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# CHEMICAL ABSTRACTS

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No. 1

## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Chemical equipment from acid-resisting concrete. N. Bernatzki. *Chem.* 5, 2960-9(1933).—Phys. and chem. properties of acid-resisting concrete compns. and their use in the constrn of chem. equipment are discussed. Chas. Blanc

Laboratory comminators. H. A. J. Pieters. *Chem. Weekblad* 30, 722-3(1933).—A changeable burner for regulating the distance of the burner opening to the crucible and a simple gaseous regulator are described. E. Schotte

Laboratory drain-trap. John L. Wilson. *Ind. Eng. Chem.* 25, 1216(1933)

Continuously-operated laboratory apparatus for high-pressure reactions. H. V. Smeets and H. Vollbrecht. *Chem. Fabrik* 1933, 4671.—Detailed description, with 8 cuts and 4 references of an app. designed for general experimentation. J. H. Moore

Design of dustop sinter. D. C. Simpson. *Ind. Eng. Chem., News Ed.* 11, 3-4(1933). E. J. C.

Uchida's new distilling flask to prevent bumping. S. Uchida. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 551-2(1933). Kari Kammermeyer

Improved form of mercury still. P. G. Nayar, Rao Narayanan, V. Venkat and B. Dasannacharya. *Indian J. Physics* 8, 113(1933).—An app. is described which allows the dist. of Hg without the use of an auxiliary pump. C. E. P. Jeffreys

Recording and predicting low humidity. A. C. Walker. *Instruments*, 184-6(1933).—App. are described. E. H.

The influence of surface tension on the reading of hydrometers. Berthold Scheda. *Chem. Fabrik* 1933, 413-14. J. H. Moore

New vacuum technique aids for chemists. W. v. Meyeren. *Chem. Fabrik* 1933, 409.—A small Gaede rotary oil pump and a Gaede manometer ("Vakuskop") are described with 3 cuts. J. H. Moore

Construction of a new high-vacuum gage. Fumio Yamazaki and Zzyugo Yoshida. *Proc. Phys.-Math. Soc. Japan* 15, 400-4(1933).—The range of the McLeod gage was extended to  $10^{-4}$  mm. by mounting a membrane differential manometer on the McLeod capillary tip. The small pressure difference between the gas compressed in the tip and the uncompressed gas is measured by magnifying the movement of the membrane with an optical lever. E. J. Rosenbaum

Simple vacuum tube oscillator for conductivity experiments. J. H. Saylor and J. M. A. Debruyne. *J. Chem. Education* 10, 703-4(1933). E. H.

Vacuum centrifugal pumps. Karl Grün. *Chem. Fabrik* 1933, 450-51.—Pumps that will handle mixts. of liquid and gas are described. Cf. C. A. 23, 4850; 27, 4443. J. H. Moore

The ultracentrifuge. J. W. Beams, A. J. Weed and E. G. Fickels. *Science* 78, 388-40(1933); cf. C. A. 27, 4901.—Details of construction are given of an air-driven type of ultracentrifuge which is simple and cheap, and with which centrifugal forces in excess of  $10^5$  gravity have been obtained. Modifications in construction to allow sepn. of solid, and the observation of the rate of sedimentation are described. Allen S. Smith

A new type of spring pipet for analytical purposes. Gunnar Sjuggren. *Z. anal. Chem.* 94, 240-7(1933).—

An instrument is described which has recently been placed on the market and serves for the accurate delivery of definite vols. of reagent. It can be used as an automatic pipet or as a buret. It is filled by the action of gravity from a bottle placed a little higher or by pressure from an atomizer bulb when the reagent is stored in a vessel placed beneath the pipet. The pipet is made to deliver its contents by pressure from a column of Hg. W. T. H.

Apparatus for microanalysis of gas. J. S. Swearingen, Otto Gerbes and E. W. Ellis. *Ind. Eng. Chem., Anal. Ed.* 5, 369-70(1933).—The method is based on the principles used by Blacet and Leighton (C. A. 25, 4816) but the app. is arranged for more convenient operation. J. H. Moore

New apparatus for microelectrolysis. Hermann Brantner and Friedrich Hecht. *Mikrochemie* 14, 27-9(1933).—The app. consists of an Al block, which is insulated by a sheet of heavy asbestos paper and is provided with 2 indentations for holding a thermometer and also the electrolyzing vessel. The app. can be heated with a flame and is provided with binding posts for elec. connection. The electrolyzing vessel is an unpolished Pt crucible which is covered with a glass bulb through which a second elec. contact is made and through which also the electrolyte can be withdrawn at the end of the electrolysis. The electrolyte can be kept at any desired temp. and there is no danger of loss by spattering. W. T. H.

Apparatus for precise viscosity measurement developed at Pennsylvania State College. Robert C. Conine. *Oil Gas J.* 32, No. 23, 17, 30(1933).

The efficiency of rectification columns. E. Kirchbaum. *Chem. Fabrik* 1933, 431-6.—Math., with 8 cuts, 11 graphs and 7 references. J. H. Moore

Investigations on rectification in packed columns. M. Weimann. *Chem. Fabrik* 1933, 411-18. J. H. Moore

Simplified micro-comparator. Wm. Stirling. *Anal. Chem.* 58, 684-6(1933).—The instrument which is mounted on a stand consists of a telescopic tube which draws out to one side giving it a range of 1 ft. In the center is a low-power eyepiece. At either end of the main tube, which is fitted with 4 specially paired prisms, depends an arm into which low-power magnifiers are fitted and these can be focused independently. The 2 halves of the field, viewed through a single eyepiece, appear in juxtaposition. Any objects such as seal impressions, typewritten letters, stamps, paper, textile fibers, wood, etc., can be compared easily and a photographic record made. W. T. H.

Gasometer with constant pressure. J. Lindner. *Mikrochemie* 13, 318-16(1933).—The gasometer consists of two 10 l. bottles, one above the other in an Fe framework. Communication between the bottles is accomplished by tubing which starts at the bottom of the upper bottle and ends near the top of the lower bottle so that the pressure depends upon the distance between these points which can be varied at will. A picture of the app. is shown. W. T. H.

The Steindorff polarimeter. K. Seiler. *Pharm. Zeit. Schw.* 3, 140-5(1933); cf. C. A. 25, 1121, 1122.—A criticism of this app. is given. It will sufficiently serve the needs required by Pharm. Inst. V. Certain (minor)

difficulties can be obviated by using a more active light filter.

**Apparatus for lactic acid determination.** Hans J. Fuchs. *Z. physikal. Chem.* 221, 271-7 (1933).—An app. is described for detn. of lactic acid by  $\text{KMnO}_4$  oxidation, and distn. and iodometric titration of the  $\text{AcH}$  formed. It is claimed to have certain advantages over the Friedemann-Cotton-Schaffer (C. A. 21, 2711) and the Lieb-Zacherl (C. A. 26, 5791) app. and to yield more nearly quant. values.

**Apparatus for subliming iodine.** R. Jacquemains. *Bull. soc. chim.* 53, 633-5 (1933).—A simple all-glass app. is described for obtaining pure, dry, sublimed I; wet or impure material is used as a starting basis.

**Apparatus for the continuous ether extraction of an aqueous solution.** Alfred Lemman. *Bull. soc. chim.* 53, 635-6 (1933).—The construction and operation of a simple glass extractor are given.

**Images of surfaces which reflect electrons in the electron microscope.** E. Ruska. *Z. Physik* 83, 492-7 (1933).—The magnetic electron microscope can be used to obtain images of objects which are too thick to transmit electrons but reflect a great part of the electrons under large angles and with small losses of energy.

**Images of metal foils in the electron microscope.** Bodo v. Borries and Ernst Ruska. *Z. Physik* 83, 187-93 (1933).—The magnetic electron microscope is applicable to the investigation of thin foils, if care is taken that the electronic beam has not only a small aperture when falling on the foil, but retains a small aperture after passing through it. This can be obtained by stopping scattered electrons by means of a diaphragm. The loss of velocity in the foil causes chromatic aberrations of the optical system.

**Gold-leaf electroscope.** J. Back. *Phil. Mag.* 16, 775-9 (1933).—A tilted electroscope is described which has, instead of a gold leaf, a phosphor bronze strip 0.0005 cm. wide, part of which is wound into a small spiral of about 6 turns. The axis of the spiral is perpendicular to the direction of displacement of the strip. This strip is less sensitive than a gold leaf but is much easier to mount, has a more uniform sensitivity and is less fragile.

**Sensitive photoelectric cells for red and infra-red.** W. Kluge. *Z. wiss. Phot.* 32, 142-4 (1933).—Measurements are shown for 3 cells the active surface of the Ag cathode of which is composed of  $\text{Cs}_2\text{O}$  having adsorbed to it an extremely thin film of Cs, in comparison with a pure Cs film cell.

**The development of the Röntgen tube in its significance for science and technology.** Walther Gerlach. *Chem. Fabrik* 1933, 219-26.—Historical, with 22 cuts.

**Progress in the design and manufacture of x-ray tubes.** M. J. Gross and Z. J. Atlee. *Radiology* 21, 365-77 (1933).—An outline is given of some of the factors which have been of importance in regards to x-ray tube construction and manuf. Problems of design include phys. dimensions, glass, gas and focal spot considerations. Under problems of manuf. details on assembling and exhaust and production tests are presented.

**Effect of tube diameter in cyclonic dust collectors.** Ewald Anderson. *Chem. & Met. Eng.* 40, 525-6 (1933).

**A new type of expansion apparatus.** C. T. R. Wilson. *Proc. Roy. Soc. (London)* A142, 88-91 (1933).—An expansion app. of new design is described in which the expansion consists of a definite pressure change followed by an increase in vol. as the temp. rises, rather than the usual method of a definite vol. change followed by an increase of pressure with the rise of temp. The new design is more easily constructed and is less restricted as to the dimensions and position of the cloud chamber than is the usual app.

**A multiform plastometer.** G. D. Lefcaditis and F. Avey. *Trans. Inst. Rubber Ind.* 9, 123-9 (1933).—The new plastometer which is described and illustrated, is so constructed that, by proper adjustment and manipulation,

the compression methods Williams (cf. C. A. 18, 1703; Martin, C. A. 25, 341) of van Rosse and van der Meijden (C. A. 22, 3048803), of Karrer, Davies and Dieterich (C. A. 24, 1544) and the hardness-elasticity method of Pusey and Jones, can be used, thus obviating several instruments. An app. feature is a revolving disk for preheating the sample.

**Pottery product for chem. wk., etc.** (U. S. 1,930,095) 19.

**Filters.** Christian Thon. *B.* 394,103, June 22, 1933. In app. comprising filter sheets, pockets, each suspended from an outlet pipe and having flexible distending means, the pockets are given a shake or vibratory movement to dislodge the cakes formed thereon.

**Filter suitable for laboratory use with "filtermass."** Lester E. Milkey (to Cellulose Co.). U. S. 1,930,209, Oct. 10.

**Leaf filters.** Henry Trent Thomas and Manlove, Alliott & Co. Ltd. Brit. 394,0 June 22, 1933.

**Rotary drum filter.** Morris Mount. U. S. 1,929,510, Oct. 10.

**Rotary drum filter.** Nels Bund (to Dorr Co. Inc.). U. S. 1,930,128, Oct. 10.

**Filter for liquids.** J. Samu White & Co. Ltd. and Arthur Hoare. Ger. 583,318, vt. 1, 1933. This corresponds to Brit. 361,681 (C. A. 1867).

**Filter for liquids.** Henri Luthier. Ger. 583,319, Sept. 1, 1933.

**Filter for liquids.** Jules Moud. Ger. 583,320, Sept. 1, 1933. Addn. to 448,346.

**Filter for liquids.** Eustace Alliott and Manlove Alliott & Co. Ltd. Ger. 584, Sept. 23, 1933. This corresponds to Brit. 338,510 (C. A. 25, 2335).

**Filter with candle-shaped elements for liquids.** Gustav Schlick. Ger. 584,284, Sept. 18, 1933.

**Apparatus for separating oil and water, etc.** Carl Billand. Ger. 583,447, Sept. 4, 1933.

**Filters and strainers, applic. for the removal of precipitates from salt solutions and impurities from oils, water or mercury.** The Thern Syndicate Ltd. and Burrows Moore. Brit. 394,042, June 22, 1933.

**Gas filter.** Ingenieur Hechekikner (to Chemical Construction Corp.). U. S. 1,924,6, Oct. 3. Numerous structural details are described.

**Apparatus for loosening square beds of granular material.** Paul Nitsch. Ger. 584, Sept. 20, 1933.

**Double filter plate for filter presses.** Meyer Wilderman. Ger. 583,317, Sept. 1, 1933.

**Flat circular filter for pot presses such as hydraulic cacao presses.** Max Michel. U. S. 1,930,903, Oct. 17. Structural features.

**Magnetic separators.** Herbert Hand Thompson and Alfred E. Davies. Brit. 388,868, June 9, 1933.

**Magnetic separators.** Darwin, Id. and Alfred C. Cathall. Brit. 389,920, Mar. 30, 1933.

**Magnetic separators.** Paul M. Lotti. Brit. 394,405, June 29, 1933.

**Magnetic separators.** Robert Forrer-Jaggi and Mines domaniales de potasse d'Alsace. Brit. 394,471, June 29, 1933.

**Jigging conveyors or separator.** Wm. J. Wallace. Brit. 394,503, June 29, 1933.

**Apparatus for separating components of different densities from flowing gaseous or liquid mixtures.** Eugen Haber. Ger. 583,261, Aug. 31, 1933.

**Apparatus for separating oil and gas.** Milton J. Trumble and Wm. L. Seeley (to Processco, Ltd.). U. S. 1,931,275, Oct. 17. Structural and mech. features of float-valve construction, etc.

**Apparatus for hydrating lime, separating lighter from heavier resultant particles, etc.** Wm. J. Kutz. U. S. 1,929,591, Oct. 10. Various structural mech. and operative details are described.

**Apparatus for separating materials of different densities, e. g., raw coal mixtures, of the jigging type.** Félian J. Meunier. Brit. 395,730, June 17, 1933.

- Vibration and air-current treatment for separating mixed materials such as those of "run-of-mine" coal Richard Peale and Rembrandt Peale, Jr. (to Peale-Davill Co.). U. S. 1,931,008, Oct. 17. Various details of an air-pervious table operation are described.
- Gravity-separation apparatus for washing granular materials. The Dorr Co., Inc. Brit. 395,222, July 17, 1933.
- Centrifugal separator for removing suspended particles from gases. George H. Horne and Marcus A. Lissman (to International Precipitation Co.). U. S. 1,930,806, Oct. 17. Structural features.
- Centrifugal bowls. Aktiebolaget Separator. Brit. 394,845, July 6, 1933.
- Device for drying centrifugal bowls. Aktiebolaget Separator. Brit. 395,021, July 20, 1933.
- Sifting apparatus for minerals, etc. Wm. A. Hiscor. Brit. 395,589, July 20, 1933.
- Apparatus for delivering measured quantities of liquids. Société d'étude de distributeurs automatiques S. E. D. A. Brit. 395,608, July 20, 1933. Addn. to 355,405.
- Surface condensers. Akt. Ges. Brown, Overi & Cie. Brit. 394,804, July 6, 1933; Ger. 583,057, Aug. 28, 1933.
- Surface condenser. Allmänna Svenska elektriska Aktiebolaget Ger. 583,058, Sept. 1, 1933.
- Temperature-regulating apparatus. I. Farbenind. A.-G. (Otto Eichenhut and Erich Kaup, inventors). Ger. 583,318, Sept. 1, 1933. In app. in which the demagnetization of a ferromagnetic material above a certain temp. actuates temp.-controlling device; the ferromagnetic material used is an alloy of Fe and Ni, e. g., an alloy contg. 8-11% of Ni.
- Apparatus for charging horizontal degassing chambers. Bamag-Megum A.-G. Ger. 583,114, Aug. 29, 1933.
- Gas-cooling apparatus operated with frozen carbon dioxide. Ernest Alvarez and André L. Jauphm. Ger. 583,263, Aug. 31, 1933.
- Apparatus for injecting liquid materials to gas streams as in treating natural gas with stenching material. Chester C. Ashley and Wm. I. Steele (to Shell Development Co.). U. S. 1,930,848, Oct. 17. A differential pressure-responsive device in communication with the gas stream serves to control the flow of liquid in accord with the velocity of the gas, and a static pressure-responsive device in communication with the gas stream adapted to maintain a predet. mass ratio of the injected liquid to the gas. Various details of app. arrangement are described.
- Apparatus for charging water with carbon dioxide. James Kantor (to Liquid Carbonic Co.). U. S. 1,929,948-9, Oct. 10. Structural and mech. features.
- Pressure vessel for carbonating liquids with solid carbon dioxide. A. Freundlich, Maschinenfabrik. Ger. 583,376, Sept. 2, 1933.
- Rotary mixing machines. John F. Wake. Brit. 394,449, June 29, 1933.
- Apparatus for mixing liquids. Akt.-Ges. Kuhnle, Kopp & Kausch and Karl Foerster. Ger. 584,234, Sept. 16, 1933.
- Mixing plant for pulverulent materials, provided with a sampling hopper fed simultaneously with the mixing hoppers. Mikael Vogel-Jorgensen. Brit. 394,484, June 29, 1933.
- Apparatus for mixing comminuted materials such as cement meal by forcing gas in the mixture. International Precipitation Co. Ger. 584,400, Sept. 15, 1933. This corresponds to Brit. 382,113 C. (A. 27, 4448).
- Apparatus for mixing dry comminuted solids. Jens K. F. Rannje. Ger. 584,333, Sept. 15, 1933.
- Rotary apparatus for contacting gaseous and non-gaseous materials as in mixers, gas driers. Sheldon B. Heath, Guy Cannon and Ormond A. Barstow (to Dow Chemical Co.). U. S. 1,930,751, Oct. 17. Various structural details of gas seals, etc., are described.
- Steam-heated tubular drier. Maschinenfabrik Buckau R. Wolf A.-G. Ger. 583,044, Aug. 28, 1933.
- Rotary drier for stone, gravel, etc. Colas Production Ltd., Augustus G. Terry and Laurence Briggs. Brit. 395,258, July 11, 1933.
- System and method for drying wood, impregnated articles, plaster, cement, liner, etc. Louis Gontier and Maurice Rougié. Brit. 394,112, June 22, 1933.
- Apparatus for drying fibrous, flaky or granular material. British Celanese Ltd., John E. Jones and David R. Johnston. Brit. 394,975, July 3, 1933.
- Separate heater and evaporator apparatus. Fischer Wym. Maschinenfabriken A.-G. Brit. 395,287, July 13, 1933.
- Spray evaporators for liquids holding solids in solution or suspension, e. g., malt extract, milk, gelatin. Wm. C. Mason and Wm. W. Hutcheson. Brit. 394,912, July 6, 1933.
- Crucible furnaces. Frederick S. Wigley and Joseph Wigley. Brit. 394,704, July 3, 1933.
- Removable cover for wide annealing furnace. Vereinigte Stahlwerke A.-G. Ger. 583,457, Sept. 4, 1933.
- Means for conveying annealing boxes through a furnace. Benno Schilde Maschinenbau A.-G. Ger. 583,111, Aug. 29, 1933.
- Means for igniting and controlling burners in a gas-heating apparatus "Gawa". Patent-Verwaltungs-A.-G. Brit. 395,565, July 20, 1933.
- Apparatus for heating air or other gases or vapors. Wm. A. Darrah. U. S. 1,929,881, Oct. 10. Structural and thermo-static control features.
- Lockable valve for gas burners. Henry Liva (one-half to Angelo Sebastianelli). U. S. 1,929,362, Oct. 3. Mech. details.
- Safety cut-off for gas burners operating when the flame is extinguished. Johan P. Franzen. U. S. 1,930,007, Oct. 10. Structural and mech. details.
- Adjustable boiler superheater. Wm. A. Jones. U. S. 1,929,532, Oct. 10.
- Heat-transfer surfaces for liquids. Paul Kleinewefers. Brit. 394,324, June 16, 1933. Structural features.
- Heating systems and apparatus. Max Winckler. Brit. 394,510, June 29, 1933. Steam from a superheater is continuously circulated by a pump through an oven, the steam being generated at starting solely in the superheater and the heat supplied thereto being sufficient to inhibit condensation during the circulation.
- Heat-exchange apparatus. Reuben N. Franc. U. S. 1,929,540, Oct. 10. Structural details.
- Heat-exchange apparatus suitable for use with liquids. Erik T. Linderöth and Curt F. Rosenblad (to Curt F. Rosenblad). U. S. 1,930,879, Oct. 17. Structural details.
- Heat exchanger (plate type). The Clyde Oil Fuel System Ltd. Ger. 583,123, Aug. 29, 1933.
- Serpentine tube heat exchangers. C. A. Parsons & Co. Ltd., Thomas Smith and Daniel C. P. Willis. Brit. 393,994, June 19, 1933.
- Tuyère block. Herbert R. Preston (to American Engineering Co.). U. S. 1,930,908, Oct. 17.
- Sintering apparatus. John E. Greenawalt. Brit. 395,619, July 20, 1933.
- Apparatus for estimating potassium by measuring its  $\gamma$ -radiation. Werner Kolhorster. Ger. 579,792, June 30, 1933. Addn. to 575,375 (C. A. 27, 3421).
- Röntgen-ray apparatus. I. G. Farbenind. A.-G. Brit. 395,578, July 20, 1933. In app. for radioscopic examn. 2 or more fluorescent screens producing fluorescence of different colors are arranged so as to be movable into operative position in turn. The screens may be composed, e. g., of Zn silicate, ZnS or BaPt(CN)<sub>6</sub>, or a mixt. of these, for 1 screen and CaWO<sub>4</sub> and (or) CdWO<sub>4</sub> for the other.
- Light-sensitive cells. Peter St. J. Heaton. Brit. 395,422, July 20, 1933. To minimize the effects of temp., humidity, age, etc., on Se and like cells the cell is subjected to a flickering light addnl. to the controlling light.
- Photoelectric cells. Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 395,049, July 13, 1933. A photoelec. cell is surrounded by a casing, the intermediate space being exhausted. The casing may be of reflecting material or of

translucent or transparent material, a part of the internal surface of which is silvered.

**Photoelectric cells.** Kenneth H. Kingdon and Hugh E. Thomson, (to The British Thomson-Houston Co. Ltd.). Brit. 695,220, July 13, 1933. A transparent light-sensitive layer is formed on a foundation member and transferred therefrom to the wall of the envelope. Thus a Cu washer is Ag plated and then oxidized by passing a high-frequency or d. c. discharge between the anode and the washer in O at 100  $\mu$ . Capsules contg. pellets of Cs dichromate and Si are heated to liberate Cs and form the layer on the washer and the bulb is baked at 300° and evacuated by the process of Brit. 303,176. The light-sensitive material is transferred to the envelope by cathodic sputtering, an a. c. or d. c. discharge being passed in A at 100  $\mu$ .

**Photoelectric cells.** Siemens & Halske A.-G. (Walter Schouky and Emil Duhme, inventors). Ger. 584,009, Sept. 13, 1933. In the manuf. of photoelec. cells in which a transparent electrode is deposited on a surface of  $\text{Cu}_2\text{O}$ , the  $\text{Cu}_2\text{O}$  surface is etched, e. g., with  $\text{H}_2\text{SO}_4$  of about 25% concn., before the transparent electrode is deposited.

**Photoelectric cell.** Westinghouse Elec. and Manufg. Co. Ger. 554,351, Sept. 18, 1933. See Brit. 291,763 (C. A. 23, 1019).

**Actinometer with a photoelectric cell.** Clarence T. Brewer (one-third each to Edward W. Menke and Harry L. Hillstrom). U. S. 1,931,283, Oct. 17. Structural, electrical and mech. details.

**Thermionic tubes.** The Mullard Radio Valve Co. Ltd. Fr. 750,640, Aug. 14, 1933.

**Thermionic valves with filamentary cathodes.** The Mullard Radio Valve Co. Ltd. and Baarte Krol. Brit. 395,439, July 20, 1933. Structural features.

**Electron tube.** Ulrich Doering (to Electrons, Inc.). U. S. 1,931,254, Oct. 17. An anode is assoc. with a heatable electron-emitting electrode adjacent which is a heatable positive ion-emitting body comprising a metal core such as Ni having embedded in it ionizable material such as Cs with a layer of another metal such as Co on the core to effect a controllable resistance to the diffusion of the Cs.

**Electron tubes.** Telefunken Ges. fur drahtlose Telegraphie m. b. H. Fr. 750,632, Aug. 14, 1933.

**Electron-discharge device.** Carl J. R. H. von Wedel (to Electrons, Inc.). U. S. 1,929,661, Oct. 10. A device such as an electron tube is provided with a cathode having an electron-emissive coating including an alk. earth metal compd., a non-emissive electrode carrying on it a compd. of a metal the oxy-acid of which is at least as acid as the corresponding acid of Pt, such as an oxide of W or Pt, and the electrodes may be surrounded by a gaseous medium.

**Discharge apparatus.** Egyesült Izzólámpa és Villamosági R. T. Brit. 394,982, June 30, 1933. An excess-voltage protective arrangement for low-voltage circuits comprises 1 or more gas-filled discharge tubes in which the electrodes are electrically connected with 1 or more thermal, e. g., bimetallic, switches, subject to heat generated by the discharge and short-circuiting the electrodes at a given temp., and wherein 1 or each of the mutually confronting electrodes, e. g., of Fe, contains a core of a more electropos. material to localize the discharge within the substantially enclosed space between them and to free the rare-gas filling from O and  $\text{H}_2\text{O}$  vapor. The electrodes may have axial bores which may be partially filled with an alkali or alk. earth metal or any electropos. compd. thereof, e. g., BaO.

**Electric discharge tubes.** Radioaktiengesellschaft D. S. Ioewe and Paul Kapteyn. Brit. 395,056, June 13, 1933. Structural and elec. features.

**Gaseous discharge device.** Heinrich Friedrichsen (to General Elec. Co.). U. S. 1,930,080, Oct. 10. Various structural details are described of a device of the neg. glow type which contains a gaseous atm. such as Ne and is provided with a cathode which may be formed of Al and which has an external wall carrying a thin coating of hydride such as  $\text{Al}(\text{OH})_3$ .

**Gaseous electric discharge device.** Martin Reger (to General Elec. Co.). U. S. 1,930,182, Oct. 10. Various structural and operative details are described of a device suitable for use with metal vapor such as Na.

**Gaseous electric discharge device.** Marcello Pirani and Martin Reger (to General Elec. Co.). U. S. 1,930,150, Oct. 10. In a device contg. mixed gases such as He and A or B and Hg vapor and the electrodes of which are connected to a d. c. source, the polarity of the current applied to the electrodes is changed at time intervals less than the time required for the sepn. of the gas mixt. noticeably affect the color of the light emitted. U. S. 1,930,147-49 (Marcello Pirani to General Elec. Co.) relate to structural details of elec. discharge devices.

**Gaseous electric discharge device suitable for use with metal vapor fillings.** Georg Gaidies (to General Elec. Co.). U. S. 1,930,090, Oct. 10. Structural features, use of particular kinds of glass, etc., are described.

**Cathodeless discharge tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 750,570, Aug. 12, 1933.

**Cathodeless discharge tubes.** Oskar G. m. b. H. Komm-Ges. (Hans J. Spauner and Ulrich W. Doering, inventors). Ger. 584,352, Sept. 18, 1933. Details are given of a construction of cathode in which an alk. earth zincate, aluminate or zirconate constitutes the electron-emitting layer.

**Device for detecting noxious gases in the atmosphere.** Arturo Imbato. Brit. 395,149, July 13, 1933.

**Apparatus for detecting smoke or dust.** Walther & Cie. A.-G. Brit. 341,853, July 6, 1933.

**Apparatus for oxidizing smoke, etc., with air.** Arthur O. Higginbotham (one-half to Wm. A. Weigle). U. S. 1,929,493, Oct. 10. Structural and mech. features.

**Hydraulic apparatus for compressing air.** Robert C. Wilson. Brit. 350,091, July 13, 1933.

**Gas-pressure regulating valves.** George A. Williams. Brit. 395,275, July 13, 1933.

**Pressure gauge of the general manometer type.** G. Cusson, Ltd. and Geo. W. Cussons. Brit. 395,399, July 17, 1933.

**Pressure-regulating valves for maintaining constant a slight vacuum in the conduit by which gases are withdrawn from a ionizing plant.** Bernard R. Parkinson and Parkinson & Cowan (Gas Meter) Ltd. Brit. 395,443, July 20, 1933.

**Liquid meter having two measuring chambers.** Joseph J.-M. Gueux. Fr. 394,558, June 29, 1933.

**Baffle-plate assembly for gas scrubbers.** Standen L. Pearce (one-half to London Power Co. Ltd.). U. S. 1,929,712, Oct. 10. Structural details.

**Storage tanks for gases and volatile liquids.** John H. Wiggins. U. S. 1,930,492-4-5, Oct. 17. Structural features.

**Receptacle for retaining liquefied gases, etc., under pressure.** Philip Mulvey. U. S. 1,929,511, Oct. 10. Structural features.

**Apparatus for partitioning flowing fluids such as in reheating steam.** Wm. E. Hannum (to Bailey Meter Co.). U. S. 1,930,055, Oct. 10. Various structural and operative details are described.

**Valve for corrosive liquids.** Fred L. Haushalter (to B. F. Goodrich Co.). U. S. 1,931,320, Oct. 17. Structural features are described of a valve with a rigid casing through which a collapsible conduit extends which may be formed of soft rubber operated on by a pinching device.

**Apparatus for measuring cellular products from fused materials.** Wilhelm Rixinger. Ger. 683,470, Sept. 4, 1933.

**Electrical apparatus for indicating the moisture content or consistency of material such as concrete aggregates.** George E. Webb (to Lechring Co.). U. S. 1,930,831, Oct. 17. Various structural, mech., electrical and operative details are described.

**Apparatus for proportional supply of materials such as acids in accord with electrical conductivity tests.** Eugene

D. Doyle (to Leeds & Northrup Co.). U. S. 1,980,353, Oct. 10. Various mech. and electrical features are described.

Apparatus for purifying gases and vapors—such as in purifying gasoline vapors with copper oxide. Milton J. Trumble and Wm. L. Szeley (to Processco, Ltd.). U. S. 1,929,659, Oct. 10. Various structural and operative details are described.

Seal for floating decks of tanks for storage of liquids such as petroleum oils. Frederick G. Hampton (to Standard Oil Co. of Calif.). U. S. 1,930,953, Oct. 17. Structural features.

Settling tanks. Leonard Andrews. Brit. 395,728, July 21, 1933. After each withdrawal of sludge from the bottom of a settling tank a portion of the sludge is forced back so as to loosen aggregated matter in the lower part of the tank and facilitate its subsequent removal.

Mercury boilers. Anthony J. Nerad (to The British Thomson-Houston Co. Ltd.). Brit. 392,783, May 25, 1933. In a Hg boiler means are adopted to ensure that the Hg wets the generating surfaces. The Fe or steel tubes are cleaned by pickling or mech. means or exposed to H for a few hrs. at 950° which decarbonizes the steel to an appreciable depth. When the heat-transfer surfaces are

cleaned prior to putting the boiler into use they are maintained clean by a coating of a suitable material that prevents their oxidation. The surfaces may be cleaned by adding Na or K, e. g., 0.25% to the Hg. NaOH may be used, the resulting H<sub>2</sub>O and H being removed by an air pump. Metals having a greater affinity for O than Fe, e. g., Zn, Sn, may be added to the Hg or the boiler may be coated initially with Zn or Sn.

Crushers with vibrating jaws. Fried. Krupp Grönsonwerk A.-G. Brit. 394,913, July 6, 1933.

Impact pulverizers. Leo St. J. Colley. Brit. 395,788, July 27, 1933.

Impact pulverizers for reducing grain. Elemér Zathureczky. Brit. 394,478, June 29, 1933.

Ball or tube mills. Humboldt-Deutzmotoren A.-G. Brit. 394,500, June 29, 1933.

Lightning arrester. Ted E. Foulke (to General Elec. Vapor Lamp Co.). U. S. 1,930,088, Oct. 10. An envelope contg. a gaseous atm. such as Ne, He and A under a pressure of about 25–45 mm. Hg also contains Ra and is provided with electrodes at least one of which carries Rb.

Automatic water-control valve for high-pressure acetylene generator. Wilhelm J. Herbst. Ger. 583,416, Sept. 2, 1933.

## 2--GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L BROWN

Henry Howard Salmon W. Wilder. *Ind. Eng. Chem.* 25, 1209 (1933). Biography with portrait.

A century of progress in chemistry. Arthur B. Lamb. *Science* 78, 371 6 (1933).

Alchemists in art and literature. Richard B. Pilcher. *J. Oil & Colour Chem. Assoc.* 16, 318 52 (1933). Lecture.

Knowledge of the metals in ancient India. R. N. Bhagvat. *J. Chem. Education* 10, 659 66 (1933).

Doctorates in chemistry and related fields conferred by American universities, 1932–33. Clarence J. West and Cilla Hull. *J. Chem. Education* 10, 693 703 (1933).

Class exercises in the industrial chemistry course. I. Topic reports on literature surveys. Kenneth A. Kobe. *J. Chem. Education* 10, 679 81 (1933).

Story of the scientific section of the educational bureau. Frederick G. Weed. *Paint, Oil & Chem. Rev.* 95, No. 19, 36 7, 82 (1933).

A new periodic chart. John D. Clark. *J. Chem. Education* 10, 675 7 (1933). Some advantages of a flattened spiral arrangement are pointed out.

Special exercises for students in general chemistry. II. Electrochemistry. G. Bryant Bachman and J. K. Farrell. *J. Chem. Education* 10, 689 90 (1933).

The story of zinc. II. H. W. Hanley. *J. Chem. Education* 10, 682 8 (1933); cf. *C. A.* 27, 5225. E. H. The fractionating column in the preparation of acetone. G. Ross Robertson. *J. Chem. Education* 10, 704–5 (1933).

Measurement of colors and its industrial applications. René Toussaint. *Mém. compl. rend. soc. ing. civils France* 85, 743 68 (1932).—An address.

Chemical information periodicals. Necessity of an international organization. C. Marie. *Chimie & Industrie Special No.*, 1255–6 (June, 1933).

The 1931 I. C. I. standard observer and coordinate system for colorimetry. Deane B. Judd. *J. Optical Soc. Am.* 23, 359–74 (1933).—This report gives in convenient form the properties of the standard observer recently recommended for colorimetric use by the International Commission on Illumination. These data supersede the 1922 report known as the O. S. A. excitation data. Formulas are given for computing trilinear coordinates

(trichromatic coeffs.), dominant wave length, colorimetric purity and luminous transmission (or reflectance) from spectrophotometric data. Tables of the data needed are included for the 1931 I. C. I. standard illuminants A, B, and C. Equations are given for interconverting O. S. A., Abbot-Priest and Davis-Gibson sunlight values.

Delivery of heat and temperature distribution of electrically heated wires. A. Farkas and H. H. Rowley. *Z. physik. Chem.* B22, 335–43 (1933).—Discontinuities in the pressure-temp. curves of electrically heated Ni and Pt wires as found in the para-H conversion are not due to surface conditions as previously supposed (*C. A.* 26, 377). The explanation lies in the lack of temp. equil. along the wire which arises if the H. Busch stability conditions are not fulfilled (*Ann. Physik* [4], 64, 401 (1921)).

The atomic mass of sodium. II. The sodium chloride-silver ratio. Clyde R. Johnson. *J. Phys. Chem.* 37, 923–33 (1933).—Using the improved methods outlined in this and in previous articles (cf. *C. A.* 26, 4551), J. detd. by means of titration analyses the ratio NaCl:Ag and gravimetrically the ratio NaCl:AgCl. If Cl = 35.457 and Ag = 107.880 the at. mass of Na as derived from both sets of expts. is 22.994.

A revision of the atomic weight of indium. Gregory P. Baxter and Chester M. Alter. *J. Am. Chem. Soc.* 55, 1943–6 (1933).—InCl<sub>3</sub> and InBr<sub>3</sub> were synthesized from electrodeposited In. From the ratios of these compts. to Ag the at. wt. was detd. nephelometrically as 114.76.

A revision of the atomic weight of thallium. The analysis of thallous chloride. Gregory Paul Baxter and Joseph Smith Thomas. *J. Am. Chem. Soc.* 55, 2384–7 (1933).—An at. wt. of 204.40 was found for Tl by nephelometric comparison of TlCl with Ag. Cf. *C. A.* 25, 1715; 26, 910.

A revision of the atomic weight of arsenic. The comparison of arsenic trichloride with iodine pentoxide. Gregory P. Baxter and Wm. E. Shaefer. *J. Am. Chem. Soc.* 55, 1957 63 (1933); cf. *C. A.* 27, 2356. The at. wt. of As was found to be between 74.906 and 74.916 from analysis of As<sub>2</sub>O<sub>3</sub>, which was dissolved in NaOH soln. and treated with a nearly equiv. wt. of I<sub>2</sub>O<sub>5</sub>. After neutralization with phosphate solns. the end point was found with 0.01 N I<sub>2</sub> and As<sub>2</sub>O<sub>3</sub> solns.

Certain relativistic aspects of the conception of chemical species, element and valence. E. Briner. *Rev. gén. Sci.* 44, 506–12 (1933).—A review pointing out the diffi-

culty of establishing a rigid definition of any one of these, and calling attention to the large no. of chem. species that must be considered. **Gregg M. Evans**

**Magnetic properties of iodine in different solvents.** S. S. Bhattacharya and C. I. Lakra. *Indian J. Physics* 8, 43 7(1933).—The magnetic susceptibility of I in  $C_6H_6$  =  $-0.51 \times 10^{-6}$ , in cyclohexane =  $-0.36 \times 10^{-6}$ , and in  $CS_2$  =  $-0.50$  to  $-0.51 \times 10^{-6}$ . These values favor the idea that I is ionized in  $C_6H_6$  and  $CS_2$ , and unionized in cyclohexane. **C. E. P. Jeffreys**

**Magnetic study of manganese sulfate and some rare earths.** S. Valayos. *Anales soc. españ. fis. quim.* 31, 597 (1933).—The Faraday method of attraction and repulsion in a non-uniform magnetic field was used. The app. used was that of Poey and Forrer (C. A. 21, 2201). The magnetic susceptibilities were:  $MnSO_4$  28.99,  $Gd_2(SO_4)_3$  38.62,  $Gd_2O_3$  38.78,  $Dy_2O_3$  51.73. Deviations of exptl. values from those of the quantum theory of Weiss magnetism whole nos. are compared. **E. M. Symmes**

**Experimental contribution to the magnetic rotation of nickel.** Kurt H. v. Klitzing. *Z. Physik* 85, 240-52 (1933).—The rotation of the plane of polarization of light on reflection at the surface of magnetic Ni (Kerr effect) or passage through transparent Ni films placed in a longitudinal magnetic field (Faraday effect) was studied in its dependence on temp., on the wave length of light (infrared) and on the field strength. The rotation diminishes with increasing wave length, passes zero (at  $1.5 \mu$ ) and assumes increasingly neg. values (Kerr effect). The same is true though with reversed sign for the Faraday effect; the min. is shifted to  $1 \mu$  in this case. The rotation is largely proportional to the magnetization. **E. B.**

**Magnetic susceptibility of electrolytically prepared palladium-hydrogen alloys.** Borje Svensson. *Ann. Physik* 18, 299-304 (1933).—Pd wires 40 mm. long and 0.75 mm. in diam. were charged electrolytically with various concns. of H. The g.-at. susceptibilities are given for 15 concns. of H up to H/Pd = 0.846. For pure Pd  $\chi \times 10^6$  = 580, and  $\chi$  diminishes linearly with increasing H concn. to H/Pd = 0.66, when an abrupt change in the slope of the curve occurs at a small neg. value for  $\chi$ . ( $\chi \times 10^6$  is 45.3 for H/Pd = 0.622 and it is -8.6 for H/Pd = 0.646.) By extrapolation, for H/Pd = 1,  $\chi \times 10^6$  = -15. These results agree well with previous values given by Briggs, and the  $\chi$ -H/Pd lines have the same general character as those found by Aharoni and Simon for Pd charged in an atm. of H, although their values are somewhat less and the break in their curve occurs at H/Pd = 0.53 with no neg. values for  $\chi$ . Comparison with the behavior of the Pd-Ag alloys suggests that this behavior is due to the formation of a series of alloys of PdH with Pd. **W. W. Stiller**

**Lack of inertia of the diamagnetic Faraday effect.** W. Hanle. *Z. Physik* 85, 304-9 (1933).—The magnetorotation of Hg vapor was studied with a high-frequency magnetic field. No diminution of the Faraday effect was noted when the field frequency was increased from 50 cycles to  $10^8$ . Light near the resonance line was used. **Egon Bretscher**

**The diamagnetism of organic compounds with respect to the effect of temperature and constitution. I. The primary alcohols, nitrobenzene and *m*-cresol.** B. Cabrera and H. Fahlénbrach. *Z. Physik* 85, 568-91 (1933).—The method of C. A. 27, 4143 to det. the temp. dependence of magnetic susceptibility is applied to org. compds. The mean mol. susceptibilities are: MeOH -21.60, EtOH -33.73, PrOH -45.20, BuOH -56.32,  $C_6H_5OH$  -79.81,  $C_6H_4OH$  -102.65,  $C_6H_3OH$  -147.70 (all values times  $10^6$ ). The mol. susceptibility increases for every  $CH_2$  group by -11.48. The susceptibility changes very considerably near the m. p., but remains const. for large temp. intervals of the liquid and solid phases. The susceptibility difference above and below the m. p. increases very much with the elec. moment of the mol. The abs. susceptibilities for PhNO<sub>2</sub> and *m*-cresol are, resp., 0.5090,  $0.6090 \times 10^{-6}$ . **E. Bretscher**

**Paramagnetic Faraday effect in alums.** H. Kaufmann

*Ann. Physik* 18, 251-64 (1933).—The Faraday effect in Cr and Fe alums was measured for a field strength of 20,800 gauss. The paramagnetic contribution was detd. by comparison with isomorphous Al alum. The results are compared with the predictions of various theories. Contrary to the predictions of Rosenfeld's theory, the  $Fe^{+++}$  ion in the  $^6S$  state has a comparatively large paramagnetic component. Calculs. based on the empirical values for the intensities also fail to agree with theory. With Cr alum, comparisons are difficult because of the no. of possible transitions and the smallness of the effects. **W. W. Stiller**

**Susceptibility of paramagnetic solutions.** G. Poëx. *Compt. rend.* 197, 749-51 (1933); cf. C. A. 26, 3156.—Fahlenbrach showed that solns. of certain salts of the Fe group obey the Curie-Weiss law,  $\chi(T - \theta) = C$ , and computed the moments of the ions, with  $C$  as the Curie const. On the other hand, Gorter maintained that the ionic moment depends upon the temp. and that the product  $\chi T$  should be used as the Curie const. in computing ionic moments. He argued that the variation in moment, either with temp. or concn., would be due to the formation of complexes; the Curie-Weiss law seems to be obeyed because the variation of moment in the temp. range used ( $65^\circ$  in Fahlenbrach's work) is less than 1%. Poëx points out that arguments based on theoretical grounds can hardly be conclusive since the theory itself may be questioned. He supports G.'s position by citing addnl. exptl. evidence: (a) Chaudron showed that solns. of Co salts obey the Curie-Weiss law within 0.2% over a temp. interval of  $130^\circ$ . Auer's recent work confirms C.'s values for  $C$  and  $\theta$ . Hence G.'s arguments based on low precision and small temp. interval do not hold for these data. (b) Anhyd.  $CoSO_4$  can be prep. either with 25 or with 26 magnetons as the moment of the Co ion, and solns. of these salts preserve this moment and obey the Curie-Weiss law. Further, the const.  $C$  possesses the same significance for the solid and for the soln. since its value remains the same. With G.'s method of calcn. this identity of the moments in solid and liquid states disappears. These facts definitely show that the Curie-Weiss law holds rigorously for F.'s solns., that the magnetic moment is independent of the temp., and that it can be calcd. from the const.  $C$ . **W. W. Stiller**

**Report on paramagnetism.** W. J. de Haas and L. C. Wiersma. *Rapports et Communications, 6e Congr. Intern. Frod, Buenos Aires, Communications Kamerlingh Onnes Lab. Univ. Leiden Suppl. No. 74, 36-70 (1932)*—van Vleck's formula for the magnetic moment of NO as a function of the temp. was verified from  $292^\circ K.$  to  $113^\circ K.$  Within this range the exptl. values differ from those calcd. theoretically by only a few tenths of 1%. At  $292.10^\circ K.$ ,  $\chi \times 10^6$  = 49.07, while at  $112.77^\circ K.$  it equals 87.32. The results of a no. of studies on  $O_2$  from room temp. down to  $155^\circ K.$  and for various ds., are summarized. Gaseous  $O_2$  does not follow the same law as liquid  $O_2$ , since the susceptibility per unit mass depends upon the d. The precision of the results is not sufficient to decide definitely which law of variation with temp. is followed, but to a first approximation many of the results can be represented by  $\chi(T + 1.7) = C$ . Among the solids, tabulated results for the temp. range  $290^\circ$  to  $14^\circ K.$  are given for  $K_2SO_4$ ,  $Cr_2(SO_4)_3 \cdot 24H_2O$ ,  $CuSO_4 \cdot 5H_2O$ ,  $NiSO_4 \cdot 7H_2O$ ,  $CeF_3$ ,  $CeCl_3$ ,  $Nd_2(SO_4)_3 \cdot 8H_2O$ ,  $Pr_2(SO_4)_3 \cdot 8H_2O$ , and  $Pr_2(SO_4)_3$ . The exptl. values for the moments VI, VIII, VII, Cr<sup>III</sup>, Cr<sup>II</sup>, Mn<sup>II</sup>, Fe<sup>III</sup>, Fe<sup>II</sup>, Co<sup>II</sup>, Ni<sup>II</sup>, Cu<sup>II</sup> are compared with the corresponding values calcd. according to the theories of Hund, Laporte-Sommerfeld and Bosc-Stoner. In general, the exptl. values agree with the Rose-Sommer predictions. The cryomagnetic anomalies presented by the behavior of  $CuCl_2$ ,  $CuSO_4$  and  $FeCl_3$  are treated in some detail. In the rare earth group many of the expts. bear on the question of an odd or an even no. of electrons in the ion. **W. W. Stiller**

**A law of discontinuous distribution of ferromagnetic Curie points. III. Applications.** Robert Forrer. *J. phys. radium* [7], 4, 427-39 (1933).—The ferromagnetic



Curie points obey the law  $\Theta = F\sqrt{N}$ , where  $\Theta$  is the Curie point temp.,  $F$  is a const. equal to 301, and  $N$  is an integer which gives the no. of effective contacts per atom between the orbits of the electron lattice (cf. C. A. 27, 3309). By starting with the known Curie points and structures of a no. of bodies, the no. of contacts is computed for each, and the structure of the electron lattice of orientation is deduced. This method is applied to such problems as the transformation of hexagonal Co, the Curie points of magnetite and the ferrites, and the behavior of certain alloys, and such questions as the change in the direction of easy magnetization and the range of viscosity in hexagonal Co are considered. Analysis of magnetite reveals the presence of the strongly bound group  $\text{FeO}_4$ . The method is then extended beyond the range of ferromagnetism to include the consideration of Rochelle salt and various substances with paramagnetic Curie points. The law is generally applicable to homopolar bonds and will find many applications in the study of solid bodies.

W. W. Stiller

**Dielectric constant of  $\text{H}^2\text{H}^2\text{O}$ .** Gilbert N. Lewis, Axel R. Olson and Wm. Maroney. *J. Am. Chem. Soc.* 55, 1731 (1933).—The ratio  $D_2/D_1$ , the dielec. const. of  $\text{H}^2\text{H}^2\text{O}$  to that of  $\text{H}_2\text{O}$ , is 0.990 at  $25^\circ$  at infinite wave length. The divergence between the 2 kinds of water increases with diminishing temp.

C. J. West

**Dielectric constants. Ethanol-diethyl ether and urea-water solutions between  $0^\circ$  and  $50^\circ$ .** Jeffries Wyman, Jr. *J. Am. Chem. Soc.* 55, 4116 (1933).—The dielec. const. of urea  $\text{H}_2\text{O}$  solns. approaches 108 at a concn. of about 8 moles per l. at  $0^\circ$ . The results are applied to the studies of Lange and Robinson (C. A. 25, 636) on the heats of diln. of KCl in 5% urea solns.

P. T. Newsome

**Study of the effect of a magnetic field on the dielectric constant of argon and oxygen by a new resonance method.** H. Voss. *Z. Physik* 85, 173 (1933).—This resonance method works at the steepest part of the resonance curve instead of the usual peak. The advantage is increased sensitivity. A detector circuit contg. 2 thermocouples (connected in such a way that they offset each other if the current is the same and loosely coupled to the oscillator and the resonant circuit) and a galvanometer serves to det. the resonance and to compensate fluctuations of the oscillator. The effect of a magnetic field on the dielec. const. of A and O<sub>2</sub> was detd. No effect larger than  $\Delta\epsilon \sim 1 \times 10^{-7}$  was found.

Egon Bretschner

**Effect of methyl, ethyl and phenyl groups on the course of association of salicylic acid derivatives.** Kazimierz Kalinowski. *Roczniki Chem.* 13, 384 (1933).—Cryoscopic  $\text{C}_6\text{H}_6$  was used as the non-polar solvent. Dipole moments and the degree of assoc. (in percentage) at  $40^\circ$  follow: salol  $3.15 \times 10^{-18}$ , 71.56; Et ester  $2.88 \times 10^{-18}$ , 62.37; Me ester  $2.41 \times 10^{-18}$ , 51.7; at  $13.2^\circ$ : Me ester  $2.41 \times 10^{-18}$ , 55.86. The substances studied are dipole compds. The effect on assoc. is greatest with the Ph group; it is least with Me. C. T. Ichniowski

**Dipole moment and group rotation. I. The moments of the chloro- and nitro-benzyl chlorides and the effect of group separation.** J. M. A. & Bruyne, Rose M. Davis and Paul M. Gross. *J. Am. Chem. Soc.* 55, 3936 (1933); cf. C. A. 26, 3708, 4219.—The dielec. const.,  $d_s$ , and  $m_s$  of dil.  $\text{C}_6\text{H}_5$ ,  $\text{CCl}_4$  and  $\text{C}_6\text{H}_5$  solns. of *o*-, *m*- and *p*-chlorobenzyl chlorides were detd. at  $30^\circ$  and also those of dil.  $\text{C}_6\text{H}_5$  and  $\text{CCl}_4$  solns. of *o*- and *m*-nitrobenzyl chlorides and the dipole moments calcd. from the results. The effect on the dipole moment of  $-\text{CH}_2\text{Cl}$  was found to be 1.85 debyes when attached to a Ph group with the ring substituent *p*- or *m*- to the  $-\text{CH}_2\text{Cl}$ .

J. W. Shipley

**The estimation of electric moment in solution by the temperature coefficient method. I. Experimental method and the electric moments of some benzyl compounds.** Fred Fairbrother. *Proc. Roy. Soc. (London)* A142, 173 (1933).—The detn. of elec. moment in soln. at different temps. by measurements of dielec. const. and  $d$  in soln. is discussed. The dielec. polarizations were estd. for both the *cis* and *trans* isomers of decahydronaphthalene.

Both isomers, a mixt. of the 2 (used as a solvent in the remaining work), and *p*-xylene are non-polar. For these substances the polarization increases slightly with rise of temp. The polarizations of  $\text{PhCH}_2\text{OH}$  and  $\text{PhCH}_2\text{Cl}$  were measured from  $20^\circ$  to  $160^\circ$  while their estd. elec. moments are resp.  $\mu = 1.6 \times 10^{-18}$  e. s. u. and  $\mu = 1.72 \times 10^{-18}$  e. s. u. The polarizations of *o*-, *m*- and *p*-nitrobenzyl chlorides were measured in *p*-xylene from  $20^\circ$  to  $120^\circ$ . The effect of temp. upon the polarizations and the elec. moments is discussed and correlated with the rotation of the  $-\text{CH}_2\text{Cl}$  group about its axis. Calvin Brous

**Experimental investigations of the electrical Kerr effect in gases and vapors at higher temperatures.** H. A. Stuart and H. Volkmann. *Ann. Physik* 18, 121-40 (1933), cf. C. A. 27, 1973.—An expl. arrangement is described by which abs. measurements of the Kerr const. of vapors accurate to 3% were obtained at temps. up to  $230^\circ$ . The temp. dependence of the Kerr const. of  $\text{EtCl}$  was measured between  $18^\circ$  and  $177^\circ$ . The observations further confirm the Langevin-Born orientation theory of the effect. Kerr consts. are given for a series of org. vapors, and the polarization ellipsoids for  $\text{EtNO}_2$  and the first members of the ketones are calcd. and discussed. In contrast to the lower ketones, the Kerr const. of diisopropyl ketone is neg., and the elongated configurations are preferred in  $\text{Et}_2\text{CO}$ . Data are tabulated for 33 compds.

Allen S. Smith

**Determination of density and viscosity of gases with the aid of the Schilling-Bunsen apparatus.** W. Schiller. *Forsch. Gebiete Ingenieurw. A or B* 4, 225 (1933).

M. C. Rogers

**Thermodynamic deduction of the law of infinitely dilute gases.** Domingo Maturo. *Rev. facultad quim. ind. agr., Univ. natl.itoral* 2, 38-49 (1932).—With the definitions of an ideal gas, i. e.  $(\partial U/\partial v)_T = 0$  and  $(\partial H/\partial v)_T = 0$ , as a starting point and by assuming that in any real gas it is impossible to reach zero pressure by any finite reversible isometric process, it is shown that  $\lim P = 0$ ,  $\lim MPV = kT$ . The application of this equation to the thermodynamic temp. scale and to the detn. of mol. wts. is discussed.

J. B. Austin

**Upper pressure limit of ignition.** N. N. Semenov. *Nature* 132, 566-7 (1933).—Polenic against Hinshelwood (cf. C. A. 27, 2084). Reply. C. N. Hinshelwood. *Ibid.* 567.

Cliff M. Evans

**Density of a vapor in equilibrium with a liquid near the critical temperature.** J. S. Tapp, E. W. R. Steacie and O. Maass. *Can. J. Research* 9, 217-39 (1933), cf. C. A. 25, 4771. Expts. were made with  $\text{Me}_2\text{O}$  in the neighborhood of the crit. point to find evidence of the discontinuity of state from observations of the  $d$ . above and below the position in the tube where the meniscus disappeared. D. detns. were made on both the liquid and gaseous phases, almost simultaneously, by measuring the elongation of a quartz spiral attached to a float submerged at will in the liquid or gaseous phase. The  $d$ . above the position of the disappearance of the meniscus was found to be less than that below this position for several degrees above the temp. at which the meniscus disappeared providing there was no temp. gradient in the tube. Heating the bottom of the tube  $0.1^\circ$  warmer than the top equalized the  $d$ . within the tube while heating the bottom to  $0.2^\circ$  above that of the top reversed the  $d$ . conditions observed when the temp. of the tube was uniform. Heating the top of the tube  $0.2^\circ$  above that of the bottom accentuated the difference in  $d$ s. Vigorous stirring of the contents had no effect upon the final  $d$ . obtained. A tube of such dimensions that the meniscus neither rose nor fell while the temp. was raised to the crit. point exhibited no difference in  $d$ . between the gaseous and liquid phases at the crit. point.

J. W. Shipley

**The vapor pressures of propane and propylene.** Alfred W. Francis and Geoffrey W. Robbins. *J. Am. Chem. Soc.* 55, 4339-42 (1933).—The vapor pressure of propane was detd. over the temp. range  $27^\circ$  to  $64^\circ$  and propylene over the range  $29^\circ$  to  $46^\circ$ . The pressure was detd. by observing the vol. of air inclosed in a special glass tube

with the liquid.<sup>1</sup> The vapor pressure in atm. is  $\log P = 4.875 - (1010/T)$  for propane and  $\log P = 4.357 - (983/T)$  for propylene.

P. T. Newsome

An azeotropic mixture of secondary butyl alcohol and secondary butyl bromide.<sup>2</sup> David F. Houston. *J. Am. Chem. Soc.* 55, 4131-2 (1933).—Secondary BuOH and secondary BuBr form an azeotropic mixt.  $b_{760}$  87.2°, having  $n_D^{20}$  1.4256 and contg. 71.0 = 0.4 mols. % of the bromide.<sup>3</sup>

P. T. Newsome

Ternary azeotropic mixtures. III. The heteroazeotrope composed of ethanol, water and carbon disulfide. W. Swietoslawski and E. Wardziński. *Roczniki Chem.* 13, 380-3 (1933); cf. *C. A.* 26, 1490.—The modified ebullioscopic app. was applied to the investigation of the system  $H_2O-EtOH-CS_2$ . The method of adding successively small portions of one component to the binary mixt. of the 2 others was applied. The mixt. 92.36%  $CS_2$ , 6.55%  $EtOH$  - 1.09%  $H_2O$ ,  $b_{760}$  41.345°, was found to be the one which would cross the heteroazeotropic line of the binary mixt.  $CS_2-EtOH$  at approx. right angles. The equation best fitting the curve is  $x + 1.4y = 101.53$ ;  $x$  = percentage  $CS_2$ ,  $y$  = percentage  $EtOH$ ;  $z$  is found from  $x + y + z = 100$ . The relation between the coeffs. was found as  $dp/dx_{hetero} = dp/dx_{H_2O} = 1.05$  ( $p = 1$  atm.).

C. T. Ichniowski

Bumping prevention. John E. S. Han. *Ind. Eng. Chem., Anal. Ed.* 5, 362 (1933).—Sieve plates of Ag or Pt are used.

G. G.

Report on specific gravity of alcohol. Alfred W. Hanson. *J. Assoc. Official Agr. Chem.* 16, 535-6 (1933).—The directions for standardization of pycnometer and detn. of the sp. gravity of alc. were rewritten to conform with the new alc. tables adopted by the A. O. A. C. (0-25% by vol., at 25/25°, 20/20°, 15.6/15.6°). A. P. C.

The measurement of viscosity by oscillating columns. S. Venkataraman. *Indian J. Physics* 8, 25-42 (1933).—

The viscosities of a no. of org. liquids and  $H_2O$  were measured by photographing the damping of their oscillations in a tube. The mathematics of the problem were modified and extended.

C. E. P. Jeffreys

Viscosity of  $H^2H^2O$ . Gilbert N. Lewis and Ronald T. Macdonald. *J. Am. Chem. Soc.* 55, 4730-1 (1933). By use of 90%  $H^2H^2O$  and by calcg. values for pure  $H^2H^2O$ ,  $\eta$  at 5-35° (5° intervals) is: 19.88, 16.85, 14.51, 12.60, 11.03, 9.72, 8.64. These results do not agree with those of Selwood and Frost (*C. A.* 27, 5636).

C. J. West

The constants of the Hagenbach correction to Poiseuille's law. Max Lippke. *Z. tech. Physik* 14, 412-18 (1933).—Rik's (cf. *C. A.* 24, 1000) modification of the Hagenbach correction does not satisfy the relations for small laminar flows and has no phys. significance because the coeff. depends on the tube diam. and on the velocity of flow. Integration of the fundamental hydraulic equation leads to a rule for pressure loss that agrees with expt. Every viscometer is characterized by a pressure at which flow obeys the original Poiseuille equation.

A. F.

The electric birefringence of camphor. Marcel Schwob. *Compt. rend.* 197, 615-17 (1933).—The elec. birefringence of liquid racemic camphor and of its  $CCl_4$  and kerosene solns. was measured by the stroboscopic method (cf. *C. A.* 27, 4460, 5225). The dispersion is normal. The variation of the birefringence with temp. obeys Langevin's law. The birefringence is modified by the solvent and decreased by diln.

Janet E. Austin

The electric conductivity of inorganic material with electronic conduction. Wilfried Meyer. *Z. Physik* 85, 278-93 (1933).—Cond. measurements at various temps. lead to the following results: The cond. of satd. compds. decreases proportionally to the no. of atoms of metalloidal nature ( $WO_3$ ,  $ZnO$ ,  $CdO$ ,  $TiO_2$ ) in the crystal lattice, while the reverse is true of unsatd. compds. ( $CuI$ ,  $Cu_2O$ ,  $NiO$ ,  $CoO$ ,  $UO_2$ ); e. g., the resistance  $w$  of  $WC_3$  at room temp. was  $10^8$  cm., but treatment at high temp. in high vacuum removed large quantities of  $O_2$  and the resistance fell to 0.1 cm.  $w$  varies with temp. according to the formula  $w = a^{1/T}$ , in which  $a$  and  $b$  are const.,  $T$  is abs. temp.

Egon Bretscher

Electric conductivity of single crystals. Wilhelm Lohfeldt. *Z. Physik* 85, 717-26 (1933).—The conductivities of  $LiF$ ,  $LiCl$ ,  $NaF$ ,  $NaCl$ ,  $NaBr$ ,  $NaI$ ,  $KF$ ,  $KCl$ ,  $KBr$ ,  $KI$ ,  $RbCl$ ,  $RbBr$ ,  $AgCl$ ,  $AgBr$ ,  $TlCl$  and  $TlBr$  were detd. between -180° and the m. p. Ohm's law is generally valid, but the cond. depends on temp. in agreement with van't Hoff's equation.

Egon Bretscher

Superconductivity. F. Zwicky. *Proc. Natl. Acad. Sci.* 19, 818-22 (1933).—A discussion of the still-unresolved difficulties in explaining supercond.

Gregg M. Evans

Superconductivity and its theoretical importance. Carl Benedicks. *Arkiv Mat. Astron. Fysik* A23, 1-20 (1933); cf. *C. A.* 27, 4140.—The equil. diagrams of  $In-Pb$ ,  $Hg-Pb$ ,  $Bi-Pb$ ,  $Sn-Tl$ ,  $In-Tl$  and  $Pb-Tl$  are considered with the corresponding curves for normal cond. and supercond. It seems possible to reconcile the breaks in the supercond. curves with the corresponding breaks in the equil. curves by means of the "phoretic" or "contact" theory of elec. cond. The  $In-Pb$  curves especially indicate that supercond. appears in exactly the same manner between atoms of different elements as between atoms of the same element. Numerous observations of unexpected supercond. phenomena, e. g., supercond. of  $Au_3Si$ , are examd. and shown to fit well into the phoretic theory but not into others. The arguments for and against the phoretic theory of elec. cond. are restated and amplified.

Oden B. Sheppard

Pleochroism and the birefringence of the nitrate ion in crystals. K. S. Krishnan and A. C. Dasgupta. *Indian J. Physics* 8, 49-66 (1933).—The pleochroism and principal  $n$ s of  $KNO_3$  crystal were measured in the visible and in the near ultra-violet. The absorption band at about 3000 Å. due to  $NO_3$  ion was found to be strongly polarized, light vibrations in the plane of the ion being absorbed considerably more than those along the normal to the ionic plane. This absorption band has no effect on the principal  $n$ s of the ion.

C. E. P. Jeffreys

The optical properties of metallic and crystalline powders. A. H. Pfund. *J. Optical Soc. Am.* 23, 375-8 (1933).—Metallic "blacks" of Au, Ag, Ni, Cu, Zn, Cd, Pb, Bi, Sn, Se and Fe were prepd. by distn. in H or air, at a pressure of 3-5 mm. The films were deposited on a thin sheet of nitrocellulose which floated on Hg. The transmissions of films of Se, Te, Bi, Zn and NaCl prepd. in this manner are shown graphically for wave lengths from 0.8 to 11  $\mu$ . The transmissions and reflections are also shown for cryst. quartz with a particle diam. of 5  $\mu$  between 4.5 and 10.5  $\mu$  and for calcite with a particle diam. of 7  $\mu$  between 3.8 and 8  $\mu$ . The prepn. of filters with high and narrow transmission bands is discussed.

G. M. P.

The dependence of the lattice constant on the hydrogen concentration in the system palladium-hydrogen. Gunnar Rosenbalt. *Ann. Physik* 18, 150-4 (1933).—A more exact detn. of H concn. in the system Pd-H was made, with a detn. of the lattice const., to ascertain the accuracy of previous measurements (cf. Krüger and Gehm, *C. A.* 27, 2361). The results agree well with those of Linde and Borelius (*C. A.* 22, 1006) and indicate a miscibility gap in the system. The value of the const. for the compd.  $Pd_3H$  was found to be 9.985 Å. U.

Allen S. Smith

Effective radius of hexamine cations  $M(NH_2)_6$  in crystals of fluorite type. G. Böttcher-Naess and O. Hassel. *Z. Physik. Chem.* B22, 471-2 (1933).—Effective radii of cations were detd. by measurements on  $M(NH_2)_6X_2$ , where  $M$  = Mg, Ca, Mn, Fe, Co, Ni, Zn, Cd and  $X$  = Cl, Br, I and  $ClO_4$ .

G. M. Murphy

X-ray investigation of the crystal structure of *p*-aminoazobenzene. Mata Prasad and M. R. Kapadia. *Indian J. Physics* 8, 77-81 (1933).—Crystals of *p*-aminoazobenzene were investigated; a Shearer tube with Cu anti-cathode was used. The lengths of the axes were detd. as follows  $a = 13.69$ ,  $b = 5.60$ ,  $c = 14.18$  Å. U.; and  $\beta = 81.49^\circ$ . The  $d$  was found to be 1.174. The calcd. no. of mols. in the unit cell is nearly 4. It therefore appears that the mols. in the unit cell are asymmetric.

C. E. P. Jeffreys

The crystal structures of some compounds of the K-

PtCl<sub>4</sub> type. Gerhard Engel. *Naturwissenschaften* 21, 704(1933).—Diagrams were made by the powder method with Cu K $\alpha$  rays of substances of the Ag<sub>3</sub>BCl<sub>4</sub> type. All have cubic, face-centered lattices, the elementary cube contg. 4 mols., 4 B<sup>+</sup> atoms in position (000), 8 alkali atoms in (1/2, 1/2, 1/2) and 24 Cl atoms fit (m 00) with 0.23  $\leq m \leq 0.25$  (H 61 type). The consts.  $a$  (in A. U.) and calcd. d. are, resp.: Rb<sub>3</sub>SnCl<sub>4</sub> 10.190  $\pm$  0.004, 3.216  $\pm$  0.004; Cs<sub>3</sub>SnCl<sub>4</sub> 10.348  $\pm$  0.006, 3.554  $\pm$  0.006; Rb<sub>3</sub>TeCl<sub>4</sub> 10.221  $\pm$  0.004, 3.157  $\pm$  0.004; Cs<sub>3</sub>TeCl<sub>4</sub> 10.449  $\pm$  0.005, 3.503  $\pm$  0.004; Rb<sub>3</sub>PtCl<sub>4</sub> 9.882  $\pm$  0.003, 3.957  $\pm$  0.004; Cs<sub>3</sub>PtCl<sub>4</sub> 10.185  $\pm$  0.004, 4.205  $\pm$  0.004; Rb<sub>3</sub>PbCl<sub>4</sub> 10.198  $\pm$  0.003, 3.675  $\pm$  0.003; Cs<sub>3</sub>PbCl<sub>4</sub> 10.415  $\pm$  0.005, 4.003  $\pm$  0.006. For the Pb compds. Cl<sub>2</sub> was passed into the HCl soln. of alkali chloride with PbCl<sub>2</sub>; all other salts were made by mixt. of the aq. soln. of alkali chloride and tetrachloride. All salts were yellow ppts. (Sn white), little sol., crystals of 0.04 mm. size, optically isotropic, octahedral or cubic. B. J. C. v. d. H.

X-ray studies of fatty acids. H. B. Slagle and Emil Ott. *J. Am. Chem. Soc.* 55, 4396-4404(1933).—The (001) spacings are accurately detd. for the very pure normal fatty acids C<sub>10</sub> to C<sub>18</sub>. The linear C content-spacing relation is confirmed. A new modification of the C<sub>10</sub> and C<sub>12</sub> is reported. *Ibid.* 4404-18; cf. C. A. 24, 5019; 27, 1, slight. The existence of solid solns. of mixts. of the normal gave (acids) C<sub>10</sub> to C<sub>18</sub> is demonstrated with: binary mixts. of various concns., the components differing in chain length by 2 or 3 C atoms; equimolar mixts. with chain length differences of 4 to 8 C atoms; very complex mixts. (up to 9 components). The assumption of double mols. is untenable. Victor Hicks

Ferrites II. The alkaline, alkaline earth and lead ferrites. S. Hilpert and A. Lindner. *Z. physik. Chem.* B22, 395-405(1933), cf. C. A. 26, 5233.—The ferrites of K, Rb, Cs, Ca, Sr, Ba and Pb were prepd. and studied. X-ray investigation shows that they differ considerably from the structural type of the spinel ferrites.

G. M. Murphy  
The crystalline form of 3I<sub>2</sub>O<sub>5</sub>·H<sub>2</sub>O. J. Garrido. *Anales soc. espan. fis. quim.* 31, 616-17(1933).—Crystals of 3I<sub>2</sub>O<sub>5</sub>·H<sub>2</sub>O are orthorhombic, monoclinic,  $a:b:c = 0.901:1:0.991$ ,  $\beta = 112^\circ 53'$ . The cryst. forms are:  $c(001)$ ,  $a(100)$ ,  $b(011)$ ,  $a(121)$ ,  $u(121)$ , tabular, based on (001).

E. M. Symmes  
The crystalline form of some cobaltamines of the dinitro series. W. McNabb and H. A. Alsentzer, Jr. *Z. Krist.* 85, 297-304(1933).—1,6-Dinitrotetramminecobaltic iodide is hexagonal,  $p_0 = 0.78020$ ,  $a:c = 1:0.6757$ . 1,2-Dinitrotetramminecobaltic dichromate is monoclinic, forms 111, 111, 100,  $\bar{1}00$ ,  $\pm 110, 001, 001$ , pinacoids striated,  $p_0 = 1.5960$ ,  $q_0 = 1.6388$ ,  $a:b:c = 1.2023:1:1.7388$ ,  $\beta = 155.01^\circ$ . 1,6-Dinitrotetramminecobaltic chlorinate is tetragonal, hemihedral,  $p_0 = 1.4901$ ,  $a:c = 1:1.4901$ . 1,2-Dinitrotetramminecobaltic chromate is tetragonal, hemimorphic,  $p_0 = 1.5034$ ,  $a:c = 1:1.5034$ . 1,2-Dinitrotetramminecobaltic chromate was recrystd. from a 5% (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> soln. at 45°,  $p_0 = 1.2957$ ,  $a:c = 1:1.2957$ .

G. T. Faust  
The melting point and boiling point of potassium perhenate [and melting points of thallium and silver perhenates]. D. Vorländer and Gerhard Dalichau. *Ber.* 66B, 1534-6(1933).—KReO<sub>4</sub> m. 552-3°, b<sub>760</sub> 1370°. Th(ReO<sub>4</sub>)<sub>2</sub> changes at 120° to an isotropic form, m. 527  $\pm$  3°. AgReO<sub>4</sub> m. 430° with slight decompn., and begins to decompose actively at 455°.

Foster Dee Snell  
Adsorption of electrolytes and  $\zeta$ -potential. Adolph I. Rabinovich. *Physik. Z. Sowjetunion* 4, 304-21(1933).—Criticism of Freundlich, et al., C. A. 23, 3838. A review of the theory of O. Stern, C. A. 19, 770 with extensions by R. L. W. Elder

Nature of activated carbons. II. E. Berl and L. Reinhardt. *Z. physik. Chem.* A166, 81-96(1933); cf. C. A. 26, 1843.—Different kinds of activated C were investigated by means of x-rays. The activity appears to be due to active centers on the surface of the C in the sense of the ideas of Taylor and Smekal (C. A. 23, 5395)

1 rather than to any disturbance of the crystal lattice.

G. M. Murphy  
A note on the heat of sorption of water vapor by massive gold. Elliott Pierce Barrett. *J. Am. Chem. Soc.* 55, 4008-9(1933); cf. C. A. 27, 4473.—The integral heat of sorption,  $H$ , of water vapor by massive gold as a function of the amt.,  $W$ , adsorbed is described by the equation  $H = mW^n$ ,  $m$  and  $n$  being consts. This equation is identical in form with that of Lamb and Coolidge for the sorption of org. vapors by charcoal.

P. H. Emmet.  
Discontinuity in the adsorption of gases, vapors and liquids on solid surfaces at the critical temperature under critical pressure: system propylene-alumina. H. E. Morris and O. Maass. *Can. J. Research* 9, 240-51(1933).—Search was made by sorption measurements for discontinuity in the properties of a substance at the crit. temp. and pressure. App. and technic for studying the adsorption of gases, vapors and liquids on solid surfaces in the region of the crit. temp. and pressure are described. Results with the system propylene and Al<sub>2</sub>O<sub>3</sub> are given. Adsorption from the gas and vapor phases reveals a surface complex unstable at low pressure and high temp. The  $d$  of the adsorbed phase is greater than that of the bulk phase. There is no discontinuity in adsorption processes with a change from vapor state to gaseous state. No evidence was obtained of an increase in crit. temp. on the surface of the solid. Adsorption does not occur from the liquid state, and there is a marked discontinuity in the adsorption curve with a change from liquid state to gaseous state. This is probably due to a change in the forces of attraction between liquid mols. and the solid as compared with the attraction between gaseous or vapor mols. and the solid surface. This is further evidence for the discontinuity in the region of the crit. temp. (cf. Winkler and Maass, C. A. 27, 5226).

J. W. Shipley  
The application of glass filters to the determination of the adsorptive or catalytic activity of technical adsorbents. Franz Krczil. *Chem.-Ztg.* 57, 803-5(1933).—The superiority of fritted-glass diaphragms over other methods for filtering gas, for bubbling gas through liquids, and for supports for solids over which gases flow is pointed out. Thirteen forms of lab. app. are illustrated. G. B. T.  
Atomic hydrogen on glass and calcium fluoride. J. H. deBoer and J. J. Lehr. *Z. physik. Chem.* B22, 423-30(1933).—The adsorption of at. H was studied on glass and CaF<sub>2</sub>. The latter surface adsorbs much more H than does glass at room temp. and adsorbs it more rapidly.

G. M. M.  
Ionic exchange and sorption of gases by chabazite. E. Rabinowitsch and W. C. Wood. *Nature* 132, 640(1933); cf. C. A. 26, 3162.—The replacement of 1 Ca ion by 2 Na ions seems to close the sorption space for N but not for H. Two K ions, however, show a marked closing effect for H.

Gregg M. Evans  
The adsorption of thorium B by thallium halide crystals in the presence of various ions. J. F. King and Paul R. Pine. *J. Phys. Chem.* 37, 851-74(1933); cf. C. A. 27, 4477.—The purest TlBr and TlI that could be prepd. showed a neg. charge and adsorbed Th B ions. The adsorption of Th B by TlI decreases with increasing concn. of HNO<sub>3</sub>. The adsorption increases in the presence of excess I ions and decreases in the presence of excess TI ions. The effect of anions on the adsorption is in the order I > CNS > Br > Cl. The effects of chromate, phosphate, oxalate, Ag, Cu and Pb ions also were detd. P. T. N.

The properties of the (electrical) double layer and the exchange adsorption of ions on non-metallic surfaces. B. P. Nikol'skii. *Physik. Z. Sowjetunion* 2, 266-81(1933); cf. C. A. 19, 770, 8402.—A review. L. W. E.

The structure of the electrical double layer. L. W. Janssen. *Physik. Z. Sowjetunion* 4, 322-33(1933).—Calcns. based on Gouy's diffuse-layer theory lead to a math. expression for potential in terms of distance from the solid surface, wall charge and ion concn. Freundlich's statement of the relation between  $e$  and  $\zeta$  is criticized as inadequate. An alternative relation is suggested for the case of the glass-water boundary. L. W. Elder

Some notes on the protective filming of liquids. C. W. B. Jeppe and B. Segal. *J. Chem. Met. Mining Soc. S. Africa* 33, 397-8(1933); cf. *C. A.* 27, 3263.—Discussion.

Phenomena involved in the motion of one of the electrodes in an electrolyte, and the electrokinetic potential. M. O. Kharmadaryan and B. I. Pervushin. *Physik. Z. Sowjetunion* 4, 334-9(1933); cf. *C. A.* 24, 4464.—The current produced by the motion of one Pt electrode in a ccl contg. dil. acid satd. with  $H_2$  varies in magnitude and direction with the concn. of dissolved  $H_2$ . An electrokinetic explanation is offered, involving the concept of polar dissolved  $H_2$  mols.

Conductivity measurements of thorium and other jelly-forming systems. Satya Prakash. *J. Phys. Chem.* 37, 907-16(1933); cf. *C. A.* 26, 357.—Cond. measurements were made (at temps. between 35° and 60°) of the jelly-forming systems Th arsenate, Th phosphate, Th molybdate, ferric arsenate and Al hydroxide. Once the equil. is established the elec. cond. becomes const. and no change is noted during or after the gel formation. On aging for a no. of days all jellies increase in elec. cond. The relation between temp. and cond. was found to be linear over a wide range of temps. The temp. of zero cond. was established by extrapolation and varied from 56° for Th arsenate to -15° for Th molybdate. The temp. coeff. is about 2% of the value for 35° with Th molybdate and Al(OH)<sub>3</sub>, and about 1-1.5% for the other jellies.

Investigation of so-called colloidal iron sulfide. J. Casares. *Anales soc. españ. fis. quim.* 31, 638-44(1933).—Addn. to a soln. of Na<sub>2</sub>S of a few drops of a FeSO<sub>4</sub> soln., boiling, then pouring into a large quantity of water, gives a black liquid. If FeCl<sub>3</sub> is used, a deep green liquid is formed. This green compd. can be obtained also by mixing FeSO<sub>4</sub> soln. with an excess of Na<sub>2</sub>S soln. and treating with H<sub>2</sub>O<sub>2</sub>, Na<sub>2</sub>O<sub>2</sub>, or a current of air. The same compds. are formed on heating gently a mixt. of alkali polysulfide and FeSO<sub>4</sub>, or Fe(OH)<sub>3</sub>, and Na<sub>2</sub>S. NaCl ppts. these green solns., forming dark green compds. in which Fe and S have the relation FeS<sub>2</sub>. These solns. are probably thioferrites in a colloidal state, and are what cause the color of the S water in Yellowstone Park.

Magnetic and x-ray studies of the aging of ferrous hydroxide. Oskar Baudisch and Lars A. Welo. *Naturwissenschaften* 21, 659-60(1933).—Freshly pptd. Fe(OH)<sub>2</sub> has the ability to reduce at room temp. alkali nitrates in the presence of O<sub>2</sub>; oxidizable compds. can be oxidized at the same time: lactic acid to pyruvic acid. In the absence of O<sub>2</sub> the Fe(OH)<sub>2</sub> remains white at room temp. but loses the qualities mentioned without losing its autoxidizability. The hydroxide aged for a few days and then oxidized with air (O<sub>2</sub>) gives ferromagnetic, red Fe(OH)<sub>3</sub> (12% H<sub>2</sub>O) free from bivalent Fe and with x-ray lines of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>, possibly contg. also some  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> (ferromagnetic). Evidently the white Fe(OH)<sub>2</sub> ages under anaerobic conditions to a compd. with less H<sub>2</sub>O, the chem. water changing to adsorption water. H<sub>2</sub>O is similarly decompd. by Fe(OH)<sub>2</sub> at 200°; it is concluded that in the presence of O<sub>2</sub> hydration water is decompd. by the compd. at room temp. to give H + OH (H<sub>2</sub>O<sub>2</sub>), thereby causing the nitrate reaction, etc. Aged hydroxide no longer possesses the labile mols. of hydration water; hence it has lost catalytic activity. The paramagnetic qualities of mol. O<sub>2</sub> affect the catalytic activity (*C. A.* 18, 3307). Recent work of Parkas and Sachse (*C. A.* 27, 3874) and of Taylor and Diamond (*C. A.* 27, 3369) confirms this opinion.

Theory of parallel deposits of solute by evaporation from the walls. H. P. Chowdhury and Satyendra Ray. *Current Sci.* 2, 91-3(1933).—A math. explanation of the formation of segments of Liesegang rings on strips of filter paper that dip into solns.

The effect of hydrogen-ion concentration on the flocculation values of chromite and aluminum oxide sols. M. Hume Bedford, W. H. Keller and J. L. Gabbard. *J. Am. Chem. Soc.* 55, 3953-6(1933).—Stability of Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>

and Al<sub>2</sub>O<sub>3</sub> sols was studied. The glass electrode was used for H<sup>+</sup> measurements.

Electrophoresis of calcium salts. Giuseppe Peretti. *Boll. soc. ital. biol. sper.* 8, 498-501(1933).—Sols. of CaCl<sub>2</sub>, CaCl<sub>2</sub> + MgCl<sub>2</sub>, CaCl<sub>2</sub> + MgCl<sub>2</sub> + NaHCO<sub>3</sub>, CaCl<sub>2</sub> + Na metaphosphate, CaCl<sub>2</sub> + Na citrate were subjected to cataphoresis in a Michaelis app. Conclusions: (1) Diffusion is masked only partially by elec. forces. The presence of electroneg. complexes contg. Ca is not demonstrated merely by showing that a certain amt. of Ca appears at the anode. (2) The presence of the citrate radical leads to the formation of Ca-complex anions.

The activity coefficient of thallous chloride in protein systems. Gilbert C. H. Stone and Crawford F. Failey. *J. Phys. Chem.* 37, 935-49(1933).—The effects of various proteins in different concns. on the activity coeff. of TlCl were detd. by soly. measurements. In isoelec., electrolyte-free protein solns. the change in soly. of the satg. salt was small. The neg. logarithm of the activity coeff. in these solns. is a linear function of the protein concn., whereas this is not the case in solns. of const. alkali content, in which a point of max. soly. is obtained. With solns. of varying protein contents and const. alkali contents and varying alkali and const. protein concns. the neg. log. of the activity coeff. of TlCl rises approx. linearly with increase in the square root of the ionic strength of the soln. calcd. according to certain assumptions.

The solubility of calcium iodate in water and in aqueous solutions of some electrolytes. J. B. Chloupek, V. L. Daneš and B. A. Danešova. *Collection Czechoslov. Chem. Communications* 5, 339 42(1933); cf. *C. A.* 27, 2865.—The soly. of Ca(IO<sub>3</sub>)<sub>2</sub> in pure H<sub>2</sub>O at 25° was 3.301 g. anhyd. salt per 1000 g. H<sub>2</sub>O, the solid phase being Ca(IO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O. The solubilities in 0.1 M salt solns. were: KNO<sub>3</sub>, 4.102 g.; K<sub>2</sub>SO<sub>4</sub>, 6.290 g.; MgSO<sub>4</sub>, 5.768 g.; MgCl<sub>2</sub>, 4.924 g. The solubilities at other concns. were detd.

Acetamide as a solvent. O. F. Stafford. *J. Am. Chem. Soc.* 55, 3987-8(1933).—The approx. solubilities of 400 org. compds. and 200 inorg. compds. in fused acetamide were detd. Cellulose was the only org. compd. showing no indication of soly.

Coefficient of partition between oil and water of a substance completely miscible with either solvent. Acetone. A. Lindenberg. *Compt. rend. soc. biol.* 114, 18-19(1933); cf. *C. A.* 27, 3654.—At 20° the partition coeff. of Me<sub>2</sub>CO is 0.2 for the oil layer and is independent of the concn. or the kind of animal or vegetable oil used.

Solubilities of thallous iodate and thallous chloride in the presence of amino acids. Crawford F. Failey. *J. Am. Chem. Soc.* 55, 4374-8(1933); cf. *C. A.* 27, 4726.—The solubilities of TlIO<sub>3</sub> and TlCl in the presence of amino acids were detd. The log of TlIO<sub>3</sub> soly. is approx. a linear function of amino acid concn. Ionic radii for the salts in the presence of the  $\alpha$ -amino acids were calcd. from the dielec.-const. measurements of Wyman and McMeekin (*C. A.* 27, 2359). The radii are of the right order of magnitude, but their differences indicate that the known effect of the acids on the dielec. const. of the medium is inadequate to account for the changes observed.

The molecular weights of some dissolved substances. Allan W. Pound and James R. Pound. *J. Phys. Chem.* 37, 369-72(1933).—The mol. wts. of several org. compds. and of rhombic and monoclinic S were detd. in C<sub>6</sub>H<sub>6</sub>, CHBr<sub>3</sub>, PhOH, AcOH and paraldehyde by the f.p. method. No differences in mol. size were found for polymers and allotropes in the same solvent. Assocn. to di-mols. for some org. acids in a few of the solvents used was confirmed.

The freezing points of aqueous solutions. IV. Potassium, sodium and lithium chlorides and bromides. George Scatchard and S. S. Prentiss. *J. Am. Chem. Soc.* 55, 4355-62(1933).—The f. ps. of K, Na and Li chloride

and bromide solns. were detd. after a recalibration of the app. previously used. The bromides show greater deviations from the limiting law than the corresponding chlorides, and the deviations for salts of the same anion increase in the order K, Na, Li with the exception of dil. LiCl solns. The behavior of the  $\text{NH}_4$  salt (cf. C. A. 26, 4525) is still unexplained; it is not due to systematic error.

Allen S. Smith

Freezing points and osmotic pressures of lactose solutions. E. O. Whittier. *J. Phys. Chem.* 37, 847-9 (1933).—The f. ps. of lactose solns. were detd. and the osmotic pressures calcd. therefrom. The f. ps. of lactose solns. agree with those of sucrose solns. within 1%. The osmotic pressures of the 2 sugars are additive as estd. by f.-p. detns. of a soln. contg. both.

P. T. Newsome

Determinations of the molecular weights of carbohydates. Arthur Reiser and Hans Pringsheim. *Ber.* 66B, 1296-8(1933); cf. C. A. 27, 1257.—In reply to Berner (C. A. 27, 2429), the previous statement of P. that the use of the additivity principle in cryoscopic measurements is not permissible if  $\text{EtOH}$  is present in dil. solns. is reaffirmed. Hess and Ullmann (C. A. 27, 3199) made osmometric measurements of polymeric carbohydates in dil. soln., using, among other substances,  $\alpha$ -methylglucoside (I). B. and P. tested I in boiling  $\text{H}_2\text{O}$  and found in equally dil. solns. a colloidal condition, i. e., a slight fall in the b. p. instead of a rise. Sucrose (II) gave the same unexpected result. The data given in the literature for mol.-wt. detns. for glucose, fructose, and II show normal results; here, however, the concns. were much higher, e. g., 2.4-4.3% with sucrose. At high concns. B. and P. obtained by ebullioscopy the correct values for the mol. wts. of both I and II. They are therefore of the opinion that the detn. of the mol. wt. of carbohydates rests on very weak foundations. Such measurements cannot be used as a basis for far reaching conclusions in the chemistry of the carbohydates. The detn. of the mol. wts. of diamylose (III) and tetramylose (IV) made by Ullmann (C. A. 26, 5477) cannot be correct, because under the conditions of his expts. III must change into IV.

Louise Kelley

The viscosity of aqueous solutions as a function of concentration. II. Potassium bromide and potassium chloride. Grinnell Jones and Samuel K. Talley. *J. Am. Chem. Soc.* 55, 4124-5(1933); cf. C. A. 27, 1804.—At very low concns. the viscosity of aq. solns. of KBr is greater than that of  $\text{H}_2\text{O}$  while at moderate concns. the viscosity is less than that of  $\text{H}_2\text{O}$ . KBr has a min. viscosity at 1.9 N and KCl at 0.8 N. The viscosity of solns. of KBr is given by the equation  $\eta = 1 + 0.00474 \sqrt{c} - 0.04904c + 0.01221c^2$ ; for KCl  $\eta = 1 + 0.0052 \sqrt{c} - 0.01012c + 0.00808c^2$ .

P. T. Newsome

The validity of the Einstein viscosity law for strong electrolytes. Hans Tollert. *Naturwissenschaften* 21, 603 (1933).—The Einstein viscosity law was applied to electrolyte solns.; the vol. of ions and mol. was taken proportional to the hydration no.  $H$  (Jones and Getman, *Z. physik. Chem.* 46, 385(1904); Freundlich and Schnell, C. A. 23, 1230), and the no. of particles was taken from the (cond.) degree of dissociation. For a uni-univalent salt the viscosity  $\eta_{\text{rel}} = k.c(1 + \alpha)H$ . For dil. solns. of LiBr, LiI,  $\text{Mg}(\text{NO}_3)_2$  and  $\text{CaCl}_2$  const.  $k$  is independent of concn.  $c$ , in agreement with the Einstein law; the hydrate shells are spherical. For greater concns. of these salts and for NaCl, NaI,  $\text{CaBr}_2$ ,  $\text{SrBr}_2$ ,  $\text{MgCl}_2$ ,  $\text{MgBr}_2$  and  $\text{H}_2\text{SO}_4$   $k$  is at first fairly const. and then rises rapidly. The spherical shape of the ion hydrates becomes more and more distorted; the incompletely hydrated mol. evidently polymerize because of a lack of active  $\text{H}_2\text{O}$  mol. Mutual friction of the compds. invalidates the Einstein law. This conclusion as to dynamic condition accords with the static  $H$  values from f. p. or surface tension. The polymerization equil. of  $\text{H}_2\text{O}$  itself probably also plays a role.

B. J. C. van der Hoeven

Refractometric investigations. XXXVI. A rotating chamber for the interferometric determination of the refractive index of solutions. A. Kruis and W. Geffekel.

*Z. physik. Chem.* A166, 10-22(1933); cf. C. A. 23, 2022.—The method previously described for obtaining the  $n$  of a soln. by means of a rotating chamber in an interferometer was applied.

G. M. Murphy

Diffusion of metals in mercury. Fritz Weischel. *Z. Physik* 85, 29-35(1933).—A method based on cond. measurements is developed to det. the diffusion of Zn and Cd in Hg.

Egon Bretscher

Diffusion of metals in solid lead. III. Diffusion in gold-lead and silver-lead alloys. W. Seith and A. Kvil. *Z. physik. Chem.* B22, 350-8(1933); cf. C. A. 27, 690.—The mechanism of the diffusion of Au and Ag in Pb was studied by measuring the diffusion of Pb into alloys contg. 0.03 and 0.08 atoms % of Au and Ag, resp.

G. M. M.

Studies in solvent action. VII. Rotatory power of ethyl tartrate in relation to the solvent, concentration, degree of association and temperature. H. Gordon Rule, Mary M. Barnett and James P. Cunningham. *J. Chem. Soc.* 1933, 1217-23; cf. C. A. 27, 3380.—The optical rotation of Et tartrate in soln. increases in the dextro sense as the polarity of the solvent rises. Minor irregularities in solvent effect are traced to the incidence of max. and min. in the rotation-concn. diagrams or to the assocn. of the ester in soln. On theoretical grounds it is deduced that (a) the rotation of the ester in a non-polar medium should increase with the concn., and (b) the temp.-rotation curves for strongly polar and non-polar solvents, resp., should converge at higher temps., with that for the homogeneous ester assuming an intermediate position and inclination. These conclusions agree with the known behavior of Et tartrate.

G. Calingaert

Difference in size of the ions of zirconium and hafnium. Alex Hoffmann. *Naturwissenschaften* 21, 678(1933).—The lattice consts. were detd. for pure  $\text{SrZrO}_3$  and  $\text{SrHfO}_3$ ,  $a = 4.089 \pm 0.003$  and  $4.069 \pm 0.003$  A. U., resp. The radius of the quadrivalent pos. Hf is 0.01 A. U. smaller than that of the corresponding Zr; this is similar to the difference between the atoms in metallic condition.

B. J. C. van der Hoeven

Mathematical study of dissociable bivalent systems in aqueous solution. Madeleine Gex. *Arch. phys. biol.* 10, 257-91(1933); cf. C. A. 22, 1719; 23, 3406. E. R. S.

The system:  $\text{AlBr}_3\text{-SbBr}_3$  in benzene. V. A. Plotnikov and I. A. Scheka. *Z. physik. Chem.* A166, 43-50(1933).—A concd. soln. of  $\text{AlBr}_3$  and  $\text{SbBr}_3$  in PhH shows a cond. of the order of  $10^{-3}$  reciprocal ohm. The sp. and mol. conductivities show max. Electrolysis with a Cu cathode and a Pt anode liberates Sb and Br, with the latter undergoing secondary reactions. With an Sb anode, Sb seps. on the Cu cathode approx. in accordance with Faraday's law. The decompn. potential for 1 g. mol.  $\text{AlBr}_3\text{SbBr}_3$  per l. of soln. is 1.20 v. Cryoscopic measurements show that large mol. are present.

G. M. Murphy

Pseudo bases and compounds with reactive groups. Conductivity changes in systems of crystal violet base and carboxylic acids. Marius Rebec and George Mandrino. *Collection Czechoslov. Chem. Communications* 5, 317-30 (1933); cf. C. A. 25, 2991.—The rate of change of the pseudo base of crystal violet to the real base as detd. by the change of cond. of  $\text{Me}_2\text{CO}$  solns. was studied. The method at present has many drawbacks, chief of which is the difficulty in getting reproducible results. In all cases 5 cc. of 0.005 N pseudo base and 5 cc. of 0.005 N acid in  $\text{Me}_2\text{CO}$  were placed in a cond. cell and measurements taken from time to time. With the fatty acids contg. an even no. of C atoms up to  $\text{C}_{11}$  the sp. cond. rose from  $10^{-4}$  to  $5$  to  $7 \times 10^{-4}$  mhos in 30 hrs.; with benzoic acid it rose to  $3 \times 10^{-4}$ ; with glutaric acid to  $3.5 \times 10^{-4}$ ; with fumaric acid to  $9 \times 10^{-4}$  in 25 hrs.; with succinic acid to  $1.1 \times 10^{-4}$ ; and with maleic, malonic and oxalic acids it rose to  $1.6 \times 10^{-4}$  in a short time.

J. E. M.

The conductivities of tetramethylammonium salts in methanol and ethyl alcohol. T. H. Mead, O. L. Hughes and Harold Hartley. *J. Chem. Soc.* 1933, 1207-14.—The conductivities of 7 Me<sub>4</sub>N salts were detd. in MeOH at 25° over the range 0.0001 N-0.0015 N. Similar measurements were made for five of these salts in EtOH.



The mobility of the  $\text{Me}_4\text{N}^+$  ion is 70.1 in MeOH and 28.3 in EtOH. The deviations of the  $\text{Me}_4\text{N}^+$  salts from the Debye-Hückel-Onsager equation are considerable in both alic., indicating appreciable ionic assocn., and in both they are greater than those of the corresponding Et<sub>4</sub>N salts.

G. Calingaert

Measurements of the high-frequency conductivity of uni-univalent electrolytes. Ernst Glowatzki. *Ann. Physik* 18, 217-32 (1933).—Relative measurements of the high-frequency cond. of HCl and NaCl solns. were made at a frequency of  $3 \times 10^8$ . The method of Zahn and Rieckhoff (cf. C. A. 24, 3154) for measurement of the cond. change at high frequencies was improved so that an accuracy of 0.05% was possible, allowance being made for deviations from theory in the magnitude of the effect to be established accurately for uni-univalent electrolytes. The theoretical dependence of the dispersion effect of Debye and Falkenhagen (C. A. 22, 2705) on the cond. was not confirmed for these compds., and an explanation is sought in a discussion of the results. Allen S. Smith

An approach to the modern theory of solutions. John P. Sampey. *J. Chem. Education* 10, 677-8 (1933).

Philip D. Adams

The dissociation constant of hypochlorous acid: glass electrode potential determinations. John W. Ingham and John Morrison. *J. Chem. Soc.* 1933, 1200-5.—From their neutralization curves of HOCl with NaOH in the presence of a glass electrode, the value  $K^1 = 3.47 \times 10^{-8}$  at 18° is derived for the dissocn. const. of HOCl.

George Calingaert

The thermodynamic ionization constants of carbonic acid. Duncan A. MacInnes and Donald Belcher. *J. Am. Chem. Soc.* 55, 2630-46 (1933).—The first dissocn. const. of  $\text{H}_2\text{CO}_3$  was detd. at 25° as  $4.54 \times 10^{-7}$  and the second as  $5.61 \times 10^{-11}$ , with methods involving galvanic cells without liquid junctions and glass electrodes.

L. P. Hall

Thermodynamic studies on potassium and sodium sulfates. F. L. Ei-ichi Shibata, Saburo Oda and Shuzo Furukawa. *J. Sci. Hiroshima Univ., Ser. A*, 3, 227-42 (1933).—See C. A. 26, 645.

L. P. H.

The "salting-out" and "salting-in" of weak acids. I. The activity coefficients of the molecules of *o*-, *m*- and *p*-chlorobenzoic acids in aqueous salt solutions. Arthur Osol and Martin Kilpatrick. *J. Am. Chem. Soc.* 55, 4430-40 (1933).—Detns. of the solubilities of *o*-, *m*- and *p*- $\text{C}_6\text{H}_4(\text{CO}_2\text{H})$  were made in aq. soln. of their Na salts and KCl, NaCl, LiCl, CsCl, KBr and  $\text{NaClO}_4$ . The mol. solubilities and activity coeffs. were calcd. The latter are the same at corresponding concns. of the same salt for mols. of  $\text{C}_6\text{H}_4(\text{CO}_2\text{H})$  and  $\text{PhCO}_2\text{H}$ . An explanation is offered for the fact that a weak acid may either increase or decrease in soly. when dissolved in various salt solns. II. The activity coefficients of the molecules of *o*-, *m*- and *p*-hydroxybenzoic acids in aqueous salt solutions. *Ibid.* 4440-4.—The solubilities of *o*-, *m*- and *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$  were detd. in solns. of KCl, NaCl, LiCl, KBr,  $\text{NaClO}_4$  and in solns. of Na benzenesulfonate, Na *p*-toluenesulfonate and Na  $\beta$ -naphthalenesulfonate. The activity coeffs. were calcd. but the "salting-out" consts. diverge from the values for  $\text{PhCO}_2\text{H}$ . In KCl soln. the consts. decrease with the transfer of OH group to the *m*- and *p*-positions.

G. M. Murphy

Exchange between atoms and ions of a metal. Otto Erbacher. *Z. physik. Chem.* A166, 23-6 (1933); cf. C. A. 27, 2366.—The effect of surface etching and polishing on the exchange of Pb and Bi atoms and ions was investigated.

G. M. Murphy

Theory of cathodic generation of hydrogen. J. Hoekstra. *Z. physik. Chem.* A166, 76-9 (1933). Reply. M. Volmer. *Ibid.* 80.

G. M. Murphy

Seven years of technical  $p_H$  measuring with the indicator film. Peter Wulff. *Chem. Fabrik* 1933, 441-3.—A review of applications, with bibliography (cf. C. A. 21, 8855).

J. H. Moore

Effect of the solvent on the potential of the chloranil electrode. Bernard O. Heston and Norris F. Hall.

*J. Am. Chem. Soc.* 55, 4729-30 (1933).—The potential of the chloranil electrode may be assumed independent of the solvent only if the electrode materials remain unsolvated under the conditions of the expt.

C. J. West

Studies on oxidation-reduction potentials. II. Changes of the oxidation-reduction potentials in the hydrolysis of starch and glycogen. Yukihiko Nakamura. *J. Chem. Soc. Japan* 54, 898-903 (1933); cf. C. A. 27, 3673.—Estn. of oxidation-reduction potentials of starch by dil. alkali and acid indicated that the 1st liquefaction is oxidation and that of 2nd hydrolysis is reduction. Glycogen showed the same result but the hydrolysis was slower than that of starch. The structure of starch is discussed.

K. Kutsura

The displacement of equilibrium by variation in the mass. J. E. Verschaffelt. *Compt. rend.* 197, 683-4 (1933).—Math. A correction in the calcs. of Etienne (C. A. 27, 4468).

Gerald M. Petty

Water vapor equilibria on vanadium and its oxides. Masanori Kobayashi. *Bull. Chem. Soc. Japan* 8, 231-45 (1933).—The oxidation-reduction equil. of V was investigated by the dynamic method of Wartenberg and Aoyama (C. A. 21, 2214). Metallic V was oxidized by water vapor in  $\text{H}_2$  at several temps. The V was prepd. by the Goldschmidt process and by analysis showed 97% of the metal. The general equations of the reaction isochor  $\log K_p = -(Q/4.571T) + C$  for the 2 systems are:  $\log K_{p,1} = -(12,333/T) + 3.141$  and for  $\text{VO}/\text{V}_2\text{O}_3$ ,  $\log K_{p,2} = -(6482/T) + 1.747$ . From these follow the heats of reaction,  $\text{V} + \text{H}_2\text{O} = \text{VO} + \text{H}_2 + Q_1$  ( $-56.4$  Cal.), and  $2\text{VO} + \text{H}_2\text{O} = \text{V}_2\text{O}_3 + \text{H}_2 + Q_2$  ( $-29.6$  Cal.). By combining these equations with that for the dissocn. of water vapor, the general equations for the dissocn. of V oxides was derived, and from these the approx. values of the heats of formation of the several oxides calcd.,  $2\text{V} + \text{O}_2 = \text{V}_2\text{O}_3 + 231.6$  Cal.,  $2\text{VO} + \frac{1}{2}\text{O}_2 = \text{V}_2\text{O}_3 + 89.0$  Cal., and  $2\text{V} + \frac{3}{2}\text{O}_2 = \text{V}_2\text{O}_5 + 320.6$  Cal. By the use of the equations for heat capacities of the substances involved in each reaction, the free energies and heats of formation were calcd. at 25°:  $2\text{V} + \text{O}_2 = \text{V}_2\text{O}_3$ ;  $\Delta F_{2980} = -216,100$  cal.,  $\Delta H_{2980} = -233,476$  cal.,  $2\text{VO} + \frac{1}{2}\text{O}_2 = \text{V}_2\text{O}_3$ ;  $\Delta F_{2980} = -82,590$  cal.,  $\Delta H_{2980} = -89,336$  cal.,  $2\text{V} + \frac{3}{2}\text{O}_2 = \text{V}_2\text{O}_5$ ;  $\Delta F_{2980} = -208,797$  cal.,  $\Delta H_{2980} = -322,812$  cal.

H. E. Mesmore

The behavior of metals, particularly lead and bismuth, in atomic hydrogen, and attempts to prepare atomic hydrogen from hydrides. Thomas G. Pearson, Percy L. Robinson and Eric M. Stoddart. *Proc. Roy. Soc. (London)* A142, 275-85 (1933).—Repetition of the expts. of Paneth (cf. C. A. 23, 5159; 24, 3750) on the dissocn. of  $\text{PbEt}_4$  confirmed his isolation of free Et and his value for its av. life. The thermal dissocn. of hydrides under low pressure in a stream of  $\text{H}_2$  yielded no at. H. The formation of  $\text{BiH}_3$  was confirmed. Further work is necessary before the traces of material reported as Pb hydride are actually confirmed as such. At. H does combine with many elements of B groups in the periodic system which do not combine directly with  $\text{H}_2$ , namely, Ge, Sn, As, Sb and Te. It does not react with metallic Pb or Bi.

Calvin Brous

Effect of nuclear substituents on side-chain reactions. I. W. S. Nathan and H. B. Watson. *J. Chem. Soc.* 1933, 1248-52.—There is a quant. relation between dipole moments of  $\text{C}_6\text{H}_4\text{X}$  and the crit. increments of the side-chain reaction of  $\text{C}_6\text{H}_5$  derivs. having X as a nuclear substituent. With X in the *m*-position, for the cases considered, the expression, derived on simple kinetic theory, is applicable, save for halogen substituents; this exception is attributed to a mesomeric effect. With X in the *p*-position, the case is far more complicated but the expression seems to be applicable.

W. E. Vaughan

Oxidation of triethylphosphine. H. W. Thompson and N. S. Kelland. *J. Chem. Soc.* 1933, 1231-6.—The oxidation of triethylphosphine vapor was studied in the temp. range from 42° to 100° and found to be a chain reaction. Explosion occurs within a crit. range of pressure. Outside of this range reaction is slight; when occurring it is detd.

by surface conditions. Vessel dimensions, inert gases and temp. all exert effects to be expected qualitatively. Deactivation in the gaseous phase as well as on the walls is important.

William E. Vaughan

The reaction of hydrogen atoms with oxygen molecules and the life-time of  $\text{HO}_2$ . John R. Bates. *Z. physik. Chem.* B22, 469-70 (1933); cf. *C. A.* 27, 4469.—The life-time of  $\text{HO}_2$  is estd. to be of the order of  $10^{-9}$  sec. from the mechanism of the reaction of HI with  $\text{O}_2$ . G. M. M.

Mechanism of bimolecular reactions in solution. Addition of methyl iodide to pyridine in several solvents. H. W. Thompson and R. E. Blandon. *J. Chem. Soc.* 1933, 1237-40.—The reaction of MeI and pyridine in  $\text{CHCl}_3$ , anisole,  $\text{PhNO}_2$  and  $\text{CCl}_4$  was studied; the activation energies are, resp., 14,200, 14,300, 15,000 and 14,800 cal. The exptl. rate is some powers of 10 slower than the theoretical rate for the gas reaction. This discrepancy is not due wholly to "solvent deactivation" because the gas rate is also "slow." Extensive drying affects the rate considerably. William E. Vaughan

The kinetics of the reduction, in acid solution, of hydrogen peroxide by iodide ion. Herman A. Liebhafsky and Ali Mohammed. *J. Am. Chem. Soc.* 55, 3977-86 (1933)

Results obtained agree with earlier data. Equil. consts. at various temps. are also given from which heat of activation is calcd. A discussion of the kinetic mechanism is given which differs from that proposed by LaMer.

R. H. Lambert

Kinetics of the decomposition of the dichlorosuccinic acids. II. V. W. Robinson and David T. Lewis. *J. Chem. Soc.* 1933, 1200-2.—The decompn. of the dichlorosuccinic acids from 25° to 80° in aq. soln. and in alk. soln. was studied; from the data were detd. as the energies of activation, 23,200 cal. for the *n*-form and 23,000 cal. for the *iso*-form, the  $E/\log B$  terms are 1027 and 982, resp. The data are compared with those for the 2 dibromo acids. Added electrolyte has a negligible effect.

William E. Vaughan

Kinetics of the decomposition of trichloroacetic acid. II. Mechanism of the decomposition of the acid in aniline solution. II. W. Patwardhan and A. N. Kapur. *Z. physik. Chem.* A166, 51-8 (1933); cf. *C. A.* 26, 2640.—The decompn. of  $\text{CCl}_3\text{COOH}$  was studied at 60°, 70° and 80° in soln. of  $\text{PhNH}_2$ , and mixts. of  $\text{PhNH}_2$  with  $\text{PhH}$  and  $\text{PhMe}$ . The latter have no effect on the reaction but serve to reduce the concn. of  $\text{PhNH}_2$ . The decompn. is unimol. with respect to the acid but bimol. with respect to the solvent. Temp. coeff. and mechanism are the same with each solvent mixt. studied. Two schemes are proposed for the mechanism. G. M. M.

The kinetics of a diene synthesis. Albert Wassermann. *Ber.* 66B, 1392-4 (1933).—The velocity of the reaction of quinone with cyclopentadiene (I) to form monocyclopentadienequinone (II) may be detd. by color measurements at different times because quinone is more highly colored than II. The reaction is bimol., as is also that of I and II to form dicyclopentadienequinone. In  $\text{C}_6\text{H}_6$  at 25°,  $k$  for the 1st reaction is about 100 times  $k$  for the 2nd reaction. The dependence of the 1st reaction upon the temp. was also studied in different solvents. L. Kelley

Kinetics of the rearrangement of  $\alpha$ -methoxystyrene. F. H. MacDougall, Walter M. Lauer and Marvin A. Spielman. *J. Am. Chem. Soc.* 55, 4089-97 (1933).— $\alpha$ -Methoxystyrene rearranges to give propiophenone and at the same time these 2 substances react to form methane and 1,2-dibenzoylpropane. The kinetics of these reactions were investigated in the temp. range 222.8-260°; both were of second order. The ratio of the reaction rate consts. remains unaltered in the temp. range studied. Both reactions have an activation energy of 34,000 cal.

William E. Vaughan

The rate of addition of methyl esters to trimethylamine. Louis P. Hammett and Helmut L. Pfluger. *J. Am. Chem. Soc.* 55, 4079-89 (1933).—The rate of the alkylation of  $\text{Me}_3\text{N}$  to  $\text{Me}_4\text{N}$  ion by the Me ester of a carboxylic acid is related to the strength of the acid by an equation of the same form as that which connects the rate of a reaction in

the general acid catalysis with the strength of the acid catalyst. It is probable that the rate-detg. step in the general acid and basic catalysis of Brønsted is a transfer of H ion from acid catalyst to substrate similar to the transfer of Me in the alkylation reaction. P. H. Hammett

The determination of the velocity of hydrolysis of acid anhydrides by the aniline-water method. I. S. E. Vles. *Rec. trav. chim.* 52, 800-26 (1933).—The velocity of hydrolysis of acid anhydrides was detd. by the method of Menschutkin and Wassilief as modified by Caudri (cf. *C. A.* 24, 2860). The following unimol. consts. were calcd. at 0° and 25°, resp., for the hydrolysis of these anhydrides: acetic, 0.0267, 0.1600; propionic, 0.0170, 0.0867; butyric, 0.0097, 0.0517; succinic, 0.0210, 0.1591; glutaric, 0.0254, 0.1616. The rate of hydrolysis of methoxyacetic anhydride was too great to measure, even at 0°. The temp. coeffs. for a 10° rise in temp. were also calcd., they are larger for anhydrides of dibasic acids than for anhydrides of monobasic acids. Similar measurements in which the  $\text{H}_2\text{O}$  was replaced with a 1:1 mixt. of  $\text{Me}_2\text{CO}$  were made with benzoic, succinic and phthalic anhydrides. The unimol. consts. for the hydrolysis of these 3 anhydrides, at 25°, in aq.  $\text{Me}_2\text{CO}$ , were 0.00028, 0.0169, 0.0747, resp. The results are compared with those of prior investigators. W. B. Keighton, Jr.

Reaction velocities of 1-chloro-2,4-dinitrobenzene and 1-chloro-2,4-dinitronaphthalene with aromatic amines. II. J. van Opstall. *Rec. trav. chim.* 52, 901-11 (1933); cf. *C. A.* 17, 2705; 27, 5065.—The velocities of the reactions between aromatic amines and 1-chloro-2,4-dinitrobenzene (I) were measured. The measurements were made at 25° and at 100° in abs. EtOH. One-fiftieth mole of amine and 0.01 mole of (I) were dissolved in a total of 250 cc. of abs. EtOH for the expt. The following bimol. consts. were found at 100°:  $\text{PhNH}_2$ , 0.2860;  $p\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.7057;  $m\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.4248;  $o\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.0295;  $\text{PhNHMe}$ , 0.03293;  $o\text{-ClC}_6\text{H}_4\text{NH}_2$ , 0.0000;  $m\text{-ClC}_6\text{H}_4\text{NH}_2$ , 0.02894;  $p\text{-ClC}_6\text{H}_4\text{NH}_2$ , 0.0792;  $o\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.0000;  $m\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.00284;  $p\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.0000;  $p\text{-MeOC}_6\text{H}_4\text{NH}_2$ , 0.6718;  $o\text{-MeOC}_6\text{H}_4\text{NH}_2$ , 0.1656;  $p\text{-AcC}_6\text{H}_4\text{NH}_2$ , 0.0035;  $p\text{-EtOC}_6\text{H}_4\text{NH}_2$ , 2.026;  $o\text{-EtOC}_6\text{H}_4\text{NH}_2$ , 0.1872; piperidine, rapid;  $\alpha$ -naphthylamine, 0.02066;  $\beta$ -naphthylamine, 0.1817;  $o$ -aminobiphenyl 0.01037;  $p$ -aminobiphenyl, 0.08619. At 25° the reaction consts. were:  $\text{PhNH}_2$ , 0.0085;  $p\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.0212;  $m\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.0109;  $p\text{-MeOC}_6\text{H}_4\text{NH}_2$ , 0.0819;  $p\text{-EtOC}_6\text{H}_4\text{NH}_2$ , 0.0857; piperidine, 1.323. These data are compared with the data of other investigators to show that (I) reacts most rapidly with alcoholates, more slowly with aliphatic amines, and most slowly with aromatic amines. The reaction products were examd and in 2 cases products were found with m. ps. higher than reported in the literature for the same compds., i. e., 2,4-dinitro-2'-methoxydiphenylamine, m. 165°, transition of yellow to red form at 145°(?); 2,4-dinitro-2'-ethoxydiphenylamine, m. 172-3°. Similar velocity measurements were made for the reaction between aromatic amines and 1-chloro-2,4-dinitronaphthalene in abs. EtOH at 25°. The bimol. consts. obtained were:  $\text{PhNH}_2$ , 1.308;  $p\text{-MeC}_6\text{H}_4\text{NH}_2$ , 4.58;  $m\text{-MeC}_6\text{H}_4\text{NH}_2$ , 2.152;  $o\text{-MeC}_6\text{H}_4\text{NH}_2$ , 0.0597;  $p\text{-ClC}_6\text{H}_4\text{NH}_2$ , 0.2154;  $p\text{-MeOC}_6\text{H}_4\text{NH}_2$ , 11.62;  $p\text{-EtOC}_6\text{H}_4\text{NH}_2$ , 18.52. In these reactions several new substances were obtained, which have not previously been reported: 2-tolyl-2',4'-dinitro- $\alpha$ -naphthylamide, m. 136° (red form), 125° (yellow form); 3-tolyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 169°; 4-methoxyphenyl 2',4'-dinitro- $\alpha$ -naphthylamine, m. 203-4°; 4-ethoxyphenyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 160°; 4-chlorophenyl-2',4'- $\alpha$ -naphthylamine, m. 209°. Further the velocity const. for the reaction between 1-chloro-2,4,6-trinitrobenzene (picryl chloride) and  $o$ -toluidine was found to be 7.028 at 25°.

W. B. Keighton, Jr.

Isopycnals of liquid helium. II. W. H. Keelson and A. P. Keelson. *Proc. Acad. Sci. Amsterdam* 36 612-15 (1933).—The investigation previously reported (cf. *C. A.* 28, 4459) was extended and data up to 35 atm are given. The app. was not satisfactory for measure

The mobility of the  $\text{Me}_4\text{N}^+$  ion is 70.1 in  $\text{MeOH}$  and 28.3 in  $\text{EtOH}$ . The deviations of the  $\text{Me}_4\text{N}^+$  salts from the Debye-Hückel-Onsager equation are considerable in both alic., indicating appreciable ionic assocn., and in both they are greater than those of the corresponding  $\text{Et}_4\text{N}^+$  salts.

G. Calingaert

Measurements of the high-frequency conductivity of uni-univalent electrolytes. Ernst Glowatzki. *Ann. Physik* 18, 217-32 (1933).—Relative measurements of the high-frequency cond. of  $\text{HCl}$  and  $\text{NaCl}$  solns. were made at a frequency of  $3 \times 10^4$ . The method of Zahn and Rieckhoff (cf. *C. A.* 24, 3154) for measurement of the cond. change at high frequencies was improved so that an accuracy of 0.05% was possible, allowance being made for deviations from theory in the magnitude of the effect to be established accurately for uni-univalent electrolytes. The theoretical dependence of the dispersion effect of Debye and Falkenhagen (*C. A.* 22, 2705) on the cond. was not confirmed for these compds., and an explanation is sought in a discussion of the results. Allen S. Smith

An approach to the modern theory of solutions John R. Sampey. *J. Chem. Education* 10, 677-8 (1933).

Philip D. Adams

The dissociation constant of hypochlorous acid: glass electrode potential determinations. John W. Ingham and John Morrison. *J. Chem. Soc.* 1933, 1200-5.—From their neutralization curves of  $\text{HOCl}$  with  $\text{NaOH}$  in the presence of a glass electrode, the value  $K^1 = 3.47 \times 10^{-8}$  at  $18^\circ$  is derived for the disson. const. of  $\text{HOCl}$ .

George Calingaert

The thermodynamic ionization constants of carbonic acid. Duncan A. MacInnes and Donald Belcher. *J. Am. Chem. Soc.* 55, 2630-40 (1933).—The first disson. const. of  $\text{H}_2\text{CO}_3$  was detd. at  $25^\circ$  as  $4.54 \times 10^{-7}$  and the second as  $5.61 \times 10^{-11}$ , with methods involving galvanic cells without liquid junctions and glass electrodes.

L. P. Hall

Thermodynamic studies on potassium and sodium sulfates. F. L. Ei-ichi Shibata, Sahujo Oda and Sluzeto Furukawa. *J. Sci. Hiroshima Univ.*, Ser. A, 3, 227-42 (1933).—See *C. A.* 26, 645.

L. P. H.

The "salting-out" and "salting-in" of weak acids. I. The activity coefficients of the molecules of *o*-, *m*- and *p*-chlorobenzoic acids in aqueous salt solutions. Arthur Osol and Martin Kilpatrick. *J. Am. Chem. Soc.* 55, 4430-40 (1933).—Detns. of the solubilities of *o*-, *m*- and *p*- $\text{ClC}_6\text{H}_4\text{CO}_2\text{H}$  were made in aq. soln. of their Na salts and  $\text{KCl}$ ,  $\text{NaCl}$ ,  $\text{LiCl}$ ,  $\text{CaCl}_2$ ,  $\text{KBr}$  and  $\text{NaClO}_4$ . The mol. solubilities and activity coeffs. were calcd. The latter are the same at corresponding concns. of the same salt for mols. of  $\text{ClC}_6\text{H}_4\text{CO}_2\text{H}$  and  $\text{PhCO}_2\text{H}$ . An explanation is offered for the fact that a weak acid may either increase or decrease in soly. when dissolved in various salt solns. II. The activity coefficients of the molecules of *o*-, *m*- and *p*-hydroxybenzoic acids in aqueous salt solutions. *Ibid.* 4440-4.—The solubilities of *o*-, *m*- and *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$  were detd. in solns. of  $\text{KCl}$ ,  $\text{NaCl}$ ,  $\text{LiCl}$ ,  $\text{KBr}$ ,  $\text{NaClO}_4$ , and in solns. of Na benzenesulfonate, Na *p*-toluenesulfonate and Na  $\beta$ -naphthalenesulfonate. The activity coeffs. were calcd. but the "salting-out" const. diverge from the values for  $\text{PhCO}_2\text{H}$ . In  $\text{KCl}$  soln. the const. decrease with the transfer of  $\text{OH}$  group to the *m*- and *p*-positions.

G. M. Murphy

Exchange between atoms and ions of a metal. Otto Erbacher. *Z. physik. Chem.* A166, 23-6 (1933); cf. *C. A.* 27, 2366.—The effect of surface etching and polishing on the exchange of  $\text{Pb}$  and  $\text{Bi}$  atoms and ions was investigated.

G. M. Murphy

Theory of cathodic generation of hydrogen. J. Hoekstra. *Z. physik. Chem.* A166, 76-9 (1933). Reply. M. Volmer. *Ibid.* 80.

G. M. Murphy

Seven years of technical  $p_n$  measuring with the indicator film. Peter Wulff. *Chem. Fabrik* 1933, 441-3.—A review of applications, with bibliography (cf. *C. A.* 21, 3855).

J. H. Moore

Effect of the solvent on the potential of the chloranil electrode. Bernard O. Heston and Norris F. Hall.

*J. Am. Chem. Soc.* 55, 4729-30 (1933).—The potential of the chloranil electrode may be assumed independent of the solvent only if the electrode materials remain unsolvated under the conditions of the expt.

C. J. West

Studies on oxidation-reduction potentials. II. Changes of the oxidation-reduction potentials in the hydrolysis of starch and glycogen. Yukihiko Nakamura. *J. Chem. Soc. Japan* 54, 898-903 (1933); cf. *C. A.* 27, 3673.—Estn. of oxidation-reduction potentials of starch by dil. alkali and acid indicated that the 1st liquefaction is oxidation and that of 2nd hydrolysis is reduction. Glycogen showed the same result but the hydrolysis was slower than that of starch. The structure of starch is discussed.

K. Kitsu

The displacement of equilibrium by variation in the mass. J. E. Verschaffelt. *Compt. rend.* 197, 683-4 (1933).—Math. A correction in the calcs. of Etienne (*C. A.* 27, 4468).

Gerald M. Petty

Water vapor equilibria on vanadium and its oxides. Masami Kobayashi. *Bull. Chem. Soc. Japan* 8, 231-45 (1933). The oxidation-reduction equil. of V was investigated by the dynamic method of Wartenberg and Aoyama (*C. A.* 21, 2214). Metallic V was oxidized by water vapor in  $\text{H}_2$  at several temps. The V was prepd. by the Goldschmidt process and by analysis showed 97% of the metal. The general equations of the reaction isochor  $\log K_p = -(Q/4.571T) + C$  for the 2 systems are:  $\text{V}/\text{VO}$ ,  $\log K_{p,1} = -(12,333/T) + 3.141$  and for  $\text{VO}/\text{V}_2\text{O}_3$ ,  $\log K_{p,2} = -(6482/T) + 1.747$ . From these follow the heats of reaction,  $\text{V} + \text{H}_2\text{O} = \text{VO} + \text{H}_2 + Q_1^0$  ( $=56.4$  Cal.), and  $2\text{VO} + \text{H}_2\text{O} = \text{V}_2\text{O}_3 + \text{H}_2 + Q_2^0$  ( $=29.6$  Cal.). By combining these equations with that for the disson. of water vapor, the general equations for the disson. of V oxides was derived, and from these the approx. values of the heats of formation of the several oxides calcd.,  $2\text{V} + \text{O}_2 = \text{V}_2\text{O}_3 + 231.6$  Cal.,  $2\text{VO} + 1/2\text{O}_2 = \text{V}_2\text{O}_3 + 89.0$  Cal., and  $2\text{V} + 1/2\text{O}_2 = \text{V}_2\text{O}_3 + 320.6$  Cal. By the use of the equations for heat capacities of the substances involved in each reaction, the free energies and heats of formation were calcd. at  $25^\circ$ :  $2\text{V} + \text{O}_2 = \text{V}_2\text{O}_3$ ;  $\Delta F_{298} = -216,100$  cal.,  $\Delta H_{298} = -233,470$  cal.,  $2\text{VO} + 1/2\text{O}_2 = \text{V}_2\text{O}_3$ ;  $\Delta F_{298} = -82,696$  cal.,  $\Delta H_{298} = -89,336$  cal.,  $2\text{V} + 1/2\text{O}_2 = \text{V}_2\text{O}_3$ ;  $\Delta F_{298} = -298,797$  cal.,  $\Delta H_{298} = -322,812$  cal.

H. E. McShore

The behavior of metals, particularly lead and bismuth, in atomic hydrogen, and attempts to prepare atomic hydrogen from hydrides. Thomas G. Pearson, Percy L. Robinson and Eric M. Stoddart. *Proc. Roy. Soc. (London)* A142, 278-85 (1933).—Repetition of the expts. of Paneth (cf. *C. A.* 23, 5159; 24, 3750) on the disson. of  $\text{PbEt}_4$  confirmed his isolation of free Et and his value for its av. life. The thermal disson. of hydrides under low pressure in a stream of  $\text{H}_2$  yielded no at. H. The formation of  $\text{BiH}_3$  was confirmed. Further work is necessary before the traces of material reported as Pb hydride are actually confirmed as such. At. H does combine with many elements of B groups in the periodic system which do not combine directly with  $\text{H}_2$ , namely, Ge, Sn, As, Sb and Tc. It does not react with metallic Pb or Bi.

Calvin Brous

Effect of nuclear substituents on side-chain reactions. I. W. S. Nathan and H. B. Watson. *J. Chem. Soc.* 1933, 1248-52.—There is a quant. relation between dipole moments of  $\text{C}_6\text{H}_4\text{X}$  and the crit. increments of the side-chain reaction of  $\text{C}_6\text{H}_4$  derivs. having X as a nuclear substituent. With X in the *m*-position, for the cases considered, the expression, derived on simple kinetic theory, is applicable, save for halogen substituents; this exception is attributed to a mesomeric effect. With X in the *p*-position, the case is far more complicated but the expression seems to be applicable.

W. E. Vaughan

Oxidation of triethylphosphine. H. W. Thompson and N. S. Kelland. *J. Chem. Soc.* 1933, 1231-6.—The oxidation of triethylphosphine vapor was studied in the temp. range from  $42^\circ$  to  $100^\circ$  and found to be a chain reaction. Explosion occurs within a crit. range of pressure. Outside of this range reaction is slight; when occurring it is detd.



by surface conditions. Vessel dimensions, inert gases and temp. all exert effects to be expected qualitatively. Deactivation in the gaseous phase as well as on the walls is important.

William E. Vaughan

The reaction of hydrogen atoms with oxygen molecules and the life-time of  $\text{HO}_2$ . John R. Bates. *Z. physik. Chem.* B22, 469-70 (1933); cf. *C. A.* 27, 4469.—The life-time of  $\text{HO}_2$  is estd. to be of the order of  $10^{-9}$  sec. from the mechanism of the reaction of  $\text{HI}$  with  $\text{O}_2$ . G. M. M.

Mechanism of bimolecular reactions in solution. Addition of methyl iodide to pyridine in several solvents. H. W. Thompson and B. E. Blandon. *J. Chem. Soc.* 1933, 1237-40.—The reaction of  $\text{MeI}$  and pyridine in  $\text{CHCl}_3$ , anisole,  $\text{PhNO}_2$ , and  $\text{CCl}_4$  was studied; the activation energies are, resp., 14,200, 14,300, 15,000 and 14,800 cal. The exptl. rate is some powers of 10 slower than the theoretical rate for the gas reaction. This discrepancy is not due wholly to "solvent deactivation" because the gas rate is also "slow." Extensive drying affects the rate considerably. William E. Vaughan

The kinetics of the reduction, in acid solution, of hydrogen peroxide by iodide ion. Herman A. Liebafsky and Ali Mohammed. *J. Am. Chem. Soc.* 55, 3977-86 (1933).—Results obtained agree with earlier data. Equil. const. at various temps. are also given from which heat of activation is calcd. A discussion of the kinetic mechanism is given which differs from that proposed by LaMer.

R. H. Lambert

Kinetics of the decomposition of the dichlorosuccinic acids. H. V. W. Robinson and David T. Lewis. *J. Chem. Soc.* 1933, 1260 2.—The decompn. of the dichlorosuccinic acids from 25° to 80° in aq. soln. and in alk. soln. was studied; from the data were detd. as the energies of activation, 23,200 cal. for the *n*-form and 23,000 cal. for the *iso*-form; the  $E/\log_e B$  terms are 1027 and 982, resp. The data are compared with those for the 2-dibromo acids. Added electrolyte has a negligible effect.

William E. Vaughan

Kinetics of the decomposition of trichloroacetic acid. II. Mechanism of the decomposition of the acid in aniline solution. II. W. Patwardhan and A. N. Kappanna. *Z. physik. Chem.* A166, 51 8 (1933); cf. *C. A.* 26, 2640.—The decompn. of  $\text{CCl}_3\text{COOH}$  was studied at 60°, 70° and 80° in soln. of  $\text{PhNH}_2$ , and mixts. of  $\text{PhNH}_2$  with  $\text{PhH}$  and  $\text{PhMe}$ . The latter have no effect on the reaction but serve to reduce the concn. of  $\text{PhNH}_2$ . The decompn. is unimol. with respect to the acid but bimol. with respect to the solvent. Temp. coeff. and mechanism are the same with each solvent mixt. studied. Two schemes are proposed for the mechanism. G. M. M.

The kinetics of a diene synthesis. Albert Wassermann. *Ber.* 66B, 1392-4 (1933).—The velocity of the reaction of quinone with cyclopentadiene (I) to form monocyclopentadienequinone (II) may be detd. by color measurements at different times because quinone is more highly colored than II. The reaction is bimol., as is also that of I and II to form dicyclopentadienequinone. In  $\text{C}_6\text{H}_6$  at 25°,  $k$  for the 1st reaction is about 100 times  $k$  for the 2nd reaction. The dependence of the 1st reaction upon the temp. was also studied in different solvents. L. Kelley

Kinetics of the rearrangement of  $\alpha$ -methoxystyrene. F. H. MacDougall, Walter M. Lauer and Marvin A. Spielman. *J. Am. Chem. Soc.* 55, 4089-97 (1933).— $\alpha$ -Methoxystyrene rearranges to give propiophenone and at the same time these 2 substances react to form methane and 1,2-dibenzoylpropane. The kinetics of these reactions were investigated in the temp. range 222.8-260°; both were of second order. The ratio of the reaction rate const. remains unaltered in the temp. range studied. Both reactions have an activation energy of 34,000 cal.

William E. Vaughan

The rate of addition of methyl esters to trimethylamine. Louis P. Hammett and Helmuth L. Pfluger. *J. Am. Chem. Soc.* 55, 4079-89 (1933).—The rate of the alkylation of  $\text{Me}_3\text{N}$  to  $\text{Me}_4\text{N}^+$  ion by the Me ester of a carboxylic acid is related to the strength of the acid by an equation of the same form as that which connects the rate of a reaction in

the general acid catalysis with the strength of the acid catalyst. It is probable that the rate-detg. step in the general acid and basic catalysis of Brønsted is a transfer of  $\text{H}^+$  ion from acid catalyst to substrate similar to the transfer of  $\text{Me}$  in the alkylation reaction. P. H. Emmett

The determination of the velocity of hydrolysis of acid anhydrides by the aniline-water method. I. S. E. Vles. *Rec. trav. chim.* 52, 809-26 (1933).—The velocity of hydrolysis of acid anhydrides was detd. by the method of Menschutkin and Wassilief as modified by Caudri, (cf. *C. A.* 24, 2660). The following unimol. const. were calcd. at 0° and 25°, resp., for the hydrolysis of these anhydrides: acetic, 0.0267, 0.1600; propionic, 0.0170, 0.0867; butyric, 0.0097, 0.0517; succinic, 0.0210, 0.1591; glutaric, 0.0254, 0.1616. The rate of hydrolysis of methoxyacetic anhydride was too great to measure, even at 0°. The temp. coeffs. for a 10° rise in temp. were also calcd.; they are larger for anhydrides of dibasic acids than for anhydrides of monobasic acids. Similar measurements in which the  $\text{H}_2\text{O}$  was replaced with a 1:1 mixt. of  $\text{Me}_2\text{CO}$  were made with benzoic, succinic and phthalic anhydrides. The unimol. const. for the hydrolysis of these 3 anhydrides, at 25°, in aq.  $\text{Me}_2\text{CO}$ , were 0.00028, 0.0109, 0.0747, resp. The results are compared with those of prior investigators. W. B. Keighton, Jr.

Reaction velocities of 1-chloro-2,4-dinitrobenzene and 1-chloro-2,4-dinitronaphthalene with aromatic amines. II. J. van Opstall. *Rec. trav. chim.* 52, 901-11 (1933); cf. *C. A.* 17, 2705; 27, 5065.—The velocities of the reactions between aromatic amines and 1-chloro-2,4-dinitrobenzene (I) were measured. The measurements were made at 25° and at 100° in abs.  $\text{EtOH}$ . One-fiftieth mole of amine and 0.01 mole of (I) were dissolved in a total of 250 cc. of abs.  $\text{EtOH}$  for the expt. The following bimol. const. were found at 100°:  $\text{PhNH}_2$ , 0.2800; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.7057; *m*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.4248; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.0295;  $\text{PhNHMe}$ , 0.03293; *o*- $\text{ClC}_6\text{H}_4\text{NH}_2$ , 0.0000; *m*- $\text{ClC}_6\text{H}_4\text{NH}_2$ , 0.02804; *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$ , 0.0792; *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.0000; *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.00284; *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{NH}_2$ , 0.0000; *p*- $\text{MeOC}_6\text{H}_4\text{NH}_2$ , 0.6718; *o*- $\text{MeOC}_6\text{H}_4\text{NH}_2$ , 0.1650; *p*- $\text{AcC}_6\text{H}_4\text{NH}_2$ , 0.0035; *p*- $\text{EtOC}_6\text{H}_4\text{NH}_2$ , 2.026; *o*- $\text{EtOC}_6\text{H}_4\text{NH}_2$ , 0.1872; piperidine, rapid;  $\alpha$ -naphthylamine, 0.02066;  $\beta$ -naphthylamine, 0.1817;  $\alpha$ -aminobiphenyl, 0.01037; *p*-aminobiphenyl, 0.08619. At 25° the reaction const. were:  $\text{PhNH}_2$ , 0.0085; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.0212; *m*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.0109; *p*- $\text{MeOC}_6\text{H}_4\text{NH}_2$ , 0.0819; *p*- $\text{EtOC}_6\text{H}_4\text{NH}_2$ , 0.0857; piperidine, 1.323. These data are compared with the data of other investigators to show that (I) reacts most rapidly with alcoholates, more slowly with aliphatic amines, and most slowly with aromatic amines. The reaction products were examd and in 2 cases products were found with m. p. higher than reported in the literature for the same compds., i. e., 2,4-dinitro-2'-methoxydiphenylamine, m. 165°, transition of yellow to red form at 145° (?); 2,4-dinitro-2'-ethoxydiphenylamine, m. 172-3°. Similar velocity measurements were made for the reaction between aromatic amines and 1-chloro-2,4-dinitronaphthalene in abs.  $\text{EtOH}$  at 25°. The bimol. const. obtained were:  $\text{PhNH}_2$ , 1.308; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 4.58; *m*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 2.152; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , 0.0597; *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$ , 0.2154; *p*- $\text{MeOC}_6\text{H}_4\text{NH}_2$ , 11.62; *p*- $\text{EtOC}_6\text{H}_4\text{NH}_2$ , 18.52. In these reactions several new substances were obtained, which have not previously been reported: 2-tolyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 136° (red form), 125° (yellow form); 3-tolyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 169°; 4-methoxyphenyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 203 4°; 4-ethoxyphenyl-2',4'-dinitro- $\alpha$ -naphthylamine, m. 160°; 4-chlorophenyl-2',4'- $\alpha$ -naphthylamine, m. 209°. Further the velocity const. for the reaction between 1-chloro-2,4,6-trinitrobenzene (picryl chloride) and *o*-toluidine was found to be 7.028 at 25°. W. B. Keighton, Jr.

Isopycnals of liquid helium. II. W. H. Keesom and A. P. Keesom. *Proc. Acad. Sci. Amsterdam* 36, 612-15 (1933).—The investigation previously reported (cf. *C. A.* 27, 4459) was extended and data up to 35 atm. are given. The app. was not satisfactory for measure-

ments on the solid. At 1.18°K. solid He has  $d > 0.1818$  g./cc. The  $\lambda$  point on the solidification curve is at  $T = 1.754^\circ\text{K}$ .  $p = 29.9$  atm. E. R. Schierz

The transformation of solid ammonium chloride at about  $-30^\circ$ . A. Smits and C. H. MacGillavry. *Z. physik. Chem.* A166, 91-112 (1933).—A dilatometric investigation was made of the transformation of  $\text{NH}_4\text{Cl}$  between  $-10^\circ$  and  $-30^\circ$ . Certain hysteresis effects were noted and are discussed. G. M. Murphy

Thermal analysis of the system hydrogen chloride-boron trichloride. W. Graff. *Compt. rend.* 197, 754-5 (1933).—Data are given for the system  $\text{HCl}-\text{BCl}_3$  in the range  $-110^\circ$  to  $-135^\circ$ , and 0 to 100%  $\text{HCl}$ .

F. D. Rossini

Extension of Braun's law to the equilibrium of binary phases. Domingo Maturro. *Rev. facultad quim. ind. agr. Univ. nac. litoral.* 2, 50 4 (1932).—Braun's law (cf. C. A. 14, 2284) is generalized to the form  $(\lambda_m^{\alpha\beta}/T)(\partial x_2^\beta/\partial p) + \Delta_m^{\alpha\beta}(\partial x_2^\beta/\partial T) = 0$ , where  $\lambda_m^{\alpha\beta}$  and  $\Delta_m^{\alpha\beta}$  are, resp., the ideal heat effect and ideal vol. change accompanying the passage of a mol. of a mixt. of 2 components from phase  $\alpha$  to phase  $\beta$  at const. temp., pressure and compn.;  $x_2^\beta$  is the mol. fraction of component 2 in phase  $\beta$ . J. B. A.

Thermal equilibrium of combinations of acetanilide with certain organic compounds. Konstanty Hrynakowski and Franciszek Adamanis. *Roczniki Chem.* 13, 448 53 (1933).—Temp.-compn. curves are given for these binary systems. The following figures are, resp., the mol. percentage of the 1st ingredient and the eutectic pt.: acetanilide antipyrine, 51.3,  $58.5^\circ$ ;  $-\text{BzOH}$ , 57.6,  $76^\circ$ ;  $-\text{quinine}$ , 84.9,  $105^\circ$ ;  $-\text{diphenylamine}$ , 12.4,  $47^\circ$ ;  $-\text{phenacetin}$ , 79.1,  $80^\circ$ ;  $-\text{hydroquinone}$ , 60.2,  $77.5^\circ$ ;  $-\text{menthol}$ , 14.8,  $35^\circ$ ;  $-\text{urea}$ , 80.3,  $102^\circ$ ;  $-\alpha\text{-naphthylamine}$ , 18.4,  $38^\circ$ ;  $-\text{salipyrine}$ , 57.4,  $64^\circ$ ;  $-\text{salol}$ , 6.2,  $40^\circ$ ;  $-\text{urethan}$ , 14.2,  $40^\circ$ . Thermal analysis showed that all belong to one class. The members of the systems do not mix in the solid state but do so in all proportions in the melted state forming eutectic mixts. C. T. I.

Thermal analysis of binary mixtures containing organic nitrates. Tadeusz Urbanski. *Roczniki Chem.* 13, 399-434 (1933).—A 2.5-g. sample, in a 12-mm. tube placed in a 43-mm. tube which in turn is placed in a 35-mm. tube contg. glycerol, is heated to  $5-10^\circ$  above its m. p. During the cooling, the melt and glycerol are stirred vigorously. Temp.-compn. curves are given. The following figures are, resp., the percentage of the 1st ingredient and the eutectic pt. Mannitol nitrate- $p$ -nitrotoluene, 12.5,  $49.2^\circ$ ;  $p$ -nitroanisole 8,  $50.8^\circ$ ;  $p$ -nitrophenetole, 5,  $56.8^\circ$ ;  $o$ -chloronitrobenzene, 15.5,  $29.7^\circ$ ;  $o$ -nitronaphthalene, 14,  $52.5^\circ$ ;  $m$ -dinitrobenzene, 52.5,  $65.5^\circ$ ;  $1,3,5$ -dinitroanisole, 55,  $77.6^\circ$ ;  $1,2,4$ -chlorodinitrobenzene, 25,  $44.5^\circ$ ;  $sym$ -trinitrobenzene, 55,  $78.7^\circ$ ;  $o$ -trinitrotoluene, 42.5,  $62.8^\circ$ ;  $n$ -naphthalene, 20,  $77.3^\circ$ ;  $dimethyldiphenylurea$ , 57,  $77.4^\circ$ ;  $diethyldiphenylurea$ , 53-4, approx.  $52.1^\circ$ . Nitroerythritol- $p$ -nitrotoluene, 47,  $32.4^\circ$ ;  $m$ -dinitrobenzene, 70,  $42.4^\circ$ . Pentaerythritol nitrate- $p$ -nitrotoluene, 10,  $50.2^\circ$ ;  $p$ -nitroanisole, 5,  $50.8^\circ$ ;  $o$ -nitronaphthalene, 4,  $55.1^\circ$ ;  $m$ -dinitrobenzene, 20,  $82.4^\circ$ ;  $1,3,5$ -dinitroanisole, 20,  $94.7^\circ$ ;  $1,2,4$ -chlorodinitrobenzene, 3,  $49^\circ$ ;  $sym$ -trinitrobenzene, approx. 30,  $101.1^\circ$ ;  $o$ -trinitrotoluene, approx. 13,  $76.4^\circ$ ;  $n$ -naphthalene, approx. 7,  $79.1^\circ$ ;  $dimethyldiphenylurea$ , 32.5,  $102.7^\circ$ ;  $diethyldiphenylurea$ , approx. 12,  $68^\circ$ ; mannitol nitrate-erythritol nitrate 18.5,  $57.6^\circ$ ; pentaerythritol nitrate-mannitol nitrate, 20,  $101.3^\circ$ ; pentaerythritol nitrate-erythritol nitrate, approx. 5,  $59.5^\circ$ . Mannitol nitrate was the only compd. giving rise to mol. addn. compds. Probable compns. (dtd. by extrapolation) are, in mols. per mol. of mannitol nitrate,  $p$ -nitrotoluene 2,  $p$ -nitroanisole 2,  $p$ -nitrophenetole 2,  $o$ -nitronaphthalene. 1. Bibliography. C. T. I.

Systems (a) ammonium  $d$ -tartrate-lithium  $d$ -tartrate-water and (b) ammonium lithium  $d$ -tartrate-ammonium lithium  $l$ -tartrate-water. Alan N. Campbell and Louis Slotin. *J. Am. Chem. Soc.* 55, 3961-70 (1933).—Soly. detns. were made at  $0^\circ$ ,  $30^\circ$  and  $60^\circ$  in the 2 ternary

systems  $\text{NH}_4 d\text{-tartrate-Li } d\text{-tartrate-water}$  and  $\text{NH}_4 \text{Li } d\text{-tartrate-NH}_4 \text{Li } l\text{-tartrate-water}$  to det. the effect on the transition temp. of the substitution of Li for Na in Na  $\text{NH}_4$  racemate. Filtration was accomplished through a sintered glass filter immersed in the thermostat. Li was detd. by ignition and conversion of the carbonate to sulfate while the  $\text{NH}_4$  was detd. by distn. A double salt,  $(\text{NH}_4)_2\text{Li}_2(\text{C}_4\text{H}_4\text{O}_6)_2$ , was formed at all 3 temps. The stability of this salt increased with the temp. In system (b) a true racemate was found at all 3 temps. having the formula  $(\text{NH}_4)_2\text{Li}_2(\text{C}_4\text{H}_4\text{O}_6)_2 \cdot \text{H}_2\text{O}$ . The transition temp. for  $\text{Li}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O} \rightarrow \text{Li}_2\text{C}_4\text{H}_4\text{O}_6 + 2\text{H}_2\text{O}$  was detd. as  $21.52^\circ$  by the dilatometric method and as  $21.81^\circ$  by the soly. method. J. W. Shipley

The ternary system biphenyl-diphenylamine-benzophenone. H. Howard Lee and J. C. Warner. *J. Am. Chem. Soc.* 55, 4474-7 (1933); cf. C. A. 27, 889.—The 1. p.-compn. diagram for the ternary system biphenyl-diphenylamine-benzophenone was detd. Two stable eutectics were found: (1) at  $18.8^\circ$  with the compn. 30.5 mols. % diphenylamine and 49.0 mols. % diphenylamine and (2) at  $16.5^\circ$  with the compn. 30 mols. % biphenyl and 52 mols. % benzophenone. Two metastable eutectics were found at the lower temps.  $15^\circ$  and  $13.1^\circ$ , resp., with slightly differing compns. H. S. van Klooster

The system  $\text{CaO-FeO-SiO}_2$ . N. L. Bowen, J. F. Schairer and E. Posnjak. *Am. J. Sci.* 26, 193-284 (1933); cf. C. A. 27, 2867.—There are 3 ternary compds.  $\text{CaFeSi}_2\text{O}_6$  (hedenbergite), stable only below  $905^\circ$ ,  $2\text{-CaO.FeO.2SiO}_2$  (Fe akermanite), stable below  $775^\circ$  and  $\text{CaFeSiO}_4$ . Only the last is stable at temps. where liquid is formed in any of the mixts. There are 30 invariant points. Seven of these are ternary but none is a eutectic, the min temp. of existence of liquid in the system ( $1093^\circ$ ) being a point at which only 2 solid phases, both solid solns., are in equil. with the liquid. The outstanding feature of the system is the occurrence of solid-soln. series, the most important of which are the 2 metasilicate series and an orthosilicate series. The 1 metasilicate series extends from pure wollastonite ( $\text{CaSiO}_3$ ) to 76%  $\text{FeSiO}_3$ ; the other from hedenbergite ( $\text{CaFeSi}_2\text{O}_6$ ) to 80%  $\text{FeSiO}_3$ . Metasilicates with a higher content of  $\text{FeSiO}_3$  do not form, orthosilicate and tridymite appearing together as excess phases in such compns. The hedenbergite solid solns. are stable only at low temps. and are transformed at  $940-980^\circ$  to wollastonite solid solns. The principal orthosilicate solid solns. are Ca-Fe olivines, extending from fayalite ( $\text{Fe}_2\text{SiO}_4$ ) through  $\text{CaFeSiO}_4$  to 59%  $\text{Ca}_2\text{SiO}_4$ . Wollastonite solid solns. and Ca-Fe olivines occur together in equil. with some liquids of the system. The optical properties of the cryst. phases were measured and the variation of optical properties with compn. in the solid soln. series are shown. The x-ray diffraction patterns of members of the solid soln. series are reproduced. The bearing of the results upon the occurrence and compn. of natural minerals is discussed. Alden H. Emery

The homogeneous catalysis of gaseous reactions. The effect of iodine on the decomposition of acids, esters, ketones and halides. S. Baird and C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1147-55.— $\text{I}_2$  has a very pronounced catalytic effect on the homogeneous decompn. of  $\text{HCOOMe}$  and  $\text{AcOMe}$  in the gaseous state. The catalyzed reactions are analogous to those of ethers and aldehydes (cf. C. A. 24, 5584). The decompn. of  $\text{HCOOH}$  and  $\text{AcOH}$  is not catalyzed by  $\text{I}_2$ . The catalyzed decompn. of  $\text{HCOOMe}$  proceeds mostly to  $\text{MeOH}$  and  $\text{CO}$ , the  $\text{MeOH}$  then decomp. principally to  $\text{CH}_4$ ,  $\text{H}_2\text{O}$  and  $\text{CO}$ . Neither  $\text{Ht}$  halide nor ketone decompn. is appreciably catalyzed by  $\text{I}_2$ . P. H. Emmett

The homogeneous catalysis of gaseous reactions. The effect of iodine on the decomposition of simple aliphatic amines and of hexane. S. Baird and C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1155-60; cf. preceding abstr.—The structural analogy between  $\text{C-O-C}$  and  $\text{C-NH-C}$  is reflected in a certain similarity between the catalyzed decompns. of the amines and the ethers. The amine reaction in the presence of  $\text{I}_2$  as a catalyst is explained

qualitatively by the general equation  $RCH_2NHR' = R'H + RCH:NH = R'H + RH + HCN$ . The intermediate aldimines enter into complex decomposition and condensation reactions that destroy any simple quantitative relations. The H of the NH group plays no part in the amine decomposition, since the decompositions of  $(C_2H_5)_3N$  and  $(C_2H_5)_2NH$  are both catalyzed and to about the same extent. The catalyzed decomposition of  $(CH_3)_3N$  and  $(CH_3)_2NH$  occurs about  $1/10$  as rapidly as that of the ethylamines. The effect of  $I_2$  on the decomposition of  $(C_2H_5)_3NH$  and of hexane is small. P. H. Emmett

Polybasic acids as catalysts for the reduction of ammoniacal silver solutions by phosphorous acid. Bruno Blaser. *Z. physik. Chem.* A166, 64-75(1933).— $HNO_3$  soln. of  $H_3PO_4$  shows little reduction of ammoniacal soln. of  $AgNO_3$ . Addn. of  $HPO_4$ ,  $H_2PO_4$ ,  $H_2P_2O_7$  as well as  $H_2AsO_4$ , citric and aconitic acids shows marked catalytic effect on the reduction. Other acids show little effect. G. M. M.

The role of ozone as catalyst of oxidation. VI. The action of diluents of the ozone, of light and of catalysts of autoxidation. E. Briner and H. Biedermann. *Helv. Chim. Acta* 16, 1119-24(1933); cf. *C. A.* 27, 3389.—The oxidation of  $BzH$  by ozonized  $O$  was studied when the  $O_3$  was dild. with  $O_2$ ,  $N_2$  and  $CO_2$  as well as when it acted in the presence of a little  $O_2$  at 20 mm. pressure. The inert gas present aids the reaction to some extent, because the oxidation was markedly less in the low-pressure expts. Ultra-violet light does not seem to affect the oxidation with  $O_3$  although the total amt. of oxidation is increased because of autoxidation. The same is true of Cu and Co salts, which catalyze autoxidation but retard the  $O_3$  reaction almost as much as mannitol. The oxidation with  $O_3$  seems to be entirely independent of autoxidation and unaffected by promoters thereof except insofar as availability of  $BzH$  may be diminished by a strong competing reaction. VII. The ozonization of dissolved hydriodic acid. *Ibid.* 1125-30; cf. Treadwell and Anneler, *Z. anorg. Chem.* 48, 86(1906); Riesenfeld and Bencker, *C. A.* 11, 563.—No conclusive evidence could be obtained that  $O_3$  catalyzed the oxidation of HI. No yields of oxidation products above 83% were obtained, and dild. of  $O_3$  by inert gases did not reduce its activity to a marked extent. It seems probable that undissolved  $O_3$  is acted upon. The reaction is 30 times more rapid in  $HOAc$  than in aq. soln. R. Baltzly

The physical state of solid catalysts. Etienne Audibert and Andre Raineau. *Compt. rend.* 197, 596-8(1933).—Catalytically active Cu has a d. of about 7.6 instead of the normal value of 8.9 for massive material. Sintering by heating to about 700° raised the d. to the normal value. P. H. Emmett

Specific catalytic surfaces. E. K. Rideal. *Soc. Chem. Ind., Chem. Eng. Group, Proc.* 13, 45-9(1931).—Exptl. methods for detg. the sp. surface of a catalyst and for studying catalytic activity are discussed. P. H. E.

The specific activity of catalysts. E. B. Maxted. *Soc. Chem. Ind., Chem. Eng. Group, Proc.* 13, 43-5(1931).—The heat of adsorption of one of the reactants on a catalyst may supply the energy of activation required for the reaction being catalyzed. P. H. Emmett

The reduction by hydrogen and the thermal decomposition of nitrides made by the reaction of ammonia with various promoted and unpromoted iron synthetic-ammonia catalysts. P. H. Emmett and Katharine S. Love. *J. Am. Chem. Soc.* 55, 4043-50(1933).— $Fe_3N$  prepd. from active catalysts decomposes more rapidly than that prepd. from rather inactive catalysts. The energy of activation of the decomposition is about 50,000 cal. The rates and nature of the reduction and decomposition of the nitrides from the various Fe catalysts are given. P. H. Emmett

The present status of the theory of ammonia catalysts. W. Brankenburger. *Z. Elektrochem.* 39, 818-20(1933); cf. *C. A.* 27, 3561.—A reply to Kröger (*C. A.* 27, 5485) and a correction for the heat of formation of  $U_3N_4$  which is between 15 and 25 Cal./g.-atom N instead of 68.5 Cal. as previously stated. H. H. Rowley

The heat conductivity of wet masses of diatomaceous earth in relation to the specific weight and the amount of water added. E. Raisch. *Gesundh.-Ing.* 56, 509-11(1933).—Curves show that the insulating properties of wet mortar-like masses of diatomaceous earth increase with decrease in sp. wt. and also with increase in the amt. of water necessary to convert the powder into a mortar-like mass. Neither relation is linear. M. G. Moore

Low-temperature specific heats. I. An improved calorimeter for use from 14° to 300°K. The heat capacity and entropy of naphthalene. J. C. Southard and P. G. Brickwedde. *J. Am. Chem. Soc.* 55, 4378-84(1933).—An improved adiabatic "vacuum" calorimeter for solid and liquid substances is described, which can be used for studying slow transitions as well as measuring heat capacities with a precision of about 0.1%. From measurement of its heat capacity from 14° to 300°K., the entropy of naphthalene at 25° was calcd. to be 39.89 ± 0.12 cal mol.<sup>-1</sup> deg.<sup>-1</sup>. II. The calibration of the thermometer and the resistance of platinum, platinum-10% rhodium and constantan between -259° and -190°. J. C. Southard and R. T. Milner. *Ibid.* 4384-91.—A const.-vol. gas thermometer was used to measure the resistance of Pt, Pt-10% Rh, and of constantan, in the range -259° to -190°, with an accuracy corresponding to ±0.02°; a reference table of  $R/R_0$  for Pt from 14° to 109°K., and for constantan from 14° to 26°K., gives values for each degree F. D. Rossini

The heat capacities of gaseous mono- and dimethyl amine. W. A. Felsing and P. W. Jessen. *J. Am. Chem. Soc.* 55, 4418-22(1933).—A closed-system, continuous-flow calorimeter was used to measure  $C_p$ . By the Kund method, the following values of  $C_p/C_v$  were found for 25°:  $CH_3NH_2$ , 1.202;  $(CH_3)_2NH$ , 1.149;  $(CH_3)_3N$  1.184;  $C_2H_5NH_2$ , 1.135. F. D. Rossini

The heats of dilution of electrolytes. G. Chapas. *Rev. gén. sci.* 44, 535-44(1933).—A review. F. D. R.

The partial and integral heats of dilution of cadmium sulfate solutions from electromotive force measurements. Victor K. La Mer and W. George Parks. *J. Am. Chem. Soc.* 55, 4343-55(1933).—The cell reaction  $Cd(satd. Hg) + PbSO_4(s) = CdSO_4(m) + Pb(satd. Hg)$  was re-investigated (cf. *C. A.* 25, 4767), and the conclusion that the Debye-Huckel parameter "a" is 3.60 Å. U. for concns of  $CdSO_4$  of 0.0005 through 0.01 M and independent of temp. from 0° to 30° was definitely confirmed. Activity coeffs. of  $CdSO_4$  and thermodynamic quantities for the reaction are given. The concn. dependence of the relative partial molal and integral heat contents of  $CdSO_4$ , which were computed, is of the form demanded by the Gronwall-La Mer and Sandved theory. The partial molal heat capacity of  $CdSO_4$  is estd. to be approx. -200 cal./deg. mol. at 15°. Allen S. Smith

Calorimetric investigations. XXI. Heats of combustion of methyl-, ethyl- and phenyl-substituted succinic acids and of their anhydrides....(a) experimental data P. E. Verkade and H. Hartmann. *Rec. trav. chim.* 52, 945-68(1933).—The following are the isothermal heats of combustion at 19.5° at const. vol., per g. weighed in air with brass weights and expressed in 15° calories: succinic anhydride 3609.2, methylsuccinic acid 3903.3, methylsuccinic anhydride (solid) 4629.0, (liquid) 4647.3, *asym* dimethylsuccinic acid 4591.0, *asym*-dimethylsuccinic anhydride, 5330.7, *cis*-*sym*-dimethylsuccinic acid 4607.7, *trans*-*sym*-dimethylsuccinic acid 4597.5, *l-trans*-*sym*-dimethylsuccinic acid 4599.6, *cis*-*sym*-dimethylsuccinic anhydride 5318.5, *trans*-*sym*-dimethylsuccinic acid 5304.1, trimethylsuccinic acid 5183.0, trimethylsuccinic anhydride 5844.2, tetramethylsuccinic acid 5681.4, tetramethylsuccinic anhydride 6356.9, ethylsuccinic acid 4588.7, ethylsuccinic anhydride (liq.) 5347.5, *asym*-diethylsuccinic acid 5653.7, *asym*-diethylsuccinic anhydride (liq.) 6393.7, *cis*-*sym*-diethylsuccinic acid 5672.1, *trans*-*sym*-diethylsuccinic acid 5662.4, *cis*-*sym*-diethylsuccinic anhydride (liq.) 6386.7, *trans*-*sym*-diethylsuccinic anhydride (liq.) 6376.5, triethylsuccinic acid 6434.9, tri-

ments on the solid. At 1.18°K. solid He has  $d > 0.1818$  g./cc. The  $\lambda$  point on the solidification curve is at  $T = 1.754^\circ\text{K}$ .  $p = 29.9$  atm. E. R. Schierz

The transformation of solid ammonium chloride at about  $-30^\circ$ . A. Smits and C. H. MacGillavry. *Z. physik. Chem.* A166, 97-112 (1933).—A dilatometric investigation was made of the transformation of  $\text{NH}_4\text{Cl}$  between  $-10^\circ$  and  $-30^\circ$ . Certain hysteresis effects were noted and are discussed. G. M. Murphy

Thermal analysis of the system hydrogen chloride-boron trichloride. W. Graff. *Compt. rend.* 197, 754-5 (1933).—Data are given for the system  $\text{HCl}-\text{BCl}_3$  in the range  $-110^\circ$  to  $-135^\circ$ , and 0 to 100%  $\text{HCl}$ .

F. D. Rossini

Extension of Braun's law to the equilibrium of binary phases. Domingo Maturo. *Rev. facultad quim. ind. agr. Univ. nac. litoral.* 2, 50-4 (1932).—Braun's law (cf. C. A. 14, 2284) is generalized to the form  $(\lambda_m^{\alpha\beta}/T)(\partial x_2^\beta/\partial p) + \Delta_m^{\alpha\beta}(\partial x_2^\beta/\partial T) = 0$ , where  $\lambda_m^{\alpha\beta}$  and  $\Delta_m^{\alpha\beta}$  are, resp., the ideal heat effect and ideal vol. change accompanying the passage of a mol. of a mixt. of 2 components from phase  $\alpha$  to phase  $\beta$  at const. temp., pressure and compn.;  $x_2^\beta$  is the mol. fraction of component 2 in phase  $\beta$ . J. B. A.

Thermal equilibrium of combinations of acetanilide with certain organic compounds. Konstanty Hrynakowski and Franciszek Adamanis. *Roczniki Chem.* 13, 448-53 (1933).—Temp.-compn. curves are given for these binary systems. The following figures are, resp., the mol. percentage of the 1st ingredient and the eutectic pt.: acetanilide-antipyrine, 51.3,  $58.5^\circ$ ; - $\text{RzOH}$ , 57.6,  $76^\circ$ ; -quinine, 84.9,  $105^\circ$ ; -diphenylamine, 12.4,  $47^\circ$ ; -phenacetin, 79.1,  $80^\circ$ ; -hydroquinone, 60.2,  $77.5^\circ$ ; -menthol, 14.8,  $35^\circ$ ; -urea, 80.3,  $102^\circ$ ; - $\alpha$ -naphthylamine, 18.4,  $38^\circ$ ; -salipyrine, 57.4,  $64^\circ$ ; -salol, 6.2,  $40^\circ$ ; -urethan, 14.2,  $40^\circ$ . Thermal analysis showed that all belong to one class. The members of the systems do not mix in the solid state but do so in all proportions in the melted state forming eutectic mixts. C. T. I.

Thermal analysis of binary mixtures containing organic nitrates. Tadeusz Urbanski. *Roczniki Chem.* 13, 399-434 (1933).—A 2.5-g. sample, in a 12-mm. tube placed in a 16-mm. tube which in turn is placed in a 35-mm. tube contg. glycerol, is heated to  $5-10^\circ$  above its m. p. During the cooling, the melt and glycerol are stirred vigorously. Temp.-compn. curves are given. The following figures are, resp., the percentage of the 1st ingredient and the eutectic pt. Mannitol nitrate- $p$ -nitrotoluene, 12.5,  $49.2^\circ$ ; - $p$ -nitroanisole 8,  $50.8^\circ$ ; - $p$ -nitrophenetole, 5,  $56.8^\circ$ ; - $\alpha$ -chloronitrobenzene, 15.5,  $29.7^\circ$ ; - $\alpha$ -nitronaphthalene, 14,  $52.5^\circ$ ; - $m$ -dinitrobenzene, 52.5,  $65.5^\circ$ ; -1,3,5-dinitroanisole, 55,  $77.6^\circ$ ; -1,2,4-chlorodinitrobenzene, 25,  $44.5^\circ$ ; -sym-trinitrobenzene, 55,  $73.7^\circ$ ; - $\alpha$ -trinitrotoluene, 42.5,  $62.8^\circ$ ; -naphthalene, 20,  $77.3^\circ$ ; -dimethyldiphenylurea, 57,  $77.4^\circ$ ; -diethyldiphenylurea, 53-4, approx.  $52.1^\circ$ . Nitroerythritol- $p$ -nitrotoluene, 47,  $32.4^\circ$ ; - $m$ -dinitrobenzene, 70,  $42.4^\circ$ . Pentaerythritol nitrate- $p$ -nitrotoluene, 10,  $50.2^\circ$ ; - $p$ -nitroanisole, 5,  $50.8^\circ$ ; - $\alpha$ -nitronaphthalene, 4,  $55.1^\circ$ ; - $m$ -dinitrobenzene, 20,  $82.4^\circ$ ; -1,3,5-dinitroanisole, 20,  $94.7^\circ$ ; -1,2,4-chlorodinitrobenzene, 3,  $49^\circ$ ; -sym-trinitrobenzene, approx. 30,  $101.1^\circ$ ; - $\alpha$ -trinitrotoluene, approx. 13,  $76.1^\circ$ ; -naphthalene, approx. 7,  $79.1^\circ$ ; -dimethyldiphenylurea, 32.5,  $102.7^\circ$ ; -diethyldiphenylurea, approx. 12,  $68^\circ$ ; mannitol nitrate-erythritol nitrate 18.5,  $57.6^\circ$ ; pentaerythritol nitrate-mannitol nitrate, 20,  $101.3^\circ$ ; pentaerythritol nitrate-erythritol nitrate, approx. 5,  $59.5^\circ$ . Mannitol nitrate was the only compd. giving rise to mol. addn. compds. Probable compds. (detd. by extrapolation) are, in mols. per mol. of mannitol nitrate,  $p$ -nitrotoluene 2,  $p$ -nitroanisole 2,  $p$ -nitrophenetole 2,  $\alpha$ -nitronaphthalene 1. Bibliography. C. T. I.

Systems (a) ammonium  $d$ -tartrate-lithium  $d$ -tartrate-water and (b) ammonium lithium  $d$ -tartrate-ammonium lithium  $l$ -tartrate-water. Alan N. Campbell and Louis Slotin. *J. Am. Chem. Soc.* 55, 3061-70 (1933).—Soly. detns. were made at  $0^\circ$ ,  $30^\circ$  and  $60^\circ$  in the 2 ternary

systems  $\text{NH}_4 d\text{-tartrate-Li } d\text{-tartrate-water}$  and  $\text{NH}_4 \text{Li } d\text{-tartrate-NH}_4 \text{Li } l\text{-tartrate-water}$  to det. the effect on the transition temp. of the substitution of Li for Na in  $\text{Na NH}_4$  racemate. Filtration was accomplished through a sintered glass filter immersed in the thermostat. Li was detd. by ignition and conversion of the carbonate to sulfate while the  $\text{NH}_4$  was detd. by distn. A double salt,  $(\text{NH}_4)_2\text{Li}_2(\text{C}_4\text{H}_4\text{O}_6)_2$ , was formed at all 3 temps. The stability of this salt increased with the temp. In system (b) a true racemate was found at all 3 temps. having the formula  $(\text{NH}_4)_2\text{Li}_2(\text{C}_4\text{H}_4\text{O}_6)_2 \cdot \text{H}_2\text{O}$ . The transition temp. for  $\text{Li}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O} \rightarrow \text{Li}_2\text{C}_4\text{H}_4\text{O}_6 + 2\text{H}_2\text{O}$  was detd. as  $21.52^\circ$  by the dilatometric method and as  $21.81^\circ$  by the soly. method. J. W. Shipley

The ternary system biphenyl-diphenylamine-benzophenone. H. Howard Lee and J. C. Warner. *J. Am. Chem. Soc.* 55, 4474-7 (1933); cf. C. A. 27, 889.—The f. p.-compn. diagram for the ternary system biphenyl-diphenylamine-benzophenone was detd. Two stable eutectics were found: (1) at  $18.8^\circ$  with the compn. 30.5 mols. % diphenylamine and 49.0 mols. % diphenylamine and (2) at  $16.5^\circ$  with the compn. 30 mols. % biphenyl and 52 mols. % benzophenone. Two metastable eutectics were found at the lower temps.  $15^\circ$  and  $13.1^\circ$ , resp., with slightly differing compns. H. S. van Kloooster

The system  $\text{CaO-FeO-SiO}_2$ . N. L. Bowen, J. F. Schairer and E. Posnjak. *Am. J. Sci.* 26, 193-284 (1933); cf. C. A. 27, 2867.—There are 3 ternary compds.  $\text{CaFeSiO}_5$  (hedenbergite), stable only below  $965^\circ$ , 2- $\text{CaO.FeO.2SiO}_2$  (Fe akermanite), stable below  $775^\circ$  and  $\text{CaFeSiO}_4$ . Only the last is stable at temps. where liquid is formed in any of the mixts. There are 30 invariant points. Seven of these are ternary but none is a eutectic, the min. temp. of existence of liquid in the system ( $1093^\circ$ ) being a point at which only 2 solid phases, both solid solns., are in equil. with the liquid. The outstanding feature of the system is the occurrence of solid-soln. series, the most important of which are the 2 metasilicate series and an orthosilicate series. The 1 metasilicate series extends from pure wollastonite ( $\text{CaSiO}_3$ ) to 76%  $\text{FeSiO}_3$ ; the other from hedenbergite ( $\text{CaFeSiO}_5$ ) to 80%  $\text{FeSiO}_3$ . Metasilicates with a higher content of  $\text{FeSiO}_3$  do not form, orthosilicate and tridymite appearing together as excess phases in such compns. The hedenbergite solid solns. are stable only at low temps. and are transformed at  $940-980^\circ$  to wollastonite solid solns. The principal orthosilicate solid solns. are Ca-Fe olivines, extending from fayalite ( $\text{FeSiO}_4$ ) through  $\text{CaFeSiO}_4$  to 59%  $\text{CaSiO}_3$ . Wollastonite solid solns. and Ca-Fe olivines occur together in equil. with some liquids of the system. The optical properties of the cryst. phases were measured and the variation of optical properties with compn. in the solid soln. series are shown. The x-ray diffraction patterns of members of the solid soln. series are reproduced. The bearing of the results upon the occurrence and compn. of natural minerals is discussed. Alden H. Emery

The homogeneous catalysis of gaseous reactions. The effect of iodine on the decomposition of acids, esters, ketones and halides. S. Baird and C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1147-55.— $\text{I}_2$  has a very pronounced catalytic effect on the homogeneous decompn. of  $\text{HCOOMe}$  and  $\text{AcOMe}$  in the gaseous state. The catalyzed reactions are analogous to those of ethers and aldehydes (cf. C. A. 24, 5684). The decompn. of  $\text{HCOOH}$  and  $\text{AcOH}$  is not catalyzed by  $\text{I}_2$ . The catalyzed decompn. of  $\text{HCOOMe}$  proceeds mostly to  $\text{MeOH}$  and  $\text{CO}$ , the  $\text{MeOH}$  then decompn. principally to  $\text{CH}_4$ ,  $\text{H}_2\text{O}$  and  $\text{CO}$ . Neither Et halide nor ketone decompn. is appreciably catalyzed by  $\text{I}_2$ . P. H. Emmett

The homogeneous catalysis of gaseous reactions. The effect of iodine on the decomposition of simple aliphatic amines and of hexane. S. Baird and C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1155-60; cf. preceding abstr.—The structural analogy between C-O-C and C-NH-C is reflected in a certain similarity between the catalyzed decompns. of the amines and the ethers. The amine reaction in the presence of  $\text{I}_2$  as a catalyst is explained.

qualitatively by the general equation  $RCH_2NHR' = R'H + RCH_2NH = R'H + RH + HCN$ . The intermediate aldimines enter into complex decompn. and condensation reactions that destroy any simple quant. relations. The H of the NH group plays no part in the amine decompn. since the decompn. of  $(C_2H_5)_2N$  and  $(C_2H_5)_2NH$  are both catalyzed and to about the same extent. The catalyzed decompn. of  $(CH_3)_2N$  and  $(CH_3)_2NH$  occurs about  $1/10$  as rapidly as that of the ethylamines. The effect of  $I_2$  on the decompn. of  $(C_2H_5)_2NH$  and of hexane is small. P. H. Emmett

**Polybasic acids as catalysts for the reduction of ammoniacal silver solutions by phosphorous acid.** Bruno Blaser. *Z. physik. Chem.* A166, 64-75(1933).— $HNO_3$  soln. of  $H_3PO_3$  shows little reduction of ammoniacal soln. of  $AgNO_3$ . Addn. of  $HPO_3$ ,  $H_3PO_4$ ,  $H_2P_2O_7$ , as well as  $H_2AsO_4$ , citric and aconitic acids shows marked catalytic effect on the reduction. Other acids show little effect. G. M. M.

**The role of ozone as catalyst of oxidation.** VI. The action of diluents of the ozone, of light and of catalysts of autoxidation. E. Briner and H. Biedermann. *Helv. Chim. Acta* 16, 1119-24(1933); cf. *C. A.* 27, 3389.—The oxidation of  $BzH$  by ozonized  $O$  was studied when the  $O_3$  was dild. with  $O_2$ ,  $N_2$  and  $CO_2$  as well as when it acted in the presence of a little  $O_2$  at 20 mm. pressure. The inert gas present aids the reaction to some extent, because the oxidation was markedly less in the low-pressure expts. Ultra-violet light does not seem to affect the oxidation with  $O_3$  although the total am $\phi$ . of oxidation is increased because of autoxidation. The same is true of  $Cu$  and  $Co$  salts, which catalyze autoxidation but retard the  $O_3$  reaction almost as much as mannitol. The oxidation with  $O_3$  seems to be entirely independent of autoxidation and unaffected by promoters thereof except insofar as availability of  $BzH$  may be diminished by a strong competing reaction. VII. The ozonization of dissolved hydriodic acid. *Ibid.* 1125-30; cf. Treadwell and Anner, *Z. anorg. Chem.* 48, 86(1906); Riesenfeld and Bencker, *C. A.* 11, 563.—No conclusive evidence could be obtained that  $O_3$  catalyzed the oxidation of  $HI$ . No yields of oxidation products above 83% were obtained, and dild. of  $O_3$  by inert gases did not reduce its activity to a marked extent. It seems probable that undissoc.  $HI$  is acted upon. The reaction is 30 times more rapid in  $HOAc$  than in aq. soln. R. Baltzly

**The physical state of solid catalysts.** Etienne Audibert and Andre Raineau. *Compt. rend.* 197, 596-8(1933).—Catalytically active  $Cu$  has a d. of about 7.6 instead of the normal value of 8.9 for massive material. Sintering by heating to about  $700^\circ$  raised the d. to the normal value. P. H. Emmett

**Specific catalytic surfaces.** E. K. Rideal. *Soc. Chem. Ind., Chem. Eng. Group, Proc.* 13, 45-9(1933).—Exptl. methods for detg. the sp. surface of a catalyst and for studying catalytic activity are discussed. P. H. E.

**The specific activity of catalysts.** E. B. Maxted. *Soc. Chem. Ind., Chem. Eng. Group, Proc.* 13, 43-5(1931).—The heat of adsorption of one of the reactants on a catalyst may supply the energy of activation required for the reaction being catalyzed. P. H. Emmett

**The reduction by hydrogen and the thermal decomposition of nitrides made by the reaction of ammonia with various promoted and unpromoted iron synthetic-ammonia catalysts.** P. H. Emmett and Katharine S. Love. *J. Am. Chem. Soc.* 55, 4043-50(1933).— $Fe_3N$  prepd. from active catalysts decomposes more rapidly than that prepd. from rather inactive catalysts. The energy of activation of the decompn. is about 50,000 cal. The rates and nature of the reduction and decompn. of the nitrides from the various  $Fe$  catalysts are given. P. H. Emmett

**The present status of the theory of ammonia catalysis.** W. Frankenburger. *Z. Elektrochem.* 39, 818-20(1933); cf. *C. A.* 27, 3561.—A reply to Kröger (*C. A.* 27, 5485) and a correction for the heat of formation of  $U_3N_4$  which is between 15 and 25 Cal./g.-atom  $N$  instead of 68.5 Cal. as previously stated. H. H. Rowley

**The heat conductivity of set masses of diatomaceous earth in relation to the specific weight and the amount of water added.** E. Raisch. *Gesundh.-Ing.* 56, 504-11(1933).—Curves show that the insulating properties of set mortar-like masses of diatomaceous earth increase with decrease in sp. wt. and also with increase in the amt. of water necessary to convert the powder into a mortar-like mass. Neither relation is linear. M. G. Moore

**Low-temperature specific heats.** I. An improved calorimeter for use from  $14^\circ$  to  $300^\circ K$ . The heat capacity and entropy of naphthalene. J. C. Southard and F. G. Brickwedde. *J. Am. Chem. Soc.* 55, 4378-84(1933).—An improved adiabatic "vacuum" calorimeter for solid and liquid substances is described, which can be used for studying slow transitions as well as measuring heat capacities with a precision of about 0.1%. From measurement of its heat capacity from  $14^\circ$  to  $300^\circ K$ , the entropy of naphthalene at  $25^\circ$  was calcd. to be  $39.89 \pm 0.12$  cal. mol. $^{-1}$  deg. $^{-1}$ . II. The calibration of the thermometer and the resistance of platinum, platinum-10% rhodium and constantan between  $-259^\circ$  and  $-190^\circ$ . J. C. Southard and R. T. Milner. *Ibid.* 4384-91.—A const.-vol. gas thermometer was used to measure the resistance of Pt, of Pt-10% Rh, and of constantan, in the range  $-259^\circ$  to  $-190^\circ$ , with an accuracy corresponding to  $\pm 0.02^\circ$ . A reference table of  $R/R_0$  for Pt from  $14^\circ$  to  $109^\circ K$ , and for constantan from  $14^\circ$  to  $20^\circ K$ , gives values for each degree. F. D. Rossini

**The heat capacities of gaseous mono- and dimethylamine.** W. A. Felsing and F. W. Jessen. *J. Am. Chem. Soc.* 55, 4418-22(1933).—A closed-system, continuous-flow calorimeter was used to measure  $C_p$ . By the Kundt method, the following values of  $C_p/C_v$  were found for  $25^\circ$ :  $CH_3NH_2$ , 1.202;  $(CH_3)_2NH$ , 1.149;  $(C_2H_5)_2N$ , 1.184;  $C_2H_5NH_2$ , 1.135. F. D. Rossini

**The heats of dilution of electrolytes.** G. Chapas. *Rev. gen. sci.* 44, 535-44(1933).—A review. F. D. R.

**The partial and integral heats of dilution of cadmium sulfate solutions from electromotive force measurements.** Victor K. La Mer and W. George Parks. *J. Am. Chem. Soc.* 55, 4343-55(1933).—The cell reaction  $Cd(satd. Hg) + PbSO_4(s) = CdSO_4(m) + Pb(satd. Hg)$  was re-investigated (cf. *C. A.* 25, 4767), and the conclusion that the Debye-Huckel parameter " $a$ " is 3.60 A. U. for concns. of  $CdSO_4$  of 0.0005 through 0.01 M and independent of temp. from  $0^\circ$  to  $30^\circ$  was definitely confirmed. Activity coeffs. of  $CdSO_4$  and thermodynamic quantities for the reaction are given. The concn. dependence of the relative partial molal and integral heat contents of  $CdSO_4$ , which were computed, is of the form demanded by the Gronwall, La Mer and Sandved theory. The partial molal heat capacity of  $CdSO_4$  is estd. to be approx.  $-200$  cal./deg./mol. at  $15^\circ$ . Allen S. Smith

**Calorimetric investigations. XXI. Heats of combustion of methyl-, ethyl- and phenyl-substituted succinic acids and of their anhydrides....(a) experimental data.** P. F. Verkade and H. Hartmann. *Rec. trav. chim.* 52, 945-68(1933).—The following are the isothermal heats of combustion at  $19.5^\circ$  at const. vol., per g. weighed in air with brass weights and expressed in 15° calories: succinic anhydride 3699.2, methylsuccinic acid 3903.3, methylsuccinic anhydride (solid) 4629.0, (liquid) 4647.3, asym-dimethylsuccinic acid 4591.0, asym-dimethylsuccinic anhydride, 5330.7, cis-sym-dimethylsuccinic acid 4607.7, trans-sym-dimethylsuccinic acid 4597.5, l-trans-sym-dimethylsuccinic acid 4599.6, cis-sym-dimethylsuccinic anhydride 5318.5, trans-sym-dimethylsuccinic acid 5304.6, trimethylsuccinic acid 5183.0, trimethylsuccinic anhydride 5884.2, tetramethylsuccinic acid 5681.4, tetramethylsuccinic anhydride 6356.9, ethylsuccinic acid 4588.7, ethylsuccinic anhydride (liq.) 5347.5, asym-diethylsuccinic acid 5653.7, asym-diethylsuccinic anhydride (liq.) 6393.7, cis-sym-diethylsuccinic acid 5672.1, trans-sym-diethylsuccinic acid 5662.4, cis-sym-diethylsuccinic anhydride (liq.) 6386.7, trans-sym-diethylsuccinic anhydride (liq.) 6376.5, triethylsuccinic acid 6434.9, tri-



ethylsuccinic anhydride (liq.) 7109.1, tetraethylsuccinic acid 7029.2, tetraethylsuccinic anhydride 7688.1, phenylsuccinic acid 5577.2, phenylsuccinic anhydride 6214.9, *cis-sym*-diphenylsuccinic acid 6690.7, *trans-sym*-diphenylsuccinic acid 6692.1, *trans-arym*-diphenylsuccinic anhydride 7202.5. The method of prepn. is given.

J. H. Austin

Révision of the at. wt. of Te (Homgtschmid) 6.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYLS, JR

Model of the electric field and of the photon. J. J. Thompson. *Phil. Mag.* 16, 809-45(1933). Theoretical. 3

E. J. Rosenbaum

Composition of atoms. A. Korn. *Scientia* 54, 240-51 (1933).—The possibility that atoms consist of 3 kinds of particles, pos. electrons, neg. electrons and gravitational particles, is briefly discussed. L. E. Gilson

Glow discharge at atmospheric pressure. H. Thoma and L. Heer. *Z. tech. Physik* 14, 385-8(1933); cf. *C. A.* 27, 911.—The cathode discharge portion of a glow discharge at atm. pressure obeys the similarity laws. The column shows the properties of glow discharge and produces no thermal ionization. Arthur Fleischer

Distribution of energies of electrons in gases. J. S. Townsend. *Phil. Mag.* 16, 729-44(1933).—Theoretical. Objections of Didlauskis (*C. A.* 27, 2374) are answered. The distribution of energies in electrons in gases is shown to be approx. Maxwellian. Even though the initial electron energies be the same, inequalities are produced by differences of the energy change in collisions with mols. 5

E. J. Rosenbaum

The passage of positive ions through gases. H. S. W. Massey and R. A. Smith. *Proc. Roy. Soc. (London)* A142, 142-72(1933).—The collisions of slow pos. ions with gas atoms are discussed in terms of a quantum mech. theory of collisions. For both elastic and inelastic collisions the relative motions of the centers of mass of the ions and atoms are treated as a perturbation. Correlation of exptl. results in terms of the theoretical formulas and agreement between observed and calcul. collision cross-sections are obtained. Nuclear symmetry is considered in the case of collisions of ions with similar atoms. Calvin Brous

The ionization of the noble gases by positive alkali ions (correction). J. Carlisle Mouzon. *Phys. Rev.* 44, 688 (1933).—A correction is made in the pressures used in former work (cf. *C. A.* 26, 5831). New data obtained in an app. of different design and with higher potentials agree with former work. A. B. F. Duncan

Studies of rare-gas-sodium arcs with the use of collectors. Tameo Harada. *Proc. Phys.-Math. Soc. Japan* 15, 371-83(1933).—The space charge, electron c. d. and electron temp. were detd. by the probe method for hot-cathode arcs of He, Ne, A, He + Na, Ne + Na and A + Na. These rare-gas-Na arcs resemble rare-gas arcs in the temp. interval from room temp. to 330° for He and 280° for Ne and A. Above these temps. the rare-gas-Na arcs resemble the Na arc, though some effect of the rare gas remains. E. J. Rosenbaum

A linear amplifier for the detection of corpuscles. Bruno Zipprich. *Z. Physik* 85, 592-617(1933).—The method uses the region where the self-consistent discharge in counters has not yet set in and therefore the no. of ions after multiplication is proportional to the primary no. (Townsend's theory). If electrode distance, gas pressure and field strength are suitably chosen the amplifier counts  $\beta$ -particles quantitatively. E. B.

The action of internal charges on the functioning of a Geiger-Müller counter. R. Brunetti and Z. Ollano. *Nuovo cimento* 10, 189-97(1933).—The excessive no. of impulses observed when a counter is exposed to x-rays (*C. A.* 27, 3396) is also found when the polarity of the

wire is reversed. The effect is ascribed to the emission of soft radiation by the metal of the counter. J. B. A.

Inner potential of metals. James A. Darbyshire. *Phil. Mag.* 16, 761-75(1933).—The diffraction of high-speed electrons by freshly cleaved surfaces of Sb, Zn, Bi and Te was studied. The deviation from the Bragg position of the beams diffracted by Sb and Zn was used to calc. the  $\pi$  and the inner potential. The values found were 12 v. for Sb and 15.5 v. for Zn. The results were not definite with Bi because of the presence of a cross-grating pattern. With Te the diffracted beams were in the undeviated Bragg position. E. J. Rosenbaum

Cuprous oxide photoelectric cells—a contribution to the space-charge photoeffect. W. Bulian. *Physik. Z.* 34, 745-56(1933).—The metal of the other electrode has no influence upon the selective max. On a gold-dusted electrode the direction of the photocurrent depends upon the wave length of the light. The optimum thickness of  $Cu_2O$  is 0.1 mm. Curves showing the temp. effect are given. Gregg M. Evans

Liberation of electrons from surfaces by ions and atoms. H. Kallmann and A. Rostagni. *Nature* 132, 567-8 (1933).—The no. of electrons emitted by metal surfaces bombarded by gaseous ions approached a limit as the voltage decreased. The no. from at. bombardment, however, decreased sharply with the voltage. At low velocities the no. is roughly proportional to the ionization potential. Gregg M. Evans

Remark on the paper by J. H. de Boer and M. C. Teves: Thermal and photoelectric emission from cesium cesium oxide cathodes and the effect of inserting cesium atoms in the dielectric. P. Görlich. *Z. Physik* 85, 128-30(1933); cf. *C. A.* 27, 4728.—A much higher quantum yield of photoelectrons is obtained if Cs atoms are embedded in a thick layer of  $Cu_2O$  instead of adsorbed on the surface of  $Cu_2O$ . Egon Bretscher

The electronic work function and the photoelectric properties of metals. P. I. Lukirskii. *Physik. Z. Sowjetunion* 4, 212-38(1933); cf. *C. A.* 26, 3990a.—A review of the energy relations at clean and coated metal surfaces. L. W. Elder

The influence of adsorbed gas films on the photoelectric sensitivity. Bernhard Abendroth. *Z. Physik* 85, 530-44 (1933).—Pt or CdI<sub>2</sub> carefully freed from adsorbed gas is photoelectrically inactive. Adsorption of small amounts of water, pyridine, propionic acid or benzene increases the photoelec. yield enormously; larger amts. diminish it. The effect is independent of the chem. nature and the dipole moment of the activator. Egon Bretscher

The inelastic scattering of slow electrons in gases. III. F. H. Nicoll and C. B. O. Mohr. *Proc. Roy. Soc. (London)* A142, 320-32(1933).—A description is given of an app. for studying the inelastic scattering in gases of electrons whose energies lie within a few v. of the excitation potential. Results have been obtained for H<sub>2</sub>, He and A for an angular range of 10-155° and a voltage range of 3-80 v. above the excitation potential. The curves for the inelastic scattering in A show diffraction effects at large angles which are similar to those that appear in the elastic scattering, but which disappear as the energy of the electrons approaches the excitation potential of the gas. The curves for H and He do not exhibit any

unusual features for low-velocity electrons, and the significance of the curves is discussed. Unlike the elastic scattering, the inelastic scattering at small angles (between  $10^\circ$  and  $30^\circ$ ) is seen to agree in form fairly well with that given by the Born formula down to relatively low velocities.

**Absorption effects in the total secondary electron emission from metal faces.** S. Ramachandra Rao. *Current Sci.* 2, 93-4 (1933); cf. *C. A.* 26, 5490.—Secondary electron emission ( $R$ ) and voltage ( $v$ ) give a linear relation when  $\log_e R/v$  is plotted against  $v$ . The slope is  $-(1 + \beta\alpha)B/2.3026$ , where  $\alpha$  and  $\beta$  are the coeffs. of absorption of primary and secondary electrons, resp., and  $B$  is the const. of variation. The equation is valid at potentials above 250 v.

**Electron diffraction and molecular structure—carbonyl compounds.** Ralph W. Dornte. *J. Am. Chem. Soc.* 55, 4126-30 (1933); cf. *C. A.* 27, 4999.—By means of electron diffraction the mol. structure of COS is proved to be linear;  $\text{COCl}_2$ ,  $\text{COBr}_2$ ,  $\text{AcCl}$  and  $\text{AcBr}$  are represented by plane "Y" models. In the first 2 compds. an angle of  $110^\circ$  was found between the halogen atoms; the tetrahedral model was found for the latter 2.

**Diffraction of slow electrons by single crystals of graphite.** V. E. Lashkarev, F. W. Barendsen and G. A. Kuzmin. *Z. Physik* 85, 631-40 (1933).—The diffraction of electrons of 6150 v. energy gives 7 maxima. Some must be forbidden. A constant inner potential of 20 v. agrees best with the exptl. results.

**Electron-diffraction investigation of the molecular structure of cyanogen and diacetylene with a note on chlorine dioxide.** L. O. Brockway. *Proc. Nat. Acad. Sci.* 19, 808-74 (1933).—The interatomic distances are:  $\text{C}-\text{N} = 1.16 \pm 0.02$ ,  $\text{C}-\text{C} = 1.43 \pm 0.03$  for cyanogen, for diacetylene  $\text{C}-\text{C} = 1.21 \pm 0.02$ , except for the center one, which is  $1.43 \pm 0.03$ . For  $\text{ClO}_2$  (cf. *C. A.* 27, 4999) the  $\text{Cl}-\text{O}$  distance should be  $1.53 \pm 0.08$ .

**Electron-diffraction investigation of the structure of molecules of methyl azide and carbon suboxide.** L. O. Brockway and Linus Pauling. *Proc. Nat. Acad. Sci.* 19, 860-7 (1933).—The accepted structure is  $\text{H}_3\text{C}-\text{N}=\text{N}$ , with the  $\text{CH}_3$  offset from the  $\text{N}$  line at an angle of  $135 \pm 15^\circ$ . The interat. distances are from left to right, 1.47, 1.26 and 1.10 Å. U.,  $\pm 2\%$ . Results for  $\text{C}_3\text{O}_2$  are best in accord with the simple electrically neutral structure  $\text{O}:\text{C}:\text{C}:\text{O}$ , with the interatomic distances  $\text{C}-\text{O} = 1.20 \pm 0.02$  and  $\text{C}-\text{C} = 1.30 \pm 0.02$  Å. U.

**Electron diffraction patterns from platinized asbestos.** D. A. Richards. *Phil. Mag.* 16, 778-87 (1933).—A sample of asbestos was platinized a no. of times by satg. in  $\text{PtCl}_4$  soln. and reducing in a stream of  $\text{H}$  at  $100^\circ$ . After each platinization the electron diffraction pattern was obtained. After 26 platinizations only the asbestos pattern was obtained, though the sample was colored black. After the 27th platinization faint Pt rings were obtained, while after the 29th only the Pt lines were obtained. The ratio of asbestos to Pt when the Pt pattern appears is 1.18 by wt. The observed facts are accounted for by the deposition of the Pt in cracks in the asbestos. Addnl. platinization then causes more splitting of the asbestos, probably during the process of reduction. When the Pt surface becomes comparable with the asbestos surface the Pt pattern appears.

**The refractive power of quartz glass in the short-wave infra-red.** C. Müller and A. Werthauer. *Z. Physik* 85, 559-60 (1933).—The  $n$  of quartz glass varies from 1.442 for  $0.511 \mu$  to 1.428 for  $2.595 \mu$ . A quartz prism was used for the detn. of  $n$ .

**Magnetic deflection of hydrogen molecules and the magnetic moment of the proton.** I. R. Frisch and O. Stern. *Z. Physik* 85, 4-16 (1933).—The magnetic deflection of para- and ortho- $\text{H}_2$  and ordinary  $\text{H}_2$  is studied at  $-195^\circ$  and ordinary temp. The deflection depends on the magnetic moment of the mol. This consists generally of 2 parts:  $\mu_r$  due to the rotation of the mol. and  $\mu_n$  resulting from the nuclear spin of the protons.

For para- $\text{H}_2$   $\mu_r$  is 0 at  $-195^\circ$  because the rotation quantum no. is 0,  $\mu_n = 0$  as the proton spins are antiparallel. The  $\mu_r$  of ortho-hydrogen is infinite at low temps. as the lowest state of rotation has the quantum no. 1.  $\mu_n$  is equal to 2 magnetic proton moments. Though the nuclear spin and the magnetic moment due to the rotation are perfectly uncoupled in the high magnetic field (20,000 gauss) used, the Maxwell distribution of velocity blurs the deflection patterns to such an extent that  $\mu_r$  and  $\mu_n$  cannot be detd. from 1 expt. The deflection for para-hydrogen is therefore measured at higher temp. when the rotation quantum no. is 2 and 4. This permits detn. of the moment due to rotation only. By combining with the results for ortho-hydrogen the magnetic moment of the proton is found not to be 1 but to lie between 2 and 3 nuclear magnetons ( $2 \times e/2mc \times \frac{1}{2} \times h/\pi$ ,  $m$  being the mass of the H atom). II. I. Estermann and O. Stern. *Ibid.* 17-24.—The expts. above are repeated with increased precision to det. the strength and inhomogeneity of the magnetic field. The  $\mu_r$  is found to be 0.8-0.9 nuclear magnetons and the magnetic moment of the proton times 2.5 the same unit. A supplement contains sample calcs. of intensities of the deflected beam.

**The magnetic moment of the rotating hydrogen molecule.** G. C. Wick. *Z. Physik* 85, 25-8 (1933); cf. *C. A.* 27, 4144.—The rotatory magnetic moment calcd. for a rigid  $\text{H}_2$  mol. differs from the experimentally detd. value (cf. prec. abstr.). The discrepancy diminishes if the perturbation of the electron movement due to the rotation is taken into account. The theory gives only the limits of 0.9 and 0.31 nuclear magnetons. The result is very sensitive toward errors of the proper functions used for the calcn.

**A new method of intensity measurement of molecular rays.** I. Estermann and O. Stern. *Z. Physik* 85, 135-43 (1933).—A new method of intensity measurement of wide applicability is based on the observation made by Langmuir and Kingdon (*C. A.* 17, 925) that the neg. space charge in the neighborhood of a glow cathode is partly destroyed by pos. ions. The mol. ray whose intensity is to be detd. enters a chamber contg. a W glow cathode which is negatively charged with respect to the cage. The mols. are ionized there and cause an increase of current which serves as a measure of the intensity of the mol. The method was tested with a  $\text{Hg}$  ray, whose pressure corresponded to  $\text{Hg}$  at  $-30^\circ$ . Benzophenone has also been used successfully.

**The magnetic deflection of oxygen molecules.** Robert Schürmann. *Z. Physik* 85, 212-30 (1933).—The magnetic deflection of  $\text{O}_2$  rays leads to a magnetic moment of 2 Bohr magnetons and to a coupling between the spin of the electrons and the angular momentum of the mol. The intensity of the  $\text{O}_2$  ray was measured by the method given in *C. A.* 23, 2386.

**Magnetic susceptibility of argon according to measurements by A. Roth.** Walther Gerlach. *Z. Physik* 85, 545-7 (1933).—Abs. susceptibility measurements of Ar between  $290^\circ$  and  $700^\circ$  lead to the value  $H = -19.72 \times 10^{-6}$  per g. atom, with a precision higher than 1% ( $H$  remains const. in the temp. range studied).

**Remark on the paper by R. Deaglio: Photoeffect in single crystals of cuprite.** G. Monch and R. Stühler. *Z. Physik* 85, 131-4 (1933).—The explanation of the photoeffect of cuprite suggested by D. (*C. A.* 27, 4728) is considered unsound on the basis of new expts.

**The neutron (Bakerian lecture).** J. Chadwick. *Proc. Roy. Soc. (London)* A142, 1-25 (1933); cf. *C. A.* 27, 1816.—In a survey of recent progress in the study of the neutron the following facts are brought out. Only bombardment of nuclei with  $\alpha$ -particles has been successful in the production of neutrons, the emission of the neutrons being accompanied by the capture of the  $\alpha$ -particle.  $\text{Al}$  and  $\text{Al}$ , although pure, emit both protons and neutrons forming either  $\text{Ne}^{23}$  or  $\text{Na}^{23}$ . Curves giving the dependence of the neutron emission on the  $\alpha$ -particle ve-

locity indicate a slight resonance level at  $2.4 \times 10^6$  electron v. for B and  $2$  at  $1.4 \times 10^6$  and  $2.5 \times 10^6$  electron v. for Be with potential barrier heights of  $3.7 \times 10^6$  electron v. for B and  $3.5 \times 10^6$  electron v. for Be. The mass of the neutron as computed from B disintegration is found to be 1.0067 with an upper limit of 1.0070 given by the neutron formation from Li and a lower limit of 1.0058 deduced from the mass of  $H^1$ . The fundamental nature of the neutron is still uncertain. Besides taking part in elastic nuclear collisions neutrons are able to disintegrate N, O and C and there is some evidence that they can produce positrons. Morris Muskat

Remarks on the subject of neutrons. Jean Perrin. *Compt. rend.* 197, 628 31(1933).--A discussion of recent ideas concerning the neutron and positron. An application of these ideas is made to the decompn. of neutrons into photons in stars and to the reverse process in interstellar space. Part of the cosmic rays at least seem to be identical with photons from neutron disintegration.

A. B. F. Duncan  
The neutron in quantum mechanics. B. M. Sen. *Nature* 132, 518(1933).--Math. By use of Dirac's relativity equation, the neutron can be properly placed in the scheme of the wave-mech. theory. If the value of  $r$  obtained ( $1.9 \times 10^{-11}$  cm.) does not agree with the present suggested radius of the neutron ( $10^{-12}$  cm.), it may be of interest as the lower limiting distance permitted under the Coulomb force. Calvin Broun

The excitation of neutrons from beryllium. Gilberto Bernardini. *Z. Physik* 85, 555-8(1933).--The intensity of neutron radiation escaping from Be on bombardment with  $\alpha$ -rays from Po is detd. with an ionization chamber contg.  $CH_4$  of 17 atm. as a source of protons. The neutron intensity is correlated with the range of the  $\alpha$ -rays (varied by change of  $CO_2$  pressure). A max. is found at 19 mm. air equiv. and a min. at 26 mm. The results are in agreement with observations by Rasetti (C. A. 27, 896) and Curie and Joliot (C. A. 26, 2021) and in contradiction with Kirsch and Slonek's results (C. A. 27, 2091).

Egon Bretscher  
Constitution of atomic nuclei. Sisaku Shimasaki. *Proc. Phys.-Math. Soc. Japan* 15, 384 99(1933).--On the assumption that nuclei are composed of  $\alpha$ -particles, ( $\alpha/2$  + neutron) particles and neutrons, the constitution and some other properties of nuclei have been deduced. The Fermi statistics yields the no. of  $\alpha$ -particles in nuclei. The outer electron configuration depends on the nuclear constitution. A nucleus formed by the addn. of an  $\alpha$ -particle is more stable than one formed by the addn. of a ( $\alpha/2$  + neutron) particle. The change of mass defect with at. no. is calcd. E. J. Rosenbaum

Nuclear radii and atom disintegration yields by heavy elements. G. Kirsch. *Naturwissenschaften* 21, 640 (1933).--Expts. of Merhaut and Wallner by the Schmidt scintillation method (*Sitzber. Akad. Wiss. Wien*, 134, 385(1925)) on the reflection of Ra C  $\alpha$ -particles by the elements Ag to Te showed abnormality. Odd-no. elements (In and Sb especially) have concave absorption curves; even-no. elements (Te, Zn, Cd) have a step in the curve. An explanation for this is the Curie-Joliot effect: atom disintegration with neutron emission. Recent expts. by Matzner have confirmed this opinion. Disintegration with neutron emission can be obtained even for the heaviest elements by Po  $\alpha$ -rays. A glass ball filled with emanation and Zn powder gives as a neutron source an effect 50 times that of Be irradiated with Po. It is concluded that the abnormal curves for  $\alpha$ -ray reflection indicate shortening in range of certain groups; disintegration of atoms by Ra C  $\alpha$ -particles with neutron instead of proton liberation is a general possibility. This conclusion is contradictory to the Gamov nuclear model with a Coulomb potential rise at a distance less than  $10^{-12}$  cm. from the nucleus; nuclear radii of 5 times larger size are to be assumed. B. J. C. van der Hoeve

Atom disintegration by cosmic radiation. J. Barnóthy. *Z. Physik* 85, 201-9(1933).--The discussion of Hoffmann collisions shows that the nuclear cross section for collisions as calcd. from Møller's formula disagrees with

expts. If a suitable nuclear model is assumed even, the largest of the Hoffmann collisions can be explained with the experimentally detd. primary energies. E. G. Steinke. *Ibid.* 210-11.

Egon Bretscher  
Fluctuation measurements of the cosmic radiation. II. W. Messerschmidt. *Z. Physik* 85, 332-5(1933).--The fluctuations of the cosmic radiation, which persist when corrections have been made for the variation of air pressure during the period of observation, can partly be correlated to variations of the earth magnetic intensity. The cosmic-ray intensity increases when the magnetic field decreases. Radiation filtered by 20 cm. Pb does not possess this dependence on the fluctuations of the magnetic field. Egon Bretscher

The absorption of penetrating radiation in water and the analyses of the absorption function. Walter Kramer. *Z. Physik* 85, 411-34(1933).--The absorption measurements of the cosmic radiation in water by Regener (C. A. 23, 2648; 26, 3179) are supplemented by observations in water depths from 0 to 20 m., as R. measured the absorption from 30 to 60 m. It is not possible to represent the absorption curve either by a superposition of exponential functions or by functions obtained by integration of the exponential over a hemisphere if homogeneous intensity of incidence is assumed. Agreement with expt. is obtained if the function calcd. by Kulenkampff (C. A. 24, 547) is used which takes into account the scattered radiation by the Compton process. Four components of different absorption coeffs. are sufficient to satisfy the exptl. figures very satisfactorily. The energies of the radiation calcd. from the Klein-Nishina formula are for the 4 components 6.4, 1.5, 0.65 and  $0.16 \times 10^6$  electron v., if only the external electrons are supposed to scatter. Egon Bretscher

The internal conversion of  $\gamma$ -rays. II. H. M. Taylor and N. F. Mott. *Proc. Roy. Soc. (London)* A142, 215 36(1933); cf. C. A. 27, 896.--Math. If a  $\gamma$ -ray escaping from a nucleus be represented by an electromagnetic wave, there is no equivalence between the loss of intensity of the wave in passing through the K ring and the no. of electrons ejected. The intensity change is generally small, even when the no. of electrons ejected is comparable with the no. of  $\gamma$ -ray quanta emitted. The ratio,  $b/g$ , of electrons to  $\gamma$ -quanta which is observed is found to replace the "internal conversion coeff.,"  $b/(g + b)$ , used in previous calcs. Agreement with expt. in the Ra B region is slightly less good than before; the alteration is negligible for Ra C. Calvin Broun

Separation of the isotopes of hydrogen. C. H. Collie. *Nature* 132, 508-9(1933).--With 10% KOH current densities must be kept below 0.1 amp./sq. cm., but with 0.3% as high as 0.5 amp./sq. cm. may be used successfully. In acid soln., with Pb electrodes, 10 l.  $H_2O$  was reduced to 1 ml. in 3 stages with the attainment of 40%  $H^1$ . The sepn. occurs when the  $H$  ion itself is discharged. Gregg M. Evans

The Allison magneto-optic effect. L. B. Snoddy. *Phys. Rev.* 44, 691(1933).--Preliminary note on modification of original Allison app. to obtain high-frequency oscillations in the spark-gap discharge. The same minima are obtained as formerly, but are sharper.

A. B. F. Duncan  
The isotopes of H by the magneto-optic method. The existence of  $H^1$ . Wendell M. Latimer and Herbert A. Young. *Phys. Rev.* 44, 690(1933).--A new minimum is found in solns. of HCl and HBr in water contg. 2-4%  $H^1$  and is ascribed to  $H^1$ .

A. B. F. Duncan  
Analysis of the long-range  $\alpha$ -particles from Ra C' by the magnetic focusing method. Lord Rutherford, W. B. Lewis and B. V. Bowden. *Proc. Roy. Soc. (London)* A142, 347-61(1933).--The long-range  $\alpha$ -particles from Ra C' have been measured with accuracy by an annular ring magnet and have been analyzed into 11 distinct groups. The corresponding energy levels of the excited nucleus have been deduced with certainty. All the prominent  $\gamma$ -rays may be correlated with these levels if 4 other levels which do not correspond with observed  $\alpha$ -particle groups are postulated. The relative intensities



of the  $\alpha$ -ray groups and the  $\gamma$ -rays show marked variations, which suggests the importance of dividing the  $\gamma$ -rays into the 2 types, dipole and quadrupole, and quantum numbers have been tentatively assigned to the levels.

Morris Muskat

$\gamma$ -Ray radiographic testing. Gilbert E. Doan. *J. Franklin Inst.* 216, 351-85(1933); cf. *C. A.* 27, 5001.

C. K. P. Jeffreys

Extraction of radium from Great Bear Lake pitchblende. R. J. Traill. *Trans. Can. Inst. Mining Met.* 1933 (in *Can. Mining Met. Bull.* No. 257) 448-67; cf. *C. A.* 27, 2876.—The history of Ra production and the principal processes for its extn. are outlined. Two distinct types of pitchblende ores occur. For high-silica pitchblende, the ore is leached with 20% HCl at 90° with const. agitation for 3 hrs. A soln. of  $\text{NaNO}_3$  is added in such a manner that oxidation will not be too rapid nor frothing excessive. The amt. of acid and nitrate required is governed by the compn. of the ore. After a 5-hr. leach, the batch is filtered hot and the residue is washed. While still warm,  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$  are added to the filtrate, agitated and cooled. After agitation for 24 hrs., Ra- $\text{BaSO}_4$  and  $\text{PbCl}_2$  settle and are removed by filtration. A weak acid wash removes U and base-metal chlorides. The washed ppt. is treated with hot brine to remove  $\text{PbCl}_2$ . The residue of Ra- $\text{BaSO}_4$  goes to the refinery. For pitchblende in a carbonate-barite gang, the ore is roasted to 750-800°, ground, leached with HCl for 3 hrs., filtered and washed with hot  $\text{H}_2\text{O}$  to remove Pb salts. From the cooled filtrate  $\text{PbCl}_2$  and  $\text{AgCl}$  are recovered by filtration and U is obtained from the filtrate. The insol. residue of the first filtration, contg. Ra, Ba, Ag and  $\text{SiO}_2$ , is leached with an alk. soln. of NaCN to dissolve Ag. The residue is heated with a boiling soln. of  $\text{Na}_2\text{CO}_3$  to convert the Ra and Ba sulfates to carbonates. After filtration, a HCl leach removes the carbonates and leaves silica. The Ra- $\text{BaSO}_4$  is reprecip. with excess  $\text{Na}_2\text{SO}_4$  or  $\text{H}_2\text{SO}_4$ . After agitation for 24 hrs., they are settled and recovered by filtration.

Alden H. Emery

Action of  $\alpha$ -rays of polonium, of x-rays and of ultra-violet rays on nitrogen iodide and other explosives. Henri Muraour. *Bull. soc. chim.* 53, 612-13(1933).—Neg results were obtained with the action of these radiations on N iodide, picric acid, Pb picrate, trinitrotoluene, nitrocellulose, nitroglycerin and sym diethyldiphenylurea.

Howard Agnew Smith

A micro method for determination of the concentration of ortho-para hydrogen mixtures. A Farkas. *Z. physik. Chem.* B22, 344-9(1933). The usual heat cond. method for detg. the concn of ortho-para H mixts. was modified to enable measurements to be made on quantities as small as 1 cu. mm.

G. M. Murphy

A new method of measuring the intensity of Compton radiation. R. O. Wollan. *Helv. Phys. Acta* 6, 270-3(1933); cf. *C. A.* 27, 4165.

Egon Bretscher

The intensity of x-ray lines formed by irradiation of quadrupoles. Leo Pincherle. *Nuovo cimento* 10, 205-10(1933).—A math. derivation of the intensity ratio between lines due to quadrupole and those due to dipoles. The results applied to the spectrum of W show agreement with expt.

J. B. Austin

X-ray emission characteristic of elements in the gaseous state. K spectrum of xenon (emission and absorption). H. Hulubei and Y. Cauchois. *Compt. rend.* 197, 644-6(1933).—The  $K_\alpha$  and  $K_\beta$  lines of xenon were obtained and the absorption limit was measured. A table of  $L$ ,  $M$  and  $N$  levels of Xe is calcd. from the  $K$  values.

A. B. F. Duncan

X-radiation characteristic of elements in the gaseous state. Feeble rays in the K spectrum of krypton. Y. Cauchois and Horia Hulubei. *Compt. rend.* 197, 681-2(1933).—Kr at a pressure of 6 cm. was excited by electrons from a Lenard-Coolidge tube. The following lines were observed in the K spectrum:  $K\beta_1$ , 863.47 X. U.;  $K\beta_2$ , 864.34;  $K\beta_3$ , 869.04;  $\gamma$ , 872.71;  $K\delta_1$ , 876.68;  $K\delta_2$ , 877.19;  $K\delta_3$ , 881.40.

Gerald M. Petty

The  $K_{\alpha_1}$  doublet of phosphorus. Osvald Lundquist.

*Nature* 132, 518(1933).—The effect of chem. constitution on the  $K_{\alpha_1}$  doublet of P was studied. The emitting substances, excited by x-rays, were violet P, Na hypophosphite, and Na phosphate. Relative to the doublet of the free element the displacements to shorter wave lengths were for the hypophosphite doublet 1.7 X. U. and for the phosphate doublet 2.5 X. U.

C. B.

Weak lines in the L-spectrum from gold (79) to tungsten (74). Herbert Claesson. *Z. Physik* 85, 231-4(1933).—By use of the method of *C. A.* 25, 1155, new weak lines of the L spectra of Au and W corresponding to the transitions  $L_I - N_{IV}$  and  $L_{II} - N_{III}$  are observed.

Egon Bretscher

The influence of the chemical binding on the absorption coefficients of the lighter elements in the region of soft Röntgen rays. R. H. Messner. *Z. Physik* 85, 727-40(1933).—The absorptions of  $\text{H}_2$ ,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{CO}_2$ , CO and air are detd. for the  $K_\alpha$  line of C (44.5 A. U.) and B (68 A. U.). A very definite and systematic influence of the chem. binding on the absorption coeff. is found. The  $Z^4$  and  $\lambda^3$  rule is valid for this spectral region, except for  $\text{H}_2$ , where the exponent is higher.

Egon Bretscher

Photometric methods of reflection of x-rays. I. Comparison of reflective powers of two crystals, by means of standard substance. Piedad de la Cievera and José Lozada. *Anales soc. españ. fis. quim.* 31, 607-15(1933).

The photometric method of measuring abs. intensities of x-rays was investigated. To operate independently of tube conditions which produce the rays, it is necessary to use a standard of comparison, e. g., a Debye Al line. By this method values of  $\rho$  were detd. wholly in accord with theoretical values.

E. M. Symmes

The thermal expansion of certain crystals with large lattices. Helen D. Megaw. *Proc. Roy. Soc. (London)* A147, 198-214(1933).—The expansion perpendicular to the cleavage plane of mica (phlogopite) has been detd., an complete detns. have been made of the thermal expansion of brucite, hydrargillite and  $\text{Ca(OH)}_2$ , by measuring with x-rays the change in lattice spacings between 0° and 100°. The hydroxides show marked anisotropy, the expansion coeff. perpendicular to the layer being greater than that in the layer.

Victor Hicks

Determination of the position of the hydrogen ions in the ammonium chloride lattice by diffraction of electron V. R. Lashkarev and I. D. Uyskin. *Z. Physik* 8, 618-30(1933).—The distance H-N in  $\text{NH}_4\text{Cl}$  is calc. from electron diffraction patterns to be  $0.95 \pm 0.07$  A. U. The  $\text{NH}_4$  radical is assumed to be a rotating tetrahedron.

Egon Bretscher

An x-ray study of *p*-diphenylbenzene. Lucy V. Pickett. *Proc. Roy. Soc. (London)* A142, 333-46(1933); *C. A.* 27, 2861.

*p*-Diphenylbenzene crystallizes in the monoclinic prismatic class with two mols. in the elementary cell with  $a_0 = 8.08$ ,  $b_0 = 5.60$ ,  $c_0 = 13.59$  A. U.,  $\beta = 91^\circ 55'$ . The space group is  $C_{2h}^2(P2_1/a)$ . The results of structure analysis by trial and error and by Fourier analysis indicate that the mol. is planar; that it consists of regular hexagons of carbon atoms 1.42 A. U. apart with probable sepn. of 1.48 A. U. between the hexagons and that its position may be given by rotations of 15° and 34° about the  $b$  and  $c$  axes, respectively, from an origin position in the (100) plane parallel to the  $c$  axis. Probable atomic positions are given.

Victor Hicks

Electrostatic deflection of positive electrons. Je. Thihaud. *Nature* 132, 480-1(1933).—When a source of pos. electrons was placed between 2 magnetic poles in the marginal region of non-uniform magnetic field the pos. particles described a cycloidal path to a recording film placed opposite the source. Application of an electric field displaced the spot by an amt. equal and opposite to the displacement for neg. electrons. The value of  $e/m$  for the pos. electron is therefore of the same order of magnitude as that for the neg. electron.

H. S. F.

Intensities in atomic spectra. M. H. Johnson. *Proc. Nat. Acad. Sci.* 19, 916-21(1933).—Theoretical.

C. C. Kies

Atomic multiplets in stellar spectra. L. M. Donnay. *Bull. sci. acad. roy. Belg.* 19, 755-69 (1933). C. C. K.

Neon absorption lines in stellar spectra. Donald H. Menzel and Roy K. Marshall. *Proc. Nat. Acad. Sci.* 19, 879-81 (1933).—Lines of Ne II have been found in absorption in the spectra of high-temp. stars of classes O and B. Thus Ne takes place with He as a gas of great abundance in the universe. C. C. Kiess

Identification of a certain number of lines observed in the spectra of the sun's disk and spots. P. Swings. *Bull. sci. acad. roy. Belg.* 19, 925-8 (1933).—Sixteen lines of  $Ba^+$  measured and classified by Rasmussen (C. A. 27, 4732) have been identified with faint lines in the disk and spot spectra of the sun. C. C. Kiess

The second spectrum of krypton. T. L. de Bruin, C. J. Humphreys, and Wm. F. Meggers. *Bur. Standards J. Research* 11, 409-40 (1933). The second spectrum of krypton (Kr II) has been selected from various Kr spectra excited in Geissler tubes by noting intensity changes accompanying variations of capacity and inductance in the elec. circuit. This description and analysis of the Kr II spectrum includes estimates of relative intensities and wave-length measurements for 1050 lines extending from 2080.53 Å. U. in the ultra-violet to 10,659.5 Å. U. in the infra-red. Most of these lines (71%) have been classified as combinations of 128 energy levels, 112 of which have been more or less definitely identified with quantum nos. and electron configurations. Zeeman effects are quoted for 102 lines. In addn., 51 lines in the extreme ultra-violet (575.92 to 964.93 Å. U.) are classified as transitions from excited states to the normal ones. The  $s^2p^6$  electron configuration of the normal  $Kr^+$  ion is represented by a doublet P term with level sepp. 5371  $cm^{-1}$ , and the excited states are described by doublet and quartet terms arising from the addn. of *ns*, *np*, *nd*, *nf* electrons to the  $s^2p^6$  group constituting the outer structure of the doubly charged ion ( $Kr^{++}$ ). An absolute value of 198,182  $cm^{-1}$  is derived for the ground level  $s^2p^6P^0_{1/2}$ , which fixes the ionization potential of  $Kr^+$  at approx. 24.4 v. W. F. Meggers

The dispersion of gases and vapors and their interpretation by the theory of dispersion. V. An interferometer for the Schumann region. G. Wolfsohn. *Z. Physik* 85, 366-7 (1933); cf. C. A. 27, 4733.—A Jamin-Mach interferometer with fluor spar plates is described. As the path of light is in vacuum, it can be used down to 1500 Å. U. Measurements of the anomalous dispersion of the Hg line 1850 Å. U. lead to an oscillator strength  $f = 1.3$ . Egon Bretschner

Extinction of the fluorescence of tellurium vapors by magnetic fields. Roman Smoluchowski. *Z. Physik* 85, 191-200 (1933); cf. C. A. 27, 5247.—The resonance series of Te is excited with Hg 4358 and 4046 Å. U. and the quenching effect of a magnetic field is investigated. The effect is different for the various series and the members of the same series. A possible explanation based on calcul. by Lenz and Condou (C. A. 23, 2046) is given. Egon Bretschner

The reversal of the direction of circular polarization of the fluorescence of thallium. W. Hanle. *Z. Physik* 85, 300-3 (1933); cf. C. A. 27, 662.—Light of 3776 Å. U. is passed into Tl vapors. The resonance line 3776 Å. U. and the green line 5300 are emitted. If the primary light is circularly polarized, the ultra violet line has the same sense of polarization, but the green line is polarized in the opposite direction. This is due to the different intensities of the Zeeman pattern components. Egon Bretschner

Probabilities of transition of the lines of the sharp and the diffuse series of thallium. A. Filippov and P. Prokoviev. *Z. Physik* 85, 647-60 (1933). K. B.

The nuclear moment of tin. H. Schuler and H. Westmeyer. *Naturwissenschaften* 21, 660 (1933).—Hyperfine structure was studied on the Sn II lines 4452.79, 6844.26, 5502.92, 5799.35 and 5589.44 Å. U. and it is concluded that the nuclear moments of  $Sn^{117}$  and  $Sn^{119}$  are  $I = -1/2$ , the  $\mu_N/\mu$  ratio is 2030 (from the  $6^3S^1/2$  term). The  $F$  level is reversed for the  $6^3S^1/2$  term of the odd no. of Sn isotopes in agreement with previous results (C. A. 27,

5640) and Kopfermann's results on Kr (C. A. 27, 5640). From the occurrences of magnetic moments only in nuclei of odd at. wt. it is concluded that an unpaired neutron or proton, not an unpaired  $\alpha$ -particle, is responsible. From the appearance of pos. or neg. moments in elements of odd at. wt. and even at. no. it is believed the neutron is more probable. It is possible for this neutron to have magnetic and mech. moments in the same or in opposite directions, probably because of its polarization. B. J. C. van der Hoeven

The magnetic moments of atom nuclei. H. Schuler and H. Westmeyer. *Naturwissenschaften* 21, 674-5 (1933).—Estermann, et al. (*Nature* 132, 170 (1933)) found for the magnetic moment of a proton  $2.5 \times 1/1840 (= 1/736)$  Bohr magnetons instead of  $1/1840$ . By tabulating first the known values for  $\mu/\mu_0$  by Fermi, Segré and Goudsmit for 12 elements or isotopes of odd at. no. and odd at. wt. having 1 proton in the nucleus (besides  $\alpha$ -particles and neutrons) (cf. preceding abstr.) a value of  $1/736$  is closely approximated; for those with an odd no. of neutrons (besides  $\alpha$ -particles) in the nucleus about  $1/2$  of this value is found. Secondly for 9 elements of even at. no. and odd at. wt., odd no. of neutrons, the value of  $\mu/\mu_0$  is near  $1/1840$  or half of this. It is concluded that the magnetic effects of the remainder of the nucleus are small as compared with those of the proton or the unpaired neutron probably because it is built like a crystal with only vibrational motions around fixed points. B. J. C. van der Hoeven

Perturbations in the barium I spectrum. G. O. Langstroth. *Proc. Roy. Soc. (London)* A142, 286-308 (1933).—A photographic method of photometry was used to measure the intensities of the lines in the Ba I multiplets which result from combinations of the  $2^1P$  and  $3^1D$  levels with higher  $^1D$  and  $^1F$  levels. Although individual lines show large departures from the normal intensities, because of mutual perturbations between terms of the same inner quantum no., yet it was found that the sum of the intensities of the lines, when arrayed into enlarged groups with the same  $\lambda$ , is in agreement with the theoretically predicted sum. C. C. Kiess

The Zeeman effect of the hyperfine structure of mercury line 2536 Å. U. A. Zvirionas. *Helv. Phys. Acta.* 6, 273-6 (1933).—Hyperfine component - 25.4 milli-Å. U. of 2536 Å. U. is isolated by the method of Mrozowski and the Zeeman effect stud. with an expl. arrangement similar to that used by Schwein (C. A. 22, 1541). The  $\pi$ -component of line - 8.5 milli-Å. U. is observed. Egon Bretschner

Hyperfine structure and nuclear moment of krypton. Hans Kopfermann and N. Wieth-Knudsen. *Z. Physik* 85, 353-9 (1933); cf. C. A. 27, 5640.—Kr 83 has a nuclear spin of  $7/2$  or more. A neg. magnetic moment is assumed for Kr 83 from the reversal of the order of the terms. The components of the even isotopes coincide with the center of gravity of the Kr 83 lines. Egon Bretschner

The nuclear moments of xenon. Hans Kopfermann. *Naturwissenschaften* 21, 704 (1933).—From hyperfine structure study of a no. of Xe lines it is concluded: (1) The mech. moment of  $Xe^{136} = 1/2$ , that of  $Xe^{131}$  probably  $= 1/2$ . (2) The even no. Xe isotopes (124, 126, 128, 130, 132, 134, 136) do not give split lines. The numerical ratio of  $\mu_{136}/\mu_{131} = 1.1$ ; the former is neg.; the latter is pos. The gravity centers for the lines of all isotopes coincide. B. J. C. van der Hoeven

Nuclear moment of tantalum. J. H. Givoli and P. Zeeman. *Nature* 132, 566 (1933).—The value of  $I = 7/2$  of Grace and MacMillan (cf. *Phys. Rev.* 44, 325 (1933)) is confirmed. Gregg M. Evans

Influence of temperature on absorption in excited mercury vapor. Osamu Masaki. *J. Sci. Hiroshima Univ., Ser. A* 3, 187-92 (1933).—Methods, previously described (C. A. 25, 2362) for measurement of absorption of lines from Hg in the presence of Ne, were extended to cover the range 2300-7000 Å. U. L. P. Hall

The spark spectrum of iron in the extreme ultra-violet. Leon Bloch and Eugene Bloch. *Compt. rend.* 197, 679-80 (1933).—The positions and intensities of 171 lines in the spectrum of Fe between 364 and 1149 Å. U. are reg.

ported. The positions of most of the lines are in fair agreement with those reported by Millikan, Bowen and Sawyer (*C. A.* 15, 1655); the intensities are widely divergent.

Gerald M. Petty  
The spectrum of the doubly ionized neon in the extreme ultra-violet. V. v. Keussler. *Z. Physik* 85, 1-3(1933). The combinations of the Ne (III) ground term  $2p^2P_{0,1,2}$  with  $3s(^4S)^1S_1$ ,  $3d(^4S)^1D_{1,3}$ ,  $3s(^2P)^1P_{0,1,2}$  are observed.

Egon Bretscher  
Wave length of the vacuum spark spectra of carbon, nitrogen and oxygen in the extreme ultra-violet. Bengt Edlen. *Z. Physik* 85, 106(1933).—Lines (1200) of the highly ionized atoms; C(I), C(II), C(III), C(IV), C(V), N(V), N(IV), N(III), N(II), O(VI), O(V), O(IV), O(III), are collected in tables. The wave lengths range from 104 to 1923 Å. U.

E. G.  
The ratio of oscillator strengths of the resonance lines of silver. A. Filippov and I. Islamov. *Z. Physik* 85, 409-10(1933).—From measurements of the anomalous dispersion of Ag vapor the ratio of  $f$ -values for the transitions  $5^2S_{1/2} - 5^2P_{1/2,3/2}$  is  $2.03 \pm 0.06$  in agreement with Fermi's theory.

Egon Bretscher  
The first spark spectrum of gold. Au II. B. V. Raghavendra Rao. *Proc. Roy. Soc. (London)* A142, 118-28 (1933).—Classifications are given for more than 150 lines of Au II between 6456 and 1378 Å. U. About 30 new terms, in addn. to those already known, have been found. Many of them arise from the electron configurations  $5d^9 6d$ ,  $5d^9 6s^2$ , and  $5d^9 6s 7s$ , but a few of them cannot be accounted for theoretically. C. C. Kiess

Probabilities of transition in the diffuse and sharp series of sodium. L. S. Ornstein and J. Key. *Z. Physik* 85, 565-7(1933).

Egon Bretscher  
Series of the alkalis in an electric field. E. Segrè and G. C. Wick. *Nuovo cimento* 10, 211-20(1933), cf. *C. A.* 27, 5245.—The intensity of permitted and prohibited lines in the spectrum of K in an elec. field is calcd. on the basis of forced ionization by a method analogous to that used for H by Lenzos (*C. A.* 25, 4181). The results appear to explain the vanishing of the higher members of the series observed experimentally in high fields (cf. Kulm, *C. A.* 24, 5615).

J. B. Austin  
The arc spectrum of cerium. Paul Karlson. *Z. Physik* 85, 482-503(1933). 540 lines of Ce I are shown to be combinations between 105 energy levels. K. gives the principal quantum no. for each level. The ground term of Ce I is an  $a^1H^0$  term with the configuration  $4f^5d1s^2$ . By using the next higher term  $b^1H^0$  the ionization potential is found to be 6.54 v. by extrapolation. L. R.

Under-water spark spectrum of cerium. J. S. Budani. *Indian J. Physics* 8, 19-25(1933). Measurements were made of the wave lengths of a no. of lines in the under-water spark spectrum of Ce; a 10-foot grating was used.

C. E. P. Jeffreys  
The spectrum of H<sub>2</sub>. The bands ending on  $2p^1\Pi$  levels. III. O. W. Richardson, P. M. Davidson, J. Marsden and W. M. Evans. *Proc. Roy. Soc. (London)* A142, 40-62(1933).—In continuation of previous work (*C. A.* 27, 2878) the bands of H<sub>2</sub> originating in the levels  $4d^1\Sigma_u$ ,  $4d^1\Pi_u$ ,  $4d^3\Pi_u$ , and  $4d^3\Delta_u$ , and terminating on  $2p^1\Pi_u$  are described. In the appendix theoretical values for the energy levels and intensities in the bands are calcd. from the wave mechanics and are found to be in agreement with the observed values. C. C. Kiess

The spectrum of H<sub>2</sub>. The  $3d^1\Delta$  and  $4d^1$  levels. O. W. Richardson and P. M. Davidson. *Proc. Roy. Soc. (London)* A142, 63-76(1933).—The  $3d^1\Delta_u$  levels of H<sub>2</sub> are now established through the bands that originate on it and terminate on  $2p^1\Sigma_u$  and  $2p^1\Pi_u$ . These new bands complete the  $3d^1\Sigma_u\Delta$  group and, from analogy with them, the previously known bands from the 4-electronic states are corrected, extended, and satisfactorily interpreted. These bands are the only ones known in the H<sub>2</sub> spectrum that break the selection rule  $\Delta A = 0$  or  $\pm 1$ , a violation which is theoretically accounted for. C. C. Kiess

The red titanium oxide system in  $\alpha_1$  Herculis. N. T. Hobronnikoff. *Astrophys. J.* 78, 211-18(1933).—In the spectrum of  $\alpha_1$  Herculis 86 bands of the transition

$^3E \rightarrow ^3E$  have been measured between 6292' and 8506 Å. U., including 11 bands of the —2 sequence not hitherto observed in lab. sources. C. C. Kiess

New investigations of the spectra of diatomic molecules of sulfur. M. L. Hubin. *Bull. sci. acad. roy. Belg.* 19, 770-88(1933).—New observations have been made of the fluorescence spectra of S<sub>2</sub> excited by ultra-violet Hg rays. From the new data and from observations by others the formula for the series has been recalcd. and is given as  $\nu = \nu_0 - 728.23 \nu' + 2.09 \nu'^2$ . The formula derived for the heads of the absorption bands of S<sub>2</sub> vapor is  $\nu = 32250.14 + 432.83 (\nu' + 1/2) - 2.93 (\nu' + 1/2)^2 - 730.92 (\nu' + 1/2) + 2.69 (\nu' + 1/2)^2$ . C. C. Kiess

Study of the variation with temperature and pressure of the absorption and fluorescence spectra of diatomic tellurium vapor. M. Migeotte. *Bull. sci. acad. roy. Belg.* 19, 789-808(1933).—From observations of the effect of temp. and pressure on the absorption and fluorescence spectra of Te<sub>2</sub> it was found: (1) that with const. pressure and increasing temp. the higher series members of the  $\nu'$  progressions are brought out in the absorption spectrum whereas in the fluorescence spectrum the higher members of the  $\nu'$  progressions are diminished in intensity; (2) that similar effects appear in both spectra when the pressure of the vapor is varied under const. temp. conditions. Theoretical interpretations of these results are derived from the kinetic theory of gases. C. C. Kiess

Quantization of the Kramers and Pauli model. P. M. Davidson. *Proc. Roy. Soc. (London)* A142, 269-72(1933). It is shown that the quantized motions which the old quantum theory permits in simple Kramers and Pauli diatomic models are not limited to those specified by the original authors. The present quantized motion and their energy formulas offer a close analogy to those given by the wave mechanics for the corresponding mol.

Morris Muskat  
The quantity of ozone in the planetary atmospheres. D. Eropkin. *Compt. rend. acad. sci. (U. R. S. S.)* 1933A 61-9.—Sec. C. A. 27, 3399. C. E. P. Jeffreys

Investigations in the infra-red region of the spectrum IX. The absorption spectrum of chlorine monoxide (Cl<sub>2</sub>O). C. R. Bailey and A. B. D. Cassie. *Proc. Roy. Soc. (London)* A142, 129-41(1933).—By methods the same as in previous work (*C. A.* 26, 5405) the infra-red spectrum of Cl<sub>2</sub>O was explored between 1  $\mu$  and 18  $\mu$ . Four bands were measured at 15.03, 10.28, 8.033 and 7.625  $\mu$ , of which the second is the only one with indication of a Q branch. In a consideration of the structure of the mol. based on various assignments of the fundamental frequencies, the rectilinear form is shown to be untenable and of the triangular form, that with vertical angl 108° is favored. The effect of the isotopes Cl<sup>35</sup> and Cl<sup>37</sup> is considered and is shown to account for the observed envelopes of the bands. C. C. Kiess

New band systems in the gadolinium oxide spectrum Giorgio Piccardi. *Nature* 132, 481(1933).—By photographing the spectrum of Gd oxide as excited by the oxyhydrogen flame, 2 new band systems were found in the blue region, with origins at  $\lambda$  4615.6 Å. U. and 4892.1 Å. U. These systems are very bright at the flame temp but disappear completely at the arc temp.

Helen S. Hopfield  
Theory of coordination bonds. III. Absorption band of complex salts. R. Samuel, A. Abdul Hafiz Khan and Nazir Ahmad. *Z. physik. Chem.* B22, 431-43(1933) (cf. *C. A.* 27, 2095).—The absorption coeffs. of aq. soln. of the following salts were measured: Cr(NH<sub>3</sub>)<sub>3</sub>(NO<sub>3</sub>), Cr(NH<sub>3</sub>)<sub>3</sub>Cl<sub>3</sub>, Co(NH<sub>3</sub>)<sub>3</sub>Cl<sub>3</sub>, Co(NH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>)<sub>3</sub>Cl, Co(NH<sub>3</sub>)<sub>3</sub>Cl<sub>3</sub>, Ni(NH<sub>3</sub>)<sub>3</sub>Br<sub>3</sub>, K<sub>3</sub>TiF<sub>6</sub> and K<sub>3</sub>BeF<sub>6</sub>. A set of empirical rules is presented to explain the absorption curves. G. M. Murphy

Nature and spatial extent of the scattering moment in optically active molecules. Werner Kuhn and Kai Rein. *Z. physik. Chem.* B22, 406-22(1933).—Earlier considerations on the order of magnitude of the anisotropy factor are extended to cases where the scattering moment is assumed to have partly or wholly quadrupole-like characteristics. Earlier difficulties, such as the very wide

extent of the scattering moment in the mol., are removed by this refinement.

G. M. Murphy

**Fluorescence of gaseous formaldehyde.** S. Gradstein. *Z. physik. Chem.* B22, 384-94(1933).—At pressures of 50-100  $\mu$ m. the fluorescence spectrum of  $\text{H}_2\text{CO}$  with monochromatic light is independent of the absorption band used for excitation. This is attributed to collisions during the lifetime of the excited mol. that cause a transition into the vibrationless state of the excited electronic state. The vibrational transitions seem to be the forbidden ones of the Herzberg-Teller selection rules for vibrational transitions (*C. A.* 27, 4170). G. M. M.

The absorption spectra of solutions of iodine bromide, cyanogen iodide and cyanogen bromide. A. E. Gillam. *Trans. Faraday Soc.* 29, 1182-9(1933).—In earlier investigations the absorption spectra of  $\text{CCl}_4$  solns. of the halogens (*C. A.* 23, 4887), and of  $\text{ICl}$  in other solvents (*C. A.* 25, 5091) were studied. Results of an investigation of the related compds.,  $\text{IBr}$ ,  $\text{CNI}$  and  $\text{CNBr}$  along similar lines are now described. Solns. are made with  $\text{CCl}_4$ ,  $\text{CHCl}_3$ , alc.,  $\text{EtOAc}$ ,  $\text{AcOH}$ ,  $\text{HBr}$  and  $\text{HCl}$ . The absorption spectra are detd. photographically, with Hüller E 3 quartz spectrographs and sector photometers, the light sources consisting of an Fe Ni arc in air, and a W spark under water. Absorption curves are plotted showing the molar extinction coeff. as a function of wave length, the concns. being of the order of 0.02 *M*. The results of this and previous work on the absorption spectra of the halogen and inter-halogen compds. in soln. show that  $\text{IBr}$  exhibits dichroism similar to that shown by  $\text{I}$  and  $\text{ICl}$ . The yellow solns. (e. g., in alc.) exhibit an absorption band with a max. near 400  $\mu$ , while the red solns. (e. g., in  $\text{CHCl}_3$ ) absorb similarly about 490  $\mu$ . The  $\text{HBr}$  and  $\text{HCl}$  solns. are different from those in the ordinary org. solvents, the absorption bands being due to  $\text{HBr}_2$  and  $\text{HBrCl}$ , resp., or their anions. The substances  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ ,  $\text{BrCl}$ ,  $\text{ICl}$  and  $\text{IBr}$  exhibit broad unresolved bands of selective absorption in the visible or near ultra-violet. The compds.  $\text{CNI}$  and  $\text{CNBr}$  are practically transparent in these regions but both exhibit end absorption which may be part of a band with a max. below 220  $\mu$ . The substances  $\text{I}_2$ ,  $\text{ICl}$ ,  $\text{IBr}$  and  $\text{CNI}$  exhibit 1 or other of 2 absorption bands according to whether they are dissolved in "saturated" or "unsaturated" solvents (e. g.,  $\text{CHCl}_3$  and alc., resp.). This property had not so far been observed in any other of the above substances, and hence would appear to be exclusive to such of these compds. as contain  $\text{I}$ . This dichroism in the case of  $\text{I}$  has been attributed to the occurrence of solvation by certain solvents, with a corresponding change in absorption spectrum. It would therefore appear that the  $\text{I}$  mol. possesses "residual valency" which makes it capable of forming loose addn. compds. with certain types of solvent mols. The present results show that this residual valency persists even when 1 of the 2 atoms in the  $\text{I}$  mol. is replaced by any one of the radicals  $\text{Cl}$ ,  $\text{Br}$  or  $\text{CN}$ .

W. F. Meggers

**Absorption spectra of a series of organic molecular compounds.** W. H. Hunter and E. H. Northey. *J. Phys. Chem.* 37, 875-87(1933).—Quant. absorption curves in the region 6500-3000  $\text{\AA}$ . U. are given for the following compds.: chloroquinone (I), quinone (II), toluquinone (IK), xyloquinone (IV), duroquinone (V), and for equimol. mixts. of each with dimethylaniline (VI), hydroquinone dimethyl ether, and resorcinol dimethyl ether; I, II, III and V with veratrole and anisole (VII); I and III with *p*-xylene, mesitylene, durene, bibenzyl and tolan. The measurements were made on thin films of molten material in heated cells. The "solvents" affect each quinone in the same order and produce changes ranging from "solvent effects," e. g., VII, to color changes attributed to mol.-compd. formation (VI). The effect of "solvent" increases with increasing quinone oxidation and reduction potential, i. e., from V to I. J. E. A.

**Influence of ultra-violet absorption on the relative intensities of Stokes and anti-Stokes lines in the Raman spectrum.** S. C. Sirkar. *Indian J. Physics* 8, 67-75,

(1933); cf. *C. A.* 26, 1189.—The value of the ratio  $I_{\text{AS}}/I_{\text{S}}$  in the case of the 655 line due to  $\text{CS}_2$ , excited by the 4358-line, was detd. with blackening-log intensity curves obtained with the aid of a standardized W-ribbon lamp for comparison of intensities. The observed value of the ratio indicates the influence of the absorption frequency, and gives the value 1.776 for the factor  $(1 + 4\nu_{\text{vib}}/\nu)^2$ ,  $\nu_{\text{vib}}$  —  $\nu^2$  in the theoretical expression of Placzek.

C. E. P. Jeffreys

**Raman spectrum of gaseous carbon dioxide.** Arthur Adel. *Phys. Rev.* 44, 691(1933).—The prediction that 2 of the 6 lines obtained by Langseth and Nielsen (*C. A.* 27, 1272) were Raman lines of  $\text{CO}_2$  is supported by infra-red measurements of Barker and Wu (unpublished).

A. B. F. Duncan

**The Raman effect. XXVI. The Raman spectra of the methyl and ethyl esters of monobasic fatty acids.** K. W. F. Kohlrausch, F. Köppl and A. Pongratz. *Z. physik. Chem.* B22, 359-72(1933); cf. *C. A.* 27, 3669.—Raman spectra were obtained for the Me and the Et esters of formic, acetic, propionic, butyric, isobutyric, valeric, isovaleric,  $\alpha$ -methylbutyric, pivalic, caproic, isocaproic,  $\alpha,\alpha$ -dimethylbutyric, cnanthic and caprylic acids, methyl pelargonate and methyl caprate. XXVII. The Raman spectra of the esters of formic and chloroformic acids as well as acid chlorides. K. W. F. Kohlrausch and A. Pongratz. *Ibid.* 373-83.—Raman spectra were obtained for the propyl, isopropyl, butyl, isobutyl, secondary butyl, amyl and isoamyl formates, the methyl, ethyl, propyl, isobutyl and isoamyl chloroformates, and the acetyl, propionyl, butyryl, isobutyryl valeryl, isovaleryl,  $\alpha$ -methylbutyryl, pivalyl, caproyl, isocaproyl and  $\alpha,\alpha$ -dimethylbutyryl chlorides.

G. M. Murphy

**The Raman effect in terpene compounds. IV. The terpenes and the terpinolenes.** G. Dupont, J. Lévy and Mlle. Marot. *Bull. soc. chim.* 53, 393-406(1933); cf. *C. A.* 27, 2623.—The dehydration products of terpene or of terpinol were investigated by means of the Raman effect. The products obtained are, namely, cineole, together with dipentene, terpinene, and  $\alpha$ - and  $\gamma$ -terpinolene. Anhyd. ( $\text{COOH}$ ), yields with terpene, the products dipentene and  $\alpha$ -terpinene.  $\text{HCOOH}$ , ( $\text{COOH}$ ), and  $\text{Al}$  with terpinol yield the same compds., with increased proportions of terpinolene. The decompn. of terpenyl acetate yields a mixt. of limonene,  $\alpha$ -terpinene, and terpinolene. Dipentene and terpinene dihydrochlorides yield dipentene and  $\alpha$ -terpinene on removal of the acid chlorides. In addn. to these compds. other products result, as yet unidentified, which contain double bonds. The complete Raman spectra of the products are given when compared with the spectra obtained with the pure compds.

James H. Hibben

**Quantitative measurements of the total spectrum of technical radiation sources.** H. Krefit and M. Pirani. *Z. tech. Physik* 14, 393-411(1933).—Quant. measurements of tech. emission radiation from 0.2 to 10  $\mu$  are obtained by simultaneous use of prismatic resoln. and of filters and thermoelements. The app., calibration, and errors are discussed. Photoelec. cells are used to the near infra-red and thermoelements to the far infra-red. Spectral sensitivity is detd. by means of W ribbon lamps. The spectral characteristics of low-pressure: Na, Hg, Cd, Zn and high-pressure (200, 400, 800 mm.) Hg lamps are described.

Arthur Fleischer

**Dispersion measurements on sodium chloride in the long-wave infra-red region.** C. H. Cartwright and M. Czerny. *Z. Physik* 85, 269-77(1933).—The absorption coeff.  $k$  and the refractive index  $n$  are detd. from measurements of transparency  $D$  of  $\text{NaCl}$  crystals for light from 70 to 125  $\mu$ . As the theoretical formula for  $D$  contains  $n$  and  $k$  a second equation is necessary which is supplied by interference effects due to repeated reflection of the ray on the front and back plane of the crystal plate.

Egon Bretschier

**Absorption spectra of burning hydrocarbons.** A. Egerton and L. M. Pidgeon. *Proc. Roy. Soc. (London)* A142, 26-39(1933).—The ultra-violet absorption spectra

of vapors of alcs., aldehydes, acids, unsatd. hydrocarbons, peroxides, etc., that may be formed during combustion of a hydrocarbon, have been photographed and compared with the absorption spectra of various hydrocarbons undergoing slow combustion. It was found that during combustion the spectra of the hydrocarbons exhibit: (1) continuous absorption in the far ultra-violet down to the limit of the spectrograph at 2000 Å. U.; (2) bands beginning near 3500 Å. U. identified with those of formaldehyde; (3) in the higher hydrocarbons a band of continuous absorption with max. at 2800 Å. U. that makes its appearance in the spectrum before the aldehyde bands.

C. C. Kiess

The action of light on vapors of rubidium iodide. Manohar S. Desai. *Z. Physik* 85, 360-5(1933).—The following 4 regions of continuous absorption have been observed: 3700 Å. U. (77.3 kg.-cal.), 2900 (98.6) 2548 (112.2) and 2150 (133). The first process is a mere dissocn. into normal atoms with an energy of reaction of 78 kg.-cal. in agreement with that calcd. by Born's cycle. The second leads to a normal Rb and excited I atom, the third to an excited Rb and a normal I atom while Rb and I are excited in the last case. E. B.

Quantum yields of the photochemical reactions of phosgene. C. W. Montgomery and G. K. Rollefson. *J. Am. Chem. Soc.* 55, 4025-35(1933).—The quantum yield for the photochem. oxidation of phosgene under the conditions of this study is 1.80; for the phosgene-sensitized oxidation of CO a value of 87-110 was found; from a comparison of the rates of oxidation and reduction, for the photochem. reaction of phosgene and H was obtained a quantum yield of 3.8, corresponding to a time of 2 min.; this figure decreases with time. Mechanisms in accord with the observations are proposed for all of these reactions. For the latter reaction the theoretical rate expression  $d(\text{CO})/dt = kI_0(\text{COCl}_2)[1 + k(\text{H}_2)/(\text{CO})]$  ( $M$ ) is in accord with the exptl. facts. W. E. V.

Phosgene-sensitized oxidation of carbon monoxide. G. K. Rollefson and C. W. Montgomery. *J. Am. Chem. Soc.* 55, 4036-43(1933); cf. preceding abstr.—The phosgene-sensitized oxidation of CO was studied in the full light of a Hg arc. For low O pressures the rate expression was found to be  $d(\text{CO})/dt = kI_0^{1/2}(\text{COCl}_2)^{1/2}(\text{CO})^{1/2}(\text{O}_2)^{1/2}$ ; at higher O pressures it is  $d(\text{CO})/dt = kI_0^{1/2}(\text{COCl}_2)^{1/2}(\text{CO})^{1/2}$ . It is thought that very similar mechanisms will be found to apply to both the Cl- and phosgene-sensitized oxidations. W. E. V.

Decomposition of ethyl chlorothionoformate in the dark and under the action of light. A Berthoud and Daniel Porret. *Helv. Chim. Acta* 16, 930-42(1933). The decompn. of  $\text{CICSORt}$ , prepd. in 2 different ways, is completely unaffected by light. The decompn. is strongly accelerated by dimethylaniline. The temp. coeff. of the thermal decompn. is 3.2 in the temp. range 77-90° and 2.2 between 90° and 98°. E. J. Rosenbaum

Kinetics of the thermal and photochemical reaction between iodine and diazoacetic ester in carbon tetrachloride solution. W. B. S. Newling, L. A. K. Staveley, and E. A. Moelwyn-Hughes. *Trans. Faraday Soc.* 29, 1155-62(1933).—The velocity of this reaction was measured between 25° and 45° by titration with thiosulfate. Because of the interference of subsequent reactions, the initial stages of the reaction were studied chiefly. The initial reaction is bimol. and is accelerated by  $\text{H}_2\text{O}$ . If the reaction which regenerates I is unimportant at first, every activating collision leads to chem. change. Otherwise the efficiency is  $1/\infty$ . Light increases the rate approx. in proportion to the intensity. The quantum efficiency ( $\lambda = 5460$  Å. U.) increases with the initial concn. of I, reaching a limiting value of 2. E. J. R.

"Transmutation" of elements. Oxygen, sulfur, nitrogen, carbon and hydrogen. Mil. Z. Jovitch. *Glas* 142, 22 pp.(Separate); *Chem. Zentr.* 1932, I, 1194.—A report on the exptl. results on "transmutations" (cf. *C. A.* 26, 4230) which are observed as a result of the action of elec. rays on (1) hydrocarbons and their neutral derivs. (aldehydes, alcs., ketones, ethers), (2) H-contg. inorg. compds. ( $\text{H}_2\text{S}$ ,  $\text{AsH}_3$ , H halides), and (3)  $\text{S}_2\text{Cl}_2$ ,  $\text{PH}_3$ ,  $\text{PCl}_3$  and  $\text{SiCl}_4$  (in presence of  $\text{N}_2$ ). "In the first 2 groups pos. H is split off and the residue condenses with itself or with the H nucleus to form new mols. or new at. complexes." In group (3) the halogen probably splits off and the residue then combines with N or a product formed by the action of the elec. rays upon it.

M. G. Moore

Raman effect and chemistry (Lespiau, Gredy) 10. Raman effect and inorganic chemistry (Volkringer) 6. Raman effect with tetranitromethane (Milone) 10. Raman spectra of heterocyclic compds. (Milone) 10. Rotatory dispersion of org. compds. (Hudson, et al.) 10.

Born, Max: *Optik: ein Lehrbuch der elektromagnetischen Lichttheorie*. Berlin: J. Springer. 591 pp. M. 38. Reviewed in *Nature* 132, 371(1933).

Chaffee, E. Leon: *Theory of Thermionic Vacuum Tubes: Fundamentals, Amplifiers, Detectors*. New York: McGraw-Hill Book Co., Inc. 876 pp.

Eggert, J., and Schiebold, E.: *Ergebnisse der technischen Röntgenkunde*. Bd. III. Leipzig: Akad. Verlagsges. 211 pp. Reviewed in *Z. Krist.* 85, 334 (1933). Cf. *C. A.* 24, 4463.

Herzberg, Gerhard: *Die Struktur der Spektren und ihre Bedeutung für die Chemie. Eine Einführung für Chemiker und Physiker*. Dresden: T. Steinkopff. 150 pp. About M. 10.

Device suitable for irradiation of liquids with ultra-violet rays. Gustav Zecher (to General Elec. Co.). U. S. 1,929,910, Oct. 10. Structural features.

#### 4—ELECTROCHEMISTRY

COLIN G. FINK

The basic electric furnace process. E. Mathieu. *Mem. compl. rend. soc. ing. civils France* 85, 1245-9 (1932).—An address.

A. Papineau-Couture

Operation and temperature control of electric furnaces by means of rectifiers. Buchting and H. Klemperer. *Siemens Z.* 13, 300-3(1933).—One of the advantages of the elec. furnace is a close temp. control which is usually effected by elec. regulating devices. Until recently these regulators operated on the principle of opening or closing contacts to provide, in stepwise succession, an increased or diminished power supply. A more uniform power supply can be obtained by using electron tubes as regulators. A resistance thermometer (Pt wire), photoelec. cell or bolometer, installed in the furnace, forms one arm of a Wheatstone bridge. The galvanometer arm is connected to the grid of an electron tube which controls the power input into the furnace. This principle is illus-

trated by various wiring diagrams, and the equipment is described which has been used in com. installations.

E. W. Volkmann

An electric furnace with demountable and interchangeable resistor elements. Maurice Billy and Felix Trombe. *Bull. soc. chim.* 53, 536-41(1933).—Nichrome windings are employed and it is possible to interchange elements during operation.

H. A. Smith

Current density in electrolytic baths. V. Alekseevskii. *J. Chem. Ind. (Moscow)* 1933, No. 6, 36-43.—Calculations are given to show the effect of design of electrodes on c. d.

H. M. Leicester

A laboratory study of asbestos diaphragms used in the electrolysis of aqueous solutions of sodium chloride. S. N. Lur'e, B. I. Rimmer and G. A. Volin. *J. Chem. Ind. (Moscow)* 1933, No. 6, 44-60.—Such diaphragms may be made from Russian materials. H. M. L.

The nature of the dropping-mercury electrode. E. Lange and M. Andager. *Physik. Z. Sowjetunion* 4, 262-5 (1933).—The improbable concn. values, calcd. for the sorption layer by the application of the Gibbs' equation to the observed potentials, leads to the proposal that no equil. exists, but that the velocity of ion transference is the potential-dtg. factor.

Determining the thickness of electrolytic deposits. Marcel Ballay. *Aciers Spéciaux* 8, 240-57 (1933).—The thickness of an electrodeposit can be detd. by means of micrographic examn. but more exactly by measuring the time it takes to dissolve the electrolytic deposit, and from this the thickness of the plate is detd. Many well-known solns. for dissolving each electrodeposited metal are given and discussed. Porosity, corrosion, hardness and brittleness tests are enumerated such as are in com. use in France.

Chromium-plating literature. XVIII. J. H. Decker. *Platers' Guide* 29, Oct. 13-14 (1933); cf. *C. A.* 27, 5649.

Testing chromium plate for resistance to abrasion. R. J. Pierson. *Metal Cleaning and Finishing* 5, 411-14 (1933).—An improved abrasion-testing machine is described.

Measurement of the throwing power of chromium-plating baths. A. Onitschenko. *Z. Elektrochem.* 39, 815-18 (1933).—A right-angled cathode is used, with one side perpendicular and the other parallel to the anode. Removable strips are held in a 3.5 mm. frame which takes the main portion of the current. The quant. effect of  $H_2SO_4$ , c. d., and temp. on the throwing power and current efficiency of Cr baths are investigated (cf. *C. A.* 23, 2664).

The limiting current in the anodic polarization of metals in aqueous solutions. III. Kurt Schwabe. *Z. Elektrochem.* 39, 791-9 (1933); cf. *C. A.* 27, 4739. Expts. show that Zn and Ag in satd. and unsatd. solns. of their chlorides, perchlorates and nitrates may not reach a limiting current with increasing anode potential. The current may increase to a max. limited by the danger of warming, or at const. potential may exhibit periodic fluctuations.

Nickel anodes. Erich Becker. *Metallborse* 22, 1293-4, 1325-6 (1932).—A review.

Chlorine in the lead storage battery. R. L. Shulley and O. W. Brown. *Proc. Indiana Acad. Sci.* 42, 123-6 (1933).—Chlorides in the acid electrolyte react with the  $PbO_2$  of the pos. plates, this resulting in the discharge of the plate and the evolution of  $Cl_2$ . The  $Cl_2$  bleaches the separators on the pos. plate side and shortens their life.  $Cl_2$  dissolves Sb from the pos. grid. During charge the  $Cl^-$  ions liberated on the pos. grid also dissolve Sb. This Sb is carried to the neg. plate where it is deposited as a sponge on the sponge Pb, thereby short-circuiting the plate. The pos. plate upon loss of Sb becomes peroxidized and very brittle. If the contaminated cell stands on open circuit, the  $Cl^-$  is eliminated, the rate depending upon the concn. of electrolyte and the concn. of  $Cl^-$  in the electrolyte. The elimination of  $Cl^-$  is increased by the charging and discharging of the cell.

Rectifiers for the charging of batteries in telephone exchanges. H. John. *Elek. Nach.-Tech.* 10, 386-8 (1933). Hg-vapor grid controlled rectifiers can advantageously be used for the d. c. supply of small telephone exchanges. An arrangement is described in which the rectifier is installed in a manner which permits the automatic supply of current for the recharging of batteries during those hours of the day when only part of the capacity of the rectifier is required for the operation of the telephones. At night the rectifier is shut off and the exchange operates on the energy of the batteries.

The minimum voltage of the electrolytic rectifier as a function of the variables involved. O. Mohr. *Z. Physik* 85, (679-82) (1933).—The min. potential which must be applied to a  $Ta$  or  $Al$  rectifier to obtain a perceptible current increases in proportion with the potential of film

formation. Other factors such as c. d., concn. and type of electrolyte, frequency, etc., are of little effect. E. B.

High-frequency electron tubes with grids as anode rectifiers. J. Kammerloher. *Elek. Nach.-Tech.* 10, 345-52 (1933).—Part of the paper consists of a detailed theoretical treatment of high-frequency electron tubes with grids used for anode rectification. Expts. are recorded the results of which show a good agreement with the theory.

A new rectifier composed of copper sulfide layers. Michel Anastassiades. *Compt. rend.* 197, (677-8) (1933).—A rectifier is made of layers of  $CuS$  and  $Cu_2S$ . The current travels from the  $CuS$  to the  $Cu_2S$ , and is insensible in the opposite direction.

The physical basis of discharges in rectifiers and their control by grids. Max Steenbeck. *Siemens Z.* 13, 251-60 (1933).—Without going into a math. treatment an account is given of all those phenomena which render electron tubes suitable for rectifying and control purposes. The discussion includes high-vacuum tubes with and without gas or vapor loading. Various diagrams and photographs illustrate the functioning of the grid.

New studies of the arc discharge. J. L. Myer. *Trans. Am. Inst. Elec. Engrs.* 1933 (preprint).—The equation  $V = A + B/I^n$  which represents correctly all normal arc characteristics is used as the starting point for a general discussion of arc phenomena and industrial applications. Tests of this equation are applied to Fe arcs in various gas atms. to obtain a series of values for  $A$  and  $B$  making possible certain deductions about arc-voltage variations and significance of the characteristics. In limiting the current exponent  $n$ , the anode temp. must exert considerable influence upon the discharge as a whole. Suggestions are given why this may be so. A value of  $n$  is predicted from the arc stream geometry, and is compared with actual values of  $n$  for various arcs.

Space charge vs. alternating-current corona loss about a conductor. Yoshio Satō. *J. Inst. Elec. Engrs. Japan* 53, 643-53 (1933).—The space charge about a conductor in 50- or 60-cycle corona was studied from the voltage charge cyclograms of a cathode-ray tube, and its effect on the corona loss was investigated. The results were compared with those calcd. from Peek's and Holm's formulas. For smaller conductors the measured and the computed losses coincide, while for larger conductors they do not agree. Addnl. factors which bring about a discrepancy between observed and calcd. values are discussed.

Osram sodium-vapor lamps. M. Reger. *A. E. G. Mit.* 1933, 196-8.—The demand for some artificial light source for the illumination of highways at night has resulted in the development of the Osram Na-vapor lamp. The theoretical disadvantage of the limited color range of Na-vapor light is of no practical importance as has been demonstrated by actual tests on highways. The Na highway lamp consumes 75 w., produces 3000 lumens and is built for operation on 220 v. a. c. It consists of 2 concentric glass tubes of which the inner one is the discharge tube. The outer tube serves for heat insulation. The annular space between inner and outer tube is evacuated. The light-emitting part of the tube is 22 cm. long. A current of 1.15 amps. and 60 v. maintains the discharge between the oxide electrodes. The difference between the voltage of the distributing system (220 v.) and the lamp (60 v.) is taken up by an inductance. In parallel with the main circuit 2 transformers are installed, the secondary windings of which (1.5 amp., 5 v.) are capable of heating the electrodes to discharge temp. When the discharge commences, the voltage across the electrodes decreases to 60 v. which, in turn, diminishes the heating current to such an extent that no further heating takes place. The lamp requires 5 min. to reach its efficient rate of light emission.

Electrodeposition on water service pipes and mains (Hill, et al.) 14. Production and deposition of  $Mn$  (Mur-



ray) 9. Resistor furnace (Ger. pat. 584,389) 19. Rendering fat from tissue (U. S. pat. 1,930,169) 27.

Engelhardt, Victor: Handbuch der technischen Elektrochemie. Bd. III. Elektrolyse im Schmelzfluss. Leipzig: Akad. Verlagsges. 560 pp. M. 52. Cf. C. A. 27, 5653.

**Batteries.** Georg Lüddecke and Graphitwerk Kropfmühl, A.-G. Brit. 395,456, July 20, 1933. Pos. electrodes of batteries are coated with a soln. of fully acetylated cellulose which may contain cellulose or other substances to increase the porosity when the coating is dry. Substances that may be dissolved out of the dried coating may be added to the soln. for the same purpose. In an example a Mn-graphite electrode is dipped in a soln. of cellulose acetate in  $\text{CHCl}_3$  (and alc.), the solvent being then evapd. off. In another example KCl is added to a soln. of the acetate in  $\text{Me}_2\text{CO}$  and alc. and the electrode, after being dipped therein, is dipped into  $\text{H}_2\text{O}$  to ppt. the acetate and dissolve out the KCl. Cf. C. A. 27, 3405.

**Rechargeable batteries.** George Rathbone and Arthur Wyers. Brit. 395,128, July 13, 1933. A battery comprises 2 cells in series, each having a pos. electrode of Cu and a neg. electrode which may be of Mg in a soln. of  $\text{CuSO}_4$ . A holder is provided for the neg. electrodes when the battery is not in use.

**Battery-paste extender.** James O. Johnstone (to Chemical & Pigment Co.). U. S. 1,929,357, Oct. 3. A battery-paste extender for a Pb-acid cell electrode is prepd. by mercerizing cellulose and forming a jelly-like material from it by soaking cellulose fiber material such as cotton or sawdust with a soln. of a Ba compd. such as  $\text{BaS}$  and then adding a soln. of a substance such as  $\text{Na}_2\text{SO}_4$  which reacts with the sol. Ba compd. to form an insol. Ba compd. and a water-sol. alk. compd. with consequent pptn. of the insol. Ba compd. in the mercerized fibers.

**Machine for bending pole strips of galvanic batteries.** Kasimir Baumgarten and Ferdinand Roessler. Brit. 395,598, July 20, 1933.

**Apparatus and method for making zinc covers for galvanic batteries.** Hans Bläsch. Brit. 396,261, Aug. 1, 1933.

**Accumulators.** Drumm Battery Co. Ltd. (formerly Ciba Ltd.) and James J. Drumm. Brit. 394,671, June 26, 1933. A storage battery in which Zn is plated out of an alk. electrolyte is provided with a neg. electrode of Ni, Co or monel metal or having a surface of 1 of these metals, e. g., Ni-plated Fe, the electrode being prepd. for reception of the Zn deposit by being heated in H at a high temp., e. g.,  $1040^\circ$ . Cf. C. A. 27, 5654.

**Accumulators.** Dunlop Rubber Co. Ltd. and Evelyn W. Mudge. Brit. 394,803, July 6, 1933. The plates of an accumulator are embedded in microporous rubber formed *in situ* in the cell and which may be provided with vents for the escape of gas. The rubber filling is obtained by pouring a sensitized latex mixt. over the plates until they are completely immersed and gelling by hot  $\text{H}_2\text{O}$ . Vulcanization is effected by hot  $\text{H}_2\text{O}$  and steam pressure.

**Accumulators.** Charles J. V. Fry. Brit. 395,376, July 13, 1933. To prevent H and O from reaching the pos. and neg. plates the container is divided by partitions into as many compartments as there are plates.

**Gas exit for accumulators.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 394,633, June 29, 1933.

**Continuous automatic electrodeposition apparatus.** Albert Jacob. Ger. 583,039, Aug. 28, 1933. Addn. to 578,475 (C. A. 27, 4178).

**Electrolytic condenser.** Joseph J. Barrett (to Magnavox Co.). U. S. 1,930,578, Oct. 17. In the wall of an electrolytic condenser, a small aperture is provided sealed with a metal of low m. p. such as soft solder for relieving any excessive pressure created within the condenser by volatilizing of the electrolyte.

**Electrolytic condensers.** The General Electric Co. Ltd. and Victor N. Halliday. Brit. 394,485, June 20,

1933. Two foils, of Al or other film-forming material, and an insulating sheet of cambric etc., are folded in a zig-zag manner, the sheets being impregnated with a substance, e. g., a soln. of Na borate that reacts with 1 or both foils to form an insulating film. The fabric layer may be replaced by a no. of raised spots of insulating material, e. g., varnish, applied to the surface of 1 or both foils.

**Electrolytic condensers.** Standard Telephones & Cables Ltd., George W. Clarke and Hugh S. Leman. Brit. 395,416, July 20, 1933. The electrodes are in the form of wires, insulated by porous material impregnated with electrolyte and closely wound together in bifilar fashion either as an open helix or round a former of insulating or magnetic material.

**Electrolytic system for coating wire with a poor conductor.** Radiohorenfabrik G. m. b. H. Ger. 582,251, Oct. 5, 1933.

**Electrolytic cell for production of metals such as magnesium from fused salts.** Alfred C. Jessup. U. S. 1,930,877, Oct. 17. Structural details.

**Electrolytic apparatus for regenerating potassium ferriocyanide used in desulfurizing gases.** Richard Brandt. Ger. 583,012, Aug. 26, 1933. Addn. to 503,118 (C. A. 24, 4994).

**Electrolytic reproduction of plate surfaces.** Howard B. Scott and Charles C. Conley (to National Cash Register Co.). U. S. 1,930,826, Oct. 17. For duplicating the surface of an intaglio grained master plate, to form a graining plate, the back of the master plate is coated with a plating resistant; a film of Ni is electroplated on the face of the master plate; the master plate is anodically treated in a caustic soln. and rinsed; a cortical layer of Ni is electroplated on the nickled face of the master plate; alternate and successive layers of superposed Cu and Ni are electroplated on the exposed side of the cortical layer to form a backing for it, and the cortical layer with its superposed backing layers is stripped as a unit from the master plate to form a "mother" or reverse master plate from which, by a described and generally similar procedure, a graining plate is formed to which a backing layer of Pb is applied by electroplating.

**Electrolytic production of metal sheet.** Anaconda Sales Co. Brit. 395,002, July 7, 1933. Metal is continuously deposited on a rotating cathode drum and is stripped as a foil. To build up the foil by further electrodeposition on 1 face only it is passed over a roller, down 1 face of a guide serving as cathode connection, up the other face and over a roller to successive rollers and guides, traveling in a series of vertical loops between sol. anode without ever passing beneath the anodes. App. is described.

**Apparatus for electrolytic reduction of aluminum.** Konrad Eigenheer (to Aluminium Industrie A.-G.). U. S. 1,930,195, Oct. 10. Various structural and operative details are described.

**Electrolytic surface treatment of aluminum and its alloys.** Charles H. R. Gower and Ernest Windsor-Bowen. Brit. 395,390, July 6, 1933. The metals are treated anodically in a bath contg. an Al salt as an initial component. A suitable electrolyte for a soft coating is obtained by mixing 160 l. dil.  $\text{H}_2\text{SO}_4$ , contg. 2.5 parts acid to 2 parts  $\text{H}_2\text{O}$ , with 20 l. of a 20%  $\text{Al}_2(\text{SO}_4)_3$  soln. a lower strength being used for a hard coating. The voltage may be 80-100 and the temp. 60-65° F. A small quantity, e. g., 1%, of a water-dispersible albumenoid colloid or a carbohydrate or polysaccharide, e. g., dextrin gum tragacanth, gum acacia, agar, etc., is added for soft coatings. Org. dyes or metallic salts imparting color to the coatings may be added or the coated articles subjected to solns. thereof.

**Magnetic electrolytic iron.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 395,505, July 20, 1933. Fe plates for magnetic purposes are deposited by electrolysis under such conditions as to contain C and N in approx. equiv. proportion so that on annealing in a vacuum both impurities are substantially completely removed.

**Beryllium-aluminum alloys.** Emil Baggli and Edwin Burger (Walter Pfau, inventor). Ger. 583,391, Aug. 26, 1933. See U. S. 1,919,379 (C. A. 27, 4744).

**Lead-calcium alloys.** Metallges. A.-G. (Wolhart Sieck, inventor). Ger. 584,399, Sept. 19, 1933. Alloys of Pb with up to 10% of Ca are prepd. by electrolyzing a fused halide of Ca with the use of a cathode of fused Pb to which sufficient addnl. heat is applied to maintain a cathode temp. above 630°, e. g., 650-700°. The cathode should be stirred during the process, e. g., by means of vertically reciprocated perforated disks. The electrolyte may contain more than one halide of Ca, with or without other metal halides, e. g., NaCl. Details are given.

**Electric heating apparatus.** Ole A. Lokke (to Aktieselskapet Elektrisk Bureau). U. S. 1,930,880, Oct. 17, 1933. Between a heat distributing body such as an iron plate and insulation which surrounds elec. resistance heaters such as chrome-Ni wire, a lining of Al is provided which serves to inhibit destruction of the heating wire. Mg, Cr or Mn also may be used.

**Electric crucible furnace suitable for use with salt baths for heat-treating metals.** Hermann Blomberg (to General Elec. Co.). U. S. 1,930,337, Oct. 10, 1933. Various structural and operative details are described.

**Electric muffle oven suitable for dental and general laboratory work.** Angelo D'Amico. U. S. 1,930,836, Oct. 17, 1933.

**Rotary electric annealing furnace.** Rudolf Gautschi. Ger. 584,378, Sept. 19, 1933.

**Tiltable electric annealing furnace.** Demag-Elektrostahl G. m. b. H. Ger. 584,377, Sept. 19, 1933.

**Carbon arc electrodes.** Wm. N. Wilson and The Morgan Crucible Co. Ltd. Brit. 395,073, July 13, 1933. C-rod arc electrodes, undecomposable by H<sub>2</sub>O, are impregnated in the surface stratum only with a H<sub>2</sub>O-resistant material, e. g., cellulose lacquer. The electrode may be coated with metal, e. g., Al, Cu, bronze, in addn. App. is described.

**Inductance coils.** Bertram S. Cohen, Frank O. Barralet and Ernest D. Hebdon. Brit. 394,327, June 15, 1933. The inductance of a coil is increased by spraying magnetic material onto 1 or more sides so as to provide it with a coating of finely divided particles sep'd. by insulating films. The particles may be coated with an insulating film by spraying the metal (Fe or Ni-Fe alloy) through (1) steam or H<sub>2</sub>O. Alternatively the magnetic material and an insulating material, e. g., a 10% soln. of a synthetic resin, may be sprayed simultaneously, or alternate layers of magnetic material and insulating medium may be sprayed to obtain a series of insulated metal films.

**Permeable diaphragms suitable for electroendosmosis.** Henry C. Howard and Ervin S. Kern (to American Anode, Inc.). U. S. 1,929,923, Oct. 10, 1933. Permeable diaphragms comprise undried unvulcanized coagulated rubber occupying the foramina of a foraminous support such as a woven wire screen.

**Electrical purification of gases.** Research Corporation of New York. Brit. 394,899, July 6, 1933. In the elec. pptn. of suspended particles from gases the gas is passed into a pptg. chamber through a no. of gas inlets arranged along its length. The distances between the inlets and (or) the amts. of gas introduced at the different points may be so adjusted that the concn. of suspended matter is substantially uniform throughout the region in which the gas is introduced. App. is described.

**Apparatus for electrical precipitation of suspended particles from gases.** Walther Deutsch (to International Precipitation Co.). U. S. 1,931,436, Oct. 17, 1933. Various structural and operative details are described.

**Preparing adsorptive material such as Barbourite for oil treatment, etc.** Justin F. Wait. U. S. 1,930,572, Oct. 17, 1933. Elec. current is passed between electrodes such as compressed Barbourite in a liquid such as a dispersing oil to form finely divided particles of the material having adsorptive properties, and these particles are purified by injection of H<sub>2</sub> to render them suitable for use in purifying addnl. oil. App. is described.

**Phosphorescent material.** Emil Rupp (to General

Elec. Co.). U. S. 1,930,110, Oct. 30, 1933. In the production of phosphorescent material consisting of a principal material such as NaCl or ZnS and a metallic addn. such as Mn or Cu, a body of the principal material which is a poor elec. conductor is interposed between 2 electrodes composed of the metal desired to be incorporated in the material; the electrodes and intervening material are heated to increase the elec. cond. of the principal material, and a current is passed which effects incorporation of some of the metal of the electrodes in the principal material.

**Apparatus for producing ozone.** Donald Simmons. Brit. 394,504, June 29, 1933.

**Dielectric materials.** Frank M. Clark (to The British Thomson-Houston Co. Ltd.). Brit. 394,776, July 6, 1933. In transformers, switches, condensers, etc., C<sub>6</sub>H<sub>5</sub>Cl<sub>2</sub> is used as the dielectric either alone or mixed with pentachlorobiphenyl, hexachlorobiphenyl or diphenyl oxide.

**Liquid dielectric for transformers, etc.** Frank M. Clark (to General Elec. Co.). U. S. 1,931,373, Oct. 17, 1933. Halogenated cyclic hydrocarbon compds. such as hexachlorobiphenyl and trichlorobenzene are used as dielectric material, and contain sufficient combined halogen in proportion to the H content that gases formed by decomposition of the material in use are substantially non-inflammable.

**Dielectric material suitable for use in transformers, switches, etc.** Frank M. Clark (to General Elec. Co.). U. S. 1,931,455, Oct. 17, 1933. Halogenated compds. of benzene and biphenyl such as trichlorobenzene and hexachlorobiphenyl are used together to provide a mixt. in which the halogen and H may be in substantially equimol. ratio and which is substantially non-inflammable.

**Arc-rupturing in switches.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 394,847, July 6, 1933. To increase the time of interruption of a vacuum switch and thereby reduce the inductive back e. m. f. a trace of rare gas or mixt. of rare gases is added to the chamber, the pressure in which is maintained below 0.1 mm. Hg.

**Dry rectifier.** Otto Irm (to Westinghouse Elec. & Mfg. Co.). U. S. 1,930,519, Oct. 17, 1933. In a dry rectifier consisting of a plurality of oxide-rectifier and contact rectifier units, each oxide-rectifier unit is connected in series with one contact-rectifier unit. Layers used may comprise Cu, Cu oxide, Pb, Mg and Cu sulfide.

**Mercury-vapor rectifiers.** Akt. Ges. Brown, Boveri & Cie. Brit. 395,383, July 6, 1933, and 395,400, July 17, 1933.

**Cathode for mercury-arc rectifier.** Errol B. Shand (to Westinghouse Elec. & Mfg. Co.). U. S. 1,929,656, Oct. 10, 1933.

**Rectifying tube with glow-discharge cathode.** György Szigeti (to Egy. sult. Izzolámpa és Villamosságai R. T.). U. S. 1,929,526, Oct. 10, 1933. For producing a rectifying glow-discharge cathode, a cathode base is coated with W bronze before the sealing-in of the support, and, after sealing in, the base in the tube is exposed to alk. earth metal vapor. Mo bronze also may be used.

**Discharge lamps.** Patent-Treuhand-Ges. für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 394,861, July 6, 1933. A lamp with thermionic electrodes and a filling of a rare gas for starting in addn. to a metal vapor whose pressure during operation is less than the satn. pressure at the temp. of the discharge has a double-walled envelope, neither wall being of conductive material, and the electrodes are arranged in the inner space which is in communication with the outer space.

**Luminous discharge lamps.** N. V. Philips' Gloeilampenfabrieken. Brit. 395,224, July 13, 1933. Structural and elec. features.

**Flash bulbs.** Keishiro Kohayashi (to General Elec. Co.). U. S. 1,930,315, Oct. 10, 1933. Various structural details are described of flash bulbs contg. a highly inflammable filling such as Al or Mg foil in a combustion supporting gas such as O.



## 5—PHOTOGRAPHY

B. P. WIGHTMAN

Recent developments in infra-red photography. Olaf F. Bloch. *Chemistry and Industry*, 1933, 829-37.

E. H.

The topography of the latent x-ray image. Lüppo-Cramer and H. Steps. *Z. wiss. Phot.* 32, 113-28(1933).—From the results of expts. on a no. of German com. plates and films and on 2 emulsions which had not been after-ripened, with x-rays from a 52.5 kv., 7 ma., Siemens & Halske machine, L.-C. and S. conclude that the increase in sensitivity even to x-rays brought about by an exclusively nucleus-producing after-ripening, i. e., one without simultaneous grain-enlargement, and also the diminution in the x-ray sensitivity by desensitizing dyes and by  $\text{CrO}_3$ , prove that the sensitivity of a AgBr plate to x-rays is due in part to the ripening nuclei. These nuclei, moreover, cannot lie very far beneath the surface of the AgBr grain, since both they and the latent x-ray image are extensively destroyed by  $\text{CrO}_3$ . It has been found, in harmony with other results, that pure AgBr emulsions are more sensitive to the action of pure x-rays (i. e., the action when no intensifying screen is present) than the similarly produced AgI-contg. emulsions. For this there is no explanation other than that the grains are always appreciably larger in the former case. E. R. B.

Time lag in the formation of the latent (photographic) image. Lester I. Zimmerman. *J. Optical Soc. Am.* 23, 342-52(1933). See C. A. 27, 3887. G. G.

History of nitrocellulose as a film base. E. Theisen. *J. Soc. Motion Picture Engrs.* 20, 250-62(1933).

Color sensitivity of negative materials. A. Jack. *Phot. Chronik* 39, 11-15(1932).—A tabulation is given of the comparative color sensitivities of several negative materials, manufactured at the present time in Europe. The comparison was made with the Agfa color chart and the tricolor speed chart. G. W. Wilhelm, Jr.

Problem of red sensitizing with chlorophyll. G. Kogel. *Kinetisch* 14, 400-10(1932).—The conclusions of Stoll and Wiedemann (C. A. 27, 727) regarding the constitution of chlorophyll are briefly reviewed. K. believes that  $\beta$ -chlorophyll, which is present in the green leaves, might prove a better red sensitizer than the  $\alpha$ -chlorophyll hitherto tried. The  $\beta$ -chlorophyll is thought to be keto-diketone and to have an open ring in a certain position in which the  $\alpha$ -chlorophyll, a diketone, has a closed ring. M. W. Seymour

The real universal developer. Paul Kühne. *Phot. Rundschau* 69, 252-5(1932).—The following three-soln. developer is suggested: Soln. A.  $\text{H}_2\text{O}$ , 1 l.;  $\text{Na}_2\text{SO}_3$ , 7H<sub>2</sub>O, 140 g.; metol, 14 g. Soln. B.  $\text{H}_2\text{O}$ , 1 l.;  $\text{Na}_2\text{SO}_3$ , 7H<sub>2</sub>O, 100 g.; hydroquinone, 17 g. Soln. C.  $\text{H}_2\text{O}$ , 1 l.;  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , 150 g. Times of development and diln. are tabulated for a large no. of plates, films and papers of several manufacturers. H. D. Russell

Fine-grain development with the A. B. C. universal developer. Paul Kühne. *Phot. Rundschau* 69, 315-16(1932).—The universal developer given in the preceding abstr. was used for a fine-grain developer after the addn. of borax and  $\text{Na}_2\text{SO}_3$ . H. D. Russell

Sceptical opinions on fine-grain developers. Lüppo-Cramer. *Phot. Rundschau* 69, 251-2(1932).—L.-C. believes that the modern fine-grain developers give no finer grain than ordinary developers if comparisons are made, as they should be, at equal gammas and equal densities for equal exposures. The finer grain obtained by using these solns. according to instructions results naturally from the lower gammas obtained. H. Parker, Jr.

The DIN scale: new German measure of photographic sensitivity. Martin Biltz. *Naturwissenschaften* 21, 734-6(1933).—The new DIN system of speed measurement is described and compared with former methods of photographic speed detn. with reference to the following: spectral distribution of light source employed; the type of d. curve obtained, i. e., intensity scale or time scale; and the manner of choosing an exposure value to designate

the speed. The new DIN method uses a daylight source obtained by means of a W lamp and a Davis-Gibson filter; an intensity-scale curve is obtained by means of a step wedge and guillotine shutter; and the speed is based on the energy/sq. cm. required to produce a density of 0.1 above fog. J. H. Webb

Influence of hydrogen-ion concentration on the light-sensitivity of gelatin-free silver bromide. A. I. Rabinovich and C. S. Bogdassaryan. *Z. wiss. Phot.* 32, 97-109(1933).—In continuing the previous investigation (C. A. 27, 673) and by using moist pptd. AgBr and measuring its light sensitivity by the amt. of Ag sepd. (dtd. volumetrically by a modification of the Kiesel method), it is found that the sensitivity increases with increasing  $p_{\text{H}}$ , the increase becoming more rapid above 7.5. The sensitivity increase is especially pronounced for exposures with red light. It is diminished, however, (as is also the general sensitivity of the AgBr) by the presence of an excess of Br ions. Results of potentiometric titrations indicate that this influence of the alky. in increasing light-sensitivity is to be attributed to adsorption of OH ions to the AgBr. E. R. Bullock

Schwarzschild effect for gelatin-free silver bromide. A. I. Rabinovich and C. S. Bogdassaryan. *Z. wiss. Phot.* 32, 110-12(1933).—In varying the intensity of the light source (a 5000-w. Philips Nitra lamp) by altering the distance, and varying the time of exposure between 5 and 540 min., R. and B. find, on the basis of the free Ag produced (cf. preceding abstr.), an av. value of 0.84 for the exponent  $p$  in the Schwarzschild equation as applied to the case of the direct darkening of moist, pptd. AgBr. They conclude that the reciprocity failure of com. emulsions is connected, in part at least, with the Ag halide grain itself. E. R. Bullock

Silver chromate. Lüppo-Cramer. *Z. wiss. Phot.* 32, 129-30(1933).—Prepd. with chloride-free gelatin and sol. chromate in slight excess, distd.  $\text{H}_2\text{O}$  being used throughout, a  $\text{Ag}_2\text{CrO}_4$  emulsion shows, with some yellow fog, a feeble panchromatic (predominantly yellow) sensitivity for phys. development. (On chem. development, an image appears but is quickly buried in fog.) Baths of KI (0.1%), KBr (10%), NaCl (10%) or even Na phosphate (10%) before phys. development act as nucleus denudants, strongly accelerating the development and increasing the ds. With 5%, as compared with 0.1%, KI, much fog and a reversed but more extensive image result. E. R. Bullock

Emulsion gelatin. Erwin Fuchs. *Phot. Ind.* 31, 558-9(1933).—The phys. and photographic properties of gelatins for emulsions are briefly discussed. The photographic properties are largely dependent upon the presence of traces of org. chemicals which promote speed and inhibit the fogging of the emulsion. C. E. Meulendyke

Statistical investigations on the grain of photographic emulsions. S. V. Cherdintzev. *Trans. Optical Inst. (Leningrad)* 9, 3-45(1933).—The size-frequency distributions of the AgBr grains in emulsions have been measured by the photographic process; special rules are used for the classification of sizes. A no. of com. emulsions of Russian and foreign production have been measured. It is found that each emulsion gives a definite frequency curve which can be expressed by 1 of 2 interpolation formulas, of which the following is the more convenient:  $f(x) = k/x \sqrt{\pi e^{-k^2(\ln x - a)^2}}$ , where  $k$  is a const. related to the dispersion,  $a$  is the log. of  $x_m$ , i. e., of the median of the distribution, and  $x$  is the size of grain. In large-grained emulsions the nos. of grains of small sizes do not fit this equation perfectly. It is observed that the crystals of Russian emulsions tend to differ from those of foreign emulsions in that the grains are more cubical in form and also that certain emulsions appear to consist of mech. mixts. of 2 original emulsions. C. E. K. Mees

Dependence of photographic properties of an emulsion

layer on the amount of silver per unit area. V. U. Michailov, R. V. Zouyca, and M. A. Gorochov. *Photochino Chem. Ind.* 3, 24-8 (1933).—As the thickness of coating is increased, the image d. increases until the amt. of emulsion is 7 cc. on a 9 by 12 cm. plate. Analysis shows the amt. of emulsion per plate varies considerably on plates of the same type, both in those prepd. in the Soviet factories and also on imported plates. The min. thickness of coating for  $\text{NH}_4$  emulsions is 4 cc. per plate to give a d. of not less than 2. The work is stated to be preliminary.

C. E. K. Mees

Preparation of a bromide emulsion for paper. A. I. Prilezhaev. *Trans. Optical Inst. (Leningrad)* 9, 46 9 (1933); cf. *C. A.* 27, 920.—The emulsion formula given differs from those already published in that a plain soln. of  $\text{AgNO}_3$  and afterward an ammoniacal soln. is added to the gelatin contg. KBr and citric acid. It is claimed that very large quantities of emulsion have been made by this formula and have proved satisfactory.

C. E. K. Mees

Regeneration of used fixing baths. A. A. Titov and T. N. Kreitzberg. *Photochino Chem. Ind.* 3, 53 7 (1933).—For the regeneration of fixing baths, "Rongalite," Na formaldehydesulfoxylate, is more satisfactory than  $\text{Na}_2\text{S}_2\text{O}_4$ . The reaction should be carried out in alk. soln. and after pptn. of the metallic Ag the fixing bath is suitable for use.

C. E. K. Mees

#### Photographic studies of detonation (Urbaniski) 24.

Color photography. I. G. Farbenind. A.-G. Brit. 395,124, July 13, 1933. Three-color photographic or cinematographic negatives are produced on a pack comprising a lenticular film superimposed on a smooth film, the lenticular film being nearer the objective, with which a 2-color selecting filter of the kind usual in lenticular-screen color photography is associated. The films are so sensitized and the filter colors so chosen that 2-component color-record images are produced on the lenticular film and the 3rd component on the smooth film, the latter being either in continuous tone or in broken tone.

Color photographs. Bela Gaspar. Brit. 395,718, July 17, 1933. Photographic dye images and cinematograph films are produced by treating a diffusely colored, photographic, metal-deposit image, free from metal halide, with an oxidizing agent which decolors the dye at the points free from metal. Ag and Hg images are mentioned. The oxidizing agent should not attack or color the photographic layer itself. Examples of baths for Ag images comprise (1) Ca hypochlorite,  $\text{AcOH}$  and  $\text{H}_2\text{O}$ , (2)  $\text{KBrO}_3$ ,  $\text{NaClO}_3$ ,  $\text{HCl}$  and  $\text{H}_2\text{O}$  and (3)  $\text{KBrO}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{CuSO}_4$  and  $\text{H}_2\text{O}$ . Hardening agents, e. g., alum, may be added to the baths. Simultaneously with the destruction of the dye the Ag image is converted into a salt, e. g., a chlorate or bromate; which dissolves out, or a halide, which may be removed in a dild. fixing-bath or may remain in the layer. Mixed tones may be obtained by using a mixt. of dyes which are destroyed with varying rapidity, e. g., a mixt. of Alizarine Blue and Diamine Fast-Pink G gives a violet color in the deep shadows and a rose color at the lighter points. Alternatively a dye may be used which changes color with oxidation. The effectiveness of the baths may be enhanced by adding catalytically acting salts, e. g., of V, U, Mo or Fe.

Light-sensitive substances. I. G. Farbenind. A.-G. Brit. 394,893, July 6, 1933. Light-sensitive products of unknown constitution are formed by reaction of an ester salt of a leuco-vat dye with a salt of a *N*-nitrosoaryl-hydroxylamine or a nuclear substitution product thereof. Such products may be produced in a layer of binding agent, e. g., gelatin, glue, collodion, already applied on a carrier or they may be formed *in situ* in or on a sheet of paper or cellulose hydrate. They may also be incorporated with the binding agent or in the paper, etc., sheets, e. g., by impregnation. Among examples (1) Na salt of leuco-4,4'-dichloro-5,5'-dibromoindigosulfuric acid ester (I) is converted to the pyridine salt by adding pyridine-HCl and then caused to react with the Na salt of nitrosophenylhydroxylamine; the product, after st

distn., is a  $\text{H}_2\text{O}$ -sol. powder which ppts. the vat dye on heating with dil. acids or on exposure to light; a layer sensitive to ultra-violet and giving a blue positive on printing under a negative is obtained by pouring an aq. soln. of this product, admixed with gelatin, onto a glass plate, etc., and (2) cellulose hydrate sheet is impregnated with an aq. soln. of I, the  $\text{NH}_4$  salt of *N*-nitrosoarylhydroxylamine and glycerol and dried.

Photographic sensitizers. I. G. Farbenind. A.-G. Brit. 396,217, Aug. 3, 1933. Ag halide emulsions, as sensitized to red by incorporating a carbocyanine dye derived from an azole base of formula  $\text{R.N:CMc.S}$ ,

where R is a residue of anthracene, phenanthrene, acenaphthene, fluorene, chrysene, carbazole or diphenylene oxide. The dyes are prepd. by treating a quaternary  $\text{NH}_4$  salt of a thiazole base of the above formula with a trialkyl orthocarboxylic acid ester. They are used as the bromide, iodide, perchlorate, etc., and may be added, e. g., in alc. soln., to the emulsion at any stage of its production or they may be incorporated by coating the cast, but not dried, emulsion layer. Among examples (1) 2-methyl- $\beta$ -anthranthiazole diethyl sulfate is heated in pyridine with triethyl orthopropionate at  $130^\circ$  and 1,1'-diethyl-*meso*-ethylantrathiocarbocyanine bromide pptd. by adding KBr, (2) 2-methylacenaphthenethiazole diethyl sulfate is heated in pyridine with triethyl orthoacetate and 1,1'-diethyl-*meso*-methylacenaphthenethiocarbocyanine bromide pptd. with KBr and (3) 1,1'-dimethyl-*meso*-methylidiphenylene oxide-thiocarbocyanine chloride is prepd. similarly from 2-methyldiphenylene oxide-thiazole dimethyl sulfate. Thiazole bases of the above formula are prepd. by converting an amino deriv. of anthracene, phenanthrene, etc., into the acetyl deriv. and the latter into the corresponding thioacetate compd. which is then oxidized by  $\text{K}_2\text{Fe}(\text{CN})_6$ . In an example acetyl- $\alpha$ -anthramine is treated with  $\text{P}_2\text{S}_5$  in xylene and the product oxidized by alk.  $\text{K}_2\text{Fe}(\text{CN})_6$  to 2-methyl- $\beta$ -anthranthiazole. Alternative methods given are (1) 9-benzyl-3-aminocarbazole is converted into 9-benzoyl-2-aminocarbazolethiazole by the process of Brit. 295,295 (*C. A.* 23, 2301) and this compd. sapon. according to Brit. 306,590 (*C. A.* 23, 5328). The *o*-mercaptamino-carbazole obtained is treated with glacial  $\text{AcOH}$  and  $\text{Ac}_2\text{O}$  to give the 2-methylthiazole compd. and (2) a similar series of operations applied to 2-aminodiphenylene oxide gives the corresponding 2-methylthiazole deriv. These bases are converted to their quaternary salts by known methods.

Sensitizing photographic emulsions. Leslie G. S. Brooker (to Kodak Ltd.). Brit. 394,601, June 30, 1933. Photographic emulsions, particularly Ag halide emulsions, are sensitized by a quaternary salt of a carbocyanine of the general formula  $\text{S.C}_6\text{H}_4\text{NRX:CCH.CACH.C.NH.C}_6\text{H}_4\text{S}$ ,

where A is an alkyl group contg. more than 1 C atom or a substituted alkyl group or (substituted) aryl group, R is an alkyl group and X an acid radical and in which the  $\text{C}_6\text{H}_4$  nuclei may contain 1 or more substituents. In 394,602, June 30, 1933, the dyes are prepd. by condensing a 1-methylbenzothiazole quaternary salt with a trialkyl ester of an orthocarboxylic acid, the acid corresponding to which is an aliphatic acid (contg. more than 2 C atoms), a substituted aliphatic carboxylic acid or (substituted) aromatic carboxylic acid. The  $\text{C}_6\text{H}_4$  nucleus may contain 1 or more substituents and suitable orthoesters are tri-Me orthopropionate, Me di-Et orthocaproate, Me di-Et orthoisocaproate, tri-Me orthovalerate, tri-Me  $\gamma$ -phenoxorthobutyrate, tri-Me phenylorthoacetate, tri-Me orthobenzoate and tri-Me ortho-p-toluate. Reaction may be carried out in boiling pyridine and the use of a 1-methylbenzothiazole quaternary salt contg. an acid radical such as *p*-toluenesulfonate is advantageous; the dye may then be isolated by double decompn. with  $\text{NHLiBr}$ , etc. Among dyes prepd. as examples by condensing the appropriate Me or Et 1-methylbenzothiazole-*p*-sulfonate with the appropriate ortho-ester and decomp. the product with al. alkali

bromide or iodide, are 2,2',8-triethylthiocarbocyanine iodide, 6,5'-dimethyl-2,8',8'-triethylthiocarbocyanine iodide, 2,2'-dimethyl-8-isoamylthiocarbocyanine iodide, 2,2',5,5'-tetramethyl-8-phenylthiocarbocyanine bromide and 2,2'-diethyl-8-p-tolylthiocarbocyanine iodide. The anion acid radical of the dyes may also be alkylsulfate, nitrate, acetate, perchlorate or other anion that does not adversely affect the soly. or sensitizing properties. The orthocarboxylic acid esters are prepd. by passing dry HCl into the acid nitrile, dissolved in a dry Et<sub>2</sub>O-alc. mixt., and causing the resulting imino-ether-HCl, after sepn. and drying, to react with mossy dry alc. Cf. C. A. 27, 2806.

**Photographic anti-halation layers.** I. G. Farbenind. A.-G. Brit. 395,889, July 27, 1933. A photographic film is furnished on its rear side with a thin, anti-halation, colloidal layer colored with non-actinic coloring matter, the layer being rendered detachable in the dry or wet state by pretreatment of the support or by choice of the solvent by which the layer is applied. A layer produced by means of an alk. casein soln., contg. CH<sub>2</sub>O and a coloring matter, is excluded. Suitable colloids comprise albumins, cellulose derivs. or natural or artificial resins. The treatment of the support, e. g., nitrocellulose or cellulose acetate, may consist in decreasing the gelatin content of the soln. of gelatin in glacial AcOH used prior to the application of the colloid layer; or the soln. may contain a solvent, e. g., alc., which exerts only a feeble swelling action. Alternatively, the layer is applied to the support without pretreatment, the solvent for the layer being such as to exert at most a feeble swelling action on the support. Examples are given of (1) a suspension of soot in aq. gelatin soln. applied to an untreated nitrocellulose or cellulose acetate support, (2) a similar suspension applied to a nitrocellulose film treated with a gelatin-AcOH-alc. soln., (3) a celluloid-graphite mixt. dissolved in an Et<sub>2</sub>O-alc. mixt. applied to an untreated cellulose acetate film and (4) a cellulose ether-soot mixt. dissolved in C<sub>2</sub>H<sub>6</sub> and applied to an untreated cellulose acetate film.

**Photographic plates.** Sillb. & Bruckmann und Gebr. Freundorfer G. m. b. H. Brit. 395,818, July 27, 1933. To prevent collodion plates<sup>6</sup> becoming horny when dry the plates, coated with a Ag halide collodion emulsion, are bathed with a soln. contg. a known softening agent, a dye of the quinoline group or ethyl violet and a sol. Ag salt of an inorg. acid, or with a soln. contg. a softening agent, a Ag salt of a dye of the phthalein group and, if desired, also a quinoline dye. If the plate has been previously dyed with a quinoline or phthalein dye it may be bathed with a soln. contg. a softening agent and an alk. Ag soln. In examples (1) a collodion Ag halide plate is bathed with a soln. contg. glycerol, the Ag salt of eosin and a large excess of alkali; (2) a collodion Ag halide plate, which may have been previously dyed with a quinoline dye, is bathed with a soln. contg. glycerol, a strongly alk. soln. of the Ag salt of eosin and an alc. soln. of a quinoline dye, e. g., pinacyanol, or of ethyl violet; and (3) a collodion Ag halide emulsion, dyed with fluorescein, erythrosin or eosin, or with a quinoline dye, or with 2 of these dyes, is treated with a strongly alk. soln. of AgNO<sub>3</sub>. A protective colloid, e. g., gelatin, albumin, albuminates or gums, may be added to the sensitizing soln. or to the Ag soln. to prevent clouding of the plate during drying. Sugar is also mentioned as a softening agent.

**Composite photographs.** Conrad G. Briels Brit. 395,492, July 20, 1933. A process of producing a composite picture embodying 2 or more different parts com-

prises producing an image of 1 component on a sensitive film, of a d. sufficient to exclude transmitted light during the 2nd exposure, exposing the film to the 2nd component, treating this image to produce a d. corresponding to that of the 1st image and treating the composite image so formed to make the image details visible by reflected or by transmitted light. Thus a film is first exposed to the foreground component and the image developed to opacity. An image is then made from the background component in the undeveloped AgBr and developed to opacity. A stop-bath may be used after either development. The composite image illuminated from the front may then be printed on a fresh sensitive surface. Alternatively, it may be treated with KMnO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub> or with CrO<sub>3</sub>, followed by an acid sulfite bath, to remove the Ag image and an opaque backing applied, the undeveloped AgBr forming an image which may be printed on a sensitive film. The undeveloped AgBr may also be developed and the image printed by transmitted light.

**Photographic film.** Oskar Schmidt (to General Elec. Co.). U. S. 1,929,290, Oct. 3. A transparent flexible film comprises a carrier consisting of a flexible condensation product of a polyhydric alc. such as glycerol and a "polybasic" acid such as phthalic anhydride on which the light-sensitive layer is placed.

**Non-halation photographic film.** Albert Narath (to General Elec. Co.). U. S. 1,929,254, Oct. 3. The rear face of the film is roughened and there is applied to it a light-absorbing substance such as carbon powder.

**Two photographic images of different contrasts on a single film with a single development.** John G. Capstaff (to Eastman Kodak Co.). U. S. 1,930,141, Oct. 10. A single sensitive Ag halide emulsion layer is exposed to one light image, the layer is then submitted to the action of an oxidizing agent such as a dil. chromic acid soln. and it is then exposed to a second light image, and both images are developed simultaneously.

**Combined sound and color picture films.** I. G. Farbenind. A.-G. Brit. 393,844, June 15, 1933. Sound is recorded photographically on a bi-pack in which 2 films are united with their light-sensitive emulsion layers adjacent to each other but sepd. by a filter layer dyed with a color complementary to a color to which 1 of the emulsions is sensitized. The film bearing the special color-sensitive layer is arranged nearer the objective, the sound being recorded on said film through its support. Erythrosin may be used for sensitizing the emulsion layer thereof to the yellow-green, a red filter layer of an alc. soln. of aurin being applied to the emulsion layer. A panchromatic emulsion is used for the 2nd layer.

**Electrical apparatus for embossing or goffering films for color photography, provided with thermostatic control** Keller-Dorian Colorfilm Corp. Brit. 395,200, July 13, 1933.

**Acid hardening photographic fixing bath.** Reinhold S. Becker (to Eastman Kodak Co.). U. S. 1,930,140, Oct. 10. An aq. soln. of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> is used contg. also a sulfite, a hardening agent such as K alum, boric acid and a compd. such as HIOAc or NaOAc supplying acetate ions in a quantity over 1% (the concn. of the boric acid being at least half that of the acetate ions).

**Bromide recovery from spent photographic developers** Kenneth C. D. Hickman and Walter J. Weyerts (to Eastman Kodak Co.). U. S. 1,930,143, Oct. 10. Spent developers contg. bromides are electrolyzed with use of a Ag anode until substantially all the Br has been deposited on the anode.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

• Essential character of the Raman effect and its application to inorganic chemistry. Henri Volkringer. *Bull. soc. chim.* 53, 445-68 (1933).—A review of the exptl. and theoretical aspects of the application of the Raman effect, to inorg. chemistry. • Howard Agnew Smith

The characteristics of praseodymium. Bohuslav Brauner. *Collection Czechoslov. Chem. Communications* 5 279-86 (1933).—Pr<sub>2</sub>O<sub>3</sub> can be obtained pure as follows The mixed rare earth NH<sub>4</sub> nitrates, with 6 times their wt of a mixt. of NaNO<sub>3</sub> and KNO<sub>3</sub>, are fused at 350° for some

time. All the Fe and Ce sepd. as  $\text{Fe}_2\text{O}_3$  and  $\text{CeO}_2$ . The ppt. is washed with concd.  $\text{NH}_4\text{NO}_3$  soln. and the filtrate evapd. to dryness. The residue is fused at  $415^\circ$  when  $\text{Pr}_2\text{O}_3$  seps. as a black mass which is free from La. The at. wt. of Pr is 140.94. Green  $\text{Pr}_2\text{O}_3$  forms salts with acids.  $\text{Pr}_2\text{O}_3$  evolves  $\text{O}_2$  with acids to form trivalent salts; therefore it is not a true peroxide and Pr must be quadrivalent. An oxide,  $\text{Pr}_2\text{O}_{18}$ , was shown to be a salt of the other two oxides. John B. Milbury

**Bivalent rhodium.** Hans Reihlen and Werner Huhn. *Z. anorg. allgem. Chem.* 214, 189-95 (1933).—If a soln. of  $\text{RhCl}_3$  and  $\text{Na}_2\text{SO}_3$  is heated on a water bath 0.5-10 hrs.  $\text{Na}_2[\text{Rh}(\text{SO}_3)_2] + x \text{Na}_2\text{SO}_3$  seps. as a yellow ppt. It is insol. in  $\text{H}_2\text{O}$  and org. solvents; it is sol. in dil.  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{C}_2\text{O}_4$ ; it is not reduced by  $\text{N}_2\text{H}_4$  nor oxidized by cold  $\text{I}_2$ . B. A. Soule

**Revision of the atomic weight of tellurium. II. Synthesis of silver telluride.** O. Hönigschmid. *Z. anorg. allgem. Chem.* 214, 281-8 (1933).  $\text{Ag}_2\text{Te}$  was prepd. by heating a weighed quantity of Ag in Te vapor. From the relationship  $\text{Ag}_2\text{Te} \cdot 2\text{Ag} = 1.591416$ , the at. wt. of Te is 127.61. H. Stoertz

**Recent investigations on borates and boron.** L. Hackspill. *Helv. Chim. Acta* 16, 1099-118 (1933).—A review of recent work on (1) borates: their formulas, nomenclature, prepn. and hydrates; (2)  $\text{BCl}_3$  and its systems with  $\text{Cl}_2$ ,  $\text{HCl}$  and  $\text{AsH}_3$ ; (3) B: its prepn. and properties. B of high purity was prepd. by passing a high-frequency arc through a mixt. of  $\text{BCl}_3$  and  $\text{H}_2$  with W electrodes. J. H. Reedy

**The second monoclinic and the rhombohedral modification of sulfur.** O. v. Deimes. *Z. anorg. allgem. Chem.* 214, 330-4 (1933).—One can no longer assume that the monoclinic S obtained from solns. is other than the familiar  $S_8$  obtained from molten S, even if the crystal angles of the crystals obtained from soln. have not been measured. The unique characteristic of this S is the transformation into  $S_8$ . H. Stoertz

**Iodine in aqueous ammoniacal solution.** Eugen Churnoaga and Eugenia Churnoaga. *Z. anorg. allgem. Chem.* 214, 167-76 (1933).  $\text{I}_2$  is vigorously shaken with hot aq.  $\text{NH}_3$ ,  $\text{N}_2$  is evolved and a soln. obtained contg.  $\text{I}_2 + \text{NH}_4\text{I}$ , also traces of  $\text{NH}_4\text{IO}_3$ . The data for one sample, in g./100 cc. of soln., are:  $\text{NH}_3$ , 2.0;  $\text{I}_2$ , 9.24;  $\text{IO}_3^-$ , 0.05;  $\text{I}^-$ , 8.66. The  $\text{I}_2$  is colloidal but cannot be removed by dialysis through a collodion membrane. B. A. Soule

**Pseudohalogens. XXII. The reactions of metallic salts with iodine and bromine in the presence of benzene.** Lothar Bickenbach and Josef Goubeau. *Ber.* 66B, 1280-7 (1933); cf. C. A. 27, 66.— $\text{AgClO}_4$ ,  $\text{AgNO}_3$ ,  $\text{AgNO}_2$ ,  $\text{AgIPO}_4$ ,  $\text{AgOAc}$  and  $\text{AgIPO}_4$  with  $\text{I}_2$  and  $\text{C}_6\text{H}_6$  gave  $\text{C}_6\text{H}_5\text{I}$  in varying yields.  $\text{AgCl}$  gave no reaction. Similarly  $\text{Hg}^{++}$  and  $\text{Au}^+$  salts reacted;  $\text{Cu}^+$  and  $\text{Cu}^{++}$  reacted slightly and  $\text{Zn}^{++}$ ,  $\text{Cd}^{++}$ ,  $\text{Tl}^+$  and  $\text{Pb}^{++}$  gave no reaction.  $\text{AlCl}_3$ , known to hasten such reactions, speeded up those shown to occur but gave no reaction in the other cases.  $\text{Br}_2$  similarly failed to give reaction of the inactive group.  $\text{CaO}$ ,  $\text{Na}_2\text{CO}_3$  and  $\text{NaClO}_4$  do not cause reaction. The reaction is associated with non-polar compds.; intermediate types show partial reaction. Removal of acid formed, by  $\text{CaO}$  or  $\text{Na}_2\text{CO}_3$ , does not cause reaction, indicating that it is not a very slow reaction in that case. Various side reactions which occur are described. Foster Dee Snell

**Hydrazinate of silver halide.** H. Gall and H. Roth. *Z. anorg. allgem. Chem.* 214, 201-8 (1933).—In continuation of previous expts. (cf. C. A. 26, 5509), the prepn. of  $\text{N}_2\text{H}_3\text{AgCl}$ ,  $\text{N}_2\text{H}_3\text{AgBr}$ ,  $\text{N}_2\text{H}_3\text{AgI}$ ,  $\text{AgClC}_6\text{H}_5\text{NHNH}_2$ ,  $\text{AgBrC}_6\text{H}_5\text{NHNH}_2$  is described. M. McMahon

**Reducibility of beryllium chloride with metallic aluminum.** Walter Kangro. *Metall u. Erz* 30, 389-90 (1933).— $\text{BeCl}_2$  can be reduced to Be by Al, even at temps. low enough (200-300°) to prevent volatilization of the costly  $\text{BeCl}_2$ . Hellmut Fischer and Newton Peters. *Ibid.* 390-1. — $\text{BeCl}_2$  was reduced with Al in an atm. of  $\text{H}_2$ . At 260°, 12-17% reduction had occurred in 30 min. and at 350°, 30-40%. Special precautions must be taken to prevent

oxidation, such as weighing and mixing the  $\text{BeCl}_2$  and Al in  $\text{CO}_2$ . H. Stoertz

**Preparation of germanium tetrachloride from germanite.** F. Stienstra. *Chem. Weekblad* 30, 706-9 (1933).— $\text{GeCl}_4$  can be prepd. from germanite by treating the mineral with a  $\text{HNO}_3$ - $\text{H}_2\text{SO}_4$  mixt. The  $\text{GeO}_2$  formed is dissolved in  $\text{HCl}$  and the  $\text{GeCl}_4$  distd. in a Cl current. From 10 kg. germanite 1340 g.  $\text{GeCl}_4$  was obtained. E. Schutte

**Some reactions of rhenium chloride.** W. Geilmann and Fr. W. Wrigge. *Z. anorg. allgem. Chem.* 214, 248-60 (1933).—The hydrolysis of  $\text{ReCl}_5$  in  $\text{H}_2\text{O}$  can be followed with cond. measurements. There is complete change of  $\text{ReCl}_5$  into  $\text{Re}_2\text{O}_7 \cdot \text{H}_2\text{O}$  and  $\text{HCl}$ .  $\text{ReCl}_5$  is reduced to the metal by  $\text{H}_2$  without the formation of lower chlorides. On heating  $\text{ReCl}_5$  with  $\text{O}_2$ ,  $\text{ReOCl}_4$  and  $\text{ReO}_2\text{Cl}$  are formed. In acid,  $\text{H}_2\text{O}$ -sol.  $\text{ReCl}_5$  is stable toward  $\text{O}_2$ .  $\text{ReCl}_5$  decomposes on heating in dry  $\text{N}_2$  into  $\text{ReCl}_4$  and  $\text{Cl}_2$ ; in  $\text{O}_2$ ,  $\text{ReOCl}_4$  and  $\text{ReO}_2\text{Cl}$  are formed.  $\text{ReCl}_5$  reacts with alkali with the formation of  $\text{ReO}_2 \cdot \text{H}_2\text{O}$  and perchlenate; with acids mixts. of  $\text{HReO}_4$ ,  $\text{H}_2\text{ReCl}_6$  and free Cl appear. In the thermal decompn. of  $\text{Ag}_2\text{ReCl}_6$  equal mol. amts. of  $\text{ReCl}_4$  and  $\text{ReCl}_5$  are formed;  $\text{ReCl}_4$  cannot be isolated. M. McMahon

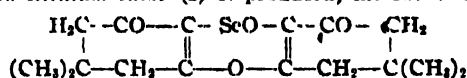
**Rhenium trichloride.** Wilhelm Geilmann, Friedr. W. Wrigge and Wilhelm Biltz. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse No. 5*, 579-87 (1932).—Chlorination of Re produces a mixt. of  $\text{ReCl}_3$  and  $\text{ReCl}_4$  from which the former can be obtained in pure state by sublimation at  $450^\circ$ . In aq. soln.  $\text{ReCl}_3$  is only slightly ionized. Hydrolysis takes place slowly with the formation of a black hydrated oxide, possibly  $\text{Re}_2\text{O}_7$ . Insol. double salts are formed with  $\text{RbCl}$  and  $\text{CsCl}$ . In liquid and aq.  $\text{NH}_3$  a violet ammoniate is formed. The salt is oxidized slowly by strong oxidizing agents; with  $\text{H}_2\text{S}$ ,  $\text{Re}_2\text{S}_7$  is formed, Zn in acid soln. removes part of the Cl. When strongly heated, especially in the presence of KCl, decompn. into metallic Re and  $\text{ReCl}_4$ , or  $\text{K}_2\text{ReCl}_6$ , takes place. H. P. Johnstone

**Rhenium trioxide and rhenium dioxide.** Wilhelm Biltz. *Z. anorg. allgem. Chem.* 214, 225-38 (1933).—Supplementary data (cf. C. A. 26, 5025, 5238) are presented on the prepn., crystal structure, elec. cond. and magnetic behavior of  $\text{ReO}_3$  and  $\text{ReO}_2$  and on the density and thermal decompn. of  $\text{ReO}_3$ . The action of alkali fusions on  $\text{ReO}_3$  and  $\text{ReO}_2$  and of  $\text{NaOH}$  soln. on  $\text{ReO}_3$  is reported with tabulated results. The existing oxides and chlorides of Re and Mn are compared. M. McM.

**Rhenium sesquioxide  $\text{Re}_2\text{O}_5$ .** W. Geilmann and Fr. W. Wrigge. *Z. anorg. allgem. Chem.* 214, 239-43 (1933).—The prepn. of a somewhat pure  $\text{Re}_2\text{O}_5$  from  $\text{ReCl}_5$  can only be accomplished with the greatest possible exclusion of air because of its ready oxidation to perchlenate. Thus far it has been impossible to obtain pure, dry  $\text{Re}_2\text{O}_5$ . M. McMahon

**Rhenium pentachloride.** Wilhelm Geilmann, Friedr. W. Wrigge and Wilhelm Biltz. *Z. anorg. allgem. Chem.* 214, 241-7 (1933).—Contrary to previous literature,  $\text{ReCl}_5$  and not  $\text{ReCl}_4$  can be obtained in the pure state.  $\text{ReCl}_5$  obtained by heating Re metal in a stream of Cl is brownish black; its vapors are dark brown; at atm. pressure it cannot be volatilized undecomposed; even on melting some decompn. occurs. M. McMahon

**Action of selenium dioxide and of selenium oxychloride on methon.** Hellmuth Stamm and Kurt Gossraß. *Ber.* 66B, 1658-63 (1933).—By addn. of  $\text{SeO}_2$  to methon (1,1-dimethylhydrosorcinol) in  $\text{MeOH}$ , anhydro-dimethon-selenium oxide (I) is produced, m.  $167^\circ$ . Addn.



of  $\text{Br}_2$  to I in  $\text{MeOH}$  gives 4,4-dibromomethon.  $\text{H}_2\text{Se}$  and  $\text{H}_2$  reduce I, probably to anhydro-dimethon-selenite; air again oxidizes it to I.  $\text{N}_2\text{O}_5$  oxidizes a  $\text{CHCl}_3$  soln.

of I to anhydro-dimethonselenon (II),

$$\begin{array}{c} -\text{C}-\text{SeO}_2-\text{C}- \\ | \quad | \\ \text{C}=\text{O} \quad \text{O}=\text{C} \end{array}$$

decompn. pt.  $150^{\circ}$ .  $\text{SO}_2$  reduces II to I.  $\text{SeOCl}_2$  reacts with methon in  $\text{CCl}_4$  to give 4-chloromethon monohydrate. It is suggested that the completeness of the reaction of methon with  $\text{SeO}_2$  offers promise as a quant. method of estn. of  $\text{H}_2\text{SeO}_3$  and its salts. F. D. S.

**Iodine pentoxide and its hydrates.** II. E. Moles and A. Parts. *Anales soc. españ. fis. quim.* 31, 618-22(1933); cf. C. A. 26, 5821.—If I is oxidized by fuming  $\text{HNO}_3$ , the product evapd. to dryness and recrystd. from 50-60%  $\text{HNO}_3$  soln., well-formed, tabular, shining crystals of  $3\text{I}_2\text{O}_5 \cdot \text{H}_2\text{O}$ , but no  $\text{HIO}_3$ , are obtained.  $3\text{I}_2\text{O}_5 \cdot \text{H}_2\text{O}$ , on dehydration, acts quite differently from the anhyd. product obtained by breaking down ordinary  $\text{HIO}_3$ . Dehydration to  $\text{I}_2\text{O}_5$  is not quant., since there is always decomn. The  $d_{20}^{20}$  of  $\text{I}_2\text{O}_5 \cdot \text{H}_2\text{O}$  is 5.074 so that the mol. vol. of  $\text{H}_2\text{O}$  of ordinary  $\text{HIO}_3$  is 13, a value fairly well in accord with other investigations. E. M. Symmes

**Chlorine hexoxide and chlorine trioxide.** C. F. Goodeve and F. A. Todd. *Nature* 132, 514-15(1933).—Mol. wt. detns. of Cl hexoxide have previously been made only in soln. and correspond to the formula  $\text{Cl}_2\text{O}_6$ . Expt. shows that in the gaseous state the compd. exists entirely as  $\text{ClO}_3$ . It is assumed to be assocd. in the liquid phase as  $\text{Cl}_2\text{O}_6$ . Calvin Brous

**Active oxides. LVI. Absorbing power of zinc oxalate, partially decomposed by heat, toward methanol vapor.** Gustave Hüttig and Alexandre Meller. *Chimie & industrie Special No.*, 788-92(June, 1933); cf. C. A. 27, 1560.—The MeOH-adsorption isotherms were detd. for  $\text{ZnC}_2\text{O}_4$  and the residue remaining after heating the salt at  $405^{\circ}$  for 14-240 min. exhibits marked adsorptive power, which increases as the degree of decomn. increases, reaching a max. for a mol. ratio of 1 ZnO to 0.105  $\text{C}_2\text{O}_4$ . The adsorptive power of pure ZnO obtained by heating  $\text{ZnC}_2\text{O}_4$  at  $405^{\circ}$  for 7 hrs. is practically the same as that of the original  $\text{ZnC}_2\text{O}_4$ ; that of calcined ZnO is almost nil. Complete bibliography of II. and coworkers' investigations on active oxides. A. Papineau-Couture

**The combination of calcium in the system: lime-titanium dioxide and in lime-silicon dioxide-titanium dioxide.** Isidro Parga-Pondal and Karl Bergt. *Anales soc. españ. fis. quim.* 31, 623-37(1933).—In the system  $\text{CaO-TiO}_2$ , if CaO is present in sufficient quantity or in excess,  $\text{CaO-TiO}_2$  forms up to  $1300^{\circ}$ , but at  $1400^{\circ}$   $3\text{CaO} \cdot \text{TiO}_2$  is formed. Melting corresponding raw mixts. in the oxyacetylene flame indicates the existence of titanates rich in CaO. In the system  $\text{CaO-SiO}_2\text{-TiO}_2$ , with gradual substitution of  $\text{SiO}_2$  by  $\text{TiO}_2$  the CaO combination at first rises, then falls. At low temps. and low  $\text{TiO}_2$  contents the CaO combination is facilitated. There is no evidence of formation of double compds. between Ca silicates and Ca titanates. E. M. Symmes

**Calcium aluminate. III. The crystallization of calcium aluminate solutions at  $90^{\circ}$ .** Gunnar Assarsson. *Z. anorg. allgem. Chem.* 214, 158-66(1933); cf. C. A. 26, 4004.—The products obtained were identical in compn. with those isolated at  $40^{\circ}$ . B. A. Soule

**Chemical constitution of hydrated calcium aluminates.** Paul Erculisse and S. Sapgir. *Chimie & industrie Special No.*, 806-19(June, 1933).—The theory of thermodynamic methods of investigating the chem. constitution of hydrated Ca aluminates is explained. From preliminary expts., which are described in detail, the existence of a compd. or of a solid soln. of the compn.  $\text{Al}_2\text{O}_3 \cdot 4\text{CaO}$  seems probable, but not that of  $\text{Al}_2\text{O}_3 \cdot 2\text{CaO}$ . The existence of  $\text{CaAl}_2\text{O}_6 \cdot \text{aq.}$  is indicated. A. Papineau-Couture

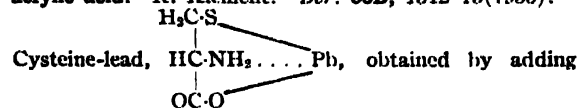
**Change of constitution of tricalcium orthophosphate after fusion.** A. Travers and Baucr. *Helv. Chim. Acta* 16, 918-22(1933).—See C. A. 27, 4186. G. G.

**The double nitrate of copper and ammonium.** Jaroslav Milbauer and Josef Doškač. *Chimie & industrie Special No.*, 787(June, 1933).—The product obtained by mixing solns. of  $\text{Cu}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$  and  $\text{NH}_4\text{NO}_3$  is not a true double salt, but is merely  $\text{NH}_4\text{NO}_3$  contg.  $\text{Cu}(\text{NO}_3)_2$  occluded or entrained in the course of crystn. A. P.-C.

**Oxidation of thalious salts to thallic and reduction of the thallic salts with sodium arsenite.** F. Čuta. *Collection Czechoslov. Chem. Communications* 5, 287-301

(1933); cf. C. A. 17, 2684.—The purpose of this work was to find the conditions under which the reaction,  $\text{Ti}^{+++} + \text{AsO}_3^{--} + \text{H}_2\text{O} \rightarrow \text{Ti}^{IV} + \text{AsO}_4^{--} + 2\text{H}^+$ , is quant.  $\text{Ti}_2\text{CO}_3$ , recrystd. until shown pure by titrating with acid, was used as a standard. It was oxidized with aq.  $\text{Br}_2$  in  $\text{HCl}$  soln. and the excess  $\text{Br}_2$  expelled on a water bath. The use of other acids in the oxidation, without a sol. chloride, gave low results, because of the partial reduction of the  $\text{Ti}^{+++}$  while heating to expel the  $\text{Br}_2$ . The addn. of a sol. chloride to these solns. prevents reduction by the formation of  $\text{TiCl}_4$ . After the  $\text{Br}_2$  was expelled, an excess of  $\text{Na}_2\text{AsO}_3$  was added, the soln. warmed for  $\frac{1}{2}$  hr. and back titrated with  $\text{I}_2$ . The reduction was carried out in acid,  $\text{NaHCO}_3$ , and basic solns. with equally good results. The mean error for the detn. of Ti by this method was about 0.2%. J. E. M.

**Lead compounds of glycocoll, cysteine and thiohydra- acrylic acid.** R. Kliment. *Ber.* 66B, 1312-15(1933).—



0.25 g. of freshly pptd.  $\text{Pb}(\text{OH})_2$  to 0.25 g. of cysteine and 0.35 g.  $\text{Na}_2\text{CO}_3$  in 20 cc.  $\text{H}_2\text{O}$ , or by treating cysteine-sodium with  $\text{Pb}(\text{OH})_2$ , is identical in properties and compn. with the substance described by Bauer and Burschkes (C. A. 27, 5059). By the action of thiohydraacrylic acid either with  $\text{Pb}(\text{OAc})_2$  or with  $\text{Na}_2\text{CO}_3$  and freshly pptd.  $\text{Pb}(\text{OH})_2$ , a lead salt,  $\text{Pb}(\text{SCH}_2\text{CH}_2\text{CO}_2)\text{Pb}(\text{I})$ , is obtained. I, heated with 20 cc. of 2 N  $\text{Na}_2\text{CO}_3$ , gave  $\text{PbCO}_3$  and  $\text{SCH}_2\text{CH}_2\text{CO}_2\text{Pb}$ . Louise Kelley

**Manganous sulfates.** F. Hammel. *Compt. rend.* 197, 684-6(1933).— $\text{MnSO}_4 \cdot 5\text{H}_2\text{O}$  on exposure to air attains the compn.  $\text{MnSO}_4 \cdot 1.37\text{H}_2\text{O}$ ; when crystd. at the b. p. and dried at  $135^{\circ}$  it gives  $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ ; when dried *in vacuo* at  $100^{\circ}$  it gives  $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ ; at  $400^{\circ}$  it gives  $\text{MnSO}_4$  in 40 hrs. at  $150^{\circ}$  *in vacuo* it gives  $\text{MnSO}_4 \cdot 0.8\text{H}_2\text{O}$ . The f.-p. depressions of solns. of  $\text{MnSO}_4$  were independent of the method of dehydration. This disagrees with the conclusions of de Forcrand (C. A. 8, 3162, 3276) and Krepelka and Rejha (C. A. 26, 1536). G. M. P.

**The action of alkali carbonates on lime water and on solutions of calcium salts; also the lime of Loiseau.** O. Spengler and G. Dorfmueller. *Z. Ver. deut. Zuckerind.* 83, 562-81(1933).—To study the mechanism of the formation of hydrated  $\text{CaCO}_3$ , as well as of hydrate double salts of  $\text{CaCO}_3$  and alkali carbonates, the author examd. the action of  $\text{Na}_2\text{CO}_3$  on (1) lime water, (2) soln. of Ca acetate, at varying concns., and temps. I: all cases a primary floccular substance (hydrated  $\text{CaCO}_3$ ) which causes gelling, is first formed. This substance is then transformed, and that the more rapidly as the temp. decreases and as the concn. of  $\text{Na}_2\text{CO}_3$  increases, into cryst.  $\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$ , or into a double carbonate, e. g.  $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3 \cdot 5\text{H}_2\text{O}$ . In other cases it is transformed into aragonite or calcite. The various stages of the changes were studied microscopically. The primary substance is a hydrated  $\text{CaCO}_3$ ; it is possible that the hydrated salts of Ca can likewise produce the gelification of sufficiently concd. solns. Ca salts of glycolic and oxalic acids would show similar behavior. F. C.-C.

**Synthesis of metallic hydrides by the use of atomic hydrogen.** Erich Pietsch, F. Seufferling, W. Roman and H. Lehl. *Z. Elektrochem.* 39, 577-85(1933).—When Be treated with at. H at  $170-260^{\circ}$  for 7 hrs. a salt-like hydride formed which is completely sol. in water with gas evolution and gives a test for Be ion with 1,2,5,8-tetrahydroxyanthraquinone. When Ga is treated with at. H at  $100-170^{\circ}$  for 15 hrs. a salt-like hydride is formed which reacts with water with heat evolution and momentaril colors red litmus paper blue. The soln. gives a test for Ga ions. It likewise forms a yellowish gray salt-like hydride with at. H. Ta forms a salt-like hydride at  $150^{\circ}$  with at. H which reacts with water to form Ta ion in soln. W forms no hydride with at. H under the conditions tried. Pure hydrides suitable for analysis were not

obtained. Earlier work on the prepn. of the hydrides of Ag, Tl, Pb, Cu and Au (C. A. 26, 1535, 1536) is reviewed.

Oden E. Sheppard

Direct combination of hydrogen with phosphorus. R. Deliqué. *Bull. soc. chim.* 53, 603-12 (1933).—An attempt to verify the results of Retgers (Z. anorg. Chem. 7, 265 (1894)) was made without success. Red P heated in a reaction tube at 400° in a stream of H does not give either the gaseous, liquid, or the solid H phosphides. Between 400° and 550° PH<sub>3</sub> may be found in small quantities. The velocity of vaporization of P in H<sub>2</sub> and in N<sub>2</sub> is the same.

Howard Agnew Smith

The effect of nitric acid on hypophosphoric acid. Bruno Blaser. *Z. physik. Chem.* A166, 59-63 (1933).—HNO<sub>3</sub> does not oxidize H<sub>4</sub>P<sub>2</sub>O<sub>6</sub> but catalyzes the hydrolysis to H<sub>3</sub>PO<sub>3</sub> and H<sub>2</sub>P<sub>2</sub>O<sub>4</sub>. In the presence of both HCl and HNO<sub>3</sub> the hydrolysis is unimol. The rate of hydrolysis gives a measure of the acid strength in concd. soln.

G. M. Murphy

The two forms of phosphorous acid. Roger Deliqué and André Grangiers. *Compt. rend.* 197, 618-20 (1933).—The surface tension of solns. of PCl<sub>3</sub> at 20° was detd. by Dubray's method (cf. C. A. 12, 1355). It increases with time and concn. for solns. contg. 20, 10 and 2% PCl<sub>3</sub> and decreases for 1.5 and 1% solns., all tending to a limiting value. These facts agree with the existence of 2 forms of H<sub>3</sub>PO<sub>3</sub> in equil. The  $\rho_{\text{H}}$  of the 1% soln. decreases with time while for higher concns. it increases. The dil. solns. must contain at first more and the higher concns. less of the 3 OH form.

Janet E. Austin

Metaphosphoric acid. A. Travers and Chu. *Helv. chim. Acta* 16, 913-17 (1933).—Mixts. of H<sub>3</sub>PO<sub>4</sub>, H<sub>4</sub>P<sub>2</sub>O<sub>7</sub> and HPO<sub>3</sub> may be analyzed (1) by pptg. with Zn<sup>++</sup> in solns. of regulated acidity and NH<sub>4</sub>Cl concn., and (2) by titration with NaOH with methyl orange and phenolphthalein as indicators. In this way it is shown that the HPO<sub>3</sub> formed either by the action of P<sub>2</sub>O<sub>5</sub> on water or by igniting (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> is hydrated directly to H<sub>3</sub>PO<sub>4</sub>, without forming any H<sub>4</sub>P<sub>2</sub>O<sub>7</sub>. Com. glacial phosphoric acid

is a mixt. of H<sub>3</sub>PO<sub>4</sub> and NaPO<sub>3</sub> (about 61.2%).

J. H. Reedy

Preparation and properties of the permolybdates Na<sub>2</sub>MoO<sub>4</sub> and Na<sub>2</sub>MoO<sub>3</sub>. N. I. Kobozov and N. N. Sokolov. *Z. anorg. allgem. Chem.* 214, 321-9 (1933); C. A. 27, 5026.—Na<sub>2</sub>MoO<sub>3</sub> is prepd. by adding a few cc. of 30% H<sub>2</sub>O<sub>2</sub> to an almost satd. soln. of Na<sub>2</sub>MoO<sub>4</sub> cooled to 0°, and adding to this mixt. 2-3 min. later 150 cc. of pure EtOH, previously cooled to -5° to -10°. The red-brown permolybdate crystals are almost immediately pptd., filtered and washed with alc. and EtOH, cooled to -5° to -10°. Na<sub>2</sub>MoO<sub>4</sub> decomposes in air at 70-80° very rapidly, more slowly at room temp., and explosively at 100°. Na<sub>2</sub>MoO<sub>3</sub> is obtained as an intermediate product in the decompn. of Na<sub>2</sub>MoO<sub>4</sub> at lower temps. The best method is to spread the red Na<sub>2</sub>MoO<sub>4</sub> in a thin layer upon filter paper, allow the prepn. to stand at room temp. and stir periodically. After 2-8 days yellow Na<sub>2</sub>MoO<sub>4</sub>.nH<sub>2</sub>O is obtained. The heat of formation is 46 cal. for Na<sub>2</sub>MoO<sub>4</sub> and 92 cal. for Na<sub>2</sub>MoO<sub>3</sub>.

H. Stoertz

The formation of salts of amidoximes. I. Hippuramidoxime. J. V. Duhský and J. Trtílek. *Collection Czechoslov. Chem. Communications* 5, 310 16 (1933).—Hippuramidoxime (I), m. 123-6°, was prepd. from hippuronitrile and H<sub>2</sub>NOH, but could not be obtained free from Cl<sub>2</sub>. It gave a reddish violet color with aq. FeCl<sub>3</sub> and a brownish green ppt. with Cu(OAc)<sub>2</sub>. This Cu salt, with a ratio tp Cu:N of 1:3, contained 2 mols. of H<sub>2</sub>O, only one of which could be driven off below 100°, so the authors gave it the formula: C<sub>6</sub>H<sub>5</sub>CONHCH<sub>2</sub>-C(NH<sub>2</sub>)NOCuOH.H<sub>2</sub>O, and for the formula of I: C<sub>6</sub>H<sub>5</sub>-CONHCH<sub>2</sub>C(NH<sub>2</sub>)NOH. NiCl<sub>2</sub> alone has no action on I but the addn. of a little NH<sub>4</sub>OH causes a very slow formation of a red-violet ppt. This action is greatly accelerated by a little H<sub>2</sub>O<sub>2</sub>. This ppt. appears to be a mixt. of 2 nickelic salts: [C<sub>6</sub>H<sub>5</sub>CONHCH<sub>2</sub>C(NH<sub>2</sub>)NO]<sub>2</sub>.Ni<sup>III</sup>.NiOH and [C<sub>6</sub>H<sub>5</sub>CONHCH<sub>2</sub>C(NH<sub>2</sub>)NO]<sub>2</sub>.Ni.

John E. Millbery

## 7-ANALYTICAL CHEMISTRY

W. T. HALL

Progress in analytical chemistry during 1932. R. Fresenius. *Angew. Chem.* 46, 615 18 (1933).—A review with bibliography.

Karl Kammermeyer

Applications of the vacuum tube in potentiometric titrations. Kosaku Masaki and Okiro Hirabayashi. *Bull. Chem. Soc. Japan* 8, 245-54 (1933).—Contrary to common practice, a pos. potential was placed upon the grid with respect to the filament of the UX201A Mazda vacuum tube. The grid current, which was very small, flowed through the titrating cell and its function was to polarize the bi-metallic Pt electrodes that were substituted for the mono-metallic system. Polarized electrodes owe their effect in electrometric titrations to gas reactions upon the electrode surfaces. The p. d. between the electrodes must remain practically const. up to the equivalence point and this constancy of p. d. was accomplished by shunting a part of the grid current to the bi-metallic electrodes. No current flowed through the soln. when the drop in potential across the shunt was equal to the back e. m. f. due to polarization. One electrode was placed close to the buret to provide a slight difference in compn. of the soln. when the drop of soln. was added. The deflection of the needle of the galvanometer was temporarily unstable and great. But it again became stable if the addn. of the standard soln. was interrupted. Thus the approach of the end point was indicated.

H. E. Messmore

Notes on microchemical procedure. IX. L. Rosenthaler. *Mikrochemie* 13, 317-20 (1933); cf. C. A. 27, 2902.—Illus. KReO<sub>4</sub> forms difficultly sol. perhenates with certain alkaloids. Expts. show that KReO<sub>4</sub> cannot, however, be regarded as a general precipitant for alkaloids but in some cases ppts. are produced which, when examd. under

the microscope, can serve for the identification of the alkaloid. 8-Hydroxyquinoline in alk. soln. gives ppts. with many cations but unfortunately most of the ppts. have similar characteristics when examd. under the microscope. The characteristics of the ppts. with Ca, Ba, Sr, Cu, Pb, Cr, Ni and Cd are described. A sensitive test for CNS<sup>-</sup> is described which depends upon its oxidation to CN<sup>-</sup> by KMnO<sub>4</sub> and detection of CN<sup>-</sup> by means of AgNO<sub>3</sub>-methylene blue soln. It is also noted that volatile amines often give the spot tests recommended by Feigl for detecting Ni<sub>2</sub>.

W. T. H.

Application of semi-micro methods in analysis. M. Chaix. *Bull. soc. chim.* 53, 697 700 (1933).—Regret is expressed that the semi-micro methods of analysis have been neglected in France. Directions regarding app. and procedure are given for detg. C, H, N and halogens in org. substances.

W. T. H.

Quantitative drop analysis. I. General apparatus and technic. Paul L. Kirk. *Mikrochemie* 14, 1 14 (1933) (in English).—Suitable app. and technic are described whereby volumetric analysis can be carried out with reasonable accuracy when a single drop of a liquid sample is taken. The terminology is explained and it is proposed to use the Greek letter lambda to designate 0.001 ml. II. Determination of calcium. R. P. Müller and Paul L. Kirk. *Ibid.* 15-22 (in English).—A method suitable for detg. Ca in blood serum is described. Samples varied from 0.025 to 0.1 ml. and the results were within about 2% of the truth. The detn. was based on the pptn. of CaC<sub>2</sub>O<sub>4</sub> and titration of the ppt. with KMnO<sub>4</sub>.

W. T. H.

Quantitative micro-mineral analysis. Friedrich Hecht. *Mikrochemie* 14, 81-3 (1933).—A. A. Benedetti-Pichler.



*Ibid.* 84. Cf. Thurgwald and Benedetti, *C. A.* 25, 4200.—  
Polemical. W. T. H.

**Quantitative organic microchemical analysis in industrial problems.** W. R. Kirner. *Ind. Eng. Chem., Anal. Ed.* 5, 303-9 (1933).—The time and money saved by working with small quantities of material are illustrated by some practical examples and the history of the development of such work is outlined. W. T. H.

**The use of physical phenomena in chemical analysis.** A. Pignot. *J. usines gas* 53, 461-7 (1933).—A review of d., viscosity, surface tension, crit. soly. (aniline) and cryoscopic methods for analysis of oils; many references are given. B. J. C. van der Hoeven

**Analytical uses of color.** M. G. Mellon, G. W. Ferner and J. P. Mefflig. *J. Chem. Education* 10, 601-3 (1933).—Examples of the aid that color gives in controlling operations are shown and classified. W. T. H.

**Studies on the starch-iodine color test and its application to quantitative analysis.** Peter P. T. Sah. *Science Repts. Natl. Tsinghua Univ.* A2, 105-28 (1933).—Under carefully controlled conditions, the starch-iodine blue color is strictly proportional to the free I content, in accord with observations of Turner (*C. A.* 26, 1544). The starch soln. is first satd. with I to destroy reducing substances. Inorg. ions as well as KI influence the color and must be kept const. 0.01 N KMnO<sub>4</sub> is preferable to Br or Cl for oxidation of HI to HIO<sub>3</sub>, the excess being removed with 0.01 N (COOH)<sub>2</sub>. The method is most successful for amts. of 0.004 to 0.012 mg. I per cc. and has been applied to the detn. of I in blood, and in iodo-egg albumin. W. H. Adolph

**Twenty-five years of using Brandt's ferric oxide as a standard.** Otto Goeke. *Z. anal. Chem.* 94, 232-7 (1933).—It is now 25 years since Brandt described the prepn. and use of pure Fe<sub>2</sub>O<sub>3</sub> as a standard for KMnO<sub>4</sub> solns. It is still much used in Germany instead of Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. More than a dozen papers have been published regarding this standard and the gist of these papers is given here. W. T. H.

**Use of rhodizonic acid as indicator for the volumetric determination of barium.** A. Friedrich and S. Rapoport. *Mikrochemie* 14, 41-8 (1933).—The use of Ba rhodizonate as indicator for the titration of Ba<sup>++</sup> is difficult because the salt is in the form of a nearly insol. colloidal suspension which undergoes very slow reaction with sulfate. Moreover the ppt. becomes inactive by interference of the BaSO<sub>4</sub> formed. Titration of Ba<sup>++</sup> with sulfate in acid soln. gives values that depend upon the speed at which the titration is accomplished and the titration in neutral soln. is difficult because the color of the soln. at the end point changes rapidly and it is impossible to titrate to a given shade. By adding gelatin to the BaCl<sub>2</sub> soln. it is possible to prevent the pptn. of the Ba rhodizonate and keep in the sol state. The addn. of acid quickly destroys this but in neutral soln. better results are obtained in the titration when gelatin is present; even then it is not possible accurately to match colors at the end point. By pptg. Ba with an excess of Na rhodizonate in the presence of gelatin it should be possible to det. Ba colorimetrically bft the solns. are not very stable to light. W. T. H.

**Antimony as an indicator electrode in potentiometric titration of iron and aluminum.** E. W. Kanning and P. H. Kratli. *Ind. Eng. Chem., Anal. Ed.* 5, 381-3 (1933).—The Sb electrode satisfactorily indicates the end point in the titrations of AlCl<sub>3</sub> and FeCl<sub>3</sub> solns. by NaOH. Mixtg. of the 2 salts can be titrated approx. L. W. Elder

**Colorimetry.** Reinaldo Vanossi and Raoul Ferramola. *Ann. chim. anal. chim. appl.* 15, 481-95 (1933).—See *C. A.* 27, 40. W. T. H.

**Determination of very small quantities of substances.** Friedrich Emich. *Mikrochemie* 13, 283-8 (1933); cf. *G. A.* 27, 5674.—If an unweighable quantity of Ag<sub>2</sub>SO<sub>4</sub> is treated with BaCl<sub>2</sub> soln., a somewhat heavier residue of AgCl + BaSO<sub>4</sub> is obtained which, after treatment with H<sub>2</sub>SO<sub>4</sub> and heating, gives Ag<sub>2</sub>SO<sub>4</sub> again. By repeating the operation 10 times, the final wt. is 8.89 times as

large as that of the original Ag<sub>2</sub>SO<sub>4</sub>. Similarly an unweighable quantity of CaCO<sub>3</sub> yields on ignition an unweighable quantity of CO<sub>2</sub> but the residual CaO will absorb CO<sub>2</sub> which can be obtained again on heating so that by sufficiently repeating the process a weighable quantity of CO<sub>2</sub> can be obtained eventually. A trace of S can be converted to SO<sub>2</sub> by oxidation and the resulting SO<sub>2</sub> reduced to S by the action of SO<sub>2</sub>. The 3 atoms of S obtained from each S originally present can be subjected to the treatment over and over again. In detg. metals it is often advantageous to measure the H<sub>2</sub> evolved on treatment with acid. The methods of measuring extremely small vols. of gases are outlined. W. T. H.

**Colorimetric determination of aluminum.** F. Alten, H. Weiland and H. Looffmann. *Angew. Chem.* 46, 608-9 (1933).—Very small ppts. of Al hydroxyquinoline were detd. colorimetrically after a coupling reaction with diazo compds. in alk. soln. to strong yellow-red 5-aryazo dyes. Satisfactory detns. could be made in solns. contg. as little as 25-γ Al. Difficulties were encountered in the sepn. of Fe, but heating of the Fe- and Al-contg. soln. with NaOH caused pptn. of Fe(OH)<sub>3</sub> and satisfactory Al detns. could then be made, provided the soln. contained only Al<sup>+++</sup>, Fe<sup>+++</sup> and PO<sub>4</sub><sup>---</sup>. In the presence of Ca and Mg salts, too little Al was always found. The use of *urotropine* for the sepn. of the bivalent cations overcame this difficulty. Seven references. Karl Kammermeyer

**Rapid quantitative microanalysis of pure aluminum.** I. Determination of iron, copper and manganese. F. Pavelka and Hermine Morth. *Mikrochemie* 13, 305-12 (1933).—Directions are given for detg. Fe in the colorimeter by the depth of color produced with K<sub>3</sub>Fe(CN)<sub>6</sub> after dissolving the sample and oxidizing with H<sub>2</sub>O<sub>2</sub>, for detg. Cu by measuring the time required to decolorize a mixt. of Fe(CNS)<sub>3</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> and for detg. Mn by means of the color produced by the action of (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> and AgNO<sub>3</sub> in the presence of dil. H<sub>2</sub>SO<sub>4</sub>. W. T. H.

**Detection of small quantities of arsenic by the Gutzeit test.** G. Lockemann and H. Fr. v. Bulow. *Z. anal. Chem.* 94, 322-9 (1933).—A bibliography of 34 titles (dating from 1836 to the present) is given together with details for modifying the procedure so as to detect 10<sup>-7</sup> g. of As. W. T. H.

**Titrimetric determination of bismuth after precipitation as bismuth oxychloride.** E. v. Migray. *Chem.-Ztg.* 57, 774 (1933).—Evap. the soln. with HCl to convert the nitrates to chlorides, dissolve the residue in 100 cc. of water and barely sufficient concd. HCl to keep the Bi dissolved. If necessary, neutralize with NH<sub>4</sub>OH. Pour the soln. into about 200 cc. of boiling water. Filter off the resulting BiOCl. If Sb is present sufficient tartarate should be added to prevent SbOCl from forming. Dissolve the BiOCl in dil. HNO<sub>3</sub>, add an excess of Ag<sup>+</sup> and titrate the excess with KCNS soln. with ferric alum as indicator. W. T. H.

**Determination of small amounts of bismuth in copper.** L. C. Nickolls. *Analyst* 58, 684 (1933).—The reaction between H<sub>2</sub>SO<sub>4</sub> and KI gives a color which resembles the KBiI<sub>4</sub> color so that it is better to use SnCl<sub>2</sub> rather than H<sub>2</sub>SO<sub>4</sub> for the reduction of Fe<sup>+++</sup> prior to the colorimetric detn. of Bi. W. T. H.

**Determination of cadmium in the presence of zinc, in spelter and in zinc ores.** A. Pass and A. M. Ward. *Analyst* 58, 667-72 (1933).—To det. Cd in the presence of Group II metals, take 50 cc. of the soln. which is 2 N in H<sub>2</sub>SO<sub>4</sub>, add a few drops of H<sub>2</sub>SO<sub>4</sub>, boil and introduce a few clean Fe nails, replacing water lost by evapn. Keep just below boiling for an hr. Filter off PbSO<sub>4</sub> and pptd. metals through a sintered glass filter contg. a piece of Fe wire. Wash the residue with cold water. To the 100-120 cc. of filtrate add 5 g. of Rochelle salt, a few drops of H<sub>2</sub>SO<sub>4</sub> and 40-50 cc. of 0.2 N KI soln. Now, to form a ppt. of CdH<sub>2</sub>(C<sub>10</sub>H<sub>8</sub>N<sub>2</sub>)<sub>2</sub>, add sufficient 2.5% β-naphthaquinoline in 0.2 N H<sub>2</sub>SO<sub>4</sub> to provide an excess of 5-6 cc. in a total vol. of 140-150 cc. Allow the ppt. to settle for an hr., filter, wash thoroughly with a mixt. of 10 cc. 0.2 N KI, 10 cc. of the reagent, a few drops of

$\text{H}_2\text{SO}_4$  and 80 cc. of water. After draining well with the aid of suction, transfer the ppt. to the beaker in which pptn. took place and triturate with 20 cc. of 2 *N*  $\text{NH}_4\text{OH}$ . Filter and wash well with 2 *N*  $\text{NH}_4\text{OH}$  and water. Transfer the filtrate to a long-necked flask, rinse out the flask with 2 *N*  $\text{HCl}$ , using such an amt. (about 100 cc.) to make the soln. at least *N* in  $\text{HCl}$  at the end of the final titration. Add 5 cc. of 10%  $\text{KCN}$  soln. and some starch soln. Titrate with 0.025 *M*  $\text{KIO}_3$  soln. until the blue starch-iodide color that first develops turns to reddish violet (due to  $\text{HIO}$ ) and then colorless. One cc. of  $\text{KIO}_3 = 1.405$  mg. of  $\text{Cd}$ . By this procedure, not more than 50 mg. of  $\text{Cd}$  can be handled. *Detn. of Cd by means of phenyltrimethylammonium iodide.* Remove interfering metals by treatment with  $\text{Fe}$  as above. To the filtrate add 3 g.  $\text{KI}$  and 25-30 cc. of a 2.5% soln. of the reagent in water. After 6 hrs., filter and treat the ppt. in the same way as in the above procedure. The reagent has the same  $\text{Cd}$  equiv.

W. T. H.

**Magneto-optic Nicol rotation method for quantitative analysis of calcium.** Edna R. Bishop, C. B. Dollins and Irene G. Otto. *J. Am. Chem. Soc.* 55, 4365-70 (1933).—The magneto-optic method (cf. Allison and Murphy, *C. A.* 24, 5661) is based upon the time-lag differences of the Faraday effect behind the magnetic field in certain liquids as a function of the wave length of the light used. The necessary app. and procedure for detg.  $3.74 \times 10^{-4}$  to 1 mg. of  $\text{Ca}^{++}$  per cc. are described. Duplicate detns. agreed and checked with the values obtained by titrating  $\text{CaC}_2\text{O}_4$  ppt. within 10%.

W. T. H.

**Adaptation of the dimethylglyoxime-benzidine test for cobalt to the usual scheme of qualitative analysis.** Alfred W. Scott. *J. Am. Chem. Soc.* 55, 3047-8 (1933).—Evap. the soln. of  $\text{CoS} + \text{NiS}$  in aqua regia nearly to dryness, dissolve in a little water contg. 1 cc. of 6 *N*  $\text{AcOH}$ , add 1 g. of  $\text{NaOAc}$ , 0.5 cc. of 0.5% benzidine in alc. and an excess of dimethylglyoxime in alc. If  $\text{Co}$  is present, the filtrate from the  $\text{Ni}$  ppt. will be red.

W. T. H.

**Determining iron and the basicity in solutions of ferric salts.** A. L. Zaides and V. N. Sveshnikova. (*Otdelnie Tekhniki: Koshobuovoe Proizvodstvo* 1932, No. 4, 45-7. —Directions are given for reducing  $\text{Fe}^{+++}$  with  $\text{SnCl}_2$  and electrolytically. The basicity of  $\text{Fe}^{+++}$  solns. is detd. by titration with  $\text{NaOH}$  and when 3  $\text{NaOH}$  are required for each  $\text{Fe}^{+++}$  (as detd. by reduction followed by  $\text{KMnO}_4$  titration) the basicity is called 100%. The basicity can be determined (1) by electrometric titration with the glass electrode and (2) by alkalimetric titration in the presence of bromothymol blue.

A. A. B.

**Microelectrolytic determination of lead.** Hermann Brantner and Friedrich Hecht. *Mikrochemie* 14, 30-40 (1933).—A series of expts. shows that the microdetn. of  $\text{Pb}$  as  $\text{PbO}_2$  in  $\text{HNO}_3$  soln. is fraught with difficulties. For the microdetn. of  $\text{Pb}$ , therefore, the detn. as  $\text{Pb}$  picrolate is to be preferred to the electrolytic method.

W. T. H.

**Determination of small quantities of nickel in rock analysis.** H. F. Harwood and L. S. Theobald. *Analyst* 58, 673-82 (1933).—Digest 2 g. of fine powder in a Pt dish with 15 cc. of 18 *N*  $\text{H}_2\text{SO}_4$  and 20-25 cc. of pure  $\text{HF}$ . Heat on a sand bath, stirring frequently with a heavy Pt wire for the first 20 min. When the rock appears to be attacked completely, add a crystal of  $\text{KNO}_3$  and evap. to dense fumes. After fuming 10 min., cool, add sufficient water to dissolve the sol. salts and again evap. to fumes. Cool, add 100 cc. of water and heat until all sol. salts are dissolved. Filter if necessary, add 2-3 g. of citric acid and neutralize to methyl red by adding  $\text{NaOH}$ . Make barely acid with a few drops of dil.  $\text{H}_2\text{SO}_4$ , add 15 cc. of 1% dimethylglyoxime in alc. followed by 4 *N*  $\text{NH}_4\text{OH}$  until slightly ammoniacal. After standing 24 hrs. filter and wash with cold water. Dissolve the ppt. in a little hot, 7.5 *N*  $\text{HNO}_3$  and evap. as far as possible on the water bath after adding a few drops of 18 *N*  $\text{H}_2\text{SO}_4$ . Take up in water, filter if necessary, add 10 mg. of citric acid and 5-7 cc. of dimethylglyoxime reagent. Make barely alk. with  $\text{NH}_4\text{OH}$ , allow to stand overnight, filter, wash free from sulfate, dry at 120-130° and weigh. If the rock contains

more than 0.05%  $\text{NiO}$  it is best to det. the  $\text{Ni}$  content of the  $\text{Al}_2\text{O}_3$  ppt. or else make a detn. of the  $\text{Ni}$  content of the final filtrate after removing  $\text{Mg}$ . This value subtracted from the total  $\text{Ni}$  content should give the  $\text{Ni}$  adsorbed by the  $\text{Al}$  ppt.  $\alpha$ -Furil dioxime can replace dimethylglyoxime to advantage, especially when the  $\text{Ni}$  content of the rock is low. As little as 0.0025%  $\text{Ni}$  can be detd. by the above procedure.

W. T. H.

**Analytical chemistry of rhenium. X. Determination of rhenium as the dioxide.** W. Geilmann and Loren C. Hurd. *Z. anorg. allgem. Chem.* 214, 280-8 (1933); cf. *C. A.* 27, 5026.—When  $\text{NaOH}$  is added to a soln. of  $\text{K}_2\text{ReCl}_6$  a ppt. of  $\text{ReO}_3$  results and this ppt. has sometimes been recommended for the detn. of  $\text{Re}$ . The studies described in this paper show that the pptn. of  $\text{Re}$  as  $\text{ReO}_3$  is not suitable as a basis for the exact detn. of  $\text{Re}$ .

W. T. H.

**Determination of graphitic silicon in a siliceous residue.** L. H. Callendar. *Analyst* 58, 580-94 (1933); cf. *C. A.* 27, 2405.—By treating graphitic  $\text{Si}$  with 40%  $\text{NaOH}$  and measuring the gas evolved in a modified Hempel gas-volumeter fitted with a pressure-temp. compensator it is possible to obtain 0.16 cc. of  $\text{H}_2$  (S. T. P.) for each 0.1 mg. of  $\text{Si}$  present. The results agree within about 0.3% and consequently this method of analysis is by far the best at present available for the detn. of graphitic  $\text{Si}$  in a siliceous residue such as is obtained in the analysis of  $\text{Al}$ .

W. T. H.

**Determination of small quantities of selenium in sulfide ores.** Karl Brückner. *Z. anal. Chem.* 94, 305-22 (1933).—A study was made of the sources of error involved in the methods of detg.  $\text{Se}$ . It was found that loss of  $\text{Se}$  occurs when solns. are boiled with  $\text{HCl}$ , when solns. contg. mineral acids are evapd. to dryness and when the residues are heated in the drying oven. Difficulties occurring when the attempt is made to deposit  $\text{Se}$  from solns. contg.  $\text{HNO}_3$  or aqua regia can be overcome by fuming with  $\text{H}_2\text{SO}_4$  after which a complete pptn. of  $\text{Se}$  can be obtained. As a result of these studies, the following rapid and accurate method is proposed: Take 20 g. of ore in a beaker with high side walls and treat with 125 cc. of cold, concd.  $\text{HNO}_3$ , added in small portions during about 10 min. Heat the soln. to boiling and carefully add 60 cc. of concd.  $\text{H}_2\text{SO}_4$ . Evap. on the sand bath to fumes. Cool, dil. to 300 cc., add 20 cc. of concd.  $\text{HCl}$ , boil till the salts dissolve, dil. to 400 cc. with hot water and filter. At 60°, introduce  $\text{SO}_2$  for 10 min., add 3 cc. of a 10% soln. of  $\text{NH}_3$ ,  $\text{NH}_4\text{H}_2\text{O}$  and allow to cool. Filter off the impure  $\text{Se}$  and treat the filter and ppt. with a mixt. of 10 cc.  $\text{HCl}$  and 5 drops of concd.  $\text{HNO}_3$ . Heat on the water bath till the filter paper is well disintegrated and ppt. the  $\text{Se}$  again by adding 2 cc. of 10%  $\text{NH}_3$ ,  $\text{NH}_4\text{H}_2\text{O}$ . Filter, dry at 105° and weigh the  $\text{Se}$ .

W. T. H.

**Determination of tin by precipitation as stannous sulfide.** Benedikt Linke and Heinrich Preissecker. *Z. anal. Chem.* 94, 238-9 (1933).—Directions are given for dissolving com.  $\text{Sn}$  in concd.  $\text{HCl}$ , reducing the soln. with  $\text{Mg}$  powder, pptg. black  $\text{SnS}$  with  $\text{H}_2\text{S}$ , filtering and igniting to  $\text{SnO}_2$ . The results obtained by this procedure were a little lower than those obtained by the method of Löwenthal.

W. T. H.

**A new titrimetric determination of zinc.** E. Aster. *Verföhrer* 6, 236-7 (1933).—The method of Lang for  $\text{Zn}$  (*C. A.* 27, 3419) is described and recommended. Check detns. are given.

B. J. C. van der Haegen

**Qualitative analysis of small quantities of minerals. II. Detection of small quantities of zinc with dithizone.** Günther Rienacker and Werner Schiff. *Z. anal. Chem.* 94, 409-15 (1933).—If a neutral or dil.  $\text{AcOH}$  soln. of  $\text{Zn}^{++}$  is treated with a soln. of diphenylthiocarbazone in  $\text{CCl}_4$ , the green color of the  $\text{CCl}_4$  soln. changes to red if  $\text{Zn}$  is present. As little as 0.025  $\gamma$  of  $\text{Zn}^{++}$  can be detected.  $\text{Cu}$ ,  $\text{Pb}$  and  $\text{Hg}$  give similar coloration effects and the test can be obtained with most samples of distd. water. If an alk. soln. of  $\text{ZnO}$ ,  $\gamma$  is treated with the reagent, both the aq. and  $\text{CCl}_4$  phases are colored reddish and if the color of the aq. phase is taken as the criterion, as little as 0.0055 mg. of  $\text{Zn}$  can be detected. As reagent  $\gamma$  soln.



of 10 mg. dithizone in 100 cc. of  $\text{CCl}_4$  is suitable. To a few drops of the soln. to be tested, add 0.5 cc. of 2 *N*  $\text{NaOH}$  and 0.5 cc. of dithizone and shake vigorously. If Cd, Cu or Hg is present, first treat the soln. with  $\text{H}_2\text{S}$  in the presence of acid, filter off the sulfide ppt. and test the filtrate for Zn. The test is suited for detg. Zn in the usual systematic qual. procedure. III. Detection of tantalum and columbium. *Ibid.* 415-22.—To detect Ta in the presence of Ti, fuse the oxide with about 3 times as much  $\text{KHSO}_4$ , cool, add a few drops of concd.  $\text{H}_2\text{SO}_4$ , evap. to fumes and repeat these last operations several times. Then add 1.5 cc. of a mixt. of equal parts 10%  $\text{H}_2\text{SO}_4$  and 3%  $\text{H}_2\text{O}_2$  and allow to stand 15 min. Filter through a Jena glass filter. To the filtrate add 1 cc. of water and 1 cc. of 0.2 *N*  $\text{H}_2\text{SO}_4$ , heat to boiling and add, while boiling, 3 cc. more of the  $\text{H}_2\text{SO}_4$  in small portions. After 10 min. boiling, the presence of Ta will be indicated by the formation of a flocculent ppt. Dil. with a little water and boil 5 min. longer. Under these conditions Ti and Cb will not give ppts. when Ta is absent but in the presence of Ta, considerable Cb is adsorbed with the  $\text{Ta}_2\text{O}_5$ .  $\text{WO}_3$  will ppt. from a tungstate but, unlike  $\text{Ta}_2\text{O}_5$ , dissolves easily in dil.  $\text{NaOH}$  soln. If more than 3 parts of  $\text{SiO}_2$  are present in the soln. the pptn. of  $\text{Ta}_2\text{O}_5$  may be prevented but this is not likely to happen in mineral analysis.  $\text{H}_3\text{PO}_4$  hinders the pptn. From a soln. of  $\text{HAcO}$  buffered with  $\text{NaOAc}$ , a flocculent red ppt. is obtained on adding a half-satd. soln. of alizarin in  $\text{KtOH}$  if trivalent Cb is present. To test for Cb, therefore, fuse with  $\text{KHSO}_4$  and digest with  $\text{H}_2\text{SO}_4$  as in the Ta test. Take up the melt in 0.5 cc. of a mixt. of equal parts 20%  $\text{H}_2\text{SO}_4$  and 3%  $\text{H}_2\text{O}_2$ , filter if necessary and treat with an excess of Zn filings until there is no further evolution of  $\text{H}_2$ . Add 0.5 cc. of a satd. soln. of alizarin in  $\text{KtOH}$  which has been dild. with an equal vol. of  $\text{KtOH}$ . Remove any undissolved Zn and finally add 0.4 cc. of 10%  $\text{H}_2\text{SO}_4$ , 1 drop of satd. Na tartrate soln. and 0.5 cc. of satd.  $\text{NaOAc}$  soln. Dissolve any alk. salts that are pptd. by the  $\text{KtOH}$  by adding sufficient water and heat the clear soln. to boiling. After standing for an hr. in a closed test tube, red flakes of  $\text{Cb}_2\text{O}_3$  will be obtained when Cb is present. The above procedures were tested with samples contg. 0.2-1 mg. of  $\text{Ta}_2\text{O}_5$  or  $\text{Cb}_2\text{O}_3$  in the presence of other constituents likely to interfere. The alizarin lake formed in the Cb test does not appear to be other than an adsorption compd. but the Cb appears to be in the trivalent condition. W. T. H.

Behavior of zirconium, thorium and certain rare earths toward quinalizarin. A. S. Kumarovskii and I. M. Korenman. *Z. anal. Chem.* 94, 247-9 (1933).—Sensitive tests were obtained in test tubes and on filter paper for Nd, Pr, Ce, La, Zr and Th. Obviously quinalizarin cannot be used for detecting Be in the presence of these earths (cf. Fischer, *C. A.* 22, 4299). W. T. H.

Titration of iodine in the presence of iodide and iodate. Eugen Chirnoagă. *Z. anal. Chem.* 94, 252-5 (1933).—To det. total  $\text{I}_2$ , first add  $\text{Na}_2\text{SO}_3$  until the soln. is nearly decolorized by the reduction of free  $\text{I}_2$  and of  $\text{IO}_3^-$  to  $\text{I}^-$ . Add starch indicator and titrate with  $\text{AgNO}_3$ . This preliminary titration serves to det. the approx. content which appears a little late under these conditions. Titrate a fresh portion, adding the starch when the end point is near. Next titrate the free  $\text{I}_2$  in another portion of the original soln. If the soln. contains iodate and iodide, take the soln. in which the free  $\text{I}_2$  has been titrated, add  $\text{H}_2\text{SO}_4$  and titrate the  $\text{I}_2$  set free by the action of  $\text{IO}_3^-$  on  $\text{I}^-$ . The total  $\text{I}$  can also be detd. by the Volhard method; in this case add an excess of  $\text{AgNO}_3$  and allow the soln. to stand until the  $\text{AgI}$  ppt. is no longer reddish in shade but a pure yellow. This may require 12 hrs. Finally titrate the excess  $\text{Ag}^+$  with  $\text{KCNS}$ , using  $\text{Fe}^{+++}$  as indicator. W. T. H.

Volumetric determination of small quantities of inorganic iodide. Joseph F. Sadusk, Jr., and Eric C. Ball. *Ind. Eng. Chem., Anal. Ed.* 5, 386-8 (1933).—A careful study of the Winkler method shows that it is accurate for detg. small quantities of  $\text{I}_2$ . As a practical result of

this study, directions are given for analyzing iodised salt which is prescribed for the prevention of endemic goiter. Dissolve 5 g. of salt in water and add 2 *N*  $\text{H}_2\text{SO}_4$  until a pink color is imparted to the soln. Add 2 ml. more of the acid and a few glass beads. Pass a stream of air through a gas-washing bottle contg. pure  $\text{Br}_2$  and into the reaction flask through a tube ending just above the soln. and, by swirling the content of the flask, allow the soln. to absorb sufficient  $\text{Br}_2$  from the vapors to impart a yellow color to the soln. but avoid an excess. Then boil the soln. until the yellow color disappears and for 2 min. longer. Cool, wash down the sides of the flask with water sufficient to restore the original vol., add 2 ml. of freshly prepd.  $\text{KI}$  soln. and titrate the liberated  $\text{I}_2$  with 0.005 *N*  $\text{Na}_2\text{S}_2\text{O}_3$  soln. Add starch indicator toward the last. W. T. H.

Microdetermination of iodine and a practical micro-drying oven. Wilhelm Münster. *Mikrochemie* 14, 23-6 (1933).—The method, like that of Vieböck and Brecher (*C. A.* 25, 896), depends upon the detn. of methoxyl but the app. used is somewhat different. Excellent results were obtained in the analysis of  $\text{C}_2\text{H}_5\text{O}_2\text{NI}$ ,  $\text{C}_2\text{H}_5\text{O}_2\text{N}_2\cdot 2\text{CHI}_2$  and  $\text{CHI}_3$ . The drying app. described is simple and easily constructed; it is suitable for drying of hygroscopic substances and for drying in a vacuum. W. T. H.

Determination of iodine values by the pyridine sulfate bromide method. Herbert Hawley. *Analyst* 58, 601 (1933).—Data are given to show that the method of Rosenmund and Kuhnenn (*C. A.* 18, 477) gives results which are reproducible but must be accepted with considerable caution when used for comparison with figures obtained by other methods. W. T. H.

Semi-microdetermination of nitrogen by the Dumas method. E. P. Clark. *J. Assoc. Official Agr. Chem.* 16, 575-80 (1933); cf. *C. A.* 27, 3680.—A detailed description is given of an app. and technic for a semi-micro N detn. by the Dumas method. A. P.-C.

Report on (the determination of) forms of nitrogen in plants. Hubert B. Vickery. *J. Assoc. Official Agr. Chem.* 16, 473-6 (1933).—A detailed description of the method of Pucher, V. and Wakeman (*C. A.* 26, 5876), which will be studied collaboratively. A. P.-C.

Detection of chloride in the presence of other halides. Wm. Brash. *Analyst* 58, 686 (1933).—Wash the Ag halide ppt. until free from sol. Ag salt, suspend it in water, add some  $\text{K}_2\text{Fe}(\text{CN})_6$  and a little  $\text{NH}_4\text{OH}$ . If the Ag ppt. contained  $\text{AgCl}$ , enough will dissolve to give a brownish ppt. of  $\text{Ag}_3\text{Fe}(\text{CN})_6$  which is much less sol. in  $\text{NH}_4\text{OH}$  than  $\text{AgCl}$  is. W. T. H.

Detection of iodide with paper impregnated with silver nitrate. Aurel I. Velculescu and Jeaneta Cornea. *Z. anal. Chem.* 94, 255-7 (1933).—If a piece of filter paper is moistened with 0.1 *N*  $\text{AgNO}_3$  soln. and then dried, a drop of a soln. contg.  $\text{I}^-$  will give a yellow spot. If  $\text{Br}^-$  and  $\text{Cl}^-$  are also present, the insol. halides are not pptd. together but in different zones. Thus the presence of 0.005 mg. of  $\text{I}^-$  in a drop of soln. can be detected in the presence of considerable  $\text{Cl}^-$  and  $\text{Br}^-$ . W. T. H.

Determination of small quantities of iodide and bromide in the presence of chloride, particularly in mineral waters.

Georg Lockemann and Theodor Kunzmann. *Z. anal. Chem.* 94, 385-96 (1933).—With bibliography. First, the  $\text{I}^-$  content is detd. colorimetrically by treating with  $\text{FeCl}_3$  and  $\text{HCl}$  and measuring the depth of color produced by action of the liberated  $\text{I}_2$  upon starch. Next, the total halide content is detd. by titration with  $\text{AgNO}_3$ . Finally, a series of 3 gravimetric detns. is made in which a measured vol. of standard  $\text{AgNO}_3$  soln. is added which is insufficient for the complete pptn. of all the halide present. In these ppts. the wt. of  $\text{AgI}$  is known from the results of the colorimetric detn. of  $\text{I}_2$ . When this wt. of  $\text{AgI}$  is deducted from that of the entire ppt., the  $\text{Br}^-$  content can be calcd. from the difference between the remaining wt. and that of  $\text{AgCl}$  corresponding to the vol. of  $\text{AgNO}_3$  added. The reason for making several tests is because the computation gives greater precision when the  $\text{AgCl}$  in the ppt. is not large in comparison with that of the  $\text{AgBr}$ . W. T. H.

Application of the potential-forming system metal-metal anion to potentiometric titrations. I. Precipitation-potentiometric titration of chromate, molybdate and tungstate anions, as well as of a series of metal ions, with chromium, molybdenum and tungsten as indicator electrodes. H. Brintzinger and E. Jahn. *Z. anal. Chem.* 94, 396-403 (1933).—The set-up recommended provides for the use of a normal calomel cell against an electrode of Mo, W or Cr-plated alloy steel. With  $\text{BaCl}_2$  as titrating reagent,  $\text{CrO}_4^{2-}$  can be detd. with a Cr-plated electrode and  $\text{MoO}_4^{2-}$  with an electrode of Mo. Since Ba, Sr, Pb, Cu, Cd and Mn give ppts. with  $\text{MoO}_4^{2-}$ , these cations can be detd. by titrating with  $\text{Na}_2\text{MoO}_4$ . All these titrations were carried out at 95°. W. T. H.

Titrimetric determination of perchlorate. Microdetermination of potassium. Adolf Bolliger. *Z. anal. Chem.* 94, 403-8 (1933).—The method described for titrating  $\text{HClO}_4$  is suitable for detg. K in biol. materials when the org. material has been decompd. by heating with  $\text{HClO}_4$ . The  $\text{KClO}_4$  ppt. is dissolved in water and the soln. is treated with a measured vol. of methylene blue chloride. The resulting ppt. is filtered off and the excess reagent is titrated with picric acid soln. The fact that methylene blue perchlorate or picrate can be shaken out with  $\text{CHCl}_3$ , although methylene blue and picric acid are both insol. in this solvent, permits a sharp recognition of the end point. Details are given for detg. as little as 1 mg. of  $\text{HClO}_4$ . W. T. H.

Determining the basicity of ferric salts in the presence of ferrous salts. A. A. Sorokina. *Ovladenie Tekhniki: Koshobuvnoe Proizvodstvo* 1932, No. 4, 47-8.—The basicity is detd. by first converting  $\text{Fe}^{++}$  into  $\text{Fe}^{+++}$  by treatment with  $\text{H}_2\text{O}_2$ , removing the excess by heating and titrating the oxidized soln. with 0.1 N NaOH while hot with bromothymol blue as indicator. A. A. B.

Action of hydriodic acid on the difficultly soluble sulfates. Earle R. Caley. *J. Am. Chem. Soc.* 55, 3947-52 (1933).—Sulfates of Ba, Sr, Ca, Pb and Cr are much more sol. in hot concd. HI than in HCl or HBr of the same strength. The sulfate is reduced to  $\text{H}_2\text{S}$  with liberation of  $\text{I}_2$ . J. W. Shipley

Determination of sulfide in zinc sulfide by the expulsion method. J. L. Buchan. *Analyst* 58, 682-4 (1933).—It has been stated by some chemists that the evolution method when used to det. the ZnS content of paints and lithopones gives values which are somewhat too low. Some expts. with the method show that it is accurate but some com. samples of pure ZnS contain only 80-90% of this substance. The procedure followed was essentially the same as the well-known evolution method for detg. S in steel except that a stream of  $\text{H}_2$  is recommended for sweeping all the  $\text{H}_2\text{S}$  into the ammoniacal Cd soln. W. T. H.

Argentometric titration of selenous cyanides with adsorption indicators by the method of Fajans. Raluca Ripan. *Z. anal. Chem.* 94, 335-7 (1933).— $\text{AgSeCN}$  is about as insol. in water as  $\text{AgI}$  but when an excess of  $\text{Ag}^+$  is present, there is pptn. of Ag. To titrate by Fajans' method, add 1-2 drops of 0.2% fluorescein in alc. and titrate with  $\text{AgNO}_3$ . After adding the first few drops, the soln. will remain clear for some time but a silky, cryst. ppt. will form on shaking. Continue adding the reagent dropwise while shaking. A fugitive red color will appear on adding the  $\text{Ag}^+$  and the color will become more persistent as the end point is approached. When the ppt. becomes more flocculent in appearance, the end point is near. A good color change is obtained at the end point. The soln. titrated should be 0.1-0.005 M in  $\text{SeCN}^-$ . W. T. H.

The potentiometric determination of selenous cyanides. Raluca Ripan. *Z. anal. Chem.* 94, 331-4 (1933).— $\text{SeCN}^-$  can be titrated potentiometrically with accuracy with  $\text{AgNO}_3$  as in the case of halides. The Ag salt of this pseudo halide is very difficultly sol. and is stable as long as no excess of  $\text{Ag}^+$  is present. One must wait after each addn. of reagent but when proper precautions are taken, the results of the titrations are excellent. W. T. H.

Methods for the qualitative analysis of the hydrogen sulfide group. Johannes Kunz. *Helv. Chim. Acta* 16, 1044-9 (1933).—Although NaCl has been often recommended for "salting out" colloids too little attention has been paid to the use of NaCl in preventing pptn. or in dissolving ppts. A table is given showing the  $\text{H}^+$  concn. at which the sulfides of the Cu-Sn group begin to form, the  $\text{H}^+$  concn. at which pptn. is complete and the  $\text{H}^+$  concn. at which the ppts. redissolve. According to this table, the pptn. of  $\text{SnS}$  is only complete when the soln. is 0.25 N. In the absence of NaCl, pptn. of CdS and PbS is complete in N  $\text{H}^+$  but when considerable NaCl is present the soln. should not be over 0.15 N for complete pptn. of CdS or 0.25 N for complete pptn. of PbS. The values for  $\text{Cu}_2\text{S}$  and  $\text{CuS}$  agree, which indicates that from  $\text{Cu}^{++}$  solns. a mixt. of  $\text{Cu}_2\text{S}$  and S is formed rather than  $\text{CuS}$  as is commonly assumed.  $\text{Hg}_2\text{Cl}_2$  ppts. from solns. that are 12 N in HCl and  $\text{HgS}$  from 6 N HCl.  $\text{As}_2\text{S}_3$  and  $\text{As}_2\text{S}_5$  also ppt. from 12 N HCl. In pptg. with  $\text{H}_2\text{S}$  it is recommended to make sure that the Sn is present in the fully oxidized state. For sepg. the Sn from the Cu group it is recommended to mix 2 cc. of 2 N KSH soln. with 8 cc. of 2 N KOH and dil. to 40 cc. This serves to dissolve the sulfides of Hg, Sn and Sb.  $\text{HgS}$  is pptd. from the soln. by diluting and boiling. By adding exactly 11 cc. of 12 N HCl,  $\text{As}_2\text{S}_3$  is pptd. and recognized as usual. Then by adding 24 cc. of water to the 16 cc. of filtrate, the Sb is pptd. on adding  $\text{H}_2\text{S}$  and the Sn is pptd. by adding 2 N  $(\text{NH}_4)_2\text{S}$  soln. By digesting the residue insol. in KSH with 5 cc. of 12 N HCl, the sulfides of Bi, Pb and Cd are easily dissolved and black Cu sulfide remains. It is recommended to wash the ppt. with strong NaCl soln. until 60 cc. of filtrate is obtained. Then on adding  $\text{H}_2\text{S}$  water,  $\text{Bi}_2\text{S}_3$  is pptd. which can be identified by dissolving in 2 N  $\text{HNO}_3$ , adding Rochelle salt, NaOH and either formaldehyde soln. or dextrose to ppt. Bi. In the Pb-Cd soln. the insol. basic carbonates can be formed by boiling with  $\text{Na}_2\text{CO}_3$  soln. On washing the ppt. with dil.  $\text{H}_2\text{SO}_4$ , insol.  $\text{PbSO}_4$  is formed and Cd can be detected in the filtrate by adding  $\text{H}_2\text{S}$  water. W. T. H.

Colorimetric determination of hydrogen sulfide, sulfides and thiosulfates. André Giberton. *Compt. rend.* 197, 646-8 (1933).—If a soln. of  $\text{Na}_2\text{S}_2\text{O}_3$  is treated with  $\text{AgNO}_3$  soln., the ppt. of  $\text{Ag}_2\text{S}_2\text{O}_3$  which forms first is soon changed to black  $\text{Ag}_2\text{S}$  and S. This takes place rapidly even in a cold, dil. soln. A small  $\text{Ag}_2\text{S}$  ppt. can be dissolved in KCN soln. and then on adding  $\text{Na}_2\text{PbO}_2$  and gelatin a brown colloidal ppt. of PbS can be formed which can be used for colorimetric comparison. This method of getting colloidal PbS has been used previously for detg.  $\text{S}^{--}$  and  $\text{HS}^-$  but the above method of forming it from  $\text{Na}_2\text{S}_2\text{O}_3$  may be used advantageously for prepg. suitable standards, because if the original quantity of  $\text{Na}_2\text{S}_2\text{O}_3$  is known, the  $\text{Ag}_2\text{S}$  and PbS formed correspond to one mol. of sulfide for each mol. of  $\text{Na}_2\text{S}_2\text{O}_3$  present at the start. W. T. H.

A very sensitive test for boric acid, studied in connection with a biochemical problem. Fr. Hahn. *Compt. rend.* 197, 762-4 (1933).—When isoalk. solns. of  $\text{H}_3\text{BO}_3$  and of a polyhydroxy compd. which can combine with  $\text{H}_3\text{BO}_3$  are mixed, the  $p_a$  of the mixt. is lower than that of the original solns. Heat a 1:1 glycerol-water soln. to boiling, add phenolphthalein and then 0.01 N NaOH to a persistent light red color; add phenolphthalein to the soln. to be examd. and bring to the same shade by addn. of 0.01 N NaOH or HCl; on mixing the 2 solns. complete decolorization occurs with as little as  $5 \times 10^{-4}$  g. B per cc. With bromothymol blue (adjusted to the transition color) instead of phenolphthalein and recrystd. mannitol instead of glycerol, the sensitiveness is  $2 \times 10^{-3}$  g. B per cc., and, with 1 drop of each soln. on a porcelain plate to make the test, the actual amt. that can be detected is  $10^{-3}$  g. The most delicate test previously known is sensitive to only  $6 \times 10^{-4}$  g. B. The action of B in the germination of the pollen of tropical white water lilies (Schmucker, C. A. 27, 751) possibly involves intermediate combination of the trace of B with:

one polyhydroxy compd. contained in the pollen.

A. Papineau-Couture

**Bromometric titration of sulfide acids.** Nils Hellström. *Svensk Kem. Tids.* 45, 157-69 (1933).—Mercapto and sulfide org. acids of the types RSH, RSR, RSSR, —CH<sub>2</sub>—SR, and RS(CH<sub>2</sub>)<sub>2</sub>SR (R is CH<sub>2</sub>COOH, etc.) when reacted with standard KBrO<sub>3</sub> and titrated iodometrically gave theoretical S values. The Br equivs. are, resp., 1, 2, 10, 12 and 4. When the acids were titrated potentiometrically (Pt-HgCl) the breaks in the voltage curve agreed with the theoretical vols. of KBrO<sub>3</sub> soln. equiv. to the S present.

A. R. Rose

**Methods for analyzing antiferrous metals.** P. Foerster. *Ann. chim. anal. chim. appl.* 15, 441-6 (1933).—Suitable methods for detg. Sn and Sb are described. W. T. H.

**New method for the analysis of industrial phosgene.** Costin D. Nenitzescu and Constantin Pana. *Bul. soc. chim. Romania* 15, 45-8 (1933).—The mixt. of COCl<sub>2</sub> and Cl<sub>2</sub> is drawn through a previously weighed tube contg. metallic Sb. This tube is connected to an absorption bulb contg. 20 cc. of a 10% soln. of alc. potash, and carrying a tube filled with silica gel to prevent escape of vapors from the absorption bulb. These 2 are weighed together before the detn. After running the mixt. to be analyzed through the app. for 5 min., dry air is drawn through to insure complete removal of the COCl<sub>2</sub> from the tube contg. the Sb. The gain in wt. of the tube contg. the Sb represents the wt. of Cl<sub>2</sub> in the mixt. Likewise, the gain in wt. of the absorption bulb and the silica gel tube represents the wt. of COCl<sub>2</sub> in the mixt. As a check, the contents of the absorption bulb can be transferred to a volumetric flask, acidified with HNO<sub>3</sub>, diluted to vol., and an aliquot portion titrated by Volhard's method.

W. A. Moore

**Detection of a bank note forgery by ultra-violet light.** Julius Grant. *Analyst* 58, 663-4 (1933).—A clever forgery of a Chinese note of elaborate engraving printed in several colors showed under ultra-violet that different dyes had been used in making the counterfeit. The procedure is described.

W. T. H.

**Report on (the determination of) carbohydrates in plants.** J. T. Sullivan. *J. Assoc. Official Agr. Chem.* 6, 471-3 (1933); cf. *C. A.* 27, 215.—A study of the possible causes of error in the detn. of sucrose by the invertase method showed that: with some plant exts. it is not possible to obtain the max. reducing power in 2 hrs. (in 1 case max. reducing power had not been reached at the end of 24 hrs.); H-ion concn. does not seem to play an important part in the final reducing power obtained; a higher concn. of invertase may hasten hydrolysis, but it causes difficulty in the filtration of the reduced su. Insufficient data have been accumulated to raise the question of the specificity of the invertase prepn.

A. Papineau-Couture

**Report on (the determination of) lignin.** Max Phillips. *J. Assoc. Official Agr. Chem.* 16, 476-9 (1933); cf. *C. A.* 6, 2395.—Lignin was detd. by the previously described method by 3 analysts on 8 different lignified plant materials. The results showed that the accuracy of the method compares favorably with other known methods. It is suggested that attempts should be made to remove V-contg. substances either before or after treatment withuming HCl so as to avoid the necessity of detg. N in the lignin residue. Further collaborative work will be done before recommending adoption of the method as official.

A. Papineau-Couture

**The ter Meulen method for direct determination of oxygen in organic compounds.** W. Walker Russell and John W. Fulton. *Ind. Eng. Chem., Anal. Ed.* 5, 384-6 (1933).—The sample is vaporized in a stream of H<sub>2</sub> and caused to flow over a red hot surface and thence over a Ni catalyst whereby the oxides of C are converted into CH<sub>4</sub> and H<sub>2</sub>O; the H<sub>2</sub>O and CO<sub>2</sub> contents of the exit gases are measured by making improvements in the procedure, it has been found possible to obtain satisfactory results. A furnace recommended for volatilizing the original substance; a coated granular quartz forms a suitable cracking sur-

face and a very active, thoriated-promoted, Ni catalyst has proved helpful. With the improved app. excellent results were obtained in detg. the O content of succinic acid, oxalic acid, dextrose, sucrose, benzoic acid, anthraquinone, quinoxaline and  $\beta$ -naphthol. A bibliography of 15 titles is given.

W. T. H.

**Microanalytical determination of methoxyl groups in liquid compounds.** A. F. Colson. *Analyst* 58, 594-600 (1933).—Expts. in detg. OCH<sub>3</sub> in a liquid such as anisole by the app. and technic recommended by Pregl gave unsatisfactory results caused by the tendency of some of the liquid to distil unchanged from the reaction vessel. Various modifications were tried until finally an app. and technic were developed whereby accurate results could be obtained. The reaction vessel is fused on to a fairly wide tube contg. glass beads wetted with 1.5 ml. of HI, d. 1.7. The excess is allowed to drain into the reaction flask and is finally poured out through a side tube which is fused to the reaction flask. The gas from the flask passes through the fairly long tube contg. glass beads into 2 traps contg. a 5% soln. of CdSO<sub>4</sub> with a little red P in suspension and from thence into AgNO<sub>3</sub> soln. The reaction vessel is charged with 0.2 ml. of Ac<sub>2</sub>O, 40 mg. of phenol, 1.5 ml. of HI, d. 1.95 and 2 small pieces of porous plate. The liquid to be analyzed is weighed in a small glass-stoppered tube which is introduced into the reaction vessel through the side tube. A current of CO<sub>2</sub> is passed through the app. at a rate not exceeding bubbles of gas per sec. in the AgNO<sub>3</sub> soln. The flask is heated in a glycerol bath and maintained at 125-135° for 45 min. The resulting ppt. of AgI is weighed with the usual precautions.

W. T. H.

**Determination of ethyl alcohol in fusel oil.** John M. Macoun. *Analyst* 58, 664-6 (1933).—To 20 ml. of the oil in a 50-ml. Eggertz tube graduated in 0.1 ml. intervals, add 5 g. of K<sub>2</sub>CO<sub>3</sub>. Mix well and add more carbonate if it all dissolves. If too much has been added so that there is no line of demarcation between the 2 liquid phases, add water sufficient to make 2 layers. After the sepn. is complete, read the vol. of the upper layer. It is fusel oil plus 93% EtOH by vol. Measure out another 20 ml. portion into a "tar acid flask" of 225 ml. capacity which is graduated from 0 to 25 ml. in not more than 0.2 ml. intervals. Add a satd. soln. of fusel oil in satd. NaCl aq. soln. until the flask is about  $\frac{3}{4}$  full. Add 4-5 ml. of concd. HCl followed by exactly 5 ml. of petr. ether. Shake well and add sufficient NaCl soln. to make the total vol. 225 ml. Shake well, let stand and tap the sides of the flask to get a good sepn. into layers. Read the upper layer. Let A represent the contraction from 20 ml. observed in the Eggertz tube, and B the contraction from 25 ml. observed in the flask. Then the percentage of EtOH by vol. is  $(B-A) \times 0.93 \times 5$ . The method is shown to be better than that recommended in Allen's *Commercial Organic Analysis*.

W. T. H.

**Microdetermination of ethyl alcohol and of glycerol with the aid of colorimetry and the photoelectric cell containing selenium.** R. Fonteyne and P. de Smet. *Mikrochemie* 13, 289-304 (in French).—The colorimetric detn. of EtOH is based upon the measurement of the excess K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> used to oxidize the alc. For this purpose a sensitive photoelec. colorimeter is recommended for use with monochromatic light. With this app., which is described in detail, it is possible to det. 0.1-2 g. of EtOH per l. within about 2 mg. of the truth. The detn. of glycerol is more difficult because glycerol is harder to oxidize completely. The step-photometer of Pulfrich can be used for these detns. but with less accuracy.

W. T. H.

**Detection and determination of tribromoethanol.** Herbert Collatz. *Biochem. Z.* 265, 199-202 (1933).—CBr<sub>3</sub>CH<sub>2</sub>OH or avertin has important therapeutic uses. It is eliminated as a glucuronate. A method is offered for converting the CBr<sub>3</sub>CH<sub>2</sub>OH to bis-hydrazone of glyoxal. A 100 mg. % soln. of avertin is heated 6 hrs. in a paraffin bath under a reflux with a soln. of 0.4 g. 2,4-dinitrophenylhydrazine in 2 N HCl and the hydrazone crystals are filtered off, dried and weighed. This yields up to

78.7% of the theoretical. With 0.4 g. *p*-nitrophenylhydrazine dissolved in 12 cc. 30% AcOH together with 0.4 g. NaOAc, and heating 7 hrs. under reflux on a water bath, the yield of hydrazine crystals is up to 93% of the avertin fixed.

**Microdetermination of acetone.** A. Lindenberg. *Compt. rend. soc. biol.* 114, 15-18(1933).—A slight modification of the Messinger-Huppert iodometric method is described. As little as 0.01 mg. Me<sub>2</sub>CO can be detd. with a possible error of about 1%. L. E. Gilson

**Determination of some phenols by weighing aristol.** Maurice François and Laure Seguin. *Bull. soc. chim.* 53, 711-23(1933).—When thymol is treated with I<sub>2</sub> dissolved in KI soln. a product called aristol is formed. Similar products are formed with other phenols. Details are given for detg. guaiacol, guaiacol carbonate,  $\alpha$ -naphthol and  $\beta$ -naphthol by such a reaction; a glass filtering crucible is recommended for filtering the ppt. The resulting compds. did not always have the expected compn. but there was a definite relationship between the wt. of ppt. and that of the original phenol. W. T. H.

**An accurate and simple method for the determination of invert sugar in the presence of sucrose.** O. Spengler and F. Todt. *Z. Ver. deut. Zuckerrind.* 83, 833-45(1933).—A review is given of the various factors that influence the amt. of Cu<sub>2</sub>O pptd. by sucrose and invert sugar from Fehling's soln. Expts. were carried out with (1) sucrose, (2) invert sugar, (3) sucrose + invert sugar to study the effect of (a) various amts. of Fehling soln., (b) boiling temp. as affected by atm. pressure and added talcum powder and (c) time of heating on the amt. of Cu<sub>2</sub>O produced. Various substitutes for Fehling soln. were also studied. The results showed that the sucrose had a reducing power that was greatly influenced by (a), (b) and (c), while the pptg. power of the invert sugar is practically independent of such conditions. Systematic expts.

are recommended to study the effect of (1) the  $p_{H}$  of the soln. used to treat the sugar product, (2) the Cu-ion concn. and (3) the working conditions. It was found that the accuracy of the detn. of invert sugar in the presence of sucrose would be greatly increased if, instead of the 2 min. boiling period, the sample were removed from the flame as soon as boiling starts. F. C.-C.

**Analysis of mixtures of Schaeffer and F acids—effect of these acids in depressing the phenol-water critical solution temperature.** Douglas G. Kerr. *J. Soc. Chem. Ind.* 52, 336-8T(1933).—The differentiation of Schaeffer acid ( $\beta$ -naphthol-6-sulfonic acid) from F acid ( $\beta$ -naphthol-7-sulfonic acid) has been impossible. It has been found, however, that they depress the crit. soln. temp. to different extents and at low concns. the depression is linearly proportional to the acid concn. To analyze a mixt. of the 2 acids, add equal wts. of various mixts. to 2.575 g. of phenol and 5 cc. of water and plot the temp. at which the soln. becomes opaque. From this graph the compn. of any mixt. can be detd. W. T. H.

**Electrometric titration of sulfurous, selenious and  $\alpha$ -hydroxyalkylsulfonic acids.** P. Rumpf. *Compt. rend.* 197, 686-9(1933).—By working with the glass electrode and titrating H<sub>2</sub>SeO<sub>3</sub> with NaOH, it was possible to detect good inflection points at  $p_{H}$  2.4 and 8 corresponding to the titration of an ordinary dibasic acid. This acid gave no ppts. with various aldehydes. With H<sub>2</sub>SO<sub>3</sub>, only the complete neutralization of the second H<sup>+</sup> could be detected with the glass electrode as the end point of the first H<sup>+</sup> is at too low a  $p_{H}$ . When H<sub>2</sub>SO<sub>3</sub> is coupled with an aldehyde, the product acts as a strong monobasic acid but the acid is too strong for successful titration with the glass electrode. W. T. H.

Breakdown of org. As compds. [estn. of PhCH<sub>2</sub>AsO<sub>2</sub>H<sub>2</sub>] (England) 10. Viologen indicators (Michaelis, Hill) 10.

## 8 - MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

**A new method for recognizing the structure of carnallite rocks.** F. Bessert. *Kali* 27, 239-40(1933). Carnallite may be distinguished from sylvite, halite, etc., by heating to 160°. MgO, formed by hydrolysis, covers the carnallite with a white crust. Kieserite undergoes hydrolysis above 200°.

**Tridymite as a slag mineral.** C. W. Carstens. *Centr. Mineral. Geol.* 1933A, 321-2.—Crystals of tridymite were identified in a slag contg. 47% FeO, 35% SiO<sub>2</sub> and small amts. of CaO, Al<sub>2</sub>O<sub>3</sub>, Cu, Zn and S. Fayalite and pyroxene were also present. Michael Fleischer

**Synthetic rutile.** Karl Chudoba and Werner Wisfeld. *Centr. Mineral. Geol.* 1933A, 323-6.—Excellent crystals of rutile, d. = 4.24, were formed on passing a dry 1:1 mixt. of TiCl<sub>4</sub> and O<sub>2</sub> through a porcelain tube at 650-750°. Forms (110) and (111) predominated; and pseudo-rhombic twinning on (101) was frequent. Michael Fleischer

**The chemical constitution of pectolite.** D. S. Belyankin and V. P. Ivanova. *Centr. Mineral. Geol.* 1933A, 327-39.—A pectolite, of mol. compn. (Na,K)<sub>2</sub>O 1.00, H<sub>2</sub>O 1.14, (Ca,Mn)O 4.16, SiO<sub>2</sub> 6.14%, was heated from 100° to 1000°. Only 0.27% of the 0.00% total H<sub>2</sub>O was lost at 600°, photomicrographs and measurement of  $n$  showing no change in structure. At 700° and above, nearly all the H<sub>2</sub>O was lost, the mineral decomposing into  $\beta$ -wollastonite and glass. Conclusion: The H<sub>2</sub>O is not zeolitic, but H<sub>2</sub>O of constitution, and the formula of pectolite is HNaCa-Si<sub>2</sub>O<sub>6</sub>. Michael Fleischer

**Differential thermal analysis of montmorillonitic clays (bentonites).** J. Orsel and S. Caillère. *Compt. rend.* 197, 774-7(1933); cf. C. A. 21, 878; 27, 4103.—Thermal differential analysis by Le Chatelier's method (*Bull. soc. franc. minéral.* 10, 204 11(1887)) was applied to a no. of montmorillonitic clays and to synthetic mixts. of montmorillonite and kaolinite. The curves obtained can show the presence of as little as 3% kaolinite, which

could not be detected by other methods; the sensitiveness for montmorillonite is only about 20%. The curves obtained show that kaolinite and montmorillonite can have been formed under the same physico-chem. conditions, and that, in a fairly large no. of cases, it is impossible to distinguish sharply between kaolinite clays and montmorillonite clays. A. Papineau-Couture

**The present condition of mining in Brazil.** F. W. Freire. *Berg- u. Hüttenm. Jb. Leoben* 80, 1 7(1932); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 607-10.—Analyses of Fe ores from Minas Geraes, of Mn ores, Ni ores, Cr ores, S ores and Au ores are included. J. F. S.

**Auriferous formation in the region of the Arassuahy River and of Minas Novas, Minas Geraes.** Luciano Jacques de Moraes. *Ann. acad. brasil. sci.* 5, 51-3 (1933).—A geological description is given. The ore nets 13.2 g. Au and 17.8 g. Ag per ton. John M. Ladino

**The Sadon silver-lead-zinc deposit.** V. Domarev. *Trans. Geol. Prospecting Service U. S. S. R.* 10, 1-00 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 480-2.—An analysis of sphalerite and data on the Pb, Zn and Ag contents of ores are given. J. F. Schairer

**The Suleiman-sai lead-vanadium deposit in Kazakhstan.** E. Yanishevskii. *Trans. Geol. Prospecting Service U. S. S. R.* 109, 1-34(1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 592-6.—Analyses of V and Pb-Zn ores, are given. J. F. Schairer

**Iron ores at Itabira, Brazil.** Bernhard H. Sander. *Bull. Inst. Mining Met.* No. 349, 1-8(1933); cf. C. A. 27, 4756.—Discussion. Alden H. Emery

**The iron range in Eastern Transbaikalia.** P. Kasatkina and S. Smirnov. *Mining J. (Moscow)* 106, 101-7 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 574-5.—Many analyses of Fe ores are included. J. F. Schairer

**The characteristics of the Dashtesan iron-ore deposit**

from a magnetometric survey (1923-1924). D. Ortenberg. *Trans. Geol. Prospecting Service U. S. S. R.* 11 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 471-3.—Several analyses of Fe ores are given.

J. F. Schairer  
Silicate nickel ores of the Tülsenevsk deposits in the Urals. E. Kuznetsova. *Bull. Geol. Prospecting Service U. S. S. R.* 50, 265-85 (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 482-4.—Analyses of garnierite and several types of Ni ores are given.

J. F. Schairer  
The Rej chromite district. M. Gordienko. *Mining J. (Moscow)* 106, 118-22 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 467.—The ore contains 15-50%  $\text{Cr}_2\text{O}_3$ .

J. F. Schairer  
Chrome minerals of Outokumpu. Pentti Eskola. *Bull. comm. geol. Finlande* No. 103, 26-41 (1933).—Serpentine rock overlying the ore deposits of the Outokumpu Cu mine in eastern Finland is intersected by quartzite, dolomite and graphite-bearing schist. It is evident that the serpentine is the source of the numerous Cr minerals present, although this rock itself is singularly free from Cr except for pigment-like secondary products. The most notable occurrences are veins composed of uvarovite, tawnaite, Cr-tremolite, Cr-diopside and chromite. These minerals are probably of hydrothermal origin, and illustrate the ability of Cr to migrate and take part in metasomatic replacements. Many analyses and 18 references are included.

A. W. Furbank  
A new phosphorite occurrence at Stadt Wolsk. N. Gan. *Mineralische Rohstoffe Moskau* 3, 442-3 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 490.—An analysis of a phosphorite is given.

J. F. Schairer  
The salt layers of the deposit of Solikamsk. E. Razumovskaya. *Trans. Geol. Prospecting Service U. S. S. R.* 54, 1-40 (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 506-10.—Colorless and blue halite, sylvite, carnallite, anhydrite, gypsum, hematite, clay and quartz occur in the salt layers.

J. F. Schairer  
Minerals from the Tschetscha deposit (Caucasus). A. Shapovalov. *Mining J. (Moscow)* 107, 58-60 (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 591-2.—A crude salt peter showed  $\text{KNO}_3$  10.9 and  $\text{NaNO}_3$  41.1%.

J. F. Schairer  
The corundum deposits of the Kazakian Steppe (Semiz-Bugu and Kalak-tas). M. Rusakov and N. Nakovnik. *Trans. Geol. Prospecting Service U. S. S. R.* 87, 1-43 (1932); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 469-70.—Analyses of corundum-rich rocks are included.

J. F. Schairer  
The occurrence in situ of corundum-bearing rocks in British Malaya. E. S. Willbourn. *De Mining* 12, 170-6 (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 468-9.—Analyses of corundum-rich masses are given.

J. F. Schairer  
The geological relationships of the deposits at the confluence of the Otava and Moldau. Karel Urban. *Šborník St. Geol. ústavu Česk. Rep.* 9, 79 pp. (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 391-3.—Several new rock analyses are given.

J. F. Schairer  
Petrographical notes about Mžezičko, Alšar and Rođen, southern Serbia. Maric Luka. *Bull. soc. sci. de Skopje* 9, 37-50; *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 411-13.—Numerous rock analyses, with optical data on many rock minerals, are given.

J. F. Schairer  
Geology of Sirohi State, Rajputana. A. L. Coulson. *Mém. Geol. Survey India* 63, pt. 1, 166 pp. (1933).—Many chem. and mineralogical analyses of the rocks of the area are given.

Alden H. Emery  
The petrology of Lillafüredor Savostales. S. von Szentpétery. *Acta chem. mineral. phys.* 2, 24-46 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 402-3.—An analysis of oligoclase-porphyrite is given.

J. F. Schairer  
The chemical and mineralogical composition of the lavas of the Timok basin. J. Tomic. *Ann. géol. pénins. balkan.* 10, 124-38 (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 418.—Four analyses of andesites are given.

1 The structure, inclusions and alteration of the Deer Creek intrusive, Wyoming. John P. Rouse. *Am. J. Sci.* 26, 139-46 (1933).—A laccolith of medium-grained quartz-diorite-porphry is intruded in Tertiary, basic breccias and basalt flows. It is composed of varying amts. of plagioclase, hornblende needles, biotite and quartz. The central zone is a much decayed mass of quartz-diorite. The computed norms of the outer fresh rock and the inner decayed zone, resp., are: quartz 20.82, 21.83, orthoclase 13.90, 12.84, albite 38.25, 36.29, anorthite 16.68, 17.02, corundum 0.61, 0.72, hypersthene 4.76, 4.13, magnetite 2.32, 1.85, ilmenite 0.61, 0.61, hematite 0.00, 0.64, apatite 0.62, 0.67, and calcite, 0.00, 0.10. The decayed zone is due to hydrothermal alteration of the rock above the stem that fed magma to the laccolith.

Alden H. Emery  
Petrography and petrology of the Mount Devon diabase porphyry. Garrett A. Mulenburg and Samuel S. Goldich. *Am. J. Sci.* 26, 355-67 (1933).—The Mount Devon dike was intruded as a porphyritic magma. Three generations of plagioclase are distinguishable. Secondary products, uraltite, sericite, chlorite, etc., were derived from the primary minerals and glass was derived by the action of hydrothermal solns. Alteration was most intense in the central porphyritic zone. The large phenocrysts are much sericitized and show enrichment in  $\text{K}_2\text{O}$ . Pseudomorphs, largely chlorite, have been developed as a secondary structure. The alteration is an end phase of dike intrusion; the solns. were derived from the main reservoir from which the dike magma was extruded.

Alden H. Emery  
The basalt of East Styria. II. Karl Schoklitsch. *Centr. Mineral. Geol.* 1933A, 348-59; cf. C. A. 26, 5042.—Three analyses and petrographic data are included.

Michael Fleischer  
A leucite rock from Kurešnicka Krasta near Demirkapija, southern Serbia. Fran. Tucan. *Bull. soc. sci. de Skopje* 9, 79-87; *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 409-11.—A rock analysis is given.

J. F. Schairer  
Genetic relations between the crystalline limestones, dolomites and amphibolites in the rock series at Chynov. Al. Orlov. *Věstník Král. Čes. Spol. Nauk.* II Kl. 36 pp. (1931); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 388-91.—Numerous chem. analyses of rocks are included.

J. F. Schairer  
Hydrothermal metamorphism of an ultra-basic intrusive at Schuyler, Virginia. H. H. Hess. *Am. J. Sci.* 26, 377-408 (1933).—The alteration of an ultra-basic rock to form soapstone is described. The changes took place under conditions of decreasing temp. The order of replacement was pyroxene, green hornblende, actinolite, chlorite and talc—each mineral stable over a temp. range lower than its predecessor. Pressure and stress were of secondary importance. The solns. which permitted the alterations to take place must have been dil., consisting of  $\text{H}_2\text{O}$ , some  $\text{CO}_2$  and little else; other original constituents probably were removed during a long migration from a distant acid intrusion, the source of the solns. Alteration of a gabbro to amphibolite probably is due usually to hydrothermal rather than dynamometamorphism, except as shearing opens paths for solns.

Alden H. Emery  
Parallel striations on etched limestone surfaces. Paul H. Dunn. *Am. J. Sci.* 26, 442-6 (1933).—Striations formed on overhanging facets of limestone or calcite placed in HCl (1:10-1:40) mark the path of rising  $\text{CO}_2$  bubbles.

Alden H. Emery  
A chemical study of the natural gas and waters of Saratov. A. Cherepennikov. *Mémoires géol. gén. appl.* 153, 11-37 (1930); *Neues Jahrb. Mineral. Geol.* 1932, Referate 2, 554-5.—Several gas and water analyses are given.

J. F. Schairer  
Oil fields of Poland, geol. summary (Bohdanowicz) 22.

Johannsen, Albert: Descriptive Petrography of the Igneous Rocks. Vol. II. Quartz-Bearing Rocks. Chicago: Univ. of Chicago Press. \$5.50. Reviewed in *Am. Mineral.* 18, 311 (1933).

## 9--METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

- Historical outline of basic processes in metallurgy. L. Guillet. *Mém. compl. rend. soc. ing. civils France* 85, 1227-35 (1932). --An address. A. Papineau-Couture
- Twenty-five years' progress in metallurgy at Broken Hill, N. S. W. M. R. McKeown. *Chem. Eng. Mining Rev.* 25, 11-18 (1933). Historical. W. H. Boynton
- Compilation of important specific heats for metallurgical calculations. C. Schwurr. *Arch. Eisenhüttenw.* 7, 281-92 (1933). --Formulas for sp. heat and heat contents for air,  $O_2$ ,  $N_2$ ,  $CO$ ,  $H_2$ ,  $CO_2$ ,  $SO_2$ , steam,  $CH_4$ ,  $C_2H_4$ ,  $C_2H_2$  and  $C_2H_6$ , and for Al, Cu, Cr, C, Fe, Mg, Mn, Mo, Ni, Si, Sn, W, Zn and a no. of oxides and slags are compiled from the most recent data available. Forty-four references. M. Hartenheim
- Minerals Yearbook, 1932-33. O. E. Kressling, et al. *Bur. Mines* 519 pp. (1933). --Production for 1932 is given, compared with previous years and discussed for Au, Ag, Cu, Pb, Zn, secondary metals, Fe, Al, Hg, Mg, Mn, Mo, W, Sn, Cr, Sb, As, Ru, U, V, Pt, and allied metals, Ni, minor metals and ore concn. Alden H. Emery
- Notes on power used in crushing ore, with special reference to rolls and their behavior. John S. Owens. *Bull. Inst. Mining Met.* No. 348, 1-2 (1933); cf. C. A. 27, 3172. --Discussion. Alden H. Emery
- The practice of flotation. G. B. O'Malley. *Chem. Eng. Mining Rev.* 25, 46-9 (1933). --A review. W. H. Boynton
- Milling methods and costs at the Alaska Mine flotation plant of the Southern Rhodesia Base Metals Corporation, Limited, S. Rhodesia. C. P. McMillin. *Bull. Inst. Mining Met.* No. 349, 15 pp. (1933). --The ore treated is malachite and chrysocolla in the oxidized zone and chalcocite with an occasional speck of chalcopryrite and pyrite in the sulfide zone. Native Cu also occurs. For the yr. ending March 31, 1931, heads averaged Cu 3.31%, Ag 10.3 dwt. per ton. By flotation, 81.4% of the Cu and 83.6% of the Ag are recovered in a concentrate assaying 68.2% Cu and 215.3 dwt. Ag; the tailings carry Cu 0.64% and Ag 1.87 dwt. Reagent consumption is xanthate 0.356 lb. per ton, cresol 0.186 lb., tar oil 0.250 lb. and creosote 0.108 lb. Total costs were 79.49 d. *Ibid.* No. 350, 15-23. Alden H. Emery
- Study of the flotation of bituminous copper ores of the type of Mansfeld and Niedermarsberg. A. Cotte and G. Aletan. *Mettall u. Erz* 30, 383-9 (1933). --Conditions required for the flotation of these ores are stated. The ores contain about 74.3%  $SiO_2$ , 10.9%  $Al_2O_3$ , 1.8% Cu, 0.002% Ag and 5.8% carbonaceous material. H. S.
- Surface actions of some sulfur-bearing organic compounds on some finely ground sulfide minerals. A. M. Gaudin and Walter D. Wilkinson. *J. Phys. Chem.* 37, 833-45 (1933). --Galena reacts with xanthates to form Pb xanthates which are extd. with acetone. The xanthate readily changes to S and unidentified oils. Galena abstracts dioxanthogen from aq. suspension. Pyrite changes xanthate to dioxanthogen. Sphalerite does not abstract xanthates from soln. Chalcocite abstracts isomyl monosulfide from aq. suspension and part of the reagent can be extd. unchanged from the treated mineral. Some of the changes appear to require atm. O. P. T. N.
- The development of mining and treatment of copper ores at Mt. Lyell, Tasmania. R. M. Murray. *Chem. Eng. Mining Rev.* 25, 5-10 (1933). A review that shows that complex siliceous ores can now be profitably treated with the same Cu content as the pyritic ores of 25 yrs. ago. W. H. Boynton
- The slags from lead and copper ore smelting. Wilhelm Völker. *Arch. Eisenhüttenw. Erzaußereit. Metallhüttenw.* 1, 163-90 (1931). --A crit. review. J. G. A.
- Reduction of iron ores with hydrogen and carbon monoxide. F. Wicner. *Arch. Eisenhüttenw.* 7, 275-9 (1933). The whole course of reduction of pure and ordinary hematite ore in H and CO was studied by examn. of etched samples taken at short intervals. At temps. below 570° the reduction to Fe in H progresses from the edges toward the center; at higher temps. the Fe formation begins at points all over the structure. Reduction with CO produces a different distribution of the metallic Fe in the FeO than that with H; Fe appears, at all temps., at single points which increase in size with increasing temp. Etched specimens can, therefore, indicate accurately the kind of reducing gases and temp. Disintegration of ores in CO is effected by the gas pressure produced on account of the selective permeability of the lattice structure for CO and  $CO_2$ . This disintegration was observed with H only at high temp. and to a small degree. Eight references. M. Hartenheim
- Degradation of "black" Portuguese uranium ores. A. Pro Leite. *Chimie et industrie Special No.* 805 (June, 1933). --When this ore is treated with  $H_2O$ , the quantity of U dissolved is a function of the sulfate content (formed by oxidation of sulfide S); P (as phosphate) begins to dissolve only above a certain sulfate content; the time of immersion has no effect on solubilization of P and U; solubilization of U takes place more readily in natural than in distd.  $H_2O$ ; bicarbonate has no effect on the solubilization of U. A. Papineau-Couture
- The non-ferrous metal manufacturing industries of Australia. Clement Blaisey. *Chem. Eng. Mining Rev.* 25, 29-33 (1933). --A brief review of the principal establishments where rolling, drawing and extruding of non-ferrous metals are or have been carried on. W. H. B.
- Production and deposition of indium. Wm. S. Murray. *Ind. Eng. Chem., News Ed.* 11, 300 (1933). The com. process of obtaining In involves mining, flotation concn., roasting of the concentrate, dissolving the sol. portion of the roasted concentrate with  $H_2SO_4$  and throwing out the In by metallic replacement or by neutralization. The impure ppt. is dissolved, purified and plated out of soln. A typical cyanide plating bath is: 5 oz. (142 g.) In as double cyanide, 9 oz. (255 g.) free cyanide or equiv. of NaCN, 2.5 oz. (71 g.) sugar and water to make 1 gal. (3.78 l.). The deposit of In is soft, uniform and gray. W. H. Boynton
- Gold in Canada. A. H. A. Robinson. *Can. Dept. Mines, Miners Branch, Rept.* 734, 92 pp. (1933). Alden H. Emery
- The development of gold mining in Morobe, New Guinea. Harold Tylour and I. W. Morley. *Bull. Inst. Mining Met.* 347, 61 pp. (1933). --Metallurgical practice is described briefly. Alden H. Emery
- Progress in the metallurgy of gold. B. H. Moore. *Chem. Eng. Mining Rev.* 25, 43-5 (1933). --Developments, during the past 25 yrs., in crushing and grinding, and Au extn. are noted. The recognition of the necessity for and the value of systematic and continuous exptl. research into all phases of the processes in use and the adaptation of the results of such research and of scientific principles to practical operations are of paramount importance. W. H. Boynton
- A history of the introduction of the MacArthur-Forrest cyanide process to the Witwatersrand gold fields. Jas. Gray and J. A. McLachlan. *J. Chem. Met. Mining Soc. S. Africa* 33, 375-97; 34, 74-5 (1933). A. H. Emery
- Some observations upon the use of potassium ferrocyanide as a coagulant in the assay of gold-bearing solutions and in the treatment of slimes residues for total gold assay. C. T. Creed and C. F. Cayton-Boxall. *J. Chem. Met. Mining Soc. S. Africa* 33, 308 (1933); cf. C. A. 27, 4497. --Discussion. Alden H. Emery
- Native wire silver: Notes on its formation and possible significance. C. B. P. Douglas. *Bull. Inst. Mining Met.* No. 348, 3 (1933); cf. C. A. 27, 4501. --Discussion. Alden H. Emery
- Practical "test" manipulation. Handling the cupella-



tion furnace. C. E. Downie. *Chemistry & Industry* 1933, 777-8. J. H. Moore

The sodium-carbonate process for treating cast iron. E. W. Colbeck and N. L. Evans. *Foundry Trade J.* 49, 191-2(1933).—Pouring molten cupola metal into ladles contg. a mixt. of  $\text{Na}_2\text{CO}_3$  and ground limestone is shown to offer several advantages. Downs Schaff

Study of nitrogen in the Thomas process. O. Quadrat and M. Pilz. *Chimie & industrie Special No.*, 694-7 (June, 1933).—In 45 tappings from 3 blast furnaces the av. N content was 0.0010%. The changes in N content during the manuf. of steel were studied on 25 charges by taking samples from (1) the cast Fe leaving the mixer, (2) the steel in the converter before deoxidation, (3) the same after deoxidation, (4) the steel remaining in the converter after pouring and (5) a small test ingot. The N contents found were: (1) 0.0017, (2) 0.0171, (3) 0.0105, (4) 0.0161, (5) 0.01601%. The greatest increase in N in the converter occurs during the final third of the blowing period. A study of N segregation in a small ingot showed that N tends to accumulate in the center, being 0.0171% at the surface and 0.0188% at the center. A. Papineau-Couture

The Thomas converter process. P. Piérard. *Mém. compt. rend. soc. ing. civils France* 85, 1236-9(1932).—An address. A. Papineau-Couture

The basic open-hearth process. L. Baclé. *Mém. compt. rend. soc. ing. civils France* 85, 1240-4(1932).—An address. A. Papineau-Couture

Installation and organization of a modern steel works laboratory. P. Chevenard. *Mém. compt. rend. soc. ing. civils France* 85, 1109-58(1932).—A detailed description of the Imphy lab. of the Soc. de Commentry-Fourchambault & Decazeville, its organization, equipment and methods used, with an outline of the results of some of the investigations carried out. A. Papineau-Couture

Progress in the metallurgy of steel. R. Perrin. *Mém. compt. rend. soc. ing. civils France* 85, 991-7(1932).—Dephosphorization of Thomas steel can be obtained by violently agitating the steel with a very fluid, basic, oxidizing slag; e. g., P was reduced from 0.060 to 0.012% practically instantaneously. By proper application of the process dephosphorization can be obtained even with high P contents; several treatments are used in series if necessary; the treatment leads to practical equil. between the metal and slag, which is indispensable for obtaining uniform results. One of the main essentials is extremely violent agitation, failing which the results are most irregular. Deoxidation of steel can be obtained by: (1) recarburization, (2) converting part of the dissolved Fe oxide into another oxide sol. in the steel and finally (3) agitating the steel violently with a fluid acid slag for a very short time. A superoxidized steel can thus be transformed, without addn. of a stilling agent, Si, Al or Ti, into a mild steel contg. about 0.150% Si and 0.001-0.002% O. Regeneration of the slag charged with oxides dissolved from the steel can be obtained by adding excess of a deoxidizer (e. g., Si or Al) and again shaking very violently for a very short time. The deoxidation of the steel and regeneration of the slag are thus effected by means of 2 short but very violent agitations, with an intermediate addn. of a deoxidizer; the latter does not cause inclusions in the steel, as the  $\text{SiO}_2$  or  $\text{Al}_2\text{O}_3$  formed dissolves in the slag. The process also lends itself to the introduction of special elements in the steel. A. P.-C.

Basic slags of Siemens-Martin furnaces. J. Bulina. *Chimie & industrie Special No.*, 672-8(June, 1933).—B. studied the effect of the chem. compn. of the slag and of temp. on the FeO concn. in the slag and in the fused steel in the transformation of cast Fe into malleable Fe in a basic furnace. Operation of the furnace was controlled by complete analysis of samples of different malleabilities. FeO was detd. via Herty et al. (*C. A.* 22, 1309). The concn. was found to depend on the  $\text{CaO}:\text{SiO}_2$  ratio. If this ratio (after subtracting the CaO combined as  $\text{Ca}_3(\text{PO}_4)_2$ ) = 1.76 the FeO and  $\text{Fe}_2\text{O}_3$  are merely dissolved in

the molten slag; if it is greater than 1.70 part of the Fe loses its oxidizing power and passes into the inactive form. The slag then consists of 2 phases: the fused mass and the solid suspension. Under these conditions it is the fused mass that possesses the oxidizing power of the slag. The ratio between the free FeO and the inactive FeO is governed by the laws of absorption. A. P.-C.

The fluidity of slag and processes of refining steel. L. Losana. *Met. ital.* 25, 405-14(1933).—Viscosity measurements have been made on slags from acid as well as basic Martins furnaces, and elec. furnaces. The viscometer consists of a graphite rod rotating in the molten slag under the impetus of a definite weight. The distance a pointer moves along the horizontal scale in a certain time is a measure of the viscosity. The basic slag had the compn.:  $\text{CaO}$  43,  $\text{Al}_2\text{O}_3$  7.0,  $\text{SiO}_2$  50%; m. p. 1440°; viscosity at 1500° —7.1; 1600° —6.3; 1650° —5.1; and at 1700° —3.5; these values are compared with those of water at 20°. The effect of addn. of  $\text{FeO} + \text{Fe}_2\text{O}_3$  (3.95-28.94%) was measured. Viscosity increases with increasing oxide from 3.0 to 6.3 (at 1500°); and from 1.2 to 2.8 (at 1700°). Replacing Fe oxide with  $\text{MnO}$  up to 15% does not alter the viscosity appreciably, but above this amt., it increases with increasing  $\text{MnO}$ . The viscosities of a no. of com. slags, acid, basic, and from elec. arc furnaces, were also detd. Slags with high FeO and low CaO have higher viscosity than when the CaO is also high. This may be due to decompn. of a very basic silicate, as  $3\text{FeO}:\text{SiO}_2$ , giving FeO and  $2\text{FeO}:\text{SiO}_2$  or  $\text{FeO}:\text{SiO}_2$ . With higher CaO, the  $\text{SiO}_2$  is combined with both oxides, so that only  $\text{FeO}:\text{SiO}_2$ , which is more stable at higher temps., is formed. The effect of adding varying amts. of a fluorspar ( $\text{CaF}$  92.64,  $\text{CaCO}_3$  2.96,  $\text{H}_2\text{O}$  4.01,  $\text{Fe}_2\text{O}_3$  0.36%) caused a drop in viscosity with addn. of up to 5%; but at 10% the viscosity again rises, except when high  $\text{SiO}_2$  is present. Therefore, there is an optimum amt. of fluorspar which may be added as flux, which increases as the percentage of  $\text{SiO}_2$  in the slag increases. A. W. C.

The transparency of sulfide and oxide inclusions in steel. C. Benedicks and H. Löfquist. *Jernkontorets Ann.* 116, 443-57(1933).—In photomicrographs of oxide or sulfide slag inclusions, certain series of parallel lines are sometimes observed. These are shown to be due to interference phenomena on transparent wedge-shaped slabs. By measuring the distances between the lines the  $n$  may be calcd. For light of wave length  $0.53 \mu$ , the value of  $n$  for  $(\text{Fe}, \text{Mn})\text{O}$  was found to be  $2.1 \pm 0.1$  and for  $\text{MnS}$ , 2.4. Nine references. H. C. Duus

Drill steels for mining purposes. W. H. Hatfield. *Bull. Inst. Mining Met.* No. 348, 5-7(1933); cf. *C. A.* 27, 4200.—Discussion. Alden H. Emery

The present status of our knowledge regarding the structure of metals and alloys and its industrial consequences. Albert Portevin. *Mém. compt. rend. soc. ing. civils France* 85, 7-42(1932).—An address. A. P.-C.

Metallographic grinding with paraffin impregnated with abrasives. R. L. Dowdell and M. J. Wahl. *Metals & Alloys* 4, 181-2(1933). Downs Schaff

The action of energizers during case carburization. E. G. Mahin and Joseph A. Toussaint. *Proc. Indiana Acad. Sci.* 42, 113-17(1933).—CO is the only important direct carburizing agent and results in the carburizing mixt. from the reactions  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ , and  $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$ . By the time the carburizing temp. of C and air is reached a very small proportion of  $\text{O}_2$  remains in contact with the C; at 850° only 14% of the original  $\text{O}_2$  remains; hence the small carburizing effect without the use of energizers.  $\text{Na}_2\text{CO}_3$ ,  $\text{CaCO}_3$ ,  $\text{BaCO}_3$ ,  $\text{CaO}$  and  $\text{BaO}$  serve well to increase the speed of C absorption. The above carbonates, upon heating, slowly give off  $\text{CO}_2$  which furnishes CO for absorption. The oxides, at 600-700°, combine with the  $\text{CO}_2$  formed from  $\text{C} + \text{O}_2$  and at 800° there is a considerable proportion of carbonate ready to furnish  $\text{CO}_2$  for  $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$  and at 850° there is carburization. H. E. Measmore

The finishing of metals used in aircraft. Harold Crary. *Metal Cleaning and Finishing* 5, 419-21(1933).—A de-

scription of the operations and the equipment employed in the finishing of parts for all-metal air craft. D. T.

**Modern trend in cast iron.** R. P. Bethell. *Proc. Staffordshire Iron Steel Inst.* 47, 2-9 (1931-32).—The chem. and phys. properties as required of good-quality pig iron are discussed. It is the general belief that irons have some inherent or intrinsic properties which are not revealed by the ordinary tensile and transverse tests usually carried out. It is recommended that all the raw materials entering the furnace be carefully graded. G. T. M.

**Heat treatment of cast iron.** J. H. Bradshaw. *Proc. Staffordshire Iron Steel Inst.* 47, 52-7 (1931-32).—A general discussion on microstructure, heat treatment, alloy cast iron and the application of the heat-treated cast iron. G. T. Motok

**Development of cast iron for machine construction.** Oliver Smalley and W. W. Kerlin. *Iron Age* 132, 24-7 (1933).—A structural analysis of cast iron or semi-steel may contain: ferrite 2-56, Fe silicide 2-10, pearlite 0-85, cementite 0-43, P eutectic 0-48 14.95, MnS 0.09 0.67, FeS 0.06-0.21 and graphite 0-10.7%. Phys. properties of the structural constituents are tabulated. Chem. analysis, structural analysis, and phys. properties of highest cast iron, autocylinder cast iron, gears, and white iron castings are listed. Factors affecting the design include compression, fatigue, rigidity, wear, hardness, corrosion, heat resistance, machinability, magnetic properties, heat treatment and mass effect. C. B. Jenni

**Some properties of alloyed gray cast iron.** Carl Pfannen-schmidt. *Giesserei* 20, 473-81 (1933); cf. C. A. 27, 5040. Curtis L. Wilson

**The effect of hydrogen on the transformation of iron.** R. H. Harrington. *Trans. Am. Soc. Steel Treating* 21, 896-8 (1933).—A reply to Esser and Cornelius (C. A. 27, 5097). W. A. Mudge

**Rates of scale formation on iron and a few of its alloys.** K. Heudlhofer and B. M. Larsen. *Trans. Am. Soc. Steel Treating* 21, 865-98 (1933).—Scaling is considered a diffusion process. The thickness of each layer, hence the thickness of the whole scale, increased as the square root of time and increases rapidly with rising temp. according to an exponential relation. These simple relations are not strictly valid for alloys or for sharply curved surfaces such as wires. Conclusions are confirmed for pure Fe and pure Cu and a few Fe alloys by expts. in which relatively long periods of exposure and continuous weighing of the sample during the scaling period are used. The greater rate of scaling in steam is probably connected with the fact that the scale formed in steam is more porous. C up to 1.00% has no effect upon scaling rate. Ni up to 35% or Al at 5-7%, reduces scaling to  $\frac{1}{2}$   $\frac{1}{2}$  of the amt. for pure Fe. Al above 12-14% and Cr at 27% decrease scaling to 0.01 that for pure Fe. W. A. Mudge

**Fatigue and the hardening of steels.** Herbert J. French. *Trans. Am. Soc. Steel Treating* 21, 899-946 (1933).—An appraisal of the process of martensitization and age hardening is given in terms of the resistance of steels to fatigue. Delayed fractures (after 10 million stress repetitions) in martensitized steels are discussed in relation to fatigue-testing technique and the utilization of hardened and slightly tempered steels. Methods are given for detg. "probable damage lines," that is, the ranges of overstress within which damage should not occur. Hard martensites are shown to require appreciable proportions of retained austenite, or decomposition products, for high resistance to fatigue. The fatigue limits produced by age hardening Cu-Si and Ni-Al steels, at around 400 Brinell, were approx. the equiv. of those of martensitized and tempered steels at the same hardness but their resistance to occasional overstress was not so good. Strengthening on overstressing in fatigue tests, reported occasionally by earlier investigators, was observed in temper-brittle Ni-Si steels. Evidence is presented in support of the hypothesis that strengthening by overstressing, or initially high ratios of fatigue limit to tensile strength, were the result of aging effects, that is, the decay of super-satd. solid solus. initiated by slip. Particle deposition in

the slip bands was conceived to obstruct slip and so to improve the resistance to fatigue. W. A. Mudge

**Production of rustproof steels.** Edward Maurer. *Z. Elektrochem.* 39, 820-2 (1933). Reply. B. Strauss. *Ibid.* 822. Correct position. Ed. Maurer. *Ibid.* 822-4; cf. C. A. 21, 3591.—A controversy over the discoverer of rustproof steels. H. Stoertz

**Modern high-grade structural steels.** P. Schoen-maker. *Ingenieur* 48W, 141-7 (1933).—A review of various German and American special steels for construction use, Ni steel, Si steel, etc. Strength, corrosion resistance and other qualities are discussed; tables and references are given. B. J. C. van der Hoeven

**Molecular compounds in liquid steel and their influence on the deoxidation equilibria.** P. Hercasymenko and F. Potohil. *Collection Czechoslov. Chem. Communications* 5, 331-8 (1933).—A thermodynamic study of the Fe-Si-O system. Investigation of the liquidus-solidus curves of the Fe-Si system near the m. p. of Fe shows that Si dissolved in Fe is mainly in the form of FeSi. But only at. Si can take part in the deoxidation:  $2\text{FeO} + \text{Si} = 2\text{Fe} + \text{SiO}_2$ . Further, if Mn is present it will combine with some of the Si to form Mn<sub>2</sub>Si (where x is probably 2 or 3). The authors conclude, therefore, that the deoxidizing effect of Si in liquid steel contg. Mn is considerably lower than in steel without Mn. This is confirmed by exptl. data taken from various sources. Bibliography. John E. Milbery

**Titanium and columbium in plain high-chromium steels.** Frederick M. Becket and Russell Franks. *Am. Inst. Mining Met. Engrs., Tech. Pub.* 506, 14 pp. (1933).—W and Mo addns. to Cr steel inhibit air hardening slightly. Their carbides are fairly sol. in Fe-Cr solid soln., and on cooling from high temps. these carbides ppt. in finely divided form, preventing the steel from becoming soft and ductile in the hot-rolled condition. Plain Cr steel and high-Cr steel contg. W or Mo can be softened through proper annealing. Suitable proportions of Zr, Ta and V afford greater improvement than W and Mo. Approx. 20 times as much Ta as C is needed, a prohibitive cost. V must be used in a ratio of 15:1 of C, but this decreases the resistance of steel to oxidation at high temp. Large amts. of Zr are needed and this introduces undesirable amts. of Si. Ti should be present in the ratio of 5-7 times the percentage of C, Cb 8-10 times. Smaller ratios afford some improvement; large excesses are detrimental through hardening of the solid soln. of Fe and Cr. The high-Cr steels contg. Ti or Cb may be hot-worked easily. Phys. properties of these steels are shown tabularly. The addn. of 0.00% Ti to 5.93% Cr steel raised the Ac<sub>1</sub> point from 803 to 808° and on cooling raised the Ar<sub>1</sub> point from 436° to 841°. Cb gives similar results. A. H. Emery

**Harmful influence of phosphorus in steel.** W. Beckers. *Ingenieur* 48, 144-7 (1933).—Test pieces were made in an acid open-hearth furnace of cast steel of variable P content (the low-P samples in a basic furnace); all charges are carefully deoxidized (O less than 0.04%, S below 0.027%), chilled and annealed at a temp. 50° above the upper crit. point. The standard stress and impact tests were made, the results of which are given in tables and curves as a function of the percentage of P from 0 to 0.12%. The influence on elastic and impact strength was insignificant up to 0.00% P; the toughness is lowered somewhat but remains within reasonable limits up to 0.08% P. In the samples with more than 0.10% P made by addn. of ferro-phosphorus to the charge the curves drop rapidly; the mfg. method is believed to be responsible for this (Ober-hoffer, *Das techn. Eisen*, p. 208, C. A. 22, 2136). It is concluded that P contents of steel up to 0.08% are insignificant; addn. of P material to a finished charge is objectionable. B. J. C. van der Hoeven

**Field and laboratory data covering tests upon special alloys for barrels, balls and seats.** Walter F. Rogers. *Oil Gas J.* 32, No. 23, 54, 58, 59 (1933).—The use of Cr-Ni-Fe alloys for balls and seats makes replacements a negligible expense. Field data are given. J. R. S.

A critical study of some iron-rich iron-silicon alloys

Chu-Phay Yap. *J. Phys. Chem.* 37, 951-67(1933).—The following Fe-Si alloys, annealed for 150 hrs. at 900°, were studied: 12.4, 13.1, 14.0, 14.5 and 15.6 Si. In addn. to these alloys of high purity 3 com. alloys of 5, 25 and 32% Si were examd. By means of the thermoelec. method, electrode potential measurements and x-ray crystal analysis, it is concluded that the phase  $\psi$  (Fe<sub>3</sub>Si) is a compd. and not a distinguished point in a series of solid solns. The existence of an  $\eta$ -phase (Fe<sub>3</sub>Si<sub>2</sub>) and an  $\epsilon$ -phase (FeSi) is indicated by electrode potential measurements without direct evidence of their actual chem. compn. On the basis of a thermodynamic study of the f.-p. lowering the actual compn. of  $\psi$  is shown to be Fe<sub>3</sub>Si<sub>2</sub>. Reasons why a solid soln. with a regular distribution should be treated as a compd. are also advanced. H. S. v. K.

X-ray study on alloys of silicon with chromium, manganese, cobalt and nickel. Bertil Borén. *Arkiv. Kemi, Mineral. Geol.* 11A, No. 10, 28 pp.(1933).—Four intermediate phases appear in the Cr-Si system. The first, Cr<sub>3</sub>Si, has cubic crystals with an edge of 4.555 Å. U. The second phase seems to be very complicated. It is not yet established but the structure appears to have a tetragonal form. It appears only at temps. below 1000°. The third phase, CrSi, is analogous to FeSi. The length of edge of the cube is 4.620 Å. U. The last intermediate phase, CrSi<sub>2</sub>, crystallizes hexagonally; the elementary prism contains 9 atoms and has the following dimensions:  $a = 4.422$  Å. U.,  $c = 6.351$  Å. U., and  $c/a = 1.44$ . In the Mn-Si system 3 intermediate forms appear, Mn<sub>3</sub>Si, MnSi and MnSi<sub>2</sub>. Mn<sub>3</sub>Si crystallizes hexagonally and has the following dimensions:  $a = 6.898$  Å. U.,  $c = 4.808$  Å. U., and  $c/a = 0.690$ . The elementary prism contains 16 atoms. The compd. MnSi has an FeSi structure with a cube edge of 4.548 Å. U. The last phase, MnSi<sub>2</sub>, belongs to the tetragonal system and has the following dimensions:  $a = 5.513$  Å. U.,  $c = 17.422$  Å. U., and  $c/a = 3.16$ . It is not analogous to FeSi<sub>2</sub>. The Co-Si system contains only 2 intermediate phases. The first, Co<sub>3</sub>Si, crystallizes in the rhombic system; the dimensions of the parallelepiped are:  $a = 3.710$  Å. U.,  $b = 4.908$  Å. U., and  $c = 7.095$  Å. U. The compd. CoSi has an FeSi structure with a cube edge of 4.438 Å. U. The Ni-Si system was only partially investigated; the presence of a compd. NiSi, analogous to FeSi, has been established. The edge of the elemental cube was estd. to be about 4.437 Å. U.

C. B. Jenni

The composition and action of metal cleaners. E. K. Strachen. *Metal Cleaning and Finishing* 5, 426-9(1933).—A practical discussion of the compn. and action of metal cleaners. General formulas are given. D. Thiessen  
The rusting of hot-water-heating plants. Alex. Marx. *Gesundh.-Ing.* 56, 481-3(1933).—A general discussion of the corrosive action of dissolved gases in both high- and low-pressure plants. Removal of gases from the feed water before use is recommended in the former case.

M. G. Moore

Protecting underground pipe lines against soil action. K. H. Logan. *Chem. & Met. Eng.* 40, 514-16(1933).—See C. A. 27, 5045. G. G.

The properties of bitumens and bitumen compounds of importance for use in protecting pipe lines against corrosion. J. Ph. Pfeiffer. *Hot Gas* 53, 413-23(1933).—A review of methods for detn. of penetration, ring and ball, m. p., Redwood viscosity, flowing tendency and brittleness of bitumens. Tabulated data and curves are given for typical examples. For use as pipe coating a zone of "asphalts" can be indicated on a diagram of penetration at 25° vs. m. p. in which sets of curves represent coal-tar pitch, "normal" asphalt and blown asphalt. For thin, 0.4 mm., dipped, bitumen coatings the material should have a penetration of less than 45 at 25°, less than 100 at 40°, a min. m. p. of 52°, a max. working temp. of 200°, max. brittleness by the Fraass method of 15°, by the Van Heurn and Begeyn fracture method of 40°. The coal-tar pitch type is generally best for this purpose. For enamel coatings (0.5-2.5 mm.) applied by brushing or centrifugation the brittleness is more important; blown asphalt

is advisable, with or without fillers. No flow should occur at 40° under a 45° angle. As to heavy, reinforced asphalt layers (interposed fibrous layers of hemp, jute, wool or asbestos) a detailed description is given of the application of Enamel HC of the Batavian Petroleum Co. for external and internal pipe protection. A coconut fiber reinforcement is used.

B. J. C. van der Hoeven

The corrosion problem. O. A. Knight. *Mineral Ind., Penna. State Coll.* 3, No. 1, 4(1933).—General.

Alden H. Emery

Mechanism of corrosion of iron in sodium chloride solution—effect on the potential of the iron of adding organic substances to the brine. E. G. R. Ardagh, R. M. B. Roome and H. W. Owens. *Ind. Eng. Chem.* 25, 1116-21(1933).—A dependable procedure is described by which reproducible measurements of the potential of an Fe electrode in a brine can be obtained. This procedure is employed in making a survey of the inhibiting effect on the corrosion of Fe in brine of different classes of org. compds. Certain classes of org. compds. are shown to have a strong tendency to inhibit the corrosion of Fe in brine. The mechanism of this inhibiting action is partially elucidated.

M. E. Haas

Corrosion-time relationship of iron. R. F. Passano. *Ind. Eng. Chem.* 25, 1247-50(1933).—P. thinks that the use of calcd. rates of corrosion is likely to be misleading except when the corrosion-time relationship is linear or when one has a knowledge of the nature of the corrosion-time relationship existing under the particular conditions, whatever they may be. Various types of corrosion are presented graphically in their relationship to time. Eighteen references.

M. E. Haas

Corrosion fatigue, the cause of rapid wear of cylinders. P. Nettmann. *Automobiltech. Z.* 36, 438-9(1933).

A. A. Boettinger

Heating parts before welding. C. C. Phares. *Transit J.* 77, 411-12(1933).—Preheating, before welding, to insure a uniform temp. throughout the entire piece and allowing it to cool slowly after the welding reduces local stresses to a min. and eliminates cracks.

W. H. Boynton

The use of silver hard solders in the chemical industry. Robert J. Snelling and Edmund Richard Thews. *Chem. Fabrik* 1933, 443-5.—A discussion of the phys. properties and practical applications of Cu-Ag-Zn solders, with or without the addn. of small amts. of Cd, Ni, etc.

J. H. Moore

Alloys in the sugar factory (Rogers) 28. Corrosion in oil-cracking installation (Perry) 22. Corrosion from products of combustion (Anon.) 21. Attack of concrete-reinforcing Fe by blast-furnace cement (Erculisse) 20. Roasting ores (Ger. pat. 583,198) 20. Grinding in ball mills (Helm) 13.

Liddell, Donald M., and Doan, Gilbert E.: The Principles of Metallurgy. New York: McGraw-Hill Book Co., Inc. 626 pp. \$5.50.

Dressing barytes ore. Casper P. DeLore (to National Pigments & Chemical Co.). U. S. 1,930,709, Oct. 17. After crushing the ore it is further comminuted in the presence of water; heavier particles are settled out and these heavier particles are subjected to a hindered settling, particles of lighter sp. gr. than barytes are sep'd. from the particles and the residue is conveyed back to the comminuting app. App. is described.

Treatment of pyrites. Patentaktiebolaget Gröndal-Ramén. Ger. 583,380, Sept. 2, 1933. A mixt. of pyrites with a flux (if necessary) and a solid reducing agent is fused in a shaft furnace, the feed opening of which is sealed and into which air is blown from below. The amt. of reducing agent is adjusted so that SO<sub>2</sub> from the lower part of the charge is reduced in the upper part, the reducing agent being practically all consumed before the charge reaches the lower part of the furnace. The gases leaving the furnace then consist almost entirely of N, CO, and S, and after S has been condensed out the residual gases can

be safely discharged into the atm. When the ore contains Cu, the conditions may be adjusted so that not all of the S is driven off, the process then yielding a slag contg. FeO and SiO<sub>2</sub> and a concentrate contg. Fe, Cu and S. This concentrate is then roasted, and the SO<sub>2</sub> evolved is mixed with the air supplied to the shaft furnace. Numerous details are given.

Treatment of ores, etc., containing iron and sulfur. Comstock & Wescott, Inc. Ger. 583,049, Aug. 28, 1933. See Brit. 306,107 (C. A. 23, 4920).

Reducing sulfidic iron ores. Demag A.-G. Brit. 395,367, July 10, 1933. In smelting Fe ores having a high S content supplemental air is passed into the charge of ore, flux and coke, the vol. of such air being 30% or more of that required for the treatment of ordinary oxidic ores and being introduced at the point in the blast furnace where with such ores the reduction of the ore is complete. The extra air may be forced into the furnace through the ordinary tuyers or through tuyers disposed in 1 or more planes above these. The SO<sub>2</sub> produced in the lower part of the furnace is reduced by contact with solid C and CO to S which passes off with the waste gases from which it is sep'd. by gas washers, elec. filters or both filters.

Roasting sulfide ores, etc. Kenneth W. Young and Imperial Chemical Industries Ltd. Brit. 394,650, June 15, 1933. Sulfide ores, e. g., Zn blende, pyrites or partly burnt pyrites, particularly cuprous pyrites, or other S-contg. materials are roasted at 600-800° in the presence of a (preheated) gas contg. free O and at least 20% SO<sub>2</sub>, whereby non-ferrous metals are converted to sulfates. App. is described.

Treating titanium ores. Lonnie W. Ryan and Johan R. Knoff (to Titanium Pigment Co.). U. S. 1,929,521, Oct. 10. A Ti ore which is difficultly sol. in H<sub>2</sub>SO<sub>4</sub> such as rutile is heated with an alkali metal compd. such as NaHSO<sub>4</sub> or K<sub>2</sub>CO<sub>3</sub> in a quantity approx. corresponding to the chem. equiv. of the metallic elements required to convert the ore into acid-sol. alkali-metal titanate such as Na<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> or K<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>.

Apparatus for roasting zinc sulfide ore. Augustin L. J. Queneau. U. S. 1,929,713, Oct. 10. Various details are described of a furnace provided with an exterior sulfur burner for producing SO<sub>2</sub> which is conducted directly over the oxidized ore in the furnace.

Dead-roasting oxidized zinc sulfide ores. Augustin L. J. Queneau. U. S. 1,930,370, Oct. 10. An air-SO<sub>2</sub> mixt. heated to above the thermal decompn. temp. of metal sulfate compds. contained in the ores is circulated over them. App. is described.

Treating oxidized ores containing metals that have more than one valency. Ralph F. Meyer (to Meyer Mineral Separation Co.). Brit. 394,840, July 6, 1933. See U. S. 1,898,018 (C. A. 27, 2659).

System for cooling metallurgical furnaces, molds, etc., with water or steam circulated under high pressure. Ferdinand Heyd. Ger. 583,381, Sept. 2, 1933.

Crucible furnace suitable for melting metals. Furman South, Jr., and Oscar E. Neuhausen (to Lava Crucible Co.). U. S. 1,930,323, Oct. 10. Structural features.

Blast heater (Cowper type). Robert Kahlenberg. Ger. 583,208, Aug. 30, 1933.

Means for changing blast-furnace tuyères. Edgar E. Brosius. Ger. 584,146, Sept. 15, 1933. This corresponds to Brit. 381,634.

Recovering blast-furnace flue dust. Arthur B. Haswell and Frank G. Cutler. U. S. 1,930,010, Oct. 10. For sintering and fusing the finely divided material, it is forced into a zone heated at least sufficiently to incandesce the particles to a plastic stage, and the material is centrifugally projected upon a hearth maintained at a temp. sufficient to fuse the material. App. is described.

Flash-roasting apparatus. Eugene C. Clarke (to Bethlehem Foundry & Machine Co.). U. S. 1,929,308, Oct. 3. Various structural features are described.

Heat treatment of metals. Aluminium Ltd. Fr. 750,622, Aug. 14, 1933. Heat treatment of easily oxidizable metals, such as Al or its alloys, is carried out in an almost dry atm.

Furnace for heating metal billets. Heinrich Bangert. Ger. 583,059, Aug. 28, 1933.

Gas-heated furnace for heating ingots. Friedrich Siemens A.-G. Ger. 579,811, July 1, 1933. Addn. to 560,241 (C. A. 27, 940).

Converter for steel manufacture. Rudolf Frerich. Ger. 583,382, Sept. 2, 1933.

Treating drosses from melting metals. Frank F. Colcord and John J. Mulligan (to U. S. Smelting, Refining & Mining Co.). U. S. 1,931,285, Oct. 17. Drosses such as those formed in melting Pb, Zn, Sn, Bi, Cd and their alloys are subjected to prolonged agitation with the molten metals in the absence of refining agents until dry drosses of low entrained metal content are produced.

Porous metallic bodies such as bearings. Charles R. Short and Craig V. Morton (to Moraine Products Co.). U. S. 1,930,287, Oct. 10. Powd. materials such as Cu, Sn, Pb, graphite and salicylic acid are fed to a conveyor and carried progressively into position to be compressed, formed into a sheet and sintered. App. is described.

Drawing metals. Electro Metallurgical Co. Ger. 584,445, Sept. 20, 1933. The drawing of difficultly worked metals, e. g., Cr-Fe alloys, is facilitated by coating the metal with powd. Al and an adhesive, e. g., a gum or a cellulose ester or ether.

Oxidation resistant bimetallic material suitable for bimetal thermostatic devices. Howard Scott (to Westinghouse Elec. & Mfg. Co.). U. S. 1,929,055, Oct. 10. A high-expansion component contg. Fe together with Cr 5.7, Ni 22, Si 0.2 and Mn 0.7% and C about 0.47% is used with a low-expansion component contg. Fe together with Cr 17, Si and Mn each 1, C 0.1-0.45% and a trace of Ni.

Bright-annealing metal articles such as those of steel. Augustus B. Kinzel (to Electro Metallurgical Co.). U. S. 1,931,134, Oct. 17. The articles are heated to a suitable annealing temp. in a reduced atm. formed by heating with carbon a substantially dry gaseous atm. contg. at least 95% N associated with O-contg. gas.

Apparatus for polishing colored pulverulent bronze. Erwin Kramer (to Hartstoff-Metall A.-G.). U. S. 1,930,683, Oct. 17. Structural and mech. features. U. S. 1,930,684 also relates to app. and operative details of manuf. of "bronze colors."

Dyeing oxidized aluminum surfaces. Leon W. Eberlin (to Eastman Kodak Co.). U. S. 1,929,486, Oct. 10. In dyeing the oxidized coating produced on Al by electrolysis in an org. acid bath, the uniformity of the dyeing is controlled by adding to the dye bath an excess of CaCO<sub>3</sub> over that required to neutralize the acid carried in the oxidized coating.

Hardening aluminum. Robert S. Archer (to Aluminum Co. of America). U. S. 1,930,463, Oct. 17. Surface hardening of Al articles is effected by packing them in close and intimate contact with comminuted metallic Mg and heating to 250-460°.

Apparatus for comminuting lead and other soft metals. Stefan Weber. Ger. 584,453, Sept. 20, 1933.

Preventing oxidation of magnesium and its alloys. Edwin O. Barstow (to The Dow Chemical Co.). Brit. 395,633, July 20, 1933. See U. S. 1,898,909 (C. A. 27, 2668).

Zinc. Philip McL. Ginder, Willis McG. Peirce and Robert K. Waring (to The New Jersey Zinc Co.). Brit. 395,602, July 20, 1933. See Can. 333,962 (C. A. 27, 4765).

Joints between metal and siliceous refractories. Julius E. Lilienfeld. Brit. 394,311, June 6, 1933. A welded joint between Al and a siliceous refractory material, e. g., porcelain, is made by placing surfaces thereof in contact and heating until the Al begins to flow, an intermediate silicized layer being produced. The Al may constitute an elec. terminal or a suspension for an insulating base and the joint may be used in high voltage equipment, spark plugs, refrigerator seals, etc., as also in the electrode structure of electrolytic condensers.

Iron. Alfred Roemelt and Walter Nagel. Ger. 583,209, Aug. 30, 1933. App. is described in which powd.

Fe ore is blown into a hot gas stream produced by a pulverulent-fuel burner. Coal dust, fluxes, etc., may be mixed with the ore.

**Cast iron resistant to heat and shock.** Stanley W. Ewing and Harry A. Schwartz (to Link-Belt Co.). U. S. 1,931,109, Oct. 17. Malleable cast iron is subjected to successive heating and cooling to derive a structure contg. free carbon, ferrite and Fe carbide. The heating is carried above the crit. temp. but below the m. p. to cause the formation of Fe carbide, and the cooling is effected at a rate not less than about 5° per hr. to enable the retention of Fe carbide together with free C and ferrite.

**Apparatus for case-hardening iron.** Firma J. Aichelin. (Carl Hummel, inventor). Ger. 583,210, Aug. 30, 1933. Addn. to 509,206 (C. A. 25, 481).

**Coating iron or other metal surfaces, etc., with organic cellulose derivatives and synthetic resins.** Wm. H. Moss (to Celanese Corp. of America). U. S. 1,929,559, Oct. 10. A film of coating compn. is applied contg. both a cellulose org. deriv. such as cellulose acetate and a synthetic resin such as may be derived from phenol and formaldehyde, and an overlying coating is applied contg. a cellulose org. deriv. such as cellulose acetate without admixt. of synthetic resin.

**Nitrided ferrous articles.** Albert W. Morris (to Moore Drop Forging Co.). U. S. 1,929,252, Oct. 3. Ferrous articles have their surface impregnated to a depth of about 0.06 in. with a metal or alloy such as Al, Zr, Ti, Cr, V, Mg, Be, Si, Ni, Mo or Mn, having an affinity for N, and the surface is then hardened by nitridation.

**Hardening iron and steel.** Friedl. Krupp A.-G. (Otto Hengstenberg, inventor). Ger. 581,376, Sept. 19, 1933. Halogens or their compds. are used as accelerators in nitridation processes of hardening iron and steel.

**Refining iron and steel.** Paul Girod. Brit. 395,158, July 13, 1933. See Fr. 738,493 (C. A. 27, 1857).

**Rustless iron or steel.** Virginia Angelini. Brit. 394,806, July 6, 1933. To a bath of 500 kg. molten Fe or steel with the desired C content is added chromite (48% Cr<sub>2</sub>O<sub>3</sub>) 300, NiO 30, CaO 150, fluorspar 40 and bauxite 30 kg. and to this mass, when molten to form a slag, is added a reduction mixt. of metal oxides and reducing agents comprising chromite 820, NiO 110, Al 316 and Fe-Si 82 kg.

**Rust-proof iron or steel.** Walter Germann and Albert Strasser. Brit. 394,845, July 6, 1933. One to 20% of an alloy of equal proportions of Pb and As is added to a molten mass of Fe or steel which is alloyed with 3% Ti and 0.5-0.6% Mn.

**Cast steel die blocks, etc.** Karl V. Wheeler and LeRue P. Bensing (to Lebanon Steel Foundry). U. S. 1,929,909, Oct. 10. The blocks, etc., are formed by pouring molten steel into a mold formed of zircon sand.

**Forming and heat-treating steel rails.** John Brunner. U. S. 1,929,346, Oct. 3. A rail ingot or billet is subjected to rolling temp. above the thermal crit. range, rolled to a section larger than the desired finished section, cooled to below the thermal crit. range but above about 300°, reheated to just above the thermal crit. range, rolled to the desired finished section, again cooled to below the thermal crit. range but above 300°, and again heated to slightly above the thermal crit. range. The head of the rail is quenched at and near its ends until the surface temps. of the head at and near its ends lie within the blue-heat range but above about 200°, reheated to above 300° but below the thermal crit. range, and then slowly cooled to room temp. Cf. C. A. 27, 5298.

**Treating steel alloys, etc., in fused salt baths.** Vincent T. Malcolm (to Chapman Valve Mfg. Co.). U. S. 1,929,492, Oct. 3. Steel articles to be hardened are immersed in a fused salt bath including cyanide salts. A flow of NH<sub>3</sub> gas is subjected to the action of an ionizing elec. discharge to dissociate the gas into H and N and these gases are then passed into the bath immediately to supply free N. App. is described.

**Surface-hardening of alloy steels.** Wm. H. Hatfield (to Thos. Firth & John Brown Ltd.). U. S. 1,930,388, Oct. 10. See Brit. 377,244 (C. A. 27, 3187).

**Steel containing chromium, manganese and silicon.** Augustus B. Kinzel (to Electro Metallurgical Co.). U. S. 1,929,554, Oct. 10. A steel which has high ductility contains Cr 0.2-0.75, Mn 0.6-2.5, Si 0.2-2.5 and C less than 0.1%.

**Treating molten steel with sodium vapor.** Harvey N. Gilbert (to E. I. du Pont de Nemours & Co.). U. S. 1,931,144, Oct. 17. N is passed through molten Na maintained at about 750-850°, and the resulting mixt. of N and Na vapor is passed into a body of molten steel in order to effect its purification. App. is described.

**Cobalt magnet steel.** Adolph F. Bandur and Herbert M. E. Heinicke (to Western Elec. Co.). U. S. 1,930,919, Oct. 17. In order to improve its magnetic properties, the magnet steel is heated to a rolling temp. of about 1150° and the cross-sectional area of the steel is reduced; then it is reheated, before it cools, substantially to maintain the rolling temp., and its cross-sectional area is again reduced, this being followed by reheating to 930° and quenching.

**Treating austenitic steel.** Emanuel J. Janitzky. U. S. 1,929,356, Oct. 3. Rails and shapes of austenitic Mn steel are subjected, at a cold-working temp., to alternate internal compressive and tensile stresses of an intensity at least beyond the elastic limit of the steel. These stresses are applied to the rail or the like progressively along its length and along a plane substantially transverse to its length (suitably by the action of staggered rolls) and serve to increase the elastic limit and wear resistance.

**Alloys.** Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Brit. 395,060, July 13, 1933. See Fr. 730,718 (C. A. 27, 262).

**Alloys.** N. V. Molybdenum Co. Brit. 395,719, July 17, 1933. Divided on 395,721. Shaped articles, e. g., tools or tool parts, are made by mixing 1 or more carbides of 1 or more metals of the 4th and 6th groups, particularly Si, Ti, Zr, W and Mo, with 1 or more auxiliary metals of the 6th and 8th groups, particularly Cr, Mo, W, Fe, Co and Ni, preliminarily shaping the mixt., heating it for about 1-15 min. at over 1100°, interrupting the heating, finally shaping by mech. treatment and continuing the heating for 1 or more hrs. Examples of compns. are:

(1) Mo carbide, Ti carbide, Ni and Cr, (2) Ti carbide, Ni and Cr, (3) W carbide and Co and (4) W carbide and W, the Mo carbide and Ti carbide being in each case replaceable by Zr carbide. In 395,721, July 17, 1933, alloys consist of 21-50% of 1 or more carbides of the 6th group, particularly Cr, Mo and W, up to 22% of 1 or more auxiliary metals of the 6th and 8th groups, particularly Ni, Co and Cr, and 1 or more carbides of 1 or more 4th group elements, particularly Ti, Si and Zr, as remainder. Up to 2% of oxides of alk. earth metals, Al and Si may be added. The Mo carbide may be made by heating in a reducing atm. to 1400-1600° a powd. mixt. of Mo and C in the proportions to produce Mo<sub>2</sub>C. Ti carbide may be similarly made at a higher temp. or by treating a mixt. of TiO<sub>2</sub> and C, the product being again heated with C to remove residual O. Zr carbide and Si carbide may be similarly produced. Alternatively, gases, e. g., coal gas, may be passed over heated powd. metal or compds. thereof in C tubes. In 395,735, July 17, 1933, divided on 395,721, shaped articles are made by mixing 1 or more carbides of 1 or more metals of the 4th and 6th groups with 1 or more auxiliary metals of the Fe group, with or without a metal or metals of the 8th group, adding glycerol or glycols, preliminarily shaping the mixt., allowing it to dry or harden, expelling at about 100-200°, if necessary, any excess reagent, finally shaping the article by mech. treatment and heating at over 1100°.

**Alloys.** Alfred Ricard. Ger. 584,020, Sept. 13, 1933. Alloys for making bearings contain Cu 52-68, Pb 23-38, Si 2-4, Ni 5-8 and Fe 0.5-1.5%. The alloys may be prep. by adding Pb to an alloy of Cu, Si, Ni and Fe heated to 1150°, oxidation of the Pb being avoided by covering the surface of the alloy with glass, wood charcoal, SiO<sub>2</sub>, etc.

**Alloys for golding and brazing.** Handy & Harman.

Ger. 584,172, Sept. 15, 1933. The alloys contain Cu 67-88, Ag 10-25, and P 2-8%. Specific alloys are described.

**Improving alloys.** Vereinigte Deutsche Metallwerke A.-G. Zweigniederlassung Basse & Selve. Brit. 395,720, July 21, 1933. Alloys consisting of Cu, Ni and a metal or metals of the group, Fe, Cr, Mo, Co, Mn, V or W, and having a compn. lying outside the range of miscibility in the solid state at ordinary temps. but within said range at temps. approaching the m. p. are improved by homogenizing the cast alloys by heating to between 800° and the m. p. and are subsequently either worked mechanically at the homogenizing temp. or are chilled and then so worked in the cold state. After working at the homogenizing temp. the alloys may be quenched and then tempered at 300-800°. The cold worked alloys may also be tempered at 300-800°.

**Sintered alloys.** Floyd C. Kelley (to The British Thomson-Houston Co. Ltd.). Brit. 395,064, July 13, 1933. A sintered alloy consists of Ta carbide and a metal binder consisting substantially of Co and W, the Ta carbide being in excess of the binder. Powd. Ta carbide, prep'd. according to Brit. 388,000 (C. A. 27, 4761), W and Co are pressed and sintered at 1300-1600°. The alloy may be used for tool tips or bits, being Cu brazed to a steel shank.

**Alloy for torsion-springs of clocks, watches, etc.** Thomas H. Chamberlain (to New Haven Clock Co.). U. S. 1,931,251, Oct. 17. A torsion spring combining high elastic limit, ductility and a substantially uniform modulus of elasticity is formed of an alloy contg. Fe together with Ni 34.5-37.5, Cr 11-13, Mn 0.6-1.0, Si 0.25-0.9 and C 0.07-0.35%.

**Alloy suitable for cast dentures.** Robert R. Bayes (to Baker & Co.). U. S. 1,930,119, Oct. 10. The alloy consists of Au 10-20, Pd 20-30, Ag 40-50, Cu 11-18 and Zn 1-4%.

**Aluminum alloys.** Wm. S. Kellar (to Electrical Research Products, Inc.). Brit. 391,380, June 26, 1933. A vibratory element, e. g., a microphone transmitter diaphragm of a light valve ribbon, is produced from an Al alloy contg. Cu 3.15-4.50, Si 0.20-0.50, Mg 0.40-1.00, Mn 0.40-1.00 and Fe not more than 0.50%. The alloy is reduced to strip form, maintained at 930-960°F. for 30-45 min., quenched, cold-rolled to about 0.0017 in. thickness, seasoned by being heated to about 212°F. for about 40 hrs. and then formed into the desired product.

**Aluminum alloys.** Aluminium Ltd. Brit. 395,586, July 20, 1933. See Fr. 748,612 (C. A. 27, 5302).

**Working aluminum base alloys.** Aluminium Ltd. Brit. 395,273, July 13, 1933. Ingots of Al base alloys contg. 5-15% Mg are preheated at above 550°F. but below the temp. of incipient fusion of the most fusible constituent and rapidly cooled to a working range between 475-600°F. The ingot may be reheated and cooled 1 or more times during working.

**Aluminum alloys containing manganese and magnesium.** Theodore W. Bossert (to Aluminum Co. of America). U. S. 1,928,641, Oct. 3. Alloys which give smooth-drawn products contain Al together with Mn about 0.75-3.0% and Mg about 0.2-0.5%.

**Aluminum-silicon alloys.** Lightalloys Ltd. and Wm. H. Grieve. Brit. 394,746, July 6, 1933. Al-Si alloys contg. 7-15% Si also contain up to 5%, preferably less than 1%, Mg, with or without up to a total of 1% of Mn, Cr, Ni, Cu, W, Ti, Mo and (or) V, there being no intentional addn. of Cu or Ca. The alloys may be heat-treated by heating at 140-185° for up to 24 hrs.; this may be preceded by heating at 500-520° for about 4 hrs. and quenching in cold H<sub>2</sub>O.

**Acid-resisting copper base alloys suitable for tanks, boilers, pipes, etc.** Reginald Hazlting. U. S. 1,930,956, Oct. 17. Cu is alloyed with Si 1.5-5.0 and Cr 0.1-1.0%.

**Ferrous alloys.** Wm. H. Seaman. Brit. 395,121, July 13, 1933. Chilled Fe rolls are made by casting in chill molds Fe alloys contg. C 2.6-3.85, Ni 2.5-5, Si 0.15-0.65 and Mn 0.15-0.27% with an amt. of Cr not exceeding one-tenth of the Ni content. In some cases the alloys may contain also 0.15-0.5% Mo, when they may contain Ni 1.25-5 and Si 0.2-1%. Cf. C. A. 27, 1319.

**Iron alloys.** Rudolf Bellak. Brit. 394,346, June 16, 1933. Fe alloys contain W 0.5-15, Co 1.2-5, Ni 1-5 and C 0.1-0.5%, with or without small quantities of Mo, V, Ta, Ti, Zr, Si, Mn, Cu and Al. Cr not exceeding 2% may be present. They are readily worked after quenching in oil or air, maintain their hardness when heated to 500-600° and are particularly suitable for tools working in heat, tools in presses, valve cones and blades of turbines, gun-barrels, etc.

**Magnesium alloys.** John A. Gann and Frid L. Reynolds (to The Dow Chemical Co.). Brit. 394,551, June 20, 1933. See U. S. 1,885,429 (C. A. 27, 946).

**Nickel alloys.** International Nickel Co., Inc. Brit. 394,378, June 23, 1933. Alloys contg. 2-99% Ni and having a lattice structure of the face-centered cubic type are hardened by including 1-10% Ti therein and holding them at 1 or more temps. in excess of 600° but not exceeding 800°. The alloys may include alloys of Ni with Cu, Fe, Mn and Cr in various combinations and may contain small amts. of Al, Si, C and other elements usually present in Fe and steel. The hardening process may be applied to so-called marginal austenitic steels.

**Zinc alloys.** Joseph Sennec. Brit. 395,271, July 13, 1933. Divided on and addn. to 388,221. A mandrel forming part of a machine for grinding round holes is made of an alloy contg. Zn, Al and Cu. A suitable alloy consists of Zn 93.5, Al 4, Cu 2 and Mg 0.5%.

**Zinc-base die-casting alloy.** John R. Freeman, Jr. (to American Brass Co.). U. S. 1,930,341, Oct. 10. Zn of 99.98% or higher purity is alloyed with Cu 0.5-15%, forming alloys free from "hot shortness." Cf. C. A. 27, 5712.

**Coating metals.** Verein für die Probier- und Forschungsanstalt für Edelmetalle. Brit. 395,491, July 20, 1933. An invisible protective coating is formed on the surface of Ag (alloys) by treating with a soln. contg. CrO<sub>3</sub>. Cuprammonium chloride, a persulfate or both may be added. The metal is preferably first degreased and then immersed in the soln., washed and dried.

**Apparatus for coating wire.** Johnson Steel & Wire Co., Inc. Ger. 583,393, Sept. 2, 1933. This corresponds to Brit. 370,626 (C. A. 27, 2664).

**Coating aluminum or its alloys.** Siemens & Halske A.-G. (Nicolai Budiloff and Alexander Jenny, inventors). Ger. 583,023, Aug. 26, 1933. Noble-metal coatings are produced on Al or its alloys by superficially oxidizing the Al or alloy in known manner, and applying to the oxidized surface a solid or dissolved noble-metal compd., e. g., AgNO<sub>3</sub>, which is then decomposed by heat. A reducing agent which leaves no residue, e. g., sugar or alc., may be applied with the metal compd.

**Tin plating.** The Roessler & Hasslacher Chemical Co. Brit. 395,377, July 14, 1933. In the use of Sn-plating baths contg. 0.25-0.65 mole of alkali stannate per l. and 1.6 moles of caustic alkali per mole of stannate plus an addnl. amt. of caustic alkali of 0.2-0.4 mole per l. the alkali content is corrected when it has become too high by addn. of (a preferably weak) acid, e. g., AcOH, and, at approx. the same time, an oxidizing agent, e. g., H<sub>2</sub>O<sub>2</sub>, alkali metal peroxide, permanganate, persulfate or perborate. Thymol phthalein is preferably used as indicator in the detn. of the caustic alkali which includes that set free by hydrolysis of the stannate. The plating temp. is preferably 60-80° and the current d. 10-100 amps. per sq. ft. at the cathode and up to 20 amps. per sq. ft. at the anode.

**Plated zinc sheets.** Franz Jordan. Brit. 395,585, July 20, 1933. A Zn alloy contg. 98-99% Zn and 2-1% Al is used for producing compd. sheets of Al and the alloy. The Al sheet is rolled onto the Zn alloy sheet while white-hot, heated to a higher temp. than that of the Zn alloy sheet, both temps. being within the limits 180-450°. The plated sheet may be rolled out into metal foil. The Al sheet may be made of an Al-Ag alloy. The sheets may be plated on 1 or both sides and after plating may be heated to 150-300°.

**Protecting iron against rust.** N. V. Maatschappij tot



exploitatie van de Parker Octrooien "Parker Rust Proof." Ger. 583,349, Sept. 1, 1933. Fe articles, after treatment in known manner in a phosphate bath contg. a compd. of a less electropos. metal, e. g., Cu, are treated with a chromate soln. or with a soln. contg. 1-3 g. of free  $\text{CrO}_3$  per l.

Protecting iron and steel against corrosion. Aladar Pacz. Ger. 584,411, Sept. 20, 1933. A resistant coating is produced on articles of iron and steel by treating them for a short time, e. g., 15 min., preferably at a raised temp., with a dil. bath contg.  $\text{H}_2\text{PO}_4$  (or a primary phosphate of a heavy metal) and a sol. compd. of  $\text{MoO}_3$ , e. g.,  $\text{NH}_4$  molybdate. The bath may also contain an acid fluoride or other salt capable of liberating  $\text{MoO}_3$  from the sol. Mo compd.

Protecting lead against corrosion. Comp. générale d'électricité. Ger. 584,124, Sept. 15, 1933. See Fr. 716,148 (C. A. 26, 1892).

Arc welding. Elektriska Svetnings Aktiebolaget and Per Y. Sjöman. Brit. 395,510, July 20, 1933. In elec.-arc welding cast or other Fe, alloyed steel or non-ferrous metals a fusible metal electrode is provided with a flux contg. more than 50% of a non-oxidizing metallurgic or synthetic slag of the same kind as that obtained in the manuf. of the electrode metal. The slag may be applied wholly or partly as an external coating on the electrode or to the interstices of a wire wound thereon. Examples of coating for steel electrodes are: (1) acid Bessemer or Siemens-Martin slag 82, Fe-Mn 8 and Na waterglass 10% and (2) basic Siemens-Martin slag 57, cellulose 25, Fe-Mn 8 and dextrin 10%. For cast Fe electrodes the coating may contain blast furnace slag 53, graphite 25, Fe-Si 10 and Na waterglass 12%.

Arc welding. Adalbert Alexay (to The British Thomson-Houston Co. Ltd.). Brit. 395,663, July 20, 1933. In arc welding the arc and molten portions of the weld are surrounded by an enveloping mist of an atomized liquid, e. g., a hydrocarbon, MeOH or other alc. App. is described.

Arc welding. James M. Weed (to The British Thomson-Houston Co. Ltd.). Brit. 395,967, July 27, 1933. A flux for arc welding, which may be inserted as a core or in pockets in a metal electrode or applied as a coating thereto, contains feldspar, a binder, e. g., liquid Na silicate, and talc and (or)  $\text{TiO}_2$ . The flux preferably consists of  $\text{TiO}_2$  0-1, talc 0-1, K feldspar 1 part and Na silicate equal to the combined wts. of the other ingredients. Al, Zn, V, Ti, Si, Mn, etc., may be added to the paste for protecting the molten metal from O and N.

Apparatus for welding together sections of zinc wire to form continuous lengths. Leaman S. Harvey and Howard P. Hart (to Platt Bros. & Co.). U. S. 1,931,001, Oct. 17. Various mech. and operative details are described.

Arc-welding electrode. Clifford B. Langstroth and Edwin M. Martin. U. S. 1,930,649, Oct. 17. A metallic core is coated with a shredded carbohydrate material such as shredded wood and various assocd. materials such as Na silicate,  $\text{CaCO}_3$ , and silico-Mn.

Arc-welding electrode. Robert Notvest (to J. D. Adams Mfg. Co.). U. S. 1,931,406, Oct. 17. A ferrous rod is coated with fluxing material together with a coumarone resin.

Welding electrodes. David L. Mathias (to Westinghouse Elec. & Mfg. Co.). U. S. 1,930,530, Oct. 17. For producing electrodes contg. occluded H, the electrodes are pickled in an acid bath contg. an inhibitor and the acid is removed; the electrodes are coated with a lubricant and drawn through dies to harden them, and are then treated with a second acid bath which is of sufficient strength and employed for a sufficient time to cause a substantial amount of H to be occluded in the electrode rods. Acid is then removed by washing with water.

Welding rods. Theophil E. Jerabek (to The Lincoln Electric Co.). Brit. 395,228, July 13, 1933. A slag-forming compn. in the form of an adherent coating for welding rods includes  $\text{TiO}_2$  and a silicate of Mg and (or) Fe. The coating may contain  $\text{TiO}_2$  and at least 1 of the following: Mg silicate, Fe silicate, talc, chrysotile, chrysotile, amosite, crocidolite, anthrophyllite, tremolite, actinolite.

Arc-welding fluxes. Lucian B. Thompson and Verni J. Chapman (to The British Thomson-Houston Co. Ltd.). Brit. 394,610, June 29, 1933. A flux for arc welding contains Fe-Mn, talc, feldspar and liquid Na silicate. The mixt. preferably consists of Fe-Mn of C content less than 1.5% 10, talc 10, feldspar 30 and Na silicate of sp. gr. 1.36 24 parts. It may also contain cellulosic material, e. g., cotton yarn, cloth or gauze or braid.

Welding fluxes. Murex Welding Processes Ltd., Aubrey T. Roberts and John H. Paterson. Brit. 394,319, June 9, 1933. A flux compn. for use in the elec. welding of ferrous metals includes Fe in powd., granular or other form offering an extended surface whereby the Fe preferentially reacts with the atm. constituents in the neighborhood of the weld metal, the compn. being free from any substance, e. g., salts, that decomposes at a red heat with disengagement of O. The finely divided Fe is at least 15% of the core metal, and small proportions of other metals, e. g., Mn, Ti, V or Si, may be added to the Fe, preferably as ferro alloys. China clay or colloidal  $\text{SiO}_2$  may be added to the compn.

Soldering flux. Frank D. McBride (to Berry Solder Co.). U. S. 1,929,895, Oct. 10.  $(\text{CH}_3)_2\text{N}_4$  1-25% is used together with a monohydric alc. ester of abietic acid such as ethyl or methyl abietate.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

Applications of the Raman effect to organic chemistry. Maurice Bourguet. *Bull. soc. chim.* 53, 409 505(1933).—A rather complete, well-written account of the applications of the Raman effect as a research method in org. chemistry. Numerous references are given.

Raman effect and chemistry. Study of several  $\alpha$ -ethylene oxides. R. Lespiau and R. Gredy. *Bull. soc. chim.* 53, 769-82(1933).—See C. A. 27, 2678. G. G.

The constitution of molecular compounds. Priyadarajan Ray. *J. Indian Chem. Soc., Prafulla Chandra Ray Commemoration Vol.* 1933, 161-9.—After a crit. examn. of the different views regarding the structure of mol. compds., R. suggests a probable solution of the problem.

The utilization of methane. T. S. Wheeler. *J. Indian Chem. Soc., Prafulla Chandra Ray Commemoration Vol.* 1933, 53-60.—Expts. were carried out to det. possible methods of utilizing  $\text{CH}_4$  for the production of HCN,

$\text{CS}_2$  and aromatic hydrocarbons. Chlorination of  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{MeCl}$ ,  $\text{C}_2\text{H}_5$  and PhMe in the gaseous phase was studied. High temp. and high space velocity were employed.

Polymerization and explosive decomposition of ethylene under pressure. Gustav Egloff and R. E. Schaad. *J. Inst. Petroleum Tech.* 19, 800-11(1933).— $\text{C}_2\text{H}_4$  was polymerized to a brown or reddish oil either in an autoclave or in passing through a heated steel tube, and in the presence or absence of  $\text{Al}_2\text{O}_3$ . At  $380^\circ$  in the autoclave and 80 atm. initial pressure the yields of oil were 63-73% of the wt. of  $\text{C}_2\text{H}_4$  charged. A temp. of  $480^\circ$  was necessary in the steel tube to obtain the same yields. When the mixed catalyst  $4\text{NiO} \cdot \text{Al}_2\text{O}_3 \cdot \text{CuO}$  was used the  $\text{C}_2\text{H}_4$  exploded at  $330^\circ$ .

Preparation and reactions of 4,4-dimethyl-1-pentene (neopentylethylene). Frank C. Whitmore and August H. Homeyer. *J. Am. Chem. Soc.* 55, 4555-9(1933).—

$\text{CH}_3\text{CHCH}_2\text{CH}_2\text{CH}_3$  and *tert*-BuMgCl give about 85% of

**4,4-dimethyl-1-pentene (I)**,  $b_{760}$  72.35°,  $d_4^{20}$  0.6827,  $n_D^{20}$  1.3911; the dibromide (1,2-dibromo-4,4-dimethylpentane),  $b_{760}$  77-8°,  $d_4^{20}$  1.5129,  $n_D^{20}$  1.4970; addn. of HBr gives 1-bromo-4,4-dimethylpentane (II),  $b_{760}$  70-1°,  $b_{760}$  154°,  $d_4^{20}$  1.1343,  $n_D^{20}$  1.4484. I does not add H<sub>2</sub>. II forms a Grignard reagent which reacts with HgBr<sub>2</sub> to give 1-bromomercuri-4,4-dimethylpentane, m. 101°, and with O<sub>2</sub> to give 90% of 4,4-dimethylpentan-1-ol,  $b_{760}$  96°,  $b_{760}$  158°,  $d_4^{20}$  0.815,  $n_D^{20}$  1.4202 ( $\alpha$ -naphthylurethan, m. 80.5-1°). I reacts with AcOH in the presence of H<sub>2</sub>SO<sub>4</sub> to give the acetate of 4,4-dimethylpentan-2-ol and a mixt. of olefins. I and 85% H<sub>2</sub>SO<sub>4</sub> give a mixt. of polymers  $b_{760}$  59-122°.

C. J. West

**Acetylene polymers and their derivatives.** XVII. **Mercury derivatives of vinylacetylene.** Wallace H. Carothers, Ralph A. Jacobson and Gerard J. Berchet. *J. Am. Chem. Soc.* 55, 4065-7 (1933); cf. *C. A.* 27, 3911.—CH<sub>2</sub>:CHC≡CH and alk. HgI<sub>2</sub> or HgO in AcOH give divinylethynylmercury, m. 114-5°; on standing 48 hrs. it becomes yellow and insol. in CHCl<sub>3</sub> and explodes under the action of heat or mech. shock; it reacts with Ba or I to give the corresponding bromo- or iodo vinylacetylene. If the temp. of the reaction with HgO is raised to 60-70° there results 93.4% of 1,1-diacyloxymercuri-2-acyloxymercurioxy-1,3-butadiene (I); KI in AcOH gives 1,1-diiodomercuri-2-iodomercurioxy-1,3-butadiene, pale yellow; KBr and KCl give the corresponding Br and Cl derivs. Hydrolysis of I gives Mt vinyl ketone, Br and I in CHCl<sub>3</sub> give CH<sub>3</sub>:CHCOBr. XVIII. **1-Halogen-2-vinylacetylenes.** R. A. Jacobson and W. H. Carothers. *Ibid.* 4607 9.—CH<sub>2</sub>:CHC≡CH and KOBr give 55% 1-bromo-2-vinylacetylene,  $b_{760}$  52-3°,  $d_4^{20}$  1.4804,  $n_D^{20}$  1.5182; it did not polymerize when stabilized with hydroquinone; after several months it was a highly explosive black solid. The 1-I deriv.  $b_{760}$  78°,  $d_4^{20}$  1.4908,  $n_D^{20}$  1.5948 (27.5% yield); after 1 month at 10° it polymerizes to a jelly and after several months it was a black solid like charcoal and extremely explosive. 1-Cl deriv.,  $b_{760}$  55-7°,  $d_4^{20}$  1.0032,  $n_D^{20}$  1.4063. HCl and the 1-I deriv. in the presence of NH<sub>4</sub>Cl and CuCl give C<sub>4</sub>H<sub>4</sub>Cl<sub>2</sub>,  $b_{760}$  73.5-4.5°,  $d_4^{20}$  1.9161,  $n_D^{20}$  1.6073, which forms a soft black tar on standing.

C. J. West

**Homogeneous thermal polymerization of isoprene.** Wm. B. Vaughan. *J. Am. Chem. Soc.* 55, 4109-16 (1933). 6  
-The homogeneous thermal polymerization of isoprene was investigated in the temp. range 286.5-371° at pressures ranging from 212 to 739 mm.; the principal process is interpreted as a bimol. assocn. reaction, the rate of which is expressible by  $k = 2.19 \times 10^{10} T^{-2.1} e^{-23,900/RT}$ .

William B. Vaughan

**Chlorinated paraffin. I. Relation of chlorine content to physical properties.** F. T. Gardner. *Ind. Eng. Chem.* 25, 1211-12 (1933). -Samples of com. paraffin were chlorinated at 70°. The final Cl content varied between 20 and 48.5%. The viscosity rises sharply after a Cl content of 40% has been reached. I.-p. data indicate slight if any polymerization.

W. A. Moore

**Higher aliphatic compounds. V. Systems with heptadecyl alcohol and heptadecane. Polymorphism of octadecane.** Peggy C. Carey and J. C. Smith. *J. Chem. Soc.* 1933, 1348-51; cf. *C. A.* 27, 4526.—Heptadecyl alc. (I) has the const. f. p. 53.80°, m. p. 53.83°; m.-p. curves are given for I with hexadecyl alc. and with octadecyl alc. In each system there is a min. which is slightly below the f. p. of the lower alc. Heptadecyl iodide has f. p. 34.05°, m. p. 34.13°. Heptadecane (II) has f. p. 21.92°, m. p. 21.97°; it seps. in transparent plates which change reversibly into the opaque form of lower m. p. All specimens of octadecane (III) show a m. p. of 27.9-28.0° but may be cooled to as low as 27.4°; transparent crystals then suddenly appear, the temp. rising usually only 0.1°; heating gives a m. p. 27.9-28.0° in each case and the crystals become opaque. F.-p. curves are given for II-III and II-hexadecane (IV). As the dominant form is the transparent  $\alpha$ -crystal common to both even and odd hydrocarbons, the systems differ little from that of IV-III. Near the extreme compns. IV and (more slowly) III undergo monotropic change to the  $\beta$ -forms. C. J. W.

**The trimethylene trisulfide of melting point 247°.** O. Hinsberg. *J. prakt. Chem.* 138, 214 (1933).—Polymical with Chattaway and Kellett (*C. A.* 25, 3650).

C. J. West

**$\gamma$ -Trimethylene trisulfide perchlorate.** O. Hinsberg. *J. prakt. Chem.* 138, 207-13 (1933).— $\gamma$ -Trimethylene trisulfide, m. 216°, yields a perchlorate (I), decomps. 138° (32% yield); the picrate, yellow, decomps. 134°. I and H<sub>2</sub>O<sub>2</sub> in AcOH and Ac<sub>2</sub>O give CH<sub>3</sub>SO<sub>3</sub>CH<sub>2</sub>SO<sub>3</sub>CH<sub>3</sub>.

CH<sub>3</sub>SO<sub>3</sub>CH<sub>2</sub>SO<sub>3</sub>CH<sub>3</sub>. I and AcONa in AcOH-Ag<sub>2</sub>O, boiled 6 min., give diacetyldimercapto dimethyl sulfide, m. 37°. MeOH-KOH and I give a compd. m. 93° and one m. 50°.

C. J. West

**Plato- and pallado-sulfines.** H. D. K. Crew, G. H. Preston, W. Wardlaw and G. H. Wyatt. *J. Chem. Soc.* 1933, 1204 6.—At low temps. and especially in dil. soln. C<sub>2</sub>H<sub>4</sub>(SET)<sub>2</sub> and K<sub>2</sub>PtCl<sub>4</sub> give the pink plato-salt, [Pt es<sub>2</sub>]PtCl<sub>4</sub> (es is C<sub>2</sub>H<sub>4</sub>(SET)<sub>2</sub>); at 100° and in more concd. solns. the yellow disulfine, [Pt es Cl<sub>2</sub>], is largely produced; the disulfine, lemon-yellow triboelectric plates or needles, m. 185°; with cold aq. Ag<sub>2</sub>O it gives a base, yellow glass, whose alk. soln. gives with HCl the original disulfine [Pt es<sub>2</sub>]PtCl<sub>4</sub> m. about 180° but transformation into [Pt es Cl<sub>2</sub>] has already occurred. The plato-salt gives Magnus' salt with hot aq. [Pt(NH<sub>3</sub>)<sub>4</sub>]Cl<sub>2</sub>. C<sub>2</sub>H<sub>4</sub>(SET)<sub>2</sub> and K<sub>2</sub>PdCl<sub>4</sub> at room temp. apparently give only [Pd es Cl<sub>2</sub>], yellow, m. 182°. Pd(SET)<sub>2</sub>Cl<sub>2</sub> m. 83°, is unimol. in free/mg C<sub>2</sub>H<sub>4</sub> or boiling CHCl<sub>3</sub>; it is sol. in aq. Et<sub>3</sub>S, giving a soln. of the unstable [Pd(SET)<sub>2</sub>]Cl<sub>2</sub>, which loses Et<sub>3</sub>S in the air. Pd(SMe<sub>2</sub>)<sub>2</sub>Cl<sub>2</sub> m. 128°. The soly. of [Pt es Cl<sub>2</sub>] at 25° is 0.130 g. per 100 cc. H<sub>2</sub>O; at this diln (319 l. per g.-mol.) the value of  $\mu = 28$  was found; if  $\mu_{\infty} = 100$ , the ionization is about 30% at  $v = 319$ . Acetonebis(Et thioacetate) and K<sub>2</sub>PtCl<sub>4</sub> do not form a plato-salt; the yellow to orange cryst. ppt. has no definite m. p. and is of varying compn. Et<sub>3</sub>S<sub>2</sub> behaves similarly.

C. J. West

**Dielectric polarization. VIII. The dipole moments of alkyl nitrates and nitrites.** Eric G. Cowley and James R. Partington. *J. Chem. Soc.* 1933, 1252-4; cf. *C. A.* 27, 2671. -The following figures give the b. p.,  $d_4^{20}$ ,  $n_D^{20}$  and dipole moment ( $\mu$ ): MeNO<sub>2</sub>,  $b_{760}$  65°, 1.2075, 1.3748, 2.85; EtNO<sub>2</sub>,  $b_{760}$  87.2°, 1.1084, 1.3852, 2.91; PrNO<sub>2</sub>,  $b_{760}$  110.4°, 1.0548, 1.3979, 2.98; BuNO<sub>2</sub>,  $b_{760}$  135.7°, 1.0153, 1.4063, 2.96; EtNO<sub>2</sub>,  $b_{760}$  17°,  $d_4^{20}$  0.9065,  $n_D^{20}$  1.3418, 2.20; PrNO<sub>2</sub>,  $b_{760}$  48.9-9.4°, 0.8861, 1.3604, 2.28. By assuming an O valency angle of 90° and the moment of the MeO group as 0.81 the NO<sub>2</sub> group moment is found to be 2.73. The results are contrasted with those of the NO<sub>2</sub> compds., in which induction along the hydrocarbon chain occurs. IX. The dipole moments of some nitrosoamines, *p*-nitrosophenol, ethylaniline, hydrazobenzene and benzaldehyde phenylhydrazones. *Ibid.* 1255-7.—Me<sub>2</sub>NNO,  $b_{760}$  154°,  $d_4^{20}$  1.0061,  $n_D^{20}$  1.4368,  $\mu$  3.28; Ph<sub>2</sub>NNO, m. 66.5°,  $\mu$  3.39; PhMe<sub>2</sub>NNO, m. 14.7°,  $d_4^{20}$  1.1288,  $n_D^{20}$  1.5709,  $\mu$  3.62; PhEt<sub>2</sub>NNO,  $d_4^{20}$  1.0874,  $n_D^{20}$  1.5598,  $\mu$  3.61; ONC<sub>6</sub>H<sub>4</sub>OH, m. 126°,  $\mu$  4.72; PhEt<sub>2</sub>NNH<sub>2</sub>, m. 1.68; (PhNH)<sub>2</sub>, m. 127°,  $\mu$  1.66; PhCH<sub>2</sub>NNHPh, m. 156°,  $\mu$  1.89. The moments of the hydrazo compds. are discussed. X. The dipole moments of the nitroanisoles. *Ibid.* 1257-9.—*o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OMe, f. p. 10.3°,  $d_4^{20}$  1.2408,  $n_D^{20}$  1.5597,  $\mu$  4.83; *m*-isomer, m. 35.7°,  $\mu$  3.86; *p*-isomer, m. 52°,  $\mu$  4.74. The results are discussed in relation to the O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OH. XI. The dipole moment of pyrrole. *Ibid.* 1259.—Pyrrole,  $d_4^{20}$  0.9600,  $n_D^{20}$  1.5208,  $\mu$  1.83. This value is lower than that of pyridine and quinoline (2.11 and 2.18, resp.).

C. J. West

**The Raman effect with tetranitromethane.** M. Milone. *Gazz. chim. ital.* 63, 453-6 (1933).—Contrary to evidence obtained by chem. and phys.-chem. means by various authors, a study of the Raman effect indicates that the formulas of tetranitromethane, chloropicrin and bromopicrin are C(NO<sub>2</sub>)<sub>4</sub>, CCl<sub>3</sub>(NO<sub>2</sub>) and CBr<sub>3</sub>(NO<sub>2</sub>), resp., i. e., true nitro derivs.

C. C. Davis

The Raman spectra of some heterocyclic compounds. II. M. Milone. *Gazz. chim. ital.* 63, 456-63(1933); cf. C. A. 27, 5003 and preceding abstr.—The expts. were continued with 7 other isomeric and non-isomeric furazans, azoximes and oxadiazoles, the phys. consts. of which in purified form were found to be as follows:

$\text{PhC:N.O.N:CPh}$ , m. 98°,  $b_{10}$  202° (cf. Ber. 27, 715 (1894));  $\text{PhC:N.N:CPh.O}$ , m. 138°,  $b_{10}$  248° (cf.

Rend. accad. Lincei [5] 8, I, 228(1899));  $\text{PhC:N.O.-CPh:N}$ , m. 108°,  $b_{17}$  210° (cf. Ber. 17, 1694(1884));

$\text{PhC:N.O.N:CMc}$ , m. 2°,  $b_{10}$  145° (cf. C. A. 26, 5564)

$\text{PhC:N.N:CMc.O}$ , m. 67°,  $b_{10}$  160° (cf. Stollé, C. A. 6, 1004);  $\text{PhC:N.O.CMc:N}$ , m. 41°,  $b_{10}$  244°,  $b_{10}$

189° (cf. Ber. 18, 1085(1885)); and  $\text{MeC:N.O.CPh:N}$ , m. 57°,  $b_{10}$  218° (cf. Crippa and Galimberti, C. A. 25, 3345). The data confirm the presence and the position of the characteristic line of the C:N group, particularly where both substituents are Ph, *s. c.*, in the 1st 3 compds. above. The oxadiazoles showed the lines of N—N and C—O groups, the azoximes those of C—O and C—N groups, and the furazans no lines within the range.  $\nu = 1000-1250 \text{ cm}^{-1}$  (except the line of Ph). Asym. azoximes which exist in 2 isomeric forms, *s. c.*, the last 2 compds. above, gave essentially the same spectra, with only slight differences in the characteristic lines. The compds. contg. 1 or 2 Me groups gave lines of high frequency and low intensity which could not be correlated with any other lines, and which may arise from oscillations of aliphatic groups with respect to nuclear N atoms. In general the expts. make possible a characterization of the 3 forms which the  $\text{C}_2\text{N}_2\text{O}$  cyclic group may assume, and thus make easier the study of isomers not otherwise

distinguishable.  $\text{PhC:N.O.N:CMc}$  was prepd. by heating  $\beta$ -methylphenylglyoxime with 6 N  $\text{NH}_4\text{OH}$  in an autoclave for 8 hrs. at 180°, which is much more convenient than the method already described (*loc. cit.*).

C. C. Davis

Styphnic acid. II. Bromopicrin, the bromination product of sodium styphnate. Hsueh-Han Lei and Peter P. T. Sah. *Science Repts. Natl. Tsinghua Univ.* A2, 129-31(1933); cf. C. A. 27, 5720.—Bromination of Na styphnate gives a high yield of bromopicrin,  $b_{10}$  89-90°,  $d_4^{20}$  2.7930,  $d_4^{25}$  2.7817,  $n_D^{20}$  1.5790,  $n_D^{25}$  1.5769. On attempting to synthesize guanidine by heating bromopicrin with alc.  $\text{NH}_3$ , the mixt. exploded. W. H. A.

Preparation of esters of chlorosulfonic acid or sulfuric acid. R. Levailant. *Compt. rend.* 197, 335-7(1933).—The following chlorosulfonates were prepd. from  $\text{SO}_2\text{Cl}_2$  and the appropriate alc.:  $\text{C}_6\text{H}_{11}$  (I),  $b_{10}$  76-7°,  $d_4^{20}$  1.250,  $d_4^{25}$  1.225,  $n_D^{20}$  1.4245;  $\text{C}_6\text{H}_{11}$  (II),  $b_{10}$  about 75-6°,  $d_4^{20}$  1.206,  $d_4^{25}$  1.185,  $n_D^{20}$  1.430; 3-chloropropyl (III),  $b_{10}$  about 85°,  $d_4^{20}$  1.483,  $d_4^{25}$  1.456,  $n_D^{20}$  1.457; 2,3-dichloropropyl (IV),  $b_{10}$  122-3°,  $d_4^{20}$  1.609,  $d_4^{25}$  1.582,  $n_D^{20}$  1.481. III and IV are more stable than I and II which in turn are more stable than  $\text{ClSO}_2\text{Pr}$ .  $\text{SOCl}_2$  and the corresponding alcs. gave the following dialkyl sulfates:  $\text{C}_6\text{H}_{11}$ ,  $b_{10}$  134°,  $d_4^{20}$  0.989,  $d_4^{25}$  0.972,  $n_D^{20}$  1.435;  $\text{C}_6\text{H}_{11}$ ,  $b_{10}$  181°,  $d_4^{20}$  0.959,  $d_4^{25}$  0.942,  $n_D^{20}$  1.443; 2-bromoethyl,  $b_{10}$  158-9°,  $d_4^{20}$  1.959,  $d_4^{25}$  1.927,  $n_D^{20}$  1.625; 3-chloropropyl,  $b_{10}$  161-2°,  $d_4^{20}$  1.333,  $d_4^{25}$  1.313,  $n_D^{20}$  1.480; 2,3-dichloropropyl,  $b_{10}$  about 175°,  $d_4^{20}$  1.529,  $d_4^{25}$  1.501,  $n_D^{20}$  1.509. A by-product in the prepn. of  $\text{C}_6\text{H}_{11}\text{OH}$  from  $\text{BuMgBr}$  and  $(\text{CH}_3\text{O})_2$  is diamyl formal,  $b_{10}$  99-101°,  $d_4^{20}$  0.855,  $d_4^{25}$  0.837,  $n_D^{20}$  1.4145.

A. F. Shepard

Esters of chlorosulfonic acid and sulfuric acids. R. Levailant. *Compt. rend.* 197, 648-51(1933); cf. C. A. 24, 824.— $\text{Cl}_2$  passed into  $\text{Bu}_2\text{SO}_4$  gave 96% *Bu chlorosulfonate*. When passed into  $\text{SO}_2(\text{CH}_2\text{CHClCH}_2\text{Cl})_2$  it gave 90%

2,3-dichloropropyl chlorosulfonate. When  $\text{SO}_2(\text{CH}_2\text{CH}_2\text{Br})_2$  was added to  $\text{SO}_2\text{Cl}_2$  81%  *$\beta$ -bromoethyl chlorosulfonate*,  $b_{10}$  103-6°, mol. refraction 34.33 (theory 34.35), was obtained.  $\text{Pr}_2\text{SO}_4$  (I) was prepd. according to reaction (a) given by L. in C. A. 27, 701. Yield 65-70%,  $b_{10}$  110°. I was also prepd. by reaction (b)  $\text{SO}_2\text{R} + \text{ClSO}_2\text{R} = \text{RCl} + \text{SO}_2 + \text{R}_2\text{SO}_4$ . Yield 55-60%.  $\text{Bu}_2\text{SO}_4$  (II) was prepd. by reaction (a). Yield 55%,  $b_{10}$  103-6°,  $b_{10}$  117°,  $d_4^{20}$  1.080,  $d_4^{25}$  1.069,  $n_D^{20}$  1.425, mol. refraction 50.27 (theory 50.23). II prepd. by reaction (b) gave a yield of 70%. *sym-3-Chloropropyl sulfate*, prepd. by reaction (b),  $b_{10}$  160-2°,  $d_4^{20}$  1.384,  $d_4^{25}$  1.363,  $n_D^{20}$  1.400, mol. refraction 50.45 (theory 50.72). W. A. Moore

Nitriles and brominated aliphatic ketones. Pierre Truncl. *Compt. rend.* 197, 453-6(1933).—T. expected that the action of Mg compds. on homologous brominated nitriles (long-chain compds. are used) should lead, after reduction, to cyclic amines of large nucleus. Ketones were obtained and not cyclic amines. 6-Bromoheptanenitrile was prepd. by the action of  $\text{KCN}$  in  $\text{MeOH}$  on dibromopentane. The Br (45.3%) and N (7.8%) contents agreed with the compd.  $\text{C}_6\text{H}_{11}\text{NBr}$ . The product of the reaction of 11 g.  $\text{Br}(\text{CH}_2)_5\text{CN}$  on an excess of  $\text{MeMgBr}$  was poured into a mixt. of ice and  $\text{NH}_4\text{Cl}$ . This mixt. was extd. with ether, dried and distd. under reduced pressure, when a very small quantity was obtained. The Br content agreed with the theoretical. Semicarbazone (in alc.) m. 136°. Both the N (16.9%) and Br (31.8%) agreed with  $\text{C}_6\text{H}_{11}\text{ONBr}$ . 11-Bromo-undecanoic acid, m. 51°, was obtained by adding  $\text{HBr}$  in dry petr. ether soln. to undecylenic acid. 11-Bromo-undecanoyl chloride, obtained by the action of the acid on  $\text{SO}_2\text{Cl}_2$ , is a liquid decompd. under 10 mm. without distg. With aq.  $\text{NH}_3$  the chloride yielded the amide, m. 88°. The yield was 74% starting from the acid. The Br (30.4%) agreed with  $\text{C}_{11}\text{H}_{21}\text{ONBr}$ . The nitrile was obtained by distn. of the amide under reduced pressure in presence of  $\text{P}_2\text{O}_5$ . Yield 70%,  $b_{17}$  184°,  $b_{10}$  161°, mol. refraction 60.72 (calcd. 60.53). Br (32.2%) agreed with  $\text{C}_{11}\text{H}_{21}\text{NBr}$ . The nitrile treated with  $\text{MeMgBr}$  as above yielded a solid ketone, m. 22°,  $b_{10}$  153-4°,  $b_{10}$  148°,  $d_4^{20}$  1.105,  $n_D^{20}$  1.4659, mol. refraction 65.8 (calcd. 65.4). Br agreed with  $\text{C}_{11}\text{H}_{21}\text{ONBr}$ . Semicarbazone, m. 118°, Br (24.8%) agreed with  $\text{C}_{11}\text{H}_{21}\text{ONBr}$ .  $\text{NH}_2(\text{CH}_2)_{10}\text{COMe}$  is prepd. as follows: 11-dodecanone-*N*-phthalimide  $\text{MeCO}(\text{CH}_2)_{10}\text{N}(\text{CO})_2\text{C}_6\text{H}_4$  is prepd. by the action at 250-300° for 5 hrs. of 15 g. *K* phthalimide on 7 g. nitrile. The product, washed with water, dried and crystd. from alc., m. 69°. N (4.20%) agreed with  $\text{C}_{20}\text{H}_{39}\text{O}_2\text{N}$ . Semicarbazone, from alc., m. 146°. The phthalimide is treated in alc. with soda lye to complete soln. Neutralizing ext. with ether and boil the phthalamic acid with 20%  $\text{HCl}$  until dissolved. The amino hydrochloride results, neutralize, ext. with  $\text{C}_6\text{H}_6$ , distil off the solvent, and crystallize from aq. alc., whence a small quantity of well-cryst. solid is obtained. N (6.85%) agreed with  $\text{C}_{11}\text{H}_{21}\text{ON}$ . Prolonged boiling (15 hrs.) of the phthalimide with 20%  $\text{HCl}$  left the phthalimide unaltered; it was necessary to pass through the intermediate phthalamidic acid. The chlorides of acids, amides and nitriles corresponding to the 10-bromoundecanoic acid were prepd. 10-Bromoundecanoic acid was prepd. by the addn. of  $\text{HBr}$  to undecylenic acid in toluene at 0°. 10-Bromo-undecanoyl chloride cannot be distd. The amide (from  $\text{NH}_2$  with chloride) is a solid, sol. in  $\text{C}_6\text{H}_6$ , crystg. from alc., m. 93.5°. N (5.36%) agreed with  $\text{C}_{11}\text{H}_{21}\text{ONBr}$ . 10-Bromoundecanenitrile is a liquid  $b_{10}$  174°. N (5.60%) agreed with  $\text{C}_{11}\text{H}_{21}\text{NBr}$ . H. E. Messmore

Action of formaldehyde on amines and amino acids. H. T. Clarke, H. B. Gillespie and S. Z. Weissman. *J. Am. Chem. Soc.* 55, 4571-87(1933).—Simple aliphatic amines are smoothly methylated to the corresponding tert. amines by warming in  $\text{HCO}_2\text{H}$  with  $\text{HCHO}$ , the yields being over 80%; prepd. in this manner were  $\text{Me-BuN}$ ,  $\text{Me-NCH}_2\text{Ph}$  and methylpiperidine. 1,4-Diaminobutane gives 92% of the tetra-Me deriv., b. 167°.  $\text{RhNH}_2$  gives a viscous oil; 2,4,6- $\text{Br}_3\text{C}_6\text{H}_2\text{NH}_2$  gives 77%

of the tert. amine.  $(\text{PhCH}_2)_3\text{NH}$  and  $\text{HCHO}$  give mainly  $(\text{PhCH}_2)_3\text{NMe}$  together with some  $\text{BzH}$  and a more volatile base, probably  $\text{Me}_2\text{NCH}_2\text{Ph}$ . Tetrabenzylidiaminomethane and 90%  $\text{HCO}_2\text{H}$ , refluxed 8 hrs., give a mixt. of  $(\text{PhCH}_2)_3\text{NMe}$  and  $(\text{PhCH}_2)_3\text{NH}$ ; methylenedipiperidine gives methylpiperidine; benzalbenzylamine, b. 143-4°, gives  $\text{BzH}$  and  $\text{PhCH}_2\text{NH}_2$ . Hexamethylene, tetraamine gives mainly  $\text{NH}_3$  and  $\text{Me}_3\text{N}$ , with smaller amts. of  $\text{MeNH}_2$  and  $\text{Me}_2\text{NH}$ , only 75% of the methylene C reappears as Me in the final mixt. Only about 80% of the anticipated amt. of  $\text{CO}_2$ , calcd. on the assumption that  $\text{HCO}_2\text{H}$  is the sole H donor, is obtained in these reactions; apparently some of the  $\text{HCHO}$  also contributes H.  $\text{NH}_3$  acids react with  $\text{HCHO}$  in warm  $\text{HCO}_2\text{H}$  with detachment of some of the N in the form of volatile bases. Di-Me' derivs. were isolated from the reaction in  $\text{HCO}_2\text{H}$  with glycine,  $\beta$ -alaninopropionic acid,  $\alpha$ -aminoisobutyric acid and  $\alpha$ -amino- $\alpha$ -phenylbutyric acid. Other  $\text{NH}_3$  acids yield breakdown and condensation products of various degrees of complexity.  $\text{BzH}$  was isolated from  $\alpha$ -aminophenylacetic acid,  $\text{PhCOEt}$  from  $\alpha$ -amino- $\alpha$ -phenylbutyric acid and  $\alpha$ -(4-phenyl-2,3-diketopyrrolidyl)- $\beta$ -phenylpropionic acid (I) from phenylalanine. Dimethylglycine-HCl, m. 189-90° (64-7% yield); the free acid is very hygroscopic.  $\beta$ -Dimethylaminopropionic acid-HCl, m. 188-91° (38% yield);  $\alpha$ -dimethylaminoisobutyric acid-HCl, m. 204° (decompn.); Me ester, b. 164-5° (20-5% yield);  $\alpha$ -dimethylamino- $\alpha$ -phenylbutyric acid, m. 220° (decompn.). I, m. 245-6°; the l-isomer m. 250-1°,  $[\alpha]_D^{25}$  -37.6° (2.7% in N NaOH); the l-di-p-methoxy deriv. m. 231°,  $[\alpha]_D^{25}$  -31° (3.0% in N NaOH); the mono-p-MeO deriv. m. 239-40°,  $[\alpha]_D^{25}$  -135.5°, results from l-p-methoxyphenylalanine, phenylpyruvic acid and  $\text{HCHO}$  in  $\text{AcOH}$  on boiling 1 hr. I yields a Ba salt, cmstg. with 3 mols.  $\text{H}_2\text{O}$ ; with  $\text{Ac}_2\text{O}$  it gives an internal anhydride of a mono-Ac deriv.,  $\text{C}_{22}\text{H}_{27}\text{O}_4\text{N}$ , m. 192-4°;  $\text{BzCl}$  gives the compd.  $\text{C}_{22}\text{H}_{27}\text{O}_4\text{N}$ , m. 60°; Me ester, m. 118°; Me ether, amorphous, m. 75-90° (Ba salt; Me ester, m. 78°);  $\text{NH}_4\text{OH}$  gives the compd.  $\text{C}_{10}\text{H}_{11}\text{O}_4\text{N}_2$ , m. 185-6°. Oxidation of I with  $\text{Ag}_2\text{O}$  gives  $\text{BzH}$ ;  $\text{H}_2\text{O}_2$  gives  $\text{BzOH}$  and  $\text{PhCH}_2\text{CO}_2\text{H}$ . Alk. fusion of I gives styrene,  $\text{NH}_3$ ,  $\text{CO}$ , and H. C. J. West

**Alkylation of secondary amines with aldehydes and ketones.** A. Skita, F. Keil and H. Havemann. *Ber.* 66B, 1400-11 (1933).—The readiness with which secondary amines can be alkylated by catalytic reduction in the presence of aldehydes and ketones (C. A. 24, 2421, and earlier papers) made it of interest to det. how widely applicable the new method is. Aldehydes especially serve quite generally as excellent alkylating agents; no disturbing influence due to the mol. size of the amine or of the aldehyde was detected. The yield of tertiary amine is markedly smaller if the 2 alkyl groups on the N of the secondary amine have side chains in the  $\alpha$ -position. Aromatic aldehydes, also, are in general not as well adapted for alkylation as the aliphatic aldehydes; with aromatic aldehydes, the mol. size of the secondary amine influences the extent of alkylation. The presence of Ph groups in the vicinity of the N atom tends to decrease the ease of alkylation. On the other hand, the applicability of ketones in the reaction depends essentially on the mol. size and structure of the secondary amine and the ketone. Secondary amines of medium mol. size with a Me group on the N can be alkylated with ketones which are methylated on the C:O group, but if the Me group is replaced by Et or a higher group the ease of alkylation is greatly diminished. A side chain in the  $\alpha$ -position to the N also decreases the ease of alkylation, and secondary amines with such  $\alpha$ -side chains in both alkyl residues cannot be alkylated at all with ketones. In the 3 methylcyclohexanones, the ability to alkylate secondary amines is greatly diminished when the Me is in the  $\alpha$ -position. Except for aromatic compds. all tertiary amines can be prepd. by the new method when the last alkyl introduced into the secondary amine is such as is produced from an aldehyde (i. e., has no  $\alpha$ -side chain). Thus, the 3 possible combinations from which  $\text{EtCHMeNMeCHMeEt}$  (I) can be produced, viz.,  $\text{MeNHCHMeEt} + \text{Et}_2\text{CO}$ ,  $\text{MeNH}$ -

$\text{CHMeEt} + \text{MeCOEt}$ , and  $\text{EtCHMeNHCHMeEt} + \text{HCHO}$ , give 0.2, 23 and 73% yields, resp. The following amines were prepd: *Ethylisoumylethylamine* (3.5 g. from 10 g. iso-AmNH<sub>2</sub>Et and enanthal), b. 112-13°; *acid oxalate*, m. 75-8°. *Ethylisoumylethyl(3,7-dimethyloctyl)amine* (21 g. from 20 g. iso-AmNH<sub>2</sub>Et and citral), b. 136-7°; *acid oxalate*, m. 81-2°. *Diisoumylethylamine* (6 g. from 15 g. (iso-Am)<sub>2</sub>NH and AcH), b. 75-8° (picrate, m. 95-6°; *picrolonate*, m. 114-15°; *methiodide*, m. 148.5-9.5°); the AcH must partially aldolize in the alk. reaction mixt., for there is also formed 3 g. *diisoumylethylamine*, b. 100-3° (picrate, m. 117-18°), which is obtained in 9 g. yield from 15 g. (iso-Am)<sub>2</sub>NH with  $\text{MeCH:CHCHO}$ . *Diisoumylethyl(3,7-dimethyloctyl)amine*, b. 161-2°, isolated as the *acid oxalate*, m. 112-13° (5.9 g. from 7 g. (iso-Am)<sub>2</sub>NH with citral). *Bis(3,7-dimethyloctyl)ethylamine*, b. 183-8°; *acid oxalate*, m. 94-5° (7 g. from 15 g. (C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>NH with AcH). *Iso-Am homolog*, b. 208°; *acid oxalate*, m. 100-1° (15.5 g. from 15 g. (C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>NH and iso-BuCHO), also obtained in 9 g. yield from 6 g. iso-Am-(C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>NH and 2,6-dimethyl-8-octanal (tetrahydrocitril). *Tris(3,7-dimethyloctyl)amine*, b. 237-4°; *acid oxalate*, m. 105-6° (17 g. from 15 g. (C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>NH and citral, and 12 g. from 8 g. (C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>NH and tetrahydrocitril). *Diisopropylpropylamine* (4 g. from (iso-Pr)<sub>2</sub>NH and EtCHO), b. 145-7°; *picrate*, m. 120-1°. *Bis(1-methylpropyl)heptylamine* (0.9 g. from 9 g. (1-CHMe)<sub>2</sub>NH and enanthal), b. 249-52°; *picrolonate*, m. 105-6°. *Ph<sub>2</sub>NMe* (7 g. from 10 g.  $\text{Ph}_2\text{NH}$  and  $\text{HCHO}$ ), b. 148°.  $\text{Ph}_2\text{NMe}$  (14 g. from 15 g.  $\text{Ph}_2\text{NH}$  with AcH), b. 150°, *di-Br deriv.*, m. 107-8°. *Propyldiphenylamine* (10 g. from 15 g.  $\text{Ph}_2\text{NH}$  with EtCHO), b. 154°; *di-Br deriv.*, m. 76-7°. *Butyldiphenylamine* (7 g. from 16 g.  $\text{Ph}_2\text{NH}$  with  $\text{PrCHO}$ ), b. 104°; *di-Br deriv.*, m. 56-7°. *Iso-butyldiphenylamine* (3 g. from 30 g.  $\text{Ph}_2\text{NH}$  and iso- $\text{PrCHO}$ ), b. 156-7°. *Methylisopropyl(1-methylpropyl)amine* (7 g. from 10 g. EtCHMeNHMe and  $\text{Me}_2\text{CO}$ ), b. 132-3°; *picrate*, m. 142-3°. *Bis(1-methylpropyl)methylamine* (3 g. from EtCHMeNHMe and  $\text{MeCOEt}$ ), b. 155-7°; *picrate*, m. 92-3°. *Methyl(1-methylpropyl)-alkylamines*, EtCHMeNHMeR: *1-methylbutyl* (R =  $\text{Pr-CHMe}$ ) (3 g. from 10 g. EtCHMeNHMe (II) and  $\text{MeCO-Pr}$ ), b. 170-2° (*picrolonate*, m. 130-1°, *picrate*, m. 87-8°); *1-methylamyl* (1.5 g. from 10 g. II and  $\text{MeCO-Bu}$ ), b. 192-3° (*picrolonate*, m. 98-9°); *1-methylhexyl* (0.7 g. from 12 g. II and  $\text{MeCOAm}$ ), b. 211-13° (*picrolonate*, m. 99-100°); *1-methylheptyl* (0.5 g. from 40 g. II and  $\text{MeCOCH}_2\text{H}_3$ ), b. 224-6°; *cyclohexyl* (3 g. from 10 g. II and cyclohexanone), b. 208-9° (*picrate*, m. 110-11°); *4-methylcyclohexyl* (0.8 g. from 10 g. II and p-methylcyclohexanone), b. 221-2° (*picrolonate*, m. 138-9°); *m-isomer* (1 g. from 10 g. II), b. 218-19° (*picrate*, m. 92-3°). *Ethylisopropyl(1-methylpropyl)amine* (0.3 g. from 10 g. EtCHMeNHMe and  $\text{Me}_2\text{CO}$ ), *picrate*, m. 118°. *Ethylisopropylisoumylethylamine* (4 g. from iso-AmNH<sub>2</sub>Et and  $\text{Me}_2\text{CO}$ ), b. 163-4°; *picrate*, m. 80-1°. *Diisoumylethylisopropylamine* (1.4 g. from 8 g. (iso-Am)<sub>2</sub>NH and  $\text{Me}_2\text{CO}$ ), b. 206-8°; *picrate*, m. 80-1°. I, b. 168-71°; *picrolonate*, m. 115-16°. The methyl(1-ethylpropyl)amine, b. 106-7° (*acid oxalate*, m. 142-3°), required for 1 of the methods of prepn. of I was obtained in 11-g. yield from 27 cc. of 20% aq. MeNH<sub>2</sub> and 15 g.  $\text{Et}_2\text{CO}$  with 20 cc. of 1% colloidal Pt soln. The 1-methylpropyl(1-methylpropyl)amine, b. 150-2° (*picrolonate*, m. 187-8°), required for another of the methods of prepn. of I was similarly obtained in 7-g. yield from EtCHMeNH<sub>2</sub> and  $\text{MeCOEt}$ . C. A. R.

**A new color reaction of aldehydes.** P. Rumpf. *Compt. rend.* 197, 337-9 (1933).—The color reaction obtained on adding 1-2 drops of an aldehyde to a few cc. of a cold freshly prepd. soln. of 2-3 mg. rosaniline-HCl in 25 cc. 98%  $\text{HCO}_2\text{H}$  distinguishes 2 general types of aldehydes. Aromatic aldehydes and those where the CHO group is linked to tertiary C increase the color of the reagent, changing the shade but little. Exceptions are  $\text{CH}_3\text{O}$  and  $\text{CCl}_3\text{CHO}$  which give a fuchsin-red color. All aldehydes having a primary or secondary group attached to the CHO slowly change the color to green, the change

being slower with aldehydes of the type  $RCH_2CHO$ .

A. F. Shepard  
The polymerization of gaseous formaldehyde. Robert Spence. *J. Chem. Soc.* 1933, 1198-7.—The polymerization of gaseous  $HCHO$  in Pyrex-glass vessels at room temps. is a surface reaction, unimol. at high pressures and polymol. below 200 mm.; it is not accelerated by ultraviolet light.

G. Calingaert  
Several new substances formed by molds. II. Constitution of gluconic acid. Hermann Sutter and Nadine Wijkman. *Ann.* 505, 248-54 (1933); cf. *C. A.* 25, 1499.—Gluconic acid (I) forms a nitric acid ester, sapon. by  $NaOH$ . Heating I at 230-50° gives 40% of  $\alpha,\beta$ -diethylacrolein (II),  $b_{11}$  42°; catalytic reduction gives  $\alpha,\beta$ -diethylpropionaldehyde,  $b_{10}$  63.4°, whose 2,4-dinitrophenylhydrazones, yellow, m. 123°. II and  $Ag_2O$  give  $PrCH_2CO_2H$ ,  $b_{11}$  103°;  $O_3$  and catalytic reduction gives  $EtCHO$  and  $EtCOCHO$ .

C. J. West  
Recent general methods of condensation of ketones. V. Grignard and J. Colonge. *Bul. soc. chim. Romania* 15, 5-12 (1933); cf. *C. A.* 26, 3231.—Two methods were employed for the condensation of ketones. (a) Condensation by means of  $HCl$ ,  $HBr$  and  $HI$ . In the condensation of ketones of the general formula  $RCOMe$ , if  $R$  is primary or aromatic,  $HCl$  serves as a condensing agent to give a yield of 15%. If  $R$  is secondary  $HBr$  is used (yield 40%). If  $R$  is tertiary no condensation takes place. Ketones of the type  $RCH_2COCH_2R$  are condensable with  $HBr$ . (b) Condensation by means of aminomagnesium halide reagent  $RR'NMgX$  ( $R$  and  $R'$  may be  $H$  or aliphatic radicals). The reaction is analogous to the Grignard reaction. The keto alcs. may be obtained in yields varying between 50 and 70%. Two thirds of a mol. of the ketone in 50-80 cc. benzene is added slowly (20-30 min.) to the aminomagnesium reagent, the temp. being kept at 20°. After standing 1 hr. the calcd. amt. of  $HCl$  is added. The ether-benzene layer is decanted, washed with  $H_2O$  and dried over anhyd.  $Na_2SO_4$ . The ether and benzene are distd. under 50 mm. The keto-alc. compd. is then distd. *in vacuo*. The following keto alcs. were prepd.: 10-methyl-12-keto-10-heneicosanol by condensation of Me nonyl ketone (yield 70%), m. 23°; 2,3,6-trimethyl-5-keto-3-heptanol, by condensation of MeCOCHMe<sub>2</sub> (yield 77%),  $b_{16}$  97°,  $d_4^{25}$  0.910,  $n_D^{25}$  1.4412, mol. refraction 49.93 (theory 49.91); 2,2,3,6,6-pentamethyl-5-keto-3-heptanol, by condensation of pinacolone (yield 70%),  $b_{12}$  103.5°,  $d_4^{25}$  0.896,  $n_D^{25}$  1.4421, mol. refraction 50.07 (theory 50.15); 5-ethyl-4-propyl-6-keto-4-nonanol, by condensation of  $Pr_2CO$ ,  $b_1$  104.5°,  $d_4^{25}$  0.894,  $n_D^{25}$  1.4459, mol. refraction 68.0 (theory 68.38); 3,5,7-trimethyl-4-ethyl-6-keto-4-nonanol, by condensation of 4-methyl-3-hexanone (yield 55%),  $b_1$  104°,  $d_4^{25}$  0.914,  $n_D^{25}$  1.4532; 1-cyclohexanol-2-cyclohexanone, by condensation of cyclohexanone (yield 55%), m. 56°,  $b_1$  116.9°. Its oxime m. 113°. 2,4-Diphenyl-4-keto-2-butanol m. 63°.

W. A. Moore  
Experiments with citral. Marston T. Bogert and Victor G. Fournier. *Am. Perfumer* 28, 345-7 (1933).—Citral,  $b_{12}$  110-12°, can be converted into *p*-cymene in 68% yield or better by distn. with small quantities of  $I$ . It can also be condensed with cyclohexanone, in the presence of  $NaOEt$ , with the formation of *mono-* and *dicitrylidene-cyclohexanones*. The mono deriv.,  $C_{16}H_{24}O$ , is a colorless, odorless liquid  $b_{12}$  156-60°,  $d_{20}$  0.9498,  $n_D^{25}$  1.54303. The di. deriv.,  $C_{26}H_{42}O$ ,  $b_2$  196-200°, forms a yellow viscous liquid of weak aroma, which is somewhat similar to the very faint odor of pseudoionone. It congealed in a freezing mixt., but could not be crystd. satisfactorily. By refluxing citrylidene-cyclohexanone with  $CH_2O_2$ , it is cyclized to the *cyclocitrylidene-cyclohexanone*,  $C_{16}H_{24}O$ ,  $b_2$  132-4°, possessing a cedar-like odor, when dil. somewhat recalling that of ionone, whereas the uncyclized compd. is practically odorless. Thus, in the matter of odor and in the drop of 20° in b. p., the resemblance of this cyclized product to its uncyclized progenitor is not unlike that of ionone to pseudoionone. Attempts to cyclize the citrylidene-cyclohexanone by the action of either  $H_3PO_4$  or  $H_2SO_4$  under various conditions proved futile.

W. O. E.  
Esterification velocity of alcohols in formic acid. II. Anton Kailan and Naftaly H. Friedmann. *Monatsh.* 62, 284-316 (1933); cf. *C. A.* 26, 3207.—The esterification velocity at 15° of  $EtOH$ ,  $PrOH$ ,  $BuOH$ , 2-methylpropanol, 2-methylbutan-1-ol, octan-1-ol, propan-2-ol, butan-2-ol, octan-2-ol and 2-methylbutan-2-ol in  $HCO_2H$  contg. various amts. of  $H_2O$  and of the last 5 alcs. also in the presence of  $HCl$  was detd. by measuring the increase of the f.-p. lowering, and the velocity const. was calcd. from the equation for a monomol. reaction. For solns. of  $C_6H_5$ ,  $BzOH$ ,  $CHCl_3$  and several formic esters in  $HCO_2H$  the apparent f.-p. consts. are independent of the  $H_2O$  content. For solns. of 0.3-2.1 mols.  $H_2O$  per kg.  $HCO_2H$  the mol. depression is 2.44°, independent of the concn. of the  $H_2O$ . The alcs. are practically completely esterified. Increase in the  $H_2O$  content, with or without  $HCl$ , causes a decrease in the velocity const. Without  $HCl$  the alcs. are esterified 15,000-20,000 times as rapidly in  $HCO_2H$  as in  $AcOH$ ; with  $HCl$  and low  $H_2O$  content, 8000-10,000 and with larger  $H_2O$  content about 2000 times as fast as in  $AcOH$ .

C. J. West  
 $\alpha$ -Chlorovinylacetates. R. Rambaud. *Compt. rend.* 197, 767-70 (1933); cf. *C. A.* 27, 2423.— $CH_2:CHCH(OH)CO_2Me$  (I) and  $CH_2:CHCH(OH)CO_2Pr$  gave with  $SOCl_2$ , resp., the corresponding  $\alpha$ -Cl compds.  $b_{10}$  55°,  $d_{15}$  1.1311,  $n_D^{25}$  1.440, and  $b_{17}$  75°,  $d_{15}$  1.046,  $n_D^{25}$  1.438. Likewise  $CH_2:CHCH(OH)CN$  gave the  $\alpha$ -Cl deriv., b. 133-4°,  $n_D^{25}$  1.441,  $d_{15}$  1.073. I boiled with dil.  $HCl$  on a water bath gave the free Cl acid,  $b_{11}$  103-4°,  $d_{15}$  1.237,  $n_D^{25}$  1.457. Julius White  
Sorbyl chloride. II. T. Reichstein and G. Trivelli. *Helv. Chim. Acta* 16, 968-75 (1933); cf. *C. A.* 26, 2701.—Sorbyl chloride ( $MeCH:CHCH:CHCH_2Cl$ ) (I) and  $PhONa$  give *o*-sorbylphenol,  $b_{11}$  100°, catalytically reduced to *o*-hexylphenol,  $b_{10}$  100°; another product is neutral,  $b_{10}$  72°,  $b_{17}$  245°. I,  $MeMgI$  and  $CO_2$  give 1,4-hexadiene-3-carboxylic acid,  $b_{11}$  100°, reduced to  $EtPrCHCO_2H$ ; the neutral part,  $C_{12}H_{18}$ ,  $b_{11}$  90-5°, results in better yield from I and Cu-Mg alloy in abs.  $Et_2O$ ;  $O_3$  gives succinic acid. I is obtained in 8-g. yield from 11.6 g. acid, 14.3 g.  $SOCl_2$  and 9.52 g.  $C_6H_5N$ ; it  $b_{12}$  45.5°,  $d_4^{25}$  0.9434,  $n_D^{25}$  1.5037.

C. J. West  
Mechanism of substitution in organic compounds. Elimination of bromine from bromoacetic acid and the bromoacetates. H. M. Dawson and N. B. Dyson. *J. Chem. Soc.* 1933, 1133-43.—The kinetic study of the substitution of  $Br$  by the  $HO$  group in solns. which contain bromoacetate ions ( $A'$ ) and bromoacetic acid mols. ( $HA$ ) has shown that 4 simultaneous reactions are involved. In each of these reactions the bromide ion is liberated in the primary stage, and the observed rate of this process can be represented very closely by the equation  $v = v_1 + v_2 + v_3 + v_4 = k_1[A'] + k_2[A']^2 + k_3[HA] + k_4[HA][A']$  when the very considerable disturbing effects due to the reaction products and to variations in the nature of the reaction medium are eliminated. When the compn. of the reacting soln. is suitably varied, any one of the 4 component reactions may be made the dominant factor in the observed rate of change. Under certain conditions the general velocity equation reduces to very simple forms which have facilitated the detn. of the several velocity coeffs. When equiv. solns. of bromoacetic acid and of Na bromoacetate are mixed in various proportions, the velocity-compn. curve shows a well-defined max. The retardation effects observed with solns. of bromoacetic acid are mainly due to the gradual elimination of the mol.-ion reaction ( $v_4$ ) as the result of the formation of  $HBr$  and consequent fall in the concn. of the bromoacetate ion. The progressive acceleration effects observed with solns. of Na bromoacetate are due to the intervention of other reactions in which glycolic acid is directly or indirectly concerned.

G. C.  
Oxidation of 1,2-glycols with lead tetraacetate and periodic acid. P. Karrer and Ryuzo Hirohata. *Helv. Chim. Acta* 16, 959-92 (1933).—The relative merits of the oxidation cleavage of the 1,2-glycols by the methods of Malaprade (*C. A.* 22, 3374) and Griegee (*C. A.* 25, 8314), with  $HIO_4$  and  $Pb(OAc)_4$ , resp., have been com-

pared. The yields of cleavage products ( $\text{Me}_2\text{CHCH}_2\text{CH}_2\text{CO}_2\text{H}$ ,  $\text{Me}_2\text{CHCH}_2\text{CH}_2\text{CO}_2\text{H}$  and  $\text{MeAc}$  from  $\text{Me}_2\text{CHCH}_2\text{CH}_2\text{CH}(\text{OH})\text{C}(\text{OH})\text{Me}$ , and  $\text{BzH}$ ,  $\text{BzOH}$  and  $\text{MeAc}$  from  $\text{PhCH}_2(\text{OH})\text{C}(\text{OH})\text{Me}$ ) were similar for both methods. The use of  $\text{HIO}_4$  is recommended for reactions in aq. soln. Otherwise the ease of removal of the Pb salts favors the use of the  $\text{Pb}(\text{OAc})_4$  method.

C. R. Addmell

**Glycol splitting, its mechanism and its use in chemical problems.** Rudolf Criegee, Ludwig Kraft and Bodo Bank. *Ann.* 507, 159-97 (1933).—Glycol splitting refers to the oxidative splitting off of  $\alpha$ -glycols by  $\text{Pb}(\text{OAc})_4$  to form aldehydes or ketones. The reaction may also be applied to  $\alpha$ -HO acids,  $\alpha$ -NH<sub>2</sub> acids and  $\alpha$ -HO amines. Other oxidizing agents may also be used. The velocity of oxidation varies considerably, thus acenaphthenediol has  $k_{25}$  120,000, gluconic  $\alpha$ -lactone 1.2 and cholestatriol 0.002. Data are given for 32 compds. This is principally detd. by steric influences. The *cis*-compd. is oxidized more rapidly than the *trans*-compd. The solvent plays an important part, thus, cyclohexandiol shows a half-period (in sec.) in  $\text{AcOH}$  of 4340, in  $\text{C}_6\text{H}_6$  1.8,  $\text{PhNO}_2$  1.6,  $\text{C}_2\text{H}_5\text{Cl}$  1.1 and  $\text{C}_2\text{H}_5\text{Cl}_2$  0.9. The kinetics of the reaction are discussed.  $\text{Pb}(\text{OAc})_4$  (50 g.) contg. some  $\text{AcOH}$ , shaken with 1 l.  $\text{MeOH}$ , disappears in 0.5 hr., giving a yellow ppt.; addn. of 1 cc.  $\text{H}_2\text{O}$  and shaking for 1 hr. gives *hydroxymethoxylead* (IV) acetate,  $\text{Pb}(\text{OAc})_2(\text{OMe})\text{OH}$ , citron-yellow, which darkens in moist air;  $\text{AcOH}$  or  $\text{Ac}_2\text{O}$  regenerates  $\text{Pb}(\text{OAc})_4$ . In the same way were prepd. the *propionate*, yellow, from  $\text{Pb}(\text{O}_2\text{CPr})_4$  and  $\text{MeOH}$ ; the *butyrate*, light yellow. Dry  $\text{Pb}(\text{OAc})_4$  and  $\text{MeOH}$ , on standing 5 days, give 81%  $\text{HCHO}$ ,  $\text{EtOH}$  gives 89%  $\text{AcH}$ ; 100- $\text{PrOH}$  gives 98%  $\text{Me}_2\text{CO}$ ,  $\text{PhCH}_2\text{OH}$  gives 66% of  $\text{BzH}$ .  $\text{Th}(\text{OAc})_3$  and  $\text{MeOH}$  give *methoxythallacetate*; the *EtO* and *iso-PrO* complexes were also prepd.  $\text{Mn}(\text{OAc})_3$  and  $\text{MeOH}$  give *dimethoxymanganese* (III) acetate, brown. Acenaphthenediol, m. 204-10°, and  $\text{Pb}(\text{OAc})_4$ , shaken in  $\text{C}_6\text{H}_6$  for 15 min., give *naphthaldehyde hydrate*, m. 130-30.4°; *bis-p-nitrophenylhydrazones*, red-brown, decomp. 229°. The *cis*-diol forms an *acetone* complex, m. 75.6-82°, the *trans*-diol, m. 158.5-95°, is unchanged in  $\text{Me}_2\text{CO}$ . 1,2-Dimethylacenaphthenediol gives *perris-diacetylnaphthalene*, m. 171-2°, which gives *3-methyl-perris-naphthinden-1-one*, yellow, m. 156°, with piperidine. 1,2-Diphenylacenaphthenediol and  $\text{Pb}(\text{OAc})_4$  in  $\text{AcOH}$  give *perris-dibenzoylnaphthalene*, m. 176-7°. 9,10-Diphenylidihydrophenanthrene diol gives  $(\text{o-BzC}_6\text{H}_4)_2$ , m. 168-9°. C. J. W.

**Some new types of chelated platinumamines** H. D. K. Drew and H. J. Tress. *J. Chem. Soc.* 1933, 1336-41. It was desired to find whether it was possible to insert large chelate groups across the  $\beta$ -positions of the bivalent Pt atom; and also whether the  $\alpha$ -positions, never yet shown to be bridged, could be spanned by sufficiently large groups. The results prove that with  $\text{C}_2\text{H}_5(\text{NH}_2)_2$  (I) and  $\text{C}_4\text{H}_9(\text{NH}_2)_2$  (II) the chelate loops span the  $\beta$ -positions, giving sparingly sol.  $\beta$ -diammines of normal type, but that on passing to  $\text{C}_4\text{H}_9(\text{NH}_2)_2$  (III) and  $\text{C}_6\text{H}_{13}(\text{NH}_2)_2$  (IV) a sudden change in the character of the products occurs, only ill-defined insol. products being obtained. It appears that III and IV are unable to form loops at a single Pt atom, presumably because this would involve the setting up of highly strained 7- and 8-membered rings; the formation of 5- and 6-membered rings contg. a Pt atom is, however, feasible, and therefore I and II are able to give normal monomeric compds. Aq.  $\text{K}_2\text{PtCl}_4$  and II at room temp. give  $\beta$ -trimethylenediaminoplatinous chloride (V), yellow;  $\text{H}_2\text{O}_2$  in dil.  $\text{HCl}$  gives the *platinsic chloride*, lemon-yellow; V and II give  $\beta$ -bis(trimethylenediaminoplatinous) chloride, which forms a flesh-colored *plato salt*,  $\text{C}_4\text{H}_9\text{N}_4\text{Cl}_4\text{Pt}_2$ .  $\text{H}_2\text{O}_2$  gives the *platinsic chloride*, which also forms a *plato salt*,  $\text{C}_4\text{H}_9\text{N}_4\text{Cl}_4\text{Pt}_2$ , orange. Heating V in 6 N  $\text{HCl}$  at 100° for 7 hrs. gives the  $\alpha$ -dihydrochloride,  $\text{C}_4\text{H}_9\text{N}_4\text{Cl}_4\text{Pt}$ . V and aq. I give  $\beta$ -ethylenediaminotrimethylenediaminoplatinous chloride (VI), which forms a pink *plato salt*, the *platinsic chloride*, which also gives an orange *plato salt*. The  $\alpha$ -dihydrochloride of VI and  $\text{K}_2\text{PtCl}_4$  give the pinkish brown *chloroplatinite*,  $\text{C}_4\text{H}_{12}\text{N}_4\text{Cl}_4\text{Pt}_2$ . V and  $\text{NH}_4\text{OH}$  give  $\beta$ -

diamminotrimethylenediaminoplatinous chloride (VII), which forms a pink *plato salt*;  $\text{H}_2\text{O}_2$  gives the *platinsic chloride*, which gives a brown *plato salt*. VII and 6 N  $\text{HCl}$  give  $\beta$ -aminotrimethylenediaminoplatinous chloride, forming a pink *plato salt*. The  $\alpha$ -monohydrochloride is yellow and reacts with  $\text{K}_2\text{PtCl}_4$  to give  $[\text{PtCl}(\text{NH}_2)_2]_2\text{PtCl}_4$ . [Pt I  $\text{Cl}_4$ ] and hot aq. [Pt( $\text{NH}_2$ )<sub>4</sub>] $\text{Cl}_2$  give [Pt I  $\text{Cl}_4$ ] or [Pt I  $\text{Cl}_4$ ]<sub>2</sub>, red plates; it is oxidized to [Pt I  $\text{Cl}_4$ ] by  $\text{H}_2\text{O}_2$ - $\text{HCl}$  and reduced to [Pt I  $\text{Cl}_4$ ] by aq.  $(\text{CO}_3\text{K})_2$ . This is quite different from the unstable buff *bisethylenediaminoplatinous chloroplatinite* and the buff *dichlorobisethylenediaminoplatinous chloroplatinite*, which were pptd. from aq. solns. of the corresponding chlorides  $\beta$ -[Pt I  $\text{Cl}_4$ ] and 6 N  $\text{HCl}$ , boiled 5 hrs., give [Pt I  $\text{Cl}_4$ ], (I  $\text{H}_2$ ) $\text{PtCl}_4$  and probably (I  $\text{H}_2$ ) $\text{PtCl}_4$ . Similarly  $\beta$ -[Pt II  $\text{Cl}_4$ ] gives [Pt II  $\text{Cl}_4$ ] and (II  $\text{H}_2$ ) $\text{PtCl}_4$ . C. J. West

**Preparation of phosphorylated glyceraldehyde.** H. K. Barrnisch and Luise Klebmann-Messner. *Biochem. Z.* 265, 157-8 (1933).—Glyceraldehyde di-Et acetal is the starting point in the synthesis. Acrolein is prepd. by distn. of glycerol with  $\text{H}_3\text{PO}_4$ , which can be carried out in a Pyrex flask. The glyceraldehyde acetal is obtained from the di-Et acetal of chloropropionic aldehyde and of acrolein acetal, and is phosphorylated in pyridine with  $\text{POCl}_3$ . The addn. of the pyridine soln. of  $\text{POCl}_3$  should be done at temps. of -10 to -16° over a period of 6-8 hrs. This is then poured into cold water, neutralized with milk of lime and the pyridine distd. off *in vacuo*. Evapd. to a small bulk and filtered, the soln. is mixed with several vols. of alc. to ppt. the Ca salt. Purification is brought about by repeated pptn., the product being easily sol. in water. The  $\text{H}_3\text{PO}_4$  ester of glyceraldehyde is directly fermented by yeast. S. M.

**Insect waxes. VI. Synthesis of triglycerides of palmitic and myristic acids.** Fr. N. Schulz and Max Becker. *Biochem. Z.* 264, 87-93 (1933); cf. C. A. 27, 4313.—The various mixed triglycerides of palmitic and myristic acids were synthesized. They had m. ps. between 53.5° and 56.8° which is much higher than that of *Schiso neuera* wax (48.4°), so that the synthetic products are not identical with the natural product. S. M.

**The manufacture of pentaerythritol.** H. Molinari. *Giorn. chim. ind. applicata* 15, 325-8 (1933).—The advantages and disadvantages of  $\text{NaOH}$  and  $\text{CaO}$  as catalysts in the manuf. of pentaerythritol are outlined.

A. W. Conliffe

**Acetone derivatives of d ribose.** P. A. Levene and I. R. Stuller. *J. Biol. Chem.* 102, 187-201 (1933). *d*-Ribose forms only a monoacetone deriv., 2,1-monoacetone ribofuranose. *d*-Ribose (20 g.) was treated with  $\text{MeOH}$ -free  $\text{Me}_2\text{CO}$  in the presence of  $\text{H}_2\text{SO}_4$  and anhyd.  $\text{CuSO}_4$  at 37°, yielding 14 g. of a syrup (A) and 3.0 g. of cryst. material (B). For the purpose of purification, A,  $b_p$  110-7°, was acetylated in  $\text{C}_2\text{H}_5\text{N}$ , giving a *di-Ac deriv.*,  $b_p$  119-21°,  $n_D^{20}$  1.4476,  $\text{C}_{15}\text{H}_{21}\text{O}_6\text{Ac}_2$ ; treatment with  $\text{Ba}(\text{OMe})_2$  in  $\text{MeOH}$  gave syrupy *monoacetone-ribose* (I),  $n_D^{20}$  1.4042,  $\text{C}_{15}\text{H}_{21}\text{O}_6$ , which could react with  $\text{NaOI}$ , a proof that the first C atom was not blocked by the  $\text{Me}_2\text{C}$  group. Methylation of I with Purdie's reagents produced *methyl monoacetone-methylribose*,  $\text{C}_{15}\text{H}_{21}\text{O}_6(\text{OMe})$ ,  $b_p$  62-5°,  $n_D^{20}$  1.4383, which remained unchanged when heated with  $\text{MeOH}$  +  $\text{HCl}$ . Hydrolysis with 0.04 N  $\text{HCl}$  at 100° gave *monomethylribose* (II)  $\text{C}_5\text{H}_{11}\text{O}_5$ , the rate of glucoside formation of which, in  $\text{MeOH}$  +  $\text{HCl}$  at room temp. and 70°, indicated a 1,4-ring structure, thus allowing the allocation of the  $\text{Me}$  group to position 5. II formed a *p-bromophenyllosazone*, m. 161-2°,  $[\alpha]_D^{25}$  -48.0 (in abs. alc.- $\text{C}_2\text{H}_5\text{N}$ , 3:2). On exhaustive methylation, II gave *trimethylmethylribose*,  $b_p$  68°,  $n_D^{20}$  1.4309; hydrolysis with 0.07 N  $\text{HCl}$  at 75° gave *trimethylribose*,  $b_p$  90-2°,  $n_D^{20}$  1.4527,  $[\alpha]_D^{25}$  39.3 (in abs.  $\text{MeOH}$ , 40.6° in  $\text{H}_2\text{O}$  and 43.4° in dil.  $\text{NH}_4\text{OH}$ , identical with the *trimethylribofuranose* of Levene and Tipson (C. A. 26, 5571); oxidation with  $\text{Br}_2$  and lactonization of the acid by heating at 100° for 5 hrs. at 15 mm. gave a syrup,  $b_p$  90-3°,  $n_D^{20}$  1.4508,  $[\alpha]_D^{25}$  56.8° in  $\text{CHCl}_3$  -14.0 (mutal) in  $\text{H}_2\text{O}$ ; after 26 hrs. in  $\text{H}_2\text{O}$ ,  $[\alpha]$  was still neg., this behavior identified it with *trimethylery-*



*ribonolactone* (C. A. 26, 897, 3433). Treatment of I with  $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Cl}$  gave a *di-p-tolylsulfonyl deriv.*, m.  $122-3^\circ$ ,  $\text{C}_{22}\text{H}_{20}\text{O}_6\text{S}_2$ ; boiled with  $\text{NaI} + \text{Me}_2\text{CO}$ , this gave *mono-p-tolylsulfonylmonoisodomonocetoneribofuranose*,  $\text{C}_{11}\text{H}_{12}\text{O}_8\text{S}$ , m.  $120^\circ$  (abs. alc.),  $[\alpha]_D^{25}$   $84.0^\circ$  ( $\text{CHCl}_3$ ); which reacted with  $\text{AgNO}_3$  in  $\text{MeCN}$  to give *mono-p-tolylsulfonylmononitromonocetoneribofuranose*,  $\text{C}_{11}\text{H}_{11}\text{O}_8\text{NS}$ , m.  $156^\circ$ . The fact that one *p-tolylsulfonyl* group could be removed easily showed that it occupied position 5 (C. A. 26, 908). Monocetoneribose has a 1,4-ring and OH groups on C atoms 1 and 5 unsubstituted; therefore, the isopropylidene group must be in positions 2,3. Cryst. material B, b.  $55-60^\circ$ , m.  $61-2^\circ$  (from  $\text{MeOH}$  or pentane),  $[\alpha]_D^{25}$   $-04.35^\circ$  (in  $\text{MeOH}$ ), formula  $\text{C}_5\text{H}_{10}\text{O}_4$ , mol. wt. 171.1, was very unreactive although it could be hydrolyzed with  $\text{HCl}$ , and was assumed to be *2,3-monocetone-1,5-anhydribofuranose*. A condensation in which  $\text{HCl}$  replaced  $\text{H}_2\text{SO}_4$  gave a small amt. of cryst. material of the same compn., m.  $93-4^\circ$ . M. P. Benoy

**Polymerization and ring formation. XVIII.** Polyesters from  $\omega$ -hydroxydecanoic acid. Wallace H. Carothers and Frank J. Van Natta. *J. Am. Chem. Soc.* 55, 4714-19 (1933); cf. C. A. 26, 2707. Polyesters have been prepd. from  $\omega$ -hydroxydecanoic acid with mol. wts. from 780 to 25,200. The m. ps. vary from  $66-7^\circ$  to  $75-80^\circ$ ,  $d_4^{25}$  1.0957 to 1.0621,  $n_D^{25}$  1.4494 to 1.4515. Strong, oriented fibers are obtained only from members having mol. wts. above 9330; a polyester with a mol. wt. of 16,900 had a tensile strength of 13.1 kg./mm.<sup>2</sup>; 20,700, 12.3; 25,200, 7.0. The influence of mol. wt. on some other phys. properties is discussed. C. J. West

The conditions of fixation of  $\text{SbO}_2\text{H}$  by some monoacid monoalcohols. Volmar and Duquenois. *Compt. rend.* 197, 599 (1933). Glycolic, lactic and  $\alpha$ -hydroxyisobutyric acids fix antimony acid. The corresponding emetics have been isolated in cryst. state. The emetic from Na glycolic acid,  $\text{HOSb}(\text{OCH}_2\text{CO}_2\text{H})_2 \cdot \text{H}_2\text{O}$ , is representative of the group as to formula. For each  $\alpha$ -monoacid monoalc., the fixation is at a max. when half the acid is salted. The free acid fixes  $\text{SbO}_2\text{H}$  feebly; the neutral salt does not fix more than a trace. Between the 2 extremes, the curve of fixation as a function of the acidity is at a max. when it corresponds to the neutralization of half the acid by an alk. base, i. e., equimol. mixt. of acid and of alk. salt. W. J. Peterson

Model experiments on the oxidative degradation of biologically important organic sulfur compounds. Alfons Schöberl. *Ann.* 507, 111-27 (1933). In the oxidation of  $\text{HSCH}_2\text{CO}_2\text{H}$  in  $\text{Ba}(\text{OH})_2$  by  $\text{O}_2$  at  $37^\circ$  much more  $\text{O}_2$  is absorbed than is required to form the disulfide. The oxidation products consist of the Ba salts of  $(\text{CO}_2\text{H})_2$ ,  $\text{H}_2\text{S}_2\text{O}_4$  and probably  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{SO}_3$  in very small quantities. Oxidation in  $\text{NaOH}$  gives  $(\text{CO}_2\text{Na})_2$  and  $\text{Na}_2\text{S}_2\text{O}_4$ ; Cu is an active catalyst. The oxidation velocity shows a sp. dependence upon the alkali concn. Oxidation to the disulfide step occurs in 4.5 min. Independent of the time of oxidation, the yield of  $(\text{CO}_2\text{H})_2$  is 68.5%. Without catalyst the decompn. is essentially slower but in the same direction. Dithiodiglycolic acid (I), the primary oxidation product, behaves in the same way toward  $\text{O}_2$  in alk. soln., giving 68.1%  $(\text{CO}_2\text{H})_2$ ; this is due to the instability of I toward alkali,  $\text{HSCH}_2\text{CO}_2\text{H}$  being formed in 59.6% yield; unexpectedly 10.1%  $(\text{CO}_2\text{H})_2$  is formed. Oxidation of  $\text{Na}_2\text{S}$  in alk. soln. gives  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{SO}_3$  and  $\text{Na}_2\text{S}_2\text{O}_3$ ; the amt. of the 1st 2 products increases with increasing alkali concn. and with the presence of Cu. Reduction of I and of dithiodilactic acid (II) with  $\text{Na}_2\text{S}$  is also reported. Alk. degradation of II gives 46.94% of thiolactic acid, whose oxidation in alk. soln. is also studied. II is not oxidized. C. J. W.

Amino acids and related compounds. VII. Oxidation of various amino acids. Yoshitaro Takayama. *Bull. Chem. Soc. Japan* 8, 213-30 (1933). A no. of amino acids were oxidized electrolytically under the following conditions: 30 millimols. of acid in 30 cc. of 2 N  $\text{H}_2\text{SO}_4$  were electrolyzed in a small glass cell. The anode was  $\text{PtO}_2$ , cathode Pb ( $2 \times 4$  cm.), temp.  $30$  or  $35^\circ$ , c.  $2$  amp./sq. cm. When 2F/mol., 4F/mol., etc. had been

passed the electrolysis was interrupted. The quantity of  $\text{CO}_2$  evolved was detd. from absorption tubes and the total N and  $\text{NH}_3\text{-N}$  were detd. in the electrolyte. The  $\text{NH}_3$  and  $\text{CO}_2$  quantities were plotted. The curves representing the formation of  $\text{NH}_3$  and  $\text{CO}_2$  for tyrosine and phenylalanine nearly coincide. The  $\text{NH}_3$  curves of alanine and glutaric acid coincide while their  $\text{CO}_2$  curves do not. Glutamic acid decompn. to succinic acid which in turn yields to anodic oxidation, thereby giving more  $\text{CO}_2$  than alanine, which oxidizes to  $\text{AcOH}$ . Aspartic acid gives still more  $\text{CO}_2$  since it yields malonic acid. The  $\text{NH}_3$  curves of glycine and valine are similar to that of alanine. Leucine evolves less  $\text{NH}_3$ . These latter 3 compds. evolve more  $\text{CO}_2$  than alanine. The  $\text{NH}_3$  curve for a pyrrolidone-carboxylic acid is the highest of all amino acids. This acid and proline yielded succinimide. Histidine and imidazolylpropionic acid were attacked at their imidazole nucleus, the former yielding some urea. Tryptophan and lysine yield normal curves. The monamino-carboxylic acids studied can be divided into 3 groups according to the ease of oxidation by consideration of their  $\text{NH}_3$  curves. (1) Glycine, valine, alanine and glutamic acid give curves which are close together and yield most  $\text{NH}_3$ . (2) The tyrosine and phenylalanine yield less  $\text{NH}_3$ , while (3) leucine and aspartic acid yield a quantity of  $\text{NH}_3$  between that of the other 2 groups. H. E. M.

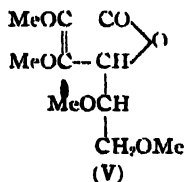
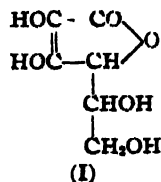
The deamination of glycine by pyrocatechol derivatives and the proof of glyoxylic acid as intermediary product. H. K. Barrenscheen and Wolfgang Danzer. *Z. physiol. Chem.* 220, 57-60 (1933).—The oxidative deamination of glycine by  $\text{O}_2$  is catalyzed not only by adrenaline, as shown by Edlbacher and Kraus (C. A. 23, 2485), but also by related derivs., notably  $\alpha\text{-C}_6\text{H}_4(\text{OH})_2$ ,  $3,4\text{-(HO)}_2\text{-C}_6\text{H}_3\text{COCH}_2\text{NH}_2$ ,  $3,4\text{-(HO)}_2\text{-C}_6\text{H}_3\text{COCH}_2\text{NHMe}$  and  $3,4\text{-(HO)}_2\text{-C}_6\text{H}_3\text{COCH}_2\text{NHEt}$ . The reaction is more energetic at  $pH$  7.7 than at 6.8, though at the higher  $pH$  the amino catalysts tend to ppt. In the catalysis by adrenaline the intermediate product  $\text{OHCCO}_2\text{H}$  was captured by  $2,4\text{-(O}_2\text{N)}_2\text{-C}_6\text{H}_3\text{NHNH}_2$  and identified as the corresponding hydrazone. The final products are  $\text{NH}_3$ ,  $\text{CH}_2\text{O}$  and  $\text{CO}_2$ . A. W. Dox

The behavior of several urea derivatives, amino acids and peptides with animal black. K. Wunderly. *Helv. Chim. Acta* 16, 1009-13 (1933).—It has been shown that urea, biuret, barbituric acid, urethan, phenylurethan, hydantoic acid and di-ketopiperazine are stable when heated in dil. aq. soln. with animal and sugar black in the absence of  $\text{O}_2$ . Under similar conditions with animal black at  $80^\circ$  serine and sarcosine are deaminated 20% and 5%, resp., and *dl*-glycylglycine and *dl*-leucylglycylglycine 40 and 8%, resp. The deaminating effect of charcoal is sp. for the true amino acid grouping. C. R. Addinall

Action of carbon monoxide on iron and cobalt complexes of cysteine. Maxwell P. Schubert. *J. Am. Chem. Soc.* 55, 4503-70 (1933).—The complex *ferro bisacrylate diacrybonyl* has been crystd. as a free acid,  $\text{Fe}(\text{SCH}_2\text{CHNH}_2\text{CO}_2\text{H})_2 \cdot 2\text{CO}_2\text{H}_2\text{O}$ , yellow, and as the Na salt with 2  $\text{H}_2\text{O}$ ; the acid results from 3.9 g.  $\text{FeSO}_4 \cdot (\text{NH}_4)_2 \cdot \text{SO}_4 \cdot 6\text{H}_2\text{O}$ , 3.2 g. cysteine-HCl, 20 cc.  $\text{H}_2\text{O}$  and 8 cc. 6.5 M KOH in H on passing CO for 4 hrs. The action of CO on K Co bisacrylate involves oxidation and reduction, the products being the green K Co trisacrylate,  $\text{K}_3[\text{Co}(\text{SR})_3] \cdot 3\text{H}_2\text{O}$  (I) and a new complex, isolated as the Ag and Hg compds., apparently derived from  $\text{H}[\text{Co}(\text{CO})_4]$  (II). The Hg salt m.  $82^\circ$ . The action of CO on I in strong alkali also involves oxidation and reduction, the products being carbonate and II. II with acid gives  $\text{Co}(\text{CO})_4$ , which reacts with cysteine and alkali to give I and II. C. J. West

Methylenebutanolone. H. Gault and L. A. Germann. *Compt. rend.* 197, 620-1 (1933). Methylenebutanolone, b.  $92-5^\circ$ , is formed as a side product in the prepn. of butanolone by the reaction of  $\text{Me}_2\text{CO}$  with 2  $\text{CH}_3\text{I}$  and loss of  $\text{H}_2\text{O}$ . It adds  $\text{Br}_2$  to form a dibromide and forms a satd. ketol (b.  $96^\circ$ ; phenylhydrazone m.  $107^\circ$ ) identical with the methylbutanolone formed from  $\text{MeCOEt}$  and  $\text{CH}_3\text{O}$ . Janet E. Austin

**Constitution of ascorbic acid.** R. W. Herbert, E. L. Hirst, E. G. V. Percival, R. J. W. Reynolds and F. Smith. *J. Chem. Soc.* 1933, 1270-90; cf. *C. A.* 26, 3242, 5498; Hirst, *et al.*, *C. A.* 27, 1383, 3190, 4777.—The previous name, hexuronic acid, has been changed to ascorbic acid (I) because the compd. is not really a member of the uronic acid class. The original must be consulted for the long theoretical discussion. I, m. 192°,  $[\alpha]_D^{25}$  24° (H<sub>2</sub>O, c 3), 25° (c 0.5), 24° (c 1.1) and shows no mutarotation,  $[\alpha]_D^{22}$  22° (0.05 N HCl or N H<sub>2</sub>SO<sub>4</sub>); Na salt,  $[\alpha]_D^{25}$  116° (neutral aq. soln.), 130° (0.05 N NaOH), 149° (N/7 NaOH), 153° (0.5 N NaOH), 161° (2 N NaOH, const. for 1 hr.). In 50% AcOH I reacts rapidly (10-15 min.) with O<sub>2</sub>, giving the same product (1st oxidation product (II)) as that produced by oxidation with I<sup>+</sup> or Cl in acid soln.; continued action gives (CO<sub>2</sub>H). The titration with I and Cl is discussed and the absorption spectra are given as a series of curves (I, Na salt, and various oxidation products). II, newly formed, has  $[\alpha]_D^{25}$  56°, changing to -6° in 70 hrs. in presence of mineral acid or more slowly in neutral soln. (-12° in 300 hrs.). The rotation of the Na salt of II depends markedly on the  $p_H$  value of the soln. I may be regenerated from II by reduction with EtOH-I or H<sub>2</sub>S, when freshly prepd.; with the equil. mixt. H<sub>2</sub>S gives only 6% I but HI gives 75-80% I. I and PhNHNH<sub>2</sub> give the compd. C<sub>10</sub>H<sub>11</sub>O<sub>4</sub>Na, deep red, m. 187° (decompn.); if the red soln. is cooled rapidly, the amorphous product m. 204°; *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub> gives the bright red compd., C<sub>10</sub>H<sub>11</sub>O<sub>4</sub>Na, m. 202° (decompn.); *p*-BrC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub> gives the dark red compd., C<sub>10</sub>H<sub>11</sub>O<sub>4</sub>NaBr, m. 170° (decompn.); 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NHNH<sub>2</sub> gives the brownish red compd., C<sub>10</sub>H<sub>11</sub>O<sub>4</sub>Na, m. 282° (decompn.). II and PhNHNH<sub>2</sub> give products m. 210° (yellow) and 216° (orange), having approx. the same compn.; the compd. from *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub>, light red, m. 280°, or yellow, m. 240°; from *p*-BrC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub>, yellowish red, m. 220°, or yellow, m. 208°; from 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NHNH<sub>2</sub>, light red, m. 268° or 280° (all melt with decompn.). *o*-Tolylendiamine and I give a pale yellow product, m. 115° (decompn.). Oxidation of I with acid KMnO<sub>4</sub> and methylation of the product gives *Me trimethyl-l-threonate*, b<sub>10</sub> 120°,  $n_D^{20}$  1.4275,  $[\alpha]_D^{25}$  49° (MeOH, c 2.9), 31° (H<sub>2</sub>O, c 1.3), d<sub>15</sub> 1.090; *trimethyl-l-threonamide* (III), m. 78°,  $[\alpha]_D^{25}$  44° (H<sub>2</sub>O, c 1), 68° (MeOH, c 0.8). Oxidation of I with I and alk. HOI, esterification and methylation finally gives a sirup, b<sub>10</sub> 135°,  $[\alpha]_D^{25}$  49° (MeOH, c 1),  $n_D^{20}$  1.4270; from this was prepd. III and *trimethoxy-l-threonamide*, m. 255°. Oxidation of I with HOCl and then with HNO<sub>3</sub> and methylation gives Me oxalate and Me *d*-dimethoxysuccinate; the latter was characterized as the amide and methylamide. I and CH<sub>3</sub>N<sub>3</sub> give dimethylascorbic acid (IV),  $[\alpha]_D^{25}$  27° (H<sub>2</sub>O, c 1.5), is not oxidized by I, does not reduce Fehling soln., is unchanged on heating with 0.1 N H<sub>2</sub>SO<sub>4</sub> for 30 min. at 65°. With MeI and Ag<sub>2</sub>O IV gives *tetramethylascorbic acid* (V), b<sub>10</sub> 150°,  $n_D^{20}$  1.4690,  $[\alpha]_D^{25}$  0° (H<sub>2</sub>O), 2° (30% MeOH-H<sub>2</sub>O, c 6), 8° (50% MeOH-H<sub>2</sub>O, c 0.8); the action of O<sub>2</sub> in AcOH gives a neutral ester, which on hydrolysis and esterification, gives Me 3,4-dimethyl-l-threonate substituted in position 2 by a Me oxalate residue. MeOH-NH<sub>3</sub> gives oxamide and 3,4-dimethyl-l-threonamide with a small quantity of 3,4-dimethylerythronamide. *Me dimethoxymaleate* b<sub>10</sub> 85°,  $n_D^{20}$  1.4525.



C. J. West

**Synthesis of *d*- and *l*-ascorbic acid and of analogous substances.** R. G. Ault, D. K. Baird, H. C. Carrington, W. N. Haworth, R. Herbert, E. L. Hirst, E. G. V.

Percival, F. Smith and M. Stacey. *J. Chem. Soc.* 1933, 1419-23; cf. preceding abstr.—*d*- or *l*-Xylosone (0.35 g. from 10 g. xylosazone) with CaCl<sub>2</sub> and KCN gives *d*- or *l*-*ψ*-ascorbic acid, a sirup which exhibits a different absorption spectrum from that of I and gives rise to an osazone, m. 210°. With 8% aq. HCl at 40-50° there results *d*- or *l*-ascorbic acid (I), the *l*-form being identical with the natural I. These 2 steps give yields of about 70%. In the same way glucosone gives 3-*keto-d*-glucoheptonofuranolactone, m. 191°,  $[\alpha]_D^{25}$  14° (H<sub>2</sub>O, c 1), 22° (MeOH, c 1). The transformation of *d*-galacturonic acid into *l*-xylose phenyllosazone is outlined. C. J. West

**Reductive acid, a strongly reducing decomposition product from carbohydrates.** T. Reichstein and R. Oppenauer. *Helv. Chim. Acta* 16, 988-98 (1933).—Tetra-galacturonic acid-a (100 g.) from citrus pectin (cf. *C. A.* 24, 65), heated with 500 cc. 5% H<sub>2</sub>SO<sub>4</sub> in an autoclave at 150-5° for 1.5 hrs. gave 7 g. of yellow cryst. *reductive acid*, C(OH):C(OH).CO.CH<sub>2</sub>.CH<sub>2</sub>, m. 213-3.5°, be-

coming white on sublimation at 0.2 mm. and 150°. It is also obtained from pectin, xylose and galacturonic acid, but not from glucose, gluconic acid, furfural or hydroxymethylfurfural. It closely resembles ascorbic acid, reducing Fehling soln., AgNO<sub>3</sub>, acid I<sub>2</sub> soln. (reversibly), and dichlorophenol-indophenol in the cold, but has no antiscorbutic action. It forms a *Pb* salt, insol. in alc. and H<sub>2</sub>O; a *Na* salt, C<sub>5</sub>H<sub>7</sub>O<sub>4</sub>Na; a *mono-Me ester* (with C<sub>2</sub>H<sub>5</sub>Na), m. 138° (from C<sub>2</sub>H<sub>5</sub>); a *di-Me ester*, b<sub>12</sub> 120° (C<sub>2</sub>H<sub>5</sub>O); and a *phenyllosazone* (dihydrazone?), C<sub>7</sub>H<sub>9</sub>ON<sub>2</sub>, m. 247.5-8.5° (decompn.). It is oxidized by alk. KMnO<sub>4</sub> to succinic acid. M. P. Benoy

**Benzyl levulinate.** Peter P. T. Sah, Hsing Han Lei and Hsi Meng Fang. *J. Am. Chem. Soc.* 55, 4727-8 (1933).—Levulinic acid (52 g.), 160 g. PhCH<sub>2</sub>OH and 440 g. PhMe with dry HCl (7 g.), boiled 24 hrs., give 65 g. *benzyl levulinate*, b<sub>11</sub> 181-3°, d<sub>20</sub> 1.0935,  $n_D^{20}$  1.5000, *phenylhydrazone*, m. 91-2°; *p*-tolylhydrazone, m. 90-100°; *p*-chlorophenylhydrazone, m. 106-7°; *p*-bromophenylhydrazone, m. 103°. C. J. West

**Ester syntheses. I. New procedure for the rational preparation of esters.** Ernst Thielepape, with Alfred Fulde. *Ber.* 66B, 1454-60 (1933).—The method consists in the use of CaC<sub>2</sub> (to remove the water formed) in the thumb of a continuous extractor (*C. A.* 25, 4743). The prepn. of Et oxalate is complicated by the formation of Ca oxalate (from the Ca(OH)<sub>2</sub> formed by the water acting on the CaC<sub>2</sub>); to keep the Ca(OH)<sub>2</sub> away from the reaction flask it is therefore well to use a double thumb or a combination of 2 extractors, which precludes any possibility of the Ca(OH)<sub>2</sub> floating over into the reaction flask. Some substance (such as CCl<sub>4</sub>:CHCl, benzene, PhMe) is added which forms with the alc. and water a ternary mixt. of lower b. p. than the added substance itself. The best yields of Et oxalate (88-9%) were obtained with 45.0 g. anhyd. acid, 92.0 g. abs. alc. (twice the calcd. amt.), 50 g. CaC<sub>2</sub> and 150 cc. CCl<sub>4</sub>:CHCl, C<sub>6</sub>H<sub>6</sub> or PhMe boiled 14-18 hrs. in the combination app. (2 extractors combined). This equals the best yields recorded in the literature (Kenyon, *C. A.* 20, 46), and only 2 instead of 3.22 times the theoretical amt. of alc. is required. In fact, 74-7% yields were obtained by boiling 3.5 hrs. with only the calcd. amt. of alc. in CCl<sub>4</sub>:CHCl. The new method has been tried with a large no. of readily available acids, always with excellent results: *e. g.*, BzOEt, yield, 94.7%; Et malonate, 95.6%; Et succinate, 96.6%. Because the b. ps. of AcOEt (77°), EtOH (78°), CCl<sub>4</sub>:CHCl (87°) and C<sub>6</sub>H<sub>6</sub> (80°) lie so close together, the esterification of AcOH was carried out in ether in the presence of H<sub>2</sub>SO<sub>4</sub>; yield of AcOEt, 54.5% after boiling only 8 hrs. C. A. R.

**Reactivity of atoms and groups in organic compounds. XIV. Influence of substituents on the thermal stability of certain derivatives of malonic acid.** James F. Norris and Helen F. Tucker. *J. Am. Chem. Soc.* 55, 4697-704 (1933); cf. *C. A.* 26, 3229.—The temps. have been detd. at which a no. of substituted malonic acids first begin to show evidence of decompn. when they are heated so that

the temp. is increased at the rate of 2° per min. All the 12 monosubstituted products began to crack below the decompn. temp. of  $\text{CH}_3(\text{CO}_2\text{H})$ , (129°); the least effective group in lowering the cracking temp. was Ph (128°) and the most effective, *sec*-Bu (98°); the order of the primary alkyl groups was: Me, *iso*-Bu, Et, Bu, *iso*-Am, Pr, allyl. The introduction of a side chain in the  $\alpha$ -position increased to some extent lability toward heat of the C—C bond: Et 110°, *iso*-Pr 103°, Pr 99°, *sec*-Bu 98°, Me, Et 123°, Me, *iso*-Pr 110°; in the  $\beta$ -position there was decreased lability, Pr 99°, *iso*-Bu 115°; in the  $\gamma$ -position increase in lability, Bu, 108°, *iso*-Am 101°. All the 5 disubstituted malonic acids contg. 1 kind of radical which have been studied decomp. at higher temps. than the corresponding monosubstituted acid: Me, 150°, Et, 126°, Pr, 143°, (*iso*-Pr), 182°, (*iso*-Bu), 140°. All the disubstituted acids contg. 2 unlike radicals decomp. below the temp. of  $\text{CH}_3(\text{CO}_2\text{H})$ ; the most striking effect of lack of sym. on cracking temps. is the case of the Me-*iso*-Pr deriv. (110°). The order of the effect of the introduction of alkyl radicals into  $\text{MeCH}(\text{CO}_2\text{H})_2$ , as far as dectd., is the same as that obtained when these same radicals are introduced into  $\text{CH}_3(\text{CO}_2\text{H})_2$ . The order of the effect of the introduction of Et, Bu and Pr into  $\text{ClCH}(\text{CO}_2\text{H})_2$  is also the same. In  $\text{PhCH}(\text{CO}_2\text{H})_2$  (123°) the radical had less effect than Me on the lability toward heat of the C—C bond; introduction of Cl in the  $\alpha$ -position changed the cracking temp. from 123° to 102°;  $\text{PhCH}_2$  (115°) had a slightly greater stabilizing effect than Me (120°).  $\text{CH}_3(\text{CO}_2\text{H})_2$  can be held for at least 3 hrs. in a stream of air at 115–6° without the formation of  $\text{CO}_2$ ; at this temp. the time in min. required to produce a ppt. of  $\text{BaCO}_3$  was:  $\text{H}_2\text{O}$  3,  $\text{AcOH}$  3,  $\text{KHSO}_4$  5, Mg powder 8, Al powder 10,  $\text{ZnCl}_2$  10. When the acid was slowly heated with  $\text{CaO}$ ,  $\text{CO}_2$  was formed at 90°. C. J. West

Synthesis of diamond-like compounds. Hans Kleinfeller and Walter Frercks. *J. prakt. Chem.* 138, 184–206 (1933).—H. Decker (*Z. angew. Chem.* 37, 795 (1924)) has designated as "diamantoids" compds. those in which the at. arrangement within the mol. is that of the C atoms in the diamond lattice.  $\text{CHNa}(\text{CO}_2\text{Et})_2$  (3 mols.) and 60 g.  $\text{ONC}(\text{CH}_2\text{Cl})_2$  in EtOH, heated 18 hrs., give 40–5 g. of *tetra*-Et 1-chloro-2,2-diethylethylene-2<sup>1</sup>,2<sup>2</sup>,2<sup>3</sup>,2<sup>4</sup>-*tetra*-carboxylate (I),  $b_p$  165–7°; this also results from  $\text{ClCH}(\text{CH}_2\text{Cl})_2$ ; *tetra*hydrazide, with 1 mol.  $\text{H}_2\text{O}$ , m. 190°. With 4 mols.  $\text{CHNa}(\text{CO}_2\text{Et})_2$ , there results *hexa*-Et 3,3-diethyl-2-propene-1,1,3<sup>1</sup>,3<sup>2</sup>,3<sup>3</sup>,3<sup>4</sup>-*hexa*carboxylate, which could not be distd. I and EtOH-KOH give the free acid, m. 100°; above its m. p. it gives 1-chloro-2,2-diethylethylene-2<sup>1</sup>,2<sup>2</sup>-dicarboxylic acid, m. 92°. I and dry EtONa or Na, heated 8 hrs. at 170°, give a compd.,  $\text{C}_{12}\text{H}_{18}\text{O}_4\text{Cl}_2$ ,  $b_p$  151–61°, which splits off HCl on standing; *hydrazide*, m. 230° (decompn.). Hexahydrobenzylmalonic acid yields a *hydrazide*, m. 148°; neither the acid nor its ester reacts with EtONa.  $\text{CHNa}(\text{CO}_2\text{Et})_2$  (1 mol.) and 1 mol. 3,5,4- $\text{Br}_3(\text{AcO})\text{C}_6\text{H}_2\text{CH}_2\text{Br}$ , heated 18 hrs., give *di*-Et bis(3,5-dibromo-4-acetoxybenzyl)malonate, m. 117°; EtOH-KOH gives the 4-*HO* deriv., m. 142°; 3 mols.  $\text{CHNa}(\text{CO}_2\text{Et})_2$  and 1 mol. bromide give *di*-Et 3,5-dibromo-4-acetoxybenzylmalonate. *Di*-Et *p*-amino-benzylmalonate, citron-yellow, m. 64°; *HCl* salt, m. 120°; the *HCl* salt of the free acid m. 178°. *Di*-Et *p*-amino-hexahydrobenzylmalonate (II), m. 94°; *urea* deriv.,  $\text{C}_{14}\text{H}_{18}\text{O}_4\text{N}_2$ , m. 206–7°. Heating II *in vacuo* gives a compd., probably  $\text{H}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CH}(\text{CONHC}_6\text{H}_4\text{CH}_2\text{CH}(\text{CO}_2\text{Et}))_2$ . *Di*-Et *p*-hydroxyhexahydrobenzylmalonate, an oil which cannot be distd.; oxidation gives the *p*-keto deriv.,  $b_p$  150–67°, which gives with EtONa a compd., whose semicarbazone,  $\text{C}_{14}\text{H}_{18}\text{O}_4\text{N}_2$ , decomp. about 80°. C. J. West

Isomerization products of pyridine salts of unsaturated acids. O. Lutz, R. Klein and A. Jirgenson. *Ann.* 505, 307–10 (1933).—Fumaric acid (I) and  $\text{C}_6\text{H}_5\text{N}$  in MeOH, allowed to stand 4 weeks at room temp., give succinic acid pyridinium betaine, m. 192°; the  $\text{C}_6\text{H}_5\text{N}$  salt of I, heated at 140–5°, gives the same product. Crotonic acid and  $\text{C}_6\text{H}_5\text{N}$ , after several weeks or on heating at 75–160°, give the compd.  $\text{C}_{17}\text{H}_{18}\text{O}_4\text{N}$ , m. 79.5–80°; this is made

up of 8 mols. of acid (2 of which may be titrated) and 1 of  $\text{C}_6\text{H}_5\text{N}$ . No reaction occurs with  $\text{C}_6\text{H}_5\text{N}$  and aconitic, citraconic, meaconic, allylmalic and cinnamic acids.

C. J. West

Walden inversion. I. Dependence of the direction of reaction in the Walden inversion upon the number of free carboxyl groups. V. Anna Rao and P. C. Guha. *J. prakt. Chem.* 138, 167–83 (1933).—A review with 46 references, with special reference to Horton's rule.

C. J. West

Isoglutamine. Max Bergmann and Leonidas Zervas. *Z. physiol. Chem.* 221, 51–4 (1933).—The *l*(+)-isoglutamine prep'd. by Abderhalden and Nienburg (*C. A.* 27, 4778) and having a sp. rotation opposite to that of the B. and Z. prep'n. (*C. A.* 26, 5072) is shown to be not isoglutamine but the  $\text{NH}_4$  salt of *l*(–)-pyrrolidonecarboxylic acid. The mono-Et glutamate from which it was obtained was not the  $\alpha$ -ester,  $\text{HO}_2\text{CCH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{Et}$ , as supposed, but the  $\gamma$ -ester,  $\text{EtO}_2\text{CCH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{H}$ , which readily undergoes ring closure.

A. W. Dox

Experiments on the production of urea from calcium cyanamide. F. G. Margolis. *Trans. Soc. Inst. Fertilizers* (Moscow) No. 92, 43–8 (1932).—Expts. are reported on the acid hydrolysis of  $\text{CaCN}_2$  with  $\text{H}_2\text{SO}_4$  as a catalyst for the production of urea. With  $\text{CO}_2$  as the neutralizing agent for  $\text{CaCN}_2$  the reaction proceeded most favorably at 40°. A higher temp. is conducive to the formation of dicyanodiamide. It is important to have the reaction go on fast; otherwise the  $\text{H}_2\text{CN}_2$  is converted into other less valuable products. The reaction was conducted with a 7–8% soln. of  $\text{H}_2\text{CN}_2$  with various addns. of  $\text{H}_2\text{SO}_4$ —from 2 to 40%. The optimum concn. of  $\text{H}_2\text{SO}_4$  was found to be 20% at a temp. of 75–86°. The product obtained was not hygroscopic and the yield was 85% of pure urea.

J. S. Joffe

Pseudohalides. XXIII. Reactions and tautomers of cyanates. Lothar Birckenbach and Hans Kolb. *Ber.* 66B, 1571–7 (1933); cf. *C. A.* 28, 59.—A satd. MeOH soln. of  $\text{KCNO}$  was electrolyzed at –15°. At the anode, added  $\text{C}_6\text{H}_{10}$  and  $\text{I}_2$  reacted to decolorize the  $\text{I}_2$  and give the Me 2-iodocyclohexylallophanate (I), m. 160.5°. Treatment of  $\text{Hg}(\text{OCN})_2 \cdot 2\text{KOAc}$  in MeOH at –50° with  $\text{C}_6\text{H}_{10}$  and  $\text{I}_2$  gave I, Me 2-iodocyclohexylcarbamate (II), m. 134–5°, and urethan. Urea by the Grignard reaction gave 2-iodocyclohexylurea, which with  $\text{ClCO}_2\text{Me}$  gave I. Et 2-iodocyclohexylallophanate, m. 171°. I refluxed with HCl gave 2-aminocyclohexano-4,5-oxazoline; *picrate* m. 202.5°; *HCl* salt, m. 138°; yield 5%. The major product, 30%, was 2-hydroxycyclohexylamine. Boiling I with  $\text{H}_2\text{O}$  gives Me 2-hydroxycyclohexylallophanate, m. 173.5°; *HCl* salt m. 183.5°. Treatment of  $\text{Hg}(\text{NCO})_2 \cdot 2\text{KOAc}$  with  $\text{C}_6\text{H}_{10}$  and  $\text{I}_2$  in MeOH at –15° gave iodomethylcyclohexanol and II, but no allophanate. Foster Dee Snell

Study of the effect of unsaturated aliphatic groups in barbituric acids. H. A. Shonle and John H. Waldo. *J. Am. Chem. Soc.* 55, 4649–52 (1933).—4-Chloro-2-pentene,  $b_{10}$  58°,  $n_D^{20}$  1.4311; 4-chloro-2-hexene,  $b_{10}$  73–6°,  $n_D^{20}$  1.4356; 3-bromohexane,  $b_{10}$  65.8–7°,  $n_D^{20}$  1.4469. Malonic esters: isocamyl propargyl,  $b_{10}$  142–51°,  $n_D^{20}$  1.4403–1.4409; 1-methyl-2-butenyl ethyl,  $b_{10}$  135–8°,  $n_D^{20}$  1.4418–1.4438; 1-ethyl-2-butenyl ethyl,  $b_{10}$  143–4.6°,  $n_D^{20}$  1.4437–1.4439; 1-ethylbutyl ethyl,  $b_{10}$  135–8°,  $n_D^{20}$  1.4363–1.4369; *sec*-butyl propyl,  $b_{10}$  122–4°,  $n_D^{20}$  1.4381–1.4382. Barbituric acids: *sec*-butyl propargyl, m. 167–8°; isocamyl propargyl, m. 163–4°; 1-methyl-2-butenyl ethyl, m. 114.5–6°; 1-ethyl-2-butenyl ethyl, m. 93–4°; 1-ethylbutyl ethyl, m. 112–5°; *sec*-butyl propyl, m. 136–8°. Alkanylethyl propargyl barbituric acids contg. the unsatd. *sec*. pentyl or hexyl group have less hypnotic action than corresponding barbituric acids with satd. alkyl groups and cause convulsions at low doses.\* The 2 propargyl deriva. have hypnotic action which was not more effective than the corresponding acids contg. the allyl or Pr group. Detailed results of physiol. effects will be published elsewhere.

C. J. West

\* Galactoseptajoses. II. Fritz Michael and Fritz

Sackfull. *Ann.* 587 p138-43(1933); cf. C. A. 27, 3453. —  $\alpha$ - or  $\beta$ -Pentaacetyl-galactoseptanose (I) and  $\text{TiCl}_4$  in  $\text{CHCl}_3$  give the same  $\beta$ -acetochlorogalactose  $< 1,6 >$ ,  $[\alpha]_D^{25} -79.5^\circ$  ( $\text{CHCl}_3$ );  $\text{Ag}_2\text{CO}_3$  in abs. MeOH gives  $\alpha$ -tetraacetylmethylgalactoseptanoside, m.  $108^\circ$ ,  $[\alpha]_D^{25} 17^\circ$  ( $\text{CHCl}_3$ ); hydrolysis gives  $\alpha$ -methylgalactoseptanoside,  $[\alpha]_D^{25} 26^\circ$  ( $\text{H}_2\text{O}$ );  $\text{Ag}_2\text{O}$  and MeI in MeOH give penta-methylgalactoseptanose, b.  $86^\circ$ , which is oxidized to tetramethylmucic acid; this establishes the above sugars as having a  $< 1,6 >$  ring. Acid sapon. of  $\beta$ -I gives galactopyranose, m.  $161^\circ$ ; MeONa gives the same product.

C. J. West

The behavior of hexoses with animal black and iron phosphate complexes. K. Wunderly. *Helv. Chim. Acta* 16, 1013-18(1933).—Neither  $d$ -fructose nor  $d$ -glucose is decompd. on heating in dil. aq. soln. in the presence of animal black, in an app. free from O. The sugars are also stable when the soln. contains  $\text{Ca}_3(\text{PO}_4)_2$ ,  $\text{Mg}_3(\text{PO}_4)_2$ ,  $\text{MgHPO}_4$  or a  $\text{Na}_2\text{HPO}_4\text{KH}_2\text{PO}_4$  buffer soln. ( $\text{pH}$  4.5-7.5). The addn. of alanine to  $d$ -fructose solns. yields fructose-alanine systems which are decompd. by heating in the presence of animal charcoal. By dissolving 2 g.  $\text{KFe}(\text{CO}_3)_2$  in 15 g.  $\text{H}_2\text{O}$  and decolorizing with 15 g.  $\text{Na}_2\text{P}_2\text{O}_7$  an acid- and alkali-stable complex is formed which can be buffered with  $\text{KH}_2\text{PO}_4$  and which promotes the decompn. of fructose-alanine systems in the absence of O.

C. R. Addinall

Ferric complex salts of aliphatic polyhydroxy compounds. Wilhelm Traube, Fritz Kuhner and Hans Harting. *Ber.* 66B, 1545-56(1933); cf. C. A. 26, 2170. Previous work was extended to include sugars and their acids. Barium-ferric glucose, mannose, mallose, lactose, saccharose, galactose, arabinose, glucose oxime, fructose oxime, mannose methoxime, gluconate, glycerate, erythrate, arabate and amygdalin were prepd. The corresponding sodium-ferric gluconate was prepd.,  $[\alpha]_D^{25} 176.3^\circ$ , as compared with Na gluconate,  $[\alpha]_D^{25} 10.3^\circ$ . Al and Cr were substituted for Fe in the prepn. of mannitol complexes. Me ethers of sugar oximes were prepd. by the action of  $\text{NH}_4\text{OMe}$  on the sugars: mannose methoxime m.  $117-8^\circ$ , galactose methoxime m.  $153^\circ$ ; arabinose methoxime m.  $120-1^\circ$ .

Foster Dee Snell

Rotatory dispersion of organic compounds. XXIII. Rotatory dispersion and circular dichroism of aldehydic sugars. H. Hudson, M. L. Wolfrom and T. M. Lowry. *J. Chem. Soc.* 1933, 1179-92; cf. C. A. 27, 5308.—Measurements are reported of the absorption spectrum, circular dichroism and rotatory dispersion of the acetates of the open-chain aldehydic  $\mu$ -forms of glucose, galactose and arabinose. These aldehydic sugars have a characteristic "carbonyl" absorption band at 2900 A. U., which is optically active and gives rise to a  $l$ -rotation in the visible spectrum. This band is either sym. on a scale of wave lengths or slightly steeper toward the visible spectrum. The "dissymmetry factor" ( $\epsilon_\gamma \sim \epsilon_\delta$ ), which measures the ratio of the circular dichroism to the absorption of unpolarized light, is approx. proportional to the frequency, but falls off slightly on the side of shorter wave lengths, although this anomaly is much less marked than with camphor and camphor- $\beta$ -sulfonic acid. The rotatory dispersion of these  $\mu$ -sugars includes (1) a  $l$ -rotation due to the induced dissymmetry of the aldehydic group, (2) a  $d$ -rotation, with a characteristic frequency in the Schumann region, which is attributed to the fixed asymmetry of the  $:\text{CHOAc}$  groups. With tetraacetyl- $\mu$ -arabinose, however, the Schumann terms cancel out and the whole of the observed rotation is due to the aldehydic groups. The partial rotation of the aldehydic group can be represented by the equation of Lowry and Hudson, which agrees with the exptl. data more closely than do the equations of Natanson and of Kuhn and Braun. The principle of optical superposition and the validity of Hudson's rules of isorotation are discussed in the light of the results obtained with the aldehydic sugars.

C. J. West

Hydrogenolysis of sugars. Walter M. Zartman and Homer Adkins. *J. Am. Chem. Soc.* 55, 4659-63(1933).

Glucose, sorbitol, mannitol, sucrose, lactose, maltose,  $\alpha$ -Me  $d$ -glucoside, pentaacetylglucose and gluconic lactone in EtOH undergo a rapid hydrogenolysis in the presence of  $\text{H}_2$  under 300 atm. pressure at  $260^\circ$  with a Cu-Cr oxide catalyst to give MeOH, EtOH, propane-1,2-diol and 3 addnl. compds. to which have been assigned the following tentative structures: 3-(4-hydroxytetrahydrofuryl)methylcarbinol, b.  $118-25^\circ$ ,  $d_4^{25} 1.1452$ ,  $n_D^{25} 1.4763$ ; hexane-1,2,6-triol, b.  $142-4^\circ$ ,  $d_4^{25} 1.1075$ ,  $n_D^{25} 1.4722$ ; and hexose-1,2,5,6-tetrol, b.  $214-5^\circ$ . The yields of higher-boiling products was materially increased by interrupting the hydrogenolysis after the absorption of 2-3 mols.  $\text{H}_2$ . No attempt is made to formulate the series of reactions involved in the formation of these products because there is no conclusive evidence on the basis of which a choice may be made between several alternatives. However, the formation of each of the products is understandable in consideration of the behavior of simpler glycols, aldehydes and ketones toward hydrogenolysis. C. J. West

Comparative ultraspectroscopic and analytical chemical studies on the splitting of sugars by alkalies. F. Fischler, H. Hauss and K. Tüfel. *Biochem. Z.* 265, 181-90(1933).—Sugars with a free carbonyl group which are split by alkali go through a 3-C phase in the process, and this is by all available evidence a methylglyoxal phase. Ultraspectroscopic studies likewise show that various sugars (glucose, galactose, mannose, xylose) under the influence of alkali give an absorption band in their spectrum which ranges from 2472 to 2845 A. U., indicating a similarity or even identity of the processes involved in all of them, dominated apparently by methylglyoxal whose absorption band is likewise 2400 to 2842 A. U.

S. Morgulis

Reducing sugars. IV. M. Gabryelski and L. Marchlewski. *Biochem. Z.* 265, 50-7(1933); cf. C. A. 27, 4218.—Glucose dissolved in a phosphate buffer of  $\text{pH}$  7.2 and heated to  $40^\circ$  begins to show a change in spectrum only after 192 hrs. when a band with max. absorption at 3655 A. U. appears. No change in the spectrum occurs when a glucose soln. is kept in a buffer of  $\text{pH}$  8.5 made up from glycine, NaCl and NaOH. Warming promotes the appearance of the characteristic band at 2670 A. U., which in 0.01 N NaOH at  $40^\circ$  comes in 17 hrs. whereas at room temp. only after 75 hrs. Lactose and maltose likewise in the presence of a sufficient OH-concn. ( $\text{pH} > 10$ ) give 3 characteristic bands with max. at 2635, 3100 and 3690 A. U. and 2682, 3116 and 4025 A. U., resp.

S. Morgulis

The assumed polyglucide formation in alkaline solutions of hexoses. H. A. Spoehr and Harold H. Strain. *Biochem. Z.* 264, 1-5(1933).—No polyglucide formation was found in solns. of  $d$ -glucose,  $d$ -fructose or  $d$ -galactose which were kept for 2 months in the dark at temps. of  $15.5-38^\circ$  in the presence of  $\text{Na}_2\text{CO}_3$ ,  $\text{Ca}(\text{OAc})_2$ ,  $\text{Pb}(\text{OAc})_2$  or  $\text{UO}_2(\text{OAc})_2$ .

S. Morgulis

$\beta$ -4-Glucosidolevoglucosan and 4-galactosidolevoglucosan. P. Karrer and J. C. Harloff. *Helv. Chim. Acta* 16, 962-8(1933).—Acetobromocellobiose (200 g.), treated with  $\text{Me}_3\text{NH}$  in  $\text{CHCl}_3$ , gives 38-40 g. heptaacetylcellobiosidodimethylamine, m.  $206^\circ$  (from alc.),  $[\alpha]_D^{25} -10.74^\circ$  ( $\text{CHCl}_3$ ). Thirty g. of this reacts with MeI in MeOH to give heptaacetylcellobiosidotrimethylammonium iodide (I) (26.7 g.),  $\text{C}_{28}\text{H}_{48}\text{O}_{11}\text{NI}$ , pptd. from alc. by  $\text{Et}_4\text{O}$ . I (25 g.), treated with  $\text{Ba}(\text{OH})_2$ , gives 3.5-4 g. hygroscopic  $\beta$ -4-glucosidolevoglucosan (II),  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ,  $[\alpha]_D^{25} -72.97^\circ$  ( $\text{H}_2\text{O}$ ). II, acetylated, gives the hexaacetate (III),  $\text{C}_{24}\text{H}_{38}\text{O}_{11}$ , m.  $144^\circ$  (from alc.),  $[\alpha]_D^{25} -46.24^\circ$  ( $\text{CHCl}_3$ ). Sapon. of III with  $\text{Ba}(\text{OH})_2$  gives again non-cryst. II, which is hydrolyzed by vineyard slug enzyme (from *Helix pomatia*), but not by emulsin, and after fermentation with yeast and acetylation of the residue, triacetyllevoglucosan (IV), m.  $110^\circ$  (from alc.), is obtained. Acetobromocellobiose (150 g.) gives similarly heptaacetylcellobiosidodimethylamine (32-5 g.), m.  $154^\circ$  (from alc.),  $[\alpha]_D^{25} -21.37^\circ$  ( $\text{C}_6\text{H}_6$ ). Thirty g. of this yields 27 g. heptaacetylcellobiosido-1-trimethylammonium iodide (pptd. from alc. with  $\text{Et}_4\text{O}$ ), 30 g. of which, heated with  $\text{Ba}(\text{OH})_2$ ,

gives 5-6 g. 4-galactosidomannosan (V), an oil becoming a hygroscopic solid on treatment with abs. alc.,  $[\alpha]_D^{25}$  -44.65 (H<sub>2</sub>O). On acetylation V gives the hexaacetate, m. 206° (from alc.),  $[\alpha]_D^{25}$  -38.89° (CHCl<sub>3</sub>). V is hydrolyzed by the slug enzyme, not by emulsin, and after fermentation and acetylation, the product m. 110° and is identical with IV. M. P. Benoy

The constitution of glucoses. F. Valentin. *Chem. Listy* 27, 275-8, 301-3, 319-25 (1933).—The constitution of sugars as polyhydroxy aldehydes, butylene oxides and arylene oxides is reviewed. The stable and unstable forms or their derivatives are discussed in connection with the semiacetal ring. Frank Maresch

Anhydride formation in 2,3,6-trimethylglucose. II. Kurt Hess and Otto Littmann. *Ann.* 506, 298-306 (1933); cf. C. A. 27, 3701.—The dimethylglucal obtained by the action of B<sub>2</sub>O<sub>3</sub>-HCl on trimethylcellulose and further action of Na is catalytically reduced to dihydrodimethylglucal, b<sub>m</sub> 66°,  $[\alpha]_D^{25}$  -16.39° (CHCl<sub>3</sub>), 0.20° (H<sub>2</sub>O); 4-*p*-toluenesulfonyl deriv., m. 73-4°,  $[\alpha]_D^{25}$  -8.72° (CHCl<sub>3</sub>); 4-*sym*-dinitrobenzoyl deriv., m. 172-3°,  $[\alpha]_D^{25}$  -14.95° (CHCl<sub>3</sub>), -69.07° (C<sub>6</sub>H<sub>5</sub>), -10.24° (Me<sub>2</sub>CO). The Na slime from the reduction of the Cl sugar contains a compd. b<sub>m</sub> 65-70°, with 27% OMe and some Ac, and another product, b<sub>m</sub> 65-70°, 29.9% MeO and 28.9% AcOH,  $[\alpha]_D^{25}$  7.35° (CHCl<sub>3</sub>). The action of mol. Ag upon the Cl sugar gives a compd. m. 75-80°,  $[\alpha]_D^{25}$  73.01° (C<sub>6</sub>H<sub>5</sub>), 78.28° (CHCl<sub>3</sub>), consisting largely of nonamethyltrihexosan. C. J. West

Synthesis of  $\alpha$ - and  $\beta$ -phenyl-*d*-mannoside. B. Helferich and S. Winkler. *Ber.* 66B, 1556-8 (1933).—The method of prep. Ph glucosides recently described (C. A. 27, 2680) is also applicable to mannose. Pentaacetyl-*d*-mannose (18 g.) with 11 g. PhOH and 1.1 g. anhyd. ZnCl<sub>2</sub>, heated 8 hrs. in the absence of moisture on the water bath, gives 0.34 g. of  $\beta$ -tetraacetylphenyl-*d*-mannoside, m. 160-70°,  $[\alpha]_D^{25}$  -62.74° ( $\beta$ -Ph *d*-mannoside, from the tetraacetate and a little NaOMe in boiling MeOH, m. 175-6.5°,  $[\alpha]_D^{25}$  -71.6° (H<sub>2</sub>O)), reduces only after hydrolysis with acids, and 3.2 g. of  $\alpha$ -tetraacetylphenyl-*d*-mannoside, m. 79-80°,  $[\alpha]_D^{25}$  73.9° (CHCl<sub>3</sub>) ( $\alpha$ -Ph *d*-mannoside, m. 132-3°,  $[\alpha]_D^{25}$  113.5° (H<sub>2</sub>O)). A somewhat better yield (30%) of the  $\alpha$ -compd. is obtained by heating equal parts pentaacetylmannose and PhOH with 0.05 part *p*-MeC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H at 100°. C. A. R.

Synthesis of 2,3,4-trimethyl-*d*-galactose. Motoi Onuki. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 12, 614-19 (1933).—With *d*-galactose (I) as starting material, 2,3,4-trimethyl-*d*-galactose (II), which is identical in phys. and chem. respects with the product obtained from methylated stachyose and methylated aldohexonic acid, has been synthesized in 2 different ways. I in anhyd. C<sub>6</sub>H<sub>5</sub>N and Ph<sub>3</sub>CCl give triphenylmethyl-*d*-galactose (III), m. 87-8°,  $[\alpha]_D^{25}$  5.08 (Me<sub>2</sub>CO), 0° (C<sub>6</sub>H<sub>5</sub>N); repeated methylation of III in pure MeOH with MeI and Ag<sub>2</sub>O results in 2,3,4-trimethyl-6-triphenylmethyl-*d*-galactoside (IV), m. 54-5°,  $[\alpha]_D^{25}$  -24.21 (alc.); on acetylation of II in anhyd. C<sub>6</sub>H<sub>5</sub>N with anhyd. AcOH, 1,2,3,4-tetraacetyl-trityl-*d*-galactose, m. 91-2°,  $[\alpha]_D^{25}$  -13.32 (Me<sub>2</sub>CO), is obtained. IV in CHCl<sub>3</sub> hydrolyzed with HCl gives 2,3,4-trimethylmethylgalactoside (V), m. 72°,  $[\alpha]_D^{25}$  24.00 (H<sub>2</sub>O); hydrolysis of V with 4% HCl at 92-8° forms II, m. 86°,  $[\alpha]_D^{25}$  151.66 (immediate detn.), 120.83 (after 24 hrs.) (H<sub>2</sub>O). On methylation of I,  $\alpha$ -Me galactoside (VI), m. 100-2°,  $[\alpha]_D^{25}$  176.47 (H<sub>2</sub>O), is formed; VI in C<sub>6</sub>H<sub>5</sub>N and Ph<sub>3</sub>CCl give 6-triphenylmethyl- $\alpha$ -methyl-*d*-galactoside (VII), m. 84-7°,  $[\alpha]_D^{25}$  3.86 (C<sub>6</sub>H<sub>5</sub>N); repeated methylation of VII in MeOH with MeI and Ag<sub>2</sub>O gives 2,3,4-trimethyl-6-triphenylmethyl- $\alpha$ -methyl-*d*-galactoside (VIII), viscous liquid,  $[\alpha]_D^{25}$  10.38° (alc.); VIII in CHCl<sub>3</sub> hydrolyzed with HCl, gives 2,3,4-trimethyl- $\alpha$ -methyl-*d*-galactoside, viscous liquid,  $[\alpha]_D^{25}$  112.50° (H<sub>2</sub>O); hydrolyzed with 4% HCl at 85-92°, II results. K. K.

Osmometric investigation of dilute solutions of polymeric carbohydrates. IV. Molecular weight of crystalline acetylcellulose. II. Kurt Hess and Max Ullmann. *Ann.* 504, 81-94 (1933); cf. C. A. 27, 3199.—The mol. wt. of cryst. acetylcellulose II depends greatly on the concn. of

the soln. Above 0.25% at 20° osmotic pressure is scarcely discernible, so that the colloidal state may be assumed. Between 0.25-0.19, 0.16-0.08% and 0.07-0.01%, the apparent mol. wt. corresponds to (C<sub>6</sub>)<sub>9</sub>, (C<sub>6</sub>)<sub>8</sub> and (C<sub>6</sub>)<sub>7</sub>, resp. Since the concn. interval in which a colloidal soln. passes into 1 with mols. of (C<sub>6</sub>)<sub>18</sub> is very narrow, one must assume a possible equil. between colloidal and cryst. phases, which is readily displaced in either direction by slight changes in concn. The changes (C<sub>6</sub>)<sub>18</sub>—(C<sub>6</sub>)<sub>9</sub>—(C<sub>6</sub>)<sub>7</sub> are even more definitely marked and in suitable concns. are functions of time. A 0.7% soln. corresponding to (C<sub>6</sub>)<sub>9</sub> may persist for days; warming 1 hr. at 50° and cooling to 20° gives the (C<sub>6</sub>)<sub>8</sub> stage; freezing and thawing gives the (C<sub>6</sub>)<sub>7</sub> stage again, gradually changing to (C<sub>6</sub>)<sub>9</sub>. Evapn. of (C<sub>6</sub>)<sub>9</sub> regenerates (C<sub>6</sub>)<sub>18</sub>, m. 280-5°,  $[\alpha]_D^{25}$  23° (CHCl<sub>3</sub>). The possibility of the (C<sub>6</sub>) stage is discussed. C. J. West

Experimental investigations concerning the depolymerization of polysaccharides. Endre Berner. *Tids. Kjem. Bergesen* 13, 6-10 (1933); cf. C. A. 27, 2429.—A short report on B.'s recent investigations concerning the reactions which take place when various polysaccharides are being heated in glycerol, HCONH<sub>2</sub>, or AcNH<sub>3</sub>. With inulin and glycogen, no depolymerization takes place but the substance undergoes a change of phys.-chem. nature and, during the subsequent treatment—pptn. with alc., etc.—adsorbs impurities, which will cause erroneous results by detns. of mol. wts. With starch and lichenin, the exptl. results lead B. to assume, in contrast to other investigators, that the degradation observed is analogous to a hydrolysis, a H atom from the HO group of the glycerol going to sat. the free valency of the O atom, while the rest of the glycerol mol. is bound to the C atom of the resp. degradation products.

H. C. M. Ingeberg  
Starch. IV. Tritosylstarch, ditosyl-6-iodostarch and tribenzoylstarch. Kurt Hess and Robert Pfleger. *Ann.* 507, 48-54 (1933).—Starch (5 g.), swollen in C<sub>6</sub>H<sub>5</sub>N (about 5 days at 18-20°) reacts with 120 g. *p*-HO<sub>3</sub>SC<sub>6</sub>H<sub>4</sub>-Me (the radical *p*-MeC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub> is named tosyl) in C<sub>6</sub>H<sub>5</sub>N at 18-20° in 9 days to give nearly quantitatively a tritosyl deriv. (I), decomps. 235-40°, insol. in ordinary org. solvents. At higher temps. the product contains 2 tosyl groups and 1 Cl atom. Results of 9 expts. are given. I (9.2 g.) and 21 g. NaI in 80 cc. Me<sub>2</sub>CO, heated 3 days at 100°, give 96% of ditosyl-6-iodostarch (II), which is not homogeneous; in 1 expt. 6 g. I gives 2.85 g. Me<sub>2</sub>CO-sol. and 2.05 Me<sub>2</sub>CO-insol. II, while in another expt. there resulted 5.15 g. Me<sub>2</sub>CO-sol. and 0.2 g. Me<sub>2</sub>CO-insol. AgF in C<sub>6</sub>H<sub>5</sub>N gives a product with 1-4% I. Starch, swollen in C<sub>6</sub>H<sub>5</sub>N, and BzCl, shaken 12 days, give a tri-*Bz* deriv. in nearly quant. yield. V. Degradation of tritosylstarch and ditosyl-6-iodostarch with hydrobromic acid-acetic acid. Kurt Hess, Otto Littmann and Robert Pfleger. *Ibid.* 55-61.—Tritosyl starch and HBr in AcOH give 78.7% of 1- $\alpha$ -bromotritosylacetylhexose, m. 162°,  $[\alpha]_D^{25}$  113.1° (CHCl<sub>3</sub>), 101.6° (Me<sub>2</sub>CO); shaking with Ag<sub>2</sub>CO<sub>3</sub> in MeOH gives 81.6% of a tritosylacetyl- $\beta$ -methylhexoside (I), m. 131-2°,  $[\alpha]_D^{25}$  -12.85° (CHCl<sub>3</sub>), -4.03° (Me<sub>2</sub>CO), -32.12° (C<sub>6</sub>H<sub>5</sub>). I and NaI in Me<sub>2</sub>CO, heated 25 hrs. at 130°, give a compd. analyzing approx. for a diiodotosyl deriv., m. 228°. Ditosyl-6-iodostarch and HBr in AcOH give 85.1% of 1- $\alpha$ -bromoditosylacetylhexoside (II), yellow, amorphous powder,  $[\alpha]_D^{25}$  114.7° (CHCl<sub>3</sub>); Ag<sub>2</sub>CO<sub>3</sub> in MeOH gives 76.6% of a ditosylacetyl- $\beta$ -methylhexoside (II), m. 162-3°,  $[\alpha]_D^{25}$  10.62° (CHCl<sub>3</sub>), 4.81° (Me<sub>2</sub>CO), -17.74° (C<sub>6</sub>H<sub>5</sub>); AgF in C<sub>6</sub>H<sub>5</sub>N, shaken 40 hrs., gives ditosylacetyl- $\beta$ -methylhexoside, m. 79-80°,  $[\alpha]_D^{25}$  -42.25° (Me<sub>2</sub>CO), -23.67° (C<sub>6</sub>H<sub>5</sub>), -24.18° (CHCl<sub>3</sub>); catalytic reduction gives the desoxy deriv., m. 133-4°,  $[\alpha]_D^{25}$  -9.35° (CHCl<sub>3</sub>), -9.90° (Me<sub>2</sub>CO), -41.35° (C<sub>6</sub>H<sub>5</sub>). C. J. W.

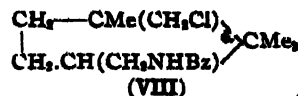
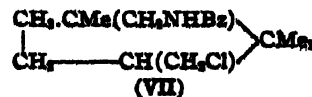
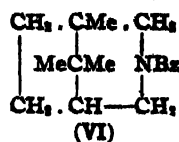
Composition of pure inulin. P. Ohlmeyer. *Pharm. Monatsh.* 14, 158 (1933).—Pure inulin upon hydrolysis yields, besides fructose, small amts. of an aldose. The possibility of a rearrangement of free *D*-fructose in glucose in an acid medium is mentioned. The fermentation hydrolysis of polysaccharides with inulinase from *Asper-*



*gillus niger* makes this rearrangement improbable since it is accomplished at a minimal acidity of  $pH$  6.0. With pure inulin the hydrolysis is quant. Glucose is exactly detd. by crystn. of the major portion of the fructose (92%) from MeOH sirup and the mother liquor examd. Difference titration and optical rotation show as much as 1.5% glucose. Calcn. shows an inulin mol. of approx. 70 hexose combinations. H. M. Burlage

**Steric hindrance.** VIII. Julius v. Braun and Ernst Anton with Charlotte Kemény. *Ber.* 66B, 1873-8 (1933); cf. *C. A.* 27, 1813.—In the study of naphthenic acids, in which the  $CO_2H$  groups are converted into  $NH_2$  and the  $NH_2$  compds. are degraded, through the corresponding methoxyhydroxides, into olefins which are then oxidized (*C. A.* 26, 2306), the question has often arisen whether a sepn. of isomers, which cannot be effected with the naphthenic acids themselves, might not be effected with the amines formed in the 1st stage of the process. It seemed possible that, as the result of steric hindrance, acyl derivs. of the amines would show a difference in the ease with which they are sapon. To test this possibility, expts. have been conducted on the Bz derivs. of cyclopentylmethylamine (I),  $\beta$ -cyclopentylethylamine (II), (2,3,3-trimethylcyclopentyl)methylamine (III), (2,2,3-trimethylcyclopentyl)methylamine (IV) and (1,4,5,5-tetramethylcyclopentyl)methylamine (V). Under optimal conditions (4 hrs. heating with 4 parts of 38% HCl at  $120^\circ$ ) the amt. of each of the above Bz derivs. remaining unhydrolyzed was, resp., 45, 20, 70, 85 and 100%. The difference between II on the hand and IV and III on the other is so great that a practicable sepn. of bases of the type VI from those of types VII and VIII seems very probable; e. g., an amine mixt. consisting of 50% of bases of type VI and 50% of those of types VII and VIII would, after 1 hydrolysis, give a mixt. of Bz derivs. contg. 80% of type VI and 20% of types VII and VIII; a 2nd hydrolysis would change the ratio to 94:6, a 3rd to 98.5:1.5. The values found for IV and III make the prospect of sepn. of individual bases of type VI less hopeful, nor did the chlorides corresponding to the above amines show more promising differences in the reactivity of the halogens. I was obtained in over 90% yield from cyclopentylacetic acid with  $HN_3$  in  $CHCl_3$ . The Bz deriv., m.  $75^\circ$ ,  $b_p$   $185^\circ$ , gives with  $PCl_5$  cyclopentylmethyl chloride (IX),  $b_m$   $60^\circ$ , which reacts quite sluggishly, 70% being recovered unchanged after heating 2 hrs. with  $NH_4Et$ , piperidine, etc.; with  $PhONa$  in alc., the extent of reaction is no greater. II, from IX converted into the cyanide and reduced with Na and alc. (yield, 70%), b.  $158-9^\circ$ ; HCl salt, very hygroscopic, m.  $195^\circ$ ; picrate, m.  $142^\circ$ ; Bz deriv.,  $b_p$   $184^\circ$ , m.  $62^\circ$ , converted by  $PCl_5$  into  $\beta$ -cyclopentylethyl chloride (80% yield),  $b_m$   $84-6^\circ$ . III (dihydro- $\beta$ -campholenamine or dihydroisolaurenamine) forms a Bz deriv.,  $b_p$   $184^\circ$ , m.  $50^\circ$ , giving with  $PCl_5$  50% of the methyl chloride,  $b_m$   $70-8^\circ$ , which hardly reacts with piperidine, etc. IV (over 90% from isocampholic acid with  $HN_3$ ),  $b_p$   $71-3^\circ$ ; picrate, darkens  $205^\circ$ , decomps.  $222^\circ$ ; HCl salt, does not crystallize readily; chloroplatinate, becomes discolored and slowly decomps. from  $245^\circ$  up; Bz deriv.,  $b_p$   $185^\circ$ , m.  $92^\circ$ , gives with  $PCl_5$  an imide chloride which  $b_p$   $150-2^\circ$  without decompn.,  $b_m$   $180^\circ$  practically unchanged, but on distn. under atm. pressure (at  $170-220^\circ$ ) gives approx. 50% of the methyl chloride,  $b_m$   $60^\circ$ , in which the reactivity of the Cl is very slight; the corresponding bromide, from the Bz deriv. of the amine with  $PBr_3$ ,  $b_m$   $78^\circ$ . The Bz deriv. of V m.  $98^\circ$ ; the methyl chloride obtained with  $PCl_5$  readily loses HCl so that the product,  $b_m$   $84-86^\circ$ , which is obtained contains about 10.5%  $C_{10}H_{18}$  (X),  $b_m$   $54-5^\circ$ ,  $b_p$   $175^\circ$ ,  $d_4^{20}$  0.8441, into which it is completely converted by aq. alc. KOH. By exhaustively methylating with  $Me_2SO_4-NaOH$ , converting the product with KI into the quaternary iodide,  $C_{11}H_{22}NI$ , decomps.  $310-12^\circ$ , then, through the quaternary base, into the tertiary amine,  $C_{11}H_{21}N$ ,  $b_p$   $91^\circ$ ,  $d_4^{20}$  0.8804,  $[\alpha]_D^{20}$   $72.8^\circ$  (picrate, m.  $176^\circ$ ), and distg. the amine in  $CO_2$  with sirupy  $H_3PO_4$ , there is obtained a hydrocarbon  $C_{11}H_{20}$ ,  $b_m$   $154-7^\circ$ ,  $d_4^{20}$  0.8153,  $n_D^{20}$  1.4848, which is certainly different from

X, but it remains an open question whether or not the 2 substances are homogeneous or mixts.



C. A. R.

**Constitution of jasmone.** W. Treff and H. Werner. *Ber.* 66B, 1521-7 (1933).—From 450 g. of a fraction  $b_p$   $70-120^\circ$ ,  $d_4^{20}$  0.990, of the ethereal oil obtained from an ext. of jasmine flowers was isolated 134 g. of the semicarbazone, m.  $204-6^\circ$ , of Hesse's jasmone (I),  $C_{11}H_{16}O$  (*Ber.* 32, 2617 (1899)), which yielded 100 g. I,  $b_p$   $108-10^\circ$ ,  $d_4^{20}$  0.9467,  $[\alpha]_D^{20}$   $\approx 0^\circ$ . Hydrogenation of I according to Skita gave a tetrahydro deriv. (II),  $b_p$   $91^\circ$ ,  $d_4^{20}$  0.8850,  $n_D^{20}$  1.44877, whose semicarbazone m.  $165-6^\circ$  (if the hydrogenation is carried out in neutral soln. there is also obtained an isomeric semicarbazone, m.  $191-2^\circ$ ; the ketone liberated from the latter gives the former when treated with semicarbazide in AcOH). II, which gives caproic, levulinic and a keto acid  $C_{11}H_{20}O_3$  (semicarbazone, m.  $111-12^\circ$ ) with 2% aq.  $KMnO_4$ , is identical with Staudinger and Ruzicka's tetrahydropyrene (3-methyl-2-amyl-1-cyclopentanone) (*C. A.* 18, 1820) and was synthesized by condensing  $AmCH(CO_2Et)_2$  with  $Me_3CHCH_2CH_2CO_2Et$ , sapon. the resulting *tri-Et* tri-carboxylate (18% yield),  $b_p$   $180-4^\circ$ ,  $d_4^{20}$  1.015, converting the free acid into the dicarboxylic acid and distg. the dry Ba salt of the latter; yield of II, 45%. Dihydrojasmone, from I according to Paal,  $b_p$   $101-2^\circ$ ,  $d_4^{20}$  0.9201,  $n_D^{20}$  1.48107, is identical with S. and R.'s synthetic 3-methyl-2-amyl-2-cyclopenten-1-one. As I with 1%  $KMnO_4$  gives levulinic acid,  $EtCO_2H$  and, in all probability, AcOH but no  $PrCO_2H$ , succinic or glutaric acid, I can be only 3-methyl-2-(2'-pentenyl)-2-cyclopenten-1-one,  $CO_2CH_3$ .

$CH_3 \cdot CMe \cdot CCH_2CH:CHEt$ , the 1st monocyclic 5-

membered ring compd. found in ethereal oils. C. A. R.

The action of aluminum bromide on benzene. Eugen Wertyporoch and Hans Sagel. *Ber.* 66B, 1306-12 (1933).—A mixt. of 5.65 l. of  $C_6H_6$  with 800 g. of  $AlBr_3$  was divided among 4 desiccators and allowed to stand for 20 weeks at  $20^\circ$ . The HBr evolved—about 10% calcd. on the basis of  $C_6H_6$ —was absorbed with NaOH and  $P_2O_5$ . The liquid, bright yellow at first, turned brown gradually with sepn. of an oily deposit. The  $C_6H_6$  layer was sepd. from the lower oily layer and decompd. with ice. After removal of the  $AlBr_3$  remaining (about 1%), the  $C_6H_6$  was distd. off. The residue, distd. *in vacuo*, gave the following fractions: (1) 34.8 g. of a transparent liquid,  $b_p$   $51-2^\circ$ ,  $b_m$   $48^\circ$ , contg. 2 OH groups and having the compn.  $C_7H_{12}O_2$ ; (2) 21.3 g. of phenylcyclohexane (I),  $b_p$   $85-7^\circ$ ,  $b_m$   $105^\circ$ ; (3) 3.5 g. of a solid, found to be a mixt. of Ph<sub>2</sub> (II) and diphenylcyclohexane (III). The dark brown oily layer was stirred with 1.5 kg. of ice and extd. with 3 l. of  $Et_2O$  in small portions. The  $Et_2O$  soln. was red, with blue fluorescence. After removal of the  $Et_2O$  the residue (143 g.) was distd. *in vacuo*, giving the following fractions: (1) 1.5 g. of PhOH,  $b_p$   $21-2^\circ$ ; (2) 10 g. of a red-violet liquid,  $b_p$   $55-50^\circ$ , from which crystals sepd. on standing a few weeks (the crystals m.  $178-8^\circ$ , and consisted of a phenylcyclohexanediol with both OH groups in the cyclohexane nucleus. The red-violet liquid is a phenylcyclohexanol); (3) 33.5 g. of a thick yellow oil,  $b_p$   $144-50^\circ$ ,  $b_m$   $168-70^\circ$ , found to be a difficultly separable mixt. of phenylated methylcyclopentanes and phenylated cyclohexanes (chiefly derivs. of II); and (4) 24.0 g. of a brown resin, which is a mixt. of hydrocarbons.  $AlCl_3$  (80 g.) with 800 cc. of  $C_6H_6$  at  $30^\circ$  gave only the



oily layer contg. products similar to those obtained with  $\text{AlBr}_3$ . When large quantities of  $\text{AlBr}_3$  or  $\text{AlCl}_3$  act on  $\text{C}_6\text{H}_6$ , the H of the  $\text{C}_6\text{H}_6$  in the oily layer formed is so loosened that it can hydrogenate; the Ph residue set free can unite to give II and higher hydrocarbons. W. and S. are uncertain whether the primary product of the reaction is II or I. On longer reaction I is converted into III, which is in equil. with phenylated methylcyclopentanes, the main reaction product. The formation of O-contg. substances in these expts. proves that in a slow reaction the  $\text{O}_2$  of the air is so activated by  $\text{AlBr}_3$ , that even di-OH derivs. can be formed. Louise Kelley

**Poly-membered ring systems.** I. Synthesis of polymethylene ketones with more than six-membered rings. K. Ziegler, H. Eberle and H. Ohlinger. *Ann.* 506, 94-130 (1933).— $\text{MeCN}$ ,  $\text{LiPh}$  and  $\text{Et}_3\text{NH}$  at  $-10^\circ$  with decompn. of the reaction product with  $\text{H}_2\text{O}$  give 86% of  $\text{AcCH}_2\text{CN}$ ; similarly,  $\text{PrCN}$  gives 71.5% of  $\alpha$ -butyrylbutyronitrile (I),  $b_p$  96°; hydrolysis with 70%  $\text{H}_2\text{SO}_4$  gives 68%  $\text{Pr}_2\text{CO}$ .  $\text{PrCN}$  and  $\text{LiNPhEt}$  give 90% I. Sebacoitrile and  $\text{LiNEt}_3$  in concd. soln. give 13% of cyanocycloheptanone (II),  $b_p$  140-1° (semicarbasone, m. 163°); hydrolysis by concd.  $\text{H}_2\text{SO}_4$  or 48%  $\text{HBr}$  gives a poor yield of suberone. In more dil. solns. the yield is increased to 71%. II is hydrolyzed by  $\text{NaOH}$  to the Na salt of sebacoheptaminitrile. A 90% yield of II is obtained with  $\text{LiNPhEt}$ . Azelanitrile (30 g.) gives 9 g. of cyanocyclooctanone,  $b_p$  158-60°, m. 55-6° (semicarbasone, m. 161°), and 2,9-dicyano-1,8-diketocyclohexadecane, m. 171°, hydrolyzed to 1,8-diketocyclohexadecane. 1,14-Dicyanotetradecane and  $\text{LiNEt}_3$  and subsequent hydrolysis with 20%  $\text{H}_3\text{PO}_4$  give dicyanodisimidocycloheptadecanone, and cyanocyclopentadecanone, m. 142°; hydrolysis gives cyclopentadecanone,  $b_p$  120°. Cyanocycloheptadecanone, m. 108-9°, gives on hydrolysis cycloheptadecanone. Tetraiscotane-1,17-dione, m. 84°. C. J. West

**Catalytic high-pressure hydrogenation of aromatic hydrocarbons and catalytic high-pressure destruction of the corresponding hydrogenated products.** II. Mesitylene. III. Hexamethylbenzene. A. Dros, A. J. Tuleners and H. I. Waterman. *J. Inst. Petroleum Tech.* 19, 784-99 (1933).—Mesitylene\* was prepd. from  $\text{Me}_2\text{CO}$  and hydrogenated with the aid of Ni on kieselguhr at 240°, 217° and 148° with corresponding initial pressures of 140, 260 and 500 kg./sq. cm. The hexahydromesitylene formed, probably a mixt. of the *cis*- and *trans*-comps., was destructively hydrogenated. The fractions of the product were examd. as to d., n, solidifying point, etc. Hexamethylbenzene, from  $\text{Me}_2\text{CO}$  and  $\text{MeOH}$  by Reckleben and Scheiber's method, was hydrogenated to hexamethylcyclohexane, at a max. temp. of 319° and initial pressure of 143 kg./sq. cm. Destructive hydrogenation of this compd. at 472°, which temp. was held for 30 min., left considerable of the hexamethylcyclohexane unchanged. Emma E. Crandal

**Polyhalo derivatives of acetomesitylene.** II. Bromination of 3,5-dichloroacetomesitylene. C. Harold Fisher. *J. Am. Chem. Soc.* 55, 4594-7 (1933); cf. C. A. 27, 5726.—2,4,6- $\text{Me}_3\text{C}_6\text{H}_2\text{Ac}$  and Cl in  $\text{AcOH}$  give  $\alpha,\alpha,3,5$ -tetrachloroacetomesitylene (I), m. 108.5-7.5°; with Zn dust and  $\text{AcOH}$  there results 3,5-dichloroacetomesitylene (II), m. 107.5-9°. I or II and  $\text{NaOCl}$  in  $\text{C}_6\text{H}_5\text{N}$  give  $\alpha,\alpha,3,5$ -pentachloroacetomesitylene, m. 90-1°. The action of Br on II gives a mixt. of III and IV, m. 103.5-4.5°, which could not be sep'd. by crystn.; the same compd. results from equimol. amts. of III and IV from  $\text{EtOH}$ . II and  $\text{NaOBr}$  in  $\text{C}_6\text{H}_5\text{N}$  give  $\alpha,\alpha$ -tribromo-3,5-dichloroacetomesitylene (III), m. 84-5°. Two mols. Br and II in  $\text{AcOH}$  give  $\alpha,\alpha$ -dibromo-3,5-dichloroacetomesitylene (IV), m. 121-2°. C. J. West

**Rearrangements of polyenes.** VI. Tetrabiphenyldi-*tert*-butylethynylethane. June Chien-Yu Tsao and C. S. Marvel. *J. Am. Chem. Soc.* 55, 4709-13 (1933); cf. C. A. 27, 5072.—*tert*-Butylacetylene,  $(\text{PhC}_6\text{H}_5)_2\text{CO}$  and  $\text{EtMgBr}$  give 86% of *di*biphenyl-*tert*-butylethynylcarbinol (I), m. 172-6° (180-1° on block); rearrangement, with  $\text{H}_2\text{SO}_4$  in  $\text{AcOH}$  gives the unsubst. ketone,  $\text{Me}_2\text{C}-$

$\text{COCH}_2\text{C}(\text{C}_6\text{H}_5)_2$ , m. 144-5°. I and  $\text{PBr}_3$  in  $\text{Et}_2\text{O}$  give the bromide, m. 135-6°; with Ag there results the hydrocarbon  $\text{C}_{26}\text{H}_{24}$  (II), decomp. 135-48° (m. 166°, block); II also results from I and  $\text{TiCl}_4$  in  $\text{EtOH}$ . The Na compd. from the bromide and 40% Na-Hg did not yield cryst. products with  $\text{CO}_2$  or  $\text{CICl}_2\text{Me}$ ;  $(\text{Me}_2\text{BrC})_2$  at  $-80^\circ$  gives tetrabiphenyldi-*tert*-butylethynylethane (III), changing at  $0^\circ$  to II. II in boiling  $\text{C}_6\text{H}_5\text{Me}$  is slowly oxidized by  $\text{O}_2$  to give about 50% of  $(\text{PhC}_6\text{H}_5)_2\text{CO}$ . III is oxidized by  $\text{O}_2$  at  $-80^\circ$  to  $(\text{PhC}_6\text{H}_5)_2\text{CO}$ . C. J. West

**Action of elementary fluorine upon certain aromatic organic compounds under various conditions.** I. Lucius A. Bigelow, J. Herbert Pearson, Louis B. Cook and Wm. T. Miller, Jr. *J. Am. Chem. Soc.* 55, 4614-20 (1933).—Several procedures are described for reaction of F with various aromatic compds. and 2 types of metal app. have been designed for this purpose. The action of F on PhMe,  $\text{C}_6\text{H}_6$  and 12 derivs. of  $\text{C}_6\text{H}_5$  in  $\text{CCl}_4$  has been investigated and products contg. over 60% F have been isolated; a study has also been made of the action of F on a no. of derivs. of  $(\text{PhCH}_2)_2$  in  $\text{CCl}_4$ . Free F has been passed directly through certain org. liquids at temps. as high as 25° in the absence of any significant vapor phase; no violent reaction occurred under these conditions although free C was deposited. Definite compds. are not described. C. J. West

**Fluorination of organic compounds.** III. Action of fluorine on organic compounds. Wilhelm Bockemüller. *Ann.* 506, 20-59 (1933); cf. C. A. 25, 3642.—Hexadecane (10 g.) in 200 cc.  $\text{CCl}_4$  at 15°, treated with F- $\text{CO}_2$  (1:1) for 2 hrs., gives 14.7 g. of a mixt. of F derivs.,  $b_p$  104-12°, m. 7°; cyclohexane in  $\text{CCl}_4\text{F}$  at  $-80^\circ$  gives a F deriv., b. 100°; this is unchanged after boiling with  $\text{MeOH-KOH}$  for 5 hrs.  $\text{PrCO}_2\text{H}$  in  $\text{CCl}_4$  at  $0^\circ$  gives a mixt. of products, among which are the  $\beta$ - and  $\gamma$ -F derivs.,  $b_p$  80-98°; a *p*-phenylphenacyl ester, m. 92°, was isolated. The distn. residue contains succinic acid. With 2 N  $\text{NaOH}$  the mixed acids give butyrolactone and crotonic acid.  $\text{EtCHBrCO}_2\text{Et}$  (20 g.) and  $\text{AgF-CaF}_2$ , heated at 150°, give 8.6 g. of the  $\alpha$ -F deriv., b. 138-41°; the free acid  $b_p$  90°; the *p*-phenylphenacyl ester m. 91.5°. The same mixed F acids ( $\beta$ - and  $\gamma$ -) were obtained from  $\text{PrCOCl}$  and also from butyric acetic anhydride. Iso- $\text{PrCO}_2\text{H}$  and F give  $\beta$ -fluoroisobutyric acid,  $b_p$  80-2°.  $\text{Cl}_2\text{C:CCl}_2$  (I) (30 g.) and F at  $-80^\circ$  give 0.3 g.  $\text{Cl}_2\text{CCF}_2$ , 9.7 g. of  $\text{Cl}_2\text{FCCFCFCl}_2$ , 0.7 g.  $\text{Cl}_2\text{CCCl}_2\text{F}$  and 5.7 g. *di*-fluorooctachlorobutane (II),  $b_p$  139-42°; at  $0^\circ$ , 16.6 g. I gives 2.3 g. II. Hexadecene at 15° gives a small yield of the compd.  $\text{C}_{16}\text{H}_{32}\text{F}_2$ ,  $b_p$  103-6°. Oleic acid yields a compd.  $\text{C}_{18}\text{H}_{34}\text{O}_2\text{F}_2$ , m. 81°; in another expt., 2 isomers, m. 81° and 95°, were obtained. Elaidic acid gives a *di*-F deriv., m. 84-5°. Crotonic acid gives a liquid  $\alpha,\beta$ -difluorobutyric acid,  $b_p$  100-12°, a solid acid (III), m. 81°, and a residue analyzing for  $\text{C}_4\text{H}_4\text{O}_4\text{F}_4$ , whose di-*Me* ester  $b_p$  105-15°; sapon. of the ester with  $\text{MeOH-KOH}$  gives a compd.,  $\text{C}_4\text{H}_4\text{O}_4$ , m. 240-4° (decompn.). III with 2 N  $\text{NaOH}$  gives  $\alpha$ -fluorocrotonic acid, m. 112°. The action of F on  $\text{BzOH}$  in the presence of Br is also discussed, the compds.  $\text{C}_6\text{H}_5\text{FBr}$  and  $\text{C}_6\text{H}_5\text{F}_2\text{Br}$ ,  $b_p$  110-20° and 150-60°, resp., being analyzed. A special app. for the generation of F and a special fluorinating app. are described. C. J. West

**Nitration of benzotrichloride.** Peter P. T. Sah, Hsing-Han Lei and Tien-Hua Wang. *Science Repts. Natl. Tsinghua Univ.* A2, 137-41 (1933).—*m*-Nitrobenzoic acid is prep'd. by adding to 10 cc.  $\text{PhCCl}_3$  (purified by distn.) a mixt. of 4.4 cc. fuming  $\text{HNO}_3$  and 4.4 cc. concd.  $\text{H}_2\text{SO}_4$ , drop by drop, at 25-30°. It is then poured into  $\text{H}_2\text{O}$  at  $0^\circ$ , and the impure product dissolved in  $\text{NaOH}$ , rep'd. with dil.  $\text{HCl}$  and recrystd. from hot  $\text{H}_2\text{O}$  (yield 85%). 3,5-Dinitrobenzoic acid may be prep'd. by treating 10 cc. of  $\text{PhCCl}_3$  and 54 cc. concd.  $\text{H}_2\text{SO}_4$  with 9 cc. fuming  $\text{HNO}_3$ , drop by drop, at 25-30°, then heating on a water bath with addn. of 10 cc. more of fuming  $\text{HNO}_3$  for 1 hr., followed by heating at 185° for 1 hr. The product is cooled, poured into  $\text{H}_2\text{O}$  at  $0^\circ$ , and recrystd. This method is recommended for prep'g. the dinitro compd. on a lab. scale. Wm. H. Adolph

**Reactivity of the chlorine atom in the benzene nucleus.** Baman Bihari Dey and Yetchan Gunja Doraiswami. *J. Indian Chem. Soc.* 19, 309-20 (1933).—The relative influences of the  $\text{NO}_2$ ,  $\text{CN}$  and  $\text{CO}_2\text{H}$  groups on the reactivity of a Cl atom adjacent to each of these groups in an aromatic nucleus contrg. a  $\text{NO}_2$  group in addn. to the halogen atom and an activating group have been investigated by a study of the condensations of 2,4-( $\text{O}_2\text{N}$ ) $_2\text{C}_6\text{H}_3\text{Cl}$  (I), 2,4- $\text{NC}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Cl}$  (II) and 2,5- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$  (III) with divers compds. The activating influence of the groups on the replacement of halogen by means of the aromatic amines decreases in the order  $\text{NO}_2 > \text{CO}_2\text{H} > \text{CN}$ . With  $\text{NaOMe}$  and  $\text{NaOEt}$  as well as with  $\text{NH}_4\text{Et}$  and urea the order becomes  $\text{NO}_2 > \text{CN} > \text{CO}_2\text{H}$ . It seems that, just as the order in which the different halogens are replaced depends upon the reagent used (*C. A.* 18, 674), so is the relative activating influence of the various neg. groups dependent largely on the nature of the reagents employed for substitution. Attempts to condense I, II and III with the Na derivs. of  $\text{CH}_3(\text{CO}_2\text{Et})_2$  (IV),  $\text{AcCH}_2\text{CO}_2\text{Et}$  (V),  $\text{NCCH}_2\text{CO}_2\text{Et}$ ,  $\text{MeNO}_2$  and  $\text{NCCH}_2\text{CONH}_2$  (VI) were only successful in the cases of I with IV and V, and I and II with VI. The difference in behavior of halo-2-nitro-4-cyanobenzene and of halo-2-cyano-4-nitrobenzene toward these reagents (*C. A.* 11, 959) as well as toward the aromatic amines is another example of the superior influence of the  $\text{NO}_2$  when adjacent to the halogen atom. The reduction of II (3 g.) with Sn and  $\text{HCl}$  gave 2 g. 4-chloro-3-cyanoaniline, m. 133° (stable to concd.  $\text{H}_2\text{SO}_4$ , concd.  $\text{HCl}$  and to boiling aq. and alc.  $\text{KOH}$ ); *Ac deriv.* m. 190°. Nitration of crude *o*- $\text{ClC}_6\text{H}_4\text{CO}_2\text{H}$  (20 g.) yielded 10-12 g. of III, m. 164°; *Me ester* (VII), m. 72°. By heating the components on the  $\text{H}_2\text{O}$  bath quant. yields of the condensation products of I with  $\text{PhNH}_2$  and *o*-, *m*- and *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , m. 158°, 118°, 160° and 135°, resp., were obtained. The condensation between II and  $\text{PhNH}_2$ , *m*- and *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$  by heating the substances together at 180° for 45-60 min. gave compds. m. 171°, 140° and 217°. II and *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$ , similarly treated, gave 2-cyano-4-nitro-4'-chlorodiphenylamine, m. 282°, but no condensation was effected with *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$  even when the components were heated at 200° for 2 hrs. When heated with  $\text{PhNH}_2$ , III yielded 2-anilino-5-nitrobenzoic acid, m. 250°, converted by heating with  $\text{PhNH}_2$  at 160° for 30 min. into 2-anilino-5-nitrobenzamide, m. 190°. The condensation of VII with  $\text{PhNH}_2$  gave *Me* 2-anilino-5-nitrobenzoate, m. 100°. With *o*-, *m*- and *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ , III formed the corresponding 5-nitro-2-toluidinobenzoic acids, m. 254°, 256° and 262°, resp. By boiling alc.  $\text{NH}_4\text{Et}$  with I and II were formed 2,4-dinitrodiethylaniline, m. 81°, and 2-cyano-4-nitrodiethylaniline, m. 85°, then condensed with I to produce 2,4-dinitroaniline, m. 176°, and with II to give 2-uramide-5-nitrobenzamide, m. 198°, hydrolyzed by 15%  $\text{KOH}$  heated to boiling for 30 min. to 5-nitroanthranilic acid (VIII), m. 264°, and to 5-nitrosalicylic acid when boiled vigorously with 20%  $\text{KOH}$ . VIII was prepd. by nitrating acetylanthranilic acid and deacetylating the 5-nitroacetylanthranilic acid, m. 214°, by boiling with concd.  $\text{HCl}$  for 30 min. *o*-, *m*- and *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  did not react with urea. By refluxing I with  $\text{NaOEt}$  and  $\text{NaOMe}$  for 20-30 min. were formed 1-ethoxy- and 1-methoxy-2,4-dinitrobenzene, m. 86° and 89°. II similarly yielded 1-ethoxy- and 1-methoxy-2-cyano-4-nitrobenzene, m. 101° and 128°.  $\text{NaOEt}$  and *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  gave *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{OEt}$ , m. 57°, and a by-product, *p,p'*-dichloroazoxybenzene, m. 164°. No definite product could be isolated from attempts to condense  $\text{NaOEt}$  with *o*- $\text{ClC}_6\text{H}_4\text{NO}_2$ . By adding I to solns. of IV and V in alc.  $\text{NaOEt}$  and refluxing for 2-3 hrs., *di-Fl* 2,4-dinitrophenylmalonate, m. 52°, and Et 2,4-dinitrophenylacetate, m. 83°, were obtained.

C. R. Addinall

**Several reactions of *aci*-nitro salts and of fulminating silver.** Heinrich Wieland and August Hochtlen. *Ann.* 505, 237-47 (1933).—( $\text{PhCH}:\text{NO}_2$ ) $_2\text{Hg}$  and  $\text{Ph}_2\text{CCl}$  give 33% of *asym*-tetraphenylnitroethane, m. 169-70°. *aci*-Phenylnitroacetoneitrile Ag salt (I) (8 g.) and 5 g.  $\text{BzBzAg}$  give

5 g. of *benzoylphenylnitroacetoneitrile*, m. 118° (decompn.);  $\text{Ph}_2\text{CHBr}$  gives  $\alpha,\beta,\beta$ -triphenyl- $\alpha$ -nitropropionitrile, m. 146-7° (decompn.); 10%  $\text{MeOH-KOH}$  gives triphenylacrylic nitrile, m. 166-7°. I and  $\text{Ph}_2\text{CCl}$  give triphenylmethylphenyldiazomethane, m. 145° (decompn.) [decompn. in boiling  $\text{PhMe}$  gives ( $\text{Ph}_2\text{C})_2\text{O}$ ], tolan, a compd.,  $\text{C}_{14}\text{H}_{11}\text{ON}$ , m. 156-8° ( $\text{EtOH-KOH}$  gives an isomer, m. 182°), and  $\text{Ph}_2\text{CCNO}$ , m. 94.5°.  $\text{C}:\text{NOAg}$  and  $\text{BzBr}$  give ( $\text{BzNH}$ ) $_2\text{CO}$ ;  $\text{Ph}_2\text{CHBr}$  gives benzohydril cyanate, identified as the urea and the urethan, m. 129°. Benzohydroxamyl chloride and  $\text{C}:\text{NOAg}$  give in  $\text{C}_6\text{H}_5\text{N}$  a compd.,  $\text{PhC}:(\text{NOH})\text{C}_6\text{H}_5\text{N}\text{Cl}$ , with 1 mol.  $\text{EtOH}$ , m. 117°. In another expt. with a little  $\text{PhNMe}_3$ , there resulted a compd.,  $\text{C}_8\text{H}_5\text{O}_2\text{N}_3$ , m. 96-7° (decompn.), which may be phenylfuroxan. C. J. West

**The action of vanadium oxytrichloride upon various organic compounds.** R. E. Nelson and A. H. McFadden. *Proc. Indiana Acad. Sci.* 42, 119-22 (1933).— $\text{VOCl}_3$  was allowed to react with 16 org. compds. With some reaction occurred, with others colored solns. resulted while with others there was no evidence of reaction.  $\text{VOCl}_3$  and aniline gave a complexity of products. (One compd., m. 236°, was sol. in ether, alc.,  $\text{C}_6\text{H}_6$ , concd.  $\text{H}_2\text{SO}_4$ , and concd.  $\text{HNO}_3$ . An analysis showed the presence of C, N and H, but no V or Cl. Another compd. has been given the formula ( $\text{PhNH}$ ) $_2\text{V}:\text{O}$ .  $\text{VOCl}_3$  and  $\text{BzH}$  gave a grainy black ppt., which evolved  $\text{HCl}$ , even in a vacuum desiccator. The compd. to which has been given the formula ( $\text{OHCC}_6\text{H}_4$ ) $_2\text{V}$   $\text{Cl}_2$  upon hydrolysis yields  $\text{BzH}$  and  $\text{V}_2\text{O}_5$ . H. E. Messmore

**Firmness of attachment of organic residues.** IX. Julius v. Braun, Robert Michaelis, F. Fischer and R. Murjahn. *Ann.* 507, 1-13 (1933); cf. *C. A.* 26, 703. *p*-Ethoxybenzyl alc.,  $b_{12}$  134-5°; chloride,  $b_{10}$  95-100°, with *p*- $\text{MeOC}_6\text{H}_4\text{NHMe}$  it gives *p*-methoxybenzyl-*p*-ethoxybenzylmethylamine,  $b_{14}$  120-5°;  $\text{BrCN}$  gives a mixt. of *p*- $\text{MeOC}_6\text{H}_4\text{CH}_2\text{Br}$  and *p*- $\text{EtOC}_6\text{H}_4\text{CH}_2\text{Br}$ .  $\text{C}_6\text{H}_{11}\text{C}_6\text{H}_4\text{CH}_2\text{NHMe}$ ,  $b_{11}$  165°, forms a *HCl* salt, m. 186° (Pt salt, decomp. 215°). *Bis*(cyclohexylbenzyl)methylamine,  $b_{10}$  240°, m. 52° (methiodide, m. 196°) Phenylbenzyl(cyclohexylbenzyl)methylamine,  $b_{10}$  230-40°, m. 52-3° (methiodide, m. 200°), with  $\text{BrCN}$  there results a bromide intermediate in compn. between  $\text{PhC}_6\text{H}_4\text{CH}_2\text{Br}$  and  $\text{C}_6\text{H}_{11}\text{C}_6\text{H}_4\text{CH}_2\text{Br}$  and about equal amts. of  $\text{PhC}_6\text{H}_4\text{CH}_2\text{NMeCN}$  and  $\text{C}_6\text{H}_{11}\text{C}_6\text{H}_4\text{CH}_2\text{NMeCN}$ . *Bis*-phenylbenzyl(phenylbenzyl)methylamine, from  $\text{PhC}_6\text{H}_4\text{CH}_2\text{Cl}$ ,  $b_{11}$  165°, and  $\text{PhC}_6\text{H}_4\text{CH}_2\text{NHMe}$ , m. 186° (*HCl* salt, m. 245°);  $\text{BrCN}$  gives  $\text{PhC}_6\text{H}_4\text{CH}_2\text{CH}_2\text{Br}$ ; the cyanamide is principally of the  $\text{PhC}_6\text{H}_4\text{CH}_2$  series *o*-ethylbenzylmethylamine,  $b_{12}$  92° (*HCl* salt, m. 108°); picrate, m. 139°. *o*-Phenylbenzylbenzylmethylamine,  $b_{12}$  223° (methiodide, m. 163°); *o*-ethylbenzyl deriv.,  $b_{12}$  173° (*HCl* salt, m. 174°; methiodide, m. 154°); *o*-ethylbenzyl-*o*-vinylbenzylmethylamine,  $b_{12}$  195-6° (*HCl* salt, m. 138°; methiodide, m. 164°); the bromides resulting from the action of  $\text{CNBr}$  are reported. *o*-Methylbenzylmethylamine,  $b_{11}$  100-2° (*HCl* salt, m. 150°; picrate, m. 129°), *o*-*Cl* deriv.,  $b_{10}$  98-100° (*HCl* salt, m. 135°; picrate, m. 120°); *o*-*I* deriv.,  $b_{10}$  130-2° (*HCl* salt, m. 180°; picrate, m. 150°); *m*-*Cl* deriv.,  $b_{11}$  122-4° (*HCl* salt, m. 170°; picrate, m. 128°); *m*-*Br* deriv.,  $b_{11}$  122° (*HCl* salt, m. 147°; picrate, m. 135°). *o*-Methylbenzyl-*p*-chloromethylamine, pale yellow,  $b_{10}$  180-4° (*HCl* salt, m. 170°; methiodide, m. 215°); *o*-chlorobenzyl-*o*-bromobenzylmethylamine,  $b_{10}$  150° (*HCl* salt, m. 160°; picrate, m. 129°); *o*-iodobenzyl deriv.,  $b_{10}$  200-3° (*HCl* salt, m. 200°); *o*-chlorobenzyl-*m*-iodobenzylmethylamine,  $b_{10}$  200°, m. 55-6° (*HCl* salt, m. 195°; picrate, m. 123°); *m*-chlorobenzyl-*p*-bromobenzylmethylamine,  $b_{10}$  186-90° (*HCl* salt, m. 187°); *p*-iodobenzyl deriv.,  $b_{10}$  210° (*HCl* salt, m. 202°; picrate, m. 110°); *m*-bromobenzyl deriv.,  $b_{10}$  180° (*HCl* salt, m. 210°; picrate, m. 147°); *m*-bromobenzyl-*m*-iodobenzyl methylamine,  $b_{10}$  200° (*HCl* salt, m. 194°; picrate, m. 140°); *o*-chlorobenzyl deriv.,  $b_{10}$  185° (*HCl* salt, m. 198°; picrate, m. 133°). The decompn. with  $\text{BrCN}$  shows that *m*- $\text{BrC}_6\text{H}_4\text{CH}_2$  takes a sharply defined middle position between *m*- $\text{ClC}_6\text{H}_4\text{CH}_2$  and *m*- $\text{IC}_6\text{H}_4\text{CH}_2$  and that *o*- $\text{BrC}_6\text{H}_4\text{CH}_2$  is between *o*- $\text{ClC}_6\text{H}_4\text{CH}_2$  and *o*-

$\text{IC}_6\text{H}_4\text{CH}_3$ . With chemically analogous substituents the position more than the mass affects the firmness of attachment. C. J. West

**Separation of *m*-xylydine from isomers with formic acid** B. I. Kissin *Anilinokrasochayaya Prom* 3, 80 (1933). The substitution of 50 and 85%  $\text{HCO}_2\text{H}$  for  $\text{AcOH}$  in the separ. of *m*-xylydine (I) from the mixt. of isomers is rendered impracticable by the formation of  $\text{C}_6\text{H}_4\text{Me}_2\text{NHC=O}$  at temps. above  $20^\circ$ , which is difficultly saponified, and by the contamination of I with the *p*-isomer which reacts with  $\text{HCO}_2\text{H}$  in similar manner. C. B.

**New azo dyes** A. Mironescu and I. V. Nicolescu *Bul. soc. chim. Romania* 15, 537 (1933). The following dyes were prepd. by use of the same general method with the appropriate deriv. of aniline in each case: *Na benzylideneaminoozobenzene p-sulfonate*,  $\text{NaO}_2\text{SC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ , was prepd. by dissolving 19.1 g. sulfanilic acid in a soln. of 5 g.  $\text{NaOH}$  and 100 cc.  $\text{H}_2\text{SO}_4$ . The diazonium salt thus prepd. was dissolved in dil. alc.  $\text{KOH}$  and 5 g.  $\text{PhCH=NPh}$  in  $\text{AcOH}$  added. Upon making the soln. slightly alk. with  $\text{NaOH}$  the dye was pptd. Recrystd. from alc. at  $m. 76^\circ$ . *Na benzylideneaminoozobenzene p-sulfonate*,  $\text{NaO}_2\text{SC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 157^\circ$ . *Na azobenzeneaminoozobenzene p-sulfonate*,  $\text{NaO}_2\text{SC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 170^\circ$ . *p-Benzylideneamino p-nitrosoazobenzene-HCl*,  $\text{NO}_2\text{C}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 107^\circ$ . *Benzylideneaminohydroxyazobenzene-HCl*,  $\text{HOOC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 175^\circ$ . *Bis-benzylideneaminophenyl diphenyl-HCl* (I),  $(\text{PhCH=NPh})_2\text{NHC=O}$ ,  $m. 107^\circ$ . *Benzylideneaminohydroxyazobenzene-HCl*,  $\text{HOOC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 175^\circ$ . *Bis-benzylideneaminophenyl diphenyl-HCl* (I),  $(\text{PhCH=NPh})_2\text{NHC=O}$ ,  $m. 107^\circ$ . *Benzylideneaminohydroxyazobenzene-HCl*,  $\text{HOOC}_6\text{H}_4\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 175^\circ$ . All of these dyes are stable and dye wool, cotton and silk without mordant. W. A. Moore

**Constitution of *o*-hydroxyazo compounds** K. v. Arver *Ann.* 505, 299 (1933). A discussion of the constitution of hydroxyazo compounds especially the work of Purvis and Markwitsch. C. I. West

**Diazotization of very weakly basic amines** H. A. J. Schoutissen *J. Am. Chem. Soc.* 55, 1331 (1933). The method is based on the reaction of  $\text{H}_2\text{SO}_4$  to form an intermediate salt of the liberation of  $\text{HNO}$  from nitroxylic acid (I) by  $\text{HPO}_4$ . Thus, e.g.,  $2,4,6\text{-}(\text{ON})_2\text{C}_6\text{H}_2\text{NH}_2$  in 1 cc.  $\text{H}_2\text{SO}_4$  at  $0^\circ$  is treated with I from  $\text{NaNO}$  and 1 cc.  $\text{H}_2\text{SO}_4$  and then with 60 cc.  $\text{HPO}_4$  the diazotization proceeds quantitatively. In the same way  $2,4,6\text{-}(\text{ON})_2\text{C}_6\text{H}_2\text{NH}_2$  (II) gives 98% of *p*-dibromo-1-nitrobenzene,  $m. 15^\circ$ , the *o*-di-Cl deriv.  $m. 153^\circ$ . The diazo compd. from II and  $\beta\text{-C}_6\text{H}_4\text{OH}$  gives the azo dye  $\text{C}_6\text{H}_4(\text{ON})\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ , reddish brown with green metallic reflex,  $m. 221^\circ$ , the di-Cl deriv., red,  $m. \text{above } 270^\circ$ . The diazo compd. from picrochrome and  $\beta\text{-C}_6\text{H}_4\text{OH}$  gives a red dye,  $m. 200^\circ$ , or an azo dye, red with metallic reflex,  $m. \text{above } 260^\circ$  (decomps.).  $\text{PhOH}$  gives an azo dye  $\text{C}_6\text{H}_4(\text{ON})\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ ,  $m. 191^\circ$ , the dye from  $\text{PhOMe}$  (80% yield), orange,  $m. 14^\circ$ , from  $\text{PhOEt}$ , red with metallic luster,  $m. 171^\circ$ .  $2,4,6\text{-}(\text{ON})_2\text{C}_6\text{H}_2\text{NH}_2$ , diazotized and coupled with  $\text{PhOH}$ , gives a dye,  $\text{C}_6\text{H}_4(\text{ON})\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ , orange,  $m. 16^\circ$ .  $\text{PhOMe}$  gives a dye,  $\text{C}_6\text{H}_4(\text{ON})\text{N}=\text{NC}_6\text{H}_4\text{NHC=O}$ , red,  $m. 118^\circ$  (82% yield). The dye from  $5,2,4,6\text{-}(\text{ON})_2\text{C}_6\text{H}_2\text{NH}_2$  and  $\text{PhOH}$  is orange-red,  $m. 140^\circ$ . C. J. West

**Character of the diazonium group** Tetrazotization of *p*-phenylenediamine H. A. J. Schoutissen *J. Am. Chem. Soc.* 55, 1535 (1933). (1) C. 4, 16, 1220. By starting from the very negative character of the diazonium group and taking account of the fact that the reaction of diazotization proceeds between the salt of the amine and  $\text{HNO}$ , a logical and simple explanation is given why negatively substituted *p*-phenylenediamines could only be diazotized at 1 of the  $\text{NH}_2$  groups. Therefore the theoretical amine and of Morgan must be cast aside. *p*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$  is quantitatively tetrazotized by the use of  $\text{H}_2\text{PO}_4$  and nitrosylsulfuric acid, with  $\text{KI}$  there results  $\beta\text{-C}_6\text{H}_4\text{I}_2$ , with  $\text{CuCl}$   $\beta\text{-C}_6\text{H}_4\text{Cl}_2$ , with  $\text{Br}$  in  $\text{KBr}$   $\beta\text{-C}_6\text{H}_4\text{Br}_2$ . *p*-Phenylenediamine sulfonic acid is tetrazotized in the same

way. Nitro-*p*-phenylenediamine, tetrazotized and treated with  $\text{KI}$ , gives 2,5-dinitrobenzene,  $m. 109-110^\circ$ . 1-iodo-2-nitrophenol, citron-yellow,  $m. 51^\circ$ , is a by-product. 2,5-Dichloro-*p*-phenylenediamine, treated with  $\text{CuCl}$  after tetrazotization, gives 61% of 1,2,4,5- $\text{C}_6\text{H}_2\text{Cl}_4$ , the 2,6-di-Cl isomer (I) gives 1,2,4,5- $\text{C}_6\text{H}_2\text{Cl}_4$ ,  $m. 80-81^\circ$ . 2,6-Dibromo-*p*-phenylenediamine gives 95% of 2,6-dibromo-*p*-diodobenzene,  $m. 115^\circ$ . I and  $\text{AcO}$  give a di- $\text{Ac}$  deriv.,  $m. 225^\circ$ ,  $\text{Ca}(\text{OCl})_2$  in  $\text{AcOH}$  gives the tri-Cl deriv.,  $m. 280^\circ$ , hydrolysis gives trichloro-*p*-phenylene diamine,  $m. 198^\circ$ , the diazo reaction gives  $\text{C}_6\text{H}_4(\text{NH})_2$  a tetrazotizable, however, different factors, as lesser stability of the tetrazo compd., coupling with products of decomposition and the formation of azimino compd., have an unfavorable influence on the yield. C. J. West

**Character of the diazonium group** New method of preparing mixed disazo dyestuffs H. A. J. Schoutissen *J. Am. Chem. Soc.* 55, 1541 (1933). The character of the diazonium group agrees with the influence of 2  $\text{NO}_2$  groups in the positions ortho and para with respect to the substituent. Tetrazotized  $\beta\text{-C}_6\text{H}_4(\text{NH})_2$  couples only with 1 mole of the azo component (both phenols and ethers) in strongly acid medium. The diazo azo compounds can be isolated by pouring into  $\text{H}_2\text{O}$  and may afterward be coupled with an azo compd. (not with ethers). Several examples are given. The compd. with  $\text{PhOMe}$  and  $\text{PhOH}$ ,  $\text{C}_6\text{H}_4(\text{ON})_2\text{N}_2$ , orange,  $m. 200^\circ$ , with  $\text{PhOH}$ , the compd.  $\text{C}_6\text{H}_4(\text{ON})_2\text{N}_2$ , greenish yellow,  $m. 171^\circ$ , is formed. C. J. West

**The formation of azides from *N*-nitroso derivatives of hydrazo compounds** G. Longo *Gazz. chim. ital.* 63, 165 (1933). The formation of hydrazoic acids from  $\text{RCOEt}$  compds. and  $\text{NH}_4\text{OH}$  (cf. *Ann.* 281, 169) suggested the prepn. of arylazohydrazoic acids,  $\text{ArN}(\text{NO})\text{NOH}$ , from  $\text{ArN}(\text{NO})\text{R}$  compds., and of arylhydrazohydrazoic acids,  $\text{ArNHNHC(OH)NOH}$ , from  $\text{ArNHNHCOR}$ . Attempts to accomplish this by first preping the  $\text{ArNHNHCOR}$  compds., forming  $\text{ArNHNHC(OH)NOH}$  compd. from these, and finally dehydrogenating to form  $\text{ArN}(\text{NO})\text{NOH}$  compd., failed under various conditions, as did further attempts by the use of  $\text{ArN}(\text{NO})\text{NH}_2$  and  $\text{ArNHNHCOR}$  compds. by the Hoffmann reaction (*Ber.* 22, 2854). Having prepd. the  $\text{ArNHNHCOR}$  compds., however, the behavior of their  $\text{ArN}(\text{NO})\text{NHCOR}$  derivs. with strong base was studied to ascertain why low yields of  $\text{ArN}_3$  compds. are obtained from them and from compds. in general with an  $\text{N}(\text{NO})\text{N}$  group like  $\text{ArN}(\text{NO})\text{NH}_2$  and  $\text{ArN}(\text{NO})\text{NHR}$  compds.,  $\text{ArN}(\text{NO})\text{NHCOR}$  compd. yield, when heated with strong bases, the corresponding azides. However, the yield is extremely low, and a simple cleavage is not the chief reaction. The formation of azide is preceded by the evolution of large quantities of  $\text{N}_2$ , which indicates that in alk. soln. the  $\text{NO}$  derivs. assume the tautomeric form,  $\text{ArN}(\text{N}=\text{O})\text{NCO R}$ , which contains a  $\text{N}=\text{N}=\text{N}$  group capable of eliminating  $\text{N}_2$ . To prep. the  $\text{ArNHNHCOR}$  esters, we cold  $\text{C}_6\text{H}_5\text{N}$  solns. of the  $\text{ArNHNHCOR}$  compds. were treated with  $\text{ClCO Me}$  or  $\text{ClCO Et}$  and poured into ice-cold  $20^\circ\text{C}$ .  $\text{H}_2\text{SO}_4$ . To prep. the  $\text{ArN}(\text{NO})\text{NHCOR}$  derivs., the ester in glacial  $\text{AcOH}$  were treated with excess concd. aq.  $\text{NaNO}$ . To prep.  $\text{ArN}(\text{NO})\text{NCO R}$  azo esters, the corresponding hydrazo compds. in glacial  $\text{AcOH}$  were treated with excess  $\text{CrO}_3$ , and poured into ice-water. These 3 syntheses gave the best results of any methods tried. *Me p-nitrophenylhydrazocarbonate* (I), yellow,  $m. 180^\circ$ . Its nitroso deriv.,  $\beta\text{-ONC}_6\text{H}_4\text{N}(\text{NO})\text{NHC(OH)Me}$ ,  $m. 125-6^\circ$ , treated in  $\text{Et}_2\text{O}$  with  $\text{PhIHNH}_2$  or in boiling water, it reverts to I. It is stable toward  $\text{NH}_4\text{OH}$ , in hot  $10^\circ\text{C}$ ,  $\text{NaOH}$  it yields approx. 43%  $\text{N}$  and 27%  $\beta\text{-ONC}_6\text{H}_4\text{N}_2$  (II). *Me p-nitrophenylazocarbonate*, orange-red,  $m. 84.5^\circ$ , stable toward  $\text{NH}_4\text{OH}$ . *Et p-nitrophenylhydrazocarbonate* (III), brown-yellow,  $m. 198.9^\circ$ , stable toward  $\text{NH}_4\text{OH}$ . Its nitroso deriv., brown-yellow,  $m. 110-1^\circ$  (decomps.), in boiling water or with  $\text{PhIHNH}_2$ , it reverts to III, in boiling dil.  $\text{NaOH}$  it evolves  $\text{N}$  and gives a low yield of II. *Et p-nitrophenylazocarbonate*,

orange-red, m 76° 5', does not react with  $\text{NH}_4\text{OH}$ . *Me 2,4-dinitrophenylhydrazoncarboxylate*, brown yellow, m 134°, could not be nitrosated or dehydrogenated. *2,4-dinitrophenylhydrazoncarboxylate*, brown-yellow, m 168°, could not be nitrosated. *Me p-toluenophenylhydrazoncarboxylate* (IV) m 110°, stable toward  $\text{NH}_4\text{OH}$ . Its *nitroso deriv.*,  $p\text{-BrC}_6\text{H}_4\text{N}(\text{NO})\text{NHCO Me}$ , straw color, m 92° (decompn), unstable in air in boiling water it forms IV, with strong alkali it forms N and a low yield of  $p\text{-BrC}_6\text{H}_4\text{N}_2$  (V). *Me p-bromophenylhydrazoncarboxylate*, orange yellow m 75°, stable toward  $\text{NH}_4\text{OH}$ . It *p-bromophenylhydrazoncarboxylate* (VI), m 107°, stable toward  $\text{NH}_4\text{OH}$ . Its *nitroso deriv.*, yellow, m 101° (decompn) in boiling water or with  $\text{PhNH}_2$  it forms VI with strong alkali it forms N and a very low yield of V. *Me p-tolylhydrazoncarboxylate* m 112°, stable toward  $\text{NH}_4\text{OH}$ . Its *nitroso deriv.*, straw color, m 51°, not stable with hot aq.  $\text{NaOH}$  it forms N and a very small yield of  $p\text{-MeC}_6\text{H}_4\text{N}_2$ . *Me p-tolylcarboxylate* brilliant orange, m 29-30°, stable toward  $\text{NH}_4\text{OH}$ . It *p-tolylhydrazoncarboxylate*, m 55°, stable toward  $\text{NH}_4\text{OH}$ .  $p\text{-BrC}_6\text{H}_4\text{NHNHCONH}_2$  and  $p\text{-ONC}_6\text{H}_4\text{NHNHCONH}_2$  prep'd according to the description of Darapsky (C 21 2, 2089), m 225 and 220, resp (instead of 226 and 212° of D) each is stable toward  $\text{NH}_4\text{OH}$ . A light excess of  $\text{AmNO}$  and  $\text{HCl}$  added to a cold soln of  $p\text{-ONC}_6\text{H}_4\text{N}(\text{NO})\text{NHCHO}$  gives *formyl p-nitrophenylhydrazine*  $p\text{-ONC}_6\text{H}_4\text{N}(\text{NO})\text{NHCHO}$  (VII), straw color, m 109-110° (decompn) gives brown red solus in aq.  $\text{NaOH}$  which on boiling evolve N and form II. Suspended in EtO VII and  $\text{PhNH}_2$  form  $p\text{-ONC}_6\text{H}_4\text{NHNHCHO}$  m 185° (C Ber 32 1810(1899)). VII is an isomer of  $p\text{-ONC}_6\text{H}_4\text{N}(\text{NO})\text{NHCHO}$ , and was prep'd because it has some of the properties of the preceding nitroso ester. C C Davi

**Preparation of p-phenylenedihydrazine hydrochloride** H A J Schoutissen *J Am Chem Soc* 55, 1546 (1933). Reduction of t-tetrazotized  $p\text{-C}_6\text{H}_4\text{N}_2$  with  $\text{SnCl}_4$  in conc'd  $\text{HCl}$  gives *p-phenylenedihydrazine di-HCl*, decomps on warming, its structure followed from the prep'n of  $p\text{-C}_6\text{H}_4\text{N}_2$  and  $\text{C}_6\text{H}_5\text{Cl}$  and the *disphenylazide*, pale yellow which carbonylates on heating. C J West

**Breakdown of organic arsenic compounds** Bertil Englund *Swensk Kem Lids* 45 140 (1933).  $\text{PhCH AsO}_2\text{H}_2$  is est'd by titration with  $\text{NaOH}$  and bromo thymol blue. It is stable when dry but break down on re-crystn, giving  $\text{AsO}_2\text{H}_2$ . This reaction is hastened by  $\text{HCl}$ . It is monomol. In brominating  $\text{H O}_2\text{AsC}_6\text{H}_4\text{CO}_2\text{H}$ , the  $\text{HBr}$  formed catalyzes an analogous reaction giving  $\text{CBrCO}_2\text{H}$  and  $\text{AsO}_2\text{H}_2$ . In both m cases  $\text{As}_2\text{S}_3$  drops to  $\text{As}^{III}$ . A K Rose

**Nitrogenous arsenical derivatives** VI V Berlin kotti *Ann chim applicata* 23, 168 (1933). Correction. The third sentence in C 1 27, 333 should read: Each has been combined with  $p\text{-H O}_2\text{AsC}_6\text{H}_4\text{N}_2\text{N}(\text{OH})_2$ , 2,4 (III) and with  $p\text{-H O}_2\text{AsC}_6\text{H}_4\text{N}_2\text{N}(\text{OH})_2$ , 2,4 (IV). I J C

**The action of copper on aromatic acetomercuric derivatives** A Contardi and B Cecchi *Ann chim applicata* 23, 362 (1933). When  $(\text{PhC}_6\text{H}_4\text{CO})_2\text{Hg}$  is refluxed in benzene or toluene with Cu powder, and the product evap'd in *vacuo* almost pure  $\text{HgPh}_2$  is obtained. Zn powder may also be used. Similarly  $\text{EtNC}_6\text{H}_4\text{CH}_2\text{CO}_2\text{Hg}$  when treated above yield  $\text{PhNH}_2$ . A W Contardi

**Action of sulfur on organic compounds** XI Action of sulfur on bibenzyl Ludwik Szpil and Mucel Grdzysian *Roczniki Chem* 12 478 S(1931 in German) (1932) (C 21 24, 520). Baumann and Klett (*Ber* 24, 3312(1891)) and Szwed and Kowalski (*Chemik Polski* 16, 112(1914)) obtained by treating stilbene with S, a comp'd containing S, m 210°. This comp'd includes admixts of tetraphenylthiophene. After purification, the substance is S free, m 24°, approx mol wt corresponds to  $(\text{C}_6\text{H}_5)_4$ . Interaction of S and bibenzyl yields  $\text{H}_2\text{S}$ , tetraphenylthiophene and *seleffu*

*phenylbutane*, m 251.5-2.0°, formed by reduction of tetraphenylthiophene. J Wiertelak

**Preparation of some derivatives of triphenylgermanium by means of sodium triphenylgermanide** Charles A Kraus and Clarence S Sherman *J Am Chem Soc* 55, 4094 7(1933).  $\text{Ph}_3\text{GeNa}$  in liquid  $\text{NH}_3$  and  $\text{PrBr}$  (added by means of  $\text{NH}_3$ ) give *propyltriphenylgermanium*, m 86.6°, *Bu deriv.*, m 54.5-5.5°, *Am deriv.*, m 42.5°, *benzyl deriv.*, m 42.5-3.5°.  $\text{Ph}_3\text{GeNa}$  and  $\text{I tC}_6\text{H}_4\text{Bi}$  in  $\text{C}_3\text{H}_6$  give *triphenylgermanyltriethylgermanium*, m 59.5-90.5°. C J West

**Labilities or electronegativities of some unsaturated alkyl radicals as determined by hydrogen chloride scission of organolead compounds** Henry Calman, Edmund B Towne and H I Jones *J Am Chem Soc* 55, 1689-93(1933). In connection with relative stabilities, a study has been made of the rates of cleavage of unsym organolead compds by means of  $\text{HCl}$ . The relative order of labilities or so-called electronegativities of radicals is essentially that observed in the scission reactions of other organometallic compds by  $\text{HCl}$  [ $\alpha\text{-C}_6\text{H}_5\text{S}$  and  $\alpha\text{-C}_6\text{H}_7$ ].  $\text{Ph}$  [I] and  $\text{PhCl}$  [I] triphenylallyllead gives  $\text{Ph}_3\text{PbCl}$  and propene, indicating that the allyl group is more labile than the  $\text{Ph}$  group, likewise, the  $\beta$  vinyl group is cleaved before  $\text{Ph}$  however, the  $\text{Ph}$  radical is removed before the  $\beta$  butenyl radical. *Triphenylbutenyllead*, m 84.6° result in 96% yield from  $\text{ClI}$   $\text{ClI}$   $\text{HCl}$   $\text{MgBr}$  and  $\text{Ph}_3\text{PbCl}$   $\text{HCl}$  gives *di-phenylbutenyllead chloride* m 134° (decompn). *Triphenylbutenyllead*, b 78°, d<sub>4</sub> 1.5416, n<sub>D</sub> 1.5230,  $\text{HCl}$  gives ethyl 3-butenyllead dichloride. *Triphenylbutenyllead* m 104.9° *triphenyl naphthyllead*, m 131.  $\text{Ph}_3\text{PbCl}$   $\text{HCl}$  and  $\text{HCl}$  give *diphenylbutenyllead chloride*, m 157°. C J West

**Diastereoisomers of 2,5-diphenylsulfinylhydroquinone diacetate** Marion I Mackin and Roger Adams *J Am Chem Soc* 55, 1681 3(1933). Diphenylthiohydroquinone diacetate oxidized with  $\text{H}_2\text{O}$  in  $\text{AcOH}$  gives a mixt of  $\alpha$  and  $\beta$ , *diphenyl sulfinylhydroquinone 1,1 diacetate* m 207.5 and 143.5°, resp, these also results a mono sulfoxide  $\text{C}_6\text{H}_5\text{SO}_2$  m 112.5°. Oxidation of either disulfide gives  $\alpha$ , *diphenyl sulfinylhydroquinone diacetate* m 201.1° (decompn). Reduction of either  $\alpha$  or  $\beta$  sulfoxide gives the original thio comp'd. These 2 forms are the *meso* and *racemic* form and are the 1st example of such isomerism in a diarylsulfoxide. C J West

**Study of certain analogs of resolvable biphenyls** Marion I Mackin and Roger Adams *J Am Chem Soc* 55, 4088 8(1933). Dimethyl sulfox and conc'd  $\text{HNO}_3$  give the *3 di-NO deriv.* pale yellow, m 172°. All m p cor. reduction with Zn and  $\text{HCl}$  in  $\text{AcOH}$  gives the *NH deriv.*, m 217.5-5.5°. *Dinitrodimethylketone* m 171.2-2.2° (15.4°), *di-NH<sub>2</sub> deriv.*, yellow, m 16.4°. Reduction with  $\text{Zn-Hg}$  and dil  $\text{HCl}$  gives *3,3-diaminodimethylmethane* in 160 (60.5) (19.4°), *di-HCl salt* decomps 220-300°, 2,3,6,3,5  $\text{Me}_2(\text{O} \text{N}) \text{C COCl}$  and *mesitylene* with  $\text{AlCl}_3$  gives *3,3-dinitrodimethyl ketone* yellow, m 199-200°. Attempts to resolve the *NH* derivs through the capthor sulfone or bromo phosphorusulfonic salts resulted in failure. [a]<sub>D</sub> is given for each salt. This failure to demonstrate the presence of enantiomorphs in the 3 compds suggests a distortion of the tetrahedral structure of the S and the  $\text{CH}_3$  C atoms in these comp'd to a degree which permits free rotation of the methyl groups or perhaps a synchronous of the ring during rotation, or even both. C J West

**Thiols derived from  $\alpha$ ,  $m$  and  $p$  methoxytoluenes and benzoic acids** Madhavlal S Shah and Chinnubhai I Phatt and Duraid Kungu *J Chem Soc* 1933, 1775-81.

*Methoxytoluenes* sulfonic acid (I), oxidized with  $\text{PCl}_5$ ,  $\text{PbO}$  and the K salt of the acid heated with  $\text{PCl}_5$  gives *methoxytoluenes sulfonyl chloride* (II), an oil the *amide* m 145.4°. Reduction of I or II with Sn and  $\text{HCl}$  gives *3,2-HS(McO)C<sub>6</sub>H<sub>4</sub>Me*, b 235.6°, *Pb salt*, deep yellow, *Bz deriv.*, m 17°. *3-methylthiol-2-methoxytoluene*, b 254°, oxidation gives *3-methylsulfonyl-2*

*methoxybenzoic acid*, m. 166°. 2,4-O<sub>2</sub>N(HO<sub>2</sub>S)C<sub>6</sub>H<sub>3</sub>Me (Ba salt crystals with 2 mols. H<sub>2</sub>O; K salt) is reduced by (NH<sub>4</sub>)<sub>2</sub>S to the *o*-NH<sub>2</sub> deriv., from which the *diaz* compd., decomps. 104°, was prepd. and decompd. by H<sub>2</sub>O to 2,4-HO(HO<sub>2</sub>S)C<sub>6</sub>H<sub>3</sub>Me (Ba salt, crystals with 2 mols. H<sub>2</sub>O); Me<sub>2</sub>SO<sub>4</sub> gives 2-methoxytoluene-4-sulfonic acid, analyzed as the Na salt, with 1 mol. H<sub>2</sub>O, and the Ba salt, with 1.5 mols. H<sub>2</sub>O. The acid chloride is an oil and the amide m. 123°; reduction of the chloride gives 4-thiol-2-methoxytoluene, b. 238° (Pb salt, yellow); 4-methylthiol deriv., b. 255-6°; 4-methylsulfonyl-2-methoxybenzoic acid, m. 156°. 4-Sulfo-2-methoxybenzoic acid, deliquescent, m. 152° (Pb salt); 4-chlorosulfonyl deriv. (III), m. 149.5°; 4-amidosulfonyl deriv., m. 201°. Reduction of III gives 4-thiol-2-methoxybenzoic acid, m. 95°; 4-methylthiol deriv., m. 112°. 5,2-HS(MeO)C<sub>6</sub>H<sub>3</sub>Me gives a Bz deriv., m. 80°; 5-methylthiol-2-methoxytoluene, b. 259°; oxidation gives 5-methylsulfonyl-2-methoxybenzoic acid, m. 190°. 5-Thiol-2-methoxybenzoic acid, m. 205°; 5-methylthiol deriv., m. 70°. 2-Methoxytoluene-6-sulfonic acid (K salt, crystals with 1 mol. H<sub>2</sub>O) gives a chloride, oily, and an amide, m. 104°. 6-Thiol-2-methoxytoluene, b. 238° (Bz deriv., m. 62°; disulfide, m. 80°); 6-methylthiol deriv., b. 256°. 2-Thiol-3-methoxytoluene, b. 256°; disulfide, m. 148°. 2-Methylthiol-3-methoxytoluene, b. 269°; 2-methylsulfonyl-3-methoxybenzoic acid, m. 212°. 5-Thiol-3-methoxytoluene, b. 251°; 5-methylthiol deriv., b. 263°; 5-methylsulfonyl-3-methoxybenzoic acid, m. 195°. 5-Thiol-3-methoxybenzoic acid, m. 162°; 5-methylthiol deriv., m. 155°; reduction of 4-chlorosulfonyl-3-methoxybenzoic acid gives 3-methoxybenzoic acid *o*-disulfide, m. 228°. 2,5-HS(MeO)C<sub>6</sub>H<sub>3</sub>Me forms a Bz deriv., m. 84°; 6-methylthiol-3-methoxytoluene, b. 272°; oxidation gives 6-methylsulfonyl-3-methoxybenzoic acid, m. 180°. 2-Thiol-4-methoxytoluene, b. 263°; 2-methylthiol deriv., b. 260°; 2-methylsulfonyl-4-methoxybenzoic acid, m. 180°; 3-methylsulfonyl isomer, m. 215°. 3-Sulfo-4-methoxybenzoic acid, m. 250° (K salt, with 2 mols. H<sub>2</sub>O; Ba salt, with 2 mols. H<sub>2</sub>O); 3-chlorosulfonyl-4-methoxybenzoic chloride, m. 70°; 3-amidosulfonyl-4-methoxybenzamide, m. 262°; 3-chlorosulfonyl-4-methoxybenzoic acid, m. 178°; 3-thiol-4-methoxybenzoic acid, amorphous, m. 317° (decomps.); 3-methylthiol deriv., m. 205° C. J. West

**Chloro derivatives of benzylphenols. II. Some monochloro, dichloro and trichloro derivatives of *o*- and *p*-benzylphenols** R. C. Huston, R. L. Guile, P. S. Chen, W. N. Headley, G. W. Warren, L. S. Bau and R. O. Mate. *J. Am. Chem. Soc.* 55, 4639 (1933), cf. C. A. 25, 3635. The following chlorodiphenylmethanes were prepd. by the AlCl<sub>3</sub> or Claisen method: 2-hydroxy-2', b. 146.51°, 16.2% yield; -3-, m. 40.5 1.5°, 27%; -3', b. 192.4°, 7.78%; -4', m. 60.1°, 25%; 4-hydroxy-2', m. 68.9°, 11.7%; -3-, b. 145.8°, 40%; -3', b. 200-2°, 15.8%; -4', m. 87.75°, 46%; 2-hydroxy-5,4'-di-, m. 44.5 5.5°, 15%; -3,5,2'-tri-, m. 59.5 60.5°, -3,5,3'-tri-, m. 59.4 60°, 4.56%; -3,5,4'-tri-, m. 69.5 70.5°; 4-hydroxy-3,5,2'-tri-, m. 86.5 7.5°, 16.8%; -3,5,3'-tri-, m. 79.80°, 11.5%; -3,5,4'-tri-, m. 61.5 2.5°, 35%. *Ethers*: 2-chlorobenzyl Ph, b. 110.5°; 3-Cl isomer, m. 66.1°, 10.9°; 4-Cl isomer, m. 85.5 6.5°, 5.8%; 4-chlorobenzyl 4-chlorophenyl, m. 80.1°, 3%; 2-chlorobenzyl 2,4-dichlorophenyl, m. 61-2°; 3-Cl isomer, m. 12.25°, 1.46%; 4-Cl isomer, m. 64.5 5.5°; 2-chlorophenyl benzyl, b. 138.40°, 7.5%; 4-Cl isomer, m. 70.1°; 4-chloro-2-benzylphenyl benzyl, m. 53.4°, 59%. **Benzoyl esters of chlorodiphenylmethanes**: 2-hydroxy-2', b. 173.6°; -3-, m. 69.71°; -3', m. 67.7.4°; -5-, m. 51.5°; 4-hydroxy-2', m. 64.5 5.5°; -3-, m. 71.3°; -5-, m. 57.5°; -4', m. 115.6°; 2-hydroxy-5,4'-di-, m. 84.5 5.5°; -3,5,2'-tri-, m. 81.2°; -3,5,3'-tri-, m. 63.5 4.0°; 4-hydroxy-3,5,2'-tri-, m. 86.7°; -3,5,3'-tri-, m. 130.30.4°; -3,5,4'-tri-, m. 116.7°. **Benzenesulfonyl esters**: 2-hydroxy-2', m. 62.4°; -5-, m. 68.9°; 4-hydroxy-3, m. 65.8°; 2-hydroxy-3,5,3'-tri-, m. 114.5 5°. ***p*-Toluenesulfonyl esters**: 2-hydroxy-3-, m. 81.5 3.5°; -5-, m. 75.7.5°; 4-hydroxy-3-, m. 51.3°; 2-hydroxy-3,5,3'-tri-, m. 125.4.6°; 4-hydroxy-3,5,3'-tri-, m. 104.5-

5°. No ethers were formed in the AlCl<sub>3</sub> condensation where Cl was present in the nucleus of the PhCH<sub>2</sub>Cl. In the Claisen reaction the presence of Cl in the nucleus of the PhCH<sub>2</sub>Cl exerted a retarding influence on the yield of benzylated phenol and its corresponding ether, the greatest retarding effect being exhibited when the Cl was in the *m*-position, the next when in the *o*-position. The yields of the benzylated phenols by the Claisen reaction in case of *m*-substituted benzyl chlorides was increased by adding the corresponding benzyl ether to the reaction mixt. C. J. West

**Oxyacanthin and berbamine. III.** F. v. Bruchhausen, H. Oberembit and A. Feldhaus. *Ann.* 507, 144-59 (1933); cf. C. A. 25, 2983. 2,5'-1-hydroxy-3,4'-diethyl-5,6,2'-trimethoxy-1,1'-diphenyl ether, previously obtained from oxyacanthin (I), is reduced by Zn and AcOH-HCl to the 2,5'-di-Me deriv. (II), m. 86.5°. This was synthesized as follows: 3,6-Me(MeO)C<sub>6</sub>H<sub>3</sub>OH and Ac<sub>2</sub>O give the Ac deriv., converted by AlCl<sub>3</sub> in PhNO<sub>2</sub> to acetosorresol (2-methyl-4-hydroxy-5-methoxyacetophenone), m. 124° (semicarbazone, m. 224°; oxime, m. 174°); reduction gives 80% of 1-methyl-3-hydroxy-4-methoxy-6-ethylbenzene (III), m. 57.5° (Bz deriv., m. 71°); the 2-Hr deriv. (IV) m. 51.5° (90% yield). IV was also prepd. as follows: 2-Bromovanillin on reduction gives 50% of 1-methyl-2-bromo-3-hydroxy-4-methoxybenzene, m. 98°, AcCl and AlCl<sub>3</sub> give 50% of 2-methyl-3-bromo-4-hydroxy-5-methoxyacetophenone, m. 82° (semicarbazone, m. 214°), reduced by Zn and HCl to IV. IV and CH<sub>3</sub>N<sub>2</sub> in Et<sub>2</sub>O give 1-methoxy-2-bromo-3,4-dimethoxy-6-ethylbenzene, b. 80°. Condensation of III and IV in MeOK with Naturkupper C and Cu(OAc)<sub>2</sub> gives II. Berbamine (V) yields a Me ether (VI), m. 182°, which analyzes for C<sub>20</sub>H<sub>16</sub>O<sub>4</sub>N<sub>2</sub>; V is then an isomer of I. The Hofmann degradation of VI gives a mixt. of 2 methine bases, A (cf. Santos, C. A. 24, 1647), and B, m. 146.7°. The base A and O<sub>2</sub> give the same products as I. V and tetrandine are optical isomers, while I is a structural isomer of these 2. C. J. West

**A new class of "free" radicals.** A. Schonberg and E. Rupp. *Naturwissenschaften* 21, 561 (1933). On dissolving PhS<sub>2</sub> or (α-C<sub>10</sub>H<sub>7</sub>CS)<sub>2</sub>S<sub>2</sub> in indifferent solvents the substances partially decomp., forming free radicals with univalent S atoms: phenylthiyl (PhS) and thionaphthylthiyl (C<sub>10</sub>H<sub>7</sub>C(S)S). The solns. do not conform to Beer's law; they are thermochromic. Solns. of diphenylene disulfide follow this law; with them possible decompn. does not change the no. of mols. The free radicals are named "thiyls"; they bind heavy metals at room temps., like radicals with trivalent C and aliphatic diazo compds. B. J. C. van der Hoeven

**Thiophenol chemistry. Condensation reaction between thiophenols and condensed aldehyde-ammonias.** Gregg Dougherty and Wendell H. Taylor. *J. Am. Chem. Soc.* 55, 4588 (1933); cf. C. A. 27, 1873. Hexamethylenetetramine (I) is decompd. by PhSH when boiled in 1,4-dioxane soln.; 2 atoms N per mol. of I are eliminated as NH<sub>3</sub>, the other product being N(CH<sub>2</sub>-SPh)<sub>2</sub>; other thiophenols and mercaptans cause analogous decompns., the following mercaptomethylamines being formed: tri-*p*-bromophenyl, m. 135°; tri-*p*-nitrophenyl, yellow, m. 146°; tri-*p*-tolyl, m. 52°; tribenzyl, m. 40°. Hydrobenzamide, hydrofurfuramide and other hydramides are partially decompd. by thiophenols, yielding the typical product RCH=NCH(SR')R, as well as NH<sub>3</sub>. benzalphenylmercaptobenzylamine, m. 79.5°; benzalbenzyl deriv., m. 67°; benzal-*p*-tolyl deriv., m. 74°; 3-nitrobenzalphenylmercapto-3'-nitrobenzylamine, pale yellow, m. 123°; methylbenzalphenylmercaptotolylamine, m. 71°; furfuralphenylmercaptofurfurylamine, m. 49°. On warming with alc. Ph(OAc)<sub>2</sub> a mercaptide ppt. forms. On distn. these compds. decomp. N(CH<sub>2</sub>SPh)<sub>2</sub> gives PhS<sub>2</sub>. Dil. alk. KMnO<sub>4</sub> does not oxidize PhCH=NCH(SPh)<sub>2</sub>Ph, while 30% H<sub>2</sub>O<sub>2</sub> gives complete decompn., forming H<sub>2</sub>OH; with H<sub>2</sub> the chief product is PhS<sub>2</sub>. C. J. W.

**Alkyl derivatives of halogen phenols and their bactericidal action. II. Bromophenols.** Emil Klarman,

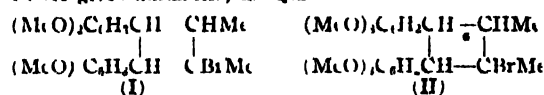
Louis W. Cate, Vladimir A. Shternov, and Philip H. Cox, Jr. *J. Am. Chem. Soc.* 55, 1057 (1933), cf. C 1 27, 3156. The following 2-alkyl derivs. of 4-bromo-phenol are reported: Me, b<sub>1</sub> 118.2°, m b<sub>2</sub> 5°, f<sub>1</sub> 110°, p<sub>1</sub> 113°, m 12°, Bu, b 125.7°, m 13.5°, 1m, b<sub>1</sub> 115.5°, m 36°, sec 1m, b<sub>1</sub> 134.8°, hexyl, b<sub>1</sub> 150.2°, m 33.6°, cyclohexyl, b 100°, m 3.8°, 1-tert-amyl, 2-bromophenol, b<sub>1</sub> 122°, 4-propyl, 2-dimethyl deriv, m 91.3°, 4-hexyl deriv, b<sub>1</sub> 145°, 2-bromo-2-hydroxypropylphenone m 133°, butyl phenone, b<sub>1</sub> 131.2°, m 55.6°, chlorophenol b<sub>1</sub> 134.6°, caprophenone, m 60°, 4-Bromophenyl acetal, b 100°, propionate, b 114°, butyrate, b 112°, d rate, b<sub>1</sub> 134.8°, caproate, b 133.40°. Four pathogenic microorganisms were used in the bacterial expt. *Escherichia typhi*, *Staphylococcus pyogenes aureus*, *Mycobacterium tuberculosis* (Horn) and *Mycobacterium africanum* when treated with the acid or these substituted bromophenol derivs. were found to be strongly germicidal and to compare favorably in this respect with the Cl deriv. studied previously. A in the latter case the constitution of the mol. and the wt. of the substituents not only influence the intensity of the germicidal action but also the point at which the quaternary effect becomes apparent, i.e., where the germicidal action of a given compd. with respect to the Gram neg. *Escherichia typhi* decline or practically disappear while at the same time reaching very considerable height with regard to pathogenic cocci and fat bacteria and pathogenic fungi. C. J. West.

**Action of nitrous acid on pyrocatechol-4-sulfonic acid** J. Frank and J. Zikl. *Colloidi in Czechoslov. Chem. Communication* 5, No. 6, 233 (1933) (in French) cf. C 1 26, 101. The starting point of the work was the Na or K salt of pyrocatechol-4-sulfonic acid (I), prepd. by heating pyrocatechol with concd. H<sub>2</sub>SO<sub>4</sub>, neutralizing the mixt. with BaCO<sub>3</sub> and treating the recrystd. Ba salt of I with the calcd. amt. of Na or K nitrate. It was H<sub>2</sub>O (from dil. H<sub>2</sub>SO<sub>4</sub> or HCl) + NaNO<sub>2</sub> reacted with the Na salt of I to give the Na deriv. of the diNO deriv. of I, the acid permitted the mono NO deriv. to be obtained also. Despite repeated attempt, the triNO deriv. could not be prepd. The free diNO deriv. was obtained by the treatment of HCl on the Na or K deriv. The following derivs. of the diNO compd. are described: Na and K derivs., yellow brown needle-like acid, golden yellow needle-like explosive. Ba deriv., small, golden yellow needles, very explosive. Sr deriv., similar to Ba deriv. Ca deriv., golden yellow lamellae. Ag deriv., very explosive needles. The above derivs. are mostly only slightly sol. in warm H<sub>2</sub>O and org. solvs. Reduction of the free diNO compd. (with Sn and HCl) gave the HCl salt of the corresponding diamine (white needles, very sol. in H<sub>2</sub>O). Oxidation of the diamine reducing diamine (by air or FeCl<sub>3</sub>) yielded a light green ppt. of the corresponding diamine, nearly insol. in H<sub>2</sub>O and org. solvent. The picric acid golden yellow needle, unstable in air and the Ac deriv. (the white crystals, very slightly sol. in H<sub>2</sub>O and org. solvent) of the diamine acid were also prepd. Edward B. Smiger.

**Condensation of dinitrochlorobenzene with p-amino phenol 3,5-disulfonic acid** I. M. Kargin, A. S. Antonov, and A. Z. Lyubitsky. *Indian Travschinaya Tr. m.* 3, 133 (1933). A yield of 80% 2,4 (ON) C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>H (SO<sub>3</sub>Na)<sub>2</sub> (O<sub>2</sub>S)<sub>2</sub> (I) was obtained by refluxing 10 hr. in a salt bath (mixt. of 10% 1,4,5,6 C<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)(OH)(SO<sub>3</sub>Na)<sub>2</sub> and 6% CH<sub>3</sub>CO<sub>2</sub>Na) 2,4 (ON) C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub> and 60 cc. H<sub>2</sub>O and then filtering out with NaCl. By working with the 39% of I results. I give fugitive yellow dyeing on wool from an acid bath. C. B.

**Structure of dimeric modifications of propenylphenol ethers** I. J. Harriett and I. Seck. *Ind.* 507, 197 (1933) cf. C 1 27, 3922, 1 with a proof of the structure of the intermediate compd. (I) in the synthesis of dioxugenol I and in its reaction with AcOAc in AcOH, 1-tert-butyl, C<sub>6</sub>H<sub>5</sub>O, 11.33, 10 mg. formed. Similarly, AgNO<sub>3</sub> in EtOH gives a NO compd., C<sub>6</sub>H<sub>5</sub>(NO)<sub>2</sub>N, m 125°. A stannic dibromide and Cu bronze or Zn dust in C<sub>6</sub>H<sub>5</sub> give the compd. (II), m 123°. II and MeOH-KOH give the

unsatd. compd., C<sub>6</sub>H<sub>5</sub>O<sub>2</sub>, m 101°, while Zn dust in EtOH gives diasaronic, m 102°.



C. J. West

**Constitution of the reaction product of benzo- and naphthoquinone with compounds which contain two negative groups neighboring to a methylene group** W. Kesting. *J. prakt. Chem.* 338, 215 (1933), cf. C 1 23, 357. CH(CN) (I) and C<sub>6</sub>H<sub>4</sub>O (II) in EtOH, treated with NH<sub>3</sub> for a short time, give a brick red ppt., II NH<sub>3</sub>, which darkens in the air. I (1 mol.) and 2 mol. II give a bluish black ppt., I II · 2NH<sub>3</sub>. Formulas are proposed for these compds. C. J. West.

**Reactions of aldoxime derivatives with bases** I. Charles R. Hann and C. I. Sullivan. *J. Am. Chem. Soc.* 55, 4611 (1933). Certain acetyl β-aldoximes react with NaOH to form partly nitrile and partly β-oxime. The following yields were obtained from acetyl β-benzaloximes and acq. alkali at 0°, 4 MeO 2, 6, 3 NO 3, 10 at 30°, 1 MeO 3, 30, 3 NO 2, 2. In EtOH at 0° 1 MeO 3, 30, 4 Cl 3, 60, 3, 3 methyl endoxy 22, 30, at 30° 1 MeO 6, 31, 4 Cl 6, 30, 3, 4 methylendoxy 64, 2. NaCO at 0° or 30° gave 70-90% of the corresponding nitrile. C. J. West.

**Cleavage of the aldehyde group as formic acid from aromatic aldehydes** I. Polychlorobenzaldehydes. Gunther Lock. *Ber.* 66B, 152 (1933). Certain aromatic aldehydes split off the CHO group quantitatively as HCOH with alkali. The cleavage seems to depend on the position and probably on the nature of the substituent. BrH and its m Cl, m Br, o and p Cl, the s NO and HO, p Me, p Et, p Ph and 2,5 Me, and 2,3, 2,4- and 3,4 Cl<sub>2</sub> derivs. have been studied. All of these, excepting the o and p HO C<sub>6</sub>H<sub>4</sub>CHO, react normally being disproportionated into acid and alcohol 2 C<sub>6</sub>H<sub>4</sub>CHO however is broken down quantitatively into o C<sub>6</sub>H<sub>4</sub>Cl and HCO<sub>2</sub>H, a new also 2,3,6 and 3,4,6 C<sub>6</sub>H<sub>3</sub>Cl<sub>3</sub>CHO and C<sub>6</sub>H<sub>3</sub>Cl<sub>3</sub>CHO. Either KOH or NaOH can be used, but not NaCO<sub>3</sub>, NH<sub>3</sub>, or PhNH<sub>2</sub>. NaCO<sub>3</sub> on the water bath does not attack 2,3,6 C<sub>6</sub>H<sub>3</sub>Cl<sub>3</sub>CHO and the NH convert it into an untypical glycol containing much of all hydro, CHCl or HCOH. Derivs. of m HO C<sub>6</sub>H<sub>4</sub>CHO and m MeO C<sub>6</sub>H<sub>4</sub>CHO in which the o position to the CHO group are occupied by Cl or Br (2,6, 3 Cl (HO)C<sub>6</sub>H<sub>3</sub>CHO) likewise split off the CHO group, while the 1,6 Br and 2-chloro-3-bromo derivs. are normally disproportionated. C. A. R.

**Synthesis of hydroxyephedrine** J. Amigos Anoro. *Rev. acad. cienc. Madrid* 3, 216 (1933). The properties and properties of hydroxyephedrine and related compds. are reviewed and over 100 references given. Hydroxyephedrine can be prepd. from hydroxyphenyl alkyl ketones. With the aid of AlCl<sub>3</sub> A prepd. from PhOH and EtCOCl or MeCH<sub>2</sub>BrCOCl, o and p hydroxypropionophenone, and the new compd., o and p hydroxyisobutyrophenone, HO C<sub>6</sub>H<sub>4</sub>COCH<sub>2</sub>CH<sub>2</sub>Me, of which latter the o compd. was volatile with steam and very irritant to the skin and mucosa, m 32°, and formed a 2,4-dinitrophenylhydrazon, orange, m 144°. The compd. not volatile with steam, m 81° (decolorate in 57%), 2,4-dinitrophenylhydrazon, dark red, m 117° (decompos.). The yields were 25-50%. The prepn. of 3,4-dihydroxypropionophenone (from pyrocatechol) and several of its derivs. is described, also o hydroxyphenyl a-methylaminoethyl ketone, HO C<sub>6</sub>H<sub>4</sub>COCH<sub>2</sub>(NHMe)<sub>2</sub>. Me. I. J. Gilson.

**The mechanism of the Perkin Oghaloro synthesis** M. Babin. *Rend. accad. sci. (Napoli)* [1] 2, 20 (1933). B gave credit to Oghaloro for the modification of the Perkin synthesis usually credited to Fittig. Intermediate compds. recently isolated in study of the reaction are iddin compd. between the salt and the acid or anhydride. The bond seems to be between the car-





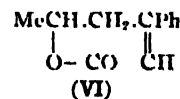
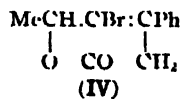
III with EtOH-KOH gives the K salt, crystals with 1.5 mols. H<sub>2</sub>O, of  $\beta$ , $\beta$ -dimethoxy- $\gamma$ -hydroxybutyric acid, m. 129° (decompn.); after 1 crvstn. from aq. MeOH about 50% was converted to III. I and Me<sub>2</sub>SO<sub>4</sub> in 20% NaOH gives  $\alpha$ , $\gamma$ -diphenyl- $\alpha$ , $\beta$ -dihydroxy- $\gamma$ -methoxybutyric acid, m. 201°, and a small amt. of a di-MeO acid, m. 148 9°.

C. J. West

**General method for the preparation of di- and tri-arylacetonitriles.** J. Hoch. *Compt. rend.* 197, 770 2 (1933); cf. C. A. 27, 3028.—The reaction of PhCHBrCN with C<sub>6</sub>H<sub>6</sub>, PhMe, *p*-xylene, PhOMe and C<sub>10</sub>H<sub>18</sub>; *p*-MeC<sub>6</sub>H<sub>4</sub>CHBrCN with PhMe and *p*-xylene; 1-C<sub>10</sub>H<sub>7</sub>CHBrCN with C<sub>6</sub>H<sub>6</sub> and 2-C<sub>10</sub>H<sub>7</sub>CHBrCN with *p*-xylene in the presence of AlCl<sub>3</sub> gave the following corresponding compds. (% yields in parentheses): Ph<sub>2</sub>CHCN, m. 76° (75%);  $\alpha$ -phenyl- $\alpha$ -(*p*-tolyl)acetoneitrile, m. 62° (59%);  $\alpha$ -phenyl- $\alpha$ -(2,5-dimethylphenyl)acetoneitrile, m. 52° (55%);  $\alpha$ -phenyl- $\alpha$ -(*p*-amyl)acetoneitrile, m. 127° (35%);  $\alpha$ -phenyl- $\alpha$ -(1-naphthyl)acetoneitrile, m. 98° (67%); di-*p*-tolylacetoneitrile, b<sub>18</sub> 212° (62%);  $\alpha$ -*p*-tolyl- $\alpha$ -(2,5-dimethylphenyl)acetoneitrile, b<sub>18</sub> 212° (62%);  $\alpha$ -phenyl- $\alpha$ -(1-naphthyl)acetoneitrile, m. 90° (35%); and  $\alpha$ -2,5-dimethylphenyl- $\alpha$ -(2-naphthyl)acetoneitrile, m. 106° (40%). PhCBrCN with C<sub>6</sub>H<sub>6</sub> and PhMe gave, resp., Ph<sub>2</sub>CCN, m. 128° (15% yield), and  $\alpha$ -phenyl- $\alpha$ , $\alpha$ -di-*p*-tolylacetoneitrile, m. 134° (33% yield). Ph<sub>2</sub>CBrCN likewise treated with C<sub>6</sub>H<sub>6</sub> and PhMe gave, resp., Ph<sub>2</sub>CCN, m. 128° (60% yield), and  $\alpha$ , $\alpha$ -diphenyl- $\alpha$ -(*p*-tolyl)acetoneitrile, m. 111° (62% yield).  $\alpha$ -Phenyl- $\alpha$ -(*p*-tolyl)- $\alpha$ -bromoacetoneitrile condensed with *p*-xylene gave  $\alpha$ -phenyl- $\alpha$ -(*p*-tolyl)- $\alpha$ -(2,5-dimethylphenyl)acetoneitrile, m. 148° (45% yield).  $\alpha$ -Phenyl- $\alpha$ -(2,5-dimethylphenyl)- $\alpha$ -bromoacetoneitrile with C<sub>6</sub>H<sub>5</sub>OMe gave  $\alpha$ -phenyl- $\alpha$ -(2,5-dimethylphenyl)- $\alpha$ -(*p*-amyl)acetoneitrile, m. 164° (45% yield). J. W.

**Course of the reaction in amalgam hydrogenations;  $\beta$ -phenylsorbic acid.** Richard Kuhn and Max Hoffer. *Ber.* 66B, 1263 73 (1933). The sym. diphenylpolyenes and carotenoid carboxylic acids which with Na and Al amalgams give  $\omega$ , $\omega'$ -dihydro compds. have pronouncedly "neg." substituents (Ph, CO<sub>2</sub>H) only at the ends of the polyene chains. Aliphatic polyenemonocarboxylic acids also undergo predominantly  $\omega$ , $\omega'$ -addn. What will happen with unsymmetrically situated "neg." substituents cannot be foretold, however. Burton and Ingold predicted that butadienes with 2 "neg." substituents in the 1,2-position would add H at the 1,2-position (C. A. 24, 39), but K. and Deutsch (C. A. 26, 4012) found that PhCH=C(CH<sub>3</sub>:CH<sub>2</sub>)CO<sub>2</sub>H adds H almost exclusively at the 1,4-position to form PhCH<sub>2</sub>C(CH<sub>3</sub>:CHMe):CO<sub>2</sub>H instead of PhCH<sub>2</sub>CH(CH<sub>3</sub>:CH<sub>2</sub>)CO<sub>2</sub>H. As, however, the latter acid is unknown and may be even more unstable than PhCH<sub>2</sub>CHCH<sub>2</sub>CO<sub>2</sub>H, which readily changes into MeC<sub>2</sub>H:CHCO<sub>2</sub>H,  $\beta$ -phenylsorbic acid, MeCH:CHCH:CH:CO<sub>2</sub>H (I), was carefully reduced with Na-Hg. Oxidative degradation of the product with KMnO<sub>4</sub> gave 27.5% HO<sub>2</sub>CCH<sub>2</sub>CHPhCO<sub>2</sub>H, 68.2% Br<sub>2</sub>OH, 29.0% AcOH and 70.0% EtCO<sub>2</sub>H. I therefore undergoes 70% 1,4- and only 30% 1,2-addn.; the 2 dihydro acids are so stable that a secondary formation of the  $\Delta^2$ - from the  $\Delta^1$  acid is improbable. K. and H. believe the 1st stage in the reduction is the addn. of 1 Na or H atom on a C atom adjacent to the "neg." substituents and that the relative extents of 1,2- and 1,4 addn. depend on the stability relationships of the tautomeric monohydro compds. In comparative expts. on sorbic acid with very carefully purified Na-Hg and ordinary Na-Hg prepd. in an Fe dish and handled with metal knives, no appreciable difference in the extent of 1,2-addn. was noted (40.2-3.0% with ordinary, 44.2-6.5% with purified Na-Hg). I was synthesized by condensing MeC<sub>2</sub>H:CHCO<sub>2</sub>Ph with BrCH<sub>2</sub>CO<sub>2</sub>Me in the presence of Zn to the Me ester (yield, 70%) of  $\beta$ -phenyl- $\beta$ -hydroxy-sorbic acid (II); this ester on listn. *in vacuo* with a few drops POCl<sub>3</sub> gave 40% of the Me ester of I. The free II smoothly splits off CO<sub>2</sub> and H<sub>2</sub>O above its m. p., and if the decompn. is carefully carried out *in vacuo* there is obtained 2-phenyl-1,3-pentadiene (III), which readily polymerizes to a clear viscous rubber. With Br in CHCl<sub>3</sub>, II simultaneously loses HBr and H<sub>2</sub>O,

forming a lactone C<sub>13</sub>H<sub>11</sub>O<sub>2</sub>Br (presumably IV) which is reduced by Zn dust and AcOH to the Br-free lactone C<sub>13</sub>H<sub>13</sub>O<sub>2</sub> (V). With alc. HCl, about half of V is converted into the Me ester of I and 1/4 of it rearranges into an isomer (presumably VI). The absorption spectra of the 2 lactones indicate clearly that the Ph and CO<sub>2</sub>O groups are in conjugation in VI but not in V. V is most simply obtained by treating II or its Me ester with AcOH-HCl. The Me ester, m. 58°, of II gives with Br in CS<sub>2</sub> a mono-Br deriv. m. 178-80° (m. ps. cor., Berl black). II m. 121-2°. IV, m. 110-0.3°, is sol. in dil. NaOH only after boiling some time. III, b<sub>18</sub> 85 6°, d<sub>4</sub><sup>20</sup> 0.915, n<sub>D</sub><sup>20</sup> 1.5500. Me ester of I, b<sub>18</sub> 154-6°, d<sub>4</sub><sup>20</sup> 1.049, n<sub>D</sub><sup>20</sup> 1.5040, I m. 133 4°. V m. 99-100°. VI, m. 63°, hardly decolorizes Br in CS<sub>2</sub> but reduces KMnO<sub>4</sub> in cold Na<sub>2</sub>CO<sub>3</sub>.



C. A. R.

**Addition reactions of unsaturated  $\alpha$ -ketonic acids. III.** Marie Reimer and Helen H. Kamerling. *J. Am. Chem. Soc.* 55, 4643 8 (1933); cf. C. A. 22, 3885. *m*-MeOC<sub>6</sub>H<sub>4</sub>CHO and AcCO<sub>2</sub>H give 90% of the K salt of *m*-methoxybenzalpyruvic acid (I), yellow, m. 116 7°; H<sub>2</sub>O<sub>2</sub> gives 96% of *m*-MeOC<sub>6</sub>H<sub>4</sub>CH:CHCO<sub>2</sub>H; Me ester, m. 57°; if the MeOH-HCl soln. is heated to boiling there results the di-Me acetal of the Me ester, m. 72°; this is not formed from the ester itself; Et ester, bright yellow oil. I and Br<sub>2</sub> in CHCl<sub>3</sub> give the dibromide, which could not be purified; shaken with cold H<sub>2</sub>O, it gives the  $\beta$ -Br deriv. (II), m. 166 7°; Me ester, m. 95°; oxidation gives  $\alpha$ -bromo-*m*-methoxycinnamic acid, m. 122°, in 81% yield; Me ester, pale yellow oil; 1 mol. Br<sub>2</sub> gives  $\alpha$ -bromo-*ti*-bromo-3-methoxycinnamic acid, cream, m. 167 9°; Me ester, m. 79°. I and excess Br give  $\alpha$ -bromo-*ti*-bromo-3-methoxystyrene, pale yellow, m. 90°. II and Br in CHCl<sub>3</sub> give  $\beta$ -bromo-6-bromo-3-methoxybenzalpyruvic acid, m. 137 9°, readily decomp. on standing in soln.; Me ester, m. 143°.

C. J. West

**Synthesis of cinnamic acids.** Julius v. Braun and Johannes Nelles. *Ber.* 66B, 1464-70 (1933).—*iso*-AmCH<sub>2</sub>(CO<sub>2</sub>H)<sub>2</sub> is instantly brominated in ether to the  $\alpha$  Br acid, decomp. 132°, which when heated several hrs. with 10-12 mols. concd. KOH gives *iso*amyltartronic acid, m. 134 6° (decompn.), and this is readily decarboxylated *in vacuo* to  $\alpha$ -hydroxyisocanthic acid, b<sub>18</sub> 150°, m. 60°. Bromohexahydrobenzylmalonic acid, m. 146° (decompn.), similarly obtained, yields hexahydrobenzyltartronic acid, decomp. 138 40°, decarboxylated to the oily acid C<sub>6</sub>H<sub>5</sub>CO<sub>2</sub>H, b<sub>18</sub> 170°, which on slow heating from 120° to 170° gives, in poor yield, cyclohexylacetaldehyde. A whole series of substituted cinnamic acids can be obtained, however, from substituted  $\alpha$ -bromomalononic acids. The latter split off both HBr and CO<sub>2</sub> on mere heating; they can also be treated with alkali first and then decarboxylated, or, as will probably generally be the more practicable way, they can be decarboxylated first and then treated with alkali. The practical significance of this method of synthesizing cinnamic acids is that the starting materials, RCH<sub>2</sub>Cl or RCH<sub>2</sub>Br (R = aryl), are often easily prepd. by halogenating aromatically bound Me groups or by introducing the CH<sub>2</sub>Cl group into aromatic compds. by means of HCHO and HCl. *p*-ClC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Cl and 1.2 mols. CH<sub>3</sub>(CO<sub>2</sub>Et)<sub>2</sub> give, together with di-Et bis(*p*-chlorobenzyl)-malonate, b<sub>18</sub> 220 30°, m. 99°, 50% di-Et *p*-chlorobenzylmalonate, b<sub>18</sub> 190 2°, rapidly and completely hydrolyzed by alkali to the free acid, m. 149-51° (decompn.), whose thick yellow oily  $\alpha$ -Br deriv. on decarboxylation at 160 70° in the vacuum of a water pump yields  $\alpha$ -bromo-*p*-chlorohydrocinnamic acid, b<sub>18</sub> 190°, m. 99°, this acid heated 2 hrs. with 30% NaOH gives *p*-ClC<sub>6</sub>H<sub>4</sub>CH:CHCO<sub>2</sub>H, m. 241°, which when heated several hrs. at 100° with AcOH-HBr, ddd. with water, filtered and warmed a short time with aq. Na<sub>2</sub>CO<sub>3</sub> yields *p*-chlorostyrene, b<sub>18</sub> 33 5°, d<sub>4</sub><sup>20</sup> 1.1554, n<sub>D</sub><sup>20</sup> 1.5742, polymerizes quite rapidly. Di-Et bis(*p*-bromobenzyl)malonate,

b<sub>0</sub>, 250-60°, m 104°, *Di-Et p-bromobenzylmalonate* (yield, 70%), b<sub>0</sub>, 193-8°, free acid, m 151-3° (decomps), forms an  $\alpha$ -B<sub>1</sub> deriv, m 88-102°, converted at 160° in the vacuum of a water pump in great part into *p*-BrC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>CHCO<sub>2</sub>H (I) (the elimination of HBr is effected quantitatively by treating the decarboxylation product with concd NaOH) which, through the chloride, b<sub>0</sub>, 175-80°, anilide, m 143°, and mucl chloride (Sonn and Muller method, C A 14, 1985), gives 60% *p*-bromo-*Ann*maldehyde, m 81° (semicarbazone, m 240), *phenylhydrazones*, yellow, m 145°  $\beta$ , *p*-*Dibromohydrocinnamic acid*, from I with HBr-AcOH at 100° in a sealed tube, m 182°, converted by short heating with Na<sub>2</sub>CO<sub>3</sub> into *p*-bromostyrene, b<sub>0</sub>, 88°, d<sub>20</sub> 1.100, n<sub>D</sub> 1.5933, which polymerizes quite rapidly (d after 6 days 1.126) and forms a dibromide, m 61° *Di-Et p-phenylbenzylmalonate* (yield, 65%), b<sub>0</sub>, 215°, free acid, m 185° ( $\alpha$ -Br deriv, m 133-5°), *bromohydrocinnamic acid* (II), m 140°, *p*-*phenylcinnamic acid*, m 225° (I ester, m 56°, forms a dihydrazones, m 128°, giving with hot alc KOH *biphenylpropionic acid*, m 165°) (*p*-*Phenylphenylalanine*, from II and concd NH<sub>4</sub>OH in sealed tubes at 100°, m 240) *Di-Et (1,5-dimethylbenzyl)malonate*, b<sub>0</sub>, 115-80°, free acid, m 135°,  $\alpha$ -Br deriv and *bromohydrocinnamic acid*, oils, *cinnamic acid*, m 125°  $\alpha$ -C<sub>10</sub>H<sub>7</sub>CHCl, m 80, obtained in 55% yield from C<sub>10</sub>H<sub>8</sub>, 5 parts concd HCl and 0.8 part formalin treated 10 hrs at 60-70° with HCl gas gives almost 80% C<sub>10</sub>H<sub>7</sub>CH(CO<sub>2</sub>Et)<sub>2</sub>, free acid, m 160°  $\alpha$ -Br deriv, m 155°, C<sub>10</sub>H<sub>7</sub>CH<sub>2</sub>CHCO<sub>2</sub>H, m 200,  $\alpha$ -*naphthacrolein* (precipd in 10% yield through the chloride, b<sub>0</sub>, 140°, and anilide, m 212°, light yellow b<sub>0</sub>, 160-10 m 18° (oxide, m 152° *semicarbazone*, light yellow, m 152° *acetylphenol condensation product* C<sub>10</sub>H<sub>7</sub>CH<sub>2</sub>CH(C<sub>6</sub>H<sub>5</sub>)CH(OH)Ph, deep yellow, m 117°) C A R

**Michael condensation** I Behavior of diethyl phenylmalonate in the Michael condensation Ralph Connor J Am Chem Soc 55, 1597 (1933) PhCH(CO<sub>2</sub>Et)<sub>2</sub> does not undergo the Michael condensation In EtOH EtCO and PhCHCOEt were formed and the latter condensed with  $\alpha,\beta$  unsatd ester or ketones In other media the only product isolated was a small amt of a cyclohexene deriv, C<sub>10</sub>H<sub>10</sub>(O)<sub>2</sub>, m 235, formed in CH<sub>2</sub> by the condensation of PhCHCOEt with 2 mols of benzilacetophenone (II) I was also precipd from Et  $\alpha$  3 diphenyl  $\gamma$  benzoylbutyrate and II with Na in CH<sub>2</sub>Cl  $\alpha$  phenyl  $\beta$  methylglutarate, b<sub>0</sub>, 130-5°, di-Et  $\alpha$  phenyl  $\beta$  dimethylglutarate, b<sub>0</sub>, 137-9° C J West

**Phenolic acids** IV Benzyl salicylate and its derivatives Iu Shun, Ma, Yen Hoo and Peter L I Science Repts Natl Tsinghua Uni A2 135 (1933) I C 1 27, 4227 Benzyl salicylate is most easily precipd by heating PhCHCl with Na salicylate in EtOH with Cu as catalyst, and the product is purified by vacuum distn Simply phys consts were detd b 211, d<sub>4</sub> 1.1791, d<sub>20</sub> 1.1751, n<sub>D</sub> 1.5405, n<sub>F</sub> 1.5787

Wm H Adolph

**Benzyl compounds of  $\alpha$ -hydroxy acids and their use in synthesis** I Derivatives of glycolic acid Hermann O I Fischer and Bruno Golik Helv Chim Acta 16, 1130 (1933) Attempts to prep ester like compds of HO acids by the aid of carbomethoxylated  $\alpha$  HO acid chlorides failed, in that, even in dil NH<sub>3</sub> solns, the difference between the resistance to hydrolysis of the protecting group and the peptide linkage was not sufficiently great to prevent total cleavage and consequent regeneration of the starting materials By employing the acid chlorides of *O*-benzylated HO acids and by removing the PhCH<sub>2</sub> group by catalytic hydrogenation in the presence of Pd (C A 26, 2704) various esters of glycolic and other HO acids have been precipd which may have biol significance To 20 g Na in 400 cc warm PhCH<sub>2</sub>OH was added gradually 30 g ClCH<sub>2</sub>CO<sub>2</sub>H in 30 cc PhCH<sub>2</sub>OH and the mixt was heated at 150° for 4 hrs After concn, extn with Et<sub>2</sub>O, and acidification with concd HCl the free acid was extd with Et<sub>2</sub>O The dry ether soln was evapd and on fractionation at high vacuum gave 53 g (75%) of *benzylglycolic acid* (I), C<sub>9</sub>H<sub>10</sub>O<sub>3</sub>, b<sub>0</sub>, 136° Treatment of 17 g of I in CHCl<sub>3</sub> with 20.7 g PCl<sub>5</sub> and removal of

the solvent and excess reagent produced a crude product which was distd rapidly at high vacuum and yielded 13 g (78%) of *benzylglycolyl chloride* (II), C<sub>9</sub>H<sub>9</sub>ClO<sub>2</sub>, b<sub>0</sub>, 81°, anilide, C<sub>11</sub>H<sub>11</sub>NO, m 19° Two g glycolic acid in 20 cc dry CHCl<sub>3</sub> was shaken in the cold with 1.1 mols of PhNMe and 1 mol of II and stood for 24 hrs at room temp After washing, drying and removing the CHCl<sub>3</sub>, the neutralized AcMe soln of the product was extd with Et<sub>2</sub>O and acidified with concd HCl The dried ether oil was evapd and on fractionation gave 2.15 g (36%) of *benzylglycolylglycolic acid* (III), C<sub>10</sub>H<sub>11</sub>O<sub>4</sub>, b<sub>0</sub>, 151°, m 79° One g Pd catalyst (C A 14, 1358) suspended in 10 cc glacial AcOH contained in a laking duck was satd with H and 1.68 g of III in 30 cc glacial AcOH was introduced The material absorbed 182.2 cc of H (calcd for II, 185.3 cc) at 761 mm and 15° The reduced material was filtered, freed from AcOH and yielded 0.8 g (80%) of thick prisms of *glycolylglycolic acid*, C<sub>4</sub>H<sub>6</sub>O<sub>4</sub>, m 97.9° (Ann 312, 146 (1900)) A similar catalytic reduction of 1 g of monobenzylglycolyl  $\beta$ -D-fructofuranose, prepd from II and  $\beta$ -D-fructofuranose (C 1 24, 3757), produced 0.6 g (77%) of monoglycolyl  $\beta$ -D-fructofuranose, C<sub>10</sub>H<sub>16</sub>O<sub>8</sub>, m 128° Similarly were produced  $\alpha$ -glycolylglycerol, *triglycolylglycerol*, *triglycolylmonosaccharoneglucose*, *triglycolylglucose* and *pentaglycolylglucose* but only in an oily or amorphous state These compds were estimated either by an alkalimetric detn of the introduced glycolic acid residue or by the formation of definite derivs by the complete acetylation or benzylation of the poly HO combination product C R Addinall

**Lichen substances XXXI Constituents of some Usnea species, with special reference to the compounds of the salazinic acid group** (1) Yashiko Asahina and Iyo taro Fukumoto Ber 66B, 1255-65 (1933), Cf C 1 27, 3318 The thalli are exhausted with boiling ether, the ext is evapd and the residue extd with hot benzene (soln 1 and residue B) The thalli, freed from ether sol constituents, are then extd with hot acetone and the ext is concd, if the lichen contains salazinic acid (I) the product which seps at this point is exhausted with ether, which leaves a residue C Soln 4 on concn usually yields a mixt of ummic acid (II) and atranorin (III), sepd by treatment with alc NaOAc in which only II is sol Residue B on purification gives protoctetraric acid, C<sub>14</sub>H<sub>16</sub>O<sub>6</sub> (IV), having all the properties of ramalinic acid From eq acetone it seps sometimes with, sometimes without, 1 mol H<sub>2</sub>O which is very firmly held and cannot be at once removed at 110°, that it is water of crystn is shown, however, by the formation of an anil C<sub>14</sub>H<sub>16</sub>O<sub>6</sub>NPh, m 225° (decomps) On long boiling with EtOH, IV is converted into cetraric acid, C<sub>12</sub>H<sub>14</sub>O<sub>6</sub> (V), while MeOH gives a protoctetraric acid Me ether (VII), which in all probability is identical with Hesse's methylprotoctetraric acid (J prakt Chem 70, 465) Catalytic hydrogenation gives hypoprotoctetraric acid, C<sub>14</sub>H<sub>18</sub>O<sub>6</sub> Residue C from lichens free from I is a neutral product (VIII), m around 211°, whether it is closely related to or perhaps even identical with Hesse's barbatin (Ann 284, 169) has not yet been detd Residue C from those lichens whose thalli give a red or rust-red color with alkali consists either of I or its Me ether (IX) That I in its reduction to hyposalazinic acid may also give hypoprotoctetraric acid has been confirmed *Usnea montis Fuji* (Motyka), whose thallus gives with KOH a deep yellow color soon becoming blood-red, gave 0.17% III, 0.53% II, IV and 4.2% I *U florida* Hoffm & perplexans Wm, whose marc gives a red KOH reaction, yielded 0.8% II, barbatin $\alpha$  acid (X), 0.27% IV and 3.77% I A species of *Usnea* from Java belonging to the *longissima* group and giving a KOH reaction similar to that of *U montis Fuji* yielded 1.7% II, IV(?) and 6% IX, which decomps 210-20°, is insol in NaHCO<sub>3</sub> sol in alkalis with yellow color changing to red-brown, gives a purple color with alc FeCl<sub>3</sub>, and forms a yellow anil and an acetate, m 227°, which gives no color with alc FeCl<sub>3</sub> *U longissima* Ach from Japan, whose thalli give a neg color reaction with KOH, yielded 1% II, 1% X, and 0.5%

VIII, which gives no color in alk with either  $\text{FeCl}_3$  or bleaching powder.  $\text{L. longissima}$  from Europe gave 3% II, 0.8% X and 0.1% VIII. A species of Japanese *Usnea* stands morphologically between *L. longissima* and *L. montis Fuji* and whose thallus gives a distinctly yellow, but not red, color with KOH yielded 1.2% II, 0.7% X, 0.6% III and 0.3% VIII. The lichen from Jesso which had been designated *L. trichodes* (C A 21, 2262) really belongs to the *longissima* group; its thallus gives only a light yellow color with KOH. This lichen yielded 5.6% II, cvermic acid and VIII. C A R

**Ursolic acid.** II. Oxidation of ursolic acid and its derivatives with chromic acid. S. Kikawa and I. Matsukawa. *J. Pharm. Soc. Japan* 53, 593 (1933), (C A 27, 192). K and M oxidized ursolic acid (I) and its derivs. with  $\text{CrO}_3$  and obtained various ketone compd., through which mutual relations of these compd. are explained. Oxidation of I with  $\text{CrO}_3$  in  $\text{AcOH}$  gave ursonic acid (II), m 251°, monoxime, m 216° semicarbazone, decomp. 209°. A small amt of a neutral compd., probably ursonic lactone, m 228°, was obtained as by-product. I and  $\text{CH}_3\text{N}$  gave 21 ml of Me ester, one (III), m 230°, 1 mol of m old AcMe, the other (IV), m 172°, 1 sol in AcMe. On oxidation with  $\text{CrO}_3$  both these compd. gave the same monoketone, Me ursinate (V), m 193.5°, which was previously described by Jacobs and Fleck (C A 25, 468). Oxime, m 211.2°. II and  $\text{CH}_3\text{N}$  also gave V. J considered that the ester m 110.20° and 1 sol in AcMe was the pure compd., while the one m 230° and 1 sol in AcMe was an impure product. Oxidation of III with  $\text{CrO}_3$  equiv. to 3 O, or by Kiliams reagent gave a ketone Me ester,  $\text{C}_{30}\text{H}_{48}\text{O}_2$ , m 190°. J et al. obtained by means of Kiliams reagent a diketone,  $\text{C}_{30}\text{H}_{46}\text{O}_2$ , m 161°. Oxime m 210.11°. The diketone was obtained by K and M as follows. I and AcO gave acetylursolic acid, m 291°, which was oxidized with  $\text{CrO}_3$  equiv. to 1 atom O to ketacetylursolic acid (VII), m 290.7°, monoxime, m 249.500° phenylhydrazine, m 300° semicarbazone, m 284° (decomp.). Sapon of VII with 10% KOH gave ketoursolic acid, decomp. 278.80°, monoxime, m 261.6°. VII and  $\text{CH}_3\text{N}$  gave Me ketacetylursolate (VIII), m 212.4°, monoxime, m 228.30°. VIII was also obtained by oxidation of Me acetylursolate (IX), m 216.7° which was in turn obtained from IV and AcO. Sapon of VIII with 10% KOH gave Me ketoursolate (X), m 162°. Oxidation of X gave Me ketoursolate (XI), m 196.1°, 1 sol in MeOH, 1 sol in  $\text{CHCl}_3$  dioxime m 211.2°. The dioxime of Jacobs diketone m 210.11°. This discrepancy can be explained by assuming that K and M's dioxime exists in anhyd form. To clarify this point, the mono phenylhydrazine, decomp. 231.6°, was obtained from XI. This was reduced by  $\text{Na}$  to the phenylpyrazole deriv., m 24°. From this it is concluded that XI is a  $\beta$  diketone having a  $\text{COCH}_2\text{COMe}$  group. Oxidation of VI with excess  $\text{CrO}_3$  gave ketacetyldehydroursolic acid (XII), decomp. 30°, oxime, decomp. 355°. XII and  $\text{CH}_3\text{N}$  gave Me ketacetyldehydroursolate (XIII), m 239.41°, which was also obtained from IX by oxidation, oxime, m 213°. Sapon of XIII with 10% KOH gave Me ketodehydroursolate (XIV), m about 135°. Sapon of XII gave impure ketodehydrouronic acid which on methylation gave XIV. By a diagram mutual relationships of these compds. are explained. Nao Y et al.

**Preparation of depsides by means of azides.** Rodolfo O. Pepp. *Notas sobre quim. Argentina* 21, 53 (1933) (C A 24, 4295).—Me gallate was prepd. as in Beilstein, Ld. 4, 10, 483. This was converted into the tri Me deriv. as in Ber. 35, 2544. By use of the method of Beilstein, Ld. 4, 10, 484, for other hydrazides, trimethylgalloyl hydrazine was prepd. The latter forms a characteristic ketone deriv. with acetone. By use of the method of J. prakt. Chem. [2] 52, 240 (1895), for other azides, trimethylgalloylazide was prepd. I. M. Symmes.

**Synthesis of dihydroisosthol.** Constitution of osthol. Masataro Yamashita. *Bull. Chem. Soc. Japan* 8, 276-80 (1933).—The condensation of resorcinol with isocyanitrile by the Hoesche reaction yielded a crude reaction

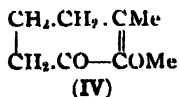
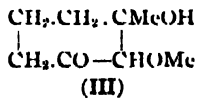
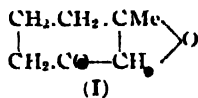
product hydrolyzed to an only substance (I) forming an oxime, 2,4-dihydroxyphenyl isobutyroline,  $\text{C}_{11}\text{H}_{11}\text{NO}_3$ , m 203.5°, identical with that of the corresponding ketone prepd. by Bohme (C A 20, 2320). I was reduced to 2,4-dihydroxyisobutylbenzene, converted by the Pechmann reaction into 6-isobutyl-7-hydroxycoumarin,  $\text{C}_{14}\text{H}_{14}\text{O}_3$ , m 104.10°. Methylation with  $\text{CH}_3\text{N}$  or with MeI and MeOH KOH yielded 6-isobutyl-7-methoxycoumarin (II),  $\text{C}_{15}\text{H}_{14}\text{O}_3$ , m 61.2°. This in p differs by about 20° from that of dihydroosthol. The constitution of dihydroosthol appears therefore to be different from that suggested by Butenandt (C A 26, 3796), a fact supported by the recent work of Spith and Peete (C A 27, 5712). II has been designated dihydroosthol. C A R

**Reaction between some acid chlorides and esters.** I. P. Kyrides and M. N. Dvonikoff. *J. Am. Chem. Soc.* 55, 1630 (1933). I gumol amts of phthalyl chloride and diethyl phthalate react in presence of traces of  $\text{ZnCl}_2$  to give excellent yields of  $\text{C}_6\text{H}_4(\text{CO})\text{O}$  and  $\text{EtCl}$ , other alkyl esters of  $\text{C}_6\text{H}_4(\text{CO}_2\text{H})$  react similarly, except that the yields of the alkyl chlorides are lower because of the formation of larger amts of alkynes. Succinic esters and succinyl chloride react in the same manner.  $\text{BzOEt}$  and  $\text{BzCl}$  react with  $\text{ZnCl}_2$  at higher temps. to give fair yields of  $\text{BzO}$  and  $\text{EtCl}$ .  $\text{BzCl}$  and phthalic ester react to give alkyl chlorides and presumably a mixt. of the anhydrides of the acids is the main reaction product. The same is true of the reaction of phthalyl chloride and  $\text{BzOEt}$ . C J West.

**Tautomerism of phthalyl bromide.** Wm. Davis, Arthur N. Hambley and Geo. S. C. Summers. *J. Chem. Soc.* 1933, 1509-15. Cryst. phthalyl bromide, b 191°, b 134°, m 78.81°, d<sub>4</sub> 1.509, results from  $\text{C}_6\text{H}_4(\text{CO})\text{O}$  and PBr or PBr<sub>3</sub> at 100° for 24 hrs. and then at 100.6° for 36 hr. or from  $\text{C}_6\text{H}_4(\text{COCl})$  and HBr at 150.60° for 2 hrs., a study of its rates of reaction with iso-PrOH shows it to have the cyclic formula. When melted and heated to 90° it exists as the acyclic compd., as is shown by parachor data, and the rate of reaction with iso-PrOH and PhNH<sub>2</sub>. The 2 forms are tautomeric. The iside could not be prepd. C J West.

**Autooxidation of  $\alpha,\beta$  unsaturated ketones.** VII. W. Feib. *Ber.* 66B, 118, 92 (1933) (C A 27, 346). The autooxidation of camphor and piperitone in alk. alk. has been shown to consist in addn. of mol. O to the ketone, cleavage of  $\text{H}_2\text{O}$  from the addn. product, oxidation of unchanged ketone to the keto oxide by this  $\text{H}_2\text{O}_2$ , and rearrangement of the oxide on addn. of alk. at the oxide union under the catalytic influence of the alkali. The study has now been extended to other similar ketones. The oxide (I) of 3-methylcyclohexanone (II), prepd. according to Weitz and Scheller (C A 16, 1252), b 201.2°, d<sub>4</sub> 1.07,  $n_D^{20}$  1.4621, gives with KOH in boiling MeOH an unstable addn. product (III) which immediately loses  $\text{H}_2\text{O}$  to form the ether (IV), b 220°, d 1.040,  $n_D^{20}$  1.4844. The same ether is formed by autooxidation of II. Similarly the oxide, b 212.15°, d<sub>4</sub> 1.07,  $n_D^{20}$  1.4630, of 3,3-dimethylcyclohexanone, forms an ether, b 228.80°, d 1.011,  $n_D^{20}$  1.4798, also obtained by autooxidation of the ketone. Carvotanacetone behave like camphor. The oxide, b 118.20°, d 1.0129,  $n_D^{20}$  1.4355, in part rearranged by KOH in MeOH into the unstable hydroxy-carvotanacetone, m 181°, and in part adds MeOH to form the ketoglycol Me ether,  $\text{C}_{11}\text{H}_{16}\text{O}_3$ , b 143.30°, d<sub>4</sub> 1.052,  $n_D^{20}$  1.4130, both of which are also obtained by autooxidation of the ketone. Carvotanone react just like piperitone. The oxide, b 118.22°, d<sub>4</sub> 1.001,  $n_D^{20}$  1.4811, heated 20 min. with excess of alkali in MeOH, gives the H<sub>2</sub>O acid  $\text{C}_{10}\text{H}_{16}\text{O}_3$ , m 78°, obtained from piperitone, and in iso-meric acid, m 114.15°, which strongly depresses the m p of the acid of the same m p obtained from piperitone, forms no lactone but loses  $\text{H}_2\text{O}$  on short heating with 20%  $\text{H}_2\text{SO}_4$ , giving an unsat. acid  $\text{C}_{10}\text{H}_{14}\text{O}_2$ , b 216.5°, d<sub>4</sub> 1.006,  $n_D^{20}$  1.4735, which, from its const., is closely related to, perhaps identical with, carvonic acid. If an excess of  $\text{H}_2\text{O}$  is used in prepg. the oxide of the autooxidation is carried out in hot soln., the oxide

is further oxidized to the tertiary alc.  $C_9H_{16}O$  which, however, unlike the isomer from piperitone, splits off  $H_2O$  in the alk. soln., giving the yellow hydrocarbon  $C_9H_{14}$ ,  $b_{20}$  50° 5',  $b$  152° 8',  $d_{20}^{20}$  0.840,  $n_D^{20}$  1.4758. Carvone, although it readily absorbs 1 mol.  $O_2$  in alk. alc., is converted by  $H_2O_2$  only with difficulty into the oxide,  $b_{20}$  105–10°,  $d_{20}^{20}$  1.020,  $n_D^{20}$  1.4823, which in boiling alk. MeOH slowly adds MeOH to form the ketoglycol *Me ether*,  $b_{20}$  135–7°,  $d_{20}^{20}$  1.034,  $n_D^{20}$  1.4727. If the ketone in alk. MeOH is treated rapidly and without cooling with 1 mol.  $H_2O_2$  there is obtained a small amt. of a cryst. substance  $C_{20}H_{32}O_3$  (formed in greater yield (up to 15%), together with the above ether, by autooxidation of the ketone), consisting of a mixt. of 2 isomers,  $m$  215° and 217° (mixed  $m$ . p., 180°), sepd. by cautious crystn. from warm dil. MeOH or AcOEt. Each forms a semicarbazone, decomp. 260° and 254°, resp., and is exceedingly stable toward chem. agents ( $KMnO_4$ , Br,  $H$ ). They are probably formed by aldol condensation of the oxide, with elimination of  $H_2O$ , and are possibly cis-trans isomers, differing from each other in the relative positions of the 2 rings united by a double bond. The main product of the autooxidation of the ketone is an alkali-sol brown resin  $C_{20}H_{32}O_3$ . *l*-Verbenone oxide,  $b_{20}$  118–20°,  $d_{20}^{20}$  1.063,  $[\alpha]_D^{20}$  –105.6° (semicarbazone, decomp. 216°), with hot alc. KOH very slowly yields 10.5% of the isomeric hydroxyverbenone,  $m$  119–21° (semicarbazone,  $m$  191°; acetate,  $b_{20}$  158–60°,  $d_{20}^{20}$  1.078,  $n_D^{20}$  1.4875). The HO compd. is very stable in alk. soln., but in solid form or in neutral or acid soln. it is changed extremely rapidly by  $O$ . Alc. cannot be added to the oxide under the influence of alkali. The ketone in alk. alc. readily absorbs 1 mol.  $O_2$ ; a small amt. of the oxide is present in the volatile part of the product. Unlike the other ketones described above, isophorone is difficultly autooxidizable although it is easily and completely converted into the oxide,  $b_{20}$  208–11°,  $d_{20}^{20}$  0.998,  $n_D^{20}$  1.4591 (semicarbazone, decomp. 216°), which with alc. MeOH gives, together with a little of the colorless hydroxyisophorone,  $m$  92–3°, chiefly the *Me ether* of the latter,  $b$  221–3°,  $d_{20}^{20}$  0.971,  $n_D^{20}$  1.4803, which is hydrolyzed to the HO compd. by  $HCl$  AcOH on the water bath, and is formed in the slow and incomplete autooxidation of the ketone. *Pulegone oxide*, formed from the ketone by long continued action of  $H_2O_2$  in the presence of alkali and the min. amt. of water,  $b_{20}$  125–7°,  $m$  40°,  $d_{20}^{20}$  1.008,  $[\alpha]_D^{20}$  6.6°,  $n_D^{20}$  1.4670, is very slowly hydrolyzed by alkali to acids, without adding alc. The ketone autooxidizes slowly and incompletely; the high  $d$ . of the higher-boiling, volatile neutral part of the product and its high  $O$  content point to the formation of the oxide. The addn. of alc. under the influence of alkali, to all the  $\alpha,\beta$ -unsatd. ketone oxides (except those of verbenone and pulegone) thus far studied, always occurs in such a way that the alkoxy group adds to the C atom adjacent to the C=O group. If the newly formed HO group is tertiary,  $H_2O$  at once splits off. One or 2 long side chains (Ph, amyl, cinnamyl) in the 3- and 5-positions do not materially decrease the autooxidizability of the ketones but do make their conversion into the oxides more difficult or impossible. Like piperitone, the ketones which are easily converted into the oxides by alk.  $H_2O_2$  (carvone, isophorone, verbenone) are also slowly converted into the oxides by  $H_2O_2$  in neutral alc. soln. Mineral acids catalyze the action of  $H_2O_2$  somewhat less than alkali, yielding chiefly keto glycols.



Neutral products of oxidation of pinene. II. K. Jawiński and W. Zacharewicz. *Roczniki Chem.* 12,

854–61 (1932); cf. *C. A.* 26, 5933. The fraction,  $b_p$  88–97°, of the neutral oxidation products of pinene yields norpinic acid, originating from pinonaldehyde, and a dibromide,  $C_{10}H_{16}O_2Br_2$  (I),  $m$  116°, on treatment with NaOBr; with NaOH the products are pinonic acid and a keto-alc.,  $C_{10}H_{16}O_3$  (II),  $m$  35°,  $b_p$  98–9° (semicarbazone,  $m$  204°, *l*- and *l*-benzylidene derivs.,  $m$  78–9° and 98°), which is also obtained by eliminating Br from I. Since pinene glycol yields *l*-pinonaldehyde on oxidation with  $K_2Cr_2O_7$  it is concluded that the original neutral fraction consists of pinene glycol, *l*-pinonaldehyde and II. B. C. A.

**Camphenilone and its derivatives.** Pascal Snitter. *Bull. inst. pin* 1933, 178–80, 200–11. Prep'n of camphenilone (I) by Komppa and Hintikka's method (*C. A.* 6, 1594) by oxidation of camphene with  $N_2O$  is long, tedious and expensive, and, contrary to K. and H., who claimed a 90% yield, S. could not obtain more than a 60% yield. The technique was modified by generating the  $N_2O$  by action of  $HNO_3$  and  $O_2$  on  $As_2O_3$  (instead of starch) and dehydrating the gas before passing into a petr. ether soln. of camphene. Almost complete oxidation of 150 g. camphene could thus be readily obtained in 6 hrs. and produced 65% of I,  $m$  (after rectification under vacuum in a Dupont column) 37°,  $b$  192°,  $b_{16}$  81°,  $d_{20}^{20}$  0.980,  $n_D^{20}$  1.469, mol. refraction 39.5 (calcd. 39.5) (semicarbazone  $m$  221°); at 37° it dissolves nitrocellulose to form a homogeneous paste. The structural formula given by Lipp (*C. A.* 7, 3739) was confirmed. Attention is drawn to the advantages of I as a f.-p. solvent; its f.-p. const. is about 600 (as compared with 39 for AcOH). The Raman spectrum is given. Reduction of I by Na and alc. gives camphenylol (II) together with a small amt. of pinacol; attempts to hydrogenate I in presence of Pt black were unsuccessful. II gives with  $PCl_5$  90% of camphenyl chloride,  $m$  54°,  $b_{16}$  70–6°. Camphenylene, obtained in 38% yield by reduction of II by  $EtONa$  at 120°,  $m$  26.5°,  $b$  138–40°, contains no santal (contrary to Meerwein, *C. A.* 8, 3183 and Komppa and Hintikka). The Raman spectra of camphenylene and of apobornylene are given, and show that the camphenylene obtained was practically pure, contg. only about 2.5% apobornylene. A Papineau-Contour.

**Synthetic camphor.** V. I. Tishchenko and G. A. Rudakov. *Lesokh. Prom.* 1, No. 5–6, 24–5 (1932). A review dealing particularly with research carried out in Russia. A. A. Bahtlingk.

**The preparation of camphor by the dehydrogenation of borneol and isoborneol with metallic catalysts.** F. K. Sivov, M. M. Korotueva and M. P. Kochueva. *J. Chem. Ind. (Moscow)* 1933, No. 3, 52–6. Cu and CuO are poor catalysts for this reaction. The best catalyst is Ni, prep'd. by grinding intimately sulfate-free  $Ni(OAc)_2$  and wood charcoal and reducing. Borneol is dissolved in 6% of its wt. of xylene and 250% paraffin, and 1% alkali is added. The mixt. must be free from  $H_2O$ . The catalyst is added in portions at 250–60°, with stirring. The yields are 85% and are somewhat better with isoborneol. H. M. Leicester.

**Optical isomerism and blood-pressure-lowering action.** Julius v. Braum and Anni Jacob. *Ber.* 66B, 1161–4 (1933). *d*-Rotatory fenchone,  $[\alpha]_D^{20}$  53.18° (the optically homogeneous compd. has  $[\alpha]_D^{20}$  65°), was converted with  $NaNH_2$  into the fencholic amide and thence with Br and alkali into the fenchyl isocyanate,  $[\alpha]_D^{20}$  2.5° (pure compd., 3.04°), which with  $Me_3NCH_2CH_2OH$  yielded the carbamate  $C_{10}H_{17}NHCO_2CH_2CH_2NMe_3$ ,  $b_{16}$  168–71°, and this with MeI in a little MeOH gave the choline deriv.  $C_{10}H_{17}NHCO_2CH_2CH_2NMe_3I$  (I),  $m$  74°,  $[\alpha]_D^{20}$  5.18° (MeOH). *l*-Rotatory fenchone was prep'd. from thuja oil and freed from a persistently adhering impurity by treatment with a little  $NaNH_2$  in benzene; it  $m$  5.2°,  $[\alpha]_D^{20}$  –66.8°,  $d_{20}^{20}$  0.9484, and was therefore quite pure. It yielded, like the *d*-rotatory compd., a fencholic amide,  $m$  94°,  $[\alpha]_D^{20}$  –5.85° (MeOH), –6.67° (benzene) (the *l*-fencholic acid prep'd. from this amide  $b_{16}$  144–5°, solidifies 16–18°,  $d_{20}^{20}$  0.9739 (0.9762),  $[\alpha]_D^{20}$  –3.61° to –3.66°; chloride,  $b_{20}$  118–19°,  $d$  1.0050,  $[\alpha]_D^{20}$  4.04°; *Et ester*,  $b_{20}$  115–17°,

d, 0.9115,  $[\alpha]_D^{25} = -3.753^\circ$ ). *Fenchyl isocyanate*,  $b_{12}$  82-3°,  $[\alpha]_D^{25} = -2.96^\circ$  (without solvent). *Choline deriv.* (II) (antipode of I), m. 75°,  $[\alpha]_D^{25} = -6.39^\circ$  (MeOH). Both I and II lower the blood pressure, I less than II. They also increase the peristalsis of the smooth musculature of the earthworm, I at a diln. of 1:50,000 and II only at 1:1000. Moreover, as I was not optically homogeneous and was about 20% racemized, the ratio of the physiol. activity of the 2 pure optical isomers must be even greater than 50:1. C. A. R.

**Stereochemistry of biphenyls.** XXXIV. 2,2',4,4',5,5',6,6'-Octamethylbiphenyl-3,3'-disulfonic acid and biphenyl-3,3'-disulfonic acid. A. E. Knauf and Roger Adams. *J. Am. Chem. Soc.* 55, 4704-9 (1933); cf. C. A. 27, 5734.-2,4,5,6-Me<sub>4</sub>C<sub>6</sub>HBr and Mg give 21% of 2,2',4,4',5,5',6,6'-octamethylbiphenyl (bisoduryl) (I), m. 121.2°; with ClSO<sub>3</sub>H at 0° there results 77% of the 3,3'-disulfonfyl chloride, m. 150-60°; the free acid was resolved by strychnine; the less sol. distrychnine salt m. 248-51° (decompn.),  $[\alpha]_D^{25} = -21.3^\circ$ ; the more sol. salt had  $[\alpha]_D^{25} = -10.3^\circ$ ; the *l*- and *d*-NH<sub>4</sub> salts had  $[\alpha]_D^{25} = -11.4^\circ$  and  $11.2^\circ$ , which showed no change on continued boiling. I and ClCH<sub>2</sub>COCl with AlCl<sub>3</sub> give the 3,3'-dichloroaceto deriv., m. 183-4°; the 3,3'-diaceto deriv. m. 184°; attempts to replace these groups were unsuccessful. Biphenyl-3,3'-disulfonic acid could not be resolved; *brucine salt*, m. 268-70°,  $[\alpha]_D^{25} = -25.3^\circ$ ; *strychnine salt*,  $[\alpha]_D^{25} = -30^\circ$ . C. J. West

**Syntheses in the bi- and terphenyl series.** II. Julius v. Braun, Gerhard Irmsch and Johannes Nelles. *Ber.* 66B, 1471-83 (1933); cf. C. A. 21, 2470.—The attachment of the *p*-PhC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub> group (I) to N and S is strikingly less firm than that of PhCH<sub>2</sub> (C. A. 18, 1830). To determine what influence the lengthening of the chain by another Ph residue to *p*-(*p*-PhC<sub>6</sub>H<sub>4</sub>)C<sub>6</sub>H<sub>4</sub> (II) and hydrogenating 1 or 2 aromatic residues in I and II would have on the firmness of attachment of these groups, the following compds. have been prep'd. (all substituents in the *p*-position): C<sub>6</sub>H<sub>5</sub>Ph (III), C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>X (X = Cl or Br) (IV), PhC<sub>6</sub>H<sub>4</sub>Ph (V), PhC<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>X (VI), C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>Ph (VII), C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>X (VIII), C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>Ph (IX), C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>X (X). *p*-Cyclohexylbenzaldehyde (XI) was obtained in small yield in 3 ways: (1) III, AlCl<sub>3</sub> and CuCl in benzene treated 15 hrs. with CO + HCl gave 14-16% XI,  $b_{12}$  160° (semicarbazone, m. 220°; oxime, m. 88°; aniline condensation product (XII), m. 122°; acetone condensation product, faintly yellow, m. 77°). With alkali (Cannizzaro) XI gives *p*-cyclohexylbenzoic acid, m. 198°, and *p*-cyclohexylbenzyl alc.,  $b_{12}$  162°, m. 41°, also obtained easily from the chloride (IV, below) by treatment with AcOH-KOH and alk. sapon. of the resulting acetate,  $b_{12}$  184°, m. 47°. (2) III with ClCO<sub>2</sub>Et gives 30% of the ester C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>Et, thick yellow oil,  $b_{12}$  215-25°; the free acid (48% yield), m. 111°, gives with PhNH<sub>2</sub> 50% XII which yields 6% XI (based on the III used). (3) III (3 mols.) allowed to stand 12 hrs. with 1 mol. anhyd. chloral and 0.25 mol. AlCl<sub>3</sub> gives 23% (based on the chloral) of the addn. product C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>CH(OH)CCl<sub>3</sub>, thick yellow oil,  $b_{12}$  215°, which is quite smoothly converted into XI by boiling satd. K<sub>2</sub>CO<sub>3</sub>. The most striking property of XI is its extraordinarily pleasant citral-like odor, which it loses on acetalization; the *di-Et acetal*  $b_{12}$  181°. Ph<sub>2</sub>, dry trioxymethylene and ZnCl<sub>2</sub>, treated in the cold with HCl gas, give about 20% *p*-PhC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Cl,  $b_{0.3}$  130°, m. 68°, and 12% 4,4'-bis(chloromethyl)biphenyl, m. 136°,  $b_{12}$  235°; the latter with hot aq. alc. KCN gives the faintly yellowish dicyanide, m. 184°, with BzH the dibenzal deriv., decomp. 256°, and with hot HCl in sealed tubes at 130°, biphenyl-4,4'-diacetic acid, m. 270-3° (*di-Et ester*,  $b_{0.3}$  204-6°, m. 55°). Under the same conditions III gives 50% *p*-chloromethylhexahydrobiphenyl (IV, X = Cl), a viscous liquid oxidized by hot 30% HNO<sub>3</sub> in sealed tubes to *p*-C<sub>6</sub>H<sub>4</sub>(CO<sub>2</sub>H)<sub>2</sub> and converted by short treatment with NHEt<sub>3</sub> into the compd. C<sub>6</sub>H<sub>4</sub>(C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>NEt<sub>3</sub>)<sub>2</sub>,  $b_{0.1}$  125° (methiodide, m. 186°). The mixt. of *cis*- and *trans*-*p*-C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>OH obtained by condensing C<sub>6</sub>H<sub>5</sub>OH with PhOH and hydrogenating the resulting C<sub>6</sub>H<sub>5</sub>C<sub>6</sub>H<sub>4</sub>OH

yields quantitatively with 66% HBr in sealed tubes at 120° a mixt. of the *cis*- and *trans*-bromides,  $b_{12}$  150-5°, which with AlCl<sub>3</sub> in C<sub>6</sub>H<sub>6</sub>-CS<sub>2</sub> yields cyclohexylcyclohexene,  $b_{12}$  110°, a mixt.,  $b_{0.3}$  130-50°, of much *m*-C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>Ph with a little IX (as shown by dehydrogenation with Se at 300° to *m*-C<sub>6</sub>H<sub>4</sub>Ph<sub>2</sub> and 15% V), and a compd. *p*-(*m*-C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>)<sub>2</sub>C<sub>6</sub>H<sub>4</sub>, m. 145°, which gives pure *p*-C<sub>6</sub>H<sub>4</sub>(CO<sub>2</sub>H)<sub>2</sub> with HNO<sub>3</sub> and is dehydrogenated by Se to an isomer, m. 232°, of quinquephenyl. By treating 2 *p*-cyclohexylcyclohexanone in the usual way with PhMgBr, boiling the product with 20% H<sub>2</sub>SO<sub>4</sub>, brominating the resulting decahydroterphenyl (XIII),  $b_{12}$  225-30°, m. 97-8°, and heating the product at 180° under 6 mm. is obtained 70% hexahydroterphenyl (VII), which m. 85° and is dehydrogenated to V by Se. *p*-BrC<sub>6</sub>H<sub>4</sub>Ph is conveniently prep'd. in a similar manner: *p*-C<sub>6</sub>H<sub>4</sub>Br<sub>2</sub> is treated with Mg activated with I and cyclohexanone and the product is boiled with 20% H<sub>2</sub>SO<sub>4</sub>, giving a little octahydroterphenyl, C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>, m. 110° (which is readily hydrogenated to *p*-C<sub>6</sub>H<sub>4</sub>(C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>, m. 101°), and tetrahydro-*p*-bromobiphenyl, C<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>Br,  $b_{12}$  175-80°, m. 73°, which, brominated as above and heated *in vacuo*, yields pure *p*-BrC<sub>6</sub>H<sub>4</sub>Ph, m. 80°. This with Mg and cyclohexanone yields tetrahydroterphenyl which, however, cannot be completely freed of the carbinol even by boiling with H<sub>2</sub>SO<sub>4</sub> and is therefore treated in ether with HCl gas to replace the OH group by Cl, and HCl is split off with pyridine; the hydrocarbon, m. 146-8°, is now nearly pure and with Pd and H gives VII but in such poor yield that the method cannot compete with that described above for prep. VII. With Pd and H in acetone XIII gives a mixt. of dodecahydroterphenyl (IX), m. 86°, and a liquid stereoisomer (XIV)  $b_{0.2}$  144°, which rearranged practically completely into IX when heated 2 hrs. in CS<sub>2</sub> with 0.02 mol. AlCl<sub>3</sub> and, like IX, is smoothly dehydrogenated to V by Se. More energetic hydrogenation of XIII (with Ni and H at 200°) gives octadecahydroterphenyl (XV), also in 2 stereoisomeric forms: crystals m. 162° and 55-7°, resp. (this is also true of all the less highly hydrogenated derivs. of V and even of V itself); neither of the isomers can be rearranged into the other with AlCl<sub>3</sub>, however. Hexadecahydroterphenyl, prep'd. like XIII from *p*-cyclohexylcyclohexanone and C<sub>6</sub>H<sub>5</sub>MgBr,  $b_{12}$  190°, m. 111-13°, gives the 2 isomeric XV with Pd and H. Attempts to introduce the CH<sub>2</sub>Cl group into V were entirely unsuccessful and VII did not give much better results with the isomeric IX and XIV the reaction was more satisfactory; XIV with trioxymethylene, ZnCl<sub>2</sub> and HCl gas and subsequent treatment with NHEt<sub>3</sub> gave the base C<sub>22</sub>H<sub>17</sub>N (less than 10%),  $b_{0.4}$  185-90°. 4,4'-Dibromoterphenyl (85% from V in C<sub>6</sub>H<sub>5</sub>Cl<sub>2</sub> with 4 atoms Br and a little I), m. 312-13°; the mother liquors yield only little of the mono-Br compd. (XVI) which could also not be obtained in any appreciable yield by using only 2 atoms Br. *p*-Cyclohexylcyclohexanone with *p*-C<sub>6</sub>H<sub>4</sub>Br<sub>2</sub> and Mg yields 45% 4-bromodecahydroterphenyl (XVII),  $b_{0.3}$  180-90°, m. 97-8°, which, treated in the cold with 2 atoms Br and then at 160° with 8 more atoms Br until the evolution of HBr ceases and distd. *in vacuo*, gives pure 4-bromoterphenyl (XVI), m. 230-2°; the mother liquors contain bromohexahydroterphenyl, m. 148°. Along with XVII is formed a little eicosahydroquinquephenyl C<sub>22</sub>H<sub>17</sub>(C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>,  $b_{0.7}$  250°, m. 240-5°. XVI is as resistant as V to HCHO and HCl. 4-Methyldodecahydroterphenyl C<sub>6</sub>H<sub>4</sub>(C<sub>6</sub>H<sub>4</sub>CH<sub>3</sub>)<sub>2</sub> (80% from *p*-MeC<sub>6</sub>H<sub>4</sub>MgBr and *p*-cyclohexylcyclohexanone), m. 108-10°,  $b_{0.7}$  165°, gives on hydrogenation a mixt. of stereoisomeric 4-methyldodecahydroterphenyls, m. 82° and 36-8°, dehydrated by Se to 4-methylterphenyl, m. 206-8° (76% yield), which is oxidized by CrO<sub>3</sub> to terphenyl-1-carboxylic acid, m. 305°, and converted by adding  $\frac{1}{4}$  mol. Br dropwise to the C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub> soln. into 4-bromomethylterphenyl (VI, X = Br), m. 210° (70% yield); this with NHEt<sub>3</sub> gives the base PhC<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>NEt<sub>3</sub>, m. 133°. C. A. R.

**Preparation of *p*-nitrophenetole from *p*-nitrochlorobenzene.** II. Shinjiro Aoyama and Kozo Nanai. *J. Pharm. Soc. Japan* 53, 613-22 (1933).—In the 1st paper (*Bull. Imp. Hyg. Lab.*, Tokyo 42, 235 (1933)) the authors

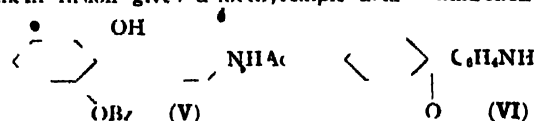


stated that among many catalysts investigated, the mixt of  $MnO_2$  and  $Co_2O_3$  (I) was the most suitable. This paper deals with the influence of various factors such as concn of alkali or alk on the yield and purity of the product. By the proper use of I the reaction can be so controlled that the side reactions are suppressed and the main reaction is augmented to make the process a tech possibility. I can be used repeatedly. The amt of I to be used depends mainly on the concn of alk and to some degree on the amt of alkali and the vol of alc. If 80% alc is used the concn of alkali ( $NaOH$ ) should be 4% or less; if the alkali is below 2.2 mols, the amt of I should be 10% of the  $p-O_2NC_6H_4Cl$  (II). If the alkali is increased to 2.7 mols, the amt of I is to be raised to 25%. If the concn of alkali is more than 80%, the formation of dichloroxybenzene is rapidly increased and 100% of I is required. The addn of  $Cu$ ,  $Fe$ , glycerol or  $NaOAc$  does not influence the speed of the reaction. If the concn of alkali is greater, the amt of alkali and the heating time can be lessened. I. g., when 95% alc is used, the heating time can be halved and only 80% of alkali is required as compared when 68% alc is used. An increase in the concn of alk increases the yield and purity of  $p-O_2NC_6H_4OH$  (IV), but decreases the yield of  $p-O_2NC_6H_4OH$  (IV), while increase in alkali and length of heating time increase the purity of III and the yield of IV but decrease the yield of III. Example. Heating for 15 hrs 200 g II, 110 g  $NaOH$ , 50% alc, 100 g  $MnO_2$ , 2 g  $Co_2O_3$  gave 92% of 98% pure III and 8% of IV.

**Preparation of nitroanisole from  $\epsilon$ -nitrochlorobenzene** S. Aoyama and J. Morita. *J. Chem. Soc. Japan* 53, 224 (1932). The authors studied the influence of various factors concerned in the prepn of 1,4- $NO_2$  (II) from 1,2- $NO_2$  (I) and  $p-O_2NC_6H_4Cl$  (II). In general the prepn of I is much easier than the prepn of 1,4- $NO_2$  (II) from 1,2- $NO_2$  (I) (see previous abstr.). If the reaction is carried on under ordinary pressure with nitric acid as catalyst, a suitable amt of dichloroxybenzene (III) is produced while the yield of I increases. By the use of the catalyst of  $Cu$  (part 1, 4) ( $CuCl_2$  + glycerol) or of the author's  $MnO_2$  +  $Co_2O_3$ , the formation of III is prevented. The most important factor is the concn of  $NaOH$ . The lowering of the concn of  $NaOH$  tends to retard the formation of  $p-O_2NC_6H_4OH$  (IV) but does not affect the yield and purity of I, the best concn being 8%. If the concn is more than 9%, the formation of III is increased. The amt of alkali ( $NaOH$ ) used should be 1.6 mols for 1 mol of II when the reaction is carried under pressure and 2.2 mol under ordinary pressure. If the amt of alkali is increased, the yield of I decreases but that of IV increases. The purity of I however increases with the increased amt of alkali as well as with the increased heating time up to 20 hrs, but its yield decreases. The heating time should be more than 20 hrs under ordinary pressure but 10 hrs if the reaction is carried under pressure at 70–80° for 3 hrs at 100°. Example A. Under ordinary pressure, 20 g II, 120 cc 95%  $MeOH$ , 11 g  $NaOH$ , 2 g  $MnO_2$  and 0.2 g  $Co_2O_3$  are heated 20 hrs to give 90% of 98% pure I and 10% of IV. Example B. 40 g II, 240 cc 95%  $MeOH$ , 11 g  $NaOH$  are heated at 70° under pressure to give 88% of 98% pure I and 2.5% of IV. N 1.

**Decomposition of basic and phenolic diphenylmethane derivatives and the synthesis of optically active aromatic compounds** II. Julius v. Braun, Ernst Anton, Werner Huesel, Gerhard Imrich, Robert Michaelis and Wilhelm I. uffert. *Ann.* 507, 143 (1933), cf. C. A. 23, 1687. PhAc (1 mol) and 2 mol  $PhOH$  with concd  $HCl$  gives, after 5 days, about 10% of dihydroxytriphenylmethane (I),  $m$  165°,  $b_p$  235–240° heating at normal pressure gives  $PhOH$  and  $p$ -hydroxydiphenylmethane (II) 18–90° ( $Ac$  deriv,  $b_p$  180–2°  $p$ -nitrobenzyl deriv,  $m$  70°), at 240° I absorbs more than 1.2 atoms  $H$ . Tetralone and  $PhOH$ , heated with concd  $HCl$  12 hrs at 100°, give about 10% of the phenol,  $C_{10}H_{10}O$   $b_p$  235–40° (1 g deriv,  $b_p$  240°). The  $Ac$  deriv,  $m$  252°, of the  $Me$ - $C_6H_4NH_2$  condensation product gives with  $HNO_3$ -

$H_2SO_4$  after 0.5 hr at 40° a  $di-NO_2$  compd,  $m$  190°, after 15 min there results a mono  $NO_2$  compd,  $m$  165°. Elimination of the  $Ac$  group gives the diaminodinitro compd (II), brown red,  $m$  214°,  $SnCl_4$  gives the tetra amine,  $m$  148° (phenanthrazine,  $C_{14}H_{10}N_4$ , yellow,  $m$  217° bis(methylbenzimidazol) compd,  $m$  225°). Elimination of the  $NH_2$  groups from II gives the  $m$ - $di-NO_2$  compd of 1,1-diphenylpropane,  $m$  101°  $m$ - $di-NH_2$  deriv,  $m$  125° ( $HCl$  salt,  $m$  150.5°,  $di$   $Ac$  deriv,  $m$  213°) through the diazo reaction there is formed  $m$ -dihydroxydiphenylpropane  $m$  114° ( $di$   $Bz$  compd  $m$  121°). The  $di$   $NO_2$  compd of the  $di$   $Ac$  deriv of the condensation product of  $PhNH_2$  and cyclohexanone  $m$  157° the free dinitrodiamino compd, brown,  $m$  245° reduction gives the tetraamino compd,  $m$  132° (phenanthrazine compd  $C_{14}H_{10}N_4$  yellow,  $m$  217°) removal of the  $NH_2$  groups gives the  $di$   $NO_2$  compd,  $C_{14}H_{10}N_4$ ,  $m$  113° reduced to the diamine,  $m$  147° ( $HCl$  salt,  $m$  150)  $di$   $Ac$  compd  $m$  214°  $Me$   $C(=O)$  and  $o$ - $Me$   $C_6H_4NH_2$  with  $HCl$  heated 10 hrs at 150°, give 40% of a methyl  $p$ -isopropylaniline  $b_p$  216° (monohydrate,  $m$  70.2°,  $HCl$  salt, only  $picrate$ ,  $m$  129°  $di$   $Ac$  compd,  $m$  201°) distn at 1 mm of the base with a very small amt of  $H_2SO_4$  gives  $o$ - $Me$   $C_6H_4NH_2$ , some mono  $m$ -isopropylaniline  $m$  132° ( $N$   $Ac$  deriv,  $m$  132°), and the dimer  $b_p$  233.5° ( $di$   $Ac$  deriv,  $m$  145°),  $di$  hydro deriv  $b_p$  215° ( $Ac$  deriv  $m$  164°)  $Me$   $C(=O)$  and  $o$ - $Cl$   $C_6H_4NH_2$  give 40% of the compd  $C_{14}H_{10}N_4$ ,  $b_p$  21° ( $Ac$  deriv,  $m$  149°) distn with a trace of  $H_2SO_4$  gives the dimer  $C_{18}H_{10}N_4$ ,  $b_p$  250.5° ( $Ac$  deriv  $m$  144°)  $Me$   $C(=O)$  and  $o$ -anisidine give 13% of the compd  $C_{14}H_{10}N_4$ ,  $b_p$  20.2° ( $HCl$  salt,  $m$  183°  $Ac$  compd only) the dimer,  $C_{18}H_{10}N_4$ ,  $b_p$  150.5°  $di$   $100^\circ$   $o$ - $H$   $NC_6H_4Ph$  and  $Me$   $C(=O)$  at 150° give at once the dimer  $C_{18}H_{10}N_4$  ( $Ac$  deriv,  $b_p$  260°)  $d$ -3-methylcyclohexanone and  $o$ -anisidine with 20%  $HCl$  and 1  $HOH$ , heated 200 hrs on the water bath or 8 hrs at 120° in a tube, give 10–20% of  $d$ -3-methylcyclohexenyl anisidine (III)  $b_p$  148.50°,  $m$  146° ( $HCl$  salt,  $m$  224°  $picrate$   $m$  162°  $Ac$  deriv,  $m$  80° dihydro deriv,  $b_p$  117.0°,  $m$  147° ( $Ac$  deriv,  $m$  51.3°  $HCl$  salt  $m$  233°) and 30–40% of dianisyl  $d$ -3-methylcyclohexane (IV),  $b_p$  240° ( $HCl$  salt,  $m$  215.7°) distn of IV with a little  $H_2SO_4$  gives III. Two preps prepd at 100° and 170° showed the following rotations at 20° (1  $HOH$  20.5°) III 12.01, 35.04 IV, 14.47, 10.10 III from IV, 10.01° 36.6° dihydro deriv of III  $b_p$  141.2°  $o$ - $Cl$   $C_6H_4NH_2$  gives 10% of methylcyclohexenyl chloroaniline,  $b_p$  158.60°,  $m$  53.70° ( $HCl$  salt,  $m$  184°  $Ac$  compd,  $m$  126°  $[\alpha]_D^{25}$  46.98° dihydro compd  $m$  17.20°  $[\alpha]_D^{25}$  1.57° ( $Ac$  compd,  $m$  97°  $[\alpha]_D^{25}$  5.99°) and 40% of methylcyclohexenyl chloroaniline  $b_p$  233.60°  $[\alpha]_D^{25}$  11.09°  $d$ -3-methylcyclohexenyl methyl lidine,  $m$  169°,  $[\alpha]_D^{25}$  -15.73° ( $HCl$  salt  $m$  236°  $picrate$   $m$  175°  $Ac$  compd,  $m$  176°)  $N$ -acetylcyclohexenylaniline and  $O_2$  give 50% of the ketoldehyde  $OH(C_6H_4)_2COC_6H_4NH_2$ ,  $m$  89–92° soln in  $Na_2CO_3$  gives the corresponding acid,  $C_{14}H_{10}O_4$   $m$  112° oxidation with  $KMnO_4$  or better with  $CrO_3$  gives the aminobenzo acid,  $C_6H_4O_2N_2$ ,  $m$  167°, giving with  $NaOH$  adipic acid. Reduction of the diazo compd gives the hydrazine,  $C_{14}H_{10}N_4$ ,  $m$  190.2°,  $BzNH_2$  gives the hydrazine  $m$  180°  $Ac$   $C_6H_4NH_2$ ,  $m$  185°. Oxidation of cyclohexenyl  $o$ -chloroaniline gives the acid  $C_{14}H_{10}O_4$ ,  $m$  151°. The compd  $MeC_6H_4C_6H_4NH_2$  on oxidation gives 25% of the  $Ac$  deriv,  $m$  110°, of the acid  $HO_2CCHMeC_6H_4CH_2CH_2CH_2CH_2CH_2NH_2$ ,  $m$  111° alkali fusion gives  $o$ -methyladipic acid. Oxidation of



cyclohexenylacetanilide with  $BzOH$  in  $CHCl_3$  gives the compd V, various fractions  $m$  from 142° to 214°, upon giving the oxide VI,  $m$  109° ( $Ac$  deriv,  $m$  142° quaternary iodide,  $m$  181°,  $picrate$ ,  $m$  167°)  $o$ -3-methyl-



NaOEt gave PhEtCHCH(CO<sub>2</sub>Rt)<sub>2</sub> (I), b<sub>p</sub> 154–6°; free acid (II) of I m. 70–70.6°. II on heating gave PhEt-CHCH<sub>2</sub>CO<sub>2</sub>H (III), b<sub>p</sub> 167 8°. III esterified and then reduced with Na and C<sub>2</sub>H<sub>5</sub>OH gave PhEtCHCH<sub>2</sub>CH<sub>2</sub>OH (IV), b<sub>p</sub> 135–8°. IV gave the bromide, b<sub>p</sub> 130 1°, which on treatment with NaCN gave the nitrile (V), b<sub>p</sub> 148 50°. Hydrolysis of V with concd. HCl gave the acid (VI), b<sub>p</sub> 185°, m. 104.5 5.5°. VI treated with SOCl<sub>2</sub> gave the acid chloride (VII), b<sub>p</sub> 138°. Cyclization of VII gave the tetralone (VIII), b<sub>p</sub> 148 50°; semicarbazone m. 183°. VIII by dehydrogenation with Se gave ethylnaphthol, m. 42°; picrate m. 152.5°. Julius White

**Catalytic dehydration of ionone and the constitution of ionone.** Marston T. Bogert and Victor G. Bourman. *J. Am. Chem. Soc.* 55, 4670 80(1933). Ionone (1,6-trimethyltetralin) (I) is conveniently prep'd. in excellent yield, by distn. of  $\alpha$ - or  $\beta$ -ionone with small amts. of I. Oxidation of I with KMnO<sub>4</sub> gives 43% of  $\beta$ -(2,4-dicarboxyphenyl)isovaleric acid (II), m. 220°, and 28% of  $\alpha$ -(2,4-dicarboxyphenyl)isobutyric acid, m. 217° (tri-Me ester, m. 91°); there is also formed a small amt. of  $\alpha$ -keto- $\beta$ -(2,4-dicarboxyphenyl)isovaleric acid, m. 140 5°, then 206°; these 2 correspond to the ionogenetic carboxylic acid and ionogenetic carboxylic acid of Tiemann and Kruger (*Ber.* 26, 2675, 2663(1893); 31, 808(1898)). I gives a sulfonic acid (the Na salt of which crystallizes with 5 mols. H<sub>2</sub>O), in 50% yield with concd. H<sub>2</sub>SO<sub>4</sub> at 90° for 2 hrs.; *Bz* salt, crystals with 3 mols. H<sub>2</sub>O; sulfonol chloride, m. 89°; sulfonamide, m. 157 8°. I and HNO<sub>3</sub> (d. 1.5) contg. P<sub>2</sub>O<sub>5</sub> give 58% of a dinitro deriv. (II), pale yellow, m. 103; catalytic reduction gives nitroaminonone, m. 171 (HCl salt, decomp. 235 9). *Ac* deriv. m. 158°. Oxidation of I with CrO in concd. H<sub>2</sub>SO<sub>4</sub>-AcOH gives 70% of  $\alpha$ -dinitroionone (III), pale yellow, m. 157 (oxime, m. 188.5°), refluxing III in Ac<sub>2</sub>O with a little H<sub>2</sub>SO<sub>4</sub> gives the  $\beta$  isomer, pale yellow, m. 99°; soln. in concd. H<sub>2</sub>SO<sub>4</sub> and pptn. with H<sub>2</sub>O gives III. Oxidation of II by refluxing the AcOH-H<sub>2</sub>SO<sub>4</sub> mixt. while Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> is added, gives  $\alpha$ -(2-carboxydinitrophenyl)isovaleric acid (IV), crystals with 1 mol. H<sub>2</sub>O, yellow, m. 150° and then at 177°, above its m. p., it loses CO<sub>2</sub>, giving  $\beta$ -dinitrophenylisovaleric acid, m. 166.5 8.5°. Oxidation of IV with KMnO<sub>4</sub> in H<sub>2</sub>SO<sub>4</sub> gives 54% of  $\alpha$ -(2-carboxydinitrophenyl)isobutyric acid, m. 170.5°; soly. 13 parts in 100 parts H<sub>2</sub>O at 100°. C. J. West

**Asymmetric syntheses. III. Action of optically active nitrates on  $\alpha$  tetralone.** W. H. Horne and R. L. Shriner. *J. Am. Chem. Soc.* 55, 4652 10(1933), cf. *C. A.* 27, 1330. Treatment of  $\alpha$  tetralone with *p*- and *l*-2-octyl nitrates in the presence of EtOK produces optically inactive salts of  $\beta$ -nitro- $\alpha$ -tetralone, m. 6.2°. C. J. West

**Polycyclic aromatic hydrocarbons. XI. Acetylation of 1,2-benzanthracene.** J. W. Cook and C. I. Hewitt. *J. Chem. Soc.* 1933, 1108 10, cf. *C. A.* 26, 4045. 1,2-Benzanthracene (I) (1 mol.) added to AlCl<sub>3</sub> in PhNO<sub>2</sub>, cooled in ice and kept at 0° for 4 hrs., gives 0.5 g. *p*-*Ac* deriv., pale yellow, m. 117°; *picrate*, orange red, m. 192°; *quinone*, orange, m. 196 7° and 0.3 g. *7-Ac* deriv. (II), pale straw, m. 151 2°; *picrate*, orange, m. 117 8°; *quinone*, orange, m. 219°. If the I was added so that the temp. did not rise above 0° there resulted 12.5 g. of the *picrate*, brick-red, m. 153.5 4.5°, of the *p*- or *10-Ac* deriv. (III), m. 104 5°, oxidation gives 1,2-benzanthraquinone; there also resulted 7 g. of II and a small amt. of a *picrate*, reddish brown, m. 187.5 8°. If the reaction mixt. is cooled in ice during the addn. and kept at room temp. for 4 hrs., there results as the chief product II; some 6-*Ac* deriv., pale yellow, m. 192.5 3.5°, also is formed (*quinone*, golden yellow, m. 197 9°). At 40° III is isomerized to II. The orientation of the 6- and 7-*Ac* derivs. was shown by the oxidation of their quinones to anthraquinone-1,2,6- and 1,2,7-tricarboxylic acids, resp. II and MeMgI give 7 (1,2-benzanthranthyl)dimethylcarbinol, m. 135°; dehydrogenation with concd. HCl in AcOH gives the dimer of  $\alpha$ -isopropenyl-1,2-benzanthracene, m. 218 51°. The poor yields of the *Ac* derivs. preclude their utilization for the synthesis of higher homologs of I. C. J. West

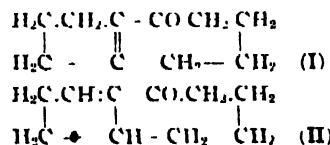
**Preparation of 1,2- and 2,3-diaminoanthraquinones.** P. H. Groggins and H. P. Newton. *Ind. Eng. Chem.* 25, 1030 3(1933).—Crit. studies show that 3',4'-dichloro-2-benzoylbenzoic acid (I) could be obtained in 80% yields by reaction 0.5 mol. phthalic anhydride, 1.1 mol. AlCl<sub>3</sub>, and 3 mol. *o*-C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub> at 90° for 8 hrs. with continuous stirring. I heated at 135° for 7.5 hrs. with 8 parts H<sub>2</sub>SO<sub>4</sub> gave 13% 1,2- and 87% 2,3-dichloroanthraquinone. The isomers could be sep'd. by differences in solv. in EtOH and concd. H<sub>2</sub>SO<sub>4</sub>. Ammonolysis of the pure dihalogen compds. with KClO<sub>4</sub>, CuO or Cu<sub>2</sub>O and NH<sub>4</sub>NO<sub>3</sub> at 200° completely removed the halogen. E. W. Scott

**Occurrence of anthraquinone dyes in the mineral kingdom (graebeite).** Alfred Treibs and Hermann Steinmetz. *Ann.* 506, 171 95(1933). Working with 14 mg. material extd. from a stone found in Ölsnitz numerous spectrographic data are given in an attempt to identify the dye which may be extd. with CHCl<sub>3</sub>; the only definite information found was that it probably is an anthraquinone dye; sublimation appears to give 2 products, termed graebeite a and b; the former analyzes for C<sub>18</sub>H<sub>8</sub>O<sub>4</sub> or C<sub>17</sub>H<sub>6</sub>O<sub>4</sub>. Spectrographic data are given for 1,2,4,5,8-penta-, 1,2,4,5,6,8-, 1,2,4,5,7,8- and 1,2,3,5,6,7-hexahydroxyanthraquinones. C. J. West

**Derivatives of phenanthrene.** Yu. S. Zalkind. *Aukhno-krasochyna Prom.* 2, 5 6, 7 10(1932). Poor yields were obtained in all steps leading to diazo compds. of phenanthrene (I). I was nitrated by introducing it into concd. HNO<sub>3</sub>, the mixt. of isomeric nitro compds. was reduced with H<sub>2</sub>S and aq. NH<sub>3</sub> in 95% alc., the mixt. of NH<sub>2</sub> compds. was diazotized and coupled with 1,4-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> O H, producing a dye which gave red dyeings on wool and silk. The work is being continued. C. B.

**Colored hydrocarbons. A blue hydrocarbon and several colorless hydrocarbons similar to it.** M. Badoche. *Ann. chim.* 20, 200 81(1933); cf. *C. A.* 26, 3250. A description of the hydrocarbons derived from the action of Na upon dehydronobrene, a di-Ph deriv. of dihydrodiphenylenenaphthacene, C<sub>22</sub>H<sub>20</sub>. Spectrophotometric detns. on dehydronobrene and several of its derived hydrocarbons are included. A bibliographic review on the addn. of alkali metals to the unsat'd. hydrocarbons is given.

W. J. Peterson  
**Stereochemistry of bicyclic ring systems. IX. Derivatives of cyclopentanocycloheptane.** Walter Huckel and Ludwig Schmitzspahn. *Ann.* 505, 274 82(1933); cf. *C. A.* 27, 3469.—Cyclopentanocycloheptanone (I or II), b<sub>p</sub> 123°, m. below 18°, d<sub>4</sub><sup>20</sup> 1.0364, n<sub>D</sub><sup>20</sup> 1.52814; *semicarbazone*, m. 195 200°; *oxime*, m. 151° (*Bz* deriv., m. 118°). Catalytic reduction of I gives *cis*-(III) and *trans*-cyclopentanocycloheptanone (IV), b<sub>p</sub> 235°; this is sep'd. through the oximes; III *oxime*, m. 119°; IV *oxime*, m. 140° (*Bz* deriv., m. 88 9°). Na and EtOH give the amines. *cis*-Cyclopentanocycloheptanamine gives 2 *Bz* derivs., m. 191° and 154°, and 2 *Ac* derivs., m. 161° and 151°. The *trans*-amine (V) b<sub>p</sub> 97°; *Bz* deriv., m. 173 1°; *Ac* deriv., m. 114 5°; HNO<sub>3</sub> gives an alc., whose *acid phthalate* m. 132 3°. V (18 g.) yields 20 g. of a quaternary iodide, m. 192°, which yields with Ag<sub>2</sub>O 8 g. cyclopentanocycloheptene (VI), b<sub>p</sub> 63.5°, d<sub>4</sub><sup>20</sup> 0.8996, n<sub>D</sub><sup>20</sup> 1.48711. With OsO<sub>4</sub> VI gives a *keto*ne, whose *semicarbazone* m. 183°. KMnO<sub>4</sub> gives  $\alpha$ -hydromednone



C. J. West  
**New compounds of the furan nucleus.** Al. Mirosescu and G. Ioanid. *Bul. soc. chim. Romania* 15, 40 52(1933). In the reaction between aromatic aldehydes, diketones, and NH<sub>3</sub> one of 3 types of compds. may be formed: an oxazole (I), an imidazole (II), or an open-branched-chain compd. (III). The authors investigated the reaction between C<sub>6</sub>H<sub>5</sub>OCOCOC<sub>6</sub>H<sub>5</sub>, NH<sub>3</sub>, and the following

aldehydes:  $\text{BzH}_2$ , anisaldehyde, furfural and piperonal. In each case a compd. of either type I or III was formed.

W. A. Moore

**Putrefaction of hydroxyproline** Werner Keil and Adolf Gintlya. *Z. physiol. Chem.* 221, 10-12 (1933) A culture medium contg. l-hydroxyproline, glucose, peptone and inorg. salts was inoculated with putril pancreas and incubated 12 days, with frequent neutralization of the acid formed. The bases were then pptd. with phosphotungstic acid and liberated by  $\text{Ba}(\text{OH})_2$ . Aside from a 10% recovery of unaltered hydroxyproline the only substance identified was  $\delta$ -aminovaleric acid which was isolated as the  $\alpha$ - $\text{C}_{10}\text{H}_7\text{NC}$  deriv. Since neither proline nor  $\text{H}_2\text{NCH}_2\text{CH}(\text{OH})(\text{CH}_2)_3\text{CO}_2\text{H}$  could be identified as an intermediate product it is not known whether the opening of the pyrrolidine ring occurs before or after reduction of the OH.

A. W. Dox

**Vegetable fish and insect poisons. VI. Relation of toxicarol to rotenone.** A. Butenandt and G. Hilgtag. *Ann.* 506, 158-74 (1933); cf. *C. A.* 26, 3796. The introduction discusses the tautomeric forms of rotenone (I) and the structure of toxicarol (II). Oxidation of I with  $\text{H}_2\text{O}_2$  in  $\text{EtOH}$ -KOH gives a small yield of toxicaric acid (III). Isorotenone gives an isoxime, m. 194°, which is optically inactive. Reduction of  $\beta$ -dihydrorotenone with Zn and KOH in  $\text{EtOH}$  gives  $\beta$ -dihydrorotenol, m. 110°, which gives a red brown color with  $\text{FeCl}_3$ . II (1 g.) in 40 cc.  $\text{Ac}_2\text{O}$  and 0.75 g.  $\text{AcONa}$ , refluxed 20 min., gives a monoacetate (IV), m. 182.5°, heating with  $\text{Ac}_2\text{O}$  for 2 days gives the diacetate (V). Oxidation of IV with 1 m.  $\text{EtOH}$  gives monoacetyldehydrotoxicarol, m. 235.6°. Dihydrotoxicarol (VI) and  $\text{H}_2\text{O}_2$  give III. VI and I give monomethoxydihydrotoxicarol, yellow, reduced by Zn and  $\text{AcOH}$  to dihydrodehydrotoxicarol (VII), m. 260°, acetate, m. 108.10°, decomps. 250°. V or the diacetate of VI, heated with 1 m.  $\text{EtOH}$  for 2 hrs., is recovered unchanged (85% yield). The hydrate of VI analyzes for  $\text{C}_{20}\text{H}_{20}\text{O}_8$  or  $\text{C}_{21}\text{H}_{20}\text{O}_8$ ; the acetate, m. 192; the benzate, m. 174°; warmed with  $\text{EtOH}$ - $\text{H}_2\text{SO}_4$ , it gives VII.

C. J. West

**New derivatives of 3,3-dimethylindolinones.** II Karl Brunner, et al. *Monatsh.* 62, 373-404 (1931), cf. *C. A.* 26, 724. 3,3-Dimethylindolinone (I) and concd.  $\text{H}_2\text{SO}_4$ , warmed 4-5 hrs., on a boiling water bath, give 97.6% of 3,3-dimethyl-2-thioindolinone-5-sulfonic acid (II), crystals with 2 mols.  $\text{H}_2\text{O}$ , m. 245.7°, purified through the *Ba* salt, crystals with 4 mols.  $\text{H}_2\text{O}$ , the *Ca* salt is anhyd. and the *Na* salt seps. with 2 mols.  $\text{H}_2\text{O}$ . The *Na* salt and  $\text{PCl}_5$ , warmed 0.75 hr. at 130.5°, give the chloride of II, m. 197°; the amide, m. 254.5°. Reduction of the chloride with Sn and  $\text{HCl}$  gives 81.2% of the 5-mercaptan, m. 156.7°, which gives with  $\text{ClCH}_2\text{CO}_2\text{H}$  in alkali the 5-thioglycolic acid (III), m. 193.1° (cor.) (*Na* salt). The 5-position for the  $\text{SO}_3\text{H}$  group is established by the synthesis of III from 5-amino-3,3-dimethylindolinone through the diazo reaction. (With Maria von Mikosch) I in concd.  $\text{H}_2\text{SO}_4$  contg. 30.2%  $\text{SO}_3$  forms a disulfonic acid (IV), crystg. with 1 mol.  $\text{H}_2\text{O}$ , the *Ba* salt seps. with 4 mols.  $\text{H}_2\text{O}$ , the *Na* salt with 3 mols.  $\text{H}_2\text{O}$ , while the *K* salt is anhyd.  $\text{Br}-\text{H}_2\text{O}$  gives the 5,7-Br deriv. and fuming  $\text{HNO}_3$  gives the 5,7-di-NO deriv.  $\text{Na}-\text{Hg}$  appears to split off only 1  $\text{SO}_3\text{H}$  group; 9%  $\text{NH}_4\text{OH}$  at 120° causes no decompos. (With Joseph Riedl.) 1 Methyl-3,3-dimethyl-2-indolinone gives a sulfonic acid, decomps. about 220°, seps. with 2 mols.  $\text{H}_2\text{O}$ ; the *Ba* salt seps. with 4 mols.  $\text{H}_2\text{O}$ , the *K* salt with 1.5 mols.  $\text{H}_2\text{O}$ , the *Na* salt with 0.5 mol.  $\text{H}_2\text{O}$ ; the acid and  $\text{Br}-\text{H}_2\text{O}$  give a di-Br deriv., m. 131°, fuming  $\text{HNO}_3$  also splits off  $\text{H}_2\text{SO}_4$ . 3,3,7-trimethylindolinone (V) also gives a sulfonic acid, whose *Ba* salt is anhyd. and whose *Na* salt seps. with 4.5 mols.  $\text{H}_2\text{O}$ . I and  $\text{P}_2\text{S}_5$  in  $\text{C}_6\text{H}_5\text{MgCl}$  give (92%) of 3,3-dimethyl-2-thioindolinone (VI), m. 108-9°;  $\text{HgCl}_2$  gives the compd.  $\text{C}_{10}\text{H}_{10}\text{NSHgCl}$ , m. 227.8°; the *Ag* salt is egg-yellow and with  $\text{MeI}$  gives the *Me* ether, m. 65°; VI gives a methiodide, m. 165°, which gives the *Me* ether with  $\text{Na}_2\text{CO}_3$ . VI and  $\text{ClCH}_2\text{CO}_2\text{H}$  give the thioglycolic acid, pale yellow, m. 151°. VI and  $\text{Ac}_2\text{O}$  give the *Ac* deriv., m. 39-40°; *Bz* deriv., m. 80°.

V gives a 2-thio deriv. (VII), m. 153-4°; the 2-thioglycolic acid m. 90°. VII is oxidized to a disulfide, m. 127.8°. 3,3,5-Trimethyl-2-thioindolinone, m. 167°; *Ag* salt, yellow; the thioglycolic acid, pale yellow, m. 136°; the disulfide m. 165°. 3,3,6-Trimethylthioindolinone, m. 135-6°.

C. J. West

**New synthesis for alkyl- and aryl-substituted coumarans.** Joseph B. Niederl and Edward A. Storch. *J. Am. Chem. Soc.* 55, 4549-55 (1933); cf. *C. A.* 27, 968. The condensation was carried out by refluxing for 5 hrs. molar quantities of the alc. and phenol in  $\text{AcOH}-\text{H}_2\text{SO}_4$  and distg. the polymer at atm. pressure.  $\text{CH}_3\text{CH}_2\text{OH}$  and  $\text{PhOH}$  give *o*-isopropenylphenol and 2-methylcoumaran, b. 208.12°,  $d^{25}_D$  1.028,  $n^{25}_D$  1.5302; *p*- $\text{MeC}_6\text{H}_4\text{OH}$  gives 4-methyl-2-isopropenylphenol and 2,4-dimethylcoumaran; *m*- $\text{MeC}_6\text{H}_4\text{OH}$  gives the 5-Me and 2,5-di-Me isomers, resp.; *o*- $\text{MeC}_6\text{H}_4\text{OH}$  gives 6-methyl-2-isopropenylphenol (penta-Br deriv., m. 190.1°) and 2,6-dimethylcoumaran, b. 253.8°,  $d^{25}_D$  0.993,  $n^{25}_D$  1.5289.  $\text{PhCH}_2\text{CH}_2\text{OH}$  and  $\text{PhOH}$  give 3-phenyl-2-(2-hydroxyphenyl)-1-propene, b. 193.6°,  $d^{25}_D$  0.953,  $n^{25}_D$  1.5027, and 2-benzylcoumaran, b. 308.11°,  $d$  1.061,  $n$  1.5760. *p*- $\text{MeC}_6\text{H}_4\text{OH}$  gives 3-phenyl-2-(2-hydroxy-5-methylphenyl)-1-propene, b. 208.12°,  $d^{25}_D$  1.000,  $n^{25}_D$  1.5314, and 2-benzyl-4-methylcoumaran, b. 320.5°, m. 198.9°,  $d^{25}_D$  1.017,  $n^{25}_D$  1.5778 (Br gives 2,3,5,6-tetrabromo-*p*-cresol); this differs from 1,4-dimethyl-2-phenylcoumaran, b. 310.4°,  $d^{25}_D$  1.080,  $n^{25}_D$  1.561, which was prepd. for comparison and which yields a penta-Br deriv., m. 249°. *m*- $\text{MeC}_6\text{H}_4\text{OH}$  gives 3-phenyl-2-(2-hydroxy-4-methylphenyl)-1-propene, b. 207.11°,  $d^{25}_D$  1.033,  $n^{25}_D$  1.5290, and 2-benzyl-5-methylcoumaran, b. 322.7°,  $d^{25}_D$  1.080,  $n^{25}_D$  1.5836. *o*- $\text{MeC}_6\text{H}_4\text{OH}$  gives 3-phenyl-2-(2-hydroxy-3-methylphenyl)-1-propene, b. 212.16°,  $d^{25}_D$  0.993,  $n^{25}_D$  1.5352, and 2-benzyl-6-methylcoumaran, b. 318.22°,  $d^{25}_D$  1.017,  $n^{25}_D$  1.5860. The coumarans form 50-65% of the reaction products. A reaction mechanism is discussed.

C. J. West

**Hydrolysis and reduction of hydantoinoxindoles** Harry R. Henze and Charles M. Blau. *J. Am. Chem. Soc.* 55, 4621-5 (1933). —The action of  $\text{Ba}(\text{OH})_2$  on the condensation products of hydantoin with isatin (hydantoin- $\beta'$ -oxindole) and 5-methylisatin (the 5-Me deriv., reddish brown, m. above 310° (I)) completely destroyed the hydantoin nucleus and reduced the isatin to the corresponding oxindole. Hydantoin-5,3-oxindole and its 5-Me homolog (II), m. 306.7°, differ toward  $\text{Ba}(\text{OH})_2$  in that the former gives 2-quinolin-1- $\alpha$ -boxylic acid and the latter 5-methylloxindole. While II is smoothly formed from I with  $\text{HI}$  in  $\text{AcOH}$ , reduction with  $\text{HI}$  and red P gives 2-keto-6-methyl-1,2,3,4-tetrahydroquinolin-4-carboxylic acid.

C. J. West

**Action of chlorine upon the 3-carbethoxy-4-hydroxy-1-nitrophenylpyrazoles.** F. D. Chattaway and D. R. Ashworth. *J. Chem. Soc.* 1933, 1389-93. —3-Carbethoxy-4-hydroxy-1-*p*-nitrophenylpyrazole and  $\text{Cl}$  in  $\text{CHCl}_3$  give 3,5-dichloro-3-carbethoxy-1-*p*-nitrophenyl-4-pyrazolone (I), orange, m. 131°; 1-(2'-chloro-4'-nitrophenyl) deriv., pale yellow, m. 87°; 1-*o*-nitrophenyl deriv., deep yellow, m. 98°; *m*- $\text{NO}_2$  isomer, yellow, m. 135°. I and  $\text{HI}$  (K1 in  $\text{AcOH}$ ) liberate I and give 5-chloro-3-carbethoxy-4-hydroxy-1-*p*-nitrophenylpyrazole, m. 146° (*Ac* deriv., m. 121.5°); 1-(2'-chloro-4'-nitrophenyl) deriv., m. 191°; 1-*o*-nitrophenyl deriv., m. 142°, *m*-isomer, m. 109°. The pyrazole ring in I readily opens when I is boiled with  $\text{EtOH}$  or dissolved in cold dil. alkali, giving *Et* diketosuccinate *p*-nitrophenylhydrazone (II), pale yellow, m. 125°; I and  $\text{MeOH}$  give the 1-Et 2-Me deriv., deep yellow, m. 138°;  $\text{PhOH}$  the 1-Et 2-Pr deriv., pale yellow, m. 92°;  $\text{PhCH}_2\text{OH}$ , the 1-Et 2-benzyl deriv., pale yellow, m. 147°. 1-Ethyl 2-methyl diketosuccinate 1-(2'-chloro-4'-nitrophenylhydrazone), yellow, m. 115°; the 2'-Br deriv., yellow, m. 126°; *Et* diketosuccinate *m*-nitrophenylhydrazone, yellow, m. 84°; 1-ethyl 2-methyl diketosuccinate 1-*o*-nitrophenylhydrazone, yellow, m. 116°; *m*- $\text{NO}_2$  isomer, pale yellow, m. 105°. 3-Carbethoxy-4-hydroxy-1-(2',6'-dichloro-4'-nitrophenyl)pyrazole and  $\text{Cl}$  in  $\text{CHCl}_3$  give the 5-Cl deriv., m. 200°. II and *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$  in  $\text{EtOH}$  give *Et* diketosuccinate *p*-nitrophenyl-

osazone, yellow, m. 180°; heating with  $C_6H_5N$  gives *Et 4,5-diketo-1-(4'-nitrophenyl)pyrazolone-3-carboxylate 1-(4'-nitrophenylhydrazonate)*, deep yellow, m. 257° (decompn.); other methods of prepn. are given. II and  $NH_4OH.HCl$  in EtOH give *Et diketosuccinate oximino-p-nitrophenylhydrazonate*, pale yellow, m. 163° (decompn.); AcONa in AcOH gives *3-carbethoxy-4-ketoisooxazolone 4-p-nitrophenylhydrazonate*, yellow, m. 186° (decompn.); this also results from II,  $NH_4OH$  and AcONa in AcOH at 100°. II, Br and AcONa in AcOH give *Et chromoglyoxylate p-nitrophenylhydrazonate*; Cl gives the corresponding  $\alpha$ -Cl deriv. I and dil. NaOH (2 g. NaOH in 500 cc.  $H_2O$ ) give *Et 2-II diketosuccinate p-nitrophenylhydrazonate* (III), yellow, m. 141°; the Et H or di-Et ester, boiled 0.7 hr. with 10 cc. EtOH and 20 cc. concd. HCl, gives *diketosuccinic anhydride p-nitrophenylhydrazonate*, orange, m. 243° (decompn.). III and  $Ac_2O$ , heated to boiling, give *3-carbethoxy-4,5-diketo-1-p-nitrophenylpyrazolone hydrate*, m. 95-105°;  $H_2O$  is lost after 1 week over  $P_2O_5$ ; the hydrate and  $NH_4OH.HCl$  in AcOH give *1-oximino-3-carbethoxy-1-p-nitrophenyl-5-pyrazolone*, yellow, decomp. above 222°.

C. J. West

**Alkylation of pyrazolones.** Adolf Sonn and Wolfgang Litten. *Ber.* 66B, 1582-8(1933).—In a series of ketonol compds. smooth C-alkylation was obtained only with easily dissolved alkyl halides (C. A. 27, 961). Similar phenomena have been encountered with ketimide-enamine tautomers of the phenyl-5-pyrazolone series. The loosely bound allyl and benzyl residues can be introduced into the 4 position of antipyrine (I) but the 4-derivs. could not be detected in the greatly resmified reaction products obtained by heating I with EtI and its homologs. From the oil obtained by heating I and EtI at 130-40° was isolated a small amt. of a cryst. substance m. 256°, perhaps identical with the product formed by condensation of 2 mols. 1-phenyl-3-methylpyrazolone (Mohr, *Ber.* 38, 2578(1905)). "1-ech. pyrazolone" (II) and  $PrBr$  at 130-5° gave only the *N-Pr* deriv. (1-phenyl-2-propyl-2-methylpyrazolone), light yellow, b.p. 220-40°, m. 90-1°, gives with  $FeCl_3$  a red, with nitrite a yellow, with  $K_2Cr_2O_7.H_2SO_4$  a yellow green color changed to green by a drop of water; *pyrate*, m. 155-8°. I reacts with  $PrBr$  only at 190° in sealed tubes; besides unchanged I, only II could be detected. Hexyl bromide reacts with II or I only at 200°; from the resin was isolated in unsatd. hydrocarbon which, from its b. p. (66-8°), was undoubtedly  $\alpha$ -hexene. On the other hand, II and I with allyl bromide at 120° gave 1-phenyl-3-methyl-4,4-diallylpyrazolone; I also gave a very small amt. of a substance, m. 79-81°, giving with  $K_2Cr_2O_7.H_2SO_4$  a green-blue color destroyed by diln. with water and which may therefore have been the 4-allyl compd., none of the 2,1-diallyl deriv. was detected. I boiled or heated in a tube at 180° with twice the calcd. amt. of  $PhCH_2Cl$  yielded a dibenzylpyrazolone, m. 139-40° (III), and (in the tube at 180°) some of the 4-benzyl deriv. II reacted in the same way in a tube at 180°, but if the mixt. was heated directly to boiling, there was formed, with much evolution of HCl, an isomeric etherol. *dibenzylpyrazolone*, m. 91° (IV). Both isomers were obtained from the 4-benzyl compd. with  $PhCH_2Cl$  and NaOH on the water bath (cf. Auwers and Dersch, C. A. 22, 3182, who obtained only III). The 2,4-deriv., m. 152°, was not observed in any of these benzylations. IV is thought to be the 4,4-compd., for with Na and  $AmCl$  it gives the 4-benzylpyrazolone and a small amt. of a product giving with  $FeCl_3$  the color reaction characteristic of hydroxypyrazolones, whereas the reactions of III with  $FeCl_3$  and  $C(NO_2)_4$  and its behavior toward Br point to the 4-benzyl-5-benzoyloxy-pyrazole structure. 1-Phenyl-2-benzyl-3,4-dimethyl-5-pyrazolone, from the dimethylpyrazolone and  $PhCH_2Cl$  (1:2.5 at the b. p. or 1:1 at 120°), m. 128.5-30°, is insol. in NaOH and easily sol. in concd. HCl and does not react with nitrite. 1-Phenyl-2-benzyl-5-methyl-3-pyrazolone, from the methylpyrazolone and  $PhCH_2Cl$  (1:1 at 120° or 1:2 at 180°), m. 103-4°; *pyrate*, m. 106-9°; HCl salt, m. 155-8°. 1-Phenyl-2-benzyl-5-pyrazolone, from the pyrazolone and

$PhCH_2Cl$  (1:1) at 120°, m. 125-6°, sol. in concd. but not in dil. HCl, gives a blood-red color with  $FeCl_3$ . 1-Phenyl-2-benzyl-3-methylpyrazolone (7.9 g.) with  $MeCl$  (1:3) at 150° gives 2.4 g. unchanged pyrazolone, 0.1 g. II, 1.9 g. I; with  $MeCl$  (1:1.5) at 180°, a resmified oil from which is isolated 0.5 g. 1-phenyl-3-methyl-4-benzylpyrazolone.

C. A. R.

**Acid chloride, ester and acid anilide of imidazole-4,5-dicarboxylic acid and their methyl and phenyl homologs.** Y. Tamamushi. *J. Pharm. Soc. Japan* 53, 580-92 (1933); cf. C. A. 23, 1639.—In order to learn the properties of imidazole-4,5-dicarboxylic acid (I), its acid chloride, ester and acid anilide were prepd. Heating of 2-methylimidazole-4,5-dicarboxylic acid (II) with  $PCl_5$  and  $POCl_3$  gave 2-methylimidazole-4,5-dicarboxylic acid 5-chloride (III), plates, m. above 300°, insol. in  $CHCl_3$ , EtOH and  $Et_2O$ . Esterification of II with HCl and EtOH gave the di-Et ester, needles, m. 88°, sol. in  $H_2O$ , EtOH and  $CHCl_3$ . HCl salt of II, m. 187°, sol. in  $H_2O$ , EtOH,  $CHCl_3$ , insol. in  $Et_2O$ . 2-Phenylimidazole-4,5-dicarboxylic acid gave the di-Et ester, needles, sol. in EtOH, difficultly sol. in  $H_2O$  and  $Et_2O$ . The anhyd. ester m. 190°, while the crystals with 1 mol.  $H_2O$  m. 120°. I or II and  $PhNH_2$  gave the corresponding monoanilides, but III and  $PhNH_2$  gave the unexpected dianilide (IV), m. 298°, sol. in  $H_2O$ , EtOH and  $Et_2O$ . It is explained that the  $CO_2H$  group at position 5 of the imidazoledicarboxylic acids cannot form anilide in free condition, but when it is in the form of  $-COCl$ , it easily gives the anilide. Nao Uyei

**Bis-3,3'-benzothiazolylene 1,2-dihydride.** R. Stollé and M. Merkle. *J. prakt. Chem.* 138, 221-4(1933).—The action of  $HNO_3$  upon 10 g. 3-amino-1,2-benzothiazole gives 3.7 g. of bis-3,3'-benzothiazolylene 1,2-dihydride (I), m. 104°; Ag salt. Fuming  $HNO_3$  oxidizes I to  $o$ - $HO_2SC_6H_4CO_2H$ ; red fuming  $HNO_3$  gives a compd., possibly  $(o$ - $HO_2SC_6H_4CO_2H)_2$ , whose  $NH_4$  salt m. 238°.

C. J. West

**Molecular rearrangement of some  $o$ -acyloxyacetophenones and the mechanism of the production of 3-acylchromones.** Wilson Baker. *J. Chem. Soc.* 1933, 1381-9. In an attempt to prep. its  $PhCH_2Cl$  ether, 4- $o$ -benzoylresacetophenone (I), m. 106-7° (Ac deriv., pale cream, m. 82-3°), was heated with 1 mol.  $PhCH_2Cl$  and  $K_2CO_3$ ; the product (20% yield) was  $\omega,1$ -dibenzoylresacetophenone (2-hydroxy-4-benzoyloxydibenzoylmethane) (II), yellow, m. 167°. It is evident that the  $PhCH_2Cl$  had taken no essential part in the formation of II and this is confirmed by its prepn. from I and also from resacetophenone (III) by the action of 1 and 2 mols. of  $BzCl$ , resp., in  $C_6H_6$  in the presence of  $K_2CO_3$  (yields, about 20%); 3 mols.  $BzCl$  and I reacted slowly and the yield was only 8%. The dibenzoate of III, m. 80-1°, heated with  $C_6H_6$  or  $PhMe$  and  $K_2CO_3$ , undergoes intramol. rearrangement, giving II. The migration concerns solely the  $o$ - $BzO$  group, since it occurs neither in I nor in  $p$ - $BzOC_6H_4Ac$  and further, if 2 different aryl radicals esterify the HO groups of III, only the 1 in the  $o$ -position migrates. 2- $O$ -Benzoyl-4- $O$ -acetylresacetophenone, from the  $O$ -Ac deriv. and  $BzCl$ , m. 67°, likewise rearranges in  $PhMe$  to II. Boiling II with AcOH and AcONa for 6 hrs. gives 7-hydroxyflavone; soln. of II in concd.  $H_2SO_4$  gives the same product; heating II with AcOH and a little concd. HCl gives 7-benzoyloxyflavone, m. 157-8°. The dianilide (IV) of III m. 118°; I and anisoyl chloride in  $C_6H_5N$  give 4- $O$ -benzoyl-2- $O$ -anisoylresacetophenone (V), m. 109-10°. Heating III and anisoyl chloride with  $K_2CO_3$  for 20 hrs. gives 7.9 g. of  $\omega,1$ -dianisoylresacetophenone (VI), yellow, m. 170-1°, and 20 g. 4- $O$ -anisoylresacetophenone, m. 151°, best prepd. by shaking an aq. alk. soln. of III with 1 mol. of anisoyl chloride. VI also results by rearrangement of IV or V. VI, AcOH and AcONa give 7-hydroxy-1'-methoxyflavone (*pratol*), m. 263-4°; the Ac deriv., m. 176-7°, is dimorphic (needles and plates). The diveratrate of III, m. 151-2°, gives  $\omega,1$ -diveratroylacetophenone, yellow, m. 159-60°; AcOH and AcONa give 7-hydroxy-3',4'-dimethoxyflavone, m. 265°. Gallacetophenone tribenzoate, m. 118-9°, with  $K_2CO_3$  in  $PhMe$  gives  $\omega,1,4$ -tribenzoylgallacetophenone, yellow, m.

1934, AcOH and AcONa give 7,8-dihydroxyflavone **III**, PhCH<sub>2</sub>CH<sub>2</sub>COCl and PhMe, heated for 8 hrs., give a mixt. of 1-*o*-methoxy-2-acetophenone, yellow, m 131°, and 1-cinnamoyloxy-2-acetylchromone, m 216.7°. 2-Hydroxy-4-benzoyloxyphenyl ketone m 121.2°. Br<sub>2</sub>/C, K<sub>2</sub>CO<sub>3</sub>, and PhMe give 7-hydroxy-2,3-diphenylchromone, m 190.1°, and 2-hydroxy-1-benzoyloxyphenyl benzyl ketone **III** or **II**, Br<sub>2</sub>O and Br<sub>2</sub>ONa, heated 8 hrs. at 20°, give 1-benzoyloxy-2-benzoylphenyl, pale yellow, m 167°. 2,4-AcMeC<sub>6</sub>H<sub>3</sub>OH, EtCOEt and Na give 2-propionylacetyl-4-methylphenol (**VII**), m 75.6°. AcOH and HCl give 6-methyl-2-ethylchromone, m 51. 2-Acetoacetyl-4-methylphenol (**VIII**), m 94.6°, gives 2,6-dimethylchromone, m 10°. **VII**, AcO and AcONa or **VIII**, (EtCO)<sub>2</sub> and EtCOONa give propionyl-2,6-dimethylchromone, m 82. The production of *o*-hydroxydibenzoylmethane by oxidation furnishes an explanation of the formation of the 3-acetylated chromones which are sometimes isolated when *o*-hydroxyacetophenone is heated with the anhydride and the Na salt of a carboxylic acid. The mechanism of the formation of chromone and 3-acetylated chromones is discussed. C. J. West.

**Pyrenium salts XXI. Bifluorenyl oxide.** W. D. H. and W. Hoskins, *J. prakt. Chem.* **138**, 115-58 (1933). Cf. C. A. **27**, 4498. Hydroxyflavonium perchlorate **I**, AcONa and AcO, refluxed 0.5 hr., give 10% of 1,1,1-trifluorene, 3-oxide **II** red, m 232.60 (decompn.) dissolves in dark green, soln. are bleached by sunlight. **II** is obtained in EtOH from **I** with AcONa if the EtOH soln. is heated only 0.5 hr., there results is the principal product, 4-hydroxy-4,4-bifluorene, yellow, m 192.5, crystal with 0.5 mol C<sub>2</sub>H<sub>5</sub>, warming in AcOH gives **II**. The mother liquor of **II** contains 1,1-bifluorenyl oxide **III** and **IV** (decompn.), 1,1-bifluorenyl oxide, from 3,4-dihydroxydibenzoylmethane m 134°, solid dark red, m 238.5, the 7,1-difluorene, dark red, m 226.34 (44%), the 3,1-difluorene, red, m 233.10 (10%), the 7,1-trifluorene, dark red, m 260. C. J. W.

**Decomposition of wogonin with caustic alkali.** formation of isretol. Shunzo Hattori and Kozo Hayashi, *J. Chem. Soc. Japan* **54**, 919-21 (1933). Cf. C. A. **27**, 3431. Heating of 1 g wogonin **I** with 17 g 50% KOH gives 0.5 g isretol (**II**) and 0.2 g PhCOH. Formation of **II** from **I** gives another proof that the structure of **I** is 3,6-dihydroxy-8-methoxyflavone. K. Katsuta.

**β-polyene oxide.** A. Sign and H. Schmid, *J. Pharm. Soc. Japan* **53**, 341-9 (1933). Heating 1 g Me(HO)C<sub>6</sub>H<sub>4</sub> with ZnCl<sub>2</sub> at 2.0-80° gave a compd C<sub>12</sub>H<sub>10</sub>O (I), colorless, m 61, difficultly sol. in H<sub>2</sub>O, sol. in org. solvents. Heating of (o-HOC<sub>6</sub>H<sub>4</sub>)<sub>2</sub> with ZnCl<sub>2</sub> gave biphenylene oxide. Therefore **I** seems to be biphenylene oxide (**II**). But according to the literature, **II** crystallizes in small platelets in 160°, difficultly sol. in Et<sub>2</sub>O. Oxidation of **I** in CrO<sub>3</sub>-AcOH under 50° gave a monobenzene acid (**III**), needles, m above 270°, difficultly sol. in H<sub>2</sub>O, sol. in org. solvents. **III** and CH<sub>3</sub>N gave the di Me ester (**IV**), colorless, m 105°. Oxidation of **IV** gave a dibenzene acid (**V**), needles, m above 270°, difficultly sol. in H<sub>2</sub>O and org. solvents. **V** and CH<sub>3</sub>N gave the di Me ester (**VI**). The tri of **III** in sealed tube at 300° for 4 hrs. gave needle, m 41, which is probably Me ester and Frueger's methylbiphenylene oxide, but on account of the small yield, no further work made. The same operation on **V** gave biphenylene oxide (**VI**), needles, m 81, from the result, it is concluded that **I** is 3,6-dimethylbiphenylene oxide (or β-polyene oxide), **III**, 3-methyl-5-carboxybiphenylene oxide, and **V**, 3,6-dicarboxybiphenylene oxide. Nao Uyei.

**Cannabis indica resin IV. Synthesis of some 2,2-dimethylidibenzopyrans and confirmation of the structure of cannabidiol.** R. S. Cahn, *J. Chem. Soc.* **1933**, 1400-5. Cf. C. A. **26**, 4019. It has been suggested that cannabidiol (I) is a 2-hydroxy-2,5-trimethyl-2,5-methylidibenzopyran. The present work brought no further evidence of structure, synthesis of 2,2-dimethylidibenzopyran and a few simple deriv. was undertaken. *o*-Bromophenyl *o*-bromobenzoate, b.p. 246.7°, m 306, does not react

1 with Mg and only slightly with Cu powder in C<sub>6</sub>H<sub>5</sub>Me<sub>2</sub> at 150°, at 285-305° for 6 hrs. liquids b.p. 200-250° and 260° resulted which did not solidify. Ph anthranilate through the diazo reaction did not give the lactone of *o*-HOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>CO<sub>2</sub>H-*o* it results in 2,2', yield from *o*-HOC<sub>6</sub>H<sub>4</sub>N<sub>2</sub>H<sub>5</sub>O<sub>2</sub> (**II**) and PhOH, with MeMgI there results almost quant. 2-hydroxy-2'-hydroxyisopropylbiphenyl, m 147.50, dehydrated to 2,2-dimethylidibenzopyran, b.p. 186.1° (90% yield), by P<sub>2</sub>O<sub>5</sub> in C<sub>6</sub>H<sub>5</sub>Me<sub>2</sub>, 2 ring closure was only partly effected by distg. at 30 min., on by heating at 175° for 45 min. **II** (40 g) and *p*-Me-C<sub>6</sub>H<sub>4</sub>OH (100 g) give 10.1 g of the lactone of 2-hydroxy-2-methylbiphenyl-2-carboxylic acid, m 144.5, MeMgI gives nearly quant. 2-hydroxy-2-methyl-2'-hydroxyisopropylbiphenyl, m 112. 2-*tert*-butyl-2'-hydroxyisopropylbiphenyl, m 127, dehydration of the phenol gives 2,2', 2,2'-trimethylidibenzopyran (**III**), b.p. 201°, m 78. AcO on the water bath gave the same product. **II** and PhOMe give a small yield of the lactone of 2-hydroxy-2-methylbiphenyl-2-carboxylic acid, m 167, MeMgI gives 2-hydroxy-2-methyl-2'-hydroxyisopropylbiphenyl, m 132.1 (118% after drying), P<sub>2</sub>O<sub>5</sub> gives 2-methoxy-2,2-dimethylidibenzopyran, a pale yellow resin. **III** heated 8 hrs. at 200° with a mixt. of 1 part AcOH and 3 parts concd. HCl acid with HCl at 0°, give 2-hydroxy-2-methylbiphenyl m 110.11. Me ether, m 90. *Bz* deriv., m 109.10. HNO<sub>3</sub> gives a compd, m 199-200, which is not the expected nitrobenzoic acid. Application of this acid first to **I** gives a phenol C<sub>12</sub>H<sub>10</sub>O, b.p. 255, m 61.2. It gives only NO<sub>2</sub> deriv., oxidized by hot HNO<sub>3</sub> to 6-nitro-*m*-toluic acid. Although this work does not afford any evidence as to the positions of the substituent in the ring, it is held that, taken in conjunction with the experimental previously reported it proves the structure of **I** in all except the particular. While **I** may be formed from a phenylene oxide during the process of isolation, it is believed that it is not such in the crude resin. C. J. W.

**Piperidine derivatives XIII. Phenyl and phenyl alkyl substituted piperidinopropyl benzoates.** I. A. Walters and S. M. McElvain, *J. Am. Chem. Soc.* **55**, 462, 9 (1933). Cf. C. A. **27**, 149. 2-(*γ*-Phenylpropyl)piperidine, b.p. 132°, d<sub>4</sub><sup>20</sup> 1.0171, n<sub>D</sub><sup>20</sup> 1.511, 20% yield. 2-(*o*-Phenylbutyl) deriv., b.p. 143°, d<sub>4</sub><sup>20</sup> 1.0010, n<sub>D</sub><sup>20</sup> 1.5142. PhCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OPh and NaNH give 2-(*o*-phenyl-*o*-phenylbutyl)cyanide, pale yellow, b.p. 180.5°, d<sub>4</sub><sup>20</sup> 1.0816, n<sub>D</sub><sup>20</sup> 1.5004. Catalytic reduction gave *p*-phenyl-*o*-phenylamylamine, whose HCl salt m 124.8, refluxing the amine with HBr and refluxing the free Br amine in PhMe gives *o*-phenylpiperidine, b.p. 275.5°, d<sub>4</sub><sup>20</sup> 1.0010, n<sub>D</sub><sup>20</sup> 1.5140, 2-(*γ*-phenylpropyl) deriv., b.p. 161.5°, d<sub>4</sub><sup>20</sup> 1.0121, n<sub>D</sub><sup>20</sup> 1.5180. 2-(*o*-phenylbutyl) deriv., b.p. 164.6°, d<sub>4</sub><sup>20</sup> 1.0152, 3-benzyl deriv., b.p. 279.5°, 1-Ph deriv., b.p. 255.8°, the HCl salts of the 1st 3 compds m 194.1, 129.1° and 146.7°, resp. The following piperidinopropylbenzoate HCl salts were prepd. 2-Ph (**I**), m 186.7°, 2-(*γ*-phenylpropyl) (**II**), m 103.5°, 2-(*o*-phenylbutyl) (**III**), m 179.81°, 2-Ph (**IV**), m 180.1°, 3-benzyl (**V**), m 163.1°, 1-Ph (**VI**), m 174.5°. The following figures give the duration of corneal anesthesia in min. and the intravenous toxicity to white rat, M.L.D. in mg/kg: **I**, 15, 26; **II**, 45, 50; **III**, 7, 28; **IV**, 20, 12; **V**, 31; **VI**, 26, 26. It is apparent that the extremely long duration of anesthesia is a fact only with those substances which contain a PhCH<sub>2</sub> or PhCH<sub>2</sub>CH<sub>2</sub> substituent in the 2 position of the piperidine nucleus. Increasing the length of the C chain which seps the Ph group from the N atom to more than 3 C atoms or decreasing it to 1 C atom diminishes very considerably the anesthetic activity of the resulting compds. C. J. West.

**Synthesis of quinoline derivatives.** II. K. Drzewonski, J. Moszcz, G. Dorthenowa and W. Ryzewski, *Roczniki Chem.* **12**, 925-35 (1933). Cf. C. A. **27**, 3937. The *o*-toluid of PhCOMe heated with PhNCS yields 4-anilino-2-phenyl-8-methylquinoline, m 171° (HCl salt, m 191°, *purate*, m 260.1°, NO deriv., m 194°), which on fusion with KOH gives 1-hydroxy-2-phenyl-8-methylquinoline,







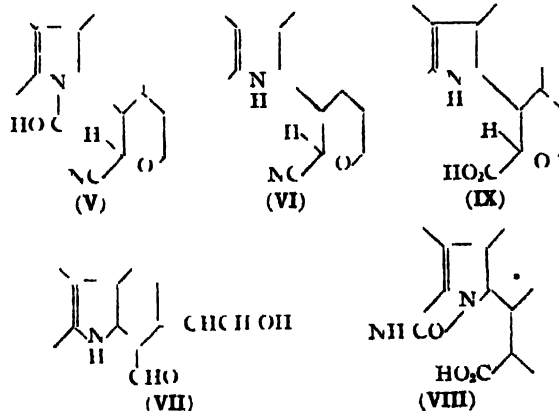
(II), m 87–8°, crystals with 1 mol.  $\text{CHCl}_3$ ,  $[\alpha]_D^{25} -45.3^\circ$  (EtOH, c 4.490), from MeOH it seps with 1 mol solvent, m 92.3°,  $[\alpha]_D^{25} -66.7^\circ$  (EtOH, c 2.134), the *HCl salt* seps with 1 mol AcOEt, m 162° and then decomps, 220°, the *HCl salt* seps with 1 mol  $\text{H}_2\text{O}$ , the *methiodide* m 225°, the *di-Ac deriv* m 140°,  $\text{NH}_4\text{OH HCl}$  gives the *mono-Ac deriv*, m 150°. A small amt of dihydrometathetabainone is formed. The so-called *p*-dihydrothetabainone of Kondo is a mixt of II and dihydrometathetabainone (III), the existence of a diastereoisomer of III, which could serve as proof of the Schöpf I formula, has not yet been demonstrated. Catalytic reduction of III gives *dihydrometathetabainol*, m 120°, whose *HCl salt* has  $[\alpha]_D^{25} 16.4^\circ$  (EtOH, c 4.128). I, reduced with  $\text{N}_2\text{H}_4\text{H}_2\text{O}$  and EtONa at 140° for 3 hrs, gives *dihydrodesoxytelacodermine*, b<sub>100</sub> 130.5°, m 72°,  $[\alpha]_D^{25} 9.8^\circ$  (EtOH, c 1.109), III gives *tetrahydrodesoxytelacodermine*, amorphous, whose *HCl salt* has  $[\alpha]_D^{25} 12.5^\circ$  (EtOH, c 1.925). Dehydration of II gives an anhydrometathetabainol of uncertain structure, b<sub>100</sub> 130°, m 106°,  $[\alpha]_D^{25} 20.1^\circ$  (EtOH, c 1.813), *Ac deriv*, m 166°, catalytic reduction gives the *dihydro deriv*, b<sub>100</sub> 130° (C. J. West).

**Specific configurative esterification of secondary alcohols in the presence of brucine or strychnine.** Richard W. Gler *Ann* 506, 718 (1933), cf C. A. 26, 592. The behavior of a series of 16 alcohols with AcO in the presence of brucine and with AcO and  $\text{Bz}_2\text{O}$  in the presence of strychnine is reported. The rotations are given for the acetate or benzoate and for the alk which is not esterified. With the acetate (with brucine) all rotations are (–) except for *N*-But HOH and the unesterified alk has a (–) rotation. All the benzoates are (–) but the unesterified alk vary in rotation. With strychnine all the benzoates are (–) with the exception of *M*-Et HOH (C. J. West).

**Alkaloids of jaborandi leaves. III. Synthesis of pilocarpine and pilocarpidine.** N. A. Probozhenskii, V. I. Vamp, V. A. Probozhenskii and M. N. Shchukin *Izv* 66B, 1336 (1933), cf C. A. 27, 28. The isopropyl acid is heated some hrs at 50–60° with  $\text{SOCl}_2$  allowed to stand overnight, again heated over 1 hr heated from excess of  $\text{SOCl}_2$  in *vacuo* repeatedly washed with dry benzene and the resulting light yellow viscous thick oil treated in ether at 15° with  $\text{CH}_3\text{N}$ . The dark oil with only *dia ketone* is decomposed in ether at 15° with  $\text{HCl}$  gas, giving *chloromethyl d* homopilocypyl ketone (I, yield) m 80.7°,  $[\alpha]_D^{25} 11.3^\circ$  (in  $\text{CHCl}_3$ ) the with  $\text{C}_6\text{H}_5\text{CO}_2\text{N}_3$  in abs alk on the water bath gives 50% of the *phthalimidomethyl ketone*, m 157°,  $[\alpha]_D^{25} 11.1^\circ$  (in  $\text{CHCl}_3$ ), which is hydrolyzed with 10% aq  $\text{HCl}$  to the *amino ketone HCl salt* (I) and the I is converted with aq  $\text{KSCN}$  on the water bath into *m* (recept) 40% of *homopilocypylmido-ole* (pilocarpine thiol) (42.01% yield, based on the phthalimidomethyl deriv), m 207.85° (decompn),  $[\alpha]_D^{25} 122.96^\circ$  (MeOH). With  $\text{HCl}$  in boiling water the thiol gives pilocarpine (II) identical with the natural product and methylated by  $\text{MeI}$  to pilocarpine, which was isolated as the nitrate, 10% yield, based on the thiol, m 175.65°,  $[\alpha]_D^{25} 15.64^\circ$  (EtOH). In some expts the intermediate I and II were isolated. I (44.3% yield, based on the phthalimidomethyl deriv), m 179.81°,  $[\alpha]_D^{25} 90.00^\circ$  (EtOH). II (32.17% yield, based on the thiol), m 132.5–3.1° (evolution),  $[\alpha]_D^{25} 71.78^\circ$  (H<sub>2</sub>O). IV **Diazomethyl isopilocypyl ketone and its transformations.** N. A. Probozhenskii and M. J. Kalachnik *Ibid* 1511.5. From *di* isopilocypyl chloride in ether slowly added to 2.5 mol  $\text{CH}_3\text{N}_2$  in ether at –10° is obtained in good yield the *dia ketone*,  $\text{CH}_2\text{N}_2\text{COCH}_2\text{CH}_2\text{CHCOCHN}$  (I), giving

pours I from solns, especially in the light. *Dibromo-methyl ketone* (20% yield), m 76.5–7.5°. *Aceto-di-homopilocypylalcohol* (I, with  $\text{CH}_3\text{OH}$  instead of  $\text{CH}_3\text{N}_2$ ), from the *diazo ketone* with aq mineral acids, does not crystallize and decomps on distn in *vacuo*, it does not react with  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$  at low temps and only in part at 110° (in xylene), giving the *p*-nitrobenzoate, m 129.5–30°, also obtained from the chloromethyl ketone with  $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Na}$  in abs alk on the water bath. *Benzooate*, obtained in the same 2 ways is the  $\text{NO}_2$  deriv, m 71.5–2° (C. A. R.).

**Strychnos alkaloids. XIII. Degradation experiments with isonitrosostrychnine.** Heinrich Wieland and Konrad Kaziro *Ann* 506, 607 (1933), cf C. A. 27, 1331. Reduction of isonitrosostrychnine (I) (C. A. 26, 3508) with  $\text{SnCl}_4$  in concd  $\text{HCl}$  gives the *di HCl salt* (II), does not m 230°, of *L*-aminostrychnine, m 88.6°. Reduction with  $\text{Zn}$ ,  $\text{ZnCl}_2$  and  $\text{HCl}$  gives the *ZnCl salt* of II, decomps 305–12°. II with  $\text{NaN}_3$  and dil  $\text{HCl}$  gives 60–70% of *12* duxostychnine (III), decomps 107–6° (2nd precipn decomps at 129–30° and 1rd, 149–90°). III and  $\text{H}_2\text{SO}_4$  give *L*-hydroxystrychnine, m 205°, catalytically reduced to the *dihydro deriv* (IV), m 282–4°. The *Br deriv* of IV m 290–2°. IV is oxidized by  $\text{KMnO}_4$  in  $\text{Me}_2\text{CO}$ - $\text{AcOH}$  to a *dicarboxylic acid*  $\text{C}_8\text{H}_{10}\text{O}_6\text{N}_2$ , decomps 290°. Isonitrosostrychnine is reduced by  $\text{ZnCl}_2$  and  $\text{HCl}$  to the *amino deriv*, analyzed as  $\text{C}_8\text{H}_{10}\text{O}_6\text{N}_2 \cdot 2\text{HCl} / \text{ZnCl}_2$ , which does not decomps below 300°. The *ZnCl salt* of the nitrosoamine is reduced by  $\text{Zn}$  and  $\text{HCl}$  to isonitrosodihydrobrucinecarboxylic acid, analyzed as  $\text{C}_8\text{H}_{10}\text{O}_6\text{N}_2 \cdot 2\text{HCl} / \text{ZnCl}_2$ . *L*-Dihydrobrucine, yellow, decomps 100–1°. The *HCl salt* of I and  $\text{SOCl}_2$ , with cooling, give 50–70% of the pale yellow *HCl salt*, decomps above 300°, of the *carbamate acid* (V), m 210–3° (decompn), and one of the base (VI) in 2.8–9 and crystals with 1 mol MeOH. V and  $\text{EtOH}$  give the *aldehyde base* (VII), m 217° (crystals with 1 mol  $\text{CHCl}_3$ , m 1–5°), *HCl salt*, decomps 310°. *Methiodide*, does not decomps 300°. *di Ac deriv*, does not decomps 300°. *oxime*, decomps 206–7°. *oxime*, decomps 21°. I and  $\text{SOCl}_2$  give V and the *urea* (VIII), decomps 210–6° (*HCl salt* decomps 270–2°). VIII and 2  $\text{N}$   $\text{NaOH}$  give *norstrychninecarboxylic acid* (IX), m 290–6°. I and  $\text{Me}_2\text{C}_6\text{H}_4\text{SO}_2\text{Cl}$  and  $\text{C}_6\text{H}_5\text{N}$  give the *compd*



$\text{C}_8\text{H}_{10}\text{O}_6\text{N}_2\text{S}$ , decomps above 290°. XIV **Vomicidine.** Heinrich Wieland, Friedrich Holscher and Pratulla K. Bose *Ibid* 507, 69–82. Vomicidine (I) in  $\text{C}_6\text{H}_5\text{N}$  gives an *Ac deriv*, m 229–30° (decompn). Electrolytic reduction of dihydrovomicidine or catalytic reduction of I gives *dihydrovomicidine* (II), decomps 296–8°, crystals with 0.5 mol  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} 34.57^\circ$  (for acid sulfate). I,  $\text{MeI}$ , MeOH and 2  $\text{N}$   $\text{NaOH}$ , refluxed 8 hrs, give the *Me ether* (III), pale bluish green, m 205°, this also results with  $\text{Me}_2\text{SO}$  and  $\text{NaOH}$ , both expts were in  $\text{N}$ . I and  $\text{MeI}$  in abs EtOH, refluxed 1 hr, give the *methiodide* of III, m above 300°, this also results from III and  $\text{MeI}$  at 100°. Heating I and  $\text{MeI}$  in EtOH at 100° for 2 hrs gives the *dimethiodide* (IV), gradually darkens

If the reactions of aliphatic diazo compds, cold mineral acids easily decomps it with evolution of  $\text{N}_2$ , I reacts with it so vigorously that in the absence of a solvent a part of the I sublims, but in ether there is obtained I (based on the isopilocypyl acid used as starting material) of the *diisodimethyl ketone*, light yellow, decomps 10–12°, unstable in the dark in the solid form but de-

above 250°, crystals with 2 mols. H<sub>2</sub>O. IV, shaken with AgCl and then catalytically reduced, gives the dimethochloride of II. IV and excess CH<sub>3</sub>N in MeOH give the phenolbaine of I, C<sub>11</sub>H<sub>13</sub>O<sub>2</sub>N, m 140 and then 200°, with HCl it yields the HI salt of the methiodide of I, which also splits off MeCl with CH<sub>3</sub>N. If the HI salt in H<sub>2</sub>O is neutralized with Na<sub>2</sub>CO<sub>3</sub> and the MeOH ext. treated with H<sub>2</sub>, the methiodide of III results. II forms a dimethiodide, m 230 (decomps). CH<sub>3</sub>N gives a phenolbaine, does not m 300°. Oxidation of I with CrO<sub>3</sub> in H<sub>2</sub>SO<sub>4</sub> gives an acid, C<sub>11</sub>H<sub>11</sub>O<sub>3</sub>N, m 242 (decomps). I in 0.5 N HCl gives with 6% CrO<sub>3</sub> (isomeric), analyzed as the HCl salt, C<sub>11</sub>H<sub>11</sub>O<sub>3</sub>N<sub>2</sub>HCl, pale yellow, which shows no m p. XV. Desoxyvomincine and isonitroso vomincine. H. Wieland and Georg Vavogli. *Ibid.* 82 (9). Electrolytic reduction of desoxyvomincine (I) gives desoxyvomincine, C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N, which has not been crystallized. There also results a base C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N, m 161, catalytic reduction of which gives C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N (II), m 18, [α]<sub>D</sub><sup>20</sup> (CHCl<sub>3</sub>). Catalytic reduction of I (PbO) gives a mixt. of II the base C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N, m 211, and the base C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N, m 220, the yield of II is about 40% of the other 2 bases 10%. Vomincine gives an isonitroso derm (III), yellow, has no m p. the Beckmann rearrangement with SOCl<sub>2</sub> gives a carbamic acid lactone (IV) C<sub>11</sub>H<sub>11</sub>O<sub>2</sub>N, m 218, hydrolysis with NaOH gives a *ner vomincine acid* blacken above 320° the *Me ester* of the *O Me derm* m 194. Catalytic reduction of IV gives a *dihydro compd* m 208. Reduction of III with Zn and HCl gives the ZnCl<sub>2</sub> salt of aminovomincine from which was prepd *iso vomincine*, yellow, darkens at 200°, it resembles chazoy trychnin. C. J. West.

The successive disintegration of  $\alpha$ -isocinchonine (cinchoniline) up to the toxic derivatives. Julius Dubi, Adam Konopnicki and Jerzy Suszko. *Ac. milit. Chem.* 13, 44-72 (1934). Hydrolysis of the enol ether to the hydroxydihydro compd is the mechanism of the present disintegration.  $\alpha$ -Isocinchonine (I) is obtained by heating anhyd  $\alpha$ -isocinchonine acid sulfate (m ab) EtOH and EtO) *in vacuo* to 140° for several hrs. The product purified with III and crystal from dil EtOH on ligron (70-80), m 98-100.  $\alpha$ -Hydroxydihydro cinchonine (II) obtained most readily by heating on dil water bath I with 20 cc 50% HCl in CO<sub>2</sub> 1.5 hr. after alkalinizing and extracting with EtO in EtO crystal from EtOAc at m 124-126.  $\alpha$ -Isocinchonine (III) is stable to strong acid undergoing no change, contrary to former report disintegrates in place on heating with dil acid. A low decomposition temperature arising from III is sensitive to dil acid especially the strong ones. The following derivatives I were prepd: N Ac, N nitroso, bromo N Me, III N Me methiodide bromo N methyl of II brom N Me (IV) N Me methiodide  $\beta$ -nitrophenylhydrazon (V) of IV and perate of V of III the monoxide of III.

C. I. Ichmowski.

Resanols. I.  $\beta$ -Amyrin of *Manilla elemi*. I. & Spring. *J. Chem. Soc.* 1933, 1345.  $\alpha$  and  $\beta$ -Amyrin may be separated by fractional soln. of their insates in CHCl<sub>3</sub>.  $\beta$ -Amyrin acetate is oxidized by H<sub>2</sub>O in AcOH to the acetate m 201.2, of  $\alpha$ - $\beta$ -amyrin, m 201.2, this is a solid oxide since it does not give a color with C(NO) in CHCl<sub>3</sub> and does not absorb Br<sub>2</sub>. In attempting to isomerize  $\beta$ -amyrin could HCO<sub>2</sub>H give the formate m 258. Partial isomerization was achieved by treating the alc. in glycerol AcOH with HCl at 5° for 6 hrs, the product being a mixt. of the acetate and the *isoacetate* m 246. Reduction of  $\beta$ -amyrin with Na and AmOH gives  $\beta$ -myrin m 95, catalytic reduction (Pd black) gives *iso  $\beta$ -amyrene* m 82. C. J. West.

Presence of syringoside (syringin) in the bark of *Phyllaea latifolia* L. and *P. decora* L. A. Krinner. *Bull. soc. chim. Ind.* 15 (64) 50 (1934). *ibid.* 1-27 (934) 1934. Syringoside was isolated from the fresh bark and its formula established a phicol (syringol) phicolide 2,6,4,1 C<sub>11</sub>H<sub>11</sub>(OMe)(CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH)OCH<sub>2</sub>CH<sub>2</sub>O. The prepn and properties of syringoside and phicol are described. I. L. Calton.

The action of heat on resinic acids. M. Fanica. *Bull. inst. chim.* 1933, 151-65, 181-9. Ultimate isomerization of the acids of gum turpentine is as follows: primary (sapinic) acids  $\rightarrow$  sapinabatic  $\rightarrow$  abietic  $\rightarrow$  pyroabietic. By heating Aleppo pine resin in CO<sub>2</sub> for about 100 hrs. at 240  $\pm$  2° or 27° in an electrically heated glass flask, there was obtained a 35-40% yield of *d*- or  $\alpha$ -pyroabietic acid (I), m 172.3°,  $\alpha$ <sub>D</sub><sup>20</sup> 60°,  $\alpha$ <sub>D</sub><sup>25</sup> 68°, consequently isomerization to I was more complete than that obtained by Dupont and Duboué (C. I. 22, 1839). I gives no nitrosocarbonate, nitrosite or Br deriv. Sulfonation by low 0° with 60% Br<sub>2</sub> H<sub>2</sub>SO<sub>4</sub> in yield about 25%, C<sub>19</sub>H<sub>19</sub>O<sub>3</sub>S, m 213.1°, very slightly sol in EtO, insol in CHCl<sub>3</sub> and CCl<sub>4</sub> sol in alc. (from which it can be crystd only by evapn of the solvent), very sol in hot H<sub>2</sub>O, from which it is completely pptd by mineral acids, gives both a di Na and a mono Na salt. Attempts to obtain higher sulfonated deriv. caused considerable decomps and yielded no definite products. I is monobasic, the Na and K salts, prepd in an anhyd solvent, and the NH<sub>4</sub> salt, prepd by passing dry NH<sub>3</sub> through a C<sub>19</sub>H<sub>19</sub>O<sub>3</sub> soln of I, are gelatinous and inactive. The Na, Co, Cu<sup>2+</sup>, Mn<sup>2+</sup>, Fe<sup>3+</sup> and Ba salts prepd by double decomps of the Na salt in presence of EtO and glycerol (to prevent hydrolysis) are very sol in EtO, very sol in CH<sub>3</sub> (Ba salt only slightly), lightly sol in alc, slightly sol in MeCO (Cu salt very sol), and insol in H<sub>2</sub>O. Dehydration of I by action of S by I. M. in Chung's method (C. I. 23, 117) yields 15% of *retene* from the acid and a discussion of the results of Ruzicki and co-workers. I concludes that the structural formula of abietic acid is



By heating of Bordeaux pine resin in m glass at 240° for 100 hrs., followed by distn and repeated fractional crystaln of the solid fraction, there was obtained m 7 or 8% pyroabietic acid (II) m 185.7°, [α]<sub>D</sub><sup>20</sup> 5°, isomorphous with I, probably the same as obtained by Fournier and Gratch (C. I. 23, 520). Heating of  $\alpha$ -pinic acid gave no II. Heating of  $\beta$ -pinic acid gave an I acid which is probably identical with II but which could not be definitely identified as such. It is probably in very intimate mixt. with  $\alpha$ -pinic acid. Heating of alpine acid gave no II. Heating of abietic acid prepd from Bordeaux pine resin gave a mixt. of approx 50% I and 50% of II, m 185.90°, [α]<sub>D</sub><sup>20</sup> 52°, [α]<sub>D</sub><sup>25</sup> 65.4°, fusion of a mixt. of this II and of  $\alpha$ -pinic acid, calcd to have [α]<sub>D</sub><sup>20</sup> -25°, gave crystal m 160.5 and having the same characteristic as those obtained by heating of  $\beta$ -pinic acid. Heating of Aleppo pine resin in Al (instead of m glass) gave an I acid, which is possibly identical with II.

A. Papineau Couture.

Proteins. X. Silk fibroin (2). The action of hypobromite on silk. Stefan Goldschmidt, Karl Martin and Werner Heidinger. *Ann.* 505 25-61 (1933). (C. I. 24, 140). Different kinds of silk behave similarly to wool and K<sub>2</sub>OBr, the only exception being Tuscan silk, which consumes much less K<sub>2</sub>OBr than does Chinese, Japanese or Malay silks. The degradation products contain glycol and alamine in the ratio 1.1% to 1.75%, only in expts in which the reaction time is 8 min or less are other NH<sub>2</sub> acid present (2.4%). XI. Silk fibroin (3). The action of hydrochloric acid on silk. S. Goldschmidt, Gertrud Frey and Kessy Strauss. *Ibid.* 262-73. The action of 5 N HCl upon silk fibroin at 25° dissolves 60% in 80 hrs and only 15% addn in 200 hrs. The hydrolysis of the insol residue (I) gives alanine, glycine, tyrosine in the mol ratio of 13.8:1. I is also de-



oxidized to II; with HCl the soln. of IV becomes browned and then green. In the MeOH-KOH degradation of pheophytin there results many times, in place of I, the pseudo compd. (V); I and V in Et<sub>2</sub>O can be sepd. by extg. V with a buffer of  $pH$  6.8-7.0. The ester of V m. 276° (cor.). V is stable and gives II with HCl-AcOH. In the fractionation of I, there is isolated *alloporphyrin*, acid no. 10, whose *Me ester* m. 269° (cor.); it is unstable and gives with C<sub>6</sub>H<sub>5</sub>N II; after 3 months it appears to give chloroporphyrin *c<sub>6</sub>*. XXXVII Chlorophyll *b*. II. Proof of the isocyclic ring in chlorophyll *b*. H. Fischer, Albert Hendschel and Ludwig Nussler. *Ibid.* 83-106.—Pheophorbide *b* (I) with CH<sub>3</sub>N<sub>2</sub> in MeOH (N atm.) gives 50% of rhodim *g* tri-Me ester (II) and a *chlorin ester* (III), extd. with 7% HCl, m. 191°, which contains 3 MeO groups; hydrolysis with 22% HCl gives a *chlorin*, C<sub>36</sub>H<sub>38</sub>N<sub>4</sub>O<sub>6</sub> (IV), m. 209°, with 1 MeO group; alk. sapon. appears to give the same compd. Degradation of IV with glycol gives a product resembling chloroporphyrin *c<sub>4</sub>*. The mesoreinol melt of IV gives a product resembling chloroporphyrin *c<sub>6</sub>*. I and CH<sub>3</sub>N<sub>2</sub> in EtOH (N atm.) give 70% II. I with HI gives pheoporphyrin *b<sub>6</sub>* (V), with CH<sub>3</sub>N<sub>2</sub> (MeOH, N atm.) it yields a porphyrin resembling pheoporphyrin *a<sub>6</sub>* (VI) but which m. 273°, depressing the m. p. of VI and analyzing for a compd. between C<sub>36</sub>H<sub>38</sub>N<sub>4</sub>O<sub>6</sub> and C<sub>36</sub>H<sub>36</sub>N<sub>4</sub>O<sub>6</sub>. If the action of CH<sub>3</sub>N<sub>2</sub> is continued for 5 days there results a product resembling chloroporphyrin *c<sub>6</sub>* (VII), m. 237°. III and HI give a compd. whose *Me ester*, C<sub>36</sub>H<sub>36</sub>N<sub>4</sub>O<sub>6</sub>, m. 249°, which resembles VII but depresses its m. p. The oxime (VIII) of V, for which a new method of prep. is given, forms a *Me ester*, m. 229°; the same compd. results from the ester of V. VIII, sapon. by 22% HCl, gives a mixt. of products; the principal compd., extd. by 15% HCl, m. 248°. The oxime of pheoporphyrin *b<sub>6</sub>* ester, m. 230°. The hydroxynitile of I, reduced with HI (4 mm. at 45°), gives the same compd. as the methanolysis of V. V and MeOH-KOH or HI-AcOH give *rhodimporphyrin g tri-Me ester*, C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub> (IX), m. 265°, also obtained from rhodim *g* tri-Me ester with HI and PH<sub>3</sub> in AcOH. V gives a di-Me ester, m. 277°. The oxime of IX m. 277°. IX and C<sub>6</sub>H<sub>5</sub>N-Na<sub>2</sub>CO<sub>3</sub> give V. Sapon. of X gives free rhodim *g*, which was not decarboxylated by C<sub>6</sub>H<sub>5</sub>N on heating 1 hr. or on heating in a tube at 135°. XXXVIII. Splitting of chlorophyll *a* and its derivatives by diazo methane. Crystalline allomerized ethylpheophorbide *a*. II. Fischer and Josef Riedmair. *Ibid.* 107-23. Pheophorbide *a* (I) (2 g.) in 2 l. MeOH contg. a little C<sub>6</sub>H<sub>5</sub>N, treated with 8 g. CH<sub>3</sub>N<sub>2</sub> and allowed to stand several days, gives 520 mg. chlorin *c* tri-Me ester (II), 300 mg. of a product nearly identical with dimethylpheopurpurin 7 and 100 mg. dimethylpurpurin, also 50 mg. of a chlorin with an acid no. greater than 16. The yield of II decreased markedly with a decrease in the quantity of MeOH used but appears to be independent of the concn. of CH<sub>3</sub>N<sub>2</sub>. Recrystd. methylpheophorbide *a* (III) (500 mg.) in 25 cc. C<sub>6</sub>H<sub>5</sub>N and 1 l. MeOH with 2.5 g. CH<sub>3</sub>N<sub>2</sub> (N atm.), allowed to stand 24 hrs., gives about 80% of II, a methylpyropheophorbide which yields a phylloerythrin ester with HI, and a chlorin which yields a complex porphyrin mixt. with HI. "Native" I or III with MeOH-CH<sub>3</sub>N<sub>2</sub> in N gives II quant. Allomerized ethylchlorophyllide *a* + *b* (IV) or I does not give II. Native I in PrOH treated with MeMgI decompd. by PrOH and the product degraded by HI gives pheoporphyrin *a<sub>6</sub>* and a trace of phylloerythrin. Methylchlorophyllide *a*, allomerized with quinone in abs. EtOH (N atm.) gives with HI pheoporphyrin *a<sub>6</sub>*. IV (2 g.), allomerized with quinone, gives 0.95 g. 10-ethoxyethylpheophorbide *a*, C<sub>40</sub>H<sub>44</sub>O<sub>6</sub>N<sub>4</sub>, does not m. 280°; HI gives pheoporphyrin *a<sub>6</sub>*. The behavior of various chlorophyll derivs. in EtOH, PrOH and C<sub>6</sub>H<sub>5</sub>N toward O<sub>2</sub> is reported. Methylchlorophyllide *a* + *b* in EtOH absorbs 0.87-1.08 mols. O<sub>2</sub> in 11-18 hrs.; in C<sub>6</sub>H<sub>5</sub>N only a trace of O<sub>2</sub> is absorbed in 120 hrs.; in EtOH with 15% C<sub>6</sub>H<sub>5</sub>N, 1.11 mols. in 24 hrs.; in C<sub>6</sub>H<sub>5</sub>N with 3% EtOH, 0.68 mol. in 120 hrs.; in PrOH, 1.10 mols. in 16 hrs.; addn. of pheophorbide *a* (which does not absorb O<sub>2</sub>) decreases the rate of reaction in EtOH so that

1.06 mols. are absorbed only in 192 hrs. Chlorophyll absorbs 0.96 mol. O<sub>2</sub> in 8 hrs. XXXIX. Catalytic hydrogenation in the chlorophyll series. H. Fischer and Eduard Lakatos. *Ibid.* 123-57.—Pyrroporphyrin (I) in AcOH with PtO<sub>2</sub> absorbs 3 mols. H<sub>2</sub>; oxidation of the reduced product with air for 2 days gives 60% of I. Phylloporphyrin (II) in CHCl<sub>3</sub> absorbs 3 mols. H<sub>2</sub> and in CHCl<sub>3</sub>-petrol. ether, 2 mols.; reoxidation gives 40-8% II. Desoxophyllyerythrin (III) in AcOH absorbs 2.94-3.58 mols. H<sub>2</sub> and gives 51% III on oxidation. Synthetic III in AcOH absorbs 5 mols. H<sub>2</sub>; oxidation gives only a little III. Phylloerythrin (IV) in AcOH also absorbs 3 mols. H<sub>2</sub> but on oxidation gives only 12% of IV. Pheophorphyrin *a<sub>6</sub>* (V) in AcOH absorbs 3 mols. H<sub>2</sub> and gives 24% of V on oxidation. Chlorin *c* in AcOH absorbs 3.24 mols. H<sub>2</sub>; oxidation gives a little II and 21% of chloroporphyrin *c<sub>6</sub>* (VI). The tri-Me ester of VI in AcOH-HI absorbs 3.10 mols. H<sub>2</sub> and on oxidation gives 25% of chloroporphyrin *c<sub>6</sub>* (VII). Pheophorbide *a* (VIII) (Sandoz) in AcOH absorbs 3.82 mols. H<sub>2</sub> and on oxidation gives pheoporphyrin *a<sub>6</sub>* (IX), a little II, VII and pheoporphyrin *a<sub>7</sub>*; native VIII also absorbs 3.88 mols. H<sub>2</sub> and gives the same oxidation products; with Pd as catalyst 2.87 mols. H<sub>2</sub> are absorbed and oxidation gives 55% IX. Pseudo-verdoporphyrin di-Me ester in AcOH absorbs 4 mols. H<sub>2</sub> and on oxidation gives 59% of rhodoporphyrin. VIII and 1 mol. H<sub>2</sub> give 56% dihydrophosphoride *a* (X), C<sub>36</sub>H<sub>38</sub>N<sub>4</sub>O<sub>6</sub>·H<sub>2</sub>O, acid no. 14.5; *Me ester*, m. 218° (cor.), acid no. 16.5. X and KOH, heated 6 days, give 62% II; degradation of X with HI gives 38% IX and a little rhodoporphyrin; HBr-AcOH gives II and III. X absorbs 2.16 mols. H<sub>2</sub> with Pd as catalyst and on oxidation gives 68% IX. The oxime of X (48% yield) seps. with 1 mol. H<sub>2</sub>O and decomps. about 236°; with HI it gives 62% of the oxime of IX. X, heated with C<sub>6</sub>H<sub>5</sub>N for 15 hrs., gives 70% of pyrodihydrophosphoride *a*, acid no. 12. *Me ester*, m. 239°, acid no. 14; it absorbs 2.36 mols. H<sub>2</sub>. X and C<sub>6</sub>H<sub>5</sub>N-KOH, heated 40 sec., give 66% of dihydrochlorin *c* (XI), acid no. 3.5, tri-Me ester (XII), m. 181°, acid no. 5.5; it absorbs 2.11 mols. H<sub>2</sub>. X with CH<sub>3</sub>N in MeOH-C<sub>6</sub>H<sub>5</sub>N gives 76% XII (in N) at 70° (in O). XII in C<sub>6</sub>H<sub>5</sub>N and Na<sub>2</sub>CO<sub>3</sub>, heated 40 hrs., gives 13% X. XI in C<sub>6</sub>H<sub>5</sub>N, boiled 15 hrs., gives 74% of pyrodihydrochlorin *c* (dihydrochlorin *c<sub>1</sub>*), acid no. 4; di-Me ester, m. 151°. C. J. West

Sulfo compounds of chlorophyll-porphyrins, a consideration of the atomic structure of porphyrins. Alfred Froehs. *Ann.* 506, 196-259 (1933) —Phylloporphyrin (I) (g.), added in small portions to 25 cc. ice cold 20% oleum and the soln. after 15 min. added to 0.1 l. of ice and H<sub>2</sub>O, gives 0.6 g. phylloporphyrin sulfone (I), C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>S, small violet prisms or red-brown-violet rods, no definite m. p., acid no. 10; the *Me ester* (II), prepd. with MeOH-HCl, m. 294°; with CH<sub>3</sub>N<sub>2</sub>, m. 320°; by sulfonation of the *Me ester* of phylloporphyrin, m. 302°. The Cu complex of II, C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>SCu, red, decomps. 250-80°; the Zn and Fe complexes were also prepd. C<sub>6</sub>H<sub>5</sub>N compd. of I, dark brown, loses the C<sub>6</sub>H<sub>5</sub>N quantitatively over P<sub>2</sub>O<sub>5</sub> at 100° in *vacuo*. The di-K salt of I, blue-violet prisms with 2 mols. MeOH; it is very hygroscopic and takes up 4 mols. H<sub>2</sub>O from the air. I (0.3 g.) in 50 cc. concd. HCl give the Cl compd., C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>SCl; soln. in 0.1 N KOH apparently gives the K salt of I. The *Me ester*, C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>SCl, black-blue, decomps. 270-90°, giving phyllo- and pyrroporphyrin esters; soln. in concd. H<sub>2</sub>SO<sub>4</sub> gives II; Cu salt of the ester. I with MeOH-KOH at 150-5° gives phylloporphyrin (III) with a little pyrroporphyrin (IV); the ester of I, heated above the m. p., gives a mixt. of these 2 esters. The Cu salt of I is stable toward AcOH at 150° but suffers total decomp. at 200°. III in H<sub>2</sub>SO<sub>4</sub>·H<sub>2</sub>O gives phylloporphyrinsulfonic acid, whose *Me ester* (V), m. 224° (decompn.), yields a red Cu salt. In the attempt to prep. the Fe complex by heating in CHCl<sub>3</sub>, reduction occurs, the compd. being C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>SiFeCl<sub>2</sub>; at a lower temp. the trd Fe complex, C<sub>37</sub>H<sub>40</sub>O<sub>6</sub>N<sub>4</sub>SiFeCl<sub>2</sub>, is formed. C<sub>6</sub>H<sub>5</sub>N and V give violet needles, m. 228° (decompn.), which lose 9.4% at 100°. Addn. of MeOH to a CHCl<sub>3</sub> soln. of V gives II. The Me





$C_{25}H_{42}O_6$ , m 215.50° (decompn),  $[\alpha]_D^{20}$  40.8° (*penta-Me ester*, m 165.6). This  $\beta$ -acid is rearranged to the  $\alpha$ -acid by HCl or alkali probably by conversion of a  $\gamma$ - into the more stable  $\delta$ -lactone. A. W. Dole.

**Cholesterol** Hamms *Lettre / physiol Chem* 221, 75, 89(1933). Several hydrocarbons were prepd from cholesterol deriv. with a view to elucidating some of the doubtful points of cholesterol structure. Reduction of the emicarbazono of cholesterol by NaOH converted it into *pseudo cholesterol* (I), m 75.9, and small amts of cholesterol and cholestanol. Oxidation of I in AcOH by CrO gave a *keto acid* (II),  $C_{27}H_{46}O_3$  (*semicarbazone*, m 240, decompn), *oxime*, m 165.6, and a *hydrocarbon* (III),  $C_{27}H_{46}$ , m 80°. Oxidation of I in AcOH followed by oxidation with CrO also gave II which on distn *in vacuo* yielded III. Oxidation of III by O<sub>2</sub>, then by CrO, gave a *keto acid*  $C_{27}H_{46}O_3$  m 161,  $[\alpha]_D^{20}$  32. II was oxidized by KOBr to a *tricarboxylic acid* (IV)  $C_{27}H_{46}O_6$ , which in 16% solution is the anhydride and m 200. Distn of IV at 240/60 and 14 mm gave a *hydrocarbon*,  $C_{27}H_{46}$ , m 85.9. The pyro acid of the dicarboxylic acid from cholesterol was reduced in AcOH by H<sub>2</sub>/Zn and HCl to a *hydrocarbon*,  $C_{27}H_{46}$ , m 85.9,  $[\alpha]_D^{20}$  32. The ketone,  $C_{27}H_{46}O$  obtained by catalytic hydrogenation of the pyroketone from the Diels acid was converted into the *semicarbazone*, m 268.70 (decompn), and the latter reduced by NaOH to a *hydrocarbon*,  $C_{27}H_{46}$ , m 85.9,  $[\alpha]_D^{20}$  32. The same hydrocarbon was obtained by Pd hydrogenation of III. These hydrocarbons and their intermediate acid are discussed in the light of known reactions of various cholesterol deriv. A. W. Dole.

**The chemistry of chlorophyll** Kenneth E. Armstrong *Chemistry and Industry* 1933, 809-16. A review of work on the constitution of chlorophyll, together with brief reference to its function in photosynthesis. I. H.

**Structure of the second nucleus of cholesterol** St. Minovici and M. Vanghelovici *Bul. soc. chim. Roumanie* 15, 944(1933). Starting with cholesterol the authors had previously prepd a  $C_{27}$  dicarboxylic acid (I) m 204 (cf *C* 1 24 2467). I, when treated with AcO and diluted yield an anhydride (II) m 100. When II is dissolved in NaOH and HCl added a ppt is obtained, which, recrystd from AcOH, m 204. Mixed mps indicate it to be identical with I. The formation of the anhydride and not the ketone indicates that the carboxyl groups of I are on adjacent C atom, but the ring may be either 5 or 6 membered. Accepting a bicyclic structure to be present in cholesterol and from analogy between I and diphenic acid the authors conclude that the 2nd ring of the compound is 6 membered. W. A. M.

**Conversion of cholesterol into 6 ketoallocholic acid** O. Stamm *Z. physiol Chem* 200, 348(1933). 6-chlorocholestanol, m 147,  $[\alpha]_D^{20}$  4.1, was obtained in 80% yield by treatment of cholesterol with PCl<sub>5</sub> and oxidized by CrO in AcOH to 6-chloroallocholic acid which without isolation was hydrolyzed by NaOH to 6-hydroxyallocholic acid (I), m 210 (*Me ester* m 101). This is the *epi* form of the acid obtained by Wieland and Dine (cf *C* 1 27, 91) from hydoxycholeic acid. Oxidation of I by CrO gave the same 6 ketoallocholic acid m 101, as that obtained by W. and D. from their isomeric acid. This is evidence that ring II of cholesterol is identical with ring III of the bile acids. A. W. Dole.

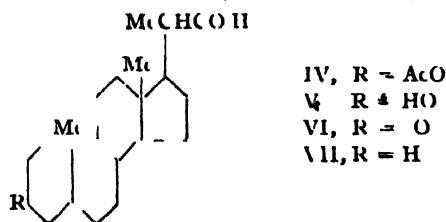
**The tetracarboxylic acid  $C_{27}H_{46}O_8$  from cholesterol** A. Windaus and M. Duppe *Ber* 66B, 1567-5(1933). Cholesterol had been degraded to a tetracarboxylic acid  $C_{27}H_{46}O_8$  (I) (*ber* 57, 3609(1901)) and later an intermediate ketodicarboxylic acid  $C_{27}H_{46}O_7$  (II) had been obtained from cholesterol ester chloride (cf *A* 15, 3219). Minovici and Vanghelovici apparently without knowing of the early work, also obtained II in the same manner. They formulated it as a  $\beta$ -ketodicarboxylic acid and state that on further oxidation it yields a tricarboxylic acid and the tetracarboxylic acid which is undoubtedly formed is unstable that it cannot be isolated (cf *A* 24 2467). A repetition of the earlier work has failed to confirm the observations of M. and V., their supposed tricarboxylic acid was presumably a mixt. of unchanged

II with I. The 4th carboxyl in I cannot be titrated sharply with alc. KOH and phenolphthalein, I was therefore converted with MeOH and concd. H<sub>2</sub>SO<sub>4</sub> into the *di-Me ester*, m 165.6, which titrates as a dibasic acid (equiv. wt found 255, calcd 262). The *ultra Me ester* was also prepd and purified by distn in a high vacuum, although amorphous, it gave correct anal results. When heated 30 min at 175°, I loses only 1 mol H<sub>2</sub>O and no CO<sub>2</sub>, but after 1 hr at 230° it splits off 1 mol CO and 2 mols H<sub>2</sub>O. The product, however, is not a tricarboxylic acid but the *anhydride*,  $C_{27}H_{46}O_6$ , m 232.2, of a *ketodicarboxylic acid*, m 161.8, readily obtained from the anhydride by alk sapon. In their paper on the action of CrO<sub>3</sub> on cholesterol acetate and chloride, M. and V. (cf *A* 23, 2121) likewise fail to consider earlier work and propose very improbable structures. C. A. R.

**Cholatrienic acid II** Photochemical alteration of cholatrienic acid and of choladienic acid Ziro *Lettre / physiol Chem* 221, 104(1933), cf *C* 1 26, 3402. Ultra violet irradiation of  $\alpha$ -cholatrienic acid I in CHCl<sub>3</sub> for 9 hr changes the sp rotation from -22.63 to +2.4. The product is a non crystalline in which can be hydrogenated by PtO + H<sub>2</sub> to cholanic acid. The resin therefore contain at least 1 acid isomeric with  $\alpha$ -cholatrienic acid III or IV, which is tentatively designated  $\alpha$ -cholatrienic acid II. It differ from the starting material in most of its color reactions. The  $\beta$ -choladienic acid from desoxycholeic acid is not altered by ultra violet rays. Hence it appears that the point of attack by the ultra violet rays is the B ring in cholatrienic acid where a shifting of the double bond occurs. The failure to react with maleic anhydride show that no conjugated double bond are present. A. W. Dole.

**Sterol group XVIII** An attempt to define the position of the hydroxyl group in ergosterol I. M. Heilbron, K. M. Samant and J. C. I. Simpson *J. Chem. Soc.* 1933, 1110-13, cf *C* 1 27, 2433. Oxidation of chloro-ergostane (I) with CrO<sub>3</sub> in AcOH gives a *chloroallonorcholeic acid* (II), m 213.4 (0.1 g from 15 g I). *Me ester*, m 168.9, which recrystd resulted a dicarboxylic acid,  $C_{27}H_{46}O_6$ , m 219.21 (*Me ester*, m 81), probably identical with the dicarboxylic acid from ergostanol. The mp of an authentic specimen of  $\beta$ -chloroallonorcholeic acid m 218 (and its *Me ester*, m 170), was strongly depressed by II and its *Me ester*, that the 2 acids are isomeric ( $C_{27}H_{46}O_6$ ) is shown by the fact that reduction of their esters with Na and PrOH give the same allonorcholeic acid, m 170.70. These facts indicate that either a cis trans isomeric change has occurred during the chlorination of I or the other of the sterols or that the HO group in ergosterol is attached to a different C atom from that in cholesterol, the latter is believed the more probable. C. J. West.

**Constitution of stigmasterol** I. Fernholz, *Ann* 507, 128-38(1933). Stigmasterol acetate (I) gives a *di-bromide*, m 122.5, O<sub>2</sub> gives Pt(iso Pr)CHClO, the 1st mol Br thus enters the nucleus and not the side chain. I (6 g) in 100 cc CHCl<sub>3</sub>, treated with 2 g Br in CHCl<sub>3</sub> with cooling and then with O<sub>2</sub> during 6 hrs, give the *1-derivative* (II), m 235 (decompn) (*Me ester* (III), m 155.9,  $[\alpha]_D^{20}$  64° (181 mg in 2 cc CHCl<sub>3</sub>)) of *hydroxybismorcholic acid*, m 295.8 (decompn) (*Me ester*, m 140). Catalytic reduction of II gives *hydroxybismorcholic acid* (IV), m 191, sapon gives



the *1-HO deriv* (V), m 270°. Hydrogenation of III gives the *Me ester* of IV, m 132.3°. Oxidation of V gives a *ketobismorcholic acid* (VI), m 244.6°, reduced by

Clampson's method to an acid,  $C_{11}H_{16}O_4$ , in 213.4° (Me ester, in 100°,  $[\alpha]_D^{20}$  8° (14.5 mg in 2 cc  $CHCl_3$ )), this is *isovallocholonic acid* (VII), which is also obtained from norallocholonic acid (Chuang, *C A* 27, 215) by the action of  $CH_3N$ , followed by  $PhMgBr$  and oxidation of the resulting carbinol with  $CrO_3$  in  $AcOH$ , the acid is optically inactive. C. J. West.

**Taurocholic acid** Ioshiyuki Tanaka *Z physiol (chem)* 220, 39 12(1933) Hammersten's method of prep. taurocholic acid from bile yields the Na salt instead of the free acid. This accounts for the discrepancy in phys. properties between Hammersten's prep. and the synthetic acid described by Bomer and Muller. H's acid must have been the Na salt of taurocholic acid, with acid properties due to fatty acid present in cholic acid combination. Na taurocholate, in 180°, when boiled with  $H_2O$  rearrange to an isomeric form, in 230°, without change in soly or sp. rotation. The isomer gradually reverts to the original form when rapidly recryst. several times from cold  $H_2O$  and  $H_2O$ . Hydrolysis by 5%  $KOH$  yields cholic acid and taurine. A. W. Dow.

**Intermediate products in the Hammarsten reaction of cholic acid** Kazumi Yamasaki *Z physiol (chem)* 220, 42 9(1933) The Hammarsten reaction, whereby cholic acid on treatment with concd.  $HCl$  gives a blue violet color, is a dehydration which proceeds through intermediate step. When the reaction is performed in  $AcOH$  soln and in excluded, 3 intermediate products can be isolated. These are apocholic acid, dihydroxycholeonic acid and a new acid is *dihydroxycholeonic acid*, in 198°,  $[\alpha]_D^{20}$  9.2°. The last contains a double linkage which is resistant to catalytic hydrogenation, but unlike apocholic acid it does not form mol. compd. with solvents or other substances. It gives a blue color with dil.  $Br$  in  $AcOH$ . It may be obtained also by treatment of apocholic acid with concd.  $HCl$ , hence is not the 1st intermediate, but a rearrangement product of apocholic acid. Treatment of cholic acid with  $SnCl_4$  as well as with  $ZnCl_2$  yields apocholic and dihydroxycholeonic acids, and on standing, the mixt. take on the blue violet color of the Hammarsten reaction. A. W. Dow.

**3 Phenyl  $\beta$  (9,10 dihydro 10 keto 9 anthryl) propionic acid** Synthesis of 3, 9,10 dihydro 10 keto 9 anthryl  $\alpha$  hydriodone Luckenbach *Natural products* 57, 181 9(1933) *Central lab. sup. chem. univ. (L'aval) Q. B. 1933* No. 2, 0 pp. Diethyl benzylidene malonate (I), b. 184.1°, b. 146.1°, is obtained in 80% yield by condensation of equimol. quantities of  $BzH$  and diethyl malonate via Knoevenagel (*Ber* 21, 285 9, 181 11). Diethyl chlorobenzylidenemalonate (II), m. 80°, b. 182°, is obtained in 8% yield by condensation of chlorobenzaldehyde and diethyl malonate in presence of piperidine. The di Me ester (III), m. 58.9°, b. 141°, is similarly obtained in 65% yield. Diethyl  $\beta$  phenyl  $\beta$  (9,10 dihydro 10 keto 9 anthryl) succinate (IV), m. 101°, sol. in  $C_6H_6$ ,  $MeCO$ ,  $CHCl_3$ ,  $MeOH$ ,  $H_2O$ ,  $H_2O$ .

very lightly sol. in petrole ether, ol. in the cold in  $H_2SO_4$ , giving a greenish yellow soln, is obtained in 30% yield by condensation of anthrone (crystd. from  $C_6H_6$  and free from  $AcOH$ ) with I in presence of piperidine. Diethyl  $\beta$  2 chlorophenyl  $\beta$  (9,10 dihydro 10 keto 9 anthryl) succinate (V), m. 119.20°, sol. in  $H_2O$  and  $MeOH$ , is obtained in 72.6% yield from anthrone and II in presence of piperidine. The di Me ester (VI), m. 118.3°, sol. in  $C_6H_6$ , is similarly obtained in 82.6% yield from III.

$\beta$  Phenyl  $\beta$  (9,10 dihydro 10 keto 9 anthryl) propionic acid (VII), m. 190.7°, is obtained in 82% yield reduced to about 30% on recrystn. from  $AcOH$  by refluxing IV with 7 parts 30%  $H_2SO_4$  + 3 parts glacial  $AcOH$  for 4-6 days, the time for completion of the reaction can be reduced by about 2 days by seeding with pure crystals at the end of 2 days.

$\beta$  (2 Chlorophenyl)  $\beta$  (9,10 dihydro 10 keto 9 anthryl) propionic acid, in 161°, ol. in  $AcOH$ , very sol. in  $H_2O$ , is obtained by saponifying VI with  $AcOH$  and 30%  $H_2SO_4$  and refluxing for 5-6 days.  $\beta$  Phenyl  $\beta$  (9,10 dihydro 10 keto 9 anthryl) propionyl chloride (VIII), m. 116°, sol. in  $CS_2$ , slowly converted into VII on exposure to air, almost quant. con-

verted into VII by boiling with  $AcOH$ , is obtained in 90.4% yield by refluxing VII and  $PCl_5$  in  $C_6H_6$  for about 1 hr, it is also formed with  $PCl_5$  but is difficult to purify owing to the formation of resins. The Me ester of VII, m. 112°, is obtained in 84.6% yield by refluxing VII with  $PCl_5$  in anhyd.  $C_6H_6$ , cooling and gradually adding anhyd.  $MeOH$ . 11 ester (69.5% yield, m. 89°, amide, m. 182°, very sol. in  $C_6H_6$  and  $H_2O$ , insol. in petrole ether, amide, m. 169°.

**10 Keto 9 ( $\alpha$  phenyl  $\beta$  benzoylthyl) 9,10 dihydroanthracene (IX)**, m. 115-16°, is obtained by adding  $AlCl_3$  to a  $C_6H_6$  soln of VIII, stirring for 3 hrs. at 20°, boiling 3 hrs. with turning, cooling, pouring on ice, acidifying with  $HCl$ , steam distg. the  $C_6H_6$ , taking up the residue in as little boiling  $AcOH$  as possible, cooling, filtering, evapg. the filtrate to dryness, and purifying by dissolving in  $EtO$ , washing with  $NH_4OH$ , evapg. the  $EtO$  and recrystg. from  $H_2O$ . The insol. residue filtered out of the  $AcOH$  soln of IX consists of a mixt. of 2 tautomeric forms of (9,10 dihydro 10 keto 9 anthryl)  $\alpha$ -hydriodone (X), which was sep'd by repeated fractional crystallization from  $MeOH$  into large lozenges, m. 161.2° (ketone form) and monoclinic plate in 187.8° (enol form). By carrying out the above Friedel and Crafts reaction in  $CS_2$  instead of  $C_6H_6$  soln, formation of IX is eliminated, the X is obtained practically pure in 75% yield after a single cry. from  $C_6H_6$  and consists almost exclusively of the ketonic form. It is slightly sol. in  $EtO$  and  $CS_2$ , more sol. in  $MeOH$  and  $H_2O$ , very sol. in  $C_6H_6$  and  $CH_2$ , crystallizes from  $H_2O$  in lozenges and from  $CS_2$  and  $C_6H_6$  in needles containing part of the solvent in combination, sol. in cold concd.  $H_2SO_4$  to a greenish yellow soln from which it is pptd. unchanged on diln, in contact with concd. alkalis it acquires a marked reddish brown coloration and partially dissolves. The ketone form only is obtained by dehydrating VII with concd.  $H_2SO_4$  heating for 3 min. at 110°, pouring on ice, filtering, drying and recrystg. from  $C_6H_6$ . Both forms of X give the same mon. bism. deriv., m. 141°, very slightly sol. in hot  $CS_2$  and  $EtO$  and easily sol. in hot  $H_2O$  and  $MeOH$ . The hydrazine hydrate of X in 146° (decomps.), phenyl hydrate in 224°, cryt. from  $C_6H_6$  with 1 mol. solvent semicarbazone in 24°, oxime, crystg. with 1  $C_6H_6$ , m. 181°, very sol. in  $H_2O$  and  $EtO$ , less sol. in  $C_6H_6$  and  $C_7H_8$ . Oxidation of X by  $CrO_3$  via Fiebermann and Rokit (*Ber* 41, 112, 7(1908)) and Hilkey and Matvel (*C A* 27, 67) give almost exclusively anthraquinone. Oxidation by  $HNO_3$  (d. 1.2) via Koenig (*Ann* 275, 541 1(1885)) gives anthraquinone and phthalic acid in amts. proving that the latter is formed from the hydriodone nucleus and not by oxidation of the anthraquinone formed. All yields given are based on theoretical. A. Papirer and Confort.

**Tetrahydroxybufostan, a tetrahydric alcohol  $C_{17}H_{24}O_4$ , from the winter bile of toads** Hiroshi Makino *Z physiol (chem)* 220, 49 54(1933) The winter bile of the toad, *Bufo vulgaris japonica*, contains a pale tetrahydroxybufostan, m. 230°,  $[\alpha]_D^{20}$  57°, which resembles both cholesterol and cholic acid and may be regarded as a transition form between the sterols and the bile acids. The substance does not add  $Br$  and cannot be hydrogenated catalytically. It gives the Pettenkofer and the Hammarsten Yamasaki reaction, but not the Fiebermann-Burckard or the Salkowski reaction. With  $AcO$  it formed a tetraacetate, m. 32°, which could not be obtained cryt. Oxidation in  $AcOH$  by  $CrO_3$  converted the alk into a tritomonocarboxylic acid,  $C_{17}H_{24}O_4$  m. 221.2°,  $[\alpha]_D^{20}$  31° (11 ester, could not be cryt'd). Me ester, m. 198.9°, bisoxime of 11 ester, m. 218°. trioxime of Me ester, m. 214.5°. The alk contains 3 secondary and 1 primary OH, the latter in the side chain. A. W. Dow.

**The viologen indicators** I. Michaels and Edgar S. Hill *J. Gen. Physiol.* 16, 859 75(1933) Viologens, quaternary bases, derived from  $\gamma,\gamma'$ -dipyridyl, are useful oxidation-reduction indicators for biol. purposes. Their p.d. range is very mg., they are colored in the reduced form, and their oxidation-reduction p.d. is independent of the pH.  $\gamma,\gamma'$ -Dipyridyl is prep'd by agitating a mixt. of anhyd. pyridine, 25%  $CCl_4$  and 50 g.  $Zn$  dust

The yellow ppt. is dissolved by heating on a water bath at 90°, the liquid is crystd. in the cold, and the crystals are exposed to the air at 50°. After several days, colorless crystals of the compd. appear in a brown mass. The entire mass is dissolved in boiling water made alk. with NaOH. The filtered soln. is crystd. at low temp. The compd. is recrystd. by dissolving in hot slightly acidified water and pptg. with NaOH. It contains 2 mols. water which are lost at 50°. The m. p. of the anhyd. compd. is 110–112°. To test for  $\gamma, \gamma'$ -dipyridyl, dissolve a small amt. of 50% AcOH and add some solid  $\text{CrCl}_3$ . An intense violet color indicates the presence of the compd. Zn dust may be used in place of  $\text{CrCl}_3$ , but the violet color is transient, reduction proceeding to the colorless state. *N, N'*-Dimethyl- $\gamma, \gamma'$ -dipyridinium dichloride (methylviologen) is prepd. from  $(\text{CH}_3)_2\text{SO}_4$  and  $\gamma, \gamma'$ -dipyridyl by heating the mixt. to boiling, cooling, and again heating in the same way. After removing the excess  $(\text{CH}_3)_2\text{SO}_4$  with  $\text{Et}_2\text{O}$ , the aq. soln. is treated with an excess of feric acid, the picate is washed with acetone and suspended in 100 cc. acetone. A little concd. HCl is then added which gradually changes the picate to the colorless dichloride which is insol. in acetone. The dichloride is recrystd. by dissolving in MeOH and pptg. with a large excess of acetone. The yield, as colorless needles, is almost theoretical. At 50°, the compd. loses the water of crystn. Me viologen, dissolved in water, gives, on the addn. of  $\text{Na}_2\text{S}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and  $\text{NH}_4\text{OH}$ , a blue to deep violet color.  $\gamma, \gamma'$ -Dipyridyl does not give this test. *N, N'*-Diethyl- $\gamma, \gamma'$ -dipyridinium dichloride (ethyl viologen) is similarly prepd. from  $\gamma, \gamma'$ -dipyridyl and  $(\text{Et})_2\text{SO}_4$ . *N, N'*-Dibenzyl- $\gamma, \gamma'$ -dipyridinium dichloride (benzyl viologen) is similarly prepd. with  $\text{BzCl}$ . Prepn. of the picate is not necessary, and it does not crystallize so easily as the others. *N, N'*-Dibetaine- $\gamma, \gamma'$ -dipyridinium dichloride (betaine viologen) is prepd. by melting  $\text{ClCH}_2\text{COOH}$  in a test tube and adding  $\gamma, \gamma'$ -dipyridyl, bringing the mixt. quickly to boiling, and holding at this temp. a short time. The soln. is then mixed with a large excess of acetone and a few drops of concd. HCl. Betaine viologen crystallizes from this soln., and is recrystd. from MeOH soln. by the addn. of an excess of acetone or  $\text{C}_6\text{H}_6$ . The normal p. ds. of these indicators at 30° referred to the normal H electrode are, within  $\pm 0.002$  v.: Me viologen  $-0.446$  v., Et viologen  $-0.449$  v., betaine viologen  $-0.444$  v. and Bz viologen  $-0.359$  v. If the soln. under test produces a coloration of these indicators to the extent of  $A\%$  of the max. color, the oxidation-reduction p. d. is  $E = E_0 - 0.06 \log A/100-A$ , where  $E_0$  is the normal p. d. of the indicator which is independent of the  $p_{\text{H}}$ . C. H. Richardson.

**Color and structure of oximes and semicarbazones.** Mine. Ramart-Lucas and Marthe Grumez. *Bull. soc. chim.* 53, 753 9 (1933). See C. A. 27, 712. G. G.

**Lignin (Brauns, Hibbert) 23.** Cellulose. XLIX. (2) Methylation of cellulose fibers. I. Diethylglucose from partially ethylated cellulose. LI. Esterification of cellulose with tosyl chloride in the presence of pyridine (Hess, et al.) 23. Behavior of dipeptides contg.  $\alpha$ -amino- $n$ -heptylic acid toward trypsin and crepsin (Abderhalden, Broich) 11A. Raman effect in terpene compds. (Dupont, et al.) 3. Raman effect. XXVI. Raman spectra of the Me and Et esters of monohasic fatty acids (Kohlrausch, et al.) 3. Treating Zn oxide residues obtained in reduction of org. nitro compds. (U. S. pat. 1,931,220) 18.

**Fischer, Emil:** Introduction to the Preparation of Organic Compounds. Translated from the 8th German ed. by R. V. Stanford. New York: D. Van Nostrand Co., Inc. 175 pp. \$2.00.

**Moore, F. J.:** Outlines of Organic Chemistry. 4th ed., revised by William T. Hall. New York: J. Wiley & Sons, Co., Inc. 338 pp. \$2.75.

**Oxygenated organic compounds from carbon monoxide and hydrogen.** I. G. Farbenind. A.-G. (Franz Lappe,

Mathias Pier, Wilhelm Rumpf and Georg Stern, inventors). Ger. 580,695, July 14, 1933. Addn. to 559,802 (C. A. 27, 730) and 490,248 (C. A. 24, 2137). The parts of the app. which come into contact with CO are made of or lined with steel contg. a substantial proportion of Mn.

**Hydrating olefins.** Henry Dreyfus. Brit. 394,375, June 22, 1933. The hydration of olefins with the production of alcs. or ethers is effected by passing olefins and steam in contact with pyrosulfates that are stable under the reaction conditions, especially alkali pyrosulfates. The temp. may be 100–350° or more and pressure up to 25 atm. or more may be used. For the production of  $\text{Et}_2\text{O}$  2 or more vols. of  $\text{C}_2\text{H}_4$  to 1 of steam may be used while for alc. equal vols. are suitable.  $\text{H}_2\text{O}$  may be used instead of steam. In 394,389, June 22, 1933, divided out of 394,674, the mixt. of olefin and steam is led through a phosphoric acid which is initially substantially anhyd. In 394,674, June 22, 1933, the mixt. is passed in contact with a liquid or molten catalyst compn. comprising a phosphate, e. g., an alkali metaphosphate or a mixt. of Na and Li metaphosphates. Other substances may be added to the bath, especially those having a low m. p.

**Catalytic oxidation of organic compounds.** Alphon O. Jaeger (to Selden Co.). U. S. 1,930,716, Oct. 17. Reactions such as the production of phthalic anhydride by oxidation of naphthalene with air are effected at a suitable temp. by use of an oxidation catalyst such as one contg. V together with SiC, Ti carbide or Zr carbide, serving as activators.

**Dehydrating organic liquids.** I. G. Farbenind. A.-G. Brit. 394,080, June 22, 1933. The vapors of the liquids are subjected to the action of anhyd.  $\text{CaSO}_4$  obtained by heating plaster of Paris or gypsum to 160–180° or higher, the anhyd. sulfate being used in such amt. as to be converted to  $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$ . The process is particularly applicable to liquids with b. p. near that of  $\text{H}_2\text{O}$  or forming azeotropic mixts. or decomposing when heated with  $\text{H}_2\text{O}$ , e. g., acetal, AcH, aldehyde-ammonia,  $\text{HCOOH}$ , amylene hydrate, crotonaldehyde, AcOH, iso-BuOH,  $\text{PrOH}$ , iso- $\text{PrOH}$ ,  $\text{EtOH}$ , piperidine, pyridine, chloral, chloroacetone, cyclohexanol. App. is described.

**Catalytic hydrogenation.** The Goodyear Tire & Rubber Co. Brit. 395,231, July 13, 1933. Heterocyclic compds. contg. N in the nucleus are hydrogenated under pressure in the liquid phase in presence of a Ni catalyst prepd. according to Brit. 394,576 (cl. C. A. 28, 270). Pressures of 100–220 atm. and a temp. of 225° may be used. Solid compds. may be dissolved in an inert solvent such as a satd. hydrocarbon. Examples describe the conversion of  $\alpha$ - and  $\beta$ -picolines to  $\alpha$ - and  $\beta$ -pipercolines, quinoline to tetrahydro- and decahydro-quinolines,  $\alpha$ -benzylpyridine to  $\alpha$ -benzylpiperidine, pyrrole to pyrrolidine,  $\alpha$ -pyridylphenylethylene to 2-phenethylpiperidine,  $\gamma$ -pyridylphenylethylene to 4-phenethylpiperidine and pyridine to piperidine. In 395,232, July 13, 1933, primary aromatic amines, e. g.,  $\text{PhNH}_2$ ,  $\gamma$ - and  $\beta$ -naphthylamines, benzidine, toluidines, xylidines, *o*-ethylphenylamine, toluidine, cumidylphenylamines, are similarly hydrogenated.

**Chlorinating arylamines.** Emeric Havas and Henry R. Lee (to E. I. du Pont de Nemours & Co.). U. S. 1,930,754, Oct. 17. For prepg. a *p*-chloroarylamine compd. of the benzene series such as 5-chloro-2-aminotoluene, a chlorinating reagent such as Cl is caused to react upon a formylaminoaryl compd. such as the formyl deriv. of *o*-toluidine in an anhyd. benzenoid solvent which is substantially inert to Cl, and aq. non-oxidizing inorg. acid such as HCl is added to effect hydrolysis of the formyl group, and the resulting pptd. salt of the *p*-chloroarylamine is recovered.

**Alcohols.** Henkel & Cie., G. m. b. H. Brit. 395,198, July 13, 1933. See Fr. 743,358 (C. A. 27, 3721).

**Alcohols.** N. V. de Bataafsche Petroleum Maatschappij. Brit. 395,202, July 13, 1933. In producing alcs. from olefins and  $\text{H}_2\text{SO}_4$ , the alc.- $\text{H}_2\text{O}$  mixt. obtained is completely or substantially dried, e. g., by  $\text{CuSO}_4$ ,  $\text{CaO}$  or  $\text{CaCl}_2$ , or by azeotropic distn. with PhMe, xylene, ethylene chloride, benzene fractions, etc., before the final

distn. which is then effective for sepg. the alc. from unpleasant-smelling polymers. In examples (1) crude aq. isopropyl alc. is concd. to 88% strength by azeotropic distn., dried with anhyd.  $\text{CuSO}_4$ , and fractionally distd. and (2) the same crude alc. is dehydrated by distn. with PhMe, with return of the PhMe layer of the condensate, and is then fractionally distd. Cf. *C. A.* 27, 4022.

**Alcohols, ethers and esters.** Henry Dreyfus. Brit. 394,376, June 22, 1933. See Fr. 746,463 (*C. A.* 27, 4539).

**Alcohols and aluminum sulfate.** Wm. S. Wilson (to Merrimac Chemical Co.). U. S. 1,931,014, Oct. 17. Alcs. such as EtOH are formed by hydrolyzing alkyl sulfate esters such as  $\text{Et}_2\text{SO}_4$  in the presence of bauxite and water.

**Higher alcohols.** I. G. Farbenind. A.-G. (Wilhelm Pungs and Karl Behringer, inventors). Ger. 583,323, Sept. 2, 1933. Higher alcs. are recovered from mixts. with higher acids by fractionally distg. the mixts. under reduced pressure with the aid of steam or the vapor of an org. liquid such as  $\text{C}_6\text{H}_6$  or EtOH. The mixts. to be treated may be those obtained by sapon. waxes, or by reducing higher fatty acid esters, or by oxidizing paraffin wax. Examples are given.

**Halogenated alcohols.** Hans Meerwein and Erich Goth (to Winthrop Chemical Co.). U. S. 1,931,204, Oct. 17. Reduction of halogenated aldehydes to the corresponding halogenated alcs. is effected (suitably in the presence of a non-tertiary alc. such as isopropyl or isobutyl alc., cyclohexanol, Et, Pr or benzyl alc.) with an alcoholate of a metal other than Al (preferably alcoholates such as those of Zr, Ti, Sn and Fe, although alcoholates such as those of B, Li, Pb, Mn, Co and Ni also may be used). Various details, modifications and examples are given.

**Purifying and separating monohydric terpene alcohols and hydroaromatic alcohols.** Howards & Sons Ltd., John W. Blagden and Walter E. Huggett. Brit. 394,979, July 4, 1933. See Fr. 744,175 (*C. A.* 27, 3943). The purification of menthols according to Brit. 376,356 (*C. A.* 27, 3946) is excluded.

**Polyvinyl alcohol derivatives.** I. G. Farbenind. A.-G. (Arthur Voss, inventor). Ger. 526,497, Sept. 25, 1933. Water-sol. polyvinyl alc. prep'd. by sapon. a polyvinyl ester, is converted into water-insol. products by heating, e. g., to 160°, and (or) by treatment with reagents capable of pptg. aluminums, e. g., tannin or  $\text{CH}_3\text{CO}$ . The products may be used for making films or molded articles. Examples are given. Cf. *C. A.* 27, 3483.

**Tertiary alkylarylamines.** Werner Muller (to General Aniline Works). U. S. 1,930,855, Oct. 17. Alkylol-alkylarylamines in nearly theoretical yields are obtained by acting with an alkylene oxide in a closed vessel upon a secondary alkylarylamine at 100–180° (preferably about 140–150° in most instances). Details are given of the production of 1-(phenylethylamino)butane,  $b_{10}$  160°, 1-(phenylpropylamino)butane,  $b_{10}$  158°, 1-(phenylethylamino)-2-methylpropane,  $b_{10}$  153°, 1-(phenylethylamino)-1-methylpropane,  $b_{10}$  152°, 1-(*o*-methylphenylamino)butane,  $b_{10}$  148°, ethylol-ethyl-1-naphthylamine,  $b_{10}$  187.8°, hydroxyethylmethyl-2-naphthylamine,  $m$  37.9°, propylolcyclohexylaniline,  $b_{10}$  176°, butylol-ethylamine,  $b_{10}$  142°, and butylol-*n*-butylamine,  $b_{10}$  160°. These compds. generally may be used as dye intermediates.

**Aromatic hydroxy aldehydes.** F. Hoffmann-La Roche & Co. A.-G. Ger. 580,981, July 19, 1933. Addn. to 578,037 (*C. A.* 27, 4241). Hydroxybenzyl alcs. are oxidized by the process of Ger. 578,037. Examples are given. Cf. *C. A.* 27, 2692.

**Ketones.** Wilhelm Quersfurth (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,929,331, Oct. 3. A mixt. of ketonizable substances including  $\text{C}_2\text{H}_2$  and EtOAc, EtOH, HOAc or acetaldehyde, and water vapors is passed at a high temp. (suitably about 400–550°) in contact with a heavy metal oxide catalyst such as Fe and Mn oxides in order to form acetone, etc.  $\text{Bq-CO}$ , etc., may also be used with the catalyst.

**Alkyl esters from olefins.** Robert M. Isham (75% to

Wm. B. Pine). U. S. 1,929,870, Oct. 10. Olefins such as those from cracked gasoline or  $\text{C}_4\text{H}_{10}$  are caused to react with a sulfonic acid such as benzenesulfonic acid to produce sulfonic esters and the latter are caused to react with an org. carboxylic acid such as HOAc to produce org. acid esters. The materials are agitated while maintaining the reaction temp. between about 25° and about 100° until the reaction is substantially complete, the sulfonic acid is allowed to settle out of the hydrocarbon materials, the latter are removed, and the esters are recovered by distn.

**Esters of phosphoric acid.** Erik Clemmensen (to Monsanto Chemical Co.). U. S. 1,931,056, Oct. 17. Refining of phosphate esters such as crude triphenyl phosphate is effected by treating the crude ester with a water-sol. permanganate.

**Esters of phosphoric acid.** Erik Clemmensen (to Monsanto Chemical Co.). U. S. 1,931,058, Oct. 17. Esters such as phenyl phosphates, obtained by the condensation of  $\text{POCl}_3$  and a phenol with the elimination of HCl, are refined by treating the crude ester with a water-sol. permanganate. U. S. 1,931,059 relates to a similar refining of neutral esters such as crude tritoly phosphate contg. naphthalenic impurities, the latter being decompd. by use of an aq. permanganate soln. (suitably at a temp. of about 80–100°).

**Sulfuric esters of anthrahydroquinones.** David A. W. Fairweather and John Thomas (to Scottish Dyes, Ltd.). U. S. 1,929,866, Oct. 10. In the esterification of anthrahydroquinone, one of the hydroxyl groups is protected by ester formation (as by introduction of an acetyl or benzoyl group) for the formation of monosulfuric esters. The remaining hydroxyl group may be esterified to form the sulfuric ester by use of pyridine- $\text{SO}_3$  in the presence of a tertiary base, and, if desired, the disulfuric esters formed may be hydrolyzed to form monosulfuric esters. Various details of procedure are given. Cf. *C. A.* 27, 3482.

**Tetrasulfuric acid ester of leuco-1,2,2',1'-anthraquinonazine.** I. G. Farbenind. A.-G. Brit. 394,887, July 6, 1933. Tetrasulfuric acid ester of leuco-1,2,2',1'-anthraquinonazine is prep'd. by reacting a compd. such as the disulfuric acid ester of anthrahydroquinone-2-sulfamic acid, or a salt thereof, with  $\text{PbO}_2$  or a ferriacyanide in a non-acid aq. medium, care being taken that sufficient alkali is present to avoid acid conditions developing during the reaction, e. g., by the addn. of hydroxides or basically reacting salts of  $\text{NH}_4$  or alkali or alk. earth metals. Among examples anthrahydroquinone-2-sulfamic acid 9,10-disulfuric acid ester Na salt is oxidized in presence of  $\text{Na}_2\text{CO}_3$  with  $\text{PbO}_2$  at 60–65°. The product may be used for unregulating fibers from a dye bath or used in a printing paste, acid oxidation yielding the dihydroazine dye.

**Refining crude phenols.** Erik Clemmensen and Roy M. Miller (to Monsanto Chemical Co.). U. S. 1,931,057, Oct. 17. Crude phenols such as phenol or cresols are distd. after adding a relatively small proportion of an inorg. base such as an alkali or alk. earth metal carbonate, bicarbonate, oxide or hydroxide.

**Amides of aromatic acids.** I. G. Farbenind. A.-G. (Heinrich Hopff, inventor). Ger. 584,142, Sept. 15, 1933. Aromatic carboxamides are prep'd. by treating mono- or di-nuclear aromatic hydrocarbons with a cyanate and a H halide in the presence of a catalyst of the kind used in the Friedel-Craft reaction. Thus, benzamide is obtained when a mixt. of benzene,  $\text{KCNO}$  and  $\text{AlCl}_3$  is treated at atm. temp. with HCl gas until  $\text{KCNO}$  cannot be detected in the mixt. Details are given also of the prep'n. of *p*-toluamide and *o*-naphthamide.

**Glucosides.** Burkhardt Helferich. Brit. 394,195, June 22, 1933. Glucosides of aromatic hydroxy compds. are prep'd. by condensing the acetates of reducing sugars with aromatic hydroxy compds. and sapon. the resulting Ac glucosides. The condensation is effected in the presence of an acidic substance and, if desired, a solvent, while the sapon. may be effected with alkali or  $\text{NH}_4$  or catalytically. Among examples  $\beta$ -phenolgalactoside is

prepd. by sapon. the tetraacetyl compd. obtained by condensing PhOH with  $\alpha$ -pentaacetylglucose with the aid of ZnCl<sub>2</sub> and  $\beta$ -thymoglucose by sapon. the tetraacetyl compd. obtained by condensing thymol with  $\beta$ -pentaacetylglucose in presence of  $p$ -toluenesulfonic acid.

**Lactones.** C. H. Boehringer Sohn A.-G. (Georg Schöning and Bruno Walach, inventors). Ger. 584,372, Oct. 18, 1933. Addn. to 575,023 (C. A. 27, 3484). This corresponds to Brit. 378,095 (C. A. 27, 3945), but includes the following addnl. examples: (1)  $p$ -methylcyclohexanone and  $\alpha$ -bromoisovaleric acid Me ester  $\rightarrow$   $\alpha$ -(4-methylcyclohexanol-1)isovaleric Me ester,  $b_{12}$  140.5°,  $\rightarrow$   $\alpha$ -(4-methylcyclohexenyl)isovaleric Me ester,  $b_{12}$  118.23°,  $\rightarrow$   $\alpha$ -(4-methylcyclohexenyl)isovaleric acid,  $b_{12}$  140.2°,  $\rightarrow$   $\alpha$ -(4-methylcyclohexanol-2)isovaleric acid  $\gamma$ -lactone,  $b_{12}$  148.52°; (2) menthone and CH<sub>3</sub>CHBrC(OMe)  $\rightarrow$   $\alpha$ -(2-isopropyl-5-methylcyclohexanol-1)-propionic acid Me ester,  $b_{12}$  142.5°,  $\rightarrow$   $\alpha$ -(2-isopropyl-5-methylcyclohexanol-2)propionic acid  $\gamma$ -lactone,  $b_{10}$  160°.

**Compounds of the "abietene family."** Clyde O. Henke and Malcolm Charlton (to B. I. du Pont de Nemours & Co.). U. S. 1,931,257, Oct. 17. A sulfonic deriv. of abietene, abietine or abietane is condensed with an aldehyde such as formaldehyde or benzaldehyde or a compd. of like reactivity such as paraformaldehyde or benzal chloride to form a product which may be used as a wetting, dispersing or tanning agent.

**Arylaminoanthraquinone compounds.** Walter C. Mealy (to E. I. du Pont de Nemours & Co.). U. S. 1,931,265, Oct. 17. An unsulfonated haloanthraquinone compd. such as 1-amino-2-methyl-4-bromoanthraquinone is condensed with an unsulfonated phenylamine such as  $p$ -toluidine in the presence of an acid-absorbing agent such as NH<sub>4</sub>OAc and an amidation catalyst to produce an arylaminoanthraquinone compd. such as 1-amino-2-methyl-4- $p$ -tolylaminoanthraquinone, the condensation being carried out in aq. suspension. Numerous examples with details of procedure are given.

**Diazo compounds.** I. G. Farbenind. A.-G. Fr. 750,619, Aug. 14, 1933. Diazo compds. of the formula RN.N(SO<sub>2</sub>R')NH<sub>2</sub>x (R is an unsulfonated aryl residue, R' is any cyclic residue, x is the residue of a carboxylic acid, the C of the -C(=O) being joined with the N atom of the imino group, n is 1 or 2, R and R' may be substituted, e. g., by an alkyl, alkoxy or halogen, the R may be substituted by acyl-, alkyl- or phenyl-amino and R' by COOH or SO<sub>2</sub>H) are prepd. from an extremely condensed, soln. contg. the diazotization constituent along with HCl and NaNO<sub>2</sub>, to which a condensed, aq. soln. contg. the aromatic sulfonic acid is added. Examples and a list of components are given.

**Chlorinating cyclic compounds.** F. Raschig G. m. b. H. (Walter Pahl and Wilhelm Mathes, inventors). Ger. 580,512, July 13, 1933. Addn. to 575,765 (C. A. 27, 5082). The process of Ger. 575,765 is carried out at a temp. of at least 300° with catalysts consisting solely of Cu or its compds. Examples are given.

**Fluorine compounds.** I. G. Farbenind. A.-G. Brit. 395,227, July 13, 1933. Aromatic compds. fluorinated in the side chain are made by interaction between practically anhyd. HF and the corresponding compds. chlorinated in the side chain. In examples  $p$ -chlorobenzotrichloride, 1,3-bis(trichloromethyl)benzene, 1,4-bis(trichloromethyl)benzene,  $o$ -chlorobenzotrichloride and 2,1-dichlorobenzotrichloride are thus fluorinated, the products being the corresponding  $\omega$ -trifluoromethyl derivs., with  $p$ -chlorobenzodifluoride-chloride and  $p$ -chlorobenzoic acid as by-products in the first case. The products may be converted by customary methods into nitro- and amino-trifluoromethyl derivs. Cf. C. A. 27, 4414.

**Pyridino compounds.** I. G. Farbenind. A.-G. Brit. 394,416, June 29, 1933. Amines of 1-, 2- or 3-ring aromatic compds., which in the case of 1-ring compds. should be free from OH or alkoxy groups attached to the nucleus and in the case of 3-ring isocyclic aromatic compds. do not contain keto groups in  $\beta$ -position to each other, are quinolized by treating with glycerol in the presence of an oxidizing agent in 40-70% H<sub>2</sub>SO<sub>4</sub>.

When the glycerol is added gradually at practically the same rate as consumed by condensation the concn. of the H<sub>2</sub>SO<sub>4</sub> may be increased to 85%. Suitable oxidizing agents are aromatic NO<sub>2</sub> compds., e. g., PhNO<sub>2</sub>, nitrobenzenesulfonic acid and H<sub>2</sub>AsO<sub>4</sub>. Substances assisting oxidation, e. g., VCl<sub>5</sub>, SeO<sub>2</sub>, may be added. Examples describe the quinolizing of PhNH<sub>2</sub>,  $p$ -toluidine,  $o$ - and  $p$ -chloroaniline, 2,5-dichloroaniline, 3,4,5-trichloroaniline,  $o$ -nitroaniline,  $p$ -aminobenzoic acid,  $p$ -aminoacetanilide (to pseudophenanthroline (I)),  $p,p'$ -diaminobenzophenone,  $\alpha$ -naphthylamine, 2,8-aminohydroxy-naphthalene-6-sulfonic acid, 6-aminoquinoline (to I), aminomaphthostyryl, 3,6-diaminoacridine, etc.

**Organic persulfo compounds.** Fleisch-Werke A.-G. Im Gerbstofffabrikation u. Chemische Produkte. Brit. 391,989, June 27, 1933. Org. derivs. of persulfuric acid of the type RSO<sub>3</sub>OOM, where R is an org. radical and

3 M a basic radical, e. g., a metal, are prepd. by the oxidation of aliphatic, aromatic, hydroaromatic and heterocyclic sulfonyl chlorides with peroxides in the presence of org. solvents and in substantial absence of H<sub>2</sub>O. Stabilizers used for H<sub>2</sub>O<sub>2</sub> and in the prepn. of peroxides and per-salts may be added before or during reaction or to the finished product. The products are sol. in H<sub>2</sub>O and slowly give off active O in its presence. Among examples (1) toluenesulfonyl chloride in C<sub>6</sub>H<sub>6</sub> is added to a suspension of Na<sub>2</sub>O<sub>2</sub>

4 in alc., intensive cooling with brine being used and (2) CaO, suspended in alc., is treated with a C<sub>6</sub>H<sub>5</sub> soln. of amyl naphthalenesulfonyl chloride. The Ca salt is obtained in flocculent form by diln. with H<sub>2</sub>O contg. a small amt. of size. The compds. may be used alone or with other compds. and have oxidizing, bleaching, emulsifying, wetting, disinfectant and insecticidal actions. In particular (a) persulfo compds. of higher aliphatic hydrocarbons and their derivs. are very effective wetting and emulsifying agents; thus in the degumming of raw silk

5 a soln. of 10 g. Na octadecylpersulfonate per l. of liquor may be used and (b) aromatic and hydroaromatic persulfonic acids and their salts, particularly those having an alkyl, aryl or aralkyl group on the side chain, show good bleaching and oxidizing action and high wetting power, thus unbleached, starch-sized cotton fabric may be de-sized and semibleached by treatment in a bath contg. 3 g.

6 Na diaminonaphthalenepersulfonate and 3 g. calcined soda per l., together with a small amt. of a Mg salt as a stabilizer. A soap powder for use in domestic washing consists of Na tetrahydronaphthalenepersulfonate 40, powd. curd soap 50 and Na<sub>2</sub>PO<sub>4</sub> 10%. For bactericidal and disinfecting purposes compds. derived from phenol or their halogen derivs. are particularly useful.

**Anthraquinone derivatives.** Scottish Dyes Ltd. Ger. 584,111, Sept. 15, 1933. See Brit. 330,215 (C. A. 24, 6031).

**Anthraquinonazine derivatives.** Durand & Huguenin A.-G. Ger. 580,531, July 12, 1933. Addn. to 579,327 (C. A. 27, 4542). Sulfuric esters of reduction products of halo-1,2,2',1'-anthraquinonazines are prepd. by the process of Ger. 579,327. An example is given.

**Halogen derivatives of the benzophenone and anthraquinone series.** I. G. Farbenind. A.-G. Brit. 394,990,

8 June 29, 1933. A halodimethylbenzophenone, where R is a residue of the C<sub>6</sub>H<sub>4</sub> series, which may be substituted but is unsubstituted in 1  $\alpha$ -position to the CO group, is caused to react with halogen under conditions such that the Me-H atoms are (nearly) completely exchanged for halogen atoms and the product is subjected to the action of a sapon. and ring-closing agent to form the corresponding haloanthraquinone-carboxylic acid or -aldehyde. Treatment of the halogenated products with agents having sapon. action

9 only, e. g., NaOH, yields halobenzophenone-carboxylic acid or -aldehyde derivs. and these may be subjected to the action of ring-closing agents to form the corresponding anthraquinone derivs. In examples (1) 2,6-dimethyl-4-chlorobenzophenone (prepd. by condensing 1,4-dimethyl-3-chlorobenzene with BzCl) is chlorinated in trichlorobenzene at 170-180° while being exposed to ultra-violet light from a Hg vapor lamp to give an  $\omega$ -hexachloro deriv.;



treating the product with concd  $H_2SO_4$  yields 2-chloroanthraquinone-3-carboxylic acid, whereas by using  $NaOH$  4-chlorobenzophenone-3,6-dicarboxylic acid is obtained and this can be ring closed as above, the chlorination can be interrupted when the  $\omega$ -protachloro deriv is formed and thus, on ring-closure with  $H_2SO_4$ , yields a mixt of 2-chloroanthraquinone-3-carboxylic acid and aldehyde which are sepd by adding  $Na_2CO_3$  and (2) 2,5,4-trimethyl-4,5-dichlorobenzophenone (prepd by condensing 2-chloro-*p*-xylene with 3-chloro-4-methylbenzoic acid chloride) is chlorinated as in (1) and the product treated with concd  $H_2SO_4$  to give 2,6-dichloroanthraquinone-3,7-dicarboxylic acid.

**Haloanthraquinone derivatives.** I. C. Liebenow & A. G. Brit 394,999, June 29, 1933. Divided on and addn to 391,990 (preceding abstr). Halogen dianthraquinonyl or halogen-diphthaloylnaphthalenes are obtained by nearly or completely halogenating in presence of a diluent and at time light the Me groups of a dihalo 2,2'-dimethyl-10,10'-dibenzophenonyl (obtainable by condensing a 1,4-biphenyldicarboxylic acid halide with a *m* halo toluene) or the Me groups of a 1,5-di(methylhalobenzoyl)naphthalene (obtainable by condensing a 1,5-naphthalenedicarboxylic acid halide with a *m* halotoluene), followed by treatment with a simultaneously saponic and ring-closing agent. In examples (1) the product obtained by condensing 1,4-diphenyldicarboxylic acid dichloride with chloro-1-methylbenzene (I) is completely halogenated in the Me group to give 2,2'-di-a-trichloromethyl-1,1'-dichloro-1,1'-dibenzophenone which is treated with concd  $H_2SO_4$  to give 2,7-dichloro-2,2'-dianthraquinonyl and (2) the product obtained by condensing I with 1,3-naphthalenedicarboxylic acid dichloride which is a mixt of isomeric 1,5-di(methylchlorobenzoyl)naphthalenes is chlorinated in the Me group as above and the product treated with concd  $H_2SO_4$ . Carboxylic acids which may have been formed by the sapon of the products obtained by chlorination of the 2-omer contg Me group in *p* position to the ketone group of the above compound removed with  $Na_2CO_3$ . 3,3'-bichlorodiphthaloylnaphthalene being produced.

**Metalliferous sulfurized phenol derivatives.** Valentin K. Kricheldorf to Chemische Fabrik vorm. J. Lindner (U. S. 1,931,010, Oct 12). Metalliferous sulfurized derivs of phenol which are easily sol in alk. soln and in water which give white-brown to black ppt. on addn of more alk. form difficulty of compd with alk. earth metal and heavy metal salt have mordanting, tanning and coloring properties, serve as insecticides and form lake with basic dyes are obtained by heating a phenol and mixt such as phenol, chlorophenols, phenolsulfonates, phenolcarboxylic acids, resorcinol, naphthol, fluoronaphthol, naphtholcarboxylic acid and sulfonic acid, with Sb in the presence of alkali metal salt of such acid that contain in the acid residue one or two metals (Li,  $NH_4$ ,  $Na$ ,  $HS$  group, such as all alkali metal, ammonium, phosphonium, antimonites, sulfantimonite, pyroantimonites, aluminates, arsenites, arsenates, chromates, plumbites, vanadates, zincates, molybdates, etc., and also O) and S contg complex salts like luto (Na) arsenosulfonate, Na chromomolybdate or dodecyl salts contg As and Sb, As and Bi, etc. Several examples with details of procedure are given.

**Condensation products of 1,5-dihaloanthraquinones.** Paul Nawaasky and Georg Kitzschmar (to General Aniline Works) U. S. 1,929,841, Oct 10. A 1,5-dihaloanthraquinone such as the 1,5-dichloroanthraquinone is condensed with an aminophenyl-carboxylic acid in the presence of a normally liquid salt (e.g. such as  $BuOH$ ) at temps above  $150^\circ$ , in order to form 1,5-dianthraquinoneanthraquinone or the like.

**Polyhydroxyfluorans.** Paul B. Woods, James Oakley and Frederick H. Kranz (to National Aniline & Chemical Co.) U. S. 1,931,049, Oct 17. In the production of a polyhydroxyfluorane such as fluorocum by the condensation of an  $\alpha$ -phthalic anhydride compd such as  $\alpha$ -phthalic anhydride with a polyhydroxybenzene compd contg a

free position ortho to one of the hydroxyl groups, such as resorcinol, the condensation is effected in a reaction mixt contg an inert org substance such as dichlorobenzene which is liquid at the temp of the reaction and serves as an "extender."

**Separating methylamines.** Rohm & Haas Co. Brit 394,475, June 29, 1933. Mixts of methylamines are sepd by first distg off trimethylamine as a const-boiling mixt with  $NH_3$ , the requisite amt of  $NH_3$  being added if not already present, or alternatively by adjusting the amts of mono and tri methylamine so that they come off as a const-boiling mixt and distg. After removal of the tri methylamine the mixt of mono and di-methylamine remaining can be sepd by fractional distn. The process is applicable to mixts contg other less volatile substances, e.g.,  $H_2O$ ,  $MeOH$ ,  $HCOONa$  or morg salts. Examples are given.

**Diketimides of *peri* indandiones and related nitrogen compounds.** Heinrich G. Gunc and Wilhelm Eckert (to General Aniline Works) U. S. 1,930,876, Oct 17. Diketimides of *peri* indandiones which are in general yellow to red compd, with intermediate formation of ketimides of  $\omega$ -cyanocetyl (both suitable for use in the manuf of dyes), are obtained by condensing compds such as malonic acid dinitrile, cyanoacetamide, malonic acid chloride or other compds which can be easily transformed into dicarboxylic acid dinitriles of the type of the malonic acid nitrile (suitably with use of a metal chloride condensing agent) with toluene, naphthalene, acenaphthene, 1-methylnaphthalene, anthracene or  $\alpha$ - or  $\beta$ -naphthol ether. Details of procedure are given for the production of the diketimides of *peri* acenaphthindandione, of *peri* naphthindandione, of 1,9-anthracene-methylindandione, of  $\alpha$ -methylnaphthindandione, of 2-methoxy-1,8-naphthindandione and some related compds.

**Complex metal salts of aliphatic polyhydroxy compounds.** I. C. Liebenow & A. G. Brit 395,005, July 7, 1933. Basic  $H_2O$  insol or difficultly  $H_2O$  sol alk. earth metal salts of complex compounds of aliphatic polyhydroxy compounds with trivalent Fe, Cr or Bi or Al are manufd by reacting upon in alk. reacting aq soln of a polyhydric alk, e.g., 1,1-ciol-cyclitol, xylitol, sorbitol, dulcitol, mannitol, or a polyhydroxy carboxylic acid, e.g., glyceric, tartaric, arabinic, mucic, saccharic, glucosaccharic, mannopentonic, lactobionic, with a salt or hydroxide of trivalent Fe, Cr, Bi or Al and pptg the complex metal compd formed by the addn of an alk. earth metal salt or hydroxide or by further mixing in alk. reacting soln of the polyhydroxy compd with the alk. earth metal salt or hydroxide and then adding the salt or hydroxide of the complex forming metal. Neutral  $H_2O$  sol salts of the metal complex compd are manufd by reacting upon the alk. earth metal salts with the calcd quantity of an alkali metal,  $M_2$ ,  $NH_3$  or amine salt, the mon of which forms alk. earth metal salts insol or sparingly sol in  $H_2O$ , e.g., salts of  $H_2SO_4$ ,  $H_2CO_3$  or oxalic acid such as Na or K sulfate or bisulfate, carbonate or bicarbonate, etc., or, in the case of the salts from polyhydroxy carboxylic acids, with 1 equiv of the free polyhydroxy carboxylic acid. Among examples (1)  $BiCl_3$  soln and  $FeCl_3$  soln are added to a soln of mannitol in aq  $NaOH$  to yield basic Bi ferric mannitol by treating in aq suspension of this with a soln of ethylenediamine sulfate or tetramethyl or tetraethyl ammonium sulfate or bisulfate the corresponding salts are obtained and (2)  $BiCl_3$  and a soln of  $BiCl_3$  are added to a soln of gluconic acid in aq  $NaOH$  to yield Bi gluconate on adding this to a gluconic acid soln a sol compd is obtained. In 395,004, July 7, 1933, divided on 395,005, complex compds of Sb with aliphatic polyhydric alcs are manufd by reacting on the alk. with a salt, oxide or hydroxide of tri- or quinquivalent Sb in the presence of an alkali or alk. earth metal hydroxide. The complex compds may be pptd by heating or by pptn with, e.g., alk. The alk. earth compds may be transformed into the corresponding alkali metal, tetraalkyl ammonium or alkylene diamine salts as described in 395,003. In example Sb $_2$ O $_3$  is added to a soln of sorbitol

in aq. NaOH to produce Na antimonyl sorbitol which is pptd. by addn. of alc. and (2)  $\text{Sb}_2\text{O}_3$  is added to a soln. of mannitol in aq.  $\text{Ba}(\text{OH})_2$  soln. to yield a ppt. of Ba antimonyl mannitol; the  $\text{Na}^+$  salt is obtained therefrom by treatment with  $\text{Na}_2\text{SO}_4$ , a compd. of quinquivalent Sb is obtained by replacing the  $\text{Sb}_2\text{O}_3$  by  $\text{Sb}_2\text{O}_5$ .

**Substituted guanidine salts of fatty acids.** Winfield Scott (to Rubber Service Laboratories Co.). U. S. 1,931,395, Oct. 17. Those members of the fatty acid series contg. from 14 to 20 C atoms which are but weakly acidic in nature, such as myristic, palmitic, stearic, arachidic acids, etc., and those acids derived from the unsatd. hydrocarbons such as oleic, linoleic, ricinoleic acids, etc., may be readily combined with the org. bases particularly the aryl substituted guanidines to produce salts, or org. soaps. Such compds. may be prepd. by mixing together the acid and the base in approx. equimol. proportions and preferably employing not over 6% excess of the fatty acid taken while heating to a temp., preferably slightly above the m. p. of the acid used. Thus, e. g., approx. 300 parts of stearic acid is heated to a temp. of about  $80^\circ$ , and 240 parts of di-*o*-tolylguanidine is added slowly thereto, with stirring. The heat evolved during the reaction is sufficient to maintain the temp. mentioned during this stage of the process. After all the guanidine has been added, the temp. is increased to approx.  $100^\circ$  and maintained thereat, preferably while stirring, for a time sufficient to insure the completion of the reaction. The stearate of di-*o*-tolylguanidine so obtained is a thick, sirup-like compd. when first prepd. On standing for a few hours, it solidifies to a stiff cake resembling stearic acid in consistency but of a darker color and possessing a lower softening point.

**Amine hydrohalides.** Newton Lamb (to Dow Chemical Co.). U. S. 1,929,950, Oct. 10. In forming an amine hydrohalide such as aniline-HCl from a gaseous H halide and an amine dissolved in a volatile org. solvent such as a mixt. of  $\text{C}_6\text{H}_6$  and  $\text{CCl}_4$  2 parts by vol. water, if present, is removed by distg. the solvent from the amine hydrohalide while absorbing uncondensed acid gas and solvent vapors in a fresh quantity of the amine and returning the latter to the process.

**Aliphatic fluoro halides.** Thomas Midgley, Jr., Albert L. Henne and Robert R. McNary (to Frigidaire Corp.). U. S. 1,930,129, Oct. 10. App. and details of operation are described for effecting reactions such as the replacement of Cl by F in  $\text{CCl}_4$  to form  $\text{CCl}_3\text{F}$  with fractionation of the desired product as it is formed.

**Diaryl sulfides.** I. G. Farbrund, A.-G. (Friedrich Muth, inventor). Ger. 583,055, Aug. 28, 1933. Di-(halohydroxyaryl) sulfides are prepd. by treating di- or tri-halophenols with a chloride of S in the presence of  $\text{AlCl}_3$ . Thus, 2,4-dichlorophenol, treated at atm. temp. in  $\text{CS}_2$  or  $\text{CCl}_4$  soln. with  $\text{S}_2\text{Cl}_2$  in the presence of  $\text{AlCl}_3$ , yields a di(dichlorohydroxyphenyl) sulfide m.  $188^\circ$ . Examples are given also of the prepn. of sulfides, m., resp.,  $177^\circ$ ,  $140^\circ$ ,  $285^\circ$ , and  $212^\circ$ , from 2,5- and 2,6-dichlorophenol, 2,4,6-trichlorophenol, and 2,4-dibromophenol.

**Formic acid.** Donald F. Othmer (to Eastman Kodak Co.). U. S. 1,930,146, Oct. 10. Propyl formate is used as a solvent for extg.  $\text{HCOOH}$  from its aq. solns.

**Purifying and decolorizing water-soluble organic acids such as maleic, fumaric, phthalic or naphthalic acids.** Alphons O. Jaeger and Lloyd C. Daniels (to Selden Co.). U. S. 1,930,054, Oct. 10. Acids such as those obtained by vapor phase catalytic oxidation processes are subjected, in aq. soln., to extn. with a plurality of solvents such as cresotic acid and  $\text{C}_6\text{H}_6$  at least one of which is partially dispersible with water and another substantially indispersible with water but miscible with the first solvent. The different solvents are successively applied in the order mentioned and are sepd. from the aq. layer and the purified acid material is recovered from the aq. soln.

**Acrylic acid.** Röhm & Haas A.-G. (Walter Bauer and Paul Weisert, inventors). Ger. 583,242, Aug. 31, 1933. See Fr. 713,261 (C. A. 26, 1622).

**Adenosinephosphoric acid.** Chemische und pharmaz-

eutische Fabrikation Georg Henning. Ger. 583,303, Sept. 1, 1933. Suitable animal organs are boiled with water, and during the boiling the mixt. is acidified with  $\text{AcOH}$ , then made feebly alk. with  $\text{NaOH}$ , and then weakly reacidified with  $\text{AcOH}$ . The filtrate is freed from inorg. phosphates by addn. of an alk. earth hydroxide, and the residue is concd. *in vacuo* to cause crystn. of an alk. earth salt of inosinic acid. Adenosinephosphoric acid is recovered from the mother liquor by crystn. Details are given.

**Apparatus for reactions such as production of benzoic acid from phthalic acid.** Frank A. Canon (to Selden Co.). U. S. 1,929,624, Oct. 10. Reacting materials are heated in a reaction chamber with a double cone-shaped bottom heated by burners and which may be filled with a material such as a Hg-Ph alloy which boils at the reaction temp. and is connected with a reflux condenser. Various structural and operative details are described.

***p*-2-Amylbenzoic acid.** Herman A. Bruson, Jack D. Robinson and Otto Stein (to Resinous Products & Chemical Co.). U. S. 1,930,449, Oct. 10. *p*-2-Amylacetophenone is boiled with  $\text{NaOCl}$  and acidified, to form *p*-2-amybenzoic acid, b. about  $140^\circ$ . Its Pb salt is suitable for use as a siccativ with oils.

**Succinic acid and anhydride.** Alphons O. Jaeger and Franz P. Fiedler (to Selden Co.). U. S. 1,929,381, Oct. 3. For purifying impure succinic acid contg. impurities which are relatively non-volatile, the acid is vaporized at a temp. above its m. p. and below its b. p., into a carrier gas stream such as air or  $\text{CO}_2$  and succinic acid, succinic anhydride or their mixts. is condensed from the carrier stream.

**Aliphatic anhydrides.** Henry Dreyfus. Brit. 304,689, June 30, 1933. Aliphatic anhydrides, e. g., of  $\text{AcOH}$ , propionic and alkoxy fatty acids, are produced by thermal decompn. of the corresponding acids in presence of catalysts comprising a phosphoric acid combined with a plurality of metals at least 1 of which is at least as electro-neg. as Ba. The metals may be present as basic or acid radicals. Among examples (1)  $\text{AcOH}$  vapor is preheated to  $500^\circ$  and passed through molten Na and K chlorides contg. K Ba tetrametaphosphate at  $700^\circ$  and (2) Ni phosphomolybdate, prepd. by heating Ni phosphate with  $\text{MoO}_3$ , is heated to  $200^\circ$  and suspended in glacial  $\text{AcOH}$  which is preheated under 10 atm. pressure at  $200^\circ$  and sprayed into a Cu-lined reaction chamber at  $700^\circ$ .

**Aliphatic acid anhydrides.** C. F. Boehringer & Soehne G. m. b. H. (Richard Müller and Erich Rabald, inventors). Ger. 580,930, July 19, 1933. Addn. to 566,332 (C. A. 27, 1011). Vapors of  $\text{CH}_3\text{CH}(\text{OAc})_2$  and its homologs are led at  $300$ – $350^\circ$  over the catalysts described in Ger. 566,332. Examples are given.

**Tetrachloroethylene and hexachloroethane from carbon tetrachloride.** Charles J. Strosacker and Clarence C. Schwegler (to Dow Chemical Co.). U. S. 1,930,350, Oct. 10.  $\text{CCl}_4$  vapors are contacted with an electrically heated body of resistor material such as granular carbon at a decomp. temp.

**$\alpha$ -Aryl- $\beta$ -aminoethanols.** Gordon A. Allen. U. S. 1,931,123, Oct. 17. For the isolation of compds. of this class (in which the aryl group may be phenyl, 4-methylphenyl, 4-methoxyphenyl, 3,4-dimethoxyphenyl or 3,4-methylenedioxyphenyl), the material is converted into a neutral sulfate by addn. of  $\text{H}_2\text{SO}_4$  and the sulfate is crystd. from a solvent such as water or alc.

**Furfural.** Kemiska Kontrollbyran Aktiebolag. (Bertil Groth and Georg Henning Blomqvist, inventors). Ger. 583,324, Sept. 1, 1933. Materials contg. pentosans are treated at  $100$ – $180^\circ$  with a relatively large amt. of dil. acid under such conditions that the furfural formed remains in the mixt. The liquid is then sepd. and furfural recovered by distn. App. is described. Cf. C. A. 27, 1012.

**Hexamethylenetetramine from methane.** Paul Nashan (to Gutehoffnungshütte A.-G.). U. S. 1,930,210, Oct. 10. A mixt. comprising  $\text{CH}_4$ , N and O is conducted through the visible non-dampened discharges of high-

tension, high-frequency a. c. to produce  $(\text{CH}_3)_3\text{N}_4$  and formaldehyde, followed by washing and heating in a crystg. tray to obtain  $(\text{CH}_3)_3\text{N}_4$  in solid form. An arrangement of app. is described.

**Chlorinating *o*-toluidine.** Emeric Havas and Henry R. Lee (to E. I. du Pont de Nemours & Co.). U. S. 1,930,751, Oct. 17. *o*-Toluidine is caused to react with formic acid to produce formylamino-*o*-toluene, the reaction product is chlorinated in a medium of  $\text{PhCl}$ , an aq.  $\text{HCl}$  soln. is added, and the mass is heated to effect hydrolysis and the resulting hydrochloride is recovered.

**Chlorinating *p*-xylydine.** Emeric Havas and Henry R. Lee (to E. I. du Pont de Nemours & Co.). U. S. 1,930,752, Oct. 17. *p*-Xylydine is converted into formylamino-*p*-xylene and the latter is then chlorinated (suitably by use of  $\text{Cl}$  in toluene soln.) to form derivs. such as 5-chloro-2-amino-1,4-xylene (which may be recovered as its hydrochloride).

**4-Alkyl-*o*-cresols.** Walter G. Christensen and Wm. S. Jones (to E. R. Squibb & Sons). U. S. 1,930,923, Oct. 17. In the production of a 4-alkyl-*o*-cresol such as 4-amylo-*o*-cresol, *o*-methylanisole is successively converted into methylnethoxyvalerophenone, amylo-*o*-methylanisole and amylo-*o*-cresol.

**Chlorinating cresidine.** Emeric Havas and Henry R. Lee (to E. I. du Pont de Nemours & Co.). U. S. 1,930,753, Oct. 17. In prepg. a 5-chloro-2-amino-4-methyl-1-anisole compd., a cresidine is chlorinated in which, as in 2-formylamino-4-methylanisole, the amino group is protected by an org. acyl group.

***peri*-Monooxynaphthalene.** Eugene Ayres (to Gulf Refining Co.). Brit. 394,511, June 29, 1933. *peri*-Monooxynaphthalene (I) is obtained by oxidizing  $\alpha$ -naphthol and extg. with  $\text{CaH}_2$  or by dehydrating 1,8-dihydroxynaphthalene under non-oxidizing conditions and extg. with  $\text{CaH}_2$ . I, its soln. in  $\text{C}_6\text{H}_6$ , the mixt. of I and bi- $\alpha$ -naphthol obtained from the oxidation of  $\alpha$ -naphthol and sublimation of unreacted  $\alpha$ -naphthol or the bi- $\alpha$ -naphthol itself may be added to fuels to inhibit gum formation. Examples are given.

**Synthetic hydrogenation menthol.** John W. Blagden. U. S. 1,930,411, Oct. 10. The menthol is partially converted into a menthol ester of an org. acid such as phthalic acid and the unchanged menthol and ester are sepd. (suitably by saponification and steam distn.) and the ester is saponified and the liberated menthol is recovered, in order to effect purification.

**1-Amino-5-methoxybenzothiazole.** Herbert A. Lubs and Arthur L. Fox (to E. I. du Pont de Nemours & Co.). U. S. 1,931,077, Oct. 17. This compd., white crystals m. about  $161^\circ$  to  $162.5^\circ$ , is formed from *p*-anisylthiourea by the action of halogenating agents such as  $\text{Cl}$ ,  $\text{SOCl}_2$ ,  $\text{S}$  chloride or  $\text{Br}$  and subsequent liberation of the free base by use of an alkali such as  $\text{NaOH}$ .

**2-Carbazyl ketones.** I. G. Farbenind. A.-G. Brit. 395,000, July 7, 1933. Acyl chlorides are caused to react on *N*-acetylcarbazole in presence of  $\text{AlCl}_3$  and  $\text{I}$  as catalyst; the *N*-acetyl group is subsequently saponified. An example of the treatment of *N*-acetylcarbazole with  $\text{AcCl}$  in  $\text{CS}_2$

soln., followed by sapon. to the ketone is given and  $\text{BzCl}$  is also specified.

**3,5-Diiodo-4-pyridones.** I. G. Farbenind. A.-G. Brit. 394,387, June 19, 1933. 3,5-Diiodo-4-pyridone is prepd. either by iodizing 4-pyridone or by iodizing 4-amino-pyridine and diazotizing the product or by decomposing  $\gamma$ -pyridylpyridinium chloride with  $\text{H}_2\text{O}$  and then iodizing. The product is a useful intermediate in the manuf. of x-ray contrast media. An example of each process is given.

**Pyranthrone.** Wm. Dettwyler (to E. I. du Pont de Nemours & Co.). U. S. 1,931,021, Oct. 17. 2,2'-Dimethyl-1,1'-bianthraquinonyl is heated with alc. potash in a closed vessel at a temp. below  $140^\circ$  (suitably about  $125^\circ$ ).

**Benzanthrone.** Alphons O. Jaeger and Lloyd C. Daniels (to Selden Co.). U. S. 1,930,681, Oct. 17. An impure anthraquinone from the catalytic oxidation of anthracene is subjected to condensation with glycerol to form a benzanthrone substance, and the product, without removal of alkali-insol. impurities, may be subjected to caustic alkali fusion in the presence of a reducing agent in order to form dibenzanthrone.

**Aminoanthrones and anthraquinones.** I. G. Farbenind. A.-G. Brit. 395,166, July 13, 1933. See Fr. 740,016 (C. A. 27, 2163).

**Quinizarin green and related compounds.** Walter C. Meuly (to E. I. du Pont de Nemours & Co.). U. S. 1,931,264, Oct. 17. A water-insol. 1,4-dihydroxy-anthraquinone compd. such as quinizarin, chloroquinizarin, purpurin or a corresponding leuco deriv. is condensed with aniline or a homolog to produce an aryl-aminoanthraquinone compd. in the presence of water.

**1,4-Diaminoanthraquinone.** Curt Bamberger and Paul Nawiasky (to General Aniline Works). U. S. 1,930,351, Oct. 10. 1,4-Diamino-2,3-dihydroanthraquinone dissolved in  $\text{H}_2\text{SO}_4$  (which may be of 50% or greater strength) is treated with an oxidizing agent such as  $\text{MnO}_2$  at a temp. (suitably  $10$  to  $15^\circ$ ) not exceeding that at which rearrangement of the 1,4-diamino-2,3-dihydroanthraquinone being formed occurs (the oxidizing agent being used in a quantity not greater than theoretically necessary to oxidize the 1,4-diamino-2,3-dihydroanthraquinone to 1,4-diamino-2,3-dihydroanthraquinone). The soln. is then heated to  $90$  to  $95^\circ$  and the melt is thereafter cooled and water is stirred in at a temp. not exceeding  $50^\circ$ . Colorless needles of 1,4-diaminoanthraquinone sulfate sep. and may be decompd. with water to obtain 1,4-diaminoanthraquinone. Various details and modifications of procedure are described.

**1,4-Aminohydroxyanthraquinone.** Curt Bamberger (to General Aniline Works). U. S. 1,930,352, Oct. 10. 1,4-Diamino-2,3-dihydroanthraquinone in 60-70%  $\text{H}_2\text{SO}_4$  is treated with slightly more than the required amt. of  $\text{MnO}_2$  for removing 2 H atoms from the initial material, at a temp. of  $80$  to  $100^\circ$ , and the reaction mixt. is treated with a reducing agent such as  $\text{SnCl}_2$  in at least sufficient amt. to reduce all of the quinonimine compd. formed to 1-amino-4-hydroxyanthraquinone.

## 11 - BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A - GENERAL

ARTHUR W. DOX

**Dehydrogenases during lysis of staphylococci.** Method for measuring bacteriolysis. Fernand Chodat and Fernand Wyss-Chodat. *Compt. rend.* 197, 657-60 (1933). Reduction time of methylene blue increases in direct proportion to the extent of the lysis. M. L. C. Bernheim

**Crystalline chlorocruorin.** Jean Roche and H. Munro Fox. *Nature* 132, 516 (1933).—Chlorocruorin, a respiratory pigment closely allied to hemoglobin and occurring only in the blood of certain polychete worms, is ob-

tained in cryst. form by the addn. of  $(\text{NH}_4)_2\text{SO}_4$  to blood at  $0^\circ$ . The crystals are rhombic, from pale yellow-green to dark brown-green in color, and exhibit strong red dichroism. The absorption spectrum of an oxychlorocruorin soln. resembles that for *Spirographis* blood. The percentage compn. of the chlorocruorin is compared with that of hemoglobin. The hematin part of the mol. is detd. to be greater for the former on a basis of the Fe content. Calvin Brous

**Urease activity as influenced by oxidation and reduction.** Leslie Hellefman, Marie E. Perkins and W. Mansfield Clark. *Proc. Nat. Acad. Sci.* 19, 855-60 (1933).—Urease

soln. was completely inactivated by the addn. of  $\text{Cu}_2\text{O}$  and again reactivated to 83% by excess  $\text{H}_2\text{S}$ .  $\text{Ph-CH}_2\text{HgCl}$  completely destroyed the activity which was again restored by excess  $\text{H}_2\text{S}$ . The effect is not due to the adsorption of enzyme on the suspended metallic deriva.  $(\text{ICH}_2)_2\text{Hg}$  caused no significant inactivation.  $\text{Cu}^{++}$  catalytically accelerates oxygenation of urease. Bzzymic activity is completely destroyed when solus. of urease contg.  $\text{Cu}_2\text{SO}_4$  or  $\text{Cu}_2\text{O}$  are aerated 3.5 hrs. The aeration effect is reversed partially by cysteine and completely by  $\text{H}_2\text{S}$ , thioglycolic acid and HS-glutathione.  $\text{I}^0$  but not  $\text{I}^-$  readily inactivates urease. Reactivation in this case is produced by  $\text{H}_2\text{S}$  but not by KCN.

R. Brown

Continued studies on the limits of specificity of protective enzymes. Differentiation of proteins from blood plasma or serum of various blood groups of healthy and diseased subjects and differentiation of homologous tissue proteins. Emil Abderhalden and Severian Budziszewski. *Fermentforschung* 14, 76-103 (1933); cf. *C. A.* 27, 2968. The urine of rabbits which have been injected subcutaneously with protein preps. from human sera representing different blood groups, and pos. and neg. Wassermann reaction, contains enzymes which are highly specific for the protein used. The presence of sarcoma, carcinoma and syphilitic infection alters the plasma proteins so that the Abderhalden reaction becomes specific for proteins of pathol. origin.

A. W. Dux

Further studies on the specificity of protective enzymes. Emil Abderhalden and Georg Eßkemann. *Fermentforschung* 14, 104-114 (1933); cf. *C. A.* 27, 2968. The urine of rabbits which had received subcutaneous injections of proteins and peptones prepd. from various organs of animals of different species (steer, horse, dog) contained enzymes which were specific not only for the organ substrate but also for the species of animal from which it was obtained.

A. W. Dux

The behavior of dipeptides containing  $\alpha$ -amino heptylic acid toward trypsin and erepsin. Emil Abderhalden and Franz Bronch. *Fermentforschung* 14, 115-17 (1933).--*dl*- $\alpha$ -Aminoheptylic acid was coupled with  $\text{BrCH}_2\text{COBr}$  to form bromoacetyl-*dl*- $\alpha$ -aminoheptylic acid, m. 74°, which was aminated to glycyl-*dl*- $\alpha$ -aminoheptylic acid, m. 245°. A similar coupling with  $\text{Me-CH(CH}_3\text{)-CHBrCOBr}$  gave *dl*- $\alpha$ -bromoisocaproyl-*dl*- $\alpha$ -aminoheptylic acid, m. p. not stated, which was aminated to *dl*-leucyl-*dl*- $\alpha$ -aminoheptylic acid, m. above 290°. Both peptides were completely resistant to erepsin and trypsin.

A. W. Dux

Further studies on the provocation of ereptic action in "erepsin-free" solutions prepared according to Waldschmidt-Leitz and Harteneck. V. Emil Abderhalden and Ella v. Ehrenwall. *Fermentforschung* 14, 118-27 (1933); cf. *C. A.* 27, 5758. --Erepsin-free trypsin acquires ereptic activity when heat-inactivated erepsin is added. The substance responsible for this effect is diffusible and thermostable. If the erepsin has been inactivated by  $\text{H}_2\text{S}$  it is no longer able to evoke ereptic activity in trypsin but regains this property on the addn. of L-3,4-dihydroxyphenylalanine.

A. W. Dux

Correction to the paper of Abderhalden and Zumstein on the behavior of polypeptides containing proline toward the erepsin and the trypsin-kinase complex. Emil Abderhalden. *Fermentforschung* 14, 128-9 (1933); cf. *C. A.* 25, 77. --The prepn. of glycyl-L-proline and *dl*-alaninyl-L-proline has been repeated and purer products have been obtained which are hydrolyzed by erepsin.

A. W. Dux

Addendum to the paper on the oxidation of lactic acid and of  $\beta$ -hydroxybutyric acid by the heart muscle. I. Banga, K. Laki and A. Szent-Györgyi. *Z. physiol. Chem.* 220, 278 (1933); cf. *C. A.* 27, 3227. --A repetition of the previous work gave neg. results, showing that the H-donor effect of the  $\text{MeCHOHCH}_2\text{CO}_2\text{H}$  used on that occasion was due to impurities.

A. W. Dux

Carboxylase. I. Wolfgang Langenbeck, Robert Juttemann, Otto Schaefer and Heinz Wrede. *Z. physiol.*

*Chem.* 221, 19 (1933). --The instability of carboxylase solns. during the process of purification can be overcome by adding 0.5 vol. of MeOH to lower the f. p. and operating at a temp. of  $-20^\circ$ . Addn. of MeOH to the yeast maceration juice ppts. the greater part of the proteins, leaving the carboxylase in soln. The remaining proteins are then pptd. by tannin and the excess tannin is removed by hide powder. Further purification is effected by adsorption on  $\text{Al}(\text{OH})_3$  and elution with  $\text{KH}_2\text{PO}_4$ . The best prepn. after dialysis was 1000 times as active in liberating  $\text{CO}_2$  from  $\text{AcCO}_2\text{H}$  as crude maceration juice contg. the same amt. of solids. The purification process removed sucrose, maltase and trypsin, and the product was protein-free.

A. W. Dux

Enzymes of the leucocytes. IX. The amylases of leucocytes. 2. Richard Willstätter and Margarete Rohdewald. *Z. physiol. Chem.* 221, 13-32 (1933); cf. *C. A.* 26, 1303, 4613. --Eight individual amylases are demonstrated: 4 lyo- and 4 desmo-amylases. The distinguishing features of the 4 members of each group are (1) inhibition by glycerol and independence of addnl. phosphate, (2) inhibition by glycerol and requirement of phosphate addn., (3) no inhibition by glycerol and independence of phosphate, (4) no inhibition by glycerol and requirement of phosphate addn. The differences are due to alterations of definite groupings rather than to an infinitely great no. of possible variations of a colloidal carrier. For the characteristic properties of these amylases 3 at. groupings of the mol. are considered responsible: the specifically active group, the group which renders the enzyme independent of phosphate, and the group which detrs. the inhibition by glycerol.

A. W. Dux

Phosphatides. VII. The sphingomyelins of heart muscle. F. Klenk. *Z. physiol. Chem.* 221, 67-72 (1933); cf. *C. A.* 27, 1311. --From 51 kg. of  $\text{Me}_2\text{CO}$ -dried beef hearts about 7 g. of a sphingomyelin prepn. was obtained which on hydrolysis by 0.5 N KOH in MeOH yielded lignoceric acid, stearic acid and sphingosine.

A. W. Dux

Emulsin. XII 1. The cleavage of phenol- $\beta$ -D-isorhamnoside by emulsin. B. Helferich, H. Rohr and E. Gunther. *Z. physiol. Chem.* 221, 90-2 (1933); cf. *C. A.* 27, 2959. Phenol- $\beta$ -D-isorhamnoside, m. 161.2°,  $[\alpha]_D^{20}$  80.8°, was obtained by hydrolysis of the tri-*Ac* deriv., m. 134.5°,  $[\alpha]_D^{20}$  in  $\text{CHCl}_3$  -7.3°, prepd. by Zn reduction of triacetyl-phenol- $\beta$ -D-glucoside-6-bromohydrin. It is hydrolyzed by almond emulsin about twice as rapidly as the corresponding glucoside. The activity of this enzyme is strictly parallel for the 2 substrates, in different stages of enzyme purification and damage by heat or ultra violet rays. There is no occasion to assume the existence of a specific isorhamnosidase. 2. The cleavage of  $\beta$ -D-glucuronides (conjugated glucuronic acids) by emulsin. B. Helferich and G. Sparnberg. *Ibid.* 92-4. --Hydrolysis of Na 1-menthol- $\beta$ -D-glucuronate by almond emulsin in different stages of purification does not parallel that of phenol- $\beta$ -D-glucoside or 1-menthol- $\beta$ -D-glucoside. A specific enzyme may therefore be assumed for the cleavage of glucuronides. 3. Impairment of emulsin by ultra-violet rays. B. Helferich and G. Brieger. *Ibid.* 94-8. --The relative rates at which enzymic activity toward 2 different substrates is destroyed by exposure of the enzyme prepn. to ultra-violet light are suggested as a means of detg. whether or not 2 specific enzymes are involved. The activity of almond emulsin toward phenol- $\beta$ -D-glucoside and phenol- $\beta$ -D-galactoside diminishes at the same rate; hence both substrates are hydrolyzed by the same enzyme. On the other hand, the activity toward phenol- $\beta$ -D-glucoside diminishes twice as rapidly as that toward phenol- $\alpha$ -D-mannoside, and the existence of 2 specific enzymes must be assumed. 4. The influence of formalin on the  $\beta$ -glucosidase and  $\beta$ -galactosidase action of emulsin. B. Helferich and S. Winkler. *Ibid.* 98-100. --The cleavage of methyl- $\beta$ -D-glucoside and phenol- $\beta$ -D-glucoside by almond emulsin occurs in the same ratio after the enzyme has been treated for varying lengths of time with  $\text{CH}_2\text{O}$ . The cleavage ratio, however, between these glucosides

and phenol- $\beta$ -D-galactoside is altered very considerably. This suggests the possible existence of a specific  $\beta$ -galactosidase.

**Emulsin.** XIII. Preparation and enzymic cleavage of glucosides of N-acetylglucosamine and of 2-deoxyglucose. Burkhardt, Helferich and Arndt Iloff. *Z. physiol. Chem.* 221, 252-8 (1933); cf. preceding abstr.—Tetraacetylphenol- $\beta$ -D-glucosaminide, m. 201.5-2.0°,  $[\alpha]_D^{25}$  -10°, was prepd. by acetylation of glucosamine with NaOAc and Ac<sub>2</sub>O and condensation with PhOH in the presence of p-McC<sub>6</sub>H<sub>4</sub>SO<sub>3</sub>H, and hydrolyzed by NaOH to N-acetylphenol- $\beta$ -D-glucosaminide (I), m. 238° (decompn.),  $[\alpha]_D^{25}$  -5.4°. Triacetylphenol- $\alpha$ -D-glucoside-2-bromohydrin, m. 104.6°,  $[\alpha]_D^{25}$  60.7°, was obtained by bromination of triacetylglucal in AcOH and condensation with PhOH, then hydrolyzed by MeOH and a trace of MeONa to phenol- $\alpha$ -D-glucoside-2-bromohydrin, m. 122.4°,  $[\alpha]_D^{25}$  88.2°, and the latter reduced by Na-Hg to phenol-2-deoxy- $\alpha$ -D-glucoside (II), m. 162.3°,  $[\alpha]_D^{25}$  150°. The enzyme which hydrolyzes I is not identical with  $\beta$ -glucosidase since the ratio of the 2 activities is not const. for emulsin in different stages of purification, nor with  $\alpha$ -mannosidase since the activity ratio varies with different degrees of heat inactivation. The cleavage of II is not proportional to that of salicin by emulsin in different stages of purification, but is proportional to that of phenol- $\alpha$ -D-mannoside by emulsin in different degrees of heat inactivation.

**Cytochrome C.** Karl Zeile and Fritz Reuter. *Z. physiol. Chem.* 221, 101-16 (1933).—The cytochrome of yeast is a complex consisting of a hemin, a porphyrin and a colloidal carrier. By treatment with HBr-AcOH the porphyrin component was converted into hematoporphyrin which was obtained crvst. as the HCl salt and as free base and reduced by HCl-AcOH to mesoporphyrin. The porphyrin is therefore a deriv. of etioporphyrin III and contains the same side-chain grouping as the natural blood pigment. An attempt was made to det. the mol. wt. of the cytochrome system. On the basis of hemin content the smallest cytochrome unit would have a mol. wt. of 18,700, but the substance is actually a high mol. aggregate. The size of the aggregate as detd. by diffusion coeffs. varies with the  $p_H$ , the values for mol. wt. then being 185,000 at  $p_H$  5.6 and 89,500 at  $p_H$  9.0.

**Crystalline urinary urobilin, and further studies on stercobilin and copromesobiliviolin.** C. J. Watson. *Z. physiol. Chem.* 221, 145-55 (1933); cf. *C. A.* 26, 4070.—Methods are described by which urobilin was isolated in crvst. form from urine, and a sepn. of copromesobiliviolin and stercobilin effected from an AcOH-Et<sub>2</sub>O ext. of feces. Spectroscopic studies are reported, also reduction to the leuco compds. and prepn. of Cu salts.

**The protamines of some fish species.** M. A. Lisitzin and N. S. Aleksandrovskaya. *Z. physiol. Chem.* 221, 150-61 (1933).—Two protamines were prepd. from fish testes by Kossel's method: *percarine* from *Lucioperca sandra* (sulfate  $[\alpha]_D^{25}$  -67.4°,  $n_D^{20}$  1.3348, free base  $[\alpha]_D^{25}$  -55°,  $n_D^{20}$  1.3350) and *acipenserine* from sturgeon (sulfate  $[\alpha]_D^{25}$  15°,  $n_D^{20}$  1.3350). The former contains arginine and histidine but no lysine, the latter all 3 diamino acids. Both of these protamines combine with casein in the proportions 1:5 to form salts which are insol. in H<sub>2</sub>O and sol. in 10% NaCl, but sol. in alkalies and irreversibly coagulated by addn. of acid. The protamine caseinates may be salted out of soln. by (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, but are not coagulated by heat unless a Ca salt has been added.

**Cell-bound enzymes of tissues and glands.** III. Pancreatic amylase. Richard Willstätter and Margarete Rohdewald. *Z. physiol. Chem.* 221, 202-6 (1933); cf. *C. A.* 27, 3956.—The amylase of hog pancreas is almost completely sol. in 87 or 100% glycerol. Only a few thousandths percent of cell-bound or desmo-amylase are present. Although the lyo-amylase is readily extd. by either 87% or anhyd. glycerol, the anhyd. soln. in contrast to the other rapidly undergoes an irreversible inactivation. Glycerol itself has a slight inhibitory effect

on the enzyme which may be overlooked in pancreatic amylase because of its high concn. compared to that of leucocytes.

**Iron studies.** VIII. Differentiation of the easily cleavable blood iron from hemoglobin iron and from inorganic iron. Georg Barkan. *Z. physiol. Chem.* 221, 241-51 (1933); cf. *C. A.* 27, 2401.—Under suitable conditions of concn. of blood soln. and quantity of adsorbent the "easily cleavable" Fe may be distinguished from hemoglobin and inorg. Fe by its failure to be adsorbed on Al(OH)<sub>3</sub>. The sepn. thus effected disposes of the mutually contradictory views of Lintzel (*C. A.* 20, 213) and Starkenstein (*C. A.* 24, 3542) regarding the nature of this easily cleavable Fe of the blood.

**Influence of the underlying surface on the cataphoretic mobility of adsorbed proteins.** F. P. Bowden and A. Dunnett. *Physik. Z. Sowjetunion* 4, 340-5 (1933) (in English).—The cataphoretic behavior and apparent isoelec. points of oxy- and carbonyl-hemoglobin adsorbed onto quartz, charcoal, Cu, and paraffin oil dispersed in water, are dependent to a marked degree on the nature of the underlying surface. The hemoglobins differ in this respect from gelatin and albumin. Cf. Loeb, *C. A.* 17, 3682, and Freundlich and Abramson, *C. A.* 22, 3331.

**The mercury-reducing substances of normal urine.** B. Gwosdz. *Bull. soc. chim. biol.* 15, 900-81 (1933).—At least 30% of the Hg-reducing power of urine is due to a group of acids contg. N and unoxidized S, formed by the oxidation of protein ("oxy-proteic acids" of Bondzynski). These acids, together with the urinary pigments, were sepd. from the other Hg-reducing compds. of the urine as the mixed Ba salts. They account for a large proportion of the unknown Hg-reducing substances of Pénau and Taurat (*C. A.* 24, 5049). The effect of different protein diets on the excretion and S content of these substances was studied.

**Properties of the phosphorus-rich peptone obtained in the initial stages of tryptic digestion of casein.** P. Grabar. *Compt. rend. soc. biol.* 114, 13-15 (1933); cf. *C. A.* 27, 3726.—Casein yielded about 5% of a peptide contg. N 13.1% and P 2.2%. It formed an insol. Cu compd. The ratio of free amino N to total N was 1:14. Other properties are mentioned.

**Some chemical aspects of life. Food and evolution.** Jerome Alexander. *Scientia* 54, 252-63 (1933). Discussion.

**Norman Urquhart Meldrum (1907-1933).** E. G. H. Biochem. J. 27, 965-6 (1933).—Obituary notice. B. H.

**Mitogenetic radiation by means of a photoelectric counter tube.** Egon Lorenz. *U. S. Pub. Health Repts.* 48, 1311-18 (1933).—Biol. material tested consisted mainly of onion-base pulp and tips of onion roots. Mouse sarcoma 180, mouse embryo tissue and tetanized frog muscle were likewise tested. No mitogenetic radiation could be detected. The exptl. arrangement was of such intensity that it should have been possible to detect very weak intensities. The discrepancy between these expts. and those of others may perhaps be explained by static effects. When L. started his work, pos. effects were found. In all cases it could be shown that these were due to a static effect of the biol. material upon the field in the counter tube. Whenever tube and window were properly shielded against static influences, no pos. effect could be observed.

**Proteins.** XXIII. Fluctuation of the bioproteins (4). Kinsuke Kondo, Masashi Murayama and Hiromu Iwamae. *J. Chem. Soc. Japan* 54, 904-18 (1933); cf. *C. A.* 27, 5761.—The isoelec. point of wheat glutenins prepd. from the same variety of wheat varied from  $p_H$  5.00 to 5.80. This fluctuation can be minimized to  $p_H$  5.24-5.37 if the other factors of estn. are identical.

**Biochemical problems of nitrogen and the synthesis of proteins.** V. Kulikov. *J. Chem. Ind. (Moscow)* 1933, No. 6, 13-17.—Chem. reactions caused by bacteria are discussed with especial reference to protein synthesis.

H. M. Leicester

**The role of proteins in metabolism.** Wm. C. Rose. *Ohio J. Sci.* 33, 372-88 (1933).—The anabolism and metabolism of proteins and their possible relationship to adrenaline and thyroxine are reviewed. Particular attention is paid to the relative importance of individual amino acids composing ingested proteins. Present knowledge indicates that lysine, tryptophan, cystine or methionine, histidine and tyrosine or phenylalanine are indispensable.

I. M. Levine

**The optical rotatory power of heat-denatured egg albumin.** H. Albert Barker. *J. Biol. Chem.* 103, 1-12 (1933). The rotatory power of alk., heat-denatured egg albumin varies in an orderly manner with the time and temp. of heating and approaches a definite limiting value which is primarily a function of the H-ion and protein concns. of the soln. during the actual heating. The optical rotatory power is the only property which at present is known to be suitable for quant. characterizing a denatured protein and one may assume that samples of denatured egg albumin (or other proteins) having the same  $[\alpha]$  are probably identical, whereas those samples possessing markedly different values are certainly distinct chem. entities.

A. P. Lothrop

**Radium emanation and muscle imbibition.** P. Mascherpa and A. Sgro. *Boll. soc. ital. biol. sper.* 8, 479-84 (1933).—Small doses of emanation produce an increase in muscle imbibition during the first 8 hrs. Later, because of changes in the permeability of the muscle membrane, there is a rapid flow of substances from the muscle into the water with a consequent decrease in the wt. of the muscle. There is also an initial increase in elec. cond. of the radioactive water compared with the controls. Large doses of emanation produce from the start a decrease in the wt. of the muscles compared with the controls. The sec. cond. of the water in which the controls are immersed is always greater than that of the radioactive water.

Peter Masucci

**Thoughts and proposals on the nomenclature, classification and quantitative valuation of accessory factors modifying enzymic reactions.** Camillo Artom. *Boll. soc. ital. biol. sper.* 8, 481-8 (1933).—A scheme of classifications including the use of symbols, based essentially on the mechanism of enzyme action.

Peter Masucci

**The esterase of enteric juice.** Lorio Reale. *Boll. soc. ital. biol. sper.* 8, 492-7 (1933); cf. *C. A.* 27, 2195. Thymol, toluene and  $\text{CHCl}_3$  in satd. soln. and 1 hr. in contact with the juice showed inactivations as follows: thymol 8; PhMe 27;  $\text{CHCl}_3$  34%. Enteric juice was very resistant to quinine and atovyl; 0.5 g quinine and 0.25 g. atovyl per l. inactivated the enzyme only 18-20%. Bile, bile salts and Na oleate inhibited the action of the enzyme very markedly (8-70%). Albumin had little influence; glycerol none. Both in an acid and alk. reaction, Willstätter's accelerating system inhibited the action of the enteric esterase. A concn of 0.02 M Na veronal at  $\text{pH}$  7.3 inactivated the esterase (33%).

Peter Masucci

**The viscosity of the blood following the introduction of suspensions and anticoagulants.** Luigi Robuschi. *Boll. soc. ital. biol. sper.* 8, 550-4 (1933). **Variations in the viscosity of the blood after the introduction of suspensions and anticoagulants.** *Ibid.* 555-60. **The action of heat on the viscosity of the plasma and serum.** *Ibid.* 560-4. **The physical state of proteins and plasma and their viscosity in relation to anticoagulants.** *Ibid.* 564-9. The intravenous injection of 8 cc. of a 1.25% soln. of neohirudin per kg. of rabbit slightly increases the viscosity of the plasma. The intravenous injection of 20 cc. of a 5% suspension of India ink per kg. of rabbit markedly decreases the viscosity of the plasma. The injection of the anticoagulant and the suspension does not change the viscosity of the plasma. Heating normal plasma and the plasma contg. the suspension to 60° decreases the viscosity, but heating serum to 60° increases the viscosity; the decrease is marked for plasma contg. the anticoagulant plus the suspension, slight for the normal and that contg. the suspension alone. The effect of diln. on viscosity is much more regular in the anticoagulant plasma +

suspension than in the others. The results are explained by assuming certain changes in the phys. state of the plasma proteins.

Peter Masucci

**The  $\text{pH}$  in electrolytic chromophoresis. Fibrillar formations in the nerve cells.** Giovanni Palma. *Boll. soc. ital. sper.* 8, 591-4 (1933).

Peter Masucci

**The influence of radium emanation on the electric conductivity of egg albumin.** P. Mascherpa. *Boll. soc. ital. biol. sper.* 8, 617-20 (1933).—The elec. cond. of egg albumin solns. is increased by Ra emanation. The increase is proportional to the quantity of emanation used. The elec. cond. at the end of 24 hrs. was: (1) egg albumin in water + Ra emanation (of 509.85 Mache U.)  $0.1185 \times 10^{-4}$ ; in water +  $\text{H}_2$  gas  $0.1000 \times 10^{-4}$ ; (2) in water + 988.80 Mache U.  $0.2486 \times 10^{-4}$ ; in water +  $\text{H}_2$  gas  $0.1585 \times 10^{-4}$ ; (3) in water + 1585.17 Mache U.  $5.1826 \times 10^{-4}$ ; in water +  $\text{H}_2$  gas  $1.3176 \times 10^{-4}$ . With very high doses of Ra emanation as in (3) the protein soln. very rapidly became turbid.

Peter Masucci

**Influence of the coagulation of proteins on the activity of amylase.** A. Oparin, S. Manskaja and M. Magaram. *Biochem. Z.* 265, 21-8 (1933).—The thermolability of amylase is increased by addn. of undialyzed egg albumin but diminished by addn. of dialyzed albumin. Amylase may be inactivated also in the cold in an acid medium. At  $\text{pH}$  6.1 dialyzed, boiled albumin soln. added to the amylase can be pptd. without adsorbing any of the enzyme, but at lower  $\text{pH}$  the pptn. in the cold is accompanied by considerable loss of activity. Peptone can protect amylase against inactivation in the cold but cannot reverse the process if the inactivation has already occurred. However, a considerable portion of the amylase inactivated by the albumin pptn. either by heat or by cold can be reactivated by digesting the protein ppt. with pepsin.

S. Morgulis

**Changes in the elimination of zinc under the influence of radiation.** Kyuhci Nakadate. *Biochem. Z.* 265, 61-3 (1933). Animals were radiated with a variety of lamps but under such conditions that during the 5 min exposure the radiation dose was 20.4 cal. In every instance an increase in the Zn content of tissues was found in the radiated animals showing that its elimination was diminished. The effect of ultra-violet rays was less than that of the longer wave lengths.

S. Morgulis

**Changes in metabolism under the influence of radiation XII Effect of different kinds of radiation on the glutathione content of the organs of radiated animals.** Ludwig Pincussen and S. Takahashi. *Biochem. Z.* 265, 64-8 (1933); cf. *C. A.* 26, 1026; 27, 4836.—The effect of radiation with different parts of the visible, ultra-violet and ultra-red spectra was detd. on the glutathione content of liver, spleen, lung and muscle.

S. M.

**Changes in the pyrophosphate fraction (adenosinetric phosphoric acid and free pyrophosphate) in muscle.** O. Reinschmidt and M. Emitrenko. *Biochem. Z.* 265, 69-75 (1933).—A pentose compd. partly precipitable by Ba appears in the  $\text{CCl}_3\text{CO}_2\text{H}$  ext. from muscle which has been ground in water. At the same time there is a diminution in the pyrophosphate fraction, principally the free pyrophosphate. When muscle is ground in  $\text{CCl}_3\text{CO}_2\text{H}$  there is likewise formation of a pentose compd. but not so great. In autolyzed muscle pulp the pyrophosphate fraction decreases, but since the increase in orthophosphate exceeds this, other phosphate compds. must be involved. On thawing out ground muscle which has been frozen by liquid air, both free and bound pyrophosphate undergo considerable decompn., but the increase in orthophosphate is less than that expected. Apparently an org. P compd. is formed.

S. Morgulis

**Oxidative inhibition of glycolysis and the mechanism of the Pasteur reaction.** Fritz Lipmann. *Biochem. Z.* 265, 133-40 (1933).—Oxidizing reagents ( $\text{I}_2$ , quinone) in small concn. inhibit glycolysis. This is not due to an oxidation of glutathione, because muscle exts. free from SH glycolyze normally, but to an oxidation of the glycolytic enzyme. 2,6-Dichlorophenol-indophenol in proper concn. can reproduce the Pasteur reaction in



muscle ext. Although the glycolysis in muscle ext. is independent of the presence of  $O_2$ , in the presence of the dye, which is reduced in  $N_2$  but oxidized in  $O_2$ , glycolysis is nearly completely inhibited only in  $O_2$ , the inhibition by the dye +  $O_2$  being reversible. In the  $O_2$ -sated cells the inhibition of glycolysis is likewise due to a reversible oxidative inactivation of the glucolytic enzyme system.

S. Morgulis

**Coenzyme activity. VI. The constitution of adenosinetriphosphoric acid.** H. K. Barrenscheen, Karl Braun and Wilhelm Filz. *Biochem. Z.* 265, 141-7 (1933); cf. *C. A.* 27, 112.—Evidence is presented which throws doubt on Lohmann's hypothesis of the inosinepyrophosphoric acid nature of coenzyme. Until evidence to the contrary is forthcoming the constitutional formula for adenosinetriphosphoric acid, with the 2 pyrophosphate groups in an imino linkage with the  $NH_2$  of the adenine should be retained.

S. Morgulis

**The theory of glycolysis.** H. K. Barrenscheen and Hela Beneschovsky. *Biochem. Z.* 265, 159-68 (1933).—According to Nilsson hexosemonophosphate undergoes physiol. decompn. into glyceraldehyde phosphate and a 3-C substance, possibly  $AcCHO$ . According to Embden, on the contrary, hexosediphosphate is the intermediate product which splits into a mol. of glyceraldehyde phosphate and  $OC(CH_2OH)_2$ , which through a Cannizzaro reaction change to phosphoglyceric acid and glycerophosphoric acid, the latter giving rise to lactic acid through the intermediate step of  $AcCO_2H$ . According to Embden  $AcCHO$  plays no part as intermediate substance in glycolysis. Expts. with phosphoglyceric acid show that muscle and, to a slight extent also, liver tissue convert this to  $AcCO_2H$ , leading also to a small increase in lactic acid. Glyceraldehyde phosphate, however, is utilized by all tissues, and in the glycolysis of muscle it gives lactic acid, but when the glycolytic process is suppressed  $AcCHO$  is formed instead. However, only a small portion of the glyceraldehyde phosphate is thus transformed, the largest amt. serving as a step in the formation of hexosediphosphate. The authors, therefore, accept Nilsson's view that the first product in the decompn. into 3-C substances is the appearance of a glyceraldehyde phosphate. Normally, the decompn. would proceed from this to lactic acid through  $AcCHO$  and  $AcCO_2H$ . The formation of phosphoglyceric and of glycerophosphoric acids is a phenomenon of stabilization, as is also that of hexosediphosphate.

S. Morgulis

**Transformation of acetoacetaldehyde by yeast.** Stefan Grzycki. *Biochem. Z.* 265, 195-8 (1933).—Acetoacetic acid is reduced by fermenting yeast to  $d$ - $\beta$ -hydroxybutyric acid. Although the Na salt of  $AcCH_2CHO$  reacts alk. when added to the fermenting sugar, the alk. is neutralized by the evolved  $CO_2$ . The  $AcCH_2CHO$  is reduced to  $d$ - $\beta$ -butylenglycol.

S. Morgulis

**Influence of fluoride on phosphatase activity.** Ernst Auhagen and Stefan Grzycki. *Biochem. Z.* 265, 217-22 (1933).—Kidney phosphatase is unaffected by NaF but yeast phosphatases are very sensitive to this inhibitor. The effect of NaF on taka-glycerophosphatase depends upon the  $pH$ , but not on the alk. A slight inhibition appears on the acid side.

S. Morgulis

**The partial enzymes of myrosinase.** Carl Neuberg and Otto von Schoenebeck. *Biochem. Z.* 265, 223-38 (1933).—See *C. A.* 27, 4823.

S. Morgulis

**Mechanism of enzyme action. XI. Cryolysis, and gas absorption of lyophilic colloids.** 1. Gertrud Weiss and F. F. Nord. *Z. physik. Chem.* A166, 1-15 (1933); cf. *C. A.* 26, 2908.—Besides the cryoscopic expt. previously described (*C. A.* 26, 2103), the absorption of  $C_2H_4$ ,  $C_2H_2$ , and  $N_2O$  on Na oleate, egg albumin, and gelatin was investigated before and after freezing at  $18^\circ$  and  $-79^\circ$ .

G. M. Murphy

**Biological effects of extreme pressures. Action of high pressures on proteins.** J. Bassot, M. Machebeuf and G. Sandor. *Compt. rend.* 197, 796-8 (1933); cf. *C. A.* 27, 3493.—Horse serum was subjected to pressures varying from 3000 to 13,000 atms. for periods up to 30 min.

1 Min. pressure for gelification was 13,000<sup>a</sup> atms. Serum globulin jelled completely at 15,000 while serum albumin remained limpid at all pressures up to 15,000 atms. Studies are being made to det. whether pressure affects the antigenic specificity of proteins.

Julius White

**Diastases (Javillier) 12. Heavy metals in biological material (Anon.) 12. Bile acids (Schenck) 10. Enzymes (Diehl, et al.) 12. Putrefaction of hydroxyproline (Keil, Günther) 10. Cholesterol (Létre) 10. Cholatrienic acid (Uraki) 10. Constitution of the bile acids (Danc, Klee) 10.**

## B- METHODS AND APPARATUS

STANLEY R. BENEDICT

**A simple method for determining the calcium and phosphorus contents of feces.** A. Lichtenstein. *Nederland. Tijdschr. Geneeskunde* 77, 4336-9 (1933).—Finely grind and mix the feces; weigh 1 g. in a crucible and ash at a temp. not exceeding  $400^\circ$ . Dissolve the ash in dil.  $HNO_3$ . To sep. P, add 4 cc. of a 15% soln. of  $NH_4$  molybdate. Remove the ppt. by centrifuging; one may dissolve it in NaOH to det. P; it is free from Ca. To the supernatant fluid, contg. all the Ca, add NaOH and then  $AcH$ , and ppt. Ca by Na oxalate. Dissolve the pptd. Ca oxalate in  $H_2SO_4$  and titrate with permanganate.

R. Beutner

**Traces of blood in the feces.** L. A. Hulst. *Nederland. Tijdschr. Geneeskunde* 77, 4455-9 (1933).—II. detects blood in the feces of healthy subjects who were on a milk diet, by the benzidine reaction as follows: dissolve 100 mg. benzidine in 8 cc.  $AcH$  and add 2 cc. 3%  $H_2O_2$ . Introduce a lump of feces into this mixture; a greenish or bluish color indicates a pos. reaction. The reaction was, however, neg. and remained so even when a food rich in peroxidases—like beans—was given. For the detection of blood in the feces, it is sufficient, therefore, to prescribe a bloodless diet, and to see that there are no bleeding spots in the nose or throat.

R. Beutner

**A new pycnometer for the calibration of respiration apparatus with alcohol.** Alexander Szakál. *Arbeitsphysiol.* 6, 235-8 (1932).

T. M. Carpenter

**A new method of determining the free water of erythrocytes.** A. Slawinski. *Bull. soc. chim. biol.* 15, 982-91 (1933); cf. *C. A.* 27, 3732.—The free water of the corpuscles is detd. by comparing the relative elec. cond. of 2 samples of blood to which different proportions of Na citrate have been added, and applying the math. formula given. Horse corpuscles contain 51% free water.

L. E. Gilson

**A method for the purification of botulinus toxin.** Shigeru Tani. *Compt. rend. soc. biol.* 114, 237-9 (1933).

L. E. Gilson

**Microdetermination of residual nitrogen and urea in the blood.** Friedrich Rappaport. *Mikrochemie* 14, 49-80 (1933); cf. *C. A.* 27, 5357.—A description of expts. on the applicability of the hypobromite method for the iodometric detn. of  $NH_3$ , of methods for detg. the residual N in blood and in serum and methods for detg. urea in serum and in blood. The analyses were made with 0.2 cc. samples. The hypobromite method consists in treating the sample with  $Br_2$  in a suitably buffered soln., allowing it to stand a few min., adding KI and acid and titrating with  $Na_2S_2O_3$ . In carrying out the method with small quantities of materials it is necessary to take particular precautions with respect to both reagents and procedure.

W. T. H.

**Microdetermination of indican in the blood.** F. Rappaport and H. Engelberg. *Mikrochemie* 14, 74-80 (1933).—By modifying the app. and taking special precautions, it has been found possible to carry out the condensation with thymol or bromothymol and satisfactorily det. the indican content of 0.2 cc. of blood serum or urea.

W. T. H.

**The determination of glycogen.** Melville Sahyun. *J. Biol. Chem.* 103, 203-8 (1933); cf. *C. A.* 26, 751. When charcoal is used to measure complete pptn. of glyco-

gen, not more than 50 mg. should be added as larger amts. (cf. C. A. 27, 2971, 3496) interfere with the subsequent hydrolysis. A small quantity of 20-30 mg. can be easily estd. on the tip of a spatula without weighing. Glycogen is hydrolyzed in 20 min. in 5 N  $\text{H}_2\text{SO}_4$  but the vol. of acid should be kept as small as possible to minimize the quantity of  $\text{Na}_2\text{SO}_4$  formed on neutralization.

A. P. Lothrop

**An apparatus for automatically measuring the respiratory exchange of small animals.** Helen G. Lewis and James M. Luck. *J. Biol. Chem.* 103, 209 (1933). - In the closed-circuit type of app. described for measuring the respiratory exchange of small animals the rate of  $\text{O}_2$  consumption is detd. electrically by the rate at which  $\text{H}_2\text{O}$  must be admitted to maintain a const. pressure in the system and the  $\text{CO}_2$  production by the change in conductivity, automatically recorded, of an absorbing soln. of  $\text{Ba}(\text{OH})_2$ . The basal metabolic rate of male rats, fasted 36 hrs., of 220 g. body wt., and at an environmental temp. of  $28^\circ$ , averaged 744 cal. per day per sq. m. of body surface.

A. P. Lothrop

**A simple photoelectric colorimeter.** G. A. Millikan. *J. Physiol.* 79, 152 (1933). - A colorimeter using a differential Cu-CuO photoelec. cell and color filters is described. It is especially well suited for measuring the degree of oxygenation of hemoglobin solns.

J. F. L.

**A selective staining method for certain fats.** Vincenzo Magri. *Boll. soc. ital. biol. sper.* 8, 569 (1933). - For histological sections the technic is: (1) Fixation in  $\text{HCOH}$ . (2) Sectioning (frozen). (3) Staining for 10 min. in a mixt. of equal parts of freshly prepd. soln. (A) and (B). (A) Heat to boiling 1 g.  $\alpha$ -naphthol in 100 cc. distd. water and add dropwise 0.1 N  $\text{NaOH}$  until the  $\alpha$ -naphthol is completely dissolved. Cool. (B) A 1% aq. soln. of dimethyl-*p*-phenylenediamine. Mix (A) and (B) in equal parts and alkalize strongly. (5) Inclusion in Apathy gum syrup. The fatty drops contg. neutral non-satd. fats appear a bright violet, the oxidase granules a blue and the remainder of the field a yellowish green color. The pos. violet reaction is only given by the glycerides of non-satd. fatty acids.

Peter Masucci

**The nuclear reaction of Feulgen on platelets.** Augusto Corradetti. *Boll. soc. ital. biol. sper.* 8, 603 (1933). Feulgen's test was neg. for blood platelets. These results do not prove conclusively that thymus nucleic acid is absent but may be present in amts. too small to be detected by the test.

Peter Masucci

**The behavior of the specific granulations of white blood corpuscles and bone marrow cells after immersion in a normal solution of hydrochloric acid.** Augusto Corradetti. *Boll. soc. ital. biol. sper.* 8, 606 (1933). Blood and bone marrow smears were treated with Giemsa stain, fixed in 95% alc. and immersed 4 min. in N HCl at  $60^\circ$ . Examn. showed that only the eosinophile and azurophile granulations of the platelets and megakaryocytes remained unchanged.

Peter Masucci

**The behavior of platelets and megakaryocytes after prolonged immersion in normal hydrochloric acid.** Augusto Corradetti. *Boll. soc. ital. biol. sper.* 8, 607 (1933). - Blood and bone marrow smears (newborn human and cat) were fixed in 95% alc. for 24-48 hrs., immersed in N HCl for 45-60 min. at  $60^\circ$  and treated with Giemsa stain for 45-60 min. Examn. reveals that the platelets remain unaltered; their azurophile granules are as colored as normal platelets. Likewise the azurophile granulations of the megakaryocytes of the bone marrow cells remain unaltered.

Peter Masucci

**Analytical studies. XVII. Microdetermination of lead and zinc in organic material.** Ludwig Pincussen and Ernst Brück. *Biochem. Z.* 265, 58 (1933); cf. C. A. 25, 2751; 27, 744. - For the Pb detn. the following reagents are required: Fe-free  $\text{HNO}_3$ , Pb-free  $\text{H}_2\text{SO}_4$  (1:1), perhydrol, 70%  $\text{AcONH}_4$ , 10%  $\text{Na}_2\text{S}$ , gum arabic soln. 1:10, a standard soln. contg. 1 mg. Pb per cc. (made by dissolving 1.6 g.  $\text{Pb}(\text{NO}_3)_2$  ground and dried at  $100^\circ$  in a l. of  $\text{H}_2\text{O}$ ). Procedure: Cover 2 g. dry tissue in a 50 cc. Kjeldahl flask with 2-3 cc.  $\text{H}_2\text{SO}_4$ . Add, drop by drop,

1  $\text{HNO}_3$ , as long as there is any reaction; leave overnight, heat cautiously, add 1 cc. perhydrol until a colorless soln. is obtained. Transfer the ash soln. quantitatively to a centrifuge tube, dil. to about 25 cc. with  $\text{H}_2\text{O}$  and centrifuge, preferably the next day. Wash the residue with a couple of cc. 1%  $\text{H}_2\text{SO}_4$ , then add to it 2 cc.  $\text{AcONH}_4$  soln. and place in a boiling bath for 10 min. Centrifuge and pour off the clear soln. into a 25 cc. flask. Digest the undissolved residue in the same manner 4-5 times, then once with  $\text{H}_2\text{O}$ , and finally dil. the contents of the flask to vol. Prep. a standard with 0.2-0.5 mg. Pb, with the same quantity of  $\text{AcONH}_4$ , and dil. to 25 cc. Add a drop or 2 of  $\text{Na}_2\text{S}$ , and 1 cc. gum arabic to each flask and match the colors at once. The method is sensitive to 0.1 mg. Pb. For the Zn detn. addnl. reagents are required: satd.  $\text{H}_2\text{S}$  soln., 30%  $\text{NaOH}$ , concd.  $\text{AcOH}$ , N HCl, 15%  $\text{AcONH}_4$ , dil. HCl (1 pt. acid + 1.5 pt.  $\text{H}_2\text{O}$ ). Make the standard soln. contg. 1 mg. Zn per cc. by dissolving in 1 l. either 6.79 g.  $\text{K}_2\text{SO}_4 \cdot \text{ZnSO}_4 \cdot 6\text{H}_2\text{O}$  or 4.4 g.  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ . Transfer quantitatively the tissue ash prepd. as before to a quartz dish, evap. to dryness and drive off the excess  $\text{H}_2\text{SO}_4$ . Dissolve the residue in 5 cc. dil. HCl, transfer with plenty of  $\text{H}_2\text{O}$  to a 25 cc. centrifuge tube, centrifuge, and wash the residue with dil. acid and water. Place the combined wash fluids in a 50 cc. Erlenmeyer flask, warm on the water bath, pass in  $\text{H}_2\text{S}$ , stopper and leave overnight. Addn. of a little ether facilitates the pptn. of sulfides; filter them through a hardened paper and wash with satd.  $\text{H}_2\text{S}$  soln. Free the filtrate from  $\text{H}_2\text{S}$ . To free it from Fe add 6 drops  $\text{HNO}_3$ , transfer quantitatively to a 25 cc. centrifuge tube, make alk. with 30%  $\text{NaOH}$ , then acidify with  $\text{AcOH}$  and centrifuge off the ppt. Dissolve the residue in a little dil. HCl, and repeat the treatment with  $\text{NaOH}$  and  $\text{AcOH}$  until a red-brown ppt. is produced. Unite the supernatant fluids in a 50 cc. flask and treat with  $\text{H}_2\text{S}$ . Leave the stoppered flask overnight. Collect the pptd.  $\text{ZnS}$  on a hardened paper, wash with  $\text{H}_2\text{S}$  water acidified with  $\text{AcOH}$ , and ash. Free the ash from further Fe impurities by treating it with 2 cc.  $\text{AcOH}$  in a centrifuge tube and wash repeatedly with acidified  $\text{H}_2\text{O}$ . Use the combined solns. obtained from centrifuging for the nephelometric detn. Use measuring cylinders, 15 or 25 cc., contg. 5 cc.  $\text{H}_2\text{S}$ -water, 1 cc. N HCl and 2 cc.  $\text{AcOH}$ . Add the unknown soln. or an aliquot and the standard soln., then 2 cc.  $\text{AcONH}_4$ , make up both to the same vol., mix and compare in a nephelometer after 15 min. The method is sensitive to 0.03 mg. in 15 cc. S. M.

**Colorimetric determination of calcium as picrolonate.** F. Alten, H. Weiland and E. Knippenberg. *Biochem. Z.* 265, 85 (1933). With 5 cc. of a soln. contg. 0.020-0.150 mg. Ca per cc., neutralize the acidity with 2 N  $\text{NaOH}$  to methyl orange, add a few drops 10% sulfosalicylic acid, dil. to 10 cc. and filter. Place 1-2 cc. of the filtrate in a small centrifuge tube, add 3 vols. of ice-cold 0.01 N picrolonic acid soln. (made by dissolving 2.64 g. in a l.  $\text{H}_2\text{O}$ , warming on the water bath and filtering the next day), and leave in a cold place for 4 hrs. with occasional shaking. Free the silny ppt. from the supernatant liquid by drawing off the latter with the aid of a porcelain filtration rod, washing out the traces of picrolonic acid with small quantities of anhyd. ether. Wash the ppt. and rod with hot water and transfer the soln. of Ca picrolonate to a 50 cc. flask. Heat this on a water bath for 10 min. with 1 cc. satd.  $\text{Br}_2$  water, add 10 cc. alc., cool, and make alk. with 2 cc. 2 N  $\text{NaOH}$ . Keep the colored soln. overnight in a protected place and exam. with the step colorimeter, using the 530 m $\mu$  filter. Mg, K, Na and  $\text{NH}_4$  do not interfere with the detn. S. M.

**Colorimetric determination of phosphoric acid in the presence of arsenate ions. Contribution to the study of induced reactions.** H. K. Barrenscheen, J. Banga and K. Braun. *Biochem. Z.* 265, 148-53 (1933). - A re-exam. of the problem of the colorimetric detn. of P in the presence of arsenate ions by the procedure recommended by Braunstein shows that this completely fails to yield reproducible results. Also, the variation in the result depending upon the relation between the phosphate

and arsenate concns. makes the application of a correction impossible. It was found that this detn. demonstrates Skrabal's induced reactions, the abs. and relative error of the analysis increasing as the abs. or relative concn. of As in the system increases. Attempts to avoid this by means of  $\text{NaHSO}_4$  to reduce the arsenate to arsenite which would not interfere with the reaction of phosphate with the molybdate have not yielded the desired result.

S. Morgulis

**Report on (the determination of) enzymes.** A. K. BALKS. *J. Assoc. Official Agr. Chem.* 16, 479-80 (1933); cf. *C. A.* 26, 5514.—The previously described method will be studied collaboratively. A. Papineau-Couture

**Methods of determining cholesterol. II. Volumetric and gravimetric methods.** A. Santos Ruiz and Isabel Torres. *Anales soc. españ. fis. quim.* 31, 685-94 (1933); cf. *C. A.* 27, 3064.—The volumetric method of Okey (*C. A.* 24, 5780), and as modified by Turner (*C. A.* 25, 6657), and the gravimetric method of Szent-György (*C. A.* 17, 3197), for detn. of cholesterol in normal human serum, were tested. The Okey method, as modified by Turner, is best for detg. plants exts., where a colorimetric method cannot be used. Recovery is 106.6%. The volumetric method of Bang (Micométodos de Pincussen, 1932) is only recommended for simultaneous detns. of neutral fats. Recovery is only 65.8 mg. %. The Szent-György method is best; recovery is 100.2%.

E. M. Symmes

**Local detection and determination of chlorophyll in plant tissues.** S. Ilupert, H. Hofmeier and K. Heidrich. *Ber. Dtsch. Bot. Ges.* 51 (1933), cf. *C. A.* 26, 756.—The green color which develops when chlorophyll-poor plant tissue is treated with  $\text{H}_2\text{SO}_4$  and a Cu salt can be used for detn. of the chlorophyll. For a quant. method, 0.1-0.3 g. of plant material is treated with the reagent, filtered and washed, dried at 50°, and freed from yellow pigment by extn. with 40%  $\text{Me}_2\text{CO}$ . The Cu compd. (probably Cu phaeophytin) is then dissolved in abs.  $\text{Me}_2\text{CO}$  and the absorption of 30 mm thickness of the soln. compared with that of a standard. The absorption of the Cu compd. is about 30% higher than that of K chlorophyllin prepd. by Wiltstätter's method.

K. V. Thimann

Viologen indicators (Michaelis, Hill) 10.

Manual of Dehydrated Culture Media and Reagents. 4th ed., revised. Detroit: Difco Labs. 191 pp.

## C - BACTERIOLOGY

CHARLES B. MORREY

**Bactericidal power of sodium ricinoleate.** H. Violle. *Compt. rend.* 197, 714-16 (1933). The effect of a 1:1000 soln. of Na ricinoleate on many kinds of bacteria was studied. The common and pathogenic bacteria of the intestinal tract were unaffected. *Streptococci* sp. were killed but *staphylococci* were not.

L. E. Gilson

**Variations in the bactericidal power of gold salts on Koch's bacillus in vitro depending upon the composition of the medium and the number of bacilli introduced.** Paul Courmont, Henri Gardère and P. Pichat. *Compt. rend. soc. biol.* 114, 48-9 (1933); cf. *C. A.* 27, 322.—Relation between the bactericidal action of gold salts on Koch's bacillus in vitro to that in vivo. *Ibid.* 50 1.—Some addnl. expts. with saucocrysin and allocrysin are reported.

L. E. Gilson

**The extraction of a toxic and antigenic complex from Aerttrycke's bacillus.** André Boivin, Ion Mesrobianu and Lydia Mesrobianu. *Compt. rend. soc. biol.* 114, 307-10 (1933).

L. E. Gilson

**Comparison of the enumeration of bacteria by means of solid and liquid media.** C. T. Butterfield. *U. S. Pub. Health Repts.* 48, 1292-7 (1933).—Under the standardized conditions of these tests, the plate colony counts and the most probable nos. computed from the diln. method are in excellent agreement for the detn. of *Es. coli*, and are in fair agreement for *Aerobacter aerogenes*.

J. A. Kennedy

The chemistry of the lipides of tubercle bacilli. XXXV.

**The constitution of phthiocol, the pigment isolated from the human tubercle bacillus.** R. J. Anderson and M. S. Newman. *J. Biol. Chem.* 103, 197-201 (1933); cf. *C. A.* 27, 5364.—The yellow cryst. pigment, phthiocol, isolated from the  $\text{Me}_2\text{CO}$ -sol. fat of the human tubercle bacillus, has been identified as 2-methyl-3-hydroxy-1,4-naphthoquinone. This formula has been confirmed by synthesis.

A. P. Lothrop

**The formation of oxalic acid in *Mycobacterium tuberculosis* microcultures.** M. Bergonzini. *Boll. soc. ital. biol. sper.* 8, 527-8 (1933).—Using Fortner's technic, B. observed crystals of Ca oxalate in 10-15-day-old cultures of *M. tuberculosis*. Similar crystals were observed in cultures of *Aspergillus*, *Penicillium* and *Streptothrix*, but not in cultures of coli, dysentery, cholera or staphylococcus groups.

Peter Masucci

**The dehydrogenase activity of *Es. coli communis* on higher fatty acids.** F. P. Mazza and A. Cimmino. *Boll. soc. ital. biol. sper.* 8, 531-4 (1933).—In the presence of a buffered suspension of *Es. coli*, the higher fatty acids undergo a rapid oxidation; the oxidation does not take place if the bacteria are killed by heat at 100°. The velocity of dehydrogenation is: stearate > oleate > palmitate. During the first 50-60 min. oxidation occurs without production of  $\text{CO}_2$ .

Peter Masucci

**The mechanism of activation of glucose in lactic acid fermentation. II. Cl. Pronageot and J. Roux. *Biochem. Z.* 265, 13-20 (1933); cf. *C. A.* 26, 2209.—Expts. with variable amts. of bacteria (on the basis of dry wt.) show that the velocity of the reaction is proportional to the quantity of bacteria. The rise in the curve of  $\text{CO}_2$  production for a given quantity of bacteria is practically the same with a range of glucose concns. from 0.052 to 2.6%. But the induction, which is unaffected when the glucose concn. varies from 1 to 0.1, becomes considerably greater as the concn. diminishes to 0.04 and 0.02.**

S. Morgulis

**Respiration and fermentation of lactic acid bacteria.** John G. Davis. *Biochem. Z.* 265, 90-104 (1933).—*L. delbrueckii* produces  $\text{H}_2\text{O}_2$  equiv. to the amt. of  $\text{O}_2$  used in the oxidation of the substrate. Methylene blue or *p*-phenylenediamine, which increase the rate of oxidation 100-300%, diminishes the formation of  $\text{H}_2\text{O}_2$  about 25%, thus causing the respiratory quotient to rise. The increase in respiration by methylene blue is due to the oxidation of lactic acid, and is unaffected by poisoning with  $\text{CH}_3\text{CO}_2\text{H}$ , while the oxidation of sugar is inhibited either in the presence or absence of methylene blue. The glucolysis is thus an essential step in the respiration. This is little affected by HCN, but the respiration of a different strain of organisms (*B. cereale*) is suppressed by HCN or  $\text{CO}$ , and no  $\text{H}_2\text{O}_2$  is produced in their oxidative process nor is it influenced by methylene blue. Their respiration is accord. with fermentation, and the pyruvic acid formed is changed partly to  $\text{AcOH}$ , acetoin and alc.

S. Morgulis

Alkyl derivs. of halogen phenols and their bactericidal action (Klarman, et al.) 10.

**Gershensfeld, Louis.** Bacteriology and Sanitary Science for Students in Pharmacy, Chemistry and Allied Sciences. 2nd ed., revised. Philadelphia: Lea & Febiger. 493 pp.

## D - BOTANY

THOMAS G. PHILLIPS

**Physicochemical aspects of sex plants.** W. F. Lockwing. *Proc. Soc. Exptl. Biol. Med.* 30, 1215-20 (1933).—Staminate plants of photoperiodic, long-day spinach and short-day hemp were richer in Fe, Mg, sugar, sol. sap constituents and oxidative activity of tissue fluids than the corresponding pistillate plants. The findings reflect the rapid metabolism necessary for the production of large amts. of pollen, which comprise 10-15% of the dry wt. of the tops.

C. V. Bailey

**The latex of the Jac tree of Cambodia.** Gabriel Bertrand and Georges Brooks. *Compt. rend.* 197, 661-5

(1933).—Cambodge lac, the latex of *Melanorrhoea laccifera*, family Anacardiaceae, was treated with EtOH. A gum contg. laccase was pptd. From the EtOH soln. a new phenol, moreacol (I), somewhat similar to laccol, was sepd. The yield of crude I was 55-80% of the latex. I was readily oxidized by the air to a brown resin. I,  $C_{12}H_8(OH)_2C_{17}H_{31}$  or perhaps  $MeC_{11}H_7(OH)_2C_{16}H_{30}$ , purified by vacuum distn, m. 28°,  $d_{15} = 0.9874$ ,  $n_{20} = 1.5277$ ; I diacetate, liquid,  $d_{20} = 0.9957$ ,  $n_{20} = 1.4958$ . Tetrahydromoreacol, prepd. by hydrogenation of I, m. 95.3°; its diacetate m. 70.5°.

**Assimilation of sulfates by fungi. Euthiotrophy and parathiotrophy.** Michel Volkonsky. *Compt. rend.* 197, 712-14 (1933); cf. *C. A.* 26, 3541.—Not one of the many species from 5 genera of Saprolegniaceae studied was able to grow in a medium contg.  $K_2SO_4$  as the sole source of S, but all grew when a thio compd. (cysteine) was added. Twenty cultures (10 genera) of other parasitic fungi studied were able to use either form of S. Saprolegniaceae are parathiotrophic; the others are euthiotrophic.

**Experiments on the origin and function of berberine in *Berberis darwinii*.** Benjamin Thornton Cromwell. *Biochem. J.* 27, 800-72 (1933).—The alkaloid berberine, present in *Berberis darwinii*, accumulates in tissues which take no part in metabolic activities, and which are made up principally of dead elements. Synthesis of the alkaloid takes place in summer during the period of active growth. It appears that berberine is a product of protein metabolism; its synthesis is brought about by condensation of the products of protein breakdown and sugar residues.

**Transpiration of different modifications of one species *Th. Schmucker* and G. Drude. *Naturwissenschaften* 21, 676 (1933).**—The transpiration of leaves of *Impatiens noli tangere* grown on different soils and with differences in leaf size was found to be appreciably different. Per sq. dm. and mm. large leaves grown on leaf-mold soil evapd. 1.3-1.5 mg.; plants grown on almost pure sand evapd. 8-9 mg. Evidently plants on poor soil tend to work up as much  $H_2O$  as possible to obtain the necessary salts. The chlorophyll content per unit of leaf surface was for plants from heathy soil 2.5 times higher than for those from garden soil.

**A sugary exudation from sorghum.** T. R. Seshadri. *Madras Agr. J.* 21, 394-6 (1933).—From the beginning of the flowering season a sweet fluid exudes from the earheads of certain plants of a variety of sorghum known as *Tella jonna*. Analyses of 3 samples of the fluid, dried for 1 week over concd.  $H_2SO_4$ , gave ash 1.36-1.53, total sugar 79.0-80.6, reducing sugar 14.3-23.5 and sucrose 56.9-64.7%; the acid content was equiv to 7.75-8.60 cc. of  $N$  NaOH per 100 g. material. Starch and dextrin were absent. Fresh samples of the exudate contained yeasts and bacteria but no fungi. A 5% aq. soln. of the fresh exudate had a  $pH$  of 5.5; this decreased to 3.5 after 24 hrs. and to 3.2 after 48 hrs. Acid was the principal product of fermentation, very little alc. being produced.

**The mechanism of the effect of toluene on fermentation by yeast.** W. A. Bultzer. *Biochem. Z.* 265, 5-12 (1933).—The inhibitory effect of toluene on the fermentation of yeast is irreversible and cannot be removed by washing the cells. This is apparently not due to the loss of some substance through a change in permeability. Toluene poisoning generally does not injure the phosphatase of the cells.

**Phosphorylation by lactose yeast.** Eduard Hofmann. *Biochem. Z.* 265, 203-8 (1933).—The lactose yeast, *Saccharomyces fragilis* and lactose yeast Sp. 102, can form  $H_2PO_4$  esters of galactose. Large quantities of hexose-diphosphate, identical with fructose-1,6-diphosphate, were isolated together with small amts. of a monophosphate. The latter, on hydrolysis with taka-diastase, yields a free sugar which gives the Selivanoff keto reaction.

**Lactase in bottom yeast.** Eduard Hofmann. *Bio-*

*chem. Z.* 265, 209-12 (1933).—Bottom yeasts do not ferment lactose because they lack the lactase for splitting the disaccharide. However, if a suspension is digested with lactose soln. it acquires the ability to split lactose-ureide, setting free galactose.

**The chemical composition of the spores of vegetable parasites of cereals.** Silvia Campanile. *Nuovi ann. agric.* 12, 640-8 (1932); *Rev. Applied Mycol.* 12, 584-5.—A parallel may be established between the chem. compn. of cereal seeds and that of the spores of the fungi which attack them; the parasitism of the cereal smuts may be conditioned to some extent by alimentary needs, the specific nature of the attack on a particular host being partly due to the alimentary possibilities of that host. In the seeds,  $P_2O_5$  predominates over K while in the spores the reverse is true. It is thought that the large K content present in the spores of the cereal smuts may account for their tendency to induce cellular multiplication and the virulence shown by the promycelium toward growing tissues.

**Exanthema in pears and its relation to copper deficiency.** J. Oserkowsky and Harold E. Thomas. *Science* 78, 315-16 (1933).—The Cu content of leaves of Bartlett pear trees affected with exanthema was 3.1-5.1 p.p.m., irrespective of whether the appearance of the leaves was healthy or diseased. On the other hand, the Cu content of the leaves from trees free of the disease varied from 5.0 to 20 p.p.m., trees growing in an affected orchard being in general low. Exanthema is thus probably due to a deficiency of Cu. Spraying, or injection into the trunk, of sol. Cu salts gave marked improvement in the affected trees, but Fe, Mn and Zn salts were without effect.

**Chlorophyll (Armstrong) 10. Red sensitizing with chlorophyll (Kogel) 5.**

## E—NUTRITION

PHILIP B. HAWK

**Carotene and vitamin A.** Harry Goldblatt and Harold M. Barnett. *Proc. Soc. Exptl. Biol. Med.* 30, 201-4 (1932).—Biol. tests with albino rats showed that the color in carrot oil when considered as carotene was equal in vitamin A potency to an equiv. amt. of cryst. carotene. Carotene is probably the only growth-promoting factor of the order of vitamin A in carrots. Tests confirmed the findings of Polak and Stokvis (cf. *C. A.* 26, 4306) that 0.0005 mg. (0.5 $\mu$ ) of carotene satisfied the requirement for a Sherman Unit of Vitamin A; this would make 1 International Unit of Vitamin A (1 $\mu$  of pure carotene) the equiv. of 2 Sherman Units.

**The specific action of corn, barley and other grains on bone development.** J. C. de Ruyter de Wiedt and E. Brouwer. *Verlag. landb. Onderzoek. Rijkslandbouwproefsta.* No. 38C, 275-300 (1932).—Seventy-six parts of corn, barley, rye, wheat or oat meal (all made from the whole grains) mixed with 20 parts of gluten meal, 3 parts of  $CaCO_3$  and 1 part of NaCl caused various degrees of rickets in rats. Corn was the worst and barley the best while rye and wheat occupied intermediary positions from the point of view of producing rickets in rats. The effect of oats was uncertain, as the rats made insufficient growth on the oat diet. When the P content of the diets was brought to the same level by addn. of a small amt. of  $Na_2HPO_4$ , there was no appreciable change in bone formation or compn. The so-called "anticalcifying action" of the cereals needs further investigation, as this "action" in addn. to the vitamin D content of the cereals may be responsible for the sp. effect on bone development.

**An appraisal of antirachitosis in terms of rat and clinical units.** Alfred F. Hess and J. M. Lewis. *J. Am. Med. Assoc.* 101, 181-4 (1933).—A clinical test carried out on irradiated milk, "yeast milk," cod-liver oil and viosterol and controlled by biol. assays demonstrated that the antirachitic milks require from 85 to 40 and viosterol 600 to 800 (rat units daily) to confer protection or

effect healing. Irradiated milk is the most desirable antirachitic on a communal scale. The marked distinction between clinical and rat units implies that the present method of rating antirachitics is misleading.

Rachel Brown

A century of progress in the chemistry of nutrition. M. C. Sherman. *Sci. Monthly* 1933, 442-7. — E. H.

Vitamin B(B<sub>1</sub>) and G(G<sub>1</sub>) contents of cottonseed products. May L. Whitsitt. *Ind. Eng. Chem.* 25, 1169-71 (1933). — Cottonseed meal when fed to rats proved to be a good source of both vitamins B(B<sub>1</sub>) and G(G<sub>1</sub>). The oil contained neither. The hulls were rich in vitamin B(B<sub>1</sub>), had no B(B<sub>1</sub>), and showed evidence of a third factor of the vitamin B complex. Amy LeVesconte

Effect of carbon dioxide and sodium benzoate on vitamin C content of orange juice. Agnes F. Morgan, Catherine I. Langston and Anna Field. *Ind. Eng. Chem.* 25, 1174-6 (1933). — Frozen Valencia and navel oranges had the same vitamin C value. Na benzoate had no effect on vitamin C, while CO<sub>2</sub> protected it from oxidation. Amy LeVesconte

Some aspects of citric acid metabolism. Adrian C. Kuyper and H. A. Matill. *J. Biol. Chem.* 103, 51-60 (1933). The serum citrate concn. is increased in rabbits by NaHCO<sub>3</sub> alkalosis and diminished by NH<sub>4</sub>Cl acidosis and markedly by inanition. Analysis of the blood from various parts of the body failed to demonstrate any relation between any particular tissue and the oxidation of citric acid but blood from the renal vein contains less than that from the renal artery. The citric acid content of human urine increases slightly after each meal irrespective of the presence of the acid in the food. It is increased by vigorous exercise and by NH<sub>4</sub>Cl ingestion and increased by alkalosis produced by hyperpnea. The variations following the intake of food cannot be explained solely on the basis of acid-base relationships. When given in doses of 2-20 g., 1.5-2.5% escapes oxidation and is excreted in the urine so that citric acid is rapidly but not completely oxidized by the human organism.

A. P. Lothrop

The gaseous metabolism of pigeons during avitaminosis. G. Surana. *Arch. intern. physiol.* 36, 1-12 (1933). — The basal metabolism of pigeons is quite variable. On a diet of polished rice at a temp. of 29-30° the values are normal but at 12-15° the O<sub>2</sub> consumed is lower. Action of pilocarpine on the gaseous metabolism of pigeons during avitaminosis. *Ibid.* 13-17. — The injection of pilocarpine into pigeons fed polished rice increases the O<sub>2</sub> consumption. A decrease occurs, however, if the vitamin deficiency is marked. If these vitamin-depleted pigeons are injected with pilocarpine while they are being fed yeast there is a marked increase in O<sub>2</sub> consumption.

C. M. McCay

So called hypervitaminosis D. A synthetic critical survey and a personal contribution.\* Pietro Coccheri and Gioacchino Rossi. *Pediatrics* 39, 301-27 (1931); *Chem. Zentr.* 1932, II, 2182; cf. C. A. 27, 1921. — Injuries caused by large doses of vitamin D depend upon (1) unchanged ergosterol, (2) contamination of the ergosterol, and (3) toxic substances formed as the result of excessive irradiation. The degenerative effect is attributed to the unchanged ergosterol. The accompanying toxic substance cause hypercalcemia and heterotropic calcification. Excessive amts. of pure vitamin D produce hyperphosphatemia and excessive calcification of the bones. Therefore pure preps. are required for therapeutics.

M. G. Moore

Vitamins and infection. A. Frank. *Z. Vitaminsforsch.* 1, 51 (1932); *Chem. Zentr.* 1932, II, 396. — On the basis of some expts. and review of the literature the fact is accepted that the danger of infection is decreased by a vitamin-contg. diet and increased in avitaminosis and hypovitaminosis. All vitamins appear to be concerned. The manner in which vitamins function to prevent infection is discussed and left an open question.

M. G. Moore

The true antiscorbutic vitamin content of German foods.\* J. V. Hahn. *Z. Volksernährung Diätetik*

6, 337-41, 364-6, 372-3; 7, 5-6 (1932); *Chem. Zentr.* 1932, I, 1282. — One guinea pig unit (M.U.) was defined as the daily dose of food in g. necessary to keep the pig healthy. Fruit was found to be much poorer in vitamin C than older work had indicated. Black currants showed 200 M.U., strawberries 100, raspberries and gooseberries 50, red currants 33, apples about 10; pears and quinces in winter practically none, oranges and lemons 200, mandarins 50, bananas and pineapples 16, dates and figs little, and haws (after cooking) 100. A large no. of culinary plants were investigated, both raw and cooked, their stage of maturity also being considered. Results showed carrots 10, red cabbage 100, cooked about 15, white cabbage somewhat less, sauerkraut still less, spinach 16, cooked none, turnip 200, cooked about 30. Cabbage salad showed less than 20, endive salad about 20; raw beets, celery and onion were poor in the vitamin. Chives were rich (100), as were parsley (200) and horseradish (200), after cooking 50. Tomatoes showed only 20.

M. G. Moore

Influence of the food and environment of milk-producing animals on the vitamin content of their milk. Martin Schieblich. *Z. Volksernährung Diätetik* 7, 9 (1932); *Chem. Zentr.* 1932, I, 1963 4; cf. C. A. 27, 143, 2707. — The vitamin A stored while the animal is on pasture is so slowly used up that there appears no deficiency of this vitamin in the milk during the period the animal is kept in the stall. Vitamin B is formed in the paunch of the cow. There is a definite relation between the vitamin C content of the food and of the milk produced; silage gives milk rich in this vitamin. Vitamin D content is dependent upon food and environment.

M. G. Moore

Studies in purine metabolism. I. Exogenous purine metabolism in guinea pigs. Kozo Tomita. *Sei-kwaï Med. J.* 51, No. 5, 95-136 (English Abstract 4-5) (1932). — Normal guinea pigs fed on oatmeal or Sherman's vitamin-C-free diet plus fresh radish excrete 0.33-0.35 mg. of urinary uric acid N per day, 0.21-0.25% of total urinary N. Feeding a purine-contg. diet or pure purine does not increase uric acid excretion, although total N is proportionally increased. The av. uricolytic index of the normal guinea pig is 98.8 and the purine coeff. is 309. The end product of purine metabolism in this animal is allantoin, not uric acid. II. Endogenous purine metabolism in guinea pigs. *Ibid.* No. 6, 37-118 (English Abstract 25) (1932). — The end product of endogenous purine metabolism in guinea pigs is also chiefly allantoin, not uric acid, and it is decreased in summer, and increased in winter. The spleen does not take part in this metabolism, but if part of the liver (about 2/3) is removed, not only uric acid formation and decompn. are decreased, but also other purine metabolism is diminished. The endogenous purine metabolism is also diminished when the reticulo-endothelial system is blocked. S. T.

Production in dogs of chronic black tongue with anemia.

C. B. Rhoads and D. K. Miller. *J. Exptl. Med.* 58, 585 (1933). — By feeding a particular diet, apparently lacking a substance closely associated with vitamin B<sub>2</sub> (G), a chronic disease may be produced irregularly in dogs, characterized by atrophic glossitis, diarrhea, loss of wt. and anemia. The disease can be prevented and relieved by materials rich in vitamin B<sub>2</sub> (G). C. J. West

Activated lipoids. Standard Brands, Inc. *Brit.* 394, 408, June 29, 1933. Unsaponifiable lipoids, particularly ergosterol, are rendered antirachitic by treatment with ultra-violet light in soln. in a liquid consisting of, or contg., diethylene dioxide (dioxan). Other compatible liquids may be mixed with the diethylene dioxide, e. g., EtOAc, triethanolamine, C<sub>6</sub>H<sub>6</sub>.

## F—PHYSIOLOGY

HOMER W. SMITH

Effect of prolonged administration of the anterior pituitary-like hormone on pituitary and thyroid. J. B. Collip, H. Selye, D. L. Thomson and J. E. Williamson. *Proc. Soc. Exptl. Biol. Med.* 30, 580-1 (1933); cf. C. A.

- 24, 2781, 5812; 25, 1563, 3700.—In the female rat, the injection of anterior pituitary-like hormone (A. P. L.) caused parallel increases in wt. of the anterior lobe of the pituitary, of the ovaries and of the thyroid gland; in the male, the thyroid and pituitary did not enlarge. A. P. L. had no effect on the thyroids of hypophysectomized male or female rats. Production of exclusively thecal luteinization and continuous estrus with anterior-pituitary-like hormone. H. Selye and J. B. Collip. *Ibid.* 647-9. - A. P. L. injected daily into 30 rats from the 6th to the 26th day of life caused luteinization of the thecal cells, the formation of thecal corpora lutea and continuous estrus; there was no follicular maturation nor formation of normal or atretic corpora lutea. Hypophysectomized rats reacted similarly to the A. P. L.-injected immature rats. Further studies on production of thecal luteinization by means of A. P. L. H. Selye, J. B. Collip and D. L. Thomson. *Ibid.* 780-3. It is thought that the immature pituitary is unable to furnish a complementary substance necessary for the normal action of A. P. L. on the ovary; it becomes able to do so before normal puberty is reached and at this time A. P. L. will produce precocious puberty. Species differences in the reaction to A. P. L. may be due to differences in the ability of the pituitary to furnish the complementary substance. C. V. Bailey
- Further experiments on induction of ovulation in toads. I. A. Wills, G. M. Riley and E. M. Strubbs. *Proc. Soc. Exptl. Biol. Med.* 30, 784 6(1933); cf. *C. A.* 27, 3507, 3530. - Six *Bufo americanus* females were given daily implants of 4 hypophyses from gar pike (*Lepidosteus platystomus* Rafinesque and *L. osseus* L.); ovulation occurred in 5 surviving animals between the 2nd and 6th days; similar results were obtained with a female, *Rana pipiens*. Ovulation was not induced in 2 toads by implants of rat hypophyses. The maturity hormone among lower vertebrates may be non-specific. C. V. Bailey
- Thyroid hypertrophy as a response to the gonad-stimulating hormone of the pituitary. Oscar Riddle, Robert W. Bates and Simon W. Dykshorn. *Proc. Soc. Exptl. Biol. Med.* 30, 794 7(1933) Neither prolactin (cf. *C. A.* 27, 4289) nor the growth principle of the anterior pituitary caused hypertrophy of the thyroid when injected into doves and pigeons. Hyperplasia of the normally developed thyroid following pituitary administration is a specific response to the gonad-stimulating hormone or to another pituitary deriv. of similar soly.; good gonad-stimulating preps. do not invariably induce thyroid hyperplasia in doves and pigeons. C. V. Bailey
- Comparative studies of gonad-stimulating hormones. II. Influence of length of period of administration of certain extracts. C. F. Fluhmann. *Proc. Soc. Exptl. Biol. Med.* 30, 1014 10(1933); cf. *C. A.* 27, 2485. -The administration of a known total dose of ovarian-stimulating pregnancy blood ext. over periods of 10, 15 and 20 days produced a much greater increase in the wts. of the ovary and the uterus of the immature rat than when the same total dose was given in 5 days. Similar results were obtained with untreated human pregnancy blood serum, Antuitrin-S (Parke, Davis & Co.), Collip's A. P. L. (Eli Lilly and Co.) and Folliculin (E. R. Squibb and Sons). Opposite results were obtained with acid exts. of sheep anterior pituitary glands. C. V. Bailey
- Biological characteristics of ovary-stimulating extracts made from blood of pregnant women. C. F. Fluhmann. *Proc. Soc. Exptl. Biol. Med.* 29, 1193 5(1932). - A crude estrin-free ext. was prepd. from blood by a method based on that of Wallen-Lawrence and Van Dyke (cf. *C. A.* 26, 1968) for the extn. of "hebin" from anterior pituitary glands. This ext. readily induced luteinization in the ovaries of immature rats; it did not stimulate the rapid development of graafian follicles nor cause a great increase in ovarian wt. when given in large doses for 5 days. Induction of ovarian growth with an extract made from blood of pregnant women. *Ibid.* 30, 149 50(1933). In immature rats given 2 daily injections of pregnancy blood ext., equiv. to 0.22 cc. of the original blood plasma, over a period of 29 days, the ovaries weighed 84-293 mg.; the ovaries of control animals weighed 15-19 mg. The time factor is an important feature in comparing the effects of this hormone with those of fresh anterior hypophysial implants. C. V. Bailey
- Preparation of prolan, theelin and theelol from the same urine. Philip A. Katzman and Edward A. Doisy. *Proc. Soc. Exptl. Biol. Med.* 30, 1196-7(1933).—Adsorb prolan from the urine on  $\text{BzOH}$  as described by the authors (cf. *C. A.* 27, 702); strongly acidify the filtrate with  $\text{HCl}$ , let stand a few days, ext. the supernatant fluid with  $\text{BuOH}$  in the continuous extn. app. (cf. *C. A.* 24, 4545), distil off the solvent, leach the residue with benzene and remove by distn. Dissolve the residue from 100 gal. of urine in 1500 cc. of 80%  $\text{EtOH}$  contg. 150 cc. concd.  $\text{HCl}$ , boil 4 hrs., distil off the alc. and add solid  $\text{NaOH}$  until the soln. is alk. to phenolphthalein. Ext. the soln. with equal parts of  $\text{BuOH}$  and benzene and continue the process as described by Doisy and Thayer, beginning at step 3 (cf. *C. A.* 25, 5458). Purify theelol as the Na salt (cf. *C. A.* 27, 989). The yield of theelol is 2 5 mg. per gal. of urine. C. V. Bailey
- Female hormone (menformone) and secondary male sexual organs. J. Freud, S. E. de Jongh and E. Laqueur. *Nederland. Tijdschr. Geneeskunde* 77, 1109-17(1933).—The antagonistic influence of the female follicular hormone upon male sexual characters is explained by a checking action on the testicles or on the anterior lobe of the hypophysis. This effect is absent in castrated animals in which, on the contrary, some of the organs, such as the seminal vesicles, increase in size (cf. Loewe, *et al.*, *C. A.* 25, 5699 700). This observation cannot be explained by male hormones, present in the female hormone as an impurity, since even pure cryst. hormone produces such effects. Moreover, the growth of the seminal vesicles produced by cryst. hormone differs qualitatively from that produced by male hormone. R. Beutner
- Urea clearance test in pregnancy. A. Cantarow and G. Ricchiuti. *Arch. Internal Med.* 52, 637-46(1933). - In normal pregnancies urea clearance ranges from 28 to 184%. Clearance diminished toward the end of the period of gestation. It was high early in this period. J. H. Brown
- Mechanism of the inhibition of gastric function by fat. Robert K. S. Lim. *Quart. J. Exptl. Physiol.* 23, 263-8 (1933). -Only one chalone is responsible for the inhibition by fat of both gastric secretion and gastric motility. R. B.
- The minute- and stroke-volumes of the human heart in different positions of the body. I. L. Fisher. *Arbeitsphysiol.* 6, 111-32(1932).—The min.-vol. of the hearts of 5 females averaged 3.63 l. lying and 2.86 l. standing, and the stroke-vol. in the 2 positions averaged 56.2 and 42.9 cc. in the 2 positions. Five men showed similar differences. The sitting position gave values between those of the other 2 positions. T. M. Carpenter
- The respiratory exchange and energy requirement in mental work. D. E. Rosenblum. *Arbeitsphysiol.* 6, 214-34(1932). -In 41 expts. of 40 min. duration with the Douglas-Haldane method, severe mental work resulted in a 5% increase of energy output. T. M. Carpenter
- The choline and acetylcholine contents of animal tissues. Erich Strack, Ernst Neubauer and Heinrich Geissendorfer. *Z. physiol. Chem.* 220, 217-28(1933).—Fresh functioning liver of steers and dogs contains practically no free choline or acetylcholine. The free choline increases rapidly after the blood circulation has been interrupted; hence the physiol. content can be detd. only after very rapid fixation of the tissue. This increase is irregular and is especially noteworthy in the 1st and after the 4th hr.  $\text{EtOH}$  is unsatisfactory as a fixing agent. This accounts for the discrepancies and doubtful findings reported in the literature. Another source of error is a substance, probably a  $\text{H}_2\text{O}$ -sol. sphingomyelin, from which free choline can be formed by too high concn. of mineral acid during the process of isolation. A. W. Dax
- Role of glutathione in the Y reduction. Rawson J. Pickard. *Bull. soc. chim. biol.* 15, 781-9(1933); cf. *C. A.* 26, 4072. -Expts. are described on the detn. of the reducing factor Y of the blood. In normal blood



about half of the Y reduction is due to glutathione and the remainder to unknown substances. In many diseases the proportion of the latter is increased. Glutathione is eliminated by pptg. the corpuscles without laking. Twenty references. L. E. Gilson

Choline in opotheric powders. M. Rondeau Du Noyer and E. Kahane. *Bull. soc. chim. biol.* 15, 938-43 (1933).—Nearly all the powd. gland preps. used in opotheric contain choline, probably derived from lecithin by hydrolysis; hence the Florence  $I_2$ -KI reaction for choline cannot be relied on to identify testicular preps. L. E. Gilson

Physicochemical properties of hemocyanins. III. Jean Roche and Pierre Dubouloz. *Bull. soc. chim. biol.* 15, 954-68 (1933).—See C. A. 27, 3958. L. E. G.

The mineral matter fixed in the seminal cells during spermatogenesis. A. Pollicard. *Compt. rend.* 197, 710-11 (1933).—The ash patterns of incinerated sections of testicular tissue are described. L. E. Gilson

Is the thyroid-stimulating hormone of the anterior hypophysis eliminated by the kidneys and present in urine? Max Aron. *Compt. rend. soc. biol.* 114, 20-3 (1933).—Reply to Krogh and Okkels, C. A. 27, 4287. L. E. Gilson

Potassium content of the voluntary and involuntary striated muscles of young animals. A. Leulier, A. Bernard and G. Bérnard. *Compt. rend. soc. biol.* 114, 58-9 (1933); cf. C. A. 27, 2000. The K of the voluntary muscles of the cat, dog and pigeon increases during the first 10 days after birth as movement becomes more rapid, but in the new born guinea pig, which is able to move about rapidly as soon as born, the K is high at the beginning and does not change. No significant change occurs in the K of the heart muscle of any of the above species. L. F. Gilson

The carbohydrate metabolism of the chick embryo. Constantin Donhoff. *Biochem. J.* 27, 800-17 (1933). With regard to the carbohydrate content of the egg, the water-sol. fraction of the alc. ppt. can be subdivided into (a) not precipitable with phosphotungstic acid (the nature of this fraction is not known); (b) the ovomucoid sugar; and (c) precipitable with trichloroacetic acid and fermentable *in toto*, representing protein sugar. Glycogen is found both in the water-sol. and water-insol. portions. The total carbohydrate content of the egg varies between 272 and 296 mg. Free sugar reaches its lowest level on the 10th day and rises again slightly during the last days of incubation. Reduction in the water-sol. fraction of the alc. fraction of the alc. ppt. decreases in the first and increases in the second half of incubation. The reducing power of the water-insol. fraction of the alc. ppt. decreases from the start to the end of the ppt. Total carbohydrate diminishes till the 9th day. B. H.

The component fatty acids and glycerides of the milk fats of Indian goats and sheep. Das Ram Dhingra. *Biochem. J.* 27, 851-9 (1933). The fatty acids of the milk fats of goats and sheep are similar in compn., but differ from those of cow or buffalo butters in the higher content of the lower fatty acids. The content of the fully satd. glycerides in the 2 fats seems to be a function of the mean unsatn. The general properties and component glycerides of goats and sheep with fats are not very different from those of the cow and buffalo, and there is no reason why they should not be used as substitutes for the latter. Benjamin Harrow

The glycolytic mechanisms of brain. Charles A. Ashford. *Biochem. J.* 27, 903-10 (1933); cf. C. A. 26, 2473. Glucose breakdown to lactic acid by brain tissue is not inhibited by the presence of glycogen. When glucose and hexosemonophosphate or hexosediphosphate are present together, the glycolysis observed is the sum of the glycolyses produced from each substrate separately, showing that the enzyme systems responsible for the 2 effects are independent. When glucose and mannose are present together, the results show that the same enzyme is responsible for their breakdown. B. H.

Distribution of sulfur in goat hair. Dorothy Jordan. Lloyd and Robert H. Marriott. *Biochem. J.* 27, 911-14

(1933).—The cortex is sepd. from the medulla of goat hair by treatment with 4 N NaOH. The percentage content of S in the cortex is 8.60 and in the medulla 0.23. Benjamin Harrow

Calcium and phosphorus metabolism. John P. McGowan. *Biochem. J.* 27, 934-42 (1933).—The most important factor controlling the absorption of Ca and P appears to be the acidity of the gastric juice. The factor which influences the absorption of P is an excess of Ca in the diet, which, having neutralized the HCl, ppts. P as  $Ca_3(PO_4)_2$ . For the optimum utilization of Ca and P after absorption, they should be supplied in the food uncombined with one another. The Ca and P in the blood are prevented from interacting and to be held in soln. by the proteins. Benjamin Harrow

Some factors in the milk of individual cows which modify the growth of lactic streptococci. Hugh R. Whitehead and Geoffrey A. Cox. *Biochem. J.* 27, 951-9 (1933).—Milk contg. nos. of leucocytes in excess of 5 million per cc. gives rise to a rennet curd in which lactic streptococci are not able to develop normal quantities of acid. The influence of the cells is probably due to phagocytosis of the streptococci. The inhibitory action of the cells is eliminated by a heat treatment of the milk at 40-52° for 30 seconds. Benjamin Harrow

Fat metabolism. J. B. Brown. *Ohio J. Sci.* 33, 359-71 (1933). The subjects of hydrolysis of fats, the action occurring for the greater part in the duodenum, resynthesis, passage to the lymph and portal blood, oxidation in the normal and diabetic systems, and the deposition in the tissues and liver are reviewed. The fatty acids of high mol. wt. undergo the same reactions as fats. I. M. Levine

The blood picture of the turtle after complete anoxia. J. M. Johlin and Ferrin B. Moreland. *J. Biol. Chem.* 103, 107-14 (1933).—Turtles are very resistant to asphyxiation and may be kept in pure  $N_2$  for as long as 28 hrs. The blood sugar after such exposure to  $N_2$  may rise from a normal of about 50 mg. to about 1200 mg. and the lactic acid may also rise to almost 1000 mg. %. The turtle expires a larger amt. of  $CO_2$  than it would in the air during a similar period and the total  $CO_2$  output in complete anoxia is greater than could be accounted for by the bicarbonate of an amt. of turtle blood equal to the total wt. of the animal. The  $pH$  of the blood decreased from a normal of 7.9 to 6.8. It was not possible to identify methylglyoxal in the blood after anoxia. A. P. Lothrop

The rate of change of alkali reserve after ingestion of salts of organic compounds. I Normal variations in acid-base balance under basal conditions. Jane Cape and Elmer L. Severinghaus. *J. Biol. Chem.* 103, 257-60 (1933).—The acid-base levels ( $pH$ ,  $CO_2$  content and total base) in blood serums of 7 normal individuals under basal conditions showed no significant variations over a morning period of 5 hrs. Blood samples were taken hourly and the subjects were kept at absolute rest during the observations. A. P. Lothrop

The kinetics of blood pigments: hemocyanin and hemoglobin. G. A. Millikan. *J. Physiol.* 79, 158-79 (1933).—The comparative properties of hemoglobin and hemocyanin are: (1) time for disocn. to reach half completion; hemoglobin = 0.025-0.05 sec.; hemocyanin = 0.025-0.1 sec.; (2) character of disocn.; hemoglobin = monomol.; hemocyanin = monomol.; (3) effect of decreasing  $pH$  on rate of disocn.; hemoglobin = increase; hemocyanin = increase or small change; (4) effect of increasing temp. on rate of disocn.; hemoglobin = great increase;  $Q_{10}$  = 3.8; hemocyanin = probably great increase,  $Q_{10}$  = 2.27-3.8; (5) approx. rate of combination (half completion of assocn. process); hemoglobin = 0.003 sec.; hemocyanin = 0.003 sec. The hemoglobins of pig, man, sheep and frog have different rates of disocn., as do the hemocyanins of *Maia* and *Limulus*. J. F. Lyman

Albuminuria in the normal male rat. Muriel E. Bell. *J. Physiol.* 79, 291-3 (1933).—Urine from normal male

rats contains 0.5-0.8 g. per l. of a heat-coagulable protein. J. F. Lyman

The diffusion of lactate into and from muscle. S. C. Devadatta. *J. Physiol.* 79, 194 (1933).—The amt. of lactate diffusing into and out of resting and fatigued frog muscles indicates an apparent concn. of lactate in the water of the muscle of 20 mg. per 100 g. for rested, and 238 mg. per 100 g. for fatigued, muscle. Conclusion: All the water of muscle is available to dissolve lactate. J. F. Lyman

The influence of the parathyroid on the metabolism of creatine and phosphoric acid. C. G. Imrie and Constance N. Jenkinson. *J. Physiol.* 79, 218 (1933).—In animals whose parathyroids have been removed the concn. of muscle creatine phosphate is less than normal, and its rate of resynthesis following stimulation is much depressed. Treatment with parathyroid hormone restores to normal the rate of resynthesis of creatine phosphate. Feeding creatine along with parathyroid hormone raised the initial creatine phosphate of the muscle to values higher than normal. J. F. Lyman

Histamine in canine gastric tissues. Gertrude Gavin, E. W. McHenry and M. J. Wilson. *J. Physiol.* 79, 224 (1933).—Histamine, in relatively large amts., is present in the mucosa of the dog stomach. Stomach muscle contains lesser amts. Of the total gastric histamine about 80% is found in the fundic mucosa. The secretagog effect of stomach exts. disappears after incubation with histaminase. J. F. Lyman

The combined digestion of starch by the enteric juice and by amylase of different origins. Lorenzo Cioglia. *Boll. soc. ital. biol. sper.* 8, 489 (1933).—The amt. of reducing substances formed by the combined action of saliva and enteric juice is greater than the sum of the reducing substances formed by each acting separately. Hepatic exts. do not accelerate the action of enteric juice on starch when combined. Malt ext. accelerates the action of enteric juice on starch when combined. Peter Masucci

Glutathione under different experimental conditions. I. The influence of the pancreas on the glutathione of the blood and of the organs. R. Ferrari. *Boll. soc. ital. biol. sper.* 8, 508-11 (1933).—In depancreatized dogs, also in dogs subjected to a ligation of the ducts or to a permanent pancreatic fistula, little change in glutathione content of the blood or organs occurs within 1-2 days after the operation. After a longer interval the amt. of glutathione in the blood, liver, kidneys and muscle diminishes markedly; the glutathione of the suprarenals, on the contrary, increases almost 4 times that of the normal. II. The influence of the removal of the liver on the glutathione content of the blood and organs. R. Ferrari and L. Cadeo. *Ibid.* 511-13. —There is a diminution in the glutathione content of the blood and organs after hepatectomy of giant Hungarian frogs. The decrease is greater in the blood and muscles than in the other organs. This takes place immediately after the operation and persists till the death of the animal. Peter Masucci

The experimental hormonal hypercholesterolemia. R. Maurizio and E. Nardelli. *Boll. soc. ital. biol. sper.* 8, 545-9 (1933).—The blood of guinea pigs and rabbits, (males or females, mature or immature) was assayed for cholesterol content before and after the injection of urine from pregnant women. There was an increase of cholesterol of at least 30% and as high as 80% after the injection of the urine. The authors consider a case pos. if the increase of cholesterol is 30% when the cholesterol content of the blood was less than 0.35% before treatment; with values above 0.35%, they regard cases as pos. even with an increase of only 20%. The increase in cholesterol is not proportional to the amt. of anterior pituitary hormone injected along with the urine. P. M.

The action of pancreatic extract. Pietro Allerton and Giuseppe Borgatti. *Boll. soc. ital. biol. sper.* 8, 586 (1933). Peter Masucci

The permeability of the vitelline membrane of hen eggs.

A. Orru. *Boll. soc. ital. biol. sper.* 8, 585-9 (1933).—The vitelline membrane of egg yolk is permeable to glucose, sucrose and raffinose and the permeability is independent of the concn. of these substances present in the external liquid. Peter Masucci

The coagulation-inhibiting action of bile in vitro. II. H. Elbel. *Biochem. Z.* 265, 36-40 (1933); cf. C. A. 27, 1668. —The equil. of the system: protein- $\text{lecithin}-\text{Ca}$  which is essential for the coagulation of the blood is disturbed by bile salts. S. Morgulis

Ammonia formation and pyrophosphate decomposition in muscle. II. Wl. Mozolowski and B. Sobczak. *Biochem. Z.* 265, 41 (1933); cf. Barrenscheen and Filz, C. A. 26, 5110; Lohmann, C. A. 27, 272. —When muscle frozen in liquid air is ground the creatine- $\text{H}_2\text{PO}_4$  is the first to undergo decompn. while the decompn. of pyrophosphate and the formation of  $\text{NH}_3$  run almost parallel. It is possible to alter this experimentally by very brief incubation at low temp., so that the decompn. of pyrophosphate becomes more rapid than the  $\text{NH}_3$  formation, but the reverse condition has not been realized. The condition in muscles poisoned with  $\text{CH}_3\text{ICO}_2\text{H}$  is the same. S. Morgulis

The significance of the bile acids in carbohydrate metabolism. XXVI. Glycogen formation in the liver of splenectomized rabbits under the influence of adrenaline, cholic acid and spleen extract. Keizo Fujiwara. *Biochem. Z.* 265, 78-9 (1933); cf. C. A. 27, 2722. —Injections of small amts. of adrenaline (0.02 cc.) and oral administration of an aq. ext. of spleen (deproteinized with colloidal iron) increase the glycogen formation from glucose in the liver of splenectomized rabbits. The simultaneous administration of adrenaline and cholic acid, however, causes a diminution in the glycogen formation. XXVII. Glycogen formation in the liver under the influence of bile acids after castration. Hiroshi Takata. *Ibid.* 80-4. —The glycogen formation from glucose in the liver of male rabbits is increased, on the av. about 17%, by the administration of cholic acid. This effect is diminished after castration, more in case of ovariectomy than of orchectomy. The reduction in glycogen formation after castration is increased still further through the administration of cholic acid. There is, therefore, a close relationship between the glycogen-forming activity of cholic acid and the gonads. S. Morgulis

The histone of the bird erythrocytes. Th. Leipert and E. Leberl. *Biochem. Z.* 265, 115-23 (1933). —A bud erythrocyte histone, purified as the picrate, was analyzed. Of its total N 45.1% was in the form of basic N (25.02% arginine N, 3.03% histidine N, 17.05% lysine N). Of 100 N atoms 4.28 are present as amide N, and 8.37 N atoms react with  $\text{HNO}_2$ . By the Sorensen or Willstatter titration 10.05 and 10.16 basic groups are detd., but the Cl content of the HCl indicates the presence of 17.37 basic groups. From the analytical results it is further concluded that 1 of the  $\text{NH}_2$  groups of lysine is free, also that there are free guanidine and imino groups. The N detd. by formal titration and that detd. by methylation bear a ratio of 1:3 to each other. Reactive OH groups, if present at all, are in very insignificant amt. S. Morgulis

The role of iron in the glycolysis of blood and muscles. Hans Jakob Utvedt. *Biochem. Z.* 265, 154-8 (1933). —Unlike the experience with alc. fermentation, the addn. of  $\alpha,\alpha'$ -phenanthroline to blood checks the glycolysis only for the first 30 min. It seems, therefore, that it prolongs the induction period, but the glycolysis then starts up again and after 3 hrs. is as large as in the controls. On the glycolysis of the muscle ext. addn. of the reagent which binds the  $\text{Fe}^{++}$  ions has no effect at all. S. M.

The absorption of aluminum compounds in the organism and a consideration of the normal aluminum content of animal tissues. J. Wuhrer. *Biochem. Z.* 265, 169-80 (1933). —After 10-15 months of administering Al to dogs the Al content of their organs was not different from that of animals receiving ordinary food. Irritation of

the gastrointestinal mucosa occurs only when easily sol. Al salts are used in high concn. In human beings Al(OH)<sub>3</sub>, administered by mouth was recovered practically completely in the feces, and even in long expts. none of the Al appeared in the urine. Conclusion: Al salts are practically not absorbed. S. Morgulis

Decomposition of added methylglyoxal by blood and musculature. Ernst Auhagen. *Biochem. Z.* 265, 213-16 (1933).—Barrenscheen's (C. A. 27, 112) claim that methylglyoxal added to blood or muscle disappears explosively and that the amt. of lactic acid formed corresponds to only a fraction of the methylglyoxal lost could not be substantiated experimentally. S. M.

Absorption of fat by the intestine. P. Mahler and W. Nonnenbruch. *Med. Klin.* 28, 1380 (1932); *Bull. soc. sci. hyg. aliment.* 21, 283.—A discussion of the function of bile and of pancreatic secretion in the mechanism of the resorption of neutral fats by the small intestine. A. Papineau-Couture

The estrin content of sow ovaries. Fred E. D'Amour, Marie C. D'Amour, and R. G. Gustavson. *J. Pharmacol.* 49, 141-5 (1933).—Follicular fluid contained 950 rat units per l. Corpora lutea contained 65 rat units per kg. T. H. Rider

Effects of estrin and other hormones upon pregnancy. F. E. D'Amour, Marie C. D'Amour and R. G. Gustavson. *J. Pharmacol.* 49, 140-61 (1933).—If estrin is injected in rats by the tenth day in doses of 5-25 rat units daily pregnancy is invariably terminated and no other hormones can overcome this effect. T. H. Rider

The excretion of uric acid and urates by the bird. E. Gordon Young and Nicholas B. Dreyer. *J. Pharmacol.* 49, 162-80 (1933). The secretion of uric acid by the cockerel is discussed. Any substance which causes diuresis increases the secretion but no substance tried increased the uric acid concn. T. H. Rider

An artificial heart for dogs. O. S. Gibbs. *J. Pharmacol.* 49, 181-6 (1933). T. H. Rider

Recognition and comparison of prolan and prolan-like substances. Hubert M. Evans, Miriam E. Simpson and Paul R. Austin. *J. Exptl. Med.* 58, 561-74 (1933). The gonadotropic hormone of the blood of the pregnant mare has been greatly coned by adsorption on active Al(OH)<sub>3</sub>, followed by elution. The preps. so obtained gave demonstrable gonadotropic effects within 100 hrs. in 21-day-old female mice after 3 subcutaneous injections of 0.001 mg. in 1 cc. of physiol. saline. Injection of comparatively large doses of these preps. into immature male rats caused marked development of the testes, which in 10 days were tripled in wt. An astonishing increase in the wt. of the seminal vesicles resulted, for these organs were approx. 75 times heavier than in controls. C. J. West

Further studies on the hypophyseal substance giving increased gonadotropic effects when combined with prolan. Herbert M. Evans, Miriam E. Simpson and Paul R. Austin. *J. Exptl. Med.* 58, 545-59 (1933), cf. (C. A. 27, 3515). The hypophyseal substance the synergic factor—which gives increased gonadotropic effects when combined with prolan has been shown to itself possess a definite though slight gonadotropic activity. By means of isoelec. pptn. or by means of tryptic and cryptic digestion, fractions contg. the synergic principle were freed from many contaminants, in particular of the antagonistic factor. The synergic principle is unaffected by digestion with trypsin or trypsin followed by a short digestion with erepsin but the action of pepsin inactivated the material. A prep. of the active substance has been obtained which is potent in a total dose of 27 gamma. C. J. West

Acid-base equilibrium and pregnancy. Henri Vignes and Max Levy. *Compt. rend.* 197, 794-6 (1933).—V. and L. have detd. the ratio of chlorides in red blood cells and plasma during pregnancy. Changes in this ratio have been interpreted as being due to a gaseous alk. dosis, concurrent with rises in  $p_{H_2}$  of the blood. Julius White

## G—PATHOLOGY

### X. GIDEON WILLS

Is goiter due to an iodine deficiency per se? Harold Levine and Roe E. Remington. *J. Chem. Education* 10, 649-50 (1933).—A review of the literature on the exptl. evidence that factors other than I (cabbage, Ca, light, temp., seasonal variation, endocrine glands, vitamins, infection, chem. stimulation) are concerned in the etiology of goiter. One hundred and twenty-nine references.

Philip D. Adams

Alleged "reflex" ocular immunity. R. R. Madison. *Proc. Soc. Exptl. Biol. Med.* 30, 1013 (1933).—Rabbits were repeatedly injected in 1 anterior chamber with heat-killed or living *B. typhosus*; the agglutinin titer of the aq. humor of the vaccinated eye never exceeded 1/2 of the synchronous serum titer; the titer in the non-vaccinated eye never exceeded 1% of the serum titer. Contrary to Shamburov (*Z. Hyg. Infektionskr.* 114, 456 (1932)), no local or "reflex" synthesis of specific agglutinins occurred in ocular tissues. C. V. Bailey

Disturbance of mineral metabolism in generalized ostia fibrosa and in multiple myeloma. C. H. Lenshoek. *Nederland. Tijdschr. Geneeskunde* 77, 1193-203 (1933).—Description of a case of ostia fibrosa with parathyroid tumor and of a case belonging to the group of multiple myeloma. These 2 affections show many similarities, also in regard to the disturbance of mineral metabolism, particularly Ca metabolism. R. Beutner

Urea retention through lack of fluid. P. H. Verspijck and R. Maathuis. *Nederland. Tijdschr. Geneeskunde* 77, 2016-25 (1933).—Depletion of water in the body damages the kidney and leads to uremia; this may occur after vomiting or diarrhea and is often accompanied by a loss of salt. At the onset this kidney damage can still be repaired; later irreparable anatomical lesions appear. R. Beutner

Fluorescent urine. W. F. Wassink. *Nederland. Tijdschr. Geneeskunde* 77, 4035-38 (1933).—The fluorescence of certain pathol. urine samples is due to their content of mono- and di-acetyl indoxyl. R. Beutner

Reduction-oxidation determination in relation to carcinoma. N. Waterman. *Nederland. Tijdschr. Geneeskunde* 77, 4057-64 (1933).—The reduction-oxidation potential of the blood serum of cancer patients is detd. A high value or a large variability is an unfavorable prognostic sign. After Röntgen-ray irradiation the potential frequently decreases. The potential of quinone hydroquinone, or of methylene blue-rongalite, or cystine-cysteine (free from Fe) also decreases after irradiation. R. Beutner

Investigations on glycogen sickness. S. van Creveld. *Nederland. Tijdschr. Geneeskunde* 77, 4659-76 (1933).—Cases of hepatomegaly due to accumulation of glycogen in the liver are described. R. Beutner

Changes in the gastric acidity in peptic ulcer, cholecystitis and other diseases. Frances R. Vansant, Walter C. Alvarez, Joseph Berkson and Geo. B. Kusterman. *Arch. Internal Med.* 52, 616-31 (1933).—A study of gastric acidity, with a new technic (C. A. 26, 4088), is described in a no. of pathol. conditions, such as ulcer of the stomach and duodenum, cholecystitis and cholelithiasis. J. B. Brown

Nitrogen and sulfur metabolism in Bright's disease. IV. Retention of urea in the nephrosis syndrome. G. P. Grabfield. *Arch. Internal Med.* 52, 632-6 (1933); cf. C. A. 25, 5201.—In a patient with the nephrosis syndrome studied over a 36-day period ingestion of urea produced diuresis. Retention of urea occurred, but this urea did not appear as non-protein N in the blood. The retained N may be stored as "flesh" to replace tissue protein which has been lost as serum proteins in the urine. J. B. Brown

Food and goiter. Robert McCarrison. *Brit. Med. J.* 1933, II, 671-5.—"The more perfect the constitution of the diet the more normal is the thyroid gland, both as to size and as to its action." J. B. Brown

**Canine distemper.** The high antigenic value of the virus after photodynamic inactivation by methylene blue. J. R. Perdau and C. Todd. *J. Comp. Path. Therap.* 45, 78-80 (1933).—The virus of canine distemper as it exists in filtrates or other fluids devoid of living cells is rapidly inactivated by the photodynamic action of methylene blue. The antigenic value of the vaccine is ultimately reduced by prolonged or excessive irradiation. Drying the vaccine does not appear to affect its immunizing properties.

Rachel Brown

**Sedimentation rate and blood proteins in colitis.** M. Rachmilewitz and A. Rosenberg. *J. Egyptian Med. Assoc.* 16, 924-31 (1933).—In spastic colitis the sedimentation rate of the erythrocytes is reduced from a normal of about 5 hrs. to over 10 hrs. in most cases. The globulin ratio of the blood proteins is also lowered. R. and R. suggest that this disease is allergic in nature.

Rachel Brown

**The production of tuberculous tissue and hypersensitivity to tuberculin in guinea pigs.** C. H. Boissevain. *Am. Rev. Tuberc.* 27, 595-9 (1933).—During the purification of the phosphatide from the tubercle bacillus, the power to provoke the formation of tuberculous tissue and the power to cause hypersensitivity to tuberculin are lost simultaneously. No concn. of the material that causes the formation of tuberculous tissue takes place during the prepn. of the phosphatide. Most of the biol. activity of the tubercle bacillus remains in the residue after removal of the lipoids, carbohydrates and sol protein. This residue contains an insol. protein.

H. J. Corper

**The lysis of tubercle bacilli in vitro. Further observations.** H. J. Corper. *Am. Rev. Tuberc.* 28, 138-43 (1933).—The loss of acid fastness (lysis) of tubercle bacilli in tissues (dog liver, spleen and kidney) sterilized by means of an equal vol. of 6%  $H_2SO_4$  for 30 min to 1 hr. and washed with sterile saline soln. is due to the acidity retained by the tissues, and is not, as previously reported, caused by the action of autolytic enzymes. The  $H_2SO_4$  treatment apparently destroys the enzymes in the tissues and, when properly neutralized, preps. these tissues so that they can be utilized as a nutrient by the tubercle bacillus at incubator temp. Tubercle bacilli added to  $H_2SO_4$ -treated tissues, which have been neutralized by suitable alkalis ( $NaOH$ ,  $Na_2CO_3$  or  $NaHCO_3$ ) so that the reaction approximates the neutral point  $pH$  6.5-8, retain their viability for over 2 months at 37°. At refrigerator temp. (about 2°) heavy suspensions (about 0.1 mg. per cc.) may remain viable within a range of about  $pH$  4.5-9.0 for over 2 months. The effects of enzymes (autolytic and digestive) upon the viability and the chem. and morphological integrity of the tubercle bacilli still remain to be disclosed and await the development of suitably controlled tests and appropriate methods which will ensure sterility and the integrity of the enzyme being tested over the long period of time required for such action to be discerned. The  $pH$  of the medium in which the enzyme acts will require careful control to obviate misinterpretation.

H. J. Corper

**Auto-antibodies in tuberculosis.** O. Fischer. *Z. Tuberc.* 68, 5-6 (1933).—F. found that a certain no. of tuberculous sera gave a pos. complement-fixation reaction with alc. lung exts. It could not be detd. with certitude whether the reaction is due to the presence of lung lipid antibodies in the tuberculous serum or whether it depends on serum lability. To det. this further studies are essential. The ability of certain tuberculous sera to react with alc. heart exts. is, in all probability, due to serum lability.

H. J. Corper

**Physicochemical properties of tissues in relation to the normal and pathological states of the organism.** XVI. New discoveries on cancer caused by electrical conditions. F. Viès and A. de Coulon. *Arch. phys. biol.* 10, 119-26 (1933); cf. *C. A.* 27, 5401.—The incidence of spontaneous cancer in mice was much greater among those kept in metal cages electrically insulated from the earth than among those kept in similar, but grounded, cages.

L. E. Gilson

**Elimination of chlorides in pemphigus.** P. Popchrioff and R. Zorn. *Compt. rend. Soc. biol.* 114, 5-7 (1933).—Report of a case with marked chloride retention. Elimination of chlorides in eczema. *Ibid.* 8-10.—Chloride retention frequently occurs in eczema. Some biopsy specimens of eczematous skin showed twice the normal Cl content.

L. E. Gilson

**The platinum electrode potential of the crystalline lens in cataract.** J. Nørdmann and P. Reiss. *Compt. rend. Soc. biol.* 114, 12-13 (1933).—The normal cryst. lens has an  $r_H$  of 18; in cataract the  $r_H$  averages 20.6. L. E. G. Buffer coefficient curves of cerebrospinal fluid. N. Bernstein. *Compt. rend. Soc. biol.* 114, 28-31 (1933); cf. *C. A.* 25, 5201.—The buffer coeff. curves, as detd. by the Sb electrode, for cerebrospinal fluids from 10 different pathol. cases are given for the  $pH$  range 2-11.

L. E. Gilson

**Cataphoresis and some serological properties of cerebrospinal fluids.** N. Bernstein. *Compt. rend. Soc. biol.* 114, 32-4 (1933).—The isoelec. and neutral points of 15 pathol. cerebrospinal fluids were detd. by cataphoresis expts. covering the  $pH$  range 4-9.5. The alexin and hemolysin contents were also investigated.

L. E. G.

**Glucemia. Its physiological variations in non-diabetic pathological cases.** M. R. Cavex and M. Schteingart. *Compt. rend. Soc. biol.* 114, 78 (1933).—The extreme limits of glucemia found in the 1000 cases studied were 0.04 and 0.16%. In 450 cases the values were between 0.09 and 0.1 and in 300 cases less than 0.09. Diurnal and seasonal variations were slight.

L. E. Gilson

**Mineral equilibrium of the blood and nephropathy.** Renato Molise. *Minerva med.* 1933, II, 506-12.—A discussion and review of the literature are given.

Helen Lee Gruchl

**Metabolism of normal and tumor tissue. VIII. Respiration in fructose and in sugar-free media.** Frank Dickens and Guy Drummond Greville. *Biochem. J.* 27, 832-41 (1933).—cf. *C. A.* 27, 1045.—The brain, retina, testes, kidney and spleen all oxidize glucose, though to differing extents. The respiration of embryonic tissues falls very little when deprived of glucose. The respiration of Jensen rat sarcoma is not decreased in the absence of glucose. The various tissues studied oxidize fructose to a greater or less extent. Jensen rat sarcoma has the same R. Q. in glucose and in fructose.

B. H.

**Sensitizing action of synthetic porphyrins.** W. Hausmann and F. M. Kuhn. *Biochem. Z.* 265, 105-9 (1933).—Since synthetic mesoporphyrin, isuroporphyrin and coproporphyrin have a photodynamic effect on blood agar plates this cannot be attributed to any impurities but must be regarded as a function of the porphyrins. Synthetic mesoporphyrin has a very strong sensitizing action in the visible and in the long ultra-violet spectrum, but isuroporphyrin and coproporphyrin act slightly with 365 m $\mu$  wave lengths, and practically not at all in the invisible range of the spectrum.

S. Morgulis

**Investigations on the physicochemical properties of tissues in relation to the normal or pathological state of the organism.** XVII. Recent studies on the statistical evolution of cancer as caused by tarring. F. Viès, A. de Coulon and A. Ugo. *Arch. phys. biol.* 10, 304-17 (1933); cf. *C. A.* 27, 5401.—In a statistical study of cancerization in mice, the progress of infection has been explained by means of 3 parameters, compared to those of a test standard previously detd. By this method modifications of cancerization have been studied as caused by radiation and varying types of tar; the influence of soils, metals, darkness and finally the presence in the feed of various organs playing a part in diastase or hormone deficiency has been detd. Feeding with these organs (suprarenals, testicles and digestive tube) produces a considerable decrease of cancerization.

W. J. Peterson

**Immunological study of native, denatured and reversed serum albumin.** Benjamin F. Miller. *J. Exptl. Med.* 58, 625-33 (1933).—Native and reversed horse serum albumin are indistinguishable when tested immunologically by means of the precipitin reaction. C. J. West

## H—PHARMACOLOGY

A. N. RICHARDS

**Ferric chloride in the treatment of secondary anemias of infants.** L. N. da Gama Filho. *Rev. brasil. med. pharm.* 9, 27-36(1933).

E. S. G. Barron

**Monosodium thyroxine, desiccated thyroid and an impure potassium salt of thyroxine.** Willard O. Thompson, Phebe K. Thompson and Lois F. N. Dickie. *Arch. Internal Med.* 52, 576-92(1933); cf. C. A. 27, 2494. — Synthetic thyroxine by mouth is considerably less effective in raising the basal metabolism in myxedema than is its monosodium salt. Considerable differences are shown between the different preps. of thyroid, which were tested, by the various methods of administration.

J. B. Brown

**Anesthetics from the practical and scientific aspects.** F. J. Morrin. *Brit. Med. J.* 1933, II, 636-8.—A review.

J. B. Brown

**Antimalarial chemotherapeutic tests at the Devon mental hospital.** S. P. James. *J. Trop. Med. Hyg.* 36, 289-91(1933).—Atelrin but not quinine or phen-quinine prevented entirely the onset of the malarial attack within the usual incubation period of the disease.

Rachel Brown

**The adsorption of nicotine by the formed elements of the blood.** A. I. Burstein. *Arbeitsphysiol.* 6, 105-10 (1932).—After the injection into dogs of 0.3 mg. of nicotine per kg. body wt. the nicotine was exclusively adsorbed by the formed elements of the blood. *In vitro* expts. showed that the adsorption capacity for nicotine of the formed elements of dog blood was equiv. to 0.006-0.007 mg. per g.

T. M. Carpenter

**Sanocrysin treatment in tuberculosis.** K. J. Heinrichsen and H. C. Swamy. *Am. Rev. Tuberc.* 28, Suppl., 1-45(1933).—The authors found 50% of tuberculous patients with a stationary or downward progressive advanced tuberculosis of the "B" or "C" types, when given Sanocrysin in well-regulated doses, showed: (1) a rather prompt cessation of symptoms which tended to be permanent if the patient observed the usual measures of hygiene, (2) a clearing of tuberculous infiltrations, with marked fibrosis and contraction of cavities in roentgenograms and (3) changes from unfavorable to favorable lab. findings. Of the remaining 50% in those showing temporary improvement there was a shortening of the convalescent period or prolongation of life or both. There seems to be a real indication for the drug's use as a supportive treatment in collapse therapy, when patients are not doing well, and when a spread to the other side is beginning.

H. J. Corpe

**The action of formaldehyde on the tubercle bacillus; formalin disinfection in tuberculosis.** Joseph Hohn and Werner Herrmann. *Z. Tuberk.* 68, 145-56(1933). The disinfection of rooms with formalin is the most efficient method of killing tubercle bacilli in the homes of consumptives. Even the bacilli found in the depth of various materials are affected by the formaldehyde gas. In the Statg. Hospital in Essen formalin disinfection in closed app. is displacing steam disinfection, and this kills tubercle bacilli at a depth and protects the most delicate materials. For the purpose of testing disinfection app. and microorganism-destroying solus. the culture of tubercle bacilli on egg nutrient media from silk threads contg. pure cultures after exposure is considered an exact and certain method of test. An introductory review of the literature is given.

H. J. Corpe

**The cumulation of the digitalis glucosides.** H. Bauer and K. Frommherz. *Klin. Wochschr.* 12, 973-6(1933).—Thirty-five % of the immediately lethal dose of digitoxin in the continuous infusion method of Magnus will kill cats in 14 days with evidence of heart damage. Moreover, the drug disappears from the heart much faster than has been supposed. Clearly, it is necessary to differentiate between the cumulative effect of the drug observed even after a single injection, and the cumulation of the drug itself in Hatcher's sense, obtained with intravenous injections of <0.5 mg./kg. every other day.

1 The degree of the true cumulative effect is given by the difference between the immediately fatal dose and that which kills after a definite time interval. So measured, digitoxin is much more cumulative than gitalin, and prepn. contg. both take an intermediate position.

Harry Eagle

**The succagagic and hypoglycemic properties of secretin.** Jean LaBarre and Jules Ledrut. *Bull. soc. chim. biol.* 15, 724-63(1933).—A method is given for prep. secretin free from hypotensive principles. This product stimulated both the internal and external secretion of the pancreas of dogs and attempts to sep. it into the resp. hypoglycemic and succagagic principles by several commonly used fractional pptn. methods failed. Two pptns. by  $\text{CCl}_3\text{CO}_2\text{H}$  or  $\text{KClO}_4$ , however, split the secretin mols. into 2 new products, which were sepd. The product *incretin* was purely hypoglycemic in action, and the other, *excretin*, purely succagagic. The latter had the higher mol. wt. Seventy references.

L. E. Gilson

**Action of sodium thiosulfate in carbon monoxide poisoning.** M. Chambon and G. Bouvet. *Compt. rend. soc. biol.* 114, 45-6(1933).—Dogs receiving 10 g.  $\text{Na}_2\text{S}_2\text{O}_3$  intravenously did not recover any faster than untreated dogs poisoned to the same degree with CO.

L. E. G.

**Specificity of the detoxifying action of amino acids.** F. Figari and L. Sivori. *Compt. rend. soc. biol.* 114, 53-5(1933).—The mixt. of amino acids obtained by digesting any particular protein, toxin or species of bacteria seemed to have a specific detoxifying action upon the agent from which it was derived.

L. E. Gilson

**Hypotensive properties of the blood during peptone shock.** L. Jung. *Compt. rend. soc. biol.* 114, 56-7 (1933).—Peptone shock differs from anaphylactic shock in that it does not cause the appearance of a hypotensive agent in the blood. Expts. with dogs are described.

L. E. Gilson

**Comparative toxicity of tryptaflavine and gonacrine in rabbits.** M. Levrat and F. Morelon. *Compt. rend. soc. biol.* 114, 60(1933). Tryptaflavine is gonacrine-HCl. Both compds. are equally toxic for the rabbit. The M. L. D. is 0.3 mg. per kg., intravenously. Chronic renal lesions in rabbits following tryptaflavine intoxication. *Ibid.* 61-2.—A severe and prolonged nephritis is produced by 0.2-0.3 mg. given intravenously.

L. E. Gilson

**The therapeutic action of foudaine on canine filariasis.** F. Popesco. *Compt. rend. soc. biol.* 114, 219-20(1933).—The drug is effective.

L. E. Gilson

**Rules of chemotherapeutic action.** R. Schnitzer. *Naturwissenschaften* 21, 681-3(1933).—A review.

B. J. C. van der Hoeven

**The behavior of cats to heroin.** Luigi Scremin. *Boll. soc. ital. biol. sper.* 8, 522-3(1933).—Cats may become partially habituated to heroin.

Peter Masucci

**Tobacco intoxication and cardiac glycogen.** Mario Mattioli. *Boll. soc. ital. biol. sper.* 8, 543-5(1933).

Peter Masucci

**The toxicity of sodium fluoride.** A. Constantini. *Boll. soc. ital. biol. sper.* 8, 573-6(1933).—NaF in large doses is more injurious when given by the intrapleural or intraperitoneal than the gastric route; given in small doses, 0.02 g. per kg. of guinea pig, it is well tolerated by the pleural and peritoneal but is rapidly lethal by the gastric route.

Peter Masucci

**The toxicity of certain organ extracts injected intravenously and its interpretation.** P. Mascherpa. *Boll. soc. ital. biol. sper.* 8, 613-16(1933).—Liver, lung, kidneys and striated muscle exts. were prep. by subjecting the resp. tissues to a pressure of 350 atms. in a Buchner press. The filtered juices were injected intravenously into rabbits. The animals showed a typical anaphylactic shock terminating in death. The order of toxicity was: lung, muscles, kidneys, liver. A current of air rich in Ra emanations was bubbled through the exts. for 12 hrs. The intravenous injection of these proved as toxic as the untreated ones. The toxicity of the exts. is ascribed to the flocculation of the colloidal particles in the blood stream with consequent embolism and death.

P. M.

**Lathyrism in Syria.** Guy Loisel. *Presse méd.* 41, 1 449-50(1933).

**Influences of insulin on the water metabolism in health and in diabetes.** Fritz Winter. *Acta Med. Scand.* 80, 136-53(1933).—In healthy persons injection of insulin brings about concn. of the blood. In diabetics under insulin treatment there is also a concn. of the blood but to a smaller extent than in the normal after a single injection.

**The effect of minute quantities of copper on the mammalian organism. Influence of minute concentrations of heavy metals on the decomposition of glycogen in vitro.** Hans Handovsky, Daisy v. Cotzhausen and Ruth Schallehn. *Biochem. Z.* 265, 110-14(1933).—Expts. with a 0.46% soln. of glycogen show that during 45 min. incubation  $\text{CuSO}_4$  in concns. of  $10^{-4}$ – $10^{-3}$  m. can form 6-10% of reducing substance from it. Within these concn. limits only Cu and Fe salts were effective but salts of Mn, Co, Zn, Ag or Hg were inactive. The increase in reducing substance was twice as large in a KCl soln. of glycogen as in an aq. soln. HCl or  $\text{H}_2\text{SO}_4$  was effective only in concn. of or above  $10^{-3}$  m.  $\text{CuCl}_2$  in concns. of  $10^{-4}$  to  $10^{-3}$  was always inactive.

**Further studies on the biological value of metals. III. Reciprocal relation between metals and foodstuffs.** J. Schwaibold and P. Fischler. *Biochem. Z.* 265, 124-32(1933).—Al salts in a concn. of 20 mg. Al per l. have no ill effects on frog tadpoles; Zn salts even in a concn. of 2 mg. Zn per l. are very injurious, inhibiting completely the growth of the tadpoles in 4 weeks and causing many to die, but the animals can still be saved. Ni salts in a concn. of 2 mg. Ni per l. are likewise decidedly toxic. The corrosion products of Pb at  $75^\circ$  are sufficiently toxic that all animals were killed off within 1 month. A concn. of 2 mg. Pb per l. added in the form of Pb salts suffices to kill most of the exptl. animals and causes irreparable injury to the rest. Sn is fairly indifferent and in a 2 mg. per l. concn. causes only a slight suppression of growth and development of the tadpoles. Mice manifest a higher resistance to Cu than do tadpoles, but even for these it is very toxic. But Ag is more toxic even than either Pb or Cu, and 1 mg. per l. kills most of the animals in a few hrs. The corrosion of Hg by ordinary tap water kills tadpoles in 10-20 days, but the corrosion of Au or Pt is so slight that it produces no effect on them. Cf. C. A. 25, 2772.

**A photometric study of the action, in vitro, of mineral waters on blood serum.** P. Pontus. *Arch. phys. biol.* 10, 318-26(1933).—Since the globulins of blood serum are insol. in distd. water, and relatively sol. in saline solns. of various concns., the photometric method of examn. is convenient in following the phase of the action of mineral waters on blood serum. The product  $\delta_1$ , for a given diln., is a function of the nature of the mineral water employed in making the serum diln. Depending upon the saline concn. of the water studied, the curve,  $\delta_1 = f(1)$ , approaches that of distd. water or of NaCl at 8 pts. per 1000.

**Calcium. VII. Calcium effects on thoracic lymph flow of dogs.** Arnold L. Lieberman. *J. Pharmacol.* 48, 293-9(1933); cf. C. A. 27, 3253.—Ca salts, especially the acid salts, retard lymph flow in dogs when rapidly injected. Ca decreases tissue cell permeability. VIII. **Therapeutic effect of calglucon (calcium gluconate) on thrombophlebitic edema.** Arnold L. Lieberman and Leo M. Zimmerman. *Ibid.* 301-4.—The subcutaneous injections of Ca gluconate and of parathormone (Ca orally to a lesser extent) hasten the disappearance of exptl. thrombophlebitic edema presumably by diminishing the permeability of the capillaries previously increased by pathol. conditions.

**The mechanism of vomiting induced by quinidine. I. Quinidine emesis in animals with denervated hearts.** A. Carlton Ernestine and Samuel Lewis. *J. Pharmacol.* 48, 805-10(1933).—Vomiting, a common toxic symptom of quinidine (I), is produced by the oral or parenteral administration of I to cats even after denervating the heart. Since the heart is not the seat of the emetic action

of I, vomiting does not indicate that the full therapeutic effect of I on the myocardium has been attained. II. *Ibid.* 359-69(1933).—Quinidine does not produce emesis when applied to the 4th ventricle; it apparently works by peripheral action. The emetic action is abolished by nicotine or ergotoxine but is not inhibited by atropine, vagus section or evisceration.

**The effect of anthelmintics on the host. I. Tetrachloroethylene. II. Hexylresorcinol.** B. V. Christensen and H. J. Lynch. *J. Pharmacol.* 48, 311-16(1933).—Hexylresorcinol in single therapeutic doses causes no apparent symptomatic disturbances although repeated doses cause pathol. changes in the small intestine, liver and heart. Tetrachloroethylene in therapeutic doses causes considerable cardiac and respiratory depression, pathol. changes in the small intestine, liver and kidney.

**The development of tolerance to nicotine by rats.** A. Behrend and C. H. Thienes. *J. Pharmacol.* 48, 317-25(1933).—Adult rats developed no tolerance to repeated injection of nicotine, and young rats developed tolerance to min. effective and min. convulsive doses but not to min. lethal doses. The acquired tolerance of young rats may be due either to conditioned inhibition or to increased tissue resistance and increased destruction or excretion.

**The effect of cyanides on the thyroid gland of chickens.** A. W. Spence. *J. Pharmacol.* 48, 327-31(1933).—Chickens are extremely resistant to  $\text{CH}_3\text{CN}$ , the injection of 3 cc. resulting in no more than a narcotic effect. Presumably the CN is not split off by the chicken body. Repeated large doses have some goitrogenic action. The ability of chickens to synthesize their own vitamin C (hexuronic acid) and the known antigoitrogenic effect of plants rich in hexuronic acid probably explain these facts.

**The physicochemical properties of some new choline derivatives in relation to their chemical constitution and pharmacological action.** W. F. von Oettingen and R. O. Bowman. *J. Pharmacol.* 48, 333-40(1933).—*Choline dichloride* (II), *dicholine dichloride* (II) and *trimethyl ammonium ethylamine chloride* (III) have pharmacol. actions similar to that of choline (V). The quant. differences are discussed. I, II, III and IV in 0.01 M concns. do not affect the surface tension and are not appreciably oil-sol. They do not ppt. serum or lecithin emulsions and do not affect the sedimentation of red blood cells. The velocity of their diffusion through living frog skin is in inverse ratio to their pharmacol. action. V may be detd. by its orange-red color reaction with Major and Welbel's guanidine reagent (10% Na ferrocyanide, 1 part; 10% NaOH, 1 part; 10% Na nitroprusside, 1 part; water, 9 parts) within limits of 0.08 mg. I and II are detd. by evapn to dryness, soln. in 0.5 cc. water, pptn. with 0.5 cc. of Kraut's reagent (to 27.2 g. KI in water is added 8 g. Bi subnitrate in 20 g.  $\text{HNO}_3$  (sp. gr. 1.18); the resulting soln. is aged and filtered, then made up to 100 cc. with water). The ppt. is filtered, washed by suction with 3 cc. of  $\text{H}_2\text{O}$ , then 3 cc.  $\text{C}_2\text{H}_5\text{OH}$  and dissolved in 4 cc. warm  $(\text{CH}_3\text{OH})_2$  and the color matched with standards similarly prepd. III and IV are detd. by means of a sharp color reaction with Tolin's amino acid reagent.

**Liver damage in dogs and rats after repeated oral administration of cinchophen, ethyl ester of p-methylphenylcinchoninic acid (tolysin) and sodium salicylate.** Henry G. Barbour and Merl E. Fisk. *J. Pharmacol.* 48, 341-57(1933).—Cinchophen (I), tolysin (II) and Na salicylate (III) all produce liver damage in repeated doses. The order of toxicity is stated to be  $\text{I} > \text{III} > \text{II}$  for rat liver and rat kidney although III did not produce bromosulfalein retention while I did markedly and II slightly when all were used in max. dosages. For dog kidney the order of toxicity is stated to be  $\text{III} > \text{I} > \text{II}$ . I, but neither II nor III, caused gastric or duodenal ulcers. The amts. of II and III required to produce liver damage were far greater than clinical dosages. I, however,



should be used clinically only with great caution.

T. H. Rider

The local anesthetic action of *p*-aminobenzoate of diethylamine ethoxy alcohol. W. H. Horne and R. L. Shriner. *J. Pharmacol.* 48, 371-4 (1933).— $\text{CH}_3\text{CH}_2\text{O}$

and  $(\text{C}_2\text{H}_5)_2\text{NH}$  yield  $(\text{C}_2\text{H}_5)_2\text{NCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$  (I), b. 92-5°;  $(\text{C}_2\text{H}_5)_2\text{N}(\text{CH}_2\text{CH}_2\text{O})_2\text{CH}_2\text{CH}_2\text{OH}$  (II), b. 123-8°;  $(\text{C}_2\text{H}_5)_2\text{N}(\text{CH}_2\text{CH}_2\text{O})_3\text{CH}_2\text{CH}_2\text{OH}$  (III), b. 164-72° and  $(\text{C}_2\text{H}_5)_2\text{N}(\text{CH}_2\text{CH}_2\text{O})_4\text{CH}_2\text{CH}_2\text{OH}$  (IV), b. 190-200°. The amino alcs. in PhH were caused to react with  $\text{NO}_2\text{C}_6\text{H}_4\text{COCl}$ , yielding oily hydrochlorides of the esters. The free bases were obtained by shaking with  $\text{Et}_2\text{O}$  and dil.  $\text{NaOH}$  and reduced with  $\text{H}_2$  and Pt black in  $\text{C}_2\text{H}_5\text{OH}$ . All *p*-aminobenzoates were noncrystd. oils. Their hydrochlorides in 1% soln. had the following properties in order of toxicity to white rats in mg. per kg.: duration of anesthesia from intracutaneous injection into guinea pigs, duration of anesthesia from topical application to rabbit cornea: I 60, 58, 30-45; II 30-60, 113, 10-14; III 30-60, 109, 20; IV 60, 108, 0. II, III and IV caused pitting of cornea and necrosis in rabbit skin. I caused no necrosis, but temporary opacity of the cornea.

T. H. Rider

Determination of the toxicity of neocarsphenamine. I. The increase in toxicity on exposure to air. C. A. Morrell and C. W. Chapman. *J. Pharmacol.* 48, 375-90 (1933).—Increased toxicity of a 4% aq. soln. of neocarsphenamine on standing in air is prevented by overlaying with mineral oil. Unprotected solns. increase in toxicity 107% in 15 min. II. The characteristic curve for rats. *Ibid.* 391-400. A curve for the toxicity of neocarsphenamine in rats is presented. Individual variations in one colony of rats are 211%.

T. H. Rider

Febrile, respiratory and some other actions of dinitrophenol. M. L. Tainter and W. C. Cutting. *J. Pharmacol.* 48, 410-20 (1933).— $\alpha$ -Dinitrophenol (I) in doses of 3-40 mg per kg. produces increases of 6-7° in temp within 1 hr. lasting several hrs., respiratory stimulation, increased pulse rate and increased tissue metabolism in rabbits, cats, dogs, rats, pigeons and men. Death may result from direct circulatory depression, hyperpyrexia or acidosis and anoxemia. I produces no augmentation of fermentation of sugar by yeast *in vitro*.

T. H. R.

Cumulative poisoning by squill derivatives and by ouabain. E. W. Wallace and H. B. Van Dyke. *J. Pharmacol.* 48, 430-44 (1933).—*d*-Scillouin ( $\text{C}_{10}\text{H}_{15}\text{O}_5$ ), m. 220°, is <1/10 as potent a cumulative poison as ouabain although its acute toxic effects were as great in dogs and cats.

T. H. Rider

The antidotal action of sodium thiosulfate and dihydroxyacetone in cyanide poisoning, and the alleged antidotal action of glucose. B. B. Turner and H. R. Hulpieu. *J. Pharmacol.* 48, 445-69 (1933).—Dihydroxyacetone has a marked but fleeting antagonistic action to cyanide *in vivo* which serves to secure time for  $\text{Na}_2\text{S}_2\text{O}_3$ , a less rapid but better antidote, to take effect. Glucose is an ineffective antidote for CN in rabbits.

T. H. Rider

Phosphate-buffered injection medium disturbance in caffeine effects on voluntary muscle response. Ralph H. Cheney. *J. Pharmacol.* 48, 470-7 (1933).—Phosphate buffers produce an independent effect which render them unsuitable as solvents for studies of caffeine effects.

T. H. Rider

Toxicity and deposition of thallium in certain game birds. Paul A. Shaw. *J. Pharmacol.* 48, 478-87 (1933).—Tl kills game birds in doses of 12-30 mg. per kg. Muscular tissues acquire a higher concn greater than that administered, the vital organs and bone an equal concn and fat practically none. From 33 to 71% of administered Tl is retained until death 13 days after administration of 20 mg. per kg. to a goose. Poisoned game would probably be innocuous if consumed by men. In dogs 61.6% of the dose of Tl is excreted in the urine in 38 days at diminishing rates, so that at least 80 days longer would be required for complete excretion.

T. H. Rider

Narcotic agency in the paraldehyde series. P. K.

Knöfel. *J. Pharmacol.* 48, 488-91 (1933).—Isomers of  $\text{R}-\text{CH}(\text{O})-\text{CH}(\text{R})-\text{O}-\text{CH}(\text{R})$ , in which R is H,  $\text{CH}_3$

$\text{C}_2\text{H}_5$ , N- (I) or iso- (II)  $\text{C}_3\text{H}_7$  were administered to rabbits by stomach tube. Only *p*-acetaldehyde was suitable as a narcotic agent. I, b. 102°, has  $d_{20}^{25}$  0.9251 and is insol. in water. II m. 80° and is insol. in water.

T. H. Rider

The physiological action of the principles isolated from the secretion of *Bufo arenarum*. K. K. Chen, H. Jensen and A. L. Chen. *J. Pharmacol.* 49, 1-13 (1933).—From the secretion of *Bufo arenarum* were isolated cholesterol (no ergosterol), *areno-bufagin* (I) ( $\text{C}_{28}\text{H}_{48}\text{O}_6$ ), m. 220° (corr.) (colorless prisms from  $\text{EtOAc}$ ), *areno-bufotoxin* (II), ( $\text{C}_{28}\text{H}_{48}\text{O}_{11}\text{N}_4$ ), m. 194-5° (corr.) (colorless spheroids) which appears to be composed of 1 mol. of I combined with 1 mol. of suberyl-arginine, a red *areno-bufotenine* A, *flavinate* (III), ( $\text{C}_{12}\text{H}_{18}\text{O}_2\text{N}_2 \cdot \text{C}_{10}\text{H}_8\text{O}_2\text{N}_2\text{S}$ ), m. 130-1° (corr.) and a white *areno-bufotenine* B, *flavinate* (IV), ( $\text{C}_{12}\text{H}_{18}\text{O}_2\text{N}_2 \cdot \text{C}_{10}\text{H}_8\text{O}_2\text{N}_2\text{S}$ ), m. 285° (corr.), an indole deriv. and probably adrenalinic. I and II have digitalis-like actions, pressor actions and a stimulating effect on isolated rabbit intestines and guinea-pig uteri. The emetic dose of I in cats is 0.06 mg. per kg. and in pigeons 0.15 mg. per kg. The fatal dose of I in cats is 0.09 mg. per kg. The emetic dose of II in pigeons is 0.2 mg. per kg. and in cats is 0.15 mg. per kg. The fatal dose of II in cats is 0.41 mg. per kg. III has a slight pressor action, increases cardiac tone, and stimulates isolated rabbit intestine and guinea-pig uterus. IV stimulates isolated guinea-pig uterus.

T. H. Rider

The physiological action of the principles isolated from the secretion of the European green toad (*Bufo viridis viridis*). K. K. Chen, H. Jensen and A. L. Chen. *J. Pharmacol.* 49, 14-25 (1933); cf. C. A. 27, 4313. —From the secretion of *Bufo viridis viridis* were isolated cholesterol contg. 3% ergosterol, *virido-bufagin* (I) ( $\text{C}_{28}\text{H}_{48}\text{O}_6$ ), m. 255-55° (corr.) (from alc.) (*1*-diacetyl deriv., m. 253-4° (corr.)), *virido-bufotoxin* (II), ( $\text{C}_{28}\text{H}_{48}\text{O}_{10}\text{N}_4$ ) m. 198-9° (corr.), contg. arginine (pos. Sakaguchi test), *virido-bufotenine* A, *flavinate* (III) ( $\text{C}_{12}\text{H}_{18}\text{O}_2\text{N}_2 \cdot \text{C}_{10}\text{H}_8\text{O}_2\text{N}_2\text{S}$ ), orange needles, m. 170° (corr.), and *virido-bufotenine* B, *flavinate* IV, ( $\text{C}_{12}\text{H}_{18}\text{O}_2\text{N}_2 \cdot \text{C}_{10}\text{H}_8\text{O}_2\text{N}_2\text{S}$ ), red crystals, m. 131-2°, probably identical with *areno-bufotenine* A, *flavinate*. I has a digitalis-like action; min. emetic dose 0.15 mg. per kg. (pigeons), 0.27 mg. per kg. (cat); min. fatal dose 0.11 mg. per kg. (cats). II has actions similar to those of I; min. emetic dose 0.2 mg. per kg. (pigeons), 0.15 mg. per kg. (cats); min. fatal dose 0.27 mg. per kg. (cats). III and IV have pressor activity, increase heart tone and stimulate smooth muscle organs.

T. H. Rider

The physiological action of the principles isolated from the secretion of the Japanese toad (*Bufo formosus*). K. K. Chen, H. Jensen and A. L. Chen. *J. Pharmacol.* 49, 26-35 (1933). —From the secretion of *Bufo formosus* were isolated cholesterol, little if any ergosterol, *gama-bufagin* (I) ( $\text{C}_{28}\text{H}_{48}\text{O}_6$ ), m. 253-4° (corr.) (probably identical with *areno-bufotenine* A and *areno-bufotenin*), *gama-bufotoxin* (II) ( $\text{C}_{28}\text{H}_{48}\text{O}_{11}\text{N}_4$ ), m. 146° (indeterminate) (spheroids from alc.), *gama-bufotenine flavinate* (III), ( $\text{C}_{12}\text{H}_{18}\text{O}_2\text{N}_2 \cdot \text{C}_{10}\text{H}_8\text{O}_2\text{N}_2\text{S}$ ), m. 186-7° (corr.) (orange crystals from water), an indole deriv. I and II have digitalis-like actions; min. emetic doses in mg. per kg. cats I, 0.07, II, 0.175, pigeons I, 0.15, II, 0.20; min. lethal doses, mg. per kg. in cats I, 0.1, II, 0.38. III, has pressor activity, increases cardiac tone and stimulates intestines and uteri. Evidence is presented for the presence of adrenalinic.

T. H. Rider

The tranquilizing and respiratory depressant effects of tribromethanol (avertin), amylene hydrate, isoamyl-ethylbarbituric acid (amytal) and ethyl-(-1-methylbutyl) barbiturate (pentobarbital) alone and in combination with morphine on the rat. O. W. Barlow and Joseph D. Gludhill. *J. Pharmacol.* 49, 36-49 (1933).—The effects of morphine (I), avertin crystals (II), amylene hydrate (III), avertin fluid (IV), Na-amytal (V), and Na-penta-

barbital (VI) were studied alone and (I) in combination with each of the others. The minimal doses (mg. per kg.) producing complete tranquilization, the percentage of the M.L.D. which this dose represents and the attendant respiratory depression in percentage are, resp.: I, 21, 5.0, 30-5; II, 275, 37.5, 25; III, 1100, 78.5, 75; IV, 680, 47.0, 46; V, 98, 60.0, 70; VI, 36, 30.0, 40. Potentiation of II, IV, V and VI by I was evident both for tranquilization (order VI > II > V) and respiratory depression (order II > VI). There was no potentiation of respiratory depression of V by I, but the effect of V alone was equiv. to the other potentiated depression. T. H. R.

The influence of morphine on the premedication value of tribromoethanol (avertin) and tribromoethanol fluid (avertin fluid) in relation to nitrous oxide anesthesia in the rat. O. W. Barlow and James T. Duncan. *J. Pharmacol.* 49, 50-9(1933).—There is potentiation between morphine and avertin (I) in their premedicant effects. I is stronger than I-fluid subcutaneously; the 2 are about equal rectally although I-fluid has a more prolonged effect. These differences are probably due to differences in the ratio of absorption. Respiratory depression is pronounced with I. T. H. Rider

The influence of morphine on the premedication value of ethyl-(1-methylbutyl)barbiturate (pentobarbital) and isoamylethylbarbituric acid (amylal). O. W. Barlow and James T. Duncan. *J. Pharmacol.* 49, 60-6(1933).—The preanesthetic values of pentobarbital (I) and amylal (II) differ only quantitatively. I is approx. 2 times as active as II and has a wider margin of safety. Morphine (III) and I synergize. III potentiates II only within a narrow range of doses. T. H. Rider

The effect of calcium on the action of cocaine. Wm. Salant and Wm. M. Parkins. *J. Pharmacol.* 49, 67-77 (1933).—Cocaine (I) has little effect on intestinal motility of cats when injected intravenously, but with low Ca, I stimulates and with higher Ca, I depresses the intestine. Reduction of blood Ca decreases or reverses pressor effects of I and causes a depressant action on the circulation by I. Respiratory depression by I was decreased by lowering the blood Ca. T. H. Rider

The pharmacologic action of the phosphorous acid esters of the phenols. Maurice I. Smith, R. D. Lillie, E. Elvove and E. F. Stohman. *J. Pharmacol.* 49, 78-99 (1933); cf. Smith, Engel & Stohman, *C. A.* 27, 3253. T. H. Rider

The acute degenerative changes and the changes of recuperation occurring in the liver from the use of ethyl alcohol. A functional and pathological study. Wm. DeB. MacNider. *J. Pharmacol.* 49, 100-16(1933). T. H. Rider

The action of sodium oxalate in normal and thyroparathyroidectomized cats. Wm. Salant and Wm. M. Parkins. *J. Pharmacol.* 49, 117-32(1933).—Oxalate (I) injected intravenously in small doses in cats increased intestinal movements and produced fall or slight rise in blood pressure. After vagotomy or atropine I was without effect on intestines and distinctly pressor. In large doses, I caused inhibition of intestine and depression of circulation. After ergotamine which diminishes the irritability of sympathetic fibers, large doses of I stimulated the intestine, probably because of action on the parasympathetic. Respiration was stimulated by medium and depressed by large amts. of I. In thyroparathyroidectomized cats the resistance to oxalates was much greater than in normal cats. T. H. Rider

The antidotal action of picrotoxin, strychnine and cocaine in acute intoxication by the barbiturates. A. H. Maloney. *J. Pharmacol.* 49, 133-40(1933).—Picrotoxin is superior to either strychnine or cocaine as an antidote to 11 typical barbiturates. T. H. Rider

Actions of dinitrophenol. Repeated administration, antidotes, fatal doses, antiseptic tests and actions of some other isomers. M. L. Tainter and W. C. Cutting. *J. Pharmacol.* 49, 187-208(1933).—Repeated administration of 2,4-dinitrophenol (I) to dogs by various routes shows no tolerance in 2-3 months. Studies of urine, van den

Bergh tests and icteric indices failed to show toxic reactions and no pathol. alterations were noted except perhaps in the spleen. Fatal doses (80% mortality) in mg. per kg. were, rats, subcutaneous 25; dogs, subcutaneous 22, intramuscularly 20, intravenously 20, orally 20-30; rabbits, subcutaneously 30; pigeons intramuscularly 7. No drug antidotes were found. Other nitrophenols did not exert comparable results. I had no antiseptic action. T. H. Rider

The action of cocaine on the intestine. Frederick Bernheim. *J. Pharmacol.* 49, 209-14(1933).—Cocaine (I) from 0.1 to 0.2% relaxes guinea-pig ileum previously contracted by histamine, pilocarpine or Ba. The actions of I and nicotine are additive. T. H. Rider

The seat of the emetic action of pilocarpine. Nathaniel T. Kwit and Robt. A. Hatcher. *J. Pharmacol.* 49, 215-28 (1933).—Pilocarpine, in intravenous doses of 2 mg., produces vomiting in the cat and dog through peripheral action on the parasympathetic type of afferent nerve endings which transmit impulses to the center mainly through the sympathetic trunk. Atropine abolishes this action by its direct depressant action on the same nerve endings. T. H. Rider

Effects of posterior-lobe pituitary extract upon the serum and urine of normal dogs. A. R. McIntyre and R. F. Sievers. *J. Pharmacol.* 49, 229-36(1933).—

Posterior-lobe pituitary ext. (I) in doses of 0.75-2.0 units to a dog does not change the Na:K ratio in the serum, does not uniformly affect serum-Ca and raises the CuSO<sub>4</sub>-reducing power of serum in fasting animals. In the urine Na, K and Ca are increased and the Na:K ratio is decreased; the CuSO<sub>4</sub>-reducing power of urine is decreased. T. H. Rider

The site of the antidiuretic action of pituitary extract. W. W. Burgess, H. M. Harvey and H. K. Marshall, Jr., *J. Pharmacol.* 49, 237-49(1933).—The antidiuretic action of pituitary ext. in man is probably due to a stimulation of water reabsorption by the thin segment of the loop of Henle. T. H. Rider

The action of diuretics upon the glomerular kidney. Raymond N. Bieter. *J. Pharmacol.* 49, 250-6(1933).—The chlorides of Li, Na, K and Rb produce progressively increasing diuresis with increase of mol. wt. The chlorides of Mg, Ca, Sr and H<sub>2</sub> produce a progressively decreasing diuresis with increase of mol. wt. NaI and KBr produce results identical with those of the corresponding chlorides. Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, NH<sub>4</sub>Cl and creatinine are also diuretic for the glomerular kidney. T. H. Rider

Tribromoethanol (Collatz) 7. Substituted quinoline-4-carboxylic acids (Benary) 10. Optical isomerism and blood-pressure-lowering action (v. Braun, Jacob) 10. Effect of unsatd. aliphatic groups in barbituric acids (Shonle, Waldo) 10. Piperidine derivs. (Walters, McElvain) 10.

## 1—ZOOLOGY

R. A. GORTNER

Physiology of the stink glands of the millipede, *Thyropygus malayus*. M. B. Lal. *Current Sci.* 2, 98-9(1933).—Both Cl<sub>2</sub> and HCN (approx. N/18000) were detected in the stink glands of *Thyropygus malayus*. R. B.

The occurrence of betaines in *Archa muscels*. Fr. Kutscher and D. Ackermann. *Z. physiol. Chem.* 221, 33-9(1933); cf. *C. A.* 26, 1003.—The filtrate from the AgNO<sub>3</sub>-Ba(OH)<sub>2</sub> ppt. (araine and other bases) from the ext. of *Archa noae* was converted into the so-called lysine fraction by means of phosphotungstic acid. This fraction contained the majority of the naturally occurring betaines. Glycine betaine was present in great preponderance. Smaller amts. of γ-butyrobetaine, carnitine and stachydrine were isolated and identified, and finally an isomer of trigonelline. Not only plants but also animal organisms have the power of methylating amino acids. A. W. Dox

Trimethylamine oxide and other nitrogen bases in crab muscles. F. A. Hoppe-Seyler. *Z. physiol. Chem.*

221, 45-50(1933).—The tail muscles of lobsters contain about 0.3% and those of river crabs about 0.05% of  $\text{Me}_2\text{NO}$ . The latter is the first reported occurrence of  $\text{Me}_2\text{NO}$  in fresh-water animals.  $\text{Me}_2\text{N}$  is also present in lobster muscle and imparts the characteristic taste and odor. Other bases identified are  $\delta$ -arginine, betaine, choline and an isomer of trigonelline.

Astacin from the eggs of the spider crab (*Maja squinado*). I. Richard Kuhn, Edgar Lederer and Adam Deutsch. *Z. physiol. Chem.* 220, 226-35(1933).—Vitellosin, one of the 2 pigments in the red eggs of the spider crab, was isolated in red crystals, m. 242-3° (decompn.). It was identified as an ester of astacin  $\text{C}_{27}\text{H}_{42}\text{O}_8$ , m. 241-2° (decompn.), the pigment of lobster eggs. Astacin is a highly unsat'd. hydroxylactone which forms a black-violet *Ac deriv.*, m. 235° (decompn.). Vitello-lutein, the 2nd pigment of spider crab eggs, is identical with  $\beta$ -carotene.

Effect of adrenaline on the structure of the hepatic cells of the turtle, *Cistudo europaea*. V. G. Radu. *Compt. rend. soc. biol.* 114, 72-4(1933).

Preliminary results of experiments made with electromagnetic waves ( $\lambda = 1 \text{ m.}$ ) on eggs of sea urchins. Carlo Maxia and Antonio Grimaldi. *Boll. soc. ital. biol. sper.* 8, 505-7(1933).—Electromagnetic waves ( $\lambda = 1 \text{ m.}$ ) acting on fertilized eggs of *Paracentrotus lividus* accelerate the development of the gastrula and plutei phases. The acceleration is not due to the development of heat by the waves.

A specific function of glucolysis in the morphogenetic processes of sea-urchin eggs. S. Tchakhotine. *Boll. soc. ital. biol. sper.* 8, 623-6(1933).—The glucolysis of sea-urchin eggs can be arrested by immersing them in solns. of  $\text{CH}_3\text{BrCOONa}$  (0.01  $M$  0.001  $M$ ). This produces a specific effect, consisting in the suppression of the development of the endoderm, and in the stimulation or excessive atypical development of the mesenchyme.

Spermatozoan movements and hydrogen-ion concentration. Experiments with the sperm of the rainbow trout. W. Schlenk, Jr. *Biochem. Z.* 265, 29-35(1933).—Movement of trout sperm is det'd. by the H-ion concn., change from  $p_H$  7.8 to 8.0 being sufficient to mobilize inactive sperm. Dilin. of the sperm fluid with ordinary water brings about this change. Dist'd.  $\text{H}_2\text{O}$  dissolves sufficient alkali from glass slides (but not from quartz slides) to cause mobilization.

Experimental investigations on the glycogen metabolism of the organization center in the amphibian

gastrula. I. Chr. P. Raven. *Proc. Acad. Sci. Amsterdam* 36, 566-9(1933).—*Axolotl* gastrula were studied. The disappearance of glycogen is intimately connected with invagination, and is probably either the cause or the result of it.

Supernumerary siphons and ocelli of *Ciona intestinalis* L. Konstantin von Haffner. *Z. wiss. Zool.* 143, 16-52(1933).—Largely zoological dealing with proliferation or regeneration of the oral or cloacal siphon of *Ciona intestinalis*. The presence of excess food material is not necessary for regeneration, since the state of nutrition of the animal has little effect.

Studies on the biology of caprellids. II. Space orientation, color adaptation and color change. A. Wetzel. *Z. wiss. Zool.* 143, 78-125(1933).—*Caprella dentata* is negatively phototactic to direct sunlight, but in diffuse light it becomes orientated at the edge of the shadow. The bulk of the light sensitivity is located in the eyes but the skin is somewhat sensitive. In colored light the various colored chromatophores broaden, each in its own color and independent of the light intensity. The green and red varieties of the animal are due to pigment not contained in chromatophores but diffused in the skin, and readily lost, in response to stimulus of the opposite color.

Blastocyte studies. I. The origin of the regeneration material in the division zone of *Dero limosa* Leidy and the problem of the activation of these cells. Haus-Adam Stolte. *Z. wiss. Zool.* 143, 150-200(1933).—Largely morphological.

The realization of genes and consecutive adaptation. III. Osmotic researches on *Physcosoma lurco* Sel. and de Man from the mangrove swamps of the Sunda Islands. J. W. Harms and Otto Dragendorff. *Z. wiss. Zool.* 143, 263-322(1933).—*Physcosoma lurca* is a marine animal which has become adapted to the soil conditions in the upper slopes of swamps, where flooding is only occasional; correspondingly the osmotic pressure of its body fluids was found to be approx. const. at about 1  $M$ , and partly independent of the osmotic pressure of the soil soln. However, on keeping in fresh water their osmotic pressure fell to 0.3  $M$ . A similarly adapted Echiuroid showed similar changes. The evolutionary process from sea to land habitat probably goes through a stage in which the animals are passively variable in osmotic pressure, following changes in the surrounding fluid.

Tetrahydroxybutofostan from the winter bile of toads (Makino) 10.

## 12—FOODS

F. C. BLANCK AND H. A. LEPFER

Food legislation and patent law. E. Merres. *Angew. Chem.* 46, 651-2(1933).—A discussion of the relation between food legislation and patent law with 26 references.

Air-conditioning in food factories. Osman Jones. *Food* 3, 7-8(1933).—A brief discussion of its benefits.

The microscopy of food products. I. Applicability and limitations. Charles H. Butcher. *Food* 3, 11-12(1933).—A brief discussion.

Painting in food factories. Albert E. Robinson. *Food* 3, 18-20(1933).—A brief discussion of the benefit of painting, more particularly in the case of Al paints.

Canning of dry materials in vacuo and in inert atmospheres. H. Wentworth Avis. *Food* 3, 45-6(1933).—A brief discussion.

Problems of heat transfer in canning. S. Lencefield. *Food* 3, 48-50(1933).—A brief discussion.

Preventing changes in stored frozen food. Donald K. Tressler. *Food Ind.* 5, 410, 432(1933).—Catalase may be used as an index of the activity of other enzymes in vegetables being prepd. for freezing preservation. A blanching period sufficient to destroy catalase insures de-

struction of other deteriorative enzymes during storage. Since fruits cannot be heated, they are best packaged in compact moisture-vapor-proof materials which largely prevent desiccation and oxidation. The addn. of sugar also has a protective action. Except for the oxidation of the fat, enzymic action in frozen meats is beneficial and increases tenderness. However, enzymic changes in fish are objectionable in that they produce offensive odors, and may increase leakage. The presence of Ca and Mg salts in the salt used in prepg. brines is likewise very objectionable.

Changes which may occur in frozen foods during cold storage. D. K. Tressler. *Food Ind.* 5, 346-7(1933).—A general discussion of deteriorative changes in frozen foods due to enzymes, oxidation, hydrolysis and coagulation. Desiccation of such products as poultry and fish is also the cause of serious losses unless controlled.

Enzymes can cause off-flavors even when foods are frozen. H. C. Diehl, J. H. Dingle and J. A. Berry. *Food Ind.* 5, 300-1(1933).—Alderman peas, asparagus, spinach, lima beans and snap beans after storage at freezing temps. for 4-6 weeks acquire undesirable flavors

and odors which are accentuated by cooking. In general, a scalding process sufficient to destroy catalase prevented the enzymic deterioration of frozen peas. Min scalding periods were 30 sec at 100°, 50 sec at 88° or 105 sec at 74°. Rapid cooling of the vegetables after scalding is recommended as an aid to preserving quality. Catalase serves as a useful index to the destruction by heat of other enzymes in fresh vegetables. C. R. Fellers.

**Diastases. General notions and applications in the food industry.** M. Javille. *Bull. soc. sci. hyg. aliment.* 21, 224-53 (1933). Two lectures. A. P. C.

**Present status and development of collective feeding in the U. S. S. R.** B. Shal'ky. *Bull. soc. sci. hyg. aliment.* 21, 251-65 (1933). A. Papineau-Couture.

**Food poisoning in Puerto Rico.** O. Costa Mundry. *Puerto Rico J. Pub. Health Trop. Med.* 9, 14-68 (1933). J. A. Kennedy.

**Bibliography on heavy metals in food and biological material.** X. Bismuth. *Ann. Analyst.* 58, 607-8 (1933). The bibliography contains the titles of 4 papers published since 1921. Brief comments are made concerning the scope of many of these papers. W. I. H.

**Report on the determination of arsenic in foods.** W. C. Ashby Jones. *J. Assoc. Official Agr. Chem.* 16, 325-9 (1933). In the third line of the title in C. I. 27, 517 read the latter, instead of the former, showing that the bromate method gave better results than the Gutzeit methods. A. Papineau-Couture.

**Lactose (milk sugar) becomes a food.** Frederick M. Greenleaf. *J. Food Ind.* 5, 301-6 (1933). Lactose is about 1% as sweet as sucrose, dissolves readily and has a pleasant taste. It is non-hygroscopic. The substance supports the normal putrefactive microflora of the colon and stimulates the growth of the acid-forming lactobacilli. C. R. Fellers.

**Report of the Subcommittee on Selenium as a Kjeldahl Catalyst in the Cereal Laboratory.** C. I. Davis and M. Wise. *Cereal Chem.* 10, 488-9 (1933). A. Kjeldahl catalyst does not appear to be a universally applicable to general titration conditions. It does, however, in combination with common catalysts, especially Hg, is to be discouraged. I. H. Bailey.

**An evaluation of systematic and random errors in protein moisture and ash determinations.** Alvin L. Tisdale. *Cereal Chem.* 10, 47-57 (1933). I. H. Bailey.

**Report on (the analysis of) cereal foods.** J. A. Leckie. *J. Assoc. Official Agr. Chem.* 16, 432-1933. Cf. C. I. 27, 141. A brief review of progress accomplished in 1933 is shown by the reports of the associate referees of following abstracts. A. Papineau-Couture.

**Report on (the determination of) hydrogen ion concentration of flour.** Rowland J. Clark. *J. Assoc. Official Agr. Chem.* 16, 393-7 (1933). A collaborative comparison of the electrometric and colorimetric determination of the H-ion content of flour with the A. O. A. C. method for the purpose of the test, showed remarkably close agreement between the two methods, particularly in view of the fact that different standard procedures were used by the various collaborators. A. Papineau-Couture.

**Report on (the determination of) the diastatic value of flour.** M. J. Ellis. *J. Assoc. Official Agr. Chem.* 16, 19-50 (1933). Cf. C. I. 27, 142. For all practical purposes it is unnecessary to run a blank determination of the diastatic activity of flour by the Rumsey type of method. Collaborative study of the previously described method yielded uniformly satisfactory results, though in some cases there was an increase particularly in view of the nature of the flour. Possible ways of improving the method are discussed. A detailed description is given of the technique of adaptation to the determination of maltose in small quantities of flour extracts of Hagdorn and Jensen's micro method for the determination of blood sugar (C. I. 17, 2721). The merits of the method are pointed out. It will be studied collaboratively. A. Papineau-Couture.

**Report on (the determination of) starch in flour.** H. Evelyn Jones. *J. Assoc. Official Agr. Chem.* 16, 501-5 (1933). Cf. C. I. 27, 142. The technique of the tentative A. O. A. C. method (Rask method) has been modified by

1 minutely specifying the conditions of hydrolysis of the starch by HCl, of precipitation of the starch and of its filtration, so as to overcome the previously noted difficulties encountered in filtration. It was compared collaboratively with the Hartmann-Hillig diastase-acid hydrolysis method (C. A. 25, 1941). Results indicated that the modified Rask method should readily give good results in the hands of analysts having experience with it, the Hartmann-Hillig method is complicated, time-consuming, offers considerable chances for errors, and gives higher results than the modified Rask method. A. P. C.

**Report on (the determination of) flour-bleaching chemicals.** Dorothy B. Scott. *J. Assoc. Official Agr. Chem.* 16, 508-10 (1933). Cf. C. A. 27, 142. Spencer's suggestion that  $\text{NH}_4\text{HCO}_3$  or  $\text{NaHCO}_3$  be used in the Seidenberg method for the determination of Cl in Cl-bleached flour is unnecessary if precaution is taken to use a small yellow flame of a Bunsen burner. High blanks were always obtained in the Seidenberg method, the greater portion of which probably comes from the  $\text{Na}_2\text{S}_2\text{O}_3$ . The 3 main difficulties of the Seidenberg method (length of time required, high blanks, difficult end point) are avoided by using the present A. O. A. C. Tentative Method II (Rask method) with final titration of the Cl by the Volhard method. A. Papineau-Couture.

**Report on (the determination of) carbon dioxide in self rising flours.** I. D. Whiting. *J. Assoc. Official Agr. Chem.* 16, 511-12 (1933). Cf. C. I. 27, 142. It is suggested it may be feasible to determine a factor which could be applied to the results of the gasometric determination of  $\text{CO}_2$  in self rising flours to give figures in close agreement with the theoretical  $\text{CO}_2$  content. A. P. C.

**Report on (the estimation of) rye in flour mixtures.** J. H. Bornmann. *J. Assoc. Official Agr. Chem.* 16, 520-5 (1933). Cf. C. I. 27, 143. The methods which have been proposed for the detection or estimation of wheat and rye in presence of each other are briefly critically reviewed from the regulatory standpoint of distinguishing between accidental and intentional addition of either to the other (10% wheat in rye or 7% rye in wheat are permissible as accidental additions). The  $\text{CHCl}_3$  test (Benedek, *Landw. Ver. Sta.* 36, 337 (1889)) and the Koenig and Busch method (C. I. 18, 1721) and the Strolacker modification (C. I. 27, 1680) of Lilman's method are considered most worthy of further consideration, the first 2 being applicable only to flour and the 3rd to bread also. A. Papineau-Couture.

**Report on experimental baking tests.** C. G. Hurd. *J. Assoc. Official Agr. Chem.* 16, 525-6 (1933). Cf. Hurd, C. I. 27, 143. It is recommended that the directions recommended to the Association of Cereal Chemists by Merritt Blish and Sundt (C. I. 26, 3543) with some reservations that are noted, be adopted by the Association of Agr. Chemists. A. P. C.

**Report on (the determination of) crude fiber in alimentary pastes, bread and baked products.** R. G. Capen. *J. Assoc. Official Agr. Chem.* 16, 518-19 (1933). The official Association of Agr. Chemists method for crude fiber in grain and stock feeds is recommended for adoption as official for bread and alimentary pastes, its application to baked products will be further studied. A. Papineau-Couture.

**Report on sampling and determination of moisture in alimentary paste, bread and baked products.** L. H. Bailey. *J. Assoc. Official Agr. Chem.* 16, 512-3 (1933). Cf. C. A. 27, 143. Collaborative study showed that concordant results may be obtained by using either the vacuum oven and the 130° air oven methods. A. Papineau-Couture.

**Report on (the determination of) fat by acid hydrolysis, total phosphorus ( $\text{P}_2\text{O}_5$ ), lipoids and lipid phosphorus ( $\text{P}_2\text{O}_5$ ), and water soluble nitrogen precipitable by 40% alcohol in flour, bread and alimentary pastes.** Lloyd C. Mitchell. *J. Assoc. Official Agr. Chem.* 16, 514-18 (1933). Cf. C. I. 27, 5120. Bornmann (C. I. 27, 143). In the determination of fat, acid hydrolysis at the temperature of boiling water is necessary in the analysis of cereals, causes considerable churning, and gives high results, a temperature of 70° is too

high to ensure concordant results in the hands of different analysts; at 48-50° there is no charring, but the temp. seems too low to ensure complete removal of the fat by  $\text{Et}_2\text{O}$ -petr. ether. The method for the detn. of  $\text{P}_2\text{O}_5$  in eggs seems satisfactory for its detn. in flour, baked products and alimentary pastes, provided the temp. is raised to 700° instead of 500°. For the detn. of lipoids and lipid  $\text{P}_2\text{O}_5$ , promising results have been obtained by applying the  $\text{CHCl}_3$ -alc. extn. method to the sample after addn. of sufficient water to form a dough. A. P.-C.

• Report on (the determination of) milk solids in milk bread. Arnold Johnson. *J. Assoc. Official Agr. Chem.* 16, 519-20(1933).—Two different types of methods have given promising results: (1) extn. of casein with a 79-30  $\text{C}_2\text{H}_5\text{N}-\text{H}_2\text{O}$  mixt., reprecipn. of the casein from the ext. either by adding 2 vols.  $\text{C}_2\text{H}_5\text{N}$  or by adding  $\text{HCl}$  to  $\text{pH}$  4.0-4.7, and detn. of N in the ppt.; (2) extn. with  $\text{H}_2\text{O}$ , fermentation of non-lactose sugars by means of yeast, defeating by Rumney's phosphotungstate method (C. A. 17, 597), reducing by Quasimoff and Thomas' method (C. A. 16, 37), and detg. reduced Cu by Shaffer and Hartmann's method (C. A. 15, 1327-8). A. P.-C.

• Report of the Subcommittee on the Viscosity Test for Soft Winter Wheat Flours E. G. Bayfield. (*Cereal Chem.* 10, 494-50(1933)) L. H. Bailey

Bean flour and malt flour in milling and baking P. Bruère and J. Chevalier. *Ann. fals.* 26, 464-9(1933).—The improvement of wheat flour by addn. of small quantities of bean or malt flours is not attributable to their proteins, but merely to their amylolytic and proteolytic enzymes and to the chem. transformations which they accelerate. Optimum results are obtained with 0.5-1% of bean or malt, and greater amts. have a detrimental effect on the mech. properties of the flour. A. P.-C.

Biochemical characteristics of dough and bread from sprouted grain Natalie Kozmin. *Cereal Chem.* 10, 120-36(1933).—The fundamental difference between bread baked from sprouted wheat flour as compared with normal flour consists of a sharp increase of water-sol. substances in the former, namely, reducing sugars and dextrans, with a predominance of the latter. The direct cause of the defectiveness of the crumb of bread made from sprouted wheat flour is an excessive splitting of the starch. The amt. of the latter decreases so much that there is not enough left for holding together all the water present in the dough by gelatinization in the baking process, and the crumb appears wet and sticky, not because there is too much water in it, but because this water is not held together sufficiently by the gel of the starch and forms with the sugars and dextrans a sticky mass. By acidifying a dough in the proper manner the starch splitting by enzymes may be greatly inhibited. A dough made with 0.1 N  $\text{HCl}$  instead of water ferments in a natural way (yeast is added after the greater portion of the acid is bound with the protein of the dough) and is capable of producing a normal loaf, slightly more sour in taste. The crumb of the bread is quite normal, dry and elastic. The content of the water-sol. substances falls off, sharply approaching the characteristics of a control loaf. L. H. Bailey

The measurement of color in flour and bread by means of Maxwell disks J. C. Baker, H. K. Parker and F. B. Freese (*Cereal Chem.* 10, 437-46(1933)). The N-A colorimeter and equipment are illustrated and described. The instrument is used primarily in confirming and maintaining mill standards, analyzing what is wrong with a flour color, selecting those grades which have a certain characteristic in the flour streams and for specifying flour color. L. H. Bailey

The influence of humidity and carbon dioxide upon the development of molds on bread. Oscar Skovholt and L. H. Bailey. *Cereal Chem.* 10, 446-51(1933).—Relative humidities of about 90% or more in the environment are required to permit appreciable mold development on bread crust within the usual interval of time between production and consumption. Bread crumb is more hygroscopic than bread crust. The introduction of milk solids into bread slightly increases the hygroscopicity of both crust and crumb.  $\text{CO}_2$  concns. of 17%

will retard, and if as high as 50% will prevent, mold growth on bread, but only while maintained in such atmos. L. H. Bailey

Use of pure yeast cultures and lactic organisms in fermenting rye flour dough. N. V. Palladin, A. I. Kdraseva and E. K. Kresling. *Schriften zentral biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 1, 300-40(1932).—From a comprehensive study of the use of lactic acid bacteria in making rye bread, it is concluded that lactic organisms alone cannot impart good flavor and aroma to rye dough even if several mixed strains are used. For fermentation of the dough to optimum acidity, porosity and flavor a pure yeast culture must be introduced to aid the lactic acid bacteria. Julian F. Smith

Report of the subcommittee on methods for chemical leavening agents. P. A. Collatz. *Cereal Chem.* 10, 501(1933). L. H. Bailey

Report on (the determination of) milk proteins. Marie I. Offutt. *J. Assoc. Official Agr. Chem.* 16, 489-91(1933).—Collaborative comparison of the official A. O. A. C. method and the method described by Waterman (C. A. 21, 2339; 25, 4942) showed satisfactory agreement between the 2. Fair agreement was obtained between the official method for albumin in milk and a method consisting essentially in removing casein as in Waterman's method for detg. casein, neutralizing the filtrate, adding 0.3 cc.  $\text{AcOH}$  (1 + 1), pptg. albumin by heating on the water bath, and calcg. the albumin content from the difference in the N content of the filtrate from the casein and in the filtrate from the albumin. A. P.-C.

The formaldehyde titration of milk proteins and its use in the detection of re-constituted creams, etc. J. C. Haral. *Analyst* 58, 605-6(1933).—The formaldehyde method as now carried out in England consists in adding 0.4 cc. of satd.  $\text{K}_2\text{C}_2\text{O}_4$  soln. to 10 cc. of milk and then titrating with 0.1 N  $\text{NaOH}$  soln. to a definite pink shade of phenolphthalein. Then 2 cc. of neutral formalin is added and the liberated acid is titrated again with  $\text{NaOH}$  until the original color is restored. A fairly close relation exists between the vol. of  $\text{NaOH}$  required for the formal titration and that corresponding to the total N in the same wt. of sample. In the analysis of 10 samples of milk, the ratio varied from 17.8 to 19.4 but with 8 milk powders the ratio ranged from 25.0 to 29.1. With natural cream the ratio was 19.2 whereas 2 samples of re-constituted milk showed the ratios 25.5 and 28.0, showing that they had evidently been prepd. from dried milk. W. T. H.

Note on the formaldehyde titration of milk protein, and its application to the estimation of caseinogen. Gerald I. Pyne. *Biochem. J.* 27, 915-17(1933), cf. C. A. 27, 144. The factor for converting formaldehyde titration values into milk protein shows a progressive increase throughout the lactation period, which appears to arise immediately from a similar but more marked increase in the whey protein factor and to be attributed largely to variations in the compn. of non-protein N. The formaldehyde titration can be used to est. casein. B. H.

Fermented milk from Sardinia. N. Baiardo and E. Lucchetti. *Ann. chim. applicata* 23, 396-401(1933).—The av. compn., method of manuf., and analytical methods for detecting adulteration of fermented milk in Sardinia are given. A. W. Contieri

Utilization of dairy wastes. T. Lakshman Rao. *Madras Agr. J.* 21, 388-91(1933).—The prepn. and uses of *casein* are discussed. K. D. Jacob

Tests for re-constituted cream. F. W. Richardson. *Analyst* 58, 686(1933).—When natural cream is shaken with a mixt. of benzene and 95%  $\text{MeOH}$  in equal vols. there is no sepn. into distinct layers, but with artificial cream layers are formed. About 20 turns of the centrifuge is often sufficient for the test. Pure acetone may be substituted for the benzene- $\text{MeOH}$  mixt. Take about 5 cc. of cream and an equal vol. of pure  $\text{Me}_2\text{CO}$  in a centrifuge tube and give it 100 vigorous spins, and at the same time treat a sample of pure cream in the same way. The test is not altogether reliable when the cream is turning sour. W. T. H.

**Chemical standardization of ice cream.** L. H. Lampitt and M. Bogod. *Chimie & industrie Special No.*, 1200-4 (June, 1933).—The method is based on the analysis of the unfrozen mix and addn. to the latter of an auxiliary mix (about 10% of the main mix), the compn. of which is calcd. from the analytical results to bring the compn. of the total mix to standard. Analysis comprises detn. of total solids (Mojonnier method), fat (Mojonnier modification of the Roesse-Gottlieb method) and sucrose (modification of the method of the Milk Products Subcommittee of the Soc. of Pub. Analysts, Hinks and Hughes, *C. A.* 24, 1905), and can be carried out in 35 min.

**Report on (the analysis of) ice cream.** G. G. Prary. *J. Assoc. Official Agr. Chem.* 16, 488 9(1933).—A preliminary study of the Illinois test (Overman and Garrett, *C. A.* 25, 1508) and of the Nebraska test (Crowe, *C. A.* 24, 5078) for detg. butter fat in ice cream by a modification of the Babcock test gave less favorable results than those reported by the initiators of the tests; they will be further studied collaboratively. A. P.-C.

**Report on (the analysis of) butter.** C. W. Harrison. *J. Assoc. Official Agr. Chem.* 16, 480 4(1933); cf. *C. A.* 27, 145.—A collaborative comparison of the present official A. O. A. C. method of prepg. butter samples for analysis and of a method using a mech. stirrer (of the malted-milk stirrer type) showed that both were equally satisfactory.

**The linoleic and linolenic acid contents of butter fat.** H. C. Eckstein. *J. Biol. Chem.* 103, 135 40(1933). The linoleic and linolenic acid contents of butter fat, representative of the product produced in Michigan, varied from 0.17 to 0.25 and from 0.07 to 0.17%, resp. These values are probably too low as poor recoveries were obtained when these acids were added to butter. The linolenic acid content can be increased by including linseed meal in the ration. The acid contents were calcd. from the wts. of cryst. bromide fraction. These results indicate why butter fat does not readily alleviate the condition caused by a prolonged fat-free dietary regime and are not in accord with the findings of Hilditch, *et al.* (*C. A.* 25, 152) who reported a linolenic acid content of as much as 4.5%.

**Isolation and identification of some hitherto unreported fatty acids in butter fat.** A. W. Bosworth and J. B. Brown. *J. Biol. Chem.* 103, 115 31(1933); cf. *C. A.* 25, 2776. Butter fat definitely contains decenoic ( $C_{10}H_{18}O_2$ ) and tetradecenoic ( $C_{14}H_{26}O_2$ ) acids, highly unsatd. acids of the arachidonic type, probably belonging to the  $C_{22}$  series, and a  $C_{20}$ , a  $C_{22}$  or a  $C_{24}$  acid with 2 double bonds. A mixt. has also been isolated contg. satd. acids consisting principally of tetracosanic (lignoceric) along with small amts. of behenic and erotic acids. Evidence for the occurrence of hexadecenoic (palmitoleic) and octadecenoic (gadoleic) acids was doubtful and all attempts to verify the presence of ordinary linoleic acid failed (cf. preceding abstr.). The Me esters of the fatty acids from a typical sample of creamery butter were efficiently fractionated into 37 fractions.

**Some further observations on factors which influence the component fatty acids of butter.** Harry K. Dean and Thomas P. Hilditch. *Biochem. J.* 27, 889 97(1933). One change is seasonal and consists in an abrupt increase in the proportion of oleic and linoleic acids, with a diminution in butyric and stearic acids, a change which occurs in each of the spring seasons when the cows return to pasture from indoor winter conditions. The other change, which is a function of the age of the cow, consists in a gradual augmentation of the amt. of unsatd. components of the fat over the whole period of years. B. H.

**Examination of authentic samples of butters from sheep and goat milk.** Th. G. Stathopoulos. *J. pharm. chim.* 18, 287 9(1933). Tabulated results on 16 samples show agreement with official Greek standards for cow butter, except that the Reichert-Meissl no. is lower (23.42-23.83 instead of 26). All these butters very strongly gave the Drummond-Watson test for vitamin A (cf. *C. A.* 16,

3934) even after considerable diln. with other fats free from this vitamin. S. Wafdhott

**Report on cheese. Determination of lactose and sucrose in process cheese.** Carl B. Stone. *J. Assoc. Official Agr. Chem.* 16, 484-7(1933).—A collaborative study of Huebner's method (*C. A.* 24, 3839) gave satisfactory results and showed that the method gives results very close to the theoretical and will recover added lactose and sucrose. A. Papineau-Couture

**Starters for cheese making: methods of preparation and maintenance.** G. M. Moir. *New Zealand J. Agr.* 47, 81-8, 143 9(1933). The chemistry, prepn., preservation and use of starters are discussed. Sixteen references.

**Study of the Schmid-Bondzynski method for the determination of fat in cheese.** Henry A. Lepper and Leslie Hurt. *J. Assoc. Official Agr. Chem.* 16, 584 9(1933).

A collaborative study of the method showed it gives concordant results in the hands of different analysts. A cheese sample in which the fat has become sepd. before analysis may be remixed and analyzed, if necessary, and the result obtained will be as satisfactory as if the fat had not sepd. A. Papineau-Couture

**The hen egg as a nourishing human food.** J. Grossfeld. *19th Ztg.* 48, 1189 91(1933). The relative values of the following foodstuffs: cow milk, Emmentaler cheese, beef, peas and wheat bread are compared with that of hen egg, from the standpoints of nourishment and cost. W. O. F.

**Report on (the determination of salt in) meat and meat products.** R. H. Kerr. *J. Assoc. Official Agr. Chem.* 16, 543 6(1933).—Four methods were studied collaboratively. (1) Ashing after addn. of  $Na_2CO_3$  soln., dissolving in 1 + 4  $HNO_3$  and titrating by the Volhard method. (2) Add a known amt. of 0.5  $N$   $AgNO_3$  (more than sufficient to ppt. all the Cl) and 15 cc. concd.  $HNO_3$ , boil till the meat is thoroughly disintegrated (about 10 min.), add 5%  $KMnO_4$  soln. in small successive portions till the soln. is practically colorless, add 25 cc.  $H_2O$ , boil 5 min., cool, dil to about 150 cc., shake with 25 cc.  $Et_2O$  to dissolve the sepd. fat, and titrate Cl by the Volhard method without sepn. of the  $Et_2O$  or filtration of the  $AgCl$ . (3) This method is the same as (2), except that  $HNO_3$  digestion is carried out on the steam bath overnight. (4) Digest 5 g. of sample with 300-350 cc.  $H_2O$  and 25 cc. concd.  $HNO_3$  on the steam bath for 3-4 hrs., heat to boiling, add 5%  $KMnO_4$  soln. in small successive portions to practical decolorization of the soln., cool, make to 500 cc., and titrate a 100-cc. aliquot by the Volhard method. Methods (1), (2) and (3) gave closely agreeing results; the results of method (4) indicated that heating with  $HNO_3$  involved a slight loss of Cl.

**Thermal properties of meat.** J. H. Awbery and Ezer Gulliths. *J. Soc. Chem. Ind.* 52, 326 8T(1933). Data are given of the specific heat, thermal cond. and thermal diffusivity of fresh beef. F. L. Dunlap

**Nutritional chemical investigation on porgy. II. The age of porgy and meat composition.** Mrs. Yasu Hata-koshi. *J. Chem. Soc. Japan* 54, 852 8(1933); cf. *C. A.* 27, 348. Analyses of 4, 5- and 7-year old porgies indicated that water, protein, ash content and  $pH$  value of the meat decreased with an increase of age while the fat content had a tendency to increase. The total N and amino N of the serum were const. The porgy proteins fluctuated slightly according to the difference in age but they were affected more by the difference of the season and sex. III. The sex of porgy and its meat composition. *Ibid.* 982-90. The meat from the male contained more water, protein, glycogen and ash and less fat throughout the season than that from the female. The water content was min. in both sexes before the propagating season; the protein and ash contents increased thereafter and then decreased gradually. There was no seasonal or sexual variation in  $pH$  value, total- and amino-N contents of the meat. K. Katsuta

**Oils used in the packing of fish.** J. Gangl. *Osterr. Chem.-Ztg.* 36, 119 53(1933). A study of methods for



the identification of oils used in the packing of fish. G. 1 concludes that despite the label that olive oil has been used in the packing of sardines produced in Portugal much use is being made of peanut oil. F. L. Dunlap

**Problems of the vegetable oil producers.** W. R. Woolrich and E. L. Carpenter. *Food Ind.* 5, 260-2(1933).—Mech. extn., chem. extn., and bacteriol. methods of vegetable oil production, particularly cottonseed oil, are discussed. The addn. of moisture to the seeds just before cooking, and bringing the seeds to a temp. of 89° with steam, materially reduces the extn. time. Cooking has several functions: it is a drying process, coagulates the proteins and facilitates filtration, breaks down the cells and allows the oil to escape, and lowers the viscosity of the oil. A cooking period of 10-20 min. is sufficient if the meats are kept at 110°. Above this temp. the oil darkens perceptibly. Most of the problems facing the industry are of a mech. rather than a chem. nature. C. R. Fellors

**Investigations on fruit products. I. Preparation of juices, sirups, concentrates and wines from some English fruits.** Vernon L. S. Charley. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 175 201.—Data are given on the compn. and characteristics of the products obtained from gooseberries, rhubarb, strawberries, red and black currants, raspberries, loganberries, blackberries and plums. **II. Enzymic clarification of fruit juices.** *Ibid.* 202-13.—The nature of the colloidal constituents in fruit juices and methods for their removal are discussed. Expts. on the use of a com. pectin-decomp. prepn. (Pectinol) as an aid to the clarification and filtration of fruit juices are reported. After the Pectinol treatment the juices were filtered through paper and lab. Seitz E. K. filters and were stored in sterile bottles. Excellent results were obtained on strawberry juice, but with juices of higher acidity, such as loganberry, raspberry and black currant, considerable fermentation occurred before any noticeable results of the enzyme were apparent. The best results were obtained with 1% of Pectinol. Enzyme action sometimes continued after filtration of juices through a Seitz filter, causing further deposits to form; this can be prevented by pasteurizing the juice at the enzyme inactivation temp. (131°F.). **III. Non-alcoholic apple juice.** *Ibid.* 214-31.—Various methods for the prepn. of nonale. apple juice are discussed. Filtration through a Seitz filter adversely affected the "body" and color of the juice, pasteurization caused "cooked" flavors in some juices. The use of Pectinol increased the clarity and loss of "body." The percentages of pectin were much greater in the pasteurized samples than in the corresponding Seitz-filtered material, and the Pectinol treatment caused further loss of pectin. A correlation between lack of flavor and loss of pectin is indicated. The type of treatment had no sp. effect on the acidity and the tannin content. K. D. Jacob

**Chemical study of tomato juice.** Charles F. Poe, Arthur P. Wyss and Truman G. McEver. *J. Assoc. Official Agr. Chem.* 16, 624 7(1933).—Analyses of lab.-prepd. juices from raw and cooked tomatoes, home-canned tomato juices and home-canned tomato juices contg. added salt are tabulated and briefly discussed. It is suggested that the detn. of total solids and insol. solids on the whole juice, and solids, H<sub>2</sub>O-sol. solids, ash, alky. of ash, immersion refractometer reading, volatile acids and reducing sugars on the serum would be suitable as a guide for detection of adulteration. A. P.-C.

**Estimation of water in tomato marc.** Clemens Grimme. *Pharm. Zentralhalle* 74, 641 2(1933).—An exptl. study of various methods shows that procedures based on distn. of the sample with xylene give too high, by sp. gr. too low, values; results which agree fairly well are obtained, however, by careful drying with sand at about 100°, by 4-hr. distn. with C<sub>2</sub>H<sub>6</sub> or 2-hr. distn. with PhMe. W. O. E.

**Ridding tomato pulp of black spots and grit.** C. M. Ambler. *Food Ind.* 5, 254(1933).—A super-centrifuge capable of delivering 500 gal. per min. of tomato pulp effectively removed dirt and carbonized particles of tomato. As much as 5 lb. of undesirable materials can

be removed from 600 gal. of pulp of apparently good quality. C. R. Fellors

**Chemistry in the dried fruits industry.** E. J. White-lock. *Chem. Eng. Mining Rev.* 25, 63 4(1933).—Various chem. dipping processes are used for lemons and sultanas depending on (1) the class of fresh fruit available, (2) the climate of the district and (3) the capacity of the drying plant. A mixed dip contg. 2 1/2 lb. (1.02 kg.) K<sub>2</sub>CO<sub>3</sub>, 1 1/2 pints (0.71 l.) olive oil and 1 1/2 lb. (0.7 kg.) NaOH is used. Dried fruit processes with the mixed dip approximate closely in color and type that from the cold dip, while a higher percentage of high-grade fruit is realized. The drying period, as compared with the cold dip, is shorter with a greater possibility of finishing off the fruit before bad weather occurs; the costs of the ingredients are much lower; the green tinge is more readily removed and the racks are released for a second filling earlier in the season with less deterioration of those grapes still on the vines. W. H. Boynton

**Chemical studies of frozen fruits.** J. G. Woodroof. *Ca. Agr. Expt. Sta., Ann. Rept.* 1932, 37 8(Summary); cf. C. A. 26, 4386; 27, 786.—The acidity of the expressed juices of fruits increases on freezing. Cond. detns. on salt and sugar solns. in which peaches and strawberries were immersed for varying periods indicated that 35% sugar solns. were most suitable for peaches and 60% for strawberries. Various concns. of CO<sub>2</sub>, N and air showed no beneficial effects on the keeping quality of peaches at 4-5°. Respiration studies showed that the gases in fresh fruits were not appreciably expelled by freezing but were slowly lost while the fruit was in the frozen state. Vacuum packing of fruit in sugar sirup caused greater penetration of the sirup into the tissue. C. R. F.

**How to control banana ripening.** C. F. Greeyes-Carpenter. *Food Ind.* 5, 341-2(1933).—Ripening is controlled by temp. and humidity. The optimum temp. is 17-20° and humidity 90-95%. When the fruit begins to color, the temp. is reduced to 19° and held there at a relative humidity of 80% to prevent over-ripening and shrinkage. Ripening fruit can be held in an almost static state at 13-14°. During ripening the starch content decreases from 26 to 1% and the sugar content increases from less than 1 to approx. 19.5%. C. R. F.

**Early potatoes with high solanine content.** Hans Valentin. *Pharm. Zentralhalle* 74, 611 14(1933).—Samples of the early potato "Vater Rhein" harvested in late September showed after examn. by 3 different methods (Schmiedeberg and Meier, Morgenstern, Börner and Mattis) unusually high solanine contents (442, 457 and 446 mg. per kg., resp.), while seed potatoes of the same strain and wintered over 1931, 1932 and 1933 yielded about 1/10 as much solanine. No satisfactory explanation is available for the high solanine content. W. O. E.

**Effect of the nature of the containers on the quality of canned goods.** M. A. Machobocuf, H. Cheftel and Mrie. J. Blass. *Ann. fals.* 26, 470-4(1933); cf. C. A. 26, 3042.—Spinach, green peas, beans and tomatoes were canned in Pyrex jars, in presence and absence of a sheet of tinplate, and in metal cans in presence and absence of a piece of ordinary glass. They were subjected to gustative tests at the end of about 1 yr. Conclusions: Overcooking, which can be more easily avoided in metal than in glass on account of the possibility of rapid cooling, always plays a certain part, very slight in most cases, but appreciable in the case of some products that are exceptionally delicate. The chem. effect of the container makes itself felt only after a fairly long time, appears to affect unfavorably the gustative qualities of the product, and is more pronounced with ordinary glass than with Pyrex. The effects of the chem. phenomena and of overcooking are additive, and in certain cases the former can mask the latter completely. A. Papineau-Couture

**Lacquers for the canning industry.** T. Hedley Barry. *Food* 3, 51-3(1933).—A discussion of the qualities required. A. Papineau-Couture

**Sirups for canning.** H. C. S. de Whalley. *Food* 3,

57-9(1933).—Precautions which should be taken to avoid failures are explained. A. Papineau-Couture.

**Pressures produced in cans during sterilization.** W. B. Adam and J. Stanworth. Univ. Bristol Fruit & Vegetable Preservation Research Sta., Campden, *Ann. Rept.* 1931-32, 44-55.—App. is described for the detn. of temp.-pressure-vol. relationships. Because of the evolution of  $\text{CO}_2$ , re-soaked dried peas, if not properly blanched, may give dangerous pressures when retorted; blanching for 5 min. at boiling temp. reduced the  $\text{CO}_2$  evolution from 55 cc. to 20 cc./100 g. of peas. K. D. J.

**The chemistry of raspberry varieties with special reference to its bearing on canning quality.** Lucy D. M. Knight. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 32-46.—Sixteen varieties of raspberries grown under comparable conditions were analyzed for total N, titratable acidity, total sugars, reducing sugars, sucrose and sol. pectin. Large variations in chem. compn. were found in the varieties, but these did not provide any obvious basis for assessing canning qualities or of classifying the berries into dessert and culinary groups. Taste was not a reliable index of either acidity or of total sugars, and cloudiness in the sirup of canned fruits was not correlated with total acid content or the percentage of sol. pectin. Good canning qualities were closely related to high dessert properties and poor canning qualities were assocd. with culinary properties. K. D. Jacob

**Processing, cooling and storage of No. 10 cans of peas.** Wm. H. Harrison. *Canner* 76, No. 18, 7-8, 14(1933). The recommended safe and practical heat treatment for No. 10 cans of peas is 55-60 min. at a temp. of  $110^\circ$ . The retorts used for processing must be provided with air-pressure equipment so that the cans can be cooled under air pressure to avoid seam injury. C. R. Fellers

**Preliminary observations on flat sour spoilage in canned peas.** F. Hirst. Univ. Bristol Fruit & Vegetable Preservation Research Sta., Campden, *Ann. Rept.* 1931-32, 65-8. K. D. Jacob

**Factors influencing the hardness of dried peas.** G. Horner. Univ. Bristol Fruit & Vegetable Preservation Research Sta., Campden, *Ann. Rept.* 1931-32, 56-64. The hardness of canned dried peas depends upon the variety, the age and the method of canning. With other factors const., the hardness increases with the Ca and Mg contents of the water used for blanching the peas prior to canning; the amts. of Ca and Mg absorbed by the peas from water of a given degree of hardness approaches a max. in 5 min. By the addn. of 2% NaCl (free from Ca and Mg) to the blanching water the amt. of Ca absorbed is considerably reduced but is still directly proportional to the hardness of the water. The harder varieties of peas initially contain more Ca than the softer varieties. K. D. Jacob

**Isolation and identification of the organic nitrogenous and non-nitrogenous compounds occurring in the Alaska pea.** I. Presence of citric acid in the Alaska pea. S. L. Jodidi. *J. Im. Chem. Soc.* 55, 4863-4(1933).—By repeatedly extg. the evapd. ext. of Alaska pea with abs.  $\text{EtOH}$  and by treating the  $\text{EtOH}$  exts. in a definite way, citric acid was obtained (0.36% of the oven-dried pea). C. J. West

**Cranberry jelly.** R. F. Cox. *Food Ind.* 5, 318-9(1933).—The natural quick setting pectin of the cranberry is destroyed by the use of a com. pectinase prepn. and com. citrus pectin is added to replace it. Approx. 1 lb. of pectin is required for 100 lb. juice and 100 lb. of sugar. Whereas cranberry sauce forms a firm jelly at a sol. solids concn. of 12-13%, the cranberry jelly prepd. by this method contains a sol. solids content of about 65%, the same as other fruit jellies. C. R. Fellers

**Macaroni products.** J. A. LeClerc. *Cereal Chem.* 10, 383-419(1933). A comprehensive discussion is given of macaroni products, together with a description of methods of manuf. and tables showing compn. of macaroni products and other common foodstuffs. B. H. Bailey

**An investigation of quebrachitol as a sweetening agent for diabetes.** Robert A. McCance and Robert D.

Lawrence. *Biochem. J.* 27, 996-9(1933).—Quebrachitol is l-methylinositol. It is not nearly so sweet as cane sugar, and 2-3 times the amt. is necessary to obtain the same effect on the palate. In such amts. it produces cholic or diarrheic. Its use as a sweetening agent is not recommended. Benjamin Harrow

**Peanuts: their products and by-products.** Wm. F. Cross. *Rev. ind. agr. Tucumán* 22, 307-10(1932).—A review of the uses of peanuts for human and animal consumption, oil production and the plant as a green manure in crop rotation. Nelson McKaig, Jr.

**Barium as a normal constituent of Brazil nuts.** W. M. Seaber. *Analyst* 58, 575-80(1933). A sample of candy was examd. to see if anything was present that might cause sickness. In the analysis, a yellow ppt. was obtained with  $\text{ClO}_4$  and was proved to be caused by the presence of Ba. Further examn. showed that the Ba came from Brazil nuts used in the candy. Subsequently 17 other samples of Brazil nuts were examd. and all found to contain 0.06 (0.31% Ba. As a qual. test for Ba the reaction with rhodizonic acid was found most suitable. It seems that the Ba in Brazil nuts is present as an insol. salt of an org. acid but possibly some of this is dissolved by the  $\text{HCl}$  of the stomach and this may act as a mild poison on people particularly sensitive to  $\text{Ba}^{+2}$ . W. T. H.

**The kind of cacao beans the manufacturer wants.** A. W. Knapp, F. Wichi and Leon Olivier. *Food Ind.* 5, 408-9(1933). Cacao beans contg. moisture in excess of 8% will become moldy. If beans are dried at a temp. above  $50^\circ$  the flavor is largely destroyed. Fermented beans give the best flavor and no post-fermentation process has been as successful as fermentation at the point of origin. Unfermented beans are slaty in color and cheesy in texture. C. R. Fellers

**Report on (the analysis of) cacao products.** J. W. Sale. *J. Assoc. Official Agr. Chem.* 16, 559-60(1933); cf. *C. A.* 27, 147. A brief discussion of the rept. of the assoc. referees; cf. next 3 abstrs. A. P.-C.

**Report on (the determination of) milk proteins in milk chocolate.** Marie L. Offutt. *J. Assoc. Official Agr. Chem.* 16, 560-3(1933); cf. *C. A.* 27, 147. The following method is proposed: to 10 g. of finely grated chocolate in a suitable 8-oz. centrifuge bottle add  $2 \times 100$  cc.  $\text{EtOH}$ , centrifuge, decant the supernatant liquid, dry at about  $100^\circ$ , powder the residue in the bottle with a flattened glass rod, add 200 cc. of 3% Na oxalate, let stand 4 hrs. with frequent shaking, centrifuge, filter, det. N in a 50-cc. aliquot; dil. a 100-cc. aliquot to slightly less than 200 cc., ppt. proteins by addn. of 2 cc. glacial  $\text{AcOH}$ , make to 200 cc., filter, and det. N in a 100-cc. aliquot. The difference between the 2 N figures gives the casein N, and casein multiplied by 1.25 gives total milk proteins. Collaborative comparison of this method with the present A. O. A. C. method indicated more uniform agreement by the former than by the latter. A. P.-C.

**Report on (the determination of foreign fat in) cacao butter.** W. O. Winkler. *J. Assoc. Official Agr. Chem.* 16, 563-4(1933); cf. *C. A.* 27, 147. Collaborative study of the "A" and "B" nos. showed that the procedures have merit, but that the techniques should be specified in greater detail. A. P.-C.

**Report on (the determination of) sucrose and lactose in milk chocolate.** J. Fitchelson. *J. Assoc. Official Agr. Chem.* 16, 561-6(1933); cf. *C. A.* 27, 148. The previously described methods were studied collaboratively on 2 samples of authentic milk chocolate. Results for sucrose by the proposed method were quite satisfactory. The proposed method for lactose gives results that are more concordant and closer to theory than the polarimetric method. Minor changes are suggested in the technic of the proposed methods for sucrose and lactose, which are described in detail. A. Papineau-Couture

**Technological study of Ivory Coast coffees.** F. Heim de Balsac, A. Parvraud and L. Lefèvre. *Bull. agence Gén. colonies* 26, 1236-42(1933); cf. *C. A.* 25, 4947.—Analyses of 5 samples showed a caffeine content of 0.74-

1.16%. The com. value of the samples is discussed.

A. Papineau-Couture

**Report on (the determination of caffeine in) coffee.** E. M. Bailey and W. J. Mathis. *J. Assoc. Official Agr. Chem.* 16, 567-8(1933); cf. Clifford, C. A. 26, 783.—Preliminary expts. indicated that, with proper precautions, detn. of N by the usual method in the caffeine residue obtained from decaffeinated coffee was sufficiently accurate for all practical purposes, and the use of micro-analysis is not essential.

A. Papineau-Couture

**Determination of chlorogenic acid in raw coffee.** H. Jurany. *Z. anal. Chem.* 94, 225-32(1933).—Take 7-8 g. of very finely ground raw coffee, or 15-20 g. of roasted coffee, and mix the sample with fine quartz sand. Ext. for 4 hrs. under reflux condensation with 70 cc. of 80% alc. (with roasted coffee, further grinding is unnecessary). Remove the raw coffee from the extn. thimble, dry at 50-70° and grind the sand-coffee mixt. in an agate mortar as finely as possible. Mix with an equal quantity of coarse sea-sand and again ext. with fresh alc. until a fresh portion of the ext. gives no ppt. with  $Pb(OAc)_2$  soln. The total time of extn. should be 6-8 hrs. To the combined exts. add 2 g. of solid paraffin, to bind the fat and wax, and evap. to 50 cc. to remove alc. Cool, break up the paraffin, and transfer with water to a 150 cc. measuring flask, filtering through a pleated filter. Of the filtrate, which need not be perfectly clear, transfer a large aliquot to a 400 cc. beaker, add 20 cc. of alc. and enough water to make 200 cc. Heat to about 90° and slowly add 12-15 cc. of 25%  $Pb(OAc)_2$  soln. to ppt. the chlorogenic acid. Heat 10 min. over a small flame and cool in ice water for 1 hr. Filter off the lemon-yellow ppt. and wash it with a little cold water. Transfer the ppt. to a Philipp's beaker with a little hot water. At a vol. of not over 100 cc., sat. the water with  $H_2S$ . This serves to ppt. the  $Pb^{++}$  and leave the free chlorogenic acid in aq. soln. Filter and remove  $H_2S$  by the passage of a stream of air. Det. the content of chlorogenic acid by measuring the optical rotation in a polariscope and also by titrating with 0.1 N NaOH to an end point with bromothymol. The 2 detns. should agree. Samples of raw coffee analyzed by this method showed 8-9% of chlorogenic acid.

W. T. H.

**Report on (the analysis of) flavors and non-alcoholic beverages.** John B. Wilson. *J. Assoc. Official Agr. Chem.* 16, 541-3(1933), cf. C. A. 27, 147. The methods of the Bur. of Industrial Alc. were studied collaboratively on exts. of almond, anise, lemon, nutmeg, orange, peppermint, rose, rosemary, spearmint, thyme, wintergreen and imitation wintergreen, on the one hand, and cinnamon and clove on the other. The results were somewhat erratic, but this can be corrected by using standardized Halcock bottles and measuring the solvent by means of a long 10-cc. buret. Adoption of the method as official by the A. O. A. C. is recommended.

A. P.-C.

**An alcoholic standard for cider.** D. W. Stewart. *Analyst* 58, 602-3(1933).—Cider sold in England contains 2-11% EtOH by vol. and any attempt to establish a legal standard is likely to be embarrassing to some honest growers of apples.

W. T. H.

**Cider-making trials for the season 1931-32.** V. L. S. Charley and P. T. H. Pickford. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 139-55; cf. C. A. 27, 4319.—Data are given on the compn. and characteristics of juices and ciders prepd. from numerous varieties of apples.

K. D. Jacob

**New filtering method produces clearer, more salable cider.** Roy E. Marshall. *Canner* 76, No. 16, 7-8, 24 (1933); cf. C. A. 27, 4319.

C. R. Fellers

**Volatile acidity in cider.** Vernon L. S. Charley. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 156-4. **Estn. and identification of volatile acids in cider.**—Methods for detg. volatile acids are outlined and comparative data on synthetic and natural ciders are given; the tentative English method gave higher recoveries than either the French official method (Duclaux) or the Swiss micro method (Widmer). Examn. of cider prepd. from the Kingston Black variety of apple showed that AcOH

is the predominating volatile acid; small amts. of caprylic, caproic and formic acids were present, but valeric acid was absent. **Development of volatile acidity in bottled and cask ciders.**—At lab. temps. development of volatile acidity is lower in bottles closed with screw stoppers than in those closed with crown corks; champagne bottles are advisable for long storage periods. Development of acidity is markedly retarded by storage at cellar temps., and to a less extent by placing the bottles on their sides. Prevention of ullage is of primary importance in retarding the increase in acidity in cask ciders; treatment of the casks with acid-resisting enamels also has a retarding effect, greatly reduces evapn. and imparts no undesirable characteristics to the cider.

K. D. Jacob

**Beam's color test for hashish.** A. Lucas. *Analyst* 58, 602(1933).—Polemical with respect to a pamphlet published by Henri Trolle (cf. C. A. 27, 4192).

W. T. H.

**Report on analysis and interpretation of mayonnaise.** Henry A. Lepper and Frank A. Vorhes, Jr. *J. Assoc. Official Agr. Chem.* 16, 545-56(1933).—The compn. of mayonnaise can be obtained from the detn. of total solids, total fat (by acid hydrolysis), total acidity, total N and total  $P_2O_5$ , and the following formulas, in which P is percentage of total  $P_2O_5$  and N percentage of total N: percentage of yolk =  $75.69 P - 1.802 N$ ; percentage of white =  $60.80 N - 114.59 P$ ; percentage of total egg = percentage of yolk + percentage of white; percentage of white in egg component =  $100(\text{percentage of white}) / \text{percentage of total egg}$ ; vegetable oil = total fat - (yolk  $\times 0.3188$ ); vinegar (4% acid strength) = total acidity as AcOH  $\times 25$ ; minor constituents (sugar, salt, spices, stabilizers) = total solids - (yolk  $\times 0.5047$ ) - (white  $\times 0.1221$ ) - vegetable oil; added water =  $100\% - \text{total egg} - \text{vegetable oil} - \text{vinegar} - \text{minor constituents}$ .

The methods are those of the A. O. A. C. with the following modifications: the tentative method for total acidity in salad dressings was altered to allow the use of a larger sample; the total N method was modified to permit the use of a larger sample and to remove oil before digestion; the total  $P_2O_5$  method was modified by specifying the burning of the sample in Pt instead of charring in glass so that the oil might be burned off before placing in the muffle. The methods were studied collaboratively on 6 samples prepd. in the lab. to represent normal types of mayonnaise and also several deviations from the present U. S. standard. From a discussion of the results, it is concluded that the methods are satisfactory.

A. Papineau-Couture

**Report on (the analysis of) gelatin.** R. M. McChurin. *J. Assoc. Official Agr. Chem.* 16, 547(1933); cf. C. A. 27, 147, 5117. A brief discussion of the prepn. of gelatin samples for the detn. of Cu.

A. Papineau-Couture

**Report on (the determination of) volatile oil in spices.** J. F. Clevenger. *J. Assoc. Official Agr. Chem.* 16, 557-9 (1933). A collaborative study of the Clevenger method (C. A. 22, 2439) on unground and ground sage and on ground nutmeg and pimento showed reasonable agreement in yield of volatile oil in most instances; the lower yields indicate lack of uniformity in mixing the sample, incomplete distn., or the loss of some volatile oil in the steam during distn. The precautions which should be taken in carrying out the detn. are pointed out. The  $d_4^{20}$ ,  $n_D^{20}$ , acid no. and ester no. of the oils obtained were detd., and the causes of the variations in results are briefly discussed.

A. Papineau-Couture

**Identification of flavoring constituents of commercial flavors.** IV. Identification of benzoic acid. John B. Wilson and Geo. L. Keenan. *J. Assoc. Official Agr. Chem.* 16, 581-2(1933); cf. C. A. 27, 5439. To fraction B obtained by carrying out the procedure for the qual. sepn. of classes (C. A. 27, 147) or other extd. matter suspected to contain benzoic acid add a slight excess of 40% aq. hydrazine hydrate soln., mix, let stand 15-20 min. at room temp., evap. on the steam bath till dry or till the odor of  $NH_3$  is no longer perceptible; in presence of benzoic acid, benzhydrazide is formed, m. 112°, and has the following  $n_D$ :  $n_D^{20}$  1.545 (common),  $n_D^{20}$  1.567 (most

common of the indices and closely approximating the  $\gamma$ -value),  $\gamma$  1.685 all  $\approx 0.003$ . To obtain larger crystals lending themselves to microscopical examn. according to the optical-immersion method, dissolve the residue in warm  $\text{H}_2\text{O}$ , filter and allow to evaporate spontaneously. Cinnamic, anisic, stearic, palmitic and myristic acids, also vanillin, coumarin and heliotropine, which might be found in fraction B under practical application of the sepn., do not give any crystals when subjected to the test.

**Economical clarification through use of enzymes.** J. J. Willaman. *Food Ind.* 5, 294-5, 301 (1933); cf. C. A. 25, 3738. Pectinase enzyme from fungi has the property of changing fruit pectins to a water-sol. form consisting largely of galacturonic acid and galactose. The addn. of 1 lb. of Pectinol, a com. pectinase prepn., to 100 gal. of fruit juice at 15-6° normally causes pptn. of colloidal matter and destruction of pectin so that the juice is easily filtered. The enzyme becomes less active and effective at temps. above 49°. Fruit juices are variable in their colloid and pectin characteristics and special enzyme prepn.s have been developed for several different juices. The enzyme action makes filtration through an ordinary filter press, aided by a siliceous filter aid, very rapid and effective. The clear juices may be subsequently filtered through a Seitz or other germ-free filter and bottled without pasteurization. Maintenance of sterility in juice containers without the use of heat is difficult under industrial conditions. The use of pectinase has no effect on flavor and greatly enhances the appearance of the juices.

**Dehydrated kelp.** M. J. Walsh. *Food Ind.* 5, 229 (1933). Dehydrated kelp is pressed into tablets and sold as a nutritional supplement. The structure and color of the original substance are retained. C. R. F.

**Bone extracts for use as food.** D. I. Lobanov and Z. V. Kochetkova. *Izvestiya Tsentral. Nauch. Issledovatel. Inst. Pischevoi Prom. Separate 1930*, 18 pp. Fresh bones yield about 15%, and boiled bones 7-8%, of fat which is edible without any further refining. Old, dry bones yield some fat, but it is not edible. The best soup stock is obtained by an acid hydrolysis, the autoclave pressure being held at 1.5 atm. for 3-4 hrs. J. F. S.

**Edible yeast.** R. V. Givartovskii. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pischevoi Prom. Separate 1930*, 24 pp.—The properties of *Torula utilis* are described, in comparison with other strains of *Torula*. A detailed procedure is given for com. production of edible yeast from pure cultures of *Torula utilis* in a molasses mash, and a cost sheet is presented. Julian F. Smith.

**Edible yeasts and their uses.** R. V. Givartovskii. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pischevoi Prom. Separate 1930*, 22 pp.—European and American products which exploit the medicinal properties of yeast are discussed. Based on a series of expts. it is suggested that edible yeasts should be produced in Russia and used in making medicinal yeast, vitamin bread, crackers, cakes, candies, yeast broth and yeasts with high N content.

**Estimation of crude fiber and soluble carbohydrate in certain foods and fodders.** Hermann Schmidt-Hebbel. *Pharm. Zentralhalle* 74, 600 (1933).—A crit. study of methods ordinarily employed in such cases forces the conclusion that the procedure of König is basically sound and with certain modifications can be advantageously employed for the estn. of crude fiber and sol. carbohydrates (total carbohydrates resulting from treatment with  $\text{HCl}$ ). The modified method eliminates the use of glycerol and employs the aq. filtrate (exclusive of alc. and  $\text{Et}_2\text{O}$  washings) in detg. the sol. carbohydrates. The various operations are given in detail. W. O. E.

**The surpassing importance of the  $p_{\text{H}}$  number in the investigation of silo fodder.** Karl Kneist. *Weidewirtschaft u. Futterbau* 8, 1-3 (1933). Suppl. to *Deut. Landw. Tierzucht* 37, No. 1 (1933). The importance to the farmer of obtaining  $p_{\text{H}}$  analyses of his silo fodder is urged. Silo fodder with a  $p_{\text{H}}$  below 4.2 is considered very good; when the  $p_{\text{H}}$  is above 4.9 it is considered poor. B. C. B.

**The mineral content of feeds.** Frank E. Corrie. *Fertiliser, Feeding Stuffs, Farm Supplies J.* 18, 341, 344, 346 (1933).—Data are given on the protein, ash,  $\text{CaO}$ ,  $\text{P}_2\text{O}_5$ , and Cl contents of numerous feeding stuffs.

K. D. Jacob

**Rye germ cake as a component of stock feeds.** M. I. Dyakov, A. I. Vereninov, Yu. V. Golubentzeva and O. A. Fedorova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 1, 291-300 (1932).—

Rye germ cake is highly nutritious for cattle, horses and hogs. The oil should be removed as thoroughly as possible, the cake should be free from grit and dirt and the moisture content should not exceed 10-12%. The ash is high in P and low in Ca; addn. of Ca salts may therefore be desirable in mixed feeds. The value of the cake is enhanced by the presence of vitamins A, B and E, and by its high content of easily digested protein. J. F. S.

**Report of the physiological chemist.** A. Viswanatha Iyer. *Imp. Inst. Agr. Research Pusa, Sci. Repts.* 1931-32, 113-21 (1933); cf. C. A. 26, 5356. *Indian coarse fodders*.—Data are given on the org. matter, protein, fiber and carbohydrate contents of Bolarum, Tornagallu, Aurangabad, Boda and scented grass hays, also Meerut and Jubbulpore hays cut at various stages of growth. The Aurangabad hay caused purging of bullocks and rendered the urine exceptionally highly acid. *Acid-base balance*.—Expts. with Bolarum hay, which produced acid urine, and ragi straw rations for cattle showed that Ca is markedly deflected into the urine from the feces when there is a tendency toward acidity in the urine.

K. D. Jacob

**Feeding experiment with tapioca meal on milk cows.**

E. Brouwer. *Verlag. landb. Ondersok. Rijkslandbouwproufs* No. 38C, 145-177 (1932).—Tapioca meal with the addn. of protein in some form is a satisfactory feed for milk cows. R. M. Barnette

**The composition and feeding value of pig swill.** Brynmor Thomas. *Fertiliser, Feeding Stuffs, Farm Supplies J.* 18, 359 (1933).—Over a period of 6 months, the fat content of garbage from hotels (I), restaurants (II), 1st-class cafes (III) and 2nd-class cafes (IV) averaged 22.9, 19.7, 17.3 and 20.9%, resp. The protein content averaged 25.1, 12.8 and 15.3% in garbage from I, III and IV, resp. Garbage from I averaged 8.8% ash which was highly phosphatic.

K. D. Jacob

Spartan barley (Rather) 16. Rept. of the imperial agricultural chemist [on potato storage] (Mukerji) 15. Printing on sausage casings (U. S. pat. 1,929,394) 26.

**Apparatus for evaporating milk, etc.** Hans Luber. *Ger.* 580,108, Oct. 10, 1933.

**Milk powder.** Anthony R. Sanna. U. S. 1,929,450, Oct. 10. Milk is treated (as by the method described in U. S. pat. No. 1,414,214; C. A. 16, 2185) to bring the caseins and other albuminoids into "a state of adherence." Coagulation of the albuminoids and casein is effected by adding an acid and the coagulants are sepd.; the mass is rendered alk. to a degree to convert it from an insol. to a sol. state, and is desiccated.

**Emulsifying apparatus suitable for use with milk and butter, etc.** Harold G. MacChesney. U. S. 1,530,686, Oct. 17. Mech. and structural details.

**Vegetable oil shortenings for foods.** Herbert Humphreys. U. S. 1,929,588, Oct. 10. Oleaginous materials such as vegetable oil shortenings are prepd. for packaging by chilling to a congealing temp., intermixing with air, raising the temp. of the mass by incorporation of a suitable proportion of similar heated material and then further heating the mixt. to the desired packaging temp. (a certain proportion of the finally heated product being packaged and another portion used in the intermediate heating operation).

**Lard.** Halvor O. Halvorson, Robert C. Murray and Edward M. Schnitz (to Geo. A. Hormel & Co.). U. S.

- 1,930,091, Oct. 10. Fat-contg. tissue is treated to render it electrically conductive (as by maceration and heating) and a sufficient elec. current is passed through it to generate heat for rendering out contained fat without scorching the N-contg. substances present. The rendered fat is sepd. from the solids and then heated to a temp. above the b. p. of water. App. is described.
- Apparatus for treating oranges or other fruits with mold-inhibiting solutions. Ernest M. Brogden (to Brogden Co.). U. S. 1,931,463, Oct. 17. Various mech. and operative details are described.
- Drying fruits and vegetables. Alfred H. McComb (one-half to Everette R. Peacock). U. S. 1,929,437, Oct. 10. In the rapid drying of vegetables, fruits, etc., substantially one-half of the moisture content of the material is first extd. by use of a warm dry gaseous fluid such as air and the partially dried material is then placed in a vacuum and indirectly heated to effect further removal of moisture, followed by cooling in the vacuum to a temp. sufficiently low that air may be allowed to come into contact with it without causing undesired oxidation. App. is described.
- Evaporators for concentrating fruit juices. Mihran K. Serailian. Brit. 394,587, Jan. 29, 1933. Addn. to 303,956 (C. A. 23, 4513).
- Removing tannin from apple juice. Frederick A. Karmann (to Industrial Research Laboratories Ltd.). U. S. 1,929,642, Oct. 10. For removing tannin while substantially retaining malic acid, an insol. compd. of Fe is formed in the juice (suitably by adding Fe and air and heating) and is sepd.
- Flavored gelatin products for preparing gelatin desserts. Clarence C. Zeigler (to Swift & Co.). U. S. 1,929,732, Oct. 10. See Brit. 372,780 (C. A. 27, 3015).
- Tea and coffee beverages. Willy Stelkens (to Albert T. Otto & Sons). U. S. 1,930,257, Oct. 10. A dry compn. for prepg. beverages comprises tea or coffee and finely subdivided activated carbon contg. adsorbed glycerol, which serves to remove a portion of the caffeine and bitter substances.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

- Ancient Egyptian materials and industries about 1350 B.C. A. Lucas. *Analyst* 58, 654 (1933). The materials and industries described are stone and stone-working, faience and its manuf., glass and glass making, woven fabrics and weaving, wood and wood working, pigments and varnish, metals and metal working.
- W. T. H.
- A century of development in industry and engineering A. P. M. Fleming. *Elec. Eng.* 52, 666 71 (1933). Historical.
- W. H. Boynton
- Science as affecting industry. Gustav Egloff. *Cereal Chem.* 10, 457 (1933).—Several examples are given showing how science has enabled many industries to make great strides, e. g., rubber, steel, oil, etc.
- L. H. B.
- Operation and function of chemical laboratories in the French navy. Saint-Serun. *Chimie et Industrie Special* No. 1, 1253-4 (June, 1933).
- A. Papineau-Couture
- Problems of technical reactions. I. Catalytic hydration. Otto Schmidt. *Z. Elektrochem.* 39, 824 37 (1933). A review.
- G. G.
- Supplementing natural resources. H. R. Howe. *Elec. Eng.* 52, 188 9 (1933). An address. Science has produced not mere substitutes but actual equivalents and sometimes items that are superior to those customarily provided by nature.
- C. G. F.
- Performance of agitators in liquid solid chemical systems. A. W. Hinson and G. A. Wilkins. *Ind. Eng. Chem.* 25, 1196 1203 (1933).—The factors involved in the agitation of solid liquid systems have been studied by following the soln. of BzOH in water and various oils in geometrically similar systems of different sizes. In free rotational agitation the intensity of agitation increases with speed of stirrer and size of equipment and decreases as the liquid viscosity increases. Agitation impeded by the addn. of baffles reduces the intensity of agitation. A general relation for each type of agitation is expressed in terms of composite variables. The power consumption of various systems and the effect of agitator design have been investigated.
- L. W. T. Cummings
- Grinding in ball mills. G. Helm. *Ber. deut. keram. Ges.* 13, 198-213 (1932).—The effects of the no. of revolutions per min. in the wet grinding, of the amt. of charge, size of grinding pebbles, amt. of grinding pebbles, and different types of grinding pebbles were studied.
- H. G. Schurecht
- The sedimentation of fine particles in liquids. A survey of theory and practice. R. F. Stewart and R. J. Roberts. *Trans. Inst. Chem. Engrs.*, Advance proof 1933, 14 pp.—A summary is given of the theory and actual behavior of fine particles subjected to sedimentation, together with a discussion of the industrial equipment used.
- L. W. T. Cummings
- Evaporation and its applications in the concentration of industrial liquids. E. Lafitte. *Mém. compt. rend. soc. ing. civils France* 85, 1258 90 (1932).—A discussion of some aspects of the problem of evapn. and its applications to the treatment of natural waters and in the sugar and distillery industries.
- A. Papineau-Couture
- Measurement of tube-wall temperatures in heat-transfer experiments. G. M. Hebbard and W. L. Badger. *Ind. Eng. Chem., Anal. Ed.* 5, 359 62 (1933).—A chord hole is drilled in the metal of the tube wall, and from the ends of this hole a groove is cut around the rest of the circumference of the tube. The couple junction is threaded into the chord hole, soldered in place, and the leads are secured in the grooves with Bakelite and kaolin. Advantages claimed are (1) there is an undisturbed fluid film over the part of the tube where the junction is located; (2) perfect metallic contact between junction and tube; (3) the leads are withdrawn through an isothermal section; (4) the installation is reasonably robust; (5) the readings are apparently accurate and reproducible.
- W. L. Badger
- Heat transfer in an industrial glass heat exchanger. H. C. Bates. *Chem. and Met. Eng.* 40, 512 13 (1933).—Overall heat transfer coeffs. from condensing steam to water were detd. on an exchanger, the inner tube of which was a 1 in. Pyrex glass tube. The water velocity was varied from 0.5 to 3 feet per sec., and the steam pressure from 18 to 100 lb. No mixing chambers were used.
- L. W. T. Cummings
- Influence of surface roughness on heat transmission to water. W. Pohl. *Forsch. Gebiete Ingenieurw.* A or B4, 230 8 (1933).—Wall roughness was detd. by pressure drop measurements. The coeff. of resistance can be expressed by the equations  $\zeta = c(1/Re)^n$ ;  $x$  and  $c$  increase with increasing roughness. Measurement of heat transfer with changing roughness shows that the coeff. is a power function of the velocity. The equation developed is  $\alpha = kw^n$ , where  $n = 3.6$  and  $k = 550 n - 1200$ .
- M. C. Rogers
- "Nitrogen narcosis" (oxygen deficiency) and an experimental method of representing it. Fr. Ruhe. *Draeger-Hefte*, Sept./Oct. 1933, 2383 7. A device for demonstrating the effect of O deficiency is described and the results of some expts. are given.
- A. I. K.
- Professional benzene poisoning. A. Fell. *Presse méd.* 41, 129-30 (1933); cf. C. A. 27, 4323.
- A. E. M.
- Accident prevention in the chemical industry. C. Rheinfels. *Chem. Fabrik* 1933, 450 2.—A summary of a report covering 1932; cf. C. A. 27, 1419.
- J. H. Moore
- Development of the constructive features of the modern gas mask. Heinrichs. *Z. ges. Schiess.-Sprengstoffw.* 28,

- 329-33(1933).—Different types of German gas masks are described and shown by photographs. A. L. K.
- Thermal insulation.** Ezer Griffiths. *Trans. Inst. Chem. Engrs.* 10, 35-44(1932).—A detailed discussion is given of methods of heat-cond. measurement used at the Natl. Phys. Lab. (Great Britain). The testing of various types of insulating materials is discussed, e. g., slab cork, granulated cork, cork wool, slag wool, Al foil, compressed peat, pumice concrete and diatomaceous earth products. Exptl. results upon the heat radiated from the external surface of a hot pipe in air are given. L. B. Miller
- Several mechanical and thermal properties of electric insulator substances. Ulrich Ritzow. *Z. tech. Physik* 14, 424 8(1933).—Data on sp. gr., mech. strength, linear expansion, sp. heat and heat cond. are given for natural materials, basalt, marble, serpentine, mica, shales, asbestos, and for the ceramic insulators, glasses, Mycalex, quartz, porcelain, sillimanite, steatite and stoneware. Arthur Fleischer
- Measurement of colors and its industrial applications (Toussaint) 2. Preserving rubber [insulating] compns. (Brit. pat. 391,510) 30. Aliphatic fluoro halides (U. S. pat. 1,930,129) 10.
- Bader, W.:** Die Technik der chemischen Operationen. Basel: B. Wepf & Cie. 430 pp. M 14 50, bound, M. 16.
- Bain, H. Foster:** Ores and Industry in the Far East. The Influence of Key Mineral Resources on the Development of Oriental Civilization, with a chapter on Petroleum by W. B. Heroy. Revised ed. New York: Council on Foreign Relations, Inc. 288 pp. \$3 00. Reviewed in *Eng. Mining J.* 134, 301(1933).
- Dugans, Thos. H.:** Solvents. 3rd ed., enlarged. New York: D. Van Nostrand Co., Inc. 197 pp. \$5 00.
- Humery, René:** La lutte contre les fumées, poussières et gaz toxiques. Paris: Dunod. 351 pp.
- Effecting endothermic catalytic reactions.** Alphons O. Jaeger (to Selden Co.). U. S. 1,930,053, Oct. 10. The reaction components, at temps. above those necessary for the reaction, are passed in vapor form through heat-exchange elements at least partly embedded in a layer of contact mass in indirect heat-exchange relation with the mass; the flow of vapors is then reversed and they are caused to flow in direct heat-exchange relation with the catalyst and with the incoming vapors, the vapor flow is again reversed and the vapors are passed through the catalyst at temps. of about 200-400°. App. is described, and catalysts may be used such as dehydrating, dehydrogenating and decarboxylating agents, etc.
- Clarifying liquids.** Marsden C. Smith. Fr. 750,615, Aug. 14, 1933. In clarifying liquids by flocculation, the flakes which have been recently formed are carried in suspension in a circulating current, following a horizontal direction, and maintained in intimate contact with previously formed flakes. The latter may be caused to pass in countercurrent to the former.
- Purifying aqueous liquids.** Carbo-Norit-Union Verwaltungs-Ges. m. b. H. Ger. 579,643, June 29, 1933. Addn. to 534,204 (C. A. 26, 788). Aq. liquids which have been preliminarily purified by extn. with a solvent are further purified by treatment with a solid adsorbent, from which the adsorbed substances are afterward recovered by direct treatment with a gas or vapor such as steam. The treatment of waste waters contg. phenols is mentioned.
- Compressing and cooling gases such as in liquefaction.** Niels C. Christensen. U. S. 1,929,350, Oct. 3. Various details of app. and operation are described.
- Apparatus for separating oxygen and nitrogen from air by liquefaction and fractional distillation.** Niels C. Christensen. U. S. 1,929,349, Oct. 3. Various structural and operative details are described.
- Apparatus for transferring liquid air, etc.** Harold B. Thompson (to Linde Air Products Co.). U. S. 1,930,731, Oct. 17. Various structural and operative details are described.
- Aqueous dispersions such as those of oils, fat, and fatty acids.** Heinrich Ulrich and Curt Schuster (to I. G. Farbenind. A.-G.). U. S. 1,930,845, Oct. 17. Aq. dispersions of fatty substances such as olein, olive oil or mineral oil are formed contg. a small proportion of a salt of an aliphatic amine contg. at least one alkylol group with an aliphatic carboxylic acid such as nonyllic, caprylic, undecylic, lauric or claidic acids, e. g., octadecylethanolamine.
- Colloidal dispersions such as aqueous wax dispersions.** Leo Kollek and Franz Pohl (to I. G. Farbenind. A.-G.). U. S. 1,930,853, Oct. 17. A viscid polymerization product of an alkylene oxide contg. 2 or 3°C atoms is used as a dispersing agent in forming dispersions such as those of montan wax, gum mastic, pyroxylin lacquers, wall-paper pigments, etc. Numerous examples are given.
- Separating oil-water emulsions.** Fritz E. Fuchs (to Dehydro Co.). U. S. 1,929,390, Oct. 3. A material for use in sepg. water-in-oil emulsions such as may be discharged from wells consists of a blown-oil soap formed with a caustic and to which diethylene glycol is added.
- Leaching system suitable for removing parchementizing or vulcanizing agents from materials such as those containing zinc chloride.** Alfred W. Laird (to Western Elec. Co.). U. S. 1,929,927, Oct. 10. Various details of app. and operation are described.
- Heating fluids such as steam by use of a plurality of waste heat exchangers.** Virgil A. Rumble (to Bailey Meter Co.). U. S. 1,930,456, Oct. 10. The fluid is proportioned through the exchangers in accord with a comparison of the temps. of the fluid leaving the exchangers. App. is described.
- Process and apparatus for coating surfaces with fibrous material and a binder.** J. W. Roberts Ltd. and Norman L. Dolbey. Ger. 584,037, Sept. 13, 1933. See Brit. 368,368 (C. A. 27, 2228).
- Fireproofing materials.** Élie L. Raymond. Fr. 750,605, Aug. 14, 1933. Materials such as rubber are fireproofed by the addn. of (1) substances which retard decompn. and inflammation at high temps., e. g., carbohydrates, C<sub>14</sub>H<sub>10</sub>, phenanthrene, polyhalohydrocarbons, polyhaloacids (tetrabromophthalic acid), mineral acids or salts such as citrates, tartrates, arsenites and arsenates, particularly of NH<sub>4</sub> and (2) substances which raise the flash pt. and reduce the combustibility of gases given off by heat decompn., e. g., volatile substances giving neg. gaseous ions at a high temp., which prevent the production and propagation of flame, such as bromides of NH<sub>4</sub> or Hg, arsenites or arsenates of NH<sub>4</sub>, Hg, Al, Sn and volatile acids.
- Impregnating porous materials such as cellulose pulp with asphalt, etc.** Philip P. Gray and Ernest K. Werle (to Fibre Conduit Co.). U. S. 1,930,646, Oct. 17. A porous body such as a fiber conduit is immersed in impregnating material such as melted pitch in three successive stages, the second of which is at a lower temp. than the first and third stage.
- Heat-insulated portable chamber for storing solid carbon dioxide, etc., provided with means permitting removal of the refrigerant from any part thereof without exposing the remainder to the outside air.** Rudolf Kurth. Brit. 394,592, June 29, 1933.
- Insulation suitable for use on submarine cables.** Archie R. Kemp and John H. Ingmanson (to Bell Telephone Laboratories, Inc.). U. S. 1,930,274, Oct. 10. A mixt. contg. at least 80% of gutta-percha, balata and rubber (at least half of this portion being rubber) is incorporated with a small proportion of an anti-oxidant such as diphenylethylenediamine. Cf. C. A. 27, 4800.
- Electric insulation.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 395,507, July 20, 1933. Laminated material, suitable for elec. insulation, consists of layers of fibrous material, e. g., paper, fabric, treated with a soln. of an amine-aldehyde resin and united by pressure at a temp.



high enough to convert the resin to the infusible and insol. condition but not to infuse the fibrous material. The resins of Brit. 348,030 (C. A. 27, 4701) may be used and  $\text{SnCl}_4$ , e. g., may be added to accelerate hardening. Cf. C. A. 27, 2743.

Paper for electrical insulation. Standard Telephone & Cables Ltd., Thomas R. Scott and Malcolm C. Field. Brit. 395,737, July 24, 1933. Paper for condensers, power transformers, insulation of power cables or joints

for power cables, etc., is obtained by treating the dry fiber or paper by a controlled process of partial acetylation such that the product is substantially free from triacetate; paper so treated retains its mech. strength and is less absorbent to moisture. Being porous, the paper may be impregnated.

Insulating oils for electrical apparatus. Seymour W. Ferris (to The Atlantic Refining Co.). Brit. 394,404, June 29, 1933. See Fr. 729,425 (C. A. 26, 6119).

## 14 -WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Berlin municipal water works, 1928-1933. A. Swyer. *Gas u. Wasserfach* 76, 717 20(1933).—A description of improvements in the several pumping stations, principally in pumping equipment.

Interesting phases of Chicago's water works activities. Myron B. Reynolds. *J. Am. Water Works Assoc.* 25, 1321-38(1933).—Many problems have developed because of the great area covered. Those of a mech. nature cover pumping, pressure, and damage from building. Those of a chem. nature involve  $\text{CaCO}_3$  deposits, Cl absorption and flocculation.

New Saxon laws for the construction, protection and supervision of potable water-supply systems. Aug. F. Meyer. *Gas u. Wasserfach* 76, 701 4(1933). R. W. R.

Ammonia salts in water treatment. A. J. Smalshaf. *J. Southeastern Sect. Am. Water Works Assoc.* 3, No. 1, 31 43(1933).

Adsorption of copper sulfate by aluminum floc. C. J. Brockman. *J. Southeastern Sect. Am. Water Works Assoc.* 3, No. 1, 28-30(1933). Data indicate that the addn. of 8.85 p. p. m. of alum to a neutral water contg. as high as 1.0 p. p. m.  $\text{CuSO}_4$  removes practically all the  $\text{CuSO}_4$ .

The bacteriology of water. E. S. Stokes. *Chem. Eng. Mining Rev.* 25, 61 3(1933). A review resulting in the following conclusions: (1) There are no distinctive water bacteria. The bacteria present in water are, in the absence of specific contamination, derived from contact of the water with the air or earth. (2) The no. and species of bacteria found in water by the ordinary tests only show those that will grow under the condition imposed by the test. (3) The *Es. coli* is a group of organisms widely distributed in nature. There is no specific test to show whether or not any individual, giving typical reaction of this group, has actually been derived from a human source. (4) A water cannot be condemned merely on account of the presence of *Es. coli*, but their no. may be such as to excite suspicion and create a demand for investigation. (5) Bacteriol. examn. is essential for checking the efficiency of a treatment plant.

Rapid bacteriological investigation of water samples. Schmidt-Lange. *Gesundh.-Ing.* 56, 486 7(1933).—Plating the samples on agar and then counting the colonies in 6-8 hrs. with the aid of a microscope is recommended.

Removal of bacterial flora from water in the settling basin by added clay dispersions. Edward M. Slocum. *J. Southeastern Sect. Am. Water Works Assoc.* 3, No. 1, 14-52(1933).—Bleaching clay of high adsorptive ability aids the  $\text{Al}(\text{OH})_3$  in building up a heavy floc, thus increasing the settling rate, removing the org. colloids more thoroughly, and decreasing the turbidity. Because of the adsorptive power of the clay for  $\text{Cl}_2$  the sediment is also rendered sterile.

Water softening. E. L. Filby. *3rd Ann. Arkansas Water Works Conf.* 1933, 9-13. —A report on the 1st year's operation of the new lime-soda softening plant at Niles, Kans., from the economic standpoint.

Water softening and iron removal. E. W. Bacharach. *3rd Ann. Arkansas Water Works Conf.* 1933, 13 14. —A brief description of the plant at Clarksville, Ark. Raw

water is pumped from wells through an aerator, flows by gravity to the mixing chamber, then to the settling basin, the carbonating basin, and the filters. M. G. Moore

Errors in determination of carbonate in boiler waters. W. C. Schroeder. *Ind. Eng. Chem., Anal. Ed.* 5, 389 93(1933); cf. C. A. 26, 4601. —The errors involved in the use of the Winkler method and the phenolphthalein-methyl orange method for this purpose are discussed. S recommends that any method used be checked against the evolution method.

Commercial aspects of high boiler pressures. A. G. Christie. *Power Plant Eng.* 37, 469 70(1933). —Increased efficiency and lower plant investment are in favor of high-pressure boilers. Feed water requirements while more stringent are being met by a new technic involving sol. as well as insol salts.

Treatment of water prior to filtration. Wellington Donaldson. *3rd Ann. Arkansas Water Works Conf.* 1933, 47-50. A general discussion, especially of the treatment of highly turbid waters. The importance of agitation for 5-45 min. after dosing with the coagulant and prior to sedimentation is emphasized.

The Richmond, Virginia, filter plant. Marsden C. Smith. *J. Southeastern Sect. Am. Water Works Assoc.* 3, No. 1, 22 7(1933); cf. C. A. 27, 2229. —The treatment process comprises  $\text{CuSO}_4$  treatment, prechlorination, flocculation, addn. of activated C, sand filtration and  $\text{NH}_4\text{-Cl}$  treatment.

The design and care of rapid-sand filters. A. B. Morrill and W. M. Wallace. *J. Southeastern Sect. Am. Water Works Assoc.* 3, 5-21(1933).

Promiscuous electric grounding on water service pipes and mains. Nicholas S. Hill, Jr., C. F. Meyerherm and M. W. Cowles. *J. Am. Water Works Assoc.* 25, 1418 30(1933). —Electrolysis or electrolytic action due to grounding d. c. or a. c. on water pipe can result in causing corrosion, color, odor and taste. Further study and consideration of the problems of elec. grounding are recommended.

Modern methods of coating and lining pipe. Linden Stuart. *J. Am. Water Works Assoc.* 25, 1431-42(1933).

The technic of lining pipe with bituminous enamel is outlined. Reinforced cement mortar is recommended over bituminous enamel as an external coating. Estd. savings are based on reduction in steel thickness due to the removal of corrosion dangers.

Bituminous pipe coatings. Wm. M. Wallace and James A. Parks. *J. Am. Water Works Assoc.* 25, 1387-417 (1933). The principles of pipe-line corrosion and its prevention are discussed. Of the various types of protective coatings in use the bituminous coating leads in pipes covered. The coal-tar base coating is somewhat more popular than the asphalt-base coating though the latter is considered, in general, superior. A thorough discussion of the 2 includes methods of test and specifications.

Sewage treatment. Paul Hansen. *3rd Ann. Arkansas Water Works Conf.* 1933, 58-62.

Recent developments in sewage treatment. C. A. Emerson, Jr. *J. Southeastern Sect. Am. Water Works Assoc.* 3, 80-8(1933).

Progress in sewage treatment. Marvin C. Nichols. *3rd Ann. Arkansas Water Works Conf.* 1933, 54-8. —His-

torical material and recent developments with a comparison of present types of treatment on the basis of percentage decrease of suspended matter and of biochem. O demand.

Machinery for dealing with sewage. H. R. Lupton. *Engineering* 136, 396-8 (1933).

Chemical stabilization of sewage. Harrison Hale. *3rd Ann. Arkansas Water Works Conf.* 1933, 50-4. General.

Control of the direction of currents in sewage aeration basins. W. Husmann. *Techn. Gemeindeblatt* 36, 229-31 (1933).

Purification of sewage by natural processes. W. E. Adeney and A. G. G. Leonard. *Engineering* 136, 423-4 (1933).—The satisfactory disposal of normal crude sewage liquors includes: (1) the removal of the coarse solid impurities in the form of sludge by mech. sedimentation; (2) the removal of the solid impurities remaining in fine suspension and in the colloidal state by means of the activated sludge process; (3) biochem. purification, under anaerobic conditions, in digestion tanks of the mixed solid impurities removed by the above 2 methods of sepn.; (4) the biochem. purification, under aerobic conditions, of the org. and ammoniacal impurities remaining in the true soln. in the effluents from the activated-sludge tanks, either through the agency of filter beds or by adequate diln. in streams. The biochem. destruction of org. matter is essentially one of oxidation; under aerobic conditions it is effected by bacteria utilizing the  $O_2$  dissolved in the contaminated liquors, while under anaerobic conditions the purification is effected at the expense of the  $O_2$  contained in the reducible  $O_2$  compds. present. Extn. and analysis of gases from polluted waters undergoing self-purification show 2 distinct stages.  $CO_2$ ,  $NH_3$ ,  $H_2O$  and colored nitrogenous org. products with the properties of the humus of peat are products of the first stage of fermentation.  $NH_3$ , humus, and any  $NH_3$  originally present are oxidized to nitrates and carbonates during the second stage of fermentation. Degree of diln. is important as availability of  $O_2$  is a limiting factor for purification. C. B. J.

Circulation of sewage sludge. O. Herb. *Techn. Gemeindeblatt* 36, 233-5 (1933).—A review of the literature indicates that there is much contradictory data on the advantages of circulating digesting sludge. A lab. expt. in which 2 flasks of the same sludge of initial  $pH$  5.5 were incubated at  $37^\circ$ , flask A being shaken 3 times daily and flask B not at all, indicated that the unshaken sludge digested much faster (as measured by gas evolution) than the shaken sludge. A reached a  $pH$  of 7.8 after 14 days, 8.2 after 18 days; B became alk. only after 2 months. In both cases the gas evolved was 85%  $CO_2$ . M. G. M.

Troubles due to sewage in rivers. Mahr. *Gesundh.-Ing.* 56, 498-501 (1933); cf. C. A. 26, 1367.—Factors detg. the min. permissible diln. of sewage when discharged into a stream are discussed, including freshness of the sewage (biochem. O demand), extent of surface of the water (hence sunlight, air, etc.), rate of flow of the stream, and plant and animal life present in it. Data (biochem. O demand, diln., etc.) are given for a no. of German cities, which include all types of sewage treatment. A graph is given from which the min. permissible diln. can be approx. detd. from biochem. O demand and *vice versa*, the extent of sewage treatment required (resulting biochem. O demand) when a given diln. is possible.

Control of pollution of the atmosphere. G. Batta and E. Leclerc. *Bul. soc. chim. Romania* 15, No. 12, 13-38 (1933).—The toxicity of harmful gases in the atm. arising from industrial and domestic sources decreases in the following series:  $H_2SO_4$ , HF,  $SO_2$ ,  $NO_2$ , CO and  $CO_2$ . Methods for their detn. are given. A method is given for comparing solar luminosities at different times (and

hence measuring roughly the dust in the atm.) by the bleaching effect of the sun's rays on a methylene blue soln. W. A. Mjore

The application of fumigants to ships and warehouses.

I. Distribution of ethylene oxide in empty warehouses.

II. Distribution of hydrogen cyanide in empty warehouses.

III. Penetration of hydrogen cyanide into bags of raw cacao stacked in piles of different sizes. A. B. P.

Page and O. F. Lubatti. *J. Soc. Chem. Ind.* 52, 309-10T, 316-23T, 323-6T (1933).

Observations on the examination of swimming-bath water. J. A. B. Hicks, R. J. V. Pulvertaft and F. R.

Chopping. *Brit. Med. J.* 1933, II, 603-6. J. B. B.

Filtration of oil from boiler feed water (Johnson) 28. Evapn. and its application [to the treatment of natural waters] (Lafitt) 13.

Purification of water with use of activated carbon. Millard Brandt (to Darco Corp.). U. S. reissue 18,967, Oct. 10. A reissue of original pat. No. 1,781,314 (C. A. 25, 158).

Apparatus for purifying water by freezing. Norman H. Gay. U. S. 1,931,347, Oct. 17. Various structural and operative details are described.

Treating hard waters. Gustav Rittler. U. S. 1,930,885, Oct. 17. To purify it and remove easily sol. compds., hard water is treated with  $H_3PO_4$ , and  $NH_4OH$  is subsequently added, and an alk. earth hydroxide is used to remove any excess  $H_3PO_4$  which may be present.

Treating liquids such as water to effect softening and clarification. Wilson Evans (to National Aluminate Corp.). U. S. 1,930,792, Oct. 17. The liquid under treatment is mixed with a preformed product formed from lime, soda ash and  $AlCl_3$  and the resulting ppt. is sepd.

Regenerative water-softening apparatus. Tord E. D. Bildt (to Aktiebolaget Filtrum). U. S. 1,929,405, Oct. 10. Various structural, mech. and operative details are described.

Apparatus for softening water with zeolites. Robert O. Freund. U. S. reissue 18,970, Oct. 17. A reissue of original pat. No. 1,783,466 (C. A. 25, 369).

Base-exchanging clays. Aktiebolaget Filtrum. Brit. 395,185, July 13, 1933. Naturally occurring base-exchanging clays are treated successively with a soln. of a neutral salt such as  $CaCl_2$  and with a soln. of water glass, whereby an insol. ppt. is formed which stabilizes the clay during its use for softening  $H_2O$ . A treatment with a soln. of water glass may precede treatment with  $CaCl_2$ . The raw clay, e. g., natrolith, may be burnt 7 c. g., at  $700^\circ$ , previous to the treatments.

Base-exchanging siliceous gel. Abraham S. Behrman (to General Zeolite Co.). U. S. 1,930,503, Oct. 17. In forming a "whole volume base exchanging gel" from  $Al_2(SO_4)_3$  and Na silicate, reaction between a strong acid such as  $H_2SO_4$  and a strong base such as NaOH is effected simultaneously with the zeolite-forming reaction.

Use of ferric chloride with a smaller proportion of antimony pentachloride as a coagulant for sewage treatment, etc. Ray H. Boundy and James L. Amos (to Dow Chemical Co.). U. S. 1,930,448, Oct. 10.

Artificially heating sewage sludge digestion chambers. Max Pruss. U. S. 1,930,457, Oct. 10. The fresh sludge is heated, prior to its regular introduction into a digestion chamber, to above the desired temp. of the chamber, thereby equalizing in the chamber at its introduction the heat losses toward the outside, and there is regularly supplied to the chamber, between each 2 long periods of regular introduction of heated fresh sludge, digestion-chamber water which has been previously drawn off from the chamber and heated above the temp. desired in the chamber. App. is described.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

**Chemistry and agriculture.** Alexander Lauder. *Chemistry and Industry* 1933, 771 7, 792 7(1933). E. H.

**Review of the work of the Alaska Agricultural Experiment Stations 1898 to 1932.** H. W. Alberts. *Rept. Alaska Agr. Expt. Stations* 1931, 1932, 1 8(1933). Summary of agr. research in Alaska. C. R. Fellers

**The relations between agricultural chemistry and industrial chemistry.** Rudolf Trnka. *Chimie & Industrie Special No.*, 1214 16(June, 1933).—A brief discussion, dealing more particularly with fertilizers. A. P.-C.

**Report of the imperial agricultural chemist.** J. N. Mukerji. *Imp. Inst. Agr. Research Pusa, Sci. Repts* 1931 32, 97-112(1933); cf. *C. A.* 26, 5365.—*Curing of tobacco*—When tobaccos were cured on racks in the sun protected from dew the nicotine content was invariably higher when the stalks were left attached to the leaves than when they were removed. *Potato storage expts.*—

Respiration of potatoes was stimulated by storage at 37°; the respiration ratio ( $\text{CO}_2$  evolved/O absorbed) increased to 1.1 in 4 days, but thereafter the  $\text{CO}_2$  evolution was far greater than the O absorption. Respiration was decreased by storage at 10 15°; the respiration ratio reached unity in 7 days and remained constant thereafter. At 37° the tissue injury known as "black-heart" occurred after 4 days, the catalase activity and O absorption simultaneously decreased and practically ceased in 12 days. At 10 15° very little injury to the tissue occurred even after 24 days; catalase activity increased considerably for the 1st 9 days and remained high till the end of the expt. (23 days). *Alkali soil investigations.*—The solonch soils from the kalar area of Sakrand (Sind) were studied. A hard pan layer rich in gypsum but not unusually high in alkali occurs at a depth of 18.5 24.5 in. The soil is high in Ca and Mg carbonates which tend to concentrate in the subsurface layers; the sum of the HCl-sol  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  remains uniform over the whole profile. Ca is the predominating exchangeable base, and the av. ratio of univalent to bivalent ions is 0.36. *Disintegrated bones,* prepared by treating raw bones with a soln. contg. 1.5% NaOH and 1% NaCl in air-tight vessels for 2 months, were more effective than either bone meal or bone superphosphate in increasing the growth of *marua* on a P-deficient soil. *Nitritation of apricot seed cake.*—The cake contained 6.5% N, 63% of which was converted into  $\text{NH}_3$  and nitrates in 8 weeks in both calcareous and noncalcareous soils. Accumulation of  $\text{NH}_3$  was greater in the calcareous than in the noncalcareous soil. Different methods for detg. the lime requirement of acid soils gave widely varying results on Indian soils, and the order of the results was different with different types of soil. In expts. on soils desalted by leaching with dil. HCl, washing free from acid and drying, there was no relation between the amt. of lime water required to bring the soil to a definite  $\text{pH}$  value and the lime requirement as detd. by several well-known lime-requirement methods.

K. D. Jacob

**The brown forest soils of England.** G. R. Clarke. *Forestry* 7, 43 7(1933).—The A horizon is characterized by its high content of humus; free  $\text{CaCO}_3$  is rare and, compared to the B horizon, it is poorer in soil material and clay, although it always contains exchangeable Ca. The B horizon is characterized by the uniform distribution of brown, well-oxidized Fe compds.; little or no humus material is present;  $\text{CaCO}_3$  may occur toward the bottom of the horizon. The C horizon consists of weathered parent material. In soils derived from heavy clays or under the influence of a high water-table, a gley horizon may occur within the zone of fluctuation of ground water; it is characterized by the blue-green varnish, due to Fe compds. in various stages of oxidation and hydration, on the faces and edges of the structural elements, concretions, specks and flakes of Fe oxides occur upon the structural elements, while grains and dendrites

of  $\text{MnO}_2$  are often widely distributed throughout the upper portion of the horizon. K. D. Jacob

**The red Mediterranean soils of France and their mother rocks.** V. Agafonoff. *Compt. rend.* 197, 693 5 (1933).—The red Mediterranean soils of France are

derived from calcite and dolomite which contain less than 1.5% insol. in HCl. The soils contain 3.43 5.09%  $\text{Fe}_2\text{O}_3$ ; loss at 105 110°, 2.39 2.63%; loss on ignition, 7.65 7.80%. These soils constitute an independent sub-type in the Mediterranean region. G. M. P.

**The soil erosion problem in New Jersey.** Linwood L. Lee. *J. Am. Soc. Agron.* 25, 652 60(1933). J. R. A.

**Interrelationships of soil and forest cover on Stat Island, Minnesota.** F. J. Alway and P. R. McMiller. *Soil Sci.* 36, 281 95(1933).—A study, is made of forest cover and soil of 4 forest types: jackpine, Norway pine, white pine and maple-basswood. The maple-basswood areas are least acid and richest in lime. Norway pine areas are usually the most acid. The chem. compn. of the forest floor material varies considerably with the season when collected. Samples taken in October contain much more volatile matter than those taken in August. The N contents of the forest floor and of the surface 3 in. of soil vary with the kind of trees and are highest for maple-basswood. As a rule, when the  $\text{pH}$  of the forest floor is below 5.1 the underlying soil is less acid, whereas elsewhere it is more acid. M. S. Anderson

**Chemical studies on Appalachian upland podzol soils.**

**I. Conditions governing base-exchange relations.** G. T. Shaw and R. R. McKibbin. *Can. J. Research* 9, 386-95 (1933). The base-exchange properties and the con-

stituent materials of the base-exchange complexes of Quebec Appalachian upland podzol soils have been studied. It has been shown that the "availability" of the acid semihumified org. matter has played the most important part in bringing about existing conditions in these soils. Org. matter is dominating the processes through which the podzol soils pass in their progress from a slightly leached to a severely leached condition. The morg. base-exchange complexes are superseded by org. complexes. The more "available" Fe and Al present in these soils, the less is their base-exchange capacity. The morg. base-exchange complexes are unstable under the strongly acidic soil conditions. The restoration of fertility to these soils must be approached through modification of the org. matter conditions. J. W. Shipley

**A sensitive hydrometer for estimating total solids in irrigation waters and soil extracts.** Amar Nath Puri. *Soil Sci.* 36, 297 301(1933); cf. *C. A.* 26, 4666.—A sensitive hydrometer is described which is suitable for testing the approx. quality of irrigation waters. Exptl. results show that the hydrometer readings of clear soil exts. are practically a linear function of the total solids in soln. In the field it is possible with this instrument readily to classify waters into 3 groups, good, medium and bad. M. S. Anderson

**The laws of soil colloidal behavior. XIII. Osmotic imbibition.** Joseph G. Falconer and Sante Mattson. *Soil Sci.* 36, 317 27(1933); cf. *C. A.* 26, 4664.—A study is made of the relationship between pressure and the  $\text{H}_2\text{O}$  content of bentonite. Electrolyzed bentonite retains much less  $\text{H}_2\text{O}$  at various pressures than does the natural product. The electrolyzed product not air dried after first dispersed retains much more  $\text{H}_2\text{O}$  than is retained by the same product after air-drying. Bentonite satd. with Mg retains about the same amt. of  $\text{H}_2\text{O}$  as the H-satd. material and the Ca product behaves similarly. K-satd. material retains more  $\text{H}_2\text{O}$  and Li-satd. material much more  $\text{H}_2\text{O}$  than the electrolyzed material. The product  $V \sqrt{P}$  is a const. whose magnitude depends on the nature of the exchangeable cation. In this expression  $V = \frac{1}{100} \times \frac{\text{cc. of } \text{H}_2\text{O per g. of dry bentonite and}}$

$P$  = pressure applied. When 0.5  $N$   $Na_2SO_4$  is used instead of  $H_2O$ , the value for the const. is lowered, and this value is still further lowered when 0.5  $N$   $NaCl$  is used.

M. S. Anderson

**Humic acid considered as the cause of the electrochemical activity of soil.** Jaroslav Kuběš. *Chimie & industrie Special No.*, 1205 7 (June, 1933). From a discussion of the literature on the effect of lignites and humus on soils, K. considers that their action is probably due to formation of insol. humates which coat the soil particles, preventing them from agglomerating into a compact mass and maintaining the soil in a loose porous condition; they also probably give rise to electrochem. phenomena through which nutritive elements which are present in insol. form are solubilized and rendered available to the plants.

A. Papineau-Couture

**Comparison of the Neubauer method with the results of growing tests carried out in Moravia in 1926 1931.** Otto Kyas. *Chimie & industrie Special No.*, 1217 41 (June, 1933). Neubauer's method was applied to Moravian soils, with which accurate field tests were carried out to det. their requirements of nutritive substances. The tests were carried out over a no. of yrs. on soils of various mech. textures and suitable for the cultivation of wheat and potatoes and as prairies. In the cases where Neubauer's physiol. method indicated a lack of nutritive substances (K,  $P_2O_5$ ) the field tests showed that in most cases when fertilizers were added in amts. sufficient to bring the K and P contents of the soil above the crit. values, as detd. by the Neubauer method, the crops increased, but in some cases no increase was noted. It is concluded that, in order to obtain remunerative crops on Moravian soils, the amt. of fertilizers (particularly K) added to the soil should be greater than the crit. amt. as detd. by the Neubauer method, or else the amt. required should be detd. directly by field tests.

A. Papineau-Couture

**Some factors limiting the applicability of biological methods for determining the availability of plant food elements in calcareous soils.** Robert A. Greene. *Soil Sci.* 36, 201 6 (1933). The *Azotobacter* method for detg. the availability of phosphates in soil is of little value on calcareous soils. However, if a soil of high  $pH$  is well aerated, *Azotobacter* will develop and by the production of  $CO_2$  and org. acids will lower the  $pH$  of the soil sufficiently to permit the absorption of phosphate. This test for P availability is most successful in soils which are extremely deficient in P.

M. S. Anderson

**The importance of calcification and its technic.** Buchinger. *Mitt. deut. Landw.-ges.* 48, 174 6 (1933). The importance of applying Ca to soil regularly in small amts. is emphasized.

B. C. Brunstetter

**The accumulation and availability of phosphorus in old citrus grove soils.** O. C. Bryan. *Soil Sci.* 36, 245 59 (1933). A study is made of the total, available, and  $H_2O$ -sol. forms of P in the soils of citrus groves. Each of these forms of P increases with age of the groves where customary fertilization is used. The accumulation of sol. P is much greater than in other humid soils. This is due to the low P-fixing power of sandy soils and to the low P requirements of citrus trees. Leaching and plant response studies show a much greater movement of P fertilizers in Florida soils than in California. The optimum concn. of P in the soil soln. for citrus growth is not known, but it appears that the amt. accumulated in the soil from fertilization is in excess of that needed.

M. S. Anderson

**Rational utilization of phosphoric acid in the growth of plants.** Ad. Tilp. *Chimie & industrie Special No.*, 1245 6 (June, 1933).  $P_2O_5$  incorporated into arable soils is generally utilized only to the extent of about 15%. The balance can be rendered available for plants by addn. of very finely ground  $SiO_2$ .

A. Papineau-Couture

**Factors affecting the phosphoric acid-phosphate rock reaction.** H. L. Marshall, L. F. Rader, Jr. and K. D. Jacob. *Ind. Eng. Chem.* 25, 1253 9 (1933). Representative phosphate rocks were treated with reduced

$H_2PO_4$ . Max. conversion of the  $P_2O_5$  to available forms without heating was obtained with acid contg. 64% of  $H_2PO_4$  and storing for 4 days or longer. Almost complete conversion was obtained when the temp. of the mixt. was held at 60° during stirring followed by storage for 2 days. The quantity, concn. and purity of the acid, the type and particle size of the rock and the time of mixing were of varying degrees of importance. K. C. Beeson

**Phosphate rock.** Bertrand L. Johnson. *U. S. Bur. Mines, Minerals Yearbook 1932-33*, 701-7 (1933). A. H. E.

**The availability and downward movement of rock phosphate in Illinois soils when used liberally for 25 to 30 years and influence of the treatment on available potash and total nitrogen.** A. U. Thor. *J. Am. Soc. Agron.* 25, 661 74 (1933). The study was made on the soils of 3 Illinois corn belt farms, on all 3 of which rock phosphate has given satisfactory results. The soils of the Mies and Mann farms are brown silt loams, and the soil of the Hopkins farm is a gray silt loam. The amts. of sol. P on the Mies, Mann and Hopkins farms have been increased 370, 217 and 224 lb. per acre, resp., through the addn. of rock phosphate. On the open-textured soils there was an appreciable downward movement of P into the 8 to 16 and 16 to 24 in. depths. On the more compact soil there was a definite movement into the 7 14 in. depth but only a slight movement into the 14-21 in. depth. The amt. of P recovered by weak acid extr. plus that removed by crops accounts for 90% or more of the total applied. The use of limestone has reduced the acidity to a marked extent in the plowed layer and to a slight degree in the subsurface and subsoil strata. Applications of rock phosphate on the Hopkins farm appear to have reduced acidity slightly. The use of lime and rock phosphate with the growing of legumes regularly in the rotation has apparently increased the amts. of available  $K_2O$  and total N in the surface soil of the Hopkins and Mies farms.

J. R. Adams

**Relation of Pythium to growth failure on phosphate-fixing soils.** D. A. Cooke. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 169 78. In Mitscherlich pot tests certain Hawaiian soils fixed all the  $P_2O_5$  added, and 3 7 times the normal dose had to be given for max. growth. Small quantities of chloropicrin gave the same result as high  $P_2O_5$ . The chloropicrin brought about no chem. or phys. change in the soil, and it did not stimulate plant growth directly. Nematodes and protozoa were not affected by it. It was finally found that the chloropicrin destroys the cane root rot fungus *Pythium aphanidermatum*. The similar effect of phosphate is explained by the stimulation and strengthening of root growth. The use of chloropicrin or large phosphate applications would be too expensive in practice, but the planting of varieties resistant to *Pythium* would be feasible on such soils. This should be combined with applications of  $P_2O_5$  near the roots of the cane. Mixing with the soil should be avoided to prevent fixation.

F. W. Zerber

**Availability of iron, aluminum and other phosphates.** R. P. Bartholomew and K. D. Jacob. *J. Assoc. Official Agr. Chem.* 16, 598 611 (1933); cf. Ross, J. and Beeson, C. A. 26, 4404. The availability of synthetic and natural  $AlPO_4$ ,  $FePO_4$ ,  $MgHPO_4$ ,  $Mg_3(PO_4)_2$ ,  $MgNH_4PO_4$ ,  $K_2P_2O_7$ ,  $Ca_3P_2O_7$ ; K and Ca metaphosphates, superphosphate and  $CaH_2(PO_4)_2$  was detd. by chem. methods, production of plant material and absorption of P by plants. The Mg phosphates, synthetic  $AlPO_4$ , unignited  $FePO_4$ , K meta- and pyrophosphates, and  $CaH_2(PO_4)_2$  are completely or nearly completely sol. in neutral  $NH_4$  citrate soln. according to the official A. O. A. C. method of analysis. Ignition increases the citrate soly. of natural hydrated  $AlPO_4$  and decreases the soly. of synthetic  $FePO_4$ , but has no effect on the soly. of synthetic  $AlPO_4$ . The citrate soly. of ignited  $AlPO_4$  and ignited  $FePO_4$  increases with increase in the wt. of sample taken for analysis; the reverse is true with unignited natural  $AlPO_4$ . The relative efficiencies in production of increased growth of Sudan grass, as compared with  $CaH_2(PO_4)_2$  as 100, are: ignited natural  $AlPO_4$ , 106.5,  $MgNH_4PO_4$ , 105.0,  $Mg_3-$

( $\text{PO}_4$ ), 94.3, unignited synthetic  $\text{AlPO}_4$ , 93.6, ignited synthetic  $\text{AlPO}_4$ , 42.8, ignited  $\text{FePO}_4$ , 27.1, unignited  $\text{FePO}_4$ , 8.4. The  $\text{P}_2\text{O}_5$  of unignited synthetic  $\text{AlPO}_4$ ,  $\text{MgHPO}_4$ ,  $\text{Mg}_2(\text{PO}_4)_3$ ,  $\text{MgNH}_4\text{PO}_4$ , K metaphosphate and  $\text{K}_2\text{P}_2\text{O}_7$  is absorbed more readily by plants than the  $\text{P}_2\text{O}_5$  of  $\text{CaH}_2(\text{PO}_4)_2$ ; for the other phosphates, the relative increases in the amts. of  $\text{P}_2\text{O}_5$  absorbed by the plants, compared to  $\text{CaH}_2(\text{PO}_4)_2$  as 100 are:  $\text{FePO}_4$ , 98.3, ignited synthetic  $\text{AlPO}_4$ , 83.5, ignited natural  $\text{AlPO}_4$ , 71.3, unignited natural  $\text{AlPO}_4$ , 52.5, ignited  $\text{K}_2\text{P}_2\text{O}_7$ , 50.7. In general, the relative availabilities of the phosphates, as detd. by the citrate method, are in good agreement with their relative fertilizer efficiencies as indicated by plant growth and absorption of  $\text{P}_2\text{O}_5$ . On the basis of the total amt. of dry matter produced, the only outstanding exceptions are the low value assigned to unignited  $\text{FePO}_4$ , which was completely sol. in citrate soln., and the high value assigned to ignited natural  $\text{AlPO}_4$ . The results, on the basis of the amt. of  $\text{P}_2\text{O}_5$  absorbed by the plants, also agree with the availability shown by chem. analyses, with the exception of ignited synthetic  $\text{AlPO}_4$  and the unignited natural  $\text{AlPO}_4$ . The results, as a whole, show that the neutral  $\text{NH}_4$  citrate test gives a reliable index of the fertilizer value of the  $\text{P}_2\text{O}_5$  in these particular phosphates. The 2% citric acid method does not give a reliable indication of the fertilizer value of the  $\text{P}_2\text{O}_5$  in Fe and Al phosphates.

A. Papineau-Couture

**Composition of some locally grown [Alaska] forage crops.** F. L. Higgins. *Rept. Alaska Agr. Expt. Stations* 1931 32, 22 3(1933). Cotton sedge, *Eriophorum vaginatum*; bluetop, *Calamagrostis* sp.; native sedge, *Carex aquatilis*, bird vetch, *Vicia cracca*; and brome grass, *Bromus inermis* yielded, resp., upon chem. examn.: lat 1.4 2.0, 1.5 1.8, 1.3 2.2, 1.4 and 1.4; crude fiber 28 34, 32 40, 29 37, 35 5 and 32 7; protein 4 10, 2 6 11 5, 3.7 12.2, 10 7 and 7 6 3; ash 1.6 2.9, 4.2 7.3, 2.0 5.6, 6.6 and 7.3%. The results show that sedges should be harvested during late Aug. and bluetop during late July to obtain max. feeding value.

C. R. Fellers

**The use of alfalfa and other semipermanent cover crops in the orchard.** A. J. Hemmick. N. Y. State Hort. Soc., *Proc. 17th Ann. Meeting* 1932, 59-60; cf. C. A. 26, 5685. Where no N fertilizer was added to the soil, the leaves of apple trees growing on grass plots were lowest in N, while those from trees growing on clover plots were highest; the use of N fertilizers greatly reduced the differences. The N content of the leaves of trees growing on alfalfa and grass plots cut in June was appreciably higher than that of leaves of trees on plots cut in Aug.

K. D. Jacob

**The control of Bermuda grass through the use of chlorates.** H. F. Murphy. *J. Am. Soc. Agron.* 25, 700 1 (1933). Bermuda grass can be controlled by the use of  $\text{NaClO}_3$  or  $\text{Ca}(\text{ClO}_3)_2$ , although the rate of application and cost is such as greatly to limit the size of the area that can be treated. Very good control was secured on both mowed and unmowed grass from the use of either chemical when applied in 2 applications  $1\frac{1}{2}$  months apart, from July 15 to Sept. 3, each application being made at the rate of 200 lb. per acre. For large areas the use of sowed cane or shade crops is to be recommended in Bermuda grass control.

J. R. Adams

**The fixation of atmospheric nitrogen by bacteria living symbiotically in root nodules of *Casuarina equisetifolia*.** R. N. Aldrich-Blake. *Oxford Forestry Mem.* 14, 1 20 (1932); *Rev. Applied Mycol.* 12, 582 3.—The fixation of atm. N by the bacteria occurring as symbionts in the root nodules of *Casuarina equisetifolia* is considered proved by growing uninoculated, inoculated and plants receiving  $\text{NH}_4\text{NO}_3$  under controlled conditions. The dry roots contained 0.96, 1.31 and 0.77% N, resp. The weights of the dry roots were 9.28, 133.5 and 33.83 g., resp.

Oden B. Sheppard

**Some factors influencing nitrogen fixation.** J. B. Graves. *Soil Sci.* 36, 267 80(1933). The N fixed in soil and in Ashby's medium together with soil ext. varies with the character of the soil. The activity of *Azotobacter*

*chroococcum* is greatly enhanced when Mn, Fe and I are added to liquid culture media. These elements appear to be essential to the growth metabolism of this micro-organism. Other elements such as B, Al, Cu, Br, Zn, Ti, Se and Te are non-essential to *Azotobacter*, while Cu and Zn are toxic even in very small amts. A basal medium is suggested which contains Fe, Mn and I and in which *Azotobacter* grows as profusely and fixes as much N as in soil ext. media. It has the advantage of having a definitely known compn.

M. S. Anderson

**Nitrogen mixed fertilizers.** Ernst Galle. *Chimie & Industrie Special No.*, 721-4 (June, 1933).—A brief discussion of the fertilizers recently developed by the I. G. Farbenindustrie: Leunaphos, Nitrophoska, Huminol.

A. Papineau-Couture

**Simple fertilizers or mixed fertilizers.** Rudolf Trnka. *Chimie & Industrie Special No.* 1242 4 (June, 1933).—A brief discussion.

A. Papineau-Couture

**Mixed fertilizers and the sugar beet.** Louis Decoux. *Ind. sacchar. ital.* 26, 460-2(1933).

L. Cusachs

**Production of concentrated fertilizers by decomposition of flotation concentrates with nitric acid and subsequent treatment of the product with ammonium sulfate and ammonia.** I. Kukushkin and A. Morozova. *Khimstrof* 5, 2343-51(1933).—The lab. expts. in the production of mixed fertilizers are based in part on Brit. pat. 232,330 and other patents. Flotation concentrate of apatite was decompd. with  $\text{HNO}_3$ , the reaction mass was treated with tech.  $(\text{NH}_4)_2\text{SO}_4$  and filtered from  $\text{CaSO}_4$ , the filtrate was neutralized with aq.  $\text{NH}_3$  and evapd. to dryness.  $\text{CaSO}_4$  treated with  $\text{NH}_3$  and  $\text{CO}_2$  gave  $\text{CaCO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$ .

Chas. Blanc

**Selection of potash fertilizers for the cultivation of potatoes.** Antonin Némec. *Chimie & Industrie Special No.*, 1247-50 (June, 1933). The use of K fertilizers, particularly those contg. KCl, produces a decrease in the starch content of potatoes grown in soils rich in chlorides; so that with such soils  $\text{K}_2\text{SO}_4$  fertilizers should be chosen. In selecting K fertilizers the compn. of the soil, and more particularly its chloride content, should be taken into consideration.

A. Papineau-Couture

**Determination of potash as perchlorate.** M. Lenglen and Milhiet. *Ann. fals.* 26, 469-70(1933).—The French official method for detn. of  $\text{K}_2\text{O}$  in fertilizers stipulates that the mixed alkali chlorates be taken up in 10 cc. of 95-96% alc. and washed with 3 5-cc. portions. This is likely to give high results, particularly in presence of relatively large amts. of  $\text{NaClO}_4$ , because of incomplete removal of the latter. In order to ensure complete removal of  $\text{NaClO}_4$ , a total vol. of at least 70 cc. of alc. (preferably satd. with  $\text{KClO}_4$  to avoid partial soln. of the  $\text{KClO}_4$ ) should be used.

A. Papineau-Couture

**Use of coal as a fertilizer.** Alexander D. Kissel. *Chimie & Industrie Special No.*, 705 18 (June, 1933).—A review and discussion showing that coals of low caloric value can be used, after suitable treatment, as a supporting material in the manuf. of fertilizers which are characterized by: (1) absence of inert material; (2) a high humic acid content which acts by maintaining the phys. properties of the soil and by the nutritive value of its C content; (3) the presence of nutritive matter in proper proportions.

A. Papineau-Couture

**Dolomite as a fertilizer supplement—its behavior and control.** W. H. MacIntire. *J. Assoc. Official Agr. Chem.* 16, 589 98(1933). A general discussion of the benefits of the use of dolomite as a fertilizer supplement and of the problems which its recognition would involve from a regulatory standpoint.

A. Papineau-Couture

**Effect of fertilizers on irrigated Ephrata fine sand and apple tree response in the Wenatchee orchard district.** C. A. Larson. *J. Am. Soc. Agron.* 25, 633-52(1933).—An attempt was made to discover the effect of various fertilizer treatments on the absorbing complex of the soil and its relation to tree response and yield of fruit. Neither  $\text{H}_2\text{O}$  nor 0.2N  $\text{HNO}_3$  extn. of the soils nor electroanalysis of the soils gave any reliable indications of relative productivity as affected by the fertilizer applications. The

amt of nitrate N<sup>o</sup> contained in the plat soils during the first half of the growing season was rather closely correlated with the actual production of fruit. The H ion concn of the various plat soils showed that combination of N and P and N, P and K increased the acidity of the soil. There appears to be a tendency for Ca, N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O to be in a definite ratio to each other in the apple leaves when production is good. Plats producing leaves with a relatively low percentage of P<sub>2</sub>O<sub>5</sub> and a high percentage of N gave an increased yield. Where N has been applied alone or in combination with other fertilizers, yield has increased. J R Adams

The shielding effects of various materials when insects are exposed to lines of force in a high frequency electrostatic field. Louis Pycn on *J N Y Entomol Soc* 41, 241-52(1933). The lethal effect of line of force in a high-frequency electrostatic field is limited in solid dielectric, by the moisture content, in pure liquid by the dielectric const. Liquid or solid conductors act as shields to insects when they are exposed to lines of force between the plate. The expts show that insect may be destroyed in many substances without injuring them. The substances are chiefly soils contg a limited amt of moisture, woody materials, tobacco seeds, breakfast foods, clothes, flours, cellulose compd and nuts. C H Richardson

Report of the imperial agricultural bacteriologist N V Joshi. Imp Inst Agr Research Pn 1 *Sci Repts* 1931 32, 116-53(1933) of *C I* 26, 331. *Antitoxin of cyanamide*. When cyanamide is added to certain Indian soils no accumulation of nitrate occurs after incubation for 20 weeks although fairly large amt of NH<sub>3</sub> accumulate in 2-3 weeks. Complete nitrification of the cyanamide occurs however, in 6-71 weeks. The delay in nitrification is due to the formation of diacyl diureide which is toxic to nitrifying bacteria and which persists in these soil for an unusually long time. The fact that nitrification eventually occurs indicate that the diacyl cyanodiamide does not kill the nitrifying organism. *Preservation of vegetables*. Lactic bacteria are normally present on *kakri* (1 of the cucurbits) but not on late cabbage. The formation of acid when cabbage is preserved in salt soln is due to the presence of epiphytic flora. K D Jacob

Progress report on vegetable diseases. IV. I. Oulvin and B O Mulligan. Univ Bristol Agr Hort Research Sta. *Ann Rept* 1932 103-20 of *C I* 27, 43. Satisfactory control of *bot ro of peas* caused by *Myco. phaeella pinodes* and *Ascochyta blight* was obtained by dusting the seed with Cresan (C<sub>2</sub>H<sub>5</sub>OH) or dipping in KMnO<sub>4</sub> soln (1 oz/gal) for 20 min. The Cresan treatment tended to preserve the cotyledons in a firm state for a long time. The treatments did not adversely affect germination. K D Jacob

Methods of testing plant protectives. IV VI. K. Gornitz, W. Trappmann, G. Nitsche and H. Voelkel. *Mitt. Biol. Reichsanst. Land- und Forstwirtschaft* 46, 1-11 (1933). *Rev. Appl. Mycol.* 12, 577. A contrivance is described for detg. the dosage of spray or dust materials deposited on the leaf surface. The mode of testing plant protectives for their resistance to washing off by rain is explained. The maintenance of permanent cultures of *Plasmopara viticola* in the inoculation of vine leaves on which to test the efficacy of new fungicides is discussed. Oden I Sheppard

Comparative laboratory tests on the fungicidal effect of colloidal and non colloidal material. W. Niggl. *Gesundheitsuch. Studtehyg.* 25, 45-50(1933). Data on colloidal and non colloidal BaSO<sub>4</sub> preps show that the fungicidal effect of a salt may be considerably increased when it is acting in the colloidal state. B C B

Pyrethrum and its derivatives. J H Irvy. *Ind. Eng. Chem. Anal. Ed.* 36, 161-65(1933). A review of these products and their use in insecticides. P I

The valuation of tuba root. C D A. George and Cunn. *Malay State. Ser. Ser. No. 12*, 0 pp (1933). *C I* 1

27, 1443. An attempt is made further to standardize the approximation of the 2 methods of valuation of tuba roots, i.e., amt of material extd with a solvent for the amt of rotenone present. This standardization covers selection of sample, prepn of root for analysis, detn of moisture, detn of solvent ext and detn of rotenone. The moisture content of the air dry root varies from 7 to 10% and can be detd by drying finely ground material to const wt in a steam oven at 100° or by distn with xylene. The latter gives slightly higher results and is preferable. The amt of extractable material is customarily detd by extn with ether for 48 hrs. The ether may be replaced by CCl<sub>4</sub>, acetone or CHCl<sub>3</sub>. A modification of the Roark method for detn of rotenone is suggested in which a few crystals of pure rotenone are introduced into the concd ext to insure satisfactory sepn of the rotenone. It was also found advisable to purify the rotenone by recrystn from alk before weighing. Ether was found unsatisfactory for the extn of the rotenone and can be replaced advantageously by either CCl<sub>4</sub> or CHCl<sub>3</sub>. Figures on both *Derris malaccensis* and *Derris elliptica* show that while the endodermic portion of the root is rich in both rotenone and ether ext than the outer th difference is insufficient to require preliminary sepn of the roots into constituent parts. J R A

The determination of the adhesiveness of dusts to treated cereal seed grain in the supervision of cooperative disinfection plants. G. Friedrichs. *Nachrichtbl. Deut. Pflanzenkrankheitsdienst* 13, 36-7(1933). *Rev. Appl. Mycol.* 12, 558-9. A colorimetric method of testing disinfectant dust for their adhesive capacity based on the admixt with the fungicidal substance of a dye which, on slightly moistening the cereal seed grain, colors the latter to a varying degree according to the amt applied is described. Winkelmann (*C I* 26, 805) suggested the method. Oden I Sheppard

Tests of certain dusts and ready made sprays for the control of potato blight in comparison with Burgundy mixture. Paul A. Murphy and Robert McKay. *J. Dept. Agr. Ireland* 32, 30-35(1933). In a 4 yr expt. spraying with 2 Burgundy mixt was more effective than spraying with Pimol (a proprietary colloidal suspension of an insol complex Cu compd contg 12.5% Cu) or bluing with hydrated CuSO<sub>4</sub> powder or Cu lime dust. Burgundy mixt checks the late growth and hardens the plant. K D Jacob

Orchard sprays in New Zealand. VI. The nicotine series. G. H. Cunningham. *New Zealand J. Agr.* 47, 131-10(1933) of *C I* 27, 5877. The chemistry, prepn and use of nicotine sprays are discussed. Twenty references. K D Jacob

Combined insecticide fungicide sprays for apples. Progress report. H. G. H. Kearns, R. W. Marshall and I. P. Pearce. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932 66-83. Oil emulsions contg 65-70% oil (Shell P2) and 20-30% water are easily prepd by the addn of 5% of sulfite liquor. The emulsion is stable toward lime S mixts and hard waters, does not set to stiff jelly and is easily diluted with water. Nicotine is compatible with emulsions of oil and lime S prepd in this manner and the result of preliminary expts indicate that the alkali of the lime S is sufficient greatly to reduce the risk of foliage injury when Ca arsenate is added to such spray. Lime S plus nicotine and a wetting agent applied on Worcester apples at the petal fall stage, gave prompt result for the simultaneous control of scab and sawfly. K D Jacob

Trials with a colloidal copper spray fluid. R. W. Marshall. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932 84-9. Favorable results were obtained with Bousof (a colloidal Cu spray material contg 12.5% Cu) for the control of scab on the Stirling Castle and Lane's Prince varieties of apples which cannot be sprayed safely in the summer with either lime S or Bordeaux mixt. The spray also reduced scab and increased foliage retention on black current, without leaving a significant amt of residue on the berries. K D Jacob



Further observations on the control of the apple sawfly, *Holocampa testudinea* (Klug.). H. G. H. Kearns and T. Swarbrick. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 90-4; cf. *Ibid.* 1931, 112.—Efficient control of the larvae on Worcester Pearmain apples was obtained by spraying the fruitlets with a nicotine wash (8 oz. nicotine, 2.5 lb. Agral I and 100 gal. water) between the 6th and 12th days after petal fall. Similar results were obtained with a rape oil-derris emulsion; a derris soap wash (0.004% rotenone) gave fairly good control. Pyrethrum emulsion (representing a concn. of 0.5% of the flowers) and colloidal Pb arsenate sprays reduced the infestation by 50%. K. D. Jacob

Control of the greenhouse Symphylid (*Scutigerella immaculata*). H. G. H. Kearns and C. L. Walton. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 97-101.—Treatment of infested greenhouse soil *in situ* with cresylic acid emulsion was ineffective in controlling the pest. Good control was obtained by heavily watering the soil with HgCl<sub>2</sub> soln. (1:25,600). K. D. J

Control of strawberry leaf roller on bearing plants. Ray Hutson. Mich. Agr. Expt. Sta., *Quart. Bull.* 16, 78 (1933).—Three sprays, spaced a week apart, resulted in 85-90% control of *Ancylos complana*. The spray consisted of a combination of nicotine sulfate, 1 pint; summer oil emulsion, 1 gal.; and activated pyrethrum dust applied at the rate of 50 lb. per acre. C. R. Fellers

Control of hard rot of strawberry fruits. L. Ogilvie. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 102. Good control of the disease, which is caused by the fungus *Septoria fragariae*, was obtained by spraying the plants with 5% tar oil emulsion or with Bordeaux mixt. K. D. Jacob

Baits for the control of certain cotton pests. D. O. Atherton. *Queensland Agr. J.* 40, 183-90 (1933).—Molasses and honey baits contg. Na arsenite, kerosene, AmOAc or EtOAc were ineffective against the corn ear worm (*Heliothis obsoleta* Fabr.). A sirup of molasses and water contg. Na arsenite (0.5 oz./gal.) showed promise as a bait for the cotton looper moth (*Antarchaea chonosticta* Turn.). K. D. Jacob

Fruit scald and leaf scorch. W. D. Mills and W. B. Blauvelt. N. Y. State Hort. Soc., *Proc. 77th Ann. Meeting* 1932, 17-24. No correlation existed between the amt. of fruit scald on Baldwin apples and the various S spray and dust material applied. More or less scald followed the use of lime-S at various dilns., dry lime-S, lime S and Fe sulfate, and S dust, all of which contained Pb arsenate. Scald did not occur with Bordeaux mixt. Combinations contg. lime-S with Pb arsenate most frequently caused leaf scorch, and addns. of Fe sulfate and Ca(OH)<sub>2</sub> did not prevent injury, in general, S dusts caused but little leaf scorch. K. D. Jacob

Oil from the seeds of *Tectona grandis* (Puntambekar, Krishna) 27. Peanuts [plant as green manure] (Cross) 12. Fertilizers (Ger. pats. 579,627-8-9) 18.

Arnold, Lionel K: Utilization of Agricultural Wastes and Surpluses. Ames, Ia.: Iowa State College. (Bull. 113, Eng. Extension Service.) 31 pp.

Fertilizer. Silas J. Smith. U. S. 1,930,542, Oct. 17. A mixt. is formed from moist fibrous material such as peat and sol. fertilizer material such as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> or NaNO<sub>3</sub>, and this mixt. is heated to dissipate moisture from the fibrous material in the form of steam and cause the sol. fertilizer to dissolve and penetrate the fibrous material.

Fertilizer. Charles Peter. U. S. 1,931,296, Oct. 17. Fine rock phosphate, fine lime rock and fine salt are mixed, and the mixt. is roasted at about 315-425° for about 30 min. A mixt. of fine coal and fine salt is separately roasted at about 175-315° for about 30 min. The two resulting mixts. are combined with each other and with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>.

Fertilizers. Kali-Forschungs-Anstalt G. m. b. H.

(Hans Friedrich, inventor). Ger. 569,151, Sept. 26, 1933. Solns. contg. K<sub>2</sub>SO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, NH<sub>3</sub>, and CO<sub>2</sub>, such as are obtained in the processes of Ger. 478,988 (C. A. 23, 4782) and 497,611 (C. A. 25, 503-4), are heated to remove NH<sub>3</sub> and CO<sub>2</sub>, treated with HNO<sub>3</sub> or nitrous gases, and then used for the treatment of crude phosphate. The resulting soln. is concd. and the cryst. product is dried in a stream of NH<sub>3</sub>. Other fertilizers may be mixed with the product before or after drying.

Fertilizers. Franz Haniel & Cie. G. m. b. H., Zweigniederlassung Mannheim. Fr. 750,638, Aug. 14, 1933. A humous fertilizer capable of dispersion is made by injecting an aq. fertilizer under pressure into a chamber contg. a finely divided peaty mass in suspension. Agents acting to exterminate harmful insects may also be injected.

Mixed fertilizer. Hermann Ochme and Ernst Herrmuth (to Chemische Fabrik Kalk G. m. b. H.). U. S. 1,930,883, Oct. 17. In producing a mixed fertilizer contg. Ca phosphate and N, decompn. products such as may be obtained from raw phosphates by treating them with acid are first treated with dil. NH<sub>3</sub> and then with concd. NH<sub>3</sub> with simultaneous addition of such a quantity of water that on complete or substantially complete satn. with NH<sub>3</sub> a directly strewable mixed fertilizer is produced.

Phosphatic fertilizer. Beverly Ober and Edward H. Wight (to Oberphos Co.). U. S. 1,929,710, Oct. 10. Phosphate rock is converted to available forms by digesting it with an acid such as H<sub>2</sub>SO<sub>4</sub> under superatm. pressure, followed by agitating the digestion products with other fertilizer materials such as NaNO<sub>3</sub>, fish scrap, garbage, etc., and reducing the pressure, adding NH<sub>3</sub> and further agitating and cooling.

Mulching product in sheet form. Carrel C. Bryar. U. S. 1,931,248, Oct. 17. For making a sheet mulch, sewage sludge is filtered to produce a filter cake of org. sewage sludge residue conditioned to produce a material self-sustaining in sheet form, and the filter cake is formed into a sheet. App. is described.

Artificial fog for protecting plants from frost and parasites. Ulrich Müller. U. S. 1,930,904, Oct. 17. A fog blanket is formed over plants by the simple volatilization of fog-forming and parasite-killing material such as "chlorosulfo acid" and H<sub>2</sub>SO<sub>4</sub>. App. is described.

Insecticides. Nicholas A. Sankowsky and Stewart C. Fulton (to Standard Oil Development Co.). Brit. 394,977, July 4, 1933. Insecticidal plant exts., e. g., of pyrethrum, derris and cubé, are mixed with hydrocarbons having considerable "unsatd." content and obtained by the extn. of petroleum naphtha with a solvent, e. g., liquid SO<sub>2</sub>, having preferential solvent action on the unsatd. hydrocarbons. A hydrocarbon vehicle contg. unsatd. aromatic hydrocarbons, obtained in any manner, to the extent of above 15%, the mixt. boiling at 350-600°F., is also suitable as a solvent.

Insecticides. I. G. Farbenind. A.-G. (Kurt Meisenburg and Hans Kukenthal, inventors). Ger. 583,344, Sept. 1, 1933. Use is made of cyanohydrin esters of the formula R<sub>1</sub>(R<sub>2</sub>)C(CN)OCOR<sub>3</sub>, where R<sub>1</sub> and R<sub>2</sub> may be H or org. radicals, and R<sub>3</sub> is an org. radical. The esters may be used alone or with appropriate addns. Details are given of the prepn. and use of cyclohexanocyanohydrin acetate, b<sub>p</sub> 118°, and crotonaldehydecyanohydrin benzoate, b<sub>p</sub> 159-60°, and acetate, b<sub>p</sub> 85-7°. The benzoates of the cyanohydrins from furfural, acrolein, sorbic aldehyde, pinacolone and CH<sub>2</sub>O have also been prepd.

Non-corrosive insecticidal mixture suitable for use as an agricultural spray. Earl B. Alvord (to Grasselli Chemical Co.). U. S. 1,931,367, Oct. 17. A mixt., imparting to its aq. suspensions a pH of 4.0 and greater, comprises Ba fluosilicate as an active parasiticide ingredient together with a substantially neutral fluoride such as BaF<sub>2</sub> or Al-Na fluoride which has a water soly. greater than that of CaF<sub>2</sub>.

Insecticides, fungicides, etc. I. G. Farbenind. A.-G. (Karl Marx and Karl Brodersen, inventors). Ger. 583,020, Aug. 26, 1933. Addn. to 551,199 (C. A. 26,

4408). Use is made of the sulfonation products of mixts. of mineral oils (other than ordinary coal-tar oils) with phenols, naphthols or their derivs.

**Insecticides and fungicides.** I. G. Farbenind. A.-G. (Addolf Steindorff and Kaspar Pfaff, inventors). Ger. 583,343, Sept. 1, 1933. See Fr 746,258 (C. A. 27, 4623).

**Fumigating.** Anthony Standen, Thomas Ewan and Imperial Chemical Industries Ltd. Brit. 895,761, July 24, 1933. In rapidly generating a definite quantity of HCN a predetd. amt. of NaCN is caused to react with the equiv. amt. of NaHSO<sub>4</sub> in the presence of an amt. of H<sub>2</sub>O to give a mol. ratio, H<sub>2</sub>O:NaCN, of 10:1, an optimum yield of gas being thereby obtained in a short time.

## 16 THE FERMENTATION INDUSTRIES

C. N. FREY

**Manufacture of alcohol in Denmark.** J. Filrsten. *Chimie & industrie Special No.*, 1177-95 (June, 1933). - A description of the development of the alc.-distg. industry in Denmark and of the process and Aalborg plant of the Aktieselskabet De Danske Spritfabrikker, touching also on the agronomical problems relating to the use of the raw materials, particularly potatoes. A. P.-C.

**Utilization of marine algae for preparation of yeast and alcohol.** G. K. Burgvitz. *Bull. acad. sci. U. S. S. R., Classe sci. math. nat.* 1933, No. 6, 837-16. The fungus, *Mucor javanicus*, differing from yeasts, has the advantages: (1) that it ferments *Laminaria* ext. without preliminary hydrolysis and (2) produces larger alc. yields; its disadvantage is slowness in fermenting 9-12 days. Fermentation by yeasts proceeds only in hydrolyzed ext. and not all of the sugar ferments. Addn. of 2-5% glucose to the *Laminaria* ext. materially speeds up fermentation. *Laminaria* may also serve as a food medium for yeast cultivation. The fermentation ability of *Saccharomyces cerevisiae* is not decreased when allowed to remain on *Laminaria* ext. for 105 days. Growth of *Saccharomyces cerevisiae* on *Laminaria* ext. is inferior to its growth on malt wort. Expts. with yeasts *Torulopsis III* and *XIII* showed that on *Laminaria* ext. (concn. 1% Ball.) the yeast harvest equals that obtained on bread wort of the same concn. All yeasts were cultivated at 25° on a 5% *Laminaria saccharina* ext., 4° Ball. and  $p_{H}$  5.91 and 10% ext. of the same *Laminaria*, 7° Ball.,  $p_{H}$  5.92. W. P. Bucks.

**The mannitol fermentation of levulose.** V. Bolcato. *Ann. chim. applicata* 23, 405-10 (1933). The fermentation of levulose by means of mannitol acetic acid enzymes takes place with the production of lactic acid, mannitol, AcOH and CO<sub>2</sub>. There is no relation between the amts. of lactic acid and mannitol formed. But for every 3 mols. of levulose, there are formed 2 mols. mannitol, 2 AcOH and 2 CO<sub>2</sub>. A. W. Conteri.

**The mannitol fermentation of beet fodder.** J. Vondrák. *Chimie & industrie Special No.*, 1113-6 (June, 1933). See C. A. 27, 1981. A. Papineau-Couture.

**Report on (the analysis of) vinegar.** A. M. Hurv. *J. Assoc. Official Agr. Chem.* 16, 536-10 (1933), cf. C. A. 27, 160. - Collaborative tests confirmed that the use of NH<sub>4</sub>Ph<sub>2</sub> as inside indicator in the detn. of glycerol gives as accurate results as K<sub>2</sub>Fe(CN)<sub>6</sub> as outside indicator, but is quicker and more convenient. In the detn. of ash, the tendency to cake or form dense carbonaceous residues is effectively prevented by addn. of 2 g. sucrose. The highest ashing temp. which can be safely used without altering the ratio of H<sub>2</sub>O-insol. to H<sub>2</sub>O-sol. P<sub>2</sub>O<sub>5</sub> is 550°, while it is practically impossible to obtain proper ashing at or below 500°. A. Papineau-Couture.

**Simple test for slop vinegar in wine vinegar.** Hans Barsch. *Pharm. Zentralhalle* 74, 599-600 (1933). - Shake vigorously for 1 min. 20 cc. of the sample in a closed 50 cc. cylinder. If the product contains 5% or more vinegar from brewer's grains or slops, a thick fine-pored white foam will appear at the surface, permanent for a period of 1/2 hr. to several hrs., depending on the amt. of added slop vinegar. On similar treatment pure wine vinegar yields a coarse-grained, very loose and thin film of bubbles which rapidly disappear. The peculiar behavior of slop vinegar may be due to the presence of saponin.

**The barleys of 1933.** J. Raux. *Brasserie & malterie* 23, 214-16 (1933). A brief outline of the characteristics

(from the standpoint of malting) of 1933 barley crops of the principal districts of France. A. P.-C.

**Commercial utilization of Spartan barley.** H. C. Ruther. *Mich. Agr. Expt. Sta., Quart. Bull.* 16, 23-5 (1933). - This barley is particularly well adapted to Mich. soil and climatic conditions. It is entirely suitable for malting purposes. It is also adapted for pearling and use in soup. C. R. Fellers.

**Evaluation of malt barleys.** P. Petit. *Brasserie & malterie* 23, 193-5, 209-13 (1933). - A brief discussion of the factors which should be considered in evaluating the malting qualities of barley, with suggestions for establishing a mutually satisfactory basis of purchase; it is more particularly suggested that there should be a requirement of a min. germinative power of 90%. A. P.-C.

**Preliminary washing of hops.** P. Petit. *Brasserie & malterie* 23, 177-82 (1933). A brief discussion of the advantages of extg. hops with hot water before adding to the brewing kettle. A. Papineau-Couture.

**Czechoslovakian hop oil and its practical utilization.** Nebovidské and J. Horel. *Chimie & industrie Special No.*, 1208-13 (June, 1933). - Analyses are given of a no. of oils obtained by distg. Czechoslovakian hops of the 1930 and 1931 crops, and discussed from the standpoint of their possible utilization in the beverage, perfumery and soap industry, and ultimately also in medicine. A. P.-C.

**Better "3.2" cider.** Weaver L. Marston. *Food Ind.* 5, 358-9 (1933). Methods of fermented cider manuf. in England are outlined. The Sharples supercentrifuge for clarification has proved very satisfactory and retains both body and flavor of the beverage better than filtration methods. By centrifuging a partially fermented cider, the fermentation is greatly checked. As a rough check in detg. the alc. content of fermenting cider, a 9-point drop (0.009) in sp. gr. is equal to approx. 1% of alc. by vol. The parts of the centrifuge coming in contact with the cider should be made of Monel or other non-corrosive metal. C. R. Fellers.

**Production conditions and composition of vinasses of agricultural distilleries in Czechoslovakia.** Václav Viličkovský. *Chimie & industrie Special No.*, 1190-9 (June, 1933). The compns. of the vinasses from 36 distilleries working with potatoes, corn, and potatoes with molasses is given and discussed from the standpoint of the conditions affecting the compn. of the vinasses. A. P.-C.

**Practical application of chemistry in wine cellars.** Herzberg. *Chem.-Ztg.* 57, 681-2 (1933). The importance of the chemist is emphasized in controlling the samples and correcting various faults and diseases of wine. C. N. Frey.

**Observations on the composition of the wines of the 1932 vintage in Champagne.** Lebrun and Radet. *Ann. fals.* 26, 474-80 (1933). - Analyses of 33 wines are tabulated and briefly discussed. A. Papineau-Couture.

**The color of wine.** F. Montequi. *Anales soc. españ. fis. quim.* 31, 663-8 (1933). - The color curve of red wine was tested under various conditions and in comparison with artificial colors, for special properties of a given kind of wine, to det. the conclusions claimed regarding storage and adulteration. The Pulfrich photometer was used. The results indicate the importance this work might prove to have if carried further. E. M. Symmes.

**Sulfurous acid in wine making. III. Dissociation of combined sulfur dioxide in grape musts and wines.** L. Moreau and E. Vinet. *Ann. fals.* 26, 454-63 (1933);

cf. C. A. 22, 2485.—The free and combined  $\text{SO}_2$  in must or wine are in equilibrium; removal of part (or all) of the free  $\text{SO}_2$  (e. g., by oxidation) disturbs the equilibrium, which is reestablished by disson. of part of the combined which becomes free. Plotting the amt. of  $\text{SO}_2$  oxidized as abscissas against remaining free  $\text{SO}_2$  (after equil. has been reestablished) as ordinates gives a curve consisting of 2 straight lines, the left-hand one corresponding to disson. of the  $\text{SO}_2$  combined in virtue of the R no. (C. A. 21, 4018); the other (which makes a more acute angle with the x axis) to disson. of the  $\text{SO}_2$  combined in virtue of the T no. As the inhibition of fermentation of must by  $\text{SO}_2$  depends only on the free  $\text{SO}_2$  content, it is important to know how much of the combined  $\text{SO}_2$  will be disson. into free when the free  $\text{SO}_2$  is reduced to a given value, and M. and V. explain how this may be calcd. from the above curves. In the course of fermentation of must contg.  $\text{SO}_2$ , the whole of the  $\text{SO}_2$  becomes combined with the volatile constituents (probably paraldehyde) in the early stages of fermentation. Increase in temp. not only increases the rate of disson., but also displaces the equil. point in the direction of higher free  $\text{SO}_2$ ; increase in acidity retards or even completely inhibits disson. of the combined  $\text{SO}_2$ ; reduction of the acidity increases it, and complete neutralization causes practically complete liberation of the combined in not over 5 min.; diln. increases the disson. A. Papineau-Couture

**Trihexosan and dextrinose in the manufacture of beer.** J. Satava and P. Rach. *Chimie & Industrie Special No.*, 1173-6 (June, 1933).—Trihexosan,  $[\alpha]_D^{20}$  102.1°, reducing power equiv. to 3.1% glucose, was isolated by a tedious method combining fermentation, dialysis and repeated pptns. with alc. and requiring about 3 weeks. Trihexosan,  $[\alpha]_D^{20}$  103.3°, reducing power equiv. to 0.82, mol. wt. 487 (theoretical 486.2) was obtained from beer wort by defecating with tannic acid and basic Pb acetate, pptg. excess Pb with  $\text{H}_2\text{S}$ , neutralizing with NaOH, eliminating colloidal S with Carborafin, dialyzing to remove acetates and ash, pptg. with alc., oxidizing the ppt. with  $\text{H}_2\text{O}_2$  and NaOH and pptg. with alc. To det. trihexosan in beer, after oxidation with  $\text{H}_2\text{O}_2$  and NaOH, the liquid is hydrolyzed with HCl to convert the trihexosan quantitatively into glucose, which is detd. During the primary fermentation of beer, about 30% of the trihexosan is decompd. by the yeast. A. Papineau-Couture

**Study of the composition of pitch baths (for beer kegs).** L. Idoux. *Brasserie & malterie* 23, 182-9, 197-200 (1933).—Deterioration of the pitch used for treating beer kegs is due to loss of volatile matter and decompn. of the resin, by heat. Though Fe kettles are corroded to some extent, as shown by the presence of an appreciable amt. of Fe in the ash of used pitch, this Fe apparently does not act as an oxidation catalyst. The pitch deteriorates much more rapidly in practice than in lab. tests conducted under apparently the same conditions of heating; this is probably due to uneven heating and local superheating in com. equipment. It is suggested that Al kettles would reduce this trouble, and would probably be more economical than Fe kettles, in spite of their higher first cost.

1 Better results would probably be obtained by removing a small portion of the used pitch at the end of each day's run and replacing by fresh pitch, than by the usual practice of waiting till the bath is useless and then renewing the whole charge. A. Papineau-Couture

**Improvement of yields by the use of various types of saccharomyces.** René Pique. *Chimie & Industrie Special No.*, 1108-72 (June, 1933).—A brief discussion showing that the use of various strains of *Saccharomyces ellipsoideus*, especially studied for each must to be fermented, increases the yield of alc., accelerates the rate of fermentation, ensures preservation of the finished beverage by elimination of injurious ferments and imparts a characteristic bouquet depending on the particular strain used. A. Papineau-Couture

**The vitality of yeast plasma.** Vaclav Jonaš. *Chimie & Industrie Special No.*, 1164 7 (June, 1933).—See C. A. 25, 5011. A. Papineau-Couture

**Ultra-violet irradiation stimulates yeast activity.** Wm. L. Owen. *Food Ind.* 5, 252-4 (1933).—The fermentation of molasses wort by yeast is greatly accelerated by short exposure to ultra-violet rays, and the final efficiency of fermentation is also increased perceptibly by it. A baker's yeast, given a limited exposure to ultra-violet rays (2300-3100 Å.) has a definite acceleration and a greater sustained fermentation activity than untreated yeast of the same origin; also because of this greater sustained fermentation activity, irradiated yeast is capable of producing a greater leavening effect than untreated yeast. Thus, less yeast is required to produce normal fermentation. In general, 24% less yeast can be used with an actual saving of time. C. R. Fellers

**Kvapn. and its applications [in the distillery industry]** (Lafitte) 13. Sterilizing and purifying sugar liquids (Brit. pat. 395,527) 28.

**Distillation for purification of alcoholic liquids, etc.** Elot Ricard and Henri M. Guinot (to Soc. anon. des distilleries des Deux-Sevres). U. S. 1,929,901, Oct. 10. For purifying alc. worts contg. impurities insol. in water, the material is heated to boiling temp., fed into the middle portion of a distg. zone which is heated at its lower end, and a stream of water heated to about 98° is sprayed into the upper part of the distg. zone; vapors which reach the upper part of the distg. zone are collected, condensed to form a liquid which seps. into 2 layers, one of the layers contg. the impurities is decanted, and the other layer is returned to the distg. zone, and dil. alc. freed from impurities is collected at the base of the distg. zone. Various details of app. and operation are described.

**Evaporator suitable for concentrating distillery slop, etc.** Gustave T. Reich. U. S. 1,930,861, Oct. 17.

**Yeast.** Hans Braasch and Arnold Braasch. Brit. 395,910, July 20, 1933. See Fr. 748,594 (C. A. 27, 5471).

**Yeast.** "Salvis" A.-G. für Nahrungsmittel- und chem. Ind. (Rudolf Bertel, inventor). Ger. 582,090, Aug. 10, 1933. See Fr. 716,250 (C. A. 26, 2375).

## 17--PHARMACEUTICAL CHEMISTRY

W O EMBERY

**Brazilian vegetable drugs. I. Vegetable mercury Apodanthera smilacifolia.** O. de Lazzarini Peckolt. *Rev. brasil med. pharm.* 9, 93-101 (1933).—The leaves and roots of this tree contain an alkaloid, apodantherine 0.053 g. % in the leaves; 0.112 g. % in the roots) and a glucoside, apodanthine (0.046 g. % in the leaves; 0.024 g. % in the roots). The roots and leaves are used in the treatment of syphilis and rheumatism. E. S. G. B.

**Standardization of hormone preparations.** H. Harms. *Egyptian Med. Assoc.* 16, 874-96 (1933).—Review.

**Cosmetic colors.** E. G. McDonough. *Drug and Cosmetic Ind.* 33, 333-4 (1933).—A discussion. H. M. B.

**Volatile oil of Juniperus polycarpus.** Kock. H. N. Rutovskii, K. Guseva and L. Kuroleva. *Reichstoff Ind. u. Kosmetik* 8, 161-2 (1933).—Three samples of leaf oil showed the following consts.:  $d_4^{20}$  0.8685-0.8746,  $[\alpha]_D^{20}$  +22.2° to +25.82°,  $n_D^{20}$  1.4745-1.4758, acid no. 1.50-2.03, ester no. 0-26.84. The oils when rectified by steam distn. had the consts.:  $d_4^{20}$  0.8598,  $[\alpha]_D^{20}$  +27.08°,  $n_D^{20}$  1.4710. Oil was distd. in vacuo into 8 fractions and the first 4 fractions were redistd. over Na at ordinary pressures into fractions I-VI with b. p. ranging from 151° to 167°. (11) yielded  $\alpha$ -pinene (nitroschloride m. 95-6°, benzylnitrolamine m. 122°) and a pinonic acid which yielded a cryst. acid m. 69-70°,  $[\alpha]_D^{20}$  +71.17° in alc. soln. (semicarbazone

m. 147°); camphene is present in (III); in (VI) and (VII) were found cedrol, m. 85.5° (phenylurethan m. 107°) (5-20%) and a small quantity of a liquid primary or secondary sesquiterpene alc. and cedrene (about 5%) or a similar sesquiterpene.  $\alpha$ -Pinene and camphene constituted about 55% of the oil. H. M. Burlage

**Glycerol.** K. Pfaff. *Richtstoff Ind. u. Kosmetik* 8, 164 (1933).—The value of glycerol in cosmetics and cosmetic preps. (with formulas) is discussed.

H. M. Burlage

**Essential oil of Podocarpus totara.** Geo. B. Beath. *J. Soc. Chem. Ind.* 52, 538 40T (1933).—The pale green oil obtained by steam distn. of the leaves contained 8% alc. (calcd. as  $C_{15}H_{24}O$ ), very little acid and ketone, and practically no ester. Vacuum distn. gave 43-52% of a terpene fraction and 19.28% of a sesquiterpene fraction in which were identified  $\alpha$ - and  $\beta$ -pinene and cadinene, resp. The latter fraction contained no monodendrene or eudesmene, since only cadalene was obtained on dehydrogenation. The distn. residue consisted of a diterpene,  $[\alpha]_D^{25} +44.7^\circ$  (in  $CHCl_3$ ), m. 55°, shown to be identical with immene (I) obtained by Finlay and McDowell (*C. A.* 19, 1176) from Rinnu (*Dacrydium cupressinum*). Refluxing with 90%  $HCOOH$  gave an isomer, m. 107°, identified with isodacrene, obtained by isomerization of dacrene, from *Dacrydium biforme* (*C. A.* 24, 2739). I gave a monohydrochloride m. 63°, a mononitroschloride m. 86.8°, a tetrabromide m. 55-60°, dihydromimene (II), and (very slowly) tetrahydromimene. I is therefore tricyclic, with one C-C group probably tetrasubstituted. Ozonolysis of I gave  $CH_2O$  equiv. to one  $CH_2$  group. This is the first double bond hydrogenated, since II gave no  $CH_2O$ . Formulas for I and for isoretene obtained from it by dehydrogenation with S are discussed. A. M. C.

**Sterilization of iodoform.** Ph. A. Coppens. *Pharm. Weekblad* 70, 1053-7 (1933).  $CHI_3$  may be kept sterile by covering it with a shallow layer of 96% EtOH.

A. W. Dox

**Communications from the laboratory of the Dutch society for the advancement of pharmacy. No. 35 Glandulae thyreoidae.** H. J. van Giffen. *Pharm. Weekblad* 70, 1101-14 (1933). A detailed discussion of the Dutch Pharm. and the Hunter-Reith methods for detn. of I in thyroid preps. and a report on the I content of 25 comm. preps. as detd. by the 2 methods. The latter method gave higher I values for all samples examd.

A. W. Dox

**Manufacture of medicaments in the druggist's laboratory.** R. A. Feldhoff. *Apoth. Ztg.* 48, 1205-8 (1933).—It is shown how the manuf. of preps. like aqua amygdalarum amararum, Bi subnitrate, Bi subgallate, Bi subsalicylate, reduced Fe with sugar,  $NH_4$ , Na and K iodides may be conveniently and practically effected in the av. druggist's lab.

W. O. Emery

**Germany's import of drugs, and domestic drug and condiment plant culture.** Ilse Esdorn. *Apoth. Ztg.* 48, *Deut. Apotheker* 2, 211 16 (1933).—Both export and import data are tabulated for the years 1913, '30, '31 and '32.

W. O. E.

**Bark of Ailanthus glandulosa Desf., and its bitter principle ailanthin.** R. Wasicky and S. Gerin. *Pharm. Presse, Wiss. prakt. Mitt.* 1933, 120 3. The anatomical structure of the bark of *Ailanthus glandulosa* in the various stages of development has been investigated. From this bark a new substance, *ailanthin*, was isolated. It has the compn.  $C_{20}H_{26}O_{10}$ , m. 223.4°, very bitter in taste, difficultly sol. in cold, somewhat more in hot,  $H_2O$ , more readily in  $H_2O/H$ , very sol. in  $CHCl_3$ , insol. in petr. ether. It crystallizes from  $CHCl_3$  in tetrahedrons, and in many ways resembles other bitter principles like quassin occurring in the Simarubaceae. *Ailanthin* tastes distinctly bitter in a diln. of 1:5,000,000. The trunk bark contains a fluorescing, hydrolyzable substance, probably a glucoside of hydroxycommarin, and also a saponin. W. O. E.

**Chemical constitution and importance of certain photographic developers, as related more particularly to prescription druggists.** Fritz Hagelstein. *Pharm. Zentralhalle* 74, 409-15, 426 30, 454 60 (1933). W. O. E.

**Sterilization of sodium bicarbonate solution.** Ar. Mihalovici. *Pharm. Zentralhalle* 74, 615 (1933); cf. *C. A.* 27, 3032.—Reference is made to recent papers on this subject. An app. ("Tinner Siphon") is described for effecting the desired sterilization. W. O. E.

**Prehistoric representatives of official plants.** Robert Potonié. *Pharm. Ztg.* 78, 1040-2 (1933).—Certain paleobotanic illustrations of leaves are shown in connection with their pharmacognostic relationships. W. O. E.

**Investigations on galenical preparations. I. L. Rosenthaler.** *Pharm. Ztg.* 78, 1000-4 (1933).—The results involve 3 galenicals: aqua amygdalarum amararum, aqua laurocerasi and aqua aurantii florum, official in the D. A.-B. 6, and hence are mainly important in view of its requirements. W. O. E.

**Analytical practice in the apothecary and commercial laboratories.** W. Peyer. *Sudderl. Apoth. Ztg.* 73, 414 16, 421 3, 463 5, 469 70, 476-7, 503-4, 517-18, 523-4, 548 9 (1933); cf. *C. A.* 27, 4347.—Several analytical schemes are systematically arranged for the examn. of crude drugs, their exts. and galenicals. W. O. E.

**Estimation of mustard oil in semen sinapis via the D. A.-B. 6.** Hans Kaiser and Otto Leeb. *Sudderl. Apoth. Ztg.* 73, 612-13 (1933).—An exptl. study of the official method leads to certain suggestions for its improvement. W. O. E.

**Latest investigations of digitalis glucosides.** Hans Kaiser. *Sudderl. Apoth. Ztg.* 73, 627 9 (1933).—An address. W. O. E.

**Recent regulations governing drug announcements in Bavaria and Württemberg.** Georg Herold. *Sudderl. Apoth. Ztg.* 73, 641-4 (1933). W. O. E.

**The bactericidal efficiency of menthol and camphor.** Louis Gershenfeld and Ruth E. Miller. *Am. J. Pharm.* 105, 490 502 (1933).—Results obtained from tests of menthol and camphor solus. in solvents of liquid petrolatum, in water, and in a solvent composed of alc., glycerol, water and soap are summarized as follows: (1) Solns. of 1% menthol, 1% camphor, and a mixt. of 1% menthol and 1% camphor in liquid petrolatum did not display any bactericidal action in any of the tests performed. (2) Satd. aq. solns. of menthol proved bactericidal against *B. typhosus* within 30 min. (with 0.1 cc. of culture), and bactericidal against *Staphylococcus aureus* (0.1 cc. of culture) within 24 hrs. in most instances (bacteriostatic in only one instance); while bacteriostatic action was displayed against *B. coli*. Satd. aq. camphor solus. displayed bacteriostatic action only against *B. coli* and neither bactericidal nor bacteriostatic action against *B. typhosus* or *Staphylococcus aureus*. (3) Phenol coeffs. for menthol and for camphor in a solvent composed of 31 parts each of alc., glycerol and water and 6.6 parts of soap when tested by the phenol coeff. test against *B. typhosus* and *Staphylococcus aureus* are listed. The effect of temp. on the bactericidal efficiency of these menthol and camphor solus. is shown in tables, but as the phenol controls also vary with the temp., in some instances this increase in bactericidal efficiency of menthol and camphor is not indicated by its phenol coeff. at the higher temp. unless the computation is made against the phenol at its standard temp. A bibliography is appended. W. G. Gaessler

**The production of pseudomorphine from morphine.** Charles C. Fulton. *Am. J. Pharm.* 105, 503-30 (1933).—Pseudomorphine can be manufd. from morphine in alk. soln. with a yield of about 90% by oxidation with ferricyanide, or by heating with a salt of Hg as  $HgCl_2$ . It can also be manufd. by catalytic oxidation with a yield of about 75%, with persulfate as oxidizing agent, Cu as catalyst, and pyridine as the substance with which Cu forms an effective complex. This new catalytic method and the Hg method originated with F. The production of pseudomorphine can be made a characteristic and fairly simple test for morphine either by utilizing the green color it gives with  $HCHO$ ,  $H_2SO_4$  and an oxidizing agent, or by recognizing its crystals under the microscope. In the color test the morphine is converted by simple oxidation, in the crystal test by catalytic oxidation. These new

tests for morphine are sensitive to a 1:3000 morphine soln.

W. G. Gaessler

**Sketch of the properties of pseudomorphine.** Charles C. Fulton. *Am. J. Pharm.* 105, 511-13 (1933).

W. G. Gaessler

• **Essential oil of Chrysanthemum lavandulaefolium Makino var. typicum Makino.** I. Buyu (Takeyu) Takahashi. *J. Chem. Soc. Japan* 54, 843-51 (1933).—Steamy distn. and ether extn. of the distillate gives an oil having a greenish color and agreeable aroma, yield 0.8%. It is slightly acid, but an alc. soln. of this oil has no reaction with  $\text{FeCl}_3$ . Consts. are:  $d_{20}^{25}$  0.9283,  $n_D^{25}$  1.4622,  $[\alpha]_D^{25}$  +8.68°, acid no. 6.0, sapon. no. 36.5, sapon no. after acetylation 177.5. The oil has a characteristic aroma and  $b_{10}$  75.6°; its semicarbazone,  $\text{C}_{10}\text{H}_{15}\text{ON}_3$ , m. 185-6°, *p*-nitrophenylhydrazine,  $\text{C}_{10}\text{H}_{13}(\text{O})\text{N}_2$ , m. 131-5°, 2,4-dinitrophenylhydrazine,  $\text{C}_{10}\text{H}_{12}(\text{O})\text{N}_2$ , m. 115-6°; it is a new ketone and is named *chrysantone*,  $\text{C}_{10}\text{H}_{16}\text{O}$ . The other constituents of the oil are an alc.  $\text{C}_{10}\text{H}_{18}\text{O}$ ,  $b_{10}$  92-4°,  $d_{20}^{25}$  0.951,  $n_D^{25}$  1.4761,  $[\alpha]_D^{25}$  +3.28, M. R. 44.53, and azulene,  $b_{10}$  145-50°,  $d_{20}^{25}$  0.9273,  $n_D^{25}$  1.4990. K. Kitsuta

**The volatile oil from the fruit of "Sankan."** Keigai Sebe. *J. Chem. Soc. Japan* 54, 973-81 (1933).—The skin of the ripe fruit (a variety of *Citrus tokotan* Hayata) has a light yellow color with a lemon-odor-like oil. Consts. are:  $d_{20}^{25}$  0.8460,  $n_D^{25}$  1.4719,  $[\alpha]_D^{25}$  +92.4°,  $[\alpha]_D^{25}$  108.96°, acid value 0.00, ester value 6.25 (after acetylation 12.70). Over 95% of the oil is *d*-limonene (I). The principal aroma of the oil is due to the presence of aldehydes (mostly octyl- and some decylaldehyde), alcs. (mostly  $\alpha$ -terpineol and a diol-*fin* alc.  $\text{C}_{11}\text{H}_{20}\text{O}$  (II)) and Ac ester of II. Terpenes other than I are pinene,  $\alpha$ -terpinene and *p*-phellandrene. The basic substance contained in the oil is the Me ester of methylanthranic acid. K. Kitsuta

**Depilatories.** Alejandro Berenguer Luque. *Quim. ind.* 10, 173-8 (1933). Alkali or alk. earth sulfides are the basic constituents of chem. depilatories. Theoretical generalities on these sulfides and their hydrolysis are presented, even acid sulfides are shown to have an alk. reaction. The industrial prepn. of these chem. depilatories is described with suggestions for diminishing their caustic action on the skin. M. McMahon

**Importance of medicinal plants in the chemical and pharmaceutical industry** K. Muller. *Chimie et industrie Special No.*, 1014-16 (June, 1933).—A brief discussion A. Papineau-Couture

**Preparation and purification of ergot alkaloids.** Miloš Hrold. *Chimie et industrie Special No.*, 1017-18 (June, 1933). A very brief review of the extn. and properties of ergot alkaloids. The following method has been developed for the com. extn. of ergot alkaloids: ground, slightly moistened and alkalinized ergot is extd. with  $\text{C}_6\text{H}_6$ ,  $\text{H}_2\text{O}$ -sol. impurities and coloring matter are extd. by shaking with very dil. alkali, the alkaloids are extd. by shaking with  $\text{H}_2\text{O}$  slightly acidulated with tartaric or citric acid, pptd. by adding  $\text{Na}_2\text{CO}_3$  to a *pH* of not over 7.7, filtered under suction, dissolved in  $\text{Et}_2\text{O}$  (to remove any histamine that may be present), extd. with 1% sulfanilic acid soln. and pptd. with  $\text{Na}_2\text{CO}_3$ ; the ppt., consisting of ergotamine, ergotamine and ergotamine, but contg. no ergotamine, is dried *in vacuo* in a current of dry, inert gas. A. P.-C.

**Report on rhubarb and rhaponticum.** Arno Viehoever. *Assoc. Official Agr. Chem.* 16, 527-31 (1933). A brief review of morphological, histological, chem., physico-chem. and physiol. methods applicable to the differentiation between these 2 drugs. A. Papineau-Couture

**Solubilities of some organic drugs and their application in drug analysis** L. R. Warren. *J. Assoc. Official Agr. Chem.* 16, 571-5 (1933).—The solubilities of 32 org. drugs in  $\text{C}_6\text{H}_6$ ,  $\text{CCl}_4$  and petroleum benzine, as found in the literature or detd. in W.'s lab., are tabulated and discussed from the standpoint of their applicability to the analytical sepn. of the drugs. A. Papineau-Couture

**Three periods of British pharmacy.** Ernest C. Cripps. *Chemist and Druggist* 119, 224-8 (1933).—An illustrated and documented account is given of the development of Allen and Hanbury's Ltd., since 1715. Pharmacy in the

Napoleonic era. *Ibid.* 348-52.—Reprints of historical documents are shown and discussed. S. Waldbott

**The Canadian Formulary.** Anon. *Chemist and Druggist* 119, 372-3 (1933).—A review of the 5th revision of the Canadian Addendum to the Brit. Pharm. S. W.

**Physicochemical characters of oil of the yolk of eggs, in particular its solubility in ethyl alcohol.** Gaetano Vita and Lorenzo Bracaloni. *J. pharm. chim.* 18, 104-8 (1933).—In the prepn. of egg ext. for serum therapy,  $\text{EtOH}$  is used as the extg. solvent. As the presence of small quantities of the yellow oil of eggs causes opalescence in the serum, the soly. curves of egg oil in alc. at concns. of 60-90% by vol. and at temps. of -4°, 15° and 37° were detd. to find the conditions of min. soly. of the oil in alc. The tabulated results and graph show that for alc. concns. of 90-90% the influence of temp. on soly. is very great; for concns. between 90 and 60% it is almost nil. The consts. of pure oil of egg are:  $d_{20}^{25}$  0.918; m. p. 16-18°; f. p. 16-17°; fatty acids m. p. 36-38°; s. p. 33-35°; thermosulfuric degree (Fortelli) 67°;  $n_D^{25}$  (Zeiss) 60.2; sapon. no. 199.5-200.5; I no. 69.8-70.3. Differences in the consts. obtained by different authors are caused by variety of feed; they also depend on the method of extn. and subsequent purification. S. Waldbott

**Assay of preparations of nux vomica.** E. Léger. *J. pharm. chim.* 18, 281-7 (1933).—The assay method is based on that for cinchona in the French Codex 1908. The use of  $\text{CHCl}_3\text{-Et}_2\text{O}$  (1:3) or of  $\text{C}_6\text{H}_6$  for extg. the alkaloids from nux vomica is advised, both giving nearly identical results. S. Waldbott

**The hydrates of sodium *p*-aminobenzenearsonate.** Ernest Kahane. *J. pharm. chim.* 18, 334-9 (1933).—When this compd. is exposed to the air at about 20°, it rapidly acquires either by hydration or by dehydration a  $\text{H}_2\text{O}$  content of 18.43%, indicating a trihydrate. When this is kept in an atm. satd. with  $\text{H}_2\text{O}$  vapor, it rapidly becomes a pentahydrate tending to a hexahydrate. The anhyd. salt when warmed to 42° in air, is changed to a monohydrate; this is also formed at ordinary temp. (20°) when the trihydrate loses  $\text{H}_2\text{O}$  *in vacuo* over concd.  $\text{H}_2\text{SO}_4$ . Seven references are added. S. Waldbott

**Preparation of glutathione.** Mlle. M. Th. Regnier. *J. pharm. chim.* 18, 369-76 (1933).—Ext. glutathione (A) from fresh or vacuum-dried baker's yeast with 45% alc.; this effects complete extn. and avoids sticky, unfilterable solns. Ppt. A from this soln. as Pb salt, decompn. with  $\text{H}_2\text{SO}_4$  gives impure A. Ppt. A as a Cu salt (cf. Hopkins, *C. A.* 15, 3119), a soln. of pure A is obtained by decompn. with  $\text{H}_2\text{S}$ , evapn. *in vacuo* below 30° and pptn. by abs. alc. as a white microcryst. powder. Its formula is that of a tripeptide; yield 1 g. + from 1 kg. fresh yeast. Ten references. S. Waldbott

**Pseudo iodine indexes of essential oils.** R. Huerre. *J. pharm. chim.* 18, 381-4 (1933); cf. Morvillez and Tackx, *C. A.* 26, 3874.—These indexes, referred to 100 g. of essence, are the max. quantities of I which disappear under definite exptl. conditions when the essence is in contact with an alc. soln. of I contg. the optimum excess of I. Dissolve 0.2 g. essence in 20 cc  $\text{CHCl}_3$ , add 30 cc. of 10% alc. soln. of I (i. e., about 15% wt. of essence). Allow this and a blank without the essence to stand for 2 hrs. in a shaded place, add to each 20 cc. 10% soln. of KI and titrate first with a *N* and then end with a 0.1 *N*  $\text{Na}_2\text{S}_2\text{O}_3$  soln. The wt. of I disappeared  $\times$  500 gives the pseudo I index. In 15 constituents of essences, the values obtained were 0-300; in 37 essences 0-330.2. S. W.

**The chemical composition of liquor arsenicalis Fowleri** Axel Jerinstad and Ottar Ostby. *Pharm. Acta Helv.* 8, 144-6 (1933).—By heating 1 g.  $\text{As}_2\text{O}_3$  in aq. soln. with  $\text{K}_2\text{CO}_3$ , 0.1134 g.  $\text{CO}_2$  was given off. This clearly points to the formation of the compd.  $\text{KH}(\text{AsO}_2)_2$ . S. W.

**Adulteration of drugs and their microscopic study in filtered ultra-violet light.** R. Freudweiler. *Pharm. Acta Helv.* 8, 147-51, 155-61, 190-201 (1933); cf. Wasicky, *C. A.* 8, 203; Miglet and Bischoff, *C. A.* 24, 4900, and following abstr.—Powd. drugs of analogous character can be differentiated by ultra-violet light. Among the groups studied were strophanthus seeds, anise, caraway, conium

and similar seeds, saffron and possible adulterants, pepper and other spices, roots and rhizomes (belladonna, veratrum, hellebore), ginger and similar drugs, leaves and herbs (belladonna, digitalis, artemisia), and the chamomile group. S. Waldbott

**Fluorescence-microscopic studies. I. Crocus (saffron) and some of its adulterants.** Kurt Leupin. *Pharm. Acta Helv.* 8, 166-70 (1933).—The percentage limits at which adulterants may still be detected are given for calendula and carthamus flowers, turmeric root, santal wood, capsicum, corn starch, cane sugar and meat fibers, examd. in powder form or in liquid media:  $H_2O$ , glycerol, alc. or chloral hydrate. S. Waldbott

**Newer ointment bases of Pharm. Helv. V; direction for the preparation of cetyl alcohol.** J. B. Lang. *Pharm. Acta Helv.* 8, 165-6 (1933).—*Unguentum ceticum* ( $C_{18}H_{38}O$ ), adeps laevis 10, white vaselin 86) can take up more than its own wt. of  $H_2O$ ; besides, it can never turn rancid. To prep. cetyl alc., m. 48-8.2°, cetaceum is saponified with alc. KOH, the K palmitate is converted into (EtO-insol.) Ca soap, and the cetyl alc. is extd. with  $H_2O$ . L. obtained a sapon. no. 10-15; the demand of the Pharm. for a sapon. no. = 0 is too rigorous. S. Waldbott

**The pharmacy of the future. II.** E. Armstrong. *Pharm. J.* 131, 432-5 (1933).—An address, with photograph of the author; also cf. *Chemist and Druggist* 119, 455-6 (1933). S. Waldbott

**Agar-agar and paraffin emulsions; extemporaneous preparation.** C. L. M. Brown and E. A. Lami. *Pharm. J.* 131, 341 (1933). To obtain the best results, triturate  $NaHCO_3$  10 grams, powd. tragacanth 20 and powd. acacia 60 grains to a smooth paste with glycerol 6 drachms. Dissolve agar 17.5 grains in boiling water 2 fluid oz., add this while hot to the mixt. in the mortar while stirring. Then add liquid paraffin 3 oz., 2-3 drachms at a time. Triturate until cold, allow to stand for 1 hr., triturate again for 5 min. and add water to complete 6 oz. If an emulsifying app. worked by hand is available (cf. *Thi* 315), a thick emulsion is obtained with agar 15,  $NaHCO_3$  6 grams, liquid paraffin 3 oz., tragacanth 5, acacia 5 grains, glycerol 2 drachms, water to make 6 oz. S. Waldbott

**A hospital pharmacopeia of 1814.** R. J. Stratton. *Pharm. J.* 131, 347 (1933). The contents of a small manuscript formulary used by the Ipswich Public Dispensary, entitled *Pharmacopoeia Valetudinariae Hippocrenensis*, probably by John Morgan, apothecary and house surgeon, are described. S. Waldbott

**The rate of solution of tablets; a method for its determination.** G. H. Elliott. *Pharm. J.* 131, 511 (1933). The "solvoimeter" of Colman (*C. A.* 26, 878) was used. It is based on the increase of buoyancy of the app. in water as the tablet is going into soln. Graphs are given showing the soly. in eg. per min. of 5 kinds of tablets:  $KI$ ,  $NH_4Br$ , quinine  $2HCl$ , hexamine and phenazone. The influence of temp. was also detd. S. Waldbott

**Edible yeasts (Givartovskii) 12.** Constitution of jasmine (Treff, Werner) 10. Manuf. of absorbent cotton (Fehre) 25. Citral (Bogett, Fourman) 10. Stenderoff polarimeter (Seiler) 1. Czechoslovakian hop oil and its utilization [in perfumes and medicine] (Nebovidský, Horcl) 16. White mineral medicinal oil (U. S. pat. 1,928,832) 22. Substituted fatty acid amides [use in medicines and cosm. ties] (Ger. pat. 582,390) 30. 3,5-Diiodo-4-pyridone (Brit. pat. 391, 37) 10

**Therapeutic preparation.** Fritz Lange and Kug. Fehre. Ger. 584,014, Sept. 13, 1933. A prepn. for distending the blood vessels and reducing the blood pressure is prepd. as follows. Animal organs contg. blood vessels are extd. with water and the ext. is freed from albumin in known manner. Phosphatides are then extd. with an org. solvent, e. g., petroleum ether, the purified aq. ext. is evapd., and the residue is extd. with a higher alc., e. g.,  $PrOH$  or  $BuOH$ . The ext. is evapd. and the evapn. residue is extd. with  $EtOH$  satd. with  $HCl$ . This ext.

is evapd., the evapn. residue is dissolved in water and the desired product finally recovered as a cryst. salt (picrate, flavianate or aurate).

**Therapeutic adsorbent preparations.** Pharmaceutische Werke "Norgine" A.-G. Ger. 583,141 Aug. 29, 1933. See Austrian 130,242 (*C. A.* 27, 1091).

**Hydroxyamino acids and their derivatives.** Schering-Kahlbaum A.-G. (Otto v. Schickl, inventor). Ger. 583,243, Aug. 31, 1933. Glycidic acid and its alkyl, aryl or aralkyl substitution products, or their esters or amides, are heated with primary or secondary monoamines. Water-sol. hydroxyamino acids (or derivs. thereof) of therapeutic value are obtained. Thus, dimethylglycidic Et ester and  $PhNH_2$ , heated for 5 hrs. in xylene under reflux, yield  $\alpha$ -hydroxy- $\beta$ -aminoisovaleric Et ester, m. 70-1°; the corresponding amide, m. 102°, and  $\beta$ -methylamino compd., b<sub>p</sub> 172-4°, are prepd. similarly from dimethylglycidic amide (I) and  $PhNHMe$ , resp. The following have also been obtained:  $\alpha$ -hydroxy- $\beta$ -phenetidinisovaleric amide, m. 105°;  $\alpha$ -hydroxy- $\beta$ -aminopyridinoisovaleric amide, m. 182-3°;  $\alpha$ -hydroxy- $\beta$ -(6-methoxy-8-amino)quinolinisovaleric diethylamide, b<sub>p</sub> 225-8° ( $HCl$  salt, m. (decompu.) 170-1°);  $\alpha$ -hydroxy- $\alpha$ -methyl- $\beta$ -phenyl- $\beta$ -methylaminopropionic methylamide, m. 98° ( $HCl$  salt, m. 245°); a compd. m. 151°, from I and 1-phenyl-2,3-dimethyl-4-amino-5-pyrazolone; and a compd. unmelted at 250°, from I and Na arsanilate.

**Pyridine derivatives.** Schering-Kahlbaum A.-G. Brit. 395,119, July 13, 1933. See Ger. 583,132 (*C. A.* 27, 1093).

**Theophylline derivative.** Chem.-Pharm. A.-G. Bad Homburg (Erwin Kohlstaedt, inventor). Ger. 583,054, Aug. 28, 1933. A water-sol. compd. of therapeutic value is prepd. by treating theophylline with 2 mols. of diethanolamine. Examples are given.

**Urea and thiourea derivatives.** I. G. Farbenind. A.-G. (Fritz Schouhofer and Hans Heneka, inventors). Ger. 583,207, Aug. 30, 1933. Urea and thiourea derivs., which contain the residue of a heterocyclic or aromatic heterocyclic compd. contg. a quaternary N atom in the nucleus, are prepd. by standard processes. In typical examples, (1) 6-aminoquinoline is treated with  $COCl_2$  and the resulting urea (di- $HCl$  salt m. 260-2°) is converted into quaternary salts m., resp., 235-7°, 260°, 255-7°, and 168°, with 2 mols. of  $Me_2SO_4$ ,  $MeCl$ ,  $MeI$  and 1 mol. of  $Me_2SO_4$ , 5- and 7-aminoquinoline and 3-aminoquinoline similarly yield ureas m., resp., 284-5°, 282° and 276°, which form with  $Me_2SO_4$  salts m., resp., 217°, 228°, and 193°; (2) quinoline-6-carboxylic acid (I), boiled in benzene soln. with 6-methoxy-8-aminoquinoline, yields N (quinolyl-6)-N'-(6-methoxyquinolyl-8)urea m. 239°, which forms with 1 mol. of  $Me_2SO_4$  a salt m. 239°; asym. ureas are obtainable similarly from I and 1-phenyl-2,3-dimethyl-4-amino-5-pyrazolone (urea m. 242-3°, urea di- $Me_2SO_4$  salt m. 217°), N-methyl-1,2,3,4-tetrahydro-6-aminoquinoline (urea m. 227°, urea di- $Me_2SO_4$  salt m. 206-7°), 6-(3'-amino-4'-toluyl)aminoquinoline (urea m. 245°, urea di- $Me_2SO_4$  salt m. 224°), 3-diethylaminoethoxyaniline (urea m. 193°, urea di- $Me_2SO_4$  salt described), 6-p-aminophenoxyquinoline (urea m. 209°, urea di- $Me_2SO_4$  salt m. 242°), (methyl)(diethylaminoethyl)amine (di- $Me_2SO_4$  salt of the urea is described), 4-amino-3',5'-dimethyldiphenyl ether (urea m. 198°, urea  $Me_2SO_4$  salt m. 234°), 5-aminoisouquinoline (di- $Me_2SO_4$  salt of the urea m. 221-2°), 7-aminoquinoline (urea m. 229°, urea- $Me_2SO_4$  salt m. 238°), and 5-chloro-8-aminoisouquinoline (urea m. 234°, urea  $Me_2SO_4$  salt m. 227°); 2 mols. of I and 1 mol. of 1,2,3,4-tetrahydro-6-aminoquinoline yield N-(quinolyl-6)-N'-(1-(quinolyl-6-carbamino)-1,2,3,4-tetrahydroquinolyl-6)urea m. 160°, the di- $Me_2SO_4$  salt of which m. 187°. The following have also been obtained: N,N'-di(5-nitroquinolyl-6)urea di- $MeCl$ , m. 242°; N,N'-di(6-methoxyquinolyl-5)urea  $Me_2SO_4$  salt m. 192°; N,N'-di(8-methoxyquinolyl-6)urea  $Me_2SO_4$  salt m. 194°; the  $Me_2SO_4$  salt m. 211°, of the urea m. 276-7°, from 3-aminocarbolidine; the di- $MeCl$  salt m. 100-5°, and  $Me_2SO_4$  salt of N,N'-di(8-methylquinolyl-6)-thiourea m. 196°; the di- $MeCl$  salts m., resp., 237°, 150°.



and 205-6°, of the sym. thioureas m., resp., 190°, 178°, and 208°, from 6- and 8-aminoquinoline and 3-aminoquinoline; a  $\text{Me}_2\text{SO}_4$  salt, decomp. 180°, of the thiourea m. 179-80° from 7-aminoquinoline; *N*-(quinolyl-6)-(thiourea m. 218°, and its salts, m., resp., 208-9° and 234°, with  $\text{Me}_2\text{SO}_4$  and  $\text{MeCl}$ ; *N*-(quinolyl-6)urea  $\text{MeCl}$  salt m. 240°; *N,N'*-di- $\gamma$ -pyridylurea m. 208°, and  $\text{Me}_2\text{SO}_4$  salt m. 191°; a nitro-*N,N'*-di- $\gamma$ -pyridylurea di- $\text{MeCl}$  salt; *N*-(quinolyl-7)-*N'*-(1-*p*-ethoxyphenylbenzimidazolyl-5)-urea m. 248°, (di- $\text{Me}_2\text{SO}_4$  salt m. 241°); *N*-(quinolyl-6)-*N'*-piperidylurea m. 166°, (mono- $\text{Me}_2\text{SO}_4$  salt m. 181°); *N*-(quinolyl-6)-*N'*-(3-nitro-4-tolyl)urea m. 250-2°, (mono- $\text{Me}_2\text{SO}_4$  salt m. 226°); a salt m. 268-70°, of *N*-(quinolyl-6)-*N'*-(3-amino-4-tolyl)urea with 1 mol. each of  $\text{Me}_2\text{SO}_4$  and  $\text{HCl}$ ; *N*-(quinolyl-6)-*N'*-(4-dimethylaminophenyl)urea m. 220°, and its di- $\text{MeCl}$  salt m. 190°; a sulfate m. 150-2°, of 6-guanylcarbaminoquinoline methyl chloride; 6-quinolinecarbonyl-6'-quinolylsemicarbazide, m. 230°, and its di- $\text{MeCl}$  salt m. 252°. The salts are effective against blood parasites.

F. H. O.

**Cyanamide-formaldehyde condensation product.** I. G. Farbenind. A.-G. (Hans Schmidt, inventor). Ger. 580,830, July 17, 1933. Addn. to 522,056 (C. A. 25, 3130-1).  $\text{CN}_2\text{H}_2$  is treated at atm. temp. with  $\text{CH}_2\text{O}$  in aq. acid soln., and the mixt. is then warmed. A condensation product not identical with that described in Ger. 522,056 is obtained. The product is useful as an intermediate for drugs. The use of impure  $\text{CN}_2\text{H}_2$  prep'd directly from  $\text{CaCN}_2$  is excluded. Examples are given.

**Stable acridine salt solutions.** I. G. Farbenind. A.-G. Brit. 395,405, July 17, 1933. Addn. to 342,690 (C. A. 25, 4663). Aq. solns. for injection purposes are manifd. by incorporating a reducing substance, other than a carbohydrate, with a (soln. of a) salt of an aminoacridine or aminoacridinium comp'd, other than the salts of 3,6-diaminoacridine or 3,6-diamino-10-alkylacridinium comp'd, or double compds. thereof. Suitable acridine compds. are the salts of substitution products of 3,6-diaminoacridine and 3,6-diamino-10-alkylacridinium compds. and of other aminoacridines or aminoacridinium compds. or their substitution products or the corresponding double compds. The salts of  $\text{H}_2\text{SO}_4$ ,  $\text{H}_2\text{SO}_4$  or sulfoxylic acid, as such or in the form of derivs., e. g., compds. with aldehydes or ketones, and hydrazines and hydroxylamines, or mixts. thereof, may be used as reducing substances. Other compds. advantageous for therapeutic application, e. g., glucose, adrenaline, acid amides, glycerol, pyridine, methylene blue,  $\text{CaCl}_2$  or  $\text{Ag}$  salts, may be added. Examples describe the prepn. of solns. contg. (1) 2,7-dimethyl-3,6-diamino-10-methylacridinium chloride, 2,7-dimethyl-3,6-diaminoacridine- $\text{HCl}$ ,  $\text{NaHSO}_4$  and  $\text{Na}_2\text{SO}_4$ ; (2) 2,7-dimethyl-3-amino-6-dimethylamino-10-methylacridinium chloride, acetone bisulfite,  $\text{Na}_2\text{SO}_4$  and glucose or an acid amide, etc.

**Chondroitin compounds.** Arthur E. Meyer (to Chappel Bros., Inc.). U. S. 1,929,786, Oct. 10. Cartilage is treated with a water-sol. aldehyde such as formaldehyde to insolubilize protein matter assoc'd. with the cartilage and the latter is then ext'd. with an alk. soln. such as  $\text{NaOH}$  to obtain desired chondroitin compds. which are purified and sepd. and may be used for medicinal purposes.

**Organic metallic compounds.** I. G. Farbenind. A.-G. Heinrich Jung and Hans Andersag, inventors). Ger. 580,516, July 12, 1933. Addn. to 578,488 (C. A. 27, 149-50). Complex metal compds. are prep'd. by various standard methods from 1,2,3-triazole derivs. which are substituted by or condensed with an aromatic or heterocyclic ring contg. an acid or basic salt-forming group. Examples are given of the prepn. of Au compds. of Na benzotriazole-*p*-carboxylate (I), Na benzotriazole-*p*-arsonate, Na benzotriazole-*p*-sulfonate, and Na benzotriazole-*p*-phosphate (II); Cu compds. of I, II, benzotriazole-*p*-carboxylic acid (III) and III diethylaminoethyl ester, and Hg and Ag compds. of III. The products are generally sol. in water and are of therapeutic value.

**Double calcium salts of organic acids.** Chemische Fabrik vormals Sandoz. Brit. 394,596, June 29, 1933.

1 See Fr. 747,350 (C. A. 27, 4886). The salts possess therapeutic properties.

**Double calcium salts.** Chemische Fabrik vormals Sandoz. Brit. 395,296, July 13, 1933. Double  $\text{Ca}_2$  salts that are useful therapeutically are prep'd. by treatment of  $\text{CaBr}_2$  with equimol. proportions of the  $\text{Ca}$  salts of polyhydroxymonocarboxylic acids derived from polyaldoses. In a modification polyaldoses are oxidized with  $\text{Ca}$  hypobromite in presence of  $\text{Ca}(\text{OH})_2$ , the  $\text{CaBr}_2$  liberated uniting with the neutralized oxidation product. Among examples (1)  $\text{CaBr}_2$  is ground, or dissolved in hot  $\text{H}_2\text{O}$ , with  $\text{Ca}$  lactobionate, the double salt being crystd. from the soln., and (2) lactose is oxidized in aq. soln. as described above.

**Acetamides.** Karl Ziegler. Brit. 394,084, June 22, 1933. Tertiary acetamides contg. 2 or 3 unsatd. alkyl groups are prep'd. by sapon. the corresponding nitriles which may be prep'd. by the process of Brit. 393,955 (C. A. 27, 5755). The products possess hypnotic properties. Examples are given of the sapon. with  $\text{KOH}$  of triallylacetoneitrile, diallylethylacetoneitrile and diallylpropylacetoneitrile dissolved in  $\text{BuOH}$ .

**Hormones.** Schering-Kahlbaum A.-G. (Erwin Schwenk and Friedrich Hildebrandt, inventors). Ger. 584,211, Sept. 16, 1933. Crude compus. contg. sexual hormones are treated with a reagent which forms a condensation product with the hormones and also contains a salt-forming group, or a group convertible into a salt-forming group. The salt-forming portion of the mixt. is then sepd. and the hormone concentrate recovered by standard methods. Thus, a crude male sexual hormone prep'n may be fused with phthalic anhydride and the acid phthalic ester of the hormone extd. with dil. soda soln. and then sapond. Similarly, the ovarian hormone of the formula  $\text{C}_{27}\text{H}_{48}\text{O}_2$ , which contains a  $\text{CO}$  group, may be treated with phenylhydrazinesulfonic acid. Details are given.

**Hormones.** Schering-Kahlbaum A.-G. (Max Gehrke, inventor). Ger. 584,340, Sept. 18, 1933. Sexual hormones are recovered by extg. urine in the warm with a normally solid hydrocarbon. The latter is sepd. after the mixt. has been cooled, and the hormone is then concd. by distg. the hydrocarbon or by crystg. it from an org. solvent.

**Hormone derivatives.** Schering-Kahlbaum A.-G. (Friedrich Hildebrandt and Erwin Schwenk, inventors). Ger. 581,113, Sept. 15, 1933. Cryst. esters of ovarian hormones are prep'd. directly from crude oil contg. such hormones by treating the oil with aq. alkali, sepg. the aq. layer, and treating this with an acclating agent. Examples are given.

**Foam-producing compositions.** August Karreth. Ger. 583,388, Sept. 2, 1933. Compns. which are stable at atm. temp. but evolve foam at a raised temp., e. g., at body temp., without addn. of water or other liquid, are prep'd. by uniting two or more gelatinous compns., each of which contains one component of a gas-evolving reaction, and one at least of which contains water or other liquid. Thus, granules of an aq. gelatin compn. contg.  $\text{NaHCO}_3$  may be embedded in an aq. gelatin compn. contg. tartaric acid. Numerous details and modifications are described. The products may be used, *inter alia*, for medical and cosmetic purposes.

**Medicines for animals.** Josef Pekar. Brit. 395,264, July 13, 1933. Medicines for injection for the treatment of septic ailments are prep'd. by dissolving oil of parsley in abs. alc. and then diluting with an amt. of distd.  $\text{H}_2\text{O}$  varying according to the nature of the disease and the animal.

**Elastic impression material suitable for making casts of parts of the human body, etc.** Carl R. Kellner. U. S. 1,930,391, Oct. 10. A nitrogenous colloid such as agar-agar and gelatin is used together with soap, Na borate and resin combined in soln.

**Synthetic perfumes.** Soc. anon. M. Naef & Cie. Brit. 394,197, June 22, 1933. See Fr. 744,345 (C. A. 27, 4031).

**Perfumes.** Compagnie de Béthune. Ger. 580,450,

July 11, 1933. See Fr. 728,998 (C. A. 26, 8071) and 42, 143 (C. A. 27, 4881).

**Disinfectants.** I. G. Farbeniud. A.-G. Brit. 394,026, June 22, 1933. Bis(haloxyphenyl) oxides and substitution products thereof are obtained by halogenating the bis(hydroxyphenyl)oxides by customary methods with the introduction of 1 or more halogen atoms or by replacing active groups in the compds., e. g., NH<sub>2</sub> groups, by halogen in known manner. The OH groups may be protected by alkylation, followed later by hydrolysis. Among examples bis(2-hydroxyphenyl)oxide is brominated and chlorinated in AcOH or iodinated in NH<sub>4</sub> soln. to give mono- or di-halo derivs. and bis(2-methoxyphenyl) oxide is nitrated and brominated followed by hydrolysis of the MeO group.

**Water-soluble disinfectants.** Paul Godrich (to Godrich Chemical Co.). U. S. 1,930,474, Oct. 17. Fatty oils such as olive oil or castor oil and bactericidal aromatic compds. such as chlorothymol which are sol. in the fatty oils but insol. or slightly sol. in water are dissolved together and concd. H<sub>2</sub>SO<sub>4</sub> is added to the oil soln. at a reduced temp. (suitably about 20°) and the action of the acid is permitted to continue until the solvent oil has become substantially sulfonated. Excess acid is then removed by washing.

**Denicotinizing tobacco.** Ludwig Lippmann. Brit.

395,458, July 20, 1933. Denicotinizing is effected by moistening the leaves with pure H<sub>2</sub>O, slightly alk. H<sub>2</sub>O or a virulent alk. liquor contg. tobacco bacteria, permitting free or copious access of air during fermentation and removing the excess of alk. produced by adding an org. acid. A cloth soaked in AcOH may be laid over the leaves or the acid may be applied by sprinkling. Volatile aromatic bases removed by the air current are collected and returned to the leaves. Cf. C. A. 27, 376.

**Denicotinizing tobacco.** Alfred Schuchard and Willy Stelkuns. Brit. 394,889, July 6, 1933. A substance for use in smoking tobacco to remove nicotine and other toxic vapors is composed of (1) Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> or other substance which, on heating, will liberate a substance, e. g., SO<sub>2</sub>, that combines with nicotine, (2) a binding material and (3) an oxidizing agent which prevents, e. g., the formation of SO<sub>2</sub> from SO<sub>3</sub>. The binding material may be formed by dissolving 20 parts ethylcellulose in 80 parts CCl<sub>4</sub>. To this may be added the other ingredients, KNO<sub>3</sub> serving as oxidizing agent. Nitrocellulose may serve both as binder and oxidizing agent. Thin rods of the dried compressed compn. are inserted in cigar, cigaret or pipe.

**Apparatus for conditioning tobacco by subjecting it to dry or moist air in counter- or co-current in a rotating drum having baffle members.** Eduard Quester. Brit. 395,818, July 27, 1933.

## 18 ACIDS, ALKALIES, SALTS AND SUNDRIES

### B. M. SUMMIS

**Experiments in construction and use of apparatus from acid-resisting concrete for production of phosphoric acid.** B. Krapukhin and N. Zuev. *Khimstron* 5, 2455 60 (1933). A mixt. of andesite, Na SiF<sub>6</sub> and water glass was used in insulating a H<sub>3</sub>PO<sub>4</sub> absorption tower and a Cottrell precipitator, with tolerably good results. C. Blane

**Sulfuric acid produced from heavy refinery sludge by use of improved contact process.** S. F. Spangler. *Oil Gas J.* 32, No. 23, 76, 78 (1933). The sludge is burned in a rotary kiln countercurrent to combustion gases from a furnace. The gases are cooled, washed with H<sub>2</sub>O and sepd. from condensed oil. The gases are further oxidized in a secondary furnace and pass into a catalytic converter, which converts 98% of the SO<sub>2</sub> to SO<sub>3</sub>. This is absorbed to make any strength acid desired. A recovery of approx. 90% of the acid content of the sludge may be expected. J. R. Strong

**Intensification of the tower process for sulfuric acid.** V. N. Shul'z. *J. Chem. Ind. (Moscow)* 1933, No. 6, 17-31; cf. C. A. 26, 4684. Theoretical and practical methods of improving the yield are given. H. M. L.

**The manufacture of sulfate of alumina.** R. L. Brown. *J. Southeastern Sect. Am. Water Works Assoc.* 3, 87-91 (1933). W. A. Moore

**Photoelectric study of the sedimentation of fresh, exhausted and regenerated activated charcoals.** V. D. Netuka. *Chimie et Industrie Special No.* 1160 3 (June, 1933). The rate of sedimentation of fresh, exhausted and thermally regenerated carboraffin and norites in pure water and in 0.02 N KCl and Na<sub>2</sub>SO<sub>4</sub> was studied by means of the Sander photoelectric colorimeter (C. A. 23, 3122-3). Fresh norite settles more rapidly than fresh carboraffin; electrolytes do not affect the rate of sedimentation of norite but merely considerably that of carboraffin. Neither of the charcoals settles in pure water when exhausted; electrolytes increase their rate of sedimentation, that of norite more than that of carboraffin. The sedimentation of thermally regenerated norite is slightly lower than that of fresh norite, and is but little affected by electrolytes. The sedimentation of thermally regenerated carboraffin is slightly quicker than that of the fresh product and is accelerated by electrolytes. A. Papineau-Couture

**Carbon black.** G. R. Hopkins and H. Backus. *Bur. Mines, Minerals Yearbook* 1932-33, 546-54 (1933). Alden H. Emery

**The manufacture of bromine in France.** M. Kaltenbach. *Mém. compt. rend. soc. ing. civils France* 85, 418 15 (1932). A detailed description of the process used for the manuf. of Br in France and Tunis (started in 1916), with particular emphasis on recent improvements in mfg. equipment. A. Papineau-Couture

**Helium.** Andrew Stewart. *Bur. Mines, Information Circ.* 6745, 46 pp. (1933). — The discovery of He and other rare inert gases, their properties, sources, com. production, and uses are described. Ninety references. A. H. E.

**Sulfur in Chile.** S. V. Griffith. *Mining Mag.* 49, 137-44, 213 19 (1933). Occurrence, mining and prepn. are described, with details of production, costs, etc., for the year 1931, at 3 individual plants. At Mount Ollague the retort system of refining has been abandoned in favor of one employing steam at 60 lb. per sq. in., and patented. A. W. Furbank

**Lime.** Paul Hatmcker and A. T. Coons. *Bur. Mines, Minerals Yearbook* 1932-33, 629 37 (1933). **Sulfur and pyrites.** R. H. Ridgway and A. W. Mitchell. *Ibid.* 669 86. **Salt, bromine, calcium chloride, and iodine.** A. T. Coons. *Ibid.* 687 700. **Barite and barium products.** R. M. Santmyers and B. H. Stoddard. *Ibid.* 753 61.

**Potash.** J. H. Hedges. *Ibid.* 763 75. **Natural sodium compounds and boron minerals.** A. T. Coons. *Ibid.* 795 8. Alden H. Emery

**Fluorspar and cryolite.** H. W. Davis. *Bur. Mines, Minerals Yearbook* 1932-33, 723 34. **Feldspar.** H. O. Rogers and C. Galilee. *Ibid.* 735 43 (1933). A. H. E.

**The possibility and importance of organization of the production of silica gel in the Soviet Union.** S. T. Sanovich. *J. Chem. Ind. (Moscow)* 1933, No. 6, 677 81. The methods of manuf. of SiO<sub>2</sub> gel are reviewed. H. M. Leicester

**Experiments on the continuous preparation of superphosphates by the method of prolonged mixing.** B. A. Sokolovskii and E. N. Zhuchkov. *J. Chem. Ind. (Moscow)* 1933, No. 6, 62 70. — Phosphorite is well mixed with 10% excess H<sub>2</sub>SO<sub>4</sub> for 40-60 min., and the mixt. allowed to stand for 1/2-1 hr. after leaving the mixer. About 93-7% decompn. occurs, and a superphosphate of good phys. properties is obtained. About 31% of the P in the phosphorite is recovered. H. M. Leicester

**Experiments on the preparation of double and enriched superphosphates from Khibin apatite.** L. Berlin and V. Mikerov. *J. Chem. Ind. (Moscow)* 1933, No. 6, 55-62.

Superphosphates may be prepd. from apatite by its extrn. with the theoretical amt. of  $H_2SO_4$  plus 10% more of 40%  $H_2PO_4$ . Impurities in the apatite decrease the amt. of  $P_2O_5$  in the product. The purer the apatite, the greater is the improvement of the resulting superphosphate when it is allowed to stand. H. M. Leicester

Fuller's earth. W. W. Adams and C. Galiner. Bur. Mines, *Minerals Yearbook* 1932-33, 709-14 (1933).

Comparison of methanol and other anti-freeze agents. T. C. Albin. *Chem. & Met. Eng.* 40, 526-7 (1933).

E. H.

Hydrocyanic acid. Konrad Keller (to Ges. für Kohlen-technik m. b. H.). U. S. 1,931,441, Oct. 17. A soln. of  $NH_4CNS$  is treated with  $HNO_3$  which is always maintained in excess of 1% in the reaction mixt.

Concentrating nitric acid. Emil Lüscher (to Lonza Elektrizitätswerke und chemische Fabriken A.-G.). U. S. 1,930,881, Oct. 17. Finely divided O (suitably after passing through ceramic plates or the like) is forced into a mixt. of dil.  $HNO_3$  and  $NO_2$  at an elevated temp. and under a pressure of at least 15 atm.

Means for feeding nitric acid to Glover towers. Georg Schaich. Ger. 583,051, Aug. 28, 1933.

Phosphoric acid. Charles H. Milligan (to American Agricultural Chemical Co.). U. S. 1,929,441, Oct. 10. A phosphate-contg. material such as animal bone matter or a mineral phosphate is treated with  $H_2SO_4$  in a quantity sufficient to form  $H_2PO_4$ . The admixed materials are then contacted with not exceeding 5 multiples by wt. of an extrn. liquid consisting mainly of  $BuOH$ ; the soln. thus formed is sepd. from undissolved material and the  $H_2PO_4$  is recovered from it. U. S. 1,929,442 relates to an otherwise generally similar process in which the  $H_2PO_4$  is extrd. from the reaction mixt. by a "water-immiscible oxygenated hydrocarbon liquid of not exceeding 8 C atoms in the chain carrying the O group," such as Bu, Am, heptyl and hexyl alks., etc. and U. S. 1,929,443 relates to a like process in which the  $H_2PO_4$  thus std. is converted into an alkali metal phosphate, as by reaction with  $Na_2CO_3$ .

Phosphoric acid, dicalcium phosphate, fertilizers. Oskar Smeltwerk A S and Erling Johnson. Ger. 579,627 & 9, June 30, 1933, 579,731, July 3, 1933, and 580,521, July 12, 1933. Addns. to 573,284 (C. A. 27, 3042). The mother liquor contg.  $H_2PO_4$  obtained from crude phosphate and  $HNO_3$  as described in Ger. 573,284, is worked up to mixed fertilizers by treatment with substances such as urea or cyanamide, with or without salts of K or  $NH_4$  (579,627). Alternatively, the mother liquor may be treated with  $NH_4$ ,  $(NH_4)_2CO_3$ , or an alkali carbonate in an amt. sufficient to ppt. Ca as  $CaHPO_4$ , the filtrate from the sepn. of  $CaHPO_4$  being evapd. to produce mixed fertilizer (579,628). When  $H_2PO_4$  or phosphate is to be recovered from the mother liquor, the latter may be freed from  $HNO_3$  by distn., preferably *in vacuo* at a low temp., at any stage in the process (579,629). Foam in the treatment of the crude phosphate with  $HNO_3$  is avoided by adding the acid in two stages. The first addn. should be sufficient to react with gas-evolving impurities and give a pasty product, which should be thoroughly kneaded before the rest of the acid is added (579,630).  $CaHPO_4$  obtained as described in Ger. 579,628, may be mixed with crude phosphate and the mixt. treated with  $HNO_3$  as described in Ger. 573,284.  $Ca(NO_3)_2 \cdot 4H_2O$  is extrd. from the soln., and the mother liquor is treated as described in Ger. 579,628 (580,521). Each patent includes examples and numerous details. Cf. C. A. 27, 1461.

Water-supply system for sulfuric acid chambers. Georg Schaich. Ger. 583,050, Aug. 28, 1933.

Catalytic combustion of ammonia. Ivar W. Cederberg. Brit. 394,400, June 29, 1933. In the catalytic combustion of  $NH_3$  the gas mixt. is passed through the catalyst with a linear flow velocity which exceeds the linear velocity of combustion under the conditions existing in the catalyst. The velocity may be higher in the free gas space before the catalyst than through the catalyst proper. A suitable

catalyst consists of (twilled) galloon fabric of Pt-Rh alloy; cooling, e. g., by a liquid layer of  $H_2O$  or  $HNO_3$ , may be applied if necessary. App. is described.

Alkali metal aluminates. Robert O. Wood (to National Aniline & Chemical Co.). U. S. 1,929,619, Oct. 10. For the production of alkali metal aluminate and of a product contg. an activated Fe oxide, a mixt. comprising an alumina sludge, an Fe oxide sludge and an alkali such as  $Na_2CO_3$  is calcined at 650-900°, the calcined material is treated with water, and the soln. of alkali aluminate thus formed is sepd. from the insol. residual material comprising activated Fe oxide.

Pure alkali metal and ammonium orthophosphates. Charles F. Booth (to Swann Research, Inc.). U. S. 1,929,476, Oct. 10. Assocd. impurities present in solns. of mono-basic orthophosphates are treated (as by the addn. of  $MnO_2$  or  $KMnO_4$ ) to form in them a trivalent Mn compd. and effect pptn. of impurities.

Alkali phosphates. Chemische Fabrik Budenheim A.-G. Ger. 583,052, Aug. 28, 1933. See Fr. 741,347 (C. A. 27, 4035).

Alkali phosphates. Metallges. A.-G. (Conway von Girschwald, Hans Weilmann and Gerhardt Roesner, inventors). Ger. 584,348, Sept. 18, 1933. See U. S. 1,903,582 (C. A. 27, 3297).

Alkali silicates or alkali-alkaline earth silicates. Henkel & Cie. G. m. b. H. Brit. 395,182, July 13, 1933. Alkali-alk. earth silicates are manufd. by treating alkali chlorides,  $SiO_2$  and alk. earth compds., heated electrically to a high temp., with steam, the heat being generated in the interior of the furnace by using the furnace contents as the heating resistance. App. is described.

Carbides; phosphorus. Nikolaem Caro and Albert R. Frank (H. Heinrich Franck and Hans Fuldner, inventors). Ger. 583,454, Sept. 4, 1933. Crude  $Ca_3(PO_4)_2$  or other tertiary phosphate is heated with C to 1200-1600° or more, if necessary under a raised partial pressure of CO. Under these conditions, P is driven off from the mixt., but the formation of carbide is precluded. When all the P has been driven off, the residue is heated to a higher temp. under a CO partial pressure of 1 atm. to cause the formation of carbide.

Chlorides and oxalates of thorium and the rare earth metals. I. G. Farbenind. A.-G. Brit. 395,300, July 13, 1933. Hydrated chlorides of the Ce group, free from Th, are pptd. by passing HCl into a soln. of said chlorides, contg. also  $ThCl_4$ , cooled to about 0° or below, or by the addn. of chlorides, e. g., of Ca or Mg, (with or without HCl) that are more sol. than Ce chloride and not pptd. by HCl at room temp. In the latter method it is unnecessary to cool the soln. The pptd. chlorides are washed with cooled coned. HCl. In an application of the process a reaction melt obtained by decomp. monazite sand in any manner is dissolved in HCl, the major part of the chlorides of the Ce group pptd. as above and the filtrate treated to ppt. the metals of the  $\gamma$  group, the remainder of the Ce group and the Th as oxalates, from which the Th is sepd. in known manner.

Cyanamides of alkaline earth metals and magnesium. Herbert Wittek. Ger. 583,476, Sept. 4, 1933. A mixt. of  $NH_3$  and  $CO_2$  is led over a dehydrating catalyst and then at 500-800° over an oxide of an alk. earth metal or Mg, or a compd. which yields such oxide. The catalyst may be  $Al_2O_3$  or a rare earth oxide, and is preferably supported on wood charcoal. The alk. earth or Mg compd. may also be mixed with a catalyst, e. g., an alkali or alk. earth halide or an alkali carbonate, or layers of the catalyst may alternate with layers of the compd. to be treated. The  $NH_3$ - $CO_2$  mixt. may contain hydrocarbons. Cf. C. A. 27, 3565.

Stabilization of phosphates. N. V. Maatschappij tot Exploitatie van de Parker Octrooien "Parker Rust Proof." Ger. 583,024, Aug. 26, 1933. Powd. phosphates are stabilized and prevented from caking by addn. of 1-5% of  $H_2BO_3$  or a similar proportion of  $ZnCO_3$ , sugar or like substance. The treatment is intended particularly for powd. phosphates required for making baths for protecting iron against rust.

**Acid metal phosphates.** Robert L. Sebastian (to American Agricultural Chemical Corp.). U. S. 1,929,452, Oct. 10. Inorg. phosphate-contg. material is treated with  $H_2SO_4$  to form  $H_2PO_4$  and the  $H_2PO_4$  formed is extd. from the reaction mixt. by an extn. liquid consisting mainly of one or more water-immiscible aliphatic alcs. contg. not more than 8 C atoms and the soln. thus formed is sepd. and treated with a metal phosphate of greater basicity than a mono-basic phosphate, such as a tri-basic phosphate in order to form an acid metal phosphate such as a di-basic phosphate.

**Aluminum oxide gel.** Earle H. Barclay (to Silica Gel Corp.). U. S. 1,929,942, Oct. 10. A soln. of an Al salt such as  $Al_2(SO_4)_3$  is mixed with a suitable reacting compd. of opposite character such as NaOH to form a gelatinous mass at low temp. under slightly alk. conditions. An Al oxide gel may be obtained which is hard, stable, highly porous and capable of absorbing water vapor to an extent of at least 21% at 25° C. when in equil. with water vapor at a temp. of 30° and a partial pressure of 22 mm. Hg.

**Ammonium nitrate and sulfate.** De Directie van de Staatsminen in Limburg. Brit. 394,447, June 29, 1933. See Fr. 732,903 (C. A. 27, 379).

**Calcium nitrate; diammonium phosphate.** Friedrich Uhde. Ger. 584,375, Sept. 19, 1933. Crude  $Ca_3(PO_4)_2$  contg.  $CaCO_3$  is sludged with  $Ca(NO_3)_2$  soln. and treated gradually with sufficient  $HNO_3$  to react with the  $CaCO_3$  without decomp. a substantial proportion of the phosphate. Alternatively, the crude phosphate may be treated directly with a soln. of  $Ca(NO_3)_2$  contg.  $HNO_3$ , which soln. may be prepd. from nitrous gases. In either case, the soln. of  $Ca(NO_3)_2$  is sepd. and crystd., and the  $Ca_3(PO_4)_2$  then converted into  $(NH_4)_2HPO_4$  in known manner.

**Dicalcium phosphate and ammonium chloride.** Louis Durepaire and Bernard Quanquin. U. S. 1,930,744, Oct. 17. Natural tri-Ca phosphate is treated with HCl in the presence of a concd. soln. of  $CaCl_2$  obtained from the mother liquors of a preceding operation. Milk of lime is added to the mixt. Di-Ca phosphate is sepd. as the principal product, the remaining soln. of concd.  $CaCl_2$  is recovered, part of this  $CaCl_2$  is decompd. by reaction with  $NH_3$  and  $CO_2$  and  $NH_4Cl$  and  $CaCO_3$  are thus formed and are recovered as secondary products, and the rest of the  $CaCl_2$  liquor is recycled in the process. An arrangement of app. is described.

**Nickel and iron carbonyls.** I. G. Farbenind. A.-G. Brit. 394,906, July 9, 1933.  $Ni(CO)_4$  is obtained by acting directly with CO (contg. gases, e. g., producer, water or illuminating gas) at elevated temp. and preferably elevated pressure on Ni-contg. mats or stones or like products obtained by a melting operation and which contain Ni and S with or without other metals such as noble metals or heavy base metals that combine with S, e. g., Fe, Cu, Co, Mo. The gases may be led in a cycle, impurities such as COS being removed and CO being regenerated therefrom. The initial materials may be treated to enlarge their surface before the reaction, e. g., given a blistered or loamy structure, granulated by pouring the molten material into  $H_2O$ , etc. If Fe is present the reaction may be so conducted that Ni only is attacked or mxts. of carbonyls may be obtained which may be subsequently sepd. Impure Ni may be refined by fusing with NiS or FeS or with other sulfides or S and subjecting the resulting mat to CO action. Cf. C. A. 27, 2257.

**Phosphorus pentachloride.** I. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauff, inventors). Ger. 583,395, Sept. 2, 1933. The inconveniences arising from the treatment of powd.  $PCl_5$  with water are avoided by compressing the  $PCl_5$  to form cylinders or the like which sink in water.

**Silica.** Peter Spence & Sons Ltd. Ger. 584,371, Sept. 19, 1933. See Brit. 357,993 (C. A. 26, 4922).

**Silver thiosulfate.** James J. Bajda. U. S. 1,929,466, Oct. 10. Reaction is effected between a suitable Ag salt such as  $AgCl$  and an alkali thiosulfate such as that of Na in a molten state.

**Sodium aluminate.** Harold W. Heiser (to Aluminum

Co. of America). U. S. 1,930,271, Oct. 10. A mixt. of finely ground alumina and soda ash with Na aluminatate is moistened with water, formed into briquets and the latter are heated to 900–1100°.

**Sodium aluminate.** Leslie M. Clark and Henry M. Spittle (to Imperial Chemical Industries, Ltd.). U. S. 1,931,374, Oct. 17. For prep. a cryst. Na aluminate, an aq. soln. of Na aluminatate of a compn. within the range of 1.5–2.5  $Na_2O$  to 1  $Al_2O_3$  of a concn. over 45% calcd. as  $Na_2O + Al_2O_3$  is cooled and the crystals which form are sepd. from the mother liquor.

**Apparatus for making sterile solutions of sodium chloride, mercuric chloride, and other corrosive reagents.** F. & M. Lautenschläger G. m. b. H. Ger. 584,160, Sept. 15, 1933.

**Trisodium phosphate.** Nils C. Lindberg (to Victor Chemical Works). U. S. 1,930,205, Oct. 10. For eliminating chlorides and sulfates from the continuous production of  $Na_3PO_4$  from comminuted ferro-P and  $Na_2CO_3$  contg. chlorides and sulfates, the initial materials are heated together to a reaction temp. below the fusion point and sulfates and chlorides are removed by passing a blast of heated gases (such as combustion gases from petroleum hydrocarbons) over the reaction mixt. The gases are removed and the sulfates and chlorides are sepd. from them by centrifugal action to recover not more than 95% of the solids and the centrifugized solids are returned to the reaction mixt. while removing the sulfates and chlorides in the gases;  $Na_3PO_4$  is leached from the reacted mixt. with an alkali leaching liquid and  $Na_3PO_4$  is crystd. from the soln.

**Purifying "technical" crystalline sodium pyrosilicate hydrates.** Myron C. Waddell (to Grasselli Chemical Co.). U. S. 1,931,364, Oct. 17. Free caustic alkali present in the material as an impurity is converted into Na pyrosilicate hydrate (suitably by adding a Na silicate of higher  $SiO_2$  content). Cf. C. A. 27, 5158.

**Titanium dioxide.** Hermann Haber and Paul Kubelka (to Krebs Pigment and Color Corp.). U. S. 1,931,380, Oct. 17. Vaporized  $TiCl_4$  is caused to react with steam at 300–400°. U. S. 1,931,381 relates to a process in which vaporized  $TiCl_4$  is heated in the presence of free O-contg. gas such as air to about 1000° or higher.

**Treating zinc oxide residues.** Robert V. Brown and Robert O. Wood (to National Aniline & Chemical Co.). U. S. 1,931,220, Oct. 17. Zinc oxide residues such as are obtained in the reduction of org. nitro compds. are freed from org. matter (as by adding  $H_2SO_4$  and formaldehyde) and filtering, in treating a residue obtained in the production of hydrazobenzene from  $PhNO_2$ .

**Apparatus for the production of bleaching powder by intimately mixing finely divided lime with chlorine and air.** Paolo Pestalozza. Brit. 394,373, June 19, 1933.

**Borax from Searles Lake brine.** Homer L. Robson (to Burnham Chemical Co.). U. S. 1,929,902, Oct. 10. Trona is removed from the brine and its alk. is thereby increased. Pptn. of  $Na_2CO_3$  is prevented by dilg. the brine with water, and the excess alk. of the brine is reduced sufficiently to ppt. borax but not sufficiently to ppt. trona by use of  $SO_2$  and borax is pptd. by cooling the treated brine.

**System for regenerating carbonate solutions used for removing carbon dioxide from gases.** Braunkohlengas G. m. b. H. Ger. 584,449, Sept. 20, 1933.

**Hydrogen peroxide.** Kali-Chemie A.-G. Fr. 750,592, Aug. 12, 1933.  $H_2O_2$  and sol. salts of Ba are made by treating  $BaHPO_4$  (obtained by decomposing  $BaO_3$  with  $H_2PO_4$ ) with volatile acids capable of forming sol. Ba salts.

**Nitrogen-hydrogen mixtures.** Walter Klempt. U. S. 1,931,442, Oct. 17. In producing N-H mixts. by first splitting hydrocarbons with steam and air in the presence of catalysts, then converting the CO of the resulting gas mixt. to  $CO_2$  by steam in the presence of a catalyst, and finally absorbing the  $CO_2$ , the N-H production is effected in 2 stages the first of which constitutes the endothermic part of the process and consists in converting only a part

of the hydrocarbon with the aid of steam chiefly into CO and the second of which constitutes the exothermic part of the process with addn. of air by which the remaining hydrocarbon material is also chiefly converted to CO.

**Sulfur trioxide manufacture by the contact process.** Theodore V. Fowler, Jr. (to General Chemical Co.). U. S. 1,930,125, Oct. 10. A  $\text{SO}_2$  gas, having a temp. above converting temp. and of a purity such that it may be passed directly to the catalyst without poisoning the latter, is cooled to a temp. below the requisite temp. for conversion but above about  $175^\circ$  (with conservation of the heat abstracted from the gas) and the cooled gas is subsequently reheated to conversion temp., contacted with a catalyst to form  $\text{SO}_3$ , and the heat generated in the conversion reaction is utilized for the reheating of the gas supplied to the reaction. App. is described. Cf. C. A. 27, 5488.

**Apparatus for making active carbon.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roeseler. Ger. 583,206, Aug. 30, 1933. Addn. to 568,400 (C. A. 27, 2019).

**Furnace for making active carbon.** Soc. de recherches et d'exploitations petrolifères. Ger. 583,184, Aug. 30, 1933. See Brit. 316,870 (C. A. 24, 1040).

**Carbon black, etc., from hydrocarbon gases and vapors.** Wm. D. Wilcox. U. S. 1,929,604, Oct. 10. For obtaining carbon black and a mixt. of H and N in controlled proportions, a partial disocn. of hydrocarbon gases such as  $\text{CH}_4$  is effected by passing them through the interior of a conduit heated to progressively higher temps. by the contact of combustion gases flowing countercurrent in contact with the exterior of the conduit; entrained carbon is removed and steam is added to the gas and it is passed through an externally heated conduit and heated to above  $700^\circ$ . Simultaneously air is passed through an externally heated conduit and heated to above  $700^\circ$  and the gas is mixed with a controlled proportion of the heated air and the resulting gases are discharged in contact with and in countercurrent flow with the exterior surfaces of the conduits through which the gas and air were introduced. App. and various operative details are described. U. S. 1,929,605 relates to app. for disocg. hydrocarbon gases and vapors in which catalytic material such as Fe or Ni may be used.

**Reactivating adsorbent carbon.** Carbo-Norit-Union Verwaltungs-G. m. b. H. Ger. 583,240, Aug. 31, 1933. The carbon is preheated to about  $200^\circ$ , e. g., with superheated steam, and then treated with a mixt. of steam and air contg. not more than 15% of O while the temp. is maintained at 300–500°. The carbon is treated in bulk, preferably in the adsorber.

**Chlorine.** Ludwig Rosenstein (to Shell Development Co.). U. S. 1,930,664, Oct. 17. See Can. 335,978 (C. A. 27, 5906).

**Drying wet chlorine.** Coke S. Lykes (to Solvay Process Co.). U. S. 1,930,526, Oct. 17. Wet Cl gas is brought into direct contact with cooling water substantially free from materials foreign to the Cl gas and the treated gas is then contacted with  $\text{H}_2\text{SO}_4$ .

**Sulfur.** Christian J. Hansen. Brit. 394,917, July 6, 1933. S is pptd. from  $\text{H}_2\text{S}$ -contg. gases by their passage through an aq. soln. of a thiocyanate, the soln. or the gas contg.  $\text{SO}_2$ .  $\text{NH}_3$  in the gases to be treated is previously removed.

**Sulfur.** Chem. Pat. in Billwärd, vorm. Hell & Sthamer A.-G. (Hanno Geller, inventor). Ger. 584,042, Sept. 14, 1933. A soln. of  $(\text{NH}_4)_2\text{S}_x$  is treated in the cold with an aldehyde, e. g.,  $\text{CH}_3\text{CHO}$ , preferably in the presence of a protective colloid, e. g., dextrin. The mixt. is stirred until pptn. occurs, and is then evapd., *in vacuo* if desired, to a paste or to dryness. The product contains up to 60% of free colloidal S, together with org. compds. of unknown constitution. It yields stable dispersions, and is useful in the agricultural, pharmaceutical and rubber industries.

**Sulfur recovery from sulfide materials such as sulfide iron ores.** Stanley I. Levy and Wm. S. Millar (to Sulphide Corp. of N. Y.). U. S. 1,929,502, Oct. 10. Sul-

fidic material contg. Fe is treated with a chlorinating medium such as Cl gas to form  $\text{FeCl}_2$  and displace the S content of the material in elemental form, in a described app. in which the sulfidic material and the chlorinating medium are subjected to the same progressive heat treatment, as by travel through a furnace in the same direction.

**Recovery of thallium from cadmium solutions.** American Smelting and Refining Co. Brit. 395,159, July 13, 1933. See U. S. 1,860,214 (C. A. 26, 5392).

**Catalytic agents.** The Goodyear Tire & Rubber Co. Brit. 394,576, June 29, 1933. Catalysts are prepd. by levigating a carrier in the presence of a salt of Ni, Co or Cu, adding a carbonate to ppt. the metal and subsequently reducing the pptd. carbonate *in situ* on the carrier. In an example 100 parts kieselguhr is levigated in a ball mill with a soln. of 100 parts Ni nitrate in 100 parts  $\text{H}_2\text{O}$ , the resulting paste being heated to  $70-80^\circ$ , and 60 parts  $\text{Na}_2\text{CO}_3$  in 260 parts  $\text{H}_2\text{O}$  is added. The mass is filtered, dried and reduced in H, C or MeOH or EtOH vapor at about  $450^\circ$ .

**Artificial masses.** Rohm & Haas A.-G. Brit. 395,291, July 13, 1933. Artificial masses are manufd. by treating polymers of acrylic acid, its derivs. or homologs, or mixts. thereof, obtained by combination of completed polymers or by combined polymerization, with Cl, with or without the application of heat and (or) pressure and with or without stirring or agitation. The products may be used for the production of lacquers, films, intermediate layers for safety glass, articles for electro-technology, threads, artificial leather, oilcloth, rayon, fabrics, sacks, elastic and transparent bandages, handles for knives, umbrellas or brushes, buttons, buckles, billiard balls, drinking cups, gramophone records, dentures, shoe soles, floor coverings, etc. Examples describe the action of Cl on (1) polymerized Me acrylate in  $\text{CHCl}_3$  soln. in the presence of light, (2) polyacrylic acid in aq. soln., (3) a film of polymerized Me acrylate, etc. A lacquer is prepd. by dissolving the product of (1) together with polymerized Bu acrylate in EtOAc with the addn. of Ti white.

**Condensation products.** N. V. de Bataafsche Petroleum Maatschappij. Brit. 395,193, July 13, 1933. Substituted carboxylic acids or carbonyl compds. are manufd. by condensing aliphatic mono-olefins, or tech. mixts. contg. aliphatic with or without aromatic mono-olefins, with substances having a double bond between 2 C atoms conjugated with 1 or more  $\text{COOH}$  or  $\text{CO}$  groups, e. g., maleic acid or anhydride, crotonic acid, crotonaldehyde, acrolein or quinone, and recovering the substituted acids or carbonyl compds. from the reaction mass. The products may be used as such or converted with other substances into synthetic resins, pharmaceutical preps., plasticizing means, lacquers or insulating materials. Among examples (1) amylene (produced from fermentation  $\text{AmOH}$ ) is heated in an autoclave to  $180^\circ$  with maleic anhydride (I) and the product treated with lye and then pptd. with a mineral acid, e. g.,  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ , to produce amylesuccinic acid and (2) cracking benzene, e. g., vapor phase cracking benzene, is heated in an autoclave at  $200^\circ$  with I and the substituted succinic acid formed is recovered as in (1).

**Condensation products from urea, thiourea, and formaldehyde.** The British Cyanides Co. Ltd. Ger. 583,262, Sept. 4, 1933. See Brit. 206,028 (C. A. 22, 505).

**Plastic composition.** Robert C. Korf. Ger. 583,176, Aug. 31, 1933. A soln. of natural or synthetic resin in borax soln. is mixed in the cold with fillers, pigments and metal salts or oxides (none specified) to produce a plastic mass which hardens in the air and can be used for interior decoration, etc.

**Plastic compositions.** Soc. des brevets étrangers de la Neoxyle. Ger. 583,374, Sept. 2, 1933. An org. or inorg. filling material is mixed with about 0.5 mol. of  $\text{H}_2\text{SO}_4$  (as 5%  $\text{H}_2\text{SO}_4$ ) and 5 mols. of  $\text{HCl}$  (as 20%  $\text{HCl}$ ), and the mixt. is treated with an aq. or anhyd. mixt. of about 4 mols. of  $\text{CaO}$  with  $\frac{1}{2}$  mol. of  $\text{ZnO}$ . The whole mixt. is then molded under pressure and dried. Addn. of powd. Al and a carbohydrate to the mixt. is advantageous.

• **Plastic compositions comprising cellulose derivatives and synthetic resins.** James F. Walsh and Amerigo F. Caprio (to Celluloid Corp.). U. S. 1,930,069, Oct. 10. A compn. suitable for the manuf. of sheets, etc., comprises a cellulose deriv. such as cellulose acetate and a plasticizer such as triphenyl phosphate in such quantity that exudation would normally occur, together with a synthetic resin such as one formed from toluenesulfonamide and formaldehyde in a quantity of 1-20% that of the plasticizer, which serves to prevent exudation and otherwise improves the properties of the product.

**Plastic compositions from dihaloparaffins and polysulfides.** Nathan Maxwell Mookin. Ger. 583,277, Aug. 31, 1933. See Brit. 350,456 (C. A. 26, 5302).

**Adhesives.** Stockholm. Bunnjolsfabriks Aktiebolag. Brit. 394,517, June 29, 1933. A dry flexible adhesive film consists of bone glue or a mixt. thereof with hide glue. Small quantities of potato starch may be added. The film may be made by mulling a viscous glue compn. between rollers and it may be reinforced with paper or fabric by immersing the latter in the liquid glue compn. and drying. The film may be used for veneering, heat and pressure being used to transform it to a viscous mass which sets on cooling. Glycerol, glucose and K lactate may be added to promote the change to a viscous state.

**Cement.** Siemens & Halske A.-G. (Reinhold Reichmann, inventor). Ger. 583,347, Sept. 1, 1933. A cement, particularly useful for securing the middle electrodes of spark plugs, is prepd. by mixing with water glass soln. a compn. comprising  $Al_2O_3$  50-53,  $Al(OH)_3$  10, powd. quartz 16, and powd. Pb glass 2.5 parts.

**Sheets or films.** I. G. Farbennud. A.-G. Brit. 394,244, June 22, 1933. The mech. properties of sheets or films prepd. from solns. of artificial polymerization products of a high degree of polymerization are improved by freeing them, by treatment with an org. liquid, from the solvents and softening agents (if any) still present, without dissolving the polymerized products themselves. Among examples a film cast from a soln. of polyvinyl chloride in a mixt. of cyclohexanone is extd. with MeOH, a mixt. of MeOH and BuOH and  $C_2H_6$ .

**Compound sheet materials.** Arthur Lichengrun. Brit. 394,753, July 6, 1933. Lacquer-like coatings on flexible materials are produced by applying by means of heat and pressure thin foils of thermoplastic material having a thickness of 0.01-0.05 mm. The flexible base may be paper, cardboard, fabrics, leather, metal foil, celluloid, synthetic resins, galalith or artificial cork made from disintegrated cork and nitrocellulose. Suitable thermoplastic materials are cellulose derivs., e. g., the nitrate, acetate, formate, propionate or butyrate and Et, Me or benzyl cellulose, which may contain plasticizers and synthetic resins. The foils may be colored and a plurality of foils having different compns. and consequently different softness may be superposed and pressed in 1 operation. Washable paper may be thus produced.

**Decorative panels.** Dulcie G. Vaughan, Alfred G. Larter and Albert F. Wagstaff (trading as Enterprise Glass Co.). Brit. 393,184, June 1, 1933. Decorative panels are made by placing between 2 sheets of glass a sheet of fabric, celluloid or cellulose acetate on which an illustration has been painted, applying to the assembly by dipping, brushing or spraying a mixt. of methylcyclohexanol acetate and Et phthalate and finally heating under pressure.

**Cleansing composition.** Dreitur-Seifenfabrik Viktor Wolf (Michael Lewinsohn, inventor). Ger. 584,477, Sept. 20, 1933. A compn. for removing grease from household articles, etc., contains an alkali or alk. earth acetate and a subordinate amt. of silica or water glass, with or without other usual components. A typical compn. contains NaOAc 25, borax 20, cryst. soda 50 and water glass 5%.

**Cleansing composition for wallpaper, painted surfaces, etc.** Herbert Walter. Ger. 584,312, Sept. 18, 1933. Coarse rye flour is treated with two thirds of its wt. of hot dil. aq. water glass soln.

**Wetting agents, etc.** Deutsche Hydrierwerke A.-G. Pr. 750,547, Aug. 14, 1933. Unsubstituted or mono-substituted amines, in which one at least of the radicals joined to N is composed of a hydrocarbon radical of high mol. wt. of the fatty or alicyclic series, are transformed to halogenated amides by treatment with halogenated carboxylic acids having one or more mobile halogen atoms or with their anhydrides or chlorides, and then one or more of the halogen atoms are replaced by sulfonic groups. Examples are given of the prepn. of cetylpropionamide- $\beta$ -sulfonic acid ( $C_{16}H_{33}NHC(=O)CH_2CH_2SO_3H$ ), dodecyl(hydroxyethyl)acetamidesulfonic acid ( $C_{12}H_{25}N(CH_2CH_2OH)C(=O)CH_2SO_3H$ ) and naphthylacetamidedisulfonic acid. The products are wetting, dispersing, cleansing and foam-producing agents.

**Emulsifying and dispersing agents.** Henry Dreyfus. Brit. 391,657, June 19, 1933.  $H_2O$ -insol. compds. are emulsified or dispersed in  $H_2O$  by means of the esters, amides or ester-amides obtained by condensing amino-acids with naphthene or resin acids, e. g., of colophony and various copals or the synthetic resin acids prepd. by condensing natural resins with phenol-aldehyde and urea aldehyde condensation products, glyptal resins and the products obtained by condensation of aliphatic dicarboxylic acid, e. g., sebacic, with alic. The esters or amides may contain  $HSO_3$  groups and, when a free COOH group is present, may be converted into the Na, K or NH salts or esterified with other alics. They are particularly useful for making aq. dispersions of dyes for dyeing and printing textile fibers, especially cellulose fibers, and for dispersing lakes and pigments for use as aq. paints. Ammonoles mentioned are mono-, di- and tri-ethanolamine, diaminopropanol, dihydroxypropanolamine, butanolamine, pentanolamine and such compds. as made by the action of ethylene oxide on ethylcucdiamine. An example is given of the dyeing of cellulose acetate fabric with a dispersion of 1-amino-4-methylaminoanthraquinone prepd. by grinding the dye with the condensation product of naphthene acid and ethanolamine in the presence of  $H_2SO_4$  and stirring the mixt. into  $H_2O$ .

**Non-resonant surfaces.** Michel & Marchal. Brit. 394,927, July 6, 1933. Non-resonant surfaces are obtained by treating the surface with a layer of adhesive and depositing pulverized vegetable or animal textile fibers thereon. A suitable adhesive comprises stand oil 25,  $CaCO_3$  45, synthetic resin 3, mineral oil 22.5,  $PbO$  0.5 and siccativ with Mn and Co 1%.

**Materials for duplicating rolls.** Carl S. Miner (to Charles H. Joy, Jr.). U. S. 1,929,601, Oct. 10. A backing material such as paper is coated on both sides with lacquer, a binding agent contg. solvents for both lacquer and duplicating compn. is applied to at least one lacquer coating, and a duplicating compn. is applied over the binding agent.

**Friction composition for brakes.** American Brake Materials Corp. Ger. 583,461, Sept. 4, 1933. See U. S. 1,882,702 (C. A. 27, 820).

**Puncture sealing compositions.** Arthur W. Dickeson and Clara E. Dickeson. Brit. 394,978, July 4, 1933. The compn. comprises a filler mixt. of ground mica, teased asbestos fiber, French chalk (or tripoli, whitening or asbestos powder), ground cork (or ground rubber) and matted human hair. It is used in conjunction with a film-forming agent consisting of tragacanth "sorts," agar agar and formalin soln.

**Chewing gum base.** John O. Barker (to Sweet's Laboratories, Inc.). U. S. 1,930,436, Oct. 10. A caustic alkali soln. is added to latex and the mixt. is allowed to stratify into layers; the rubber contg. layer is sepd. and other chewing gum components are added to it.

**Dental fillings.** Sally Oppenheim. Brit. 394,260, June 22, 1933. A dental root-canal filling consists of a mixt. of 2 different powd. metals, e. g., Ag and Au, mixed with an electrolytic liquid, e. g., the  $H_3PO_4$  used as a binder for the cement that holds the filling in place.

**Sound records.** Laurence Fisher. U. S. 1,931,287, Oct. 17. A disk of fibrous material such as cardboard



is treated on both sides with a sizing and a glue wash is applied to the sizing. Two disks of cellulose ester composition such as cellulose nitrate or acetate are treated on one side with a "cellulose" soln which is a thermally reactive adhesive and the other sides of the cellulose ester disks are treated with a soln of bronzing liquid contg pulverized silica and a filling powder such as soapstone, whiting and soap. Disks of paper are placed between opposite sides of the fibrous disk and the adhesive-treated sides of the cellulose ester disks, and sound lines are impressed under the action of heat and pressure on the assembled materials.

**Apparatus for blowing slag to form artificial pumice stone** Carl H Schol Ir 750,610, Aug 11, 1933

**Printing-surfaces** Henz Horn Brit 395,214, July 13, 1933 Rubber forms for relief and intaglio printing are produced by supplying the matrices or original forms

with natural or synthetic, thinly or thickly liquid or paste like rubber milk which may be mixed with fillers, (e.g., chalk, ZnO, Zn or other metal dust, cement, powdered cork, heavy spar and S, and may be hardened by vulcanizing at normal temp or in an oven at 115°. The milk may be vulcanized, concd or mixed with suitable substances to render it microporous before it is applied. The matrix or original form is preferably coated with a thin layer of rubber-repellent substance, (e.g., gelatin, chalk).

**Foam-producing compositions for extinguishing fires** Felix Neville Ger 543,231, Aug 31, 1933 Comps of the known kind comprising an anhyd carbonate,  $Al_2(SO_4)_3$ , a foam-producing agent, and a dehydrating agent are improved as regards stability to storage by using anhyd  $Al_2(SO_4)_3$  and an anhyd foam-producing agent. Anhyd  $NaHSO_4$  may replace a part of the  $Al_2(SO_4)_3$ .

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

F BARTOW C H KEIR

**Venetian art glass** Robert Schmidt *Glastech Ber* 11, 324 (1933) J I Hyde

**Old Thuringian cut glass** Gustav I Paurick *Glastech Ber* 11, 325 (1933) J I Hyde

**Essentials of glass technology based on American practice** Samuel R Scholes *Ceram Ind* 21, 242-52 (1933), cf C 1 27, 591, Herbert S Willson

**A peculiar attack on chemical glassware by dilute aqueous ammonia** Franz Hundt *Glastech Ber* 11, 323 (1933) On standing several months there was a skin of hydrated amorphous silica, accompanied by small nodules. The base of these were brownish black and consisted of  $MnO$ . The remainder of the nodules was made up of calcite crystals. Thus considerable  $Mn$ , lime, alkali and silica had been extd. J I H

**The coloring of glasses with copper selenium and sulfur** Hermann Weckerle *Glastech Ber* 11, 273-8, 314-23 (1933) The study of the Cu ruby was carried out on a base glass of the compn  $SiO_2$  50.43,  $PbO$  21.2,  $CaO$  0.09,  $Na_2O$  7.49,  $K_2O$  5.33,  $B_2O_3$  0.05,  $Li_2O$  0.08%. Cu was introduced in the form of  $Cu_2O$  with Sn as the reducing agent. The amt of  $Cu_2O$  was varied from 0% to 9% and the Sn from 0% to 6%. The time and temp of heat treatment required to produce coloring and liveness were directly proportional to the amt of Cu present. An analysis of colors, ruby and liver glass showed the Cu to be present as metal and oxide in nearly equal amts, so that the difference must be largely phys., such as particle size. This, together with ultra-microscopic examn, substantiates the theory that the colorless glass contains only crystal centers which grow by pptn of the dissolved Cu on proper heat treatment to give the ruby and finally livering. A glass of the compn  $SiO_2$  55.9,  $Na_2O$  2.1,  $K_2O$  15.0,  $CaO$  7.0%, was used in the study of pure S glasses. Addn of  $Na_2SeO_3$  with a reducing agent failed to give any color but brown. The compn of the glass used in the study of the Se Cd sulfide ruby was  $SiO_2$  58.58,  $B_2O_3$  2.19,  $PbO$  0.31,  $Na_2O$  3.4,  $K_2O$  14.06,  $CaO$  4.21,  $ZnO$  16.21%. Omission of  $B_2O_3$  and  $PbO$  did not affect the color. Replacement of K by  $Na$  shifts the color toward yellow. Replacing  $ZnO$  by  $Al_2O_3$  or  $CaO$  results in colorless or brownish glasses. Leaving out  $CdS$  gives colorless glasses. Cd introduced as oxide also gives a colorless glass. With  $CdSe$  added, in amts equiv to the usual amts of  $CdS$ , to the normal Zn-contg glass good ruby glass resulted. The amt of Cu remaining in a glass was directly dependent on the Zn content. It is definitely shown that Zn, Cd and Se are all essential to the production of a ruby glass. The Se may be introduced as  $Se$ ,  $Na_2SeO_3$  or  $CdSe$ , and the Cd as  $CdS$  or  $CdSe$ . The S is in any case unnecessary. For S yellow glasses the following compn was used:  $SiO_2$  42,  $Na_2O$  18% with small addns of sulfate and C. The  $SiO_2$  obtained from  $Na_2SiO_3$  was iron free and the melting done in Pt. The yellow color due to C is weak, hard to reproduce, and therefore of no significance. The real

yellow to deep brown colors are the result of introduction of S. The pure melt was colorless showing the absence of any color due to Na S. The variation in color with  $Fe$  content was studied. The  $Fe$  has no influence on the (sulfide) S content of the glass. Forty-two references. J F Hyde

**Studies on the heat currents in tanks by means of models** Adolf Schild *Glastech Ber* 11, 305-14 (1933) Transparent oil of the proper viscosity, in conjunction with dye, was used to simulate glass in model tanks of various types. The behavior of the currents is amply illustrated by sketches and photographs. J F H

**Scientific principles of fuel economy in the glass industry** The importance of low-grade town gas David Brown *Glass* 10, 108-11 (1933), cf C 4 27, 5932

Herbert S Willson

**Is glass a rigid substance?** Hugo Kuhl *Glastech Ber* 63, 155 (1933) —Seemingly rigid and brittle glass is more or less elastic and plastic. Elasticity and plasticity depend on the compn and working of the glass melt. Inhomogeneity of the glass is the reason for an increased brittleness and depends on the prepn of the batch, melting and working of the glass. The compn of the glass is very significant for the rigidity of its structure, for its elasticity, and hence, for its plasticity. Alumina glasses are very viscous and elastic glasses rich in Pb are very viscous and plastic. Viscous and elastic glasses have a high impact strength and are resistant to pressure. Plasticity is a relative property of glass. Every glass is plastic in the softened state and is only distinguished by the height of temp necessary to bring about the plastic state. The more elastic the glass is, the smaller is its plasticity. The crystal processes producing devitrification in old glasses show that the arrangement of the mol. and their position changes. These phenomena are not conditioned by newly originated formations of crystals but by the growth of those present. This transformation of glasses is considerably affected by their compn and working. Certain optical phenomena stipulated by chem reactions confirm the relative movement of mol. in glass assumed to be rigid. Rays acting chemically release chain processes in the glass. Another confirmation of the mobility of seemingly rigid mol. is shown by the fluorescence of glasses contg Cu when exposed to Röntgen rays and the violet coloring of Mn glasses originally colorless.

M V Kondordy

**Is ceramics physics or chemistry?** Anon *Bull Am Ceram Soc* 12, 295 (1933) C H Keir

**The trend of improvements in ceramics** R Barla *Chimie & Industrie Special No*, 855 (10 June, 1933)

A Papineau-Couture

**Clay** R H Kudlick and K V Herlitz *Bur Mines, Minerals & Carbide*, 1932 33, 639-45 (1933) A H E

**Selection of clays for saggars of predetermined resistance to thermal shock and prediction of sagger life in**

service. R. A. Heindl and L. K. Mong. *J. Am. Ceram. Soc.* 16, 601-6 (1933).

An x-ray study of the toughness of paving brick. Guy S. Wroong. *J. Am. Ceram. Soc.* 16, 598-600 (1933).

Tests of reinforced brick columns. Inge Iversen. *J. Am. Ceram. Soc.* 16, 584-97 (1933).

The manufacture of terre cotta wall block. P. W. Lee. *Bull. Am. Ceram. Soc.* 12, 301-3 (1933).

Pipet analyzer of Krausz. O. Sommer. *Ber. deut. keram. Ges.* 14, 193-7 (1933). A new app. is described for measuring the fineness of grain of clay by the pipet sedimentation method.

Notes on the x-ray diffraction patterns of mullite. K. Posnjak and J. W. Gray. *J. Am. Ceram. Soc.* 16, 569-83 (1933).—Various artificial  $Al_2O_3 \cdot SiO_2$  products, also clay minerals and clays heated to 1000°, were examined by the x-ray powder method. All patterns identified were mullite, not sillimanite. Mullite crystal conts.  $Al_2O_3$ ,  $Fe_2O_3$  or  $TiO_2$  in solid soln gave patterns with lines slightly displaced toward the origin. Mullite crystals, freed by HCl from the matrix, often gave patterns in which the intensity of certain lines was much different from normal, because of the orientation of the minute, etched crystals when mounted for photographing. No basis is found for claims of the discovery of similar materials for which new names have been proposed.

Melting ranges of silica-glass oxide systems and some conclusions. M. Hollnagel and H. Rumpf. *Ingew. Chem.* 46, 662-7 (1933). The phase diagram of  $SiO_2$  glass oxide systems was investigated, which contained the glass oxides in the following mol. proportion: (1) 0.3  $K_2O$ , 0.7  $Al_2O_3$ , 0.7  $CaO$  and, for lower melting concs., (2) 0.3  $K_2O$ , 0.3  $Al_2O_3$ , 0.7  $CaO$ , 0.7  $PbO$ . It was found that the system contg. 42.125% glass oxide mol., the balance being  $SiO_2$ , after melting, form pure phys. solns of these oxides in  $SiO_2$ . The proof of the fully anisotropic state of the melt is established by Dbye diagrams. The system with less than 12.5% glass oxide mol., after melting, consist of mixed crystal, where the oxide mol. are probably interspersed in the quartz lattice. Well-formed interference figures at the Dbye diagrams of the melts prove their crystal character. Only at the m. p. of the mixt. contg. 12.5% glass oxide mol., 1472°, do 3 phases exist in equil. In the melting range of the other mixts. only 2 phases exist, the solid amorphous or the solid crystal and the liquid phase. These observations hold only within the melting range and slightly below it, as on cooling, some pure  $SiO_2$  always crystallizes out. The point of separation into  $SiO_2$  and  $SiO_2$  glass oxide mixt. lies lower for greater quantity of dissolved glass oxide mol.

New processes in the manufacture of refractories. L. Litinsky. *Techn. Offenbau* 9, 121-31 (1933).

Magnesia refractories in Canada. G. M. Curran and D. W. Stewart. *Can. Mining Met. Bull.* 257, 511-51 (1933).

Silica refractories that give doubled service. I. P. Budnikov. *Ceram. Age* 22, 30-1 (1933).

Tercod a new refractory. G. S. Diamond. *Ceram. Age* 22, 133-4 (1933), cf. *C. A.* 27, 2625.

An investigation of the refractories used in ladles and in ingot casting. I. Some characteristics of the clays used in the manufacture of runners, stoppers, nozzles, etc. J. R. Prastly and W. J. L. *J. Soc. Chem. Ind.* 52, 297-304 (1933).—Fine clays from the Sheffield district showed a shrinkage up to 1100°, then a slight expansion around 1200°, then further shrinkage until permanent bloating begins at 1300°. This expansion at 1200° may be due to mineralogical changes or to a premature bloating. The mineralogical exams have not been completed, but porosity and sp. gr. data indicate that the expansion is due to an increase in the closed pores.

Test for chemical resistance of glass containers. F. C. Flint and A. K. Lyle. *Bull. Am. Ceram. Soc.* 12, 296-9

(1933).—A simple NaOH and an autoclave test are described.

Air-cooled enamel. Vielhaber. *Emailwaren-Ind.* 10, 303-4 (1933).

Practice in the enamel shop, efficiency of heat transfer. Ludwig Stuckert. *Ceram. Age* 22, 102-3 (1933); cf. *C. A.* 27, 1645. Bibliography.

Sintering of the lining of rotary kilns for fusing enamel. Karanus. *Emailwaren-Ind.* 10, 285-7 (1933).—Directions are given.

Majolica enameling according to the wet and powder methods. Lang. *Glashutte* 63, 204-6 (1933).—Four methods for applying powder and the wet method are described.  $SiO_2$  (2.4%) is the best opacifier for the round coat in the wet method. Attempts to use  $SnO_2$  were unsatisfactory, it produced bubbles and dark spots.  $SiO_2$  increased the adherence of the ground coat. Fluorides should not be used in the ground coat when the wet method is employed.

Manufacturing defects and mechanical damages in wet process porcelain enamelware. Edward Dahill. *Bull. Am. Ceram. Soc.* 12, 317-18 (1933).

Waste in enamel works. H. Motscham. *Emailwaren-Ind.* 10, 284-90 (1933).

Leakage in horizontal gas retorts [also in fireclay retorts]. (Lucas) 21. Uses of coal in the ceramic industry (Nold) 21. Joints between metal and siliceous refractories (Brit. pat. 394,311) 9.

Littleton, J. T., and Morey, G. W. Electrical Properties of Glass. Monograph No. 3, Natl. Research Council Series. New York: John Wiley & Sons, Inc. 184 pp. \$3.00. Reviewed in *Ind. Eng. Chem.* 25, 1408 (1933).

Electric furnaces for making glass, etc. Harold W. McIntosh (to Hartford-Empire Co.). Brit. 394,709, July 3, 1933. In the production of glass, sol. Na silicate and vitreous enamels the graphite electrodes are coated with the substance to be made before insertion in the furnace so that they are not oxidized and the product consequently discolored.

Resistance furnace, with auxiliary gas burner, for glass manufacture. Patent-Inchard Ges. fur Glask. Glash. Lampen u. H. Ger. 584,389, Sept. 19, 1933.

Tank furnace for glass manufacture. Deutsche Glas- u. Owens Ges. fur maschinelle Glasherstellung A.-G. Ger. 581,388, Sept. 19, 1933.

Means for preventing formation of bubbles in molten glass. Leopoldo Sanchez Vello. Ger. 584,163, Sept. 15, 1933. See Brit. 379,216 (*C. A.* 27, 2551).

Apparatus for manufacture of hollow glassware such as bottles. Clyde C. Cook and Charles Badger (to Owens-Ill. Glass Co.). U. S. 1,931,375, Oct. 17. Mech. features.

Apparatus for making glass articles such as bottles. Hartford Empire Co. Fr. 750,558, Aug. 12, 1933.

Apparatus for the manufacture of glass containers such as jars and bottles. Arthur C. Forster. U. S. 1,920,842, Oct. 10. Mech. features.

Apparatus for forming glassware such as bottles. Henry W. Inck (to Hartford-Empire Co.). U. S. 1,930,139, Oct. 10. Mech. features.

Apparatus for forming glassware such as bottles. Willard L. Van Ness (to Owens-Ill. Glass Co.). U. S. 1,931,336, Oct. 17. Mech. features.

Apparatus for making glass filaments. Borukes and Brenner und Glasmaschinen G. m. b. H. Ger. 584,215 and 584,216, Sept. 16, 1933.

Apparatus for making glass strip with a surface of colored glass. Deutsche Spiegelglas-A.-G. Ger. 584,214, Sept. 16, 1933.

Continuous apparatus for drawing glass or wired glass strip. Hugo Knoblauch. Ger. 584,015, Sept. 13, 1933, and 584,391, Sept. 19, 1933.

Apparatus for sheet-glass manufacture. Paul J. M. Escole (to Forges et ateliers de constructions electriques

de Jeumont, Soc. anon.). U. S. 1,930,424, Oct. 10. Mech. features.

**Preventing blurring or dulling of sheet glass.** "Mühlig-Union" Glasindustrie A.-G. Brit. 394,635, June 29, 1933. The dulling or corrosion of sheets or plates of glass, due to the action of condensed moisture, is prevented by treating their surfaces with a medium, e. g.,  $\text{CuSO}_4$ ,  $\text{FeSO}_4$ , citric acid,  $\text{H}_2\text{BO}_3$ , that neutralizes the alkalies extd. by the moisture. The medium may be incorporated with a carrier adapted to be spread thinly off the surface, e. g., asbestos, sawdust, etc. Paper, satd. with a soln. of 1 g.  $\text{FeSO}_4$  per 1.  $\text{H}_2\text{O}$ , may be used for sepg. glass sheets when packed or stacked.

**Method of hardening sheet glass by blowing with air.** Société anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cirey. Ger. 584,217, Sept. 16, 1933.

**Apparatus for drawing glass tubes.** Soc. anon. "Le Pyrex." Ger. 584,162, Sept. 15, 1933.

**Roller for flat-glass-drawing machines.** Joseph Gaskell (to Pilkington Bros. Ltd.). U. S. 1,930,999, Oct. 17. Mech. features.

**Glass transparent to ultra-violet rays.** Sendlinger optische Glaswerke G. m. b. H. (Georg Jacekel, inventor). Ger. 583,001, Aug. 20, 1933. Glass of high transparency to ultra-violet rays contains  $\text{BaO}$  at least 10 and  $\text{B}_2\text{O}_3$  not more than 10%, and not more than 3.5 mols. of acid ( $\text{SiO}_2 + \text{H}_2\text{O}$ ) per mol. of base ( $\text{BaO} + \text{Na}_2\text{O}$  and/or  $\text{K}_2\text{O}$ , with or without  $\text{ZnO}$ ). The glass contains no  $\text{As}_2\text{O}_3$  and practically no  $\text{Fe}_2\text{O}_3$  and preferably no  $\text{CaO}$ . A specified compn. is  $\text{SiO}_2$  59,  $\text{B}_2\text{O}_3$  4,  $\text{Na}_2\text{O}$  7,  $\text{K}_2\text{O}$  7,  $\text{BaO}$  10 and  $\text{ZnO}$  4%.

**Apparatus and process for the formation of flashed glassware by pressing.** Glashüttenwerke vormals J. Schreiber & Neffen. Brit. 395,599, July 20, 1933.

**Rolling machine for making wire glass.** Chance Brothers & Co. Ltd., Wm. H. S. Chance and Leonard Garman. Brit. 394,783, July 6, 1933.

**Press for making nonsplintering glass.** Carl Schaefer. Ger. 584,171, Sept. 15, 1933.

**"Acid-grooving" of safety glass.** Brook J. Dennison (to Duplate Corp.). U. S. 1,930,587, Oct. 17. For removing the periphery of a sheet of cellulose deriv. material such as cellulose acetate compn. lying between a pair of glass sheets in a laminated plate, the plate is submerged in a bath of  $\text{H}_2\text{SO}_4$  contg. an oxidizing agent such as  $\text{HNO}_3$ .

**Laminated glass.** Joseph G. Davidson (to Carbide & Carbon Chemicals Corp.). U. S. 1,929,352, Oct. 3. Glass sheets are united by a layer composed of a polymerization product of an ester of vinyl alc. such as polymerized vinyl acetate which adheres directly to the glass.

**Non-drip vessels.** Corning Glass Works. Brit. 394,918, July 6, 1933. The underside of the rim or lip of a glass or pottery vessel is coated with a transparent, fired-on film of a metallic compd. that resists wetting by aq. solns., dripping being thus prevented when pouring therefrom. Suitable materials for the coating are  $\text{TiCl}_4$ ,  $\text{SiCl}_4$ ,  $\text{SnCl}_4$  and  $\text{FeCl}_3$ . Cf. C. A. 27, 4646.

**Composite articles of fused silica or the like.** Elihu Thomson (to General Elec. Co.). U. S. 1,930,327, Oct. 10. Articles such as large telescope mirrors are formed by accretion from particles of  $\text{SiO}_2$  or the like fed into a fusion zone at such a rate, during formation of a portion of the article, that a dense transparent product results, and, subsequently, at a higher rate by which a less transparent and less dense product is formed. Cf. C. A. 27, 1471.

**Composite articles, such as large telescope mirrors, of fused silica.** Alvarado LeR. Ellis and Gunnar A. F. Winckler (to General Elec. Co.). U. S. 1,930,340, Oct. 10. Otherwise homogeneous articles such as telescope mirrors are formed in part of transparent vitreous silica having a d. of about 2.2 and substantially devoid of gas inclusions, and in part of a translucent material contg. gas inclusions and having a d. of about 2.0.

**Manufacture of pyroxylin tubing.** Cecil J. Carroll

(to Nizon Nitration Works). U. S. 1,930,995, Oct. 17. Various details of app. and operation are described.

**Purifying clay.** David F. McCormick (to Kaolin Processes Inc.). U. S. 1,930,247, Oct. 10. Clay is purified by disintegrating, drying and air-sepg. a part of the clay from its impurities, and washing the rejects of air sepg. contg. pure clay for recovering substantially the balance of pure clay, these operations being carried out successively on a constantly moving stream of clay (in a described app.).

**Ceramic compositions.** A C Spark Plug Co. (Hans Navratil and A. H. Fessler, inventors). Ger. 583,003, Sept. 1, 1933. See Brit. 322,361 (C. A. 24, 2853-4).

**Apparatus for extruding hollow bricks, etc.** Heinrich Supthut (trading as the firm Wilhelm Schülke) and Paul Thomas. Brit. 395,341, July 4, 1933. Addn. to 380,591 (C. A. 27, 5503).

**Porous bricks and pottery.** Aage Nielsen. Ger. 583,301, Sept. 1, 1933. See Fr. 735,954 (C. A. 27, 1471).

**Pottery product suitable for chemical work, etc.** Max Hauser. U. S. 1,930,095, Oct. 10. A container having acid-resisting properties, high-thermal cond. and high resistance to breakage from temp. changes has walls comprising a fired mixt. of discrete particles of finely ground or granular  $\text{Si}$  bonded by a matrix of ceramic raw material of the silicate type such as may be formed from clay, etc.

**Products such as bent tubes or rods from plastic materials such as fire clay, etc.** Louis C. Bonnot (to Bonnot Co.). U. S. 1,931,371, Oct. 17. A mass of plastic material is homogenized by degasifying, and subsequently formed and reshaped.

**Gramophone needles.** Jack F. Jordan. Brit. 394,823, July 6, 1933. Needles for gramophones, etc., are made of burnt clay, preferably by drying to a plastic condition a colloidal suspension obtained by washing out the coarser ingredients, drying further and heating to a sintering temp. about 10-12 hrs. An analysis of a suitable clay is given.

**Refractories.** Alterra A.-G. Brit. 394,115, June 22, 1933. Refractory sintered  $\text{MgO}$  is produced from raw materials low in  $\text{Fe}$  by adding to the charge a small proportion of preformed  $\text{CaFe}_2\text{O}_4$  or  $\text{CaO}$  and  $\text{Fe}_2\text{O}_3$  (or substances yielding these) in such proportions that the  $\text{CaO}$  does not exceed that necessary to form  $\text{CaFe}_2\text{O}_4$ , addns. other than  $\text{CaO}$  and  $\text{Fe}_2\text{O}_3$  being made, or being present as impurities, only in such quantities that the formation of  $\text{CaFe}_2\text{O}_4$  is not impeded. The  $\text{CaO}$  may be present in the raw material as impurity. Where the raw material contains acid silicates, or substances yielding acid silicates on calcination, sufficient basic material is added to combine therewith, and if  $\text{CaO}$  is added for this purpose, sufficient excess must be added to combine with the added  $\text{Fe}_2\text{O}_3$ . In an example magnesite, poor in  $\text{CaO}$ ,  $\text{SiO}_2$  and  $\text{Fe}$ , is mixed with 15%  $\text{CaO}$  and 5%  $\text{Fe}_2\text{O}_3$  and fired at 1350°.

**Refractory ceramic articles.** Deutsche Ton- & Steinzeug-Werke A.-G. Ger. 583,195, Aug. 31, 1933. Articles made from an ordinary ceramic compn. are provided with an internal supporting framework of a material more highly resistant to temp. and pressure and of similar compn. Thus, a standard compn. comprising chamotte and clay may be molded around a framework of  $\text{SiC}$  and then fired in the usual way. The products retain their shape when subjected to a bending force at a high temp. and pressure.

**Refractory compositions.** Victor M. Goldschmidt (Rudolf Knudsen, co-inventor). Ger. 583,194, Aug. 31, 1933. Comps. consisting mainly of  $\text{Mg}$  orthosilicate are prepd. by heating talc with  $\text{MgO}$  or magnesite to a temp. insufficient to fuse the mixt., e. g., to 1300-1450°. Natural  $\text{Mg}$  orthosilicate may be added to the initial mixt.

**Cast refractory bricks for Siemens-Martin furnaces, etc.** Arthur Sprenger. Ger. 583,125, Aug. 29, 1933. Constructional features are described.

**Waterproof abrasive articles.** Zoltan Hadnagy, Albert Bouillard and Andre Auby. Brit. 394,442, June 29, 1933. The articles, e. g., sand paper, emery cloth, etc.,

are made by use of an adhesive consisting mainly of material elastic at normal temp., melting or softening at about 100° and solidifying in a few sec. on natural cooling. Suitable substances are oils treated with S, stearin pitch, gutta-percha, balata with or without oil, partially oxidized or polymerized oils, e. g., linolin, mordant or blown oil,  $C_{10}H_8$  and S and to these may be added resins, wax or a mixt. of synthetic and natural resin. App. is described for prepg. abrasive paper.

**Abrasive tools for grinding, lapping and finishing of metals.** Joseph N. Bethel (to Norton Co.). U. S. 1,931,370, Oct. 17. Tools such as burs, disks or wheels are formed of a molded compacted mixt. of sep. and distinct particles of granular metal such as brass, Al, Sn or Pb and granular abrasive material such as SiC or emery held in position by a brittle, non-metallic bond such as shellac or Na silicate which has been heat-set to form an integral body. Cl. C. A. 27, 4050.

**Machine for testing abrasive qualities of materials and for testing lubricants.** The Timken Roller Bearing Co. Brit. 395,976, July 27, 1933.

**Adhesive for use in manufacture of waterproof abrasive products such as abrasive cloth or paper.** Jacques Lemerle (to Société anon. compagnie centrale des emeris et produits a Polir). U. S. 1,930,393, Oct. 10. An oxidized drying oil such as oxidized linseed oil is mixed with about 4% of a bitumen material such as asphalt.

**Enameling.** The Porcelain Enamel and Manufacturing Co. of Baltimore. Brit. 395,482, July 20, 1933. Vitreous enamelled articles having a multicolored appearance are produced by forming a rough surface on an article, applying colors to the surface so that the article appears of different color when viewed from different directions and then firing to produce a smooth surface. Comps. of suitable enamels are given.

**Coating metal surfaces such as steel or iron.** Ford C. Zimmer (to General Elec. Co.). U. S. 1,930,331, Oct. 10. A corrodible metal surface such as steel or iron is provided with a ground coat of vitreous enamel and a superposed protective and decorative coat of an org. finishing material such as a synthetic resin varnish entirely covering the ground coat.

## 20 CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**Cement.** H. H. Hughes and B. W. Bagley. *Bur. Mines, Minerals Yearbook 1932* 33, 565 75(1933).

**Rapid analysis of portland cement.** P. N. Grigoriev. *Z. anal. Chem.* 94, 249 51(1933).—First det. the loss on ignition in a Pt crucible. Digest the ignited product with 3-5 cc. of HCl and heat to gelatinize the hydrated  $SiO_2$ . Cool, dil. with water and filter off the ppt. without dehydrating. For this a membrane filter is recommended. Divide the filtrate into 3 aliquot parts. In one det. the  $Fe_2O_3$  content by the Zimmermann-Reinhardt method. In a second part, ppt. with  $NH_4OH$  and weigh the ignited ppt. of  $Fe_2O_3$  and  $Al_2O_3$  in the usual way. In the filtrate from this pptn. det.  $SO_4^{2-}$  by the rhodizomate method, as follows: neutralize, add an excess of 0.5 N  $BaCl_2$ , shake repeatedly, add 2 cc. of  $HCl$  and 10 drops of Na rhodizomate and titrate the red soln. with 0.2 N  $(NH_4)_2SO_4$  to det. the excess  $Ba^{++}$ . In the third aliquot det.  $CaO$  and  $MgO$ . To do this, heat to boiling without neutralizing, add  $NH_4OAc$  and  $(NH_4)_2C_2O_4$ , filter off the resulting  $CaC_2O_4$  and titrate with  $KMnO_4$  in the usual way. In the filtrate ppt. the  $Mg$  as  $MgNH_4PO_4$  and titrate the ppt. with 0.1 N  $HCl$  by the method of Killig. The entire analysis can be completed in 7-8 hrs.

**Preparation and properties of anhydrite cement.** Peter P. Budnikov. *Chem.-Ztg.* 57, 801 3(1933).—Addn. of small amts. of  $NaHSO_4$  and  $CuSO_4$  to dead-burnt gypsum results in a product that may be rehydrated to a cement having a tensile strength above 40 kg./sq. cm. after a month. G. B. Taylor

**Porcelain cement for cable mountings.** St. Reiner. *Chem. Fabrik 1933*, 461 2. Directions are given for making phys. tests of cements, with some results. J. H. M.

**Special low-heat cement for mass concrete dams.** Samuel B. Morris. *J. Am. Water Works Assoc.* 25, 1350 61(1933). Concrete of high early strength is not necessary. Low heat of hardening is usually coupled with durability. Constancy of vol., high d. and strength reduction of cement used reduce the heat of setting. Specifications are outlined and explained. D. K. F.

**Volume changes of concrete.** Edmour Chauret. *Rev. trimestr. can.* 19, 311-30(1933).—The influence of the following factors upon vol. changes of concrete are discussed: (1) chem. compds. in portland cement and possible reactions and mechanism in the setting and hardening process, (2) heat, (3) water, (4) freezing, (5) phys. action of dissolved salts, and (6) chem. action of dissolved salts. Vol.-change curves of cement test bars over test periods of 18 20 years, for repeated immersions in  $H_2O$ , and short-time tests extending over 60

days including observations for the first appearance of cracking are presented. Fourteen references. K. K.

**Note on the possible attack of concrete-reinforcing iron by blast-furnace cement.** Paul Proulx. *Chimie & Industrie Special No.*, 820 1(June, 1933).—Examin. of the Fe removed, after 10 yrs. service, from concrete consisting of slag lumps, granulated slag and slag cement, showed that its surface was not attacked. Expts. on the elec. potential of blast-furnace cement confirmed its suitability for this purpose. A. Papineau-Couture

**Development and use of a Canadian plastic magnesia.** A. F. Gill. *Can. Chem. Met.* 17, 200 3, 208(1933).—Plastic magnesia as used with  $MgCl_2$  soln. for the production of oxy-chloride cement is obtained by the "caustic" calcination of Mg-bearing carbonate rock. It possesses a comparatively high degree of chem. activity, caused by the low temp. of calcination (800-1000°). Points discussed include: the occurrence of Mg minerals, work of the Research Council on magnesite, the problem of hydration, calcination, magnesia as a flooring material, etc. Curves show the effect of heat treatment of plastic magnesia on initial set and on final set, and certain specifications and comparisons of plastics are tabulated. W. H. Boynton

**Crushing resistance. Linear deformation and cohesion according to the Jourdain test.** Vladimir Škola. *Chimie & Industrie Special No.*, 830 50(June, 1933).—Jourdain recommends that, in the crushing test of structural materials, a small rubber disk be placed between the sample and the crushing surface, the results thus obtained are lower than those by the usual procedure, but it is claimed there is better concordance between duplicate tests. Comparison of the 2 technics showed that the ratio between the results is not const., but depends on the properties of the material tested. Analysis of the accuracy of the 2 methods by the method of least squares showed that both the abs. variation and the relative variation were smaller by Jourdain's technic than by the usual procedure. A. Papineau-Couture

**The decomposition of mortars.** Ed. Marcotte. *Mém. compt. rend. soc. ing. civils France* 85, 129-43(1932); cf. C. A. 27, 2275.—A general discussion of the practical protection of mortars and concrete against the action of sea water and S-bearing waters. A. P.-C.

**Gypsum.** R. M. Santmyers. *Bur. Mines, Minerals Yearbook, 1932-33*, 617-28(1933).

**Methods for testing wood preservatives. I. Testing the corrosive effect of preservative solutions.** W. Krieg and H. Pfug. *Chem.-Ztg.* 57, 773-4(1933).—Iron plates, 2 × 20 × 80 mm. are immersed in 270 cc. of the soln. to be tested. After 10 days, loss in wt. is noted and

the appearance of the surface. The toxicity of the soln. before and after the test may be detd. II. Determining the leachability of preservatives from treated wood. *Ibid.* 794-5.—(1) Fifty g. pine saw-dust, treated with the preservative soln., after drying is successively washed with 50 cc. of  $H_2O$  10 times on a suction filter. The filtrates are analyzed separately. (2) A block of pine weighing 100 g. is impregnated with the preservative soln. under vacuum and after drying is split into match sticks. These are placed in a 1 l. flask, 600 cc.  $H_2O$  added and mechanically shaken 1, 2, 4, 6 and 8 hrs. After each shaking period the soln. is decanted and 600 cc. more  $H_2O$  is added. The resulting solns. are separately analyzed. (3) A series of wood blocks  $5 \times 2.5 \times 1.5$  cm. is impregnated as in (2). Ten dried blocks are placed in a 1 l. flask and 600 cc.  $H_2O$  is added. The flask is mechanically shaken for 30 days, 8 hrs. per day. The  $H_2O$  is changed at the beginning and end of each 8-hr. period. At the end of the test period the blocks are removed, dried at  $105^\circ$  and weighed. The flasks are then given a toxicity test by the "block nutrient agar method" of the Berlin Toxicity Conference 1930 (*C. A.* 26, 2205). A. K.

Hydrated Ca aluminates (Erculisse, Sapgir) 6. Repairs to reinforced concrete by the cement gun method (Pearson) 21. Chem. equipment from acid-resisting concrete (Bernatki) 1. Cold tar [for road surfacing] (Mallison) 21. App. for indicating the moisture content or consistency of concrete aggregates (U. S. pat. 1,930,831) 1.

Kieslinger, A.: Weathering of Stone Buildings. Its Cause and Prevention. Leipzig: F. Deuticke. Reviewed in *Mineralog. petrol. Mitt.* 44, 83-1 (1933).

Cements. "Straba" Strassenbaudarls A.-G. Brit. 391,122, June 22, 1933. Bituminous material is admixed with a hydraulic binding medium, e. g., cement, by atomizing or dispersing the 2 constituents and intermingling them. The bituminous material may also be thus admixed with  $Ca(OH)_2$ , tuff, furnace slag, etc., and later intermingled with dispersed cement.

Burning cement; roasting ores, etc. Fried. Krupp Grusonwerk A.-G. (Arno Andreas, inventor). Ger. 583,198, Aug. 31, 1933. Briquets or granules of the material are prevented from caking in the furnace by coating them with dust pptd. from the furnace gases.

Rotary kiln for burning cement raw materials. Povel T. Lindhard (to F. L. Smith & Co.). U. S. 1,929,953, Oct. 10. A kiln is described having a preliminary heating section comprising a perforated shell closed at its upper end and surrounded by a housing. Combustion gases from a calcining section of the kiln are delivered to the interior of the shell of the preliminary heating section. Various structural and operative details are described.

Rotary kiln for cement, etc. Fried. Krupp Grusonwerk A.-G. (Arno Andreas, inventor). Ger. 583,197, Aug. 30, 1933.

Pozzuolanic materials. Società anonima italiana per la produzione calce e cementi Di Segni. Brit. 391,518, June 29, 1933. The pozzuolanic activity of natural pozzuolanas and rocks of volcanic origin, e. g., volcanic ashes and tufts, basalts, diabases, trachytes, syenites, gabbros, Santorin earths, etc., is increased by heating to  $400-900^\circ$  and then chilling, e. g., by air, a mixt. of air and steam or a mixt. of air and  $HCl$ . The treated material may be mixed in powd. or granulated form with  $CaO$  or portland cement to form cements, mortars and concretes.

Paving material. Charles A. Mullen. U. S. 1,929,388, Oct. 3. A cold or but slightly warmed mineral aggregate is treated with a priming oil to coat the aggregate and facilitate subsequent admixtures. Bituminous cement is then added, followed by the addn. of another and dissimilar volatile oil as a temporary fluxing oil to soften the mixt. for transportation and laying so that heating is not required and the pavement will sustain traffic after laying and compaction.

Bituminous road-making compositions. Maschinenfabrik Komnick G. m. b. H. Brit. 205,288, July 13, 1933. The interstices between paving blocks are filled by a compn. prepd. by mixing sand with bitumen in a hot state. In an example the filling material comprises fine sand 100, bitumen 3.5 and  $Ca(OH)_2$  0.5-0.75 parts. The sand is perfectly dry and heated to  $150-200^\circ$  and mixed with liquid bitumen at the same temp., the  $Ca(OH)_2$  being added when the mixt. is cold. The blocks preferably comprise  $CaO$ -sandstone or a mixt. of  $CaO$  and  $SiO_2$  or silicic acid, molded and impregnated with bitumen, the proportion of bitumen being substantially higher than in the filling compn. The molded blocks are treated with steam under pressure for a short time to produce a thin skin of  $Ca$  hydrosilicate.

Bituminous compositions for making roads. Larvite (Foreign & Colonial Rights) Ltd. Ger. 583,238, Aug. 31, 1933. See Brit. 351,385 (*C. A.* 27, 390).

Bituminous emulsions for roads. Romag A.-G. für Rohmaterialien. Ger. 583,196, Aug. 31, 1933. Sulfite cellulose lye of about 16 B $\phi$ . and an acidity of 0.08-0.11 N, and tar or a soln. of bitumen in tar, are fed in approx. equal parts by wt. through a colloid mill or like emulsifying app. Fermented sulfite cellulose lye may be used, and about 0.2% of bentonite may be added to the lye before it is mixed with the tar.

Bituminous emulsions for use in making roads. Robert Tagg. Ger. 583,237, Sept. 4, 1933. A mixt. of tar and (or) petroleum bitumen with water glass and an org. solvent for tar and bitumen is agitated with hot milk of lime.

Calcining gypsum. Wilbur S. Randel and Manuel C. Dailey (to U. S. Gypsum Co.). U. S. 1,931,240, Oct. 17. Gypsum lumps of a diam. of one-eighth in. to 2 in. are agitated in a closed externally heated container for 2.5-5.0 hrs., evolved steam is removed to maintain a uniform gage pressure of 17-50 lb. per sq. in. in the container, the calcined product is ground so that 88% or more of it passes a 100-mesh screen, to obtain a product having a compressive strength of 3500-5000 lb. per sq. in. when set with water at pouring consistency. Cf. *C. A.* 27, 3052.

Apparatus (with a vertical cylinder and beater) for producing foam for light-weight gypsum products, etc. Bernard T. Ballard (to U. S. Gypsum Co.). U. S. 1,929,170, Oct. 10. Structural and mech. details.

Lining tubes. Veremigte Stahlwerke A.-G. Brit. 395,019, July 10, 1933. In lining tubes, etc., with a bituminous or similar material the cleaned tube is heated  $30-10^\circ$  above the working temp. of the bitumen which is then applied in a thin layer and baked. The tube is then cooled and a final thicker coating is formed centrifugally by injecting heated bitumen into the rotated tube.

Building materials. Michael Groskopf. Ger. 579,880, July 1, 1933. Addn. to 544,060 (*C. A.* 26, 3644) and 541,439 (*C. A.* 26, 2033). For sound- and heat-insulating purposes, use is made of bituminized material, prepd. as described in Ger. 544,660 or 541,439, in the form of a loose layer on which a solid layer united by a binder is superimposed.

Flat products formed from hydraulic cement and fibrous material. Lloyd R. Calkins (to Ruberoid Co.). U. S. 1,931,018, Oct. 17. Articles such as asbestos-cement shingles formed of hydraulic cement and fibers are pressed with a flexible membrane such as waxed paper interposed between opposed faces of the articles, in order to produce an irregular wavy surface.

Sound-absorbing material suitable for covering walls and ceilings. Ernest T. Hermann. U. S. 1,929,425, Oct. 10. A mineral aggregate such as pumice particles is mixed with a fusible ceramic binding material, in only sufficient quantity to coat the aggregate, the mixt. is formed into desired shape, and is heated to fuse the binding material. Various formulas are given.

Coating wood. H. Albert Hellmers. Ger. 584,253, Sept. 16, 1933. Freshly cut veneers are coated with an aq. mixt. contg. cellulose acetate, chrome alum, gelatin and glycerol.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Fuel problems of combustion engines.** G. D. Boerlage and J. J. Broeze. *Ingenieur* 48, W31 48(1933).—A lecture describing Diesel engine tests on the combustion qualities of different fuels, behavior of lubricating oils, etc.; the high-speed Diesel engine is especially discussed. The ignition qualities of Diesel oil are expressed (cf. C. A., 26, 4438) by the "cetane" index detd. by comparison of the oil with mixts. of cetene,  $C_{16}H_{34}$  and 1-methylnaphthalene. For normal Diesel oils this index (percentage  $C_{16}H_{34}$ ) is between 40 and 60; the index may be as low as 25 or as high as 70; rapid ignition is indicated by a high no. Many curves, drawings and tables are included and a detailed discussion of the operating characteristics of various types of high-speed Diesel engines.

B. J. C. van der Hoeven  
**The automatic regulation of combustion in producer furnaces.** Giulio Allata. *Gas u. Wasserfach* 76, 722 f(1933). More const. temps. are maintained in producer furnaces by using a controller to maintain the secondary air rate at a fixed ratio to the primary air. Advantages claimed are fuel economy and easier control of the furnace.

R. W. Ryan  
**Volumetric determination of the combustible constituents H - O/S and C in solid and liquid fuels.** Hellmann. *Feuerungstech.* 21, 136 8(1933).—Two rather similar pieces of app. are described in which the fuel is burned in a closed system with O and the contraction in vol. and  $CO_2$  produced are noted.

Ernest W. Thiele  
**Valuation of fuels for boiler and gas-producer plants.** E. Wesmann. *Arch. Eisenhüttenw.* 7, 329 32(1933). A method is developed which permits detg. the proper choice of fuel and a comparison of several kinds of fuel by exactly evaluating costs for all items entering into production and operating conditions of boiler plants and large gas-producer installations. The application of the formulas evolved is illustrated by several examples. M. H.

**Fuel comparisons for billet reheating furnaces.** G. W. Akerlow. *Gas Age-Record* 72, 103 6(1933).—Carefully controlled tests on costs of reheating steel billets gave the following results: (1) with a coal-fired furnace with a W. Va. coal of 14,125 B. t. u., at \$5.56 per ton, \$3.13 per ton of steel; (2) with oil of 28,876 B. t. u., of 19,300 B. t. u. per lb., costing at the burner 8.07¢ per gal., \$5.65 per ton; (3) with gas of 5,300 B. t. u. at 30¢ per M. cu. ft., \$5.13 per ton. To make gas fuel successful automatic control of temp. and gas feed must be maintained.

H. L. Olin  
**The use of alcohol as a motor fuel.** Adrian Corbett. *Petroleum Times* 30, 459(1933).—The economic and political aspects of the use of alc. as motor fuel in France, Germany, U. S. and other countries are discussed.

C. Wirth, III  
**The place of oil in the world of fuel.** John Cadman. *Gas J.* 204, 208 9, *Petroleum Times* 30, 501(1933). During the gasification of coal, energy equiv. to 20% of the total in the coal is consumed, but in the production of motor fuel by hydrogenation 60% is used up.

P. J. Wilson, Jr.  
**The problem of olive oils as fuels and lubricants.** S. Pachum. *Chimie & Industrie Special No.* 1078 9(June, 1933).—A criticism of recent attempts to use vegetable oils, and more particularly olive oil, as fuels for Diesel and similar engines and lubricants.

A. P. C.  
**How and why we burn cottonseed hulls.** V. Hoffman. *Power* 77, 462 3(1933). The hulls, analyze moisture 11.25, ash 2.52, volatile matter 68.81, fixed C 17.42%, and heating value 7,077 B. t. u. Operations are described.

Alden H. Emery  
**Production, utilization and conservation of coal in South Africa.** P. N. Latagan. *J. Chem. Met. Mining Soc. S. Africa* 34, 46 56(1933). General. A. H. E.

**Microscopic structure of Tzuhsien coal and its bearing on coking property.** C. C. Wang. *Contrib. Sin Yuan*

*Fuel Lab., Geol. Survey China No. 11; Bull. Geol. Soc. China* 12, 413-32(1933).—Coal from 8 seams was studied microscopically. In 5 seams there are abundant bands of fusain, xylain, xylovitrain and vitrain, in which fragmented or unfragmented cellular tissues are visible. Nearly all the Tzuhsien coals that are coking are composed essentially of wood or materials of woody origin. Analyses of 11 coals are given. Ash of > 10% or pyrite of > 1% are recognized microscopically in polished section.

Alden H. Emery  
**Graphical classification of Chinese coals.** K. Y. King. *Contrib. Sin Yuan Fuel Lab., Geol. Survey China No. 12; Bull. Geol. Survey China No. 21, 1-11(1933).*—The general features of 11 existing methods of coal classification are tabulated. A graphical method of coal classification is presented and applied to Chinese coals.

A. H. E.  
**The plastic range of coking coals in China.** K. Ping. *Contrib. Sin Yuan Fuel Lab., Geol. Survey China No. 10; Bull. Geol. Survey China No. 21, 45 56(1933).*—The plastic ranges of 17 Chinese coals were detd.; the Layng-Hathorne app. was used. The initial softening point (7 coals) was 342-433°, fusion point (15 coals) 364-457°, solidification point (16 coals) 410-690°, pressure of fusion point (14 coals) 38.5-133.0 mm., pressure at solidification point (14 coals) 82-346 mm., and swelling coeff. (17 coals) 0.90-2.72. Those coals showing greatest resistance to gas flow when plastic and those with the smallest range of plasticity give comparatively good cokes. Pressure difference/plastic range arranged the coals in order of their coking ability. P measured plastic properties of fractions of various sizes of the same coal and obtained different results for each size. He favors using 60-200-mesh coal for the test.

Alden H. Emery  
**A low-temperature carbonization assay of some Chinese bituminous coals.** C. C. Hsiao. *Contrib. Sin Yuan Fuel Lab., Geol. Survey China, No. 9; Bull. Geol. Survey China No. 21, 13-44(1933).*—Low-temp. carbonization tests were made on 16 Chinese coals with the Gray-King app. The coals analyzed moisture 0.10-2.00% and, on the moisture-free basis, volatile matter 21.25-37.60, fixed C 45.81-73.88, ash 4.31-20.59, S 0.57-5.47% and heating value 11,124-14,902 B. t. u. Yields of coke, oil, gas, liquor and  $NH_3$  and analyses of the coke and gas are given. High yields of oil are given by coals with high content of volatile matter. The well-known coking coals show rather low tar-oil yields. The younger the coal the greater is the tar yield. Low-temp. tars reflect the character of the coal more than high-temp. The gases are rich in satd. hydrocarbons and are relatively low in  $H_2$ ,  $CO$  and unsatd. hydrocarbons. Coals from Shunkengshan and Chiawang give a high oil yield and a strong coke.

Alden H. Emery  
**Recent developments in coal utilization.** A. C. Fieldner. *Bur. Mines, Minerals Yearbook 1932-33, 433-50(1933).*—Recent developments in combustion of coal, brown coal as fertilizer, plastics from brown coal, briquetting, seam. of bright and dull coal, high-temp. and low-temp. carbonization, hydrogenation and liquefaction of coal, and synthesis of chem. products from gases produced from coal or coke are described. Over 100 references.

Alden H. Emery  
**Uses of coal in the ceramic industry.** H. E. Noid. *Am. Inst. Mining Met. Engrs., Tech. Pub.* 509, 10 pp. (1933).—High-volatile coals are the most desirable solid fuels for kiln firing; low-volatile coals can be used. Producer gas is a desirable fuel and profitable in some larger plants. Natural gas is the greatest competitor of coal for kiln firing and largely has replaced coal for firing the finer wares. It cannot compete with coal in firing heavy clay products except in regions where cheap gas is available.

Alden H. Emery  
**Coal-washability curves. A discussion of efficiency formulas.** G. S. Scott. *Mineral Industries, Penna.*



*State Coll.* 2, No. 7, 8(1933); cf. *C. A.* 27, 3059.—The Drakeley and the France formulas are discussed.

Alden H. Emery

The inflammation of coal dusts: the effect of the nature of added incombustible dust. T. N. Mason and R. V. Wheeler. *Safety in Mines Research Board, Paper No. 79*, 13 pp.(1933).—Tests of 7 different incombustible dusts showed that their relative efficacies in preventing the propagation of coal-dust explosions were, in ascending order of effectiveness: shale (2 samples), fuller's earth, anhydrite limestone, pptd.  $\text{CaCO}_3$  and gypsum. Quantities were in the same ratios for both coals used, one of 21.7% volatile matter and one 36%. With the latter 67.1% of shale, 57.1% of limestone and 40% of gypsum were necessary to suppress inflammation.

A. H. E.

Mechanical separation of the constituents of coal. David Brownlie. *Steam Engr.* 3, 5-6, 44(1933).—Fusain and extraneous mineral matter can be sepd. from coal by froth flotation in 2 stages with starch or dextrin treated with acid. In the Lehmann process, coal is treated in a percussion mill and the 4 constituents, differing in friability, are roughly sepd. with air.

Alden H. Emery

The distillation of coal under very low pressures. V. Stone and M. W. Travers. *Chemistry & Industry* 1933, 686 7.—Distn. of coal under pressures of 0.01-0.001 mm. Hg and at a temp. of 350° yielded a brown pitch almost completely sol. in  $\text{C}_6\text{H}_6$  and a small residue sol. in abs. alc. Yields were almost identical with those obtained by Bunc with  $\text{C}_6\text{H}_6$  extn. under pressure and the possibility of identity of the 2 exts. is suggested.

H. L. Olin

Possible production of low ash and sulfur coal in Illinois as shown by float-and-sink tests. David R. Mitchell. *Univ. Ill. Eng. Expt. Sta., Bull.* No 258, 43 pp.(1933).—Float-and-sink data on Illinois coals from beds 1, 2, 5, 6 and 7 which have been compiled since 1931 are set forth to show the relative difficulties of producing clean products. In brief, No. 2 coals are amenable to treatment; No. 5 varies from simple to difficult; from No. 6 products of less than 6 8% of ash are possible; while No. 7 would prove somewhat difficult. X-ray technique has proved to be valuable in the study of ash in the coal structure.

H. L. Olin

Coal. F. G. Tryon and H. O. Rogers. *Bur. Mines, Minerals Yearbook* 1932 33, 381-418(1933). Coke and by-products. E. B. Berquist and H. L. Bennett. *Ibid* 119 32. Fuel briquets. W. H. Young and J. M. Corse. *Ibid* 451 8. Natural gas. E. B. Swanson. *Ibid* 517 33.

Alden H. Emery

The present situation of the gas industry. H. Laurain. *Mém. compl. rend. soc. eng. civils France* 85, 1177 1217 (1932). A discussion of the problems relating, directly or indirectly, to coal carbonization and the gas industry.

A. Papineau-Couture

Development of the gas industry in France. A. Baril. *C. I. J.* 204, 141 2(1933).

P. J. Wilson, Jr.

The development of the industrial field. J. W. Mclusk. *Gas World* 99, No. 2568, *Ind. Gas Suppl.* 104 5 (1933). Recent applications of gas in Glasgow.

P. J. Wilson, Jr.

Town gas and industrial recovery. R. D. Keillor. *Gas World* 99, No. 2568, *Ind. Gas Suppl.* 106-7(1933). Recent applications of gas in automobile factories, as a motor fuel, and for railways.

P. J. Wilson, Jr.

Possible improvements in gas and coke production. K. Hawthorn. *Gas World* 99, 349-51; *Gas J.* 204, 14 16(1933).

P. J. Wilson, Jr.

Gas-manufacturing plant for a small works. Wm. Scott. *Gas J.* 204, 217-18; *Gas World* 99, 376-7(1933).—A comparison of the operating and capital costs of horizontal retorts, vertical retorts, carburetted water gas, complete carburettation and a combination of horizontal retorts and carburetted water gas.

P. J. Wilson, Jr.

The Marienburg gas plant. Heidt. *Gas u. Wasserfach* 76, 720 2(1933).—A description of the Marienburg gas plant, with operating results. This plant consists of a bank of 5 Otto vertical ovens with a built-in producer.

R. W. Ryan

Centralized manufacture and distribution of gas in Belgium. Geo. Evetts. *Inst. Gas Engrs. Communication No. 71*, 56 pp.(1933); cf. *C. A.* 27, 3584.—The plant of the Cokeries du Brabant is described. It has a max. daily gas output of 116,400 therms, or a min. output of 52,800 therms with all ovens at work and a max. output of 1583 tons of coke (for sale), or 1075 tons at a min. with both batteries compounded. Data are given on horizontal ovens heated by coal gas (I) or by producer gas (II) and on continuous vertical chambers heated by coal gas (III) or by producer gas (IV). I and II yield 59.5 therms per ton of dry coal, III and IV 67.4 therms. I and II yield, per ton of coal, 11,650 cu. ft. of gas of 488 cal. heating value; III and IV give 16,600 cu. ft. of 470 cal. gas. I gives 6500 cu. ft. of surplus gas, II, 11,650 cu. ft., III 11,300 cu. ft. and IV 16,600 cu. ft. Net coke production was 1 875 tons, II 407 tons, III 473 tons and IV 266 tons. Benzene yield was 1 9.4 tons, II 4.85 tons, III 5.0 tons and IV 3.4 tons. Cost of gas per 1000 cu. ft. was I 6.0 d., II 7.25 d., III 6.75 d. and IV 7.75 d.

Alden H. Emery

A new installation of Glover-West verticals at Forli, Italy. C. Jori. *Gas J.* 204, 532(1933).—The capacity of the plant has been raised from a max. of 198,000 cu. ft. daily from the horizontal retorts to 318,000 cu. ft. by addn. of 8 Glover-West continuous vertical retorts.

P. J. Wilson, Jr.

Leakage in horizontal gas retorts. A. H. Lucas. *Gas World* 99, 421-5; *Gas J.* 204, No. 3676, *Institution of Gas Engineers Suppl.* 6-9(1933).—In order to det. the gas leakage from horizontal gas retorts, tests were made at New Wortley on fire clay retorts, each 20.5 ft. long and 22 in.  $\times$  16 in. oval D section, set 8 in a bed and fired with producer gas. The leakage was calcd. by use of the formula: Leakage in therms per ton of coal carbonized =  $797(a - c)/u(c - 13.2)$ , where  $a$  = percentage of  $\text{CO}_2$  in the theoretical combustion products (air-free, dry), and  $c$  = percentage of  $\text{CO}_2$  in the actual waste gases (air-free, dry). In tests on 9 beds, in which the working life of the retorts varied from 1570 to 2700 days and no retort had been scurfed within 20 days prior to the testing gas leakage losses varied between 2.7 and 0.7 therms per ton. The pressure in the middle line of the retort mouthpieces varied between 0.2 and 0.05 in. water during each test. Increase of this pressure to 1 in. increases the loss to the order of 15% of the gas. Studies were made of the losses due to the permeability of the retort material by pumping air into a sealed empty retort. The leakage was measured by the rate of delivery of the air and the pressure in the retort. The leakage results for a retort were found to approximate a straight-line function of pressure. Leakage was not influenced by the working life of the retort, nor by the position in the setting. After scurfing the leakage was greatly increased, and even after hot patching and spraying with a refractory slip it was extensive. Generally the leakage did not vary to any great extent beyond the first 6-10 days after scurfing. Although the wet spraying did not tighten the retorts, it did reduce the coke-discharging troubles from retorts with 1200 days of use to which it was applied.

P. J. Wilson, Jr.

The results of constructive policy as applied to a small gas undertaking. W. Clark Jackson. *Inst. Gas Engrs. Communication No. 52*, 33 pp.(1932).—Costs of caring for consumers' complaints due to naphthalene, rust and H<sub>2</sub>O condensation were reduced from 1988 (1920) to £211 (1930) and £117 (1932) by installation of a Dri-Gas and Naphthalene Washer. Costs of operating, including capital charges, were £174 (1930) and £166 (1932).

Alden H. Emery

Efficiency and economy in gas-works practice. H. C. Sims. *Gas World* 99, 446-8; *Gas J.* 204, 413-15(1933).—Small but important economies in the gas mfg. process may be effected by close attention to such points as coal quality, elimination of heat losses in the gas producer, performance of the charging machines on horizontal retorts, etc.

P. J. Wilson, Jr.

The design of town-gas-fired furnaces. F. L. Atkin.

*Gas World* 99, No. 2572, *Ind. Gas Suppl.* 112-18 (1933).—A. deals with furnaces operating at temps. of 600-1200°.

P. J. Wilson, Jr.

Investigating reactions taking place in gas generators. Rudolf Lehman. *Glashutte* 63, 270 (1933).—Investigations of reactions occurring in a generator with a revolving grate are described. The compn. of the gas present in different layers in the generator is given. M. V. K.

Applications of gas analysis to industrial problems. Morton Bernmann. *Gas Age-Record* 72, 211-14 (1933).—Numerous nomographic charts for solving practical problems are illustrated. H. L. Olin

Viscosity of natural gas. W. B. Berwald and T. W. Johnson. *Bur. Mines, Tech. Paper* 555, 34 pp. (1933).

By use of a simple app., the viscosity of gases is detd. easily by measuring the relationship between the friction factor and the Reynolds no. for flow of gas through circular tubing. A gas of known viscosity is used to det. the relationship for any tube. From this calibrated relationship and from the flow of gases of unknown viscosity through the tube, it is possible to calc. the viscosity of the latter within  $\pm 1.25\%$ . The smallest rates of flow (low Reynolds nos.) consistent with accuracy in volumetric measurement should be used. The observed viscosities of 25 natural gases of widely different chem. compns. at 60° F. and approx. atm. pressure were 0.00000646-0.00000866 lb. per sec.-ft., depending on the compn. Expts. at 40°, 60° and 80° F. show a viscosity increase of about 7% within this range, but varying somewhat with the chem. compn. Viscosities at 500 lbs. per sq. in. differ little from those at atm. pressure. Alden H. Emery

Limits of inflammability of natural gases. C. W. Jones and R. E. Kennedy. *Gas Age-Record* 72, 53 (1933). See C. A. 27, 4057. H. L. Olin

Thermal decomposition of the methane of Sarmasel (Rumania) natural gas. C. Candea and J. Kuhn. *Chimie et Industrie Special No.* 561-5 (June, 1933). In the presence of catalysts, decomn. was complete at 800-1000° according to equation  $\text{CH}_4 = \text{C} + 2\text{H}_2$ , without formation of intermediate products. The best results were obtained with the following catalyst:  $\text{Fe}_2\text{O}_3$ ,  $\text{CaCO}_3$ , 2,  $\text{NiO}$  1,  $\text{MnO}_2$  0.5, on an Fe film support. A. Papineau-Conture

The coordination of power relative to gas works. F. M. Birks. *Inst. Gas Engrs. Communication No.* 47, 40 pp. (1932).—The uses of power around a gas works, the most suitable forms for each, and generation in fuel fired or waste-heat boilers are described. Process steam is used for the manuf. of water gas, steaming retorts, steaming producers, production of benzene, manuf. of  $\text{NH}_4\text{SO}_4$ , heating gas prior to purification, gas drying, etc. The use of compressed air, hydraulic power, steam and electricity as a means of transmitting power is discussed and successful examples of each type around a gas plant are described. The uses of power in the works of the Gas Light & Coke Co. are described. Alden H. Emery

Investigation of nitric oxide in gas works. Vincent Porrazzo. *Gas Age-Record* 92, 123-4 (1933). The Schuitan method for NO is used in a modern gas lot in the study of the gum problem. A continuous and controlled flow of gas and  $\text{O}_2$  in the 2:1 ratio passes to a mixing bottle where they react for 15 min. The mixt. then passes to a soln. of *m*-ph. nylene diamine in AcOH where the Bismark brown is measured with the use of color standards. H. L. Olin

The application to the Battersea Power Station of researches into the elimination of noxious constituents from flue gases, and the treatment of resulting effluents. G. W. Hewson, S. L. Pearce, A. Pollitt and R. I. Rees. *Soc. Chem. Ind., Chem. Eng. Group*, 52nd Ann. Meeting, Preprint 1933, 35 pp.—A complete description is given of the development of a process for eliminating  $\text{SO}_2$  from the flue gas of a power station. The initial concn. of  $\text{SO}_2$  in the flue gas is between 0.02 and 0.05% by vol. as a result of burning coal contg. approx. 1% S. The gas is washed with aerated water in contact with  $\text{Fe}$  oxide. A second water washing is effected in a tower constructed of chemi-

cally inert material. A final scrubber employs an aerated alk. soln. contg. 0.25% lime. After passing through a baffled chamber to remove entrained moisture, the flue gas is exhausted to the atm. with 90% of the initial  $\text{SO}_2$  removed. The time of contact of the gas in the washer is about 30 secs. and about 20 tons of water and 10-12 lb. of lime or chalk are used per ton of coal burned. The effluent from the washers is aerated to oxidize sulfites. The completed installation is capable of treating the flue gas resulting from the burning of 133 tons of coal per hr. Also in *Engineering* 136, 459-61, 556-8 (1933).

I. W. T. Cummings

Removal of acid-sulfur compounds from combustion gases. David Brownlie. *Steam Engr.* 2, 517-19 (1933); cf. preceding abstr. and Johnstone (cf. C. A. 26, 3359).—A summary and discussion. Alden H. Emery

Making sulfur recovery from flue gases an economic process. Anon. *Steam Engr.* 2, 534-6 (1933).— $\text{SO}_2$  is removed from flue gases by washing with milk of lime with an efficiency of  $>90\%$ . About 1.5 tons of lime per ton of S and 200-300 gal. of  $\text{H}_2\text{O}$  per ton of coal burned contg. 2% S are used. Alden H. Emery

Gum deposits in gas-distribution systems. I. Liquid-phase gum. A. L. Ward, C. W. Jordan and W. H. Fulweiler. *Ind. Eng. Chem.* 25, 1224-34 (1933); cf. C. A. 27, 2557. —Gum-forming compds. must be removed from the gas systems. This may be done by several methods, namely, condensation (with water for cooling), supercondensation (refrigeration), compression or oil scrubbing. Data on oil scrubbing are presented rather fully. Reduction of O, the use of adsorbents,  $\text{H}_2\text{SO}_4$  and neg. catalysts are covered. M. C. Rogers

The upkeep of gas holders. R. J. Millbourne. *Gas J.* 204, 275-80, *Gas World* 99, 398-403 (1933).—M. discusses factors in the design to handle the imposed loads, corrosion and painting. P. J. Wilson, Jr.

Repairs to reinforced concrete—by cement gun method. Geo. C. Pearson. *Gas J.* 204, 343-53; *Gas World* 99, 469-77 (1933).—Repairs to gas plant structures and protection against corrosive atm. by guniting are described. P. J. Wilson, Jr.

Corrosion from products of combustion. 33rd Report of the Joint Research Committee. Institution of Gas Engineers and Leeds University. *Gas J.* 204, No. 3676, *Institution of Gas Engineers Suppl.* 2, 1 (1933).—The preliminary investigations indicate that  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{SO}_3$  formed by combustion of S compds. in the gas are the main cause of corrosion of gas appliances; but the problem is complicated by the presence of oxides of N and water vapor condensed to a variable extent in different types of appliances. P. J. Wilson, Jr.

Third Report of the Liquor Effluents and Ammonia Subcommittee. Institution of Gas Engineers. *Gas World* 99, 425-7; *Gas J.* 204, No. 3676, *Institution of Gas Engineers Suppl.* 4, 5 (1933). Expts. on the biochem. oxidation of gas works liquor along with sewage in sectional and non-sectional bacteria beds, and in a lab. activated sludge app. have shown that although all the substances present could be destroyed completely, the individual compds. are not all of the same importance. The removal of phenol alone would appear to be of doubtful benefit. It would seem that a particularly suitable spent liquor would be produced from a crude liquor originating in gas which, while still above the dew point, is passed through an efficient tar precipitator, and is kept free from O until it enters the purifiers. This liquor will be free from higher tar acids, thiocyanates and thiosulfates. Tests on the removal of  $\text{NH}_3$  and phenols from ammoniacal liquors by distn. show that  $\text{NH}_3$  is 6.2 times as volatile as phenol. Phenol is less volatile than the cresols. The presence of  $\text{NH}_3$  in the liquor retards the distn. of phenol. A process for recovering  $\text{NH}_4\text{HCO}_3$  from crude vertical retort gas by concn. of all the  $\text{NH}_3$  in a fraction of the gas contg. sufficient  $\text{CO}_2$  to combine with it in mol. proportions is outlined. The  $\text{NH}_3$  and  $\text{CO}_2$  are absorbed continuously in a bath of  $\text{NH}_4\text{HCO}_3$  from which the salt crystallizes. Losses of benzene from the Partington benzene process dephenolizing

plant have been reduced by washing all the vapors leaving the plant in a scrubber fed with gas liquor.

P. J. Wilson, Jr.

**Liquid purification with otherwise waste ammonia.** John D. Price. *Gas World* 99, 342; *Gas J.* 204, 142 3 (1933).—At Montreal  $\text{NH}_3$  and  $\text{H}_2\text{S}$  are partially removed from coke-oven gas by water circulated in a closed system; first, through the final cooler in which absorption occurs; second, through the producer gas cooler in which the  $\text{NH}_3$  and  $\text{H}_2\text{S}$  are taken up from the water by the producer gas; and last, through a set of cooling coils. The cooled water is then returned to the final cooler. The  $\text{NH}_3$  is reduced from 300–350 grains per 100 cu. ft. to 120–150, and the  $\text{H}_2\text{S}$  from 250 to 90 grains. The  $\text{NH}_3$  in a mixed gas contg. 0.2% coke-oven gas is further reduced to 20–40 grains entering the oxide boxes by an addnl. water wash. This water is distd., and the  $\text{NH}_3$  added to the gas entering the primary cooler.

P. J. Wilson, Jr.

**The removal of phenol from gas-house water.** I and II Otto Krebs. *Chem.-Ztg.* 57, 721 3, 743–4 (1933).—A review of phenol scrubbing methods with diagrams of app. and flow.

H. L. Olin

**Modern methods of benzene refining.** The use of inhibitors to prevent gum formation. W. H. Hoffert and G. Claxton. *Gas u. Wasserfach* 76, 704 10 (1933); cf. *C. A.* 27, 4653. —Previous methods of stabilizing motor benzene resulted in excessive loss of unsatd. hydrocarbons. The most valuable inhibitors for preventing gum formation in storage are phenols and aminophenols. The effect of inhibitor addn. can be detd. both by finding the small amt. of gum formed during the inductive period as well as the length of this period before appreciable amts. of gum are formed in the oxidation test for gum-forming tendency. While 0.01% com. cresol contg. at least 60% *o*- and *p*-cresol is sufficient for many benzenes, 0.03–0.05% is added for safety. Although this inhibitor is suitable for many benzenes, some give better results with  $\alpha$ -naphthol, *p*-methylaniline, *p*-benzylaminophenol and pyrogallol. Each inhibitor has a definite range of concn. over which it gives the min. amt. of gum during the inhibition period. Inhibitors must be volatile and must not form non-volatile compds. Crude benzene may contain  $\text{SO}_2$ , which prevents inhibitor action, or substances such as thiophenol which reduce their action. These substances as well as inhibitors present in the crude benzene are removed by treatment with dil. alkali soln., followed by washing. Badly colored benzenes with a bad odor may be given a preliminary treatment with 2% by vol. of 75–80% of  $\text{H}_2\text{SO}_4$  before the alkali treatment. Odor alone may be removed by 3.5% by vol. of 25–40%  $\text{H}_2\text{SO}_4$ . After the alkali treatment and water washing the benzene is distd. and the inhibitor added during distn. to prevent gum formation. Treated benzenes ordinarily form about 1–3 mg. gum during storage up to 18 months and rarely as much as 5 mg. per 100 cc. Advantages of this process are low reagent cost, no appreciable acid tar, greater antiknock power of benzene, higher yields and adaptability to continuous operation.

R. W. Ryan

**Physicochemical conditions in the performance of distillation installation for production of crude benzene.** S. Krolevitz. *Khimstrof* 5, 2363 71 (1933).—Tabular presentations and discussion are given of the phys. and chem. conditions observed in the distn. for recovery of crude benzene extd. from coking gases. Chas. Blanc

**Sulfur elimination from flue gases.** David Brownlie. *Steam Engr.* 3, 22 (1933).—Addition to *C. A.* 25, 5750.

Alden H. Emery

**The removal of sulfur from metallurgical coke.** III. Coking coal with the addition of inorganic substances.

I. V. Shimanenkov and A. N. Blazhennova. *J. Chem. Ind. (Moscow)* 1933, No. 6, 31–6; cf. *C. A.* 26, 3051.

The addn. of  $\text{NaCl}$  to coal before coking removes more S from the product than any other substance studied.  $\text{MgO}$  and  $\text{MgCO}_3$  remove somewhat less S than  $\text{NaCl}$ , but the final S content is still below that of untreated coke.  $\text{MgCO}_3$  also increases the yield of gas formed in the process. Fe ore and  $\text{CaCO}_3$  do not greatly alter the S content,

and Fe ore lowers the yield of coke.  $\text{CaO}$  binds most of the S as  $\text{CaS}$ , lowers the yield of coke and increases the yield of gas. Dolomite increases the content of org. S in the coke and decreases the yield of gas. H. M. L.

**The treatment and distillation of tar by hot crude gases.** Alfred L. Holton. *Gas J.* 204, 331–41; *Gas World* 99, 435–45 (1933).—Tars which meet in all particulars the Brit. Standard Road Tar Specifications are successfully produced by contacting vertical retort tar with the hot gases from a Trefois producer in a vertical main, and by circulating it through the collecting and offtake mains on several batteries of vertical retorts. The mains are insulated as completely as possible, and are so operated that the gas temp. at the point of initial contact with the tar is sufficiently high to eliminate all oils not required in the road tar specified. No water is circulated in the mains. The heavy tarry deposits ordinarily encountered in the foul mains of retort houses have not been found. The process is simple. Operating results and design for tar sprays are given. The results of an expt. in which 12 tons of vertical retort tar were cracked by the process of the Firma Carl Still are described.

P. J. Wilson, Jr.

**Cold tar.** H. Mallison. *Teer u. Bitumen* 31, 273–6 (1933).—The properties of tar for use in volatile solvents for road surfacing and their detn. are discussed.

F. W. Jung

**Coke Oven Manager's Association. Presidential address.** W. E. Mordecai. *Gas World* 99, No. 2570, *Coking Sect.* 113 14; *Gas J.* 204, 263–4 (1933).—A discussion of the relative values of coke properties to different consumers leads to a plea for more research.

P. J. Wilson, Jr.

**The coke-oven plant at Beckton Gas Works.** R. W. Hunter. *Inst. Gas Engrs. Communication* No. 68, 54 pp (1933); cf. *C. A.* 27, 3586. —The coke ovens, the producer-gas plant, and the tar and  $\text{NH}_3$  recovery plant at Beckton Gas Works are described. Detailed costs and yields are given for continuous verticals, intermittent verticals, coke ovens and horizontal. A. H. Emery

**Recent developments in coking practice.** Heinrich Koppers. *Gas J.* 204, 267 72 (1933).—*Carbolux* is a coke produced by carbonizing coal between  $680^\circ$  and  $720^\circ$ . Its reactivity approaches that of wood charcoal, and is practically the same for any kind of coal. The burning qualities, high crushing strength, low friability and other properties render *Carbolux* an excellent domestic fuel. Tests made in a full-scale exptl. oven have shown that by addn. of a suitable filler (low-temp. coke) practically all caking coals may be converted by moderate temps. into a large-sized, solid fuel, and frothing and swelling of the coal in the oven are prevented. The investigation has also shown that an oven width of 11.8–13.8 in. is suitable for the carbonization of most coals at medium temps. and the production of a large-sized high-temp. coke. For *Carbolux* alone 11.8 in. and less have advantages. *Carbolux* is produced at Bruay, France, in 50 Koppers hairpin combination ovens, each with a capacity of 120 cu. ft. of coal, the designs of which are fundamentally the same as those for high temps. In these ovens the charge is homogeneously fused with no center parting, and the pieces broken up by the coke guide often have a surface area each of 10.7 sq. ft. The filler is produced in rotary, horizontal retorts, and then thoroughly mixed with the rest of the coal. The mixt. is so proportioned that shrinkage amounts to 1.5–2 cm. on each side of the charge. The coke yield is 7–9% higher than by high-temp. carbonization of the same coal. An oven of narrow width and correspondingly small capacity, even with lower carbonizing temps., shows no reduction in daily capacity as compared with a large oven at high temps. Since the capital cost for a plant with narrow ovens is less than that for a plant with wide ovens, the cost of production of coke cannot be higher.

P. J. Wilson, Jr.

**The preparation of coke for the London market.** F. M. Birks. *Gas J.* 204, 399 402 (1933).—The coke is quenched, crushed, screened and finally cleaned in an effort to provide a smokeless fuel of proper size and quality for the different uses. If the larger grades the denser cokes from coke ovens and intermittent chambers are sized somewhat

smaller than the lighter cokes from vertical continuous and horizontal retorts.

P. J. Wilson, Jr.

**Studies on coke and charcoal. XV. Preparation of selectively de-ashed carbon.** Y. Oshima, Y. Fukuda and S. Takashima. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 545-6(1933); cf. *C. A.* 27, 3804.—Samples of coke, charcoal, sugar C and C black were treated, for the purpose of selective removal of ash, with HCl, H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HF and a mixt. of HCl and HF. It was found that gas coke and charcoal differ markedly in HF-sol. ash content and that in the charcoal the percentage decrease of ash due to the HF-HCl treatment is almost identical with the sum of those due to the resp. individual treatments with HF and HCl. The gas coke did not show such a differentiation but a certain amt. of ash was sol. in both acids. Exptl. results for the various acid treatments are presented. C was oxidized only in the treatments with HNO<sub>3</sub>.

Karl Kammermeyer

**The influence of pressure-hydrogenation upon the coking constituents of coals.** I. J. B. Blom. *J. Chem. Met. Mining Soc. S. Africa* 34, 1-44(1931). Four non-coking coals were hydrogenated at 380-395° for 5 hrs. The resulting shiny pitch-like substance was strongly coking. Heating alone or under pressure is ineffective. Hydrogenation forms large units. of benzene-sol. substances resembling the benzene pressure exts. of bituminous coal. Fraction II added to high-temp. coke is binding, fractions III and IV yield strong coherent cokes. At 80° benzene removes oily as well as solid material from the hydrogenated coal, leaving residues with coking properties. At 270° all coking elements are extd.; the solid fractions form 79-91% of the ext. With increasing maturity of coals hydrogenated the ext. at 80° falls relative to the portion extd. at 270°. The increase in the benzene-sol. portion in coals hydrogenated above 380° is due to solid rather than oily fractions. Hydrogenation is more sensitive to increase in temp. than in pressure. After hydrogenation and complete extn. with benzene, further hydrogenation produces more benzene-sol. material, but it eventually reaches an end point. Hydrogenation research is reviewed. Seventy references. Alden H. Emery

**Plastic properties of coking coals.** Joseph D. Davis, P. W. Jung, Bernard Juchner and D. A. Wallace. *Ind. Eng. Chem.* 25, 1269-74(1933).—Plastic penet. tests applied to 22 American coals covering the range in rank of those suitable for coke making have been correlated with the coking properties of the same coals carbonized by the Bureau of Mines test methods. The tests are: expansion and contraction by the Damm-Agde method, resistance to the passage of N by the Layng-Hathorne method, the max. stickiness using the plastometer, and the agglutinating power by the Marshall-Bird method. The quality of the coke is measured by the av. of the shatter index on 1.5 in. and the tumbler index on 1 in. The Damm-Agde test is the only one that does not show a rough proportionality with the strength of the coke; the agglutinating test is the best measure of this property. The apparent sp. grs. and the porosities of the cokes are shown not to vary much for coals of medium and high rank.

P. J. Wilson, Jr.

**The combustible properties of coke.** H. E. Blayden and H. L. Riley. *Gas World* 99, No. 2570, *Coking Sect.*, 116-21(1933).—An app. is employed for comparing the combustible properties of coke by measuring under standard conditions the min. air current in which coke of 10-20 J. M. M. grading will continue to burn, and the relative rates of coke consumption. The results were readily reproducible. Correlation of the results from preliminary tests by this method with known performance of cokes in domestic appliances and in cupolas indicates that the method is capable of differentiating cokes on the basis of differences in their combustible properties.

P. J. Wilson, Jr.

**Behavior of coke in the open grate.** E. I. Lloyd, F. Bell and H. J. Hodsmann. *Gas J.* 204, No. 3676, *Institution of Gas Engineers Suppl.*, 12-16(1933).—The behavior of cokes when consumed in the open grate has been examd. and correlated with the properties of the cokes

capable of measurement in the lab., i. e., reactivity to CO<sub>2</sub> and to O, ignition temp., ash content and bulk density. The ignitability of a no. of different cokes was increased by the application of a skin of coal (tar is the adhesive), the effect being most pronounced with coke made in continuous vertical retorts. The treated coke emits some smoke, but the quantity can only be a fraction of that from coal.

P. J. Wilson, Jr.

**Fuel economy in the glass industry (Brownlie) 19.** Waterless gasholder accident at Neunkirchen (Anon.) 24. Use of coal as a fertilizer (Kissel) 15. Sepp. mixed materials such as those of "run-of-mine" coal (U. S. pat. 1,931,008) 1. App. for injecting liquid material into gas streams (U. S. pat. 1,930,848) 1.

**Fuel briquets.** Walter E. Trent (to Trent Process Corp.). U. S. 1,929,800, Oct. 10. Pulverized bituminous coking coal is mixed with heavy hydrocarbon oil and the mixt. is heated sufficiently to vaporize a substantial portion of the oil and to reduce the unvaporized portion to an asphaltic condition. The coal particles thus are coated with asphaltic material and this coated material then is mixed with a substantially greater amt. of low volatile carbonaceous solids such as coal or coke and the mixt. is formed into briquets.

**Fuel pastes.** James S. B. Fleming and Imperial Chemical Industries Ltd. Brit. 394,696, June 30, 1933. Fuels in paste or like form adapted to produce heat for relatively short periods are obtained by incorporating with a soln. of nitrocellulose in EtOH or MeOH a nitrocellulose that is insol. in the alc. Citric acid or other agent preventing gelation, small amts. of other combustible liquids not causing soln. of the insol. nitrocellulose and coloring materials may be added.

**Solid fuel.** Hugh Archbald. U. S. 1,930,377, Oct. 10. A mixt. is formed of cokable material such as anthracitic, bituminous and tarry materials so proportioned as to coke without substantial deformation and to retain as planes of facile fracture the faces where pressure has been applied; this mixt. is extruded in the form of a thick-walled tube having a small bore, without substantial preheating, into a coking zone so heated that the surface of the extruded material is subjected immediately to a temp. above the range of sticking temps. of coking coals, and coking is effected while the material is still in the form of a tube. App. is described.

**Apparatus for testing fuels and other combustible liquids to ascertain the temperatures at which they ignite spontaneously in heated air and the intervals at various temperatures between contact with and ignition or explosion in the heated air.** William Hehnore. Brit. 394,736, July 6, 1933.

**Low-temperature carbonization of carbonaceous materials.** Mathias Pier and Karl Winkler (to Standard-I. G. Co.). U. S. 1,929,649, Oct. 10. For sepp. the contained oils from semi-liquid oil-bearing residues obtained by destructive hydrogenation of carbonaceous materials such as coal, the oil-bearing residues are made up into a paste with finely divided solid carbonizable material such as lignite dust and the mixt. is carbonized at a low temp. in the presence of a counterflow of hot inert scavenging gas. App. is described.

**Destructive hydrogenation of carbonaceous materials.** Hein I. Waterman (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,929,528, Oct. 10. In the destructive hydrogenation of materials such as brown coal, a catalyst is used comprising a mixt. contg. Mo and an activated mass derived from an alk. Fe oxide-contg. material obtained from the conversion of bauxite to Al oxide by wet treatment. Cf. *C. A.* 27, 4379.

**Apparatus for proportional mixing of coal and binder for briquets, etc.** Emory B. Jones and Jesse L. Knight (to Winding Gulf Collieries). U. S. 1,929,663, Oct. 10. Various structural, mech. and operative details are described.

**Apparatus for washing coal or other minerals.** George Norton. U. S. 1,931,390, Oct. 17.

- Compressing coal before coking.** C. Otto & Co. G. m. b. H. Ger. 584,309, Sept. 19, 1933. Details are given of a method of procedure in which the pressure applied varies inversely with the water content of the coal. Cf. C. A. 27, 2561.
- Vertical retort suitable for distilling coal, shale, lignite, etc.** Ernst L. Schultz. U. S. 1,931,417, Oct. 17. Various structural and mech. details are described of an app. comprising a heating cylinder and 2 superposed surrounding concentric rotatable cylinders spaced apart from the heating cylinder.
- By-product recovery in coal distillation.** Laurence R. Forrest (to Barrett Co.). U. S. 1,930,124, Oct. 10. Parts of coal-distn. gases are cooled and tar is sep'd. from them. The resulting gases are cleaned to sep. tar and pitch particles from them. Tar is distd. by bringing it into intimate contact with another part of the hot coal-distn. gases, the resulting gases are cleaned to sep. suspended tar and pitch particles from them, and the 2 portions of cleaned gases are combined at a temp. above the dew point for the gases for water and then are passed through an ammonia saturator at a temp. above the dew point of water. App. is described.
- Spiral baffle apparatus for purifying steam by removal of condensed water and foreign matter.** Wilson L. McLaughlin, Herold L. McLaughlin and Virg. Ballou. U. S. 1,931,135, Oct. 17. U. S. 1,931,136 relates to structural features of a steam condenser and water pre-heater.
- Steam condenser.** Henry E. Byer. U. S. 1,929,403, Oct. 10.
- Apparatus for superheating steam.** Heinrich Peperkorn and Otto H. Hartmann (to The Superheater Co.). U. S. 1,929,514, Oct. 10. Structural features.
- Steam desuperheaters.** The Superheater Co. Ltd. and John E. Wood. Brit. 394,417, June 29, 1933.
- Apparatus for desuperheating steam, etc.** Dagobert W. Rudolph (to The Superheater Co.). U. S. 1,929,520, Oct. 10. Structural and operative details are described.
- Combustible gas.** Wm. W. Odell (to Columbia Engineering & Management Corp.). U. S. 1,930,442, Oct. 10. A mixt. of steam and hydrocarbon gas comprising chiefly  $C_2H_4$  and  $C_2H_6$  is introduced into a highly heated fuel bed to produce a gas comprising essentially H and CO in the ratio of 2 to 3, resp., and the resulting gas is enriched by at least partially reforming in it, in a chamber contg. refractory material, hydrocarbon material of normally liquid character. App. is described. U. S. 1,930,443 relates to the manuf. of gas by air-blasting an ignited fuel bed to bring it to incandescence, separately introducing a hydrocarbon material into a stream of superheated steam and thoroughly mixing and heating the steam and hydrocarbon material to above  $540^\circ$ , introducing the heated gaseous product into the incandescent fuel bed from above and removing the resulting gas from beneath. The gas generated contains 2.0 to 3.5 times as much H as CO and is substantially free from suspended carbon resulting from pyrolysis of the hydrocarbon material. App. is described.
- Purifying gases such as coal gas.** Thyssen'sche Gas- und Wasserwerke G. m. b. H. Ger. 583,417, Sept. 2, 1933. Addn. to 457,264 and 482,880 (C. A. 24, 445). The bulk of the tar is removed in known manner, and the gas is then cooled to below  $15^\circ$ , e. g., to  $-10^\circ$ , in two stages.  $C_{10}H_8$  is removed in the first stage, and most of the  $NH_3$  in the second stage. The gas may be treated directly in the first stage with an oil which dissolves  $C_{10}H_8$ , and in the second stage with cooled  $NH_3$  liquor. The gas then may be treated, while still at a low temp., with a dehydrating liquid.
- Purifying coal gas.** Gewerkschaft Mathias Stinnes. Ger. 584,048, Sept. 14, 1933. Coal gas, which has been purified and cooled in the usual way, is freed from residual  $C_{10}H_8$  by passing it at a temp. above  $40^\circ$  and at atm. or raised pressure through an oil which dissolves  $C_{10}H_8$ . Oil vapor is then removed from the gas by cooling.
- Coal-distillation gases.** Harald Kemmer. Ger. 584,041. Sept. 13, 1933. The sensible heat of the combustion products from gas works, coke ovens and like plant is used to operate an absorption refrigerating machine, and the low temp. attained is utilized in purifying the coal-distn. gases.
- Horizontal retort system for producing gas and coke.** Hermann Bröcker. Ger. 583,113, Aug. 20, 1933.
- Step-grate gas producers.** Woodall-Duckham (1920) Ltd. and James W. Reber. Brit. 391,737, July 6, 1933.
- Heat-regenerating system for water-gas producers using pulverulent or liquid fuel.** Gas- und Teer G. m. b. H. Ger. 583,415, Sept. 18, 1933.
- Gas holders.** Shell-Mex & B. P. Ltd. and Edwin H. P. Young. Brit. 395,067, July 13, 1933.
- Dry gas holders.** Maschinenfabrik Augsburg-Nürnberg A.-G. Brit. 394,270, June 22, 1933.
- Waterless gas holders.** (Firm of) Aug. Klonne. Brit. 393,887, June 15, 1933.
- Means for maintaining horizontal the floating disk of a gas holder.** Edward L. Pease. Brit. 393,285, May 30, 1933.
- Desulfurizing gases and vapors.** I. G. Farbenind. A.-G. (Hans Bahr, inventor). Ger. 583,387, Sept. 2, 1933. Gas or vapor mixts. contg. H<sub>2</sub>S and org. compds. of S are passed at  $300-600^\circ$  over catalysts such as Sn, Pb, Cu, Zn or Cr, or their oxides or salts, whereby the org. S compds. are reduced to H<sub>2</sub>S. The H<sub>2</sub>S formed, and that originally present, are then catalytically oxidized in known manner at a lower temp., e. g.,  $200-450^\circ$ . Details are given of the treatment of coal gas. Cf. C. A. 27, 2564.
- Removing hydrogen sulfide from natural or other gases.** Grover M. Ford and Otto H. Schenwald. U. S. 1,930,875, Oct. 17. The gas is contacted with an aq. soln. of NaCl contg. dissolved  $Ca(OH)_2$  under pressure at least as great as that of the incoming gas; spent treating liquid is withdrawn and steam is passed through it in an open receptacle; the resulting liquid is cooled in heat-exchange relation to water at atm. temps. and the cooled liquid is pumped into fresh aq. NaCl soln. contg. dissolved  $Ca(OH)_2$  preparatory to beginning another cycle of operation. The gas contact is effected countercurrentwise. App. is described.
- Removing sulfur oxides from flue gases containing free oxygen.** Henry J. Hodsman and Alan Taylor (to W. C. Holmes and Co. Ltd.). U. S. 1,931,408, Oct. 17. The gases are passed continuously through a chamber in which they are subjected to a co-current contact with an aq. soln. contg.  $NH_3$ .
- Extracting phenols, etc., from oils containing them.** Ralph H. McKee. U. S. 1,929,438, Oct. 10. Oils such as "tar oils" are treated with a relatively strong aq. soln. of an org. acid salt of a base-forming metal such as Na cymenesulfonate in order to ext. constituents such as phenols and the soln. is sep'd., dild. and treated for recovery of the extd. substances.
- Removing carbon oxides from gases.** I. G. Farbenind. A.-G. (Georg Schiller, inventor). Ger. 583,241, Aug. 31, 1933. CO and  $CO_2$  are removed in one operation by washing the gases at atm. or raised pressure with aq. liquids contg. a cuprous compd. and a difficultly volatile amine capable of combining with  $CO_2$ , preferably  $N(C_2H_5OH)_3$ .
- Tar distillation.** Stuart P. Miller (to Barrett Co.). U. S. 1,930,130, Oct. 10. Hot fresh coal-carbonization gases from various coal-carbonization units are divided into 2 parts. One part is cleaned at a high temp. to remove solid and liquid impurities entrained in the gases, and the matter thus removed is distd. in the other portion of the coal-carbonization gases while they are still hot, and these gases are cleaned at a high temp. to remove entrained solid and liquid particles, and the cleaned gases are cooled to sep. clean oils. An arrangement of app. is described.
- Coking agglomerates of zinciferous and carbonaceous reducing materials.** Earl H. Bunce (to New Jersey Zinc Co.). U. S. 1,929,408, Oct. 10. See Brit. 344,570 (C. A. 27, 829).
- Coke-oven operation.** Carl Still G. m. b. H. Ger.

584,067, Sept. 14, 1933. Details are given of a method of forming channels in the compressed coal mass in the oven chambers. Cf. C. A. 27, 1150.  
 Regenerative vertical-chamber coke oven. C. Otto & Co. G. m. b. H. Ger. 594,055, Sept. 14, 1933. Addn. to 460,752 (C. A. 23, 1535).  
 Roller mill for breaking coke. Roy W. Green and Aldridge & Ranken, Ltd. Brit. 394,430, June 29, 1933.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. PARAGHIER

The world's petroleum resources. R. Brunschwig. *Mem. compl. rend. soc. ing. civils France* 85, 141-94 (1932). A. Papineau-Couture.

The nature of Roumanian petroleum. Emil Severin. *Petroleum Z.* 29, No. 28, 13 (1933).—Analytical data for petroleum from various Roumanian fields are given, including C, H, S, N and O contents, and the percentage of light and heavy naphtha, kerosene and gas oil. The oil contains 1-4% of light aromatic hydrocarbons.

Chemical composition of petroleum. I. M. Levine and R. A. Virabyantz. *Erdol u. Teer* 9, 170-2, 187-9, 202-3, 220-2 (1933); cf. C. A. 23, 3400.—The aromatic and unsatd. hydrocarbons, naphthenes and methane hydrocarbons of 8 European oils have been sepd., detd. and examd. Data are tabulated to show that the hydrocarbons comprise these 4 classes and that 6 types of petroleum are defined by their chem. compn., e. g., (1) methane; (2) naphthene; (3) methane-naphthene; (4) aromatic; (5) methane-naphthene-aromatic; and (6) naphthene-aromatic petroleum. Types (1), (2) and (3) are characterized by small proportions of polycyclic compds. and by long side chains. In Type (5) there are more polycyclic aromatic compds. and naphthenes. In Type (6) the ring structures are most complicated and the side chains shortest. It yields the best lubricants inasmuch as only the polycyclic naphthenes and aromatic compds. lubricate, the tricyclic being more viscous than the bicyclic. Aromatic compds. are more viscous than naphthenes but resist oxidation less. F. W. Jung.

The chemical composition of petroleum. I. The chemical composition of petroleum gases. A. N. Sakhanov, A. I. Doladugin and I. I. Lapkin. *Gosudarstvennoe Nauch.-Tekh. Izdatel'stvo Moscow-Petrograd* 1931, 3-17; cf. C. A. 27, 1151. Various methods for analyzing gases are described. Grozny natural gases are characterized by a high content of casing-head gasoline (25-30% by vol.) due to the high temp. of the petroleum in the well, 75-80°. The compn. of gases, depending on the depth (sand layer), is (av.):  $\text{CH}_4$  31.6-51.0,  $\text{C}_2\text{H}_6$  7.4-12.8,  $\text{C}_3\text{H}_8$  11.0-21.7, iso- $\text{C}_4\text{H}_{10}$  7.2-11.5,  $\text{C}_4\text{H}_{10}$  6.0-9.5,  $\text{C}_5\text{H}_{12}$  and higher 7.4-13.4% and sp. gr. 1.207-1.111. The detns. were carried out with gases freed from air and gasoline. Gas used in gasoline compressing plants from the New Grozny field contains  $\text{CH}_4$  44-8,  $\text{C}_2\text{H}_6$  7.5-8,  $\text{C}_3\text{H}_8$  14-17,  $\text{C}_4\text{H}_{10}$  8-9, iso- $\text{C}_4\text{H}_{10}$  7-9 and  $\text{C}_5\text{H}_{12}$  and higher homologs 12.5-15%. The Old Grozny district has 2 types of gas. (1) is similar to gas from New Grozny fields and (2) contains  $\text{CH}_4$  70-75,  $\text{C}_2\text{H}_6$  6-7,  $\text{C}_3\text{H}_8$  8-10,  $\text{C}_4\text{H}_{10}$  5-7 and  $\text{C}_5\text{H}_{12}$  and higher homologs 4-5%. Gases from the Matkop oil field C horizon contain  $\text{CH}_4$  85,  $\text{C}_2\text{H}_6$  3.5,  $\text{C}_3\text{H}_8$  3.8,  $\text{C}_4\text{H}_{10}$  and higher homologs 3.3 and  $\text{CO}_2$  5; those from the F horizon contain:  $\text{CH}_4$  7-10,  $\text{C}_2\text{H}_6$  17-25,  $\text{C}_3\text{H}_8$  35-40,  $\text{C}_4\text{H}_{10}$  18-19 and  $\text{C}_5\text{H}_{12}$  and higher homologs 7-8%. The amt. of casing-head gasoline found in gas from the New Grozny fields is 1050-1100 g. per cu. m., Old Grozny fields (a) 350 g. per cu. m., and (b) 200 g. per cu. m. and that from the Matkop gas is insignificant. Properties of some stabilized gasolines are given. II. Method for the determination of the chemical composition of straight-run gasolines and the determination of aromatic compounds. A. N. Sakhanov, M. D. Tilicheev and A. I. Dumskaya. *Ibid.* 18-79.—A large no. of synthetic mixts., individual compds. and fractions from petroleum were investigated. It is concluded that the detn. of "benzene," "toluene" and "xylene" fractions can be carried out by the aniline pt., nitrobenzene, refractometric and sp. gr. methods. The

refractometric method is given preference because of its simplicity and the small amt. of substance needed. The detn. of aromatic compds. in the 150-200° fraction is made by the aniline or nitrobenzene method because of the smaller influence of the varying structure of aromatic compds. in this fraction on the crit. soly. temp. method in aniline than on the sp. gr. and the  $n$ . Accordingly, the refractometric and the sp. gr. methods can be applied only to fractions b. below 150°. All 4 methods can be used in detg. the aromatic compds. in the fraction b. below 150° and the refractometric and the sp. gr. methods are preferred. For gasolines b. to 200° the aniline and the nitrobenzene methods of detg. the aromatic compds. are best. Volumetric methods are not sufficiently accurate for the detn. of aromatic compds. III. Methods for the determination of the chemical composition of straight-run gasolines and the determination of naphthene and paraffin hydrocarbons. A. N. Sakhanov and M. D. Tilicheev. *Ibid.* 80-104.—It is concluded that chem. methods for the detn. of naphthene and paraffin hydrocarbons are of little use because of the inert chem. nature of these hydrocarbons. A detn. of these hydrocarbons on the basis of their phys. consts. is difficult because of the presence of paraffin and naphthene hydrocarbons of various structures. Therefore, the best method in this case is the aniline method. A phys. sepn. may be effected by (1) distn. under reduced pressure, (2) distn. in the presence of a third ingredient which has a different soly. and (3) freezing out some of the normal paraffins (in some cases also other hydrocarbons). It is thus possible to sepn. narrow cuts of these hydrocarbons (gasoline) into 3 groups; i. e., normal paraffins, branched paraffins and naphthenes. In the exptl. part of this report pure individual paraffin hydrocarbons were obtained by the freezing method. IV. Methods for the determination of the chemical composition of kerosene and lubricating oil fractions. A. N. Sakhanov and R. A. Virabyantz. *Ibid.* 105-35. This investigation was carried out with the principal Russian and some of the American crude oils. Cofls. for the detn. of aromatic compds., naphthenes and paraffins were found in the course of the exptl. procedure which is described. Thus unsatd. compds. were detd. by the I or Br nos. described in XII, while the aromatic compds. were detd. by the  $\text{H}_2\text{SO}_4$  method, 31% vols. (monohydrate) were sufficient for the complete removal of aromatic compds. The amt. of the aromatic hydrocarbons removed may be calcd. by the phys. consts. of the fraction before and after treatment, with the aniline method. The detn. of naphthene and paraffin hydrocarbons left after the removal of aromatic compds. can be effected by detg. their phys. consts. such as their aniline poms. The methane hydrocarbons which are present in the heavier fractions are detd. from the amt. of solid paraffin which is the only satd. hydrocarbon class present in the heavy fractions. V. The chemical composition and classification of crude oils. *Ibid.* 136-74.—On the basis of the methods described in IV the chem. compn. of fractions of 23 crude oils was detd., 50° cuts being investigated. This led to the following classification of crude oils: (1) Paraffinic crude oils (Grozny paraffinic oil, Oklahoma-Davenport, Texas-Mexia, Oklahoma-Tonkawa). The American paraffinic crude oils contain 1.3-2.0% of paraffin, while the Grozny paraffinic crude oils contain 5-9% of wax. Galician, Roumanian and East Indian crude oils are also high in paraffin. The asphaltene content does not exceed 1-1½% and that of resins, 5-6%. (2) Crude oils having an unchanging high proportion of naphthenes are very rare. A typical



crude oil of that kind is the Dossor crude oil which contains 60% and more of naphthenes. (3) Paraffin-naphthene mixed crude oils are also rare. They contain an excess of naphthenes in the lower fractions while the higher fractions have more aromatic compds. These crude oils have 1.5% and more wax, while the content of asphaltene and neutral resins is very small. Surakhanui crude oil is a representative of this class. It contains up to 6% of paraffin. (4) Representatives of the paraffin-naphthene-aromatic class and Grozny mixed-base, light Voznesenskii, light Maikop, Bibi-Eibat and Huntington-Beach (Calif.), crude oils. (5) This class, the naphthene aromatic, is represented by the Grozny mixed base crude oil derived from the upper layers, heavy Maikop, Binagadi, Kirmaki Kaluga and Hull (Texas), crude oil. They contain, as a rule, not more than 0.3% wax but the amt. of neutral resin is high, reaching 15-20%. (6) A purely aromatic crude oil is Perm oil. It is characterized by a high sp. gr. and prevalence of aromatic compds. in all fractions. This type of crude oil is very rare. The analytical procedure of sepg. aromatic compds. from various fractions with the application of liquid  $\text{SO}_2$  and the use of the aniline method is discussed and characteristics of many fractions are tabulated. VI. Content of five- and six-membered naphthenes in straight-run gasolines. A. N. Sakhanov, A. I. Doladugin and I. M. Bogorova. *Ibid.* 175-84. Naphthenes were detd. in gasoline (b. below 150°) fractions by the Zelinskii catalytic dehydrogenation method. The prepn. of the catalysts (Pd and Pt) as well as the analytical procedure is described. The unsatd. compds. obtained simultaneously by dehydrogenation of satd. compds. present in the cuts were detd. by the I method. The aromatic compds. were removed before the detn. of naphthenes. Thus, 60-95°, 95-122° and 122-150° cuts freed from aromatic compds. of the Balakhano-Sabunchi, Surakhanui, Bibi-Eibat, Dossor and Grozny crude oils were analyzed. It was found that Baku crude oils contain up to 50% of six-membered naphthenes, which exceed those of five-membered compds. in the majority of fractions. All the crude oils investigated had a max. of six membered naphthenes in the 95-122° fraction, except Dossor crude oil. VII. The chemical composition of lubricating oils. A. N. Sakhanov and M. A. Butuzhev. *Ibid.* 180-217; cf. C. A. 25, 3816. VIII. Physical properties of lubricating-oil fractions and their relation to the chemical composition. *Ibid.* 218-30. The b. p., mol. wt., viscosity, and flash points of lubricating oils are closely related to their chem. compn. The mol. wts. of lubricating oils having the same viscosity depend upon the chem. nature of the crude oil. It is highest for paraffine crude oil and lowest for asphalt-base (naphthene aromatic) crude oils, the methane-naphthene crude oils occupying an intermediate position. Thus oils of the same tech. application have different mol. wts. Similarly, the b. ps. of the same tech. lubricating oils depend on the nature of the crude oil. They are highest for methane crude oils and lowest for asphalt-base crude oils with methane-naphthene crude oils having an intermediate position. Flash points of lubricating-oil fractions depend on their b. ps. and both depend on the nature of the crude oil. Thus, lubricating oils from methane crude oils are distinguished by a comparatively high b. p. and mol. wt., while those from asphalt-base crude oils have comparatively low b. ps. and mol. wts. IX. Chemical characteristics of paraffins and ceresins. Surakhanui paraffins and ceresins. A. N. Sakhanov and I. G. Zherdeva. *Ibid.* 231-45. Ceresins as well as paraffins form a group of methane hydrocarbons. Ceresins, contrary to the paraffins, produce stable mixts. with oils which cannot be sepd. from the ceresins either by filtration or sweating. Ceresins can be distd. without decompn. if the temp. is kept sufficiently low. At higher temps. they distil under partial decompn. and partial conversion into paraffins. Crude oils contain both ceresins and paraffins. The latter are obtained in the distillates from paraffins already present in the crude oils and only in part from decompd. ceresins. Surakhanui crude oil is high in ceresins which

were sepd. by the authors and investigated. Having the same m. p., the ceresins are distinguished from the paraffins by higher mol. wt., viscosity, b. p. and nitrobenzene ps. The high b. p. of ceresins permits their sepn. from paraffins which distil easily with the distillate while the ceresins are concd. in the residue. Chemically the ceresins are distinguished from the paraffins by the ease with which they are attacked by fuming  $\text{H}_2\text{SO}_4$ . It is possible that ceresins belong to the isoparaffin series; however, this is not yet proved. Paraffins sepd. from Surakhanui distillates are identical with those obtained from Grozny distillates. X. The chemical characteristics of paraffins and ceresins. Grozny paraffins and ceresins. A. N. Sakhanov and N. A. Vasil'ev. *Ibid.* 246-54. The solid hydrocarbons which are sepd. from Grozny paraffinic crude oil belong also to the paraffin and ceresin class, though Grozny crude oil has more paraffins than ceresins. The fractions of Grozny paraffins are similar to the corresponding fractions sepd. from paraffin-contg. tars from brown coal and shale. The paraffins are distinguished by a plate or strip-like structure of their crystals which are closely interwoven. Though an admixt. of oil or tar does not change the structure, an addn. of ceresin acts strongly on the structure of paraffins, changing it into a needle-like, finely cryst. agglomeration. Ceresins from Grozny crude oil are very similar in their phys. properties to those from the Surakhanui crude oil. XI. The chemical composition and structure of asphaltic resinous petroleum substances. A. N. Sakhanov and N. A. Vasil'ev. *Ibid.* 255-85. Asphaltenes in contrast to neutral resins are present in the petroleum in colloidal soln and they can be pptd. quantitatively with an excess of petr. ether for which they are lyophobic. properties. They contain C, H, O and S. Neutral resins form a true soln. in petroleum. On being sepd. by adsorbers in a pure state they are partially transformed into asphaltene, depending on the nature of the adsorber. They consist of C, H, O (and S). The content of asphaltene and neutral resins in different petroleum and their products differs and their presence is indicated by the coloration. The color in the distillates is caused almost exclusively by neutral resins, part of which distils over even with the light gas-oil distillates. The main portion of the resins, however, is left in the distn. residues. The amt. of coke formed in petroleum is in direct relation to the asphalt content, which is the principal coke-forming agent. The coke no. of pure neutral resins is higher, the higher their mol. wt. The coke no. of asphaltene is considerably higher than that of the heaviest resins. An investigation carried out with Grozny asphalt and Balakhano-Sabunchi crude oils and their products shows that the chem. compn. of the resins obtained from the above products is const. Mol. wts. of neutral resins do not exceed 1000 and are of the same magnitude as the mol. wts. of the corresponding distillates. Asphaltene have a considerably higher mol. wt. which is of the magnitude of several thousands. Both asphaltene and neutral resins are highly polycyclic compds. with not more than 1 double bond. The former are formed from neutral resins by condensation which is easily effected by a no. of factors. A further condensation of asphaltene produces the insol. modifications (carbene, carlonds). Neutral resins are formed from the basic petroleum hydrocarbons (and S compds.) by oxidation (and sulfonation). The procedure of sepg. the above substances is described and their compn. and properties are tabulated. XIII. A method for determining the unsaturated compounds in gasolines and heavy petroleum fractions by means of bromine numbers. A. N. Sakhanov, R. A. Virabyantz and A. P. Meshcheryakov. *Ibid.* 322-32. Expts. were carried out with unsatd. compd.-mixts. sepd. from cracked gasoline, with cracked gasoline, gasoline freed from aromatic compds. to which caprylene was added, and with Grozny asphalt-base crude oil. It was found that substitution and addn. products are formed with petroleum when acted upon by halogens. This method cannot, therefore,

be used. In most cases and particularly in fractions b. above 120°, the substitution no. exceeds that of addn. The substitution no. is unreliable because it depends on many factors such as the amt. of reagent used, the degree of exposure to light, and temp. Unsatd. hydrocarbons of high mol. wt. do not react with halogens. XIV. Polarimetric properties of crude oil. A. N. Sakhanov and G. M. Kagan. *Ibid.* 333 42.—The following oils were investigated: Balakhanui, Surakhanui, Binagadui Kirmaki, Bibi-Kibat, Grozny paraffinic, Grozny slightly paraffinic, Grozny, Maikop, Kaluga, Dossor, Makat, Sakhalin, Mexia, Huntington Beach and Hull fuel oils. It was found that the optical activity of methane, methane naphthene and naphthene oils is low, the highest activity being shown by the naphthene-aromatic crude oils. A treatment of the optically active distillates with fuller's earth and H<sub>2</sub>SO<sub>4</sub> does not affect their optical properties. This indicates that aromatic compds. are not the cause of optical activity. Since highly active oils belong to the naphthene-aromatic class, it is concluded that the optical activity is characteristic of highly polycyclic naphthenes.

A. A. Boethling  
The constitution of Ural petroleum (Perm). N. D. Zelinskii and Yu. K. Yur'ev. *Brennstoff-Chem.* 14, 347 9(1933); cf. C. A. 25, 4112 and Sakhanov, et al., part VI of preceding abstr.—Analytical data for 6 fractions between 150° and 240° are tabulated. Aromatic compds. were detd. by both the H<sub>2</sub>SO<sub>4</sub> and the aniline-point methods with different results. Hydroaromatic compds. were detd. as aromatic compds. after catalytic dehydrogenation. Paraffins and naphthene hydrocarbons were detd. by the Carpenter naphthene no. and the aniline point. Aromatic compds. were highest in the 150-70° fraction. Hexahydroaromatic compds. were the same throughout the fractions. Other polymethylene cyclic and paraffin hydrocarbons increased with h. p. Mono-substituted C<sub>10</sub>H<sub>8</sub> derivs. were found only in the 225-240° fraction; all the disubstituted benzenes were o-derivs. Naphthalene hydrocarbons were found neither in the aromatic compds. nor the dehydrogenated hydroaromatic compds. in contrast to the results with Baku oils.

F. W. Jung  
Crude petroleum and petroleum products. G. R. Hopkins. *Bur. Mines, Minerals Yearbook* 1932 33, 459-95(1933). Natural gasoline. G. B. Shua. *Ibid.* 535 44. Asphalt and related bitumens. A. H. Redfield. *Ibid.* 555 64.

Alden H. Emery  
Petroleum-refinery technology. A. J. Kraemer. *Bur. Mines, Minerals Yearbook* 1932 33, 511 15(1933).—The changed status of petroleum refining during recent years is reviewed. All phases of refinery operation have been modernized and cracking capacity has been increased. Developments in purification of gases, methods for processing various fractions, hydrogenations, etc., are described.

Alden H. Emery  
Technical developments in petroleum and natural-gas production. H. C. Fowler. *Bur. Mines, Minerals Yearbook* 1932 33, 497-509(1933); cf. C. A. 27, 4912. The interrelation of oil and gas production and recent developments in engineering research are discussed. A. H. F.

The recovery of hydrogen sulfide from petroleum refinery gases. Ludwig Rosenstein. *Petroleum Z.* 29, No. 24, 4 6(1933).—A practical method for removal of H<sub>2</sub>S is described involving absorption in K<sub>2</sub>PO<sub>4</sub> soln. with the formation of K<sub>2</sub>HPO<sub>4</sub>, KHS and K<sub>2</sub>S, from which mixt. the H<sub>2</sub>S is recovered by heating. The partial pressure of H<sub>2</sub>S at 20° in the vapor above a 2.57 M soln. of K<sub>2</sub>PO<sub>4</sub> contg. 1.53, 1.35, 0.98 and 0.85 mols. of H<sub>2</sub>S per kg. of soln. are, resp., 10, 3.7, 0.9 and 0.4 mm. In practice the rich soln. contg. the H<sub>2</sub>S is pumped on to the top plate of a column and on its journey downward becomes gradually devoid of its H<sub>2</sub>S. The method is superior to absorption in NaHCO<sub>3</sub> soln. or interaction with SO<sub>2</sub>, or polythionates to give free S.

J. M. Levine  
Safety at petroleum-cracking plants. R. L. Marek. *Bur. Mines, Tech. Paper* 551, 92 pp.(1933). The influence of temp. and corrosion on cracking equipment,

selection of proper metals for various equipment, the prevention of corrosion, toxic vapors, inflammable vapors, etc., are discussed.

Alden H. Emery

Conversion of fatty and waxy substances into petroleum hydrocarbons. W. F. Seyer. *Bull. Am. Assoc. Petroleum Geol.* 17, 1251-67; *J. Inst. Petroleum Tech.* 19, 773 83(1933).—The most stable portions of org. tissues are fatty acids. It is assumed that petroleum is formed from a wax-like substance. When a pure hydrocarbon is heated in a bomb a complex liquid and gaseous mixt. is obtained. The reverse does not occur. Hydrocarbons are unstable at high temps.; the rate of decompn. in either the gaseous or liquid phase follows the monomol. law. There is no definite temp. at which reaction begins and the rate of decompn. at any temp. can be calcd. by the Arrhenius equation. When satd. hydrocarbons are heated, unsatd. hydrocarbons are produced and a fraction of them undergoes mol. rearrangement to form satd. cyclic hydrocarbons. Another fraction polymerizes or recombines to form complex hydrocarbons of the branched chain or ring type. The transformation of the waxy substances can be regarded as a sort of low-temp. high-pressure distn. process in which pressure favors the production of cyclic hydrocarbons. Ultimately, only gases, composed of low mol. wt. hydrocarbons and a dense semi-solid or asphaltic material, remain. A. H. L.

Petroleum storage-tank coatings and corrosion in oil-cracking installation. E. Perry. *Paint & Varnish Production Mgr.* 9, No. 11, 10 et seq.(1933).—The corrosion of petroleum-storage tanks by sour crude oils is outlined. The use of noncorrosive alloys is too expensive and therefore paints must be relied upon to prevent the corrosion. The characteristics of various coatings which have been tried are discussed.

G. G. Swaid

Petroleum and synthetic gasoline. Carl Bosch. *Petroleum Z.* 29, No. 27, 1-10(1933).—Destructive hydrogenation of coal is reviewed and its economic importance is discussed.

I. M. Levine

Oil fields of Poland, geological and statistical summary. Charles Bohdanowicz. *Bull. Am. Assoc. Petroleum Geol.* 17, 1084-1097(1933).—B. gives data on the density and quality of crude oil from various Polish oil fields.

Alden H. Emery

Generation of oil in rocks by shearing pressures. IV V. Further studies of effects of heat on oil shales. W. P. Rand. *Bull. Am. Assoc. Petroleum Geol.* 17, 1229 50(1933). Changes produced in the character of fossil org. matter by heating are due to fractional decompn. of its chemically complex structures. The nature of the intermediate products depends in part on the type and state of preservation of the org. material in the shale. Differences in character of sol. products obtained from a given shale under various conditions of heating are not readily apparent; variable results are more easily noted in the amt. of conversion effected and in the vol. of gases produced. Formation of sol. bitumens under thermal conditions in the lab. depends on temp., time and volumetric ratio between the org. matter in the rock and the pore space accessible to gas. Rate of bitumen formation increases with the temp. During the 1st 24 hrs. of heating, approx. 6 times as much bitumen was formed at 300° and 61 times as much at 350° as was formed at 250°. Time is more important at high than at low temps. and during the early part of the conversion process. Vapor pressures sufficient to retard volatilization are necessary to bitumen formation. The org. products formed from oil shale and kindred rocks as a result of heating are derived from their insol. org. constituents by cracking. Some products may be immediately sol. and others immediately volatile. Certain constituents may be broken up repeatedly. The phys. conditions det. the amt. of conversion and the nature of the products formed; in the absence of especially favorable conditions the trend is toward the production of volatile gases and fixed C.

Alden H. Emery

The distillation of Wurtemberg oil shales. Franz Waclaw. *Petroleum Z.* 29, No. 32, 4 7(1933).—By

distn. of 100 tons of shale in a rotary kiln there were obtained 3-6 tons of heavy oil (S 2.4-3.8%), 100 kg. gasoline (S 0.5-3%) and 1800-2200 cu. m. of gas of 7500-9200 B. t. u. The gasoline has a strong odor and does not lend itself to refining because of the large losses entailed and deepening in color. By treatment of the heavy oil with  $H_2SO_4$  an ichthyol-like substance was obtained; ichthyol itself could not be formed since no  $C_4H_8S$  is present. The oils could be used as fuel or Diesel oil. Extn. with  $CS_2$  yielded 1.536% bitumen contg. 3.08% S; with  $K_2CO_3$ ,  $CHCl_3$ ,  $(CHCl_3)_2$ , and  $CCl_4$  the yields were smaller. Conclusion: While the ash from the distn. of the shale can be utilized for hydraulic cement or building material, no good use has been found for the oil. I. M. Levine

**Influence of rotary mud on the production capacity of oil sands.** R. W. Brauchli. *Petroleum Z.* 29, No. 30, 14 (1933).—The influence of the addn. of rotary mud, water, oil (25°Bé. or tank bottoms free from light ends) or aqua gel is discussed. With particular reference to the Oklahoma City field it was found rational to use mud or water while the well was still under high pressure but when the pressure was considerably reduced, production was greatly increased by the addn. of oil or gel. The loss of oil by absorption in the sands is relatively small, viz. 0-13.6%. The subject is reviewed with reference to other fields. I. M. Levine

**Pretreating crude oils with alkali.** A. S. Velikovskii and A. V. Druzhinina. *Neftyanoe Khozyaistvo* 25, 48-55 (1933).—The caustic treatment of Baku crude lubricating oil (a mixt. of light Balakhanui-Sabunchi and light Roumanian crude oils) by using a 4% soln. of NaOH and passing it in countercurrent to the crude at 65-70° lowered the acidity from 2.292 mg. KOH to 0.402 mg., the neutralization being effected up to 96.7%. The caustic sludge had a black color, and its org. part had an acid no. of 124. It contained 36.8% of unsaponifiable substances. The stability and the color of the crude oil were improved and emulsions were not formed, while the distillates had a better color and needed smaller amts. of reagents in the final treatment. Because of the removal of naphthene acids from the crude oil the distn. equipment is not subjected to corrosion. Similar results were obtained with other Baku oils, in some cases the strength of NaOH was changed. All treated oils showed a higher amt. of ash. Heavy crude oils contg. 0.9-1.2% petroleum acids acted less favorably; some of the alkali remained in the oil and quite a high proportion was found in the sludge. Some oils such as the Fimba crude oil formed emulsions which were broken by adding 1% of kerosene naphthene acids. The alkali sludge contained up to 50-60% of oil. The compn. of the org. part sepd. from the sludge from Bibi-Eibat crude oil contained: asphaltogenic acids 0.23, naphthene acids 63.52, asphaltenes 0.96, resins 4.07 and "oil" 31.16%. The oil is composed of the lightest and the heaviest crude-oil fractions. A. A. Bochtlingk

**Isolation of pure benzene from Shukoko crude oil and its identification by comparing its properties with those of pure benzene.** Masakichi Mizuta. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 448-50 (1933).—Pure benzene was sepd. from the crude oil by repeated fractionation and crystn. of the benzene at low temps. Comparison with Merck's c. p. benzene showed that the properties of the 2 were the same. Karl Kummermeyer

**Cracking process.** R. Berl and W. Dienst. *Petroleum Z.* 29, No. 32, 1-4 (1933).—Gas oil was heated for 70, 190 and 310 min. at 400° and 425° under pressures of 18 and 24 atms. under conditions wherein the gasoline and gas were continuously removed as formed. The gasoline yields at 425° were 4 times the yields at 400°. I. M. L.

**Cracking with liquid metal as heat-transfer medium.** Alfred Oberle. *Petroleum Z.* 29, No. 25, 1-2 (1933)

I. M. Levine  
**Determination of unsaturated and aromatic compounds in cracked gasoline.** S. S. Nametkin and E. A. Robinson. *Neftyanoe Khozyaistvo* 24, 184-6, 230-3 (1933).—The authors carried out expts. on synthetic mixts. of 60-95% cuts of dearomatized gasoline with various proportions

of cyclohexene, benzene and amylene. It was found that the completeness of removal of aromatic and unsatd. compds. with  $H_2SO_4$  depends upon the structure of the unsatd. compds. present as well as on the ratio of the above hydrocarbons in the mixt., and on the concn. and the amt. of  $H_2SO_4$  used. Thus, mixts. contg. about 20% of cyclohexene and 15%  $C_6H_6$  are freed from these hydrocarbons after treatment by the Kattwinkel method, by use of 3 parts of the mixt. and 1 part of the reagent and shaking for 100 min. However, a mixt. contg. 20% amylene and 10%  $C_6H_6$  still contains 8-10% of unsatd. compds. Mixts. contg. relatively less unsatd. compds. (50% of the aromatic compds.) contain 23% of polymerization and condensation products which are not removed by the above reagent.  $H_2SO_4$  treatment with acid of gradually increasing strength effects a removal of some of the aromatic and unsatd. compds. while the Kattwinkel reagent leaves 10%. When the Kattwinkel soln. is used first, followed by treatment with  $H_2SO_4$  contg. 1% of  $SO_3$  at -5°, 15% remains; repeated treatment with oleum removes another 2 1/2% which indicates an attack of satd. hydrocarbons. Narrow cuts of cracked gasoline were treated with 80, 90, 94 and 98%  $H_2SO_4$  with 1 vol. of gasoline and 2-3 vols. of acid with shaking for 20 min. In another series the Kattwinkel soln. was used. The latter soln. was more effective than the  $H_2SO_4$ , although identical results were obtained with a preliminary treatment with  $H_2SO_4$  of lower strength followed by the Kattwinkel treatment. The deviation of results obtained by the  $H_2SO_4$  method from that of the Kattwinkel method may amount to 30%. In the detn. of unsatd. compds. in the presence of aromatic compds. the  $H_2SO_4$  cannot be applied because of the attack of the  $H_2SO_4$  on both aromatic and unsatd. hydrocarbons. The benzoyl peroxide method was found to be very dependable with synthetic mixts. such as menthene-gasoline, menthene-benzene, limonene-menthane. The detn. of unsatd. compds. by the above method in narrow cuts of cracked gasoline showed deviations not exceeding 1 1/2%, provided that 30-50% of unsatd. compds. were present. A. A. B.

**The mechanism of detonation, or knocking, in internal-combustion motors.** Charles Dufraisse and René Chauv. *Compt. rend.* 197, 672-4 (1933).—The peroxide theory of detonation was not originated by Dumanois (*C. A.* 22, 1406; 27, 5955). Gerald M. Petty

**New catalytic processes for the production of motor fuels having high octane number.** Anon. *Oil Gas J.* 32, No. 22, 12, 31 (1933).—The Houdry process is described which cracks the oil in the presence of steam over molar solid catalyst. The untreated gasoline is low in gum and S and has excellent  $O_2$ -bomb stability. J. R. S.

**Commercial application of the "Chlorex" process in the manufacture of high-grade motor oils.** W. H. Bahlke, A. B. Brown and F. F. Diwocky. *Oil Gas J.* 32, No. 23, 60, 62, 72 (1933).—A review of the com. application of "Chlorex" ( $\beta, \beta'$ -dichloroethyl ether). Diagrams, tables and charts are given. J. R. Stroug

**Use of furfural as the extraction solvent to make motor oils having low viscosity index.** R. E. Manley, B. V. McCarty and H. H. Gross. *Oil Gas J.* 32, No. 23, 78, 79, 81, 82 (1933).—Furfural manufd. from agricultural wastes is cheap and has a high degree of selective solvent action on a wide variety of lubricating stocks. It is stable in a closed system, and has the advantage of high application temp. (300° F.). It is non-poisonous. A flow chart of the plant is given as well as data secured in testing various stocks. J. R. Strong

**Pyrolysis of the Surakhanui paraffinic fuel oil.** N. A. Butkov, E. I. Rabinovich and T. P. Kolpenskaya. *Neftyanoe Khozyaistvo* 25, 29-35 (1933).—In the vapor-phase cracking of Surakhanui paraffinic fuel oil an app. consisting of an iron retort 1 m. long and 5 m. in diam. was used. It was heated electrically and the temp. was kept const. within 5°. The pressure in the retort was maintained at about 5 mm. Hg, and the cracking stock was charged at the rate of about 2.5 cc. per min.  $C_2H_4$  (detd. by the Allosway method) amounted to 0.08% (by vol.) when cracking at 700°, 0.09% at 750° and 0.12%

at 650°. The Surakhanui mazout used had a sp. gr. of 0.894, initial b. p. 205°, below 300° 10%,  $E_{50}$  viscosity 3.54, ash 0.12%, paraffin (Hofde) 4.21%, pour point (Hofde) +20° and Brenken flash 126°. The yield of light fractions amounted to 18% and was almost const. regardless of the cracking temp., while their sp. gravities changed with temp., amounting to 0.850 at a cracking temp. of 700°. The "naphthalene" yield increased with increase in cracking temp., reaching 2.7% at 800°. The yield of pitch decreased from 20 to 13% with increase in temp. from 650° to 700° and remained const. on a further temp. increase. The vol. of gas increased with cracking temp. but the yield by wt. decreased. An increase in cracking temp. caused a decrease of the sp. gr., the calorific value and the content of higher olefins while the amt. of  $H_2$  increased. The influence of the cracking temp. on various aromatic compds. was as follows: Increase in temp. raised the yield of  $C_{11}H_8$ , while that of  $C_{10}H_8$  had a max. of 3.6%, decreasing on a further increase in cracking temp.  $C_{11}H_8$  contained a max. of 16% of unsatd. compds. while  $C_{10}H_8$  had a max. of 10.5%. The yield of coke was detd. separately in a porcelain tube, the tar being removed with  $CaH_2$ . The yield of coke varied between 4.15 and 7.37% while that of lamp black was 2.51-6.35%, yields about 5 times higher than those found on cracking kerosene distillate. The yield of pitch reached 4% calcd. on the cracking stock. The gases from cracking Surakhanui paraffinic fuel oil contained amylene and  $C_{11}H_8$  1.7%, diolefins (butadiene) 1.0-2.2, isobutylene 2.3, butylene and propylene 11.0, ethylene 19.18,  $H_2$  12,  $CO$  and  $O_2$  3.0, methane 38 and ethane 12%.

A. A. B.

**Substitute Diesel fuels.** Donald A. Howes. *Mining J.* 182, 583-4, Adv. sect. viii (1933).—There are few, if any, supplies of alternative Diesel fuels. Coal-tar oils of aromatic nature are unsuitable because of their high ignition temp. and long delays between injection and ignition. Even after hydrogenation and conversion into a mixt. of naphthalenes, the product probably would not be satisfactory, because naphthenic oils of petroleum origin are inferior to paraffin and mixed-base oils, and costs are high. Polymerization of olefins under pressure will give satisfactory oils, but costs are prohibitive. Shale oils often are satisfactory Diesel fuels, but a better return can be obtained by cracking to form gasoline. Cracked vegetable oils give a low power output. The most promising field is the development of antiknock agents for coal-tar oils.

Alden H. Emery

**Chemical nature of gum-forming constituents in gasoline.** D. T. Flood, J. W. Hladky and G. Edgar. *Ind. Eng. Chem.* 25, 1231-40 (1933).—Individual hydrocarbons of the type likely to be formed by cracking were added in varying amts. to straight-run paraffinic gasoline and the mixts. subjected to the usual gum-stability and storage tests. The largest amts. of gum were developed in the mixts. contg. aliphatic or cyclic diolefins or mono-olefins attached to a benzene ring. In certain cases large concns. of aliphatic mono-olefins also formed appreciable quantities of gum. Gum formation was found to be almost invariably assocd. with oxidation. It was found that the action of inhibitors consists in prolonging the induction period without apparently affecting the rate of  $O_2$  absorption once the induction period is finished. No simple relation was found between the time of stability in storage and the length of the induction period detd. by the  $O_2$  bomb. It is suggested, however, that a study of the complete  $O_2$  bomb pressure curve may give valuable indications of the behavior of the mixt. in storage.

D. F. Brown

**Recent developments in the gum problem.** W. H. Fulweiler. *Gas Age-Record* 72, 411-3 (1933); cf. 1 27, 318. —A discussion of the relation of NO concn. to gumming troubles. Late studies have shown that the danger limit must be moved from 6 g. of NO per million to 2 or less.

H. L. Ohm

**Solubility of hydrogen and natural gas in oils at high operating temperature and pressure.** V. V. Ipat'ev, Jr., V. P. Teodorovich and I. M. Levine. *Oil Gas J.* 32, No. 20, 14-30 (1933).—The solv. of  $H_2$  in benzene, toluene,

1 xylene, as well as in gasoline, kerosene, cylinder oil and mazout, increased in proportion to the pressure up to 500 atm. The solv. of  $H_2$  in hydrocarbons decreased with the complexity of the mol.  $CH_4$ , unlike  $H_2$ , decreased in solv. with increased temp.

J. R. Strong

**Colloid graphitic oils and pastes.** E. Helani. *Petroleum Z.* 29, No. 31, *Motorbetrieb und Maschinen-Schmierung* 6, No. 8, 5-8 (1933).—The subject is reviewed in particular connection with roller and ball bearings. A suitable product is one in which the colloid is stable and homogeneous; the particle size of at least 70% of the graphite is 0.1-0.3  $\mu$ , and no gummy substances are formed. It is suggested that pumps be used for lubrication with this type of prepn. The graphitic film on the bearing wall is discussed.

I. M. Levine

**Smoke point of kerosene.** Anon. *J. Inst. Petroleum Tech.* 19, 812-11 (1933). App. and procedure are described for detg. the max. height of flame with which a kerosene will burn without smoking.

E. E. C.

**Vapor-gathering systems with steel balloons reduce evaporation and corrosion losses.** T. E. G. Bignell. *Oil Gas J.* 32, No. 21, 8, 54 (1933).—The use of steel balloons in the petroleum field is described.

J. R. S.

**Some of the theoretical and practical aspects of the acid treatment of limestone wells.** M. E. Chapman. *Oil Gas J.* 32, No. 21, 10, 53, 54 (1933).—The com. use of inhibitors for the protection of metals in acid solns. has resulted in the development of inhibitors which have largely eliminated the damage by acid corrosion to well casing or other equipment.

J. R. Strong

**Catalytic influences in autoignition processes.** Carl Zerbe, Franz Beckert and Hermann Jentzsch. *Angew. Chem.* 46, 650-62 (1933).—The catalytic influence of 22 metals and metal compds. upon autoignition in pentane- $O_2$  and benzene  $O_2$  mixts. was investigated and the results are presented in graphical form. The min.  $O_2$  requirements and the accelerating or retarding actions of the catalysts were detd. The contact mechanism was discussed. In the presence of catalysts it was found that the autoignition is still mainly dependent upon temp.,  $O_2$  concn., and the chem. constitution of the inflammable material.

Karl Kaunmeyer

**The analysis of lubricating oils.** Tepugov. *Compt. rend. cong. Graissage* 1931, 63-73, *Chem. Zentr.* 1932, 11, 2575-6. —Tables show anomalies in detns. of the solidifying points of various oil mixts. These points may be either higher or lower than the values calcd. from the solidifying points of the constituents and their relative proportions. Shortly after heating, the solidifying point is higher but it sinks again in a few days. In detns. of the acid no. it was found that the method of Mahler gave values as accurate as the standard method of Hofde and effected a saving of time. Ten g. of the oil is boiled with 25 cc. neutral abs. alc. in a 250-cc. Erlenmeyer flask for 1 hr. and then titrated with NaOH. A blank must be run. In the usual viscosity measurements based upon the principle of Poiseuille the temp. of the oil is noted before passage through the capillary, the vol. being measured in the vessel receiving the oil. In the Engler, Redwood and Saybolt viscometers no provision is made to prevent cooling of the oil after flow. Comparative expts. showed that the error in vol. due to contraction upon cooling (initial temp. 100°) can be neglected for technical work. *Methods of obtaining oils of high viscosity without heating* are reported. A cylinder oil of viscosity 5.5 at 100° was shaken with 2 vols. ether and 1 vol. 96% alc. in a separatory funnel. After distg. off the solvents and drying at 100°, the upper layer yielded an oil (75% wt. of the original) of viscosity 6.8. The lower layer after the same treatment yielded an oil of viscosity 4.6.

W. A. Moore

**The slope of the viscosity-temperature function as an important characteristic of lubricating oils.** H. Umstätter. *Petroleum Z.* 29, No. 31, 1-3 (1933).—The slope  $B = (\log \log \eta' - \log \log \eta) / (\log T - \log T')$  is given for several com. lubricating oils. An oil is more serviceable the lower the slope, for it is shown that the

coeff. of friction varies directly with the slope. *B* cannot be made to coincide with viscosity index. I. M. L.

The evaluation of automobile lubricating oils from the point of view of formation of carbon deposits. N. I. Chernozhukov. *Nefyanoe Khozyaistvo* 24, 234-40 (1933).—Fresh lubricating oils were tested for sp. gr., flash,  $E_{100}$  and  $E_{100}$  viscosities, acidity, sulfonates, Conradson C, ash, NPA color, Sly, and Grozny and Butkov oxidizability, including the acid and residue detn. as a result of oxidation, and distn. test (at 2 mm. Hg) in a stream of  $CO_2$ . The spent oil was tested in the above manner except for its oxidizability. The engine tests were run on a 6-cylinder AMO-2 (Hercules type) motor of 60 h. p. and a single-cylinder motor 1-3 of 3 h. p., which were run for 60 hrs. It was found that acidity causes an increased amt. of Fe in the C deposit. An increased content of a fraction b. below  $225^\circ$  (2 mm.) causes an increase in the C deposit; this behavior depends also on the type of refining. An increase of the acidity after oxidation (by 1 of the 3 methods specified) shows an increased acidity in the spent oil in the crank case. The amt. of burned oil does not depend on the b. p. of the oil but evidently on the vaporization of fractions. The Conradson C test is not a criterion on the behavior of the oil in the engine. Residual oils form a hard C deposit. The oils must be properly acid treated and washed with alkali. The stability of oil may be tested by the Sly method. An oil should not give more than 0.3% residue and its acidity should not exceed 0.8 mg. KOH. The expl. procedure is described and the results of tests are tabulated and plotted. A. A. B.

Lubricating properties of greases from petroleum oils. F. H. Rhodes and H. D. Allen. *Ind. Eng. Chem.* 25, 1275-80 (1933). Tests of greases in an app. developed by A. W. Lewis and modeled after the Wilson-Barnard app. indicate that the soap in soda-base greases is an important factor in the formation of the lubricating film. The glycerol present helps to stabilize the structure of the grease, reduces the change in consistency on heating or working, increases the lubricating power, eliminates the increase in the coeff. of static friction on heating, and reduces the susceptibility to moisture. The best lubricating greases are those containing 2-3 times the quantity of glycerol equiv. to the soap present. The lubricating value of the grease decreases with either increase or decrease of this amt. of glycerol. D. F. Brown.

Use of two immiscible solvents for the manufacture of lubricating oils by the extraction process. Max. H. Miller. *Oil Gas J.* 32, No. 21, 11, 62; *Natl. Petroleum News* 25, No. 41, 26-8 (1933).—The 2 immiscible solvents pass countercurrently while the oil is fed in the center of the system. As it is sepd. into the paraffine and naphthene fractions the 2 phases flow countercurrently with their resp. solvents, stripping each other of the final traces of the undesired fraction. J. R. Strong.

Application of the solvent extraction method for improvement of lubricating-oil quality. John W. Poole and J. M. Wadsworth. *Oil Gas J.* 32, No. 23, 49, 50, 52 (1933).

J. R. Strong.  
Trolley-wire lubrication improved. J. V. Lamson. *Ele. Eng.* 52, 771-6 (1933).—"Lab. tests indicate that solid graphitic material for trolley-wire lubrication is vastly superior to the graphite-grease now commonly used." The general problem of trolley-wire lubrication is discussed briefly and the results of tests on both types of lubricants are indicated. W. H. Boynton.

Rationalization of the charcoal industry. I. Dorofeev-Silant'ev. *Lesokhm. Prom.* 1, No. 3-4, 14-19 (1932).—It is proposed to discontinue firing of wood-carbonizing kilns as soon as a temp. of  $280^\circ$  is reached. The exothermal reaction which sets in at this point is assumed to be sufficient to carbonize the wood. An addnl. firing is recommended after the completion of the exothermal reaction. Various changes in the construction details of the Schwartz kiln are recommended and its advantages are analyzed. Reply. A. A. Nimvitzki. *Ibid.* 19-21.—N. contradicts the assumption that the exothermal reaction takes place very gradually; i. e., that while the upper layers of wood are being carbonized under the

influence of the exothermal reaction, the lower layer is still wet and water is accumulating in that region. Therefore, the heat produced by the exothermal reaction is entirely inadequate for continuing the process without the introduction of external heat. A. A. B.

Creosote from tar obtained as residue in the rectification of "black" acetic acid in the Vilesov experimental extraction plant. A. L. Piryatinskii and L. F. Saenkov. *Lesokhm. Prom.* 1, No. 3-4, 21-3 (1932).—A dil. AcOH soln. (cf. Nasakin, *C. A.* 23, 3077) was steam distd. and the distillate contg. AcOH as well as resins and higher boiling fractions was investigated. The fractions b.  $110-260^\circ$  obtained from the residue by distn. (54% of the residue) had a sp. gr. of 1.07 and acidity of 14.76% (calcd. as AcOH). They were used in the sepn. of creosote. This distillate was redistd. into 2 fractions, the first fraction having an acidity of 17.81%, and a b. p. of  $98-180^\circ$  while the second fraction had a b. p. of  $180-240^\circ$ . The latter was treated with a 10% soln. of calcined soda for the removal of free acids and the oil obtained was treated with a 8-10% soln. of caustic soda (an excess is used). The phenolates sepd. from a small layer of oil were heated with open steam for the removal of substances which did not combine with the alkali. The cooled soln. of phenolates was acidified with a 30%  $H_2SO_4$  to a clear acid reaction and the floating oil (phenols) was sepd. from the  $H_2O$  layer contg. water-sol. phenols (which were sepd. by salting out and were added to the basic portion). The phenols were neutralized with a 5% calcined soda soln. and washed with water. The pure phenols were distd. into 2 fractions and a residue boiling above  $240^\circ$ . The yield of the fraction b.  $180-240^\circ$  amounted to 9.56% of the resins and produced a clear soln. when 1 cc. was mixed with 2.5 cc. of a 15% NaOH soln. which could be diluted to 50 cc. before the appearance of turbidity. The heavy fraction b.  $200-220^\circ$ , conforming with the requirements of the U. S. S. R. Pharm. and obtained in the distn. of the purified phenols, was treated with a 10% soln. of NaOH (with slight excess) and blown with steam till transparent and treated in the same manner as the low-boiling fraction. The liquid was then distd. into 4 fractions and the combined first 3 fractions b.  $98-220^\circ$  were treated with chromic acid mixt., left stand overnight and redistd. The second fraction b.  $200-220^\circ$ , which amounted to 3.86% of the resin, was an only substance with a high  $n$ , a slightly yellow color and a sp. gr. of 1.090, yielding 96.5% with a b. p. of  $200-200^\circ$  on redistn. by Engler-Ubbelohde. It passed all tests prescribed by the U. S. S. R. Pharm. except that for the presence of coal-tar phenols. A. A. B.

Crude turpentine obtained from stumps. A. L. Piryatinskii and L. A. Segeidin. *Lesokhm. Prom.* 2, No. 2, 47-9 (1933).—The crude turpentine is characterized by the presence of heavy ends (pine oil), composed mainly of terpene aces., which are used as flotation agents, solvents and disinfectants. It has the following characteristics: sp. gr. 0.8732, Br no 172,  $n_D^{20}$  1.4726, b. p.  $153-180^\circ$  (residue b.  $180^\circ$ , 19%), aces 9.61% (calcd. as  $C_{10}H_{18}O$ ), esters 0.44% (calcd. as  $C_{10}H_{17}OCOCH_3$ ). In a steam distn. in the lab., 16 fractions were sepd. The distillates can be classified into 2 groups. The first group is characterized by its lower sp. gr. (0.8617-0.8622), low aces. content and high content of terpene hydrocarbons. The 2nd group is a straw-yellow liquid of a higher sp. gr. (0.8932-0.9367) and has a high content of aces. (up to 40%) and a considerably higher  $n$ . The first 6 fractions constitute a high-grade turpentine with a high content of pinene fraction. The 7-11 fractions can be classified as a 2nd-grade turpentine which can be used as a solvent in the varnish industry. The intermediate (12th) fraction can be recycled together with a new charge, while the higher fractions (about 13.5%) can be used as the stock in the prepn. of high-grade pine oils. The residue (about 4.5%) is a viscous, heavy substance that may find application in the rubber industry. A. A. B.

Siberian larch, a new raw material for the chemical industry. L. V. Gordon. *Lesokhm. Prom.* 1, No. 3-4, 24-7 (1932).—The Siberian larch contains an av. of

3.4% fiber impregnated with gum and the fiber contains about 14% of gum by wt. The extn of gum is carried out with water in the usual manner resulting in a yellowish oil contg about 3% of gum. The unrefined gum is bleached and is suitable for the manuf of silk goods, matches and as a substitute for gum arabic, although it is not quite as sticky. The bark of the young larch contains 10-12% and more of tannins and larches of 150-250 years containing only 7-8% tannins, which, however, are of a much higher grade contg 70-80% of the dry substance in the ext. This makes it possible to use smaller quantities of tanning substance than when oak bark is used. About 40-42% of cellulose is produced from the dry substance with the sulfate method. Larch chips are used in this process and they are treated with a 25-30% alkali. The chips are treated with the smallest possible amt of alkali to obtain fiber, followed by the removal of the major part of the accompanying lignin, etc., by treatment with  $\text{Cl}_2$  or  $\text{Cl}$  water and the final bleaching is carried out with  $\text{Ca}(\text{OCl})_2$ . A. A. B.

Place of oil in the world of fuel (Cadmin) 21.  $\text{H}_2\text{SO}_4$  from heavy refinery sludge (Spangler) 18. Olive oils as lubricant (Lichim) 21. Testing lubricant (Brit pat 395,976) 19. Purifying gasoline vapors with  $\text{Cu}$  oxide (U. S. pat 1,920,659) 1. *peri* Monooxynaphthene (Brit pat 394,511) 10. Seal for floating deck of tanks for storage of petroleum oils (U. S. pat 1,930,953) 1. Aqueous dispersions such as those of oils, fats and fatty acids (U. S. pat 1,930,945) 13. Trepan barbourite for oil treatment (U. S. pat 1,930,572) 4.

**Treating petroleum with sulfuric anhydride** Wright W. Gary (one half to Charles O. Middleton) U. S. 1,929,480, Oct. 10. In order to remove S compounds, etc. a petroleum oil is contacted with  $\text{SO}_2$  maintained in a dry and viscous state the reaction product is separated and the remaining petroleum material is contacted with an agent such as  $\text{H}_2\text{SO}_4$  adapted to coagulate the remaining unreacted reaction product. (Cl. C. 1, 27, 299)

**Breaking petroleum emulsions** Abraham M. Holzman (to Industrial Patent, Ltd.) U. S. 1,931,112, Oct. 17. An emulsion such as a natural petroleum and water emulsion treated with chloroform (suitably in very small proportion) and the emulsion is then allowed to remain at rest to permit stratification of oil and water. App is described. "Chloroform" or the like also may be used.

**Purifying petroleum sulfonic acids** Kolchali S. Ramayya (to I. Somachorn, Son, Inc.) U. S. 1,930,488, Oct. 17. Impure alkali metal and  $\text{NH}_4$  salts of the monohydric sulfonic acids derived from the treatment of a petroleum oil with  $\text{H}_2\text{SO}_4$  are dissolved in a solvent containing water 75-75% together with  $\text{MeOH}$ ,  $\text{EtOH}$  or  $\text{PrOH}$ , and the resultant mixture is agitated with a petroleum hydrocarbon material such as gasoline boiling mainly below 300. The agitated materials are permitted to stratify producing a solvent layer and a hydrocarbon layer, the solvent layer is separately collected and the purified salts of the monohydric acids are recovered from the solvent layer.

**Distilling petroleum residues** George B. Conbrough (to The Tinnus Co.) Brit. 34,856, July 11. See 17,745,375 (Cl. 1, 27, 434C).

**Disposing of wastes from petroleum refineries, etc.** Marvin L. Chappell and Richard P. L. U. S. 1,929,675, Oct. 10. In disposing of waste product containing S compounds by combustion in a heated zone with air, the heated zone is maintained at temps above the decomp. temp. of  $\text{SO}_2$ , and the heated products of combustion are quickly cooled below a  $\text{SO}_2$  forming temp by introduction of water into the combustion products as they pass from the heated zone into a condit. App is described.

**Arrangement of apparatus for refining petroleum oils, etc., by use of solid reagents such as fuller's earth** Rudolph C. Osterstrom and Robert L. Tucker (to Pure Oil Co.) U. S. 1,930,597, Oct. 17.

**Treating cracked petroleum distillates for removing gum-forming and color-producing substances** Joseph B. Weaver U. S. 1,929,861, Oct. 10. A mixt. of the distillate with added finely divided acid-treated clay is passed in a generally upward direction through a vertical treating zone while agitated and heated sufficiently to vaporize the low boiling constituents present. The evolved vapors are fractionated and separately condensed and collected. The remainder of the mixt. is removed from adjacent the upper end of the treating tower and is subjected to redistill under temps higher than those prevailing in the treating zone to sep desired low-boiling products from the residual mixt. and material of higher bp. App and various details of operation are described.

**Oxidation of hydrocarbons** Grigory S. Petroff, Alexander J. Danilowitch and Abram U. Robinowitch (U. S. 554,110, Sept. 20, 1933. Higher naphtha hydrocarbons are oxidized to acids by treatment with an (preferably dried) at 95-125° in the presence of a catalyst comprising an oil sol. mixt. of free naphthenic acids with naphthenates of  $\text{Ca}$ ,  $\text{Ba}$  or  $\text{Mg}$ .

**Hydrocarbon oils** Wm. I. R. Bindley Brit. 394,506, June 20, 1933. Divided on 396,982 (C. A. 27, 4655). Hydrocarbon oils are produced by passing mixts. of  $\text{CO}$  and  $\text{H}_2$  at atm pressure and at 205-230° over catalyst consisting of oxides of  $\text{Co}$  and  $\text{Mn}$  with which may be mixed  $\text{Ca}$  is metal or oxide and  $\text{Ca}$  oxide. The powder granular catalysts are attached to supports by spraying or otherwise coating the support with a binder and sprinkling the catalyst onto it while it is still tacky.

**Cracking and coking oils** Universal Oil Products Co. Brit. 333,847, July 6, 1933. The residues from the reaction drum of a tube and reaction drum-cracking plant are immediately discharged through a line into a coil where they are heated rapidly to prevent deposition of coke and then introduced into coking chambers, preferably used alternately and maintained at reduced pressure relative to that maintained in the drum. Liquid residues or mixed vapors and liquids may be fed through the line. App is described.

**Oil cracking to produce gasoline** Arthur D. Smith and Norman H. Rinstead (to Jenkins Petroleum Process Co.) U. S. 1,929,955, Oct. 10. An oil such as crude petroleum is heated to distil off light constituents including gasoline present in the oil. Heavier ingredients are fractionally condensed and sep'd from the resulting gasoline vapors. The oil is then subjected to pressure cracking in liquid phase to produce additional gasoline and other oil vapors and the heavier portions of vapors thus produced are condensed in 2 stages and the condensate from the first stage is returned to the liquid phase cracking reaction while returning sep the condensate from the second stage. Residual oils are withdrawn from the cracking reaction and pressure on them is reduced while they are still heated to flash a portion into hot vapor. A portion of these hot vapors is passed in heat interchange with the hydrocarbon oils before they are subjected to the cracking reaction to heat the hydrocarbon oils and distil off light constituents. A portion of the unvaporized residual oils is passed in heat interchange with the heavier ingredients and condensate from the second stage to effect a substantial reevaporation and the resulting vapors are subjected to vapor phase cracking to produce gasoline vapors and heavier liquid condensates. App is described.

**Distilling and cracking oils** Standard Oil Co. Brit. 331,745, July 6, 1933. In distilling or cracking oils, e. g., in a tubular furnace from which the heated oils pass to 1 or other of a battery of reaction drums, the oil is fed to the drum through a continuous loop way in which a free passage of the oil is maintained throughout the whole loop and the oil flows in opposite directions to the selected drum. App is described.

**Cracking hydrocarbon oils** Jean D. Seguy (to Universal Oil Products Co.) U. S. 1,927,187, Sept. 19. The oil is passed in a restricted stream through a heating zone in which it is heated to a cracking temp under pressure and then is passed to a reaction chamber



maintained under cracking pressure and temp. conditions and in which the velocity of the oil is materially reduced; unvaporized oil is continuously removed from the reaction zone and is flash-distd. in a flashing zone by pressure reduction; resultant flashed vapors are removed from the flashing zone, and a portion of such vapors, prior to condensation, is passed to a vapor-phase-cracking zone maintained at cracking temp. and from such zone into the unvaporized oil undergoing distn. in the flashing zone to augment vaporization in such zone. The remaining portion of the flashed vapors from the flashing zone is condensed. App. is described. Cf. C. A. 27, 5180.

**Cracking hydrocarbon oils.** Jean Delattre-Seguy (to Universal Oil Products Co.). U. S. 1,929,795, Oct. 10. Oil is heated to a cracking temp. in a heating zone such as a pipe coil in a furnace and is then delivered to an enlarged reaction zone in which conversion takes place. A body of reflux condensate is maintained in a second enlarged zone and vapors from the first enlarged zone are passed in direct contact with material in the second enlarged zone and vapors and reflux condensate in the latter are heated to a higher temp. than that used in the first heating zone. Vapors from the second zone are subjected to reflux condensation and the reflux condensate sepd. from the vapors is passed to the second enlarged zone to supply the body of reflux condensate maintained in that zone. A suitable superatm. pressure is maintained on the oil in the heating zone and first enlarged zone while maintaining a higher superatm. pressure on the body of reflux condensate and vapors in the second enlarged zone. App. is described.

**Cracking hydrocarbon oils.** Joseph G. Alther (to Universal Oil Products Co.). U. S. 1,930,221, Oct. 10. Oil is heated under superatm. pressure to a cracking temp. in a heating zone such as a pipe coil and the heated oil is passed to a conversion zone. Vaporous products are sepd. from the heated oil and unvaporized oil is continuously withdrawn from the conversion zone at such a rate as to prevent substantial accumulation. The pressure on the withdrawn oil is reduced while it is in heated condition to release lighter fractions in the form of vapors which are sepd. and removed while the withdrawn oil is maintained in a substantial body. Solid and semi-solid materials are settled and supernatant liquid oil freed from these materials is sepd. and returned for retreatment to the oil undergoing cracking. An arrangement of app. is described. Cf. C. A. 27, 2797.

**Cracking hydrocarbon oil.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,930,231, Oct. 10. A body of oil is maintained under cracking conditions of temp. and pressure in an enlarged zone, vapors from which are passed to a dephlegmator in which insufficiently cracked fractions are condensed. Reflux condensate, free from addnl. oil, is passed through a heating zone where it is heated to a cracking temp. and is then delivered into the body of oil in the enlarged zone to which also charge oil is continuously admitted (a portion of the charging oil being discharged into the vapor space above the oil body and another portion being discharged into the liquid oil body below its surface). The process is carried out under superatm. pressure. App. is described. Cf. C. A. 27, 5900.

**Cracking hydrocarbon oils.** Wm. M. Stratford (to Texas Co.). U. S. 1,930,730, Oct. 17. Oil such as gas oil is subjected to cracking and vaporization in a cracking zone comprising a still under superatm. pressure forming evolved vapors of low-boiling and higher-boiling constituents. Products undergoing cracking and contg. constituents of the low-boiling character are withdrawn from the cracking still and passed to a stripping still, and without reducing the pressure in the stripping still there is introduced into it a fluid such as steam adapted to lower the partial pressure therein so that vapors are evolved comprising the low-boiling constituents mentioned. Evolved vapors from both the cracking and stripping stills are passed to a common fractionating zone and there fractionated under superatm. pressure.

1 Residue is withdrawn from the stripping still substantially free from low-boiling constituents and is passed to a second stripping still maintained under a substantially reduced pressure to vaporize constituents of higher b. p. adapted and used for recycling to the cracking zone for further cracking. An arrangement of app. is described.

**Combined cracking and destructive hydrogenation of hydrocarbon oils.** Frederick W. Sullivan, Jr. (to Standard Oil Co. of Ind.). U. S. 1,927,074, Sept. 19. Material such as gas oil or "reduced crude" oil is heated to about 425° in a closed conduit. A light hydrocarbon gas such as refinery gas is heated in an elec. arc by which it is decompd., activated and raised to a high temp., and the hot reaction products from the elec. arc are combined with the heated hydrocarbon material in the conduit so the temp. of such material is raised to about 500° and the reaction products of the arc treatment combine with the heated hydrocarbon material in the conduit. App. is described.

**Apparatus for cracking hydrocarbon oils.** Sigbert Seelig. Ger. 579,684, June 29, 1933. Addn. to 535,277 (C. A. 26, 1111).

**Cracking and preheating stills for hydrocarbon oils.** Willis F. Sims and Venus U. Cloer (to Panhandle Refining Co.). U. S. 1,930,372, Oct. 10. Various structural and operative details are described, of stills and furnace setting.

**Conversion of hydrocarbon oils.** Audley E. Harnsberger and Clyde L. Smith (to Gyro Process Co.). U. S. 1,927,829, Sept. 26. A hydrocarbon oil such as topped crude or gas oil is heated to a vaporizing temp. without substantial pyrolytic conversion (suitably in a pipe system) and the heated oil is then vaporized in a sepg. zone and vapors are withdrawn from the latter and are heated in an elongated confined stream to temps. not substantially in excess of active vapor-phase cracking temps. to vaporize liquid oil entrained in the vapors; the velocity of the dried vapors is increased and they are then heated to temps. above 540° to effect pyrolytic conversion and the temp. of the conversion products is then sharply reduced by admixt. with cool hydrocarbon oil. Various details of app. and operation are described.

**Conversion of hydrocarbon oil.** Claude W. Watson (to Texas Co.). U. S. 1,929,520, Oct. 10. Oil such as topped crude oil or the like is heated to a cracking temp. under superatm. pressure. Lighter products in vapor form are sepd. from unvaporized residue and the residue is expanded by reducing the pressure on it, to form addnl. vapors. The pressure on the vapors of the lighter products is further reduced (but to a pressure still in excess of that on the expanded residue) and the kinetic energy of the expanding vapors of the lighter products is utilized to entrain the addnl. vapors mentioned and to increase the pressure on them. The resulting mixed vapors are fractionated to obtain a product of the character desired. App. is described.

**Conversion of hydrocarbon oils.** Douglas P. Bailey (to The Texaco Development Corp.). Can. 335,818, Sept. 19, 1933. Higher-boiling hydrocarbon oils are converted into lower-boiling oils by heating a condensate oil to a high cracking temp. in a heating coil and passing the heated oil into a reaction chamber, where sepn. of vapors and liquid occurs. Oil at a lower temp. than that of the condensate oil is introduced into the reaction chamber to lower the temp. of reaction. Liquid is withdrawn from the reaction chamber at a rate adequate to prevent the accumulation of liquid and vapors are withdrawn from the reaction chamber and passed through a plurality of vapor digestion zones wherein the vapors are maintained at cracking temp. to effect further cracking. The vapors in the last digestion zones are scrubbed with condensate oil. Liquid from the last digestion zone is directed to the reaction chamber. The cracked vapors are passed to a fractionating zone and sepd. into a final light distillate and a reflux condensate. The reflux condensate is conducted to the heating coil. Cf. C. A. 27, 1156.

**Conversion of hydrocarbon oils.** Richard F. Trow (to

The Texaco Development Corp.) Can 335,819, Sept 19, 1933 Higher-boiling hydrocarbon oils are converted into lower-boiling oils by subjecting the cycle condensate formed in the process to cracking temp in transit through a heating coil and passing the heated oil into an enlarged reaction zone, wherein cracking temp under superatm pressure is maintained and where sepn of vapors from liquid occurs and the liquid is withdrawn from the reaction zone at a rate adequate to prevent the accumulation of liquid therein. The sep'd vapors are heated in a continued stream to a higher cracking temp than that to which the condensate oil is heated and the heated vapors are put into a second reaction zone, wherein cracking temp under superatm pressure is maintained and sep'n of vapors from liquid occurs. The heat of reaction in the second reaction zone is tempered by introducing fresh charging stock at a relatively low temp. Vapors from the second reaction zone are passed to a fractionating tower maintaining under superatm pressure and sep'd into a final light distillate and a reflux condensate. Liquid is withdrawn from the second reaction zone at a rate adequate to prevent the accumulation of liquid therein and the withdrawn liquid is expanded into a low pressure autogenous distn zone. Evolved vapors are condensed and the condensate directed into the pressure fractionating tower. Reflux condensate is conducted from the pressure fractionating tower to the heating coil as the sole charge thereto.

**Processing hydrocarbon oils** Gu Kaufman and Carl L. Jancia (to The Texaco Development Corp.) Can 335,993, Sept 26, 1933 Cracked motor fuel of high antiknock properties is produced by distilling phenetic crude oil, exp'd therein a lubricating oil fraction containing a substantial amt of high boiling org. acid and subjecting the fraction to vacuum distn in the presence of  $\text{NaOH}$ , thereby producing a heavy still residue composed of heavy hydrocarbon admixed with the Na salts of the high boiling org. acid. The still residue is treated with mineral acid in aqueous solution in sufficient quantity to liberate the org. acids. The mixture is allowed to settle, the gas oil formed during subsequent cracking, to increase the fluidity of the mixture and facilitate settling out of water and suspended solids. The mixture is permitted to settle to form an aqueous layer and an oil layer comprising a mixture of the heavy hydrocarbons and the org. acid. The layer of mixed oil and org. acid is drawn off and cracked under pressure of 250 lb per sq in. or higher and a temp. of over 750° F. The cracked products are fractionated to produce motor fuel. A portion of the relatively high boiling cracked products is returned as a recycle oil for distillation of the acid treated residue.

**Processing hydrocarbon oils** Helge C. Dieckhoff (to The Texaco Development Corp.) Can 335,994, Sept 26, 1933 Relatively high boiling hydrocarbon oil is converted into lower boiling oil of the kerosene type by heating to distn temp in a coil flowing through of oil and discharging the heated oil into a sep'n zone where the oil sep'n into vapor and liquid portions. The vapors are withdrawn and cracked in the vapor phase and the cracked product is discharged into an enlarged coking still. The liquid portion from the sep'n zone is withdrawn and independently cracked in the liquid phase and the product is directly discharged into an independent distn and fractionating zone. Cracked unvaporized residual product in the distn and fractionating zone are separately collected and separately withdrawn and discharged directly into the coking still wherein they are converted to coke by the heat of the vaporous cracked products passed thereto from the vapor phase cracking operation. Relatively cool fresh charging stock is charged into the independent distn and fractionating zone and brought into intimate contact with vaporous products to effect fractional condensation thereof. The resulting mixture of reflux condensate and fresh oil is collected in the distn and fractionating zone and the mixture is withdrawn and passed to the first coil for treatment. Cf. C. A. 27, 5520.

**Fractionating hydrocarbon oil vapors** Wm M. Strat-

ford (to Texas Co.) U S 1,927,652, Sept 19, 1933 Hydrocarbon oil vapors are introduced into a fractionating tower at an intermediate point of the tower, the upper portion of the tower is cooled to effect fractionation of vapors therein, and the resulting condensate is subjected to vaporization at a point within the tower below the point at which the vapors are introduced, an overhead vapor fraction and unvaporized portions of the condensate are separately withdrawn from the tower, and an intermediate cut is separately withdrawn by taking off vapors from a section of the tower intermediate the point at which vapors are introduced and the point at which the condensate mentioned is subjected to vaporization. App is described. Cf. C. A. 27, 1067.

**Condensing and rectifying hydrocarbon oil vapors** Clarence D. Gard (to Union Oil Co. of Calif.) U S 1,920,160, Oct 10, 1932 In a distn process without substantial decompn, heat supplied for vaporization is automatically regulated (in a described app) in accord with the velocity of the vapors flowing to the condensing stage.

**Vapor phase refining of hydrocarbon oils with sulfuric acid** Jacques C. Morrell (to Universal Oil Products Co.) U S 1,930,219, Oct 10, 1932 A refining soln is obtained from the sludge produced in the process, by sep'g the sludge into an oily layer and an aqueous layer containing a substantial portion of a spacing agent such as  $(\text{NH}_4)_2\text{SO}_4$  or  $\text{PhSO}_3\text{H}$  used in the refining, and adding fresh  $\text{H}_2\text{SO}_4$  to the aqueous layer.

**Desulfurizing hydrocarbon oil distillates** Harold C. Weber (to Universal Oil Products Co.) U S 1,930,216, Oct 10, 1932 Distillates such as lower boiling motor fuel fractions are subjected to the simultaneous action of substances such as  $\text{NaHCO}_3$  and  $\text{NaCl}$  capable of producing  $\text{OH}$  and  $\text{Cl}$  ions while in the presence of metallic Ag and metal such as Al electropos. to H.

**Catalytic polymerization of unstable constituents of hydrocarbon oils** Frank W. Hall and James H. Grahame (to Texas Co.) U S 1,930,974, Oct 17, 1932 Vapors from oil such as cracked naphthenes for stable gasoline production are contacted with adsorbent catalytic material such as fuller's earth to polymerize unstable constituent and form liquid polymers with resulting increase in the end point of the vapor. The resulting vapor is introduced to the middle portion of a dephlegmating tower to form a liquid fraction and a desirable dephlegmated vapor fraction and the polymer collected during the contacting of the vapor are introduced to a lower portion of the tower to combine with the polymer liquid fraction being formed and collecting in the lower portion of the tower. The polymers are subjected to a reboiling to form a desirable vapor fraction and a liquid fraction free from the previously admixed volatile fractions and this vapor fraction is passed through the upper portion of the tower along with the incoming contacted vapor to form a final vapor fraction which is removed and condensed (a portion of the distillate being returned as reflux to the tower). App is described.

**Motor fuels** N. A. de Buttsche Petroleum Mitt. Schrupp, Brit 395,192, July 13, 1933 See Fr 712,957 (C. A. 27, 512).

**Motor fuel and lubricant** Union Motors, Brit 394,800, July 6, 1933 Internal-combustion engine fuel oil, gas oil is used also as the lubricant. It is continuously withdrawn from the lubricating system to form in its impure state the whole or part of the fuel charge and is replaced by fresh oil so that the lubricant is maintained in better condition than with normal replacement.

**Gasoline from cracked hydrocarbon vapors** John W. Brown (to Gray Processes Corp.) U S 1,930,453, Oct 10, 1932 For obtaining a stable distillate from cracked hydrocarbon vapors, the vapors are fractionated in a first fractionating stage from which head products are withdrawn, the head product is clay-treated and the polymers formed in the clay treating stage are withdrawn. The clay treated vapors are fractionated in a second fractionating stage from which tail products are withdrawn and mixed with the polymers mentioned and

this mixt. is introduced at selected points in the first fractionating stage. An arrangement of app. is described.

**Treating gasoline.** Jacque C. Morrell (to Universal Oil Products Co.). U. S. 1,930,248, Oct. 10. Deterioration during storage of cracked gasoline having anti-knock properties is reduced by adding about 0.1% of camphor, camphorophorone or camphoric acid.

**Apparatus for purifying gasoline by fuller's earth or the like.** Henry Thomas (to Sun Oil Co.). U. S. 1,929,907, Oct. 10. Structural features.

**Tank for storing hydrocarbon motor fuels.** Audley E. Harmsberger (to Pure Oil Co.). U. S. 1,930,592, Oct. 17. A vent is provided connected with a device through which a liquid such as pyrogallic acid may be circulated in order to absorb O from the entering air. Various structural details are described.

**Apparatus for collecting volatile material evolved from light hydrocarbon oils in storage tanks, etc.** Edwin F. Nelson (to Universal Oil Products Co.). U. S. 1,930,211, Oct. 10. Various structural and operative details are described.

**Apparatus suitable for delivery of fire-extinguishing foam into oil tanks, etc.** Karl Schmidt (to Pyrene-Minimax Corp.). U. S. 1,929,390, Oct. 3. Structural and mech. features of a portable app.

**Mineral oils.** Standard Oil Co. Fr. 748,925, July 13, 1933. Naphthenic and other undesirable compds. in mineral oils are removed by extg. with a chlorinated ether, such as  $\text{ClCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{Cl}$ , or by a mixt. of a primary and a secondary solvent. The secondary solvents used include ketones of low b. p. such as acetone, ethyl methyl ketone, dipropyl ketone, etc., and the primary solvents used have higher b. p. and mol. wt., and include aromatic  $\text{NO}_2$  compds., xylidines, chlorobenzenes, chlorophenols, phenylacetates, halogenated ethers, heterocyclic compds. such as dioxane, piperidine, furfural, thionine, aldehydes and halogenated aliphatic hydrocarbons. The preferred proportions are 1-2 vols. of the primary solvent to 1 vol. of the secondary. Cl. C. A. 27, 2291.

**White mineral medicinal oil.** Seymour W. Ferris (to Atlantic Refining Co.). U. S. 1,928,832, Oct. 3. A viscous mineral oil distillate is extd. with  $\text{PhNO}_2$  to dissolve from the oil a substantial part of its components which react with  $\text{H}_2\text{SO}_4$ . The  $\text{PhNO}_2$  is sepd. from that part of the distillate which remains undissolved therein, and the undissolved portion is treated with a further quantity of  $\text{PhNO}_2$  to dissolve further material reactive with  $\text{H}_2\text{SO}_4$ . After sepn., the undissolved oil is treated with  $\text{H}_2\text{SO}_4$ , the acid sludge is sepd., and the oil is treated with an adsorbent material. A white oil is obtained having a viscosity of at least 500 sec. Saybolt Universal at  $38^\circ$  and a viscosity-gravity const. not higher than 0.803. App. is described.

**Cutting fluids from mineral oils.\*** Roy F. Nelson (to Texas Co.). U. S. 1,929,955, Oct. 10. S is mixed with an oil having a viscosity of at least 70 sec. Saybolt at  $38^\circ$  and the mixt. is heated to a reacting temp. (suitably about  $200^\circ$ ) under a superatm. pressure of about 75-150 lb. per sq. in.

**Refining oils and waxes.** The Burmah Oil Co. Ltd., Geo. R. Nixon and Ronald E. Downer. Brit. 304,414, June 29, 1933. Oil-wax mixts. contg. 5% or more of paraffin wax are refined, prior to sepn. by known processes into wax and oils, by treating the melted mixt. at up to  $180^\circ$  with anhyd. chlorides of Al, Fe, Zn, Sn, Sb and (or) Cr and sepg. the sludge, e. g., by settling, centrifuging and filtering through an absorbent, e. g., fuller's earth, bauxite. The sludge may be treated to recover the chloride and to make asphaltic bitumen. Among examples crude oil, topped to  $300^\circ$ , is agitated 10 min. at  $1.5^\circ$  first with 1% and twice with 2% of  $\text{AlCl}_3$ , the oil is sepd. from the settled sludge, filtered through fuller's earth and distd. under reduced pressure to obtain gas oil, a distillate from which wax scale and lubricating oil

are obtained by pressing and a residue from which viscous oil and crude petroleum are obtained by cold settling with naphtha.

**Separating more and less fusible portions of mineral oil-wax mixtures.** Albert G. Peterkin, Jr. and Lloyd B. Smith (to Atlantic Refining Co.). U. S. 1,929,933, Oct. 10. An alk. silicate soln. in heated condition is used for treating the material to keep the more fusible portions liquid and facilitate sepn. U. S. 1,929,934 relates to use of heated Na silicate soln. for sweating oil and low-melting wax from wax of higher m. p.

**Leaf-type apparatus suitable for filtering wax from chilled oils.** Francis X. Govers (to Indian Refining Co.). U. S. 1,931,000, Oct. 17.

**Purifying crude paraffin.** Martin Mueller-Cunradi and Robert Werner (to Standard-I. G. Co.). U. S. 1,930,468, Oct. 17. The crude material is treated, in liquid state, with a gas comprising  $\text{H}_2$  at a temp. of  $250-400^\circ$  and under a pressure of at least 20 atm. and in the presence of a mixed catalyst contg. at least 2 elements selected from Bi, V and Fe metal, and the temp. and duration of the treatment are so regulated that the paraffin undergoes no substantial cracking.

**Testing lubricating oils.** "Yacoco" S. A. F. Ger. 584,175, Sept. 15, 1933. A relatively small amt. of the oil is circulated between two relatively large surfaces which are in relative motion and sufficiently close together to cause the oil to form a film. The same amt. of fresh oil is then circulated through the app. under a different atm., e. g., an atm. of N, but under otherwise identical conditions. The chem. and phys. properties of each sample of oil are then detd. and compared.

**Dewaxing hydrocarbon lubricating oil.** Robert E. Manley (to Texas Co.). U. S. 1,929,831, Oct. 10. The oil is subjected to a sepg. treatment, while chilled and maintained at a low temp., by which pptn. of wax constituents is effected and while intimately mixed with an inert comminuted solid filter-aid material contg. not more than 5% by wt. of free water comprising a filter aid recovered from a previous operation of dewaxing lubricating oil (the filter-aid material having been chilled to a temp. approx. equal to the temp. of the chilled oil before being mixed with it) so that pptd. wax and filter-aid material are sepd. from the oil. The filter-aid material is subsequently sepd. from the wax for further use in the process. App. is described. Cf. C. A. 27, 2029.

**Dewaxing mineral lubricating oils.** Leo D. Jones (to Sharples Specialty Co.). U. S. 1,930,479, Oct. 17. The wax-contg. oil is treated with a solvent comprising dichloroethane and a petroleum fraction lighter than the oil to be dewaxed, selected and proportioned so that the solvent mixt. will have a sp. gr. greater than that of wax pptd. in the mixt. by cooling. The mixt. is then cooled to effect pptn. of wax and the pptd. wax is sepd., as by centrifuging. An app. is described. Cf. C. A. 27, 594.

**Cleansing used lubricating oils.** Charles E. Fox (to British Oil Cleaners Ltd.). U. S. 1,930,006, Oct. 10. Various details are described of the construction and operation of an elec. heated app. for containing the oil and water and for effecting sepn. of foreign particles of colloidal size from the used oil.

**Rotary device for testing the consistency of liquid materials such as lubricating oils.** Elton S. Stephens (to Consistometer Corp.). U. S. 1,930,629, Oct. 17. Structural and mech. features.

**Asphaltic emulsion.** Donald McK. Hepburn (to Amiesite Asphalt Co. of America). U. S. 1,931,072, Oct. 17. A bituminous compn., ready for application without heating to an unheated aggregate such as paving material, comprises a dispersion in soapy water of asphalt about 296 parts, a non-volatile heavy emulsified oil such as a fuel oil about 20 parts, a salt of a fatty acid having a greater affinity for oils than for water such as Al oleate 1-4 parts and a water-sol. soap about 9 parts.

## 23 CELLULOSE AND PAPER

CARTER, I. CURRAN

**Cellulose XLIX Method of reaction of cellulose**  
**2 Mechanism of the methylation of cellulose fibers**  
 (Formation of a half methylate of cellulose) K. Hess, C. Trogus, W. Lyvick and I. Carthe. *Ann.* 506, 280-85 (1933), cf. (A) 28, 111. Methylation (on soda cellulose II (I) with  $\text{Me}_2\text{SO}_4$  in  $\text{H}_2\text{O}$ ) are reported for 5, 10, 30, 70 and 100%  $\text{Me}_2\text{SO}_4$  at 18°, 35° and 49° over a period of 2 hrs. At 35° and 49° the reaction rapidly attains a steady rate (about 20 min.), while at 18° it gradually increases, finally reaching about 28% MeO in 7 hrs. 5%  $\text{Me}_2\text{SO}_4$  gives 19%, MeO 10%, 6 hrs., 27%, 30%, 37% after 6 hrs., 35%, after 7 hrs., 70%, 36%, after 4 hrs., 34%, after 6 hrs., 100%, 30% after 3 hr. The results indicate at least 2 stages of methylation the 1st of which is the formation of a cellulose deriv. contg. 1 MeO to 2 C<sub>6</sub> groups, this is followed by the formation of a tri Me deriv. Proof of this follows from an x-ray exam. of the reaction product at various stages and of the various fractions of the methylated product. Hydrolysis of the partially methylated fibers and the prepn. of a half-methylate (II) of cellulose I gives II, with 9.11% MeO, in about 10 min. with pure  $\text{Me}_2\text{SO}_4$ . II forms a double compd. with MeOH. Hydrolysis of II gives glucose, 2 methyl and 3 or 6 methylglucose. **L Formation of a uniform diethylglucose from partially ethylated cellulose** K. Hess. *Ibid.* 23, 8. Cellulose contg. 2.5 H<sub>2</sub>O groups (103.2%) in 300 g. AcCl treated with 34.5 g. dry HBr and allowed to stand 24 hrs. at 0° gives 40 g. of a bromoacetate diethylglucose in 12% yield, 257 (C<sub>12</sub>H<sub>21</sub>) the Br atom is probably on C<sub>1</sub> since it is easily removed by Ag<sub>2</sub>CO<sub>3</sub> the Ac group is probably on C<sub>4</sub> but the position of the H<sub>2</sub>O groups is unknown. **LI Esterification of cellulose with tosyl chloride in the presence of pyridine** K. Hess and N. L. Smith. *Ibid.* 507, 62-9. Cellulose and p.  $\text{Me}_2\text{SO}_4$  (I) in  $\text{C}_6\text{H}_5\text{N}$  at 70° for 13 days give a product contg. about 11% S, 12% Cl and 1% N which is a complicated mixture. A product contg. 12.42% S, 7.84% Cl and 0.8% N warmed with  $\text{C}_6\text{H}_5\text{N}$  in  $\text{C}_6\text{H}_5\text{N} \cdot \text{HCl}$  at 0° for 2 days gives a product with 11.6% Cl, 1.4% S and 3.6% N. Cu rayon, shaken with  $\text{I}_2$  in  $\text{C}_6\text{H}_5\text{N}$  4 days at 15° 20° gives a product contg. 2 tosyl groups and with only 0.1% Cl and 0.7% N. The tosyl group is difficultly removed and with partial decomposition of the cellulose. The action of  $\text{NH}_3$  or  $\text{H}_2\text{N} \cdot \text{NH}_2$  does not increase the N content above 2%. C. J. West.

**A new method for the determination of cellulose, based upon observations on the removal of lignin and other incrusting materials** Arthur C. Norman and Samuel H. Jenkins. *Biochem. J.* 27, 815-31 (1933). The cellulose is a polysaccharide material associated with pure cellulose must remain intact in any satisfactory method of cellulose determination. The method proposed for raw and wood cellulose involves first 2 treatment with neutral hypochlorite and then 3 or more with acid hypochlorite, each followed by boiling with Na sulfite. Benjamin Harrow.

**Some factors relating to the estimation of  $\alpha$  cellulose** Adoni Yogananda Swamy and Frank W. Bailey. *Cellulose Paper Trade J.* 99, 1331-8, 1576, 1578, 1611-18, 1651-4, 1692 (1933). *Paper Maker & Brit. Paper Trade J.* 85, 119-24 (1933). From a critical review of outstanding methods proposed for the determination of  $\alpha$  cellulose, it is concluded that the U. S. Bureau of Standards method is simple, rapid and accurate for practical application.  $\text{CO}_2$  present in the air has little or no effect on the results. Atm.  $\text{O}_2$  is absorbed by the alkali pulp mixture during mercerization, but the amt. of oxycellulose so produced, even after 24 hr., is too small to be detected by the  $\alpha$  cellulose determination. The use of an oven dried (104°) sample for the determination is wrong in principle because during the heating, degradation of the cellulose occurs. This occurs on a second mercerization. The effect of (1) mercerization, extruding the etherification (2) etherification, the

the drying of the  $\alpha$  cellulose by heat, (b) being the more important. Degradation occurring when a cellulose material is heated at about 100° is due mainly to the agency of atm.  $\text{O}_2$ , the non-cellulosic injurious chemical impurities present in pulp do not cause the entire degradation, as is generally believed by those engaged in testing the permanence of paper by artificial aging. Cellulose damaged during bleaching usually suffers a very pronounced degradation during heating. The order of the pulps tested arranged according to their ability to produce permanent papers would be, according to the artificial aging test in air: Kraft, nitrating alpha, paper alpha, sodium pulp, strong sulfite, Al sulfite, L. B. sulfite A. The tech. interest of the  $\alpha$ -cellulose detn. of the present investigation is pointed out. A. Papineau-Couture.

**State of cellulose compounds in solution I Rotatory power of cellulose acetate** J. Duclaux and Mme. A. Dobry. *Bull. Soc. chim.* 53, 724-5 (1933). The rotatory power of cellulose acetate in 13 different solvents was independent of the concn. in the range studied (0.5 to 10%), and there was no correlation with the properties of the solvent. The detn. of the rotatory dispersion based on the application of Lowry (C. 4, 15, 389) and Darnows (C. 1, 17, 970) indicated that the solvents caused deformation (condensation or internal isomerism) of the cellulose acetate mols. with a resulting equil. of 2 forms, d- and l-rotatory, of the acetate in proportions varying from one solvent to another. I. A. Sammonds.

**Cellulose fibers of a low degree of acetylation** A. Lerner. *Ibid.* 11, 667-77, 613-51, 723-9 (1933). An address discussing the prepn. and properties of cellulose monoacetate fibers. *Cell.* 525 (1934), (A) 25, 4136, *Cell.* 525 (1934), (A) 25, 5, 01, *U. S.* 1,861,200, (A) 26, 910. The mechanism of their behavior toward the various classes of dyes, their advantages and applications. A. Papineau-Couture.

**Weakly acetylated fiber celluloses** A. Lerner. *Ingénieur chim.* 46, 67-81 (1933). The prepn. and properties of weakly acetylated fiber celluloses, then dyeing properties together with those of other fiber celluloses and their applications in dyestuffs. Photomicrographs of dyed sections and acetylation curves are presented. Twenty-two references. K. K.

**Dyeing cellulose materials with reference to the structure of cellulose** R. I. Rose. *Ind. Eng. Chem.* 25, 1408-15 (1933), cf. (A) 26, 2509. Since different cellulose materials as well as derivatives react differently toward the same dyestuff and since much treatment of a given material alters its dye index, probably correlation relevant to the structure of cellulose can be found. I. A. Sammonds.

**The structure of cellulose gel V The structure of natural cellulose fiber revealed by x-ray analysis** Katamitsu Atsuki and Masanori Ishiwara. *J. Soc. Chem. Ind. Japan* 36, Suppl. banding, 21 (1933), cf. (A) 27, 1401. X-ray analyses of cotton and hemp fibers were made and compared with the structure of artificial silk and other cellulose gels. Experimental results are reported. **VI The structure of viscose silk and Cellophane analyzed by x-ray** *Ibid.* 521-4. The structure of cellulose gels in the form of viscose silk and Cellophane, regenerated from viscose, was determined by x-ray analysis. X-ray patterns are reproduced. Karl Kummermeyer.

**The properties of oxycellulose and the methods for its determination** R. Haller and Fritz Lorenz. *Bull. Federation intern. assoc. chim. textile couleur* 1, 16 (1933). A review of the literature. It is concluded that none of the published methods of identifying oxycellulose is so far this compound. Oxycellulose is a mixt. of compounds whose composition depends on the history of the sample and consequently it cannot be identified by a general method. S. Leiber.

**Holocellulose, total carbohydrate fraction of extractive free maple wood** Geo. J. Ritter and F. J. Kurth.

*Ind. Eng. Chem.* 25, 1250-3 (1933).—A new rapid method for isolating the total carbohydrate portion of extractive-free wood is described. The name "holocellulose" is proposed for this material replacing "Skallettsubstanzen" coined by Schmidt, Tang and Jandabeur, *C. A.* 26, 1772.

F. A. Simmonds  
**Limits of fractionation of nitrocelluloses.** J. Duclaux and J. Barbieri. *Bull. soc. chim.* 55, 584-5 (1933).—The viscosities of 4 fractions obtained by fractional pptn. of a nitrocellulose increased to a limiting value corresponding to a definite compd. The chem. compn. of the last fraction was the same as that of the initial compd. and the soly. was not appreciably modified. F. A. S.

**Lignin. X. Identity and structure of spruce lignins prepared by different methods.** Fritz Brauns and Harold Hibbert. *J. Am. Chem. Soc.* 55, 4720-7 (1933); cf. *C. A.* 27, 2803.—Lignin has been isolated from spruce meal by the action of glycol and HCl, the use of MeOH and HCl, extn. with PhOH and HCl, Willstätter's method and Freudenberg's method. The lignin isolated in each case was subjected to careful purification, and well-characterized derivs. of each type were prepd. by methylation and acylation, resp. Each lignin type yields a well-characterized lignin-phenol condensation product, the analysis of which shows that they are derived from a common lignin building unit. This building unit, representing the native lignin present in spruce wood, has the empirical formula  $C_{10}H_{10}O_6$  or  $C_{10}H_{10}O_6(OH)_2(OMe)_2$ . Of the 5 free HO groups at least 3 are aliphatic in character, while 1 is of an acidic type, either phenolic or enolic; the 5th HO group differs markedly from the remaining 4 and is characterized by its reactivity toward alkylating reagents such as HCl and alcs., phenols, etc. The phenol condensation products from Willstätter and Freudenberg lignin are shown to possess the structure  $C_{10}H_{10}O_6(OH)_2(OMe)_2(OPh)(C_6H_4OH)_2$ . C. J. W.

**Formaldehyde-yielding complex in the lignin molecule.** Pulin Behari Sarkar. *Current Sci.* 2, 93 (1933).—Raw jute freed from fatty material when distd. with 12% HCl yields furfural (I) and HCHO (II). Jute after complete removal of lignin by moist  $ClO_2$  gives I but not II. Lignin obtained by 72%  $H_2SO_4$  or Willstätter's method gives II but not I. Raw bamboo similarly treated gives II but not delignified bamboo. Rachel Brown

**Investigations on viscose by G. Kita and co-workers.** XLVII. Quantitative investigation of the time-temperature relationship of the aging of alkali cellulose. S. Iwasaki and T. Sakuno. *J. Soc. Chem. Ind., Japan* 36, suppl. binding 507-11 (1933); cf. *C. A.* 27, 1747.—Two types of fibers were subjected to aging expts. varying from 1 hrs. to 216 hrs. and from 13° to 25°. After aging the regenerated cellulose was changed to cellulose nitrate, and the viscosities were detd. on the acetone solns. The aging effect upon viscosity was evaluated in terms of  $K = \log \eta / C$ , where  $\eta$  is the relative viscosity and  $C$  the concn. of the solu. The exptl. data resulted in families of straight lines when  $K$  is plotted against  $\log Z$ , where  $Z$  is the time of aging. Further correlation gave an expression for the relative viscosity  $H$ , when  $C = 1$ ;  $H = K_1 K_2 Z^\theta$ ;  $K_1$  and  $K_2$  are consts. characteristic of one or a no. of cellulose types resp.,  $\theta$  is the aging temp. and  $n$  the slope of the family of curves in the  $K - \log Z$  plot. Karl Kammermeier

**The cooking process. IV. Cooking wood with sodium thiosulfate.** S. I. Aronovsky and Ross A. Gortner. *Ind. Eng. Chem.* 25, 1200-5 (1933); cf. *C. A.* 27, 3072.—A comparison of the pulping effects of  $Na_2S_2O_3$  and water on aspen sawdust showed the  $Na_2S_2O_3$  removed more lignin and  $\alpha$ -cellulose and less pentosans and Cross and Bevan cellulose than the water alone. F. A. Simmonds

**Alkaline process for obtaining high yields of pulp from aspen wood.** Roy L. Davis. *Paper Trade J.* 97, No. 8, 44 (1933).—A process of soda cooking, consisting of alkali digestion with low percentage and concn. of alkali followed by a 1st-stage chlorination, an alk. wash, and a final hypochlorite bleach, gave favorable results. Yields of about 50% bleached pulp based on the wood may be obtained where a rod mill is available for intermediate

refining, or of 53-54% where a rod mill is not available; the bleach consumed by these 2 types of cooks is 30 and 20%, resp. This compares with a 42-45% yield of bleached pulp and a bleachability of 8-10% by the com. soda process. Black liquor may be used to make up the cooking liquor vol. without any appreciable ill effect on the pulp. The results obtained by the use of typical dil. kraft liquor, consisting of 2 parts NaOH to 1 part  $Na_2S$ , were no better than those obtained by the use of dil. NaOH. Two-stage bleaching, with Cl in the 1st stage followed by an alk. wash and completion of bleaching with hypochlorite, is beneficial mainly in saving about 33% of the total Cl consumption. Yields as high as the above cannot be obtained by the use of concd. liquor and shorter cooking time. The chem. tests on the pulps obtained by the proposed process are as good as those on com. pulps, the bursting strength is 50-100% higher, and the tearing strength also is higher. The proposed process is much more efficient in preserving the cellulosic portion of the pulp than com. pulping procedure. The opacity of the unbeaten pulp is about the same as that of com. pulps; when beaten, the com. pulps, which do not hydrate readily, have a greater tendency to retain their unbeaten opacity. A. Papineau-Couture

**The relation between sheet strength and sizing of unbleached sulfite pulp.** H. Ellern-Bichmann. *Papier-Fabr.* 31, Tech.-wiss.-Teil 197-201, 209-13, 222-6 (1933).—Rosin size effects a partial coverage of the fibers with relatively rough particles. In unbeaten pulps the natural adhesion of the fibers is small, and the rosin reinforces it. If the natural adhesion is large, as in highly beaten stuffs, the rosin decreases it by interference with interfiber bonding. This appears to explain the results of numerous expts. An optimum sheet strength is developed with 1-1.5% rosin and 1 3/4% alum, depending on the degree of beating. Larger amts. cause a rapid decrease of strength. The deleterious effects of alum, of which the fiber may absorb as much as 6%, can be largely avoided if the rosin is well beaten into the fiber. The loss of strength due to alum can be more than compensated by the use of 3-5% glue size; hence the effect of alum must be on the interfiber, not on the intrafiber, bonds. Pine oil, contrary to experience in the textile industry (cf. Fermazin, *C. A.* 25, 5983), has no strengthening effect on paper. Thorium and cerium salts give as good sizing as alum, and being nonamphoteric, cannot impart acidity to the sheet. Heating sized sheets to 150° while wet, but not under tension, has no serious effect on the sizing; improperly sized sheets are improved by high temp., but properly treated sheets develop the full sizing effect at 70°. Because of the harmful effect of alum, hard water should be neutralized with acid under careful pH control, and only enough alum added properly to set the size. The relative amt. of glue size retained by fibers under standard conditions is set up as a measure of the adhesive power of the fibers. It is independent of the degree of fibrillation and fiber swelling, actually decreasing somewhat at high beating degree. This is contradictory to the theory that adsorption by fibers is a measure of fibrillation and hydration. R. H. Doughty

**The influence of moisture and temperature on the strength and elasticity of paper.** A. Basberg. *Papier-J.* 21, 103-5, 114-17, 123-6, 130-9 (1933).—Theories of paper strength are discussed. The strength of paper reaches the max. at 50° and decreases with further heating. At a const. temp. of 20° the max. is attained at 1-2% moisture. At const. temp., elasticity is practically independent of the moisture of the paper. When a load is applied in the Schopper tester, the strip shows permanent elongation or "slip" before rupturing. This "slip" does not increase with time. Paper heated for some time at 100° will not recover its original moisture content. The higher the heating temp. the less moisture is reabsorbed. This permanent loss of moisture is accompanied by a permanent loss of strength. Clinton L. Brooke

**Clay-casein slips for paper coating. Causes and prevention of foaming.** E. O. Whittier, S. P. Gould and S. A.

Hall. *Ind. Eng. Chem.* 25, 1213 16(1933); cf. *C. A.* 27, 4392.- The theory is advanced that the foaming tendency of a casein is dependent upon the degree of aggregation of the casein mols. Pptn. of the curd at or above 34° with slow agitation and immediate washing yielded a casein of low foaming index. Surface-tension depressants added during pptn. of the curd were effective in preventing foaming. Likewise, the addn. of a casein of low foaming index to one of high index prevented foaming. W. A. Moore

Siberian larch (Gordon) 22. Printing on articles of regenerated cellulose (U. S. pat. 1,929,394) 26

Waterproofing thin films of regenerated cellulose. Wolf & Co., Komm.-Ges. auf Aktien, Emil Czapek and Richard Weingand. *Ger.* 683,117, Aug. 29, 1933. The films are washed in the usual way and the water left in the films is then displaced by a water-sol. cellulose ester solvent, after which the films are coated in known manner with a cellulose ester lacquer.

Halogen-containing cellulose ethers. Henry Dreyfus. U. S. 1,930,471, Oct. 17. An ether such as a bromo-ethyl cellulose ether is produced by treating cellulose, in the presence of a base such as NaOH in an aprot. and concn. reactive with the cellulose, with a halogen-contg. etherifying agent such as ethylene chlorobromide or the like. U. S. 1,930,472 relates to the production of halogen hydroxy alkyl ethers of cellulose such as cellulose chlorohydroxy propyl ether by treating cellulose, in the substantial absence of alkali, with an etherifying agent contg. in addn. to the etherifying radical a halogen atom of lower reactivity than the etherifying radical, such as epichlorohydrin.

Esterifying cellulose. Robert Haller and Andreas Rupert (to Soc. pour l'ind. chim. à Bâle). U. S. 1,930,895, Oct. 17. For esterifying cellulose while maintaining its structure, material such as cotton or "viscose silk" is treated with an aliphatic acid anhydride such as  $\text{Ac}_2\text{O}$  in the presence of a K salt of a weak acid such as  $\text{KOAc}$  in the absence of an acid catalyst.

Cellulose ester composition suitable for films or sheets, etc. Hans T. Clarke and Charles F. Waring (to Eastman Kodak Co.). U. S. 1,930,142, Oct. 10. A cellulose ester such as cellulose acetate is used with a plasticizer comprising phenyl- or *o*-cresyl-*p*-chlorobenzoate or phenyl 3,4-dichlorobenzenesulfonate.

Cellulose ester products. I. G. Farbenind. A.-G. (Delft Dells and Albert Brucke, inventors). *Ger.* 584,179, Sept. 26, 1933. An azole compd., capable of coupling with a diazo compd., is added to a cellulose ester soln. from which artificial fibers or films are then made in known manner. Fibers or films which can be dyed by treatment with a diazo compd. are obtained. Suitable enolic compds. are  $\beta$ -naphthol, 2,3-hydroxynaphthol anilide and 1-phenyl-3-methyl-5-pyrazolone.

Cellulose derivatives. Henry Dreyfus. *Brit.* 394,722, July 6, 1933.

Cellulose derivatives having strong affinity for acid dyes. Robert Haller and Alphonse Heckendorn (to Soc. pour l'ind. chim. à Bâle). U. S. 1,929,868, Oct. 10. By treating cellulose with alkali and  $\text{CS}_2$ , then (preferably in the presence of an excess of the  $\text{CS}_2$  as a reaction medium) with phosgene, thiophosgene, S chloride, chloro-carbonic esters,  $\text{AcCl}$  or the like, and then effecting further conversion of the product with an aliphatic diamine such as piperazine cellulose derivs. are obtained which retain the original fibrous structure of the cellulose, e. g., cotton, but contain S and N and have a strong affinity for acid and direct dyes.

Processing cellulose derivatives. Camille Dreyfus and Herbert Platt (to Camille Dreyfus). *Can.* 335,671, Sept. 12, 1933. Yarns, filaments, bristles or fabric contg. org. esters of cellulose are stiffened by the action of  $\text{H}_2\text{SO}_4$  of a strength between 40 and 80% for 5-30 sec. After treatment the  $\text{H}_2\text{SO}_4$  is removed by washing with water and treatment with weak alk. soln. such as weak solns.

of NaOH or  $\text{NH}_4\text{OH}$ . If the org. ester material is partially sapond. the action of the strong  $\text{H}_2\text{SO}_4$  is not as great, so that the stiffness imparted is not as great. The stiffness may be controlled by partial sapon. of the material before the treatment with  $\text{H}_2\text{SO}_4$ .

Compositions containing cellulose derivatives. I. G. Farbenind. A.-G. (Hans Persiel, inventor). *Ger.* 584,166, Sept. 15, 1933. See U. S. 1,885,475 (*C. A.* 27, 1169).

Partially acetylated cellulose. Cyril J. Staud and Russell H. Van Dyke (to Kodak Ltd.). *Brit.* 394,359, June 23, 1933. Natural cellulose in the form of paper, threads, etc., is partially acetylated in a bath comprising an acetylating agent and a non-solvent for cellulose triacetate. The amt. of acetylating agent used, may be insufficient for the production of triacetates, or a normal amt. may be present, in which case the time, temp. and (or) strength of soln. are insufficient for complete acetylation.  $\text{CCl}_4$ ,  $\text{C}_6\text{H}_6$  and toluene are suitable non-solvents. The products have high elec. resistance and may be used in the production of insulated wires or as dielectrics in condensers and transformers.

Acetone-soluble cellulose acetate. Thomas F. Murray, Jr., and Harry LaB. Gray (to Eastman Kodak Co.). U. S. 1,930,145, Oct. 10. Cellulose such as cotton linters is pre-treated in a concd. org. acid such as glacial  $\text{HIOAc}$  in the presence of an acetylation catalyst such as  $\text{H}_2\text{SO}_4$  and  $\text{H}_3\text{PO}_4$ , and acetylation is effected by adding  $\text{Ac}_2\text{O}$  and at least 25 cc. of an aldehyde such as acetaldehyde per 100 g. of cellulose employed, which serves to produce an acetone-sol. product. Cf. *C. A.* 27, 4395.

Decolorizing dyed cellulose acetate scrap. Marvin J. Reid (to Eastman Kodak Co.). U. S. 1,930,133, Oct. 10. Dyed sheet scrap material is dissolved in acetone, the soln. thus formed is passed into an excess of water, and the resulting cellulose acetate ppt. is treated while in a relatively open and porous condition with an aq. Cl-contg. bleaching agent.

Use of propylene chloride and ethyl lactate, etc., as solvents with cellulose acetate. Henry B. Smith (to Eastman Kodak Co.). U. S. 1,930,134, Oct. 10.

Plasticizers for esters such as cellulose acetate. Henry B. Smith and Stewart J. Carroll (to Eastman Kodak Co.). U. S. 1,930,135, Oct. 10. Butyl-*o*-methoxybenzoate, ethyl *p*-methoxybenzoate or propyl *p*-hydroxybenzoate are used as plasticizers.

Use of furfural diacetate and *p*-nitrobenzyl acetate as plasticizers for esters such as cellulose acetate. Henry B. Smith (to Eastman Kodak Co.). U. S. 1,930,136, Oct. 10.

Sugars. Holzhydryl A.-G. *Fr.* 729,295, July 21, 1933. Vegetable materials having a high content of pentosans are transformed to sugars by treating them first with hot moderately dil. acids, e. g., 12-30%, and at temps. near the b. p. of the aq. solns. The greater part of the pentosans are thereby converted to a sol. form, and the hexosans contained in the residues are saccharified in known manner. The reaction may be carried out in a battery of reaction vessels so that the soln. of pentoses becomes more concd. in each. The hexoses and pentoses are polymerized by treatment with a concd. acid soln. The  $\text{AcOH}$  formed in the digestion of the pentoses and hexoses is used in the decompn. of more cellulose.

Films. J. P. Bemberg A.-G. *Brit.* 395,251, July 13, 1933. Films obtained by extruding cellulose solns. into a coagulating bath are brought together before they are completely coagulated and subjected jointly to further treatments. The incompletely coagulated films may be brought also into contact with a finally formed flat structure, e. g., of a woven, knitted or braided fabric, metal, wood, paper, etc. App. is described.

Films, etc. Karl Lorch, Jr., and Erwin Farr. *Brit.* 394,714, July 3, 1933. Transparent films, sheets, artificial glass, etc., are obtained by spreading viscose in a thin layer on a continuously advancing support, completely drying the film produced and then washing with boiling  $\text{H}_2\text{O}$ . The use of pptn., hardening and other treatment baths having a corrosive action on the app. used is thus



avoided. The products may be provided with a metallic or textile fabric reinforcement.

**Treatment of films and sheets.** I. G. Farhenind. A.-G. Brit. 395,243, July 13, 1933. Sheets or films of highly polymeric colloids, particularly cellulose derivs. and albuminous substances, are subjected to extn. with an indifferent non-aq. liquid that has only a feeble swelling action and contains no softening agent for the colloid until the solvent and any softening agent retained by the sheet after manuf. are (almost) completely removed. Among examples (1) a film made from a soln. contg. nitrocellulose, camphor,  $\text{Et}_2\text{O}$  and alc. is extd. with  $\text{Et}_2\text{O}$  and (2) a gelatin film is extd. with  $\text{MeOH}$ .

**Plastic sheeting, etc.** Du Pont Viscoid Co. Brit. 393,957, June 12, 1933. Sheets of cellulose esters and others are obtained from compns. contg. the cellulose compd. in relatively high concns. with a solvent by heating and extruding under pressure through a sheet-forming orifice, cooling the sheet and applying tension thereto as it emerges from the orifice. The extrusion temp. is preferably at least  $45^\circ$  and that of the hardening gas, e. g., air, or liquid, e. g., an aq. soln. of  $\text{EtOH}$ ,  $\text{MeOH}$ , glycerol, sucrose, dextrose, chlorides, sulfates,  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ , preferably  $0-40^\circ$ . In an example pyroxylin is mixed with camphor,  $\text{EtOH}$  and monomethyl ether of ethylene glycol and, after filtering, heated and forced into aq. glycerol, the extruded sheet being subjected to tension and passed through a further bath and then subjected to warm circulating air for a few days. Smooth sheets for making laminated glass or, by working at higher speeds, rougher sheets for phonographs, may be obtained. App. is described.

**Apparatus for coating sheets, films or webs such as those of regenerated cellulose.** Waldemar Schwalbe and Otto Herrmann (to DuPont Cellophane Co.). U. S. 1,930,666, Oct. 17. Structural and mech. details.

**Hollow filaments, etc., of cellulose or its derivatives.** Lonza Elektrizitätswerke und chem. Fabriken A.-G. Ger. 583,272, Aug. 31, 1933. Hollow filaments and other tubular articles of cellulose or its derivs. are perforated at a no. of places, in order to facilitate dyeing and other liquid treatments.

**Artificial threads from viscose.** Thomas F. Banigan (to DuPont Rayon Co.). U. S. 1,931,245, Oct. 17. The threads are bleached, on Al carriers, by use of a hypochlorite bleaching soln. contg. a sufficient amt. of Na bicarbonate to inhibit the corrosion of the carriers by the hypochlorite.

**Artificial threads from viscose.** Harold H. Parker (to DuPont Rayon Co.). U. S. 1,931,266, Oct. 17. In treating viscose threads on Al carriers, with a desulfurizing soln. such as Na sulfide, sufficient Na silicate is added to prevent corrosion of the Al (the total alkali of the soln. being sufficient to prevent the pptn. of silica).

**Artificial filaments from viscose.** Wm. Harrison. U. S. 1,930,803, Oct. 17. The viscose is coagulated in the form of filaments in acids of a hydron concn. less than that of 7%  $\text{H}_2\text{SO}_4$  and after the viscose has entered "a evanescent active plastic state" the filaments are passed into a bath of water to which have been added substances such as  $\text{Na}_2\text{SO}_4$  or glucose which permit the swelling of the formed filaments by the action of the water without effecting their soln. The filaments are treated before complete decompn. of the viscose. An arrangement of app. is described.

**Artificial thread by the "bucket process."** Paul E. Harrison and Wm. V. Sternberger (to Du Pont Rayon Co.). U. S. 1,930,510, Oct. 17. Thread such as that formed from viscose is wound in a coverless bucket rotated at such a speed that the peripheral speed of the winding-on surface at the beginning of the winding operation is in excess of 9100 ft. per min., in order to facilitate the process.

**Artificial threads, films, etc.** Leon Lilienfeld. Brit. 393,941, June 14, 1933. In producing artificial threads, coatings, sizings, dressings, etc., from compds. obtained by reacting cellulose in either order or simultaneously

with a xanthating agent and a reagent such as an etherifying agent which replaces 1 or more H atoms of the OH groups of the cellulose mol. by an org. group or radical 1 or more substances that lead to the production of materials of a semi-lustrous or dull appearance or of materials having hollow spaces dispersed through them are incorporated during the course of manuf. Such substances are  $\text{BaSO}_4$ , Ti salts, animal, vegetable or mineral oils, fats, soaps, aromatic hydrocarbons or derivs. thereof, org. bases, e. g.,  $\text{PhNH}_2$ , or other natural or synthetic substance known to produce delustering of viscose rayon, a gas or substance that evolves a gas in the coagulating step or very finely divided liquid or solid which is afterward removed by evapn. under such conditions as not to damage the material or by extn. with a solvent.

**Filaments, films, etc.** Henry Dreyfus. Brit. 394,015, June 19, 1933. Threads, etc., are produced by dry or wet spinning processes from solns. contg. cellulose esters or ethers, e. g., cellulose acetate of 52-62.5% Ac content, and methylene ethylene ether (I), which may be the sole solvent or present in mixt. with other solvents and (or) diluents. The solns. may contain dyes, pigments, substances reducing inflammability, etc. In a modification I is used to diminish the tendency of fabrics to slip, split or ladder, to improve the pliability, extension or knotting properties of filaments or threads and to assist in the absorption of various liquid and solid materials for dyeing, printing, discharging, loading, re-lustering and delustering purposes. I may be used in making up sizes for textiles. Among examples (1) cellulose acetate fabric is printed with a paste contg. dye or pigment, diethylene glycol,  $\text{H}_2\text{O}$ , I and gum arabic and (2) an  $\text{Me}_2\text{CO}$  soln. of cellulose acetate is spun into a soln. of I. In 394,016, June 19, 1933, divided on 394,015, the filaments, etc., are treated with media contg. I and subjected to stretching operations.

**Cellulose acetate yarns.** Camille Dreyfus and Wm. Whitehead (to Celanese Corp. of America). U. S. 1,930,230, Oct. 10. A soln. of an org. cellulose ester such as cellulose acetate in a solvent such as acetone together with 5% or less of alc. is used for forming yarns or films. The alc. serves to produce a product resistant to delustering. Cf. C. A. 27, 4398.

**Rayon.** Rene Picard (to Du Pont Rayon Co.). U. S. 1,931,239, Oct. 17. For producing an artificial thread having a luster similar to mother-of-pearl, a viscose soln. having a cellulose content of over 7.5% is prepd. from cellulose having an original high  $\alpha$ -cellulose content, the viscose soln. being ripened for a comparatively short period and spun into a bath contg. 100-150 g.  $\text{H}_2\text{SO}_4$  per l. together with at least twice as much sulfate such as  $\text{Na}_2\text{SO}_4$  and  $\text{ZnSO}_4$ .

**Rayon.** British Bemberg Ltd. Brit. 394,217, June 22, 1933. In the wet treatment of rayon the filaments are led round a continuous cylindrical surface and advanced in a helical path and are treated with liquid which is also advanced on the cylinder's surface in a helical path. App. is described.

**Rayon.** I. G. Farhenind. Brit. 395,216, July 13, 1933. In spinning rayon fluctuations of pressure are avoided by the insertion in the discharge pipe of a length of rubber tubing having a bore less than the thickness of the wall. Undue distension of the tube may be prevented by an outer tube or spiral.

**Rayon, etc.** Leon Lilienfeld. Brit. 393,932, June 12, 1933. The processes described in Brit. 335,906 (C. A. 25, 1995), 335,993 (C. A. 25, 1994), 341,843 (C. A. 25, 4126), 341,930 (C. A. 25, 4402), 357,527 (C. A. 26, 6137), 357,540 (C. A. 26, 6137) and 375,334 (C. A. 27, 4080) are modified by using as the coagulating bath a liquid consisting of or contg. a large proportion of an ester of a polybasic inorg. acid and an aliphatic or aromatic monohydric or polyhydric alc., or a sulfonic acid of an aromatic or aliphatic hydrocarbon, or an aromatic sulfonic acid contg. N, or a carboxy organo-mineral acid, or strong  $\text{H}_2\text{SO}_4$ , contg.  $\text{CH}_3\text{O}$  or pyridine, or  $\text{H}_2\text{SO}_4$  of less than 35% contg., and preferably satd. with,  $\text{NH}_4\text{HSO}_4$ . Examples of these baths are  $\text{MeHSO}_4$ ,  $\text{EtHSO}_4$ , mixts.

of MeOH or EtOH with concd.  $H_2SO_4$ , glycerophosphoric acid, glycerolsulfuric acid, a mixt. of acetaldehyde-sulfonic acid and  $H_2SO_4$ , benzenesulfonic acid, sulfonodiacetic acid, sulfoacetic acid, Me or Et sulfonic acid, methionie acid, a sulfonic acid of mineral oil, diphenylaminodisulfonic acid, etc. Mineral acids, inorg. salts, aldehydes, PhNH<sub>2</sub>, pyridine, glycerol, glucose and alcs. may be added to the baths.

**Rayon, etc.** Henry Dreyfus. Fr. 750,640, Aug. 14, 1933. The properties of filaments, threads, etc., made of cellulose esters or ethers, are improved by submitting them, in the form of a chain or sheet, to a drawing operation applied to the entire sheet. Fr. 750,641. A compd. of B is incorporated in cellulose acetate or other org. ester of cellulose used for making filaments, films, etc. The B compd. may be incorporated in the spinning soln. or in the finished product. An org. borate may be used which is afterward decomposed by water or aq. agents.

**Spinning pot for rayon.** Algemeene Kunstzijde Unie, N. V. Ger. 583,335, Sept. 1, 1933.

**Centrifugal spinning pots for artificial filaments.** Algemeene Kunstzijde Unie, N. V. Brit. 394,922, July 6, 1933.

**Combined wet- and dry-spinning apparatus for rayon.** Otto Hansen. Ger. 583,418, Sept. 4, 1933.

**Filtering device for rayon spinning jets.** Kirklees Ltd., Arthur Bennett and Wm. Tong. Brit. 395,051, July 13, 1933.

**Apparatus for producing artificial filaments such as rayon, horsehair, staple fiber, etc.** Leonard J. Shone. Brit. 394,049, June 22, 1933.

**Eliminating gases from "viscose silk" cakes or cheeses.** Jan Koostra (to American Finka Corp.). U. S. 1,930,302, Oct. 10. Air or other harmless gas at a temp. of 50-80° is passed, for a period of about 10 min., through the walls of the spun cakes or cheeses before washing and skinning. App. is described.

**Artificial bristles.** Camille Dreyfus. Wm. Whitehead and Henry W. Kuhl (to Celanese Corp. of America). U. S. 1,930,220, Oct. 10. Heavy stiff artificial filaments having a denier above 25 and which are formed with entrant angles or cusps contain a cellulose deriv. such as cellulose acetate and a resin such as toluene sulfonamide-formaldehyde resin.

**Treating pulp for paper manufacture, etc.** Mone R. Isaacs. U. S. 1,929,432, Oct. 10. A cellulose pulp is beaten in liquor contg. a protein material such as casein,  $Ca(OH)_2$ , and a fluoride such as NaF in order to produce a water-resistant product. Soap and a light mineral oil also may be added.

**Centrifugal machine for purifying paper pulp, crude starch, etc.** Gustav ter Meer. Brit. 394,811, June 6, 1933.

**Treating wood, fiberboard, etc.** Ernest F. M. Payne. Brit. 394,019, June 22, 1933. Wood, fiberboard, wood pulp, wood fiber and fibers contg. lignocellulose, *e. g.*, jute, hemp, are treated successively with a soln. of an acid phosphate of a metal forming an insol. phosphate, *e. g.*, Ca, Mg, Al, Zn, Fe, Cr, and with a soln. that reacts with the acid phosphate to ppt. an insol. phosphate within the cell walls of the material. Thus a Zn phosphate that is resistant to fire and to animal and vegetable life may be applied by soaking the material in a soln. of an acid phosphate of Zn and then in a soln. contg.  $NH_4H_2PO_4$  and (or)  $(NH_4)_2HPO_4$ . The soln. of Zn may be prepd. by dissolving 8 parts ZnO in 39 parts  $H_2PO_4$  (sp. gr. 1.5) and diluting to 100 parts with  $H_2O$ . After pptn. the product may be treated with a soln. of Na aluminate and (or) silicate with or without the addn. of colloidal substances, *e. g.*, carrageen, cellulose solns., viscose.

**Paper-making apparatus.** Wm. H. Millsbaugh. U. S. 1,930,104, Oct. 10. Structural and mech. features.

**Paper-making apparatus.** James K. Darby (to Wm. H. Millsbaugh). U. S. 1,931,062, Oct. 17. Mech. features.

**Device for feeding paper stuff to the wire cloth of a paper-making machine.** Firma J. M. Voith. Ger. 583,291, Aug. 31, 1933.

**Flow-boxes for paper-making machines.** Walter Voith, Hermann Voith and Hanns Voith (trading as the firm J. M. Voith). Brit. 395,539, July 20, 1933.

**Means and method for removing press-rolls from paper-making machines.** The Downingtown Manufacturing Co. Brit. 395,532, July 20, 1933.

**Felt for paper-making machines.** Firma Christian Petzoldt. Ger. 584,224, Sept. 16, 1933. Felt is made resistant to heat, acids and rot by coating it with a silicate of Mg at any stage of its manuf. Thus, the fiber or yarn or the finished felt may be treated with a soln. of Na silicate and then with a soln. of  $MgCl_2$ .

**Apparatus for regulating the density and flow of paper stuff.** Franz Hassmann. Ger. 583,041, Aug. 28, 1933.

**Apparatus for sifting paper stuff.** "Mieg" Mühlenbau und Industrie A.-G. (Robert Stehr, inventor). Ger. 583,040, Sept. 1, 1933.

**Rosin size.** Judson A. DeCew (to Process Engineers, Inc.). U. S. 1,929,577, Oct. 10. Melted rosin is emulsified with a dil. aq. alk. soln. such as NaOH under conditions unfavorable for the saponification of the rosin, and the emulsion formed is separately treated in a container without diln. and at a temp. below the h. p. under conditions favorable for saponification of rosin, to produce a lighter colored product than would be obtained by boiling the emulsion. App. is described.

**Sizing paper.** I. G. Farhenind. A.-G. Brit. 395,155, July 13, 1933. See Fr. 738,991 (C. A. 27, 2035).

**Machine for drying sheets of paper, etc.** Alfred E. Browne and Charles W. H. Honor. Brit. 394,565, June 29, 1933.

**Waterproofing paper.** Soc. anon. Papeteries Navarre. Brit. 395,197, July 13, 1933. Paper is waterproofed by passing a band thereof upwardly through a bath of viscose and then successively through baths for coagulating and pptg. the viscose, the band being finally washed and dried. App. is described. Before coagulation a no. of bands, 1 or some of which may be of fabric, may be impregnated with viscose and superposed or compd. sheets comprising impregnated and unimpregnated bands may be prepd.

**Watermarked paper.** Magyar Nemzeti Bank and Friedrich von Heinrich. Brit. 395,284, July 13, 1933. Addn. to 373,905 (C. A. 27, 3609). See U. S. 1,901,049 (C. A. 27, 3078).

**Carbon papers.** Unichem Chemikalien-Handelsgesellschaft A.-G. Brit. 395,225, July 13, 1933. See Fr. 744,832 (C. A. 27, 4360).

**Wallpaper.** E. I. du Pont de Nemours & Co. Brit. 394,974, June 30, 1933. Washable and greaseproof wallpaper is made by coating paper with a compn. comprising a cellulose deriv., a sufficient proportion of a wax (-like substance) or a metal stearate, *e. g.*, Zn or Al stearate, to give a matt surface and solvents of the kind used in the prepn. of cellulose lacquers. The cellulose derivs. may be esters, *e. g.*, cellulose nitrate or acetate, or ethers, *e. g.*, Et or benzyl cellulose. Plasticizers, *e. g.*, di-Bu phthalate, tricresyl phosphate, castor oil and  $\beta$ -ethoxyethyl stearate, and modified natural resins or synthetic resins may be added to the coating compns.

**Apparatus for making laminated paper or cardboard.** Alois Purkert, Jr. Ger. 583,162, Aug. 29, 1933.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES B. MUNROE AND C. O. STORM

**Testing safety explosives with respect to detonating gases.** Jean Sedivy. *Chimie & industrie Special No.*, 976-7 (June, 1933).—Tests by Dautriche's method showed that, for a given total charge, the size of the flame and the speed of detonation decrease as the no. of cartridges into which the charge is divided is increased. A. P.-C.

**Liquid oxygen explosives.** T. Coulter and A. E. Lance. *J. Chem. Met. Mining Soc. S. Africa* 34, 57-73 (1933); cf. *C. A.* 27, 3079.—Authors' reply to discussion. Further tests on sensitiveness to impact, inflammability, formation of  $\text{CO}_2$ , ignition of fire damp, extent of enrichment of atm., effect of such enrichment in creating an atm. susceptible to coal dust explosion, possibility of coal dust in suspension transmitting a flame and so causing a premature explosion, effect of  $\text{O}_2$  on fuse, etc., are presented. Alden H. Emery

**Manufacture and testing of "methanites."** V. Pelant (*Chimie & industrie Special No.*, 888-901 (June, 1933)).—A detailed description is given of the procedure used for testing "methanites" (safety explosives used in coal mines) in an exptl. tunnel according to Czechoslovakian specifications, and of expts. carried out in Czechoslovakia during the last few yrs. with a view to increasing the safety of such explosives. From a discussion of the procedure now in use, suggestions are made for its modification and improvement. A. Papineau-Couture

**Explosive properties of dioxan-air mixtures.** G. W. Jones, H. Seaman and R. E. Kennedy. *Ind. Eng. Chem.* 25, 1283-6 (1933).—At 100-110° the lower and upper inflammable limits for dry dioxan vapor in air are 1.97% and 22.25% by vol. Ignition temps. were detd. for several vapors by the "quartz-bulb" method and the "drop" method. In the latter a drop of the liquid is placed on the surface of some molten material such as glass. If in the quartz-bulb method the vapor of a given substance gives a concn-ignition-temp. curve whose slope is (a) pos., the drop method gives higher values of ignition temps.; (b) neg., it gives ignition temps. equal to or lower than does the quartz-bulb method. Thus the combustion properties depend upon conditions of test. R. E. Anderson

**Photographic studies of detonation of explosives.** Ladusz Urbański. *Roczniki Chem.* 12, 715-60 (768-9 in French) (1932), cf. *C. A.* 27, 4930. The detonation process of picric acid and nitrocellulose was studied by means of a high-speed camera permitting the dissection of a detonation flame into a series of pictures differing from each other by a distance of  $\frac{1}{10,000}$  of a sec. With picric acid the primary flame represents the main and partly the secondary reaction and consists of a center surrounded by luminous bundles. The progress of the secondary reaction depends on the rate of cooling of the reaction products effected by reduction of the pressure. The luminescence is due to glowing of free C and is induced by various reactions in the explosion space. The photographic record permits the establishment of the following scheme of the explosion progress: The charge, being the center of the primary flame, is the place of the decomposition of the explosive. The decomposition products interact immediately, forming brighter reaction zones upon a darker field. This state is especially well perceived in photographing blue rays, in case the explosive is confined only with celluloid or is entirely free. If it is placed in a glass tube, the different zones run into each other causing brightening of the whole field, upon which darker bands are visible. The interacting decomposition products diverge and form luminous bands around the center. The glowing ceases with time toward the inner part whereby rings around the center are formed. The diam. of the rings decreases steadily until the light is extinguished. The space between the center and the rings is illuminated by numerous radiant points. Analysis of the primary flame permits the conclusion that the reactions of the primary decomposition products do not proceed evenly in the whole

mass, but are broken up into secondary centers forming rings around the place of the detonation. The flame along the charge axis shows all characteristics of an explosion flame. After extinction of the primary flame, a secondary one appears induced by oxidation of the reaction products: C, CO,  $\text{CH}_4$ ,  $\text{H}_2$ , HCN, etc. The primary flame contains all colors of the visible spectrum; in the secondary one, blue is observed feebly, red and infra-red intensely. The lowest temp. limit of the primary flame is calcd. to 2000-2200°. Nitrocellulose behaves similarly, except that the form of the rings around the center is more regular, and their diam. is smaller than with picric acid. The lowest temp. of nitrocellulose, having 13.3% N, is calcd. to 1900-2000°. J. W.

**Electrochemical testing of the stability of explosives.** A. Pavlik. *Chimie & industrie Special No.*, 978-1005 (June, 1933).—Description of an investigation into Hansen's potentiometric method (*Dansk Artillerie Tidsskr.* 12, 129 (1925)), consisting of detg. the  $p_{\text{H}}$  of the ext. of explosives subjected to stability tests, with a discussion of the applicability of the test and a comparison with other stability tests. It was found suitable for testing nitroglycerin, nitroglycerin smokeless powders, nitrocellulose and penthrate, but not for trinitrotoluene, picric acid nor trimethylenenitrosoamine; it may or may not be suitable for dynamite according to the compn. of the latter. The great advantage of the method lies in the fact that it permits of drawing a decomposition curve which gives a more complete picture of the effects of a heat test than a test like the Abel, which merely indicates the degree of decomposition at a given moment. The potentiometric measurements were carried out with the quinhydrone electrode, which is suitable only for a  $p_{\text{H}}$  range of 2.5-6 (with explosives). A few polarograms were detd. by means of the Hg-drop electrode, and further investigation will be carried out along this line. A. Papineau-Couture

**Internal ballistics considered as a link between the manufacture and consumption of smokeless powder.** V. Benda. *Chimie & industrie Special No.*, 1006-10 (June, 1933).—Math. A. Papineau-Couture

**Determination of stabilizers in smokeless powders.** F. Becker and G. A. Hunold. *Z. ges. Schiess-Sprengstoffw.* 28, 233-7, 284-6 (1933).—Volumetric and gravimetric methods are described in detail for the detn. of diphenylamine, diethyldiphenylurea (centralite), diphenylurea (Akardit), alone or in presence of each other in smokeless powders of both single-base and double-base types. In general the methods are accurate to within 10% of the amt. of stabilizer present (usually between 0.5 and 5%). This accuracy is considered satisfactory for the purpose. C. G. Storm

**The importance of the composition of nitroglycerin spent acid to a rational manufacture of nitroglycerin.** Gosta Wallerius. *Z. ges. Schiess-Sprengstoffw.* 28, 169-72, 203-6, 247-50, 280-4 (1933).—W. discusses the effect of variations in  $\text{HNO}_3$  and  $\text{H}_2\text{O}$  contents of spent acids on soly. of nitroglycerin. Spent acid of compn. having min. solvent action does not lead to max. yield, since yield is a function of both soly. and quantity of spent acid. The soly. of nitroglycerin was detd. in 24 acid mixts. and curves were plotted showing relations between dissolved nitroglycerin and (a)  $\text{HNO}_3$  content, and (b)  $\text{H}_2\text{O}$  content. A method is described for calcg. the proportion and compn. of nitrating acid to give max. yield, with  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  of given concns. Tables show results of a large no. of such calcns. C. G. Storm

**The heats of formation of nitrocelluloses, nitroglycerin and other important constituents of propellants.** A. Schmidt and F. Becker. *Z. ges. Schiess-Sprengstoffw.* 28, 280-2 (1933).—Six samples of nitrocellulose covering a range of N content from 11.05 to 14.12% were prepd. and their heats of combustion detd. in the micro-combustion bomb. N was detd. by the Lunge method and at. compn. calcd. A linear relation exists between the heats

of formation calcd. from these data and the N content (cf. C. A. 26, 2641). Results ranged from 754 Cal./kg. with 11.05% N to 800 Cal./kg. with 11.12% N. Heats of combustion were also detd. and heats of formation calcd. for nitroglycerin, substituted ureas and urethans and dinitrotoluene. Results are tabulated. C. G. S.

The determination of diphenylamine by bromination, with special regard to its application in the analysis of smokeless powders. L. Galatis and J. Megaloikonomos. *Z. ges. Schiess-Sprengstoffw.* 28, 273-7 (1933). A series of detus. carried out on pure  $\text{Ph}_2\text{NH}$  and on various types of both nitrocellulose and nitroglycerin smokeless powders contg. centralites, or dinitrotoluene, in addn. to  $\text{Ph}_2\text{NH}$ , showed that the inaccuracy of the usual bromination method for detn. of  $\text{Ph}_2\text{NH}$  could be largely overcome. The tetrabromide ppt. is filtered from the alc. liquid and weighed, a correction being applied for soly in the  $\text{EtOH}$ .  $\text{MeOH}$  may be used with equal results and is preferable in presence of dinitrotoluene. A pure colorless tetrabromide is obtained if the Br is diluted 5-fold with alc., and if this soln. is added until the liquid has the color of 0.1 N  $\text{K}_2\text{Cr}_2\text{O}_7$  soln. C. G. Storm

The combustion of two colloidal powders of different compositions but with the same explosive temperature. Henri Murrou and G. Aunis. *Bull. soc. chim.* 53, 613-17 (1933); cf. C. A. 27, 2302. The powders are made up of varying amts. of nitroglycerin, nitrocellulose and diethyldiphenylurea. If the temps. of the explosions are equal the combustion velocities are the same in spite of the difference in compn. and in spite of the varying amts. of nitric N in the products of combustion. H. A. Smith

The ignition of gases. VIII. Ignition by a heated surface. (a) Mixtures of ethane, propane or butane with air. (b) Mixtures of ethylene, propylene or butylene with air. C. A. Naylor and R. V. Wheeler. *J. Chem. Soc.* 1933, 1240-7; cf. C. A. 26, 1124, 4951. (a) Lowest ignition temps. and longest ignition lag for  $\text{CH}_4$ -air mixts. occur with excess of  $\text{O}_2$ , whereas for higher paraffins the opposite is true. Traces of  $\text{I}_2$ ,  $\text{C}_2\text{H}_4$  or  $\text{C}_2\text{H}_5\text{Br}$  retard sub ignition-temp. reactions of  $\text{CH}_4$ -air, but accelerate those of  $\text{C}_2\text{H}_6$ -air. Ignition temps. depend on the size of the reaction vessel, being lower for a large vessel. (b) Ignition temps. decrease with increasing mol. wt. of hydrocarbon. Rates of reaction are influenced more by concn. of hydrocarbon than by that of  $\text{O}_2$  in the mixt. Oxidation to aldehyde is the most important reaction leading to the production of flame. Of these olefins, propylene shows the lowest rate of reaction, possibly because of steric hindrance. R. F. Anderson

A new principle for detonators and its practical application. A. Majrich. *Chimie & industrie Special No.*, 926-32 (June, 1933).—Certain substances, such as basic Pb picrate, Pb trinitroresorcinol, Pb nitrate-hypophosphite, Hg acetylide and Na fulminate, burn at a fairly rapid rate, but without exploding; yet, by a phenomenon which might be called "explosio-ismicrism," they can induce explosion of explosives. This property is based on a principle entirely different from the action of ordinary detonator explosives, namely, adiabatic compression of the explosive charge produced by the rapid combustion of the primary "explosive." Contrary to the principle of the usual detonator, acceleration takes place in the main charge, but not in the detonator. The max. pressures produced by adiabatic compression and the rates of combustion are calcd., and the practical application of the principle to the manuf. of detonators is indicated. A suggested explanation, based on this new principle, is given of the Munster Univ. explosion and of the Oppau disaster. A. Papineau-Couture

Controlling the quality of safety fuses by the galvanoscope. Karl Pečák. *Chimie & industrie Special No.*, 933-8 (June, 1933).—An elec. current, not more than 300 v., is passed through the fuse, and measured by means of the resultant galvanometer deflection. The method can be applied to the finished fuses and detects defects which are not revealed by other methods. A. Papineau-Couture

Improved fire damp detectors. O. Muller and H. Wöhlbier. *Z. ges. Schiess-Sprengstoffw.* 28, 277-80, 317

19 (1933).—A review with description of types.

C. G. Storm  
Explosion tests of Pittsburgh coal dust in the Experimental Mine, 1925 to 1932, inclusive. Geo. S. Rice, H. P. Greenwald and H. C. Howarth. *Bur. Minas. Bull.* 369, 44 pp. (1933).—The increased effectiveness of rock dust caused by increasing the amt. of the —200-mesh dust 50-100% over the 20%—200-mesh usually specified is too small to justify crushing costs. Various methods of ignition are described and their relative igniting and dust-raising powers discussed. The effect of the varying quantity of dust present is considered. Tests showed that small accumulations of gas that might pass unnoticed can be exceedingly dangerous; 150 cu. ft. of a gas-air mixt. contg. 9-10% natural gas initiated dust explosions. Tests on stratified gas and on the ignition of coal dust by elec. arcs are described. Alden H. Emery

The waterless gas holder accident at Neunkirchen. Report of the Gasholder Subcommittee. Institution of Gas Engineers. *Gas World* 99, 428-9; *Gas J.* 204, No. 3876 Institution of Gas Engineers Suppl., 5-6 (1933).—The M. A. N. waterless gasholder (capacity 4,250,000 cu. ft.) at Neunkirchen exploded on Feb. 10, 1933, during the course of repairs on the mains. Conclusion (as the result of an inspection of the site a month later): If the precautions normally taken in England during the repairs to mains had been observed, the disaster would not have occurred. P. J. Wilson, Jr.

Inflammation of coal dusts (Mason, Wheeler) 21.  
Limits of inflammability of natural gases (Jones, Kennedy) 21.

Priming mixture for explosives. Joseph D. McNutt (to Winchester Repeating Arms Co.). U. S. 1,930,653, Oct. 17. Pb dinitrophenylazide is used with a heavy metal salt of tetrazene such as the Ag salt (suitably also with  $\text{PbO}$ ,  $\text{Ba}(\text{NO}_3)_2$ , gum and  $\text{SbS}$ ). Cf. C. A. 27, 3612.  
Charges for detonating caps. Josef Meissner. U. S. 1,930,765, Oct. 17. A primary charge consisting of a mixt. of about 0.15 g. TNT and 0.03-0.1 g. Pb azide is used with a secondary charge of TNT about 0.4 g. and Pb azide about 0.1 g.

Detonators for explosives. Sylvester B. Large (to Atlas Powder Co.) U. S. 1,928,204, Sept. 26. In compnd detonators, the primary detonating substance used is a solid explosive of the general formula  $\text{C}_n\text{H}_{n+2}(\text{NO}_2)_n$  such as hexanitromannite which may be used with a base charge of tetryl. U. S. 1,928,205 relates to detonators with a primary initiating charge of a solid nitration product of a polyhydric alc. having the general formula  $\text{C}_n\text{H}_{n+2}(\text{OH})_n$  such as hexanitromannite and provided with a preformed fuse head such as one comprising  $\text{KClO}_3$  and Hg fulminate of a nature adapted to deliver a hot semi-explosive burst of flame upon the primary initiating charge. U. S. 1,928,206 relates to detonators having a primary detonator compn. free of all explosives as sensitive to friction as Hg fulminate and Pb azide and including a mixt. of a solid nitration product such as a nitromannite and at least one other solid explosive ingredient, such as nitroacetone, which is less sensitive to friction and impact than Hg fulminate and Pb azide. U. S. 1,928,207 relates to detonators with a primary detonator compn. consisting of a solid disaccharide nitric ester such as nitroactose, etc. U. S. 1,928,208 relates to a detonator comprising a shell, a primary "safety" charge in the shell, a confining element for the charge in the shell, and an igniting medium for the charge, the character and amt. of the igniting medium being such, with respect to the strength of the shell and 9 confining element, that these are completely resistant as to impairment of the confinement of the primary charge under the heat and pressure developed within the shell up to the time of detonation of the primary charge. Numerous details and examples are given.

Blasting detonators. Mario F. F. Biazzi. *Brit.* 387,545, Feb. 9, 1933. In mfg. a blasting detonator comprising a secondary charge in a case surmounted by a primary charge in a capsule, the primary and secondary charges are

previously compressed in their resp. containers and the capsule is then pressed down on the secondary charge so that the zones of highest compression are in juxtaposition. The primary charge may be Hg fulminate in a Cu capsule in an Al case contg. a nitroaromatic compd.; or the case may be of Cu and the capsule of Al filled with Pb azide. Part of the secondary charge may be inserted in the capsule or an intermediate charge of nitropentaerythrite, trimethylenetrinitroamine or the like may be used.

1 Apparatus for mixing blasting explosives. R. I. du Pont de Nemours & Co. Brit. 395,759, July 24, 1933. The app. comprises an annular metal bowl, non-metallic, revolving wheels adapted to pass through the ingredients and means for regulating the temp. of the bowl. Adjustable scrapers for the edges of the bowl and a rake are provided. The bowl is made of a non-parking alloy consisting of Cu 94.8%, Si 3.4% and Mn 1.5%. The scrapers and rake are preferably of hard rubber.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Notes on the determination of the constitution of azo dyestuffs. Vladimir Kfepelka. *Chimie industrie Special No.*, 903 5 (June, 1933). The methods described in modern literature for the identification of the products obtained by reduction of azo dyestuffs are complicated and are not universally applicable. They can be simplified and modified in such a manner that Green's original observation regarding the color produced by oxidation in ammoniacal soln. can be made the basis of a single scheme of identification for all such dyes. All constituents of azo dyes which have been enriched by 1 or 2  $\text{NH}_2$  groups by reduction, when applied to filter paper in a soln. of given  $\text{NH}_3$  concn., give a characteristic color by the action of atm.  $\text{O}_2$ ; this color is changed by the action of  $\text{HCl}$ , as indicated by Green, and in an even more pronounced manner by  $\text{NaOH}$  soln., which permits of their almost instantaneous and infallible identification. Similarly, nonsulfonated  $\text{C}_6\text{H}_5$  derivs., such as  $\text{C}_6\text{H}_5(\text{NH}_2)_2$ ,  $\text{C}_6\text{H}_5(\text{NH}_2)_3$ , aminohydroxy derivs., such as aminoresorcinol, diaminesorcinol, etc., give characteristic colors.

A. Papineau-Couture

Investigations of the vat dyes of the benzanthrone series. V. The preparation of Bz 1 chlorobenzanthrone. 2. Toshio Maki and Yoshio Nakai. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 520 31 (1933), cf. *C. A.* 27, 3431. When 0.3 g. or 10% cc. (at 20°)  $\text{Cl}_2$  was introduced into a homogeneous soln. of 12.5 g. benzanthrone in 150 cc. glacial  $\text{AcOH}$ , at 100°, the optimum time of reaction for the formation of Bz-1-chlorobenzanthrone was 17 min. The yield of pure  $\text{Cl}$  deriv. (13.36–13.30%  $\text{Cl}$ ), pptd. twice from glacial  $\text{AcOH}$ , was 80.2% of the benzanthrone or 69.4% of the theoretical yield. The benzanthrone concn. of the glacial  $\text{AcOH}$  soln. is not a straight-line function of the corresponding optimum time of chlorination.

Karl Kammermeyer

Standards for determining the fastness of dyes toward washing, perspiration and water. Report of the Polish sub-committee on the fastness of dyes. Wladimir Mazanski. *Ann. chim. anal. chim. appl.* 15, 433–41 (1933). The principles involved, the necessary app. and procedure to be followed are described. W. T. H.

A method of determining the fastness of dyestuffs with 'lousaints' photocolormeter. Jules Pinte. *Bull. fedération intern. assoc. chim. textile couleur* 2, 90 (1933).—Spectrophotometric readings at 410, 460, 530, 575, 620 and 680 m $\mu$  are taken for a dyestuff (in powder form or in soln.) with Wratten filters. The change in the reflectivity of the fabric or powder on exposure to light under standard conditions is called and used as an index of the fastness of the dyestuff. S. Lenher

Influence of light on vat dyeings. A. Landolt. *Bull. federation intern. assoc. chim. textile couleur* 2, 102 (1933).—Cotton dyed or printed with certain vat colors is tendered by exposure to light. The tendering after a normal long exposure has been correlated with that caused by a short exposure of the same sample impregnated with a dil. soln. of  $\text{NaOH}$ . The tendering colors cause fading of other colors when applied in mixts. The acylaminoanthraquinones and the dianthraquinonyl amines cause severe tendering, while the anthraquinonazines and the derivs. of benzanthrone are inoffensive. With the thiondigoids the derivs. of thionaphthene are to be feared in spite of the antioxidant  $\text{NH}_2$  group in the mol. Blues and greens are

least objectionable of the various shades. A list of safe vat colors is given. S. Lenher

3  $rH$  in dyeing. Maurice Deribere. *Tiba* 11, 729 37 (1933).—An explanation of the notion of  $rH$  (decimal colog. of the equil. H pressure over the soln.), of its electrometric and colorimetric detn., and of its applications to chem. phenomena, more particularly in dyeing.

A. Papineau-Couture

Theory of the dyeing process. A. E. Porai-Koshitz, A. Efimov, I. Shapiro, I. Riskin, N. Gorelik, M. Peskin, E. Veller, N. Sokolova and E. Vasil'eva. *J. prakt. Chem.* 137, 179 215 (1933). The mechanism of dyeing with substantive acid (cotton) dyes is investigated by using a neutral dye bath of the  $\text{NH}_4$  salt of the dye and detg. the  $\text{NH}_4$  set free. Wool has a weak affinity for  $\text{NH}_4$  which is removed by boiling in  $\text{H}_2\text{O}$ . When wool is dyed in such a dye bath at the h. p.  $\text{NH}_4$  is evolved proportionally to the dye absorbed (allowance being made for the affinity of the wool for  $\text{NH}_4$ ). With cotton, however, the dye is absorbed as a whole and no  $\text{NH}_4$  is evolved. No appreciable dyeing occurs when wool is boiled in a neutral soln. of the Na salt of the dye, but in presence of  $\text{NH}_4$  salts dyeing takes place with evolution of  $\text{NH}_4$ . The effect is not one of "salting out" as in the case of cotton, for whereas  $\text{Na}_2\text{SO}_4$  and  $\text{NH}_4\text{Cl}$  have an equal effect in dyeing cotton, only the latter is really effective in the case of wool. As  $\text{NH}_4$  salts do not ppt. the dye acids, this new technique makes it possible to use substantive dyes on wool that previously were considered unsuitable. The satn. value of wool for acid dyes is a stoichiometric relationship independent of the nature of the dye (cf. Meyer, *C. A.* 20, 3350), and is equal to the value for mineral acids ( $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ). Wool satd. with  $\text{H}_2\text{SO}_4$  from a 0.25  $\text{N}$  soln. takes up dye (Chicago Blue 6B) equiv. to the  $\text{H}_2\text{SO}_4$  present. Mutual replacement of dyes can occur when dyed wool is immersed in a soln. of a different dye ( $\text{NH}_4$  salt); if the wool is satd., no  $\text{NH}_4$  is evolved. Conclusion: Whereas cotton dyeing is a purely phys. process of adsorption, the dyeing of wool is a chem. process arising from combination of the dye acid with the basic wool fiber. An explanation is offered of the anofhalous behavior of Alkali Blue, which is taken up by wool from weakly alk. baths, but then gives dull, weak shades which develop into blue on addn. of acids. It is shown that the behavior of wool free from volatile bases with the  $\text{NH}_4$  salt of the dye is normal and that the anion alone enters the fiber. It is suggested that in presence of alkali it does so in the carbinol form, which is dehydrated to the colored quinonoid form by acids. B. C. A.

Colloid-chemical processes in the dyeing of cotton. Albert Schaeffer. *Angew. Chem.* 46, 618 22 (1933). Dispersion tests were carried out on dyes of all classes by the method of Auerbach, as well as by dialysis and ultrafiltration through standardized ultrafilters. The results are presented in schematic form. Present-day information leads to the belief that cotton dyeing consists of 3 phases: (1) diffusion of the dye into the sub-microscopic voids of the fiber, (2) adsorption of the dye and (3) irreversible fixation of the dye. Further theoretical possibilities are discussed. Seventeen references.

Karl Kammermeyer

The dyeing of cellulose acetate rayon. Maingnet. *Russa* 8, 757–61 (1933).—Practical operating directions

are given for the successful reduction of the shade of over-dyed goods. A. Papineau-Couture

The effect of the products of hydrolysis of wool on dyes of the thiocyanine GR group. N. Nikolaev. *Anilino-krasochaya Prom.* 1931, No. 2-3, 28-34; *Chem. Zentr.* 1932 I, 1298.—Expts. were carried out to det. the cause of brown specks on textiles dyed with "Sulfocyanin GR" and "Sulfocyaninschwarz 2B." Addn. of NaCl or Na<sub>2</sub>SO<sub>4</sub> to a soln. of either dye in distd. H<sub>2</sub>O does not change the shade. Addn. of alk. earth carbonates ppts. some of the dye, which redissolves upon the addn. of AcOH. In dyeing wool with thiocyanine GR in distd. H<sub>2</sub>O a deep blue shade is obtained at both 80° and 100°. In tap water the color is somewhat duller at 80°, and at 100° a red-brown shade is obtained. The addn. of alkali carbonates to the bath decomposes the dye on wool fibers very quickly; alk. earth carbonates decompose it more slowly. That the effect is due to products of the hydrolysis of wool is shown by the fact that a soln. of soda in which wool has been boiled and removed changes the dye to orange. Analogous expts. using CaCO<sub>3</sub> and MgCO<sub>3</sub> instead of soda showed no effect on the dye. The products of hydrolysis therefore form insol. compds. with Ca and Mg which remain on the fibers. Expts. with wool extd. with ether did not substantiate the claim that fat and soap residues remaining on the wool have a reducing and decomp. action on the dye. However, S compds. formed during hydrolysis do have this action on thiocyanine dye. The gases evolved during boiling wool turn an aq. soln. of the dye orange. Both sulfate and sulfite can be detected in an alk. soln. in which wool has been boiled. The content of the latter is entirely sufficient for the decomp. of the dye on the fibers. M. G. Moore

Ultramarine blue imitation and laundering blue. C. Becher. *Seifensieder-Ztg.* 60, 743-4, 764-6, 781, 799-800 (1933).—B. considers the manuf. of various substitutes for ultramarine blue and washing blue. P. Escher

Colors for colored-paper manufacture. Alois Triltsch. *Farben-Chem.* 4, 365-9 (1933). The suitability of various types of dyes, pigments and methods for coloring and dyeing paper is discussed. Formulas are given for the prepn. of bronze, fiery red, violet, green and yellow pulp colors. G. G. Sward

White and colored discharges on naphthylamine garnet by means of hyposulfite formaldehyde. Lucien Baumann, G. Thesmar and A. Hug. *Bull. soc. ind. Mulhouse* 99, 467-71 (1933). (Scaled note of 1905.) Report. M. Battegay and J. Lichtenberger. *Ibid.* 475.—The process consists of a combination of discharge by "rongalite" (formaldehydesulfoxylate) in the presence of an Fe salt and of nitrite, with discharge in the presence of an aromatic base and an org. acid. I. H. Odell

Bleaching and dyeing of viscose schappe. J. Braconnot. *Russa* 8, 753-7 (1933). Practical operating directions on the proper degreasing, bleaching and dyeing of viscose schappe. A. Papineau-Couture

Bleaching and dyeing of so-called "buntal" hats. W. Fehre. *Tiba* 11, 651, 653 (1933). A brief discussion of the practical bleaching and dyeing of these fibers, which consist of the veins of the leaves of various palm trees, and which have properties intermediate between those of straw and of hemp. A. Papineau-Couture

Color reactions of the aqueous solution of the cocoon layer. Hideo Kaneko. *Bull. Sericult. Silk Ind., Japan* 4, No. 3, 10-12 (1932); cf. *C. A.* 27, 5984.—By color reactions it is shown that the aq. soln. of the cocoon layer which was boiled for 30 min. probably contains a flavone-like compd., glycocholl, NH<sub>4</sub> oxalate, NH<sub>4</sub> carbonate and a very min. quantity of aspartic acid. Milton Harris

Tinctorial determination of artificial fibers and their mixtures with cotton. Giovanni Tagliani. *Bull. federation intern. assoc. chim. textile couleur* I, 35 (1932).—Methods are outlined for detg. viscose, cupranonium rayon, cellulose acetate and sapon. cellulose acetate in cotton cloth by means of dye tests. S. Lenher

X-ray investigation of natural and regenerated silks. Ichiro Sakurada, Keiroke Futino. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 21, 266-9 (1933).—Identi-

cal x-ray photographs are obtained from *Antheraea pernyi* and *Antheraea yamamai* while the photograph from *Bombyx mori* is different. One prepn. of tegusu gave a photograph identical with that from *Bombyx mori* while 2 other preps. of tegusu gave photographs similar to those of the pernyi and the yamamai. Dispersion and regeneration changes the lattice structure of the silk fibrils very slightly.

Howard Agnew Smith

Viscosity investigation of silk solution. I. Effect of nickel and copper in the ammoniacal solution. Hiroshi Sobue and Saburo Manago. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 576-9 (1933).—The swelling of various boiled-off silks in cuproammonia soln. was observed under the microscope and it was found that with raw silk the degree and velocity of swelling are great, while for mildly boiled-off silk the degree of swelling is fairly great but the velocity is small, and for severely boiled-off silk the velocity of swelling is great. The viscosities of cuproammonia and Ni oxide ammonia solns. and of their mixts. are presented. The exptl. results show that the swelling of silk particles is a min. in a mixt. of CuO-ammonia soln. and a small amt. of NiO-ammonia soln. at a temp. of 30°.

Karl Kammermeyer

The action of alkaline copper solution on silk fibroin. II The solution phenomena in the system fibroin-copper amine 1. Yujiro Takamatsu. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 566-7 (1933); cf. *C. A.* 26, 2323.—In Schweizer's soln. the fibroin is dissolved so rapidly that in 1/2 hr. 90% of the fibroin is dissolved and in 4 hrs. the soln. may be complete. The effects of oxidation due to air during the treatment are almost negligible.

The soly. of fibroin in Cu-amine soln. is increased with increased amts. of fibroin used and the fibroin is brought completely into soln. without leaving any solid phase till it reaches its max. soly. But if the amt. of fibroin is increased still more the soly. of fibroin is decreased. These abnormal phenomena are comparable with those usually observed in the soln. of colloidal substances, when their solubilities are greatly affected by the amts. of substance used. The max. degrees of soly. of fibroin in Cu-amine solns. of varying Cu contents were detd. under definite soln. conditions and the following equation was derived: max. degree of soly. of fibroin (Cu content in the soln. = 1, where the chem. equiv. of fibroin was 227 as previously detd. From the solns. of fibroin in Cu oxide-ethylenediamine with fibroin and Cu in a monomol. ratio a complex fibroin-Cu-amine compd. was isolated which contained the 3 constituents in equal proportions. It was ascertained that the smallest amts. of Cu and amine necessary to dissolve a definite amt. of fibroin can be also expressed by this ratio III. The solution phenomena in the system fibroin copper amine. 2. *Ibid.* 567-8.—In the soln. fibroin, Cu and ethylenediamine combine in monomol. ratios, while in the solid phase they exist in the ratios: undissolved fibroin Cu. ethylenediamine = 2:1:1.

Karl Kammermeyer

The progress realized in the linen industry by the application of hyposulfite-formaldehyde. Lucien Baumann, G. Thesmar, L. Lantz and F. A. M. Nelling. *Bull. soc. ind. Mulhouse* 99, 471-4 (1933). (Scaled note of 1910.) Report. M. Battegay and J. Lichtenberger. *Ibid.* 475.—The uses of hyposulfite-formaldehyde include direct printing with vat colors, illumination on the goods with vat colors, and discharge on goods dyed with alizarin.

I. H. Odell

Recent improvements in the manufacture of absorbent cotton. W. Fehre. *Tiba* 11, 737, 739 (1933).—A description, with formulas, of a recently developed process in which boiling is carried out in presence of a wetting agent (with or without addn. of small amts. of water glass and H<sub>2</sub>O<sub>2</sub>) and bleaching at 80-90° with a weakly alk. H<sub>2</sub>O<sub>2</sub> soln. contg. a wetting agent, with or without addn. of water glass. A. Papineau-Couture

The delustering of rayon. G. Choisy. *Russa* 8, 673-7 (1933).—A description of H. Dreyfus' process for reducing the luster of rayon by fixation of TiO<sub>2</sub> or other white or practically white, insol. Ti compds. A. P.-C.

Dustiness of certain sized fabrics. L. Bonnet. *Tiba*



11, 677, 679 (1933).—A brief discussion of the causes of this defect and of its prevention. A. P.-C.

The bleaching of straw tresses. M. Lepretre. *Tiba* 11, 739, 741 (1933).—Polemical with Fehre (C. A. 27, 5534). Reply. W. Fehre. *Ibid.* 741, 743. A. P.-C.

• Evaluation of textile penetrants. Samuel Lenher and Edward J. Smith. *Ind. Eng. Chem., Anal. Ed.* 5, 370-81 (1933).—An improved centrifugal method is described for evaluation of textile penetration assistants. The advantages of this method as compared with the sinking time method for the qual. evaluation of wetting out agents are pointed out. The surface tension of a soln. toward air is no criterion of its penetrating ability toward textile fibers. Measurements of the efficiency of a variety of textile-penetrating assistants over a range of concns. and temps. are given. Milton Harris

New consideration on the use of glues and gelatins in textile finishing. E. Sifferlen. *Tiba* 11, 653-9 (1933).—A brief explanation of the nature of glues and gelatins and the uses to which they can be put in the textile industries, with a no. of formulas. A. Papineau-Couture

Propylene dichloride mixture controls clothes moths and carpet beetles in rugs and over-stuffed furniture. E. I. McDaniel. Mich. Agr. Expt. Sta., *Quart. Bull.* 16, 13-15 (1933).—By using a mixt. of 90 parts of propylene dichloride with 10 parts of  $\text{CCl}_4$  in a pressure spray gun on stuffed furniture, bedding or rugs, the clothes moths, *Tinea pelionella* and *T. biselliella*, and the cigaret beetle, *Lasioderma serricorne*, are destroyed. C. R. Fellers

Prepg. mixed diazo dyestuffs (Schoutissen) 10. Dyeing cellulose materials (Rose) 23. Weakly acetylated fiber celluloses [dyeing properties] (Rheiner) 23. Condensation of dinitrochlorobenzene with *p*-aminophenol-3,5-bisulfonic acid (Kogan, et al.) 10. Derivs. of phenanthrene (Zalkind) 10. Aliphatic ketonilids [dyes from] (Cliffe) 10. Azo dyes (Mironescu, Nicolescu) 10. N-ketinilids of *peri*-indandiones and related N compds (U. S. pat. 1,930,876) 10. Rubber coating compns. [for fabrics] (Brit. pat. 392,797) 30.

Blondel, E.: Principes de la teinture par les pigments végétaux naturels. Paris: J. B. Baillière & Fils. Reviewed in *Tiba* 11, 793 (1933).

Herzog, E.: Reaktionstabelle der Küpfenfarbstoffe und Indigokole. Basel: B. Nepf & Cie. M. 2, bound, M. 2.80.

Dyes. Deutsche Hydrierwerke A.-G. Brit. 393,906, June 12, 1933. Dyes having soap-like properties are made by treating  $\text{OH}$ - or  $\text{NH}_2$ -contg. dyes, as such or at any stage in their manuf., with such org. monobasic sulfonic acids or their halides or such monobasic carboxylic acids, their halides or anhydrides as contain substituted or unsubstituted hydrocarbon radicals of the aliphatic or cycloaliphatic series corresponding to soap-forming carboxylic acids in order to esterify or acylate said  $\text{OH}$  or  $\text{NH}_2$  group. Textiles may be simultaneously dyed and rendered  $\text{H}_2\text{O}$ -resistant therewith. Dyes of the azo, triphenylmethane, azine, oxazine, thiazine, xanthene, acridine and anthraquinone series are specified. The products may be sulfonated. Among examples (1)  $\text{H}$  acid is *N*-acylated with stearyl chloride and the product coupled in alk. soln. with any suitable diazo component and (2) aminoazobenzene, benzeneazo- $\alpha$ - or  $\beta$ -naphthylamine or the aminoazonaphthalenes are condensed with cupric, lauric, oleic or ricinoleic acids or with naphthenic or resin acids and the condensation products sulfonated.

Dyes. Deutsche Hydrierwerke A.-G. Brit. 394,343, June 12, 1933. Divided on 393,906 (preceding abstr.). Dyes having soap-like properties are made by combining with dyes, as such or at any stage in their manuf., high mol. (substituted) hydrocarbon radicals of the aliphatic or naphthenyl series, contg. not less than 10 C atoms, corresponding to soap-forming carboxylic acids, 1 of the components having a labile halogen atom and the other an  $\text{OH}$  or  $\text{NH}_2$  group, the combination being effected by means of the  $\text{OH}$  or  $\text{NH}_2$  group in known manner *per se*.

The radicals of the naphthenyl series are introduced by means of compds. of the general formula, alicyclic ring- $(\text{CH}_2)_x\text{R}$ , where R is  $\text{OH}$ ,  $\text{NH}_2$  or  $\text{Cl}$  and  $x$  is such that the total no. of C atoms is not less than 10. The dyes produce a lather in soln. and gelatinize to soap-like jellies, being therefore useful for printing pastes. Textiles may be simultaneously dyed and rendered  $\text{H}_2\text{O}$ -resistant by them and softness of the fibers attained at the same time. In examples (1) *p*-hydroxyazobenzene is etherified with alkali and octadecyl chloride and the product sulfonated, (2) 2,4-dinitrochlorobenzene is condensed with lauric alcoholate and the product reduced to 1-lauroxy-2,4-diaminobenzene which may be used for the synthesis of azo and acridine dyes and (3) aminoazobenzene, benzeneazo- $\alpha$ - or  $\beta$ -naphthylamine or aminoazonaphthalenes are heated with cetyl chloride and the products sulfonated. Dyes of the triphenylmethane, azine, oxazine, xanthene, acridine or anthraquinone series contg. amino or hydroxy groups, e. g., rosaniline, safranin T or Lauth's violet, may be similarly treated or compds. contg. a labile halogen atom, e. g., fluorescein chloride can be condensed with higher alkylamines and then sulfonated.

Azo dyes. Fritz Muller. U. S. 1,929,328, Oct. 3. Water-insol. azo dyes which, in general, dye yellowish orange shades of good fastness are formed from components such as 1-amino-2,5-bis(trifluoromethyl)benzene and 1-(2',3'-hydroxynaphthylamino)-2-ethoxybenzene, etc.

Azo dyes. Hans Reindel and Hans Krzikalla (to General Aniline Works). U. S. 1,929,853, Oct. 10. Azo dyes which dye wool fast yellow shades are formed from components such as *p*-amino-lauric (or -stearic) acid anilide and 1-(*m*-sulfophenyl)-3-methyl-5-pyrazolone or acetoacetic- $\alpha$ -anilide-sulfonic acid.

Azo dyes. I. G. Farbenind. A.-G. Brit. 394,984, July 4, 1933. The diazo compd. of 2-aminobenzoic acid or a deriv. thereof (1 or 2 mols.) is coupled with a di-(acetoacetyl) deriv. of benzidine or a 3,3'-deriv. thereof (1 mol.), the diazo compd. being selected so that the dye always contains at least 1  $\text{HSO}_3$  group. They dye vegetable fiber yellow shades which on aftertreatment with a Cu compd. become very fast to light and washing. In examples (1) 1-sulfo-2-aminobenzoic acid (I)  $\rightleftharpoons$  di-(acetoacetyl)-*o*-toluidine (II) (greenish yellow on aftertreatment with  $\text{CuSO}_4$ ), (2) I  $\rightarrow$  II  $\leftarrow$  2-aminobenzoic acid and (3) 5-sulfo-2-aminobenzoic acid  $\rightarrow$  II.

Azo dyes. I. G. Farbenind A.-G. (Rudolf Knoche and Detlef Delfs, inventors). Ger. 576,546, May 11, 1933. Dyes are produced by treating azo dyes contg. the grouping  $\text{o-C}_6\text{H}_4\text{N NR}_2(\text{OH})\text{o}$ ,  $\text{R}_1$  and  $\text{R}_2$  being aromatic residues, with  $\text{Cr}$ -yielding agents in an alk. medium till the  $\text{Cl}$  is replaced by  $\text{OH}$  and a complex  $\text{Cr}$  compd. of *o*-hydroxyazo dye results. Thus, the dye from diazotized 1-chloro-2-aminonaphthalene-6-sulfonic acid and 2-hydroxynaphthalene is treated with  $\text{Cr}_2\text{O}_3$  in  $\text{KOH}$  to give a blue dye. Another example is given.

Azo dyes. Soc. pour l'ind. chim. à Bâle. Ger. 583,224, Aug 31, 1933. *o*-Hydroxyazo dyes, obtained by coupling diazotized *o*-aminophenols with resorcinol, are treated with a suspension of a Co compd. in a neutral medium. The treatment of dyes contg. the  $\text{COOH}$  group or a group contg.  $\text{SO}_2$  is excluded. Dyes which contain Co and are useful for coloring lacquers are obtained. Examples are given.

Azo dyes; dyeing. Soc. pour l'ind. chim. à Bâle. Ger. 583,223, Aug. 31, 1933. Diazo or tetrazo compds. are coupled in substance or on the fiber with pyrazolone derivs. of the formula  $\text{PRCONHR}'$ , where P is a pyrazolone residue, R is an aryl residue and  $\text{R}'$  is an aryl residue contg. at least 2 nuclei. Dyes or dyeings of various colors are obtained. Examples are given.

Monoazo dyes; dyeing. Soc. pour l'ind. chim. à Bâle. Brit. 393,873, June 15, 1933. Monoazo dyes suitable for dyeing cellulose esters and ethers, natural or artificial resins, lacquers or varnishes, are made by coupling an aromatic diazo compd. that contains no  $\text{OH}$  group in *o*-position to the diazo group with a 1-amino-3-hydroxybenzene having free 4- and 6-positions so that coupling occurs in 4-position and acylating the dyes thus obtained. Greenish yellow to orange non-phototropic shades are

obtained. The dyes may be made into pastes or dry preps. with suitable dispersing agents. Suitable acylating agents are  $\text{HCOOH}$ ,  $\text{Ac}_2\text{O}$  or  $\text{AcCl}$ , propionic anhydride, Et or Me chloroformate or a cyanate. Among examples (1)  $\text{PhNH}_2$  or *p*-anisidine (I)  $\rightarrow$  (neutral) *m*-aminophenol is treated with  $\text{Ac}_2\text{O}$  and (2) the dye obtained in (1) from I is dissolved in finished nitrocellulose lacquer.

**Disazo dyes.** I. G. Farbenind. A.-G. (Karl Wiedemann and Heinrich Clingstein, inventors). Ger. 576,614, May 16, 1933. Disazo dyes obtained by the alk. coupling of tetrazotized aromatic diamines contg. an alkoxy group in the *o*-position to each amino group, with 2 mols. of 2-amino-5-hydroxynaphthalene-1,7-disulfonic acid or with 2 mols. of an *N*-acyl compd. thereof, or with 1 mol. of 2-amino-5-hydroxynaphthalene-1,7-disulfonic acid (or an *N*-acyl deriv.) and 1 mol. of a hydroxynaphthalenesulfonic acid, are treated with Cu-yielding agents in the substance. In an example, 4,4'-diamino-3,3'-dimethoxybiphenyl is tetrazotized and coupled with 2-acetyl amino-5-hydroxynaphthalene-1,7-disulfonic acid in soda-alk. soln. The isolated dye is treated with  $\text{CuSO}_4$  in lime-free water to give a dye coloring cotton and silk in reddish blue shades. Other examples are given. (C. A. 27, 3830).

**Disazo dyes; dyeing.** Imperial Chemical Industries Ltd. and Arthur H. Knight. Brit. 395,005, June 30, 1933. Disazo dyes are prepd. by coupling a diazotized nitroamino compd. of the  $\text{C}_6\text{H}_4$  or  $\text{C}_6\text{H}_3$  series, including derivs. thereof devoid of OH,  $\text{HSO}_3$ , or  $\text{COOH}$  groups, with a 2,5-dialkoxyaniline similarly devoid of OH,  $\text{HSO}_3$ , and  $\text{COOH}$  groups and capable of rediazotization after coupling, rediazotizing and coupling with amines of the  $\text{C}_6\text{H}_4$  or  $\text{C}_{10}\text{H}_8$  series devoid of OH,  $\text{COOH}$  or  $\text{HSO}_3$  groups in the aryl nucleus and customarily used as end components. The products dye cellulose esters and ethers clear blue to violet shades. They are applied as aq. emulsions. Among examples (1) *p*-nitroaniline  $\rightarrow$  2,5-dimethoxyaniline (I)  $\rightarrow$  *m*-phenylenediamine and (2) *o*-nitroaniline  $\rightarrow$  I  $\rightarrow$  4-chloro-*m*-phenylenediamine. In an example of dyeing the products are applied to cellulose acetate from a bath contg. a naphthalenesulfonic acid  $\text{CH}_3\text{O}$  condensation product. In 395,006, June 30, 1933, disazo dyes are prepd. by coupling a diazotized aniline or naphthylamine, or substitution deriv. thereof other than a  $\text{NO}_2$ , OH,  $\text{HSO}_3$ , or  $\text{COOH}$  deriv., with a 2,5-dialkoxyaniline, rediazotizing and coupling with amines as described in 395,005. The products dye cellulose esters and ethers clear violet-red to blue-violet shades. They are applied as aq. suspensions. Among examples (1) *o*-chloroaniline  $\rightarrow$  I  $\rightarrow$  ethyl-*o*-naphthylamine and (2) 5-chloro-*o*-toluidine  $\rightarrow$  I  $\rightarrow$  *o*-naphthylamine.

**Trisazo dyes.** Chem. Fab. vorm. Sandoz. Ger. 582,309, Aug. 11, 1933. Addn to 566,471 (C. A. 27, 1189). One mol. of a tetrazo compd. is coupled in mineral acid soln. with 1 mol. of 1-amino-8-naphthol 3,6-disulfonic acid, and the product is coupled in alk. soln. with 1 mol. of a diazo compd., which may be sulfonated, and 1 mol. of a *N*-substituted *m*-aminophenol, which may also be sulfonated and which must contain more than one sulfo group when an un-sulfonated diazo compd. is used. Black dyes particularly useful for dyeing leather are obtained. Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. (Georg Kranzlem, Heinrich Vollmann and Werner Schultheis, inventors). Ger. 584,010, Sept. 13, 1933. Pyrene is heated to 110-180° with an aromatic carboxylic acid chloride, unsubstituted in at least one *o*-position to the  $\text{COCl}$  group, in the presence of  $\text{AlCl}_3$  and a dehydrogenating agent, e. g., air or  $\text{MnO}_2$ . A flux may be added to the mixt., e. g., an alkali halide. The examples describe the prepn. of orange dyes from pyrene and benzoyl, *m*-chlorobenzoyl, *p*-toluyl, and *o*-naphthoyl chlorides.

**Vat dye compositions.** I. G. Farbenind. A.-G. (Sebastian Gassner and Hermann Bergwald, inventors). Ger. 583,315, Sept. 1, 1933. Printing pastes and other compns. contg. unreduced vat dyes are improved by inclusion of alkali salts of hydroaromatic sulfonic or

carboxylic acids. Glycerol or like water-sol. alc. may also be included. Printing pastes contg. reduced vat dyes may be similarly improved. Examples are given.

**Vat dyes of the anthraquinone naphthacridone series.** Philip F. Bangham and Robert F. Thomson (to Imperial Chemical Industries Ltd.). U. S. 1,929,870, Oct. 10. Vat dyes which yield fast gray shades are formed by nitrating anthraquinone-1,2,2',1'-naphthacridone to introducing at least 2 nitro groups, reducing the nitro deriv. formed to an amino deriv. and benzoylating the resulting amino compd. The reduction may be effected by heating the nitro compd. with Na sulfide and the benzoylation by heating the amino compd. with benzoyl chloride in  $\text{PhNO}_2$ .

**Yellow to brown to violet vat dyes.** Georg Kalischer, Heinrich Ritter and Fritz Baumann (to General Aniline Works). U. S. 1,931,196, Oct. 17. Various examples are given of the production of dyes by condensing thiophenanthronecarboxylic acid halides with amino derivs. of cyclic ketone compds. such as  $\alpha$ -mono- and dianthranthraquinones, anthranthraquinones and their carbazolic derivs., anthranthraquinones, aminopyranthrones, aminodibenzanthrone, aminodibenzopyrenequinones, their substitution products and derivs., aminothiazoloanthrone-sulfone and aminocetamidones.

**Anhydrous leuco vat dyes.** Ronald S. Barnes, John E. G. Harris, Burtell Wylam and John Thomas (to Scottish Dyes, Ltd.). U. S. 1,930,109, Oct. 10. For the prepn. in a liquid medium of an anhyd. leuco compd. of an anthraquinone or indigoid vat dye, an aq. prepn. of the leuco compd. is added to  $\text{PhCl}$ ,  $\text{PhNO}_2$  or dimethylaniline, and water is removed by distn. under a suitable pressure.

**Derivatives of vat dyes.** I. G. Farbenind. A.-G. (Walter Meig and Rudolf M. Heidemeich, inventors). Ger. 583,070, Aug. 28, 1933. Leuco compds. of vat dyes are treated with a *m*-sulfonyl halide of benzoic acid in the presence of a tertiary org. base. Water-sol. esters of the leuco compd. are obtained. Examples are given. The products are decomposed by alkalis, and are useful in dyeing and printing.

**Sulfuric esters of leuco compounds of vat dyes.** I. G. Farbenind. A.-G. (Wilhelm Bauer, Ludwig Zeh and Bernhard Bollweg, inventors). Ger. 583,071, Aug. 28, 1933. Addn to 578,323 (C. A. 27, 4410). The method of Ger. 583,331 modified by using salts of dithiocarbamic acid or of polythiocarbamic acid as reducing agents in place of  $\text{CS}_2$  and  $\text{NH}_3$ , or an amine. Examples are given.

**Anthraquinone dyes.** Imperial Chemical Industries Ltd., Norman H. Haddock and Frank Lodge. Brit. 394,312, June 13, 1933. The dyes are prepd. by causing to react an amino-3-keto-2,3-dihydrobenzo-1,4-thiazine with a 1-hydroxyanthraquinone, or a leuco deriv. thereof, oxidizing, if necessary, and hydrolyzing the product to give the substituted thioglycolic acid of which it is the lactam. The 1-hydroxyanthraquinone may carry substituents. Among examples (1) leucoquinazarin is condensed with 7-amino-3,4-dio-2,3-dihydrobenzo-1,4-thiazine (I) in pyridine in presence of  $\text{H}_2\text{BO}_3$  and saponified with aq.  $\text{NaOH}$  to yield the thioglycolic acid which dyes wool green shades and (2) leuco-1,1,5-trihydroxyanthraquinone is similarly condensed with I; the dyeing shade after lactamization is green. I is prepd. by hydrolyzing (alk.) the 6-amino-benzothiazole according to Brit. 355,808 (C. A. 26, 5573), treating the resulting mercaptophenylenediamine with chloroacetic acid and ring-closing by means of hot dil. mineral acid.

**Polymethine dyes.** I. G. Farbenind. A.-G. Fr. 749,331, July 22, 1933. Sym. and asym. polymethine dyes, the central atom of which is substituted, are prepd. by causing quaternary N bases having a reactive Me group in the *o*-position to react with an alkyl ester of an arylated thioamide acid, preferably in the presence of condensation agents and solvents. The reaction may be carried out in 2 steps, the condensing agents for the 1st being acids or anhydrides, e. g.,  $\text{Ac}_2\text{O}$ , and the condensing agents for the 2nd being bases, e. g., pyridine or piperidine. The intermediate product may be isolated and condensed with another quaternary  $\text{NH}_4$  salt. The products are used for sensitizing photographic emulsions. Examples are given.

of the prepn. of the iodide or perchlorate of 1,1'-diethyl-meso-methyl-, 1-ethyl-1'-methyl-6',7'-benzo-meso-methyl-, 1,1'-diethyl-6'-diethylamino-meso-methyl-, 1,1'-diethyl-4',5'-benzo-meso-methyl-, 1-ethyl-1'-methyl-6',7'-benzo-meso-ethyl-, 1,1'-diethyl-meso-ethyl-, 1,1'-diethyl-4',5'-benzo-meso-ethyl-, and 1-methyl-1'-ethyl-4',5'-benzo-meso-ethylbenzothiocarbonyl-, 1,1'-diethyl-meso-methyl-, 1,1'-diethyl-6,6'-dimethoxy-meso-ethyl-, 1,1'-diethyl-6'-methoxy-meso-ethyl-, 1,1'-diethyl-6,6'-dimethoxy-meso-ethyl- and 1,1'-diethyl-6,6'-dimethoxy-meso-methoxyphenyl-benzoselenocarbonyl-, 1,1'-diethyl-6'-diethylamino-meso-methyl-, 1,1'-diethyl-6',7'-benzo-meso-methyl-, 1,1'-diethyl-meso-ethyl-, 1,1'-diethyl-6',7'-benzo-meso-ethyl- and 1,1'-diethyl-6'-methoxy-meso-ethyl-benzoselenocarbonyl- and 1,1'-diethyl-meso-ethylbenzothiocarbonyl- and 1,1'-diethyl-meso-ethylbenzothiocarbonyl- Cf. C. A. 27, 3618.

**Dyes of the pyranthrone series.** Ronald S. Barnes, John E. G. Harris, Birkett Wylam and John Thomas (to Scottish Dyes, Ltd.). U. S. 1,929,912, Oct. 10. A sulfuric ester of brominated pyranthrone is formed by heating brominated pyranthrone, pyridine- $\text{SO}_2$  and pyridine, gradually adding finely divided Cu, adding NaOH and sepg.

**Stilbene dyes.** Soc. pour l'ind. chim. à Bâle. Ger 583,036, Aug. 31, 1933. See Brit. 348,283 (C. A. 26, 5215).

**Acid wool dyes (anthraquinone series).** I. G. Farbenind. A.-G. Brit. 393,631, June 9, 1933. Anthrapyrimidone compds. are obtained by causing a 1-aminoanthraquinone-2-sulfonic acid, or salt thereof, substituted in the 4-position by an alkylamino, arylamino, aralkylamino or hydroalkylamino group, to react with a urea, alkylurea or urethan at an elevated temp. (150-200°), preferably in a solvent for both components, e. g., PhOH, and in the presence of condensing salts. Among examples 1-amino-4-methylaminoanthraquinone-2-sulfonic acid (I) or the corresponding 1-hexahydroamino compd. is treated with Me or Et urethan. In 393,632 the above sulfonic acids, in which the 5-8 positions may be substituted in particular by halogen or HSO group, are condensed with a malonic acid dialkyl ester at an elevated temp., preferably in presence of a solvent for both reactants and in the presence of an alk. reagent, to form O-carbalkoxyanthrapyridones. Among examples I is condensed with malonic acid di-methyl ester.

**Acid wool dyes of the anthraquinone series.** Georg Kalscher, Ernst Honold, Heinrich Klingenstein and Karl Dörmann (to General Aniline Works). U. S. 1,927,125, Sept. 19. Dyes gradually producing blue or greenish blue shades on wool from an acid bath (these shade being generally more bluish and of better leveling properties than in the case of the starting material) are produced by treating with acylating agent a 1-amino-4-aryl-aminoanthraquinone-2-sulfonic acid in which the 4-aryl-amino group is  $\text{NH-R-NH}_2$ , where R means a residue of the benzene series and N H, alkyl or cycloalkyl. Suitable acylating agents are for instance acid anhydrides, carboxylic or sulfonic acid chlorides such as acetyl chloride, mono- and di-chloroacetyl chloride, acetic anhydride, benzoyl chloride, benzenesulfonyl chloride, phthalic anhydride. When an acid chloride is used, an acid-binding agent may be added with advantage. The process may be carried out either in an aq. medium or by using dried starting materials in an org. solvent particularly an org. base. Several examples with details of procedure are given. Cf. C. A. 27, 6078.

**Wool dyes of the anthraquinone series.** Ernst Honold and Klaus Weinand (to General Aniline Works). U. S. 1,928,725, Oct. 3. Dyes are obtained by condensing a 1-hydroxy-4-haloanthraquinone-2-sulfonic acid with a compd. which contains an exchangeable hydrogen atom linked to nitrogen and corresponds to the general formula  $\text{P-NH}_2$ , wherein R represents alkyl, cycloalkyl, aralkyl, aryl or acyl. The addition of a catalyst, such as Cu or a Cu salt, facilitates the reaction. The same effect is also produced by the application of the Cu salt of the 1-hydroxy-4-haloanthraquinone-2-sulfonic acid which is prepd. by heating 1-diazo-4-haloanthraquinone-2-sulfonic acid with Cu or a Cu salt as described in U. S. Patent No. 1,888,017 (C. A. 27, 1364). The new dyes show good fastness. Their shades vary according to the nitrogen compds. applied; aromatic and aliphatic amines yield violet to blue dyes, whereas reddish products are obtained by using acid amides. Several examples with details of procedure are given.

**Sensitizing dyes.** I. G. Farbenind. A.-G. Brit. 394,537, June 20, 1933. See Fr. 731,508 (C. A. 27, 5014).

**Reduction products of dyes of the indigo series.** I. G. Farbenind. A.-G. Brit. 395,183, July 13, 1933. Stable reduction products of halogen derivs. of indigo, indirubin and their homologs are prepd by heating the leuco compds. of the dyes, wholly or substantially in the free form and dispersed in aq. or  $\text{H}_2\text{O}$ -contg. media, until they are converted wholly or substantially into compds. that are difficultly sol or insol. in cold aq. solns. of caustic alkalis.

The dyes may be reduced in alk., neutral or acid media and the free leuco compds. may be heated, simultaneously or subsequently or after isolation, either alone in aq. or  $\text{H}_2\text{O}$ -contg. media or with acid agents. Among examples (1) 5,5',7,7'-tetrachloroindigo is boiled in alc. with  $\text{HCOONH}_4$  and  $\text{SO}_2$  until a stable reduction product seps and (2) 5,5',7,7'-tetrabromoindigo is heated in aq. alc with  $\text{Na}_2\text{S}_2\text{O}_4$  and after reduction the soln. is boiled; or the dye is treated in very dil. alkali soln. in presence of a Ni catalyst with H under pressure at about 90°; or the dehydroacetate deriv. is boiled in alc with  $\text{HCOONH}_4$  and  $\text{NH}_4\text{HSO}_4$  soln. The products are stable in air and may be dried without special precautions; they dissolve in hot alkali solns. and in cold alc. alkali solns. to give the ordinary leuco compds. into which they may also be converted by steaming (when worked up as printing pastes).

**$\alpha$ -Amino carboxylic acid esters of the anthraquinone series.** Karl Wilke (to General Aniline Works). U. S. 1,929,803, Oct. 10. Dye intermediates are obtained by causing an anthraquinone-1,2-isoxazole to react with a compd. of the general formula  $\text{R-OH}$  in which R represents an alkyl or an aryl group of the benzene series, in the presence of KCN or Na methylate. Details are given of the production of the 1-aminoanthraquinone-2-carboxylic acid methyl, ethyl and phenyl esters, m. 228°, 198° and 198°, resp.

**Aromatic condensation products.** I. G. Farbenind. A.-G. (Hans Schlichtmaier, inventor). Ger 576,964, May 22, 1933. These are produced by action of 1 mol. of a *p*-nitro amine of the general formula  $\text{H}_2\text{N-Ar-NO}_2$  on 2 mols. of an arylsulfonic acid in soln or suspension. Thus, 1-methyl-2-amino-4-methoxy-5-nitrosobenzene is treated with *p*-toluenesulfonic acid to give a product m. 233-4°. The products are useful as dye intermediates.

**Anthraquinone derivatives.** Henry Dravins. Fr. 750,639, Aug. 14, 1933. Alkyl or other substituents are introduced into the *m*-positions of arylamino groups of arylaminoanthraquinones to form new dyes which have an increased affinity for cellulose esters and ethers. Examples of dyes mentioned are 1-hydroxy-4-, 1-amino-4-, 1-methylamino-4-, 1,5-diamino-4,8-di-, dihydroxy-4-, 1-amino-4,8-dihydroxy-5- and 1-amino-5-hydroxy-4-m-tolylaminoanthraquinone, also 1-amino-4-(5'-methyl-2'-methoxyphenylamino)-, 1-hydroxy(or amino)-4-(3'-methyl-4'-acetvlaminophenylamino)-, 1-amino-4-(2',5'-dimethylphenylamino)- and 1-amino-4-(3',5'-dimethylphenylamino)-anthraquinone.

**Halogenated substances.** I. G. Farbenind. A.-G. Karl Keller and Ferdinand Munz, inventors. Ger. 576,710, May 18, 1933. Higher satd. or unsatd. aliphatic acid- or hydroxy aliphatic acids are treated with sufficient Cl to replace at least one H atom in the unsatd. acids and at least 2 in the satd. acids. The chlorination is carried out in the usual way in the presence of an org. diluent. In an example, ricinoleic acid is treated with sufficient Cl to replace 3 H atoms. The products are useful as auxiliaries in dyeing, and for other tech. purposes.

**Nitrogen-containing cyclic ketones.** Heinrich Greune, Wilhelm Fekert, Heinrich Sieber and Gerhard Langbein (to General Aniline Works). U. S. 1,931,192, Oct. 17.

**Dye intermediates** are obtained by causing a compd. of the formula  $\text{NCCH}_2\text{COOX}$  in which X stands for H, an alkali metal or an alkyl group to react, first at a temp. of about 70-140° and then at about 150-190°, upon a polynuclear aromatic compd. of the acenaphthene, naphthalene or anthracene series contg. at least one pair of free *peri* positions in the presence of an acid-condensing agent such as  $\text{AlCl}_3$  mixed with  $\text{NaCl}$ ,  $\text{KCl}$  and  $\text{NaF}$ . When using acenaphthene and cyanoacetic acid as initial materials, the reaction probably proceeds in such a manner that the cyano group is first added to the hydrocarbon and the monoketimide of the *peri*-indandione is then formed with the elimination of water and alc., resp. Various other examples are given and products formed which correspond

with the general probable formula  $\text{CH}_2\text{---}\overset{\text{---}}{\text{C}}\text{---}\overset{\text{---}}{\text{C}}\text{---}\overset{\text{---}}{\text{C}}\text{---}\overset{\text{---}}{\text{C}}\text{---}\text{NH}$ ,

where the C atoms  $\text{C}_1$ ,  $\text{C}_2$  and  $\text{C}_3$  are members of an aromatic grouping of the naphthalene or anthracene series,  $\text{C}_1$  and  $\text{C}_2$  representing C atoms occupying the *peri*-positions of said grouping, are considered as new products. They are generally obtained in the form of their salts especially the hydrochlorides, but the corresponding free imides may easily be obtained therefrom by a treatment with alkali.

**Dyes and intermediates of the anthraquinone series.** Wm. Smith, Sidney Thornley and Robert P. Thomson (to Imperial Chemical Industries Ltd.) U. S. 1,929,875, Oct. 10. Aroylated triaminoanthraquinone dyes which dye green shades turned to red by oxidizing are formed by mononitrating 1,4-diphthalimidanthraquinone, removing the *N*-phthaloyl groups by hydrolysis, reducing the nitro group to an amino group, and causing the product to react with an aroylating agent such as benzoyl chloride.

**Dyes and intermediates.** Soc. pour l'ind. chim. à Bâle. Brit. 393,271, May 17, 1933. Intermediates that couple with diazo compds. or condense with aldehydes to form dyes and have the formula  $\text{RCONHR}'(\text{NHCOR}')_n$ , in which R is the residue of any aromatic carboxylic acid contg. a  $-\text{COCH}_2$  group that can couple with diazo compds. or condense,  $\text{R}'$  the residue of any aromatic carboxylic acid that can couple with diazo compds.,  $\text{R}''$  the residue of an aromatic diamine or polyamine and  $n$  a whole no., are obtained by acylation of the amines with the acids. Among specified amines are *m*- and *p*-phenylenediamines; tolylenediamines, halogenated phenylenediamines; anisylendiamines; phenylethylenediamines, naphthylenediamines; benzidine; tolidines, bisanilines, biphenetidines; *o,p'*-, *o,p''*- and *p,p'*-diaminodiphenyl ethers, e. g., 2,4,4'-triaminodiphenyl ether; and generally diamines and polyamines in which (un)substituted aromatic residues are connected by bivalent connecting members such as  $\text{O}$ -,  $\text{S}$ -,  $\text{CH}_2$ -,  $-\text{NH}$ -,  $\text{NHCO}$ -,  $\text{N}=\text{N}$ -, azoxy,  $\text{NHCONH}$  or a heterocyclic residue, such as triazine and pyrimidine residues, and diamines and triamines derived from complexes contg. condensed heterocyclic and aromatic nuclei, e. g., dehydrothiophthalidines, dehydrothiopyridines contg. further amino groups, diamino- and polyamino-dibenzimidazoles, dibenzoxazoles and dibenzotriazoles. Specified acids contg. the  $\text{COCH}_2$  group are the 1-aryl-5-pyrazolones carrying a  $\text{COOH}$  group in the aryl nucleus (obtained by condensing hydrazines derived from amino carboxylic acids such as *m*- or *p*-aminobenzoic acids, aminotoluic acids, etc., with acetoacetic or oxaloacetic esters), the acetoacetic arylides carrying a  $\text{COOH}$  group in the aryl nucleus, the arylbarbituric acids carrying a  $\text{COOH}$  group in the aryl nucleus, e. g., 3-carboxyphenylbarbituric acid, derivatives of benzoylacetone carrying nuclear  $\text{COOH}$ , e. g., benzoylacetone-*o*-carboxylic acid. Other specified aromatic carboxylic acids that can couple are hydroxy carboxylic acids of the  $\text{C}_6\text{H}_5$  series, especially those, e. g., *p*-cresotic acid, coupling in *o*-position to the OH group, hydroxynaphthalene-carboxylic acids, e. g., 2,3-hydroxynaphthoic acid and its 7-methoxy and 6-phenylamino derivs., hydroxycarbazole-carboxylic acids, hydroxyphenanthrene-carboxylic acids, hydroxynaphthocarbazole-carboxylic acids and hydroxydiphenylaminocarboxylic acids. The products are sol in

alkalies and may be absorbed from the solns. by animal or vegetable fibers. Dyes specified as obtainable by condensation with aldehydes are the condensation products from benzidine, symmetrically diacylated with 1-(3'-carboxyphenyl)-3-methyl-5-pyrazolone, and (a) benzaldehyde and (b) dimethyl-4-aminobenzaldehyde. The azo dyes obtainable by coupling with diazo compds. from unsulfonated amines, diazotized nitroanilines, diazoazo compds., diazotized aminodiphenylamines, *o*-hydroxy- and *o*-carboxydiazo compds. are described and examples are given.

**Dye intermediates.** I. G. Farbenind. A.-G. Brit. 395,152, July 13, 1933. *p*-Aminobiphenyl and derivs. thereof are obtained by the reaction of (halogenated) hydrocarbons of the  $\text{C}_6\text{H}_5$  series with *N*-haloacylamino compds. of the  $\text{C}_6\text{H}_5$  series in the presence of halides having a condensing action, e. g.,  $\text{AlCl}_3$ ,  $\text{FeCl}_3$ , with or without an org. diluent and with exclusion of  $\text{H}_2\text{O}$ , followed by sapon. of the acetylaminobiphenyl compd. formed. Among examples the following compds. are condensed in presence of  $\text{AlCl}_3$ : (1) *N*-chloroacetanilide with  $\text{C}_6\text{H}_5$  and with  $\text{C}_6\text{H}_5\text{Cl}$ , the latter yielding the 4'-chloro compd., (2) *N*-chloroacetyl-*o*-toluide (I) with  $\text{C}_6\text{H}_5$ ; the product gives on oxidation 3-carboxy-4-acetamidobiphenyl which is saponifiable to 3-carboxy-4-aminobiphenyl, (3) *N*-chloropropionylanilide with  $\text{C}_6\text{H}_5$  and (4) I with  $\text{PhMe}$ .

**Dyeing.** British Celanese Ltd. and George H. Ellis. Brit. 391,317, June 9, 1933. In producing azo dyes on textile materials (cellulose esters and ethers and animal fibers) by fixing the diazo and (or) coupling component in the free state on the material prior to color formation the fixation is effected by applying aq. dispersions or suspensions of the component(s) by mech. impregnation and subjecting the material to a moist heat treatment, e. g., steaming. The fixation and subsequent development may be effected continuously. Among examples (1) cellulose acetate is padded with a dispersion of *p*-aminobenzeneazo- $\alpha$ -naphthylamine, dried, steamed, diazotized and developed with a dispersion of  $\beta$ -hydroxynaphthoic acid and (2) a natural silk fabric is padded with a dispersion contg. the anilide of 2,3-hydroxynaphthoic acid and 5-nitro-2-aminidine, dried, steamed and developed.

**Dyeing organic derivatives of cellulose.** Wm. Whitehead (to Celanese Corp. of America). U. S. 1,929,573, Oct. 10. Fabrics or films of materials such as cellulose acetate are sprayed with a compn. contg. a water-insol. dye dissolved in an org. liquid such as ethylene dichloride which is a swelling agent for the cellulose deriv. Cf. C. 1. 27, 5980.

**Dyeing rayon.** Soc. pour l'ind. chim. à Bâle. Ger. 581,162, Sept. 20, 1933. Piece goods of viscose rayon are dyed in uniform blue shades with dyes prepd. by coupling in an alk. medium 1 mol. of tetrazotized 4,4'-diaminobiphenyl, or its derivs. substituted in the 3- and 3'-positions with alkyl or alkoxy groups, with 1 mol. of 1-naphthol-4,8-disulfonic acid and 1 mol. of a 1-amino-8-naphtholsulfonic acid or a 2-amino-5-naphtholsulfonic acid. An example is given.

**Dyeing materials such as cellulose acetate.** George H. Ellis, Tobias Ockman and Henry C. Olpin (to Celanese Corp. of America). U. S. 1,930,232, Oct. 10. The fastness of colorations such as those produced by anthraquinone derivs. on cellulose acetate is improved by incorporating in the materials, at any stage of their manuf., an alkylated aminodiphenyl base such as tetramethyldiaminodiphenylmethane having itself no coloring action on the material.

**Dyeing, sizing or impregnating paper during manufacture.** I. G. Farbenind. A.-G. (Kuno Franz, inventor). Ger. 580,813, July 17, 1933. Added to 546,270 (C. A. 27, 1925). Modifications of the invention of Ger. 546,270 are described.

**Dyeing and printing.** I. G. Farbenind. A.-G. Brit. 393,408, June 8, 1933. Insol. azo dyes are made on the fiber by treating the material with an azo dye prepn., adding in an acid soln. and developing by passing over heated drying cylinders or through a heated chamber or by lawing through a container filled with steam. The

process is used for printing with azo preps. alone or together with printing by means of ester salts of leuco vat dyes and for the production of colored resists under dyeings from aniline black preps. and (or) ester salts of leuco vat dyes. Among examples (1) a fabric is printed with a mixt. of the diazoamino compd. from 4-chloro-2-toluidine and 4-sulfo-2-aminobenzoic acid with diacetoacetyl-*o*-folidine (I), dried, padded on the reverse side with an acid soln. contg. 1 or more org. acids,  $H_3PO_4$ , 1 or more easily dissociated metal salts of inorg. acids or 1 or more salts capable of yielding acid, *e. g.*,  $NH_4$  salts of org. acids, or mixts. of these, and then directly dried on a cylinder drying machine and finished, and (2) a fabric is printed with a prepn. contg. the nitrosoamino Na salt of 5-chloro-2-anisidine,  $NaOH$ ,  $NaOAc$  and I or 2',3'-hydroxynaphthyl-*o*-anisidine and finished as in (1). Cf. C. A. 27, 1767.

**Dyeing and printing.** Oranienburger chem. Fab. A.-G. and Kurt Lindner. Ger. 582,378, Aug. 14, 1933. In dyeing or printing animal or vegetable materials with mordant dyes, the mordants used are salts of mordant metals with alkyl-substituted aromatic sulfonic acids, *e. g.*, hexadecyltoluene- or aminonaphthalene-sulfonic acids. The salts may be formed *in situ* from an alkali sulfonate and an inorg. mordant metal salt. The mordants are preferably used in assocn. with a water-sol. mono- or poly-hydric alc. Examples are given. Cf. C. A. 26, 5769.

**Printing with vat dyes.** Bleachers' Association Ltd., Charles S. Parker, Charles L. Wall and Franklin Farrington. Brit. 393,381, June 8, 1933. Pattern effects are obtained with leuco esters of vat dyes by treating a fabric, prior to application of the ester, in selected areas with a resist contg. reagent(s), *e. g.*, readily reducible mineral acid salts of heavy metals such as Fe or Cu, serving to hydrolyze and oxidize the ester before absorption of the ester by the fabric can take place. In an example a silk or cotton fabric is printed with a resist paste contg.  $CuSO_4$ ,  $Al(OAc)_3$ , and locust bean thickening, dried, padded in an aq. soln. contg. Soldon jade green paste and  $Na_4Fe(CN)_6$ , dried again, steamed 30-60 min., oxidized in  $H_2O_2$  and mineral acid and soaped. In the case of silk fabric the residue may be removed from the resisted areas by treatment with  $NH_4$  and oxalic acid. Cf. C. A. 27, 4418.

**Printing textiles.** I. G. Farbund. A.-G. Brit. 394,632, June 29, 1933. Vat or other alk. printing or discharge pastes are made suitable for use on wool by incorporating therewith ammonoacetic acid or a salt thereof. Among examples (1) wool is printed with an aq. paste contg. Indigo pure BASF, glycerol, gum thickening,  $K_2CO_3$ , Na formaldehyde sulfoxylate and Na ammonoacetate, dried, steamed 5 min., exposed to air, passed through a bath contg. Na perborate and  $AcOH$ , rinsed, soaped and dried and (2) woolen goods, dyed with Naphthol blue-black S, are printed with an aq. discharge paste contg. the vat dye Hydron orange R and other ingredients as in (1) and finished. Cf. C. A. 27, 2313.

**Printing fabrics.** I. G. Farbefund A.-G. (Richard Fischer and Hermann Freund, inventors). Ger. 571,355, Apr. 13, 1933. Addn. to 562,023 (C. A. 27, 1206). Fabrics are printed or reserve-printed on the fiber with insol. azo dyes, and slop-padded or printed with vat dyes from ester salts of leuco vat dyes after the manner of 562,023. An oxidizing agent such as  $NaNO_2$  or a neutral chromate soln. is added to the slop-padding paste. Oxide, hydroxide or carbonate of an alk. earth metal or of Mg and Zn and a mild reducing agent such as  $Na_2S_2O_4$  is added to the printing paste. The dried fabric is then treated with dil. org. acid or with  $H_2PO_4$ , or with easily dissoci. salts such as  $(NH_4)_2SO_4$ . The fabric is then finally dried. In an example, fabric is slop-padded with a paste contg. the  $H_2SO_4$  ester of a blue dye, ethylenethiodiglycol, water,  $NaNO_2$ ,  $NH_4OH$  and tragacanth thickening. The fabric is then printed with a paste contg. the yellow dye No. 3 of the table appended to Ger. 584,040 (C. A. 26, 1133), water,  $NaOH$ , denatured alc., tragacanth thickening,  $ZnO$  and  $Na_2S_2O_4$ . The printed fabric is then washed in a soln. contg.  $(COOH)_2$ ,  $HCOOH$  and  $Na_2SO_4$ . The dried fabric then shows a yellow pattern on a blue background. Other examples are given.

**Printing fabrics.** I. G. Farbenind. A.-G. (Hermann Freund, inventor). Ger. 583,316, Sept. 6, 1933. A fabric is printed with a paste contg. a substantive azo dye component, a water-sol. diazoamino compd., an alkali, and a reserve for ester salts of leuco compds. of vat dyes, *e. g.*,  $ZnO$  or  $MgO$ , with or without a mild reducing agent, *e. g.*,  $Na_2S_2O_4$ . The fabric is then printed in another design with a paste contg. an ester salt of a vat dye leuco compd., an oxidizing agent, *e. g.*,  $NaClO_2$ , a reagent which yields a nonvolatile acid, *e. g.*, an  $NH_4$  salt of  $HCNS$ ,  $(COOH)_2$ , citric or tartaric acid, and an oxidation catalyst, *e. g.*,  $NH_4$  vanadate. The fabric is then steamed, whereupon the parts covered by both pastes are colored by the azo dye from the first paste, the parts covered by the second paste only are colored by the vat dye from the second paste, and the parts covered by the first paste only remain undyed. The fabric is finally washed and soaped. The process may be modified by replacing the vat dye deriv. in the second paste by an aniline black compn. or other compn. which yields a dye on oxidation, and in this case the second paste may contain free nonvolatile org. acids as well as reagents yielding such acids. Numerous details are given.

**Printing silk.** Durand & Huguenin A.-G. Ger. 583,204, Aug. 31, 1933. See Brit. 387,297 (C. A. 27, 4689).

**Coloring textiles.** Henry Dreyfus. Fr. 749,364, July 22, 1933. Colors are discharged or the fixation of a color is prevented by a discharging compn. in the presence of an org. base, *e. g.*, urea or dimethylurea. Fr. 749,365. In producing discharge effects on materials composed of or contg. cellulose esters, the materials are saponified after being colored by the foundation color but before the discharge of this color. The sapon. is carried out to a degree such that cellulose acetate loses 5-15% of its wt.

**Coloring organic cellulose derivatives such as cellulose acetate.** Wm. A. Dickie and Frank B. Hill (to Celanese Corp. of America). U. S. 1,930,226, Oct. 10. Finely divided particles are incorporated in the material by exposing it to a high-velocity particle stream formed by disintegration of a mordanting metal such as Zn and some of these particles are oxidized during their transit to the material. A mordant dye is then applied, such as alizarin blue A.

**Discharge printing.** Frederick B. Downing and Richard G. Clarkson (to E. J. du Pont de Nemours & Co.). U. S. 1,931,108, Oct. 17. A discharge compn. contg. guanidine thiocyanate is printed on dyed cellulose acetate material and the discharge operation is finished by aging at about 100°, washing and drying.

**Dyeing apparatus.** Joseph Annicq. Brit. 394,900, July 6, 1933.

**Yarn-printing machine.** Henry F. Shaffner (to Briggs-Shaffner Co.). U. S. 1,930,986, Oct. 17. Structural and mech. features.

**Treating textile fibers.** Johann G. Kästner. Ger. 584,313, Sept. 18, 1933. Addn. to 553,047 (C. A. 26, 4723). An aq. carob-bean ext. contg. a hygroscopic substance, *e. g.*,  $MgSO_4$  or glycerol, is applied to textile fibers consisting of or contg. cotton, before they are spun into fine yarns. The hygroscopic substance may be replaced wholly or in part by a water-sol. oil, *e. g.*, Turkey-red oil.

**Treating fibrous materials, e. g., textiles, paper, leather, etc., with liquids.** Erba Fabrik chemischer Produkte Spezialitäten für die Textilindustrie. Brit. 394,816, July 6, 1933. See Fr. 739,214 (C. A. 27, 2045).

**Vegetable textiles.** Heberlein & Co. A.-G. Fr. 749,117, July 18, 1933. Textiles, particularly cotton and viscose silk, are improved by submitting them, at any desired point of their manuf., to a treatment with compds. of bi- or polyvalent metals and with natural or artificial resins or lacquers. Compds. of Al, Zr, Sn, Ti or Zn may be used and the artificial resins may be produced in the textiles.

**Composition for cleaning and purifying animal and vegetable fibers.** Carl Ludecke and Wilhelm Wilcken. U. S. 1,927,839, Sept. 26. An emulsion miscible with water comprises an aq. soln. of an acid used as the dis-

persion medium such as a soln. of oxalic or tartaric acid together with a volatile water-immiscible org. fat solvent such as benzine and  $C_2H_5Cl$  as the dispersed substance, and a vegetable mucous substance such as tragacanth and Irish moss serving as a thickening medium and stabilizer and sour milk.

**Crepe rayon threads.** Claude Clémeucon. Brit. 394,793, July 6, 1933. To avoid the necessity for sizing and to permit the use of the usual twisting machines viscose rayon, previous to the hard twisting necessary for creping, is subjected to a shrinking by treatment with a swelling agent so that the breaking elongation is increased or the process of manuf. is conducted so as to produce a thread of similarly high elongation by avoiding tension during the spinning operation. A soln. of NaOH may be used for the shrinking and  $Na_2S$  may be added thereto to effect desulfurization at the same time. Cf. C. A. 27, 3317.

**Lustrous effect threads.** Alfred Rheiner (to Chemische Fabrik vorm. Sandoz). U. S. 1,926,498, Sept. 12. For the prepn. of lustrous effect threads having no affinity for substantive dyes and consisting of the lower acetylated derivs. of cellulose, by the direct acetylation of mercerized cellulosic fibers without altering the phys. character of the fibers, the reaction is effected in a single acetylating bath and the fibers are immersed in a quantity of acetylating mixt., contg. glacial HOAc, an acetylation catalyst such as  $ZnCl_2$  and an excess over the theoretically required amt. of  $Ac_2O$ , which entirely covers the material during the reaction, and the reaction is allowed to proceed only until mono- and di-acetyl derivs. of cellulose are formed, and care is taken that during the reaction no local superheating occurs and that the temp. of the mass is uniform. Cf. C. A. 26, 3919.

**Processing fabrics.** Camille Dreyfus and Herbert Platt (to Camille Dreyfus). Can. 335,669, Sept. 12, 1933. Fabrics or yarns made of, or contg., org. esters of cellulose are treated with a saponifying bath contg. an alk. soln. of comparatively high concn. preferably at low temp. The fabric may then be dyed with suitable dyes. The saponifying bath may contain any suitable alkali such as NaOH, KOH or  $NH_3$ . The concn. of the alkali soln. is preferably 5-20% by wt. The saponifying bath may also contain such assistants as ales. or  $AcONa$ , e. g., material contg. cellulose acetate is treated with an alk. soln. corresponding to a NaOH soln. of 5-20% concn. at 35°. The treated fabric is dyed with a cotton dye and then printed with a discharge paste contg. a reducing agent.

**Dressing textiles.** I. G. Farbenind. A.-G. (Herbert Gensel, inventor). Ger. 579,913, July 5, 1933. Addn. to 561,178 (C. A. 27, 1208) and 553,174 (C. A. 26, 4724). Textiles are treated with a compn. contg. starch or other usual dressing agent, an aldehyde, e. g.,  $CH_2O$ , and a polymerization product of the kind described in Ger. 553,174. The textiles may then be heated to about 70°. Dressings fast to washing are obtained. Examples are given. Cf. C. A. 27, 2045.

**Saponification of the surface of fabrics containing cellulose esters.** Camille Dreyfus and Herbert Platt (to Camille Dreyfus). Can. 335,670, Sept. 12, 1933. A soln. of alkali is padded onto a fabric contg. yarns of org. esters of cellulose in such a manner that alkali in amt. equal to 3-12% of caustic based on the wt. of the fabric is applied to the fabric. The fabric is dried on heated drums and then thoroughly washed. The safe ironing point of the fabric is materially increased and the yarns are intensely saponified on the surface. The alk. soln. may contain alkalis as NaOH or KOH. If desired these alkalis may be replaced in whole or in part by suitable alk. salts as  $Na_2CO_3$  or  $K_2CO_3$ , Na or K silicate, Na or K sulfide.

**Composition for treating silk and rayon fabrics.** Frank P. Miller. U. S. 1,929,705, Oct. 10. An aq. mixt. suitable for impregnating hosiery fabrics in order to strengthen them is formed from alum 70 and boric acid 27 parts to which may be added about 3 parts of gum arabic with a smaller proportion of salt and casin.

**Fibroin solutions.** I. G. Farbenind. A.-G. Brit. 394,212, June 22, 1933. Fibroin is dissolved in a soln. of a

mixt. of 2 or more hydrated salts, e. g., the thiocyanates of Na, Mg, Ba, Li, Mn and Zn. Acid amides may be present according to the process of Brit. 375,242 (C. A. 27, 4100). The soln. obtained may be purified by dialysis and used in the prepn. of spinning solns. or plastic masses.

**Apparatus for coating fabrics for tarpaulins, etc.** Nagapa C. Tambrali. Brit. 394,860, July 6, 1933.

**Apparatus for the wet treatment of textiles on bobbins.** Zittauer Maschinenfab. A.-G. (Alwin Schwenke, inventor). Ger. 580,694, July 14, 1933. Addn. to 484,228 (C. A. 24, 975).

**Tentering and drying machine for fabrics.** Emile Prat. Brit. 394,521, June 29, 1933.

**Decomposition products of albumin.** Chemische Fabrik Grunau Landshoff & Meyer A.-G. Fr. 749,228, July 20, 1933. Decomposition products of high mol. wt. from albumin, particularly those of the type of lysalbinic and protalbinic acids are given new properties by treating them with fatty acids, said or not, of high mol. wt. or their substitution products or derivs. The products obtained may be used in washing, dyeing or mercerizing baths and for treating textile fibers and leather.

**Washing and decolorizing textile materials.** Victor Weerts, Jr. and Maximine Soc. anon. Brit. 394,871, July 6, 1933. See Belg. 384,611 (C. A. 26, 6159).

**Desizing and bleaching textiles.** De Fibergesche Stoombleekery voorheen de Firma G. J. Ten Cate & Jonen. Brit. 395,306, July 13, 1933. Textiles are desized and bleached by treatment under pressure with an enzyme bath and the usual bleaching baths, said baths being successively circulated through the material in the same vessel. App. is described. The walls thereof are of manifold. App. or lined with an alloy contg. Fe, Cr, Ni, C and not less than 2% Mo, e. g., an Fe alloy contg. Cr 18, Ni 8, C 0.15 and Mo 34%.

**Delustering rayon.** Imperial Chemical Industries Ltd. and Leslie G. Lawrie. Brit. 393,985, June 19, 1933. Rayon comprising cellulose acetate or other acyl, alkyl or aralkyl deriv. of cellulose is delustered by treatment at an elevated temp. with an emulsion, of less than 5% concn., of pine oil, i. e., an oil in which terpenols are the main constituents. A powerful wetting and swelling action is exerted by the oil which assists the penetration of dyes. Among examples 10 lbs. of cellulose acetate or benzyl-cellulose rayon is delustered by treating 0.5-0.75 hr. at 80-90° in a bath contg. in 20 gals. of water 2 lbs. of an emulsion of pine oil 25, turkev red oil 25 and  $H_2O$  50 parts. Sulfonated fish oils and highly sulfonated castor oil are also specified as emulsifying agents.

**Delustering cellulose acetate.** Bleachers' Association Ltd. and Geo. D. Sutton. Brit. 394,332, June 21, 1933. Fibers or fabrics consisting of or contg. cellulose acetate are treated with  $H_2SO_4$  of preferably 3-6% concn. and, after removing the acid, the materials are delustered in known manner while under tension. When the delustering agent is a boiling soap soln. that contains a little  $PhOH$ , the delustered material may be finally washed with dil.  $NH_3$ . In 394,333, June 21, 1933, the delustering is carried out in known manner without applying tension.

**Mercerizing liquor.** Hermann Schuette (to I. G. Farbenind. A.-G.). U. S. 1,929,654, Oct. 10. An alk. mercerizing liquor is formed comprising a water-sol. salt of an acid sulfuric ester of an aliphatic alc. contg. from 4 to 8 C atoms, such as the Na salt of the acid sulfuric ester of hexyl alc. to reduce the surface tension of the alk. liquor.

**Mercerizing lyes.** I. G. Fabrik chemischer Produkte Spezialitäten für die Textilindustrie. Brit. 394,499, June 29, 1933. A naphthene and a phenol or a deriv. thereof, e. g., cresol, xylenol, chlorophenol, are added to mercerizing lyes. A small amt. of aliphatic ales., aromatic or hydrogenated aromatic compds. that increase the moistening power of the lyes may also be added. In examples cresol and naphthene alc. and cresol, naphthene alc.,  $BuOH$  and methyleyclohexanol are added.

**Combined mercerizing and neutralizing machine for yarns, etc.** Soc. Veuve Bonnet Aine et ses Fils. Brit. 394,906, June 22, 1933.

**Treating furs for extending or straightening the hair.**



Alexander Nathansohn. U. S. 1,931,355, Oct. 17. Skins such as those of sheep, etc. are treated with a substantially anhyd. lower aliphatic acid such as formic or acetic acid. Gasoline,  $C_6H_6$ ,  $CHCl_3$  or  $CCl_4$  may be used as solvents, and  $EtOAc$ , ethyl ether,  $EtOH$  or acetone act as retarders.

Rubber coated fabric. Wm. S. Gocher and Arthur N. Parrett (to E. I. du Pont de Nemours & Co.). U. S. 1,931,110, Oct. 17. A rubber-coated fabric is provided with a final baked coat of a compn. comprising asphalt oil (an unsatd. distillate or asphalt), pigment and drying oil, which serves to give good durability and weather resistance. Cf. C. A. 27, 631.

Rubberized fabric. Foster D. Snell and Aaron London (to Londat Agtz Fabric Co.). U. S. 1,929,368, Oct. 3. A transparent sheet of flexible material such as strained latex is cast upon a foundation layer of flexible open-work material such as lace so that the design of the latter remains visible through the overlying cast layer which fills the open portions of the design.

Kier suitable for boiling and finishing textile fabrics. Ethelbert A. Kusden and Kenneth S. Johnson (to Textile-Finishing Machinery Co.). U. S. 1,931,119, Oct. 17.

Various details are described of app. and of a liquid circulating system in which steam is injected into the central portion of the liquid in the kiers.

Wetting agents, etc. H. Th., Bohme A.-G. Brit. 393,769, June 15, 1933. The wetting, cleansing, foaming and dispersing power of liquids and plastic preps. used for treating textiles, leather or other fibrous materials is improved by the addn. of synthetically prepd. glucosides derived from sugars or polymeric carbohydrates and aliphatic alcs. having more than 5 C atoms, cycloaliphatic or aromatic alcs. or substitution derivs. thereof such as halogen, amino or carboxy derivs. The glucosides may be prepd. by known methods or directly from the sugar by treatment with a soln. of  $HCl$  in the alc. Starch is treated with  $HI$ ,  $AcBr$  and glacial  $AcOH$  to produce aceto-bromoglucose. Among examples a dye bath for cotton contains Sirius blue G,  $Na_2CO_3$ ,  $Na_2SO_4$ , the Na salt of lauryl sulfuric ester and lauryl glucoside and a spinning flux comprises an emulsion of olein, cetyl glucoside, Turkey-red oil and  $H_2O$ .

Wetting agents for textile fibers. Newport Chem. Corp. Ger. 583,475, Sept. 4, 1933. See Fr. 710,541. (C. A. 26, 1803).

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

A century of progress in the paint industry. Geo. B. Heckel. *Paint, Oil & Chem. Rev.* 95, No. 20, 5-8, 18; *Am. Paint J.* 17, No. 51, 18 et seq., No. 52, 16 et seq. (1933).

Common sense in the paint and varnish industry. Wilhelm Krumhhaar. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 520-32; *Paint, Oil & Chem. Rev.* 95, No. 22, 43 et seq. (1933).—The value of cooperative research is stressed.

Technical educational work in Great Britain. For the student in paint and varnish technology. Louis L. Drake. *Paint & Varnish Production Mgr.* 8, No. 5, 24-7 (1932); 9, No. 11, 32-4 (1933).—A brief account is given of the courses in paint and varnish technology of the Borough Polytechnic, London. A list of other institutions offering similar courses is given.

Casein in paint technology. Georg Zerr. *Farben-Ztg.* 38, 1250-90, 1314, 1338, 1360-1, 1469-70 (1933). The production of casein, methods of dispersing it and suitable pigments for casein paints are described.

Casein paints and casein emulsion vehicles. Gottfried Troger. *Farbe u. Lack* 1933, 472, 487-8, 499-500, 516.—The phys. and chem. properties of casein are reviewed. Types of casein suitable for use in paint, methods for dispersing it and preserving it from decompn., suitable pigments and uses for casein paint are given.

Red lead or iron oxide paint. J. Rinse. *Verfkromck* 6, 238-9 (1933).—Polemical (cf. Matthijsen, C. A. 27, 5655).

The degree of protection afforded wood against moisture by paint coatings. F. L. Browne. *Paint, Oil & Chem. Rev.* 95, No. 18, 9-12 (1933).—A summary of C. A. 27, 4423, with some newly arranged tables. The effectiveness of coatings on different woods was in the following order: So. white pine (best), No. white pine, Douglas fir and redwood. The vol. percentage of pigment in a paint, within the range 24-48%, has little effect on the permeability of the paint to moisture. Zn oxide seems to rank higher than white lead, other opaque pigments ranking next. Linseed oil paints increase in effectiveness during the first 6 months of exposure.

Valuation of paints for acoustical treatment. P. C. Atwood. *Am. Paint J.* 17, No. 53A, 8 et seq.; *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 443-53; *Paint, Oil & Chem. Rev.* No. 22, 53 et seq. (1933).—Paint is not an acoustical corrective and must be applied with care in order not to reduce the sound absorption of acoustical surfaces. It must be of such consistency that the fine pores and holes are not filled or bridged over. Data from

various sources on the sound absorption of various surfaces before and after painting are assembled. Some tests by A. are also given.

The effect of high temperatures on some paint materials. Detroit Paint and Varnish Production Men's Club. *Am. Paint J.* 17, No. 53A, 18; *Paint, Oil & Chem. Rev.* 95, No. 22, 52, 92; *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 505-7 (1933).—A no. of pigments and vehicles were subjected to gradually increasing temps. in an elec. muffle. Turps. causing changes in appearances or decompn. are given.

Accelerated weathering of paints and varnishes. V. G. Jolly. *J. Soc. Chem. Ind.* 41, 329-36T (1933).—Test panels were exposed continuously to light from a powerful C arc and intermittently to a cold water spray. For a wide variety of clear and pigmented oleoresinous products, this test gave failure of the same kind and in the same order as obtained with control panels on ordinary outside exposure. No quant. relationship existed, however, between life under accelerated and normal conditions, and results for compns. in which nitrocellulose predominated could not be correlated with the rest. Factors influencing the test (changes of temp. and humidity, type of supporting surface for film, intensity and wave length of ultra-violet light) are discussed.

Priming coat reductions for painting new wood surfaces. F. L. Browne. *Am. Paint J.* 18, No. 4, 19 et seq.; *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 454-8; *Paint, Oil & Chem. Rev.* 95, No. 22, 67-8, 96 (1933). The condition of the tests described in C. A. 26, 1138, after 26 months is given. In general, the relative orders of failure of all paints on the 4 woods are the same, indicating that the optimum percentage of thinner (turps) is the same for all 4 woods. Many details regarding cleanliness, chalking, etc., are given.

The causes of and remedies for paint failures on plaster surfaces. Montreal Paint & Varnish Production Club. *Am. Paint J.* 17, No. 53B, 14-16; *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 425-31; *Paint, Oil & Chem. Rev.* 95, No. 22, 71-3 (1933); cf. C. A. 27, 432.—Painting tests were conducted on plaster panels which included as one ingredient 0.1-2.0%  $Na_2SO_4 \cdot 10H_2O$ , equiv. to 0.03-0.50%  $NaOH$ . Including the  $NaOH$  introduced by the ingredients of the plaster, the max. amt. compatible with successful painting was 0.25%. Heat-bodied oils and  $S_2Cl_2$ -treated oils appeared to be the best vehicles. A high proportion of  $CaSO_4$  in the pigmented paints is desirable.

G. G. Sward

**A study of livering and its prevention by the use of catalysts.** Chicago Paint & Varnish Production Club. *Am. Paint J.* 17, No. 53B, 12-14; *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 450-69; *Paint, Oil & Chem. Rev.* 95, No. 22, 80 *et seq.* (1933).—The thickening of lithopone enamels contr. lined rosin-tung oil varnishes was proportional to the amt. of tung oil and acid value. Thickening was reduced by the addn. of small amts. of polar solvents, *e. g.*, cellosolve, and by dibasic and tri-basic org. acids, the latter being more effective. An attempt to predict the thickening tendencies of varnish by means of Gardner's alkali increase test was not successful. G. G. Sward

**Utilization of spirit of turpentine in paints.** G. Dupont. *Bull. inst. pin* 1933, 176. —The use of spirit of turpentine which has been aged several months is more economical than white spirit, even in relatively cheap paints for rolling stock, as the increased life of the paint more than offsets the difference in cost. A. Papineau-Couture

**Effect of China wood and fish oils in outside paints.** R. I. Kellam. *Am. Paint J.* 17, No. 53B, 16, 20, *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 477-80; *Paint, Oil & Chem. Rev.* 95, No. 22, 83-4 (1933).—Various properties of paints prep'd with linseed, tung, fish (pilchard) oils and mixts. thereof are noted and tabulated. Fish oil imparts to paints elasticity, blooming, non-yellowing and non-discoloration. Tung oil imparts gloss, a certain degree of shortness and yellowing. G. G. S.

**Accelerated tests for the settling of pigments in paints.** H. S. Werthan, R. H. Wien and B. A. Batzinger. *Ind. Eng. Chem.* 25, 1288-92 (1933); cf. *C. A.* 22, 2818. —Comparisons with actual shelf storage indicated that accelerated tests which involved storage at 65-70° with intermittent centrifuging tended to be too severe. Storage at elevated temp. is unnecessary, and centrifuging should certainly be performed at room temp. In the centrifuging a speed of 750 r. p. m. proved most satisfactory. With a simple lithopone flat wall paint a 4-day cycle consisting of 2 one-hr. centrifuging periods per day produced settling equiv. to 1 yr. of normal shelf storage. For a lithopone paint contg. 1% of a weak H<sub>2</sub>O soap soln. a 4-day cycle consisting of 2 half hr. centrifuging periods per day was satisfactory. H. Stoertz

**A study of the effect of addition agents on floating of pigments in paints and enamels.** Edwin Edelstein. *Am. Paint J.* 17, No. 53A, 11 *et seq.*; *Paint, Oil & Chem. Rev.* 95, No. 22, 40 *et seq.*; *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 481-97 (1933); cf. *C. A.* 26, 1130. It is postulated that exact neutralization by adsorption of suitable compds. will reduce floating. To det. the amt. of adsorption compd. necessary for neutralization, pigments were shaken with dil. petroleum spirits solns. of various materials, *e. g.*, rosin, stearic acid, NH<sub>4</sub> stearate, stearanilide, rosin anilide and the amt. of solute unadsorbed was detd. Various combinations of pigments and the above named materials were incorporated into paints and the behavior of the paints in an electrostatic field studied to det. the amt. of charge remaining on the pigment. The reduction of floating was not proportional to the reduction of the charge on the pigment. The effects of the addn. agent on gloss and drying were also detd. Illustrated. G. G. Sward

**Antimony oxide its properties and uses.** H. S. Riker. *Am. Paint J.* 17, No. 39, 47-52 (1933). —The general properties of Sb oxide pigment are described. Its unique properties are soft texture, low oil absorption and easy wettability. It imparts to paints good flow and slow drying and slow chalking properties. G. G. Sward

**A study of various pigments and vehicles in rust-inhibitive primers.** Pittsburgh Paint & Varnish Production Club. *Am. Paint J.* 17, No. 53B, 8 *et seq.*; *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 469-76 (1933). The rust-inhibitive values of single pigment paints were studied by means of (1) salt spray, (2) weatherometer, and (3) exterior exposure tests. The results are given in extensive tables. According to 1, Zn chromate and blue Pb; to 2, pptd. black Fe oxide; Pb chromate, Zn

chromate and red Fe oxide; and to 3, Pb chromate, Zn chromate and Al bronze appear best. G. G. S.

**Cadmium, thallium, indium and gallium as by-products of the lithopone industry.** W. N. Hirschel. *Chemistry and Industry* 1933, 797-8. E. H.

**Light fastness of coal tar color lakes.** Heinr. Haase. *Farbe u. Lack.* 1933, 484, 498. —Considerable confusion regarding light fastness of color lakes is due to non-uniformity of tests. Tests should always be made upon the finished paint. G. G. Sward

**New developments in driers.** C. A. Klebsattel. *Paint & Varnish Production Mgr.* 9, No. 11, 28-30 (1933). —Coincident with the development of synthetic resins, improved chem. pigments, petroleum solvents, etc., the naphthenate driers have appeared. Their superiority is due to uniformity, better soly., less after-staining and stability. G. G. Sward

**Drier standardization. The aridyne.** IV. W. Grier Armstrong. *Am. Paint J.* 17, No. 53B, 20-1; *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 498-505 (1933); cf. *C. A.* 26, 1140. —The relative drying times of oils are shown to be dependent upon the consens. of the driers, the natures of the oils and on atm. conditions. The aridyne, therefore, loses its chief virtue, *viz.*, stability. G. G. Sward

**Effect of driers on durability (of paint).** Cincinnati-Dayton-Indianapolis Paint & Varnish Production Club. *Am. Paint J.* 17, No. 53B, 11 *et seq.*; *Am. Paint & Varnish Mfrs'. Assoc. Circ.* No. 445, 508-20; *Paint, Oil & Chem. Rev.* 95, No. 22, 74-7, 100 (1933). —After 26 weeks of exterior exposure of the varnishes described in *C. A.* 27, 613, the following conclusions were reached. Pb in amts. up to 1.5% and Mn up to 0.4% did not reduce the durability. On the other hand, durability was inversely proportional to the amt. of Co in the varnish. Driers tend to increase tensile strength, reduce elongation and the resistance to exposure in a Fade-O-meter, in which aged films showed better durability than fresh ones. Co produced the hardest films, Pb the softest. There was no difference in durability due to the use of linoleate or naphthenate driers. G. G. Sward

**Rational syntheses in the field of drying oils.** Johannes Scheiber. *Angew. Chem.* 46, 643-7 (1933). —The synthesis of products, which are characterized by conjugated-unsatd. groups, is discussed, and drying curves as well as graphs showing I nos. and coagulation capacities as functions of heating time are presented. Twelve references. Karl Kammermeyer

**Oil absorption and space filling.** Hans Wolff and G. Zudler. *Farben-Ztg.* 38, 1495-7 (1933). —A statistical study of over 100 cases of oil absorption data shows that the ratios (vol. pigment at crit. oil content)/(vol. pigment at min. oil content) fall into 4 groups. The assumption that the particles of a paint are in cubic arrangement at the crit. oil content concn. (*C. A.* 26, 1456) must be extended to include the 4 groups which may or may not include other arrangements. It is therefore impossible to calc. the crit. oil content from detns. of min. oil content (cf. *C. A.* 27, 3348). G. G. Sward

**Further experiments on the importance of the critical point.** Hans Wolff. *Paint & Varnish Production Mgr.* 9, No. 10, 5 *et seq.*; No. 11, 16 *et seq.* (1933); cf. *C. A.* 26, 1161. Addnl. evidence for the existence of the crit. oil content is given. Brushability has a relation to the crit. oil content only in paints made with raw linseed oil. However, other properties, such as tensile strength, resistance to liquids, etc., do depend upon the oil content of paints made with stand oil. Bodying of stand oils takes place in 3 stages: (1) in which linolic acid is converted to a high-melting isomer with 1 inactive double bond and linolenic acid no longer gives hexabromides; (2) in which the I no. of linolenic acid is reduced; and (3) in which greater changes in  $\eta$  but only lesser ones in I no. occur. The evidence is based upon isolation from (1) of high-melting acids of high refractive index with relatively low mol. wts. and Br values (Becker-Rossmann). G. G. S.

**Polymerization of linseed oil.** H. I. Waterman and

D. Oosterhof. *Rac. trav. chim.* 52, 895-900 (1933).—High-vacuum distn. app. is described in which a thin film of the liquid is in contact only 8-4 sec. with the heated surface, both distillate and residue being cooled immediately afterward. By use of a vacuum obtained by immersing charcoal in liquid air, linseed oil could be almost completely distd. without significant change in const. Stand oil (viscosity 55 poises) gave 19 g. of distillate having poor drying properties, becoming cloudy on standing, and consisting of unpolymerized glycerides (mol. wt. 757) and 41 g. of nondistillable residue (mol. wt. 3468, viscosity 379 poises) which remained clear on standing, dried better than the original stand oil, and had a lower acid no. The 2 fractions had nearly the same I no. and ultimate analysis. Arnold M. Collins

Water absorption by varnish and lacquer coats and its relation to their composition. P. W. Serb-Serbin, *Malyarnoe Delo*. 1931, No. 5/6, 62-75; *Chem. Zentr.* 1932, 1, 2388.—Varnishes having exclusively liquid film formers or binders (linseed and wood oils) show the greatest H<sub>2</sub>O absorption. The largest value is shown by oxidized oils (30%), 23.6% is shown by polymerized oils, and a max. of 15% by polymerized-oxidized oils. Addn. of wood oil to linseed decreases the H<sub>2</sub>O absorption. Russian and Chinese wood oils being quite different in this respect. Introduction of solid binders (resin esters) retards H<sub>2</sub>O absorption, so that twice the time is required to reach the same max. absorption, but otherwise improves H<sub>2</sub>O absorption and resistance of the films. Increasing the resin ester and decreasing the oil content almost doubles the hardness of the film. Introduction of nitrocellulose and decreasing the oil content decrease the quantity of H<sub>2</sub>O absorbed, the film finally reaching a stable condition with 12.8% H<sub>2</sub>O absorbed. Red ochre has no effect on the H<sub>2</sub>O absorption of varnishes having liquid binders (with the exception of polymerized oils); it decreases the adhesion about 23%. The same holds for varnishes with solid and liquid binders. Chrome orange greatly retards H<sub>2</sub>O absorption and increases the adhesion (liquid binders) about 25%. Pigmented heavy oil from Chinese wood oil is an exception. PbCrO<sub>4</sub> improves varnishes with solid and liquid binders without increasing their adhesion. M. G. Moore

Mat varnishes. Kern *Farbe u. Lack* 1933, 511 15. Hints for selection of matting media for varnish and lacquer are given. G. G. Sward

Baking varnishes for the metal-decorating industry. Fritz Zimmer *Farben Ztg.* 38, 1530 1 (1933).—A few properties of baking enamels for tin plate, and machinery for application and baking of the enamels are given. G. G. Sward

Shellac production in India. K. De Basanto *Farbenchem.* 4, 293 6, 325 7, 412 15 (1933). G. G. Sward

Clarifying and straining of surface coatings. Wm. DeCamp and J. McF. Sanders *Am. Paint J.* 17, No. 53A, 24 5, *Am. Paint & Varnish Mfrs.' Assoc.* (circ. No. 445, 438 42; *Paint, Oil & Chem. Rev.* 95, No. 12, 78 9 (1933)). G. G. Sward

An experiment in the temperature effect of various colored coatings on contents of tanks. Lloyd R. Moses. *Paint, Oil & Chem. Rev.* 95, No. 20, 9 10 (1933).—White enamel, Al paint and black paint ranked in the order named in their effectiveness in reflecting the heat of the sun from 55 gal. drums contg. H<sub>2</sub>O and 1 gal. cans contg. mineral spirits. G. G. Sward

Efflorescence on black enamels. Felix Fritz. *Farbe u. Lack* 1933, 475.—A case of white efflorescence on black enamel was diagnosed as sweating of fatty acids of high m. p. G. G. Sward

The behavior of aluminum stearate with various solvents. Francis J. Licata. *Official Digest, Fed. Paint & Varnish Production Clubs* No. 129, 250-60 (1933); cf. *A.* 27, 4105.—Hydrocarbons are more effective dispersing agents than esters, alcs., ketones, etc. Aromatic hydrocarbons are more effective than aliphatic, and long chain more effective than short chains. For flattening purposes the dispersions should be kept cool during

grinding, as gelling and loss of flattening properties is induced by high temps. G. G. Sward

Aqueous emulsions of cellulose ester solutions. Walter König. *Farbe u. Lack* 1933, 461-2, 474-5.—Emulsifiability of nitrocellulose solns. was detd. by adding H<sub>2</sub>O drop by drop to 12.5 or 25 g. with vigorous stirring until an excess of 2.5 cc. was obtained. The emulsion no. passed through a max. as the viscosity of the nitrocellulose soln. increased. Plasticizers may increase or decrease the no. All films laid down from emulsions dried white. Water-sol. solvents must not be present. G. G. Sward

Non-metal constituents in bright gold. II. Akira Nakatsuchi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 524 5 (1933); cf. *C. A.* 27, 3625.—The influence of impurities such as organo-halogen compds. and organo-S compds. on bright gold was studied and the course of change during the heating of balsam golds and rhodium balsam was investigated. Karl Kammermeyer

Dope poisoning as a potential hazard in spray-coating airplane wings. Clifton A. Young. *U. S. Naval Med. Bull.* 31, (38-86) (1933).—It is recommended that benzene, tetrachloroethane and o-trichlorophosphate be excluded from a standard formula for navy airplane dopes. B. C. Brunstetter

Chlorinated resins. C. A. Redfern *Paint Manuf.* 3, 312 14 (1933).—A brief review. G. G. Sward

Plant equipment from synthetic resins. D. H. Killefer. *Ind. Eng. Chem.* 25, 1217-19 (1933).—The development of liquid molding compds. which contain asbestos fiber and Ph(OH-CH<sub>2</sub>O) resin and which may be hardened without pressure allows the manuf. of large and intricate shapes without expensive molding equipment. Absence of cellulosic fillers makes the product highly acid resistant without loss of strength. It may be drilled, threaded, etc., like wood and may be satisfactorily joined by autogenously hardened cement. Arnold M. Collins

Cannabis indica resin (Cahn) 10. Lacquers for the canning industry (Barry) 12. Azo dyes [for coloring lacquers] (Ger. pat. 583,224) 25. App. for polishing colored pulverulent bronze (U. S. pat. 1,930,683-4) 9.

Gardner, Henry A.: Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors. 6th ed. Washington. Inst. of Paint & Varnish Research. 1500 pp. \$11.00. Reviewed in *Ind. Eng. Chem.* 25, 1406 (1933).

Paints, varnishes, etc. 1. G. Farberund A.-G. Fr. 749,156, July 20, 1933. Products serving as a basis for paints, etc., are made by polymerizing transformation products of vegetable oils which are at least partially drying, in common with polymerizable ethers and ketones which contain at least one vinyl radical. The transformation products are obtained by esterification of the oils by means of alcs. other than glycerol, or by heating the oils in the presence or absence of air, if necessary in the presence of polymerization catalysts. Fr. 749,157. The ethers or ketones are replaced by a polymerizable open chain aliphatic hydrocarbon contg. at least one vinyl radical. Fr. 749,158. The ethers or ketones are replaced by a polymerizable vinyl compd. of the formula RX (R is an alkyl radical contg. a vinyl group and X is halogen or CN).

Paints and varnishes. George H. Potts. Brit. 393,045, June 7, 1933. Anticorrosive varnishes, which may be mixed with pigments to give paints, contain a paste boiled oil obtained by adding to boiling flaxed oil a soln. of mastic in turpentine, white lead, Zn white, shellac varnish, borax and AcOH and, after cooling, adding copal varnish and turpentine. The oil is mixed with (1) raw flaxed oil, copal or other varnish free from colophony, a paste consisting of Zn white, white lead, linseed oil and copal varnish and a soapy liquid consisting of alum, soda, olive oil, turpentine, coconut oil, palm oil and lard and (2) in addn. to the ingredients of (1) a varnish consisting of

shellac, methylated spirit, venice turpentine and Am-OAc, together with small proportions of vegetable oils, *e. g.*, coconut, palm or olive.

**Pigments.** Carl J. Harbert (to the Harshaw Chemical Co.). Brit. 393,474, June 8, 1933. Pigments are obtained by heating together O-contg. compds. of Ti, Sb and Cr in the presence of an element that is electropos. to the other 3 constituents at high temp., *i. e.*, combines as a base therewith. The products are insol. in  $H_2O$ , acids and alkalis, inert to most chem. reagents at high temp. have high opacity and covering power, range from light yellow through orange and brown to olive and may be used in the manuf. of pottery, paints, cements and rubber articles. Among examples mixts. of (1)  $TiO_2$ ,  $Sb_2O_3$ ,  $CrO_3$  and  $NaOH$  and (2)  $MgCO_3$ ,  $SuO_2$ ,  $SrCO_3$ ,  $CdO$ ,  $NiCO_3$ ,  $Al_2O_3$ , Na silicate, kaolin or feldspar,  $TiO_2$ ,  $CrO_3$  and  $Sb_2O_3$  are heated.

**Drying extract.** I. G. Farbenind. A.-G. (Friedrich Meidert and Hermann Schutz, inventors). Ger. 576,939, May 19, 1933. A homogeneous drying ext. readily sol. in drying oils and volatile org. solvents is prepd. from heavy or alk. earth metal salts of naphthenic acids and fatty acid drying or semi-drying oils such as linseed, wood, soy-bean or poppy seed oils. The product is used in the paint and varnish industry. In an example, naphthenic acid is saponif. with  $NaOH$  and the clear soln. treated with  $Co_2(SO_4)_3$ . The resulting ppt. is washed and mixed with linseed oil.

**Modified vegetable oils.** Institut für Lackforschung (G. m. b. H. (Felix Wilborn and Erdmann Rieger, inventors). Ger. 583,249, Sept. 9, 1933. Vegetable oils such as linseed oil are thickened by heating for several hrs. to  $240^\circ$  or more after addn. of a small proportion of an oil-sol. compd. of Th, *e. g.*, Th resinate, lincolate, naphthenate or stearate.

**Varnishes.** Elektrochemische Werke München A. G. Brit. 395,299, July 13, 1933. A varnish comprises a colloidal aq. soln. of wood oil stand oil, *e. g.*, wood oil stand oil 75, Co resinate 2 and turpentine oil 25 parts may be mechanically dispersed in 100 parts  $H_2O$  to which 1 part of an emulsifying agent, *e. g.*, K resinate, has been added.

**Lacquers.** Aug. Nowack A.-G. and Richard Hessen. Fr. 750,574, Aug. 12, 1933. In making lacquers contg. artificial resins, particularly  $PhOH-CH_2O$  resins, the filling and coloring materials are incorporated in the resins by kneading under pressure and at a temp. at which the resin becomes plastic or liquid, before adding the usual solvents.

**Colored lacquers and plastic masses.** Soc. pour l'ind. chim. à Bâle. Ger. 584,387, Oct. 11, 1933. See Brit. 385,409 (C. A. 27, 4429).

**Nitrocellulose "dope" for coating airplane and balloon fabrics, etc.** Linton C. Amberson. U. S. 1,931,368, Oct. 17. A soln. of nitrocellulose is treated with an aq. soln. of a Zn salt such as  $ZnCl_2$  and  $HCl$  to effect pptn. of the nitrocellulose; the acid liquor is then drawn off, the residue is washed with an aq. soln. of a Mg salt such as  $MgSO_4$  and finally washed with water; a plasticizer is added to the wet residue and it is worked with further sept. of water, and dissolved in a liquid contg. volatile solvents.

**Japanned metallic tiles.** Sotojiro Asobe. U. S. 1,930,990, Oct. 17. The surface of tiles such as those formed of Al or Mg alloys is coated with a moist mixt. of red ochre, tonoko (lignified fine powder of clay slate or fine powder of Japanese grinding stone) and kirurushi (raw japan); the coated material is heated to  $180-220^\circ$  and the surface is polished, treated with a coat of japan and again polished.

**Printing composition suitable for use on wet lumber.** Logan A. Mizener (to Chicago Mill and Lumber Corp.). U. S. 1,930,178, Oct. 10. A pasty base of starch and water is used with a water-sol. aniline color, glycerol and vinegar in specified proportions.

**Printing on sausage casings or other articles of regenerated cellulose.** Julius Voss (to Visking Corp.). U. S. 1,929,394, Oct. 3. In order to fix them, imprints which may be formed with an oil-base ink on regenerated

cellulose articles are dried and then subjected to a high temp. (suitably about  $100^\circ$ ) in a relatively humid atm.

**Rosin composition resistant to crystallization.** Irwin W. Humphrey (to Hercules Powder Co.). U. S. 1,931,226, Oct. 17. Rosin is mixed with about 15% or less of a rosin-distn. residue, in order to form a product which is suitable for use in core oils, varnishes, printing inks, etc.

**Apparatus for making molded inlaid linoleum.** Edward J. Kessler (to Armstrong Cork Co.). Brit. 396,047, July 25, 1933.

**Synthetic resins.** E. I. du Pont de Nemours & Co., Walter E. Lawson and Lloyd T. Sandborn. Brit. 392,924, May 15, 1933. Vinyl compds., *e. g.*, vinyl acetate, chloride or styrene, are polymerized in the presence of non-polymerized, non-oxidized drying oils in the absence of  $H_2O$ . Among examples (1) vinyl chloride and raw linseed oil are polymerized in the presence of Bz peroxide, (2) styrene and alkali-refined linseed oil are polymerized in soln. in ethylbenzene and (3) a spraying enamel consists of the resin of example (2), dioxylethane, a drier and "Titanox" pigment dissolved in a mixt. of  $C_6H_6$ , PhMe and xylene. Cf. C. A. 27, 3837.

**Synthetic resins.** Walter W. Durant and Paul H. Scrutcheild (to The British Thomson-Houston Co. Ltd.). Brit. 393,034, June 1, 1933. A dihydric alc., *e. g.*, propylene, diethylene or tetramethylene glycol, an alc. having 3 or more OH groups in the mol., *e. g.*, glycerol, a dibasic aliphatic acid, *e. g.*, malic, maleic, fumaric, glutaric, adipic, pimelic or suberic, a polybasic acid other than a dibasic aliphatic acid, *e. g.*, phthalic, citric or tartaric, a vegetable oil, *e. g.*, linseed, perilla or soy-bean, and a natural resin, *e. g.*, dammar, kauri or copal, or resinic acid derived therefrom, are condensed together to give a resinous compn. Cf. C. A. 27, 4431.

**Synthetic resins.** I. G. Farbenind. A.-G. Ger. 576,714, May 16, 1933. Resinous condensation products are produced by condensing polyhydric alcs. partly esterified by fatty acids, with phenols and treating the product with  $CH_2O$ . Alternatively, the polyhydric alc. can be condensed with a phenol, then partly esterified by a fatty acid, and finally treated with  $CH_2O$ . In an example, the mono ester of glycerol and lauric acid is condensed with  $PhOH$  in the presence of  $ZnCl_2$ , and treated with  $(CH_2O)_2$  to give a mass useful in the lacquer industry.

**Synthetic resins.** Allgemeine Elektrizitäts-Ges. Ger. 582,164, Sept. 2, 1933. In the manuf. of resins from polyhydric alcs. and polybasic acids or their anhydrides, *e. g.*, from glycerol and phthalic anhydride, an amino-carboxylic acid is added at any stage before the conversion of the resin into its final form. The amino acid may be formed *in situ*, *e. g.*, from  $PhNH_2$  and  $ClCH_2COOH$ . Preferably, 0.25-0.75 mol. of amino compd. is taken per mol. of polyhydric alc. Blue resins of improved mech. and elec. properties are obtained. The color may be changed by after-treatment, *e. g.*, with Br. Examples are given.

**Casting synthetic resins.** Ambi-Verwaltung A.-G. (Arthur Muller, Stefan Goldschmidt, Emil Gerisch and Wilhelm Beuschel, inventors). Ger. 584,308, Sept. 19, 1933. Details are given of a method of mfg. large disks from synthetic resins of the urea- $CH_2O$  type. The principal features of the method are (1) the use of closed vertical molds made of acid material, *e. g.*, an acid glass, and (2) the drying of the molded disks in an air stream of gradually rising temp. and a humidity about 10-40% below the satn. pressure of water vapor at the obtaining temp.

**Artificial resin compositions.** James G. F. Wright (to The British Thomson-Houston Co. Ltd.). Brit. 394,450, June 29, 1933. Alkyd resins, modified or not with vegetable oils or their fatty acids, in a state no longer permitting soln. in a volatile solvent but still capable of absorbing such solvent accompanied by swelling (the B-stage) are treated with a swelling agent, *e. g.*,  $Me_2CO$ ,  $Me$  cellosolve or mixts. of  $C_6H_6$  and alc., in the presence of a plasticizer, *e. g.*, vinyl chloride or acetate, tricresyl or diphenyl phosphate, camphor, dibutyl phthalate and the

product, with or without fillers and (or) pigments is molded. The alkyd resin may contain its own plasticizer in the form of an ester of the ingredients used, e. g., glycol succinate or adipate. Examples are given. Cf. C. A. 27, 5906.

**Artificial resin molding compositions.** Imperial Chemical Industries Ltd. and Wm. J. S. Naunton. Brit. 395,023, July 10, 1933. Comps. for making articles having variegated color surfaces are made by placing layers of colored molding powders, comprising phenol-aldehyde condensation products in the A stage, fillers and pigments, in a container, heating to about 100°, extruding and, if desired, breaking the extruded mass into fragments. In an example brown molding powder is placed in a vertical cylindrical extrusion press, provided with a hole near the

bottom at 1 side, red powder is poured over it and the mass is heated and extruded to produce rods colored red and brown.

**Molding artificial resin.** Frazier Groff (to Carbide & Carbon Chemicals Corp.). Brit. 392,770, May 25, 1933. To produce composite molded articles comprising a metallic portion and a portion of polymerized products of vinyl compds. with or without fillers, e. g., cellulose, alk. earth, metal salts of fatty acids, or natural or artificial acid resins, and also with or without fluxing agents, e. g., curcumba wax, the metallic portion is treated by etching, plating or sizing with a priming agent to cause the vinyl compd. to adhere on the application of heat and pressure. Suitable sizing materials are  $\beta$ -coumarone resin and resins of the Glyptal group.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**The detection of the adulteration of cacao butter. Determination of the azelaic acid number.** G. Schuster. *Compt. rend.* 197, 760 2(1933); cf. C. A. 27, 1955.—The azelaic acid no. is defined as the no. of mg. KOH required to neutralize the acidity of 1 g. of the mixed insol. acid glycerides obtained by  $\text{KMnO}_4$  oxidation of the fat. Direct detn. of this const. by sepn. of the glycerides and acidimetric titration is a delicate operation on account of the difficulty of eliminating pelargonic acid which is but slightly sol. in  $\text{H}_2\text{O}$ . The following technique, which makes use of the considerable difference in soly. of the Mg salts of pelargonic acid and of azelaic esters in 80% alc., is recommended: Oxidize 40 g. cacao butter dissolved in 400 cc.  $\text{Me}_2\text{CO}$  with 160 g.  $\text{KMnO}_4$ ; dissolve the mixed acids in 350 cc. 80% alc.; to the hot soln. (70–80°) add a hot soln. of 6 g. anhyd.  $\text{MgCl}_2$  in 60 cc. 80% alc.; let stand 24 hrs. at 15°, filter, wash with 100 cc. 95% alc. and then with distd. water, dry in vacuum over  $\text{H}_2\text{SO}_4$ ; in 1 g. of the Mg salts det. Mg as  $\text{MgSO}_4$  and calc. therefrom the equiv. KOH. Cacao butter has an azelaic acid no. of 98.7; Karite butter, 131.1. In mixts. of the 2, the compn. can be calcd. from the azelaic acid no.; in more complex mixts., it can detect adulteration.

**A. Papineau-Couture**  
**Report on (the analysis of) fats and oils.** Geo. S. Jamieson. *J. Assoc. Official Agr. Chem.* 16, 568–9(1933); cf. C. A. 27, 2001.—Detn. of the acidity and sapon. no. of extd. cottonseed oil gives higher results by the Albert method than by the present official A. O. A. C. method.

**A. Papineau-Couture**  
**The fat and the oil from the seeds of Actinodaphne hookeri Meissn. An indigenous source of lauric acid.** S. V. Puntambekar and S. Krishna. *J. Indian Chem. Soc.* 10, 395 100(1933).—Ninety-six % of the fat which was extd. from the kernel of the seeds was shown to be trilaurin. The remainder was chiefly triolein. Some trilaurin was obtained from the seed shells. The oil remaining after sapon. was a small amt. of resin acids, a mixt. of glycerides of oleic acid and isomeric oleic acids. P. and K. suggest the use of the fat as a convenient source of lauric acid.

**Julius White**  
**New method for the capillary fractionation of fatty acids.** René Dubrisay. *Chimie et industrie Special No.*, 1045–7(June, 1933).—Gibbs' principle that the compn. of the surface film of a soln. has not the same compn. as the mass of the liquid is generalized, showing that the impoverishment or enrichment of the surface film varies with different solutes. Application of this principle is made to the sepn. of 2 or more soaps in a given soln.; by bubbling air through the soln. and sepr. the foam considerable sepn. may be effected. Several examples are given.

**A. Papineau-Couture**  
**Chemical constitution of the unsaturated fatty acid  $\text{C}_{20}\text{H}_{38}\text{O}_2$  in Japanese sardine oil.** Masakichi Takano. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 550 1 (1933).—The mixed fatty acids were sepd. by the Na and Pb salts-acetone method and fractionated as Me esters.

From the 220–5° fraction (at 6 mm.) the fatty acids were liberated, converted to the Li salts and fractionally sepd. by means of alc. Nearly pure eicosenoic acid was obtained which had a neutralization value of 180.28, and an I no. of 82.34 and m. 22–23°. Its chem. constitution was ascertained to be  $\text{CH}_3(\text{CH}_2)_9\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$ .

Karl Kammermeyer

**Unsaturated fatty acids of the oleic series in Japanese sardine oil.** Masakichi Takano. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 549–50(1933).—The mixed fatty acids from the sapon. of oil were sepd. by the Na and Pb salts-acetone methods. The liquid fatty acids were converted into their Me esters and fractionated by vacuum distn. The acids identified were (1) zoömaric acid, (2) oleic acid (probably normal), (3) gadoleic acid, and (4) eicoteic acid. Acids (1) and (2) constitute 20–30% of the total mixed fatty acids. Five references. K. K.

**Examination of the fatty acids separated from soaps.** G. Wolff. *Chimie et industrie Special No.*, 1039–42 (June, 1933).—Attention is drawn to the complexity of the problem of detg. the nature and amts. of fats used in the manuf. of soaps made from several different fats. Emphasis is laid on the value of the titer test, the value of which, however, is not proportional to those of the materials used. Curves are given showing the variation in the titer test of various mixts. of peanut, coprah, tallow, stearic acid, palm oil, horse fat, soy-bean oil, linseed oil and rosin.

A. Papineau-Couture

**Taffel and Revis method for estimating the rancidity of oils and fats.** J. K. Giles. *Chemistry and Industry* 1933, 816 17.—The method of T. and R. (C. A. 25, 2315) is revised as follows: Through a 2-oz. bottle contg. 40 ml. of glacial  $\text{AcOH}$  kept in  $\text{H}_2\text{O}$  at 95–100°, pass a stream of  $\text{CO}_2$  for 2 min. Next add 2 ml. of 50%  $\text{KI}$  with the  $\text{CO}_2$  still on, and after 1 min. pour in a weighed amt. of liquid fat (approx. 10 ml.) and obtain the wt. by reweighing the cylinder. Pass the  $\text{CO}_2$  for 4 min. and then pour the bottle contents into 150 ml. of  $\text{H}_2\text{O}$  and titrate with 0.02  $N$   $\text{Na}_2\text{S}_2\text{O}_3$  with starch soln. as indicator. Make a blank detn.

E. Scherubel

**Determination of the hydroxyl number.** W. Normann and F. Schilcknecht. *Fettchem. Umschau* 40, 194–7(1933).

The following modification of the Verley-Rölsing method for acetyl no. has been developed by N. and S.: Into a 150-cc flask weigh enough substance to use up only  $\frac{1}{2}$  of the  $\text{Ac}_2\text{O}$  to be added, and from a pipet weigh 4 cc. of a fresh mixt. of 1 vol.  $\text{Ac}_2\text{O}$  and 2 vols. pyridine. Cover the flask with a funnel and immerse it 1 cm. for 1 hr. in boiling  $\text{H}_2\text{O}$ . Cool, rinse the funnel with 0.5–1.0 cc.  $\text{H}_2\text{O}$ ; cool again if heat is liberated, dil with neutral alc. and titrate back with 0.5  $N$  alc. KOH and phenolphthalein; run a blank. Then: hydroxyl no. =  $[(b - a)28.055/e] + A$ , where  $a$  = cc. 0.5  $N$  KOH,  $b$  = cc. used in blank,  $e$  = wt. of substance and  $A$  = any free acid no. the substance may have had. There is also described a method for the detn. of alcs. whose esters are volatile in mixts. of fatty acids and neutral fats. P. E.

The oil production from sunflowers and its economic significance for Germany. K. Riccius. *Fellchem. Umschau* 40, 201-4 (1933).—A plea for introducing sunflower cultivation in Germany. P. Escher

Russian soy-bean oil. S. Yushkevich. *Fellchem. Umschau* 40, 197-200 (1933).—An extensive table shows the const. and compns. of 13 carefully prep'd. soy-bean oils from all parts of the Soviet Union, mostly of the Kruschula type of soy-bean between 41° and 53° N. Latitude and from 36° to 132° E. Longitude. The oils show a fairly const. linoleic acid content of 50%, but the northern country produces oils with a greater percentage of linolenic and a lesser percentage of oleic acid, while southern latitudes produce oil with small amts. of linolenic acid and larger amts. of oleic acid. In general the const. agree with published values, except that some of the northern samples exceed the values for I no., hexabromide no. and thiocyanate no. Limits are: sat'd acids 11.22-20.55, oleic acid 18.33-32.62, linoleic acid 41.90-56.27, linolenic acid ( $\alpha$ - $\beta$ ) 0.46-12.49,  $\alpha$ -linolenic acid 0.0-3.71%. P. Escher

A system of control for oil-palm factories. C. D. V. Georgi. *Malayan Agr. J.* 21, 113-25 (1933). E. H.

Oil from the seeds of *Tectona grandis* (Teak). S. V. Puntambekar and S. Krishna. *J. Indian Chem. Soc.* 10, 401-3 (1933). The extr. of 50 g. of kernels with ether produced 20.45 g. of a bright red oil. No essential oil could be obtained by steam distn. Sapon. and removal of the non-saponif. fraction produced chiefly stearic and palmitic acids, while the liquid acids were mainly oleic and linoleic. P. and K. believe the insecticidal properties are due to the resin acids only. Julius White

The composition of oil of *Jatropha curcas* L. (Barbadoes nut). M. Th. François and S. Drott. *Bull. soc. chim.* 53, 728-11 (1933). Analysis of 2 com. samples and 5 samples prep'd. in the lab. by extr. with petr. ether (boiling below 60°) of seeds of different origin, showed the following characteristics:  $d_4^{20}$  0.9108-0.9205,  $n_D^{20}$  1.4720-1.4733, viscosity at 35° 0.277-0.375, viscosity at 100° 0.0568-0.077, f. p. -15° to -13°, calorific value 9,168-9,480 cal. per g., acid no. (of com. samples) 4.2-5.5, acidity (of lab. prep'd. samples) as percentage of oleic acid 0.4-0.6, sapon. no. 176-190, I no. (Hanus) 93-98, Ac no. (André) 4-9.6. The oil contains 80.5% total fatty acids having: neutralization no. 198, mean mol. wt. 283, sapon. no. 198, I no. (Hanus) 102, Ac no. (André) 0; the sat'd acids consist of stearic, palmitic and myristic acids; the unsat'd acids consist of approx. 78% oleic and 22% linoleic; the absence of hydroxy-acids is proved. The oil also contains about 0.1% of a resin-sterolic complex. A. Papineau-Couture

Ketiau oil from the seeds of *Ganua* (Bassia) motleyana (Sapotaceae). J. Zimmerman. *Chem. Werkblad* 30, 657-8 (1933).—From the seeds of *Ganua motleyana* the natives (Sumatra, Bangka, Borneo) press an oil used for baking and drying. From new and old seeds the oil has been extrd. with EtO for detn. of various const. The IICN content of oil from the fresh seed is higher than that from old seed. Both oils contain BzH. The cryst. part of the unsaponifiable matter consists of lupcol. The remainder of the unsaponifiable matter is a gutta-percha-like material. The fatty acids consist of stearic acid 18.56, palmitic acid 10.17, oleic acid 68.77 and linoleic acid 2.49% with very small amts. of lower acids. E. S.

A primary tar derived from exhausted olive oil mash. A. Mangini and F. Lablart. *Ann. chim. applicata* 23, 373-91 (1933); cf. *C. A.* 26, 1676. The tarry residue obtained from expressed olive-oil mash is extrd. with EtOH, acid, and basic solvents. Thus 5.80% of bases, 10.86% acids (both non-resinous and sol. in EtO), 30.25% phenols, and 23.53% neutral oils were recovered. Five alkylquinolines and 2 hydrogenated alkylquinolines were identified in the acid fraction, as well as formic acid,  $C_8H_{16}O_2$ , and octadecanocarboxylic acid. Five paraffins from  $C_{25}$  to  $C_{35}$  were identified in the neutral fraction, while the phenols are probably like pyrocatechol in compn. A. W. Courtieri

Portuguese (bees) waxes. \* Charles Lepierre and Abel de Carvalho. *Chimie & industrie Special No.*, 1087-93 (June, 1933).—The present status of the bees wax industry in Portugal and in its colonies is outlined. From the results of a large no. of analyses, which are tabulated, the following are suggested as criteria for yellow continental waxes, white continental waxes and yellow African waxes, resp.: acidity (in mg.) 19-19.5, 19.5; esters (in mg.) 72.5, 73, 73; sapon. no. 91.5, 92.5, 92.5; I no. (Wijs) 10.5-11, 6, 12-12.5; Hübl's ratio (combined acids/free acids) 3.85, 3.75, 3.75. A. Papineau-Couture

The composition of various recent washing compounds. C. Grunne. *Seifensieder-Ztg.* 60, 771-2 (1933).—The compns. of Persil, Ozonil, Clasen's Rapol, Beral, Pergolin, Bleichin and Standard washing compds. are given. Their dry soap content varies between 23.5 and 29.1%. P. E.

Washing powders containing perborates. R. Krings. *Seifensieder-Ztg.* 60, 751-5, 772-3 (1933).—A description of their mfg. process. P. Escher

Detergency of alkaline salt solutions. IV. Laboratory comparison in simulation of laundry practice. Foster D. Snell. *Ind. Eng. Chem.* 25, 1240-6 (1933); cf. *C. A.* 27, 1531. Exptl. washing by a modified Rhodes and Baird procedure gives reproducible results in the same lab. A soap builder alone is primarily a detergent only to the extent that it can react with free fatty acid in the soil to produce soap. Secondly it may be effective because of improved wetting power of the detergent soln. One of the important functions of a soap builder is to speed up detergency. This may be expressed as a measure of the rate of removal of soil. Based on several factors, the order of decreasing value as detergents of the builders studied is:  $Na_4SiO_4$ ,  $Na_2SiO_3$ , a mixt. of  $Na_2SiO_3$  and  $Na_2CO_3$ ,  $NaOH$ , modified soda and  $Na_2CO_3$ . The behavior of colloidal soap builders is clearly distinguishable from that of noncolloidal soap builders. Acidity of dirt increase the ease with which it is removed. The theory is advanced that the efficiency of the different builders with soap is some pos. power of the no. of units of brightness regained in washing. It is estd. as not less than the second, or greater than the third power. The data are in agreement with the micelle theory of detergency. F. D. S.

Czechoslovakian hop oil and its utilization [in the soap industry] (Nehovidské, Horel) 16. Aq. dispersions such as those of oils, fats and fatty acids (U. S. pat. 1,930,845) 13. Prepp. barbourite for oil treatment (U. S. pat. 1,930,572) 4.

Fischer, Emil J.: Wachse wachssähnliche Stoffe und technische Wachsgebinde Dresden: T. Steinkopff. 192 pp. About 12 M., bound about M. 13.20.

Rendering fat from fat-containing tissue. Halvor O. Halvorsen, Edward M. Schmitz and Robert C. Murray (to Geo. A. Hormel & Co.). U. S. 1,930,169, Oct. 10. The material is treated (suitably by macerating and adding NaCl) to increase its elec. cond.; an elec. current is then passed through the mass to heat the tissue to a fat-rendering temp., and the rendered fat is permitted to drain from the tissue. App. is described.

Apparatus for rendering fats. Darling & Co. Ger. 584,478, Sept. 20, 1933. This corresponds to Brit. 374,438 (*C. A.* 27, 4113).

Drying oleaginous seeds and fruits. Hermanus J. Hutteman. U. S. 1,929,691, Oct. 10. Materials to be dried such as copra or the like are submerged (preferably after being comminuted) in heated oil such as coconut oil in a vacuum and at a temp. above the b. p. of water at the vacuum pressure used. App. is described.

Casting soap. Baker Perkins Ltd., Edwin T. Webb and Anciens établissements A. Savy, Jeanjean et Cie. Brit. 394,365, June 26, 1933. In molding soap by an endless chain of molds traveling under filling means and through a cooling chamber the molds are preheated approx. to the temp. of the liquid soap and preferably are formed



with 4 hinged sides opening out to release the molded cakes, and the cooling is effected gradually and progressively to prevent sudden chilling of the cakes. The filling may take place in a vacuum chamber. App. is described.

**Disinfectant soaps.** Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. Brit. 395,570, July 20, 1933. See Fr. 746,401 (C. A. 27, 4707). In 395,572, July 20, 1933, addn. to 395,570, a Ag compd. that is neither insol. nor readily sol. in  $H_2O$ , e. g., Ag subchloride, subbromide and thiocyanate, is incorporated in soap. Metallic Ag,  $NaBO_3$ , Na pyrophosphate peroxide, etc., may be added also.

**Condensation products from benzoin.** Soc. pour l'ind. chim. à Bâle. Ger. 582,380, Aug. 14, 1933. Addn. to 517,498 (C. A. 25, 2575). Products useful as wetting and emulsifying agents are obtained by treating naphthalenesulfonic acids with benzoin and an aliphatic or cyclic alc., together or in either order, in the presence of a condensing agent, e. g.,  $H_2SO_4$  or  $HSO_3Cl$ . Alternatively, a mixt. of  $C_{10}H_8$ , benzoin, and an alc. may be treated with a reagent having both a sulfonating and a condensing action. Examples are given.

**Detergents, etc.** René Meunier. Brit. 394,843, July 6, 1933. Products for use in degreasing, deozing, goffing and dressing textiles and in bleaching, dyeing and mercerizing baths are obtained by sulfonating a mixt. of fatty substance and solvents therefore and sapon. with alc. caustic alkali at preferably below  $70^\circ$ . The products may be added to soaps. The sulfonated mixt. may be neutralized with soda or  $NH_3$  before sapon. Solvents specified are  $C_8H_{18}$ , turpentines,  $Me_2CO$ ,  $AmOAc$  and those contg. Cl.

**Wetting agents, etc.** Imperial Chemical Industries Ltd., Anthony J. Hailwood and Wm. Todd. Brit. 393,276, May 25, 1933. Emulsions and dispersions of mineral and vegetable oils, fats, tar oils and other  $H_2O$ -insol. liquids and waxes are obtained by using as an emulsifying agent a quaternary  $NH_4$  salt contg. 1 alkyl or alkylene radical the chain of which contains not less than 10 C atoms but no alc. OH groups, e. g., dodecyl, cetyl or octadecyl pyridinium or trialkylammonium halides. The salts are prepd. by combining suitable alkyl halides with pyridine and morpholines, e. g., dodecyl pyridinium bromides from pyridine and dodecyl bromide, and are used in aq. soln. to which an addn. of gelatinizable substances, e. g., glue, gelatin, starch, gum arabic, isinglass, may be made. The emulsions may be used in leather dressing, as insecticidal sprays, in waterproofing, sizing and softening textiles, in wood impregnation or as disinfectants. Examples are given.

**Wetting agents, etc.** 1. G. Farbenind. A.-G. Brit. 394,043, June 22, 1933. Assistants for the textile and allied industries are obtained by the chlorination of sulfuric esters of (cyclo)aliphatic alcs. contg. at least 6 C atoms, or salts thereof. The ethers of polyhydric alcs. contg. at least 6 C atoms and a free OH group, e. g., the monodecyl and cetyl glycol ethers, and polyhydric alcs. contg. at least 6 C atoms, e. g., dodecanediol and 7,18-stearylene glycol, may be used as starting materials. Among examples (1) octadecyl alc. is sulfonated with  $ClHSO_3$  in  $CCl_4$  and then treated with Cl in the presence of a Hg-vapor lamp, (2) a mixt. of naphthenic alcs. is sulfonated and then treated with Br, the nonsulfonated alcs. being extrd. with  $K_2CO_3$ , and (3) lauryl alc. is sulfonated in  $CCl_4$  and treated with  $ICl_3$ . The products are wetting, foaming, dispersing and cleansing agents.

**Wetting agents, etc.** Deutsche Hydrierwerke A.-G. Brit. 394,196, June 22, 1933. See Fr. 743,594 (C. A. 27, 3789 90).

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

A suggestion to sugar growers of the Philippines. A. H. Muzzall. *Sugar News* 14, 431 5(1933).—By taking advantage of the results of research in rubber growing, certain sugar soils can be profitably planted in rubber.

I. Cusachs

**Progress report on studies of milling tests.** B. B. Henderson. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 127 9.—There are various objections to the milling tests used in the past in Hawaii. A perfect milling test should be capable of being carried out while the mill is running normally, and without interfering with the grinding rate; sampling and analyses should be simple and not consume too much time; the test should give a result which can be definitely interpreted. With this line of reasoning as a basis, the extrn. of sep. milling units was detd. by finding the polarization and fiber in the bagasse from each mill. These tests at the beginning gave a satisfactory curve, but this could not be duplicated in subsequent tests. The work is being continued.

F. W. Zerban

**Milling control by juice density curves.** Raymond Elliott. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 141-4.—The d. of the juices of sep. milling units, and of front and back rollers, gives a useful indication of mill work efficiency. The curves representing such data should be established when the mill is doing its best work, to serve as a basis of comparison with similar curves obtained under different conditions of operation. Generally, a steep, practically straight curve is indicative of good work. The ratio between the d. of the last roller juice and that of the theoretical residual juice sol. solids in bagasse/[sol. solids in bagasse + water in bagasse] should be at least 0.55. High extrn. by the front roller compared to that by the back roller of a single mill also indicates good performance.

F. W. Zerban

**Cane and juice sampling of field experiments.** Ralph

J. Borden, et al. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 49-67.—For a reliable interpretation of the results of field tests it is necessary to det. not only the cane-yield differences of replicated plots, but also the quality ratio in the same manner, and not from combined cane samples. Unless the cane is sampled properly, it is better to make no juice analyses at all. The juice samples may be taken from under the crusher in various ways, but it is necessary that they be truly representative. Some automatic devices are described which make it possible to sample at the proper time the crusher juice from sep. lots of cane placed on the carrier, without blank spaces being left between the different lots.

F. W. Zerban

**Removal of colloids from diffusion juices by the action of lime in an electric field.** A. G. Arkhipovich. *Nauk. Zapiski Tsukrovoy Prom.* 10, No. 29/30, 97-102(1933).—The action of lime in diffusion juice is to neutralize the org. acids forming sol. and slightly sol. Ca salts and producing Ca saccharate; the lime saponifies the fats into insol. soap; araban and glucurone are partly pyrid. in the form of Ca salts of polyglucuronic acids. The undissolved lime adsorbs the colloids. All this can be obtained with a small amt. of lime (0.2-0.4%), but the filtrability of the juice in this case is very poor. The purity of the juices can be increased by 1-2 units if an electro-coagulator is used. Decreasing the amt. of lime decreases the purity of the juice. A temp. increase up to  $55^\circ$  is favorable. Expts. with dried beets showed an increase in purification of 1.5 units when electro-coagulation was applied. The increase of lime alone did not show any increase of purity. Therefore the creation of an elec. field in diffusion juices after adding the lime increases the activity of colloids and of the lime and a better purification is obtained.

V. E. Baikow

**Crystallization of beet sugar.** Karel Sanders. *Chimie &*

**industrie Special No.**, 1147-50 (June, 1933).—See C. A. 27, 2330.

**Determination of invert sugar in sugar-house products.** R. Oger. *Chimie & Industrie Special No.*, 1125-6 (June, 1933).—See C. A. 26, 3693.

**The application of Davies' method of determining chlorides in sugar products.** Mario Catenacci. *Ind. sucarr. ital.* 26, 458-9 (1933).—This method gives 0.49% Cl directly on the dil. molasses sample against 0.45 and 0.46%, after incineration, by the Vollard and Mohr methods, resp.

**The nature of the impurities of raw sugar crystals.** Ippolito Sorgato. *Ind. sucarr. ital.* 26, 449-57 (1933).—Cond. titration, with 0.05 N HCl, curves enable an evaluation of the org. and inorg. electrolytes. Comparative curves for the raw sugar, before and after affination, furnish a criterion of the impurities adsorbed by the sugar crystals.

**Vacuum pan volume calculations.** S. S. Peck. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 113-15.—The calcn. of pan-capacity demands can be simplified by referring all the figures to Brix or percentage of solids. Derr's formula gives in this case: Brix in sugar per unit Brix in raw material =  $(s - m) / (s - m)$  for low-grade calcns. the following formula may be used: Brix in low-grade sugar per unit Brix in sirup =  $[(s - j)(b - m)] / [(s - b)(r - m)]$  where  $s$ ,  $j$ , and  $m$  have the usual meaning,  $b$  is the purity of the low-grade pan, and  $r$  the purity of the low-grade sugar. Because of the return of low-grade sugar as seed or remelt the total low grade produced becomes a const. quantity after several cycles. The const. Brix in low grades per 100 Brix in sirup =  $[(s - j)(b - m)] / [(s - m)(r - b)] < 100$ . A graph is presented, giving this figure for varying purities of low-grade sugar and of sirup.

**Use of alloys in the sugar factory.** Edwin A. Rogers. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 153-5. Attention is called to the possible uses in the sugar factory of special steels, hard surface metals, and non-ferrous metals for various purposes, and the experiences in 3 factories with such materials are related.

**Correction for sugar introduced with bagasse in Oliver-Campbell filter operation.** S. A. Wickey. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 125-6.—To det. this correction it is necessary to find the wt. of bagasse screenings added. Samples are taken of the screenings, of the settlings from the clarifier, and of the filter cake. The percentage of total insol. solids is detd. in the last 2 giving  $S'$  and  $S''$ , resp., by filtering through cloth or paper, washing with hot H<sub>2</sub>O, drying and weighing. The percentage of fiber is detd. in all 3 materials by washing with tap water through a 100-mesh screen, drying and weighing; this gives  $F$ ,  $F'$  and  $F''$ , resp. Then tons of fiber added =  $[(\text{tons filter cake} \times S'') / 100] - [(\text{tons filter cake} \times S') / 100] / [(100 - (100 F' / S'))]$ . Tons of bagasse screenings =  $(100 \times \text{tons fiber added}) / F$ .

**Relative effect of trash on the factory operations.** Geo. D. Becker. *Repts. Assoc. Hawaiian Sugar Tech. 12th Annual Meeting 1933*, 11-14.—Three 7.5-ton samples of cane, without, with 8%, and with 16% trash, resp., were ground separately in the factory, and the usual analyses and other observations made. The results are shown in a table. The trash depressed the Brix and purity of all the juices. The boiler-house recovery was lowered from 94.51 to 93.96 and 93.18%, resp. The cane ratio increased, also the bagasse percentage of cane, but the fuel value of the bagasse from the cleaned cane was much higher. The tons of cane ground per hr. were less for the uncleaned samples. The estd. loss from 8% trash is over \$8000 per crop, from 16% trash over \$20,000.

**Field trash.** H. F. Hadfield. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 95-104.—On blumming plantations the trash carries a considerable amt. of absorbed water which affect; the d. of the 1st expressed

juice, and hence the calcd. wt. of the cane. New methods for detg. both field trash and the abs. juice factor are suggested for further trial by blumming plantations, because the present methods cause losses to the mill through excessive payments for cane.

**Entrainment.** James W. Donald. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 105-8.—When the drops of sirup in the vapor space of the evaporator become extremely small they are carried away through the usual catch-alls into the condenser, no matter how high the vapor space may be. In a given instance the crit. size of the drops was 0.1 mm. at 27 in. of vacuum. Entrainment was completely stopped in this case by installing in the last body of the effect a Heckmann foam separator, which consists essentially of an inverted funnel above the pipe of which a deflector plate is placed at the proper distance.

**Definition of terms which describe heavy chemicals.** R. Q. Smith. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 109-11.—Definitions of the following terms used in connection with chemicals which are employed in sugar factories (except lab. chemicals) are given: Baumé, Twaddell, water white, com. grade, degree of fineness and shape, package. The various com. grades of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, NaOH, Na<sub>2</sub>CO<sub>3</sub>, Ca(OH)<sub>2</sub> and H<sub>3</sub>PO<sub>4</sub> are briefly characterized.

**Filtration of oil from boiler feed water.** Ralph H. Johnson. *Repts. Assoc. Hawaiian Sugar Tech. 12th Ann. Meeting 1933*, 145-51.—When the steam consumption in sugar factories becomes high, some oil is always carried through the traps and causes trouble in the boilers. The oil may be removed by chem. coagulation, but this is expensive. Filtration has proved quite efficient for the purpose. It may be either gravity filtration in tanks through fine bagasse, cotton waste or excelsior, or else pressure filtration through heavily woven cloth, in so-called grease extractors of the Ross, Elliot or Cochran type. Filtration with Hyflo-Superel in Sweetland filters is still better, although the operating cost is a little higher.

**Crystallizer massecuite.** B. B. Henderson and G. H. W. Burnhart. *Repts. Assoc. Hawaiian Sugar Tech. 12th Annual Meeting 1933*, 131-40.—The purity of the final molasses may be lowered effectively by heating the massecuite prior to purging. Several methods for doing this are described. It is necessary, however, that the d. of the massecuite be reasonably high, and that diln. water be used sparingly. The massecuite should ordinarily not be heated above 135°F., to avoid local overheating. The low-grade grain must be fairly uniform. The temp. drop between the heater and the centrifugal should be small, as otherwise the viscosity will rise too high again.

**The partial removal of certain alkalies by zeolite from, and the effect upon the crystallization of sucrose and the viscosity of, final molasses.** R. H. King and Salvador B. Oliveros. *Sugar News* 14, 436-44 (1933).—Portions of dild. molasses were each percolated through sep. amts. of zeolite, activated with chlorides of either (1) Na, (2) K, (3) Mg or (4) Ca. The 4 percolates were concd., seeded with sucrose and placed in cry. tallizers; the mother liquors were sep'd and analyzed. Samples from 1 and 2 were higher in purity while 3 and 4 were lower than the control. The viscosities were inversely related to the purities.

**Studies on the cause of molasses formation. II. The equilibrium of the ternary system of sucrose-water-sodium carbonate or potassium carbonate at 30° and the viscosity of the coexisting liquid phase.** Kyosuke Nishizawa and Marataka Amagasa. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 497-501 (1933); cf. C. A. 25, 5790.—The ternary equil. diagrams for both carbonates and a solv. diagram are presented. A new stable compd., C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>Na<sub>2</sub>CO<sub>3</sub>, was observed. Addn. of carbonates resulted in an initial slight decrease of the soly. of sucrose to a min. pt., and then a sudden increase, with an ac-

accompanying marked increase in the viscosity of the coexisting liquid phase. The K salt increased the soly. of sucrose more than the Na salt. The transition points of the carbonates were displaced by the addn. of sucrose and crystals with different waters of crystn. than in pure water exist as stable solid phases.  $K_2CO_3 \cdot 1.5H_2O$  and  $Na_2CO_3 \cdot 7H_2O$  were the stable forms chiefly encountered in the presence of sucrose at 30°. The relative viscosities of the liquid phases of the carbonate solns. were very greatly influenced by sucrose addns. but not so the relative satns. as seen from an accompanying plot. The properties of the new compd. are described. III. The equilibrium of the ternary system of sucrose-water-sodium acetate or potassium acetate at 30° and the viscosity of the coexisting liquid phase. *Ibid.* 501-4. — Ternary diagrams, a soly. diagram and curves for relative viscosities and satns. are presented. Addns. of NaOAc decreased the soly. of sucrose by about 10% at approx. 15% salt content, while KOAc did not show any such decrease; after the min. point the increase for both salts is quite sudden and that of the K salt is more pronounced. In sucrose solns. NaOAc  $\cdot 3H_2O$  existed as the stable solid and its soly. increased regularly with the sucrose content, and 2[KOAc]  $\cdot H_2O$  was the main stable compd. which had its soly. increased in a like manner. Although no compds. of sucrose and acetate could be found the authors believe that such might exist. As with carbonates the relative viscosities of the liquid phase were much more affected than the relative satns., with the K salt being the more effective one. Kari Kammermeyer

Hydrogenolysis of sugars (Zartman, Adkins) 10.  $\beta$ -Lactose (Greenleaf) 12. Evapn. and its applications [in the sugar industry] (Lafitte) 13. Mixed fertilizers and the sugar beet (Decoux) 15. Mannitol fermentation of levulose (Bulcato) 16. Starch (Hess) 10. Sugars (Ir. pat. 729,205) 23. Centrifugal machine for purifying crude starch, etc. (Brit. pat. 394,811) 23.

Counterflow extraction apparatus for sugar, etc. Rafinerie Tirkemontaise Soc. anon. Ger. 579,726, June 30, 1933. Addn. to 578,025 (C. A. 27, 4436). This corresponds to Brit. 365,007 (C. A. 27, 3840).

Apparatus for saturating sugar juices. Fritz Blanke. Ger. 579,966, July 3, 1933. Addn. to 559,048 (C. A. 27, 1228).

Sterilizing and purifying sugar liquids. Gaston Durct. Brit. 395,527, July 20, 1933. Sugar-contg. juices are neutralized or made slightly alk. (cf. C. A. 27, 1540) when sugar is manufd. or made slightly acid, e. g., with HCl,  $H_2SO_4$  or HF, when alc. is manufd. and finally maintained at below 35° in a sterile condition under a layer of an insol. or slightly sol. antiferment, e. g.,  $C_6H_6$ , PhMe, PhEt, xylene, the antiferment being periodically mixed with the juice. The sterilization with ultra-violet light may follow the acidification or alkalization.

## 29 LEATHER AND GLUE

ALLEN ROGERS

Scientific activity of the French Section of the International Leather Industry Chemists Society. P. Vignon. *Chimie & industrie* Special No., 1107 10 (June, 1933). A review of work published during the year 1931-32.

A. Papineau-Conture

Investigating the conditions of infestation of hides with *Dermestes lardarius* and *Dermestes frischii* and measures for their destruction. L. I. Evremova. *Ovladenie Tekhniki: Koshobuynoe Proizvodstvo* 1932, No. 4, 11-5. — The habits of these parasites found in hide storehouses are described. The following insecticides were tried: Schwemfurt green, Na arsenate and arsenite, BaCl, bisulfite, bisulfate,  $CS_2$ , chloropierin, *p*-dichlorobenzene, naphthalene, kerosene, turpentine, kerosene + turpentine (1:1), gasoline and  $CCl_4$ . A complete extermination was obtained with kerosene and kerosene + turpentine, 1:1 being used for 200 dry skins. Schwemfurt green, Na arsenite, chloropierin and  $CS_2$ , although being 100% efficient, are not recommended because of their toxicity to human beings. The hides are sprayed individually with one of the above insecticides and *p*-dichlorobenzene powder is sprayed between the hides when they are placed back in storage.

A. A. Bochtlingk

Influence of the preparation methods and of sulfitation on the tanning and physicochemical properties of pine extracts. E. A. Zobina, N. S. Krasnikova and A. N. Mikhailov. *Ovladenie Tekhniki: Koshobuynoe Proizvodstvo* 1932, No. 3, 38-9. — The investigation was carried out for the purpose of detg. the best conditions for the prepn. of sulfited pine exts., as well as for defining the influence of temp. on the extn. of pine bark and the influence of concn. on the quality of the ext. To det. the best sulfitation conditions expts. with a liquid pine ext. obtained by the extn. of pine bark at 80-90° and treated with sulfite, bisulfite,  $Na_2CO_3$  and their mixts. were undertaken. The best sulfitation results were obtained with  $\frac{1}{4} Na_2SO_3 + \frac{1}{2} NaHSO_3$ , the amt. of the reagent being 5% of the dry substance, the pine ext. being first treated with sulfite for 4 hrs. at 90-95°, then with bisulfite also for 4 hrs. at 75-85°. The influence of the temp. during the extn. was investigated by extg. the pine bark at (1) a temp. not exceeding 50°, (2) at 90-95° in all diffusers and (3) at 90° in the first and 120° in the last diffuser and with 5° intervals in the intermediate diffusers.

The concn. was carried out *in vacuo* up to 20-22°Bé. The investigation covered sulfited as well as unsulfited exts. Results: (1) An increase of the extn. temp. up to 120° does not affect the diffusion of the ext. (2) Sulfitation of the ext. improves its diffusion properties in all cases. (3) Its tanning properties do not deteriorate on concg. the ext. to the consistency of dough. A complete diffusion was not attained in all cases. The binding properties of the ext. decrease on sulfitation (Crede coeff.), while they improve on heating. The tannides are more stable against salting out on sulfitation. The surface tension of all the exts. was the same, amounting to 0.73-0.76 toward water. An increase of the extn. temp. causes a higher viscosity at high concns. and the total acidity as detd. by the Steven and Anker dialysis decreases on sulfitation at elevated temp.

A. A. B.

Improving low-quality oak and other extracts. S. S. Vovutskii. *Ovladenie Tekhniki: Koshobuynoe Proizvodstvo* 1932, No. 3, 39-40. — This investigation was carried out to det. the advisability of pptg. the tannide from spent exts. followed by a regeneration of the tanning substance. The following methods were investigated: (1) with lime water instead of milk of lime for precipitant; (2) fractional pptn. of tannides with  $Ca(OH)_2$  and prepu. of exts. from individual fractions; (3) detg. the possibility of using  $Ba(OH)_2$  for precipitant. It was found that the yield of tannides as well as the quality of exts. is improved on using the lime water instead of milk of lime pptn. method, while the amt. of  $H_2SO_4$  as well as of lime can be lowered three-fold. Poor-quality lime can be used when applying lime water, a lime which would be unsuitable for milk of lime pptn. A fractional pptn. showed that an ext. of a higher quality can be obtained on incompletely pptg. the tannides. The yield as such is lowered although the unpptd. tannides which remain in the soln. can be pptd. by a new portion of lime and after regeneration they may be used for prepg. a second-grade ext. Pptn. with  $Ba(OH)_2$  instead of lime produced an ext. with a very low ash content.

A. A. B.

Combining tannides of sulfite cellulose extracts "TzNIKP" No. 4 and "TzNIKP" No. 5 depending on the pn during tanning. T. I. Korotnev. *Ovladenie Tekhniki: Koshobuynoe Proizvodstvo* 1932, No. 4, 44. — To develop a tanning method for sulfite cellulose tannides

of various brands, the conditions for the best combination of collagen with tannides must be detd. This condition is complied with by detg. the  $pH$  factor during the tanning. Thus 40 g. of an American hide powder was moistened with 10 vols. of distil.  $H_2O$  for 4-5 hrs., followed by pressing out 25% of the water present and placing it in ext. solns. of TzNIKIP No. 4 and TzNIKIP No. 5 having a concn. of 52 g. of tannides per l., corresponding to 10°Bé. for TzNIKIP No. 5 at a  $pH$  of 1.5, 2, 2.5, 3, 4.5, 6 and 10. The  $pH$  concn. was adjusted by adding 2 N HCl or 2 N NaOH and the detn. was carried out with a freshly palladized electrode. The powders were tanned for 3 days, dried at 25-30° and the following detns. were made:  $H_2O$ , ash, hide substance, sol. org. and inorg. substances and resistance to  $H_2O$ . The substances which were washed out from the powder were detd. 4 days after the tanning. It was found that the max. of combination for sulfite cellulose exts. TzNIKIP No. 5 and TzNIKIP No. 4 lies at  $pH$  2. The max. of the water-resistance curves was found at  $pH$  2.5, which would amount to 87.2 for TzNIKIP No. 5 and 78.17 for TzNIKIP No. 4. The min. of the isoelec. point and the second max. was at  $pH$  10. In the investigation of the influence of  $pH$  on the analysis of the tanning solns. at an analytical concn. of 4 g. per l. arbitrary curves showing the amt. of tannides decrease with increase of  $pH$ . A. A. B.

**Preparing and bleaching reptile leather.** Ya. N. Kaplinov and V. N. Semenova. *Ovladenie Tekhniki Kozhevennoe Proizvodstvo* 1931, No. 2, 18-19.—The following procedure is recommended. Soak in 5 parts  $H_2O$  at 15-20° for 20 hrs. Lame with  $H_2O$  500% of the wet leather, CaO (50%) 10 g. per l.,  $Na_2S$  (62%) 2 g. per l. for 4 days at 15° for lizard skin and for 3 days for snake skin. Delime with  $H_2O$  300%,  $NaHSO_3$  2%, HCl 0.25% of the wt. of the raw skin at 35° for 1 hr. Soften with HCl 400%, oropon  $MO_2$  0.5% of the raw skin at 35°. For vegetable tanning treat with sumac soln. of 0.3° Bé. in the first and 3° Bé. in the last vat (4° Bé. for lizard skin in the last vat) for 4-5 days. Bleach with acetic or oxalic acid, fat liquor with an emulsion of alizarin oil (2%), castor oil (2%), preserved egg yolk (3% with 10% fat) and  $H_2O$  100% of the tanned skins, at 35° for 20-30 min. For formalin-chrome tanning give a preliminary treatment with  $H_2O$  200%, formalin 3%, add to the same soln. after one hr.  $Na_2CO_3$  4% and  $H_2O$  50% of the second wt. of the skin and let stand 2 hrs. Then treat with  $H_2O$  200% and  $Cr_2O_3$  2.0% of the 2nd wt. of the skin, having a basicity according to Schorkemmer of 35%. Neutralize, fat liquor and finish. For S-chamoise tanning, the skins are pickled for one hr. after softening in a soln. of 3% HCl, 150%  $H_2O$ , 10% NaCl. The thiosulfate bath is prep'd. from 150%  $H_2O$ , 5%  $Na_2S_2O_4$  and 6% NaCl of the 2nd wt. of the raw skins; duration 1-1.5 hrs. For chamoise tanning use  $H_2O$  40%, alum 7%, flour 10%, NaCl 3%, egg yolk 20% (with 10% fat), dry and finish. The lizard leather prep'd. by one of the above methods has a breaking strength of 2.18 kg. per square mm. when dry and 1.70 kg. per square mm. when wet.  $KMnO_4$  is the best bleaching agent. A. A. B.

**Determining the total sulfur in leather by the combustion method in a calorimetric bomb.** Ya. P. Berkman and T. S. Basal-Kudish. *Ovladenie Tekhniki: Kozhevennoe Proizvodstvo* 1932, No. 5, 38-9.—The following procedure is recommended for detg. total S in leather in the absence of trivalent metals. (1) The leather is broken up into pieces of 1 cu. m. of which about 1 g. is used. It is compressed in the usual manner and the briquet is weighed and placed in a Pt or  $SiO_2$  crucible in a bomb charged with 10 cc. of a 10% soln. of alkali. The  $O_2$  pressure is brought up to 20-25 atm., the sample burned in the usual manner, the bomb placed in water and the gas released with care. The contents of the bomb are transferred into a beaker, the bomb is rinsed and the soln. added to that in the beaker. The caustic soln. is oxidized with Br water, heated to boiling, acidified with HCl, boiled for 30 min. to remove the Br and filtered.  $SO_2$  is detd. in the filtrate in the usual manner. It was found that concordant results are obtained by this method and that

they are as a rule higher than those obtained in the Baland-Maljean method and that the deviations of the results obtained by the above methods have no relation to the  $SO_2$  content. The analysis of total S in a leather contg. Cr should be carried out as follows: The preliminary prep'n. (1) of the sample is as usual but the pressure in the bomb is brought up only to 8 atm. (2) The soln. of alkali and the washing water are handled in the same way as before. (3) The ash is fused with the oxidizing mixt., the melt dissolved in  $H_2O$  and S is either directly pptd. as  $BaSO_4$  or in an acidic medium with a correction for  $BaCrO_4$  or it may be first reduced to remove Cr. The total S is that contained in (2) and (3). Conclusion: The total S in leather can accurately and rapidly be detd. by combustion in a calorimetric bomb. The analytical procedure is described. A. A. B.

**Determination of the moisture content of leathers.** V. Kubelka, V. Nemeš and S. Zuvavlev. *Chimie & Industrie Special No.*, 1111-16 (June, 1933).—See C. A. 27, 2334. A. Papineau-Couture

**Determining the moisture and fat in leather by the Pryanishnikov method.** K. M. Platinov. *Ovladenie Tekhniki: Kozhevennoe Proizvodstvo* 1931, No. 1, 34-5.—The Pryanishnikov method (C. A. 23, 1503) was applied to leather by use of a mixt. of gasoline and 6% iso-Bu alc. The results when applied to red tanned leather were too low in  $H_2O$  and too high in fats for chrome-tanned leather. A. A. Bochtlingk

**Adsorption and swelling. IV. Influence of temperature on the swelling of hide powder.** V. Kubelka and V. Sumec. *Chimie & Industrie Special No.*, 1117-19 (June, 1933). See C. A. 27, 4436. A. P.-C.

**Change in the isoelectric point of collagen under the action of trypsin.** N. I. Gavrilov and A. M. Smaskaya. *Ovladenie Tekhniki: Kozhevennoe Proizvodstvo* 1931, No. 2, 23-4.—The object was to study the reactions that take place in leather under the influence of the enzyme during bating. The albumin mols. of the collagen may be converted from keto to the enol form and the latter may exist in two isomers: the  $\alpha$ , which may be obtained by the transition of the unstable H from the N, and the  $\beta$ , which utilizes the unstable H of the adjacent C. Both enols have acidic functions. This explains the formation of the enol form from the neutral keto form, which must be accompanied by an increase in the acidity of the whole compd., i. e., by a shift of the isoelec. point in the direction of acid. It was assumed that the isomerization of the peptide bond in the collagen from the keto to the enol form takes place under the influence of trypsin. The middle layer of a hide, consisting of almost pure collagen, was ground to powder. Detns. were made of the isoelec. point of the unlimed powder and of the powder after treatment with trypsin, oropon and water at  $pH$  7.8-8.1 and 8°. For the isoelec. point was selected a concn. of H ions at which the content of the Ca in collagen is lowest. The isoelec. point of collagen changed under the influence of trypsin in the acid direction from  $pH$  4.64 to  $pH$  3.7 and under the influence of oropon to  $pH$  3.4-4.2, depending upon the duration of bating. A. A. Bochtlingk

**Study of dressing buhrstone mills.** Baltimore Paint & Varnish Production Club, *Am. Paint J.* 17, No. 53A, 16-17; *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 445, 432-7; *Paint, Oil & Chem. Rev.* 95, No. 22, 64-6 (1933).—The factors affecting the output of a buhrstone mill are no. of sectors, angle and points of intersection, speed; those affecting the fineness of the grind are angle of intersection and length of the shearing crack. A device for dressing buhrstone mills is described. G. G. S.

**Siberian larch [use in tanning]** (Gordon) 22. Trisazo dyes [for leather] (Ger. pat. 582,399) 25. Decompn. products of albumin [for treating leather] (Pr. pat. 749,228) 25. Rubber coating compns. [for leather] (Brit. pat. 392,797) 30.

**Bergmann, Max:** *Gesammelte Abhandlungen des Kaiser Wilhelm-Instituts für Lederforschung in Dresden.*

Bd. IV. 1930 bis 1932. (Berlin: J. Springer. 520 pp. 1 M. 46 bound.

**Tanning solution.** Otto Röhm. U. S. 1,930,910, Oct. 17. Fe salts contg. a trivalent cation such as Fe sulfate-chloride are used with esters of phosphoric acid such as glycerophosphoric acid. Alum or Cr chloride, etc., also may be used.

**Leather.** I. G. Farbenind. A.-G. Brit. 388,091, Feb. 23, 1933. Tanning and other  $H_2O$ -sol. substances of high mol. wt. that contain acid groups in free, esterified or salt state, and also fatty substances and dyes, are pptd. in hides by treatment with  $H_2O$ -sol. complex hexa-urea chromic salts having the formula  $CrY_3X_3$ , where Y is urea and X is a monobasic acid radical. The complex salts are obtained by reaction of an alkali salt of the acid with hexa-urea chromic chloride which is obtained by evapg. an aq. soln. of urea and  $CrCl_3$  in requisite proportions. The treatment may be before or after tanning or after greasing, etc. Substances that do not form a ppt. with the complex salts may be used in conjunction therewith, e. g.,  $AcOH$ ,  $HCOOH$ , oxalic acid,  $Al_2(SO_4)_3$ ,  $MgSO_4$ , pink salt, etc., and also substances capable in excess of dissolving any ppt. formed, e. g., org. sulfonic acids. Among examples skins are pretanned with a condensation product of naphthalenesulfonic acid and  $CH_2O$  with the addn. of hexa-urea chromic chloride and afterward treated with a mixt. of wattle bark, chestnut wood and sulfitized quebracho.

**Leather from green hides.** Robert W. Chandler (to Graton & Knight Co.). U. S. 1,930,158, Oct. 10. The hide is subjected to mineral tanning, impregnated with sol. stuffing material and a sealing ingredient such as phenolic resin varnish and heated to convert the sealing ingredient into a product normally insol. in media with which the leather may come into contact so as to protect the stuffing against such media and to strengthen and reinforce the finished leather.

**Patent leather.** E. I. du Pont de Nemours & Co. Brit. 391,000, June 19, 1933. In making patent leather the final coating comprises a drying-oil-modified poly-

hydric alc.-polybasic acid resin. Leather is coated first with a mixt. of bodied linseed oil, i. e., oil heated to 550–600°F. in the absence of driers, and a pigment; 2 or 3 coats of a clear varnish consisting of a bodied linseed oil thinned with naphtha are then applied. Nitrocellulose may be added to these undercoats. Finally a soln. of the said resin is applied and dried 10–20 hrs. at 150–175°F. Suitable resins are made from glycerol, pentaerythritol or polyethyleneglycol with phthalic anhydride or succinic, fumaric, maleic or adipic acid and linseed, chinawood, perilla or soy-bean oil. Drying oil acids may be used instead of drying oils. Optional addns. include rosin or resin acids, monohydric alcs., e. g., benzyl alc., polyhydric alcs., e. g., ethyleneglycol, glycol ethers, xylene, naphtha, terpene, turpentine substitutes and driers, e. g., Co, Pb, Mn and Fe linolates.

**Leather substitute.** Leonard Boudy. U. S. 1,931,428, Oct. 17. Fibrous material such as cotton, jute or "wood-wool" is freed from greasy matter, dried and incorporated with a powd. mixt. of slaked lime, sandstone, resin, pumice stone and emery, and the material is then subjected to the action of a liquid bath comprising latex, ammonia, pure water and a weak soln. of carbolic acid, and may be formed into sheets. Cf. C. A. 27, 5575.

**Gelatin, etc., compositions.** Robert P. Rudin. Brit. 390,543, Apr. 13, 1933. A substance for receiving sound, etc., record impressions by direct cutting of a recording stylus and which is subsequently hardened chemically consists of colloid materials such as glue to which is added 0.2–25% of chem. compds. that are not vaporizable without decompn. and have a high b. p., e. g., glycol or glycerol or their derivs., *p*-methoxypyridine, for the purpose of reducing the hardness. The adhesiveness and elasticity are then removed by adding compds. which may form a component of the means for the subsequent hardening, e. g., certain simple or substituted sugars, particularly pentagalloylglucose. After recording, the substance can be hardened by treating with a hardening fluid such as a dichromate or aldehyde soln.

**Machine for making capsules from gelatin.** Robert P. Scherer. Brit. 395,546, July 20, 1933.

### 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**Review of developments and progress in the chemistry and technology of latex and of rubber from 1927 to July, 1932.** St. Reiner. *Caoutchouc and gutta-percha* 30, 16542 4(1933); cf. C. A. 27, 4124.—Numerous patents on the direct application of latex to various products are cited.

C. C. Davis

**A new technic in the rubber industry.** J. Ch. Bongrand. *Chimie & industrie Special No.*, 1080 4(June, 1933).—See C. A. 26, 4721.

A. P. C.

**Determination of rubber in rubber-bearing plants.** D. Spence and M. L. Caldwell. *Ind. Eng. Chem., Anal. Ed.* 5, 371–5(1933).—Extensive expts. on various methods of detg. the rubber content of plants, in which all the factors influencing the results were studied in detail, showed that all known methods give either incomplete extn. or an impure rubber. The most important factors are respiration changes in the plant tissue after harvesting, colloidal substances in the plant tissue upon extn., oxidation during drying of the ext. and the solvent. As a result of this exhaustive study, a new method was developed which removes the rubber completely in a pure form. It involves grinding, treatment with boiling 1%  $H_2SO_4$  and steam (30 lb. per sq. in.), washing, acetone extn., extn. with  $C_6H_6$ , and drying of the ext. In the final drying the addn. of a known quantity of dimethyl-*p*-phenylenediamine prevents oxidations and increases the precision, and it is suggested that the use of antioxidants in chem. analysis should be capable of wide application where org. compds. susceptible to oxidation are encountered. Analysis of the final product from guayule indicated a hydrocarbon of the compn.  $(C_6H_8)_n$ .

Though the work was carried out with guayule shrub, the method should be applicable to other plants contg. rubber

C. C. Davis

**Estate practice and its relation to factory requirements.** F. B. Jones. *Trans. Inst. Rubber Ind.* 9, 112–22(1933).

A crit. discussion of the variability of plantation rubber. Tests of the rate of vulcanization of slowly curing and quickly curing smoked sheets in a rubber-S (90:10) mixt. showed optimum times of cure of 140 and 80 min., resp., at 147°. In mixts. accelerated with mercaptobenzothiazole and with  $MgO$ , the rubbers still showed wide differences. Scorching tests where the change in recovery was measured with a parallel-plate plastometer showed that recovery is a satisfactory criterion of the true plasticity, but that plasticity is not a certain criterion of behavior during processing. However, the recovery test can be used to judge prevulcanizing by heating pellets for increasing times at a temp. which ultimately causes vulcanization and measuring the recovery. At a crit. time the percentage recovery increases disproportionately fast, irrespective of its original magnitude. Tests by this method show that variations in raw rubber, as shown by rubber-S vulcanizates, may persist when org. accelerators are included. Means for minimizing on the plantations the variability of raw rubber is discussed.

C. C. Davis

**Investigation of the physicommechanical properties of rubber.** M. O. Segal. *Otlozhenie Tekhniki: Konobuovnoe Proizvodstvo* 1932, No. 4, 38–41.—The following tests of shoe-sole rubber are reported: d., uniformity of thickness and shape, tensile strength when moist and

dry, and after keeping in a thermostat at 50° and 70°, swelling, air permeability, water permeability, deformation by water diffusion followed by drying, hardness, wear by rubbing, holding of screws and resistance to punching and removing a needle. A. A. B.

Products of porous rubber. St. Reiner. *Caoutchouc and gutta-percha* 30, 16546 7(1933).—A description of tech. problems in the manuf. of various types.

C. C. Davis  
Rubber in highway service construction. Program of research. R. G. H. Clements, et al. *Bull. Rubber Growers' Assoc.* 15, 489 96(1933).—A detailed outline of research to be carried out on rubber road-surfacing mixts., including the character and scope of the investigation, the essential properties of a good road surface, (durability, stability, resilience, coeff. of friction, resistance to traction, vibration, sound absorption, adhesion, light-reflecting power) and tests to det. and control these properties, and the properties and behavior of various types of materials best suited for use in conjunction with rubber. C. C. Davis

Antioxygens P. Jacobs. *Caoutchouc and gutta-percha* 30, 16548-50(1933); cf. *C. A.* 27, 3357. —A tabulation of the chem. name and formula, com. name, properties and behavior as accelerators of various phenols, amines amino-condensation products. C. C. Davis

The action of anti-aging agents. B. Dogadkin. *J. Rubber Ind.* (U. S. S. R) 5, No. 6, 11-21(1931); *Chem. Zentr.* 1932, I, 1959. —Attempts were made to develop methods by which some insight could be gained into the mechanism of the stabilization of rubber by means of anti-aging agents. Illumination with the quartz lamp changed the properties of raw rubber by photochem. action. The curves showing the decrease in viscosity of a crepe soln. in toluene for various periods of illumination were plotted. The viscosity of a 1% soln. diminished to a limiting value in 1 hr. Bubbling air through the solns. had no influence on the viscosity curves, which indicates that any oxidation of the rubber is accomplished by the small quantity of O dissolved in the toluene soln. Of the stabilizers used, phenol, stearic acid and cumene were without influence; benzaldehyde accelerated the decomposition of rubber. Further expts. included a phenolic substance with a long side chain and a yellow azo dye (nothing more definite given). In contrast to "aldamin," the stabilizing action of the azo dye was independent of the concn. of the rubber. The action of "aldamin" appears to depend upon both chem. and optical properties. A theory of the mechanism of stabilization, based on the expts., is offered. M. G. Moore

Development of a method for the chemical and physical analysis of rubber plates. M. I. Sametnik. *Otdelenie Tekhniki: Koshobuynoe Proizvodstvo* 1932, No. 4, 36-9. After a review of methods covering the detn. of pigments, softeners, fillers, accelerators for improving mech. properties, and accelerators of vulcanization, and of methods for detg. chem. ingredients, the following scheme is presented. The rubber is extd. with acetone, and the following detns. are then made: ash, mineral components, C black, cellulose, factice, total S, Sb<sub>2</sub>S<sub>3</sub> and Hg. The soln. is comd. and the ext. analyzed for free S, mineral and vegetable oils, paraffin, vegetable resins, org. accelerators, white and black factice and waxes. Free S and unsaponifiable matter are detd. in the ext. The residue is extd. with CHCl<sub>3</sub> and the soln. is tested for bituminous substances and rubber particles (if the rubber is highly depolymerized). The residue obtained by extn. with CHCl<sub>3</sub> contains rubber combined with S, C black, cellulose, factice and mineral ingredients. A. A. Bochtlingk

The behavior of rubber-lined apparatus toward organic solvents. A. Bresser. *Synthetic and Applied Finishes* 4, 225(1933).—The results of exposure of a com. rubber coating (on metal) to 16 solvents of interest in the lacquer and plastic industries are described. The compn. and character of the rubber are not, however, mentioned. C. C. Davis

Accelerators of vulcanization. F. Jacobs. *Caoutchouc*

and gutta-percha 30, 16541-2(1933); cf. *C. A.* 27, 4128. —The properties and behavior of certain aldehyde-amines are described. C. C. Davis

Studies on the nature of the action of organic accelerators for rubber vulcanization. VII. The effect of heat on the surface tension of rubber solutions. Keiichi Shinada. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 450-4(1933); cf. *C. A.* 27, 4128. —The prepn. of the rubber solns. and the exptl. equipment are described and exptl. results are reported. The change of surface tension of purified pale crepe-xylene and smoked sheet xylene on heating was investigated and a progressive rise of the relative surface tension with increasing heating periods was observed, which S. believes to be due to depolymerization of the mols. The relative surface tensions of purified rubber-benzene, -toluene and -xylene solns. were studied stalagmometrically as a function of concn. at the boundary surface of the gaseous phase in order to ascertain the state of rubber in soln. and the structure of rubber solns. At the boundary air-benzene, -toluene and -xylene pure rubber behaves like a capillary-active substance up to 0.9% concn., and the isotherm of the relative surface tension shows a min. between 0.5 and 0.7% concn., which is due to the fact that dil. rubber solns. up to 0.7% concn. contain mainly free colloidal rubber mols., while at higher concns. aggregation takes place with the distinct appearance of a micellar structure. This is in support of the chem. depolymerization theory for the change of surface tension of dil. rubber solns. on heating and the accompanying lowering of viscosity. K. K.

Accelerators with a retarded action. F. Jacobs. *Rev. gén. caoutchouc* 10, No. 94, 33-8(1933); cf. *C. A.* 27, 4128. —More data on "Vulcacit J" are presented. C. C. Davis

Scorching of different accelerators. B. Pabritzhev and R. Shabanova. *India Rubber J.* 86, 363 7(1933). —See *C. A.* 27, 4954. C. C. Davis

Are hot-vulcanized dipped rubber goods detrimental to health? Werner Fsch. *India Rubber J.* 86, 303-4(1933). —See *C. A.* 27, 4128. C. C. Davis

The chemistry of soft rubber vulcanization. II. The function of sulfur. B. S. Garvey, Jr. and G. Thompson. *Ind. Eng. Chem.* 25, 1292 7(1933); cf. *C. A.* 27, 6018. —When crude raw rubber is heated with S, 2 reactions take place, either of which can bring about vulcanization: (1) a direct addn. of the S to the double bonds, and (2) a reaction at the double bonds of the hydrocarbon, which does not involve any change in the unsatn. of the latter. The changes in phys. properties during vulcanization are the result of a building-up of a mech. structure, and the phys. properties of the vulcanizate depend to a considerable extent upon the relative rates at which the 2 reactions take place and therefore upon the character of the structure formed by the 2 reactions. S catalyzes the 2nd reaction, whether or not accelerators are present, while accelerators influence both reactions. The relative effects on the 2 reactions probably depend upon the particular accelerator, the accelerator-S ratio and the temp. of vulcanization. In ordinary "soft rubber" vulcanizates, both reactions take place. With high proportions of accelerator and relatively low S the properties of the vulcanizates depend almost solely upon the non-S reaction, whereas the character of hard rubber depends primarily upon the combination of rubber and S. C. C. Davis

Effect of temperature and frequency on the dielectric constant, power factor and conductivity of compounds of purified rubber and sulfur. A. H. Scott, A. T. McPherson, Harvey L. Curtis and A. D. Cummings. *Bur. Standards J. Research* 11, 173-209(1933) (Research Paper No. 555). —The dielec. const., power factor and cond. of purified rubber and of a series of vulcanized rubber-S mixts. were detd. at -75° to 235°. Vulcanization was carried to a point where practically all S was combined. The dielec. const. and power factor were measured at 5 frequencies from 60 to 300,000 ~, and the apparent cond. at approx 0.002 sec. and at 1 min. after application of the potential. The results are given in tables and graphs. At



25° and 1000 ~, the dielec. const. of purified rubber contg. no S was 2.37. With increase in S content, the dielec. const. increased to a max. of approx. 3.75 at 11.5% S, then diminished to a min. of 2.70 at 22% S, and again increased to 2.82 at 32% S. Under similar conditions, the power factor increased from  $1.8 \times 10^{-3}$  for rubber alone to a max. of  $93.8 \times 10^{-3}$  at 13.5% S, then diminished to approx.  $4.0 \times 10^{-3}$  at 20% S, and again increased slowly to  $5.1 \times 10^{-3}$  at 32% S. The 1-min. cond. was  $2.3 \times 10^{-17}$  mho per cm. for rubber alone. With 12% S it was only  $0.5 \times 10^{-17}$ , while at 18% S it passed through a sharp max.  $38 \times 10^{-17}$ , then diminished to values between  $1$  and  $1.5 \times 10^{-17}$  for mixts. of 23–32% S. Changes of the temp. or the frequency at which the measurements were made shifted the maxima and minima of these curves and changed their heights. Thus at –25°, the max. dielec. const. at 1000 ~ was 2.8, which was obtained with a mixt. contg. 4% S. At 145° the max. was 4.5, with a mixt. contg. 26% S. A comparison of the results of this investigation on purified rubber with previous expts. on crude rubber (cf. C. A. 22, 330) indicates that purification alters the elec. properties but does not alter the general manner in which these properties vary with changes in compn., temp. or frequency. The results may have a practical bearing on the formulation of rubber mixts. for sp. uses. They also indicate the manner in which the properties of rubber are related to temp. or frequency, and show the inadequacy of the sample numerical consts. sometimes employed to evaluate changes in elec. properties with temp. and frequency.

C. C. Davis

**Mechanism of rubber aging.** Bernard L. Johnson and Frank K. Cameron. *Ind. Eng. Chem.* 25, 1151–2 (1933). — Vulcanizates of rubber, S, tetramethylthiourani monosulfide, stearic acid and ZnO, with and without phenyl- $\beta$ -naphthylamine, were examd. by x-rays before and after aging for 10 days in air at 70°. On aging, the intensity of the diffraction lines decreased progressively, whereas their position did not change. The increasing elongation required to produce fibering as rubber deteriorates depends upon the fact that it is necessary to expel an increased concn. of lower polymers formed from the cryst. aggregates or fibers by depolymerization during aging. The aggregates or fibers can then diffract x-rays. Oxidation may, however, give the same effect by obstructing in some way the elongation of tangled mols. or nuelles. A curve of the elongation at which the cryst. form first appears as a function of the time of aging gave evidence of the rate of depolymerization of the vulcanizates studied. The curves for the vulcanizates with and without phenyl- $\beta$ -naphthylamine were similar, which indicates that such an antioxidant does not influence the rate of depolymerization or the elongation necessary to produce fibering in deteriorated rubber. Bary and Fleurent have also found evidence of depolymerization during aging (cf. C. A. 21, 2398).

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**Suggestion to sugar growers of the Philippines** [rubber growth in sugar soils] (Muzzall) 28. Multiform plastimeter (Lefcaditis, Avey) 1. Rubberized fabric (U. S. pat. 1,929,368) 25. Rubber coated fabric (U. S. pat. 1,931,110) 25. Puncture-sealing compns. (Brit. pat. 394,978) 18. [Rubber] printing-surfaces (Brit. pat. 395,214) 18. Leaching system for removing vulcanizing agents, etc., from materials (U. S. pat. 1,929,927) 13.

**Stabilizing latex.** Philip Schidrowitz and Pirelli Ltd. Brit. 395,066, July 13, 1933. Concd. latex, particularly that to be used for heat-deposition processes described in Brit. 284,808 (C. A. 22, 4877), 292,964 (C. A. 23, 1527), 330,520 (C. A. 24, 8063) and 351,012 (C. A. 26, 4505), is stabilized against thickening, or reduced in viscosity without diluting the disperse phase, by adding small quantities of piperidine,  $Et_3NH$ ,  $Me_3NH$  or like strong org. base, preferably in aq. soln.

**Rubber coagulum.** Frank O. Woodruff (to Harry H. Beckwith). U. S. 1,929,544, Oct. 10. A water-sol. gum such as gum arabic is dissolved and then mixed with a smaller quantity of mineral oil and the mixt. is passed

through a colloid mill to form a stable emulsion. The resulting mixt. is added to a quantity of latex contg. a wt. of rubber equal to the combined wts. of the gum and oil in the mixt. and the mixt. is coagulated by stirring with a quantity of 40% formaldehyde soln. equal in wt. to about 2% of the oil and solids in the mixt. The product thus prep'd. is suitable for making vulcanized products of good strength.

**Rubber compositions.** Harold A. Morton. U. S. 1,929,580, Oct. 10. "Age resisting" properties of rubber compns. are improved by addn. of about 1.0–1.5% of compds. such as a hydroglyoxaline selected from a class consisting of 2,4,5-trifuryldihydroglyoxaline, 1,3-di- $\alpha$ -naphthyltetrahydroglyoxaline, 1,3-diphenyl-2-propyltetrahydroglyoxaline, 1,3-di- $p$ -tolyl-2-phenyltetrahydroglyoxaline, 1,3-diphenyl-2-propenyltetrahydroglyoxaline, 1,3-di- $p$ -tolyl-2-methyltetrahydroglyoxaline, 1-phenyl-3-xylyl-2-thiotetrahydroglyoxaline, and 1,3-di- $\beta$ -naphthyl-2-phenyl-4-methyltetrahydroglyoxaline.

**Rubber compositions.** Albert E. Bond. Brit. 382,709, Nov. 3, 1932. Decorative compns., particularly for laying *in situ* for floorings, etc., are made by incorporating pieces of colored stone, vulcanized rubber, metal, etc., in a paste of rubber latex and filler, e. g., china clay, asbestos powder,  $Al_2O_3$ ,  $Ca(OH)_2$ , fine sand, hydraulic cement. In examples, latex of 70, 60 and 40% concns. is mixed in the presence of a casein base cold  $H_2O$  glue with vulcanizing materials, including ultra-accelerators, and fillers and the paste is mixed with the pieces, the compn. being spread, e. g., by a trowel, allowed to set and dry and the surface then ground or polished. The paste may include C black, pigments, dyes and an anti-agar. In 382,750, Nov. 3, 1932, the pieces are pressed into the spread paste.

**Rubber compositions.** Dunlop Rubber Co. Ltd. and Douglas Frank Twiss. Brit. 390,531, Apr. 7, 1933. Plasticizers, softeners, anti-agers and accelerators that are easily fusible solids or adhesive semi-solids or liquids are incorporated in rubber to form mother stocks by contacting them, in the proportions desired in the finished article, in an easily flowable condition with rubber, preferably in thin sheet form, for a time at a raised temp. by pouring, stirring, spreading or spraying. The mixt. may be given a subsequent milling. In a typical example 10 lb. pale crepe in thin sheet form is heated 15 min. to 60° and 10 lb. stearic acid at 110° added slowly. The hot acid is rapidly absorbed to give a dough which is kept at 90–100° for 1–2 hrs. and then cooled to 35–40° and rolled out in sheet form. In 390,532 similar materials are incorporated by forming them into emulsions or solutions in org. solvents that may themselves be plasticizers, softeners, etc., and contacting with rubber, preferably in thin sheet form. Examples are given.

**Rubber compositions.** Dunlop Rubber Co. Ltd., Douglas F. Twiss and Frederick A. Jones. Brit. 394,007, June 19, 1933. The mix contains, *inter alia*, a basic ingredient or mixt. of ingredients, e. g., accelerators, anti-oxidants, plasticizers or activators, at least 1 of which is basic, together with an aliphatic acid or acidic substance which decomposes with partial or complete loss of acidity at vulcanizing temps. The acid, e. g., malonic, oxalic or others contg. the grouping  $-COCH_2COOH$  or  $-COCOOH$ , may be used as normal or acid salt with 1 of the ingredients. In examples diphenylguanidine malonate, diphenylguanidine H malonate and diphenylguanidine H oxalate are used.

**Rubber compositions.** Dunlop Rubber Co. Ltd., Douglas F. Twiss and Frederick A. Jones. Brit. 394,754, July 6, 1933. An acid salt (or such a mixt. of the acid and base as to form an acid salt) of (substituted)  $NH_4$ , including urea and thiourea, is included as an ingredient in a vulcanizable rubber mix. The salt decomposes with evolution of  $NH_3$  or amine at or near the vulcanization temp. and the acid itself, e. g., malonic, may also decompose with partial or complete loss of acidity. Such ingredients have a "delayed action" effect on vulcaniza-

tion. The base may be  $\text{NH}_3$ , alkylammonium, polymethylene ammonium, urea, alkylurea, thiourea or alkylthiourea and the acid citric, oxalic, tartaric, sebacic, adipic,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ , and malonic.

**Rubber compositions.** Dunlop Rubber Co. Ltd., Douglas F. Twiss and Frederick A. Jones. Brit. 395,109, July 18, 1933. Org. acids having 1 or more OH or COOH groups in addn. to the characteristic COOH group present, admixed with or in combination with fluid or relatively easily fusible substances, are added to a vulcanizable rubber mix. The acids include lactic, tartaric, citric, oxalic, malonic, succinic, sebacic, adipic and salicylic. The fluid, etc., substances include glycerol, glycol, triethanolamine,  $\text{PhNH}_2$ , and its homologs,  $\text{Ph}_2\text{NH}$ , the naphthylamines and their derivs.

**Rubber coating compositions.** Giacomo Galimberti and Giuseppe Peverelli. Brit. 302,707, May 25, 1933. An emulsion consists of rubber latex, a drying oil, which may be mixed with resin or gum, or resin, an agglutinate, e. g., casein or gelatin, and  $\text{CH}_2\text{O}$  or a homolog thereof. It may be applied to wood or metal as an elec. insulating material or used for coating or varnishing fabrics or natural leather. In an example fabric is coated several times with a paste of macerated rubber and with white lead, coloring matter or artificial colors pptd. on white lead, china clay or  $\text{BaSO}_4$  and is then further coated with the above compn., stamped or printed with a design and vulcanized in the cold with S chloride in a solvent, e. g.,  $\text{C}_6\text{H}_6$ ,  $\text{CS}_2$ , benzene,  $\text{CCl}_4$ , xylene.

**Preserving rubber compositions.** Archie Reed Kemp and John H. Ingmanson (to Electrical Research Products, Inc.). Brit. 391,510, May 4, 1933. Thermoplastic, unvulcanized insulating compns. suitable for deep-sea cables, contg. rubber, gutta-percha, balata and a plasticizer, e. g., wax, are preserved by adding a small amt. of a substituted amine, e. g., phenyl-2-naphthylamine, aldol-1-naphthylamine (Age-Rite Resin), sym. di-2-naphthyl- $\beta$ -phenylenediamine (Age Rite White), diphenyl- $\beta$ -phenylenediamine (Stabilite), acetaldehyde-ethylcne-diamine (V. G. R.), phenyl-1-naphthylamine. Other antioxidants, conferring inferior elec. properties, but suitable for use in the air are a mixt. of org. bases and 2-naphthol (Allisan) and diaminodiphenylamine (Aynon).

**Preserving rubber.** I. G. Farbenind A. G. Brit. 394,603, June 30, 1933. The aging of natural rubber and artificial rubber-like masses is retarded by adding to the mix compds. of the constitution  $\text{R}'\text{N}(\text{R})\text{N}(\text{CSH})$  or

$(\text{R}'\text{N}(\text{R})\text{N}(\text{CS}))_2$ , in which R is a (substituted) arylene radical and R' is H or a (substituted) hydrocarbon radical.

Radical R' is H or a (substituted) hydrocarbon radical. They are obtained by the action of  $\text{CS}_2$  on *o*-arylenediamines, naphthalene-*peri*-diamines or *o*-semidines. The prepn. is carried out as described in *Gazz. chim. ital.* 23, 205-300 (1893); also cf. Franz Sachs (C. A. 3, 1982). The disulfides are obtained by the oxidation of the monosulfides with  $\text{H}_2\text{O}_2$ .

**Retarding deterioration of rubber.** Louis H. Howland (to Naugatuck Chemical Co.). U. S. 1,930,051, Oct. 10, 1933. Rubber compns. are admixed with a compd. such as tetraaminodimethyltriphenylmethane or the like.

**Preservatives for natural or synthetic rubber.** I. G. Farbenind. A.-G. (Ludwig Ortner, Max Bogemann, and Theodor Weigel, inventors). Ger. 578,672, June 16, 1933. Addn. to 565,090 (C. A. 27, 1233). Use is made of compds. of the formula given in Ger. 565,090, except that the OH or alkoxy group is replaced by an  $\text{NH}_2$  group. Among the compds. specified are 4,4'-diaminodiphenylmethylethane and 1,1-di( $\beta$ -aminophenyl)cyclohexane. The use of unsubstituted diaminodiphenylmethane is disclaimed.

**Synthetic rubber-like composition.** Waldo L. Seimon (to B. F. Goodrich Co.). U. S. 1,920,453, Oct. 10, 1933. An insol. polymerized vinyl halide such as polymerized vinyl chloride is dissolved at an elevated temp. in a compn., such as a mixt. of *o*-nitrodiphenyl ether, dinitro-

benzene and dinitrotoluene, which will serve as a solvent for the polymerized vinyl halide only when heated, in such proportions as to form a stiff, resilient gel at ordinary temps., and the compn. is caused to gel by cooling it. The resulting product is suitable for coatings, insulation, etc.

**Synthetic rubber goods.** R. I. du Pont de Nemours & Co. Brit. 393,172, June 1, 1933. Addn. to 387,340 (C. A. 27, 4717). Articles are made by forming a predet. shape of a dispersion of a 2-halo-1,3-butadiene polymer and simultaneously or subsequently coagulating, without necessarily including S or S compds. and subsequent vulcanization. The dispersions are prep'd. as in 387,340. The dispersions may also contain 2,3-dichloro-1,3-butadiene, e. g., 0.2-5%, salts of glyptal resins, antioxidants, compounding ingredients or natural or vulcanized rubber latex or other synthetic rubber latices. Methods described include extrusion, dipping and electrodeposition. In an example a dispersion in 400 g.  $\text{H}_2\text{O}$  of 2-chloro-1,3-butadiene 400, Na oleate 16,  $\text{NH}_4\text{OH}$  16 and phenyl- $\beta$ -naphthylamine 4 g. is treated with  $\text{NH}_4\text{Cl}$  2.5 and  $\text{NaOH}$  2 g. in a vol. of  $\text{H}_2\text{O}$  equal to that of the latex. It is then electrolyzed with a small Zn plate as cathode and a Zn anode of the size and shape of the article required, the c. d. being 1 millamp. per sq. cm.

**Rubber dispersions.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Douglas F. Twiss and Wm. McCowan Brit. 301,077, June 22, 1933. In prep. compns. contg. rubber and a  $\text{H}_2\text{O}$ -sol. soap as the continuous phase the rubber, preferably premasticated and compounded, is heated to a relatively high temp., e. g., 130° upwards, either alone or in presence of a high-boiling org. liquid, e. g., suitable petroleum fractions, oleic acid or a mixt. thereof. When the rubber is premasticated the addn. of a small amt. of an acidic substance, e. g.,  $\text{Br}_2/\text{OH}$ , toward the end of the mastication aids softening of the rubber.

**Aqueous dispersions of rubber.** Lester Kirschbraun (to Plintkote Corp.). U. S. 1,929,499, Oct. 10, 1933. A mass of rubber material such as crude rubber is subjected to an incipient attenuation, as by the action of a rubber mill, and a colloid such as bentonite and water is added without previous formation as a paste while the mass is undergoing its incipient attenuation. The entire mass is kneaded until the rubber becomes dispersed in the water and the quantity of water used is at all times sufficient to maintain continuously the water as the external phase of the system during the dispersion of the rubber.

**Treatment of rubber dispersions.** Dewey & Almy Chem. Co. Ger. 583,251, Aug. 31, 1933. See Brit. 324,287 (C. A. 24, 3398).

**Rubber articles from dispersions.** Eardley Hazell (to Naugatuck Chemical Co.). U. S. 1,931,002, Oct. 17, 1933. For improving the water- and electrical-resistance of articles made from rubber dispersions, water-sol. substances are removed by electroosmotic passage of liquid such as water through the material. App. is described.

**Molding rubber, etc., articles.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Douglas F. Twiss and Edward A. Murphy. Brit. 387,670, Feb. 7, 1933.

Molded articles, e. g., surgeons' gloves, of, or contg., rubber, etc., and provided with a surface finish ranging from a smooth mat to a coarse granular texture as desired, are made by applying as a coating to formers, molds or molding surfaces the particular type of flocculent or granular ppt. desired, obtained from aq. dispersions or emulsions consisting of, or contg., rubber, gutta-percha, balata or similar vegetable resins occurring naturally or artificially obtained, drying the coatings thereon and contacting the thus produced master former, etc., with aq. emulsions or dispersions of the type above described or solns. of these substances in org. solvents by dipping, spreading, spraying, molding or electrophoresis. The articles may be vulcanized before removal from the master formers, etc. The flocculent or granular ppts. may be obtained by the process of Brit. 360,450 (C. A. 26, 2684).

**Treating surfaces of rubber articles.** Wm. C. Geer.

Brit. 384,911, Dec. 15, 1932. Addn. to 320,427 (C. A. 24, 2689). Hard surfaces are produced on rubber articles, e. g., golf balls, by treatment with a halide of an amphoteric metal dissolved in an org. solvent, the hardness and flexibility of the surface being controlled by selection of solvents of 1 or more of the following types: (a) inert solvents, e. g., ethylene dichloride, (b) solvents forming addn. products with the halide and thus retarding its action, e. g., esters of carboxylic acids and halogen-substituted carboxylic acids, alcs., ketones, phenols and hydrocarbons, (c) solvents that swell the rubber to a limited extent, e. g., PhMe, and (d) substances that accelerate the action of the halide, e. g., stearic acid.

Rubber goods. Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd. and Geoffrey Wm. Trobridge. Brit. 383,432, Nov. 17, 1932. Articles of rubber, etc., are produced from aq. dispersions thereof by coating supports or backing strata with a non-coagulating compn. comprising 1 or more polyhydroxy compds. having a slight stabilizing action, e. g., polyhydric alcs. or their derivs. such as glycerol, glycol, diethylene glycol or alkyl ethers of these such as glycol monoethyl ether, in admixt. with 1 or more volatile solvents, e. g., acetone, alc., Et<sub>2</sub>O, then with the aq. dispersions and finally coagulating the deposits, e. g., by heat, with or without coagulating agents and (or) setting and dehydrating means.

Rubber goods. Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Douglas F. Twiss and William McCowan. Brit. 393,036, June 1, 1933. Articles produced from natural rubber latex are coated with an artificially prepd. aq. dispersion of rubber (substitute) that has been previously heated, either alone or in the presence of a high-boiling liquid, e. g., high-boiling petroleum, oleic or stearic acid, to a relatively high temp., e. g. (over) 140°, to reduce it to a viscous and preferably adhesive state. The dispersion of the treated rubber (substitute) may be mixed with natural latex before application. Alternatively rubber articles may be made directly from mixts. of latex and treated rubber (substitute) dispersion. The assembly of plies of rubber-proofed fabric and the production of a farina finish on rubber-proofed material for rain coats is facilitated by the adhesive properties thus conferred on surfaces obtained by evapn. of latex. Examples are given.

Rubber goods. Benjamin D. Porritt, Thomas R. Dawson, John R. Scott and The Research Association of British Rubber Manufacturers. Brit. 394,730, July 6, 1933. Rubber articles required to resist mech. failure under the influence of liquids that swell vulcanized rubber, e. g., oil hose, packings and valves, include vulcanized rubber having as a constituent a H<sub>2</sub>O-sol. protein, e. g., glue, gelatin, introduced by dissolving the protein in the aq. phase of a rubber dispersion, e. g., latex, removing substantially all the H<sub>2</sub>O from the dispersion and subjecting the mixt. to vulcanization. Vulcanizing agents, accelerators, fillers, etc., may be incorporated.

Rubber products of sponge-like or cellular texture. Edward A. Murphy and Eric W. B. Owen (to Dunlop Rubber Co. Ltd.). U. S. 1,929,603, Oct. 10. An aq. rubber emulsion or dispersion is formed into a mass while in foamed condition and the interior of the mass is caused to set while still in a reversible condition and the setting of a surface of the mass is interrupted in order to prevent formation of a surface skin.

Porous or microporous rubber articles. Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 583,146, Aug. 29, 1933. An aq. rubber dispersion is coagulated in or on molds or surfaces which have been pretreated with a metal soap, preferably Zn stearate. Vulcanization is then effected in known manner under conditions precluding evapn. of liquid from the pores of the coagulate. The pretreatment of the molds or surfaces leads to easily removable products free from surface markings.

Microporous rubber, etc., articles. Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Evelyn W. Madge

and Albert N. Ward. Brit. 395,022, June 1, 1933. Articles of microporous rubber, etc., which are free from surface markings and easily removable from the mold e. g., hard rubber battery separators, are made by a modification of the known process, in which dispersions are gelled and vulcanized under conditions such that evapn. of the liquid in the pores is prevented, by cooling, preferably sharply, the product part of the way through the vulcanization which is thereafter carried to completion, the articles remaining in the original mold or on the original backing. The process is particularly applicable to the processes of Brit. 346,810 (C. A. 27, 446), 351,937 (C. A. 27, 445), 366,120 (C. A. 27, 2339), 377,751 (C. A. 27, 4130) and 393,023. In 393,023 similar articles are made by a modification of the above-described known process, consisting in treating the mold surfaces prior to introduction of the dispersions with certain non-oily metallic salts of the higher fatty acids, namely those of Zn, Cd, Mg, Al and ferric Fe, preferably Zn stearate. The invention is particularly applicable to the process of 393,022 and to those referred to therein.

Rubber threads, etc. Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Edward A. Murphy and Robert G. James. Brit. 393,057, June 1, 1933. Threads, tubes, etc., are made by extruding aq. dispersions of rubber, etc., into a coagulating medium which operates partly or entirely under continuous penetrative osmotic action and comprises a concd. soln. of a salt of a weak acid capable of considerable dissociation together with such an amt. of the weak acid that the  $pH$  is 4.0-6.5. The aq. dispersions contain a substance adapted to react with the coagulating medium and which, until it has so reacted, is substantially inert to the dispersions but thereafter is decompd. into a mild coagulant effecting a smooth coagulating action throughout the thickness of the thread. Suitable inactive substances that can be added to the dispersions are NH<sub>4</sub> and ethanolamine soaps of the fatty acids and colophony.

Ornamenting rubber. The B. F. Goodrich Co. Fr. 748,940, July 13, 1930. A decorated rubber article is produced by applying to an unvulcanized rubber base a liquid decorating layer of rubber, which is of lower plasticity at all temps. to which the rubber is subjected during vulcanization than the base. The base layer may be of masticated unvulcanized rubber and the applied pattern of latex, which is dried, the article being then vulcanized.

Attaching rubber to metal. Dunlop Rubber Co. Ltd., Douglas Frank Twiss, John Alex. Wilson and Albert Edw. T. Neale. Brit. 390,932, Apr. 20, 1933. In uniting rubber to a metal surface an intermediate layer is introduced, consisting of, or contg., Cu, Hg, Mn or Fe (preferably ferric) salts of org. acids contg. 1 or more reactive groupings in addn. to the characteristic acid group, e. g., salicylic, thiosalicylic or picric acid. The metal may be coated with the salt or with successive films of the acid and the oxide, hydroxide or amino-hydroxide of the metal or with a film of 1 of the ingredients while the other is applied to the rubber.

Uniting rubber with rigid materials such as steel plates or other metal articles. Owen A. Thompson (to B. F. Goodrich Co.). U. S. 1,981,309, Oct. 17. The materials are united with an intervening layer comprising vulcanizable rubber together with a fusible synthetic resin capable of hardening and becoming infusible when heated, and the assembled materials are heated.

Apparatus for plasticizing rubber. George R. Burrell (to Wingfoot Corp.). U. S. 1,930,736, Oct. 17. Mech. features.

Plastic compositions. Herman L. Grupe and Roy H. Kienle. Brit. 395,217, July 13, 1933. Rubber latex or a rubber dispersion is compounded with an alkyl resin in alk. soln. or dispersion. Vulcanizing agents and other compounding and filling ingredients may be incorporated. If an ammoniacal or alk. soln. of the resin is used the mixt. is coagulated, washed and dried. The products are resistant to mineral oils and hydrocarbons and useful

for gaskets, oil-proof cloth, gasoline gauze diaphragms, wire coatings, etc.

**Resilient, gasoline-resistant rubber stock.** David J. Beaver (to Doherty Research Co.). U. S. 1,930,437, Oct. 10. A compn. formed from rubber, a vulcanizing agent such as S, a soft C black and less than 5% of a softener such as stearic acid is vulcanized and the degree of resilience of the stock after cure is controlled by mixing with the C black used a minor portion of channel black before compounding the C black with the rubber, the relative proportions of the materials being adjusted to form a rubber stock which when vulcanized is gasoline-resistant.

**Rubber-refining machine with rolls of different diameters, etc.** Henry G. Brewster (to Farrel-Birmingham Co.). U. S. 1,930,873, Oct. 17. Mech. features.

**Rubber paving and coverings.** Wee Theang Siew. Brit. 380,828, Sept. 19, 1932. Rubber coverings for roads, floors, roofs, ceilings, etc., are vulcanized *in situ* and consist of 1 or more inner layers of soft rubber and 1 or more outer layers of hard rubber. The foundation is cleaned and sprayed with a cementing soln. consisting of 1 gal. naphtha or benzine and 1 lb. of a mixt. of compn. plantation rubber 24, whitening 12, PbO 16 and S, or its equiv., 1.25 parts. The soft rubber may be plantation rubber 73, ZnO 18, S 6, powd. rosin 2 and CaO 1%. The hard layer(s) may be plantation rubber 44, 36; tread reclaimed rubber 0, 10; ZnO 50, 40; S 3, 5; lime or equiv. 1, 1, coloring matter 2, 0 and C black 0, 10%. The vulcanizing may be effected by the machine of Brit. 380,121 (C. A. 27, 5580).

**Waterproof indelible prints on rubber.** Hermann Beckmann. U. S. 1,930,301, Oct. 10. A waterproof indelible ink is adsorbed in the pores of a cured, colloidal rubber article of reticulate structure having microscopically visible filter-size pores such as in the production of bank notes or documents.

**Halogenated butadienes and butenes.** E. I. du Pont de Nemours & Co. Brit. 395,131, July 13, 1933. Addn. to 387,325 (C. A. 27, 4718). The process of 387,325 is effected by passing gaseous monovinylacetylene into contact with a soln. of H halide at a rate which is varied in accordance with the product desired, a higher rate of flow favoring the production of halobutadienes and a lower rate that of halobutenes.

**Substituted fatty acid amides.** I. G. Farbenind. A. G. (Robert Knoll, inventor). Ger. 582,390, Aug. 14, 1933. Higher fatty acids or their esters, chlorides, amides or imino ethers are condensed by standard processes with primary or secondary aromatic amines substituted by a side chain which contains a tertiary N atom. Alternatively, a side chain contg. a tertiary N atom is introduced in known manner into the condensation products of higher fatty acids or their derivs. with primary or secondary aromatic amines. The products are useful as "assistants" in the rubber industry and as thickening agents for medicines and cosmetics. Examples are given of the prepn. of the *p*-diethylaminoethoxyamides of oleic, palmitic, hydrocaptive and chaulmoogric acids (HCl salts m., resp., 85.7, 108.11, 94.6 and 87.90°); palmityl- and stearyl-*p*-(ethyl)(diethylaminoethyl)aminoanilides (HCl salts m., resp., 81° and 94°); oleyl-*p*-(methyl)(diethylaminoethyl)aminoanilide - HCl; *p*-palmitylamino-benzoic acid diethylaminoethyl ester (HCl salt, m. 116°); oleyl-*N*-*p*-hydroxyphenyl-*N*-diethylaminoethylamido-HCl; and stearyl-7-diethylaminoethoxy-1-naphthylamide-HCl. The following intermediates are described: *p*-diethylaminoethoxyaniline, b<sub>p</sub> 170°; *p*-diethylaminoethylaminophenol, b<sub>p</sub> 172.80°; and 7-diethylaminoethoxy-1-naphthylamine, b<sub>p</sub> 213-7°, m. 66-7°.

**Rubber vulcanization accelerator.** Winfield Scott (to Rubber Service Laboratories Co.). U. S. 1,931,394, Oct. 17. For accelerating vulcanization there is added a small proportion of a compd. obtained by treating about one mol. proportion of a Schiff's base produced by com-

binizing substantially equimol. proportions of an aliphatic amine such as butylamine and an aldehyde series contg. 4 to 10 C atoms such as butyric acid while simultaneously causing the Schiff's base to react with substantially 2 mol. proportions of an aliphatic aldehyde such as butyraldehyde.

**Vulcanizing.** Sidney M. Cadwell (to The Naugatuck Chemical Co.). Brit. 383,679, Nov. 24, 1932. The vulcanization of rubber is controlled to avoid scorching, etc., by incorporating, in addn. to an accelerator, an acidic retarding agent and at any time before or during vulcanization nullifying the retarding effect by treatment with NH<sub>3</sub>. Org. and inorg. acids, acid salts, heavy metal salts of strong acids, acid anhydrides and chlorides, etc., may be used as retarders. Twelve examples are given showing the results with various mixes, including crepe and sprayed rubber.

**Rubber vulcanization.** Harold A. Morton. U. S. 1,929,561, Oct. 10. Pre-vulcanization of compds. contg. rubber, a vulcanizing agent such as S and ZnO together with an "ultra accelerator" such as dimethylammonium dimethyldithiocarbamate is prevented by addn. of compds. such as benzoic acid or a similar compd.

**Rubber vulcanization.** Robert L. Sibley (to Rubber Service Laboratories Co.). U. S. 1,931,396, Oct. 17. In vulcanizing with S, an accelerator is used comprising a reaction product of an org. acid halide such as phthalyl chloride and a mercaptoarylthiazole deriv. of an org. base such as a mercaptobenzothiazole deriv. of (CH<sub>3</sub>)<sub>3</sub>N<sub>4</sub>.

**Rubber vulcanization.** Robert L. Sibley (to Rubber Service Laboratories Co.). Brit. 391,122, Apr. 18, 1933. The vulcanization of rubber is accelerated by adding to the mix a salt of a (substituted) guanidine with an org. acid, e. g., diphenylguanidine benzoate, acetate and phthalate, guanidine acetate and phthalate, in admixt with 1 or more other accelerating compds., e. g., the reaction product of a mercaptoarylthiazole and an aromatic acid halide, the crotonaldehyde deriv. of the reaction product of mercaptobenzothiazole (I) and (CH<sub>3</sub>)<sub>3</sub>N<sub>4</sub>, the AcH deriv. of the reaction product of *p,p'*-diaminodiphenylmethane and I.

**Rubber vulcanization.** Wm. F. Tuley (to The Naugatuck Chemical Co.). Brit. 387,454, Feb. 9, 1933. To avoid pre-vulcanization or scorch, accelerators of the "ultra" or "semiultra" type are used with material which at vulcanizing temp. decomposes to give NH<sub>3</sub> or aliphatic amines that aid acceleration. Such material comprises compds. of the type R'R'NC:ONHR, where R is H or an aliphatic (including aralkyl) hydrocarbon radical, R' and R'' are H or similar or dissimilar aliphatic or aromatic hydrocarbon radicals, and includes urea, mono- and disubstituted ureas. Examples of acidic derivs. are complex salts of urea and its homologs with ZnCl<sub>2</sub> or amide, org. or inorg. acid salts such as urea oxalate, urea-HCl, etc. In examples urea is used in conjunction with mercaptobenzothiazole, 2,4-dinitrophenyl benzothiazyl sulfide, tetramethylthiuram monosulfide, etc.

**Vulcanizing rubber.** R. T. Vanderbilt Co., Inc. Ger. 583,278, Sept. 6, 1933. See U. S. 1,875,997 (C. A. 27, 2198).

**Vulcanized products from natural or synthetic rubber.** Hermann Mark and Heinrich Hopff (to I. G. Farbenind. A.-G.). U. S. 1,929,373, Oct. 3. For the production of products of good resistance to attrition, rubber or a polymeric material derived from diolefins is treated, at temps. up to 100° or lower, in the presence of an inert solvent such as C<sub>6</sub>H<sub>6</sub> with an "org.-inorg." oxonium compd. such as may be formed from AlCl<sub>3</sub> and phthalyl chloride.

**Device for vulcanizing rubber soles to the uppers.** Bata Akciova Spolenost. Brit. 394,564, June 29, 1933.

**Apparatus and method for molding and vulcanizing gas-filled hollow articles of rubber, etc., e. g., tennis balls.** Dunlop Rubber Co. Ltd. Brit. 394,595, June 29, 1933.

# CHEMICAL ABSTRACTS

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## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

- Filtering device. E. B. Kester. *Ind. Eng. Chem., Anal. Ed.* 5, 422(1933).—A Bakelite or soft rubber plunger is fitted into a glass test tube. The filtrate can escape and the ppt. or solid is sepd. out. J. L. E.
- Automatic pipet washer. Ellen Howell and Fannie Mac Frank. *Am. J. Pub. Health* 23, 1186(1933). J. A. K.
- A convenient weighing buret. Jacob Cornog and Robert Cornog. *Ind. Eng. Chem., Anal. Ed.* 5, 408(1933). G. G.
- Buret with reservoir for series titrations. M. Chatron. *Bull. soc. chim. biol.* 15, 1154 5(1933).—A 1-l. dropping funnel is mounted on top of a buret. L. E. Gilson
- Stirring rod with fritted glass disk. John E. S. Han. *Ind. Eng. Chem., Anal. Ed.* 5, 421(1933).—A fritted glass disk sealed on the end facilitates removal of gaseous products. J. L. E.
- Mercury seal for stirrers. D. T. Rogers. *J. Am. Chem. Soc.* 55, 4901(1933).—A Hg seal made of Allegheny metal No. 22 or soft steel coated with paint is good for speeds of 1000 r. p. m. J. L. E.
- Continuous liquid extractor. Abraham Mazur, Robert Rosenthal and Benjamin Harrow. *Ind. Eng. Chem., Anal. Ed.* 5, 419(1933).—An extractor is devised for solvents having a lower sp. gr. than the liquid to be extd. The solvent condenses and is passed upward through the liquid being extd. and thence into the reboiler. J. L. E.
- An automatic cryostat. Angus E. Cameron. *Rev. Sci. Instruments* 4, 610-11(1933).—An app. to hold any temp. from 0° to -70° within 0.1° by forcing cold liquid from a reservoir into the thermostat and automatically returning an equal vol. is described with 1 cut. J. H. M.
- Apparatus for filling large closed-end manometers. Angus E. Cameron. *Ind. Eng. Chem., Anal. Ed.* 5, 419(1933).—A diffusion pump in which Hg is distd. into the manometer tube is described. J. L. E.
- Micropycnometer for the determination of differences in the isotopic ratio of water. E. S. Gillfillan and M. Polanyi. *Z. physik. Chem.* A166, 254-6(1933).—The pycnometer is made of a capillary 6 mm. long and 1 mm. wide with one end closed. The other end has an opening 0.02 mm. wide. The closed end is fitted with a bulb of such size that the pycnometer just floats at 0° in ordinary H<sub>2</sub>O. By varying the pressure on the bulb in H<sub>2</sub>O of different ds. it is found that a change of external pressure of 1 cm. Hg corresponds to a change of d. of 10<sup>-4</sup> mg. With a total variation of 1 atm. and if one reads the pressure to 1 mm., differences in d. between 10<sup>-6</sup> and 10<sup>-8</sup> mg. may be detected. An error in the result for ordinary H<sub>2</sub>O found in successive readings requires that the app. be re-calibrated for each measurement. The cause of this error has not yet been detd. G. M. Murphy
- The Höppler viscometer. C. Kaiser. *Petroleum Z.* 29, No. 36, *Motorentrieb und Maschinen-Schmierung* 6, No. 9, 5-6(1933).—The instrument, operating on the basis of the time of fall of balls of various sizes through the fluid under investigation, is discussed. It is more accurate, has a much wider effective range (0.2-220,800 centipoises) than the viscometers now ordinarily used, and the results are easily converted into C. G. S. units. Detns. on the same sample of fluid at various temps. can be quickly executed. I. M. Levine
- How to select ammonia compressors. W. R. Kit-miller. *Power* 77, 565-7(1933).—K. discusses vertical, horizontal, rotary, compound and dual-effect compressors and their applications. Alden H. Emery
- Gas purification in the chemical plant. H. W. Gonell. *Chem. Fabrik* 1933, 479-83, 489-91.—Dust chambers, cyclones, cloth filters, stationary and revolving washers, electrostatic filters, oil-moistened metal filters, Kestner turbo-atomizers and Theisen disintegrators are discussed with 16 cuts and many references. J. H. Moore
- Mercury switches for conductivity experiments. Eugene W. Blank. *J. Chem. Education* 10, 751(1933). E. H.
- Modified design for mercury bulb of thermostat. G. B. Heisig and Angus F. Cameron. *Ing. Eng. Chem., Anal. Ed.* 5, 420(1933).—A modification of the present large-bulb thermostat is made by sealing 2 concentric tubes together at one end, this making a hollow cylinder of Hg; also provision is made for circulating liquid through inner space. J. L. E.
- A simple sensitive thermostat regulator. Chas. E. Woodworth. *Science* 78, 535-6(1933). E. H.
- Evaporator construction (Vorkauf) 13.
- Apparatus for carrying out chemical reactions between gases and liquids in flow, e. g., for preparing monochlorohydrins from gaseous unsaturated hydrocarbons and hypochlorous acid. Paul Letourneur. *Brit.* 396,744, July 31, 1933.
- Hydrometer float. Howard E. Christie and Kibbey W. Couse. U. S. 1,935,564, Nov. 14. Structural details.
- Temperature-regulating apparatus. George E. Hulse (to Safety Car Heating & Lighting Co.). U. S. 1,932,408, Oct. 31. Various mech. and electrical details are described.
- Mercury-column thermometer. Logan Eisele. U. S. 1,932,578, Oct. 31. Structural details.
- Viscometer. Wilhelm Valentiner. *Ger.* 577,578, June 1, 1933.
- Filters. Eugen Haas. *Brit.* 395,871, July 27, 1933.
- Filters. Svenska Ackumulator Aktiebolaget Jungner and Thor F. Mandahl. *Brit.* 396,840, Aug. 17, 1933.
- Filters. Enzinger-Union-Werke A.-G. *Brit.* 396,255, Aug. 3, 1933. The filtering media of beer and other filters are cleansed mechanically outside the filter and, after being charged into the filter, sterilized by the passage or circulation of a heated or other disinfecting agent. App. is described.
- Laboratory filter with a perforated porcelain bottom. Fritz Müller. *Ger.* 577,627, June 2, 1933.
- Suction drum cell filter. Maschinenfabrik Baum A.-G. and Wilh. Hocheisel. *Ger.* 577,767, June 3, 1933.
- Air filters. Amal Ltd. and Clement Brown. *Brit.* 395,498, July 20, 1933.
- Dust filters. The New Shariston Collieries Co. and Philip D. Barker. *Brit.* 396,066, July 17, 1933.
- Filter with granular filtering material. Carbo-Norit-Union Verwaltungsges. m. b. H. (Eduard Siebert, inventor). *Ger.* 586,064, Oct. 16, 1933.
- Device for filtering grinding solutions (such as used in grinding metals) through horsehair filters or the like. Rudolph A. Walters and Niels A. Sorenson. U. S. 1,932,996, Oct. 31. Structural details.

- Filters and strainers.** Wm. R. Beldam. Brit. 396,156, Aug. 3, 1933.
- Filter-presses.** Kautzinger-Union-Werke A.-G. Brit. 396,612, Aug. 10, 1933.
- Filter plate for filter press.** Firma Louis Herrmann. Ger. 586,243, Oct. 19, 1933.
- Apparatus for separating materials of different densities by means of a fluid medium.** Thomas Chance. Brit. 396,558, Aug. 10, 1933.
- Air separators suitable for grading solid materials.** Thomas J. Sturtevant (to Sturtevant Mill Co.). U. S. 1,933,604-5-6, Nov. 7. Structural, mech. and operative details.
- Centrifugal apparatus suitable for separating solids from liquids.** Leo D. Jones (to Sharples Specialty Co.). U. S. 1,931,496, Oct. 24. Various structural, mech. and operative details are described.
- Separator for classifying a mixture of solids in a liquid, e. g., ore pulp, or for separating solids from liquids.** Donald MacLean. Brit. 396,233, Aug. 3, 1933.
- Centrifugal apparatus suitable for separating ore pulps, etc.** Harrison S. Coc. U. S. 1,931,406, Nov. 7. Various structural, mech. and operative details are described.
- Centrifugal separation of materials such as starch and gluten, etc.** Albert Peltzer and Albert Peltzer, Jr. (to Merco Centrifugal Separator Co., Ltd.). U. S. 1,933,119, Oct. 31. Mech. features.
- Sieves.** John J. Mayor. Brit. 396,525, Aug. 10, 1933.
- Plansifter sieves.** Henry Simon Ltd. and Charles Ledger. Brit. 395,850, July 27, 1933.
- Pan-conveyor sifting apparatus.** The Fife Coal Co. Ltd. and John Paton. Brit. 396,602, Aug. 10, 1933.
- Metal funnel with a foldable discharge stem (which may be formed of thin metal).** Rufus B. Lillard. U. S. 1,935,324, Nov. 14. The discharge stem may be bent on itself to stop discharge when desired.
- Spray evaporators.** Martinus J. Stam. Brit. 396,579, Aug. 10, 1933.
- Multiple-effect evaporators, applicable to the concentration of milk, whey, gelatin, glue, lactic acid, fruit juices, vitamins, sugar, blood, etc.** Alfred R. Jahn. Brit. 395,957, July 27, 1933.
- Apparatus for evaporating liquids by circulation.** Escher Wyss Maschinenfabriken A.-G. Swiss 160,164, Apr. 17, 1933.
- Apparatus for evaporating solutions to dryness.** Theodor Lichtenberg. Ger. 577,685, June 2, 1933.
- Drying devices for separated coarse material in ball or tube mills.** Fried. Krupp Grusonwerk A.-G. Brit. 395,912, July 27, 1933. In a ball mill in which an air current carries the ground material to a sifter where the coarse material is sep'd. and conducted back to the mill drum the coarse material is dried previous to its introduction into the drum.
- Tubular drier.** Niedersaatz-Kohlenwerke. Ger. 576,155, May 8, 1933. Addn. to 555,678 (C. A. 26, 6104).
- Blower for tube driers.** Maschinenfabrik Buckau. R. Wolf. A.-G. Ger. 577,680, June 2, 1933.
- Trough drier with rotating hot gas drum.** Buttnr-Werke A.-G. Ger. 577,776, June 3, 1933.
- Vacuum drier for pasty materials.** Reckitt & Sons. Ger. 577,601, June 3, 1933.
- Vacuum drum drier suitable for drying milk, etc.** Henry D. Miles and Duncan B. Montgomery (to Buffalo Foundry and Machine Co.). U. S. 1,933,819, Nov. 7. Various structural, mech. and operative details are described.
- Apparatus for drying articles in plate form, e. g., plates of fibrous material.** Eugen Siempelkamp and Ewald Siempelkamp (trading as G. Siempelkamp & Co.). Brit. 396,621, Aug. 10, 1933.
- Gas-washing apparatus.** Hermann Blehtreu and John B. Eberlein (to Freyn Engineering Co.). U. S. 1,933,699, Nov. 7. Various structural and operative details of an app. with spray nozzles are given.
- Apparatus for washing gases.** Appareils et évaporateurs Kestner. Fr. 750,049, Aug. 3, 1933.
- Apparatus for removing liquid particles from gases under compression.** Ammonia Casale S. A. Swiss 162,138, Aug. 10, 1933.
- Scrubber washing or purifying gases with liquids.** London Power Co. Ltd. and Standen L. Pearce. Brit. 396,489, Aug. 10, 1933.
- Centrifugal gas-cleaner for use with an internal-combustion engine or for other purposes.** Andrew Swan. Brit. 396,157, Aug. 3, 1933.
- Device for testing gases.** Frank O. Barralet and Colbert E. Richards. Brit. 396,672, Aug. 10, 1933.
- Rotary gas compressors.** Serge R. Seilliere. Brit. 396,425, Aug. 1, 1933.
- Gas-pressure regulator.** Walter I. Thrall (to Reliance Regulator Corp.). U. S. 1,931,777, Oct. 24. Structural and mech. details.
- Gas valve suitable for stopping gas flow when a flame is extinguished.** Friedrich Trudwig. U. S. 1,934,020, Nov. 7. Mech. features.
- Apparatus for taking samples of gas such as that from a main at timed intervals.** Gaylord H. Halvorson. U. S. 1,932,582, Oct. 31. Various structural and operative details are described.
- Hollow condensing or refrigerating tower suitable for treating acid gases.** Ottmar Conradty. U. S. 1,932,954, Oct. 31. A tower is formed of hollow cylindrical sections of carbonaceous material such as coal or graphite.
- Apparatus for heating liquids at high pressure to high temperatures, particularly for use in cracking and distilling oil and in distilling glycerol and acids.** Robert A. Carleton. Brit. 395,709, July 12, 1933.
- Device for treating liquids with a volatile extraction agent.** Einar Langfeldt and Ragnvald Hellerud. Ger. 577,626, June 2, 1933.
- Photoelectric cells.** N. V. Philips' Gloeilampenfabrieken. Brit. 396,348, Aug. 3, 1933. In the prep'n. of an alkali metal electrode excess alkali metal, e. g., Cs, is removed by providing 1 or more metals in the cell, outside the photoelectric electrode, capable of forming an alloy with said alkali metal at below 150°. The metals may be Zn, Cd, Hg, Sn, Pb or Ge.
- White luminous effects in electrified neon tubes.** Rudolph de Lamprecht (to Cold White Light Inc.). U. S. 1,931,529, Oct. 24. Tubes are filled with Ne with the addition of a decolorizing gas produced by adding H<sub>2</sub>SO<sub>4</sub> to ZnO in small regular increments.
- X-ray tube.** Albert Bouwers (to N. V. Philips' Gloeilampenfabrieken). U. S. 1,933,005, Oct. 31.
- Röntgen-ray apparatus.** N. V. Philips' Gloeilampenfabrieken. Brit. 396,803, Aug. 14, 1933.
- Cathode-ray and Röntgen-ray tubes.** Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 395,882, July 27, 1933.
- Cathode-ray tubes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 395,660, July 20, 1933. In a gas-filled tube an electrode, such as a disk with a central aperture, is disposed between a Wehnelt cylinder and a thermionic cathode forming a coned. source of electrons. The cathode consists of a Ni tube contg. a heating wire sep'd. by a partition from a small cylinder coated with BaO, the end of the tube being closed by a cap having an aperture smaller than that in the disk. The disk is connected directly with the anode.
- Cathode-ray tubes.** Wm. Richard Bullimore and Leslie H. Bedford. Brit. 396,422, July 31, 1933.
- Discharge apparatus.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 396,928, Aug. 17, 1933. In a dependent arc discharge device, e. g., a rectifier, a magnetic field of 10-100 gauss is applied to the discharge space at right angles to the electrostatic field between a directly or indirectly heated cathode and an anode to cause the efficiency factor to have a max. value. The device may contain Hg.
- Discharge apparatus.** Ted E. Foulke (to The British



Thomson-Houston Co. Ltd.). Brit. 397,107, Aug. 8, 1933. A cathode-glow device has at least 1 electrode consisting of a foundation, *e. g.*, of Ni, having a portion of its surface to which the glow is to be confined coated with an activating substance having a work function lower than that of Al, *e. g.*, Ba, mixed with BaO, while the remainder is coated with material having a higher work function than that of the activating substance, *e. g.*, Al, Al<sub>2</sub>O<sub>3</sub>, Sb, Se, CuO.

**Electric discharge device.** Frederick Barton (to General Elec. Co.). U. S. 1,934,477, Nov. 7. A device is described which comprises an envelope contg. a cathode, an anode and a control member formed entirely of metal and coated with Ag, Cu or Pb which may be carried on an underlying metal such as Mo.

**Electric discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Fr. 41,744, Mar. 29, 1933. Addn. to 729,219.

**Gas-discharge tubes for use with electric out-outs** Francis T. Jenkins. Brit. 397,108, Aug. 14, 1933.

**Discharge tubes operating without appreciable gas ionization.** C. H. F. Müller A.-G. Brit. 396,930, Aug. 17, 1933.

**Discharge tubes containing gas or mercury vapor.** Eugene A. Giard (to Igranic Electric Co. Ltd.). Brit. 396,998, Aug. 17, 1933.

**Gaseous discharge tubes.** Hans J. Spanner and Carl J. H. R. v. Wedel (to Electrons, Inc.). U. S. 1,934,830, Nov. 14. An incandescible electron-emissive cathode subject to ionic bombardment comprises at least on its surface a double metal compd. such as a Ba-Ni nitride or the like which is non-vaporizable at temps. at which the cathode has an emissivity substantially equal to the emissivity of BaO at 650°.

**Luminous gas discharge tubes.** Unecol Ltd. and Leonard H. Soundy. Brit. 395,804, July 27, 1933.

**Apparatus for controlling the vacuum in vacuum discharge apparatus.** Walter Dallenbach. U. S. 1,933,097, Oct. 31.

**Introducing active metal into evacuated electric discharge devices.** Jan H. de Boer, Johan L. H. Jonker and Karel M. van Gessel (to Radio Corp. of America). U. S. 1,931,647, Oct. 24. A mixt. of active metal (such as Ba from Ba azide) together with a refractory insulating material such as MgO or Zr oxide sufficient in amount to render the mixt. electrically insulating is placed in an evacuated elec. discharge device and heated to vaporize some of the metal.

**Thermionic discharge tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 41,505, Jan. 28, 1933. Addn. to 723,932. The cathodes are formed of piled disks with emissive substance.

**Thermionic discharge tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 41,679, Mar. 10, 1933. Addn. to 723,932.

**Thermionic cathodes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 395,529, July 20, 1933. A cathode, particularly for Braun and Röntgen-ray tubes, consists of a pin-shaped electron-emitting portion which is heated by conduction and (or) radiation from another non-emitting portion and has a cross-section corresponding to the desired shape of the fluorescent speck. The pin may be tipped with alk.-earth oxide, or the tip may be hollow and filled with the oxide.

**Thermionic cathodes.** Siegmund Loewe. Brit. 395,537, July 20, 1933. In mfg. highly emissive cathodes for rectifiers, amplifiers or oscillation generators a superficially oxidized cathode core, *e. g.*, a W wire, is introduced into an atm. of a highly emissive metal, *e. g.*, Ba, in a vacuum furnace and heated to a temp. to react with the vapor to form a coating of BaO thereon, after which excess vapor is removed by pumping or condensing and a part of the wire is mounted as a cathode in a thermionic tube, heated to degasify it and convert any residual hydroxide or carbonate into the pure metal oxide and finally provided with a coating of highly emissive metal which is evapd. within the tube. The latter metal may be the same as that vaporized to form the oxide but

preferably consists of a light metal having a higher evapn. point. The filament material, preferably W, may be coated initially with W oxide by introducing a loosely wound coil thereof into a furnace contg. H with a proportion of H<sub>2</sub>O.

**Thermionic cathodes.** Wm. F. Winter, Jr. (to The British Thomson-Houston Co. Ltd.). Brit. 395,794, July 27, 1933. A cathode comprises a heating member, a metal cylinder having radial metallic members, *e. g.*, of Ni, mounted thereon and layers of emissive material, *e. g.*, a Ba compd., filling the spaces between the radial members (disks).

**Thermionic cathodes.** Radioaktiengesellschaft D. S. Loewe and Ernst Waldschmidt. Brit. 395,862, July 27, 1933. Highly emissive cathodes are made by producing on a W wire a coating of the higher oxides WO<sub>3</sub> and W<sub>2</sub>O<sub>5</sub>, reducing these to WO<sub>3</sub> and vaporizing an alk.-earth metal, *e. g.*, Ba, on the WO<sub>3</sub>. The W wire is initially cleaned by passing through a furnace at 400-500° to oxidize the surface and burn off org. matter and then passing through a molten alk. mass, *e. g.*, NaOH at 300-400°, to remove the oxide and impurities. Prior to passing through the mass it may also be passed through a soln. of bichromate in concd. H<sub>2</sub>SO<sub>4</sub> to make org. impurities, *e. g.*, aromatic oils, sol. in H<sub>2</sub>O and then through H<sub>2</sub>O baths. The cleaned wire is passed through a furnace at 700° to form the higher oxides and then through a reducing furnace, through which a preheated mixt. of H and steam passes, to form the WO<sub>3</sub>. App. is described.

**Thermionic cathodes.** A-C Spark Plug Co. Brit. 396,514, Aug. 10, 1933. Electron-emitting electrodes for vacuum or gas-filled tubes comprise a homogeneous alloy of Ni, Cr and Ba, Sr and (or) Ca, the alloy being oxidized on its surface. It may contain 0.01-0.2% Ba and 0.5-10% Cr, and 1.5-2% Mn or other deoxidizing metal, *e. g.*, Ca, may be added to facilitate rolling and drawing. The electrode, which is oxidized by heating in air, O or CO<sub>2</sub>, is finally activated by heating to 1000-1500° in a vacuum or inert gas, *e. g.*, A, He.

**Thermionic cathodes.** Bernhard Erber and Alfred Schwitzer (trading as Gustav Ganz & Co.). Brit. 396,905, Aug. 17, 1933. Addn. to 371,419 (C. A. 27, 2350).

**Thermionic cathodes.** The M-O Valve Co. Ltd., Mark Benjamin, Charles E. Ransley and Colin J. Smithells. Brit. 397,132, Aug. 16, 1933. A core for an oxide-coated cathode contains not more than 5% of Ti and (or) Al. When Al is present, the core contains not substantially less than 2% thereof. The main constituent is preferably Ni but may be Ni alloys, Fe or Pt. Ti may be introduced as Ti-Ti, the final alloy contg. Fe and Ti.

**Thermionic valves.** Bernhard Erber and Alfred Schwitzer (trading as Gustav Ganz & Co.). Brit. 396,527, Aug. 10, 1933. Addn. to 371,419 (C. A. 27, 2350).

**Thermionic valves.** Arcturus Radio Tube Co. Brit. 396,799, Aug. 14, 1933.

**Thermionic valves.** Rogers Radio Tubes Ltd. Brit. 397,126, Aug. 15, 1933.

**Thermionic valves.** Julius Pintsch A.-G. Brit. 397,216, Aug. 24, 1933.

**Thermionic valves for wireless receiving apparatus.** Frank M. Hills and John S. Faulkner. Brit. 396,436, July 27, 1933.

**Thermionic wave amplifiers.** Radioaktiengesellschaft D. S. Loewe and Paul Kapteyn. Brit. 395,823, July 27, 1933. Addn. to 395,050 (C. A. 28, 7).

**Thermostatic regulation for electric discharge apparatus.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 41,726, Mar. 29, 1933. Addn. to 728,612.

**Rotary smelting furnace operated by coal dust.** Gebrüder Buhler. Swiss 101,900, Aug. 1, 1933.

**Gas-fired furnace using compressed gas.** Indugas Industrie- und Gasofen-Bauges. m. b. H. and Christian Pfeil. Ger. 585,437, Oct. 13, 1933, and 586,099, Oct. 16, 1933.

**Vertical retort furnaces.** Drakes Ltd. and Marcellus Thompson. Brit. 396,122, Aug. 3, 1933.

- Rotary kilns.** Mikael Vogel-Jorgensen. Brit. 395,729, July 21, 1933.
- Tunnel kilns.** Gibbons Brothers Ltd. and Wm. E. Gibbons. Brit. 395,983, July 27, 1933.
- Furnace operation.** Willibald Trinks (to Libbey-Owens-Ford Glass Co.). U. S. 1,933,571, Nov. 7. In the operation of furnaces such as those for glass manuf., products of combustion are taken off and cooled, mixed with gaseous fuel, the gaseous fuel is cracked, and the mixt. is fed to the furnace. App. is described.
- Megass feeder for a furnace.** Charles D. C. Mathews. Brit. 396,030, July 21, 1933.
- Apparatus for heating liquids for use in process plants.** Babcock & Wilcox Ltd. and Christopher H. Davy. Brit. 396,470, Aug. 10, 1933.
- Safety devices for gas-heated appliances.** Robert Bosch A.-G. Brit. 384,200, Dec. 1, 1932, and 395,964, July 27, 1933, addn. to 384,200.
- Temperature-control device for oil burners.** Elliott D. Harrington (to General Elec. Co.). U. S. 1,932,269, Oct. 24. Various structural and operative details are described.
- Heat-exchange apparatus.** Emmett F. Annis. U. S. 1,932,950, Oct. 31. Structural features.
- Plate heat exchangers for drying apparatus, etc.** Soc. pour l'ind. chim. à Bâle. Brit. 395,005, July 20, 1933.
- Plate heat-exchangers for fluids.** Reginald L. Munday. Brit. 396,696, July 31, 1933.
- Apparatus for heating and distilling water.** Marie P. Beraud. U. S. 1,931,838, Oct. 24. Structural features.
- Means for the automatic control of air-humidifying apparatus.** Brecknell, Munro & Rogers (1928) Ltd. and Henry J. Dolman. Brit. 396,426, Aug. 2, 1933.
- Apparatus for producing crystals from concentrated solutions.** Compagnie de produits chimiques et électro-métallurgiques Alais, Froges et Camargue. Brit. 396,613, Aug. 10, 1933.
- Means for preventing accumulation of air in a pump for delivering measured quantities.** Andreas Stuhl. Brit. 397,083, Aug. 17, 1933.
- Steel pallet for sintering apparatus.** Albin P. Wutzke. U. S. 1,932,496, Oct. 31.
- Safety screen device suitable for use in openings of containers such as those for holding volatile combustible liquids.** John E. Simmonds and Charles Peterson. U. S. 1,933,486, Oct. 31. Structural details.
- Apparatus for conditioning air by water sprays.** Samuel M. Anderson (to B. F. Sturtevant Co.). U. S. 1,933,039, Oct. 31. Structural and operative details.
- Pressure-resisting closures for vessels such as used for liquid carbon dioxide.** Cecil S. Hall (to Imperial Chemical Industries Ltd.). U. S. 1,932,135, Oct. 24. Mech. features.
- Apparatus for indicating the density of liquids in tanks, vacuum pans, etc.** Fred J. Postel. U. S. 1,932,228, Oct. 24. Various structural and operative details are described.
- Device for diffusing and radially distributing a gaseous fluid, more particularly air for ventilation, but also adapted for use in dust-separating apparatus.** Norman F. Johnston. Brit. 396,468, Aug. 10, 1933.
- Apparatus for oxidizing carbon monoxide such as that produced by internal-combustion engines.** Isidore Pasternack (8% to Harry E. Brown). U. S. 1,933,997, Nov. 7. Structural details.
- Container for bleaching solutions such as those used with peroxide solutions.** Willi Hundt (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,931,798, Oct. 24. A container resistant to the action of active O compds. and to sudden changes in temp. comprises a strong outer vessel which may be formed of brickwork, a thin inner vessel of concrete not influencing or influenced by active O compds., and an intermediate layer of non-coherent heat-insulating material such as loam, diatomite or asbestos.
- Device for determining the percentage of potassium in chambers containing potassium such as mines.** Werner Kolbster. U. S. 1,933,063, Oct. 31. Various structural and operative details are given of a device for detg. K by means of its emitted  $\gamma$ -rays.
- Apparatus for testing and recording the tensile strength of materials.** Frank A. Valentine (to Henry L. Scott Co.). U. S. 1,935,421, Nov. 14. Structural and mech. features.
- Mixing valve suitable for use with hot and cold fluids.** Clyde M. Hamblin. U. S. 1,932,404, Oct. 31.
- Mixing device for liquid, semi-liquid and powdery materials.** Paul Lenart. Ger. 577,946, June 7, 1933. Addn. to 576,528 (C. A. 27, 5586).
- Apparatus for extracting soluble material from mixtures of insoluble and soluble materials to estimate the relative solubility of the latter.** Paul Köttgen. Ger. 577,579, June 1, 1933.
- Apparatus for estimating the relative proportions of solids of different particle size in gases.** Zeiss Ikon A.-G. (Hans Tappen, inventor). Ger. 586,026, Oct. 14, 1933.
- Machine for estimating the water content of sand, etc.** Toledo Scale Mfg. Co. Ger. 586,115, Oct. 18, 1933.
- Apparatus for coating sheets of glass, porcelain, enamel, cellulose acetate or condensation products of formaldehyde with phenol or urea with solutions of wholly or partially polymerized or polymerizable unsaturated organic compounds such as vinyl acetate, butadiene and esters of acrylic or metacrylic acid.** Röhm & Haas A.-G. Brit. 396,097, July 31, 1933.
- Roller-and-breast mills.** Lionel G. Holmes. Brit. 396,663, Aug. 10, 1933.
- Ball-and-ring mills.** Ervin G. Bailey, Perry R. Cassidy and Ralph M. Hardgrove (to Babcock & Wilcox Ltd.). Brit. 396,614, Aug. 10, 1933.
- Ball mills with drying means.** Frantisek Wiesner and Vratislav Malik. Brit. 396,608, Aug. 10, 1933.
- Grinding mills and apparatus.** George Porteus. Brit. 396,400, Aug. 2, 1933. In a mill in which the dust-laden air is discharged to a cyclone, the air returning to the mill in a closed circuit, the air outlet of the cyclone has associated therewith a hood or canopy delivering into the substantially closed path or circuit.
- Floating roof and seal for tanks.** Clayton L. Day (to Chicago Bridge & Iron Co.). U. S. 1,932,398, Oct. 31.
- Floating roof for tanks for holding volatile oils, etc.** Harry C. Boardman (to Chicago Bridge & Iron Co.). U. S. 1,932,394, Oct. 31.
- Tank (with a floating roof) for storage of liquids.** Otterbein A. Bailey (to Chicago Bridge & Iron Co.). U. S. 1,932,392, Oct. 31. Structural features.
- Tank (with a floating roof) for holding volatile oils, etc.** Walter Garske (to Chicago Bridge & Iron Co.). U. S. 1,932,403, Oct. 31.
- Acetylene generator of the carbide-feed type.** Eston W. Weaver. U. S. 1,932,565, Oct. 31. Structural and mech. details.
- Thermostats.** John L. Hodgson, Alexander Ivanoff and Giles P. E. Howard. Brit. 396,085, July 17, 1933. Temps. that are measured by thermocouples or elec. pyrometers or flows whose rate is made to cause a voltage variation are controlled by arranging the thermocouple, pyrometer or resistance in a Wheatstone bridge, potentiometer or ratiometer which is balanced only at the desired temp., clamping the galvanometer or ratiometer pointer intermittently and causing the clamped pointer to control the temp. or flow.
- Thermostatic device suitable for controlling the mixing of hot and cold fluids.** Chester I. Hall (to General Elec. Co.). U. S. 1,934,499, Nov. 7. Structural and mech. details.

## 2-GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Egbert Watson Magruder. Wortley F. Rudd. *Ind. Eng. Chem.* 25, 1406(1933).—Biography with portrait.

G. G.

Notes on Liebig. H. Waldeck. *Pharm. Zentralhalle* 74, 548-51(1933).

W. O. E.

Public liability and chemical education. II: Earthquake precautions in the chemistry laboratory. Park L. Turrill. *J. Chem. Education* 10, 721-5(1933); cf. *C. A.* 27, 4723.

E. H.

Developments in chemical engineering education. D. B. Keyes. *J. Chem. Education* 10, 717-20(1933).

—E. H.

Developments in the teaching of chemistry and chemical engineering at King's College, London. Anon. *Ind. Chemist* 9, 393-6(1933).

E. H.

Class exercises in the industrial chemistry course. II. Economic survey of a chemical commodity. Kenneth A. Kobe. *J. Chem. Education* 10, 738-40(1933); cf. *C. A.* 28, 9.

E. H.

Lecture demonstration of the arc process. Paul Arthur and Cecil V. King. *J. Chem. Education* 10, 748(1933).

E. H.

Development of the electronic theory of valency. C. A. Buchler. *J. Chem. Education* 10, 741-5(1933).

E. H.

Relations between stereochemistry and physics. Peter Debye. *J. Chem. Soc.* 1933, 1386-71.—Fifteenth Faraday lecture.

G. G.

New method of colorimetry. R. A. Houston. *Phil. Mag.* 16, 945-53(1933). A simple method for describing colors is presented which requires only common app. such as a spectrometer and Nicol eyepiece.

B. J. R.

Coldrimetry with photoelectric cells. Rudolf Seifert. *Suddeut. Apoth.-Ztg.* 73, 507 8(1933).

W. O. E.

The virial and molecular structure. J. C. Slater. *J. Chem. Phys.* 1, 687-91(1933); cf. *C. A.* 26, 5799.—The virial theorem is applied to a mol. if external forces are applied to keep the nuclei fixed. It permits sep. detns. of the kinetic and potential energies for all configurations of the nuclei from the total-energy curves as derived from expt. or theory. Such potential- and kinetic-energy curves are derived for simple forms of the total-energy curves for diatomic mols. These can be readily interpreted as indicating bond formation in attractive forces. The method can be extended to apply to more complicated mols. and to solids.

M. M.

The occurrence of univalence in the system of the elements. Hans Schmid. *Angew. Chem.* 46, 691-7(1933).—A comprehensive treatise on the subject of univalence based on the theory of at. structure. With the exception of the alkali and alk. earth metals about 18 elements form univalent compds. Of these 11 fall in the 8th, 7th and the 1st groups. Only Rh, Os and Ir of the 8th group are not known to exhibit univalence. Forty-one references.

Karl Kammermeyer

The diamagnetic susceptibility of the hydrogen molecule. Kōtarō Honda and Tokutarō Hirone. *Z. Physik* 84, 204-11(1933).—The  $H_2$  mol., apart from its diamagnetism, shows a paramagnetism due to the magnetic moment set up by thermal rotation. This paramagnetism is independent of temp. and accounts for the difference between the observed and calcd. susceptibility.

R. Peierls

Permeability of iron (to 100 meter waves) in a high-frequency field. V. Uguison. *J. Tech. Phys.* (U. S. S. R.) 1, 814-22(1931).—The permeability decreases as the frequency increases. The decrease does not depend essentially on the species of iron.

F. H. Rathmann

Paramagnetic properties of  $Co^{++}$  in very dilute solution. R. Mercier. *Helv. Phys. Acta* 6, 240-2(1933); cf. *C. A.* 27, 1804.—The variation of magnetic susceptibility of  $CoCl_2$  soln. with temp. and concn. is measured. The Curie const. is independent of concn., but diminishes with temp. The no. of Weiss magnetons drops from

24.3 at room temp. to 18.1 at 177°K. These results are at variance with the values expected from spectroscopic data as the angular momentum is most probably coupled to the surrounding solvent mols.

E. B.

Temperature and pressure dependence of the dielectric constant of gaseous bromine and iodine chloride. Karl F. Luft. *Z. Physik* 84, 767-82(1933).—The dipole moment of Br is less than  $10^{-18}$  e. s. u.; that of ICl is about  $5 \times 10^{-19}$ .

R. Peierls

Anomalous dispersion of the dielectric constant of Rochelle salt. Georg Busch. *Helv. Phys. Acta* 6, 315-36(1933).—The observation of Errera (*C. A.* 25, 3916) that Rochelle salt possesses an anomalous dispersion of the dielec. const. is confirmed. This anomaly in the region of  $\lambda = 2000$  m. is due to piezoelec. oscillations because the crit. frequency varies with the dimensions of the crystal. The bridge method of detg. the dielec. const. with cond. compensation is described. Directions for growing single crystals of Rochelle salt are given as well as a very useful method of cutting the crystal and polishing it.

Egon Bretscher

Investigation of the space charges in ice. G. Oplatka. *Helv. Phys. Acta* 6, 198 209(1933).—The dielec. const. at very low frequencies was found previously to exceed 150. The course of the potential in a capacity contg. ice as dielec. was detd. with a test rod. A linear increase of potential as a function of the distance from the electrodes was found for very pure ice, but a sharp rise in close proximity of ice contg. traces of  $CO_2$  or  $NH_3$ . This proves that the high dielec. const. above 80 of impure ice is due to space charges.

Egon Bretscher

The polar structure of molecules and the nature of the secondary valence forces. Gunther Briggleb. *Z. physik. Chem.* B23, 105-30(1933).—A discussion of van der Waals forces in the mol.

G. M. Murphy

Polarity of chemical compounds. III. Ken'ichi Higashi. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 12, 771-9(1933) (Abstracts 1 (in English) published with *Sci. Papers Inst. Phys.-Chem. Research* (Tokyo) 22, Nos. 450 3); cf. *C. A.* 27, 2358.— $Et_2O$  was further examd. as a solvent for the elec. moment detn. Dielec. const. and d. of the same at different temps. were detd. for solns. of  $EtOH$  (I),  $(CH_3OH)_2$  (II) and  $AcOH$  (III). The elec. moments of solute mols. were calcd. as follows: I  $-60^\circ$  1.5;  $-40^\circ$  1.6;  $-20^\circ$  1.6;  $0^\circ$  1.6;  $10^\circ$  1.7,  $25^\circ$  1.79. II  $-60^\circ$  1.2;  $-40^\circ$  1.6;  $-20^\circ$  1.9;  $0^\circ$  2.3;  $20^\circ$  2.3. III  $-60^\circ$  0.7;  $-40^\circ$  0.8;  $-20^\circ$  0.9;  $0^\circ$  1.0;  $15^\circ$  1.1;  $20^\circ$  1.17;  $25^\circ$  1.23 (unit  $10^{-18}$  e. s. u.). I shows a very simple polarization component curve and satisfies approximately Debye's equation  $P_{\infty} = a + (b/T)$  in  $Et_2O$ , while this equation is not applicable to II or to III. IV. *Ibid.* 780-9.—Dielec. const. and d. were detd. for solns. of cetyl alc. (I) and  $\alpha$ - (II) and  $\beta$ -naphthols (III) in  $PhH$  (IV),  $C_6H_6$  (V) and  $Et_2O$  (VI), and the elec. moments of solute mols. were found as follows: I  $20-60^\circ$  1.70-1.09 (in IV);  $20-60^\circ$  1.30-1.58 (in V);  $0-20^\circ$  1.79 (in VI); II  $20-60^\circ$  1.40-1.43 (in IV);  $26^\circ$  1.91 (in VI); III  $25^\circ$  1.53 (in IV) (unit  $10^{-18}$  e. s. u.). The dipole moment values of I are const. in the temp. range  $0^\circ$  to  $60^\circ$ , and are the same as those of lower aliphatic alcs.; the moments of II and III found in IV are a little smaller than those of other alcs. but are far greater than the values 1.00 and  $1.3 \times 10^{-18}$  e. s. u. given by Puchalik for II and III (cf. *C. A.* 26, 3708).

K. K.

Report on the paramagnetic rotatory polarization. Jean Becquerel and W. J. de Haas. *Rapports et Communications*, No. 31, 6e Congr. intern. froid, Buenos Aires; *Communications Kamerlingh Onnes Lab. Univ. Leiden Suppl.* 74, 1-35(1932); cf. *C. A.* 26, 3154-5.—The Faraday effect is readily due to 2 phenomena, one connected with diamagnetism, the other with paramagnetism. These effects can be sep'd., in some minerals and uniaxial crystals contg. some of the rare earths, by magneto-optical expts. at very low temps. The re-



**Kolloid-** 65, 25-31 (1933) **Max viscosity in the ternary system was found at 10% alc., 55%  $C_2H_5$ .** In a binary system  $H_2O-C_2H_5$ , the max. was little pronounced, because of the lack of charge at the interface. No max. was found in the systems petroleum or petroleum oils with  $H_2O$ .  $HCl$  and  $NaOH$  diminish the viscosity at higher oil concns. but no max. occurs. A. I.

**Form elasticity of thin layers of water.** B. Derjagin / *Physik* 84, 69-70 (1933). Layers of water of a thickness less than  $1.5 \times 10^{-7}$  cm. brought between glass plates, show the elastic behavior of solids, i.e., they can transmit transverse stresses. R. Peierls.

**Theory of thermoelectric potential between semiconductor and metal according to Fermi statistics.** G. Monch / *Physik* 83, 47-52 (1933), cf. C. 1, 27, 1433. The contact of a metal and a semiconductor represents a transition from an entirely degenerated Fermi gas of electrons to a non-degenerated classical gas. A combination formula therefore applies. The formula agrees accurately with the measurements on CuO. R. Peierls.

**Some electrical properties of calcite.** Sadakichi Shimizu / *Sci. Repts. Tohoku Imp. Univ.*, First Ser. 22, 50-98 (1933). From measurements of residual charge and its recovery time it is concluded that Japanese calcite has no condensed polarization. The apparent cond. is affected by the previously applied potential. At  $2^\circ$  the resistance for the direction of the  $c$  axis is 10 times greater than for the direction perpendicular to the  $c$  axis. The variation of cond. due to the direction of the parallel specimen begins at  $0.80^\circ$  and continues to  $8.50^\circ$ , but the variation for the other appears in a range from  $8.50^\circ$  to  $8.10^\circ$ . I. G. Vanden Boesche.

**Effect of surface charges on measurements of the conductivity of poor conductors.** A. D. Goldammer / *Physik* 84, 11-14 (1933). The condition under which surface charge seriously affects such measurements were studied. In the expt. of Seiff / *Physik* 76, 63 (1932) insufficient care was taken to avoid error from this source. I. Peierls.

**Preparation and properties of thin lead sulfide films with special reference to their detector action.** I. Gerhard Bruchmann / *Z. Phys.* 65, 11-14 (1933). Mirrors of PbS are produced by immersion in a lead salt sol., and prep'd by mixing quickly a part of  $H_2O$  with 4 parts of a mixt. of 1 part of  $H_2O$ , 11  $AgNO_3$  to 1 part of 2% thionurea (cf. Colbert, C. 1, 22, 1141). Perfect mirrors are obtained only when the soln. remains clear for 1 min. after immersion. The films present a complex ion whose compn. is catalyzed by  $OH$  ion. Colloidal PbS is first formed. The pptn. of PbS from the complex is complete. Expt. at various temp. indicate a temp. coeff. of  $2^\circ$  for the velocity. Addn. of Sn, Sb or As helps form perfect mirror. The PbS mirrored on quartz mirrors  $Fe$ ,  $Pt$ ,  $Fe$ ,  $W$ ,  $Cr$ ,  $Ag$ ,  $Pb$ ,  $Su$  and  $Ni$  but not on  $Cu$  or  $Cu$  alloys. If the plate was mirrored after the initial cloudiness developed, a local non-mirroring deposit formed. The PbS deposited as a mirror was proportional to the surface extent, and varied from 0.22  $\mu$  thickness on quartz to 0.14 on  $Ni$ . Arthur Heller.

**Variation in the electrical conductivity of some hydrous minerals with temperature.** Sadakichi Shimizu / *Science Repts. Tohoku Imp. Univ.*, First Ser. 22, 63-64 (1933), see C. 1, 27, 1476. G. G.

**The electric conductivity of  $Cu_3Pd$  and  $Cu_3Pt$  alloys with superlattice and random structure at low temperatures.** H. J. Seemann / *Physik* 84, 59-64 (1933). The resistance curve of these alloys does not depend upon whether they show a random distribution of the 2 kinds of atoms over the possible sites or a superlattice structure. R. Peierls.

**Superconductivity of alloy systems.** J. I. Allen / *Phil. Mag.* 16, 1005-11 (1933). The supercond. of the following alloy systems was studied over the entire compn. range:  $Au-Sn$ ,  $Au-Pb$ ,  $Ag-Sn$ ,  $Ag-Pb$ ,  $Cu-Sn$ ,  $Cu-Pb$  and  $11-Su$ . The changes in supercond. with compn. are related to the phase diagram of the alloy. Supercond. is a property of the complete structure of an alloy

and not a property of one of the components. Alloy structures can be divided into 3 types: (1) Simple eutectic mixts. have a const. supercond. point. (2) Mixed crystal phases have a continuous varying supercond. point and transition interval. (3) Regions of which both components form mixed crystal are similar to (2). In this type the transition temp. varies inversely with the magnitude of the lattice constant. I. J. R.

**Ultra light alloys of great strength.** S. A. Pogodin / *Ann. Inst. anal. phys. chim.* 6, 295-310 (1933). A review of phys. chem. properties of com. Mg metal and phys. chem. properties and compn. diagram of alloy of Mg with metals of the 1st, 2nd and 3rd group of the periodic system. Sixty-two references. S. I. Madorsky.

**Nature of polish layers.** J. A. Durby and K. K. Dixit / *Phil. Mag.* 16, 961-11 (1933). The surfaces of the following elements were highly polished and then examined by means of electron diffraction: Bi, Sb, Zn, Fe, Cd, Au, Ag, Pb, Mo, Cu, Cr, S and Si. In all the cases the pattern obtained consisted of 2 diffraction rings, indicating that the polished layer is amorphous and resembles a supercooled liquid. From the position of the rings the interatomic distances were obtained. These distances are smaller than normal for those metals which are near the minimum of the  $\alpha$  vol. curve, except for S and Si, which retain their normal distance. This led to the possibility of a normally high surface for some metal. It is possible that the surface atoms of conductors are trapped of their outer electrons. The ring observed with polished PbS and FeS are due to the small size of the crystals after polishing. I. J. Rosenblum.

**The elastic constants of single crystals of copper.** Kenichi Kimura / *Sci. Repts. Tohoku Imp. Univ.*, First Ser. 22, 55-64 (1933). Elastic constants for monocryst. Cu were det'd. at room temp. by the static method. The Voigt moduli in c.g.s. units follow the elastic parameters:  $10^{10}$  are  $S_{11} = 1.91$ ,  $S_{12} = 0.52$ ,  $S_{44} = 1.63$ ; the moduli of elasticity ( $\times 10^{10}$ ) are  $E_{11} = 0.77$ ,  $E_{12} = 1.26$ ,  $E_{13} = 1.49$ ; the moduli of torsion ( $\times 10^{10}$ ) are  $\mu_{11} = 0.41$ ,  $\mu_{12} = 0.50$ ,  $\mu_{13} = 0.1$ . The anisotropy of Cu is conspicuous. I. G. Vanden Boesche.

**The structure of real crystals.** I. Zwicky / *Helv. Phys. Acta* 6, 210-1 (1933). The evidence indicating a secondary structure of crystals is summarized. The objection of Otowin (C. 1, 27, 1794) are discussed. Bibliography. I. J. Brutscher.

**X-ray investigations in the system (zinc cadmium) antimony.** H. I. Hall, H. Nowotny and H. Tompa / *Ann. d. Chem.* 214, 190-200 (1933). The form and dimension of the elementary bodies of CdSb were worked out as follows:  $a = 0.41$ ,  $b = 1.01$ ,  $c = 0.16$ .  $V = 0.0066$ .  $d = 100$ .  $\rho = 5.90$  g./cm<sup>3</sup>. The crystal form is monoclinic. The no. of mol. in the elementary body is derived from  $d$  of 6.2 and mol. wt. 280.8 ( $\times 1.1$ ) or approx. 4. ZnSb is isomorphous with CdSb, is of rhombic form with the following dimension:  $a = 0.17$ ,  $b = 0.24$ ,  $c = 0.94$ .  $V = 0.0026$ .  $\rho = 5.72$  and  $d$  of 6.38, leading to  $n = 4.1$ . CdSb shows the same monoidal form as the corresponding Zn compd. Crystals of ZnSb show pseudomorphous phase. The phase primarily cpd. is further differentiated into Zn and ZnSb. This is also indicated by the change in  $d$  accompanying pulverizing or tempering. Resulting modification of the phase diagram of the ZnSb system are discussed. C. J. Humphreys.

**An elementary deduction of Gibbs' adsorption theorem.** I. O. Koenig and R. C. Swann / *J. Chem. Physics* 1, 23-20 (1933). An exact elementary deduction of Gibbs' adsorption theorem and some related equations is given by means of a suitable thermodynamic engine. The assumptions underlying the Gibbsian treatment of the thermodynamics of surfaces are discussed briefly. The relation of the equations related to the corresponding general Gibbsian equation is explained. M. M.

**A statistical derivation of the adsorption isotherm of binary gas mixtures.** G. Damkohler / *Physik. Chem.* B23, 58-68 (1933). The adsorption isotherm was de-

rived statistically for a binary gas mixt. covering a surface with a monomol. layer. Concn., pressure and temp. dependence are discussed. G. M. Murphy

**Adsorption of CO derivatives. IX. Effect of solvent on reaction rate.** Gertrud Buttmann. *Z. physik. Chem.* B23, 100 4(1933); cf. *C. A.* 26, 5257. The reaction between  $\text{CCl}_3\text{CHO}$  and  $\text{FIOH}$  was studied in hexane, cyclohexane, cyclohexene,  $\text{CCl}_4$ ,  $\text{EtCOEt}$ , dihexane,  $\text{Et}_2\text{O}$  and  $\text{CHCl}_3$ . G. M. Murphy

**An analysis of hydrogen adsorption phenomena.** M. C. Johnson. *Trans. Faraday Soc.* 29, 1139 55(1933). The kinetics and heat effects of adsorption, desorption and disson of  $\text{H}_2$  mol. and of adsorption, desorption, soln. or recombination of  $\text{H}$  atoms in the presence of metals and of nonmetals are considered separately and also in various conceivable combinations. Several of the type cases considered are shown to characterize the results obtained by workers in exptl. studies of various  $\text{H}_2$  solid systems. P. H. Emmett

**The adsorption of nitrogen-argon mixtures.** G. Damböhrer. *Z. physik. Chem.* B23, 69 88(1933).—Adsorption isotherms were obtained for N and A on  $\text{SiO}_2$  gel at 89.5° and 111° abs. and their mixts. at 89.5°, 111° and 163° abs. at pressures between 100 and 700 mm. Hg. A few measurements were also made on uricite, charged with  $\text{CO}_2$  and gas-free at 111° and 250 mm. pressure. G. M. Murphy

**The sorption of vapors by nitrocellulose.** J. W. McBain, S. J. Good, A. M. Bakr, D. P. Davies, H. J. Willavoy, and R. Buckingham. *Trans. Faraday Soc.* 29, 1096 100 (1933). The quantities of different vapors retained by nitrocellulose in equil. with various partial pressures of their vapors differ 100 fold between the indifferent solvents and the best solvents. At low relative pressures sorption laws are followed; with increasing sorption pores are opened and capillary condensation occurs. Gels have more pore space than ungelatinized fibers. When nitrocellulose contg. sorbed vapor is heated for 3 or 4 days at 60° a change that is tentatively called "consolidation" occurs, diminishing the sorptive power of the nitrocellulose. P. H. Emmett

**Fractionation and purification of organic substances by the principle of chromatographic adsorption analysis. I.** Alfred Winterstein and Gertrud Stein. *Z. physik. Chem.* B22, 247-63(1933). The chromatographic adsorption method introduced by Tswett (*C. A.* 5, 2835) for analytical purposes is in many cases admirably adapted to the preparative sepn. of mixts. that are difficult to sep. by fractional crystn. It is applicable not only to pigments but also to the sepn. of colorless substances. Satisfactory sepn. were made of ergosterol and cholesterol, oleanol and oleanylene, dipalmityl ketone and hentriacontane. An activated and standardized  $\text{Al}_2\text{O}_3$  is used as adsorbent, and usually benzine as solvent. II. **Chlorophylls.** *Ibid.* 263-77.—By using powd. sucrose as adsorbent chlorophylls *a* and *b* were preparatively sepd. from crude chlorophyll by the method of chromatographic adsorption analysis. The absorption bands reported in the literature for the 2 chlorophylls should be superseded by the new detns. made on the pure preps. As a criterion of purity of chlorophyll preps. the detn. of extinction coeffs. is recommended. The adsorption method is applicable also to the sepn. of chlorophyll derivs. and permits the detection of traces of impurities in chlorophyll preps. It is adapted to the detn. of the chlorophyll components in minute quantities of plant material. A. W. Dox

**Formation of nuclei of condensed vapors in non-ionized dust-free air. II. The system methanol-water.** J. A. Frommke, C. R. Bloomquist and E. X. Anderson. *Z. physik. Chem.* A166, 305-15(1933); cf. *C. A.* 24, 8. — The condensation phenomena during the adiabatic expansion of a series of  $\text{MeOH-H}_2\text{O}$  mixts. in dust-free air were studied. The fact that each mixt. condenses more easily than the pure components is attributed to coalescence. G. M. Murphy

**Physicochemical analysis and surface molecular forces. Heat of melting and inversion of composition-properties diagram.** B. V. Il'in, V. A. Oshman, N. L. Rehenko

and N. K. Arkhangelskaya. *Ann. inst. anal. phys.-chim.* 6, 91 6(1933).—Expts. on wetting powd. charcoal with a soln. of  $\text{AcOH}$  in  $\text{H}_2\text{O}$  show that the curve expressing the relation between heat of wetting and percentage compn. of soln., consists of 2 parts intersecting at a point near 50 mol%  $\text{Ac}_2\text{O}$ . S. L. Madorsky

**Liquid drops on the surface of the same liquid.** L. D. Mahajan. *Z. Physik* 84, 676(1933).—The effect described by M. (cf. *C. A.* 27, 1250) is due to a thin layer of air between the drop and the rest of the liquid. This was proved by observing Newton's rings from this air layer and the scattering of light from its boundaries. R. Peierls

**A theory of the phenomenon of liquid drops on the surface of the same liquid.** L. D. Mahajan. *Kolloid-Z.* 65, 20 3(1933); cf. *C. A.* 25, 14. The equation  $L = \gamma a^2 / \nu V$ , where  $L$  is the life of the drop on the surface,  $\gamma$  a const.,  $\nu$  the viscosity of the soln.,  $V$  the viscosity of the surrounding medium, and  $\gamma$  the viscosity of the soln. whose drops have a max. life, represents the exptl. data. The stability of the drops is due to a thin air film surrounding the drops. Smaller drops are more stable because they exert less pressure on the film. Arthur Fleischer

**Viscosity of emulsions.** E. G. Richardson. *Kolloid-Z.* 65, 32 7(1933); cf. *C. A.* 24, 992. Viscosity and velocity distribution in  $\text{CaH}_2\text{-H}_2\text{O}$  emulsions were detd. in a Couette-type and a hot-wire viscometer. Concd.  $\text{CaH}_2$  in aq. emulsions shows a marked structure viscosity and with high concns. assumes a margarine-like consistency. At mean velocities, the data are reproduced by the equation,  $\log(\eta/\eta_0) = k\Phi$ , where  $\eta$  and  $\eta_0$  are the viscosities of the emulsion and dispersant, resp.,  $k$  is a const., and  $\Phi$  the vol. of the disperse phase. A. F.

**Theory of electrocapillarity.** I. S. R. Crasford, O. Gatty and J. St. L. Philpot. *Phil. Mag.* 16, 819 61(1933).—The concepts of surface tension and surface work are discussed and a generalized app. for doing surface work is described. The surface tension can be defined in such a way as to be applicable to a boundary of finite thickness. The phase rule is extended to include extensive degrees of freedom. A system of  $P$  phases and  $C$  components has  $C + 2$  degrees of freedom of which  $P$  refer to extensive properties. The effect of a gravitational field is considered. F. J. Rosenbaum

**Remarks on the paper by M. Satō: "The effect of heat flow on the Brownian movement."** I. Kurt Sitte. *Z. Physik* 83, 266-9(1933). The calcs. of Satō's paper (*C. A.* 27, 2363) are based on a principle not applicable to this problem and contain math. errors. R. P.

**The lower limit of particle sizes in disperse systems.** Gogoberidze. *Kolloid-Z.* 65, 24 5(1933).—By substituting the value of 1033 cm. the vapor pressure at the b. p., in Kelvin's equation for the change of vapor pressure with surface curvature, limiting radii for liquid droplets can be calcd. For  $\text{H}_2\text{O}$ , the particle size increases from  $7 \times 10^{-8}$  at 0° to  $128 \times 10^{-8}$  cm. at 50°.

Arthur Fleischer  
**Wetting experiments with hydrophilic and hydrophobic powders in systems of two immiscible liquids. III.** E. Berl and B. Schmitt. *Kolloid-Z.* 65, 83 100(1933); cf. *C. A.* 27, 618.—Sepn. of 2 powders by flotation method is indicated in the water-benzene emulsification test by sepn. of the 2 solids in sep. films at the liquid-liquid interface, and by the complete wetting of 1 solid at the  $\text{CaH}_2$  interface with exclusion of the other. Although crystal violet makes quartz hydrophobic it is displaced from the interface by anthracite. Marble treated with cloth red is not displaced from the interface by anthracite powder. Artificial mixts. of Freiberg galena and Clausthaler sphalerite show little difference in wetting when aged. In  $\text{Na}_2\text{CO}_3$  or  $\text{NaCN}$  solns. they are readily sepd. by addn. of aniline, *o*-toluidine, or creosote soln. The activating action of  $\text{CuSO}_4$  on sphalerite is due to the irreversible adsorption of Cu ion with subsequent oriented adsorption of xanthate. A. F.

**Osmosis in systems consisting of water and tartaric acid and containing three liquids, separated by two membranes. II.** F. A. H. Schreinemakers and H. H.



Schreinemachers. *Proc. Acad. Sci. Amsterdam* 36, 620-35(1933); cf. *C. A.* 27, 5226-7.—A membrane made of sheets of Cellophane and pig bladder in intimate contact was placed between  $H_2O$  and a soln. of tartaric acid. When the Cellophane was in contact with  $H_2O$ , an aq. layer formed between the 2 parts of the membrane; on interchanging the liquids, the inter-membrane soln. disappeared, and the 2 parts of the membrane adhered closely. The equil. attained with the combination membrane was the same as that attained with the bladder alone; the rate of osmosis was much smaller.

Gerald M. Petty

**Electroosmosis. I. The electrokinetic potential difference at the interface of some acidic electrolytes of several concentrations.** Hajime Isobe and Sadami Imai. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 790-813(1933) (Abstracts 2 (in English) published with *Sci. Papers Inst. Phys.-Chem. Research (Tokyo)* 22, Nos. 450-3).—The electrokinetic potential differences were calc'd. by detg. the velocities of acidic electrolyte solns. in electroosmosis. The electrokinetic potential  $\xi$  in each acidic soln. increases at first with increasing concn. to the max. and then decreases. The relation between  $\xi$  and the concn.  $c$  is expressed by the equation  $\xi = \xi_0 e^{-\beta c} - (\xi_0 - \xi_\infty) e^{-\gamma c}$ , where  $\xi_0$  is the value obtained by extrapolating the  $\log \xi - c$  curve to zero concn.,  $\xi_\infty$  is the electrokinetic potential of the cond. water of  $0.6 \times 10^{-8}$  mho of sp. cond., and  $\beta$  and  $\gamma$  are consts. characteristic of acids. The values of  $\xi_0$  (v.),  $\beta$ ,  $\gamma$ ,  $C_m$  (millimol./l.) ( $c$  corresponding to the max.  $\xi$ ) and  $\alpha$  ( $\alpha$  degree of dissociation) were calc'd. as follows: HCl 0.0911, 0.387, 17.1, 0.18, 0.18; AcOH 0.0905, 0.0401, 0.572, 3.81, 0.26;  $CH_3ClCO-H$  0.0902, 0.333, 12.2, 0.23, 0.21;  $HCO_2H$  0.0910, 0.212, 6.51, 0.41, 0.21;  $(CO_2H)_2$  0.0907, 0.375, 13.2, 0.21, 0.21; maleic acid 0.0904, 0.346, 12.2, 0.23, 0.23; fumaric acid 0.0906, 0.301, 9.55, 0.28, 0.23; succinic acid 0.0907, 0.0804, 1.59, 1.43, 0.28;  $H_3PO_4$  0.0907, 0.323, 11.9, 0.26, 0.26; citric acid 0.0904, 0.270, 8.34, 0.32, 0.25.

K. Konda

**Changes in the surface and structure of gels and minerals at high temperatures.** Jaroslav Splichal. *Chimie et Industrie Special No.* 757 81 (June, 1933). By detg. the  $H_2O$  adsorption and calcg. the angles of the lines of debyeograms, it was found that: (1) The surface of  $SiO_2$  gel does not change up to 500°; at 1000° the surface decreases to such an extent that it no longer adsorbs  $H_2O$  or dyes; only by heating in a blast lamp is it possible to obtain cristobalite; siliceous earth has a considerable surface and a relatively high  $H_2O$ -adsorption power. (2) Hydrated  $Al_2O_3$  gels and bauxites strongly adsorb  $H_2O$ , even after heating to 500° or 1000°; this is due to the  $Al_2O_3$ . (3) Hydrated  $Fe_2O_3$  gels change to hematite at 200°; at higher temps. crystn. proceeds and  $H_2O$  adsorption decreases. X-ray examn. showed that the ferric minerals examd. were solid solns. of goethite and  $H_2O$  and at 250° they exhibited the lines of hematite. The most recent hematite has a high  $H_2O$  adsorption, in spite of the fact that the sharpness of the debyeogram indicates a cryst. structure.

A. Papineau-Couture

**Action of electrolytes on solutions of kaolin.** Pichot. *Compt. rend.* 197, 451-3(1933); cf. *C. A.* 27, 5850.—The effect of variable quantities of electrolyte ( $NaCl$ ) on the flocculation or dispersing of kaolin was studied.  $L/t$  values ( $L$  = distance from the free surface to the observed layer,  $t$  = time of turbidity) when plotted against opacity lie on a curve for any given  $l/t$  concn. of  $NaCl$  and temp. being const. If the concn. of  $NaCl$  is increased beyond a certain value the  $l/t$ -opacity values lie on one curve as long as  $t$  remains const. There will be a sep. curve for each  $t$  value. Salts that below a certain concn. yield one uniform curve for values of  $l/t$ -opacity when  $t$  is variable are termed peptizing electrolytes, while the same salts above a certain concn., which yield a curve for each value of  $t$  when  $l/t$ -opacity is plotted, are termed flocculating electrolytes. Curves for  $NaCl$  are illustrated.

H. E. Messmore

**Calcium oxalate rings. A peculiar case of periodic**

**precipitate formation.** H. Döring. *Naturwissenschaften* 21, 675(1933).—A photomicrograph is given of rhythmic pptn. of Ca oxalate around an epidermal cell of the skin of an onion (*Allium cepa*) moistened with 0.1  $N$  K oxalate. Ca salts have moved out of the dead cell and formed the ppt. with the reagent outside of the cell around the diffusion center. The wider rings have the larger crystals.

B. J. C. van der Hoeven

**Colloidal sulfur solutions by the action of iodine on sodium sulfide.** A. Janek. *Kolloid-Z.* 65, 87(1933); cf. *C. A.* 27, 4402.—The reaction of dil.  $Na_2S$  soln. and alc. I produces an opalescent S sol which changes to a suspension in 24-36 hr.

Arthur Fleischer

**Iron oxide sols. II. The charge in irregular series.** A. Lottmoser and Ta-Yu Chang. *Kolloid-Z.* 65, 62-72(1933); cf. *C. A.* 27, 5612.—Irregular series were noted in the coagulation of pos.  $Fe_2O_3$  sols by  $KH_2PO_4$ . Aging had negligible effect. The crit. potentials were 39, -38 and -46 mv. The  $pH$  of the phosphate soln. had no effect on sol charge. With increasing phosphate concn., increasing Cl ion was liberated; constancy of exchange adsorption was reached at the first crit. point. Not all of the Cl of the micelles was exchangeable. Increasing phosphate was adsorbed until the sign of the sol changed.

Arthur Fleischer

**The electrical properties of colloids. III. Discrepancies between activities and conductivities in colloidal solutions.** Jnanendra Nath Mukherjee. *Kolloid-Z.* 65, 72-7(1933); cf. *C. A.* 27, 3129. The discrepancies are evident from calcns. of cond. and c. m. f. data of  $Al_2O_3$  and  $SiO_2$  sols.

Arthur Fleischer

**Viscometric investigation of solutions of natural compounds of high molecular weight. I. Rubber in toluene.** Markus Reiner and R. Schoenfeld-Reiner. *Kolloid-Z.* 65, 44-62(1933); cf. *C. A.* 24, 764; 25, 2613; 26, 890, 1495, 4738.—Pale crepe rubber, 0.13% moisture, 0.23% ash, d. 0.92, was dissolved in an atm. of  $CO_2$  in purified toluene and filtered. The viscosity of solns. was detd. in capillary and Couette-type viscometers. Since the previous history did not affect the results the research materials could be considered reproducible. Wall effects were absent, showing the solns. to be quasihomogeneous. Relative viscosity measurements from 0° to 40° gave the same relative consistency curve indicating that the non-Newtonian behavior is a purely mech. phenomenon. The general shape of the consistency curve is deduced from the measurements in the 2 types of viscometers. At very low and at high flows, a Newtonian behavior is indicated. The values at the inflection points are interpreted as the various viscosity values.

A. F.

**The viscosity of iron phosphate sol at varying pressures.** S. N. Banerji and S. Ghosh. *Kolloid-Z.* 65, 37-44(1933); cf. *C. A.* 24, 767, 2762, 4444, 5572.—With increasing dialysis, ferric phosphate sols prep'd. by mixing  $KH_2PO_4$  and concd.  $FeCl_3$  solns. become less stable and the viscosity increases. The increase in viscosity is less noticeable at higher pressures, which cause increased shear and decreased hydration. The viscosity change is not as great in dil. as in concd. solns.

Arthur Fleischer

**Further investigations on the viscosity and elasticity of sols.** Bruno Rabinowitsch. *Z. physik. Chem.* A166, 257-69(1933); cf. *C. A.* 24, 766.—The flow of cellite soln. in dioxane,  $MeOAc$  and furfural was studied in small capillaries.

G. M. Murphy

**Effect of electrolytes on the formation and decomposition of urate gels.** E. Gordon Young, F. F. Musgrave and H. C. Graham. *Can. J. Research* 9, 373-85(1933); cf. *C. A.* 27, 110.—The effect of various electrolytes in promoting gelation of aq. supersatd. solns. of the urates of methylamine, Li, piperazine and  $Me_4N$  was studied. The cation is the active agent. The min. concn. of the electrolyte that is effective was detd. over the gelation range of the urate. The order of efficacy of the cations is in general  $K > NH_4 > Rb > Cs > Li > Na$ . A max. concn. of electrolyte was found above which immediate pptn. rather than gelation occurs. The time required for gelation varies inversely with the amt. of

electrolyte present in any single concn. of urate. The rigidity varies directly up to the point of pptn. The time of crystn. of the gel varies directly with the concn. of the electrolytes, NaCl, RbCl and LiCl but inversely with KCl and  $\text{NH}_4\text{Cl}$ . Certain org. diamines possess the power of causing gelation over a limited range of urate. EtOH, between 20 and 60%, causes gelation of Li urate and methylammonium urate. The thixotropic effect was observed in gels of pipetazine urate contg. KCl and in Li urate with EtOH. The action of electrolytes on urate gels is interpreted as partially electrokinetic and partially lyotropic in nature. J. W. Shipley.

**Bound water of gelatin gels.** D. Jordan Lloyd and T. Moran. *Nature* 132, 515 (1933).—The percentage of bound water in gelatin gels was detd. by subjecting the gels in a collodion-impregnated canvas bag to pressures up to 2250 lb. per sq. in. At this pressure the gelatin concn. of the gel is 60%, confirming the value of 66% obtained through freezing expts. The pressure-concn. curves are the same for both 18.23° and 0°. Calvin Brous.

**The structure of cellulose gel. VII. The x-ray study of cellulose nitrate gel.** Katsumoto Atsuki and Masanori Ishiwara. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 540 1 (1933); cf. C. A. 28, 316. The cryst. structure of elastic gels prepd. from cellulose nitrate was studied. It was found that the structure of the cellulose nitrate film of N<sub>2</sub> content 11.2–11.4% is nearly amorphous, but a slight regularity and a decided direction of the mol. cryst. aggregate were observed in the x-ray diagram. The viscosity of the cellulose nitrate prepd. at a higher nitration temp. was lower than that obtained at a lower temp., which indicated that a mol. depolymerization occurred at the high nitration temp. The film of the cellulose nitrate of low viscosity showed a more diffused x-ray pattern, which suggests that the structure of such a film is more cryst., suffering less internal distortion, and giving weaker mech. properties. The film prepd. from an  $\text{Me}_2\text{CO}$  soln. of the cellulose nitrate has more uniform structure without internal distortion, while the film from  $\text{Et}_2\text{O}$ -EtOH soln. consisted of thready network structure, having an internal distortion as well as a heterogeneous distribution of mol. surface contact. K. K.

**A new type of shaking effect (thixotropy effect) in cellulose solutions, followed by means of changes of vapor pressure.** Max Ulmann. *Z. physik. Chem.* A166, 147–55 (1933).—Dil. solns. of acetylcellulose colloiddally dispersed in glacial AcOH show a higher vapor pressure than the pure solvent. This effect disappears in the course of time but can be restored by shaking the soln. A method is described for following the course of the effect.

G. M. Murphy

**Colloid chemistry of rice starch and boiled rice.** I. Ichiro Sakurada and Keiroku Futino. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 761–70 (1933) (Abstracts 1 (in English) published with *Sci. Papers Inst. Phys.-Chem. Research (Tokyo)* 22, Nos. 450–3).— $\beta$ -Starch contained in natural rice and giving a C-spectrum, is converted by boiling with water into  $\alpha$ -starch which gives a V-spectrum quite different from the former. On keeping the boiled rice at, or under, room temp.,  $\alpha$ -starch is again turned into  $\beta$ -starch giving a B-spectrum similar to the C-spectrum, whether or not water is lost. The boiled rice, dehydrated with EtOH directly after boiling, gives also  $\alpha$ -starch which shows a V-spectrum;  $\alpha$ -starch is thus stable, when the boiled rice contains less water, and if air-dried, it does not turn into  $\beta$ -starch.  $\alpha$ -Starch thoroughly freed from water at about 100° and giving a VT-spectrum absorbs water while kept in the room, and is converted into  $\alpha$ -starch showing a V-spectrum; this is, like the starch dehydrated with EtOH, stable for a long time. Addn. of water in optimal quantity gives at least röntgenographically almost the same product as boiled rice.

K. Konda

**The solubilities of some salts in liquefied ammonia. I. The solubility of sodium chloride and the saturated vapor pressure of the solution.** Suekichi Abe and Ryusaku Harō Hara. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding

557–9 (1933).—Data are presented for the soly. and vapor pressure of NaCl in liquid  $\text{NH}_3$ . K. K.

**Active oxides. LXIII. The solubility of active zinc oxides in ammonia.** Gustav F. Hüttig and Hans Schmeisser. *Kolloid-Z.* 65, 77–87 (1933); cf. C. A. 26, 5485; 27, 4157–8. The soly. of ZnO prepd. by ignition for 2 hrs. of  $5\text{ZnO} \cdot 3\text{CO}_2 \cdot 4\text{H}_2\text{O}$  at various temps., amorphous  $\text{Zn}(\text{OH})_2$  from  $\text{Zn}(\text{NO}_3)_2$  soln. and  $\text{NH}_4\text{OH}$ ,  $\text{ZnO} \cdot 1.85\text{H}_2\text{O}$  by drying cryst. hydrate over 70%  $\text{H}_2\text{SO}_4$ , and  $\text{ZnO} \cdot 1\text{H}_2\text{O}$  were detd. at 20° in  $\text{NH}_4\text{OH}$  by keeping the  $\text{NH}_3$  concn. const., varying the amt. of solid or time of shaking. Up to an ignition temp. of 600°, the ZnO attained a const. soly. in 90 min., which time increased with ignition temp. to blasting. The hydrates tended toward higher soly. but did not reach a const. value, because of slow dehydration, liberating a very active ZnO. The soly. of the ignited oxides increased linearly with the amt. of solid used until a const. point was reached. This point was at higher soly. and larger amts. of solid with decreasing ignition temp. If the soly. of ZnO is plotted against ignition temp., an inflection occurs at 550° in agreement with increased catalytic activity in MeOH decompn. above this temp. Free energy differences of the various ZnO preps. were calcd. from the soly. data. In KOH, the soly.-time curves show a max. soly., indicating a complicated behavior. In ignited ZnO the soly. data may be interpreted on the basis of 2 forms, an easily sol. and a difficultly sol. oxide. A. F.

**The rapid elimination of oxygen from water or aqueous solutions.** K. B. Mears and U. R. Evans. *J. Soc. Chem. Ind.* 52, 349–50 T (1933).—Satn. of  $\text{H}_2\text{O}$  with  $\text{CO}_2$  or N followed by evacuation (2 min. for each process), repeated 4 times, lowers the O content from 5.65 to 0.12–0.14 cc. per l.

H. A. Beatty

**Determination of vapor pressure of solutions. I. Total heat of solution, differential heat of dilution; theoretical heat of solution and activity coefficient of potassium chloride.** Zen-ichi Shibata and Kichizo Niwa. *J. Chem. Soc. Japan* 54, 996–1008 (1933).—By using the differential manometer (cf. C. A. 27, 1807) the vapor pressure of KCl from 0.2786 mol. to satn. was measured within the temp. range 0° to 10°. From the results of measurement total heat of soln., differential heat of soln., theoretical heat of soln. and the activity coeff. of KCl were calcd. Between 0° and 25° there is a relation between the concn.  $m$  (mol.) and the total heat of diln.  $L_d$  such that  $mL_d = -17,811$  cal.

T. Katsura

**The molecular weight of l-erythrose.** Venancio Deuloten. *Anales asoc. quim. Argentina* 21, 113 27 (1933); cf. C. A. 27, 958. The mol. wt. of l-erythrose in fresh aq. soln. was 129.9 and 131.8; after 4 hrs. it was 126.2 (calcd. 120).  $\text{Ac}_2\text{O}$  and pyridine acting on arabinose oxime form the acetonitrile of arabinonic acid, not the acetoxime. Treatment of triacetylerythrose with  $\text{NH}_3$ -alc. forms  $\text{H}(\text{OCH}_2\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{NHAc}))_3$ .

E. M. Symmes

**Determination of molecular weight of linseed oil and its polymerides.** P. J. Gay. *Chemistry and Industry* 1933, 703–5.—Ebullioscopic and cryoscopic methods for detg. the mol. wt. of fatty oils give variable results in different solvents. In a series of expts. attempting to obtain mol. wts., which could be given some theoretical interpretation, the solvents tried were benzene,  $\text{PhNO}_2$  and  $\text{PhCOMe}$ . The results with benzene and  $\text{PhNO}_2$  fully agreed with published figures.  $\text{PhCOMe}$  was less suitable on account of the supercooling effect prior to freezing. A chem. and phys. inert substance of suitable properties such as cyclohexane should provide the ideal solvent. It has a convenient and sharp f. p. of about 5.5°. The cryoscopic const. was detd. with naphthalene as solute in concns. varying from 0.1 to 1.2%. There was no change with concn. in the value of the const., being 212.5 on an av. of results agreeing within the limits of exptl. error. Linseed oil, which was sol. in all. concns., gave no variations in the mol. wt. with concn. and the values were within the limits of the theoretically possible. The values obtained were: acid-free oil, dried several

days in a vacuum over  $P_2O_5$ . 879, 880 and 876 at concns. of 6.3, 2.35 and 4.7%, resp. Undried oil: 867.5 at a concn. of 5.12%. Com. oil: 878 at a concn. of 3.5%. The same method could be applied to measure the mol. wt. of polymerides of linseed oil, giving values which remained const. at different concns. The method was applied with satisfactory results to oily polymerides of mol. wt. as high as 4320, although with such very viscous substances the estn. is less accurate, and it is doubtful whether results can be guaranteed within 3.5%. The discrepancies in values usually obtained must therefore be due to changes in the state of assocn. of the solvent used and the building up of large colloidal aggregates during heat-bodying of oils is fundamentally a chem. rather than a phys. phenomenon, the polymerides having a definite compn. and mol. wt. D. Timesen

**Rotatory dispersion of certain classes of organic molecules.** D. Biquard. *Ann. chim.* 20, 153 99(1933).—A systematic study of the optical activities of either phenyl- or diphenyl-succinic acids in various solvents and under different temp. conditions resulted in variations explainable only on the basis of 2 mol. forms in equil. The effect of solvents on phenyllactic acid, its Me ester, or benzylactic acid is explained by the existence of more than 2 forms in equil. W. J. Peterson

**The electrolytic dissociation of acids in salt solutions. VII. The dissociation constants and activity functions of a few hydroxy and keto acids in sodium chloride and potassium chloride solutions.** Erik Larsson. *Z. physik. Chem.* A166, 241 53(1933); cf. *C. A.* 27, 4467.—Many measurements of disson. const. and activity were made in NaCl and KCl soln. of hydroxy and keto acids. The results are compared with earlier measurements.

**Corrections to: "Electrolytic water transfer in sodium iodide solutions."** J. Baborovsky and A. Wagner. *Z. physik. Chem.* A166, 320(1933); cf. *C. A.* 27, 1805.

**Conductivity of iron chloride in non-aqueous solution.** Eugen Wertyporoch and I. Kowalski. *Z. physik. Chem.* A166, 205-18(1933); cf. *C. A.* 25, 4764.—Cond. measurements were made of  $FeCl_3$  dissolved in  $EtCl$ ,  $EtBr$ ,  $PrCl$ ,  $iso-PrCl$ ,  $BuCl$ ,  $iso-BuCl$ ,  $AmCl$ ,  $iso-AmCl$ ,  $C_6H_{13}Cl$ ,  $AcCl$ ,  $BzCl$ ,  $PhCH_2Cl$ ,  $PhCHCl_2$ ,  $PhCCl_3$  and of  $AlCl_3$  in  $BuCl$ ,  $iso-BuCl$ ,  $AmCl$ ,  $iso-AmCl$ ,  $C_6H_{13}Cl$ .

**The single potential of aluminum.** Hikojo Endo and Shigenori Kanazawa. *Sci. Repts. Tôhoku Imp. Univ.*, First Ser. 22, 537-52(1933). Though Si has no effect, the addn. of Fe considerably lowers the potential of Al. Three samples of Al gave different e. m. fs. due to varying impurities, particularly Fe, which was present to the extent of 0.29, 0.43 and 0.31%, resp. Samples I and II were mixed in varying amts. and then by extrapolating the potential-Fe content curve to 0% Fe the single electrode potential of Al was found to be 1.29 v.  $H_2$ ,  $N_2$  and  $CO_2$  caused no appreciable change but  $O_2$  lowered the potential greatly because of the formation of an oxide film. E. G. Vanden Boscche

**Colorimetric methods for the determination of pH.** J. M. de Castro Matçal. *Rev. brasil. med. pharm.* 9, 61(1933).

**Note on the electrometric titration of dl-2-thiolhistidine.** Geo M. Richardson. *Biochem. J.* 27, 1036-9(1933).—The disson. consts. of the compd. are  $pK_1 = 1.84$ ,  $pK_2 = 4.17$ ,  $pK_3 = 11.4$ . These figures correspond, resp., to the  $-COOH$ ,  $-NH_2$  and  $-SH$  groups. Benjamin Harrow

**Reducing action of amalgams. II. A theory of the amalgam surface.** Kurô Masuda. *J. Chem. Soc. Japan* 54, 558-65(1933); cf. *C. A.* 27, 5620.—The reducing action of Zn amalgam can be expressed by the no. of  $H_2$  bubbles formed at the contact surface between  $H_2SO_4$  and the amalgam under a certain condition. T. Katsurai

**Theory of overvoltage.** O. A. Esin. *Z. physik. Chem.* A166, 270-2(1933).—The theory of Erdey-Gruz and Volmer (*C. A.* 25, 452) on H overvoltage explains most of the exptl. data without further assumptions if one considers the rate of the back reaction. G. M. M.

**Dependence on concentration of the Volta potentials in the systems  $Ag/Ag^+$  and  $Cu/Cu^+$ .** M. Andauer and E. Lange. *Z. physik. Chem.* A166, 219-27(1933).—The ionization method was used to investigate the dependence of Volta potential on concn. in the system  $Ag/Ag^+$  from 0.1 to  $10^{-9}$  M Ag-ion concn. The potential of the surface layer changes only by about 0.01 v. for a 10-fold change in the concn. of the Ag-ion. A few preliminary expts. were also made in Cu soln. G. M. M.

**The isothermal equilibrium,  $CaCO_3 + NH_4NO_3$ , aq.** A. Guyer and H. Schütze. *Helv. Chim. Acta* 16, 904-13(1933).—The soly. of  $CaCO_3$  in  $NH_4NO_3$  solns. was detd. for the temp. range 25-45°. By use of the simplified expression for the equil. const.,  $K = [Ca^{++}]^2/[NH_4^+][H_2O]$ , it was shown that the soly. is due to the  $H^+$  ions from the  $HNO_3$  formed by the hydrolysis of  $NH_4NO_3$ .

**Graphic representation of chemical equilibrium.** Pierre Jolibois. *Compt. rend.* 197, 451(1933).—J. cites an earlier paper (*C. A.* 23, 2636) in which a graphic method of representation of chem. equil. was used to calc. the disson. of  $CO_2$ . The remarks by Etienne (*C. A.* 27, 5624) were generalized by Montagne (*C. A.* 27, 2866).

**Active oxides. LXVII. Aluminum oxides and their addition products with water.** (A contribution to the thermodynamics of equilibria in systems with two solid basic compounds.) Gustav F. Hüttig and Franz Kölbl. *Z. anorg. allgem. Chem.* 214, 289-306(1933); cf. *C. A.* 27, 3415.—Isobaric dehydration and hydration curves were detd. for hydrated gels and *bohmite*, *bayerite* and *hydrargillite* in the crystal. hydrates of the  $\gamma$  series and for  $\gamma$  Al oxides, such as *diaspore*. The thermodynamic relationship between experimentally observed equil. and the equil. calcd. from thermodynamic data in the systems  $XV_{solid} + X_{solid} + Y_{gaseous}$  is discussed. H. S.

**A calculation of the equilibria in keto-enol tautomerism.** G. W. Wheland. *J. Chem. Phys.* 1, 731-6(1933).—The equilibria obtaining in some simple cases of keto-enol tautomerism were calcd. with the aid of bond and resonance energies derived from empirical data. The results obtained are in qual. and semi-quant. agreement with expt. Morris Muskat

**The equilibrium of manganese and phosphorus in the light of recent temperature measurements. II.** Carl Schwarz. *Arch. Eisenhüttenw.* 7, 223-7(1933); cf. *C. A.* 27, 5693.—A previously developed formula is modified to give more exact values of equil. for Mn and P when the content of  $P_2O_5$  is high; also, the basicity and the ratio of Mn:Fe are taken into account. The new formula is  $\log K_{Mn} = \log [(Fe) \cdot (Mn)] \times Mn = -(5920/T) - (0.332 T/1000) + 1.778 B (0.956 - B) + 3.0243$ . Nomograms on the basis of this formula are given. Ten references. M. Hartenheim

**Effect of supersonic waves on chemical phenomena. I.** Nofuo Moriguchi. *J. Chem. Soc. Japan* 54, 949-57(1933).—The effect of supersonic waves on heterogeneous reactions was studied. The formation of  $H_2$  in the reactions  $Zn + HCl$ ,  $Zn + H_2SO_4$ , and that of  $CO_2$  in the reaction  $CaCO_3 + HCl$  was markedly promoted by supersonic waves. T. Katsurai

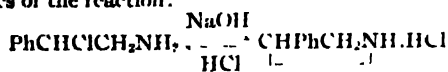
**Action of chlorine water on silver nitrate: kinetic study.** M. L. Josien. *Compt. rend.* 197, 449 50(1933).—The oxidizing power of a soln. of Cl in water after the Cl ion is removed by  $AgNO_3$  is the same as in the Cl water before pptn. If a  $AgNO_3$  soln. is added, drop by drop, to Cl water (test excess by  $K_2CrO_4$ ) a color change occurs when the amt. of  $AgNO_3$  added is equiv. to half the original amt. of Cl. If the  $AgNO_3$  soln. is poured into the Cl water rapidly in the case of an older soln. the same color change occurs ( $K_2CrO_4$ ). The second step consists of  $3HClO = HClO_3 + 2HCl$ , and an addnl. quantity of  $AgCl$  is thrown down. Dilm. retards and increased temp. accelerates the formation of chloric acid. Thus the slow addn. of  $AgNO_3$  to Cl water ppt. half the Cl, while  $AgNO_3$  poured rapidly into Cl water ppt. 5/6 of the Cl.

H. E. Messmore

**Recombination of the hydrogen atoms in the technical tungsten arc.** F. J. Havlicek. *Izv. Phys. Acad. 6*, 165-97 (1933).—The recombination of at. H of high pressure (1 atm.) is found to be monomol. The velocity of reaction increases with temp. The mean life at ordinary temp. is about  $10^{-10}$  sec. The expts. were made with streaming H contg. about 50% at. H, which combines in a calorimeter contg. Pt asbestos as catalyst. E. B.

**Effect of hydrogen chloride on propyl alcohol. Relation between rate of reaction and the electrostatic activity.** S. Kilpi. *Z. physik. Chem.* A166, 285-301 (1933). The rates of the reaction between HCl and PrOH and the hydrolysis of PrCl were studied. The change of the rate of the reaction with the electrolyte concn. was compared with the change of the activity of the HCl calcd. according to the Gronwall, LaMer and Sandved extension of the Debye-Hückel theory (C. A. 22, 3334). The change of the rate with change of solvent was also studied. The change of rate with temp. as well as the activation energy and the action const. of the reaction were calcd.

**Raising of the lifetime of  $\beta$ -phenyl- $\beta$ -chloroethylamine on charcoal.** H. Freundlich and G. Salomon. *Z. physik. Chem.* A166, 179-204 (1933); cf. C. A. 24, 3487. The kinetics of the reaction:



was studied on blood charcoal.

**Two problems connected with the method of investigation of saline equilibria.** V. P. Shishokun. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 21-4 (1933); cf. C. A. 21, 3802. The problem of detg. the no. of solid phases in a system consisting of a liquid solvent and a solute of 2 substances in a state of solid soln. is discussed together with the problem of detg. the amt. of soln. impregnating a cryst. mass in contact with its soln. S. L. Madorsky

**The cooling of blocks in molds, especially of brass blocks in water-cooled molds.** Walter Roth. *Giesserei* 20, 413-19 (1933).—A math. discussion of thermal cond. is given. Under rapid cooling a 70-30 brass solidifies at const. temp., and not over a temp. interval, as would be expected from the equil. diagram. C. L. W.

**Solubility of silicon in aluminum in the solid state at various temperatures.** P. Ya. Saldan and M. V. Danilovich. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 81-9 (1933).—Solv. curves of Si in Al in solid state were detd. for the temp. interval 15-560°. It was found that in the interval room temp. to 300° soly. is const. and is 0.09% by wt. of Si. From 300° to 400° soly. gradually increases up to 0.3%. Above 400° it increases rapidly up to 0.48% at 480°, and to 1.25% at 560°. By extrapolating the soly. curve up to the eutectic point at 570°, the limiting soly. is found to be 1.32% by wt. Si. S. L. Madorsky

**Solubility curve of copper in aluminum in the solid state.** P. Ya. Saldan and N. G. Anisimov. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 69-77 (1933); cf. C. A. 21, 3801; 24, 4742. S. L. Madorsky

**Singular points in fusion curves.** A. B. Mlodzevskii. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 5-12 (1933); cf. C. A. 23, 3148.—Math. S. L. Madorsky

**Fusion curves of solid solutions with formation of chemical compounds.** A. B. Mlodzevskii. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 13-20 (1933); cf. C. A. 26, 24.—Math. S. L. Madorsky

**Binary systems in two phases (1) HCl-Kr, (2) HCl-C<sub>2</sub>H<sub>4</sub>.** George Glockler, Donald L. Juller and Charles P. Row. *J. Chem. Phys.* 1, 714-16 (1933).—The P-T-X relations of the binary mixts. HCl-Kr and HCl-C<sub>2</sub>H<sub>4</sub> were detd. Retrograde condensation was observed with all mixts. studied. Not more than 1 liquid phase was found for any of the mixts. Morris Muskat

**An investigation of the thermal expansion of the double system Na<sub>2</sub>B<sub>2</sub>O<sub>7</sub>-B<sub>2</sub>O<sub>3</sub> in molten state.** M. P. Volarovich. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 663-74.—The dilatometric method was used for measuring the sp. vol. of molten glass up to 1400°, and consisted in measuring the level of the molten glass, contained in a

test-tube shaped Pt vessel, by means of elec. contact with a Pt rod. Sp. vols. of Na<sub>2</sub>B<sub>2</sub>O<sub>7</sub>, B<sub>2</sub>O<sub>3</sub> and of binary mixts. contg. 74, 59.5 and 20% Na<sub>2</sub>B<sub>2</sub>O<sub>7</sub> were measured through the interval 500-1300°. The expansion coeffs. obtained are in satisfactory agreement with those of Samson. With B<sub>2</sub>O<sub>3</sub>, the expansion coeff. reaches a max. at about the m. p., then gradually decreases. Results confirm Batzchinski's formula  $v = \omega + (c/\eta)$ , where  $\eta$  = viscosity,  $v$  = sp. vol. and  $c$  and  $\omega$  are const., for a certain range of temp. At high temps., the relation between  $\eta$  and  $v$  is linear. At lower temps. variation from linearity is considerable, which can be accounted for by polymerization. Isothermal curves for  $v$  plotted against percentage compn., show that mixing Na<sub>2</sub>B<sub>2</sub>O<sub>7</sub> with Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> is accompanied by considerable contraction with eventual increase in viscosity. S. L. Madorsky

**Vapor tension in the systems: sodium sulfate-water and sodium carbonate-water.** E. Ya. Rode. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 97-134 (1933).—Vapor-tension curves were detd. for a series of temps. (5° to 51°) for the following systems: Na<sub>2</sub>SO<sub>4</sub>·10H<sub>2</sub>O soln. vapor; Na<sub>2</sub>SO<sub>4</sub>-soln. vapor; Na<sub>2</sub>SO<sub>4</sub>·10H<sub>2</sub>O-Na<sub>2</sub>SO<sub>4</sub> vapor; Na<sub>2</sub>CO<sub>3</sub>·10H<sub>2</sub>O-soln. vapor; Na<sub>2</sub>CO<sub>3</sub>·7H<sub>2</sub>O-soln. vapor; Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O-soln. vapor; Na<sub>2</sub>CO<sub>3</sub>·10H<sub>2</sub>O-Na<sub>2</sub>CO<sub>3</sub>·7H<sub>2</sub>O-vapor; Na<sub>2</sub>CO<sub>3</sub>·7H<sub>2</sub>O-Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O-vapor; Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O-Na<sub>2</sub>CO<sub>3</sub> vapor. Isotherms of dehydration of Na<sub>2</sub>SO<sub>4</sub> and Na<sub>2</sub>CO<sub>3</sub> were detd. at 15° and 25°. The exptl. results were used for detg. transition points in these systems and for a theoretical calcn. of heats of hydration of these salts at various temps. Calcd. results are in good agreement with the exptl. S. L. Madorsky

**Thermal analysis of the system lithium fluoride-lithium metaborate.** I. I. Kitaigorodskii, T. A. Popova and O. K. Botvinkin. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 135-9; *J. Phys. Chem.* (U. S. S. R.) 4, 380-2 (1933).—A thermal investigation of the system LiF-LiBO<sub>2</sub> was undertaken with the object of finding a glass capable of transmitting ultra-violet rays. The melting diagram contains a max. corresponding to the complex compd. 2LiF·LiBO<sub>2</sub>. Two polymorphic transformations in this compd., at 515° and 585°, were detd., also 2 in LiF, at 812° and 762°, and 1 in LiBO<sub>2</sub> at 785°. Eutectics were found at 688° for LiF-2LiF·3LiBO<sub>2</sub>, contg. 66% LiBO<sub>2</sub>, and at 710° for LiBO<sub>2</sub>-2LiF·3LiBO<sub>2</sub>, contg. 80% LiBO<sub>2</sub>. S. L. Madorsky

**Solubility of potassium acid phosphate in the presence of phosphoric acid, potassium hydroxide and potassium chloride.** A. I. Krasilshelkov. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 159-68 (1933). That part of the system K<sub>2</sub>O-P<sub>2</sub>O<sub>5</sub>-H<sub>2</sub>O was investigated which corresponds to the solid phase KH<sub>2</sub>PO<sub>4</sub>, in order to find out to what extent the soly. isotherms of KH<sub>2</sub>PO<sub>4</sub> belong to the singular type of isotherms discovered by Kurnakov for compds. which are non-dissoc. either in the liquid or solid phase. The K<sub>2</sub>HPO<sub>4</sub> reacts with free H<sub>3</sub>PO<sub>4</sub> and with KOH forming KH<sub>2</sub>PO<sub>4</sub>·H<sub>3</sub>PO<sub>4</sub> and K<sub>2</sub>HPO<sub>4</sub>, both of which are more sol. than KH<sub>2</sub>PO<sub>4</sub> and, therefore, soly. isotherms of KH<sub>2</sub>PO<sub>4</sub> form the so-called anticlinical folds. The systems K<sub>2</sub>O-P<sub>2</sub>O<sub>5</sub>-H<sub>2</sub>O and KH<sub>2</sub>PO<sub>4</sub>-KCl-H<sub>2</sub>O were investigated at 0°, 25° and 50°, and the system K<sub>2</sub>O-P<sub>2</sub>O<sub>5</sub>-KCl-H<sub>2</sub>O at 25°. The solubilities of KH<sub>2</sub>PO<sub>4</sub> in H<sub>2</sub>O are 12.70, 19.42 and 29.1% wt. at 0°, 25° and 50°. At 25° the soly. of KH<sub>2</sub>PO<sub>4</sub> in satd. soln. of KCl is 32.9 mols. per 1000 mols. H<sub>2</sub>O, while the soly. of KCl in satd. soln. of KH<sub>2</sub>PO<sub>4</sub> is 83.9 as compared with 86.8 mols. per 1000 mols. in pure H<sub>2</sub>O. The addn. of free H<sub>3</sub>PO<sub>4</sub> or KOH lowers to a considerable extent the soly. of KCl and increases the soly. of KH<sub>2</sub>PO<sub>4</sub>. S. L. M.

**Ternary system ammonia-nitrogen pentoxide-water.** N. S. Kurnakov and M. I. Ravich. *Ann. inst. anal. phys.-chim.* (Leningrad) 6, 169-84 (1933); cf. C. A. 26, 3720.—Isotherms for the ternary system NH<sub>3</sub>:N<sub>2</sub>O<sub>5</sub>:H<sub>2</sub>O were detd. at -10°, 0°, 25°, 35°, 55°, 80°, 80°, 100° and 130°. The isotherm at 130° was detd. by keeping the soln. in a sealed tube. S. L. Madorsky

**Electrochemical properties of the triple system iodine-water-sodium iodide.** A. N. Strelnikov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 715-28.—Satn.

curves of I in aq. solns. of NaI contg. 0.21-04.86 salt satn. and satn. curves of NaI in I solns. of various concns. are given. The sp. cond. curve for satd. solns. of I in aq. solns. of NaI shows a max. at 50.09% NaI satn. Sp. cond. measurements of various concns. of I in satd. soln. of NaI show some increase in cond. because of the I, probably because of the dissoec. effect of the I on the salt. E. m. f. values between any one of the metals: Mg, Al, Zn, Fe, Cd, Ni, Pb, Cu, Ag and Sn on one side, and Pt on the other, in an electrolyte contg. 12.90%  $\text{H}_2\text{O}$ , 63.28% I and 23.82% NaI, were detd. S. L. M.

**The homogeneous catalysis of gaseous reactions by iodine. The decomposition of propionaldehyde and a general discussion.** S. Bairstow and C. N. Hinshelwood. *Proc. Roy. Soc. (London)* A142, 77-88(1933).—The rate of the homogeneous decompu.  $\text{C}_3\text{H}_7\text{CHO} = \text{C}_2\text{H}_4 + \text{CO}$  is increased about  $10^4$  times by 7 mm. of  $\text{I}_2$ ; the rate of reaction is proportional to the concn. of the  $\text{I}_2$  catalyst. The kinetics of the process indicate that the  $\text{C}_3\text{H}_7\text{CHO}$  mols. exert a deactivating effect on the I-aldehyde complex. The energy of activation is 32,800 cal. In general the energies of activation of such reactions catalyzed by  $\text{I}_2$  are very much lower than those of the uncatalyzed reactions and this energy instead of being distributed through the whole mol. appears to be placed in a part of the mol. where it can be efficiently used in breaking the bond. The existence of a dipole moment in or near the bond broken suggests that the selective energy transfers are favored by polarization and attraction of the I. mol. P. H. Emmett.

**The action of inhibitors.** K. Bodendorf. *Ber.* 66B, 1608 11(1933); cf. C. A. 27, 4472.—In the autoxidation of  $\text{BzH}$ , *m*- and *p*- $\text{C}_6\text{H}_4(\text{OH})_2$  are powerful inhibitors and their di-Me ethers are moderately strong, but their diacetates have almost no effect, in agreement with Staudinger's observations (C. A. 8, 685) of the relative rates of oxidation of  $\text{BzH}$  and its  $\text{OH}$ ,  $\text{OMe}$  and  $\text{OAc}$  derivs. In Eder's soln. the phenols and their di-Me ethers act as above, but in  $\alpha$ -terpinene the phenols are only moderately active and the ethers have no effect.

H. A. Beatty

**Homogeneous catalysis of the para-ortho-hydrogen conversion under the influence of paramagnetic molecules.** I. L. Farkas and H. Sachsse. *Z. physik. Chem.* B23, 1 18(1933); cf. C. A. 27, 3874.—The reaction: para  $\text{H}_2 \rightleftharpoons \text{X} \rightleftharpoons \text{ortho H}_2 + \text{X}$  was studied where  $\text{X} = \text{O}_2$ ,  $\text{NO}$  and  $\text{NO}_2$  at temps. of 77.3-77.3°, 143-793° and 293-373° abs., resp. The reaction rate consts. are, resp., 2.16, 31.9 and 12.5 l./mol., min. at 293° abs. The collision yield does not change much with temp. but it agrees well with the theory of Wigner as does also the abs. rate (cf. below). In the solvents  $\text{H}_2\text{O}$ ,  $\text{PhNH}_2$ ,  $\text{PhH}$ ,  $\text{MeOH}$  and cyclohexanol the rate is about  $5 \times 10^{-6}$  smaller than in the gas reaction and the conversion is ascribed to the effect of the nuclear moment of the H atom in the solvent. II. *Ibid.* 19-27.—The paramagnetic ions Zn, Cu, Ni, Co, Fe, Mn, Pr, Nd, Sm, Gd, Er and Yb catalyze the para-ortho-H conversion in the same way that mols. do. The rate is proportional to the square of the magnetic moment of the ions. Dissolved O gives about the same rate as O does in the gas state.

G. M. Murphy

**Paramagnetic conversion of para-ortho hydrogen.** III. I. Wigner. *Z. physik. Chem.* B23, 28-32(1933); cf. preceding abstr.—The collision yield in the conversion of ortho- into para- $\text{H}_2$  and the reverse reaction are inversely proportional to the abs. temp. and directly proportional to the square of the magnetic moment. G. M. M.

**Chemical inertia and heterogeneous catalysis.** M. Lemaire. *Chimie & Industrie Special No.*, 747 51 (June, 1933); cf. C. A. 26, 5480. Conclusions: The chem. inertia exhibited by 2 substances, one of which is solid and the other gaseous, is due to the fact that the heat generated by superficial attack of the solid suppresses adsorption, and consequently the contact between the substances, thus preventing further reaction. This impossibility of reaction is complete if the film formed is impermeable to the gas; it is transient and periodic if

the film is permeable. There is no inertia if the reaction product has a b. p. so low that it is volatilized by the heat generated. From a discussion of the application of this theory to the action of catalysts, it is concluded that a solid can act as catalyst only provided it adsorbs gases efficiently; its efficiency as a catalyst is reduced in proportion to the degree to which it can react exothermically with one of the gases present in the mixt. to be catalyzed.

A. Papineau-Couture

**Promoter action in the catalytic decomposition of sodium hypochlorite solutions.** IV. John R. Lewis and Francis Seegmiller. *J. Phys. Chem.* 37, 917-21(1933); cf. C. A. 25, 4773.—The promoter effect of  $\text{CaO}$ ,  $\text{CdO}$ ,  $\text{HgO}$ ,  $\text{MgO}$ ,  $\text{BaO}$ ,  $\text{BaCO}_3$ ,  $\text{BaC}_2\text{O}_4$ ,  $\text{BaCr}_2\text{O}_7$ ,  $\text{BaSO}_4$ ,  $\text{CaCO}_3$ , and  $\text{CaC}_2\text{O}_4$  in the  $\text{CuO}$  catalysis of  $\text{NaClO}$  was studied. Max. promotion is obtained at various ratios of promoter to catalyst; no relation exists between cryst. structure of a promoter and its activity. E. G. V. B.

**The sorption of oxygen by nickel catalysts.** W. Walker Russell and Leonard G. Ghering. *J. Am. Chem. Soc.* 55, 4468 71(1933).—Large vols. of  $\text{O}_2$  were instantaneously and irreversibly adsorbed by catalytically active Ni even at  $-190^\circ$ ; a slower irreversible adsorption also occurred, the extent and rate of which increased with temp. over the range  $-190$  to  $23^\circ$ . A considerable amt. of reversible adsorption occurred at  $-190^\circ$  and decreased rapidly in amt. with increasing temp. Apparently, activated adsorption of  $\text{O}_2$  occurs instantaneously and rapidly even at  $-190^\circ$  on active Ni surfaces.

P. H. Emmett

**Benzene synthesis from carbon monoxide and hydrogen at ordinary pressure.** XII. Cobalt-copper-thorium-uranium catalysts. XIII. Nickel catalysts (1). XIV. Nickel catalysts (2). Kenji Fujimura and Shunzo Tsunekawa. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 22, 198 201, 242 7, 248 53(1933).—See C. A. 27, 16, 3133. XV, XVI. Nickel catalysts. *Ibid.* 254-8, 259-63. —See C. A. 27, 4997. G. G.

**General investigation of the activity of a catalyst.** E. Rosenkranz. *Chimie & Industrie Special No.*, 755-6 (June, 1933); cf. C. A. 26, 663. Catalysts obtained by the decompu. of a chem. compd. were studied. A decompu. of the type: crystal  $\rightarrow$  crystal<sub>2</sub> + gas, must be considered as a dissoen. resulting from a superposed partial reactions, to which are due the activity and characteristics of the final product. It can be shown that for each catalyst intended to accelerate a specific reaction obtained by such a decompu., there is a certain time of dissoen. during which activity is max. A. P.-C.

**Relation between active adsorption centers and catalytic activity. Measurements on active iron.** R. Klar. *Z. physik. Chem.* A166, 273 84(1933).—The adsorption of  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$  and  $\text{H}$  on Fe preps. of various activities was studied. From the results the no. of active centers was calcd. and their properties were discussed.

G. M. Murphy

**Catalysts.** Paul Sabatier. *Chimie & Industrie Special No.*, 868(June, 1933).—The essential factor in catalysis must be the formation of an unstable compd. between the catalyst and one of the elements of the system, e. g.,  $\text{Ni}$  hydride in hydrogenation in the presence of  $\text{Ni}$ . Recent observations of the diffraction of electrons appear to confirm the existence of such a hydride. A. P.-C.

**Theory of thermal conduction.** B. Bružs. *Z. Physik* 83, 513-53(1933).—A new principle in thermodynamics is suggested, according to which the properties of a system in a stationary state (such as a const. heat current) depend only on the properties of the system in thermal equil.

R. Pierls

**Heat dissipation of heated wires and pipes in a current of air.** R. Hilpert. *Forsch. Gebiete Ingenieurw.* A or B, 4, 215-25(1933).—Work is reported on the amt. of heat dissipated from a wire or pipe in a current of air. The wires and the tubes used were circular in cross section with diams. of 0.0198-150 mm. Air velocities varied from 2 to 30 m. per sec. Reynold's no. for these conditions ranged between 2.1 and 231,000. Hexagonal and square cross sections were studied with Reynold's no. from 5000

to 100,000. Nusselt's function ( $Nu$ ) is related to Reynold's no. ( $Re$ ) by the expression  $Nu = c(Re)^m$ , where  $c$  and  $m$  are consts. with special values for various ranges of Reynold's no. Heat from a wire at 1000° is about 6% greater than the heat given off at 100°. The exptl. work can be represented by the equation:

$$Nu = c_1 \left( \frac{Re(T_w)^{1/4}}{(T_w)} \right)^m$$

where  $Nu$  = Nusselt's function,  $c_1$  = const.,  $Re$  Reynold's no.,  $T_w$  = surface temp.,  $T_a$  = air temp.

M. C. ROBERTS

**Remark on the article by H. Kuhn and S. Arrhenius: "Determination of the heat of dissociation of the cadmium molecule by a thermooptical method."** A. Jablonski. *Z. Physik* 85, 268 (1933). A correction of an error. Cf. C. 1. 27, 1158. E. B.

**Energy of formation of aluminum oxide from the ele**

**ments.** W. D. Treadwell and L. Terebesi. *Helv. Chim. Acta* 16, 922-39 (1933).—The heat of formation of  $Al_2O_3$  was calcd. up to 2600°K. by means of the third law of thermodynamics and found to be in accord with exptl. data. For 298.1°K. it is 371,100 cal. These calcd. values were checked as follows: For the temp. range 380-460°K. by means of the  $Cl-Al$  cell and the equil.,  $AlO_3 + 6HCl \rightleftharpoons 2AlCl_3 + 3H_2O$ ; for 1120-1380°K. by means of the  $O-Al$  cell; and for 1930-2160° by means of the  $CO$  tension over  $Al_2O_3-C$  mixts. J. H. Reedy

**Spectrum physics and thermodynamics. The calculation of free energies, entropies, specific heats and equilibria from spectroscopic data, and the validity of the third law II. Some selected cases and principles** H. Zula. *Z. Elektrochem.* 39, 895-909 (1933); cf. C. 1. 27, 1919. Review — G. G.

**Terpenes, sesquiterpenes and their related compds.** (Uchida, Shunoyama) 10.

### 5—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERTI NOYTS, JR

**Critical observations on the evaluation of measurements on the charge of small particles.** A. Lustig and M. Reiss. *Z. Physik* 84, 131-5 (1933).—L. and R. maintain that there is no exptl. evidence showing definitely that there is no charge smaller than that of the electron. R. P.

**Conditions for the existence of the Ramsauer effect** Wilhelm Voss. *Z. Physik* 83, 581-618 (1933). The sharp max. in the scattering of electrons by atoms as a function of their energy is due to a competition between the elec. forces attracting the electron to the atom and the centrifugal force. The position of the max. and its approx. height can easily be calcd. from this picture. R. Peierls

**Visual observation of interferences of slow cathode rays.** W. Ischnberg. *Naturwissenschaften* 21, 673 (1933). R. J. C. van der Hoeven

**Scattering of electrons by heavy atoms.** Walter Henneberg. *Z. Physik* 83, 555-80 (1933). The field of the atom has been approximated by Fermi's field, the wave function of the electron has been calcd. by the method of Wentzel-Kramers-Brillouin. The calcd. scattering is in very good agreement with expts. of F. L. Arnot and others. R. Peierls

**The anomalous reflection of fast electrons from the surfaces of single crystals.** II. Seishi Kikuchi and Shigeo Nakagawa. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 21, 256-65 (1933); cf. C. 1. 27, 1975. At certain azimuths, 40-100 kv. electrons produce diffraction images not in accord with the Bragg relation. The discrepancies are of 2 kinds: supernumerary maxima and doubling of predicted maxima. K. and N. suggest that these results, as well as the anomalous dispersion mentioned by Davisson and Germer and the anomalous behavior of the  $P$ -line observed by Shinohara, are explicable on the ground that the reflectors behave simultaneously as two- and three-dimensional lattices. It is consequently not justifiable to assume a const.  $n$ . Bethe's theory predicts values for the width of the maxima which are too small. Calvin Brous

**Structure of thin celluloid films.** E. Taylor Jones. *Phil. Mag.* 16, 793-808 (1933). Electron diffraction photographs of nitrocellulose were obtained in which the pattern appears to be quadruple. This effect is ascribed to the formation of principal patterns in 2 parts of the film whose lattices are inclined at 67° to each other and of sec. patterns from thinner layers of different lattice dimensions inclined at nearly the same angle as the principal pattern. The patterns are explained in terms of a net of hexagonal rings of length 4.95 Å. U. and width 3.68 Å. U. The spacing between layers is 4.26 Å. U. The d. calcd. from the compn.  $C_6H_7O_2NO_2$  is 1.48 g./cc.; the observed d. is 1.33 g./cc. II. *Ibid.* 953-61.—Two addnl. electron diffraction patterns of celluloid are described

and explained in terms of lattice planes and spacings.

R. J. ROSENBAUM

**Thermionic work function and atomic distance.** W. Distler and G. Monch. *Z. Physik* 84, 271-5 (1933). The work functions for Ni and Fe have been found to be 4.63 and 4.04 v., resp. The first value is in agreement with a theoretical formula due to Schottky for the relation between work function and at. distance, while the second definitely is in disagreement with this formula. A discussion of the existing exptl. material gives no argument in favor of any existing theoretical formula. R. P.

**The long wave limit of cesium oxide cells.** J. P. Widmer. *Helv. Phys. Acta* 6, 269-70 (1933).—The sensitivity of Philips Cs photocells is small for wave length 1.1280  $\mu$ . The limit current for longer waves in the paper by de Boer and Leves (C. 1. 25, 1151) is due to scattered light. Egon Bretscher

**Energy levels of the hydrogen molecular ion.** C. Gilbert. *Phil. Mag.* 16, 529-44 (1933).—A perturbation theory is presented whose results agree with those of the variation method. Energy curves for the excited state of the  $H$  mol. ion are drawn. Exptl. values of the moment of inertia are smaller than the theory requires. R. J. ROSENBAUM

**Present state of our knowledge of the surface photoelectric effect.** W. Kluge. *Kinetech.* 14, 423-8 (1932). A review M. W. Seymour

**The external photoelectric effect of alkali halides.** R. Fleischmann. *Z. Physik* 84, 717-21 (1933). R. P.

**Inner potential of semiconductors.** K. R. Dixit. *Phil. Mag.* 16, 980-91 (1933).—The inner potentials of  $ZnS$ ,  $PbS$ ,  $FeS$ , and  $Fe_2O_3$  were detd. by the diffraction of fast electrons. The value found, which were checked by Kikuchi line measurements, are:  $ZnS$  4.8 v.,  $PbS$  2.5 v.,  $FeS$  5.1 v. and  $Fe_2O_3$  12.6 v. These values are in approx. agreement with those calcd. from an extended form of Bethe's equation for the potential of a crystal. The surface grating effect was observed. R. J. ROSENBAUM

**The nuclear distances of the mercury halides ( $HgI_2$ ,  $HgBr_2$ ,  $HgCl_2$ ).** H. Braune and S. Knoke. *Z. physik. Chem.* B23, 163-70 (1933).—Electron diffraction expts. were used to det. nuclear distances in  $HgI_2$ ,  $HgBr_2$ , and  $HgCl_2$ . G. M. Murphy

**Theory of atomic nuclei.** IV. E. N. Capon. *Z. Physik* 84, 509-19 (1933).—See C. A. 27, 3393. V. *Ibid.* 520-30. R. Peierls

**Interaction between neutrons and protons.** G. C. Wick. *Z. Physik* 84, 799-800 (1933).—Heisenberg's hypothesis on the nature of these interaction forces could be verified by measuring the angular distribution in the scattering of sufficiently fast neutrons by H. R. P.

**Scattering of neutrons by protons.** E. Wigner. *Z.*



*Physik* 83, 253 8(1933).—From the exptl. fact that the scattering is nearly isotropic one can obtain an upper limit for the distance up to which there are forces between the 2 particles. This in connection with the existence of a stationary state in which the particles are bound (deuteron) permits an est. of the scattering cross section which is confirmed by some of the existing exptl. figures. The expts., however, do not give consistent results.

R. Peierls

**The atomic weights of radioactive substances.** Forrest Western and Arthur E. Ruark. *J. Chem. Physics* 1, 717 22(1933).—At. wts. of the lead isotopes 206, 207 and 208 are obtained in 3 independent ways from chem. and mass-spectrograph data. They are: 205.98, 206.98 and 207.98  $\pm$  0.03. By adding the mass lost in disintegration in the form of  $\alpha$ - and  $\beta$ -particles and  $\gamma$ -rays, at. wts. of all known radioactive substances are obtained. Some results, correct to  $\pm$  0.03, are: Po, 209.99, Rn, 222.02, Ra, 226.02; M<sup>238</sup>Th, 228.03; Io, 230.03; Th, 232.03, Pa, 231.03, U<sup>235</sup>, 235.04, U<sup>238</sup>, 238.04, U<sup>234</sup>, 234.04. These data extend the packing-fraction curve to U. The following relation is approx. true:  $W/N = 0.02 + 0.00214(N - 200)$ , where  $W$  = at. wt. of a radioactive isotope and  $N$  = nearest integer. M. M.

**Artificial disintegration of magnesium with Po  $\alpha$ -rays.** W. Bothe and H. Klamann. *Naturwissenschaften* 21, 639 10(1933). A Rutherford Geiger counter tube was used to study the no. of protons emitted in a 90° direction by irradiation of Mg with Po  $\alpha$ -rays. Curves are given for the no. of protons per  $10^6$   $\alpha$ -particles vs. their range with 7 different  $\alpha$  range from 1.81 to 3.87 cm. In the 3.87 cm. curve 4 proton groups are found. Between 1.9 and 2.8 cm. only 1 group remains and it disappears for an  $\alpha$ -range of 1.5 cm. Evidently the Pose (C. A. 25, 248) resonance (on Al) for nuclear excitation is found here for Mg as well. The energy liberation range for all proton groups.

B. J. C. van der Hoeven

**Disintegration of atoms by cosmic rays and the positive electron.** Blackett and Occhialini. *Spektr. Fiz. Nauk.* 13, 491-517(1933). C. A. 27, 2874

F. H. Rathmann

**The weakening of the cosmic radiation when passing through different materials.** F. G. Stenke and H. Heich. *Z. Physik* 84, 125 9(1933).—The ratio of the weakening in Pb, Fe and Al corresponds approx. to the ratio of the no. of at. electrons. It is, therefore, not consistent with the assumption that also the nuclear electrons make a contribution of the same magnitude as the outer electrons.

R. Peierls

**Atom debris of low range from lithium and boron.** F. Knecht. *Naturwissenschaften* 21, 676(1933).—Photographs were made of fog chamber expts. on atom disintegration by canal rays (C. A. 27, 1729) on B, range 1.3 to 1.5 cm. The range was further extended downward by reducing the air equiv. of the sepp. wall between vacuum and chamber to less than 2 mm. For 15 mm. atoms debris traces were found of range 1-1.5 cm. (energy ( $\alpha$  particles) 2 million electron v. (cosmory 17 million). Signs were found of a faint group at 2 cm corresponding to the one found by Cockerill and Walton (C. A. 27, 1816). For B debris was traced down to a range of 6 mm, however of less intensity than that above 2 cm.

B. J. C. van der Hoeven

**The disintegration of the nuclei of nitrogen and other light atoms by neutrons.** I. Wm D. Harkins, David M. Gans and Henry W. Newson. *Phys. Rev.* 44, 529 37(1933). Thirty-one disintegrations of N were found in 6000 pairs of photographs of a Wilson chamber through which neutrons were shot from a Be-MsTh source. Of these, 19 were disintegrations in which the neutron was captured according to reaction



The no. of disintegrations shows a max. for neutrons of velocity  $3.2 \times 10^9$  cm/sec. The lowest velocity and highest velocity which produce such a disintegration are  $1.9 \times 10^9$  and  $5.5 \times 10^9$  cm./sec., resp. The form of the distribution curve is explained by the assumption

that the probability that a neutron will be effective in producing disintegration increases rapidly with its velocity, but that as the velocity considered lies higher and higher above  $3.2 \times 10^9$  cm./sec. the no. of neutrons present at such a velocity decreases rapidly. The highest energy found for a neutron at capture is  $15.8 \times 10^6$  electron v., while, according to theory, it should be  $14.7 \times 10^6$  provided the  $\alpha$ -particle comes from ThC'. Without exception, for every disintegration of an at. nucleus by capture of a neutron, kinetic energy is conserved or much more often disappears. It is assumed that this energy plus any energy in the form of mass which disappears is converted into  $\gamma$ -rays. The value obtained suggest that the spectrum of these rays is a line spectrum, which may be superimposed upon a continuous spectrum. Nine disintegrations of the N nucleus were obtained in which it is probable that either (a) the neutron was first reflected by a nucleus and later disintegrated a N nucleus with capture or (b) the neutron was not captured. Thirteen disintegrations of Ne nuclei in 5200 photographs and 2 disintegrations in ethylene are reported. The latter are presumably due to C nuclei but may be due to O of the H<sub>2</sub>O present.

Bernard Lewis

**Nuclear excitation by hard  $\gamma$ -rays.** Th. Heiting. *Naturwissenschaften* 21, 674(1933). Al, Fe, Cu and Pb are excited by the Th C'  $\gamma$  line of  $\lambda = 4.7$  X. units to nuclear radiation. This was studied for a scattering angle of 130° by the ionization method; correction was made for stray radiation of the (Pb) absorber. The  $E_\gamma$  found was for Al 0.519, for Fe 0.538, for Cu 0.567, for Pb 1.87 (all  $\times 10^6$  electron v.). The law of intensity of  $\gamma$  radiation proportional to the square of at. no. (Gray and Tarrant, C. A. 26, 1211) was well confirmed.

B. J. C. van der Hoeven

**Wilson chamber investigations of the wave radiation emitted by Ra D.** G. v. Droste zu Vischering. *Z. Physik* 84, 17 11(1933). The ranges and relative nos. of the various groups of electron tracks have been measured. One of these groups is due to photoelectrons from the direct  $\gamma$  rays, the second to the Compton electrons and the third to Bi L radiation excited when the  $\gamma$  quantum was caught in the L shell of the original atom. The ranges apply a check of the formulas for the dependence of range on energy; from the no. one can calc. the probability that the  $\gamma$  quantum is caught before leaving the atom of origin. The result is that only 3.6 out of 100 quanta will leave the atom.

R. Peierls

**Scattering of short wave  $\gamma$ -rays.** L. Meitner and H. Koster. *Z. Physik* 84, 137-44(1933).— $\gamma$ -Radiation of a mean wave length of 4.7 X. U. falls on a target of Fe or Pb. The radiation scattered under 90° is measured. It contains, aside from the Compton radiation, the wave length of which is much greater than the original one, a component with unmodified wave length. This result is in disagreement with the results of Gray and Tarrant (C. A. 26, 4211). It is pointed out that in connection with the creation of pos. electrons one ought to expect scattered light with unmodified wave length.

R. P.

**The exchange of hydrogen between water and hydrogen compounds dissolved in it.** K. F. Bonhoeffer and G. W. Brown. *Z. physik. Chem.* B23, 171-4(1933).—H<sub>2</sub>O contg. 1 part in 800 of H<sub>2</sub> was prepd. by the electrolysis of 150 l. of H<sub>2</sub>O from com. electrolytic cells with H<sub>2</sub>SO<sub>4</sub> as electrolyte and Pb electrodes. NH<sub>3</sub>, NH<sub>4</sub>Cl and cane sugar were dissolved in this water and by d. detn it was shown that the H<sub>2</sub> exchanged with H<sup>+</sup> contained in the compds.

G. M. Murphy

**Isotope of hydrogen of mass 2.** G. S. Landsberg. *Spektr. Fiz. Nauk.* 12, 313-8(1932).—Comments are made on the work of Urey, Brickwedde and Murphy (C. A. 26, 4212).

F. H. Rathmann

**The concentration of deuterium by electrolysis.** D. H. Rauk. *J. Chem. Physics* 1, 750 1(1933).—The concn. of deuterium by electrolysis is discussed and it is shown that the sepn. factor depends on the temp. at which the electrolysis takes place. It is concluded that com. cells which are run hot will have a low equil. concn. of deuterium

and that the  $I_{\beta}$  produced by such cells will have a low concn. of the heavier isotope. M. M.

**Detection of radioactivity in the S Stefano D'Istria hot sulfur spring.** Mario Picotti. *Boll. soc. ital. sper.* **40**, 665-7(1933). The water has a radioactivity of 8 milli-microcuries per l. The "half-period" is 4 days. Peter Masucci

**Radioactivity of natural brines of the Ural region, Gorki District and Bashkir Republic.** B. A. Nikitin and P. V. Myatelnin. *Bull. Acad. sci. U. R. S. S. Classe sci. math. nat.* **1933**, 675-81. Brines obtained near Balakhash (Gorki District) and Krasnoursk (Bashkir Republic) contain Ra and Rn. These brines are related in their chem. compn. to the petroleum waters contg. Ra, but unlike these, do not contain appreciable amts. of I. Balakhash brines seem to be in contact with bitumens. Brines obtained near Solikamsk and Bereznikov (Ural Region) are by their chem. compn. and genesis unlike Ra-carrying waters and are not radioactive. S. L. Madorsky

**The radium industry in Portugal.** Charles Lepicre and A. Pio Leite. *Chimie Et industrie Special No.*, 797-801(June, 1933). A description of the Ra-bearing deposits in the Guarda and Vizeu districts of Portugal. The acid, alk. and mixed acid-alk. processes of attacking the ore are briefly outlined. A. Papineau Couture

**The existence of time lags in the Faraday effect.** J. S. Webb and D. R. Morev. *Phys. Rev.* **44**, 589-601(1933). The nature of the initial or surge currents, and of the oscillatory currents, found in a magneto-optic app. similar to that used by P. Allison, has been investigated. Conclusion. The cause of the results of Allison is not a time lag in the Faraday effect but is some, as yet, unknown cause, possibly a peculiar sort of Kerr phenomenon. Bernard Lewis

**Magnetorotation with non-adiabatic variation of the magnetic field.** Egon Bretschner and Walter Deek. *Helv. Phys. Acta* **6**, 229-31(1933). Magnetorotation in a high-frequency magnetic field is treated theoretically and experimentally to det. whether a relaxation occurs when the frequency of the magnetic field is larger than the Larmor frequency of the corresponding Zeeman effect. A beam of light was sent through Na vapor contained in an absorption tube and a high-frequency magnetic field was applied in the direction of the beam. The light used was polarized by a Nicol prism and a second Nicol prism after the tube acted as analyzer. The light intensity after the analyzer was detd. as a function of the field frequency, the amplitude of the magnetic field remaining const. In agreement with theory no sign of inertia of the Faraday effect was found. Egon Bretschner

**The L, M and N absorption in the region of ultra-soft x-rays.** J. A. Prins and A. J. Takens. *Z. Physik* **84**, 65-74(1933); cf. *C. A.* **27**, 4166. R. Peierls

**Precision measurements in the L-series of the elements molybdenum and silver.** Philip Haglund. *Z. Physik* **84**, 248-59(1933). R. Peierls

**The L x-ray spectrum of solid aluminum.** T. H. Osgood. *Phys. Rev.* **44**, 517-19(1933).—The L x-ray spectrum of solid Al consists, not of sharp lines, but of a wide continuous band of radiation extending between the approx. limits 170 and 200 A. U. This is in agreement with the Pauli-Sommerfeld theory of free electrons in metals. Bernard Lewis

**Quadrupole transitions and other faint lines in the K spectra of the elements 37 rubidium to 42 molybdenum.** H. Erik Carlsson. *Z. Physik* **84**, 119-30(1933); cf. *C. A.* **27**, 2092. A new spectrometer, combined with x-ray tube, and contg. a curved crystal, has been constructed for this purpose, and several weak lines of Mo, 9 Cb, Zr, Yt, Sr and Rb have been found and discussed. R. Peierls

**Thermal and röntgenographic characterization of lattice distortions in zinc oxide.** R. Fricke and P. Aeltermann. *Z. anorg. allgem. Chem.* **214**, 177-88(1933); cf. *C. A.* **27**, 1980. Below 600°, ZnO, prepd. from rhombic crystal  $Zn(OH)_2$ , shows a higher energy content the lower the temp. of formation, and the shorter the

period of formation. The indicated excess in total energy in the youngest prepn. amounts to 1.3 kg. cal./mol. The x-ray investigations indicate that this excess energy is dependent upon an incomplete lattice formation. The presence of another modification or of distorted lattices may be inferred. No certain evidence has been obtained as yet from line broadening. C. J. Humphreys

**The thermal expansion of quartz by x-ray measurements.** A. H. Jay. *Proc. Roy. Soc. A* **142**, 237-47(1933); cf. *C. A.* **27**, 4458, 5220. —The lattice spacings for clear colorless quartz were detd. for various temps. between 18° and 730 by powder photograms. A temp. scale for the camera was obtained from the lattice expansion of silver (cf. Jay, *Z. Krist.* **86**, 150(1933)). The  $\alpha, \beta$ -transformation point was found at 579°. The expansion laws for the  $a$  and  $c$  axes were found identical with those found by optical methods. Victor Hicks

**Anomalies in the regular reflection and diffraction of molecular beams by crystal surfaces.** I. R. Frisch and O. Stern. *Z. Physik* **84**, 430-42(1933).—The reflection curves for mol. beams by crystal surfaces show strange minima which are probably connected with the adsorption of the mols. to the surface. II. R. Frisch. *Ibid.* **443** 7. The described effect has been studied in detail. Each of these anomalous minima occurs, when 2 components of the velocity of the outgoing particle have certain values. It seems, therefore, that mols. can most easily be adsorbed if 2 components of their velocity relative to the surface have given values. R. Peierls

**Chemical action of x-rays.** Paul Gunther. *Angew. Chem.* **46**, 627-31(1933). A discussion of chem. action of x-rays in the light of the quantum theory and a review of the literature. Twenty-seven references. K. K.

**Multiplet separations and perturbed terms.** N. G. Whitelaw. *Phys. Rev.* **44**, 54-50(1933). B. L.

**The quantum defect of nonpenetrating orbits, with special application to Al II.** J. D. Van Vleck and N. G. Whitelaw. *Phys. Rev.* **44**, 551-69(1933). B. L.

**The nuclear spin of  $Li^7$  from hyperfine structure data.** Newton M. Gray. *Phys. Rev.* **44**, 570-4(1933). Bernard Lewis

**Hyperfine structure in the arc spectrum of fluorine.** J. Stuart Campbell. *Z. Physik* **84**, 393-401(1933).—Measurements of hyperfine structure lead definitely to the assumption of a spin of  $1/2$  for the F nucleus. The magnetic moment is slightly smaller than that of the Br nucleus. R. Peierls

**Nuclear spin of arsenic.** A. S. Rao. *Z. Physik* **84**, 236-17(1933); cf. *C. A.* **27**, 2093. —Measurements of the hyperfine structure in As II confirm Tolansky's value  $1/2$  for the nuclear spin and the structures of the lines investigated by Tolansky. More lines have been studied and the new material leads to some changes in the interpretation of terms. With these new interpretations the selection and interval rules and the intensities are in accord with theoretical predictions. R. P.

**The magnetic transformation of hyperfine structure in mercury.** D. R. Inglis. *Z. Physik* **84**, 460-73(1933).—Simplified formulas for the Paschen-Back effect in this special case are given. R. Peierls

**Paschen-Back effects in the spectra of thallium.** A. M. Crooker. *Phil. Mag.* **16**, 994-1005(1933).—The Paschen-Back effect for the  $\Gamma$  lines of wave lengths 3776, 5362 and 5949 A. U. was studied with a 3-m. grating at a field strength of 25.3 kilogausses. The observed patterns agree well with those deduced from the theory of Goudsmit and Bacher, showing the absence of perturbation effects. E. J. Rosenbaum

**Term tables for the atomic spectra of carbon, nitrogen and oxygen.** Bengt Edlén. *Z. Physik* **84**, 746-66(1933).—Tables are given contg. all known terms in the spectra C I, C II, C III, C IV, N II, N III, N IV, N V, O II, O III, O IV, O V, O VI. R. Peierls

**Experiments to extend the helium spectrum by exciting both electrons.** A. H. Rosenthal. *Z. Physik* **84**, 794-8(1933). The expts. were unsuccessful. R. P.

**Wave mechanical calculation of the Rydberg corrections for helium.** Egil A. Hylleraas. *Z. Physik* 83, 730-64 (1933).—The calcn. of the terms of the He atom has been improved, by extending the method in such a way as to give account of the polarization forces (i. e., the change of the distribution of one electron connected with the change of state of the other). R. Peierls

**The continuous absorption spectrum of helium.** J. P. Vinti. *Phys. Rev.* 44, 524-8 (1933). B. I.

**Isotope shift in neon.** J. H. Bartlett, Jr. and J. J. Gibbins, Jr. *Phys. Rev.* 44, 538-43 (1933).—The theory of isotopic displacement due to the motion of the nucleus has been extended to atoms with any no. of electrons (Russell-Saunders coupling being assumed) and applied to the transitions  $2p^2s$   $2p^2p$  in Ne. Approx. Hartree wave functions have been obtained and orthogonalized. The theory gives a shift in singlet states of  $0.0195 \text{ cm}^{-1}$  more than that in triplet states, as against approx.  $0.017 \text{ cm}^{-1}$  measured by Nagaoka and Mishima (*C. A.* 24, 4985). However, the calcd. shift for the singlet transition is  $0.0038 \text{ cm}^{-1}$  as against the exptl. value of  $0.0332 \text{ cm}^{-1}$ . This discrepancy may disappear if better wave functions are found. Bernard Lewis

**The lowest excited states of neon according to Slater's method.** St. Rozental. *Z. Physik* 83, 534-42 (1933).—The energy values have been calcd. by using approx. expressions for the wave functions, and give fairly good agreement with the exptl. values. R. Peierls

**The spectrum of doubly ionized argon.** A. III. V. v. Keussler. *Z. Physik* 84, 42-55 (1933).—Several lines of the term system with the limit  $4s$  have been found and analyzed. Their comparison with the spectra S I and Cl II suggest some changes in the quantum nos. usually ascribed to the terms of S I. The third ionization potential of A is  $40.7 \text{ v}$ . R. Peierls

**The primed terms in the spectra of alkaline earths** H. C. Brinkman. *Z. Physik* 83, 259-65 (1933).—By using theoretical relations between the terms of a spectrum contg. two-valence electrons, one term in each of the spectra of Ca, Sr and Ba could be identified. Predictions as to the probable positions of other terms with the same electronic configuration have been obtained. R. Peierls

**Polarization of fluorescent light of pure mercury vapor** A. Kastler. *Compt. rend.* 197, 412-4 (1933). When Hg vapor is illuminated with rays contg. light of 2537 and 4358 Å. U., fluorescent rays of 4358 and 4046 Å. U. observed in a direction normal to the incident rays should be polarized and the planes of vibration at right angles to one another. The state of polarization of a fluorescent ray is defined by the degree of polarization  $P = I + i, I - i$ . For 4358 Å. U.  $P$  should equal  $+1$ , for 4046 Å. U.  $P$  should equal  $-1$ . Two images are seen on the photographic plate; the ray 4358 Å. is polarized positively and the ray 4046 Å. negatively. These 2 rays are incompletely polarized. By diminishing the aperture of the incident ray, lowering the temp. of the fluorescence chamber and by rectifying the terrestrial field by a magnetic field parallel to the incident ray the degree of polarization of the 2 rays agrees in value. H. E. M.

**The series  $1S_0 - m^1P_1$  and  $1S_0 - m^3P_1$  in the arc spectrum of mercury and their perturbing term  $1P_1(5d)^0$  ( $1s^2(6p)$ ).** H. Beutler. *Z. Physik* 84, 289-303 (1933). New measurements of these series have been made. As the series do not follow Rydberg's formula, they must be perturbed by a configuration having energy which is not very different. A new assumption as to the position of this perturbing term is discussed. R. Peierls

**Shifting and asymmetrical widening of absorption lines by foreign gases.** Chr. Fichtbauer and F. Gössler. *Naturwissenschaften* 21, 675-6 (1933).—Widening of spectral lines by foreign gases has been described previously C. I. 17, 2830; Meier, Diss. Rostock 1925; cf. C. A. 21, 1063; Margenau and Watson, *C. A.* 27, 5245; Minkowski, *C. A.* 24, 1794). The Cs lines 4555 and 850 were studied in the presence of pure He, Ne, A and  $N_2$  of  $4 \frac{1}{2}$  atm. pressure, temp.  $125^\circ$  and  $180^\circ$ . The line shifting is proportional to the pressure (table),

toward violet as well as toward red; in 2 cases the direction is different for the 2 lines (C. A. 27, 4731). On going over to a line higher in the series violet asymmetry becomes more pronounced (He); faint red asymmetry changes into violet (Ne and  $N_2$ ); strong red asymmetry weakens slightly (A). All disturbances tend to increase for the higher members in the series.

B. J. C. van der Hoeven

**A new method for the detection of metastable atoms.** A. Buhl. *Helv. Phys. Acta* 6, 231-3 (1933).—The atoms of a beam of Hg are partly excited to the metastable state by electron collision and the charged particles are removed by an elec. field. The atom beam falls on a W wire activated with O and heated to about  $1500^\circ$ . As the work function of the activated W is 5.40 v. and the ionization potential of Hg atoms in the  $^1I_1$  state only 4.95 v. Hg<sup>+</sup> ions are formed on the W surface which are collected on an electrode and their no. deduced from the current. A rough estn. shows that only 1 atom among 30,000 is in the metastable state. Leon Bretscher

**Quantum mechanics of the anharmonic oscillator.** G. Poschl and E. Teller. *Z. Physik* 83, 143-51 (1933).—If the energy values (band spectrum) of an oscillating system (mol.) are known, one cannot draw an unambiguous conclusion on the potential curve, as there are always many different curves giving rise to the same energy values. The relations between these different curves are slightly different from the old quantum theory. Several typical examples are given. R. Peierls

**Dissociation of diatomic molecules with the  $p$ - $p$  bond.** H. Lassheim and R. Samuel. *Z. Physik* 84, 637-656 (1933).—Discussion of several examples of mols., where the electrons which are responsible for the binding forces, are in at.  $p$ -states (non-vanishing angular momentum). In several cases the correspondence between mol. and at. states which is suggested here differs from the usual one. One of the new principles introduced in order to set up this correspondence means that if an unsatd. electron is present, which does not contribute to the binding, the disson. energy will be increased by exciting this electron into a higher level. By this method one has more freedom in ascribing at. states to the disson. limits of band series and better coincidence between the at. energy differences and the frequencies of the band limits can be obtained. Conclusion: The calcn. of these limits from spectroscopic data is more accurate than generally assumed. R. Peierls

**Character of the linkage in hydrogen halides on the basis of absolute intensity measurements of the infra-red fundamental vibration bands.** E. Bartholomé. *Z. Physik. Chem.* B23, 131-51 (1933).—A method is described for measuring the abs. intensity of infra-red vibration bands. The results for HCl, HBr and HI give the transition probability,  $B_0 = 1.93, 1.67$  and  $0.35 \times 10^{18}$ , resp., and the effective charge,  $0.086, 0.075$  and  $0.0336$ , resp. The latter values are so small that they indicate homeopolar linkage in the halides. G. M. Murphy

**The heats of dissociation of hydrogen and nitrogen.** W. Wallace Lozier. *Phys. Rev.* 44, 575-81 (1933).—A method previously described (Lozier, *C. A.* 25, 3550) has been used to det. the heats of disson. of normal mol. and the mol. ion for  $H_2$  and  $N_2$ . The new app. is made of Ta. Electrons passing through diat. gases are able to produce at. ions possessing kinetic energies of several v. Simultaneous measurements of the electron energy necessary to produce at. ions and the kinetic energy of the ions permit the detn. of the heats of disson. The values found are  $D(H_2^+) = 2.59 \pm 0.03 \text{ v.}$ ,  $D(H_2) = 4.43 \pm 0.03 \text{ v.}$ ,  $D(N_2^+) = 6.73 \pm 0.02 \text{ v.}$ ,  $D(N_2) = 7.90 \pm 0.02 \text{ v.}$  These results are free from systematic errors to  $\pm 0.1 \text{ v.}$  These data are compared with the results of other methods, mainly spectroscopic. B. I.

**A band spectrum of barium hydride.** G. Funke. *Z. Physik* 84, 610-28 (1933).—The band spectrum of BaH between 5950 and 7500 Å. U. has been measured and analyzed. R. Peierls

**Intensity distribution and width of some AIE lines showing predissociation.** L. Farkas and S. Levy. *Z.*

*Physik* **84**, 195-207(1933). Width and intensity distribution of several lines showing predissociation have been measured as functions of the rotational quantum no.

R. Peierls

**The band spectrum of copper hydride.** All Heimer and Tage Heimer. *Z. Physik* **84**, 222-35(1933).—By making one electrode of an arc of C, the other of a Bi-Cu alloy, one can obtain the CuH bands. By this method several new band systems were found.

R. Peierls

**The so-called second positive group in the nitrogen spectrum.** D. Coster, F. Brion, and A. van der Ziel. *Z. Physik* **84**, 301-31(1933). Measurements.

R. P.

**A new band system of beryllium oxide and the structure of the beryllium oxide molecule.** Lause Herzberg. *Z. Physik* **84**, 571-92(1933). A new band system of this mol. has been found which extends from the red to the near infra-red. It has been measured and analyzed and the potential curves for the corresponding term of the mol. have been constructed.

R. Peierls

**Spectroscopic evidence for the molecule PN.** J. Curry, L. Herzberg and H. Herzberg. *J. Chem. Physics* **1**, 749(1933).—A new band system discovered in gas discharges of mixts. of H<sub>2</sub> and P is shown to be due to the PN mol. The heads of 21 bands of the system are closely represented by the formula  $\nu = 39699.3 + (1094.75 v' - 7.25 v'^2) + (1329.38 v'' - 6.98 v''^2)$ , a preliminary rotational analysis giving:  $B'' = 0.48 \text{ cm}^{-1}$ ,  $B_0'' = 0.73 \text{ cm}^{-1}$ ;  $r_0'' = 1.49 \text{ \AA}$ ;  $r' = 1.51 \text{ \AA}$ . The system is due to a  $\Sigma \rightarrow \Sigma$  transition, the  $\Sigma$  state probably being the ground state of the mol.

M. M.

**Band spectra of indium chloride.** I. Miescher and M. Wehrh. *Helv. Phys. Acta* **6**, 256-9(1933). Band spectra of InCl are observed in the region 2600-7000 Å. U. (I) and 3300-3700 Å. U. (II). The band heads in (I) have been fitted to a formula.

Egon Bretscher

**Absorption of light by ozone between 3050 and 2150 Å. U.** Tsi Ze Ny and Shun-Piao Choong. *Compt. rend.* **196**, 916-18(1933). An extension of the table mentioned in C. A. **26**, 5008.

A. L. Hanna

**Extension of the ultra violet absorption spectrum of ozone toward the long wave lengths.** D. Chalouge and Mue. L. Uchelye. *Compt. rend.* **197**, 111-7(1933). O<sub>3</sub> is prepd. by the use of 2 Berthelot type ozonizers, having the form of a Dewar flask 28 cm. deep by 40 mm. in diam. Two tubes, then external faces covered with Sn, are connected to the secondary poles of a Rochford coil, the interrupter being of the revolving Hg type. The 2 ozonizers operate in series and are cooled to -80° with CO<sub>2</sub> and acetone. The ozone is sep'd by plunging the tube into liquid O<sub>2</sub>, the O<sub>3</sub> condensing to a blue liquid. The liquid O<sub>3</sub> is allowed to vaporize in a tube 2.45 m. in length and the gas, very rich in O<sub>3</sub>, has an intense violet-blue tint. A spectroscopic detn. gave 22° O<sub>3</sub>. The coeff. of absorption is of the order of 0.0025 for 3618 Å. U.

H. B. Mesmore

**Structure and Zeeman effect of the CO doublet emission bands at 2900 Å. U.** R. Schmid. *Z. Physik* **83**, 711-38(1933).

R. Peierls

**The double band at 3660 Å. U. in the spectrum of carbon dioxide.** R. Schmid. *Z. Physik* **84**, 732-9(1933).

R. Peierls

**The vibrational structure of the spectrum of carbon tetrachloride.** J. Hornich. *Z. Physik* **84**, 380-92(1933).—This spectrum shows a case of accidental resonance, as the sum of 2 fundamental frequencies is nearly equal to the third one. In such a case there will be a splitting of the vibrational lines. This splitting has been calculated and compared with observation.

R. P.

**Measurements on the rotational spectrum of water vapor.** Joachim Kulne. *Z. Physik* **84**, 722-31(1933). With a new type of vacuum spectrometer for the infra-red all water lines given by Rubens (cf. C. A. **11**, 1357) could be reproduced and a no. of new lines have been given.

R. Peierls

**The absorption spectra of some hydrocarbons in the Schumann region.** E. P. Carr and H. Stuecklen. *Helv. Phys. Acta* **6**, 261-5(1933). The absorptions of heptane, heptane, 1 heptylene, 2-pentylene, 1-pentylene, trimethyl

ethylene and benzene were detd. in the Schumann region. The satd. hydrocarbons have an absorption max. at 1500 Å. U. which is shifted to 1750 if the compd. is not satd. These bands are without any structure and attributed to the C-C disson. A series of oscillation bands in the region of 2200-1800 Å. U. characteristic for each substance is found. They have no rotational structure. The first oscn. band for C<sub>2</sub>H<sub>6</sub> has 2 maxima at 1778 and 1805 Å. U. The oscillation spectra are more complicated.

Egon Bretscher

**The infra red spectra of propane and diacetylene.** E. Bartholomé. *Z. Physik Chem.* **B23**, 152-7(1933).—The infra-red spectra of C<sub>3</sub>H<sub>8</sub> and C<sub>4</sub>H<sub>2</sub> were obtained. For the latter, a linear mol. is indicated.

G. M. M.

**Magnetic investigation of one-electron bonds in compounds of the type of tellurium dimethyl dihalides.** S. S. Bhattacharya and T. K. Lahiri. *Z. Physik* **84**, 671-5(1933). These compds. cannot contain a bond due to one electron, because in that case they ought to be either paramagnetic, or their diamagnetic susceptibility ought to decrease with decreasing temp. This is not the case according to the authors.

R. Peierls

**Absorption of sodium chloride, potassium chloride and potassium iodide in the far ultra-violet.** Albert Smith. *Phys. Rev.* **44**, 520-3(1933).—By use of a normal incidence, concave-grating, vacuum spectrograph with a hot spark as light source, qual. absorption curves have been obtained for NaCl, KCl and KI between 190 Å. U. and 1550 Å. U. The absorbing film of the alkali halide was deposited directly onto the ruled surface of the grating. The portions of max. absorption as read from the 3 curves given, are: for NaCl, 655, 535, 350 and 890 Å. U.; for KCl, 705, 530, 320 and 1120 Å. U.; for KI, 825, 625 and 510 Å. U., all accurate to 6%. These results are at variance with early theoretical extrapolations from the known form of the dispersion curves for rock salt and sylvite in the near infra-red.

B. L.

**Dispersion measurements with potassium bromide and potassium iodide in the infra-red.** K. Korth. *Z. Physik* **84**, 677-85(1933). A new method has been developed for obtaining large salt crystals. With these dispersion measurements have been made.

R. P.

**The theory of coordination bonds. IV. Raman effect of some complex cyanides.** R. Sammel and Mohd. Jan Khan. *Z. Physik* **84**, 87-91(1933); cf. C. A. **28**, 42.—All investigated cyanides show one Raman line which S. and K. interpret as due to the oscillation of the C against N, while some of them show also a second line which is attributed to the oscillation of CN against the rest of the mol. This latter line appears to be present only in complexes with the coordination no. 6.

R. P.

**The reactions of the hydroxyl radical in the electrodeless discharge in water vapor.** W. H. Rodebush and M. H. Wahl. *J. Chem. Physics* **1**, 696-702(1933).—A study of the reactions occurring in the electrodeless discharge in water vapor showed consistently high yields of H<sub>2</sub>O<sub>2</sub>. On the basis of a study of a no. of sp. reactions and by a process of elimination it is suggested that the mechanism of the formation of the H<sub>2</sub>O<sub>2</sub> is a homogeneous bimol. condensation of the hydroxyl to H<sub>2</sub>O<sub>2</sub>. The spectrographic investigation of the electrodeless discharge revealed the presence of new bands with heads at 3564 and 3328 Å. U., which appear to be due to an ionized hydroxyl. These bands were also found in the condensed electrode discharge at low pressures, but were absent in the uncondensed electrode discharge.

M. M.

**Chemical action in the glow discharge. XI. The decomposition of nitrogen dioxide and the nitrogen dioxide equilibrium.** A. Keith Brewer and P. D. Kuerk. *J. Phys. Chem.* **37**, 889-96(1933); cf. C. A. **26**, 5497.—The decompn. of NO<sub>2</sub> in the glow discharge is shown to obey the electrochem. equivalence law given for other reactions already reported in the present series. NO<sup>+</sup>, N<sub>2</sub><sup>+</sup> and O<sub>2</sub><sup>+</sup> are equally capable of initiating the reaction. The M/N ratio is about 2. The decompn. has a strong neg. temp. coeff., the M/N ratio being 3 times as great at room temp. as at 225°. Equil. measured at room temp. after the decompn. had come to a steady

state corresponded to 1.6%  $\text{NO}_2$  when the pressure was 5–10 mm. **XII. The dissociation of ammonia.** J. W. Westhaver. *Ibid.* 897–906.— $\text{NH}_3$  decomposes into its elements in the glow discharge, some  $\text{N}_2\text{H}_4$  being formed in the pos. column but none in the neg. glow. The rate is proportional to the current but independent of pressure.  $\text{N}_2^+$ ,  $\text{O}_2^+$ ,  $\text{He}^+$ ,  $\text{A}^+$  and  $\text{Hg}^+$  catalyze the decompn. as well as  $\text{NH}_3^+$ ; only  $\text{H}_2^+$  ions are inert. The equil. in an  $\text{NH}_3$ –( $3\text{H}_2$ : $\text{N}_2$ ) mixt. corresponds to about 6%  $\text{NH}_3$  at room temp. The  $M/N$  ratio is between 0.5 and 1.0.

P. H. Emmett

**The triboluminescence of mercurous halides.** J. II Krepelka and D. F. Novotny. *Collection Czechoslov. Chem. Comm.* 59 367 82(1933).—See *C. A.* 27, 4482.

G. G.

**Photosynthesis of nitrogenous compounds.** L. N. Bhargava and N. R. Dhar. *J. Indian Chem. Soc.* 10, 453–8(1933).—Nicotine and  $\text{MeNH}_2$  can be obtained by the exposure of a 2% soln. of  $\text{CH}_2\text{O}$ , a small quantity of  $\text{NH}_3$  in the presence of a catalyst as  $\text{CuCO}_3$ ,  $\text{ZnO}$  or  $\text{TiO}_2$  to sunlight or radiations from a Hg-vapor lamp. The nicotine is sepd. from the hexamethylenetetramine by the soly. of its  $\text{HgCl}_2$  salt in dil.  $\text{HOAc}$ . No nicotine was obtained when the expts. were carried out in the dark. This evidence supports the view that the synthesis of nitrogenous compds. in nature is photochem. J. W.

**Energy transfers at surfaces.** VII. Photosensitized oxidation as the action of an active, metastable state of the oxygen molecule. II. Kautsky, H. de Bruijn, R. Nieuwirth and W. Baumeister. *Ber.* 66B, 1588 600 (1933), cf. *C.* 1, 26, 1486; 27, 1029.—Trypallavine (I), and leuco-malachite green (II) are adsorbed separately on  $\text{SiO}_2$  gel granules 1.5 and 0.15–0.3 mm., resp., in size which are then mixed and illuminated in  $\text{O}_2$ . Oxidation of II occurs only at  $\text{O}_2$  pressures below 0.004 mm., and is not due to diffusion of I or II or to  $\text{H}_2\text{O}$  or oxidation products of I. With I and II sepd. by several mm., there is no reaction; with both adsorbed on the same gel,

oxidation occurs even at 1 atm. of  $\text{O}_2$ . Conclusion: Illumination of I produces an active, metastable  $\text{O}$  mol., possibly in the  $^1\Sigma$  state.

H. A. Beatty

**Quantum theoretical contributions to the problem of aromatic and unsaturated compounds.** IV. Free radicals in organic chemistry. Erich Huckel. *Z. Physik* 83, 632 68(1933); cf. *C. A.* 26, 5826.—When considering the dissoen. of hexaphenylethane into triphenylmethyl as taking part in 2 steps, first breaking up the large mol. into 2 halves without changing the configuration of atoms within the halves, and then rearranging, the first step would require a very high energy. In order to explain the low dissoen. energy one has to show, therefore, that the second step contributes a considerable gain of energy. This, according to II., is due mainly to the interaction between the valence electrons, which, for a plane arrangement of the atoms, is more favorable than in the actual arrangement before the dissoen. The dissoen. energy can reach these low values only with compds. contg. aromatic and unsatd. bonds. The magnitude of the dissoen. energy is discussed.

R. Peierls

Lignin [spectrum of] (Hillmer) 10.

**Electron-emitting cathodes.** Cornelis Zwicker (to Radio Corp. of America). U. S. 1,931,974, Oct. 24. An electron-emitting cathode of high electron emissivity at a working temp. of about  $1000^\circ$  comprises a metal coat such as Zn and Al alloy which at such a working temp. has a neg. resistance coeff. and a sp. heat about 20-fold the normal value, with a coating of an oxide such as that of an alk. earth metal having high electron emissivity at the working temp.

**Luminous compositions.** Richard Werner. Ger. 582,401, Nov. 2, 1933. A rare earth is sintered with  $\text{SiO}_2$  or a silicate or an alk. earth carbonat., and the product is comminuted. Examples are given.

## 4 – ELECTROCHEMISTRY

COLIN G. FINK

**Graphical method for determining the power factor of an electric furnace under varying working conditions.** C. Fous. *J. four élec.* 42, 311 16(1933).—Simple calcns. from graphic data are presented. Inductance is assumed to be const., and the power factor independent of current.

C. F. Bonilla

**Casting special electric steels in the Marcinelle (Belgium) steel works.** E. Decherf. *J. four élec.* 42, 317 23(1933).—Many cast steels have been developed to replace more expensive ones and those difficult to forge: (1) C steel, 0.7% Mn, 0.3% Si, 68 kg./sq. cm. tensile strength; (2) 14% Mn steel, 1.4% C, good wearing qualities, preferable to converter steel (they can be improved by Cr or Mo addns.); (3) Ni-Cr-Mo steels, preferable to the usual Ni-Cr steels; high wearing resistance, resilience, good machinability, 105 kg./sq. cm. tensile strength (they can be welded); (4) a special 24% Cr steel for temp. up to  $1100^\circ$ ; (5) also very pure cast irons. Many photomicrographs are included. C. F. B.

**Electric-furnace manganese steel castings.** M. Salomon. *J. four élec.* 42, 324–6(1933).—The elec. furnace is preferable for hard, wear-resisting Mn steel castings, and is the only means of almost completely removing S. General advice is given on the steps in casting, melting, pouring, heat treating the castings and finishing them.

C. F. Bonilla

**The three-phase electric arc furnace.** Samuel Arnold, 3d. *Elec. Eng.* 52, 839–43(1933).—A review. C. G. F.

**Scientific control of electric arc furnaces.** E. Decherf. *J. four élec.* 42, 282–8(1933).—D. discusses application of semi-slow and slow melting to the manuf. of Ni-Cr steels. The latter requires more energy, but improves phys. properties. Time vs. voltage and power are given in graphical form for typical cases. C. F. Bonilla

**Carbon shapes for linings of electric melting and reducing furnaces.** C. Kuhlmann. *J. four élec.* 42, 289–91(1933).—Except for steel furnaces, C is the best lining, for chem. and phys. reasons. Cracks unpreventable in lining are healed with a mixt. of C scrap, tar, etc., and baked in place. Pre-baked forms do not shrink and have long life. They are also good in cells for production of Al by the Hall process. C. F. Bonilla

**Transformers for electric furnaces.** H. O. Stephens and L. S. Schell, Jr. *Elec. Eng.* 52, 822 6(1933).—The extremely high secondary currents and low secondary voltages, together with the wide variation in voltage required by many elec. furnaces, demand special design considerations in both the transformer and its assoc. equipment. C. G. F.

**Dephosphorization of Thomas steel in the electric furnace.** P. Girod. *J. four élec.* 42, 281(1933).—

Rapid dephosphorization of high-P steel (0.08%) to 0.015% P is possible at low temp. with a basic oxidizing flux of lime and hematite, together with a fluxing agent, such as soda ash, feldspar or fluorspar. At the same time oxidation of Fe is minimized. C. F. Bonilla

**Combined operation of converter and electric furnace.** A. Kayl. *J. four élec.* 42, 359 62(1933).—K. claims 250% daily capacity increase, reduced energy consumption, and better cast steel by making these steps immediately consecutive. The required change to a basic converter lining and the furnace and converter operation are described. C. F. Bonilla

**Conductivity of slags in the electric furnace.** Axel Wejnarth. *Arch. Erzbergbau Erzaufbereit. Metallhüttenw.* 1, 191–208(1931).—In order of decreasing effectiveness, the following constituent lower the elec. cond. of silicate slags:  $\text{Al}_2\text{O}_3$ ,  $\text{CaO}$ ,  $\text{SiO}_2$ ,  $\text{FeO}$ , and  $\text{MnO}$  more strongly,

raises the cond. With rising temp. cond. increases, the coeff. being smaller with FeO and MnO than with CaO and  $\text{Al}_2\text{O}_3$  silicates. No definite relation was found between cond. and viscosity of the systems FeO-SiO<sub>2</sub>, FeO-CaO-SiO<sub>2</sub>, and FeO-CaO-MnO- $\text{Al}_2\text{O}_3$ -SiO<sub>2</sub>. Cond. is both metallic and electrolytic; the relative proportion of each depends upon composition of slag. Slags from numerous electrothermal processes show great variation in compn. Energy relationships in the slag bath are extremely complicated, partly because of a flaming arc which is influenced by c. d. and the form of electrode, and partly because of varying temps. of and near the electrode. Each process requires a specific voltage, charge, depth of bath, and operation. John G. Attwood

**Economical muffle-furnace operation.** C. G. Harrel and Stener Duos. *Cereal Chem.* 10, 452-56(1933).—It is pointed out that rheostat control of muffle furnaces is expensive on account of the current consumed by the rheostat. With a c. a. transformer may be used at a large saving in cost. With d. c. a high-temp. thermostat may be used. L. H. Bailey

**Smelting sponge iron in electric and open hearth furnaces at a German plant.** Ya. Granikov. *Dokl. Akad. Nauk SSSR*, No. 7, 29-42. Sponge iron prep'd. at the Bokunsk exptl. plant was smelted in an elec. and in an acid open-hearth furnace. Compn. of sponge: C 1.07, SiO<sub>2</sub> 0.6, Mn 0.1, P 0.01, S 0.027, Fe 75.2, Fe<sub>2</sub>O<sub>3</sub> 10.0, FeO 8.8 and CaO +  $\text{Al}_2\text{O}_3$  4.1%. This sponge was used with and without deoxidizers as part of the charge in the prep'n. of Cr-W-V tool-steels and plain steels. For comparison, melts were prep'd without the addn. of sponge. No tech. difficulties were encountered in the operation of the furnaces when sponge was used, and the products were of good grade. S. L. Madorsky

**Electrodes—carbon and graphite.** Frank J. Vosburgh. *Elect. Eng.* 52, 844-8(1933).—A review. C. G. F.

**The steel-melting coreless induction furnace.** M. Marchbanks. *J. Inst. Elec. Engrs.* (London) 73, 509-20 (1933).—A quite thorough description is given of construction and performance of this type of furnace, particularly of  $\frac{1}{4}$  ton capacity. Metallurgical refining action and math. theory of operation are also given. C. F. B.

**Copper electrolysis.** E. Vuigner. *J. four élec.* 42, 363-7(1933).—A general discussion of the acid sulfate bath. Max. efficiency and purity of cathode are obtained by using: anodes at least 99.25% pure; highly coned free acid, about 150 g./l.; temp. at least 40°; pure starting sheets; absence of colloidal addn. agents or chlorides. C. F. Bonilla

**The electrolysis of barium chloride without a diaphragm.** I. S. Katsen. *J. Chem. Ind.* (Moscow) 1933, No. 4, 34-41.—To get ClO ions in ordinary electrolysis of a soln. of BaCl<sub>2</sub>, 45% of the current is wasted in the production of Cl<sub>2</sub>. Cr and its compds. fail to prevent this. Best ClO efficiencies are obtained with graphite electrodes and a relatively high c. d. with a soln. contg. 1% CaCl<sub>2</sub> kept at 70°. Addn. of 1% gum arabic causes rapid evolution of Cl<sub>2</sub>. H. M. Leicester

**Electrolytic refining of mercury.** E. Newbery and S. M. Naude. *Metal Ind.* (London) 43, 415-18(1933).—See C. A. 27, 4175-6. G. G.

**Electrolytic deposits on aluminum.** H. Krause. *Mitt. Forschungsinst. Probant Edelmetalle* 7, 87-9(1933).—The procedure of Ni plating of Al and Al alloys is discussed. The metal must first be degreased in a 90° hot soln. of 7.5-22.5 g. each of Na<sub>3</sub>PO<sub>4</sub> and Na<sub>2</sub>CO<sub>3</sub> per l. and, after rinsing in cold water, immersed in a 5% bath of HCl. The surface is then roughened in a sand blast, or better, in a pickling bath, to make the deposit adhere well. The Ni soln. consists of 150 g. Na<sub>2</sub>SO<sub>4</sub>, 77 g. MgSO<sub>4</sub>, 15 g. H<sub>2</sub>SO<sub>4</sub>, and 15 g. boric acid per l.; temp., 35°; c. d. 1.5-2.5 am.;  $\rho_n$  5.8-6. A min. thickness of 0.0125 mm. is recommended. Any other metal may be deposited on Ni; Zn and Cr may be deposited directly on Al; but Al is not suitable for further working. Behavior especially for articles which are

exposed to high temps.; gradually increase to 315° and hold this temp. for several hrs. M. H.

**The influence of the basis metal, in particular, nickel, upon the throwing power of the chrome-plating bath.** J. Korpium and Ernst Vogel. *Oberflächentechn.* 10, 243-4 (1933).—The inherent low throwing power (t. p.) of the Cr-plating bath has been remedied in various ways which are briefly reviewed. A method for detg. the t. p. is described and results are given for the improvement which is obtainable through the basis metal. M. Hartenheim

**The art of cadmium plating.** F. Pietrafesa and E. Lotti. *Met. ital.* 25, 167-73(1933). The best conditions for Cd plating have been found to be: c. d. 2 amps./sq. dm., temp. 20°. Bath compn. is: 0.75 N Cd (as Na<sub>2</sub>Cd(CN)<sub>4</sub>); 1 N free NaCN; 0.75 N NaCl; plus a small amt. of certain org. addn. agents to improve the quality of the deposit. A. W. Contiri

**The rate of growth of cathodic deposits.** A. Glazunov and J. Janoušek. *Chimie & industrie Special No.*, 739-42(June, 1933).—By following electrolysis under the microscope, it was observed that there are 2 rates of linear crystn. during the deposition of the metal on the cathode, that of growth perpendicular to the cathode and that of growth parallel to the cathode. A. Papineau-Couture

**Relationship between the direction of growth of the cathodic deposit and of the direction of the lines of electric force.** A. Glazunov and O. Rada. *Chimie & industrie Special No.*, 736-8(June, 1933).—By using shallow electrolytic tanks (3-5 mm. deep) in which were placed variously shaped obstacles, dendritic shaped cathodic deposits were obtained which followed the lines of elec. force. A. Papineau-Couture

**Heterogeneous chemical reactions in the silent electric discharge.** VI. Susumu Miyamoto. *J. Sci. Hiroshima Univ.* A3, 347-66(1933). See C. A. 27, 2630. G. G.

**Overvoltage.** M. Volmer. *Physik. Z. Sowjetunion* 4, 346-59(1933).—V. modifies Tafel's theory (*Z. physik. Chem.* 50, 611(1905)) by adding the concept of an activation energy necessary for the discharge of ions through the double layer. For metals other than those of the bc group, concn. polarization masks the ion-discharge effect. L. W. Elder

**Quantum mechanics and overvoltage.** R. W. Gurney. *Physik. Z. Sowjetunion* 4, 360-4(1933)(in English); cf. Bowden. *C. A.* 24, 299, 1039. The elec. double layer is transparent to an electron wave; hence the transfer of electrons to and from ions may occur at some distance from the electrode surface. Overvoltage facilitates such electron transfers. L. W. Elder

**The size of electrolytically generated gas bubbles.** B. Kabanov and A. Frumkin. *Z. physik. Chem.* A166, 316-17(1933); cf. C. A. 27, 5617. —A few addnl. remarks are made in connection with the work of Wark (*C. A.* 27, 4194). G. M. Murphy

**The effect of the internal resistance of the galvanic cell upon the measurement of the electromotive force of the cell, using the capillary electrometer, and means for correcting for this effect.** II. T. Ishino and H. Inagawa. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 571(1933); cf. C. A. 27, 4177. —The true e. m. f. of the cell is given by the formula  $e = E(n_1 - n_m)/n$ , where  $E$  is the e. m. f. of the standard cell,  $n$  = bridge reading with the standard cell only,  $n_1$  = bridge reading with the standard cell and the cell with large internal resistance connected in the same direction and  $n_m$  = the mean value of the bridge readings. The results calcd. by means of this formula completely coincided with the known applied e. m. f. Karl Kammermeyer

**The mechanism of electrolytic degreasing of metals.** B. Kabanov. *Kolloid-Z.* 65, 101-5(1933); cf. C. A. 26, 4996.

**Utilization of electrochemically produced oxide layers on aluminum (Eloxal process) for metal coloration and for electrolytic coatings.** G. Buchner. *Oberflächentechn.* 10, 233-4. A table is given showing the different colors which can be obtained by electrochemically produced



oxide layers on Al, silumin and lantal; gray, yellow, white and bluish tones can be produced by definite electrolyte and oxidation conditions. The oxide layers are good absorbers for fat-sol. and water-sol. org. colors, especially tar derivs.; the article is suspended as anode in different org. solns., a few of which are described. Either a. c. or d. c. may be used; special effects may be obtained by polarized high-frequency current, that is, an a. c. with a superimposed d. c. of such intensity that the resulting current is only on one side of the zero line. The oxidation process is a complicated chem., electrochem. and elec. process in which *Al hydroxide* is formed on the surface. M. Hartenheim

**The constitution of  $Ta_2O_5$  layers as anodes.** P. O. Schupp. *Z. Physik* 84, 412-24(1933).—A contribution to the problem of electrolytic rectifiers. A method is described by which the development of the layer in an early stage may be interrupted. The layer is very porous during the early stages but not so later. The effect on the theoretical interpretation is discussed. R. Peierls

**Research in liquid dielectrics.** W. F. Davidson and Thorstein Larsen. *Elec. Eng.* 52, 918-20(1933).—A review. A bibliography of recent periodical literature is appended. C. G. F.

**Improvements in impregnated paper.** D. W. Roper. *Elec. Eng.* 52, 920-3(1933).—A review. C. G. F.

**Improvements in solid dielectrics.** R. W. Atkinson. *Elec. Eng.* 52, 923-7(1933).—A review with a 4-year bibliography. C. G. F.

**Recent trend of the mercury rectifier.** T. Ippomatsu. *J. Inst. Elec. Engrs., Japan* 53, 709-13(1933).—Production statistics, constructional details and characteristics of operation are given. C. F. Bonilla

**Comparison between surface and space discharges.** S. Mochizuki. *J. Inst. Elec. Engrs., Japan* 53, 722-5(1933).—Photographs and plotted characteristics of positive impulse voltage discharges, along or through dielectrics, are given. C. F. Bonilla

**New compensation method for the exact measurement of high voltages.** E. Hess. *Z. Physik* 83, 698-700(1933).—With the electrostatic method, developed by H., voltages up to 1100 v. may be measured with an accuracy of 1 in 1000. The method might be extended to even higher voltages and higher accuracies. R. P.

**Fine dust from the electrical precipitators at the Vitkovice blast furnaces.** F. Wald. *Chimie & industrie Special No.*, 698 9(June, 1933).—The dust from the Cottrell-Muller precipitators contains as much as 25% ZnO, 15% PbO and 0.1-0.28% I. The chief sources of the I are Ostrava coal and Polish limonites. A. P.-C.

**New methods and apparatus for magnetic and electrical beneficiation.** B. Granigg. *Arch. Erzebergbau Erzaufbereitung. Metallhüttenw.* 1, 75-87(1931).—A spiral serving as 1 pole of an electromagnet revolves in a cylinder which forms the other pole. A field intensity of 12,000 lines of force per sq. cm. is developed in a lab. machine consuming less than 5 amp. Hematite, siderite, tetrahedrite, chalcocopyrite, chamoisite, limonite, pyrolusite, miter magnesite, gel magnesite, feldspar, scynite, leucite, nephelite, apatite, corundum, and pptd. silicic acid in sizes of 0-12 mm. were satisfactorily treated in this machine. A tube separator is described which is unusual in that the material passes through the inside of the tube, thus being aided by centrifugal force, which is important in the sizes treated: 8-80 mm. Solenoid, radial, and axial windings have been tried in com.-sized machines, in which siderite, limonite, serpentine, chamoisite and hematite were concd. Separators making use of magnetic cond., elec. cond., and dielec. const. of the mineral have all operated successfully as lab. machines. J. G. A.

**Static electricity in nature and industry.** Paul G. Guert. *Bur. Mines, Bull.* 368, 98 pp.(1933).—The literature on static electricity and its hazards is reviewed. Over 260 references are given. The industries concerned include Al, aviation, building, chem., cleaning and dyeing, cotton, grain, mining and handling coal, paper and printing, petroleum. S and sugar. Alden H. Emery

**Current distribution on a straight wire excited at the center. Its impedance at the feeding point.** Y. Kato. *J. Inst. Elec. Engrs., Japan* 53, 746 9(1933).—Math. derivation. C. F. Bonilla

**Radiation power from conductors carrying current of steady flow.** G. Hata. *J. Inst. Elec. Engrs., Japan* 53, 750-6(1933).—Math. derivation for single conductors and groups. C. F. Bonilla

**Comparison of arc-extinguishing power of various anhydrous inorganic oxides.** S. Fukuda. *J. Inst. Elec. Engrs., Japan* 53, 729-33(1933).—The min. arc length that could be extinguished in  $1/2$  cycle was detd. for a cartridge fuse in terms of percentage packing of the arc space.  $B_2O_3$  is the best. C. F. Bonilla

**Magic with (ultra-violet) light.** Robert L. Zahour. *Elec. J.* 30, 453-6(1933).—After a brief review of the common source of ultra-violet light, a new "black bulb" lamp is described which emits 99% ultra-violet and 1% visible light. It operates at 5 amp. and 15 v. The source of light is a small Hg arc. C. G. F.

**Cl smelting with chloride electrolysis (Ashcroft) 9.** Exchange of H between  $H_2O$  and H compds. dissolved in it (Bonhoeffer, Brown) 3. New uses for thin films (Edwards) 9.  $II_2$  as a transmitter of energy (Voss) 13. Electrolytic bleaching of molasses (U. S. pat. 1,933,830) 16. App. for producing a hydrocarbon and metallic sol (U. S. pat. 1,933,836) 22. Alloy for storage-battery terminals (U. S. pat. 1,934,875) 9. App. (with spaced rotating electrodes) for effecting reactions (U. S. pat. 1,931,800) 18.

**Primary electric battery.** LeRoy S. Dunham (to Thomas A. Edison, Inc.). U. S. 1,932,654, Oct. 31. Structural features.

**Dry cell electric battery assembly.** Herman R. C. Anthony (to French Battery Co.). U. S. 1,932,128, Oct. 24. Structural details.

**Dry cells.** The Ever Ready Co. (Great Britain) Ltd. and Marcel Van Koningsveld. Brit. 396,521, Aug. 10, 1933. The dolly of a dry cell is insulated from the Zn cup by a member of paper, etc., having radial arms which are turned up when the dolly is inserted.

**Dry batteries.** Compagnie générale des piles wonder. Fr. 749,412, July 24, 1933. Construction of base to hold the depolarizing agglomerate in the center.

**High-tension battery provided with a flash-lamp bulb which serves as a fuse.** Wm. Fleet. Brit. 395,959, July 27, 1933.

**Galvanic cells.** Edouard Meier. Swiss 161,852, Aug. 1, 1933. A mech. appliance for preventing collection of gas bubbles in cells is described.

**Storage battery.** Bryan Merlan and John F. McClelland. U. S. 1,934,945, Nov. 14. Structural features.

**Positive storage battery plates.** Fred C. Perkins. U. S. 1,933,928, Nov. 7. Structural details.

**Battery cans.** Metallgesellschaft A.-G. Brit. 397,044, Aug. 17, 1933. Sheet Zn for battery cups is made by rolling plates cast at just above the m. p.; 420-425° is suitable, or even lower, if the Zn contains a small proportion of Pb.

**Accumulators.** The Chloride Electrical Storage Co. Ltd. and Herbert Dean. Brit. 395,488, July 20, 1933. An arrangement of glass plates for arresting spray is described.

**Accumulators.** Drumm Battery Co. Ltd. (formerly Celia Ltd.), James J. Drumm, Thomas Hagyard and Robert H. D. Barklie. Brit. 396,101, July 31, 1933. Addn. to 365,125 (C. A. 27, 2631) and 363,629 (C. A. 27, 5654). An accumulator in which Zn is deposited from an alk. electrolyte on charging is provided with a neg. electrode consisting of an alloy of Ni, Cr and Fe which is subjected to a pickling operation before use. A suitable alloy is Ni 35, Cr 5 and Fe 60%. The electrode may be heat-treated before pickling which may be effected by immersing in a soln. of HCl, HNO<sub>3</sub> and a restrainer comprising a mixt. of powd. glue, H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O or by anodic treatment in 10% HCl, the current d. being 300

milliamps. per sq. cm. The electrolyte contains 60 g. ZnO per l. KOH or may be prepd. by dissolving Zn in the a/k. soln.

**Accumulators.** Norman D. Sturges. Brit. 396,668, Aug. 10, 1933. The electrolyte in an accumulator is absorbed in bagasse which has been subjected to partial cooking to loosen the encrusting casing that surrounds the fibers but to retain the pith naturally present in the fibers. The cooling may be with a soln. of NaOH or in solns. of the sulfitcs or sulfates of the alkali metals.

**Accumulators.** Leonard A. Levy and Almeida Accumulators Ltd. Brit. 396,751, Aug. 9, 1933. An accumulator, in which Zn is deposited on charging, has pos. plates consisting of graphite surrounded by C granules or powder held together in plate form by gelatin, glue, etc., which dissolves in the electrolyte when the cell is assembled. The electrolyte contains  $ZnBr_2$ ,  $ZnCl_2$ , KOAc, LiCl or LiBr, and HCl.  $HgCl_2$  may be added to amalgamate the Zn and the Li salts may be replaced by the chlorides or bromides of Mg, Na and Be.

**Accumulators.** James Veith. Swiss 161,650, July 17, 1933. Electrodes for accumulators are made by spraying Pb on porous carriers. These may be previously treated with oxygenated Pb compds.

**Accumulators provided with specific gravity balls.** The Chloride Electrical Storage Co. Ltd. and Arthur W. Browne. Brit. 396,180, Aug. 3, 1933.

**Electrolytic condensers.** N. V. Philips' Gloeilampenfabrieken. Brit. 395,842, July 27, 1933. An electrolytic condenser has at least 1 fixed electrode, with a permanent oxide film, in the form of a rod having longitudinal ribs.

**Electric condensers.** Elektrizitäts-A.-G. Hydrowerk. Brit. 396,336, Aug. 3, 1933. A mixt. of castor oil and a solid or viscous material is used for impregnating the paper, etc., dielcc. of a condenser. A suitable compn. is castor oil 50%, the remainder being ozokerite, paraffin wax or a product of chloronaphthalene.

**Film formation on "valve metals" as in the production of electrolytic condensers.** Edgar W. Ingile (to Fansteel Products Co.). U. S. 1,935,395, Nov. 14. A metal plate such as Al is subjected to a.c. in an aq. electrolyte such as  $NaHCO_3$  soln., then to d.c. in an aq. electrolyte such as  $NaHCO_3$  soln., and finally to d.c. in a substantially dry glycerol soln. contg.  $NaHCO_3$ .

**Electrodeposition of metals.** Julius Winkler, Jr. Brit. 396,191, Aug. 3, 1933. In the deposition of 2 or more metals from a bath direct voltage, appropriate to each metal are applied in alternation for periods so short that the deposited layers have the characteristics of an alloy. 50-150 complete cycles per min. may be used. In an example an alloy contg. Au 69.5, Cu 28.2 and Ni 2.3% is deposited in a plating bath prepd. by treatment of an anode contg. Au 50.0, Cu 42.5 and Ni 7.5 in a bath contg. Na pyrophosphate 20, Na citrate 20, KCN 8 and  $H_2O$  1000 parts, an auxiliary cathode having half the surface of the anode being used and, when the bath contains 6 g. per l. of dissolved metal, replaced by the article to be plated. Sep. anodes of Au, Cu and Ni may be used.

**Electrodeposition of nickel.** Franz von Wursterberger. Brit. 395,979, July 27, 1933. Fe or steel, before plating with Ni, is anodically treated in  $H_2SO_4$  for passivation and slight etching. After brief rinsing it is plated in a bath contg. a Ni salt, a conducting salt, e. g.,  $MgSO_4$  or  $Na_2SO_4$ , a buffer acid, e. g.,  $H_3BO_3$ , and a tartrate, e. g.,  $NaK_2C_4H_4O_6$ , no adverse effects being produced with such a bath by Fe compds. unavoidably introduced by the preliminary treatment. Detailed examples are given.

**Zinc deposition from sulfate solutions.** Wm. H. Hannay and Frederick E. Lee (to Consolidated Mining and Smelting Co. of Canada Ltd.). U. S. 1,934,305, Nov. 7. A hydro-metallurgical method for the electrodeposition of Zn from a sulfate soln. comprises, when using a Pb anode in the electrolysis, the incorporation and maintenance in the soln. of 0.001-0.006 g. C<sub>60</sub> per l. of the soln. contg. about 10% of free acid, which serves to prevent corrosion and disintegration of the anode.

**Electroplating on aluminum and its alloys.** Siemens &

Halske A.-G. Brit. 394,637, June 29, 1933. Addn. to 385,067 (C. A. 27, 5257). The process of 385,067 is modified by producing the initial oxide coating by the use of a.c. in an alkali metal carbonate bath of low concn. free from Cl. The bath may contain 20-80 g.  $Na_2CO_3$  per l. The coated articles are subsequently treated as cathodes in a degreasing bath contg. Cu and Zn to effect first reduction of the coating and then deposition of brass. They are then rinsed and plated with the desired metal.

**Electroplating cadmium.** Roscoe Treats and Rudolph L. Hasche (to American Smelting & Refining Co.). U. S. 1,931,851, Oct. 24. Insol. anodes are used with a Cd sulfate electrolyte contg. a small proportion of saponin.

**Electroplating with tantalum.** Frank C. Driggs and Wm. C. Liffendahl (to Westinghouse Lamp Co.). U. S. 1,933,319, Oct. 31. An article to be plated such as one of Ni, Fe or Mo is immersed in a fused bath contg. alkali halide compds. such as KCl and KF together with an ionized Ta compd. such as K Ta fluoride and Ta oxide, and Ta is deposited as a continuous adherent coating by use of a c. d. of 1 to 10 amps. per sq. decimeter.

**Chromium-plating ferrous metals.** Stanley C. Moore and Frank E. Bowker (to Dura Co.). U. S. 1,931,704, Oct. 24. Articles of ferrous metal are successively coated with a metal such as Cd which is electronegative to Fe, with Ni and with Cr. Cu also may be used.

**Coating aluminum.** Aluminum Colors, Inc. Brit. 396,201, Aug. 3, 1933. White coatings are produced on Al (alloy) articles by forming an adherent oxide coating thereon by anodic treatment in a  $H_2SO_4$  or oxalic acid electrolyte and then, without the application of external elec. energy, removing the colored constituents of the coating with a suitable reagent, e. g.,  $H_2SO_4$  and (or)  $HNO_3$  or HF. Cf. C. A. 27, 2887.

**Coating aluminum.** Ernest Windsor-Bowen. Brit. 396,743, Aug. 8, 1933. In the anodic oxidation of Al (alloys) by d.c. or a.c. a bath contg.  $H_2SO_4$  and  $Na_2SO_4$  in the absence of Cl ions is used. An oxidizing agent, e. g., Na or K nitrate, persulfate or perborate, may be added in proportion of 1% or less. A  $H_2O$ -dispersible colloid may also be added, e. g., 25 parts of a 1% dispersion of gum to 75 parts electrolyte. Cf. C. A. 27, 5257.

**Locally strengthening electroplate deposits by means of stencils.** Hermann Kruger. Ger. 582,633, Aug. 18, 1933. Addn. to 576,099 (C. A. 27, 3674). Modifications in the method of Ger. 576,099 are described. Cf. C. A. 27, 3407.

**Electrolytic apparatus for depositing metals.** Copper Steel Co. Ger. 577,746, June 3, 1933.

**Electrolytic indicating and control apparatus.** Adolf Ufer (to Pioneer Instrument Co.). U. S. 1,932,329, Oct. 21. Structural and elec. features.

**Electrolysis of water.** Siemens & Halske A.-G. Fr. 750,002, Aug. 3, 1933. A series of U-shaped long metal pieces are assembled by the tie rods, with the branches turned outward and sepd. by insulating material, to form a body of elements open at the top, into which the electrodes may be inserted.

**Cobalt.** Soc. générale de constructions électriques et mécaniques (Als-Thom). Fr. 750,097, Aug. 3, 1933. Pure Co is obtained as a powder by electrolysis of a soln. of a Co salt, preferably pure sulfate, the density of the current is 500-5000 amps. per dm.<sup>2</sup> according to the size of grain desired and the temp. is 40-60°. Means is provided to remove the Co periodically from the cathode.

**White lead.** Horace G. Huls. U. S. 1,932,160, Oct. 24. Various structural details are described, of an app. for the electrolytic production of white lead.

**White lead by electrolysis.** Robert J. Frost. Ger. 586,065, Oct. 16, 1933. See Brit. 314,987 (C. A. 24, 1303).

**Alloy iron and steel.** Wm. B. Arnues (to Alloy Research Corp.). U. S. 1,932,252, Oct. 24. In the production of alloy iron and steel in an elec. arc furnace, there is added, to a ferrous metal bath, a reducible oxide such as Cr oxide and an amt. of a Si-contg. reducing agent such as ferro-Si in excess of the chem. equiv. of the oxide; also, a basic slag-forming material such as lime is added

in sufficient quantity to maintain basic conditions during reduction. Cf. C. A. 27, 5258.

**Rhodium.** Baker & Co., Inc. Fr. 749,846, July 29, 1933. Rh is deposited electrolytically from a soln. contg. phosphate and Rh ions in acid soln., e. g., that obtained by the reaction of a Rh compd. with  $\text{H}_2\text{PO}_4$  in a  $\text{H}_2\text{SO}_4$  soln. Ag articles may be coated with Rh in this way.

**Electrolytic separation of copper, gold and silver.** Chilesalpeter G. m. b. H. Ger. 577,892, June 6, 1933. Solns. of O-free I compds. of the metals and  $\text{NH}_4\text{I}$  are used.

**Alkali lye.** Akt.-Ges. für Zellstoff- und Papierfabrikation and Erich Bayer. Ger. 577,607, June 2, 1933. Foreign metals are removed from alkali lye by treatment with alkali amalgam. The lye may be electrolyzed for this purpose with Hg or amalgam as the cathode.

**Piperidine.** Robinson Brothers Ltd. and Deric W. Parkes. Brit. 395,741, July, 24, 1933. Piperidine sulfate is obtained by electrolytic reduction of pyridine in the cathode chamber of a diaphragm cell, the catholyte contg. 2.0–6.0 equivs.  $\text{H}_2\text{SO}_4$  of the pyridine present. The temp. is 70–85° for the lower limit of acidity and 20–50° for the higher. The anolyte consists of acid of such strength as to prevent loss of acid by the catholyte, since such loss may cause excessive production of dipiperidyls and formation of a gelatinous ppt., but not to dissolve the anodes. The anodes, cathodes and cell linings are of Pb. Piperidine is produced from the sulfate by treatment with  $\text{H}_2\text{SO}_4$  and distn. The crude piperidine is dried and allowed to stand over NaOH before final distn.

**Electric furnaces.** Paul L. J. Miquet and Marcel P. Perron. Fr. 750,108, Aug. 5, 1933. Construction of electrodes.

**High temperature electric furnace.** Gotthardwerke A.-G. für elektrochemische industrie and Arturo Paoloni. Swiss 161,514, July 17, 1933. An elec. furnace for temps. of 1400–1900° is described. The chambers are built of SiC.

**Electric furnace for manufacture of tungsten carbide.** Gorham W. Woods (to Hitches Tool Co.). U. S. 1,932,499, Oct. 31. A crucible is placed between upper and lower elec. conductive plates which may be formed of Cu and cooled by circulating water. The upper plate is provided with an opening to receive the material to be fused which is fed by gravity from a laterally curved tunnel above the opening. Various other structural details also are described.

**Electrolytic furnaces for the production of magnesium from molten magnesium chloride.** Société de Produits Chimiques des Terres Rares (to Johnson Matthey & Co. Ltd.). Brit. 396,820, Aug. 17, 1933, and 396,827, Aug. 17, 1933.

**Electrical induction furnaces.** Ludwig Dreyfus (to Almänna Svenska Elektriska Aktiebolaget). U. S. 1,935,046, 7, Nov. 14. Structural and elec. features.

**Electrical resistance furnace.** John T. Nichols (to American Sheet and Tin Plate Co.). U. S. 1,933,532, Oct. 31. Structural and mech. features.

**Cylindrical electric resistance furnace suitable for heating salts, etc.** Oskar Zingg (to Akt.-Ges. Brown, Boveri & Cie.). U. S. 1,932,567, Oct. 31. Structural features.

**Electric resistance heater furnace suitable for fusing zinc, etc.** Randolph Ganzler (to Akt.-Ges. Brown, Boveri & Cie.). U. S. 1,933,851, Nov. 7.

**Automatic temperature-regulating device for electric resistance furnaces.** Soc. anon. de Commentry, Fourchambault & Décazeville. Ger. 586,179, Oct. 17, 1933. Addn. to 576,208 (C. A. 27, 3675).

**Resistances.** The Globar Corp. Brit. 396,088, July 17, 1933. To increase the cond. of the terminal portions of a SiC resistor to facilitate making contact therewith these portions are impregnated with Si or a metal, e. g., Al, Ni, Fe, Co and (or) Cr. App. is described.

**Means for starting electrically heated salt-bath furnaces and like fusion furnaces.** Allgemeine Elektrizitäts Ges. (to Schmidt, inventor). Ger. 586,254, Oct. 19, 1933. Addn. to 411,278.

**Apparatus for discharge of materials from electric furnace shafts, etc.** George F. Weaton (to St. Joseph Lead Co.). U. S. 1,932,388, Oct. 31. Structural and mech. features.

**Electrodes.** Maschinenfabrik Oerlikon. Swiss 161,836, Aug. 1, 1933. Electrodes with a roughened surface especially useful for the decompn. of water are prepd. by coating the electrode with a metal which alloys with the electrode metal on heating. Thus, Ni or Fe electrodes are coated with Zn or Al by spraying, painting or dipping.

**Composite electrodes for metallurgical processes.** Vereinigte Aluminium-Werke A.-G. Ger. 577,733, June 3, 1933.

**Continuous rotary cathode apparatus for making metal strip.** Anton Kratky. Ger. 586,490, Oct. 21, 1933.

**Purifying mercury used as cathode in electrolysis.**

Knut W. Palmær. Brit. 396,041, July 18, 1933. In removing Fe, Ni and Co from solns. by electrolytic deposition into a Hg cathode the contaminated Hg is purified for re-use by treatment with an oxidizing agent, preferably one that may be readily re-oxidized, e. g.,  $\text{Fe}_2(\text{SO}_4)_3$ , a hypochlorite or  $\text{HNO}_3$ , which should be present in amt. less than equiv. to the metal impurity so that purification is not carried to completion in order to avoid attack on the Hg. The Hg may be continuously circulated between the cell and the purification app. so that the proportion of impurity is maintained at not above 0.5%. In 396,415, July 18, 1933, the Hg is purified by treatment with an agent indifferent to Hg, e. g., a mercurous salt, preferably in soln. A detailed example of the removal of Fe present in a soln. of an Al salt is given.

**Electrolytic electricity meter.** Wm. A. Childs. U. S. 1,931,954, Oct. 24. Various structural and operative details are described of an electrolytic meter which may have a liquid anode such as Hg.

**Fuse for interrupting alternating-current circuits.** Bertram Wellman and David C. Prince (to General Elec. Co.). U. S. 1,934,458, Nov. 7. A highly evacuated vessel contains a fuse link such as W supported between terminals composed of a metal such as Cu, Ag or Ni adapted to emit electrons at a relatively low temp. with a voltage drop of the order of 50 v. across the fuse terminals when the fuse is blown (the vessel being evacuated to a vacuum of the order of one-thousandth of a micron). U. S. 1,934,459 also relates to a generally similar device, the walls being thoroughly freed of occluded gas.

**Electrical contacts.** Samuel Ruben. U. S. 1,932,678, Oct. 31. A contact element such as that of a spot welding electrode has its base composed of a refractory metal of the sixth periodic group such as W and a highly conductive metal of the Cu-Ag class, and this base is provided with a contact-making surface of Be.

**Electrical shielding.** Henry J. Harris (to Bell Telephone Laboratories, Inc.). U. S. 1,933,261, Oct. 31. A shield suitable for use on telephone circuits, etc., consists of a plurality of adjacent layers of Fe and Cu including an outside layer of Cu.

**Purifying petroleum products by an electric field.** Charles W. Girvin (to Petroleum Rectifying Co. of Calif.). U. S. 1,931,725, Oct. 24. Material such as gasoline contg. acid or alkali is subjected to the action of an elec. field of greater voltage gradient toward the neg. electrode than toward the pos. electrode, the field being produced by a unidirectional current and the impurities in the material being moved to and collected on one of the electrodes and allowed to settle by gravity along the electrode. App. is described.

**Apparatus for electrothermic reduction of ores such as those of iron.** Sydney T. Wiles (to Buffalo Electric Furnace Corp.). U. S. 1,934,634, Nov. 7. Various structural, mech. and operative details are described.

**Bath for anodic treatment of aluminum.** Rudolf Auerbach (to General Elec. Co.). U. S. 1,933,301, Oct. 31. A bath which facilitates oxidation of Al surfaces contains  $\text{NH}_4$  phosphate 10 and  $\text{NH}_4$  vanadate 0.1%.

**Testing properties of materials by use of electric current from a thermionic tube circuit.** John J. Dowling (in

- part to Kenyon S. G. Somerville). U. S. 1,932,337, Oct. 24. Various elec. features are described.
- Elongated-flame production from electric arcs.** Engelbert Wist (to Presslicht-Patent-Verwertungsges. m. b. H.). U. S. 1,935,593, Nov. 14. In operations such as welding or for chem. processes, when employing an arc developed between concentric electrodes, a blast of a gas contg. hydrocarbon material is passed across the arc (the decomposition of the gas causing deposition of C on the electrodes). App. is described. Cf. C. A. 27, 1858.
- Cleaning gases.** Soc. anon. pour le traitement des minerais aluminopotassiques. Swiss 161,308, July 1, 1933. Coal dust and vapors are recovered from industrial gases by spraying the gases with a finely divided absorbent or adsorbent for the vapors and dust, and submitting the sprayed gases to an elec. pptg. process.
- Electrical precipitation of suspended particles from gases.** Richard Hensch (to International Precipitation Co.). U. S. 1,931,923, Nov. 11. Various details of app. and operation are described.
- Sterilizing liquids.** Lucien F. Grandchamp and Fernand H. L. Holweck. Fr. 750,031, Aug. 3, 1933. Liquids are sterilized by Ag ions produced by an elec. current using a Ag electrode.
- Electric rectifier.** Emil Duhme (to Westinghouse Elec. & Mfg. Co.). U. S. 1,932,067, Oct. 24. A portion of the surface of a piece of Cu is oxidized, a ductile metal layer such as Zn is placed in contact with the oxidized surface, the ductile metal is coated with an oxide compd. such as PbO<sub>2</sub> in a liquid carrier such as varnish lacquer and the coating is dried.
- Rectifier element of the cuprous oxide film type.** Stuart Ballantine (to Radio Corp. of America). U. S. 1,935,383, Nov. 14. A Cu plate is heated to an oxidizing temp. in air at a pressure of 2.5 cm. and for not more than 2 min. A film may be thus formed the thickness of which is so restricted that the rectification efficiency at 1000 kilocycles is not less than 75% of the efficiency at 60 cycles. App. is described.
- Mercury-arc rectifiers.** The British Thomson-Houston Co. Ltd. and John C. Read. Brit. 396,802, Aug. 14, 1933.
- Mercury-vapor rectifiers.** The General Electric Co. Ltd. and Enrico Gallizia. Brit. 395,747, July 20, 1933.
- Grid-regulated mercury-vapor rectifiers.** Akt.-Ges. Brown, Boveri & Cie. Brit. 395,779, July 27, 1933. Elec. features.
- Jet-wave mercury interrupter for use in rectifying electric currents.** Julius F. G. P. Hartmann. Brit. 395,748, July 20, 1933.
- Cut-out or electric short circuiting device.** Johannes A. M. van Liempt (to General Elec. Co.). U. S. 1,931,457, Nov. 7. A bronze of a refractory metal such as a W bronze is used for coating a W wire or the like.
- Discharge lamps.** Fidelity Films Ltd. and Frederick K. Crowther. Brit. 395,799, July 27, 1933. Addn. to 364,146 (C. A. 27, 2060). Means is described for insulating metal deposits forming on the insulation adjacent the cathode in a sound recording lamp.
- Discharge lamps.** Ted Eugene Foulke (to The British Thomson-Houston Co. Ltd.). Brit. 395,851, July 27, 1933.
- Discharge lamps.** Wm. J. L. Chinn. Brit. 396,582, Aug. 10, 1933.
- Discharge lamps.** N. V. Philips' Gloeilampenfabrieken. Brit. 397,074, Aug. 17, 1933.
- Discharge lamps.** Hans J. Spanner and Ulrich W. Doering (to The British Thomson-Houston Co. Ltd.). Brit. 397,162, Aug. 8, 1933.
- Discharge lamps for recording sounds.** Fidelity Films Ltd. and Frederick K. Crowther. Brit. 396,830, Aug. 17, 1933. Addn. to 364,146 (C. A. 27, 2060).
- Discharge lamps containing a vaporizable metal, e. g., sodium or mercury.** Albert E. Chapman. Brit. 395,711, July 17, 1933. Structural features.
- Discharge lamps wherein impurity is continually introduced to cause a ripple effect.** The General Electric Co. Ltd., Henry G. Jenkins and John W. Ryde. Brit. 395,738, July 24, 1933.
- Positive-column discharge lamps.** Daniel McF. Moore (to The British Thomson-Houston Co. Ltd.). Brit. 396,725, July 31, 1933.
- Discharge devices, e. g., lamps, rectifiers, having a liquid cathode and a directly or indirectly heated thermionic cathode.** Patent-Treuhand-Gesellschaft für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 397,032, Aug. 17, 1933.
- Electrode positive-column lamp.** Charles H. Thomas (to Westinghouse Lamp Co.). U. S. 1,932,025, Oct. 24. A lamp with an inert gas filling has at least one hollow open ended electrode at least a part of the interior surface of which is provided with a thermionically active material of the Th group and which is exteriorly surfaced with elec. insulating material such as Th oxide.
- Arc lamp electrodes.** Compagnie Lorraine de charbons pour l'électricité. Brit. 395,580, July 20, 1933. To facilitate ignition of a lamp having a carbon with a mineralized core and a shell of substantially pure C the tip of the shell is slightly mineralized, e. g., by dropping a soln. of K<sub>2</sub>CO<sub>3</sub> or K borate onto it from a pipette, wrapping it in felt or blotting-paper impregnated with the soln. or dipping it into a bath.
- Electric lamp embodying a source of visible radiation combined with a source of ultra-violet radiation.** George Sperti (to Sperti Lamp Corp.). Brit. 396,210, Aug. 3, 1933.
- Daylight, etc., lamps.** Patent-Treuhand-Gesellschaft für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 397,006, Aug. 17, 1933. One or more elec. discharge lamps having thermionic electrodes and filled with rare gas at a low mm. pressure are arranged around the middle of 1 or more elec. discharge lamps having thermionic electrodes and filled with rare gas and metal vapor assuming a pressure of above 50 mm. in operation.
- Flash-light lamps.** N. V. Philips' Gloeilampenfabrieken. Brit. 396,411, Aug. 2, 1933. See Ger. 578,097 (C. A. 27, 4182).
- Electric battery safety lamps.** Samuel A. Pollock. Brit. 396,089, July 20, 1933.
- Sealing lead-in wires into vitreous envelopes.** Siemens & Halske, A.-G. Brit. 396,103, July 31, 1933. A vacuum-tight seal for securing elec. current conductors into quartz or other refractory glass vessels is effected by using as conductors refractory metal strips of a max. thickness of about 20  $\mu$ . The strips may be of Ta, Nb, Mo, W, W-Mo alloys, etc., and the sealing is effected, as far as possible, in the absence of H, e. g., by a C-flame arc, an elec. furnace or by embedding a C core in the quartz body and circulating eddy currents therethrough. The metals are pretreated to expel occluded gases by heating *in vacuo*. Ta conductors are first anodically polarized in N H<sub>2</sub>SO<sub>4</sub> with a potential of about 90 v.

## 5 PHOTOGRAPHY

E. P. WIGHTMAN

**Antifogging agents in developers.** A. Steigmann. *Phot. Korr.* 69, 88 (1933). A review and discussion are given. E. P. Wightman

**Decorating cellulose ester material (U. S. pat. 1,933,810) 23.** Carboyanine dyes [having good photosensitizing properties] (U. S. pat. 1,934,657) 25.

**Color photography.** Michele Martinez (to A. H. Johnson & Co. (Paper) Ltd.). U. S. 1,935,477, Nov. 14. A surface such as celluloid is coated with at least one photosensitive layer contg. potential colors; the coated surface is exposed to the action of light, potential colors are then removed from those parts which have not been affected by light; the surface is then applied to a support

contg. at least one agent adapted to develop the colors required from the potential colors remaining on the surface. Various details and modifications are described.

**Color photographs.** Anton Jasmatzi. *Fr.* 749,922, Aug. 1, 1933. A proof having a basis of Ag obtained on Ag halides is toned toward the red by substituting the Ag of the proof by Ni dimethylglyoxime or its homologs.

**Photographic materials.** 1. G. Farbenind. A.-G. *Fr.* 41,770, Apr. 13, 1933. Addn. to 656,569 (*C. A.* 23, 4154). A colored layer which is not decolorized by development and is combined with a layer of a binder contg. Ag dispersed in colloidal form, is used as protection against halation in photographic materials.

**Photographic filter or antihalation layers.** 1. G. Farbenind. A.-G. *Brit.* 396,646, Aug. 10, 1933. A filter or antihalation layer consists of a colloid carrier in which is incorporated a dye obtained by condensing equimol. proportions of an aromatic or cyclic aldehyde and a cyclic compd. having a reactive  $\text{CH}_2$  group. Examples are given of layers formed by incorporating the condensation products of (1) malonyl urea and 4-dimethylaminobenzaldehyde-2-sulfonic acid (I) and (2) thiobarbituric acid and I in a layer of  $\text{NH}_4$  polyglucuronate, and the condensation products of (1) Na-*p*-benzaldehydesulfonic acid and 3-oxythionaphthene (II), (2) *m*-oxybenzaldehyde and II, (3) Na-benzaldehyde-2,4-disulfonate and II and (4) Na-*p*-benzaldehydesulfonate and 3-oxy-selenonaphthene in layers of gelatin. *Cf. C. A.* 27, 3156.

**Sensitized photographic paper.** Paul C. Seel (to Eastman Kodak Co.). U. S. 1,933,821, Nov. 7. A paper support is provided on both sides with a waterproofing coating contg. a polymerized vinyl compd. such as polymerized vinyl acetate and a coating contg. light-sensitive salts is placed over the waterproofing coating on one side.

**Light-sensitive layer.** Maximilian P. Schmidt and Hermann Neuroth (to Kalle & Co. A.-G.). U. S. 1,934,011, Nov. 7. As light sensitive substances, there are used aromatic diazo compds. such as the  $\text{CdCl}_2$  double salt of 4-diethylamino-2-hydroxy-1-diazo-benzene, capable of coupling, in mixt. with a diazo sulfonate such as

1 the Na salt of naphthalene- $\beta$ -diazo-*N*-sulfonic acid, incapable of coupling. Layers are thus prepd. which are stable and yield a neg. copy from a pos. pattern when exposed under the pattern. *Cf. C. A.* 27, 239.

**Light-sensitive layers.** Philippe Frangiali and Robert Lantz. *Fr.* 750,080, Aug. 3, 1933. An aromatic sulfonic acid or a sol. salt thereof is added to the aq. soln. contg. a diazo compd. and an azo coupling component to maintain the mixt. in soln.

2 **Photosensitive layer sensitive to ultra-violet.** Samuel E. Sheppard and Leon W. Kberlin (to Eastman Kodak Co.). U. S. 1,934,451, Nov. 7. Layers such as those applied to paper comprise dextrose and an O-contg. compd. of a metal of the 6th periodic group having an at. wt. between 90 and 200, such as Na tungstate or molybdate.

**Desensitizing halogen silver films.** Eugen Riesz. *Ger.* 577,666, June 2, 1933. Ag halide films are desensitized by treatment with pyrazinium compds. or derivs. and reagents forming quaternary cyclammonium salts. Derivs. contg. condensible  $\text{CH}_3$  or  $\text{CH}_2$  groups are treated with aromatic aldehydes. Thus, an exposed plate is treated with an equiv. mixt. of 2,5-dimethylpyrazine and  $\text{Me}_2\text{SO}$ . Similarly, the plate may be treated with an aq. soln. of 1,5-dimethyl-2-[(benzylidene)methyl]-pyrazinium nitrate obtained from an equiv. mixt. of 2,5-dimethylpyrazine-methyl nitrate and  $\text{BzH}$ .

**Photographic developer.** John I. Crabtree and John F. Ross (to Eastman Kodak Co.). U. S. 1,933,789, Nov. 7. A developer including formalin, an alkali and *p*-aminophenol sulfate is free from fogging effects when used at high temps. *Cf. C. A.* 27, 5266.

5 **Regenerating used photographic developers.** Kenneth C. D. Hickman and Walter J. Weyerts (to Eastman Kodak Co.). U. S. 1,933,804, Nov. 7. For regenerating a used developer and sepg. sol. bromides from it, there is added a soln. of a sol. Ag salt such as  $\text{AgNO}_3$  and a water-sol. Al salt such as K Al sulfate. Salts of Cr, Co, Cu, Ni, Bi, Pb, Ba, Mn, Mg or Zn also may be used. *Cf. C. A.* 28, 58.

**Carbon-arc lamps for photographic, etc., purposes.** Benjamin J. Hall. *Brit.* 396,876, Aug. 17, 1933.

## 6- INORGANIC CHEMISTRY

A. R. MIDDLETON

**Germanium. XLI.** Some new salts of fluogermanic acid. L. M. Dennis, B. J. Staneslow and W. D. Fox-geng. *J. Am. Chem. Soc.* 55, 4392 6(1933); *cf. C. A.* 24, 5247. Salts were prepd. from  $\text{H}_2\text{GeF}_6$  and the following bases (figures in parentheses are d $_{25}^\circ$ ):  $\text{NH}_3$  (2.564);  $\text{NH}_4\text{OH}$  (2.492) (forms dihydrate (2.229)), hydrazine (2.406); aniline (1.579); monomethylaniline (1.631), dimethylaniline (1.548). All are sol. in  $\text{H}_2\text{O}$ , with some hydrolysis. T. H. Chilton

**Recovery of iodine from metallic iodides by oxidation with technical nitric acid.** Rush F. McCleary and Fd. F. Degering. *Ind. Eng. Chem., Anal. Ed.* 5, 420(1933). — An app. is shown which is suitable for the recovery of  $\text{I}_2$  from  $\text{ZnI}_2$  residues obtained in the presence of  $\text{ZnEt}_2$ . Conc'd.  $\text{HNO}_3$  in small portions is added to the cake in slight excess over the calcd. quantity. The  $\text{I}_2$  collects on the sides of the reaction vessel but is easily expelled by heating into a larger chamber where it comes in contact with a surface cooled by running water. W. T. H.

**The liberation of iodine from alkali iodides by means of oxygen of the air through the intervention of nitrous gases.** Rasik L. Datta. *J. Soc. Chem. Ind.* 52, 350T(1933). — A hot mixt. of 1 mole alkali iodide in 0.75 mole conc'd.  $\text{H}_2\text{SO}_4$  is treated with air contg. oxides of N, resulting in quant. oxidation of the iodide. The N oxide catalyst is completely recovered by absorption in  $\text{H}_2\text{SO}_4$ , from which it is liberated by addn. of alkali iodide. H. A. B.

**Hydrides of boron II.** The preparation of  $\text{B}_2\text{H}_6$ : its thermal decomposition and reaction with hydrogen. Anton B. Burg and H. I. Schlesinger. *J. Am. Chem. Soc.* 55, 4009 20(1933); *cf. C. A.* 26, 663.— $\text{B}_2\text{H}_6$  is

prepd. by a flow method of heating  $\text{B}_2\text{H}_6$ . Its m. p. is  $-123.3^\circ$  and its vapor tension 53 mm. at  $0^\circ$ . Heating  $\text{B}_2\text{H}_6$  for a short time yields  $\text{H}_2$ ,  $\text{B}_2\text{H}_4$ ,  $\text{B}_4\text{H}_{10}$ , probably  $\text{B}_2\text{H}_8$ , and non-volatile solids. Long heating yields also  $\text{B}_2\text{H}_4$  and  $\text{B}_{10}\text{H}_{14}$ . Short heating of  $\text{B}_2\text{H}_6$  with a large quantity of hydrogen gives only  $\text{B}_2\text{H}_4$  and  $\text{B}_4\text{H}_{10}$ . Heating  $\text{B}_4\text{H}_{10}$  with  $\text{H}_2$  yields  $\text{B}_2\text{H}_4$  and  $\text{B}_4\text{H}_{10}$ .  $\text{B}_2\text{H}_4$ ,  $\text{B}_4\text{H}_{10}$ , and  $\text{H}_2$  thus form a system of reversible reactions. Long heating of this mixture with  $\text{HCl}$  as a catalyst gives 33% yields of  $\text{B}_4\text{H}_{10}$ . III. Dimethoxyborane. Anton B. Burg and H. I. Schlesinger. *Ibid.* 55, 4020-5(1933). — Reaction of  $\text{B}_2\text{H}_6$  with  $\text{MeOH}$  yields  $(\text{MeO})_2\text{BH}$ ; m. p.  $-130.6^\circ$ ; b. p.  $25.9^\circ$ .  $(\text{MeOBH})_2$ , a white solid which decomposes to yield  $\text{B}_2\text{H}_4$ ,  $(\text{MeO})_2\text{B}$ , and  $(\text{MeO})_2\text{BH}$ , also is formed.  $(\text{MeO})_2\text{BH}$  is entirely unassociated in the vapor state. It hydrolyzes to yield  $\text{H}_2\text{B}(\text{OH})_2$  and  $\text{MeOH}$ . It decomposes reversibly, yielding  $\text{B}_2\text{H}_4$  and  $(\text{MeO})_2\text{B}$ . A. B. Burg

**Chemical and crystallographic investigations on nickel-nitrites of bivalent metals.** A. Ferrari and R. Curti. *Gazz. chim. ital.* 63, 499-506(1933). — In establishing the existence of the complex  $\text{Ni}(\text{NO}_2)_6^{4-}$  ion (*cf. C. A.* 24, 5559; 26, 4221; Mouseron and Cariteau, *C. A.* 27, 1839), discordant results were obtained by the 2 groups of investigators. F. and C. present further data on the prepn. and properties of 3 nickel-nitrites and the impossibility of prepg. certain others. When heated at  $100^\circ$ ,  $\text{Ba}_2[\text{Ni}(\text{NO}_2)_6]$  (*cf. Pogg. Ann.* 118, 296(1863); M. and C., *loc. cit.*) loses 3.75 mols. of  $\text{H}_2\text{O}$  per  $\text{Ni}(\text{NO}_2)_6$ , without changing its lattice structure, so that the loss is probably  $\text{H}_2\text{O}$  of a zeolitic nature.  $\text{Sr}_2[\text{Ni}(\text{NO}_2)_6]$  (*cf.*





is oxidized to  $\text{Sn}^{++++}$  prior to pptn. with  $\text{H}_2\text{S}$ , colorless  $(\text{NH}_4)_2\text{S}$  can be used in the subsequent treatment.

W. T. H.

**Assaying of non-metallic minerals.** E. S. Sinegub. *Mineral. Suir'e* 8, No. 7, 2-14(1933).—The proposed methods for sampling and assaying of non-metallic ores are mostly based on the foreign practice. C. B.

**Determination of antimony.** R. I. Shreider. *Khim. Farm. Prom.* 1933, 151-2.—Heat 2-300 mg. of substance in a Kjeldahl flask with 2 g. of  $\text{K}_2\text{SO}_4$  and 3 cc. of concd.  $\text{H}_2\text{SO}_4$ . After 30 min., cool, carefully add 25 cc. of water, boil off  $\text{SO}_2$ , add 4 cc. of  $\text{HCl}$  soln. and det. the Sb content by the bromate method. L. Nasarevich

**Mold growth tests for minute amounts of arsenic.** H. R. Smith and E. J. Cameron. *Ind. Eng. Chem., Anal. Ed.* 5, 400-1(1933). The garlic odor caused by the action of molds may be used for the detection of traces of As; 0.001 mg. of As will suffice to give the test. Full directions are given. W. T. H.

**Reading the Gutzeit arsenic test on a graph.** Claude E. Hynds. *N. Y. State Dept. Agr. & Markets, Ann. Rept.* 1931, 96-7(1932).—By means of a plotted graph from known values of As and length of the stain on the paper strip, unknown stains may be read with greater accuracy. C. R. Fellers

**New color test for bismuth.** A. D. Powell. *Quart. J. Pharm. Pharmacol.* 6, 464-6(1933).—To 10 ml. of the aq. soln. to be tested add 2 ml. dil.  $\text{HCl}$  and about 0.5 g.  $\text{KI}$ . Mix and add 5 ml. alc. or acetone and 5-10 ml.  $\text{EtOAc}$ . Shake and allow to sep. A red color in the upper layer indicates Bi. W. O. J.

**Detection of cesium, rubidium and thallium.** P. Robin. *J. pharm. chim.* 18, 381-7(1933).—Ppt. K, Cs, Rb and Tl from a 10-20% soln. free from  $\text{NH}_4$  as  $\text{NaX}_2[\text{Co}(\text{NO})_2]$ . Calcine the ppt. at a low temp. in a metal capsule, dissolve out the nitrites and convert these into chlorides by evapn. with excess of  $\text{HCl}$ . Eliminate most of the  $\text{KCl}$  and  $\text{NaCl}$  by means of a mixt. of  $\text{HCl}$  22 Bc — 35.21% 1 vol., and 96% alc. 2 vols., then ppt. Cs, Rb and Tl (=X) as  $\text{Ag}_2\text{X}[\text{Bi}(\text{NO}_3)_3]$  (cf. Ball and Abram, C. A. 8, 1247, 1248), allow to stand for 24 hrs., put the ppt. on a glass filter, wash with a few drops of alc., hydrolyze on the filter with dil.  $\text{HNO}_3$ , evap. the nitrates, take up with  $\text{H}_2\text{O}$  and look for Cs, Rb and Tl in the spectroscope. Cs and Rb were found by this method in 8 French mineral waters; Tl was absent. S. Waldhott

**Electrolytic determination of chromium with the rotating mercury electrode.** Panta S. Tutundzhic. *Z. anorg. allgem. Chem.* 215, 19-22(1933).—Fresh Hg should be used for each analysis, about 25 g. when 0.1 g. of Cr is present and 40-45 g. for 0.2 g. Cr. For violet solns. it is best to make the soln. contain 0.1 cc. of concd.  $\text{H}_2\text{SO}_4$  to 25-100 cc. of electrolyte, and twice as much acid should be added if the  $\text{Cr}_2(\text{SO}_4)_3$  soln. is green. At the start, use a current of 0.5 amp. at 8 v. between the electrodes. After 10 min. increase the current to 1.5 amp. when the p.d. will rise to 14-16 v. During the electrolysis, the temp. of the soln. will rise to nearly 90°. W. T. H.

**Increasing the sensitivity of a microchemical test for cobalt and copper and the induced test for ferrous iron, ferric iron and nickel.** I. M. Korenman. *Z. anal. chem.* 95, 44-8(1933).—A soln. of  $(\text{NH}_4)_2[\text{Hg}(\text{CNS})_4]$ , prepd. by dissolving 5 g. of  $\text{HgCl}_2$  and 5 g. of  $\text{NH}_4\text{CNS}$  in 5 cc. of water, has been recommended as a sensitive reagent for  $\text{Co}^{++}$  and  $\text{Cu}^{++}$ ; a blue ppt. is obtained with the former and a green ppt. with the latter. A white amorphous ppt. of similar constitution is obtained with  $\text{Zn}^{++}$ . If there is a little  $\text{Zn}^{++}$  present, so that mixed crystals are formed, the sensitivity of the test for  $\text{Co}^{++}$  or  $\text{Cu}^{++}$  is increased greatly. Thus if a drop of the soln. to be tested is mixed with a drop of the reagent together with a tiny drop of 0.25%  $\text{ZnSO}_4$  soln., as little as 0.02  $\gamma$  of Co can be detected at a diln. of 1:100,000. Moreover, in the absence of Zn, tests for Fe and Ni are not obtained in dil. solns. but after a little  $\text{Zn}^{++}$  has been added, as little as 0.002 mg. of  $\text{Fe}^{+++}$ , 0.012 mg. of  $\text{Fe}^{++}$  or 0.033

mg.  $\text{Co}^{++}$  can be detected in 1 cc. of soln. at dilus., resp., of 1:500,000, 1:85,000 and 1:30,000. W. T. H.

**Use of amyl alcohol in the sodium diethyldithiocarbamate method for estimation of copper.** R. W. Thatcher. *J. Am. Chem. Soc.* 55, 4524(1933).—For detg. Cu in org. tissues by the McFarlane method (C. A. 27, 46) isoamyl alc. is better than amyl alc. W. T. H.

**Colorimetric determination of iron with sulfosalicylic acid.** F. Alten, W. Weiland and E. Hille. *Z. anorg. allgem. Chem.* 215, 81-91(1933).—Detailed directions are given for detg. the Fe content of drinking water (cf. Lapin and Kill, C. A. 26, 790).  $\text{Fe}^{+++}$  in acid solns. gives a red color with sulfosalicylic acid. The color is similar to that obtained in the KCNS test for  $\text{Fe}^{+++}$ , and the reaction is about equally sensitive. In alk. soln. the reagent gives a yellow color with both  $\text{Fe}^{++}$  and  $\text{Fe}^{+++}$ . It is possible, therefore, to det. the total Fe in alk. soln. and the  $\text{Fe}^{+++}$  in acid soln. by measuring the actual depth of color, with the aid of a suitable light filter, or comparing with standards. Contrary to previous statements, the depth of color produced with  $\text{Fe}^{+++}$  in acid solns. appears to be somewhat intensified by the presence of  $\text{Fe}^{++}$ , but allowance for this effect can be made. To det.  $\text{Fe}^{+++}$ , take a little of the soln. contg. not over 2 mg. of Fe, dil. to about 20 cc., add 10 cc. of  $\text{N NH}_4\text{Cl}$  and 1 cc. of indicator (cold satd. soln. of a dinitrophenol). If the soln. is already alk. to the indicator, add 0.1 N  $\text{HCl}$  until the yellow color disappears. Carefully add 0.1 N  $\text{NaOH}$  until a permanent yellow is obtained, add 5 cc. of sulfosalicylic acid reagent (10 g. of solid dissolved in 20 cc. of water and treated with  $\text{NaOH}$  until the  $\text{pH}$  is 2 and then dild. to 100 cc.) and 5 cc. of citrate buffer soln. (Dissolve 21 g. of citric acid in 200 cc. of  $\text{N NaOH}$ , dil. with water to 1 l. Treat 3 cc. of this citrate soln. with 7 cc. 0.1 N  $\text{HCl}$ .) After 3-4 hrs. measure the color. To det. the total Fe, take a similar quantity of soln., add 10 cc. of  $\text{N HCl}$ , 2 cc. of reagent (20 g. of sulfosalicylic acid in 100 of water) and 20 cc. of the above citrate soln. which has not been mixed with  $\text{HCl}$ . Add  $\text{NaOH}$  to change the red soln. to yellow, and after the soln. is a distinct yellow add 10 of  $\text{N NaOH}$  and 20 cc. of borate buffer soln. (Dissolve 12 g. of  $\text{H}_3\text{PO}_4$  in 100 cc. of  $\text{N NaOH}$  and dil. to 1 l. Mix 46 cc. of this soln. with 54 cc. of  $\text{N NaOH}$ .) Measure the color after 3-4 hrs. W. T. H.

**A quantitative study of the lanthanum-neodymium separation.** P. W. Selwood. *J. Am. Chem. Soc.* 55, 12, 4900-1(1933).—Tests with 8 procedures show that Prandtl's basic ammonia sepn. is the best, but in actual practice it is often found that a reversal of the solv. order facilitates rapid purification. W. T. H.

**Colorimetric determination of magnesium.** F. Alten, H. Weiland and B. Kirmies. *Angew. Chem.* 46, 697-8(1933); cf. C. A. 28, 66.—The soln. contg. 10-500  $\gamma$  Mg is evapd. to about 1 cc. and weakly acidified with  $\text{AcOH}$ . Na acetate is added and Fe, Al, Mn, Cu, Zn and Ti are pptd. with hydroxyquinoline. The alk. earths are pptd. without previous filtration, by addn. of  $\text{NH}_4$  oxalate.  $\text{NaOH}$  and Na tartrate are added to the filtrate to keep any Al which is still present in soln. and Mg is pptd. as hydroxyquinolate. This ppt. is colored by coupling it to diazobenzenesulfonic acid and compared with standard Mg solns. The prepn. of reagents and the procedure are given in detail. Exptl. results show very good agreement. Four references. K. K.

**Determination of molybdenum in manganese minerals.** H. Hauptmann and M. Balconi. *Z. anorg. allgem. Chem.* 214, 380-4(1933).—Tests were made on the detn. of Mo by measuring the red color produced with KCNS and  $\text{SnCl}_2$  and the red color produced by the action of a soln. of phenylhydrazine in dil.  $\text{H}_2\text{SO}_4$ . The first color develops best in a soln. contg. 4% of free acid. The test is very sensitive and serves to detect as little as 0.005 mg. in 20 cc. but the color is not very stable. The latter test is only about  $1/4$  as delicate, but the color developed is less sensitive with respect to temp. changes.

Directions are given for applying both tests to the analysis of minerals that are decomposable in HCl. W. T. H.

**Several microchemical tests for the identification of molybdenum and tungsten.** G. Tartarum. *Ann. chim. applicata* 23, 367-72 (1933). The reaction products of pyrocatechol with molybdic and tungstic acids have sexivalent Mo and W atoms, rather than quinquevalent, as indicated by Martini. *C. A.* 26, 5870. Thus the compn. is  $[O_2Mo(C_6H_4O_2)_2] \cdot [H_2(C_6H_4NH_2)_2 \cdot 3H_2O]$ , with a similar W compd. A. W. Contieri.

**Favorable conditions for the precipitation of zinc sulfide and hydrated alumina and a method for the gravimetric separation of zinc and aluminum.** J. N. Fiers. *Z. anal. Chem.* 95, 136 (1933). The methods for sep. Zn from Al are discussed, and it is shown that it is reasonable to assume that it is better to ppt. ZnS first rather than to attempt to ppt.  $Al(OH)_3$  in the presence of  $Zn^{++}$ . The conditions for pptg. ZnS were studied and the results of considerable exptl. work compared with those obtained by previous investigators. W. T. H.

**Determinations of small quantities of fluorine. I. Steiger-Merwin reaction—optimum conditions and interference.** H. J. Wichmann and Dan Dahle. *J. Assoc. Official Agr. Chem.* 16, 612-19 (1933).—In the colorimetric detn. of F by means of its bleaching action on "peroxidized" Ti (Steiger, *C. A.* 2, 1104; Merwin, *C. A.* 3, 2919; Sharpless, *C. A.* 27, 4562), the bleaching action increases with increasing  $pH$  to an optimum of approx. 1.5 and then rapidly decreases to practically 0 at  $pH$  of about 2.5. The concn. of both Ti and F has a strong influence on both the sensitivity and practical range of the reaction at the optimum  $pH$ : (1) the bleaching per unit F increases as the concns. of F increase and the concns. of Ti decrease; (2) up to certain limits it is proportional to the quantity of F present; (3) above this limit the bleaching per unit of F decreases. Numerous curves are given and discussed, the curves showing the interference with the detn. of  $PO_4$ , phosphates, Al,  $K_2SO_4$ , NaCl and "apple wash" (org. matter derived from apple skins by the usual rapid methods of spray-residue analysis). Some of these interferences suggest the formation of unknown complexes that prevent the accurate detn. of F because the effect of the foreign substance and F on the Ti is not additive. II. **Steiger-Merwin reaction—details of procedure.** *Ibid.* 619-24. A technic for the colorimetric detn. of small quantities of F (down to 0.002 mg.) based on the above findings is described. F can be successfully isolated from fruits and vegetables without ashing by a double Willard and Winter distn. (*C. A.* 27, 681) on (1) a subsample of the org. matter, and (2) on the oxidized first distillate after evapn. The crucial points of the method consist in carrying out the detn. at a controlled  $pH$  of 1.50  $\pm$  0.02 and of using an amt. of Ti in accordance with the expected quantity of F and the ability of the operator to match colors, and obtaining the F content from a previously detd. curve prepd. with the amt. of Ti used. W. and D. prefer the use of a photometer, as being more accurate, but in view of its much higher cost as compared with Nessler tubes, the method has been worked out so as to permit the use of either. Typical results obtained by this method on various foods are tabulated. A. P.-C.

**Titration of ammonia in the presence of boric acid.** Edward W. Meeker and E. C. Wagner. *Ind. Eng. Chem., Anal. Ed.* 5, 396-8 (1933).—For collecting the  $NH_3$  distd. during the Kjeldahl analysis it has been recommended to use a soln. of  $H_3BO_3$  instead of an excess of  $H_2SO_4$  but some difficulty has accrued with respect to the indicator. Procedures are given here which serve for the macro- and micro-detn. of N. Methyl red is recommended and the color is matched with a control of the same  $H_3BO_3$  content. W. T. H.

**Colorimetric method for the determination of carbon dioxide in gas mixtures.** Perry W. Wilson. *Science* 78, 461-2 (1933); cf. Wilson, Orcutt and Peterson, *C. A.* 26, 5872. In view of some criticisms concerning the method, further information is given concerning the

choice of indicators, the comparisons with the Hellige color disks and the prepn. of a plot to assist in computing the results. For detns. in the acid range above 0.15%  $CO_2$ , bromothymol blue gives good results but in the alk. range cresol red or  $\alpha$ -naphtholphthalein should be used. W. T. H.

**Direct titration of sulfate. Tetrahydroxyquinone as an internal indicator.** W. C. Schroeder. *Ind. Eng. Chem., Anal. Ed.* 5, 403-6 (1933).—To 25 cc. of soln. contg. 2-20 mg. of  $SO_4^{--}$  add 0.030 N (or weaker) HCl until the soln. is just acid to phenolphthalein. The soln. must be below 30° in temp. Add 25 cc. of EtOH and 0.20-0.22 g. of a mixt. prepd. by triturating a little tetrahydroxyquinone with considerable KCl. The soln. will have a yellow color. Titrate with 0.025 N  $BaCl_2$  until a brown color indicates the approach to the end point. Then add the  $BaCl_2$  reagent in portions of 2-3 drops until the whole soln. assumes a red color. One hundred and twenty references. W. T. H.

**Determination of cyanides and thiocyanates by the mercurimetric method.** Al. Ionesco-Matin and Minc. A. Popesco. *Chimie & Industrie Special No.*, 1011-13 (June, 1933); cf. *C. A.* 21, 2445, 3575. The method is applicable to the detn. of cyanides and thiocyanates, either alone or in presence of each other, with the same degree of accuracy as present standard methods. A. Papineau-Couture.

**Microchemical analyses for slag inclusions in steel.** R. Trege and H. Albr. *Jernkontorets Ann.* 116, 457-71 (1933). As a result of the study of standard methods for detg.  $SiO_2$ ,  $Al_2O_3$ , FeO, MnO and MnS in steel, numerous necessary conditions were detd. Twenty-one references. H. C. Duus.

**Distillation of hydrocyanic acid from sulfuric acid solutions.** Samuel Morris and Vireil G. Lilly. *Ind. Eng. Chem., Anal. Ed.* 5, 407-8 (1933).—In dist. HCN from  $H_2SO_4$  solns., no retardation was caused by the presence of Cl. Loss of HCN occurs unless the rubber stoppers are protected with Sn foil. Ferrocyanide is a common impurity in com. "C. P." cyanides and when they are present high results are obtained. With ferrocyanide-free cyanides, the method of Pagel and Carlson (*C. A.* 27, 243) is accurate. The rate of hydrolysis of HCN is a function of the acid concn. Thirteen references. W. T. H.

**Flask oxidation in the determination of sulfurous acid by distillation.** P. F. Nichols and H. M. Reed. *Ind. Eng. Chem., Anal. Ed.* 5, 398-9 (1933).—In detg.  $SO_2$  in dried fruits or similar products, some  $SO$  may be oxidized in the flask and other gases may be evolved which will have a reducing action similar to that of  $SO_2$ . Expts. with synthetic solns. of  $SO_2$  show that none of the expedients hitherto suggested is capable of preventing entirely some oxidation in the flask. Gravimetric detn. by the Monier-Williams method gave the highest yields, but the preliminary heating can be omitted without serious loss of accuracy. W. T. H.

**Inhibiting effect of certain substances upon the oxidation of sulfurous acid.** J. S. Mitchell, G. A. Pitman and P. F. Nichols. *Ind. Eng. Chem., Anal. Ed.* 5, 415-16 (1933). Expts. with  $SO_2$  solns. showed that the presence of sucrose, mannitol, lactose, glycerol, etc., tends to prevent the oxidation of  $SO_2$ , but the addn. of such substances as inhibitors during the detn. of  $SO_2$  in dried fruits did not serve to increase the  $SO_2$  found. W. T. H.

**Determination of sulfuric anhydride in sulfonated oil and other products.** Ralph Hart. *Ind. Eng. Chem., Anal. Ed.* 5, 413-14 (1933); cf. *C. A.* 26, 5871. The method described depends upon the fact that the "organically combined" sulfate after conversion into its "monosodium compds." is sol. in ether and may be extd. from satd. aq. solns. of NaCl or  $Na_2SO_4$ . Then, if the ether is distd. off and the residue weighed after ignition, it will consist of  $Na_2SO_4$  equiv. to just  $1/2$  the original sulfate content;  $2R \cdot SO_3Na = Na_2SO_4 + SO_3$ , etc.;  $2R \cdot SO_3Na = Na_2SO_4 + SO_2$ , etc. W. T. H.

**Report on (the analysis of) plants.** O. B. Winter.

*J. Assoc. Official Agr. Chem.* **16**, 462-3 (1933), cf *C. I.* **27**, 244. Progress report. A. Papineau-Couture.

**Report on the preparation of plant material for analysis.** H. R. Kraybill. *J. Assoc. Official Agr. Chem.* **16**, 461-5 (1933), cf *C. I.* **27**, 244. The samples of cabbage leaves, apple fruits, carrots, apple shoots and tomato plants used for the previously reported studies were analyzed again at the end of 11 months. In most cases there was a slightly smaller quantity of free reducing substances and slightly larger quantity of sucrose, but the differences were not greater than the usual errors of the methods used. A. Papineau-Couture.

**Report on less common metals in plants. Spectroscopic method for determination of boron in plant material.** J. S. McHargue. *J. Assoc. Official Agr. Chem.* **16**, 465-71 (1933). The technique of a method worked out by McHargue and R. K. Cullen (*C. I.* **26**, 869) is described. It consists essentially in saturating the plant material with 10% B free  $K_2CO_3$  ashing, making distinctly red with satd. citric acid soln., adding  $MgO$ , distilling in a special app. into 0.1 cc. 0.5%  $KOH$  and 10 cc.  $HClO_4$ , evaporating to dryness, taking up in a definite vol. of 5%  $HClO_4$  in  $MgO$ , observing the spectrum of the flame of  $MgO$  vapors produced in a special burner, and determining the no. of cc. of 0.01%  $KMnO_4$  which must be added to 0.1 cc. of  $HClO_4$  in a cell interposed between the flame and the spectrocope in order just to eliminate the brightest green band of the B spectrum. The corresponding amt. of B is obtained from a table or curve which should be prepared by the operator from known quantities of B because the sensitivity and adjustment of different spectroscopes vary widely. Only 1 hr. reagent must be used. From 0.1 to 0.001 p.p.m. B can be determined with an accuracy of 1 p.p.m. Pyroforming in  $O_2$  under controlled conditions by means of a specially designed burner which is used in detail the sensitivity can be increased to 100 p.p.m. The method is also applicable to analysis of mineral matter in natural water by making a survey modification in technique to burn the B into a stable form for analysis in  $MgO$ . A. P. C.

**Determination of halogens in organic substances.** J. E. Egan. *Knowl. from Ind.* **1933** 14, 8. The procedure is as follows: 100 cc. flask connected with 1 mm. vertical  $NaOH$  line. Cover the flask with 10 cc.  $HClO_4$  it to boil and pass the air through 100 cc.  $HClO_4$ . Det. the halo- content of the distillate by the method of L. Senius. I. N.

**Determination of nitrogen in organic compounds.** D. J. A. Kinn. *Farm. J.* **1933** 218-20. The method of Andersen and Jensen (*C. I.* **25**, 1400) is slightly modified for small quantities of material. I. N. Uchich.

**New method for the differentiation and determination of formaldehyde and acetaldehyde.** M. Ureca. *V. J. J. Soc. Hort. Shisunshi. Bull. su chin.* **53**, 900-18.

Both aldehydes give white ppts. with dimethyl- $\alpha$ -naphthol, but the speed of the reaction varies. By measuring the time required to give a visible ppt. it is possible to differentiate between the aldehydes and also to det., within 2%, the concn. of aldehyde in a mixt. As little as 1.5 mg. of  $HCHO$  is detected in 100 cc. of soln. and 50-100 mg. of  $CH_3CHO$  in a mixt., it is recommended to det. the content of aldehyde by the iodometric method. Then dil. the soln. to make it 1% and the time required to obtain a ppt. after treatment with resorcinol deriv. From an empirical table, the concn. of each aldehyde can be estd. W. I. H.

**Determination of chloroform.** M. Shchigol. *Khim. Zvezd.* **1933**, 150-1. Weigh out 10 drops of  $CHCl_3$  in a stoppered flask with 5 cc. of toluene. Shake 1-2 hrs. with 0.5%  $NaOH$ , cool, dil. with 10 cc. of  $HNO_3$  and det.  $Cl$  by the method of I. Nasruch.

**Fluorescence analysis.** F. H. Stock. *Sudden. Upoth.* **73**, 46 (1933). The importance of testing the various chemicals and materials in ultra-violet light for fluorescence (luminescence) phenomena is emphasized,

in connection with a description and illustration of the app. "Callophane," recently developed by the physicist Callo of Berlin especially for such work.

W. O. P.

**New method for determining aldehydes by quantitative Cannizzarization.** L. Palfiay, S. Sabatay and Denise Sontag. *Chimie & Industrie Special No.*, 1037-8 (June, 1933). Cannizzaro's reaction consists essentially in an oxido-reduction phenomenon, 1 mol. of aldehyde being oxidized to acid and the other reduced to an alc. radical, resulting in the formation of an ester which is saponated to give the free acid and alc. The reaction applies to aldehydes in which the  $CHO$  group is combined to an electronegative radical. In strongly alk. soln. the yields of alc. and acid are high, but not quant. By using 0.5%  $KOH$  in  $PhCHOH$  the reaction is quant. and can be used as an analytical method, except for aliphatic aldehydes for which it is only partial. A new acid glass should be used, Pyrex or Silbor should not be used, Boheman glass is suitable after treating for about 15 hrs. with 0.5%  $KOH$  in  $PhCHOH$ . The method also permits of easily preparing no. of esters and acids which can be obtained only with difficulty by other methods. A. P. C.

**Shaffer and Hartmann combined carbonate citrate method for determination of glucose.** J. O. Halveron and I. W. Sherwood. *Int. Eng. Chem., Anal. E.* **5**, 118 (1933), cf *C. I.* **15**, 1327-8. In some experiments the Cu-glucose ratio averaged 2.5 mg. more than the initial unit. In other words there was somewhat more reduction from a given wt. of glucose than that reported by Hartmann. The method is excellent but each chemist should carefully standardize his technique and should himself derive an expression for the ratio between the wt. of dextrose present and the wt. of Cu reduced. W. I. H.

**Detection and determination of fructose in presence of glucose.** Felix Fischl. *Chimie & Industrie Special No.*, 1125 (June, 1933), cf *C. I.* **27**, 3120. The optimum conditions for applying Ohlert's method (*C. I.* **26**, 865) to the detn. of fructose are: 10 cc. of soln. cont. less than 0.5% sugar in a wide mouthed flask add 50 cc.  $Cu$  soln.,  $CuSO_4$  50,  $HClO_4$  50,  $Na_2CO_3$  10,  $NaK$  tartrate 500,  $NaHPO_4$  1200, 1200-50% per l., place in the water bath at 60° for 5 min. with gentle turning, cool rapidly, dissolve the pptd.  $Cu$  directly in the soln. by addition of  $HCl$  and titrate with  $N/77.1$   $I_2$  of which 5 mg. fructose. A. Papineau-Couture.

**Argentometric evaluation of hexamethylenetetramine.** Gyula Miks. *Pharm. Zentralblatt* **74**, 642 (1933). Several methods are briefly reviewed and a new procedure is suggested. Five cc. of a 2% soln. of the sample is mixed with 45 cc. of 0.1%  $AgNO_3$  (excess) by vigorous shaking, the soln. is filtered and an aliquot part of the filtrate is acidified with 5 cc.  $HNO_3$  and titrated with 0.1%  $NH_4CNS$  by the Volhard method. W. O. P.

**A method for the photometric determination of small amounts of adrenaline.** G. N. Thoms. *Praktika (Hlad. Phenom)* **7**, 17-21 (1932). Detn. of adrenaline by the Atherton-Suddell colorimetric method may be inaccurate if any  $HCl$  present is not carefully neutralized. The  $Cl$  liberated during the analysis alters the intensity and shade of the color. The concn. of the soln. is equally important, since from 0.02% there is no ratio between color intensity and the adrenaline content of the liquid. A standard color scale may be prepd. from basic salts of  $Co$  and  $Au$ . With the Pullrich photometer it is found that this color reaction does not follow Beer's law between certain limits of concn. Above 0.01% the coeffs. of extinction corresponding to the permeability observed are not proportional to the concn. which should fall between 0.002 and 0.006% if exactness is expected. Absorption and extinction curves are given, plotted for a series of observations on a 0.005% adrenaline soln. for a thickness of reservoir of 10 mm. From these constants may be calcd. the content of an unknown soln. according to the relation  $C_x/C = L_x/L$ . Lucien Y. Dyrenforth.

**Color reactions obtained with metadinitrobenzene in alkaline media.** Marcel Peronnet and Rene Iruhaud. *J. pharm. chim.* **18**, 339-43 (1933). (1) The aldehydes

*HClO*, chloral, *B.H.*, vanillin give a violet color with *m*-dinitrobenzene (1) in alk. medium only upon warming. To 5 cc of 0.1% of 1 in 95% alc. add 1 cc 10% NaOH on warming a pink color is seen on adding now a little of the aldehyde, the color turns violet. (2) Of purine substances, *urea acil* alone shows the test. To a crystal of uric acid add a little of 1, then 1 cc of 10% alc. NaOH a violet color is formed. (3) Certain amino acids (*B*) glycine, lysine and *l*- $\beta$ -alanine (C) give the test. Dis-

solve 0.10 g. *B* in 2 cc 10% NaOH and overlay without mixing with 2 cc of alk. soln of *A* an evanescent but strongly violet ring is obtained, notably with *C*. Or, with glycine mix 0.10 g with 2 cc alk. soln of *A* and add 1 or 2 particles of NaOH violet streaks are seen, a blank test shows a merely yellowish color. S. Waldhoff.

Recovery of  $\text{Pb}$  from metallic iodides (McClary, Deering) 6

## 8 MINERALOGICAL AND GEOLOGICAL CHEMISTRY

L. CARL WILKIN AND J. J. SCHAIKIN

**Chemical migration II** Roland Blanchard *Eng. Mining* 134 (2) 5 (1933) cf. C. 1 27 387. The distribution and behavior of Au and Ag in the Edie Creek and Golden Kidges lodes indicate: (1) irregular deposition a primary Au without important subsequent migration, (2) much concn. due to weathering of the lode with subsequent transportation by gravity or by circulating ground water along fissures, (3) chemical migration because the Au was taken into solution by ground waters and subsequently reprecipitated, and (4) a combination of 2 or more of the conditions mentioned above. Each of these is discussed. Neither hypothesis (1) nor (2) satisfactorily explains all conditions found. W. H. Boynton.

**The Nigerian gold field** W. R. *Mining Mag.* 49 (2) 52 (1933). Nearly the entire area consists of an Archean complex in which chlorite and mica schists are of the most importance to the miner. It is probable that the Archean dikes are a product of hydrogenesis and are not generally of direct igneous origin. The industry is still confined to the alluvial type. A. W. Fairbank.

**The lime resources of Kenya Colony** G. H. Graham Jones *Kenya Colony Dept. Agr. Bull.* 12, 15 pp.

(1932). Deposits of limestone are known in numerous localities and coal beds are widely distributed along the coast. The material ranges from calcareous tuff to marble and the  $\text{CaCO}_3$  content from approx. 5 to 98%, with  $\text{P}_2\text{O}_5$  0.30 to 5.80% in material containing more than 60%  $\text{CaCO}_3$ . K. D. Jacob.

**Salt domes, gases and petroleum** V. I. Luchitskii *Mineral. Sbornik* 8, No. 4, 12 (1933). Test borings in the Pomen and Lachek regions, North Poltava, disclosed deposits of rock salt and gas. The high elevation of the salt deposits above the sea level indicates doming. Shatskii. Petrology with the salt domes of U.S.A., the deposit must be of great magnitude and overlie petroleum deposit. The presence of He in gases is suggested by the location of the deposit in Permian Carboniferous strata. Chas. Blum.

**Seefeld diarsenite** Guido Hradil *Pharm. Ztg.* 78, 109 (1933) cf. Totome (C. 1 27, 5688). W. O. I.

Monobite lust from the Flychind zone of the East Carpathian. Casimir *et al.* 22

## 9 METALLURGY AND METALLOGRAPHY

D. J. DEMAREST, OSCAR E. HARDER AND RICHARD RIMBACH

**Application of x rays to metallurgy** C. A. Kuryumov *Dokl. 1933*, No. 5, 411. A theoretical discussion and review of the literature with 36 figures and 3 references. S. I. Miodorsky.

**Ore treatment at the Lake View and Star** I. B. Steven *Mining Mag.* 49 201 (2) 19 cf. *Western Australian Metallurgical Practice* 1906. The Au in the sulfide ore at Kalgoorlie occurs (a) in the free state (b) as tellurides and (c) associated with pyrite. The proportion of the total Au which occurs in each of the ways varies considerably in the different lodes but for any treatment process to be satisfactory it must be able to treat all of them equally well. Three methods of treatment used since 1910 are compared. In the second plant the ore was crushed dry, and all of it was roasted and cyanided. In the third plant just completed, wet crushing is used and flotation takes the place of gravity concn. Over 90% of the mineral content of the ore is concd. into 7% of concentrate and 95% of the ore is discarded without cyanide treatment. The flotation concentrate like the gravity concentrate in the first plant is roasted, but without the addition of fuel as the S content is now sufficiently high, it is then cyanided as before. In the first plant the free Au was caught on the Wulley table, but with the flotation process a better saving has been effected by using corduroy strikes before flotation. In pptn. of dust coarser than the imported variety is used with satisfactory results.  $\text{Pb}(\text{NO}_3)_2$  amounting to 10% of the wt of the Zn is added before chlorination. No acid treatment is given to the ppt. which passes direct to cast iron muffles for roasting. An additional life has been given to the muffles by filling them with renewable chrome steel bottom contg. 27% Cr. A. W. Fairbank.

**Influence of the concentration of ores by flotation on metallurgy** I. Prost *Rev. universelle chim.* 9 521 (9)

1933). The great progress made in the metallurgical field during the last 15 years due to the application of flotation processes for concg. ore and especially of selective flotation has made possible the working of formerly neglected low grade ore. The various methods in use in non-ferrous metallurgy are discussed. Thirty six references. M. Hertenheim.

**The clarification of ore dressing effluents** G. Garth *Arch. Freiberg. Bergbau. Verh. Metallhuttene* 1 11 (4) (1933). In the effluent from a plant treating tin ore, the settling rate of solids was increased by the addition of  $\text{Ca}(\text{OH})_2$ ,  $\text{CaCl}_2$ , dextrin or Irish moss. The best results were obtained with 0.026 lb  $\text{Ca}(\text{OH})_2$  plus 0.05 lb Irish moss per ton of water treated. John C. Attwood.

**The applicability of low temperature reduction to certain Ontario iron ores** J. R. Gordon and O. W. Ellis *Can. Mining Met. Bull.* No. 259, 68 (725) (1933).

Detailed data are given on the reducibility, grade of concentrate and recovery of Fe at various temps. of reduction for various times for various ores ground to various sizes. The highest grade ores were the most readily reduced. The order of reducibility is determined chiefly by the quantity, distribution and character of their impurities. Variations in the size of ore have much less effect on the reducibility of high grade ore than of low grade ores. Lengthening the time of reduction is effective only in dense impervious ores. Magnetic concn. of the raw ore prior to reduction is preferable to concn. of the material reduced from unconc'd ore. A. H. Emery.

**Gold its relationship to mankind** R. C. Rowe *(Can. Mining J.)* 54, 122 (7) (1933). A brief review.

W. H. Boynton. **Recovery of silver from Kongsberger slime by cyaniding** R. Støren *Arch. Freiberg. Bergbau. Verh. Metallhuttene* 1 15 54 (1933), cf. C. 1 26, 3758. Ag recovery started

at this mine in 1815. Since 1901 over 200,000 tons of slime have been leached. History of the mine, theory and technology of the process are included. J. G. Attwood

**The separation of lead and zinc in oxidized ores, smelting products and residues.** G. Grusser. *Arch. Erzbergbau Erzverh. Metallhüttenw.* 1, 131-45 (1931).—Pb in oxide form is volatilized at 800-800°, without influence by ZnO, CaO, MgO or Al<sub>2</sub>O<sub>3</sub>, but SiO<sub>2</sub> forms Pb silicate and hinders volatilization. A chloridizing treatment produces PbCl<sub>2</sub> which readily volatilizes, forming also Na<sub>2</sub>SiO<sub>3</sub>, which is not harmful. Pb in sulfate form when treated with NaCl volatilizes at 450-800°. Pb as silicate is liberated by NaCl at 800°. ZnO is not affected by NaCl below 1900°, does not volatilize below 1300°. ZnSO<sub>4</sub> readily forms ZnCl<sub>2</sub> which is very volatile, but is oxidized in presence of PbO to ZnO and PbCl<sub>2</sub>. Small amts. of C reduce PbO to Pb and interfere with volatilization. PbSO<sub>4</sub> is not affected. Strong reducing agents interfere seriously with chloridizing volatilization of PbSO<sub>4</sub> at 800°. Sulfides of Pb and Zn have no harmful effect in oxidizing or neutral atm. John G. Attwood

**Preparation of vanadium from aegirine.** M. B. Zapadinski and V. M. Zhogina. *Sovetskoe Metal* 1932, No. 5, 68-73. Extn. of V with acids is too low because of low soly. of aegirine. Roasting with addn. of 15% of chalk or lime at 850-950° followed by treatment with acid resulted in 80-90% recovery. Pure iron vanadate was obtained by adding Fe and neutralizing the soln., but the ratio V:Fe was too low, and the process can be applied only to ores with low P content. For high-P ores a method was developed whereby all the V is sepd. from Fe to obtain V<sub>2</sub>O<sub>5</sub>. Charge roasted with lime or chalk is dissolved in HCl, the soln. neutralized with CaO, and the ppt. treated with ammonia. By this treatment 92-95% of the V is extd. The soln. is then evapd. to dryness to obtain V<sub>2</sub>O<sub>5</sub>. The ammoniacal solns. are free from P, Al, Fe, etc., and contain only a small amt. of SiO<sub>2</sub> and traces of Ca. B. N. Daniloff

**Investigation of the conditions for the chloridizing volatilization of metals.** Paul Zielinski. *Arch. Erzbergbau Erzverh. Metallhüttenw.* 1, 31-41 (1931). Samples were exposed in a glass or porcelain boat to a stream of specially purified Cl and heated by an elec. muffle. For PbO chloridizing starts at room temp., for SnO<sub>2</sub> at 1000°, for SnS, FeS, Ag<sub>2</sub>S, CoS, Cr<sub>2</sub>S<sub>3</sub> and CuS below room temp.; for Ni<sub>2</sub>S<sub>3</sub> at 150°. Chloridizing is complete for PbO at 400°, for SnO<sub>2</sub> at 1400°, for SnS at 130°, FeS and Ag<sub>2</sub>S at 250°, CoS and Cr<sub>2</sub>S<sub>3</sub> at 700°, Ni<sub>2</sub>S<sub>3</sub> at 550°. Both CuCl and CuCl<sub>2</sub> are formed. CuCl reaches a max. of 22% of the sample at 100°, at 570° the sample is 100% CuCl<sub>2</sub>, at 880° CuCl<sub>2</sub> has reverted to CuCl. Phys. condition of the sample is important; pptd. PbS or ZnS is completely chloridized at 200° earlier than pure galena or sphalerite. In the presence of small amts. of water and C, chloridization is accelerated. The process is more complete at a given temp. where more of the surface of the sample is exposed. An analytical detn. of impurities in Al through volatilization of the chloride of the metal is impossible because of the chloridization and volatilization of the oxides and inclusions before the Al. Z. takes advantage of this to purify Al. Cl can be used to protect Mg from N which thickens it and makes casting difficult. NaCl begins reacting with metals and oxides at 500°, with sulfides at 350°. The presence of S makes the oxides much easier to chloridize with NaCl. Z. shows that this process can be successfully used on a difficult Sn ore. John G. Attwood

**Bralorne mill of Bralorne Mines, Limited.** Fred E. Gray. *Can. Mining Met. Bull.* No. 259, 683-6 (1933).

A Au-bearing (75-80% free) quartz congt. a very small amt. of Ag is passed over blankets, and the tails are floated. Amalgamation (traps and blankets) recovers 74% of the Au and flotation 21% more. Alden H. Emery

**The Hoge mill.** Frederick G. Moses. *Eng. Mining J.* 134, 422-4 (1933).—A 50-ton plant treats Au ore formerly unworkable by all-flotation methods. Mill recovery is 97%, with heads averaging \$12 per ton and tails \$0.00.

W. H. Boynton

**The Hardinge-Hadsel mill at Antamok.** J. B. Martin. *Mining J. (Phoenix, Ariz.)* 17, No. 10, 3-4 (1933). A 125-hp., 24-ft.-diam. Duplex Hardinge-Hadsel mill for grinding in a single operation is used; 200 tons per day of ore passing a 12-in. grizzly is ground to 65% minus 200-mesh. The mill is stated to operate satisfactorily even on oxidized ore, and without any large pieces of rock to act as a grinding medium. A. W. Furbank

**The Nkana smelter.** A. D. Wilkinson and F. L. Bosqui. *Mining Mag.* 49, 265-78 (1933). Two reverberatory furnaces, each 90-ft. long and with an inside width at the slag line of 26 ft., handle a charge of raw concentrates, mat shell and converter slag shells, together with holding-furnace slag and dust from the waste heat boilers. At present, no flux is necessary. The concentrates charged run Cu 54.9, S 23.3, SiO<sub>2</sub> 1.76 and Fe 9.09%. Flow-plan and photograph illustrate the layout of the furnaces and the two 13-ft. by 30-ft. Pierce Smith converters. A. W. Furbank

**Practical notes on amalgamation.** Geo. Holcombe. *Chem. Eng. Mining Rev.* 25, 105-6 (1933). Hard Cu plates should be employed and carefully prepd. Na amalgam is invaluable in case stamps develop. The proportions should be 97 parts Hg to 3 of Na and should be used at about 82°. When all of the Na has been absorbed, the contents of the retort are poured and the amalgam is obtained in a thin sheet on cooling. It should be ground and placed in a well stoppered glass jar. The addn. of a 0.5% cyanide soln. at a rate of 1 drop per min. where Hg has been added to the mortar box has a marked effect in retarding the staining of the plates. Dressing is then required less often and the greater efficiency of the amalgamation outweighs any possible loss of Au by soln. W. H. Boynton

**Tellurides.** W. E. Johnston. *Eng. Mining J.* 134, 412-13 (1933), cf. C. A. 27, 1759. Discussion.

W. H. Boynton

**An investigation of the performance of hot-blast stoves at the Petrovskii and Dzerzhinskii plants.** N. B. Rulla. *Dokl. 1933*, No. 5, 6, 14-30; No. 7, 20-9. A study was made of data on construction and operation of blast furnace hot stoves in order to find optimum conditions in regard to economy of performance. S. I. Madorsky

**Study of the operation of a crucible furnace of three tons capacity.** M. L. Gasquard. *Rev. l'industrie moderne* 27, 267-72 (1933). A complete thermal balance of a 3-ton crucible furnace is given, together with the compn. of the charge and materials obtained in the slags. The development of a special refractory lining is advisable. M. H.

**Smelting operations at Roan Antelope Copper Mines Limited.** Charles R. Wraith. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 511, 25 pp. (1933). Cu is contained in the ore as chalcocite, chalcopyrite and bornite.

Chalcocite predominates in the ore body now being mined. The mat contains Cu 79.00 and Fe 0.5%, almost pure Cu<sub>2</sub>S. Limestone is added to supply a deficiency of bases for producing a satisfactory slag; it also counteracts to some degree the thickening influence of the Al<sub>2</sub>O<sub>3</sub> present. Expts. in a 4- by 6 ft. reverberatory showed (1) that a Ca silicate slag congt. up to 15% Al<sub>2</sub>O<sub>3</sub> and having a silicate degree approaching a bisilicate was sufficiently fluid to be handled and to permit satisfactory sepn. of the mat, and (2) that mat congt. 80% Cu could be blown in a converter without the addn. of extraneous heat during the blow but the converter would have to be heated between blows. Outstanding features contributing to simplicity of operations, high efficiency and low costs are: (1) high Cu fall (57% of the wt. of concentrate smelted), (2) low fuel ratio (averaging 15.5%), (3) high mat fall (70% of the wt. of the charge), (4) low slag (26% of charge), (5) low flux burden (6% of wt. of concentrate), (6) high furnace capacity, (7) simple converter operations (no SiO<sub>2</sub> flux and no slag) and (8) high converter capacity (short blow). The flow sheet is described in detail, with analyses and operating data. Alden H. Emery

**Chlorine smelting with chloride electrolysis.** E. A. Ashcroft. *Bull. Inst. Mining Met.* No. 350, 65 pp.

(1933) All the metal in sulfide ore are converted to chlorides with  $\text{Cl}_2$  and reduced by pptn with Zn. The fused  $\text{ZnCl}_2$  is electrolyzed to produce Zn and Cl. Elemental S is recovered. The history of the development of the process by Swinburne and its subsequent use is discussed. Flow sheets are given and individual steps, including removal and separ. of impurities, are described in detail. One lb Zn is obtained per kw hr. Costs are estd at \$3.16 per ton Zn from 30% concentrate without credit or cost for by products. Alden H. Emery.

**An experimental combination of shaft roasting and reverberatory smelting.** Frederick Latt and J. P. Cooper. *Am Inst Mining Met Engrs, Tech Bul No 510*, 8 pp (1933). The small reverberatory alone smelted 16,678 lb per 25 hr with 797 gal oil. In connection with a roasting unit 30,500 lb were smelted per 24 hr with 62 gal oil. The increase due to the temp at which elements enter the melting chamber (1170 F) and to a lesser extent to the hot gas from the roasting shift. When operated alone, the shift capacity was 10 ton per 24 hr and produced a dense concentrate. Alden H. Emery.

**The influence of impurities on the roasting of sphalerite.** Franz Fennrich. *Arch Elektroan Erzaufbereit Metallhütten* 1, 1-10 (1931). Roasting always begins at 500°. Ignition is retarded by FeS and FeS<sub>2</sub> is unaffected by PbS and CuS. CuS adds to a ZnS-FeS-PbS-SnO<sub>2</sub> mixt lower the ignition temp. When mixed with 20% of the commercial Sphalerite completely roasted at the following temp: CuS, 650°; FeS, 680°; FeS<sub>2</sub>, 690°; PbS, 700°. The value hold true for complex mixts. Homophen FeS retard the roasting more than do pyrrhotite. Sulfate formation is promoted by the presence of FeS, PbS, FeS<sub>2</sub>, CuS in order of increasing effectiveness. SnO<sub>2</sub> is ineffective. The highest sulfate content has at about 1000. Above 900° very little is found. When a roasting temp of 1000° is exceeded part of the Zn become mol in Murratt oil. FeS causes the largest Zn loss through formation of ZnO-FeO. This Zn exceeds loss through sulfate formation. Loss of Zn in the presence of PbS and CuS are caused by intermixing. In complex mixt greater Zn loss occur than would be anticipated from the constituent because of formation of low melting alloys. John G. Attwood.

**Some practical considerations in a small jobbing foundry.** B. G. G. *Foundry Trade J* 49, 20-21 (1933). An outline of some of the methods used in a gray Fe foundry mfg high grade castings such as globe valves. Down Schrad.

**Developments in the iron and steel industry.** W. H. Burr. *Iron Steel Eng* 10, 20-21 (1933). W. H. Burr.

**What phase of steel making is most responsible for the quality of steel products?** Theodore L. Fos. *Iron Steel Inst* 10, 8-11 (Oct., 1933). An historical address. W. H. Roynton.

**Effect on various steels of hydrogen at high pressures and temperatures.** N. P. Inglis and W. Andrews. *Engineering* 136, 11-14 (1933). See C. I. 27, 290.

**Influence of thermal conductivity of metals on their utilization in the chemical industry, particularly in the manufacture of acids and explosives.** Zdenek Stefan. *Chemie et Industrie Special* No. 9017 (June 1933). A general discussion dealing with principal rules affecting the thermal cond of metals, detn of the influence of the choice of metal on the heat transmission, detn of the relation by means of which to select the metal having the most advantageous properties, satisfactory resistance to corrosion, optimum mech properties, max thermal cond, principal metals and alloy used in the chem industry, particularly from the standpoint of thermal cond and the possibility of giving them the shapes required in the mfg of acids and explosives. A. P. C.

**X ray investigation of the nature of change of structure in a metal, resulting from deformation at high temperatures.** I. I. Bikhmetev, M. D. Vozdvizhenski, S. I. Gubkin, G. I. Kosolapov and B. M. Rovinski. *Vitt*

*Forschungsin Luftfahrtmaterialprüfung* (U. S. S. R.), No 1, 131 pp (in German 129-31) (1933), cf C. I. 25, 5377. An exhaustive study made by means of X-ray examn of the changes taking place in the structure of duralumin when deformed under pressure or impact at high temps. It was found that recrystall rate is equal to rate of deformation %, under the following conditions: at 300° 0.6 mm sec, 50, 0.5° 0.75-400, 1.5 slightly greater than 1.24-450, 1.24° 2000-300, 1.24° 2000. Where deformation has reached 60-70%, an anisotropy of structure in the alloy can be observed not only where the deformation takes place at room temp, but at high temp as well and not only where it is high (under impact), but where it is small (less than 0.001%). This is also true in case where recrystall is not experimentally observable. Duralumin samples deformed at 150° and at room temp are similar in structure. Numerical table, diagrams, curves and photomicrographs are given. S. I. Madorsky.

**A flat-bend endurance testing machine of the D. L. V. and results obtained with it.** Kurt Matthies. *Metallurgisch* 12, 48-50 (1933). C. I. Madorsky.

**Testing sheet metals.** M. A. Schwarz and K. Christoph. *Metallurgisch* 12, 47-48 (1933). For the testing of thin sheets which are to be cold worked the tensile, hardness and bend test are not as satisfactory as a ductility test such as the Erichsen. The ductility, tensile strength and elongation are related as follows: ductility in mm  $\times 10$  (thickness)  $\times$  (tensile strength)  $\div$  2 = elongation. S. C. (1)  $\div$  1. The ductility of S material were detd on an Erichsen app and calculated from their tensile strengths and elongation and the result agreed fairly well. C. I. Madorsky.

**New uses for thin films.** James D. Edwards. *Ind Eng Chem, Anal Ed* 11, 28-30 (1933). Properties and use of Al bearing thin film of oxide in dielectric. I. J. C.

**The cause and effect of the solution of salt in metal.** Thadde Peczkalski. *Combustion* 107, 2-9 (1933). Expt with Cu and Fe treated in CuCl, KCl, KI and BaCl<sub>2</sub> showed that cementation of metal in contact with a salt at high temp is accompanied by soln of the metal in the salt. The principal mechanism of attack is the penetration into the metal of products of the salt. J. P. A.

**Reasons for differences in the results obtained by various authors for the solubility of copper in aluminum in solid state.** P. Ya. Seldin. *Am Inst Metallurgichesk* (Leningrad) 6, 7-9 (1933). A comparison made between the result obtained by S. and Annenkov (C. I. 21, 5801) and those of Divin and Kichardson (C. I. 20, 21-22) and the discrepancy is explained on the ground that in the case of the latter investigators, because of insufficient time (0.5 hr) of cooling the alloy equil was not reached. S. and A. kept the alloy at the tempering temp for a week. There was also a difference in the size of the samples, it being smaller in the work of S. and A. S. I. Madorsky.

**Tests of cold pressed screws.** J. Vodicka. *Chemie et Industrie Special* No. 67 (Sept. 1933). A metal exhibiting considerable P and S segregation is unsuitable for mfg cold pressed screw. Slight or moderate segregation does not cause defect on pressing. When the center of segregation is symmetrically placed relative to the circular section of the screw the latter may break between the body and head. By cold pressing the screw and following a definite mfg process a spherical zone obtained in which there is max deformation of the ferrite grains between the body and head. Corrosion with 1% HCl can advantageously be used to examine the zone of deformation in the head. The changes in the mech properties can be detd from the extent of corrosion with 1-2% HCl. To ascertain the condition of the metal during pressing of the head, only the Rosenham etching method is suitable. The Hevn etching method cannot be used because it also brings out the effects of cold working, which does not completely mask segregations. From the result of the Rosenham etching, the procedure of pressing the



head may be modified so as practically to eliminate the possibility of separ. of the head from the body.

A. Papineau-Couture

**Gas-free metals used in x-ray tubes.** W. D. Coolidge and E. E. Charlton. *Metal Progress* 24, No. 5, 36-40 (1933). Pt has been replaced by W, Mo and Cu, adequately degassed by long heating in H<sub>2</sub>. W. A. Mudge

**New method for determining the thickness and quality of zinc coatings on galvanized iron wires.** A. Glazunov. *Chimie et Industrie Special No.*, 688-90 (June, 1933).

A 20-30-cm. length of wire is covered with wax, leaving about 3-4 cm. bare near the center. The wire is immersed vertically in a coned. ZnSO<sub>4</sub> soln and is connected to the pos. pole of a source of d. c.; a cylindrical Pt cathode is used. The voltage and amperage are read. During soln. of the pure Zn coating the amperage and voltage remain const., when the layer of Zn-Fe alloy begins to dissolve the voltage increases. When the alloy has completely dissolved the voltage remains const., but at a much higher value than at the beginning of the expt. The dimensions of the wire, amperage and time being known, the thicknesses of the pure Zn coating and of the Fe-Zn layer can easily be calcd.

A. Papineau-Couture

**Preparation and etching of galvanized wire for metallographic examination.** Ladislav Hajda and Stephan Popole. *Chimie et Industrie Special No.*, 700-1 (June, 1933). The following treatment was found to give very distinct structures under the microscope: mounting of sample in chomite, polishing with MgO suspended in denatured alc., etching by means of a dil. Kourbatoff reagent (1 vol. of 4% HNO<sub>3</sub> in AcO is mixed just prior to use with 10 vol. of a mixt. of equal vols. of MeOH, EtOH and iso AmOH).

A. Papineau-Couture

**Removal of pickling fumes.** W. Fischer. *Oberflächentech.* 10, 234-7 (1933). Fumes originating in the pickling process, being more or less injurious to health, must be removed from the work rooms. Hoods over the tank and exhausters are usually arranged, or the fumes removed with a spray of atomized water. Arrangements are described.

M. Hartenheim

**Use of nitrophenols as etching reagents for iron carbides and ferromanganic carbides.** A. Glazunov and V. Petak. *Chimie et Industrie Special No.*, 691-3 (June, 1933).

Etching of *o*-, *m*- and *p*-C<sub>6</sub>H<sub>4</sub>(OH)NO<sub>2</sub> (I) in NaOH or KOH soln. was studied comparatively with that of Le Chatelier's reagent (25 g. NaOH and 2 g. C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> per 100 cc.) on hypereutectoid steel (C 1.3, Mn 0.8%, ) white (Fe-C 5, Mn 1%, ) and ferro-Mn contg. up to 14% Mn. With *o* I, all the I sepd. from the soln. and could not be dissolved, even on boiling, showing that the etching was reduced exclusively by the alkali present in the reagent.

I gave practically the same results as Le Chatelier's reagent. With *p*-I, the carbide was bicolored (green and d.) and the pearlite remained white, even after 5 mins. etching. With white cast Fe (1% Mn) the cementite did not appear heterogeneous, i. e., the initial solid soln. of Mn carbides decomps. into 2 phases, the decomposition taking place in such a manner that the  $\alpha$ -Fe<sub>3</sub>C solidification (below the A<sub>0</sub> point) does not dissolve or solves only to a very slight extent in the Mn carbide.

A. Papineau-Couture

**The effect of thickness on the crystal arrangement of rolled sheet aluminum.** G. V. Vargha and G. Wasser. *Metallwirtschaft* 12, 511-13 (1933). Sheet Al was cold rolled to 5 mm. thickness and various layers were examined by the x-ray diffraction method. The layers were obtained by machining and etching away parts of one or both sides of the sheet. The orientation in the center of the sheet was entirely different from that at the surface. The center corresponded to the crystal position (110) parallel to the rolling plane and [112] parallel to the rolling direction. The surface corresponded to the crystal position (100) parallel to the rolling plane and [110] parallel to the rolling direction, but the scattering was much weaker in this case. The surface orientation was practically unchanged to a depth of 1.2 mm. and at 1.6 mm. the orientation of the center was obtained. The center

orientation of the 5 mm. sheet was obtained throughout in 1 mm. and thinner sheets, the surface being less sharp than the center. These results are similar to those obtained on hard drawn wire. Thirteen references. C. F. M.

**Factors governing the life of lead in chemical plants.** R. S. Russell. *Chem. Eng. Mining Rev.* 25, 421 (1933). Phys. properties and the analysis of a good chem. Pb are given and the corrosion-resisting alloys of Pb briefly discussed. Pb-Cu and Pb-Fe alloys are the most promising of these. Tests are being conducted, with results, so far, insufficient for definite conclusions. A bibliography is appended.

W. H. Boynton

**The lattice constants of pure iron and iron-carbon alloys at temperatures up to 1100°.** Hans Esser and Georg Mueller. *Arch. Eisenhüttenw.* 7, 265-8 (1933). By means of a specially developed x-ray camera exposures were made in a vacuum at different temps. on the same film whereby the picture at room temp. was used as standard for the detn. of the lattice const. Electrolytic and carbonyl iron showed that the lattice parameter of  $\alpha$ -iron does not change linearly with temp., the curve shows a discontinuity at the Curie point which is different with different irons. The  $\gamma$ -phase showed in all samples the increase of the lattice const. to be linear with temp. The expansion values found in this manner were higher than those given usually from dilatometric measurements. Fe-C alloys within the  $\gamma$ -range do not show linear change of the parameter as function of C content; hypo eutectic steels showed at 720° an increase of the lattice parameter with increasing C content, contrary to the Fe-C diagram. Eight references.

M. Hartenheim

**Production and properties of superior cast iron.** Oliver Smailey. *Foundry Trade J.* 49, 289-91 (1933). Data are given concerning Mechanite.

Downs Schaaf

**Mechanical properties of malleable cast iron, with special reference to its grain size.** Fritz Loepelmann. *Giesverein* 20, 366-72 (1933). From a series of heat-treatment expts., the following procedure is recommended: white cast Fe is heated rapidly to 1050°, held at that temp. until all carbide is decompd., cooled below A<sub>1</sub>, annealed to form the  $\alpha$ -solid soln., cooled again below A<sub>1</sub>, and finally heated just above and then just below A<sub>1</sub> and quenched in water.

Curtis L. Wilson

**Wear properties of cast iron.** P. A. Heller. *Giesverein* 20, 392-400 (1933). The effects of compn., surface condition, phys. properties, graphite and hardness on wear are summarized.

Curtis L. Wilson

**The malleabilization of white cast iron.** R. Schuicide-wind and A. E. White. *Univ. Mich. Eng. Research Bull.* No. 24, 56 pp. (1933). The changes occurring during the transformation of white Fe to malleable Fe are given. The various factors which affect the rate of malleabilization are discussed and a new theory of its mechanism is proposed.

Downs Schaaf

**Gray cast iron especially suitable for metal plating.** H. Reminger. *Metallwaren-Ind. u. Galvano-Tech.* 31, 359-61, 379-81, 419-21 (1933). Exptl. Ni plating on cast Fe showed that coarse flakes of graphite are detrimental. A pearlitic structure with finely divided graphite is best.

Curtis L. Wilson

**Gray-iron castings for laundry machinery.** J. Longden. *Foundry Trade J.* 49, 293-6, 307-8, 314 (1933).

Downs Schaaf

**Influence of arsenic and antimony on cast iron.** P. Piwowarsky, J. Vladescu and H. Nipper. *Arch. Eisenhüttenw.* 7, 323-7 (1933). Cast iron melts with addns. of As up to 2% and Sb up to 1.2% were investigated. Arsenic has very little influence on quantity and formation of graphite and structure. Bending and tensile strength are increased at first but decrease at higher contents. Brinell hardness, elasticity modulus, wear resistance and particularly corrosion resistance against acids increase with As content. Impact strength and endurance impact no. are reduced by As but not quite as much as by P and S; the effect of the 2 latter elements is more pronounced in the presence of As. Sb seems to be sol. in cementite and counteracts graphite formation. Bending and tensile

strength, deflection and toughness are greatly reduced by Sb. Brinell hardness, elasticity modulus and wear resistance are increased. Corrosion resistance depends on the attacking medium. Further test with reduction of iron ore contg As and Sb seem to point to the fact that addition of As to cast iron is much more harmful than the content of As which originates from the iron ore in the cast iron. M. Hartenbach.

**Thermal conductivity of wrought iron steel, malleable cast iron and cast iron.** J. W. Donaldson. *Iron Steel Inst. (London) Advance copy No. 6*, 20 pp. (Sept., 1933).

The thermal cond. of wrought iron is approx. 0.17 cal per cm per sec. at 100° C. and decreases with increasing temp. The thermal cond. of steel decreases with the C content: a value of 0.100 cal per cm per sec. was obtained for a 0.10% C steel and 0.117 cal per cm per sec. for a 1.00% C steel; the decrease due to the influence of C has on the structure in producing relative units of ferrite, pearlite and cementite. Data indicate that the thermal cond. of ferrite is higher than 0.141 cal per cm per sec. hitherto adopted, and that pearlite has a thermal cond. of approx. 0.124 cal per cm per sec. Blackheart malleable iron with a structure of ferrite, temper C and a small proportion of pearlite, has a thermal cond. of 0.100 cal per cm per sec. at 100° C. and whiteheart malleable Fe, with a structure of pearlite, temper C and a small proportion of ferrite, a thermal cond. of 0.111 cal per cm per sec. The influence of Si to lower the thermal cond. especially in cast Fe-P produces a slight decrease in thermal cond. in gray cast iron. Five references.

C. B. Jones.

**The  $\alpha$   $\gamma$  transformation in the ternary systems of iron.**

W. Koester and W. Fonn. *Arch. Eisenhütten* 7, 19 (200/1933). The possible form of ternary Fe alloys in the heterocentron ( $\alpha + \gamma$ ) space of the equilibrium are investigated and represented by a dimensional model. There are three models of ternary Fe alloy corresponding to the multian on presence of binary alloy with the  $\gamma$  field; they can be represented by 1) melt +  $\alpha + \gamma$ , melt +  $\alpha + \delta$  (2) melt +  $\alpha + \gamma + \delta$  the 4 phase reaction and (3)  $\alpha + \gamma + \delta$  in melt +  $\gamma + \delta$  at the crystal that is exchanged in the transformation. The 3 basic diagrams permit the derivation of all other cases; they occur under limited only, or when a third crystal type enters. The 3 possibilities and their representation in the space diagram are explained at length. Twenty-four references. M. Hartenbach.

**Final examination of the second series of iron and steel specimens exposed at Halifax N.S. for a period of ten years.** J. Newton Friend. *Def. and Ind. Research Thirteenth (Interim) Rept. Comm. Int. Conf. Eng. Det. notation of Structures in Sea water*, 7-20 (1933). High Ni steel show the greatest corrosion resistance.

**Final examination of the second series of iron and steel specimens exposed at Auckland for a period of 10 years.** *Ibid.* 21. High Ni steel show greatest corrosion resistance. **Final examination of mild steel plates coated with various protective media and exposed to sea air at Southampton docks 1924-31.** *Ibid.* 31. Coating that proved satisfactory include the red lead, refined coal tar and hot galvanizing. Leopold Essel.

**Pickling iron and steel.** Wm. Ashcroft. *Metallurgy* 9, 19 (20/1933). Pickling is given on plant operation.

J. L. Greck.

**Heat resistant steel.** S. S. Steinberg, S. I. Gutermin and I. P. Bernova. *Tekhn. Sci. Ser. 1* 41 (1931). *Chem. Zvesti* 1932, I, 1910. Resistance to oxidation at high temps is imparted to steel by Cr and Si. Mo increases the resistance only slightly. A steel contg Cr 5, Si 1, and Mo 0.6, oxidizes readily; a ordinary C steel increasing the Si to 0.6, decreasing the Mo and leaving the Cr unchanged render the steel fireproof. A steel contg Cr 8% and Si 1% is unsatisfactory unless it also contains 2% Mo. When the Cr content is 8% the steel must not contain less than 0.5% Si. 1% Si suffices in the presence of 14% Cr with 18% Cr Si is unnecessary. Likewise steel high in Si is fireproof without Cr. At low

Cr content, increasing the C impairs the quality of the steel. At higher Cr content it has little influence.

M. G. Moore.

**Residual metals in open hearth steel.** C. J. Williams and J. D. Sullivan. *Metals & Alloys* 4, 151 (2/1933), cf. C 1 27 51. A continuation of the study of the amt. of residual Mn, Cu, Ni, Cr and Sn in open-hearth steel sample from some 18 different companies in the U.S. and Canada. Downs Schaaf.

**Influence of the quenching temperature on steel hardening phenomena.** H. Essert and H. Mayer. *Arch. Eisenhütten* 7, 519 (22/1933). The influence of cooling velocity on the temp. of magnetic transformation of  $\alpha$  iron and cementite was investigated by the method of Essert-Spenle. Pure Fe showed that the magnetic transformation has a certain capacity for undercooling, and in steel it was found that formation of martensite requires cooling not only from a temp. range above  $A_{c1}$  with a definite velocity but also from a temp. which is detd. by the C content. This is explained by the fact that residual ferrite and cementite which would serve as crystal germs for formation of pearlite during quenching dissolve in martensite only at sufficiently high temps. M. H.

**Quenching steel in hot baths.** H. I. Doesch. *Metal Progress* 24, No. 3, 24 (9/1933). SAE steels 1045 and 150 give lower ductility for equal strength when quenched in an appropriate hot bath as compared to regular quenching and tempering. W. A. Mudge.

**The structure of carbon steel at elevated temperatures and under reduced pressure.** H. I. Pablow and I. D. Parker. *Mech. Eng. Expt. Sta. Bull. No. 53*, 16 pp. (1933). A vacuum furnace design is described which permits of microscopic observation of specimens at temps. up to 1000°. It is shown that recryst. temp. of steel vary with the pressure in much the same manner as the boiling temp. of liquid. Downs Schaaf.

**X-ray investigation of the aging effect in quenched carbon steels.** Zemp Nishiyama. *Science Repts. Tohoku Imp. Univ. Int. Ser.* 22, 563 (9/1933). Specimens of Swedish steel were machined in the form of a rod, quenched by the water jet vacuum method and then x-ray diffraction pattern of the specimen kept at 49°, were obtained. The result shows that age hardening at room temp. or below 100° is due to the low temp. formation of tetragonal martensite to the harder cubic martensite with the transformation more conspicuous in low C steel.

J. G. Vanden Bosch.

**The composition of the carbides in chrome steels.** L. Maurer, Th. Dörning and H. Buttg. *Arch. Eisenhütten* 7, 247 (1933). The carbides in steels with 0.1-1.0% C and 0-5% Cr were dissolved either by acid or electrolytically. The existence of Cr-Fe carbide was found of which the Cr carbide components had the compns. Cr<sub>3</sub>C and Cr<sub>7</sub>C<sub>3</sub> the former occurring in steel with 0.5% C the latter in steel with higher Cr content. Cr carbide of the compn. Cr<sub>3</sub>C, Cr<sub>7</sub>C<sub>3</sub> or Cr<sub>7</sub>C<sub>3</sub> could not be found. The result of the investigation indicated also the possibility of detg. the structural arrangement and the distribution of Cr between carbide and ferrite. M. H.

**Mechanism of breakdown of steel III.** Masao Kuroda. *Bull. Int. Phys. Chem. Research (Tokyo)* 12, 511 (7/1933). *Abstracts* 4 (in English) published with *Sci. Super. Int. Phys. Chem. Research (Tokyo)* 22, Nos. 400-3; cf. C 1 27 692. The mechanism of the breakdown of C, soft and hard steel has been microscopically examined. It is explained that the steel not only yield by slipping of the cleavage plane but that it is deformed by plastic cracking. The lines considered as cracks, and passing through several grains, seem to be independent of the orientation of each grain. Thus in some remarkable cases, the cracks run along the peripheries of pearlite. As previously reported the yield point appears when the stressed member in steel is transformed from honey-comb boundary structure of grain into ferrite. When this boundary structure is broken, further stress breaks ferrite along line joining these cracks of the boundary structure. These lines must be crack lines in ferrite, the internal

deformations in grains are naturally considered due to slipping of cleavage planes. K. Konda

**Practical plasticity problems.** Geo. M. Eaton. *Mech. Eng.* 55, 557 60(1933).—The opportunities afforded by a study of the plasticity of steel during fabrication are pointed out. L. W. T. Cummings

**Prevention of flakes in alloy steels.** H. H. Ashdown. *Metal Progress* 24, No. 5, 13 17(1933). Flakes are internal cracks caused by stresses set up when the forging passes through a depressed crit. range. The remedy is a slow and controlled cooling rate. The temp. of the work should never be allowed to go below 700°F. until the grain is refined. W. A. Mudge

**Standardization of tempering of alloy steels.** V. D. Sadovskii and P. A. Trofimov. *Dokl. Akad. Nauk SSSR* 19, 19. A study was made of the process of decomposition of austenite in supercooled tool-steel analyzing C 0.65, W 16.27 and Cr 3.86. Conclusion. For high-speed tool steel temp. limits for tempering are 720–780° and for Ni-Cr steels, 600–660°. S. L. Madorsky

**Graphic solution of technical calculations in alloy melts** Alfred Koster. *Metall u. Erz* 30, 406 8(1933). An explanation is given of graphic methods applied to binary and ternary alloys. H. Stoertz

**Phenomena of quenching and tempering in alloys.** Albert Portevin. *J. Inst. Metals* 51, 315 56(1933); *Chim. Ind.* 27, 5701. Improvements in exptl. technic and app. have been effected in the past 20 years. In addn. to thermal analysis, dilatometric analysis, thermomagnetic analysis and x-ray spectroscopy are useful. In binary alloys almost all cases of quenching are connected with the following: (1) the increase of solv. in the solid soln.  $\alpha$  of a phase  $\beta$  which is frequently a chem. compd. or intermediate phase; (2) the transition on heating a mixt. of 2 phases  $\alpha + \beta$  into a single phase  $\gamma$ . Thermal treatment of the light alloys of Al represents case 1, while that of steels represents case 2. Quenching alloys of case 1 does not, in general, produce an important hardening with a marked increase in strength. This result is obtained by the pptn. of compd.  $\beta$  from the supersatd. soln. on the return to an equil. state, i. e., by a tempering effect. The laws of tempering are the expression of the speeds of reaction starting from a non-equil. system. Variation of hardness is also influenced by the phenomenon of coalescence which follows laws analogous to those of pptn. The phenomenon of quenching with structural hardening is common as shown by the following instances of hardening by pptn.: Al contg. Si, Be, Cu, Mg, Si, Ag and Zn; Ag contg. Cu, Cd, Cu Cd, Si, Cu Si, Cu Mg, Cu Sb, Mg Zn, Cu contg. Ag, Be, Cu, Co, Fe, Pd, Pt, Si, Be Si, Co Si, Cr Si, Mn Si, Ni Si, Ni P, Ti, Zn; Au contg. Cu, Fe, Ni, Ni Si, Co Si, Cu Si, Pd, Zn; for Fe (ferrite or austenite) contg. B, Be, C, Cu, Mn, Mo, Nb, O, Ta, Ti, U, W, Zr; Co and Ni contg. B, Be, Si, Ti; Pb contg. Bi, Ca, Sb, Sn; Pd and Pt contg. Au, Ag, Cu; Sn contg. Pb; Zn contg. Al, Cd, etc. Influence of the crit. values of quenching factors, time, speed, temp., etc., on the physicochem. states of sol are discussed. C. B. Jenni

**The uses of aluminum and its alloys.** A. V. Sibiley. *Centraire Metal* 1931, 1672 98; *Chem. Zentr.* 1932, II, 118. Discussion of tech. uses. M. G. Moore

**The heat treatment of aluminum-bronze components** P. Mahb. *Machinery* (London) 43, 39 42(1933). Al bronze responds to hardening treatments in a similar manner to steels; Al is the crit. element, instead of C as in the latter case. Details are given with photomicrograph of the effects of heat treatment and hardening, and of the presence of addnl. alloying elements. By heating the alloy contg. 10.3% Al to 520–40° and slowly cooling, the amts. of  $\alpha$ - and  $\beta$ -constituents are obtained; the  $\beta$ -constituent is distributed in a very uniform fashion, and with all the tendency toward the lamellar condition, throughout the soft matrix of  $\alpha$ . A. W. Furbank

**Critical study of the hardness behavior of duralumin.** Hugh O'Neill, J. F. B. Jackson and G. S. Parnham. *Phil. Mag.* 16, 913 29(1933). The changes in hardness with heat treatment were studied by the Meyer (ball-test)

analysis. Age hardening at room temp. is analogous to the strain-hardening of a slightly cold-worked metal. "Pptn." can be caused by a sufficiently long heat treatment above 200°. The lattice parameters were measured for a no. of samples. No easily measured change occurs during age hardening. The processes which might be operating in the hardening are discussed. F. J. Rosenbaum

**Metals in art.** Louis Delville. *Arts et Metiers* 8, 197 202, 231(1933). Sn, Ag and bronzes found extensive use in ornamental and artistic objects. Forged duralumin along with stainless steels are now used in modern furniture, while forged Fe and Cu are used in decorating portals. G. T. Motok

**High-grade chromium-nickel alloys and the testing of their life.** W. Hessenbruch and W. Rohn. *Elektrowärme* 3, 245 9, 291 7, 317 22(1933). Methods of production of Cr-Ni alloys for resisting high temps. are described. Phys. properties of various alloys, chem. resistance, influence of frequency of switching current on and off, and metallographic investigations are discussed. Almost all Fe-contg. Cr-Ni alloys when used at high temps. show in the course of use a segregation of a ternary compd. Fe-Cr-Ni while in the unmixed state the alloy consists of pure solid solns. of Ni-Cr-Fe-Mn-Si; this segregation takes place at the grain boundaries and also in the interior of the grain, and is the greater the higher the Cr content. M. Hartenheim

**Chromium-nickel as a corrosion-resistant alloy.** R. J. McKay. *Metals & Alloys* 4, 177 80(1933). Various uses are suggested and corrosion-resistance figures are given for the Ni alloy Inconel contg. 12 14% Cr and 5 6% Fe. Downs Schaaf

**Heat-resisting chromium-nickel-iron alloys for furnace construction.** L. J. Stanbery. *Metals & Alloys* 4, 127 35, 159 64(1933). Available load-carrying data for Cr-Ni-Fe alloys are assembled from various sources as an aid to the designer of parts subject to operating temps. of 650–1150°. Selection of alloy compn. and treatment are considered for the conditions under which they are used and also as to their suitability for fabrication and for casting. Downs Schaaf

**High-chromium iron alloys for castings.** W. F. Furman. *Metals & Alloys* 4, 147 50, 167 9(1933). Cr-Fe castings contg. 20% Cr with varying C and without other alloying elements are described and defined. The effects are noted of small addns. of Ni, Mo, W, Ti, Mn and N on straight Cr-Fe castings. Downs Schaaf

**Change of volume of iron alloys in the melting range.** F. Sauerwald and F. Fleischer. *Arch. Eisenhüttenw.* 7, 219 21(1933). Investigations on different Fe alloys of the effect of gases, occurrence of graphite, and of the eutectic have shown that the increase in the content of C of the  $\gamma$ -solid soln. which takes place during solidification is, for white cast iron and steel, connected with expansion and the decrease during melting with contraction. The dissolving of the graphite in the solid soln. and in the melt during heating causes a contraction in graphitic cast iron, the segregation during cooling an expansion. All these phenomena are superimposed on one another more or less in ordinary cast iron, and the vol. is further influenced by the gases of reaction. M. Hartenheim

**Fundamentals of alloying gray cast iron with metals.** Franz Roll. *Gießerei* 20, 401 6(1933). The influence of metal addns. on the stability of the carbide, the eutectic and eutectoid points, the graphite structure, strength, wear and corrosion are reviewed. C. L. Wilson

**Ferrosilicon.** H. Delomenie. *Compt. rend.* 197, 249 52(1933). Microscopic examn. of alloys contg. approx. 50% Si confirms the existence of FeSi. The crumbling of industrial alloys appears to be due to the presence of P and As. Also in *J. four elec.* 42, 278(1933). J. B. Austin

**Preparation of non-liquating lead-zinc alloys.** A. A. Bocharov and A. Ya. Ulyanov. *Izvestia Metal.* 1932, No. 5/6, 28 32. Alloys of Zn with 1% of Pb can be prep'd. by dissolving the required amt. of Pb in the liquid Zn at high temps. However, upon solidification the Pb seps. out, and liquation takes place. In order to prep. a

uniform alloy free from liquation the authors made 1.5% Pb alloys by introducing PbCl into molten Zn. Upon solidification the structure was found to be uniform and the micrographs obtained by etching with HCl showed uniform darkening, indicating the absence of segregation or liquation. The fact that the Pb content of the ingots exceeded the solubility limit indicated that Pb was present as an emulsion. On remelting part of the Pb came out. Further expts indicated that the liquation can be partly prevented by adding small amt of Mg and wholly by Cd, Fe and Cu. Fe t by dissolving thin rolled plate in a 40-50% soln of  $\text{NH}_4\text{NO}_3$  showed some traces of coagulation of Pb, although not sufficient to cause liquation. The existence of coagulation was interpreted as indicating the absence of a solid soln of Pb in Zn. B. N. Dandloff.

**The equilibrium diagram of iron-nitrogen alloys.** See Nishigori, *Tech. Rept. Univ. of Tokyo*, No. 11, No. 1, 68-92 (1933). Samples were prepared by passing  $\text{NH}_3$  gas over thin down electrolytic Fe wire at various temps., and were annealed for 40 days at 600 mm Hg. The change of electrical resistance on heating and cooling were measured and x-ray, magnetic and metallographic studies of alloy were made. Two eutectoid transformation were found on heating: (1) 0.8% and (2) 0.6% corresponding to the eutectic  $\alpha + \gamma$  and  $\gamma + \delta$  respectively. The Fe t and large drop in resistance above 600°C thought to be due to the rapid decomposition of nitride. The remaining nitride continues to decompose gradually until 900°C is reached. It is maintained that only 2 nitrides exist: Fe<sub>3</sub>N and Fe<sub>4</sub>N, and that no Fe-N compound Fe<sub>2</sub>N can exist in the system. The diagram proposed by Lecher is recommended (C. I. 24, 427-192). H. W. Lurhbeck.

**The system iron-nickel-aluminum.** W. Koester, *Arch. Eisenhüttenw.* 7, 51-62 (1933). The partial diagram of the system Fe-Ni-Al was determined up to 0% Al. Ni-Al form an uninterrupted series of solid solns with  $\alpha$  Fe  $\beta$  that only  $\alpha$  and  $\gamma$  solid solns occur in solid phase in the investigated range. The peritectic equl.  $\delta + \alpha = \gamma$  in the Fe-Ni system changes gradually into the eutectic equl.  $\delta + \alpha + \gamma$  in the system Fe-Al by passing through a minimum temp. The temp. of the magnetic transformation point of Fe-Al alloys increases at first with increasing Ni content. The  $\alpha$  solid soln of Fe-Ni alloy is in general reversible at 20°C Al and 0% Ni. The Curie point for higher Al and Ni content lies after quenching from higher temps. considerably lower than after heating to medium temps. The miscibility gap in the system are discussed. M. Hartenbaum.

**The system iron-cobalt-aluminum.** W. Koester, *Arch. Eisenhüttenw.* 7, 263-4 (1933) (cf. preceding paper). The partial equilibrium diagram up to 0% Al of the system Fe-Co-Al differs from that of Fe-Ni-Al only quantitatively, this is illustrated by a dimensional diagram. The eutectic line is at 1.70 between 8.5 and 1.0% Al; the eutectic contains about 11% Al. The magnetic transformation of Fe-Co-Al alloy is in general reversible at the border of the ferromagnetic field heat treatment exert a similar influence as in Ni alloys. Miscibility gap and transformation point under varying conditions are discussed. M. Hartenbaum.

**Ternary alloys of thallium with lead, cadmium and tin.** N. S. Kurnakov and N. I. Korotkiy, *Izv. Akad. Nauk SSSR, Khim. (Comm. d.)* 6, 4 (1933). The ternary systems Pb-11-Cd and Pb-11-Sn were studied thermally. It was found that the addition of Cd or Sn to the binary system Pb-11 disturbs the equl. of the latter and changes the ratio Pb-11 = 1 (16.18%) corresponding to the max. fusion temp. This is similar to the liquid-vapor type of binary system, where equl. disturbance due to change of temp. and pressure results in a change of vapor pressure. Eutectic lines in the above ternary system deviate considerably from a straight line connecting eutectic points of the corresponding binary systems. Addition of 1% Cd or 5% Sn to the system Pb-11 slightly changes the character of the system. S. I. Medvedev.

**Mechanism of inverse segregation.** Alloy group 3 Sn

bronzes, 89-11 type (Open W. Ellis, *Metal Ind.* (London) 43, 194-6 (1933)). The Cu-Sn alloy of the 89-11 type remains molten at temp. well below the solidus of the alloy when poured into molds of the dimensions used in foundry practice; it cools at such rate that primary crystals are delayed until the metal in the mold has reached a temp. at least a few degrees below a point half way between the equilibrium liquidus and solidus. If crystals are delayed until a temp. of 910°C has been reached, the crystal nuclei will contain approx. 7% Sn. Upon these nuclei dendrites will form. If nuclei appear in the melt within the body of the casting at 900°C the Sn content would be about 5%. The dendrites that form around these nuclei on cooling from 900°C to 800°C contain approx. 9% Sn and the melt contains about 50% Sn. The slower the rate of growth of the dendrites the richer in Sn they will be. Other factors exert themselves in inverse segregation, which tends to raise the Sn content of the outer part of the casting. The interdendritic flow theory suggests that cavities are formed around growing crystals because of contraction, and that molten alloy richer in Sn is forced into contact with the crystals and solidifies. *Ibid.* 22, 6. The casting possessing the best mechanical properties was poured at 1100°C and had a yield of 8.18. When the metal (88-10.2%) is poured too hot the metal actually rises in the mold because of formation of blowholes. When poured too cold the surface cracks. Between these extremes sound castings are obtained. Brinell hardness was taken at the centers of but increased uniformly as the pouring temps. were decreased. Large castings are less dense at their interiors than at their surface. Casting poured at high temp. cool more slowly and give larger crystals and form a strong interlocking structure. Annealing at 700°C decreased the porosity of the metal by surface oxidation. The ideal microscopic structure obtained from a high pouring temp. contains large and connected areas of eutectoid. The capillaries formed by the crystals of the dendrites are filled with Sn-rich liquid from the center of the casting. *Ibid.* 33, 4. An alloy which when cast under specified conditions gives evidence of inverse segregation subsequent to solidification may upon the addition of small quantities of Fe, Mn or Zn become normal in its behavior under the same condition of casting. The added element may change the temp. of primary solidification and modify the size of the dendrites, may alter the diffusibility, may change the surface tension or may alter the vapor pressure of the Sn-rich liquid. Referring to a Cu-7% Al alloy, rapid cooling increases inverse segregation in the absence of gas, but when gases are present the effect of rapid cooling may or may not cause an increase in the segregation of the Cu. H. I. Messmer.

**Artificial bronzing.** Eugen Werber, *Metallwaren Ind. u. Calim. Tech.* 31, 42-4 (1933). Chemical methods of coloring brass, Cu and Fe are given. C. I. Wilson.

**Theory of corrosion.** II. New expts. pertaining to the rusting of Fe based upon the film theory of passivity. W. J. Miller and W. Michu, *Amer. Inst. Metallurg.* 9, 197-204 (1933) (C. I. 27, 5294). The porosity of film on Fe electrodes in solns of  $\text{Na}_2\text{SO}_4$  and  $\text{NaOH}$  were computed. The area of the pores was found to vary within wide limits. Fe specimen is stored in air or provided with interference colors by moderate heating to 100-110°C. It was found that the electrical resistance across the pores is little influenced by the period of storage, but is greatly increased by heating. The same applies to the resistance of the film itself. The natural oxide layer is of a hydrous nature, 10<sup>-3</sup> cm thick, not influenced by long storage in dry air and its pores have an area of 2.10<sup>3</sup> to 5.10<sup>3</sup> sq cm per sq cm. The area of the pores increases with the period of immersion in  $\text{Na}_2\text{SO}_4$ , which phenomenon is obviously identical with the break down of the layer. After longer storage the original oxide layer has almost completely disappeared, although the electrode is covered with a black to brown rust layer, which change depends greatly on the original condition of the surface. It is concluded that the film does not break down mechanically but is removed by chemical or colloidal action. The different

corrosion rates on shielded and freely suspended electrodes are explained by the shielding action of accumulated Fe-salt soln. which prevents access of  $O_2$  and passivity.

Leopold Pessel

**Corrosion of metals under the influence of some gasolines and kerosenes.** N. I. Laduzhnikova. *Repts. Gost. Petroleum Research Inst. (Moscow) 1932*, 139-43. — Strips of various metals were immersed in gasoline from Ural contg. 0.458% S. It reacted considerably with Pb and to a smaller degree with Cu, brass and Fe, while its distillate did not attack brass or iron. A kerosene of the same origin which had 1.684% S attacked all 3 metals to a much greater extent, while the distillate which contained 1.925% S attacked Cu and brass more vigorously and Fe much less than the refined product. Cracked gasoline from Baku attacked, after contacting for 7 months, the following metals arranged in decreasing order of attack: Pb, Fe, Cu and brass. The attack was not so severe if the samples were kept in the dark. This phenomenon is explained by the presence of unsatd. compounds in the cracked gasoline which are oxidized in the presence of metals, the latter acting as catalysts. This gasoline also showed a higher acidity after the expt. Baku kerosene had a corrosive action on the following metals arranged in decreasing order: Pb, brass, Cu, Fe and Al, the latter was not attacked during the 21 months of the expts. This phenomenon was accompanied by an increase in the I no., the aniline pt. and the acidity. Kerosene satd. with water attacked the metals in a more severe manner than dry kerosene.

A. A. Bochtimgk

**Corrosion effects of lubricants on bearing surfaces.** Christopher H. Bierbaum. *Iron Age 132*, No. 9, 20-1, 58 (1933). Chem. effects of different lubricants are discussed. Practically all cause corrosion of the bearing, which may be beneficial if very slight and selectively directed toward the softer constituents. Other forms are unfavorable and destructive.

Leopold Pessel

**Corrosion of electric bulb bases.** Otto Herbatschek. *Korrosion Metallschut. 9*, 209-12 (1933). Discussion of the corrosion phenomena caused by a store room fire. Reconditioning of the bases thus damaged is of uncertain value.

Leopold Pessel

**Prevention of corrosion of the grain-boundaries in steels with 18% chromium and 8% nickel.** F. Houdremont and P. Schalmesser. *Arch. Eisenhüttenw. 7*, 187-91 (1933). Corrosion of the grain-boundaries occurs in austenitic, non-rusting steels with 18% Cr and 8% Ni if Cr-rich carbides are sep'd in finely distributed form during tempering to about 500-800°, and the surroundings of the grain boundaries thus become lower in Cr. By reducing the C content to a max. of 0.07%, segregation of carbide and disintegration of the grain boundaries can be avoided. Also, the addn. of carbide producers will reduce the soly. of carbide in austenite to such extent that intercryst. corrosion is prevented, addn. of Ti is particularly suitable. It is possible to agglomerate the carbides by annealing, especially after cold working, and to make them segregate in the austenite grains so that the grain-boundaries remain free from carbide films at subsequent tempering. A mixed structure of austenite and ferrite proved to be particularly resistant to corrosion. If Ti is added the yield reduction of elongation and reduction of area at 700-800° accompanying grain-boundary corrosion and segregation of carbide is hardly noticeable. Seven references.

M. Hartenheim

**Explanation of mechanism of corrosion fatigue and its application to sucker-rod failures.** Blaine B. Wescott and Norman Power. *Oil Gas J. 32*, No. 23, 65, 68, 70, 72 (1933). The electrochem. nature of corrosion generally results in the formation of pits which leads to marked trans. When this reaches a value greater than the endurance limit, cracks form at the base of the pits. These cracks are propagated by stress concn. until failure occurs.

J. R. Strong

**Effect of organic coatings in preventing damage of metal subjected to stress and corrosion.** F. N. Speller and

J. B. McCorkle. *Oil Gas J. 32*, No. 23, 73, 74 (1933). J. R. Strong

**Electromagnetic thickness tester for corrosion-resisting coverings.** E. Schweiter and S. Kiesshult. *Herbstkolloid Korrosion 8*, 33-4 (1933). A method for detg. thickness of non-magnetic coverings for steel or iron. An electromagnetic field is brought up to the coating by means of an electromagnet. The current required is measured, and from a calibration chart the coating thickness can be detd.

M. C. Rogers

**Effects of absorption of oxygen and nitrogen in fusion welding.** Eugen Piwowarsky and W. Klemm. *Arch. Eisenhüttenw. 7*, 205-8 (1933). Tests with unalloyed wires of 0.02-0.1% C and Ni-alloyed wires of 0.05-0.15% C and 2-3.5% Ni showed that a weld made with bare wire absorbs the greatest amts. of N and O; welds made by autogenous welding methods absorb even less than those made with covered electrodes, a. c. favors the absorption more than d. c.; Ni and Mn retard it. Tensile strength, elastic limit and hardness increase, and elongation, reduction in area and notch toughness decrease if by annealing above A<sub>1</sub> and slow cooling or by tempering at 600°, cold-working and tempering at 250° or by natural aging the excess amts. of N, O and C can be expelled. Ni-alloyed autogenous welds and elec. welds made with covered Ni-alloyed electrodes behaved best against aging for a certain content of N and O.

M. H.

**Smelting sponge iron (Granikov) 4. Casting special elec. steels (Decher) 4. Fine dust from the elec. precipitators at the Vitkovice blast furnaces (Wald) 4. Ultra-light alloys of great strength (Pogodin) 2. Aromatic bases [addns. to pickling acids] (Pr. pat. 749,961) 10. Prolonged flame production from elec. arcs (U. S. pat. 1,935,593) 4. Centrifugal app. for segg. ore pulps (U. S. pat. 1,934,406) 1. Coating Cu or other alloys to prevent corrosion (U. S. pat. 1,932,156) 26.**

**Ore concentration by flotation.** Frederick G. Moses, Raymond W. Hess and Robert L. Perkins (to Barrett Co.). U. S. 1,931,440, Nov. 7. A N-free aromatic carboxylic mercaptan compd. such as phenyl mercaptan is mixed with mineral pulps such as those of Cu sulfide ores preliminary to froth flotation treatment.

**Use of tetrahydrofurfuryl xanthate as a mineral flotation reagent.** Rutherford B. Martin. U. S. 1,933,179, Oct. 31.

**Flotation cell suitable for use in ore treatment.** Walter L. Scheeler. U. S. 1,932,089, Oct. 24.

**Solubilizing ores.** Ralph F. Meyer (to Meyer Mineral Separation Co.). Brit. 396,933, Aug. 17, 1933. See Fr. 743,985 (C. A. 27, 3905).

**Apparatus for mixing and "balling" ores to prepare them for sintering.** Bethune G. Klugh (to American Ore Reclamation Co.). U. S. 1,931,499, Oct. 24. Mech. features.

**Ore treatment.** Carl Goetz. Ger. 576,380, May 10, 1933. Addn. to 551,924 (C. A. 26, 4787). Metals are obtained by heating bituminous ores in the presence of air, the hot gases produced being led back into the ore under treatment.

**Treatment of ores.** I. G. Farbenind, A.-G. (Gustav Wietzel and Wilhelm Haller, inventors). Ger. 586,170, Oct. 18, 1933. In reducing Fe ores and other oxide ores with a gaseous reducing agent, caking is prevented by mixing the ore with up to 5% of a finely divided solid such as soot, ground coal, graphite, an alk. earth oxide or kaolin.

**Reciprocating pumps for liquids for the treatment of mineral ores.** The General Electric Co. Ltd., Herbert W. B. Gardiner and Alexander B. Jackson. Brit. 396,460, Aug. 10, 1933.

**Treatment of iron and manganese ores.** Vereinigte Stahlwerke A.-G. Ger. 586,078, Oct. 18, 1933. Fe and Mn ores are freed from As and Sb by treatment at a raised temp., preferably above 500°, with a mixt. of  $CO_2$  and a

reducing gas, *e. g.*, H, CO or a hydrocarbon. The compn. of the gas mixt. must be such that production of metallic Fe or Mn or their carbides is avoided. A suitable mixt. contains  $\text{CO}_2$  50-70 and CO 50-30%, or  $\text{CO}_2$  70-90 and H 30-10%. The  $\text{CO}_2$  content of the gases may be raised toward the end of the process.

**Treating manganese ore.** Napoleon A. Laury (to Howard B. Bishop). U. S. 1,932,413, Oct. 31. Material such as hot ore from a reducing furnace is leached with a soln. of an  $\text{NH}_4$  salt such as  $(\text{NH}_4)_2\text{SO}_4$  which is capable of forming a sol. manganous salt;  $\text{NH}_4$  is simultaneously removed from the leaching liquid, and the  $\text{NH}_4$  is then used to ppt. a Mn compd. from the soln. obtained.

**Treating sulfide ores.** Charles R. Kuzell. Brit. 396,600, July 31, 1933. Complex sulfide ore contg. Fe is subjected to an intensive oxidation, thereby removing most of the S and forming a molten product in which most of the Fe is present as magnetite. Ores deficient in fuel value are first coned, or mixed with ore of higher sulfide content. Extraneous fuel may also be used. The molten product is subjected to a selective reduction by a gas or atomized agent blown through the melt or by a solid reducing agent mixed with the melt by means of a gas blown therethrough. A tilting furnace or barrel converter for carrying out the oxidation and reduction is described. Fluxes, *e. g.*,  $\text{CaO}$ ,  $\text{CaF}_2$ , that are required in subsequent operations are charged with the ore. S, Pb, Zn, Cd, etc., pass off in the oxidation process. The reduction produces gases contg. a further part of the volatile constituents, a  $\text{FeO}$  slag and a product such as impure Cu or Cu matte which seps. by gravity from the  $\text{FeO}$  slag. The Cu-contg. product is treated in a converter to produce Cu contg. Au and Ag, any Fe present being slagged off and returned to the initial melt of ore. The Fe product of the selective reduction is reduced in a fuel or electrically heated furnace by treatment similar to the first reduction by means of, *e. g.*, natural gas. The Ca aluminosilicate slag formed is worked up into portland cement.

**Roasting plumbiferous sulfide ores.** Kenneth W. Young and Imperial Chemical Industries Ltd. Brit. 395,760, July 24, 1933. PbS is recovered from sulfide ores contg. small amts. of Pb, *e. g.*, pyrites, by roasting with a limited supply of air or O-contg. gas in a rotary, shaft kiln or mech. furnace so that the O is entirely used up and a portion of the heated material in contact with gas free from O. An O-free gas, *e. g.*, N and (or)  $\text{SO}_2$ , is introduced into the furnace in sufficient quantity and at such velocity, *e. g.*, 20 cm. per sec., to volatilize and remove the PbS. The exit gases are cooled, *e. g.*, to  $100^\circ$ , and the PbS ppt., *e. g.*, by an electrostatic precipitator. The charge may be mixed with coke, etc., whereby S is evolved, being condensed after removal of the PbS. The gases so obtained are, after removal of excess N, preferably used as the O-free gas, being introduced wholly or in part into the combustion zone or with the O-contg. gases as described in Brit. 359,478 (C. A. 26, 4923) to control the temp. of the combustion zone to about  $800-900^\circ$ . Cf. C. A. 28, 87.

**Eliminating arsenic and antimony from iron and manganese ores.** Vereinigte Stahlwerke A.-G. Brit. 396,058, July 26, 1933. See U. S. 1,923,511 (C. A. 27, 5045).

**Reducing oxide ores such as those of iron, chromium, etc.** Donald M. Scott (to Buffalo Electric Furnace Corp.). U. S. 1,932,831, Oct. 31. A coherent and adherent charge is formed of comminuted ore, reducing agent such as pitch or Si and flux such as lime and sand, and the charge is progressively fed through a hollow electrode of an elec. arc furnace and toward the arc end of the electrodes (which is enclosed within an inner wall inside the furnace chamber and out of contact with the electrodes, serving as a muffle). Various details of app. and operation are described.

**Reduction of iron ore.** Karl H. Moll, Harold Etherington and David F. Smith (to A. O. Smith Corp.). U. S. 1,934,082, Nov. 7. In the reduction of a charge comprising a mixt. of Fe ore and flux in a vertically disposed shaft the charge is smelted in the lower portion of the shaft by

the combustion of gas and preheated air, and in the upper portion of the shaft the charge is reduced by contact with a reducing gas and with heated gases ascending from the lower portion of the furnace. Reducing gases are added for locally cooling the ascending gases immediately above the point of fusion, and the charge is drained from the base of the shaft as rapidly as it is smelted. App. is described.

**Recovery of metals from ores, etc., by use of mercury.** Fredus A. Thurston. U. S. 1,933,193, Oct. 31. In treating materials such as ores or the like with Hg, a cleansing agent such as  $\text{NH}_4\text{F}$  or  $\text{HOAc}$  is also used and the mercurized mass is heated, broken up after cooling, further treated with cleansing fluid, dried and pulverized.

**Apparatus for extracting gold from solutions such as sea water by adsorption with ferrous sulfide.** Herschel C. Parker. U. S. 1,932,531, Oct. 31. Various structural, mech. and operative details are described.

**Extracting tin from ores.** Louis A. Wood and Henry L. Sulman. U. S. 1,931,944, Oct. 24. The ore is mixed with carbonaceous material such as crushed coal and with  $\text{CaCl}_2$  soln. which serves as a chloridizing agent and also as a binder, and the mixt. is heated to effect distn. of the Sn in the form of chloride. App. is described.

**Recovery of metallic values from slag.** Edward P. Fleming and Armand L. Labbe (to American Smelting & Refining Co.). U. S. 1,932,656, Oct. 31. A bath of molten slag such as that contg. Pb, Zn and Ag is heated directly with an air-gaseous fuel mixt. contg. an excess of air, to maintain the slag in molten condition and in contact with an oxidizing atm., and is agitated to liberate metals in the form of oxides which are recovered. App. is described.

**Metallurgical furnaces.** Heraeus Vacuumschmelze A.-G. and Wilhelm Rohm. Ger. 577,657, June 2, 1933. The protective covers of the above furnaces are filled with a gas lighter than air and forming an explosive mixture therewith, *e. g.*, H, before the oven is operated and emptied after the operation is finished, the filling and emptying taking place at a distance from the furnace.

**Furnaces for roasting ores.** La Nouvelle Montagne. Fr. 41,751, Apr. 13, 1933. Addn. to 726,339 (C. A. 26, 4923). In roasting ores contg. powd. blends, all parts of the combustion chamber of the furnace are maintained at a temp. above that of the decompn. of  $\text{ZnSO}_4$ , and the roasted material is removed from the action of the roasting gases before being cooled below that decompn. temp.

**Shaft furnace construction and operation for reducing ores such as those of iron.** Karl H. Moll, Harold Etherington and David F. Smith (to A. O. Smith Corp.). U. S. 1,934,081, Nov. 7. A mixt. of air and gas is burned in the lower portion of a vertically disposed ore-reduction shaft, and a reducing gas is admitted into the shaft at a point above the point of fusion of the charge. Reduced and molten material is withdrawn from the lower portion of the shaft as formed.

**Stirrer for superimposed-hearth furnace for roasting ores, etc.** Humboldt-Deutzmotoren A.-G. Ger. 586,192, Oct. 17, 1933.

**Metal-melting furnaces.** Stephen Stanworth, James H. Clegg and James Stanworth. Brit. 395,766, July 27, 1933.

**Carbon- or graphite-tube furnace for melting carbides.** Fried. Krupp A.-G. Ger. 576,263, May 17, 1933. Addn. to 516,656 (C. A. 25, 2679).

**Reversible regenerative rocking furnace for melting metals.** Arthur E. Vogt and Ludwig Kirchhof. Brit. 395,143, July 13, 1933.

**Regenerator suitable for use with blast furnaces.** Albert J. Hulse (to H. A. Brassert & Co.). U. S. 1,933,114, Oct. 31.

**Pressure control in furnace combustion chambers.** George W. Smith (to John M. Hopwood). U. S. 1,931,906, Oct. 24. Various structural and operative details are described, suitable for control of furnaces such as those for metallurgical purposes.

**Muffle furnaces.** Willoughby S. Smith, Henry J.



Garnett and Walter F. Randall. Brit. 395,371, July 13, 1933. In the manuf. of sheet, wire or strip from ingots of Ni (alloys) the ingots are raised to the temp. necessary for working in a combustion-heated muffle furnace in which the muffle is formed of fireclay with an internal lining of Cr-Ni alloy.

**Vertical conveyer oven suitable for foundry cores.** Charles A. Barnett and Harry W. Steindorf (to Foundry Equipment Co.). U. S. 1,934,904, Nov. 14. Structural and mech. features.

**Apparatus for heating metal slabs and rolling them into sheets.** Florence C. Biggert, Jr. (to United Engineering & Foundry Co.). U. S. 1,932,504, Oct. 31. Mech. features.

**Transportable container for molten materials, e. g., metal, slag, which may serve also as a ladle or mixer.** John D. Pugh. Brit. 396,221, Aug. 3, 1933.

**Sampling liquid metals.** Charles B. Francis and Paul B. Guyer. U. S. 1,933,425, Oct. 31. A device is described which is immersed in molten metal such as an alloy steel to obtain a sample which is chilled on the device and then stripped off.

**Apparatus for spraying molten metals such as lead, tin or zinc.** Donald D. Taylor (to Advance Engineering Corp.). U. S. 1,934,891, Nov. 14. Various structural, mech. and operative details are described.

**Mold materials.** John A. Gann (to The Dow Chemical Co.). Brit. 396,645, Aug. 10, 1933. Mg (alloys) or other readily oxidizable metals are cast in molds having hydrofluoboric acid or a volatilizable salt thereof incorporated in the molding compn.; 1-3% of the acid or 0.5-10% of the  $\text{NH}_4$  salt may be used, with or without other protective agents, e. g.,  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{F}$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{NH}_4\text{Br}$ ,  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{HSO}_4$ ,  $\text{S}$ ,  $\text{H}_2\text{BO}_3$ .

**Ingot mold.** Charles W. Meyers and Walter F. Munford. U. S. 1,933,530, Oct. 31. Structural features are described of an ingot mold having an induction coil for heating the upper portion.

**Molds suitable for iron-foundry use.** Harry P. Kumber (to Erb-Joyce Foundry Co.). U. S. 1,935,362, Nov. 14. Permanent molds are formed of chrome ore 3, fused silica 1 and bentonite 1 part.

**Sand molds for casting magnesium, etc.** Maurice N. Lacey (to British Maxium, Ltd.). U. S. 1,935,591, Nov. 14.  $\text{NH}_4$  fluoride or borate (suitably in a proportion of about 2% or less) is mixed with the sand contacting with Mg or other like easily oxidizable metals.

**Apparatus for pressure die casting of metals such as magnesium.** John E. Hov (to Dow Chemical Co.). U. S. 1,932,823, Oct. 31. Various structural and operative details are described.

**Cast metal stair treads, etc.** Donald S. Connelly and Theodore J. Hahn (to Wooster Products Inc.). U. S. 1,934,592, Nov. 7. Cast metal articles such as stair treads are formed with spaced stratifications of wear-resisting material such as steel plates carrying carborundum embedded in them. Cf. C. A. 27, 4761.

**Making hollow articles such as balls or shells from cast metal such as brass or bronze.** Arthur A. Schupp (to Fredericksen Co.). U. S. 1,934,239, Nov. 7. Various details of app., operation and temp. control are described.

**Metal compositions.** Floyd C. Kelley (to The British Thomson-Houston Co. Ltd.). Brit. 396,120, Aug. 3, 1933. A sintered hard metal compn. consists of Cb carbide, Ta carbide in excess of the Cb carbide and a metal cementing material consisting of metal(s) of the Fe group and W and (or) Mo, the carbides forming the major portion of the compn. Powd. Ta and Cb carbides are ground with a mixt. of, e. g., Fe and Mo, and the mixt. is hydraulically pressed to the desired shape and fired in a closed graphite tube in a H furnace at 1400-1600° or, after pressing, the mixt. may be fired at 800-1100°, shaped or cut to the desired size and then fired at 1400-1600°. For use as a tool bit the cemented carbides may be Cu brazed to a steel shank. Cf. C. A. 27, 5299.

**Metallic compositions.** N. V. Molybdenum Co. and Paul Schwartzkopf. Brit. 395,745, July 17, 1933. In

compus. consisting of 1 or more hard metals, e. g., W, Mo, Ta, bonded by 1 or more soft metals, e. g., Ag, Au, Al, Cu, Pt, Sn, Zn, the hard metal in the powd. form in which it is obtained from its compds. or ores is sintered or melted and, if desired, hammered, rolled or otherwise mechanically worked and then finely powd. before bonding with the soft metal. The composite material may be heated and chilled or otherwise treated to obtain a fine cryst. structure. Articles may be made having different proportions of hard metal in different parts. Other metals, e. g., Ti, V, Zr, Co, Cr, Ni, Fe, may be incorporated in the above compus.

**Metallic compositions.** Chrysler Corp. Brit. 396,195, Aug. 3, 1933. Porous flexible elements for insertion between the leaves of a laminated spring are made by mixing Cu 10, sponge Fe 88.5 and graphite 1.5 parts, together with a small amt. of volatile lubricant, e. g., petroleum, stearic acid, compressing under high pressure, sintering at about 2100°F. in a non-oxidizing or reducing atm. and then quenching with oil before cooling or immersing in oil after cooling. The porous elements may also be similarly made from a mixt. of powd. Cu 85, powd. Sn 13 and graphite 2 parts, with a small amt. of stearic acid.

**Metallic powder.** Soc. anon. Le Carbone. Brit. 396,250, Aug. 3, 1933. Contact pieces for elec. switches, etc., and carbon brushes are made of C with which is incorporated a powd. base metal coated with an unoxidizable metal, e. g., Cu coated with Ag. A suitable powder may be made by dropping powd. Cu through a 300-mesh sieve into a  $\text{AgNO}_3$  soln. contg. 2.5 g. Ag per l.

**Metallic powders such as disintegrated bronze foils.** Erwin Kramer (to Hartstoff-Metall A.-G.). U. S. 1,932,711, Oct. 31. In effecting disintegration by the action of balls in a rotary drum, the proper proportions of metallic particles and balls to obtain high efficiency in output of the powder is detd. by placing a quantity of the balls in the drum, supplying metallic particles to the drum until the output of the powder rises to a distinct max., and then supplying more balls until the output of the powder falls to a min. and subsequently rises to a second max. higher than the first max.

**Apparatus for briquetting metal shavings.** Waldemar Lindemann. Ger. 586,325, Oct. 20, 1933.

**Smelting solid substances with high melting point.** Mathias Frankl (to Société oxythermique). Brit. 396,698, Aug. 3, 1933. In a shaft furnace for the production of Si-Fe or carbides, the reduction of ores or the melting of steel scrap the charge is agglomerated or sintered in the upper part of the shaft so that it will form a self-sustaining column spaced from the enlarged lower part where the melting is effected.

**Separating metals such as nickel and copper by selective oxidation of their chlorides.** Raymond G. Brown (to Sulphur & Smelting Corp.). U. S. 1,933,702, Nov. 7. A mixt. of oxidizable anhyd. metallic chlorides such as chlorides of Ni and Cu or Co is treated with an oxidizing gas such as air at a temp. promoting oxidation, and sufficient Cl is introduced into the reaction zone to inhibit oxidation of at least one of the chlorides of lesser reactivity with O, while oxidizing other chlorides present.

**Treating lead to remove oxidizable and chloridizable constituents such as zinc.** Jesse O. Betterton and Yuri E. Lebedeff (to American Smelting & Refining Co.). U. S. 1,934,480, Nov. 7. Portions are continuously withdrawn from a bath of the material, subdivided into parts which are treated with a chloridizing agent such as Cl and with an oxidizing agent such as air, resp., by which material such as Zn is removed as chloride and oxide; unreacted Pb and products of reaction are returned to the bath and the oxide and chloride are caused to form an oxychloride slag which seps. and is removed from the surface of the metal. App. is described.

**Apparatus for treating metals as in the removal of zinc from lead.** Jesse O. Betterton and Yuri E. Lebedeff (to American Smelting & Refining Co.). U. S. 1,934,479, Nov. 7. Structural and mech. features.

**Treating metal before working.** Nikolaus Bregger (to Anton Knip, Fritz Krassl, Hugo Roth, Rudolf Knips and Herbert Schallenberg-Krassl (trading as C. T. Petzold & Co.)). Brit. 396,284, Aug. 3, 1933. Addn. to 367,738 (C. A. 27, 2924). Metal work pieces, *e. g.*, tubes, are prepd. for drawing as described in 367,738 and then coated with a fatty substance, *e. g.*, by immersion in a bath contg. talc, French chalk, soapstone, graphite, PbO, etc., with oil and turpentine.

**Chilling metals.** Pomosm-Werke G. m. b. H. (Robert Feix, inventor). Ger. 577,711, June 3, 1933. Pectin substances are used as chilling agents for hardening steel and similar metal alloys.

**Carbonizing metallic articles.** Fredolf J. Peterson. U. S. 1,934,614, Nov. 7. Various details of app. and operation are described.

**Carburizing metals.** Roysel J. Cowan (to Surface Combustion Corp.). U. S. 1,932,032, Oct. 24. Metal to be carburized, such as steel, is passed, in the same direction as a carburizing gas, through successive heat zones of a single chamber, the first zone of which is maintained at a lower temp. than the succeeding zone and formed of material such as "calorized" iron or steel which is less active as a catalyst than steel in assisting in the thermal decompn. of a hydrocarbon gas with liberation of soot, the succeeding zone being maintained at carburizing temp.

**Pickling and cleaning metals.** Robinson Brothers Ltd., Derie W. Parkes and Charles D. Mitchell. Brit. 396,053, July 20, 1933. A substance for use as a restrainer in pickling Fe or steel or as an ingredient for cleaning them prior to painting is prepd. by heating with S or S chloride a mix consisting mainly of homologs of pyridine and quinoline, separately or mixed in any proportions, but which may also contain other cyclic nitrogenous bases, *e. g.*, piperidine bases or the dipiperidyls. A preferred mix is that commercially known as heavy pyridine bases. In an example the product is mixed with H<sub>2</sub>SO<sub>4</sub>, impurities that sep. are removed and the liquid then blown with steam. Casein, glue, size, sulfite cellulose lye, etc., may be added to produce a frothing restrainer which decreases acid spray and facilitates subsequent removal of dirt from the metal.

**Pickling iron and steel.** George L. Magoun (to Rubber Service Laboratories Co.). U. S. 1,932,553, Oct. 31. A soln. of H<sub>2</sub>SO<sub>4</sub> is used with a small proportion of an inhibitor comprising a reaction product of a fully satd. aliphatic amine and a mercaptobenzothiazole such as the reaction product of (CH<sub>3</sub>)<sub>3</sub>NH<sub>2</sub> with 2 mercaptobenzothiazole. Cl. C. A. 27, 1307.

**Metal pickling baths.** James H. Gravell. U. S. 1,932,015, Oct. 24. The action of baths such as dil. acid used for pickling metal is controlled by use of a briquet of a d. to sink in the bath and which is composed of comminuted solid inhibiting material such as di-*o*-tolylthiourea and a "blasting agent" comprising an alk. substance such as Na<sub>2</sub>CO<sub>3</sub> for reacting with the bath soln. to produce a gas for disintegrating and dispersing the material of the briquet. Cl. C. A. 27, 5018.

**Apparatus for treating wire rod in pickling, and sulling and lime dipping chambers.** James S. Pfifer (to American Steel and Wire Co. of New Jersey). U. S. 1,933,533, Oct. 31. Structural and mech. features.

**Apparatus for conveying metal sheets, etc., through acid baths, furnaces, etc.** Hubert S. Thomas and Wm. R. Davies. Ger. 584,410, Sept. 19, 1933. This corresponds to Brit. 360,457 (C. A. 27, 455).

**Apparatus for annealing coiled wire or rod.** Carl J. Toll (to American Steel and Wire Co. of New Jersey). U. S. 1,933,461, Oct. 31. Structural features.

**Box-annealing ferrous sheets and plates.** Rufus E. Zimmerman (to American Sheet and Tin Plate Co.). U. S. 1,933,519, Oct. 31. Sticking of the metal sheets in box-annealing is prevented by treating the rolled and pickled sheets or plates by immersion in an aq. soln. contg. ZnSO<sub>4</sub> 0.001-0.2% previous to piling and annealing the material.

**Tempering.** Joseph H. Southern. Brit. 395,960,

July 27, 1933. Rolled steel rod, especially for springs, is quickly cooled in turbulent water. App. is described.

**Aluminum.** I. G. Farbenind. A.-G. (Johannes Brode, Carl Wurster and Erich Buttgenbach, inventors). Ger. 582,508, Aug. 17, 1933. Addn. to 581,310 (C. A. 27, 5010). See U. S. 1,854,684 (C. A. 26, 3193).

**Aluminum.** Aluminium Ltd. Fr. 749,608, July 27, 1933. The hardness of the surface of Al or Al alloys is increased by causing a diffusion of Mg into the surface. The surface is covered with finely divided Mg and heated to above 250°. Fr. 749,609, Al-Mg alloys contg. 5-16% Mg have higher resistance to corrosion if the Fe impurity is kept below 0.1% and below the amt. of Si.

**Working aluminum and maintaining its ductility.** Wm. T. Ennor (to Aluminum Co. of America). U. S. 1,931,913, Oct. 24. In operations such as wire drawing, the metal is continuously worked at a temp. below the temp. at which substantial metal recrystn. takes place, to a cross section greater than that finally desired, a substantial portion of the heat induced in the metal by the working is removed, and the metal is then worked to desired cross section. App. is described.

**Working aluminum to form rods, bars, wire or the like.** Raymond T. Whitel (to Aluminum Co. of America). U. S. 1,931,912, Oct. 24. The metal is progressively hot-worked and is rapidly progressively cooled from its hot-working temp. to a temp. not higher than about 100° to give it a substantially uniform internal structure throughout its length. App. is described.

**Extracting cobalt.** I. G. Farbenind. A.-G. Brit. 396,717, Aug. 8, 1933. Co nitrosocarbonyl (I) and (or) Co nitrosyl are obtained by acting with NO, if necessary together with CO, upon Co, or a material contg. Co as metal or in a state from which it can be reduced to metal by the reducing gases present such as excess CO. When I is produced, the NO may be wholly or in part replaced by substances supplying it, *e. g.*, nitrates. Substances, *e. g.*, Cu, that facilitate the production of the nitroso compds. may be added. The nitroso compds. may be burnt, or thermally decompd. in the presence of inert gases, to form CoO, thermally decompd. in the presence of reducing gases, *e. g.*, H<sub>2</sub>, to form Co or treated with strong mineral acids to form Co salts. Among examples an industrial waste contg. CaSO<sub>4</sub> and oxides of Fe, Cu and Co is dried, reduced by H<sub>2</sub> at 380° and treated with CO contg. 5% NO at 160-180° to produce I.

**Distillation retort for zinc.** The New Jersey Zinc Co. Ger. 577,891, June 6, 1933.

**Heat-treating white iron castings.** Anson Hayes, Edward E. Walker and Joseph J. White (to Industrial Furnace Corp.). U. S. 1,932,664, Oct. 31. In order to obtain a product of high tensile strength and some ductility, the iron is subjected to a temp. above the crit. temp. for a sufficient time to decompose substantially all of the massive cementite, then quickly cooled to a temp. below the crit. range to prevent further decompn. of cementite, reheated to a temp. in or just above the crit. range for a sufficient time to effect structural rearrangements and restricted chem. decompn. of the pearlitic cementite, and the heat treatment is terminated while the combined C content of the iron is greater than 0.45%. Cl. C. A. 27, 4206.

**Heat-treating malleableized cast iron.** Carl F. Lauenstein (to Link-Belt Co.). U. S. 1,934,313, Nov. 7. In order to improve its strength, malleableized cast iron is heated initially to just slightly below the effective practical C-combining temp. and is held at that temp. for a time sufficient to attain uniformity, then raised to a temp. definitely above the effective practical C-combining temp., then quenched and reheated to a temp. below the C-combining temp.

**Apparatus for making wrought iron.** Fredrik H. Wille (to A. M. Byers Co.). U. S. 1,933,577, Nov. 7. Structural and mech. features.

**Hardening iron and steel.** Maschinenfabrik Augsburg-Nürnberg A.-G. Ger. 586,450, Oct. 21, 1933. Iron and steel are carburized by cementation, then superficially

decarburized in known manner, and the decarburized portion is finally nitrogenated.

**Steel production.** Karl H. Moll and Harold Etherington (to A. O. Smith Corp.). U. S. 1,934,083, Nov. 7. A mixt. of flux, carbonaceous material and ore is charged into a shaft furnace, the carbonaceous material being sufficient to provide a C content in the melted Fe of about 0.3-1.5% and insufficient to provide for melting the Fe by combustion. A flame burning hydrocarbon material is blown on the charge at the bottom of the shaft for melting reduced Fe in the presence of the flux and carbonaceous material. A shallow zone is provided, contg. reduced Fe, flux and solid C, above the melting flame, by adding hydrocarbon gases to the ascending products of combustion a short distance above the flame in quantities sufficient to reduce the ore at the rate of melting and to reduce the temp. of the gases below sintering temps. of the unreduced ore. App. is described.

**Steel.** George F. Jaubert. Brit. 396,438, Aug. 1, 1933. Cylinders or bottles for storing compressed gases are made of steel contg. at least 98% Fe with C about 0.42, Ni about 0.02, Si at least 0.2 and S and P together about 0.006%, the remainder consisting of varying amts. of Mn, Si, Cr and Mo. The steels may be made by melting steel contg. C and Si with ferro-alloys contg. Mn, Cr, Ni and Mo prepd. in an elec. furnace or aluminothermically.

**Steels.** Établissements Jacob Holtzer. Fr. 41,646, Feb. 15, 1933. Addn. to 720,732 (C. A. 26, 1025). The process of Fr. 720,732 is applied to steels contg. Co 10-15, C about 0.75 and Cr 5-6%, with or without W 18%.

**Steels.** Akt.-Ges. vorm. Skodawerke in Pilsen. Fr. 749,503, July 26, 1933. The surface of austenitic steels and alloys is hardened by causing an instabilization of the  $\gamma$  phase at the surface, by removing from the surface the elements preserving the phase (C, Mn, Ni, Co, etc.) or introducing elements reducing the phase (Si, Al, P, As, Cr, Mo, V, Sn, Ti, etc.), so that the surface passes to other phases such as the martensite, pearlite, etc., while the core retains its original structure.

**Low-silicon steel strips.** James A. Sargent (to Sharon Steel Hoop Co.). U. S. 1,933,188, Oct. 31. In making low-Si steel strips with a dielectric surface coating, the metal is hot rolled and a hot rolled dielectric surface scale is formed on it, and the scale is then cold-rolled into the surface of the metal.

**Nitrided steel articles.** Edouard Houdremont (to Nitralloy Corp.). U. S. 1,934,672, Nov. 7. An alloy contg. Fe together with C 2, Cr 12 and W 0.8% is suitable for manuf. of articles such as dies, toothed wheels or bearings the surface of which may be nitrided.

**Nitrified steel.** Wilhelm Kroll. Ger. 577,637, June 2, 1933. Steel contg. Be is chilled and nitrified during the tempering process.

**Open-annealed steel and iron sheets.** Wm. H. Payne (to American Rolling Mill Co.). U. S. 1,932,560, Oct. 31. Sheets are first open-annealed and a thin scale is then formed over any exposed bare metal of the open-annealed product prior to pickling, by annealing the sheets at such low temps. that the product is not deprived of its open-annealed characteristics, and the sheets are then pickled.

**Silicon steel.** Edward M. Freeland. U. S. 1,932,306, Oct. 24. In making products such as "electrical steel" strip, the material is subjected to heavy reduction by cold-work, heated to remove part only of the strain thus imparted, cooled and then annealed. App. is described. U. S. 1,932,307 relates to a process involving casting a steel ingot of desired Si content and rolling it through passes extending in the same direction to form sheets of desired elec. properties. App. is described. U. S. 1,932,308 claims as a new product elec. strip steel contg. Si 2.75-3.5%, which may be produced as described in U. S. 1,932,306 and has a watt-loss property not more than about 1.1 watts per lb. in 24 gage thickness, decreasing as the thickness of the strip decreases.

**Electrical strip steel suitable for motors, dynamos, transformers, etc.** Edward M. Freeland. U. S. 1,932,-

309, Oct. 24. Steel contg. Si 3-6% may be treated as described in U. S. 1,932,306 (preceding abstr.) so that the watt-loss property of the resulting strip material is not more than about 0.98 watt per lb. in 24 gage thickness and decreases as the thickness of the strip decreases.

**Alloy steel for high-grade bore-hole casings such as those for oil wells.** Herbert Buchholtz (to Vereinigte Stahlwerke A.-G.). U. S. 1,931,717, Oct. 24. A steel is used contg. C 0.1-0.4, Si 0.7-1.0, Mn 0.9-2.0, Cr 0.2-0.9, Cu 0.7-1.5 and Al 0.1-0.2%, having a yield point 55 kg. per sq. mm., tensile strength 60 kg. per sq. mm., elongation 22%, reduction of area 58%, notched-bar tenacity 9 m. kg. per sq. cm., resistance to oscillation 40 kg. per sq. mm.

**Alloy steel.** Robert C. Becker and Franklin H. Allison, Jr. (to Crucible Steel Co. of America). U. S. 1,934,520, Nov. 7. An alloy steel having a "tool-proof" essentially austenitic structure which is not softened sufficiently by tempering to substantially decrease its tool resistance, and which is suitable for jail bars, etc., contains C 1.25-1.75, Cr 1-3, Mo. 1-3 and Ni 3.5-7.0%, the remainder being Fe except for elements present normally and in amounts not adversely affecting the characteristics of the alloy. Cf. C. A. 27, 4522.

**Heat-treating alloys.** Fried. Krupp A.-G. Brit. 396,383, July 31, 1933. Articles or parts of machinery that require a high strength at elevated temp., e. g., valves for internal combustion engines, are made from an austenite-martensitic transition alloy steel contg. C 0.3, Ni 10, Cr 4 and W 18. The Ni may be replaced wholly or partly by Mn and the W wholly or partly by Mo or V. The steel is first quenched from a sufficiently high temp. to give it an austenitic structure, e. g., 1200°, and is then reheated to above the austenite-martensitic crit. range, e. g., about 800°.

**Bearing alloy.** Metallhütten Schaefer & Schael A.-G. Ger. 577,772, June 3, 1933. A bearing alloy of the ternary system Sn-Sb-Pb contg. Cd consists of 10-55% Sn, 10-30% Sb, 0.2-3.0% Cd, 0.5-7.0% Ni and the remainder Pb. Cu and As may also be present in amts. of 3.0-3.5 and 0.5-1.0%, resp. The alloy is useful for locomotive bearings.

**Bearing metal.** Oskar Brandenberger. U. S. 1,934,586, Nov. 7. A bearing metal is formed of Cu, Sn, Zn, Pb and up to 4% S which serves to improve the durability.

**Hard alloys.** Wolfram & Molybdaen A.-G. Swiss 162,517 to 162,520. Sept. 1, 1933. A hard metal alloy contains a carbide such as TiC or TaC, and an alloy of metals of the 4th to 6th groups and of the Fe group fusing between 1500° and 2000°, such as Ni-W, Co-W, Fe-W, Fe-Co-W, Cr-Co-W, or Cr-Co (162,517). Hard tools are made from WC, 20% of a low-m. auxiliary metal such as Fe or Co and a carbide of a metal of the 4th to 6th groups convertible to a nitride, such as TiC, TaC or ZrC. These are sintered in an elec. furnace in an atm. of N (162,518). The WC may be sintered with a low-m. metal as before, but also with mixed crystals contg. a hard carbide such as TiN-TaC, TaN-TaC, TiN-TiC or TaN-TiC (162,519). Hard tools are also made by pressing and sintering a powder contg. a hard carbide such as WC and a low-m. metal such as Fe, Co or Ni (162,520). Cf. C. A. 27, 5710.

**Magnetic alloys.** The General Electric Co. Ltd. Ger. 581,673, Aug. 1, 1933. Addn. to 571,288 (C. A. 27, 3439). See Brit. 345,736 (C. A. 26, 418).

**Magnetic alloy.** Kinzokuzairyo Kenkyusho (Hakaru Masumoto, inventor). Fr. 749,713, July 28, 1933. Magnetic alloys for elec. app., etc., contain Si 0.5-16, Al 0.5-16% and Fe the rest. Ni, Co, Cr, W, Mo, Mn, V, Ti, Sn and Zn less than 10, Mg, Sb, Ta and Be less than 5 and B, Cu or P less than 2% may also be present to improve the magnetic properties and malleability.

**Sintered alloys.** Tool Metal Manufacturing Co. Ltd. Brit. 395,134, July 13, 1933. Addn. to 391,984 (C. A. 27, 5301). In a modification of the hard alloy for tools and working implements described in 391,984 the Ti carbide is wholly or partly replaced by another hard Ti compd., e. g., Ti nitride or boride or a mixt. of such compds.

**Alloy suitable for storage-battery terminals, etc.** Felix Nicodemus. U. S. 1,934,875, Nov. 14. In prepg. a corrosion-resisting alloy, a preliminary alloy contg. Sn, Sb and Cu is melted and then treated with Bi phosphate, ZnO and CuSO<sub>4</sub>, followed by the addn. of Hg, and the alloy thus prepd. is formed into articles such as battery posts without substantial change of temp.

**Aluminum alloys.** Robert T. Wood (to Aluminum Co. of America). U. S. 1,932,831, Oct. 31. An alloy which forms good castings contains Al together with Mg 2.9 and Ca 0.01-2.0%.

**Aluminum alloys.** Ludwig J. Weber (to Aluminum Co. of America). U. S. 1,932,835, Oct. 31. Alloys which have high resistance to corrosion contain Al together with Mg 0.4-2.0, Si 0.6-2.5 and Zr 0.1-1.0%, and are substantially free from Cu except as an impurity.

**Aluminum alloys.** Robert T. Wood and Otto H. Heil (to Aluminum Co. of America). U. S. 1,932,836, Oct. 31. Alloys which are suitable for casting comprise Al together with Mg 1.8, Zn 0.5-6.0 and Ca 0.1-2.0%.

**Aluminum alloys.** Robert T. Wood (to Aluminum Co. of America). U. S. 1,932,837, Oct. 31. Alloys which form good castings contain Al together with Mg about 1%, Mn about 0.5%, and Ca about 0.2%.

**Aluminum alloys.** Walter A. Dean and Louis W. Kempf (to Aluminum Co. of America). U. S. 1,932,838, Oct. 31. Alloys which have good properties at high temps. contain Al together with Mg 1.15 and Co 0.2-3.5%. U. S. 1,932,839 relates to alloys contg. Al together with Mg 3.0-7.5 and Ni 0.2-2.0%. U. S. 1,932,840 relates to alloys contg. Al together with Mg 3.8, Mn 0.5-4.0 and Ni 0.5-4.0%.

**Aluminum alloys.** Walter A. Dean and Louis W. Kempf (to Aluminum Co. of America). U. S. 1,932,841, Oct. 31. Alloys of high physical and tensile properties at elevated temps. and which are suitable for casting contain Al together with Mg 3.8, Mn 0.5-4.0, Ni 0.5-4.0 and Co 0.1-2.0%. U. S. 1,932,842 relates to otherwise similar alloys contg. Cr 0.1-2.0% instead of Co. U. S. 1,932,843 relates to similar alloys which may contain, instead of Co or Cr, about 0.1-0.75% of Ti, Zr, V, Mo or W. U. S. 1,932,844 relates to alloys similar to those of U. S. 1,932,841 contg. Cu 0.5-4.0%, instead of Co. U. S. 1,932,845 relates to alloys contg. Al together with Mg 3.0-7.5, Ni 0.2-2.0, and Sb or Bi (or a total of both) 0.05-0.4%. U. S. 1,932,846 relates to alloys contg. Al together with Mg 3.8, Mn 0.5-1.0, Ni 0.5-4.0 and Sb or Bi (or both together) 0.05-0.4%. U. S. 1,932,847 relates to otherwise similar alloys contg. also Cu 0.5-1.0%. U. S. 1,932,848 relates to alloys contg. Al together with Mg 2.15, and Sb or Bi (or both together) 0.05-0.1%. U. S. 1,932,849 relates to alloys of Al with Mg 3.8, Ni 0.5-4.0 and Co 0.1-3.0%. U. S. 1,932,850 relates to alloys of Al with Mg 3.8, Ni 0.5-3.5, Cr 0.3-3.5 and Sb or Bi (or a total of both) 0.05-0.1%. U. S. 1,932,851 specifies Al together with Mg 3.8, Ni 0.5-5.0, Cu 1.6 and Sb or Bi (or both together) 0.05-0.4%. U. S. 1,932,852 specifies Al together with Mg 3.8, Ni 0.5-4.0, Co 0.1-3.0 and Sb or Bi (or both) 0.05-0.4%. U. S. 1,932,853 specifies Al together with Mg 3.8, Cu 1.6, Cr 0.5-3.5 and Sb or Bi (or both) 0.05-0.4%.

**Aluminum alloys.** Robert T. Wood (to Aluminum Co. of America). U. S. 1,932,854, Oct. 31. Alloys which are suitable for casting contain Al together with Mg 2.10, Ni 0.2-5.0 and Ca 0.05-2.0%. U. S. 1,932,855 relates to alloys of Al with Mg 3.0-7.5, Ni 0.2-2.0, Sb or Bi (or both) 0.05-0.4 and Ca 0.05-2.0%. U. S. 1,932,856 specifies Al with Mg 3.8, Ni 0.5-4.0, Mn 0.5-1.0 and Ca 0.05-2.0%. U. S. 1,932,857 relates to similar alloys contg. also Sb or Bi (or both) 0.05-0.1%. U. S. 1,932,858 relates to alloys contg. Al together with Mg 2.15, Sb or Bi (or both) 0.05-0.4 and Ca 0.05-2.0%. U. S. 1,932,859 specifies Al together with Mg 2.10, Ni 0.2-5.0, Cr 0.5-3.5 and Ca 0.05-2.0%. U. S. 1,932,860 specifies Al together with Mg 3.8, Ni 0.5-3.5, Cr 0.5-3.5, Sb or Bi (or both) 0.05-2.0 and Ca 0.05-2.0%. U. S. 1,932,861 specifies Al together with Mg 2.10, Ni 0.2-5.0, Cu 1.6 and Ca 0.05-

2.0%. U. S. 1,932,862 specifies Al together with Mg 3-8, Ni 0.5-5.0, Cu 1.6, Sb or Bi or both 0.05-0.4 and Ca 0.05-2.0%. U. S. 1,932,863 specifies Al together with Mg 3-8, Ni 0.5-5.0, Co 0.5-3.5, Cu 0.5-5.0 and Ca 0.05-2.0%. U. S. 1,932,864 specifies Al together with Mg 3-8, Ni 0.5-5.0, Cu 1.6, one or more of the elements W, V, Mo, Ti and Zr 0.1-1.0, and Ca 0.05-2.0%. U. S. 1,932,865 specifies Al together with Mg 2-10, Ni 0.2-5.0, Co 0.1-3.5 and Ca 0.05-2.0%. U. S. 1,932,866 specifies Al together with Mg 3-8, Cr 0.5-3.5, Cu 1.6 and Ca 0.05-2.0%. U. S. 1,932,867 specifies Al together with Mg 3-8, Cr 0.5-3.5, Sb or Bi (or both) 0.05-0.4, Cu 1.6 and Ca 0.05-2.0%. U. S. 1,932,868 specifies Al together with Mg 3.8, Sb or Bi or both 0.05-0.4, Ni 0.5-4.0, Co 0.1-3.0 and Ca 0.05-2.0%. U. S. 1,932,869 specifies Al together with Mg 2.15, Co 0.1-3.5, Sb or Bi or both 0.05-0.4 and Ca 0.05-2.0%.

**Aluminum alloys.** Robert T. Wood (to Aluminum Co. of America). U. S. 1,932,870, Oct. 31. Alloys which are suitable for casting contain Al together with Mg 3.8, Ni 0.5-5.0, Cr 0.5-3.5, Cu 0.5-5.0 and Ca 0.05-2.0%. U. S. 1,932,871 specifies Al together with Mg 2.15, Co 0.1-3.5 and Ca 0.05-2.0%. U. S. 1,932,872 specifies Al with Mg 2.9, Ca 0.05-2.0, Mn 0.1-4.0 and Sb or Bi or both 0.05-0.4%.

**Aluminum alloys.** Walter A. Dean and Louis W. Kempf (to Aluminum Co. of America). U. S. 1,932,873, Oct. 31. Alloys of high phys. and tensile properties at elevated temps. and which are suitable for casting contain Al together with Mg 1.15, Co 0.2-3.5 and Sb or Bi or both 0.05-0.4%.

**Aluminum alloy.** Akt.-Ges. vorm. Skodawerke in Pilsen. Swiss 160,811, June 1, 1933. An alloy contains 15.9% Si, 3.10% Zn, 1.5-6% Cu, 1-2.5% Fe, 0.2-1.5% Mn, 0.05-1% Mg and the rest Al. Small amts. of Cr, Pb, Ni, Sn, Cd, Sb and Ti may be added. The product has good casting properties.

**Aluminum alloys.** Aluminium Ltd. Fr. 749,415, July 24, 1933. See Brit. 391,737 (C. A. 27, 5302).

**Corrosion resistant aluminum alloy.** Wm. E. McCullough (to Bohn Aluminum & Brass Corp.). U. S. 1,932,795, Oct. 31. An alloy which is suitable for exposure to the weather contains Al together with Cu 0.05-0.5, Cr 0.75-1.5, Co 0.25-0.5, Si 0.75-3.0 and Mg 0.5-1.25%. Cf. C. A. 27, 4209.

**Aluminum-magnesium alloys.** Aluminium Ltd. Fr. 749,451, July 25, 1933. Satisfactory castings of Al-Mg alloys contg. 5-20% of Mg are obtained by using Al which contains less than 0.8% of impurities and by using a molding material, e. g., sand contg. boric acid and an aq. soln. of diethyleneglycol, which will produce a protective vapor against the atm. around the hot metal.

**Aluminum-silicon alloy.** Theron D. Stay (to Aluminum Co. of America). U. S. 1,932,281, Nov. 7. An alloy which can be cast with substantial freedom from surface shrink or draws contains Al together with Si 3-15 and Ti 0.1-0.5%.

**Barium-aluminum alloy.** Egyesült Izzólámpa és Villamossági R. T. Brit. 395,989, July 27, 1933. A light alloy contains Ba 80-90 and Al 10-20% and may be made by the thermo-aluminic reduction of BaO, the reduced Ba alloying with the excess Al. The alloy may be used in discharge lamps for the removal of residual gases and for the activation of cathodes.

**Cobalt-tungsten alloys.** Vereinigte Stahlwerke A.-G. Brit. 396,380, July 25, 1933. Addn. to 356,080 (C. A. 26, 3226). The heat treatment described in 356,080 is applied to alloys contg. Co 41-85, W upward of 5, the Co and W amounting to at least 80, and Cr up to 40%. The Cr may be partially replaced by Fe up to 35% of the latter and the alloys may contain 5% of Mo, Mn, Ni, Cu, Al, V and (or) Ti. In an example an alloy of Co 49, W 38, Cr 12, V 1 and C 0.1% is quenched from 1200° and annealed at 800°.

**Copper alloy.** Kenneth W. Ray and Howard W. Gould (to American Brass Co.). U. S. 1,933,390, Oct. 31. An alloy which can readily be cast and worked contains Cu 82

and Si 3%, the remainder being substantially all Zn. *Cf. C. A. 27, 5302.*

**Copper alloys.** Theodor Laible. Swiss 162,791, Sept. 1, 1933. Fused Cu alloys are purified by adding wood charcoal dust and an alkali pyrosulfate to the fused mass. One part of a mixt. contg. 90%  $\text{Na}_2\text{S}_2\text{O}_7$  and 10% C is added to 100 parts of fused alloy.

**Thermal treatment of copper-nickel alloys.** Vereinigte Deutsche Metallwerke A.-G. (Eugen Vaders, inventor). Ger. 586,338, Oct. 20, 1933. Alloys contg. Cu 50-90, Ni 5-40, Fe 0.5-10 and Al 0.5-5% are heated at 700-900° for about 3 hrs. and then cooled gradually to atm. temp. Alloys of improved mech. properties are obtained.

**Iron-nickel-beryllium alloys.** Siemens & Halske A.-G. and Wilhelm Kroll. Fr. 41,574, Feb. 7, 1933. Addn. to 609,551 (*C. A. 24, 1838*). The mech. properties of alloys contg. Fe, Ni and Be, contg. 20% or more of Ni and Cr, are improved by cooling rapidly from 800-1200° and artificially aging by heating to 700-850°.

**Ferrous alloy carburizing boxes.** Harry L. Frevort and Francis B. Foley. U. S. 1,933,900, Nov. 7. Carburizing boxes are formed of an alloy contg. Fe together with C 0.05-1.2, Mn 2-10, Si 0.25-5.0, Cr 20-45, Cu 5-15 and Al 1-5%.

**Refining magnesium and its alloys.** Frederick Badger. U. S. 1,935,284, Nov. 14.  $\text{MgF}_2$  and hydrated Mg chloride are added to the metal to be melted to protect it from oxidation and effect refining. App. is described.

**Zinc alloys.** Leland E. Wemple and John R. Daesen. U. S. 1,933,490, Oct. 31. Alloys which are suitable for use in polished sheet form contain Zn together with Cu 0.025-0.245 and Ag 0.001-0.245%.

**Coating metals.** Horace Campbell Hall. Brit. 396,746, Aug. 4, 1933. A protective coating is formed on non-ferrous metals and alloys, particularly high Al alloys, by immersion in a hot soln. of  $\text{H}_3\text{PO}_4$  in ethylene glycol, glycerol and (or) trimethylene glycol. The coated articles are washed, preferably in dil. alk. soln., and may then be tumbled in air or oil a few hrs. at 100-200°. The coating may be used as a base for paint, varnish or enamel.

**Coating metal surfaces.** Francis H. Snyder and Stanley F. M. McLaren (to Industrial Research, Ltd.). U. S. 1,932,713, Oct. 31. Cleaned metal surfaces such as iron or steel are prepd. for coating with a metal or alloy of low m. p. by immersion in a molten bath of a Pb salt of a non-soap-forming fatty acid such as Pb acetate or propionate.

**Protective coating for metals.** Heinrich Klas (to Vereinigte Stahlwerke A.-G.). U. S. 1,932,699, Oct. 31. Metal surfaces are treated with a compn. comprising a soln. of induratable artificial resins in tar oil and an org. substance such as anthracene b. above 300°, while heating.

**Applying metal coatings such as lead to steel strips or the like.** David R. Ward (to Youngstown Sheet and Tube Co.). U. S. 1,933,401, Oct. 31. The material to be coated is passed through a molten bath of the coating metal, and, while the coating is still at a high temp., it is confined and compressed and is cooled in a non-oxidizing atm. App. is described.

**Apparatus for tinning metal sheets or plates in a bath of molten metal.** Claude A. Bollinger and John P. Rodgers (to American Sheet and Tin Plate Co.). U. S. 1,933,136, Oct. 31. Various details are described of an app. with sheet feeding rolls in an oil bath and soapstone "brushes" for at least one pair of the rolls.

**Coating galvanized surfaces.** Hans Hofer. Swiss

162,214, Sept. 1, 1933. Surfaces coated with Zn are roughened and coated, e. g., with lacquer or a mixt. of cement, lime and water.

**Apparatus for passing wire or metal strip through plating baths, etc.** Felix Kleiss. Ger. 586,121, Oct. 18, 1933.

**Babbitt-lined journal bearing shell.** Fred C. Jones and Richard W. Funk (to Bohn Aluminum & Brass Corp.). U. S. 1,932,787, Oct. 31. A lined bearing shell comprises a shell element formed of extruded bronze having less than 75% Cu content and of high thermal cond., and a thin lining of softer metal such as babbitt metal integrated with the shell to be in high thermal conductive relation to the shell for rapid dissipation of heat.

**Rotary percussive drills.** Tool Metal Manufacturing Co. Ltd. Brit. 396,943, Aug. 17, 1933. Inserted cutters for rotary percussive drills are made of a sintered alloy of "hard metal" with 5-12% of a softer metal, e. g., Fe, Co, Ni, Mn. "Hard metals" are borides, carbides, nitrides or silicides of W, Mo, Ta, B or Ti. An example is W carbide 92 and Co 8%.

**Saw blades.** Universal Steel Co. Brit. 397,151, Aug. 18, 1933. Hacksaw blades are made from steel contg. Cr 3-12 and W 2-12%, with or without V up to 3%, and contg. also embedded abrasive nodules of cementite. The C may be 0.7-1.3%. The sheets are annealed at 1425-1475° for about 18 hrs., cooled slowly and cut into blades which are hardened by heating just above the crit. point and quenching in oil and are afterward tempered.

**Method of sharpening files, rasps, etc., by treatment with mineral acid.** Hans Ludwig. Ger. 586,232, Oct. 21, 1933.

**Apparatus for welding, etc.** Sally Sandelowsky (to General Elec. Co.). U. S. 1,933,343, Oct. 31. Electrodes formed mainly of Ta carbide are used with their arcing terminals surrounded by a hydrocarbon gas. Zr and Hf carbides also may be used.

**Welding electrodes.** N. V. Machinerieën-en Apparaten Fabrieken. Brit. 396,331, Aug. 3, 1933. The core of a coated electrode for arc welding soft, alloy and other steels consists of acid Siemen's-Martin steel. A C steel may be used, deoxidizing and alloying substances being contained in the coating or wholly or in part alloyed with the core metal. The core should contain not more than 0.015% S. The deoxidizing substances may consist of Fe-Mn, Fe-Si, Mn, Si, Carborundum, Cr, Ni or Mo.

**Welding compositions.** I. G. Farbenind. A.-G. (Leo Schlecht, Walter Schubardt and Franz Duftschmidt, inventors). Ger. 581,749, Aug. 2, 1933. Addn. to 580,398 (*C. A. 27, 4770*). Powd. metals obtained from metal carboxyls are used in prepg. the compns. described in Ger. 580,398, with or without powd. metals otherwise obtained.

**Welding powder.** Pio Rossi. Swiss 161,102, June 16, 1933. A powder for autogenic welding of Al consists of a mixt. of KCl, LiCl and alkali metal sulfate.

**Uniting different pieces of "duralumin."** Wolfgang B. Klemperer (to Goodyear-Zeppelin Corp.). U. S. 1,934,673, Nov. 7. Substantially pure unalloyed Al is used as an intermediate material in forming a unitary welded joint.

**Solder for aluminum.** Friedrich Strasser. Swiss 162,522, Sept. 1, 1933. A solder for Al and its alloys contains Al, Zn, Sn and up to 20% Ag. *Cf. C. A. 27, 4770.*

**Melting pot for soldering ends of wires together.** Earl G. Klock (to The British Thomson-Houston Co. Ltd.). Brit. 396,420, July 24, 1933.

## 10 ORGANIC CHEMISTRY

CHAS. A. ROUILLE and CLARENCE J. WEST

**Molecular distillation in the organic laboratory.** F. A. Skishakov. *Uspekhi Khim.* 2, 354-60 (1933); *cf. Hill, C. A. 26, 5319; Hickman, C. A. 26, 1833; F. H. R.*

**The manufacturing processes for liquid organic products from industrial gases.** Étienne Audibert. *Ann. com-*

*hustibles liquides* 8, 757-869 (1933).—The manuf. of liquid org. products from CO and  $\text{CH}_4$  is discussed. The following subjects are presented: (1) thermodynamic study of the hydrogenation of CO, (2) catalytic hydrogenation of CO at atm. pressure, and (3) under pressure,

(4) MeOH synthesis from CO, (5) the pyrolysis of CH<sub>4</sub>, and (6) partial oxidation of CH<sub>4</sub>. Considerable data are presented for each subject. K. K.

**The principles of thermal decomposition and hydrogenation of organic compounds.** Étienne Audibert. *Ann. combustibles liquides* 8, 565 605 (1933).—The article deals with primary reactions of paraffins, cyclic hydrocarbons, hydroaromatics, olefins and aromatics, with superimposed reactions and catalytic cracking. Berthelot's hydrogenation method and Sabatier's discoveries and their applications are also discussed. K. K.

**Isoparaffins of high molecular weight.** Hermann Suida and Rudolf Planckh. *Ber.* 66B, 1445 54 (1933).—The known pure isoparaffins with 13 or more C atoms are tabulated with their phys. properties, and classified as end-branched (I), middle-branched (II) and multiple-branched (III), the side chains being attached, resp., at the  $\beta$ -C atom, at any other atom, and at 2 or more points. For a detn. of structure from phys. properties, the value of mol. wt. times  $n_0^{1/3}$  is the most useful. These values for the  $n$ -paraffins agree to 0.1 with those calcd. from 20.445 for CH<sub>2</sub> and 7.06 for H<sub>2</sub>, whereas values found for I are less, for II greater and for III either more or less than calcd.; large increments are shown by naphthenes and paraffin waxes. Attempts to synthesize isoparaffins from (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CIII (from (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CHOH, m. 33.5°,  $d_4^{20}$  0.9692,  $n_D^{20}$  1.4596) failed. However, (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CO and MeMgBr give (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>C(OH)Me (m. 40.1°,  $d_4^{20}$  0.8292,  $d_4^{25}$  0.8085,  $n_D^{20}$  1.4503,  $n_D^{25}$  1.4408), from which, via the iodide, is obtained (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CIMe (IV), m. 32.1°,  $d_4^{20}$  0.8214,  $d_4^{25}$  0.7821,  $n_D^{20}$  1.4517,  $n_D^{25}$  1.4395. Similarly obtained are (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>C(OH)Et, m. 37.8°,  $d_4^{20}$  0.8135,  $n_D^{20}$  1.4414. (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CH<sub>2</sub>Me, m. about 18°,  $d_4^{20}$  0.8214,  $d_4^{25}$  0.8001,  $n_D^{20}$  0.7934,  $d_4^{25}$  0.7666,  $n_D^{20}$  1.4583,  $n_D^{25}$  1.4469,  $n_D^{20}$  1.4404. (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>C(OH)Bu, m. 16.8°,  $d_4^{20}$  0.8219,  $d_4^{25}$  0.7996,  $n_D^{20}$  1.4417. (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>(HBr) (V), m. about 23°,  $d_4^{20}$  0.8263,  $d_4^{25}$  0.8206,  $d_4^{20}$  0.7913,  $n_D^{20}$  1.4602,  $n_D^{25}$  1.4579,  $n_D^{20}$  1.4425,  $n_D^{25}$  1.4108, viscosity (100  $\eta$ ) from 42.01 at 20° to 4.11 at 100°. (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>C(C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>, m. 16.7°,  $d_4^{20}$  0.8116,  $d_4^{25}$  0.7811,  $n_D^{20}$  1.4450. (C<sub>15</sub>H<sub>31</sub>)<sub>2</sub>CHC<sub>15</sub>H<sub>31</sub>, m. 45.5–46°,  $n_D^{20}$  1.4450. Dipentacyclononylcyclononol is not formed by this method. IV and V on distn. at 1 atm. yield cryst. paraffins, m. 68.9° and 62.3°, resp.; V is decompd. by ClSO<sub>3</sub>H and SbCl<sub>5</sub>. H. A. Beatty

**1,4-Addition and subtraction reactions in hydrocarbon chemistry.** Louis S. Kassel. *J. Chem. Physics* 1, 749 50 (1933). Qual. quantum mech. arguments show that the activation energy for 1,4-dehydrogenation of 2-butene should differ little from that for 1,2-dehydrogenation of a paraffin. The model used for the former reaction applies also to butane, the products then being H<sub>2</sub> + 2C<sub>2</sub>H<sub>2</sub>; 1,4-loss of methane, ethane, etc., is predicted by analogy. These reactions should occur in the pyrolysis of paraffins with chains of at least 4 C atoms. The results of Frev and Hepp (*C. A.* 27, 2670) are interpreted as well in this way as by the free radical chains of Rice (*C. A.* 27, 3910). Morris Muskat

**The chemical constitution of nitric acid esters.** A. Majrich. *Chimie & industrie Special No.*, 727 35 (June, 1933). From a study of the sapon. of various HNO<sub>3</sub> esters by means of NaHSO<sub>3</sub> and Na<sub>2</sub>S, M. concludes that, of the 3 types of formula which have been suggested, the most probable is RCH<sub>2</sub>OONO. A. P.-C.

**Action of concentrated aqueous sodium hydroxide solution on nitromethane.** H. Shupley Fry and Joseph F. Treon. *Rec. trav. chim.* 52, 827 32 (1933).—Each reaction mixt. contained 13.34 cc. of pure MeNO<sub>2</sub> and 250 cc. of aq. NaOH (5, 10, 15 N), and was heated in a 500-cc. Cu flask in an oil bath at 130–40° for 10 hrs. The yields of Na<sub>2</sub>CO<sub>3</sub> and NH<sub>3</sub> showed that 48% of the MeNO<sub>2</sub> underwent an oxidation-reduction reaction which was practically 100% in conformity with the equation: MeNO<sub>2</sub> + 2NaOH  $\rightarrow$  Na<sub>2</sub>CO<sub>3</sub> + NH<sub>3</sub> + H<sub>2</sub>O. L. K.

**The condensation of sulfamide, dimethylsulfamide, and aniline-*p*-sulfonamide with formaldehyde.** Frederick C. Wood and Albert E. Battye. *J. Soc. Chem. Ind.* 52,

1 346 9T (1933).—SO<sub>2</sub>(NH<sub>2</sub>)<sub>2</sub> (m. 92–3°; best prepd. by the method of Ephraïm (*C. A.* 4, 1000)) with 2–4 mol. parts CH<sub>2</sub>O at  $p_H$  4–7.5 and room temp., forms a clear, hard, photostable resin, insol. in org. solvents, hydrolyzed by boiling H<sub>2</sub>O to amorphous SO<sub>2</sub>[N(CH<sub>2</sub>OH)]<sub>2</sub>. NH<sub>2</sub>SO<sub>2</sub>NMe<sub>2</sub>, CH<sub>2</sub>O and a trace of HCl give in 2–3 days a cryst. anhydride of Me<sub>2</sub>NSO<sub>2</sub>N(CH<sub>2</sub>OH)<sub>2</sub>, m. 185° (decompn.), insol. in boiling water and org. solvents. *p*-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NH<sub>2</sub> and CH<sub>2</sub>O yield, probably, a mixt. of *p*-CH<sub>2</sub>:NC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NH<sub>2</sub> and *p*-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NHCH<sub>2</sub>OH. H. A. Beatty

**Esters of tetrathioorthosilicic acid.** II. H. J. Backer and F. Stenstra. *Rec. trav. chim.* 52, 912 15 (1933).—The compds. Bu, sec-Bu, iso-Bu, Ph and *p*-tolyl tetrathioorthosilicates have been prepd. and identified analytically. The b. p.,  $n$  and  $d$  are given for each. *tert*-Bu mercaptide gives a trithiosilicate, showing that but 3 Cl atoms of SiCl<sub>4</sub> are replaceable in some cases in this reaction. R. H. Lambert

**Simple esters of tetrathioorthostannic acid.** H. J. Backer and J. Kramer. *Rec. trav. chim.* 52, 916 22 (1933). The prepn. of esters of tetrathioorthostannic acid has been accomplished in several ways. Those described are the Me, Et, Pr, iso-Pr, Bu, iso-Bu, *tert*-Bu, and *tert* Am esters. The crystals of these compds. are described. The fact that substances having filled mols. have higher m. ps. than those of mols. less compact or less sym. is again exemplified. R. H. Lambert

**The action of sodium on aliphatic diazo compounds.** Eugen Müller and Helmut Disselhoff. *Naturwissenschaften* 21, 661 (1933). Metallic Na will give gas evolution and finally complete decolorization of an ether soln. of CH<sub>2</sub>N<sub>2</sub>. CH<sub>2</sub>N<sub>2</sub> free of EtOH and H<sub>2</sub>O (Arndt, *C. A.* 24, 3985) was decompd. by Ph<sub>3</sub>CNa under N<sub>2</sub>. The ppt. washed with abs. Et<sub>2</sub>O and decompd. with H<sub>2</sub>O yielded part of the CH<sub>2</sub>N<sub>2</sub> back. A Na compd. of CH<sub>2</sub>N<sub>2</sub> could not be isolated; the ether-dry prepn. exploded in N<sub>2</sub>. It reacted vigorously with BzCl, giving C<sub>6</sub>H<sub>5</sub>ON<sub>2</sub>, not identical with N<sub>2</sub>HCCOPh. PhCN<sub>2</sub> also reacts with Ph<sub>3</sub>CNa without gas evolution, forming an ether-sol compd. which on decompn. with H<sub>2</sub>O yields C<sub>6</sub>H<sub>5</sub>I<sub>2</sub>N<sub>2</sub> (M = 106) and which is not identical with (Ph<sub>2</sub>C=N)<sub>2</sub>. The reactions are similar to the decolorization of PhN<sub>3</sub> by Ph<sub>3</sub>CNa (cf. Hantzsch and Lehmann, *Ber.* 34, 2522 (1901)). B. J. C. van der Hoeven

**New process for concentrating acetic acid.** Bruno v. Tetmajer. *Chimie & industrie Special No.*, 866 7 (June, 1933); cf. *C. A.* 26, 1127. The merits of the Clamecy process, revealed by several yrs. operation at the plant of the Soc. des Produits Chimiques de Clamecy, are brought out. A. Papineau-Couture

**Acetic acid dehydration.** Donald F. Othmer. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint), 17 pp. The paper classifies by types some of the methods proposed and in use for removing part or all of the water from an AcOH soln. Only a few of the many processes available are discussed, but the general theories are compared. The chem. processes, distn., extn., refrigeration and other methods are given. C. L. Mantell

**Addition of hydrogen bromide to olefinic acids.** R. P. Linstead and H. N. Rydon. *Nature* 132, 643 (1933); cf. *C. A.* 27, 4214. Expts. with allylacetic acid (I) indicate that the peroxide effect, as suggested by Kharasch (*C. A.* 27, 3444) for explaining the direction of addn. of HBr to allyl and vinyl bromides, is of secondary importance here. Addn. of HBr to I in hexane normally yields pure  $\delta$ -bromovaleric acid; L. and R. have been unable to reverse this in the presence of H<sub>2</sub>, Ph<sub>2</sub>NH or hydroquinone. Both freshly prepd. I and a very stale sample which gave a strong peroxide reaction yielded  $\gamma$ -bromovaleric acid in the absence of solvent. Reversal of the addn. of HBr to I in the absence of solvent can be induced by addn. of Bz<sub>2</sub>O<sub>2</sub>, which gives the  $\delta$ -Br acid. Apparently the importance of the peroxide effect varies with different unsatd. acids and cannot account for the influence of the solvent on the addn. of HBr to I. Louise Kelley



**Synthesis of nonadecylic acid.** Shiehirō Shiina. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 569 (1933).— $C_{19}H_{39}COOH$  was synthesized by the following scheme: Et stearate  $\rightarrow$  octadecyl alc.  $\rightarrow$  octadecyl iodide  $\rightarrow$  octadecyl cyanide  $\rightarrow$  nonadecylic acid. The m. p. of the acid was found to be 68.2–84°.

**Chloroacetic acid.** G. A. Kirkhof and A. I. Zilberg. *Khim. Farm. Prom.* 1933, 192 3. —The difficulties of distn. are eliminated by chlorinating in porous clay vessels with Schott's gas distributor. The reaction is complete when the gravity reaches 36° B $\phi$ .

**The more recent literature on ethylene oxide.** II. H. Kemper. *Z. Gesundheitstsch. Stadtehyg.* 25, 341 6 (1933); cf. *C. A.* 27, 5296.—A review. Forty-eight references.

**Industrial process for the manufacture of ethylene oxide and ethylene glycol.** Jacques Françon. *Chimie & Industrie Special No.*, 869 75 (June, 1933); cf. Leulier, *C. A.* 26, 23.  $C_2H_4$  can be oxidized directly to pure  $C_2H_4O$  and  $CO_2$  by using a sp. catalyst, the nature of which is not specified beyond stating that it is a binary mixt., one of the constituents of which acts as an activator. Lab. expts. carried out on a product obtained by dehydration of EtOH and contg. 92%  $C_2H_4$  showed that: (1) the optimum air: $C_2H_4$  ratio is 10; (2) the optimum temp. is 375°; (3) injection of  $H_2O$  reduces the production of both  $C_2H_4O$  and  $CO_2$ , but the latter to a greater extent than the former; (4) formation of  $CO_2$  is not due to oxidation of  $C_2H_4O$  but to the direct oxidation of  $C_2H_4$ ; (5) with a tube 2.3 mm. in internal diam., the optimum rate of flow of gas is 80 l. per hr.; with lower rates the production of both  $C_2H_4O$  and  $CO_2$  falls off slightly; with higher rates the production of  $C_2H_4O$  falls while that of  $CO_2$  remains practically const.; (6) with different sized tubes, the optimum rate of flow is proportional to the cross section of the tube; (7) at the optimum rate of flow, reducing the air: $C_2H_4$  ratio (below 10) rapidly reduces the formation of  $C_2H_4O$ , while that of  $CO_2$  remains const. or tends to increase; (8) reducing the temp. below 375° rapidly reduces the production of  $C_2H_4O$  and has but little effect on that of  $CO_2$ ; increasing it above 375° accelerates both reactions, the formation of  $CO_2$  increasing more rapidly than that of  $C_2H_4O$ ; (9) increasing the pressure up to 50 kg. per sq. cm. decreases the production of  $C_2H_4O$  and increases the production of  $CO_2$ , possibly because of partial combustion of the  $C_2H_4O$ . Ordinary purified coke-oven gases still contain S and P compds. and about 2%  $C_2H_2$ , which poison the catalyst and which can be satisfactorily purified by passing over CuO at 150–200°. From a discussion of the industrial application of the process, it is concluded that this can be successfully carried out with purified coke-oven gases, by using an air: $C_2H_4$  ratio of 1:3, adding about 5% pure  $O_2$  to the mixt., and passing the mixt. successively through a series of tubes contg. catalyst of increasing degree of activity.

**Formation of the chlorohydrins.** VI. A few higher homologs of ethylene chlorohydrin. Harald Nilsson and Lennart Smith. *Z. physik. Chem.* A166, 136 46 (1933); cf. *C. A.* 14, 2629.—The alk. and neutral decompn. of  $\alpha$ -dimethyl-, trimethyl-, tetramethyl- and  $\alpha$ -diethyl-ethylene chlorohydrin were investigated. G. M. M.

**Action of phosphorus tribromide on ethylenic  $\alpha$ -hydroxy nitriles.** R. Rambaud. *Compt. rend.* 197, 689 91 (1933). When  $PBr_3$  was added to vinylglycolonitrile,  $CH_2=CHCH(OH)CN$ , in  $CCl_4$  or dry  $Et_2O$ , an intramol. rearrangement occurred and propionyl cyanide,  $EtCOCN$  (b. 109–110°,  $d_4^{20}$  0.958,  $n_D^{20}$  1.392, was formed. Most of the  $PBr_3$  was recovered unchanged by distn. I. added to water, reacted with evolution of heat, forming  $H_2CO_2$  and HCN.  $\alpha$ -Hydroxypentenic nitrile,  $MeCH=CHCH(OH)CN$ , b. 108–109°,  $d_{15}^{20}$  0.980,  $n_D^{20}$  1.4415, was prepd. and found to behave like vinylglycolonitrile in the above reactions. L. E. Gilson.

**Ether-like compounds.** XI. An ether lactone with a seven-membered ring. M. H. Palomaa and Unto Toukola. *Ber.* 66B, 1629–32 (1933); cf. *C. A.* 27,

3698.—( $\gamma$ -Methoxypropoxy)acetic acid, prepd. from  $MeOCH_2CH_2CH_2OH$  in the usual way, b. 140–141°,  $d_4^{20}$  1.1240, 1.1164, 1.1110 at 10°, 20° and 30°,  $n_D^{20}$  1.43484, 1.43693, 1.44293, 1.44653 for  $\alpha$ ,  $D$ ,  $\beta$  and  $\gamma$  at 20°; with  $HBr$  it gives the  $\gamma$ -HO acid (I) but it is difficult to obtain the product free of halogen and I was obtained in purer form from 1 atom Na, 4 mols.  $CH_2(CH_2OH)_2$  and 0.5 mol.  $ClCH_2CO_2H$ . The excess of glycol was removed by vacuum and steam distn., and since I is extraordinarily little sol. in ether the soln. was evapd. to dryness, taken up in fuming  $HCl$  and dioxane, treated with a current of  $H$  for some hrs., filtered from the  $NaCl$ , freed from the dioxane and water by distn. *in vacuo*, purified by alternate addn. of small amts. of water and distn. *in vacuo*, and finally distd. *in vacuo*. If the bath temp. is kept at 90–100° and air is passed through the liquid under about 1 mm. pressure, 3 distns. give a thick oil consisting of I and its lactone; at a sufficiently high temp. this is converted largely into the lactone, m. 135.2–6.0°, mol. wt. in freezing benzene 121, sol. in hot water with neutral reaction. The hydrolysis velocity was measured in  $H_2O$ - $Me_2CO$  (1:1 by vol.) at 25° and in water-dioxane at 25° and 35° with  $HCl$  as catalyst (concn. of lactone, around 0.025  $N$ ; of  $HCl$ , about 0.1 and 0.2  $N$ ). The hydrolysis const. (time in min.) reduced to 1  $N$   $HCl$  as catalyst is  $k_{25}$  0.0091 in  $H_2O$ - $Me_2CO$  and  $k_{35}$  0.00478 and  $k_{25}$  0.0104 in water-dioxane. C. A. R.

**Condensation of bromal hydrate with aliphatic amides.** R. H. Velburgi. *J. Indian Chem. Soc.* 10, 383 90 (1933). The  $Ac$  (I),  $Bz$  (II), anhydro (III),  $\beta$ -tribromo- $\alpha$ -chloroethyl (IV), and  $Me$  (V) derivs. of  $RCONHCH(OH)CH_2Br$  (VI) were prepd. M. and b. ps.:  $R = H$ , VI 139–40°, I 107–8°, II 139°, III chars 160°, m. 170°, IV b. 80°,  $R = Me$ , II 122°, III 183–5°, IV b. 76°, chloroamide of IV b. 138°,  $R = Et$ , VI 171°, I 96–8°, II 113–15°, III 192°, IV b. 120°, V 85–7°,  $R = Pr$ , I 96–8°, II 122°, III 155°, IV b. 126°, V 101°;  $R = iso-Pr$ , VI 156°, I 141–3°, II 131–2°, III 155°, V 135°;  $R = iso-Bu$ , VI 149°, I 110–2°, II 98–100°, III 130–2°, V 115–17°;  $R = C_2H_5$ , VI 146°, I 120–2°, II 132–4°, III 153°, V 105–7°;  $R = C_6H_5$ , VI 142°, I 135–6°, II 126°, V 93–5°;  $R = C_6H_{11}$ , VI 139°, I 120°, II 108–10°, III 166°, V 85°;  $R = C_6H_{13}$ , VI 139°, I 121°, II 123–6°, V 72–4°. When VI was reduced with  $HOAc$  and  $Zn$  dust the corresponding  $\beta$ -dibromoethylene derivs. with the following m. ps. were obtained:  $R = Et$ , 84–6°;  $Pr$ , 78–80°;  $iso-Pr$ , 80–2°;  $iso-Bu$ , 68–70°;  $C_6H_{11}$ , m. 74–5°;  $C_6H_{13}$ , m. 115°;  $C_6H_{17}$ , m. 63–4°. M. ps. of mono- $Br$  derivs.:  $R = C_6H_{11}$ , 61–3°;  $C_6H_{13}$ , 67–71°;  $C_6H_{17}$ , b. 148°. J. W.

**Synthesis of succinic acid.** M. S. Rozhdvestvenskii, B. A. Slasenna and N. O. Valter. *Khim. Farm. Prom.* 1933, 117–20. Tech. tartaric acid (960 g.), 240 g. of red P, 144 g. of I and 960 cc. of 96%  $AcOH$  are heated slowly in a 5-l. flask, with agitation, to 100–105°. The temp. is raised to 140° and the mixt. refluxed for 3 hrs.; then most of  $AcOH$  is distd. off, the mixt. dissolved in hot  $H_2O$ , filtered with activated charcoal, cooled and the crystals of succinic acid are filtered and washed with  $H_2O$  at 4°. The I is regenerated. L. N.

**The velocity of alcoholysis of esters of dibasic acids.** Z. H. Patel and H. E. Watson. *J. Indian Ind. Sci.* 16A, 55–67 (1933).—The velocity of alcoholysis by  $MeOH$  and  $EtOH$  of, resp. the di- $Et$  and di- $Me$  esters listed below is detd. at 30° by a dilatometric method, with an excess of alc. and  $HCl$  as catalyst, and by taking precautions to exclude  $H_2O$ . Except for the oxalates, the data support the assumption that, for a given sym. ester, the reaction of each terminal group is unimol., and occurs with  $d$  rate and vol. change equal to, and independent of, that of the other group, giving a unimol. velocity const. for the reaction as a whole. With the oxalates there is a slight effect of one terminal group on the other, OMe having a retarding influence relative to  $OEt$ . In the unsym. malate the reaction velocity of each group is unimol., but the 2 rates are no longer equal. The velocities are a little less than proportional to the  $HCl$  concn. in the range studied, about 0.03–0.11  $N$ . The esters studied

and the resp. velocity consts. in min.<sup>-1</sup> at 0.05 *N* HCl are as follows: di-Me oxalate 248, malonate 39.5, succinate 50.3, adipate 111, suberate 113, azelate (*b*<sub>28</sub> 175°) 114, sebacate 114; di-Et oxalate 762, malonate 142, succinate 212, adipate 442, tartrate 76.5, malate 554 ( $\alpha$  group) and 116 ( $\beta$  group). H. A. Beatty

**A new acetonesugar.** R. Weidenhagen. *Pharm. Monatsh.* 14, 171 (1933).<sup>2</sup> By the action of Ag<sub>2</sub>CO<sub>3</sub> or Ag<sub>2</sub>O on acetobromoglucose in dry acetone a new acetonesugar may be produced a bis(tetraacetylglucosyl) acetal of acetone, prismatic needles, m. 152.3°. H. M. B.

**The 2,4-dinitrophenylhydrazine reagent with carbonyl compounds.** C. Torres and S. Brosa. *Anales soc. españ. fis. quim.* 31, 649 (1933); cf. *C. A.* 27, 1590. The behavior of  $\alpha$ -hydroxycarbonyl compds., especially sugars, with 2,4-dinitrophenylhydrazine (I) was investigated. The utility of I in the detn. of solns. of MeCO and CH<sub>2</sub>O, of AcH from the oxidation of lactic acid, and the detn. of PhCH·CHClO in cinnamon essence, aq. exts. and tincture of cinnamon, was tested. E. M. S.

**The glycerolysis of sucrose.** H. Vogel. *Ber.* 66B, 1670 (1933); cf. *C. A.* 22, 1480; Berner, *C. A.* 27, 4780. In connection with the depolymerization of inulin with glycerol, expts. had also been made with sucrose in attempts to prep. in pure form the glycerol fructoside which had been obtained from inulin. Although a cryst. and absolutely homogeneous product was not obtained the results gave certain indications that a degradation of the sucrose had occurred. V. considers the intermediate formation of a fructose anhydride very probable. Five g. sucrose was heated 1.5 hrs. at 130° under 12 mm. with 30 g. anhyd. glycerol and the product was then freed from most of the glycerol in a high vacuum and thoroughly stirred with abs. alc. contg. 10% ether, which threw out a viscous sirup. From this sirup were obtained phenylglucosazone and glucose  $\beta$ -pentaacetate, while the alc.-ether soln. yielded a sirup (glycerol fructoside) which tasted bitter, evolved a very strong odor of acrolein when heated with KHSO<sub>4</sub>, did not reduce Fehling soln., showed in water  $[\alpha]_D^{20}$  26.14° (changed to 79.5° when boiled 0.5 hr. with dil. HCl) and slowly gave phenylglucosazone when boiled with aq. PhNHNH<sub>2</sub>.  $\alpha$ -Galactosan heated in the same way with glycerol gave a bitter sirupy product which did not reduce Fehling soln., and rhamnosan and arabinosan yielded similar products.  $\alpha$ -Glucosan heated 1 hr. at 120° with 10 parts anhyd. MeOH gave  $\alpha$ -Me glucoside and  $\alpha$ -galactosan yielded  $\alpha$ -Me galactoside. C. A. R.

**Lignin.** VI. Armin Hillmer. *Ber.* 66B, 1600 (1933); cf. *C. A.* 25, 4277. The interdependence of the ultra-violet absorption spectra and chem. constitution permits conclusions concerning the structure of lignin to be made from the comparison of the ultra violet absorption consts. of lignin and numerous aromatic substances. A series of ultra-violet color groups has been compiled, comprising families of substances with similar spectra. All spectra of the members of such groups can be distinguished from each other though their extinction values are of the same order of magnitude and the displacement of their max. apts. to a few  $m\mu$  at the most. From numerous quant. measurements of the absorption spectra of various lignins it has been shown that lignin belongs to the group related to pyrocatechol and ethyllignin from beech to the pyrogallol group. Lignin may have a basic unit made up of di- or trihydric, partially esterified phenols with a side chain of 3 C atoms contg. neither double linkage nor CO group in conjunction with the benzene ring. The % content of optically active material ( $X\%$ ) in an unknown substance can be estd. from the relation  $X\% = E' \cdot M/10e$  where  $e$  is the molar extinction coeff. of any member of the same ultra-violet color group and  $E'$ ,  $M$  are the extinction coeff. and mol. wt. of the unknown substance. It is known that the members of homologous series contg. a regularly occurring atom group with a characteristic spectrum show one and the same spectrum and that equimol. solns. show an increase in intensity corresponding to the no. of such recurring ab-

sorbing groups (*C. A.* 26, 4300). It is shown by the spectrochem. behavior of a series of gallic acid esters of polyhydric alcs. that this spectral additivity holds good for long chains in a polymer homologous series. Thus substances which are polymer homologs show the same spectrum as the simple fundamental unit and so since the ultra-violet absorption spectrum of alkali lignin from rye straw is that of the unit C<sub>10</sub>H<sub>12</sub>O<sub>4</sub> it becomes possible to show that lignin is practically entirely built up from its aromatic fundamental unit. From the formula given ( $E'$  for ash-free lignin from rye straw, 21,170;  $M$  for C<sub>10</sub>H<sub>12</sub>O<sub>4</sub>, 196 and  $e$  for eugenol, 4470)  $X = 93\%$ . This finding agrees with the investigations on purely chem. grounds into the constitution of lignin made by Freudenberg and his co-workers. C. R. Addinall

**Physical constants of cyclic hydrocarbons.** P. Martin Vivaldi. *Anales soc. españ. fis. quim.* 31, 645 (1933).

The sp. deviation of Dargmois (*C. A.* 15, 622), the parachor of Sugden (*C. A.* 19, 197) and the Raman spectra of ethyl-*l*-cyclopentene, ethyl-*l*-cyclohexene, ethylcyclopentane, and ethylcyclohexane were detd. The results agree with those obtained by others. E. M. S.

**Naphthenic acids and naphthenesulfonic acids. III. Chemistry, physics and physiology of naphthenic acids.** M. Naphthal. *Fettchem. Umschau* 40, 176 (1933); cf. *C. A.* 27, 5062. - A résumé including patent literature. P. Escher

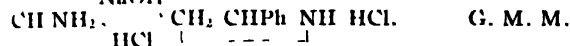
**Some new hydroaromatic compounds of the cyclooctane series.** M. Godchet and Mlle. Cauquil. *Chimie & Industrie Special No.*, 1019 23 (June, 1933); cf. *C. A.* 22, 1335, 1960, 3147; 25, 3972. - Treatment of Me cycloheptanocarboxylate with MeMgI gives asym. dimethylhexamethylene glycol (isopropylcyclohexylpinacol) (I), *b*<sub>p</sub> 128.30°, m. 45°. Dehydration of I, either by H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> at 135-40° in the presence of H<sub>2</sub>O or by concd. H<sub>2</sub>SO<sub>4</sub> at 0°, gives: (1) mainly C<sub>10</sub>H<sub>16</sub>, *b*<sub>p</sub> 68°, *b*<sub>100</sub> 188.90°, *d*<sub>4</sub><sup>20</sup> 0.8868, *n*<sub>D</sub><sup>20</sup> 1.4946, mol. refraction 45.68 (calcd. 45.24), Nekrasov's const. (*C. A.* 23, 4380) 32.31; (2) a small amt. of mixed ketones probably contg. some 2,2-dimethylcyclooctanone. Reduction of  $\alpha$ -methylcyclooctanone: (1) by Pt black, gives  $\alpha$ -methylcyclooctanol A, *b*<sub>16</sub> 100.1°, *b*<sub>20</sub> 201.2°, *d*<sub>4</sub><sup>20</sup> 0.9400, *n*<sub>D</sub><sup>20</sup> 1.4750, mol. refraction 42.52 (calcd. 43.08), gives an acid phthalate m. 104°, and a phenylurethan m. 137°; (2) by abs. alc. and Na, gives  $\alpha$ -methylcyclooctanol B, *b*<sub>16</sub> 103.4°, *d*<sub>4</sub><sup>20</sup> 0.94304, *n*<sub>D</sub><sup>20</sup> 1.4808, mol. refraction 42.38 (calcd. 43.08), gives an acid phthalate m. 119.20°, and a phenylurethan m. 151°. It has not yet been detd. which of the 2 is the *cis*- and which the *trans*-isomer. Reduction of  $\alpha,\alpha$ -dimethylcyclooctanone in abs. alc. by Na gives  $\alpha,\alpha$ -dimethylcyclooctanol, *b*<sub>6</sub> 91.2°, *b*<sub>24</sub> 219.20°, *d*<sub>4</sub><sup>20</sup> 0.9540, *n*<sub>D</sub><sup>20</sup> 1.4798, mol. refraction 47.50 (calcd. 47.60), gives an acid phthalate m. 110.3°, and a phenylurethan m. 147°. Cyclooctylcarboxylic acid, prepd. by treating the Mg deriv. of cyclooctyl bromide with CO<sub>2</sub> gas, *b*<sub>19</sub> 150°, *d*<sub>4</sub><sup>20</sup> 0.9931, *n*<sub>D</sub><sup>20</sup> 1.4779, mol. refraction 45.03 (calcd. 45.20); the acid chloride, *b*<sub>19</sub> 110°, with NH<sub>3</sub> aq. gives cyclooctylcarboxamide, m. 191°. A. P.-C.

**Decomposition of phenyl dichloriodide. IX. Molecular weight and electrical conductivity of its solutions.**

**X. Structure of a typical salt representing dichloriodides, trichloriodide, and phosphorus pentachloride.** Enrique V. Zappi and Sta. Juanita Cortelezzi. *Anales asoc. quim. Argentina* 21, 71 99 (1933); cf. *C. A.* 27, 2139. PhICl<sub>2</sub> solns. in PhN(O)<sub>3</sub> or POCl<sub>3</sub> show low cryoscopic mol. wt., indicating disson. The elec. cond. of solns. in POCl<sub>3</sub>, AsCl<sub>3</sub>, or CHCl<sub>3</sub> is zero. Solns. in pyridine or PhN(O)<sub>3</sub> have low elec. conductivities, 8.3 and 0.5, resp., which are in accord with those found by others for substances whose structures resemble that of PhICl<sub>2</sub>, e. g., pyridine chloriodide, ICl<sub>3</sub>, and PCl<sub>3</sub>, indicating disson. in i.-p. detns. is not of ionic nature, but mol., e. g., PhICl<sub>2</sub> · Cl<sub>2</sub> + PhI. Iodonium structures lack exptl. support. The low elec. cond. can be explained by formation of complexes with the solvent, comprising sluggish ions of high mol. wt. A stable PhICl<sub>2</sub> was prepd. The soly. of PhICl<sub>2</sub> in POCl<sub>3</sub> was detd. E. M. S.

**Dinitropolyhalogen derivatives of benzene.** Shiam Sundar Joshi and Shrirang M. Sane. *J. Indian Chem. Soc.* **10**, 459-63 (1933).—4,2,6-Br(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>Cl (I), treated in boiling EtOH with a current of NH<sub>3</sub>, produced 4,2,6-Br(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>NH<sub>2</sub>. I, treated similarly with the corresponding amine, gave the following: 4-bromo-2,6-dinitrodiphenylamine; 4-bromo-2,6-dinitrodiphenylamine, m. 119°; 4-bromo-2,6-dinitrophenylpiperidine, m. 110°; bis(bromodinitrophenyl)-p-phenylenediamine, m. above 300°; 3-bromo-5-nitrophenoxazine, m. 179°; 2-phenyl-5-bromo-7-nitropseudoaziminobenzene, m. 179°. Similarly, 4,2,6-I(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>Cl gave 4-iodo-2,6-dinitroaniline, m. 175°; 4-iodo-2,6-dinitrodiphenylamine, m. 135°; 4-iodo-2,6-dinitrophenylpiperidine, m. 90°; 3-iodo-5-nitrophenoxazine, m. 210°; 2-phenyl-5-iodo-7-nitropseudoaziminobenzene, m. 209°. 2,4,6-Br(O<sub>2</sub>N)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>Cl likewise produced 2-bromo-4,6-dinitrophenylpiperidine, m. 127°; 2-phenyl-7-bromo-5-nitropseudoaziminobenzene, m. 174°. 2,4,6-I(O<sub>2</sub>N)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>Cl similarly gave 2-iodo-4,6-dinitroaniline, m. 158°; 2-iodo-4,6-dinitrodiphenylamine, m. 144°; 2-iodo-4,6-dinitrodiphenylamine, m. 122°; bis(iododinitrophenyl)-p-phenylenediamine, m. above 300°; 2-phenyl-7-iodo-5-nitropseudoaziminobenzene, m. 192°; 3,5-dinitrophenoxazine, m. 214-15°. Julius White

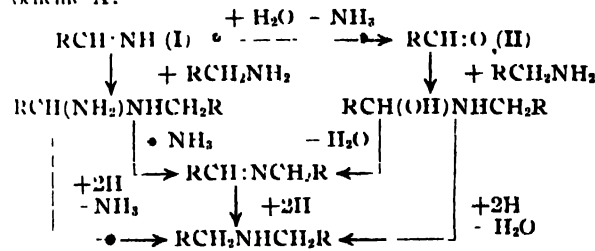
**The kinetics of transformation of haloalkylamines into heterocyclic compounds. V. The influence of phenyl groups on ring closure and breaking.** H. Freundlich and G. Salomon. *Z. physik. Chem.* **A166**, 161-78 (1933); cf. *C. A.* **20**, 3686. The following reaction was studied in acid and basic soln. at various temps.: PhCHCl-NaOH



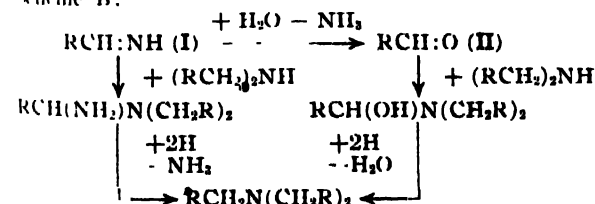
**New and improved methods for the synthesis of pharmacologically important amines. VII. Synthesis of secondary and tertiary amines by the hydrogenation of nitriles.** Karl Kindler and Fritz Hesse. *Arch. Pharm.* **271**, 439-45 (1933); cf. *C. A.* **27**, 278. In the reduction of nitriles there are formed, in addn. to primary, the corresponding secondary and tertiary amines, due apparently to a complication in the procedure, e. g., inter-

mediate appearance of an aldimine:  $\text{RCN} \xrightarrow{+2\text{H}} \text{RCH:NH} \xrightarrow{+2\text{H}} \text{RCH}_2\text{NH}_2$ . The aldimine (I) forms, either directly or after preliminary transition to an aldehyde (II), with primary amine already present, compds., the reduction of which leads to a secondary amine (scheme A). This procedure thereupon undergoes repetition, with formation of a tertiary amine (scheme B).

Scheme A:



Scheme B:



An analysis of these schemes reveals the possibility of preparing any desired secondary or tertiary amine from

nitriles. To this end there is added, at the initial stage of the catalytic hydrogenation of a nitrile  $\text{RCN}$ , a primary or secondary amine  $\text{R}'\text{NH}_2$  or  $\text{R}'\text{NHR}'$ . These amines thereupon react with the intermediate products, in accordance with the scheme A or B, resp., to yield the compd.  $\text{RCH}_2\text{NHR}'$  or  $\text{RCH}_2\text{NR}'^2$ . As examples of the new procedure, syntheses of epinine, hordenine and hydroxyhordenine are described. W. O. E.

**$\beta$ -Phenylhydroxylamine.** Eugen Muller and Erich Lindemann. *Angew. Chem.* **46**, 681-5 (1933).—The thermal decompn. of  $\beta$ -phenylhydroxylamine,  $\text{C}_6\text{H}_5\text{NHOH}$  (I), was found to be a dehydration reaction. The first product formed is azoxybenzene which then changes to azobenzene. In the normal reaction the  $\text{H}_2$  does not go to form azobenzene but is used mainly for the formation of aniline. However, if azoxybenzene is initially present then at higher concns. it takes up the  $\text{H}_2$  so that aniline disappears and azobenzene is formed. The reaction has the character of a chain reaction, where the azoxybenzene formed is reduced by I, forming PhNO which in turn forms azoxybenzene. The PhNO acts as the chain carrier. Some derivs. of I were investigated also, and it was found that the Me ether of the mono-Bz compd. forms largely  $\text{BzNHPh}$  and  $\text{CH}_3\text{O}$  and that the di-Bz compd. remained completely unchanged under the exptl. conditions. The exptl. procedures and results are reported in detail, an anal. method for the detn. of I is given, also dehydration expts. with Pd black, and the preps. of an alkyl ether of the mono-Bz compd. and the mono-Ac compd. of I are described. K. K.

**The constitutional formula of laccol.** Gabriel Bertrand and Georges Brooks. *Chimie & Industrie Special No.*, 1085-6 (June, 1933).—See *C. A.* **26**, 5558. A. P.-C.

**Catalytic oxidations. II. The oxidation of benzaldehyde.** Karl Meyer. *J. Biol. Chem.* **103**, 25-37 (1933); cf. *C. A.* **23**, 1561.— $\text{BzH}$ , purified by distn. and crystn., does not oxidize in  $\text{C}_6\text{H}_6$  but absorbs  $\text{O}_2$  very readily without an induction period in the presence of very small amts. of Fe. If purified by distn. alone, it is not immediately activated by Fe because of the presence of impurities which inhibit its catalytic oxidation. Pyridine-hemochromogen is a more effective catalyst than  $\text{Fe}^{+++}$  which in turn is more effective than  $\text{Fe}^{++}$ . PhOH inhibits the catalytic action of 10 times its equiv. of Fe and the inhibition is influenced by the order in which the materials are added, being much greater if the PhOH is added first. In acid soln.  $\text{BzO}_2\text{H}$  decomp. immediately either in the presence or absence of  $\text{BzH}$  but with  $\text{BzH}$  in non-aq. soln. it is stable even in the presence of hemin.

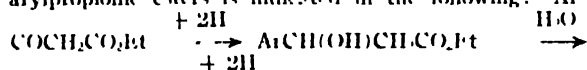
**III. The oxidation of pyruvic acid.** *Ibid.* 39-49. Only the enolic form of pyruvic acid is oxidized by hemin and photosensitizers, and the main oxidation product is  $(\text{CO}_2)_2$ . The speed of the reaction is proportional to the concn. of the acid and to the log of the eosin concn., other factors remaining const. The reaction is also dependent upon the nature of the fluorescent dye used. PhOH does not inhibit the reaction. A. P. Lothrop

**p-Azoxybiphenyl and p-azobiphenyl.** D. Vorländer. *Ber.* **66B**, 1666-7 (1933). All aromatic azoxy compds. are much more strongly cryst.-liquid (c.-l.) than the corresponding azo compds. but azobiphenyl (I) and azoxybiphenyl (II) were both described (*C. A.* **20**, 584) as having but 1 m. p. and being monotropically cryst.-liquid (m. c.-l.). Janecke, however, had earlier reported that II has 2 m. ps. (262° and 208°) and is enantiotropically cryst.-liquid (c. c.-l.). In view of a possible isomerism, I and II have been prepd. by various methods. I, prepd. (1) by reduction of  $p\text{-O}_2\text{NC}_6\text{H}_4\text{Ph}$  with Zn dust and boiling aq. alc. KOH to the hydrazo compd. and oxidation of the latter in alc. suspension with air or  $\text{FeCl}_3$ , or (2) from diazotized  $p\text{-PhC}_6\text{H}_4\text{NH}_2$  with  $\text{NH}_3\text{-Cu}_2\text{O}$ , crystallizes from AcOH or benzene in orange or brownish yellow leaflets sintering 254°, m. 256° (cor.), gives a violet color with concd.  $\text{H}_2\text{SO}_4$ ; it is m. c.-l., or e. c.-l. with a very small range of existence (about 1°). II, prepd. (1) from  $p\text{-O}_2\text{NC}_6\text{H}_4\text{Ph}$  and aq. alc. NaOH, followed by treatment with concd.  $\text{HNO}_3$  or AcOH-

$H_2O_2$ , (2) from  $O_2NC_6H_4Ph$  and Na in anhyd. MeOH, or (3) from  $HO_2NC_6H_4Ph$  heated or allowed to stand in moist soln., seps. in yellow c. c-l. crystals, m. 259-60° and 215-16° (cor.) (sintering at 211°), gives a brown-red color with concd.  $H_2SO_4$ . The sintering point is probably the transition point to the initially viscous cryst. liquid which on heating becomes more fluid and liquefies, as manifested by the 2nd m. p.

C. A. R.

**New and improved methods for the synthesis of pharmacologically important carboxylic acids. I. Synthesis of arylacetic acids from aromatic aldehydes, and of arylpropionic acids from aromatic carboxylic acids.** Karl Kindler and Wilhelm Peschke. *Arch. Pharm.* 271, 431-9 (1933). In expts. calcd. to develop certain relationships between chem. constitution and pharmacol. action, it is necessary to consider reactivity values. Based on this knowledge, Kindler has attempted to discover the laws appertaining thereto. For this purpose were required numerous carboxylic acids, prepd. either by the aid of new or improved methods. These procedures are described in the present and subsequent studies, the first 3 of which have to do with the prepn. of arylacetic and  $\beta$ -arylpropionic acids. Such acids are for various reasons important, notably because they far exceed the corresponding aromatic acids in bactericidal behavior. Furthermore, the amides and thioamides of arylacetic acids on reduction, and the amides of arylpropionic acids with  $KClO$ , yield smoothly pharmacologically important  $\beta$ - $\alpha$ -thylamines. Finally, the amides, resulting from the action of the arylthylamines on arylacetic acids, lead readily to  $\alpha$ -benzylisoquinolines, several representatives of which class, such as papaverine, cupaverine and perparine, already find therapeutic application. A noted improvement in the procedure hitherto followed in prepg. arylpropionic esters is indicated in the following:



$ArCH_2CH_2CO_2Et \rightarrow ArCH_2CH_2CO_2Et$ , in that one operation is eliminated. The utility of the new or improved procedures is illustrated in the prepn. of homoveratric acid, homoaconic acid, homopiperonic acid, phenylpropionic (resp. derivs. thereof) acid. W. O. F.

**Chemistry of isochavibetol. III. Action of Grignard's reagent on ethers of isochavibetol.** 2. Nenokichi Hirao. *J. Chem. Soc. Japan* 54, 991-5 (1933), cf. C. A. 27, 276-7. A new fact found in this expt. is that 3,4-RO-(MeO) $C_6H_3CH_2CHMe$  (I) give 3,4-HO-(MeO) $C_6H_3CH_2CHMe$  by the action of  $RMgX$  ( $MeMgI$  gives the best result although  $EtMgBr$  can be used), where R =  $CHMe_2$  (II),  $CH_2CH_2CH_3$ ,  $CH_2Ph$  or cyclohexyl (III). I give new acids, 3,4-RO-(MeO) $C_6H_3CO_2H$  (IV) when oxidized by  $KMnO_4$ . The m. p. of IV when R is II 135°, iso-Bu 161-2°, III 161-5°. K. Kitsuta.

**Action of potassium cyanide on meconin.** V. M. Rodionov, S. I. Kanevskaya and A. B. Davankov. *Ber.* 66B, 1623-7 (1933); cf. Bowman, *Ber.* 20, 890 (1887). B.'s observation that meconin does not add KCN to form  $(MeO)_2C_6H_3(CO_2K)CH_2CN$  has been confirmed. The KCN merely acts as a demethylating agent, giving MeCN and chiefly (45-70%) B.'s normeconin Me ether (I), m. 124-5°, with a little of an isomer (II), m. 86-8°. That I is 3-hydroxy-4-methoxyphthalide was established by ethylating it with  $p-MeC_6H_4SO_3Et$  to the Et ether, m. 68-9°, and oxidizing the latter with  $KMnO_4$  to 3,4,1,2- $C_6H_3(OEt)(OMe)(CO_2H)$ , m. 174-5° (anhydride, m. 105°, shows blue violet fluorescence in alc.; N-ethylamide, m. 83-4°). Both I and II give meconin in excellent yield on methylation (best with  $p-MeC_6H_4SO_3Me$ ); II is therefore 1-hydroxy-3-methoxyphthalide. C. A. R.

**Terpenes, sesquiterpenes and their related compounds. III. The molecular depression of the freezing point of camphene.** So Uchida and K. Shimoyama. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 725-7 (1933); cf. C. A. 27, 4989. The true mol. depressions of the f. p. of camphene in dil. solns. of  $C_{10}H_{16}$  and  $Ph$  were detd. At infinite diln. the mol. depression is  $K_b = 36.31$

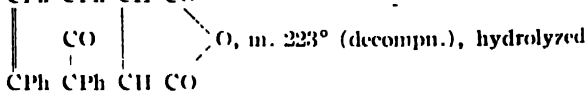
and 38.85 for  $C_{10}H_{16}$  and  $Ph$ , resp., while the calcd. heats of fusion are 5.76 and 5.39 cal./g., resp. IV. **Fusion diagrams of the systems camphene-naphthalene and camphene biphenyl.** *Ibid.* 528-9.—The fusion diagrams and exptl. data are presented. K. K.

**Preparation of nitrosopinene.** G. Vitte. *Bull. inst. pin* 1933, 216.—The method described by Wallach and Lorentz (*Ann.* 268, 197) lacks precision. The following technic has been found to be quicker and to give a higher yield. To 300 cc. 95% alc. in a 1-l. flask gradually add 7 g. Na; when reaction is complete add 50 g. pinene nitroschloride; connect to a reflux condenser; place in a boiling water bath for 15 min., regulating the rate of boiling by adjusting the degree of immersion of the flask; filter, pour the filtrate gradually with stirring into 4 l.  $H_2O$  + 200 cc. AcOH, let stand a few hrs., filter, dry, wash with petr. ether and dry; yield 50% of theoretical; m. p. 132°.

A. Papincau-Couture

**Occurrence of  $\pi$ -hydroxy derivatives in camphorol.** Yasuhiko Asahima and Morizo Ishidate. *Ber.* 66B, 1673-7 (1933). Work with larger amts. of material has shown that the supposed labile 5-ketocamphor, m. 210°, obtained by energetic oxidation of 5-hydroxycamphor (C. A. 25, 2990), is in fact a quite complicated mixt. (I) of structural isomers and the "1,5,5-trimethylcyclopentane-2,4-dioneacetic acid" is not a homogeneous substance. From the acid products of the autooxidation of I there have now been isolated 2 sharply defined isomers  $C_{10}H_{14}O_4$ , which are satd monoketocarboxylic acids and can be sepd. by reason of their different solubilities in water. The more difficultly sol. A isomer (II), m. 249-50°,  $[\alpha]_D^{25}$  3.17° in abs. alc. (phenylhydrazine, yellowish, m. 205° (decompn.), semicarbazone, m. 255° (decompn.)), is probably Wedekind and Stusser's isoketopinic acid (C. A. 18, 67), and the B isomer (III), m. 272°,  $[\alpha]_D^{25}$  67.2° in abs. alc. (semicarbazone, m. 204-5° and, after repeated fusions, 215-6°), is presumably Hasselstrom's ketodihydroteresanilic acid (2-keto- $\pi$ -apocamphane-7-carboxylic acid) (C. A. 25, 1823). Wolff reduction of II gives 1- $\pi$ -apocamphane-7-carboxylic acid, m. 231°,  $[\alpha]_D^{25}$  18.16° (abs. alc.), and III gives the d-antipode, m. 231°,  $[\alpha]_D^{25}$  18.0° (abs. alc.). Further oxidation of II with  $KMnO_4$  or concd.  $HNO_3$  yields trans-d-camphotricarboxylic acid, m. 197°,  $[\alpha]_D^{25}$  38.8° (abs. alc.),  $[\alpha]_D^{25}$  15.0° (water) (anhydride, m. 251°). Although the cis-d-isomer has not yet been isolated from the oxidation products of III, it is assumed, from the formation of the stereoisomeric  $\pi$ -apocamphane-7-carboxylic acids, that the CO $_2H$  group in III is in the cis position. Camphorol therefore contains, in addn. to 3- and 5-hydroxycamphor, at least 2  $\pi$ -hydroxycamphors which, on mild oxidation of camphorol, are first converted into an aldehyde mixt. which is then rapidly autooxidized to II and III. In fact, I with  $NaHSO_3$  yields a substance (mono-semicarbazone,  $C_{10}H_{17}O_3N$ , m. 202° (decompn.); di-semicarbazone, becomes discolored about 300°, decomp. around 360°), which in the free state rapidly changes into a mixt. of II and III but does not reduce Fehling soln. or  $NH_3 \cdot AgNO_3$ . C. A. R.

**Highly arylated benzene derivatives. I.\*** W. Dillthey, W. Schommer and O. Trosken. *Ber.* 66B, 1627-8 (1933), cf. C. A. 27, 2676. The deeply colored ketones of the cyclopentadienone series readily add maleic anhydride tetraphenylcyclopentadienone, e. g., giving endo-carboxyltetraphenylidihydrophthalic anhydride (I)  $CPh CPh CH CO$



by alkalis to the dicarboxylic acid. On heating, I loses  $CO$  and yields tetraphenylidihydrophthalic anhydride (II), m. 243° (the m. p. depends greatly on the method of heating and may be found higher than 250°), which on higher heating (about 200°—so given in original Abstr.) with or without dehydrating agents splits off  $H$  and gives tetraphenylphthalic anhydride (III), m. 286° (depending

on method of heating). Instead of maleic anhydride all possible ethylene or acetylene compds. can be used, according as it is desired to obtain analogs of II or of III. Thus,  $C_2H_2$  gives 1,2,3,4-tetraphenylbenzene, m. 190  $1^\circ$ , also obtained by distn. of III with soda-lime, and PhC CII gives  $C_6HPh$ , m. 246  $7^\circ$ . Tolun (as also stilbene) yields a very difficultly sol. cryst. substance, m. 421  $2^\circ$ , having the compn. of  $C_6Ph_2$  but which is different from the compd. (m. 260 $^\circ$ ) described by Durand and Hsun (C. A. 25, 1501). PhC CCO $_2$ H yields pentaphenylbenzoic acid, m. 345 $^\circ$ ; the nitrile, from PhC CCN, m. 271  $2^\circ$ ; the aldehyde, from PhC CCHO, is cryst. C. A. R.

**Optical activity in the case of triphenylmethane derivatives.** I. Lischitz. Z. wiss. Phot. 32, 131-41 (1933).—The proof of the existence of optically active carbonium salts (halochromes) does not allow a decision between the benzoid and the quinoid formula. Only investigations of the rotation, or better the rotator dispersion, of the colorless and colored triphenylmethane derivs. might render this possible. The existence of optically active halochromes is impossible according to the theories of Diltz and Hantzsch, as long as it is not assumed that compds. of the type C<sup>1</sup>abd can be optically active. This assumption is to be characterized as at least improbable. The views advanced by L. would, on the other hand, allow the existence of active halochromic compds. to be immediately explained. The question of the existence of such compds. must be tested by further investigation. F. R. Bullock

**Preparation of methyl green.** A. G. Pukirev. Khim. farm. Prom. 1933, 120 2. Crystal violet base (50 g.), 27.5 g. of  $p$ -MeC $_6$ H $_4$ SO $_3$ Me and 250 cc. of Me $_2$ CO is boiled for 8 hrs. The ppt. on cooling is dissolved in 10% HCl and treated with 20 g. of ZnCl $_2$ , 5 g. of Zn(OAc) $_2$  and 200 g. of NaCl and the pptd. needles are filtered, washed with 5% NaCl and dried at 60 $^\circ$ . The yield of methyl green is 95%. Fifty g. of methyl violet base and 100 g. of the  $p$ -toluenesulfomethylate is fused with mixing at 125-30 $^\circ$ . The unreacted methyl violet base is pptd. with NH $_4$ OH and from the filtrate methyl green is salted out as above. The yield is 35-55%. L. N.

**The autoxidation of tetralin (tetrahydronaphthalene).** I. Piatti. Angew. Chem. 46, 638-9 (1933).—Absorption of atm. O $_2$ , followed by heating, increases the d., b.-p. and viscosity of tetralin. Higher-boiling acids which attack metals are formed during the process. The use of alkali in titration is a measure of the degree of oxidation. Distn. and viscosity-temp. curves are presented. Ten references. Karl Kammermeyer

**The naphthylamines in coal tar.** O. Kruber. Ber. 66B, 1653-4 (1933); cf. C. A. 26, 5936. The coal-tar oils b. around 300 $^\circ$  contain about 6% of basic constituents consisting chiefly of quinoline and isoquinoline derivs. of unknown structure and a smaller quantity of primary amines. As representatives of the latter have now been isolated the 2 naphthylamines. The crude tar bases, b. 290  $6^\circ$ , contained 8-10% of the 2 amines, as estd. from acetylation expts. C. A. R.

**Condensation of ethyl propylacetoacetate with aromatic amines II.** G. V. Jadhav. J. Indian Chem. Soc. 10, 391-4 (1933); cf. C. A. 26, 2969. The treatment of MeCOCH $_2$ CH $_2$ CO $_2$ Et with  $\alpha$ -C $_6$ H $_4$ NH $_2$  gave di- $\alpha$ -naphthylcarbamide, m. 296 $^\circ$ . Similarly prepd. were the following: di- $\beta$ -naphthylcarbamide, m. 310 $^\circ$ ; propylacetoacet- $\beta$ -naphthylamide, m. 115  $6^\circ$ ; bis( $\alpha$ -ethoxyphenyl)carbamide, m. 220  $1^\circ$ ; propylacetoacet- $\alpha$ -phenetide, m. 90  $1^\circ$ ; bis( $p$ -hydroxyphenyl)carbamide, m. 280 $^\circ$  (decompn.); propylacetoacet- $p$ -hydroxyphenylamide, m. 95  $6^\circ$ ; propylacetoacet- $m$ -hydroxyphenylamide, m. 223  $1^\circ$ , 1c deriv. 165 $^\circ$ ; bis( $\alpha$ -chlorophenyl)carbamide, m. 235  $6^\circ$ ; propylacetoacet- $\alpha$ -chloroanilide, m. 83-4 $^\circ$ ; bis- $m$ -chlorophenylcarbamide, m. 245  $6^\circ$ ; propylacetoacet- $m$ -dichloroanilide, m. 88-9 $^\circ$ ; bis( $p$ -chlorophenyl)carbamide, m. 289-90 $^\circ$ ; propylacetoacet- $p$ -chloroanilide, m. 123-4 $^\circ$ ; bis( $m$ -nitrophenyl)carbamide, m. 241-2 $^\circ$ ; propylacetoacet- $m$ -nitroanilide, m. 95  $6^\circ$ ; bis( $p$ -nitro-

phenyl)carbamide, m. 310 $^\circ$ ; propylacetoacet- $p$ -nitroanilide, m. 118  $9^\circ$ . Julius White

**Course of the alkylation of enolates.** Gustav Vapags. Ber. 66B, 1678-81 (1933). Adickes, v. Hessling and v. Mullenheim (C. A. 27, 3700) believe that in the action of alkyl halides on enolates C-alkyl derivs. are formed directly and not through intermediate O-alkyl ethers. In the course of work on alkylbiindones which will be described in detail elsewhere, V. has made some observations, however, which confirm the intermediate formation of O-alkyl ethers. When carefully purified, completely isobiindone-free biindone is boiled in alc. with excess of K $_2$ CO $_3$ , no isobiindone is formed, but if MeI or other alkyl halide is added, C-alkylbiindone and isobiindone are produced. The formation of the latter can be explained by the primary formation of O-alkylbiindone which adds water at its conjugated double bond (at the 3,6- or 1,6-positions) and then splits off alc. at position 6, with formation of K isobiindone. This salt, being almost insol. in the soln. of the K biindone, is pptd. and thus protected from reconversion into biindone. This view is further confirmed by the fact that the pure Me or Et ether of biindone gives isobiindone in abundance when boiled with K $_2$ CO $_3$ . C. A. R.

**Synthesis of hydrocarbons with high molecular weight.** M. Lerer. Ann. combustibles liquides 8, 681-733 (1933).

The action of alkyl halides upon Na addn. products of anthracene leads to good yields of 9,10-dihydro-9,10-dialkylanthracene and the true anthracenic deriv., the dialkylanthracene, is always formed in small quantities. The reaction is independent of the halogen; chlorides, bromides and iodides can be used with like success. Also the length of the chain of the halogen deriv. does not seem to exert any influence. The solvent which serves as medium influences the speed of formation of the Na anthracene addn. product only. This formation is accomplished very easily in ether and liquid NH $_3$  while it takes place very slowly in toluene and xylene. The alkylation reaction of aromatic hydrocarbons by the intermediate way of their Na compds. is not limited to anthracene only. The Na deriv. of C $_{10}$ H $_8$  prepd. in liquid NH $_3$  gives on treatment with halogen a 1,2,3,4-tetrahydro-1,4-dialkyl-naphthalene and a more condensed deriv. of (C $_{10}$ H $_7$ ) $_2$ . The Na addn. compds. of aromatic hydrocarbons can also be used for other than alkylation syntheses, e. g., the action of BzOEt upon the Na deriv. of 9,10-dihydroanthracene results in the formation of mono- and di-benzoyldihydroanthracene. With octyl alc. as starting product a series of liquid hydrocarbons with side chains and higher mol. wt. was obtained. By dehydration of di- and tricaprylic alc. the unsatd. hydrocarbons dicaprylene C $_{24}$ H $_{42}$  and tricaprylene C $_{26}$ H $_{44}$  were obtained. Na treatment in a toluene medium results in the formation of the satd. hydrocarbons C $_{26}$ H $_{54}$  and C $_{28}$ H $_{58}$  from dicaprylic iodide and tricaprylic bromide, resp. By the action upon Me palmitate of the Grignard reagent prepd. from bromooctane, the unsatd. hydrocarbon C $_{18}$ H $_{34}$  was obtained through the intermediary compd. pentadecyldioctylcarbmol. A series of oxidation tests was carried out to det. the constitution of the unsatd. hydrocarbons. It was found that the use of 0.2 N KMnO $_4$  in presence of H $_2$ PO $_4$  permitted the limitation of oxidation to the double bond with 3-C chain olefins only. For hydrocarbons with side chains the reaction becomes more complex, the tertiary C atoms being attacked simultaneously with the double bond. K. K.

**$\alpha$ -Dihalogenated benzantrones and their transformation by sodium sulfide.** Kurt Brass and Charles Lauer. Chimie & industrie Special No., 876-82 (June, 1933).

From the behavior of halogenated benzanthranyl sulfides, which are described in detail, it is concluded that the C atoms to which are attached the S atoms and those to which are attached the halogens are not situated in the same plane, and consequently their structure is not favorable to the formation of thianthrene nuclei.

A. Papineau-Couture

**Sandmeyer's indigo synthesis.** Rin-nosuke Shibata,

Minoru Okuyama and Katsuo Okamura. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 569 71(1933).—The action of concd.  $H_2SO_4$  upon oxaldiphenylamidinethioamide is given. When the thioamide was heated with concd.  $H_2SO_4$  at 90–95° for 2.5 hrs., followed by 1 hr. at 105–110°,  $\beta$ -isatinilide was the main product, while on heating at 50° both  $\alpha$ - and  $\beta$ -isatinilide were obtained. Both compds. were also obtained on heating for 1 hr. only at 90°.

Karl Kammermeyer

**Isatin from indigo.** P. N. Rabinovich and V. K. Dzirkal. *Khim. Farm. Prom.* 1933, 190 2. Powd. indigo (5 moles) is stirred into 8 kg. of ice and 1.3 l. of  $H_2SO_4$  and 1.3 kg. of  $Na_2Cr_2O_7$  in 2 l. of  $H_2O$  is slowly added (temp. 1–2°). After 0.5 hr. the temp. is raised to 50–60°, the mixt. cooled and isatin filtered out. Unreacted indigo is removed by dissolving the ppt. in 4 l. of 10%  $NaOH$  at 80°, filtering, acidifying at 90° with  $HCl$ , cooling and filtering again. For complete sepn. of 3 indigo the purification is repeated. Yield, 75–80%.

L. Nasarevich

**Tris(arylamino)ethylenes. III. The reaction products of sulfur and tris(phenylamino)ethylene.** (Supplement.)

Rin-nosuke Shibata, Minoru Okuyama, Nakaba Kojima and Tetsumosuke Nishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 511 14(1933), cf. *Ibid.* 32, 282 4(1929).

Exptl. results on melts of tris(phenylamino)ethylene and S at 150° showed the existence of 5 compds.: (1) bis(phenylamino)ethylene ( $C_{14}H_{14}N_2$ ), (2) tris(phenylamino)mercaptioethylene ( $C_{20}H_{18}N_3S$ ), (3) dithiooxanilide ( $C_{14}H_{12}N_2S_2$ ), (4) thiooxanilide ( $C_{14}H_{12}N_2SO$ ), (5) oxanilide ( $C_{14}H_{12}N_2O_2$ ). Compds. (4) and (5) are only secondary reaction products. The expts. are described in detail. **IV. The action of sulfur on tris(o-tolylamino)ethylene.** *Ibid.* 511 17.—Fusion at 130–5° resulted in the formation of the following compds.: (1) dithiooxalo(o-toluide),  $C_{18}H_{16}N_2S_2$ , (2) tris(o-tolylamino)mercaptioethylene,  $C_{22}H_{20}N_3S$ , and (3) bis(o-tolylamino)ethylene,  $C_{18}H_{18}N_2$ . Exptl. procedure and results are presented. **V. Action of sulfur upon tris(p-tolylamino)ethylene.** Rin-nosuke Shibata and Tetsumosuke Nishi. *Ibid.* 538 40. Heating 5 parts of the base with 1 part of S at 140° for 60 min. resulted in an orange-red melt which permitted isolation of the following compds.: (1) bis(p-tolylamino)ethylene,  $C_{18}H_{18}N_2$ , (2) tris(p-tolylamino)mercaptioethylene,  $C_{22}H_{20}N_3S$ , and (3) dithiooxalo-p-toluide,  $C_{18}H_{16}N_2S_2$ . Exptl. details are presented.

Karl Kammermeyer

**Constitution of the antipyridines. Action of sodium on 1,2-diphenyl-3-methylpyrazolone.** Albrecht Heymons and Werner Rohland. *Ber.* 66B, 1654 61(1933).

Although antipyrine (I) is quite stable toward Na and boiling alc., with Na and  $CO_2$  in hot PhMe the ring is opened with formation of  $PhNHCOCH:CMcNHMe$  (Knorr, *Ber.* 25, 768(1892)). In attempts to gain light on the mechanism of the reaction by a study of the by-products, which are formed to the extent of about 30%, considerable difficulties were encountered because of unfavorable soly. relationships and attention was directed to 1,2-diphenyl-3-methyl-5-pyrazolone (II) (the "oxymethylphenylquinizine" obtained from  $AcCH_3CO_2Et$  and  $PhNHNHPh$ ), which is stable toward acids and alkalis and forms a 4-NO deriv. reduced to the corresponding  $NH_2$  deriv. and undergoing with  $PhNHNH_2$  the cleavage characteristic of nitrosoantipyridines. With Na and  $CO_2$  in PhMe II gives, besides  $PhNH_2$  and  $AcCH_3CONHPh$  (the hydrolysis products of the expected  $PhNHCOCH:CMcNHPh$ ), a small amt. of an acid  $C_{17}H_{16}O_2N_2$  (III) which on heating readily loses  $CO$  and gives a base  $C_{16}H_{16}ON_2$  (IV), quite stable toward acids and alkalis and contg. 2 tertiary N atoms. IV can therefore be only 1,2-diphenyl-3-methyl-5-pyrazolidone and III the corresponding carboxylic acid. That the  $CO_2H$  group in III is not in the 4-position is indicated by the fact that the enolate obtained from IV cannot be converted into III. Furthermore, II reacts with Na in the absence of  $CO_2$ , taking up 2 atoms without evolution of  $H_2$ ; when the soln. of the resulting di-Na compd. is treated with  $Ac_2O$  and

subsequently with  $CO_2$ , only 1 Na atom reacts, giving an Ac deriv. (V) of III. As V is stable toward acids and alkalis it must be a C-Ac deriv., and since on decarboxylation it gives the same base  $C_{15}H_{14}O_2N_2$  (VI) as is obtained from the enolate of IV with  $Ac_2O$ , the  $Ac_2O$  in the formation of V, can have reacted only with a Na atom attached to the O of the  $C:O$  group, and the Na atoms in the di-Na compd. must be in the 3- and 5-positions. The formation of III is greatly favored if the II is heated with Na a long time before being treated with  $CO_2$ ; if the 2 are allowed to react simultaneously on II, ring cleavage occurs almost exclusively and only traces of III are formed. The di-Na compd. and III are therefore both probably formed secondarily from a common intermediate product. The primary product of the reaction of Na can readily be derived only from the betaine form of II and would then have the structure  $\begin{array}{c} CH \\ || \\ NaOC \\ | \\ NPh \\ | \\ NPhNa \end{array}$ .



The tendency of such a compd. to undergo ring cleavage between the N atoms on treatment with  $CO_2$  and also the tendency to rearrange into a 3,5-di Na compd. (with change of the N from the 5- to the 3-valent stage) is readily understandable. So also, when the di-Na compd., prepd. at the lowest possible temp., is at once treated with  $Ac_2O$ , there is obtained, in addn. to V, a compd.  $C_{18}H_{16}O_2N_2$  (VII) which on acid hydrolysis under even mild conditions gives  $AcCH_3CONHPh$ ,  $AcOH$  and  $PhNH_2$  and must therefore be  $\beta$ -anilinoaceton-N-acetylanilide, a structure confirmed by the rearrangement, under the influence of traces of acid, of VII into  $\beta$ -(acetylanilino)-crotonanilide (VIII) which is hydrogenated to  $MeCH(NAcPh)CH_2CONHPh$  and is hydrolyzed to  $AcNHPh$ ,  $PhNH_2$  and  $AcCH_3CONHPh$ . II, obtained in 63% yield,  $b_p$  250–60°, m. 130°; picrate, yellow, m. 138°; 4-Br deriv., m. 145°; 4-NO deriv. (yield, 80%), green amorphous ppt. quickly decomg. in the reaction soln.; 4-amino deriv., m. 165° (yield, 64%, based on II). 1,2-Diphenyl-3-methylpyrazolidone-3-carboxylic acid (III), dc compds. 122° (yield, 5%, increased to 39% if II is heated 4 hrs. with 5 mols. Na before it is treated with  $CO_2$ ); Me ester, m. 130°. IV, m. 126°. 4-Ac deriv. (VI) of IV, m. 135°. 4-Ac deriv. (V) of III, m. 165° (decompn.). VII, m. 112°. VIII, m. 164°. C. A. R.

**Commercial method of preparation of pyridine bases.** N. Narushkin, E. Chernomordik and A. Kvasnitski. *Coke and Chem.* (U. S. S. R.) 1932, No. 5 6, 52 68. A review of plant processes for the recovery of pyridine bases from benzene. The Glund-Schneider recovery scheme is considered unsuitable for U. S. S. R. industry. Washing of the benzene followed by dephenolation is recommended. James Sorrel

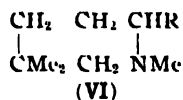
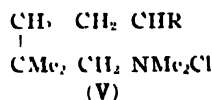
**Oxidation of pyridine to a 2-pyridylpyridinium salt.** Paul Baumgarten and Else Dammann. *Ber.* 66B, 1633 8(1933). All previous attempts to oxidize pyridine with peracids had resulted either in the formation of pyridine N-oxide (with  $BrO_3H$ ; Meisenheimer, C. A. 21, 94) or in complete oxidative degradation (with persulfate; Dorronsoro, C. A. 22, 783). Under the conditions described in this paper (heating aq. pyridine with  $K_2S_2O_8$  1–2 hrs.) the oxidation followed a different course; the chief product was 2-pyridylpyridinium sulfate which, however, could not be isolated but, after removal of the  $H_2SO_4$  and excess of pyridine, was converted into the perchlorate (I), m. 214°. The reaction apparently consists in dehydrogenation of a pyridinium ion in the 1-position and of a 2nd mol. in the 2-position, and combination of the resulting residues. The intermediate formation of pyridine N-oxide is excluded by the fact that these salts cannot be obtained from the N-oxide and pyridine I in water with excess of  $NaOH$  or  $KOH$  gives an intensely yellow-red soln. which with  $HCl$  and  $PhNH_2$   $HCl$  yields  $PhNHCH:CHCH:CHCH:NPh$   $HCl$  (II) and 2-aminopyridine. Koenigs and Gräner's 4-pyridylpyridinium dichloride behaves in the same way with alkalis (C. A. 25, 3998), but whereas the base of this salt is normally diacidic, the 2-pyridyl base is mono-



acidic, presumably because of steric hindrance of the pyridyl N by the close proximity of the 2 N atoms to each other. To test this view expts. have been undertaken to prep. salts with anions of very small ionic diameter to see whether in such cases the base can function as a bivalent cation. This seems to be true of the fluoride. The 2-pyridyl are also more stable than the 4-pyridyl salts. I has the properties of a salt of a strong base with a strong acid; it reacts neutral in water, is hardly attacked by  $\text{NH}_4\text{OH}$  even after boiling several hrs., and, unlike the 4-isomer, is not decompd. by  $\text{PhNH}_2$  alone. Preliminary expts. indicate that electrochem. oxidation of pyridine in  $\text{H}_2\text{SO}_4$  follows the same course as the persulfate oxidation. No 2-pyridylpyridinium salt has yet been obtained, but cleavage of the oxidation product with alkali and treatment with  $\text{PhNH}_2$ ,  $\text{HCl}$  gave II; under conditions other than those here described, electrochem. oxidation results in complete degradation (Yokoyama and Yamamoto, *C. A.* 26, 2194). 2-Pyridylpyridinium chloroplatinate, orange, m. 213–14° (decompn.).

C. A. R.

**N-Alkylated 1,5-aminoketones and their conversion into piperidine derivatives.** C. Mannich and K. Th. Lesse. *Arch. Pharm.* 271, 92 7(1933). The syntheses herein described involve condensation of 1,3-aldehyde bases with ketones in alk. soln. Thus, from  $\text{Me}_2\text{NCH}_2\text{CMe}_2\text{CHO}$  and  $\text{Me}_2\text{CO}$  or  $\text{AcPh}$ :  $\text{Me}_2\text{NCH}_2\text{CMe}_2\text{CHO} + \text{Me}_2\text{CO} = \text{Me}_2\text{NCH}_2\text{CMe}_2\text{CH}=\text{CHCOR}$  (I), one obtains an unsatd., N-alkylated 1,5-amino ketone, which on catalytic hydrogenation passes into the corresponding satd. amino ketone:  $\text{Me}_2\text{NCH}_2\text{CMe}_2\text{CH}_2\text{CH}_2\text{COR}$  (II), the latter thereupon yielding on reduction with Na and  $\text{EtOH}$  the amino alc.:  $\text{Me}_2\text{NCH}_2\text{CMe}_2\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{R}$  (III). When this alc. base is treated with  $\text{CS}_2$  there is formed the  $\text{HCl}$  salt of the halogenated base,  $\text{Me}_2\text{NCH}_2\text{CMe}_2\text{CH}_2\text{CH}_2\text{CHClR}$  (IV), in which the  $\text{NMe}_2$  group and the Cl atom occupy the 1,5-position with respect to one another. Caustic alkali ppt. the chlorinated base as an oil sol. in  $\text{Et}_2\text{O}$ , insol. in  $\text{H}_2\text{O}$ , shortly changing by mol. rearrangement into the  $\text{HCl}$  salt of a piperidinium base (V), which on heating suffers thermic di socn. into  $\text{MeCl}$  and a piperidine deriv. (VI, R = Me or Ph). The  $\text{HCl}$  salt of I m. 147°; the free base



forms a yellowish oil,  $b_D^{20}$  100.5°; the methiodide m. 172°; the oxime m. 60° ( $\text{HCl}$  salt, m. 177° (decompn.)); semicarbazone, m. 134° ( $\text{HCl}$  salt, m. 165°). The amino ketone (II, R = Me)  $b_D^{20}$  92°; its  $\text{HCl}$  salt, very hygroscopic, m. 100.1°; aurate, yellow needles, m. 118.5°; methiodide, m. 133°; oxime, m. 58.5° ( $\text{HCl}$  salt, hygroscopic); semicarbazone, m. 128° ( $\text{HCl}$  salt, m. 163°). The amino alc. (III, R = Me)  $b_D^{20}$  98°; its aurate m. 116°;  $\text{HCl}$  salt of p-nitrobenzoate ester, m. 162°. The piperidinium base ( $\text{HCl}$  salt of V, R = Me),  $\text{C}_{10}\text{H}_{12}\text{NCl}$ , m. above 260°; picrate, greenish yellow, m. 201°. 1,2,5,5-tetramethylpiperidine (VI, R = Me), b. 147.8° ( $\text{HCl}$  salt, m. about 221° decompn.); picrate of N-Me compd., greenish yellow, m. 201°. 1-Dimethylamino-2,2-dimethyl-5-keto-5-phenylpentane (I, R = Ph),  $b_D^{20}$  159.6° ( $\text{HCl}$  salt, yellowish leaves, m. 162–3°);  $\text{HCl}$  salt of the oxime, m. 178° (decompn.);  $\text{HCl}$  salt of semicarbazone, m. 195°. A secondary base,  $\text{C}_{23}\text{H}_{30}\text{O}_2\text{N}$ , was also isolated which b. 210–15°, and m. 102.3°, and represented apparently the condensation product of 1 mol. of the aldehyde and 2 mols. of  $\text{AcPh}$ . 1-Dimethylamino-2,2-dimethyl-5-phenylpentane (II, R = Ph),  $b_D^{20}$  105.70° ( $\text{HCl}$  salt, m. 119.50°);  $\text{HCl}$  salt of semicarbazone, m. 171° (decompn.). 1-Dimethylamino-2,2-dimethyl-5-phenylpentanol,  $b_D^{20}$  168.70°.  $\text{HCl}$  salt of the benzoate, m. 91.2°, and is weakly aromatic. 1-Dimethylamino-2,2-dimethyl-5-phenyl-5-chloropentane (V, R = Ph);  $\text{HCl}$  salt of the chloro base, m. 150°. 1,1,5,5-Tetramethyl-2-phenylpiperidinium chloride, m. above 250°; aurate, yellow needles, m. 118°.

1,5,5-Trimethyl-2-phenylpiperidine (VI, R = Ph),  $b_D^{20}$  145.7°;  $\text{HCl}$  salt, m. 148° (decompn.). 1-N-Piperidino-2,2-dimethylhexenone (condensation product of  $\beta$ -piperidino- $\alpha,\alpha$ -dimethylpropionaldehyde and  $\text{Me}_2\text{CO}$ ),  $b_D^{20}$  135.45°;  $\text{HNO}_3$  salt, m. 105° (base therefrom,  $b_D^{20}$  140.2°).

W. O. E.

**An optically active arsonic acid possessing molecular dissymmetry. Resolution of dl-spirobis-3,5-dioxane-4,4'-bis(phenyl-p-arsonic acid).** Charles S. Gibson and Barnett Levin. *Proc. Roy. Soc. (London)* A141, 494–501 (1933).—Benzaldehyde-p-arsonic acid in 30%  $\text{H}_2\text{SO}_4$ , when treated with pentaerythritol at 100° for 0.5 hr., gave dl-spirobis-3,5-dioxane-4,4'-bis(phenyl-p-arsonic acid) (I), m. above 200°. I was purified by crystn. of the dl- $\alpha$ -phenylethylamine salt from an aq.  $\text{EtOH-Me}_2\text{CO}$  mixt. (1:1:1). Resoln. of I with nor-d- $\psi$ -ephedrine gave the pure d-amine l-acid salt, decomp. 225°. [ $\alpha$ ] – 24.67°. Likewise the nor-l- $\psi$ -ephedrine yielded the pure l-amine d-acid salt, m. above 300°, [ $\alpha$ ] 23.69°. The tetra-Na salts of the 2 isomers of I gave [ $\alpha$ ]  $\pm 70.2^\circ$ . The optically active acids were not racemized by boiling alkali, but were by conversion into spiro-bis-3,5-dioxane-4,4'-bis(phenyldichloroarsine), m. 163°.

E. W. Scott

**Alkaloids from Heliotropium lasiocarpum.** G. Menshikov. *Khim. Farm. Prom.* 1933, 113–16; cf. *C. A.* 27, 3714. Heliotridine (the product of the sapon. of heliotrine) when treated in the cold with  $\text{SOCl}_2$ , made ammoniacal, extd. with ether, changed into the  $\text{HCl}$  salt, reduced according to Adams (Pt as catalyst), made alk. with  $\text{NaOH}$  and extd. with ether, forms chloroheliotridan,  $\text{C}_8\text{H}_{12}\text{NCl}$ ,  $b_D^{20}$  85°, [ $\alpha$ ] 133.5°. Heliotridene,  $\text{C}_8\text{H}_{12}\text{N}$ , is made by boiling chloroheliotridan with alc. and Na for 8 hrs., acidifying with  $\text{HCl}$ , boiling off the alc., making alk. with  $\text{NaOH}$  and distg. with steam; [ $\alpha$ ] – 10.5°. Heliotridan is made from heliotridene by reduction according to Adams, [ $\alpha$ ] – 68°. The picrate, methiodide and other salts are discussed.

L. Nasarevich

**Alkaloids from Anabasis aphylla.** A. P. Orekhov and S. S. Norkina. *Khim. Farm. Prom.* 1933, 109–13; cf. *C. A.* 27, 3477. 1-Aminooanabasin was made by reduction of 1-nitrooanabasin with  $\text{AcOH}$ ,  $\text{H}_2\text{O}$  and Zn dust at 10°. The mixt. was filtered on the 2nd day, made alk. with  $\text{NaOH}$  and extd. with ether. dl-Anabasin was made by heating anabasin sulfate in closed tubes at 200° for 120 hrs. and distg. in vacuo. Derivs. are discussed.

L. Nasarevich

**Separation of the opium alkaloids.** S. Busse and V. Busse. *Khim. Farm. Prom.* 1933, 127–9. The combined filtrate after the sepn. of the resins from 1 kg. of opium is treated with 200 g. of  $\text{AcONa}$  and 200 g. of  $\text{NaCl}$ . The pptd. papaverine resin is filtered, dissolved in  $\text{H}_2\text{O}$  and  $\text{AcOH}$ , neutralized, treated with 100 g. of  $\text{AcONa}$  and 100 g. of  $\text{NaCl}$ , the ppt. contg. papaverine is filtered off and the filtrates are combined. The resin (40–50 g.) is dissolved in  $\text{AcOH}$  and  $\text{NaCl}$ , filtered, redissolved and from the combined filtrates papaverine is pptd. with  $\text{NaOH}$ . The yield is 7–9 g. In the combined filtrates from the 1st pptn. thebaine is pptd. with  $\text{NH}_4\text{OH}$ , and purified as usual. The yield is 3–4 g. The filtrate from thebaine is acidified with  $\text{AcOH}$ , concd., dild. with alc. (50%) and after 2 days morphine is pptd. The main portion of the filtrate after thebaine contains codeine, which may be extd. with  $\text{C}_6\text{H}_6$ . The yield is 6–8 g.

L. Nasarevich

**The influence of light on the formation of chloroplast pigments.** H. Rudolph. *Ber. Verhandl. sachs. Akad. Wiss. Leipzig Math.-phys.* 85, 107–15(1933).—In this polarization spectrophotometric study the log of the extinction coeff. was plotted against wave lengths, expressed in  $\mu$ . Chlorophyll a showed a max. in the red at 660  $\mu$ , chlorophyll b, at 640. The resp. min. were in the green at 550 and at 565. Xanthophyll and carotene max. were at 450 and at about 443, resp. Protochlorophyll, in a somewhat pure form, gave a max. at about 625. To avoid difficulties with chlorophyll mutants the bush bean was selected as the exptl. plant. A 250-w.

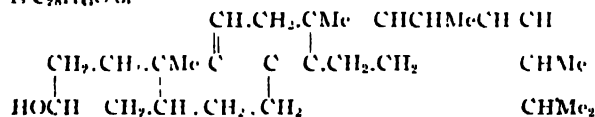
Osram lamp with red, yellow-green and blue filters was used, and the light intensity was kept const. throughout the study. No chlorophyll was ever found in blanched plants, but protochlorophyll, xanthophyll and carotene were always present. The carotenoid content of blanched leaves was almost proportional to the leaf surface. The protochlorophyll content varied within narrow limits and was independent of the leaf surface. Per sq. cm., less chlorophyll was developed in older illuminated leaves than in the younger ones. Illumination of the blanched plants at first causes a rapid increase in the amt. of chlorophyll, in the 1st, and after the 4th hr. Its appearance is accompanied by a rapid diminution of the carotenoids. Possibly carotenoids are used in the production of chlorophyll. Subsequently carotenoids are again formed. In blue light about 3 1 times as much, in yellow-green light 2.7 times as much, and in red light no more carotenoid is produced than is formed in the dark. Less xanthophyll is produced, but the light-production ratio is about the same as for chlorophyll. Possibly a carotenoid precursor is used in making a chlorophyll-like one in red light. Chlorophyll is formed almost instantly upon exposure to light. Hence a chlorophyll precursor must be present. The significance of protochlorophyll in the living leaf is still an uncertainty; it may be a direct precursor of chlorophyll, or it may be something formed from such a precursor, but only in the dark, and it may not be directly convertible into chlorophyll. Settlement of this question awaits an accurate knowledge of the chem. nature of protochlorophyll. The constancy of the chlorophyll-carotenoid ratio, and the likelihood that phytol is derived from a carotenoid, makes the relation between the green and the yellow chloroplast pigments a question of importance. In blanched plants mitochondria abound and plastids are scarce. Improved development of the plastids takes place after 4 hrs., with the result that proportionately increased amts. of chlorophyll appear on further illumination.

G. A. Hill

**Selenium dehydrogenation of sitosterol.** L. Ruzicka, M. W. Goldberg, G. Thomann and E. Brandenberger. *Nature* **132**, 643 (1933); *Ch. J.* **27**, 4809. In response to the criticisms of Diels and Karsten (*Ch. J.* **24**, 2136), Diels (*Ch. J.* **27**, 4810), and Cook and Hewitt (*Ch. J.* **27**, 5335), the authors reiterate that the Se dehydrogenation of cholesterol and ergosterol gives 2 different hydrocarbons. The x-ray spectra of the 2 hydrocarbons are distinctly different. Moreover, if the 2 hydrocarbons were identical, sitosterol would furnish the same substance by Se dehydrogenation; instead it gives a new hydrocarbon,  $C_{27}H_{48}$ , m. 202.3°.

Louise Kelley

**Structural formula of ergosterol.** A. L. Bacharach. *Analyst* **58**, 605 (1933). The formula generally accepted is  $C_{28}H_{44}O$  or



W. T. H.

**Cinchol.** A. Windaus and M. Deppe. *Ber.* **66B**, 1689-90 (1933). Cinchol (I), the sterol-like substance present in cinchona bark (Hesse, *Ann.* **228**, 294 (1885); Liebermann, *Ber.* **18**, 1805 (1885)), was converted, after purification through the Ac deriv. (which gave a neg. test for a doubly unsatd. phytosterol of the type of stigmasterol), into the *m*-dinitrobenzoate, m. 200.2°,  $[\alpha]_D^{25}$  10.9° ( $\text{CHCl}_3$ ), whose compn.,  $C_{29}H_{46}OOCOC_6H_3(N-O)_2$ , excludes the formula  $C_{30}H_{48}O$  assigned to I by Hesse, and which is identical with the dinitrobenzoate of hammol (*Ch. J.* **27**, 5749). I, regenerated from the ester, m. 136-7°,  $[\alpha]_D^{25}$  -33.5° ( $\text{CHCl}_3$ ), it retains some water at 100° and on analysis gives C values 1.2% low. The acetate, m. 123°,  $[\alpha]_D^{25}$  -38.3° ( $\text{CHCl}_3$ ), however, has the calcd. compn. I therefore belongs to the group of sitosterols of the compn.  $C_{29}H_{46}O$ .

C. A. R.

**Conversion of a bile acid into a hydrocarbon derived from 1,2-benzanthracene.** J. W. Cook and G. A. D.

<sup>1</sup> Haslewood. *Chemistry & Industry* **1933**, 758 9; cf. Wieland and Dane, *Ch. J.* **27**, 5334. —Dehydrogenation of dehydronorcholene with Se gave the yellow "methylcholanthrene" (I), m. 171.2° (picrate, m. 176-7°), of W. and D. and a colorless hydrocarbon m. 132-4° (II). Oxidation of I with  $\text{Na}_2\text{Cr}_2\text{O}_7$  in AcOH followed by decarboxylation produced a quinone m. 229° whereas the product expected on the basis of W. and D.'s formula for I, 6-methyl-1,2-benzanthraquinone, m. 174°. II was not oxidized to a quinone.

E. W. Scott

Synthesis of *d*- and *l*-ascorbic acid (Reichstein, *et al.*)

<sup>11E</sup>. Purification of trinitrotoluene by  $\text{Na}_2\text{SO}_3$  (Meif) **24**. Formation of nitrodiazotoluenesulfonic acid (Bafik) **24**. Constituents of petroleum. II. Prepn. of the first homogeneous naphthenic acid (v. Braun, *et al.*) **22**. Polarity of chem. compds. (Higashi) **2**. Fractionation and purification of org. substances (Winterstein, Stein) **2**. Rotatory dispersion of certain classes of org. mols. (Biquard) **2**. Aromatic and unsatd. compds. (Huckel) **3**. CO and H mixt. [for the synthesis of MeOH] (Swiss pat. 162,458) **18**. C, H and hydrocarbons (Brit. pat. 395,893) **18**.

**Hydrocarbons.** Henry Dreyfus. *Fr.* 749,916, Aug. 1, 1933.  $\text{C}_2\text{H}_4$  or other hydrocarbons of low mol. wt. are prepd. by heating  $\text{CH}_4$  or gases contg. it, in the presence of a dehydrogenating catalyst, such as Ni, Co, Cu or Zn, and with or without an accelerator.

**Purifying hydrocarbons.** Pierre C. Petroff. *Fr.* 41,622, Feb. 15, 1933. Addn. to 727,048 (*Ch. J.* **26**, 5101). The oxidation of the impurities is carried out in the presence of O carriers, *e. g.*, salts, preferably org., of metals, such as Fe, Mn, V or others capable of different degrees of oxidation, or an org. compd. capable of forming a peroxide.

**Aromatic hydrocarbons.** Edward D. Kamm and Imperial Chemical Industries Ltd. *Brit.* 395,370, July 13, 1933. The hydrocarbons are prepd. by treatment of the corresponding phenols in the vapor phase with H at pressures below 15 atm. in the presence of catalysts contg. Mo or W sulfide, H<sub>2</sub>S being present in the gas mixt. The catalyst need not be originally present as sulfide, being converted thereinto by the H<sub>2</sub>S. Examples are given of the production of (1) PhMe by continuously passing *o*-cresol vapor, H and H<sub>2</sub>S over W sulfide and (2) a mixt. of  $\text{C}_6\text{H}_6$ , PhMe and xylene by passing a similar gaseous mixt. over a mixt. of oxides of Mo, Mg and Zn in equimol. proportions;  $(\text{NH}_4)\text{MoO}_4$  may replace the Mo oxide.

<sup>7</sup> **Brominated organic compounds.** Oskar Kasilitz. *U. S.* 1,932,590, Oct. 31. For producing brominated compds. from corresponding unsatd. compds., as in the production of  $\text{C}_6\text{H}_4\text{Br}_2$  from  $\text{C}_6\text{H}_6$ , the compd. to be brominated is washed with a dil. aq. soln. of elementary Br, and with some of the corresponding brominated compd. in countercurrent, the exhausted Br soln. is sep'd. from the brominated compd., and at least part of the latter is used in cycle.

<sup>8</sup> **Organic mercury compounds.** I. G. Farbenind. A.-G. (Karl Stuetz and Paul Fritzsche, inventors). *Ger.* 586,352, Oct. 20, 1933. Alkyl compds. of Hg are made to react with benzene derivs. which contain an acid group and a heterocyclic ring contg. the SH group. The effect of the reaction is to replace the H atom of the SH group by a -Hg-alkyl group. The alkali salts of the products are sol. in water and have antiseptic properties. Examples are given of the manuf. of products from  $\text{ClHgEt}$  and Na 2-mercaptopbenzoxazole-5-carboxylate (I), Na 2-mercaptopbenzimidazole-6-sulfonate, Na 2-mercaptopbenzimidazole-5-arsenate, and Na 2-mercaptopbenzothiazole-5-carboxylate; a product from I and  $\text{ClHgPr}$  is also described.

**Catalytic oxidation reactions such as oxidations of organic compounds.** Alphon O. Jaeger (to Selden Co.). *U. S.* 1,935,054, Nov. 14. A catalyst is used contg. a compd. of a metal of the 5th or 6th group of the

periodic system, such as a V compd. carried on a support of diatomaceous brick fragments. Various examples are given. Cf. *C. A.* 28, 172.

**Exothermic vapor-phase catalytic reactions such as oxidation of aromatic hydrocarbons, etc.** Alphons O. Jaeger (to Selden Research & Engineering Corp.). U. S. 1,935,053, Nov. 14. The reaction gases are passed through at least one catalytic zone and the exothermic heat of reaction is absorbed by a non-boiling liquid placed in heat-exchanging relation; the liquid is removed from the catalytic zone and its pressure is reduced to a point at which the liquid will boil at or only slightly below the temp. at which it leaves the catalyst zone; vapors given off are condensed and the condensate and unboiled liquid are returned to the catalytic zone at the pressure there existing (the circulation being accelerated by introducing an inert gaseous medium at a portion of the circuit where the normal circulation is upward). App. is described. Cf. *C. A.* 27, 3017.

**Catalytic hydrogenation of non-nitrogenous organic compounds such as linseed oil, naphthalene or acetylene.** Alphons O. Jaeger (to Selden Co.). U. S. 1,931,846, Oct. 24. A contact mass is used comprising when freshly prepd. a permutogenetic material with at least one effective catalytic component other than an exchangeable base such as one contg. Ni, Cu and Mn. Numerous details are given. Cf. *C. A.* 27, 3944.

**Diolefins.** Serge V. Lebedev. Ger. 577,630, June 3, 1933. MeOH, EtOH, PrOH or iso-PrOH, or mixts. of these are heated with a mixt. of catalysts which cause H or water to split off from the alc. mol. Catalysts obtained by reducing Cu compds. are excepted. ZnO is mentioned as a H-splitting catalyst and  $Al_2O_3 \cdot SiO_2 \cdot xH_2O$  as a water-splitting catalyst.

**Aromatic bases.** Soc. pour l'ind. chim. à Bâle. Fr. 749,964, Aug. 2, 1933. Polynuclear aromatic amino bases, the rings of which are joined directly or indirectly by CH<sub>2</sub> groups, in such a manner that the mol. proportion of CH<sub>2</sub> groups to aromatic amine groups is above 0.5 and less than 1, are prepd. by condensing primary aromatic amines, the *p*-position being free, with derivs. contg. active CH<sub>2</sub> groups, such as CH<sub>2</sub>O, anhydroformaldehydeaniline, anhydro-*p*-aminobenzyl alc., hexamethylenetetramine and methylal. The reaction is carried out in the presence of acid at a temp. not above 120° and avoiding a large excess of PhNH<sub>2</sub>. The products may be used as addns. to pickling acids, in the rubber industry and as starting materials for the prepn. of artificial resins.

**Liquid-phase oxidation of hydrocarbons to alcohols.** Martin Luther and Wilhelm Dietrich (to I. G. Farbenind. A.-G.). U. S. 1,931,501, Oct. 24. Oxidation such as that of paraffin wax or oil to form alcs., esters, etc., is effected by heating to about 160° under atm. pressure with a gaseous oxidizing agent such as air in the presence of an added acid such as HOAc having a dissoc. const. between  $10^{-4}$  and  $10^{-13}$  (the quantity of the acid added during the whole reaction being at least 2% by wt. of the initial hydrocarbon material and the reaction being stopped as soon as the saponification value of the reaction product is 70).

**Alcohols.** H. Th. Rohme A.-G. (Hermann Truckner, inventor). Ger. 576,387, May 12, 1933. Addn. to 571,834 (*C. A.* 27, 4539). See Brit. 385,488 (*C. A.* 27, 1240).

**Dehydrating and rectifying raw ethyl alcohol, etc.** Otto v. Kussler and Daniel Peters. U. S. 1,935,529, Nov. 14. A raw alc. contg. 2-4 C atoms and which may be of a 90-96% concn. but which still contains originally present impurities is treated with  $C_2H_5I$ ; the resulting azeotropic mixt. is distd., its vapors are condensed, the condensate is sepd. into 2 layers one of which contains substantially all the  $C_2H_5I$  and the other the alc.-water mixt. and substantially all the distd. impurities. The last-mentioned layer is rectified, simultaneously sepg. the low-boiling fraction of the impurities from the alc. and removing them as first runnings at the top of the rectification zone, and sepg. the higher-boiling fraction of the distd. impurities from the alc. as later runnings and

removing them from the rectification zone, the highly concd. alc. being withdrawn from the rectification zone and returned to the distn. zone. An arrangement of app. is described.

**Stabilizing aromatic alcohols.** Lucas P. Kyrides (to Monsanto Chemical Co.). U. S. 1,933,064, Oct. 31. An aromatic alc. such as benzyl alc. is mixed and heated with about 3% of a strong org. amine such as triethanolamine which is sol. in the alc. and less volatile than the latter.

**Recovery of alcohol from mixtures with ammonia.** Joseph E. Jewett (to National Aniline and Chemical Co.). U. S. 1,933,556, Nov. 7. A vapor mixt. contg. alc. and NH<sub>3</sub>, such as the mixt. produced in the production of arylglycines by the aldehyde-cyanide process, is contacted with an arylamine such as aniline which serves to absorb the alc. App. is described.

**Triazoles.** Schering-Kahlbaum A.-G. Brit. 396,778, Aug. 11, 1933. 3,4,5-Trisubstituted-1,2,4-triazoles are prepd. by causing 3,5-disubstituted furodiazoles to react with primary aliphatic, aromatic or heterocyclic amines, with or without such solvents as MeOH and EtOH. The furodiazoles are prepd. by treating diacylhydrazines in known manner with POCl<sub>3</sub>. Among examples dimethylfurodiazole is treated with (1) alc. MeNH<sub>2</sub> to give 3,4,5-trimethyltriazole and (2) PhNH<sub>2</sub> to give 3,5-dimethyl-4-phenyltriazole and (3) methylphenylfurodiazole is treated with alc. MeNH<sub>2</sub> to give 3,4-dimethyl-5-phenyltriazole and with PhNH<sub>2</sub> to give 3-methyl-4,5-diphenyltriazole.

**Aminopropanols.** I. G. Farbenind. A.-G. Brit. 396,551, Aug. 10, 1933. Addn. to 365,535 (*C. A.* 27, 1639) and 365,540 (*C. A.* 27, 1640). Racemic 1-hydroxyphenyl-2-amino-1-propanols are prepd. by reducing a 1-hydroxyphenyl-2-keto-1-propanol with H at raised temp. in the presence of NH<sub>3</sub>, or a primary or secondary amine, and a precious metal or metal of the Ni group (Fe, Co, Ni or Cu). When using an alkylamine or arylamine the product is alkylated or arylated in the NH<sub>2</sub> group but in the case of NH<sub>3</sub> or an aralkylamine there is obtained a product unsubstituted in the NH<sub>2</sub> group except when an aralkylamine is used in conjunction with a catalyst of the Ni group (in which case the aralkyl-amino compd. is formed and requires to be further hydrogenated in the presence of a precious metal to split off the aralkyl group). The reaction is preferably effected in an alc. soln. Examples are given of the prepn. of racemic (1) *m*-hydroxyphenylpropanolamine by hydrogenating 1-*m*-hydroxyphenylacetylcarbinol in the presence of benzylamine and Pd; using Ni as the catalyst the racemic *m*-hydroxyphenylbenzylaminopropanol is obtained from which the benzyl group is split off by continuing the hydrogenation in presence of Pd, (2) 3,4-dihydroxyphenylaminopropanol from 1-3,4-dihydroxyphenylacetylcarbinol with Pd and benzylamine, etc.

**Aminopropanols.** I. G. Farbenind. A.-G. Brit. 396,951, Aug. 17, 1933. Racemic 1-phenyl-2-amino-1-propanols that are monohydroxylated in the Ph nucleus are resolved into their optically active components by means of an optically active tartaric acid. Examples are given of the resolution of 1-*m*-hydroxyphenyl-2-methylamino-1-propanol and 1-*m*-hydroxyphenyl-2-amino-1-propanol by *d*-tartaric acid. Cf. *C. A.* 27, 1640.

**Indophenols; sulfur dyes.** Imperial Chemical Industries Ltd. and Max Wyler. Brit. 396,393, Aug. 1, 1933. Indophenols are prepd. by condensing a compd. of formula  $ArNHCHX$ , wherein Ar is an aryl radical having a free *p*-position, X is H, alkyl or aryl and Y is a —CN or CONH<sub>2</sub> group, with a nitrosophenol or a quinonechloroimide or by oxidizing such a compd. with *p*-aminophenol (I) according to known methods. By sulfuring these indophenols or the corresponding leuco compds. S dyes giving level greenish blue to violet-blue shades on cotton are obtained. Among examples (1) anilinoacetamide (II) is condensed with *p*-nitrosophenol and the indophenol obtained sulfurized before or after reduction; the same leucoindophenol is produced by oxidizing II (obtained by boiling the corresponding nitrile in soda soln.) with I by means of acid dichromate followed

by reduction with Zn dust, and (2) the nitrile prep'd. by condensing  $\text{PhNH}_2$ ,  $\text{BzH-bisulfite}$  and alkali cyanide together is treated with quinonechloroimide in  $\text{H}_2\text{SO}_4$ .

• **Acetylated phenols.** Herbert L. J. Haller and Paul S. Schaffer (to the free use of the public). U. S. 1,933,075, Nov. 7. In prep. an acetylated phenol such as *p*-acetamidophenylacetate, an aryldiazonium fluoroborate such as *p*-acetamidophenyldiazonium fluoroborate is heated with a lower aliphatic acid or anhydride such as  $\text{Ac}_2\text{O}$ . Several examples are given.

**Isopropylcresols.** Rheinische Kampfer-Fabrik G. m. b. H. (Karl Schollkopf, inventor). Ger. 586,150, Oct. 18, 1933. Propylene is condensed with *o*-, *m*- or *p*-cresol at a temp. up to  $400^\circ$  in the presence of a catalyst, *e. g.*,  $\text{Al}_2\text{O}_3$ ,  $\text{AlPO}_4$ , Al-Mg hydrosilicate, kieselguhr, or anhyd.  $\text{ZnCl}_2$ . The reaction may be effected in the gaseous or liquid phase and at atm., reduced or raised pressure. The propylene may be replaced by reagents yielding it, *e. g.*,  $\text{Pr}_2\text{O}$ , but the use of  $\text{PrOH}$  is excluded. The products are generally mixts. of *C*-mono or di-isopropylcresols, with or without cresol isopropyl ethers. Similar mixts. may be prep'd. by heating a *C*-isopropylcresol with a catalyst, or by heating a diisopropylcresol with cresol in the presence of a catalyst. The components of the mixed products are sep'd. by extn. with alkali followed by fractional distn. Examples are given describing the prep'n. of thymol and various isomers and homologs, including 4-hydroxy-2-isopropyltoluene, *m.* 37°, *b.* 248°, and 3-hydroxy-2-isopropyltoluene, *m.* 69°, *b.* 228.5°.

**Ketones from secondary alcohols.** Clyde O. Henke (to E. I. du Pont de Nemours & Co.). U. S. 1,933,215, Oct. 31. See Fr. 736,087 (C. A. 27, 1361).

**Cyclic ketones.** Soc. anon. M. Naef & Cie. Brit. 396,576, Aug. 10, 1933. See Fr. 744,343 (C. A. 27, 4031).

**Ketenes.** Peter J. Wiczewich and Per K. Frolich (to Standard Oil Development Co.). Brit. 396,568, Aug. 10, 1933. See Fr. 742,985 (C. A. 27, 3722).

**Esters.** I. G. Farbenind. A.-G. Brit. 395,340, July 4, 1933. Esters, suitable for *plastering* and *softening agents for lacquers, films and plastis contg. cellulose derivs.*, *e. g.*, the nitrate and acetate, urea-aldehyde and other resins or other org. film-forming substances, are made by esterifying all the carbonyl groups of polycarboxylic acids produced by the oxidation of aliphatic hydrocarbons, or their O derivs. of high mol. wt., with  $\text{HNO}_3$  or oxides of N, such oxidation being effected at not over  $110^\circ$ . The esterification is effected with monohydric alcs. or phenols or with 1 OH group of polyhydric alcs. or OH-bearing ethers of polyhydric alcs. Among examples (1) an oxidation product of paraffin wax with  $\text{HNO}_3$  at  $90^\circ$  is esterified with  $\text{BuOH}$ , the ester being distd. off at  $170-230^\circ$  at 1-2 mm. pressure; it may be added to a soln. of low-viscosity cellulose nitrate in a mixt. of equal parts of  $\text{BuOAc}$  or  $\text{iso-BuOAc}$ ,  $\text{BuOH}$  or  $\text{iso-BuOH}$ , and  $\text{PhMe}$  to form an elastic lacquer, (2) an oxidation product of train oil with 45-50%  $\text{HNO}_3$  at  $90^\circ$  while maintaining the acid concn. by adding nitrous gases is esterified with glycol mono-Et ether; the product is a gelatinizing agent for celluloid articles and (3) an oxidation product of "S olive oil" (an oil extd. from olive husks by  $\text{CS}_2$ ) with  $\text{HNO}_3$  as in (2) is esterified with cyclohexanol; the product is stirred with  $\text{Ca(OH)}_2$ , ground in a ball-mill with benzene, the Ca soaps filtered off, the benzene distd. off and the ester distd. off *in vacuo*.

**Alkyl esters of acrylic acid from  $\beta$ -chloropropionic esters.** Bernhard Jacobi and Hans Fikentscher (to I. G. Farbenind. A.-G.). U. S. 1,934,613, Nov. 7. Alkyl esters of  $\beta$ -chloropropionic acid are heated in the presence of a difficultly volatile acid reacting substance such as  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$  or  $\text{ZnCl}_2$ .

**Polymerized vinyl esters and fatty oils.** Alexander Eibner, Willy O. Herrmann, Wolfgang Hachuel and Martin Miller (to Consortium für elektrochemische Industrie G. m. b. H.). U. S. 1,934,297, Nov. 7. Products which are suitable for *lacquers*, etc., are obtained by polymerizing vinyl esters such as vinyl acetate or butyrate with products of the polymerization of fatty oils such as

stand oil or linseed oil or the like. Numerous examples are given.

**Vinyl esters and their polymerization products.** I. G. Farbenind. A.-G. Brit. 395,478, July 20, 1933. Vinyl esters of aliphatic satd. or unsatd., mono- and polycarboxylic acids contg. at least 5 C atoms, of aromatic, cycloaliphatic and heterocyclic mono- and polycarboxylic acids and of mixed aliphatic-aromatic and mixed aliphatic-cycloaliphatic mono- and polycarboxylic acids, the  $\text{COOH}$  groups of which may be attached to the aliphatic or cyclic radical, are manuf'd. by treating such acids with  $\text{C}_2\text{H}_2$  in the presence of Zn or Cd salts of org. carboxylic acids while working in the liquid phase, preferably under increased pressure. Suitable acids are valeric and its isomers, caprylic, lauric, palmitic, margaric, stearic, oleic, adipic, myristic, sebacic,  $\text{BzOH}$ , *o*-, *m*- and *p*-toluic, the different isomers of naphthoic, phenylacetic and cinnamic acids, phenylglycine, phthalic acid and monoalkyl esters thereof, salicylic and hydroxynaphthoic acids, pyridine- and quinoline-carboxylic acids, hydrophthalic and abietic acids, also partially esterified acids, natural resins of high acid value, *e. g.*, colophony, or mixts. of acids, *e. g.*, those obtainable by sapon. of natural fats and oils, *e. g.*, coconut or palm kernel oils, or by oxidation of paraffin or montan waxes. Suitable Zn and Cd salts are  $\text{Zn(OAc)}_2$ , Zn stearate,  $\text{Zn(OBz)}_2$ , and  $\text{Cd(OBz)}_2$ . Absorptive substances, *e. g.*, active C, fuller's earth, silica gel, may be added to the reaction mixt. To prevent explosions the  $\text{C}_2\text{H}_2$  is dild. with inert gases, *e. g.*, N, H, CO,  $\text{CH}_4$  or  $\text{C}_2\text{H}_6$ . Danger of explosions is further precluded by the addn. of inert solvents, *e. g.*,  $\text{C}_6\text{H}_6$ ,  $\text{PhMe}$ , benzene, xylene, cyclohexane or decahydronaphthalene, or esters such as the vinyl esters obtainable by the process or such esters as Me, Et, Bu iso-Bu or Am acetate or butyrate. Polymerization inhibitors, *e. g.*, hydroquinone, naphthols or amines, may be added during distn. or storage of the esters or incorporated in the reaction mixt. during the reaction itself. The prep'n. and polymerization of the esters may be combined, *e. g.*, by using small amts. of catalysts and prolonging the reaction time or by continuing heating to  $150-200^\circ$  after the reaction is completed. The esters may also be polymerized by methods usually used in polymerizing lower vinyl esters. Various other methods of polymerization are described. The polymerization products may be used as varnishes and lacquers, if desired together with cellulose derivs. compatible therewith, with or without inert fillers, org. or inorg. pigments, org. dyes and softening agents. Polymerized vinyl esters of aliphatic open-chain or cycloaliphatic carboxylic acids contg. more than 12 C atoms may be added to polishing preps. Numerous examples are given.

**Ethers of cellulose esters.** Henry Dreyfus. Brit. 396,796, Aug. 11, 1933. A cellulose ester or mixed ester is caused to react with an oxyalkylating agent in the absence of strong inorg. bases such as NaOH under conditions such that no substantial sapon. of the ester occurs. Esters contg. the  $\text{CSS}$  group are excluded. The products may be used in the production of rayon, films, varnishes, plastic masses, molding powders, etc. Among examples (1) cellulose acetate contg. 2-2.5 ester groups is heated in an autoclave with ethylene oxide and (2) cellulose benzoate contg. 1.5-2 ester groups is reacted with propylene oxide in the presence of hydroxypropylmethylamine.

**Alkyl ethers.** Imperial Chemical Industries Ltd. Fr. 749,402, July 24, 1933. Alkyl ethers are prep'd. by causing an alc. contg. more than 10 C atoms to react with an alkyl halide in the presence of finely divided Al and an agent fixing acid. Examples are given of the prep'n. of *octadecyl benzyl ether*, *b<sub>11</sub>*  $250^\circ$ , *cetyl benzyl ether*, *b<sub>18</sub>*  $340-350^\circ$ , *dodecyl benzyl ether*, *b<sub>11</sub>*  $190-202^\circ$ , and *oleyl benzyl ether* which decomposes when heated. The products may be sulfonated to form *wetting agents*.

**Cyclic ethers.** Henry Dreyfus. Brit. 396,761, Aug. 8, 1933. See Fr. 747,423 (C. A. 27, 5082).

**Amino ethers.** Edgar C. Britton (to Dow Chemical Co.). U. S. 1,932,653, Oct. 31. A comp'd. of the general formula  $\text{X}-\text{R}-\text{O}-\text{R}'$  in which X represents a halogen

substituent, R an aryl group and R' alkyl or aryl, is heated with  $\text{NH}_3$ , as in the production of *p*-phenetidine from *p*-chlorophenetole under pressure at  $225^\circ$  in the presence of  $\text{Cu}_2\text{O}$ .

**Unsaturated ethers from acetals.** Karl Haur (to I. G. Farbenind. A.-G.). U. S. 1,931,858, Oct. 24. Acetals are converted into unsatd. ethers, with good yields, by contact of the acetal vapor with finely divided metals such as Au, Ag or the Pt metals, preferably on a carrier such as asbestos, ceramic or metallic substances, kieselguhr, alumina or silica gels or active charcoal, with or without various auxiliary substances such as Cu, Mg, Ca, Al, Ti, Sn, Zn, Cd, Pb, Zr, Th, Cr, Mo, W, U or Mn, their oxides or heat-resisting salts. Various examples with details of procedure are given, and the *vinyl ether of ethylene glycol monoethyl ether* is particularly claimed as a new product. Temps. of  $200$ – $350^\circ$  are suitable for the conversion.

**Cyclic acetals.** Kenneth H. Hoover (to Association of American Soap and Glycerine Producers). U. S. 1,934,309, Nov. 7. A polyhydric alc. and an aldehyde are caused to react to form a cyclic acetal and water in the presence of a water-immiscible org. liquid such as  $\text{C}_6\text{H}_6$  which is not reactive with the alc. and aldehyde and a water mixt. of which will distil from the reaction mixt. at a reaction temp.; distn. of this org. liquid and water is effected and the org. liquid is sep'd. from the water and returned. Various examples are given including the production of butyl glycerol, furfural glycerol and furfural glycol, suitable for plasticizing lacquer compns., etc.

**Organic amines.** Gilbert T. Morgan and David D. Pratt. Brit. 396,760, Aug. 11, 1933. Aliphatic and aromatic amines are obtained by heating to a high temp. and under pressure an aliphatic or aromatic compd., contg. alc. or a single phenolic OH, with an  $\text{NH}_4$  or an aliphatic amine salt. According to examples  $\text{NH}_4\text{Cl}$  reacts under such conditions with EtOH to give mono-, di- and triethylamine, with *m*-cresol to give *m*-toluidine and di-*m*-tolylamine and with *sym*-*m*-xyleneol to give *sym*-*m*-xylylidine and di-3,5-xylylamine and dimethylamine-HCl reacts with *sym*-xyleneol to give a mixt. of primary and secondary bases.

**Halogenated aromatic amines.** Lindley E. Mills (to Dow Chemical Co.). U. S. 1,935,515, Nov. 14. For producing a chloro-aromatic amine such as 3,4-dichloroaniline or the like, a chlorobromo hydrocarbon of the benzene or naphthalene series contg. Cl and Br in the 1,4-position to each other is treated with an aq.  $\text{NH}_3$  base such as  $\text{NH}_3$  itself or monomethylamine in the presence of a Cu-contg. catalyst capable of promoting the aminolysis of a nuclear halogenated aromatic compd., at a temp. of  $80$ – $150^\circ$  and under superatm. pressure, to effect reaction with the Br only. Several examples are given.

**Primary amino compounds.** Wm. J. Hale (to Dow Chemical Co.). U. S. 1,932,518, Oct. 31. Formation of primary amines of the lower aliphatic or benzene series such as aniline is effected by reaction of  $\text{NH}_3$  with a monohalogenated hydrocarbon such as  $\text{PhCl}$  in the presence of added corresponding secondary and tertiary amines, which serve to establish equilibrium reaction conditions.  $\text{Cu}_2\text{O}$  or  $\text{Cu}_2\text{Cl}_2$  may be used as a catalyst.

**Addition compounds of menthols and orthophosphoric acid.** John W. Blagden and Walter E. Huggett (one-third to Howards & Sons, Ltd.). U. S. 1,932,130 1, Oct. 24. See Brit. 374,893 (C. A. 27, 3940).

**$\beta$ -Alkylamino compounds of hydroxyphenylethanols.** Helmut Legerlotz (to Frederick Stearns & Co.). U. S. 1,932,347, Oct. 24. *p*-Hydroxymethylaminoacetophenone-HCl, by reduction in water soln. with H and Pd on carbon as a catalyst, with addn. of  $\text{NH}_3$  after the reduction, forms *p*-hydroxyphenylethanolmethylamine, m.  $184$ – $5^\circ$ , and its hydrochloride m.  $155$ – $6^\circ$ . The *m*-hydroxyphenyl deriv., correspondingly obtained, m.  $142$ – $3^\circ$ . Various details and modifications of procedure are described.

**Tetrazo compounds.** I. G. Farbenind. A.-G. (Erwin Hoffa, Wilhelm Schumacher II, Ernst Tietze and Anton Ossgenbeck, inventors). Ger. 586,353, Oct. 20, 1933.

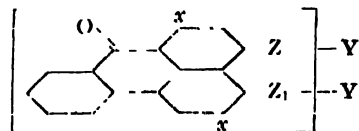
1 Stable water-sol. tetrazo compds. of *m*- and *p*-diamines of the benzene series are prep'd. by tetrazotizing these in the presence of  $\text{HRF}_4$ . Examples are given.

**Organic persulfo compounds.** Fleisch-Werke A.-G. für Gerbstofffabrikation u. chemische Produkte. Brit. 396,395, July 27, 1933. Divided on and addn. to 394,989 (C. A. 28, 176). The org. persulfo compds. described in 394,989 are prep'd. by treating sulfo compds. other than sulfonyl chlorides with peroxides, the presence of org. solvents and absence of  $\text{H}_2\text{O}$  not being essential. Good cooling and (or) stabilizers must be used. In examples (1) naphthalenesulfonic acid is treated, while cooling and in the presence of Na pyrophosphate (I), with both  $\text{Na}_2\text{O}_2$  and  $\text{H}_2\text{O}_2$ , (2) naphthalenedisulfonic acid is treated with  $\text{H}_2\text{O}_2$  in the presence of I, and (3) diisopropyl- $\beta$ -naphthalenesulfonic acid peroxide is treated with  $\text{Na}_2\text{O}_2$  in the presence of I, with cooling.

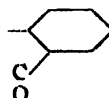
**Aromatic vinyl compounds.** I. G. Farbenind. A.-G. Brit. 396,079, July 28, 1933. See Fr. 720,730 (C. A. 27, 307).

**Polyvinyl compounds.** I. G. Farbenind. A.-G. Brit. 396,186, Aug. 3, 1933. Mixed polymerization products are made by causing a product of the polymerization of a mixt. of at least 2 vinyl compds., said product contg. free OH groups, to react with a compd. that reacts with OH groups, e. g., aldehydes, ketones or other compds. such as benzyl chloride, oleic acid chloride,  $\text{ClSO}_2\text{H}$  or phthalic anhydride. Alternatively the product of the polymerization of a mixt. of at least 2 vinyl compds., at least 1 of which is an ester, is sapond. and caused to react with the aldehyde, etc., or is treated simultaneously with a sapon. agent and the aldehyde, etc. When starting from a mixed polymerization product of 2 vinyl esters or a vinyl ester and an acrylic acid ester there may be first obtained a product that still contains 1 acid component while the other has been split off to leave free OH groups. By the action of an aldehyde or ketone on this product a mixed polymerization product is obtained, the OH groups of which are in part esterified and in part combined with the aldehyde or ketone to form an acetal. Among examples (1) the product prep'd. by polymerizing a mixt. of vinyl acetate and oleate in alc. soln. with the aid of Bz peroxide is heated in alc. soln. with butyraldehyde and  $\text{H}_2\text{SO}_4$  to yield a product contg. oleic acid groups and butyraldehyde acetal groups; it is suitable for making lacquers and plastic masses, (2) the mixed polymerization product of acrolein and *p*-hydroxystyrene is heated with chloroacetic acid and aq. NaOH; the product can be used as an assistant in the textile industry and (3) the polyvinyl alc. obtained by sapon. in an acid medium of the mixed polymerization product of vinyl acetate and stearate and still contg. the stearyl residue is heated with  $\text{ClSO}_2\text{H}$  and pyridine, the product dild. with  $\text{H}_2\text{O}$ , the pyridine and excess acid removed by dialysis and the residue neutralized, evapd. under reduced pressure and dild. with  $\text{H}_2\text{O}$  to give a viscous soln. which can be used for sizing and other purposes in the textile industry.

**Compounds of the dibenzopyrenequinone series.** Georg Kranzlein, Arthur Wolfram and Emil Hausdorfer (to General Aniline Works). U. S. 1,932,501, Oct. 31. New compds. of the general formula:



where Z and  $Z_1$  jointly represent the grouping



and Y represents hydroxy, O-alkyl, O-aryl, O-aralkyl or  $\text{SO}_3\text{H}$  occupying positions other than those marked by an x in the formula, and in which the aromatic nuclei may be

further substituted are obtainable by subjecting a dibenzopyrenequinone compd. to the action of a sulfonating agent as, for instance, concd.  $\text{H}_2\text{SO}_4$  or oleum and replacing, if desired, in the sulfonated products thus obtained, the sulfonic acid groups by hydroxy groups as, for instance, by a treatment with caustic alkali. The dihydroxy compds. thus obtained can be converted into the corresponding ethers as, for instance, into the alkoxy or aralkoxy compds. by the usual methods. As etherifying agent preferably *p*-toluenesulfonic acid alkyl ester is used. The compds. thus obtained may be halogenated by the usual methods whereby products are obtainable the shades of which are changed in comparison with the parent material. Numerous examples with details of procedure are given.

**Alkyl derivatives of methyl ethers of cresols.** Alexei F. Chichibabin (to Schering-Kahlbaum A.-G.). U. S. 1,933,775, Nov. 7. For the production of a deriv. such as *tert*-butyl-*p*-cresol Me ether, an olefin such as isobutylene is caused to react on a Me ether of a cresol in the presence of  $\text{H}_3\text{PO}_4$  or  $\text{H}_2\text{SO}_4$ .

**Aminoanthraquinone derivatives.** Compagnie nationale de matières colorantes et manufactures de produits chimiques du nord réunies établissements Kuhlmann. Fr. 750,112, Aug. 5, 1933. Intermediate products are prep'd. by causing  $\text{CH}_2\text{O}$  or substances liberating it, e. g.,  $\text{CH}_3\text{O}-\text{bisulfite}$ , to act on leuco derivs. of aminoanthraquinones and reoxidizing. Me groups are thereby introduced into the anthraquinone ring while the  $\text{NH}_2$  is not methylated. Examples are given of the prep'n. of 2,6-dimethyl-1,5-di-, 2-methyl-1- and 2-methyl-5-chloro-1-aminoanthraquinone.

**Anthracene derivatives.** I. G. Farbenind. A.-G. (Max A. Kunz, Rudolf Stroh and Hermann Dimroth, inventors). Ger. 586,068, Oct. 18, 1933. New compds. are obtained by heating anthraquinone (I) or its derivs. with aliphatic acid amides. Thus, I and  $\text{HCONH}_2$ , boiled gently together for 4 hrs., yield a product, m. 435°, believed to be 9,10-di(formylamino)anthracene. Similar products are obtained from  $\text{HCONH}_2$  and 2 methyl-I and 2-chloro-I. A product believed to be 9-hydroxy-10-acetylaminanthracene is prep'd. by boiling I in  $\text{AcNH}_2$  in the presence of Zn dust. The products yield I or its derivs. on oxidation.

**Guanidine derivatives.** Schering-Kahlbaum A.-G. (Herbert Schotte, inventor). Ger. 576,020, May 12, 1933. Addn. to 565,881 (C. A. 27, 2456). Guanidine compds. are prep'd. by treating basic polyamine salts contg. primary or secondary amino groups with ethers of isothiourea or their salts. Alkali may be present during the reaction. In an example  $\delta$ -aminobutyl- $\gamma$ -aminopropylamine-HBr is treated with *N*-ethylisothiourea-HBr in the presence of water to give  $\delta$ -guanidobutyl- $\gamma$ -guanidopropylamine-(HBr). The trihydrate m. 232°. The prep'n. of guanylthiourea-(HBr) $_2$ , m. 208°, is also described. Cf. C. A. 27, 4245.

**Chlorinated derivatives of indanthrene.** Joyce H. Crowell (to National Aniline & Chemical Co.). U. S. 1,931,046, Oct. 24. An indanthrene substance is subjected to the action of Cl in the presence of  $\text{H}_2\text{SO}_4$  at a temp. not exceeding 50° (suitably about 35°).

**Sulfonating derivatives of aliphatic hydrocarbons.** Soc. pour l'ind. chim. à Bâle. Swiss 161,837, Aug. 1, 1933. A process is described for sulfonating the above derivs. to form soap-like products with alkali hydroxide solns. The process is carried out at low temps. Thus, castor oil is sulfonated with concd.  $\text{H}_2\text{SO}_4$ .

**Acrylic acid derivatives.** Chemische Fabrik Grunau Landshoff & Meyer A.-G. (Fritz Sommer, inventor). Ger. 577,921, June 14, 1933. Derivs. of  $\beta,\beta$ -alkylated or alkylarvylated acrylic acids are prep'd. by converting these, especially those contg. alkyl residues with 2-4 C atoms or a Ph residue, into their amides or ureides. Thus,  $\beta,\beta$ -diethylacrylic acid is heated with  $\text{SOCl}_2$ . The resulting chloride is converted to  $\beta,\beta$ -diethylacrylic acid amide, m. 113°, by treatment with  $\text{NH}_3$ . The prep'n. of  $\beta,\beta$ -diethylacrylic acid ureide, m. 173°, is also described.

**Keto derivatives of cholanolic acid.** Friedrich Boedecker, Gustav Revere and Hans Volk. U. S. 1,933,003, Oct. 31. Keto derivs. of cholanolic acid are formed from cholanolic acid derivs. which contain free OH groups and which except for the OH groups do not contain any substituents which are oxidizable by chromic acid (such as trihydroxy-cholanolic acid), by oxidizing with aq. chromic acid soln., in an inert medium such as xylol. Esters of hydroxy-cholanolic acids such as the methyl ester may be similarly treated.

**Phthalic acid derivatives.** Ernest G. Beckett, Cecil Shaw, William E. Stephen, George C. Semple, Robert F. Thomson and Imperial Chemical Industries Ltd. Brit. 396,735, Aug. 9, 1933. The sepn. and purification of mixts. of chlorinated phthalic acids and (or) anhydrides is effected by treating the mixts. (which may also contain phthalic acid and (or) anhydride) with  $\text{H}_2\text{SO}_4$  of 50-100% concn., so as to convert 1 or more of the acids into anhydrides and (or) *vice versa*, and removing 1 or more of the constituents of the resulting mixt. by the differential action of an org. solvent. Among examples (1) a mixt. of 3,6- and 1,5-dichlorophthalic anhydrides is treated with 98%  $\text{H}_2\text{SO}_4$  at 100° and dild.; the mixt. is then extd. with PhMe which dissolves the 3,6-dichlorophthalic anhydride and leaves 4,5-dichlorophthalic acid and (2) phthalic anhydride is chlorinated in aq. KOH and crystals of impure acid K 4-chlorophthalate filtered off. The mother liquors are treated with  $\text{CaCl}_2$  and the acids (phthalic, 3- and 4-chlorophthalic and dichlorophthalic) obtained from the mixt. of pptd. Ca salts. The dry mixt. of acids is treated with 99.5%  $\text{H}_2\text{SO}_4$ , dild. and extd. with PhMe whereby 3-chlorophthalic and some dichlorophthalic anhydrides pass into soln. The PhMe soln. is concd. and agitated with 56%  $\text{H}_2\text{SO}_4$  whereby 3-chlorophthalic acid ppts. 3,6-Dichlorophthalic anhydride can be crystd. from the filtrate.

**Phthalic acid derivatives.** Imperial Chemical Industries Ltd. Fr. 749,951, Aug. 2, 1933. Mixts. of chlorinated phthalic acids or anhydrides are sepd. and purified by treating the mixt. with  $\text{H}_2\text{SO}_4$  of appropriate concn. whereby one or more of the anhydrides present are converted to acids and may be sepd. from the anhydride or anhydrides not converted.

**Condensation products of the anthraquinone series.** Walter Mieg, Berthold Stein and Willy Trautner (to General Aniline Works). U. S. 1,932,591, Oct. 31. Caustic alkalis in alc. soln. cause condensation of aminoanthraquinones at temps. between about 70° and the b. p. of the reaction mixt. with the formation of new compds. (of undetd. compn.) which do not exhibit pronounced vat dye character but are themselves of yellow to brown color. The condensation is facilitated by the presence of an oxidizing agent, as by leading in a current of air. Several examples with details of procedure are given. Cf. C. A. 28, 177.

**Condensation products from diolefins and hydrocarbons.** Fritz Holmann and Alfred Michael (to I. G. Farbenind. A.-G.). U. S. 1,934,123, Nov. 7. See Ger. 557,514 (C. A. 27, 514).

**Benzyl chloride.** Imperial Chemical Industries Ltd. Ger. 580,115, Oct. 25, 1933. See Brit. 334,260 (C. A. 25, 973).

**Vinyl chloride.** Granville A. Perkins (to Carbide and Carbon Chemicals Corp.). U. S. 1,934,324, Nov. 7. See Can. 329,012 (C. A. 27, 1375).

**Carbamic acid chloride.** I. G. Farbenind. A.-G. Brit. 396,870, Aug. 17, 1933.  $\text{NH}_4\text{Cl}$  is treated with  $\text{COCl}_2$  at 150-310° and carbamic acid chloride sepd. from the reaction products by cooling which may be effected in stages. The  $\text{COCl}_2$  may be dild. with inert gases, e. g., N,  $\text{CO}$ ,  $\text{CO}_2$ , air and (or) HCl.

**Chlorinating naphthalene.** Rudolf Engelhardt (to I. G. Farbenind. A.-G.). U. S. 1,933,122, Oct. 31.  $\text{Cl}_2$  is continuously introduced into a molten reaction mass, maintained at 5-10° above the m. p. of the material in each stage of the chlorination, according to a temp. curve given which follows the same general slope as the



m.-p. curve and gradually increases from 10° above the m.-p. curve at 80° to 80° above the m.-p. curve at -30° when one Cl atom has entered the molecule and which gradually decreases again to about 22° above the m.-p. curve at about 40° when 2.5 Cl atoms have entered the mol. and to at the most 15° above the m. p. curve at a temp. of at least 70° when at least 3 Cl atoms have entered the molecule. The chlorination is continued to obtain a waxy product.

**Salt of acetylsalicylic acid.** Chinoin Gyogyszer és Vegyészeti Termékek Gyára R. T. (V. Kereszty and Wolf) and Emil Wolf. *Swiss* 160,440, May 16, 1933. A basic Al salt of the above acid is obtained by treating an aq. soln. of a salt of the acid with an aq. soln. of an Al salt. The product contains 6.5-6.6% Al and 28-29% AcOH.

**Dialkyl sulfates from olefins.** N. V. de Bataafsche Petroleum Maatschappij. *Ger.* 577,947, June 7, 1933. The dialkyl sulfates with 4 or more C atoms in the alkyl groups are prepd. by treating excess of olefin with 90-100% H<sub>2</sub>SO<sub>4</sub> at least 2 mols. of the former being used to 1 mol. of the latter. The olefins may be used in liquified form under pressure and may be freed from isoolefins by prior treatment with 65-70% H<sub>2</sub>SO<sub>4</sub>. Thus, butylene and H<sub>2</sub>SO<sub>4</sub> give Bu<sub>2</sub>SO<sub>4</sub>.

**Disulfides.** Imperial Chemical Industries Ltd., Hugh M. Bunbury, John S. H. Davies and Alfred Eccles. *Brit.* 395,726, July 21, 1933. Mercaptans in which the SH group is directly attached to a C atom which is itself directly linked to N and S are converted to disulfides by treatment with persulfuric acid or a H<sub>2</sub>O-sol. persulfate. In examples 2-mercaptobenzothiazole, Na dimethyldithiocarbamate and the diethylamine salt of diethyldithiocarbamic acid are converted to corresponding disulfides by aq. NH<sub>3</sub> persulfate. The invention is particularly directed to the manuf. of disulfides for use as *rubber vulcanization accelerators*.

**Diaminodiphenyl disulfides.** Robert Lantz (one-half to Société anon. des matières colorantes et produits chimiques de Saint-Denis). *U. S.* 1,933,217, Oct. 31. Dithioanilines of the general formula NH<sub>2</sub>-R-S-S-R-NH<sub>2</sub> in which R represents a benzene nucleus to which S and NH<sub>2</sub> are attached in any relative positions except the *m* position, are formed by causing a sol. salt of hydroarsulfuric acid such as the Na salt to react with a compd. of the general formula Cl-R-NO<sub>2</sub> in which R represents a benzene nucleus to which Cl and NO<sub>2</sub> are connected in any relative positions except the *m* position, and then oxidizing the resulting product (suitably by air).

**Zinc phthalate.** Lloyd C. Daniels (to Selden Co.). *U. S.* 1,934,171, Nov. 7. A suspension of ZnO or ZnCO<sub>3</sub> in water is treated with a small amt. of an acid weaker than phthalic acid, such as HOAc, and is then agitated with phthalic acid until the Zn is pptd. as Zn phthalate.

**Hydrazine-sulfonates of the diarylamine series.** Arthur Zischer, Wilhelm Seidentaden and Karl Jellinek (to General Aniline Works). *U. S.* 1,932,152, Oct. 24. Hydrazine sulfonates of the diarylamine series corresponding to the probable general formula



where X means a naphthalene nucleus or a radical of the benzene series which may contain in the *p*-position to the NH group a further NH-NH-SO<sub>3</sub> alkali-metal group and R means a radical of the benzene series, with substituents of the benzene radicals such as alkyl, alkoxy, allyloxy, alkylmercapto, aroylamino, halogen, nitro, arylsulfonyl, or arylaminocarbonyl, are produced by treating the corresponding diazo- or bis-diazo-diarylamine sulfonates with a suitable reducing agent or by reducing the corresponding diazo- or bis-diazodiarylaminines in the manner described in *Journal of the Society of Dyers and Colorists* 1921, page 7. They are suitable for the production of *azo dyes*. For this purpose they are advantageously first mixed with combining components contg. a hydroxy or an O-alkali-metal group whereof the adjacent position is capable of attaching an arylazo group. The

comps. thus produced are then brought onto the fibers in the presence of an alkali and the goods thus treated are thereafter subjected to a steaming operation. Several examples with details of procedure are given.

**Organic acids.** I. G. Farbenind. A.-G. (Martin Luther and Hans Franzen, inventors). *Ger.* 576,160, May 8, 1933. Addn. to 492,755 (*C. A.* 24, 2472). In sepg. the carboxylic acids and unsaponifiable constituents from the product obtained by oxidizing paraffin hydrocarbons, the method of 492,755 is improved by carrying out the sapon. with an excess of an aq. suspension of alk. earth hydroxide, or Mg(OH)<sub>2</sub>. This ensures a more complete sapon. Examples are given.

**Organic acids by oxidation of hydrocarbons.** Christoph Beck and Heinrich Diekmann (to I. G. Farbenind. A.-G.). *U. S.* 1,932,613, Oct. 31. For the production of acids by oxidizing normally liquid and solid hydrocarbons such as those of fuel oil or paraffin at temps. of about 60-160° with a stream of gas contg. O, the strength of the oxidation conditions is gradually reduced (as by lowering the temp.) during the oxidation of a batch of the material, to retard the oxidation of the org. acids.

**Organic acids from oxidized nonaromatic hydrocarbons.** Hans Beller and Martin Luther (to I. G. Farbenind. A.-G.). *U. S.* 1,931,859, Oct. 24. An oxidation product of paraffin wax is heated in an open vessel to about 60-95° with a quantity of aq. Na<sub>2</sub>CO<sub>3</sub> soln. of about 20% strength about 5-10% in excess of that theoretically required for saponification, until evolution of CO<sub>2</sub> has ceased, and the material is then heated in a closed pressure-tight vessel to 100-185° in order to obtain org. acid salts. App. is described.

**Producing acids by oxidation of alcohols.** Charles J. Strosacker, Chester C. Kennedy and Earl L. Pelton (to Dow Chemical Co.). *U. S.* 1,934,648, Nov. 7. Alcs. such as PrOH or BuOH are caused to react, at temps. of 250-325°, with a fused mixt. initially contg. NaOH and KOH in specified relative proportions, to produce corresponding acids such as propionic or butyric acids in the form of their salts.

**Producing aliphatic acids, etc., by catalytic reaction between alcohols and carbon monoxide.** Walter Bader (to Celanese Corp. of America). *U. S.* 1,933,696, Nov. 7. For producing oxygenated compds. such as HOAc and MeOAc, an aliphatic alc. such as MeOH is mixed with at least 1 inorg. acidic catalyst contg. at least 1 acidic OH group linked directly to a non-metallic element, such as H<sub>3</sub>PO<sub>4</sub> and the mixt. is subjected to reaction with CO (suitably at a temp. of about 60-400° in successive stages). App. is described.

**Formic acid.** Henry Dreyfus. *Brit.* 396,375, Aug. 1, 1933. See *Fr.* 745,083 (*C. A.* 27, 4248).

**Acetic acid from acetaldehyde.** George Barsky (to American Cyanamid Co.). *U. S.* 1,934,161, Nov. 7. Liquid AcH and an oxidizing gas such as air are caused to flow continuously upwardly through a reaction kettle and the reaction zone is maintained under superatm. pressure and the top of the kettle is maintained at a temp. sufficient to remove AcH from the HOAc produced. The AcH is removed, condensed and returned to the bottom of the kettle, and the HOAc formed is continuously removed. App. is described.

**Lactic acid.** Friedrich A. V. Klopfer. *Brit.* 395,990, July 27, 1933. Solid granular preps. of lactic acid are obtained by absorbing the acid, e. g., an 80% soln. thereof, on dried, powd. vegetable pulps, e. g., peeled, degerminated and powd. carob beans, ext. of acacia berry kernels, carraghene, ext. of seaweed and dried mucilage of linseed.

**Alkylaminosulfobenzenecarboxylic acids.** I. G. Farbenind. A.-G. *Brit.* 396,100, July 31, 1933. 2-Alkylaminobenzene-1-carboxylic acid-4-sulfonic acids are manufd. by reacting an alkylamine with 2-chlorobenzene-1-carboxylic acid-4-sulfonic acid (I) in aq. soln. at above 50°, advantageously with the addn. of Cu or a compd. thereof as catalyst. Examples describe the reaction of (1) I with MeNH<sub>2</sub> with or without Cu, at 130°, (2) the Na salt of I with BuNH<sub>2</sub> at 120° and (3) the Na salt of I with EtNH<sub>2</sub> at 110-120°.

**1,6-Dibromo-2-hydroxynaphthalene-3-carboxylic acid.** Leopold Laska and Johannes Wollemann (to General Aniline Works). U. S. 1,933,987, Nov. 7. 2-Hydroxynaphthalene-3-carboxylic acid is dissolved in  $H_2SO_4$  and 2.0-2.1 at. proportions of Br are added to the soln.

**Acyl benzoic acids.** Bernard H. Jacobson (to Calco Chemical Co.). U. S. 1,933,375, Oct. 31. In the manuf. of an acyl benzoic acid such as *o*-benzoyl or *p*-toluylbenzoic acid by the Friedel & Crafts synthesis, phthalic anhydride, an unsubstituted aromatic hydrocarbon such as  $C_6H_6$  or toluene capable of forming a condensation product, and anhyd.  $AlCl_3$  are commingled at temps. substantially below  $40^\circ$  and reaction heat is withdrawn to maintain the temp. at about such a max. until the reaction is substantially complete.

**Sulfonic acids of organic compounds.** Hans Haussmann (to I. G. Farbenind. A.-G.). U. S. 1,931,491, Oct. 21. Trugsulfonic acids of non-aromatic org. compds. contg. at least 6 C atoms and corresponding to the general

formula  $R'CHSO_3H$  in which R and R' are aliphatic radicals, such as  $C_6H_{17}$  and  $HOOC(C_7H_{14})$ , resp., are produced by acting with an "onium" compd. of a sulfonating agent stronger than concd.  $H_2SO_4$  on an unsatd. aliphatic compd. such as oleic acid, rubber, etc., more than an equimol. proportion of the sulfonating agent being used if the unsatd. compd. contains a hydroxyl group. The products thus formed are water-sol.

**Aminoalkyl sulfonic acids.** Otto Nicodemus and Walter Schmidt (to I. G. Farbenind. A.-G.). U. S. 1,932,907, Oct. 31. For prepg. aminoalkyl sulfonic acids such as the methyltaurine Na salt, a compd. of the general formula  $OH-R-R'-SO_3X$  in which R and R' each stand for a bivalent satd. aliphatic hydrocarbon radical and X stands for H, or an alkali or alk. earth metal atom, such as hydroxyethane Na sulfonate, is heated in an autoclave with a compd. of the general formula  $Y-NH-Y'$  in which Y and Y' stand for H or alkyl, such as methylamine. Cf. C. A. 27, 3949.

**Substituted benzenesulfonic acids.** I. G. Farbenind. A. G. (Richard Strasser, inventor). Ger. 577,632, June 2, 1933. Chloroaminoalkoxybenzenesulfonic acids are prepd. by treating 5-chloro-2-amino-1-alkoxybenzene, or its derivs. obtained by introducing the residue  $COCH_2COR$  (R being a hydrocarbon residue) into the amino group, with a sulfonating agent. Thus, 5-chloro-2-amino-1-methoxybenzene is treated with  $H_2SO_4.H_2O$  at  $40-50^\circ$  to give the sulfonic acid. The deriv. 5-chloro-2-acetoacetyl-amino-1-methoxybenzene can be similarly sulfonated. Other examples are given. The products are used for the prepn. of dyes.

**1-Nitro- and 1-aminocarbazole-3,6-disulfonic acids.** Friedrich Muth and Albert Schmelzer (to General Aniline Works). U. S. 1,931,826, Oct. 24. Compds. of this group, in which the 8-position may be substituted by  $SO_3H$ , H, alkyl, hydroxyalkyl, halogen, CN, the carboxylic acid group, a thioalkyl group or a sulphydryl group, form white to yellow crystals sol. in water in the form of their alkali metal salts and may be employed as dye intermediates, as for prepg. unsulfonated carbazole compds. by splitting off the sulfonic groups in weakly acid soln. by heating under pressure. Several examples with details of procedure are given.

**Sulfamic acids of secondary bases.** Georg Kramlein, Heinrich Gremme, Max Thiele and Fritz Helwert (to General Aniline Works). U. S. 1,933,985, Nov. 7. Sulfamic acids of secondary bases are obtainable in good purity and yields by causing chlorosulfonic acid (or its esters or salts,  $SO_3$  or pyrosulfuric acid or the like) to act upon a prepn. contg. a secondary base such as monomethylaniline or a mixt. of mono- and dimethylanilines, etc. Various examples with details of procedure are given. Cf. C. A. 27, 1010.

**Sulfamic acids of 2-aminoanthrahydroquinone sulfuric acid esters.** Roger Ratti (to Durand & Huguenin S. A.). U. S. 1,934,143, Nov. 7. 2-Aminoanthraquinones having a free amino group are reduced to the corresponding 2-

aminoanthrahydroquinones and the latter are treated in the presence of a tertiary base with an esterifying agent comprising  $SO_3$  so as to introduce, in the same operation,  $H_2SO_4$  residues into the enolic groups of the 2-aminoanthrahydroquinones as well as into their free amino group. Various examples are given, including the production of the Na salt of the sulfamic acid of 2-aminoanthrahydroquinone disulfuric acid ester from 2-aminoanthraquinone and similar reactions.

**Acids, anhydrides and ketones.** Henry Dreyfus. Brit. 396,770, Aug. 9, 1933. See Fr. 749,139 (C. A. 27, 5755).

**Anhydrides.** Henry Dreyfus. Fr. 41,769, Apr. 13, 1933. Addn. to 736,651 (C. A. 27, 1364). Anhydrides, particularly  $Ac_2O$ , are prepd. by the thermal decompn. of salts of the acids with metals of high or relatively high basicity, e. g., Fe, Pb, Mn, Al, Zn or an alk. earth metal, the salts being mixed with more acid salts such as sulfates or chlorides.

**Aliphatic anhydrides.** Henry Dreyfus. Fr. 749,915, Aug. 1, 1933. Aliphatic anhydrides are prepd. by thermally decomposing  $AcOH$  or other aliphatic acids in the presence of a vanadate and/or a molybdate, with the exception of a phosphomolybdate. An example is given using a mixt. of Ba molybdate and pyrovanadate pptd. on kieselguhr.

**Aliphatic acid anhydrides.** C. F. Boehringer & Soehne G. m. b. H. Brit. 396,276, Aug. 3, 1933. See Fr. 746,684 (C. A. 27, 4515).

**Aliphatic anhydrides such as acetic anhydride.** Henry Dreyfus and Clifford I. Haney (to Celanese Corp. of America). U. S. 1,931,887, Oct. 24. Vapor of an aliphatic acid such as  $HOAc$  is subjected to pyrogenetic decompn. and the reaction vapors are condensed by leading them under the surface of an extg. liquid such as a mixt. of ether and gasoline the temp. of which is maintained below the b. p. of water. Cf. C. A. 27, 4250.

**Nitriles of resinous acids.** I. G. Farbenind. A.-G. Fr. 749,970, Aug. 2, 1933. Gaseous  $NH_3$  is caused to react on resinous acids, particularly colophony or their esters, if desired, in the presence of solvents or diluents at a high temp. and in the presence of a dehydrating catalyst, to produce nitriles.

**Acetylene.** Air Reduction Co. Inc. Fr. 749,625, July 27, 1933. See U. S. 1,900,655 (C. A. 27, 2966).

**Diphenylolpropane.** Imperial Chemical Industries Ltd. and Richard Greenhalgh. Brit. 395,732, July 21, 1933. Diphenylolpropane is prepd. by condensing  $PhOH$  with  $Me_2CO$  in equiv. quantities at not exceeding  $65-65-75\%$   $H_2SO_4$  in amt. at least 3 times the wt. of the  $PhOH$ , being used as condensing agent. The condensation may be effected in vessels of Pb.

**Aminophenylhydroxymethylaminopropane.** Firma. E. Merck. Ger. 577,687, June 2, 1933. The substance normal *p*-(*p*-aminophenyl)-1-hydroxy-2-methylaminopropane, m.  $114-116^\circ$ , is obtained by the hydrogenation of the corresponding keto compd. by the aid of noble metal catalysts.

**3-Methylal-3-hydroxymethyl-n-pentane.** Alexander Wacker Gesellschaft für elektrochemische Industrie G. m. b. H. Brit. 396,658, Aug. 10, 1933. 3-Methylal-n-pentane (I) is condensed with  $CH_2O$ , preferably in the presence of a known catalyst for aldol condensations, e. g.,  $NaOH$  or  $Na_2CO_3$ . Advantageously an excess of I is used and a solvent, e. g.,  $MeOH$ , is present.

**Ethyl alcohol.** The Distillers Co. Ltd., Walter P. Joshua, Herbert M. Stanley and John B. Dymock. Brit. 396,724, July 31, 1933. Divided on 392,289 (C. A. 27, 5341); Fr. 749,671, July 27, 1933.  $EtOH$  is produced by passing a mixt. of  $C_2H_4$  and steam over a catalyst comprising  $H_3PO_4$  and  $B_2O_3$ , the amt. of  $H_3PO_4$  being at least 10% more than that corresponding to the orthophosphate but not more than 95% of the catalyst. The process may be effected at  $100-300^\circ$  and up to 250 atm. Examples describe the use of a catalyst made by evapg. a mixt. of 1 mol.  $B_2O_3$  with 2.2 mols.  $H_3PO_4$  and heating at  $200^\circ$ .

**Ethanol and acetone.** Maurice Chaffette. Fr. 750,-

053, Aug. 3, 1933. EtOH and acetone are made by passing a mixt. of steam or water and  $C_2H_4$  or gases contg. it at 150–500° over catalysts composed of a mixt. contg. an oxide of Zn or Cd and other substances such as  $CaCO_3$ ,  $Al_2O_3$ , or Hg phosphate.

**Refining isopropyl alcohol produced from olefins.** Sylvan R. Merley (to Doherty Research Co.). U. S. 1,933,505, Oct. 31. Isopropyl alc. produced from olefins by absorption in  $H_2SO_4$  and subsequent hydrolysis and distn. is refined by passing the vaporous material counter-current and in contact with a  $H_2SO_4$  soln. of about 25% strength, then removing and condensing the treated alc. vapors, sepg. the absorbed impurities from the  $H_2SO_4$  and restoring the strength of the acid to about 25%, re-heating the relatively clean acid, and again using it. App. is described.

**Optically active 1-phenyl-2-(*N*-methyl-*N*-aralkylamino)-1-propanols and 1-phenyl-2-(*N*-methylanilino)-1-propanol.** Friedrich Stolz and Franz Flaecher (to Winthrop Chemical Co.). U. S. 1,934,015, Nov. 7. Synthetically prepd. racemic 1-phenyl-2-(*N*-methyl-*N*-aralkylamino)-1-propanols, where aralkyl is a benzyl radical of the general formula  $CH_2C_6H_4R$ , where R stands for H or methyl can easily be resolved into their optically active components by transforming them into the bitartrates by means of *l*- or *d*-tartaric acid, and these optically active compds. in the form of their salts or as free bases can be transformed into the optically active 1-phenyl-2-(*N*-methylanilino)-1-propanols by hydrogenating them, the aralkyl group being then split off. 1-Phenyl-2-(*N*-methyl-*N*-benzylamino)-1-propanol can be prepd. from methylbenzylaminopropiophenone by reduction by means of reducing agents, such as Na and alc. or by causing benzyl chloride to react with 1-phenyl-2-(*N*-methylanilino)-1-propanol. It forms colorless crystals, m. 72.3°, is sparingly sol. in water and readily sol. in most org. solvents. When racemic 1-phenyl-2-(*N*-methyl-*N*-benzylamino)-1-propanol is resolved by means of *d*-tartaric acid, the *d*-tartrate of *d*-1-phenyl-2-(*N*-methyl-*N*-benzylamino)-1-propanol first crystallizes out almost completely, while the *d*-tartrate of *l*-1-phenyl-2-(*N*-methyl-*N*-benzylamino)-1-propanol remains in soln. The base obtained when the latter compd. has been decompd. easily crystallizes. It is *l*-rotatory and, on catalytic hydrogenation, it yields besides toluene *l*-1-phenyl-2-(*N*-methylanilino)-1-propanol which is identical with the natural ephedrine.

**Acetone.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Hans Walter and Hermann Schults, inventors). Ger. 577,705, June 3, 1933. Acetone is produced by leading  $C_2H_2$  and water vapor over porous C impregnated with an Fe-free catalyst. A suitable catalyst is obtained by impregnating active C with aq. solns. of  $(AcO)_2Zn$  and  $(AcO)_2Mn$ , drying, and heating to about 100°. Cf. C. A. 27, 5086.

**Vaporizing formamide.** Paul J. Carlsle (to E. I. du Pont de Nemours & Co.). U. S. 1,934,485, Nov. 7. Liquid formamide is continuously contacted with a metal surface such as Al maintained at a temp. above the b. p. of the formamide at the pressure existing at the metal surface and the vapor formed is removed at such a rate that vaporization takes place substantially instantaneously. App. is described.

**Diphenylformamidines.** Tom Birchall and Ernest H. Rodd (to Imperial Chemical Industries Ltd.). U. S. 1,933,206, Oct. 31. In forming a diphenylformamidine such as diphenyl- or ditolyl-formamidine, a mixt. of formic acid and a primary aromatic amine of the benzene series such as aniline or toluidine is heated (suitably to about the b. p.) in the presence of a catalyst contg. boric acid, a borate or metallic Fe.

**Hexamethylenetetramine.** Henry O. Dering, Margaret D. Kelly and Superfine Chemicals Ltd. Brit. 390,467, Aug. 10, 1933.  $(CH_2)_6N_4$  is prepd. by reacting  $CH_3O$  with  $(NH_4)_2SO_4$  and the oxide, hydroxide or carbonate of an alk. earth metal in aq. medium, the  $(CH_2)_6N_4$  being isolated from the aq. component of the

reaction mixt. To further purify the product  $NH_4H_2PO_4$  may be added to the soln. or the soln. may be treated with  $BaCO_3$  and  $CO_2$ .

***p*-Hydroxyphenylglycine.** Freeman A. Gillett (to Eastman Kodak Co.). U. S. 1,933,799, Nov. 7. In a cyclic process, one mol. proportion of chloroacetic acid in aq. soln. is reacted with a quantity of impure material from the end of a previous cycle which contains one mol. proportion of *p*-aminophenol, the soln. of *p*-aminophenyl chloroacetate thus formed is treated with a decolorizing agent such as decolorizing carbon and after filtering is treated with a mol. proportion of *p*-aminophenol.

**Purifying benzene.** Carl Krauch and Mathias Pier (to I. G. Farbenind. A.-G.). U. S. 1,932,365, Oct. 24. Crude benzene is treated with a gas contg. free H at a temp. of 180–500° and under a pressure of at least 10 atm. in the presence of a catalyst contg. a metal of the 6th group of the periodic system or a difficultly reducible metal oxide immune to poisoning from S, such as MgO (the pressure employed being lower than would effect hydrogenation of the benzene itself under the conditions of the treatment).

**1,2,4,5-Tetrachlorobenzene.** Ludley L. Mills (to Dow Chemical Co.). U. S. 1,934,675, Nov. 7. *o*-Dichlorobenzene is caused to react with approx. 2 mol. equivs. of Cl at a temp. of 20–30°, then cooled and crystd.

**Benzanthrone.** Alphons O. Jager and Lloyd C. Daniels (to Selden Co.). U. S. 1,931,847, Oct. 24. Impure anthraquinone is produced from impure phthalic anhydride and  $CaH_2$  by the Friedel-Craft reaction, and the impure product thus formed is subjected to condensation with an acrolein-forming substance such as glycerol in the presence of a condensing agent, such as  $H_2SO_4$  and Cu or Al. Cf. C. A. 28, 182.

**2-Methylbenzanthrone.** Alexander J. Wuertz (to E. I. du Pont de Nemours & Co.). U. S. 1,934,221, Nov. 7. For the recovery of 2-methylbenzanthrone from a crude mixt. of this compd. with isomers, alkali-reactive impurities are pptd. from a soln. of the crude material in an org. solvent such as  $C_6H_6$  by use of an alkali such as  $Na_2CO_3$  and after sepn. of the pptd. impurities and alkali the 2-methylbenzanthrone is crystd. out.

**Fenchone.** Lee T. Smith (to Hercules Powder Co.). U. S. 1,933,939, Nov. 7. In producing fenchone by the dehydrogenation of fenchyl alc. under the action of heating in the absence of O, a catalyst is used which is capable of effecting the dehydrogenation and which includes at least 2 metals such as Cu and Ni. Mn, Mg, Zn and inert carriers also may be used. Cf. C. A. 27, 187.

**Hydroquinone.** Edgar C. Britton, Shailer L. Bass and Norman Elliott (to Dow Chemical Co.). U. S. 1,934,656, Nov. 7. *p*-Bromophenol is hydrolyzed with an aq. alkali metal hydroxide soln. at a temp. of 75–150°.

**Aminoanthraquinones.** Alexander J. Wuertz (to E. I. du Pont de Nemours & Co.). U. S. 1,933,236, Oct. 31. An anthraquinone deriv. with a sulfonic substituent such as Na  $\beta$ -anthraquinone-sulfonate is heated with aq.  $NH_3$  in the presence of an inorg. oxidizing salt sol. in aq.  $NH_3$  such as  $KClO_3$  and of a nitrate such as  $NH_4NO_3$  in order to form the corresponding aminoanthraquinone.

**Hydroxyselenonaphthenes.** I. G. Farbenind. A.-G. Brit. 390,011, July 27, 1933. 3-Hydroxyselenonaphthenes are prepd. by reacting KCN and Se with a diazotized ester of an anthranilic acid, sapon., treating the product with monochloroacetic acid and converting the product to the hydroxyselenonaphthene by boiling with  $Ac_2O$  followed by sapon. In an example Me anthranilate is converted to 3-hydroxyselenonaphthene.

**1,2,3,4-Tetrahydronaphthalene 1-peroxide.** Soc. pour l'ind. chim. à Bâle. Brit. 390,351, Aug. 3, 1933. Tetrahydronaphthalene (I) is treated with a gas contg. O either in the absence of a catalyst at below 100° or in the presence of a catalyst below 60°. Suitable catalysts are Sn, Pb or  $PbO$ . The product may be crystd. out. In examples I is treated with O or air, followed by sepn. of the product

by distn., pptn. with petr. ether or sepn. of the Na salt with NaOH and addn. of acid to free the peroxide. Cf. *C. A.* 27, 5341.

**Sulfonating  $\beta$ -naphthol.** John M. Tinker and Vernon A. Hansen (to E. I. du Pont de Nemours & Co.). 1,934,216, Nov. 7. For prep. 2-naphthol-1-sulfonic acid,  $\text{SO}_2$  gas is passed into a soln. of  $\beta$ -naphthol in an inert

org. solvent such as  $\text{C}_2\text{H}_2\text{Cl}_4$  (suitably with addn. of a small proportion of  $\text{H}_3\text{BO}_3$ ).

**$p$ -Ketocamphor.** Kenzo Tamura, Gyokujo Kihara, Yasuhiko Asahina and Morizo Ishidate. U. S. 1,933,642, Nov. 7. In producing allo- $p$ -ketocamphor,  $p$ -hydroxycamphor 5 is oxidized with  $\text{Na}_2\text{Cr}_2\text{O}_7$  4 and  $\text{H}_2\text{SO}_4$  3 parts, at a temp. below  $50^\circ$ .

## 11 BIOLOGICAL CHEMISTRY

PAUL F. HOWE

### A GENERAL

ARTHUR W. DOX

**Dilatometric studies in enzyme action. III. Contraction constants of enzyme-substrate reactions. II.** B. Sreenangachari and M. Sreenivasaya. *J. Indian Inst. Sci.* 16A, 69 75(1933).—See *C. A.* 27, 2166

M. L. C. Bernheim

**Crystallization of a compound of hemoglobin and carbon dioxide.** Donald D. Van Slyke, Robert T. Dillon and Alma Hiller. *Proc. Nat. Acad. Sci.* 19, 828 9(1933).—The crystals which sepd. from a soln. of hemoglobin contg.  $\text{CO}_2$  at various pressures contained an amt. of  $\text{CO}_2$  proportional to the amt. of free  $\text{H}_2\text{CO}_3$  in the mother liquor. When the  $\text{CO}_2$  tension reached 670 mm. the hemoglobin crystals contained as much  $\text{CO}_2$  as  $\text{O}_2$ . Crystals forming at physiol.  $\text{CO}_2$  tensions contained only  $1/15$  or  $1/10$  as much  $\text{CO}_2$ .

Rachel Brown

**Sulfur content of hair and of nails in abnormal states. Therapeutic value of hydrolyzed wool. I. Hair.** Herman Brown and Joseph V. Klauder. *Arch. Dermatol. Syphilol.* 27, 584 604(1933).—The av. S content of the hair is 4.86% (4.6–5.1). In 6 cases of alopecia areata, before the oral administration of hydrolyzed wool, the av. amt. of S was 4.38%; after hydrolyzed wool therapy, it rose to 5.5%. In 9 cases suffering from hair loss, the mean S content was 4.28%, regarded as subnormal. Loss of hair is not necessarily assoc. with low S. The metabolism of S (cystine) is not exclusively concerned in the cause of the loss of hair. Hydrolyzed wool therapy may increase the S content of the hair but such increase may or may not be accompanied by increased growth of hair. Dietary deficiency as a cause of loss of hair is more apparent in lab. animals than in man. Local applications of  $p$ -thiocresol were ineffective in stimulating the regrowth of hair.

B. C. Brunstetter

**Taste and chemical constitution.** S. Michael. *Pharm. Monatsh.* 14, 171 2(1933); cf. *C. A.* 27, 742. When the material to be tested is put on the tongue a taste sensation and a temp. sensation occur. The latter is detd. in an app. devised by G. Lämmer. The relation of this temp. change to chem. compn. is discussed.

H. M. Burlage

**An essential difference between protein breakdown by exhaustion of reserves and a temporary breakdown by momentary administration of protein.** G. Sant. *Pharm. Weekblad* 70, 1153 8, 1175 80(1933). The "hydrolysis no." of blood serum, or percentage difference in optical rotation before and after hydrolysis, does not change appreciably from an initial value of 35–43 after ingestion of protein. With higher initial values a lowering of the hydrolysis no. occurs during the 1st 3 hrs. followed by a return to the original value during the next 3–4 hrs. The value 35–43 thus represents a min. protein content because of exhaustion of reserve before or during the assimilation of food.

A. W. Dox

**The barbituric acids. Their toxicology.** Charles Desodt. *Thesis, Lille* 1932, 125 pp.—The properties, uses, toxicology and color reactions of 5 important barbituric acid hypnotics are reviewed. The original work consists in the application of a new method for isolation of barbituric acids from urine. To 250–300 cc. of urine add 0.1 vol. of 15%  $\text{K}_4\text{Fe}(\text{CN})_6$  and shake, then add 0.1 vol. of 11.2%  $\text{Zn}(\text{OAc})_2$  and mix with a stirrer. Filter, and if the filtrate is not acid, add a few drops of  $\text{AcOH}$ . Transfer to

a separatory funnel, add 75 cc. of  $\text{Et}_2\text{O}$ , mix carefully at first, then more vigorously, draw off the aq. layer and repeat the extrn. 4 times. Dry the combined exts. for 20 min. with anhyd.  $\text{Na}_2\text{SO}_4$  and filter through cotton. Evap. the  $\text{Et}_2\text{O}$  on the water bath, ext. the residue with 10–20 cc. of boiling  $\text{EtOH}$ , filter into a tared dish and evap. A white residue is assumed to be pure barbituric acid and the percentage is calcd. from the vols. of urine and of the various filtrates. If the residue is colored it is extd. with 20–30 cc. of boiling  $\text{H}_2\text{O}$  and treated with animal charcoal 15 min. or until the color is removed, then evapd. and weighed. The recovery of barbituric acid (barbital, rutonal, gardenal, dial, soneryl) is 89–96% of the amt. present. Essentially the same procedure is said to be applicable to blood, gastric contents and cerebrospinal fluid. Extrn. from brain and liver is discussed but no expts. are described. Daily excretion by hospital patients during daily doses for the period indicated averaged: barbital 0.25 g., 13 days, 65%; rutonal 0.2 g., 14 days, 49%; dial 0.1 g., 13 days, 30%; gardenal 0.2 g., 14 days, 25%. The barbituric acids are resistant to putrefaction. The findings of Kohn-Abrest (*C. A.* 24, 2506) that putrefaction in the presence of a barbituric acid gives rise to HSCN could not be corroborated.

A. W. Dox

**The system of lipoids.** W. Halden. *Fettechem. Umschau* 40, 189 94(1933).—H. surveys the many attempts to define the term "lipoids"; in a chart he enumerates the compds. related to fats and waxes with their accompanying constituents of sterols, lipochromes, hydrocarbons, carotenoids, and shows isoprene to be the fundamental source of vitamins D and A, of squalene, phytol and xanthophyll. By means of structural formulas the relationship is shown between phytol, squalene, lycopene,  $\beta$ -carotene and vitamin A. The following definitions are suggested. "Lipoids" are biogenetically closely related non-volatile substances of animal or vegetable origin, showing a pronounced fat-wax character, or they occur mixed with fats, waxes or their solvents. "Lipides" is a general term which includes lipoids, fats and waxes.

P. Escher

**Chemical nature of enzymes.** James B. Sumner. *J. Nutrition* 6, 103 12; *Science* 78, 335(1933).—Proof is adduced to show the chem. nature of the enzymes. A comprehensive crit. review with 62 references.

C. R. Fellers

**Comparative biological values of proteins for different species of animals.** Anna Rajzmann. *Compt. rend.* 197, 706 7(1933). In detg. the biol. values of proteins substantially the same values were obtained with rats, rabbits or pigs as exptl. animals.

L. E. Gilson

**Tissue chloropenia and chloropenia.** L. Raffil and I. Ghersevici. *Compt. rend. soc. biol.* 114, 319 22(1933). The results of many post-mortem analyses of tissues are discussed.

L. E. Gilson

**The static biomineral constant of normal human blood serum.** A. Urbeanu. *Compt. rend. soc. biol.* 114, 467 9(1933).—The significance of the surplus of cations in normal serum is discussed.

L. E. Gilson

**Biochemistry of silicic acid. I. Microdetermination of silica.** Earl J. King and Helen Stantial. *Biochem. J.* 27, 990–1001(1933).—The method depends upon the production of a blue color when silicotungstic acid is reduced by 1,2,4-aminonaphtholsulfonic acid. The interfering phosphates are removed by pptn. with  $\text{CaCl}_2$  and  $\text{NH}_4\text{OH}$ . Iron is removed as  $\text{FePO}_4$ . Blood is de-

proteinized by basic ferric acetate. The procedure can be used for the detn. of silica in blood, urine and various tissues. II. The presence of silica in tissues. Earl J. King, Helen Stautial and Margery Dolan. *Ibid.* 1002-6.—Silicate in considerable amt. is excreted through the tissues. The amt. in the urine is influenced by the diet. Among tissues, lung has the largest amt. of silica. Only a small amt. is found in circulating blood. III. The excretion of administered silica. *Ibid.* 1007-14.—Intravenous injection of silicic acid (into rabbits and dogs) caused a moderate concn. of silica in the blood and enormous increases in the urine, but not all of the silica injected could be accounted for. The blood is capable of maintaining a much higher concn. of org. than of inorg. silicate. IV. Relation of silica to the growth of phytoplankton. Earl J. King and Viola Davidson. *Ibid.* 1015-21.—Addn. of silicate to a culture soln. already contg. an abundance of nutrient salts caused increased diatom growth. In high concn. silicic acid appeared to have an unfavorable effect on the growth of diatoms. B. H.

**Removal of sugars from dilute solutions.** Julian L. Baker and Henry F. E. Hulton. *Biochem. J.* 27, 1040-3 (1933).—The capacity of yeast to remove (up to 50%) glucose, sucrose and maltose is approx. equal. Bakers' yeast resembles brewers' yeast in its behavior to glucose, but the former has little action on maltose under the conditions described. Benjamin Harrow

**New views in the field of biologic carbohydrate decomposition.** Ragnar Nilsson. *Angew. Chem.* 46, 647-50 (1933).—A treatise on the formation of glyceric acid-monophosphoric acid and its action in the glucolytic decompn. of carbohydrates. Exptl. results and possible mechanisms of the reactions involved are presented.

Karl Kammermeyer

**Proteins. XIV. Occurrence of phosphorus, copper and iron in various proteins.** Kinsuke Kondo and Shigeki Mori. *J. Chem. Soc. Japan* 54, 966-72 (1933).—Etn. of Cu, Fe and P in 37 purified simple proteins indicates that these elements form the main part of ash; sericin and glutenin contain addnl. ash constituents. The ash of glutenin is mostly Cu and P while that of gliadin is Cu. These elements may exist in combined form with proteins or they may act as a combining link between protein mols. Nutritional investigation of the proteins, therefore, is far more complicated than heretofore realized. Fluctuation of the bio-proteins is also possible when these differ in ash content. K. Katsuta

**Hematoporphyrin, an artificial proteolytic enzyme.** M. J. Boyd. *J. Biol. Chem.* 103, 249-56 (1933).—"Serum albumin undergoes hydrolysis in the presence of light and hematoporphyrin and O<sub>2</sub> is necessary for the hydrolysis. Hematoporphyrin unites with the protein, becomes excited through the absorption of light energy, combines with O<sub>2</sub>, and passes a part of the energy over to the protein mol., thereby activating the latter and causing it to become hydrolyzed. The results obtained support Mathews' theory of enzyme action that enzymes are 'conductors of energy.'" A. P. Lothrop

**The cystine content of deaminized casein.** Abraham White. *J. Biol. Chem.* 103, 295-7 (1933).—The cystine content of casein, 0.27%, which has been deaminized by HNO<sub>3</sub> is identical with that of the untreated protein, within the limits of accuracy of the Vickery and White method of analysis. These results are not in accord with those reported by Steudel and Wohinz (*C. A.* 25, 2743).

A. P. Lothrop

**Glutathione and endocrine glands.** Gaetano Viale. *Rev. sud-americana endocrinol. immunol. quimioterap.* 16, 320-32 (1933).—A review. A. E. Meyer

**The separate enzymes in the enzymic system of lactose yeast.** Stefan Grzycki. *Biochem. Z.* 265, 191-4 (1933).—Lactose yeast affects alc. fermentation of the milk sugar. In the 2 groups studied (*Saccharomyces fragilis* and lactose yeast sp. 102) a' formation of methylglyoxal occurs. Added AcCHO is quantitatively converted to lactic acid, which in one case was the optically pure d-form. Pyruvic acid is converted to the extent of AcH to 69-75%. The

lactose yeast, therefore, contains the usual components (glycolase, mutase and carboxylase) of the fermentation enzyme system. S. Morgulis

**The products of ultra-violet irradiation of ergosterol.** A. V. Trufanov. *Khim. Farm. Prom.* 1933, 198-203.—The app. consists of a quartz vessel, water cooled, with an outlet for recovery of solvent. Soln. of ergosterol is agitated by a flow of O<sub>2</sub>-free, dry CO<sub>2</sub> which is sucked through by a vacuum pump; the flow of CO<sub>2</sub> lags behind the pump creating a vacuum in the app. When taking samples for testing the degree of irradiation the app. is flooded with CO<sub>2</sub>. Carbon arc with 10% MgO is used at 5 cm. distance. The unchanged ergosterol is sepd. by MeOH. The products of irradiation, after recovery of the solvent, are dissolved in oil free from vitamin D and their vitamin efficiency is tested on rats. Photographs of the system and discussion of sources of light are supplied. L. Nasarevich

**Quantum physics of the biologic action of x-rays.** Friedrich Dessauer. *Z. Physik* 84, 218-21 (1933).—Remarks on a paper by Glocker (*C. A.* 26, 5077).

R. Peierls

**Chemistry of the sclera.** Arlington C. Krause. *Am. J. Ophthalmol.* 16, 214-18 (1933).—The distribution of N in the scleral gelatin, elastin and mucoid was detd. by the Van Slyke method (cf. *C. A.* 21, 931). The av. percentage of several more important amino acids in these proteins was calcd. K. W. Scott

**Rate of decomposition of creatine in acid and in alkaline solution.** Alexander T. Cameron and Jean S. Guthrie. *Can. J. Research* 9, 360-72 (1933).—Studies have been made on the decompn. of creatine in acid and alk. solns. at 37.5° and 50°. The rates of transformation to creatinine in acid solns. gave values for the Arrhenius const. varying from 20,700 to 24,000, values in moderate agreement with those of Edgar and Wakefield. There was a definite min. rate of transformation at approx. 0.1 N HCl, and a secondary max. at about 0.01 N HCl. This was probably because of catalysis of creatine-HCl and free creatine at different rates. The slightly differing values found for the Arrhenius const. in strong and in weak acid solns. may be explicable on this basis. The results with alkali support Gachler's views that creatine is initially transformed into urea and sarcosine, which then reunite to form NH<sub>3</sub> and methylhydantonic acid. Alkali catalyzes the change from creatine to creatinine much more rapidly than acid of corresponding strength. J. W. Shipley

**Further investigation of the reaction of certain cells to neutral red solutions.** Hilda Douglas, E. S. Dunthie and J. Bront. *Gatenby. Z. wiss. Zool.* 144, 211-30 (1933).—The result, produced by neutral-red staining of certain cells, is due to aggregation of the dye into globules within the cytoplasm, and is thus to be differentiated from the true neutral-red staining globules, which consist of yolk material. A 30% satd. soln. of neutral red in Ringer soln. is pptd. by some fixatives, but the ppts. are readily sol in alc. and therefore are not the cause of the appearance of the red globules. K. V. Thimann

**Electrometric titration of dl-2-thiolhistidine (Richardson) 2. Naphthenic acids and naphthenesulfonic acids 8 III. Physiology of naphthenic acids (Naphthali) 10.**

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

**A critical study of histochemical methods for the determination of iodides in tissues.** I. Geish and Edward J. Stieglitz. *Anat. Record* 56, 185-93 (1933).—All histochem. methods for the detn. of iodides in tissues so far suggested are inadequate because of the high diffusibility of the iodide ion or to the failure of the pptg. reagent to penetrate the tissue proteins with sufficient speed. As heavy metals are required for the pptn. of iodide ions, the tendency of these metals to ppt. proteins and thus block their penetration so far has been an insurmountable difficulty. B. C. Brunstetter

**A method for qualitative analysis of protein solutions**

Adolf Schmitz. *Z. physiol. Chem.* **221**, 197-201 (1933).—The concn. of salt soln. required for pptn. of a protein varies with the mol. size of the protein and with the no. and arrangement of ionizable groups present. The qual. method here described for sepn. and classification of proteins is based on photometric detn. of turbidity obtained by adding increasing concns. of  $(\text{NH}_4)_2\text{SO}_4$ . Curves are plotted for blood serum, globulin and albumin, casein, ovalbumin, blood of *Octopus vulgaris*, crust. oxyhemocyanin, chicken embryonal fluid and fibrinogen.

A. W. Dox

**Microscopic detection of saponins by the evaluation of hemolysis in blood gelatin.** R. Fischer and L. Berthold. *Pharm. Presse, Wiss.-prakt. Heft* **1933**, 113-20.—A somewhat modified method, based on recent investigations, for the prepn. of blood gelatin is described. The hemolytic processes taking place in plant sections have been observed and plotted, the curves thereby developed having relationship not only to saponin solns. but to saponin in dry condition. With the saponin solns. in blood gelatin an attempt was made to det. the concn. and therefrom draw conclusions respecting the hemolytic index. On the other hand, slips of filter paper were satd. with saponin solns., dried and examd. These expts. served to det. the degree of hemolysis observed in the plant section, and to furnish comparable data respecting the saponin content of the single plant organs. For this purpose curves were developed which clearly showed the progress of hemolysis in the blood gelatin. In this connection also the advisability of buffering the gelatin was investigated. The action of other hemolyzing substances was studied, notably distd.  $\text{H}_2\text{O}$ , acids, soaps, and org. solvents as  $\text{Et}_2\text{O}$  and xylene, which are involved in the detoxication of plant sections with cholesterol.

W. O. F.

**Estimation of parathyroid hormone.** F. J. Dyer. *Quart. J. Pharm. Pharmacol.* **6**, 426-30 (1933). Expts. are described with groups each of which consists of 5 male rats weighing 140-180 g., for measuring the increase produced in the urinary Ca by 2 different doses of parathyroid ext. The method suggested in an earlier note has been amended. Thus, each rat is placed in a cage by itself, but the urine from the group of 5 is pooled, the diet is given as a paste contg. about 15% butter; the urine is collected at the end of 48 hrs. and not at 24 as previously, the urine is incinerated and the Ca detd. in the ash, by the method of Clark and Collip; injections of parathyroid ext. are given for 3 successive days. To carry out an estn., 2 groups of rats must be used simultaneously, one for the ext. to be tested, the other for the standard of reference. Because of the great variation of rats in their response to parathyroid hormone, and the limited no. of expts. made, it has not so far been possible to construct a curve relating dose and effect. The test sample, must, therefore, be matched against the standard, so that it produces the same rise in urinary Ca as the standard.

W. O. Emery

**Effects of anticoagulants and antiglycolytic agents on the results of determination of blood sugar.** R. Carrasco Pomiguera and E. Bieto. *Compt. rend. soc. biol.* **114**, 116-18 (1933).—Blood samples to which 0.2% of  $\text{Na}_2\text{C}_2\text{O}_4$  was added showed a glucose content 2-22 mg. per 100 cc. lower than untreated samples when analyzed by the Hagedorn-Jensen method. Other samples to which 2% NaF was added gave results 2-14 mg. lower than the controls.

L. E. Gilson

**Method for the photometric measurement of urinary pH.** René Reding. *Compt. rend. soc. biol.* **114**, 187-9 (1933).

L. E. Gilson

**Microdetermination of protein sugar.** H. Bierry and A. Magnan. *Compt. rend. soc. biol.* **114**, 257-8 (1933). A method of detg. glucosamine in 1 cc. of blood plasma is described.

L. E. Gilson

**A micro method for the determination of certain fractions of the nonprotein sulfur of the blood.** R. H. de Meo. *Compt. rend. soc. biol.* **114**, 397-401 (1933).—The method and special app. are described. Two cuvs. I. E. G.

**Some sources of error in the estimation of cysteine and cystine in complex materials when acid hydrolysis is employed.** Joseph W. H. Lugg. *Biochem. J.* **27**, 1022-9

(1933).—In the presence of carbohydrates variable amts. of cysteine and cystine are lost. Addn. of  $\text{SnCl}_2$  before hydrolysis to minimize humin formation fails to prevent a loss of cysteine and also causes the loss of any cystine present by reducing it to cysteine. If sufficient ferric salts are present they destroy some of the cystine and most of the cysteine during hydrolysis. The salts of other heavy metals also interfere. Benjamin Harrow

**The technic of glass electrode measurements.** Benjamin S. Platt and Sylvia Dickinson. *Biochem. J.* **27**, 1069-77 (1933).—Details of the construction of the electrode system are given. Careful temp. control is of considerable importance. Benjamin Harrow

**Determination of iodine in blood.** Harold J. Perkin. *Biochem. J.* **27**, 1078-81 (1933).—A modified von Fellenberg method (cf. *Biochem. Z.* **139**, 371 (1923) and C. A. **17**, 2717.

Benjamin Harrow

**Use of some microorganisms in sugar analysis.** Victor J. Harding and Thomas F. Nicholson. *Biochem. J.* **27**, 1082-94 (1933).—A strain of *Proteus vulgaris* has been developed as an analytical reagent for glucose. *Monilia tropicalis* removes maltose. A system of carbohydrate analysis is suggested.

Benjamin Harrow

**A rapid method for obtaining protein-free ultrafiltrates of blood and plasma.** Clifford Wilson and Ensor Roslyn Holiday. *Biochem. J.* **27**, 1095-98 (1933).—The method is suitable for obtaining rapidly small quantities of ultrafiltrate for inoculation and for filtering large quantities.

Benjamin Harrow

**Determination of alcohol in the blood according to Widmark.** Hans Kaiser and Eugen Wetzel. *Angew. Chem.* **46**, 622-5 (1933).—Considerable exptl. data have shown that the micro method of Widmark is very satisfactory, while it was found that Nicloux's method requires further investigation. The principle of Widmark's method and details of operation are described, and exptl. results are presented. Fourteen references. K. K.

**The quantitative separation of progesterin from estrin in extracts of the corpus luteum.** W. M. Allen and R. K. Meyer. *Am. J. Physiol.* **106**, 55-63 (1933).—Sepn. of progesterin and estrin is made by extg. a soln. of the 2 in 33%  $\text{EtOH}$  3 times with 0.5 times its vol. of petr. ether. The petr. ether fraction contains about 100% of the progesterin and 5% of the estrin.

J. F. Lyman

**The estimation of the free hydrochloric acid in the human gastric juice.** Migiwa Hori. *Japan. J. Gastroenterol.* **5**, 1-12 (1933). The acidity of gastric juice from free HCl and the protein content are not related. Sahlb's iodometric method for free HCl gives a result similar to that from  $\text{C}_1\text{H}$  detn. Titrimetric detns. of free HCl should involve a factor to correct the indicator. These factors are 0.95 for  $\beta$ -dimethoxyphenol, 0.91 for methyl orange and 1.1 for methyl violet. The dimethylaminoazobenzene method may involve an error of 100%.

C. M. McCav

**The error of the titrated total acidity of the human gastric juice.** Migiwa Hori. *Japan. J. Gastroenterol.* **5**, 13-18 (1933).—The values for total acidity in human gastric juice are too high when phenolphthalein is used as the indicator. They can be corrected to bromothymol blue values by multiplication by 0.91. Alizarin red gives values about 1% too low.

C. M. McCav

**A micro method for the quantitative estimation of the proteins of blood plasma.** Grace Medes. *Am. J. Clin. Path.* **3**, 439-42 (1933).—A micro method is described for the estn. of the plasma proteins, requiring 0.7 cc. for complete fractionation and 0.4 cc. for fractionation into fibrinogen, albumin and globulin. The method consists in (1) fractional pptn. with anhyd.  $\text{Na}_2\text{SO}_4$ , (2) pptn. of the protein remaining in the various filtrates with  $\text{CCH}_3\text{COOH}$ , (3) dissolving the ppts. with  $\text{NaOH}$  and (4) detn. of the N in aliquots of the solns. E. R. Main

**The determination of nonprotein nitrogen with special reference to the Koch-McMeekin method.** Cornelius A. Daly. *J. Lab. Clin. Med.* **18**, 1279-85 (1933).—Modifications of the Koch-McMeekin method (C. A. **18**, 3335) are described in which Na citrate and gum ghatti are used to prevent pptn. of the color reagent when solns. turbid from tungstic acid are nesslerized.

E. R. Main



**A simple method with a new apparatus for rapid dialysis.** Preliminary report. I. A. Nelson and I. H. Nelson. *Am. J. Clin. Path.* 3, 447-53(1933).—Two types of app. are described in which dry or wet membranes of Cellophane are used. With the app. it is possible to spread uncoagulated blood in such a thin layer that the proteins approach a monolayer state. Methods are described for obtaining blood dialyzates rapidly and accurately. E. R. Main

**The photometer and its use in the clinical laboratory.** Arthur H. Sanford, Charles Sheard and Arnold E. Osterberg. *Am. J. Clin. Path.* 3, 405-20(1933).—The principles of photoelec. photometry and their applications are reviewed. A new type of app. is described and directions are given for its use in the detn. of the hemoglobin, glucose and creatinine contents of the blood. E. R. Main

**A micro Kjeldahl still.** Thomas P. Nash, Jr. *J. Lab. Clin. Med.* 18, 1285-7(1933). E. R. Main

**A pipet washing device.** Thomas P. Nash, Jr. and Wm. Krauss. *J. Lab. Clin. Med.* 19, 94 5(1933). E. R. Main

**A study of the Otto test for strychnine.** Charles F. Poe and John F. Bailey. *J. Lab. Clin. Med.* 19, 40 6(1933).—Many org. compds., especially alkaloids and aniline derivs., give color reactions characteristic of strychnine when treated with concd.  $H_2SO_4$  and  $K_2Cr_2O_7$ . Lists of compds. which completely mask or interfere with the test are given. E. R. Main

**A study of the dimethylaminobenzaldehyde test for atropine.** Arlie A. O'Kelly and Charles F. Poe. *J. Lab. Clin. Med.* 18, 1235 41(1933). Many org. compds. give color reactions which might be mistaken for a pos. reaction in the dimethylaminobenzaldehyde test for atropine. Lists of compds. which completely mask or interfere with the production of the characteristic color are given. E. R. Main

**The nuclear reaction with yeasts.** Emilia Rochlin. *Zentr. Bakt. Parasitenk.* 11. Abt. 88, 304 6(1933).—An application of the nuclear reaction of Feulgen to yeasts of Feulgen and Rossenback, *C. A.* 18, 2725). Yeast prepns. are hydrolyzed with  $N/1$  HCl and treated with fuchsin decolorized with  $SO_2$  for 3-4 hrs. Any thymonuclear acid present will stain red. John T. Myers

**The detection and estimation of radium in living persons.** IV The retention of soluble radium salts administered intravenously. Herman Schlundt and John T. Nerancy. *Am. J. Roentgenol. Radium Therapy* 30, 515-22(1933); cf. *C. A.* 26, 1315.—In the treatment of certain types of insanity, intravenous injections have been given of  $RaCl_2$ , 10 micro-gr. dissolved in 2 cc. of isotonic  $NaCl$  soln., at intervals of a few days over a period of 2-6 months. Soon after completion of treatment, and again 6 months later, the radioactivity of these patients was measured by both a ray method and a test of the expired air for radon.

Ray measurements were made with a Wulf-Hess quartz lucr. electroscope which had been carefully calibrated against a 10 mg.  $Ra$  standard. The expired air tests were made with Lund electroscopes, calibrated in  $Ra$  units. Precautions necessary in making both types of measurement are described. Complete data were obtained on 12 patients, representing an administration of 2190 micro-gr. of  $Ra$ . At the time of the first tests, averaging 6 months after treatment, 93.6 micro-gr. or 4.3% was retained. Six months later only 1.9% was still retained. Clinical results show no superiority of  $RaCl_2$  therapy over other therapeutic procedures in psychiatric patients. E. H. Quimby

**Verification of the analytical technics in biological media by the method of added quantities.** Henri Grifon. *J. pharm. chim.* 18, 198-206(1933).—For correctness of the technic to be adopted, 2 conditions must be fulfilled: (1) The results of a series of detns. on a given medium must be regular and must agree within exptl. error allowed for pure substances. (2) When a known quantity of the substance to be detd. is added to a known quantity of the same medium, it must be recovered exactly within exptl. error. If this is not the case, a "systematic error" is inherent in method (1), better defined by Vigneron (cf. *C. A.* 26, 902) as the "effects of an accessory phenomenon

superposed on that which is studied." The method of added quantities is discussed mathematically; to avoid error, percentage of substance recovered must not be referred to the sum of substance found in the medium plus that added, but to the former alone. S. Waldbott

**Determination of thyroxine iodine in powdered thyroid glands.** L. Cuny and J. Robert. *J. pharm. chim.* 18, 233-40(1933); cf. Harrington and Randall, *C. A.* 23, 5207; Leland and Foster, *C. A.* 26, 2759.—The Brit. Pharm. 1932 assay of I in the thyroid gland is based on the H. and R. method (A). The recent L. and F. method (B), in which thyroxine-Na is oxid. with  $BuOH$ , gives results about 50% too low. In order to find where the loss of I occurs, both methods were used in parallel on sep. and mixed samples of (1) thyroxine, (2) diiodotyrosine, (3) KI and (4) testicular powder; this I-free protein medium is presumed to give by alk. hydrolysis a soln. analogous to that obtained from the thyroid tissue. The tabulated results show that cold alk. hydrolysis gave good recovery of I in all cases; 4 hrs. heat without (4) lowered recovery with method B to 87.8%; when heated with (4), recovery by this method was lowered to 76.5% in 4 hrs., to 59.6% in 18 hrs. The lowest result with method A was 93.1%. It follows that boiling in alk. medium diminishes the solv. of thyroxine in  $BuOH$ , which is accentuated by the presence of the orchitic medium. Hence method B cannot as yet be adopted; method A should be retained within limitations. Results by Rotter and Miez (*C. A.* 26, 5701) obtained by method A support this conclusion. S. Waldbott

**Enzymic histochemistry. V. A micro method for the estimation of sugars.** K. Linderström-Lang and Heinz Holter. *Compt. rend. trav. lab. Carlsberg* 19, No. 14, 1 12 (1933); cf. *C. A.* 27, 2499, 5826.—The authors have developed the iodometric titration of sugars as a micro method. The buret holds 60 cu. mm., graduated in 0.02. A 0.05 N  $Na_2S_2O_3$  soln. is forced from the buret by a Hg plunger, and the titrating is done in a small vessel with a magnetic stirrer. Glucose and maltose are oxidized stoichiometrically in 30 min. Fructose and sucrose are not oxidized. Sol. starch appears to contain a small amt. of easily oxidized sugar. J. J. Willaman

**Fractionation and purification of org. substance by the principle of chromatographic adsorption analysis** (Winterstein, Stein) 2.

## C - BACTERIOLOGY

CHARLES B. MORREY

**A simply prepared broth for producing hemolytic streptococcal hematoxin (streptolysin).** Homer F. Swift and B. E. Hodge. *Proc. Soc. Exptl. Biol. Med.* 30, 1022-5 (1933).—Filtered sterile salts, buffers and glucose are added to fresh beef heart peptone broth previously sterilized at 100°. The procedure for the manuf. of the broth and the production of streptolysin is given. C. V. B.

**Influence of salt upon diffusion from bacterial cells.** C. R. A. Winslow and H. H. Walker. *Proc. Soc. Exptl. Biol. Med.* 30, 1033 5(1933).—Washed cells from cultures of *Es. coli* were suspended, resp., in distd.  $H_2O$ , and in  $NaCl$  solns. of 0.05-0.08 M, 0.8-1.0 M and 2.0 M concn. and let stand for 30 min. at 37°. The cells were counted and the  $NH_4$  in the centrifuged and clarified menstruum was detd. by direct nesslerization. The low concn. of  $NaCl$  increased cell viability and the diffusion of  $NH_4$  outward through the cell wall; the higher concns. of  $NaCl$  had the opposite and toxic effect. The results may be due to altered permeability or to changes in the physicochem. conditions within or without the cell. C. V. Bailey

**Action at a distance of staphylococcus and *Es. coli* on rabbit bone marrow.** Eugénie Soru and R. Brauner. *Compt. rend. soc. biol.* 114, 231-2(1933); cf. *C. A.* 27, 2706.—By using the cultures in quartz tubes as previously described a mitogenetic effect was observed after 45 min. exposure. L. K. Gilson

**Chemical composition of bacteria. Purine compounds.** André Boivin and Lydia Mesrobian. *Compt. rend. soc.*

*biol.* 114, 302-4(1933); cf. *C. A.* 27, 4555.—Six species were examd. Nucleic acid is not extd. when bacteria are treated with  $\text{CCl}_3\text{CO}_2\text{H}$  soln. Of the total purine N 73-74% is in the form of nucleic acid. Purine N makes up 4-24% of the total acid-sol. N. Acid-sol. purine N increases during autolysis. Chemical composition of bacteria. **Pyrophosphoric acid derivatives.** *Ibid.* 305 7.—The different P acids were detd. in 6 species. All species contained some pyrophosphate. During autolysis the pyrophosphoric acid changes to phosphoric. L. E. Gilson

**Effects of the endocellular substance of the diphtheria bacillus.** H. Goldie. *Compt. rend. soc. biol.* 114, 446-9(1933). L. E. Gilson

**The action of Acanthamoeba castellanii on carbohydrates in peptone culture media.** Relda Caillean. *Compt. rend. soc. biol.* 114, 474 6(1933).—The organism did not utilize glycerol, mannitol, sorbitol or any of the 12 different sugars tried. L. E. Gilson

**Water-soluble proteins of the tubercle bacillus.** George A. C. Gough. *Biochem. J.* 27, 1049 54(1933).—The method of prepn. was based upon one developed by Hardy and Gardner (*J. Physiol., Proc.* lviii(1910)). An ice-cold suspension of the living bacilli, grown on a synthetic medium, was treated with a large excess of abs. alc. at  $-10^\circ$ . This was followed by treating at  $-3^\circ$  with mixts. of alc. and ether contg. increasing proportions of ether until a suspension of the organisms in anhyd. ether was obtained. The suspension was then filtered into Soxhlet thimbles and exhaustively extd. with ether. The bacilli were dried in a vacuum, ground and extd. with water. Fractionation of the mixed proteins with half and fully satd.  $\text{NH}_4$  sulfate solns. yielded 2 proteins, possessing many of the properties of albumins and globulins. These proteins showed different chem. and immunological characteristics. Benjamin Harrow

## D -BOTANY

THOMAS G. PHILLIPS

**Chlorophyll content as an index of the productive capacity of selfed lines of corn and their hybrids.** Howard B. Sprague and Norman Curtis. *J. Am. Soc. Agron.* 25, 709 24(1933).—Both chlorophyll and carotene decreased rather regularly from the uppermost to the lowest leaves of the plants. Xanthophyll values were erratic and no significance was attached to them. Lists of total chlorophyll and carotene contents per plant based on the concn. of the pigments in the middle leaf and on the leaf area were practically as reliable as complete analyses of all leaves. A group of 12 nearly homozygous selfed lines selected on the basis of observed greenness of leaves in 1929 varied in chlorophyll concn. from 5.14 mg. for the lightest strain to 11.30 mg. per 100 sq. cm. of leaf for the darkest green strain when grown in 1930. Total chlorophyll per plant ranged from 106 to 407 mg. The chlorophyll concn. of 18 first generation hybrids involving the 12 selfed lines ranged from 6.23 to 11.61 mg. and the total chlorophyll from 332 to 607 mg. Correlation coeffs. for the 12 selfed lines and 18 hybrids are given to show the relation between total chlorophyll and chlorophyll concn. and leaf area, yields of total dry matter and shelled grain. J. R. Adams

**The effect of soaking in water on the "seeds" of *Dactylis glomerata* L.** H. G. Chippindale. *Ann. Botany* 47, 841 9(1933).—Germination is considerably accelerated if the seeds have at any time previously been soaked in water and subsequently dried. This effect is due to the seeds so treated absorbing water more rapidly than untreated seeds, the pales of which are at first impermeable. R. C. Burrell

**Catalase, peroxidase and respiration in the germination of the light-sensitive seeds of *Nicotiana tabacum*** Ferdinand Schropel. *Botan. Centr. Beihefte* 51, 377-407 (1933).—In the dark, respiration increases with swelling. When swelling ceases, it slowly decreases. In the light, there is at first an increase, then a decrease and finally a slow increase of respiration followed by a more rapid acceleration after 30 hrs. from the beginning of swelling. In the dark, catalase activity slowly increases, reaches a

max. in about 30 hrs. and then decreases. The weakly active peroxidase starts to show decreased activity in about 40 hrs. In the light, after 37 hrs., there was a very marked increase in catalase activity and after 52 hrs. in peroxidase activity. R. C. Burrell

**The presence of citrinin in *Crotalaria crispata*.** A. J. Ewart. *Ann. Botany* 47, 913-15(1933).—The pigment citrinin which has been reported as a metabolic product of the fungus, *Penicillium citrinum*, is also produced by a flowering plant, *Crotalaria crispata*, growing in tropical North Australia. The dried leaves contain 1-1.2%. R. C. Burrell

**Oxidation potential and protein change in the leaf.** Kurt Mothes. *Flora* (Festschrift George Karsten, 1933) 58-98. High  $\text{O}_2$  tension stabilizes the protein, protects it from decompn. and furthers its synthesis. Low  $\text{O}_2$  tension makes the protein subject to the attack of leaf proteinases and leads to its decompn. R. C. B.

**The action of salts in water cultures.** Karl Schmalfuss. *Flora* (Festschrift George Karsten, 1933) 197 210.—A study was made of the effects of various mineral deficiencies (esp. K, Mg, Ca, Fe) on the growth of cuttings of *Callisia repens* in water cultures. Iron chlorosis is favored by the presence of easily sol. phosphates; alk. reaction, and an excess of Ca ions in the culture soln. R. C. B.

**The action of ultra-violet rays on leaves and fruit skins.** Hans Freytag. *Botan. Centr., Beihefte* 51, 408 36 (1933).—F. has investigated necrotic pigmentation of leaves and fruit skins produced by ultra-violet irradiation. With certain leaves, a change in permeability of the cell membrane seems to result. O is necessary for the development of pigmentation in the irradiated area. Enzyme poisons hinder or completely prevent pigmentation. The pigment is perhaps a melanin. R. C. Burrell

**The germination and growth of *Peltandra virginica* in the absence of oxygen.** Thomas I. Edwards. *Bull. Torrey Botan. Club* 60, 573-81(1933).—Seeds of *Peltandra virginica* will germinate in almost complete absence of  $\text{O}_2$  and the seedlings seem to possess unusual tolerance to the products of their own anaerobic respiration. R. C. Burrell

**Potato catalase.** H. H. Bunzell and Marjorie Kenyon. *Bull. Torrey Botan. Club* 60, 469 74(1933).—Catalase activity in different parts of the potato plant (shoots, leaves, stems, tubers) was detd. at different stages of development. It was greater in the foliage than in the tubers of the same plant. In the foliage it was lowest in the early stages of development, increased with growth and diminished when the plant reached full growth. The method of Bunzell (*C. A.* 25, 720) was used to measure the catalase activity. R. C. Burrell

**The vaccination of the tobacco plant against *Thielaviopsis basicola*.** Carlo Ataudi. *Bull. Torrey Botan. Club* 60, 583 97(1933).—Heat, ether and dry vaccine were prepd. from the fungus. The vaccines were poured on the germinating seeds or administered to the soil. Control and vaccinated seedlings were later inoculated with a suspension of *Thielaviopsis*. The treated seedlings showed greater resistance to infection in several series of expts. than did the controls. R. C. Burrell

**Amylases in resting and germinating seeds II.** Rye Erik Ohlsson and Carl E. Uddenberg. *Z. physiol. Chem.* 221, 165 73(1933); cf. *C. A.* 26, 3003.—Seps detns. were made of the  $\alpha$ - or dextrinogenic and the  $\beta$ - or saccharogenic amylases of exts. from rye at different stages of germination. Each enzyme may be obtained free from the other by selective destruction:  $\beta$ -amylase by treating the mixt. with 0.1 N HCl, and  $\alpha$ -amylase by heating 15 min. at  $70^\circ$ . The former has  $pH$  optimum at 4.3 and the latter at 5.5. The saccharogenic power of the original enzyme solution diminishes during the first days of germination, then increases and after 9 days amounts to twice that of the ungerminated rye. The dextrinogenic power is at first almost nil and increases rapidly after the 6th day. These observations are in complete agreement with those previously reported for germinating barley. The combined action of the 2 amylases is not greater than the sum of their

sep. activities. Hydrolysis of starch with dextrinogenic amylase gives products with neg. mutarotation, while those obtained with saccharogenic amylase show pos. mutarotation; hence the amylases are  $\alpha$  and  $\beta$ , resp. III. Oats. Erik Ohlsson and Olle Edfeldt. *Ibid.* 174-9.—The amylases of oats correspond precisely to those of barley and rye, except that the saccharogenic enzyme is present in smaller proportion, and the 2 enzymes have practically the same  $pH$  optimum. The dextrinogenic amylase does not appear until the 9th day of germination, somewhat later than in barley and rye. Simultaneously there is a considerable increase in the saccharogenic enzyme. Mutarotation tests of the hydrolytic products identify the enzymes as  $\alpha$  and  $\beta$ .

**Mandarin pigment.** L. Zechmeister and P. Tuzson. *Z. physiol. Chem.* 221, 278-80 (1933).— $\beta$ -Carotene was isolated in cryst. form from the flesh and from the peel of the mandarin (*Citrus madurensis*).

The presence of a bitter principle in the secretory glands of *Cynara scolymus* and *C. cardunculus* J. Politis. *Praktika (Akad. Athenon)* 7, 31-3 (1932).—The center of formation of the bitter principle in the leaves and other aerial parts of the artichoke (*C. scolymus*), hitherto unobserved, is shown to be located in certain external glands principally on leaves and stalk. Internal parts of stalk and leaves, the root, fleshy flower receptacle and the bloom which lack such glands also lack the bitter principle. The glands comprise 4-5 cell layers, disposed in 2 rows. The uppermost cells grade into smaller ones underneath. The secretion begins beneath the cuticle of the secretory cells at the apex and to it is added that of the connecting cells. The bitter principle of *C. cardunculus* is similar. The presence of an essential oil is mentioned.

Lucien Y. Dyrenforth  
Comparative studies of the metabolism of soluble carbohydrates in male and female plants of *Mercurialis perennis*. R. Bouilleme, M. Bouilleme and L. Ghennu. *Compt. rend. soc. biol.* 114, 189-94 (1933).

The fat and lipid metabolism of yeast. W. Halden, I. Bilger and R. Kunze. *Naturwissenschaften* 21, 660-1 (1933).—The lipid formation in yeast cells is not a sign of degeneration but a special type of metabolism incident to suppression of fermentation and to sprouting. The lowering of the water content of the yeast to a certain optimum value is instrumental in raising the lipid content of cells of a culture: a lowering of 90 to 80%  $H_2O$  in an aq. suspension of beer yeast can raise the ergosterol value of the yeast 5 times (0.2 to 1.1%) without raising the fat content. In order to increase the fat content as well, it is necessary to pass an air- $EtOH$  vapor mixt. over a flat yeast culture contg. 75-80%  $H_2O$  with intermittent evacuation. The ergosterol content will rise to 2-4%, after 10-14 days to 7-8%. The glyceride and sterol formation by respiration process is induced by many narcotic substances like  $EtOH$  (oxidizing to  $AcH$ ); the  $AcH$  itself, however, paralyzes the cells. The  $AcH$  formed is further synthesized to acetoin. A yeast fat formed in this manner and extd. by solvents generally consists of about  $1/4$  to  $1/3$  sterols.

Additional cyanophoric plants of the Maquiling region. IV. Jose B. Juliano. *Philippine Agr.* 22, 254-7 (1933). A list is given of botanical species in the organs of which HCN was found in a systematic testing of plants in the region.

A. L. Mehring  
Inheritance of sugar content and weight in hybrids of sugar and fodder beets. Václav Stehlsk. *Chimie & industrie Special No.*, 1127-40 (June, 1933).—The inheritance of the sugar content is governed by the same laws as that of morphological characteristics. Correlation was established between the sugar content and morphological characteristics and the anatomical constitution of the roots of the hybrids. The partial and intermediate dominance of the sugar-content characteristic of the hybrids was established, and also the physiol. correlation and relation between the wt. of leaves, color, wt. of roots and no. of rings of vein bundles, on the one hand, and the shape of the bulb and sugar content on the other. The

coeffs. of variability of the sugar content were calcd.; the intermediate variation in the first generation of hybrids and an extraordinarily large variation in the second and subsequent generations were observed. By hybridization, various types were obtained that had const. sugar content and morphological characteristics.

A. P.-C.  
Absorption tests with plants. VI. A study of urea and comparison with the ammonia salts. F. Díaz Aguirreche and A. Castillo. *Anales soc. españ. fis. quim.* 31, 609-71 (1933).—The influence of urea on plants was studied, the previous method being investigated (cf. *C. A.* 26, 3005). These results were compared with those obtained by the use of  $NH_4NO_3$  and a mixt. of  $KNO_3$  and other N compds. The results with  $NH_4NO_3$  are explained to be due to the action of opposite ions, while those obtained with urea depend upon its undissocd. state.

R. M. Symmes  
Growth of *Aspergillus niger* at different hydrogen-ion concentrations, with and without the addition of growth-promoting substance B. Niels Nielsen and Vagn Hartzhus. *Compt.-rend. trav. lab. Carlsberg* 19, No. 15, 1-22 (1933); cf. *C. A.* 26, 4358; 27, 1019.—Without the growth-promoting substance the opt.  $pH$  for growth is about 3; with it, the opt.  $pH$  is 6.7. The lowest  $pH$  at which germination will take place is 1.3 with, and 1.5 without, the substance. Cultures over 8 days old show considerable autolysis with the substance, but only a little without it. Conidia formation increases as the  $pH$  increases, there being none below 2.1.

J. J. Willaman  
Fractionation and purification of org. substances by the principle of chromatographic adsorption analysis. II. Chlorophylls (Winterstein, Stein) 2. Ca oxalate rings—periodic precipitate formation [around the epidermal cell of onion skin] (Doring) 2. The tobacco plant (Vickery, Pucher) 17. Prune maturity and storage (Tucker) 12. Influence of light on the formation of chloroplast pigments (Rudolph) 10. Absorption of K by plants (Proebsting) 15.

## F—NUTRITION

PHILIP R. HAWK

A highly satisfactory vitamin B deficient ration. Ba. nett Sure. *Proc. Exptl. Biol. Med.* 30, 779-80 (1933).—Ration (No. 1751), deficient in vitamin B complex, consists of purified casein 20, agar-agar 2, McCollum's salts (No. 185) 4, filtered butter fat 10 and dextrin 64; depletion in the rat is secured in 2-3 weeks. Ration (No. 2345), deficient in vitamin B only, consists of purified casein 10, salts (No. 185) 4, autoclaved dried round steak 15, butter fat 10 and dextrin 61; depletion of vitamin B reserves is secured in 2-3 weeks after all storage of vitamin B complex has been depleted on ration No. 1751. To purify, suspend 3 kg. of casein in 30 l. of tap water contg.  $AcOH$  50 cc.,  $CHCl_3$  5 cc. and toluene 5 cc.; change the fluid daily for 14 days (use distd.  $H_2O$  the last 3 days); dry at  $100^\circ$  and grind; suspend 5 kg. of the powder in 25 l. of 25% by vol.  $EtOH$  for 12 hrs. and stir for 12 hrs. at room temp.; filter, dry at  $100^\circ$  and grind. Round steak to supply vitamin G is cut in small cubes, heated for 6 hrs. at 20 lb. pressure, dried at  $100^\circ$  and ground.

C. V. Bailey  
Some observations on rickets with special reference to its occurrence in pigs. J. P. McGowan. *Brit. Med. J.* 1933, II, 599-602.—Ca deficiency in pigs causes osteoporosis which cannot be prevented by cod-liver oil, vitamin D or sunlight. Balancing of the diet with  $CaCO_3$  also fails to prevent the condition, but actually seems to aggravate it. Rickets is regarded as due to a deficiency of P in the diet in relation to the protein intake. Osteomalacia is essentially a combination of aphosphorosis and acalciosis, because of a deficiency of Ca and P in the diet.

J. B. Brown  
Oil-soluble vitamin A in some pulses and fish of Bengal. N. C. Nag and H. N. Banerjee. *Current Sci.* 2, 95 (1933).—Absorption spectrum analysis of *Cicer arietinum* oil shows bands corresponding to those of cod-liver oil. Hilsha fish-liver oil gives a pronounced band at 500  $\mu$ .

Physiol. expts. with *Cicer arietinum* oil in rats give promising results. Rachel Brown

The role of fat in glycogenesis and the utilization of proteins. P. Maignon. *Nutrition Abstracts & Rev.* 3, 345-53(1933); cf. *C. A.* 27, 2166.—A review. E. H.

The occurrence of vitamin A in the oil of West Indian sharks. C. F. Asenjo. *Science* 78, 479(1933).

E. H.

Recent results in the field of vitamin investigation. Charlotte Riedel. *Pharm. Zentralhalle* 74, 593-9(1933).—A survey is given of recent results obtained in this field, in connection with the graphical formulas of  $\beta$ -carotene and vitamins A and C. W. O. Emery

Vitamin D in the nutrition of the dairy calf. I. W. Rupel, G. Bolstedt and E. R. Hart. *Wis. Agr. Expt. Sta., Research Bull.* 115, 40 pp.(1933).—On rations deficient in vitamin D, calves showed declining rates of growth at the 12th-15th weeks and little growth occurred after 25 weeks. The deficiency is manifested also by a reduction of inorg. P and Ca in the blood serum and by a reduction in the percentage of total ash in the dry fat-free bone. A decline in the level of inorg. P in the blood serum preceded the appearance of stiffness. A level of 10-13 mg. of serum Ca and 7 mg. of inorg. P is considered normal for calves 1-10 months old. The feeding of oxidized cod-liver oil causes increases above these levels at first, but they gradually return to normal. Non-rachitic bones carried 60-63% ash while rachitic bones carried from 45 to over 50%. The breaking strength of the non-rachitic bones was much greater than for the rachitic. Ultra-violet irradiation, sunlight and the feeding of liberal amounts of sun-cured hay protected the calves from vitamin D deficiency. Fifty-two references. C. R. Fellers

Effect of feeding a cod-liver oil concentrate to cows on the vitamin D content of milk. W. E. Krauss, R. M. Bethke and Willard Wilder. *J. Dairy Sci.* 16, 549-55(1933).—See *C. A.* 27, 1919 G. G.

Threshold of activity of pure carotene. Exact value of the biological activity of the international standard of vitamin A. Lucie Randoin and R. Netter. *Bull. soc. chim. biol.* 15, 706-23(1933); cf. *C. A.* 27, 4564. Feeding expts. with young rats are described. By both the preventative and curative methods the minimum daily dose of international standard carotene capable of maintaining health and growth, when used as the sole source of vitamin A, was found to be 4 $\gamma$  or slightly less, although 2 $\gamma$  daily prevented xerophthalmia and prolonged the survival period. Even 10 $\gamma$  per day did not permit as rapid growth as did 1 drop per day of cod-liver oil. The biological activity of the carotene of the adrenals and the presence of carotenoids in the adrenals of various species of animals. *Ibid.* 941-53.—Carotene extd. from beef adrenals had practically the same vitamin A activity as international standard carotene. Carotene was detected in horse and swine adrenals but not in the adrenals of normal rats.

L. E. Gilson

Note on glutathione and vitamin C in tumor tissue. Eric Boyland. *Biochem. J.* 27, 802-5(1933).—The estn. of glutathione in tumor tissue (sarcoma of rat, mouse and fowl, and carcinoma of mouse) by a colorimetric method gives values only  $\frac{1}{3}$  as great as those obtained by I titration. This is due to the presence of ascorbic acid in tumor tissue Benjamin Harrow

Catatorulin. A new method of comparing the oxidative factor in vitamin B<sub>1</sub> concentrates. Reginald Passmore, Rudolf A. Peters and Hugh Mac. Sinclair. *Biochem. J.* 27, 842-50(1933).—The coenzyme effects upon the O uptake of avitaminous birds' brain of 2 vitamin B<sub>1</sub> concentrates are compared. The specific factor responsible is called catatorulin. Cryst. specimens of vitamin B<sub>1</sub> are good sources of catatorulin. There is a wide parallelism between vitamin B<sub>1</sub> and catatorulin activity, suggesting their identity. The method, then, probably ests. vitamin B<sub>1</sub>. Benjamin Harrow

The need for a standard reference in vitamin A testing. Katharine Hope Coward, Kathleen Mary Key and Barbara Gwynneth Emily Morgan. *Biochem. J.* 27, 873-

7(1933).—Thirteen tests of the vitamin A content of a sample of cod-liver oil have been made on groups of rats. A five-fold variation in result was found. B. Harrow

Variations in the quality of butter, particularly in relation to the vitamin A, carotene and xanthophyll contents as influenced by feeding artificially dried grass to stall-fed cattle. Albert E. Gillam, Isidor M. Heilbron, Richard A. Morton, Gerald, Bishop and Jack C. Drummond. *Biochem. J.* 27, 878-88(1933).—The results show that the relatively high proportions of carotene, xanthophyll and vitamin A present in summer butter can be maintained during the winter period of stall feeding by the use of artificially dried grass. Benjamin Harrow

Vitamin A and carotene. X. The relative minimum doses of vitamin A and carotene. Thomas Moore. *Biochem. J.* 27, 898-902(1933); cf. *C. A.* 26, 3545.—Carotene is utilized in the body as efficiently as preformed vitamin A at levels approaching the min. dose. B. H.

The mineral content of the skin of rats suffering from beriberi, with investigations on the formation of vitamin B<sub>1</sub> by molds. Humphrey T. Fawns and Albert Jung. *Biochem. J.* 27, 918-33(1933).—The mold, *Aspergillus niger*, can form vitamin B<sub>1</sub> from a vitamin-B-free diet and cure and prevent beriberi in rats. In beriberi a marked increase in K in the skin is found, and in some cases a rise in Ca. Mg is raised when the Ca is not increased. Phosphates show a tendency to sink and chlorides to rise.

Benjamin Harrow

Further investigations into the fundamental nature of vitamin D action. John P. McCowan. *Biochem. J.* 27, 943-50(1933); cf. *C. A.* 26, 1321.—Vitamin D produces its action by setting free inorg. phosphate endogenously and in all probability from the lipins of the body.

Benjamin Harrow

The ascorbic acid content of the adrenals and livers of different animals. Joseph L. Svirhely. *Biochem. J.* 27, 960-3(1933).—The ascorbic acid content of the adrenals is higher than that of the liver in every animal. Guinea pigs fed first with a liberal amt. of spinach and then placed on a vitamin-C-free diet show a decrease in the ascorbic acid content first in the liver and then in the adrenals; this indicates that the liver serves as a reserve store for the acid. Benjamin Harrow

Essential hematuria—an avitaminosis? N. Aars Nicolaysen. *Med. Rev.* 50, 103-211(1933).—On the west coast of Norway, the food used by certain classes of the population is at times poor in C-vitamin, and a deficit in C-vitamin may manifest itself clinically in unforeseen ways, because the knowledge concerning the latent scurvy is still rather scarce; there is reason to believe that some cases of so-called essential hematurias are of a scorbutic nature, possibly also some cases of melena. H. C. M. Ingeberg

The effect of feeding on the fat content of cow milk. E. J. Sheehy. *J. Dept. Agr. Ireland* 32, 18-29(1933), cf. *C. A.* 27, 755.—No sp. quant. effect on the yield of butter fat was obtained by including olive, linseed, cottonseed, coconut, peanut, palm nut, soy bean or whale oil, or beef fat in the diet of milking cows. Palm nut, cottonseed and linseed meals, when fed up to 6 lb. daily, had no sp. quant. effect on the percentage of fat in milk; cod-liver oil, at the rate of 6 oz. daily, had a depressing effect which persisted for several days after the oil was withheld. The inclusion of sugar-beet pulp, beet roots, treacle, wet grains, rice meal or green fresh pasture herbage in the diet had only a temporary effect on the percentage of fat, neither sepd. nor whole milk powder had a sp. effect. There was no connection between the plane of nutrition and the percentage of fat in the milk. Thirty-one references. K. D. Jacob

Nutrition studies of foodstuffs used in the Puerto Rican dietary. VI. Vitamin A content of pasteurized milk and native cheese. D. H. Cook and Joseph H. Axtmayer. *Puerto Rico J. Pub. Health Trop. Med.* 9, 90-2(1933); cf. *C. A.* 27, 5381.—The vitamin A content of pasteurized milk was found to be 2 units per cc. and whole milk cheese 20 units per g. J. A. Kennedy

Some aspects of carbohydrate metabolism. John R.

Murlin. *Ohio J. Sci.* 33, 385-58(1933)—Carbohydrate metabolism is reviewed. The following subjects are covered: hydrolysis to glucose, conversion of amino acids and proteins to this substance, its oxidation and conversion to glycogen and fats, the opposing actions of insulin and adrenaline on its metabolism, sugar tolerance. Expts. are conducted to prove that fats are converted to carbohydrates. This contention appears to be true in the germinating bean and practically so in human beings chosen because of their high fat tolerance. I. M. L.

**Vegetable feeding in the young infant. Influence on gastro-intestinal motility and mineral retention.** Frederic W. Schlutz, Minerva Morse and Helen Oldham. *Am. J. Diseases Children* 46, 757-74(1933).—The use of raw or puréed spinach as supplements to the milk feedings of very young infants does not appreciably affect the mineral balance. When dried spinach is used the retention is slightly lower than that which prevails when the minerals are derived solely from milk. The beneficial effect of the addn. of vegetable matter to the dietary of young infants does not appear to be due to improvement in mineral retention or to increased gastro-intestinal motility.

E. R. Main  
**The vitamin D potency of sun-irradiated dried yeast.** Katharine H. Coward. *Lancet* 1933, II, 920.—Yeast may be activated antirachitically by exposure to strong sunlight. Different samples vary greatly in the extent to which they may be activated. E. R. Main

**Vitamin D milk in the treatment of active rickets. A clinical assay.** Benjamin Cramer and Isaac F. Gittleman. *New Engl. J. Med.* 209, 906-16(1933).—Vitamin D milk produced either by direct irradiation of milk or by feeding yeast to lactating cattle appears to be an effective therapeutic agent in active rickets. E. R. Main

**Vitamin D milk.** Edwin T. Wyman. *New Engl. J. Med.* 209, 889-93(1933).—Vitamin D milk appears to be an effective antirachitic agent, producing marked increases in the serum Ca and P contents and healing of active rickets in children. E. R. Main

**The action of large doses of irradiated ergosterol in rats fed with a normal diet. I. The behavior of calcium in the lungs and skin.** I. Marcialis. *Boll. soc. ital. biol. sper.* 8, 627-30(1933).—Excessive doses of irradiated ergosterol (50 drops Vigantol daily 75 to 165 days) caused no injurious effects on the growth. There was an increase of Ca in the lungs but the amt. in the skin was about normal. II. **The behavior of potassium in the lungs and skin.** *Ibid.* 631-4.—Large doses of irradiated ergosterol produced no noticeable changes in the K content of the lungs during the first 2 months but toward the 3rd month it produced a noticeable diminution compared with the controls. The amt. of K in the skin fell within the normal limits. III. **The action of large doses of irradiated ergosterol in rats kept on a deficient diet. The behavior of calcium in the lungs and skin.** *Ibid.* 634-6.—The amt. of Ca in the lungs of the rats receiving the irradiated ergosterol increased very markedly compared with the normals. The amt. in the skin was within the normal limits. Peter Masucci

**Magnesium in the bones of animals treated with irradiated ergosterol.** Luigi Robuschi. *Boll. soc. ital. biol. sper.* 8, 675-9(1933).—The administration of irradiated ergosterol and Mg lactate to rabbits favors growth, increases the total solids of the bones, but does not change the ash content nor the percentage of Mg in the ash. Peter Masucci

**Determination of the antiscorbutic potency of vegetable products.** Gustaf F. Göthlin. *Acta med. scand., Suppl.* 53, 120 pp., 52 charts(1933).—In Upper Norrland, at least in the early spring, even among the apparently healthy children 1 in every 5 may be suffering from vitamin C undernourishment. Raw mash or juice of black currants, raw cloudberry mash or beverage, raspberry mash and "water cloudberry" (14 to 90 g.) can give complete protection. The raw juices may be stirred into a little gelatin soln. at 35-40° and thickened by rapid cooling. The "water cloudberry" is a preserve made without boiling and has a

50% higher vitamin C content. Its use on a larger scale is strongly recommended. S. Morgulis

**Determination of potency of vitamin D preparations.** III. Martin Schieblisch. *Biochem. Z.* 265, 1-4(1933); cf. C. A. 23, 4971.—The rachitogenic effect of McCollum's diet 3143 has been greatly increased by substituting buckwheat for the ordinary wheat, so that the need of rat units for prevention is more than doubled (0.07γ instead of 0.03γ). S. Morgulis

**Knowledge of the antiscorbutic vitamin (vitamin C).** P. Karrer, H. Salomon, K. Schöpp and R. Morf. *Vierteljahrsschrift naturforsch. Ges. Zurich* 78, No. 1/2, 8-14(1933).—The authors purified hexuronic acid by recrystn. from MeOH. Both the first and fifth fractions showed the same potency when fed to guinea pigs. The fifth fraction had the empirical formula,  $C_6H_8O_6$ . From the properties of the Na salt, the detn. of active H, the behavior toward *p*-nitrophenylhydrazine, nitromethane, activated H, diazomethane, and Cu acetate in the cold, and the properties of the acetate and dimethyl derivs., the authors conclude that the most likely formula for the compd. is  $CH_2(OH)CH(OH)COCH_2COCOOH$ , although  $OHCH_2COCH(OH)CH(OH)COOH$  is also possible. Further investigation is in progress. C. R. Moulton

**Directions regarding the practical evaluation, according to vitamin requirements, of foods and medicines rich in vitamins. II. The vitamin B complex.** A. Jung. *Z. Vitaminforsch.* 1, 192(1932); *Bull. soc. sci. hyg. aliment.* 21, 292.—From a comparison of various methods of investigation, J. concludes: (1) For pigeons, the av. total curative dose of vitamin B<sub>1</sub> is 6 rat units, the daily curative dose 1.5, the prophylactic dose 6-8 units for 35 days and 20 units for 60 days. (2) For a working man the prophylactic dose is 15-45 prophylactic pigeon doses or 200-300 daily rat doses. These doses are contained in 15-20 g. of dried yeast, 400-600 g. fresh meat, 12 egg yolks, 240 g. whole wheat, 400 g. whole-wheat bread, 1 kg. potatoes, 1 l. milk, 500 g. spinach, etc. As regards vitamin B<sub>2</sub>, 4 units per kg. body wt. is sufficient for a child and 2 units for an adult. III. **Vitamin C.** *Z. Vitaminforsch.* 1, 294; *Bull. soc. sci. hyg. aliment.* 21, 289-90.—The min. dose of vitamin C for nurslings is 5 guinea-pig units, and for adults 15-25; corresponding to 150-250 international units, or 100 or 500 g. methyl-nornarcotine. The juice of 2 oranges per day is sufficient. Apples constitute a very irregular source, while potatoes are a good source, furnishing 100 units per 400 g. The doses of vitamin D required for prophylaxis are 1 or 2 clinical units, and for therapeutic treatment 5 units. Strongly activated medicines should be controlled as to vitamin D content and should be administered only on prescription. A. Papineau-Couture

**Synthesis of *d*- and *l*-ascorbic acid (vitamin C).** T. Reichstein, A. Grüssner and R. Oppenauer. *Helv. Chim. Acta* 16, 1019-33(1933); cf. C. A. 27, 3977, 5789.—*d*-Xylose was converted to the osone (I) by prep. the osazone (66.5% yield) and treating this with BzH (22.3% yield). Small samples of I were converted to the cyanohydrin with HCN under various conditions, the max. yield being 26%. Hydrolysis of this product with HCl gave crude *d*-ascorbic acid (II). II was purified through the Me<sub>2</sub>CO compd. m. 185-9° corr.,  $[\alpha]_D^{25} = -24.5^\circ$ , or the brucine salt (decompn. 209°)  $[\alpha]_D^{25} = -80^\circ$ . *l*-Ascorbic acid (III) was prep. from *l*-xylose (20 g.) in a similar way (yield, 0.880 g.). III m. 187-9°,  $[\alpha]_D^{25} = +48^\circ$ . It showed no depression of m. p. when mixed with natural ascorbic acid. A mixt. of equal pts. of II and III after crystn. together m. 168-9° and was optically inactive. Preliminary reports state that III is as active as natural ascorbic acid in preventing scurvy. II is ineffective when used in amts. 4 times as great. Proof was cited for the belief that Haworth's formula for ascorbic acid  $CH_2OHCHOH-CH(OH)-COH = COHCO$  was correct. E. W. Scott

**Phosphorus and rickets. II. The role of phosphate ion in antirachitic activity of inorganic compounds of phosphorus.** Raoul Lecoq and Henri Vilette. *J. pharm.*

*chim.* 18, 192-7(1933); cf. *C. A.* 26, 3012.—Summary: (1) The  $\text{PO}_4$  ion as in  $\text{Na}_2\text{HPO}_4$  has practically no curative action on rickets of the white rat after a diet devoid of vitamin C, and contg. a large excess of Ca compared with P. (2) The  $\text{PO}_4$  ion seems definitely endowed with antirachitic properties; they vary, however, with the no. of mols. of  $\text{H}_2\text{O}$  combined with  $\text{P}_2\text{O}_5$ . Thus in order to produce identical results, 100 parts of rickets-producing diet (Rando-L.) must receive 0.100 part of P in the form of  $\text{Na}_2\text{HPO}_4$ , 0.200 part of P as  $\text{Na}_4\text{P}_2\text{O}_7$  and 0.300 part as  $\text{NaPO}_3$ . (3) The antirachitic activity of  $\text{NaH}_2\text{PO}_4$  and  $\text{Na}_2\text{HPO}_4$  is comparable to that of  $\text{KH}_2\text{PO}_4$  and  $\text{K}_2\text{HPO}_4$ , their contents in P being taken into account; the activity of the analogous  $\text{NH}_4$  salts under like conditions seems slightly inferior. (4) The calcifying properties of  $\alpha$ -phosphates diminish from the Na to the  $\text{Na}_2$  salt, from K to  $\text{K}_2$  and from  $\text{NH}_4$  to  $(\text{NH}_4)_2$ ; hence the no. of free acid functions of these salts seem to det. their efficacy. (5) In order to confer upon the ration, under the usual conditions of the expt., a curative, satisfactory antirachitic action, about 20 international units (*i. u.*) of vitamin D must be added to 100 g. of the rickets-producing diet (R.-L.). The efficacy of a phosphoric deriv. may be expressed in antirachitic *i. u.* and referred either to 1 g. of substance, or to a definite wt. of P. S. Waldbott

**Ergosterol products.** I. G. Farbenind. A.-G. (Otto Linsert, inventor). Ger. 576,021, May 6, 1933. Addn. to 565,900 (*C. A.* 27, 2476). See U. S. 1,902,785 (*C. A.* 27, 3294).

## F—PHYSIOLOGY

HOMER W. SMITH

**Total and thyroxine iodine content of thyroid gland after injection of saline anterior pituitary extracts.** G. L. Foster, A. B. Gutman and E. B. Gutman. *Proc. Soc. Exptl. Biol. Med.* 30, 1028-32(1933). In the sheep, 10 daily intraperitoneal injections of a saline anterior pituitary ext. caused a 50% decrease in the total I content of the thyroid gland and a proportionate decrease in the thyroxine content. C. V. Bailey

**Relationship between chloride content and blood cerebrospinal fluid bromide ratio.** Wm. Malamud, B. M. Mullins and J. R. Brown. *Proc. Soc. Exptl. Biol. Med.* 30, 1084-7(1933). By the Walter method, Br added to water, blood serum or spinal fluid from which the Cl had been removed was recovered with the usual error of colorimetry. When 100 mg. of bromides per 100 cc. was added to these fluids, and NaCl in concns. of 0.2, 0.3 and 0.6%, the recoveries were, resp., 86.5 mg., 78.0 mg. and 73.7 mg. per 100 cc. In applying this method to the detn. of Br in body fluids, correction should be made for the definite loss due to the particular concn. of Cl in the fluid. C. V. Bailey

**The hormonal determination of pregnancy in domestic animals.** Küst. *Zuchtungskunde* 7, 245-56(1932).—The Aschheim-Zondek pregnancy test is not applicable for the detn. of pregnancy in domestic animals. By the detection of ovarian hormone (O. H.) in urine pregnancy in mares may be established with certainty beginning with the 7th or 8th week. The O. H. and the hormone from the anterior pituitary (H. AP.) are present in strikingly large amts. in the blood of pregnant mares. The irregular sepn. of O. H. in the urine of pregnant oxen, goats and hogs makes the detection of pregnancy so uncertain as to be impractical. The blood, milk and saliva of pregnant cows contain neither O. H. nor H. AP. in amts. sufficient for the detn. of pregnancy. The presence of O. H. or H. AP. could not be demonstrated in the urine of pregnant dogs. B. C. Brunstetter

**Physiology of the bone marrow.** K. Felix, A. Grassmück, K. Huck and K. Matzen. *Z. physiol. Chem.* 221, 137-44(1933).—Respiration expts. with bone marrow suspended in physiol. NaCl soln show a max.  $\text{O}_2$  consumption at  $p_{\text{H}}$  8.3. Red marrow is more active than fat marrow. The  $\text{O}_2$  consumption is proportional to the content of purine bases which in turn is an index of the abundance of cells. It is increased by addn. of alanine

but not by aspartic or glutamic acid nor by glycine or glycerylglycine. Proline and tryptophan have a somewhat favorable influence. By far the greatest effect is obtained with prepn. from liver and gastric mucosa, not only those contg. the anti-anemic substance but other fractions as well. A. W. Dux

**Ethyl sulfide formation in the animal organism.** J. Wohlgenuth. *Z. physiol. Chem.* 221, 207-8(1933).—W. takes issue with Christomanos (*C. A.* 27, 3978) regarding the endogenous origin of  $\text{Et}_2\text{S}$ . Although dogs excrete more  $\text{Et}_2\text{S}$  on a low-protein diet of potatoes and bread, the explanation is the incomplete utilization of such a diet and the resulting intestinal putrefaction. A. W. Dux

**Uric acid synthesis in the avian organism. I. Uric acid synthesis in the organism of the pigeon.** Werner Schuler and Wilhelm Reindel. *Z. physiol. Chem.* 221, 209-31(1933). In the presence of surviving tissue sections of pigeon organ<sup>4</sup> the synthesis of uric acid has been performed *in vitro*. The site of the biol. synthesis is the kidney. Both kidney and liver contain a precursory substance which is not a purine. The formation of this precursor is an enzymic reaction with  $p_{\text{H}}$  optimum at 7.6-7.7 and temp. optimum at 40°. The same substance is present in the musculature although not formed there by enzyme reaction. The actual synthesis of uric acid shows a  $p_{\text{H}}$  optimum at 7.1 and requires the intervention of living kidney tissue. Amino acids are the source of N and this is utilized by way of  $\text{NH}_3$ . Urea is not a precursor of uric acid, and the 3-C compds., glycerol, lactic acid, malonic acid and tartaric acid, do not serve as sources of C, as generally stated in the literature. II. **Uric acid synthesis in the organism of the hen and goose.** *Ibid.* 232-40.—Similar observations were made with liver and kidney sections from the hen and goose. Uric acid synthesis was performed *in vitro* in 2 stages, *vis.*, the enzymic formation of precursory substance without the intervention of living tissue, and the final synthesis in the presence of surviving resping tissue. The 2nd step occurs here in the kidney, as with the pigeon, and also in the liver. A. W. Dux

**The parallel determination of the respiratory quotient and alveolar air of man in the post-absorptive condition.** T. M. Carpenter and R. C. Lee. *J. Nutrition* 6, 37-53(1933); cf. *C. A.* 27, 761. Respiratory exchange of 2 human subjects was measured for numerous 15-min intervals by means of an open-circuit respiration app. with mouthpiece as a breathing appliance. With 1 trained subject the av. respiratory quotient and the alveolar  $\text{CO}_2$  did not change significantly in 3½ hrs. With the untrained subject both respiratory quotient and alveolar  $\text{CO}_2$  varied, usually in opposite directions. In both subjects the respiratory quotients tended to run parallel with the respiratory quotients of total expired air. There was a marked neg. correlation between the alveolar respiratory quotient and the percentage of alveolar  $\text{O}_2$  deficit. Effect of glucose and fructose on the human respiratory quotient and alveolar air. *Ibid.* 55-82. There was no change in the alveolar  $\text{CO}_2$  with the trained subject accompanying the rises in the respiratory quotient after the ingestion of the sugars, but with an untrained subject there was a marked fall in the alveolar  $\text{CO}_2$  during the periods of max. rise in the respiratory quotient. With the trained subject there was not a definite relationship between the alveolar  $\text{CO}_2$  and the alveolar respiratory quotient in the expts. with fructose, but in the expt. with glucose and in the 2 groups of expts. with the untrained subject, there was a tendency to a neg. correlation between the alveolar  $\text{CO}_2$  and the alveolar respiratory quotient. The rise in respiratory quotients resulting from the fructose is regarded as a result of the metabolism of fructose without the formation of org. acids in its transformation in sufficient quantities to affect the  $\text{CO}_2$  tension of the alveolar air. C. R. Feller

**Results from feeding spray chemicals to albino rats.** T. J. Talbert and W. L. Tayloe. *Mo. Agr. Expt. Sta. Research Bull.* 183, 3-19(1933).—Arsenic fed to rats did not retard growth unless fed in quantities larger than the



equiv. of 0.04 grain  $As_2O_3$  per lb. of fruit. Pb as Pb(OAc)<sub>2</sub> and As in its various forms as an insecticide appear to have injurious effects on rats only after prolonged feeding. Arsenic or Pb or both, when fed in quantities larger than the equiv. to 0.04 grain for about 175 days, had an injurious effect on the offspring by decreasing the wt. and ability of the females to produce and rear young. When spray chemicals are fed in quantities 4 times the "world" tolerance, they have very marked injurious effects on rats, and when the feeding is extended for 400 or more days, the mortality rate greatly increases and reaches 35.5%. Conclusion: Human beings are unlikely to consume enough As as residue on fruit sprayed and handled in the usual manner to be injurious to health.

C. R. Fellers

**Growth and development with special reference to domestic animals. XXVII. Endogenous urinary nitrogen and total creatinine excretion in rats as functions of dietary protein level, time on nitrogen-free diets, age, body weight and basal metabolism.** Ural S. Ashworth and Samuel Brody. Mo. Agr. Expt. Sta., *Research Bull.* 189, 5-68(1933); cf. C. A. 27, 1924.—Comparisons are made of rats paired to diets of low- and high-protein levels. To secure min. urinary N excretion, the animals were kept on practically N-free diets for approx. 100 days. The av. total creatinine N coeff. for all the rats was 15.1 and this value is practically independent of age and dietary protein level. The min. N coeff. is not reached until about the 15th day on the N-free diet. The av. value at this time is about 140 mg. of urinary N per kg. of body wt. The limiting max. value of the ratio of total creatinine N to total endogenous N is about 15%, reached at the same time that the N coeff. becomes a min. The av. value of this ratio is 11%. The ratio of Cal. (basal metabolism) to mg. total creatinine N declines with increasing wt. at approx. the same rate as the ratio of Cal. to body wt. The av. numerical values of this ratio range from 13 at 80 g. body wt. to 6 at 300 g. body wt. The Cal. per mg. of urinary endogenous N ratio approach 1.5 as a limit for young rats with high basal metabolism. For heavier animals the limit is about 0.8 Cal. A greater amt. of fatty tissue in high protein rats is indicated by their lower endogenous N coeffs. **XXVIII. Decline of endogenous nitrogen excretion per unit weight with increasing weight in growing rats, and its relation to the decline in basal metabolism. Decline in live weight, nitrogen and energy metabolism with the advance of the period of nitrogen starvation and the influence of live weight and of the preceding level of protein intake on these declines and on survival periods.** *Ibid.* 190, 5-19.—Basal, endogenous N and basal energy metabolism in rats follow the same course with increasing live wt., age or conditions of starvation. There is a very intimate functional relation between basal energy and endogenous N metabolism. This relation is "caused by the same mechanism, i. e., the "active protoplasmic mass" in the body. It is unreasonable to assume that surface area is a limiting factor under conditions of thermal neutrality. Creatinine N is a decreasing function of the total endogenous N with decreasing live wt. of the animal. A prolonged period on a N-free diet reduces the energy metabolism to the same min. level, 400 Cal. per sq m. per day, as during prolonged abs. starvation. The fecal N on a N-free diet constitutes close to 20% of the total N excretion. Rats may survive for 6 months on N-free but otherwise complete diets. The time curve for live wt. of such rats shows stair-case phenomena, suggesting the successive use of tissues of successive stability. These stair-case phenomena are also exhibited in the time curves of N excretion. **XXIX. Age curves of creatinine and urinary nitrogen coefficients in dairy cattle and their relations to energy metabolism.** *Ibid.* 191, 5-18.—The preformed creatinine N coeff., 9.5, of growing dairy cattle is the same as in human beings. This figure is a const. during the age interval of 7-40 months. The creatine N coeff. of dairy females is 7.6 which is parallel to the preformed creatinine N coeff. The high creatine coeff. may be of dietary origin. The ratio of basal energy metabolism

to creatinine excretion declines with the increasing live wt. in the same manner as the decline of the ratio of basal metabolism to live wt. **XXX. The partition of digestible nitrogen intake between growth, milk secretion and urinary excretion in growing dairy cattle.** Samuel Brody and Arthur C. Ragsdale. *Ibid.* 192, 5-28.—After the age of 10 months in growing dairy heifers 45-92% of the digestible dietary N is excreted in the urine. The higher value obtains between the age of 10 and 20 months, and the lower value during the last months of gestation and during the flush of lactation. The digestible crude protein intake of dairy heifers on good feed ranged from 0.14 to 0.47 lb. per 100 lb. live wt. The total digestible nutrient intake ranged from 1 to 2 lb. total digestible N per 100 lb. of live wt. The apparent efficiency of growth when expressed in the form of ratios of unit live wt. gained to unit wt. of food consumed ranged, with respect to digestible N, from 23 during the 1st month to 4 during the 25th month; with respect to total digestible nutrients during the same period, it ranged from 0.8 to 0.1. In general, young calves from 3 to 9 months old are overfed with respect to N and relatively underfed with respect to energy. It is desirable to reduce the protein content of the grain mix, and possibly add an inexpensive oil to the skimmed milk fed to calves to compensate for the removal of the butter fat. **XXXI. Influence of the plane of nutrition on the utilizability of feeding stuffs. Review of literature and graphic analysis of published data on the net-energy and specific dynamic action problems.** Samuel Brody and Robert C. Procter. *Ibid.* 193, 5-48.—This paper is devoted largely to a graphical and math. analysis of data concerning the influence of plane of nutrition on the net energy values of feeding stuffs fed to steers and rabbits.

C. R. Fellers

**Function, assay and preparation of galactin, a lactation-stimulating hormone of the anterior pituitary, and an investigation of the factors responsible for the control of normal lactation.** W. U. Gardner and C. W. Turner. Mo. Agr. Expt. Sta., *Research Bull.* 196, 5-61(1933).—Galactin is effective in stimulating or initiating lactation in the rabbit, guinea pig, dog and sow. The rat, mouse and monkey have not thus far responded to galactin administration. The response of the mammary glands of the rabbit to galactin depends on the degree to which the glands are developed and to some other factor, presumably of ovarian origin, which conditions them for response. Galactin was ineffective in stimulating the growth of mammary glands of young ovariectomized female rabbits, young male rabbits, or of restoring involuted mammary glands of ovariectomized female rabbits. Galactin was obtained from both sheep and bovine pituitaries. Galactin content of the exts. was independent of the gonad-stimulating hormone content. Methods of extn. and assay are detailed. Eighty-one references. C. R. F.

**Histological differences in the muscles of full-, half- and rough-fed steers.** Don D. Robertson and Dan D. Baker. Mo. Agr. Expt. Sta., *Research Bull.* 200, 3-11(1933).—The muscle fibers of the full-fed animals were greatest in diam.; those of the rough-fed steers smallest. Glycogen was present in small amts. in fresh muscle fibers of all animals studied. Glycogen was not found in refrigerated meat. True fats were abundant in connective tissue of the muscles of full-fed cattle, but only traces in the rough-fed steer. True fats were not demonstrated within the muscle fibers. Short-period cold storage produced no significant changes in the fats. C. R. Fellers

**The theory of blood coagulation. II. Syneresis of blood in the presence of acids and alkalis.** Satya Prakash. *Kolloid-Z.* 65, 88-92(1933); cf. C. A. 25, 738, 1580; 26, 4643.—Syneresis of goat blood at 25° increases at low concn. of AcOH, HCl and glycochol but decreases at higher concns. Urea speeds the syneresis but the final values diminish with increased concn. Glycerol and glucose diminish syneresis. Arthur Fleischer  
**The synthetic formation of creatine at the expense of tissue proteins.** Gertrude Pariset. *Compt. rend.* 197, 704-6(1933).—The sum of the creatine and creatinine

N excreted during a period of inanition plus that present in their tissues at the end of the period was considerably greater than the quantity calcd. to be present in their tissues at the beginning; hence creatine must have been formed from tissue proteins. L. E. Gilson

The phosphorus, potassium, calcium and potassium-calcium ratio of the blood after partial ablation of the liver. C. I. Parhon, Hélène Derevici and Michel Derevici. *Compt. rend. soc. biol.* 114, 67-8(1933).—Partial ablation of the liver in guinea pigs caused a small decrease in blood Ca and a large decrease in blood K, resulting in an av. K/Ca ratio of 1.41 (1.92 is normal). Blood P was slightly decreased. L. E. Gilson

Comparative values for the urobilin contents of human urine and duodenal contents. M. Royer, R. Dassen and F. Martinez. *Compt. rend. soc. biol.* 114, 75-7(1933).—Detns. were made on numerous normal and pathol. cases. The values obtained varied greatly. In hepatic insufficiency there is much bilirubin in the urine and little in the bile. L. E. Gilson

Action of hypophysis and thyroid on basal metabolism. B. A. Houssay and Argentina Artundo. *Compt. rend. soc. biol.* 114, 79-80(1933).—In dogs hypophysectomy decreases basal metabolism about 15% by causing epithelial atrophy and hypofunction of the thyroid. Removal of the thyroid after hypophysectomy caused an addnl. decrease in basal metabolism, but removal of the hypophysis from a thyroidectomized animal had no effect on basal metabolism. L. E. Gilson

Action of follicular hormone on the tetany and blood calcium of female dogs with chronic parathyroid insufficiency. Franz Mathieu. *Compt. rend. soc. biol.* 114, 104-6(1933); cf. *C. A.* 27, 5107.—In thyroidparathyroidectomized female dogs subcutaneous injections of theelin or menformon caused a decrease in blood Ca and a slight tetany. Theelin had a similar and stronger action. None of the hormones had any hypocalcemic effect in normal animals. L. E. Gilson

A conception of the structure and the oxidizing-reducing function of hemoglobin. G. Litareczek and G. T. Dinischiotu. *Compt. rend. soc. biol.* 114, 287-90(1933). Hypothetical. L. E. Gilson

Calcium of the milk and blood serum of thyroparathyroidectomized lactating bitches. C. I. Parhon, R. Ceruatesco and I. Ornstein. *Compt. rend. soc. biol.* 114, 323(1933); cf. *C. A.* 26, 5135.—Milk Ca and serum Ca showed large decreases 21 hrs. after the operation. Milk secretion usually ceased in less than 96 hrs. L. E. Gilson

Metabolism of growth. Its variations with age and with the seasons. G. Popoviciu, G. Benetato, N. Munteanu and M. Sorescu. *Compt. rend. soc. biol.* 114, 332-4(1933).—Analyses of blood samples taken from infants 1-15 months old and adolescents 18-21 yrs. old at different months of the year are given. L. E. Gilson

Form in which iodine is eliminated in human urine after administration of thyroxine by mouth. A. W. Elmer and M. Scheps. *Compt. rend. soc. biol.* 114, 350-1(1933).—The I is eliminated as degradation products of thyroxine. Decomposition by the liver of thyroxine injected intravenously. A. W. Elmer and Z. Luczynski. *Ibid.* 351-2.—In the rabbit part of the thyroxine traverses the liver unchanged and part is broken up and the I compds. formed excreted in the bile. L. E. Gilson

Effect of extirpation of the spleen on the cholesterol of the blood after irradiation by infra-red rays. S. Malczynski and J. Lankosz. *Compt. rend. soc. biol.* 114, 352-4(1933); cf. *C. A.* 27, 5345.—In the dog the spleen seems to have no influence on the oscillations of blood cholesterol. L. E. Gilson

[Changes in] the hypophysis of the rabbit treated with the hormones from the urine of pregnant women. I. Karp. *Compt. rend. soc. biol.* 114, 357-9(1933). L. E. Gilson

Action of extract of the anterior hypophysis on basal metabolism. Argentina Artundo and L. A. Solari. *Compt. rend. soc. biol.* 114, 385-6(1933).—Hypophyseal

implantations do not modify the metabolism of the toad. In the dog, ext. of the anterior hypophysis causes a marked increase in basal metabolism and all the other symptoms characteristic of hyperfunction of the thyroid. L. E. Gilson

Effect of alkalosis on the secretion of acid by the stomach. G. Delrue and A. Lacquet. *Compt. rend. soc. biol.* 114, 570 2(1933).—In dogs extreme alkalosis produced by feeding  $\text{NaHCO}_3$  (max.  $p_{\text{H}}$  of blood reached was 7.76) had no effect on the acidity of the gastric juice. L. E. Gilson

Morphological metabolism of neutral fats in the central nervous system during development of the embryo. A. Hadjiloff and G. Ouzounoff. *Compt. rend. soc. biol.* 114, 578 80(1933).—In the chick embryo neutral fats were detected in the central nervous system from the 5th to about the 15th day, then they disappeared. L. E. Gilson

Blood glutathione of Sebright cocks and hens. J. R. Chanton and P. Caridroit. *Compt. rend. soc. biol.* 114, 893-4(1933).—The plumage of Schright cocks is similar to that of the hens and the glutathione content of the blood of both sexes is practically the same, whereas in breeds where there is a marked difference in the plumage of the sexes the blood glutathione of the cocks is much greater than that of the hens. L. E. Gilson

Acid-base equilibrium in old age. G. C. Dogliotti and M. Santi. *Minerva med.* 1933, 11, 378-84.—Fifty persons 70 yrs. of age or older were studied for blood  $p_{\text{H}}$  (electrometric method) and alk. reserve (Van Slyke). Normal  $p_{\text{H}}$  was considered between 7.35 and 7.40, normal alk. reserve 50-70. There were 17 cases of acidosis, 10 with normal and 7 with low alk. reserve; 20 cases of alkalosis, 14 with normal and 6 with low alk. reserve; 13 with normal  $p_{\text{H}}$ , 7 with normal and 6 with low alk. reserve. Helen Lee Gruehl

Chloride and water in the constitution of tissues. Harold G. Close. *Biochem. J.* 27, 967-70(1933). The chief characteristics of body fluids (B), nuclear tissues (N) and anuclear tissues (A) are: no. of cells: B nil, N many, A few; metabolic rate: B nil, N high, A low, reaction: B alk., N acid, A alk.; water: B high, N moderate, A low; Cl: B high, N low, A high, Na: B high, N low, A high; K: B low, N high, A low; Na/K: B high, N low, A high; protein: B low, N moderate, A high. Benjamin Harrow

The volume variations of the muscle as related to the chemical processes of the contraction. O. Meyerhof and H. Hartmann. *Naturwissenschaften* 21, 661(1933).—Dilatometric measurements in enzyme exts. of the muscle indicate that the vol. variation (cf. *C. A.* 27, 1665, 3513, 4291) during contraction is due to changes in mol. vol. by decompn. and synthesis of the participating substances. Decompn. of creatinephosphoric acid is accompanied by a contraction of 10-12 cc. per mole, that of adenyphosphoric acid 42 cc. per mole, lactic acid formation from glycogen by an increase of 24 cc. per mole. The balance, however, did not entirely check with live muscle. The explanation is in addnl. swelling of the muscle. If liquid paraffin is used in the expts. instead of Ringer soln. the results agree. After a series of tetanus conditions a dilatation of  $4.7 \times 10^{-4}$  of the muscle vol. remains, equal to the calcd. value for 2.5 mg. lactic acid and 1.6 mg.  $\text{H}_2\text{PO}_4$  formation per g. muscle. Good agreement is also obtained for muscle poisoned with iodoacetic acid in which lactic acid formation is inhibited. B. J. C. van der Hoeven

The fluorine content of bones and teeth. R. Klement. *Naturwissenschaften* 21, 662-3(1933).—The F contents of bones and teeth substances, consisting largely of hydroxyl apatite (*C. A.* 24, 405; 27, 1037), were detd. anew. The analysis method of Armstrong (*C. A.* 27, 2397) and that of Willard-Winter (*C. A.* 27, 681) were used. Land mammals have a F content below 0.1%: human skull 0.059, tooth 0.030, bovine hollow bone 0.047, tooth 0.049, deer bone 0.065, monkey-tail vertebrae 0.038. Sea animals have higher F contents:

"dugong" phalanx 0.57, narwhal rib 1.62, dolphin tooth 0.71, dolphin cheekbone 0.80, shark (*Lamna*) cartilage 0.59, shark tooth 0.74, man-eating shark tooth 0.69. Fossil bones are exceptionally high in F: *Halitherium* rib 2.73, shark tooth 2.84, *Triceratops* rib 2.36%. F and OH can interchange isomorphically in the apatite; the F is derived from the sea water and accumulated.

B. J. C. van der Hoeven

The availability of iron from different sources for hemoglobin formation. C. A. Elvehjem, E. B. Hart and W. C. Sherman. *J. Biol. Chem.* 103, 61-70(1933).—The dipyriddy method of Hill (*C. A.* 25, 2387) is apparently a valuable means of detg. available Fe in food stuffs. Feeding expts. showed an availability of the Fe in wheat, yeast and oats approx. equal to the amt. of the total Fe which reacted with dipyriddy (47, 47 and 57%, resp.). The Fe in glutamic acid parahematin does not react with the reagent and showed very slight utilization. FeCl<sub>3</sub>, pyrophosphate, glutamate and hypophosphite supply readily available Fe for hemoglobin formation.

A. P. Lothrop

The renal threshold for bilirubin. II. E. H. Bensley. *J. Biol. Chem.* 103, 71-9(1933); cf. *C. A.* 26, 4637.—No evidence has been obtained that direct bilirubin is a threshold substance. The kidneys offer no barrier to its excretion regardless of its concn. in the blood. The kidneys are, however, impermeable to indirect bilirubin and no bilirubin is found in the urine (with a few explainable exceptions) when the blood contains indirect bilirubin only. Hunter's diazo test was used for the detection of bilirubin in the urine. The results confirm the findings of Rabinowitch (*loc. cit.*).

A. P. Lothrop

The synthesis of hippuric acid in the animal organism. VII. Hydrazine intoxication and hippuric acid synthesis in the rabbit. Victor J. Tulane, A. A. Christman and Howard B. Lewis. *J. Biol. Chem.* 103, 141-50(1933).—In hydrazine intoxication the excretion of hippuric acid during the 1st 6 hrs. after administration of BzONa is much less than in normal rabbits but the total excretion after 24 hrs. is only slightly less than in normal animals. Three equivs. of glycine were always fed with the BzONa so there was no failure in the supply of glycine. There is no corresponding increased excretion of either free BzOH or BzOH conjugated with some substance other than glycine. Similar results are obtained after feeding Na hippurate and glycine. The delayed synthesis of hippuric acid by the liver is best explained by the hepatic injury induced by the hydrazine. IX. A comparative study of the rate of synthesis and excretion of hippuric acid and phenacetic acids by the rabbit. Victor J. Tulane and Howard B. Lewis. *Ibid.* 151-60.—Even in the same species the 2 homologous acids, BzOH and PhCH<sub>2</sub>CO<sub>2</sub>H, differ in their behavior in the living organism. The excretion of phenacetic acid is slow, the av. excretions after feeding equiv. amts. of BzOH and PhCH<sub>2</sub>CO<sub>2</sub>H being equiv. to 37 and 6% of the intake, resp., during the 1st 6 hrs. The rate is increased by feeding glycine along with PhCH<sub>2</sub>CO<sub>2</sub>H but only up to an av. total excretion of 21%. The slow excretion is not assoc. with slow absorption from the intestine since the rate is not increased after intravenous injection. The slow excretion is believed to be due to a limitation in the capacity to synthesize phenacetic acid even though an exogenous supply of glycine is available. The excretion of "extra" hippuric acid after BzONa ingestion with or without exogenous glycine is usually complete after 24 hrs. but under similar conditions the excretion of "extra" phenacetic acid is frequently prolonged for a period of several days. Twenty-two references. A. P. L.

The effect of  $p_{H_2}$  on carbohydrate changes in isolated anaerobic frog muscle. Margaret Kerly and Ethel Ronzoni. *J. Biol. Chem.* 103, 161-73(1933).—"At an alk. reaction lactic acid increase approx. balances carbohydrate decrease and there is only a small increase in hexosemonophosphate. As the reaction is made progressively more acid, lactic acid formation becomes less while hexosemonophosphate formation increases, the sum

of the 2 about balancing the loss in total carbohydrate. During anaerobiosis at an alk. or neutral reaction the formation of lower carbohydrates is very small. At  $p_{H_2}$  6 considerable quantities both of glucose and of intermediary carbohydrate are formed. The latter is alc.-sol., has an alc.-insol. Ba salt, is reducing but non-fermentable and on hydrolysis forms fermentable sugar." A method is described for the estn. of total carbohydrate, sol. carbohydrate, hexosephosphate and lactic acid on a single muscle sample. The disappearance of hexosephosphate from intact frog muscle. Ethel Ronzoni and Margaret Kerly. *Ibid.* 175-81.—"Muscles kept anaerobically at  $p_{H_2}$  6 form in 2 1/2 hrs. 70-80 mg. % of hexosephosphate (as hexose), the phosphocreatine is almost completely hydrolyzed and approx. 1/2 of the adenosinetriphosphate is dephosphorylized but no lactic acid is formed. During the subsequent treatment with O<sub>2</sub> all of these substances are restored to their normal level accompanied by an acceleration in the rate of O<sub>2</sub> consumption above that of normal muscles. This bears no direct relationship to the loss of hexosephosphate. The time at which the rate of oxidation approaches the normal rate approx. coincides with the complete restitution of creatinephosphate. On the other hand when placed in N<sub>2</sub> at  $p_{H_2}$  9, while lactic acid production is resumed, it proceeds at the normal rate for anaerobic muscles. Hexosephosphate shows but little decrease; the breakdown of phosphocreatine is slowed but there is no restitution; neither is there a restitution of adenosinetriphosphate."

A. P. Lothrop

The calorogenic action of glycine. Helen G. Lewis and James M. Luck. *J. Biol. Chem.* 103, 227-33(1933).—The increase in metabolism induced by low concns. of subcutaneously administered glycine to fasting rats is equal to that induced by oral ingestion but in higher concns. it is considerably less and it exerts no calorogenic action at 2 g. per kg. of body wt. and above. Glycine is markedly toxic to rats in doses of 2 g. per kg. or more. For amts. not exceeding 0.55 g. per kg. (1.5 millimols.) the increase in metabolism after oral ingestion of glycine is directly proportional to the quantity given, is quickly produced and of short duration. It is clear that various factors are involved which do not permit a simple hypothesis to explain the specific dynamic action of glycine (or any other amino acid).

A. P. Lothrop

Is *d*-glucose absorbed from the stomach of the dog? Stephen J. Maddock, Harry C. Trimble and Benjamin W. Carey, Jr. *J. Biol. Chem.* 103, 285-94(1933); cf. *C. A.* 27, 2480.—Absorption of *d*-glucose in significant quantities from the stomach of the dog does not take place. In expts. in which the pylorus was blocked from the outside thus avoiding the complications of fistulas or of general anesthesia 99.3 ± 1.2% of ingested glucose (5-47 g.) was recovered, the concn. of the solns. varying between 2.8 and 38%. Changes in the sugar content of the small veins of the dog stomach before and for several hrs. after the introduction of glucose into the stomach with ligated pylorus were slight and irregular and not definitely in excess of the probable exptl. error. The activity of the pylorus in preventing or promoting outflow of liquid may be responsible for the irregularities in measurement of absorption rates and has an important bearing in tolerance tests, particularly in the production of variations in the shape of the early portions of blood-sugar curves. Twenty-five references.

A. P. Lothrop

The influence of nervous stimulation on absorption from the intestine, the humoral theory of nervous action. Ernst Gellhorn and David Northup. *Am. J. Physiol.* 106, 283-90(1933).—In a frog prepn. in which the intestine is perfused with isotonic glucose and the blood vessels supplying the intestine with Ringer soln. and in which the perfusion rate is kept const., the absorption of glucose is regularly altered by stimulation of the autonomic nerves. Similarly glucose absorption is altered by the administration of acetylcholine and adrenaline.

J. F. Lyman

Metabolic studies in partially hypophysectomized dogs. R. G. Dagg and A. G. Eaton. *Am. J. Physiol.* 106,

299 308(1933).—Two dogs, portions of whose pituitaries had been removed, showed decreases of 5.4 and 22.0%, resp., in basal metabolism. The specific dynamic action of beef heart was slightly above normal in the operated animals; their tolerance to insulin was increased and their glucose tolerance decreased. J. F. Lyman

The potassium-calcium antagonism in regard to absorption from the intestine. Ernst Gellhorn and Arthur Skupa. *Am. J. Physiol.* 106, 318 22(1933).—In the absence of both K and Ca the permeability of the intestine to glucose increases reversibly. Slight changes in the concn. of KCl and CaCl<sub>2</sub> in Ringer soln. with which the intestinal blood vessels are perfused lead to changes in the permeability of the intestine wall to glucose. The absorption of glucose is increased by K and decreased by Ca. J. F. L.

Choline esters in tissue extracts. H. C. Chang and J. H. Gaddum. *J. Physiol.* 79, 255 85(1933).—An unidentified substance occurs in some tissues which produces an effect on the isolated frog heart superficially similar to that of acetylcholine. Acetylcholine is undoubtedly present in most of the tissues but the amounts are less than 4  $\gamma$  per g. of tissue except in human placenta where 28  $\gamma$  per g. was found. J. F. Lyman

The control of the insulin output of the pancreas. T. Kosaka. *J. Physiol.* 79, 416 22(1933).—Infusion of a 5% glucose soln. into the pancreatic blood stream of a decapitated cat is followed by a more rapid decline in arterial blood sugar than occurs when similar injections are made into the general circulation. The pancreas responds promptly to a high sugar content of its arterial blood by a liberation of insulin. J. F. Lyman

The influence of the gall bladder, Oddi's muscle and the duodenum upon the outflow of bile. I. Injection of visceral nerve poisons and pituitrin. Konan Shi. *Japan. J. Gastroenterol.* 5, 19 25(1933). Intravenous injection of pilocarpine increases the internal pressure of the gall bladder and the excretion of bile. Atropine gives the opposite effects. Adrenaline gives a temporary reaction like atropine, and pituitrin acts slightly like pilocarpine. II. Observations made after the injection of some substances into the duodenum. *Ibid.* 26-30.—The injection of milk or peptone into the duodenum of a dog increases the outflow of bile as a result of increasing the pressure of the bile and decreasing the tension of Oddi's muscle. Under the same conditions a MgSO<sub>4</sub> soln. increases the bile flow as a result of a depression of tension of Oddi's muscle and of the duodenum. C. M. McCay

Factors causing variation in the hemoglobin level with age in the first year of life. Helen M. M. Mackay. *Arch. Disease Childhood* 8, 251-44(1933).—The rapid decrease in the hemoglobin content of the blood during the 1st week of life is assocd. with a decrease in the no. of erythrocytes, which continues until the 3rd month. The Fe derived from the destruction of the erythrocytes is stored in the liver and spleen and is utilized during the period of rising hemoglobin level, from the 3rd to the 6th month. As the store becomes depleted, the hemoglobin content drops slowly until the end of the 1st yr. when the ingestion of mixed diets augments the Fe intake. E. R. Main

A study of the total and ultrafilterable calcium and the acid-soluble phosphate content of the blood serum of four hundred and twenty-two healthy children. Marion S. Needels and Carl M. Marberg. *J. Lab. Clin. Med.* 18, 1227 34(1933). There appears to be no correlation between the incidence of dental caries and the total Ca, ultrafilterable Ca or total acid-sol. phosphate contents of the serum of children 10 17 yrs. of age. The total Ca content of the serum is lower in the spring than in the fall. When 1 pint of orange juice and the juice of 1 lemon are included in the daily diet, the total Ca content of the serum of the boys shows no seasonal variations while that of the girls shows indefinite variations. The acid-sol. phosphate content is not subject to seasonal variations but tends to decrease as the age increases. Modifications are described for the methods of Moritz

(C. A. 20, 1099) and Greenberg (C. A. 24, 1403) for the detn. of ultrafilterable Ca. E. R. Main

A study of the red blood cell count and hemoglobin in the adolescent male. S. Milton Goldhamer and Agnes I. Fritzell. *J. Lab. Clin. Med.* 19, 172-7(1933).—The no. of erythrocytes present in the blood of boys 12-17 yrs. of age ranges from 3.28 to 5.87 millions per cu. mm. with an av. of 4.718 million. The hemoglobin content is 9.80-13.58 g. per 100 cc. with an av. of 11.55 g. The av. hemoglobin coeff. is 12.35 g. per 100 cc. and the av. color index is 0.87. E. R. Main

The physiology of insulin. Geo. H. Tuttle. *Lancet* 1933, II, 687-90.—A review of the evidence for the existence of cellular insulins and a theoretical discussion of their physiol. functions and relation to pancreatic insulin. E. R. Main

Chemical organization in the living cell. Gowland Hopkins. *Lancet* 1933, II, 573-5.—An address. E. R. Main

Spinach and gastric secretion. J. Oviedo Bustos. *Arch. Argent. enfermedades ap. digest. nutrición* 8, No. 4 (1933); *Rev. sudamericana endocrinol. inmunol. quimioterapia* 16, 743-4.—Spinach and a decoction from fresh leaves produce an abundant secretion of gastric juice. A. E. Meyer

Extracts from muscles and organs in medicine. C. Mallardo. *Il Morgagni* 75, No. 6(1933); *Rev. sudamericana endocrinol. inmunol. quimioterapia* 16, 760.—Muscle and organ exts. have a different method of hypotensor action and different applications. It is supposed that the former contain adenyolphosphoric acid, the latter choline or a related compd. A. E. Meyer

The hypotensor action of muscle extracts. G. Lanza. *Il Morgagni* 75, No. 18(1933); *Rev. sudamericana endocrinol. inmunol. quimioterapia* 16, 750-60.—Muscle exts. have a pronounced hypotensor action, which is especially conspicuous in hypertension. A. E. Meyer

Pigments in bile obtained by duodenal tube. M. Royer. *Presse méd.* 41, 74-6(1933).—The bilirubin and urobilin contents in bile A and B have been studied in patients with and without cholecystitis. As H<sub>2</sub>O is absorbed from the bile B through the mucosa, an increase of both pigments is observed. The ratio of the relative increase of bilirubin: relative increase of urobilin varies from 1.14 to 5.0 in persons free from cholecystitis. In cholecystitis, urobilin can be formed from bilirubin by the action of microorganisms; the ratio may vary from 0.85 to 0.37. A. E. Meyer

Hypercrinemia (increase of hormones in the blood) and renal retention. M. Loeper, P. Soulié and F. P. Merklen. *Presse méd.* 41, 153-5(1933) A. E. M.

## G—PATHOLOGY

### IF. GIDEON WRLES

Active immunization of human beings with tetanus toxoid. Edith M. Lincoln and Charles K. Greenwald. *Proc. Soc. Exptl. Biol. Med.* 30, 1241 3(1933).—At weekly intervals 3 intramuscular injections of tetanus toxoid, made by treating toxin with 0.4% formalin and incubating at 38° for 10 days, were given to 5 adults and 13 children; tetanus antitoxin appeared in the blood and remained for at least 3 years. C. Y. Bailey

The relation of amino acid nitrogen to the Wassermann reaction. George Brewer. *Am. J. Syphilis* 17, 221-7 (1933).—In 41 controls, the mean ratio of amino acid N in the blood to amino acid N in the cerebrospinal fluid was 0.260 (0.163-0.431); in 14 neurosyphilitics, this ratio was 0.261 (0.171-0.335). No evidence was found to relate amino acid N to the Wassermann reaction. B. C. Brunstetter

The spinal-fluid sugar and chlorides in neurosyphilis. Geo. Brewer. *Am. J. Syphilis* 17, 382-6(1933).—In 86 controls, the mean ratio of cerebrospinal fluid (C. S. F.) sugar to blood sugar was 0.647, while the ratio of C. S. F. chlorides to blood chlorides was 1.48. The chloride ratio is significantly decreased in neurosyphilis only

when severe meningeal irritation or damage occurs; in 5 cases of general paresis the av. ratio was 1.36. The sugar ratio which showed considerable individual variation tended to decrease with increasing meningeal damage; for the above paresis cases the av. ratio was 0.519.

B. C. Brunstetter

**The relation of lipoids in inflamed skin.** Wilhelm Milbradt. *Arch. Dermatol. Syphilis* 168, 429-37 (1933).—Rabbit skin was inflamed by 3 methods: (1) chemically, by the application of croton oil or mustard oil for 24 hrs.; (2) by ultra-violet radiation; and (3) by infra-red radiation. After 1, there was a rise in cholesterol (C), phosphatides (P) and in the ratio of phosphatides to cholesterol (lipocytic index, or L. I.). After 2, there was a decrease in C, with increase in P and L. I. After 3, there were decreases in C, P and L. I. The water content of the skin increases in all forms of skin irritation.

B. C. Brunstetter

**Urinary proteose. Allergic dermatoses and the eczema-asthma-hay fever complex.** Frank E. Cormia. *Arch. Dermatol. Syphilol.* 27, 745-50 (1933).—Proteose, present in normal urine to the extent of 25 mg. per 100 cc., increases in various allergic conditions to 100 mg. per 100 cc.

B. C. Brunstetter

**The morbid anatomy and histology of asbestosis.** S. Roodhouse Gloyne. *Tubercle* 14, 445-51, 493-7 (1933).—The asbestosis lung shows particles of 5 different kinds: (a) C pigment common to all town dwellers; (b) amorphous brown pigment, presumably blood; (c) sharp jagged particles, probably carbonaceous; (d) the asbestos fiber; (e) the asbestosis body. The asbestos fibers can also be readily found in the upper respiratory tract of the workers. *Ibid.* 550-8.—The asbestosis body is a regular concomitant of the disease, but structures closely resembling it are found in other pneumoconioses. In case of doubt the strong yellow pigment should be dissolved with strong  $H_2SO_4$ . The central asbestos fiber thus displayed is usually different from the particles seen in the pseudo-asbestosis bodies.

H. J. Corper

**The galactose test for liver cirrhosis.** Eugen Hermann. *Wiener klin. Wochschr.* 41, 1230-1 (1933).—The test (*Wiener med. Wochschr.* 1906) consists in giving 40 g. of galactose at 6 A. M. Galactose excretion by the kidneys in the next 4 hrs. is detd. Although cases of liver cirrhosis are supposed to excrete less than 3 g. H. found much larger amts. excreted by many such cases and he concludes the method is without value in diagnosis.

D. B. Dill

**Aptitude of various species of animals to ketonuria and ammoniuria.** H. Trimbach. *Compt. rend.* 197, 708-9 (1933). The relative amts. of the different ketone bodies and the  $NH_3$  in the urine of the common exptl. animals on the same diet vary greatly with the species. Exptl. data are given.

L. E. Gilson

**Histological and chemical modifications in argyria.** L. Langeron, A. Delattre and M. Paget. *Compt. rend. soc. biol.* 114, 132-3 (1933).—Ag deposits in the tissues of a person who had taken collargol daily for a long period are described.

L. E. Gilson

**Presence of hemolysins in extracts of intestinal parasites of the dog (*Ancylostoma caninum* and *Toxocara canis*).** Walter O. Cruz. *Compt. rend. soc. biol.* 114, 139-41 (1933).—The parasites contain a heat-resistant substance having a weak hemolytic action.

L. E. G.

**The thermal amplitude of anti-typhus serums and the standardization of Widal's reaction.** L. Hirsfeld and R. Amzel. *Compt. rend. soc. biol.* 114, 201-2 (1933).

L. E. Gilson

**Urea content of the blood serum in experimental deuteropathic amyotrophy.** C. I. Parhon, I. Ornstein and I. Lucinescu. *Compt. rend. soc. biol.* 114, 325-7 (1933).

In dogs resection of the nerves of the brachial plexus caused little change in blood urea the first week following, but during the next 2-4 weeks, as wasting of the affected muscles progressed, the blood urea was in most cases considerably above normal.

L. E. Gilson

**Pancreatic diabetes and the adrenal glands.** J. T.

Lewis and E. S. Turcatti. *Compt. rend. soc. biol.* 114, 403-6 (1933).—Removal of the adrenals has little effect on the diabetes and glucemia produced in dogs by pancreatectomy.

L. E. Gilson

**Glucemia after clyma.** Enrico Tagliaferro. *Minerva med.* 1933, 11, 424-8.—Fasting patients (18 non-diabetics, 2 diabetics, 2 hepatic cases) were studied for normal glucemia (colorimetric method of Crecelius Seifert) and then received 40 cc. cold water by clyma; 2 hrs. later the blood was tested for glucemia again. On the 2 subsequent days the test was repeated first with 40 cc. physiol. saline and then with 40 cc. 40% glucose soln. All non-diabetics showed hypoglucemia (min. 5 mg./100 cc., max. 40 mg./100 cc.) after rectal introduction of liquid, even of the sugar soln. The diabetics showed a more marked hypoglucemia while in the hepatic cases there was hardly any change over the normal. A physiol. explanation is offered for these changes.

H. L. G.

**Nature of the bactericidal substance in the urine of patients receiving a ketogenic diet.** Albert T. Fuller. *Biochem. J.* 27, 976-82 (1933).—In the treatment of pyelitis, providing a sufficiently intense ketosis can be obtained, the bacteria and pus often disappear from the urine within a few days. The principal factor inhibiting the growth of bacteria is  $L$ - $\beta$ -hydroxybutyric acid.

Benjamin Harrow

**Calcium, potassium and inorganic phosphate contents of the serum in cancer patients. Effect of Röntgen-ray radiation on the level of these substances in the blood serum of cancer patients.** Henry Jackson, Jr. and F. H. L. Taylor. *Am. J. Cancer* 19, 379-88 (1933).—Normal values for the Ca content of the blood were found in 52% of the cases of cancer exant. and values lower than normal in 48%. The lowered concn. of Ca appeared to be a result of the disturbed nutrition assocd. with advanced carcinoma. The K and inorg. phosphate concns. were normal. After x-ray therapy the K, Ca and P contents and the ratios, Ca:P and K:P, were unaltered.

E. R. Main

**Tar cancer in mice maintained on diets supplemented with fresh liver.** A. F. Watson. *Am. J. Cancer* 19, 380-95 (1933).—An increased carcinogenic response is observed in tar-treated mice when fresh liver is included in the diet. Benign warts and epitheliomata appear earlier and in greater nos. and the period of induction of malignancy is not reduced.

E. R. Main

**The immunologic properties of casein.** Marie Lucie Demanez. *Arch. intern. méd. exptl.* 8, 233-54 (1933); cf. C. A. 27, 3726.—The caseins derived from cow, goat and sheep milks appear to be biologically identical, but distinct from those of human and horse milk. The precipitin serums obtained by injections of beef, sheep and horse serums into rabbits do not react with the corresponding caseins, although human antiserum shows a definite reaction with casein from human milk. Anticasein serums show only a slight reaction with the serums of the corresponding species. The fraction of casein sol. in 70% EtOH and the alc.-insol. residue cannot be distinguished by biol. methods. The antigenic properties of casein are not modified by exposure to temps. of 50° or 100°, and are only slightly modified by iodation.

E. R. Main

**Studies concerning the specificity of fibrinogen.** Marie Lucie Demanez. *Arch. intern. méd. exptl.* 8, 255-67 (1933).—Immune serums produced by injections of fibrinogens into rabbits react definitely with the corresponding antigens, but only to a slight extent with fibrinogens from other species. The lack of species specificity is possibly explained by the fact that fibrinogen has the same physiol. function in all species.

E. R. Main

**Investigations on the anemia of experimental rat cancer.** Istvan Sümegi. *Beitr. path. Anat.* 92, 210-21 (1933).—The lipoidal material obtained by extn. of rat tumor tissue with  $Et_2O$ , injected subcutaneously into rats, produces an anemia characterized by a high color index and marked lymphocytosis. The higher fatty acids obtained by sapon. of the  $Et_2O$ -sol. ext. cause similar symptoms but no lymphocytosis. The

lower fatty acids cause severe or fatal cachexia but do not affect the blood picture. The glycerol fraction causes an anemia with no increase in the color index. Other fractions of tumor tissue, protein, carbohydrate, lecithins and esters of higher alcs. produce no symptoms of anemia. Goose fat and the fatty acids obtained from it do not cause anemia, although the glycerol fraction produces effects similar to those produced by the glycerol fraction of tumor fat. The injection of com. glycerol causes an anemia resembling the hemolytic type. Anemia is produced by the injection of fat from human carcinomas, but the effect is less marked.

E. R. Main

Glucose tolerance curves in pulmonary tuberculosis. Observations upon 100 cases. David W. Kramer. *J. Lab. Clin. Med.* 18, 1212-20(1933).—Patients with pulmonary tuberculosis appear to have an increased tolerance for glucose. High or diabetic types of glucose tolerance curves were found in 17% of the patients examined, low curves in 24% and normal curves in 59%.

E. R. Main

The possibility of a pressor principle in the blood of persons with hypertension. An experimental study. Albert H. Elliot and Franklin R. Nuzum. *J. Lab. Clin. Med.* 18, 1255-60(1933).—Intravenous injections of large amts. of fresh citrated blood from normal persons into rabbits produce in most instances a marked transitory rise in blood pressure followed by a prolonged fall. The injection of blood from patients with hypertension produces a higher initial rise. Injections of EtOH, Et<sub>2</sub>O and H<sub>2</sub>O-sol. fractions of blood cause a transitory fall.

E. R. Main

Blood catalase in heart disease. I. Preliminary report. James C. Healy and Henry Baker. *J. Lab. Clin. Med.* 19, 133-41(1933).—The blood catalase content appears to be markedly increased in rheumatic heart disease and scarlatinal endocarditis and normal in cases of scarlet fever and diphtheria which show no heart damage. The technic for the detn. of catalase by the action of an alk. soln. of H<sub>2</sub>O<sub>2</sub> upon laked blood is described.

E. R. Main

The relationship between the antianemia principles in stomach and liver. John F. Wilkinson and Louis Klein. *Lancet* 1933, II, 629-33.—Further evidence is presented for the enzymic nature of hemopoietin, the antianemic principle isolated from hog stomach (*C. A.* 27, 3980). Upon incubation of thermolabile, active concentrates of hemopoietin with beef muscle, a heat-resistant hemopoietically active substance is synthesized, which is similar to or identical with the active principle of liver. The active substance appears to be synthesized *in vivo* by the action of hemopoietin on the proteins of food and stored in the liver. Hemopoietin is present in the normal stomach of man and carnivorous and omnivorous animals, but has not been found in herbivorous animals. The gastric secretions of patients with true pernicious anemia appear to be deficient in this enzyme.

E. R. Main

Carbohydrate metabolism in pruritus and chronic urticarias. J. Gay Prieto and M. González Rey. *Arch. med. cirurg. especialidades* 35, No. 52(1932); *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 846.—Hypoglycemia was found in 10 cases out of 16; the dermatosis is caused by a hepatic dysfunction. It may be relieved by increasing the glycogen reserve in the liver with carbohydrate and insulin.

A. E. Meyer

Glucemia in scarlet fever, measles and varicella. L. Manzoni. *Riv. clin. pediatr.* No. 12(1932); *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 846-7.—The blood sugar is increased during the febrile stage of scarlet fever and measles. No change was found in varicella.

A. E. Meyer

Glucemia in pulmonary tuberculosis. Antonio Dalto. *Semana méd.* (Buenos Aires) 1933, II, 1004-26.

A. E. Meyer

A reducing substance found in chromophilic adenomas, and in the normal anterior pituitary. T. J. Putnam and H. B. Wilcox. *Am. J. Path.* 9, 649-50(1933).

1 A substance reducing methylene blue was demonstrated in the normal anterior pituitary and its ext.; and in larger amts. in a chromophile adenoma. None was found in a chromophobe adenoma. It does not reduce Benedict's soln. or give the other common tests for sugar.

F. B. Seibert

Contributions of chemistry to the knowledge of immune processes. M. Heideberger. *Medicine* 12, 279-95 (1933).—A discussion of the meaning of antigen and antibody is followed by a chem. analysis of the interaction between them. Strong evidence is given for the chem. union of antigen or hapten with antibody in multiple proportions which can be expressed in terms of the laws of phys. chemistry. Methods are given for measuring quantitatively the amt. of antibody pptd. by antigen.

F. B. Seibert

Application of optical spectroscopy to analysis of tumor tissue. Winifred R. Mankin. *J. Proc. Roy. Soc. N. S. Wales* 66, 509-15(1932); cf. *C. A.* 26, 2478.—Dried tumor tissue showed the presence of Al, Cr, Cu, Li, Mn, Sr and Zn.

Cornelia T. Snell

Fibrinogen formation in the animal body. Eiichi Hori. *Sei-i-kwai Med. J.* 51, No. 8, 97-111(English Abstract 8-9(1932)).—The fibrinogen (I) content of rabbit blood under various exptl. conditions is detd. by a refractometer. The venous blood contains more I than the arterial. I in the blood, reduced by means of plasmaphoresis or by the injection of the placenta infusion, reaches the normal value in 3-4 hrs. But in a rabbit the liver of which is previously blocked by pelikan, the recovery of I in the blood does not occur even after 4 hrs. By perfusing the livers of normal rabbits with their own defibrinated blood, I is gradually increased in the blood, and reaches the normal value after 3-4 hrs., but by a similar perfusion through the liver previously blocked with pelikan, the formation of I occurs to a slight extent. When defibrinated blood is free from leucocytes, the recovery of fibrinogen by perfusion through the normal liver is slower than when the blood contains leucocytes. The perfusion of the liver with suspension of red blood corpuscles, with or without the serum, causes a delay in fibrinogen formation; at the end of 4 hrs., the amt. is still about 1/2 of the normal value. H. concludes that I must be formed chiefly from the leucocytes by the liver—at least in the rabbit.

S. Tashiro

## H—PHARMACOLOGY

A. N. RICHARDS

Enhanced action of morphine in experimental nephrosis after oral ingestion of magnesium sulfate. Arthur D. Hirschfelder. *Proc. Soc. Exptl. Biol. Med.* 30, 1057-8 (1933). In 8 rabbits, rendered nephrotic by the injection of 10 mg. of HgCl<sub>2</sub>, the plasma Mg was 1.89-2.17 mg. per 100 cc. Two hrs. after the oral administration of 2 g. MgSO<sub>4</sub> per kg. of body wt., the plasma Mg was 6.9-8.98 mg. per 100 cc. and at that time the subcutaneous injection of 30 mg. of morphine sulfate per kg. caused deep narcosis and death of 5 of the exptl. animals. In 4 controls the narcosis was less intense and recovery was complete in 3-4 hrs. Morphine should be administered only with the greatest caution to nephritic patients who have received MgSO<sub>4</sub> as a purgative.

C. V. Bailey

Configuration and anesthetic activity of aromatic alcohols. P. K. Knoefel and G. A. Alles. *Proc. Soc. Exptl. Biol. Med.* 30, 1070-7(1933).—Aq. solns. of aromatic alcs. applied locally were tested by the duration of anesthesia of the rabbit cornea and by the time required for the production of sensory block of the frog sciatic nerve. Increase in the length of the straight C chain and (or) the transformation to secondary and tertiary alc. increased the anesthetic activity.

C. V. Bailey

A comparative pharmacologic study of adsorption, distribution and excretion of injectable bismuth preparations. Marvin R. Thompson, C. I. Ichniowski and Bertrau S. Roberts. *Am. J. Syphilis* 17, 205-20(1933).—Five com. BI preps. were studied. It was found that



the greater the rate of absorption of Bi, the greater the toxicity. After toxic doses, the greatest tissue destruction appeared to occur in the liver and kidneys. B. C. B.

The toxic effect of arsenobenzene preparations on the liver. E. M. Lewin. *Arch. Dermatol. Syphilis* 168, 7-12(1933).—Liver cells respond to the toxic action of arsenophenamine by the increased production and secretion of bile; the cells absorb more bilirubin from the blood.

B. C. Brunstetter

Sensitivity to erythema and mineral economy. Gustav Papcke. *Arch. Dermatol. Syphilis* 168, 476-9(1933).—Peroral administration of an isoionic mixt. of Ca, K and Mg salts decreased the erythemic response of the skin to ultra-violet light radiation.

B. C. B.

The hydrogen-ion concentration of the topical preparations commonly employed in dermatology. Oscar L. Levin and Seymour H. Silvers. *Arch. Dermatol. Syphilis* 28, 149-52(1933).—With the quinhydrone electrode most local remedies were found to be acid or neutral in reaction. The reaction of solns. of Al acetate N. F. and solns. of boric acid is about that of the skin surface; their excellent buffer action makes them valuable in the treatment for acute and subacute inflammatory skin conditions and particularly for the exudative and vesicular dermatoses.

B. C. Brunstetter

Chemotherapeutic investigation. D. Binz. *Pharm. Monatsh.* 14, 173-4(1933).—A historical review.

H. M. Burlage

The active principle of onions (*Allium sativum*) which lowers blood sugar per os. I. Per Laland and Odd Wåge Havrevold. *Z. physiol. Chem.* 221, 180-96(1933).—Oral administration of various exts. of onions to rabbits and pancreatized dogs causes a lowering of blood sugar. The active principle is volatile with steam and sol. in  $H_2O$ . In addn. to the hypoglucemic substance there is present also a substance which raises blood sugar. This substance has been isolated but not examd. chemically. The lowest blood-sugar values are obtained after 1-5 hrs. With prolonged control expts. an after-effect has been observed in numerous instances. The various active fractions lose their activity when kept 1-10 days in the ice box, despite addn. of antiseptics. Even with large doses no symptoms of intoxication have been observed. By fractionation in high vacuum and subsequent recryst. a white cryst. substance m. 174° was obtained. The substance is S-free and gives characteristic pptn. and color reactions with most of the alkaloid reagents. S is present in the active fractions. It seems that the simultaneous presence of S and alkaloid is absolutely necessary for physiol. activity, since either one separately is inert. A pericard fraction from potatoes obtained by a modification of Sippola's method causes a lowering of blood sugar both orally and intravenously. The hypoglucemic principle is believed to be widely distributed in the plant kingdom.

A. W. Dox

The pharmacologic importance of furfuryl alcohol and furfural of coffee infusions. G. Joachimoglu and N. Khasuni. *Praktika (Akad. Athenon)* 7, 39-43(1933) (in German).—Furfuryl alc. in amts. of 40-150 mg. and furfural in amts. of 30-60 mg. given per os to human beings are without effect. Daily doses of 1 g. of furfuryl alc. or of furfural are without effect on dogs. Furfural acts 21 times and furfuryl alc. 11 times more powerfully than ethanol upon isolated rabbit intestine. Furfuryl alc. has a narcotic effect on goldfish 21 times that of ethanol. The corresponding figure for furfural is 63. With the limited amts. of these constituents present in coffee infusions no pharmacol. effect should mar enjoyment of this beverage.

Lucien Y. Dyrenforth

Poisoning by *Taxus* leaves. Aufrecht. *Pharm. Ztg.* 78, 1149(1933).—An unusual case of intoxication is cited involving the death of a horse from feeding on leaves of the yew, although it had been originally assumed that the animal succumbed from a dose of strychnine.

W. O. E.

Effect of calcium administration on the toxicity of carbon tetrachloride in mice. Frank Wokes. *Quart. J. Pharm. Pharmacol.* 6, 413-17(1933).—The oral toxicity of  $CCl_4$

for mice has been detd. A mortality of 50% is produced by a dose of approx. 8.75 ml. per kg. in mice on a normal diet contg. 0.4 to 0.5% of Ca. Variation in the Ca content of the diet from 0.2 to 2.0% of Ca produced no significant difference in the susceptibility of the mice to  $CCl_4$ . Oral administration of Ca lactate (0.15 or 0.3 g. of Ca per kg.) caused a decrease in the susceptibility, but failed to secure complete protection, although the dose was considerably higher than that recommended by Lamson, Minot and Robbins from expts. on dogs.

W. O. E.

Variation in the susceptibility of mice to certain anesthetics. J. C. Gage. *Quart. J. Pharm. Pharmacol.* 6, 418-25(1933).—Mice have been injected with a series of doses of 4 drugs used as basal narcotics: paraldehyde, avertin, nembutal and pemocton. Paraldehyde and avertin were given by rectum, nembutal and pemocton intravenously. Curves have been constructed for each drug showing the percentages of mice narcotized and killed when a series of doses is injected; the ratio of the 50% narcotic dose to the 50% toxic dose has also been calcd. for each. It is concluded from a consideration of the curves and the narcotic-toxic ratios that, for use as basal narcotics on mice, nembutal, pemocton and avertin are as safe as paraldehyde.

W. O. E.

Action of metallic salts on tissue cultures in vitro. J. Verne and C. Sannic. *Bull. soc. chim. biol.* 15, 1022-43(1933).—See C. A. 27, 3754.

L. E. Gilson

The lipoids of the parathyroid cells in certain experimental conditions, with particular reference to variations in the endocrine equilibrium. C. I. Parhon and Eugénie Trofimov. *Compt. rend. soc. biol.* 114, 65-7(1933).—The effects of thyroxine, pituitary hormones, insulin, Vigantol and KCl on the quantity and appearance of the lipid deposits in the parathyroid cells of rabbits are described.

L. E. Gilson

Extract of anterior hypophysis and adrenaline and morphine hyperglucemia. B. A. Housay and Elena Di Benedetto. *Compt. rend. soc. biol.* 114, 82-3(1933).—The hyperglucemic action of adrenaline or morphine is greater in dogs already made hyperglucemic by repeated large daily doses of ext. of anterior hypophysis than in untreated controls.

L. E. Gilson

The fixation of hydrocyanic acid by erythrocytes containing methemoglobin. E. Hug and A. D. Marenzi. *Compt. rend. soc. biol.* 114, 84-6(1933); cf. C. A. 27, 2216.—Dog corpuscles were treated with  $NaNO_2$ , phenylhydrazine or other reagents to convert the hemoglobin to methemoglobin, washed with physiol. NaCl soln., and treated with HCN soln. The methemoglobin prep. by  $NaNO_2$  fixed more than 1 but less than 2 eqvs. of HCN, that formed by the other reagents less than 1 equiv.

Mechanism of the antidotal action of sodium nitrite in hydrocyanic acid intoxication. *Ibid.* 86-7.—Dogs were used. The  $NaNO_2$  forms methemoglobin which fixes the HCN. There is some evidence that the HCN is then slowly converted to a thiocyanate and excreted in the urine. Combined action of sodium nitrite and sodium thiosulfate in the treatment of hydrocyanic intoxication in rabbits. E. Hug. *Ibid.* 87-9; cf. C. A. 27, 135.—Rabbits survived several times the lethal dose of HCN when it was followed by 0.02 g./kg.  $NaNO_2$ , then 1 g./kg.  $Na_2S_2O_3$ , given intravenously.

L. E. Gilson

Insulin and the protein sugar of the blood. G. Carrière and P. Martin. *Compt. rend. soc. biol.* 114, 135-6(1933).—Insulin has no effect on the total protein sugar of the blood. Protein sugar and serum proteins during insulin hypoglycemia in normal and diabetic cases. G. Carrière, P. Martin and Carbonnel. *Ibid.* 205-6.—Insulin does not affect the protein sugar of the plasma or the proteins of the serum.

L. E. Gilson

Changes in the blood of dogs caused by the venom of *Naja tripudians*. J. Vellard and M. Miguelote-Vianna. *Compt. rend. soc. biol.* 114, 143-4(1933).—The venom has no action on the blood proteins. It acts on the phosphatides, causing a decrease in the ability of the blood to coagulate. It causes a transient decrease in the natural hemolytic power of the serum.

L. E. G.

**Phlorhizin concentration of the plasma during phlorhizin diabetes in dogs with or without kidneys.** Albert Lambrechts. *Compt. rend. soc. biol.* 114, 146-7(1933); cf. C. A. 27, 5358.—When phlorhizin is injected intravenously in the dog 80% of it disappears from the blood in 15 min. A trace can be detected after 4 hrs. Ligating the renal pedicles to exclude the kidneys from the circulation does not change the above results. L. E. Gilson

**Chemotherapy of spontaneous and induced leptospirosis in white mice.** U. Thiry. *Compt. rend. soc. biol.* 114, 172-4(1933).—The effects of some compds. of Bi, As, Sb and Au were detd. L. E. Gilson

**Caryokinetic action of arsenic compounds on grafted tumors.** A. P. Dustin and C. Grégoire. *Compt. rend. soc. biol.* 114, 195-6(1933).—In mice the subcutaneous injection of 30 mg. Na cacodylate enormously increased the no. of cell mitoses in grafted Crocker type sarcoma. L. E. Gilson

**Choleretic action of marrubic acid.** Fernand Mercier and C. Rizzo. *Compt. rend. soc. biol.* 114, 263-4(1933).—Marrubic acid and Na marrubinate were prepd. from marrubium. Na marrubinate, given parenterally, had a marked cholagog effect on dogs. L. E. Gilson

**Effect of urethan anesthesia on the sensitivity of the respiratory center to direct chemical excitants.** André Le Grand and Norbet Herbaux. *Compt. rend. soc. biol.* 114, 271-2(1933).—In dogs, cats, rats and rabbits urethan anesthesia renders the respiratory center much less responsive to the direct application of NaCl. L. E. Gilson

**Ability of glutathione to penetrate the interior of the erythrocyte.** G. Litareczek and G. T. Dinischiotu. *Compt. rend. soc. biol.* 114, 285-7(1933); cf. C. A. 27, 2995. When 0.1% glutathione was added to whole blood *in vitro* at 37° most of it was fixed within the corpuscles at the end of 2 hrs. None of it could be recovered from the corpuscles by washing with physiol. salt soln. L. E. Gilson

**Influence of injections of potassium chloride and calcium chloride on the potassium-calcium ratio of dog blood.** L. Balilif and I. Ghercovici. *Compt. rend. soc. biol.* 114, 324-5(1933). L. E. Gilson

**Action of diiodotyrosine and inorganic iodine on the thyroids of guinea pigs given injections of the hormone thyreostimulin of the anterior hypophysis.** A. Wladyslaw Elmer. *Compt. rend. soc. biol.* 114, 348-50(1933).—Histological. L. E. G.

**Manometric study of cerebral circulation. Analysis of the vasoconstrictor action of adrenaline.** G. Ungur and M. Eek. *Compt. rend. soc. biol.* 114, 459-60(1933); cf. C. A. 27, 3524.—Action of adrenaline on the cerebral arteries of animals after enervation of the carotid sinus. G. Ungur. *Ibid.* 460-1. L. E. Gilson

**Hypotensive and vasodilator action of hordenine.** Raymond-Hamet. *Compt. rend. soc. biol.* 114, 476-8(1933). L. E. Gilson

**Hyperthermia-producing action of sodium picramate.** H. Casier. *Compt. rend. soc. biol.* 114, 551-5(1933). In pigeons and dogs picramic acid, 40-90 mg./kg. given intravenously, caused a marked hyperthermia. Its action is similar to that of dinitrophenol or dinitronaphthol but it is less toxic. L. E. Gilson

**Influence of the autonomic nervous system on the toxicity of lanadigloside.** Edgard Zunz and Gabriel Sanchez de la Cuesta. *Compt. rend. soc. biol.* 114, 558-60(1933). The effect of lanadigloside (lanadigin of Mannich, Mohs and Mauss, C. A. 25, 377) on cats under various conditions was studied. L. E. Gilson

**Anticoagulant action of germanin and moranyl *in vivo*.** Edgard Zunz, Gabriel Sanchez de la Cuesta and Olga Vesselsky. *Compt. rend. soc. biol.* 114, 560-2(1933).—In rabbits 75-200 mg. of germanin or moranyl given intravenously renders the blood non-coagulable for at least 45 min. after the injection by inhibiting the formation or action, or both, of thrombin. The larger doses cause some decrease in blood fibrinogen, platelets and alkali reserve. L. E. Gilson

**Pharmacodynamic properties of a new derivative of sparteine, sparteine ethylphenylbarbiturate.** Fernand

<sup>1</sup> Mercier. *Compt. rend. soc. biol.* 114, 615-17(1933).—The compd. has a marked neurodepressive effect, each constituent complementing the effect of the other. It acts on both the central and the vegetative nervous systems. L. E. Gilson

**Comparative action of strychnine and brucine on the fatigue of [frog] muscle.** M. Chambon and C. Salussola. *Compt. rend. soc. biol.* 114, 633-5(1933); cf. C. A. 27, 1048. L. E. Gilson

<sup>2</sup> **Toxicity of rivanol injected intravenously in the dog or rabbit.** M. Levrat, F. Morelon and Ollier. *Compt. rend. soc. biol.* 114, 643-5(1933). Rivanol is diethoxy-6,9-diaminoacridine. It acts like tryptaflavine but it is less toxic. L. E. Gilson

**Mechanism of the action of calcium and potassium salts injected into the cerebral ventricles.** L. Stern, J. A. Rossine and G. J. Chvoles. *Compt. rend. soc. biol.* 114, 674-7(1933); cf. C. A. 27, 2216.—The direct action of Ca on the vegetative nervous centers of the brain consists of an excitation of the parasympathetic centers (vasodilator and cardiac inhibitor) but a possible inhibitor effect on the sympathetic centers is not excluded. K excites the vasoconstrictor and cardiac centers and probably indirectly weakens the tonus of the parasympathetic centers. Expts. on dogs are described. L. E. G.

<sup>4</sup> **Action of diethylaminomethyl-3-benzodioxan (Fournéau 883) and coryanthine on the fever provoked by chemical agents.** J. Sivadjan. *Compt. rend. soc. biol.* 114, 848-70(1933). Both compds. antagonize the hyperthermia-producing action of  $\beta$ -tetrahydronaphthylamine or 2,4-dinitrophenol in rabbits or guinea pigs. L. E. Gilson

<sup>5</sup> **Vascular effects of the Peruvian drug called "chuchua." Raymond-Hamet and Colas.** *Compt. rend. soc. biol.* 114, 914-16(1933).—The drug has a powerful vasodilator action. Its botanical source is uncertain. An alkaloid is present. L. E. Gilson

**Action of methyl violet, uranium nitrate and sodium citrate on the formation of cerebrospinal fluid.** C. Massaut. *Compt. rend. soc. biol.* 114, 921-2(1933).—When injected intravenously in dogs none of the above compds. altered the compn. of the spinal fluid. L. E. Gilson

<sup>6</sup> **Acute response of guinea pigs to vapors of some new commercial organic compounds. VII. Dichloroethyl ether.** H. H. Schrenk, F. A. Patty and W. P. Yant. *U. S. Pub Health Repts.* 48, 1389-98(1933); cf. C. A. 24, 5071. The physiol. action, symptoms and pathol. findings are given. It was not possible at room temp. to attain a concn. that would kill in a short time. Exposure to 0.10% for 30-60 min. was dangerous to the life of guinea pigs; 0.01-0.02% is the max. amt. for 60 min. without serious disturbance; and 0.0035 is the max. amt. for several hrs. exposure without serious disturbance. This substance possesses definite warning properties of odor, as well as eye, nose and throat irritation in concns. that are dangerous in an exposure of 1 hr. or less. Concns. below 0.01%, dangerous for exposure periods of several hrs., possess an easily noticeable, though not especially objectionable, odor and little or no irritation. J. A. K.

<sup>8</sup> **Treatment of bis( $\beta$ -dichlorodiethyl)sulfide (mustard gas) burns with paraffin preparations.** Muntsch. *Gasschutz u. Luftschutz* 3, 269(1933).—M. comments on an article by Drugow (*Wojennomedizinski Zhur.* 2, 12-25(1931)) describing successful expts. on treating mustard gas burns with paraffin packing. M. states that the method is not new and was described by Taylor, *Military Surgeon* 46, 83(1920). A. L. Kibler

<sup>9</sup> **The influence of sinomenin and parasinomenin on the excretion of phosphoric acid in the urine of rabbits, together with a comparison of their influence with that of quinine.** Yoshizo Arakawa. *Folia Pharmacol. Japon.* 16, No. 3, 257-64(Breviaria 21-2)(1933).—The excretion of  $P_2O_5$  in the urine of rabbits after administration of the above drugs was measured by the titration method with uranyl acetate. In doses of 0.05-0.15 g. per kg. no change was noted in quantity or sp. gr., but  $P_2O_5$  excretion increased with the small dose and decreased with the

large one. The influence of sinomenin and parasinomenin on the excretion of sodium chloride in the urine of rabbits, together with a comparison of their influence with that of quinine. *Ibid.* 265-71 (Breviaria 22).—The excretion of NaCl was almost unchanged by the administration of the hydrochloride of the above drugs when given to rabbits in doses of 0.05-0.15 g. per kg. In the largest dose, a slight diminution was observed, quinine giving the greatest effect and sinomenin the least.

G. H. W. Lucas

**Experimental studies on mercury poisoning. III.** The influence of dextrose, calcium chloride and urea on mercury poisoning. Makoto Kuse. *Folia Pharmacol. Japon.* 16, No. 3, 278-91 (Breviaria 23-4) (1933); cf. *C. A.* 27, 3527.—Dextrose injected with novasurol produced a marked diuretic action and appeared to prolong the life of the animals. This protecting effect was exhibited also by CaCl<sub>2</sub> and urea. **IV.** The influence of some organ extracts and hypnotics on mercury poisoning. *Ibid.* 292-308 (Breviaria 24-5).—After novasurol injections in male rabbits, in about 4 hrs. urine flow was suppressed and the water and salt excretion was decreased. When pituitrin was given with novasurol a similar effect was noted. Administration of thyroxine caused a marked diuresis which was present even if it were given with pituitrin and novasurol; the NaCl excretion was much greater. Liver powder, "Leber Riken," caused a marked diuresis with increased NaCl output when given alone or with novasurol. Paraldehyde produced a similar effect. Na phenobarbital caused a fall in water and NaCl excretion, but when given with novasurol a marked diuresis followed with a great increase in NaCl. Pituitrin exerted a protective action in novasurol poisoning even up to 7 days after the administration of the novasurol. This protective action was shown also by paraldehyde, Na barbital and Na phenobarbital.

G. H. W. Lucas

The narcotic reinforcing action of yohimbine, quinine, cinchonine and ergotamine. Shigeo Yamachi. *Folia Pharmacol. Japon.* 16, No. 3, 309-24 (Breviaria 25) (1933).—While yohimbine, quinine, cinchonine and ergotamine in rabbits alone show no hypnotic action, small doses combined with narcotics so increase the narcotic action of such drugs as morphine and chloral that non-effective doses now become effective. This may be due to a sympathetic effect.

G. H. W. L.

The action of opium alkaloids on the blood sugar of rabbits. Holm Gyoku. *Folia Pharmacol. Japon.* 16, No. 3, 337-50 (Breviaria 26-7) (1933). Opium alkaloids 0.02 to 0.05 g. per kg. injected in the ear vein of rabbits increased blood sugar. This increase was more marked with heroin, codeine, morphine and apomorphine than with thebaine, papaverine, narceine and narcotine. Pantopon produced a marked increase. One perhaps must assume that the alkaloids with the phenanthrene nucleus produced a more noticeable effect than those with the isoquinoline nucleus. Thebaine is an exception to this rule; it produced violent convulsions. Its action on blood sugar may be attributed to its peculiar C linkage. The action of pantopon is especially interesting.

G. H. W. Lucas

Some atypical responses of rabbits to insulin. I. T. Zeebwer. *Am. J. Physiol.* 106, 273-82 (1933).—Six out of 40 unselected rabbits showed marked resistance to insulin. After removal of the thyroids 2 very resistant rabbits showed increased sensitiveness to insulin varying from 10 to 20 times, while 4 normal control rabbits showed an increased sensitiveness to insulin of 2.5 to 4.6 fold after thyroidectomy.

J. F. Lyman

The effect of atropine on adrenaline hyperglucemia in rabbits, decerebrated anterior to the pons. M. G. Forster assisted by A. K. Chalmers. *J. Physiol.* 79, 239-48 (1933).—Atropine affects the hyperglucemia which results from injections of adrenaline much in the same way as it does that which follows pontine decerebration or the feeding of sugar.

J. F. Lyman

Insulin and adrenaline. M. W. Goldblatt. *J. Physiol.* 79, 286-300 (1933).—Insulin and adrenaline produce an

increase in liver glycogen in the starving young rabbit. With insulin this increase may or may not be associated with a fall of muscle glycogen. Most frequently there is an increase in total glycogen. With adrenaline, in non-glucosuric doses, the increase in liver glycogen is always associated with a fall in muscle glycogen. The action of insulin is not accompanied by such an increase in blood lactate as would justify the belief that adrenal secretion is the cause of the increase in liver glycogen which always follows such action.

J. F. Lyman

**Studies of the pharmacology of local anesthetics. VI.** Comparison of metycaine with cocaine and procaine on experimental animals. Edward L. Swanson. *J. Lab. Clin. Med.* 19, 120-5 (1933); cf. *C. A.* 24, 5370.—Metycaine,  $\gamma$ -(2-methylpiperidino)-propylbenzoate-HCl, produces less depressing symptoms on the perfused frog heart than cocaine but is more depressant than procaine. The comparative effects on the general circulation and on the peripheral vessels are more like those of procaine than cocaine. The effect on the sensory nerve trunk is  $\frac{2}{3}$  as great as that of procaine and more than 3 times greater than that of cocaine. Its action on smooth muscle is more effective than either.

E. R. Main

**Phytopharmacology of stomach washings in various digestive disorders and pernicious anemia.** David I. Macht and Moses Paulson. *J. Lab. Clin. Med.* 19, 155-65 (1933).—A phytotoxic substance appears to be present in the stomach washings as well as in the serum and spinal fluids of patients with pernicious anemia (cf. *C. A.* 24, 2799). The degree of toxicity is indicated by the phytotoxic index, the ratio of increment in the length of seedlings of *Lupinus albus* grown in media containing the stomach washings to that of normal seedlings. The stomach washings obtained from normal persons and patients with gastric carcinoma and various gastrointestinal disorders (exclusive of pernicious anemia) have a phytotoxic index of 0.86. The washings from cases of true or essential achylia have an index of 0.85, while those from cases of pernicious anemia have an index of 0.50.

E. R. Main

**Methylene blue as an antidote for aniline dye poisoning.** Case report with confirmatory experimental study. John R. Williams and Frank E. Challis. *J. Lab. Clin. Med.* 19, 166-71 (1933).

E. R. Main

**Morphine pentobarbital anesthesia for dog surgery.** M. H. Seevers. *J. Lab. Clin. Med.* 19, 202 (1933).

E. R. Main

**Discussion of the so-called "acidosis-therapy" of malignant tumors.** Anna Goldfeder. *Z. Krebsforsch.* 39, 417-20 (1933).

E. R. Main

**The influence of acidosis-producing chemical preparations upon the growth or disappearance of transplantable tumors.** Anna Goldfeder. *Z. Krebsforsch.* 39, 421-35 (1933).—The injection of CH<sub>3</sub>COOH in combination with NH<sub>4</sub>Cl and CaCl<sub>2</sub> into tumor-bearing rats and mice caused the tumors to become smaller or disappear in 38% of the mice and in 51% of the rats. The injections were most effective if made during the early stages of tumor development. Injections of CH<sub>3</sub>COOH or of I alone were ineffective.

E. R. Main

**The pharmacodynamic action of mineral waters.** Gaston Dastugue. *Bull. sci. pharmacol.* 40, 532-45 (1933).—A review of the experiences by other authors, proving the necessity of the pharmacodynamic study in addition to the phys. and chem. analysis.

A. E. M.

**Ergotamine and quinine in glucemia.** G. De Boins. *L'ospedale maggiore* Dec., 1932; *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 748.—Both alkaloids caused a decrease of blood sugar and inhibit artificial hyperglucemia to a certain degree. However, they do not increase the sugar tolerance and are useless in diabetes.

A. E. Meyer

**Diabetes treatment with insulin in oil.** Marcel Labbé, R. Boulin and Daunois. *Presse méd.* 41, 113-15 (1933).—Two preps. had no effect; one was moderately successful. The method shows many disadvantages.

A. E. M.

**The effect of vagotonin in arterial hypertension.**

Abrami, Santenose and Bernal. *Presse méd.* 41, 329-31 (1933).—Doses of 20-40 mg. vagotonin produce a slowly progressing reduction of the arterial pressure of long duration. It is especially effective in sympatheticotonic hypertension. It is ineffective in normal pressure.

A. E. Meyer  
Insulin in oil. II. Chabanier, C. Lobo-Onell and E. Lelu. *Presse méd.* 41, 377-8 (1933).—The oil soln. of insulin is of advantage only in very grave cases, where a continuous intake of insulin is required. Local reactions are present, but they are not prohibitive. A. E. M.

Magnesium sulfate in skin diseases. J. Azpuru España. *Rev. méd. Hondureña* 1, No. 3 (1930); *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 763-4. The local application is described. A. E. M.

Spectroscopic method for the investigation of the action of poisons in the blood. Carlos L. Carbousschi. *Semana méd.* (Buenos Aires) 1933, 11, 1187-96. The general technique is described and the absorption spectra of blood treated with the following substances are given: CO, N<sub>2</sub>O, C<sub>2</sub>H<sub>2</sub>, H<sub>2</sub>S, PhNO<sub>2</sub>, and F salts; the spectroscopic characteristics of methemoglobin, hematin, hemochromogen and hematoporphyrin are discussed and also the intoxications, which may lead to the formation of these substances. A. E. Meyer

Gastro-duodenal ulcer treatment with pepsin injections. M. Royer. *Soc. medicina interna* Nov. 17, 1932; *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 767. The results were not satisfactory. A. E. Meyer

The pharmacology of *Marrubium vulgare* L. Rizzo Cath. *Thesis Univ. Aix-Marseille* (1933); *Rev. sudamericana endocrinol. inmunol. quimioterap.* 16, 743. The crystal. bitter substance, *Marrubium*, does not exist in the fresh drug; it is probably formed from an essential oil. The plant contains a neutral saponin and 0.2% of choline. The ext. has a hypotensor action on intravenous application. It is effective as an expectorant and as a diuretic. A. E. Meyer

Pharmacology of anabesine. K. D. Sargin. *Khim. Farm. Prom.* 1933, 136-8. The expts. on the animals indicate that this alkaloid is very similar to nicotine in its action. It changes the blood pressure and affects the intestines and uterus the same way as nicotine and its general effects show that it can hardly be used in therapy. L. Nasarevich

Racemic lactic acid as a food. I. Its assimilation and toxicity in rabbits. J. A. Collazo, J. Puyal and Isabel Torres. *Anales soc. espn. fis. quim.* 31, 672-84 (1933). Lactic acid and glucose in the blood were detd. after giving lactic acid to rabbits by mouth. Per kg. of body weight 5-6 g. of the acid or of its salts produced no severe toxic effects. Symptoms (excitement, dyspnea, tachycardia) occurred when the lactic acid content of the blood exceeded 200-250 mg.%. E. M. Symmes

The influence of panax ginseng on serum calcium and potassium ions. II. The effects of convulsants on serum calcium and potassium ions of normal rabbits, and rabbits fed with ginseng. Kinci In. *J. Chosen Med. Assocn.* 23, 725-32 (German Abstract 61) (1933); cf. C. A. 26, 214; 27, 4590. The injection of camphor, picrotoxin and caffeine in doses producing a stimulation in normal rabbits increases the serum Ca ion, but the effect on the K ion is not decisive. Strychnine in stimulant or convulsant dosage also increases serum Ca. When a similar injection is made into rabbits fed with ginseng, these effects on serum Ca are more pronounced, showing that ginseng acts pharmacologically additive with convulsants. S. Tashiro

Sugar tolerance in experimental acidosis and the effect of insulin and vitamin B. Susumu Tatsuzawa. *Sei-i-kwai Med. J.* 51, No. 8, 1-16 (English Abstract 1-2) (1932).—The normal sugar-tolerance curve of the rabbit shows the max. at 10 min. after the glucose injection (4 cc. 25% soln. per kg.), and reaches the normal 2 1/2-3 hrs. The rabbits fed 2.438 g. of NaH<sub>2</sub>PO<sub>4</sub> in 35 cc. H<sub>2</sub>O (pH 4.3) twice daily for 3 days showed a marked disturbance in sugar tolerance, which can be corrected

by an injection of insulin, but not that of vitamin B (oryzanin soln.). Normal rabbits starved for 3 days show a slight sign of acidosis, having also more or less hyperglucemia, but their curve is normal. S. T.

Studies in phlorhizin. II. The relation between phlorhizin diuresis and glucosuria in normal rabbits and in rabbits with disturbance of the liver function. Toranoshin Onodera. *Sei-i-kwai Med. J.* 51, No. 8, 17-29 (English Abstract 2-3) (1932); cf. C. A. 27, 5825. When phlorhizin is injected into rabbits subcutaneously, the period of the max. glucosuria is preceded by that of the max. vol. of the urine; but with intravenous injection, the 2 periods coincide. In the latter case, however, the return to normality is quicker in urinary vol. than in that of urinary sugar. The disappearance of glucosuria in repeated phlorhizin injection requires a longer time than in a single injection. When phlorhizin is injected into rabbits, the liver of which is previously damaged by P or pelikan, the disappearance of glucosuria takes a longer time than when a similar injection is made to normal rabbits. III. Glutathione content of the tissues of phlorhizinized rabbits. *Ibid.* 30-7 (English Abstract 3).—The av. reduced glutathione contents of the normal rabbits are: liver 0.2424, kidney 0.0823, suprarenals 0.0193, muscle 0.0424, spleen 0.1249, testicles 0.0696, lungs 0.058 and heart 0.0320%. The av. reduced glutathione contents of tissues taken at the max. period of phlorhizin glucosuria are as compared to that of the normal: liver 11, kidney -1.0, muscle -2.4, heart -4.0, spleen +21, testicle +60.8, lung +22.0 and suprarenal +495.4%. The av. glutathione contents of tissues taken from the animal recovered from phlorhizin intoxication show some increase over normal in all the tissues. S. Tashiro

The role of diiodotyrosine in hyperthyroidism. Alexander B. Gutman, Lawrence W. Sloan, Ethel R. Gutman and Walter W. Palmer. *J. Am. Med. Assoc.* 101, 256-9 (1933).—Thirty cases of hyperthyroidism were treated with diiodotyrosine before subtotal thyroidectomy. The glands were analyzed for total I and thyroxine contents. The effects on basal metabolic rate and clinical symptoms in this series were compared with those of a series of 185 cases treated with inorg. iodides. The results are interpreted as emphasizing the similarities in these 2 types of iodide medication. R. P. Walton

Synthesis of pharmacologically important amines (Kindler, Hesse) 10. Synthesis of pharmacologically important carboxylic acids (Kindler, Peschke) 10.

## I. ZOÖLOGY

R. A. GORTNER

The effect of increasing the partial pressure of carbon dioxide in the environment on the gas exchange of *Chironomus laryae*. Otto Marnisch. *Z. vergl. Physiol.* 16, 76-88 (1932).—The R. Q. of larvae of *Chironomus thummi* (obtained in the summer) was independent of the partial pressure of CO<sub>2</sub>. The ant. of respiration was const. in the presence of 10-30% CO<sub>2</sub> and then decreased in proportion to the further increase of CO<sub>2</sub>; at 85% CO<sub>2</sub> it was about 1/2 that found in air. There is a discussion of the concept "ecological efficiency" which is measured by the range of CO<sub>2</sub> in which the organism can hold its ant. of respiration const. H. C. Brunstetter

Phosphatides. VIII. Fatty acids of the liver phosphatides and of the liver oil from *Rana temporaria*. E. Klenk. *Z. physiol. Chem.* 221, 259-64 (1933); cf. C. A. 28, 184. The characteristic feature of the fatty acids from the phosphatides and oil of frog liver, in comparison with that of higher vertebrates, is the low content of stearic acid and the relatively high content of highly unsatd. acids of the C<sub>20</sub> and C<sub>22</sub> groups. External factors such as nutrition and body temp. seem to det. the nature of the glycerides stored in the fat deposit. A. W. Dox

The fat of the fatty deposit of *Rana temporaria*. F. Klenk. *Z. physiol. Chem.* 221, 264-70 (1933).—By fractionation of the Me esters of the fatty acids, detn. of

their I nos., prepn. of the Br derivs. of the unsatd. acids, and crystn. of the hydrogenated acids, the presence of palmitoleic, linoleic, linolenic, arachidonic and clupanodonic acids was established. The palmitoleic acid probably originates by  $\beta$ -oxidation of higher unsatd. acids rather than by dehydrogenation of palmitic acid. Frog fat resembles the fat of fresh-water fishes and, like the latter, occupies a position intermediate between the fat of land mammals and that of marine fishes. A. W. D.

The hypophysis and the nitrogen excretion of toads. B. Braier. *Compt. rend. soc. biol.* 114, 80-2(1933).—In the toad, as in dogs, hypophysectomy causes a 80% decrease in N excretion. L. E. Gilson

The phosphocreatine and glutathione of the muscles of toads after hypophysectomy. A. D. Marenzi. *Compt. rend. soc. biol.* 114, 394-6(1933).—In toads ablation of the glandular lobe of the hypophysis produces an asthenic syndrome, a 30% decrease in the phosphocreatine and total P of the muscles, and a decrease in muscle and liver glutathione. Implantation of toad hypophysis or injection of ext. of bovine anterior hypophysis ameliorates all these effects. L. E. Gilson

Action of butylethylmalonylurea (Soneryl) on the excitability of the nervous centers of selachians. Albert (Hrc). *Compt. rend. soc. biol.* 114, 453-5(1933); cf. C. A. 27, 1938, 3580.—Action of butylethylmalonylurea on neuromuscular excitability [of frogs]. *Ibid.* 667-9.

Mineral excretion of leeches. Mme Braconnier-Favreudeny. *Compt. rend. soc. biol.* 114, 705-6(1933). L. E. Gilson

Toxicity to trout of potassium cyanide and *p*-cresol in water containing different concentrations of dissolved oxygen. Bernard A. Southgate, Frederick T. K. Pentelow and Ronald Hassindale. *Biochem. J.* 27, 983-5(1933).—At low O concns. the toxicity of the cyanide solns. increases rapidly with decrease in O concn. The same is true for *p*-cresol. Benjamin Harrow

The production biology of the Baltic Sea. Fritz Gessner. *Naturwissenschaften* 21, 649-54(1933).—A review of work on the plankton production in the Baltic related to the phosphate, nitrate and  $\text{NH}_4$  contents at different elevations and the presence of convection currents. B. J. C. van der Hoeven

Phytoplankton in the English lakes. II. The composition of the phytoplankton in relation to dissolved substances. W. H. Pearsall. *J. Ecology* 20, 241-62(1932); cf. *Ibid.* 18, 306. Diatoms occur when the waters are richest in nitrate, phosphate and  $\text{SiO}_2$  (in winter and spring). The appearance of *Asterionella* is correlated with higher concns. of phosphate, nitrate and

Ca than that of *Tabellaria fenestrata*. *Melosira granulata* shows a very definite correlation with waters rich in org. matter and in Myxophyceae, and forms maxima in waters of low Ca content. The green algae and desmids occur in summer when nitrates and phosphates are low. Desmids occur particularly when Ca and the nitrate phosphate ratio is low. *Dinobryon* appears to be favored by somewhat higher ratios of nitrate to phosphate; it may replace diatoms when the  $\text{SiO}_2$  or Ca content is low in spring.

Myxophyceae show a general correlation with high org. matter, and have the ability to grow rapidly in minimal quantities of nitrate and phosphate. *Oscillatoria tenuis* seems to have a higher Ca requirement than *Coccolophaerium kuetzingianum*. K. D. Jacob

Biology of the American cockroach (*Periplaneta americana* L.). H. Z. Klein. *Z. wiss. Zool.* 144, 102-22(1933).—The duration of the pre-oviposition period of *Periplaneta* has a very high temp. coeff., lasting 10 days at 26-8°, 15 days at 24-5°, and more than 6 months at temps. below 20°. Other stages in development are also markedly dependent on temp., some being completely suspended below 20°. K. V. Thimann

Local irradiation of the Triton embryo with ultra-violet light. Bernhard Durken. *Z. wiss. Zool.* 144, 123-62(1933).—The effects of local ultra-violet irradiation on developing embryos of *Triton taeniatum* are largely limited to the surface cells, probably on account of high light absorption by the yolk granules. The result is a pigmentation of the irradiated area followed by a contraction of the surface of the cell which forces out the contents. In the later stages of development irradiation kills the entire cell on which it falls, and the dead cell is either thrown out, or, in still older embryos, remains within the organism without undergoing further development. K. V. Thimann

Ecology of sand-dune beetles. H. Z. Klein. *Z. wiss. Zool.* 144, 240-61(1933).—The surface temp. of the soil largely det. the activities of Scarabaeidae and Tenebrionidae. Temps. below 11-12° at a depth of 10 cm. inhibit all activity. Activity begins at various temps. above 14°. A further increase of 7° above the min. leads in each case to the beginning of flight. K. V. T.

Castration studies in cladocerans. I. Development of secondary sexual characters in radium-irradiated males of *Daphnia magna*. Yasumasa Mori. *Z. wiss. Zool.* 144, 289-316(1933).—Exposure of young males of *Daphnia magna* to 15 mg. of  $\text{RaBr}_2$  through a film of 7 mm. of water causes degeneration of the sexual cells equiv. to castration, together with a decrease in metabolic rate and some general inhibition of growth. The influence of sex organs on growth can thus be conveniently studied. K. V. Thimann

## 12—FOODS

F. C. BLANCK AND H. A. LEPPER

Proteins of Indian foodstuffs. V. Alcohol-soluble protein of fenugreek (*Trigonella foenum graecum*). V. V. Sreenivasa Rao, B. N. Sastri and N. Narayana. *J. Indian Inst. Sci.* 16A, 85-7(1933).—Two prepn. of the prolamin from fenugreek obtained by different methods had nearly the same compn. The prolamin is characterized by a low basic N content and high percentages of cystine and tryptophan, thus resembling the alc.-sol. protein of leg. F. L. Dunlap

Food adulteration today. C. H. Manley. *J. Roy. Sanit. Inst.* 54, 214-18(1933).—Sulfites (600 pts. per million) in boiled sweets, cheeses colored by Sn and As, As in baking powders, starch fillers in potted meats, baking powders of only 1.5% available  $\text{CO}_2$ , are among the many violations reported. A. L. Elder

Concentrating liquids by freezing in a continuous process. Karl L. Ford. *Food Ind.* 5, 129(1933).—Equipment is described. C. R. Fellers

How to prevent caking in powdered foods. H. V. Moss. *Food Ind.* 5, 133(1933).— $\text{Ca}_3(\text{PO}_4)_2$  and basic  $\text{MgCO}_3$  gave

best results as anticakers in table salt and in powd. sugar when used at a concn. of 1 1/2%. Starch and  $\text{CaSO}_4$  were of little value. The point is made that the  $\text{Ca}_3(\text{PO}_4)_2$  is a valuable addn. to the av. human diet as a source of both Ca and P. C. R. Fellers

Making up color solutions. J. H. Toulouse. *Natl. Bottlers' Gas.* 51, No. 610, 55(1933).—Stock solns. of certified colors for food use will support the growth of yeast and bacteria. Four methods for maintaining sterility are: steam sterilization, Na benzoate with or without added citric acid,  $\text{EtOH}$  and citric acid. The latter is particularly adaptable to carbonated beverages. J. H. T.

Report of the Committee on Definition of Moisture Bases for Laboratory Reports. R. K. Durham. *Cereal Chem.* 10, 465-7(1933). L. H. Bailey

Report of the Committee on Definitions of Technical Terms. Washington Platt. *Cereal Chem.* 10, 463-4(1933). L. H. Bailey

Report of Committee on Methods of Analysis. C. E. Mangels. *Cereal Chem.* 10, 470-1(1933). L. H. B.

**Report of the Subcommittee on the Development of a Volumetric Copper Reduction Method for Sugar Determinations.** J. T. Flohil. *Cereal Chem.* 10, 471-6(1933).

L. H. Bailey

**Report of Committee on Testing Rye Flours.** L. H. Bailey. *Cereal Chem.* 10, 468 9(1933).

**Non-survival of red mold of the *Monilia sitophila* group at baking temperature.** C. B. Morison. *Cereal Chem.* 10, 462(1933).—The conidia and ascospores of this species of *Monilia* were killed at 70° exposure of 10 min. and at 60° exposure of 20 min. At 50° survival was noted after 30 min. exposure.

L. H. Bailey

**Eight years' work by the Montana Grain Inspection Laboratory.** Clyde McKee, W. O. Whitcomb, W. D. Hay and D. M. Peese. *Mont. Agr. Expt. Sta., Bull.* 270, 4 52(1933).—The protein test is considered the most important single, simple test in detg. the strength of wheat from a baking viewpoint. There is a definite increase in loaf vol. as the protein increases to 15%; above this percentage, there is no further increase in vol. Protein percentage should be reported at a standard moisture content of wheat. The protein content of wheat from adjoining fields varied by as much as 2%.

C. R. Fellers

**Effect of winter exposure in the stook on quality of wheat.** R. K. Larmour, J. G. Malloch and W. F. Geddes. *Can. J. Research* 9, 252-60(1933).—Samples of wheat were exposed in the stook over winter and threshed in the spring in 2 seasons. These spring-threshed samples were compared with check samples from the same lots that had been threshed in the fall. The exposed samples lost grade in 50% of the cases, and decreased in weight per bushel in practically all cases. The flour yield was generally increased slightly as a result of the winter exposure. In respect to baking quality 22% showed improvement and 40% showed damage. The change in grade and bushel weight do not correspond very closely with changes in baking behavior.

J. W. Shipley

**A comparison of various harvesting methods in respect to moisture and grade of the grain.** R. K. Larmour, W. F. Geddes and D. Cameron. *Can. J. Research* 9, 486-501(1933). In a moisture and grade survey of grain harvested by various methods in western Canada during the 1932-1933 season it was found that straight-combined wheat showed a greater percentage of tough and damp samples than either stook-threshed or swath-combined samples. Of 401 stook-threshed samples 3% was tough or damp; of 416 straight-combined samples 22% was tough and 3% damp; and of 211 swath-combined samples 8% was tough and 1% damp. With respect to grade, it was found that as a result of exposure to rains the av. grade lowering was least for stooked grain and greatest for swath-combined grain.

J. W. Shipley

**Wheat milling tests; awards and comments on R. A. S. show wheats, 1933.** G. W. Norris. *Agr. Gaz. N. S. Wales* 44, 502 6(1933).—Analytical data are given.

K. D. Jacob

**Identification of sitosterol palmitate in the ether extract of wheat flour.** A. Dangoumau. *Bull. soc. chim. biol.* 15, 1083-93(1933). Sitosterol palmitate crystd. spontaneously from concd. Et<sub>2</sub>O exts. of wheat flour. After repeated crystn. from AcOEt it formed irregular hexagonal plates m. 96.5°. Thirty-five references.

L. E. G.

**Effect of storage upon the bread-making qualities of Wyoming hard wheat flours.** Emma J. Thiessen. *Wyo. Agr. Expt. Sta., Bull.* 198, 3 27(1933).—An aging period of 1-3 months improved flour; little further change occurred for about 2 yrs. but after that deterioration set in and increased rapidly to the 4-yr. period. The water-absorbing power of the flour increased with age, and was most rapid when stored in sacks. A modification of the gluten probably occurs during storage.

C. R. Fellers

**Harvesting and drying rough rice in California.** Roy Bainer. *Calif. Agr. Expt. Sta., Bull.* 541, 3 29(1932). Rice having a high moisture content does not give high yields of head rice since it lacks resilience to withstand the milling process. Such rice is best artificially dried at temps. below 100°F. Paddy rice may be safely handled

in bulk or sacks if the moisture is below 15%. Too rapid drying of rice at high temps. in the sun produces sun-checks. Sun-checking in brown rice is a fair, though not pos., indication as to what milling yields may be expected.

C. R. Fellers

**Chemical compositions of New Mexico pinto and bayo beans.** Mary L. Greenwood. *N. M. Agr. Expt. Sta., Bull.* 213, 3-11(1933).—Twenty-four samples of pinto beans gave the following av. percentage compn.: protein 23.9, fat 1.1, total carbohydrates 63.2, ash 3.9 and moisture 7.9. Sixteen samples of bayo beans gave: protein 22.3, fat 1.3, total carbohydrates 65.6, ash 3.7 and moisture 7.1. Limited data indicate that the percentage of protein varies inversely with the yield of beans. Significant differences in compn. among samples grown in different sections of the state and at varying altitudes were not found.

C. R. Fellers

**Baking powder.** E. M. Bailey. *Conn. Agr. Expt. Sta., Bull.* 354, 762(1933).—Seven samples of baking powd. varied from 13.8 to 15.2% total CO<sub>2</sub>, and from 12.6 to 15% of available CO<sub>2</sub>.

C. R. Fellers

**Baking powder.** Simon Mendelsohn. *Food Manuf.* 8, 415-19(1933). Recent developments in the org. chemistry of baking-powder materials are described.

E. H.

**Action of milk and cleansing chemicals on the metals used in dairy equipment.** G. Keymeulen. *Bull. inst. agron. sta. recherches Gembloux* 2, 215-42(1933).—Test pieces of different metals and alloys used in the manuf. of dairy equipment have been put in contact with sour milk and sterilized milk either sep. or joined together by a rivet. Preference, in the following order, should be given to the use of glass-enameled equipment; stainless steels and Ni-Cr alloy no. 60; Al and its alloys; and Cu alloys nos. 58, 64 and 65. The riveted pieces proving highly resistant were: stainless steel-Ni with Ni rivets; stainless steel-tinned Cu with Fe rivets; tinned Cu-Ni with Cu rivets and tinned Cu-tinned steel with Cu rivets. A no. of cleansing agents were tested and it was found that the cleansings should be done with the following chemicals: a 1-2% soln. of either a liquid or solid product contg. Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>SiO<sub>3</sub> and NaOCl for stainless steel, Cu and its alloys, Al alloy no. 46, Ni and its alloy no. 60, glass-enameled equipment; a 1 to 4% soln. of a solid product with a soda base and Na<sub>2</sub>SiO<sub>3</sub> for stainless steel, Cu, Al alloy no. 46, tinned equipment, glass-enameled equipment; a 1-4% soln. of a special solid product which does not attack Sn for tinned and glass-enameled equipment; a 1-4% soln. of a solid product probably composed of Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>SiO<sub>3</sub> and NaOCl for tinned equipment, Ni and its alloy no. 60, Al and its alloys, glass-enameled equipment.

J. R. Adams

**Standard procedure for the bacterial analysis of milk.** A. H. Robertson. *N. Y. State Dept. Agr. & Markets, Ann. Rept.* 1931, 127 33(1932).—The directions have been made more detailed and sp. than the Standard Methods of the American Public Health Asscn.

C. R. Fellers

**Testing cow milk for pasteurization.** A. Tapernoux. *Compt. rend. soc. biol.* 114, 649-52(1933).—Discussion.

L. E. Gilson

**Thermophilic bacteria in milk pasteurized by the high-temperature short-time process.** M. W. Yale and C. D. Kelly. *N. Y. Agr. Expt. Sta., Bull.* 630, 3 23(1933).—Counts on 125 samples of market milk showed 10 4500 thermophiles per cc., with an av. of less than 100. The role of these organisms in pasteurization is discussed.

C. R. Fellers

**Certain biological factors related to tallowness in milk and cream.** P. H. Tracy, R. J. Ramsey and H. A. Ruehe. *Ill. Agr. Expt. Sta., Bull.* 389, 579 95(1933).—Incubation of milk contaminated with Cu at 68 90°F. retards the development of tallowness which normally occurs in such milk stored at 40°F. The incubation of milk at the above temps. previous to contamination with Cu retards the development of tallowness. Both yeasts and bacteria growing in milk retard tallowness. When milk contg. Cu is homogenized, the tallowy flavor is less apparent.



Incubation of cream contg. Cu greatly improves the quality of the resulting butter. Oxidation-reduction potential measurements on milk show (1) aseptically drawn milk develops a lower *Eh* reading upon storage at either 40°F. or room temp.; (2) the addn. of Cu salts causes the potential to rise rapidly toward the oxidation phase; and (3) bacteria or yeast cells cause a rapid reduction to take place in the milk. Similar results were obtained with cream. The metabolism of bacteria and yeasts plays an important role in control of tallowiness in dairy products and probably accounts for the general absence of tallowy flavors in pasteurized milks produced during the summer months. Lack of bacterial metabolism in raw milk probably accounts for the tendency for some pasteurized milk to become tallowy during winter.

**Controlling ropy milk outbreaks.** C. D. Kelly. N. Y. Agr. Expt. Sta., *Bull.* 631, 3-18(1933).—The outbreaks were caused by types of bacteria closely resembling *Aerobacter aerogenes*. Milk plant equipment may be sterilized by the use of steam, hot water and Cl so that the ropy milk organisms can be controlled. C. R. Fellers

**Detecting milk powder in frankfurters and sausages.** M. A. Meskil. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 120-3(1932).—Milk powder is best detected by detg. lactose by the A. O. A. C. method and confirming the presence of lactose by the osazone test. A simple test for mucic acid also is given. C. R. F.

**Some of the factors affecting the body and texture of ice cream.** B. E. Horrall. Ind. (Purdue) Agr. Expt. Sta., *Bull.* 375, 3-12(1933).—Processing the mix at 165° and 180°F. gave the best body and texture, while the 150°F. processing gave the poorest texture. The fat clumping, basic viscosity and time to obtain the desired overrun decreased as the processing temp. decreased. There was very little difference in the body and texture in ice cream when the mix was aged 4 and 24 hrs. Ice cream stored at -10°F. had the best body and texture during a 30-day holding period, while that stored at 10°F. had the coarsest body and texture and developed a stronger storage flavor. When ice cream is drawn from the freezer at the hard stage, the body is smoother and the texture closer, than if drawn at a soft stage. The smoothness of ice cream increased with increased content of gelatin.

**Bacteriology of butter. V. Studies on microorganisms in churns.** H. C. Olson and B. W. Hamner. Ia. Agr. Expt. Sta., *Research Bull.* 159, 59-120(1933); cf. C. A. 26, 1355.—The agar disk method showed great variations in the bacterial content of churns in different milk plants. The use of NaOCl or other Cl derivs. in the rinsing water greatly reduced the nos. of bacteria in churns. Nearly all of the 61 cultures of bacteria isolated from churns produced objectionable changes in butter when stored at a temp. of 59°F. The micrococci and non-sporulating bacilli caused more serious flavor changes than the aerobic sporulating bacteria. Rancidity was the most common defect noted as a result of bacterial changes in butter. C. R. Fellers

**The  $p_H$  of fresh and storage eggs.** S. E. Erikson, R. E. Boyden, J. Holmes Martin and W. M. Insko, Jr. Ky. Agr. Expt. Sta., *Research Bull.* 335, 359-94(1932); cf. C. A. 27, 2918.—Pen averages gave little variation in  $p_H$ , the greatest differences being 7.95 and 6.31. The pens were given different feeds but cod-liver oil, sunshine or blue grass range showed no significant effect on the  $p_H$  of the eggs. Storage eggs showed greater variation, i. e., 6.9-8.8. The av.  $p_H$  of yolk and white of fresh eggs was 6.32 and 7.92, resp. The av.  $p_H$  of yolk and white of storage eggs was 6.98 and 8.9, resp. C. R. Fellers

**Beating properties of egg white.** W. C. Henry and A. D. Barbour. Ind. Eng. Chem. 25, 1054-8(1933).—A mech. power beater with speed control was used to beat eggs to obtain vol. increase at 20° at a speed of 1080 r. p. m. Thin egg white has better initial beating properties than the thick fraction, but loses vol. on continued beating. The addn. of water to egg white greatly increases the

resulting vol. after beating. Oil reduces vol. under similar conditions. The increase in vol. after beating increases with decreasing H-ion concn. of the mixt., this effect becoming more pronounced above  $p_H$  10.

**Copper, iron and manganese content of fish.** T. B. Parks and E. R. Rose. *J. Nutrition* 6, 95-8(1933).—The content of Cu in both the fresh and salt water fish averaged about 2.5 mg. per kg. of moist fish. Salt water fish contain about 12% more Fe than the fresh water species. Species of fish with dark tissues contain approx. 75% more Fe than species with light colored tissues. Fish muscle contains small amts. of Mn, the content varying from 0.10 to 0.31. The Fe varied from 3.4 to 9.6; and the Cu from 1.4 to 4.1 mg. per kg. Twenty species of fish were exand. C. R. Fellers

**Free hydrogen-ion concentration of oyster liquor and the ratio of total solids to free liquor of oysters.** Kathryn Breen. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 124-7(1932).—Data obtained on 237 samples of oysters show that generally a high  $p_H$  value is accompanied by a low free-liquor content, and a low  $p_H$  with a high free-liquor content. The  $p_H$  value is more indicative of how long and at what temps. the oysters have been stored. If the  $p_H$  is 5.8 or above, water has probably been added. If the  $p_H$  is less than 5.8, the detection of small amts. of water becomes more questionable. C. R. Fellers

**Changes occurring during freezing and thawing of fruits and vegetables.** M. A. Joslyn and G. L. Marsh. Calif. Agr. Expt. Sta., *Bull.* 551, 3-40(1933); cf. C. A. 27, 4319. C. R. Fellers

**Canning fruit and vegetables.** Geo. Cadbury. *Chemistry & Industry* 1933, 885-91.—A paper discussing briefly the tech. aspects of the canning industry. F. L. D.

**Pectin from dried grape marc.** A. Mehlitz. *Konserven-Ind.* 19, 320-1, 325-7(1932).—From the material contg. 0.5-1.5% pectin, calcd. as Ca pectate, only an impure powder contg. 14% ash and 31.3% of Ca pectate could be obtained by triple extn. and pptn. with EtOH. Fermentation may have diminished its gelatinizing power. B. C. A.

**Citrus fruit juice.** J. F. Cooper. *Canning Age* 13, 468-90(1932).—The bitter taste developing in stored citrus juice is due to the presence of naringin in grapefruit juice and to hesperidin in the orange. The content of these glucosides in the fruit decreases with maturity. Changes in color in these juices are due to the presence of peel oil, a certain amt. of which, however, causes the solid particles to remain in suspension in the juice. B. C. A.

**Tomato juice.** E. M. Bailey. Conn. Agr. Expt. Sta., *Bull.* 354, 791-3(1933).—Ten samples of canned or bottled tomato juice showed the presence of no added color or preservatives; the NaCl content varied from 0.29 to 0.87, and solids from 5.4 to 8.3%. C. R. Fellers

**Orange extracts.** E. M. Bailey. Conn. Agr. Expt. Sta., *Bull.* 354, 769-71(1933).—Thirty-one samples of com. orange exts. showed variations in orange oil by vol. of 4.1-16.2. Orange ext. should not contain less than 5% of orange oil. Terpeneless orange ext. is prepd. by shaking oil of orange in dil. alc. or by dissolving terpeneless oil of orange in dil. alc. It corresponds in flavoring strength to orange ext. C. R. Fellers

**Sugar content of fruit sirup.** P. Berg. *Konserven-Ind.* 19, 313-15(1932).—The ext. content of the com. samples of com. fruit sirup was 64.6-72.9%. B. C. A.

**Methods of sirup preparation.** J. H. Buchanan. *Natl. Bottlers' Gaz.* 51, No. 610, 48(1933).—A review of sirup making for carbonated beverages. A nomograph is given for calg. amts. of sucrose and water for sirups of varying densities and time table for sterilizing effect of citric acid in stored sirups. J. H. Toulouse

**Variations in arsenical spray residue caused by sampling.** Alice Waterhouse. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 97-9(1932).—A sample of apples contg. spray residue was divided into 2 parts, the first consisting of the apples showing the greatest amt. of visible residue, and the second, the remainder of the apples.

The 20 individual analyses made on fruit from the first sample showed variations in grains of  $As_2O_3$  per lb. of 0.005-0.05; and the second sample variations of 0.004-0.047. Variations in results on the same sample greater than 20-25% are excessive. Visual examn. cannot be relied on to give apples contg. the most As residues.

C. R. Fellers

**Prune maturity and storage.** Lowell R. Tucker and Lief Verner. Idaho Agr. Expt. Sta., *Bull.* 196, 3-20 (1932).—Maturity changes in the Italian prune are characterized by softening of the flesh, development of color pigments in the skin, increase in sugar content, and decrease in acid content. Firmness is an accurate measure for judging the keeping qualities of prunes in storage. Firm prunes with a high sugar content when picked keep as well as prunes of the same firmness with a low sugar content, and also have a better flavor. Prunes keep better if placed in storage immediately after picking. In general, prunes keep approx. as well in storage as they do if left on the tree.

C. R. Fellers

**Prune maturity and storage.** L. R. Tucker. Idaho State Hort. Assoc., *Proc. 36th Ann. Conv.* 1931, 110-15.—Data are given on the sugar content of prunes at different stages of maturity. The ratio sugar:pressure (required to rupture the fruit) gives a more dependable measure of ripeness than does either test alone. The russeted areas on damaged prunes are higher in sugar than the normal areas, whereas the sunburned areas are low in sugar.

K. D. Jacob

**Maple products.** L. J. Cross. N. Y. State Dept. Agr. Markets, *Ann. Rept.* 1931, 93 4(1932); cf. C. A. 26, 868.—The Cowles malic acid method for the examn. of maple products gave the best results for routine work. Darker colored maple products, in general, contained more malic acid and ash than the lighter colored products. The chem. compn. of the various maple products examd. showed great variations.

C. R. Fellers

**Estimation of vegetable oil in mayonnaise.** J. L. Perlman. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 118-20(1932).—In fresh mixed eggs the lipoids are present to the extent of 37.5 times the av. lipid  $P_2O_5$  content. Hence, the percentage of lipid  $P_2O_5$ , times the factor 37.5 subtracted from the total fat-and-lipoids value, will yield a reasonably accurate approximation of the vegetable oil present in a mayonnaise.

C. R. Fellers

**Mayonnaise analysis; special reference to its egg constituents.** J. L. Perlman. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 101-12(1932); cf. C. A. 26, 5353.—A study of several methods for the detn. of total fat and lecithin-phosphoric acid in mayonnaise revealed a condition of lecithin decompn. present in most of the samples sold on the retail market, which renders a true estn. of the egg-yolk content somewhat uncertain. The alc.- $CHCl_3$  extn. method yields the highest fat and the highest lecithin-phosphoric acid values in the fresh samples. A new species of bacteria, *B. lekitosis*, was isolated from decomp. egg yolk, and this organism forms an enzyme capable of decomp. lecithin. The diagnostic value of the lecithin-phosphoric acid detn. for ascertaining the percentage of egg yolk in mayonnaise is questionable in samples over 30 days old and stored at ordinary temps.

C. R. Fellers

**Activated carbon for water treatment (carbonated beverages).** F. S. Lammers. *Natl. Bottlers' Gaz.* 51, No. 614, 58(1933).—A review, with applications to carbonated beverages.

J. H. Toulouse

**Using anhydrous dextrose in carbonated beverages.** J. H. Buchanan. *Natl. Bottlers' Gaz.* 51, No. 613, 58(1933).—A table is given for replacement of sucrose with dextrose. Advantages are: Greater freedom from micro-organisms, better body and flavor transfer, no change in taste because of inversion.

J. H. Toulouse

**Sulfites in horseradish.** M. A. Meskil. N. Y. State Dept. Agr. & Markets, *Ann. Rept.* 1931, 100-1(1932).—The A. O. A. C. method for detg.  $SO_2$  is sufficiently accurate for the detection and estn. of  $SO_2$  in com. samples of

ground horseradish. The mercaptans present in horseradish are apparently active only in the very fresh roots and even then not in amts. sufficient to be misleading.

C. R. Fellers

**The influence of time of cutting on the yield of highmoor meadows and nutrient content of highmoor hay.** F. Brune. *Landw. Jahrb.* 76, 767-82(1932).—The nutrient value decreases with age after flowering. Data on the nutrient value and results of feeding trials of hay cut at various times are given.

George R. Greenbank

**The effect of a varying percentage of clover in pasture field grass upon its chemical composition and feed value.** Nils Hansson. *Nordisk Jordbrugsforskning* 1932, 262-7.—Results of chem. analyses and digestibility tests of pasture field grass contg. 0.7-100% of clover show that the optimum percentage of clover lies between 15-20 and 40-50% referred to dry samples. The upper limit results from the fact that higher percentages have an unfavorable effect upon the digestion of the animals, and upon the consistency of the butter, while at lower percentages the feed does not contain the necessary min. of digestible albumin.

H. C. M. Ingeberg

**Ensilage competition—Hills District.** R. Hill. *J. Dept. Agr. S. Australia* 37, 54-9(1933).—Chem. analyses are given of 12 ensilage samples prepd. from different plants and treated under different conditions. The  $H_2O$  content varies from 69 to 82% but is standardized at 75% for purposes of comparison of the products.

M. S. A.

**Edible fish meal. Its composition and value with instructions for its use in feeding cattle, swine, sheep and poultry.** Rodney DeLisle. *Brit. Columbia Fisheries Dept. Victoria* 80 pp.(1930).—A comprehensive review. In general, fish meal is a good source of protein and minerals.

C. R. Fellers

**Waste-disposal systems in food plants (Fielder) 14. Detn. of sulfurous acid [in dried fruits] (Nichols, Reed) 7. Removal of spray residue from canning peaches (Plank) 15. Starch and bread making (Katz, van Italic) 28. Recovering protein from press cake (Kozanov, Smirnova) 27. Inhibiting effect of certain substances on the oxidation of sulfurous acid [in dried fruits] (Mitchell, et al.) 7. Colloid chemistry of boiled rice (Sakurada, Futino) 2. Detn. of F [in foods] (Wichmann, Dahle) 7. Detg. moisture [in flour, corn, etc.] (Brit. pat. 396,098) 13. Fats and oils (lard, beef fat) (Brit. pat. 395,971) 27. Centrifugal sepn. of starch and gluten (U. S. pat. 1,933,119) 1. Drier for milk (U. S. pat. 1,933,819) 1.**

**Food product.** Camille Groll and Édouard Stirnimann. *Fr.* 749,742, July 28, 1933. A food contg. vitamin C, suitable for children, is made by introducing into freshly condensed and sugared milk plants such as cress grown under perfectly sterilized conditions. The seeds are freed from bacteria and grown on a sterilized absorbent material such as felt or sawdust and sprinkled with sterilized water in a sterilized atm.

**Food preparations.** "Tres" Gyógyszer-Végyészeti Ipari és Kereskedelmi R. T. *Brit.* 396,150, Aug. 3, 1933. Gluten or glutinous products are made from the seed kernels of the carob bean tree or of related plants of the groups Mimosaceae and Caealpineaceae, or the sepd. germinal substance thereof, by methods similar to those used in making such products from wheat, e. g., kneading with  $H_2O$ . Bleaching may be effected by treating the raw material or glutinous products with dil. acids, e. g., citric, tartaric or oxidizing agents, e. g., hypochlorites, Na *p*-toluenesulfonchloroamide, peroxides and per salts. The wet gluten ext. may be intermittently sterilized or dried at room temp. or *in vacuo* at 40-50° and subsequently ground. Food preps. may be made by baking a paste of the gluten to which flour, albuminous food, cellulose, starch or gluten denatured by heating may be added. Cf. C. A. 27, 4320.

**"Molasses-cake" flour.** John D. Duff and Louis E. Dietrich (to P. Duff & Sons, Inc.). U. S. 1,931,892, Oct. 24. Molasses and a shortening are first mixed and

heated together to produce an emulsion in which the shortening is melted and thoroughly incorporated with the molasses, flour is then added while heating, and the resulting dough is reduced to a dry powd. condition and a dry gasifying agent such as  $\text{NaHCO}_3$  is added.

**Preserving bread, etc.** Établissements J. J. Carnaud & Forges de Basse-Indre. Brit. 396,634, Aug. 10, 1933. In preserving bread, etc., the dough is mixed with a hygroscopic substance, e. g., glycerol, glucose,  $\text{MgCl}_2$ , and baked in a container onto which a cover is clinched. The cover is completely sealed by soldering while the container is hot and the container is again heated and allowed to cool slowly.

**Food product\* from milk solids, etc.** Frederick S. Beverley (to Kraft-Phenix Cheese Corp.). U. S. 1,931,813, Oct. 24. A product of sufficiently solid consistency to be served with a knife without crumbling or shattering comprises milk solids (contg. the albumen in substantially its natural chemical condition) about 65, water about 15 and sugar about 20%.

**Device for estimating the fat in milk, etc.** Firina Carl Zeiss. Ger. 577,577, June 1, 1933.

**Antirachitic milk.** Gustav Kersten and Otto K. Schultz. Ger. 577,531, June 1, 1933. This prepd. by sepp. the cream, subjecting this to an ultra-violet irradiation, and finally mixing the irradiated cream with the skim milk.

**Rotary drum apparatus suitable for drying milk, etc.** Jorgen Braback. U. S. 1,933,960, Nov. 7. Various structural and operative details are described.

**Emulsifying appliance for the production of artificial cream, etc.** Leonard W. Taylor and Thomas N. Osborne (trading as Taylor & Osborne). Brit. 396,985, Aug. 17, 1933.

**Homogenizing apparatus, especially for making cream-like compositions from milk and butter or butter substitutes.** Frederick J. Clarke and Samuel G. Clarke. Brit. 396,014, July 25, 1933.

**Coloring butter, etc.** Carl von Kanel. Swiss 162,130, Aug. 16, 1933. Butter, margarine and other fats or oils are colored by an ext. of *bixa orellana* tinted with turmeric.

**Oleomargarine or butter substitute.** Arthur E. Seymour. U. S. 1,934,564, Nov. 7. Melted edible oils are mixed with milk at a temp. slightly below the solidifying temp. of the oils to produce an emulsion in which a slight rise in temp. due to release of the latent heat of fusion of the oil mixt. is then permitted; the emulsion thus formed is solidified or crystd. while the temp. is so raised by combining it with cold ripened skimmed milk; the liquid is drained off; warm ripened milk is added to the crystals,

followed by churning, drawing off liquid, salting and working. App. is described.

**Apparatus for preparing fresh fruits such as apples or pears for the market by spraying with solutions such as those of cleansing agents to remove toxic spray residues.** Douglas C. Morris and Leonard O. Cockrill (to Brodex Co.). U. S. 1,932,827, Oct. 31. Various structural and operative details are described.

**Retarding damage by mold growth of fruits and vegetables.** Hugh F. Rippey (to Laucks Laboratories, Inc.). U. S. 1,935,509, Nov. 14. After harvesting, fruits or vegetables such as apples, etc. (substantially free from poisonous spray residue), are treated with an aq. soln. contg. at least 2% of  $\text{Na}_2\text{PO}_4$ .

**Clarifying grape juice by use of pectic enzymes.** John J. Willaman and Zoltan I. Kertesz (to Rohm & Haas Co.). U. S. 1,932,833, Oct. 31. The juice may be treated with enzymes from *Aspergillus niger* or the like.

**Jelly preparations.** California Fruit Growers Exchange. Brit. 396,749, Aug. 8, 1933. A confectionery jelly prepd. from sugar, pectin and sufficient citric, tartaric or other acid to make it tart is rendered slow-setting by adding a small quantity of a sol. salt of a strong base and weak acid, e. g.,  $\text{NaOAc}$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{NaHCO}_3$ ,  $\text{Na citrate}$ .

**"Soluble coffee."** Louis G. Copes, Carl H. Haurand and Emily Kellogg (to The Best Foods, Inc.). U. S. 1,932,769, Oct. 31. Green coffee beans are preheated at a temp. above about 95° and below the roasting temp. for a sufficient time to render insol. in water those substances which would be made insol. by the subsequent evapn. and roasting of the water ext. The preheated coffee is then extd. with water, the ext. is filtered and dehydrated, and the residue is roasted.

**Coffee extract.** Louis G. Copes (to The Best Foods, Inc.). U. S. 1,933,040, Oct. 31. Crushed raw coffee beans are extd. first with cold water and then for a short time with hot water; the extracts thus obtained are combined, evapd. to dryness, and the residue is roasted.

**Metallic high-pressure container suitable for use in carbonating beverages.** Kurt W. H. Barthelmes (to K. Barthelmes Mfg. Co.). U. S. 1,933,135, Oct. 31. Structural features.

**Animal food.** Commanditaire Vennootschap Onder de Firma P. H. Kaars Sijpesteijn. Fr. 749,595, July 26, 1933. Colloidal Fe oxide (contg. about 66%  $\text{Fe}_2\text{O}_3$ ) is added to animal foods.

**Poultry feed.** Ernst Häberli. Swiss 161,303, July 1, 1933. A nutritive food especially for poultry, is prepd. by treating casein with a Ca compd. and mixing the product with foods such as bone meal, fish meal, grain, etc.

### 13 - GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Cross section through the inorganic heavy-chemical industry, 1932-3.** Bruno Waeser. *Chem.-Ztg.* 57, 833-6, 854-5 (1933). E. H.

**Determination of the hardness of technical adsorbents.** Franz Krezil. *Z. ges. Schiess-Sprengstoffw.* 28, 382-4 (1933). Methods are described for testing adsorbents, such as charcoal, for resistance to abrasion or crumbling by pressure, impact, friction and heat. A. L. Kibler

**Flow of fluids in conduits.** L. D. Williams. *Ind. Eng. Chem.* 25, 1316-19 (1933). The methods of calcg. pressure drops accompanying the flow of fluids in conduits are summarized and reduced to simplest form for engineering use. L. W. T. Cummings

**Investigation on evaporation and the application of the test results to evaporator construction.** Heinrich Vorkauf. *Chem. App.* 20, 13-15, 33-5 (1933). Investigations of various operating and design factors showed that the evapn. of liquors is affected by the vapor space height, the height of the liquid level above the steam inlet and the pressure. For a fixed vapor space the expression for the allowable load is:  $R_v = R_{v1} + 1/(1 + 1.1H_w)^4$ , where  $R_v$  has the dimensions cu. m./cu. m. hr.;  $R_{v1} = 500 +$

$40/(0.01 + H_D \sqrt{H_D})$  (cu. m./cu. m. hr.), where  $H_D$  = height of vapor space and  $H_w$  = height of liquid level above the vapor inlet. These formulas are valid for atm. pressure only. For other pressures  $R_v$  must be multiplied by the pressure coeff.  $f$ . Charts are presented which relate  $R_v$  and  $(f \times R_v)$  directly. When the vapor is introduced above the liquid level these formulas cannot be used; an empirical value of 7500 (cu. m./cu. m. hr.) has to be used for  $R_v$ , which is corrected for other pressures in the usual manner. Exptl. results in graphic form are presented for the relations between load and vapor space, moisture content of vapor and load, load and pressure, and load and concn. of liquor. The liquids tested were pure  $\text{H}_2\text{O}$ , and solns. of various concns. of  $\text{NaOH}$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{Na}_2\text{CO}_3$ , and  $\text{NaCl}$ . Sample calcs. are made and diagrams of various types of construction are presented. Karl Kammermeyer

**The load capacity of the surface of boiling liquid in the evaporation process.** Martin Strübin. *Chem. App.* 19, 148-7, 157-61 (1932). A math. treatment of the deviations from the ideal evapn. process and of the equl. of suspension for the entrained water particles in the vapor

stream. The detn. of the position of the limit plane of suspended particles is an indication of the required height of free vapor space over the liquid and shows that the free-vapor-space requirement increases rapidly with increasing load and increasing sp. vol. of the vapor. Neither the wt. % moisture content of the vapor nor the height vapor space is affected by the sp. gr. of the vaporizing liquid. The following equations are derived (1) for the velocity of rising vapor  $Cv = (G \times v) / (3600 \times F)$ , where  $G$  = wt. evapd.,  $v$  = sp. vol.,  $F$  = cross-sectional area, (2) for the limit diam. of the suspended particles (spheres),  $\delta = 6/4(v^2(2g \times v \times \delta_1))$ , where  $\delta_1$  = sp. gr. of liquid, (3) for the position of the limit plane of the suspended particles  $h = (v^2/2g)$ ; (4) for the moisture content of the vapor which can be expected  $x = 0.0031 \sqrt{G} \sqrt{v}$ , where  $G$  =  $G/F$  and (5) for the vapor space for vertical evaporators  $V' = (G^2 v^2 / 3600^2 2g)$ . Exptl. results for water and MeOH at various pressures are presented. Seven references.

K. Kammerneyer

**Surface extension of liquids in gas washing** L. Piatti. *Kolloid-Z.* 65, 122 (1933). Patent review, subdivided on the basis of (a) uninterrupted production of new surface, (b) small liquid drops, (c) change of surface tension and viscosity of absorbent.

Arthur Flischer

**A study of entrainment in a forced-circulation evaporator.** Oren C. Cesna and Walter L. Badger. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 23 pp. —The entrainment of liquor by the vapor in an evaporator of the forced-circulation type was studied and the relation between the quantity of liquor carried by the vapor and the conditions maintained within the evaporator was detd. The amt. of entrainment in a forced-circulation evaporator when using a non-foaming liquid is given by the equation  $E = (\rho/\rho') \lambda' (\rho \mu v^2 / \rho' \mu' \lambda')^{1/2}$ . The  $\lambda'$  function in general follows the form of the plot shown in the paper. The actual values given for the function, however, apply only for a liquid with a surface tension and viscosity essentially the same as those of water and for an evaporator whose dimensions in the vicinity of the deflector have the same relation as those of the evaporator used in this study and shown in graphs.

C. L. Mantell

**The isothermal flow of liquid layers.** C. M. Cooper, T. B. Drew and W. H. McAdams. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 12 pp. The use of wetted-wall towers in connection with such processes as absorption, rectification and humidification lends importance to the relationships that describe the motion of thin layers of liquid flowing under the action of gravity over wetted surfaces. The radii of curvature of these surfaces are usually so great relative to the thickness of the fluid layer that the problem is essentially that of a broad, shallow, open stream on a flat plate. The paper is an exptl. study over the velocity ranges below those usually met by customary hydraulic equations. The exptl. method is outlined and the data are compared with theoretical formulas.

C. L. Mantell

**The development of air conditioning in industrial, residential and public buildings; its effect on human beings, the factors which enter into its design.** P. I. Davidson. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 69 pp. —The paper discusses the history of air conditioning, its application to the textile industries and rayon, the tobacco industries, the manuf. of asbestos, ceramics, food products, fruit ripening, the packaging of effervescent salts and the manuf. of rope. Investigations on the effect on health, comfort and efficiency are reviewed. The major share of the paper treats of design problems of air conditioning, the source and nature of the heat load, and typical air-conditioning equipment, with a prediction of the future of air conditioning. An extensive bibliography is included.

C. L. Mantell

**Dust deposits from commercial operations.** A. Quintana y Mari. *Quim. e ind.* 10, 241-4 (1933). —Sources, compns., and routine phys., microscopic and chem. tests are described briefly.

E. M. Symmes

**Azeotropism in technic.** L. Piatti. *Nitrocellulose* 4, 154-61 (1933). —A review.

E. M. Symmes

**Hydrogen as a transmitter of energy.** Gerhard Voss. *Arch. Warmewirt.* 14, 301-2 (1933); cf. *C. A.* 22, 2114. —V. gives a brief description of a compact plant for generating 3.2 cu. m. per hr. of  $H_2$  electrolytically at 200 atm. The voltage is less than at ordinary pressure and the energy efficiency is 73%. Engines using  $H_2$  have high compression, efficiency and capacity. With  $H_2$  and  $O_2$  (with water in the cylinder to keep the temp. down) an engine without exhaust can be made, suitable for enclosed places. Hydrogen may also be used to help out in gasoline motors.

Ernest W. Thiele

**Heat transfer in jacketed vessels.** Basil Heastie. *Ind. Chemist* 9, 371-2, 380 (1933).

E. H.

**Heat transfer by condensing vapor on vertical tubes.** C. G. Kirkbride. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 17 pp. —Since the literature contains so little information on condensation on vertical tubes and on liquid films flowing down vertical surfaces, it was decided to investigate this subject and attempt to develop a reliable method for predicting heat-transfer coeffs. for vapors condensing on vertical tubes. Data were taken on film thicknesses and were correlated by means of an equation developed by dimensional analysis. By using the information on film thicknesses and data on heat-transfer rates available in the literature, a method was developed which apparently has considerable merit.

C. L. Mantell

**Heat transmission by condensing pure and mixed substances on horizontal tubes.** C. G. Kirkbride. *Ind. Eng. Chem.* 25, 1324-31 (1933). —Data are reported on heat transmission by condensing benzene and complex hydrocarbon vapors outside a single horizontal tube. Condensation was effected from satd. and superheated conditions in the absence of noncondensable gas, in the presence of steam, and in the presence of a noncondensable gas,  $N_2$ . Methods of predicting the heat-transfer coeffs. under these conditions are presented. Data are also given for heat transmission to fluids flowing inside tubes in turbulent and viscous motion.

L. W. T. Cummings

**Steam film heat-transfer coefficients for vertical tubes.** G. M. Hebbard and W. L. Badger. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec. 1933 (preprint) 21 pp. —

The larger part of the available data on heat transfer through films of condensed steam has been observed with horizontal tubes. Only a few workers have investigated the films on vertical tubes. Some empirical relations have been established, but generally, the effort has been made to compare the data with some one of the theoretical equations that have been derived by W. Nusselt. For vertical tubes, observed values of the steam film coeffs., ranging from 2000 to 3000 B. t. u., were from one-half to twice as large as corresponding values calcd. by the theoretical equations. Steam film coeffs. of heat transfer, detd. for a 1-in. O. D. vertical tube over a wide range of operating conditions (84 runs) with practically air-free steam, do not check the Nusselt equation. If a const. factor of 0.2515 is applied to this equation, all runs are within the limit of accuracy of the work for the greatest individual deviation (approx.  $\pm 5\%$ ), and within  $\pm 0.33\%$  for the av. of all runs. A similar relation is shown to be possible with the data of a parallel investigation. The cause of the deviation of the present coeffs. from other results is probably due partly to a layer of Fe oxide on the evaporator tube, partly to the use of a longer tube than was heretofore employed, and partly to less accurate methods for wall-temp. measurement used in all previous work.

C. L. Mantell

**Chemical warstuffs and their future development.** Beck. *Sudder. Apoth.-Ztg.* 73, 581-8 (1933). —An address descriptive of the various devices and materials (app. and chemicals) employed during the World War.

W. O. E.

**Protection from gas attacks by air.** H. Gnam. *Sudder. Apoth.-Ztg.* 73, 588-91 (1933). —An address suggestive of certain precautions indicated during war gas attacks.

W. O. E.

**Prescriptions for war gas intoxications.** Hans Kaiser. *Sudderl. Apoth.-Ztg.* 73, 592-4 (1933). W. O. E.

**First provisional gas masks during the World War.** Eugen Hohnsaenger. *Sudderl. Apoth.-Ztg.* 73, 595 (1933).—A brief account of the 1st Ger. attempts to prep. a suitable gas mask during the early campaign in France. W. O. E.

**Water-vapor refrigeration.** Paul Bancel. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 20 pp.—The development of water-vapor refrigeration depended on the development of compressing units capable of sweeping very large vols. of low-density vapor. These have taken 2 forms: the steam jet booster and the centrifugal compressor. The paper describes these units, gives their characteristics and applications, with illustrations and charts. C. L. Mantell

**The drop-wise condensation of steam.** W. M. Nagle and T. B. Drew. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint) 38 pp.—The investigation was undertaken to explain observations made during a study of the water-side coeff. of heat transfer in a falling-film condenser. During 12 hrs. of continuous operation the capacity of the condenser was repeatedly found to increase about 60% from an initial value of approx. 90 lb. of steam/(hr.)(sq. ft.) to 145 lb. of steam/(hr.)(sq. ft.), although there was no corresponding change in the operating conditions imposed upon the app. The cause of this behavior was proved to be an increase of the steam-side coeff. of heat transmission. Results of others indicated that the change might be assocd. with a shift from film to drop-wise condensation. Exptl. work with various app. and metallic surfaces was made. The heat-transfer coeff. of drop-wise condensation is many times larger than film-wise condensation. App. is described in detail. Methods are given by which drop-wise condensation was made to take place. C. L. Mantell

Heat dissipation of heated wires and pipes in a current of air (Hilpert) 2.

**Chemical reactions.** Henry Dreyfus. *Fr.* 749,791, July 29, 1933. Exothermic chem. reactions, particularly in the gaseous or vapor phase, are carried out in narrow spaces, e. g., annular spaces formed between concentric tubes. The spaces have a thickness below 2.5 cm., and preferably 12-2.5 mm. An app. is described. (C. A. 27, 4323).

**Gaseous reactions.** Le Carbone. *Fr.* 750,094, Aug. 3, 1933. Gases or vapors are caused to react by passing them, mixed or not with moist air, through a battery, the pos. electrode of which is composed of very porous active C and which works in a continuous or intermittent manner on an exterior circuit of low resistance, or the gases or vapors traverse an electrolyzer, the cathode of which is composed of porous active C.

**Liquefying gases.** I. G. Farbenind. A.-G. (Fritz Markau, inventor). *Ger.* 577,834, June 6, 1933. Condensable gases in gas mixts. are liquefied by compressing in several stages, removing the heat developed by compression, and subjecting to a cooling agent.

**Liquefying gases such as sulfur dioxide.** Ralph H. McKee. *U. S.* 1,932,903, Oct. 31. The gas is dissolved in a strong soln. of a salt such as KCNS in which soln. the gas is more sol. than in water; the salt soln. is heated to expel the dissolved gas, the latter is dried by contacting it with liquefied gas, and the dried gas is cooled. App. is described.

**Purifying liquids.** Jacques R. Anger. *Fr.* 41,708, Mar. 29, 1933. Addn. to 711,654 (C. A. 26, 2001). Flocculation of the impurities is caused by the presence in the liquid of conducting elements acting on the charge of the colloidal particles, which become agglomerated and are deposited by their wt. Various forms are described.

**Distilling liquids.** Maschinenbau-A.-G. Goltzern-Grumma. *Fr.* 749,496, July 25, 1933. In distg. liquids contg. gases, such as worts for the manuf. of BuOH, acetone and EtOH, the mixt. of vapors and gases are con-

densed in more than one step, e. g., in one or more condensers kept at a relatively high temp., and then in a "gas separator" at a much lower temp. The condensate from the gas separator is preferably returned to the distn. column.

**Concentrating, distilling or heating liquids such as acids, alkalies, hydrocarbons, etc.** Joseph W. Harris *U. S.* 1,932,406, Oct. 31. Falling, exposed streams of the liquid are subjected to the heating action of an elec. current passed through them. *U. S.* 1,932,406 relates to app. for elec. heating of liquids flowing as a thin sheet over foraminous material such as wire cloth screen and exposed on both sides.

**Dispersing organic materials.** James F. Moseley. *Fr.* 749,446, July 24, 1933. An insol. hydrated oxide having colloidal properties, particularly SiO<sub>2</sub>, is used for dispersing org. substances such as those used for treating leather, textiles or paper, or for impregnating, finishing or delustering rayon. The degree of dispersion of the SiO<sub>2</sub> may be modified by peptizing agents.

**Determining moisture.** Charles H. W. Long. *Brit.* 396,098, July 31, 1933. To det. the moisture content of flour, corn, beet pulp, tobacco, etc., a measured quantity of the substance is arranged in an elec. circuit (a selected elec. characteristic of which is predetd.) in such manner as to produce a variation in said characteristic, which is ascertained from indicating means operatively connected with the circuit and which is substantially proportional to the moisture content of the substance. App. is described.

**Vacuum distillation.** Cecil R. Burch, Frederick H. Preece and Associated Electrical Industries Ltd. *Brit.* 396,205, Aug. 3, 1933. In the vacuum distn. of org. liquids that contain substances which condense under pressure or when the vacuum is lowered in the rotary pump producing the vacuum a tube or chamber is interposed between the distn. system and the pump, the surface thereof being heated to such temp. that the condensable substances are decompd. into solids and incondensable gases. App. is described.

**Recovering volatile substances by use of solid absorbent material.** Albert Godel (to Société de recherches & d'exploitations pétrolières). *U. S.* 1,934,301, Nov. 7. Loss of volatile substances contained in an absorption material during the step of drying and simultaneously cooling the hot absorption material after distn. is obviated by effecting the drying and cooling by a gas circulated in a closed circuit (the gas being cooled at a point in the circuit in the interior of the absorber and then conveyed back to the absorbent material). App. is described.

**Resolving oil-water suspensions and loose emulsions.** Harmon F. Fisher (to Petroleum Rectifying Co. of Calif.). *U. S.* 1,932,093, Oct. 24. The emulsion is passed between two relatively moving bodies such as intermeshed gears one of which is preferentially wetted by one phase of the emulsion and the other by the other phase. App. is described.

**Removing acid constituents from gases.** Metallgesellschaft A.-G. *Brit.* 396,969, Aug. 17, 1933. Gaseous contg. small amts. of acid constituents in a gaseous or finely divided liquid or solid form, e. g., HCl, HF, SO<sub>2</sub>, SO<sub>3</sub>, HNO<sub>3</sub>, SiF<sub>4</sub>, are caused to act on aq. suspensions of residues of fossil fuels whereby the acid constituents are extd. and converted to salts, principally of Al, Fe and Ca. Grate residues or fine dust from the combustion of brown coal or pit coal may be used. In examples (1) a furnace gas contg. SO<sub>2</sub> is washed at 50° with an aq. suspension of a flue dust, (2) a gas contg. HF or SiF<sub>4</sub> is washed with an aq. suspension of coke ash and (3) a gas contg. HCl is washed with an aq. suspension of brown coal ash.

**Crystallization.** Appareils et évaporateurs Kestner. *Fr.* 41,587, Feb. 7, 1933. Addn. to 731,065 (C. A. 27, 355). The process of *Fr.* 731,065 may be applied to a soln. of several salts of exothermic crystn. or to a mixt. of a soln. of one or more salts of exothermic crystn. with a finely divided solid product, e. g., a mixt. of NH<sub>4</sub>Cl and KNO<sub>3</sub>, or NH<sub>4</sub>NO<sub>3</sub> and CaSO<sub>4</sub>.

**Classifying diatomaceous earth into different sizes by**

air currents. Arthur B. Cummins (to Celite Corp.). U. S. 1,934,410, Nov. 7. Various details of app. and operation are described.

**Drying in molds.** J. D. & A. B. Spreckles Investment Co. Brit. 395,903, July 27, 1933. In molding solid bodies from granular material, particularly sugar, a cementing liquid (sirup) is poured on the granular material in the mold and a gas, *e. g.*, dried, heated air, is passed through the mass to distribute the liquid throughout the material, remove excess liquid and dry the mass. App. is described.

**Drying air.** Bernard H. Wilsdon and Leonard W. Burrige. Brit. 396,439, Aug. 4, 1933. The air in an enclosed space, *e. g.*, a showcase, shop window or picture frame, is prevented from becoming too moist by contact with a mixt. of solid compds. which contain  $H_2O$  of crystn. and exhibit aq. vapor dissocn. pressures below those at which molds and fungoid growths vegetate, *e. g.*,  $MgSO_4 \cdot 6H_2O$  and  $MgSO_4 \cdot 7H_2O$ ,  $ZnSO_4 \cdot 6H_2O$  and  $ZnSO_4 \cdot 7H_2O$ ,  $CuSO_4 \cdot 3H_2O$  and  $CuSO_4 \cdot 5H_2O$ ,  $FeSO_4 \cdot 6H_2O$  and  $FeSO_4 \cdot 7H_2O$ .

**Filtering air.** Società italiana Pirelli. Brit. 395,918, July 27, 1933. Air is rendered respirable by removal of aerosols in filters employing a loose mass of mingled fibers, other than the fine "vegetable wool" of reeds, etc., intimately mixed with inert powd. substance. Wool, cotton waste, hemp waste, wood pulp, rayon waste and (or) asbestos may be used mixed with talc, cork and (or) elonite dust.

**Conditioning air by heat exchange with a cooling medium such as water.** Jesse H. Davis and Samuel M. Anderson (to H. F. Sturtevant Co.). U. S. 1,932,513, Oct. 31. Various details of app. and operation are described.

**Use of exhaust steam from a steam engine for heating water, etc.** Maynard D. Church (to Moore Steam Turbine Corp.). U. S. 1,932,574, Oct. 31. The steam is condensed by 2 independent streams of water or other fluid and the effective action of one of the streams is controlled to regulate the outgoing temp. of the other. App. is described.

**Heat-transfer medium.** Herbert W. Daudt and John E. Cole (to E. I. du Pont de Nemours & Co.). U. S. 1,933,166, Oct. 31. A product suitable for use in refrigerating systems comprises a compd. of S, O and F, such as  $SO_2F_2$  or  $SOF_2$ .

**Use of mercury vapor for heat transfer in operations such as chemical reactions or distillation.** Crosby Field (to Chemical Machinery Corp.). U. S. reissue 18,993, Nov. 14. A reissue of original pat. No. 1,810,912 (C. A. 25, 4950).

**Manipulating drums containing material such as carbon dioxide under pressure.** Franklin B. Hunt (to Liquid Carbonic Corp.). U. S. 1,933,060, Oct. 31. Various details are given relating to transfer of the material under pressure from one receptacle or chamber to another, as in gasifying solid  $CO_2$ .

**Use of solid and liquid carbon dioxide in cooling, freezing and carbonating liquids, etc.** Justus C. Goosmann (to American Dryice Corp.). U. S. 1,933,256-7, 8, Oct. 31. Various features of app. and operation are described.

**Antimony trifluorodichloride.** Robert R. McNary (to Frigidaire Corp.). U. S. 1,934,943, Nov. 14. A compd. of the formula  $SbF_2Cl_2$  is formed by the action of Cl on  $SbF_3$  and is a viscous liquid suitable for use as a catalyst in fluorination of halogen derivs. of aliphatic hydrocarbons.

**Gas masks.** Rudolf Weichert. Brit. 396,904, Aug. 17, 1933.

**Filter boxes for respirators.** Bernhard Dräger. Brit. 396,323, Aug. 3, 1933.

**Respiratory filters.** Erwin Thaler and Clara-Fabrikate Cloetta & Co. m. b. H. Brit. 396,804, Aug. 17, 1933. A filter element for use in respirators comprises sponge rubber, the pores of which are lined with a gas-absorbing substance, preferably by kneading into the sponge an aq. chem. paste which may also contain moistening agents, powd. adsorbent, *e. g.*, active C or silica gel, or binding,

stiffening or setting agents, *e. g.*, cement, dextrin, starch, powd. asbestos, waterglass. The rubber may subsequently be vulcanized. Suitable pastes are (1) for absorbing acid gases, K metasilicate, or a mixt. thereof with  $K_2CO_3$ , 12, active C 4, powd. cement 5 parts;  $(CH_3)_4N_4$  or complex Zn salts, *e. g.*, zincates or zincamines may be added, and (2) for absorbing  $NH_3$ ,  $CuCl$  and active C in equal parts.

**Impermeable suit for use in chemical warfare.** Beriah M. Thompson. U. S. 1,931,562, Oct. 24. Structural details of a ventilating device, etc.

**Dielectric materials.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 41,743, Mar. 29, 1933. Addn. to 711,858. Dielectrics are composed wholly or in part of polychloro derivs. of aromatic hydrocarbons, particularly biphenyl and its derivs. The no. of Cl atoms is preferably equal to or greater than the no. of H atoms.

**Insulators.** Ernest A. Hallwood. Brit. 396,151, Aug. 3, 1933. Insulators are made from a compn. of powd. resin and powd. glass molded under heat and pressure without the use of solvents. Coloring matter may be added.

**Insulators, condensers, etc.** Alexander F. Fekete. Brit. 396,453, Aug. 10, 1933. An elec. insulator, condenser, etc., comprises a metallic armature, *e. g.*, of Al or an Al-coated base, an insulating film comprising an electrochemically formed compd. of the metal of such armature, *e. g.*, the oxide, and a metallic layer providing a second armature or conductor closely adhering to the insulating film. Further layers of film and metal may be applied. The oxide layer, prior to coating, may be treated with superheated steam and may be coated with the metallic layer by spraying.

**Insulating materials.** Allgemeine Elektrizitäts-Ges. Fr. 749,575, July 26, 1933. Unsapond. cellulose acetates contg. a small amt. of radicals of other org. or inorg. acids are used for making insulating materials.  $CHCl_3$  may be used as solvent.

**Heat and sound insulating materials.** Soc. des établissements Wanner. Fr. 749,686, July 27, 1933. The material is obtained by mixing  $MgCO_3$ , asbestos fibers, slag wool and kieselguhr.

**Heat-insulating material suitable for use at high temperatures.** Russell H. Heilman (to Philip Carey Mfg. Co.). U. S. 1,931,795, Oct. 24. Natural bauxite is processed to form monohydrated bauxite and a mass of particles of the monohydrated bauxite in its initial moist condition is mixed with asbestos fiber and bentonite clay, surplus liquid is removed and the mass is dried.

**Light-weight heat-insulating blocks.** Erik Hüttemann and Wolfgang Czernin (to Frederick O. Anderegg). U. S. 1,932,971, Oct. 31. A mixt. of finely pulverized siliceous material and a calcareous binder is formed into a fluid consistency with water, prehardened (as by steam under pressure) and formed into desired shapes, completely hardened and dried to remove all water.

**Heat-insulating cement suitable for use on brickwork or metal work of ovens, etc.** Adolph V. Leun and Leo H. Roffe (to Bethlehem Steel Co.). U. S. 1,933,271, Oct. 31. Slag wool 73, asbestos fiber 13, bentonite 6, a modifying clay such as "medium fat" clay 7 and  $Na_2CO_3$  1% are used together.

**Machine for continuously extruding a plastic covering, *e. g.*, vulcanized rubber, upon a series of wires.** Bell Telephone Laboratories, Inc. Brit. 396,062, July 26, 1933.

**Oil compositions suitable for cooling and insulating in electrical apparatus.** Frank M. Clark (to General Elec. Co.). U. S. 1,935,595, Nov. 14. Trichlorobenzene (suitably in a proportion of about 40% or less) is added to mineral or vegetable oils to lower the congealing point.

**Electrical insulation.** Willoughby S. Smith, Henry J. Garnett and John N. Dean. U. S. 1,934,335, Nov. 7. An insulating material suitable for use on submarine cables comprises gutta-percha of low resin content mixed with 50% or less of a semi-solid refined petroleum product such



as a petroleum jelly. Rubber also may be added. Cf. C. A. 27, 448.

**Submarine cable insulation.** Siemens & Halske A.-G. Brit. 395,908, July 27, 1933. The cables are provided with an insulation contg. a rubber mixt. consisting of rubber and cellulose derivs. in the preferred proportions of 60:40. The cellulose derivs. may be ethers or esters of high mol fatty acids, e. g., cellulose laurate, sol. in the rubber or, especially where vulcanization is contemplated, act as fillers, e. g., benzylcellulose. Softening agents, e. g., mineral wax, may be added. The compn. is highly resistant to H<sub>2</sub>O and has low dielec. losses.

**Lacquer-covered electric cables.** Winters S. Johnstone (to Packard Elec. Corp.). U. S. 1,931,610, Oct. 24. After applying successive lacquer coatings to a cable and while some of the outer coatings are still in a soft and partially dried condition, pigmented material of contrast-

ing color such as a pigmented pyroxylin ink contg. a solvent such as toluene to assist penetration of the lacquer is applied.

**Lead covered electric cable.** Archie R. Kemp (to Bell Telephone Laboratories, Inc.). U. S. 1,935,322, Nov. 14. Structural features are described, involving an insulated cable sheathed with Pb and having an outer covering of braided asbestos covered wire impregnated with a fire- and water-proofing material such as a stearin pitch compn.

**Sheathed underground cables.** Archie R. Kemp and John H. Ingman (to Bell Telephone Laboratories, Inc.). U. S. 1,935,323, Nov. 14. Metal-sheathed cables are provided with an outer covering of a mixt. comprising "vegetable pitch" 10-40, blown asphalt 10-15, ground vulcanized rubber 30-45, ground silica about 10 and gil-onite or asbestos fibers 10-30%. Various details of manuf. are described.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Water supplies.** G. M. Fyfe. *Surveyor* 84, 295-6 (1933).—Av. temporary and permanent hardness for different types of waters are: rainwater 0, 0.3; upland surface 1.4, 3.6; spring 11, 7.0; deep well 12, 8; shallow 18, 22, resp. From a health point of view there is little to choose between soft and hard water. Claims have been made that where soft water is consumed children have a tendency to suffer from rickets. Hard water is considered to be assocd. with rheumatic and gouty complaints.

A. L. Elder

**Steps in the purification of the Bridgeport water supply.** Frank C. Barrows. *J. New Engl. Water Works Assoc.* 47, 219-22 (1933).—In 1911 hypochlorite of lime was used; in 1916 Cl<sub>2</sub> gas replaced this; in 1932 NH<sub>3</sub> was used in conjunction with Cl<sub>2</sub>. Improvement was marked. Flushing of dead ends was less frequent. CuSO<sub>4</sub> used for algae has been greatly decreased. The approx. Cl<sub>2</sub> dosage has been 3.5 lb. per million gal. water.

D. K. F.

**Wakefield water supply.** Robert S. Weston. *J. New Engl. Water Works Assoc.* 47, 239-47 (1933).—The main supply, from a spring- and brook-fed lake, is supplemented by excellent well water. The surface is subject to contamination with bacteria and microorganisms. Cl<sub>2</sub> aeration and slow sand filtration produce a satisfactory supply.

D. K. French

**Relation of forests to the evaporating power of the air.** Paul W. Stickel. *J. New Engl. Water Works Assoc.* 47, 229-38 (1933).—In openings, even small ones, nearly twice as much water will be evapd. than beneath forest cover. Many interrelated factors are involved. Shade and temp. are the principal ones.

D. K. French

**Catalytic action of mineral waters.** A. Rezek and T. Pinter. *Pharm. Monatsh.* 14, 197-202 (1933).—The work of previous investigators is reviewed. Several waters are studied and the following detns. made: (1) For the detn. of catalysis the reaction with H<sub>2</sub>O<sub>2</sub>, as suggested by Fresenius is used. (2) The peroxidases are detected by benzidine in acid soln. (conc'd. soln. of benzidine in dil. AcOH and 3% H<sub>2</sub>O<sub>2</sub>) and in alk. soln. (0.5% benzidine in EtOH and 0.1% H<sub>2</sub>O<sub>2</sub>). The appearance of the green and blue color in about 5 min. was taken as a pos. reaction. (3) Fe<sup>3+</sup> ion was detected with thiocyanate or ferrocyanide soln. after oxidation with HNO<sub>3</sub> or by means of isonitrosoacetophenone according to Kröhnke and the Mn ion with NH<sub>4</sub> peroxide and AgNO<sub>3</sub> according to Feigl. (4)  $p_H$  was detd. by the methods of Sorenson and of Michaelis.

H. M. Burlage

**Manganese in drinking and industrial water.** E. Naumann. *Z. Gesundheitsch. Städtehyg.* 25, 163-70 (1933).—A review.

B. C. Brunstetter

**Active carbon in water purification.** H. Haupt and W. Steffens. *Z. Gesundheitsch. Städtehyg.* 25, 97-111 (1933).—A review.

B. C. Brunstetter

**The determination of odors and tastes in water.** Gordon M. Fair. *J. New Engl. Water Works Assoc.* 47, 248-72

(1933).—An unusually complete consideration of the problem including physiol. factors. Classification of odors, threshold values, the Weber Fechner law, the odor scale of Allison and Katz, followed by a discussion of the existing methods of determining odors and tastes in water. Refinements in equipment and technic are suggested, as well as the use of odor potential for recording the results.

D. K. French

**Pipe linings and friction coefficients.** Elson T. Killam. *J. New Engl. Water Works Assoc.* 47, 283-95 (1933); cf. C. A. 27, 153.—Smooth linings make possible pipe of smaller diam., elimination of variations in residual pressure, and of troubles and problems due to tuberculation. Rate of flow is directly proportional to the value of its friction coeff. Relative values for various surfaces are given. A slight roughening will cause a great loss in carrying capacity.

D. K. French

**Advances in iron coagulation and coagulants.** E. L. Bean. *J. New Engl. Water Works Assoc.* 47, 273-9 (1933).—With the appearance of iron coagulants at reasonable prices their efficiency has been emphasized. Reaction time is shorter. Effective  $p_H$  range is shown from 3.8 to 10 or higher. Mn removal is easily accomplished. Color removal is more effective than where Al compds are used. Pure ferric sulfate in granular or powd. form is now available.

D. K. French

**Aldershot sewage-disposal experiments.** J. W. Edwards. *Surveyor* 84, 204 (1933).—Primary purification with beds of 2-in. gage gravel, clinker and coke beds were 58, 70 and 70%, resp. The percentage purification at 4, 9, 12, 15, 27, 43 and 59 in. levels was 28, 16, 7, 5, 5, 9 and 5, resp. Expts. are being made with a steam-heated sludge bed.

A. L. Elder

**Development and status of ventilation technic.** L. Worp. *Ingenieur* 48, W53-9 (1933).—A lecture reviewing modern air-conditioning equipment.

B. J. C. van der Hoeven

**Ship fumigation at the Port of Durban.** G. A. Park Ross. *J. Roy. Sanit. Inst.* 54, 35-40 (1933).—Ca(CN)<sub>2</sub> dusting is used in concn. of slightly over 1 to 11,000 or 60-80 g. dosage per 1000 cu. ft. are used. Compressed air and steam have been used to drive the gas from ill-ventilated spaces.

A. L. Elder

**Installing waste-disposal systems in food plants.** Fred A. Fielder. *Food Ind.* 5, 440-1 (1933).—Suitable systems are described with figures and drawings.

C. R. Fellers

**Typhoid formerly and at present.** O. Solbrig. *Gesundh.-Ing.* 56, 461-4, 474-8 (1933).—The decrease in typhoid in various cities of Germany with improvement of sanitary conditions and water supplies is discussed, together with the means of spread of the disease and methods of combating it. Tables and graphs present statistics from various localities of Germany and some other countries over about the last 60 years.

M. G. Moore

Determination of Fe [in drinking water] (Alten, et al.) 7. 1

**Purifying water.** Hugh Rodman (to Rodman Chemical Co.). U. S. 1,933,567, Nov. 7. Water such as may contain substances of objectionable smell or taste is rendered potable by agitating it with finely divided and readily suspensible coal or coke and then sepg. the suspended solids.

**Purifying water.** Max Penschuck. Ger. 577,830, June 6, 1933. App. in which sewage or surface water is purified by treatment with  $Al_2(SO_4)_3$  as a precipitant is described.

**Apparatus for purifying water by active carbon.** Bau et assainissement. Fr. 749,759, July 29, 1933.

**Apparatus for purifying water by injection of chemical reagents into a water conduit.** Harry B. Hartman. U. S. 1,931,818, Oct. 24. A water meter controls a pump for injecting the treating agent.

**Water filter suitable for use with spigots.** Joseph F. Auberscheck. U. S. 1,934,159, Nov. 7. Structural details.

**Apparatus for treating water with softening agents, etc.** Laurentz Hunkemoller and Anton Hunkemoller. Swiss 161,850, Aug. 1, 1933.

**Apparatus for softening water.** Wm. L. O'Brien and Arthur C. Zimmerman (to Duro Co.). U. S. 1,932,117, Oct. 24. Structural details.

**Apparatus for softening water.** Aktiebolaget Filtrum. Fr. 749,696, July 27, 1933.

**Base-exchange water-softening apparatus.** Aktiebolaget Filtrum. Brit. 396,104, Aug. 3, 1933.

**Apparatus for softening water by use of base-exchange material.** Andrew J. Dotterweich (to Automatic Water Softener Co.). U. S. 1,933,309, Oct. 31. Various structural and mech. details are described. U. S. 1,933,370 also relates to app. for softening water with zeolitic material.

**Control system (with a photoelectric cell) for base-exchange water-softening apparatus.** Orland R. Sweeney and Thomas B. Clark (to Permutit Co.). U. S. 1,931,968, Oct. 24. Various structural and operative details of an elec. control system are described.

**Fixed diffusers for blowing air or other gas into sewage or other liquid.** Joseph A. Hartley, Cyril J. Hartley and John W. Hartley. Brit. 396,732, Aug. 4, 1933.

**Apparatus for separating solids from sewage, etc.** Wilhelm Wurl. Ger. 586,429, Oct. 21, 1933.

**Purifying waste waters.** Adrien Chabal. Fr. 749,455 July 25, 1933. Waste waters and sewage are aerated not only at the purifying station, but also in the drainage system, whereby the liberation of odors and formation of colloidal matter is avoided.

**Conditioning air with ozone.** Earle W. Ballentine (to Solar Industries, Inc.). U. S. 1,932,379, Oct. 24. Air is first treated with an amt. of ozone in excess of that required to produce the desired effect and is then heated to remove the objectionable excess of ozone. App. is described adapted for conditioning air for rooms.

## 15- SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND E. D. JACOB

Some soils of the North Cape district [New Zealand]. R. F. R. Grimmer and F. J. A. Brogan. *New Zealand J. Agr.* 47, 229-36(1933).—Chem. analyses of 13 samples are given. The soils are deficient in available Ca, Mg, K and P, and the  $pH$  values are usually less than 5.5.

K. D. Jacob

**Notes on the soils of the Trans Nzoia.** G. H. Gethin Jones. Kenya Colony Dept. Agr., *Bull.* 8, 11 pp.(1932).—The light reddish soils are derived from volcanic lava and metamorphic Archean schists. In 51 samples of surface soil the  $pH$  ranged from 5.6 to 6.4, the av. being approx. 6.0. The  $pH$  of the subsoils ranged from 5.2 to 7.2 and averaged 5.85. In general, the soils are low in available P.

K. D. Jacob

**Classification and evaluation of the soils of Western San Diego County.** R. Earl Storie. Calif. Agr. Expt. Sta., *Bull.* 552, 3-41(1933).—A reconnaissance survey.

C. R. Fellers

**The story of Field A of the Massachusetts Agricultural Experiment Station. A review of experiments with nitrogen fertilizers.** Fred W. Morse. Mass. Agr. Expt. Sta., *Bull.* 290, 3-23(1932).—Fifty years' results are presented and interpreted.

C. R. Fellers

**Soil conditions associated with crop failures in Devon and Cornwall.** A. Blenkinsop. *J. Ministry Agr. (Engl.)* 40, 595-604(1933).—An accurate valuation of a soil can be made by a careful estn. of the balance of its Ca,  $P_2O_5$  and  $K_2O$  and nitrate N content. Extreme variations in these soils are:  $pH$  3.9-8.9; total  $P_2O_5$  310-10,410 pts. per million; available  $P_2O_5$  12-5200 pts. per million and exchangeable  $K_2O$  36-1190 pts. per million. The failure of a no. of crops is discussed with relation to soil balance. The CaO status of the soil is the greatest single limiting factor detg. the distribution of crops. Excess soil acidity is a cause of crop failures and with this is often assocd. a  $P_2O_5$  deficiency. These soils are also marked by their high rate of nitrification.

J. R. Adams

**Mechanical analysis of soils.** J. Gollan, L. Hervot and V. Nicollier. *Rev. facultad quim. ind. agr., Univ. nacl.itoral 2*, 64-87(1932).—A general outline of principles and methods.

O. W. Wilcox

**A new reversible agitation apparatus with horizontal rotary movement suitable for analyses on a large scale.**

C. Krugel and C. Dreyspring. *Superphosphate* 6, 197-205(1933).—See C. A. 27, 5865.

K. D. Jacob

**Determination of the liquid limit of soils.** Josue Gollan. *Rev. facultad quim. ind. agr., Univ. nacl.itoral 2*, 106-9(1932).—Description, with figures and drawings, of an improved app. L. Hervot. *Ibid.* 110-11. H made an exptl. comparison of the capsule method used in the U. S. with the method and app. originated by Gollan. The results obtained by the American method show deviations up to 3.304 (about 11%); with the Gollan method, which largely eliminates the personal equation of the operator, the agreement was within 0.4.

O. W. Wilcox

**Moisture relationships of soils in situ.** J. H. Neal. *Agr. Eng.* 13, 128-32(1932).—Data are given on mineral, muck and peat soils of varying textures. The moisture content of satd. mineral soils and their pore space show a fairly definite relationship to the moisture equiv. The moisture content of moderately fine-textured soils *in situ* lying below the water table varies between 1.0 and 1.4 times the moisture equiv., while that for the coarsest textured soils may exceed 5 times the moisture equiv. A more or less direct relation exists between the org. matter content, moisture equiv., linear shrinkage and cubical shrinkage of soils. Methods for the study of moisture conditions in soils *in situ* are outlined.

K. D. Jacob

**Combined water in the clay of the soils of Santa Fe.** Josue Gollan and Carlos Christen. *Rev. facultad quim. ind. agr., Univ. nacl.itoral 2*, 128-9(1932).—Analyses give an av. value of 5.2% for the combined water in the clay fraction of Santa Fe soils.

O. W. Wilcox

**"Overo" soils with infertile spots.** J. Gollan and J. Cruellas. *Rev. facultad quim. ind. agr., Univ. nacl.itoral 2*, 96-105(1932).—Certain fertile soils ("tierras overas") are dotted with spots of varying areas which are practically sterile. This sterility was found to be due to a low ratio  $CaO/MgO < 2$ , whereas on the fertile areas this ratio was found to be  $> 4$ .

O. W. Wilcox

**The relation between reaction and particle size in soils.** H. Niklas and A. Frey. *Landw. Jahrb.* 76, 819-43(1932).—Soils having particles of different sizes but of the same compn. are studied to det. if particle size is related to

acidity. A formula is given for detg. the "rest" acidity curve of soils.

**Determination of nitrogen in soils. II. Protective action of silica as a factor in the estimation of nitrogen by the Kjeldahl method.** A. Srinivasan and V. Subrahmanyam. *Indian J. Agr. Sci.* 3, 646-57(1933); cf. *C. A.* 27, 1696.—A study was made of the effect of various substances on the detn. of N in soil, by the Gunning-Hibbard modification of the Kjeldahl method (I) and by digestion after allowing the sample to stand overnight in contact with 1:1  $H_2SO_4$  (II). The results obtained by I were lower than those obtained by II and the residue left after digestion by I consisted of undigested soil particles enclosed in thick coatings of  $SiO_2$ , the protective action of  $SiO_2$  being more marked with heavy than with light soils. A study of the mechanism of the formation of the protective layer showed that  $SiO_2$  was the immediate product of the reaction between hot concd.  $H_2SO_4$  and the aluminosilicates present in the soil, the protective coat usually being formed before the acid had wetted all the soil particles. When soil was heated with dil. acid, as in II,  $SiO_2$  was not formed until all the  $H_2O$  had been driven out, thus allowing sufficient time for the acid to react with all the soil particles. The layer of  $SiO_2$  formed by concd. acid was readily penetrated by dil. acid. Titaniferous minerals and org. compds. had no appreciable effect on the decompn. of soil by concd.  $H_2SO_4$ , but the digestion was rendered somewhat difficult by the presence of increasing amts. of Fe and Al oxides and laterite; digestion was greatly hastened by addn. of  $H_2O_2$  and fine grinding of the soil had a favorable effect. K. D. Jacob

**Determination of carbonates and organic matter in soils.** Josue Gollan and Carlos Christen. *Rev. facultad quim. ind. agr., Univ. nat.itoral* 2, 112-19(1932).—A sample of the soil is decompd. with HCl or  $H_2SO_4$  in a flask and the evolved  $CO_2$  is absorbed in standard NaOH soln., free from  $CO_2$ ; the absorbed  $CO_2$  is pptd. with  $BaCl_2$  and the change in titer of the NaOH soln. detd. for detn. of org. matter in soils the sample is first freed from  $CO_2$  by treatment with acids; the residue is oxidized in a flask with dichromate and  $H_2SO_4$ ; the  $CO_2$  formed is absorbed in NaOH soln. and detd. as described above.

O. W. Wilcox

**Soil conditions affecting coffee in Kenya.** David S. Gracie and A. D. Le Poer Trench. Kenya Colony Dept. Agr., *Bull.* 7, 45 pp.(1931).—Data are given on the coloration with Comber's soln., exchangeable Ca,  $pH$  value (0.2 M KCl ext.) and sp. acidity of numerous profiles of coffee soils. The  $pH$  values of the samples from the 1st 9-in. layers of soils ranged approx. from 4.5 to 5.5, the subsoil samples usually having slightly lower values. Although there was no direct relation between soil acidity and the growth of coffee, excessive subsoil acidity favored development of chlorosis of the trees and was assocd. with a low content of available K. High acidity and low exchangeable Ca in the soil seemed to favor mealy bug attack on the trees. In the red soils of the Kikuyu Province the exchangeable C and total N decreased and the  $pH$  value increased with increase in the richness of the soil. In certain soils, high in exchangeable Ca and having low acidities, the trees exhibited the typical symptoms of Mn deficiency and the leaves were somewhat low in Mn as compared with those from normal trees. Data are given on the percentages of dry matter, total N, Ca, P, K, Fe and Mn in the leaves, cherries and pulp of coffee. Chlorotic wheat plants, grown on a grayish black soil, that had been fertilized with double superphosphate, contained 51.9 mg. Fe and 2.9 mg. Mn per 100 g. dry matter, whereas normal plants contained 8.0 and 12.9 mg., resp.

K. D. Jacob

**The climatic and soil requirements of tea.** Harold H. Mann. *Empire J. Exptl. Agr.* 1, 245-52(1933).—The chem. characteristics of tea soils are discussed. They should not contain more than a trace of lime (less than about 0.15% CaO sol. in HCl) and the  $pH$  should be approx. 5.2-5.6. A large excess of N, either org. or inorg., in the soil is disastrous to the quality of the tea. Seventeen references.

K. D. Jacob

**The acidity of tea soils of northeast India. II. The treatment of soils of low acidity.** C. J. Harrison. Sci. Dept. Indian Tea Assoc., *Quart. J.* 1932, 70-7.—Tea grows well on soils having  $pH$  values of about 4.3-5.8, and having neutral salt ext.  $pH$  values of approx. 3.5-5.0; the  $pH$  values of the less acid soils can be brought into this range by applications of S, the amt. of S required being detd. from the amt. of  $H_2SO_4$  necessary to reduce the  $pH$  of a small sample of the soil to the desired value. For a given change in  $pH$  a much larger amt. of S is required for heavy clay soils than for sand, silt and loam soils. Data are given on the Hopkins acidities,  $pH$  values of soil water exts. and  $pH$  values of neutral salt exts. of tea soils from various localities in northeast India. K. D. Jacob

**Effect of soil acidity on the yield of sugar cane.** H. H. Croucher. *J. Jamaica Agr. Soc.* 37, 508(1933).—The yield of cane on soil having a  $pH$  value of 7.0 in the top soil and 7.2 in the subsoil was 33.0 tons/acre, as compared with 18.50-18.75 tons on soils of  $pH$  4.95-5.50 in the top soil and 4.6-4.8 in the subsoil.

K. D. Jacob

**Principles of fruit production and soil fertility maintenance.** Clayton L. Long. Idaho State Hort. Assoc., *Proc. 37th Ann. Conv.* 1932, 58-70.—Over a 9-yr. period, an apple orchard soil planted to a cover crop of alfalfa showed an av. annual gain of 245 lb. N and a loss of 81 lb.  $P_2O_5$  and 206 lb.  $K_2O$  per acre as compared with the virgin soil.

K. D. Jacob

**Test on plant material for diagnosing phosphorus deficiencies.** S. F. Thornton. Ind. (Purdue) Agr. Expt. Sta., *Bull.* 355, 20 pp.(1932); cf. *C. A.* 26, 2267.—Samples of stems or leaf petioles are taken from or near actively growing points of plants. From 1 to 1.5 g. of the crushed material is treated with 10 cc. of a reagent contg. 4 g. of  $(NH_4)_2MoO_4$  dissolved in 500 cc. of  $H_2O$ , to which are added 63 cc. of concd. HCl and 437 cc. of  $H_2O$ . After vigorous shaking with the reagent a small crystal of  $SnCl_2$  is added. The blue coloration indicates the morg. P in the stems.

B. C. A.

**Recent investigations and experiments on different phosphate fertilizer questions.** O. Engels. *Das Superphosphat* 9, 97-101(1933).—A brief review of work on soil P and the effects of phosphate fertilizers on the yield and quality of crops. Thirteen references.

K. D. J.

**Is there danger of loss of phosphate by leaching when phosphate fertilizers are applied to the soil in the autumn?** Ludwig Schmitt. *Das Superphosphat* 9, 103-8(1933).—Lysimeter expts. were carried out with a strongly acid pervious sand soil (I), an alk. slightly loamy loess soil (II), an alk. strongly loamy, sandy loess soil (III) and an alk. river mud (IV). Superphosphate and basic slag were applied in amts. equiv. to 60 kg.  $P_2O_5$  per hectare annually and the lysimeters were planted to wheat, potatoes and oats in successive years. With superphosphate the total loss of  $P_2O_5$  by leaching during 3 years from I, II, III and IV was 1.41, 1.19, 0.91 and 0.98 kg./hectare, resp., and with basic slag the loss was 1.40, 0.71, 0.74 and 0.99 kg.; with superphosphate the total amt. of  $P_2O_5$  removed by the crops was 100.2, 171.1 and 115.6, and with basic slag 114.2, 166.2 and 115.8 kg./hectare from I, II and IV, resp. No increase in the P content of a soil at depths below 20 cm. was obtained in 30 years when superphosphate and basic slag were applied at the rate of 64 kg.  $P_2O_5$ /hectare annually; with double this amt. of P a slight increase was obtained in the 2nd 20 cm.

K. D. J.

**Movement of added phosphate in soil.** I. B. W. Doak. *New Zealand J. Sci. Tech.* 15, 155-62(1933).—It appears that the penetration of added  $P_2O_5$  is much more rapid when the applications of  $P_2O_5$  are heavy and made at infrequent intervals than when smaller applications are made more frequently. Analyses support the contention that the P in the soil occurs as (a) natural stable P compds. which are subject to negligible wastage by leaching, and (b) the unstable P compds. of added dressings which are removed fairly rapidly from the surface layers by percolating waters. A brief review is given of the available literature on the subject.

J. R. Adams

**The laying of cereal crops.** P. Hildebrand. *Das Superphosphat* 9, 102-3(1933).—A brief discussion of the

factors contributing to the laying of cereal crops and the value of phosphate fertilizers in preventing this condition.

K. D. Jacob

Soil maps, reaction maps and phosphoric acid maps as a basis for the setting up of fertilizing and tillage plans for fields. E. Pfuhl. *Das Superphosphat* 9, 110-14 (1933).—The prepn. of maps showing the soil types and the reaction and P requirements of fields is described.

K. D. Jacob

Can the amount of phosphoric acid necessary for maximum plant growth be determined in advance? Hoffmann. *Das Superphosphat* 9, 114-16 (1933).—Contrary to Remy (cf. C. A. 27, 3770), H. concludes that the fertilizer requirements of soils usually can be detd. in advance of planting the crop with sufficient accuracy for practical purposes.

K. D. Jacob

Is a top-dressing of superphosphate equal to a dressing applied to the arable soil? C. Krugel and C. Hevspaning. *Das Superphosphat* 6, 157-65, 177-85 (1933).—The results of pot expts. with oats, barley, corn, red clover and summer wheat indicated that superphosphate is used as efficiently by the plant when it is applied to the surface of the soil as when it is worked into the soil. This seems to be due to the strong development of the root system near the surface of the soil rather than to the leaching of the P into the soil.

K. D. Jacob

Investigations in pasture production. V. Effect of applying superphosphate at different times of year and of heavy dressings of sulfate of ammonia on yield of herbage. A. W. Hudson and G. K. McPherson. *New Zealand J. Agr.* 47, 234-42 (1933); cf. C. A. 27, 4616.—The lowest total yields were obtained from winter applications of superphosphate; the differences between the yields from applications at other times of the year were small, spring applications giving the best results. Application of  $(\text{NH}_4)_2\text{SO}_4$  with the superphosphate resulted in smaller yields than were obtained with superphosphate alone.

K. D. Jacob

The efficiency of Schleswig-Holstein permanent pastures. W. Dix. *Landw. Jahrb.* 76, 525-74 (1932).—1. shows the relation between the chem. compn. and phys. properties of the soil to chem. compn. and nutritional value of the herbage.

George R. Greenbank

Influence of season and of ammonium sulfate on the chemical composition of perennial rye grass and of white clover. H. O. Askew. *New Zealand J. Sci. Tech.* 15, 143-54 (1933).—Samples were taken from 2 series of plots, one receiving a base fertilizer of superphosphate and  $\text{K}_2\text{SO}_4$  (control plot) and the other the same base fertilizer mixt. with top dressings of  $(\text{NH}_4)_2\text{SO}_4$ . Dry matter in the rye grass and in white clover show little variation. With both species drought decreases the  $\text{P}_2\text{O}_5$ , N,  $\text{K}_2\text{O}$  and sol. ash contents; the CaO and  $\text{SiO}_2$  contents increase as the season advances, and are not decreased during dry weather. Seasonal variations in the different constituents are much smaller for white clover than for perennial rye grass. Application of  $(\text{NH}_4)_2\text{SO}_4$  increases the N content most markedly in the first sample collected after top-dressing; later, there is little difference between the N contents of treated and untreated rye grass or white clover. Rye grass is much more sensitive to drought than is white clover.  $(\text{NH}_4)_2\text{SO}_4$  increases the K<sub>2</sub>O, sol. ash and total and morg. S contents of rye grass, particularly in the periods immediately following the application of the fertilizer. CaO,  $\text{P}_2\text{O}_5$  and  $\text{SiO}_2$  tend to be lower on the N plots than on the control. With white clover the CaO,  $\text{P}_2\text{O}_5$ , N, and sol. ash contents are increased after each application of  $(\text{NH}_4)_2\text{SO}_4$ ; later, they all fall to lower values than those for the control plots.  $\text{K}_2\text{O}$  tends to be lower on the N-treated clover than on the controls. The depression in the CaO content of the rye grass and of white clover due to fertilizing with  $(\text{NH}_4)_2\text{SO}_4$  is insufficient to account for the large decreases in the CaO content of mixed pastures following the use of nitrogenous fertilizer. The N: $\text{P}_2\text{O}_5$  ratio tends to fall during the summer periods in the perennial rye grass but tends to increase in the white clover. This ratio for white clover is almost double that of rye grass.

J. R. Adams

Causes of the action of Thomas meal. V. The significance of magnesia and manganese in Thomas meal. A. Wilhelmj and S. Gericke. *Phosphorsäure* 3, 513-47 (1933); cf. C. A. 27, 5860.—Samples of synthetic Thomas meal were prepd. in which the Ca was replaced by equiv. quantities of Mg in amts. ranging from 0.0 to 47.21%  $\text{MgO}$ . The results of numerous expts. showed that the Mg in Thomas meal has the same effect as the Ca in reducing soil acidity. In amts. to about 2% of the Thomas meal, Mg has a favorable effect on the absorption of P by seedling plants; higher percentages depress the absorption of P, the effects being similar to those obtained with equiv. amts. of Mg as  $\text{MgCO}_3$ . Under comparable conditions, Mg as  $\text{MgSO}_4$  increases the absorption of P. The normal content of Mg (about 1-4.5%  $\text{MgO}$ ) in Thomas meal has a direct beneficial effect on the growth of plants in Mg-deficient soils; higher percentages of Mg may have a detrimental effect. Expts. with synthetic Thomas meals contg. 0.0-10.24% Mn showed that the Mn had no effect either on the root soly. of the  $\text{P}_2\text{O}_5$  in Thomas meal or on the yield of oats grown in sand and loamy sand soils, but increased the kernel wt. and the germinating power of the grain; it had no effect on the absorption and utilization of the  $\text{P}_2\text{O}_5$ . Seventeen references.

K. D. Jacob

Recent developments in nitrogen fertilizers. C. L. Burdick. *Am. Inst. Chem. Eng., Rome Meeting*, Dec. 1933 (preprint), 147pp.—The synthetic  $\text{NH}_3$  industry is approaching the 20th anniversary of its large-scale com. development. In the early years of this century fears were regularly expressed regarding prospective shortage of N. For the last 15 years the pressure has been steadily for cheaper N. The emphasis of the paper is on the history and economics of recent developments.

C. L. Mantell

Assortment and technology of nitrogen fertilizers in relation to the coke chemical industry. L. S. Assinovsky. *Coke and Chem. (U. S. S. R.)* 1932, No. 3, 14-24, No. 7, 20-7. — A discussion of the resp. values of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ ,  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{CO}(\text{NH}_2)_2$ ,  $(\text{NH}_4)_2\text{CO}_3$ ,  $\text{NH}_4\text{Cl}$ ,  $(\text{NH}_4)_2\text{HPO}_4$  and  $\text{NH}_4\text{H}_2\text{PO}_4$  as fertilizers. An outline of plant technology for the production of each of these fertilizers is given.

James Sorrel

The effect of nitrogenous fertilizers on the growth and yield of wheat and barley in South Australia. I. Wheat grown after fallow and after stubble. A. E. V. Richardson and H. C. Gurney. *Empire J. Exptl. Agr.* 1, 193-205 (1933).—When equiv. amts. of N were applied to wheat over a 5-yr. period the largest increases in yields were obtained with  $\text{NaNO}_3$ ; no significant differences occurred between the increases given by  $(\text{NH}_4)_2\text{SO}_4$ , Nitro-chalk and urea, but the increases given by  $(\text{NH}_4)_2\text{HPO}_4$  were definitely smaller. Drilling superphosphate or  $(\text{NH}_4)_2\text{HPO}_4$  with the seed increased the yield 3.2 and 3.9 bu./acre, resp., as compared with broadcasting the fertilizer on the surface of the soil; with  $(\text{NH}_4)_2\text{SO}_4$  there was no significant difference between the drilled and the broadcast applications.  $(\text{NH}_4)_2\text{SO}_4$  slightly depressed the plant-establishment, caused a vigorous burst of tillering resulting in a greater no. of ear-bearing tillers at harvest, increased slightly the length of ear, caused a weaker and sapper growth, decreased the percentage of grain to total produce, and increased the growth of weeds. Naturally occurring N on fallow caused a more prolonged and steadier tillering, resulting in sturdier tillers, the percentage survival of which was better than with  $(\text{NH}_4)_2\text{SO}_4$  on stubble.

K. D. Jacob

A simple and rapid chemical test on plant material as an aid in determining potassium needs. S. F. Thornton. *Ind. (Purdue) Agr. Expt. Sta. Bull.* 384, 3-20 (1933); cf. C. A. 27, 4336. The previously described technique gave reliable indications of the needs of farm crops for K fertilizers. Interpretation of results of the test in terms of K supply is based on work with plants from a large no. of soils whose fertilizer and yield histories are definitely known. For corn, potatoes and soy beans a good correlation existed between results of the test fertilizer treat-

ments, and yield responses. Thirty-two references.

C. R. Fellers  
Absorption of potassium by plants as affected by decrease exchangeable potassium in the soil. E. L. Proebsting. *J. Pomology and Hort. Sci.* 11, 190-204 (1933).—Exptl. data show that different plants vary widely in their ability to withdraw supplies of K from a given soil. Neither exchangeable nor  $H_2O$ -sol. K is an accurate index of the ability of the soil to supply K. The non-exchangeable K may be an important source of supply to some plants in certain soils. J. O. H.

The effect of fertilizers and rainfall on the length of cotton fiber. E. B. Keynolds and D. T. Killough. *J. Am. Soc. Agron.* 25, 756-64 (1933); cf. C. A. 27, 3280.—On Lufkin fine sandy loam there appeared to be no significant correlation between the percentage of N,  $P_2O_5$  or  $K_2O$  and the length of cotton fiber. N and  $K_2O$  had no appreciable effect on the length of fiber on Kirwin fine sandy loam but applications of  $P_2O_5$  increased the length of lint to some extent, which approached significance. In some instances the length of fiber was positively correlated with the amt. of rainfall during the time the bolls were developing. J. R. Adams

Cotton fertilizer tests at the Georgia Coastal Plain Experiment Station. S. A. Parham. Ga. Coastal Plain Expt. Sta., *Bull.* 19, 12-21 (1932).—Long-continued tests with various formulas show the ideal cotton fertilizer applied at the rate of 500 lb. per acre should contain  $P_2O_5$  9,  $NH_4$  3 and  $K_2O$  5% applied at the time of planting, and a top dressing of 100-150 lb. of  $NaNO_3$  or its equiv., applied as soon as the cotton is chopped. On thin land this formula may be changed to a 9-4-5 combination.  $CaO$  or  $CaCO_3$  gave no increases in yield of cotton. High-analysis fertilizers gave equally good results as the less concentrated, provided they are thoroughly mixed with the soil. Approx. 20-25% of the  $NH_4$  in cotton fertilizers should be derived from an org. source such as cottonseed meal and the remainder from such inorg. sources as  $NaNO_3$  or  $(NH_4)_2SO_4$ . As sources of K, kainite, over a 9-yr. period gave the highest yields with  $K_2SO_4$  next, and KCl third. C. R. Fellers

Study of rice fertilization. L. C. Kapp. Ark. Agr. Expt. Sta., *Bull.* 291, 3-37 (1933).—A lack of N is responsible for most of the abnormal growth and low yields of rice. In greenhouse expts.  $NaNO_3$  proved superior to a source of N to  $(NH_4)_2SO_4$ . Rice straw applications decreased the growth and yield of rice. Small frequent applications of  $NaNO_3$  greatly increased yields of rice. Nitrites are not accumulated in submerged soils in sufficient quantities to prove toxic to rice seedlings. The increased yields of rice from dried and sterilized soil over moist soil are not correlated with the P content of the soil soln. The P content of the plants decreased as the age of the plant increased. P fertilizers did not increase yields because it appears that the rice obtains sufficient P for its needs from the soil. This holds good in spite of the fact that the soil soln. contains very little P.

C. R. Fellers  
Tobacco fertilizer tests at the Georgia Coastal Plain Experiment Station. J. M. Carr. Ga. Coastal Plain Agr. Expt. Sta., *Bull.* 19, 89-93 (1932).—Field expts. on Lufkin sandy loam covering 8 yrs. showed that fertilizers analyzing 3-4%  $NH_4$  gave the greatest net returns per acre. Less than 3%  $NH_4$  gave good quality but decreased yields. The fertilizer for tobacco should contain 8-12%  $P_2O_5$ . Because of premature ripening less than 10%  $P_2O_5$  is suggested. Potash increased yields of tobacco in proportion to the amt. added (max. 8%). Marked signs of K deficiency occurred when the  $K_2O$  % was less than 1%. Org. and inorg. sources of N should be used in approx. equal proportions. Dried blood, cottonseed meal and fish scrap are satisfactory organics, while  $NaNO_3$ , urea,  $NH_4NO_3$  and  $Ca(NO_3)_2$  are good inorg. sources of N. C. R. Fellers

Effects of inoculation and liming on soybeans grown on the Grundy silt loam. R. H. Walker and P. R. Brown. Ia. Agr. Expt. Sta., *Bull.* 298, 279-406 (1933).—From 2 to 3 tons of  $CaCO_3$  per acre are required to neutralize most

of these soils. Inoculation produced much healthier plants and greater yields of hay and beans. By the use of both lime and inoculated seed, the yield of hay was doubled and the yield of seed tripled, as compared to the controls. Lime alone also resulted in marked crop increases.

C. R. Fellers  
Effects of inoculation and liming on alfalfa grown on the Grundy silt loam. R. H. Walker and P. R. Brown. Ia. Agr. Expt. Sta., *Bull.* 305, 43-60 (1933).—Inoculation of alfalfa seed planted on Grundy loam not only insured a far better stand and yield of hay, but the hay contained more N. Lime, especially when finely ground, likewise increased the stand and yield of alfalfa on these soils. The use of lime increased the protein and Ca content of the alfalfa, thus greatly adding to the nutritive value of the hay.

C. R. Fellers  
Reaction between urea and gypsum. Colin W. Whitaker, Frank O. Lundstrom and Sterling B. Hendricks. *Ind. Eng. Chem.* 25, 1280-2 (1933).—Urea reacts with gypsum in the presence of moisture to form the complex  $CaSO_4 \cdot 4CO(NH_2)_2$ . The phys., optical and chem. properties of this compd. are described. It is less hygroscopic than urea and, if formed in a fertilizer mixt., would not impair the mech. condition of that mixt. J. O. H.

Some factors affecting the premature dropping of pecans. H. L. Crane. National Pecan Assoc., *Rept. Proc. 30th Ann. Conv.* 1931, 92-7.—Increasing the N content of complete fertilizers applied to pecan trees caused an approx. proportionate increase in tree growth, total no. of blossoms, total no. of nuts set, percentage of pistillate blossoms that set nuts and percentage of shoots that blossomed which set nuts. N-deficient trees set but few nuts although the trees blossomed heavily. Under extreme conditions of N starvation the trees formed but few blossoms and these failed to mature into nuts.

K. D. Jacob  
The base exchange in coal ashes. H. Mönig. *Angew. Chem.* 46, 631-4 (1933).—Exptl. results, which are reported, show that the exchangeable mineral constituents contained in coal are identical with the Al silicates of the soil and could possibly be used for artificial fertilizing purposes. The exchange reactions follow the mass-action law and consequently the phenomena are not absorption processes but equil. reactions. K. K.

Chlorophyll defects of lucern as indicators of different physiological disturbances. M. Kliukowski. *Phytopath. Z.* 6, 531-7 (1933).—When lucern was grown in quartz sand and supplied with a nutrient medium deficient in K the leaves developed a white mottling in 10 weeks and the plants exhibited the typical symptoms of K deficiency. In the presence of an excess of K growth of the plants was strongly depressed and comparatively few blooms were formed. The best growth and development were obtained when K was supplied in the proper amt.

K. D. Jacob  
Composition of commercial insecticides, fungicides, bactericides, rodenticides and weed killers. A compilation supplementary to Bulletin 300. H. J. Fisher and E. M. Bailey. Conn. Agr. Expt. Sta., *Bull.* 346, 211-68 (1933); cf. C. A. 23, 4010.—Addnl. analyses are listed.

C. R. Fellers  
Comparative toxicities of anabasine sulfate and nicotine sulfate for aphids and leafhoppers. Philip Garman. Conn. Agr. Expt. Sta., *Bull.* 349, 433-4 (1933).—Preliminary field tests showed the anabasine sulfate obtained from the North African weed, *Anabasis aphylla* L., to be about 5 times as toxic as the nicotine sulfate. These promising results indicate a need for further work on this new insecticide.

C. R. Fellers  
Control of the grape leafhopper in California. J. F. Lamiman. Calif. Agr. Expt. Sta., *Circ.* 72, 3-20 (1933).—The grape leafhopper, *Erythroneura comes*, may be effectively controlled by nicotine, pyrethrum-oil sprays or by nicotine or  $Ca(CN)_2$  dusts. For the nicotine spray, 1 pint of 40% nicotine sulfate and  $\frac{1}{2}$  lb. of casein spreader is used for 100 gal. of spray.  $Ca(CN)_2$  dust should be used at the rate of approx. 20 lb. per acre.

C. R. Fellers

**Walnut aphid control.** W. H. Wright. Calif. State Dept. Agr., *Monthly Bull.* 22, 166-9(1933).—Light infestations are readily controlled by dusting the trees with 4% nicotine sulfate. For heavier infestations 2 or 3 applications of 3.5-4% should be used and timed 1-2 weeks apart.

**Review of codling-moth-control measures.** Stewart Lockwood. Calif. State Dept. Agr., *Monthly Bull.* 22, 170-8(1933).—A crit. review.

**Control of the codling moth of Idaho.** Claude Wakeland and R. W. Haegele. Idaho State Hort. Assoc., *Proc. 36th Ann. Conv.* 1931, 74-82.—Addn. of 1 gal. of com. oil emulsion (80%) to 100 gal. Pb arsenate spray materially increased the degree of control of the codling moth on apples, but rendered the removal of As from the fruit more difficult. The oil used in emulsions for summer spraying should have a viscosity of 65-75 and the sulfonation no. should not be less than 85. Oil-Pb arsenate sprays applied after July 25th rendered As residue removal extremely difficult. Arsenic is very much more easily removed from fruit washed immediately after picking than after it has been allowed to set a few days at normal temp.

**Codling-moth control: experiments at Harcourt.** R. T. M. Pescott. *J. Dept. Agr. Victoria* 31, 484-9(1933).—Alternating sprays of white oil emulsion (1.60) and Pb arsenate, following the 2 calyx sprays of Pb arsenate, gave more efficient control of the codling moth than was obtained with Pb arsenate sprays alone and resulted in smaller amts. of As (0.006-0.008 grams per lb. of fruit) adhering to the apples. Dutox, a proprietary product consisting principally of BaSiF<sub>6</sub>, was not satisfactory as a follow-up spray for the calyx sprays of Pb arsenate. A 10% vinegar soln. was more effective than fermented apple juice as a codling-moth lure; addn. of geraniol reduced the efficiency of the lures. Banding the trees with corrugated cardboard soaked in an engine oil soln. of  $\beta$ -naphthol resulted in the capture and killing of large nos. of larvae.

**Fluorine compounds as substitutes for lead arsenate in the control of the codling moth.** E. J. Newcomer and R. H. Carter. Idaho State Hort. Soc., *Proc. 36th Ann. Conv.* 1931, 161-5.—BaSiF<sub>6</sub>, K<sub>2</sub>SiF<sub>6</sub> and cerolite gave results comparable with those obtained with Pb arsenate for control of the codling moth on apples in the Pacific Northwest. Sprays contg. 1 lb. of the F compd. and 1 pint of fish oil or mineral oil emulsion per 100 gal. water are recommended.

**The danger of the cabbage moth and its economical and efficient control.** Enrique F. Schultz. *Rev. ind. agr. Tucuman* 22, 313-16(1932).—Control of the cabbage moth in the larval stage is effected by use of a 1% soln. of Pb arsenate in an aq. soln. prepd. by trituration of cabbage leaves, also use of a powder composed of 75-100 g. Pb arsenate per kg. flour. The poison is applied to the plant leaves.

**Banding for mealy-bug control.** H. C. James. Kenya Colony Dept. Agr., *Bull.* 24, 6 pp.(1932).—Cellophane is more effective than grease-proof paper as a base for castor-oil bands on coffee trees. The best results are obtained with crude castor oil but refined oil is satisfactory if it is mixed with 30% of resin. The duration of effectiveness of the band is not increased by addn. of HgCl<sub>2</sub>. The life of treated Cellophane bands is approx. 1 yr.

**Biology and control of citrus insects and mites.** H. J. Quayle. Calif. Agr. Expt. Sta., *Bull.* 542, 3-87(1932).—A complete survey of insects with recommended sprays and treatments to control those of economic importance.

**San Jose scale control by lime-sulfur and oil emulsion sprays.** Claude Wakeland. Idaho State Hort. Assoc., *Proc. 37th Ann. Conv.* 1932, 43-7, 49-54.—Oil emulsion (3%) and liquid lime-S (4-5° Baume) sprays gave good control of San Jose scale on fruit trees; dry lime-S gave poorer results. The effect of oil sprays was immediate and of short duration, whereas the max. efficiency of lime-S sprays was attained only after approx. 60 days.

The oil used in the sprays should have a sulfonation value of 50-70 and a viscosity of not less than 100. The chemistry of lime-S sprays is reviewed.

**Influence of sprays on residue removal.** R. S. Snyder. Idaho State Hort. Assoc., *Proc. 37th Ann. Conv.* 1932, 71-3, 75-7.—When apple trees were sprayed with combination mineral oil-Pb arsenate sprays removal of arsenical residue from the fruit was much more difficult when the oil had a viscosity of 70-75 and sulfonation test of 90 than when it had the same sulfonation value and a viscosity of 50. Because of the formation of wax, removal of As was much more difficult when the fruit was stored for 10 weeks at ordinary temp. before washing than when it was washed immediately after picking. When the fruit was placed in cold storage for 10 weeks formation of wax was hindered and removal of As was nearly as easy as when the apples were washed immediately.

**Removal of spray residue from canning peaches sprayed for peach twig borer control.** H. K. Plank. Calif. State Dept. Agr., *Monthly Bull.* 22, 113-30(1933).—Hanss, Cling and Phillips variety of canning peach trees were sprayed 1-4 times with a spray contg. per 300 gal., 9 lb. dry basic Pb arsenate and 2 lb. of colloidal spreader. The ripe peaches showed 0.011-0.072 grains per lb. of As<sub>2</sub>O<sub>3</sub>; peeled fruit from the canning tables showed only traces of As, and the canned peaches, none.

**Report of the imperial mycologist.** W. McRae. Imp. Inst. Agr. Research Fusa, *Sci. Repts.* 1931-32, 122-40 (1933); cf. C. A. 26, 5374.—A fungus resembling *Sclerotinia sclerotiorum* Lib. was isolated from *Hibiscus sabdariffa* affected with stem rot. The fungus prefers an acid medium, produces appreciable amts. of oxalic acid and requires good aeration for abundant sclerotial formation. Disinfection of the seed with Uspulun Universal (0.25% soln. for 1 hr.) was more effective than treatment with formalin in controlling *Helminthosporium salivum* and *H. teres* on barley. The wilt disease of chickpeas, caused by *Fusarium* sp., was favored by fertilizing the plants with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and superphosphate.

**New methods for the control of loose smut of wheat by steeping.** G. Gassner. *Phytopath. Z.* 5, 407-33(1933). *Rev. Applied Mycol.* 12, 499-500.—Immersion up to 24 hrs. of wheat in hot water (35°, 40° or 45°) gives good control of loose smut (*Ustilago tritici*) apparently because when O is excluded under these conditions intramolecular respiration takes place to form alc. and other cleavage products. Moistening the grain with 5, 6, 7 1/2 or 10 l. of water per cwt. in closed containers for 14 hrs. at these temps. was equally effective. G. believes that the disinfection is partially or wholly due to these cleavage products. On this assumption 2-5% of EtOH was added to the water used and it was found that the time necessary for the treatment was much less and the EtOH soln. could be used repeatedly without decrease in its efficacy. Methylated spirits and MeCHOHMe similarly gave good results and promising results were also given by acetone, cyclohexanone, dioxane, MeOH, glycol, glycol monoethyl ether, and glycol monobutyl ether.

**Combating the flying smut of wheat by means of wet disinfectants.** G. Gassner and H. Kirchhoff. *Phytopath. Z.* 6, 453-68(1933); cf. Gassner, C. A. 27, 4016.—Promising results in the control of flying smut of wheat were obtained by treating the seed for 3-5 hrs. at 50° with 5-6 l. water per quintal. The time of treatment and the amt. of liquid can be reduced somewhat by increasing the temp. to 52.5°. Addn. of 0.5-4.0% of either distd. spirits or isopropyl alc. improved the efficiency of the treatment but slightly reduced the germinating power of the grain.

**Root rot, foot rot and head blight of wheat in Kenya.** H. J. Taylor and Colin Maher. Kenya Colony Dept. Agr., *Bull.* 4, 15 pp.(1931).—Good control of the diseases, which are caused by *Fusarium* sp., was obtained by treating the soil with 200 lb. CaCN<sub>2</sub> per acre.

**Photoperiodism. Value of supplementary illumination and reduction of light on flowering plants in the green-**



house. Alex Laurie and G. H. Poesth. Ohio Agr. Expt. Sta., *Bull.* 512, 3-42(1932).—Copious nitrate formation occurred in greenhouse soils in spite of greatly reduced daylight. Heavy N fertilization with  $(\text{NH}_4)_2\text{SO}_4$  did not retard flower formation in chrysanthemums. C. R. F.

**Diseases of narcissus.** Frank P. McWhorter and Freeman Weiss. Ore. Agr. Expt. Sta., *Bull.* 304, 5-41(1932).—In order to control common bulb diseases, it is recommended that the bulbs be dipped before planting for at least 15 min. in either  $\text{CH}_2\text{O}$  or  $\text{HgCl}_2$  solns. The  $\text{CH}_2\text{O}$  dip contains 1 pint of 40%  $\text{CH}_2\text{O}$  to  $12\frac{1}{2}$  gal. of water. The  $\text{HgCl}_2$  dip contains 1 oz. of  $\text{HgCl}_2$  to 6 gal. of water. C. R. Fellers

**The control of Antestia in wetter districts.** F. B. Notley. Kenya Colony Dept. Agr., *Bull.* 4, 12 pp. (1933).—Good control of *Antestia jaceta* Germ. on coffee trees was obtained by spraying with a 1:50 aq. diln. of kerosene-pyrethrum-soap emulsion; the emulsion contains 1 lb. pyrethrum powder, 1 gal. kerosene and 0.5 lb. neutral soap per 6 gal. Because of its low stability, the emulsion must be used immediately and it is incompatible with Bordeaux mixt. and Pb arsenate. Arsenite-molasses baits are ineffective against the insect in wet districts. K. D. Jacob

**Melampsora amygdalinae, the rust of basket willows (Salix triandra).** I. Observations and experiments in 1932. L. Ogilvie and H. P. Hutchinson. Univ. Bristol Agr. Hort. Research Sta., *Ann. Rept.* 1932, 125-30.—Treatment of willow stumps with 2 applications of tar oil winter washes (10-15%), the 1st on Apr. 20th and the 2nd on May 4th, killed the 1st willow shoots but caused a marked diminution of rust on the subsequent shoots. II. Spore germination experiments. L. Ogilvie. *Ibid.* 131-8.—Germination of spores of *M. amygdalinae* was entirely prevented by exposure to 0.2% Bordeaux mixt., 1.0% Burgundy mixt., 0.25% "Shirlan" (salicylanilide), or 0.00058%  $\text{CuSO}_4$ ;  $\text{NH}_4$  polysulfide (1:200) and flowers of S had little effect. The dry spores are not resistant to a temp. of  $24^\circ$  and germination of the spores in water is checked at this temp.; air is essential to germination. K. D. Jacob

**The "yellowing of coffee."** V. A. Beckley. Kenya Colony Dept. Agr., *Bull.* 3, 6 pp. (1931).—Chlorosis of coffee trees was prevented and cured by the application of 0.5 lb.  $(\text{NH}_4)_2\text{SO}_4$  per tree. Other N fertilizers also were effective in treating the condition. K. D. Jacob

**Control of Alternaria blight of ginseng with Bordeaux mixture and injuries accompanying its use.** H. A. Rannels and J. D. Wilson. Ohio Agr. Expt. Sta., *Bull.* 522, 4-16 (1933). The use of a 3-4-1/2-50 Bordeaux mixt. to which 1 lb. each of potash fish-oil soap and Ca arsenate have been added for each 50 gal. of spray material is recommended for the control of blight, *Alternaria panax* Whetzel. This treatment is normally effective if 3-4 applications are made. Leaf burning and drought injury occasionally occur. C. R. Fellers

**Puncture vine in California.** B. Johnson. Calif. Agr. Expt. Sta., *Bull.* 528, 42 pp. (1932).—Among chem. methods of killing plants and seeds, Diesel-oil spraying was most successful. Oils contg. 2.5% of asphalt emulsify readily with water and water-oil emulsions penetrate the seed-burns. C. R. Fellers

**Cotton wilt. IV. Effect of fertilizers.** V. H. Young, G. Janssen, and J. O. Ware. Ark. Agr. Expt. Sta., *Bull.* 272, 27 pp. (1932).—Heavy applications of K fertilizers either alone or in combination with N and P markedly decreased cotton wilt and rust, and stimulated vegetative growth and seed production. B. C. A.

**Collar rot of tomatoes.** W. A. Kreutzer and L. W. Durrell. Colo. Agr. Expt. Sta., *Bull.* 402, 3-12(1933).—Seed treatments with  $\text{CuCO}_3$ , Ceresan and Semesan dusts were ineffective in controlling this infection. The seed bed may be sterilized by steam or by  $\text{CH}_2\text{O}$ . One part of  $\text{CH}_2\text{O}$  to 50 parts of water and applied at the rate of 1 gal. per sq. ft. of soil is recommended. C. R. Fellers

**The absorption and movement of sodium chlorate when used as an herbicide.** W. E. Loomis, E. V. Smith, Russell Bissey and L. E. Arnold. *J. Am. Soc. Agron.*

25, 724-30(1933).— $\text{NaClO}_3$  apparently penetrates readily all the external surfaces of the plant with the exception of unusually heavy cuticle or corky layers. It appears that the movement of  $\text{NaClO}_3$  within the plant is principally in the xylem and is most rapid in the direction of the transpiration stream.  $\text{NaClO}_3$ , whether applied to the soil directly or reaching it in the drip and leachings from sprayed plants, has persisted in the soil in an apparently unchanged form for  $2\frac{1}{2}$  yrs. It may be absorbed from the soil soln. by the roots and rhizomes of plants and translocated to the tops so that both tops and roots are killed by the toxin. Its removal from the soil by leaching is possible but large vols. of  $\text{H}_2\text{O}$  are required and it appears that its disappearance is due primarily to the decompos. of the salt. Decompos. is fairly rapid in moist soil at temps. above  $20^\circ$ , but may be very slow in cool dry soil. J. R. Adams

**Use of arsenical compounds in the control of deep-rooted perennial weeds.** A. S. Crafts. *Hilgardia* 7, 361-72(1933).—The most dil. As soln. giving effective control in field plots contained 0.5%  $\text{As}_2\text{O}_3$  by wt. Higher concns. up to 4% were not more effective. Sprays of acid reaction were most effective; the lowest effective concn. of the acid was approx. 1 N. The stock arsenical is prepd. by mixing dry 4 parts by wt. of  $\text{As}_2\text{O}_3$  and 1 part by wt. of NaOH, adding 3 parts of water and stirring until dissolved. The spray soln. is made by dilg. 1 part of the stock As soln. with 100 parts of water, mixing thoroughly, and adding with const. stirring 5 parts by wt. of concd.  $\text{H}_2\text{SO}_4$ . C. R. Fellers

**Weed control.** Walter S. Ball. Calif. State Dept. Agr., *Monthly Bull.* 22, 252-7(1933).—The limitations of oil and chem. sprays are discussed. C. R. Fellers

**Progress in weed control.** A. S. Crafts. Calif. State Dept. Agr., *Monthly Bull.* 22, 264-8(1933).—General. C. R. Fellers

**Weed control by means of soil sterilization.** Paul M. Goodwin. Calif. State Dept. Agr., *Monthly Bull.* 22, 299-301(1933).—The use of  $\text{Na}_2\text{HAsO}_4$  as a weed spray along irrigation ditches proved feasible and effective. C. R. Fellers

**Camel thorn, Alhagi camelorum Fisch.** Walter S. Ball and Wilfred W. Robbins. Calif. State Dept. Agr., *Monthly Bull.* 22, 258-63(1933).—This very obnoxious weed which has recently spread greatly in Calif. can be eradicated only by thorough treatment of the soil with  $\text{CS}_2$  to a depth of 10 in. C. R. Fellers

**Disinfectants and parasiticides in relation to poultry.** H. A. Hoffman. Calif. Agr. Expt. Sta., *Monthly Bull.* 22, 232-9(1933).—A summary of properties and uses of phenol, cresols, emulsified coal-tar disinfectants, chlorinated lime, NaOCl preps., 1, CaO,  $\text{HgCl}_2$ ,  $\text{CH}_2\text{O}$ , lye, Cu salts,  $\text{KMnO}_4$  and kerosene. C. R. Fellers

**Effect of mercurial ointment on hatchability.** Alan Deakin and Geo. Robertson. *Poultry Sci.* 12, 378-81 (1933).—When eggs were set under hens treated with mercurial ointment (for control of body lice) for 48, 36, 24, 12 and 2 hrs., resp., then transferred to the incubator, there was a gradation of mortality of the embryo that was complete for eggs set under treated hens for 48 hrs., but not apparently affecting those set under treated hens only 2 hrs. In a few cases embryos survived when the eggs were treated directly with mercurial ointment and then incubated. Mercurial ointment should not be used on breeding chickens during, and probably 2-3 months previous to, the breeding season. K. D. J.

**Variations in arsenical spray residue (Waterhouse) 12.**  $\text{P}_2\text{O}_5$  and double superphosphates (Tiedemann, Gundelach) 18. [Product contg.] alkali chlorates [as weed killer] (Brit. pat. 306,701) 18. Fungicides (Brit. pat. 306,737) 17.

**Fertilizer.** Harry C. Moore (to Armour Fertilizer Works). U. S. 1,931,768, Oct. 24. Superphosphate is treated with an ammoniacal soln. of  $\text{NH}_4\text{NO}_3$ .

**Fertilizer.** Leopold Hecht (to I. G. Farbenind. A.-G.).

U. S. 1,931,819, Oct. 24.  $\text{NH}_4\text{NO}_3$  and di- $\text{NH}_4$  phosphate are used together in a fertilizer which may also contain other ingredients.

**Fertilizers.** Ruhrchemie A.-G. Brit. 396,092, July 27, 1933. Fertilizers are prepd. by decomp. raw phosphates with the  $\text{HNO}_3$  necessary to render the  $\text{P}_2\text{O}_5$  present sol., treating the mixt. with  $\text{NH}_4$  salts of acids that form difficultly sol. salts with Ca, preferably with  $(\text{NH}_4)_2\text{SO}_4$ , filtering off the pptd.  $\text{CaSO}_4$  and undecomposed, evap. the soln. almost to dryness to form a mixt. of  $\text{NH}_4\text{NO}_3$ ,  $\text{NH}_4\text{H}_2\text{PO}_4$  and residual  $\text{CaSO}_4$  and treating the mass with liquid or gaseous  $\text{NH}_3$  in a practically pure state until the  $\text{NH}_4\text{NO}_3$  is dissolved out. The  $\text{NH}_4\text{NO}_3$ , after the removal of the  $\text{NH}_3$  and the  $\text{NH}_4$  phosphate, preferably after removal of the residual  $\text{NH}_3$ , are then mixed in desired proportions or 1 or the other may be mixed with the dried reaction mass that has not been treated with  $\text{NH}_3$ . Any residual  $\text{NH}_4\text{NO}_3$  or  $\text{NH}_4$  phosphate may be mixed with other fertilizers. The  $\text{NH}_3$  used for the soln. of the  $\text{NH}_4\text{NO}_3$ , if necessary after sepn. from the  $\text{NH}_4\text{NO}_3$ , may be combined with acids to form fertilizers. In 396,729, July 31, 1933, addn. to 396,092, the soln. is evapd. to dryness, the N content adjusted by dissolving out any desired amt. of  $\text{NH}_4\text{NO}_3$  with the  $\text{NH}_3$  and the  $(\text{NH}_4)_2\text{HPO}_4$  formed in the residue reconverted into  $\text{NH}_4\text{H}_2\text{PO}_4$  by adding free acid, e. g.,  $\text{HNO}_3$ ,  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ , either with or without the simultaneous addn. of other fertilizing salts. The  $\text{NH}_4\text{NO}_3$  may be completely removed.

**Fertilizer production by alkaline digestion of cellulosic materials such as wood chips.** Harold R. Murdock (to Champion Fibre Co.). U. S. 1,933,445, Oct. 31.  $\text{HNO}_3$  or  $\text{H}_3\text{PO}_4$  or an acid nitrate or phosphate is used for neutralizing an alk. waste liquor produced by the pulping of cellulosic material such as wood chips with alk. liquor (such as KOH soln.) contg. a suitable proportion of an alk. K compd.

**Solidification of reaction products obtained by the reaction of nitric acid on phosphate of lime.** Gottfried Trumpler (to Lonza Elektricitätswerke und Chemische Fabriken A.-G.). U. S. 1,935,528, Nov. 14. For producing a fertilizer, the plastic reaction product, while still warm and during the course of its solidification, is subjected to mech. subdivision while mixing with it the cold, dry, pulverized final product from a previous operation.

**Superphosphates.** Soc. anon. pour le traitement des minerais aluminopolassiques. Swiss 162,159, Aug. 16, 1933. Superphosphates sol. in water are prepd. by treating  $\text{Ca}_3(\text{PO}_4)_2$  with  $\text{H}_2\text{SO}_4$  contg. 850-900 gr.  $\text{P}_2\text{O}_5$  per l.

**Insecticide, etc.** Schering-Kahlbaum A.-G. (Karl Gornitz and Herbert Schotte, inventors). Ger. 577,739, June 3, 1933. A prepn. for killing insects or fungi on plants contains white complex Fe arsenates. Other substances, such as wetting, sticking or suspending agents, filling material or other fungicides or insecticides may be added.

**Insecticide and insectifuge.** Dudley H. Grant (to

Standard Oil Development Co.). U. S. 1,934,057, Nov. 7. See Can. 333,642 (C. A. 27, 4622).

**Insecticides and disinfectants.** E. I. du Pont de Nemours & Co. Brit. 396,064, July 17, 1933. Divided on 391,141 (C. A. 27, 4818). **Insecticidal, wood-preserving and disinfectant compds.** comprise a fluosilicate of an aliphatic or heterocyclic amine as defined in 391,141 and an inert liquid diluent, with or without other active materials. According to examples horticultural insecticides consist of dil. aq. sols. of the fluosilicates of di-*n*-butylamine, pyridine, piperidine or 6-ethoxy-2-amino-benzothiazole together with a small quantity of fish-oil soap or sulfonated oxidized petroleum oil as spreading agent. Wool, fur, hair, hide, etc., may be rendered mothproof with aq. solns. of di-*n*-butylamine fluosilicate or quinoline fluosilicate.

**Fungicides, etc.** Maison A. Baud. Fr. 749,521, July 25, 1933. Sulfonated compds., particularly sulfonaphthalenes, with or without antiflocculating agents such as powd. alum are added to insecticide or fungicide pastes, etc., for vegetables.

**Fungicide and insecticide.** Soc. anon. des mines d'Orbagnoux. Ger. 577,977, June 8, 1933. A prepn. for plant preservation is prepd. by treating the Cu or Pb salts of ichthoysulfonic acid with an alkali salt of an oxyacid and alkali or  $\text{NH}_4\text{OH}$  to render them sol. in water. Thus,  $\text{CuSO}_4$ , Rochelle salt,  $\text{NH}_4\text{OH}$  and  $\text{NOH}$  are mixed into ichthoysulfonic acid.

**Parasiticidal sulfur preparation.** Alonzo S. McDaniel (to Loomis, Stump and Banks). U. S. 1,934,989, Nov. 14. A compn. suitable for spraying or use on animal or on human beings comprises bentonite, the particle size of which is mainly 0.01-0.02 in. in diam. assocd. with S solidified from a fluid state in the bentonite and on its particles.

**Extract from pyrethrum flowers.** Nicholas A. Sankowsky (to Standard Oil Development Co.). U. S. 1,933,077, Oct. 31. Pyrethrum flowers are placed in an extr. column in the form of a mass contg. interstices; a solvent such as kerosene is distributed over the flowers at a rate less than sufficient to flood the interstices of the material with solvent, so that the solvent is caused to flow substantially only over the exterior surfaces and through the intercellular surfaces of the flowers, and the resulting comparatively concd. ext. is withdrawn from the bottom of the extraction column. App. is described.

**Barium polysulfide.** Ignaz Kreidl. Ger. 577,812, June 6, 1933. Solid  $\text{BaS}_2$  for use in the protection of plants is prepd. by treating  $\text{BaS}$  with S in water in the presence of morg. sulfides, sulfites or thiosulfates to act as carriers. The water is heated to nearly boiling.

**Weed killers.** I. G. Farbenind. A.-G. Fr. 719,973, Aug. 2, 1933. The possibility of recultivating soil in which weeds have been killed is accelerated by using as weed killers chlorates, such as those of Fe or Sn, which undergo a spontaneous decompn. Catalysts such as  $\text{MgCl}_2$  which accelerate the decompn. may be added to the soil after the destruction of the weeds.

## 16 THE FERMENTATION INDUSTRIES

C. N. FREY

**Experiences in hydrolysis and fermentation of sawdust.** M. Schön and P. Béraud. *Ann. combustibles liquides* 8, 619-29 (1933). Hydrolysis expts. with dil.  $\text{H}_2\text{SO}_4$  solns. and fermentation tests were carried out on pine, oak and poplar sawdusts and the resulting juices, resp. Exptl. procedure and results are reported, and time-concn. fermentation curves are presented. Karl Kammermeyer

**Recirculation process lowers cost of vinegar production.** A. L. Nugry. *Food Ind.* 5, 174-6 (1933).—By cooling the vinegar stock as it passes through the surge tank, 100-grain vinegar can be produced in a single but a larger-capacity generator. C. R. Fellers

**The very frequent presence of coproporphyrin in preparations of nucleic acid extracted from beer yeast.** C.

Dheré and Andree Roche. *Compt. rend. soc. biol.* 114, 449-52 (1933).—Coproporphyrin was detected by its fluorescence spectrum in nearly all the com. preps. of nucleic acid examd. L. E. Gilson

**Fat and lipid metabolism of yeast (Halden, et al.)** 11D Distg. liquids (Jr. pat. 749,496) 13. Filters [for beer] (Brit. pat. 396,255) 1.

**Rectifying alcohol.** Usines de Melle and Henri M. Guinot. Brit. 396,005, Aug. 10, 1933. Addn. to 387,589 (C. A. 27, 4624). See Fr. 42,028 (C. A. 27, 4873).

**Denaturing alcohols.** A. Riebeck'sche Montanwerke

A.-G. (Theodor Hellthaler and Erich Peter, inventors). Ger. 586,224, Oct. 19, 1933. See Fr. 743,498 (C. A. 27, 3774).

**Butyl and isopropyl alcohols by fermentation.** Samuel C. Prescott and Kisaku Morikawa (Morikawa to Prescott). U. S. 1,933,683, Nov. 7. A substantially pure culture of *Bacillus technicus* which may be derived from molded rice or "koji" is used for fermenting a mash contg. fermentable sugars.

**Propionic acid.** Hugh R. Stiles and Perry W. Wilson (to Commercial Solvents Corp.). U. S. 1,932,755, Oct. 31. For the production of propionic acid and HIOAc, a mash contg. hydrolyzed starchy material and which may be prepd. from corn, barley or potatoes, etc., is subjected to fermentation by a culture contg. propionic acid bacteria. Cf. C. A. 27, 4874.

**Fermentation processes.** H. Th. Bohme A.-G. Nr. 41,537, Jan. 28, 1933. Addn. to 708,285 (C. A. 26, 1062). The pyloric attachments of fish are used in the process of fermentation. Nr. 708,285.

**Fermentation process.** Industrikemiska Aktiebolaget. Nr. 749,848, July 29, 1933. Finely divided air is passed through a relatively thin layer of the fermenting liquid.

**Filter press, particularly for worts.** Edmond Bredon-Weustenraad. Fr. 749,628, July 27, 1933.

**Yeast.** The International Yeast Co. Ltd. and Wm. G. Bennett. Brit. 396,206, Aug. 3, 1933. Yeast and similar organisms of high ergosterol content for use as food and for medicinal purposes are produced by cultivation under conditions in which they are subjected to deficiency in nitrogenous nutrient while in the presence of an oxidizing agent or O-carrier, e. g., salts of peracids, methylene blue, in an aerated medium, other nutrient substances being supplied in normal amt. Examples are given. Cf. C. A. 27, 5471.

**Dried yeast.** Kyutaro Mizobata. U. S. 1,934,941, Nov. 14. Whole rice is steamed and sterilized by heating, then cooled and used as an absorbent for previously cultivated pure yeast to form a compn. which may be stored for a time in a suitable vessel (such as a described bottle).

**Electrolytic bleaching of molasses for yeast production.** Joseph W. Thompson and John W. Hinchley. U. S. 1,933,830, Nov. 7. Molasses is dild. until it contains about 15% of sugars; 0.5–1.0% of a non-poisonous inorg. acid such as  $H_2SO_4$  is added; the mixt. is subjected to the action of an electric d. c. until bleaching to a degree of about 60% is effected; impurities are removed by filtration, the acid present is neutralized (suitably by adding  $NH_3$  or  $CaCO_3$ ) and the soln. is decanted from any ppt. which may be formed.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**Aseptic filtration in the apothecary.** H. Eschenbrenner. Pharm. Monatsh. 14, 169–70 (1933). Methods of sterilization and titration under sterile conditions are reviewed. The disadvantages of the Seitz filter are discussed. The use of the Zigmundy membrane filter and the Buwa app. is recommended and the latter described. H. M. B.

**Observations concerning the healing properties of Leonurus cardiac.** L. B. Pater. Pharm. Monatsh. 14, 171 (1933).—Cases are cited in which the drug was used in the treatment of epilepsy. H. M. Burlage

**Pharmaceuticals and medicinals from the Bible and Talmud.** E. Berg. Pharm. Monatsh. 14, 177 (1933).—Historical review. H. M. Burlage

**The brooms (Genista).** A. M. Burger. Reichstoff Ind. u. Kosmetik 8, 159–61 (1933).—The brooms—*Genista coparia* and *G. monosperma* (*G. tinctoria*)—and their constituents are discussed. They have been found of value in the prepn. of *Wisteria*, *Ixia* and *Freesia* bouquets and formulas for the same are given. H. M. Burlage

**The use of iodoform gauze in surgery.** H. Feriz. Pharm. Weekblad 70, 1154–60 (1933).—Numerous advantages of CHI<sub>3</sub> dressings are pointed out. A. W. D.

**The phytosterol of Phyllanthus acidus Skeels.** A. J. Ultee. Pharm. Weekblad 70, 1173–5 (1933).—The phytosterol obtained by  $C_6H_6$  extn. of the bark of *Phyllanthus acidus* and repeated crystn. from EtOH m. 228–9° and  $[\alpha]_D^{25}$  40.7° in  $CHCl_3$ . Its acetate m. 206°. It is not identical with lycopel as shown by m.-p. depression when the 2 sterols or their acetate are mixed. A. W. Dox

**Methods for the examination of homeopathic drugs.** H. Neugebauer. Pharm. Weekblad 70, 1221–7 (1933).—A review of methods for detecting certain drugs in high diln., e. g., Fe, Cu, Sb, Bi and some alkaloids, by means of color reactions, biochem., spectroscopic, luminescence and capillary reactions. A. W. Dox

**Mucilage of fenugreek (Trigonella foenum graecum).** C. R. Hariharan Iyer and B. N. Sastri. J. Indian Inst. Sci. 16A, 88–90 (1933).—The purified mucilage is a mannogalactan. F. L. Dunlap

**Difference in alcohol values of pharmacopoeial tinctures.** Walter Mayer. Apoth. Ztg. 48, 1089–91 (1933).—Reference is made and exception taken to certain statements made by Schlemmer and Siegert (cf. C. A. 27, 4875). A series of tinctures is listed showing both their alc. and dry residue content, noting the striking relationship of these values.

W. O. E.

**Essential oil content of the 1933 camomile harvest.** H. Will. Apoth. Ztg. 48, 1134 (1933).—A tabular presentation of some 37 different samples of camomile from provinces in Germany, Hungary and Jugoslavia affords a comparative est. of differences in the color, smell and essential oil content of the 1933 product. W. O. E.

**Investigation of emplastrum lithargyri.** S. Babich. Arch. Pharm. 271, 446–8 (1933).—To the pharmacopoeial directions under "Emplastrum lithargyri" should be added: the method for estg. PbO and moisture; the method given in detail by B. is equally applicable to Emplastrum plumbi compositum; the estn. of fatty acid is desirable. W. O. E.

**Emulsions and salve bases.** W. Kern. Deut. Apotheke 2, 140–3 (Apoth. Ztg., 1933).—An address. W. O. E.

**Petrolatum salves in the treatment of poison gas (dichlorodiethyl sulfide) burns.** Otto Muntsch. Deut. Apotheke 2, 143–4 (Apoth. Ztg., 1933).—An exptl. study of the relative merits apparent in the treatment of burns from dichlorodiethyl sulfide with various petrolatum salves and with bleaching powder. The results obtained do not justify a preference of the former over the latter treatment. W. O. E.

**Natural and synthetic drugs.** K. Bodendorf. Deut. Pharm. Ges. 1, 1–5 (Apoth. Ztg., 1933).—An address. W. O. E.

**Preparation of mixtures, as liq. kalii arsenicosi with tinct. chinac composita, or tinct. amara or tinct. ferri pomati.** S. Babich. Pharm. Zentralhalle 74, 563–6 (1933).—On mixing tinct. chinac composita with (a) liq. kalii arsenicosi (via the Pharm. U. S. S. R.), (b) liq. Kalii arsenicosi acidulus via Winkler and (c)  $H_2O_2$  ppts. result in all cases. The formation of these ppts. is influenced by the presence of  $H_2O$ ,  $As_2O_3$  in acid and alk. soln., and by alkali. The wt. of ppts. is least with  $H_2O$ , the greatest with liq. kalii arsenicosi. Avoidance of pptn. under the conditions stated appears impossible. The amt. of ppt. in g. and in percentage is in proportion to the total amt. of dry residue of the mixts. very small. The ppt. absorbs none of the  $As_2O_3$ . Since the amt. of ppt. formed is not large, and since the content of  $As_2O_3$  is not thereby materially changed, mixts. of tinct. chinac composita and liq. kalii arsenicosi may be regarded as practically compatible. The same also may be said in the case of mixts. of tinct. amara and liq. kalii arsenicosi acid or with liq. kalii arsenicosi. The mixt. of tinct. ferri pomati

and liq. kalii arsenicosi forms no ppt. on standing.

W. O. E.

**Estimation of arbutin in folia uvae ursi, and its preparations.** Clemens Grimme. *Pharm. Zentralhalle* 74, 669-70 (1933).—Zechner's method is so modified and given in detail that it now becomes possible to effect the estn. of arbutin in one day.

W. O. E.

**Microvolumetric estimation of bismuth in pharmaceutical preparations.** Johann Straub and Eugen Mihalovits. *Pharm. Zentralhalle* 74, 685-9 (1933). The microvol. method previously developed by S. is equally applicable to pharmaceutical preps.

W. O. E.

**Estimation of phenol in 1% solutions of sodium arsenate in ampoules.** A. M. Kleshnya. *Pharm. Zentralhalle* 74, 689-91 (1933). The method followed is essentially a modified form of Koppeschaar's procedure.

W. O. E.

**Turbidity in solutions of aluminum acetate D. A.-B. VI.** E. Mohlau. *Apoth. Ztg.* 48, 1337 (1933).—The practice of adding boric acid to the official prepn. to counteract turbidity is discouraged, since it is believed that as yet no substance is known which is capable of permanently inhibiting the formation of turbidity and ppt. in solns. of Al acetate.

W. O. E.

**New drugs and pharmaceutical specialties in the second and third quarters of 1933.** F. Zernik. *Sueddeut. Apoth.-Ztg.* 73, 690-1, 700-1 (1933).

W. O. E.

**Tinctura anticholeric D. Apoth. Ver. 5.** Walter Meyer. *Pharm. Ztg.* 78, 968-9 (1933).—Several suggestions for the improvement of this prepn. are given, notably the substitution of tinct. gallarum for opium where the latter is not readily available, or for economic reasons.

W. O. E.

**Natural and synthetic menthol.** A. Serini. *Pharm. Ztg.* 78, 979 (1933).—A commentary on this year's report of Schimmel & Co. (*C. A.* 27, 5472) in regard to certain quality differences in menthols. *dl*-Menthol m. 35° and on standing quietly begins to solidify at about 25°. The solidification pt. is found by the usual method at 28°. The product is not, however, really hard, but pappy. Only after 1/2 to 3 min. does the cryst. mixt. change into a hard and stiff mass, whereby the temp. rises to 31-2°. This phenomenon of double solidification permits recognition of isomer-free *dl*-menthol from all other types of menthol and its mixts.

W. O. E.

**Stability of insulin in solution.** Gyula Mikó. *Pharm. Zentralhalle* 74, 561-3 (1933). Comparison of a 10-yr. old sample of insulin, "Iletin," with a standard insulin developed the surprising fact that the older product "Iletin" was very nearly as strong (96.58%) as the standard of 100 units.

W. O. E.

**Ultramicroscopic observations on salve bases and medicated salves.** W. Brandrup. *Pharm. Ztg.* 78, 1121 (1933).—An ultramicroscopic study of ichthyl salves shows that uniform distribution of the medicament, and hence uniform distribution of the salve over the skin, is effected only when the salve is rich in lanolin.

W. O. E.

**Extr. chamomillae fluid, and extr. salviae fluid.** Hans Kuiser and Eugen Wetzel. *Sueddeut. Apoth.-Ztg.* 73, 683-4 (1933).—Improved procedures for prepg. these extrs. are outlined.

W. O. E.

**Stability of aqueous solutions of gallotannic acid.** W. A. Woodard and A. N. Cowland. *Quart. J. Pharm. Pharmacol.* 6, 363-74 (1933).—The rate of deterioration in aq. solus. of gallotannic acid preserved at a temp. of 60-65°F. is negligible over a period of 6 months. The rate of deterioration is not influenced by the concn. of solns. A small quantity of suitable antiseptic and preservative is needed in solns. HgCl<sub>2</sub> has been shown unsuitable for this purpose, and on the evidence herein quoted purified cresol 1 part in 250 might conveniently replace the Hg compd.

W. O. E.

**Keeping properties of liquor arsenicalis.** E. M. Smelt. *Quart. J. Pharm. Pharmacol.* 6, 375-88 (1933).—The occurrence of molds and deposits contg. As<sub>2</sub>O<sub>3</sub> in some specimens of liquor arsenicalis Brit. Pharm. 1932 is confirmed. No objectionable odors were detected. The use of NaOH instead of KOH was found to encourage rather than pre-

vent mold growth. No increase in the tendency to grow molds was observed when liquor arsenicalis was contaminated with traces of nitrate. Storage under dispensary conditions did not prove more favorable to the development of molds than storage in closed, filled containers. The growth of molds was inhibited by addn. of preservatives and by adjustment of the soln. to *p*<sub>H</sub> 2 or to *p*<sub>H</sub> 8.0. The limits of *p*<sub>H</sub> beyond which the formation of As<sub>2</sub>O<sub>3</sub> crystals would be prevented were considered to be 3.0 and 9.0. On account of the incompatibility of an alk. soln. with soln. of strychnine-HCl, an acid soln. is to be preferred.

W. O. E.

**Determination of acriflavine and related medicinal dyes.** A. D. Powell and G. F. Hall. *Quart. J. Pharm. Pharmacol.* 6, 389-94 (1933).—The method recommended consists in the pptn. of flavine dyes as ferrieyanide, and titration of the excess ferrieyanide by reduction with HI under suitable conditions. It may be applied to acriflavine and proflavine, and is more satisfactory and readily carried out than are N detns. It also may be applied in the detn. of dressings medicated with flavine dyes, where the N detn. is inapplicable.

W. O. E.

**Relative activities of ergotoxine and ergotamine with special reference to the assay of ergot preparations.** E. Lozinski, G. W. Holden and G. R. Diver. *Quart. J. Pharm. Pharmacol.* 6, 395-8 (1933).—A correction for the presence of ergotamine should be introduced in the colorimetric assay of ergot. When assayed biologically, with ergotamine as a standard, a correction for the lower activity of this salt, as compared with ergotoxine, should be introduced. In both instances, for all practical purposes, 60% of the observed readings would give a sufficiently close approximation of the ergotoxine content.

W. O. E.

**Keeping properties of liquid extract of ergot.** E. M. Smelt. *Quart. J. Pharm. Pharmacol.* 6, 399-405 (1933).—The Brit. Pharm. method of assay for liquid ext. of ergot requires bright sunlight or a Hg vapor lamp and cannot always be used. Allport and Cocking's modification of this assay gives identical results and may be conveniently carried out at any time. The rate of deterioration of liquid ext. of ergot Brit. Pharm. 1932 under different conditions of storage has been investigated. At room temp. in partially filled bottles rapid loss of alkaloid takes place. If kept for more than 6 weeks under ordinary dispensary conditions the alkaloidal strength is liable to fall below the min. permitted by the Brit. Pharm. When kept at room temp. in filled bottles in the dark, the keeping properties are much improved. The rate of change in liquid ext. kept in completely filled bottles in an ice chest is very slow.

W. O. E.

**Determination of moisture in mercuric oxide.** G. J. W. Ferrey. *Quart. J. Pharm. Pharmacol.* 6, 406-10 (1933). Moisture in yellow HgO Brit. Pharm. may be detd. with negligible error by drying for 1 hr. at 70°. The error involved in drying at 150° is considerable. The behavior of Hg<sub>2</sub>O on heating has been investigated. The influence of the non-volatile impurities in yellow HgO on the detn. of moisture is discussed.

W. O. E.

**Note on the British Pharmacopeia limit test for more soluble sugars in lactose.** G. J. W. Ferrey. *Quart. J. Pharm. Pharmacol.* 6, 411-12 (1933).—In examg. samples of lactose it was found that specimens passing the Brit. Pharm. tests in other respects and possessing no odor often gave residues in the limit test for more sol. sugars than the stipulated Brit. Pharm. limit of 0.005 g. It is suggested that the Brit. Pharm. limit might well be trebled without detracting in any way from its usefulness in detecting adulteration by cane sugar or dextrose.

W. O. E.

**Precipitation of alkaloids by tannins and the use of antipyrine in the detection of tannins.** Alan H. Ware and Victor Smith. *Quart. J. Pharm. Pharmacol.* 6, 454-63 (1933).—The statements recently published implying that it is the exception rather than the rule for alkaloids to be pptd. by tannins are erroneous. Fifty-two alkaloids, related org. N bases and their salts representing 31 distinct alkaloids and org. bases; of which 22, representing 14

distinct alkaloids and bases, are pptd. by tannin alone from aq. soln., while 14 others, representing also 14 distinct alkaloids and bases, are pptd. by tannin in the presence of 0.04%  $\text{NaHCO}_3$  (in the final admixt.), that is, insufficient  $\text{NaHCO}_3$  to ppt. the alkaloid without the tannin, with rare exceptions. Furthermore, it is shown that 49 substances, including the 36 above referred to, and representing 29 individual bases, are pptd. by tannins in the presence of an acid admixt. of Na phosphates (most other Na salts of weak acids will give more or less pptn., but there are several advantages in the use of the particular admixt. adopted). A method is referred to and suggested for use as a routine test for alkaloids to confirm results obtained via Dragendorff. While parallel results are obtainable by the 2 methods in testing isolated alkaloids and their salts, Dragendorff's reagent is well known to give ppts. with many org. substances which are not bases. A method is outlined for testing vegetable powders and extractives. The behavior of antipyrine with aq. vegetable extractives has been examd. This substance yields a bulky ppt. with all extractives contg. tannin over a wide range of  $\text{pH}$ , but most completely in the presence of an acid admixt. of phosphates; no other aq. vegetable extractives tested behave similarly, with a partial exception named. The method is recommended as affording an apparently specific test for tannins useful in confirming the result given to the test with an Fe complex devised by one of the writers, more especially when the color of the ppt. given in the last case is not typical. W. O. E.

**Chemical tests for *Strophanthus*.** E. M. Smelt. *Quart. J. Pharm. Pharmacol.* 6, 467-74 (1933).—Fourteen color tests were investigated with a view to finding some which would distinguish between the seeds and preps. of *S. bomby* and *S. emini*. Four tests are recommended for this purpose, namely, the  $\text{H}_2\text{SO}_4$  test, the  $\text{PhOH}$  and  $\text{HCl}$  test, the fufural and  $\text{H}_2\text{SO}_4$  test, and the resorcinol and  $\text{HCl}$  test, all of which are suitable for the identification of the seeds of other species of *Strophanthus*. More definite colors were obtained when an alc. ext. of the seeds was used than when the tests were applied directly to sections of the seeds. W. O. E.

**Spectrographic investigation of gum acacia.** S. Judd Lewis and J. Wombwell. *Quart. J. Pharm. Pharmacol.* 6, 475-82 (1933). Eight samples of gum from various sources ("Soudan," "Bleached," "Kordofan," "cleaned," "Italian," "Talha," etc.), have been examd., notably with respect to their ash. From the data obtained it appears that Al was absent in the Kordofans; Ba and Ca are both variable, in general occurring in fairly constant amounts to one another; Sr is practically uniform throughout; Fe is much higher in the Talhas, while K is low; Li is remarkably high in one sample and is almost universally present; Mg is much higher in the Talhas than elsewhere; Mn also following Fe with which it is constantly associated; with one exception B occurs in the Talhas only; Si is high in the Talhas; Pb and Sn occur in the majority; the Italian was exceptional in that it contained slight traces of Ag, As, Br and W; 2 other samples contained min. traces of Bi, and another a heavy trace of Zn. W. O. E.

**Comparison of the action of various solvents on defatted cochineal.** John Rae. *Quart. J. Pharm. Pharmacol.* 6, 18, 5 (1933).—An ash limit of 6% is suggested which would include all genuine samples of coccus cacti, and the figure given in the Brit. Pharm. Codex 1923 requires amending. Ethylene glycol is an excellent solvent of defatted cochineal, producing a soln. approx. 50% stronger in tintorial value than one made with 26% alc., and 20% stronger than Liq. cocci Brit. Pharm. Codex. W. O. E.

**Compound tincture of cardamom: loss of color in certain mixtures.** Charles M. Caines and Norman Evers. *Quart. J. Pharm. Pharmacol.* 6, 486-91 (1933).—Decolorization occurring in mixts. contg. compound tincture of cardamom Brit. Pharm. is due to the alkyl of the mixts. from  $\text{pH}$  7.0 to 9.5 mixts. are fairly stable in the dark and are not sensitive to oxidation, but are decolorized by exposure to light. At  $\text{pH}$  values above 9.5 fading occurs in the dark as well as in the light and is hastened by oxidation.

1 There is little difference observable in the rate of fading of mixts. prepd. with tinct. cardam. compo Brit. Pharm. 1932 and Brit. Pharm. 1914. Ca salts cause pptn. of Ca carminate in the form of a black deposit at  $\text{pH}$  values of 4 and upward. Mg salts do not ppt. the coloring matter in the same way as Ca salts. W. O. E.

**Decomposition of acetylsalicylic acid in aqueous solution.** C. Morton. *Quart. J. Pharm. Pharmacol.* 6, 492-5 (1933).—The velocity of decompn. of acetylsalicylic acid in aq. soln. in the presence of alkali-metal citrates and acetates has been detd., and a composite graph given from which the percentage of hydrolysis at any period during storage can be read. The rate of decompn. is independent of the absolute and relative concns. of the acetylsalicylic acid and alkali metal salt, but increases very rapidly with rise of temp. The use of stock mixts. or of heat in effecting soln. is inadmissible. The velocity const. for the unimol. reaction at air temp. is 0.0043. W. O. E.

**Mistura bismuthi hydroxidi.** H. Treves Brown. *Quart. J. Pharm. Pharmacol.* 6, 502-5 (1933).—The following procedure was devised for making this product: Mix Bi subnitrate (125 g.) with 75 ml. of distd.  $\text{H}_2\text{O}$ , add 90 ml.  $\text{HNO}_3$ , and warm gently until soln. is effected. Dissolve 90 g.  $\text{NaOH}$  in 5000 ml. of  $\text{H}_2\text{O}$  and add the Bi soln. quickly, in one quantity, stirring rapidly. Allow the ppt. to subside and pour off the clear liquid; collect the ppt. on a calico strainer and wash with  $\text{H}_2\text{O}$ , maintaining a layer of liquid above the ppt., until the washings are neutral to phenolphthalein; allow the residue to drain and mix it with sufficient distd.  $\text{H}_2\text{O}$  to produce the required vol. (1000 ml.). W. O. E.

**Some proposed new formulas for the British Pharmaceutical Codex.** II. H. Treves Brown. *Quart. J. Pharm. Pharmacol.* 6, 506-16 (1933); cf. C. A. 27, 563. The preps. considered are: Exst. ergoti, Liq. azorubri, Liq. tartrazinae compositus, Mist. magnesi hydroxidi et parafini liq., Nebula adrenalinae et ephedrinae oleosa, Nebula adrenalinae aromatz., Pasta magnesi sulph., Pasta tragacanthae compos. and Syrup. glycerophosphatum cum pepsino compos. W. O. E.

**Solution of arsenious and mercuric iodides.** F. R. C. Bateson. *Quart. J. Pharm. Pharmacol.* 6, 517-21 (1933).— $\text{HgI}_2$  when dissolved in a soln. of arsenious iodide forms a compd. with the HI and not with the As. In solns. of III contg. 0.1 mols. per l., when satd. with  $\text{HgI}_2$ , a compd. is formed, approximating the formula  $\text{HgI}_2 \cdot 2\text{III}$ . Donovan's soln., when prepd. with pure arsenious iodide, is much more stable than has been generally assumed. In dispensing solns. of  $\text{HgI}_2$  and KI, a wt. of KI at least equal to that of  $\text{HgI}_2$  should be used. W. O. E.

**Variation in solubility of calcium lactate.** Norman Glass. *Quart. J. Pharm. Pharmacol.* 6, 522-30 (1933).—The differences observed are not due to any change taking place within a specimen of Ca lactate after production, but such differences are inherent in the original formation of the salt. No method was discovered of sepg. a more sol. salt from a less sol. sample. For practical purposes it must be accepted that specimens of Ca lactate differ from one another in soly. with different processes of manuf.; the true explanation of the difference has not been found; it is useless to set a single const. as a standard of soly. for Ca lactate, because it would exclude the product of a no. of manufacturers which in all other respects is of official quality. W. O. E.

**Yield of extractive in unstandardized official extracts.** B. R. Veness. *Quart. J. Pharm. Pharmacol.* 6, 531-2 (1933).—The drugs examd. were cascara sagrada, gentian, liquorice and krameria, from which the av. yields of exts. were 24, 40, 30 and 11%, resp. W. O. E.

**Preparation and storage of solutions of tribromoethyl alcohol.** W. H. Butchers, K. Bullock and G. R. Priddey. *Quart. J. Pharm. Pharmacol.* 6, 533-9 (1933).—Exptl. results clearly indicate among other things that tribromoethyl alc. in soln. undergoes progressive decompn., the rate of which is increased by a rise in temp. Initial decompn. was shown by means of a Universal Indicator

(B. D. H.), whereas this was not disclosed by Congo red soln. The following test has been devised: Transfer 3 mls of the prep. soln. to a clean test tube and cool. In a similar test tube place a like vol. of distd.  $H_2O$  used in the prep. of the tribromoethyl alc. soln., and to each tube add 2 drops of Universal Indicator; the color of the 1st tube should be greenish yellow and it should not be possible to detect any difference in color of the 2 tubes. The new test indicates decompn. when the acidity of the soln. is too low to be indicated by titration with 0.02 N NaOH soln. Congo red requires the liberation of a titratable amt. of acid (over 0.5 mil per 100 mls) before indicating decompn. There is progressive decompn. of tribromoethyl alc. in soln. when stored at body temp. Appreciable decompn. occurs when the soln. is stored overnight in a vacuum flask and this practice is open to serious objection. Overheating the  $H_2O$  with which the tribromoethyl alc. is used to a temp. of 65° will cause decompn. immediately detected by the new test. W. O. E.

**Antisepsis and disinfection of the mouth and throat.** Durcsm. *Suddeut. Apoth.-Ztg.* 73, 574-6(1933). An illustrated article suggesting the use of certain ring-form tablets (Ringlein) contg. higher esters of *p*-hydroxybenzoic acid, for gradual soln. in the mouth. Expts. show the efficiency of such treatment. W. O. E.

**Brazilian "coto barks" and their plant sources.** Fred. W. Preise. *Pharm. Zentralhalle* 74, 577-8(1933).—The following species are mentioned as constituting the various sources of com. coto bark: *Ocotea pretiosa* Muessn., *Oreodaphne hookeriana* Nees, *Palcurea densiflora* Mart., *Rudgea viburnoides* Benth., *Pseudochimarrhis turbinata* Ducke, *Ladenbergia paraensis* n. sp. Ducke, *Calyophyllum spruceanum* Benth., *Spicramnia* species, *Simaruba amara* Aubl., *Simaruba ferruginea* St. Hil., *Ocotea argyrophylla* Ducke, *Nectandra elaeophora* Barb., *Bracteanthus glycyrrhizifolius* Ducke, *Piper* species, *Stenocalyx* species, *Pourouma cecropifolia* Mart., *Couepia rufa* Ducke, *Couepia subcordata* Benth., *Eugenia grisea* Mart., *Arrabidaea chia* Bur., *Warszewiczia coccinea* Klotzsch, *Picrolemma pseudo-coffee* Ducke, listed in the order of importance. W. O. E.

**Pharmacopeia Helvetica 5th edition.** L. Rosenthaler. *Pharm. Zentralhalle* 74, 579-84(1933).—A digest. W. O. E.

**Chemical investigations of the tobacco plant. IV. Effect of the curing process on the organic acids of tobacco leaves.** Hubert B. Vickery and Geo. W. Pucher. *Conn. Agr. Expt. Sta., Bull.* 352, 649-84(1933); cf. *C. A.* 25, 2458; 27, 4274.—With new improvements in methods and technic, previous conclusions have been rechecked. Methods are described. For the general method, a faintly acid hot- $H_2O$  ext. of the tissue was prep. and the substances that form Ba salts insol. in 60% EtOH were removed. The org. acids in this ppt. were recovered by Et<sub>2</sub>O extn., and were esterified and the esters distd. Different acids were identified by the prep. of suitable derivs. Analyses for citric and malic acids were also carried out by indirect methods, and it is shown that the ester method closely confirms the results of the indirect method. Very extensive losses of oxalic acid occur during ordinary procedures for the prep. of aq. exts. from tobacco leaf tissue inasmuch as this acid is moderately volatile with water or alc. vapor. No reliance can be placed on analytical figures secured after such exts. have been concd. unless precautions are taken to recover the oxalic acid from the distillate. A new method for oxalic acid detn. was developed in which the oxalic acid in dried leaf tissue is removed from the acidified tissue by Et<sub>2</sub>O and is detd. as  $CaC_2O_4$ . The efficiency of the Ba salts pptn. method for the isolation of the org. acids was confirmed. From 85 to 90% of the titratable acidity of an aq. ext. of dried tobacco leaves was found in the Ba salts fraction. Both nitrogenous and non-nitrogenous org. solids of unknown compn. were present in the Ba salts fraction. Malic acid decreased during the curing process, about 16% of the original amt. of this acid being utilized in the catabolic processes. On the other hand, citric acid increased nearly 6-fold in the

same time. The origin of this citric acid is as yet unknown. Oxalic acid changed very little during the curing process. It was present largely as insol. salts. The total acidity, the acidity in the form presumably of monobasic acids, and the acidity in the form of acids precipitable as Ba salts by 60% alc. all changed very little, if at all, during curing. On the other hand, the acids of unknown compn. diminished greatly, their place being taken by citric acid. The curing process thus results in a very extensive simplification of the org. acid picture. Only 64% of the acidity of the fresh leaves can be accounted for in terms of known acids, chiefly malic, citric and oxalic. More than 81% of the acidity consists of these 3 acids after only 12 days of curing and a similar high proportion was identified in the fully cured leaf. Small amts. of succinic and fumaric acids were found, also possibly maleic acid. Both citric and malic acids were present in the residue from the distn. of the esters even after the temp. was carried far above the b. p. of triethyl citrate. Small but appreciable quantities of malic and citric acids were also found in the so-called unesterifiable fraction. C. R. Fellers.

**Aspirin.** E. M. Bailey. *Conn. Agr. Expt. Sta., Bull.* 354, 796-9(1933).—Fifty-four com. samples were examd. for acetyl-salicylic acid and free salicylic acid content. The 5-grain tablets showed variations of 4.65-5.27 grains of acetyl-salicylic acid, and none—0.05 grain free salicylic acid per tablet. C. R. Fellers.

**Essential oils: the methods of production and their possibilities in Kenya Colony.** V. A. Beckley. *Kenya Colony Dept. Agr., Bull.* 19, 25 pp.(1931).—*Micromeria microphylla* yields a clear white oil practically identical with that from scented verbena. *Mentha sylvestris* produces an oil resembling peppermint with a suggestion of pennyroyal. Camphor is present in the oil from *Ocimum canum*. When it is distd. with low-pressure steam the East African cedar (*Juniperus procera*) yields 1.5-3.0% of a pale yellow to dark brown oil which deposits a large amt. of long needle-shaped crystals on standing; the yield of crystals is higher from well-seasoned wood than from green or partially seasoned wood and is increased by exposing the sawdust to the sun. Geranium oil produced from plants grown in Kenya is low in esters and has a peculiar odor; the yield is about 0.15% from the leafy shoots and 0.27% from the leaves. Lemon-grass oil produced from plants grown in Kenya is very insol. in alc. The leaves of *Eucalyptus globulus* yielded 1.5% oil; *E. citriodora* gave a smaller yield. The fresh leaves of *Pogostemon patchouli* yielded 0.06-0.20% oil; fermentation of the leaves increased the yield to 0.5%. K. D. Jacob.

**Stillts for the production of essential oils.** V. A. Beckley and T. L. McClelland. *Kenya Colony Dept. Agr., Bull.* 25, 9 pp.(1932). K. D. J.

**Sodium evipan: a preliminary report on a new intravenous anesthesia.** G. Miller. *Can. Med. Assoc. J.* 29, 596-8(1933).—Sodium evipan is administered intravenously. The patient falls into a deep sleep in about 30 sec and operations may be commenced immediately. Anesthesia persists for about 20-30 min. For properly chosen cases it appears to be a valuable anesthetic. G. H. W. Lucas.

**The combination action of Solanaceae alkaloids.** Hajime Yamada. *Folia Pharmacol. Japon.* 16, No. 3, 351-60(Breviaria 27)(1933). The combined action of 1-hyoscyamine, 1-scopolamine and 1-homatropine on the parasympathetic fibers of the rabbit intestine and isolated frog heart show much greater efficiency in removing the effect of acetylcholine than any one alone. Apparently one alkaloid potentiates the action of the others. G. H. W. Lucas.

**The cultivation of *Lobelia inflata*.** M. Mascré and H. Genot. *Bull. sci. pharmacol.* 40, 453-9(1933).—The harvest can be increased by the use of fertilizers to above 3 times the usual value, but the relative content of alkaloids decreases. The factor for the alkaloid increase is about 2.5. A. E. Meyer.

**Chemical and physiological assays of some *Lobelias*.** M. Mascré and M. Caron. *Bull. sci. pharmacol.* 40, 519-



20(1933).—The chem. assay was performed by the pptn. of the alkaloids as silicotungstates. For the physiol. assay, the silicotungstates were decompd. with  $\text{NH}_3$ , extd. with  $\text{Et}_2\text{O}$  and the residue of evapn. was dissolved in dil.  $\text{H}_2\text{SO}_4$ . The physiol. effect of *L. inflata* in the anesthetized dog is a sharp increase of the blood pressure and a decrease of the amplitude and rate of respiration. The alkaloid content was found as follows: *L. inflata* leaves 0.585%, seeds 0.21 and 0.235%; *L. cardinalis* 0.445%; *L. syphilitica* 0.535%; *L. urens* 0.752%; *L. erinus* traces. The physiol. action in all species was like that of *L. inflata*. A. E. Meyer

The chemical composition of *Retama sphaerocarpa* Boiss. P. Valier. *Bull. sci. pharmacol.* 40, 520-3(1933). The upper parts of the plant give 3.1% of ashes, the compn. of which is given. The  $\text{EtOH}$  ext. contains an appreciable quantity of an alkaloid. A. E. Meyer

A new method of extraction and separation of the alkaloids of *Pseudocinchona africana* A. Chev. Raymond-Hamet. *Bull. sci. pharmacol.* 40, 523-7(1933).—Moisten the powd. bark with a 10% soln. of  $\text{Na}_2\text{CO}_3$  and ext. with benzine. Shake out with 2% formic acid, add  $\text{NaHCO}_3$  and ext. with  $\text{CHCl}_3$ . Evap. to dryness. The yield from 900 g. bark was 52.5 g. alkaloids. Dissolve the latter in  $\text{EtOH}$  and  $\text{Me}_2\text{CO}$  and change into the  $\text{HCl}$  salts. When the aqueous soln. of the  $\text{HCl}$  salt is extd. with  $\text{CHCl}_3$ , an amorphous alkaloid is obtained on evapn. (yield 1.325% of the bark). Make the extd. soln. alk. with  $\text{NaHCO}_3$  and ext. with  $\text{Et}_2\text{O}$ . The alkaloid corynanthine crystallizes from the concd.  $\text{Et}_2\text{O}$  soln. (1.0925%). When the mother liquid is mixed with a soln. of  $\text{HCl}$  in  $\text{Et}_2\text{O}$ , a small quantity of a ppt. is obtained. A. E. M.

*Digitalis lanata*. G. Spagnol. *Rev. sudamericana cardiol. inmunol. quimioterap.* 16, 783-94(1933).—*Digitalis lanata*, cultivated in Argentina, contained 49.6 international cat units per g., which is 4.4 times the potency of a standard of *Digitalis purpurea*. Hanvlik's methods on pigeons give the same toxicity as *purpurea*. This proves that the difference between toxic limit and therapeutic dose is more favorable in *D. lanata*. A. E. Meyer

Determination of phenacetin, antifebrin or aspirin. G. Vaisman. *Farm. Zhur.* 3, 109-12(1933).—The method is based on acid ( $\text{NHCl}$ ) hydrolysis of the sample for 1 hr. and subsequent titration of the excess  $\text{HCl}$  with standard  $\text{NaOH}$  and phenolphthalein. L. Nasarevich

Extract of ergot; its biological evaluation. A. D. Porenfeld and H. V. Tutayev. *Farm. Zhur.* 4, 156-9(1933).—The state pharm. method bases the evaluation of the ext. on its histamine content, instead of the alkaloids. Broom-Clark's method is much more specific and better adapted for biol. standardization. L. N.

Chemical evaluation of extract of ergot. A. D. Rozenfeld and H. Ya. Troppe. *Farm. Zhur.* 4, 159-64(1933).—Extensive expts. with about 37 detns. listed shows that Keller-Bromme's method as used in the German Pharm. V for alkaloids is sufficiently accurate and reliable to replace biological methods. Smith's colorimetric method has the advantages of speed. L. Nasarevich

Determination of volatile oils in plants. M. I. Perlova. *Farm. Zhur.* 4, 165-6(1933).—The app. comprises steam supply, a flask in which the sample is steamed, a condenser and a U-shaped buret, with one column graduated, and wide neck into which the distillate is fed. Water rises through the second column and is discarded and the oil floated in the graduated neck. L. Nasarevich

Preparation of bismoverol. G. A. Kirkhgof, M. O. Spektor and E. A. Akon'yantz. *Khim. Farm. Prom.* 1933, 122-3. —The method used in Russ. patent 14,468 is much simplified by dissolving 1.2 moles of  $\text{Bi}_2\text{O}_3$  in a mixt. of 1.67 moles of lactic acid and 7 moles of  $\text{AcOH}$  and dild. with  $\text{H}_2\text{O}$ . This soln. is heated to 50-60° and while stirring 1 mole of tartaric acid is added. The temp. is kept at 80° for 3 hrs., the ppt. washed by decantation, filtered and dried *in vacuo* at 80-90°. L. Nasarevich

Bismuth citrate and lactate. G. A. Kirkhgof and M. O. Spektor. *Khim. Farm. Prom.* 1933, 123. —One mole of 10% lactic acid is heated to 45° and treated with excess of

$\text{Bi}_2\text{O}_3$ , filtered and the crystals are washed and dried. The contents of  $\text{Bi}_2\text{O}_3$  = 59.23%. A. compd.  $(\text{C}_6\text{H}_5\text{O}_2)_3\text{Bi}(\text{OH})_3$  is prepd. analogous to bismoverol, with 1 mole each of citric acid and  $\text{Bi}_2\text{O}_3$ . The product contains 87%  $\text{Bi}_2\text{O}_3$ . L. Nasarevich

Anhydrous quinine. S. Elgazin. *Khim. Farm. Prom.* 1933, 124-5. —Stir wuter (90 l.), 2.5 kg. of  $\text{H}_2\text{SO}_4$  and 25 kg. of wet quinine at 60° and filter through charcoal. Neutralize the filtrate with  $\text{NaOH}$  (5%), filter the anhyd. quinine and dry at 50°. L. Nasarevich

Determination of santonin. N. G. Buntzelman. *Khim. Farm. Prom.* 1933, 130-5. —Treat the ground plant with 10%  $\text{HCl}$  until completely wet and shake with 10%  $\text{CHCl}_3$  90%  $\text{C}_6\text{H}_6$ . After 12 hrs. filter, evap. to 5-7 cc., add 5 g. of  $\text{Ba}(\text{OH})_2$  + 100 cc. of  $\text{H}_2\text{O}$  and heat with grinding. Reext. the pptd. resins. Acidify the filtrates with  $\text{HCl}$  and ext. 3 times with  $\text{CHCl}_3$ . Wash the  $\text{CHCl}_3$  with 1.5%  $\text{NaOH}$  and  $\text{H}_2\text{O}$ , evap., dissolve the residue in 7.5 cc. of abs. alc. and 42.5 cc. of hot  $\text{H}_2\text{O}$  and crystallize for 20-40 hrs. Filter the pptd. santonin, wash with 15% alc. and dry at 105-110°. L. Nasarevich

Determination of nicotine. M. G. Ruitkov. *Khim. Farm. Prom.* 1933, 140-2. —The sample dissolved in 50 cc. is dild. with steam and 2 g. of fresh  $\text{MgO}$  into dil.  $\text{HCl}$ . An aliquot of the distillate is treated with 1.5 cc. of  $\text{HCl}$  and 3 cc. of 12%  $\text{H}_2\text{Si}(\text{W}_2\text{O}_7)_8 \cdot 22\text{H}_2\text{O}$ . In 3 min. at 85° the ppt. is formed and after 2 hrs. crystn. is ready to filter. The ignited residue multiplied by 0.114 = the weight of nicotine. This method requires  $\frac{1}{3}$  of the time necessary for Bertran and Javillier's method. L. N.

Powdered extract of uva-ursi. I. Oberhard and E. Katz. *Khim. Farm. Prom.* 1933, 143-6. —The highest percentage of arbutin is obtained by double extn. of leaves; the leaves are boiled each time for 15 min. with 5 pts. of  $\text{H}_2\text{O}$ . The hot ext. is filtered on cloth, evapd. to  $\frac{1}{2}$  vol., mixed with dextrin or lactose, dried at 50° and powd. Arbutin is detd. iodometrically according to Zeichner. L. Nasarevich

Determination of alkaloids. Ya. Fialkov and S. Babich. *Khim. Farm. Prom.* 1933, 148-9. —Very rapid detn. is made by shaking a small vol. of the sample (2 cc.) with 70 cc. of  $\text{CHCl}_3$  and 5 g. of anhyd.  $\text{Na}_2\text{SO}_4$  in a flask until dispersed. Then  $\text{NH}_4\text{OH}$  is added, the flask shaken, the clear  $\text{CHCl}_3$  filtered, evapd., the residue dissolved in 0.02 N acid and the excess titrated with 0.02 N  $\text{NaOH}$ . L. Nasarevich

Quinine hydrochloride and sulfate. E. M. Tareev. *Khim. Farm. Prom.* 1933, 157-8. —A comparative discussion of quinine hydrochloride and sulfate uses in treatment of malaria, with preference given to hydrochloride as more sol., stable and efficient salt. L. Nasarevich

Analysis of tablets. D. Popov. *Khim. Farm. Prom.* 1933, 164-7. —A discussion of analysis of tablets contg. diethylallylacetanilide, aspirin, amatin, diplosal, antipyrine, pyrimidone, nitroglycerin, veramon, phenobarbital, and its derivs. Br is detd. either by boiling with  $\text{NaOH}$  and titration with  $\text{AgNO}_3$  and  $\text{NH}_4\text{CNS}$  or by boiling with  $\text{Na}$  and  $\text{C}_2\text{H}_5\text{OH}$ . I is detd. by oxidation to  $-\text{IO}_2$  and titration with  $\text{KI}$  and  $\text{Na}_2\text{S}_2\text{O}_3$ , or it is liberated with  $\text{HNO}_3$ , extd. with  $\text{CHCl}_3$  and titrated. The double bond is detd. bromometrically. Antipyrine is either titrated according to Kolthof or treated with the excess of picric acid (standard) and titrated. Nitroglycerin is detd. by reduction with  $\text{Al}$  and alkali, distg. and titrating with  $\text{NH}_3$ . Pyrimidone and barbituric acids are sepd. by extn. with solvents; the soln. is first made alk. (for pyrimidone) and then acidified and the acids are extd. L. N.

Hydration of anabasine. A. P. Orckhov and D. A. Brodskii. *Khim. Farm. Prom.* 1933, 188-90. —Anabasine (8 g.) in 120 cc. N  $\text{HCl}$  with Adams' catalyst is shaken with  $\text{H}_2$  for 18 hrs. 3.7 l. of hydrogen is consumed (3.3 l. theoretical). The filtered soln. evapd. *in vacuo* and treated with abs. alc. ppt.  $\alpha,\beta$ -dipiperidyl- $\text{HCl}$ , m. 300°. The base is sepd. with alkali, extd. with ether and crystd. in needles.  $\alpha,\beta$ -Dipiperidyl m. 68-9° and b. 113-14°. Picrate, chloroaurate, chloroplatinate, dinitroso- $\alpha,\beta$ -dipiperidyl and dibenzoyl- $\alpha,\beta$ -dipiperidyl are

sepd. and described. Another way to hydrate anabasine is to boil it in abs. alc. with Na. L. Nasarevich

**Xanthone.** M. Spektor. *Khim. Farm. Prom.* 1933, 195 6.—Aspirin (2 mols) is distd. at 120–70° until all the AcOH is over, then the temp. is raised so that in 4 hrs. it reaches 350–5° at 40 mm. and xanthone crystallizes out. Recrystd. from alc. xanthone yields 70%; m. p. 168–70°. L. Nasarevich

**Analysis of opium.** B. A. Klyachkina. *Khim. Farm. Prom.* 1933, 203 13.—After detn. of H<sub>2</sub>O 10 g. of opium is extd. with 100 cc. of 0.5% HCl for 24 hrs. and filtered. One part of the filtrate is dried for solids and the other 50 cc. is extd. with CHCl<sub>3</sub> and NaOH, concd., mixed with ether, filtered, shaken with 6 cc. of 30% NaOH, the aq. part combined with the original NaOH soln. contg. morphine and the solvent evapd. leaving narcotine, papaverine, thebaine and codeine. For morphine the combined NaOH soln. is acidified with HCl, treated with 6 g. of slaked lime, made up to known weight and set aside for 2 hrs. with shaking. A known part of the filtrate is mixed with 22 cc. of ether, 3 cc. of alc., 2 g. of NH<sub>4</sub>Cl, crystd. for 24 hrs., filtered on Schott's glass filter, washed with H<sub>2</sub>O satd. with ether and dried as anhyd. morphine at 70–105°. A correction of 0.08 is added. For narcotine the filtrates from morphine are neutralized, concd., strongly acidified with HCl, extd. with CHCl<sub>3</sub>, the CHCl<sub>3</sub> is concd. to 2 cc. and poured slowly into petr. ether. Narcotine-HCl is pptd., gently dried and weighed. Narcotine and papaverine are sepd. from other alkaloids by dissolving the mixt. in 5% CH<sub>3</sub>COOH, addn. of 2 g. of CH<sub>3</sub>COONa and crystn. The narcotine-papaverine ppt. is washed, sapond. with 6% alc. KOH, transferred to a separatory funnel with 5% NaOH and CHCl<sub>3</sub>, the CHCl<sub>3</sub> ext. is dried and dissolved in 10 cc. of alc., 5 cc. of this alc. mixed with 5 cc. of satd. alc. picrolonic acid, crystd. for 24 hrs., filtered and weighed. Picrolonate  $\times 0.561$  = papaverine. The alk. soln. contg. narcotine is acidified with HCl, heated to 90°, cooled, made alk., extd. with C<sub>6</sub>H<sub>6</sub>, dried and weighed. Codeine and thebaine in the filtrate from the above are extd. with CHCl<sub>3</sub> (alk.), concd. with H<sub>2</sub>O, crystd. in the cold, filtered and washed with *N* NH<sub>3</sub>. The filtrate is made more alk., extd. with CHCl<sub>3</sub>, of which an aliquot is dried and titrated for codeine. The thebaine left in the CHCl<sub>3</sub> is detd. colorimetrically (red ring with H<sub>2</sub>SO<sub>4</sub>; the min. amt. shown = 0.00025 g.). The ppt. (main part of thebaine) is dried at 70°, dissolved in 6 cc. of alc. mixed with 3 cc. of 7.5% alc. tartaric acid and crystd. for 24 hrs. The filtered thebaine tartrate may be either weighed or titrated. L. Nasarevich

**Thermopsis lanceolata K. Br.** M. Varlakov. *Khim. Farm. Prom.* 1933, 226–8.—*Thermopsis* found along the northern Chinese border contains 0.37% of alkaloids, sol. in H<sub>2</sub>O, CHCl<sub>3</sub> and alc., insol. in ether and benzene. The plant is poisonous and its action on frogs, rats, rabbits, cats and dogs is described. L. Nasarevich

**Estimation of the primary alcohols content of essential oils by phthalization.** L. S. Glichitch and Y. R. Naves. *Chimie & Industrie Special No.*, 1024 8 (June, 1933).—A study of the detn. of primary alcs. by phthalization in C<sub>6</sub>H<sub>6</sub> soln. on the water bath as recommended by Schimmel (*Ber. Schimmel* 1899, 24; 1912, 39–42; cf. C. A. 26, 2285) showed that phthalization is more or less complete and that the results obtained require a correction that varies with the nature of the alcs. present, the amt. found present and the time of alk. neutralization. It may be of some use for the comparative analysis of oils of citronella, as the influence of the 3 above-mentioned factors is fairly const. for this oil. Moreover, a considerable proportion of the secondary alcs. present are counted as primary. The following technique overcomes these sources of errors and gives accurate results for the sum of the primary and secondary alcs.: to 2–3 g. (accurately weighed) of oil in a 250-cc. glass-stoppered Erlenmeyer flask add 5 g. phthalic anhydride and 20 cc. pure dry C<sub>6</sub>H<sub>6</sub>N (distd. over K and redistd. over BaO and kept in paraffined glass-stoppered bottles), let stand 18 hrs. at atm. temp., add 25 cc. H<sub>2</sub>O

and 10 drops phenolphthalein indicator and titrate the excess acid with standard KOH. A. P.-C.

**Essential oils of *Ocimum canum* Sims and of *Ocimum gratissimum* L.** L. S. Glichitch and Y. R. Naves. *Chimie & Industrie Special No.*, 1029 33 (June, 1933).—Oils obtained from *Ocimum gratissimum* L. produced at Alindao (Ubangi-Chari), Combani (Anjouan) and Bani-bari (Ubangi-Chari) contained considerable amts. of thymol, but no eugenol. Oils obtained from *O. gratissimum* L. produced at Roulé (Comoro Islands) and Romba (Madagascar) contained considerable amts. of eugenol, but no thymol. Oils obtained from *O. canum* Sims, produced in Mayotte, Kenya, Anjouan (Comoro Islands) and at Antibes (Alpes-Maritimes, France) contained considerable amts. of *d*-camphor, but no *Me* cinnamate. Oils obtained from *O. canum* Sims, produced in the Comoro Islands, Madagascar and Ubangi-Chari contained considerable amts. of *Me* cinnamate, but no *d*-camphor. This would indicate that there exist botanical species which can be differentiated only by their chemism. A. Papineau-Couture

**Essential oil of *Canarium zeylanicum* (Thw.).** J. P. C. Chandrasena and Hans Lourens. *J. Soc. Chem. Ind.* 52, 362T (1933).—The fresh resin from the tree *Canarium zeylanicum* gave 10–15% essential oil. This, upon fractionation, gave  $\alpha$ -phellandrene and a fraction b<sub>5</sub> 120–2° consisting of a copd., C<sub>7</sub>H<sub>10</sub>O, m. 164°, obtained by cooling and filtering, and a liquid sesquiterpene, C<sub>15</sub>H<sub>24</sub>, which formed a nitrosite m. 113°. E. W. Scott

**Essence of lavender.** Antonio Illera Camino. *Quim. e ind.* 10, 245–55 (1933).—Some Spanish soils are well suited to lavender cultivation. Test plots have been grown, the essence has been recovered, and characteristics of the latter were detd. E. M. Symmes

**Industrial preparation of twice-distilled water; physico-chemical characters of the water.** R. Cliquet, J. Guilbert and H. Pénau. *J. pharm. chim.* 18, 321–34 (1933).—A semi-industrial distn. app. of Pyrex glass is sketched; by its means a twice-distd. water meeting all pharmaceutical and biol. requirements is obtained from ordinary distd. water at the rate of 3 l. per hr. The elec. cond. of Seine water is  $400 \times 10^{-4}$ ; of once-distd. 100–200  $\times 10^{-4}$ ; twice-distd. 2–3  $\times 10^{-4}$ . The av. *p*<sub>H</sub> of twice-distd. water detd. by potentiometry is 5.5, caused by dissolved traces of CO<sub>2</sub> (about 0.5 mg. per l.). Mineral impurities detd. by sensitive colorimetric methods were: Pb less than  $1:2 \times 10^6$ ; Cu  $1:2 \times 10^7$ ; B  $1.5 \times 10^7$ ; NH<sub>3</sub> less than  $1:5 \times 10^6$  org. matters: none; solids: 5 mg. per l. S. Waldbott

**Some fundamentals of perfumery.** H. Stanley Red grove. *Pharm. J.* 131, 395, 452–3 (1933).—A summary is given of present-day "formulating a perfume" and modern methods of prepn. of perfumes. S. Waldbott

**Surgical dressings. Consumption and Government regulations.** J. Widdiffe Peck. *Pharm. J.* 131, 421.—**Manufacture of cotton.** *Ibid.* 484 6.—The history of cotton, and its manuf. are given; illustrated. Lint bandages and gauze. *Ibid.* 513.—Modes of prepn. are described; special definitions are recorded. Plasters and ligatures. *Ibid.* 540. Sterilization of dressings by steam. *Ibid.* 568–9 (1933). S. Waldbott

**The new Swiss pharmacopeia (Ed. V).** C. H. Hampshire. *Pharm. J.* 131, 511–12 (1933).—The characteristic features and differences from other pharmacopeias are pointed out. S. Waldbott

**Constituents of the volatile oil from the wood of *Chamaecyparis formosensis* Matsum** (Kafuku, Ichikawa) 22 Sepn. of the opium alkaloids (Busse, Busse) 10. Hydroxy compds. of phenazone (Ger. pat. 577,631) 25. Org. Hg compds. (Ger. pat. 580,352) 10. Disinfectants (Brit. pat. 396,064) 15. Naphthalene derivs. [intermediates in the production of drugs] (Swiss pat. 162,350–1) 25. Porphrin (Swiss pat. 162,355) 25.

**Therapeutic preparation suitable for use in "non-specific protein therapy."** Maxwell M. Becker (to Geo. A. Breon & Co.). U. S. 1,935,497, Nov. 14. Mr

butyrate is used with proteins such as those of milk and with substances such as Na citrate which are suitable for providing a buffer soln. having a  $p_H$  of about 6.2.

**Medicinal silica preparations.** Chem. Fab. von Heyden A.-G. (Rudolf Zellmann, inventor). Ger. 542,448, Oct. 28, 1933. Colloidal silicic acid solns. are mixed with colloidal metals or nonmetals or their compds., or with reagents yielding colloidal ppts. of metals or nonmetals or their compds. The mixts. are then dried, preferably by spraying. Examples are given.

**Basic bismuth salts of organic arsonic acids.** Karl Streitzwolf, Alfred Fehle and Walter Herrmann (to Winthrop Chemical Co.). U. S. 1,934,017, Nov. 7. New basic Bi salts of org. arsonic acids of the probable formula  $HOBi.O.As(:O)R.O$ , wherein R stands for an

aromatic nucleus which may be substituted by one side chain, a heterocyclic nucleus, hydroxy, alkyl, halogen, amino, nitro or further groups, are obtainable by causing the alk. salts of org. arsonic acids to react with a soln. of a Bi salt other than bismuthyl K Na tartrate. These preps. which in contradistinction to the compd. of Levaditi are insol. in alkali, and which possess the combined therapeutical action of As and Bi, show antiparasitary properties and are especially suitable for the depot treatment of *trypanosoma* and *spirochete* diseases. Examples are given in which, as initial materials, there are used 3-acetylaminio-4-hydroxybenzenearsonic acid, *p*-acetylaminobenzenearsonic acid, 3,4-benz(4-*N*-methyl)imidazolonecarsonic acid and the formaldehyde bisulfite compd. of 3-amino-4-hydroxybenzenearsonic acid.

**Calcium citrate.** Klemens Bergl. Ger. 586,371, Oct. 20, 1933. Colloidal Ca citrate for medicinal use is prepd. by mech. disintegration of the citrate in the presence of a protective colloid comprising juice, pulp, or like products obtained from fruits of the genus *Citrus*.

**Use of sodium iodoarsenite, etc., for combating Vincent's angina and similar affections.** Charles Gurchot. U. S. 1,934,977, Nov. 14. Na iodoarsenite or a similar compd. of Hg, Bi, Sb or V are used as the therapeutic agents.

**Water-soluble formaldehyde bisulfite aminoaryl antimony compounds.** Hans Schmidt (to Winthrop Chemical Co.). U. S. 1,934,010, Nov. 7. From compds. of the type  $H_2NC_6H_4As:SbC_6H_4NH_2$ , such as 3-amino-4-hydroxy-1'-amino-1'-arseno-1'-stibiobenzene, etc., by treatment with formaldehyde bisulfite in aq. soln., water-sol. derivs. are obtained which are brownish colored powders, difficultly sol. in usual org. solvents and suitable for therapeutic use. Several examples with details of procedure are given. U. S. 1,934,012 also relates to similar compds. of the type  $H_2NC_6H_4As:Sb.AsC_6H_4NH_2$ ,  $Sb:AsC_6H_4NH_2$ .

**Esters of amino alcohols.** F. Hoffmann-La Roche & Co. A. G. Ger. 580,247, Oct. 19, 1933; Brit. 396,318, Aug. 3, 1933. Esters of aryl-substituted aliphatic acids with ams. of the formula  $RR'C(C_6H_4OH)CH_2NR_2$ , in which R is an alkyl group and R' is H or an alkyl group, are prepd. by standard processes. The products have antiparasmodic properties. Examples are given of the prepn. of (1) esters of 2,2-dimethyl-3-diethylaminopropanol with phenylacetic acid (ester  $b_p$  173°, HCl salt m. 80°),  $\alpha$ -phenylbutyric acid (ester  $b_p$  147°), phenylbromacetic acid (ester  $b_p$  186°),  $\alpha$ -phenyl- $\beta$ -hydroxypropionic acid (ester HCl salt m. 92°), and  $\alpha,\alpha$ -diphenylglycolic acid (ester HCl salt m. 141°); (2) esters of 2,2-dimethyl-3-dimethylaminopropanol with  $\alpha$ -phenyl- $\alpha$ -acetyloxypropionic acid (ester HCl salt m. 161°), acetylmandelic acid (ester HCl salt m. 179°), and propionylmandelic acid (ester HCl salt m. 139°); (3) esters of  $\alpha$ -phenyl- $\beta$ -acetyloxypropionic acid with 2,2-dimethyl-3-benzylmethylaminopropanol and 2,2-dimethyl-3-piperidylpropanol; (4) the quaternary methyl sulfate, m. 133-4°, of the ester from  $\alpha,\alpha$ -diphenylglycolic acid and 2,2-dimethyl-3-methyldiethylaminopropanol.

**Halogenated bis(hydroxyaryl) oxides.** Friedrich Muth and Georg Wessenberg (to Winthrop Chemical Co.). U. S. 1,932,595, Oct. 31. See Ger. 569,726 (C. A. 27, 3721).

**Chlorohydroxybiphenyls.** The Dow Chemical Co. Brit. 396,251, Aug. 3, 1933. 3- and 5-chloro-2-hydroxybiphenyls are obtained by chlorinating 2-hydroxybiphenyl by usual methods, with or without catalysts and solvents. Good yields are obtained with somewhat less than 1 mol. of Cl. The mixt. of monochloro compds. of close b. ps. may be sepd. from unchlorinated and polychlorinated products by a preliminary distn. and are then sepd. by fractional crystn., involving at 1 stage conversion into alkali or alk. earth metal salts. The products are suitable as germicides, disinfectants, etc.

**7-Ethoxy-4-methylcoumarin.** Arthur A. Levinson (to Selected Chemicals Inc.). U. S. 1,934,361, Nov. 7. This compd., which is suitable for use as a flavoring or perfume and m. about 115°, is produced by ethylating 7-hydroxy-4-methylcoumarin (various alternative methods of manuf. being described).

**Basic esters of fatty-aromatic acids.** Marcus Guggenheim (to Hoffman-La Roche Inc.). U. S. 1,932,341, Oct. 24. Details are given of the production of various esters which, in general, possess a strong antispasmodic action. Examples are given of the manuf. of: (1) 1-phenylacetyl 2,2-dimethyl-3-diethylaminopropanol ester,  $b_p$  173-4°; (2)  $\alpha$ -phenylbutyryl ester of 2,2-dimethyl-3-diethylaminopropanol,  $b_p$  147°; (3) phenylbromacetyl 2,2-dimethyl-3-diethylaminopropanol ester,  $b_p$  186°; (4) the hydriodide of the acetyltropyl ester of 2,2-dimethyl-3-diethylaminopropanol, m. 92°; (5) acetylacetyl 2,2-dimethyl-3-dimethylaminopropanol ester-HCl, m. 161°; (6) acetylmandelic acid 2,2-dimethyl-3-dimethylaminopropanol ester-HCl, m. 179°; (7) propionylmandelic acid 2,2-dimethyl-3-dimethylaminopropanol ester-HCl, m. 139°; (8) acetyltropyl 2,2-dimethyl-3-benzylmethylaminopropanol ester (a yellow oil which cannot be distd.); (9) acetyltropyl 2,2-dimethyl-3-piperidylpropanol ester (a yellow oil); (10) benzilic acid 2,2-dimethyl-3-diethylaminopropanol ester-HCl, m. 141-2°; (11) benzilic acid 2,2-dimethyl-3-methyldiethylammoniumpropanol ester methylsulfate, m. 133-4°; and, (12) tropyl 2,2-dimethyl-3-diethylaminopropanol ester (a colorless thick oil). The amino ams. used as starting materials may be prepd. by reduction with Na amalgam in a dil. HOAc soln. of the amino aldehydes made as described in U. S. 1,824,676 (C. A. 26, 258).

**Dilodoimidazoleacetic acid.** F. Hoffmann-La Roche & Co. Swiss 159,795, Apr. 17, 1933. I in alk. soln. is caused to react on Na imidazoleacetate, the resulting Na salt being converted to the acid by treatment with mineral acid. The substance m. 165° with decompn. and its HCl m. 186°. It is used as Rontgen ray contrast agent.

**Compounds of sparteine with barbituric acids.** F. Hoffmann-La Roche & Co. A.-G. Ger. 580,245, Oct. 19, 1933. Cryst. compds. are obtained by combining 1 mol. of sparteine with 1 or 2 mols. of a C,C-disubstituted barbituric acid (I). The reaction may be effected by fusing the components together, or by heating them in a solvent, or by double decompn. in a solvent between salts of the components. The products are sol. in water, alc., ether, and benzene, and exert a beneficial action on the circulatory system. Examples are given of the manuf. of compds., m. at the temps. stated, from sparteine and diethyl-I (1 mol.) (138°); phenylethyl-I (1 mol. and 2 mols.) (151° and 157°, resp.); ethylisopropyl-I (1 mol.) (140°); diallyl-I (1 mol. and 2 mols.) (139-40° and 140° resp.); and isopropylallyl-I (2 mols.) (122-3°).

**Adenosinephosphoric acids.** I. G. Farbenind. A.-G. Brit. 396,135, Aug. 3, 1933. Yeast adenylc acid (adenosine triphosphate) is converted into muscle adenylc acid (an adenosinephosphoric acid) by hydrolysis at 10-50°. The starting material, or crude ext. contg. it, is treated with the hydrolyzing agent, e. g.,  $Ba(OH)_2$ ,  $NaOH$  or mineral acid soln., a precipitant is then added and the product sepd. from the ppt. It is useful in the therapy of the circulation of the blood. The starting material may be prepd. by (1) extg. yeast in the cold with trichloroacetic acid, mixing with Hg acetate under feebly alk. conditions, decompg. with  $H_2S$  and pptg. the adenosine triphosphate as its Ca salt by adding  $CaCl_2$  and alc.,

(2) treating with  $H_2O$  plasmolytes obtained at a low temp. from yeast, eliminating the undissolved constituents and, if desired, treating the soln. with adsorbents, *e. g.*, bentonite, and pptg. with org. solvents, *e. g.*,  $MeOH$ , the soln. remaining after removing the adsorbent, (3) extg. yeast with trichloroacetic acid before or after plasmolysis, a crude material being obtained, and (4) plasmolyzing yeast with  $EtOAc$  at below  $15^\circ$  and introducing into boiling  $H_2O$ .

**Salts of adenylypyrophosphoric acids.** I. G. Farbenind. A.-G. Brit. 396,647, Aug. 10, 1933. Alkali metal salts of adenylypyrophosphoric acids are prep'd. by neutralizing the acid with an alkali metal hydroxide or carbonate, or by double decompn. of a sparingly sol. salt of the acid with an alkali metal salt, and isolating the product by evapn. or by pptn. with an org. solvent. The salts are stable, readily  $H_2O$ -sol. and useful therapeutically. Among examples (1) the Ca salt of the adenylypyrophosphoric acid isolated from the cardiac muscles is dissolved in  $HCl$ ,  $Na_2C_2O_4$ , and  $NaOH$  are added and, after standing, the Na salt is ppt'd. from the filtrate by alc. and (2) Pb adenylypyrophosphoric acid is decomp'd. with  $H_2S$ ,  $NaOH$  is added to the filtrate and the Na salt ppt'd. with alc.

**Double compounds.** Chemische Fabrik vorm. Sandoz. Swiss 161,244-5, July 1, 1933. Addn. to 158,387 (C. A. 27, 4630). New double compds. useful in therapy are prep'd. by heating Ca mannonate and Ca lactobionate (161,244) or Ca glyconate and Ca maltobionate (161,245) in an aq. medium.

**Quinoline derivatives.** Carl A. Rojahu. Ger. 586,335, Oct. 20, 1933. Addn. to 582,320 (C. A. 27, 5152). Salts are prep'd. by the usual methods from 2-phenylquinoline-4-carboxylic acid or its derivs. and mono- or diethanolamine or a mixt. of the three ethanolamines. An example is given. The salts are sol. in water, alc., and oils, and are of therapeutic value.

**Stable aqueous emulsions of lecithin and oil.** Bruno Rewald (to Hanscatische Mühlenwerke A.-G.). U. S. 1,934,005, Nov. 7. An oil-in-water emulsion is prep'd. contg. lecithin as the essential emulsifying agent and also contg. a small proportion of benzyl alc. Various examples and details of procedure are given.

**Alkaloid.** Chinoin Gyógyszer és Vegyészeti Termékek Gyára R. T. (V. Kereszty & Wolf) and Paul Wolf. Swiss 160,898, June 1, 1933. A new alkaloid is obtained by treating ergot with alkali and extg. with an org. solvent. The alkaloid is recrystd. in a chlorinated org. solvent such as  $CHCl_3$  to which the alkaloid is indifferent. It m.  $180-4^\circ$  with decompn.

**Vegetable extracts.** Chemische-Pharmazutisch A.-G. Bad Homburg, Werk Frankfurt a. M. Ger. 577,653, June 2, 1933. Exts. of plants such as camomile, sage, arnica, etc., are treated with active light ether during or after extn.

**Refining the vitamin-containing unsaponifiable matter of oils such as cod-liver oil.** Archie Black (to E. R. Squibb & Sons). U. S. 1,935,042, Nov. 14. The unsaponifiable matter is dissolved in a substantially oil-immiscible solvent such as alc. or dioxane and the soln. is washed with small portions of an oil such as corn oil to remove certain inert substances.

**Contrast media for x-ray photography.** I. G. Farbenind. A.-G. Brit. 396,114, July 18, 1933. See Fr. 728,631 (C. A. 26, 6071).

**Hormones.** F. Hoffmann-La Roche & Co. A.-G. Swiss 161,179, July 1, 1933. Hormones are adsorbed from liquids contg. them by animal charcoal and extd. from the latter by a mixt. of  $MeOH$  and  $CHCl_3$ .

**Hormones.** I. G. Farbenind. A.-G. Ger. 586,246, Oct. 19, 1933. Materials contg. growth-promoting

hormones are treated with acid and extd. with water or an org. solvent, and the ext. is transferred, if necessary, to a water-insol. org. solvent. The hormones are then extd. from the org. solvent with a weak aq. alkali soln., or with a stronger alkali soln. which is afterward partly neutralized. The hormones may then be extd. again from the weak alkali soln. and purified by standard processes, various methods of procedure being described. The starting material may be substrates on which fungi, algae or bacteria have been cultivated, or residues from the fermentation industries, or human or animal urine. If the starting material contains sexual hormones, these may be separately recovered from the portion of the original ext. which is insol. in weak aq. alkali. Numerous details are given. C1. C. A. 27, 4032.

**Antiseptic, anesthetic and antispasmodic preparations.** Fitzgerald Dunning (to Hynson, Westcott and Dunning). U. S. 1,932,886, Oct. 31. A compn. suitable for therapeutic uses contains a halogen deriv. of *o*-hydroxybenzyl alc. such as a mono- or di-chloro, bromo or iodo deriv. which may be formed into sol. tablets or used for intramuscular injection.

**Antiseptics; fungicides.** I. G. Farbenind. A.-G. Brit. 396,737, Aug. 9, 1933. Animal and vegetable glues, photographic and other gelatins, casein, vegetable mucilages and tech. and pharmaceutical preps. contg. such substances are preserved against attack by bacteria, molds, etc., by incorporation therewith of a monohydric halogen-free phenol of the diphenylmethane series, *e. g.*, the benzyl phenols and benzyl cresols, or a salt thereof with an org. or inorg. base. Substances, *e. g.*, glycerol diacetate, ethanolamine, may be added to increase the solv. of the phenols.

**Bandages.** Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. Ger. 577,798, June 3, 1933. Bandages are impregnated with substances such as percarbonates or perborates which give off active O when moistened, a stabilizer such as  $MgSiO_3$  being present.

**Dentifrices.** Sigurd Gustav Gulbrandsen. Brit. 396,055, July 21, 1933. See Fr. 730,168 (C. A. 27, 375).

**Use of bentonite in dentifrices.** John J. Harris. U. S. 1,933,977, Nov. 7. Bentonite is used with various other ingredients such as water, oils and flavoring materials.

**Perfume.** Henri Terrisse. Swiss 161,018, June 16, 1933. An iris perfume is prep'd. by treating 2,6-dimethyl undecane-2,6,9-triene-8-one with an acid, *e. g.*,  $H_2SO_4$ . The perfume is purified by passage through the semicarbazone and b.  $125-135^\circ$ .

**Disinfectant.** Hans Finkelstein and Jakob Willem (to I. G. Farbenind. A.-G.). U. S. 1,932,338, Oct. 21. A cyanophenol in which the benzene nucleus is at least substituted by one hydroxy group and at least one cyano radical, such as 4-cyano-2-chlorophenol is used as a disinfectant (suitably in preserving glue or the like).

**Disinfectant.** Hans Priewe (to Schering-Kahlbaum A.-G.). U. S. 1,933,757, Nov. 7. The double comp'd. of equimol. proportions of urea and *m*-cresol is used with a diluent such as powd. talc or Na naphthalenesulfonate.

**Fumigants.** James G. Wright, Geo. A. Graham and Alfred K. Light. Brit. 396,004, July 27, 1933. A deodorizing fumigant consists of a mixt. of gum benzoin, balsam of tolu, gum olibanum, powd. sandalwood, salt peter, gum tragacanth and  $H_2O$ . A little C black may be added and the finished compn. dipped in an essential oil. The paste may be applied to wood or paper matches or spread between layers of thin paper.

**Solution for use in curling hair.** Frederic Maeder and Brian M. W. Sims (Sims to Maeder). U. S. 1,933,021, Oct. 31. See Brit. 360,900 (C. A. 27, 1120).

## 18 ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

**Phosphoric acid and double superphosphates.** Modern industrial process for their preparation by the wet process.

H. Tiedemann and W. Gundelach. *Chem. Fabrik* 1933, 497-9.—The Dorr washer-filter operation in Trail is

outlined and the general mfg. principles are discussed briefly with 4 cuts and 14 references; cf. Weber, *C. A.* 27, 166, 1702.

**Study on contact sulfuric acid manufacture. I. Barium-vanadium catalyst.** Mototarō Matsui, Kikujō Ōki and Ken-ichi Oda. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 546-9(1933).—Exptl. results, obtained with a special app. which is described, are reported. Good conversions were obtained at temps. above 475°, but a rapid decrease occurred below 450°. Karl Kammermeyer

**New process for the manufacture of alkali nitrates.** Wilhelm Schneider and Paul Kubelka. *Chimie & Industrie Special No.*, 743-6(June, 1933); cf. Fr. pat. 736,815, *C. A.* 27, 1457; Ger. pat. 572,722, *C. A.* 27, 4354.—The manuf. of  $\text{NaNO}_3$  or  $\text{KNO}_3$  by double decompn. of an alk. earth nitrate and  $\text{NaCl}$  or  $\text{KCl}$  in aq. soln. is not economical, because of the relatively poor yield, which, under optimum conditions, cannot exceed 80%. It may be increased to 100% in theory and to 98% in practice by making use of the low soly. of basic  $\text{CaCl}_2$  ( $\text{CaCl}_2 \cdot 3\text{CaO} \cdot 16\text{H}_2\text{O}$ ). A process has been developed (Fr. Pat. 333,989; Brit. Pat. 304,365) consisting essentially in mixing  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NaCl}$  (or  $\text{KCl}$ ) solns., adding  $\text{CaO}$ , filtering and washing the basic  $\text{CaCl}_2$ , evapg. the soln., and reintroducing the mother liquor into the cycle. Optimum operating conditions are given. A. Papineau-Couture

**New processes used in the manufacture of ammonium nitrate.** L. Tamié. *Chimie & Industrie Special No.*, 906 20(June, 1933).—A description of the processes developed by the Société Kestner, of which the following are the essential features: (1) Neutralization of  $\text{HNO}_3$  by  $\text{NH}_3$  is carried out at atm. pressure and the heat of the reaction is used for evapg. part of the  $\text{H}_2\text{O}$  of the soln. by passing the latter through a series of vessels under increasing vacuum, part of the cooled liquid from the last stage being returned to the neutralizer to maintain the proper temp. (2) The vapor given off in each vacuum stage is used for heating the acid. (3) Crystn. is carried out in vacuum, removal of the heat of crystn. being effected by evapg. of the last traces of  $\text{H}_2\text{O}$ . A. P.-C.

**Wet process of manufacturing calcium chromate.** J. Milbauer and J. Doškač. *Chimie & Industrie Special No.*, 784 6(June, 1933).—The following are the optimum conditions for production of pure  $\text{CaCrO}_4$  by wet pptn.: ppt. a cold satd.  $\text{Na}_2\text{CrO}_4$  soln. with 1.6 times the theoretical amt. of  $\text{CaCl}_2$  as a soln. contg. 400-450 g.  $\text{CaCl}_2$  per 1000 cc.  $\text{H}_2\text{O}$ . When using  $\text{CaO}$ , the ppt. occludes considerable amts. of Na and K ions. A. P.-C.

**Notes on the manufacture of lime.** Maurice Dérivière. *Rev. matériaux construction trav. publics* 1933, 300-5.—Material and heat balances for a vertical kiln are carried out based on operating data. A discussion of kiln lining and the descent of the materials in the kiln is presented. Karl Kammermeyer

**Studies on the preparation of sodium sulfide from sodium sulfate and its causticization. II. Reduction of sodium sulfate by the use of carbon.** T. Okuno, T. Masumi and M. Fukuyama. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 562 3(1933); cf. *C. A.* 27, 5900.—It was found that the ratio  $3\text{Na}_2\text{SO}_4:1\text{C}$  gave the max. yield of  $\text{Na}_2\text{S}$  and that the reduction occurs readily above 800°. The relation between gas vol. evolved and time of heating is presented graphically. **III. Causticization of sodium sulfide by the use of cupric oxide.** *Ibid.* 563-5.—The relative proportion of  $\text{Na}_2\text{S}$  and  $\text{CuO}$  and the duration of the reaction were studied. The ratio  $1\text{Na}_2\text{S}:1.2\text{CuO}$  seemed to give the best yields of  $\text{NaOH}$  according to the reaction  $\text{Na}_2\text{S} + \text{CuO} \rightarrow \text{H}_2\text{O} = 2\text{NaOH} + \text{CuS}$ . Reaction temps. between the b. p. and 184° corresponding to pressures from 1 to 10 atm. gave essentially the same yields. The roasting reaction of  $\text{CuS}$  was also investigated and the effects of temp. and time are presented graphically. Karl Kammermeyer

**Preparation of the hyposulfite-formaldehyde of soda.** Factory of Emile Zundel. *Bull. soc. ind. Mulhouse* 99, 463-7(1933)(Scaled note of 1904). Report. M. Battenay and T. Lichtenberger. *Ibid.* 474-5.—Zn powder is

added to a soln. of  $\text{NaHSO}_3$  contg.  $\text{H}_2\text{SO}_4$ . The Zn is removed by pptn. with  $\text{Na}_2\text{CO}_3$ . The hyposulfite is then salted out and filtered, and the press cake introduced into a slightly less than equiv. quantity of  $\text{CH}_2\text{O}$ . More  $\text{CH}_2\text{O}$  is then added to complete the reaction, tounesol being used as an indicator. B. and L. report that this process was used for several years after 1904. I. H. Odell

**The behavior of alumina and silica with metal sulfides in relation to alumina recovery from siliceous raw material.** X. Siebers and E. J. Kohlmeier. *Arch. Erzbergbau Erzaufbereit. Metallhüttenw.* 1, 97-129(1931).—In the Haglund process for recovery of  $\text{Al}_2\text{O}_3$  from bauxite, bauxite is melted in an elec. furnace with  $\text{FeS}$  and C. Silica seps. as an Fe-Si alloy, while  $\text{Al}_2\text{S}_3$  lowers the m. p. of the  $\text{Al}_2\text{O}_3$ , improving it for electrolysis.  $\text{Al}_2\text{S}_3$ - $\text{Al}_2\text{O}_3$  mixts. give the lowest m. p. (1008°) with a 1:1 mixt.  $\text{Al}_2\text{O}_3$  begins to react with  $\text{FeS}$  or  $\text{ZnS}$  and C at 1300°. At 1500° reaction proceeds with considerable velocity. Because of soln. of reaction products in the melt, only part of the  $\text{Al}_2\text{O}_3$  is converted to  $\text{Al}_2\text{S}_3$ . Metallic Si does not react with  $\text{Al}_2\text{S}_3$  at 1000-1500°, but  $\text{SiO}_2$  reacts with  $\text{Al}_2\text{S}_3$  in a graphite crucible at 1150°, almost completely to form  $\text{SiS}$  at 1450°. In  $\text{N}_2$  at atm. pressure  $\text{ZnS}$  begins to volatilize at 1150°, sublimes at 1470°.  $\text{ZnS}$  plus C begins to volatilize at 1000°, sublimes at 1350°.  $\text{ZnS}$  plus Si begins to volatilize at 900°, sublimes at 1150°.  $\text{ZnCS}$  is first formed, which reacts with  $\text{SiO}_2$  in the presence of more C.  $\text{SiO}_2$  can be volatilized from kaolin, alumina and bauxite mixts. with  $\text{ZnS}$  and C as easily as with  $\text{SiO}_2$  alone, but when  $\text{FeS}$  and C are used, reaction products are partly sol. in the melt, and complete volatilization of the  $\text{SiO}_2$  does not occur.  $\text{TiO}_2$  reacts with  $\text{ZnS}$  and C to form a sulfide, which is not easily volatilized. Up to 1600° the  $\text{TiO}_2$  in bauxite is not reduced, so that the Fe-Si alloy is free from Ti. John G. Attwood

**Subsurface concentration of chloride brines.** Wm. L. Russell. *Bull. Am. Assoc. Petroleum Geol.* 17, 1213-28(1933).—Evapg. of  $\text{H}_2\text{O}$  into natural gas or evapg. of  $\text{H}_2\text{O}$  in coarse-grained rocks and its pptn. in very fine pores have not been important in producing concd. chloride brines. Under some conditions brines may have been concd. after deposition by deep evapg. during periods of long aridity. Settling of sol. mols. probably occurs, but its effect is slight. Certain rocks contain large amts. of unstable minerals and in such formations there may have been considerable concn. by hydration. Osmosis may have had an important influence, but little is known about it. It is probable that the bases of chloride brines are adsorbed from sea water by very fine sediments during deposition, and if Cl also is entombed, adsorption may be a very important agency in the subsurface concn. of chloride brines. Alden H. Emery

**The manufacture of natural Vichy salt at the Compagnie Fermière de Vichy. Description of the apparatus.** R. Perrot. *Bull. sci. pharmacol.* 40, 513-19(1933).—The app. causes the  $\text{CO}_2$ , given off during evapg., to be reabsorbed by the salt. The final compn. is: Na 27.181, K 1.040, Ca 0.032, Mg 0.009, Fe, Al, Mn 0.021, Li-Sr traces, Cl 2.482, As traces,  $\text{CO}_2$  63.929,  $\text{SiO}_2$  0.682. A. R. M.

**The activation of earths.** A. Travers. *Chimie & Industrie Special No.*, 793 6(June, 1933).—Activation of earths (such as bentonite, etc.) by treatment with dil. acids is due, at least to a large extent, to the liberation of free  $\text{SiO}_2$ , which acts as a  $\text{SiO}_2$  gel. Earths which are not attacked by dil. acid cannot be activated; if such earths can be converted into permutites by treatment with alkali, they can be activated by treating the permutite with dil. acid. A. Papineau-Couture

**Production of adsorbent carbon from carbonaceous material by steam activation.** Eduard Deisenhammer. *Chem.-Ztg.* 57, 781-2(1933).—Carbonaceous material, coal, peat, or the like, is mixed with equal parts of tar and molded into small briquets. The briquets are hardened by heating in a furnace at 400° in an atm. free of  $\text{O}_2$ , which is changed continuously. The activation is accomplished by heating the hardened briquets in a rotary furnace at 800° for 8-16 hrs. while steam is passed through the fur-

nace. A hard adsorbent C of high capacity is produced.

L. W. T. Cummings

**Occurrence of indium in Japan.** II. Yoshio Imaizumi. *J. Chem. Soc. Japan*, **54**, 1009 10(1933).—The In content of Zn blends from various districts in Japan has been found by detg. In as  $\text{In}_2\text{O}_3$ .

T. Katsurai

**Recovery of sulfur from sulfur dioxide.** Arthur J. Caddick. *Mining Mag.* **49**, 282 5(1933); cf. *C. A.* **23**, 5014.—A review of the procedure adopted by different investigators for the recovery of S from  $\text{SO}_2$  by the use of incandescent carbonaceous matter. Independent expts. showed that the  $\text{SO}_2$  content of the ingoing gas at which a coke column can be maintained in an incandescent condition is about 7% by vol. Tabulated results show that S recovery is a max. and coke consumption a min. for this condition. A further set of expts. was made to ascertain the effect of varying amts. of steam admitted at the bottom of the coke column together with the incoming  $\text{SO}_2$ . Results of these are given, including one showing S recoverable 74.14%. Coke and steam used are 1.12 tons and 0.08 tons, resp., per ton of recoverable S.

A. W. Furbank

**Urea-formaldehyde: Types and their uses.** Kennet M. Chance. *Australian Plastics & Allied Trades Rev.* **2**, No. 2, 13-17(1933).

E. H.

**Roasting of disintegrated pyrites containing sulfates.** J. Jelinek. *Chimie & industrie Special No.*, 725 6(June, 1933).—A brief discussion of the troubles encountered in the roasting of pyrites which have been exposed to atm. agents so that part of the S has been converted into sulfates. Even 3.5% sulfate S can interfere seriously with the normal operation of a pyrites burner.

A. P.-C.

**Asbestos milling in the Urals.** Walter A. DuRever. *Eng. Mining J.* **134**, 415 9(1933).—A description of Canadian asbestos milling methods applied in Russia. Flowsheets show the Ilvinski mill with Russian technique and the "Gigant" crushing plant.

W. H. Boynton

**Australian non-metallic minerals. II. Asbestos.** Harold S. Elford. *Chem. Eng. Mining Rev.* **25**, 395 400 (1933); cf. *C. A.* **27**, 5486.—Occurrence, imports, prepn. for market and uses of asbestos are given.

W. H. B.

**Canadian Kaolin Silica Products, Limited.** W. M. Goodwin. *Can. Mining J.* **54**, 377 80(1933).—A description of a new 300-ton mill at Lac Remi, Quebec. Flowsheets are shown for the raw ore, kasil and silica circuits.

W. H. Boynton

**Garnets.** Joseph W. Howard. *J. Chem. Education* **10**, 713 16(1933).—A review.

E. H.

**Examination of composition tumblers with reference to possible liberation of formaldehyde.** H. J. Fisher. *Conn. Agr. Expt. Sta., Bull.* **354**, 804 12(1933).—Of the many methods for the detection and detn. of HCHO, the ferricyanide and Shrewsbury tests alone were satisfactory. Details of both tests are given. Only traces of CHOH could be obtained from 3 different lots of tumblers. However, the evolution of CHOH is continuous and is due to the decompn. of the plastic itself, rather than to extn. of a sol. impurity. At least a part of the CHOH extd. from tumblers is free  $\text{CHOH}$ , the total amt. extd. being a function of the amt. of tumbler surface exposed to the liquid. A ground sample gave up 190 p. p. m. of CHOH to 10 times its wt. of water in 24 hrs. at room temp. At higher temps. the amt. extd. increased greatly. At 75° all tumblers cracked after standing for a time. It is not believed that the same amts. of CHOH which might be extd. from plastic tumblers are of physiol. significance.

C. R. Fellers

**Impregnation composition for stiffening shoe tips.** G. S. Guseynnikov. *Izvestiya Tsentral. Nauch-Issledovatel. Inst. Kozhevnoi Prom.* **1932**, No. 2, 5-6.—Satisfactory results carried out on a lab. scale were obtained with the following prepn.: glue 250, water 250, portland cement 300, ceresin 100, coal-tar pitch 100 g. Various other compns. were tried but without success.

A. A. B.

**Shoe polishes.** A. A. Pechelin. *Izvestiya Tsentral. Nauch-Issledovatel. Inst. Kozhevnoi Prom.* **1932**, No. 2, 6.—Best results were obtained with a shoe polish com-

posed of peat wax, the polymerization product of linseed oil with  $\text{CaO}$ , paraffin, stearin, beeswax, ceresin and other ingredients (the proportion is not given).

A. A. B.

**A new pest exterminator (Fosfolon).** Otto Rebmann. *Z. Gesundheitstsch. Stadtehyg.* **25**, 279 88(1933).—Fosfolon, a proposed exterminator, consists chiefly of  $\text{Ca}_3\text{P}_2$  and  $\text{CaC}_2$ ; in contact with moisture,  $\text{PH}_3$  and  $\text{C}_2\text{H}_2$  are liberated.

B. C. Brunstetter

**T gas, an agent for the eradication of vermin in single rooms in the midst of occupied buildings.** Bruno Tesch. *Z. Gesundheitstsch. Stadtehyg.* **25**, 325 42(1933).—A review of German practice in fumigating with a mixt. of  $(\text{CH}_3)_2\text{O}$  and  $\text{CO}$ .

B. C. Brunstetter

**Foam fire-fighting methods: Past, present and future.** Henry S. Simonis. *Chemistry and Industry* **1933**, 957-8.

E. H.

**Influence of thermal cond. of metals on their utilization in the manuf. of acids (Stefan).** 9. Fillers for plastic compns. (Brit. pat. 396,243) 25. Utilizing by-product gas from petroleum cracking for  $\text{NH}_3$  synthesis (U. S. pat. 1,935,469) 22. Centrifugal sepn. of materials such as in drying salt (U. S. pat. 1,933,644) 28.

**Hydrocyanic acid.** Thomas S. Wheeler (to Imperial Chemical Industries Ltd.). U. S. 1,934,610, Nov. 7. A gas contg. a hydrocarbon such as  $\text{CH}_4$  or  $\text{C}_2\text{H}_2$ , together with more than one mol. proportion of  $\text{NH}_3$  for each atomic proportion of C is rapidly passed, at a temp. of at least 1150°, through an unpacked reaction chamber under conditions (such as those of suitable "space velocity") which are unfavorable to decompn. of the reagents into their elements.

**Hydrocyanic acid.** Leonid Andrusow (to I. G. Farbenind. A.-G.). U. S. 1,934,838, Nov. 14. A gaseous mixt. contg.  $\text{NH}_3$ , a vaporous or gaseous hydrocarbon material such as  $\text{CH}_4$ , etc. and sufficient O to make the reaction exothermic (but less than would cause complete combustion) is contacted with a hot oxidation catalyst such as Pt contg. Rh (suitably at 900-1000°).

**Hydrocyanic acid.** Imperial Chemical Industries Ltd. Fr. 749,665, July 27, 1933. A rapid liberation of a detd. amt. of gaseous HCN is obtained by causing a detd. amt. of an alkali metal cyanide to react with about the stoichiometric amt. of an alkali metal bisulfate, in the presence of a detd. amt. of water such that the av. liberation of HCN, measured during a relatively short time, is a max. or nearly so.

**Vaporizing formamide.** Burrill S. Lacy (to E. I. du Pont de Nemours & Co.). U. S. 1,934,433, Nov. 7. In vaporizing formamide, as in the production of HCN, liquid formamide is brought into contact with a surface such as a silica tube heated to a temp. above the atm. b. p. of formamide at such a rate that no liquid formamide remains unvaporized in contact with the heating surface for any appreciable period of time. App. is described.

**Separating phosphoric acid from decomposed monazite sands.** I. G. Farbenind. A.-G. Brit. 395,305, July 13, 1933.  $\text{H}_3\text{PO}_4$  and excess  $\text{H}_2\text{SO}_4$  are sepd. from the rare earth sulfate pulp obtained by decompn. monazite sand with cond.  $\text{H}_2\text{SO}_4$  by introducing the pulp into aliphatic ales., e. g.,  $\text{MeOH}$ , or ketones, e. g.,  $\text{Me}_2\text{CO}$ , preferably at a low temp., e. g., 0°, sepg. the undissolved sulfates from the liquid and washing and drying them. The alc. or ketone is recovered by distn. after neutralization of the acid-contg. liquid with  $\text{Na}_2\text{CO}_3$  or lime.

**Purifying and concentrating weak acids such as those resulting from treatment of hydrocarbon oils with sulfuric acid.** Laurance V. Phillips (to Texas Co.). U. S. 1,934, 234, Nov. 7. Sludge acid which contains carbonaceous material which decomposes and reacts with the acid during concn. by heating is subjected to prolonged heating at a temp. insufficient to effect substantial vaporization and below that at which decompn. of the carbonaceous material occurs, to effect pptn. of the carbonaceous material from the acid; the ppt. is sepd. and the purified acid is



then exposed to higher temps. to effect concn. App. is described.

**Apparatus for regulating the temperature of gases such as in sulfuric acid manufacture.** Lowry Gillett (to General Chemical Co.). U. S. 1,934,419, Nov. 7. Various structural and operative details are described.

**Ammonia synthesis.** Walter H. Kniskern (to Atmospheric Nitrogen Corp.). U. S. 1,932,247, Oct. 24. H-N synthesis gas is passed under pressure into a chamber in which it is caused first to pass lengthwise through a passage situated in the space between the inner wall of the chamber and the outer wall of the catalyst container and then caused to travel as a plurality of individually isolated gas streams flowing through a body constituting a united mass of catalyst in direct heat-exchange relation but out of contact; the isolated streams are then merged and the merged gas stream is immediately passed as an integral stream in the opposite direction through and in actual contact with the united mass of catalyst, and the product is withdrawn from the chamber. App. is described.

**Ammonia synthesis, etc.** Frank Porter (to Atmospheric Nitrogen Corp.). U. S. 1,931,678, Oct. 24. In effecting  $\text{NH}_3$  synthesis, etc., the inert content of a cyclic system may be maintained and controlled by reaction of a mixt. contg. inert material in a primary cyclic system, withdrawing a portion of the reaction mixt. circulating in the primary system, and introducing the withdrawn mixt. into a secondary system at a pressure substantially not greater than that in the primary system. Various details of app. arrangement and operation for  $\text{NH}_3$  synthesis are described.

**Apparatus for catalytic reactions such as ammonia synthesis.** Wm. W. Tuck (to Atmospheric Nitrogen Corp.). U. S. 1,931,636, Oct. 24. Various details of heat-exchange tubes, etc., are described.

**Pressure-reducing valve suitable for use with ammonia.** Paul C. Temple (to A. W. Cash Co.). U. S. 1,934,832, Nov. 14. Structural and mech. details.

**Alkali carbonates.** I. G. Farbenind. A.-G. Fr. 41,-20, Jan. 28, 1933. Addn. to 721,307 (C. A. 26, 4138).  $\text{KHCO}_3$  is produced by treating  $\text{KCl}$  with  $\text{CO}_2$ , or its compds. with  $\text{NH}_3$ , in the presence of a mixt. of  $\text{NH}_3$  and water, contg., on the one hand, a proportion of  $\text{NH}_3$  higher than that which corresponds to its soly. in water at ordinary temp. and pressure and, on the other hand, at least the amt. of water necessary to saponify the carbonate to bicarbonate, operating at a temp. at which the  $\text{NH}_2\text{COOK}$  is no longer stable.

**Alkali chlorates.** Charles Carter and Imperial Chemical Industries Ltd. Brit. 396,701, Aug. 4, 1933. Alkali metal chlorates or solid products contg. the same are prep'd. by reaction of  $\text{Cl}_2$ , either pure or in admixt. with inert gases, with alkali of metal carbonate and, optionally, bicarbonate in the presence of 3-20% of  $\text{H}_2\text{O}$ , calcd. on the wt. of the carbonate. The solid product may be used as a weed killer or may be leached to obtain the chlorate by evapn. and crystn.

**Alkali metal phosphates.** Otto Laubi (to Bozel-Maletra société industrielle de produits chimiques). U. S. 1,935,-11, Nov. 14. An alloy of P such as ferro-P is caused to react with an alkali metal compd. which gives an alk. reaction, such as  $\text{Na}_2\text{CO}_3$ , in the presence of water and of an oxidizing agent such as O or air (suitably at a temp. of about 200-350°).

**Arsenates.** Gustav Fester and Francisco Bertuzzi. Ger. 586,349, Oct. 20, 1933.  $\text{As}_2\text{O}_3$  is treated in the cold with an alkali hypochlorite soln. or with an alk. earth hypochlorite soln. not contg. an excess of free alk. earth. Alternatively,  $\text{Cl}_2$  is passed into an aq. mixt. of  $\text{As}_2\text{O}_3$  with the calcd. amt. of an alk. earth required to neutralize the  $\text{HCl}$  produced in the reaction. A soln. of  $\text{H}_3\text{AsO}_4$  is obtained in each case, and is converted into arsenates in known manner.

**Nitrates.** Ludwig Rosenstein (to Shell Development Co.). U. S. 1,932,939, Oct. 31. A substantially anhyd. liquid oxide of N higher than nitric oxide is caused to react with a substantially anhyd. solid inorg. halide to form the

1 corresponding nitrate; the mixt. of nitrate and unconverted halide is treated with substantially anhyd. liquid  $\text{NH}_3$  to dissolve the nitrate formed, and the ammoniacal soln. is sepd. and substantially pure nitrate is recovered from it.

**Phosphides.** Sylvain M. Perraud. Fr. 750,035, Aug. 3, 1933. The handling, use and preservation of phosphides, particularly Zn phosphide, are facilitated by coating the particles with a waterproofing substance such as 2 oils or fats.

**Silicates.** Philadelphia Quartz Co. of California Ltd. (Chester L. Baker, inventor). Fr. 41,736, Mar. 20, 1933. Addn. to 725,923 (C. A. 26, 4919). Cryst. hydrates of alkali silicates, e. g., hydrates of Na metasilicate, are prep'd. from solns. of alkali silicates in which the mol. ratio of  $\text{SiO}_2$  to alkali oxide corresponds to that of the crystals to be made, the amt. of water being regulated, at a high temp., approx. to that required for the hydrate. The solns. are brought to partial crystn. at a temp. slightly below the f. p. of the hydrate desired, with very gradual admission of heat and energetic agitation during a prolonged period. The mother liquor is afterward eliminated, e. g., by centrifugation, from the cryst. paste formed and the crystals are dried.

**Metal carbonyls.** I. G. Farbenind. A.-G. (Leo Schlecht and Fritz Spoun, inventors). Ger. 586,162, Oct. 18, 1933.

4 Substances contg. compds. of Ni, Co, Mo or W are reduced with H at a relatively low temp. under pressure, e. g., at 200-250° and 200 atm., and then treated with CO at a relatively low temp., e. g., 120-160°, preferably under the same pressure.

**Aluminum compounds.** Heinrich Specketer, Fritz Rosstetscher and Konrad Rosenberger (to I. G. Farbenind. A.-G.). U. S. 1,931,515, Oct. 24. An alkali metal chloride such as  $\text{NaCl}$  and an alkali metal sulfate such as 5  $\text{Na}_2\text{SO}_4$  are added to an Al salt soln. contg.  $\text{AlCl}_3$  and  $\text{Al}_2(\text{SO}_4)_3$  so as to produce an aq. salt mixt. approx. corresponding to the formula  $\text{Al}(\text{Fe})_2(\text{SO}_4)_3 + \text{Al}(\text{Fe})_2\text{Cl}_3 + 6\text{MCl}$ , in which M represents alkali metal. The product is evap'd. to dryness and heated to about 600-800° by a co-current of direct heating gases until the  $\text{HCl}$  is expelled. The resulting sintered product is mixed with coal, and the mixt. is heated to 800-1100° and the aluminate thus 6 formed is sepd., and may be used to form alumina, etc.

**Potash salts.** Geo. F. Thomson. Brit. 396,111, Aug. 3, 1933. Potash salts are recovered from the dusts collected from the flues of hot-air stoves, blast furnaces, etc., by treating with  $\text{H}_2\text{O}$ , removing the pptd. dust and evapp. the solns. obtained by the waste heat of the flue gases, e. g., in flat Fe pans which can be slid or inserted on top of the flues or by drawing the hot gases off through pipes and passing directly into the soln.

7 **Complex compounds of tungsten and molybdenum.** I. G. Farbenind. A.-G. (Balo Zschimmer, inventor). Ger. 577,703, June 3, 1933. Oxy compds. of W and Mo are mixed and treated with a reducing agent to produce complex W-Mo compds. Alternatively, compds. of W and Mo contg. O are reduced separately and the products mixed in an acid soln. In an example, aq. solns. of  $\text{Na}_2\text{WO}_4$ ,  $\text{Na}_2\text{MoO}_4$  and  $\text{Na}_2\text{HPO}_4$  are mixed and treated with 8 hyposulfite to give a complex compd. contg.  $\text{WO}_3$ ,  $\text{MoO}_3$ ,  $\text{P}_2\text{O}_5$ ,  $\text{Na}_2\text{O}$  and water. Other examples are given.

**Ammonium sulfate.** Adrianus J. van Peski (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,934,-573, Nov. 7.  $\text{NH}_3$  and  $\text{SO}_2$  are caused to react, with water practically absent, and the reaction product is contacted with water and O to form  $(\text{NH}_4)_2\text{SO}_4$ .

**Ammonium sulfate.** Daniel Pyzel (to Shell Development Co.). U. S. 1,932,674, Oct. 31.  $\text{NH}_3$  and  $\text{H}_2\text{SO}_4$  9 are introduced into a container which is maintained under vacuum. This serves to facilitate operation at lowered temp. with production of large crystals.

**Beryllium fluoride.** Comp. de produits chim. et électrométallurgiques Alais, Froges et Camargue. Ger. 586,-244, Oct. 19, 1933. A double fluoride of Be and an alkali metal is treated at atm. or raised temp. with  $\text{AlF}_3$  in the presence of water. A soln. of  $\text{BeF}_2$  and an insol. double

fluoride of Al and an alkali metal are obtained. Various methods of procedure are described.

**Calcium carbide.** Soc. anon. pour l'exploitation des brevets Jullien. Fr. 750,039, Aug. 3, 1933. The  $\text{CaO}$  contained in  $\text{CaC}_2$  is converted to  $\text{Ca}_3\text{N}_2$  in a reaction independent of the formation of the  $\text{CaC}_2$ , which allows of the optimum temp. being used. The reaction is carried out in the elec. furnace by the addn. of not only N but also C or C and Ca. An app. is described.

**Double compound of calcium cyanide and ammonia.** Curt Schumann and Erwin Oberreit (to I. G. Farbenind. A.-G.). U. S. 1,934,823, Nov. 14. A double compd. of Ca cyanide and  $\text{NH}_3$  in the form of macroscopic crystals having a diam. of at least 0.2 mm. is produced by reaction of a Ca compd. such as  $\text{CaO}$ ,  $\text{Ca(OH)}_2$ , or a water-sol. Ca salt such as  $\text{Ca(NO}_3)_2$  with HCN and  $\text{NH}_3$  in the presence of water. This double compd. decomposes into  $\text{Ca(CN)}_2$  and  $\text{NH}_3$  on heating.

**Calcium hypochlorite.** Heinrich Reitz and Hans Ehlers (to Pen-Chlor, Inc.). U. S. 1,931,622, Oct. 24. For recovery of Ca hypochlorite from an aq. soln., a substance such as NaOH is added to give a slight but lasting alkalinity, and the resulting product is atomized in heated dry air. Cf. C. A. 27, 4887.

**Apparatus for dehydrating materials such as calcium and magnesium chlorides by heated gas.** Otto V. Martin (to Texaco Salt Products Co.). U. S. 1,932,364, Oct. 24. Various structural and operative details are described.

**Calcium sulfate.** Peter Spence & Sons Ltd. Ger. 586,007, Oct. 14, 1933. See Brit. 319,228 (C. A. 24, 2555).

**Lead sulfate containing lead oxide.** Shin Negishi (to Empun Toryo Kabushiki Kaisha) U. S. 1,933,750 Nov. 7. A suspension of Pb suboxide powder in a current of air is blown into a high-temp. chamber provided with a supply of sulfurous acid gas (in a described app.) and reaction of the material in suspension is effected.

**Anhydrous magnesium chloride.** Wilhelm Moschel (to Magnesium Development Corp.). U. S. 1,933,499, Oct. 31. A preheated loose unbonded mixt. of crude pieces of magnesite and charcoal is heated to about 700–900° above a heated pervious layer of inert carbon through which  $\text{Cl}_2$  is passed into the mixt. at a temp. above the m. p. of  $\text{MgCl}_2$ , and molten  $\text{MgCl}_2$  formed is withdrawn from a lower level of the carbon layer. App. is described.

**Nickel carbonyl.** I. G. Farbenind. A.-G. Fr. 749,434, July 24, 1933. CO or gases contg. it are caused to react, under high pressure, on materials contg. Ni and S obtained by a fusion operation. The presence of heavy metals such as Cu, Fe or Co to fix the S is preferred. The product known as "Ni matte" or "Ni stone" obtained in the manuf. of Ni from its ores may be used.

**Potassium carbonate.** Friedrich Rusberg (to Kali-Chemie, A.-G.). U. S. 1,933,452, Oct. 31. In the cyclic manuf. of  $\text{K}_2\text{CO}_3$  from K salts of strong inorg. acids such as KCl by the Engel-Precht method, the impure  $\text{MgCO}_3$  trihydrate obtained by decompn. of the Engel salt is regenerated by converting it into an aq. soln. of  $\text{Mg(HCO}_3)_2$ , sepg. the solid residue from the soln., recovering  $\text{MgCO}_3$  trihydrate from the soln. and reusing this trihydrate for making fresh Engel salt.

**Potassium nitrate.** Paul Hofer. U. S. 1,932,587, Oct. 31. A mixt. of solid Al nitrate and solid HCl is heated to about 200° to expel nitrous gases and  $\text{Cl}_2$ ; the residue is treated with hot aq. liquid to dissolve the  $\text{KNO}_3$  formed and the latter is sepd. by crystn.

**Commercial phosphates of soda.** Louis Neuberg (to Warner Chemical Co.). U. S. 1,935,575, Nov. 14. A substantial vol. of a hot liquid aq. Na phosphate material sufficiently concd. to crystallize on cooling is maintained at temps. above the crystg. point pending use (as for use in the textile arts) and portions of the liquid material are withdrawn as desired for use.

**Sodium pyrophosphate.** Chemische Fabrik Joh. A. Benckiser G. m. b. H. Brit. 395,642, July 20, 1933. Neutral Na pyrophosphate is obtained by dehydrating and igniting the salt,  $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ . The process may be conducted in a rotary furnace, dehydration being effected

in 1 zone and decompn. in a succeeding zone. A small quantity of an oxidizing agent, e. g.,  $\text{NaClO}_3$ , may be added to avoid discoloration.

**Purifying sodium hydroxide solutions.** Harold M. Broadhurst and Imperial Chemical Industries Ltd. Brit. 390,456, Aug. 10, 1933. Aq. NaOH solns. are freed from their sulfate content by treatment with  $\text{CO}_2$  or salt(s) of  $\text{H}_2\text{CO}_3$  and sepn. of the ppt., contg. sulfate and carbonate, from the clear liquor. Thus the soln. may be passed slowly through a filter bed comprising  $\text{Na}_2\text{CO}_3$  and (or)  $\text{CaCO}_3$ .

**Caustic soda.** Leonardo Cerini. Ger. 577,606, June 2, 1933. Addn. to 537,993 (C. A. 26, 1401). App. for extg. pure NaOH from waste NaOH lye contg. colloidal substances is described.

**Titanium dioxide.** Hartmut W. Richter. U. S. 1,932,087, Oct. 24. Ground rutile is mixed with NaOH in at least sufficient amount to produce Na titanate, the mixt. is heated without fusion to 280–650°, and subsequently  $\text{TiO}_2$  is recovered from the residues (after removing NaOH as by use of  $\text{H}_2\text{SO}_4$ ) without further heating to high temps.

**Use of tannic acid for peptizing hydrosols of zirconium.** John L. Brown. U. S. 1,934,294, Nov. 7.

**Decomposing thiocyanogen compounds as in producing hydrogen sulfide and ammonia from ammonium thiocyanate.** Christian J. Hansen (to Koppers Co. of Del.). U. S. 1,932,819, Oct. 31. Thiocyanogen compds. other than those of the alkali-forming metals are decomposed by the action of water substantially free from strong inorg. acid, under pressure and at a temp. above 200°.

**Carbon monoxide and hydrogen mixture.** S. I. R. I. (Società italiana ricerche industriali). Swiss 162,458, Sept. 1, 1933. A mixt. of CO and H free from O is produced by leading II contg. O as an impurity into a solid fuel distn. retort at a zone where the temp. is sufficiently high to ensure that the O reacts with the fuel. The CO-H mixt. is suitable for the synthesis of MeOH, etc., by passage over suitable catalysts.

**Sulfur dioxide.** Manufacture de produits chimiques de Jouy-en-Josas (Anciens établissements Louis Descamps) Fr. 41,605, Feb. 15, 1933. Addn. to 715,872 (C. A. 26, 2022).  $\text{SO}_2$  is sepd. from the mixt. obtained by Fr. 715,872 by passing the mixt. in countercurrent to a fine spray of water. An app. is described.

**Blanc fixe.** Gewerkschaft Gevenich, Otto Englert and Wilhelm Becker (trading as R. Englert & F. Becker, Chemische Fabrik). Brit. 397,001, Aug. 17, 1933. See Fr. 747,872 (C. A. 27, 5161).

**Fluorspar.** Edmond Hubert, Pierre J. Herbinger and Paul Jeancard. Fr. 749,732, July 28, 1933. Fluorspar is purified and enriched by grinding, classifying, heating it quickly to 700–900°, preferably by causing it to fall into hot gases, and again classifying.

**Litharge.** Genzo Shimadzu. Fr. 749,898, Aug. 1, 1933. Fine powders of Pb oxide having a high content of O and composed for the greater part of litharge are prep'd by passing an oxidizing gas into contact with pieces of Pb in a rotating drum so as to oxidize only the exterior surfaces and form an oxide having a content of O lower than the stable oxide, evacuating the unstable oxide continuously to expose fresh Pb and oxidizing immediately, in the solid phase, the Pb oxide produced. An app. is described.

**Adsorbent silica from greensand.** John W. Turrentine. U. S. 1,932,832, Oct. 31. Greensand is ext'd. with an excess of acid such as  $\text{H}_2\text{SO}_4$  over the theoretical amt. necessary to combine with the non-siliceous constituents, substantially completely to dissolve metallic oxides, adsorbed impurities of the residual silica are removed by washing, and the product is dried. It is suitable for use as a decolorizing agent, etc.

**Decomposing monazite sand, etc.** I. G. Farbenind. A.-G. Brit. 395,657, July 20, 1933. Monazite sand or similar ores contg. rare earth compds. are heated with C, in amt. sufficient only for reducing the phosphates to P, in conjunction with Ca, Ba, Sr or Mg oxide or carbonate in proportions not exceeding 3 mols. alk. earth or  $\text{MgO}$  per mol. of rare earth metal oxide. The rare earths are

obtained as compds. of a compn. analogous to Ca aluminate. Reaction may be effected in a rotary-drum furnace at about 1500°, a sintered product being obtained, or in an elec. furnace at 1650–1750°, the melt produced being granulated in H<sub>2</sub>O and then ground. The product is dissolved in HCl and Th or the entire group of rare earth metals recovered by known methods or that of Brit. 395,300 (C. A. 28, 266).

**Treatment of carbides and like reactive compounds.** Georges Baume and André Glorifet. Brit. 395,421, July 20, 1933. Solid compds. that react with aq. liquids, *e. g.*, sulfides, silicides, carbonates, peroxides, nitrides, phosphides, hydrides and carbides, are impregnated with a compn. comprising (a) a distn. product, boiling at 175° or above, of a carbonaceous material, *e. g.*, petroleum, bituminous schist, wood tar, coal, brown coal, lignite or their cracking or hydrogenation products, (b) a substance having as such or in soln. a lower surface tension than H<sub>2</sub>O, *e. g.*, aliphatic esters (including animal and vegetable fats and oils), alkali salts of aliphatic acids (including soaps), saponin, amino acids and their esters, camphor and animal and vegetable gums, and (c) a H<sub>2</sub>O-sol. mono-, di- or tri-hydric alc. or a ketone. The treatment protects the solids against H<sub>2</sub>O vapor during storage or after use and also restrains and regulates their reactions with aq. liquids. Cf. C. A. 26, 4894.

**Removing water from solutions of ammonium salts.** Joseph A. Wyler (to Trojan Powder Co.). U. S. 1,932,434, Oct. 31. Water is removed from a soln. such as one of NH<sub>4</sub>NO<sub>3</sub> in the presence of an aq. soln. of Na silicate, until a substantially dry pulverulent mass is obtained, which is of non-caking character.

**Separating bismuth from lead.** American Smelting and Refining Co. Ger. 586,112, Oct. 18, 1933. See Can. 325,126 (C. A. 26, 5540).

**Carbon, hydrogen and hydrocarbons.** Carlo Padovani. Brit. 395,893, July 27, 1933. C black, H and liquid hydrocarbons, particularly those of a light aromatic character, are produced by heating (gases contg.) CH<sub>4</sub>, preheated to about 800°, at about atm. pressure to 1000–1300° while passing through a retort of such dimensions that the ratio between its area (in sq. cm.) of contact with the gas and its unobstructed capacity (in cc.) is 0.25–1, the period of heating being 0.5–6 sec. and such that for each 100 vols. CH<sub>4</sub> dissoed. into C and H 5–100 vols. are converted into higher hydrocarbons. The properties of the C black may be varied by effecting its sepn. at 150–600° or by heating in air, steam or other oxidizing gas at 300–1000°.

**Apparatus (with spaced rotating electrodes) for effecting reactions such as production of carbon black from petroleum oils.** John J. Jakosky and Herbert J. Wieden, Jr. (to Electroblacks, Inc.). U. S. 1,931,800, Oct. 24. Various structural and operative details are described.

**Hydrogen from methane.** Wm. Hennicke (to I. G. Farbenind. A.-G.). U. S. 1,931,492, Oct. 24. CH<sub>4</sub> is passed at a temp. of about 1200–1250° over a catalyst consisting of a mixt. prepd. from Al(OH)<sub>3</sub>, about 100, boric acid 20 and silica 20 parts.

**Hydrogen production by catalytic conversion of hydrocarbons by steam.** Gustav Wietzel and Wm. Hennicke to I. G. Farbenind. A.-G.). U. S. 1,934,836, Nov. 14. Initial materials such as illuminating gas and steam are continuously passed over an activated catalyst (such as Ni activated with alumina) arranged in a vertical space having a length very large in proportion to its cross-sectional area and confined by a surface consisting of a highly alloyed steel such as one contg. Cr and Ni which is externally heated to about 600–1000°. App. is described.

**Phosphorus.** Victor Chemical Works. Brit. 395,844, July 27, 1933. See Fr. 738,265 (C. A. 27, 1723). Brit. 395,865, July 27, 1933. See Fr. 739,712 (C. A. 27, 2258).

**Sulfur.** Saurefabrik Schweizerhall. Swiss 162,140, Aug. 16, 1933. Pure S is obtained by extg. S masses with a solvent, removing the impurities from the soln., *e. g.*, by H<sub>2</sub>SO<sub>4</sub>, oleum, ClHSO<sub>3</sub> or H<sub>2</sub>SO<sub>4</sub> contg. HNO<sub>3</sub>, and crystg. the S from the purified liquid.

**Recovery of sulfur.** Zahn & Co. G. m. b. H. Fr. 749,495, July 25, 1933. S is recovered from the mass used for gas purification by heating the gas indirectly and using only a small fraction of the combustion gas, almost deprived of O, to carry over the S vapor. An app. is described.

**Sulfur recovery from roaster gases.** Raymond F. Bacon. U. S. 1,934,474, Nov. 7. Materials such as sulfide ores are roasted in the presence of regulated amounts of air and under pressure (sufficient O being provided for the conversion of substantially all the S available in the material to SO<sub>2</sub> without much diln. of the resulting gases with uncombined O) and the resulting SO<sub>2</sub>-bearing gas, without any substantial loss of heat, is subjected to reduction under superatn. pressure in the presence of incandescent carbon. App. is described.

**Sulfur ores.** Imperial Chemical Industries Ltd. Fr. 749,570, July 26, 1933. PbS is recovered from ores such as pyrites contg. small amts. of Pb, by roasting the ore with a limited amt. of air in a rotary or vertical furnace, so that the whole of the O is absorbed and a part of the heated material is in contact with a gas free from O. A current of gas free from O, *e. g.*, N or SO<sub>2</sub>, is introduced at one or more points in amt. and at a speed sufficient to volatilize the PbS and remove it from the furnace as a vapor. A small amt. of coke may be added to the ore.

**Catalysts.** Silica Gel Corp. Brit. 396,712, Aug. 8, 1933. Catalysts for the oxidation of SO<sub>2</sub> to SO<sub>3</sub> comprise a carrier, consisting of 1 or more dried hydrous oxide gels or a base-exchange compd., Pt introduced by impregnation and a promoter consisting of a compd. of 1 or more of the metals Fe, Ni, Al, Cu, Bi, Mo, Be, V, Sn, Cr or, preferably, Mn in amt. up to 5% of the mass. Suitable oxides are those of Si, Ge, Cr, W, Ti, Al or Sn. Various methods of prepn. are described. To obtain a rigid catalyst a reinforcing material may be incorporated at any stage of the prepn., suitable substances being clays contg. a large percentage of Al silicate or Al<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>. Among numerous examples silica gel is charged with H<sub>2</sub>S and treated with a soln. of PtCl<sub>4</sub> and CuSO<sub>4</sub>, and the mass is dried and heated in air at 500° to convert the sulfides into Pt and CuO.

**Catalyst preparations.** Howard Spence, Ivor P. Llewellyn and Peter Spence & Sons Ltd. Brit. 396,780, July 31, 1933. Siliceous material suitable as a catalyst or a carrier is obtained by treating, in small lump or granular form, naturally occurring indurated (either naturally or by calcination) Al silicates, *e. g.*, aluminous fire clays, with mineral acids to ext. any desired proportion of the basic constituents. The residue may be calcined, *e. g.*, at 600–700°. In the case of silicates contg. Ti the extn. may be effected without removal of the Ti which may act as a catalyst or assist other catalysts deposited thereon. In an example an indurated fire clay is treated with H<sub>2</sub>SO<sub>4</sub>, calcined at 600–700°, moistened with Al(NO<sub>3</sub>)<sub>3</sub> soln. and calcined at 500° to deposit active Al within the pores.

**Catalyst.** S. I. R. I. (Società italiana ricerche industriali). Swiss 162,460, Sept. 1, 1933. A catalyst suitable for use in the synthesis of NH<sub>3</sub> is prepd. by fusing natural or synthetic magnetite and reducing so that the product does not contain an excess of FeO over Fe<sub>2</sub>O<sub>3</sub>.

**Catalysts.** I. G. Farbenind. A.-G. (Josef König, inventor). Ger. 577,628, June 2, 1933. Mo and W catalysts are prepd. by heating decomposable Mo and W compds., such as oxides or cyanides, to fusion or sintering temps. The heating takes place under pressure. Other substances such as Al<sub>2</sub>O<sub>3</sub> gel may be added to the Mo or W compds. before heating. Cf. C. A. 27, 2259.

**Catalyst carrier.** Johann A. Bertsch (to Monsanto Chemical Co.). U. S. 1,933,091, Oct. 31. A carrier suitable for use with Pt or V catalysts, etc., consists of fragments of a natural porous substantially pure silica such as tripoli, opalite, Carrara silica or geyserite (having greater mech. strength and resistance to self-abrasion than kieselsgruht).

**Catalyst carrier for use in sulfur trioxide manufacture.** Lloyd F. Nickell (to Monsanto Chemical Co.). U. S.

1,933,067, Oct. 31. See Russ. 25,111 (*C. A.* 27, 1463).

**Condensation products.** Soc. pour l'ind. chim. à Bâle. Swiss 162,213, Sept. 1, 1933. Covering layers are formed on materials of all kinds by applying a suspension of carbamide-aldehyde condensation products, drying, and hardening by application of heat and pressure. Urea- $\text{CH}_2\text{O}$  or urea-thiourea- $\text{CH}_2\text{O}$  condensation products are preferred. Examples are given.

**Condensation products.** I. G. Farbenind. A.-G. (Friedrich Frick and Adolf Kinsky, inventors). Ger. 577,706, June 3, 1933. In prepg. condensation products from polybasic acids and polyhydric alcs. (except sorbitol), the condensation is carried out in the presence of  $\text{H}_3\text{BO}_3$ ,  $\text{B}_2\text{O}_3$ , or esters of  $\text{H}_3\text{BO}_3$ . Thus, glycerol is condensed with phthalic acid anhydride in the presence of  $\text{H}_3\text{BO}_3$  by heating to  $250^\circ$ .

**Urea-aldehyde condensation products.** Fritz Pollak and Wilhelm Kraus (to Synthetic Plastics Co.). U. S. 1,935,411, Nov. 14. A soln. of the condensation product is sprayed quickly to evaporate the solvent and produce a pulverulent product only slightly polymerized and suitable for molding by heat and pressure.

**Artificial mass.** Paul Meyersberg and Georg Wolf. Swiss 162,156, Aug. 16, 1933. An elastic leather-like mass is produced by mixing chemically unchanged leather chips with vulcanized rubber and dehydrating. The leather waste may be mixed with a rubber dispersion, dehydrated and vulcanized. Substances such as  $\text{ZnO}$ , lithopone, stearic acid, dye, petrolatum, soot, linseed oil, etc., may be added according to the uses intended for the product.

**Plastic materials.** Jean de Granville and Léopold Davion. Fr. 749,733, July 28, 1933. Vegetable materials such as sorghum or maize are deprived of their fatty materials by a preliminary treatment, and the proteins are converted to hydrates by a current of steam, and then extd. by a solvent b. below  $80^\circ$ , e. g., acetone or ethylacetic ester. The soln. is concd. to a semi-fluid and used alone or with cellulose derivs. or resins for making films, threads, etc.

**Plastic materials.** The Bonnot Co. Fr. 749,810, July 29, 1933. An app. for homogenizing plastic materials, cements, etc., is described.

**Pressed articles.** Soc. pour l'ind. chim. à Bâle. Swiss 161,570, July 1, 1933. Articles are made by hot-pressing a mixt. of fibers and a binding agent prepd. from anhydro-*p*-aminobenzyl alc. or its nuclear homologs.

**Molded bodies.** Imperial Chemical Industries Ltd. and Rowland Hall. Brit. 395,687, July 17, 1933. Articles are manufd. by thermoplastic molding of products obtainable by known processes for polymerizing Me methacrylate, preferably in the presence of a known polymerization catalyst, e. g., an org. peroxide, an ozonide or (an agent giving off)  $\text{O}$ . The polymerization may be in the presence of a solvent or diluent and is preferably performed at  $60$ – $100^\circ$ , being controlled by cooling if necessary. The polymerization products are, if necessary, powdered, placed in a mold, preferably already hot, which is then closed and the powder heated and pressed, e. g., at  $80$ – $200^\circ$  and pressures of 0.1 ton per sq. in. and over. Molding may also be effected by extrusion. Plasticizers, e. g., camphor, tricresyl phosphate, fillers, e. g., powd. metals or crushed mica, or sol. or insol. coloring materials may be added to the polymer prior to molding, e. g., by milling on heated rolls, or to the Me methacrylate prior to polymerization. Variegated effects are obtainable by suitable choice of sol. dyes and by stratifying or otherwise filling the mold. The molded bodies are suitable for mfg. unsplinterable glass and the molded sheets may be used by themselves as a transparent medium of good mech. properties. Examples describe the molding of products obtained by the polymerization of Me methacrylate by (1) heating to  $100^\circ$  in presence of Bz peroxide, (2) heating to  $60^\circ$  in presence of  $\text{Ac}_2\text{O}$  and  $\text{NaBO}_3$ , (3) mixing with titanium white and china clay and heating to  $100^\circ$  in presence of Bz peroxide, and (4) mixing with the disazo dye obtained by coupling tetrazotized diaminodi-*p*-xylylphenylmethane

with  $\beta$ -naphthol and heating as in (3), transparent orange-red molded bodies being formed by molding the product.

**Molding nonplastic metallic oxides.** Reinhold Reichmann and Hans Kohl (to Siemens & Halske A.-G.) U. S. 1,934,091, Nov. 7. See Fr. 744,737 (*C. A.* 27, 4355).

**Molding composition consisting of hydrolyzed ligno-cellulose, furfural and an acid such as hydrochloric acid.** Earl C. Sherrard and Edward Beglinger (to the Government and People of the U. S.). U. S. 1,932,255, Oct. 24. A compn. is described which is suitable for molding under heat and pressure.  $\text{PhOH}$  or  $\text{PhNH}_2$  also may be added. Cf. *C. A.* 27, 5493.

**Polymerization products suitable for threads, films, coatings, etc.** Hans Fikentscher and Walter Wolff (to I. G. Farbenind. A.-G.). U. S. 1,933,052, Oct. 31. A product which is suitable for various uses is obtained by the conjoint polymerization of at least one aliphatic acrylic compd. free from salt groups such as acrylic acid, nitrile or ethyl ester with another polymerizable, monovinyl compd. such as vinyl acetate or vinyl chloride or styrene, etc.

**Adhesive.** Albert Benteli. Swiss 161,052, June 16, 1933. An adhesive contains nitrocellulose, softening agent, solvent and a urea-aldehyde condensation product.

**Latex adhesive.** Albert W. Holmberg (to Naugatuck Chemical Co.). U. S. 1,932,624, Oct. 31. Rosin oil is added to creamed latex; an emulsion of  $\text{CCl}_4$  also is added, and the odor of  $\text{NH}_3$  may be masked, as by the addition of oil of wintergreen.

**Adhesive tape.** Kenneth L. Osmun (to Union Selling Co.). U. S. 1,933,026, Oct. 31. A paper web is impregnated with a soln. of  $\text{NH}_4$  mono-phosphate and formaldehyde to which a soln. of ethylene glycol mono-ethyl ether acetate, triethanolamine and diethylene glycol has been added, and a coating of rubber latex is subsequently applied.

**Cementing composition.** Abraham Cohen (to General Elec. Co.). U. S. 1,935,434, Nov. 14. A compn. suitable for use on wood, cloth, etc., comprises blood albumin,  $\text{CH}_2\text{O}$ ,  $\text{NH}_3$  and  $\text{Co}$  oxide. Oxides of Mn, U or Cr also may be used.

**Cleaning agent.** Josef Floss. Swiss 160,416, May 1, 1933. A cleaning agent consists of  $\text{C}_2\text{H}_5\text{Cl}$  and benzene, preferably in the quantities 80 and 20%, resp.

**Cleaning agent.** Emil Frei. Swiss 161,520, July 1, 1933. A cleaning agent contains quartz sand, soft soap, borax; it may contain benzaldehyde.

**Cleaning preparations.** The Electric Smelting & Aluminium Co. Ger. 577,701, June 3, 1933. A water-free cleaning prepn. consists of  $\text{Al}_2\text{O}_3$  (e. g., kaolin),  $\text{SiO}_2$  (e. g., quartz sand), and alkali carbonate. These are fused together.

**Composition for cleaning white leather.** Sampson Blacher. U. S. 1,932,262, Oct. 24. A white coating material is used, such as lithopone together with an aq. vehicle, a substance such as phenolphthalein which changes color with change of  $\text{pH}$  and a second substance such as  $\text{Na}_3\text{PO}_4$  which reacts to form a water-sol. salt. Change of color is effected on application of the compn. to the leather. Soap,  $\text{CaCO}_3$  and Na benzoate also may be used.

**Polishing compositions.** Henkel & Cie. G. m. b. H. Brit. 395,538, July 20, 1933. A polishing compn. for floors, boots, etc., consisting of an aq. emulsion of wax and oil, is prepd. with sulfuric esters of alcs. or salts thereof as dispersing agents. In examples mixts. of waxes and stearin are melted and dissolved in turpentine (substitute) and the mixts. are then stirred with an aq. soln. contg. the Na salt of the sulfonation product of glycol mono-oleic acid ester or the Na salt of the  $\text{H}_2\text{SO}_4$  esters of the alcs. obtained by the catalytic hydrogenation of coconut oil glycerides.

**Bleaching powder.** I. G. Farbenind. A.-G. Brit. 396,256, Aug. 3, 1933. Bleaching powder of low  $\text{H}_2\text{O}$  content is obtained in an intermittent process by first chlorinating lime so that no substantial quantity of  $\text{H}_2\text{O}$  is removed and until a moderate Cl concn. at which the "wet point" is not

reached is attained and then, chlorination being continued, gradually removing  $H_2O$  in such measure that the granular character is preserved without impairing the capacity for absorbing  $Cl$ . The temp. in the first stage is kept below  $40^\circ$  and in the second stage above  $45^\circ$  with or without reduced pressure. In a modification in which a pulverulent product is obtained a continuous removal of a moderate amt. of  $H_2O$  in the first stage is effected under reduced pressure decreasing from 90 to 40 mm. Hg, a pressure of 30–50 mm. being maintained in the second stage. App. is described. Cf. C. A. 27, 4887.

**Tar remover.** Soc. pour l'ind. chim. à Bâle. Swiss 161,002, June 1, 1933. Tar spots are removed from surfaces coated with cellulose ester lacquers by *o*-dichlorobenzene.

**Polysulfide solutions.** Adriaan Nagelvoort (to Delaware Chemical Engineering Co.). U. S. 1,934,626, Nov. 7. S is rendered miscible with water by treatment with a dispersing agent such as tannin and is then caused to react in aq. suspension with a caustic alkali.

**Friction material for brake lining.** Adolph Rosner (to Bendix Brake Co.). U. S. 1,932,912, Oct. 31.  $BaCO_3$  is used in brake lining material such as that comprising asbestos fabric, NaCN and a synthetic resin in order to effect hardening of low-C brake drums when heated in use. Cf. C. A. 27, 1465.

**Brake lining material.** Hamilton Abert and Albert Whitelaw (to Raybestos-Manhattan, Inc.). U. S. 1,932,919, Oct. 31. Brake lining such as that formed of a rubber compn. and asbestos is hardened in a convolute strip having a plurality of turns, to such a degree that the strip may be bent without fracture to any curvature between the radii of 5 and 9 in. but not to a curvature of radius 10 times its thickness.

**Impregnated cloth for protecting metal articles from tarnishing.** Walter G. Aurand (to R. Wallace & Sons Mfg. Co.). U. S. 1,933,302, Oct. 31. Cd acetate is used as an impregnating agent in treating a dyed textile fabric or the like.

**Shoe-bottom filler.** Harold S. Miller (to Beckwith Mfg. Co.). U. S. 1,931,930, Oct. 24. A blank of substantially uniform thickness and shaped for insertion in a shoe bottom is formed from thermoplastic material and felt-like fibrous material such as box-toe scrap and rubber, proportioned to become plastic and sticky at a temp. of about  $95^\circ$ .

**Magnet core material.** Philip N. Roseby (to Automatic Electric Co. Ltd.). U. S. 1,932,639, Oct. 31. Finely divided magnetic particles of cores are sepd. from one another by a coating of metallic fluorides such as may be formed on the particles by treating them with HF.

**Laminated articles such as gaskets and packings.** Wm. B. Damsel and Wm. C. Damsel. U. S. 1,931,922, Oct. 24. A backing formed of resilient material such as rubber has a surface protected by a non-porous, non-corrosive plastic coating such as a compn. formed from olefinic compds. and polysulfides bonded to the backing and which will not interfere with its resiliency (the coating being vulcanizable at substantially the same temp. as the backing and being insol. in alc., benzene and various acids).

**Sound records.** Frazier Groff (to Carbide and Carbon Chemicals Corp.). U. S. 1,932,889, Oct. 31. A record-reproducing surface is formed from a compn. contg. a vinyl resin such as may be formed by the conjoint polymerization of at least 70% of a vinyl halide such as vinyl chloride together with a vinyl ester of an aliphatic acid such as vinyl acetate and which is less than about 30% sol. in toluene at  $20-30^\circ$ . Records thus formed have a low "surface noise level" and are tough and resistant to water and produce but slight wear on the needle.

**Moisture-preventing composition.** Hercules Powder Co. Fr. 740,013, Aug. 3, 1933. A compn. for protecting paper, Cellophane, etc., in sheet or other form, against

1 moisture contains chlorinated rubber and a wax, the proportion of wax being such that a transparent film is formed on the article protected. A plasticizer such as dibutyl phthalate may be added.

**Antifreeze composition.** Henkel & Cie G. m. b. H. (Eberhard Elbel, inventor). Ger. 580,003, Oct. 16, 1933. Water is prevented from freezing by adding a lower monoalkyl ether of glycerol.

**Dental filling material.** Werner Salzmann and Rudolf Funke. U. S. 1,935,418, Nov. 14. A dental cement is mixed with finely divided diamond or SiC (suitably in a proportion of about 10–30%).

**Dental wax.** Leon C. Hickok. U. S. 1,933,907, Nov. 7. A compn. which heats and chills quickly comprises beeswax 99 and impalpable Al powder 1%.

**Dental casting investment composition comprising cristobalite and a binder such as plaster of Paris.** Richard L. Coleman and Louis J. Weinstein (in part to Dorothy S. Dugan). U. S. 1,932,202, Oct. 24. The materials are proportioned to compensate for shrinkage of castings (such as Au inlays) from the molten to the cooled state.

**"High gelatinating" colloidal composition suitable for use as a detergent, etc.** Louis H. Heyl (to Wyodak Chemical Co.). U. S. 1,934,267, Nov. 7. Bentonite of the Wyoming variety is used with about 2.5% its wt. of an alk. agent for increasing the "gelling value" of the bentonite, this agent being formed of  $CaSO_4$  20.33 and  $MgO$  80.67%.

**Urethan substances for use as wetting agents, etc.** Heinrich Ulrich and Karl Saurwein (to I. G. Farbenind. A.-G.). U. S. 1,933,945, Nov. 7. Products suitable for use as wetting, dispersing or cleansing agents in the textile, paper or leather industry, etc., are obtained by reaction of an aliphatic amino acid contg. at least 1 H atom connected to a N atom, such as glycocoll, *N*-methyltaurine or the like, with a chlorocarbonic ester of an aliphatic alc. in which the C atom bearing the OH group is directly connected to at least 1 H atom, such as the chlorocarbonic esters of *n*-nonyl, *n*-decyl and *n*-undecyl alcs. (suitably at a temp. of  $20-30^\circ$ ). Various examples with details of procedure are given.

**Graining plate for reproducing the grain of wood on surfaces such as other kinds of wood.** Charles J. Fess. U. S. 1,934,114, Nov. 7. The surface of wood selected for the plate is provided with a smooth even surface and treated with a hot concd. aq. soln. of an alk. Na boric acid compd. such as borax and while still wet is treated with an abrasive to provide an ink-receptive surface, then rinsed, dried, smoothed with fine abrasive material and treated with a thin protective coating such as pyroxylin lacquer to prevent penetration of the ink used.

**Removing paint, etc.** Walter Gampp and Emil Sorensen. Swiss 161,568, July 17, 1933. Paint, etc., is removed by a mixt. of NaOH and spirit.

**Storing fire-extinguishing powder.** Komet Kompagnie für Optik, Mechanik und Elektro-Technik G. m. b. H. Brit. 396,779, Aug. 11, 1933. Caking of dry fire-extinguishing powder consisting mainly or wholly of  $NaHCO_3$  is hindered by treating with a soap soln., e. g., by spraying, and then drying and sieving. If the powder also comprises cryst. salt(s), e. g., borax,  $Na_2CO_3$ , the ingredients may be treated separately or after mixing.

**Inflammable links.** Francis Warren and Stanley F. Warren. Brit. 395,734, July 21, 1933. The inflammable element of inflammable links, particularly for fire-extinguishing app. is reinforced by non-extensible material. One form is a strip of Mg wire or ribbon to which celluloid, etc., is attached; another, a strip of celluloid reinforced by silk or like thread, which may be impregnated with nitrocellulose; another, celluloid strip reinforced by strip(s) of Cu, etc.

**Liquid carbon dioxide fire-extinguishing apparatus.** Alois Groer, and Heinrich Huebner. Ger. 577,774, June 3, 1933.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. E. KERR

**Essentials of glass technology based on American practice.** Samuel R. Scholes. *Ceram. Ind.* 21, 285-8 (1933); cf. *C. A.* 27, 5013; 28, 273. H. S. W.

What must the glass technician know about the new researches dealing with the refining of glass? II. Ludwig Springer. *Glashutte* 63, 455-6 (1933); cf. *C. A.* 27, 5013.—(1) The prolongation of the refining time improves the glass melt. (2) The greater the temp. of refining the better and the more rapidly the glass refines. It is important to increase the temp. suddenly and rapidly and then as rapidly lower it when sulfate is used as refining agent. With such a steep increase in temp. (called "temperature shock") O and SO<sub>2</sub> are chiefly sepd. from sulfate with a strong development of gases. The sudden fall in temp. checks the formation of new amts. of gas, but the bubbles present have time to escape from the melt. (3) It is generally thought that it is more difficult to refine a so-called hard glass (glass difficult to melt) than a corresponding soft glass at the same temp. However, expts. show that hard glass is refined better and more easily when employing a higher temp. and that soft glass is less well refined at lower temps. (4) An addn. of more than 50% cullet to the batch generally affects refining unfavorably, although some expts. contradict this. A literature index is given. M. V. Kondoidy

**The thermal endurance of glass.** Kōzo Tabata and Taro Moriya. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 575 6 (1933).—The ability of glass to withstand thermal shock depends on the following conditions: (1) chem. compn., (2) geometrical form and size of test piece, (3) temp. difference causing shock and its position on the temp. scale, (4) kind of cooling agent and its state and condition, (5) edge effect, and (6) vectorial anisotropy. Borosilicate glass rods were used as test pieces and water was used as cooling agent. Theoretical expressions are given for the temp. distribution, the thermal stress and for the relation between the radius of the glass rod and the crit. thermal shock. Exptl. results are presented. K. K.

**Investigations on coloration of glass by cementation.** A. Leclercq, P. Gilard and L. Dubrui. *Rev. belge ind. verrières* 4, 218 21 (1933); cf. *C. A.* 27, 4045. A paste made by mixing 1 part of CuO with 3 of Fe<sub>2</sub>O<sub>3</sub> is painted on the glass and given 3 firings at about 630°, the second firing being of a reducing nature. After the first firing a green color appears. The sample is then washed. The second firing gives a black color and the third produces a red. The effect of secondary constituents in the glass is: favorable—As<sub>2</sub>O<sub>3</sub>, SnO, F, Sb<sub>2</sub>O<sub>3</sub>, MnO, FeO and C; inactive—Sb<sub>2</sub>O<sub>3</sub>; unfavorable—MnO, NaCl, Sc, KNO<sub>3</sub> and Am<sub>2</sub>SO<sub>4</sub>. The effect of primary constituents is: ZnO and MgO very favorable; PbO—results in poor reduction; CaO and BaO—cement poor; K<sub>2</sub>O—better than Na<sub>2</sub>O. *Ibid.* 242 6.—A paste composed of CuSO<sub>4</sub> gives a more pronounced color, but more irregular, than one of CuO. Polished glass is less easily colored than untreated glass. The thickness of the coating does not affect the color. The color produced by the first firing is variable. Glass may also be colored by Cu vapors. The mechanism of coloration may be explained by assuming the formation of Cu oxide or finely divided metallic Cu in the glass. Both theories are discussed. Bibliography. Herbert S. Willson

**The English method of hand manufacture of glass crucibles.** H. Winnwood. *Rev. belge ind. verrières* 4, 225-7 (1933). Herbert S. Willson

**The physical properties of the system SiO<sub>2</sub>-Na<sub>2</sub>O-K<sub>2</sub>O-CaO.** W. Haulein. *Z. tech. Physik* 14, 418 24 (1933).—The glasses were prep'd. by fusion of analytical reagents. The results of the measurements are expressed graphically; one component is kept const. The devitrification limits move toward lower alkali content with increasing CaO content. The partially crystal state noted by Berger (cf. *C. A.* 23, 253) was not present

in this work and appeared as an extension of the glass region because of the rapid cooling of the melts. The sp. resistance increases with CaO content, while the alkalis present singly diminish it. With both present there is a sp. ratio for each glass where the resistance is the greatest. The coeff. of expansion of the annealed glasses and the sp. gr. are almost additive functions of the compn. The viscosity is diminished by Na<sub>2</sub>O to a greater extent than by K<sub>2</sub>O while CaO causes a large decrease. The results are in qual. agreement with previous workers. A. F.

**BaO and MgO as glass-forming oxides.** H. Kühl. *Glashutte* 63, 371-3 (1933).—The use of MgO in glass melting has been limited because of its high fusion temp. However, when MgO is introduced into the batch in the form of dolomite, melting is considerably facilitated. If alkalis and lime are replaced simultaneously by BaO, the quality of the glass is improved considerably. It increases d., the n, hardness and the modulus of rupture. In the production of enamels, BaO has an advantage over PbO in that it is not affected by the injurious influence of reducing gases in the kiln. M. V. Kondoidy

**Melting glass rods together.** M. A. Besborodov. *Glashutte* 63, 127-30 (1933).—A detailed description of attempts to fuse glass objects together. The results are tabulated and shown in curves. It has been found that this melting is not a function of the coeffs. of expansion (18-100°) of the glasses alone, but also of other factors as the shape of the glass objects and their size. M. V. Kondoidy

**Report on optical glass.** D. S. Rozhdestvenskii. *Trans. Optical Soc. (Leningrad)* 8, No. 84, 1-22 (1932).—A report dealing with (1) the principles of optical glass, (2) its manuf. and (3) the optical industry in Russia. M. V. Kondoidy

**Streaks in window glass manufactured on Fourcault machines.** S. V. Rodin. *Keram. i Steklo* 9, No. 7, 11-18 (1933).—The reasons for the formation of streaks in window glass when manuf'd. according to the Fourcault method are due to: (1) the thermal inhomogeneity of the glass mass, (2) crystn. and cooling of the glass ribbon, and (3) the effect of the Fourcault "boat," especially its shape. M. V. Kondoidy

**Scientific principles of fuel economy in the glass industry.** Combined low-temperature carbonization and partial gasification of coal. David Brownlie. *Glass* 10, 152-5 (1933); cf. *C. A.* 28, 274. H. S. W.

**X-ray examination of some ceramic raw materials.** III and IV. T. Nakai and Y. Fukami. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 559-62 (1933); cf. *C. A.* 27, 4644, 5163.—X-ray exams. on materials heated for 3 hrs. at 1100°, 1200°, 1300° and 1400° and for 1 hr at 1500° are reported. Karl Kammermeyer

**Combined testing methods.** V. Škola. *Ber. deut. keram. Ges.* 13, 157 77 (1932).—Data are given to show the advantage of testing several different properties on the same specimens. Results are given on the fire brick tested for both their resist. to spalling and slag action. H. G. Schurecht

**The ceramic properties of kaolins.** H. Lehmann. *Ber. deut. keram. Ges.* 14, 155-62 (1933).—The properties of kaolin from 7 different localities were studied in both raw and washed condition. The washed kaolins had the following analysis: SiO<sub>2</sub> 48.60, Al<sub>2</sub>O<sub>3</sub> 27-37, clay substance 70-90 and quartz 3.3-27%. H. G. S.

**Manufacture of tridymite brick.** H. Salmang and R. Wentz. *Ber. deut. keram. Ges.* 14, 141-55 (1933).—Silica brick with 1.5% Na<sub>2</sub>O and 1.5% Fe<sub>2</sub>O<sub>3</sub> can be changed to tridymite by firing to 1250°. At 1050° a silica brick with a sp. gr. of 2.45 can be produced. The alkali content can be reduced to 0.3% and there will still be full transformation of quartz to tridymite. Even with 0.1% Na<sub>2</sub>O considerable transformation may take place. By the addn. of alkali without the Fe<sub>2</sub>O<sub>3</sub> transformation



takes place but the brick does not develop strength. Good strength can also be produced by increasing the CaO content to 7%. The red spots become greater when CaO is increased. Phosphoric acid and  $B_2O_3$  retard quartz transformation. In order to prevent the alkalis from becoming deposited on the surface a frit is prep. composed of 1  $Na_2O \cdot 1Fe_2O_3 \cdot 3SiO_2$ . Expansion studies of cristobalite brick showed rapid changes at 230°. Tridymite brick has a more gradual expansion curve than cristobalite brick.

**Magnesite and chromite-magnesite brick and furnace-lining material.** P. P. Budnikov and A. A. Grebenik. *Ber. deut. keram. Ges.* 14, 197-202 (1933).—The manuf. of magnesite and chromite-magnesite brick is described in detail. The chromite-magnesite brick was found to be much more resistant to coal and slag action than magnesite brick. The chem. analyses of the magnesite were: MgO 46.08, CaO 0.30,  $Fe_2O_3$  1.30,  $Al_2O_3$  0.60,  $SiO_2$  0.90 and  $CO_2$  50.82%. The chromite-magnesite brick is made by mixing one part of dead-burned magnesite with five chromite.

**Effect of MgO on physicochemical properties of Dinas brick.** P. P. Budnikov and N. S. Kassiyev. *Domes* 1933, No. 7, 14-17.—Exptl. bricks, contg. 0, 0.2, 0.3, 0.5, 1 and 2% MgO, were prep. from mixts. of 2 kinds of quartzites. Micro- and macroanalysis and physicochem. tests showed that in every case the bricks were of good quality.

**Expansion of silica bricks of the coke-oven lining during firing.** M. I. Tagunov. *Coke and Chem.* (U. S. S. R.) 1932, No. 2, 55-61.—A study of heat resistance and expansion of fire bricks (approx. compn.:  $SiO_2$  95.5%; CaO, 2.3%;  $Al_2O_3$  1.1%;  $Fe_2O_3$  0.6%; fusion 1710°; sp. gr. 2.36) was made from plant observations. Data are tabulated. The following procedure is recommended for breaking in a newly lined coke oven: (1) drying for 20 days, av. temp. rise 4-5° per day; (2) during the following 23 days, the temp. is raised from 105° to 420°; (3) during the next 15 days the temp. is raised to 900°; (4) finally for 8 days it is raised from 900° to 980°.

**Burning defects in tunnel kilns and their possible prevention.** P. Gatzke. *Ber. deut. keram. Ges.* 14, 203-10 (1933).—Large wide cracks may develop around the edge of plates and saucers resulting from uneven heating. Fine cracks may develop if the kiln is cooled too rapidly from red heat. Porcelain pieces may have a dirty appearance because of a too rapid firing in the biscuit burn which causes the soda on the surface of the pieces to blister. "Reduction" yellow is caused by incomplete reduction of the ware in the center of the ear. "Atmospheric" yellow may result when the burning flue does not become entirely filled with the flame. Smoked ware contains C which cannot be burned out in subsequent firing. Smoked glazed ware is usually badly blistered because of the combustion of the dissolved hydrocarbons in the glaze and body.

**Efficient use of pyrometric cones demands care and judgment.** H. B. Henderson. *Ceram. Age* 22, 98-101 (1933).—Pyrometric cones indicate firing conditions and not temp.

**Highly sintered alumina as a commercial product.** H. Gerdien. *Glastech. Ber.* 11, 331 (1933).—Pure  $Al_2O_3$ , tab. red and formed above 1800° into a dense hard body, but at room temps. a heat cond. 18 times that of porcelain and has high elec. insulating properties up to around 1200°. Its resistance to HF, molten alkalis and molten glass makes it of special interest in glass labs. for small melts.

**The Steger method of measuring strains as a plant-control test in the manufacture of sanitary ware.** G. Hamner. *Ber. deut. keram. Ges.* 13, 557-68 (1932).—In the Steger method thin strips of glazed ceramic ware are heated in elec. furnaces. One end of the strip is held firmly while the other end is free to move. By recording the movements of the free end as the strip is heated up to 800° the strains between glaze and body may be noted.

H. G. Schurecht

**A new method of measuring the expansion of materials at high temperatures and results with the same.** E. Lux. *Ber. deut. keram. Ges.* 13, 549-56 (1932).—A modification of the Endell app. for measuring the expansion of materials at high temps. is described. Expansions up to 1700° were detd. for graphite, coke,  $SiC$ , granular graphite and flake graphite.

**Studies on the thermal and hydrothermal syntheses of mullite.** Takeo Ao. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 546 (1933).—The thermal and hydrothermal syntheses of mullite from "katō-kaolin", Kibushi, Gairone and Okayama clays contg. low  $Al_2O_3$  are carried out at temps. between 1000° and 1400°. The percentage of mullite produced by the hydrothermal synthesis proposed by A. is always greater than those formed by the hitherto known thermal synthesis. Crucibles and cones were made from these clays and Kahlbaums  $Al_2O_3$ ; their compn. corresponded to that of mullite. When burned at 1600° for 2 hrs. they are converted to amorphous mullite. If silicates are heated at temps. between 1000° and 1300° in a current of superheated steam the lowering of their melting temps. is much more pronounced than otherwise. An increased degree of vitrification occurred when various Seger cones were treated hydrothermally.

**Avoid iron contamination troubles with magnetic separator.** R. A. Weinhardt. *Ceram. Ind.* 21, 290 (1933).

**The classification of porcelains.** A. Granger. *Chimie & industrie Special No.*, 853-4 (June, 1933).—G. draws attention to the lack of precision of Brongniart's classification and suggests a new classification based on the nature of the fusible constituent and, if need be, of the glaze.

**The system  $SiO_2-Al_2O_3-TiO_2$ .** Vladimir Škola. *Chimie & industrie Special No.*, 822-4 (June, 1933).—In evaluating  $Al$  silicates the current practice of considering  $TiO_2$  as equiv. to  $Al_2O_3$  is inaccurate. Not only does  $TiO_2$  not improve the refractory quality, but generally lowers it. The equilibria of the system  $SiO_2-Al_2O_3-TiO_2$  should be thoroughly investigated to deduce the proper method of expressing  $Al_2O_3$  for com. purposes.

**Refractory materials.** 24th report of the Joint Subcommittee, Institution of Gas Engineers and Leeds University. The hot patching of gas retorts. Use of dry powdered cements containing silicon and aluminum. F. H. Clews, H. Booth and A. T. Green. *Gas J.* 204, No. 3676 Institution of Gas Engineers Suppl., 10 (1933).—The lab. work is sufficiently promising to make work on gas retorts themselves desirable. Grading, porosity and permeability to air of silica bricks. F. H. Clews and A. T. Green. *Ibid.* 10 (1933).—The permeability and porosity of silica bricks as affected by the pressure and the distribution of sizes in the ganister have been studied. The action of alkalis on refractory materials. F. H. Clews, A. Green and A. T. Green. *Ibid.* 10-11 (1933).—An examn. of the brickwork of continuous vertical retorts has furnished fairly definite evidence of attack on the refractories by alkalis in the liquid and gaseous condition. Preliminary expts. have been made on the disintegration of fire clay and  $SiO_2$  exposed to the action of KOH vapor at 900-1000°. The rate of volatilization of KOH from materials impregnated with it up to 4%  $K_2O$  at 1000° has shown that the loss from  $SiO_2$  materials is many times more rapid than from those contg. clay. Flaking of continuous vertical retorts. A. T. Green and F. H. Clews. *Ibid.* 11-12 (1933).—The nature, cause and cure of flaking are discussed.

**The action of sodium sulfate on refractory materials.** Otto Bartsch. *Glastech. Ber.* 11, 285-93 (1933).—The resistance of refractories to attack by melts of soda and mixts. of  $Na_2SO_4$  and C is similar and increases with increasing clay content. More evidence is furnished to establish the fact that the very corrosive action of sulfate melts, in which the gall has been removed by reduction, is due to the localized surface area with a high concn. of alkali. Certain clays cause a peculiar deforma-

tion of the refractory in fused  $\text{Na}_2\text{SO}_4$  which is minimized by proper pre-firing. This is suggested as a test to aid in detg. the proper firing conditions for refractories.

J. F. Hyde

**Fused refractory blocks.** Vladimir Škola. *Chimie et industrie Special No.*, 825 9 (June, 1933).—A brief pat. review, followed by a description of the manuf. of "Corhart" refractories (U. S. pats. 1,675,751, 1926; 1,700,288 (C. A. 23, 1487; 1,728,350, C. A. 23, 5291)).

A. Papineau-Couture

**Tin oxide.** Heinrich Sasse. *Emailwaren-Ind.* 10, 72-3 (1933).—Methods for obtaining  $\text{SnO}_2$  and the detn. of its opacifying power are discussed. M. V. K.

**Coating glass with rubber** (Ger. pat. 577,812) 30. **Sealing lead-in wires into vitreous envelopes** (Brit. pat. 306,103) 4. **Furnace operation [glass manuf.]** (U. S. pat. 1,933,571) 1.

**Glass.** Hobart M. Kraner. U. S. 1,933,739, Nov. 7. A partially vitrified material produced by firing a mixt. of clay and a flux is used with other glass-forming ingredients.

**Glass.** Robert H. Dalton (to Corning Glass Works). Brit. 396,015, July 27, 1933. Molten glass is fined by adding to the batch a small amt. of a material that contains Br or I, e. g., iodides,  $\text{C}_2\text{H}_5\text{I}$  or bromides.

**Apparatus for feeding mold charges of molten glass.** John W. Harding (to Brockway Machine Bottle Co.). U. S. 1,934,676, Nov. 7. Structural, mech. and operative details are described.

**Apparatus for feeding mold charges of molten glass.** Walter R. Sterrett (to Ball Bros. Co.). U. S. 1,935,527, Nov. 14. Structural and mech. features.

**Cut-off knife for machines that gather molten glass by suction, for severing the glass in a mold from the supply in the gathering-pool.** Europäischer Verband der Flaschenfabriken G. m. b. H. Brit. 397,030, Aug. 17, 1933.

**Timing mechanism for glass-forming apparatus such as used for the manufacture of bottles, etc.** Samuel G. Stuckey (to Ohear-Nester Glass Co.). U. S. 1,932,024, Oct. 24. Various mech. and operative details are described.

**Glass-blowing apparatus suitable for use in the manufacture of bottles and jars.** August Kadow and John P. McLaughlin (to Owens-Ill. Glass Co.). U. S. 1,931,497, Oct. 24. Mech. features.

**Device for melting off the rough ends of hollow glassware.** The Libbey Glass Manufacturing Co. Ger. 577,890, June 7, 1933.

**Surface treatment of glassware to increase its strength.** Thomas Wardley and John B. Murgatroyd (to Hartford-Empire Co.). U. S. 1,933,529, Oct. 31. A pulverulent glass-treating material such as Pb borate or S in suspension in a gaseous medium is injected into an annealing lehr while glassware is being passed through the lehr.

**Apparatus for manufacture of glass tubing.** Henry K. Richardson (to Westinghouse Lamp Co.). U. S. 1,933,341, Oct. 31. Various structural and operative details are described.

**Sheet-glass manufacture.** Luke C. Mambourg (to Libbey-Owens-Ford Glass Co.). U. S. 1,932,669, Oct. 31. Various details of app. and operation are described.

**Apparatus for sheet glass manufacture.** Wm. Wildermuth (to Libbey-Owens-Ford Glass Co.). U. S. 1,932,651, Oct. 31. Mech. features.

**Cylinders for drawing sheets of glass.** Pilkington Bros. Ltd. Fr. 749,572, July 26, 1933.

**Apparatus for making sheets of glass.** Soc. anon. des manufactures des glaces et produits chimiques de St.-Gobain, Chauny et Cirey. Fr. 41,791, Apr. 13, 1933. Addn. to 699,275 (C. A. 25, 3454).

**Rolling machine for plate-glass manufacture.** Georges P. Despret (to Compagnies réunies des glaces et verres speciaux du nord de la France). U. S. 1,933,167, Oct. 31. Mech. features.

**Hardening glass disks or plates by air-cooling.** Soc. anon. des manufactures des glaces et produits chim. de St.-Gobain, Chauny et Cirey. Ger. 586,478, Oct. 21, 1933.

**Grinding and polishing apparatus for sheets of compound glass.** Cyril W. Bonniksen. Brit. 396,713, Aug. 8, 1933.

**Silver-copper alloy mirror films on glass.** Wm. Peacock, Jr. U. S. 1,935,520, Nov. 14.  $\text{AgNO}_3$  is dissolved in an aq. soln. of  $\text{NH}_3$ . An aq. soln. of  $\text{CuSO}_4$  and addnl.  $\text{AgNO}_3$  are dissolved in an aq. soln. of Rochelle salts. Tartaric acid is dissolved in water. The resulting solns. are added, in the order mentioned, to a further quantity of water, and the soln. thus produced is poured upon the body to be treated.

**"Glass substitute."** Frank A. Canon (to Acetol Products Inc.). U. S. 1,933,616, Nov. 7. A reticular metal base such as one formed of galvanized wires of elliptical cross section is coated and its meshes are filled with a cellulose deriv. compn. which in the meshes has a general divergent-lens-shaped form.

**Reception and transport table for laminated glass sheets.** Herzogenrather Glaswerke Bicheroux & Cie G. m. b. H. Fr. 41,519, Jan. 28, 1933. Addn. to 600,182.

**Ceramic materials.** Soc. Quartz & Silice. Fr. 41,648, Feb. 15, 1933. Addn. to 620,356. Elec. insulators, etc., are made by mixing debris from fused  $\text{SiO}_2$  with an appropriate binder.

**Permeable ceramic material suitable for "acoustic tile," etc.** Wm. L. Stafford (to Johns-Manville Corp.). U. S. 1,934,383, Nov. 7. Bricks, slabs and the like are formed by mixing a body material of relatively low bonding strength, such as clay, with a volatile solid such as naphthalene and a cementitious material capable of hardening at a relatively low temp., such as calcined gypsum, and sufficient strength is imparted to the mixt. to prevent substantial disintegration or deformation during subsequent heating, the mixt. is formed into suitable shapes, and the shaped material is heated to volatilize the volatile solid.

**Firing ceramic articles.** Porzellanfabrik Kahla, Zweigniederlassung Freiberg. (Friedrich Dettmer, inventor). Ger. 586,424, Oct. 21, 1933. Addn. to 530,269 (C. A. 25, 5264). The system described in Ger. 530,269 is modified by maintaining an atm. of  $\text{CO}_2$  or other inert gas in the preheating chamber in which the oil vapors are evolved.

**Porous bricks.** Henrik Nielsen. Brit. 396,590, Aug. 10, 1933. Raw wet clay and org. substances, e. g., sawdust, peat, ground coke and coal are mixed, the mixt. is dried until it contains 10-17%  $\text{H}_2\text{O}$ , granulated, e. g., to granules 2.5 mm. diameter, dry molded, e. g., at 100-150 kg. per sq. cm. pressure, and fired, preferably in a tunnel kiln. The org. substances may form 2-75% of the total mix.

**Method and apparatus for making sand-faced bricks.** Herbert H. Bailey, Richard Barker and Thomas Jones. Brit. 395,696, July 18, 1933.

**Combined molding and re-pressing machines for bricks, tiles, etc.** Clayton, Goodfellow & Co. Ltd. and Thomas Whittaker. Brit. 395,986, July 27, 1933.

**Molding pipes, tiles, etc., by extrusion.** Rainford Potteries Ltd. and Francis Wilson Grundy. Bgt. 396,349, Aug. 3, 1933. In making pipes, tiles, etc., by extrusion and cutting up of clay tubes or bars the bar, etc., is subjected to a rapid drying of its surface layer, preferably by means of air jets, immediately after extrusion, whereby the surface layer is rendered sufficiently porous to allow entrapped air to escape so that blistering is avoided during subsequent firing. The articles are subjected to a slow final drying before firing.

**Burning and preheating tunnels, etc., for treating clay products as in brick and tile manufacture, etc.** Edward M. Hoover. U. S. 1,935,319, Nov. 14. Structural and mech. features.

**Furnace suitable for melting silica and alumina with alkali metal carbonate.** Alfred W. Scheidt (to Elec.

Smelting & Aluminum Co.). U. S. 1,932,354, Oct. 24. Various details are described relating to forming a refractory lining in part from material chilled in the furnace. U. S. 1,932,355 also relates to furnace construction and operation of generally similar character.

**Tunnel or enameling pottery kiln heated by electric resistors.** Wm. J. Millar (to Ajax Elec. Co.). U. S. 1,934,870, Nov. 14. Structural and elec. features.

**Pottery-making machine.** Wm. J. Miller. Brit. 395,855, July 27, 1933.

**Pottery.** Walter Bloch. Brit. 396,532, Aug. 10, 1933. Dense, refractory pottery ware is made by using a eutectic mixt. (approx. equal parts) of clay and talcum, or a mixt. having the clay or talcum slightly in excess, as a sintering flux for the main raw materials, *e. g.*, refractory clays, refractory oxides, silicates, nitrides or carbides. The main materials may contain clay but not feldspar, quartz or talc. The fluxing action of the clay-talcum mixt. may be modified by addns. such as  $MnO_2$ , rutile, marble, beryl, pyrolusite, bone ash, fluor spar, etc., up to 10% of the mixt. Examples are (1)  $Al_2O_3$  65 and eutectic mixt. 35 parts, (2) magnesite 20, Zr silicate 30 and eutectic mixt. 50 parts and (3)  $ZrO_2$  75, eutectic mixt. 20 and Lothian or Dorset clay 5 parts.

**Cast vitreous panels formed on reinforcing metal supports.** Walter N. Thurn (to Vitrolite Co.). U. S. 1,935,583-4, Nov. 14. Various details of manuf. are described.

**Transparent siliceous materials.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 749,436, July 24, 1933. A material suitable for insulation in spark plugs, etc., is made by fusing together crystallized quartz and beryl ( $Si_2O_3 \cdot Al_2Be_3$ ). The best proportion is 3-5% of beryl.  $Al_2O_3$  may be added if desired.

**Refractory furnace lining.** Karl Hacks and Wm. S. Sprow. U. S. 1,934,263, Nov. 7. For fusing a refractory lining upon the interior surface of a furnace such as one for melting glass or metals, there is applied to the surface a layer formed of a mixt. of granular refractory material such as magnesite and particles of a readily oxidizable metal such as Al and the metal is oxidized (as by Fe oxide) to supply heat for fusing the refractory material.

**Checkerwork of regenerators.** Dorman, Long & Co. Ltd. and Harry W. Owston. Brit. 395,859, July 27, 1933.

**Checkerwork for regenerators, for gas retort settings, etc.** John R. Masters. Brit. 395,593, July 20, 1933.

**Ceramic nozzles for spinning rayon, etc.** Porzellan-fabrik Ph. Rosenthal & Co. A.-G. Ger. 577,562, June 1, 1933. A flux such as feldspar is mixed with the ceramic mass so that a glaze is formed on the nozzle during the firing without addn. of a glaze powder.

**Electrical insulators.** Frank J. Stevens (to Locke Insulator Corp.). U. S. 1,931,626, Oct. 24. Insulators are formed comprising at least one insulating component such as porcelain together with aluminate cement serving as a lining for the pin hole or the like.

**Forming articles such as collar-insulators from fused quartz.** Alexander O. Freiherr von Beaulieu Marconnay (to Thermal Syndicate Ltd.). U. S. 1,932,402, Oct. 31. Mech. features.

**Porous refractory articles.** N. V. Vereenigde Nederlandsche Chamotte-Fabrieken. Ger. 580,442, Oct. 21, 1933. A mixt. contg. chamotte, refractory clay and 50-90% by vol. of Scottish cannel coal is molded and fired. The coal employed should yield not more than 10% of ash, which should be of high m. p.

**Abrasive articles.** Sigel F. Hepp. U. S. 1,932,104, Oct. 24. Finely divided abrasive material is used with polymerized chloroprene.

**Emery and sand cloth, etc.** Behr-Manning Corp. Brit. 396,385, Aug. 1, 1933. In the manuf. of sand paper, etc., the abrasive particles are propelled onto the backing material by an elec. field. App. is described.

**Molding abrasive wheels, etc.** Orello S. Buckner. Brit. 396,231, Aug. 3, 1933. In the manuf. of abrasive wheels and other tools from bonded, irregularly shaped grains of abrasive material the grains are turned during the molding process so that their largest dimensions lie in a desired dimension, *e. g.*, approx. perpendicular to the working face. The positioning is achieved by coating the grains, when of non-magnetic material, with a layer of Fe, etc., dust and subjecting in the mold to a magnetic field. The coating may be secured to the grains by an adhesive, *e. g.*, dextrin, glue, or by means of ceramic, etc., bonding material.

**Grinding wheels for wood, etc.** The Carborundum Co. Brit. 396,060, July 26, 1933. The wheels comprise a bonded abrasive body in combination with another element, *e. g.*, cement or reinforcing-members, formed of material having substantially the same temp. coeff. of expansion as the abrasive body. As applied to a wheel built up of segments the cement may comprise synthetic resin, fused quartz and  $H_2O$ , with or without  $(CH_3)_4N_4$ , and where reinforcing rings are used these may be of high-Ni steel held in position by said cement. To allow for a slight difference of coeff. of expansion of the rings and abrasive body a cement comprising fine SiC, smoked rubber and S may be used. The cement joints may be caulked with a quick-setting cement of CuO and  $H_3PO_4$ .

**Enamels.** Ignaz Krcidl. Brit. 396,007, July 27, 1933. In clouding enamels by means of gas bubbles as described in Brit. 297,724 (C. A. 23, 2798), 297,725 (C. A. 23, 2798) and 297,737 (C. A. 23, 2798) the quantity of clouding agent used is not materially greater than can be adsorbed by the slip and retained during storage. Suitable clouding agents are org. dyes, *e. g.*, methylene blue, malachite green, or highly polymerized hydrocarbons or substitution products thereof, *e. g.*, resins, pitch, tars, asphalt.

**Enamel suitable for use on bathtubs, sinks and the like.** Charles J. Kaspar. U. S. 1,933,437, Oct. 31. An enamel is formed of flint, borax,  $NaNO_3$ ,  $Na_2CO_3$ ,  $Ph_3O_4$ ,  $BaCO_3$ , fluor spar, Sb oxide and Na antimonate, in specified proportions.

## 20—CEMENT AND BUILDING MATERIALS

J. C. WITT

**The story of cement.** Oliver Bowles and H. Herbert Hughes. *Trans. Can. Inst. Mining Met.* 1933 (in *Can. Mining Met. Bull.* No. 259) 525-36.—General.

Alden H. Emery

**Aluminate cements.** J. I. Packalén. *Teknillinen Aikakauslehti* 23, 316-26 (1933)—A review of the development of aluminate cements is given. The analyses and structure are compared with those of portland cements. The time of binding, consistency of vol., storing ability and corrosion resistance are described. S. A. K.

**Anhydrite cement, its preparation and properties.** Peter P. Budnikov. *Chem.-Zig.* 57, 822-3 (1933); cf. C. A., 28, 279. E. H.

**Comparison of the effect of high temperatures on con-**

cretes of high alumina and ordinary portland cements. Alfred L. Miller and Herbert F. Faulkner. Univ. Wash. Eng. Expt. Sta., *Bull.* 43, 5-23 (1927).—In structures where the possibility of exposure to greater than ordinary temps. is remote and the probable period of exposure is short high-alumina cement is a satisfactory substitute for portland cement. High-alumina cements are less stable under conditions of high temp. The application of heat at all temps. decreased the strength of both cements, the greatest loss occurring during the first hr. Numerous data and graphs are given. C. R. F.

**Correction of alkaline soils in road making.** J. Gollan, L. Hervot and V. Nicollier. *Rev. facultad quim. ind. agr., Univ. nacl.itoral* 2, 88-95 (1932).—A clay taken

from a dirt road was found to have a plasticity index of 16.3 in its natural condition ( $p_H = 7.35$ ); when converted into acid clay ( $p_H = 3.06$ ) the plasticity was 10.7. Satn. of the clay with Ca, Mg or Na gave plasticity indexes of 18.2, 21 and 34.3, resp.  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , applied at the rate of 2.52 kg. per sq. m. distributed through the top 30-cm. layer, is a practicable corrective, because it displaces the Na to which the clay owes its extreme dispersion.

O. W. Willcox

Note on a laboratory apparatus for the fractional distillation of road tars. Joseph Malette. *Chimie & Industrie Special No.*, 851-2 (June, 1933).—A detailed description of a distg. flask and condenser specially developed for carrying out distn. tests on tar for roads.

A. Papineau-Couture

The breaking of road-building emulsions in contact with Austrian road-building stones. II. Suida and G. Uiberreiter. *Petroleum, Z.* 29, No. 29, 1-6 (1933).—Tests for evaluating asphalt emulsions for street construction are discussed. It is of special importance in the emulsion-breaking test to employ the particular substance to which the emulsion is to be applied. It is shown that the same quantity of the same emulsion can suffer breaking to various extents between 1.4 and 25.4 g. according to the stone used in the test. The stones react differently to different types of emulsions but may be roughly classified according to their activity. This activity appears to parallel alkali adsorption of the stone. Deposition of asphalt due to evapn. of the water is greater the less active the stone. Thus in dry warm weather the emulsion is broken because of this factor, while in cold wet weather the specific action of the stone controls the behavior of the emulsion.

I. M. Levine

Microasbestos in the asphalt industry and street construction. Heinrich Rosenberg. *Petroleum, Z.* 29, No. 45, 1-12 (1933).—The literature depicting the advantages of microasbestos as a filler in asphalt and tar for bituminous coatings, cement, roofing and road building is reviewed. In the last, R. shows that microasbestos increases the viscosity and resistance to pounding, and reduces the danger of the formation of fissures in winter and flowing in summer. This is due to the formation of a mineral skeleton because of the fibrous structure. It is very useful for streets exposed to dampness, by which it is not affected. It has the property of adsorbing water from the asphalt emulsion, which is thereby more rapidly broken and the fixation of the stone and bitumen is hastened. This prevents the displacement of the emulsion by flowing, in the case of both the surface and subsurface structures, yielding a more uniform and stronger pavement. It also provides a rougher surface and, therefore, greater freedom from sliding.

I. M. Levine

Wood-fiber plates (insulating wall boards), their manufacture, properties and use. Ivar Lundback. *Tek. Tid. Upl. C. Kemi* 62, 73-80 (1933).—A new type of wall board, *Treetex*, is manufactured in Sweden; the method employed is similar to the insulite board method. Testing methods for the phys. properties and water absorption are described. Expts. on fireproofing of Treetex have proved successful. Treetex is manufactured in different grades of hardness. Another product, *Startex*, consists of 1 board of Treetex between 2 boards of plywood. These plates having a hard outer shell and a porous insulating inner core have been successfully employed for doors.

D. Thuesen

Mastic asphalt roofing. D. M. Wilson. *Chemistry and Industry* 1933, 959-60.

E. H.

Practical experiments on chemical fire protection for wooden timbers. L. Metz and R. Schlegel. *Gasschutz u. Luftschutz* 3, 296-9 (1933).—Small-scale and large-scale methods for testing the efficiency of fireproofing treatments are described. Some results of tests are given.

A. L. Kihler

Durability of posts and results of preservative treatment. Deane G. Carter, Harold T. Barr and John B. Woods. *Ark. Agr. Expt. Sta., Bull.* 287, 3-16 (1933).—Pine posts which were creosoted by the pressure process were entirely sound after 10 yrs. Galvanized steel posts

likewise showed no deterioration. Painted steel posts gave good service, but the paint was not weather resistant, and the posts were subject to corrosion. Home creosote treatment adds about 4 yrs. to the life of posts. About 50% of the home creosoted posts were sound after 10 yrs.  $\text{ZnCl}_2$  treatment was effective and can be carried out at home. Used cylinder oil gave some promise as a useful preservative. Best results were obtained when the oil treatments were of short duration and at lower temps. Cu compds. pptd. in the wood and were highly toxic to wood-destroying fungi. Molten S offered some mech. resistance to decay. C. R. Fellers

Insecticides [and wood preserving compns.] (Brit. pat. 396,064) 15. Treating sulfide ores [slag used in portland cement] (Brit. pat. 396,690) 9.

Cement. Charles H. Breerwood (to Valley Forge Cement Co.). U. S. 1,931,921, Oct. 24. In prep. a cement raw material mixt. approaching a predetd. analysis from original material contg. an excess of one constituent such as  $\text{SiO}_2$ , the material is reduced to workable sizes, at least part of the material is treated (as by a flotation sepn.) to sep. some of the constituent present in excess and such treated portion is then combined with the untreated part of the original material.

Apparatus for cement manufacture. Walter M. Keenan (to Metropolitan Engineering Co.). U. S. 1,932,467, Oct. 31. A rotary kiln is provided with a nozzle burner projecting into the kiln, and with a water wall within the lower end of the kiln comprising longitudinal tubes lining the shell, headers at opposite ends of the tubes and connections for circulating water from the lower to the upper ends and for taking off hot water or steam from the upper header.

Shaft kiln for cement burning. Arno Andreas. Ger. 577,616, June 2, 1933.

Rotary kilns for the wet process manufacture of cement, etc. Gustave Coovmans. Brit. 396,265, Aug. 3, 1933.

Filtering cement slurry. The Dorr Co. Ger. 586,237, Oct. 19, 1933. See Brit. 380,239 (C. A. 27, 2742).

Apparatus for thickening crude cement slurry. Fried Krupp Grusonwerk A.-G. Ger. 577,521, June 1, 1933. Addn. to 530,640 (C. A. 26, 277).

Hardening cementitious products such as asbestos cement pipes. Manabu Tada (to Frank W. Plane). U. S. 1,932,150, Oct. 24. The product is formed on a core while in plastic condition and is subjected to an atm. contg.  $\text{CO}_2$  to effect surface hardening while still on the core, then removed from this atm. and sepd. from the core, and further hardened and dried under normal atm. conditions.

Porous compositions. Leichthausstoff-Ges. m. b. H. Ger. 586,236, Oct. 19, 1933. Cement or the like is mixed with gas-evolving reagents, and the mixt. is subjected to reduced pressure during the evolution of the gas.

Porous agglomerates. Hugo Ippach and Otto Bielgk. Fr. 750,117, Aug. 5, 1933. Finely divided quartz or rocks composed principally of  $\text{SiO}_2$  are mixed with  $\text{CaO}$  and an excess of water. The mass is molded and hardened by steam.

Heat-treating apparatus for manufacture of cellular aggregate from clay, shale or argillites, etc. Thorne E. Lloyd (to Dwight & Lloyd Sintering Co.). U. S. 1,932,415, Oct. 31. Mech. features.

Apparatus for treating concrete by vibration. Walter H. Horsch (to Massey Concrete Products Corp.). U. S. 1,932,520, Oct. 31. Various structural, elec. and operative details are described.

Tamping machines for molding concrete, etc., blocks. Leonard Hall. Brit. 396,381, July 27, 1933.

Apparatus for heat treatment of materials (such as clay in forming a concrete aggregate). Reed W. Hyde. U. S. 1,932,409, Oct. 31. Structural and mech. details of an app. adapted for heating clay, shale, etc., in the presence of a hot gaseous medium such as that from fuel burners.

**Road-making materials.** Giovanni D. Coletta. Ger. 586,423, Oct. 21, 1933. Sand or comminuted stone is warmed to about 45° and mixed with melted bitumen. A cold mixt. of powd. asphalt and powd. stone is then added, and mixing continued until a loose nonadhesive product is obtained.

**Bituminous dispersions and compositions for road-making.** Wilhelm R. Roederer. Brit. 395,384, July 3, 1933. See Fr. 727,328 (C. A. 26, 5192).

**Colored asphaltic compositions.** Highways Construction Ltd. and Cecil W. Rhodes. Brit. 396,545, Aug. 10, 1933. Asphaltic material is comminuted and heated under such conditions that it does not melt and a powd. pigment, e. g.,  $\text{Fe}_2\text{O}_3$ ,  $\text{Cr}_2\text{O}_3$ ,  $\text{PbO}$ ,  $\text{BaSO}_4$ ,  $\text{PbCrO}_4$ , ultramarine, etc., is incorporated with the heated material. A further quantity of bitumen may be added if necessary. The compn. may be applied to a road or other surface in powder form or molded into slabs, etc.

**Artificial stone.** Siemens-Schuckertwerke A.-G. (to Siemens & Halske A.-G.). Brit. 396,234, Aug. 3, 1933. Highly pure calcined  $\text{Al}_2\text{O}_3$  is made into a slip with a dil. mineral acid, e. g.,  $\text{HCl}$ , without any binding agent, and cast into porous molds or press molded. The shaped bodies are dried and sintered at below 1600°. They have a porosity of about 6–15% by vol. and may be used as grinding tools, polishing stones and oilstones, particularly for use in Cu plate printing and dentistry.

**Artificial stone.** Berliner Städtische Elektrizitätswerke A.-G., Friedrich Gropp and Helmut Richter. Ger. 586,332, Oct. 20, 1933. Flue ash is mixed with 15–30% of clay, with or without a flux, and the mixt. is molded, dried and fired in the usual way.

**Artificial marble.** Herman Ziegler. U. S. 1,935,535, Nov. 14. A liquid cement mixt. is subjected to air under pressure to produce a smooth close-grained product and is then permitted to dry under atm. pressure.

**Artificial stone surfaces.** Frederick R. Cooper (one-third each to Theodore L. Swoboda and Charles Steed). U. S. 1,931,573, Oct. 24. Dry cement is added to a batch of wet cement to form a mixt. of stiff lumpy consistency; the material is rolled into a layer on a flexible backing sheet such as paper, and a flexible cover sheet such as cloth is applied over the layer; the layer is rolled by pressure applied through the cover sheet, the latter is then removed, the layer is applied to a suitable base surface such as a plaster coated wall and the backing sheet is then removed.

**Decorative artificial stone from alumina cement and hard mineral granules.** Victor Langer. Ger. 586,333, Oct. 20, 1933. Numerous mfg. details are given.

**Building blocks from calcium carbonate and lime.** Arthur H. Harrison (to Carbonated Lime Processes Ltd.). U. S. 1,934,534, Nov. 7. Cellular particles of  $\text{CaCO}_3$  are incorporated with an aerated slurry of lime, the mixt. is molded, and the molded material is subjected to the action of  $\text{CO}_2$  gas in a heated chamber.

**Ornamental effects simulating marble on surfaces of building materials.** Emil C. Loetscher. U. S. 1,931,667, Oct. 24. An oil pigment is dropped upon the surface of a water bath contg. alum in soln. and allowed to spread in a thin film of a predetd. pattern which is then transferred to the surface of a sheet of material such as sized paper by surface contact and may be dried, varnished and applied by heat and pressure.

**Apparatus for continuous treatment of building bricks, etc., in drying, preheating, burning and cooling zones.** Ferdinand Fanta. U. S. 1,933,051, Oct. 31. Structural and mech. features.

**Fireproof building material.** Arthur Sprenger. Ger. 577,932, June 7, 1933. Oxides of Cr, Al, Mg and Si are fused together at high temps. the amts. being arranged so that the compds.  $\text{MgO} \cdot \text{Al}_2\text{O}_3$ ,  $\text{MgO} \cdot \text{Cr}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$  result. Minerals or compds. contg. oxides of the above may be used as starting materials.

**Filling porous masonry surfaces.** Warren G. Brown. U. S. 1,931,643, Oct. 24. For preventing penetration of water, surfaces such as those of masonry joints are treated with a coating essentially comprising a cement such as

portland cement and a finely pulverized oxidizable metal such as iron which swells in oxidation, and excess of the coating, not embedded in the surface, is subsequently removed.

**Impregnating and coating structural material such as stone, concrete or brick.** Ralph A. Altenhof (to Koppers Co. of Del.). U. S. 1,932,502, Oct. 31. S-treated tar is used as a pore filler and the surface of a concrete block or the like is provided with a continuous film of metal such as Al or Cu bronze which may be applied by use of metal flake powder with the tar.

**Fibrous compositions.** Bart T. Neervoort and Jan S. Volker. Brit. 396,652, Aug. 10, 1933. A compn. for making building elements, e. g., bricks, slabs, etc., comprises at least 3 parts of a hydraulic binder and 1 part of sugar-free bagasse. In an example the binder comprises cement 18.75, lime 9.7 and trass 6 kg. This is added to 6 kg. bagasse and made into mortar by mixing with  $\text{H}_2\text{O}$ .

**Roofing material.** Carl J. Pater (to Philip Carey Mfg. Co.). U. S. 1,932,144, Oct. 24. A foundation portion such as rag felt carries an exposable surface of weather-resisting material such as asphalt and mica and on its opposite side is provided with cellular heat-insulating material such as granular cork.

**Air-blown asphalt roofing.** Morris Levine (to Lehou Co.). U. S. 1,934,315, Nov. 7. Asphalt roofing comprises a roofing base such as a roofing felt coated with an air-blown asphalt of the Mid-Continent type with a thin overlying coating of rosin for preventing discoloration.

**Apparatus for coloring and drying roofing granules.** Paul S. Denning. U. S. 1,931,754, Oct. 24. Various structural and operative details are described.

**Plastering compositions.** N. P. Development Syndicate Ltd. and Henry L. Beresford. Brit. 395,426, July 20, 1933. A plastering compn. comprises cement and a larger quantity of finely comminuted pumice, or other material having similar vesicular structure and chem. compn., e. g., certain blast furnace slags, which is graded so that none of the particles exceeds  $1/16$ th in. in size and an appreciable portion passes a 150-mesh sieve but some is retained thereby. A suitable compn. comprises portland cement 1, pumice 4–20 and, optionally,  $\text{Ca}(\text{OH})_2$ , 1–2 parts. Coloring matter and micaceous sand and also a small proportion of  $\text{CaCl}_2$  may be added.

**Plaster.** Jean C. Seailles. Fr. 41,705, Mar. 29, 1933. Addn. to 730,011. A plaster of higher resistance is obtained by using water above 35°, preferably 50–100° or higher in the presence of a substance giving an alk. reaction in water.

**Plaster composition resembling natural gypsite.** Carlisle K. Roos and Richard Ericson (to U. S. Gypsum Co.). U. S. 1,932,120, Oct. 24. A ball-milled mixt. is prepd. with a major proportion of calcined gypsum and a minor proportion of clay, together with a trace of a deliquescent substance such as  $\text{CaCl}_2$ . Cf. C. A. 27, 2783.

**Calcium sulfate plaster.** Victor Lefebure. Ger. 586,331, Oct. 20, 1933. See Brit. 337,926 (C. A. 25, 2264).

**Plastic "acoustic pulp" for wall plaster.** Mario Valdastri. U. S. 1,932,807, Oct. 31. Cellulosic material such as cotton, sawdust, chaff or straw is used with asbestos,  $\text{ZnSO}_4$  and a binder comprising dextrin, casein, albumin or glue.

**Wallboard.** Dean D. Crandell (to National Gypsum Co.). U. S. 1,932,956, Oct. 31. In making wallboard, a cover paper is overlaid with a core paste having an alkalinity equiv. to more than 0.03%  $\text{NaOH}$ , which serves to give a strong bonding action. App. is described.

**Toughening wood and other fibrous materials with gum hydrocarbons.** Felix F. v. Wilmowsky. U. S. 1,933,573, Nov. 7. Fibrous material, free from resinous, oily and fatty substances and from starch, is impregnated with a soln., in a neutral volatile petroleum hydrocarbon menstruum or the like, of teneaceous gum hydrocarbons substantially free from resin, such as those of rubber or chicle, and the solvent is then volatilized at a temp. below that at which the gum hydrocarbons soften; the temp. is then raised to the coalescing point of the gum hydrocarbons.

"Artificial lumber" from excelsior or the like. Horatio W. Brown and Cyrus J. Taylor (to Bemis Industries, Inc.). U. S. 1,931,570, Oct. 24. Excelsior or the like is formed into a continuous uniform mat by uniformly distributing it in a passage (of a described app.) under air pressure; the mat is gradually and partially compressed, impregnated with a cementitious binder such as a Mg oxychloride cement mixt. and the impregnated material is held under pressure until the binder has at least partially set.

Adhesive for floor coverings. I. G. Farbenind. A.-G. (August Runte and Adolf Menger, inventors). Ger.

577,885, June 6, 1933. Linoleum, etc., is attached to floors by an adhesive prep'd. from an aq. emulsion of resinous condensation products obtained from a polyhydric alc., a polybasic org. acid and a monobasic org. acid. The example mentions an emulsion of the product obtained by condensing glycerol, phthalic acid and linseed oil fatty acid, with a small addn. of casein,  $\text{NH}_3$  and a Mn or Pb salt of a high mol. org. acid.

Floor-covering material, etc., containing porous rubber. Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 586,111, Oct. 16, 1933. See Brit. 358,561 (C. A. 27, 446).

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Briquets prepared by Averkiev's method. Shapovalov. *Domes* 1933, No. 5-6, 30-34.—Averkiev's method for briquetting iron ore fines consists in binding a mixt. of ore, lime and coke breeze with liquid glass. Briquets thus prep'd proved satisfactory as regards mech. strength, resistance to abrasion, gas permeability, reducibility, sp. gr. and chem. compn. The fear that  $\text{Na}_2\text{SiO}_3$  would corrode the furnace lining seems to be groundless. The use made of lime and coke fines helps to reduce cost of briquetting.

Some chemical aspects of coal utilization. H. H. Lowry. *Am. Inst. Chem. Eng.*, Roanoke Meeting, Dec., 1933 (preprint), 18 pp.—A brief review is given of the chem. nature of coal, and certain chem. aspects of the utilization of coal for hydrogenation, coking, combustion and gasification are discussed. The present knowledge of the chemistry of coal utilization is extremely incomplete. Need for addnl. work on the fundamental chemistry of coal and its reactions is emphasized. The engineer has achieved much in coal utilization with the limited knowledge of the nature of coal itself at his disposal.

C. L. Mantell

Report of experimental work on the hydrogenation of Canadian coal, coal tar and bitumen for the production of motor fuel. I. Batch experiments on the hydrogenation and cracking of low-temperature coal tar. T. E. Warren and A. R. Williams. *Can. Dept. Mines, Mines Branch Rept.* 737-3, 1-10 (1933).—Tar from the low-temp. carbonization of Sydney bituminous coal in an Illingworth retort contained 58.9% neutral oil, 33.05% tar acids and 7.5%  $\text{H}_2\text{O}$ . An Engler distn. of the dehydrated tar gave 4% up to  $410^\circ\text{F}$ . ( $210^\circ\text{C}$ .) and 35%  $410^\circ$  to  $572^\circ\text{F}$ . ( $300^\circ\text{C}$ .). The fraction to  $410^\circ\text{F}$ . contained acids 48, bases 2, olefins 20, aromatics 20 and paraffins and naphthenes 10%. The fraction  $410$ – $572^\circ\text{F}$ . contained acids 31, bases 4, olefins 7, aromatics 50 and paraffins and naphthenes 8%. Cracking this tar by the Cross exptl. procedure gave (2 expts.) crude gasoline, b. to  $410^\circ\text{F}$ ., 7.0, 8.9%; crude kerosene, b. 410– $572^\circ\text{F}$ ., 17.6, 17.2%;  $\text{H}_2\text{O}$  1.3, 1.3%; loss as gas, —, 4.1%; loss as coke, —, 23.1%. Petr. ether extd. 24.8% of the coke and raised yields of gasoline and kerosene in the second expt. to 9.3 and 18.5%, resp. In hydrogenation expts. Cu and  $\text{MoO}_3$  catalysts were effective in reducing coke formation. The best results were obtained with 10% of the wt. of the charge of  $\text{MoO}_3$  at  $476^\circ$ , 252 atm. for 30 min. Recoveries were total oil 90.4, coke 0.6, gas 9.0, fraction b. to  $410^\circ\text{F}$ . (gasoline) 17.8, fraction b. 410– $572^\circ\text{F}$ . (kerosene) 29.0. Also Fe oxide,  $\text{MoS}_2$ , and  $\text{MoO}_3 + \text{S}$  were tested as catalysts. II. Description of an apparatus for continuous hydrogenation and experiments on coal tar, bitumen and a suspension of powdered coal in coal tar. T. E. Warren and K. W. Howles. *Ibid.* 11-31.—A continuous lab.-scale, liquid-phase hydrogenation app. has been constructed. The volatile oil is removed as vapor in a stream of  $\text{H}_2$  at high pressure. About 260–280 g.  $\text{MoO}_3$  on 8–10 mesh coke was used as catalyst for 2800 cc. liquid. Temp. was  $428$ – $452^\circ$ , pressure 183–187 atm. and  $\text{H}_2$  circulation 87–112 cu. ft. per hr. Somewhat similar results were obtained with tar described in I, Alberta

bitumen and 40% powd. Cape Breton bituminous coal in tar. C formation was avoided. Loss as gas and vapor was about 10%.  $\text{H}_2$  combined or lost was 5.7–7.2% of material charged. Yields of volatile oil were 67.5, 73.3 and 65.5% by vol. of tar, bitumen and coal in tar, resp. Yields based on total charge — partly converted oil left in chamber at end of run were 90, 102 and 89%, resp. These are nearer to the results to be expected from continuous operation. Approx. 90% distd. below  $572^\circ\text{F}$ . and 45% below  $410^\circ\text{F}$ . About 10% of olefins was present.

Alden H. Emery

New process for the pressure gasification of brown coal with oxygen. A. Sander. *Arch. Warmewirt.* 14, 303-4 (1933).—A brief description is given of an exptl. installation of 1 sq. m. grate area, fed with O and steam at 20 atm. The combustion zone was very cool so that no clinker formed. Twenty tons of coal was gasified per 24 hrs. The gas contained 31%  $\text{CO}_2$  which could easily be washed out at this pressure.

Ernest W. Thiele

New combustion chart insures speed, ease, accuracy. Eric Therkelsen. *Power* 77, 600-1 (1933). A. H. B.

The Kreisa system in the Tokyo Gas Company. S. Minoru. *J. Fuel Soc. Japan* 12, 893-901 (1933) (in English 83-5).—M. discusses the merits and demerits of the 3 gasification systems, viz., the Baniag, Strache and Kreisa. The Kreisa system is far superior to the other 2 in principle and practice for the generation of water gas and the decompn. of tar, which are the chief elements for a mixed gas producer.

F. I. Nakamura

Gas power at the Sons of Gwalia Mine, Western Australia. V. T. Edquist, C. Valentine and Norman Dunstan. *Bull. Inst. Mining Met.* No. 350, 33-6 (1933). cf. C. A. 27, 3802.—Discussion.

Alden H. Emery

The mechanically operated gas producer, its origin and development. Gottfried Reitböck. *Feuerungstech.* 21, 148-52 (1933).—A review, including a list of about 80 German patents.

Ernest W. Thiele

Experiments with gas main stoppers and bags. Zumbusch and Hinze. *Gas u. Wasserfach* 76, 753-6 (1933).—The pressure necessary to cause leakage was det'd. for a series of stoppers. One cause of failure was displacement of the stopper rather than failure of it. To eliminate this feature the stopper was redesigned and fitted with handles that prevented displacement. While rubber bags are convenient means of stopping gas mains, the thin rubber required for convenience in handling is readily torn.

R. W. Ryan

Economic evaluation of benzene removal from gas. R. Mezger. *Gas u. Wasserfach* 72, 775-7 (1933).—A study of the economics relative to the removal of light oils from gas, with special reference to Stuttgart conditions.

R. W. Ryan

Distillation of crude benzene in continuous fractionation columns. G. N. Tyutyunnikov. *Coke and Chem.* (U. S. S. R.) 1932, No. 2, 26-9.—A discussion of technology of the continuous crude benzene-distn. plant for sepn. of benzene, toluene and xylene.

J. S.

Synthesis of benzene from carbon monoxide and hydrogen at ordinary pressures. XI. Cobalt-copper-thorium and cobalt-copper-uranium catalysts. K. Fuji-



- mura and S. Tsuneoka. *Sci Papers Inst. Phys. Chem. Research* (Tokyo) 22, 189-97(1933).—See C. A. 26, 4444. G. G.
- Method of determination of sulfur in solid fuels.** G. L. Stadnikov and N. G. Titov. *Coke and Chem.* (U. S. S. R.) 1932, No. 5-6, 29-36.—A review of methods for S detn. in solid fuels. The following methods are recommended: for S of sulfates and pyrites—Parr and Powell; for total S—Eschka; org. S by difference.
- Ferro-ammonium method for recovery of sulfur from coke-oven gas.** S. G. Aronov. *Coke and Chem.* (U. S. S. R.) 1932, No. 4, 42-8.—A study of data obtained in a series of expts. with  $H_2S$  absorption from coke-oven gas with a base contg. suspended  $Fe(OH)_3$ , as an absorbing liq. The probable reactions taking place are: (a)  $2NH_3 + H_2S = (NH_4)_2S$ ; (b)  $3H_2S + 2Fe(OH)_3 = 2FeS + S + 6H_2O$ ; (c)  $3(NH_4)_2S + 2Fe(OH)_3 = 2FeS + S + 6NH_4OH$ , etc. The results of the expts show: (1) absorption of  $H_2S$  renders the gas practically free from S compds.; (2) a considerable amt. of S can be recovered by regeneration of the absorbing liq.; (3) 25%  $NH_3$  can be recovered by regeneration; (4) secondary reactions during regeneration are negligible.
- Analysis of coke-oven gas and its components.** P. K. Sakmin. *Coke and Chem.* (U. S. S. R.) 1932 No. 4, 31-4.—A description of an improved app. for coke-oven gas analysis (detn. of  $CO_2$ , olefins,  $O_2$ , CO and  $H_2$ ,  $C_2H_4$ ,  $C_2H_6$ ). App. is essentially a modified Rasfeld app. The improvement consists of two-way stop cocks on each of the burets and an arrangement for a closer Hg-level control in the burets.
- Separation of benzene hydrocarbons from coke-oven gas by absorption.** G. V. Kopcelevich. *Coke and Chem.* (U. S. S. R.) 1932, No. 2, 62-6.—A theoretical scheme for recovery of benzene hydrocarbons from coke-oven gas by absorption in oil. The process consists of the absorption of  $C_6H_6$ ,  $C_7H_8$ ,  $C_8H_{10}$ ,  $C_9H_{12}$  in oil circulating in absorption towers and the distg. out of each of the hydrocarbons separately by raising the temp. of the oil and circulating it in a distn. column.
- The causes of the decomposition of absorbing oils in the absorption of benzene from coke-oven gas.** G. V. Kopcelevich and A. I. Brodovich. *Coke and Chem.* (U. S. S. R.) 1932, No. 4, 35-42.—An extensive study of exptl. data in changes of properties of oils used for absorption of benzene from coke gas.
- Determination of the extent of outgassing of cokes.** Walter Ludewig. *Gas u. Wasserfach* 76, 733-6(1933), (C. A. 26, 580)—The previous method of detg. the extent to which a coke had been outgassed was modified by increasing the vol. of the system to 3.2 l and evacuating the whole system to 5 mm. pressure before heating, so that the av. pressure was 20-36 mm. during the detn. In 60 min. the vol. of gas evolved was 90% of that from 6 hrs. heating. The app. is said to be simpler than that formerly used. A fully carbonized coke is now defined as one giving off not over 30 cc. gas at 0° and 760 mm. pressure per g. of air-dried coke, when heated at 1000° for 60 min. with an initial pressure of 5 mm. under the given conditions.
- Recent developments in coking practice.** Heinrich Koppers. *Colliery Guardian* 147, 724-8, 770-3(1933); *Gas World* 99, No. 2574, Coking Sect. 124-9; cf. C. A. 28, 290.
- Improvement of water cooling in a coke-benzene plant.** Sh. M. Levin. *Coke and Chem.* (U. S. S. R.) 1932, No. 4, 16.—Some practical suggestions are given for improvement of design and operation of natural draft water cooling towers used in the U. S. S. R.
- Expansion of silica bricks of the coke-oven lining during firing.** (Tagunov) 19. **Naphthylamines in coal tar.** (Kruiber) 10. **Assortment and technology of N fertilizers in relation to the coke chemical industry.** (Assinovskii) 15. **Fuel economy in the glass industry.** (Brownlie) 19. **Production of oil from British coal.** (Ormandy, Burns) 22.
- Refractory materials—hot patching of gas retorts.** (Clews, et al.) 19. **Mfg. processes for liquid org. products from industrial gases.** (Audibert) 10. **Destructive hydrogenation.** (Brit. pat. 395,345) 22. **Centrifugal gas cleaner.** (Brit. pat. 396,157) 1. **App. for oxidizing CO produced by internal-combustion engines.** (U. S. pat. 1,933,977) 1. **Liquefiable aromatic hydrocarbons from coke-oven gas.** (U. S. pat. 1,933,845) 22.
- Fuel.** Fred L. Mennie. Brit. 395,282, July 13, 1933. A compn. for treating coal or prepg. fuel briquets comprises  $NaCl$ ,  $NaClO_3$  and  $KClO_3$  and (or)  $KMnO_4$ . In an example 1 lb. of a mixt. comprising crushed rock salt passing a 7-mesh sieve 27, dried medium salt passing a 12-mesh screen 40,  $NaClO_3$  15,  $KClO_3$  15 and  $KMnO_4$  3% is dissolved in 8 gallons  $H_2O$  and distributed over 2 tons coal.
- Fuel.** Fritz Stotzel. Ger. 586,159, Oct. 18, 1933. App. is described in which town refuse, low-grade fuel or like carbonaceous material is mixed with appropriate substances and treated with air or  $O$  under pressure to produce fuel resembling coal.
- Fuel containing nitrocellulose.** S. Sternau & Co., Inc. Ger. 586,444, Oct. 21, 1933. See Brit. 380,467 (C. A. 27, 4058).
- Liquid fuels.** Robert E. Goldsborough. Fr. 41,595, Feb. 7, 1933. Addn. to 705,206 (C. A. 25, 5274). The catalytic surfaces used in the process of Fr. 705,206, are made of a Ni-Cr alloy contg. small amts. of Si, Zn, Al and Fe, e. g., Ni 60, Cr 30, Si 1, Zn 2, Fe 4 and Al 3%.
- Motor fuels.** Universal Oil Products Co. Brit. 395,448, July 20, 1933. Hydrocarbon motor fuels are purified by treatment of the vapor with  $HCl$  in presence of a solid contact material contg. free and (or) combined metal adapted to catalyze the action of the acid. Treatment with  $H_2SO_4$  may follow and steam and an or other  $O$ -contg. gas may be used with the  $HCl$  gas or aq. soln. In examples granulated Cu or Zn, Fe or brass turnings, mixts. of Cu with Fe or Zn, chlorides of Sn, Fe or Zn and mixts. of naturally occurring minerals or ores are used with  $HCl$  as vapor or as 20% soln. App. is described.
- Motor spirit.** W. C. Holmes & Co. Ltd. Brit. 395,635, July 20, 1933. Hydrocarbon motor spirit, especially that produced by cracking or low-temp. carbonization, is purified by treating with alkali before prolonged storage, preferably before or during condensation, then with such a proportion of about 95-96%  $H_2SO_4$  as to remove only the basic and the more unsatd. compds., e. g., diokfins, and then with alkali for a prolonged time, the acid-treated spirit being allowed to stand for a prolonged time before neutralization. Fractional distn. may follow. The first alkali treatment may be in 2 stages, e. g., with an aq. suspension of lime to remove S and easily decompd. compds. and then with  $NaOH$  to remove phenols. The acid wash may also be in 2 stages, e. g., first by agitation with 1-1.5% of acid tar from the 2nd stage, followed by settling, and then with 0.5% of 95-96% acid, followed by settling. The neutralization is preferably with  $Na_2CO_3$  soln.
- Synthetic fuel.** Urban P. M. Chandeysson. Fr. 41,613, Feb. 15, 1933. Addn. to 729,016 (C. A. 26, 6114). Charcoal from any source, a carbonate or CO is allowed to remain in a hermetically closed vessel in contact with  $NH_3$  or a compd. thereof to form a more or less oily hydrocarbon according to the charcoal or carbonate used.
- Colloidal fuel.** The Cunard Steam Ship Co. Ltd., Robert A. Adam, Frederick C. V. Holmes and Arthur W. Perrins. Brit. 396,432, Aug. 2, 1933. A stable mixed fuel is obtained by intimately mixing coal ground so that 100% passes through a sieve with about 180 meshes per linear in. with a hydrocarbon oil having a "fixed" C content of at least 5%. "Fixed" C is the residue when 1 g. of oil is heated in 7 min. to about 900° in a fused  $SiO_2$  crucible 3.5 cm. deep, 2.0 cm. wide at the bottom and 4.0 cm. at the top, having a loose porcelain lid and arranged

6.8 cm. above the top of a Bunsen burner having a flame 20 cm. high.

**Solid fuel comprising alcohol and nitrocellulose.** Griffnell Jones and Albert F. York (to S. Sternau & Co.). U. S. 1,934,860, Nov. 14. Nitrocellulose is mixed with an abs. monohydric alc. such as EtOH or MeOH (the nitrocellulose being insol. in the alc. at ordinary temp.) and the mixt. is subjected to a temp. of  $-20^{\circ}$  or lower, there is added an amt., not materially less than that of the abs. alc. used, of an aq. monohydric alc. such as EtOH chilled to a substantially similar temp., and the mixt. is warmed to atm. temp.

**Hydrogenating solid fuel.** Standard-I. G. Co. Fr. 41,609, Mar. 10, 1933. Addn. to 712,617 (C. A. 26, 2039). Means is provided to treat the fuel with H as a suspension under high pressure and at a high temp. before the treatment described in Fr. 712,617.

**Gasification of fuel.** Henri Philippon. Fr. 41,650, Feb. 15, 1933. Addn. to 674,061 (C. A. 24, 2580). Water or steam is introduced into the blast to the tuyères in amt. varying according to the working of the gas producer and such that the slag obtained preserves a practically const. compn.

**Smokeless fuel.** Thomas M. Davidson. Brit. 396,087, July 31, 1933. Coking coal in lumps free from fines is distd. with powd. non-coking coal or coke breeze in the production of smokeless fuel. The coking coal is screened to the size of peas, beans, nuts or balls of 2 in. av. diameter and the non-coking coal is powd. through a sieve having 16 mesh to the inch.

**Apparatus for preparing and conveying pulverized fuel for combustion.** Harlowe Hardinge (to Hardinge Co.). U. S. 1,933,111, Oct. 31.

**Briquets.** Wilhelm Groth. Ger. 577,766, June 3, 1933. Coked briquets are made from non-coking fuel such as anthracite coal dust, by mixing the latter with a slmy dispersion contg. coking coal, briquetting and coking.

**Furnace with rotating hearth for carbonizing fuel.** Otto Hellmann. Pt. 749,806, July 29, 1933.

**Destructive hydrogenation.** Mathias Pier and Karl Winkler (to Standard-I. G. Co.). U. S. 1,933,069, Oct. 31. In a H-recovery process involving washing of vapors and gases such as those produced in the destructive hydrogenation of coal, tars, oils, etc., a washing oil is introduced into the mixt. of gases and vapors leaving the reaction zone and prior to substantial condensation, and substantially all the normally condensable vapors are condensed while the gases and vapors are in contact with the washing oil (which is a solvent for S compds. and hydrocarbons) and while providing for a sufficient, indirect heat exchange with a cooling medium. App. is described.

**Destructive hydrogenation.** Francis S. Woidich. Brit. 396,054, July 20, 1933. Motor spirit and fuel oils contg. a high percentage of finely divided C are obtained by heating a mixt. of finely ground bituminous fuel and oil under pressure and then passing into a "shock" separator where light fractions are sepd. in the vapor phase while the liquid residues are passed in countercurrent to vapors from a converter and finally into the converter where they are heated under pressure in presence of hydrogenating gases while flowing over molten metal surfaces disposed on superposed trays. App. is described.

**Destructive hydrogenation of bituminous materials.** Mathias Pier and Karl Winkler (to Standard-I. G. Co.). U. S. 1,932,673, Oct. 31. A body of liquid bituminous material such as a coal-oil sludge or tar or oil is subjected to destructive hydrogenation under pressure in the presence of a solid finely divided catalyst immune from poisoning by S, such as one formed from tungstic acid, molybdic acid and ZnO which is uniformly dispersed in the material. For this purpose, the catalyst is mixed with a suitable material to form a mixt. of a sp. gr. such that it is more readily mixed uniformly with the material under treatment, and a hydrocarbon material of about the same sp. gr. is also added. Various examples with details are given.

**Catalytic destructive hydrogenation of heavy hydro-**

**carbons.** Edward B. Peck (to Standard-I. G. Co.). U. S. 1,933,508, Oct. 31. In the destructive hydrogenation of heavy hydrocarbon material contg. bituminous substances, in the presence of sulfactive catalytic materials comprising oxides and sulfides of metals of the 2nd and 6th groups of the periodic system, the catalytic material is maintained in active condition by withdrawing a portion of the partially spent catalyst and treating it with a solvent for high-mol.-wt. tarry material such as a low-boiling naphtha. App. is described.

**Motor-fuel production by destructive hydrogenation of heavier oils.** Edwin J. Gohr (to Standard-I. G. Co.). U. S. 1,934,054, Nov. 7. Oils such as crude oils or heavy distillates are subjected to destructive hydrogenation under pressures above 50 atm. and at temps. in the upper portion of the range suitable for destructive hydrogenation under intense destructive hydrogenation conditions, to form both motor fuels and "asphalt;" a portion of the product contg. the "asphalt" is withdrawn, the "asphalt" content of this portion is reduced and this portion is then returned to the destructive hydrogenation step. App. is described. U. S. 1,934,055 relates to a method in which sepn. of products of hydrogenation of hydrocarbon oils with H at a pressure over 20 atm. and with sulfactive catalysts is effected by discharging the products into a sepn. zone maintained at a pressure over 20 atm. but not greater than the pressure in the hydrogenation zone and packed with a sulfactive catalyst of large surface area in which cooling and partial condensation is effected. App. is described.

**Destructive hydrogenation of liquid bituminous materials such as oils and tars.** Mathias Pier and Kurt Wissel (to Standard-I. G. Co.). U. S. 1,934,001, Nov. 7. The material is treated with H at a temp. and pressure suitable for destructive hydrogenation, in several stages, at least the first stage being effected in a reaction zone in the liquid phase with a pressure of the gas of 100-1000 atm. and at a temp. slightly below the midpoint of the usual destructive hydrogenation range such that the bituminous materials are entirely converted into oils of middle oil character; in the final stage, the oils are expanded into a reaction zone in which they are treated in the vapor phase at a higher temp. than in the first stage, but not exceeding  $60^{\circ}$  higher, and under a pressure of between 20 and 50 atm., to produce oils contg. benzines. App. is described.

**Destructive hydrogenation of materials such as coal, tar or petroleum.** Clarence A. Wright (to Standard-I. G. Co.). U. S. 1,934,023, Nov. 7. A stream of heavy liquid hydrocarbon material such as a coal-oil mixt. and H is passed upwardly between closely spaced substantially vertical and parallel catalytic surfaces disposed in a reaction zone, so that substantially unobstructed flow is permitted, at a temp. above  $400^{\circ}$  and under a pressure above 20 atm. App. is described.

**Destructive hydrogenation of materials such as coal, lignite and bitumen.** Willard C. Ashbury (to Standard-I. G. Co.). U. S. 1,934,028, Nov. 7. Material such as coal or lignite while preheated to a point below its carbonizing temp. is forced into a zone of destructive hydrogenation maintained under a H pressure of at least 50 atm.; a hydrocarbon oil is heated separately to a temp. above the reaction temp. and the oil is forced into the reaction zone, the temp. of the oil being sufficient to maintain the reaction zone at a destructive hydrogenation temp. above  $400^{\circ}$ . App. is described.

**Destructive hydrogenation of materials such as brown coal, tar or oil residues.** Carl Krauch and Mathias Pier (to Standard-I. G. Co.). U. S. 1,931,549, Oct. 24. Solid or liquid fuels or products from their distn. or extrn. are treated with an excess of added free H in the presence of an inorg. N compd. such as  $\text{NH}_3$ , serving as a catalyst at a suitable conversion temp. (which may be about  $500^{\circ}$ ) and under a pressure of at least 20 atm. An arrangement of app. is described. Cf. C. A. 27, 1738. U. S. 1,931,550 relates to a generally similar process in which the reaction with H is effected in the presence of a solid inorg. nitride

such as that of Cr, Mn, Si, Ti or V as a catalyst, at temps. of about 300-700° and under a pressure of 20 atm. or more. An arrangement of app. is described.

**Hydrocarbons.** *Gewerkschaft Kohlenbenzin.* Ger. 577,608, June 2, 1933. App. for the low-temp. distn. of fuel and subsequent catalytic treatment of the products to produce hydrocarbons is described.

**Apparatus for heating distillation tubes such as those used for laboratory coal distillation.** Stanton I. Charlesworth and Arch W. Harris. U. S. 1,933,414, Oct. 31. Various structural and operative details are described.

**Carbonizing solid fuels such as coal.** Walter E. Trent (to Trent Process Corp.). U. S. 1,932,296, Oct. 24. The subdivided material is continuously fed downwardly by gravity through a heating zone, at such a rate in relation to the heating to allow time for substantially all constituents which are volatilizable below the normal fusion temp. to be removed below such temp.; thereafter, the temp. of the material is raised to above its normal fusion temp. to complete the devolatilization and carbonization without substantially coking, by slowly increased temp. and regulated heating, and the material is continuously discharged (from a described app.) at a rate proportionate to that of its supply to the heating zone.

**Vertical-shaft apparatus for carbonizing solid bituminous fuels such as coal.** Carl J. Wright (to Combustion Utilities Corp.). U. S. 1,931,972, Oct. 24. Structural details.

**Vertical carbonization retorts.** Frederick J. West, Ernest West and West's Gas Improvement Co. Ltd. Brit. 395,092, July 13, 1933.

**Heating flue for retort furnaces.** Gas Chambers & Coke Ovens Ltd., Arthur H. Lynn and Frank Ritson. Brit. 395,052, July 13, 1933.

**Treating coal.** Harold J. Rose and Wm. H. Hill (to Koppers Co. of Del.). U. S. 1,932,535, Oct. 31. Coal is treated with a S-pptg. material (such as Cu or Pb or their oxides or CaO) adapted to remove org. S from coal; heated oil is passed through the mixt. to dissolve the coal and the soln. is sepd. from the undissolved matter. App. is described.

**Hydrogenating coal, tar, mineral oils, etc.** I. G. Farbenind. A.-G. (Carl Krauch and Mathias Pier, inventors). Ger. 577,835, June 6, 1933. Coal, tar, mineral oils, etc., their extn. and distn. mixts. and residues are improved by subjection to H at high-pressure in the presence of a contact mass contg. oxides of Th, the rare earths or oxides or carbonates of U, Mn or V.

**Apparatus for heating coal or the like in order to condition it for coking.** Franz Puening (to Koppers Co. of Del.). U. S. 1,932,830, Oct. 31. Structural features.

**Adsorbent carbon from non-coking coal.** Maurice E. Barker. U. S. 1,933,579, Nov. 7. Coal such as that of the anthracite, semi-anthracite or semi-bituminous grade is sorted and crushed and the granular material is distd. in a partial vacuum at about 300° until substantially all water and loosely held hydrocarbons are removed; the crushed particles are oxidized by heating in a current of air, and are carbonized by heating while passing over them a flue gas mixt. contg. less than 5% free O.

**Coal, etc., screening and grading apparatus.** James A. Cook. Brit. 396,748, Aug. 8, 1933.

**Crushing apparatus for coal, loam, etc.** Pennsylvania Crusher Co. Ger. 577,750, June 6, 1933.

**Apparatus for dehydrating peat.** Wilhelm Nachtigall. Ger. 577,778, June 3, 1933.

**Montan wax.** A. Riebeck'sche Montanwerke A.-G. Ger. 586,435, Oct. 21, 1933. Brown coal contg. not more than 25% of water is extd. with benzene or toluene mixed with the water-insol. portion of fusel oil or of wood spirit. Cf. C. A. 27, 2789.

**Removing carbon deposits from internal-combustion engines, etc.** Eugene Lieber (to Standard Oil Development Co.). U. S. 1,934,076, Nov. 7. A compn. comprising an aliphatic diamine such as ethylenediamine together with a compd. of the "pyridine type" such as pyridine, quinoline or the like dissolved in anhyd. NH<sub>3</sub>

is used as a C-deposit remover, being applied for just sufficient time to loosen the deposits.

**Apparatus for burning carbon monoxide in engine exhaust gases.** Livius V. Fogas. U. S. 1,934,596, Nov. 7. Structural features.

**Oil filter suitable for use with pressure oiling systems of internal-combustion engines.** Harvey D. Austin (to Briggs & Stratton Corp.). U. S. 1,934,251, Nov. 7. Structural details.

**Diffusion flame combustion using liquid fuel.** Albert L. Klees (to Combustion Utilities Corp.). U. S. 1,931,927, Oct. 24. In operating furnaces, heavy hydrocarbon fuel such as fuel oil is fed in liquid form into an enclosed chamber while the fuel is simultaneously atomized and a regulated part at least is vaporized by heat developed in the method, in the presence of a gas low in uncombined O and at an elevated temp. near but below that at which substantial thermal decompn. occurs. The gas and hydrocarbon material are proportioned to give a mixed fluid fuel having a heating value of 200-2000 B. t. u. per cu. ft., and this fuel and combustion-supporting gas are simultaneously flowed into a highly-heated enclosed space in parallel contacting streams at approx. equal velocities below the turbulent velocity range, to effect complete combustion. App. is described.

**Superheater for steam.** Wilbur H. Armacost (to The Superheater Co.). U. S. 1,931,639, Oct. 24. Structural features.

**Steam superheater.** Henry E. Geer (to Superheater Co.). U. S. 1,935,049, Nov. 14.

**Proportioning gases of different heating value per unit of volume.** Edwin X. Schmidt (to Cutler-Hammer, Inc.). U. S. 1,933,641, Nov. 7. Various details of construction and operation of an automatic control app. are described, suitable for regulating and proportioning mixts. of fuels such as different gases.

**Gas rich in free hydrogen.** Willard C. Asbury (to Standard Oil Development Co.). U. S. 1,934,029, Nov. 7. A gas contg. H such as a mixt. of H and hydrocarbon gases is scrubbed under superatm. pressure with a non-aq. liquid solvent such as naphtha in which H has a pos. temp. coeff. of soly. and in which the other gas assocd. with the H has a neg. coeff. of soly.; the solvent is withdrawn and part of the dissolved gas is separately removed by heat while maintaining substantially the same pressure under which soln. was effected, and the solvent is cooled and returned to the absorption step. App. is described.

**Treating coke-oven gas for obtaining hydrogen, etc.** Marcel C. Jean and Pascal Matile (to Société l'air liquide (Soc. anon. pour l'étude & l'exploitation des procédés Georges Claude)). U. S. 1,935,505, Nov. 14. Coke-oven gas is freed from its N oxides (suitably by use of hot Cu) and is then liquefied.

**Producer gas.** Frank N. Becker (to Jeddo-Highland Coal Co.). U. S. 1,931,716, Oct. 24. In producing gas by the combustion of solid fuel of substantially low volatile content such as coke or anthracite, a body of the fuel in lump form is enclosed within a combustion chamber and all air required for combustion is passed upwardly through the fuel body; a portion of this fuel body below its upper surface is maintained in a state of combustion, fresh fuel is added and ashes are removed from time to time, and gases are removed from that portion of the substantially continuous top surface of the fuel bed which lies adjacent the chamber walls separately from gases arising from the remaining portion of the fuel surface. App. is described.

**Gas production.** Humphreys & Glasgow Ltd. Fr. 749,986, Aug. 2, 1933. In a complete gasification process, water gas produced in the water gas production zone is drawn off and burnt to produce heat which is utilized to effect the carbonization of coal in excess of that carbonized in the generator.

**Gas producers.** I. G. Farbenind. A.-G. (Walter Gross, inventor). Ger. 577,725, June 3, 1933. In operating gas producers, the fire zone is allowed to reach temps. at which a liquid slag forms for part of the period only, the temp. for the remaining period being lower.

- Gas producer using finely granular or pulverulent fuel.** Carl Geissen. Ger. 586,182, Oct. 17, 1933.
- Apparatus for producing gas at a predetermined temperature.** Julius Pintsch A.-G. Ger. 576,016, May 6, 1933. Addn. to 572,942 (C. A. 27, 4139)
- Apparatus for the gasification of fuels which tend to agglomerate.** I. G. Farbenind. A.-G. Brit. 394,747, July 6, 1933.
- Apparatus for gasifying coking fuel.** I. G. Farbenind. A.-G. (Fritz Winkler, inventor). Ger. 577,888, June 6, 1933.
- Apparatus for gasifying heavy oils for engine fuel.** George L. Reichhelm (to Gasifier Co.). U. S. 1,932,478, Oct. 31. Various structural and operative details are described.
- Water-gas plant.** Humphreys & Glasgow Ltd. and Arthur R. Griggs. Brit. 395,473, July 20, 1933.
- Water-gas generation.** I. G. Farbenind. A.-G. Brit. 396,718, Aug. 8, 1933.
- Generators for producing a mixture of water gas and coal gas.** Vergasungs-Industrie A.-G. Brit. 395,991, July 27, 1933.
- Apparatus for manufacture of carbureted water gas.** Gerald J. Nordmeyer (to Koppers Co. of Del.). U. S. 1,932,828, Oct. 31. Structural features.
- Device for collecting the gases from fuel-distillation retorts.** Società anon. Forni ed Impianti industriali. Swiss 161,001, June 16, 1933.
- Gas purification.** Gillert A. Bragg, David L. Jacobson and Philip J. Wilson, Jr. (to Koppers Co. of Del.). U. S. 1,932,507, Oct. 31. Gas such as coal, coke-oven or water gas contg.  $\text{NH}_3$  and  $\text{H}_2\text{S}$  is washed with an alk. soln. to remove the  $\text{H}_2\text{S}$ ; the alkalinity of the soln. is maintained by absorption of the  $\text{NH}_3$  in the soln. simultaneously with the  $\text{H}_2\text{S}$  removal, and the alkalinity of the soln. is regulated by regulating the  $\text{NH}_3$  content of the total quantity of gas washed by the soln. This regulation is effected previous to the washing of the gas by dividing the total quantity of gas, removing substantially all the  $\text{NH}_3$  from one divided part while leaving the  $\text{H}_2\text{S}$  in it, by-passing the other divided part relative to the  $\text{NH}_3$ -removal, combining the  $\text{NH}_3$ -freed part (which still contains its  $\text{H}_2\text{S}$ ) with the by-passed part which still contains substantially all its  $\text{NH}_3$  and  $\text{H}_2\text{S}$ , to form the total quantity of gas previously to the mentioned  $\text{H}_2\text{S}$  washing step, and the by-passed portion is varied suitably to regulate the  $\text{NH}_3$  content of the recombined gas mixt. as desired. App. is described.
- Gas purification.** George M. Carvlin (to Koppers Co. of Del.). U. S. 1,932,812, Oct. 31. In purifying gas such as coal, coke-oven or water gas from acidic constituents, a soln. contg. a Na compd. and an As compd. is recirculated through a stage in which the soln. absorbs acidic constituents from the gas, and then through a stage in which the fouled soln. is aerated and S is liberated, forming Na thiosulfate in the recirculated soln.; part of the soln. is withdrawn from the purifying system, concd. to about half its original volume, cooled to about  $0^\circ$  to crystallize thiosulfate substantially without crystg. the As compd., and the crystd. thiosulfate is sepd. and the remaining soln. is returned to the purifying system.
- Purifying gases.** Soc. anon. des hauts-fourneaux et fonderies de Pont-à-Mousson. Fr. 750,102, Aug. 5, 1933. Furnace and other gases are purified by washing with acids or other substances capable of dissolving dust contained in the gases. The acid may be  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$  or  $\text{CO}_2$ .
- Material for gas purification.** Arthur L. Smyly. U. S. 1,934,242, Nov. 7. For removing impurities from gas contg.  $\text{H}_2\text{S}$ , rigid paper pulp wood chips are used coated with Fe oxide compn. (various details of size, etc., being described).
- Apparatus for cooling or purifying gases, e. g., from flue dust or lamp black, by passage between wetted blades mounted on a shaft revolving in a chamber partly filled with liquid.** Johannes J. Cos. Brit. 396,648, Aug. 10, 1933.
- Separating gases.** American Smelting & Refining Co. 1 Brit. 395,641, July 20, 1933. A condensable constituent of a gas mixt., e. g.,  $\text{SO}_2$  in furnace gases or volatile hydrocarbon in petroleum gases, is recovered by dividing the gas into 2 portions, 1 of which is cooled by expansion of cold stripped gas and the other by evapn. of liquid. The gas is first compressed and dried. App. is described.
- Removing gum-forming substances from fuel gas.** David L. Jacobson and Walter L. Shively (to Koppers Co. of Del.). U. S. 1,932,525, Oct. 31. Fuel gas is scrubbed with a solvent such as a heavy oil which absorbs gum-forming compds., and the resulting enriched solvent is treated with a  $\text{H}_2\text{O}$ -contg. gas to reduce the vapor pressure of the gum-forming compds. present. The solvent is then recirculated to treat more fuel gas. App. is described, also various other details and modifications of procedure.
- Revivifying gas-purifier waste.** Thomas Coxon and Imperial Chemical Industries Ltd. Brit. 395,028, July 13, 1933. In revivifying an alk. Fe hydroxide suspension liquor used for removing  $\text{H}_2\text{S}$  from coke oven and like gas a part of the liquor is treated with  $\text{FeSO}_4$  to ppt. Fe compds. which are returned to the purification system, the clear liquor being discarded.
- Hydrogen recovery from wash water containing gases in solution.** Gunther Hornung. U. S. 1,933,734, Nov. 7. Wash water under pressure contg. H and other gases in soln., such as wash water derived from coke-oven gas, is finely subdivided and simultaneously relieved of the pressure upon it; part of the H is allowed to escape for further use; the remaining water is subdivided again and treated by contact countercurrentwise with a scavenging gas such as a gas rich in N, and the latter and the escaping H are collected. App. is described.
- Gas-washing oils.** W. C. Holmes & Co. Ltd. Fr. 750,011, Aug. 3, 1933. Oils such as tar oils used for removing hydrocarbons from gases are recovered by vaporizing the whole of the volatile constituents from the oil and submitting the vapors to a selective condensation by bringing them into direct or indirect contact with a cooling agent in one or more vessels, including at least one fractionating condenser. The temp. of the vapor flowing from the condenser or last of the condensers is used to control automatically the degree of cooling in the condenser or condensers.
- Gas-distribution system.** Herbert D. Straight (to Koppers Co. of Del.). U. S. 1,932,537, Oct. 31. In a distribution system comprising a low-pressure gas main and a high-pressure gas main for supplying gas to the low-pressure main, a motor is driven by the pressure of gas from the high-pressure main which exhausts into the low-pressure main and drives a compressor utilizing gas from the high-pressure main for supplying gas to an oil atomizer which discharges into the low-pressure main. Various details of app. are described.
- Detecting leaks in closed gas systems.** Harold W. Crouch (to Eastman Kodak Co.). U. S. 1,933,791, Nov. 7. For detecting leaks in gas systems such as solvent-recovery drying app., an extraneous gas such as H or He is introduced into the system in sufficient quantity readily to be detected by analysis, and leakage is detd. by analysis of the gas mixt. from time to time.
- Sealing material for gas holders.** Eric Laue (to Koppers Co. of Del.). U. S. 1,932,825, Oct. 31. A gas holder of the disk-closure type is sealed with a viscous aq. soln. of waste sulfite material from the digestion of wood by the sulfite process. Cf. C. 1, 27, 1489.
- Device for oxidizing carbon monoxide such as that produced by internal-combustion engines.** Frederick C. Fischer. U. S. 1,932,927, Oct. 31. Structural details are described of a device formed with concentric cylinders in one of which an Al sheet is placed which serves as a catalyst.
- Separating carbon dioxide from flue gases.** Albert S. Allen and Arthur Michalske. U. S. 1,934,472, Nov. 7. Flue gas is contacted with a liquid such as  $\text{Na}_2\text{CO}_3$  soln. having an affinity for  $\text{CO}_2$  while the liquid and gas are

passing in the same general direction (in a described app.), and the sepd. liquid is subsequently heated under reduced pressure to recover the  $\text{CO}_2$ .

**Absorption apparatus for recovery of carbon dioxide from stack gases.** Francis W. Hogan and Harry M. Bulbrook (one-third to H. H. Adams). U. S. 1,931,817, Oct. 24. Various structural and operative details are described suitable for use in scrubbing gases with  $\text{Na}_2\text{CO}_3$  or  $\text{K}_2\text{CO}_3$  soln.

**Removal of hydrogen sulfide and ammonia from gases.** Christian J. Hansen (to Koppers Co. of Del.). U. S. 1,932,820, Oct. 31. A coal distn. gas is divided into 2 portions; at least part of the  $\text{NH}_3$  is sepd. from one portion, and the portion thus treated is washed with a suspension of a metal hydroxide of the Fe group. The other portion of the gas is washed with a soln. of a metal thionate of the Fe group in the presence of at least part of the  $\text{NH}_3$ , previously sepd. An arrangement of app. is described. Cf. C. A. 27, 3063.

**Removal of phenols from hydrocarbons.** Hans Roos and Emil Schwamherger (to I. G. Farbenind. A.-G.). U. S. 1,934,007, Nov. 7. A liquid hydrocarbon material contg. a phenol, such as a tar oil, is treated with formic acid to dissolve the phenol; the mixt. of phenol and formic acid is sepd. from the hydrocarbon, the formic acid is distd. from the mixt. and is again employed in the phenol extn. App. is described. Cf. C. A. 27, 308.

**Removing phenols in a pure state from tars or tar oils.** Jeno Kárpáti and Muri G. Hubsch. U. S. 1,934,861, Nov. 14. The materials are treated under a moderate superpressure (not exceeding 6 atm.) and at a temp. of about 90–150° with an aq. soln. of a phenol solvent such as aq.  $\text{MeOH}$ , and the mixt. is allowed to stand until it seps. into 2 layers; the aq. solvent layer which contains the dissolved phenols is removed and by cooling and release of pressure is caused to sep. into 2 layers consisting of phenols and aq. solvent, resp., and the phenols are removed.

**Treated coke.** Joseph D. Doherty (to Koppers Co. of Del.). U. S. 1,932,815, Oct. 31. Colored paper pulp and  $\text{CaCl}_2$  soln. are applied to the surface of coke to restrict dusting and for identification.

**Coking fuel.** Josef Plassmann. Ger. 577,623, June 2, 1933. App. for shaking the fuel to form a compact mass in the coking chamber is described.

**Coking pitch.** Marston L. Hamlin (to Barrett Co.). U. S. 1,935,317, Nov. 14. Pitch is added to an oven or retort in a plurality of steps and the pitch charged in each step is heated until violent ebullition ceases before adding more pitch. The amt. of pitch charged in each step is less than that charged in any preceding step, and the heating is continued until the pitch is coked. App. is described. Cf. C. A. 27, 2020.

**Dip or seal pipes for use in gas and coke-oven plants.** The Gas Light & Coke Co., Wm. J. B. Leach, Stephen Hay, Harold Hollings and Albert E. Burton. Brit. 396,552, Aug. 10, 1933. Addn. to 325,173 (C. A. 24, 4140).

**Coke and gas ovens.** Firma Carl Still. Fr. 41,600, Mar. 10, 1933. Addn. to 710,578 (C. A. 26, 1760).

**Horizontal coke ovens.** Evence Coppée & Cie. Fr. 41,652, Mar. 10, 1933. Addn. to 616,460.

**Vertical-flue coke oven.** Société générale de fours à coke systèmes Lécocq. Brit. 395,914, July 27, 1933.

**Coke-oven bracings.** Evence Coppée et Cie. Brit. 395,292, July 13, 1933.

**By-product coke-oven operation.** Stuart P. Miller (to Barrett Co.). U. S. 1,935,320, Nov. 14. For distg. tar and producing pitch and distillate oils, fresh hot coal-distn. gases are sprayed with a limited amt. of  $\text{NH}_3$  liquor to cool them somewhat but still leave them at a sufficiently high temp. to permit their use for effecting the distn. of tar to pitch; non-volatized  $\text{NH}_3$  liquor from the spraying is collected, and the still hot gases are used for the distn. of tar by spraying it into them to vaporize oils from the tar and produce pitch. An arrangement of app. is described.

**Utilizing waste heat of coke-oven plants, gas works, etc.** Harald Kemmer. U. S. 1,932,076, Oct. 24. The waste heat is used for "producing cold" by means of absorption-type refrigerating app., and the "cold so produced" is used for the purification of the produced gas by cooling at low temps. App. is described.

**Operation of regenerative coke-oven batteries.** Roger F. Richardson (to Smet-Solvay Co.). U. S. 1,935,298, Nov. 14. Various details of operation are described involving heating by combustion in the heating flues of atomized coal-tar oil or petroleum oil together with preheated air. App. is described.

**Closure for coking retorts.** Gottfried Goetz (to Ludwig Kern). U. S. 1,933,729, Nov. 7. Mech. features.

## 22--PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

**Twenty years of petroleum research. A retrospect.** A. E. Dunstan. *Chemistry and Industry* 1933, 938–45.

**The petroleum industry in 1931–1932.** R. Kissling. *Industriell. Umschau* 40, 175 6(1933).—A list of references with titles. P. Escher

**The petroleum industry in 1932.** Richard Kissling. *Chem.-Ztg.* 57, 814 5(1933). E. H.

**Rationalization of the petroleum industry.** J. B. Kessler. *Petroleum Z.* 29, No. 30, Spec. paging, 1–11 (1933).—Lecture. I. M. Levine

**Science in the petroleum industry.** John Cadman. *Petroleum Z.* 29, No. 39, 1–8(1933).—Lecture.

**The position of the geoelectrical methods of applied geophysics for the investigation of petroleum strata.** Otto Keunecke. *Petroleum Z.* 29, No. 30, 5–6(1933).—Geoelectrical methods in the search for oil have not been accepted in Germany because of the difficulty involved in the interpretation of the results due to the many factors that influence them. A new method is discussed where an alternating current of a frequency of about 500 is passed through a loop on the ground and the induced current through the ground measured as a basis for detg. the nature of the subsurface. The theory involved is well known so that skin-effect and the influence due to unevenness

in the surface can be evaluated. The method cannot be used directly for establishing petroleum strata since it requires a good conductor to obtain a sufficiently high induced current; it is useful in locating salt-water levels and is thus of importance indirectly in petroleum search.

I. M. Levine

**Chemical study of several menillite schists from the Flyschrand zone of the East Carpathians.** R. Casimir, M. Dimitriu and V. Pascu. *Petroleum Z.* 29, No. 37, 1–4(1933).—Of the 7 schists studied (4 from Agapea and 1 each from Seaca, Horaita and Harja), 2 were basically  $\text{CaSO}_4$  and quartz and very poor in org. matter. The content of org. matter varied in the others (basically  $2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  and quartz), from 2.54 to 14%. High org. content was accompanied by high  $\text{FeS}_2$  ( $\text{FeS}$ ) which accounted for 77–87% of the S present (0.29–4.5%). Upon heating the schists to 650°, 27% of the org. matter (90% of which was insol. polybitumen) was obtained as oil ( $\text{H/C}$ , 0.128) and 15% as gas. Humic acid-like substances were formed as the result of heating to 250° with 50%  $\text{KOH}$ .

I. M. Levine

**The results obtained to date in petroleum production and search in Czechoslovakia.** Jaroslav J. Juhn. *Petroleum Z.* 29, No. 33, 10–12(1933).

**Physical and chemical properties of North German petroleum.** G. Keppeler. *Petroleum Z.* 29, No. 37, 6–7

(1933).—With few exceptions, viscosity, paraffin, asphalt and naphtha contents and amt. of residue from distn. to 300° vary regularly with sp. gr. The olefinoids (sol. in 92% H<sub>2</sub>SO<sub>4</sub>) decrease from 59 to 12% and the aromatics (further sol. in 100% H<sub>2</sub>SO<sub>4</sub>) increase from 12 to 53% with drop in sp. gr., while the paraffin-naphtha content was const. at 35% for the light and 26-9% for the heavy oils.

I. M. Levine

**Constituents of petroleum. II. Preparation of the first homogeneous naphthenic acid.** Julius v. Braun, Ludwig Mannes and Martin Reuter. *Ber.* 66B, 1499-505 (1933); cf. C. A. 26, 2306. The complex mixt. of isomeric acids of which a naphthenic acid of given compn. generally consists cannot be sepd. into the pure individual acids by fractional distn. of the acids or their esters or fractional crystn. of the salts. Degradation products, especially the ring ketones obtained from the acids, can be sepd. Thus, a mixt. of isomeric acids R<sup>1</sup>CHCH<sub>2</sub>CO<sub>2</sub>H, R<sup>2</sup>CH-CH<sub>2</sub>CO<sub>2</sub>H, etc., R<sup>1</sup>CHCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H, R<sup>2</sup>CHCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H, R<sup>3</sup>CHCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H, etc., (R<sup>1</sup>, R<sup>2</sup>, etc. = rings) can be degraded into mixts. of isomeric ketones R<sup>1</sup>CO, R<sup>2</sup>CO, etc., (from which at least one and sometimes more ketones can generally be isolated in pure form by means of ketone reagents), and of isomeric acids, R<sup>1</sup>CHCO<sub>2</sub>H, R<sup>1</sup>CHCO<sub>2</sub>H, etc., R<sup>1</sup>CH-CH<sub>2</sub>CO<sub>2</sub>H, R<sup>1</sup>CHCH<sub>2</sub>CO<sub>2</sub>H, etc., and the latter by a 2nd degradation can be converted into R<sup>1</sup>CO, R<sup>2</sup>CO, etc. From the structures of the ketones thus isolated can be deduced the structures of the naphthenic acids from which they were formed and these acids can be synthesized from the ketones by a reversal of the degradation. The monocyclic ketone C<sub>7</sub>H<sub>14</sub>CO (I) obtained from the C<sub>10</sub>H<sub>18</sub>O<sub>2</sub> naphthenic acids from various sources, must be one of 11 possible alkylated cyclohexanones and cyclopentanones (if the very improbable presence of a 3-, 4-, 7- or 8-membered ring is excluded). Preference had been given to 3,3,4-trimethylcyclopentanone (II) as the probable structure of I; this has been confirmed by synthesis of the 2 still unknown possible isomers, viz., 3- (III) and 4-ethylcyclohexanone (IV), which proved to be quite different from I, and by degradation of I. The amine (V) formed by reduction of the oxime of I gives on Hofmann degradation after exhaustive methylation a mixt. (VI) of 3,3,4- and 3,4,4-trimethylcyclopentenes, oxidized to a dicarboxylic acid (VII), which is evidently a mixt. of Me<sub>2</sub>C(CO<sub>2</sub>H)CHMeCH<sub>2</sub>CO<sub>2</sub>H and Me-C(CH<sub>2</sub>CO<sub>2</sub>H)CHMeCO<sub>2</sub>H. *p*-Ethylcyclohexanol (mixt. of stereoisomers), m. 194.6°, d<sub>4</sub><sup>20</sup> 0.9194, n<sub>D</sub><sup>20</sup> 1.4663, obtained in 80% yield from *p*-EtC<sub>6</sub>H<sub>4</sub>OH with Ni and H in an autoclave, yields 2 phenylurethans, m. 116°, b<sub>0</sub> 165°, and m. 57.9°. IV (75% from the hexanol with Beckmann's mixt.), b. 192-4°, d<sub>4</sub><sup>20</sup> 0.9211, n<sub>D</sub><sup>20</sup> 1.4533; oxime, b<sub>0</sub> 120.1°; semicarbazone, m. 174°; bis(*p*-nitrobenzylidene) deriv., yellow, m. 156°; *p*-nitrophenylhydrazone, m. 101°. III was prep'd. as follows: CH<sub>3</sub>(CO<sub>2</sub>Et)<sub>2</sub> + NaOEt → EtCH(CO<sub>2</sub>Et) + ClCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>Et → the ester EtC(CO<sub>2</sub>Et)<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>Et (b<sub>0</sub> 169-72°) + boiling HCl → free acid (oil) + heat *in vacuo* → the acid EtCH(CO<sub>2</sub>H)CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H (b<sub>0</sub> 175°) → di-Et ester (b<sub>0</sub> 120-3°, d<sub>4</sub><sup>20</sup> 0.9916, n<sub>D</sub><sup>20</sup> 1.4295) + Na + EtOH → the glycol HOCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH (b<sub>0</sub> 140-2°) + fuming HBr at 120-30° → the dibromide (b<sub>0</sub> 120°) + NaCN → 5-ethylmelic dinitrile (b<sub>0</sub> 175-80°) + HCl at 120° → the acid (b<sub>0</sub> 205°) + Ca(OH)<sub>2</sub> → Ca salt + dry distn. → III (60% yield), b. 192-4°, d<sub>4</sub><sup>20</sup> 0.9196, n<sub>D</sub><sup>20</sup> 1.4543; oxime, b<sub>0</sub> 116.18°; semicarbazone, m. 184°; *p*-nitrophenylhydrazone, m. 130°; bis(*p*-nitrobenzylidene) deriv., m. 176°. V (82% yield), b. 164-8°, d<sub>4</sub><sup>20</sup> 0.8458; HCl salt, hygroscopic; picrate, m. 174.6°; chloroplatinate, yellow, becomes discolored 250°, decomps. 255°. V, exhaustively methylated with alk. Me<sub>2</sub>SO<sub>4</sub> and subjected to the Hofmann degradation, gives 30% of the *N*-di-Me deriv., m. 183.6° (HCl salt, unusually hygroscopic; picrate, m. 153-5°; chloroplatinate, m. 160-1°; chloraurate, m. 60-2°; methiodide, m. 242-3°), and 53% VI, b. 117-23°, d<sub>4</sub><sup>20</sup> 0.782. VII, b<sub>0</sub> 160-70°; di-Ag salt. I with R<sup>1</sup>CH<sub>2</sub>CO<sub>2</sub>Et and Zn gives 75% of Et 1-hydroxy-3,3,4-trimethylcyclopentane-1-acetate, b<sub>0</sub> 140°, d<sub>4</sub><sup>20</sup> 0.9813,

1 dehydrated by KHSO<sub>4</sub> at 150° to Et trimethylcyclopentene-acetate, b<sub>0</sub> 112-20° (60% yield), which with Pd and H yields Et 3,3,4-trimethylcyclopenteneacetate, b<sub>0</sub> 113-15°, d<sub>4</sub><sup>20</sup> 0.8285, n<sub>D</sub><sup>20</sup> 1.4472; the free acid, b<sub>0</sub> 144-5°, d<sub>4</sub><sup>20</sup> 0.9783, n<sub>D</sub><sup>20</sup> 1.4609, is the first homogeneous naphthenic acid which has ever been isolated. The chloride, b<sub>0</sub> 105-8° (prep'd. with SOCl<sub>2</sub>); amide, m. 122-3°; anilide, obtained in solid, cryst. form only by distg. under 0.5 mm., m. 55-8°; ureide, from the chloride and urea, m. 197-8°.

C. A. R.

The application of adsorption phenomena in the purification and refining of petroleum products. Dubrisay. *Ann. combustibles liquides* 8, 607-18 (1933).—Sols. of petroleum pitch, nitrogenous substances, S compds. and ethylene derivs. in refined white spirit were treated with the following adsorbents: (1) kaolin, (2) SiO<sub>2</sub>, (3) kieselguhr, (4) Fe<sub>2</sub>O<sub>3</sub>, (5) Al<sub>2</sub>O<sub>3</sub>, (6) vegetable charcoal, (7) animal charcoal, (8) sugar charcoal, (9) pulverized quartz and (10) pulverized talc. All adsorbents show more or less decolorizing power, always most markedly upon pitch sols. The best adsorbents for other impurities were C and talc for the amines: C, Al<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub> for S compds.; and finely divided SiO<sub>2</sub> for ethylene derivs. Fineness of the powder always increased the adsorbent power, while increasing moisture was always harmful. The influence of moisture was studied in detail on several Al<sub>2</sub>O<sub>3</sub> prep'd. by different methods. Exptl. results are reported.

Karl Kammermeyer

**Nomenclature for oil products in various countries.** Robert Schwarz. *Petroleum Z.* 29, No. 39, Spec. paging 4 (1933).

I. M. Levine

The production of oil from British coal. W. R. Ormandy and J. Burns. *Petroleum Times* 30, 551-2, 579 81, 607 8 (1933).—The quality of oils from coal is discussed with reference to price competition with petroleum. The production of oil from coal is considered under the headings (1) distn. with variation in temp., (2) hydrogenation and (3) distn. of coal and conversion of coke into water gas, which by catalytic reactions is converted into a wide range of products. A comparison is made between fuel oil and coal oil mixts. C. Wirth, III

**Common constituents of Japanese crude oils. IV. The constituents of the fractions distilled at atmospheric pressure above 200°.** Ryōsaku Kobayashi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 553-6 (1933); cf. C. A. 27, 183. The distn. range was 200-250° and the pressure 5 ± 0.2 cm. of Hg. Four crude oils were exam'd. Sp gr, *n*<sub>D</sub><sup>20</sup>, unsatd. and aromatic hydrocarbon contents for the treated cuts collected at 10° intervals are given. After removal of unsatd. and aromatic compds., the sp gr. and *n*<sub>D</sub><sup>20</sup> were again det'd. For 2 of the crude oils the paraffin wax content was also det'd.

K. K.

The action of elevated temperatures upon mineral oils Ribagac. *Ann. combustibles liquides* 8, 875 82 (1933) — A no. of expts. carried out by heating oils by an elec filament are described. A cut of the app. and exptl results are presented.

Karl Kammermeyer

**Utilization of the waste products from the acid refining of mineral oils.** Gino J. L. Paganini. *Petroleum Z.* 29, No. 34, 6-8 (1933).—Acid sludge from a primary treatment of oil and clay filter cake may be treated to recover the lubricating oil they contain, to the extent of 20-35% of the waste products, or they may be converted into fuel by mixing them in a ratio of about 4:1 with 55-60% fine coal or 70-5% coke. Sludge from a second or subsequent application of acid, which contains a high proportion of sulfonic acids, is rationally reduced to fuel. The oil-free clay may be burned to yield an active product and advantageously added to unactivated clay for oil purification.

I. M. Levine

The refining industry of France. N. Pervonchine *Petroleum Times* 30, 559 (1933).—A review.

C. Wirth, III

Technical and theoretical questions in the designing of natural gasoline plants. Nikolaus Meyer. *Petroleum Z.* 29, No. 38, 1-5 (1933).—A discussion of the basic principles connected with the recovery of natural gasoline.

I. M. Levine



**The irradiation of cracking gasoline.** E. Vellinger and G. Radulesco. *Ann. combustibles liquides* 8, 883-5(1933). —Expts. were made by exposing cracked gasoline to Hg lamp irradiation. Curves are presented for the absorption of  $O_2$  as a function of the time of irradiation.

Karl Kammermeyer

**Investigation on sulfur and sulfur compounds in gasoline.** René Dubrisay. *Ann. combustibles liquides* 8, 871-4(1933).—A qual. method which in many cases permits detns. of S in gasoline is described. It is based upon the action of S upon Cu or Ag strips immersed in the gasoline for 12 hrs. The actions of S, allyl sulfide,  $H_2S$ , Et mercaptan, thiophene and  $CS_2$  are described.

Karl Kammermeyer

**New experiments on the condensation of hydrocarbons in kerosene.** I. Ciocchina. *Petroleum Z.* 29, No. 33, 1-8 (1933).—Some degree of condensation (polymerization) was effected by (1) refluxing with water for 6 hrs. or with  $H_2SO_4$ , (2) heating at 400-50° with  $C_2H_2$  with or without  $H_2$  ( $C_2H_2:H_2$ , 2:1), or (3) chlorination and refluxing with metals or  $CaC_2$  to effect dechlorination. The residue (I) b. above 260° was increased from 10 to 15-25%; 17% was obtained where  $CaC_2$  was used. Cracking accompanied the heating with  $C_2H_2$  to a greater extent than in its absence, while the loss was lowered. I compares well with com. middle oils except for lower flash and fire pts. (and darker color). C was formed when the kerosene was boiled with  $H_2SO_4$ ; with an excess of acid, CO and  $CO_2$  were produced. This may explain the resulting lowering of the initial b. p. I. M. L.

**The physical significance of the knock problem.** J. J. Zeehuisen. *Petroleum Z.* 29, No. 31, *Motorenbetrieb und Maschinen-Schmierung* 6, No. 8, 2-5(1933).—An attempt is made to analyze the chem. and phys. processes occurring in the cylinder of an engine which lead to knocking, on the basis of Schmidt's values of the HUCR of a no. of fuels. B. C. A.

**Kinematic viscosity and conventional viscosity values.** I. H. Garner and C. I. Kelly. *Petroleum Z.* 29, No. 28, 1-12(1933); cf. C. A. 27, 4455. —The advantages of reporting viscosity in terms of C. G. S. units are discussed. As a result of very careful work, equations showing  $\nu$  in terms of Redwood, Saybolt Universal and Furol sec. and  $E^\circ$  were constructed, based on the equation  $\nu = at - b/t$ , where  $t$  is time in sec. or  $E^\circ$  and  $a$  and  $b$  are consts. The values for  $a$  and  $b$  are: Redwood No. 1, for  $t = 34-100$ , 0.260, 179,  $t > 100$ , 0.247, 50; Redwood No. 2, 2.467, 0; Saybolt Universal,  $t = 32-145$ , 0.226, 197,  $t > 145$ , 0.220, 80; Furol,  $t = 25-40$ , 2.24, 181,  $t > 40$ , 2.16, 60; Engler,  $E^\circ 1.35-3.2$ , 8.0, 8.64,  $E^\circ > 3.2$ , 7.6, 4.0. The  $E^\circ$  equations give results in good agreement with those obtained from the use of the Vogel formula which must be applied for  $E^\circ < 1.35$ .

I. M. Levine

**Oxidation of hydrocarbons from the lubricating oil fractions of crude oil.** III. N. I. Chernozhukov and S. E. Krut (Crane). *Neftyanoe Khozyaistvo* 25, 35-8, 102-5 (1933); C. A. 27, 5178. —Oxidation of synthetic mixts. of naphthene hydrocarbons and aromatic hydrocarbons. A pure medicinal white oil having an acidity of 0%, av. mol. wt. of 397,  $d_{44}^{20}$  of 0.8806,  $E_{50}$  viscosity of 4.25,  $n_{20} = 1.4800$  and S (lamp method) 0%, was oxidized by the Butkov method with  $O_2$  at 15 atm. and 150° and for 3 hrs. in the presence of the following aromatic hydrocarbons: (1) Individual aromatic hydrocarbons: (a) without side chains (naphthalene, anthracene, phenanthrene); (b) with side chains ( $\alpha$ -methylnaphthalene, propylbenzene, decylbenzene); (c) aromatic hydrocarbons with rings connected through an intermediate C atom (diphenylmethane, triphenylmethane, acenaphthene); (d) aromatic hydrocarbons sepd. from various fractions of petroleum lubricating oils; (2) O-contg. compds.; (3) S-contg. compds.; (4) resins; (a) sepd. from natural products; (b) obtained as a result of oxidation of various hydrocarbons of the naphthene as well as of the aromatic series; (5) N-contg. compds.; (a) amines (aniline,  $\beta$ -naphthylamine); (b) heterocyclic compds. (pyridine, quinoline). From 0.1 to 10% of the above compds.

were introduced. The expts. are described in detail and the following conclusions are made. (1) The oxidation ability of naphthene hydrocarbons is lowered in the presence of aromatic compds. without side chains whereby the latter are consumed in the course of oxidation. (2) The lowering of the oxidizability of the naphthenes does not increase in direct proportion to the concn. of the aromatic compds. The presence of more than 5% of aromatic compds. is of no practical effect. (3) Aromatic hydrocarbons without side chains when present in soln. in naphthenes act in the presence of  $O_2$  quite differently than if present as individuals. Naphthenes induce the oxidation of aromatic compds. (4) In a mixt. with naphthenes the aromatic compds. are oxidized more rapidly than the naphthene hydrocarbons. (5) The antioxidation effect of aromatic compds. increases with increase in the no. of rings. (6) Aromatic compds. contg. a trivalent C are very effective antioxidants. (7) Hydrocarbons of the acenaphthene and diphenylmethane type are less effective. (8) Aromatic compds. having long (satd.) side chains of normal structure and in low concns. practically do not improve the antioxidizing properties of naphthenes, and even increase the tendency of naphthenes to oxidize. (9) The products of oxidation of aromatic hydrocarbons are of the type of phenols and condensation products which are more active as antioxidants and thus retard the process of oxidation.

A. A. Boehtlingk

**Problems of lubrication.** Hilliger. *Oberflächentechnik* 10, 221(1933).—Lubrication is discussed as a mech., chem. and mol.-phys. problem. A schedule for the valuation of a lubricant derived on the basis of these considerations is used. Lubrication from the first viewpoint is explained by the hydrodynamic theory, which is briefly outlined. The chem. viewpoint considers compn. and reaction with  $O$ , also catalytic influences. From the 3rd viewpoint lubricants are represented by the structural formulas of naphthene, asphalt and paraffin, with which other materials are mixed. By denoting the quality of a lubricating oil with 1 as good and 3 as bad the following schedule was derived for naphthene, asphalt and paraffin, resp.: resistance against  $O$  1, 2, 3; resistance against heat 2-3, 3-2, 1; flat viscosity curve 2, 3, 1; polar activity 2, 1 and 3. Modern lubricating oils are developed from oils with a polar-active center of a carboxyl group (CO).

M. Hartenhein

**Investigation and judging of lubricating oil for motors.** Michael Freund and Stephan Thamm. *Petroleum Z.* 29, No. 40, 1-14, No. 41, 1-13(1933).—Lubricating oils from various sources (300) including blends of some of them were subjected to comprehensive lab. tests designed to predict the behavior of the oils under operating conditions. The tests included gravity, viscosity at various temps. 30-200°, viscosity-temp. relationships, fractionation under 0.1 mm. pressure, Conradson C (C), asphalt content, thermal stability with and without  $O_2$ , and acid and sapon. nos. The huge mass of data are tabulated and graphed to show principally the effect of increasing gravity for oils of like viscosity at 50° and also for fractions of the same crude oil. The viscosity-temp. relationship is recorded in terms of  $\Delta\eta(\eta_{150} - \eta_{100}^\circ)$ ,  $\Delta\eta'(\eta_{150} - \eta_{100}^\circ)$ ,  $\Delta\eta(\eta_{150} - \eta_{100}^\circ)$ , viscosity index, viscosity-gravity const. (V. G. C.), and as developed by F. and T., the radius of curvature  $\rho$ , at pt. S on the hyperbola obtained by plotting  $\log \eta$  against temp., S being the pt. at which the tangent adjoins the axes at an angle of 45°. It is noted that while  $\Delta\eta$  falls with rise in gravity,  $\Delta\eta'$  rises. This is due to the fact that in the 150-200° interval the hyperbola approaches the temp. axis more slowly the smaller the value of  $\rho$ , or the higher the naphthenicity of the oil. The thermostability test without  $O_2$  consisted of heating of the oil for 60 hrs. at 325° subsequent to replacing the air with  $N_2$  and evacuating to a pressure of 0.1 mm. The results from this test were those attributable to cracking, for the oil became darker but still retained its clearness, and the gravity and viscosity were lowered to a degree independent of the constitution of the oil. The effect was greater with increase in original viscosity

Sludge was formed in traces or not at all. C was increased only in the highly naphthenic oils. The other thermostability test was conducted at 200° for 5 or 10 hrs. with O<sub>2</sub> bubbling through the oil, resulting in darkening, opacity, increased viscosity and formation of sludge. Conclusion: (1) The viscosity-gravity relationship is the most characteristic property, for it signifies the constitution of the oil. For oils of like viscosity at 50°, rise in gravity denotes increasing naphthenicity, volatility, slope of the viscosity-temp. curve, amt. of sludge formed and increase in C upon oxidation. Thus the essential tests are viscosity, say at 50°, d<sub>4</sub><sup>20</sup>, pour pt. and C. (2) For oils of the same viscosity at 50° C falls with increase in gravity; for fractions from the same crude, C rises with gravity rise. (3) Increase in acid and sapon. nos. upon oxidation is independent of the constitution of the oil. (4) The asphalt and asphalt-forming substances have some influence on the increase in C upon oxidation. (5) For oils of like gravity and viscosity there is a parallelism among C, hard asphalt content and color depth. (6) For fractions from a given crude oil, the V. G. C. among all of the viscosity-temp. relationships is the only value that remains const. regardless of the gravity. A large no. of literature references are given. I. M. Levine

**New distillation unit increases yield of lubricating oils.** Paul Truesdell. *Chem. Met. Eng.* 40, 517-9 (1933).

Lubricating oil of low C content and high flash point is produced by a plant designed with mild heating in the pipe still, short time of contact in the fractionating column, and provision for removal of salt water from the crude oil before processing. L. W. T. Cummings

**Insoluble and infusible lubricating and packing material.** Franz Josef. *Petroleum Z.* 29, No. 40, *Motoren-betrieb und Maschinen-Schmierung* 6, No. 10, 4 (1933).—Addn. of a C<sub>10</sub>H<sub>8</sub>-inorg. compd. of unknown constitution to several of the higher alcs. caused the latter to become insol. in org. substances without affecting their lubricating or packing properties. This compd. has the consistency of vaseline and does not change even when heated to 250°.

I. M. Levine

**Lubrication of ring-oiled-bearing steam turbines.** James I. Clower. *Power Plant Eng.* 37, 466-7 (1933).—Selection and care of oil are both of importance. Five factors, each of which is discussed, which a proper oil must meet are temp., water, solid impurities, air and rust. In other words, oils must be both chemically and mechanically stable. General specifications are included.

D. K. French

**Fiber formation test as a technical method of examination in the bitumen industry.** W. Rodiger. *Kolloid-Z.* 65, 11 20 (1933).—By use of the Ubbelohde app., fiber lengths to which bitumens could be drawn were detd. The lengths vary between 5 and 30 cm. Those bitumens incapable of forming fibers are useless for road building. Bitumens should be tested by the usual examn. with the greatest care if the length of fiber is below 10 cm. Those above 20 cm. are excellent, while the suitable type averages about 18 cm. The effect of paraffin and relations between various properties, such as ductility, are discussed (cf. Manheimer, C. A. 26, 4708; Klinkmann, C. A. 26, 4150; Macht, C. A. 26, 200, 3087, 5409; Walther, C. A. 25, 3800; Lucr, C. A. 23, 3324; Schlapfer, C. A. 24, 494).

Arthur Fleischer

**Matitza asphalt.** C. Otin and S. Savenco. *Petroleum Z.* 29, No. 42, 1 5, No. 45, 13-17 (1933).—The substance, a bitumen-impregnated marl with 68.58% ash, was extd. twice with tetralin at 250° for 2 hrs. in an autoclave under its self-imposed pressure, to yield 23.55% of extd. tar, d<sub>4</sub><sup>20</sup> 1.0682, Saybolt viscosity at 100°, 687 sec., percentage C, H, S, N, O 87.38, 10.77, 0.43, 0.43 and 0.99, resp. Its elementary analysis differentiates the ext. from that obtained with other solvents. Upon distn. of the ext. there were obtained 57% distillate (acid), 37% pitchy residue (alk.) and 6% gas. The distillate in 4 fractions was also subjected to detailed phys. and chem. examn. and all of the results were tabulated. I. M. L.

**(French) colonial forest products.** Georges Dupont. *Bull. inst. pen* 1933, 169-75, 193-9.—A review of the

forest-product resources of the French colonies.

A. Papineau-Couture

**Constituents of the volatile oil from the wood of Cham-aecyparis formosensis Matsum.** Kinzo Kafuku and Nobutoshi Ichikawa. *J. Chem. Soc. Japan* 54, 1011-25 (1933).—Steam distn. of the wood gives a reddish, viscous oil which increases in color and viscosity on standing. Yield, 1.10%. Consts. of oil: d<sub>4</sub><sup>20</sup> 0.9685, n<sub>D</sub><sup>20</sup> 1.5020, [α]<sub>D</sub><sup>20</sup> +4.76°, acid value 6.13, sapon. no. 24.00 (after acetylation 196.4). In comparison with the oil obtained from the leaves (cf. C. A. 25, 3774), it contains less terpenes and more alcs.; these are *d*-α-pinene, *d*-camphene, α-terpineol and allylpyrocatechol. The new primary terpene alcs. isolated from the oil are *benihol* (I), C<sub>10</sub>H<sub>18</sub>O, and *benihinol* (II), C<sub>10</sub>H<sub>16</sub>O. I is satd. and gives *benihol* (III), C<sub>10</sub>H<sub>16</sub>O, on oxidation with CrO<sub>3</sub>; the *semicarbazone* of III m. 167°; oxidation of III gives *benihic acid*, m. 110°. II is unsatd. and gives *benihinal*, C<sub>10</sub>H<sub>14</sub>O (IV), on oxidation with CrO<sub>3</sub>; *semicarbazone* of IV m. 216°. The other new substances isolated are *sesquibenehene*, C<sub>15</sub>H<sub>24</sub>, b<sub>10</sub> 127-31°, d<sub>4</sub><sup>20</sup> 0.9162, n<sub>D</sub><sup>20</sup> 1.5058, [α]<sub>D</sub><sup>20</sup> +35.7°, M. R. 66.45; V-2HCl (VI) m. 103-4°; a *sesquiterpene* obtained from VI gives [α]<sub>D</sub><sup>20</sup> -10.32°; a *tertiary alc.* C<sub>15</sub>H<sub>26</sub>O; a *primary alc.* C<sub>15</sub>H<sub>26</sub>O, a *phenol* m. 127-8° and a *liquid substance* C<sub>10</sub>H<sub>16</sub>O<sub>2</sub>.

K. Kitsuta

**Dry distillation of wood tar.** Hilding Bergström and Karl Cederquist. *Iva* 1933, No. 4, 90 3.—Tar obtained by charring resinous wood was heated to 500° at atm. pressure, and the compn. of distillate and fixed gases detd. The oils were treated with 80% H<sub>2</sub>SO<sub>4</sub>, and the compn. of the residue was detd. E. M. Symmes

**Production of acetic acid.** "Technologist." *Chemist and Druggist* 119, 217 (1933).—A review of modern methods of the manuf. of AcOH from wood waste and by synthesis. S. Waldbott

**Corrosion effects of lubricants on bearing surfaces (Bierbaum) 9.** Mfg. processes for liquid org. products from industrial gases (Audibert) 10. Thermal decompn and hydrogenation of org. compds. (Audibert) 10. Corrosion of metals under the influence of gasoline and kerosenes (Laduzhnikova) 9. App. for use in cracking and distg. oil (Brit. pat. 395,709) 1. Tanks for holding volatile oils (U. S. pats. 1,932,394 and 1,932,403) 1. Fatty acid recovery from soaps derived from asphaltic residuum of mineral oil stills (U. S. pat. 1,931,855) 27. Alloy steel for bore hole casings for oil wells (U. S. pat. 1,931,717) 9. Destructive hydrogenation of oil residues (U. S. pat. 1,931,549) 21. Sepp. [petroleum] gases (Brit. pat. 395,641) 21. Metallic soaps [products used in lubricants] (Brit. pat. 395,406) 27. App. for production of C black from petroleum oils (U. S. pat. 1,931,800) 18. Destructive hydrogenation of bitumen (U. S. pat. 1,934,028) 21. Destructive hydrogenation of petroleum (U. S. pat. 1,934,023) 21. Destructive hydrogenation of oils (U. S. pat. 1,934,001) 21. Synthetic resins [from hydrocarbon oil distillates] (U. S. pat. 1,933,715) 26.

**Refining crude heavy petroleum hydrocarbons containing sulfur.** Wilhelm Gaus and Mathias Pier (to I. G. Farbenind. A.-G.). U. S. 1,932,174, Oct. 24. Material such as a topped oil or middle oil is subjected to the action of a gas contg. H in the presence of a catalyst immune to S poisoning at a temp. within the usual range of liquid-phase cracking temps. and under a pressure of over 20 atm. for only such a period of time that no substantial decompn. of the hydrocarbons into other of lower b. p. is effected, to remove S as H<sub>2</sub>S and produce purified oils of substantially the same b. p. and viscosity range as the crude starting materials. An arrangement of app. is described.

**Petroleum refining apparatus suitable for mixing oil with acid, alkali or sodium plumbite solution, etc.** Cyril L. Erickson (to Standard Oil Co. of Ind.). U. S. 1,932,655, Oct. 31. Various details are described of an app. including a conduit formed in attachable sections and contg. perforated conical baffles.

**Refining petroleum distillates containing sulfur** Mathias Pier, Friedrich Ringer and Walter Simon (to Standard Oil Co.) U S 1,932,186, Oct 21. A crude oil contg distillate such as gasoline, kerosene or lubricating oil is subjected to the action of a gas contg H at a temp. of 300-420° and a pressure of at least 10 atm in the presence of a catalyst immune to S poisoning comprising metallic sulfides, difficultly reducible metal oxides or metal from group 6 of the periodic system, for only such a period of time that no substantial decompn of hydrocarbons of the crude distillate into hydrocarbons of lower b p ensues, to remove S as H<sub>2</sub>S and produce a refined product of about the same b p and viscosity range as the initial material. App is described.

**Treating alkaline wash liquors from petroleum oil refining** Sidney M Blair, Francis L Melvill, Arthur G V Berry and Bernard G Banks (to Trinidad Caschold, Ltd.) U S 1,933,110, Oct 31. Alkali wash liquors such as those which have been used in treated cracked petroleum oils are acidified and the oily layer formed contg acidic substances is sep'd and a fraction is obtained by distn, b 180-270°, this fraction is caused to react with a reducing agent such as Fe and H<sub>2</sub>SO<sub>4</sub> to convert disulfides present into corresponding mercaptans, and the fraction is thereafter fractionally dist'd, the several fractions thus produced are oxidized (suitably by air) to convert the mercaptans into disulfides, and the fractions contg the oxidized products are subjected to fractional distn to obtain, on the one hand, phenolic products relatively free from disulfides, and, on the other hand, disulfides relatively free from phenolic compds.

**Distillation column and associated apparatus suitable for vacuum distillation of crude petroleum bottoms, etc** Frank I Lichtenthaler (to Immus Co.) U S 1,934,041, Nov 7. Structural details.

**Electrical dehydration apparatus suitable for treating natural petroleum emulsions** Wm I Van Loenen (to Petroleum Rectifying Co of Calif.) U S 1,932,713, Oct 31. Various structural and operative details are illustrated.

**Still and furnace setting for continuous coking of petroleum residues, etc** Joseph B Weaver U S 1,934,091, Oct 24. Various details are described of a unit, including a tubular retort, set in a generally vertical inclined direction, which may be heated by oil or gas burners the waste heat from which may be utilized for preheating steam for use in the app.

**Utilizing by product gas from petroleum cracking for ammonia synthesis** Carlton Ellis (to Ellis-Foster Co.) U S 1,935,469, Nov 14. H<sub>2</sub> is sep'd from gases of petroleum cracking stills, and the H<sub>2</sub> is maintained under pressure and used in catalytic hydrogenation under pressure as in NH<sub>3</sub> synthesis.

**Cracking petroleum oil** Frank A Howard (to Standard Oil Development Co.) U S 1,934,067, Nov 7. A stream of oil is heated to a cracking temp in an elongated narrow heating zone such as a heating tube system and the oil is then passed into a heat insulated enlarged heating zone where cracking occurs. A stream of oil is continuously conducted from one part of the digestion zone to another part, out of direct contact with the main body of the oil undergoing cracking, and all the fluid is continuously withdrawn from the digestion zone in a single stream. App is described.

**Cracking hydrocarbon oils** Gustav Igloff (to Universal Oil Products Co.) U S 1,931,757, Oct 21. For producing gasoline of high "anti-knock" value, heavy hydrocarbon oil is subjected to cracking conditions of temp and pressure and evolved vapors are sep'd from unvaporized oil, the vapors are dephlegmated to condense and sep' insufficiently cracked fractions from the gasoline vapors. resultant reflux condensate is retreated under cracking conditions of temp and pressure, the dephlegmated gasoline vapors are heated independently of the heavy oil and reflux condensate to a temp adequate to form substantial amounts of condensable unsat'd hydrocarbons in the material, and the resulting product is

condensed as a product of the process. An arrangement of app is described. Cf C A 28, 309.

**Cracking hydrocarbon oils** Stewart P Coleman (to Standard Oil Development Co.) U S 1,933,048, Oct 31. A mixt of hot non-oxidizing gas and steam is introduced together with the hydrocarbon oil into a vaporizing zone to effect vaporization of a substantial part of the oil, unvaporized oil and the vapor and gas mixt formed are separately removed, and the vapor-gas mixt is passed into a sep cracking zone into which another portion of the original non oxidizing gas and steam mixt is also introduced at a temp sufficient to effect substantial cracking of the vaporized oil. A substantially uniform temp is maintained throughout the cracking zone and low b p material is recovered from the cracked products. App is described.

**Cracking hydrocarbon oils** Edward B Peck (to Standard Oil Development Co.) U S 1,933,507, Oct 31. Oil is passed in a continuous stream through a heating zone such as a heated pipe coil and thence into an enlarged cracking zone where the temp and pressure are regulated to maintain the oil in a homogeneous gaseous state. A pressure is maintained in the heating zone equal to that in the cracking zone plus the frictional pressure drop due to the passage of the oil through the heating zone, and the pressure in the cracking zone and the rate of heating in the heating zone are sufficiently high to insure a homogeneous state of the oil at any cross section of the heating and cracking zone, and the resulting cracked oil is fractionated. App is described. Cf C A 27, 3067.

**Cracking hydrocarbon oils** Claude W Watson (to Texas Co.) U S 1,933,574, Nov 7. Vapors from oil cracking under pressure are cooled to effect partial condensation and the resulting cooled fluids (still at an elevated temp) are passed to a sep polymerizing chamber in which they are digested under superatm pressure while hot to effect polymerization and stabilization, resulting products are expanded into a fractionating tower in which fractionation is conducted under reduced pressure to form a vapor fraction and a reflux condensate, heat is supplied to reboil the reflux condensate and the vapor fraction is condensed to form a final stabilized distillate. App is described. Cf C A 27, 5180.

**Cracking hydrocarbon oils** Frank H Edson (to Standard Oil Development Co.) U S 1,934,049, Nov 7. Oil is subjected to optimum temp and pressure conditions for cracking in an elongated narrow heating zone such as a heating coil and is digested in an enlarged digesting zone to produce efficient cracking. The digested oil is discharged into a vapor sep' zone and sep'd into liquid and vapor fractions, the vapor is sep'd into a plurality of condensate fractions in a fractionating zone, and the sep'd condensate fractions, while isolated from each other and from the charging oil, are subjected to optimum conditions of temp under pressure in independent narrow heating zones such as heating coils and the heated fractions are discharged into the enlarged digesting zone in such manner as to digest a lighter fraction for a longer time than a heavier fraction, and the digested fractions are discharged into the sep' zone. App is described.

**Cracking hydrocarbon oils** Edwin F Nelson (to Universal Oil Products Co.) U S 1,934,873, Nov 14. Oil is heated to a cracking temp in an elongated heating coil and is thence delivered to the upper portion of a vertically elongated reaction chamber from the lower end of which liquid and vapors are removed at such a rate that no substantial accumulation of liquid occurs, thence passed to a low-pressure distn zone where vaporization of unvaporized oil occurs, vapors are liberated from the oil in the upper portion of the chamber and the downward flow of liquid oil through the chamber is confined to an area sufficiently small as to provide a velocity preventing coke formation. App is described.

**Cracking hydrocarbon liquids and solids** Gustav Igloff (to Universal Oil Products Co.) U S 1,934,847,

Nov. 14. For producing liquid products of low b. p., a mass of hydrocarbon solids such as coal is maintained in an enlarged zone; a body of hydrocarbon liquids such as gas oil or fuel oil is maintained under cracking conditions of temp. and pressure in an independent enlarged zone and vapors from the latter are passed through the hydrocarbon solids, to distil certain portions and dissolve other portions; resulting commingled vapors are condensed, with reflux of heavier fractions which are united with dissolved material and subjected to further cracking in the second-mentioned enlarged zone. App. is described.

**Cracking hydrocarbons.** Soc. des carburants synthétiques. Fr. 41,616, Feb. 15, 1933. Addn. to 607,156. Heavy hydrocarbons and stable org. residues are transformed to light hydrocarbons by heating them in the presence of H at 400–500° and at a pressure above 50 kg. per sq. cm. and using as catalysts Se, Te or their derivs., either alone or associated with hydrogenating catalysts.

**Cracking oils.** Texaco Development Corp. Brit. 396,517, Aug. 10, 1933. Crude oils are converted into oils of low b. p. by cracking a condensate formed as reflux in a fractionating tower by passing it through pipes and the inner coil of a furnace to reaction towers maintained under pressure from which the liquid products are led off without accumulation while the vapors pass through a line to the outer coil of the furnace where they are heated to 1000°F. and then passed through a line to a sec. reaction zone from which also the liquid products are removed as quickly as they are formed and where the cracked products are mixed with the crude stock. The vapors formed pass through a pipe to the fractionating tower where they are fractionated to give a final product, which is passed through coolers to a receiver, and a condensate which collects at the bottom of the tower and is used as the cracking stock. Part of this condensate may be supplied to the sec. reaction zone (a tower). The liquid products from the reaction towers and the sec. reaction zone are flashed into a tower and the vapors produced are passed through a cooler and pipe into the fractionating tower. Cf. C. A. 27, 1500.

**Oil cracking.** Norman H. Ranstead (to Jenkins Petroleum Process Co.). U. S. 1,934,004, Nov. 7. In cracking a heavier oil such as a petroleum oil for the production of gasoline, etc., by a process in which a portion of the heavier hydrocarbon oil undergoing cracking in an enlarged cracking zone is normally withdrawn through one of a plurality of outlets, a portion of the heavier hydrocarbon oil is also withdrawn through another outlet, as the flow diminishes in the first-mentioned outlet because of clogging; subsequently, the normal withdrawal of oil through the first-mentioned outlet is interrupted, and, during the interruption, hydrocarbon oil is forced through the first-mentioned outlet in reverse flow, to remove accumulated deposits. App. is described. Cf. C. A. 28, 308.

**Pressure cylinders suitable for use in oil cracking apparatus, etc.** Sune Hermanson and Orrin E. Andrus (to A. O. Smith Corp.). U. S. 1,934,064, Nov. 7. Various details are described relating to the manuf. of cylinders from a thick metal plate such as ferrous metal with a liner such as a Cr alloy and with deposition of corrosion resistant alloy metal by an elec. arc at the edges of the liner and seam of the plate edges. U. S. 1,934,065 relates to a somewhat similar process of making lined nozzles suitable for use in oil-cracking app.

**Hydrocarbon oil production by condensation of unsaturated cyclic hydrocarbons together with gaseous olefins.** Fritz Hofmann and Carl Wulff (to I. G. Farbenind. A.-G.). U. S. 1,933,134, Oct. 31. Condensation of materials such as naphthalene and C<sub>2</sub>H<sub>4</sub> is effected in the presence of a H halide such as HCl and of a B halide such as B chloride at a temp. of 300° or lower. An arrangement of app. is described, and numerous examples are given.

**Hydrocarbon oil conversion.** Wm. L. Gomory (to Standard Oil Development Co.). U. S. 1,933,108, Oct. 31. Oil is subjected to conversion temps. in a heating and conversion zone such as a pipe system under at least 50

atm. pressure in the presence of H; resulting hot products are transferred directly to a vaporizing and fractionating zone, reflux condensate from which is separately withdrawn and distd. to remove light fractions from it. The residue from this distn. is then returned directly to the heating and converting zone. Numerous details of app. arrangement are described.

**Hydrocarbon oil conversion.** Wm. L. Gomory (to Standard Oil Development Co.). U. S. 1,934,056, Nov. 7. Oil is subjected to distn. in a sep. distg. zone without substantial decompn.; the vapors are discharged into a vaporizing zone, and the distn. residue is subjected to cracking conditions of temp. and time in a heating and conversion zone in the presence of H under over 50 atm. pressure; resulting products are discharged into the vaporizing zone and lower-boiling fractions are sep'd. App. is described.

**Desulfurizing hydrocarbon oils.** Jacque C. Morrill (to Universal Oil Products Co.). U. S. 1,933,748, Nov. 7. Oils such as "cracked distillates" contg. unsatd. hydrocarbons and S are treated at an elevated temp. with a gaseous N oxide dild. with an inert gas such as N or C<sub>2</sub>H<sub>6</sub> and the oil is subsequently treated with H<sub>2</sub>SO<sub>4</sub>. Cf. C. A. 28, 312.

**Hydrogen treatment of hydrocarbon oils.** Edwin J. Gohr (to Standard-I. G. Co.). U. S. 1,933,107, Oct. 31. Oil such as heavy naphtha is passed through a reaction zone such as a heated coil at a temp. of about 370–440° while under a H pressure of at least 20 atm., with an oil supply rate below about 1.5 volumes per hr. of reaction space contg. a sulfactive catalyst such as ZnO, MgO, CaO or Al<sub>2</sub>O<sub>3</sub> and with use of a H volume of at least 5000 cu. ft. per bbl. of oil. Part of the oil is thus converted into an oil suitable for illuminating purposes, and part is unsuitable for such use. The 2 parts are sep'd. (suitably by use of a bubble plate tower) and the part unsuitable for illuminating purposes is passed through a second reaction zone contg. a second sulfactive catalyst under H pressure above 20 atm. at a temp. above 480°, the oil rate being above 1.5 volumes per hr. per volume of reaction space and the volume of H being approx. 1000–4000 cu. ft. per bbl. of oil, thus producing a product of low b. p. and good anti detonation properties. App. is described.

**Exothermic hydrogenation of hydrocarbon oils.** Marion W. Boyer (to Standard-I. G. Co.). U. S. 1,934,061, Nov. 7. In the catalytic hydrogenation of oils such as gas oil or kerosene, a stream of preheated oil and H is passed continuously longitudinally through one portion of a catalytic mass in one direction and then through an adjacent portion of the catalyst in the opposite direction. The entire mass of catalyst is maintained at a reaction temp. solely by the exothermic heat of the reaction and rapid interchange of heat is effected between the adjacent streams flowing in opposite directions. App. is described.

**Fractionating hydrocarbon vapors.** Daniel E. Stines (to Standard Oil Development Co.). U. S. 1,934,101, Nov. 7. Hydrocarbon vapors are passed through a zone in which heavier constituents of the vapors are condensed, uncondensed vapors are withdrawn from the upper portion of the zone (which may be in the form of a bubble tower) and accumulated condensate is withdrawn from an intermediate portion of the zone, reheated to a const. temp. and returned to the lower portion of the zone at a const. rate. The withdrawn vapors are condensed and a portion of such condensed vapor is returned to the fractionating zone as reflux under control in accord with accumulated condensate. App. is described.

**Refining hydrocarbon vapors.** Arthur G. Connolly (to Universal Oil Products Co.). U. S. 1,934,967, Nov. 14. Various details of app. and operation are described for treating vapors such as those of cracked distillates with a solid filtering material such as fuller's earth which is also contacted with a washing liquid such as a hydrocarbon distillate. U. S. 1,934,968 also describes app. and procedure for contacting hydrocarbon vapors such as those of cracked motor fuel with a polymerizing agent such as fuller's earth.

**Fractionating tower and associated apparatus for treating hydrocarbon oils.** Edward C. D'Yarmett (to Fractionator Co.). U. S. 1,932,514, Oct. 31. Structural and mech. details are described, of an app. provided with a rotating shaft on which centrifuging blades and disks are mounted.

**Destructive hydrogenation of hydrocarbon oils.** James M. Jennings (to Standard-I. G. Co.). U. S. 1,933,503, Oct. 31. In hydrogenating oils under pressure above 20 atm. and at temps. above 400° in the presence of a sulfidic catalyst, the reaction products are maintained in contact with a packed mass of catalytic material (such as one contg. oxides of Cr, Mg and Zn) which promotes hydrogenation, during substantially the entire time until the temp. of the products is below that at which decompn. would occur in the absence of a hydrogenating catalytic material. App. is described.

**Destructive hydrogenation of hydrocarbon oils to produce lubricating oil.** Edgar M. Clark (to Standard-I. G. Co.). U. S. 1,934,037, Nov. 7. From a lower-grade oil there is sepd. a fraction having a Saybolt viscosity at 99° not more than 30 sec. greater than the viscosity of the desired product, and this fraction is subjected to the action of H at a temp. of about 370-450° under over 20 atm. pressure until at least 5%, but not more than 20% of the fraction is converted into hydrocarbons of low b. p.; a lubricating fraction of the desired viscosity is recovered from the product. App. is described.

**Destructive hydrogenation of oil.** Robert P. Russell (to Standard-I. G. Co.). U. S. 1,931,093, Nov. 7. In the destructive hydrogenation of oil such as gas oil or kerosene at temps. above 480° and under pressures above 20 atm., a mixt. of oil and gas rich in free H is passed through a bed of solid catalyst arranged in a relatively short path of flow and with a relatively extended sectional area at right angles to the direction of flow (the introduction of the oil and gas into the catalytic material being effected through a large no. of inlets substantially uniformly spaced, and products being educted through a large no. of exits uniformly spaced). Various details of app. and operation are described.

**Destructive hydrogenation.** Tide Water Oil Co. Brit. 9,345, July 11, 1933. Gas oil or other petroleum fractions are treated at above 500° under about 50 atm. pressure with gases contg. H, e. g., coke-oven gas, for such a time, e. g., 0.5 hr., that a large yield of gas oil suitable for enriching blue water gas is obtained while the liquid products consist mainly of aromatic hydrocarbons. The process may be conducted in a closed vessel or pipe still and in the presence of a hydrogenating catalyst.

**Destructive hydrogenation.** Processco Ltd. Brit. 9,065, July 17, 1933. Carbonaceous residues obtained in the destructive hydrogenation of oils are treated with superheated steam at high temps. with the formation of gases contg. H<sub>2</sub> and CO<sub>2</sub> which are used as the hydrogenating gases for the destructive hydrogenation reaction. The latter comprises a multi-stage cyclic process under varying conditions of temp. and pressure, the vapors and gases from 1 stage being recycled to another stage. App. is described.

**Light hydrocarbon products by destructive hydrogenation of heavier hydrocarbon oils.** Robert T. Haslam (to Standard-I. G. Co.). U. S. 1,934,062, Nov. 7. Light hydrocarbon products of good antidetonation properties suitable for use as motor fuels are prepd. from heavier oil such as gas oil or kerosene by preheating the oil in the absence of hydrogenation catalysts, to a temp. of about 125-480° and then bringing the preheated oil into contact with an active hydrogenation catalyst in the presence of free H and under over 20 atm. pressure, thus completing vaporization of the oil and raising the temp. of the vapors to a temp. of above 480° for a sufficient reaction time solely by the exothermic heat of reaction. App. is described.

**Non cracking catalytic hydrogenation of hydrocarbon material.** Hans Kaffer. U. S. 1,933,435, Oct. 31. In hydrogenating materials such as crude naphthalene or low temp. tar benzene with H under at least 20 atm.

pressure and at temps. of about 350-425°, there is used, as a catalyst, the undistillable residue, insol. in org. solvents and not attackable by H, which remains when coal is subjected to splitting hydrogenation in the presence of H under pressure.

**Apparatus for distilling hydrocarbon or other liquids.** Earnest F. Skinner. U. S. 1,932,712, Oct. 31. Various structural details are described of an app. suitable for cracking hydrocarbons.

**Apparatus for producing a hydrocarbon and metallic sol.** James C. Arnold. U. S. 1,933,836, Nov. 7. Various details are described of an app. for use of a high-frequency elec. current for dispersing Pb in hydrocarbon fuels in order to form a non-detonating product.

**Liquefiable aromatic hydrocarbons from hydrocarbon gases such as cracked still gas or coke-oven gas.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,933,845, No. 7. The gas is subjected to conversion conditions of temp. and pressure in a heating zone such as a heating coil and the conversion reaction is then immediately checked by introducing a cooling oil into direct and intimate contact with the heated gas; the resultant mixt. is passed to a stabilizing zone such as a vertical drum in which a temp. gradient is maintained from top to bottom to produce a rectifying effect on the gases and vapors; condensable reaction products are sepd. from those which are incondensable in this zone and the gases and liquids are withdrawn, resp., from the top and bottom of the stabilizing zone. App. is described.

**Rotary drill for taking samples of materials such as of formations in drilling oil wells.** Redus D. Dodds (to George J. Barrett and S. Robichaux). U. S. reissue 18,975, Oct. 24. A reissue of original pat. No. 1,295,134. Mech. details.

**Furnace setting, etc., for heat treatment of mineral oils in pipe systems, etc.** Wm. G. Leamon. U. S. 1,933,020, Oct. 31. Various structural and operative details are described.

**Continuous distillation system for mineral oils, etc.** I. G. Farbenund. A.-G. (Martin Muller-Cunradi, Wilhelm Sinnat and Erhard Willig, inventors). Ger. 586,436, Oct. 21, 1933.

**Apparatus for distillation of oils such as in vacuum distillation.** John E. Schulze (to Red River Refining Co.). U. S. 1,934,150, Nov. 7. Various structural and operative details are described of an app. adapted for use with steam and vacuum.

**Apparatus for the catalytic treatment of "cracked" distillate vapors.** The Gray Processes Corp. Ger. 577,926, June 7, 1933.

**Use of activated carbon for selective separation of hydrogen from hydrocarbons.** Warren K. Lewis (to Standard Oil Development Co.). U. S. 1,934,075, Nov. 7. For increasing the selective absorbent capacity of the activated C used, a mixed gas under treatment is contacted with the activated C under a pressure substantially greater than atm. pressure and a gas rich in H is obtained. App. is described.

**Tube and shell heat-exchange apparatus suitable for use with oil stills, etc.** Ralph M. Swartz and Carl S. Reed (Swartz to Superheater Co.). U. S. 1,935,066, Nov. 14. Structural features.

**Treating acid sludge from oil refining.** Stanislaw Pilat and Jaroslaw Sereda. U. S. 1,933,070, Oct. 31. A treatment of acid sludge such as is obtained as a waste product in the refining, with H<sub>2</sub>SO<sub>4</sub>, of mineral, vegetable or animal oils or distn. products of coal and bituminous slate, for obtaining sulfonic acids and sulfonates from the sludge, involves neutralizing of the crude acid sludge by introducing it into a sludge consisting of derivs. of alk. earth metals and water (such as an aq. lime sludge) capable of reacting to form alk. earth metal sulfonates from the sulfonic acids in the acid sludge, followed by treatment of the resulting pptd. sulfonates, together with resinous and asphaltic components of the acid sludge and mineral salts, with an aq. soln. of an alkali metal carbonate to form an aq. soln. of alkali metal sulfonates from which the latter can be isolated.

**Coking heavy oil stocks.** Arnold C. Vobach and Horace K. Rogers (to Sinclair Refining Co.). U. S. 1,935,067, Nov. 14. The interior of the coking receptacle is covered with a frangible material such as a fireclay and water glass mixt. and after the material undergoing coking has been coked by contacting it with a hot gaseous material the frangible lining of the receptacle is fractured to permit removal of the coke en bloc from the receptacle. App. is described.

**Motor fuel.** I. G. Farbenind. A.-G. Fr. 749,843, July 29, 1933. Fuels contg. unsatd. hydrocarbons or org. S or O compds. are submitted to a refining hydrogenation under pressure and then to a thermal dehydrogenation treatment at 450-600°. A product with good anti-knock properties is obtained.

**Diesel fuel.** James E. Southcombe and Germ Lubricants Ltd. Brit. 396,427, Aug. 2, 1933. Fuel for Diesel-type engines consists of a light Diesel oil with up to 2% of an org. acid contg. at least 14 C atoms added to obtain improved lubrication of the pistons and cylinders. Naphthenic acids and higher fatty acids are specified, e. g., 3 kg. of a 30:70 mixt. of oleic acid and lubricating oil or 1 kg. of oleic acid to 500 kg. of 0.8 petroleum Diesel oil.

**Gasoline-like products from gases of the ethylene series.** Cary R. Wagner (to Pure Oil Co.). U. S. 1,934,806, Nov. 14. Gases such as those from vapor phase-oil conversion and which may comprise  $C_2H_4$ ,  $C_2H_6$  and  $C_3H_8$  are passed over a catalyst comprising a metallic halide such as chloride of Al, Ni, Fe or Ti or  $AlBr_3$  at temps. of about 175-375° and under a pressure of 600-1500 lb. per sq. in. Cf. C. A. 27, 4390.

**Utilizing heavy fuels such as petroleum in automobile engines.** Rene Oppenheim (to Société anon. Le Carbone). U. S. 1,931,875, Oct. 21. An auxiliary charge of the heavy fuel is contacted with a heated catalyzing substance such as activated carbon so that it may be decomposed to form an easily starting mixt. Exhaust gases are led from the burned starting mixt. around a second mass of catalyzing substance to heat the latter and the main charge of heavy fuel is decompd. by this second heated catalyst and the decompn. products are mixed with air for operation of the engine. App. is described.

**Removing traces of halides from synthetic oils.** Edward M. Jolly and Charles C. Swoope (to Standard Oil Development Co.). U. S. 1,931,068, Nov. 7. Liquid oil such as is produced by the condensation of "chloroparaffin" with  $AlCl_3$  and which contains a halide is treated with a reactive metal such as Na in a liquid or molten condition at a temp. (suitably about 160°) below the decompn. temp. of the oil.

**Removal of sulfur compounds from crude aliphatic saturated hydrocarbon materials such as crude oil, gas oil, or gasoline.** Friedrich W. Guthke (to I. G. Farbenind. A.-G.). U. S. 1,932,369, Oct. 24. Crude material, particularly that having a b. p. up to 180°, is treated with H under 1-10 atm. pressure and at a temp. of about 200-300° in the presence of a catalyst contg. an added sulfide of a metal of groups 6 to 8 of the periodic system (under conditions such as to avoid cracking, polymerization and hydrogenation of the hydrocarbon material itself).

**Absorption apparatus suitable for use in determination of sulfur and halogens in combustible substances such as naphtha products, etc.** Wolfgang Grote and Heinz Kreckler (to Jenaer Glaswerk Schott & Gen.). U. S. 1,931,895, Oct. 24. Structural details.

**Lining vessels for holding oil.** Gustav Egloff and Charles D. Lowry, Jr. (to Universal Oil Products Co.). U. S. 1,932,726, Oct. 31. A layer of Al is attached to the inner surface of a vessel such as a retort or still which may be formed of steel, by a plastic material such as pitch and an inner lining of cementitious corrosion-resisting material such as a ganister lining mixt. is placed over the Al.

**Removing wax from wax-bearing oils.** John F. Mitchell-Roberts (to Texas Co.). U. S. 1,933,868, Nov. 7. A hydrocarbon flocculating or seeding agent such as a small proportion of "filter aid" is added to the oil; the treated oil is chilled to congeal the wax; a diatomaceous

"filter aid" is then added in a larger proportion and the wax and the filter aid are sepd. from the oil.

**Lubricating oil.** Wm. O. Stevens (to Anti Hot Box Co.). U. S. reissue 18,988, Nov. 7. A reissue of original pat. No. 1,798,310 (C. A. 25, 2559).

**Lubricating oil.** Benjamin Gallsworthy (to Texas Co.). U. S. 1,932,381, Oct. 24. For producing a lubricating oil having an acid value of less than 0.5%, oxidized paraffin wax is treated with fuller's earth while maintaining it at a temp. sufficient to keep it in the liquid state, to reduce its acid value, and the treated wax is mixed with lubricating-oil stock in the proportion of 1-5%. Cf. C. A. 27, 5531.

**Lubricating oils.** Robert T. Haslam (to Standard-I. G. Co.). U. S. 1,934,063, Nov. 7. Heavy hydrocarbon oils are subjected to the action of a gas rich in free H at temps. of 400-430° under over 50 atm. pressure for a limited time so that an appreciable but restricted quantity of low-boiling hydrocarbons is formed. The treatment with H is conducted in 2 sep. zones, heavier lubricating fractions are removed from the products of the first zone, and only the lighter lubricating fractions are passed to the second zone. App. is described.

**Lubricating oils.** Jean Grosso and Daniel Perrier. Fr. 749,731, July 28, 1933. Impurities are eliminated from used or fresh oils by bringing the viscosity of the oil to so low a value that the mol. attraction between the oil and the impurities falls below the attraction between an adsorbent of suitable nature and the impurities, the adsorbent being added after the viscosity is lowered.

**Petroleum lubricating oils.** Edgar M. Clark (to Standard-I. G. Co.). U. S. 1,933,047, Oct. 31. For producing higher grade lubricating oils of increased viscosity index in relatively large yields from lower grade petroleum, the oil is subjected to the action of H in the presence of S insensitive catalysts at temps. of about 370-450° under a pressure above 25 atm. (the duration of the operation being limited so that a substantial quantity of naphtha, less than 20% of the oil fed, is produced). App. is described.

**Lubricating oil treatment.** Garland H. B. Davis (to Standard Oil Development Co.). U. S. 1,934,043, Nov. 7. An activated material prepd. from petrolatum and  $AlCl_3$  is mixed and heated with lubricating oil for a prolonged period (suitably about 3 hrs.), and, after cooling, excess petrolatum and the aluminous sludge are sepd. This treatment serves to improve the "viscosity index" of the oil.

**Lubricant of good penetrating properties.** Samuel Cabot (to Polygon Products Co.). U. S. 1,935,588, Nov. 11. See Brit. 369,197 (C. A. 27, 2295).

**Lubricants.** Yacco S. A. F. Brit. 395,867, July 27, 1933. Addn. to 371,643 (C. A. 27, 3813). Fluid lubricants of increased thermal cond. and especially suited for the cylinders of internal-combustion engines are prepd. by dissolving a metal soap and an  $NH_4$  soap in 1 or more vegetable oils and combining the soln. with 1 or more mineral oils. Thus  $NH_4$  oleate 1,  $NH_4$  stearate 1, Cu oleate 0.25, a vegetable oil mixt., e. g., of equal wts. of olive, peanut and soy-bean oils, 7.75% and mineral oil 90 lb. are used. Cf. C. A. 27, 4391.

**Lubricants.** George M. Maverick (to Standard Oil Development Co.). Brit. 396,147, Aug. 3, 1933. Heavy lubricants for transmission and differential gears, etc., comprise a heavy hydrocarbon oil having a Saybolt viscosity above 95 sec. at 210°F. and a minor proportion of a heavy unctuous synthetic product prepd. by condensing with themselves or other substances aliphatic hydrocarbons of mol. wt. 170 or more and contg. 13.5-15.0 parts of H for each 100 pf C. Less than 1 to more than 20% of condensation product may be used and the oils may contain metallic soaps, e. g., Pb, Na and Al stearates or oleates. Suitable synthetics are obtained by condensing  $C_{10}H_{18}$  or  $C_{12}H_{26}$  or aromatic gas oil on chlorinated paraffin wax or by polymerizing dehydrogenated paraffin wax in the presence of  $AlCl_3$ .

**Lubricants.** I. G. Farbenind. A.-G. Fr. 749,942, Aug. 1, 1933. Lubricants or products to be used as addns.



to lubricants are made by submitting soft or hard paraffin or a mixt. thereof or substances contg. appreciable amts. of such waxes to a treatment with dark elec. discharges, preferably elec. discharges of high frequency, taking care that a final product exempt from or poor in soft and hard paraffin and middle oil is obtained. As starting materials compds. composed for the greater part of waxy paraffin hydrocarbons having an average mol. wt. above 300, preferably 350, or derivs. of these hydrocarbons may be used.

**Filters for lubricating systems.** S. F. Bowser & Co., Inc. Brit. 396,257, Aug. 3, 1933. Oil is drawn from the sump of an engine-lubricating system by a pump and part passed through a fine filter and returned direct to the sump while the rest is passed through a coarse filter and hence to the parts to be lubricated from which it returns to the sump. The filters are described:—

**Asphalt emulsion.** Kenneth Taylor (to Standard Oil Co. of Ind.). U. S. 1,932,648, Oct. 31. An aq. concd. asphalt emulsion which can be dild. with hard water without sepn. and which is not broken by wide temp. variations comprises asphalt dispersed in a small amount of water by means of an emulsifier such as green acid soap together with a farinaceous protein material such as corn-gluten meal or soy-bean meal.

**Asphalt and fatty acids from mineral-oil-still bottoms.** Harry F. Angstadt (to Sun Oil Co.). U. S. 1,931,880, Oct. 24. Impure soap-contg. asphaltic material, re-

maining as a residue after the distn. of lubricating oils in a lubricating oil distn. process adapted to form soaps, is heated with added water under sufficient pressure to prevent boiling and to sep. the asphalt from impurities associated with it, without destroying the Na soaps contained in the impurities; cooling is effected under sufficient pressure to prevent boiling with resultant re-entry of the sepd. constituents into emulsion, soln. or dispersion stage, and the asphalt and sepd. impurities contg. soaps adapted to yield water-insol. org. acids are segregated.

**Blending wood pitch with fatty acid pitch.** Louis J. Figg, Jr. (to Eastman Kodak Co.). U. S. 1,933,790, Nov. 7. A stable, viscous, homogeneous mixt. suitable for blending with gilsonite is prepd. by heating a wood pitch with a fatty acid pitch of approx. the same flow point.

**Separating oxygenated components from pine oil.** Irvin W. Humphrey (to Hercules Powder Co.). U. S. 1,932,183, Oct. 24. For the sepn. of components such as borneol and fenchyl alc., pine oil is subjected to the action of a non-acidic substance such as iodine, fuller's earth or activated carbon which will selectively chemically dehydrate the tertiary alcs. present; products of dehydration are removed and the residual pine oil is then fractionated. Cf. C. A. 27, 5755.

**Oven and associated apparatus for making charcoal sticks or pencils.** Irving A. Hultberg (to American Art-Char, Inc.). U. S. 1,933,141, Oct. 31.

## 23—CELLULOSE AND PAPER

CARLETON F. CURRAN

**Cellulose acetate or viscose sheets?** Johann Eggert. *Nitrocellulose* 4, 162 4(1933); cf. C. A. 27, 5184.—A cost study.

**Delignification of wood with gaseous chlorine.** F. Komarov. *Bumazhnyaya Prom.* 12, No. 5, 9 24(1933).—Lab. expts. in the sepn. of cellulose by delignification of wood with gaseous Cl led to the following conclusions: The degree of delignification depends to a certain extent on the quantity of Cl used. A complete delignification can be accomplished only by intermittent chlorination and removal of chlorinated lignin by washing. The resinous matter retards the chlorination very little, and is removed together with chlorinated lignin by washing with alkalis. Chlorination of deresinified samples showed no advantage. The effect of wood swelling on chlorination varies with different kinds of trees. The yield of cellulose is decreased by delignification of wood previously treated with aq. NaOH at 90°, and is practically unaffected by such a treatment with sulfite. Aspen, poplar, willow (66% yield of cellulose) and spruce (60%) are more easily and completely delignified. Birch, beech and especially pine are less easily delignified. In the delignification, 11–13.6% of other constituents of wood, mostly carbohydrates (pentosans), is removed from leafy trees and 5.5–7% from conifers. Thirteen references.

Chas. Blanc

**The bleaching of kraft pulp.** J. O. Murto. *Finnish Paper and Timber J.* 1933, 757 62.—Raw cellulose is sepd. from lignin by direct chlorination, the chlorinated lignin being dissolved in water and dil. alkali prior to the bleaching process. In the Bergström-Zennström kraft pulp-bleaching process a method has been developed in which the total Cl consumption has been reduced to 4–5% of active Cl.

S. A. Karjala

**Pitchy substances in the edge runner screws and at drainage outlets of sulfate pulp plants.** Hilding Bergström and Karl Cederquist. *Iva* 1933, No. 4, 94–6.—The pitchy masses consist of Ca salts of the acids in liquid resin, and CaCO<sub>3</sub>. They are formed from the sulfate soaps and the Ca in the water, and can cause spots in the paper.

E. M. Symmes

**A printing ink and method for discharging from paper.** Sidney D. Wells. *Am. Inst. Chem. Eng., Roanoke Meeting*, Dec., 1933(preprint) 10 pp.—The increasing

demand for paper-making fiber has frequently directed the attention of paper makers to printed paper as a source of supply. Numerous processes for the liberation and removal of the C black pigment are known and some paper-making plants have for a long time secured a large portion of their fibrous raw materials from paper stock recovered from discarded books, periodicals and other publications printed on paper composed of cellulose fibers free from lignin. The use of dischargeable printing ink based upon a pigment consisting of the Fe lake of hematein has now been continuous throughout a period of 2 years. The recovery of the groundwood paper printed with this ink has been taking place in large quantities throughout the past year. A new paper-making material has been made available, which forms an important item in our national inventory of fibrous stock and the supply of such new material can be greatly increased should it become important further to increase our national inventory of paper-making stocks.

C. L. Mantell

**Hydrolysis and fermentation of sawdust** (Schoen, Béraud) 16. **Structure of thin celluloid films** (Jones) 3. **Esters [for softening agents for plastics contg. cellulose derivs.]** (Brit. pat. 395,340) 10. **Resin [for making glaze for paper]** (Ger. pat. 577,723) 26. **Ceramic nozzles for spinning rayon** (Ger. pat. 577,562) 19. **Moisture-preventing compn. [for paper, Cellophane]** (Fr. pat. 740,013) 18.

**Cellulose.** Louisa Elektrizitätswerke und chemische Fabriken A.-G. (Gampel). Swiss 162,143, Aug. 16, 1933. A cellulose ester with a high affinity for dyes, particularly direct dyes, is obtained by treating cellulose with an acetylating agent such as Ac<sub>2</sub>O, in the presence of CH<sub>3</sub>CNCO<sub>2</sub>H. A catalyst may be present.

**Cellulose.** Henry Dreyfus. Fr. 749,536, July 25, 1933. Noncellulosic substances are sepd. from wood, straw, etc., by treating the latter with a liquid composed of or contg. an alc. of relatively high b. p., preferably above 120°. The liquid may be composed of a 30–80% aq. soln. of a glycol, glycerol or other di- or polyhydric alc.

**High  $\alpha$ -cellulose from vegetable fiber such as sugarcane fiber, etc.** Joaquín J. de la Roza. U. S. 1,931,575, Oct. 24. For producing a high-quality, low-ash product

of high  $\alpha$ -cellulose content, material such as sugar-cane fiber is treated with a concd. aq. soln. of  $\text{SO}_2$  contg. at least 12 lb.  $\text{SO}_2$  per each 100 lb. of bone-dry fiber, and, subsequently, the fiber is treated with alkali. Cf. C. A. 27, 4926.

**Cellulosic compositions.** Henry Dreyfus. Brit. 395,664, July 17, 1933. The solvent medium of a cellulosic compn. comprises 1 or more org. liquids,  $\text{H}_2\text{O}$  forming at least 7% of the total org. liquid and a basic org. substance, which may be an aliphatic, aromatic or alicyclic amine. The amine may contain a substituent group, e. g., a  $\text{HSO}_3$ , phosphinic or OH group, rendering it more sol. in  $\text{H}_2\text{O}$  or the org. liquid than is the simple amine. The no. of amino groups should be such as to overcome the acidity of any acidic groups or, alternatively, such groups may be present as salts.  $\text{Me}_2\text{CO}$  or  $\text{Me Et}$  ketone are suitable solvents and they may be mixed with non-solvents, e. g.,  $\text{MeOH}$ ,  $\text{EtOH}$ . The cellulose deriv. may be the acetate or nitrate, ethylcellulose or other ester or ether. Examples of amines are  $\text{PrNH}_2$ ,  $\text{iso-BuNH}_2$ ,  $\text{AmNH}_2$ , hexylamine,  $\text{Et}_3\text{NH}$ ,  $\text{Et}_2\text{N}$ , ethanolamines, diaminopropanols, dihydroxypropylamines, hydroxy-amines obtained by reduction of aldehydes, ketones or alkylene oxides with  $\text{HCN}$ , substituted amines such as the alkali salts of taurine,  $\text{PhNH}_2$ ,  $\text{PhNHMe}$ , hydroxyethylaniline, alkali salts of sulfanilic acid, quinoline, cyclohexylamine, benzylamine, ethylenediamide of oleic, palmitic or stearic acid, etc. The basic substance is preferably sol. in the compn. Its presence reduces the corrosive action of the compn. on app. used in the production of artificial filaments, films, etc., and in the application of lacquers and varnishes. They may be removed from the filaments, etc., or left in to reduce the tendency of the dyed products to fade.

**Cellulose esters.** C. F. Boehringer & Soehne G. m. b. H. Brit. 396,309, Aug. 3, 1933; Fr. 749,657, July 27, 1933. Cellulose is esterified in the presence of a catalyst comprising an aliphatic sulfonic acid which contains at least 1 further acidic group or atom derived from an inorg. acid, e. g.,  $\text{NO}_2$ ,  $\text{Cl}$  or another  $\text{HSO}_3$ . These catalysts do not combine with the cellulose and are completely removed by washing, stable primary or secondary esters being obtained. Among examples (1) cotton linters are pretreated in  $\text{AcOH}$  and acetylated in a mixt. of  $\text{Ac}_2\text{O}$ , methylene chloride and methanesulfonic acid and (2) wood pulp is pretreated with  $\text{AcOH}$  and caused to react with a mixt. of  $\text{Ac}_2\text{O}$ ,  $\text{SO}_2$ ,  $\text{C}_6\text{H}_6$  and trichloromethanesulfonic acid.

**Cellulose esters.** C. F. Boehringer & Soehne G. m. b. H. Brit. 396,575, Aug. 10, 1933. Addn. to 387,533 (C. A. 27, 4671). The process of 387,533 is extended to the prepn. of esters of acids other than  $\text{AcOH}$ , esters of substituted acids and mixed esters. Among examples (1) cotton linters are pretreated and esterified by means of a mixt. of  $\text{Ac}_2\text{O}$ ,  $\text{C}_6\text{H}_6$ , butyric acid,  $\text{SO}_2$  and  $\text{HClO}_4$ , part of the  $\text{SO}_2$  being evapd. as in the process of Brit. 312,242 (C. A. 24, 903), and (2) cotton linters are pretreated with propionic acid and acidulated with a mixt. of propionic anhydride, ligroin,  $\text{SO}_2$  and  $\text{HClO}_4$ . In 396,657, Aug. 10, 1933, addn. to 387,533, the process of 387,533 is modified by avoiding the use of the non-solvent and the limitation of the temp. to below  $40^\circ$ . The esterification soln., after neutralization of the catalyst and, if desired, addn. of further quantities of solvent, may be used directly for the production of rayon, films, plastic masses, etc. In an example cotton linters, pretreated in  $\text{AcOH}$ , are treated with a mixt. of  $\text{Ac}_2\text{O}$ ,  $\text{AcOH}$ ,  $\text{SO}_2$  and  $\text{HClO}_4$ , the catalyst is neutralized and the product pptd. with  $\text{H}_2\text{O}$  or cyclohexanol acetate.

**Cellulose esters.** Kodak-Pathé. Fr. 749,974, Aug. 2, 1933. Esters are obtained in the fibrous state by esterifying cellulose in a bath contg. a sufficient amt. of an ether of high b. p., e. g.,  $\text{Pr}_2\text{O}$ ,  $\text{Bu}_2\text{O}$  or  $\text{Am}_2\text{O}$ , to prevent soln. of the ester formed. The bath may also contain a catalyst such as perchloric acid. Cf. C. A. 27, 1753.

**Mixed cellulose esters.** Carl J. Malm and Charles E. Waring (to Eastman Kodak Co.). U. S. 1,933,815, Nov. 7. A partially de-esterified cellulose acylate of a std. acid such as partially de-esterified cellulose acetate is

1 treated with an anhydride of an aliphatic acid (such as stearic or propionic anhydride) different from that corresponding to the acyl group already present in the cellulose deriv. in the presence of a catalyst such as  $\text{H}_2\text{SO}_4$  or  $p$ -toluenesulfonyl chloride and an org. liquid such as toluene or  $\text{CCl}_4$  in which the anhydride and catalyst are sol. and the cellulose esters in the bath are insol.

**Cellulose organic ester compositions.** Henry B. Smith (to Eastman Kodak Co.). U. S. 1,933,826, Nov. 7. Compns. suitable for films, molded articles, etc., are formed of a cellulose org. ester such as cellulose acetate together with a plasticizer comprising the ethyl ether of ethylene glycol mono-glycolate or the ethyl ether of ethylene glycol  $\alpha$ -hydroxyisobutyrate. U. S. 1,933,827 relates to the use of a compd. such as ethyl  $\gamma$ -phenoxybutyrate as a plasticizer with cellulose org. esters such as cellulose acetate.

**Cellulose esters of lauric acid.** Max Hagedorn and Georg Hingst (to I. G. Farbenind. A.-G.). U. S. 1,931,844, Oct. 24. The solubility of cellulose esters such as those of lauric acid is increased by heating the esters at a temp. below  $200^\circ$  (suitably about  $145^\circ$ ) in a liquid acid medium such as one contg. pyridine- $\text{HCl}$ .

**Purifying organic esters of cellulose.** Camille Dreyfus and Geo. Schneider (to Celanese Corp. of America). U. S. 1,933,720, Nov. 7. By sepg. finer from coarser particles of materials such as cellulose acetate the coarser particles are freed from a substantial part of objectionable constituents such as insol. impurities.

**Decorating cellulose ester material.** Wm. O. Kenyon and Cyril J. Staud (to Eastman Kodak Co.). U. S. 1,933,810, Nov. 7. Cellulose ester material such as cellulose acetate contg. an org. indicator such as bromothymol is subjected to the action of an electrostatic field set up by an a. c. of high potential, in order to produce color changes, as in developing designs or markings.

**Printing fountain pen casings, etc. of cellulose ester material.** Emery G. Desnoyers and Herbert E. Nims (to Fiberloid Corp.). U. S. 1,934,047, Nov. 7. The outer surface of a core of material such as cellulose acetate or nitrate compn. is printed with a design, treated with a softening agent and then united with a shrunk-on covering of transparent material such as a thin cellulose ester compn. which is heated on the core.

**Cellulose esters and ethers.** British Celanese Ltd., John E. Jones and David R. Johnston. Brit. 395,707, July 18, 1933. Cellulose org. derivs., e. g., the acetate, methylcellulose, other esters and ethers, mixed esters and ethers and ether-esters, are pptd. by incorporating with the soln. a precipitant in an amt. in substantial proportion to that required to effect permanent pptn. but insufficient to cause such pptn. and then mechanically mixing the soln. with a further quantity of precipitant so as to ppt. the deriv. in finely divided form. The deriv. may be pptd. from its esterification or etherification soln. Esters may be ripened before pptn. To insure efficient distribution of the precipitant and avoid local pptn. during the first stage spraying and stirring devices are used. In an example cellulose acetate in its esterification soln. contg.  $\text{Ac}_2\text{O}$ ,  $\text{AcOH}$  and  $\text{H}_2\text{SO}_4$  is ripened and, after neutralizing the  $\text{H}_2\text{SO}_4$ , a large quantity of aq.  $\text{AcOH}$  is added with const. agitation. The soln. is then mixed with excess of aq.  $\text{AcOH}$ , with stirring, to ppt. the cellulose acetate. The products may be used for the manuf. of rayon, plastic and other compns.

**Cellulose ethers.** Henry Dreyfus. Fr. 749,401, July 24, 1933. Mixed ethers of cellulose are prepd. by treating cellulose with alkylating and (or) aralkylating agents and by alkylene oxides, the reaction with alkylene oxides being carried out in the presence of  $\text{NH}_3$  or an org. base, such as  $\text{MeNH}_2$ ,  $\text{Me}_2\text{NH}$  or  $\text{Et}_3\text{NH}$ .

**Cellulose ethers.** Henry Dreyfus. Fr. 749,534, July 25, 1933. Hydroxy ethers of cellulose are made by causing hydroxy alkylating agents such as ethylene oxide or propylene oxide to react on cellulose or cellulose derivs. in the presence of primary or secondary org. bases, e. g.,  $\text{Me}_2\text{NH}$ . The reaction is carried out under pressure and at  $80$ – $120^\circ$ .

**Cellulose derivative.** Soc. pour l'ind. chim. à Bâle. Swiss 160,852, May 16, 1933. Addn. to 142,175 (C. A. 25, 2288). Acetylcellulose sol. in acetone is treated with cyanuric chloride, an aromatic tertiary base being present as an acid-binding agent. The product is used for making films, fibers, insulators, etc.

**Cellulose derivatives.** Henry Dreyfus. Fr. 749,568, July 26, 1933. Cellulose derivs. contg. ester groups and hydroxyalkyl groups, particularly acetate groups and hydroxyethyl groups are prepd. by causing a hydroxy-alkylating agent such as ethylene oxide to act on a cellulose ester.

**Cellulose-derivative solutions and compositions.** British Celanese Ltd. Brit. 396,344, Aug. 3, 1933. Solid, liquid or plastic compns. comprise a cellulose deriv. and a sulfonamide of a phenol ether. The compn. may be molded or solns. may be evapd. or pptd. to form artificial filaments, threads, yarns and other textile materials or films which may be used in photography or the manuf. of laminated glass. Solns. in appropriate solvent mixts. may form the basis of lacquers and other coating compns. and compatible resins may be added. Mixts. of the phenol ether sulfonamides with each other or with other plasticizers may be used. Pigments, fillers or dyes may be incorporated. In examples a coating compn. consists of cellulose acetate, anisolesulfonamide and Me<sub>2</sub>CO and a lacquer contains in addn. a resin of the diphenylol-CH<sub>2</sub>O type, alc., C<sub>2</sub>H<sub>5</sub> and diacetone alc.

**Solvents for cellulose derivatives, etc.** Henry Dreyfus. Fr. 749,788, July 29, 1933. Cyclic compds. contg. 2 O atoms and 2 methylene groups, simple or substituted, e. g., dimethylene dioxide and dimethyldimethylene dioxide, are used as solvents and softening agents for cellulose esters and ethers and natural and synthetic resins, in the prepn. of threads, films, varnishes, lacquers, etc. The compds. may be made by the process of Fr. 729,416 (C. A. 26, 5961).

**Cellulose acetate, etc.** James W. McKiuney (to Brown Co.). U. S. 1,933,676, Nov. 7. Wood pulp such as an alkali-refined pulp having an  $\alpha$ -cellulose content of about 94% or more is pretreated with lactic acid before acetylation or the like, to "activate" the material.

**Cellulose acetate preparation.** Samuel E. Sheppard and Leon W. Eberlin (to Eastman Kodak Co.). U. S. 1,931,150, Nov. 7. Cellulose acetate or the like in powder form has its particles provided with an oleaginous film such as castor oil which prevents dusting and retains electrostatic charges.

**Transparent cellulose acetate film.** James P. Walsh (to Celluloid Corp.). U. S. 1,931,518, Oct. 24. A "glass substitute" comprises a reticular film such as wire cloth covered with a transparent film permeable to ultraviolet light and comprising cellulose acetate 100, an aromatic phosphate such as triphenyl phosphate 10-20 and an ester of tartaric acid such as dibutyl tartrate 10-20 parts.

**Cellulose nitroacetate higher aliphatic acid esters.** Cyril J. Staud and Charles R. Waring (to Eastman Kodak Co.). U. S. 1,933,828, Nov. 7. Mixed esters are produced by acylating partially acetylated cellulose with a higher aliphatic acid such as stearic acid in the presence of an "impelling agent" such as chloroacetic anhydride and then initiating the resultant product.

**Use of benzyl ethers of trihydroxybenzene containing a free hydroxyl group as plasticizers with cellulose acetate or the like.** Leon W. Eberlin and John J. Schmitt (to Eastman Kodak Co.). U. S. 1,933,794, Nov. 7. A compd. such as a mono- or di-benzyl ether of hydroquinone or the like may be used with cellulose acetate in the proportion of about 10% or more for making films, etc.

**Cellulose acyl nitrates.** Cyril J. Staud and James T. Bassett (to Eastman Kodak Co.). U. S. 1,933,829, Nov. 7. A product which is suitable for films, lacquers, etc., is produced by acylating (suitably by use of acetic or butyric anhydride) a cellulose nitrate which has been partially de-nitrated so that there are less than 3 nitrate groups to very C<sub>6</sub> cellulose unit.

**Cellulose xanthate.** George A. Richter (to Brown Co.). U. S. 1,932,751, Oct. 31. Cellulose pulp is treated with

1 excess NaOH soln. of about 18% strength and contg. an oxidant such as a hypochlorite or peroxide at temps. above about 40°; excess soln. is removed, and the soda cellulose so prepd. is cooled to a temp. at which mercerization is effected, and the cooled mercerized product is xanthated.

**Use of *p*-biphenyl benzoate as a crystallizing agent with cellulose organic esters such as cellulose acetate.** Thomas F. Murray, Jr. and Cyril J. Staud (to Eastman Kodak Co.). U. S. 1,933,823, Nov. 7.

2 **Modified castor-oil product suitable for use as a softening agent with nitrocellulose.** Harold J. Barrett (to E. I. du Pont de Nemours & Co.). U. S. 1,933,697, Nov. 7. By the action of heat (suitably at a temp. of about 220°) the OH groups of one equiv. of castor oil are esterified with 0.3-1.0 equiv. of a "polybasic" org. acid such as maleic acid or phthalic anhydride which is stable under the reaction conditions, until a viscous oil having a viscosity of 65-1000 poises is produced. The heating is discontinued 3 before gelation occurs.

**Plastic compositions.** Lonza Elektrizitätswerke und chemische Fabriken A.-G. (Campel). Swiss 161,620, Aug. 1, 1933. Objects are made by heating thermoplastic cellulose derivs. to a high temp. and pressing while hot. Cellulose acetate is preferred. Softening agents may be added.

**Films.** Kenneth S. Low. Brit. 395,864, July 27, 1933.

4 **Multi-colored films, bands or sheets are obtained by heterogeneous coloration of aq. cellulosic solns., e. g., viscose or a soln. of cellulose in cuprammonium, thiocyanate or ZnCl<sub>2</sub> soln., followed by regeneration or coagulation in known manner. Examples are given.**

**Film suitable for covering caps over bottle corks.** Joseph C. Ford and Einar Olson. U. S. 1,932,617, Oct. 31. A film is formed of a cellulose compd. such as viscose rendered opaque and glossy by the pptn. in it of S (which may be effected by reaction of Na polysulfide with H<sub>2</sub>SO<sub>4</sub>).

**Regenerated cellulose films.** Kalle & Co. A.-G. (Maximilian P. Schmidt and Julius Voss, inventors). Ger. 586,021, Oct. 14, 1933. Films having a surface pattern are made by forcing the spinning soln. into the coagulating bath through a nozzle of a shape corresponding to the desired pattern.

6 **Films or sheets.** Spicers Ltd. Fr. 41,709, Mar. 29, 1933. Addn. to 615,912 (C. A. 23, 2293). Sheets or films made from compns. contg. cellulose esters or ethers are rolled, immediately after ripening, in a space maintained at a temp. considerably below the ripening temp. The reduction of temp. may be in 2 steps, by rolling first at a temp. 8° below and then rerolling at 22° below ripening temp.

**Apparatus for the manufacture of foils and films by wet or dry methods.** British Celanese Ltd. and Edward Kinsella. Brit. 396,424, July 21, 1933, and 396,723, July 31, 1933, divided on 396,424.

**Apparatus for the manufacture of foils and films, particularly from cellulose derivatives.** British Celanese Ltd. and Edward Kinsella. Brit. 396,398, Aug. 10, 1933.

**Device for producing endless bands of cellulosic materials, gelatin, etc.** Folien- u. Flitterfabrik A.-G. Brit. 395,816, July 27, 1933.

8 **Polypeptide preparations.** Soc. pour l'ind. chim. à Bâle. Swiss 160,144, May 1, 1933. Polypeptide substances are dissolved in a liquid quaternary NH<sub>4</sub> salt. Thus, powd. casein is dissolved in a mixt. of pyridine and benzylpyridinium chloride. The preps. give the biuret reaction and are used in the making of films, fibers, etc.

**Denitrating spun nitrocellulose products.** Harry P. Bassett. U. S. 1,933,204, Oct. 31. NH<sub>4</sub> sulfide and 9 NH<sub>4</sub>OH are used together for denitration.

**Recovering plasticizers such as camphor from scrap celluloid, etc.** Harry P. Bassett. U. S. 1,933,205, Oct. 31. The material is intimately contacted with a solvent for the plasticizer (such as CHCl<sub>3</sub> for recovery of camphor) and alc. is conjointly used as a solvent-recovery agent. CHCl<sub>3</sub> and alc. when used together may be sep'd. by fractional distn. Various details and modifications of procedure are described.

**Esters of polymeric carbohydrates such as cellulose.** Albrecht Schmidt, Gerhard Balle and Hans Lange (to I. G. Farbenind. A.-G.). U. S. 1,931,832, Oct. 24. A carbohydrate deriv. such as diethylcellulose or hydroxypropyl starch is esterified by reaction with an aliphatic carboxylic acid such as formic or acetic acid in the presence of liquid  $\text{SO}_2$ . Cf. C. A. 27, 5976.

**Carbohydrates.** Lonza Elektrizitätswerke und chemische Fabriken A.-G. (Gampel). Swiss 160,753, June 1, 1933. Carbohydrates are pptd. from their solus. by intimate mixture with a liquid pptg. agent in the form of a soln. or dispersion. Thus, a soln. of cellulose acetate is pptd. by addn. of water or aq. salt soln. The rate of pptn. is regulated by the proportions of the mixt.

**Saccharification of cellulosic materials.** Heinrich Scholler. Ger. 577,850, June 6, 1933. App. in which sawdust, etc., is treated with dil. acids under high pressure and temp. is described. Cf. C. A. 27, 1754.

**Polysaccharides.** I. G. Farbenind. A.-G. (Karl Fredenhagen, Burkhardt Helferich and Ernst Koch, inventors). Ger. 577,764, June 3, 1933. Addn. to 560,535 (C. A. 27, 1169). The method of 560,535 for converting polysaccharides to water-sol. form by treatment with liquid or gaseous anhyd.  $\text{HF}$  is modified by using  $\text{HF}$  gas diluted with inert gas such as air.

**Cuprammonium silk.** Bemberg S. A. Ger. 577,726, June 3, 1933; Swiss 162,112, Aug. 16, 1933. App. for spinning cuprammonium silk is described, the pptg. bath being a 1.4% soln. of  $\text{Na}_2\text{SO}_4$ . After use, this is freed from  $\text{NH}_3$  by heating to  $40-70^\circ$  in *vacuo*, and from Cu compds. by filtration; it is then returned for further use.

**Rayon.** N. V. Fabriek van chem. Producten. Ger. 586,228, Oct. 19, 1933. A nitrocellulose of low N content, e. g., 2.4%, is treated with  $\text{Ac}_2\text{O}$  in the presence of  $\text{H}_2\text{SO}_4$  until the degree of esterification of the cellulose is at least 91%, complete conversion into triester being regarded as 100% esterification. Excess of  $\text{Ac}_2\text{O}$  is then decompd. by addn. of water or alc., and the mixt. is left to stand until the  $\text{H}_2\text{SO}_4$  residues in the cellulose ester have been replaced by Ac groups. The soln. is then filtered and spun into a pptg. bath, either directly or after neutralization of free  $\text{H}_2\text{SO}_4$ . Rayon of high resistance to water is obtained.

**Rayon.** Soc. chimique des usines du Rhône. Fr. 41,645, Feb. 15, 1933. Addn. to 638,448 (C. A. 23, 278). A mat surface is obtained by forming  $\text{TiO}_2$  or other white mineral oxide by chem. action in the soln. of cellulose acetate used. The secondary products of the reaction are removed by washing.

**Rayon.** La soie de Valenciennes, Maurice A. Starink and Pierre Koets. Fr. 750,101, Aug. 5, 1933. The strands of rayon are held together after spinning without sizing, by reducing the acidity of the coagulating bath, reducing its temp. or reducing the ratio of cellulose to soda in the viscose soln.

**Rayon, etc.** Henry Dreyfus. Fr. 41,759, Apr. 13, 1933. Addn. to 683,463 (C. A. 24, 4632). The coagulation of solns. of org. derivs. of cellulose is obtained by baths contg. lower aliphatic acids of a relatively high degree of concn. and also solvents of the cellulose deriv. of a relatively high b. p. The bath may also contain sol. salts or other substances capable of reducing the solv. of the aliphatic acid in the water of the bath. Examples are given of baths contg.  $\text{AcOH}$ , l-t lactate and  $\text{NaOAc}$ . Cf. C. A. 28, 323.

**Rayon, etc.** Henry Dreyfus. Fr. 749,709, July 28, 1933. The filaments are extruded into an evapg. medium and at least 2 currents of evapg. agent are directed toward the filament from different sides. An app. is described.

**Rayon, etc.** Henry Dreyfus. Fr. 749,789, July 29, 1933. In dry-spinning processes, the evapg. agent is introduced at a pt. intermediate between the ends of the spinning chamber and at least a part of the current moves in the same direction as the extruded products. Various forms are described. Fr. 749,790. The evapn. of the solvent is retarded in the first stages of the spinning by protecting the filaments when freshly extruded from the evapg. agent and the filaments are afterward drawn in

1 such a manner that the drawing does not wholly extend to the spinning nozzles.

**Rayon, etc.** Henry Dreyfus. Fr. 749,913, Aug. 1, 1933. In dry spinning, the filaments are carried aside from the spinning nozzle and submitted to a tension at points in their course, which points get nearer to one another as the distance from the extruding point increases. The filaments are lubricated before coming in contact with the tensioning means and the tension is preferably applied while the filaments contain at least 50% of solvent.

**Centrifugal spinning apparatus for rayon.** Barney Maschinenfabrik A.-G. Brit. 395,650, July 20, 1933.

**Spinning centrifuge for rayon.** N. V. Intern. Spinpot Exploitatie Maatschappij (I. S. E. M.). Ger. 586,185, Oct. 17, 1933.

**Device for imparting an irregular oscillation to the filament guide in winding rayon in bobbin-spinning machines.** Algemeene Kunstrijde Unie N. V. Brit. 395,954, July 27, 1933.

**Apparatus for washing and other liquid treatments of cakes of rayon.** Walter Schieber and Frich Friedemann (to I. G. Farbenind. A.-G.). U. S. 1,932,913, Oct. 31. Structural details of an app. with spraying nozzles.

**Apparatus with a spinning nozzle and precipitating bath for manufacture of artificial threads from viscose solutions.** Hugo Pfannenstiel and Harry Meyer (to I. G. Farbenind. A.-G.). U. S. 1,933,999, Nov. 7. Various structural and operative details are described.

**Spinning cell for production of artificial filaments from cellulose acetate or the like by the evaporative process.** Henry Dreyfus, Edward Kinsella, Joshua Bower and Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,933,587, Nov. 7. Various structural and operative details are described.

**Apparatus for production of artificial filaments from cellulose acetate or the like.** Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,933,607, Nov. 7. A plurality of filaments are extruded into a setting medium and at some distance from the point of extrusion a fluid such as compressed air is projected onto the filaments to unite them into a single filament while the material is still in a sticky condition.

**Artificial filament manufacture from solutions such as those of cellulose acetate.** John F. Briggs and Robert P. Roberts (to Celanese Corp. of America). U. S. 1,934,618, Nov. 7. Various details of app. and operation are described for the production of filaments by the dry or evaporative method.

**Artificial filaments.** British Celanese Ltd., Edward Kinsella and Reginald H. J. Riley. Brit. 396,792, Aug. 10, 1933. In the dry spinning of artificial filaments 2 or more streams of air, etc., are directed against the filaments near their point of extrusion from different sides at different distances from the spinning nozzle. App. is described.

**Artificial filaments and threads.** Henry Dreyfus. Brit. 395,353, June 30, 1933. Cyclic 1,3-diethers contg. at least 5 atoms in the ring, except methylene ethylene oxide, are used in the manuf. and treatment of filaments, etc., of cellulose esters, ethers and ether-esters as solvents in the spinning soln. or coagulating bath or for swelling the threads for dyeing, printing, stenciling, discharging, delustering, relustering, improving or stretching. Diethers, or their ethers or esters, obtained by condensation of an aldehyde or ketone with an aliphatic alc. contg. 3 or more OH groups are excluded. Examples of diethers are 2-methyl-1,3-cyclotrimethylene dioxide, 2,4-dimethyl-1,3-cyclotrimethylene dioxide, 2-methyl-1,3-cyclotetramethylene dioxide, 4-chloromethyl-1,3-cyclotrimethylene dioxide, 2,2-diethyl-1,3-cyclotrimethylene dioxide, 2-phenyl-1,3-cyclotetramethylene dioxide (obtained from Bzl and 1,3-propylene glycol), 2-benzyl-1,3-cyclotrimethylene dioxide, the diether obtained from cyclohexanone with glycerol monochlorohydrin and the compds. obtained by condensation of  $\text{CH}_2\text{O}$ , or its polymers, with diethylene or other polyolefin glycols. Etherification catalysts may be used in the condensation of the aldehydes or ketones with the aliphatic dihydroxy compds. The lower diethers are suitable as the sole or principal solvent in spinning solns.

and the higher di-ethers for stretching or other treatment. Examples of spinning and various treatments are given. Cf. C. A. 27, 5200.

**Artificial threads and films.** Jan C. de Nooij and Dirk J. Gerritsen. Brit. 395,947, July 27, 1933. Solns. of cellulose suitable for use in the production of rayon threads, films, bands, etc., are obtained by dissolving cellulose in  $\text{H}_2\text{SO}_4$  of concn. above 60% and then dilg. with  $\text{H}_2\text{O}$ , alcs.,  $\text{Me}_2\text{CO}$ , dil. salt solns. or other substance or mixt. of substances which is sol. in the acid until the concn. of the  $\text{H}_2\text{SO}_4$  is less than 60%. The soln., which is then in a metastable condition, coagulates on standing. When making filaments or films the concn. of the soln. and the temp. are adjusted so that the soln. may be subjected to the de-aerating, filtering and ripening processes without coagulating. The soln. is spun into  $\text{H}_2\text{O}$ , alc. or aq. alc. and the coagulating liquid may contain dissolved acids, alkalis and salts.

**Threads.** Henry Dreyfus. Fr. 749,448, July 24, 1933. Filaments made from cellulose acetate, etc., are submitted in the softened state to a stretching or drawing so as to cause rupture of the individual filaments, whereby threads resembling those made by spinning operations are obtained.

**Artificial hollow threads, artificial straw, etc., from cellulose esters and ethers.** Otto Laubi (to Lonza Elektrizitätswerke und chemische Fabriken A.-G.). U. S. 1,933,019, Oct. 31. In operating according to the "dry method," highly concd. dough-like solns. or masses flowing only with difficulty or not at all at ordinary temp. and contg. at least about 30% of a cellulose ester or ether are forced through nozzles with annular orifices under high pressure while simultaneously jointly introducing at least one thread-like inlay and a gas stream into the body undergoing formation. App. is described.

**Cellulose acetate artificial threads.** Société pour la fabrication de la soie "Rhodiaseta." Brit. 395,440, July 20, 1933. The threads are made by downward dry spinning in a mild evaporative atm., the usual spinning solns. being preheated before issuing from the die at such a temp. that their viscosity does not exceed 100 C. G. S. units and the filaments being only subjected during the spinning operations to a stretching not exceeding the ratio 2. The threads produced have an elongation at breaking greater than 30% and a breaking load similar to that of the usual cellulose acetate threads. In the production of crepe fabrics therefrom swelling without peptization may be reduced to a min. or, in some cases, dispensed with. The threads can also be used in the manuf. of horsehair or straws.

**Thin sheets having a basis of viscose, cellulose derivatives, etc.** Henry Dreyfus. Fr. 748,500, July 5, 1933. The drum on which the soln. for making thin sheets is deposited has a surface made of a tenacious and inoxidizable metal, such as stainless steel or Ni worked in the cold.

**Thin sheets having a basis of viscose, cellulose derivatives, etc.** Henry Dreyfus. Fr. 748,539, July 5, 1933. Solns. for making sheets suitable as packing paper are deposited on flexible bands made of stainless steel, or Ni worked in the cold or other highly polished metal.

**Purifying copper salt solutions.** Bemberg S. A. Swiss 161,503, July 17, 1933. Fe is removed from Cu salt solns. by heating with an O-yielding agent in the presence of an alkali. Thus, a soln. contg. 7% Cu and 0.07% Fe is heated with KOH and  $\text{K}_2\text{Mn}_2\text{O}_8$ . The Fe content is reduced to 0.005%. The process is useful for removing Fe from the waste lye of cupranonium silk processes.

**Bleaching pulp, etc.** Carl B. Thorne. Brit. 395,512, July 20, 1933. See Fr. 739,909 (C. A. 27, 2297). In 395,513, July 20, 1933, pulp, or the like, of low d. is bleached while passing in a shallow layer along a conduit having a downwardly inclined floor. App. is described. Cf. C. A. 27, 5977.

**Utilizing "black liquor" from sulfate or soda pulp manufacture.** Edward G. Goodell. U. S. 1,931,536, Oct. 24. For recovering alkali metal values and heat of combustion from black liquor, concd. black liquor and black liquor powder are introduced into a smelting furnace

together with inert gases to retard combustion of org. materials present. App. is described.

**Production of bisulfite liquor and cooling of carbon dioxide.** Sigmund Wang. U. S. 1,935,381, Nov. 14. \* In the production of bisulfite liquor and cooling of  $\text{CO}_2$  preliminary to its liquefaction or solidification, an aq. limestone slurry is decompd. by the action of  $\text{SO}_2$  gas, and liquid  $\text{SO}_2$  is evapd. by heat exchange with the  $\text{CO}_2$  produced from the limestone slurry treatment; the gaseous  $\text{SO}_2$  thus obtained is then caused to react with slurry. An arrangement of app. is described.

**Cooking cellulosic material for fiber liberation.** Geo. A. Richter (to Brown Co.). U. S. 1,935,579, Nov. 14. Material such as wood chips is cooked short of fiber liberation in an alk. Na base liquor such as one contg. NaOH and Na sulfide and, after sepn. of this liquor, is further cooked, to effect complete fiber liberation, in a substantially neutral soln. contg. a sulfite. U. S. 1,935,580 relates to a process in which preliberated cellulosic pulp is digested at temps. above  $150^\circ$  in a soln. of a sol. borate, aluminate or silicate, to improve its properties for manuf. of paper, nitrocellulose, etc.

**Cellulose pulp.** Oscar V. E. Jansa and Erik G. Planck. U. S. 1,933,017, Oct. 31. In the continuous digestion of vegetable fibrous material such as wood chips by treatment with a lixivation liquor in a digester under pressure and while heated, the raw material is introduced into the digester in admixture with an excess of liquor and the excess liquor is then sepd. and withdrawn from the digester. App. is described.

**Cellulose pulp.** A.-G. für Halbzellstoff-Industrie. Swiss 100,451, May 16, 1933. Pulp for the paper industries, capable of storage or transportation, is made by mechanically disintegrating the crude fiber, softening it by treatment with hot water, washing, dehydrating and pressing.

**High  $\alpha$ -cellulose pulp.** Wm. D. Nicoll (to E. I. du Pont de Nemours & Co.). U. S. 1,931,933, Oct. 24. Raw gramineous fiber such as that of bagasse substantially free from pith is countercurrently digested in alk. liquor such as NaOH soln. maintained at  $130$ – $60^\circ$ . The pulp is then washed and countercurrent digestion is continued until a pulp is obtained contg. at least 95% alpha cellulose on the dry basis.

**Multiple-stage washer for treating cellulosic pulp.** Charles L. Wagner (to J. O. Ross Engineering Corp.). U. S. 1,933,609, Nov. 7. Structural and mech. features.

**Treating black liquor from cellulose pulp manufacture.** Edward G. Goodell. U. S. 1,933,254, Oct. 31. For recovery of alkali metal values and utilization of the heat content, the solids of black liquor, in substantially dry condition, are introduced into a smelting furnace and burned under reducing conditions; alkali metal values are fused off, and addnl. air is supplied to the combustion gases directly above the fuel bed and the gases are burned under a boiler. App. is described. U. S. 1,933,255 relates to app. for generally similar use, including a steam generator and spray drier.

**Apparatus for pulping wood.** James H. Ross. Fr. 750,119, Aug. 5, 1933.

**Grinding apparatus for making wood pulp.** A.-G. der Maschinenfabriken Escher Wyss & Cie. Ger. 586,129, Oct. 18, 1933.

**Apparatus for removing bleaching, etc., liquids from wood pulp and like fibrous masses.** Zellstofffabrik Waldhof and Walter Leupold. Ger. 586,205, Oct. 21, 1933.

**Apparatus for straining wood pulp, etc.** Walter Voith, Hermann Voith and Hanns Voith (trading as J. M. Voith). Brit. 395,897, July 27, 1933.

**Paper pulp.** Ralph H. McKee. U. S. 1,932,904, Oct. 31. Alkali-treated fibrous vegetable material (such as straw or stalks) is subjected to the action of a mixt. of Cl gas and air.

**Paper pulp.** Sidney D. Wells (to Lewis L. Alsted). U. S. 1,934,957, Nov. 14. In the manuf. of pulp from wood contg. foam-producing substances, the wood is digested in a cooking liquor maintained at such a d. as to be separable from suspended foam-producing substances

by centrifuging; after cooking of the wood and removal of the liquor from the digested material, such centrifugal sepn. is effected.

**Refining paper pulp.** Lemuel V. Reese and George W. Johnson (to American Laundry Machinery Co.). U. S. 1,931,508, Oct. 24. Pulp is centrifuged to sep. the pulp and impurities into strata so that pulp free from impurities may be obtained; impurities are sepd. and trapped, liquid is extd. from the impurities, and the liquid is delivered to the purified pulp. App. is described.

**Screening paper-making pulp.** Anton J. Haug. U. S. 1,932,603, Oct. 31. Various details of app. and operation are described.

**Pulp from waste paper.** Francis H. Snyder and Stanley P. M. Maclaren (to Industrial Research Ltd.). U. S. 1,933,227, Oct. 31. Waste paper is subjected to the action of a solvent for linseed oil varnish such as  $C_6H_6$  or  $CCl_4$  and a dil. aq. suspension of the treated paper is subsequently subjected to beating in the presence of Na silicate. U. S. 1,933,228 relates to a process in which a dil. suspension of the waste paper is beaten in the presence of a sol. salt of an amphoteric metal acid such as an alkali metal aluminate or titanate.

**Cellulose digester.** Rinar Morterud. Ger. 577,985, June 8, 1933.

**Continuously operated cellulose digester.** Felix Gohl and Sixten Magnus Hjelte. Ger. 586,302, Oct. 19, 1933. Pressure rolls for dewatering cellulose coming from the digester are described.

**Use of carbon bricks for lining digesters such as those used for cooking material for paper pulp.** James L. Green (to National Carbon Co.). U. S. 1,932,457, Oct. 31.

**Digesting wood chips with sulfite liquor.** Thomas L. Dunbar. U. S. 1,932,885, Oct. 31. Hot preconditioned sulfite liquor is flowed from an elevated pressure accumulator, under the pressure and static head existing in the accumulator, directly into a digester (the liquor being of such concn. that it can be used immediately for the digesting operation). App. is described.

**Treating sulfide solutions such as residual solutions from cooking wood.** Linn Bradley and Edward P. McKeefe (to Bradley-McKeefe Corp.). U. S. 1,934,655, Nov. 7. A residual soln. contg.  $Na_2S$  is mixed with  $NH_4$ , Ca and Mg sulfites and Mg sulfate and heated to remove  $H_2S$ .

**Apparatus for recovering fibers from waste waters of cellulose or paper manufacture.** Carl B. Thorne. Ger. 580,494, Oct. 21, 1933. See Brit. 343,327 (C. A. 25, 4338).

**Paper.** James J. O'Connor and Donald F. Morris (to Mead Corp.). U. S. 1,935,482, Nov. 14. See Brit. 341,733 (C. A. 27, 597).

**Paper.** Papeteries Navarre (Soc. anon.). Fr. 750,032, Aug. 3, 1933. The cellulose is sized before its use for the manuf. of paper. The sizing agents, e. g., an emulsion of paraffin, may be applied to the cellulose in suspension in water or while the sheet of cellulose is in process of formation or completely formed. Fr. 750,036, describes an app. for dispersing paraffin, etc., on paper, etc.

**Vacuum apparatus for stock consistency control in paper making.** Darcy E. Lewellen and Emmons F. Lewellen. U. S. 1,933,814, Nov. 7. Various structural and operative details are described.

**Press for paper-making apparatus, including a screen-faced press roll.** Carl H. R. Johnson (to Downingtown Mfg. Co.). U. S. 1,934,543, Nov. 7. Mech. features.

**Doctor blades for paper-making apparatus.** Oliver P. Arnold (to W. F. Greene Corp.). U. S. 1,933,837, Nov. 7. Mech. features.

**Apparatus for manufacture of paper reinforced with woven fabric or threads.** Wm. H. Cannard. U. S. 1,934,580, Nov. 7. Mech. and structural features.

**Homogenizing suspensions of solids such as pigments or fillers for paper manufacture.** Harold R. Rafton (to Raffold Process Corp.). U. S. 1,934,637, Nov. 7. Various details of operation are described by which oversize solid particles may be reduced in size by passing them in liquid suspension under high pressure through a restricted orifice. U. S. 1,934,638-9 relate to mech. details in the prepn. and use of an alk. filler in making paper. U. S. 1,934,640-1 (Harold R. Rafton to Rafton Engineering Corp.) relate to prepn. and use of satin white in the manuf. of coated paper, the material being prppd. in particles of regulated and desired size.

**Preparation and use of a clay filler in paper manufacture.** Harold R. Rafton (to Rafton Engineering Corp.). U. S. 1,934,642, Nov. 7. Various details of operation are described for the prepn. and use of material of desired particle size.

**Resin soap for sizing paper.** Cyprien Gillet. Ger. 577,887, June 6, 1933. Resin is heated with an aq. soln. of alkali carbonate and ammonia in two stages. App. is indicated.

**Sizing paper.** I. G. Farbenind. A.-G. (Eduard Schnitzler and Georg Hingst, inventors). Ger. 584,490, Oct. 25, 1933. Resin, wax or other usual paper size having, either naturally or as the result of treatment, an acid no. between 2 and 40 is emulsified in water with the aid of a monocarboxylic ester of polyglycerol. The emulsion is mixed with paper stuff, and the size then pptd. on to the fiber with  $Al_2(SO_4)_3$ . Cf. C. A. 27, 2035.

**Carbonate-filled sized paper.** Harold R. Rafton (to Raffold Process Corp.). U. S. reissue 18,983, Oct. 31. A reissue of original pat. No. 1,803,647 (C. A. 25, 3837).

**Waterproofing or sizing paper.** Papeteries Navarre (Soc. anon.). Fr. 749,722, July 28, 1933. The application of paraffin, pure or in admixt. with products favoring sizing or waterproofing, is carried out in the normal manuf. of paper or cardboard, preferably before the last drying cylinders.

**Coating paper, etc., sheets.** Cyril A. Chester and Raymakers Syndicate Ltd. Brit. 390,810, Aug. 14, 1933.

**Waxed paper or sheet material such as textile material** manufd. by depositing wax in a liquid film upon the surface of a flotation medium at such temp. as to maintain the wax film in liquid form and applying the paper, etc., to the surface of the medium so as to remove the wax film therefrom. The wax, e. g., white wax, may be dissolved, e. g., in gasoline, and used at normal temp. or the process may be conducted at higher temps., e. g., 90°F., when using paraffin wax dissolved in gasoline.

**Coating paper with aqueous mineral coating compositions.** Donald B. Bradner (to Champion Coated Paper Co.). U. S. 1,933,003, Nov. 7. Various details of app. and operation are described.

**Apparatus for water-marking paper during manufacture.** Howard Brown (to Southworth Co.). U. S. 1,933,006, Oct. 31. Mech. features.

**Machine for opening or cleaning and simultaneously disinfecting waste paper, esparto grass, rags, etc.** Reynald Brown. Brit. 395,824, July 27, 1933.

**Tracing material.** Waldemar Schwable and Otto Schnecko (to Du Pont Cellophane Co.). U. S. 1,934,824, Nov. 14. A tracing sheet comprises cellulose hydrate coated with a material such as a nitrocellulose lacquer which is resistant to the action of writing fluids and which contains a finely divided filler such as chalk, starch or talc which is capable of retaining writing fluid lines.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROK AND C. G. STORM

**Alfred Nobel. P. Martel. Z. ges. Schiess-Sprengstoffw.** 28, 305-6(1933).—In commemoration of the 100th anniversary of Nobel's birth. C. G. Storm

**Determination of mononitrotoluene.** K. Lesničenko *Chimie & Industrie Special No.*, 945-51 (June, 1933).—See C. A. 27, 2113. A. Papineau-Couture



**Modern explosives.** Guido Guastalla and Giovanni Raccui. *Industria chimica* 8, 1231-41 (1933); cf. C. A. 27, 5541, 5979.—The prepn. and properties of tetryl are reviewed; a bibliography is appended. A. W. Contieri

**The limiting charge of fulminate of mercury.** J. Barcikowsky and J. Kleczewski. *Chimie & industrie Special No.*, 939-44 (June, 1933).—Detonator charges can be made considerably smaller than they are at present, by suitably shaping them. A 0.1-g. of  $\text{Hg}(\text{CNO})_2$  detonator can be used for firing TNT charges in mines by shaping the detonator as 2 co-axial cylinders, the base of the larger being in contact with the main charge of explosive into which it may be pressed. A. Papineau-Couture

**Purification of trinitrotoluene by sodium sulfite: its effect on  $\alpha$ -trinitrotoluene.** Jean McElf. *Chimie & industrie Special No.*, 952-9 (June, 1933).—A study of the action of  $\text{Na}_2\text{SO}_3$  on sym.  $\text{C}_7\text{H}_5(\text{NO}_2)_3$  (I), on the impurities which accompany it in crude com.  $\text{C}_7\text{H}_5(\text{NO}_2)_3$  (2, 3, 4- and 3,4,6-trinitrotoluene, dinitrotoluenes) and on mixts. of I with the impurities (including  $\text{C}(\text{NO}_2)_4$  and trinitrobenzoic acid) in approx. the proportions in which they are present in the crude com. product. At atm. temp. I reacts but slightly with  $\text{Na}_2\text{SO}_3$ ; 2,3,4- and 3,4,6-trinitrotoluene combine fairly rapidly; increasing the temp. reduces the time necessary for completion of the reaction, but increases the loss of I. Removal of 2,3-, 3,4- and 2,5-dinitrotoluene requires a temp. of about 50°, but at the expense of a quite appreciable loss of I; but the 2,4-deriv. is practically unacted upon at this temp. In the presence, however, of both I and asym.  $\text{C}_7\text{H}_5(\text{NO}_2)_3$ , dinitrotoluenes are removed, provided they are present in amts. not exceeding 3%; up to 0.4% of the 2,4-deriv. remains, and the purified I m. 80.5°. The small amts. of  $\text{C}(\text{NO}_2)_4$  (0.3%) and trinitrobenzoic acid (0.2%) normally present in the crude product are readily removed by this treatment when carried out at 35° for 45 min., the loss of I being about 4%, which is due to the formation (through a series of intermediate reactions) of hexanitrodikuzvl. Treatment is best carried out when the crude oil is in small crystals, readily obtained by pouring the melted mass in an equal wt. of water at 90° and cooling at the rate of 1° per 3 min. A. Papineau-Couture

**Formation of nitrodiazotoluenesulfonic acid from the waste waters of the purification of trinitrotoluene by sodium sulfite.** Bedlich Batik. *Chimie & industrie Special No.*, 960-3 (June, 1933).—On acidification of the waste waters from the purification of trinitrotoluene by  $\text{Na}_2\text{SO}_3$ , there ppts. 6-nitro-4-diazotoluene-3-sulfonic acid (I) (constitution proved), which easily explodes on heating (as low as 75°). These waste waters should therefore be discharged in such a manner as not to become acidified. Formation of I may be used as a test for detecting the presence of asym.  $\text{C}_7\text{H}_5(\text{NO}_2)_3$  in the com. product. On boiling with  $\text{NaHSO}_3$ ,  $\text{C}_7\text{H}_5(\text{NO}_2)_3$  gives amino derivs. which, on acidification, give with  $\text{NaNO}_2$  diazo and diazo-amino derivs. which ignite very easily; aminosulfonic acids are also probably formed to a slight extent. A. Papineau-Couture

**High brisance in the service of commercial and military technic.** Stettbacher. *Schweizerische Bauzeitung* 101, No. 17, 4 (1933); *Nitrocellulose* 4, 166 (1933).

E. M. S.

**Theory of detonation of safety explosives.** Karl Fisher. *Z. ges. Schuss-Sprengstoffw.* 28, 316-17 (1933).—An explanation, contrary to the theory offered by Audibert (*Chronik der Unfallverhütung* 8, 131), is advanced to explain the presence of portions of the original explosive

charge in the products of explosion of certain coal-mining explosives. C. G. Storm

**A new azide detonator.** Fr. Blechta. *Chimie & industrie Special No.*, 921-5 (June, 1933).—The advantages of  $\text{AgN}_3$  as a detonator, even in coal mines, are discussed. The fact that it ppts. in the colloidal form has prevented its adoption because of tech. difficulties in the manuf. of detonators. This has now been overcome by mixing the  $\text{NaN}_3$  with substances (either inert, or, preferably, explosive such as tetryl, penthrite,  $\text{Hg}$  fulminate, etc., suitable as detonators) which remain granular and mobile when dried, so that the  $\text{AgN}_3$  forms a thin film over the added substances. The efficiency of such detonators, wt. for wt., is practically the same as that of pure  $\text{AgN}_3$ , and the cost appreciably lower. A. Papineau-Couture

**The explosion of carbon disulfide-nitrous oxide and carbon disulfide, nitrous oxide-nitric oxide mixtures.** J. A. M. van Liempt and J. A. de Vriend. *Rec. trav. chim.* 52, 862-8 (1933); cf. C. A. 27, 5180.—The explosion limits for mixts. of  $\text{CS}_2$  and  $\text{N}_2\text{O}$  at pressures from 1 to 35 cm. were detd. and the intensity of light evolved by the explosion flames was measured, the max. being obtained with the ratio of 1:3.5. Intensity is proportional to the sq. of the pressure. Ignition temp. is 1800-1900°. Explosion limits for mixts. of  $\text{CS}_2$ ,  $\text{NO}$  and  $\text{N}_2\text{O}$  were also detd. C. G. Storm

**Influence of thermal cond. of metals on their utilization in the manuf. of explosives.** (Stefan) 9. Ignition temps. of mixts. of  $\text{H}_2\text{S}$ ,  $\text{CS}_2$  and air (Leicester) 2.

**Explosives.** Charles P. Spach (to E. I. du Pont de Nemours & Co.). U. S. 1,932,050, Oct. 24. Explosives such as  $\text{NH}_4\text{NO}_3$  or a smokeless powder mixt. are coated with trimethylethylmethane trinitrate, which serves as a waterproofing and auxiliary explosive agent. Cf. C. A. 27, 845.

**Pentaerythritol tetranitrate.** Thomas R. Paterson (to Imperial Chemical Industries Ltd.). U. S. 1,933,754, Nov. 7. Purification of pentaerythritol tetranitrate is effected by crystg. from  $\text{PhNO}_2$ . Cf. C. A. 27, 3950.

**Smokeless powder.** Sereno G. Norton (to Hercules Powder Co.). U. S. reissue 18,989, Nov. 7. A reissue of original pat. No. 1,788,438 (C. A. 25, 1086).

**Slow match composition suitable for igniting smokeless powder, etc.** Aubrey A. Young (to Atlas Powder Co.). U. S. 1,935,495, Nov. 14. An "elec. match" comprises a body of a sensitive initiating compd. such as cuprous acetylide and a body of deflagrating and more slowly burning material such as  $\text{NH}_4$  picrate and  $\text{K}_2\text{Cr}_2\text{O}_7$ . Various details and examples are given.

**Pyrotechnic product suitable for coloring open fires.** Althea T. Berry. U. S. 1,932,722, Oct. 31. An assemblage is formed of elongated combustible shreds such as excelsior which are each coated with material including a flame-coloring ingredient, a combustible binding ingredient such as gelatin or glue and a comminuted refractory combustion-retarding ingredient such as talc, gypsum or  $\text{CaCO}_3$ . The shreds are sufficiently flexible and the coating of such frangible character that by flexure of the shreds the coatings may be ruptured to permit simultaneous combustion of the shreds and of the combustible ingredients of the coating compn.

**Miners', etc., safety lamps.** The Concordia Electric Safety Lamp Co. Ltd. and Theodore Stretton. Brit. 396,886, Aug. 17, 1933.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Studies on Japanese dyeing tannins. XI. Discussion of the mechanism of tannin mordanting (Preliminary Report III).** The absorption of tannin by cellulose (Supplementary Report). Yoshisuke Uyeda and Kikuo Ishinada. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 574 5(1933); cf. *C. A.* 26, 6142.—Some improvements on the exptl. procedure are reported. K. K.

**Influence of treatment with hyposulfite on the dyeing ability of pine extract.** A. N. Mikhailov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Koshevennoi Prom. Tsentral. Nauch.-Issledovatel. Inst. Koshevennoi Prom.* 1932, No. 4, 21.—The expts. were carried out in an alk. medium because of the decompn. of the hyposulfite in an acid medium, thus causing a lower viscosity. Conclusion: Although the hyposulfite treatment causes some changes in the colloidal properties of the pine ext., these changes do not improve the tanning properties of the ext. to any noticeable extent. A. A. Boehlingk

**Effect of sunlight and other factors on the strength and color of cotton fabrics.** Mary Anna Grimes. *Tex. Agr. Expt. Sta., Bull.* 474, 5 56(1933).—Unnecessary exposure of cotton fabrics to direct sunshine should be avoided. To lose the least strength upon exposure to sunlight, a cotton fabric should be composed of unbleached, mercerized, coarse, hard twisted yarns. If dyed, a vat dye with protective characteristics and in a high concn. should be used. The fastness of the dye is not dependent upon the color. C. R. Fellers

**The use of unoxidizable or stainless steels in the dyeing industry.** Andre Michel. *Rev. gen. mat. color.* 37, 417 23(1933). The unoxidizable or stainless steels which contain Cr, Ni and other metals in varying proportions are quite satisfactory in the various operations of bleaching and dyeing but a selection should be made of the one best suited for the chem. baths used. Halsey E. Silliman

**The use of aluminum in the construction materials in the bleaching industry.** H. Tatu. *Rev. gen. mat. color.* 37, 427 36(1933). There are no serious objections to the use of Al for materials of construction in contact with bleaching baths, particularly  $H_2O_2$ . Large constructions are now in use. The merits lie in no serious corrosion, no catalytic decompn. of the baths as with Cu, Fe and their alloys, also its lightness. Halsey E. Silliman

**Overcoming the bad effect of sodium alkalis on vegetable textile fibers.** Raymond Vidal. *Rev. gen. mat. color.* 37, 137 8(1933). To overcome the bad effect of alkali treatment in bleaching operations, it is proposed to use a bath of about 1% of Liposels for 5-10 min. followed by a cold bath of alk. hypochlorite contg. 0.3% active Cl. Repetition of this treatment even 3 or 4 times does not show formation of oxycellulose by the Turnbull blue test. The merits of this process are the cold treatment, omission of 2 washings and 2 acid treatments, reduction of time of bleaching, in so far as concerning cotton, from 2 or 3 days to 3 or 4 hours, and a better conservation of the fiber and its weight. Halsey E. Silliman

**The influence of light on cotton and wool.** Emil J. Simola. *Teknillinen Aikakauslehti* 23, 326 9(1933). Comparative tests were made on cotton and worsted yarns which were exposed to sunlight through a double glass window. The results showed that exposure for 5 summer months reduced the tensile strength of cotton 17.8% and of wool 7.3%, but the stretching properties were simultaneously reduced an av. of 12% for cotton yarn and 37.7% for worsted yarn. Mercerized cotton yarn had the smallest loss in tensile strength (13.7%) but the greatest loss (27.3%) in elasticity. Fine fiber wool suffered more from the light than coarse fiber. S. A. Karjala

**Use of aqueous chlorine and bromine solutions in the manufacture of knitted unshrinkable wool fabrics.** S. R. Trotman. *Rev. gen. mat. color.* 37, 388 92(1933); cf. *C. A.* 27, 4085.—When wool is treated with Cl in the presence of acid, the amine group is lost. Structural alteration is not necessarily accompanied by unshrinkability. It is proposed to employ Br water in place of the

usual NaClO and HCl methods. Much less alteration of structure is obtained in using Br than in an equiv. quantity of Cl. Cl with NaOAc, Br and HBr, and Br alone permit good dyeings although bromination does not augment the affinity of wool for dyestuffs as much as chlorination. Halsey E. Silliman

**Direct sulfonation of natural substances containing higher alcohols.** Mario Gallotti and Alberto Moggi. *Industria chimica* 8, 1226(1933).—Natural products, such as oils, waxes, may be sulfonated directly to obtain products useful in treating textile yarns. Treat spermaceti oil by dissolving in trichloroethylene, cool to  $-2^\circ$ , and treat with sulfuryl chloride. After 48 hrs., pour in ice, neutralize with  $Ca(OH)_2$ , distill to recover solvent, and filter. Treat the filtrate contg. the cetylsulfonate with  $Na_2CO_3$  to give the sol. Na cetylsulfonate. This product is used in textiles without further purification. A. W. C.

**Impregnating pig skins and dyeing them with a black permanent dye (Baidan, et al.)** 29. Dyeing chrome sheep skins black (Vinogradova) 29. Dyeing light box leather into brown color resistant toward wet and dry friction (Metlitzkaya) 29. Prepn. of the hyposulfite-formaldehyde of soda (Zundel) 18. Metallic soaps [products used in mordanting, dry cleaning] (Brit. pat. 395,406) 27. Polyvinyl compds. [products for use in the textile industry] (Brit. pat. 306,186) 10. Indophenols—S dyes (Brit. pat. 396,393) 10. Hydrazine-sulfonates of the diarylamine series (U. S. pat. 1,932,152) 10.

**Dyes.** I. G. Farbenind. A.-G. Brit. 395,968, July 27, 1933. Complex Cr compds. of *o*-hydroxyazo dyes are made by treating *o*-alkoxyazo dyes with a Cr sulfate under such conditions that the alkyl radical is split off. In examples the dyes 4-chloro-2-anisidine  $\rightarrow$  2-naphthol-6,8-disulfonic acid or 1-naphthol-3,8-disulfonic acid and 5-nitro-4-methyl-2-aminoanisole  $\rightarrow$  1-naphthol-4,8-disulfonic acid are heated in a Pb-lined autoclave with a  $H_2SO_4$  soln. of  $Cr_2O_3$ .

**Dyes.** I. G. Farbenind. A.-G. Brit. 396,077, July 28, 1933. 1,4-Diamino-2,3-dihaloanthraquinones are sulfonated, advantageously in the presence of  $H_2BO_3$ , to give  $HSO_3$  derivs. without splitting off either halogen atom. The products dye wool in fast clear shades which are not changed by after-chroming. In examples 1,4-diamino-2,3-dichloroanthraquinone is heated with  $ClSO_3H$ , fuming  $H_2SO_4$  and  $H_2BO_3$  at  $145-50^\circ$ ; the product dyes wool violet shades. Fuming  $H_2SO_4$  and  $H_2BO_3$  may be used alternatively at about  $120-25^\circ$ .

**Dyes.** Chemische Fabrik vorm. Sandoz. Swiss 160,757, June 1, 1933. A dye sol. in water is prepd. by treating 1-benzoylamino-2-methyl-4- $\beta$ -naphthylaminoanthraquinone with  $H_2SO_4$ . It gives fast brown shades to wool.

**Dyes.** Soc. pour l'ind. chim. à Bâle! Swiss 161,051, June 16, 1933. The dye 1-methylamino-4-aminoanthraquinone is prepd. by heating 1-methoxy-4-aminoanthraquinone with alcoholic  $MeNiI_2$  soln. The dye gives blue-violet shades to acetate silk.

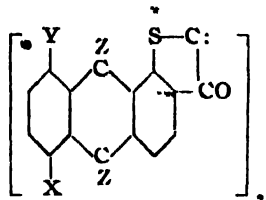
**Dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 162,635 to 162,638, Sept. 1, 1933. Addns. to 159,942 (*C. A.* 27, 4680). New dyes are prepd. by chroming the azo dyes from 1-amino-2-naphthol-4,6-disulfonic acid and the following,  $\beta$ -naphthol (162,635), 1-phenyl-3-methyl-5-pyrazolone-(162,636), 1-(3 $\beta$ -sulfo)-phenyl-3-methyl-5-pyrazolone (162,637), and 4-methyl-1,3-phenylenediamine (162,638).

**Dyes.** I. G. Farbenind. A.-G. (Max A. Kunz, Karl Koberle and Erich Berthold, inventors). Ger. 577,963, June 8, 1933. Dyes are produced by replacing the  $NO_2$  group of mono-nitro-3,4,8,9-dibenzopyrene-5,10-quinone by other residues. Thus, the above compd. is treated with  $BzCl$  to give the monochloro deriv. which colors

cotton from a blue-red vat in yellow shades. Other examples are given.

**Dyes; dyeing.** I. G. Farbenind. A.-G. (Fritz Lange and Richard Stüsser, inventors). Ger. 588,180, Oct. 18, 1933. Cr compds. of azo dyes contg. a sulfo group are treated in substance or on the fiber with dyes of the triarylmethane or xanthene series which contain a sulfo and an amino group but no chromable group. Dyes giving fast shades of various colors on animal fibers are obtained. Examples are given.

**Anthracene or anthraquinone dyes.** Imperial Chemical Industries Ltd. Fr. 749,569, July 26, 1933. Dyes of the formula



(X and Y are Cl, Br, NO<sub>2</sub>, SO<sub>2</sub>H, COOH, OH, substituted OH, NH<sub>2</sub> or substituted NH<sub>2</sub>, and Z is H or O) are prepd. by treating anthracene or anthraquinone acids contg. the group -SCH<sub>2</sub>COOH in the 1-position, with ClSO<sub>2</sub>H or a mixt. of ClSO<sub>2</sub>H and H<sub>2</sub>SO<sub>4</sub>. Several examples are given.

**Azo dyes.** Franz Henle and Herbert Kracker (to General Aniline Works). U. S. 1,933,431, Oct. 31. Disazo dyes dyeing fast yellow to red shades are formed from components such as an aminomethoxynitrobenzene and terephthaloylbisaceto-*o*-toluide or the like. Numerous examples are given. Cf. C. A. 27, 5194.

**Azo dyes.** Rainald Brightman and Wm. L. B. Wellcott (to Imperial Chemical Industries Ltd.). U. S. 1,933,585, Nov. 7. Disazo dyes suitable for dyeing regenerated cellulose various even level shades are formed from components such as 3,3'-diaminodiphenylurea and salicylic acid and 2-amino-8-naphthol-6-sulfonic acid or the like. Various examples are given.

**Azo dyes.** Albert Schmelzer, Fritz Ballauf and Heinrich Helmer (to General Aniline Works). U. S. 1,934,009, Nov. 7. Azo dyes generally producing brown or black dyes are formed by coupling hydroxynaphthocarbazolecarboxylic acid arylamides with unsulfonated and uncoupled diazotized aromatic amines. Numerous examples are given and the dyes have the general formula C<sub>6</sub>H<sub>4</sub>.NX.K(OH)(CONHR)(N:NR'), where K stands

for a naphthalene nucleus which is bound to the carbazole in an  $\alpha$ , $\beta$ -position, R stands for the residue of an amine of the benzene or naphthalene series, R' stands for the residue of an amine of the benzene, azobenzene, naphthalene, anthraquinone or carbazole series, the groupings -CONHR and -OH stand in ortho position to each other, the groupings -CONHR, -OH and -N=N-R' stand in that benzene nucleus of the naphthalene nucleus K which is not neighbored to the carbazole ring, X stands for hydrogen or alkyl, and where all nuclei may be further substituted by alkyl, alkoxy and nitro groups or halogen.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 160,342, May 1, 1933. The dye from diazotized 4-chloro-2-amino-1-phenol-5-sulfonic acid and 1-hydroxynaphthalene-5-sulfonic acid is treated with a Cr-yielding agent to give a product which gives wool from a H<sub>2</sub>SO<sub>4</sub> bath fast blue-violet shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 161,050, June 16, 1933. The dye obtained by coupling diazotized 1-amino-2-naphthol-4-sulfonic acid with  $\beta$ -naphthol in a medium with a  $\mu_{11}$  value of below 7 is chromed in an alk. medium. The dye gives wool from a H<sub>2</sub>SO<sub>4</sub> bath fast marine blue shades. Examples are given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 161,841, Aug. 1, 1933. A new dye is produced by coupling 2-diazo-4,4'-dimethoxy-5-acetylaminol-1,1'-diphenyl ether with the anilide of 2,3-hydroxynaphthoic acid. The dye colors cotton, wool and rayon in fast violet shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 161,842, Aug. 1, 1933. A new dye is produced by coupling 2-diazo-4-carboxy-4'-chloro-1,1'-diphenyl ether with the  $\alpha$ -naphthylamide of 2,3-hydroxynaphthoic acid. The dye colors cotton, wool and silk in fast red shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 162,464, Sept. 1, 1933. A red dye is prepd. by chroming the azo dye from diazotized 4-chloro-2-amino-1-phenol-6-sulfonic acid and 1-(3'-sulfo)phenyl-3-methyl-5-pyrazolone.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 162,465, Sept. 1, 1933. A new dye is produced by coupling diazotized PhNH<sub>2</sub> with diacetyl-1,4-diamino-8-hydroxynaphthalene-6-sulfonic acid. The dye colors wool from an acid bath in red shades.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 41,589, Feb. 7, 1933. Addn. to 734,021 (C. A. 27, 1180). Azo dyes are prepd. by coupling a diazotized aminoarylide of an aliphatic acid contg. at least 10 C atoms with a sulfonated ketone, e. g., sulfonic acids of phenylmethylpyrazolones, carboxylated phenylpyrazolones and arylides of acetoacetic acid.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 41,731, Mar. 29, 1933. Addn. to 735,365 (C. A. 27, 1186). Azo dyes are prepd. by impregnating the fiber in an alk. medium with hydrazinesulfonic acids of 4-amino- or 4,4'-diaminodiamines in which the hydrazinesulfonic acid is in the *p*-position to the imino group, in the presence of azo compds. capable of forming *o*-hydroxyazo dyes and contg. no other solubilizing groups. The fiber is then steamed. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 749,926, Aug. 1, 1933. Dyes going from yellowish red to Bordeaux-red and insol. in water are prepd. by coupling arylamides of 2,3-hydroxynaphthoic acid with 2- or 3-aminobenzanilides, the NH<sub>2</sub> group attached to the CO being substituted by aryl or aralkyl groups and the benzoyl group may also contain substituents. These amides are prepd. by the reaction of *m*- or *p*-nitrobenzoyl chlorides with appropriate amines and subsequent reduction. The following are referred to, 3-aminobenzoylphenyl- $\alpha$ - (m. 157°), 3-amino-4-methylbenzoylphenyl- $\beta$ - (m. 154-5°), and 4-aminobenzoylphenyl- $\beta$ -naphthylamine (m. 222°), 3-amino-4-phenoxybenzoyl- (m. 172-3°), 3-amino-6-methoxybenzoyl- (m. 165°), 3-amino-4-chlorobenzoyl- (m. 175°), 4-aminobenzoyl(*p,p'*-dimethoxy) (m. 193°), and 4-amino-6-methylbenzoyldiphenylamine (m. 181-2°) and 4-aminobenzoylbenzylamine, m. 118°. Dyes prepd. from these compds. are described.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 749,971, Aug. 2, 1933. Metal complexes of 4-amino-1-hydroxybenzene-2-carboxylic acid or its derivs. are linked with coupling components. Thus, refluxing the above acid in water with pyridine and an aq. soln. of Cr chloride gives a complex compd. contg. Cr and pyridine, which may be diazotized and coupled. Pyridine may be omitted or replaced by PhNMe<sub>2</sub> or triethanolamine. Examples are given.

**Azo dyes; dyeing.** British Celanese Ltd., George H. Ellis and Ernest W. Kirk. Brit. 396,412, July 26, 1933.

**Azo dyes** are made in substance by coupling any component with a diazo compd. obtained by diazotizing an anthraquinone compd. contg. an external diazotizable amino group. Diazo components specified are aminoaryl or aminoaracyl derivs. of 1-amino- or 1,5- or 1,8-diaminoanthraquinone, e. g., 1,5-di(*p*-aminophenylamino)anthraquinone, 1-(*p*-aminophenylamino)anthraquinone, 1-amino-5-(*p*-aminophenylamino)anthraquinone; 1-hydroxy-1-amino- or 1-aliphatically-substituted-amino-4-arylaminoanthraquinones contg. an amino group in the aryl residue, e. g., 1-amino, 1-methylamino-, 1-dimethylamino-, 1-(hydroxyalkylamino)-4-(aminoarylamino)-anthraquinone. Coupling components of relatively low mol. wt., e. g., PhOH, *o*- or *m*-cresol, *m*-phenylenediamine, *m*-aminophenol, dimethylaniline, *m*-hydroxydiphenylamine, 1-phenyl-3-methyl-5-pyrazolone, gives dyes suitable for cellulose esters and ethers. In the case of 1-amino-4-(aminoaryl-

amino)anthraquinones 1 or both amino groups may be diazotized and coupled. The dyes may be applied to cellulose esters and ethers as suspensions or dispersions. In an example the dye 1-methylamino-4-*p*-aminophenylaminoanthraquinone  $\rightarrow$  PhOH is described. Anthraquinone derivs. having the 1,4-aminohydroxy grouping and also contg. an external diazotizable amino group are used for producing azo dyes on the fiber. The arylamides of aromatic hydroxy carboxylic acids and the di- $\beta$ -ketosacyl diamines are specially suitable as coupling components. Swelling agents may be used when dyeing cellulose ester and ether materials. In examples the following dyes are produced on acetate silk: 1-hydroxy-4-*p*-aminophenylaminoanthraquinone  $\rightarrow$  diacetoacetyl-*o*-toluidine (green) or 2,3-hydroxynaphthyl-*o*-toluidine (blue). In 396,430, July 26, 1933, divided on 396,412, azo dyes are made on the fiber by coupling thereon an azo coupling component with a diazo compd. obtained by diazotizing an anthraquinone compd. contg. an external diazotizable amino group, excluding 1,4-aminohydroxyanthraquinones contg. external amino groups. The use of (substituted) amides of aromatic hydroxycarboxylic acids and the dyeing of cellulose textiles by combining on the fiber a diazotized 1-alkyl- or dialkyl-amino-4-*p*-aminoanilinoanthraquinone with a bis-acetylaldiamine is also excluded.

**Dyeing.** British Celanese Ltd., George H. Ellis and Ernest W. Kirk. Brit. 396,431, July 26, 1933. Divided on 396,412 (preceding abstract). Azo dyes are made on the fiber by coupling a diazo compd. of an anthraquinone of formula  $1-H_2N-4-R'R''NC_6H_4(CO)_2C_6H_4$ , where R' is alkyl, aryl or aralkyl and R'' is H, alkyl, aryl or aralkyl and which may be further substituted in the anthraquinone nucleus but which contains no diazotizable external amino groups, with a coupling component. Specified components are 1-amino-4-*p*-tolyl- or -anisyl-aminoanthraquinone, 1-amino-4-phenylaminoanthraquinone, 1-amino-4-phenylamino-5-hydroxyanthraquinone, 1,5-diamino-4-phenyl- or -4,8-diphenyl-aminoanthraquinone and 1-amino-4-*p*-tolylamino-5-hydroxyanthraquinone. Coupling components specified are amines, phenols, pyrazolones and  $\beta$ -keto acid derivs. and (substituted) amides of hydroxycarboxylic acids, e. g., salicylic acid and 2,3- or 1,4-hydroxynaphthoic acids, di-2,3-hydroxynaphthoyl-bianisidine, diacetoacetylaldiamines. Swelling agents may be used.

**Azo dyes; intermediates.** I. G. Farbenind. A.-G. Brit. 396,741, Aug. 9, 1933. 2-(3'-Hydroxynaphthyl-2')-4-hydroxy-6,7-benzopseudoazaminobenzene is made by coupling a diazotized 2-amino-3-naphthol in which the OH group is protected with a similar compd., converting the *o*-aminoazo dye thus obtained into the pseudoazimine and splitting off the radicals linked to the O of the original OH groups. In examples (1) the dye obtained by coupling diazotized 2-amino-3-(4'-methylbenzenesulfonylhydroxy)naphthalene with itself is treated with thionyl chloride in xylene and the product hydrolyzed, (2) the *o*-aminoazo dye from diazotized 2-amino-3-methoxynaphthalene is oxidized by air in presence of pyridine and CuSO<sub>4</sub> and the dimethoxyazimine compd. is treated with HBr in glacial AcOH to split up the alkoxy groups and (3) 2-(3'-hydroxy-7'-methoxynaphthyl-2')-4-hydroxy-*Bz*-4'-methoxy-6,7-benzopseudoazaminobenzene is made by treating the *o*-aminoazo dye from 2-(carboxybenzenesulfonylhydroxy)-6-methoxy-3-aminonaphthalene as in (1), oxidizing to the pseudoazimine as in (2) and hydrolyzing to remove the benzenesulfonyl group. They have good affinity for vegetable fibers. Azo dyes, insol. in H<sub>2</sub>O, are made in substance, on a substratum or on the fiber, e. g., cotton, viscose or animal fibers, by coupling the above azimine compds. with suitable diazo components. In examples (1) cotton is impregnated with 2-(3'-hydroxynaphthyl-2')-4-hydroxy-6,7-benzopseudoazaminobenzene and developed with diazotized 2,5-dichloroaniline (orange) and (2) the azimine compd. of (1) is coupled in substance with diazotized *o*-nitroaniline.

**Water-soluble azo dyes.** Rudolf Bauer (to General Aniline Works). U. S. 1,931,836, Oct. 24. See Ger. 562,644 (C. A. 27, 1186).

**Monoazo dyes.** I. G. Farbenind. A.-G. Brit. 395,882, July 27, 1933. Monoazo dyes are made by coupling 2-amino-4,6-dinitrophenol with a *m*-diamine of the C<sub>6</sub>H<sub>4</sub> series which is substituted in 1 or both of the amino groups by hydroxyalkyl or dihydroxyalkyl group(s), or with a nuclear substitution product of such an amine (e. g., halogen, alkyl, alkoxy). In examples 1-amino-3-hydroxyethylaminobenzene, 4-chloro-3-amino-1-hydroxyethylaminobenzene, 1-amino-3-( $\beta$ , $\gamma$ -dihydroxypropyl)aminobenzene, 1-( $\beta$ , $\gamma$ -dihydroxypropyl)amino-3-( $\beta$ , $\gamma$ -dihydroxypropyl)aminobenzene, 1-amino-3-di(hydroxyethyl)aminobenzene, etc., are specified as coupling components.

**Monoazo dyes.** Durand & Huguenin A.-G. Brit. 395,951, July 27, 1933. See Fr. 748,840 (C. A. 27, 5548).

**Water-insoluble disazo dyes.** Hefnz Eichwede and Adolph Koch (to General Aniline Works). U. S. 1,932,577, Oct. 31. Dyes suitable for forming lakes and for coloring natural or synthetic rubber (yellow shades in examples given) are formed by tetrazotizing a dihalo-dialkoxydiaminobiphenyl such as 2,2'-dichloro-5,5'-dimethoxy-4,4'-diaminobiphenyl and coupling with an acrylactic acid arylide such as acetoacetic acid anilide, *o*-chloroanilide, *m*-xylide or the like or benzoylactic acid anilide. Several examples with details of procedure are given. Cf. C. A. 27, 5548.

**Hydroxyazo dyes.** I. G. Farbenind. A.-G. Brit. 396,895, Aug. 17, 1933. Diazotized *o*-aminophenolmonosulfonic acid or a nuclear substitution product thereof not contg. a further HSO<sub>3</sub> group is combined with a benzo-2,4-dihydroxyquinoline or a deriv. thereof. Wool is dyed red to violet with the aid of a Cr mordant by the single bath process. In examples the following dyes are described: (1) 4-chloro-2-amino-1-phenol-5- or -6-sulfonic acid (I) or 4-nitro-2-amino-1-phenol-6-sulfonic acid (II)  $\rightarrow$  7,8-benzo-2,4-dihydroxyquinoline, (2) I  $\rightarrow$  5,6-benzo-2,4-dihydroxyquinoline and (3) II  $\rightarrow$  6,7-benzo-2,4-dihydroxyquinoline.

**Vat dyes.** I. G. Farbenind. A.-G. (Heinrich Nere-sheimer, Willy Eichholz and Georg Böhrner, inventors). Ger. 576,131, May 8, 1933. Addn. to 553,000. Vat dyes are produced by treating *Bz*-1, *Bz*-1'-di(1,2-benzanthraquinonyl), unsubstituted by halogen in the *Bz*-1-positions as in the prior patent, with acid condensing agents. Reduction products, ethers or esters of the starting substance may be used. The condensation product may be further substituted. In an example *Bz*-1-*Bz*-1'-di(1,2-benzanthraquinonyl) is treated with Cu powder and 96% H<sub>2</sub>SO<sub>4</sub> to give a dye which colors cotton from a red-violet vat in violet shades. Other examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. (Wilhelm Eckert, Ernst J. scher, II and Otto Braunsdorf, inventors). Ger. 576,132, May 9, 1933. Addn. to 538,314 (C. A. 26, 3384). Isomers of 1,4,5,8-naphthoylencdiarylimidazoles are converted into salts of org. acids in the presence of solvent or suspending agent and sepd. by taking advantage of their differing soly. Thus, the dye obtained by condensing 1,4,5,8-naphthalenetetracarboxylic acid and 1,2-diaminobenzene is heated with *p*-toluenesulfonic acid and glacial AcOH. On filtering, the residue contains an orange colored salt of *p*-toluenesulfonic acid and the filtrate a blue-red isomeric salt of the same acid. Several other examples are given.

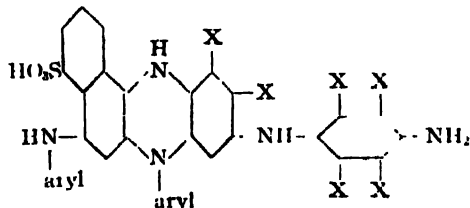
**Basic dyes.** I. G. Farbenind. A.-G. Brit. 396,177, Aug. 3, 1933. See Fr. 736,079 (C. A. 27, 1519).

**Dyes of the anthanthrone series.** Rudolf M. Heidenreich (to General Aniline Works). U. S. 1,931,821, Oct. 24. By causing ring closing agents (such as concd. H<sub>2</sub>SO<sub>4</sub>, chlorosulfonic acid, a mixt. of anhyd. AlCl<sub>3</sub> and NaCl or a mixt. of KOH and alc.) to react upon the compds. obtainable by condensing halogenated anthanthrones or their derivs. with aminoanthraquinones or their derivs. (these compds. probably being anthanthrone-anthrimides), vat dyes are obtained which dye cotton from the hyposulfite vat various khaki-brown to gray shades of good fastness. Several examples with details of procedure are given.

**Carboyanine dyes.** Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 1,934,687, Nov. 7. Dyes having

good photo-sensitizing properties may be prepd. by the treatment of a 1-methylbenzothiazole alkyl quaternary salt with an ester of an aliphatic orthocarboxylic acid, the acid corresponding to which contains more than 2 C atoms in the mol. The reaction may be carried out in boiling dry pyridine. The esters of the orthocarboxylic acids which are suitable include tri-Me orthopropionate, Me di-Et orthocaproate, Me di-Et orthoisocaproate, and tri-Me orthovalerate. Several examples with details of procedure are given. U. S. 1,934,658 relates to the production of dyes having good photo-sensitizing properties prepd. by the treatment of a 1-methylbenzothiazole alkyl quaternary salt with an ester of an orthocarboxylic acid, the acid corresponding to which contains a substituted alkyl group directly linked to the carbon atom of the carboxyl group. U. S. 1,934,659 relates to dyes having good photo-sensitizing properties prepd. by the treatment of a 1-methylbenzothiazole alkyl quaternary salt with an ester of an aromatic orthocarboxylic acid, such as tri-Me orthobenzoate or tri-Me ortho-*p*-toluate. Various examples are given.

**Naphthophenazine dyes.** I. G. Farbenind. A.-G. Br. 750,016, Aug. 3, 1933. Dyes are prepd. by causing oxidizing agents to act in the presence of diluents or solvents on a mixt. of 1,3-diarylamino-naphthalene-8-sulfonic acid, and a monosulfonic acid of 4,4'-diaminodiphenylamine or its alkyl substitution products. The dyes obtained have the formula



where X represents a  $\text{SO}_3\text{H}$  group and the others H or alkyl groups).

**Reserve dye.** Soc. pour l'ind. chim. à Bâle. Swiss 160,439, May 1, 1933. A product for use in reserve dyeing is obtained by condensing 1 mol. of benzoin with 1 mol. of 2-hydroxynaphthalene-3,6-disulfonic acid. The product has a strong affinity for animal fibers and is used in reserve dyeing wool.

**Isatins, thioindigo dyes.** I. G. Farbenind. A.-G. Brit. 396,636, Aug. 10, 1933. Thioindigo dyes are prepd. by condensing hydroxythionaphthenes with dimethylalkoxyamines or their reactive  $\alpha$ -derivs. Both the isatins and the dyes may be halogenated. The isatins may be prepd. from the corresponding dimethylalkoxyaminobenzenes by the Sandmeyer synthesis. Among examples (1) 1,3-dimethyl-4-hydroxy-5-nitrobenzene, is methylated and reduced and then converted into the isonitrosoacetanilide by warming with hydroxylaminesulfonic acid and chloral hydrate; the 4,6-dimethyl-7-methoxyisatin obtained by treatment with  $\text{H}_2\text{SO}_4$  may be chlorinated to 5-chloro-4,6-dimethyl-7-methoxyisatin or brominated to give the corresponding bromo compd.; dyes are obtained by condensing 5-chloro-4,6-dimethyl-7-methoxy (and ethoxy) isatin- $\alpha$ -chloride with 4,7-dimethyl-5-chloro-3-hydroxy-naphthalene and (2) 1-amino-2,5-dimethyl-3-methoxy-1-chlorobenzene, prepd. from 1-amino-2,5-di-methoxy-1-methoxybenzene by chlorination of the corresponding amine and subsequent sapon., is converted into 4,7-dimethyl-5-chloro-6-methoxyisatin by condensation with an oxalic ester (Martinet's method); the isatin may be condensed with 5,6,7-trichloro-3-hydroxythionaphthene.

**Water-soluble derivatives of indigoid dyes.** Walter Metz and Rudolf M. Heidebreich (to General Aniline Works) U. S. 1,933,993, Nov. 7. Indigoid dyes such as indigo, monohaloindigos, alkyl indigos or the like are treated with a benzoic acid sulfohalide in the presence of a cyclic tertiary org. base such as pyridine or its homologs, at temps. between about  $80^\circ$  and the b. p. of the reaction mixt. Several examples are given.

**Condensation product.** I. G. Farbenind. A.-G. (Heinz Scheyer, inventor). Ger. 577,560, June 1, 1933. The condensation product obtained as in 575,948, is further condensed by treatment with an alk. condensing agent such as a soln. of KOH in EtOH. The product is a dye fast to sunlight.

**Condensation products.** Soc. pour l'ind. chim. à Bâle. Swiss 161,739 to 161,743, July 17, 1933. Addns. to 159,665 (C. A. 27, 4688). Products useful as dye intermediates are obtained by condensing 2 mols. of 1-(4'-carboxyphenyl)-3-methyl-5-pyrazolone with 1 mol. of benzidine (161,739), or 1 mol. of *o*-tolidine (161,740), or 1 mol. of *o*-biansidine (161,742), or 2 mols. of 1-(3'-carboxyphenyl)-3-methyl-5-pyrazolone with 1 mol. of *o*-tolidine (161,741), or 1 mol. of *o*-tolidine (161,741), or 1 mol. of *o*-biansidine (161,743).

**1-Methylamino-4-aminoanthraquinone.** Soc. pour l'ind. chim. à Bâle. Brit. 390,662, Aug. 10, 1933. 1-Methoxy-4-aminoanthraquinone is treated with alc.  $\text{MeNH}_2$ , the MeO group being exchanged without substantial disturbance of the  $\text{NH}_2$  group. In an example the reaction is performed with periodic testing of samples until the product is obtained. It dyes acetate rayon blue-violet shades.

**Amino compounds.** I. G. Farbenind. A.-G. Br. 750,065, Aug. 3, 1933. Compds. of the formula  $\text{HN}(\text{R}^1)\text{R}^2$ .  $\text{CH}_2\text{R}^1$  (R is a hydrocarbon group contg. at least 7 C atoms,  $\text{R}^1$  is alkyl, aralkyl, aryl or a hydrogenated aryl group and  $\text{R}^2$  is H, alkyl, aralkyl, aryl or hydrogenated aryl) are prepd. by transforming to ketones carboxylic acids capable of forming soaps and which contain at least 8 C atoms, if desired with the addn. of other carboxylic acids, and transforming the ketones to amino compds. by hydrogenation in the presence of  $\text{NH}_3$  or a primary amino compd. which contains an aliphatic, cyclic, alicyclic or heterocyclic group. The products are used as intermediates for making auxiliary agents in the textile industry and for dispersing agents, etc. Examples are given of the prepn. of 2-phenylaminononadecane, b.p.  $200^\circ$ , 1-phenyl-2-aminoheptadecane and others of unspecified compn.

**Arylides of 2,3-hydroxynaphthoic acid.** Ernest F. Grether and Lindley E. Mills (to Dow Chemical Co.). U. S. 1,935,551, Nov. 14. 2,3-Hydroxynaphthoic acid is condensed with a substituted aniline such as monochloro-dimethoxyaniline, monochlorodimethoxyaniline or monochlorodiphenoxyaniline to form arylides suitable for use as dye intermediates. Various details of procedure are given. Cf. C. A. 27, 5340.

**Hydroxy compounds of phenazone.** I. G. Farbenind. A.-G. (Otto Goll, inventor). Ger. 577,631, June 2, 1933. These are prepd. by the action of fused alkali on phenazone-2-mono- or -2,7-disulfonic acid. Thus, Na phenazone-2-sulfonate is fused with KOH to give 2-hydroxyphenazone, m.  $275^\circ$ . The prepn. of 2,7-dihydroxyphenazone, m.  $300^\circ$ , 2,7-diacetylphenazone, m.  $239^\circ$ , and 2-hydroxyphenazone-7-sulfonic acid is also described. The substances are used as intermediates for dyes and medicines.

**Porphins.** Chemische Fabrik vorm. Sandoz. Swiss 162,355 to 162,359, Aug. 10, 1933. Addns. to 158,834 (C. A. 27, 4686). Strongly basic porphins useful for dyeing and in pharmacy, are prepd. by treating protoporphyrin dimethyl ester, phylloporphyrin monomethyl ester, or pyroporphyrin monomethyl ester with diethylaminoethylenediamine; similarly, strongly basic porphins are prepd. by treating a complex Cu salt of methyl pheophorbide with asym. diethylaminoethylenediamine, or by treating a complex Fe salt of phylloporphyrin with diethylaminoethanol.

**Basic porphins.** Chemische Fabrik vorm. Sandoz. Swiss 161,232 to 161,237, July 1, 1933. Addns. to 158,834 (C. A. 27, 4686). Strongly basic porphins are prepd. by (a) treating methylpheophorbide with diethylaminoethanol, (b) with ethylenediamine, (c) pheophorbide with diethylaminoethylenediamine, (d) hematoporphyrin with diethylaminoethanol, (e) phylloporphyrin with diethylaminoethanol, and (f) pyroporphyrin with diethylaminoethanol. The products are used in dyeing.

**Naphthalene derivatives.** Chemische Fabrik vorm. Sandoz. Swiss 162,350, and 162,351, Aug. 16, 1933. Addns. to 159,408 (C. A. 27, 4685). The compds. 1-iodo-8-hydroxynaphthalene-4,6- and -3,6-disulfonic acid are prep'd. by treating 1-diazo-8-hydroxynaphthalene-4,6- or -3,6-disulfonic acid with Cu bronze in the presence of HCl. The substances are used as *intermediates in the production of dyes or drugs*.

**2,7-Dihydroxynaphthalene-3,6-dicarboxylic acid.** I. G. Farbenind. A.-G. Brit. 395,365, July 12, 1933. The acid, which is a *dye intermediate*, is obtained by treating 2,7-dihydroxynaphthalene alkali salts, 2,7-naphthol mixed with alkali carbonate, or a 2,7-dihydroxynaphthalene-3-carboxylic acid alkali salt or mixt. with alkali carbonate with CO<sub>2</sub> under increased pressure at above 250°.

**Dye intermediates.** I. G. Farbenind. A.-G. Brit. 396,320, Aug. 3, 1933. Addn. to 382,449 (C. A. 27, 4249). Arylamino-1-hydroxynaphthalene-3-carboxylic acids are prep'd. by heating with CO<sub>2</sub> at a raised pressure, an alkali metal salt of a 1-hydroxynaphthalene contg. an arylamino group in 5-, 6-, 7- or 8-position, the COOH group apparently entering the 2-position. In an example 1-hydroxy-7-phenylaminonaphthalene is treated in aq. KOH in an autoclave with CO<sub>2</sub> at about 200°.

**Dye intermediate.** Soc. pour l'ind. chim. à Bâle. Swiss 160,170, Apr. 17, 1933. A new intermediate is prep'd. by introducing an acetyl group into both NH<sub>2</sub> groups of 1,4-diamino-5-hydroxynaphthalene-7-sulfonic acid by treatment with an acetylating agent.

**Dyeing.** H. Th. Bohme A.-G. Brit. 395,853, July 27, 1933. Impregnating baths and printing colors contg. arylides of 2,3-hydroxynaphthoic acid are made by using as dispersing agents sulfonated or phosphatized compds. of the fatty series of high mol. wt. which contain at least 9 C atoms and still contain free alc. OH groups. In examples (1) 2,3-hydroxynaphthoic acid bianiside or  $\alpha$ -naphthalide is dispersed with sulfonated oleic alc. which still contains a free alc. OH group and (2) 2,3-hydroxynaphthoic acid *o*-toluide is dispersed with ricinoleic alc. sulfuric ester which still contains a free alc. OH group (monosulfuric acid ester of octadecanetriol). Sulfonated alics. that still contain free alc. OH groups are made by sulfonating unsat'd. alics. contg. at least 9 C atoms at about 0°, sulfonation taking place at the double bonds. Sulfonated partially esterified polyhydric alics. contg. more than 9 C atoms are made by esterifying the alics. obtained by reducing sugars with fatty acids and sulfonating the esters so that 1 or more OH groups remain free. In an example mannitol is treated with concd. H<sub>2</sub>SO<sub>4</sub> and oleic acid. Phosphatized compds. are made as follows: (a) mannitol is treated with anhyd. H<sub>3</sub>PO<sub>4</sub> and P<sub>2</sub>O<sub>5</sub> and then with oleic acid, (b) hydroxystearic alc. (1,12-octadecanediol) is treated with chlorinated acetylphosphorous acid (from PCl<sub>3</sub> and AcOH), (c) ricinoleic alc. is treated with AcCl and H<sub>3</sub>PO<sub>4</sub> and (d) oleic acid is treated with acetylphosphoric acid (from H<sub>3</sub>PO<sub>4</sub> and Ac<sub>2</sub>O).

**Dyeing.** Soc. pour l'ind. chim. à Bâle. Brit. 396,859, Aug. 17, 1933. Wool is grounded with an unsulfonated arylide of 2,3-hydroxynaphthoic acid, contg. no SO<sub>2</sub>NHR group, under specified conditions and developed by means of a diazotized amine of the general formula H<sub>2</sub>NC:CH.CX:CH:CH:CY, where 1 X is —NHCOR

(R is alkyl, aralkyl, aryloxyalkyl, aryl) and the other X and also Y is H, halogen, alkyl or alkoxy. The grounding conditions are (a) the liquor ratio is from 6:1 to 50:1, (b) not more than 5% of the arylide on the wt. of the wool, (c) the NaOH used is 1.5-2.5 times the amt. of arylide but should not exceed 4 g. per l. of grounding liquor and (d) the grounding bath should be exhausted. An electrolyte may be present in the bath. In examples the following dyes are made on wool (1) 1-amino-4-benzoylamino-2,5-dimethoxybenzene  $\rightarrow$  *p*-chloroaniline, (2) 1-amino-4-benzoylamino-2,5-diethoxybenzene  $\rightarrow$   $\alpha$ -naphthylamide and (3) 1-amino-4-benzoylamino-2-methoxy-5-methylbenzene  $\rightarrow$  aniline.

**Dyeing.** Société pour l'ind. chim. à Bâle. Brit. 396,883, Aug. 17, 1933. Textile materials contg. cellulose

esters and ethers are dyed or printed with products obtained by condensing a compd. contg. a reactive CH<sub>2</sub> or CH<sub>3</sub> group with an aromatic aldehyde or nitroso compd., especially 1 contg. an NH<sub>2</sub> group which is unsubstituted or substituted by alkyl, aryl or aralkyl. In examples acetate silk is dyed with (1) products obtained by condensing *p*-dimethylaminobenzaldehyde with 1-(2'-chloro)phenyl-3-methyl-5-pyrazolone, Et cyanoacetate and the corresponding Me, iso-Pr and Bu esters, (2) products obtained by sapon. said esters after condensation and (3) products obtained by condensing *p*-nitrosodimethylaniline with 1-phenyl-3-methyl-5-pyrazolone.

**Dyeing compositions.** Joseph Nusslein (to General Aniline Works). U. S. 1,933,068, Oct. 31. Aq. preps. suitable for dyeing wool or cotton, etc., comprise a vat dye such as one of the indanthrene series and an aromatic sulfonic acid contg. an alkyl radical with more than 2 C atoms such as a propylated naphthalenesulfonic acid which serves as a wetting agent.

**Dyeing level tints on cotton goods or the like.** Justin F. Wait. U. S. 1,934,936, Nov. 14. In dyeing a light level tint on cotton, the goods are suspended in water held at a temp. of about 75° for a short time while flowing ozonized air in contact with the water and the goods, and there is subsequently applied a dye, such as a diphenylmethane dye not normally considered as having affinity for cotton goods so treated, which produces a light tinting. App. is described.

**Dyeing wool.** Soc. pour l'ind. chim. à Bâle. Fr. 41,688, Mar. 10, 1933. Addn. to 734,189 (C. A. 27, 1205). The diazo derivs. of *p*-aminodiphenylamines are replaced by diazo derivs. of compds. of the general formula H<sub>2</sub>NC:CH.CX:CH:CH:CY, in which one X is —NHCOR

(R is alkyl, aralkyl, aryloxyalkyl or aryl) and the other X and Y are H, a halogen or an alkyl or alkoxy group, e. g., 4-benzoylamino-1-amino-2,5-diethoxybenzene.

**Dyeing furs, hairs and feathers.** Erich Lehmann (to General Aniline Works). U. S. 1,932,901, Oct. 31. For producing variously colored dyeings, the material is treated in a bath contg. an oxidizing agent such as H<sub>2</sub>O<sub>2</sub> and a benzene compd. contg. as a substituent an amino group substituted by an aliphatic alc., such as a condensation product of 1-methoxy-2,5-diaminobenzene and 1,2-dihydroxy-3-chloropropane or the like. Mordants are used.

**Dyeing and printing textiles.** Durand & Huguenin S. A. Fr. 749,461, July 25, 1933. Esters of leuco derivs. of vat dyes which are easily sol. in water are prep'd. by transforming the H<sub>2</sub>SO<sub>4</sub> esters of leuco derivs. of vat dyes into their Li salts.

**Printing.** Durand & Huguenin A.-G. Brit. 395,949, July 27, 1933. See Fr. 748,403 (C. A. 27, 5551).

**Sizing textile fibers.** I. G. Farbenind. A.-G. Fr. 41,788, Apr. 13, 1933. Addn. to 687,155 (C. A. 25, 828). Instead of a polyvinyl alc., a mixt. of at least 2 polyvinyl alics. having different viscosities is used, or a mixt. in which one or more of the constituents are replaced by a sol. deriv. in water of a polyvinyl alc., the viscosities of the various constituents being different.

**Printing textiles.** Henry Giesler. Brit. 396,219, Aug. 3, 1933. Knitted fabrics with ornamental effects are obtained by re-knitting yarn obtained by de-knitting a printed knitted fabric, the re-knitted fabric being preferably of a width different from that of the original fabric. Among examples woolen yarn dyed with Cloth fast brilliant red 4B is knitted into strips which are printed with Neolan black WA (1st roller) and a hyposulfite discharge (2nd roller); the strips are then de-knitted and re-knitted to obtain a fabric with black-white effects on a red ground.

**Printing wool.** A. Holtmann & Co. G. m. b. H. (Mark Frankfurt, inventor). Ger. 577,832, June 6, 1933. A paste contg. wool dyes, thickening and the usual addn. of urea or glycerol is used. Thus, a paste for wool printing contains the dye obtained by coupling 2-hydroxynaphthalene and diazotized 2-aminonaphthalenesulfonic acid, urea, British gum, (CO<sub>2</sub>H)<sub>2</sub> and water.



**Reserve-printing fabrics.** Soc. pour l'ind. chim. à Bâle. Ger. 577,702, June 3, 1933. Fabric impregnated with coupling components is printed with xanthogenates and developed with diazo compds. Thus, fabric impregnated with a soln. of 2,3-hydroxynaphthoic acid anilide in NaOH, Turkey-red oil and hot water is printed with a paste contg. K xanthogenate, water and gum. The dried fabric is then developed with a soln. of the diazo salt of 4-chloro-2-aminodiphenyl ether. Other examples are given.

**Discharge printing.** British Celanese Ltd., Henry C. (Opin and George H. Ellis. Brit. 396,730, Aug. 9, 1933. Discharge effects on textile and other materials are obtained by the action of discharging agents, having an acid reaction or liberating acid during the discharge process, in the presence of an org. base which restricts acidity and minimizes the tendering of the material. The base may be incorporated in the discharge compn. or applied separately, e. g., by padding before or after application of the compn. and before steaming, aging or like moist heat treatment. Any other desired substances may be present in the discharge compn., e. g., swelling agents (in printing cellulose deriv. materials), dyes resistant to the discharging agent, basic coloring matters of the di- and tri-aryl-methane, azine, oxazine and thiazine series. In examples (1) a silk fabric colored with a dye dischargeable by  $\text{SnCl}_2$  is printed with a compn. contg.  $\text{SnCl}_2$ , methylated spirits (1) urea, NaSCN, citric acid, gum arabic (1:1) or gum tragacanth (10%) and  $\text{H}_2\text{O}$  and then dried, aged and steamed to give a white discharge on a colored ground and (2) a fabric contg. silk and cellulose acetate and dyed with dyes dischargeable with  $\text{SnCl}_2$  is printed with a compn. contg.  $\text{SnCl}_2$ , I, sym-dimethylurea, NaSCN and gum arabic thickening and then dried, steamed, washed off and again dried.

**Coloring bone articles.** Soc. pour l'ind. chim. à Bâle. Swiss 162,206, Aug. 16, 1933. Buttons, buckles, spoons, etc., are colored by dyeing them with dyes comprising complex metal compds., such as chromed dyes.

**Apparatus for dyeing yarn locally.** Eclipse Textile Devices Inc. Ger. 577,937, June 7, 1933. Addn. to 511,731 (C. A. 25, 1391).

**Dyeing apparatus for hanks of thread and cloth in the piece.** Smith, Drum & Co. Fr. 749,833, July 29, 1933.

**Dye-grinding mill.** Johann Aebi. Ger. 577,904, June 7, 1933.

**Fibers.** Comptoir des textiles artificiels (Soc. anon.). Fr. 749,734, July 28, 1933. Natural or artificial fibers are transformed to a light flocculent state by passage through a rotor having pivoted arms rotating at a high speed.

**Vegetable fibers.** Emil Schwabe. Ger. 577,889, June 6, 1933. These are obtained by treating straw, etc., with a soln. of alkali, alk. earth or  $\text{NH}_4$  salts of complex org.  $\text{H}_3\text{BO}_3$  compds. Thus, ramie bast is treated with a soln. contg. NaOH,  $\text{H}_3\text{BO}_3$  and glacial AcOH.

**Fibers and fillers for plastic compositions from kapok, etc., cores.** Marcel Dupret. Brit. 396,243, Aug. 3, 1933. Fibers for mattresses and a filler for use with rubber to form a plastic compn. are obtained from the seed cores of kapok and like pods of the Bombacaceae by disintegrating, by beating, crushing, grinding or passing through a hard waste opener to form "ground centers" which is used as a filler or further sepd. to obtain the fibers and the powd. meal. The finer filler thus obtained may be substituted for cork as a filling material, e. g., mixed with rubber latex to obtain a tough elastic sheet like soft bukkum.

**Apparatus for wet-treating textile fibers.** Eclipse Textile Devices Inc. Ger. 577,939, June 7, 1933.

**Sizing textile fibers.** Auguste F. Galvin. Brit. 396,952, Aug. 17, 1933. Silk or rayon fibers are sized at 35-80 with a soln. of linseed oil in 0.25-2 times its vol. of  $\text{C}_6\text{H}_6$ , PhMe or like solvent or with an emulsion of the oil in 2-7 times its vol. of  $\text{H}_2\text{O}$ .

**Delustering filaments.** Franz Hoelkeskamp (to American Bemberg Corp.). U. S. 1,932,734, Oct. 31. The filaments are successively treated with a soln. contg.

baryta and a soln. contg.  $\text{Al}_2(\text{SO}_4)_3$ , then rinsed with water and treated with a wax-soap emulsion.

**Treating artificial threads, horsehair, ribbons, etc.** British Celanese Ltd. Brit. 395,380, July 14, 1933. The luster of artificial yarns, etc., contg. cellulose acetate or other org. esters or ethers of cellulose is modified or reduced by treatment in the form of hanks or fabrics with aq. suspensions or dispersions of  $\text{H}_2\text{O}$ -insol. soaps, e. g., Zn, Mg and alk. earth stearates, oleates, palmitates, cerotates, elaidates or carnaubates. The treatment is preferably in the presence of a swelling agent for the cellulose deriv. The delustered threads, etc., do not cut the guides, etc., and they possess improved textile properties, e. g., they knit closer and the fabrics are free from defects and the packages are less liable to collapse.

**Apparatus for wet-treating wound yarn.** Vereinigte Glanzstoff-Fabriken A.-G. Ger. 577,940, June 7, 1933.

**Treating textiles.** Bleachers' Association Ltd. and George D. Sutton. Brit. 395,722, July 21, 1933. Fibers or fabrics consisting of or contg. cellulose acetate are made resistant to delustering by subjection to the action of dil. aq. AcOH under conditions of concn., temp., etc., such that substantially no swelling occurs and then washing free from the acid. Instead of or in addn. to AcOH HCOOH, propionic, HCl,  $\text{HNO}_3$  or chloroacetic acid may be used. The treated goods may again be made susceptible to delustering by treatment with dil. aq. succinic, lactic or  $\text{H}_2\text{SO}_4$ .

**Treating textiles.** Wm. M. Theobald. Brit. 396,434, Aug. 4, 1933. In dry-cleaning or dyeing fabrics, etc., the fabric is treated with a soln. of an animal, vegetable or mineral oil, wax or fat in an org. solvent; evapn. of the solvent causes impregnation with the wax, etc. The soln. may be applied simultaneously with the dry-cleaning solvent or the cleaned or dried dyed fabric may be immersed in or sprayed with the soln., excess of the latter removed and the treated fabric dried. The process restores the original appearance and texture.

**Treating textiles.** Ignacy Rassalski and Roman Vogel. Brit. 396,750, Aug. 9, 1933. Slivers of hard fibrous material, e. g., sisal, manilla hemp, are treated with a mixt. of lanolin, glycerol, mineral oil, soda lye and talc and are then spun. The resulting string is treated with a mixt. of casein, glycerol, stearin and soda lye and is preferably smoothed, dried and treated with formalin in a single operation.

**Apparatus for liquid treatments of textile materials as in treating silk with oil emulsions.** Albert J. Pfeiffer and Thayer P. Gates. U. S. 1,934,208, Nov. 7. Various details of a closed container and liquid circulation system are described.

**Preparation for textile treatment baths.** I. G. Farbenind. A.-G. Brit. 396,050, July 19, 1933. Wool, silk, fur and other animal fibers are protected against the detrimental action of alk. and acid liquors by adding thereto a prepn. consisting of a salt, oxide or hydroxide of Mg, Zn or Cd and a natural or waste org. substance of high mol. wt., e. g., sugars, sol. starch or other carbohydrates, albuminous compds. and the degradation products thereof, waste liquors from sulfite cellulose and molasses, the metal compd. being present in the prepn. in ams. up to about 5% (calcd. as oxide) such that no metallic ions are detectable therein or in aq. solns. thereof. The org. compds. form sol. or colloidal dispersed complex compds. with the metallic compd. or act as protective colloids and prevent the sepn. of the metallic oxides in alk. soln. Aminocetic acid may be added to facilitate dispersion of the metallic compd.

**Sizing textiles.** A. Th. Böhme Chem. Fabrik (Richard Böhme, inventor). Ger. 577,831, June 6, 1933. Textiles, especially rayon yarns, are sized by treatment with finely dispersed solns. of metal salts of sulfonated aliphatic or cyclic fatty acids, e. g., naphthenic acids, or their esters. Thus, a sizing soln. may be made up from commercial water-sol. casein, Turkey-red oil, a conserving agent such as salicylic acid and  $\text{BaCl}_2$  soln. Sulfonated peanut oil and  $\text{SrCl}_2$  are used instead of Turkey-red oil and  $\text{BaCl}_2$  in another example.

**Apparatus for wet-treating textile pieces.** Maschinen-fabrik Benninger A.-G. Ger. 577,938, June 7, 1933.

**Apparatus for cooling cloth and conditioning it by treatment with water.** Ernest Farrell. U. S. 1,935,022, Nov. 14. Structural and mech. features.

**Apparatus for treating fabrics with viscose, etc.** Arthur H. Kilner. Ger. 588,061 and 588,062, Oct. 10, 1933. See U. S. 1,892,579 (C. A. 27, 2314).

**Viscose fabrics.** Feldmühle A.-G. vormalis Loeb, Schoenfeld & Co., Rorschach. Swiss 161,018, June 16, 1933. Textile fabrics with a mat sheen are produced by using viscose in which are suspended metal salts capable of pptn. in the presence of a protective colloid. Thus, Ba salts may be suspended and starch used as the protective colloid.

**Rayon.** Benuo Borzykowski. Fr. 750,014, Aug. 3, 1933. Instead of the various washing, desulfurizing and bleaching baths generally used, a single bath is used which will accomplish all these operations. E. g., viscose silk is treated with a 2%  $\text{Na}_2\text{SO}_3$  soln. at 60–5°. The sulfite neutralizes the acid, eliminates the salt and the  $\text{SO}_2$  liberated bleaches the silk.

**Rayon from fibroin.** Gustavus J. Esselen (to Corticelli Silk Co.). U. S. 1,931,413, Nov. 7. Fibroin is dissolved in a cuprammonium solvent contg. a sugar or glycerol and free from acid radicals; the soln. is filtered, extruded into a bath contg.  $\text{NaHSO}_4$  and  $\text{Al}_2(\text{SO}_4)_3$ ; the fibers formed are wound on a bobbin, and are treated (as by a soap soln.) to prevent their adherence together on the bobbin. App. is described.

**Desulfurizing rayon in package form.** Hayden B. Kline (to Industrial Rayon Corp.). U. S. 1,932,789, Oct. 31. For desulfurizing rayon in package form with min effect upon or contamination by the material of either the device on which the rayon is held or the app. in which it is desulfurized, where such material includes one substance such as iron affected less as the soln. is made more alk. and another substance such as Al affected less as the soln. is made more acid, the rayon in package form is treated in such app. in a soln. of  $\text{NH}_4$  sulfide contg.  $\text{NH}_4\text{OH}$  in such quantity that the OH ion concn. of the soln. is such that effect upon and contamination by both of such substances is minimized.

**Incandescent mantles.** Deutsche Gasglühlicht-Auer G. m. b. H. Brit. 395,975, July 27, 1933. The mantles are made from plaited rayon and provided with reinforcing ribs composed of staple fiber. In 396,010, July 27, 1933, the longitudinal ribs are composed of a yarn that will shrink to a higher degree during the manuf. of the mantle than the yarn used for the rest of the mantle. The body may be of artificial silk or ramie and the ribs of cotton.

**Silk.** Francesco S. Rossi. Swiss 161,539, July 17, 1933. A concd. soln. of natural silk in  $\text{HCO}_2\text{H}$  is obtained

by adding a little mineral salt such as  $\text{CaCl}_2$  to facilitate dispersion.

**Regenerated silk yarn.** Samuro Yamamoto. Brit. 396,901, Aug. 17, 1933. A regenerated silk filament is subjected, during coagulation, by deflection to a frictional drag increasing progressively or by graduated stages. App. is described.

**Dust trunks for cotton or other fiber-opening and cleaning machines.** Howard & Bullough Ltd. and Arthur NeuKirchner. Brit. 396,885, Aug. 17, 1933.

**Machines for opening cotton or other fibers.** Richard Greenhalgh and Josiah Greenhalgh. Brit. 396,176, Aug. 3, 1933.

**Openers or scutchers for cotton, etc.** Harold Andrew. Brit. 396,918, Aug. 17, 1933.

**Rendering clothing or other fibrous material impervious to tetraalkyl lead compounds.** Wm. S. Calcott and Howell V. Bricka (to E. I. du Pont de Nemours & Co.). U. S. 1,933,704, Nov. 7. The material is impregnated with a compn. comprising a Na soap, glycerol and  $\text{EtOH}$ .

**Coating apparatus for making waterproof and washable linen, e. g., collars.** Aktiebolaget Reno-Kragar. Brit. 396,653, Aug. 10, 1933.

**Woven fabric suitable for lining shoe uppers.** Henry Kahlmeyer (to United Shoe Machinery Corp.). U. S. 1,931,612, Oct. 24. A woven fabric is formed of individual fibers which carry minute discrete particles of dry adhesive such as paracumaronic resin adhering to them (the remainder of the length of the fibers being uncoated) which serve to secure the fabric to assocd. material. Cf. C. A. 27, 5201.

**Apparatus and method for drying or conditioning materials in long lengths, e. g., cloth or warp.** Wm. W. Spooner. Brit. 388,167, Feb. 23, 1933, and 396,106, July 31, 1933, divided on 388,167.

**Tank and associated apparatus for treating lengths of fabric with washing or other liquids.** Florent Hinneken. U. S. 1,932,105, Oct. 24. Structural and mech. details.

**Apparatus for coating lengths of fabrics with various materials.** James W. Faulkner. U. S. 1,932,727, Oct. 31. Structural and mech. features.

**Furs.** Georges Romanc. Fr. 750,111, Aug. 5, 1933. Furs are made fuller by shrinking and softening the skin and then drying. These operations may be repeated several times.

**Tentering machine with a steaming unit, provided with a steam separator.** Maurice M. Kasanof. Brit. 396,350, Aug. 3, 1933.

**Dry cleaning.** Alexander Wacker Gesellschaft für elektrisch-chemische Industrie G. m. b. H. Brit. 395,517, July 20, 1933. See Fr. 739,141 (C. A. 27, 2047).

**Filter suitable for use with dry-cleaning apparatus.** James A. Bell. U. S. 1,932,569, Oct. 31. Structural details.

## 26 PAINTS, VARNISHES AND RESINS

A. H. SABIN

**Case of lead poisoning by sprayed paint.** W. Stoldt. Pharm. Zentralhalle 74, 545-6(1933). W. O. E.

**Artificial vermilion in the Middle Ages.** Daniel V. Thompson, Jr. Tech. Studies Field of Fine Arts 2, 62-70 (1933). E. H.

**New notes on the reconstitution of the pictorial technic of Jan van Eyck.** Jacques Maroger and Geo. Mourier-Malouf. Compl. rend. 197, 766 7(1933); cf. C. A. 26, 3938.—The medium used by van Eyck is transparent when dry and consists of microscopical superposed oleoresinous droplets agglomerated in the stabilizing material, which also is transparent. It is thus composed of 2 different optical systems, one continuous and the other discontinuous, with different  $n$ s. The distribution of the pigment throughout the medium is governed by a definite law for each pigment; the oleoresinous droplets exhibit selective affinity for the pigments, which prevents contact of the particles of the different pigments. This results in an

extremely high chromatic value with a min. amt. of pigment, which cannot be obtained with present-day practice, and at the same time eliminates the possibility of ultimate chem. reaction between different pigments, which explains the perfect state of preservation of the paintings. From its very nature, van Eyck's medium dries throughout the mass (and not from the surface inward as with present-day paints), which accounts for the total absence of cracking or blistering of the paintings. A. P.-C.

**The specifications of China wood oil.** M. Th. François. (Chimie & Industrie Special No., 1051-5(June, 1933). cf. C. A. 27, 5202. Analysis of 4 samples of tung oil (*Aleurites fordii*) of known purity gave the following results: acid no. (as % oleic acid) 0.53-0.84, sapon. no. 192-5, I no. (Hanus) 144-173, I no. (Wijz) 159-179, d<sub>4</sub> 0.9422-0.9489,  $n_D^{20}$  1.51875-1.51992; 2 samples of oil of *A. montana* of known purity gave: acid no. 1.3 15, sapon. no. 191-192, I no. (Hanus) 137 170, I no. (Wijz)

155-168,  $d_4^{20}$  0.9340-0.9390,  $n_D^{20}$  1.51019-1.51194; 1 sample of oil of *A. moluccana* of known purity gave: acid no. 12, sapon. no. 192, I no. (Hanus) 140-159, I no. (Wije) 150-173,  $d_4^{20}$  0.9286,  $n_D^{20}$  1.47449. Some of the values fall appreciably outside the limits set in the generally accepted specifications in the U. S., Gt. Britain, Australia, China, Germany and France, presumably because the specifications were in most cases based on the examn. of com. samples which may not have been pure. The I no. is considered to be of little value because of lack of proper duplication of results; 7 days are required to obtain the true value. The most promising single test, from the triple standpoint of rapidity, accuracy and specificity, seems to be the  $\pi$ , or possibly better still the refractive dispersion, which distinguishes between tung oil and oil of *A. montana*.

A. Papineau-Couture

Selection of nitrocellulose varnishes for covering imitation leather. V. P. Malign. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Koshevennoi Prom.* 1932, No. 3, 5.—This imitation leather consists of a no. of paper layers held together by a mixt. of animal glue and glycerol. The finished plates are treated in a formalin bath and dried. This substitute is used for making trunks; however, it has the disadvantage of losing its shape and its dark gray color is another undesirable feature. It was attempted to eliminate these disadvantages by covering the substitute with a base varnish composed of a mixt. of one part (by weight) of nitrocellulose contg. 10.5-11.5% N and 2 pts. of acetone-alc. mixt. and with the addn. of the necessary amt. of Am acetate and pigments; the whole is thoroughly ground with castor oil and a layer placed on the imitation plate. The latter was then dried at 25-30°. The face was covered 2-3 times with that compn. and once with varnish. The results were satisfactory.

A. A. Boehlingk

Benzylcellulose lacquers. L. Meunier and M. Goufard. *Chem. Tech.* 22, 200-3 (1933); cf. C. A. 27, 1593.—Benzyl groups may be detd. either by acetylation or by forming benzyl iodide. Three specimens of high-, medium- and low-viscosity all contained about 52% benzyl groups, corresponding closely to 2 benzyl groups per  $C_{12}H_{10}O_2$  group. Tests showed that benzylcellulose is superior to acetate cellulose and nitrocellulose in decompn. temp., non-hygroscopicity, resistance to acids and alkalis, adhesion, toughness and dielec. strength. Benzylcellulose contg. 56% benzyl groups is sol. in  $C_6H_6$ ; that contg. 52% requires addn. of 10-20%  $PrOH$ . Benzylcellulose films swell about 3% in  $H_2O$ ; swelling increases progressively with concn. on addn. of  $KtOH$ , acetone (partial sol. in 40% soln.), pyridine, phenol and aniline. The partition coeffs. of the last 2 compds. between  $H_2O$  and benzylcellulose are const. Viscosity measurements on benzylcellulose solns. indicate no appreciable internal mobility; viscosity declines on aging. The properties of benzylcellulose indicate that it may be used in making leather or artificial leather.

H. B. Merrill

The use of polymerization products of organic acids with nitrocellulose lacquers and plastics. A. Bresser. *Synthetic and Applied Finishes* (London) 4, No. 41, 167-8 (1933), Nitrocellulose 4, 166 (1933).

E. M. S.

Gums and resins. V. G. Fourman. *Drug and Cosmetic Ind.* 33, 228, 268 (1933).—A review. H. M. B.

The development, characteristics and future of urea-formaldehyde resins and molding powders. James Taylor. *Australian Plastics & Allied Trades Rev.* 2, No. 2, 8-11 (1933).

E. H.

Printing ink (Wells) 23. Detn. of mol. wt. of linseed oil and its polymerides (Gay) 2. Aromatic bases [use in prepn. of artificial resins] (Fr. pat. 749,964) 10. Metallic soaps [products used in the paint, varnish and lacquer industries] (Brit. pat. 395,406) 27. Esters [for plasticizing and softening agents for lacquers] (Brit. pat. 395,240) 10. Polyvinyl compds. [products used for making lacquers] (Brit. pat. 396,186) 10. Polymerization product for coatings (U. S. pat. 1,933,052) 18. Cellulose acyl nitrates for lacquers (U. S. pat. 1,933,296) 23.

1. Polymerized vinyl esters and fatty oils [products for lacquers] (U. S. pat. 1,934,297) 10.

Siccatives for paints, etc. Herman A. Bruson\* (to Resinose Products & Chemical Co.). U. S. 1,933,520, Oct. 31. Compns. are described comprising Co, Mn and Pb salts such as those of *p*-isopropylphenolcarboxylic acid, *p*-isopropylsalicylic acid, *p*-sec-octylsalicylic acid, *p*-sec-butyl- or amyl-salicylic acid and the like. U. S. 1,933,521 relates to the similar use of compds. such as salts of *p*-cymyl-*o*-benzoic acid.

Storage tank and mixing device suitable for preparing paints, etc. Fred F. Schwentker (to General Elec. Co.). U. S. 1,933,346, Oct. 31. Structural and mech. features.

Titanium dioxide. Herbert L. Rhodes (to Glidden Co.). U. S. 1,931,682, Oct. 24.  $TiO_2$  is calcined with 0.1-2.5% of a titanate of the alkali metal group such as Na titanate which will remain white or light colored after calcination and serves to give the product lower oil absorption, higher opacity and improved mixing properties.

Zinc white. Joseph M. H. Cornillat. Fr. 41,712, Mar. 29, 1933. Addn. to 632,235 (C. A. 22, 3498). Zn is heated indirectly by the combustion flame to a temp. near its f. p., and then directly by this flame which provokes instant fusion and volatilization in the current of  $CO_2$  from the flame.

Permanent quick drying writing fluid. Carl S. Miner and Galen H. Sayler (to Parker Pen Co.). U. S. 1,932,248, Oct. 24. A direct dye such as Schultz No. 424 is used with flake NaOH,  $NH_4$  metavanadate, amyl xanthate, corn starch, bentonite and water.

Ink suitable for printing on materials such as cellulose acetate plastics. Americo F. Caprio and William Bowker (to Celluloid Corp.). U. S. 1,931,485, Oct. 24. An ink is formed contg. low-viscosity cellulose acetate or nitrate 100, dimethyl phthalate 200 and a pigment 75-200 parts.

Varnishes, etc. Albert J. Ducamp and Marie E. A. Baule. Fr. 41,711, Mar. 29, 1933. Addn. to 729,547 (C. A. 27, 434). Surfaces of metals, more or less oxidized, are coated with fatty substances capable of resinifying and contg. one or more fatty acids. The oxide is dissolved in the coating by the action of heat and the whole is transformed by catalytic action to a solid layer.

Coating copper or other metals to prevent corrosion. Albert J. Ducamp and Marie E. A. Baule. U. S. 1,932,156, Oct. 24. Dist. castor oil, free from heptylic aldehyde, is mixed with undecylenic acid and a metal oxide such as Cu oxide, and the mixt. is heated so that the castor oil is resinified and oxidized and the product is used as an insulating-resistant varnish. The material is heated after application, and other ingredients such as naphthenic acids, gums, gasoline, alc., pigments, etc. may be added. Cf. C. A. 27, 4427.

"Wrinkle finish" varnish. Glen H. Burgman (to G. J. Liebhich Co.). U. S. 1,934,034, Nov. 7. A base for a wrinkle finish varnish comprises raw China wood oil and a hard fusible resin in a proportion of 5-10% the wt. of the oil, the compn. being heated to 175-285° for 4-8 hrs.

Lacquers; putty compositions. Deutsche Hydrierwerke A.-G. Brit. 396,924, Aug. 17, 1933. Esters of fatty acids contg. not more than 6 C atoms with alcs. corresponding to soap-forming carboxylic acids, e. g., alcs. corresponding to coconut oil, naphthenic and resin acids and oleic, cetyl, myristic and lauryl alcs., are used as constituents of oil lacquers and varnishes and putty compns. Free alcs. corresponding to soap-forming carboxylic acids may also be included. In examples (1) a lacquer is prepd. from linseed oil, cetyl acetate, oleic alc., varnish benzene and a pigment and (2) a putty is prepd. from linseed oil varnish, turpentine oil, cetyl acetate, myristic alc., slate dust and white lead.

Lacquer. J. R. Geigy A.-G. Ger. 577,724, June 3, 1933. A light-fast yellow lacquer is prepd. by coloring nitro- or acetylcellulose lacquer with the azo dye obtained from *o*-nitrodiazonium compds. of benzene derivs. without free  $COOH$  or  $HSO_3$  groups, and acetoacetic esters. Thus, the lacquer is colored by the azo dye from 1-methyl-3-

nitro-6-aminobenzene and the ethyl ester of acetoacetic acid.

**Synthetic gum lacquers.** Charles T. Ellis (to Sherwin-Williams Co.). U. S. 1,934,261, Nov. 7. A base for use in pyroxylin coating compns. consists of 50 parts of a "destructively-distd. castor-oil condensation product" mixed with a hardening agent such as ester gum, fused Kauri copal or fused Congo copal, together with BuOAc 15, AmOAc 10, BuOH 5 and toluene 20 parts.

**Compounds of the aroyl-o-benzoic acid series.** Herman A. Bruson (to Resinous Products & Chemical Co.). U. S. 1,934,033, Nov. 7. Siccatives suitable for dissolving in linseed oil, China wood oil, soy-bean oil, etc., in making *varnishes, enamels, paints*, etc., comprise metal salts such as the Al, Ba, Ca, Pb, Ce, Mg, Sr, Zn, Cr, Co, Cu, Fe or V salts of synthetic acids (prepn of some of which is described) such as *n*-butylbenzoyl-o-benzoic acid, *n*-amylbenzoyl-o-benzoic acid, *sec*-amylbenzoyl-o-benzoic acid, *di sec*-amylbenzoyl-o-benzoic acid, *sec*-hexylbenzoyl-o-benzoic acid, *sec*-octylbenzoyl-o-benzoic acid, *sec*-amyltoluyl-o-benzoic acid, *sec*-octyltoluyl-o-benzoic acid, *sec*-amylxyloyl-o-benzoic acid, *sec*-octylxyloyl-o-benzoic acid, *sec*-amyl-naphthoyl-o-benzoic acid, *sec*-amyl-tetrahydronaphthoyl-o-benzoic acid, *sec*-octyl-naphthoyl-o-benzoic acid, and the like (which acids may also be employed in the crude state or admixed with each other).

**Coating compositions.** E. I. du Pont de Nemours & Co. Brit. 396,081, July 28, 1933. A vehicle which promotes *leafing of flake pigments*, e. g., flake Al, graphite, mica and flake sulfide pigments, consists of an oil-modified polyhydric alc.-polybasic acid resin having an acid value of 15 or less and driers dissolved in mineral spirits or other solvent to give a soln. having a viscosity between A and F on the Gardner-Holdt scales. The flake pigment may be first coated with substances, e. g., stearic acid, that enhance the *leafing properties*. The resins may be formed by condensing in presence of PhO phthalic anhydride, glycerol (which may be replaced in part by ethylene glycol) and 45-70% of linseed, China wood, perilla or menhaden oils, or acids derived from these oils.

**Rust-preventing coatings.** I. G. Farbenind. A.-G. (Hermann Schladebach and Herbert Hahle, inventors). Ger. 576,210, May 9, 1933. Addn. to 570,738 (C. A. 27, 4427). The protective coating of cellulose ether lacquer of 570,738 is applied over a layer of drying fatty oil.

**Preventing oxidation of metal objects.** Sigg A. G. Swiss 159,677, Aug. 16, 1933. Oxidation of metal bodies, especially of Al, is prevented by cleaning off grease and applying a layer of paraffin, ceresin or other wax-like substance; a second layer consisting of a soln. of synthetic resin in a primary state of condensation is then applied and the object heated to 250-400° so that the first layer is volatilized and the second layer burned on to the object.

**Composition for making molded articles.** Frazier Groff (to Bakelite Corp.). U. S. 1,931,958, Oct. 24. A compn. suitable for making molded articles comprises a resin of the hexamethylenetetramine triphenol type, a water-repellant org. substance of low vapor pressure such as rosin or carnauba wax and a filling material such as mica.

**Inlaid linoleum.** Emerson R. Newell (to Sloane-Blahon Corp.). U. S. 1,932,419, Oct. 31. Mech. features.

**Resin.** Hercules Powder Co. Ger. 577,723, June 3, 1933. Resin is purified by dissolving it in an org. solvent and treating it with PhOH, chlorohydrin, 2-furancarbinol SO<sub>2</sub> or PhNH<sub>2</sub>. The purified resin may be used for making *glaze for paper*.

**Resin esters.** I. G. Farbenind. A.-G. (Arthur Voss, inventor). Ger. 577,691, June 2, 1933. In prepg. resin esters, a low-mol., difficultly volatile org. acid or synthetic resin acid is added before or during the esterification. Thus, colophony is fused with glycerol, with addn. of diglycolic acid. The products are used in the *paint and varnish industry*.

**Vinyl resin.** Ernest W. Reid (to Carbide & Carbon Chemicals Corp.). U. S. 1,935,577, Nov. 14. An arti-

ficial resin which may be used for lacquers or plastics is obtained by conjointly polymerizing vinyl chloride and a vinyl ester of a lower aliphatic acid such as vinyl acetate.

**Condensation products of polyvinyl alcohol with cyclic ketones.** Georg Kranzlein, Arthur Voss and Werner Starck (to I. G. Farbenind. A.-G.). U. S. 1,933,986, Nov. 7. Condensation products suitable for use in making *lacquers, molding compns.*, etc., are obtained by causing a cyclic ketone such as  $\alpha$ -methylcyclohexanone, cyclohexanone or *p*-chlorocyclohexanone to act upon a polyvinyl alc., in the presence of a condensation catalyst of acid reaction such as H<sub>2</sub>SO<sub>4</sub>, HCl, H<sub>3</sub>PO<sub>4</sub>, monochloroacetic acid, dichloroacetic acid, borofluoroacetic acid, oxalic acid, formic acid, lactic acid, an aromatic sulfonic acid, ZnCl<sub>2</sub> or AlCl<sub>3</sub>. Various examples with details of procedure are given.

**Resinous condensation products from phenols and ketonic "monobasic" acids such as benzoyl-o-benzoic acid.** Herman A. Bruson (to Resinous Products & Chemical Co.). U. S. 1,934,032, Nov. 7. Condensation products substantially free from esterified phenol and suitable for use with nitrocellulose in lacquers, etc., are produced by reaction of a phenol such as PhOH, *o*-cresol or a naphthol with a ketonic "monobasic" acid such as benzoyl-o-benzoic acid (suitably by heating and use of H<sub>2</sub>SO<sub>4</sub>). (CH<sub>3</sub>)<sub>2</sub>N<sub>4</sub>, etc., may be added.

**Resinous ester-aldehyde condensation products.** Fritz Seebach (to Bakelite G. m. b. H.). U. S. 1,933,124, Oct. 31. An aromatic ester of an aliphatic acid such as phenyl carbonate is condensed with a reactive methylene-contg. reagent such as (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub> and polymerized formaldehyde to form a product which is suitable for *varnishes, etc.*

**Forming plates or the like from artificial phenol-formaldehyde resins.** Kurt Raschig and Max Koeber (to F. Raschig G. m. b. H.). U. S. 1,934,817, Nov. 14. Various details of operation are described suitable for forming a block or plate of phenolic resin firmly united with a layer of wood or the like.

**Resinous compositions.** Moyer M. Safford (to The British Thomson-Houston Co. Ltd.). Brit. 396,354, Aug. 3, 1933. A molding compn., particularly suitable for extrusion processes, comprises a mixt. of uncured, e. g., 20-40%, and cured, e. g., 60-80%, flexible alkyd resin with, if desired, a basic substance such as ZnO, BaO, PbO, etc., to accelerate curing. Fillers and other accelerators may also be added. The resins are described in Brit. 365,140 (C. A. 27, 1775). Armature coils may be molded in the solid bar by covering the wire with the compn. curing it, then extruding a second coating thereon, winding, pressing in a mold and, after removing, curing. The compns. are resistant to corona, oil and H<sub>2</sub>O. Wide sheets, tape, oil-proof gaskets, wire coverings, tubes, etc., may be molded, extruded or calendered. Cf. C. A. 28, 352.

**Synthetic resin.** Merlin M. Reubaker (to E. I. du Pont de Nemours & Co.). U. S. 1,932,688, Oct. 31. A non-drying fatty oil or a semi-drying fatty oil having an I no. of at least 70 or acids derived from such oils by saponification are converted from the  $\alpha$ - to the  $\beta$ -form (suitably by use of HNO<sub>3</sub>). The  $\beta$ -product is *sepd. from unconverted  $\alpha$ -material* and is caused to react with a "polybasic" acid such as with phthalic anhydride and glycerol. Various details and examples are given.

**Synthetic resins.** Roland B. Day (to Universal Oil Products Co.). U. S. 1,933,715, Nov. 7. Cracked hydrocarbon oil distillates contg. unsatd. material are oxidized and subjected to the action of a solvent such as liquid SO<sub>2</sub> to sep. the unsatd. hydrocarbons and the solvent is removed from the dissolved unsatd. compds. and the latter are caused to react with *furfural*. Products are obtained which may be used for molding, etc. U. S. 1,933,716 relates to a generally similar process in which an aldehyde may be used instead of furfural.

**Synthetic resins.** Richard Weithoner and Glasurit-Werke M. Winkelmann A.-G. Brit. 395,894, July 27, 1933. Resins are prepd. by condensing polybasic carboxylic acids, e. g., succinic, citric, malic, camphoric or their anhydrides, with mixts. of polyhydric alcs., e. g., glycerol,

glycol, polyals. and incompletely esterified polyals. and their esters with volatile monobasic aliphatic acids contg. not more than 5 C atoms, with or without addns. such as monobasic acids, e. g., BzOH, lactic, salicylic, glycollic, chloroacetic, chlorobenzoic, oleic and resin acids or fatty oils. In examples phthalic anhydride is heated with (1) a mixt. of glycerol and glycerol mono-, di- and tri-acetates, with or without linseed oil and (2) a mixt. of glycerol and glycerol formates, propionates, butyrates or valerates, with or without linseed oil.

**Synthetic resins.** American Cyanamid Co. and Theodore F. Bradlev. Brit. 395,899, July 27, 1933. The fatty acids of walnut oil, with or without walnut oil and other oils and fatty acids, e. g., linseed or tung oils, heat treated if desired, are condensed with a polybasic acid or anhydride, e. g., phthalic anhydride, and a polyhydric alc., e. g., glycerol, to give a resinous product.

**Synthetic resins.** Edward H. Jackson and Hugh J. Cameron (to The British Thomson-Houston Co. Ltd.). Brit. 396,071, July 26, 1933. See U. S. 1,919,163 (C. A. 27, 4943).

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Fr. 749,962, Aug. 2, 1933. Infusible masses are obtained by submitting fusible condensation products (obtained from

primary aromatic amines and  $\text{CH}_2\text{O}$  in the absence of acid or in the presence of less than  $1/4$  mol. of acid for 1 mol. of amine) to the action of fresh amts. of aldehydes or agents liberating aldehydes at temps. not above  $140^\circ$ , with or without the use of acid condensing agents, and causing the final hardening at higher temps., if necessary under pressure.

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Fr. 750,025, Aug. 3, 1933. Products which may be molded and hardened are made by condensing amino or hydroxy-amino aromatic di- or poly-nuclear bases, the rings of which are joined directly or indirectly in the mol. ratio of less than 2 methylenic groups, substituted or not, for 2 aromatic radicals and which contain, as a min., as many amidogen or amidogen and hydroxyl groups as joined rings, with aldehydes or agents yielding aldehydes. The products may be submitted to a preliminary hardening at a moderate temp. Suitable bases include amidobenzyl-aniline and its homologs and analogs of higher mol. wt. (cf. Fr. 749,964 (C. A. 28, 481)), *p*-diaminophenylmethane and its derivs., hydroxybenzylarylamines (by condensing mono- and poly-methylolphenols with aromatic bases) as well as products obtained by replacing  $\text{CH}_2\text{O}$  by other aldehydes in the syntheses of the products mentioned.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**Determination of the unsaponifiable matter of fats.** V. Veselý and L. K. Chudožilov. *Chimie & industrie Special No.*, 1048 50 (June, 1933).—If the unsaponifiable matter consists of higher als., the Spitz-Honig method using petr. ether gives low results, because of the solv. of the higher als. in the 50% alc. used for washing the petr. ether to remove the last traces of soap. If the unsaponifiable matter consists mainly of hydrocarbons, the use of petr. ether gives accurate results. A. P.-C.

**Estimation of fats, oils and fatty acids by fusion with wax or ceresin.** C. A. Rojahn and Josef Haugg. *Apoth. Ze* 48, 1117 20 (1933). The method, simple in execution and for all practical purposes sufficiently exact, consists in the case of soaps in pptn. of the fatty acids by addn. of acid to the soap soln., followed by heating the resulting mixt. with 3-6 g. of wax, ceresin or a mixt. of equal parts of the latter, removal of the supernatant cake, drying on paper and weighing, the increase in wt. representing the fatty acids. The entire operation requires only a few min. Emulsions, liniments, salves, suppositories, creams and spirituous preps. are treated in much the same way. *Ibid.* 1236-7.—An amplification of the recent paper by the authors. W. O. E.

**Composition of fatty acid mixtures. I. Relation of composition to Dalcian's curve.** Robert N. Wenzel. *Ind. Eng. Chem., Anal. Ed.* 5, 393-6 (1933).—It has been shown that the Dalcian curve is at best only an approximation which must be handled with considerable caution even in its proper application, which is the estn. of yields of chem. products. It can contribute no evidence of an exact quant. nature regarding the actual content of satd. fatty acids in any tech. mixt. R. Scherubel

**Accelerating effect of metals on the development of peroxides in oils and fats.** A. E. King, H. L. Roschen and W. H. Irwin. *Oil and Soap* 10, 204-7 (1933).—Sols. of the acetates of Cu, Fe, Mn, V, Ni, Al, Pb, Zn, Sn and Cr in  $\text{CHCl}_3$  were made; and 2-cc. portions in 20 cc. lard were aerated at a uniform rate at  $208^\circ\text{F}$ . until a peroxide concn. was produced which coincided with the rancid point of the fat as detd. organoleptically. Results are tabulated. Cu showed the greatest effectiveness as an accelerator of rancidity while Sn showed the least. The same test was made with strips of some of the metals immersed in lard. The results classify the metals in a different order from that given by the tests made with the dissolved metals. Cu was found to be active in both forms. Fe is inactive in solid form, but Sn in solid form is active. No loss in wt. of the metals took place except

with Pb. Insufficient work has been done to draw many conclusions, but Cu should be avoided in fat-handling and processing equipment.

E. Scherubel

**Analytical classification of the fish-liver oils.** Norman Evers and Wilfred Smith. *Quart. J. Pharm. Pharmacol.* 6, 329 37 (1933); cf. C. A. 27, 617. In the first part of this paper an attempt was made to correlate the chem. characters of the fish-liver oils with the zoological classification of the fish, more particularly in regard to the nature of the unsaponifiable matter. In the present paper further samples of fish-liver oils have been examd. by the methods previously followed. A no. of oils were examd. for vitamin A by the spectrographic method of measuring the intensity of absorption at a wave length of  $328 \mu$ . The results obtained have been compared with the blue values yielded by the  $\text{ShCl}_3$  color test on the same oils. It is shown that for none of these oils is the "blue value" detd. directly on the oil more than an approx. measure of the vitamin A content. W. O. E.

**Relationship between the antimony trichloride blue value of cod-liver oils and that of their unsaponifiable fractions.** F. J. Dyer. *Quart. J. Pharm. Pharmacol.* 6, 338-46 (1933).—Thirty-nine samples of liver oil were tested by  $\text{ShCl}_3$  reagent both for the blue value of the oil ( $x$ ) and of the unsaponifiable fraction ( $y$ ). For this series it has been shown that the blue value of the unsaponifiable fraction is 161.5% of that of the blue value of the oil itself. By math. analysis, the curve of distribution of the values of  $\log y - \log x$  has been shown to be almost normal, to possess only a slight degree of "skewness" and to be of normal height. In practice this means that the likelihood of the blue value of the unsaponifiable matter prepd. by the rapid method of Smith and Hazley, being 161.5% of that of the blue value of the oil, is equal for oils of high and low blue values. A simple calcn. has been made of the degree of inaccuracy that is unavoidable in making a detn. of the blue value of an oil direct, rather than on the unsaponifiable matter. A worker must decide whether this degree of inaccuracy is so great as to make it worth while to carry out the test on the unsaponifiable matter. W. O. E.

**Notes on extraction plants for oil seeds.** Herrmann Meyer. *Chem. App.* 20, 94-5, 103-5 (1933). The flow sheet and details of construction for extn. plants are discussed. Summarized data for properties of oils and suitable solvents are presented. Karl Kammermeyer

**Calculation of a refining plant for seed oils.** Herrmann Meyer. *Chem. App.* 20, 113-17 (1933); cf. preceding

abstr.—Calens. for the various steps in a refining plant processing 3000 kg. cottonseed oil per 12 hrs. are carried out for heat and material requirements. A table is presented which gives values for the mean temp. difference as functions of the terminal differences, in heating equipment.

Karl Kammermeyer

The seeds of *Euphorbia oxigua* L. Paul Gillot. *Bull. sci. pharmacol.* 40, 449-53(1933).—The compn. of the seed was detd. as follows:  $H_2O$  7.04, fat 34.35, protein 19.77, sugars 1.80, inorg. matter 7.64, cellulose 29.40. The oil obtained by pressing is of pale yellow color and has the following characteristics:  $[\alpha] = +50'$  ( $d = 2$ );  $d_{20} 0.9368$ ;  $n_D^{20} 1.4858$ ;  $n_D^{25} 1.4832$ ; Crismer's index (alc. d = 0.7967) 64.5°; m. p. -25°; free fatty acids as oleic acid per 100 g. 0.35; sol. fatty acids, as butyric acid 0.07%; Hehner value 95.79%; volatile fatty acids (Reichert-Wolny) sol. 0.3, insol. 0.2 (in cc. 0.1 N KOH); sapon. value 191.5; I value 212.5; Ac value (André) 7.0; un-saponifiable matter 0.94%; Hehner-Mitchell value 99.60%; oxidation degree (Bishop) 21.85. It gives immediately a ppt. in the Br reaction of Halphen; Bellier's resorcinol reaction produces a violet oil and yellow acid. The fatty acids have  $n_D^{20} 1.4735$ , I value 220.8 and neutralization value 198.5. The constn. obtained with oil prepd. by extn. vary slightly from the above figures. The oil has a purgative action.

A. E. Meyer

Impregnating viscose plates with emulsions of sulfonated and non-sulfonated linseed and hempseed oils followed by fixing the emulsions on the plates. A. P. Pisarenko. *Izvestiya Tsentral' Nauch-Issledovatel' Ins. Koshvennoi Prom.* 1932, No. 3, 4.—In an attempt to prep. sulfonated oils suitable for impregnating viscose plates it was found that a good product is obtained when linseed oil is sulfonated with 30% of  $H_2SO_4$ ; it is added gradually and the temp. kept below 30°. If these conditions are disregarded, polymerization occurs and 2 layers form. The  $H_2SO_4$  is sep'd from the sulfonated oil by treatment with a 20% soln. of NaCl followed by neutralization with an 18% soln. of NaOH. The obtained product is dissolved with difficulty in cold but easier in hot water; a perfectly clear soln. is obtained on adding 1 drop of  $NH_4OH$ . Hempseed oil is sulfonated without forming 2 layers. The product obtained on using more than 30% of  $H_2SO_4$  is too viscous and difficultly sol. in water, while 20% of  $H_2SO_4$  produces an oil which dissolves in water and yields a clear soln. upon the addn. of 1 drop of  $NH_4OH$ . The sulfonation temp. should also be kept below 30°. The sep'n. of  $H_2SO_4$  is carried out in the usual manner.

Recovering protein from press cake. V. N. Rozanov and N. V. Smirnova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 1, 301-8 (1932).—The  $NH_4OH$  method of extg. protein from oil seed press cake is not economical because of the difficulty and expense of  $NH_3$  recovery. Use of KOH or NaOH causes no greater protein degradation and is more efficient. Details vary according to conditions, but in general good results are obtained by extn. with 0.5-1.5% KOH (or NaOH) and pptn. with dil. HCl.

J. F. S.

Reesterification. Ryohei Oda. *Sci. Papers Inst. Phys. Chem. Research* 22, 15-46(1933).—Reesterification of olive oil in a 1-l. shaking autoclave at 200° with EtOH takes place readily and easier if excess of EtOH is used as a solvent; with glycerol the reaction is slower. The amt. of reesterification is detd. by sapon., acid and acetyl nos. Olive, coconut and linseed oils, resp., react similarly with  $(CH_3OH)_2$  to give probably the mono acid glycol of the oil. EtOH and  $C_2H_5$  are ineffective as solvents but  $C_2H_5N$  accelerates the reaction probably because of its alkyl. The use of CaO or  $K_2CO_3$  has an accelerating effect, while fuller's earth,  $Na_2B_4O_7$ ,  $SiO_2$ ,  $ZnCl_2$ , and activated C have practically no effect. Excess pressure has no effect. Castor oil, hardened fat or fish oil reacts with  $(CH_3OH)_2$ , while spermaceti does not react with  $(CH_3OH)_2$ , EtOH or glycerol. Olive oil does not reesterify with  $C_2H_5OH$ ,  $PhCH_2OH$  and *o*-, *m*- or *p*- $C_6H_4(OH)_2$ . The oils can similarly be reesterified with org. acids. Olive oil and  $ClCH_2CO_2H$  react easily. Traces of  $H_2O$  accelerate the reaction, as does higher temp.; with  $Ac_2O$ ,  $CH_3(CH_2)_2$ ,

$CO_2H$  or  $(CO_2H)_2$ , the reaction is slower; with lactic, citric or tartaric acid there is very little action; with  $C_6H_5CO_2H$  a small amt. which is accelerated by  $H_2SO_4$ . Coconut oil and oleic acid are reesterified as well as linseed oil and stearic acid. Castor oil reacts similarly with oleic acid and  $(CH_3OH)_2$ . Linseed oil and coconut oil are about 30% reesterified. Ethers react with alcs. in an analogous manner.  $ClCH_2CO_2H$  and  $Cl_3CCO_2H$  react with castor oil without a catalyst very easily. Castor oil reacts with  $(CO_2H)_2$ , citric or phthalic acid under reduced pressure to give resins called *oxalestolid*, *citronestolid* and *phthalestolid*. No resins are obtained with malonic, succinic or tartaric acid. Citric acid with glycerol and  $(CH_3OH)_2$  gives resins.

Julius White

Investigations on reesterification. \*VIII. Reaction between castor oil and some polycarbonic acids, particularly oxalic acid. Ryohei Oda. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 571-4(1933); cf. C. A. 27, 5719.—The reactions of castor oil with oxalic, malonic, succinic, citric and tartaric acids were investigated, and it was found that (1) oxalic acid reacts easily but excess acid is ineffective; (2) malonic and citric acids react easily; (3) succinic and tartaric acids react only with difficulty. Exptl. data are presented.

Karl Kammermeyer

Quantitative estimation of detergency. O. M. Morgan. *Oil and Soap* 10, 223-7(1933).—A standard soiled cloth in lab. expts. showed that it was sufficiently sensitive to show up differences in washing procedure. In a comparison of the detergent efficiencies of laundry soap builders it was shown that  $Na_2SiO_3$  was the most efficient followed by NaOH,  $Na_2PO_4$  and  $Na_2CO_3$ . On a plant scale the same order of efficiency was obtained. The  $pH$  values at which max. detergent effects were noted varied considerably. For  $Na_2CO_3$ ,  $Na_2PO_4$  and modified soda the max.  $pH$  values found during treatment with suds were 10.1 and 10.2;  $Na_2SiO_3$  gave opt. results at a  $pH$  value of 10.8 and NaOH at 10.6. No trouble was experienced in rinsing out any of the alkalies used.

E. Scherubel

Detn. of volatile oils (Perlova) 17. System of lipoids (Halden) 11A. Coloring butter, etc. [oils] (Swiss pat 162,130) 12. Aralkyl ethers [wetting agents] (Fr. pat 749,402) 10. Polymerized vinyl esters and fatty oils (U. S. pat. 1,934,297) 10.

Purifying and splitting fats, etc. I. G. Farbeund A.-G. Brit. 396,769, Aug. 8, 1933. Fats, oils, waxes, oxidation products of non-aromatic hydrocarbons and other mixts. contg. fatty acids are freed from unsaponifiable substances of high mol. wt by heating the crude alkali metal soaps prepd. from the raw material in a closed vessel under pressure, removing  $H_2O$  therefrom by releasing the pressure and then distg. off the volatile substances from the anhyd. molten soap. Thus bleached montan wax, wool grease, spermaceti or hydrogenated soy bean oil is heated to 200-300° with aq. NaOH or KOH or  $Na_2CO_3$  in an autoclave under 10-30 atm. pressure. Pressure is then released to allow steam to escape and the residue is heated to 310°, if desired *in vacuo* or in a current of steam or inert gas, e. g.,  $CO_2$ , N or waste gases, whereby unsaponifiable products, e. g., alcs., aldehydes, ketones and hydrocarbons, are distd. off and condensed. The residu. may be dissolved in  $H_2O$  and fatty acids recovered by addn. of mineral acid, the acids being purified by distn. *in vacuo* or in steam and used in the manuf. of soap.

Fats and oils. Donald P. Grettie (to Swift & Co.). Brit. 395,971, July 27, 1933. Lard, beef fat, hydrogenized or unhydrogenized cottonseed oil and other shortening agents are stabilized against rancidity by adding a small amt., e. g., 5-10%, of hydrogenized sesame oil, which may be partially deodorized before use and hydrogenated to the consistency of the material being treated.

Distilling fatty acids, glycerol, etc. Nicolaas H. S. van Recsema. Brit. 396,095, July 31, 1933. In the distn. of fatty acids, etc., with steam under vacuum, a high vacuum is maintained by freezing out the steam in solid



form after first condensing the distd. vapor and then withdrawing the residual gases by means of a vacuum pump. App. is described.

**Fatty acid recovery from soaps derived from asphaltic residuum of mineral oil stills.** Gellert Alleman (to Sun (il Co.). U. S. 1,931,855, Oct. 24. The soaps, in aq. soln., are acidified and xylene is added to the fatty acids and water; the xylene and water are then distd. off, leaving all the fatty acids in the residue, and they may then be extd. with anhyd. EtOH. App. is described.

**Purifying oils.** I. G. Farbenind. A.-G. Fr. 41,676, Mar. 10, 1933. Addn. to 888,370 (C. A. 25, 837). Lecithins, phosphatides, etc., are removed from crude oils, particularly soy-bean oil, by dispersing a small proportion of water or steam in the oil at about 60-70° and cooling rapidly to normal or lower, and removing the products which are pptd.

**Purifying hydrogenated fatty oils.** Dietrich Hildisch. Brit. 397,039, Aug. 17, 1933. The oils are freed from objectionable taste and odor by treating the hot oil with substances which split off gases or vapors such as O, NH<sub>3</sub>, CO<sub>2</sub>, etc., e. g., NH<sub>4</sub> carbamate, (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, NH<sub>4</sub>NO<sub>3</sub>, mixts. of NH<sub>4</sub>Cl and NaNO<sub>3</sub>, urea, di- or tri-ethanolamine, inorg. or org. peroxides, e. g., Bz peroxide, or bicarbonates alone or mixed with acids. During evolution of the gas a current of steam, NH<sub>3</sub> or CO<sub>2</sub> may be passed into the oil, or the latter may be submitted to steam treatment *in vacuo* after deodorization.

**Catalytic hydrogenation.** Deutsche Hydrierwerke A.-G. Brit. 396,311, Aug. 3, 1933. Metallic salts of high mol. org acids are used as catalysts for the reduction of fats, oils, waxes, fatty acids, etc., to high mol. alcs. Such salts are the Cu, Zn, Pb, Mn, Co, Ni and Hg salts of palmitic, stearic, linseed oil, rosin and naphthenic acids. They may be formed within the substance to be reduced, e. g., CuCO<sub>3</sub> and oleic acid may be added to coconut fat and the mixt. heated in an autoclave to 280-300° under 100-200 atm. of H pressure.

**Wax-like emulsifiable materials suitable for various uses.** Walther Schrauth (to Unichem Chemikalien Handels A.-G.). U. S. 1,932,643, Oct. 31. A wax-like material capable of combining with 5 times its quantity of water contg. 2% Na<sub>2</sub>CO<sub>3</sub> to form a colloidal mass may be formed of spermaceti 65, cetyl alc. 25 and stearic acid 10%. Similar mixts. also may be formed contg. wool fat alcs., palmitic acid, colophony, etc.

**Soap.** Nguyễn-Ngọc-Thai dñ Nguyễn-Van-Thai. Fr. 749,751, July 29, 1933. The soap contains water 280.1, coco oil 550, soda 100 and talc 5 parts.

**Apparatus for the continuous preparation of soap and glycerol.** John B. E. Johnson. Ger. 577,886, June 6, 1933.

**Metallic soaps.** Titanium Pigment Co., Inc. Brit. 375,406, July 17, 1933. Soaps of tetravalent elements of group IV A are obtained by adding a compd. of the element, e. g., org. or inorg. salts of Ti, Zr and Th, to a soln. of a salt of a fatty or resin acid, the soln. being at 40-70° and being constantly agitated during the addn. Mixed soaps, e. g., Ti Co linolate tungstate or Pb Ti tungstate resinate, may also be obtained by co-pptn. or by mixing the separately prepd. soaps. The products may be used in *waterproofing, mordanting, the prepn. of emulsions, lubricants, floor waxes, polishing compds., in dry-cleaning and in the paint, varnish and lacquer industries*. Cf. C. A. 27, 1215.

**Wetting, etc., agents.** Karl Marx, Karl Brodersen and Matthias Quaedvlieg (to I. G. Farbenind. A.-G.). U. S. 1,931,902, Oct. 24. Aminosulfonic acid or a deriv. such as phenyl- or tolyl- or 4-methylphenylsulfamic acid is used for reaction with the higher aliphatic alcs. such as dodecyl alc., hexadecyl alc., octadecyl alc., polyhydric alcs. with more than 10 C atoms, fatty alcs. contg. a phenyl group or a cyclohexyl group, alcs. corresponding to the general formula R-CO-NHR'-OH (R meaning a higher aliphatic radical and R' an aliphatic radical) such as lauroylhydroxyethylamide, the hydroxyethyl- or propylamide of coconut oil acid, stearylhydroxypropylamide,

monocarboxylic acids, esters of the higher fatty acids, such as esters of coconut oil acid, oleic acid, stearic acid, palmitic acid with polyhydric alcs. such as glycerol, sorbitol and polyglycerol and mono ethers of polyhydric alcs., such as stearyl glycerol ether, palmitylglycerol ether. Numerous examples with details of procedure are given. The products are wetting, emulsifying and softening agents.

**Wetting, etc., agent.** Chemische Fabrik vorm. Sandoz. Swiss 160,755 June 1, 1933. An agent for wetting, washing, dispersing or emulsifying is prepd. by treating a mixt. of isomeric monoxylene glycol ethers, obtained by the action of CH<sub>3</sub>OHCH<sub>2</sub>Cl on a tech. mixt. of isomeric xylenes, with *n*-butanol and a sulfonating agent. The product is used in the paper, leather and textile industries.

**Wetting, etc., agent.** Chemische Fabrik vorm. Sandoz. Swiss 160,937 and 160,938, June 16, 1933. Addns. to 151,958 (C. A. 26, 4926). An agent for wetting, cleaning, and emulsifying is prepd. by sulfonating the propylglycol ester of ricinoleic acid (160,937), or the CH<sub>3</sub>ClCH<sub>2</sub>OH ester of oleic acid (160,938).

**Wetting, etc., agent.** Chemische Fabrik vorm. Sandoz. Swiss 162,347, Aug. 16, 1933. Addn. to 151,958 (C. A. 26, 4926). An agent for wetting, washing, emulsifying, etc., is prepd. by treating a mixt. of coconut oil and the monoxylene ether of glycerol with H<sub>2</sub>SO<sub>4</sub>.H<sub>2</sub>O at 30-5°, the sulfonation and esterification proceeding simultaneously. The resulting sulfonic acid is isolated and neutralized with NH<sub>4</sub>OH.

**Wetting, etc., agents.** I. G. Farbenind. A.-G. Fr. 41,542, Jan. 28, 1933. Addn. to 728,415 (C. A. 26, 5713). Wetting, cleaning and dispersing agents are prepd. by treating with sulfonating agents urethanes to the N atoms of which are fixed atoms of H or aliphatic, cycloaliphatic, aromatic or heterocyclic radicals, or the alc. radical of which contains one or more double or triple bonds or aromatic or heterocyclic rings.

**Wetting, dispersing and softening agents, etc.** Heinrich Ulrich and Paul Koerding (to I. G. Farbenind. A.-G.). U. S. 1,931,806, Oct. 24. Products suitable for use in the textile industries, etc., are obtained by the action of a sulfuric ester of a hydroxyalkyl amine contg. at least one H atom attached to a N atom (such as monoethanolamine sulfuric ester, *n*-butylaminoethanol sulfuric ester or secondary aminobutanol sulfuric ester) with an org. halogen compd. corresponding to the general formula R-COX in which X is a halogen atom and R represents alkyl, aryl, alkoxy, halogen alkoxy, halogen alkyl or hydroxyalkyl (such as stearic chloride, coconut oil fatty acid chloride or chloroformic *n*-butyl ester), in the presence of water and of a metal compd. having an alk. reaction such as NaOH or Na<sub>2</sub>CO<sub>3</sub>. Various examples are given with details of procedure.

**Esters of sulfoacetic acid.** J. R. Geigy A.-G. Swiss 160,079-80-1, May 1, 1933. Addns. to 157,337. New high mol. esters of sulfoacetic acid are prepd. by treating the myristyl, cetyl or oleyl esters of ClCH<sub>2</sub>CO<sub>2</sub>H resp. with neutral or acid sulfites. The products are useful as *wetting, dispersing, emulsifying or foam-producing agents*.

**Sulfo carboxylic acid amides.** Winfrid Hentrich and Helmut Keppler (to I. G. Farbenind. A.-G.). U. S. 1,931,540, Oct. 24. Colorless or but slightly colored compds. sol. in water and with alkalis and suitable for use as *softening, purifying, frothing, wetting and dispersing agents in dyeing or other textile treatments*, etc., correspond to the probable general formula: R<sub>1</sub>R<sub>2</sub>NCORSO<sub>2</sub>X, where R stands for a substituted or unsubstituted alkylene or aralkylene or arylene, such as ethylene, propylene, CH<sub>2</sub>CH(OH)CH<sub>2</sub>, C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>, C<sub>6</sub>H<sub>3</sub>ClCH<sub>2</sub>, C<sub>6</sub>H<sub>4</sub>NO<sub>2</sub>, X means hydrogen, ammonium (NH<sub>4</sub>) or a metallic equivalent, R<sub>1</sub> represents a satd. or unsatd. aliphatic radical contg. at least 8 carbon atoms, R<sub>2</sub> means hydrogen, alkyl, for instance, a lower alkyl group or the above-mentioned saturated or unsaturated aliphatic radical containing at least 8 carbon atoms, aralkyl, aryl or cycloalkyl. The manuf. of these compds. is carried out by

causing a primary or secondary amine contg. at least one higher unsubstituted or substituted aliphatic radical to react with a carboxylic acid contg. at least one sulfonic acid group, or an appropriate functional deriv. thereof, for example, ester salts. Details are given of the production of a deriv. from heptadecylamine and the Na salt of the ethyl ester of sulfoacetic acid, corresponding to the formula  $C_{17}H_{35}NHCOCH_2SO_3Na$ , forming short white felted needles and stable to acids and to hard water.

**Sulfuric acid derivatives of amides.** Fritz Guenther, Ferdinand Munz and Hans Haussmann (to I. G. Farbenind. A.-G.). U. S. 1,932,176, Oct. 21. *Wetting, cleansing and dispersing agents* are obtained by the action of sulfonating agents on reaction products of nitrogenous bases such as  $NH_3$ , primary or secondary amines or heterocyclic bases such as morpholine or piperidine and carboxylic acids or their derivs. such as are obtainable from vegetable or animal oils or fats or by the oxidation of paraffin or from resinic or naphthenic acids or from lower aliphatic carboxylic acids provided the amides derived from them contain at least 8 C atoms. Numerous examples with details of procedure are given. U. S. 1,932,177 (Fritz Guenther and Hans Haussmann, to I. G. Farbenind. A.-G.) relates to the production of products of similar utility by reaction of a carboxylic halide or anhydride, such as chlorides of the acids of coconut oil or palmityl chloride, on an ammonomethanesulfonic acid contg. at least one H atom connected to the N atom, such as methylammonomethanesulfonic acid, in the presence of an alk. diluent (the reacting materials together supplying at least 6 C atoms). Several examples with details of procedure are given. U. S. 1,932,178 (Fritz Guenther, Hermann Holsten and Karl Saffert, to I. G. Farbenind. A.-G.) relates to products also having like uses obtained by reaction of an alkali sulfite such as  $Na_2SO_3$  with an inorg. acid ester such as the octadecylamide of chloroacetic acid in a vehicle such as 30% aq. alc. soln. Several examples with details of procedure are given. U. S. 1,932,179 (Fritz Guenther, Hans Haussmann and Ferdinand Munz, to I. G. Farbenind. A.-G.) relates to products also of like utility produced by reaction of an aliphatic satd. compd. contg. the grouping  $RCOX$  in which X is

either halogen,  $OR_1$ ,  $-OH$ ,  $-OCOR_1$ , R being an aliphatic saturated radical contg. from 5 to 15 carbon atoms and  $R_1$  being an aliphatic satd. radical, which radicals may possess sulfuric ester or sulfonic acid groups, with an aromatic amine free from aliphatic alc. and chromophorous groups, but contg. at least one H atom connected to a N atom which amine may contain sulfuric deriv. groups; if the above initial reacting components do not contain sulfuric ester or sulfonic acid groups, the resulting arylide is caused to react with a sulfonating agent. An anilide of  $\alpha$ -hydroxylauric acid, or of satd. aliphatic acids contg. 12 to 15 C atoms and derived from oxidation of paraffin or coconut oil fatty acids may be used as initial material.

**Sulfuric acid derivatives of amides.** Fritz Guenther, Ferdinand Munz and Hans Haussmann (to I. G. Farbenind. A.-G.). U. S. 1,932,180, Oct. 24. Products suitable for use in the textile and related industries as *wetting, cleansing and dispersing agents* are obtained from an aliphatic compd. contg. the grouping  $RCOX$  in which X is either halogen,  $-OH$ ,  $-OR$ , or  $-OCOR$ , R being an aliphatic radical which radical may contain sulfuric deriv. groups, in the absence of a metal halide having a condensing action, by reaction with an ammonia base corresponding to the formula  $HNX'X''$ , in which  $X'$  denotes hydrogen or an aliphatic open-chain, an isocyclic aliphatic, or an aliphatic aromatic radical which radicals are free from aliphatic alc. groups, and  $X''$  denotes H or a radical as denoted by  $X'$  or an aromatic radical free from chromophorous groups provided  $X'$  is one of the aforementioned org. radicals, or  $X'$  and  $X''$  denote a conjoint aliphatic chain, all of which radicals may contain sulfuric deriv. groups (if the above initial reacting components do not contain sulfuric deriv. groups the resulting amide is caused to react with a sulfonating agent), the C-contg. reacting components being so selected that the total C atoms in the resulting amide is at least 8. Products such as the carboxylic amide of hydroxystearic sulfuric ester and *N*-ethylaniline, oleic *N*-methyltaurine products, etc., are claimed as being new compds., and a very large number of detailed examples with statements of procedure are given.

## 28—SUGAR, STARCH AND GUMS

J. K. DALL

**Modern control in the sugar factory.** G. Gollnow. *Chem.-Ztg.* 57, 825-6 (1933). E. H.

**$pH$  measurements in the refinery.** Ippolito Sorgato. *Ind. saccar. ital.* 26, 511-17 (1933).—A discussion with bibliography. I. Cusachs

**Study of the deterioration of cut cane, topped vs. not topped.** Alejandro S. Alvarez. *Rev. ind. agr. Tucuman* 23, 53-59 (1933).—Tests on P. O. J. 213 and P. O. J. 36 show little difference in deterioration after cutting, whether topped or untopped. In either case, the purity decreases 13-30% during 10 days' storage. The storage conditions are not described. It is inferred from the data that *invertase* is formed in the stalks of these varieties after cutting. Nelson McKaig, Jr.

**A mutation of P. O. J. 36 of greater sucrose content.** William E. Cross. *Rev. ind. agr. Tucuman* 23, 47-52 (1933).—Comparative tests over a 5-year period show that the cultivation of P. O. J. 36-M (I) is preferable to P. O. J. 36 (II). The data show that (I) has more stalks per hectare, each of less weight, but of better sucrose, glucose and purity contents, and gives slightly more sugar per hectare than (II). (I) also matures earlier as inferred from early purity analyses. N. McKaig, Jr.

**Beet and cane sugar.** H. C. S. de Whalley. *Food* 3, 26 (1933).—A recently published statement to the effect that the best British beet sugar contains 2% raffinose is refuted by showing that it contains  $H_2O$  0.02, ash not more than 0.01, org. non-sugars 0.02, and sucrose 99.95%.

A. Papineau-Couture

**The oxidation of sucrose by oxygen in the presence of**

lime. M. I. Nakhmanovich, S. L. Berman, M. S. Plachotnik and I. I. Pletnik. *Z. Ver. deut. Zuckerrind.* 83, 235-61 (1933).—By treating a 15% sucrose soln heated to various temps., 40-100°, for varying times, 2-24 hrs., and limed to varying lime concns., 0.2-1.0% alk., it was found that the presence of air promotes the decompn. of sucrose solns. contg.  $CaO$ , decrpn. increasing with increase in temp.,  $CaO$  concn., and time of heating, but decreasing when the  $CO_2$  of the air was not removed, because of the effect of the  $CO_2$  in decreasing the alk. Control expts. as well as expts. with pure  $O_2$  confirmed these findings. Increase in the sucrose concn. varying from 5 to 80% showed that there is an increase of the percentage of sucrose decompd. up to a sugar concn. around 30%, while for greater concns. the effect decreases.  $HCHO$  and  $CH_3CHO$  were identified in the volatile decompn. product, while evidence indicates the presence of equiv. anits. of Ca salts of glycolic and oxalic acids in the ppt. in addn. to some  $CaCO_3$  from the  $CO_2$ .

F. Camps-Campins

**Crystallization.** A. Schweitzer. *Intern. Sugar J.* 35, 385-7 (1933).—Up to the present time advances in the knowledge of crystn. were obtained largely through empirical methods. In expts. on the initiation of crystn. in supersatd. solns., it was found that in the absence of crystal nuclei, the formation of crystals does not take place spontaneously. Crystn. can be induced, however, by the introduction of "crystallones" or mol. complexes arranged according to the crystal lattice. These substances can pass through hardened filter paper, but are

retained by an ultra-filter. An insight is thus obtained into the sizes of these "molecular complexes" which induce spontaneous crystn. in supersatd. solns.

W. L. Owen

**Recent practice with the Lafeuille rotary crystallizer pan.** Fernand Lafeuille and G. C. Kaar. *Intern. Sugar J.* 35, 387-8(1933).—The use of these crystallizers in the Philippine Islands has resulted in a lower purity of final molasses, a decrease in the total molasses produced per ton of cane, and an increase in house capacity. The massecuites produced with these crystallizers have shown a much improved curing quality. The recent improvements in the construction of the crystallizers are enumerated.

W. L. Owen

**Crystallization and its control in the sugar house.** Mario Lupo. *Ind. saccar. ital.* 26, 518-27(1933).—The principles are reviewed with a description of the recording device of Teatini, and illustrations of records and sugar crystals obtained.

L. Cusachs

**A method to prevent crystallization of sugar-cane sirup.** Wm. E. Cross. *Rev. ind. agr. Tucuman* 23, 66-7(1933).—Leaving cut sugar cane in the field several days before grinding permits the invertase content to increase to the point that crystn. of sucrose in the final sirup will be prevented. The method is particularly applicable to P. O. J. 36, P. O. J. 213, P. O. J. 234 and Zwinga varieties. The flavor of the resulting sirup is adversely affected.

Nelson McKaig, Jr.

**Studies of the cause of molasses formation. IV. The equilibrium of the ternary system sucrose water sodium sulfate or potassium sulfate at 30° and the viscosity of the coexisting liquid phase.** Kyōsuke Nishizawa and Masataka Amagasa. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 535-7(1933); cf. *C. A.* 28, 300.—The equil. diagrams for the ternary mixts.  $H_2O-C_{12}H_{22}O_{11}-Na_2SO_4$  and  $K_2SO_4$  on a wt. percentage basis and a diagram for the solubilities in 100 g. of  $H_2O$  are presented. By the addn. of  $Na_2SO_4$  the soly. of sucrose was diminished to a lar extent and at the invariant pt. the content of sucrose was about 20% lower than that in pure  $H_2O$ . The addn. of  $K_2SO_4$  did not show any marked effect on the soly. of sucrose. In the ternary system,  $Na_2SO_4 \cdot 10H_2O$  existed as a stable solid phase for small amts. of sucrose added. For greater addns. this stable solid phase disappeared until at the invariant pt. both  $Na_2SO_4$  and sucrose existed as stable solid phases. The soly. of  $K_2SO_4$  was not notably affected by the addn. of sucrose. A diagram of the relative viscosity, relative satn. and salt content in g. per 100 g.  $H_2O$  is given. In comparison with the system of acetates or carbonates the addn. of  $Na_2SO_4$  and  $K_2SO_4$  has much less effect on the viscosity of the liquid phase. The systems  $CaSO_4$  and  $CaCO_3 \cdot C_{12}H_{22}O_{11} \cdot H_2O$  were studied, but in these cases no remarkable phenomena related to molasses formation were observed. K. K.

**A new design of the compensator box for polarimeters.** Noel Deerr and G. F. Stanley. *Intern. Sugar J.* 35, 432-3(1933).—In a previous communication (*C. A.* 27, 3105), D. reported a new design of polarimeter for use in the microscopical rather than in a horizontal position, having as its essential features the greater accessibility of its optical parts, comfort in observation and facility of adjustment. Similar modifications with respect to facility of adjustment and accessibility have now been applied to the compensator box. Two drawings of the modified compensating system are shown. W. L. O.

**Efficiency of carbon dioxide during saturation.** V. Konn. *Chimie & industrie Special No.*, 1151-4(June, 1933).—See *C. A.* 26, 3133. A. Papineau-Couture

**Physical and chemical activity of lime during technical saturation.** V. Konn. *Chimie & industrie Special No.*, 1155-6(June, 1933).—See *C. A.* 25, 4732-3. A. P.-C.

**Foaming of defecated juices by fractional addition of lime during saturation.** Jaroslav Brzek. *Chimie & industrie Special No.*, 1157-9(June, 1933).—See *C. A.* 27, 2328. A. Papineau-Couture

**The control of sugar boiling by electrical conductivity.** O. Spengler, F. Tödt and J. Wigand. *Z. Ver. deut.*

*Zuckerind.* 83, 822-32(1933); cf. *C. A.* 27, 4118.—A review is given of the various sources of error due to leakage of current (a) on the pan wall, (b) from one pan through the framework to another. The need for having electrodes of suitable area and close together so as to avoid these troubles as well as oxidation is discussed. Two elec. hook-ups are described. Methods for calibrating the electrodes are given so as to obtain comparable results. F. Camps-Campins

**Conductometric control of the boiling process.** S. Stare. *Z. Ver. deut. Zuckerind.* 83, 807-21(1933).—The work of Honig is reviewed. For the control of the boiling of refinery liquors of 98-100 purity, S. found Honig's method unsatisfactory because of the low and fluctuating readings of the milliammeter at high concn., as well as because of the dependence of cond. on temp., Bx., ash quotient, etc. However, by gold plating the electrodes to obviate oxidation, by using larger electrodes to reduce the c. d., and by adjusting the reading of the milliammeter to 100 at the start (say the graining point) of the process by varying the voltage, the method proved satisfactory for control purposes. Care should be taken that if a sirup of different ash quotients is introduced, a correction is made. The temp. correction at 80° Bx. is about 3.5% per degree centigrade. F. C.-C.

**Automatic device for the detection of sugar in boiler feed water.** S. Lange. *Sucr belge* 52, 390-8(1932-3).—A detailed drawing is given of an automatic app. for adding  $H_2SO_4$  and  $\alpha$ -naphthol soln. to a continuous water-sampling device. A photoelec. hook-up sets off the alarm when the coloration due to the presence of sugar occurs. F. Camps-Campins

**The composition of waste waters from sugar houses.** Jiří Vondrák. *Chimie & industrie Special No.*, 1141-2(June, 1933).—See *C. A.* 27, 3845. A. P.-C.

**The colorimetric determination of pectins.** P. M. Silin and Z. A. Silina. *Z. Ver. deut. Zuckerind.* 83, 390-7(1933).—A new method is given, based on the comparison by a Duboseq colorimeter of the coloration produced by the addn. of 4 cc. of AcOH and 0.5 cc. of aniline to (1) 5 cc. of a furfural soln. prepd. by dilg. a standard stock soln. contg. 0.1 g./100 cc., so that its furfural concn. is approx. equal to that of (2) the distillate obtained by distg. slowly so as to collect 30 cc. over 3 hrs. from 40 cc. of a parent mixt. made up of 5 cc. of sample plus 2.5 cc. of concd. HCl and the remainder of HCl of sp. gr. 1.06, 10% NaOH being added to the distillate to phenolphthalein neutrality. The following are the advantages of the method over that of Tollens: (1) 4 instead of 48 hrs. are required; (2) little HCl and no phloroglucinol are used; (3) it yields more accurate results for the detn. of small amts. of furfural-forming substances. Expts. have been worked out for the calcn. of the pectin from the amt. of furfural formed on HCl digestion for raw and purified beet juices. The resp. coeffs. to convert the furfural values into "pectins" are 3.8 and 5.5. The coeffs. to convert furfural values in arabinose and xylose are 1.894 and 1.732, resp., as based on exptl. detns. F. Camps-Campins

**Starches of commerce.** T. E. Wallis. *Pharm. J.* 131, 396-7(1933).—The microscopic appearance of the 10 principal com. starches is sketched, and their phys. properties are tabulated and discussed. S. W.

**Starch. III. Swelling of potato starch in pyridine-water.** K. Hess, R. Pfeiffer and C. Trogus. *Ber.* 66B, 1505-12(1933); cf. *C. A.* 23, 302.—Potato starch which has been dried at 95-100° over  $P_2O_5$  shows marked swelling in mixts. of pyridine and water, with maxima at 30% and 85% pyridine. The extent of swelling is const. after 3 days, and the swollen granules lose their double refraction. The second swelling max. at 85% pyridine is assocd. with the appearance of a new kind of x-ray diagram and is therefore ascribed to the formation of a pyridine-starch compd. Untreated potato starch shows the same maxima, but to a much less extent, and exhibits the same x-ray diagram in 85% pyridine. At the first swelling max. only the normal B-diagram can be

observed and this max. is therefore probably due to ionic adsorption followed by hydration. K. V. T.

Physical chemistry of starch and bread making. XIII. Comparison of the agglutination of various sorts of native starches with much water. J. R. Katz and Th. B. van Itallie. *Z. physik. Chem.* A166, 27-42(1933); cf. C. A. 27, 5213.—The agglutination phenomena investigated are mostly the same for different kinds of starches, but there are certain minor differences that characterize the starch. G. M. Murphy

Colloid chemistry of rice starch (Sakurada, Futino) 2. Inheritance of sugar content and wt. in hybrids of sugar and fodder beets (Stehlík) 11D. Effect of soil acidity on the yield of sugar cane (Croucher) 15. Mucilage of fenugreek (Iyer, Sastri) 17. Centrifugal sepn. of starch and gluten (U. S. pat. 1,933,119) 1. Detg. moisture [in beet pulp] (Brit. pat. 396,098) 13. Drying [sugar] in molds (Brit. pat. 395,903) 13.

Purifying sugar juices. Adrien Leduc. Brit. 396,136,

Aug. 3, 1933. The satn. of lime-contg. or lime-treated sugar juices or sirups with  $\text{SO}_2$  or  $\text{CO}_2$  is effected by introducing the gas into the liquid in a closed boiler kept under pressure. The pressure may be 1 atm. for the treatment of beet-root juices. App. is described.

Apparatus (with an inclined rotary drum) for drying and granulating materials such as sugar. Robert S. Kent. U. S. 1,934,930, Nov. 14. Structural and mech. details.

Centrifugal separation of materials such as in drying sugar or salt, etc. Edward N. Trump. U. S. 1,933,644, Nov. 7. Various details of app. and operation are described.

Stirring and temperature-regulating device suitable for treating "massesclutes." Wm. A. Rolston. U. S. 1,934,008, Nov. 7. Structural and mech. features.

Starch. Hugo Kühl and Gustav Soltau. Ger. 577,540, June 1, 1933. Starch is prepd. by mixing fine ground rice with water at  $45^\circ\text{f}$  introducing whey cultures of yoghurt bacteria at  $40-45^\circ$  to set up lactic acid fermentation, and sepg. the starch by usual methods.

## 29—LEATHER AND GLUE

ALLEN ROGERS

Influence of the composition, the state and the origin of salt on the preservation processes of skins. A. G. Dauman, A. I. Zhdanovich and M. A. Reizman. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1931, No. 1, 24 30.—A literature review covering the following items: (1) Influence of chem. admixts. generally found in NaCl on process of preservation; (a) chem. phys. investigations, (b) bacteriol. control, (c) histological control, (d) treating exptl. batches down to the stage of finished leather. (2) Dependence of the preservation process on the size of grain for different types of raw material. (3) Detg. the max. of  $\text{H}_2\text{O}$  permissible for NaCl. (4) Expts. with rock salt.

A. A. Bochtlingk  
Enzymes of vegetable and fungus origins and their application in unhairing and in preserving wool. E. K. Kaverzneva and E. M. Oleinikova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 24.—Proteases were obtained from exts. of sprouting soy beans. They contain some of the proteases of the pepsin and trypsin type which are active at  $p_{\text{H}}$  4-8. The optimum for trypsin acting on gelatin lies at  $p_{\text{H}}$  7.4 and on peptone at  $p_{\text{H}}$  7.0. Cyanic acid depresses the activity of the trypsin. The pepsinase penetrates into the adsorbing medium when subjected to adsorption by kaolin. Hide powder is energetically dissolved by soy exts. in an alk. medium ( $p_{\text{H}}$  = 8.0), less in a neutral medium and quite insignificantly in an acid medium. The skins are first kept for 1-2 days in a 0.1-0.2% soln. of NaOH at ordinary temp., immersed for 5 hrs. in 0.1% soln. of  $\text{NaHCO}_3$  to lower the  $p_{\text{H}}$ . The fermentation vat soln. consisted of 1%  $\text{NaHCO}_3$  and 10-30% of soy-bean fermentation ext.; the temp. was  $30^\circ$  and the duration 1-3 days, toluene or phenol also being added. From mold cultures, exts. and dry preps. were prepd. The activity of the proteases is lowered through storage, this being particularly noticeable with exts. The proteases easily dissolve the collagen from the albumin of the hides; they have almost no effect on elastin and do not dissolve keratin even after treatment with 0.2% of NaOH. A slight activation of the proteases is observed if the soln. contains 0.05-0.1%  $\text{Na}_2\text{SO}_4$  and  $(\text{NH}_4)_2\text{SO}_4$ . High concns. depress the action of the enzyme and  $(\text{NH}_4)_2\text{SO}_4$  is even harmful. Trypsin is only slightly adsorbed by kaolin and the soln. is activated if sawdust is introduced. Sawdust preps. are good unhairing agents. A. A. B.

Investigating the adsorption ability of various hide powders. E. S. Ovechkis and I. Dukarskaya. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 3, 5-8.—Conversion factors for tannides

tested with German, British, Russian untanned and Russian chrome-tanned hide powders were derived experimentally. These factors were based on the assumption that the tannides detd. by the German hide powder in the tanning substance amounted to 100. Thus the relationship between the 4 powders was found to be German 1, British 0.95, Russian tanned 0.96 and Russian untanned 0.95 when the tanning substances in various parts of oak and oak ext. were detd. The procedure is described and numerical data are tabulated.

A. A. Bochtlingk  
Relation of the fat content of hides to the conditions of curing. P. White and F. G. Caughley. *New Zealand J. Sci. Tech.* 15, 163-8(1933).—Excess fat in greasy hides differs from natural skin fat in having a higher I value and lower m. p.; it resembles the oil pressed out from fatty tissues. When uncured hide is cured in contact with fat under pressure, fatty oil is absorbed by the hide. The presence of fat retards penetration of salt, resulting in bacterial damage and loosening of structure with increased absorption capacity for fatty oil. H. B. M.

Treating hides with sulfur-vegetable tanning substances with a preliminary fat liquoring. G. K. Baidan and A. I. Zhemochkin. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 24.—The hides were unhaird, pickled and treated with hypsulfit to ppt. S on the leather tissue and fat liquored in a drum with a mixt. of lard and seal oil. They were then dried in a no. of stages. The calking was carried out for a no. of days and the leather was then placed in drums to be tanned with willow ext.; the tanned leather was then made up into black Russia leather in the usual manner. Thus when this method is used the mfg. cycle is shortened to 22 days, the consumption of tannides lowered by 30%, while the obtained leather is characterized by its high qualities. A. A. Bochtlingk

Changes in the saturation with water of raw skins on vat tanning with pine. A. N. Mikhailov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1931, No. 1, 20-3.—The hydration of leather treated in various ways was studied and the following conclusions were derived. The decrease in the content of water is smaller and it proceeds more slowly when the diffusion of the tannides is not uniform. Changes in the water content in leather after centrifuging show an increase of combined water calcd. on the hide substance, the curves having their max. in the middle of the tanning process. In prolonged tanning the dehydration tends to increase which is also true when the tanning is carried out at high temps. The hydration increases after hydrating a leather which was already dried and tanned. A raw material

which was subjected to a preliminary chrome treatment shows a greater dehydration and the amt. of absorbed substance is lowered. The following explanation is given: In comparing the conditions existing in gelatin with those in hides when both are exposed to the influence of tanning substances, it is said that they are quite different because of the fact that tanning substances act only on the surface of the gelatin. Some authors assume that the same conditions may exist with leather; this is, however, incorrect because gelatin can be accepted as having a micellar structure, while the structure of leather is similar to elements occupying an intermediate position between the intermicellar spaces and the macro-capillary spaces of the gelatin. If it is assumed that the original interaction between the raw hide and the tanning substance is due to the charges carried by the tannides and the collagen, overtanning, whereby the tannides do not penetrate the top layer, is explained. An interaction of the tannides and the collagen occurs when the former pass on the surface of the microcapillary. In case the tannides carry a high charge the amt. of particles is not sufficient for neutralizing the particles with a different index carried by the collagen and there is no clogging of the capillaries. However, if the charge carried by the tannides is smaller the amt. of the particles which would participate in the action would be greater and the vol. of the particles of the tannides may interfere with a further diffusion through the microcapillaries. The same is true if some of the substances which accompany the tannin penetrate at a higher speed than the tannin, thus affecting the charge of the collagen. A. A. B.

**Purification and clarification of tanning extracts.** P. S. Konovalenko. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 4, 203.—A bibliography on various clarification and purification methods is given. According to the method of du Perua, ox blood expd. from fibrin and diluted to 2°Bé. is added in small portions to the cooled diffusion ext., the mixt. is then heated to 70–75°, whereby the blood is coagulated and the insol. substances and part of the pigments are thus taken out. According to expts. an increase in the amt. of blood used leads to an increase in the loss of tanning substances which may be as high as 5–18%. This is due to the coagulation of the albumin of the blood which carries off some of the tanning substances. When cellulose is used as a purifier, it is softened in water with the addn. of 3.5% HCl for 2–3 hrs., and the mass is then added at 70–75° to the tanning liquid. The latter had a sp. gr. of 8°Bé.; the settling required 24–48 hrs. It was found that the application of cellulose for coagulation does not accelerate the settling. A. A. Bochtlingk

**Tannin diffusion through gelatin gel.** Z. V. Zolotareva. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 3, 20–9.—In the diffusion process of tannin into gelatin the latter is subjected to deformation because of the compression and increase in the density of the layer which is in direct contact with the tanning substance. This fact, as well as the fact that the color of the tannin in the gelatin changes with time (probably because of oxidation), makes the operation of measuring the diffusion coeff. more difficult and causes the measurement to become only very approx. However, according to the theory of Westgren the data obtained accurately reproduce the actual procedure. Accordingly it may be concluded that only a small amt. of the tanning substance, namely a mol. dispersive amt., penetrates into the gelatin. This amt. does not enter into a reaction with the gelatin and has therefore no direct effect on tanning, and it is assumed that on tanning the leather the most important part played during the process belongs to the processes which occur in the structural element of the leather and not on its surface. It was also found that skins were formed on the boundary of the gelatin and the soln. of the tanning substance, these skins differing in structure, depending upon the exptl. conditions. They were either turbid and friable or transparent and dense. The latter kind was obtained

when the  $p_H$  of the soln. amounted to 4 or on repeated diffusions through the gelatin gel. It appears that the nature of the skin depends on the hydration of the tannin-gelatin complex, and that the transparent skin is formed by a stronger action of the tannin on the gelatin. In applying this theory to leather, the formation of a dense layer on the micella or the gel of collagen prevents the penetration of colloidal tannin particles causing osmosis, i. e., penetration of water from the outside, from the micella. A. A. Bochtlingk

**Changes in the color measurement of tannin infusions at analytical strength as a function of time.** G. H. W. Humphreys. *J. Intern. Soc. Leather Trades Chem.* 17, 685–8 (1933).—Filtered exts. contg. 0.5% tannin were exposed to north light in beakers and color measurements were made with the Lovibond tintometer at intervals for 24 hrs. With sulfited quebracho and mimosa, both the red and yellow values increased markedly with time; appreciable changes were observed in 1 hr. No change was noted with valonia, chestnut, myrobolam, and pine bark. Conclusion: Color measurement should be made promptly after filtering. H. B. Merrill

**Action of tannase on pine tanning extracts.** D. M. Mikhlina and G. L. Gutkina. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 1, 8.—Tannase was grown by the authors in pine tanning ext. (process not disclosed) and it was found that its activity is not inferior to other enzymes. Its basic properties are: it is neutral; it does not reduce Fehling soln., decomposes tannin with sepn. of gallic acid. The max. reaction temp is 60°. Tannase, judged by its action on tannin, has esterification properties; its glucosidic properties belong to those of corresponding enzymes, since *Aspergillus niger* is very high in various enzymes and the existing methods of sepg. the enzymes do not assure the purity of the latter. The detns. of the products of hydrolysis of tannin by tannase, i. e., sugar and gallic acid, are stoichiometrically in agreement with data by B. Fischer for the compn. of tannin, i. e., pentadigalloylglucose. However, the obtained ratios of sugar and gallic acid in the tannin justify the assumption that digalloyl combines with glucose in the tannin via an ester bond and that the presence of the glucoside bond only is highly improbable. It was found that after the action of the tannase prepn. the amt. of nontannides and of sugar increased in the tanning soln. while that of tannides decreased. The reaction was not investigated quantitatively because of the absence of suitable methods. A. A. Bochtlingk

**Acid and fermentative method of hydrolyzing pine tanning extract.** A. M. Simskaya. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 1, 9.—Vat tanning with pine exts. causes overtanning which prevents tannides from entering the hide. The low diffusion of pine ext. tannides is probably due to the large mols. of these tannides. If the large size of the mol. is due to the presence of carbohydrates in the tannin mol. then a decrease of the amt. of combined carbohydrates would lead to a decrease of the size of this mol. The bond of the tannin with the carbohydrate may be of the nature of an ester or a glucoside, both being hydrolyzed with acids and specific enzymes. The hydrolysis of pine ext. tannides was undertaken with HCl of varying  $p_H$  concns., as well as with enzymes of the  $\alpha$ - and  $\beta$ -type glucosidases. The effect of the hydrolysis was ascertained by the increase of free reducing sugar, while changes in the diffusion properties of the ext. were tested by the penetration of color into the raw hide. It was found that the mol. of pine ext. tannide contains carbohydrates which are split off through the hydrolysis with dil. HCl. A moderate hydrolysis with HCl did not improve the diffusion of the tannides present in pine ext. The same is true when the sugar is removed by fermentation. A. A. Bochtlingk

**Influence of tanning and non-tanning substances from pine on the diffusion properties of tannides.** N. N.

Tarasenko and G. A. Arbuzov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 8-9.—Expts. carried out with mixts. of pine and quebracho-willow exts. showed that overtanning characteristic of pine ext. can be eliminated by using a mixt. of non-tanning substances derived from pine together with quebracho-chestnut exts. It is stated that overtanning with pine ext. is due to the low charge carried by the tannin from pine ext.

A. A. Bochtlingk

The use of sulfite cellulose extract No. 1 together with oak extract in tanning sole leather. G. K. Baidan and A. I. Zhemochkin. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 25.—In tanning carried out with this mixt. the thoroughly limed leather is tanned in vats where it stays up to 28 days depending on the amt. of tanning required. It is then tanned in drums for 48-60 hrs., left for 24 hrs., washed, pressed in a press, fat liquored in a drum and dried as usual at a temp. not in excess of 30°.

A. A. B.

Oxidation of fish oils by chromic acid and by dichromate in the presence of acid. A. Dohogne and G. Rezahek. *J. Intern. Soc. Leather Trades Chem.* 17, 413-23, (608-12) (1933).—The oxidation theory of oil tannage implies that tannage would be facilitated by the presence of a suitable oxidizing agent. As a preliminary to tanning expts., the oxidation of cod-liver oil by  $\text{CrO}_3$  in the presence of  $\text{H}_2\text{O}$  is studied as a function of time, ratio of oil to  $\text{CrO}_3$ , ratio of  $\text{H}_2\text{O}$  to  $\text{CrO}_3$ , and temp. The extent of oxidation is detd. by titration of excess  $\text{CrO}_3$  after shaking the oil with  $\text{CrO}_3$  soln. for a definite time. When the ratio oil: $\text{CrO}_3$  is low, oil: $\text{H}_2\text{O}$  is high, and temp. = about 20°, an exponential oxidation-time curve is obtained. Rate of oxidation is very greatly increased by increasing the ratio of  $\text{CrO}_3$  to oil, by decreasing the ratio of  $\text{H}_2\text{O}$  to oil and  $\text{CrO}_3$ , and by increasing the temp. The oxidation appears to take place in 3 stages, during the first of which the oil is emulsified without visible change, during the second of which oxidized products sep., and during the third of which products are formed that are sol. or easily emulsifiable in  $\text{H}_2\text{O}$ .

H. B. M.

The influence of the volume of the precipitate on the accuracy of the  $p_H$  determinations in tanning extracts. Ya. P. Berkman. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 1, 9-10.—In all indirect methods used in the detn. of  $p_H$  (by the difference of the dry residues before and after their sepn.) there is always an inaccuracy caused by not taking into account the vol. occupied by the residue. This inaccuracy increases rapidly with increased concn. of the soln. and it can be calcd. by the introduction of the following factor:  $d/(d-a)$ , where  $d$  = sp. gr. of the insol. and  $a$  = the dry residue of sol. substances in 1 cc. The deviations observed for oak ext. increase from 5 to 27% for analytical concns. up to 20°Bé. The inaccuracy is still higher when the gravimetric method is used and the correction factor to be used in this case is  $d/(d-a)$ , where  $d$  = the sp. gr. of the soln. after the removal of the ppt. and  $a$  = the dry residue of sol. substances in 1 cc. The exptl. procedure is described.

A. A. Bochtlingk

Investigation of the ratio of the  $p_H$  of tanning solutions and of the  $p_H$  of hides during diffusion. G. A. Arbuzov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 18-22; No. 3, 13-20.—The Sb electrode can be used in the detn. of  $p_H$  of vegetable tanning solns. and of horizontally split leather and hides; the acid fractions penetrate the hides more rapidly than the tannides in diffusion, thus prepg. the hide and binding the tannides. The  $p_H$  of dyed layers of hides is lower than that of undyed and it is lower toward the end of the tanning operation than that of tanning solns. When tanning with pine ext. the  $p_H$  of the dyed top layer is lower than that of the flesh side; they are identical for willow tanning and occupy an intermediate position for oak; these data are analyzed in accordance with the scheme for tanning proposed by Procter and Wilson and give a theoretical explanation of practical results obtained.

A. A. Bochtlingk

Determination of  $p_H$  of lime liquors. W. R. Atkin, L. Goldman and F. C. Thompson. *J. Intern. Soc. Leather Trades Chem.* 17, 568-75 (1933).—In the presence of more than traces of  $\text{Na}_2\text{S}$  measurements of  $p_H$  with the H electrode, glass electrode or indicators are unreliable. A method is given for calcg.  $p_H$  from the concn. of  $\text{Ca}^{++}$  and soly. product. The constancy of the soly. product was demonstrated by adding  $\text{NaOH}$  to  $\text{Ca}(\text{OH})_2$  soln. and detg.  $\text{Ca}^{++}$  analytically and  $\text{OH}^-$  by the H electrode.  $pS (= 1/\log S)$ , where  $S = [\text{Ca}^{++}] [\text{OH}^-]^2$  was found to be const. up to a concn. of added  $\text{NaOH}$  of 0.12  $N$ , which exceeds any probable concn. of  $\text{OH}^-$  arising in practice from hydrolyzed  $\text{Na}_2\text{S}$ . The value of  $pS (= 4.5)$  is unaffected by large addns. of non-hydrolyzed protein (gelatin), but is lowered somewhat by amino acid (glycine). To det. the  $p_H$  of a lime liquor, det.  $\text{Ca}^{++}$  at 25°, and apply the equation:  $p_H = 0.5 pCa + pK_w - 0.5 pS = 0.5 pCa + 11.65$ . Calcd. values for  $\text{Ca}(\text{OH})_2$  solns. contrg. increasing amts. of  $\text{Na}_2\text{S}$  are rational and self-consistent. The use of  $p_{OH}$  instead of  $p_H$  for alk. liquors is advocated because, on account of the change in  $K_w$  with temp., a given value of  $p_H$  does not always correspond to the same value of  $p_{OH}$ .

H. B. Merrill

Impregnating pig skins for boxes and dyeing them with a black permanent dye. G. K. Baidan, A. A. Pchelina and G. S. Rabkina. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 27.—The dyed leather was treated with tannides of pine, etc., followed by a treatment with salts of metals which form with vegetable tanning substances dark brownish water-insol. varnishes, the best results being obtained with Na and K chromates. The impregnation was affected with machine and spindle oil, paraffin, Al soap, Al naphthenate, light petroleum bottom oils, paraffinic fuel oil, an alk. soln. of albuminous substances and vegetable tannides and with Al naphthenate produced on the leather.

A. A. B.

Dyeing chrome sheep skins black. A. S. Vinogradova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 29.—After a no. of mixts. were tried the following formulas were accepted: (1) Wool-black AT4B 25 g. per l., orange PB 3% of the weight of AT4B, 50% com. AcOH (80%) from the weight of the dye. (2) Wool-black AT4B 20 g., cyanine sulfone AT2B 4 g., acid brown 5G 2 g. and 50% com. AcOH (80%) of the weight of the dye. Formic acid may be used instead of AcOH. The dye soln. is applied with a brush on the soaked sheep skin 2 times in succession with a 3 hrs. drying period in between. It is finally dried for 8-10 hrs., washed with ordinary water, dried and finished.

A. A. B.

Dyeing light box leather a brown color resistant toward wet and dry friction. R. L. Metlitzkaya. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 25-6.—Three methods were investigated: (1) The leather is dyed in the usual manner in the drum or by brushing with acid anthracene-brown ATR, followed by treatment with an acidified soln. of  $\text{NaNO}_2$  and  $m$ -tolylene- or  $m$ -phenylenediamine. The following diazotizing soln. produced the best results: 2 g.  $\text{NaNO}_2$ , 5 cc.  $\text{HCl}$  (18°Bé.), one l. water, temp. 15° and duration of treatment 15 min. The treated leather was subjected to a no. of tests (described in detail) and was found to be satisfactory. (2) Mordant dyes do not produce such bright colors, probably on account of the low temp. used in the processing. The following substances were investigated: Chrome brown RO, olive-brown metachrome, and some vegetable tanning substances. (3) According to the literature the color of leather dyed with vegetable tanning substances is a function of  $p_H$ , i. e., the color darkens with an increase of the  $p_H$  value up to 8-9. The expts. revealed that dyeing with tanning solns. produces colors of low intensity of brownish yellow tint which have higher intensities with increase in  $p_H$  value. The color acquires a higher intensity on treating the leather with K Ti oxalate.

A. A. Bochtlingk

Method for determining the oxidation-reduction coefficient in liming solutions. E. L. Gutkina. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.*



1932, No. 3, 8-13.—The oxidation-reduction potential is measured preferably by means of a platinized Pt electrode and in a stream of  $N_2$ . The size of the electrode should be const. and it should be completely immersed in the soln. under investigation. The oxidation-reduction potential of liming liquids changes and depends on the concn. of  $Na_2S$ ; it is higher with increase in the amt. of  $Na_2S$ . In the detn. of the active reaction of the liming liquid a palladized electrode is best. The latter is satd. with  $H_2$  above the liquid and is then immersed in the soln. only when measuring its  $p_H$ . The Pt electrode is unsuitable in the detn. of liming solns. contg.  $Na_2S$ . The expts. are described in detail and are illustrated by plots and tabulated data. A. A. B.

Determining sulfur and fat in leather. L. Ya. Ginzburg. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 27-8.—Various methods used in detg. S and fat in leather are discussed and the following procedure is recommended: Ext. 5 g. of leather as usual in a Soxhlet app. with freshly distd.  $CS_2$  in a tared and dried flask. Distil off the  $CS_2$  and dry the flask contg. the extn. products (S and fats) in an oven at 102-105°. If sulfated oil is present, treat the extn. products in the same flask with 30 cc.  $HCl$  (1:5) and boil under a reflux condenser until the fatty and aq. layers brighten. Sep. the fat layer from the aq. layer by shaking in a separatory funnel with ether and wash the ether layer a no. of times with distd.  $H_2O$  and pour back in the same flask. Oxidize the mixt. with strong  $HNO_3$  (1.40 sp. gr.), heating gently; after evapg. the ether, pour the contents into a beaker, neutralize with  $NH_4OH$ , boil until ammonia is removed, filter and ppt. with  $BaCl_2$ . Recalc. the results on the leather and calc. the amt. of fat by subtracting from the total weight of S and fat. A. A. Bochtlingk

The application of *p*-dichlorobenzene in preserving pig skins. I. M. Baronov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 13.—The deterioration of skins is prevented by the addn. of *p*-dichlorobenzene to salt lyes. A. A. Bochtlingk

Impregnating leather with synthetic resins. A. P. Pisarenko. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 1, 18-19.—Red-tanned leather was impregnated with phenol-formaldehyde resins for various periods and at a temp. of 45-50°. It was found that there is a max. for the duration of impregnation. An excessive duration causes brittleness. The resistance to water was much greater for impregnated than for non-impregnated leather which is also true for swelling when the leather is immersed in water. A. A. B.

Impregnation of stiff varieties of leather with mixtures of albuminous substances containing sulfite-cellulose and vegetable tannides. A. A. Pchelina and E. P. Lotova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 26-7.—Leather was impregnated with a glue obtained after detanning leather waste, the viscosity of the chrome glue being lowered to 1.1-1.3° Engler by a special treatment. The soln. of this glue together with sulfite cellulose ext. was kept below  $p_H$  6.0-8.0 during the reaction to avoid coagulation. The leather was then treated with acid to effect coagulation in the leather. The latter acquires elasticity when fat emulsions are used. This treatment lowered the water adsorption of pig sole leather 40-50% and its air permeability 25-30%. The appearance of the leather was that of good-quality sole leather. A. A. B.

Hydrolysis of leather. The system leather + water at 100° and its dependence on  $p_H$  during tanning. G. A. Abuzov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 18.—Hide powders which were vat tanned with willow and pine exts. at  $p_H$  = 5-7.5 were investigated. It was found that the amt. of solid products of the hydrolysis combined with the tannide proteins is lower than the total of combined tannides in the tanned powders and higher than the amt. of irreversibly combined substances in the latter. The influence of the  $p_H$  of the tanning on the ratio between

the tannides and proteins in the solid products of hydrolysis is similar to that in the tanned powders; it is higher for willow than for pine. The amt. of tannides which is combined with the protein in the  $p_H$  zones is on the left side of the isoelec. point of collagen and it increases with decrease of  $p_H$ . On comparing the compn. of the solid products of hydrolysis and that of the tanned powder it is concluded that an addnl. tanning takes place in the zone close to the isoelec. point of collagen when heat is applied. The resistance of hide powders to water is at a max. when tanning with solns. having a  $p_H$  close to the isoelec. point of collagen. A. A. Bochtlingk

The influence of relative humidity and air temperature on the physico-mechanical properties of chrome leather. N. A. Bogdanov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 1, 20-3.—All conditions which differ from normal affect the quality of leather. Thus the air humidity should not exceed 50-60%, and the temp. should not be above 20°. The worst effect on leather is a temp. in excess of 40°, a humidity of 80-100% and a drying temp. exceeding 40°. Air with 20-35% humidity and a temp. of normal to 40°, as well as repeated soaking and drying, are less harmful. Temps. below 0° do not affect the leather to any appreciable extent; they lower its breaking strength slightly. The expts. are described and data are plotted. A. A. Bochtlingk

Effect of mineral acidity on vegetable-tanned sole leather. Committee report. Thomas Blackadder. *J. Am. Leather Chem. Assoc.* 28, 532-41 (1933).—Substitution of a method based on the detn. of the  $p_H$  value of an aq. ext. of leather for the Procter-Searle method is advocated. Cf. C. A. 27, 2334. H. B. Merrill

Vegetable-tanned sole leather: studies of physical and chemical data. A. T. McKay. *J. Intern. Soc. Leather Trades Chem.* 17, 583-607 (1933).—Statistical. H. B. Merrill

Apparatus for drying leather in the laboratory. T. F. G. Hepburn. *J. Intern. Soc. Leather Trades Chem.* 17, 688-91 (1933).—Humidity control is effected by a strip of goldbeater's skin whose contraction actuates an immersion heater in a small  $H_2O$  reservoir, the steam so generated being injected into the cabinet. H. B. M.

Spots on red tanned leather. V. G. Babakina. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 27.—Two types of spots were investigated: (1) spots of dark brownish and black color with a white aureole and a diam. of 0.25-2 mm., and (2) white spots with veins. The following cultures were sep'd. from the infected spots: two varieties of yeast, a dry and a fat culture of *Aspergillus fumigatus*, *Aspergillus glaucus* and *B. mesentericus*. Expts. with the above cultures were successful and spots with the characteristics of the original spots were reproduced on non-infected leather, which was infected by contact with infected pieces of leather. A. A. Bochtlingk

Influence of fat emulsions on the quality of the inner skin of chrome-tanned sheep skins. K. L. Krasnov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 30.—The inner skin is softened after fat liquoring. The operation is carried out after neutralization, washing and proper pressing. Hides which are naturally fat should have the fat removed in the wet state. A. A. Bochtlingk

Developing standards for inspection for chrome- and red-tanned sheep skins. V. A. Abramukhev. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 2, 31-2.—Various tentative standards are discussed and tests are described. A. A. Bochtlingk

Preparing inner soles by the viscose method. A. S. Kryukova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932, No. 3, 3-4.—Viscose inner soles are usually prep'd. as a plate by the method developed by the Central Inst. of Leather Research in Moscow; 50% of pulp cellulose and 50% "linter" are used. The plates are then treated with rubber and polymerized oils. The rubber is introduced in the viscose in a benzene soln. and water and  $CaO$  and  $ZnO$  or casein are added as emulsi-

fiers. The plates are elastic but become brittle after some time. The polymerized oils are also introduced in a benzene soln. These plates have a higher elasticity (without plasticizers) than hollow ones and have a lower swelling and water-adsorbing factor. The oils were polymerized as follows: 100 parts of linseed or hemp-seed oil + 50 pts. rosin were heated for 4-5 days to 300°. A mixt. of polymerized oils and rubber on being introduced in a benzene soln. into rubber yielded brittle plates.

A. A. Boehtlingk

Artificial leather prepared from sulfite cellulose extract and rubber. A. A. Nikolskii. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevnoi Prom.* 1932, No. 2, 7.—The following compn. was used in prepg. sole-leather substitute: tar 61, rubber 12.75, formolite 25, lampblack 5.1, S 2.5, S ore 2.5 and stearic acid 1.0% (by weight). The tar was prepd. from 50% sulfite cellulose ext. and 50% petroleum residues, the mixt. being heated to 260-300°. The above mixt. was vulcanized with open steam in an autoclave for 3 hrs. and at 3 atms. The plates were brittle and would not hold the nails. It is stated that the properties can be improved by use of more rubber and rags.

A. A. Boehtlingk

Artificial leather prepared from naphthenates and fillers. A. A. Minerv. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevnoi Prom.* 1932, No. 4, 16-19.—The following unsuccessful attempts were made to prep. a leather substitute from Al naphthenate. Al naphthenates from petroleum were mixed with S, litharge, rubber, C black, talc, leather fiber, and cow hair in various proportions with all or some of the substances in the mixts. The attempts carried out with various synthetic resins were of no avail. Vulcanization of the mass did not yield satisfactory results. The plates were either brittle or too soft. The expts. are described in detail and proportions used in making the mass are given.

A. A. B.

Utilizing red-tanned sole-leather waste for making glue. A. A. Pchelin and G. S. Perelman. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevnoi Prom.* 1932, No. 2, 32-3.—The raw material used for glue extn. had the following properties: moisture 18, ash 0.72, fatty substances 0.35, extractable org. substances 11.80, non-leather substance 69.13, hide substance 40.86 and combined tannides 28.27%. The finely cut leather was de-tanned with  $\text{Ca}(\text{OH})_2$ ,  $\text{Na}_2\text{CO}_3$ , NaOH,  $\text{NaHSO}_3$ ,  $\text{Na}_2\text{SO}_3$  and  $\text{Ca}(\text{OH})_2$  +  $\text{Na}_2\text{S}$ . The expts. are described.

1 The best results were obtained when de-tanning in a slightly alk. or acid medium with 1.5% NaOH at 18-20°. The glue obtained by the application of some of the chemicals had low solubilities in water and an unsatisfactory color. The boiling of the de-tanned material was carried out with 2-4 vol. of water for 5-6 hrs. and at a temp. of 85-90°; 7-8 water extns. were made and the exts. concd. to 10-12°Bé. A liquid glue was obtained on heating the undissolved material to 85-90° with 1 1/2-2% NaOH, whereby the substance was completely dissolved. This glue was, however, of a low viscosity.

A. A. B.

Colloid chemistry of collagen, gelatin and glue. H. R. Kruyt. *J. Intern. Soc. Leather Trades Chem.* 17, 612-20 (1933).—An address.

H. B. Merrill

Benzylicellulose [use in making leather] (Meunier, Goufard) 26 Japanese dyeing tannins (Uyeda, Ishinada) 25. Nitrocellulose varnishes for covering imitation leather (Malgin) 26. Rubber compn. or artificial leather (Ger. pat. 586,282) 30.

Hydraulic press suitable for treating hides, skins or leather. Paul V. J. Meranda (to Turner Tanning Machinery Co.). U. S. 1,932,556, Oct. 31. Mech. features.

Dyeing pelts. Soc. pour l'ind. chim. à Bâle. Swiss 161,814, Aug. 1, 1933. Pelts are colored by dyes contg. complex metal compds. such as chromed dyes. Examples are given.

Chamber for treating leather, etc., in bulk with hot air or other gas for drying purposes. Walter Bridges. Brit. 396,824, Aug. 17, 1933.

Substitute for neat's-foot oil for treating leather, etc. Carl Stiepel (to Unichem Chemikalien Handels A.-G.). U. S. 1,934,100, Nov. 7. An oil having a turbidity point of about -5° or lower consists of triglycerides of that fraction of a mixt. of fatty acids derived from sperm oil, hog fat, palm oil or olive oil which has a turbidity point approx. 5° or lower. Cf. C. A. 27, 4945.

Artificial leather. Koch & Co. G. m. b. H. Ger. 586,383, Oct. 20, 1933. Fibrous material such as rags is digested with dil. NaOH soln., and comminuted leather waste is afterward added to the hot mixt. The dissolved leather is then pptd. on to the fibers by addn. of a tanning agent, and the mixt. is worked up on a paper-making machine.

### 30— RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Post nubila, Phoebus. A new rubber era. Philip Schidrowitz. *India Rubber J.* 86, 589-91 (1933).—A discussion of present trends and future desiderata in the chem. engineering of rubber manuf.

C. C. Davis

The chlorination of rubber. Andreas Nielsen. *Kautschuk* 9, 167-70 (1933). A review and discussion of the various methods of prepg. chlorinated rubbers, the chemistry involved, their phys. and chem. properties and present and potential applications.

C. C. Davis

The stress-strain relationship in ebonite. B. L. Davies. *Trans. Inst. Rubber Ind.* 9, 130-49 (1933).—The extensometer which is described and illustrated is an attachment to a standard tensile testing machine, and will give stress-strain curves of low elongations of hard rubber. Various expts. were carried out with this instrument to det. the behavior of hard rubber under stress and the influence of various factors. Hard rubber does not deform in exact agreement with Hooke's law, for it exhibits plastic flow. The deviations from this law depend upon the rate of extension, and moreover the faster this rate the higher the tensile strength. Prolonged mastication of the rubber and the addn. of neutral softeners both result in a weaker vulcanizate. Curves representing the transition from overcured soft rubber to hard rubber indicate that hard rubber curves may be related to the initial portions of soft rubber curves. The plasticity of overcured rubber,

as judged by deviations from Hooke's law, increase with the time of cure up to the "semi-hard rubber" stage. Leather-like semi-hard rubbers differ from soft or hard rubbers in that they are extremely sensitive to small changes in the time of cure, and in that the velocity of plastic flow is approx. equal to the rate of extension. The best tech. cure of hard rubber for mech. service is that at the max. tensile strength and where at a temp. commensurate with service there is considerable plastic flow (e. g., 50%) at the const. max. load. Hard rubbers cured with org. accelerators are particularly sensitive to the time of vulcanization, and prevulcanization is detrimental to the mech. properties of vulcanizates, even where it is almost inappreciable. "Mineral rubber" accelerates the rate of vulcanization, as judged by the stress-strain curve. Gas black gives weak and brittle vulcanizates, and its effect on stiffness is similar to that of further vulcanization. Stress-strain curves offer a reliable means for comparing vulcanizates at the same state of cure contg. different ingredients.

C. C. Davis

Viscometric investigations of solns. of natural compds. of high mol. wt. 1. Rubber in toluene (Reiner, Schoenfeld-Reiner) 2. Aromatic bases [use in the rubber industry] (Fr. pat. 749,904) 10. Machine for continuously extruding vulcanized rubber on a series of wires (Brit. pat.

396,069) 13. Disulfides [as vulcanization accelerators] (Brit. pat. 395,726) 10. Water-insoluble disazo dyes [for coloring rubber] (U. S. pat. 1,932,577) 25.

**Treating latex.** Alexander A. Nikitin (to Naugatuck Chemical Co.). U. S. 1,931,678, Oct. 24. Milk is mixed with alkaline preserved latex and the treated latex is then mixed with an acidic material such as formaldehyde and HOAc in order to produce a stable material (suitably having a  $pH$  of 5.5).

**Forming gloves, caps or other rubber articles by dipping forms into liquid latex.** Abraham N. Spanel, Roger D. Weston and Walter Bitner (to International Latex Corp.). U. S. 1,933,397, Oct. 31. Various details of app. and operation are described.

**Rubber.** Rubber Growers' Association, Inc. and Geo. Martin. Brit. 395,774, July 27, 1933. A soft rubber is obtained by adding a nitrite, *e. g.*,  $NaNO_2$ , to latex and then coagulating with an acid. Insufficient acid to react with all the nitrite produces a harder rubber. The longer the coagulum remains in the serum before machining the softer the product. In 395,775, July 27, 1933, rubber in powd. or crumb form is made by lightly pressing the coagulum obtained as in 395,774 and disintegrating. 10%  $NaNO_2$  may be added and the amt. of acid added should be sufficient to coagulate the rubber, react with the nitrite and neutralize any  $NH_3$ , etc., present. If the latex is preserved with  $NH_3$  it is desirable to add a protective colloid, *e. g.*, casein, to insure gradual coagulation.

**Rubber.** The Goodyear Tire & Rubber Co. Fr. 749,642, July 27, 1933. The surface characteristics of vulcanized rubber are improved by a treatment with ultra-violet rays.

**Rubber.** I. G. Farbenind. A.-G. (Wilhelm Breuers, inventor). Ger. 576,349, May 10, 1933. Addn. to 563,406 (C. A. 27, 1233). The method of 563,506 for producing rubber products by heating rubber in the presence of org. solvent to temps. between 200° and 300° is varied by confining the temp. to the limits 180–300°. Examples are given.

**Rubber.** I. G. Farbenind. A.-G. (Hans Tochtermann and Claus Heuck, inventors). Ger. 577,731, June 3, 1933. Rubber-like masses are prepd. by treating a latex of butadiene hydrocarbon polymerization products with an emulsified anti-ageing compd. and coagulating.

**Rubber.** I. G. Farbenind. A.-G. (Otto Schmidt, inventor). Ger. 577,732, June 3, 1933. Addn. to 568,906 (C. A. 27, 2845). The process of 568,906 for treating films, fibers, etc., of synthetic rubber with sulfurizing agents to obtain a product of desired elasticity is applied to mixts. of natural and polymerized butadiene rubber.

**Rubber.** Chem. Fabrik Ludwig Meyer. Ger. 586,382, Oct. 20, 1933. A product resembling smoked crude rubber is obtained by coagulating fresh or preserved latex or concd. latex by addn. of beechwood-tar oil. Alternatively, crude rubber may be mixed with beechwood-tar oil.

**Microporous rubber.** Zellkautschuk G. m. b. H. Ger. 586,283, Oct. 19, 1933. A rubber compn. contg.  $NaHCO_3$  and  $PbSe$  is vulcanized in the usual way. It is stated that the  $PbSe$  strengthens the walls of the cells formed by the evolution of gas from the  $NaHCO_3$ , and thus restricts the size of the cells. The proportions taken may be  $NaHCO_3$ , 10–20 and  $PbSe$  1–2%, calcd. on the rubber.

**Porous rubber compositions.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Edward A. Murphy and Evelyn W. Madge. Brit. 396,158, Aug. 3, 1933. Porous or microporous goods of rubber and the like, contg. fibers, are produced by forming granular ppts. of rubber, mixing with fibrous materials, *e. g.*, cellulose fiber or asbestos, compacting the mixt. by filtration and vulcanizing so that evapn. of the contained  $H_2O$  is prevented. The filtration may be conducted in conjunction with molding, spreading, impregnating or dipping operations, *e. g.*, a porous former may be dipped and suction applied to produce cylindrical articles. Pressure may be used in addn. to suction for filtering and the filter cake may be treated with a rubber solvent, *e. g.*,  $CCl_4$ , mixed with a

mutual solvent for  $H_2O$  and the rubber solvent used, *e. g.*, alc.

**Rubber compositions.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Edward A. Murphy and Alfred Niven. Brit. 396,159, Aug. 3, 1933. Dough-like or paste-like aq. compns. of rubber and the like and asbestos are prepd. by mixing asbestos fiber, preferably dry, with a q. compns. of flocculent or granular ppts. prepd. from aq. dispersions of rubber and the like. The compn. may be compacted by filtration, *e. g.*, through ceramic material, cotton fabric or fine-mesh wire gauze. Concentrates, such as obtained in Brit. 219,635 and 290,313 to which may be added any known vulcanizing or compounding ingredients, may be used subsequent to diln. Cf. C. A. 27, 3854.

**Rubber composition or artificial leather.** Helsingborgs Gummitfabriks Aktiebolag. Ger. 586,282, Oct. 19, 1933. See Swed. 71,981 (C. A. 27, 3110).

**Preserving rubber.** Max Hagemann, Curt Kreuter and Theodor Weigel (to I. G. Farbenind. A.-G.). U. S. 1,933,962, Nov. 7. See Ger. 557,138 (C. A. 27, 1233).

**Sulfonating rubber.** I. G. Farbenind. A.-G. (Erich Konrad and Helmut Kleiner, inventors). Ger. 582,565, Aug. 17, 1933. Addn. to 550,243 (C. A. 26, 4067). Rubber is treated with oleum,  $HSO_4Cl$ , or other reagent yielding  $SO_3$ , in the presence of an ether or ester of low mol. wt. Partly isomerized or partly degraded rubber may also be treated. Water-sol. sulfonic acids stable to boiling  $HCl$  are obtained. Details are given.

**Conversion products of rubber.** Frederick S. Shadholt. Brit. 396,154, Aug. 3, 1933. A conversion product of rubber is obtained by treating a soln. thereof with a compd. of P, O and Cl or Br in which the proportion of () is greater than that in the corresponding oxyhalide. The compd. may be prepd. by the partial hydrolysis of  $PCl_5$  and (or)  $POCl_3$  or it may be the residue obtained by distg. a mixt. of  $PCl_5$  or  $POCl_3$  and a phosphoric acid. As the conversion proceeds the soln. becomes less viscous and reddish brown in color. The solvent may be removed by any suitable means or the product pptd., *e. g.*, with alc. Mineral acids may be removed with  $H_2O$  or alkali. The products are hard at room temp., become plastic at 100°, are sol. in most solvents, yielding a less viscous soln. than raw or milled rubber, and, with the plasticizers commonly used with nitrocellulose, are suitable for the production of films, etc. Solns. thereof can be halogenated at ordinary or raised temps., the final product being more sol. than ordinary chlorinated rubber. Plasticizers may be mixed also with the halogenated products; vegetable oils are incompatible. Numerous examples are given.

**Dispersion of rubber and like materials.** Ralph T. Halstead (to Dispersions Process, Inc.). U. S. 1,932,661, Oct. 31. Artificial dispersions of rubber or rubber-like material in an aq. medium are formed with the use of Na abietate, Na rosinate or Na oleate and either Na palmitate or Na stearate.

**Evaporators and method for concentrating aqueous dispersions of rubber, etc., preferably with simultaneous compounding.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Wm. McCowan, Eric W. B. Owen and Douglas F. Twiss. Brit. 396,919, Aug. 17, 1933.

**Apparatus (with rolls and scrapers) for working rubber, etc.** Raymond W. Allen (to Firestone Tire & Rubber Co.). U. S. 1,932,200, Oct. 24. Mech. features.

**Molds, etc., for rubber.** Accumulatoren-Fabrik A.-G. Brit. 395,941, July 27, 1933. Molds or traveling bands for the shaping and vulcanizing of microporous rubber are made of Al (alloys), the contact surfaces being oxidized previous to use to render them incorrodible when the rubber is vulcanized in the presence of aq. media. Oxidation is effected in known manner, *e. g.*, by electrolysis.

**Bands of cellular rubber with closed cells (such as those of large size.** Maurice P. H. L. Raepsaet (to Société belge du caoutchouc mousse). U. S. 1,931,964, Oct. 24. Various mech. and manipulative details of manuf. are described.

**Rubber sheets.** Marcel Dupret. Brit. 396,503, Aug. 10, 1933. A sheet of rubber obtained by spreading latex

upon a sheet of glass, etc., and allowing to dry is attached to 1 or both surfaces of a reinforcing layer of porous, fibrous or granular structure, *e. g.*, paper, fabric, etc., or cork dust or rice husks agglomerated with latex, using liquid latex as the adhesive. Ornamental surfaces can be obtained by using plates having impressed patterns for forming the rubber sheets.

**Substituted sulfenamides.** I. G. Farbenind. A.-G. (Ewald Zaucker, inventor). Ger. 586,351, Oct. 20, 1933. Sulfenamides of the formula  $\text{RSNR}'\text{R}''$ , where R is an org. radical and R' and R'' are alkyl or aralkyl radicals, or together form an alicyclic or heterocyclic radical, are prepd. by treating mercaptan salts with *N*-halo derivs. of secondary amines. Thus, Na *p*-thiocresolate, treated in MeOH soln. in the cold with *N*-chloropiperidine, yields *p*-tolylsulfenpiperidide ( $\text{MeC}_6\text{H}_4\text{SNC}_4\text{H}_9$ ). Examples are given also of the prepn. of benzothiazolyl-2-sulfenpiperidide, m.  $80^\circ$ , -morpholide, m.  $85^\circ$ , -dimethylamide, m.  $36^\circ$ , -dibutylamide and -thylcyclohexylamide (from a salt of 2-mercaptobenzothiazole and the corresponding *N*-chloro amine); another example describes the prepn. of 4-phenyl-1,3,4-thiadiazole-5-thione-2-sulfenpiperidide

( $\text{S.CS.NPh.N:CSNC}_4\text{H}_9$ ), m.  $80^\circ$ . Benzoxazolyl-2-sulfenpiperidide, m.  $51^\circ$ , has also been obtained. The products are useful in the rubber industry.

**Adhesive from latex, etc.** John McGavack and Alexander A. Nikitin (to Naugatuck Chemical Co.). U. S. 1,932,632, Oct. 31. Adhesives which are suitable for uniting rubber to metals are formed from concd. acidified latex and various other ingredients such as acidified and creamed latexes, casein, glue, gelatin, corn gluten, egg albumin, powd. silica gel, Fe oxide and MgO.

**Adhesive containing rubber, etc.** Douglas F. Twiss, Frederick A. Jones and James H. Anderson (to Dunlop Rubber Co. Ltd.). U. S. 1,931,879, Oct. 24. An adhesive which is suitable for bonding rubber to metals, etc., is prepd. by the reaction of a reactive polymerized or polymerizable unsatd hydrocarbon such as isoprene or butadiene with resins such as those of balata, gutta-percha or rubber in the presence of  $\text{H}_2\text{SO}_4$  or a sulfonic acid or  $\text{SnCl}_4$  or  $\text{H}_3\text{PO}_4$ .

**Apparatus for plasticizing rubber compositions in successive stages of treatment.** Wm. A. Gordon (to Farrel-Birmingham Co.). U. S. 1,935,050, Nov. 14. Mech. features.

**Adhesives for bonding rubber to metal.** Dunlop Rubber Co. Ltd., Douglas F. Twiss, Frederick A. Jones and James H. Anderson. Brit. 395,430, July 20, 1933. An adhesive for bonding rubber to metal, etc., surfaces is made by heating a polymerizable unsatd. hydrocarbon with balata-, gutta-percha- or rubber-resins and a condensing agent, *e. g.*,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{SnCl}_4$  or a sulfonic acid. Examples are given. The solid adhesive or a soln. may be dispersed in  $\text{H}_2\text{O}$  by stirring with the addn. of emulsifying agents, *e. g.*, casein, oleic acid,  $\text{NH}_3$ . Treatment of the hot reaction products with solid  $\text{Ca}(\text{OH})_2$  or MgO or with  $\alpha$ -naphthylamine or a mixt. of aldol,  $\alpha$ - and  $\beta$ -naphthylamines enhances the keeping properties of the adhesive.  $\text{SiO}_2$ , kieselguhr and vulcanizing agents also may be added.

**Coating metal objects with rubber.** Vereinigte Stahlwerke A.-G. (Heinrich Klas and Gustav Tichy, inventors). Ger. 577,803, June 6, 1933. The metal object is coated with a soln. of rubber in a non-volatile solvent such as tar oil or mineral oil distillate. The layer is then vulcanized at a temp. at which the solvent is partly evapd.

**Coating glass, etc., with rubber, etc.** Dunlop Rubber Co. Ltd. Ger. 577,802, June 6, 1933. One or more layers of the product obtained by treating resins, such as balata or gutta-percha resins with  $\text{CH}_2\text{O}$  or its polymers in the presence of a condensing agent is used as the binding agent for the rubber coating, or as the coating itself.

**Gutta-percha insulation.** Archie R. Kemp and John H. Ingmanson (to Bell Telephone Laboratories, Inc.). U. S.

1,935,321, Nov. 14. -Albane is used as a plasticizing agent with resin-poor gutta-percha.

**Vulcanization accelerators.** Imperial Chemical Industries Ltd., Maldwyn Jones and Wm. J. S. Naunton. Brit. 395,705, July 18, 1933. A vulcanization accelerator which shows substantially no tendency to scorch at milling temps. and behaves as a superaccelerator at vulcanization temps. comprises a mixt. of not less than 40% dibenzothiazyl disulfide and not more than 60% tetraethylthiuram disulfide. The 2 accelerators may be added to the rubber separately.

**Vulcanizing molds for the production of rubber toys.** Magyar Rugsyantaárugyár R. T. Brit. 396,610, Aug. 10, 1933.

**Rubber tire manufacture.** Adrian O. Abbott, Jr. (to Morgan and Wright). U. S. 1,931,638, Oct. 24. Mech. features.

**Apparatus for vulcanizing rubber tires.** Harold A. Denmire (to General Tire & Rubber Co.). U. S. 1,931,923, Oct. 24. Mech. features.

**Apparatus for vulcanizing rubber tires.** Roy W. Brown and George P. Bowmworth (to Firestone Tire & Rubber Co.). U. S. 1,932,063, Oct. 24. Mech. features.

**Vulcanizing rubber tires.** Edward Fetter. U. S. 1,932,092, Oct. 31. Mech. features.

**Vulcanizing rubber to leather.** Leon B. Conant. U. S. 1,934,038, Nov. 7. In hot-vulcanizing rubber compn. with pressure to cement cured leather, a hot fibrous blanket is applied before and during vulcanization, in order to prepare the leather for uniting with the rubber compn.

**Apparatus for the continuous vulcanization of rubber-covered wire.** Bell Telephone Laboratories, Inc. Brit. 396,061, July 26, 1933.

**Age-resisting vulcanized rubber.** Robert L. Sibley (to Rubber Service Laboratories Co.). U. S. 1,932,562, Oct. 31. In prepg. a S-vulcanized rubber product, an antioxidant is used comprising a reaction product of a dihydroxynaphthylmethane and a phenylamine or naphthylamine contg. 7-13 C atoms such as the reaction product of  $\beta,\beta$ -dihydroxydinaphthylmethane and *p*-toluidine. Cf. C. A. 27, 4133.

**Vulcanizing rubber.** I. G. Farbenind. A.-G. Fr. 749,413, July 24, 1933. Pastes contg. colloidal S in intimate mixt. with plastic or very viscous substances are used for vulcanizing rubber.

**Vulcanizing rubber.** The Goodyear Tire & Rubber Co. Fr. 749,716, July 28, 1933. Comps. of the formula  $[(\text{YCS})_n \text{RCOO}]_m \text{M}$  (Y is  $-\text{N}(\text{R}')\text{R}''$ , R is C or Cand H, R' and R'' are alkyl, aryl or aralkyl or a heterocyclic radical contg. N,  $\pi$  and  $\pi'$  are 1 or higher and M is a metal, an alkyl, aryl or aralkyl radical or a radical giving rise to salts, such as  $\text{NH}_4$  and substituted  $\text{NH}_4$  groups, *e. g.*, carboxymethyl(or ethyl)di(dimethyl(or ethyl)dithiocarbamate) or carboxymethyl(di(pentamethylenedithiocarbamate)).

**Vulcanizing rubber.** The Goodyear Tire & Rubber Co. Fr. 749,928, Aug. 1, 1933. Rubber is vulcanized in the presence of a mixt. of a nitrophenyl ether of a mercapto-benzothiazole, *e. g.*, 2,4-dinitrophenyl-6'-ethoxybenzothiazyl-2'-mercaptide, and a reaction product of an aldehyde and an amine, *e. g.*, crotonylideneaniline.

**Vulcanizing rubber.** Imperial Chemical Industries Ltd. Fr. 749,953, Aug. 2, 1933. The "burning" of rubber during vulcanization is prevented or reduced by using as accelerator dibenzothiazyl disulfide and tetraethylthiuram disulfide mixed in such proportions that there is not less than 40 of dibenzothiazyl disulfide and not more than 60% of tetraethylthiuram disulfide in the total accelerator.

**Hard rubber-like products.** Waldemar Zieser (to I. G. Farbenind. A.-G.). U. S. 1,932,390, Oct. 31. A material which has good resistance to heat and to chem. reagents comprises a product obtained by polymerizing 1,3-butadiene in the presence of an alkali metal, together with natural rubber 40-80% and a large proportion of S.

# CHEMICAL ABSTRACTS

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## 1-APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

**Apparatus for facilitating melting-point reading.** G. Speroni. *Ann. chim. applicata* 23, 432-4 (1933).—To make it possible to watch the melting substance constantly, and also follow the temp. in m.-p. detns., a sliding clamp is placed on the thermometer, with a mirror set at 45° to reflect the reading down to another mirror, half of which is silvered to reflect the reading to the eyepiece; the other half is clear glass so that the melted substance can be viewed directly. A. W. Contieri

**A simple apparatus for the determination of melting points, boiling points, transition points, ignition temperatures, etc., specially convenient for use with a small quantity of sample.** Satoshi Watanabe. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 22, 264-8 (1933).—An elec. recording device is described, with 1 cut and 4 graphs, with which the b. p. of H<sub>2</sub>O may be detd. with less than 0.01 cc., or the ignition temp. of S with 0.05 g.

**A non-isothermal, adiabatic microcalorimeter for studying the thermal effects of radioactive substances.** Alexandre Sanielevici. *J. chim. phys.* 30, 513-27 (1933).—A non-isothermal, adiabatic microcalorimeter designed for weak thermal effects is described, and its sensibility and precision are discussed. The measured heat effects of a radioactive salt checked with those calcd. from the energy of radiation. L. B. Steiner

**A simple apparatus for exact gas analysis, especially for the determination of carbon dioxide and water vapor at low concentrations.** Paul Schulten. *Chem. Fabrik* 1933, 113-15.—An improved Riedel app. (cf. *C. A.* 26, 2849) is described with 2 cuts, and comparative results are shown.

**A new high-frequency calorimeter for investigation of the dielectric losses of liquids.** L. Pungs and H. Rieche. *Z. tech. Physik* 14, 483-5 (1933).—A description of a calorimeter for measuring dielec. losses of liquids at frequencies from 0 to  $5 \times 10^6$  and temps. from -40° to +80°

**A quartz glass plunger pump without packing gland.** Theo Frantz. *Chem. Fabrik* 1933, 508.—A glass-lined pump is described.

**Rotary compressors for Anilob'edinenie plants.** B. I. Entikhtikov. *Aminokrasnochnaya Prom.* 3, 208-72 (1933). The performance of various types of rotary air compressors is discussed.

**General properties of photoelectric cathodes.** Geo. Daurin. *Rev. gen. elec.* 34, 515-26, 535-66, 591-607, 629-37 (1933).—Modern development of photoelec. cells, their different types, characteristics and performances, sensitivity to white light and to spectral colors are discussed theoretically and in respect to their practical applications. Of great importance for practical purposes is proportionality of current produced to illumination. The various fields in which these appliances are now used are described and curves and tables of performance and sensitivity of different light-sensitive devices given. One hundred and twenty-four references. M. H.

**High capacity of rotary furnaces, their calculation and suggestions for further uses of this furnace system.** J. Lainort. *Feuerfest Ofenbau* 9, 137-40 (1933).—The dimensions and heat efficiencies of rotary kilns and stationary furnaces are calcd. and compared; the superiority of the former is shown. The indirect heat transfer (re-

generative effect) from preheated wall to charge is especially pointed out. The active heating surface of a rotary kiln is 1.46 times the diam. times the length as compared with the mere bath surface of an open hearth. The use of rotary kilns for the glass industry is advocated.

**Possible set-ups of the Ostwald decade rheostats for the purposes of potentiometric titrations.** Edmund Erbacher. *Chem.-Ztg.* 57, 904-5 (1933).—A wiring diagram is shown and the method of carrying out titrations with the new set up is explained in detail.

**Color tests in metallurgical labs. equipped with the Leitz colorimeter (Kropf) 7.**

**Felgentraeger, W.:** Feine Waagen Wagungen und Gewichte. 2nd enlarged ed. of "Theorie, Konstruktion und Gebrauch der feineren Hebelwaage." Berlin: J. Springer. 308 pp. M. 26. Reviewed in *Nature* 132, 730 (1933).

**Temperature indicators.** Henry Dreyfus. *Fr.* 750,240, Aug. 7, 1933. A solid mass for indicating the temp. of a surface consists of a fusible substance and (or) a sublimable substance and a filling material, e. g., a mixt. of C<sub>12</sub>H<sub>10</sub>, C<sub>10</sub>H<sub>8</sub> and chalk.

**Columns or towers for holding materials for chemical treatment.** Garvenswerke, Maschinen-, Pumpen- und Waagenfabrik W. Garvens. *Ger.* 578,650, June 16, 1933.

**Hydrometer.** Charles O. Fairchild and Robert M. Willhelm (to Charles J. Tagliabue Mfg. Co.). U. S. 1,935,703, Nov. 21. Structural details.

**Portable thermocouple pyrometer suitable for use with molten metals.** John A. Obermaier. U. S. 1,936,140, Nov. 21.

**Viscometer of the compound pendulum type.** Howard C. Rule, Jr. U. S. 1,934,739, Nov. 14. Various structural and operative details are described.

**Apparatus for distillation and fractionation of materials or for effecting various reactions.** Adolph Placek. U. S. 1,936,523, Nov. 21. Various structural and operative details are described of an app. comprising a casing in which is mounted a rotatable drum with a closed convolute spiral channel through which material is fed from the inner to the outer portion of the drum. U. S. 1,936,524 relates to structural and operative details of a similar app.

**Apparatus for feeding catalyst to pressure reaction vessels such as used for converting acetylene to acetaldehyde.** Philip H. Falter (to American Cyanamid Co.). U. S. 1,935,627, Nov. 21. Various structural and operative details are described.

**Disk valve closure, particularly applicable for use with purifiers and scrubbers.** Wm. Blakeley. *Brit.* 397,542, Aug. 28, 1933.

**Air filter.** Anselme Neveu (to Westinghouse Air Brake Co.). U. S. 1,935,813, Nov. 21.

**Filter for liquids.** The Dorr-Co. *Ger.* 582,503, Aug. 16, 1933.

**Filter for liquids.** Giacinto Ravinetti. *Fr.* 751,730, Sept. 8, 1933.

**Filters for liquids.** Auto-Klean Strainers Ltd. *Fr.* 753,010, Oct. 5, 1933.

**Funnel-shaped filter.** Firma Mellita-Werke A.-G.<sup>1</sup> Fr. 751,732, Sept. 8, 1933.

**Rotary filter with pump for cleaning liquid.** Auto-Klean Strainers Ltd. and Wm. R. Beldam. Fr. 751,739, Sept. 8, 1933.

**Filter presses.** Georges Perrin. Fr. 753,190, Oct. 9, 1933. Construction of plates.

**Spray cooler or washer for gases required to be kept above or below atmospheric temperature.** Thyssen'sche Gas- und Wasserwerke G. m. b. H. Ger. 587,064, Oct. 28, 1933.

**Centrifugal apparatus for removing dust from gases.** Deutsche Babcock & Wilcox Dampfkessel-Werke A.-G. Ger. 587,168, Oct. 31, 1933.

**Apparatus for scrubbing gases.** London Power Co. Ltd. and Stauden L. Pearce. Fr. 752,321, Sept. 20, 1933.

**Apparatus for contact of gases with liquids as in ammonium sulfate production, etc.** Wilhelm Mueller. U. S. 1,936,308, Nov. 21. Structural details.

**Gas-pressure regulators.** Karl Wolinski. Brit. 396,308, Aug. 3, 1933.

**Reaction column for distilling or concentrating liquids.** Harry Pauling. Ger. 578,565, June 15, 1933.

**Apparatus for evaporating liquids.** I. G. Farbenind. A.-G. (Adolf v. Friedolsheim and Konrad Pratzel, inventors). Ger. 578,790, June 17, 1933.

**Apparatus for measuring the wetting power of liquids.** Firma Louis Schopper. Ger. 578,880, June 17, 1933.

**Treating liquids with gases as in "phosgenating" amino compounds.** Albert H. Munro (to National Aniline and Chemical Co.). U. S. 1,935,190, Nov. 14. Various details of app. and operation are described relating to a method in which gas is introduced into a downwardly moving stream of liquid which is recirculated in the app.

**Apparatus for distilling liquids such as dry-cleaner solvent.** Cyrus H. Haggood (to De Laval Separator Co.). U. S. 1,935,183, Nov. 14. Various structural and operative details are described.

**Device for indicating when the level of a liquid in a container falls below a predetermined level, particularly for use with oil-filled electrical bushings and transformers.** The Ohio Brass Co. Brit. 397,958, Sept. 7, 1933.

**Mixer for dissolving, mixing or emulsifying liquid, viscous or powdered masses.** J. S. Petzholdt, Maschinenfabrik und Heinrich Horn. Ger. 582,863, Aug. 21, 1933.

**Apparatus for concentrating solutions by circulation.** Soc. anon. des ateliers de constructions mécaniques Escher Wyss. Fr. 750,295, Aug. 8, 1933.

**Apparatus for treating liquids with gases as in aerating sewage.** Ralph R. Lefler. U. S. 1,936,305, Nov. 21. Various structural and operative details are described.

**Steam-heated tubular drier.** Maschinenfabrik Buckau R. Wolf A.-G. Ger. 584,678, Sept. 22, 1933. Addn. to 583,043 (C. A. 28, 5<sup>o</sup>).

**Rotary mill for drying, grinding and burning goods of all kinds.** Bruno Faber. Ger. 578,980, June 19, 1933.

**Apparatus for drying bands, films, etc.** Ernst Bleibler. Ger. 582,721, Aug. 21, 1933.

**Apparatus for utilizing the waste heat from lignite driers, etc., for heating water, etc.** Metallgesellschaft A.-G. Ger. 578,823, June 17, 1933.

**Water-tube boiler and superheater.** Charles A. Hulsart (to Babcock & Wilcox Co.). U. S. 1,934,714, Nov. 14.

**Superheater installation for boilers.** Richard P. Wagner (to Superheater Co.). U. S. 1,935,068, Nov. 14. Structural features.

**Apparatus for feeding treating chemicals to boilers.** Edward W. Butzler (to John M. Hopwood). U. S. 1,934,791, Nov. 14. Structural and mech. features.

**Lids for sealing pressure-resisting vessels.** Cecil S. Hall and Imperial Chemical Industries Ltd. Brit. 397,890, Sept. 4, 1933.

**Thermally-actuated device for operating valves, dampers, etc.** Bernard T. Wingfield. Brit. 397,239, Aug. 24, 1933.

**Apparatus for the detection, measurement or recording of suspended particles, e. g., smoke or thin fogs.** Eric B. Moss and Cambridge Instrument Co. Ltd. Brit. 396,300, Aug. 1, 1933.

**Jigging conveyors.** Alfred Bickhoff (trading as Gebr. Bickhoff Maschinenfabrik und Eisengiesserei). Brit. 396,332, Aug. 3, 1933.

**Apparatus for classifying and dewatering fine solid materials.** James M. Mitchell. U. S. 1,934,812, Nov. 14. Structural and mech. features.

**Hydraulic by-pass valves for use with gas-holders, washers, purifiers, etc.** R & J. Dempster Ltd. and Wm. A. Hulme. Brit. 396,307, Aug. 3, 1933.

**Shaking mechanism for sifting and conveying apparatus.** George E. Smith. Brit. 397,241, Aug. 24, 1933.

**Centrifugal mixer and sprayer for heavy viscous fluids and powders such as molasses, etc.** Hermann H. Schmidt (to Missouri Holding and Investment Co.). U. S. 1,936,120, Nov. 21. Various structural, mech. and operative details are described.

**Apparatus for lixiviating solid materials.** Egon Bohm. Ger. 578,704, June 16, 1933.

**Crystallizing apparatus.** Compagnie de produits chimiques et électrometallurgiques Alais, Froges et Camargue. Ger. 578,840, June 22, 1933.

**Surface condenser suitable for steam, etc.** Townsend Timber and Harold M. Graham (to Ross Heater & Mfg. Co.). U. S. 1,935,864, Nov. 21.

**High-capacity surface condenser suitable for steam.** John H. Smith. U. S. 1,935,822, Nov. 21. Structural features.

**Apparatus for rectifying volatile products.** Jean B. Segura. Fr. 751,931, Sept. 12, 1933.

**Apparatus for examining substances by ultra-violet light.** Griffin & Tatlock Ltd. and Joseph C. O. Turfery. Brit. 397,059, Aug. 17, 1933.

**Röntgen-ray apparatus.** Oscar H. Pieper. Brit. 397,483, Aug. 14, 1933.

**Röntgen-ray-tube anodes.** C. H. F. Muller A. G. Ger. 582,751, Aug. 22, 1933. Details of construction are given.

**Selenium cell.** Byron Decker and Elmer Blume. U. S. 1,935,698, Nov. 21. Structural details.

**Selenium cells.** Elise Haerdtl nee Bartschneider and Frieda Kirsch. Fr. 752,241, Sept. 19, 1933. Construction of electrodes is given.

**Operating luminous tubes.** Zoltan Bay. U. S. 1,936,005, Nov. 21. For producing, in a luminous tube such as one contg. Ne and Hg, colors or tints other than the fundamental color, the tube is subjected to the action of current impulses sep'd. from one another by intervals the lengths of which are much greater than the duration of the impulse (the intensity of the impulses being many times the effective strength of the current).

**Vacuum tube.** Hendrik Lems (to General Elec. Co.). U. S. 1,935,723, Nov. 21. A tube is described which has a wall portion of refractory material such as quartz which is sealed by means of a graded seal to the basal portion of the tube, the seal being coated on the outside with an opaque opalescent glass layer.

**Thermionic cathodes.** Westinghouse Electric & Manufacturing Co. Fr. 753,113, Oct. 7, 1933. The emitting substance is prep'd. by mixing BaNa<sub>2</sub> with compds. of Ba and Sr, such as BaCO<sub>3</sub> and SrCO<sub>3</sub> and a binder such as a nitrocellulose binder. The mixt. is applied to a conductor, dried at a low temp. and the BaNa<sub>2</sub> is reduced in the vacuum to liberate metallic Ba in the coating.

**Photoelectric cell.** N. V. Philips' Gloeilampenfabriek. Ken. Fr. 42,669, Sept. 1, 1933. Addn. to 603,016 (C. A. 25, 1415).

**Photoelectric tube.** Theodore W. Case (to Case Research Laboratory, Inc.). U. S. 1,935,939, Nov. 21. A portion of the interior surface of the bulb is coated with a metallic substance such as Ag and there is inserted within the bulb a heatable electrode such as Pt having a coating of material such as a Ba comp'd. adapted to be photo-active; the heatable electrode is heated to throw off the coating in



vaporized form, and the vaporized material is condensed upon the interior of the metallic coating on the bulb; the metallic coating on the bulb is connected in circuit with the heatable electrode, and H is admitted to the bulb until a condition is reached at which a glow discharge takes place between the electrodes; H is removed from the bulb, the electrodes are connected in circuit with a source of potential and the connection is maintained until the tube obtains a maximum sensitivity; then H is admitted to the bulb until a pressure is reached which gives the desired sensitivity.

**Photoelectric tube.** Soichiro Asao and Motomatsu Suzuki (to General Elec. Co.). U. S. 1,936,419, Nov. 21. In the production of the tube, there are evapd. and condensed on the envelope a superposed coating of alk. material such as Cs or K and a layer comprising Ni, Au, Ag or Pt. Cf. C. A. 27, 3120.

**Photoelectric battery.** Horst Kottas. Austrian 134,913, Oct. 10, 1933.

**Discharge tubes.** Compagnie générale de télégraphie sans fil. Fr. 751,867, Sept. 11, 1933.

**Electric discharge apparatus.** Walter Lehmann. Fr. 753,017, Oct. 5, 1933. Means for controlling the discharge is described.

**Electric discharge devices such as discharge lamps containing gases.** Hans Ewest, Kurt Wiegand and Martin Roger (to General Elec. Co.). U. S. 1,935,702, Nov. 21. Structural and elec. features.

**Gas-filled electric discharge device.** Leonard J. Davies and Henry de B. Knight (to General Elec. Co.). U. S. 1,935,697, Nov. 21. Structural features.

**Electric discharge tube.** Hans von Hartel. Fr. 753,002, Oct. 5, 1933. The metal to form the screen is placed in a part of the tube which may be sepd. from the rest by fusion. This part is heated to vaporize the metal and to sep. it by fusion.

**Electric discharge tube for the emission of ultra-violet rays.** Jan H. de Boer (to General Elec. Co.). U. S. 1,935,699, Nov. 21. A device having at least 2 cooperating electrodes one of which is a thermionic cathode contains a substance such as I in the vapor of which the discharge takes place and the spectrum of which is emitted by

the tube, and a material such as carbon,  $\text{CaF}_2$  or  $\text{ZrO}_2$  capable of adsorbing the said substance and liberating it again on being heated (various structural and operative details being described). Cf. C. A. 27, 3363.

**High-tension electron-discharge tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 753,300, Oct. 12, 1933.

**Electron-discharge amplifier.** Radio Research Laboratories Inc. Fr. 751,631, Sept. 7, 1933.

**Chamber furnace.** C. Otto & Co. G. m. b. H. Ger. 578,993, June 19, 1933. Addn. to 569,688 (C. A. 27, 3807).

**Gas-fired industrial furnace.** Wilhelm Ruppmann. Ger. 578,233, June 12, 1933.

**Tunnel furnace.** Alfred P. Denus. Fr. 752,087, Sept. 15, 1933.

**Apparatus for determining the composition of the atmosphere of furnaces.** Marie T. J. Lépine née Roussel. Fr. 750,367, Aug. 9, 1933.

**Pre-heating device for furnaces for roasting or sintering materials.** Lepol Internationale Patentverwertungs-G. m. b. H. and N. V. Solopol Ingenieursbureau tot Exploitatie van het systeem Polysius. Ger. 578,935, June 19, 1933.

**Apparatus for heating or cooling iron ore, cement, or other granular materials.** Nikolai Ahlmann. Ger. 578,652, June 16, 1933.

**Rotary tubular heat-exchange apparatus suitable for use with naphthalene vapor for heating various substances.** Ernst Daub. U. S. 1,936,293, Nov. 21. Various structural and operative details are described.

**Heater suitable for vaporizing liquids.** Walter M. Cross (to Babcock & Wilcox Co.). U. S. 1,935,617, Nov. 21.

**Oil burner.** Walter W. Williams. U. S. 1,934,755, Nov. 14.

**Apparatus for generating acetylene.** Marius L. G. Toussaint. Fr. 751,930, Sept. 12, 1933.

**Thermostatic valve suitable for controlling the flow of gas and air to furnaces.** Anthony J. Donohue (to Simplex Gas Products Corp.). U. S. 1,936,502, Nov. 21.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

**Edward Theodore Brewis.** E. Hinks. *Analyst* 58, 732 (1933).—(Obituary. W. T. H.

**John David Roberts.** C. A. Adams. *Analyst* 58, 732 3 (1933).—(Obituary. W. T. H.

**The negative weight of phlogiston.** Charlotte Saechtling. *Angew. Chem.* 46, 754 (1933). A philosophical-historical treatise. Karl Kammermeyer

**Extremely low temperatures.** W. J. de Haas. *Naturwissenschaften* 21, 732 4 (1933).—Adiabatic demagnetization brings about a temp. drop of suitable substances (Debye, also Giauque); these substances are nonferromagnetic and of reasonably high magnetic moment. The effect is most marked at low temp. A short description is given of the exptl. arrangement of the Leyden lab. for these investigations, principally a glass vacuum vessel with  $\text{CeF}_3$  tube between the poles of a large magnet. The vessel is surrounded by He at  $1.26^\circ$  abs.; the substance indicates its own temp. from the force with which it is attracted into the magnetic field. The  $\text{CeF}_3$  temp. obtained was  $0.27^\circ$  abs., for  $\text{Dy Et sulfate}$   $0.14^\circ$  abs., for  $\text{Ce Et sulfate}$   $0.085^\circ$  abs., no definite limit to the possible temp. has been set as yet. A magnetic temp. scale for these extremely low temps. is suggested; the gas-thermometer scale becomes impracticable in this range.

**Hydrogen sulfide water.** A. I. Sheinkman. *Farm. Zhur* 4, 166 7 (1933).— $\text{H}_2\text{S}$  water is suggested in place of  $\text{H}_2\text{S}$  gas for class-room analysis. A convenient arrangement of a series of flasks for satn. is designed.

L. Nasarevich

**Molecular symmetry and the reduction of the secular equation.** Henry Eyring, Arthur A. Frost and John Turkevich. *J. Chem. Physics* 1, 777 83 (1933).—A method is given for expressing a characteristic function of a bond of any multiplicity in terms of a linear independent set. The independent sets for the multiplicities corresponding to one bond and to two bonds for an arbitrary no. of electrons are given. A method recently given for obtaining matrix components for characteristic functions of a singlet bond is generalized to include all multiplicities. Group theory is applied to the characteristic functions of bonds for sym. mols. to reduce the secular equations, and examples are worked out for all multiplicities. The possible reasons for the approx. additivity of bond energies for mols. is examd. in connection with the common custom of ignoring all but the strongest bonds. G. M. Petty

**Ionization potentials and energies of formation of non-polar molecules.** Jean Savard. *Compt. rend.* 197, 1122-4 (1933).—The energy of dissociation of a mol.  $AB_n$  is expressed as the difference in ionization potentials of the mol. and of the atoms. The formula was verified with a precision of 0.1-0.2 v. for  $\text{H}_2$ ,  $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{C}_2$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{HCl}$ ,  $\text{HBr}$ ,  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{CH}_4$ ,  $\text{CH}_3\text{CH}_3$ ,  $\text{CH}_3\text{CH}_2\text{CH}_3$ ,  $\text{CH}_3\text{CH}_2\text{CN}$ ,  $\text{CN.CN}$ . Formulas for the energy of the C-C bond are given in terms of the ionization potentials of the mol. The energy of a mol. reaction is calcd. by replacing the ionization potentials of the atoms by those of the mols. Also in *J. phys. radium* 4, 650 64 (1933).

P. S. Roller

The effect of pressure on galvano-magnetic phenomena.

C. Bellia. *Nuovo cimento* 10, 221 9(1933).—The application of hydrostatic pressure increases the Hall coeff. ( $R$ ) in sheet Bi and lowers it in sheet Sb. The values for Bi are as follows, where the first figure is the pressure in atm. and the second is the coeff.: 1, 2.583; 5, 2.731; 25, 2.741; 50, 2.750. The value of the const. magnetic field ( $H$ ) is not given. Variations in  $H$  gave the following data which are, in order, the field strength in c. m. u.,  $R$  at 1 atm. and  $R$  at 25 atm.: (sheet A) 1500, 3.483, 3.510; 2000, 2.915, 2.950; 4080, 2.373, 2.408; 5500, 1.973, 2.015; (sheet B) 1500, 3.122, 3.150; 2000, 2.699, 2.718; 4080, 2.180, 2.220; 5500, 1.887, 1.922. The elec. cond. was also measured in Bi with the following results, which are in order, the pressure in atm., the cond.  $\times 10^6$  without a magnetic field, the cond.  $\times 10^6$  in a field of 1485 c. m. u.: 1, 7.600, 7.488; 5, 7.740, 7.628; 25, 7.773, 7.765; 50, 7.790, 7.681. The no. of free electrons per cc. is calcd. to be  $753.5 \times 10^{16}$ . J. B. Austin

The dielectric constant and absorption of several organic fluids at 1.82 m. W. T. Szymanski. *J. Chem. Physics* 1, 809 16(1933).—Dielec. consts. and absorption of energy at  $\lambda = 1.82$  m. were measured in EtOH, PrOH, iso-PrOH, iso-BuOH, BuOH, AmOH,  $C_6H_5Cl$ ,  $C_6H_5NO_2$  and quinoline. The resonance method for undamped waves was used. The results agree well with Debye's theory of anomalous dispersion and with the results of Mizushima for fluids whose polarization does not change with diln. from normal concn. By use of the Malsch modification of Debye's theory, the dielec. const. for  $C_6H_5NO_2$  and quinoline is in satisfactory agreement with theory; the agreement is improved for energy absorption, but is far from satisfactory. Gerald M. Petty

Dipole moment and solvents. Horst Muller. *Physik. Z.* 34, 680-710(1933); cf. *C. A.* 27, 1248.—An app. of high precision was developed to measure dielec. consts. of liquids, and to show the dependence of mol. polarization of solutes on the solvent. A no. of solutes were measured in the solvents: hexane, cyclohexane, decalin,  $CCl_4$ ,  $C_6H_6$ ,  $C_2Cl_4$  and  $CS_2$ . An empirical equation, valid for many substances, was developed which permits for non-gaseous mols. the calcn. of the dipole moment of free mols. by extrapolation of the results obtained in soln. To explain the results, a "satn. effect" in the elec. field of the dipoles is assumed. L. E. Steiner

Complex formation due to polarization. I. The system krypton and hydrogen chloride. Geo. Glockler, Charles P. Roe and Donald L. Fuller. *J. Chem. Physics* 1, 703 8(1933).—Five lines of evidence are cited for the formation of mol. complexes confg. rare gas atoms and an excited atom or a mol. with a dipole moment. They are (1) Band spectra of complex HgA and HgKr are known. (2) Rare-gas hydrates have been described. (3) Iso-electronic systems similar to the rare gases have proton affinity. (4) Rare gas hydride ions have been found in the mass spectrograph. (5) The  $P$ - $V$ - $T$  relation of gas mixts. shows that interaction between unlike mols. exists. The last type of evidence was established experimentally for Kr HCl mixts. from a study of the second virial coeff. as a function of the compn. of the mixt. II. The system propane and hydrogen chloride. Geo. Glockler, Donald L. Fuller and Charles P. Roe. *Ibid.* 709 13. The similarity in structure between the rare gases and satd. hydrocarbons suggests that the latter should also show complex formation with other mols. or atoms of dipole character. This is verified by an exptl. study of the  $P$ - $V$ - $T$  relations of gaseous mixts. of propane and HCl and an analysis of the second virial coeffs. as a function of the compn. The question of complex formation of satd. hydrocarbons is also discussed on the basis of Bronsted's theory of acids and bases. Morris Muskat

Investigations in the critical region. IV. Critical isotherms and Joule effect of  $N_2O_4$ . K. Bennewitz and J. J. Windisch. *Z. physik. Chem.* A166, 416 27(1933); cf. *C. A.* 23, 5078.—An app. is described for measuring the isothermal Joule effect at high temp. with corrosive substances. The crit. Joule-isotherm was detd. for  $N_2O_4$ . Conclusion: The van der Waals coupling between 2  $NO_2$

mol. and the chem. binding to form  $N_2O_4$  are different and can be sepd. G. M. Murphy

Thermal dissociation of cyanogen into cyanide radicals A correction. G. B. Kistiakowsky and H. Gershinowitz. *J. Chem. Physics* 1, 885(1933).—A correction of *C. A.* 27, 4474. Gerald M. Petty

Meyer micro method for vapor density determination Paul de Ceuster. *Natuurw. Tijdschr.* 15, 180-91(1933).

The liquid (about 15 mg.) in a bulb with capillary 25 mm long is dropped in a tube with lower half surrounded by bath of boiling aniline; the upper half at room temp. is protected by an asbestos shield. The vol. of the content is measured before and after dropping the bulb by means of a volumeter tube (3 mm. diam., 3 cc. contents) with Hg seal. The entire detn. takes less than 2 hrs., the error is less than 1.5%. B. J. C. van der Hoeven

A new method for determining density of corrosive liquids at high pressures, and the critical density of nitrogen tetroxide. K. Bennewitz and J. J. Windisch. *Z. physik. Chem.* A166, 401 15(1933).—A magnetically regulated buoyancy method is described suitable for detg. d. of corrosive liquids at high pressure and temp. The d. temp. curve for  $N_2O_4$  was detd. between 17.60° and 158.20°. The latter is the crit. temp. and the crit. d. is 0.570. G. M. Murphy

Vapor pressure of vinyl acetate. J. Marsden and A. C. Cuthbertson. *Can. J. Research* 9, 419 23(1933).—The vapor pressure of vinyl acetate, from 0° to the normal b. p. 72.5° was measured. The detns. were made on vacuum-distd. samples with an isotenoscope. The mol. heat of evapn. is 8211 calories. The results are represented by  $\log_{10} P_{mm.} = (-0.05223 \times 34433/T) + 8.001$  Trouton's const. and the crit. temp. were calcd. as 23.8° and 228.3°, resp. The crit. temp. was calcd. from Ramsay and Shields' formula as 228.9, from Ramsay and Young's as 233.6, with Et propionate and *n*-PrOAc as the reference liquids and from Sugden's formula as 222.1. J. W. S.

Graphic representation of crystal forms. Helmut Stutzel. *Centr. Mineral. Geol.* 1933A, 52 8.—A method is given for the graphic illustration of crystal forms and their growth in terms of their relative central distances on a triangular net. Victor Hicks

Variation of the principal magnetic susceptibilities of certain paramagnetic crystals with temperature. H. W. Bartlett. *Phys. Rev.* 44, 687(1933); cf. *C. A.* 26, 5463. Errata. L. S. Kassel

A polymorphous transformation of calcium. A. Schulze and H. Schulte-Overberg. *Metallwirtschaft* 12, 633 1(1933).—Logarithmic cooling curves of Ca, which was 95.4% pure, show a change in direction between 430° and 450°. Above and below this range the curves are straight lines corresponding to the different sp. heats of the 2 phases. The thermal expansion curve detd. with a differential dilatometer shows a sudden contraction between 430° and 450° equal to 0.6% change in length. It is reversible with falling temp. The elec. resistance measurements were made on wire 2 mm. in diam. placed in Ni tubes to prevent oxidation. The resistance also shows a change between 430° and 450°, a decrease of 5.8%. It is not completely reversible. A polymorphous transformation of Ca between 430° and 450° is indicated. The heat of transformation, 2.3 calories, was detd. in a small water calorimeter. A sharp kink at 350° in the elec. resistance curve is due to recrystn. of the Ca. Six references. C. E. Macfarlane

X-ray examination of calcium at elevated temperatures I. Graf. *Metallwirtschaft* 12, 649 53(1933). Ca of 95.4% purity was extruded hot into wire and was examined under vacuum in a small specially built x-ray diffraction app. at temps. up to 500°. An allotropic transformation from the face-centered cubic lattice with a const.  $a = 5.50$  to a body-centered cubic lattice with a const.  $a = 4.43$  takes place at 450°. This explains the irregularities at this temp. in cooling, dilatometer, and elec.-resistance curves (see preceding abstr.). The d. of the  $\alpha$ -phase at 450° is 1.48 and of the  $\beta$ -phase at 480° 1.52. The irregularities in the elec. resistance-temp. curve of Ca with

which was extruded at 300° as compared with soft temper wire, which were found by Schulze, are caused by intense lattice disturbances due to the 100% reduction in extruding. These disturbances are not relieved at temps. below 300° but are relieved at 345°, when a very rapid recrystallization takes place, which causes the peculiar kink in the resistance-temp. curve.

C. E. Macfarlane

**X-ray investigation of the system iron-selenium.** Gunnar Hagg and Anna-Lisa Kindstrom. *Z. physik. Chem.* **B22**, 453-64 (1933). In the system Fe-Se at 50 atoms % Se there are 2 intermediate phases. Below a temp. of about 600° the stable form has B-10 structure with a tetragonal elementary cell contg. 2 atoms each of Fe and Se. This phase is not stable with more than 50% Se. Above the transition temp. the stable phase has Ni arsenide structure (B-8). It may dissolve Se and then is stable at lower temp. When this happens considerable deformation of the crystal lattice takes place. Between 5 and 100% Se there are no stable intermediate phases.

G. M. Murphy

**X-ray analysis of the crystal structure of the thallium alloys.** H. J. C. Ireton, J. P. Blewett and J. F. Allen. *Can. J. Research* **9**, 415-18 (1933).—The crystal structure of Tl-Sn alloys was analyzed. The Sn lattice const. had a max. value at the eutectic point (42.5% Tl), while the superconducting curve showed a cusp-shaped min. at this point and a peak at the soly. boundary. When Sn was added to Tl a change from  $\alpha$  to  $\beta$  Tl was observed. This change is similar to that already noted in other alloys of Tl.

J. W. Shipley

**The crystal structure of troilite and pyrrhotite.** Gunnar Hagg and Ingrid Sucksdorff. *Z. physik. Chem.* **B22**, 444-52 (1933). In the compd. FeS a hexagonal superstructure of the NiAs type exists with the longest base diagonal the  $a$ -axis and with a doubled  $c$ -axis. This disappears between 51 and 52° S and the usual NiAs structure exists up to about 55.5° S. Increase of the S content is accompanied by contraction of the crystal lattice and d. detns. show that the S fills empty places in the Fe lattice. This is a new type of solid soln. which the authors call subtraction phases.

G. M. Murphy

**Comparison of x-ray diagram of crystalline-liquid and normal liquid phases of the same substance.** W. Kast. *Naturwissenschaften* **21**, 737 (1933). X-ray diagrams were made (cf. Katz, *C. A.* **23**, 765); Buchwald, *C. A.* **25**, 620) of a 0.5-mm. layer of  $p$ -azoxyanisole in 2 conditions with strictly monochromatic Cu radiation in parallel beam of 0.3 mm. diam. No significant differences are found between the anisotropic and the isotropic melt; the diagram of the former is shifted somewhat because of the higher d. In both cases groups of an approx. equal no. of arranged mols. exist, this seems to be characteristic for the liquid state (Stewart, *C. A.* **25**, 3562). The difference between normal and crvst. liquid must lie in isotropy or anisotropy of the groups themselves.

B. J. C. van der Hoeven

**Structure of chrysene and 1,2,5,6-dibenzanthracene in the crystalline state.** John Iball and J. Monteath Robertson. *Nature* **132**, 750-1 (1933).—Chrysene crystallizes in the monoclinic system with 4 mols. per elementary cell with  $a_0 = 8.34$ ,  $b_0 = 6.18$ ,  $c_0 = 25.0$  A. U.,  $\beta = 115.8^\circ$ . The space group is  $C_{2h}^2$ . 1,2,5,6-Dibenzanthracene crystallizes in the monoclinic system with 2 mols. per elementary cell with  $a_0 = 6.50$ ,  $b_0 = 7.84$ ,  $c_0 = 14.17$  A. U.,  $\beta = 103.5^\circ$ . The space group is  $C_{2h}^2$  or  $C_2^2$ . The mols. of both compds. stand nearly upright on (001). F. D. Bernal. *Ibid.* **751**.—Preliminary optical data confirm the mol. orientation found by x-rays. V. Hicks

**Refractive index of  $H_2O^{18}$  and the complete isotopic analysis of water.** Gilbert N. Lewis and Daniel B. Luten. *J. Am. Chem. Soc.* **55**, 5061-2 (1933).— $\alpha$ , the mole fraction of  $H_2O$ , =  $1.370\Delta s - 190.5\Delta n$ , where  $\Delta s$  is the difference in d. at 25° between a given sample and ordinary  $H_2O$  and  $\Delta n$  is the difference in  $n$  at 25°;  $\gamma$ , the increase in mole fraction of  $H_2O^{18}$ , or the atom fraction of  $O^{18}$  =  $7.602\Delta s + 180.9\Delta n$ .

C. J. West

**Isotopic analysis of water.** R. H. Crist, G. M. Murphy

and Harold C. Urey. *J. Am. Chem. Soc.* **55**, 5060-1 (1933).—Detn. of  $n$  by a Zeiss interferometer is discussed.

C. J. West

**The deuteroammonias.** Hugh S. Taylor and Joseph C. Junger. *J. Am. Chem. Soc.* **55**, 5057-8 (1933).—Passing heavy  $H_2O$  over  $Mg_3N_2$  gave 3 samples of deuteroammonias, d. 1.12, 1.158 and 1.174 (compared with  $NH_3$ ) corresponding to ammonias with 68, 90 and 99% heavy H; the f. p. and b. p. ("abs.") are, resp.: 0° 195.2, 239.75; 68°, 197.9, 241.7; 90° 198.6, 242.1; 99°, 199, 242.3.  $NH_3$  and the 99% deuteroammonia showed vapor pressure at  $T$  ("abs.") as follows: 202.3, 77, 63; 213, 184, 154; 226.1, 304, 313; 232.1, 511, 445; 238.6, 714, 628; the latent heat of vaporization of  $NH_3$  is calcd. as 5900 cal. per mole. The absorption spectra are discussed.

C. J. West

**Volatilization of silicon dioxide and of copper in steam.**

J. Gillis. *Natuurw. Tijdschr.* **15**, 153-4 (1933).—The results on volatility of  $SiO_2$ , etc., of Nieuwenburg and Bloemendaal (*C. A.* **24**, 5553; **25**, 3215) were confirmed contrary to work of Morey (*C. A.* **27**, 3374). A steel Hofer autoclave, 50 cm. deep, was used, the cover provided with a sample tube 50 cm. long. Small metal cylinders contg. the reagents were attached to this tube just below the cover, the water inside the autoclave stood 5-10 cm. high. The willemite synthesis from  $ZnO$  and  $SiO_2$  in containers at 5 cm. distance was evident after 4 hrs. at 300 atm., the  $ZnO$  increased 25 and 16% in wt., the  $SiO_2$  decreased around 50% in wt. Amorphous fine  $SiO_2$  volatilizes faster than sand or quartz. With  $CuO$  and  $SiO_2$  or plancheite ( $Cu$  silicate) reduction to  $Cu$  took place.  $Cu$  volatilizes under these conditions to the extent of 50 mg. from 20 g.  $Cu$  during 3 days in 300 atm. steam, the  $Cu$  settling as a fine, loose deposit on the autoclave walls. Cassiterite and rutile do not lose wt.; pitchblende loses 11% of its wt. during a 3-day period.

B. J. C. van der Hoeven

**The properties of Rochelle salt.** Hans Muller. *Phys. Rev.* **44**, 854-5 (1933); cf. *C. A.* **27**, 4452. Numerous results are listed as derived from an extensive study of the dielec., optical, electro-optical and pyroelec. properties of Rochelle salt in the temp. range from  $-50^\circ$  to  $+50^\circ$ . The results can be explained by generalizing the Weiss theory of ferromagnetism so that the polarization is caused both by an orientation of polar mols. and by a polarization of non-polar mols., and the assumption that the ease of orientation decreases as the temp. decreases.

Morris Muskat

**Recovery of carbon tetrachloride.** W. L. Mendenhall, C. W. McClure and Mildred Huntsinger. *Science* **78**, 482-3 (1933).— $CCl_4$  vapor is led into a shallow dish contg. ice cubes floating on Hg. No fumes escape into the room, and recovery is practically complete.

G. M. Petty

**Adsorption and surface tension of strong electrolytes.** Syōten Oka. *Proc. Phys.-Math. Soc. Japan* **15**, 407 (1933); cf. *C. A.* **27**, 652.—By use of Gibbs' adsorption equation, the same results as were previously deduced (*C. A.* **26**, 4230) are obtained. The theory is extended to concd. solns. by introducing an av. ionic diam.

E. R. Smith

**Oil lenses on water and the nature of monomolecular expanded films.** Irving Langmuir. *J. Chem. Physics* **1**, 756-76 (1933).—Higher hydrocarbons form circular lenses on the surface of water if the spreading coeff.  $F_s = \gamma_1 - \gamma_2$  is neg. As the vol. of the lens increases, the thickness  $l$  at the center approaches a limit  $l_\infty^2 = -2F_{sp}/R_{sp}(\rho_1 - \rho_2)$ .  $F_s$  is detd. from the radii and vol. of large lenses. The linear tension at the lens boundary is calcd.  $C_{14}H_{30}$  on water at 25° gives  $F_s = -0.2$  dynes/cm. and  $\gamma = 26.9$ . Hydrophilic mols. in the interface give a spreading force  $F_{12}$  which causes a decrease in  $F_s$  and  $l$ . When  $l < 0.1$  mm. gravitational effects are negligible and the lens degenerates into a duplex film. Such a film, confined by a piston, exerts a force  $F_h$  per unit length  $F$ . If mols. adsorbed at the interface give a force  $F_{12}$ , the equation of state of the duplex film is  $(F - F_0)(a - a_0) = kT$ , where  $F_0 = F_h$  in the absence of hydrophiles. This

equation applies to expanded oil films on water and these films, even when monomolecular, are duplex films. A kink in the  $F$ - $a$  curves is attributed to the formation of micelles, each contg.  $\beta$ -mols. when  $F_{12}$  rises to a crit. value. For fatty acids on dil. HCl,  $\beta = 13$ ; the low value is due to sepn. of the hydrated mol. heads. The esters show little or no hydration and  $\beta = 60$ . The heat of formation of micelles in the fatty acids is  $5.5 + 0.24n$  kg. cal./mol., where  $n$  in the no. of C atoms. Values of  $F_0$  and  $a_0$  are detd. from data given by Adam (C. A. 16, 4107 8; 20, 3804; 22, 1713, 1296; 24, 2351; 27, 1254).

Gerald M. Petty

A physicochemical reaction modifying itself because of an electrical connection with a sol. F. Vles and M. Gex. *Compt. rend.* 197, 777 9(1933).—When thin sheets of metal (Zn, Al, Cu, Fe, Pt) are inserted into Bredig Ag sols whose  $p_H$  is less than 6.5, the color changes and final coagulation appears in less time, if the sheets are not grounded, than if they are grounded. If condensers are introduced into the connections of those grounded, those connected to the larger condensers coagulate most rapidly. These effects are due to exchanges of atm. electricity.

F. B. Brown

The transverse magneto-optic anisotropy of a few colloid solutions. II. Iron oxide sol. Wilfried Heller and Hans Zocher. *Z. physik. Chem.* A166, 365 81(1933); cf. C. A. 27, 2853. — Although the Majorana phenomenon in  $Fe_2O_3$  sols. is complicated a series of regularities was found.

G. M. Murphy

Surface phenomena on the boundary solid body-solution. Change of the heat of wetting in solutions of substances with active surface upon introduction of electrolytes. Boris V. Il'in, V. Semuchenko and V. Ivanov. *Z. physik. Chem.* A166, 382 92(1933). The heats of wetting of C with aq. sols. of NaCl, of iso-PrOH, of iso-BuOH and of these aces. in the presence of NaCl were measured. The introduction of electrolyte increases the heat of wetting with wide deviations from additivity. A qual. explanation is given.

G. M. M.

Electrokinetic processes in capillaries. II. Reichardt. *Z. physik. Chem.* A166, 433 52(1933); cf. C. A. 25, 5330. — The preceding work was extended to allow for cases where the capillary is so small that the region of the double layer cannot be neglected with respect to the vol. of the liquid.

G. M. Murphy

Preliminary report on the meaning of the gas phase for the formation of emulsions. F. Rogowski and K. Sollner. *Z. physik. Chem.* A166, 428 32(1933). — Emulsions of paraffin oil- $H_2O$ ,  $PhMe-H_2O$ ,  $PhMe$ -ethylene glycol,  $Hg-H_2O$  were prepd. by shaking or with supersonic waves. The emulsions differ according to whether or not a gas is present as a third component. Emulsions contg. gas are much easier to prep. and are more stable.

G. M. M.

Beginning of hydrolysis of agar-agar. A. Korentzvit. *Khim. Farm. Prom.* 1933, 153. — The process is traced by adding alc. soln. of I and observing the colors which range from violet at the beginning to colorless at the end.

L. Nusarevich

Viscosity changes of the cellulose solution with various treatments. T. Nakashima and M. Negishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 621 3(1933); cf. C. A. 26, 6124; 27, 1164. — An equation for the change of viscosity with temp. is derived which coincides with a previously detd. empirical equation. Data are presented for the change of viscosity as affected by (1) alkali boil, (2) aging and (3) bleaching. Karl Kammermeyer

Discontinuous diffusion into gelatin Suzanne Veil. *Compt. rend.* 197, 756 8(1933); cf. C. A. 27, 1801 and 4151. — Rings like Liesegang rings form when  $Na_2S$  or  $(NH_4)_2C_2H_4O_4$  diffuses into gelatin, independently of any chem. reaction.

F. B. Brown

Molecular weight of gelatin. W. R. Atkin. *J. Intern. Soc. Leather Trades Chem.* 17, 575-82(1933). — By use of the most recent data on amino acid content and assuming 2 histidine residues per mol., a mol. wt. of 34,500 is calcd.

H. B. Merrill

Solubility of some complex metal thiocyanates. III.

1 The system  $Ba(SCN)_2 - Co(SCN)_2 - H_2O$ . V. Cuvelier. *Natuurw. Tijdschr.* 15, 177-80(1933). — The soln. equil. of the above system was detd. at  $25^\circ$  in a thermostat (cf. C. A. 25, 3551). The SCN was detd. by titration with 0.05 N  $Hg(NO_3)_2$ , with  $NH_4Fe(SO_4)_2$  indicator;  $Ba$  was detd. gravimetrically. A compd.  $BaCo(SCN)_4 \cdot 8H_2O$  appears, identical with julenite (C. A. 27, 2114), of wide stability range: it is formed in a satd. soln. contg. more than 5%  $Co(SCN)_2$  or 20%  $Ba(SCN)_2$ . The existence of  $Ba(SCN)_2 \cdot 3H_2O$  (satd. soln. 62.87 parts  $Ba(SCN)_2$  to 37.13  $H_2O$ ) could not be definitely established. A triangular diagram is given with tabulated soly. data.

B. J. C. van der Hoeven

Theory of the distribution of electrolytes between a solid crystalline and a liquid phase. A. P. Ratner. *J. Chem. Physics* 1, 789 94(1933). — Equations are deduced from the general theory of thermodynamic potential and the activity theory of strong electrolytes, giving the effect of the compn. of the liquid phase on the distribution ratio and the dependence of the partition const. on the properties of the pure components. The relative importance of the various factors in these equations is discussed. The equations agree with exptl. data for the pairs  $Pb(NO_3)_2$ ,  $Ra(NO_3)_2$  at  $25^\circ$ .  $BaBr_2$ - $RaBr_2$  at  $0^\circ$  and  $Ba(NO_3)_2$ - $Ra(NO_3)_2$ .

Gerald M. Petty

The theory of non-stationary processes in electrolytic solutions and some problems for electrolytic investigation H. Falkenhagen and W. Fischer. *Physik. Z.* 34, 786 8(1933). — A brief discussion of the dispersion effect in mixts. of electrolytes is followed by a survey of some problems yet to be solved.

E. R. Smith

The law of Lambert-Beer and the nature of the absorbing particles in solution. E. Darnois. *Compt. rend.* 197, 1120 1(1933). The variation of the sp. absorption coeff. with concn. indicates more than one species in soln. If in plotting the coeff. against wave length a bundle of conc. current lines is obtained, the presence is shown of 2 species only. If concurrence is not obtained, there are more than 2 species.

P. S. Roller

Surface tension and complex formation in non-aqueous salt solutions. P. P. Kozakevich and N. S. Kozakevich. *Z. physik. Chem.* A166, 113 35(1933); cf. C. A. 22, 4297. — The previous measurements were continued with expts. on d. and surface tension of the following salts and solvents:  $LiCl$ ,  $LiBr$ ,  $NaBr$ ,  $CaCl_2$ ,  $CoCl_2$ ,  $CdCl_2$ ,  $HgCl_2$ , picric acid,  $H_3BO_3$ ,  $(CO_2H)_2$ , malic acid, succinic acid,  $BzOH$ ,  $C_6H_6$ ,  $AcNH_2$  in  $MeOH$  soln.;  $LiCl$ ,  $HgCl_2$ ,  $C_6H_6$ ,  $AcNH_2$ ,  $BzOH$  in  $EtOH$ ;  $C_6H_6$ ,  $BzOH$  in  $BuOH$ ,  $BzOH$ ,  $C_6H_6$ , 1,  $H_2O$  in  $i-AmOH$ ;  $LiCl$ ,  $LiI$ ,  $LiBr$ ,  $NaCl$ ,  $NaI$ ,  $NaBr$ ,  $KCl$ ,  $KI$ ,  $KBr$ ,  $CaCl_2$  in  $HCO_2H$ ;  $CaCl_2$ ,  $C_6H_6$  in  $AcOH$ ;  $CaCl_2$ ,  $C_6H_6$  in  $BuCO_2H$ ;  $C_6H_6$  dissolved in  $C_7H_{16}$ ,  $C_6H_6$  and  $PhNH_2$ ;  $LiBr$ ,  $LiI$  in  $AcOMe$ ;  $C_6H_6$ ,  $LiCl$ ,  $LiBr$ ,  $LiI$ ,  $NaI$ ,  $HgI_2$  in  $C_6H_6$ . In concd. soln. the salt raises the surface tension approx. in proportion to the concn. But the effect of the sp. surface tension due to any one component is usually hidden by other factors.

G. M. Murphy

Propagation of supersonic waves through an electrolyte Syöten Oka. *Proc. Phys.-Math. Soc. Japan* 15, 413 19(1933). — The theory of Debye (C. A. 27, 1577) for the detn. of the mass of electrolytic ions from the propagation of supersonic waves through electrolytes is developed further by taking into account the relaxation and electrophoretic forces. An expression for the potential waves due to the sound waves is derived.

E. R. Smith

Some notes on the calomel electrode. Kentaro Nomura. *J. Biochem. (Japan)* 18, 301 9(1933). — If properly satd. with  $HgCl_2$  a freshly prepd. 3.5 N  $KCl$ -calomel electrode attains a const. potential in about 2 days. At different temps. the potential of such an electrode has a value expressed by the formulas:  $\pi_{25} = 0.28382 - 0.0007$  between  $13^\circ$  and  $25^\circ$ , and  $\pi_{25} = 0.30249 - 0.0007$  from  $25^\circ$  to  $43^\circ$ .

S. Morgulis

Cells of liquid ammonia and ammonia solutions. Georges I. Costeanu. *Compt. rend.* 197, 1113-14(1933); cf. C. A. 27, 887. — The e. m. fs. of the cells  $Cd | Cd(NO_3)_2 \cdot 4H_2O ; NH_4NO_3 ; AgNO_3 | Ag$  and  $Zn | Zn(NO_3)_2$ .

$\text{H}_2\text{O}$ ;  $\text{NH}_4\text{NO}_3$ ;  $\text{AgNO}_3/\text{Ag}$  were measured for liquid  $\text{NH}_3$  solns. contg. 0, 20.5, 45.2 and 80%  $\text{H}_2\text{O}$ . The temp. varied from  $-75^\circ$  to  $18^\circ$ . Over the whole range of concn. and temp. the e. m. f. varied by a few hundredths of a v. only.

P. S. Roller

**Studies on the antimony stick electrode. I. The degree of stability of the electrode potential and its effect on the relation between  $p_{\text{H}}$  and e. m. f.** Tetuo Tomiyama. *J. Biochem. (Japan)* 18, 285-99 (1933). An Sb stick electrode is prepd. by dipping it for several days into a soln. of  $p_{\text{H}}$  11.8. On suddenly stirring the soln. in which the electrode is placed the potential against a calomel electrode increases on the acid and diminishes on the alk. side. In unstirred solns. the potential varies according to temp. and duration of immersion, and the longer the latter is the more nearly does the  $p_{\text{H}}$ -e. m. f. curve approach a straight line. After immersion for 30 min. and between 10 and 30, the change in p. d. per  $1^\circ$  is 1.5 mv. for  $p_{\text{H}}$  2-4; 2.0 mv. for  $p_{\text{H}}$  5-7; and 2.5-3.0 mv. for  $p_{\text{H}}$  8-11. The following exptl. formula was obtained:  $E = 0.022 + 0.0567 p_{\text{H}}$  at  $20^\circ$  as compared to a calomel electrode.

S. Morgulis

**Measurement of  $p_{\text{H}}$ .** F. C. Thompson. *J. Internat. Leather Trades Chem.* 17, 680-4 (1933).—An address.

H. B. Merrill

**The theory of passivity. XIX The structure of natural layers of iron oxide in rusting processes.** W. J. Muller and W. Machus. *Z. physik. Chem.* A166, 357-61 (1933), cf. *C. A.* 27, 1468. Fe electrodes were treated in  $\text{Na}_2\text{SO}_4$  soln. under different conditions. The amt. of Fe on the surface can then be detd. either optically or by the curve of initial current strength vs. passivation time. The law of the formation of oxide film is exponential, the half value time is a measure of the different exptl. conditions.

G. M. Murphy

**Effect of fluid velocity on heterogeneous reactions. II Effect of fluid velocity on solution velocity of metallic copper in ammoniacal cupric solutions.** Shun-ichi Uchida and Ichito Nakayama. *J. Soc. Chem. Ind., Japan* 36, suppl. binding 635-42 (1933); cf. *C. A.* 27, 4993. Ammoniacal cupric soln. satd. with  $\text{O}_2$  was passed through Cu tubes of 3 different diams. at 25 and the reaction velocity const.  $k$  was found to be expressed by  $kd = 0.0000225(dup/\mu)^{0.4}$ , where  $d$  is the inside diam. of the Cu tubes,  $u$  the mean fluid velocity,  $p$  its d., and  $\mu$  its viscosity. At  $dup/\mu$  about 4000, the pure chem. reaction seems to play a part and the deviation from the equation is such that  $kd$  becomes independent of  $dup/\mu$ . The number in which  $dup/\mu$  affects the reaction velocity const. is similar to heat transfer processes. The viscous-flow region was not distinct because of probable disturbances.

Karl Kammermeyer

**A method of measuring gaseous reactions.** M. Polanyi. *Nature* 132, 747-8 (1933). Gas A is led through an orifice into sufficient gas B to consume it before it reaches the wall of the reaction vessel. The rate of reaction and the half period are readily calcd.; collision efficiencies from 1 to  $10^{-4}$  should be amenable to measurement.

Gerald M. Petty

**The kinetics of the reaction between potassium persulfate and potassium ferrocyanide in neutral solution.** E. J. Holliba and Walter Herrmann. *Z. physik. Chem.* A166, 453-67 (1933). The reaction between  $\text{K}_2\text{S}_2\text{O}_8$  and  $\text{K}_4\text{Fe}(\text{CN})_6$  was investigated in neutral soln. Second- and third order "const." are not const. with change of the initial concn. of the reactants; this is attributed to the presence of a strong electrostatic ionic field. In concd. K soln the irregularities disappear completely. The reaction is considered 2nd order and a reaction scheme is proposed. Temp. and the effect of light on the rate were investigated.

G. M. Murphy

**Conversion of ammonium cyanate into urea. Mechanism and kinetic salt effect.** J. C. Warner and Fred B. Stitt. *J. Am. Chem. Soc.* 55, 4807-12 (1933).—The effect of the concn. of  $\text{NH}_4\text{OCN}$  and of added salts on the rate of conversion of  $\text{NH}_4\text{OCN}$  into urea was investigated.

A neg. primary salt effect is evidence that the rate of conversion depends upon collisions between  $\text{NH}_4$  and  $\text{CNO}$  ions. The velocity const. of the reaction was detd. by graphic extrapolation to zero ionic strength and also by direct calcn. from the exptl. data and activity coeffs. by taking into account the effect of changing ionic strength during the course of the reaction. The possibility of detg. activity coeffs. from velocity measurements is suggested.

Walter B. Keighton, Jr.

**The velocity of decomposition of diazo compounds in water. XII.** E. Yamamoto, R. Goshima and J. Hashima. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 609-13 (1933); cf. *C. A.* 27, 5620.—Exptl. data for the decompn. velocity of the diazo compds. derived from 1-ammonaphthalene-4-sulfonic acid (I), 1-ammonaphthalene-5-sulfonic acid (II), and Cleve's acid (III) are presented. The following values for the temp. coeff.  $A$  and the const. of the decompn. velocity at  $0^\circ$ ,  $C_0$ , were obtained from the data,  $A_{\text{I}} = 8068$ ,  $A_{\text{II}} = 22$ ,  $306$ ,  $A_{\text{III}} = 14,076$  and  $C_{0\text{I}} \times 10^4 = 2.89$ ,  $C_{0\text{II}} \times 10^4 = 3.10$ ,  $C_{0\text{III}} \times 10^4 = 1.77$ . Decompn.-velocity consts. calcd. at various temps. are given.

Karl Kammermeyer

**The law of displacement of chemical equilibrium.** J. E. Verschaffelt. *Compt. rend.* 197, 753-4 (1933). The law of displacement of chem. equil. can be derived by setting the differential equations which characterize the system.

F. E. Brown

**Thermal decomposition of propyl mercaptan. II.** Austin Taylor and Edwin T. Layng. *J. Chem. Physics* 1, 798-808 (1933).—The thermal decompn. of  $\text{PrSH}$  at temps. of  $405-35^\circ$  and at pressures of 100-300 mm. was studied by static and dynamic methods. There is an induction period with autoaccelerating rate, ending in a pseudoequil. of propylene,  $\text{H}_2\text{S}$  and  $\text{Me}_2\text{CSH}$ . The induction period is reproducible if the glass surface is thoroughly poisoned with the decompn. products of the reaction. The energies of activation of the induction period and of the later reaction are about 40,000 and 39,000 cal., resp. A mechanism is proposed which involves the successive formation of  $\text{PrS}$  and  $\text{PrSSH}$ . The vapor pressure of  $\text{PrSH}$  from 284.6 to  $340.57^\circ\text{K}$ . and from 84.0 to 760 mm. is given by the equation  $\log p = (1647/T) + 7.7190$ .

Gerald M. Petty

**The Cotton-Mouton constant of nitrobenzene at the transition point.** Hans Koenig. *Physik. Z.* 34, 731-4 (1933). The Cotton-Mouton effect for  $\text{PhNO}_2$  shows no discontinuity at  $9.6^\circ$ , and therefore no evidence of the transition point reported by Wolfke and Mazur. The Cotton-Mouton const., at  $20^\circ$  and  $546 \mu\mu$  is  $25.7 \times 10^{-12}$  c.g.s. units.

L. E. Steiner

**Temperature-composition relations of the binary system zinc nitrate-water.** Warren W. Ewing, John J. McGovern and George E. Mathews, Jr. *J. Am. Chem. Soc.* 55, 1827-30 (1933). The f.-p. curve was detd. for the concn. range 56-90%  $\text{Zn}(\text{NO}_3)_2$ . The solid phases found were the hexa-, tetra-, di- and mono-hydrates, melting congruently, resp., at 36.1, 44.7, 55.4 and about  $70.7^\circ$ .

Michael Fleischer

**Solubility relations of the ternary system magnesium nitrate-nitric acid-water at  $25^\circ$ .** Warren W. Ewing and Ernst Klinger. *J. Am. Chem. Soc.* 55, 4825-7 (1933). Solv. detns. were made over the entire concn. range. The solid phases found were the hexa- and di-hydrates and the anhydrous salt.

Michael Fleischer

**Solubility relations of the ternary system zinc nitrate-nitric acid-water at  $25^\circ$ .** Warren W. Ewing, Atwood J. Richards, William J. Taylor, Jr. and David W. Winkler. *J. Am. Chem. Soc.* 55, 4830-2 (1933).—Solv. detns. were made over the entire concn. range. The solid phases found were the hexa-, tetra-, di- and monohydrates.

Michael Fleischer

**Development of the theory of catalysis in the nineteenth century.** A. Mittasch. *Naturwissenschaften* 21, 729-32, 745-9 (1933).—A lecture.

B. J. C. van der Hoeven

**Catalysis and transformation of the alkaline earth cyanides into cyanamides.** A. Perret and R. Perrot.

*Compt. rend.* 197, 704-6(1933).—The equation,  $\text{CaCl}_2 + 2\text{NaCN} \rightarrow \text{CaNCN} + \text{C} + 2\text{NaCl}$ , represents a chem. change which is irreversible because of the change of  $\text{Ca}(\text{CN})_2$  to  $\text{CaNCN}$  and C. Finely divided metals, Fe, Co, Ni and Mn, hasten the decompn. and consequently the primary reaction. F. E. Brown

The free energy of the synthesis of alanine from pyruvic acid and ammonia. René Wurmser and Nelicia Mayer-Reich. *Ann. physiol. physicochim. biol.* 9, 923-8(1933).—The calcd. free energy change is -17,180 cal. The concns. of the reactants are such as to necessitate an intracellular  $r_H$  of approx. 13 if the reaction is to take place. It is interesting to note that this is the value obtained by W. for the potential of aerobic cells. H. E.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Electrostatic deviation and specific charge of the positive electron. Jean Thibaud. *Compt. rend.* 197, 447-8 (1933). See *C. A.* 28, 38<sup>9</sup>. H. E. Messmore

Scattering processes produced by electrons in negative energy states. O. Halpern. *Phys. Rev.* 44, 855-6 (1933). The scattering of radiation by electrons in neg. energy states is briefly discussed. A distinction is made between the case where all the incident quanta have the same direction of propagation and that where they have different directions. In the former case scattering processes can only reduce the frequency, the reduction, if small, being on the av. proportional to the distance traveled by the quantum through vacuum. A possible connection with the Hubble red shift is suggested.

Morris Muskat

The scattering of electrons by nitrogen molecules. H. S. W. Massey and E. C. Bullard. *Proc. Cambridge Phil. Soc.* 29, 511-21(1933).—Exptl. results are given for the scattering of 4- and 2-v. electrons in N and are shown to agree well with Stier's theoretical curves. As Stier's theory applies only to low voltages in which the electron wave lengths are large compared with the nuclear sepn. an approx. method of calcul. is developed for the opposite case of electron wave lengths which are small compared to the nuclear sepn. The results of the new theory agree well, except at small angles, with measured angular distributions in N for voltages from 30 to 780 v. M. Muskat

The inelastic scattering of slow electrons in gases. IV. F. H. Nicoll and C. B. O. Mohr. *Proc. Roy. Soc. A* 142, 647-58(1933); cf. *C. A.* 28, 32<sup>9</sup>.—Previous work on the angular distribution of inelastically scattered electrons has been extended to  $\text{CH}_4$ ,  $\text{N}_2$ ,  $\text{Ne}$  and  $\text{Hg}$  for the angular range of 10-155°. The voltages used extended from a few v. above the excitation potential upward. The particular energy losses studied were those of 9 v. in  $\text{CH}_4$ , 12.8 and 8.5 v. in  $\text{N}_2$ , 16.6 v. in  $\text{Ne}$  and 6.7 v. in  $\text{Hg}$ . The elastic scattering observed at small angles is discussed in relation to Born's theory, and the gradual disappearance of the diffraction effects at large angles at the lower voltages is investigated and discussed. Morris Muskat

Electro-optical Kerr effect in gases. C. W. Bruce. *Phys. Rev.* 44, 682-6(1933).—The Kerr const. for  $\text{CO}_2$  is measured as a function of d. and temp.; the results agree with the Langevin-Born theory. For N, the exptl. value exceeds the calcd. one by an amt. greater than exptl. error. The const. for H was too small to detect, as is expected from theory. L. S. Kessel

The intensity of cathode rays scattered by potassium chloride. Shunji Shirai. *Proc. Phys.-Math. Soc. Japan* 15, 420-7(1933).—Cathode rays from an electron tube

were made homogeneous by spreading into the magnetic spectrum and passing through 3 holes. A thin layer of cryst. KCl, deposited by evapn. in a high vacuum on a thin film of collodion, was mounted behind the last hole with its plane normal to the primary rays. The distance from the specimen to the photographic plate was 16.74 cm. The camera was evacuated. Photographs showed the intensities of the Debye-Scherrer rings to be uniform in all directions. It was found that with KCl there is fair quant. agreement between the exptl. results and the theoretical calcn. of electron scattering, as with Au, Ag and Al (cf. *C. A.* 24, 22, 2948). E. R. Smith

The crystal photoeffect. G. Monch. *Naturwissenschaften* 21, 751-2(1933). A Dember photoeffect (*C. A.* 26, 878) was observed on cuprite, proustite and pyrrargyrite crystals as well as on natural (Almaden) cinnabar, usually the electrode on the side of the light source was neg. Superficially sand-papered proustite and pyrrargyrite crystals gave a charge of the reverse sign. Artificial, clear,  $\text{Cu}_2\text{O}$  monocrystals gave no photoeffect; evidently the explanation of this effect by light pressure or by diffusion potential is erroneous. The explanation by impurity or by non-homogeneity (barrier effect) of mineral  $\text{Cu}_2\text{O}$  is more likely to be correct. At room temp. several substances were examd. as to the sign of the electrode at the side of the irradiated light and the sign of the thermopotential (hot electrode). B. J. C. v. d. H.

The structure of glow discharges. H. Rothe and W. Kleen. *Naturwissenschaften* 21, 772(1933).—In low voltage d.-c. glow discharges in a gas-filled tube with a grid a high-frequency modulation appears, the wave length depending on the potential. The discharge is built up of electron groups at intervals depending on the migration time for the ions. B. J. C. van der Hoeven

Atom ionization by electric fields. Rudolf Schulze. *Naturwissenschaften* 21, 737(1933).—The ionization of a homeopolar substance without free conduction electrons by means of an elec. field was studied. Vacuum-distd. S was condensed on 2 sliding Ni electrodes to give an insulating film of about  $10^{14}$  ohm. On a current-potential curve of this system there are found sudden cond. rises at 45, 101.6, 152 and 205 v., these being in the same ratios as the ionization potentials of S from spectral data: 10.31, 23.3, 34.9 and 47.8 v. Hence it is assumed that the S film consisted of 4 superimposed at. films.

B. J. C. van der Hoeven

The surface ionization of potassium on molybdenum. R. C. Evans. *Proc. Cambridge Phil. Soc.* 29, 522-7 (1933).—Expts. are described in which the efficiency of ionization of K at a hot Mo surface was investigated.



The degree of ionization observed is consistent with the most recent measurements of the electron work function of Mo.

**The structure of atoms.** Arvi Talvitie. *Acta Chem. Fennica* 6A, 100-6(1933).—See C. A. 27, 5630.

**The ground state of the hydrogen molecule.** Hubert M. James and Albert S. Coolidge. *J. Chem. Physics* 1, 825-35(1933); cf. C. A. 27, 2869.—The method used by Hylleraus in treating the He atom was extended to the  $H_2$  mol. The method consists in setting up a wave function as a series in the five variables required, electronic spin being introduced explicitly as one of the variables. The coeffs. are then detd. so as to produce the lowest energy. The energy found is within 0.03 v. of the most probable exptl. value, while the form and location of the potential-energy curve for various internuclear distances agree with those deduced from spectra to within similar limits. The value of the function is computed for several configurations of the electrons, and compared with other approximations. Application of the method to other problems is discussed. A method is given for the numerical soln. of secular equations of high degree.

**Possibility of matter formation by interaction of a photon and an electron.** Francis Perrin. *Compt. rend.* 197, 1100-2(1933).—The conservation of momentum requires that the electrons take on kinetic energy. The total energy required of the photon is double that in a nuclear interaction, half the energy being recovered as kinetic energy of the electrons.

**The equilibrium theory of the abundance of the elements: A statistical investigation of assemblies in equilibrium in which transmutations occur.** T. E. Sterne. *Monthly Notices Roy. Astron. Soc.* 93, 736-67(1933); cf. C. A. 27, 3877. Theoretical.

**A note on the liberation of energy by transmutations of nuclei in the stars.** T. E. Sterne. *Monthly Notices Roy. Astron. Soc.* 93, 767-9(1933).—Theoretical.

**The equilibrium of transmutations in stars in which transmutations are an important source of energy.** T. E. Sterne. *Monthly Notices Roy. Astron. Soc.* 93, 770-7(1933). Theoretical.

**The exponential law of radioactive disintegration.** Arthur E. Ruark. *Phys. Rev.* 44, 654-6(1933). A math. proof is given that ordinary half-life expts. require the disintegration probability of a radioactive atom to be independent of its own age and of the lives of its parents.

**The half-life of actinouranium and the problem of geologic time.** Forrest Western and Arthur E. Ruark. *Phys. Rev.* 44, 675-81(1933); cf. C. A. 27, 2102.—Reasons are given for assuming that the Ac series arises from  $U^{238}$  and that this is the only long-lived U isotope. Equations are then developed for calcg. the decay const. of  $U^{238}$  and  $U^{235}$  and the ages of radioactive minerals. The best value for the half life of  $U^{238}$  is  $(4.58 \pm 0.09)10^9$  years, while that for  $U^{235}$  is 3 or  $4 \times 10^8$  years. The ages calcd. for Karlskruv boggerite and Wilberforce uraninite are 0.81 and  $1.04 \times 10^9$  years, resp. Equations are developed to show the effect of uniform leaching.

**An explanation of  $\beta$ -ray activity.** M. N. Saha and D. S. Kothari. *Nature* 132, 747(1933). Either an internal or an external  $\gamma$ -ray is divided in the at. nucleus into an electron, which escapes as a  $\beta$ -ray, and a positron, which is captured by a nuclear neutron. This partition may occur anywhere within the nucleus, giving a wide range of  $\beta$ -ray energy.  $\beta$ -Ray emission is accordingly a secondary process.

**Artificial atomic disintegration.** Fritz Kirchner. *Physik Z.* 34, 777-86(1933); cf. C. A. 27, 659.—A summary is given of recent work on the artificial disintegration of the light elements by means of high-energy protons and  $H^2$  nuclei. Among the subjects treated in detail are: (1) dependence of the no. of disintegrations on the proton energy; (2) ranges of the  $\alpha$ -particles produced by the

disintegrations by proton bombardment and (3) the mechanisms of the disintegration processes.

**The  $\alpha$ -particles from radium C'.** H. A. Wilson. *Phys. Rev.* 44, 858(1933).—By use of the energies of  $\alpha$ -rays from Ra C' found by Rutherford, Lewis and Bowden, it is shown the energies for disintegration can be arranged in pairs having sums equal to multiples of 3.85 in units of  $10^6$  electron v. The disintegration energies can, therefore, be expressed as  $3.85n + c$ . As Ra C'  $\gamma$ -ray energies are also expressible by the same formula with the same values for  $c$  it is probable that the disintegration energies of the Ra C' nucleus are equal to 3.85 n. M. Muskat

**The disintegration energies of radioactive nuclei.** H. A. Wilson. *Phys. Rev.* 44, 858-9(1933).—It is found that all the disintegration energies of the radioactive nuclei can be represented to 1 part in 4000 by the expression  $3.85n + c$ , in units of  $10^6$  electron v., and that the values of  $c$  are nearly the same as those in the same expression giving the Ra C'  $\gamma$  ray energies. This suggests that there is some process which takes place in all radioactive atoms which releases an energy of  $3.85 \times 10^6$  electron v. The values of  $c$  probably represent energy exchanges with the electrons or a secondary action between the emitted  $\alpha$ -or  $\gamma$ -rays and the rest of the atom.

**$\alpha$ -Rays of long range emitted by an active deposit of actinium.** Mme. Pierre Curie and W. A. Lub. *J. phys. radium* [7], 4, 513-16(1933).—By using active deposits of Act(B + C + C' + C'') having an initial activity corresponding to the emission of  $2 \times 10^6$  to  $3 \times 10^6$   $\alpha$ -rays from Act C per second (as many as from 5 to 8 millicuries of Ra C') the  $\alpha$ -rays of long range were counted by the scintillation method.  $\alpha$ -Rays of about 10 cm. range are emitted in about the proportion of  $3 \times 10^7$  per  $\alpha$ -ray from Act C.

**An application of probabilities to the counting of  $\alpha$ -particles.** Norman I. Adams, Jr. *Phys. Rev.* 44, 651-3(1933). The  $\alpha$ -particles emitted in a simple radioactive change are distributed individually and collectively at random, and hence the probability of any no. of particles in a fixed interval obeys the Poisson law. This is not true in general for the particles from a radioactive series; A. derives the distribution law for the case that the chosen interval is either long or short compared to the half life of each species considered; the results are needed for accurate detn. of the disintegration const. of Th. L. S. Kassel

**The absorption of penetrating  $\gamma$ -radiation.** W. Gentner. *Compt. rend.* 197, 1111-12(1933); cf. C. A. 27, 5242.—The coeff. of absorption for Pb detd. experimentally, less the calcd. coeff. for Al, shows a faint min. at 6.6 A. U. The min. is much less sharp than that found previously by Chao. It is concluded that this wave length has no special significance for Pb. The min. is due to the greater nuclear absorption for Pb with decrease in wave length.

**The isotopic fractionation of water.** Edward W. Washburn, Edgar R. Smith and Mikkell Frandsen. *Bur. Standards J. Research* 11, 453-62(1933); cf. C. A. 27, 3865.—When water is subjected to electrolysis an isotopic fractionation occurs, the evolved H being richer in the  $H^1$  isotope and the evolved O richer in the  $O^{16}$  isotope than is the water from which they are evolved. If the gases resulting from the electrolysis of water are recombined, the water produced has a lower d. than that from which they were evolved. The residual water grows progressively more dense as the electrolysis proceeds, because of the increasing concn. of the  $H^2$  isotope of H and of the  $O^{18}$  isotope of O. Curves illustrating the efficiency of the fractionation process are given. Substantially pure  $H^2$ , pure  $H^1$  and pure  $O^{18}$  can be obtained. The heavy water has a higher f. p., a higher b. p. and a lower n than normal water. Isotopic fractionation of water by distn. and by adsorption has also been accomplished. A differential pycnometer method for detg. d., accurate to 1 p. p. m., is described.

**Theoretical and practical studies of atomic and molecular forms of the hydrogen isotopes.** Hugh S. Taylor and Henry Eyring. *Proc. Am. Phil. Soc.* 72, 255-64

(1933).—In the abstract in *C. A.* 27, 5630, there should have been included a statement that for concg. the heavy H an electrolytic method was used. The explanation of the concn. effect is shown to lie in the relative reaction rates for the 2 isotopes, the rate of desorption of the light and heavy isotopes at the electrodes being the principal reaction. Other modifying factors are discussed. A theoretical explanation of the mechanism is given. It is shown that a compd. with light H will enolize about 7 times and ketonize approx. 12 times as fast as the heavy species at ordinary temps. The authors also have shown that rapid conversion from *ortho*- to *para*-hydrogen at liquid-air temps. with only van der Waals' adsorption involved is assocd. with the paramagnetic properties of the surface. Calvin Brous.

**Isotopes of sodium and cesium.** C. B. Dollins and Edna R. Bishop. *J. Am. Chem. Soc.* 55, 4372-4 (1933). The magneto-optic method indicates that Na has 1 isotope lighter and 1 heavier than 23, the most abundant one, and that Ce has 3 isotopes lighter and 2 heavier than 133, the most abundant one. F. E. Brown.

**Manganese isotopes.** Irene G. Otto and Edna R. Bishop. *J. Am. Chem. Soc.* 55, 4371-2 (1933). Study of solns. of Mn salts by the magneto-optic method indicates that there are 3 isotopes heavier and 3 lighter than 55, the most abundant one. F. E. Brown.

**Decay of luminescence and light absorption in phosphorescent materials.** D. H. Kabakjian. *Phys. Rev.* 44, 618-24 (1933). Various luminescent materials are irradiated by  $\alpha$ -,  $\beta$ - and  $\gamma$ -rays. The luminescence consists of both fluorescence and phosphorescence, which vary with time in different ways. The variation in absorption coeff. with time is also detd. The results are not in agreement with the usual theories of these phenomena. L. S. K.

**New investigations on the radioactivity of the waters of the massif of Ballon d'Alsace.** R. Delaby, R. Charonnat and M. Janot. *Compt. rend.* 197, 1140-2 (1933). The Rn content of the source of the Savoureuse River reached a max. of 106.3 millimicrocuries per l., decreasing to 96.7 after 4 days of rain. The descent of the river causes the disengagement of Rn till at 3 km. from the source the content is practically nil. The subterranean waters near the summit of Ballon de Servance which scarcely touch granite have a content of less than 0.1. The Rn contents at various locations are given. P. S. Roller.

**X-ray satellites of high atomic number elements.** F. K. Richtmyer and Sidney Kaufman. *Phys. Rev.* 44, 605-9 (1933).—The x-ray lines,  $L_{\alpha 1}$  and  $L_{\alpha 2}$ , are examd. for satellites in the range Ta(73) to U(92). Two satellites are found,  $L_{\alpha 1}'$  extending from Au(79) to U(92) and  $L_{\alpha 2}'$  from Os(76) to Bi(83); these are apparently unrelated to the satellites in the range  $36 < Z < 54$ .  $L_{\beta 1}$  is also found to have 2 satellites, one extending from Ta(73) to U(92), the other having a slightly greater range. These also may be new lines. L. S. Kassel.

**X-ray spectra in the region 50-250 Å.** U. Manne Siegbahn and Torsten Magnusson. *Nature* 132, 750 (1933).—The L series have been followed to No. 12 Mg. Nineteen K and 17 Cl show sharp doublets; 14 Si, 13 Al and 12 Mg show broad lines with a sharp limit. V. H.

**Soft x-rays from (100) and (111) faces of copper single crystals.** Morgan L. Williams. *Phys. Rev.* 44, 610-17 (1933). Between 90 and 220 v., 14 identical crit. potentials were found for the (100) and (111) faces of single-cryst. Cu. Most of these can be explained in terms of the Kronig theory (*C. A.* 26, 4247) of forbidden electronic energy zones within the crystal. L. S. Kassel.

**The energy levels of the rare-gas configurations.** Geo. H. Shortley. *Phys. Rev.* 44, 606-74 (1933). A math. study of the  $sp$  and  $pd$  levels, leading to exact specification of the proper states in the  $jj$ -coupling scheme. L. S. Kassel.

**The inversion of doublets in alkali-like spectra.** Melba Phillips. *Phys. Rev.* 44, 644-50 (1933). Math. L. S. Kassel.

**Forbidden lines in the arc spectrum of lead.** Henryk Niewodniczanski. *Phys. Rev.* 44, 854 (1933).—Four

lines corresponding to transitions between the 5 lowest energy states of Pb, which are forbidden by the Laporte-selection rule, were observed in an undamped high-frequency discharge in a mixt. of a rarefied Pb vapor and a noble gas, He or Ar. One of the lines is also forbidden by the quadrupole radiation selection rules and is due to an electrically disturbed dipole radiation while the other lines may be either quadrupole or perturbed dipole radiations. Morris Muskat.

**Sulfur spark lines in the sun's spectrum.** O. Bartelt and L. Eckstein. *Z. Astrophys.* 7, 272-80 (1933).

The existence of singly ionized S atoms in the reversing layer of the sun is established through identification of the lines of several of the strongest S II multiplets with faint solar lines of hitherto unknown origin. C. C. Kiess.

**The calcium ionization temperature of the sun.** R. v. d. R. Woolley. *Monthly Notices Roy. Astron. Soc.* 93, 691-710 (1933).

From measurements of the intensities of the principal lines of neutral and ionized Ca in the sun the ratio of ionized to neutral atoms per cc. at any prescribed optical depth may be found. With this ratio and a value for the electron pressure at the prescribed depth Salpêtré's formula gives a temp. of 6310° for sunlight integrated over the disk. C. C. Kiess.

**The Zeeman effect of infra-red krypton arc lines.** B. Pogany. *Naturwissenschaften* 21, 719 (1933). The magnetic multiplicity of infra-red Kr arc lines was detd., the results are in good agreement with those of Laporte and Ingles (*C. A.* 24, 5223). B. J. C. van der Hoeven.

**The dissociation of molecules in the atmospheres of the stars of the main sequence.** Yvonne Cambresier and L. Rosenfeld. *Monthly Notices Roy. Astron. Soc.* 93, 710-23 (1933). It is shown that the intensity variations of the bands of TiO, ZrO, CH, CO, CN and C<sub>2</sub> in the spectra of the main sequence stars can be satisfactorily explained by the theory of dissociative equil. in stellar atmos. assumed to be of the same chem. compn. and state of ionization. C. C. Kiess.

**The dissociation of molecules in the atmospheres of carbon stars.** L. Rosenfeld. *Monthly Notices Roy. Astron. Soc.* 93, 724-9 (1933).—The intensity variations in the bands of C compds. in the spectra of stars of class R and N (carbon stars) as compared with their variation in the main-sequence stars (cf. preceding abstr.) are accounted for, on the theory of dissociative equil. by the relative abundances of C and O in the 2 sequences. C. C. Kiess.

**The spectra of red stars of types M and N.** G. Piccardi. *Atti accad. Lincei* 17, 952-4 (1933). In order to det. whether spectra from red stars of types M (due to TiO) and N (due to C<sub>2</sub>) can coexist, lab. expts. were made with TiCl<sub>3</sub> in an oxyhydrogen flame. The spectrum shows that the TiO and C<sub>2</sub> lines may be adjacent but not superimposed. A. W. Cotton.

**Magnetic rotation spectrum of the red bands of sodium.** W. R. Fredrickson and Carl R. Stannard. *Phys. Rev.* 44, 632-7 (1933). The red Na bands are due to a  $^2S - ^2P$  transition and should show no magnetic rotation spectrum. Since such a spectrum does exist, it was re-investigated under high dispersion. It is found that the rotational levels in the various initial vibrational states from 0 to 12 which give magnetic rotation doublets are 53, 45, 35, 11, 60, 52, 43, 31, 16, 58, 51, 40, 28, resp. That just these levels give magnetic rotation lines suggests a perturbation, probably by a  $^3H$  state. The vibrational numbering of the initial state is corrected. L. S. Kassel.

**The magnetic extinction of the fluorescence of iodine vapor.** Jean Genard. *Compt. rend.* 197, 1101-7 (1933).

Photometric measurements were made on the first and third members of the resonance series excited by  $\lambda 5461$  Hg I in magnetic fields between 0 and 42,000 gauss. At the highest field, the fluorescence was too feeble to be measured photometrically. The results agree with the theoretical formula of Van Vleck. The existence of an unstable electron level between  $^1\Sigma_g^+$  and  $^3\Pi_{g,2}$  is indicated. P. S. Roller.

**The polarization of the fluorescent bands of mercury**

vapor. Georges Ziclinski. *Compt. rend.* 197, 1109-11 (1933).—The fluorescence was excited by the light from a Zn spark. The first max. is at 2320 Å. U. followed by a series of step-like maxima as far as 2100, 2063 and 2026 Å. U. The excitation gives also broad continuous bands with maxima approx. at 4850 and 3300 Å. U. With the direction of observation perpendicular to the direction of the exciting nonpolarized light, the polarization is equal to  $5.6 \pm 0.4\%$ . Between 235° and 380° corresponding to changes in vapor pressure of 50-1140 mm. Hg, the degree of polarization is unchanged. The polarization persists in spite of many at. collisions. The bands contg. the maxima at 4850 and 3300 Å. U. show no trace of polarization. P. S. Roller

**Fluorescence testing.** Erich Stock. *Farben-Ztg.* 38, 1557 8(1933); cf. *C. A.* 28, 4339.—An app. called the Callophane for examn. of materials in ultra-violet light is described. It consists of a collapsible triangular box one side of which contains glass transmitting ultra-violet light. G. G. Sward

**The discovery of the molecular diffusion of light in a pure liquid.** Albert Turpain. *Compt. rend.* 197, 1107-9 (1933).—It is claimed that Lallemand anticipated the results obtained by Raman 60 years later. P. S. R.

**The spectrum of sulfur dioxide.** Tung-Ching Chow. *Phys. Rev.* 44, 638-43(1933).—The emission and absorption spectra of SO<sub>2</sub> are studied in the region 2000-2600 Å. U. and most of the observed bands fitted into a vibrational-level scheme. L. S. Kassel

**The absorption of light by metals.** A. Smakula. *Physik Z.* 34, 788 90(1933). The absorption for metallic films of Ag, Au, Cu, Al, Sn, Pb, Cr, Mn, Sb and Bi was measured in the region of 186 700 mμ. All the metals show a no. of small maxima and minima superposed on the large-scale variations of the absorption. When the energies of these minima are plotted against the consecutive no. of the minima beginning in the red, they form a set of smooth curves, the mean separation of the minima for each metal showing a correlation with their at. conductivities. Morris Muskat

**Actinometry with uranyl oxalate at 2537, 253 and 208 mμ, including a comparison of periodically intermittent and continuous radiation.** F. Parkhurst Brackett, Jr., and Geo. S. Forbes. *J. Am. Chem. Soc.* 55, 4459 66 (1933). The gross quantum yield at 27° (expressed in mols. of oxalic acid per quantum) in a soln. wherein 1 (O SO<sub>4</sub>) is 0.01 and H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> is 0.05 M  $M/N$  is 0.48  $\pm$  0.01 at 2080 Å. U.; 0.63  $\pm$  0.03 at 2530 Å. U.; 0.59  $\pm$  0.01 at 2780 Å. U. The various absorption coeffs. are given. William E. Vaughan

**Photochemical studies. XVI. A further study of chlorination of benzene.** Homer P. Smith, W. Albert Noyes, Jr., and Edwin J. Hart. *J. Am. Chem. Soc.* 55, 1441 59(1933); cf. *C. A.* 27, 905. In the photochem. chlorination of benzene it is found that both addn. and substitution occur, but the main initial reaction is addn. In the early stages of the reaction the rate of pressure decrease was proportional to the square root of the light intensity, the pressure of Cl<sub>2</sub> and the pressure of benzene. The mechanism of the reaction is discussed. William E. Vaughan

**The absorption spectra of glycine solutions and their interpretation.** Gladys A. Anslow, Mary Louise Foster and Charlotte Klingler. *J. Biol. Chem.* 103, 81 92 (1933). The glycine cation exists in aq. and HCl solns. in the same form, NH<sub>3</sub><sup>+</sup>CH<sub>2</sub>COOH. Total dissoen. occurs at a frequency of 51,894 in H<sub>2</sub>O and 51,813 in HCl and glycine obeys the linear relationship which other amino acids follow indicating that dissoen. consists in the sepn. of the H from the mol. amphoterion. The cation exists in NaOH as NH<sub>3</sub><sup>+</sup>CH<sub>2</sub>COONa. Dissoen. occurs at a frequency of 48,972, differing from the above frequencies by an amt. equal to the difference between the limiting frequency of the Balmer series for H and that for Na, and consists in the sepn. of Na ion from the amphoterion. The energy of dissoen. is in H<sub>2</sub>O 6.413 v., in HCl 6.403 v., in NaOH 6.052 v. The heat of dissoen. is in H<sub>2</sub>O 146,860

cal., in HCl 146,630 cal., in NaOH 138,590 cal. From f.-p. measurements increasing concn. causes increased polymerization as does irradiation with ultra-violet light. R. C. Elderfield

**The production of histamine by irradiation.** P. Holtz. *Klin. Wochschr.* 12, 1613-14(1933).—The irradiation of 1:150 histidine solns. at pH 12 in the absence of O causes the appearance of histamine (7 mg. from 1 g. histidine). The histamine was identified by the m. p. and compn. of the cryst. picrate, chloroaurate and chloroplatinate. A preliminary report. Harry Eagle

**Light sensitivity of 2 benzylpyridine.** Hans Freytag and Adolf Muller. *Naturwissenschaften* 21, 720 1(1933).

Pure colorless 2-benzylpyridine (M. and Krauss, *Monatsh.* 61, 595(1932)), b. 137°, on standing in diffuse daylight, becomes yellow-red to brown and shows weak green fluorescence. The action of ultra-violet rays on the substance was studied (cf. *C. A.* 27, 15, 2440, 2687). Filter paper impregnated with a soln. of the discolored base (2 drops in 10 cc. EtOH or C<sub>6</sub>H<sub>6</sub>) turns yellow or brown after 1/2 min. exposure in daylight, gray-brown or greenish after 1 hr. The yellow-brown product reacts like the corresponding product from pyridine with hot  $\beta$ -naphthylamine-HCl soln., giving a red-purple dye. Light of various  $\lambda$  between 365 and 270 mμ gives green discoloration, of  $\lambda$  between 265 and 248 mμ yellow discoloration of the original substance. Many details of the photoreactions are given. B. J. C. van der Hoeven

**Chemical reactions induced by x-rays and a method for following them.** N. Waterman and H. Limburg. *Biochem. Z.* 266, 329(1933) —A table giving the changes in potential for different concns. of quinone is published which had been omitted from the paper abstracted in *C. A.* 27, 5244. S. Morgulis

**Modifications of chemical reactions under the influence of a forced wave oscillatory circuit.** Antonio de Pereira Forjaz. *Compt. rend.* 197, 1124 5(1933).—The wave length of the circuit was 1.256 m. The amt. of esterification of 20 drops each of alc. and AcOH in 25 cc. H<sub>2</sub>O at 21.5° showed a max. increase over the normal amt. after 2 days. Thereafter, the difference decreased. After 2 days the acidity of olive oil was decreased 37.5%; of wine 15.71%; of vinegar 5%. P. S. Roller

**Spectrochemical investigation of the viscose reaction.** Katsumoto Atsuki and Hiroshi Sobue. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 589 95(1933). The xanthogenation of alkali cellulose was studied spectrochemically by the absorption of the visible and ultra-violet light. The absorption of visible light by viscose increases as the time of xanthogenation increases, and the max. of absorption becomes sharper with a longer time of xanthogenation. The reaction product of NaOH and CS<sub>2</sub> shows a considerable absorption of light after 1 hr. The absorption of light in this case increases also very rapidly with the reaction time except at about 5800 Å. U. The max. absorption of ultra-violet light occurs at about 3000-3100 Å. U. in the viscose reaction, and at about 3300 Å. U. and at a wave length shorter than 2800 Å. U. in the reaction of NaOH and CS<sub>2</sub>. It is considered that the reaction velocity of alkali-cellulose and CS<sub>2</sub> is greater than that of NaOH and CS<sub>2</sub>. Though the xanthogenation velocity is great, the xanthogenated alkali-cellulose is not dissolved in water as fast as its reaction velocity would indicate because the diffusion of CS<sub>2</sub> into the fiber is slow. The xanthogenation can be much accelerated by the disintegration of the fiber. Exptl. data and photographs are presented. Karl Kammermeyer

**Effect of water contg. the isotope of H on fresh-water organisms (Taylor, et al.) 11A.** Action of ultra-violet rays on pyridine (Freytag) 10. Refractive index of H<sub>2</sub>O<sup>19</sup> and the complete isotopic analysis of water (Lewis, Luten) 2. The deuteroammonias (Taylor, Jungers) 2.

**Bled-Charreton, René:** De la turbine à l'atome. Paris: Gauthier-Villars et Cie. 198 pp.

Glasser, Otto: The Science of Radiology. Springfield, Ill.: Chas. C. Thomas. 450 pp. \$4.50. Reviewed in *Can. Chem. Met.* 17, No. 10, 35(1933).

Rutherford, Lord: Artificial Transmutation of the Elements. 35th Robert Boyle Lecture. London: Oxford Univ. Press. 12 pp. 1s.

Slater, John C., and Frank, Nathaniel H.: Introduction to Theoretical Physics. New York: McGraw-Hill Book Co., Inc. 576 pp. \$5.00.

Underhill, Chas. R.: Electrons at Work. New York: McGraw-Hill Book Co., Inc. 354 pp. \$3.00.

Apparatus for treating liquids with radium emanation. August Czapek. *Austrian* 134,728, Sept. 25, 1933.

Fluorescent screens. Siemens-Reiniger-Weiss Gesell-

schaft für medizinische Technik m. b. H. *Brit.* 396,601, Aug. 10, 1933. Addn. to 372,827 (*C. A.* 27, 2882). To obviate loss of brightness the active layer of the screen of 372,827, or its binding medium, is colored with a coloring matter which selectively absorbs part of the fluorescent light and thus alters the spectral compn. of the emitted light. Zn silicate and Cd tungstate are mentioned as luminescent materials and examples are given of screens made from Cd tungstate with a cellulose ester binding medium colored with brilliant green, fluorescein, quinoline yellow, auramine, chrysoidine or I; also of the use of colored natural or synthetic resins as binding media, alone or mixed with other colored or uncolored binding media, e. g., orange or ruby shellac solns which may be combined with cellulose ester solns.

#### 4—ELECTROCHEMISTRY

COLIN G. FINK

High-frequency furnaces and their services to industry 1923 1933. G. R. Webster. *Foundry Trade J.* 49, 312 (1933). D. S.

Commercial power-factor measurements. R. M. Rowell. *Gen. Elec. Rev.* 36, 493-500(1933).—The various indicating, recording and integrating instruments and meters that have been used for power-factor detn. are reviewed and discussed. Special emphasis is placed on reactive-v.-amp. meters. E. W. Volkman

The development of the Söderberg electrode in the manufacture of calcium carbide. W. Blumeister. *Chem.-Ztg.* 57, 841 2(1933). E. H.

• The graphite oxidation process. V. Sihvonen. *Acta Chem. Fennica* 6B, 68 70(1933)(in German); cf. *C. A.* 27, 5234. —A discussion of the mechanism of the electrolytic oxidation of graphite anodes in acid and alk. media. S. A. Karjala

The voltage balance of a cell for the electrolysis of sodium chloride solutions. Distribution of voltage drop through the (Vorce) cells with vertical filtering diaphragms. W. W. Stender, P. R. Zivotinsky and M. M. Stroganoff. *Trans. Electrochem. Soc.* 65, 24 pp.(preprint)(1934).—Cl at the graphite anode and H at the Fe cathode are discharged at a considerable overvoltage. The values of this overvoltage depend on the kind and quality of the graphite and Fe used, on the c. d., and on the concn. and temp. of the solns. Electrodes having the least overvoltage are: Acheson graphite anodes and steel cathodes. With increase of c. d., the overvoltage also increases to a great extent. Therefore, the lowest voltage drop requires the largest possible electrode surface. It is shown that elec. conductivity of the Vorce cell anolyte differs but slightly from the cond. of pure brine solns. of the same NaCl concn. It is shown that making a total balance for the whole cell is not possible, because of unequal c. d. at different points of the electrodes. The relation between electrode potentials and voltage drop in the electrolyte will vary for different points of the cell. The voltage may be accurately balanced only for definite electrode surfaces identical as to the distribution of the current over them. C. G. F.

The potential of the cobalt electrode. M. M. Haring and B. B. Westfall. *Trans. Electrochem. Soc.* 65, 12 pp.(preprint)(1934).—Co is closely related to Ni and has possibilities for use instead of the latter in the electroplating and electroforming industries. Its potential has been studied by several investigators but the results are not in agreement and apparently do not have the reliability desired. The standard potential of Co was found to be  $-0.278 \text{ v.} \pm 0.002 \text{ v.}$  at 25°. The normal potential is, therefore, close to  $-0.300 \text{ v.}$  The necessity of using pure metal free from strains prepared by high c. d. electrolysis and of maintaining O-free conditions is reemphasized. C. G. F.

The hydrogen overvoltages of iron-chromium alloys in potassium hydrate solution. M. deKay Thompson and D. M. Fleming. *Trans. Electrochem. Soc.* 65, 5 pp.

(preprint)(1934).—The H overvoltages of the Fe-Cr series of alloys were measured in molal KOH soln. at 25°. No appreciable change in the overvoltage was found between zero and 60% Cr; above 60% the overvoltage rises gradually to that of pure Cr in a curve that is concave upward. In the Fe-Ni alloys, these curves are concave downward. C. G. F.

The electrochemistry of complex cuprohalogen anions. István Nárá-Szabó and Zoltan Szabo. *Z. physik. Chem.* A166, 228-40(1933). Cu was dissolved anodically into solns. (satd. with H<sub>2</sub>) of KCl, NaCl, HCl, CaCl<sub>2</sub>, KBr and KI. The compn. of the soln. was detd. analytically and e. m. f. measurements were made with an auxiliary Cu electrode. In chloride soln. above 0.04 M Cu concn. a complex anion  $\text{CuCl}_4^{+}$  is formed. Activity coeffs. were calcd. from the equil. equation and it is shown that the Debye-Huckel limiting law is valid up to very high concn. G. M. Murphy

Chromium plating literature. XIX. L. H. Decker. *Platers' Guide* 29, Nov. 13 14(1933); cf. *C. A.* 28, 17.

W. H. Boynton

Electrodeposition of cuprous oxide film. Masami Nakajima. *J. Electrochem. Assoc. (Japan)* 1, 230 2 (1933).—The effects of c. d. and time of electrolysis on the deposition of  $\text{Cu}_2\text{O}$  film from Fehling and Wernicke solns. have been worked out. The deposit from the latter is in general more uniform and clearer in the reddish purple color, and the range of c. d. is far wider than that from the former. Electrolysis of the former with c. d. of 1.5 9 ma./sq. dm. gives a beautiful deposit. K. Konda

Anodic oxidation of fluophosphoric acids. Juan M. García Marquina. *Rev. acad. cienc. Madrid* 30, 382 138 (1933).  $(\text{NH}_4)_2\text{FP}_2\text{O}_7$  can be made by heating  $\text{NH}_4\text{F}$  and  $\text{P}_2\text{O}_5$ , but heating  $\text{KF}$  and  $\text{P}_2\text{O}_5$  or  $\text{KHF}_2$  and  $\text{P}_2\text{O}_5$  does not give the K salt.  $\text{K}_2\text{FP}_2\text{O}_7$  can be obtained by decomposition of  $(\text{NH}_4)_2\text{FP}_2\text{O}_7$  with cold KOH. Electrolysis of fluophosphoric acid produced monoperoxo-monofluophosphoric acid,  $\text{O:PF(OH)OOH}$ , and diperoxo-monofluophosphoric acid,  $\text{O:PF(OH)OO(HO)FP:O}$ . Yields are better than 2% during addn. of fluoride to the electrolyte. The best anode c. d. depends upon the electrolyte compn. The best yields were obtained with the K salt, lower yields with the  $\text{NH}_4$  salt, and almost zero with the Na salt. The best electrolyte: 250 g./l.  $\text{K}_2\text{FP}_2\text{O}_7$  and 300 g./l.  $\text{KF}$ ; c. d. 3 amp./sq. cm. Addn. of acid or alkali reduces the yield. Temp. variation between 3° and 16° has little effect. Concns. above 0.36 N were not obtained on adding chromate or increasing coulombs. These peroxo acids decompose in alkalies, one losing O and forming monofluophosphates, the other hydrolyzing to form peroxophosphates. E. M. S.

The electrolysis of solutions of metallic salts with a rarefied gas cathode. N. Thon. *Compt. rend.* 197, 1114-17(1933).—The electrolysis was made in a U-tube with side bulbs and with movable electrodes for adjusting the thickness of the evacuated gas space. Electrolysis was at 1000 v., the current being 15 milliamp. for a gas

space of 1 cm. H is always evolved at the cathode. Zn, Cd, Pb and Ni were not deposited from a soln. of their salts; neither was Cu deposited from  $\text{CuSO}_4$  or Hg from  $\text{HgNO}_3$ , although these metals are lower in the e. m. f. series than H. However, Ag, Au and Pt were deposited from solns. of  $\text{AgNO}_3$ ,  $\text{AuCl}_3$  and  $\text{PtCl}_4$ , resp. When the c. d. is increased by decreasing the gas space, Cu hydroxide is liberated by reason of the alkyl. at the cathode. Under the same conditions Zn remains in soln., evidently because of the formation of a zincate, but Zn hydroxide ppts. when the c. d. is decreased. If one does not take the precaution of leaving a considerable space between the electrodes and the wall of the U-tube, the discharge takes place between the electrode and the film of electrolyte on the walls. Only under these conditions T. observed a turbidity in the vicinity of the wall which after agglomeration proved to be metallic copper. The results agree with Volmer's theory of electrolytic polarization of metals according to which the overvoltage disappears only at active points of a preformed crystalline network. With a. c., the combination electrolyte-rarefied gas-Pt is a noteworthy detector, the positive current becoming rectified from the surface of the liquid toward the metal.

P. S. Roller

**Electrodes of the third type.** M. LeBlanc and O. Haruapp. *Z. physik. Chem.* A166, 321-42(1933).—A formula is derived for electrodes of the third type. The electrode Zn oxalate | Ca oxalate |  $\text{Ca}^{++}$  requires a long time for equil. but the final double decompn. corresponds quantitatively to the theory. By measuring soly. the equil. was calcd. for  $\text{CaWO}_4$ ,  $\text{Hg}_2\text{WO}_4$ ,  $\text{Hg}_2\text{C}_2\text{O}_4$ . The electrodes  $\text{Hg}_2\text{WO}_4$  |  $\text{CaWO}_4$  |  $\text{Ca}^{++}$  and  $\text{Hg}_2\text{C}_2\text{O}_4$  |  $\text{CaC}_2\text{O}_4$  |  $\text{Ca}^{++}$  were also investigated; the latter seems to be very usable. For solns. contg. chlorides, electrode combinations with mercurous salts are not applicable because of the formation of  $\text{HgCl}$ .

G. M. Murphy

**Electrodeposition of aluminum from non-aqueous solutions.** R. D. Blue and F. C. Mathers. *Trans. Electrochem. Soc.* 65, 14 pp.(preprint) (1934); cf. C. A. 27, 2629. Al of high purity can be deposited easily in bright, finely cryst., adherent form from a soln. made by dissolving metallic Al in  $\text{EtBr}$  and  $\text{C}_2\text{H}_5$  with  $\text{AlBr}_3$  as a starter or catalyst. Toluene, xylene,  $\beta$ -tetrahydronaphthalene and kerosene may be substituted for benzene under certain conditions and  $\text{EtCl}$ ,  $\text{MeCl}$  and ethylene dichloride for  $\text{EtBr}$ . The Al adheres well to Pt, Cu, Fe and cast Fe but not to Mg or Al. The bath has a current efficiency of 60% and over at both electrodes and a throwing power as high as 28. The bath does not deteriorate and can be operated indefinitely if moisture is excluded. The bath does not show a definite decompn. voltage, the potential drop varying directly and regularly with the current.

C. G. F.

**Methods of controlling deposits of zinc and cadmium.** J. Barv and P. Orłowski. *Usine* 42, No. 40, 21-3(1933).

Methods for comparing the electrodeposition of Zn and Cd with respect to resistance against corrosion and industrial checking of the thickness of the deposit are discussed. The Preece test for Zn (with 20%  $\text{CuSO}_4$  soln. at 18°) gives proper indication of required thickness for corrosion resistance. For testing Cd deposits a method is given depending on time required to dissolve the coating by a soln. of  $\text{HCl}$  and  $\text{SnCl}_2$ .

M. Hartenheim

**The electrolytic oxidation of glycolic acid in alkaline solution.** Eero Tommila. *Acta Chem. Fennica* 6B, 70 (1933)(in German); cf. C. A. 27, 910.—In the oxidation of glycolic acid low anodic potentials, with Fe, Ni or Cu, yield glyoxylic acid as the primary product, which is then further oxidized partly to oxalic acid and partly to formic acid. With higher anodic potentials (polished Pt)  $\text{HCHO}$  is the primary product. No glyoxylic acid is found.  $\text{H}_2$  also is formed at the higher anodic potentials. S. A. K.

**Electrolytic reduction of camphoric acid imide.** Buhei Sakurai and Yoshiyuki Tamura. *J. Electrochem. Assoc.* (Japan) 1, 139-43(1933).—Reduction does not occur in high  $\text{H}_2\text{SO}_4$  concn. such as 80% or at a temp. lower than 30° irrespective of the concn. of  $\text{H}_2\text{SO}_4$ ; while it goes on comparatively easily in  $\text{H}_2\text{SO}_4$  concn. as low as 5% or at a temp.

higher than 80° (in 15-30% concn. of  $\text{H}_2\text{SO}_4$ ).  $\beta$ -Camphidone (I) is easily formed in the higher  $\text{H}_2\text{SO}_4$  concn., while the yield of  $\alpha$ -camphidone (II) increases in the lower  $\text{H}_2\text{SO}_4$  concn. and almost only II is formed under 15% concn. At the higher temp. the yield of I and II decreases, bringing about an increased yield of camphidine (III). Prolonged electrolysis increases the yields of all three, but, beyond a certain limit, II decreases and III increases, up to an almost const. value. Reduction of I to III is very difficult, while that of II to III is comparatively easy; the yield of I is, therefore, almost const. It is reasonable to conclude that reduction of I gives III, and the properties of the two  $\text{CO}_2\text{H}$  groups in camphoric acid imide are different and are responsible for the different reducibilities of I and II and the different conditions for their formation.

K. Konda

**Electrolytic oxidation of piperidine.** Kazuo Yamamoto and Moriaki Yokoyama. *J. Electrochem. Assoc.* (Japan) 1, 160 2(1933).—Piperidine (5.15 g.) in 2 N  $\text{H}_2\text{SO}_4$  electrolytically oxidized with peroxidized Pb anode and Pt cathode at 0.05 amp./sq. cm. and 8 Faradays per mol. gives  $\delta$ -aminovaleraldehyde,  $\delta$ -aminovaleric acid (0.95 g.), glutaric acid (0.5 g.),  $\text{NH}_3$  (1.9 g. as  $\text{NH}_4\text{Cl}$ ), succinic acid (2.0 g.) and formic acid (1.8 g.). The anodic oxidation is, therefore, analogous to oxidation with peroxides. Compared with pyridine, piperidine reacts more easily with anodic  $\text{O}_2$  and behaves similarly to  $\text{C}_6\text{H}_6$ .

K. Konda

**Dry cells of standard sizes.** I. Saburo Makino. *J. Electrochem. Assoc.* (Japan) 1, 225 30(1933).—Empirical formulas representing the relation between wt. and capacity, and between av. discharge current per unit wt. of mixt. and life, of some dry cells of standard sizes are described.

K. Konda

**The alkaline accumulator. I. The electrolysis of alkali zincate solution.** Shosaburo Tanaka. *J. Electrochem. Assoc.* (Japan) 1, 143 9(1933).—For the preliminary expt. with the alk. accumulator, with a cathode filled with sol. active material, the relative values of the current at Ni electrode and the cathode p. d. were detd. in various alk. solns. contg. ZnO of different concns. NaOH soln. (5.7 N) contg. ZnO in a wt. ratio ( $\text{NaOH}/\text{ZnO}$ ) of 8-12 and 5.7 N KOH soln. with ZnO in a wt. ratio ( $\text{KOH}/\text{ZnO}$ ) of 12-16 can be used. The KOH soln. is, however, preferable. Upon electrolysis in alk. soln. with or without ZnO and Ni cathode, the Ni surface is changed into a favorable condition for the deposition of Zn, but this surface condition does not last. An amalgamated Ni cathode is most effective for prolonged Zn deposition.

**II. The electrolysis of alkali zincate solution.** 2. Shosaburo Tanaka and Kohei Iwasa. *Ibid.* 149 53. —Soly. of deposited Zn can be indirectly estd. by the measurement of  $\text{H}_2$  in cc. per hr. evolved during standing of the cell after the electrolysis: 1 cc.  $\text{H}_2$  is equiv. to 0.0029 g. Zn.  $\text{H}_2$  evolved is greatly diminished in 7 N KOH soln. contg. ZnO in a wt. ratio ( $\text{KOH}/\text{ZnO}$ ) of 12. Electrolysis with this soln. and a Ni-mesh cathode at about 1 amp./sq. dm. cathode gives the most compact Zn deposit. Upon washing the electrode with  $\text{H}_2\text{SO}_4$  to remove the surface oxide film, very good results are obtained. Amalgamated Ni-mesh cathodes increase the deposition rate of Zn and greatly lower its soly. Amalgamation seems to be the most suitable method for treating the cathode of an alk. accumulator. **III. Alkali zincate accumulator with nickel-mesh cathode.** 1. Shosaburo Tanaka and Tametsugu Tominaga. *Ibid.* 220 5.—The comparative expts. on cells with Ni-Fe anode and Ni cathode treated in 4 different ways showed that Ni-mesh cathodes give the most compact Zn deposit. Even with Ni-mesh cathodes the cryst. grains of Zn deposited become more and more coarse with repeated charge and discharge of the cell. The dropping off of Zn particles is very slight if discharged directly or within 4 hrs. after the charge; but after standing 1-2 days, an insol. ppt. is formed.

K. Konda

**Incandescent lamps as mercury-arc ballast.** L. J. Buttolph. *Gen. Elec. Rev.* 36, 482-5(1933).—In the operation of Hg arc lamps  $\frac{1}{2}$  the applied voltage is absorbed in series reactance or resistance. Efficient arc

ballasting can be obtained by a series resistance of a W lamp filament. Since the W filament when in series with a Hg arc experiences greater voltage changes than if connected directly to the supply line, an autotransformer must be employed to insure a large degree of voltage regulation. Various circuit diagrams are given and their performance characteristics discussed. E. W. Volkmann

**Electronics and electron tubes, gas- or vapor-filled tubes.** E. D. McArthur. *Gen. Elec. Rev.* 36, 501 5 (1933).—A general discussion of the operating characteristics of thyratron tubes with reference to various practical applications E. W. Volkmann

Reducing the toxicity of cyanide wastes (Eldridge) 14.  
Hardening high-speed steel (U. S. pat. 1,934,741) 9.  
Connector for elec. wires (U. S. pat. 1,936,185) 9.

**Batteries.** Charles H. Vince, Jr. *Brit.* 397,475, Aug. 22, 1933. A single-fluid primary cell comprises electrodes of Al (alloy) and Cu (alloy) sep'd. by paper, cotton wool, etc., in which the electrolyte is absorbed. The latter may be a NaOH soln. or granular NaOH may be packed in with the absorbent material, the NaOH becoming moist by deliquescence. Cf. C. A. 27, 5254.

**Electric batteries.** Irwin S. Joseph. *Fr.* 752,082, Sept. 15, 1933. The electrolyte of a battery of the Leclanché type is composed of an alk. soln. or an alk. gel and the pos. electrode of wood charcoal, preferably impregnated with an oxidation catalyst, rendered conductive and coated with paraffin.

**Electric batteries.** Miguel Sireol. *Fr.* 752,110, Sept. 16, 1933. An electrolyte for charging batteries is made by mixing water with  $MgSO_4$  in the proportion of 10.95% by wt., adding  $ZnSO_4$ , 2.8%, and collodion 2.10% as well as glycerol and  $Al_2(SO_4)_3$ . After 24 hrs.  $H_2SO_4$  is added till a d. of 1.225–1.280 is reached.

**Arrangements for charging electric secondary batteries** Siemens Brothers & Co. Ltd., David A. Christian and Hugh S. Double. *Brit.* 396,823, Aug. 17, 1933.

**Dry-cell batteries.** The Ever Ready Co. (Great Britain) Ltd. *Brit.* 390,068, Aug. 17, 1933

**Storage batteries.** D. & B. Electrical Co. Ltd. *Fr.* 750,200, Aug. 8, 1933. After discharging and emptying a battery the plates are treated with oxalic acid, then with  $H_2SO_4$ , and the battery is then filled with distd. water and a little pyrogallol acid.

**Molding materials such as gilsonian compositions as in the production of storage battery cell covers, etc.** Harvey D. Geyer (to Inland Mfg. Co.). U. S. 1,935,794, Nov. 21. Various details of app. and operation are described.

**Accumulators.** John A. Hamilton. *Brit.* 396,904, Aug. 17, 1933.

**Accumulators.** Accumulatoren-Fabrik A.-G. *Fr.* 752,016, Sept. 15, 1933. Liberation of gases from Pb accumulators after charging is avoided by coating the parts, composed of an alloy of Pb and Sb dipping into the electrolyte and not covered with active material, with an adherent insulating material not attacked by the electrolyte, e. g., hard or soft rubber. *Fr.* 752,017. The covering for the grating filled with active material is composed of a conducting material, particularly Pb or an alloy of Pb, the exterior face of which is covered with non-conducting material such as hard or soft rubber.

**Means for heating an electroplating or other vat.** Percy E. Randall. *Brit.* 397,565, Aug. 31, 1933.

**Electroplating apparatus with a rotating container for articles to be plated.** John T. Daniels. U. S. 1,936,382, Nov. 21. Mech. and structural features.

**Electrodeposition of indium.** Daniel Gray (to Oncoida Community, Ltd.). U. S. 1,935,630, Nov. 21. The article to be plated is made the cathode and an anode of indium is immersed in a bath such as may be formed of water 1 gal., KCN 15 o. and glycine 7 oz. (or cyanuric acid, abietic acid, adipic acid, acetyl-*m*-aminobenzoic acid, acetyl-*p*-aminobenzoic acid, acetaldehyde, Na bisulfite or *m*-aminobenzoic acid, serving to prevent pptn. of

the In). A c. d. of about 0.035 amps. per sq. in. or more is used to effect the deposition of indium.

**Galvanic precipitates.** Ernst Kelsen. *Ger.* 582,910, Aug. 25, 1933. In order to remove galvanic Fe ppts. easily from the anode, this is given an intermediate layer by galvanic pptn. thereon of W or Mo by electrolysis, e. g., of a soln. of  $(NH_4)_2MoO_4$  and  $NH_4Cl$ .

**Electrolytic condensers.** Preston Robinson (to Sprague Specialties Co.). U. S. 1,935,860, Nov. 21. A filming electrode such as Al foil is subjected to electrolytic formation, the formed electrode is provided with a pasty electrolyte which may be formed from boric acid, glycerol, etc., followed by baking for 2–15 hrs. at a temp. of about 50–80°.

**Electrolytic condenser.** Junius D. Edwards (to Aluminium Co. of America). U. S. 1,936,084, Nov. 21. Structural features.

**Electrolytic condenser.** N. V. Philips' Gloeilampenfabrieken. *Fr.* 751,806, Sept. 11, 1933.

**Electrolytic condensers.** N. V. Philips' Gloeilampenfabrieken. *Fr.* 751,981 2, Sept. 13, 1933. Closure means.

**Electrolytic condensers.** N. V. Philips' Gloeilampenfabrieken. *Fr.* 752,023, Sept. 15, 1933. At least one electrode is made of Al contg. less than 0.05% of Cu and the electrode is toughened, preferably by chem. means.

**Anodes for electrolytic condensers.** Frederick W. McNamara (to Sprague Specialties Co.). U. S. 1,936,252, Nov. 21. Structural details.

**Electrolytic rectifier and condenser anodes.** The British Aluminium Co. Ltd., Alfred G. C. Gwyer and Alfred N. D. Pullen. *Brit.* 397,538, Aug. 21, 1933. Al (alloy) anodes for electrolytic rectifiers and condensers are treated so as to form a comparatively thick, low-resistance oxide coating either chemically or electrolytically by d. c. and a dielec. thin oxide coating is then deposited thereon electrolytically by d. c.

**Electrolytic cells.** Charles Pouyau. *Brit.* 397,300, Aug. 24, 1933. In a cell of the filter-press type for the manuf. of Cl and alkalis the cubic capacity of the anode compartments is made greater than that of the cathode compartments to avoid loss of alkali by ionic migration.

**Electrolytic cell for light metals.** Wintershall A.-G. *Fr.* 752,310, Sept. 20, 1933. Light metals, particularly Mg, are made electrolytically by fused masses, the sp. gr. of which is higher than that of the sep'd. metal. The anode is placed in the center of the cell, while the cathodes are placed around it without a sep'd. wall. The cell is shaped approx. as an ellipse and the bottom is raised at the part further out from the circle of electrodes.

**Electrolytic baths.** Druckersetzter G. m. b. H. *Fr.* 750,457, Aug. 11, 1933. The diaphragms are finely and uniformly porous. They are made of a kind of asbestos paper or board, they have long fibers and are free from metal oxides.

**Aluminum.** Herbert Friedmann. *Ger.* 578,547, June 15, 1933. Clay, bauxite, kaolin or other materials contg.  $Al_2O_3$  are mixed with a substance such as Fe or Si which reduces the vapor tension of Al, and are fused in an elec. furnace to form a crude Al alloy. This is sep'd. by liquation to an alloy rich in Al and one poor in Al. Pure Al is then distd. off from the former.

**Iron.** Vereinigte Stahlwerke A.-G. (Friedrich Meissner, inventor). *Ger.* 580,732, July 15, 1933. Fe is obtained by electrolysis of fused  $FeCl_3$ . The latter is obtained by chlorinating Fe ores or Fe waste. A suitable arrangement of cell is indicated.

**Iron.** Vereinigte Stahlwerke A.-G. (Friedrich Meissner, inventor). *Ger.* 582,698, Aug. 18, 1933. Addn. to 580,732 (preceding abstr.). Electrolytic app. for obtaining pure Fe from ores or materials contg. Fe by converting the Fe into  $FeCl_3$  and electrolyzing this in the fused state is described.

**Steel.** Christian F. Arnold. *Ger.* 550,127, Nov. 4, 1933. In the manuf. of W steel in an elec. furnace, fused Fe is first freed from P and S by covering it in known manner with a slag contg. a comp'd. of F. The slag is



then replaced by a slag of alkali and alk. earth silicates not contg. a compd. of F, and W and other desired constituents of the steel are then added.

**Dental alloys.** Stefan Loos. *Fr.* 753,202, Oct. 12, 1933. Each of the constituents of the desired alloy is applied successively one on another on a matrix in very thin layers and in no. sufficient to form the desired thickness of plate. The outer layers are preferably of a precious metal. The metals are applied by electrolysis or by a pistol.

**Protecting light metals.** Siemens Elektro-Osmose G. m. b. H. *Fr.* 42,676, Sept. 4, 1933. Addn. to 702,206 (*C. A.* 25, 3922). In forming protective coatings on Al or alloys of Al, a layer of oxide on the cooperating electrode, and preferably also the protective coating on the articles, is obtained by using a satd. soln. of chromic acid. The temp. is 40–60° and the tension 40–60 v. during about 20 min.

**Hydrocarbons.** I. G. Farbenind. A.-G. (Walter Riedelberger, inventor). *Ger.* 587,129, Oct. 30, 1933. Unsatd. gaseous hydrocarbons, e. g.,  $C_2H_2$  and  $C_2H_4$ , are obtained from liquid hydrocarbons by causing a film of the latter to flow down the inside of the wall of an arc furnace in which the arc burns in a stream of H or a gas consisting mainly of H. App. is described.

**Acetylene.** I. G. Farbenind. A.-G. *Fr.* 750,521, Aug. 11, 1933. Gases contg. hydrocarbons are passed through several elec. arcs, the  $C_2H_2$  being eliminated after each treatment by the arc, and the energy per cu. m. of gas treated being increased from arc to arc. *Cf. C. A.* 27, 2101.

**Dehydrating chlorides.** Société de produits chimiques des terres rares (to Johnson Matthey & Co. Ltd.). *Brit.* 97,179, Aug. 22, 1933. See *Fr.* 736,415 (*C. A.* 27, 1285).

**Electric furnaces.** Siemens-Planawerke A.-G. für Kohlefabrikate. *Fr.* 752,041, Sept. 15, 1933. Construction of a continuously functioning electrode is described.

**Electric annealing furnace for wire or metal strip.** Allgemeine Elektricitäts-Ges. (Viktor Paschke, inventor). *Ger.* 587,134, Oct. 30, 1933.

**Induction furnaces.** Ugnis-Infra. *Fr.* 750,400, Aug.

**Induction electric furnace.** Edwin F. Northrup (to Ajax Electrothermic Corp.). U. S. 1,936,309, Nov. 21. Structural features.

**Device for charging electric arc furnaces.** Demag-Elektrostahl G. m. b. H. *Ger.* 578,944, June 19, 1933.

**Electrodes for gaseous conduction devices.** Richard E. Miesse (to General Scientific Corp.). U. S. 1,936,334, Nov. 21. The active surface of a base metal such as Ni is coated with a Ba compd. by dipping the base metal into a soln. of Ba azide, heating somewhat, and then heating to a still higher temp. in the presence of carbon to form Ba carbide which serves to prevent "sputtering."

**Electrode for electric arcs.** I. G. Farbenind. A.-G. *Ger.* 578,501, June 14, 1933. The electrode is coated with SiC or WC.

**Electric cleaning of gases.** Siemens-Schuckertwerke A.-G. *Ger.* 578,566, June 15, 1933. Gases difficult to ionize, such as furnace gases, are cleaned by a current of tension sufficient to cause the electrodes to emit sparks.

**Electrical apparatus for purifying gases.** Paul Herberlot. *Fr.* 750,383, Aug. 9, 1933.

**Precipitating electrode for electrofilter.** Siemens-Schuckertwerke A.-G. (Richard Heinrich, inventor). *Ger.* 577,050, May 22, 1933. Addn. to 575,746 (*C. A.* 27, 4745).

**Electric resistances.** Nürnberger Schraubenfabrik und Facondreherei. *Fr.* 751,745, Sept. 8, 1933. A non-conducting layer composed of a strongly adhesive colloidal material is interposed between a layer forming an elec. resistance and its ceramic support.

**Apparatus for electrometrically determining hydrogen-ion concentration.** Fritz Lux. *Brit.* 397,303, Aug. 24, 1933.

**Electric cut-outs.** Wm. H. Turner and Wm. H. Isherwood. *Brit.* 397,234, Aug. 24, 1933. The casing for an enclosed fuse contains a liquid which vaporizes when the fuse flows and raises the pressure to rupture the casing; the de-ionizing effect of the expanding, cooling and condensing vapor extinguishes the arc.

**Electron lamps.** Allgemeine Elektricitäts-Ges. *Fr.* 750,248, Aug. 7, 1933. Construction of cathodes is described.

## 5 PHOTOGRAPHY

L. P. WIGHTMAN

**The Gasparcolor process.** Paul Knoch. *Camera Lucida* 12, 83–5 (1933). The Gasparcolor process employs 3 photographic emulsions coated in superposition upon a common support. Each of these emulsions contains a dye of 1 of the 3 colors used in subtractive prints. In 1 form of the process, the top emulsion is dyed yellow and sensitized for green light, the intermediate emulsion is dyed magenta and sensitized for red light, and the bottom emulsion is dyed blue-green and sensitized for infrared radiation. The sensitive material is exposed, developed and fixed and then submitted to a soln. that destroys the dyes where they are not needed, but allows them to remain in the proper places to form the colored images. Pos. prints can be obtained from negatives or from positives depending upon the soln. used.

M. W. Seymour

**Fine grain panchromatic 16-mm. negative film.** Leopold Kutzsch. *Kino-technik* 15, 237–8 (1933).—Spectral sensitivity and density-log exposure curves are published for the new Agfa fine-grain panchromatic 16-mm. neg. film in comparison with the corresponding orthochromatic film which has been on the market for some time. Filter factors are also given for the film.

M. W. Seymour

**Quick developer for obtaining fine-grained images from coarse-grained emulsions.** A. Seyewetz. *Chimie & Industrie Special No.*, 1034–6 (June, 1933); *cf. C. A.* 27, 3291 and Lumière and S., *C. A.* 26, 929.—Appreciable decrease in the size of the grain can be obtained with the following formula, though it does not give as pronounced a decrease as the formula without hydroquinone:  $H_2O$

1000, gérol 4, hydroquinone 2, anhyd.  $Na_2SO_4$  65, borax crystals 7.5; the time of developing is 3 min. at 18°. In order to obtain max. decrease in grain size, developing should not be prolonged beyond the indicated time, otherwise the size of the grain gradually increases, and becomes about the same as with ordinary developers when the time is doubled. With fine-grained emulsions the grain size obtained is about the same as with coarse-grained emulsions.

A. Papineau-Couture

**A new effective fine-grain developing method and its aspect in motion picture technic.** Franz Baur and Gottlieb Imhof. *Kino-technik* 15, 291–4 (1933).—The procedure consists in desensitizing with pinakryptol green and following with phys. development. Panchromatic motion picture neg. film developed in this way is shown at 1000 times magnification compared with a representative transparency developed in a metol-hydroquinone developer. The negative is said to have the finer grain. (*Cf. Odell, C. A.* 27, 4182.)

O. E. Miller

**Development halos.** Lüppo-Cramer. *Phot. Rundschau* 70, 267–8 (1933).—Negatives, developed in dil. unagitated developers, such as glycine, frequently show pronounced clear halos surrounding areas of heavy density. This effect must be eliminated particularly in sensitometric and spectrographic work. The Eberhard and edge effects are believed to be varieties of this phenomenon, which is ascribed to the retarding action of local high concns. of oxidation products of the developer.

P. W. Vittum

**Protection against halation.** H. Harke. *Phot. Rundschau* 70, 170–2 (1933).—The effects of halation due to

scattering of light within the emulsion may be minimized by employing a slow soft developer which does not penetrate far into the emulsion. Rodinal or glycine is suggested. Papers of low contrast should be used in making prints from negatives in which halation is noticeable.

P. W. Vittum

**Progress in the field of sensitizers for deep red and infra-red in Germany since 1918.** W. Dietrich, H. Durr, and W. Zeh. *Z. wiss. Phot.* 32, 145-56 (1933). *Brit. J. Phot.* 80, 634-6 (1933). A review. The dyes known as di-carboxyanines (termed 'pentacarboxyanines' in the present paper) were first made in Germany by a process patented by W. König, and unsymmetrical members of this class have now been prepared. Recently unsymmetrical tri-carboxyanines have been obtained, the example given being derived from benzothiazole and 5,6-dimethylbenzothiazole. Suggestions for the preparation of dyes having 9 and 11 methine groups are available from the work of W. König.

I. G. S. Brooker

**New apparatus for measuring sensitivity.** G. Traub. *Phot. Rundschau* 70, 213-15 (1933). A description is given of the construction and operation of a sensitometer in which the light sensitive material is exposed through a step tablet to a standardized light source, and the sensitivity evaluated in terms of the exposure required to give a density greater by 0.1 than the fog density.

P. W. Vittum

**Photochemical destruction of the latent image with the aid of desensitizers.** H. Iuppo-Cramer. *Phot. Arch.* 60, 115-9 (1933). cf. *C. A.* 26, 885. Addition of KBr (1%) slightly increases the destroying action of red light, in the presence of phenosalframine or pinkryptol green, on the latent image of high speed emulsions. While with yellow light, in the absence of KBr, complete fogging results, its addition to the dye solution allows an extensive diminution of the latent image without production of fog. Unlike KBr, sulfite (5% Na<sub>2</sub>SO<sub>3</sub>) decreased the action of red light. With green light and in the presence of KBr, the result for phenosalframine over a series of emulsions are not parallel with those for pinkryptol green. A discussion is given of Ernst Heger's application of green light during the development of x-ray film that have been desensitized with pinkryptol green (*C. A.* 25, 206).

I. R. Bullock

**Modern high speed emulsions.** Curt Immermann. *Phot. Rundschau* 70, 229-2 (1933). A general discussion is presented of the improvement which have been made in recent years in photographic materials, particularly with regard to increased speed, color sensitivity, and latitude and decreased inherent fog, halation and graininess.

P. W. Vittum

**Dispense with potassium bromide? [Sodium chloride in photographic developers.]** Iuppo-Cramer. *Phot. Rundschau* 70, 151 (1933). Exception is taken to the general statement that chloride in developers has a retarding effect equal to that of bromide. Experimental evidence is presented to show that this is true only for a limited number of rapid developing solutions which are not retarded greatly by either salt. In other cases little or no retardation is effected by the addition of NaCl to the developer.

P. W. Vittum

**Warm sulfur tones.** Curt Immermann. *Phot. Rundschau* 70, 328-30 (1933). Formulas and procedures are given in detail for obtaining warm yellow-brown tones on AgBr papers.

P. W. Vittum

**Utilization of film scrap.** Kurt Bistring. *Nutrocellulose* 4, 161-2 (1933). A review.

I. M. S.

**Ramnazina oil [used in photography]** (Fr. pat. 752,093) 17

**Color photography.** Oliver A. Townsend (to Fru Colour Film Ltd.). U. S. 1,934,779, Nov. 14. See *Ir.* 738,196 (*C. A.* 27, 1563).

**Color photography.** I. G. Iarbofund A-G. Brit. 390,585, Aug. 10, 1933. A tripack such as described in Brit. 380,341 (*C. A.* 27, 3014) is provided with an addi-

1 yellow filter layer on the blue-sensitive emulsion in order to flatten the gradation of the blue record image and yield images of the same gradation on all 3 emulsion layers. The 2 yellow filters together absorb all blue rays. Cf. *C. A.* 28, 55.

**Color photography.** Victor von Gardanovits. Brit. 397,149, Aug. 15, 1933. Emulsion screens for color photography are produced by applying different emulsions in screen form to a base, the emulsion pertaining to a particular color, e. g., blue, having a total sensitiveness greater than those of the remaining colors so that the amount of light necessary for producing the image in the blue elements of the screen is without effect on the remaining emulsion screen elements pertaining to the other color. The screen may be produced by applying the screen elements to an elastic base as in Brit. 358,157 (*C. A.* 27, 210<sup>2</sup>) and transferring to the final screen carrier. The emulsion may be thickened with dextrin, sugar, gum arabic, albumin, etc., while collodion emulsions may be thickened with (artificial) resins. A yellow protective dye, e. g., aurumum G may be added to the red and green element of the screen and this dye may be removed eventually by dissolving out in H<sub>2</sub>O and the residual traces expelled by treatment with aq. H<sub>2</sub>O. The red elements are dyed with indigosol scarlet H B, the green with indigosol green A I and the blue with indigosol 013. These dyes are fixed by adding NaNO<sub>2</sub> and then treating with aq. H<sub>2</sub>SO<sub>4</sub>. The Ag image may be toned by Pt, Au, S, Se or other baths or with a suitable dye after bleaching in a bath of K Fe(CN)<sub>6</sub> oxalate may be the developer.

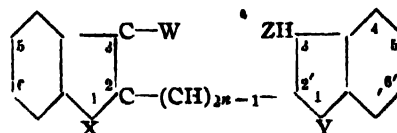
**Color photography.** Bela Gaspar. Brit. 397,170, Aug. 15, 1933. Multicolor photographic, particularly cinematograph, images are obtained by the simultaneous copying of a plurality of component color images onto a light sensitive multilayer material composed of superimposed Ag halide layers. The component images may be united to form a master image or combined by projection. The multilayer emulsions may contain dye or dye forming substances.

**Color photography.** Bela Gaspar. Ir. 719,342, Sept. 12, 1933. In making colored images by means of a layer colored in a diffused manner with coloring substance, the decomposition of the coloring substance in the layer takes place in the presence of an amount of Ag<sub>2</sub> higher than that which is necessary for the decomposition and this decomposition is followed by diminution of the excess of Ag<sub>2</sub> by an appropriate reducer, e. g., CuSO<sub>4</sub> 20, NaCl 20, water 100 g. and H<sub>2</sub>SO<sub>4</sub> 1 cc.

**Colored photographs.** Bela Gaspar. Ger. 557,111 (Oct. 31, 1933). Addition to 528,318 (*C. A.* 25, 4474). The process of Ger. 528,318 is modified by replacing the Ag<sub>2</sub> in the image by an oxidation catalyst, e. g., vanadyl ferrocyanide. The image is then treated with an oxidizing bath to develop the color.

**Photographic materials.** Bela Gaspar. Ir. 753,071 (Oct. 6, 1933). Ag halide layers are colored by deep blackish or black coloring substances or pigments and are sensitized for infrared radiation and, in addition, contingently, for the spectral field which corresponds to the absorption gaps of the coloring substances. Then naphthylamine 4B black is mixed with an Ag halide emulsion and a sensitizer such as cryptocyanine is added. Other examples are given.

**Photographic emulsions.** I. G. Iarbofund A-G (Wilhelm Schneider, inventor). Ger. 542,575, Aug. 1, 1933. Halogen Ag emulsions are sensitized by simple substituted compounds of the general formula



in which a bivalent atom of O, S, Se or Te takes the place of W, X, Y and Z and  $n = 1, 2$  or  $3$ . Thus, the emulsion

may be sensitized by the compd. obtained from 2 mols. of 3-hydroxythionaphthene, 1 mol. of  $\text{CHCl}_3$  and 3 mols. of  $\text{KONa}$ . Other examples are given.

**Photographic proofs.** Photo-Produits Gevaert S. A. Fr. 751,948, Sept. 12, 1933. Proofs are treated in a toning bath at such a low concn., or at a higher concn. for such a reduced time, that after drying the color tone of the picture is not changed, but there is produced a deepening of the black and a brightening of the whites. The toning agent, e. g., one contg. Se, may be added to one of the usual treating baths.

**Photographic films.** W. M. Still & Sons Ltd. and John L. Howell. Fr. 751,702, Sept. 8, 1933. Non-inflammable films are composed of a core of gelatin made insol. by  $\text{CH}_2\text{O}$  and coated on both sides with a thin layer of rubber and then an exterior layer of celluloid, collodion or other varnish which takes the sensitized emulsion. After application of the rubber it is dried and vulcanized, e. g., by gaseous  $\text{H}_2$ . To increase resistance to moisture about 2% of a mineral oil is added to the rubber soln., and to secure adhesion of the varnish a solvent for rubber is added to it.

**Colored films.** Béla Gáspár. Fr. 753,061, Oct. 6, 1933. One or more uncolored layers sensitive to light are combined with sensitive layers contg. a coloring substance serving at the same time as a filtering substance and to form the image. The uncolored layers may contain chromogen substances. The method is particularly advantageous for the production of trichrome photographs.

**Toning photographic prints.** Stephen D. West. Brit. 396,935, Aug. 17, 1933. The hypo-alum process for toning developed bromide prints is modified to reduce the time required by treating the developed print about 10 mm. at room temp. in a hypo-alum fixing bath and then subjecting it to hot  $\text{H}_2\text{O}$  vapor for a short time, e. g., 2-2.5 mm. with vapor at 50-60°. App. is described and a

formula for a hypo-alum bath contg. an addnl. hardener is given.

**Photosensitive bodies.** Carl Roehrich (to Sillree A.-G. (Sillree Ltd.)). U. S. 1,936,525, Nov. 21. A colloid layer such as gelatin on celluloid is photosensitized with an agent such as a soln. contg.  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  adapted to harden the layer by reaction with light, and the material is treated with a dil. aq. alc. soln. to free the photosensitive surface of non-uniformly distributed sediments (the treatment being continued for only a short time so as to leave the sensitivity unimpaired).

**Anti-halation layers.** I. G. Farbenind. A.-G. Fr. 751,692, Sept. 7, 1933. Anti-halation layers for photographic films are composed of a colored colloidal layer insol. in water but sol. in alk. photographic baths, a synthetic resin contg. an OH or COOH group capable of forming a salt being used as binder for the dye. Thus, a soln. contg. resin (from salicylic acid and paraldehyde) 10, fuchsin 1 and iso-BuOH 100 g. is applied to the back of a cellulose acetate film to give a layer of 1-2  $\mu$ . Other examples are given.

**Cyanine dyes.** Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 1,935,096, Nov. 21. Dyes suitable for use as color sensitizers in photography are prepd. by condensing a  $\mu$ -methylnaphthothiazole quaternary salt with a quinolinium salt in the presence of an alkali and an inert org. solvent. Various examples with details of procedure are given. Cf. C. A. 27, 4412.

**Transferring pictures to fabric.** Sarah A. Boyle and Robert J. Boyle. U. S. 1,936,080, Nov. 21. The fabric is first impregnated with an adhesive comprising rubber with addns. such as rosin,  $\text{ZnO}$ , white wax and spermaceti; an intimate contact is then effected between the picture on the original material, such as paper, and the fabric; the fabric is stripped from the original picture-carrying material; substances are applied to bring out the coloring on the fabric, and a fixative is applied to fix the colors.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

**New developments in the chemistry of fluorine** Otto Ruff. *Angew. Chem.* 46, 739-42 (1933). A presentation of the latest developments of F chemistry, particularly with respect to compds. of F with Re, Cl, Br, I, O, S, N and C. Data for phys. consts. are given. Nine references.

**Fluorine polyhalides of organic amines.** Harold S. Booth, Wm. C. Morris and G. D. Swartzel. *J. Am. Chem. Soc.* 55, 4406-8 (1933). Org. amines form F polyhalides, similar to those formed by the alkali metals, on adding a cold satd. soln. of  $\text{ICl}_3$  to a cold satd. soln., slightly acidified, of the hydrofluoride of the amine, except in cases where the amine is chlorinated by the  $\text{ICl}_3$ . The tetramethylammonium fluoride iodine trichloride is the most stable and the monomethylamine salt the least. The pyridine salt is next in stability to the quaternary amine salt and both of them compare favorably with the corresponding alkali metal polyhalides. The thermal decompn. is primarily disson in the case of the alkali metal polyhalides. All the org. fluoride polyhalides thus far prepd. form orange-yellow tetragonal crystals.

**Ammoniates of the vanadium halides.** E. Ephraïm and I. Anava. *Helv. Chim. Acta* 16, 1273-87 (1933).  $\text{VCl}_3$  (I) is best prepd. by action of  $\text{Cl}_2$  at red heat upon an 80% V-Fe alloy. I is reduced to violet  $\text{VCl}_2$  (II) by refluxing in a stream of pure  $\text{H}_2$ . II is decomposed further to  $\text{VCl}$  at 500° by  $\text{H}_2$ . Higher temps. cause partial reduction to V.  $\text{VBr}_3$  is obtained by passing  $\text{Br}_2$  vapor along with  $\text{CO}_2$  over Fe-V at red heat and is sepd. from  $\text{FeBr}_3$  by fractional sublimation.  $\text{VBr}_2$  is obtained by careful reduction of  $\text{VBr}_3$  in a stream of  $\text{H}_2$ . All bi- and tri-valent V halides add approx. 6 mols.  $\text{NH}_3$ . These undergo deammoniation to form the pentammoniates, then the triammoniates. Nitrides or ammonobasic products are not formed directly as in the case of  $\text{VCl}_3$ , but

decompn. does take place at higher temps. All  $\text{NH}_3$  complexes described are very unstable toward air and  $\text{H}_2\text{O}$ . They do not resemble the corresponding Cr complexes. Comparison of the mol. vols. of the bi- and tri-valent V complexes indicates that the contraction is normal. Densities of the pure halides and their ammoniates are given. L. F. Audrieth

**Hydrated aluminates of calcium.** Jacques Lefol. *Compt. rend.* 197, 919-21 (1933).—With the method of Guichard (C. A. 19, 1219, 1355; 21, 2577), the dehydration of 1 hydrated Ca aluminates was studied between 20° and 350°; curves were obtained by plotting temp. against the no. of mols. of  $\text{H}_2\text{O}$  removed.  $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 12\text{H}_2\text{O}$  gave at 95° a hydrate contg. 10.5-11  $\text{H}_2\text{O}$  and at 175° one contg. 6  $\text{H}_2\text{O}$ . At 350° it still retained a little more than 3  $\text{H}_2\text{O}$ . The curve for  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 21\text{H}_2\text{O}$  (needles) (I) did not show any peculiarity which would permit one to verify the existence of I. Doubtless the initial product was too moist and when heated attained the compn. of I at 110°, a temp. at which I is probably not stable. At 135° there is a hydrate contg. 8-8.5  $\text{H}_2\text{O}$ .  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$  (cubic) gave between 200° and 310° a hydrate with 1.5  $\text{H}_2\text{O}$ . Up to 65°  $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 7\text{H}_2\text{O}$  gained almost 0.5  $\text{H}_2\text{O}$ . At 65° dehydration began, and at 150° there exists a hydrate with 5  $\text{H}_2\text{O}$ . Louise Kelley

**Specific oxidation reactions of selenium dioxide.** Robert Muller. *Ber.* 66B, 1668-70 (1933).—Oxidation of  $\text{EtO}_2\text{CCH}_2\text{CO}_2\text{Et}$  with  $\text{SeO}_2$  in  $\text{C}_6\text{H}_5\text{Me}_2$  at 130° for 16 hrs. gave  $(\text{HO})_2\text{C}(\text{CO}_2\text{Et})_2$  and  $(\text{HO})_2\text{CCO}_2\text{H}$ . Similarly

$\text{CH}_3\text{CO}_2\text{Et}$  and  $\text{SeO}_2$  in  $\text{C}_6\text{H}_5\text{Me}_2$  for 15 hrs. at 90° gave  $\alpha, \beta$ -diEt-diketobutyrate. Foster Dee Snell

**Sulfur monoxide.** III. The formation of sulfur monoxide in certain chemical changes. Peter W. Schenk and H. Platz. *Z. anorg. allgem. Chem.* 215, 113-28 (1933);

cf. C. A. 27, 3160; Gruner, C. A. 27, 4184.—Metals whose chlorides have greater heats of formation than their oxides tend to react with  $\text{SOCl}_2$  vapor as follows:  $\text{SOCl}_2 + 2\text{M} \rightleftharpoons 2\text{MCl} + \text{SO}$ , but if the reverse is true the tendency of the reaction is  $\text{SOCl}_2 + \text{M} = \text{MO} + \text{SOCl}_2$ . Of the first class of metals, Ag, Na, Sb and Sn react as indicated. Of the second class of metals, Zn and Mg react according to both equations giving a poor yield of SO at high temps. ( $300^\circ$  to  $450^\circ$ ) but Al reacts only according to the second equation. SnCl<sub>2</sub> and Ag react almost quantitatively with  $\text{SOCl}_2$  to give SO but  $\text{SO}(\text{OH})_2$  did not react with Na to produce SO. In disagreement with Gruner, S. and P. were unable to find any absorption spectrum bands of SO formed in the vapor state during the thermal decompn. of  $\text{Na}_2\text{S}_2\text{O}_4$  or during its decompn. with  $\text{H}_2\text{SO}_4$ . Also, S. and P. find that gaseous SO and alkali form  $\text{NaHSO}_2$  and  $\text{Na}_2\text{S}_2\text{O}_4$  but  $\text{S}_2\text{O}_2$  and alkali form  $\text{Na}_2\text{S}_2\text{O}_4$ , whereas Gruner believed SO and alkali formed  $\text{Na}_2\text{S}_2\text{O}_4$ . Spectroscopic investigation of the reaction between  $\text{H}_2\text{S}$  and  $\text{SO}_2$  showed that SO was not formed. The decompn. of  $\text{S}_2\text{O}_2$  to S and  $\text{SO}_2$  does not give SO in the gas phase as an intermediate product nor does the thermal decompn. of  $\text{SO}_2$  yield SO. The burning of S with excess S vapor at low pressures yields SO. SO is also formed in about 1% yield with air at atm. pressure and excess S vapor. O. E. Sheppard

**Dehydration of the dihydrate of magnesium chloride.** G. A. Abramov. *Metallurg* 8, No. 3, 11 19(1933). Expts. with a lab. furnace indicate the possibility of continuous production of anhyd.  $\text{MgCl}_2$  in molten form by passing a countercurrent of Cl through the descending charge. The charge consists of 2 kg.  $\text{MgCl}_2 \cdot 2\text{H}_2\text{O}$  and 0.1 kg. coke per hr. The temp. of the furnace varied from about  $300^\circ$  at the top to  $720^\circ$  at the bottom. The analysis of the product was  $\text{MgCl}_2$  75.85,  $\text{MgO}$  5 and  $\text{KCl} + \text{NaCl}$  12%. About 1.2 kg. Cl per kg.  $\text{MgCl}_2$  is required to prevent hydrolysis which represents a saving of about 50% as compared with HCl. H. W. R.

**Action of iodine water on silver nitrate. Kinetic study.** M. L. Josien. *Compt. rend.* 197, 988 90(1933); cf. C. A. 28, 398.  $\text{AgNO}_3$  reacts preferentially with the I in a 0.1 N iodine-iodide soln. The pptn. of the I from the KI which acts as a solvent for the iodine causes the pptn. of the iodine. The details of the reactions leading to this conclusion are given. Howard A. Smith

**Oxygen and halogen compounds of rhenium.** Ida Noddack and Walter Noddack. *Z. anorg. allgem. Chem.* 215, 129 84(1933); cf. C. A. 23, 785. Compds. of Re correspond to the following oxides:  $\text{Re}_2\text{O}$ ,  $\text{ReO}$ ,  $\text{Re}_2\text{O}_3$ ,  $\text{ReO}_2$ ,  $\text{Re}_2\text{O}_5$ ,  $\text{ReO}_3$  and  $\text{ReO}_4$ . Re melted with NaOH in  $\text{N}_2$  is not altered. As  $\text{O}_2$  becomes available the color changes through dark brown, light brown, sand yellow, olive green, dark green, brown, bright red, corresponding to varying oxidation of the Re.  $\text{ReO}_2$  reacts quantitatively with NaOH in  $\text{N}_2$  at  $500^\circ$  to form  $\text{Na}_2\text{ReO}_4$ , Na rhenite, insol. in NaOH or  $\text{H}_2\text{O}$ . This property of forming rhenites is analogous to the action of  $\text{MnO}_2$  in forming manganites. The color is identical with the first brown color resulting from fusion of Re and NaOH in the air. With oxidizing agents  $\text{Re}^{\text{IV}}$  is oxidized to  $\text{Re}^{\text{VII}}$ .  $\text{K}_2\text{ReO}_4$  was similarly prep'd.  $\text{ReO}_2$  and  $\text{BaO}$  did not fuse at  $1200^\circ$ . By proper admission of  $\text{O}_2$  to the melt of  $\text{NaReO}_3$ ,  $\text{Re}^{\text{V}}$  is formed. By fusion of proper amts. of  $\text{ReO}_2$  and  $\text{NaReO}_4$  with NaOH at  $700^\circ$  Na pyrohyporhenate, a sandy yellow cryst. salt, is slowly formed. Reaction is incomplete. The compn. approaches  $\text{Na}_4\text{Re}_2\text{O}_7 \cdot \text{H}_2\text{O}$ , analogous to the pyroantimonate, soly. in  $\text{H}_2\text{O}$  0.04 g. per l. Air oxidizes it to  $\text{Na}_2\text{ReO}_4$  or  $\text{NaReO}_4$ . Similar K and Ba salts were obtained and found to be much more sol. in  $\text{H}_2\text{O}$ . Admission of air to the  $\text{Na}_4\text{Re}_2\text{O}_7$  melt produces a green color due to rhenate. Fusion of NaOH with proper amts. of  $\text{ReO}_2$  and  $\text{NaReO}_4$  at  $350^\circ$  gives neither  $\text{Na}_2\text{ReO}_4$  nor  $\text{NaReO}_4$ . At  $500^\circ$  the former, analogous to the manganate, is obtained. Fusion of NaOH with  $\text{Ba}(\text{ReO}_4)_2$  and  $\text{ReO}_2$  at  $500^\circ$ , cooling to  $300^\circ$ , then after 1 hr. cooling to  $20^\circ$ , gave  $\text{BaReO}_4$ , leaf-green. It is very unstable. With excess air Re fused with NaOH forms

$\text{NaReO}_4$ . The melt is bright red while hot and yellow when cold. No  $\text{O}_2$  is evolved by heating the compd. at  $500^\circ$ . Fusion of NaOH and Ba metaperhenate,  $\text{Ba}(\text{ReO}_4)_2$ , forms  $\text{Ba}_2(\text{ReO}_4)_3$ , a salt of  $\text{H}_2\text{ReO}_5$ , or mesoperhenate. The latter was also ppt'd. by addn. of  $\text{Ba}(\text{OH})_2$  soln. to  $\text{NaReO}_4$  in 50% aq. NaOH soln.  $\text{Ba}_2(\text{ReO}_4)_3$  is hydrolyzed by  $\text{H}_2\text{O}$  to  $\text{Ba}(\text{ReO}_4)_2$  and  $\text{Ba}(\text{OH})_2$ .  $\text{H}_2\text{ReO}_5$  is weaker than  $\text{H}_2\text{CO}_3$ . Addn. of KI soln. to  $\text{KReO}_4$  in concd. HCl protected by  $\text{N}_2$  liberates 3I for each Re, forming  $\text{Re}^{\text{IV}}$ . At lower HCl concn. the reaction is slower. Attempts to reduce to intermediate stages gave mixts. of  $\text{Re}^{\text{VII}}$  and  $\text{Re}^{\text{IV}}$ . A brown cryst.  $\text{K}_2\text{Re}_2\text{OCl}_{10}$  was so obtained by crystn. from concd. HCl. When heated with 10 20% HCl this is converted into green  $\text{K}_2\text{ReCl}_6$ . At less than 8% HCl  $\text{ReO}_3$  seps. Addn. of HBr in place of HCl gave  $\text{K}_2\text{Re}_2\text{OBr}_{10}$  and  $\text{K}_2\text{ReBr}_6$ . The basic salt can be converted to the normal by heating with excess concd. halogen acid. Insol. Rh, Cs and Ag basic salts are ppt'd. from soln. of the K compd. Alkalies ppt.  $\text{ReO}_3$ . Oxidation forms  $\text{Re}^{\text{VII}}$  compds. Hydrolysis of  $\text{K}_2\text{Re}_2\text{OCl}_{10}$  gives a mixt. of  $\text{ReO}_3$  and  $\text{K}_2\text{ReCl}_6$ . Dil. acid hastens hydrolysis. There is a salt  $\text{K}_4\text{Ru}_2\text{OCl}_{10}$  similar to the  $\text{K}_2\text{Re}_2\text{OCl}_{10}$ , with which it forms mixed crystals. The oxychloride,  $\text{Re}_2\text{OCl}_6$ , was not obtained for the basic salt. Re was chlorinated and the liquid chloride dissolved in  $\text{H}_2\text{O}$  and diluted. Some  $\text{ReO}_2$  sepd. and apparently the unionized  $\text{Re}(\text{OCl})_2$  was in soln. A soln. of  $\text{ReO}_2$  in concd. HCl permits pptn. of  $\text{ReS}_2$ . On standing or heating the Re is all present as  $\text{H}_2\text{ReCl}_6$ . Salts of the structure  $\text{X} \cdot \text{Re}(\text{OH})\text{Cl}_5$  were not obtained (cf. Krauss and Dachlmann, C. A. 26, 4265). An HCl soln. of  $\text{H}_2\text{ReCl}_6$  gives green ppts. with  $\text{K}^+$ ,  $\text{Rh}^+$ ,  $\text{Cs}^+$ ,  $\text{Ti}^+$ ,  $\text{NH}_4^+$ ,  $(\text{CH}_3)_2\text{N}^+$ ,  $\text{C}_6\text{H}_5\text{N}$ , quinoline and nitron, having the structure  $\text{X}_2\text{ReCl}_4 \cdot \text{NH}_4\text{OH}$  ppts. brown  $\text{Re}(\text{O})_3$ . Acidity delays pptn. of  $\text{ReS}_2$  from  $\text{H}_2\text{ReCl}_6$ ; therefore under those conditions it can be ppt'd. from  $\text{K}_2\text{ReOCl}_{10}$  and from  $\text{Re}^{\text{VII}}$  compds. without effect on  $\text{H}_2\text{ReCl}_6$ . Solubilities of  $\text{KReCl}_6$ ,  $\text{CsReCl}_6$  and  $\text{K}_4\text{ReOCl}_{10}$  in 12% and 37% HCl and in 20%  $\text{H}_2\text{SO}_4$  are given at  $0^\circ$  and  $18^\circ$ . Ionization of  $\text{K}_2\text{ReCl}_6$  and  $\text{K}_4\text{ReOCl}_{10}$  is of the same order of magnitude as that of  $\text{K}_2\text{PtCl}_6$ . Similar results were obtained with Br compds. Pptn. of  $\text{K}_2\text{ReCl}_6$  by boiling in the absence of air is quant. Similar pptn. with NaOH followed by boiling is not complete. Part of the  $\text{Re}^{\text{IV}}$  is oxidized to  $\text{Re}^{\text{VII}}$  and part reduced. Isolation of  $\text{Re}^{\text{III}}$  is not quantitatively adequate to equal the oxidation. There is evidence of the presence of an  $\text{Re}^{\text{II}}$  compd. The reaction approximates  $9\text{Re}^{\text{IV}} = 3\text{Re}^{\text{II}} + 4\text{Re}^{\text{IV}} + 2\text{Re}^{\text{VII}}$ . Reduction of  $\text{ReCl}_4$  (or  $\text{ReCl}_5$ ) with Re gives mainly dark red  $\text{ReCl}_3$ . The reaction is rapid at  $400$   $500^\circ$ . Pptn. of  $\text{ReCl}_3$  with NaOH gives a brown ppt. in which Re is present at the various stages of oxidation represented approx. by  $9\text{Re}^{\text{III}} = 6\text{Re}^{\text{II}} + 2\text{Re}^{\text{IV}} + \text{Re}^{\text{VII}}$ . Strongly acid solns. of  $\text{ReCl}_4$  are very stable to strong oxidizing or reducing agents. Zn reduces it rapidly to  $\text{Re}^{\text{I}}$  at  $5^\circ$ .  $\text{ReCl}_4$  is not ionized.  $\text{C}_6\text{H}_5\text{N}$  forms  $\text{ReCl}_3$ , HCl,  $\text{C}_6\text{H}_5\text{N}$ . The ppt. from hydrolysis of  $\text{ReCl}_3$  in the absence of air is  $\text{Re}_2\text{O}_3$ . Similar Br compds. are obtained. Electrolysis of acid  $\text{K}_2\text{ReCl}_6$  gives  $\text{Re}^{\text{II}}$  and  $\text{Re}^{\text{IV}}$  at the cathode (cf. Machot, Schmid and Dising, C. A. 26, 1204).  $\text{ReCl}_2$  was not isolated as a solid but its soln. was isolated from Re in other valences and showed easy oxidation and other expected properties. Similarly, reduction of  $\text{ReCl}_3$  with Zn or Na-Hg at  $0^\circ$  gives  $\text{Re}^{\text{I}}$ . The soln. reduces  $\text{NaCNS}$  to  $\text{H}_2\text{S}$ , a distinction from  $\text{Re}^{\text{II}}$ . When the soln. is made alk. a brown ppt. is obtained and  $\text{H}_2$  is liberated.  $\text{ReOCl}_3$  was obtained by combustion of Re in  $\text{Cl}_2$  and displacement of  $\text{Cl}_2$  vapor by  $\text{O}_2$ . When dissolved in HCl it forms  $\text{H}_2\text{ReOCl}_6$ , as shown by cond. This hydrolyzes within 10 min. at  $0^\circ$  to  $\text{H}_2\text{ReCl}_6$  and  $\text{HReO}_4$ . The K salt can be ppt'd. but decomposes similarly. After reduction of  $\text{NaReO}_4$  with  $\text{SnCl}_2$ , addn. of  $\text{KCNS}$  and  $\text{C}_6\text{H}_5\text{N}$  gives  $\text{Re}(\text{CNS})_4 \cdot \text{CNS} \cdot \text{HNC}_6\text{H}_5$ . For detn. of the state of oxidation of Re compds. further oxidation in acid soln. usually gives low results because of the stability of  $\text{Re}^{\text{III}}$  and  $\text{Re}^{\text{IV}}$ . As a quant. oxidation method the use of alk.  $\text{Na}_2\text{CrO}_4$  and gravimetric detn. of the  $\text{Cr}_2\text{O}_3$  is recom-

ended. Analytical pptn. of Re with  $H_2S$  followed by  $NaOH$  solution with nitron is satisfactory. Foster Dee Snell  
**Mesoperrhenates.** B. Scharnow. *Z. anorg. allgem. Chem.* 215, 185-9 (1933).—By evapn. of an aq. soln. of  $a(ReO_4)_3$  protected from  $CO_2$  and contg. excess  $Ba(OH)_2$  the ratio of 1:6 to 1:360, a ppt. of  $Ba_3Re_2O_{10}$  is obtained.  $(OH)_2$  is not sufficiently sol. to ppt.  $Sr_2Re_2O_{10}$ , which is, however, obtained if to the soln. in which it is present strong  $NaOH$  soln. is added. Foster Dee Snell

Abegg, R., Auerbach, F., and Koppel, I.: Handbuch der anorganischen Chemie. Bd. IV, Abt. 3. Die Elemente der 8. Gruppe des periodischen Systems. Tl. 3. Kobalt. Lfg. 1. Leipzig: S. Hirzel. About 760 pp. About M. 72. Cf. C. A. 27, 678.

## 7--ANALYTICAL CHEMISTRY

W. T. HALL

**Indirect volumetric determinations.** C. V. Bordeianu. *Chem. Pharm.* 271, 514 (1933). Reply to that of J. Isenbrand (cf. C. A. 27, 5673). W. O. E.

**Analytical methods for analyzing mixtures of solvents present in "stabilin."** A. A. Vorob'eva. *Izvestiya central. Nauch.-Issledovatel. Inst. Koshevennoi Prom.* 132, No. 4, 11-16. Stabilin solvents may contain acetone, Et, Et, iso-Pr, Bu and Am acetates, EtOH, MeOH, iso-PrOH, BuOH, AmOH, benzene, toluene, xylene, gasoline and unsatd. compds. Methods for detg. all these ingredients are discussed and a systematic procedure is recommended. A. A. Bochtlingk

**Analysis with wedge spectra—its recent application to iron on a quantitative basis.** Morris Slavin. *Engineering J.* 134, 509-13 (1933).—Application of the spectrograph to det. 4 metals in Zn, and in concd.  $ZnSO_4$  solns. High purity is shown. The wedge-spectrum method is more rapid than the old methods because outside standards are not used and but one exposure is required. W. H. Boynton

**Volumetric method for the determination of barium and sulfates.** J. C. Giblin. *Analyst* 58, 752-3 (1933).—Take some yellow stains on white filter paper by adding drops of a soln. contg. the Na salt of rhodizonic acid. Titrate the sulfate soln. in the presence of acid with a dil. soln. of  $BaCl_2$  until a drop of the soln. gives a red color on a test paper. The results obtained by students in using the above procedure were good. W. T. H.

**Determination of iron.** C. T. Bennett and N. R. Campbell. *Quart. J. Pharm. Pharmacol.* 6, 436-42 (1933).—Official and other methods now in common use are reviewed and criticized. A new procedure is recommended which calls for a preliminary oxidation with  $KMnO_4$  followed by reduction with  $SnCl_2$  and titration with  $K_2Cr_2O_7$  with  $Ph_2NH$  as indicator. W. O. E.

**Iodometric and potassium permanganate determinations of lead in lead acetate.** S. F. Shubin and A. T. Troshchenko. *Khim. Farm. Prom.* 1933, 138-9.—The sample (2-2.5 g.) is shaken in a volumetric flask with 30% AcOH, made up to the mark with 30 cc. of 0.2 N  $K_2Cr_2O_7$  and 10 cc. and after 15 min. a filtered aliquot is taken, KI and  $HSO_4$  are added and the liberated I is titrated with  $Na_2S_2O_3$ . The  $KMnO_4$  method recommended is similar to that of U. S. P. IX and is less accurate than the iodometric method. L. Na-sarevich

**Determination of manganese by the method of R. Lang and F. Kurz in connection with the determination of silicon in cast iron.** A. Cotti. *Chem.-Ztg.* 57, 934 (1933).—The method depends upon the formation of valent Mn by induced oxidation produced by the action of dichromate and arsenite in the presence of HF and  $H_2PO_4$ . Treat 4 g. of sample with 50 ml. of 6 N  $HNO_3$ , transfer to a porcelain dish, add 8-9 ml. of concd.  $H_2SO_4$  and evap. to fumes. Cool, dil., and filter off  $SiO_2$ . To the filtrate add 10 cc. of 15%  $H_2O_2$  soln., evap. to a sirup and treat with satd.  $Na_2CO_3$  soln. until the ppt. that forms dissolves very slowly. Add 5 cc. of concd. HF and  $H_2PO_4$ , 1-1.7. Add a slight excess of 0.35 N  $K_2Cr_2O_7$  (10% excess of Mn + 5 ml.). Then add 5 cc. more of arsenite soln. (15 g.  $As_2O_3$  = 10 g.  $Na_2CO_3$  per l.) than was used of dichromate, add 3 drops of a phosphoric acid soln. of diphenylamine and titrate with standard  $FeSO_4$  soln. to a grass-green color. W. T. H.

**Determination of molybdenum in alloy steels, particu-**

larly in self-hardening steels, and the simultaneous determination of higher copper contents. W. Bruggemann. *Chem.-Ztg.* 57, 803-6 (1933).—The methods of attacking various kinds of steel are described and it is shown how best to ppt.  $CuS$  and  $MoS_3$  from the resulting soln. This ppt. can be dissolved in aqua regia and then the soln. can be made ammoniacal and the Cu titrated with KCN soln. In the filtrate the Mo can be detd. as  $PbMoO_4$ . The entire analysis requires about 3 hrs. W. T. H.

**Determination of silicon in sea water.** Thomas G. Thompson and Harold G. Houlton. *Ind. Eng. Chem., Anal. Ed.* 5, 417-18 (1933). The effect of 4 factors on the molybdate method for detg. Si in sea water was studied. Meta- and orthosilicates give equal colors. Variation of temp. between 7° and 25° did not change color intensity. The picric acid standards contg. mold growth, or after aging for 20 months, compared well with those freshly prepd. Many notes on the use of the method are appended. H. W. Leahy

**Technical spectrum analysis in the steel plant laboratory.** W. Gerlach. *Arch. Eisenhüttenw.* 7, 353-4 (1933).—In detg. Si in steel by spectrum analysis the selection of proper spectral lines is of utmost importance. M. H.

**Direct determination of sodium in the presence of large amounts of calcium, magnesium and ammonium.** Tokichi Noda. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 635 (1933).—Kahane's uranyl magnesium acetate method for detg. Na gave results accurately to 1% when the chloride solns. were diluted to concns. of 0.1 g. Ca/cc., 0.07 g. Mg/cc. and 0.04 g.  $NH_4$ /cc. K. Kammermeyer

**Determination of small quantities of bromine in the presence of large amounts of chlorine and iodine.** S. H. Bertram. *Biochem. Z.* 266, 417 (1933); cf. C. A. 27, 4266.—According to the directions given in the original paper, losses of  $I_2$  may occur which, however, can be prevented if during the second distn. there is added a little KI dissolved in 3 cc.  $H_2O$  + 2 drops of 4 N  $H_2SO_4$  and 10 drops of 1% starch soln. The starch decreases the volatility of the  $I_2$ . S. Morgulis

**Determination of fluorine in insoluble fluorides.** P. Urech. *Chem.-Ztg.* 56, 855-6 (1933).—The gravimetric detn. of F in insol. minerals by the method of Berzelius-Ros was subjected to crit. study and the results were compared with those obtained by the titration method of Greef. The latter method gave results which averaged 0.7% higher than those obtained by the former method and this is probably due to the sensitivity of the gravimetric method to the concn. of  $H^+$ . W. T. H.

**An improved micro method of estimating iodine.** M. Patnaik. *Indian J. Med. Research* 21, 237-48 (1933).—A modification of the Fellenburg-Newcomb-Sankaran method eliminating the evolution of fumes and the presence of reducing substances. Harry Eagle

**Determination of phosphorus in unalloyed steel, alloy steel and cast iron.** Karl Swoboda. *Chem.-Ztg.* 57, 934-41 (1933).—The methods as worked out in German industrial labs. are described. No new procedure is mentioned. W. T. H.

**Elon and sodium sulfite as reducing agents in the colorimetric determination of phosphorus.** G. van der Linde. *Analyst* 58, 755-6 (1933).—Na sulfite + hydroquinone have been used as reducing agents in the colorimetric detn. of inorg. P in blood, plant ashes, etc. A 3.128%

soln. of elon (*p*-methylaminophenol sulfate) can be substituted for the 1% soln. of hydroquinone. The color develops in 20 min. at 26.5° and is clearer than when hydroquinone is used. Values obtained by the hydroquinone-sulfite and elon-sulfite methods are given to show that the results are more accurate with the latter method.

W. T. H.

**New method for the determination of elemental sulfur.** Noel L. Allport. *Quart. J. Pharm. Pharmacol.* 6, 431 (1933). A new and rapid method is proposed which depends on conversion to thiocyanate by the use of KCN and triethanolamine. The method is applicable to both pptd. and sublimed S, to all official pharmaceutical preps. and to S lozenges. The accurate detn. of free S by this method is unaffected by the presence of sulfates.

W. O. E.

**The most important color tests in metallurgical laboratories equipped with the Leitz colorimeter.** Otto Kropf. *Chem.-Ztg.* 57, 843 (1933). The optical firm of Leitz in Wetzlar has recently placed a new colorimeter on the market. With it accurate detns. of C, Mn, Cr, Cu, Ti, V, Mo and S can be made in much less time than is required by the usual methods. The methods of analysis, which are not new, are described and the results compared with those obtained by the more conventional methods.

W. T. H.

**Rational analysis of nickel plating salts.** J. Maly. *Chem.-Ztg.* 57, 823 (1933).—A method is outlined for detg. sulfate, Ni, Mg, alkalies, Cl, NH<sub>4</sub>, citric acid, H<sub>2</sub>BO<sub>3</sub>, H<sub>2</sub>O and non-volatile residue, which are the constituents likely to be present.

W. T. H.

**Methods for the analysis of technical solvents. IV. Color tests for trichloroethylene, carbon tetrachloride and other chlorinated hydrocarbons of the aliphatic series.** Hans H. Weber. *Chem.-Ztg.* 57, 836 (1933); cf. C. A. 27, 1296. —As reagents use (A) a 2% soln. of  $\alpha$ -naphthol in cyclohexanol, (B) cyclopentanol and (C) a 2% soln. of phenolphthalein in cyclohexanol. Of reagents A or B, take 2 ml., 1 drop of the chlorinated hydrocarbon and a small piece of pure NaOH. Boil about 25 sec., pour into another tube and observe the color when cold. Then add an equal vol. of either 85% H<sub>2</sub>SO<sub>4</sub> or glacial AcOH and shake after standing 1 min. For the test with C, first prep. a glycol bath by taking a 200-cc. Erlenmeyer flask and placing about 30 ml. of glycol and a few boiling stones in it. Put a large test tube (18 × 2 cm.) in the flask and suspend in this an ordinary test tube through which water is flowing so that this tube acts as a reflux condenser. Place 2 drops of the chlorinated solvent in the larger tube, 2 ml. of the reagent C and 1 small piece of NaOH. Heat the glycol slowly to boiling and watch for any appearance of color. After heating exactly 5 min., pour off the soln. into an ordinary test tube, add 1 ml. of glacial HOAc and a few glass beads. Shake well. The colors obtained with 10 solvents and these 3 reagents are tabulated. V. **Determination of chlorinated hydrocarbons and aromatic compounds in gasoline.** Hans H. Weber and Frederick Hauck. *Ibid.* 915 16.—Recently mixts. of chlorinated hydrocarbons, benzene and gasoline have been recommended under various phantastic names for cleaning metals. In such mixts. the method of Marcusson, which depends upon nitration in the cold, is best suited for detg. aromatic hydrocarbons. For detg. the chlorinated hydrocarbons 2 methods have been used. A. —After detg. n, take 5 ml. of the mixt. and add 10 ml. of Pr alc., some MnO<sub>2</sub> or PbO<sub>2</sub> as catalyst and caustic alkali corresponding to the quantity necessary to combine stoichiometrically with the Cl present and heat under a reflux condenser. This dehalogenization is best accomplished in a 250-300 ml. Jena flask connected with a ground-glass fitting to an 8-bulb condenser, which has a little glass wool in the bottom bulb. B. —Treat 5 ml. of the mixt. with 10 ml. of a 2% soln. of  $\alpha$ -naphthol in cyclohexanol and heat under reflux condensation with the proper quantity of NaOH. After the sapon. has been accomplished by either of the above methods, free from solid residue by filtering, add water until 2 layers are formed and, in case

method A was used, add 2.5 vols. of 25% HCl. Remove the layer of liquid and treat the upper layer with 2.5 vols. of 85% H<sub>2</sub>SO<sub>4</sub>, mix well and cool if necessary. Continue to agitate for 15 min. Allow to settle, draw off the lower layer of liquid and treat the upper layer with fuming H<sub>2</sub>SO<sub>4</sub> contg. 20% of anhydride, taking special precautions to avoid overheating. Finally det. the d. of the upper layer of liquid. The necessary precautions and method of computing the results are explained.

W. T. H.

**Determination of methanol and ethyl alcohol in mixtures containing acetone and its homologs.** Ronald W. Hoff and John M. Macoun. *Analyst* 58, 749-52 (1933).

Place the sample contg. not more than 20 ml. of alc. in a 500-ml. Kjeldahl flask and dil. with water to about 100 ml. For each ml. of AcMe assumed to be present, add 1.5 g. of paraformaldehyde followed by 50 ml. of satd. NaCl soln. and 20 ml. of N NaOH. Slowly bring to a boil under a Liebig condenser of 60 cm. or more. By this time the reaction between the acetone and excess formaldehyde will be complete. To the just boiling mixt., add an excess of Fehling's soln. (usually 50-60 ml. is sufficient) through the top of the condenser and then cool the contents of the flask. Rinse down the condenser with a little water, remove the flask and slide down into it an open glass tube about 15 cm. long which will facilitate gentle boiling during the ensuing distn. Arrange the flask for distn. through a foam trap and a vertical condenser fitted with a straight adapter. Collect the distillate in a 100-ml graduated flask and det. the d. at the standard temp. Tables are given which show the percentage alc. by vol. corresponding to pure EtOH and pure MeOH. Then by taking a refractometer reading the percentage of each alc. can be detd.

W. T. H.

**A new method of estimating o-toluidine.** Shigezō Ueno and Haruo Sekiguchi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 613 15 (1933).—The method is based upon the lowering of the m.p. of o-toluidine-HCl or -HBr by the *p*- and *m*-isomers.

Karl Kanuermeyer

**The toxicological detection of barbital, phenobarbital and phanodorn.** Joseph Peltzer. *Chem.-Ztg.* 57, 816 (1933).—Barbital (I), phenobarbital (II) and phanodorn (III) can be isolated from organs by digestion with 20% CCl<sub>3</sub>CO<sub>2</sub>H, followed by evapn. of the ext. and extn. with ether. Zwickler's methods (C. A. 26, 396) were used on the residue to identify the barbiturate and for its detn. I gives a stable blue Co-Ba complex even with excess Ba(OH)<sub>2</sub>-CH<sub>3</sub>OH soln., II a blue changing to yellow with excess Ba(OH)<sub>2</sub>-CH<sub>3</sub>OH soln. and III a blue which disappears with an excess of Ba(OH)<sub>2</sub>-CH<sub>3</sub>OH soln.

E. W. Scott

**The formalin titration of proteins.** D. W. Steuart. *Analyst* 58, 754 5 (1933).—A discussion of the ratio between total N and the vol. of 0.1 N NaOH used in the formal titration of 2 g. of com. *gelatin, casein, albumin, peptone, pepsin* and *pancreatin*.

W. T. H.

Set-ups of the Ostwald decade rheostats for potentiometric titrations (Erlacher) 1. 6,8-Dibromobenzoylencurea and the constitution of dinitrobenzoylencurea [detection of Na] (Sheibley, Turner) 10.

Austin, R. G.: Aids to Qualitative Inorganic Analysis. London: Baillière, Tindall & Cox. 204 pp. 3s. 6d.

Radley, J. A., and Grant, Julius: Fluorescence Analysis in Ultra-Violet Light. London: Chapman & Hall, Ltd. 232 pp. 15s. Reviewed in *J. Intern. Soc. Leather Trades Chem.* 17, 704 (1933).

Smith, D. M.: Metallurgical Analysis by the Spectrograph. British Non-Ferrous Metals Research Assoc., Research Monograph No. 2. London: The Assoc. 114 pp. 10s. 6d.

Standard Methods of Analysis of Iron, Steel and Ferro-Alloys. Sheffield: The United Steel Companies, Ltd., 17 Westbourne Rd. 35 pp. 4s. 6d. Reviewed in *Chem. Trade J.* 93, 292 (1933).



**Reagent paper for glucose.** Maurice Fernand Masson. *Fr. 750,358*, Aug. 9, 1933. Paper is soaked in an alk. cuprotartaric soln. and dried. The intensity of color obtained after dipping in a liquid contg. glucose and drying gives an estn. of the glucose content.

**Determination of potassium.** Kali-Forschungs-Anstalt

G. m. b. H. *Fr. 750,319*, Aug. 8, 1933. K is detd. rapidly by pptn. of the K in the form of one of its salts difficultly sol. in water; concd. solns. of the precipitant which have previously been satd. or almost so with the K salt to be pptd. are used. Thus, a soln. of  $\text{NaClO}_4$  satd. with  $\text{KClO}_4$  may be used.

## 8--MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIKER

**Some new minerals.** H. Jüngemach. *Compt. rend.* 197, 1132-4(1933).—The new minerals are all natural from Tierra Amarilla, Chili. They are *amarillite*,  $\text{Na}_2\text{O} \cdot \text{Fe}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 10\text{H}_2\text{O}$ ; *kapparentite*,  $\text{Al}_2\text{O}_3 \cdot 2\text{SO}_3 \cdot 10\text{H}_2\text{O}$ ; *tenoglaucite*,  $\text{Fe}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 5\text{H}_2\text{O}$ ; and *paracoquimbite* which is a rhombohedral modification of coquimbite. The crystallographic properties are given, and those of copiapite, quenstedite and coquimbite which belong to the same group are revised. P. S. Roller

**Mineral deposits near the west fork of the Chulitna River, Alaska.** Clyde P. Ross. *U. S. Geol. Survey Bull.* 840E, 289-332(1933). E. H.

**Pure limestones of the Dordogne district.** J. E. Duchez. *Rev. matériaux construction trav. publics* 1933, 307-9, 340-3; cf. *C. A.* 27, 5280. Several deposits are discussed and their chem. compn. given. K. K.

**Graphite deposits near Poltavka.** I. I. Sobolev and V. S. Veselovskii. *Mineral. Sibir'e* 8, No. 7, 45-51(1933).—The chem. and phys. properties of the graphite and the results of a geological survey are described. C. Blanc

**New views on the formation of coal and petroleum.** P. Niggli. *Schweiz. Ver. Gas Wasserfach. Monats. Bull.* 13, 237-47(1933).—A lecture on coal and oil genesis reviewing existing hypotheses. It is pointed out that different processes may be responsible for the formation of these products in different locations. B. J. C. v. d. H.

**Investigation of resin occurrence in an early tertiary coal from southeast Borneo.** I. Borneo coal. H. H. Muller-Neugluck. *Angew. Chem.* 46, 751-3(1933). The resin was sepd. from the coal by 2 methods, settling in  $\text{CaCl}_2$  soln. and selective extr. with benzene. Borneo coal is a pitch lignite with inclusions of coniferous fossil resin. Karl Kammermeyer

**Volcanic history of Glass Mountain, Northern California.** Charles A. Anderson. *Am. J. Sci.* 26, 485-506(1933). The volcanic sequence of the region is reconstructed. Petrographic and chem. analyses of the principal rocks are given. The  $\text{Al}_2\text{O}_3$  curve is at a max. at 49%  $\text{SiO}_2$ , in contrast to 58% for the Lassen Peak volcanics. The  $\text{CaO}$  curve drops much more rapidly in the former than the latter. In the Medicine Lake group, the alk. index ( $\text{SiO}_2$  value at which  $\text{Na}_2\text{O} + \text{K}_2\text{O} = \text{CaO}$ ) is 58; at Lassen Peak it is 63.9. Further differences between the 2 suites are discussed. Alden H. Emery

**Age of Fitchburg granite.** Alfred C. Lane. *Science* 78, 435(1933).—Microanalysis of a 30 mg. sample of uraninite, extd. from granite from the Fitchburg quarries, was made

by Friedrich Hecht of Vienna (cf. *C. A.* 27, 2111) showing  $\text{ThO}_2$  3.86%,  $\text{U}_3\text{O}_8$  59.19% and  $\text{Pb/U} + 0.25\text{Th} = 0.049$ . There is so little Th that if the factor 0.36 is used instead of 0.25 there is no appreciable difference. If allowance is made for Act D and Th D an age would be derived of  $15,000 \log(1 + (\text{Ra G} - 2.37)/\text{U} = 50)) = 366$  million years. This granite is therefore akin to that from which Hillebrand analyzed a sample of uraninite many years ago. A. W. Furbank

**The conditions of formation of oolitic deposits as affected by movement of the terrestrial crust.** J. P. Arend. *Compt. rend.* 197, 847-50(1933).—The oolitic deposits N.E. of the Briey basin, adjoining Luxembourg, are composed almost entirely of 2 materials resulting from chem. pptn.: (1) carbonates of the alk. earths, and (2) of ferruginous character and including the micellar grains of constituents made up of the tri- and polyvalent elements: Fe, Al, Mn, Si, P, V, As. Neither the chem. compn. of the ppts. nor the amt. or nature of the constituents changed during the geological time required for a deposit of 55 m. The variations in the character of the beds were due alone to the changes which ensued in the proportions of the constituents present in the ancient Toarcian (upper Lias) Lake. The various factors tending to change the character of the hydrothermal waters subsequently arising are given. In general, the ferruginous ppts. increased with the  $p_{\text{H}}$  of the mother liquor, and the calcareous ones the reverse. It is evident that oolite formation is brought about by mol. layers which cause, through very slight changes in concn., sudden and quite considerable changes in surface tension; the effect of this is to cause the oolitic deposit always to have approx. the same character, and to resemble in many respects a living organism. A. W. F.

**Beekite in tertiary oil-bearing formations of southern Ecuador.** Geo. Sheppard. *Bull. Am. Assoc. Petroleum Geol.* 17, 1388-91(1933). Beekite is found along fracture planes of nodular siliceous masses. Silica has been leached from the matrix in the vicinity of the fracture planes and deposited on the latter. Alden H. Emery

**Iyengar, P. Sampat:** Ores and Their Rock Associates in Peninsular India. Mysore Geol. Dept., Bull. No. 13. Bangalore: Govt. Press. 13 pp. 1 rupee.

**Wernicke, Friedrich:** Die primäre Erzverteilung auf den Erzlagertstätten und ihre geologischen Ursachen. Halle (Saale): W. Knapp. 173 pp.

## 9 METALLURGY AND METALLOGRAPHY

D. J. DEMORESI, OSCAR F. HARDER AND RICHARD RIMBACH

**A quarter century of metallurgical progress.** Walter Robinson. *Can. Chem. Met.* 17, 210-12, 231-2, 234, 235(1933). *Engineering* 136, 725-8; cf. *C. A.* 27, 5281.—A review. W. H. Boynton

**Standards and specifications for metals and metal products.** Anon. U. S. Bur. Standards, *Miscellaneous Pub. No. 120*, 1359 pp.(1933). E. J. C.

**Unusual minerals in flotation products at Cananea mill studied quantitatively by the microscope.** A. M. Gaudin. *Eng. Mining J.* 134, 523-7(1933).—A new ore body contg. considerable covellite has been developed at the property of the Cananea Consolidated Copper Co. In studying the floatability of this Cu mineral, other minerals

of the enargite and tetrahedrite groups were observed, together with molybdenite. The latter may prove valuable as a by-product. The following minerals were recorded: "silicate," molybdenite, pyrite, chalcocopyrite, hornite, covellite, "gray Cu" and sphalerite. "Silicate" covered all the translucent gang minerals. Identification of each mineral by microscopic examn. is explained. W. H. B.

**The concentration of metals in the circulating load and their recovery.** W. B. Donoghue. *Can. Mining J.* 54, 470-1(1933).—A brief review of recent practice at the Central Manitoba mill. It appears that if the ton value of the circulating load in Au metallurgy is held down to not more than 3 times the ton value of the mill heads cer-

tain phantoms of the art may fade away. It may be accomplished by amalgamation or other treatment of the classifier sand. With the removal of all Au possible from the circulating load it seems reasonable to expect a shortening up of Au mill circuits and lower cost in operation and less trouble. Work on the circulating load constitutes an advance step in Au metallurgy, and of Ag, if it is in the native state.

W. H. Boynton  
**Production of vanadium pig iron by slag reduction.** V. K. Sokovnin *Metallurg* 8, No. 3, 55 8(1933). - Bessemer and open-hearth slags contg 7-12% V were reduced by C in an elec. furnace; 90-93% of the V in a Fe-Cr-V alloy contg. up to 14% V was recovered. The oxides are reduced from the slag in the order Fe-V-Cr-Mn. The process is easy and rapid.

H. W. Rathmann  
**Blast-furnace operations with peat fuel.** N. Chuzhevskii, A. Panbulov, A. Vavilov and V. Shmelov. *Stal* 3, No. 4 5, 13 22(1933). Air-dried peat contg. 17.25% H<sub>2</sub>O and 1.5-6.0% ash was used to produce a 3.5% Si pig iron with a peat to pig ratio of 3.5-4. Compn. of the top gases was CO<sub>2</sub> 9-10, CO 29-31, H<sub>2</sub> 9-10 and CH<sub>4</sub> 2-3%. The use of peat is considered economically possible.

H. W. Rathmann  
**Melting in the cupola furnace.** G. Itam. *Rev. fonderie moderne* 27, 291 5(1933). The general principles of melting in a cupola furnace are described. The different stages of the melting process and influence of coke, ash content, size of cupola and wind pressure are discussed.

M. H.  
**Sulfur in cupola practice.** I. Trifonov. *Gieserei* 20, 497 500(1933). Pig Fe absorbs S in the cupola only when molten, and only from combustible S compds. CuS reacts with FeO, but not with Fe, to form FeS when the atm. is oxidizing and insufficient CaO is present.

Curtis L. Wilson  
**The present status of some important corrosion problems.** H. van der Veen. *Het Gas* 53, 437 44(1933). A review.

B. J. C. van der Hoeven  
**The dependence of corrosion velocity of copper upon the thermal and mechanical pretreatment of the copper.** Du Bois. *Oberflächentechn.* 10, 235(1933). - Preliminary results show that corrosion of Cu is influenced by the arrangement of the crystallites, but there is a difference between refined and electrolytic Cu, and also between hard and soft electrolytic Cu. X-ray tests revealed that soft-annealed material has an orientated crystallite arrangement, hard material an unorientated. Electrolytic Cu showed a lower resistance against H<sub>2</sub>SO<sub>4</sub> than refined Cu. Rolling produces differences in the crystallite arrangement and therefore different corrosion resistance. It is proposed to use as a definition of the intensity of an attack by acid on a material not the percentage loss in weight but the time required for corroding away 1 mm thickness from the surface of the material by the corroding agent, and also to state previous thermal and mech. treatment of the material.

M. Hartenheum  
**Metals and condensed milk** (Thompson, et al.) 12. Theory of passivity. XIX. Structure of natural layers of Fe oxide in rusting processes (Muller, Machu) 2. App. for heating or cooling Fe ore (Ger. pat. 578,652) 1. Pyrometer for use with molten metals (U. S. pat. 1,936,140) 1

Cazaud, R.: *Métallurgie* Agenda Dunod 1933. Paris. Dunod. 354 pp. F. 20. Reviewed in *Metals & Alloys* 4, MA 241(1933).

**Lead**—The Mineral Industry of the British Empire and Foreign Countries. 2nd ed. Issued by Imperial Inst. London: H. M. Stationery Office. 253 pp. 4s. Reviewed in *Ind. Eng. Chem.* 25, 1063(1933).

**Working up ores.** "Ekof" Erz- u. Kohle-Flotation G. m. b. H. (W. Schafer, inventor). Ger. 578,819, June 17, 1933. In working up non-sulfidic ores and minerals by flotation, resin acids and oils resulting from the extr. processes of sulfite and sulfate wood pulp are used as flotation agents.

**Treatment of lead ores.** Paul Garnichon (Robert Tournaire, inventor). Ger. 587,001, Oct. 28, 1933. This corresponds to Fr. 712,528 (C. A. 26, 1560), but gives addnl. details.

**Disintegration of beryllium ores, especially silicates.** Beryllium Development Corporation. Ger. 577,029, June 2, 1933. See Brit. 374,705 (C. A. 27, 4038).

**Disintegrating pyrite ores with sulfonic acid.** International Mining-Trust. Ger. 578,967, June 19, 1933. The ore is powdered, mixed with twice its mol. wt. of H<sub>2</sub>SO<sub>4</sub> and heated for some time to the b. p. of the acid. App. is described.

**Reducing metal oxides.** Società italiana per le industrie minerarie e chimiche. Ger. 579,949, July 3, 1933. App. for reducing metal oxides by heating them to 400-700° in heavy hydrocarbon vapor is described.

**Recovering noble metals.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Ger. 587,002, Oct. 28, 1933. In the known process in which waste alloys, etc., contg. noble metals and base metals are successively fused, comminuted, oxidized and treated with H<sub>2</sub>SO<sub>4</sub> to ext. base metals, the oxidation and extr. are facilitated by adding 3-10% of S or a reagent yielding S to the alloy before or during the oxidation.

**Apparatus suitable for the separation of gold from beach sand, etc., by centrifugal action.** Oatmer B. Germond. U. S. 1,936,130, Nov. 21. Structural and mech. features.

**Zinc metallurgy.** Charles R. Kuzell (to United Verde Copper Co.). U. S. 1,936,092, Nov. 21. A carbonaceous reducing agent is injected by means of steam into a molten bath contg. a Zn compd. such as a mat or slag to reduce the Zn compd. and vaporize metallic Zn (an excess of the reducing agent being used), and air is introduced into the app. used above the surface of the bath to oxidize the excess reducing agent and Zn vapor and form a fume contg. ZnO and generate heat for maintaining the bath in molten condition. The fume is collected. App. is described.

**Apparatus for continuous distillation and filtration of magnesium.** Österreichisch-Amerikanische Magnesit A. G. Fr. 750,183, Aug. 5, 1933.

**Blast furnaces.** Vereinigte Stahlwerke A.-G. Fr. 752,036, Sept. 15, 1933. Obturator for the hot air conduits is described.

**Blast-furnace charging top.** Charles O. Barks. U. S. 1,936,374, Nov. 21.

**Tilting forehearth for cupola furnaces.** Friedrich Schünke. Ger. 578,927, June 23, 1933.

**Furnace for heating copper billets.** Henry M. Koll (to Western Elec. Co.). U. S. 1,936,199, Nov. 21. A skid rail contacting with the billets is formed of an alloy of Cr 1 and Fe 2 parts.

**Continuous furnace for heating sheet metal, etc.** Akt.-Ges. Brown, Boveri & Cie. Ger. 584,712, Sept. 25, 1933. Addn. to 580,143 (C. A. 27, 4761).

**Apparatus for heat-treating and cooling metals.** Schloßmann A.-G. Fr. 751,943, Sept. 12, 1933.

**Furnace for recovering copper wire and lead from cables.** J. A. Topf & Sohne. Ger. 587,149, Oct. 31, 1933.

**Device for cooling Siemens-Martin and similar furnaces.** Österreichisch-Alpine Montangesellschaft (Friedr. Witting, inventor). Ger. 578,725, June 16, 1933.

**Suction box for Dwight-Lloyd apparatus.** Blei- und Silberhütte Braubach G. m. b. H. and Paul Wefelschuid. Ger. 578,874, June 20, 1933.

**Stripper for Dwight-Lloyd sintering apparatus.** Blei- und Silberhütte Braubach G. m. b. H. and Paul Wefelschuid. Ger. 578,958, June 20, 1933.

**Distilling metals.** Fried. Krupp Grusonwerk A.-G. Fr. 750,251, Aug. 8, 1933. Metals such as Zn and Cd are distd. from one or more muffles mounted in a rotating tubular furnace and turning with it. The sepn. of the metal vapors and the solid materials is carried out at such a temp. that a condensation of the vapors on the various parts of the charge is avoided. The residues are evacuated

by lateral tubes passing through the wall of the furnace while the material is charged and the vapors are evacuated along the axis of the furnace.

**Apparatus for filtering molten metals** Fortunc Roland Fr 750,209, Aug 8, 1933

**Polymetals** Soc Ltd Wagner Fr 750,302, Aug 8, 1933 In uniting sheets of different metals by hydraulic pressure, the metal forming the base, e g, Cu, and (or) the covering metal, e g, Au, is alloyed with a light metal such as Al or Be which lowers the sp gr.

**Cold-drawing metals** Russell Franks (to Elektro Metallurgical Co) U S 1,942,454, Oct 31 Metal to be drawn such as a ferrous alloy is coated with a vehicle such as a bronzing liquid contg scale like particles of Al the coating is hardened into a tough adherent film, and the metal is then drawn through a die Cf C A 28, 88

**Case-hardening ferrous metals by nitriding** John J Egan (to Elektro Metallurgical Co) U S 1,936,294 Nov 21  $\text{NH}_3$  is brought into contact with the surface heated to nitriding temp while there is closely placed adjacent the surface a metal such as Cu, brass, Al, Si, Cr, V, Mo, Ti or Mn, which may be in the form of a gauze wrapping and which serves to accelerate the nitriding.

**Articles such as cutting tools comprising tantalum carbide** Lloyd C Kelly (to General Elec Co) U S 1,940,435, Nov 21 A hard, tough, sintered compn consists of 1a carbide together with a binder making up about 3-25% of the compn and consisting substantially of W with a smaller proportion of Co.

**Cutting and grinding tools** Paul Hopf U S 1,935,188 Nov 21 For securing granular grinding material such as diamond carbide or silica to a support of hard metal such as iron or steel, the support is coated with soft metal the grinding material is pressed into this coating and the tool thus obtained is coated with a hard, corrosion resisting metal.

**Apparatus for manufacture of rolled strips of metal** Willard Sykes U S 1,936,311, Nov 21 Mech features.

**Apparatus for pickling steel sheets etc** George R Reimer U S 1,935,783 Nov 21 Mech and structural features.

**Apparatus for annealing tools** Heinrich Koppers A G Ger 582,553, Aug 17, 1933

**Pins for artificial teeth** Frederick Maulen (to Baker & Co) U S 1,936,333 Nov 21 Tooth pins are formed of a metal such as Ni having a plurality of coating layers of different corrosion resisting precious metals such as an outer layer of Au and an inner layer of an alloy of Pd with Au or Ag.

**Wire drawing die with a nib of tungsten carbide** Morris Simons U S 1,945,821, Nov 21 Structural details.

**Connector for electric wires** Orson W Brumser (25% to Andrew V Group) U S 1,946,185, Nov 21 A tubular connector is formed of Cu with an inner wall having a frangible coating of uneven thickness formed of harder metal resistant to corrosion such as a Ni-Cr alloy.

**Nitriding iron** Fried Krupp A G (Adolf Fry, inventor) Ger 579,968, July 3, 1933 Fe alloys are hardened by treatment with N first at a temp below the  $\alpha/\gamma$  transformation temp and then at higher temps.

**Device for making blocks from spongy iron** C A Buckelberg Ger 575,795, June 17, 1933

**Steel** Österreichische Schmidtstahlwerke A G (Leo Kluger inventor) Austrian 134,832, Oct 10, 1933 H of resist ant steel contains C 0.5-2, Cr 20-25, Al up to 2, up to 2, and Cu 1-5%, the remainder being Fe.

**Steel** Deutsche Edelstahlwerke A G Ger 578,945 June 19, 1933 A steel alloy contains 1-1.5% C, 2-8% W, 1-1% Cr, 0-5% V and up to 20% Co.

**Steel** Stahlwerke Rohling-Buderus A G and Alfr Kropf Ger 578,946, June 20, 1933 High-speed steel consists of C 0.8, Cr 4.0, W 13-22, Mo 0.5-1.0, V 1.0-1.5% and Ta up to 5%.

**Steel** Vereinigte Stahlwerke A-G Fr 752,208, Sept 19, 1933 Steel is given a surface resistant to wear

1 and a core of high tenacity by carbonizing a soft steel contg Mn 0.6-0.8% until the surface has the eutectoid compn corresponding to the above Mn content, and after ward submitting the sheet for a short time to a heating just above the equil pt of the starting metal and cooling in calm air. The steel may contain Si 0.35-0.8, Ni up to 3 and Cu up to 1.5% Fr 752,209 Wheel rims are made from a eutectoid steel of pure lamellar perlite texture, contg elements generating double carbides in amt such

2 that the content of C is below 0.9%, and contg preferably Si 0.35-0.8%, the steel being alloyed with Ni or Cu or both, e g, Ni 6-7 and Cu 1.5%. Fr 752,210 A eutectoid steel contg elements generating double carbides, particularly Mn, in amts such that the C content is below 0.9%, while preserving the lamellar perlite structure, is conformed by heating to below 850°.

The conformation may be carried out in 2 phases, the 1st to above 950°, the 2nd 3 to below 850° with cooling there. Fr 752,211 Steel alloys are made in a basic Siemens Martin furnace by adding to the slag the alloying elements e g, C, Mo, V, Ti, W, Cu or Ni in the form of their chem compds, e g, their ores, and they are extd from the slag by reduction at the same time as the Mn of the charge, a high temp and a high basicity of the slag are used. The elements pass into the bath of steel.

4 **Hardening high speed steel** Joseph Schlem U S 1,934,741 Nov 14 For hardening an article made of high speed steel of uniform compn, a thin adherent plating of Cr is electrodeposited on a selected portion of the article while leaving the remaining portion of the article free from the plating. The article is then heated to a temp above the crit temp to effect recrystn of the steel, then quenched to effect a general hardening throughout the entire mass without substantial change in compn except, 5 underneath the Cr plating where a thin underlying relatively soft low C Cr alloy layer is formed.

**Tempering steel** Deutsche Pektungesellschaft mb H Fr 733,231 Oct 12, 1933 Solns contg pectic substances as well as gum arabic and glucose, are used for tempering steel and like alloys to retard the lowering of the temp.

**Stainless steel** Thos Iirth & Sons Ltd Ger 577,521, June 1, 1933 See Brit 316,394 (C A 24, 1612)

6 **Softening cobalt alloy steel** Clifford A Nickle (to General Elec Co) U S 1,936,406, Nov 21 Co alloy steel is softened to render it easily machinable by heating to about 900-800° and quickly cooling.

**Aluminum and its alloys** Helmut Lichtmetall G m b H Fr 752,127, Sept 16, 1933 Particularly dense castings of Al and its alloys capable of taking a high polish are made by fusing the metal, adding a mixt of cryolite and fluorspar (4:1) and in amt sufficient to form a fluid film on the metal, and introducing into the bath K antimonate or BaO or a mixt of the 2.

**Chromium, etc** Heracus Vacuumschmelze A-G and Wilhelm Rohm Fr 42,643, Aug 23, 1933 Addn to 730,718 (C A 27, 262) Hydrocarbons, such as  $\text{C}_2\text{H}_6$ , benzene,  $\text{CH}_4$ , natural gas or coal gas, are added to the H used in the reduction process of Fr 730,718, and in amt such that the final product contains practically no C. 8 The H used may be less pure than in the former process.

**Black copper** Société générale métallurgique de Honnain Ger 578,674, June 16, 1933 Impure black Cu, especially that contg metals of the I group, is subjected to a preliminary refining process by fusing it with a slag contg CuO, in a shaft furnace.

**Alloys** W C Heracus G m b H Ger 578,676, June 16, 1933 The mech properties of Pt alloys contg 9 up to 10% Rh, Ni, Fe, Cr, Ta or W, or of Au alloys contg 5-25% Pt and 10% Rh, are improved by heating to over 700°, chilling, and hardening at 400° Cf C A 27, 946.

**Alloys** American Smelting & Refining Co Fr 42,704, Sept 14, 1933 Addn to 713,550 (C A 26, 1571) An alk earth metal carbide is added to a fused metal covered with an appropriate layer of slag and the bath is agitated to submit the particles of the carbide alternately

and constantly to the purifying and solvent action of the slag and of the molten metal. The carbide is in the form of "peas." The temp. is 700-800°.

**Alloys.** Imperial Chemical Industries Ltd. Fr. 753,035, Oct. 5, 1933. Alloys contg. Zn up to 37, Ni at least 2, Al at least 0.5% and Cu the rest are hardened by heating to 800-900°, cooling rapidly and reheating to 300-400°.

**Hard alloys.** Faustel Products Co. Inc. Fr. 752,049, Sept. 15, 1933. A hard alloy contains a carbide of a hard and refractory metal of the 5th group, a metal of the 6th group, and one or more metals of the Fe group, e. g., Ta carbide 80, W or Mo 9 and Ni 11%. Cf. C. A. 27, 3187.

**Working aluminum alloys.** Aluminum Ltd. Fr. 750,460, Aug. 11, 1933. See Brit. 395,273 (C. A. 28, 919).

**Magnetic alloys.** Siemens & Halske A.-G. (Franz Noll, inventor). Ger. 576,509, May 11, 1933. The magnetic properties of Fe alloys contg. Ni or Si are improved by coating the alloy with Na<sub>2</sub>SiO<sub>3</sub> or K<sub>2</sub>SiO<sub>3</sub> and heating.

**Shaped articles from carbide alloys.** Fried. Krupp A.-G. (Hermann Voigtlander and Otto Kaufels, inventors). Ger. 587,117, Oct. 30, 1933. See U. S. 1,895,950 (C. A. 27, 2415).

**Alkaline earth metal alloys of aluminum.** Gustaf N. Kirsebon (to Calloy Ltd.). U. S. 1,935,215, Nov. 14, 1933. See Fr. 749,346 (C. A. 27, 5711).

**Aluminum-magnesium alloys.** Robert S. Archer (to Aluminum Co. of America). U. S. 1,935,608, Nov. 21, 1933. Corrosion-resistant alloys contain Al together with Mg 5-16% and a Si-plus-Fe content of about 0.3-1.0% (with at least about as much Si as of Fe).

**Brass alloy.** Vereinigte deutsche Metallwerke A.-G. Ger. 582,842, Aug. 23, 1933. Addn. to 456,342. Brass for bearings contg. 54-59% Cu contains also 6-8% of Al plus Ni, the amt. of Ni being about double that of Al. Thus, an alloy may contain 57-89% Cu, 33.46% Zn, 2.22% Pb, 4.17% Ni and 2.26% Al.

**Copper alloys.** Siemens & Halske A.-G. (Gunter Hunsel and Karl Dorsch, inventors). Ger. 578,675, June 16, 1933. Cu alloys contg. As, Sb or Bi are worked up by vigorously stirring the powd. alloys with acid solns. of CuCl or CuCl<sub>2</sub>, removing the unchanged alloy, neutralizing the acid remaining in the lye and removing the Cu by usual methods. App. layout is indicated.

**Copper alloys containing silicon and manganese.** Herbert C. Jennison (to American Brass Co.). U. S. 1,936,397, Nov. 21, 1933. Alloys which have good strength and workability are formed of Cu together with Si 0.1-2.5 and Mn 0.01-0.4%. Cf. C. A. 27, 4768.

**Copper-tin alloys.** Johann Kalowi and Bruno Sachs. Ger. 581,507, July 28, 1933. See Fr. 720,087 (C. A. 26, 3772).

**Copper-tin alloys.** Bruno Sachs and Johann Kalowi. Ger. 582,858, Aug. 24, 1933. Addn. to 581,507 (preceding abstr.). Alloys of Cu and Sn are prevented from becoming brittle by heating to 820-970°C, cooling slowly to 495-525°, keeping at these temps. for several hrs. and finally chilling to room temp.

**Ferro-boron.** I. G. Farbenind. A.-G. Fr. 752,251, Sept. 20, 1933. Ferro-boron is obtained as a regulus by causing a mixt. of boracite and Fe oxide, e. g., magnetite, to enter into aluminothermic reaction with an alloy of Al and Mg, in the presence of an oxidizing agent such as KClO<sub>3</sub>.

**Alloy of cast iron.** The Mond Nickel Co. Ltd. Ger. 577,923, June 7, 1933. See Brit. 279,414 (C. A. 22, 2735).

**Iron-chromium-molybdenum-carbon alloy.** Hoersch-Köln-Neusen A.-G. für Bergbau und Huttenbetrieb. Fr. 750,197, Aug. 5, 1933. A rustless alloy contains Cr 16-22, Mo 1-3, C 0.1% and Fe the rest.

**Heat-treating magnesium alloys containing manganese.** John A. Gann and Leo B. Grant (to Dow Chemical Co.). U. S. 1,936,550, Nov. 21, 1933. Mg alloys such as those contg. over 0.5% Mn in solid soln. are subjected to heat treatment at 250-500°, in order to raise their yield point and Brinell hardness.

**Alloys of palladium, copper and silver.** Edmund M. Wise (to International Nickel Co.). U. S. 1,935,897, Nov. 21, 1933. Alloys which are suitable for dental uses, as elec. conductors, etc., contain Pd 25-98, Cu 1-50 and Ag 1% or more and are substantially free from Fe or other metals which would impair the ductility of the alloy. Cf. C. A. 27, 4210.

**Non-tarnishing alloys containing silver and indium, etc.** Wm. S. Murray and Daniel Gray (to Oneida Community, Ltd.). U. S. 1,934,730, Nov. 14, 1933. Alloys such as those contg. Ag together with In have their colors modified by the addn. also of a smaller proportion of Au, Pd, Cd or Cu.

**Rust prevention.** Chemieprodukte G. m. b. H. Ger. 578,520, June 14, 1933. Welded joints on Fe tubes are protected against rusting by a paste contg. petrolatum, pyroparaffins, protoparaffins, K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, Na<sub>2</sub>PO<sub>4</sub> and isocholesterol.

**Protecting metals.** I. G. Farbenind. A.-G. (Eduard Tschunkur, Albert Klamroth and Hans Ahrens, inventors). Ger. 579,955, July 3, 1933. Metals are protected against corrosion by non-oxidizing acids by adding aralkyl sulfides or polysulfides to solns. of the acids. Thus, benzyl sulfide is added to H<sub>2</sub>SO<sub>4</sub>.

**Protecting lead.** Compagnie générale d'électricité. Fr. 42,700, Oct. 10, 1933. Addn. to 716,148 (C. A. 26, 1892). Pb is sulfurized by the application of a grease contg. S or S derivs. Resin or resin oil may be added to the grease.

**Silver plating.** Alphonse Tabarant. Fr. 750,476, Aug. 11, 1933. Cu and Fe are silvered without external current in a liquid composed of 2 solns. A and B mixed together. A is obtained by dissolving Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> in water and adding AgBr. B is obtained by adding a satd. soln. of Pt chloride to water and then adding red K chromate. Decompn. of the final soln. by light is prevented by adding a little Ag blue called Borel.

**Apparatus for coating objects by immersion in fused metal baths.** Albin Bohacek. Ger. 582,862, Aug. 24, 1933.

**Coating aluminum alloys.** Vereinigte Aluminium-Werke A.-G. Ger. 587,257, Nov. 1, 1933. In protecting Al alloys from corrosion by coating them with Al or other Al alloys, a very thin layer of Pb, Cd or Sn or their alloys is interposed between the alloy and the coating. Diffusion of alloy components into the coating during the tempering of the alloy is thus prevented.

**Aluminum surfaces.** Aluminum Colors Inc. Fr. 750,391, Aug. 9, 1933. Surfaces of Al or Al alloys are covered with a layer of oxide which is treated by a metal compd. and an oxidizing agent in the dissolved state to produce a metal oxide of a characteristic color in the said layer.

**Corrosion-resistant coatings on aluminum and its alloys.** Alexander Jenuy and Nikolai Budloff (to Siemens & Halske A.-G.). U. S. 1,936,058, Nov. 21, 1933. Articles of Al or its alloys are immersed in a satd. soln. of chromic acid and an a. c. is passed between the articles through the soln.

**Coating iron with zinc.** Carl Wallmann and Wilhelm Radeker. Ger. 587,166, Oct. 30, 1933. Fe is dipped into fused Zn contg. a little Cr.

**Apparatus for galvanizing articles such as pipe lengths.** John W. Free (to Jones and Laughlin Steel Corp.). U. S. 1,935,087, Nov. 14, 1933. Structural and mech. features.

**Apparatus for galvanizing iron or steel wire, etc.** Julian L. Schueler. U. S. 1,936,487, Nov. 21, 1933. An adjustable device is provided for regulating the amt. of molten coating remaining on the material and flame-treating is provided for uniformly distributing the coating material.

**Phosphates of alkylolamine compounds.** Herbert O. Albrecht (to E. I. du Pont de Nemours & Co.). U. S. 1,936,533, Nov. 21, 1933. A compn. suitable for coating metals to prevent rusting and which is sol. in hydrocarbon solvents comprises a reaction product of an acid of P such as H<sub>3</sub>PO<sub>4</sub> with an ester consisting of the reaction product of an alkylolamine such as triethanolamine and a fatty acid, fatty oil or natural resin acid. Various examples and modifications are described.

**Welding electrode.** Alfred C. Castle (to A. M. Castle

& Co.). U. S. 1,936,348, Nov. 21. A ferrous metal welding rod is provided with an inner coating formed mainly of silica together with carbon and a binder such as "ferrotite" or Na silicate and with an outer coating comprising finely divided carbon,  $\text{MnO}_2$ ,  $\text{Na}_2\text{CO}_3$ , and  $\text{CaCO}_3$ . (U. S. 1,936,349 relates to a welding rod coating compn. comprising a major proportion of  $\text{CaCO}_3$ , together with  $\text{Fe}_2\text{O}_3$ , borax and quantities of  $\text{Na}_2\text{PO}_4$  and magnesia which together are not greater than the amount of the borax.)

**Welding flux compositions.** Ferdinand de Pape (to

La Soudure electrique autogene, Soc. anon.). U. S. 1,936,010, Nov. 21. A saline mixt. such as one comprising alk. chlorides is treated with an acid such as  $\text{H}_2\text{SiF}_6$  and after adding a compd. of a metal of the Ce group such as  $\text{Ce}(\text{SO}_4)_2$  the mass is peptized with a basic peptizing agent such as KOH. Cf. C. A. 27, 2660.

**Joining difficultly solderable metals.** Miner M. Austin (to Fansteel Products Co.). U. S. 1,936,222, Nov. 21.  $\text{K}_2\text{Ta}$  double fluoride is used as a flux in joining metals such as Ta, Nb or W with other metals.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CHARLACK J. WEST

**Pyrolysis of hydrocarbons. Further studies on the butanes.** Charles D. Hurd and Forrest D. Pilgrim. *J. Am. Chem. Soc.* 55, 4902-7 (1933); cf. C. A. 24, 53. Expts. with the butanes demonstrate that similar results may be expected in tubes of widely varying sizes if a const. contact time is maintained in the various tubes. The inverse relationship between temp. and contact time is pointed out. Decompn. of  $\text{C}_4\text{H}_{10}$  or iso- $\text{C}_4\text{H}_{10}$  in Fe or Ni tubes at  $600^\circ$  pursued practically the same course as that observed in quartz tubes; Monel, however, exerted a vigorous catalytic action at this temp. The change was largely one into C and H. The fact that no iso- $\text{C}_4\text{H}_{10}$  is formed during the pyrolysis is sufficient evidence that the C chain does not undergo rearrangement in this process.

C. J. West

**Pyrolysis of butane at low decomposition temperatures.** Charles D. Hurd, C. I. Parrish and F. D. Pilgrim. *J. Am. Chem. Soc.* 55, 5016-19 (1933).—The pyrolytic products from  $\text{C}_4\text{H}_{10}$  at incipient decompn. temps. include  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$  and traces of H as well as  $\text{CH}_4$  and  $\text{C}_3\text{H}_6$ . No evidence could be found to support the contention that there is scission at the exclusive C-C location in the mol. if temps. near the "initial decompn. temps." are used.

C. J. West

**Octanes.** Frank C. Whitmore and K. C. Laughlin. *J. Am. Chem. Soc.* 55, 5056 (1933). All 18 of the structurally isomeric octanes have been synthesized.

C. J. West

**Syntheses in the olefin series. V. Completing the survey of the hexenes and including certain heptenes and octenes.** Ivan Schurman and Cecil E. Board. *J. Am. Chem. Soc.* 55, 4930-5 (1933). cf. C. A. 27, 4770. Dehydration of  $\text{Me}(\text{OH})\text{CHMe}_2$  with  $(\text{CO})\text{H}_2$  gives  $\text{Me}(\text{CMe})_2$ ,  $b_{10}$  72.9-73.2°,  $n_D^{20}$  1.4081,  $d_4^{20}$  0.7081,  $n_D^{25}$  1.4113,  $n_D^{30}$  1.4067,  $n_D^{35}$  1.41775, and  $\text{Me}(\text{CHCMe})_2$ ,  $b_{10}$  55.6-56°,  $n_D^{20}$  1.420,  $d_4^{20}$  0.6810,  $n_D^{25}$  1.3899. The following methyl xanthates were prepd.: methyl-*tert*-butylcarbamate,  $b_{10}$  85.7°,  $d_4^{20}$  1.0255,  $n_D^{20}$  1.5242 (75% yield), methyl-*tert*-amyl,  $b_{10}$  110.2°,  $d_4^{20}$  1.0235,  $n_D^{20}$  1.5250, ethyl-*tert*-butyl,  $b_{10}$  92.2-93°,  $d_4^{20}$  1.0014,  $n_D^{20}$  1.5206; ethyl-*tert*-amyl,  $b_{10}$  118.20°,  $d_4^{20}$  1.0160,  $n_D^{20}$  1.5210; propyl-*tert*-butyl,  $b_{10}$  112.1°,  $d_4^{20}$  0.9950,  $n_D^{20}$  1.5122. Decompn. gives the following olefins: 3,3-dimethyl-1-butene,  $b_{10}$  11.2°,  $d_4^{20}$  0.6510,  $n_D^{20}$  1.3759, 3,3-dimethyl-1-pentene,  $b_{10}$  76.9°,  $d_4^{20}$  0.6061,  $n_D^{20}$  1.3901; 4,4-dimethyl-2-pentene,  $b_{10}$  76.6-77°,  $d_4^{20}$  0.6881,  $n_D^{20}$  1.3980, 4,4-dimethyl-2-hexene,  $b_{10}$  105.1-106°,  $d_4^{20}$  0.7202,  $n_D^{20}$  1.4120; 2,2-dimethyl-3-hexene,  $b_{10}$  100.1°,  $d_4^{20}$  0.7048,  $n_D^{20}$  1.4068; 1,2-Dibromo 3,3-dimethylpentane,  $b_{10}$  95.3-95.6°,  $d_4^{20}$  1.5615,  $n_D^{20}$  1.5109; 2,3-dibromo-1,4-dimethylpentane,  $b_{10}$  92.8-93°,  $d_4^{20}$  1.5538,  $n_D^{20}$  1.5080; 2,3-dibromo-1,4-dimethylhexane,  $b_{10}$  92.3°,  $d_4^{20}$  1.5148,  $n_D^{20}$  1.5113; 3,4-dibromo-2,2-dimethylhexane,  $b_{10}$  96.5-97°,  $d_4^{20}$  1.4856,  $n_D^{20}$  1.5032. As evidence that a skeletal rearrangement did not take place in the formation of these olefins, 1,4-dimethyl-2-pentene was reduced to 2,2-dimethylpentane, 3,3-dimethyl-1-pentene to 3,3-dimethylpentane, 4,4-dimethyl-2-hexene to 3,3-dimethylhexane and 2,2-dimethyl-3-hexene to 2,2-dimethylhexane.

C. J. West

**The point of cleavage of chemical linkage in unsaturated compounds.** Ryohei Oda. *Sci. Papers Inst. Phys.*

*Chem. Research* (Tokyo) 22, 47-58 (1933). O. has extended Schmidt's "double bond" rule (C. A. 26, 3710) for the splitting of the C-C linkage of unsatd. compds. of the paraffins, hexaphenylethane series, sugar splitting and hydrated splitting of polyales. to include the malonic acid series, nitro compds., halides, ethers, tertiary alcs. and mol. rearrangement involving unsatn. The double-bond rule is also assocd. with the disson. consts. of fatty acids.

Julius White

**Theory of multiple binding.** A. Burawoy. *Z. physik. Chem.* A166, 393-400 (1933); cf. C. A. 27, 2866. From optical considerations, B. concludes that org. compds. with double bonds are to be considered as being in electronic isomeric states. The states may be represented by the formulas:  $E = E' - E'' - E'''$ ;  $E = E' - E'' = E'''$

and  $E = E' - E'' = E'''$ . All properties of these compds. can be explained in this way. The reactivity of unsatd. compds. is also easily explained.

G. M. Murphy

**Properties of conjugated compounds. XVI. Dipole moments and atomic polarization of the monomethyl- and dimethylbutadienes.** E. Harold Farmer and Frank L. Warren. *J. Chem. Soc.* 1933, 1297-301; cf. C. A. 26, 2417.—Data are given for the dielec. const.,  $d$ , and polarization for solns. of  $\beta$ -Me,  $\beta,\gamma$ -di-Me and  $\alpha,\alpha$ -di-Me derivs. of butadiene at  $-75$  to  $50^\circ$  in intervals of  $25^\circ$ ; values for  $\mu \times 10^{18}$  e. s. u. are 0.15, 0 and 0.52, resp. The values for the dipole moment would seem to indicate that alkyl substitution at the  $\alpha$ -C atom of a butadiene chain causes a greater permanent polarization of the mol. than similar substitution at the  $\beta$ -C atom. XVII. Determination of the dipole moments of the monomethyl and dimethylbutadienes. *Ibid.* 1302-4.—Values for  $\mu \times 10^{18}$  e. s. u. are reported as follows for the alkyl derivs. of butadiene:  $\alpha$ -Me 0.50,  $\alpha,\beta$ -di-Me 0.53,  $\alpha,\gamma$ -di-Me 0.59,  $\alpha,\delta$ -di-Me 0.36, 0.31 (low- and high-boiling fractions),  $\beta,\gamma$ -di-Me 0. Values for  $d$  of  $\text{C}_4\text{H}_6$  solns. at  $25^\circ$  are given.

C. J. West

**Secondary isoamyl chloride, 3-chloro-2-methylbutane.** Frank C. Whitmore and Franklin Johnston. *J. Am. Chem. Soc.* 55, 5020-2 (1933).—Addn. of HCl to  $\text{Me}_2\text{CHCH}(\text{CH}_3)_2$  in sealed tubes in the dark at room temp. gives 88% of a mixt. of about equal amts. of *tert*- and *sec*-AmCl; the *tert*-AmCl was removed by repeated hydrolysis with  $\text{H}_2\text{O}$  at room temp. The  $\text{Me}_2\text{CHCHClMe}$   $b_{10}$  91.0°; it is stable at its b. p. at atm. pressure, stable at  $100^\circ$  for 24 hrs. and stable to  $\text{H}_2\text{O}$  at room temp. A new type of rearrangement resulting from the addn. to an olefinic linkage is indicated.

C. J. West

**$\alpha,\alpha$ -Dibromopentane.** John D. A. Johnson. *J. Chem. Soc.* 1933, 1531-2.— $\alpha,\alpha$ -Dibromopentane (I), prepd. from benzopiperidine and  $\text{PBr}_3$  and purified in the usual way, contains so much  $\text{PhCN}$  as to be almost unacted upon by  $\text{Mg}$  in  $\text{Et}_2\text{O}$ . The following process gives a pure product: the crude mixt., after removal of  $\text{POBr}_3$ , is washed, distd. and the fraction  $b_{10}$  105° or below in ligroin ( $b. p.$   $40^\circ$ ) extd. 7 times with concd.  $\text{H}_2\text{SO}_4$ ; the ligroin soln. is then washed with  $\text{NaOH}$  and  $\text{H}_2\text{O}$ , dried and distd. I m.  $-29.5^\circ$ ,  $b_{10}$  95.5°,  $d_4^{20}$  1.6995,  $d_4^{25}$  1.6583,  $n_D^{20}$  1.5136,  $n_D^{25}$  1.40.3,  $n_D^{30}$  1.36.8 dynes/cm.,  $[\eta]^{20}$  340.9,  $[\eta]^{30}$  341.0 (calcd. 331).

C. J. West

**Preparation of crotylmagnesium bromide. Effect of solvents on the yield of crotyl and allylmagnesium bromides.** Wm. G. Young, Arthur N. Prater and Saul Winstein. *J. Am. Chem. Soc.* 55, 4908-11 (1933).—The yield of crotylmagnesium bromide in Et<sub>2</sub>O is about 90% if the time for bromide addn. is 275 min., if the ratio of solvent to bromide is 0.5 and if 20-30-mesh freshly prepd. Mg turnings are used; Mg-Cu alloy has a detrimental effect. In Bu<sub>2</sub>O the tendency to coupling is far more pronounced than in Et<sub>2</sub>O. It is necessary to use much larger ratios of solvent (76) and of Mg to bromide (11-12) and extremely vigorous stirring is necessary.

C. J. West

**Molecular rotations in members of homologous series.** P. A. Levene and R. J. Mark. *J. Biol. Chem.* 103, 299-309 (1933).—On forming a homologous series with respect to R' in a substance of the type R'CH(CH<sub>2</sub>)<sub>n</sub>X the rotations vary more or less irregularly. In the series with respect to (CH<sub>2</sub>)<sub>n</sub>X as the functional group becomes more remote from the center of asymmetry the influence of CH<sub>2</sub>X approaches that of Me. Thus the rotation of Me(CH<sub>2</sub>)<sub>n-1</sub>MeCH(CH<sub>2</sub>)<sub>n-1</sub>CH<sub>2</sub>X should approach zero and the direction of rotation of members of the series higher with respect to (CH<sub>2</sub>)<sub>n</sub>Me should be opposite to that of the lower members. Such a condition holds when X is OH and n is 3 or 4 and when R' contains as many C atoms as the radical (CH<sub>2</sub>)<sub>n-1</sub>CH<sub>2</sub>OH. The zero rotation is due to the sum of the contributions of the substituents approaching zero since the alcs. give active bromides. 4-Methyl-1-heptanol, b<sub>18</sub> 81°, optically inactive, from 3-methyl-1-bromohexane Grignard compd and CH<sub>2</sub>O, with PBr<sub>3</sub> gave 1-1-methyl-1-bromoheptane, b<sub>18</sub> 80°, [M]<sub>D</sub><sup>25</sup> -14.5°. d-Et 8-methylenanthate, b<sub>28</sub> 95°, d<sub>4</sub><sup>25</sup> 0.865, [M]<sub>D</sub><sup>25</sup> 12.84, with Na and abs. alc. gave d-5-methyl-1-heptanol, b<sub>28</sub> 87°, [M]<sub>D</sub><sup>25</sup> 12°, which with PBr<sub>3</sub> gave d-5-methyl-1-bromoheptane, b<sub>18</sub> 86°, [M]<sub>D</sub><sup>25</sup> 14.92°. Similarly, d-Et 6-methylcaprylate, b<sub>28</sub> 110°, d<sub>4</sub><sup>25</sup> 0.868, [M]<sub>D</sub><sup>25</sup> 13.66°, gave d-6-methyl-1-octanol, b<sub>28</sub> 100°, d<sub>4</sub><sup>25</sup> 0.828, [M]<sub>D</sub><sup>25</sup> 12.5°, and d-6-methyl-1-bromooctane, b<sub>18</sub> 101°, d<sub>4</sub><sup>25</sup> 1.086, [M]<sub>D</sub><sup>25</sup> 13.96°. 1-Et 8-propylcaproate, b<sub>28</sub> 112°, d<sub>4</sub><sup>25</sup> 0.865, [M]<sub>D</sub><sup>25</sup> -5.9°, gave 1-5-propyl-1-hexanol, b<sub>28</sub> 110°, d<sub>4</sub><sup>25</sup> 0.828, [M]<sub>D</sub><sup>25</sup> -1.72°, and 1-5-propyl-1-bromohexane, b<sub>18</sub> 95°, d<sub>4</sub><sup>25</sup> 1.082, [M]<sub>D</sub><sup>25</sup> -7.78°. 1-Et 8-butylocaproate, b<sub>28</sub> 125°, d<sub>4</sub><sup>25</sup> 0.862, [M]<sub>D</sub><sup>25</sup> -2.84°, gave 5-butyl-1-hexanol, b<sub>28</sub> 125°, d<sub>4</sub><sup>25</sup> 0.831, optically inactive, and 1-5-butyl-1-bromohexane, b<sub>18</sub> 112°, d<sub>4</sub><sup>25</sup> 1.062, [M]<sub>D</sub><sup>25</sup> -5.29°. 1-Et 8-amylcaproate, b<sub>28</sub> 140°, d<sub>4</sub><sup>25</sup> 0.864, [M]<sub>D</sub><sup>25</sup> -1.69°, gave d-5-amyl-1-hexanol, b<sub>28</sub> 140°, d<sub>4</sub><sup>25</sup> 0.840, [M]<sub>D</sub><sup>25</sup> 1.85°, and 1-5-amyl-1-bromohexane, b<sub>18</sub> 124°, d<sub>4</sub><sup>25</sup> 1.044, [M]<sub>D</sub><sup>25</sup> -4.02°.

R. C. Elderfield

**Influence of a quaternary ammonium group on the hydrogen atoms of an adjacent methylene group.** Arnold O. Jackson and C. S. Marvel. *J. Am. Chem. Soc.* 55, 5000-2 (1933).—ClCH<sub>2</sub>CO<sub>2</sub>Et and Me<sub>4</sub>N in EtOH give 72% of carbethoxymethyltrimethylammonium chloride (I), m. 166.7°; the bromide (II), m. 158-9° (67% yield); BrCH<sub>2</sub>CONH<sub>2</sub> gives 86% of carbamylmethyltrimethylammonium bromide (III), m. 203-4°; bromocyanooacetamide, m. 176.7° (61% yield), gives 77% of cyanooacetamidatrimethylammonium bromide (IV), m. 199-200°. Treatment of I and II with EtONa and EtBr did not effect alkylation of the -CH<sub>2</sub>- group; I is changed into II in the reaction. IV is converted into III by hot EtOH-EtONa. III is not alkylated by EtONa and an alkyl halide.

C. J. West

**The effect of ethyl radicals on the thermal decomposition of azomethane. The kinetics of the thermal decomposition of tetraethyllead. Ethyl radicals and hydrogen.** John A. Leermakers. *J. Am. Chem. Soc.* 55, 4508-18 (1933).—The kinetics of the thermal decompn. of Pb-Et<sub>2</sub> were studied at 245°, 260° and 275° and from initial pressures of 13-52 mm. The decompn. was found to be unimol. and 96-97% homogeneous. The rate consts. are given accurately given by the equation  $k_1 = 1.2 \times 10^{12} e^{-10,900/RT}$  sec.<sup>-1</sup>. Since the rate of decompn. of PbEt<sub>2</sub> at temps. around 275° is not affected by the presence of

CH<sub>3</sub>N<sub>2</sub> (I), Et radicals do not react with I. One may conclude therefore that there are no chains accompanying the unimol. decompn. of I. Et radicals react very little, if at all, with H<sub>2</sub> at 275°. The activation energies of bimol. reactions of Et radicals with H<sub>2</sub> or I are calcd. to be greater than 15 kg. cal.

Louise Kelley

**Organic reactions with boron fluoride. VI. Reaction of acetamide with alcohols and phenol.** Frank J. Sowa and Julius A. Nicuwlund. *J. Am. Chem. Soc.* 55, 5052-3 (1933); cf. C. A. 27, 4785.—The addn. compd. formed between AcNH<sub>2</sub> and BF<sub>3</sub> reacts rapidly with alcs. and PhOH to form acetates and monoaminoboron fluoride, by this method the acetates of MeOH, EtOH, iso-PrOH, BuOH, tert-BuOH and PhOH have been prepd. in yields of 71, 69, 32, 50, 38 and 50%, resp. It is possible to recover practically all of the BF<sub>3</sub> by treatment with H<sub>2</sub>SO<sub>4</sub>.

C. J. West

**Triphenylsilyl ethylamine, (C<sub>6</sub>H<sub>5</sub>)<sub>3</sub>Si.C<sub>2</sub>H<sub>5</sub>NH<sub>2</sub>.** Charles A. Kraus and Harry Batough. *J. Am. Chem. Soc.* 55, 5008-14 (1933).—Ph<sub>3</sub>SiBr and Li in EtNH<sub>2</sub> form triphenylsilyl ethylamine, m. 45°; it does not dissociate at 150° in a high vacuum; in boiling Et<sub>2</sub>O, Ph<sub>3</sub>Si<sub>2</sub> is formed, it does not react with Na in liquid NH<sub>3</sub>. Li in EtNH<sub>2</sub> gives Li triphenylsilyl (I), a cryst. solid. I and NH<sub>4</sub>Br give Ph<sub>3</sub>SiH, LiBr and NH<sub>3</sub>; PhBr gives Ph<sub>3</sub>Si and LiBr. I and Me<sub>3</sub>SnCl.NH<sub>3</sub> in liquid NH<sub>3</sub> give trimethylstannyl-triphenylsilyl, a viscous liquid; with Na in liquid NH<sub>3</sub>, there results Ph<sub>3</sub>SiNa and Me<sub>3</sub>SnNa; Br gives Me<sub>3</sub>SnBr and Ph<sub>3</sub>SiBr.

C. J. West

**Aliphatic germanium derivatives. III. Ethylgermanium trihalides.** H. A. Flood. *J. Am. Chem. Soc.* 55, 4935-8 (1933); cf. C. A. 26, 2720. GeI<sub>4</sub> and EtI, heated in an air-free tube at 110° for 3 days, give 86% of ethylgermanium triiodide (I), lemon-yellow, b<sub>28</sub> 281°, m. -1.3° to -2.5°; it is stable at 300° but at 350° gives gas and GeI<sub>4</sub>; while I does not react appreciably with "mol." Ag at 220°, it reacts slowly with hot Hg and rapidly with other more electropos. metals at temps. as low as 100°. Ag I and freshly prepd. Ag<sub>2</sub>O give monoethylgermanium oxide, (EtGeO)<sub>2</sub>O (II), a glass, which does not m. at 300° but sublimes and decompn. at higher temps. in vacuo HCl gives the trichloride, b<sub>18</sub> 141°. Ammonolysis of I gives the nitride. II and P<sub>2</sub>O<sub>5</sub>, over which HBr is passed, gives the tribromide, b<sub>28</sub> 200°; the trifluoride, b<sub>28</sub> 112°, m. -15.5° to -16.5°.

C. J. West

**Improved method of preparing diethylgermanium derivatives.** L. Horvitz and H. A. Flood. *J. Am. Chem. Soc.* 55, 5055 (1933).—EtGeI<sub>3</sub> and an excess of 40-60 Ph-Bi alloy are heated in the absence of air to 150° for 1-2 days, the product is extd. with dry Et<sub>2</sub>O or ligrom and the viscous yellow residue in EtI is heated at 125° for 2-3 days and the EtGeI<sub>3</sub> distd. Et<sub>2</sub>GeI<sub>2</sub> b<sub>28</sub> 252°, m. 2° to -1°; Et<sub>2</sub>GeCl<sub>2</sub>, b<sub>28</sub> 175°, m. -39° to -37°. The impure diiodide may be hydrolyzed by aq. NaOH to the oxide.

C. J. West

**Condensation reactions of unsaturated aldehydes. IV. Formation of dicrotonaldehyde and of octatrienal from crotonaldehyde.** Konrad Bernhauer and Robert Drobniak. *Biochem. Z.* 266, 197-201 (1933).—Methods of prepn. are described.

S. Morgulis

**Acetamide and benzamide.** F. Govaert. *Natuurw. Tijdschr.* 15, 149-53 (1933).—AcNH<sub>2</sub> and BzNH<sub>2</sub> can readily be prepd. from the chlorides + liquid NH<sub>3</sub>, 40-50 cc. dry liquid NH<sub>3</sub> is condensed in a 25 × 3 cm test tube; to it is added dropwise in 15 min. 15 g. AcCl in 50 cc. Et<sub>2</sub>O while shaking mechanically (heat liberated). The NH<sub>3</sub> is evapd., the ether distd. off and the mass extd. twice with boiling EtOH, this is evapd., and the product redistd. in vacuo; yield 10 g. (88%). For BzNH<sub>2</sub> there is substituted 15 g. BzCl in 60 cc. Et<sub>2</sub>O. After evapn. of the NH<sub>3</sub> the ether is sucked off, the solid residue shaken with H<sub>2</sub>O to remove NH<sub>4</sub> salts and the remaining BzNH<sub>2</sub> is dried; yield 98%. An alternate method for both substances is: Pass through 50-60 cc. ether cooled to -20° a rapid NH<sub>3</sub> stream and add after a few min. slowly 15 g. AcCl in 30-40 cc. ether (10 min.); the reaction is instantaneous. Pour off the ether and distil (a small amt



of amide is dissolved), ext. the solid residue with warm  $\text{H}_2\text{O}$ , distill off and vacuum-distill; yield 88–90%. For  $\text{BzCl}$ , the residue after sucking off the ether is washed with cold  $\text{H}_2\text{O}$  and dried; yield quant. The ether used in the expts. should be distd. over  $\text{Na}$ .

B. J. C. van der Hoeven

**Some ammonolytic reactions.** Edward C. Franklin. *J. Am. Chem. Soc.* 55, 4912–15 (1933).—The method of prep. of  $\text{Et}_2\text{NCN}$  and its hydrolysis are in accordance with the assumption that it is a di-Et ammonocarbonate. Ammonolysis of  $\text{Et}_2\text{NCN}$ ,  $\text{Pr}_2\text{NCN}$  and  $(\text{iso-Bu})_2\text{NCN}$  give approx. 100%  $\text{K}_2\text{NCN}$  and about 75%  $\text{R}_2\text{NH}$ .  $\text{PhN}:\text{C}(\text{NHPh})_2$  in liquid  $\text{NH}_3$  at  $200^\circ$  gives  $\text{PhNH}_2$  and  $\text{HN}:\text{C}(\text{NH}_2)_2$ .  $\text{KNH}_2$  and dialkylcyanamides in cold liquid  $\text{NH}_3$  give  $\text{K}$  salts of dialkylguanidines; *Me*, *Et*, *iso-Pr*, *iso-Bu*, *iso-Am* were prep.; also the  $\text{Na}$  salts of *Et* and *iso-Bu*.  $\text{H}_2\text{NCO}(\text{NHMe})$  on ammonolysis gives  $\text{MeNH}_2$ ,  $\text{CO}(\text{NH}_2)_2$  and guanidine;  $(\text{PhNH})_2\text{CO}$  and  $\text{NH}_3$  give  $\text{PhNH}_2$  and  $\text{CO}(\text{NH}_2)_2$ , with some guanidine;  $\text{NH}_2$  in  $\text{EtOH}$  at  $150^\circ$  gives  $\text{PhNH}_2$  and  $\text{CO}(\text{NH}_2)_2$ .  $\text{AcONH}_2$  or  $\text{AcNH}_2$  in  $\text{NH}_3$ - $\text{NH}_4\text{Cl}$  gives  $\text{MeC}(:\text{NH})\text{NH}_2$ , readily hydrolyzed to  $\text{AcNH}_2$  and then  $\text{AcOH}$ .  $\text{MeC}(:\text{NPh})\text{NIHPh}$  and  $\text{NH}_3$  give  $\text{MeC}(:\text{NH})\text{NH}_2$  and  $\text{PhNH}_2$ ; diphenylbenzamidine behaves similarly.  $\text{PhNHAc}$  gives  $\text{MeC}(:\text{NH})\text{NH}_2$  and  $\text{PhNH}_2$ .  $\text{PhCCl}_2$  and  $\text{NH}_3$  give 75%  $\text{PhCN}$ .

C. J. West

**Metallic salts of carboxazyl acids.** Edward C. Franklin. *J. Am. Chem. Soc.* 55, 4915–17 (1933).—Alkaline metal amides react in liquid  $\text{NH}_3$  with acid amides (carboxazyl acids) to give metallic salts; there were prep.:  $\text{HCONiK}$ ,  $\text{HCONiNa}$ ,  $\text{AcNHK}$ ,  $\text{PrCONiK}$ ,  $\text{BuCO-NiK}$ ,  $\text{C}_6\text{H}_5\text{CONiK}$ ,  $\text{BzNHK}$ ,  $\text{C}_6\text{H}_5\text{CONiK}$  and  $\text{CH}_3\text{CONiK}$ . When heated in the dry state these salts yield satd hydrocarbons and  $\text{KNCN}$ . Attention is called to the close resemblance between the reactions represented by the equations:  $\text{RCOK} + \text{KOH} = \text{RH} + \text{KCO}_2$ ,  $\text{RC(Ni)NHK} + \text{KNH}_2 = \text{RH} + \text{K}_2\text{CN}_2$  and  $\text{RCNiK} = \text{RH} + \text{KNCN}$ .

C. J. West

**Rotation of polar groups in organic compounds.** Julian M. Sturtevant. *J. Am. Chem. Soc.* 55, 4478–85 (1933).—In certain cases of strong dipole interaction between polar groups capable of rotation about a single bond in org. mols., application of quantum methods to the study of the motion of these groups leads to practically the same results as those obtained on the classical theory at temps. within the range of exptl. observations. With  $\text{Ac}_2$  the calcd. values of the elec. moment agree very well with expt. over a temp. range of  $200^\circ$ . Classical calcns. indicate that the elec. moment of  $\text{HCO}_2\text{H}$  should show a considerable temp. variation; this agrees with exptl. observations.

Louise Kelley

**Polymerization and ring formation. XIX Many-membered cyclic anhydrides.** Julian W. Hill and Wallace H. Carothers. *J. Am. Chem. Soc.* 55, 5023–31 (1933); cf. *ibid.* 28, 1054.—Data are presented on the anhydrides of dibasic acids  $(\text{CH}_2)_n(\text{CO}_2\text{H})_2$ , where  $n$  is 4–12 and 16, the anhydrides are all linear polymers and when heated in a mol. still they are depolymerized, yielding volatile products ( $\beta$ -anhydrides). The latter are either cyclic monomers or dimers depending upon the unit length,  $n + 3$ . The compds. thus obtained are rings of 5, 18 (dimeric), 10, 22 (dimeric), 12, 26 (dimeric), 14, 18 and 19 atoms. The dimers are cryst. solids which polymerize instantly when heated above their m. ps. The monomers are liquids or low-melting solids which polymerize at lower temps. than the dimers. The monomers of 8–10 and 12 atoms are exceedingly unstable and polymerize rapidly even below room temp. The following  $\alpha$ -polyanhydrides were prep. by refluxing the acid with 6 parts  $\text{Ac}_2\text{O}$  for 4–6 hrs. and pptg. from  $\text{C}_6\text{H}_6$  with petrol ether: *pinelic* (I), m.  $53\text{--}55^\circ$ ; *suberic* (II), m.  $65\text{--}66^\circ$ ; *azelaic* (III), m.  $53\text{--}55^\circ$ ; *undecanedioic* (IV), m.  $69\text{--}70^\circ$ ; *dodecanedioic* (V), m.  $86\text{--}87^\circ$ ; *brassylic* (VI), m.  $78\text{--}80^\circ$ ; *tetradecanedioic* (VII), m.  $80\text{--}91^\circ$ ; *stearic* (VIII), m.  $94\text{--}95^\circ$ . These react with  $\text{PhNH}$  to furnish the dibasic acid, its monoanilide and its anilide in the ratio 1:2:1. *Monoanilides*: I, m.  $108\text{--}9^\circ$ ;

II, m.  $128\text{--}9^\circ$ ; III, m.  $107\text{--}8^\circ$ ; IV, m.  $112.5\text{--}3^\circ$ ; V, m.  $123^\circ$ ; VI, m.  $118.6\text{--}9.5^\circ$ ; VII, m.  $124\text{--}5^\circ$ ; VIII, m.  $128\text{--}9^\circ$ . *Dianilides*: I, m.  $155\text{--}6^\circ$ ; II, m.  $186\text{--}7^\circ$ ; III, m.  $186\text{--}7^\circ$ ; IV, m.  $160\text{--}1^\circ$ ; V, m.  $170\text{--}1^\circ$ ; VI, m.  $160\text{--}1^\circ$ ; VII, m.  $169.5\text{--}70^\circ$ ; VIII, m.  $162\text{--}3^\circ$ . In the study of the depolymerization of these anhydrides, the product, size of ring, m. p. and stability were detd. Adipic, monomer, 7, m.  $20^\circ$ , unstable; I, monomer, 8, liquid, extremely unstable; II, dimer, 18, m.  $56\text{--}7^\circ$ , stable up to m. p.; III, monomer, 10, liquid, extremely unstable; sebacic, dimer, 22, m.  $68^\circ$ , stable up to the m. p.; IV, monomer, 12, liquid, extremely unstable; V, dimer, 26, m.  $76\text{--}8^\circ$ , stable up to the m. p.; VI, monomer, 14, liquid, unstable; VII, monomer, 15, liquid, unstable; VIII, monomer, 19, m.  $36\text{--}7^\circ$ , unstable. The  $\beta$ -anhydrides on being heated or allowed to stand readily revert to a polymeric form, the  $\gamma$ -anhydride; in their phys. properties these are generally practically indistinguishable from the  $\alpha$ -anhydrides; however, the latter structurally are probably open chains terminated by  $\text{Ac}$  groups while the former, at least when freshly formed under anhyd. conditions, are perhaps giant rings. XX. Many-membered cyclic esters. *Ibid.* 5031–9.—By heating linear polyesters with catalysts under certain conditions it is possible in many cases to bring about a smooth depolymerization to the corresponding monomeric and/or dimeric esters. This method makes it possible for the 1st time to prep. macrocyclic esters in good yields. The cyclic carbonates and oxalates are obtained most easily. The ratio in which the 2 forms, monomer (I) and dimer (II), are obtained is detd. in part by the exptl. conditions and in part by the nature of the ester, especially by its unit length. Monomers of 7–12 atoms are especially difficult to obtain. The following give the unit length, proportion of I and II in the distillate and the phys. properties: ethylene carbonate, 5, exclusively I, m.  $30^\circ$ , b.  $238^\circ$ ,  $n_D^{20}$  1.4158,  $d_4^{20}$  1.3079, trimethylene carbonate, 6, exclusively I, m.  $47\text{--}8^\circ$ , b.  $135^\circ$ ,  $n_D^{20}$  1.4409,  $d_4^{20}$  1.2282; tetramethylene carbonate, 7, mixt. of II, m.  $175\text{--}6^\circ$ , and tetrahydrofuran; pentamethylene carbonate, 8, exclusively II, m.  $117\text{--}8^\circ$ ; hexamethylene carbonate, 9, almost exclusively II, m.  $128\text{--}9^\circ$ ; heptamethylene carbonate, 10, almost exclusively II, m.  $97\text{--}8^\circ$ ; octamethylene carbonate, 11, almost exclusively II, m.  $116\text{--}7^\circ$ ; the I b.  $74\text{--}6^\circ$ , m.  $21.5\text{--}3^\circ$ ,  $d_4^{20}$  1.0727,  $n_D^{20}$  1.4065; nonamethylene carbonate, 12, almost exclusively II, m.  $95\text{--}5.5^\circ$ ; the I b.  $63\text{--}4^\circ$ , m.  $34\text{--}5^\circ$ ,  $d_4^{20}$  1.0240,  $n_D^{20}$  1.4528; decamethylene carbonate, 13, mixt. of I and II; II m.  $105\text{--}6^\circ$ ; I b.  $92\text{--}3^\circ$ , m.  $10\text{--}11^\circ$ ,  $d_4^{20}$  1.0354,  $n_D^{20}$  1.4659; undecamethylene carbonate, 14, mixt. of I and II; II m.  $97\text{--}7.5^\circ$ ; I b.  $104.5^\circ$ , m.  $40\text{--}1^\circ$ ,  $d_4^{20}$  0.9968,  $n_D^{20}$  1.4544; dodecamethylene carbonate, 15, almost exclusively I, b.  $118\text{--}9^\circ$ , m.  $11\text{--}2^\circ$ ,  $d_4^{20}$  1.0036,  $n_D^{20}$  1.4639; the II m.  $93\text{--}5^\circ$ ; tridecamethylene carbonate, 16, almost exclusively I, b.  $149\text{--}50^\circ$ , m.  $23\text{--}24.5^\circ$ ,  $d_4^{20}$  0.9888,  $n_D^{20}$  1.4622; tetradecamethylene carbonate, 17, only I, b.  $144\text{--}6^\circ$ , m.  $21\text{--}2^\circ$ ,  $d_4^{20}$  0.9814,  $n_D^{20}$  1.4622; octadecamethylene carbonate, 21, only I, b.  $165\text{--}9^\circ$ , m.  $36\text{--}7^\circ$ ,  $d_4^{20}$  0.9273,  $n_D^{20}$  1.4537; triethylene glycol carbonate, 11, mixt. of I and II, I being liquid; tetraethylene glycol carbonate, 14, only I, b.  $128\text{--}30^\circ$ , m.  $42\text{--}4^\circ$ ,  $d_4^{20}$  1.1961,  $n_D^{20}$  1.4569; decamethylene oxalate, 14, only I, b.  $125\text{--}6^\circ$ ,  $d_4^{20}$  1.0812,  $n_D^{20}$  1.4730; undecamethylene oxalate, 15, only I, b.  $120\text{--}3^\circ$ , m.  $23\text{--}4.5^\circ$ ,  $d_4^{20}$  1.0623,  $n_D^{20}$  1.4700; decamethylene malonate, 15, only I, b.  $117\text{--}8^\circ$ ,  $d_4^{20}$  1.0599,  $n_D^{20}$  1.4695; decamethylene succinate, 16, only II, m.  $108\text{--}9^\circ$ ; ethylene sebacate, 14, almost exclusively II, m.  $80\text{--}1^\circ$ ; trace of I, m.  $40\text{--}1^\circ$ ; ethylene undecanedioate, 15, II, m.  $143^\circ$ ; trace of I, m.  $35^\circ$ ; ethylene dodecanedioate, 16, only II, m.  $95\text{--}6^\circ$ ; ethylene tridecanedioate, 17, only II, m.  $145\text{--}6^\circ$ ; ethylene tetradecanedioate, 18, only II, m.  $102\text{--}3^\circ$ ; trimethylene sebacate, 15, only II, m.  $108\text{--}10^\circ$ ; self ester of  $\omega$ -hydroxy-pentadecanoic acid, 16, almost exclusively II, m.  $83\text{--}4^\circ$ ; the I m.  $31\text{--}2^\circ$ . 9-Decen-1-ol b.  $85\text{--}6^\circ$ ,  $d_4^{20}$  0.8446,  $n_D^{20}$  1.4480 (phenylurethan, m.  $49\text{--}50^\circ$ ). Mol. wts. of many of the above compds. in freezing  $\text{C}_6\text{H}_6$  are given. Macrocyclic esters show no tendency to polymerize spontaneously;

they do, however, polymerize at elevated temps. especially in the presence of catalysts for ester-interchange. **XXI. Physical properties of macrocyclic esters and anhydrides. New types of synthetic musks.** *Ibid.* 5039-43.—Macrocyclic esters and anhydrides have odors closely resembling those of the ketones and lactones of the same ring size. The rings in the neighborhood of 15 atoms have musk-like odors. The mol. refractions show a neg. exaltation. M. ps. in the carbonate series oscillate from 1 member to the next. **XXII. Stereochemistry and mechanism in the formation and stability of large rings.** W. H. Carothers and Julian W. Hill. *Ibid.* 5043-52.—The formation of macrocyclic ketones from salts of the dibasic acids probably involves first a linear polyketone which is subsequently cracked or decompd. The ketones thus follow a course already established for esters and anhydrides. The characteristic analogies and differences in the 3 series can be explained by taking into account the nature of the reactions involved and the steric effects of peripheral atoms. Rings of more than 5 atoms cannot be regarded as entirely strainless. The probable nature of the strains in large rings is indicated. C. J. West

**Hydrogenolysis of succinates and glutarates.** Bruno Wojcik and Homer Adkiss. *J. Am. Chem. Soc.* 55, 1939-46(1933).—Hydrogenolysis of  $(\text{CH}_3\text{CO}_2\text{Et})_2$  gives  $\text{HOCH}_2\text{CH}_2\text{CH}_2\text{CO}_2\text{Et}$ ,  $(\text{CH}_3\text{CH}_2\text{OH})_2$  (I), butyrolactone (II),  $\text{PrCO}_2\text{H}$  and probably tetrahydrofuran; I is obtained in 72% yield, together with 41 g. II, when 523 g. ester and II at 300 atm. are allowed to react at 250° over 30 g. Cu-Cr oxide. Succinic anhydride gives 31% II and some  $\text{PrCO}_2\text{H}$  and  $(\text{CH}_3\text{CO}_2\text{H})$ . Di-Et  $\alpha$ -methylsuccinate gives 72% of 2-methylbutane-1,4-diol,  $b_d$  126.7°, and some iso-AmOH; the  $\alpha$ -iso-Pr deriv. (100 g.) during 6.5 hrs. gives 7.3 g. alics.,  $b_d$  123.7°, 8.1 g. isohexyl alc., 3.2 g. 3,4-dimethylpentan-1-ol,  $b_d$  159-62°,  $n_D^{20}$  1.4261, 11.8 g. unchanged ester and 16.4 g. 2-isopropylbutane-1,4-diol,  $b_d$  119.22°,  $n_D^{20}$  1.4535. Di-Et  $\alpha$ -butyl- $\alpha$ -acetylsuccinate gives 79% of 2-butylbutane-1,4-diol,  $b_d$  135.7°,  $n_D^{20}$  1.4530; the  $\alpha$ -benzyl deriv. gives 35% of 2-benzylbutane-1,4-diol,  $b_d$  162.5°,  $n_D^{20}$  1.5210, and an equal quantity of 3-benzylbutan-1-ol. Di-Et  $\alpha,\gamma$ -dicarboxyglutarate (166 g.) gives 17.2 g. pentane-1,5-diol; 65 g. of the  $\beta$ -Me deriv. gives 18.2 g. of 3-methylpentane-1,5-diol; 153 g. of the  $\beta$ -Ph deriv. gives 13.8 g. 3-phenylpropan-1-ol, 47.6 g. of 3-phenylpentane-1,5-diol and 1.1 g. of 2,4-dimethylphenylpentane-1,5-diol; the  $\beta$ -Pr deriv. (40 g.) gives 14.2 g. alics. and H<sub>2</sub>O, 3.7 g. hexyl alc. and 8.7 g. 3-propylpentane-1,5-diol,  $b_d$  134.6°,  $n_D^{20}$  1.4569. Di-Et  $\alpha,\gamma$ -diacetyl- $\beta$ -phenylglutarate (79 g.) gives 40 g. 2,4-dichloro-3-phenylpentane-1,5-diol. Di-Et dodecamethylenedicarboxylate (202 g.) gives 141 g. tetradecane-1,14-diol. Di-Et  $\alpha$ -keto- $\beta$ -methylsuccinate (202 g.) gives 184 g. di-Et  $\alpha$ -hydroxy- $\beta$ -methylsuccinate; the  $\alpha$ -HO deriv. (102 g.) gives 53.5 g. alics. and  $\text{H}_2\text{O}$ , 19.3 g. 3-methylbutane-1,2-diol and 13.2 g. 2-methylbutane-1,4-diol. Di-Et  $\alpha$ -ethyl- $\alpha$ -acetyladipate,  $n_D^{20}$  1.4445 (46 g.), gives 2.6 g. alics.,  $b_d$  45.90°, and 18.1 g. 2-ethylpentane-1,5-diol. Di-Et  $\alpha,\gamma$ -diacetyl- $\beta$ -phenylglutarate (35 g.) gives 31.1 g. 3,5-dicarboxy-1-phenylheptane-2,6-diol,  $m$  162.3°. Di-Et  $\alpha$ -phenylsuccinate (38 g.) gives 16.2 g. 3-phenylbutan-1-ol and 3.2 g. 2-phenylbutane-1,4-diol. Di-Et  $\alpha$ -acetylsuccinate (144 g.) gives 40.2 g. alics. and H<sub>2</sub>O, 21.2 g. of a lactone,  $\text{C}_8\text{H}_{10}\text{O}_2$ ,  $b_d$  85.7°, and 38.9 g. glycols,  $b_d$  113-4°. Di-Et  $\beta$ -phenylglutarate (35 g.) gives 21.2 g. 3-phenylpentane-1,5-diol. Di-Et  $\alpha$ -acetylglutarate (139 g.) gives 18.3 g. of 2-ethylpentan-1,5-diol and pentane-1,5-diol. These results lead to certain conclusions with regard to the relation of structure to susceptibility to cleavage of C to C and C to O linkages and with regard to feasible methods for prep. various glycols and alics. C. J. W.

**Preparation of l-tartaric acid by the oxidation of d-gulonic lactone.** J. K. Dale and W. F. Rice, Jr. *J. Am. Chem. Soc.* 55, 4984-5(1933).—A yield of 1.6% of l-tartaric acid has been obtained by the oxidation of d-gulonic lactone, which is easily obtained from xylose. Details are given. C. J. West

**Hexacyanocobaltic acid and propyl alcohol.** Franz Hölzl, Walter Brell and Guido Schinko. *Monatsh.* 62, 349-58(1933).—As in the case with EtOH,  $[\text{Co}(\text{CN})_6]\text{H}_2$  (I) forms primary, secondary and tertiary salts with PrOH. This was verified by vapor-pressure measurements obtained upon evapn. of  $[\text{Co}(\text{CN})_6] \cdot (\text{PrOH})_3$  at 0°, 25° and 40°. On heating I in PrOH the acidity drops continuously until a const. value is reached. Addn. of water to the alc. accelerates the drop in proportion to the water content and reduces the acidity to a lower const. value. Among the reactions taking place under these conditions are (1) esterification with the formation of NC complexes, particularly in alc. with little or no water, (2) splitting off of HCN and formation of  $\text{RNH}_2$ , accelerated by the addn. of water. In 98 and 90% PrOH there were formed the equil. compds. II (violet) and III (dark rose), resp. These substances produce RNC and  $\text{RNH}_2$ , resp., when treated with NaOH. Upon heating III for a long time in *vacuo* there was obtained the water-insol. compd.  $[(\text{CN})_5\text{Co}(\text{CN})_2\text{Co}(\text{CN})_5]\text{H}_2$ ,  $[(\text{NC})_5(\text{H}_2\text{O})_2\text{CoCNCo}(\text{CN})_5(\text{H}_2\text{O})(\text{Pr})]\text{H}_2$ ,  $[(\text{NC})_5(\text{H}_2\text{O})(\text{OH})\text{CoCNCo}(\text{CN})_5(\text{H}_2\text{O})(\text{Pr})]\text{H}_2$  (II)  $[(\text{NC})_5(\text{H}_2\text{O})\text{CoCNCo}(\text{CN})_5(\text{H}_2\text{O})]\text{H}_2$ ,  $[(\text{NC})_5(\text{OH})\text{CoCNCo}(\text{CN})_5(\text{OH})]\text{H}_2$  (III).

I. M. Levine

**Dielectric constants. XI. Electric moment of amides and substituted ureas.** G. Devoto, with Raffaello Di Nola. *Gazz. chim. ital.* 63, 495-9(1933); cf. C. A. 27, 4227.—The elec. moments of some of the aq. polar compds. already studied were measured in non-polar org. solvents. The following data give the compds., their  $\mu$  values (in D) and the solvent ( $\text{C}_6\text{H}_6$  (I) or dioxane (II)):  $(\text{MeHN})_2\text{CO}$ , 5.1, I;  $(\text{EtN})_2\text{CO}$ , 3.3, I;  $\text{NCNH}_2$ , 3.8, I; pyrrolidone, 2.3, I;  $\text{AcNH}_2$ , 3.6, II;  $\text{BzNH}_2$ , 3.6, II;  $\text{PrHNCONH}_2$ , 4.1, II;  $\text{SO}_2(\text{NH}_2)_2$ , 3.9, II;  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CONH}_2$ , 4.9, II;  $p\text{-H}_2\text{NC}_6\text{H}_4\text{CONH}_2$ , 4.7, II. The high  $\mu$  values of the amides are noteworthy, i. e., they are of the same order of magnitude as those of nitriles. Nevertheless the existence of a semi-polar bond for the CN group is contradicted by the values of  $p\text{-O}_2\text{N}$ - and  $p\text{-H}_2\text{NC}_6\text{H}_4\text{CONH}_2$ , and the results indicate a strong elec. moment of a wholly different nature from that of nitriles. Substitution either of a pos. or of a neg. group increases the moment, in contrast to the effect in the couple:  $p\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$  and  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CN}$ . The identical  $\mu$  values of  $\text{AcNH}_2$  and  $\text{BzNH}_2$  (higher than that of  $\text{NH}_3$ ) indicate the incorrectness of the classical  $\text{RC}(\text{:O})\text{NH}$  formula of amides, and the greater probability of the  $\text{RC}(\text{:NH})\text{OH}$  formula, which can in turn be expressed in semi-polar form. In water, the semi-polar form of  $\text{AcNH}_2$  probably becomes polar,  $\text{MeC}(\text{:NH})^+\text{O}^-$ , whereas this does not happen to  $\text{BzNH}_2$ . While solid sulfamide is probably  $\text{O}_2\text{S}(\text{NH}_2)_2$ , in solvents with low dielec. consts. it has an amidic or semi-polar form, and in solvents with high dielec. consts. it has a polar form. In general the results show the irregular character of the  $\text{CONH}_2$  substituent, and the influence of the solvent on the structure of the mol. bonds. C. C. Davis

**Mechanism of carbohydrate oxidation. XVI. Action of aqueous solutions of potassium hydroxide on l-rhamnose.** Gale F. Nadeau, Mildred Rathff Newlin and Wm. L. Evans. *J. Am. Chem. Soc.* 55, 4957-63(1933); cf. C. A. 27, 1580.—The yields of lactic acid from l-rhamnose (shown as curves) lie between those from glucose and mannose on the one hand and arabinose on the other at 50° and 75°; in the case of xylose the yields of lactic acid are still higher than those from arabinose. The yields of  $\text{AcCHO}$  are influenced by the temp. and the concn. of the alkali employed; at 75° the max. is much lower than at 50°. There is no way to differentiate between glyceric and lactic aldehydes as the source of pyruvic aldehyde osazone in the case of rhamnose, which is more like the hexoses than arabinose in this respect.

C. J. West

**Mutarotation of  $\alpha$ -l-glucose in heavy water.** Eugene Pascu. *J. Am. Chem. Soc.* 55, 5056-7(1933).—A sample of  $\alpha$ -l-glucose which shows a velocity coeff. of mutarotation in  $\text{H}_2\text{O}$  of 0.00540, shows in  $\text{H}_2\text{O}$  of  $d_2^{20}$  1.06 a coeff.

0.00290. It is concluded that on soln. of a reducing sugar in heavy  $H_2O$  the displaceable H atom of that sugar is immediately replaced by a heavy H atom of the heavy  $H_2O$  and that the mutarotation is indeed due to oxo-cyclo desmotropy. C. J. West

**A new acetonefructose. Derivatives of  $\gamma$ -fructose.** Leonidas Zervas and Pius Sessler. *Ber.* 66B, 1698 703 (1933).—Fructose cyanohydrin, obtained in 15 g. yield from 18 g. fructose in 15 cc. water at 0° treated with 1 cc. of 20% aq.  $NH_3$  and 8 cc. anhyd. HCN, m. 114–15° (hexaacetate, m. 80–2°), gives with  $BzCl$  and pyridine 91% of the *pyridine addn. product* (I),  $C_{21}H_{35}O_8N \cdot C_5H_5N$ , m. 128° (cor.),  $[\alpha]_D^{25} - 13.3^\circ$  (pyridine), of 1,6-dibenzoyl-fructose cyanohydrin (II), m. about 150°. The free II can be obtained, with great loss, by recrystg. I from alc. contg. a little HCl, but it is not stable. When I is dissolved in AcOH, the pyridine is replaced by AcOH; the *product*,  $C_{21}H_{37}O_8N \cdot AcOH$ , m. 140° (cor.). I cannot be tritylated, which indicates that it contains no free primary alc. groupings. Boiling of I in AcOEt with  $Ag_2CO_3$  eliminates the HCN and gives 91% 1,6-dibenzoylfructose (III), m. 114–15° (cor.),  $[\alpha]_D^{25} - 7.3^\circ$  (alc.) 5 min. after soln., 2.0° (const.) after 10 hrs.; in glacial AcOH the end value,  $[\alpha]_D^{25} 1.8^\circ$ , is reached at once. That there is no rearrangement in the reaction is indicated by the regeneration of I from III with HCN in pyridine. With acetone contg. a little concd.  $H_2SO_4$ , 8 g. III gives 5.5 g. 1,6-dibenzoyl-2,3-acetone- $\alpha$ -d-fructofuranose (IV), m. 118° (cor.),  $[\alpha]_D^{25} 13.5^\circ$  (alc.), 12.7° (acetone), does not reduce Fehling soln. and forms a *benzoate* (V),  $C_{26}H_{35}O_9$ , m. 137° (cor.),  $[\alpha]_D^{25} - 9^\circ$  (acetone). 2,3-Acetone- $\alpha$ -d-fructofuranose VI (1.6 g. from 3.5 g. IV in aq. MeOH with  $Ba(OH)_2$ ), m. 50°,  $[\alpha]_D^{25} 18.9^\circ$  (water),  $[\alpha]_D^{25} 14.1^\circ$  (acetone), is strongly hygroscopic, does not reduce Fehling soln. even after long boiling, is not further acetonated by shaking 5 days in acetone with anhyd.  $CuSO_4$  and cannot be oxidized by  $Ph(OAc)_2$  according to Criegee (therefore contains no adjacent free HO groups), gives with  $BzCl$  in pyridine the tri-Bz deriv. (V), with AcO-pyridine a *triacetate*, m. 55°,  $[\alpha]_D^{25} - 8^\circ$  (EtOH), and with  $Ph_2CCl$  in pyridine a *dibenzyl deriv.* in 15% (cor.),  $[\alpha]_D^{25} - 5.2^\circ$  (pyridine). Like all acetone-sugars, VI is stable toward alkalis but is easily hydrolyzed by acid. Polarimetric measurements of the hydrolysis in 0.5 N HCl at 20° give for  $K$  6.19 to  $7.02 \times 10^{-4}$ , in N HCl  $6.75 \times 10^{-4}$ , i. e., value about  $1/4$  that for sucrose. C. A. R.

**Nitro derivatives of  $\beta$ -diketones.** N. J. Toivonen, E. Oja and O. Ojala. *Acta Chem. Fennica* 6B, 67 8 (1933) (in German).—2,5,5-trimethyl-1,3-cyclohexanedione (I) was prepd. by heating a mixt. of MeBr, MeONa and 2,5-dimethyl-1,3-cyclohexanedione in an autoclave. I on soln. in concd. or moderately dil.  $HNO_3$  nitrated readily to yield 2-nitro-2,5,5-trimethyl-1,3-cyclohexanedione (II), needles, m. 145–3°. II with strong NaOH in a N atm yielded the di-Na salt of  $\beta,\beta$ -dimethyl- $\delta$ -keto- $\epsilon$ -nitroheptanoic acid (III) in good yields. The Ag salt is difficultly sol. III seps. from ether-petr. ether in broad needles, m. 60–2°. The di-Na salt of III on treatment with NaOBr yielded an oil  $C_{12}H_{17}BrNO_2$ , b. 165–7°, which was identified as  $\alpha,\alpha$ -dibromonitroethane, and  $\epsilon,\epsilon$ -dimethylglutaric acid. Although the action of alkali on II opened the ring, reduction in acid or neutral soln. split off the nitro group. Sn and HCl gave 90.6% and  $Na_2SO_3$ , 82% of the calcd.  $NH_3$ . Zn and AcOH yielded 91.5% of the calcd.  $NO$ . All reductions gave I in good yields in the pure state. S. A. Karjala

**Synthesis of some cyclic  $\Delta^2$ -unsaturated ketones.** R. S. Thakur. *J. Chem. Soc.* 1933, 1481 5.— $\alpha$ -Cyclohexylidenepropionyl chloride and MeZnI give  $\alpha$ -methylcyclohexylidenecetone (I), the semicarbazone of which was split into 2 fractions, m. 193–3° (II) and 155–60° (III). The I regenerated from II by  $(CO_2H)_2$ , b. 91–8°,  $d_4^{20} 0.9410$ ,  $n_D^{20} 1.4877$ ,  $J$  4.4% (5 min.), 5.9% (10 min.); oxidation gives cyclohexanone; the semicarbazone is a mixt. of II and III. The I from III b. 100–1°,  $d_4^{20} 0.9412$ ,  $n_D^{20} 1.4857$ ,  $J$  12.9% (5 min.), 14.8% (10 min.).  $\alpha$ -Methylcyclohexenylacetone (IV), b. 93–4°,  $d_4^{20} 0.9287$ ,

$n_D^{20} 1.4701$ ,  $J$  89.1% (5 min.), 98% (10 min.). Starting with I, the % of  $\Delta^2$ -ketone decreased from 98% in 30 min. to 10% in 63 hrs. The fully equilibrated ketone gives a semicarbazone m. 170°, depressing the m. p. of II. Catalytic reduction of  $\alpha$ -cyclohexylidene- or  $\alpha$ -cyclohexenylpropionic acid gives  $\alpha$ -cyclohexylpropionic acid, m. 62°; chloride (V), b. 91–4°; amide, m. 156–7°; anilide, m. 135–6°; *p*-toluide, m. 155–6°. Reduction of IV gives  $\alpha$ -methyl- $\alpha$ -cyclohexylacetone (VI), b. 80–90°,  $d_4^{20} 0.9130$ ,  $n_D^{20} 1.4582$ , and  $\gamma$ -cyclohexyl-*sec*-butyl alc., b. 109–10°,  $d_4^{20} 0.9215$ ,  $n_D^{20} 1.4715$ ; oxidation gives VI. VI was also prepd. from V and MeZnI. The semicarbazone of VI (3 fractions) m. 110–20°, 113–18° and 155–6°. 2-Methylcyclohexylidenecetone (VII), regenerated from the semicarbazone, m. 197°, b. 99–101°,  $d_4^{20} 0.9399$ ,  $n_D^{20} 1.4908$ ,  $J$  5.7% (5 min) and 7.0% (10 min.). 2-Methylcyclohexenylacetone, b. 102°,  $d_4^{20} 0.9361$ ,  $n_D^{20} 1.4774$  (semicarbazone, m. 174–5°). The % of  $\Delta^2$ -ketone in VII decreased from 85% after 10 min. to 7.5% in 42 hrs.; the value at equil. may be taken as 90% of the  $\Delta^2$ -ketone; mobility about 175, time for half-change 47 min.; the equilibrated ketone gives the  $\beta$ -semicarbazone, m. 170°.  $\alpha$ -Methyl-*trans*-decalydranaphthylidene-2-acetone,  $d_4^{20} 0.9678$ ,  $n_D^{20} 1.5025$ ,  $J$  39.7% (10 min.), thus contg. the  $\Delta^2$ -ketone; the semicarbazone m. 214–5° (decompu.). After treating with 2 N  $HClONa$  for 5 days, the ketone had  $n_D^{20} 1.4933$ ,  $J$  70.2% (10 min.); the semicarbazone m. 195–6° and did not depress the m. p. of the  $\beta$ -semicarbazone. C. J. West

**Naphthenic and naphthenesulfonic acids.** IV. V. VI. M. Naphtali. *Fellchem. Umschau* 40, 219 23 (1933); cf. C. A. 27, 5062; 28, 4681.—A summary of recent publications, discussing the constitution and giving a table of consts. for various naphthenic acids from Roumanian crude, illuminating and lubricating oil, from gas and from Californian, German and Galician oil. The analysis and methods of analysis are discussed. P. Escher

**The quantum mechanical stability of a benzene molecule.** M. Markov. *J. Chem. Physics* 1, 784 8 (1933).—The Heitler-London-Rumer treatment of valence bonds is applied to benzene, considered as a system of 6 trivalent CH groups. Partial soln. of the secular equation of the 34th degree shows that this model of the benzene ring is unstable relative to 3 HIC CH mol., in disagreement with expt. This method does not recognize the directional properties of Slater-Pauling valence bonds.

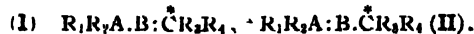
Gerald M. Pettv

**Catalytic oxidation of ethylbenzene in the liquid phase.** C. E. Semseman and J. J. Stubbs. *Ind. Eng. Chem.* 25, 1266 7 (1933); cf. C. A. 26, 5921. —Bubbling  $O_2$  through PhEt in the presence of pptd.  $MnO_2$  catalyst for 5.75 hrs. yields PhCOMe (51.8% max., at 115°),  $BzOH$  (36.5% max., at 120°) and  $PhCH(OH)Me$  (11.7–16.3%). The best yield of PhCOMe (63.2%) was obtained by keeping the temp. at 130° for 45 min. (induction period), followed by 5 hrs. at 115°. T. H. Chilton

**Pseudonitrosite of asarone.** Viktor Bruckner. *J. prakt. Chem.* 138, 268 74 (1933).—Asarone (2,4,5-(MeO) $_3$ - $C_6H_2CH_2CH_2CH_2Me$ ) (I) in  $Et_2O$  and satd. aq.  $NaNO_2$ , treated with 20%  $H_2SO_4$ , give 80% of the *pseudonitrosite* (II),  $(C_{12}H_{17}O_6N_2)_2$ , yellow, m. 130° (decompu.); a by-product is 2,4,5-(MeO) $_3$ - $C_6H_2H_2NO_2$ . I and  $NaNO_2$  in AcOH at 50–60° give the *glyoxime peroxide* of  $\alpha,\beta$ -diketodihydroasarone, m. 149°. II (10 g.) with 8%  $BzOH$ -KOH gives 7.2 g.  $\beta$ -nitroasarone (III), m. 101°; this exists in 2 forms, red and yellow prisms; it does not add Br in  $CS_2$ . At the b. p. there results 3.5 g. III and 3 g. acrylaldehyde. Elec. reduction of III gives  $\beta$ -amino-dihydroasarone, m. 187°. II and  $Ac_2O$  with a little  $H_2SO_4$  give  $\alpha$ -acetoxy- $\beta$ -nitrodihydroasarone, golden yellow, m. 141°;  $BzOH$ -KOH gives III. C. J. West

**Optical activity in relation to tautomeric change. I. Conditions underlying the transport of the center of asymmetry in tautomeric systems.** C. K. Ingold and C. L. Wilson. *J. Chem. Soc.* 1933, 1493–505.—The immediate question may be stated as follows: given 2 mutually convertible triad tautomerides (I and II), each contg. only

1 asym. center (\*), which is in each case situated at the point of attachment of the mobile group [X], it is required to find whether an optically active modification of I would, on conversion under ordinary non-asym. conditions, yield an optically active tautomer (II):



[X]

[X]

The theoretical object is concerned with the problem of whether or not particular electron pairs are mechanistically coupled in conjugated electrometric systems. The original should be consulted for the discussion. Mesityl oxide and PhMgBr give an oil, probably PhMeC(OH)-CH:CM<sub>2</sub>, which cannot be esterified and is readily dehydrated to  $\gamma$ -phenyl- $\alpha$ -methylbutadiene, b<sub>18</sub> 94.6°, possibly identical with Klages'  $\alpha$ -phenyl- $\alpha,\gamma,\gamma$ -trimethylallene (Ber. 37, 2305(1904)).  $\alpha$ -Phenylcrotyl alc. (III), b<sub>1</sub> 88-90°, n<sub>D</sub><sup>20</sup> 1.5412; C<sub>6</sub>H<sub>5</sub>(CO)<sub>2</sub>O, alone or in C<sub>6</sub>H<sub>5</sub>N, gives  $\alpha$ -phenylbutadiene and a dimer, b<sub>1</sub> 160°; III and succinic anhydride at 100° for 30 hrs. give  $\alpha$ -phenylcrotyl succinate, m. 72-80°, which is probably a mixt. of *cis*- and *trans*-isomers; in C<sub>6</sub>H<sub>5</sub>N there results 80% of a II succinate, m. 76-8°.  $\alpha$ -Ethylcrotyl alc., b<sub>70</sub> 135-42°, was sepd. into 6 fractions; that b<sub>70</sub> 137.1° (30% of the total) gives a *p*-nitrobenzoate, m. 42-3.5°, a 3,5-dinitrobenzoate, m. 47-8°, and a *H* phthalate, m. 51.3°; these crystallize with difficulty. 3-Phenyl-2-methylindenone (IV) gives a 2,4-dinitrophenylhydrazones, deep red, m. 250° (decompn.); 3-phenyl-2-methylindanone gives a 2,4-dinitrophenylhydrazones, red, m. 176-7°. IV and PhMgBr give 1-hydroxy-1,3-diphenyl-2-methylindene, m. 92°; catalytic reduction and distn give 1,3-diphenyl-2-methylindene, m. 108°; attempts to introduce a H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub> or Me<sub>2</sub>NC<sub>6</sub>H<sub>4</sub> group were not successful; in 1 expt. Me<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>MgBr in C<sub>6</sub>H<sub>5</sub>N gave *p*-dimethylaminophenylpyrrolidine, buff, m. 228-9°. Details are given of the reduction of fluorenone oxime with a 90% yield of 9-fluorenylamine (V); with PhAc at 100° there results 50% of  $\alpha$ -phenylethylidene-9-fluorenylamine (VI), m. 156.5-7.5°, and some fluorenylidene-9-fluorenylamine (VII), S-yellow, m. 175° (decompn.); VII also results from V and fluorenone. If the reaction is carried out at 140-50° or if V is heated at 180°, bifluorenyl is formed. Warming VI with 1.33 *N* EtOH-EtONa at 85° for 4 hrs. gives a mixt. of azomethines which could not be sepd.; by-products were also formed which complicated the reaction. Phthalobenzohydrylimide, m. 149-50°, results from Ph<sub>2</sub>CHBr and C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>NH or C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>NK or from Ph<sub>2</sub>CHNH<sub>2</sub> and C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>O. Ph<sub>2</sub>CHN:CHPh (VIII) and Ph<sub>2</sub>C:NCHPh (IX) form a eutectic mixt., m. 50°, contg. 25% of VIII; the equil. mixt. contains 57% of IX; the unimol. velocity const. is 0.50 min.<sup>-1</sup>. Benzohydrylidenebenzohydrylamine, m. 152°, results from Ph<sub>2</sub>CHNH<sub>2</sub> and Ph<sub>2</sub>CCl<sub>2</sub>; benzohydrylidene- $\alpha$ -phenylethylamine, from Ph<sub>2</sub>CCl<sub>2</sub> and MePhCHNH<sub>2</sub>, m. 52°; the *p*-Me deriv., from *p*-MeC<sub>6</sub>H<sub>4</sub>CCl<sub>2</sub>Ph, pale yellow green oil, b<sub>0</sub> 198-201°; isomerization was very slow. The *p*-Cl deriv. (X) b<sub>0</sub> 195-8°, from *p*-ClC<sub>6</sub>H<sub>4</sub>CCl<sub>2</sub>Ph (b<sub>1</sub> 160°, b<sub>2</sub> 207-9°); the equil. mixt. with EtOH-EtONa contains approx. equal proportions of the 2 isomers and half-conversion to equil. occurs in about 2 days. *l*-MePhCHNH<sub>2</sub> (XI), b<sub>1</sub> 54°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -22.92° (benzoate, m. 163.3.5°); *d*-MePhCHNH<sub>2</sub> (XII), b<sub>70</sub> 187°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> 22.22°. Optically active X from impure XII has [ $\alpha$ ]<sub>D</sub><sup>20</sup> -4.32°, [ $\alpha$ ]<sub>D</sub><sup>25</sup> -5.58° (EtOH, c 5.56°); on hydrolysis the XII recovered often had a higher rotation than the XII used; this was not observed with optically pure XII. XI gives a X with [ $\alpha$ ]<sub>D</sub><sup>20</sup> 13.9°, [ $\alpha$ ]<sub>D</sub><sup>25</sup> 19.4° (1.932 g. in 25 cc. EtOH). The isomer produced by isomerization, PhMeC:NCHPhC<sub>6</sub>H<sub>4</sub>Cl, had no perceptible rotatory power. *p*-Chlorobenzohydrylamine (XIII) b<sub>0</sub> 161°, b<sub>14</sub> 193°; *l*-Cl salt, m. 304-5° (decompn.); benzoate, m. 163.5-4°; aceto-*p*-chlorobenzohydrylamide, m. 132°. XIII could not be resolved through the *d*- $\alpha$ -bromocamphor-*s*-sulfonate, m. 251°. The *l*-malate m. 171°, [ $\alpha$ ]<sub>D</sub><sup>25</sup> -5.4° (1 g. in 25 cc. MeOH); the *H* *l*-malate m. 100° (decompn.),

[ $\alpha$ ]<sub>D</sub><sup>25</sup> 0.46° (1 g. in 25 cc. MeOH); the *d*-bromocamphor-10-sulfonate of *l*-XIII m. 218° and gives a *l*-XIII with [ $\alpha$ ]<sub>D</sub><sup>25</sup> -206°.  $\alpha$ -Phenylethylidene-*p*-chlorobenzohydrylamine could not be purified.

C. J. West

The influence of substituents on the rate of saponification of benzal chloride. Fritz Asinger and Gunther Lock *Monaish.* 62, 323-43(1933).—The speed of hydrolysis of PhCHCl<sub>2</sub> (I) and its 2-, 3- (II) and 4-Cl, 2- (III), 3- (IV), and 4-Me, 2-, 3-, and 4-nitro-, 2,5-, 3,5- and 2,6-Cl<sub>2</sub>, 2,3,6-tri-Cl (V) and 2,4,6-tri-Me (VI) derivs. were detd. in 50 or 71% Me<sub>2</sub>CO at 50° or 50% EtOH (96.7%) at 83.5°, according to the speed. The hydrolysis is a pseudo 1st order reaction, the speed being independent of the actual concn. of the reactant. The results showed that the Cl and NO<sub>2</sub> derivs. were hydrolyzed more slowly than I while the Me compds. reacted faster. With increasing no. of like constituents the increase or decrease was multiplied tremendously. The speed of hydrolysis of the NO<sub>2</sub> derivs. was of the same order as that of the di-Cl compds. The effect of the substituents was qualitatively the same as that in PhCH<sub>2</sub>Cl and in either case cannot be explained by steric hindrance for it depends not upon their position but on their kind and no. In 50% Me<sub>2</sub>CO the "half-value time," i. e., the time necessary for 50% of the substance to be hydrolyzed, was 5, 155 and 0.03; times that in 50% EtOH at 50° and 83.5° and 71% Me<sub>2</sub>CO, resp. The following new compds. used in the work were prepd. by the action of PCl<sub>5</sub> on the corresponding aldehyde. The no. in parenthesis designates yield; the acid and yield obtained upon refluxing the compd. with KMnO<sub>4</sub> are noted in some cases. II (75), b<sub>70</sub> 235-7°, b<sub>11</sub> 105°, 70% 3-ClC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H. V (81), b<sub>12</sub> 145.50°, m. 83°. III (80), b<sub>12</sub> 105.7°, *o*-MeC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H. IV (85), b<sub>11</sub> 110.1°; the aldehyde was obtained in 25% yield from *m*-MeC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>. VI (85), b<sub>12</sub> 139-40°, m. 37°, 70% 2,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>CO<sub>2</sub>H.

I. M. Levine

Tris(arylamino)ethylenes. VI. The colored by-products from the synthesis of tris(arylamino)ethylenes. Rinosuke Shibata and Tetsunosuke Nishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 625-30(1933); cf. C. A. 28, 475<sup>1</sup>. Two by-products were obtained in the reaction between *p*-toluidine and CCl<sub>4</sub>:CHCl, one as yellow needles, m. 141°, and the other as black-red needles, m. 207°. The yellow compd. has the general formula RN.C.(NHR)CH:NR, where R is the aryl radical and the particular compd. had the formula C<sub>22</sub>H<sub>22</sub>N<sub>3</sub>. Identification tests are described.

Karl Kammermeyer

The velocity of diazotization of aromatic amines. Shigezo Ueno and Tazō Susuki. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 615 19(1933).—The velocity of diazotization of 47 amines in 0.05-4 *N* HCl and of 10 amines in 0.05-1 *N* HBr was detd. and found to depend mainly on the kind and concn. of acid used and to be practically independent of the H<sup>+</sup> concn. beyond a certain limit.

Karl Kammermeyer

Replacement of the diazo group by the acetoxy group H. L. Haller and P. S. Schaffer. *J. Am. Chem. Soc.* 55, 4954-5(1933).—*m*-ClC<sub>6</sub>H<sub>4</sub>N<sub>2</sub>BF<sub>4</sub> and AcOH, gently heated, give about 50% of *m*-chlorophenyl acetate, b<sub>2</sub> 84-6°, b<sub>12</sub> 108°. *p*-AcNHCC<sub>6</sub>H<sub>4</sub>N<sub>2</sub>BF<sub>4</sub>, decompn. 135° (cor.) (84% yield), and Ac<sub>2</sub>O give 52% of *p*-AcNHC<sub>6</sub>H<sub>4</sub>OAc, m. 151.5-2.5° (cor.). Since the aryl acetates are readily hydrolyzed to the phenols, the reaction provides a ready method of replacing the NH<sub>2</sub> group by the HO group when the normal decompn. of the diazo body with H<sub>2</sub>O does not take place.

C. J. West

The reaction between diazonium salts and trinitromethane. G. Ponzio. *Gazz. chim. ital.* 63, 471-8(1933).—Earlier expts. on the action of ArN<sub>2</sub>OAc compds. on KC(NO<sub>2</sub>)<sub>3</sub> (C. A. 10, 1178; 11, 1155) established the formation of compds. of the ArN<sub>2</sub>C(NO<sub>2</sub>)<sub>3</sub> type. On the other hand, the formation of Ar(CH<sub>2</sub>O<sub>2</sub>N<sub>3</sub>) and ArN:NC(OH):NOH compds. by their decompn. is, in the face of later expts., incorrect. However, the belief of Quilico (C. A. 26, 5950; 27, 1348) that the decompn. products are ArN(NO)N:CO compds. is also incorrect because they do not give the reactions of *N*-NO deriva. of aryl-

hydrazines or of NO or :CO groups. Instead,  $\text{Ar}(\text{CO}_2\text{N})_2$  compds. are internal anhydrides of  $\text{ArN}(\text{:NOH}): \text{NCO}_2\text{H}$

acids, i. e.,  $\text{O.N:NAr:N.CO}$ , which agrees with their decomn. upon fusion, their stability toward water,  $\text{H}_2\text{O}$ ,  $\text{PhNH}_2$ , etc., and their reactions with alk. alcoholates. With cold  $\text{MeOK}$  and  $\text{EtOK}$  they give 100% yields of the K salts of the acid esters, thus

$\text{CO.N:NAr:N} + \text{ROK} \rightarrow \text{ArN}(\text{:NOK}).\text{NCO}_2\text{R}$ . The latter compds. with dil. acids form  $\text{ArN}(\text{NO})\text{N}(\text{NO})_2\text{R}$  compds., already prepd. by Longo (cf. C. A. 8, 1234). The reaction between  $\text{Ar}(\text{CO}_2\text{N})_2$  compds. and strong bases is not simply:  $\text{Ar}(\text{CO}_2\text{N})_2 \rightarrow \text{ArN}_2 + \text{O}_2$ , because N is liberated and  $\text{ArN}_2$  and  $\text{CO}_2$  are formed or decomn. of salts of  $\text{ArN}(\text{:NOH}): \text{NCO}_2\text{H}$  acids, which are first formed from  $\text{Ar}(\text{CO}_2\text{N})_2$  compds. Contrary to Julico (loc. cit.), the behavior of  $\text{ArN}_2\text{C}(\text{NO}_2)_2$  compds. is not analogous to that of  $\text{ArN}_2\text{C}(\text{NO}_2)_2\text{Ph}$  compds. (cf. P, C. A. 8, 2692), and since the former contain an extra  $\text{NO}_2$  group they should in moist  $\text{Et}_2\text{O}$  first form  $\text{ArN}(\text{NO})\text{N}(\text{NO})\text{CONO}_2$  compds. and then by the action of water should form  $\text{ArN:NCONO}_2$  compds. (under the same conditions  $\text{ArN}_2\text{C}(\text{NO}_2)_2\text{Ph}$  compds. form successively  $\text{ArN}(\text{NO})\text{N}(\text{NO})\text{Bz}$ ,  $\text{ArN}(\text{NO})\text{NHBz}$  and  $\text{ArN:N}$  compds.). It is moreover very improbable that  $\text{Ar}(\text{CO}_2\text{N})_2$  compds. are formed from  $\text{ArN}_2\text{C}(\text{NO}_2)_2$  compds. by elimination of  $\text{N}_2\text{O}$ . Even if  $\text{ArN}_2\text{C}(\text{NO}_2)_2$  compds. are azo derivs., this is not true of  $\text{ArN}_2\text{C}(\text{NO}_2)_2$  compds., and the latter are diazonium salts, as is established by the present expts. and by the constitution of  $\text{Ar}(\text{CO}_2\text{N})_2$  compds. into which they are transformed the compd.  $p\text{-O.NC}_6\text{H}_4(\text{CO}_2\text{N})_2$  (I) formed by the action of  $\text{ArH}$  on  $p\text{-O.NC}_6\text{H}_4\text{N}_2\text{C}(\text{NO}_2)_2$  (cf. Quilico, C. A. 27, 148) can also be prepd. by the action of concd.  $\text{HNO}_3$  on

$\text{Ph}(\text{CO}_2\text{N})_2$ . Its structure is  $\text{O.N:N}(\text{C}_6\text{H}_4\text{NO}_2\text{-}p)\text{:N.CO}$ , and it is straw-yellow, m.  $165^\circ$ , sol. in concd.  $\text{H}_2\text{SO}_4$  without coloration even with  $\text{PhOH}$ , gives with  $\text{PhNH}_2$  a bright red color, which disappears on exposure to air, does not react with  $\text{PhNHNH}_2$  in  $\text{Et}_2\text{O}$ . In ice-cold abs.  $\text{EtOH}$  it reacts with alc. KOH thus:  $\text{I} + \text{KOH} \rightarrow p\text{-O.NC}_6\text{H}_4\text{N}(\text{:NOK}).\text{NCO}_2\text{K}$ , in fact addn. of dil.  $\text{H}_2\text{SO}_4$  gives 100% of  $p\text{-O.NC}_6\text{H}_4\text{N}(\text{NO})\text{NHC(O)Et}$ . Under similar conditions I and  $\text{MeOK}$  form 100% of  $p\text{-O.NC}_6\text{H}_4\text{N}(\text{NO})\text{NHC(O)Me}$ . C. C. Davis

**Interaction of chloro-substituted aldehydes with chloro-substituted arylhydrazines** F. D. Chattaway and Allan Alder *J. Chem. Soc.* 1933, 1484-90. 2,5- $\text{Cl}_2\text{C}_6\text{H}_3$ ,  $\text{NHNH}_2$ ,  $\text{HCl}$  (I) and butylchloral hydrate (II), shaken with  $\text{EtOH}$  for 0.5 hr, give 2,5-dichlorobenzeneazo- $\beta$ , $\gamma$ -chloro  $\Delta^9$ -butylene (III), red, m.  $101^\circ$ ; on standing gives VI. III in  $\text{C}_6\text{H}_6$  with  $\text{HCl}$  gives the pale yellow 2,5-dichloro 2,5-dichlorophenylhydrazone, which loses  $\text{HCl}$  when warmed, giving III. Boiling III in  $\text{C}_6\text{H}_6$  gives 2,5-dichloro 2,5-dichlorophenylhydrazone (IV), m.  $90^\circ$  (Ac deriv. (V), m.  $150^\circ$ ). I and II in  $\text{AcOH}$  give isomer (VI) of IV, pale yellow, m.  $116^\circ$  (Ac deriv. (VII), m.  $139^\circ$ ). Either V or VII, satd. with  $\text{Cl}$  in hot  $\text{CHCl}_3$ , gives  $\alpha,\alpha,\beta,\beta$ -tetrachlorobutylaldehyde 2,5-dichloro- $\Delta^9$ -butylphenylhydrazone, m.  $154^\circ$ ; reduction gives 2,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{NH}_2$ . II and 2,4,5- $\text{Cl}_3\text{C}_6\text{H}_2\text{NHNH}_2$  (VIII) in  $\text{EtOH}$  at  $40-50^\circ$  give  $\alpha,\beta$ -dichloro 2,4,5-trichlorophenylhydrazone, pale yellow, m.  $86^\circ$  (Ac deriv., m.  $123^\circ$ ). In boiling  $\text{EtOH}$  II and VIII give  $\beta$ -chloro- $\alpha$ -ketobutylaldehyde 2,4,5-trichlorophenylhydrazone, pale yellow, m.  $102^\circ$ ; boiling with 2,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{NHNH}_2$  in  $\text{EtOH}$  gives the 2,4,5,2',5'-pentachlorodiphenylazone of  $\alpha$ -ketobutylaldehyde, yellow, m.  $212^\circ$ . I and chloral hydrate in  $\text{H}_2\text{O}$  give 2,5-dichlorobenzeneazo- $\beta,\beta$ -dichloroethylene, orange-red, m.  $93^\circ$ . In  $\text{EtOH}$  the reaction product is 1,1-glyoxylate 2,5-dichlorophenylhydrazone, yellow, m.  $140^\circ$ ; the 2,4,5-tri- $\text{Cl}$  deriv. m.  $102^\circ$ . Either  $\text{Cl}$  deriv. in  $\text{CHCl}_3$ , satd. with  $\text{Cl}$ , gives  $\beta$ -chloroglyoxylate 2,4,5-trichlorophenylhydrazone, pale yellow, m.  $115^\circ$ ; concd.  $\text{NH}_4\text{OH}$  gives the  $\omega\text{-NH}_2$  deriv., m.  $140^\circ$ . C. J. West

**Glucoisidic azo dyestuffs.** Burckhardt Helferich, Otto

Lang and Ernst Schmitz-Hillebrecht. *J. prakt. Chem.* 138, 275-80 (1933).— $\alpha\text{-C}_6\text{H}_4(\text{OH})_2$ ,  $\beta$ -pentaacetyl-d-glucose and  $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{H}$ , heated 40 min. at  $125-30^\circ$ , give 40% of tetraacetylpyrocatechol- $\beta$ -d-glucoside, m.  $114-6.5^\circ$ ,  $[\alpha]_D^{25} -15.1^\circ$  ( $\text{CHCl}_3$ );  $\text{N NaOH}$  gives pyrocatechol- $\beta$ -d-glucoside, crystals with 1 mol.  $\text{Me}_2\text{CO}$ , m.  $129-33^\circ$ ,  $[\alpha]_D^{25} 71^\circ$  ( $\text{H}_2\text{O}$ ); it is split by emulsin.  $\text{Ph-N}_2\text{Cl}$  gives 3,5-bis(benzeneazo)pyrocatechol-1- $\beta$ -d-glucoside, violet, m.  $214-51^\circ$  (decompn.); the Na salt is orange-red;  $p\text{-MeOC}_6\text{H}_4\text{N}_2\text{Cl}$  gives 4-methoxy- $\beta$ -d-glucosido-4'-hydroxyazobenzene, m.  $220-2^\circ$ , split by emulsin diazobenzene-sulfonic acid gives Na 3- $\beta$ -d-glucosido-4'-hydroxyazobenzene- $t'$ -sulfonate, amorphous, orange-red,  $[\alpha]_D^{25} -41^\circ$  ( $\text{H}_2\text{O}$ ). All m ps. are cor. C. J. W

**Course of oxidation of primary hydrazines. II. Action of oxidizing acids upon primary aromatic hydrazines.** (I). A. Zeide, S. M. Sherlin and G. I. Bras. *J. prakt. Chem.* 138, 225-30 (1933); cf. C. A. 27, 4784.— $\text{PhNHNH}_2$  (I) and excess  $\text{HClO}_3$  give 30%  $\text{PhCl}$ ;  $\text{HIO}_3$  gives 25%  $\text{PhI}$ ;  $\alpha$ -quinolyldiazine and  $\text{HIO}_3$  give 25%  $\alpha$ -iodoquinoline and 20% of carbostyryl. I and  $\text{H}_2\text{AsO}_4$  at  $0^\circ$  give phenylhydrazine arsenate,  $\text{I.H}_2\text{AsO}_4$ , which is decomd. by  $\text{Cu}$  in  $\text{H}_2\text{O}$  at  $70^\circ$  to give a mixt. of  $\text{PhAsCl}_2$  and  $\text{Ph}_2\text{AsCl}$ . Oxidation of I with  $\text{H}_2\text{AsO}_4$  in the presence of  $\text{Cu}$  at  $75^\circ$  gives 0.98%  $\text{PhAsCl}_2$ , 59.06%  $\text{Ph}_2\text{AsCl}$  and 5.08%  $\text{Ph}_3\text{As}$ ; in the presence of  $\text{HCl}$  the yield of  $\text{PhAsCl}_2$  is 50%. I and  $\text{PhAsO}_2\text{H}_2$  give the compd.  $\text{I.PhAsO}_2\text{H}_2$ , m.  $94^\circ$  (decompn.); in the presence of  $\text{Cu}$ , 14.15 g. I gives 13.81 g.  $\text{PhAsCl}_2$ , corresponding to the undecomd.  $\text{PhAsO}_2\text{H}_2$ , 14.09 g.  $\text{Ph}_2\text{AsCl}$  and 4.72 g.  $\text{Ph}_3\text{As}$ . I (33 g.) in 3 g.  $\text{EtOH}$ , added to 105 g.  $\text{H}_2\text{AsO}_4$  in 150 cc.  $\text{H}_2\text{O}$  and 15 cc. 0.5  $\text{N CuSO}_4$  at  $45^\circ$ , gives 1 g.  $\text{PhAsCl}_2$ , 3.35 g.  $\text{Ph}_2\text{AsCl}$  and 13.5 g.  $\text{Ph}_3\text{As}$ .  $\text{PhAsO}$  and excess I on standing 8-10 days give the compd.,  $\text{I.PhAsO}_2\text{H}_2$ , m.  $100-1^\circ$ .  $p\text{-MeC}_6\text{H}_4\text{NHNH}_2$  (61 g.) and  $\text{H}_2\text{AsO}_4$  with  $\text{Cu}$  give 21.7 g.  $p\text{-MeC}_6\text{H}_4\text{AsCl}_2$ , 31.5 g.  $(p\text{-MeC}_6\text{H}_4)_2\text{AsCl}$  and 7.2 g.  $(p\text{-MeC}_6\text{H}_4)_3\text{As}$  (72.2% yield of As compds.). C. J. West

**Thermal decomposition of trinitrotriazidobenzene and of other polynitropolyazidobenzenes.** Oldrich Turek. *Chimie É. industrie Special No.*, 883-7 (June, 1933); cf. C. A. 26, 848.—2,4-Dinitro-1,3,5-triazidobenzene (I), m.  $116-17^\circ$  (decompn.), insol. in  $\text{H}_2\text{O}$ , sol. in  $\text{Me}_2\text{CO}$  and boiling  $\text{EtOH}$ , slightly sol. in cold  $\text{EtOH}$ , is produced by refluxing  $\text{C}_6\text{H}_5(\text{NO}_2)_2\text{Cl}$  or  $\text{C}_6\text{H}_5(\text{NO}_2)_2\text{Br}$  in aq.  $\text{Me}_2\text{CO}$  with alc.  $\text{NaN}_3$ , pouring into  $\text{H}_2\text{O}$  and recrystg. from  $\text{EtOH}$ . 2,4,6-Trinitro-1-azidobenzene (picryl azide) (II), m.  $92-3^\circ$ , is obtained in practically quant. yield by adding with const. agitation a concd.  $\text{Me}_2\text{CO}$  soln. of picryl chloride to a concd. soln. of  $\text{NaN}_3$  in dil.  $\text{EtOH}$  at atm. temp. The thermal decomps. of 2,4,6-trinitro-1,3,5-triazidobenzene (III), I and II were studied by measuring the amt. of N given off by heating 1%  $\text{Me}_2\text{CO}$  solns. of the substances in the dark at  $61^\circ$  (b. p. of  $\text{CHCl}_3$ ) and  $76.5^\circ$  (b. p. of  $\text{CCl}_4$ ) and also the solids at  $50^\circ$ . The activation energies of the reactions, calcd. from the rate of liberation of N at different temps., were calcd. as: II 22,400, I 25,300, III 23,800 cal. The temp. coeffs. were: II 2.69, I 2.80, III 2.75. As the resp. values are very close to one another, it is concluded that they depend primarily on the presence of the azoimide groups or of the azoimide and nitro groups in  $\alpha$ -position to each other in the  $\text{C}_6\text{H}_3$  ring, while the actual no. of azoimide and  $\text{NO}_2$  groups has apparently no effect on these values. III is very much more stable to heat than I or II, both in soln. and in the cryst. state, in spite of the fact that it contains a considerably higher proportion of N than can be liberated; this is attributed to the perfect symmetry of its mol. At  $50^\circ$ , I first turns brown, becomes semi-liquid and is transformed into a dark swollen mass which solidifies to a dark brown substance; decomn. is most rapid when the mass is in a semi-cryst. state; liberation of N is manifestly not confined to the azoimide groups, but becomes more complex. The phenomenon is due to the fact that liberation of N lowers the m. p. of the reaction products below  $50^\circ$ , and the resultant fusion increases both mobility and rate of reaction. A. P.-C.

**Addition products of *p*-phenoxyphenyldialkylphosphines with carbon disulfide.** W. C. Davies and C. J. O. R. Morris. *Bull. soc. chim.* 53, 980 (1933); cf. *C. A.* 25, 5602. The constitution of the products of the addn. of tert. phosphines to CS<sub>2</sub> is discussed and a coordination formula R<sub>3</sub>P → S:C:S is suggested. This is in accordance with the behavior of the compds. but is in variance with the formulation of Jacobson accepted by Huntzsch and Hibbert (*C. A.* 14, 536). These red cryst. addn. compds. are unstable and decomp. on melting. In soln. they exist as an equil. mixt., R<sub>3</sub>P·CS<sub>2</sub> ⇌ R<sub>3</sub>P + CS<sub>2</sub>. This instability renders the investigation of their constitution by parachor and dipolar moment detns. difficult if not impossible. Any formulation of these products must explain the lack of combination between R<sub>3</sub>P and CO<sub>2</sub> or COS and between amines or tert. amines with CS<sub>2</sub>. The phosphines, *p*-PhOC<sub>6</sub>H<sub>4</sub>PR<sub>2</sub> (R = Me, Et or Pr) were prepd. (*C. A.* 27, 966) by the reaction between the requisite RMgBr compd. and *p*-PhOC<sub>6</sub>H<sub>4</sub>PCl<sub>2</sub>. The addn. of 3 cc. CS<sub>2</sub> with shaking, to a mixt. of 2 cc. *p*-PhOC<sub>6</sub>H<sub>4</sub>PR<sub>2</sub> and 4 cc. 96% EtOH gave *p*-phenoxyphenyldimethylphosphine compd. C<sub>17</sub>H<sub>15</sub>OP<sub>2</sub>S<sub>2</sub>, m. 87.5°. The almost colorless soln. in boiling EtOH became red on cooling and deposited red crystals. The corresponding *di-*tert** compd., C<sub>17</sub>H<sub>15</sub>OP<sub>2</sub>S<sub>2</sub>, m. 67°, dissoc. in soln. and yields, on the addn. of MeI, white rectangular tabls. of *p*-PhOC<sub>6</sub>H<sub>4</sub>IPr<sub>2</sub>·MeI, m. 163°. The *di-*tert** compd., C<sub>17</sub>H<sub>15</sub>OP<sub>2</sub>S<sub>2</sub>, m. 57°, is stable in soln. but the cryst. material rapidly loses CS<sub>2</sub> on exposure to the air. A red soln. but no cryst. solid was formed by adding CS<sub>2</sub> to *p*-ClC<sub>6</sub>H<sub>4</sub>IPr<sub>2</sub>. C. R. Addnall

**Reactions of sodium triphenylstannide with polyhalogenated methanes.** Charles A. Kraus and Harry Batough. *J. Am. Chem. Soc.* 55, 5014-16 (1933).—Ph<sub>3</sub>Sn, treated with Na in liquid NH<sub>3</sub> and then with CH<sub>2</sub>Cl<sub>2</sub>, gives *di*-triphenylstannylmethane, m. 101.5°; CHCl<sub>3</sub> gives *tri*-triphenylstannylmethane, m. 128°; with CCl<sub>4</sub> the main reaction product was Ph<sub>3</sub>Sn and NaCl.

C. J. West

**Rearrangement of *o*-acetamido sulfoxides.** Alfred Levi, Leonard A. Warren and Samuel Smiles. *J. Chem. Soc.* 1933, 1490-3; cf. *C. A.* 27, 195. —*1*-Chloro-2-nitro-2'-aminodiphenyl sulfide, deep yellow, m. 130°, results from 2-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>SH and 2,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NO<sub>2</sub>; *Ac* deriv. (I), yellow, m. 150°. 2-Nitro-2'-acetamidodiphenyl sulfide and H<sub>2</sub>O<sub>2</sub> in AcOH at 100° for 2 hrs. give the corresponding sulfoxide (II), pale yellow, m. 160°; the sulfoxide (III) from I, pale yellow, m. 179-80°; the free NH<sub>2</sub> compd. from III, orange, m. 162°. Rearrangement of III with 2 mols. N NaOH and reaction with MeI at 53° gives 2-*o*-nitrophenylaminophenyl Me sulfoxide (IV), *o*-MeOSC<sub>6</sub>H<sub>4</sub>NHCH<sub>2</sub>CH<sub>2</sub>NO<sub>2</sub>, orange, m. 149-51°; oxidation gives the sulfone, yellow, m. 130-1°. III and 3 mols. N NaOH, heated at 100° for 0.5 hr. with free access of air, appear to give the sulfonic acid, since with dil. HI and SO<sub>2</sub> it yields bis[2-(*o*-nitrophenyl)-aminophenyl] disulfide, red, m. 149-51°; with 1 mol. NaOH and MeI III gives the *Ac* deriv. of IV, yellow, m. 160-1°. II gives 2-(*p*-chloro-*o*-nitrophenyl)aminophenyl Me sulfoxide, orange, m. 152°; the sulfone m. 187°. 2-Nitrophenyl 4-hydroxy-*m*-tolyl sulfoxide, yellow, m. 206-7°; this does not rearrange with NaOH, nor does 2-nitrophenyl 2-hydroxy-1-naphthyl sulfoxide, yellow, m. 144° (decompn.); *Ac* deriv., pale yellow, m. 169°.

C. J. West

**Basis for the physiological activity of onium compounds.** XV. Sulfonium compounds. R. R. Renshaw and D. S. Scarle. *J. Am. Chem. Soc.* 55, 4951-3 (1933); cf. *C. A.* 27, 2432-3. Sulfonium salts were prepd. by condensing sulfides with mol. equivs. of halide and Hg salt using Me<sub>2</sub>CO or EtOH as the solvent, then treating with solid AgNO<sub>3</sub> and pptg. the Hg and Ag with H<sub>2</sub>S. (PhCH<sub>2</sub>)<sub>2</sub>S(NO<sub>3</sub>)Me, m. 79°, was prepd. from (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>S(I)Me.HgI<sub>2</sub>, m. 155°; (PhCH<sub>2</sub>)<sub>2</sub>S(NO<sub>3</sub>)CH<sub>2</sub>CO<sub>2</sub>Et, m. 120°, resulted from (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>S(Br)CH<sub>2</sub>CO<sub>2</sub>Et.HgI<sub>2</sub> or from (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>S(Br)CH<sub>2</sub>CO<sub>2</sub>Et.HgBr<sub>2</sub>. Ph<sub>2</sub>S(NO<sub>3</sub>)Me, m. 108°, was prepd. from Ph<sub>2</sub>S(I)Me.HgI<sub>2</sub>, m. 95°. Me<sub>2</sub>S, BrCH<sub>2</sub>CH<sub>2</sub>-

Oph and HgBr<sub>2</sub> give Me<sub>2</sub>S(Br)CH<sub>2</sub>CH<sub>2</sub>Oph.HgBr<sub>2</sub>, m. 70-1°, from which was prepd. Me<sub>2</sub>S(NO<sub>3</sub>)CH<sub>2</sub>CH<sub>2</sub>Oph, m. 62-5°. Et<sub>2</sub>S(Br)CH<sub>2</sub>CH<sub>2</sub>Oph.HgBr<sub>2</sub>, m. 78°; the nitrate was a gummy semi-solid. Pr<sub>2</sub>S(Br)CH<sub>2</sub>CO<sub>2</sub>Et, m. 70°. (PhCH<sub>2</sub>)<sub>2</sub>S(Br)CH<sub>2</sub>CO<sub>2</sub>Et.HgBr<sub>2</sub>, m. 127°.

C. J. West

**Preparation of tris(hydroxytriaryl) sulfonium salts.** D. Liebermann. *Compt. rend.* 197, 921-3 (1933); cf. *C. A.* 27, 1873. Tris(hydroxytriaryl) sulfonium chloride, may be prepd. by treating a phenol (3 mols.) with SOCl<sub>2</sub> (2 mols.), the latter being added drop by drop with shaking and continual cooling. In prepg. similar compds. from naphthols, the latter are added gradually to SOCl<sub>2</sub>. The following sulfonium chlorides were prepd.: *tris*-(hydroxyphenyl), m. 261-2° (decompn.) (*tetra*-Bz deriv., m. 35°); *tris*-(hydroxy-*o*-tolyl), pale rose, m. 190° (*tetra*-Bz deriv., m. 39°); *tris*-(hydroxy-*m*-tolyl), m. 273-4° (decompn.) (*tetra*-Bz deriv., m. 41°); *tris*-(*α*-hydroxy-naphthyl), greenish, m. above 350°; *tris*-(*β*-hydroxy-naphthyl), of which 2 isomers were obtained, one m. 227°, the other, yellow, m. 273-4°. All of these compds. give colors with H<sub>2</sub>SO<sub>4</sub>. Louise Kelley

**Attempted resolution of some substituted disulfonyl-methanes and the resolution of *α*-*p*-carboxyphenyl-sulfonyl-*α*-*p*-tolylthioethane.** F. Barry Kipping. *J. Chem. Soc.* 1933, 1506-10. —*Et p*-mercaptobenzoate (I), b. 162-4°, b. 275°, oxidation with I in EtOH gives bis(*p*-carbethoxyphenyl) disulfide, m. 65-6°. I and Cl-CH<sub>2</sub>Ac with NaOH give *p*-carbethoxyphenylthioacetone, m. 53-4°, oxidized to *p*-carbethoxyphenylsulfonylacetone (II), m. 88°, by acid KMnO<sub>4</sub> (Na salt (III)). III and PhCH<sub>2</sub>I in EtOH give the *α*-benzyl deriv., EtO<sub>2</sub>CC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>CH(CH<sub>2</sub>Ph)Ac, m. 104°, hydrolyzed to HO<sub>2</sub>CC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>CH(CH<sub>2</sub>Ph), m. 232-3°, whose *Et* ester m. 77-8°. II and di-*p*-tolyl disulfide in EtOH give a mixt. of *p*-carbethoxyphenylsulfonyl-*p*-tolylthiomethane (IV), m. 121°, and *α*-*p*-carbethoxyphenylsulfonyl-*α*-*p*-tolylthioacetone (V), m. 86-7°. IV and V are hard to sep. but if the reaction is heated for 7 hrs., IV may be obtained in 80% yield. The free acid (VI) from IV m. 205-6° (Na salt, needles). Oxidation of VI with KMnO<sub>4</sub> in AcOH gives *p*-carboxyphenylsulfonyl-*p*-tolylsulfonylmethane (VII), m. 210-2° (*Et* ester (VIII), m. 147-5°); the Na salt of VIII and PhCH<sub>2</sub>I give the benzyl deriv., m. 116-7°, the free acid (IX) m. 185-6°; IX could not be resolved, the following salts were prepd.: *quinine*, m. 215°, [α]<sub>D</sub><sup>25</sup> -115°, [α]<sub>D</sub><sup>25</sup> -132° (CHCl<sub>3</sub>, c 1.3); *nor-d*-*α*-ephedrine, m. 115-8°, *l*-menthylamine, m. 214-5°; *d*-sec-butylamine, m. 205-7°; *cinchonidine*, [α]<sub>D</sub><sup>25</sup> -65°, [α]<sub>D</sub><sup>25</sup> -75° (CHCl<sub>3</sub>, c 1); *l*-phenylethylamine, m. 186°. Condensation of VII with di-Ph disulfide in EtOH-EtONa gives *p*-carboxyphenylsulfonyl-*p*-tolylsulfonylphenylthiomethane, m. 212° (*Et* ester, m. 126-7°); this could not be resolved; *quinine* salt, m. 209-10°, [α]<sub>D</sub><sup>25</sup> -111.5°, [α]<sub>D</sub><sup>25</sup> -127° (CHCl<sub>3</sub>, c 1.2); *l*-menthylamine salt, m. 184-5°, [α]<sub>D</sub><sup>25</sup> -10-7° (CHCl<sub>3</sub>, c 1.07). I and MeCHBrAc with EtOH-EtONa, followed by oxidation, give 77% of *α*-*p*-carbethoxyphenylsulfonyl-*α*-*p*-tolylthioethane (X), m. 66-7°; with di-*p*-tolyl disulfide and hydrolysis this gives di-*α*-*p*-carboxyphenylsulfonyl-*α*-*p*-tolylthioethane (XI), HO<sub>2</sub>CC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>CH(CH<sub>2</sub>SO<sub>2</sub>CH<sub>2</sub>Ph)<sub>2</sub>, m. 168-9° (*Et* ester, m. 72°, chloride, m. 83-4°); this is resolved by *l*-menthylamine, the least sol. fraction of which salt m. 199-202°, [α]<sub>D</sub><sup>25</sup> 57° (CHCl<sub>3</sub>, c 1.2); *d*-X, m. 160°, [α]<sub>D</sub><sup>25</sup> 130° (CHCl<sub>3</sub>, c 0.55); in 1 equiv. NaOH the acid has a half life period of 10 hrs., in NH<sub>4</sub>OH about 60 hrs. The *quinine* salt m. 180-1°, [α]<sub>D</sub><sup>25</sup> -100° (CHCl<sub>3</sub>, c 0.6); the *d*- and *l*-Me esters, m. 131-2°, [α]<sub>D</sub><sup>25</sup> ± 134° (CHCl<sub>3</sub>, c 1.025). *d*-*Et* ester, m. 44-5°; *d*-acid chloride, m. 101-2°, [α]<sub>D</sub><sup>25</sup> 145° (CHCl<sub>3</sub>, c 1.31). *α*-*p*-Carboxyphenylsulfonyl-*α*-*p*-tolylsulfonylthioethane, m. 233-4°; *Et* ester, m. 120-1°. Me ester, m. 141°; this could not be resolved; the following salts were prepd.: *quinine*, m. 211-2°; *l*-menthylamine, m. 187-91°, [α]<sub>D</sub><sup>25</sup> -18.6° (EtOH, c 1.5); *cinchonidine*, m. 177-8°, [α]<sub>D</sub><sup>25</sup> -85.5° (CHCl<sub>3</sub>, c 1.08); *l*-hydroxyhydrindamine, m. 208-10°, [α]<sub>D</sub><sup>25</sup> -72° (Me<sub>2</sub>CO, c 0.84); *l*-phenylethylamine, m. 214-6°. *α*-*p*-Carboxy-



*phenylsulfonol- $\alpha$ -methylthioethane*, m. 185° (decompn.); salts: *l*-hydroxyhydrindamine, m. 194°,  $[\alpha]_{D}^{25} -91^{\circ}$  (Me<sub>2</sub>CO, *c* 0.6); *strychnine*, m. 234°,  $[\alpha]_{D}^{25} -10.3^{\circ}$  (CHCl<sub>3</sub>, *c* 0.63); *l*-menthylamine, m. 174.7°,  $[\alpha]_{D}^{25} -21^{\circ}$  (EtOH, *c* 0.76); *quinine*, m. 217°,  $[\alpha]_{D}^{25} -160^{\circ}$  (CHCl<sub>3</sub>, 1.3). The acid could not be resolved nor could its oxidation product,  *$\alpha$* -*p*-carboxyphenylsulfonol- *$\alpha$* -*p*-methylsulfonylethane, m. 273°; salts: *d*-hydroxyhydrindamine, m. 186.7°,  $[\alpha]_{D}^{25} 85^{\circ}$  (Me<sub>2</sub>CO, *c* 0.7); *quinine*, n. 165.7°,  $[\alpha]_{D}^{25} -94.5^{\circ}$  (CHCl<sub>3</sub>, *c* 0.51); *l*-phenylthylamine, m. 195.8°; *cinchonidine*, m. 183.4°,  $[\alpha]_{D}^{25} -78.7^{\circ}$  (EtOH, *c* 1.53); *l*-menthylamine, m. 189.40°,  $[\alpha]_{D}^{25} -18.3^{\circ}$  (EtOH, *c* 2.26). C. J. West

**Identification of mercaptans with 2,4-dinitrochlorobenzene.** II. R. W. Bost, J. O. Turner and M. W. Conn. *J. Am. Chem. Soc.* 55, 4956 7(1933); cf. C. A. 26, 3230.—The following 2,4-dinitrophenyl thiethers are reported: *decyl*, m. 85° (all m. ps. col.); *undecyl*, m. 40°; *lauryl*, m. 89°; *allyl*, m. 71.5°; *o*-thiocresol, m. 101°; *m*-isomer, m. 90.5°; *p*-chlorothiophenol, m. 123°; *p*-Br deriv., m. 142°;  *$\alpha$* -thionaphthol, m. 176°;  *$\beta$* -isomer, m. 145°; *cyclohexyl*, m. 138°; *ethylenethiohydrin*, m. 100.5°; *dimethylene di*-, m. 248°;  *$\alpha$* -methylmethylenedi-, m. 226°; *trimethylene di*-, m. 194°; *tetramethylene di*-, m. 170°; *pentamethylene di*-, m. 170°; *hexamethylene di*-, m. 218°. The monothiols are golden yellow; the dithiols of the dimercaptans are an orange. Sulfones of 2,4-dinitrophenyl thiethers: *decyl*, m. 93°; *undecyl*, m. 97°; *lauryl*, m. 101°; *cetyl*, m. 105°; *o*-thiocresol, m. 155°; *m*-isomer, m. 144.5°; *p*-chlorothiophenol, m. 170°; *p*-Br deriv., m. 190°; *cyclohexyl*, m. 172°. C. J. West

**Glucosides of *p*-nitrophenol and *p*-aminophenol and their fermentative degradation.** Burkhardt, Hellerich and Otto Peters. *J. prakt. Chem.* 138, 281 3(1933).—Catalytic reduction of tetraacetyl-*p*-nitrophenol- $\beta$ -D-glucoside in MeOH gives the *tetra-Ac deriv.*, m. 127–30°,  $[\alpha]_{D}^{25} -15.5^{\circ}$  (CHCl<sub>3</sub>), of *p*-aminophenol  $\beta$ -D-glucoside (I), m. 157–60°,  $[\alpha]_{D}^{25} -65^{\circ}$  (H<sub>2</sub>O). *p*-Nitrophenol  $\beta$ -D-glucoside is decompd. to the extent of 85% in 15 min. in emulsion; I is decompd. to the extent of 50% in 50 min. C. J. West

**Cymorcinol.** W. Treibs. *J. prakt. Chem.* 138, 281 8 (1933).—Cymorcinol (I) forms an *acetate*, b. 270°. With 4 atoms Br per mol. I gives a *di-Br deriv.*, yellow, m. 65°. HNO<sub>3</sub> and I form a *NO compd.*, brown-red, m. 112°, reduction with SnCl<sub>2</sub> and HCl gives *hydroxythymoquinone* (II), m. 170° (semicarbazone, m. 217°). Oxidation of I gives II. Oxidation of I with O<sub>2</sub> in MeOH-KOH gives *dihydroxythymoquinone*, red, m. 220°. C. J. West

**Molecular rearrangement of  $\alpha,\beta$ -unsaturated ethers.** Walter M. Lauer and Marvin A. Spielman. *J. Am. Chem. Soc.* 55, 4923 30(1933).—The following *Br-Br ethers* were prepd.: *p*-PhCH(OMe)CH<sub>2</sub>Br, b<sub>28</sub> 117–8° (65% yield); *p*-ClC<sub>6</sub>H<sub>4</sub>CH(OMe)CH<sub>2</sub>Br, b<sub>28</sub> 151.6° (51%), PhCH(OPr)CH<sub>2</sub>Br, b<sub>28</sub> 146.8° (66%); PhCH(OBu)CH<sub>2</sub>Br, b<sub>28</sub> 165.6° (57%); PhCH(OAm-iso)CH<sub>2</sub>Br, b<sub>12</sub> 140–3° (81%),  *$\alpha$* -butoxystyrene (I), b<sub>28</sub> 131.5–5.5°, n<sub>D</sub><sup>20</sup> 1.5493; *p*-chloro- $\alpha$ -methoxystyrene (II), b<sub>28</sub> 118.21°, n<sub>D</sub><sup>20</sup> 1.5510 (59%); *p*-chloroacetophenone semicarbazone, m. 202–4°.  $\alpha$ -Methoxystyrene (20 g.), heated 2 hrs. at 300°, gives 13 g. BzEt and 2 g. BzMe (CHCl<sub>3</sub> sol., m. 104–4.5° (dioxime, m. 166–7°); dehydration gives 2,5-diphenyl-3-methylfuran, m. 57–8°. Condensation of PhC(=CH<sub>2</sub>)OMe and BzMe, heated 2 hrs. at 300°, gives (CH<sub>3</sub>Bz)<sub>2</sub>.  $\alpha$ -Ethoxystyrene (25 g.), heated at 300° for 1 hr., gives 14.4 g. BzPr, b<sub>20</sub> 115.21°, and 1.5 g. 1,2-dibenzoylbutane, b<sub>20</sub> 234–45°, n<sub>D</sub><sup>20</sup> 1.5795.  $\alpha$ -Propoxystyrene gives 20% valerophenone and impure 1,2-dibenzoylpentane. I (5 g.) gives 3.7 g. caprophenone. II gives *p*-chloropropiophenone, b<sub>11</sub> 134–7° (semicarbazone, m. 175–6°), and 1,2-bis(*p*-chlorobenzoyl)propane, m. 116.5–7°.  $\alpha$ -Isobutoxystyrene gave isopentene, isopentane, PhAc, *Ph isohexyl ketone*, b<sub>11</sub> 145.8°, n<sub>D</sub><sup>20</sup> 1.5067 (semicarbazone, m. 144–5°), and (Cl<sub>2</sub>Bz)<sub>2</sub>. Heating 10 g. each of I and II together to 265° for 3 hrs. gave PhAc and BzEt, thus showing that a strictly intra-

mol. mechanism is untenable. The mechanism advanced involves complex formation between 2 ether mols. followed by rearrangement in either of these 2 parts of the complex body. C. J. West

**3,5-Dichlorobenzaldehyde.** Fritz Asinger and Gunther Luck. *Monatsh.* 62, 344–8(1933).—By chlorinating 3,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Me (in the prepn. of which from 4,6-Cl<sub>2</sub>-2-MeC<sub>6</sub>H<sub>3</sub>NHAc it was found most effective to hydrolyze the latter compd. with 50% H<sub>2</sub>SO<sub>4</sub> to yield 80–5% of the amine) at 180–90° and hydrolyzing 50 g. of the product by agitation with fuming H<sub>2</sub>SO<sub>4</sub> (8% SO<sub>3</sub>) for 30 hrs. at room temp., there were obtained 70–80% 3,5-dichlorobenzaldehyde (I), b<sub>748</sub> 235–40°, m. 65°, and 10–2% 3,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H (II), which latter compd. was also formed from I by oxidation in 74% yield. The following derivs. of I were also prepd.: *NaHSO<sub>3</sub> addn. compd.*; *aldoxime*, m. 112°; *phenylhydrazone*, m. 106.5°; 3,5-dichlorobenzal chloride (III), m. 36.5° (18 g. from 17.6 g. I and 20.8 g. PCl<sub>5</sub>); 3,5-dichlorocinnamic acid (IV), m. 176° (3.9 g. by refluxing 4 g. I, 2.5 g. NaOAc and 1.9 g. Ac<sub>2</sub>O), which upon bromination yielded 3,5-dichloro- $\alpha,\beta$ -dibromocinnamic acid, m. 209°. II results from the oxidation of IV. In an unsuccessful attempt to hydrolyze III by heating it with water and an excess of Ca(OH)<sub>2</sub> to 200° in an autoclave there were obtained IV and 3,5-dichlorobenzyl alc. (V), m. 82°, which same 2 products were formed in 90% yield by subjecting I to the same conditions. By interaction with PCl<sub>5</sub> V is converted to 91% of the corresponding chloride, m. 36°. I. M. L.

**Replacement of groups by hydrogen in certain substituted methanes.**  $\alpha$ -Tribromoacetophenones. C. Harold Fisher. *J. Am. Chem. Soc.* 55, 5003 8(1933).—2,4,6,3,5-Me<sub>2</sub>Br<sub>2</sub>C<sub>6</sub>COCH<sub>3</sub> (I) in Me<sub>2</sub>CO liberates 1, from KI, giving 2,4,6,3,5-Me<sub>2</sub>Br<sub>2</sub>C<sub>6</sub>COCH<sub>2</sub>Br; this also results from 2,4,6,3,5-Me<sub>2</sub>Br<sub>2</sub>C<sub>6</sub>Ac and Br in AcOH; reduction with Zn in AcOH removes the  $\alpha$ -Br atom. I and EtMgBr give 2,4,6,3,5-Me<sub>2</sub>Br<sub>2</sub>C<sub>6</sub>COCH<sub>2</sub>Br, as does N<sub>2</sub>H<sub>4</sub>, PhOH and PhAc; I is unchanged by refluxing in Me<sub>2</sub>CO for 1 hr. 2,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>Ac and Br in AcOH give the  $\alpha,\alpha$ -di-Br deriv. (II), m. 73.4°; alkali has little effect; ClCH<sub>2</sub>COCH<sub>2</sub>Br<sub>2</sub> dissolves in aq. KOH several hundred times as rapidly as does II. C. J. W.

**Isomerism in halochromic compounds.** II. P. Pfeiffer and H. Kleu. *Ber.* 66B, 1704 13(1933); cf. C. A. 27, 4787.—The formation of isomeric monoperochlorates (colorless or light colored NH<sub>4</sub> and colored oxonium or carbenium salts) seems to be quite general for amino ketones and a no. of addnl. pairs of isomers has been prepd.; in some cases, the theoretically expected diperochlorates have been obtained. All these salts are readily split down into their components by water but the isomers generally show characteristic differences in the ease with which they are hydrolyzed, sometimes the colorless, sometimes the colored isomer being the more easily hydrolyzed. The colorless salts can, in general, be obtained by dissolving the amino ketone in excess of dil. aq. HClO<sub>4</sub>. To prep. the colored salts advantage can often be taken of the fact that they are the primary hydrolysis products of the diperochlorates. Even when the latter are too sol. to be isolated, the colored monoperochlorates can generally be obtained by dilg. (with water) solns. of the amino ketones in 70% aq. HClO<sub>4</sub>, which contain the diperochlorates. Where the diperochlorates are too readily hydrolyzed the colored monoperochlorates are obtained by isomerizing the colorless salts by crystn. from ClCH<sub>2</sub>CO<sub>2</sub>H. The following *p*-chlorates are described: *p*-Dimethylaminobenzal-*p*-chloroacetophenone (the ketone itself forms yellow needles, m. 140.0–5°), needles sol. in hot AcOH with faint violet color, and blue-violet crystals; *p*-Dimethylaminobenzal-*p*-methylacetophenone (free ketone, golden yellow, m. 122–3°), needles sol. in hot AcOH with deep blue-red color, and blue, finely cryst. powder (also yields a yellow diperochlorate); *p*-Dimethylaminobenzal-*p*-methoxyacetophenone, needles sol. in AcOH with Bordeaux-red color, and fine, dark blue needles; *p*-Dimethylaminobenzalacetone, brownish yellow crystals sol. in AcOH with blue color, and bluish green



**Phenol ketones of diphenylmethane, -ethane, -propane and certain of their reduction products.** H. Wöjahn. *Arch. Pharm.* 271, 417-31(1933).—The disinfecting power of simple phenols is in general increased by introduction of alkyls in the nucleus. Thus, it develops that the activity of 2,4-(HO)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH<sub>2</sub>Ph, as compared with its corresponding mono-HO deriv., is almost 5 times as great, that furthermore extension of the aliphatic chain, e. g., transition of diphenylmethane to diphenylethane derivs., involves a further increase, thereupon suffering diminution again in the analogous propane deriv. The results of the present investigation are outlined in the following summary, after employing the procedure followed by Clemmensen: The at. rearrangement via Fries, e. g., transition of the acyclic radical to the nucleus, is readily effected in the case of hydroxydiphenylmethane, ethane and -propane, involving both *p*- and *o*-formation. The formation of *o*-ketones by heat treatment (baking) is somewhat disadvantageous; by treatment in PhCl, however, the process is measurably improved. The resorcinol monoketones of diphenylmethane, -ethane and -propane are most advantageously prep'd. by the action of AlCl<sub>3</sub> on like mols. of the diester and free phenol in PhNO<sub>2</sub>. Aliphatic ketones are susceptible of reduction via Clemmensen; with increase in the chain, however, the yields become correspondingly less. The following new compds. are described and characterized: 2-Hydroxydiphenylmethane: 5-Ac (I), C<sub>15</sub>H<sub>14</sub>O<sub>2</sub>, m. 137.8° (phenylhydrone, yellow needles m. not sharply 122.4°); 5-EtCO, m. 153°; 5-PrCO, m. 142°; isovaleryl, m. 121°. 2-Methoxydiphenylmethane: 5-Ac, m. 101.2°; 5-EtCO, m. 119°; 5-PrCO, m. 106°; isovaleryl, m. 66°. From I by reduction with Zn and HCl was obtained 5-ethyl-2-hydroxydiphenylmethane, b<sub>17</sub> 197°, becoming yellowish brown, and similarly were prep'd. the 5-Pr, b<sub>1</sub> 205°, 5-Bu, b<sub>18</sub> 211°, and 5-iso-Am compds., b<sub>18</sub> 222°. 1-Hydroxydiphenylmethane: 5-Ac (II), m. 56° (4-Me ether, yellow oil, b<sub>22</sub> 223°); 5-Et, from II by reduction with Zn and AcOH + HCl, b<sub>22</sub> 212.15°, identical apparently with the phenolic product described by Marschalk; 5-EtCO, m. 75.6°; 5-PrCO, m. 52°; 5-isovaleryl, b<sub>22</sub> 223°. 4-Hydroxydiphenylethane (III), prep'd. from PhCH<sub>2</sub>COPh by reduction with Hg-Zn and HCl and identical with the phenol obtained by Stoermer and Kippe in another way, yielded the following derivs.: 5-Et, from III in the form of its acetate with AlCl<sub>3</sub>, yellow oil, b<sub>18</sub> 250°, and crystals m. 52°; 5-EtCO, b<sub>18</sub> 220°, m. 17-8°; 5-PrCO, yellow oil, b<sub>18</sub> 240.2°; 5-isovaleryl, yellow oil, b<sub>18</sub> 247°. 5-Acetyl-4-hydroxydiphenylpropane, yellow oil, b<sub>18</sub> 232°. 2,4-Dihydroxydiphenylmethane: 5-Ac, m. 149° (phenylhydrazone, C<sub>15</sub>H<sub>10</sub>O<sub>2</sub>N<sub>2</sub>, yellow needles, m. 146°; 2,4-di-Me ether, C<sub>17</sub>H<sub>16</sub>O<sub>2</sub>, m. 110°), yields on reduction the 5-Et deriv.; 5-EtCO (IV), m. 92°; 5-PrCO, m. 72°; 5-isovaleryl, m. 115°. Reduction of IV yields the 5-Pr deriv., b<sub>18</sub> 225°, identical with the reduction product from 5,2,4-Tris-(HO)-C<sub>6</sub>H<sub>3</sub>Br described by Rosenmund, Buchwald and Deligiannis. Similarly were obtained the 5-Bu, yellow oil, oxidizing easily in the air, b<sub>18</sub> 238-40° (decompn.), and 5-iso-Am deriv., yellow oil, b<sub>18</sub> 241°. 2,4-Dihydroxydiphenylethane: 5-Ac, m. 136°; 5-EtCO, m. 85.6°; 5-isovaleryl, m. 102°. 2,4-Dihydroxydiphenylpropane: 5-Ac (from the diester of dihydroxydiphenylpropane), m. 106°; 5-EtCO, m. 78°; 5-isovaleryl, m. 105°.

W. O. E.

**Halogenated benzophenones.** Josef Ganzmüller. *J. prakt. Chem.* 138, 311-12(1933).—*p*-C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub> (14.5 g.), 14.5 g. AlCl<sub>3</sub> and 11.5 cc. BzCl, heated over a small flame for 3 days, give 2,5-dichlorobenzophenone, m. 85-6°; *o*-ClC<sub>6</sub>H<sub>4</sub>COCl gives 2',2',5-trichlorobenzophenone, m. 145-7°, 2,4-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>COCl gives 2',4',2,5-tetrachlorobenzophenone, m. 176°.

C. J. West

**Oxidation products of benzophenone oxime.** W. H. Hunter and W. S. Dyer. *J. Am. Chem. Soc.* 55, 5053-5 (1933).—Expts. with K<sub>2</sub>Fe(CN)<sub>6</sub>, I in a dry medium and Ag<sub>2</sub>O in C<sub>6</sub>H<sub>6</sub> or Et<sub>2</sub>O are reported. The definite products are Ph<sub>2</sub>CO, a yellow compd. C<sub>12</sub>H<sub>10</sub>ON<sub>2</sub>, m.

156-7°, and a compd. (C<sub>12</sub>H<sub>10</sub>NO)<sub>4</sub>, m. 193° (decompn.). C. J. West

**Rubenes, organic compounds possessing the property of absorbing and regenerating free oxygen.** Charles Dufraisse. *Bull. soc. chim.* 53, 789-849(1933).—An address. The discussion of the chemistry of rubenes includes the usage of the proposed new nomenclature, methods of prep'n., tabulation of known rubenes and their phys. properties, the constitution of tetraphenylrubene (I) (formerly "rubrene") and mention of collateral researches on ethynylmethyls, indenenes and on the satellites of I. The description of the special study of the oxidation of rubenes comprises the absorption and reemission of free O by the rubenes with a detailed account of the fundamental expts. with I, and a discussion of the constitution of the oxyrubenes. The address concludes with several remarks concerning dissociable oxides, including a comparison between inorg. and org. dissociable oxides, mention of other org. dissociable oxides and references to the respiratory pigments. A bibliography of 80 references is appended.

C. R. Addinall

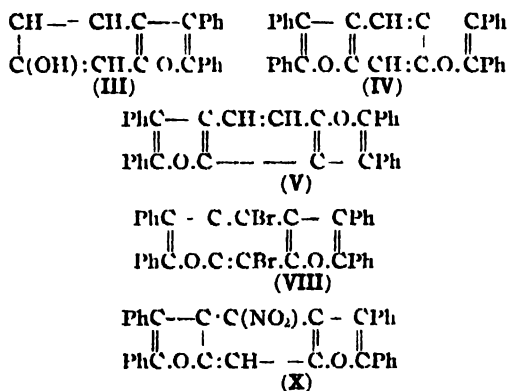
**Dissociable organic oxides. A second isomer of oxytetraphenylrubene.** Leon Eudelin. *Compt. rend.* 197, 691-3(1933); cf. *C. A.* 27, 1880.—Agitation of oxytetraphenylrubene (I) in benzene with 50% H<sub>2</sub>SO<sub>4</sub>, concd. HCl, or other strong acid solns. gives an isomer of I, C<sub>16</sub>H<sub>12</sub>O<sub>2</sub>.C<sub>6</sub>H<sub>6</sub> (II), m. 205°, contg. 1 atom of active H. II is unstable to light and heat, decomp. to indefinite substances and yielding neither O nor rubene. The dissociability, the fundamental property of I, is absent in this isomer II. It differs in its instability from the previously known isomer (C. A. 24, 5747), which can be distd. unaltered. On reduction with Zn and AcOH, II gives almost quant. yields of a naphthalene, C<sub>10</sub>H<sub>8</sub> (C. A. 26, 2189), suggesting a close relation of II to rubene.

C. R. Addinall

**Arsonic acids of the fluorenone and the fluorenol series.** Gilbert T. Morgan and Jessie Stewart. *J. Chem. Soc.* 1933, 1454-7; cf. *C. A.* 26, 4040.—Na aminofluorenone-2-arsonate (I) and ClCH<sub>2</sub>CONHCONH<sub>2</sub>, NaI and NaOH in dil. EtOH, boiled 4 hrs., give fluorenone-6-glycineureide-2-arsonic acid, red-purple (Na salt, purple); the min. curative dose for trypanosomiasis is 6 mg. per 20 g. mouse; the Me deriv. (Na salt, red) is inactive; the Ph deriv., bright red (Na salt, orange-pink; di-Na salt, crystals with 6 mols. H<sub>2</sub>O), is slightly active in max. doses. Na 7-hydroxyfluorenone-2-arsonate and ClCH<sub>2</sub>CONH<sub>2</sub> give a small yield of Na 7-carbamylmethoxyfluorenone-2-arsonate, whose M. C. D. is 10. 2-Amino-9-fluorenol through the diazo reaction gives 9-fluorenol-2-arsonic acid (Na salt, yellow). Catalytic reduction of I (60 atm.) gives Na aminofluorenol-2-arsonate (II); the free acid is amphoteric; Ac<sub>2</sub>O gives the 7-acetamido deriv. (Na salt, pale yellow) and the 7-acetamido-9-acetoxy deriv. II and ClCH<sub>2</sub>CONH<sub>2</sub> give 9-fluorenol-7-glycineamide-2-arsonic acid (Na salt, pale pink); there is also formed a 9-O-carbamylmethyl deriv. (di-Na salt), which has no therapeutic action. II and KCNO in H<sub>2</sub>O give 7-carbamido-9-fluorenol-2-arsonic acid, pale yellow (Na salt, crystals with 2 mols. H<sub>2</sub>O); Me deriv. (Na salt, crystals with 0.5 mol. H<sub>2</sub>O); Ph deriv., yellow (di-Na salt, with 3 mols. H<sub>2</sub>O, pale yellow); these are slightly active in max. doses. C. J. West

**The condensation of benzoin and resorcinol.** Otto Dischendorfer. *Monatsh.* 62, 263-83(1933).—The condensation of benzoin (I) and *m*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> (II) in the presence of 73% H<sub>2</sub>SO<sub>4</sub> led to the formation of III (acetate, m. 112°), lin- (IV) and ang-m-benzotetraphenyldifuran (V), m. 203.4°, the last in small quantity. The method of Japp and Meldrum (*J. Chem. Soc.* 75, 1035(1899)), who isolated III and IV, was followed with the exception that the crude III was converted into the benzoate (VI), m. 160-2°, and sapond., instead of isolating it in the pure state directly. The yield was thus increased from 7.5 to 80%. The structures of these compds. and their derivs. were verified by oxidation with CrO<sub>3</sub>. In all cases the double bond in the furan ring was split. VI

upon oxidation gave 2,4-dibenzoylbenzophenone, 2,4-(BzO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>COPh, m. 143-4°, which was sapond., yielding 2,4-(HO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>COPh. This last compd. was also synthesized by condensation of II and BzCl in the presence of AlCl<sub>3</sub>. Likewise, IV and V were transformed by action of CrO<sub>3</sub> to 1,3,4,6-C<sub>6</sub>H<sub>2</sub>(OH)<sub>4</sub>Br<sub>2</sub> (VII), and 2,4-dihydroxy-1,3-dibenzoylbenzene, m. 103-4°, resp. IV in CCl<sub>4</sub> reacts with Br<sub>2</sub> to give 93% of *ms*-di-Br deriv. (VIII), m. 291-2°, which yielded upon oxidation 2,5-dibromo-4,6-dihydroxy-1,3-dibenzoylbenzene (IX), m. 256°; the *ds*-BzO deriv. of IX, obtained before hydrolysis, m. 246-7°. Severe oxidation of IX with alk. KMnO<sub>4</sub> resulted in BzOH only, confirming the position of the Br atoms on the ring susceptible to destructive oxidation by the presence of the 2 free OH groups. In an attempt to prep. IX by brominating VII there was obtained only the 2- or 5-Br deriv., m. 212°, even with an excess of Br<sub>2</sub>. By means of a similar series of reactions originating with IV (in boiling AcOH) and coned. HNO<sub>3</sub> there were obtained *ms*-nitro-*lin*-*m*-benzo tetraphenylidifuran (X), m. 281°, and the 5-nitro deriv. of VII (XI) (dibenzoyl m. 255°), which like IX yields only BzOH upon oxidation with alk. KMnO<sub>4</sub>. Position 5 for the NO<sub>2</sub> group is preferable to that of 2 since XI is light yellow in color in contrast to the orange color of 1,3,2-C<sub>6</sub>H<sub>2</sub>(OH)<sub>2</sub>NO<sub>2</sub>. Reduction of X with PhNIINH<sub>2</sub> gave the corresponding amino compd. which sinters 250-60°. Nitration of IV (2 g.) with a large excess of HNO<sub>3</sub> yielded 0.3 g. of the tetranitro deriv., m. 242-3°, the structure of which with respect to the NO<sub>2</sub> groups is as yet unknown. M. ps. of mixts. of I and II were detd. No evidence of compd. formation was obtained. The eutectic mixt., m. 83°, consisted of 46% I and 54% II.



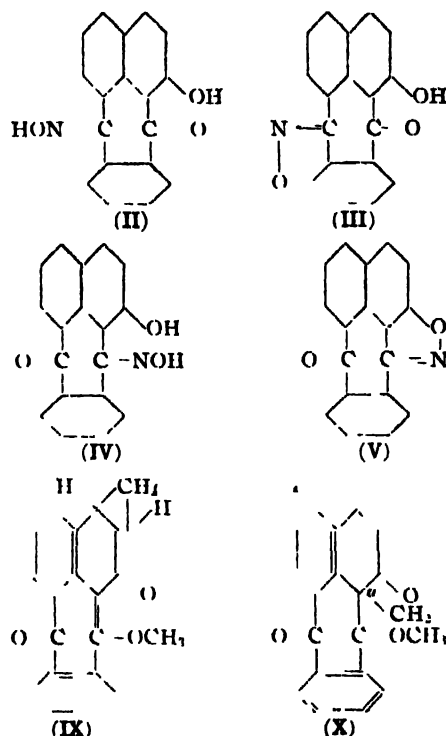
I. M. Levine

**7-Phenylthio derivatives of deoxybenzoin.** Wm. A. Mitchell and Samuel Smiles. *J. Chem. Soc.* 1933, 1529. Reduction of the phenylmercaptide of benzil with Zn and AcCl gives 7'-acetoxy-7-phenylthiostilbene, m. 141°, hydrolysis gives 7-phenylthiodoxybenzoin, m. 81°. 7-(5-Chloro-2-methoxyphenylthio)-7'-acetoxy-7-phenylthiostilbene, m. 114°; hydrolysis gives 7-(5-chloro-2-methoxyphenylthio)-deoxybenzoin, m. 102°, also obtained by condensing 5-chloro-2-methoxyphenylthiol with benzoin in EtOH with dry HCl; a excess of thiol is used there results 7,7'-bis(5-chloro-2-methoxyphenylthio)stilbene, m. 208°. The phenylmercaptide of  $\omega$ -phenylthioacetophenone, m. 82°, results from benzoylcarbonyl acetate and phenylthiol with dry HCl in EtOH.

C. J. W.

**Condensation and ring closure in the naphthalene series.** VII. Reaction of phthaloylnaphthol with hydroxylamine and with diazomethane. Louis F. Fieser. *J. Am. Chem. Soc.* 55, 4963 76(1933); cf. C. A. 27, 1793.—Phthaloylnaphthol (I) (10 g.) in 200 cc. EtOH and 20 cc. 6 N NaOH with 15 g. NH<sub>2</sub>OH.HCl, refluxed 2 hrs., gives 9 g. 1-hydroxy-7,12-pleiadenedione 7-oxime (II), yellow, m. 242°; it is recovered unchanged after boiling with alkali for several hrs. and after heating with 82% H<sub>2</sub>SO<sub>4</sub> 1 hr. on the steam bath; diacetate, pale yellow, m. 237°; by heating II at 300-20° gives a dehydro product, C<sub>18</sub>H<sub>8</sub>O<sub>2</sub>N e-yellow, m. 260° (monoacetate, pale yellow,

m. 208°); it shows no change on heating in EtOH-KOH or on short heating with coned. H<sub>2</sub>SO<sub>4</sub>. The isomeric anhydro compd. of 1,6-dihydroxypleiadenedione oxime, yellow, m. 202°, results from the ketone and NH<sub>2</sub>OH in alkali. The 12-oxime (IV) is formed in addn. to II, if the amt. of alkali is increased but is best prepd. from VIII. IV, yellow, m. 262°, with the formation of V, in EtOH contg. alkali IV is fairly stable but in aq. solns. V is formed. The diacetate (VI), pale yellow, m. 174°, is best prepd. in C<sub>6</sub>H<sub>6</sub>N. The anhydro compd. (V) of IV, m. 227°, results as indicated above and also in nearly quant. yield from 1 g. of the Me ether of I, 30 cc. EtOH, 8 cc. 6 N NaOH and 1.5 g. NH<sub>2</sub>OH.HCl. III has not been converted into V, so that they are not stereoisomers. I in 30 cc. H<sub>2</sub>O and 2 cc. 6 N NaOH, treated with 1 g. NH<sub>2</sub>OH in H<sub>2</sub>O in the cold, gives an addn. product, C<sub>18</sub>H<sub>12</sub>O<sub>2</sub>N<sub>2</sub> (VII), pale yellow, decomp. about 135°; on heating in alkali there results H and V; in cold C<sub>6</sub>H<sub>5</sub>N and Ac<sub>2</sub>O there results a diacetate (VIII) of IV, pale yellow, m. 163°, easily hydrolyzed by cold EtOH-KOH to IV. VIII is not identical with VI; with C<sub>6</sub>H<sub>5</sub>N, VII gives the Me ether of I. Neg. results were obtained from the attempted reaction of I with MeNH<sub>2</sub>OH, PhNIINH<sub>2</sub>, Ph<sub>3</sub>NNH<sub>2</sub>, NH<sub>2</sub>CONHNH<sub>2</sub> and nitroxy. I and N<sub>2</sub>H<sub>4</sub> give an addn. product, yielding with Ac<sub>2</sub>O and C<sub>6</sub>H<sub>5</sub>N a hydrazone diacetate, pale yellow, m. 199-200°. The reaction of I with CH<sub>3</sub>N<sub>2</sub> furnishes certain indications that I exists largely in a tautomeric, quinonoid form. I (7 g.) in 180 cc. C<sub>2</sub>H<sub>5</sub>Cl<sub>4</sub> with C<sub>6</sub>H<sub>5</sub>N<sub>2</sub> gives 2.8-3.1 g. of the compd. C<sub>20</sub>H<sub>12</sub>O<sub>4</sub> (IX or X), pale yellow, m. 208°; the reduction product with Zn and AcOH, C<sub>20</sub>H<sub>16</sub>O<sub>4</sub>, m. 245° (acetate,



m. 184°). VIII. Some further derivatives of pleiadene. *Ibid.* 4977-84.—The following compds. were prepd. in connection with the study of the action of NH<sub>2</sub>OH on phthaloylnaphthol (I). The reaction of AlCl<sub>3</sub> on 2,3-C<sub>10</sub>H<sub>6</sub>(OH)<sub>2</sub>, 2-phenanthrol or 2,5,7-Me<sub>3</sub>C<sub>10</sub>H<sub>6</sub>OH with C<sub>6</sub>H<sub>5</sub>(CO)<sub>2</sub>O (II) at 160-200° gives 32% 1,2-dihydroxy-7,12-pleiadenedione, yellow, m. 233°; 85-90% of the 1-hydroxy-4,5-benzo deriv., yellow, m. 240° (acetate, pale yellow, m. 227°), and the 2,6-dimethyl-1-hydroxy deriv., yellow, m. 209° (acetate, pale yellow, m. 205°). II and 2,6,7-Me<sub>3</sub>C<sub>10</sub>H<sub>6</sub>OMe with AlCl<sub>3</sub> give 3',7'-dimethyl-6'

*methoxy-1'-(or 2')-naphthoyl-2-benzoic acid* (III), m. 212°, and a small quantity of the *3',7'-dimethyl-2'-methoxy-1'-naphthoyl deriv.*, yellow, m. 223°. Heating III with 2%  $\text{H}_2\text{SO}_4$  0.5 hr. on the steam bath gives *2',4'-dimethyl-3'-methoxy-1,2-benzanthraquinone*, yellow, m. 235°.  $2,7\text{-C}_{10}\text{H}_6(\text{OMe})_2$  (IV) yields a mixt. of the 8- and 7-sulfonates, whose *p*-toluidine salts m. 279° and 286°, resp. IV and II give *2',7'-dimethoxy-1'-naphthoyl-2-benzoic acid*, m. 201° (Me ester, m. 114°); the *2',6'-dimethyl-4-methoxy deriv.*, yellow, m. 261°. Reduction gives *2',7'-dimethoxy-1'-naphthylmethyl-2-benzoic acid* m. 101°; *2',6'-dimethyl-4-methoxy deriv.*, m. 236°. Ring closure gives the following *1,9-pleiadones*: *1,6'-dimethoxy*, yellow, m. 201°; *1,6-di-IO deriv.*, yellow, m. 233; *1,6-di-IO deriv.*, m. 220°; *2,6-dimethyl-4-methoxy deriv.*, bright yellow, m. 211°; *2,6-dimethyl-4-hydroxy deriv.*, bright yellow, m. 280°. Catalytic reduction of I (1 g.) gives 7.3 g. *1-hydroxy-7,12-dihydropleiadene*, m. 179° (acetate, m. 136°). *1,6-Dimethyl-7,12-dihydropleiadene* (V), m. 133°; Se had little effect at 350°; S at 260° gives a compd.  $\text{C}_{20}\text{H}_{16}\text{S}$ , pale orange, m. 217°. Br in AcOH gives the compd.  $\text{C}_{20}\text{H}_{17}\text{Br}$ . AcOH, which could not be crystd. and decomp. 150–60°. Shaking this compd. with  $\text{C}_6\text{H}_5\text{N}$  gives a Br deriv. of V, m. 179°. C. J. West

**Synthesis of certain naphtha(1,2,4,3')coumarin derivatives.** Robert Robinson and J. D. Rose *J. Chem. Soc.* 1933, 1469–72. *m*- $\text{C}_6\text{H}_4(\text{OH})_2$  and Et benzoylsuccinate condensed with 55%  $\text{H}_2\text{SO}_4$  give the Et ester I, m. 177°, of *7-hydroxy-4-phenylcoumarin-3-acetic acid* (II), m. 249–50°; the *7-MeO deriv.* (III), m. 200°, results from I and Me $\text{SO}_4$  in 10% aq. NaOH and hydrolysis, using less Me $\text{SO}_4$ , gives *1-Me-2-Et phenyl-2,4-dimethoxyphenylmethylenesuccinate*, m. 93°; II gives the Me ester, m. 101°. II and Ac $\text{O}$ , refluxed 12 hrs., give the *1,7-di-Me deriv.*, m. 230°, of *1,7'-dihydroxy-naphtha(1,2,4,3')coumarin*, yellow, does not m. 360°. III gives the *4-Me deriv.*, pale yellow, m. 181°, of *4-hydroxy-7'-methoxynaphtha(1,2,4,3')coumarin*, yellow, m. 205–7°. III and PO in xylene, refluxed 4 hrs., give *7'-methoxy-1-7'-methoxy-1'-phenylcoumarin-3'-acetyl* naphtha(1,2,4,3')coumarin (?), yellow, m. 237°. Et veratroylsuccinate, m. 82°; Et  $\alpha,\alpha$ -veratroylacetylsuccinate, m. 98°. Et veratroylsuccinate and *m*- $\text{C}_6\text{H}_4(\text{OH})_2$  give Et *1-hydroxy-4-veratroylcoumarin-3-acetate*, crystals with 1 mol.  $\text{H}_2\text{O}$ , m. 172. Hydrolysis and boiling with Ac $\text{O}$  gives *1,7'-dihydroxy-7,5-dimethoxynaphtha(1,2,4,3')coumarin*, m. 256–7°. Et *m*-methoxybenzoylsuccinate, b.p. 211°, does not condense with *m*- $\text{C}_6\text{H}_4(\text{OH})_2$ . C. J. W.

**$\alpha$ -Methyl-trans-hexahydroindene-2-acetic acid and the reduction of  $\Delta^{\alpha}$ - and  $\Delta^{\beta}$ -unsaturated trans-hexahydro-2-hydrindene compounds.** R. S. Thakur. *J. Chem. Soc.* 1933, 118–21, cf. *C. A.* 26, 5941—While the dehydration of 1,2-dihydroxy- $\alpha$ -methyl-trans-hexahydroindene-2-acetic acid with  $\text{P}_2\text{O}_5$  invariably produces an inseparable mixt. of  $\alpha$ -methyl-trans-hexahydroindene-2-acetic acid I and a  $\Delta^{\alpha}$ -isomer (II),  $\text{SOCl}_2$  yields only I (the  $\Delta^{\alpha}$  acid is produced in considerable quantities in both cases). The Et ester of I b.p. 150–1°,  $d_4^{20}$  0.9747,  $n_D^{20}$  1.472,  $J$  83.3° (10 mm.). This ester, treated with  $\text{P}_2\text{O}_5$ , gives no II. I m. 80–1°; amide, m. 131–2°. The structure of I follows from its oxidation to *trans*-hexahydrophthalic acid, *trans*-hexahydrohomophthalic acid (III) and (CO $\text{H}$ ) $_2$ . Catalytic reduction gives  $\alpha$ -methyl-trans-hexahydroindeneacetic acid, m. 104–5°, also obtained from  $\alpha$ -methyl-trans-hexahydrohydrindylidene-2-acetic acid; amide, m. 196°; anilide, m. 170–7°.  $\alpha$ -Methyl-trans-hexahydrohydrindyl-2-acetone, by reduction of the unsatd. compd., b.p. 149°,  $d_4^{20}$  0.9400,  $n_D^{20}$  1.461 (semicarbazone, m. 179–80°; oxime, m. 85–6°). *trans*-Hexahydrohydrindene-2-acetic acid, m. 102–3°; amide, m. 180. *trans*-Hexahydrohydrindyl-2-acetone, b.p. 141°,  $d_4^{20}$  0.9396,  $n_D^{20}$  1.4719; semicarbazone, m. 202–3° (decompn.); oxime, m. 68–70°. III can be readily prep'd pure and in large quantities by oxidizing *trans*-hexahydro-2-hydrindone with concd.  $\text{HNO}_3$ . C. J. W.

**Condensation products of bicyclic ketones.** R. S. Thakur. *J. Chem. Soc.* 1933, 1477–81.—Condensation

of *trans*-hexahydro-2-hydrindone with dry HCl gives *trans*-hexahydrohydrindylidene-2-*trans*-hexahydrohydrindone (I) and a hydrocarbon, ( $\text{C}_8\text{H}_{12}$ ) $_n$  ( $n$  probably 3), m. 116–8°; EtONa gives only I, m. 100–5°; I forms a *2,4-dinitrophenylhydrazones*, deep orange, m. 248° (decompn.); *phenylhydrazones*, m. 193–4° (decompn.); *p*-nitrophenylhydrazones, brick-red, m. 267° (decompn.); semicarbazones, m. 180° and on crystn. 234–5°; oxidation of I gives the original ketone and its peroxide. *trans*- $\beta$ -Decalone (II) and dry HCl give a mixt. of 2 Cl compds.,  $\text{C}_{20}\text{H}_{30}\text{OCl}$ , m. 130–1° and 118–9°; elimination of HCl by  $\text{C}_6\text{H}_5\text{N}$  gives the compd.  $\text{C}_{20}\text{H}_{28}\text{O}$ , b.p. 228–30° (semicarbazones, m. 207°). II and EtONa give a resin-like solid which could not be crystd. The ketone  $\text{C}_{20}\text{H}_{30}\text{O}$  (*C. A.* 26, 5939) is probably  $\Delta^1$ -*trans*-octahydronaphthyl-2-*trans*- $\beta$ -decalone, since the final product of oxidation is *trans*-cyclohexane-1,2-diacetic acid. This was sep'd. into 2 forms, m. 125–6° (III), and 75–80° (IV); the semicarbazones of III m. 212° (decompn.); of IV, m. 224–5° (decompn.); the same *phenylhydrazones*, m. 153–4°, was obtained from both; the *2,4-dinitrophenylhydrazones* of III, orange, m. 175–6°; of IV, m. 146–7° and on crystn., 194–5°; the *p*-nitrophenylhydrazones, of III, yellow, m. 208° (decompn.); of IV, m. 191–3°. C. J. West

**Reduction products of the hydroxyanthraquinones.** XIV. Arthur G. Perkin and Norman H. Haddock. *J. Chem. Soc.* 1933, 1512–20—Attree and P. showed (*C. A.* 25, 1518) that oxidation of 1-hydroxy-2-methoxyanthrone with I in  $\text{C}_6\text{H}_5\text{N}$  gives a compd.  $\text{C}_{20}\text{H}_{18}\text{O}_2$ , which is believed to be *3,9-dihydroxy-2,8-dimethoxy-5,6,11,12-dibenzoperylene-1,10-quinone* (I); the mechanism of this reaction is discussed. Acetyl-4-bromoisovaleryl-2-Me ether, with  $\text{SnCl}_4$ -HCl in AcOH on boiling for 1 hr., gives *4-bromo-1-hydroxy-2-methoxyanthrone* (II), orange, and 4-hydroxy-3-methoxyanthranol, m. 198–200°. II, Ac $\text{O}$  and  $\text{C}_6\text{H}_5\text{N}$  give *4-bromo-1-acetoxy-2-methoxy-9-anthranilic acid*, yellow, m. 185–8°. II boiled in  $\text{C}_6\text{H}_5\text{N}$  or  $\text{PhNO}_2$  gives I. 4-Bromoisovaleryl-2-Me ether,  $\text{BzCl}$  and  $\text{C}_6\text{H}_5\text{N}$ , heated at 100° for 5 min., give *4-bromo-1-benzoyloxyisovaleryl-2-Me ether*, m. 207–8°; boiling with Cu in  $\text{PhNO}_2$  gives *4,4'-dibenzoyloxy-3,3'-dimethoxy-1,1'-bianthraquinonyl*, yellow, m. above 360°; with 5% EtOH-KOH there results the *4,4'-di-IO deriv.* (III), orange, does not m. 360°; *Ac deriv.*, pale yellow, m. 322–6°;  $\text{H}_2\text{BO}_3$  in  $\text{H}_2\text{SO}_4$  at 140° gives *3,3',4,4'-tetrahydroxy-1,1'-bianthraquinonyl*, orange-red, whose *Ac deriv.* m. 280–2°. III and Cu in  $\text{H}_2\text{SO}_4$ , heated at 140–50°, give *4,4'-dihydroxy-3,3'-dimethoxyhelianthron* (IV), red-brown-green, m. 335–7°; *diacetate*, scarlet, m. 267–9°. The tetrahydroxyhelianthron (V) with Ac $\text{O}$  and  $\text{C}_6\text{H}_5\text{N}$  gives *3,3',4,4'-tetraacetoxynaphthabianthron*, pale yellow, m. about 360°, and the *tetra-Ac deriv.* of V, orange, m. 282–6°. The sulfonation of V is described. Oxidation of 1-hydroxy-2-methoxyanthrone (VI) with I in  $\text{C}_6\text{H}_5\text{N}$  gives I and IV; 1,1'-dihydroxy-2,2'-dimethoxybianthron gives the same products. Air oxidation of VI also gives I and IV. II and  $\text{C}_6\text{H}_5\text{N}$  slowly give I. IV, as the K salt, with  $\text{Me}_2\text{SO}$  and  $\text{Na}_2\text{CO}_3$ , heated to 140°, give *3,3',4,4'-tetramethoxyhelianthron*, scarlet, m. 263–5°, and a *3,3',4'-tri-Me deriv.* (?), scarlet, m. 285–7°. I under the same conditions gives a *tetra-Me ether*, scarlet, crystg. with 1 mol. AcOH, m. 314–5°, and a *tri-Me ether*, red, m. 289–90°. 1-Hydroxy-2-methylanthraquinone on reduction gives *1-hydroxy-2-methylanthron*, pale yellow, m. 136–8°; oxidation with I in boiling  $\text{C}_6\text{H}_5\text{N}$  gives *3,9-dihydroxy-2,8-dimethyl-5,6,11,12-dibenzoperylene-4,10-quinone*, leaflets resembling aniline blue; if the oxidation reaction is cooled, the product is *4,4'-dihydroxy-3,3'-dimethylhelianthron*, green-iridescent red needles, whose *di-Ac deriv.*, orange, m. 297–300°. 3-Bromoisovaleryl-2-Me ether, yellow, m. 136–7°; 33% HCl gives the *2-Me ether*, orange-yellow, m. 146–7° (*Ac deriv.*, m. 150–1°).

C. J. West

The action of Grignard reagents on benzanthrone, a case of 1,6-addition. Matawo Nakanishi. *Proc. Imp. Acad. (Tokyo)* 9, 394–7 (1933).— $\text{PhMgBr}$  in excess reacted with benzanthrone (I) to give a yellow-brown

compd.  $C_{20}H_{14}O$  (II), m. 186°. II must be 3-phenylbenzanthrone formed by 1,6-addn., since it showed an orange-red halochromism with concd.  $H_2SO_4$ , gave  $\alpha-C_6H_4(CO)C_6H_4CO_2H$  on oxidation with  $Na_2Cr_2O_7$ -AcOH, and its mono-Br deriv. with NaOEt formed an isoviolanthrone dye. 1,2- and 1,4-Addn. are eliminated because the products of such addn. could not possess these properties. 1-Phenylbenzanthrone (III), m. 182°, was prep'd. from anthrone (IV) and  $PhCOCH_2CH_2Cl$  by condensation with 72%  $H_2SO_4$ . A mixt. of II and III showed a decided m. p. depression. III on oxidation gave  $\alpha$ -benzoylanthraquinone and its mono-Br deriv. formed no dye with NaOEt. The attempted synthesis of II was unsuccessful. Anthrafuchson (V) was formed by 1,6-addn. of  $PhMgBr$  to benzylidencanthrone. V was also prep'd. from IV and  $Ph_2CCl_2$ . II gave  $BzOH$  and a colorless compd.  $C_{21}H_{16}$ , m. 242°, when oxidized with  $KMnO_4$  in  $Me_2CO$ . I and  $BuMgBr$  formed 3-butylbenzanthrone, m. 96°, having properties similar to II. E. W. S.

**Synthesis of octahydrophenanthrene derivatives.** James D. Fulton and Robert Robinson. *J. Chem. Soc.* 1933, 1463-6.—Cyclohexene, gradually added to a mixt. of  $SnCl_4$ ,  $PhCH_2COCl$  and  $CS_2$  at  $-15^\circ$ , and the product heated 2 hrs. at  $180^\circ$  with  $PhNEt_3$ , gives benzyl  $\Delta^1$ -cyclohexenyl ketone, m. 44.5° (semicarbazone, m. 171-2°). Cyclohexanone and  $PhCH_2CH_2MgBr$  give 1- $\beta$ -phenylethylcyclohexanol, m. 56.5°, and probably 1- $\beta$ -phenylethylcyclohexene, b. 112-3°,  $n_D^{20}$  1.5402; nitrosocyclohexide, m. 118-9°; nitropiperidide, m. 117 8°. Cyclohexene oxide gives the 2-isomer, b. 135-6°, m. 17-8° (91.5% yield); *p*-nitrobenzoate, m. 73.5°. 2-Chloro- $\beta$ -phenylethylcyclohexane, b. 130-4° (not pure), and  $AlCl_3$  in petrol. ether give 1,2,3,4,9,10,11,12-octahydrophenanthrene, b. 135 7°; heating with S gives phenanthrene. 2- $\beta$ -Phenylethylcyclohexanone, b. 135 6° (oxime, m. 74-5°; semicarbazone, m. 157°);  $EtMgBr$  gives 2- $\beta$ -phenylethyl-1-ethylcyclohexanol (I), b. 147 8°;  $ZnCl_2$  gives 2- $\beta$ -phenylethyl-1-ethyl- $\Delta^1$ -cyclohexene, b. 113-4°,  $n_D^{20}$  1.5306. I, converted into the chloride and treated with  $AlCl_3$ , gives 12-ethyl-1,2,3,4,9,10,11,12-octahydrophenanthrene (I'), b. 113 6°,  $n_D^{20}$  1.5387; heating with S gives phenanthrene and anthracene. *Et* 3,4-dimethoxycinnamate, m. 56°; di-Br deriv., m. 107 8°;  $EtOH$ -KOH gives 3,4-dimethoxyphenylpropionic acid, m. 154°; heating with  $PhNEt_3$  at  $150-60^\circ$  gives 3,4-dimethoxyphenylacetylene, m. 73-4°. *Et* homovertrate, b. 159 60°; amide, m. 139°.  $\beta$ -3,4-Dimethoxyphenylethyl alc., m. 47 8°; phenylurethan, m. 99°; *p*-nitrobenzoate, m. 85°. 3,4-Dimethoxymandelonitrile, m. 104-5°; the  $HCl$  salt of the imino *Et* ester m. 139-40°. C. J. West

**Decarboxylation temperatures of some furoic acids.** Henry Gilman, A. M. Jamney and C. W. Bradley. *Iowa State Coll. J. Sci.* 7, 429-31 (1933).—The Norris graphical method for detg. the temp. of decarboxylation of malonic acids was applied to 16 furoic acids. The m. ps. and decarboxylation temps., resp., of the acids are as follows: 2-Furoic acids: unsubstituted, 132°, 158°; 5-Me, 107°, 123 5°; 5-*tert*-Bu, 105°, 125-7°; 5-Cl, 175°, 180-2°; 5-Br, 185°, 177 9°; 3,5-di-Cl, 156-7°, 168-70°; 3,5-di-Br, 108-8.5°, 174°; 5-I, 193°, —; 5-nitro, 186°, 201 3°. 3-Furoic acids: unsubstituted, 122°, 152°; 2-Me, 101°, 101-3°; 2,4-di-Me, 114°, 129°; 2-methyl-5-nitro, 154.5°, 172°; 2,4-dimethyl-5-nitro, 182°, 185 6°. *o*-Anisic acid, 98°, 213 15°; *p*-anisic acid, 106-7°, 243-5°. F. E. Brown

**Polyhalogenated ketones. III. Pyrrole.** G. Sanna and Francesco Athene. *Gazz. chim. ital.* 63, 479-84 (1933); cf. S. and Massidda, *C. A.* 25, 2720.—The synthesis previously used gives favorable results in the pyrrole series, where the mol. is sensitive to many reagents.

In the present work, 2 derivs. of  $HN:CH:CH:CH:CCO-Me$  are described. These new compds. behave differently from indoles toward alkalis in that, instead of replacement of halogen by OH, there is some sort of change involving a rapid blackening of the soln., followed by notn. of a black substance similar to pyrrole blacks.

$NH_3$ , in water, EtOH or a closed tube, also forms black substances. Since with  $NH_3$  there is probably no oxidation, the black substance may result from condensation of 2 or 3 mols. (as has been proved for halogenated ketones of the indole series (*loc. cit.*), and possibly have 1 of the

following formulas:  $[HN:CH:CH:CH:CCOCH:]_2$  (I) or

$HN:CH:CH:CH:CCOCH:CH(CO:CH:CH:CH:NH):$ .

$CHCO:CH:CH:CH:NH$  (II). Expts. on the catalytic reduction and oxidation of the blacks obtained are in progress. Ice-cold magnesylpyrrole and  $Cl_2CHCOCl$  in anhyd. EtO yield, by extn. with  $Et_2O$ ,  $\alpha$ -dichloroacetyl-

pyrrole,  $HN:CH:CH:CH:CCOCHCl_2$  (III), m. 90°, sol. in cold concd.  $H_2SO_4$ , gives a wine-red color with  $HNO_3$ , and a rose-colored soln. in hot aq.  $HCl$ , is sol. in alk. hydroxides,  $NH_4OH$  and  $C_6H_5N$ , reduces hot  $NH_4$ -AgNO<sub>3</sub> and Fehling soln., and with alkaloids ppts. compds. of various colors. The stability of the 2 Cl atoms toward water is high, and several hrs. in boiling water decomps. it only slightly. III and 5% aq. KOH (2 mols.), boiled and acidified with dil.  $H_2SO_4$ , ppts. an amorphous brown-black compd., with a mol. wt. of approx. 600, does not contain Cl and is sol. in hot caustic alkalis; it is probably a condensation compd. with the structure II. With concd.  $NH_4OH$  in a sealed tube for 6 hrs. at 95°, II forms a microcryst. brown substance contg. no Cl, without a sharp m. p., and with a mol. wt. around 250. It is probably a condensation compd. with constitution I. Prep'd. like III, with crystn. from boiling water,  $\alpha$ -trichloroacetylpyrrole (IV) m. 67°, is sol. in cold concd. and hot dil. mineral acids, hot  $NH_4OH$ , and hot caustic alkalis, and reduces Fehling soln. by formation of a small quantity

of  $CHCl_3$ , thus:  $IV + KOH \rightarrow HN:CH:CH:CH:CCO_2K + CHCl_3$ . Prolonged heating in aq. KOH causes a deep-seated change, with pptn. of a black substance which could not be crys'd. The same substance is probably also formed in hot concd.  $NH_4OH$ , but this was not verified. C. C. Davis

**Experiments on the synthesis of physostigmine (eserine).** VIII. F. E. King, Robert Robinson and H. Sugimoto. *J. Chem. Soc.* 1933, 1472-5; cf. *C. A.* 27, 2443.—The acid, m. 170°, reported in part II (*C. A.* 26, 1929) is now recognized to be 3-keto-4-*o*-carboxybenzoyl-10-ethoxy-7-methyl-3,4,5,6-tetrahydro-4- $\psi$ -carboline. Hydrolysis gives the di-K salt of 5-ethoxy-3-methyl-3-( $\beta$ -*o*-carboxybenzamidoethyl)indolenine-2-carboxylic acid. 1-Eserethole (I) gives a *II d*-tartrate, m. 164 6°. *dl*-Norserethole and *p*- $MeC_6H_4SO_3Me$  give an oil, substantially *dl*-eserethole (II). I gives a *H d*-racemate, m. 159°, and a *H l*-tartrate, m. 172-3°. Attempts to resolve II by means of *l*-tartaric acid were inconclusive. II methopurate, orange-red, m. 184-6°; I methopicate, orange-red, m. 190° (decompn.). *Et c*-phenoxy- $\gamma$ -methylpentane- $\beta$ , $\beta$ -dicarboxylate, b. 211-2°, results from  $\delta$ -phenoxysec-butyl bromide and  $CHMe(CO_2Et)_2$ . IX. Improvement in the synthesis of *dl*-eserethole. F. E. King, Mario Liguori and R. Robinson. *Ibid.* 1475 7.— $\gamma$ -Phenoxy- $\alpha$ -methylbutyraldehyde (I) gives a 2,4-dinitrophenylhydrazon, yellow, m. 109-10°. I and *p*- $MeOC_6H_4NIINH_2$  in EtOH, refluxed 1 hr. and treated with  $HCl$ , give 5-methoxy-3-methyl-3- $\beta$ -phenoxethylindolenine, which did not crystallize; picrate, yellow, m. 157°, methiodide, golden yellow, m. 180-1°. The methiodide could not be dephenoxylated by hot  $HBr$  or other means.  $\gamma$ -Phthalimido- $\alpha$ -methylbutyramide, m. 162 3°. the butyronitrile m. 102°; the butyraldehyde, oily, forms a 2,4-dinitrophenylhydrazon, yellow, m. 191°; condensed with *p*- $EtOC_6H_4NIINH_2$  and treated with satd. EtOH-HCl, there results 5-ethoxy-3-methyl-3-( $\beta$ -phthalimidoethyl)indolenine, the methosulfate of which is hydrolyzed to *dl*-norserethole. C. J. West

**Binuclear isomerism of the biphenyl type.** II. A. J.



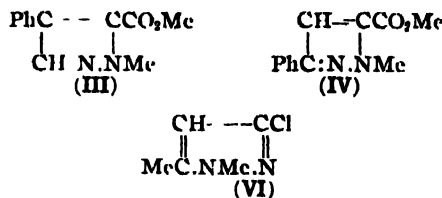
Chalmers and P. Lions. *J. and Proc. Roy. Soc. N. S. Wales* 67, 178-99 (1933).—Phenacylbenzoylacetate ester, condensed with  $\alpha$ -naphthylamine, gives *Et* 1- $\alpha$ -naphthyl-2,5-diphenylpyrrole-3-carboxylate (I), m. 181-2°. Hydrolysis of I yields the corresponding acid, m. 278-80°. Phenylacetoveratrone, refluxed with PhNHNH<sub>2</sub> in EtOH, gives the *hydrazone* (II), m. 153-4°. Treatment of II with EtOH satd. with dry HCl ppts. 2-(3',4'-dimethoxyphenyl)-3-phenylindole (III), m. 197°. Veratrole, reacting with succinic anhydride and AlCl<sub>3</sub> in CS<sub>2</sub>, yields 3,4-dimethoxybenzoylpropionic acid (IV), m. 163°. Nitration of IV at 0° gives 6-nitro-3,4-dimethoxybenzoylpropionic acid, m. 115°. Asym. phenylmethylhydrazone of IV, m. 171°, undergoes successful cyclization in xylene satd. with dry HCl to give 1-methyl-2-(3',4'-dimethoxyphenyl)-indolyl-3-acetic acid (V), m. 153-6°. Bromination of V in CCl<sub>4</sub> results in a mono-Br deriv., m. 206-7°. Treatment of 2,4-dimethoxybenzoylpropionic acid in glacial AcOH with PhNMeNH<sub>2</sub> gives 1-methyl-2-(2',4'-dimethoxyphenyl)indolyl-3-acetic acid, m. 210°. A cold soln. of 40 g. *o*-BrC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>CHAcCO<sub>2</sub>Et (VI) in 350 cc. alk., treated with 6 g. NaOH in 20 cc. H<sub>2</sub>O and then after 1 min a suspension of the diazonium chloride from 2,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub> (23 g.), HCl (45 cc.) and NaNO<sub>2</sub> (10 g.), yields *Et*  $\alpha$ -(2,5-dichlorobenzene- $\alpha$ -(*o*-bromophenyl)- $\alpha$ -acetylacetate (VII), m. 142-3°. Dry HCl passed into alc. VII gives the *Et* ester (VIII), m. 108-9°, of *o*-bromophenylpyruvic acid 2,5-dichlorophenylhydrazone (IX), m. 194°, obtained by hydrolysis of VIII with alc. KOH. PhCH CHAcCO<sub>2</sub>Et, treated as in the prepn. of VII, yields 1,3-phenyl-4,7-dichloroindole-2-carboxylate (X), m. 130°. Hydrolysis of X with alc. KOH gives the acid (XI), m. 216-8°. When VI is treated with a diazonium soln. from aniline as in the prepn. of VII, *Et* 3-*o*-bromophenylindolyl-2-carboxylate (XII), m. 164-5°, is obtained. Hydrolysis of XII gives the acid (XIII), m. 231-2°. VI in EtOH and NaOH when treated with diazotized  $\beta$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub>, HCl and NaNO<sub>2</sub> gives cryst. fractions from EtOH of 1,3-*o*-bromophenyl-4,5-benzotindole-2-carboxylate (XIV), m. 249°, and the 5,6-benzotindole isomer (XV), m. 217°. The corresponding acids obtained by hydrolysis m. 229 and 189°, resp. PhNMeNH<sub>2</sub> reacting with 3,4-MeO<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH<sub>2</sub>COCO<sub>2</sub>H yields 1-methyl-3-(3',4'-dimethoxyphenyl)indole-2-carboxylic acid (XVI), m. 194°. Dry HCl passed into alc. XVI eliminates the carboxyl group instead of esterifying it, yielding 1-methyl-3-(3',4'-dimethoxyphenyl)indole (XVII), m. 104°. W. J. P.

Condensation products of isatin with pyrroles (pyrrole blue). P. Pratesi. *Atti accad. Lincei* 17, 954-60 (1933).—The reactions of mono-, di-, tri- and *N*-substituted pyrroles with isatin have been studied in the general problem of detg. the compn. of pyrrole blue. *N*-Methyl-, *N*-phenyl-, *N*-ethyl- and *N*-acetylpyrroles do not give any blue product. 2,3-Dimethylpyrrole (I) and 3-methyl-4-ethylpyrrole (II) both give blue products, C<sub>14</sub>H<sub>10</sub>ON, and C<sub>14</sub>H<sub>14</sub>ON<sub>2</sub>, resp., with the elimination of H<sub>2</sub>O. II also forms a small amt. of a violet product cpd by the different solv. in boiling AcOH. 2,5-Dimethylpyrrole does not react. Of the trisubstituted compds., 2,4-dimethyl-3-ethylpyrrole alone was tried; it gives a blue product, C<sub>16</sub>H<sub>16</sub>ON<sub>2</sub>, like the above.

A. W. Contieri

Methylation of pyrazoles with diazomethane. K. v. Auwers and O. Ungenach. *Ber.* 66B, 1690-4 (1933); *C. A.* 27, 5327.—Whereas the *Et* ester of 4-phenylpyrazole-3(5)-carboxylic acid (I) with alk. Me<sub>2</sub>SO<sub>4</sub> gives about equal parts of the 2 structurally isomeric *N*-Me derivs. and the *Et* ester of 3(5)-phenylpyrazole-5(3)-carboxylic acid (II) behaves similarly with alk. MeI, the *Me* esters with CH<sub>2</sub>N<sub>2</sub> give almost exclusively the compds. III and IV, whence it may be concluded that I and II have definite structures corresponding to III and IV. On the other hand 3(5)-methyl-5(3)-chloropyrazole (V) with CH<sub>2</sub>N<sub>2</sub>, just as with Me<sub>2</sub>SO<sub>4</sub> or MeI, yields the 2 *N*-Me derivs., although its Na salt with MeI in the complete absence of moisture gives only VI. V seems therefore to be a mixt. while its Na salt exists in only 1

form. 1-Methyl-4-phenylpyrazole-5-carboxylic acid, m. 210-11° (gas evolution), is difficultly esterified (*Et* ester, m. 52.5-3.5°; *Me* ester (III), m. 69°); 1,4,3-isomer, hydrated needles, m. about 100° and, anhyd., 132° (*Me* ester, m. 122-3°).



C. A. R.

Benzo- and naphthopyrazolyl-*o*-benzoic acids. A. Corbellini and A. Cecchi. *Gazz. chim. ital.* 63, 489-94 (1933).—In connection with previous expts. by Corbellini and Barbaro (*C. A.* 26, 3250) on pyrazolic acids, the synthesis of benzo- and naphthopyrazolyl-*o*-benzoic acids by the intramol. reaction of NHNH<sub>2</sub> and CO groups was studied. The lactam (I) of *o*-[2-aminobenzoyl]benzoic acid (II), prep'd. by a patented method (French pat. 670,812 (1929)) (30 g. of I from 60 g. of phenylphthalimide) was converted by boiling dil. NaOH and AcOH to II, which in EtOH with HCl gas and treatment with Na<sub>2</sub>CO<sub>3</sub> yielded the *Et* ester of II, pale yellow, m. 71-2°. I saponified by boiling 5% NaOH, acidified with concd. HCl, diazotized, added to SnCl<sub>4</sub> in ice-cold concd. HCl and the ppt. purified with Na<sub>2</sub>CO<sub>3</sub> and HCl, yields *o*-[4,5-benzopyrazolyl-3]benzoic acid (III), m. 184-6.5°.  $\beta$ -Naphthylphthalimide (cf. *Gazz. chim. ital.* 15, 479 (1885)) (5 g.), added to a fused mixt. of AlCl<sub>3</sub> (16 g.) and NaCl (3.5 g.) and heated at 260-5°, decompd. with ice, boiled in dil. HCl, and extd. with PhCl, yields 0.2-0.3 g. of the lactam

C<sub>12</sub>H<sub>9</sub>CO.NH.C<sub>10</sub>H<sub>6</sub>CO (IV), light yellow, m. 277.5° (uncor.). In boiling 5% NaOH, with acidification by AcOH, it yields *o*-[2-aminonaphthoyl]benzoic acid, H<sub>2</sub>NC<sub>10</sub>H<sub>6</sub>CO.C<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H, orange-yellow, m. 279-9.5° (uncor.). Various attempts to verify its constitution by conversion into known compds. by substitution of the NH<sub>2</sub> by H or OH were ineffectual. IV, saponified, as before, diazotized, and reduced with SnCl<sub>4</sub>, yields *o*-[4,5-naphthopyrazolyl-3]benzoic acid (V), light yellow, m. 238-8.5°. In a similar way II yields *o*-[4,5-benzopyrazolyl-3]-benzoic acid (VI) (cf. Corbellini and Barbaro, *loc. cit.*). V is not the same as the isomer formed by oxidation of the decompn. product of the tetrazo deriv. of 2,2'-diamino-1,1'-binaphthyl by KMnO<sub>4</sub> (cf. Corbellini and Barbaro, *loc. cit.*).



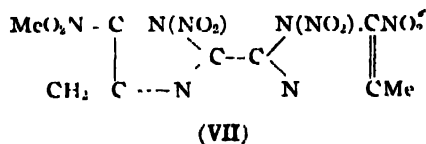
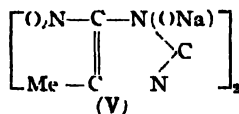
C. C. Davis

Bicarbazyls. IV. Synthesis of 1,1'-bicarbazyl. T. F. Macrae and S. Horwood Tucker. *J. Chem. Soc.* 1933, 1520-3; cf. *C. A.* 21, 2898.—(2-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>·*o*-ClC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub> and BaCO<sub>3</sub>, heated at 230° for 14 hrs., give 12% of 2,2'-bis(*o*-nitrophenylamino)biphenyl (I), ruby-red, m. 188.5-9.5°; many variations of the expt. are reported; *N,N*-di-Ac deriv., pale green, m. 246-9°. 2-*o*-Nitrophenylamino-2'-aminobiphenyl, orange, m. 113-4.5°; HCl salt, bright scarlet, m. 222°; 2'-diacetylaminobenzyl, bright scarlet, m. 192-4°. Reduction of I with SnCl<sub>2</sub> and HCl gives 50% of 2,2'-bis(*o*-aminophenylamino)biphenyl, m. 235-7°. Through the diazo compd. there results 2,2'-di-1',2'-3'-benzotriazolylbiphenyl, crystals with 1 mol. C<sub>6</sub>H<sub>6</sub>, m. 194-6°; it also appears to cryst. with EtOH, MeOH and AcOH; on heating, N is evolved and 1,1'-bicarbazyl, m. 205-7°, results; it seps. with 2 mols. AcOH. V. Synthesis of 3,9'-bicarbazyl. Margaretta C. Nemes and S. H. Tucker. *Thid.* 1523-5.—*o*-p-Nitrophenylcarbazole, whose structure was established by synthesis, gives 80% of the *p*-NH<sub>2</sub> deriv.; heating 6-8

hrs. with  $\alpha\text{-ClC}_6\text{H}_4\text{NO}_2$  and  $\text{Na}_2\text{CO}_3$  gives 40% of 9-*p*-(*o*-nitrophenylamino)phenylcarbasole, ruby-red, m. 181-5°; picrate, orange, m. 170°; *Ac* deriv., orange, m. 205-7°; *o*- $\text{MeI}_2$  deriv., cream, m. 115-6° (80% yield); picrate, m. 137°; *Ac* deriv., m. 180-1°; 9-*p*-1",2",3"-benzotriazolylphenylcarbasole, salmon-pink, m. 163° (80% yield); heating gives 55% of 3,9-*incarbazyl*, m. 212-4°; 9-*Ac* deriv., cream, m. 197°. Carbazole,  $\alpha\text{-ClC}_6\text{H}_4\text{NO}_2$  and  $\text{K}_2\text{CO}_3$ , boiled 3 hrs., give 10% of 9-*o*-nitrophenylcarbasole, m. 156°; 9-*o*-acetamido deriv., cream, m. 150°. All m. ps. are cor. C. J. West

4(or 5)-Hydroxymethyl-2-thiolimidazole. Arnold O. Jackson and Carl S. Marvel. *J. Biol. Chem.* 103, 191-5 (1933).—Bromoacetylphthalimide (I) boiled with  $\text{NaOAc}$  in abs. alc. gave  $\omega$ -acetoxyacetylphthalimide, m. 141-2°. This with 20%  $\text{HCl}$  at 85-95° gave hydroxyaminoacetone-*HCl*, m. 136-7°, which with 60%  $\text{KSCN}$  soln. gave 4(or 5)-hydroxymethyl-2-thiolimidazole (II), m. 203-4°, whose structure was proved by oxidation with  $\text{FeCl}_3$  to 4(or 5)-hydroxyimidazole. Attempted replacement of the OH in II by Cl gave polymers. Condensation of I with cyanacetamide gave  $\omega$ -phthalimidouacetylcyanoacetamide, m. 196-7°, which on bromination gave a mixt. of monobromide, m. 209-300°, and dibromide, m. 345-6°, with the position of the Br unknown. R. C. Elderfield

Glycosine of Debus. II. Carbon salts of tetranitro-bimidazole and methylation of nitroimidazole. Kurt Lehmsiedt. *Ann.* 507, 213-25 (1933); cf. *C. A.* 21, 3364.—The Na salt of tetranitroimidazole (I) and  $\text{BzCl}$  or  $\text{AcCl}$  in  $\text{C}_6\text{H}_5\text{N}$  give only the pyridine salt of I,  $\text{C}_6\text{H}_5\text{O}_6\text{N}_4\cdot 2\text{C}_6\text{H}_5\text{N}$ , yellow, decomp. 233°; the imidazole salt,  $\text{C}_6\text{H}_5\text{O}_6\text{N}_4\cdot 2\text{C}_6\text{H}_5\text{N}$ , orange, decomp. 325°. The Na salt of I and  $\text{Me}_2\text{SO}_4$ , shaken at 20-5° for 5 min., give 4-methyl-1,1',5,5'-tetranitro-2,2'-bimidazole (II), crystg. with 2 mols.  $\text{H}_2\text{O}$ , yellow, decomp. 273-1°; *Na* salt, crystals with 4 mols.  $\text{H}_2\text{O}$ , light brown needles; *Ag* salt, yellow needles. Reduction of II gives the 1,1'-diamino deriv., the Na salt crystg. with 4 mols.  $\text{H}_2\text{O}$  as blood-red needles; the free amine is a light brown, amorphous mass. The anhyd. Na salt of II and  $\text{Me}_2\text{SO}_4$  give, on warming on the water bath, the 4,4'-*di-Me* deriv. (III) of I, light yellow, decomp. 239-40°. The 4-*Et* deriv. (IV) of I, crystg. with 2 mols.  $\text{H}_2\text{O}$ , light yellow, m. 250° (decomp.); the *Na* salt seps. with 2 mols.  $\text{H}_2\text{O}$ ; the 4,4'-*di-Et* deriv., light yellow, decomp. 203°. I and  $\text{CH}_3\text{N}_3$  in abs.  $\text{Et}_2\text{O}$  give III. IV and  $\text{CH}_3\text{N}_3$  give the 4-*Me* deriv. of IV, decomp. 226°. III (1.7 g.) and 4.5 cc. 5 *N*  $\text{NaOH}$  in 30 cc.  $\text{Me}_2\text{CO}$ , shaken 15 min., give 1.25 g. of the brick-red salt,  $\text{C}_6\text{H}_5\text{O}_6\text{N}_4\text{Na}_2\cdot \text{H}_2\text{O}$  (V); the concd.  $\text{H}_2\text{SO}_4$  soln. (yellow) gives on pouring into  $\text{H}_2\text{O}$ , a blue dye sol. in  $\text{H}_2\text{SO}_4$  with a violet-red color. V dissolved in  $\text{H}_2\text{O}$  without warming and shaken with 2 *N*  $\text{HCl}$ , gives the indigo-blue dye  $\text{C}_6\text{H}_5\text{O}_6\text{N}_4$  (VI). III and hot  $\text{MeOH-MeONa}$  give 92% of 1,1'-dimethoxy-1,4'-dimethyl-5,5'-dinutro-2,2'-bimidazole, m. 212° (decomp.), warming with dil.  $\text{NaOH}$  and acidification gives VI. In 1 prepn. of II there was also formed 1-methyl-4'-methylene-1,1',5,5'-binutro-2,2'-bimidazole-5'-nitronic acid *Me* ester (VII), light red, decomp. 127°, crystals with 1 mol.  $\text{H}_2\text{O}$ . 4(5)-Nitroimidazole gives a yellow Na salt, 6.75 g. of which with  $\text{Me}_2\text{SO}_4$  gives 3.85 g. of 4-nitro- and 0.925 g. of 5-nitro-1-methylimidazole.



C. J. West

Isomeric 2-iminotolyl-3-tolyl-4-*p*-chloro- and *p*-bromo-

phenyl- $\Delta^4$ -thiazolines. Raymond M. Hann and E. Emmet Reid. *J. Am. Chem. Soc.* 55, 4998-5000 (1933).—The following phenyl- $\Delta^4$ -thiazolines were prepd. by the general reaction  $\text{XC}_6\text{H}_4\text{COCH}_2\text{Br} + \text{RN:C(SH)NHR}$ : 2-iminophenyl-3-phenyl-4-*p*-chloro (I), m. 204° (all m. ps. cor.) (*HCl* salt, m. 228-9°); 2-iminophenyl-3-phenyl-4-*p*-bromo (II), m. 206°; 2-imino-*o*-tolyl-3-*o*-tolyl-4-*p*-chloro (III), pale yellow, m. 132°; *p*-Br deriv. (IV), pale yellow, m. 123°; 2-imino-*p*-tolyl-3-*p*-tolyl-4-*p*-chloro (V), m. 227°; *p*-Br deriv. (VI), m. 239°. The yields were 80-90%. *Picrates*: I, golden, m. 206°; II, golden, m. 203°; III, yellow, m. 187°; IV, yellow, m. 196°; V, yellow, m. 183°; VI, yellow, m. 193°. C. J. West

Preparation of halo and other 2-phenylbenzopyrylium salts. Catherine G. Le Fevre and Raymond J. W. Le Fevre. *J. Chem. Soc.* 1933, 1532.—The following process gives perchlorates of pyrylium compds. in 1 step: to the appropriately substituted acetophenone (0.01 g.-mol.) and salicylaldehyde (0.01 g.-mol.) in 40 cc. anhyd.  $\text{Et}_2\text{O}$ , is added  $\text{HClO}_4$  (70%, 3 cc) and the mixt. satd. with  $\text{HCl}$  at 0°; after 24 hrs. the cryst. perchlorate is washed with  $\text{Et}_2\text{O}$ . C. J. West

Synthesis in the chromone group. X. Coumarin and chromone formation. Tara C. Chaudha, Harbhajan S. Mahal and Krishnasani Venkataraman. *J. Chem. Soc.* 1933, 1450-62; cf. *C. A.* 27, 5329. The action of an acid anhydride and the Na salt of an acid on a phenolic ketone may produce the acyl deriv. of the ketone, a chromone, a 3-acetylated chromone or a coumarin; 10 examples are given with references. Phloracetophenone,  $\text{Ac}_2\text{O}$  and  $\text{PhCH}_2\text{CO}_2\text{Na}$  give the *di-Ac* deriv., m. 169° of 5,7-dihydroxy-3-phenyl-1-methylcoumarin, m. 282-3°. *o*- $\text{HO}_2\text{C}_6\text{H}_4\text{Ac}$  (I),  $\text{PhCH}_2\text{CO}_2\text{Et}$  and Na, heated 4 hrs. on the steam bath, give 2-benzylchromone, pale yellow, m. 86°. I,  $\text{PhCH}_2\text{COCl}$  and  $\text{PhCH}_2\text{CO}_2\text{Na}$ , heated 6 hrs. at 180°, and the product hydrolyzed, give 3-phenyl-4-methylcoumarin but no chromone. *Ph* phenylacetate, from the chloride and  $\text{PhOH}$ , b. 174°, m. 50°; heating with  $\text{AlCl}_3$  gives a mixt. of *o*-hydroxyphenyl benzyl ketone (II), m. 60° (2,4-dinitrophenylhydrazine, pale orange, m. 219°), and the *p*-isomer, m. 151° (2,4-dinitrophenylhydrazine, deep orange, m. 221°). II,  $\text{Ac}_2\text{O}$  and  $\text{AcONa}$ , heated 8 hrs. at 170-80°, give 2-methylisoflavone, m. 110°;  $\text{Bz}_2\text{O}$  and  $\text{BzONa}$  give 2,3-diphenylchromone, m. 152°.  $\omega$ -Methoxyacetophenone,  $\text{PhCH}_2\text{CO}_2\text{Na}$  and  $\text{Ac}_2\text{O}$  in  $\text{Et}_2\text{O}$  give the 7-*Ac* deriv., m. 163°, of 7-hydroxy-3-phenyl-4-methoxymethylcoumarin, m. 213°; resorpropionophenone gives the 7-*Ac* deriv., m. 205°, of 7-hydroxy-3-phenyl-4-ethylcoumarin, m. 254°.  $\beta$ -Naphthyl phenylacetate, m. 87°;  $\text{AlCl}_3$  in  $\text{CS}_2$  gives 1-phenylacetyl-2-naphthol, m. 101°, also prepd. from  $\beta\text{-C}_{10}\text{H}_7\text{OH}$ ,  $\text{PhCH}_2\text{COCl}$  and  $\text{AlCl}_3$  in  $\text{CS}_2$ ; with  $\text{Ac}_2\text{O}$  and  $\text{AcONa}$  there results 3-phenyl-2-methyl-1,4- $\beta$ -naphthopyrone, cream, m. 161°;  $\text{Bz}_2\text{O}$  and  $\text{BzONa}$  give 2,3-diphenyl-1,4- $\beta$ -naphthopyrone, m. 188°. 1-Benzyl-2-naphthol,  $\text{Ac}_2\text{O}$  and  $\text{PhCH}_2\text{CO}_2\text{Na}$  give 3,1-*di*phenyl-1,2- $\beta$ -naphthopyrone, m. 221-2°. C. J. West

Rosenmund aldehyde synthesis in the pyridine series. II. Roderich Graf and Paul Lászlo. *J. prakt. Chem.* 138, 231-8 (1933); cf. *C. A.* 26, 5096.—4,5,6-Trichloropyridine acid chloride on catalytic reduction gives a mixt. of 2,3,4-trichloropyridine, m. 45-7°, and 4,5,6-trichloropyridine-2-aldehyde, m. 94-5°, crystg. with 2 mols.  $\text{H}_2\text{O}$ , m. 65-7°; phenylhydrazine, yellow, m. 203-4°; 50%  $\text{KOH}$  gives the 2-methanol, m. 84°. 5-Chloronicotinic acid chloride (5 g.) gives 0.8 g. of 5-chloropyridine-3-aldehyde, m. 60-70°; phenylhydrazine, yellow, m. 150-61°. 5-Bromopyridine-3-aldehyde, obtained in small yield, was analyzed as the phenylhydrazine, yellow, m. 156-7°. 2,6-Dibromoisonicotinic acid chloride did not yield an aldehyde. C. J. West

Action of ultra-violet rays on pyridine. IV. The formation of photo products from pyridine derivatives by ultra-violet light of various wave lengths. Hans Freytag. *J. prakt. Chem.* 138, 264-7 (1933); cf. *C. A.* 27, 2687.—Most of the  $\text{C}_6\text{H}_4\text{N}$  derivs. studied (2-, 3- and 4-Me, 2,4- and 2,6-di-Me and 2,3,4,5-( $\text{CO}_2\text{H}$ )<sub>4</sub>) are acted upon

by wave lengths of 265–248  $\mu$  and very slightly by 240  $\mu$ ; the 3-NH<sub>2</sub> deriv. shows the greatest reaction at 313  $\mu$ , although some effect is noted from 365 to 240  $\mu$ . The 2,6-di-Me and the 2-NH<sub>2</sub> derivs. are not changed.

C. J. West

**4-(N-Piperidyl)pyridine.** Roderich Graf and Robert Lehmann. *J. prakt. Chem.* 138, 239–43 (1933).—4-Chloropicolinic acid and piperidine with a trace of CuO, heated 5 hrs. at 130–5°, give 4-(N-piperidyl)pyridine-3-carboxylic acid, crystals with 4 mols. H<sub>2</sub>O, m. 77°; it is purified through the purple Cu salt; HCl salt, m. 225°; III salt, crystals with 1 mol. H<sub>2</sub>O, m. 200–10° (decompn.); Me ester, m. 52–3°. Above the m. p. the acid loses CO<sub>2</sub>, giving 4-(N-piperidyl)pyridine, b<sub>12</sub> 164°, m. 80°; chloroaurate, orange, m. 961 3°; picrate, deep yellow, m. 142°; methiodide, yellow, m. 150°.

C. J. West

**Several nucleus-substituted-pyridine- $\beta$ -carboxylic acid diethylamides.** Roderich Graf, Sr., Antonella Theyer and Renato Purkert. *J. prakt. Chem.* 138, 259–63 (1933).

Pyridine-3,5-dicarboxylic acid, through the chloride, gives a tetraethylamide, m. 73 5°. 6-Methylnicotinic acid azide and Et<sub>3</sub>NH give 6-methylpyridine-3-carboxylic acid diethylamide, b<sub>12</sub> 160–4°; 2,6-dimethylpyridine-3,5-dicarboxylic acid tetraethylamide, b<sub>12</sub> 230°, m. 82 3°, has a very bitter taste. 3-Bromopyridine-3-carboxylic acid diethylamide, yellow oil, b<sub>12</sub> 189°; 3,5-di-Cl analog I, yellow oil, b<sub>12</sub> 191–2°. 5-Chlorobenzotriazole-3-carboxylic acid diethylamide, m. 113 5°, results by reacting I with N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O, giving the 6-hydrazino deriv., which is then diazotized.

C. J. West

**N-Methylolamides of several pyridine- and quinolinemonocarboxylic acids.** Roderich Graf. *J. prakt. Chem.* 138, 262 8 (1933).—Picolinic acid amide (3 g.) in 2.2 cc. 40% HCHO, 3 cc. H<sub>2</sub>O and 0.1 g. K<sub>2</sub>CO<sub>3</sub>, heated until the amide dissolves, gives pyridine-3-carboxylic acid N-methylolamide, m. 102–4°; 6-Me deriv., m. 95°. Nicotinic acid amide gives the pyridine-3-carboxylic acid deriv., m. 141 2° (decompn.). Quinaldic acid amide gives the quinaldine-2-carboxylic acid deriv., m. 129 31°. 2-Butoxyquinoline-4-carboxylic acid amide (I) m. 161–2°; the N-methylol deriv. m. 110° (decompn.); HCHO and Et<sub>3</sub>NH give 2-butoxy-4-quinolyl diethylmethylenediamine, m. 60–1°, dil. HCl gives I; 20% HCl gives methylenbis-2-butoxyquinonic acid amide (I), m. 290°. Benzoyl-diethylmethylenediamine under the same conditions gives methylenedibenzamide, m. 218–9°.

C. J. W.

**Symmetrical secondary hydrazides of several pyridine- and quinolinemonocarboxylic acids.** Roderich Graf. *J. prakt. Chem.* 138, 280 91 (1933).—Picolinic acid chloride and N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O in C<sub>6</sub>H<sub>6</sub> give sym-di(2-pyridoyl)-hydrazine, m. 218 9°; 3-pyridoyl isomer, m. 227–8°; 4-pyridoyl isomer, m. 254–5°; sym-di(2-quinoloyl)-hydrazine, m. 239–40°; 4-quinoloyl isomer, m. 251 6°; sym-di(2-phenyl-4-quinoloyl)-hydrazine, m. 328 9°.

C. J. West

**5-Chloro- and 5,6-dichloronicotinic acids.** Roderich Graf, Ernst Lederer-Ponzer, Viktor Kopetz, Renato Purkert and Paul Lászlo. *J. prakt. Chem.* 138, 244–58 (1933). Nicotinic acid HCl salt (100 g.) and 180 g. SOCl<sub>2</sub>, gently boiled 5 days and then heated in tubes 12 hrs. at 180°, give 50–60% of a mixt. of the 5-Cl and 5,6-dichloro (I), in about equal amts.; more SOCl<sub>2</sub> increases the proportion of the di-Cl acid. 5-Aminopyridine-3-carboxylic acid (II), m. 238–90° (decompn.). II through the diazo reaction gives the 5-Br deriv., m. 182–3°; chloride, m. 74–5°; Me ester, m. 98–9°; Ph ester, m. 80 7°. The chloride and N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O in C<sub>6</sub>H<sub>6</sub> give sym-bis(5-bromo-3-pyridoyl)-hydrazine, m. 308° (decompn.). The Me ester gives 5-bromopyridine-3-carbonyl hydrazide, m. 191 3° (benzal deriv., m. 191 3°); the azide m. 88–9° (decompn.) and with abs. EtOH gives 5-bromo-3-carbathoxypyridine, m. 150–1°; Me ester, m. 109–70°; heating the Et ester with 30% NaOH gives 5-bromo-3-aminopyridine (III), b<sub>12</sub> 149–50°, m. 66 7°; the intermediate Na 5-bromo-3-pyridylcarbamate was also analyzed; Me deriv. of III, m. 127–8° (dihydrate, m. 76–8°); picrate of III, deep yellow, m. 212–3°; chloroaurate, red-orange,

m. 185–7°. 5-Iodopyridine-3-carboxylic acid, m. 220°; Ph ester, m. 100–1°; Me ester, m. 121°; Et ester, m. 86–7°; amide, m. 221–2°. 5-Hydroxypyridine-3-carboxylic acid, m. 299° (decompn.). The Et ester of I and N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O give Et 5-chloro-6-hydrazinopyridine-3-carboxylate (IV), m. 137–8°; the hydrazide, gray, m. 238–40°; the free acid m. 248–9° and was also obtained directly from I. IV on diazotizing yields Et 5-chlorobenzotriazole-3-carboxylate, m. 95–6°; the free acid m. 195–6°; heating with HCO<sub>2</sub>H gives 5-chlorobenzotriazole-3-carboxylic acid, m. above 300°. I and concd. NH<sub>4</sub>OH at 180–90° give 6-amino-3-chloropyridine-3-carboxylic acid, m. 323° (decompn.); Me ester, m. 163–5°; the Me ester of the 6-HO deriv. m. 218°.

C. J. West

**Addition of 8-hydroxyquinoline by thorium and uranium 8-hydroxyquinolates.** Francis J. Frere. *J. Am. Chem. Soc.* 55, 4362–5 (1933).—Th(C<sub>9</sub>H<sub>6</sub>NO)<sub>4</sub>·C<sub>9</sub>H<sub>6</sub>NOH is pptd. from Th salts by 8-hydroxyquinoline (I), without H<sub>2</sub>O of crystn.; it loses 1 mol. I at 160–170°. So likewise UO<sub>2</sub>(C<sub>9</sub>H<sub>6</sub>NO)<sub>2</sub>·C<sub>9</sub>H<sub>6</sub>NOH, which loses I at 200°.

T. H. Chilton

**Attempts to find new antimalarials. VI. Preparation of  $\beta$ -6,7-dimethoxy-4-quinaldylethylamine dihydrochloride.** Kozo Miki and Robert Robinson. *J. Chem. Soc.* 1933, 1467 9; also Haq, Kapur and Ray, *C. A.* 27, 5331.—2,4,5-H<sub>2</sub>N(MeO)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CO(CH<sub>2</sub>)<sub>2</sub>CO<sub>2</sub>H, m. 141–2 5°, Me<sub>2</sub>CO and NaOH in EtOH give  $\beta$ -6,7-dimethoxy-4-quinaldylpropionic acid (I), m. 249°; HCl salt, m. 216° (decompn.); Me ester, m. 101.5–2°; hydrazide, m. 188.5°; azide, decompn. 94–5°; EtOH gives  $\beta$ -6,7-dimethoxy-4-quinaldylethylurethan, m. 154°; this is converted into a substituted phthalamide, which is hydrolyzed to  $\beta$ -6,7-dimethoxy-4-quinaldylethylamine, whose di-HCl salt seps. with 2 mols. H<sub>2</sub>O and does not m. 270°. Autocondensation of I (NaOH in EtOH) gives a compd., C<sub>21</sub>H<sub>24</sub>O<sub>4</sub>N<sub>2</sub>, m. 271–2° (decompn.).

C. J. West

**Acridones. V. 3-Nitrophenylantranil.** Ioan Tanasescu and Eugen Ramontianu. *Bull. soc. chim.* 53, 918–23 (1933); cf. *C. A.* 21, 3905.—By modifying the technic of sepn. of the products formed in the synthesis of 3-nitroacridone by the condensation of 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CHO with C<sub>6</sub>H<sub>6</sub>, the intermediate 3-nitrophenylantranil (I) (*C. A.* 26, 1285) has been isolated. The phys. consts. of I are very similar to those of 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Bz (II) simultaneously formed in the reaction. To a soln. of 5 g. of 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CHO in 20 cc. C<sub>6</sub>H<sub>6</sub> was added 15 cc. concd. H<sub>2</sub>SO<sub>4</sub>. The mixt. was agitated and settled for 24 hrs. Diln. of the H<sub>2</sub>SO<sub>4</sub> layer with H<sub>2</sub>O gave a brick-red compd. which on extn. with C<sub>6</sub>H<sub>6</sub>, recrystn. from AcOH (in which acridone is insol.) and recrystn. from 96% EtOH yielded 1.6 g. of I, C<sub>12</sub>H<sub>7</sub>N<sub>3</sub>O<sub>3</sub>, m. 174–5°; HgCl<sub>2</sub> complex, m. 190° (decompn.). The original benzene layer contained II. Reduction of I with SnCl<sub>2</sub> and concd. HCl gave 3-aminophenylantranil (III), C<sub>12</sub>H<sub>10</sub>N<sub>2</sub>O, m. 155 6°; HgCl<sub>2</sub> complex, m. 192°. A similar reduction of II invariably produced III. Benzoylation of III yielded 3-benzoylaminophenylantranil, C<sub>20</sub>H<sub>14</sub>N<sub>2</sub>O<sub>2</sub>, m. 260° (decompn.). Treatment of 0.6 g. of I, II or III with 50 cc. boiling water contg. a little CaCl<sub>2</sub>, 5 cc. 96% EtOH and 4 g. powd. Zn for 1.5 hrs. formed 2,4-(H<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Bz, m. 132°; di-Bz deriv., C<sub>27</sub>H<sub>18</sub>N<sub>2</sub>O<sub>2</sub>, m. 201°.

C. R. A.

**Some physical constants of thioxane, selenoxane and dithiane.** John D. A. Johnson. *J. Chem. Soc.* 1933, 1530.—Thioxane, b<sub>77</sub> 69.9°, b<sub>100</sub> 100°, b<sub>140</sub> 137.7°, m. –17°,  $n_D^{20}$  1.5081; selenoxane, b<sub>77</sub> 79.5°, b<sub>100</sub> 100.8°, b<sub>140</sub> 156.0°, m. –21.5°,  $n_D^{20}$  1.5480; dithiane, b<sub>77</sub> 115.6°, b<sub>100</sub> 163.7°,  $n_D^{20}$  1.4217. B. ps. at other pressures are given.

C. J. West

**1,4-Selenothiane.** Charles S. Gibson and John D. A. Johnson. *J. Chem. Soc.* 1933, 1529–30.—(CICH<sub>2</sub>CH<sub>2</sub>)<sub>2</sub>S and Na<sub>2</sub>Se, boiled 4 hrs., give a small yield of 1,4-selenothiane, m. 107°; it reacts readily with Br. (CICH<sub>2</sub>CH<sub>2</sub>)<sub>2</sub>Se and Na<sub>2</sub>S give Se and C<sub>2</sub>H<sub>4</sub>(?). Al<sub>2</sub>Se<sub>3</sub> and the sulfide give dithiane.

C. J. West

**Synthesis of heterocyclic compounds by means of isothiourea ethers.** J. F. Deck and F. B. Dains. *J. Am. Chem. Soc.* 55, 4980–91 (1933).—The following Me iso-

thiourea ethers were prepd.: *di-p-bromodiphenyl*, m. 129°; *m-nitrodiphenyl*, m. 87-9°; *di-m-tolyl*, m. 97.5°; *mono-bromodiphenyl*, m. 79-80°; *thiomethyl ether of methylphenylurea* (I), m. 58-9° (*perchlorate*, m. 114°). Me salicylate and the diphenyl thioether, heated at 180°, give *2-phenylimino-3-phenyl-1,3,4-benzoxazin-1-one*, m. 157-8°; salol gives a 68% yield; *2-o-tolylimino-3-o-tolyl deriv.* (I), m. 114°; refluxing with concd. HCl and EtOH for 4 hrs. gives *3-o-tolyl-1,3,4-benzoxazine-2,4-dione*, m. 129-30°; the *p-isomers* m. 163-4° and 221°. *2-Phenylimino-3-p-bromophenyl-1,3,4-benzoxazin-1-one*, m. 135-6°; hydrolysis with dil. acid gives PhNH<sub>2</sub> and *3-p-bromophenyl-1,3,4-benzoxazin-2,4-dione*, m. 214°. *o-HOC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>Ph* and I give *2-phenylimino-1,3,4-benzoxazin-1-one*, m. 189°; boiling 40% H<sub>2</sub>SO<sub>4</sub> gives *1,3,4-benzoxazine-2,4-dione*. *o-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H* and Me isodiphenylthiourea, fused at 170-80° or heated in C<sub>6</sub>H<sub>5</sub>Me<sub>2</sub>, give *2-phenylimino-3-phenyl-4-ketotetrahydroquinazoline*, m. 163°, and *3-phenyl-2,4-diketotetrahydroquinazoline*, m. 271°. *o-MeNHC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H* gives *1-methyl-2,4-diketo-3-phenylquinazoline*. *2-p-Tolylimino-3-p-tolyl-4-ketotetrahydroquinazoline*, m. 149°; *3-p-tolyl-2,4-diketotetrahydroquinazoline*, m. 273°; *1-methyl-2-keto-3-p-tolyl-4-ketotetrahydroquinazoline*, m. 190°; *2-o-tolylimino-3-o-tolyl-4-ketotetrahydroquinazoline*, m. 157-9°. *o-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H* and the Me ether of monophenylthiourea give a mixt., which could not be sep'd. *o-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>* and Me isodiphenylthiourea give *2-anilinobenzimidazole*, m. 188°; *2-p-tolylaminobenzimidazole*, m. 207°; *2-o-isomer*, m. 182°. *o-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OH* and Me pseudodiphenylthiourea, heated 2 hrs. at 170°, give *1-anilinobenzoxazole*, m. 170°; *1-p-tolylamino deriv.*, m. 178°; *m-isomer*, m. 146°; *4-chloro-1-phenylamino deriv.* (II), m. 190°; *4-chloro-1-p-tolylamino deriv.*, m. 204.5°; *4-nitro-1-phenylamino deriv.*, m. 235°; *1-nitro-1-p-tolylamino deriv.*, m. 222-4°; *o-isomer*, m. 173-4°; *m-isomer*, m. 207°. II, EtOH and CS<sub>2</sub>, refluxed 36 hrs., give *4-chloro-1-mercaptobenzoxazole*, m. 262°; *4-NO<sub>2</sub> deriv.*, m. 235-8°. PhNHCH<sub>2</sub>CO<sub>2</sub>Et and I give *1,3-diphenyl-2-phenylimino-5-imidazolone*, m. 150-1° (*4-m-nitrobenzyl deriv.*, yellow, m. 170°). *1-Phenyl-2-p-tolylimino-3-p-tolyl-5-imidazolone* (III), m. 158°; *1-p-tolyl-2-keto-3-phenyl-5-imidazolone*, m. 153°; *m-nitrobenzyl deriv.* of III, m. 156°; *1-o-tolyl-2-o-tolylimino-3-phenyl-5-imidazolone*, m. 130°; *1-o-tolyl-2-keto-3-phenyl-5-imidazolone*, m. 126°; *1-phenyl-2-phenylimino-3-p-tolyl-5-imidazolone*, m. 126° (*4-m-nitrobenzyl deriv.*, m. 176°); *1-phenyl-2-keto-3-p-tolyl-5-imidazolone*, m. 155°. C. J. West

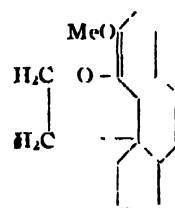
**Extinction curves of a few alkaloids of the quinoline group.** I. Manta. *Z. physik. Chem.* B22, 465-8 (1933).

The extinction curves of the following alkaloids were obtained in 0.001 and 0.005 N alc. soln.: quinoline and *p*-methoxyepidine; quinidine and quinine; cinchonine and cinchonidine; ethylidoquinine and diidoethylquinine, chitennine. The pairs of comp'd. show nearly the same form of curve. G. M. Murphy

**Alkaloids of fumariaceous plants. VIII. Corydalis aurea**, Willd. and the constitution of bicucine. R. H. F. Manske. *Can. J. Research* 9, 436-42 (1933); cf. C. A. 27, 5148.—The chem. examn. of the alkaloids of *Corydalis aurea* has shown an unusual complexity and of the total of more than 10 alkaloids thus far isolated only 6 are now described. The record deals chiefly with the stems and leaves of the plant in which protopine was present in exceptionally low concn. (0.025%). Equally exceptional is its high concn. in the roots (1.6%). 1-Tetrahydropalmatine constituted the largest fraction of the remaining alkaloids, and its present isolation is the first on record although the *d*-form was previously known. Two new and well-characterized alkaloids, which have been named capaurine and capauridine, resp., are isomeric and are best represented by the empirical formula C<sub>21</sub>H<sub>27</sub>N<sub>3</sub>O. Each contains 1 phenolic HO and 4 MeO groups, and yield on methylation non-phenolic bases which do not appear to be identical. The presence of 2 bases, bicuculline and bicucine, which were first recorded in this series of papers, has again been demonstrated. The constitutional analysis of the new bases, as well as the isolation and characterization of the minor alkaloids, is in progress. Bicuculline and

bicucine are shown to be closely related and interconvertible. The latter is the free  $\gamma$ -HO acid of which the former is the lactone. J. W. Shipley

**Sinomenine. XXXVIII. Dihydrosinomenilane and its degradation** Kakuji Goto and Hideo Shishido. *Ann.* 507, 296-300 (1933); cf. C. A. 27, 4235.—Dihydrosinomenilane and PCl<sub>5</sub> in CHCl<sub>3</sub> give *6-dichlorodihydrosinomenilane*, m. 110-6°; catalytic reduction gives *dihydrosinomenilane*, m. 145-50°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> 34.15° (0.1757 g. in 10 cc EtOH); the diazo reaction is pos. in a diln. of  $2 \times 10^{-6}$  methiodide, m. 85-7°; the latter with 16.5% KOH, heated 1 hr., gives 65% of *des-N-methyl-dihydrosinomenilane* (I), m. 183-5°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -98.22° (0.1858 g. in 25 cc. EtOH), the methiodide, m. 225-7°, gives with 16.6% KOH 60% of *sinomenilane* (II), m. 85-90°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -178.03° (0.2258 g. in 10 cc. EtOH). Catalytic reduction of I gives the *dihydro deriv.*, m. 143-6°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> 45.48° (0.2089 g. in 10 cc. EtOH), the methiodide, amorphous, gives with 16.5% KOH *dihydrosinomenilane*, m. 55°, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -104.63° (0.2074 g. in 10 cc. EtOH); this also results by the catalytic reduction of II.



(II)

C. J. West

**Derivatives of 1-methyltropine** B. K. Blount and Robert Robinson. *J. Chem. Soc.* 1933, 1511-12. Levulinide, Ca acetonedicarboxylate and MeNH in H<sub>2</sub>O give *1-methyltropine*, b<sub>p</sub> 124°, isolated through the *picrate*, yellow, m. 201° (65% yield), *methiodide*, m. 273-82° (decompn.); the base forms a cryst hydrate in the air; a dipiperonyldene deriv could not be prep'd. Reduction with Na and BuOH gives 50% of *1-methyl-4-tropine*, m. 71°; *picrate*, yellow, explodes at 280°; *IIb* salt, m. 286° (decompn.); *Bz deriv.* (*methyltropocaine*), b<sub>p</sub> 210°; *picrate*, yellow, m. 163-4°. C. J. West

**Strychnos alkaloids LXXVII. Benzal and C-benzyl derivatives of brucine and strychnine and of their sulfonic acids.** Hermann Leuchs and Helmut S. Overberg. *Ber.* 66B, 1711-18 (1933). cf. C. A. 28, 156.—The 3 sulfonic acids (I, II, III) obtained with MnO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> from brucine and from strychnine all condense with BzH like the bases themselves and hence it is not the groupings, (undoubtedly (a)N CO CH<sub>2</sub>) that condenses with BzH which is involved in the sulfonation. Although benzal derivs. of the 4th sulfonic acid (hydrate) of each base were not prep'd. there can hardly be any doubt that these acid also still contain the group which condenses with BzH. *Benzalbrucinesulfonic acid I* (I) with CrO<sub>3</sub> gives 67% of a well cryst. acid (II), with a compn., C<sub>24</sub>H<sub>24</sub>(O<sub>2</sub>N)<sub>2</sub>, analogous to that of the Hansen C<sub>10</sub> acid; CrO<sub>3</sub> therefore does not attack the benzal group, the presence of which was further demonstrated by the development of the aldehydic odor on boiling with alkali. It can be made oxidizable by reduction to the PhCH<sub>2</sub> group, which is easily effected by Na-Hg; unlike catalytic hydrogenation, this leaves the original double bond of the brucine unchanged. The benzyl derivs. are attacked by CrO<sub>3</sub> with formation of BzOH (and BzH). KMnO<sub>4</sub> in acetone, on the other hand, attacks only the double bond in the benzyl derivs. *C-Benzylstrychninesulfonic acid I*, from the benzal comp'd. (C. A. 27, 3478), cryst powder, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -159° (in 2 mol 0.1 N NaOH). *Benzal acid II*, prisms with 9.8% H<sub>2</sub>O, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -440° (2 mols. 0.1 N NaOH); *benzyl acid*, prisms with 7.7% H<sub>2</sub>O, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -123.3° (0.1 N NaOH). *Benzal acid III*, amorphous, yellow ppt. with 9-9.6% H<sub>2</sub>O. *benzyl acid*, amorphous flocks with 9.5-10.1% H<sub>2</sub>O, m. 205° (foaming), loses 1 H<sub>2</sub>O (of constitution) at 115-20° and 15 mm. *C-Benzylstrychnine* (III), leaflets from alc., m. 65°, foams about 90° (preps. from MeOH m.

102–5° (foaming)), loses 7.8% in wt. at 50–70° and 15 mm.,  $[\alpha]_D^{25} = -76^\circ/\text{d.}$ ; *methiodide*, decomps. around 305°. With  $\text{KMnO}_4$  in acetone III gives 30% *C-benzylstrychninonic acid*,  $\text{C}_{20}\text{H}_{25}\text{O}_6\text{N}_2$ , sinters about 200°, m. 208–10° (foaming), loses 6.5–7.8% in wt. at 100–20° and 15 mm.,  $[\alpha]_D^{25} = -19.0^\circ$  (in 1 mol. 0.1 *N* NaOH), is only slightly sol. in *N*  $\text{KHCO}_3$ , readily in *N*  $\text{NH}_3$ , gives the Otto reaction but none with  $\text{FeCl}_3$ , is reduced by Na–Hg to the *strychninolic acid*, m. 220–3°, loses 12.05% in wt. at 100–20° and 15 mm., dissolves readily in *N*  $\text{NH}_3$  and NaOH, from which a powder (probably the strychninoline) soon seps. *C-Benzylhydrostrychnine*, from the benzal compd. (Kotake and Mitsuwa, *C. A.* 27, 5334) and Na–Hg, m. 187–9° (evacuated tubes),  $[\alpha]_D^{25} = -13.4^\circ/\text{d.}$  (abs. alc.); *methiodide*, m. around 310° (decompn.). Benzalbrucine with  $\text{CrO}_3\text{--H}_2\text{SO}_4$  gave the *benzal-Haussen acid*, isolated as the *perchlorate*,  $\text{C}_{20}\text{H}_{25}\text{O}_6\text{N}_2\cdot\text{HClO}_4$ , powdery ppt. with 5.7–11.1%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -229^\circ/\text{d.}$  (0.7% soln. in water), sinters 70–140°, m. 240–5° (foaming and turning yellow) *C-Benzylbrucine*, from the benzal compd. with Na–Hg, powder with alk. reaction, isolated as the *methiodide*, needles with 10.1%  $\text{H}_2\text{O}$ , m. 255–8°; its *dihydro deriv.*, from benzalbrucine with H and Pt oxide, is amorphous (*methiodide*, also amorphous). I, yellow prisms with 12.2%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -23.2^\circ$  (in 2 mols. 0.1 *N* NaOH); *benzyl acid*, prisms with 9.0–9.3%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -146.3^\circ$  (0.1 *N* NaOH). II, seps. in 2 forms mutually interconvertible by seceding in *N/30* NaOH: squares or tables with 12.4–13.3%  $\text{H}_2\text{O}$ , and needles or prisms with 7.3%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -103.8^\circ$ . *Benzyl acid*, from II with Na–Hg, needles losing 3.5% in wt. at 95° and 15 mm.,  $[\alpha]_D^{25} = -104^\circ$  (in 1 mol. 0.1 *N* NaOH). *Benzalbrucinesulfonate II*, yellow prisms and tables with 6.6%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -346.5^\circ$  (in 2 mols. 0.1 *N* NaOH); *benzyl acid*, tables with 6.6%  $\text{H}_2\text{O}$ ,  $[\alpha]_D^{25} = -112^\circ$  (0.1 *N* NaOH). C. A. R.

Compounds of sparteine with substituted cyclic barbituric acids. Fernand Mercier and L. J. Mercier. *Compt. rend.* 197, 941 (1933); cf. *C. A.* 24, 5377; 25, 4659. To ethylphenylmalonylurea (2 mols.) in hot 96% EtOH was added 1 mol. of sparteine base in Et<sub>2</sub>O. The mixt. was heated at 50°; when it had become sirupy, crystn. was started. The neutral ethylphenylbarbiturate of sparteine (I),  $[\text{CO}(\text{NHCO})_2\text{C}_6\text{H}_4]_2\text{C}_{10}\text{H}_{18}\text{N}_2$ , m. 148–50°. I (dry) does not decomp. when heated for 3 hrs. at 110°; after 3 hrs. at 135° its decompn. is about 5%. In aq. soln. I decomp. at 100°, giving its constituents. Its satd. aq. soln. has a *pH* of 6.4. *Methylphenylbarbiturate of sparteine* (II), m. 151–6°. When II (dry) is heated for 1 hr. it undergoes 5% decompn. at 110°, 15% at 120° and 30% at 130°. In aq. soln. it decomp. at 70°. The *pH* of its satd. aq. soln. is 6.6. Louise Kelley

Protein salts of organic bases. M. A. Lisitzuin. *Biochem. Z.* 266, 25–8 (1933).—Protein forms salts with org. bases in strictly equiv. amts. Methods are described for prep. caseinates with piperidine, pyridine, nicotine, cocaine, methylaniline, ethylenediamine, arginine, glucosamine, brucine, cocaine, veratrine, strychnine, quinine, morphine and some protamines. In every instance the reaction is stoichiometric; the aq. solns. may be clear or milky, except that of morphine caseinate, which salt is sol. neither in  $\text{H}_2\text{O}$  nor in alc. but in 60–70% alc. They are not coagulated by heat, the solns. frequently clearing up on warming, and some (glucosamine caseinate) are pptd. by  $(\text{NH}_4)_2\text{SO}_4$ . S. Morgulis

Ascaryl alcohol. Fr. N. Schulz and Max Becker. *Biochem. Z.* 265, 253–9 (1933).—Ascaryl alc., obtained from the fat of ascards, has the compn.  $\text{C}_{20}\text{H}_{35}\text{O}_4$  (Flury's formula is  $\text{C}_{21}\text{H}_{36}\text{O}_4$ ), as detd. by elementary analysis and mol. wt. detns. and from the fact that glycerol is part of its mol. constitution, accounting for the uneven C no. No double bond was demonstrable; the alc. can be acetylated and benzoylated, yielding a diacetate m. 52° and a dibenzoate m. 37°, the m. p. of the pure alc. being 84°. Pure preps. were obtained by sapon. of the diacetate, but the alc. can also be obtained from the total fat by a process of fractionation. On heating at a high temp. the development of the pungent fumes of acrolein is obvious, but the

combination with the glycerol is not etheral since it can not be hydrolyzed by sapon. S. Morgulis

Genuine glucosides of *Digitalis lanata*, the diglanides A, B and C. Arthur Stoll and Walter Kreis. *Helv. Chim. Acta* 16, 1049–98 (1933); cf. *C. A.* 27, 3777.—The application of the enzyme-hindering extn. method of Kreis, used previously in the isolation of scillaren A (*C. A.* 27, 4806), to the extn. of the glucosides from the leaves of *Digitalis purpurea* gave, in place of the previously obtained digitoxin, a new glucoside, *purpurea glucoside A* (I), richer in sugar than digitoxin by 1 mol. of glucose. The complete hydrolysis of I yielded a mixt. of 1 mol. digitoxigenin, 3 mols. digitoxose and 1 mol. of glucose. The fresh leaves of this *Digitalis* contain an enzyme, *digipurpase*, which promotes the hydrolysis of I into digitoxin and glucose in the course of the usual extn. procedures. The enzyme-hindering extn. of the fresh leaves of the Hungarian *Digitalis lanata* permitted the isolation of a splendidly crystd. glucoside, *diglanide* (II), m. 245–8° (decompn.),  $[\alpha]_D^{25} = 33.3^\circ$  (in 95% EtOH). The phys. consts. of II were not altered by repeated crystns. from MeOH, EtOH and AcOH and the various fractions showed the same Keller–Kiliani color phenomena. A soln. of 4.623 g. of II (calcd. on the vacuum dried wt.) in 137 cc. 95% EtOH was mixed with 125 cc. 2 *N*  $\text{H}_2\text{SO}_4$  and maintained at 40° for 6 hrs. From this mixt. was crystd. out, by the addn. of various org. solvents, 1.72 g. (37.2%) of aglucones (III). After the removal of III and the org. solvents the mother liquor was adjusted to a 1%  $\text{H}_2\text{SO}_4$  concn., covered with toluene and kept at room temp. for 4 months. This mild hydrolysis yielded the 2 sugars, digitoxose and *diglanidobiose* (IV),  $\text{C}_{19}\text{H}_{26}\text{O}_{10}$ , m. 227°,  $[\alpha]_D^{25} = 30.1^\circ$ , in a mol. proportion of 2 to 1. IV was hydrolyzed into a mixt. of 1 mol. glucose and 1 mol. digitoxose by boiling in 5%  $\text{H}_2\text{SO}_4$  for 15 hrs. over a free flame. Fractional crystn. of III sepd. the aglucone mixt. into the known aglucones, digitoxigenin, gitoxigenin and digoxigenin. In addn. to the 3 aglucones and the 2 sugars the complete acid hydrolysis of II gave 1 mol. of AcOH, recognized by alk. titration, isolated as AcOAg and estd. by a microacetyl detn. The isolation of the aglucones proved that II consisted of at least 3 glucosides present as a homogeneous mixt. of completely isomorphous substances. By distribution between  $\text{CHCl}_3$  and a mixt. of MeOH and  $\text{H}_2\text{O}$  in the proportion of 1 to 5 a gradual sepn. was obtained. In the preliminary operation a mixt. was chosen which yielded an insol. layer between the 2 liquid phases so that each operation gave 3 fractions. Each of these fractions was similarly treated and after several repetitions of this shaking-out process the terminal solns. yielded 3 individual glucosides. From these substances obtained in this wasteful procedure it was possible to det. empirically the distribution coeffs. for the 3 glucosides and for II when 1 g. of glucoside was shaken with 100 cc. MeOH, 500 cc.  $\text{CHCl}_3$  and 500 cc.  $\text{H}_2\text{O}$  for 30 sec. at 25°. An AcOH soln. of II contr.  $\text{FeCl}_3$  when layered over concd.  $\text{H}_2\text{SO}_4$  gave a beautiful blue AcOH layer and a vivid red  $\text{H}_2\text{SO}_4$  ring. This red color, superimposed on a brown color due to the sugars formed by partial hydrolysis, diminished as the glucoside of the gitalin group was removed. Aided by this Keller–Kiliani color reaction and by a careful partition by means of the  $\text{CHCl}_3\text{--MeOH--H}_2\text{O}$  solvents controlled by the previously ascertained distribution coeffs. II was sepd. into the 3 new glucosides, *diglanide A* (V),  $\text{C}_{20}\text{H}_{28}\text{O}_{10}$ , m. 245–8°,  $[\alpha]_D^{25} = 31.4^\circ$  (in 95% EtOH); *diglanide B* (VI),  $\text{C}_{20}\text{H}_{28}\text{O}_{10}$ , m. 245–8°,  $[\alpha]_D^{25} = 36.7^\circ$  (in 95% EtOH); and *diglanide C* (VII),  $\text{C}_{20}\text{H}_{28}\text{O}_{10}$ , m. 245–8°,  $[\alpha]_D^{25} = 33.5^\circ$  (in 95% EtOH). One g. of each dissolves in 225, 600 and 1500–2000 cc.  $\text{CHCl}_3$ , resp. A table is provided in which the properties of these glucosides and those of the previously known digoxin (*C. A.* 24, 2753) and lanadigin (*C. A.* 25, 377) are compared. The investigation of the individual glucosides confirmed the findings from II in every way. From the pure glucosides the corresponding aglucone, digitoxigenin from V, gitoxigenin from VI and digoxigenin from VII, could be easily obtained in pure form and in good yields by hydrolysis. The accompanying sugars proved to be 2 mols. of digi-

- toxin and 1 mol of diglucanidobiose and from each individual glucoside an Ac group could be quantitatively separated. The pharmacological properties of II and its components V, VI and VII have been studied and reported by Rothlin (*C A* 27, 3752). The toxicity of II lies in the order of magnitude of the digitoxins and amounts to 0.34 mg per kg for cats and 400 I.D. per 1 mg for frogs. II has been successfully introduced into therapy in numerous clinics, and Hochrein and Ickelheimer have reported the treatment of 60 cases of heart disease (*C A* 27, 3752). The individual nature of V, VI, VII and the established compound and purity enables the dosage to be controlled in a way not possible with the probably partially decomposed galenic preparations. (R Addinall)
- Isocholesterol II** The chemistry of lanosterol. Charles Donic and Donald C. Garrett. *J Soc Chem Ind* 52, 355-61 (1933), cf (*C A* 27, 3719).—Pure lanosterol (I), m 140.5°,  $[\alpha]_D^{25}$  57.9°. I prepd from purified lanosteryl benzoate (II), m 191.5°,  $[\alpha]_D^{25}$  74.2°, and lanosteryl acetate (III), m 113.5°, had identical properties. The sapon value of III indicates the formula  $C_{30}H_{50}O$  for I. AmOH and Na with I gave unchanged I and dihydrolanosterol (IV), m 143°,  $[\alpha]_D^{25}$  51.0° (acetate, m 119.20°). I was unaffected by Na and EtOH or by 10%  $H_2SO_4$  in alc. Controlled oxidation of I with  $CrO_3$  in AcOH gave lanostenone (V),  $C_{30}H_{48}O$ , m 116.5°,  $[\alpha]_D^{25}$  71.9° (semicarbazone, m 242.3°). Phenylhydrazine, decomps 140.5-75°, 2,4-dinitrophenylhydrazine, m 207°, a ketone (VI), m 88.5-95°,  $[\alpha]_D^{25}$  51.4° (PhNHNH<sub>2</sub> deriv, m 117.20°), and a leucic acid (VII),  $[\alpha]_D^{25}$  64.2° (2,4-dinitrophenylhydrazine, m 133.4°), having a mol wt of 389 by titration. Vigorous oxidation with  $CrO_3$ -AcOH mixt gave MeCO and other volatile ketones. V with Na and EtOH formed lanosterol 1 (VIII), m 142.5-35°,  $[\alpha]_D^{25}$  58.7° (acetate, m 126.7°,  $[\alpha]_D^{25}$  59.1°). Sapon of the acetate regenerated VIII instead of I, thus differing from cholesterol. I in EtOH with Br in AcOH formed a Br deriv (IX), m 177°, contg 1.2 atoms of Br per  $C_{30}$  unit. IX with Zn in AcOH gave I. With NaOH, lanosterol B (X), m 149.5-50°,  $[\alpha]_D^{25}$  58.9° (acetate, m 118°,  $[\alpha]_D^{25}$  55.0°, benzoate, m 192.3°,  $[\alpha]_D^{25}$  78.7°), was formed. Sapon of these esters regenerated X. X with  $CrO_3$ -AcOH mixt gave V. Dihomologous acetate dibromide (XI) and NaOH yielded X. IX with  $CrO_3$ -AcOH mixt oxidized to dibromolanostene (XII), m 188°,  $[\alpha]_D^{25}$  -10.5° (2,4-dinitrophenylhydrazine, m 199.200°). Zn and AcOH with XII produced a gum. I in  $CHCl_3$  formed a mono ozonide (decomps 150°), which with  $H_2O$  decomposed to form a volatile ketone (semicarbazone, m 252°), having a lemon odor and an acid (XIII), m 225° (mol wt 523 by titration). I, VIII and X respond only faintly to the typical sterol color reactions and the Iordell-Jaffe Br reaction is neg. Oxidation shows the OH group in I to be secondary and  $\beta$ ,  $\gamma$  to a double bond in a ring system by analogy to other sterols, and a side chain of more than 8 C atoms probably terminated by a  $-CHMe_2$  or  $=CMe_2$ . The formation of IX can be explained by assuming substitution of Br followed by addn of HBr, giving a mixt of mono- and di Br derivs. At least 1 reactive double bond is present in I and perhaps 2. Br/OH titration indicates only 1, but I values indicate 3. The I values by Dun's method were I, 170.5, 174.5, III, 167.3, IX, 120.8, XI, 115.0, V, 140.4, VIII, 174.9, X, 181.1, VII, 41.3, XIII, 63.5. D and G were unable to find isocholesterol in South African *Euphorbia* latex as had been reported. (J W Scott)
- Retanmic** (Wunschendorff, Valier) 17. Insecticidal action of some furan compounds (Giblin, et al) 15. Sp. oxidation reactions of SeO (Muller) 6. Conversion of  $NH_4OCN$  into uric acid (Warner, Slitt) 2. Velocity of decomposition of diazo compounds in water (Yamamoto, et al) 2. Thermal decomposition of propyl microplastic (Laylor, Layng) 2. Electrolytic oxidation of piperidine (Yamamoto, Yokoyama) 4. Electrolytic reduction of camphoric acid imide (Sakurai, Iamura) 4. Colloidal state of cholesterol, cholesterol esters and lecithin (Rentezov, Supalova) 11A. App for feeding catalyst to pressure reaction vessels such as used for converting  $C_2H_2$  to  $AcH$  (U S pat 1,935,627) 1. Treating liquids with gases as in "phosgenating" amino compounds (U S pat 1,935,190) 1. Modifications of the gutta-percha hydrocarbon (de Jong) 30.
- British Standard Specifications** No 506 Methyl Alcohol, No 507 Ethyl Alcohol, No 508 Normal Butyl Alcohol, No 509 Acetone London Brit Standards Inst, Publications Dept 2s 2d
- Apparatus for producing hydrocarbons from methane** Franz Fischer. Ger 583,851, Sept 13, 1933. Addn to 578,311 (*C A* 27, 4239).
- Aliphatic hydrocarbons** Henry Drayfus. Fr 750,496, Aug 11, 1933. Hydrocarbons are decomposed, particularly to unsatd gaseous hydrocarbons such as olefins, by a heat treatment as vapors in the presence of CO and (or)  $CO_2$ , e.g., 5-20% of  $CO_2$ .
- Transforming hydrocarbons** I G Farbenund A-G (Paul Feller, Hermann Wiegmann and Hans Hubert, inventors). Ger 578,778, June 16, 1933. Hydrocarbons, such as  $CH_4$  or its homologs, are transformed into  $C_6H_6$  or other aromatic hydrocarbons, by heating to high temps in periodically heated chambers contg non-metallic heat storing material coated with Si or Cr as catalyst. Thus, the chambers may contain chamotte plates coated with Si. Of the total  $CH_4$  heated periodically therein, 35% is changed, mostly to  $C_6H_6$ .
- Dehydrogenation of hydrocarbons** I G Farbenund A-G. Ger 578,567, June 15, 1933. In carrying out the above process, catalysts consisting of Co or Fe or mixts of the 5-7 groups of the periodic table, or their compounds, especially oxides, are used. These metals or compounds may have Pb, Zn, Sn or Cd, or their compounds, or solid oxides of the metalloids of the 5th group, admixed. The mixt is then heated to over 200° in a current of hydrogen of metalloids of the 5th and 6th groups. Thus, active C soaked in  $(NH_4)_2MoO_4$ ,  $Pb(NO_3)_2$  and  $H_3PO_4$  is heated to 300° in a current of  $H_2$ . Cyclohexane vapor is led over the resulting catalyst at 140° to give a product contg 10-45%  $C_6H_6$ .
- Chlorinating aromatic hydrocarbons** Joseph R. Musy (to Monsanto Chemical Co). U S 1,935,618 Nov 21. In the production of products such as chlorobenzene, an aromatic hydrocarbon such as  $C_6H_6$  in vapor phase is caused to react with  $Cl_2$  and O in the presence of a catalyst, a compound of Al together with Cu, Fe or Co such as a Deacon process catalyst.
- Organic oxygen compounds** Henry Drayfus. Fr 753,168, Oct 9, 1933. Ethers are heated in the presence of an oxidation and (or) dehydrogenation catalyst. O and steam may also be present. AcH and a proportion of AcOH and  $Ac_2O$  may be obtained in this way from EtO.
- Oxidizing aromatic compounds** Philip Kucer (to General Aniline Works). U S 1,935,919, Nov 21. See Ger 557,219 (*C A* 27, 304).
- Oxidation products of sulfurized hydrocarbons** I G Farbenund A-G (Karl Keller, inventor). Ger 583,853 Sept 14, 1933. The sulfurized derivs of higher aliphatic hydrocarbons described in Ger 557,215 (*C A* 27, 310) and 559,739 (*C A* 27, 730) are oxidized, e.g., by treatment with  $HNO_3$  or  $KMnO_4$  at 40-50°. The oxidation may be stopped at the stage when compounds of the disulfide type are present, or may be continued to produce sulfonic acids. The latter are useful as protective colloids and are assistants in the treatment of textiles. The less highly oxidized products are useful as emulsifying agents. Examples are given. Cf (*C A* 27, 5337).
- Separating organic compounds, such as acetic acid from their mixtures** Horace B. Olevy and Leonard Fallow (to Celanese Corp of America). U S 1,936,172, Nov 21. In such systems as the system of concd  $HOAc$  from its solns by forming an azeotropic mixt with an added entraining substance such as  $C_6H_6$ , the entraining agent is vaporized before bringing it into contact with the mixt undergoing separation.
- Unsaturated hydrocarbons** I G Farbenund A-G
- Retanmic (Wunschendorff, Valier) 17. Insecticidal action of some furan compounds (Giblin, et al) 15. Sp. oxidation reactions of SeO (Muller) 6. Conversion of  $NH_4OCN$  into uric acid (Warner, Slitt) 2. Velocity of decomposition of diazo compounds in water (Yamamoto, et al) 2. Thermal decomposition of propyl microplastic (Laylor, Layng) 2. Electrolytic oxidation of piperidine (Yamamoto, Yokoyama) 4. Electrolytic reduction of camphoric acid imide (Sakurai, Iamura) 4. Colloidal state of cholesterol, cholesterol esters and lecithin (Rentezov, Supalova) 11A. App for feeding catalyst to pressure reaction vessels such



(Walter Reppe and Ulrich Hoffmann, inventors). Ger. 578,994, June 21, 1933. Mono- or polyhydric alcs. and steam or water vapor are led over phosphates (except  $\text{AlPO}_4$ ) which have an acid action under the conditions of the reaction. Thus, 1,3-butylene glycol contg. 20% water is vaporized and led over  $\text{CePO}_4$ . A 90% yield of butadiene is obtained. Other examples are given.

**Oxidation of olefins.** Henry Dreyfus. Brit. 397,161, Aug. 3, 1933. O-contg. org. compds. other than glycols or alcs. are produced by oxidation under pressure of olefins contg. not more than 5 C atoms with O or air in presence of  $\text{H}_2\text{O}$  or steam at least sufficient to sat. the gases at room temp. and pressure but insufficient to produce substantial quantities of alc. products such as glycols, the production of which is covered by Brit. 387,372 (C. A. 27, 4540). The gases may be passed through hot liquids contg. O-carriers of an acid nature, e. g., chromic acid,  $\text{Mn}(\text{OAc})_2$ ,  $\text{Cr}(\text{OAc})_3$ , which may be dissolved in  $\text{H}_2\text{O}$  or  $\text{AcOH}$ . Diluent gases, e. g.,  $\text{N}$ ,  $\text{CO}_2$ , may be used. When ethylene oxide is desired its further oxidation may be minimized by using moderate temps., a considerable quantity of diluent, high speed of the gas and avoidance of acid catalyst in the reaction zone,  $\text{NH}_3$  or other volatile base being added to the gases if desired. To produce  $\text{AlH}$  hydration catalysts, e. g.,  $\text{H}_3\text{PO}_4$ ,  $\text{ZnCl}_2$ , may be used or the products of reaction may be passed over these catalysts at 300–400°. The formation of  $\text{AcOH}$  is favored by the use of excess O, relatively high temps. and oxidation catalysts such as Ag, Cu or their oxides. Propylene may be oxidized to  $\text{Me}_2\text{CO}$  and butylenes and amylenes to the corresponding ketones. Cf. C. A. 27, 3942.

**Hydration of olefins.** Henry Dreyfus. Brit. 397,187, Aug. 21, 1933; Fr. 749,951, Aug. 2, 1933. Aliphatic alcs. and ethers are prepd. by absorbing olefins at elevated temp. and pressure in aq. solns. of acids that are weaker than  $\text{H}_2\text{SO}_4$ , e. g.,  $\text{H}_3\text{PO}_4$  and org. sulfonic acids, and hydrolyzing the product after addn. of the appropriate amt. of  $\text{H}_2\text{O}$  (vapor). Acid concns. used are 40–80% for absorption of  $\text{C}_2\text{H}_4$ , 40–75% for  $\text{C}_3\text{H}_6$  and 40–60% for higher olefins. Pressures of 30–200 atm. and temps. of 100–300° may be used and catalytic substances, e. g., Ag,  $\text{V}_2\text{SO}_4$ ,  $\text{Cu}_2\text{O}$ ,  $\text{CaSO}_4$ ,  $\text{FeSO}_4$ ,  $\text{PbSO}_4$ ,  $\text{Hg}_2\text{SO}_4$ , may be present. Cf. C. A. 27, 4539.

**Alcohols.** Air Reduction Co., Inc. Fr. 749,478, July 25, 1933. Alcs. are made in a continuous manner by passing a mixt. of steam and an alkylene hydrocarbon in contact with an acid catalyst under high pressure and using the heat of the reaction products to form more steam and hydrocarbon mixt. An app. is described. Cf. C. A. 27, 1981.

**Separating terpene alcohols from mixtures.** Adolf Kaufmann. Ger. 582,917, Aug. 25, 1933. Dehydrated mixt. contg. terpene alcs. are treated with neutral alkyl esters of  $\text{H}_3\text{BO}_3$ . The mixt. is then warmed and distd. The terpene alcs. go over first as esters of  $\text{H}_3\text{BO}_3$ . The non alk. constituents go over next. The residue contains esters which may be obtained by crystn. Examples are given.

**Alcohols and ethers.** Henry Dreyfus. Brit. 396,107, July 24, 1933. Divided on 394,375 (C. A. 28, 1721) and 394,671 (C. A. 28, 1723). The hydration of olefins collected with  $\text{H}_2\text{O}$  or steam in presence of a chloride of a metal at least as electropos. as Ni, the salt being of acid character and sol. in about twice its wt. of  $\text{H}_2\text{O}$ , e. g.,  $\text{ZnCl}_2$ ,  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ . The salts may be used solid, molten or in soln. and may be supported on inert carriers. The temp. may be 100–350° or more and pressure of 15–25 atm. or more may be used. For producing  $\text{Et}_2\text{O}$  2 or more vols. of  $\text{C}_2\text{H}_4$  may be used for 1 of steam while for alc. equal vol. may be used.

**Ethers.** Henkel & Cie. G. m. b. H. Fr. 751,923, Sept. 12, 1933. Ethers contg. at least 8 C atoms in the mol. are made by causing esters of higher aliphatic or hydroaromatic alcs. and hydroxy acids to react with alcs. or phenols in an alk. medium or with alcoholates or phenolates. Examples are given of the prepn. of  $\beta$ -hydroxyethyl (b<sub>1</sub> 170–4°),  $\beta$ , $\gamma$ -dihydroxypropyl (b<sub>1</sub> 210–5°), and glycerol monododecyl ether, b<sub>1</sub> 198°, also glycerol

monotetra- (b<sub>1</sub> 206–7°), -hexa- (b<sub>1</sub> 205–6°) and -octadecyl ether (b<sub>1</sub> 215–20°, slight decompn.) and an ether from Na dodecylsulfate and  $\text{PhOH}$ , m. 25°. Cf. C. A. 27, 4242.

**Sorbitol ethers and the like.** Walter E. Lawson (to E. I. du Pont de Nemours & Co.). U. S. 1,936,093, Nov. 21. Ethers such as ethyl or benzyl sorbitol are prepd. by the action of an etherifying agent such as ethyl or benzyl chloride on sorbitol or other hexahydric 6 C alc. in the presence of an alkali such as  $\text{NaOH}$ .

**Aldehydes.** I. G. Farbenind. A.-G. Fr. 750,467, Aug. 11, 1933. Aldehydes are prepd. by passing a mixt. of unsatd. carboxylic acids or volatile derivs. of these and  $\text{HCOOH}$  or volatile derivs. of this over a decarboxylation catalyst while heating, the partial pressure of the unsatd. acid or its deriv. being maintained in the reaction chamber at most at  $1/30$  atm.

**Aromatic aldehydes.** Edgar T. Olson. U. S. 1,935,914, Nov. 21. An aldehyde such as benzaldehyde is prepd. by treating a hydrocarbon such as  $\text{C}_6\text{H}_6$  with CO in the presence of a catalyst such as  $\text{AlCl}_3$  and of moisture (suitably at a temp. of about 20–50° in a described app.).

**Aromatic aldehydes.** Imperial Chemical Industries Ltd. and Leonard E. Hinkel. Brit. 397,124, Aug. 15, 1933. Aromatic aldehydes are manufd. by treating an aromatic hydrocarbon or an ether of a mono- or polyhydric phenol, preferably at 60° or above, with  $\text{HCN}$  (or a metal cyanide),  $\text{HCl}$  and  $\text{AlCl}_3$  in excess of 1 mol. to every 2 CN groups in the  $\text{HCN}$  or metal cyanide and treating the aldimine so obtained with acid. Examples describe the prepn., by the action of  $\text{AlCl}_3$ ,  $\text{HCN}$  and  $\text{HCl}$ , of (1)  $\text{HzII}$  from  $\text{C}_6\text{H}_6$ , (2) *p*-tolmaldehyde from  $\text{PhMe}$  and (3) 2,4-dimethylbenzaldehyde from *m*-xylene. Other starting materials specified are mesitylene, anisole, phenetole, diphenyl ether, dialkyl ethers of pyrocatechol, resorcinol or hydroquinone, di- and trialkyl ethers of pyrogallol or phloroglucinol.

**Esters.** Edward H. Strange and Thomas Kane. Fr. 752,008, Sept. 15, 1933. Esters are prepd. by combining an aliphatic monocarboxylic acid in the presence of a suitable catalytic or chem. agent at a temp. above the b. p. of the desired ester. Suitable catalytic or chem. agents include chlorides, bromides, phosphates and sulfates of Zn, Al, Hg, Cu, Cd, Bi and Sb,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{NaHSO}_4$ ,  $\text{Et}_2\text{SO}_4$  and  $\text{PhSO}_3\text{H}$ . Examples are given of the prepn. of  $\text{AcOI}$ r.

**Esters.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. Fr. 752,150, Sept. 16, 1933. Glycerides of aliphatic acids are transformed to alkyl esters by the action of aliphatic alcs. on the glycerides in the presence of catalysts, using only a small excess of alc. above that theoretically necessary. The liberated glycerol is insol. in the reaction mixt. Hydrocarbons may be added to hasten the sepn. of glycerol. Ether may be used as a solvent for the glyceride, alc. and catalyst.

**Vinyl esters.** I. G. Farbenind. A.-G. (Walter Weibezahn, inventor). Ger. 582,544, Aug. 16, 1933. See U. S. 1,912,608 (C. A. 27, 4243).

**Ester of substituted benzoic acid.** I. G. Farbenind. A.-G. (Otto Eisleb, inventor). Ger. 582,715, Aug. 21, 1933. The  $\beta$ -dimethylaminoethyl ester of 4-butylamino-benzoic acid is prepd. by converting the acid into the ester by usual methods or by butylating the ester of 4-amino-benzoic acid. The ester m. 153–4° and its mono- $\text{HCl}$  m. 147–8°. Examples are given.

**Disulfuric ester of dihydro-3,3'-dichlorodanthraquinone-1,2,2',1'-dihydroazine.** David A. W. Fairweather and John Thomas (to Scottish Dyes Ltd.). U. S. 1,936,474, Nov. 21. This compd., which dissolves in water with a blue color, is produced by oxidation of the disulfuric ester of dihydro-2-amino-3-chloroanthraquinone.

**Amines.** The Goodyear Tire & Rubber Co. Fr. 751,712, Sept. 8, 1933. Amines are prepd. by hydrogenating under pressure in the liquid phase and in the presence of a catalyst, a reaction product or a mixt. of an amine contg. the group  $=\text{NH}$  and an aliphatic or cyclic aldehyde or a ketone. Examples are given of the prepn. of dicyclohexyl- (b<sub>10</sub> 115–120°), *N*-butylcyclohexyl- (b. 200–4°),

*N*-butylphenethyl- ( $b_{10}$  130-5°), *N*-dibutylphenethyl- ( $b_{10}$  162 8°), di- $\alpha$ -furfuryl- ( $b_{2,3}$  103-6°), and  $\gamma$ -phenyl-propyl-amine,  $b_1$  75-80°, and *N*-butylpiperidine,  $b_1$  170-4°.

**Aromatic amines.** The Goodyear Tire & Rubber Co. Fr. 760,243, Aug. 7, 1933. Secondary aromatic amines are prepd. by causing a hydroxyaromatic compd. to act on a primary amine in the presence of a dehydrating agent which is not decomposed at the temp. of reaction and which gives, by ionization, an electroneg. group to which are joined one or more acid H atoms or which can give rise to one or more acid H atoms. Boric acid or alkali bisulfates, bisulfite, metabisulfites, acid phosphates, acid oxalates or pyrosulfates may be used. Phenyl- $\beta$ -naphthylamine may be made in this way from  $\beta$ -naphthol and PhNH<sub>2</sub>.

**Aromatic amines from phenols.** Paul Herold and Friedrich Reubold (to I. G. Farbenind. A.-G.). U. S. 1,935,209, Nov. 14. Reaction such as the production of toluidine from vapors of cresol and NH<sub>3</sub> while heating in the presence of a dehydration catalyst such as Al(OH)<sub>3</sub> is effected under a pressure of 50-300 atm., which serves to give high yields.

**Ketones.** Schering-Kahlbaum A.-G. Fr. 751,807, Sept. 11, 1933. Unsaturated ketones are prepd. by causing selenious acid or anhydride to react on unsaturated compds. containing the grouping CH:CHCH<sub>3</sub>. The reaction may be carried out in the presence of a solvent for the Se compd. and under pressure, and using the action of ultra-violet light instead of heat. Examples are given of a ketone from 1-menthene,  $b_1$  212-20° (a thiosemicarbazone, m. 158°), from  $\alpha$ -pinene,  $b_1$  97-100° (semicarbazone, m. 208-11°), from  $\beta$ -pinene,  $b_1$  82-1°, from dipentene,  $b_{10-11}$  98-105° (semicarbazone, m. 201-2°), from 3-menthene,  $b_{10}$  89-93° (semicarbazone, m. 172-5°) and from eugenol, m. 95° (benzoate m. 117°).

**Aryl ketones.** Alphons O. Jaeger (to Selden Co.). U. S. 1,936,091, Nov. 21. For producing a diaryl ketone such as naphthyl phenyl ketone, a keto aromatic acid such as naphthoylbenzoic acid is heated in the presence of a small amt. of a compd. of a metal other than an alkali or alk. earth metal, such as oxide of Zn or Cu, to a temp. at which CO<sub>2</sub> is given off and the heating is continued until evolution of CO<sub>2</sub> ceases.

**Ketones of the cycloolefin series.** Schering-Kahlbaum A.-G. (Erwin Schwenk and Erich Borgwardt, inventors). Ger. 582,545, Aug. 16, 1933. SiO<sub>2</sub> or H<sub>2</sub>SiO<sub>4</sub> is caused to react on cycloolefins. Thus, methyleyclohexene is heated with SiO<sub>2</sub> to give methyleyclohexenone. Other examples are given.

**Catalytic apparatus suitable for producing ketones from alcohols, etc.** Koloman Roka (to Deutsche Gold- und Silber-Scheidanstalt vorm. Roessler). U. S. 1,936,118, Nov. 21. Various details of construction and operation are described.

**Ketone hydrazones.** Ernst Herdickekerhoff and Fritz Ballauf (to General Aniline Works). U. S. 1,935,712, Nov. 21. An alkali metal or Mg salt of a phenylhydrazine-sulfonic acid is heated with about an equimol. proportion of acetone, acetophenone, a *Bz*-chloro- or -methyl-substitution product of acetophenone or cyclohexanone, in aq. soln. neutral to litmus and with addn. of a water-miscible inert org. solvent (suitably at a temp. of about 95°). Products are obtained suitable for use as dye intermediates and several examples with details of procedure are given.

**Phenols from aromatic hydrocarbon halides.** Willy Rittler (to Chemische Fabrik von Heyden A.-G.). U. S. 1,936,507, Nov. 21. In forming a phenol such as PhOH, a hydrocarbon halide such as PhCl together with water vapor and at a temp. of 350-600° is passed over minerals containing hydrosilicate such as fuller's earth in the presence of Cu. App. is described.

**Aminobiaryls.** I. G. Farbenind. A.-G. (Georg Kränzlein, Paul Ochwat and Karl Moldaenke, inventors). Ger. 582,844, Aug. 24, 1933. *p*-Aminobiaryls are prepd. by the action of hydrocarbons of the C<sub>6</sub>H<sub>5</sub> series on *N*-halogen compds. of acyl derivs. of aromatic amines in the presence of a condensing agent such as metal halide, and

in the presence or absence of org. diluents and in absence of moisture. The product is sapon. Thus, *N*-chloroacetanilide is dissolved in C<sub>6</sub>H<sub>6</sub> and treated with AlCl<sub>3</sub> with ice cooling to give *p*-acylamino-biphenyl which, on sapon., gives *p*-aminobiphenyl. The prepn. of 3-methyl-4-amino-biphenyl, m. 43°, 3,4'-dimethyl-4-aminobiphenyl, m. 205-7°, 3,4'-dimethyl-4-acetamidobiphenyl, m. 199-200°, 3-methyl-4-acetamido-4'-chlorobiphenyl, m. 226°, 4-benzoyl-amino-3-methylbiphenyl, m. 180°, 3,5'-dimethyl-4-amino-biphenyl,  $b_1$  210-12°, and 4-propionylaminobiphenyl, m. 182-3°, are also described.

**Halogenated substances.** I. G. Farbenind. A.-G. (Karl Keller and Ferdinand Münz, inventors). Ger. 578,793-4, June 17, 1933. Addns. to 576,710 (C. A. 28, 338°). The method of 576,710 for halogenating fatty acids is applied to compds. of the general formula RCOX, where R represents a paraffin, olefin or acetylene residue containing OH, and X represents Cl, NX<sub>2</sub>, X<sub>3</sub> (X<sub>1</sub> and X<sub>2</sub> representing H, alkyl or aryl), or OR<sub>1</sub> (R<sub>1</sub> representing a monohydric alc. residue). Thus, the monoethylanilide of oleic acid is treated with Cl to give a chlorinated product with the ethylanilide group intact (578,793). The method of 576,710 is also varied by using Br at raised temps. instead of Cl (578,794).

**Reaction products of ketene.** George Hartland Law (to Carbide and Carbon Chemicals Corp.). Brit. 397,025, Aug. 17, 1933. An org. substance which yields ketene, e. g., Me<sub>2</sub>CO, is thermally decomposed, the reaction products are rapidly passed into intimate contact with a liquid cooling medium, non-reactive with ketene, to condense less volatile substances and the uncondensed gas is used to form reaction products of ketene. Suitable cooling liquids are hydrocarbons, e. g., C<sub>6</sub>H<sub>6</sub>, C<sub>6</sub>H<sub>14</sub>, C<sub>6</sub>H<sub>12</sub>, all phatic ethers, e. g., Et<sub>2</sub>O, iso-Pr ether, and aliphatic ketones, e. g., Me<sub>2</sub>CO, MeEtCO. App. is described Cf. C. A. 27, 306.

**Polyvinyl compounds.** Leland C. Shriver (to Carbide and Carbon Chemicals Corp.). Brit. 397,361, Aug. 24, 1933. Vinyl compds., e. g., vinyl chloride, vinyl esters of aliphatic acids such as vinyl acetate, propionate or butyrate or styrene, or mixts. thereof, are polymerized with the aid of acetyl benzoyl peroxide (I), if desired in conjunction with other catalysts, promoters and accelerating agents. In an example a mixt. of vinyl chloride and acetate is heated under pressure to 40° in Me<sub>2</sub>CO soln. in the presence of I in the form of the crude product obtained by passing dry air or O through a mixt. of BzH and Ac O. Less than 1% of catalyst is required.

**Diazo compound.** I. G. Farbenind. A.-G. (Karl Schnitzspahn and Rudolf Jung, inventors). Ger. 586,354, Oct. 20, 1933. The diazo compd. of *o*-aminoozotoluene is pptd. from soln. as diazonium acid sulfate and dried, alone or after admixture with diluents or auxiliary substances used in dyeing, e. g., Na<sub>2</sub>SO<sub>4</sub>, borax, or Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>. Compds. stable to storage are obtained. Cf. C. A. 28, 175° and following abstr.

**Diazo compounds.** I. G. Farbenind. A.-G. (Karl Schnitzspahn and Wilhelm Koch, inventors). Ger. 586,355, Oct. 21, 1933. Stable solid diazo compds. containing a free NH<sub>2</sub> group are prepd. from halo-1,4-diaminobenzenes not containing a COOH or SO<sub>3</sub>H group by treating these with sufficient mineral acid and nitrite to diazotize one NH<sub>2</sub> group only, and converting the product into the solid form by a standard method, e. g., as ZnCl<sub>2</sub> double salt or as borofluoride or arylsulfonate. Examples are given.

**Tetrazo compounds.** I. G. Farbenind. A.-G. Brit. 397,034, Aug. 17, 1933. See Ger. 586,353 (C. A. 28, 485°).

**Aminoaralkylaryl compounds.** Alphons O. Jaeger (to Selden Co.). U. S. 1,936,090, Nov. 21. Aralkylaryl compds. are prepd. by causing a phthalide to react with a halogenated aromatic nucleus in the presence of AlCl<sub>3</sub>, hydrolyzing the AlCl<sub>3</sub> addition product formed to produce halogenated diarylmethanecarboxylic acid and treating the latter, without complete purification, with NH<sub>3</sub>, a sol. NH<sub>4</sub> salt or a primary amine. Various details and examples are given and products are obtained which can be

ring-closed to form corresponding anthrone compds. suitable for production of dyes.

**m-Alkyl ethers of protocatechuic aldehyde.** J. D. Riedel-E. de Haën A.-G. Fr. 751,687, Sept. 7, 1933. Glyoxylic salt are treated in a basic medium with mono-alkylprotocatechuic ethers, then the products obtained, preferably without sepn., are treated with moderately acting oxidizing agents. Cf. C. A. 27, 993.

**Barbituric acid derivatives.** I. G. Farbenind. A.-G. Fr. 753,178, Oct. 9, 1933. Dicyanodiamide is united by condensation with disubstituted malonic acids or cyanoacetic acids or their derivs. such as esters, chlorides or nitriles. The cyanimino compds. are alkylated and the alkyl cyanimino compds. are transformed by sapon. into N-monoalkyl 5,5-disubstituted barbituric acids. Examples are given of the prepn. of 1-cyano-2-imino-5,5-ethylphenyl- (m. 223°), 1-cyano-2-imino-3-methyl-5,5-ethylphenyl- (m. 150 1°), 5,5-ethylphenyl-3-methyl- (m. 176°), 5,5-methylphenyl-3-methyl (m. 154°), 5-(Δ¹)-cyclohexenyl-5-methyl-6-imino-3-cyano- (decompn. 265°), 5-(Δ¹)cyclohexenyl-5-methyl-3-methyl- (m. 146°), 5,5-ethylphenyl-3-ethyl- (m. 102°) and 5,5-diallyl-3-methyl-barbituric acid, m. 80°. Cf. C. A. 27, 3947.

**Aminodiphenylamine derivatives.** I. G. Farbenind. A.-G. Fr. 752,207, Sept. 19, 1933. Derivs. of 4-amino-diphenylamine, substituted in the 3-position by an alkoxy or alkyl group are prepd. by coupling a diphenylamine, substituted in the 3-position by alkoxy or alkyl but not substituted in the 4-position, with an appropriate diazonium compd., and splitting the azo dye thus formed by a reducing agent in known manner. Examples are given of the following derivs.: 3-methoxy-3'-methyl, m. 52-3° (acetyl compd., m. 166-7°), 3,2'-dimethoxy, m. 104-5°, 3-methoxy-2'-ethoxy-, 3-ethoxy-, m. 77-8°, 3-methoxy-3'-chloro, m. 78-9°, 3-m-propyloxy 52-3°, 3-n-butoxy, m. 57-8°, 3,6-dimethoxy, m. 117-8°, 3-methoxy-5-methyl, m. 61-5°, 3-methoxy-6-methyl, m. 80-1°, 3-methoxy-2'-methyl, m. 60-1° (acetyl compd. m. 144-5°), 3-methoxy-2'-chloro, m. 84-5°, 3-methoxy-2',5'-dimethyl, m. 89-90° (acetyl compd. m. 129-30°), 3-methoxy-2'-methyl-3-chloro, m. 102-3°, 3-methoxy-2',5'-dichloro, m. 116-7°, 3,6-dimethyl, m. 86-7°, 3-methyl-3'-chloro, m. 188° (acetyl compd. m. 144-5°), 3-benzyloxy, m. 91-2°, 3,2'-dimethyl-6,5'-dichloro, m. 81-2°, 3-isopropyloxy, m. 73-4°, 3,6-diethoxy, m. 81-2°, and 3-cyclohexyloxy, m. 100-1°.

The prepn. of the following is also given: 4-nitro-3-methoxy-N-benzoyl- (m. 166-7°), 4-nitro-3-methoxy-N-formyl- (m. 133-4°), 3-ethoxy-N-acetyl- (m. 88-9°), 4-nitro-3-ethoxy-N-acetyl- (m. 105-6°) and 4-nitro-3-methoxy 3'-chloro-N-acetyldiphenylamine, m. 112-3°. All the m. ps. given are uncorrected.

**α-Hydroxyanthrone derivatives.** Karl Zalm and Hans S. Hohenmaier (to General Aniline Works). U. S. 1,935,928, Nov. 21. By reducing an anthraquinone compd. contg. in the α-position an -O-acetyl or -O-benzoyl radical, in the presence of a diluent of neutral to weakly acid reaction (suitably at temps. of about 50-100°), products such as 1-hydroxy-4-acetoxy-5,8-dichloroanthrone (m. 222°) and the like are obtained. Several examples with details of procedure are given. The reduction is carried out either with substances having a reducing action such as Na hyposulfite, Zn or the like, or with H in the presence of a catalyst, such as Ni. As solvents may be used: dil. acetic acid, alc., decahydronaphthalene, water or the like. There are thus obtained: from 1-acetoxyanthraquinone α-hydroxyanthrone m. 238-40°, from chrysazin diacetate an α-hydroxyanthrone m. 247-8° and from quinizarin diacetate an isomeride m. 208°. Analogous compds. are obtained from alizarin- and anthrarufin diacetate, as well as from substitution products of the said compds.

**Anthrapyridone derivatives.** Chemische Fabrik vorm. Sandoz. Ger. 578,995, June 20, 1933. Anthraquinone derivs. with at least an amino or alkylamino group in the α position are condensed with esters of the general formula R(COO)H·COO-alkyl (R₁ representing Ph, alkyl or alkoxy residues), in the presence of a small amt. of condensing agent. Thus, α-aminoanthraquinone is boiled

with the diethyl ester of malonic acid in the presence of a small amt. of AcONa to give carbethoxyppyridone, m. 312-313°. The prepn. of dianthrapyridone, m. 340°, carbethoxymethyl-4-bromoanthrapyridone, m. 183-185°, 5-chloro-1-methylanthracetylpyridone, m. 263°, acetyl-2-methyl-4-bromoanthrapyridone, m. 350° (with decompn.), carbethoxy-2,4-dibromoanthrapyridone, m. 202°, acetyl-2,4-dibromoanthrapyridone, m. 333° (with decompn.), carbethoxy-4-methoxyanthrapyridone, m. 298° (with decompn.), acetyl-4-methoxyanthrapyridone, m. 316° (with decompn.), carbethoxy-5-hydroxyanthrapyridone, m. 303° (with decompn.), and 4-p-toluino-2-bromoanthracarbethoxyppyridone, is also described.

**Substituted pyrazolones.** Hans Stenzl (to Hoffmann-LaRoche Inc.). U. S. 1,936,488, Nov. 21. See Ger. 565,799 (C. A. 27, 2456).

**Arylides of 1-(carboxyphenyl)pyrazolone.** Soc. pour l'ind. chim. à Bâle. Ger. 582,806, Aug. 23, 1933. 1-(Carboxyphenyl)-5-pyrazolone obtained from aromatic aminocarboxylic acids is condensed with aromatic amines. Thus, 1-(3'-carboxyphenyl)-3-methyl-5-pyrazolone is condensed with β-naphthylamine in a mixt. of pyridine and diethylaniline contg. PCl₃. Other examples are given. The products are used in the prepn. of dyes.

**Condensation products.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Fr. 42,653, Sept. 1, 1933. Addn. to 722,050 (C. A. 26, 4062). Alcs., esters and other derivs. of high mol. wt. are prepd. by passing not only alcs. but aldehydes, such as AcH, and esters, such as AcOEt, along with H over a mixed catalyst contg. a stable metal oxide having a weak basic action or none and a metal or metals known for their hydrogenating or dehydrogenating action, the metal being not more than 10% of the wt. of the catalyst. Examples are given.

**Polymerization products.** Röhm & Haas A.-G. Fr. 753,045, Oct. 5, 1933. Acrylic acid, its homologs, salts or esters are polymerized alone or mixed in the presence of solvents in which the monomer is sol. but the polymer is not. By esters is to be understood those in which the alc. group of the monomer ester has at least 2 C atoms less than the acyl radical. Examples are given of the use of paraffin oil, ozokerite, ceresin and a mixt. of paraffin oil and CCl₄.

**Polymerization products.** I. G. Farbenind. A.-G. Fr. 750,520, Aug. 11, 1933. Products having a degree of polymerization higher than that of dioxane are prepd. by heating ethylene oxide or α-propylene oxide in the presence of a solid polymerization product of inorg. nature, but not metallic and having an alk. reaction and in the presence of an org. liquid which does not react with the alkylene oxide. Such liquids include ethylene chloride or bromide, acetone, CCl₄, C₆H₆, PhCH₃, cyclohexane, Et₂O, AcOEt and AcO-Bu.

**Concentrating aliphatic acids.** Julius A. Brachfeld and Albert Smola. Austrian 135,002, Oct. 25, 1933. Aq. solns. of lower aliphatic acids are neutralized with a difficultly acylated amine b. above 130°, other than a simple aromatic amine. The salt soln. obtained is then dehydrated by distn. at a temp. below the dissoen. temp. of the salt, preferably with the aid of the vapor of a water-insol. org. solvent which forms an azeotropic mixt. with water, e. g., benzene. Finally, the dehydrated salt is decompd. by heat. Suitable amines are ethanol- and propanol-amines and morpholine derivs. App. is described.

**Citric acid.** Montan- und Industrialwerke vormals. Joh. D. Starek. Ger. 578,820, June 17, 1933. A process for the prepn. of citric acid by the fermentation of solns. of sugar or carbohydrates by the aid of mildew fungus is described.

**Ketocholanic acid.** J. D. Riedel-E. de Haën A.-G. (Gustav Reverey, inventor). Ger. 582,727, Aug. 21, 1933. Pptd. hydroxycholanic acids are treated with an aq. soln. of CrO₃ at temps. of about 40°. Thus, a soln. of cholic acid in NaOH is diluted with water and stirred with kieselguhr. An aq. soln. of Na₂Cr₂O₇ is added to ppt. the acid in the kieselguhr. Concd. H₂SO₄ is then added

to give dehydrocholic acid m. 233-5°. Other examples are given. Cf. C. A. 27, 5758.

**1,4-Diaminoanthraquinone-2,3-disulfonic acid.** I. G. Farbenind. A.-G. *Fr.* 753,138, Oct. 7, 1933. Boric acid ester, particularly boracetic ester, of 1,4-diamino-2,3-dihaloanthraquinone is treated with neutral sulfites. The production of the ester and the transformation may be carried out in a single operation. The reaction may be carried out in the presence of PhOH.

**1,4-Diamino-2-aryloxyanthraquinone-3-sulfonic acids.** I. G. Farbenind. A.-G. (Berthold Stein and Fritz Baumann, inventors). *Ger.* 583,936, Sept. 12, 1933. Addn. to 561,442 (C. A. 27, 1000). 1,4-Diamino-2,3-dihaloanthraquinones are heated with aromatic hydroxy compds. and sulfites in the presence of feebly alk. metal compds. capable of combining with acids, *e. g.*, alkali perborates, MnO<sub>2</sub>, PbO<sub>2</sub>, MgO or ZnO. Preferably, at least 10 mols. of aromatic hydroxy compd. and 2-3 mols. of sulfite are taken per mol. of anthraquinone deriv. The reaction may be effected under pressure. Examples are given.

**Aliphatic anhydrides.** Henry Dreyfus. *Fr.* 751,823, Sept. 11, 1933. Aliphatic acids, particularly AcOH, mixed with a limited amt. of steam are submitted to a thermal decompn. The preferred amt. of steam is 8-15% of the wt. of AcOH and the preferred temp. 500-700°. Cf. C. A. 28, 180<sup>a</sup>.

**Aliphatic anhydrides.** Henry Dreyfus. *Fr.* 752,270, Sept. 20, 1933. The decompn. of aliphatic acids to anhydrides, *e. g.*, AcOH to Ac<sub>2</sub>O, is carried out in the presence of catalysts whose action is accelerated or seconded by a metal oxide, *e. g.*, an oxide of Al, Ti, V or an alk. earth metal. The catalyst may be Ca tungstate or NaPO<sub>3</sub>.

**Sulfonating phthalic anhydride.** Soc. pour l'ind. chim. à Bâle. *Ger.* 578,724, June 16, 1933. Addn. to 572,962 (C. A. 27, 4250). In sulfonating phthalic anhydride by heating it with SO<sub>3</sub> by the method of 572,962, the mixt. of anhydrides is heated so that only a little of the SO<sub>3</sub> distills off. Examples are given.

**Vinyl bromide, etc.** La soc. anon. des ateliers de constructions mécaniques Ischer Wyss. *Fr.* 751,969, Sept. 13, 1933. Vinyl bromide, its higher homologs and  $\alpha$ - and  $\beta$ -bromo (and chloro)propylenes are used as *refrigerating agents* in cycles where the agent is compressed. *Fr.* 751,970. Vinyl bromide is prepd. from gaseous mixts. contg. C<sub>2</sub>H<sub>4</sub> (obtained by fractionated sepn. from coke-oven gases) by reaction with Br<sub>2</sub> and introducing the resulting gas into a liquid which immediately decomposes the ethylene bromide to vinyl bromide, *e. g.*, an alc. soln. of KOH, after which the CH<sub>2</sub>:CHBr is eliminated by distn. from the gases which escape.

**Aminoanthraquinonesulfonyl chlorides.** I. G. Farbenind. A.-G. *Brit.* 397,190, Aug. 21, 1933. POCl<sub>3</sub> is reacted with an aminoanthraquinonesulfonic acid, or a salt thereof, advantageously in the presence of POCl<sub>3</sub>. When using the free sulfonic acid an alkali metal chloride is advantageously added. In examples Na 2-aminoanthraquinone-3-sulfonate, 1-amino-4-bromoanthraquinone-2-sulfonic acid and Na 1-aminoanthraquinone-2-sulfonate are treated with POCl<sub>3</sub> in presence of POCl<sub>3</sub> and with or without NaCl. The products react with amines, *e. g.*, PhNH<sub>2</sub> and hydroxyethylamine, to give the corresponding sulfonamides.

**Liquefying tribromoethyl alcohol.** I. G. Farbenind. A.-G. (Erich Goth, inventor). *Ger.* 582,520, Aug. 16, 1933. Addn. to 479,520 (C. A. 23, 4951). The method of 479,520 for liquefying C<sub>2</sub>H<sub>5</sub>Br(OH) is modified by treating the alc. with higher primary or polyhydric alcs., esters, ethers, ketones or acetals. Examples are given.

**Ozonized acetone.** Chem. Fab. von Heyden A.-G. (Georg Schroeter, inventor). *Ger.* 557,516, July 26, 1933. Addn. to 495,021 (C. A. 25, 1922). The process of *Ger.* 495,021 is effected in the presence of an org. catalyst, particularly H<sub>2</sub>O.

**Nitrating diethylene glycol.** Arthur Hough. U. S.

1,936,020, Nov. 21. Diethylene glycol is added alone to a mixt. comprising HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub> and water, the HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> being in about equal proportions and the water, initially, being over 5% (suitably about 6-7%) of the mixt., in order to form the dinitrate.

**Glycol ethers.** I. G. Farbenind. A.-G. (Gerhard Steinmig and Karl Baur, inventors). *Ger.* 578,722, June 16, 1933. Addn. to 558,646 (C. A. 27, 512). The method of 558,646 for prepg. the above by treating alkylene oxides with alcs. in the presence of activated hydro-silicate, is varied by using F compds. as the catalyst. Thus iso-PrOH and C<sub>2</sub>H<sub>5</sub>O are heated with BF<sub>3</sub> to give an 80% yield of the monoisopropyl ether of C<sub>2</sub>H<sub>5</sub>(OH).

**Purifying ether.** Ferdinand W. Nitardy (to E. R. Squibb & Sons). U. S. 1,935,658, Nov. 21. For removing O and oxidation products from ether, a bulk supply of ether contg. such impurities is subjected to intimate contact with metallic Cu and may also be brought into contact with Mg(OH)<sub>2</sub>. App. is described.

**Thiourea.** Emil Hene. *Ger.* 582,626, Aug. 17, 1933. CaCN<sub>2</sub> is treated with sol. hydro-sulfides of alkali or alk. earth metals with addn. of S at temps. below 150°. The thiourea is leached out of the reaction mass by water or org. solvents. Examples are given.

**Camphene.** Schering-Kahlbaum A.-G. (Irwin Schwink and Kurt Schmidt, inventors). *Ger.* 578,569, June 15, 1933. Pinene or nopinene vapor and water vapor are led over a catalyst comprising BPO<sub>4</sub> and a carrier substance. Examples are given.

**Oxidizing naphthalene.** Henry O. Forrest and Per K. Frølich (to National Synthetic Corp.). U. S. 1,936,444, Nov. 21. For producing compds. such as phthalic anhydride, liquid naphthalene is contacted with molecular O in a closed system at a temp. between the normal boiling and crit. temps. of naphthalene and under a pressure substantially in excess of the vapor pressure of naphthalene at the temp. employed. Various generally similar oxidations also are described. Cf. C. A. 27, 4540.

**Oxidizing anthracene.** Julius Schmudlm. *Ger.* 578,723, June 16, 1933. Anthracene is oxidized by O or gases contg. O at ordinary or raised pressure by fusing the anthracene and using V<sub>2</sub>O<sub>5</sub> or salts of H<sub>2</sub>VO<sub>4</sub> as a catalyst. The Fe or Ag salts of H<sub>2</sub>VO<sub>4</sub> are preferred.

**Optically active menthols.** Howards & Sons Ltd. John Read and Wm. J. Grubb. *Brit.* 397,212, Aug. 21, 1933. A mixt. of *d*- and *l*-menthol is resolved into its components by esterifying with *d* or *l*-menthoxyacetic acid, isolating 1 of the esters by fractional crystal and hydrolyzing the same under conditions such that the liberated menthoxyacetic acid is not decompd., *e. g.*, by treatment with a slight excess of dil. alc. alkali soln. Esterification is preferably effected with the optically active menthoxyacetyl chloride, prepd. by treatment of the acid with thionyl chloride, in the presence of a tertiary base, *e. g.*, pyridine, quinoline.

**Xylenol.** Gilbert T. Morgan and Alfred F. J. Pettit. *Brit.* 397,148, Aug. 18, 1933. A salt of *p*-xynol-sulfonate acid is prepd. by sulfonating a mixt. of xylenols contg. *p*-xynol with less H<sub>2</sub>SO<sub>4</sub> than that required for monosulfonating the mixt., neutralizing the sulfonated mixt. and fractionally crystg. The salt may then be de-sulfonated to yield *p*-xynol. Suitable salts include the NH<sub>4</sub>, Na, K, Ca and alkylamine, *e. g.*, monomethylamine, salts.

**1-Arylamino-2-alkylantraquinones.** Alexander Wurtz (to E. I. du Pont de Nemours & Co.) U. S. 1,936,077, Nov. 21. For producing a 1-arylamino-2-alkylantraquinone such as 1-anilino-2-methylantraquinone, an arylamine such as PhNH<sub>2</sub> and a 1-chloro-2-alkylantraquinone such as 1-chloro-2-methylantraquinone are refluxed in the presence of a Cu salt such as CuSO<sub>4</sub> an alc. such as EtOH and an alkali metal salt of a satd. aliphatic acid such as anhydrous NaOAc at a temp. of about 100°, followed by cooling to about 20-25° and sepn. of the product. Cf. C. A. 28, 182<sup>a</sup>.

## 11—BIOLOGICAL CHEMISTRY

PAUL F. HOWE

## A—GENERAL

ARTHUR W. DOX

**Sulfur in the animal organism.** L. Silberstein. *Compt. rend.* 197, 1008-9(1933).—S detns. in various animals and their organs are given. M. L. C. Bernheim

**The enzymic cleavage of ammonia from thymonucleic acid by rabbit liver.** Ernst Buding. *Z. physiol. Chem.* 222, 6-10(1933).—Rabbit liver dried with  $\text{Me}_2\text{CO}$  contains an enzyme system which splits off  $\text{NH}_3$  from thymonucleic acid. The system consists of 2 components, one of which is sol., the other insol. in  $\text{H}_2\text{O}$ . Both are inactivated by heat. Neither one is active independently of the other, but the activity is largely restored by mixing the 2. Part of the  $\text{NH}_3$  liberated comes from the guanidine nucleus. A. W. Dox

**The inhibitory effect of primary alcohols on the lipase of carp liver.** IV. Joseph C. Kernot and Henry W. Mills. *Z. physiol. Chem.* 222, 11-15(1933); cf. *C. A.* 26, 3070.—The lipases of carp and pig liver are inhibited to practically the same extent by primary alcs. In the series:  $\text{MeOH}$ ,  $\text{EtOH}$ ,  $\text{PrOH}$ ,  $\text{BuOH}$ ,  $\text{AmOH}$ , hexyl alc. and octyl alc., each member has about 1 times the inhibitory effect of its next lower homolog. A comparison of  $\text{PhCH}_2\text{CH}_2\text{OH}$  and  $\text{PhMeCHOH}$  shows that Ph in the  $\alpha$ -position has a greater inhibiting effect than it has in the  $\beta$ -position, especially at lower concns. Traube's rule for substances with capillary activity applies here. The hydrolysis of Et crotonate is about 14 times slower than that of Et butyrate, showing that the presence of a double bond diminishes the velocity of hydrolysis as well as the capillary activity. A. W. Dox

**Formation of cysteine from cystine by irradiation.** Paul Szendro, Ulrich Lampert and Fritz Wrede. *Z. physiol. Chem.* 222, 16-20(1933).—Ultra-violet irradiation of a 0.5% soln. of L-cystine in 0.1 N HCl or NaOH causes a decomn. during which  $\text{H}_2\text{S}$ , S and cysteine are formed. The cysteine was identified by color reactions, isolation, analysis, sp. rotation, prepn. of the benzyl deriv. and oxidation to cystine. The yield was about 5%. A. W. Dox

**The optical activity of phytol.** Th. Wagner-Jauregg. *Z. physiol. Chem.* 222, 21-31(1933).—Phytol has a sp. rotation of  $0.79^\circ$  before, and  $0^\circ$  after distn. The 17.5% residue then has a rotation of  $6.6^\circ$ . Either the phytol itself before distn. is optically inactive or else it has a rotation not exceeding  $-0.48^\circ$ . A sterol isolated from crude phytol m.  $137.9^\circ$  and has  $[\alpha]_D -27.1^\circ$  in  $\text{CHCl}_3$ . The yellow mother liquor contained d-rotatory substances. A. W. Dox

**Cardiac glucosides. III. Scillarenase.** A. Stoll, W. Kreis and A. Hofmann. *Z. physiol. Chem.* 222, 24-38 (1933). The prepn. of a cryst. glucoside from squill is much easier after the bulb sections have been immersed for a time in  $\text{EtOAc}$ . The product is then not identical with the original glucoside, but results from a cleavage of the scillarene A into proscillaridin A and d-glucose through the intervention of a *scillarenase*. The glucose is thereby split off from scillarene A, and not from the scillabiose which may be obtained by acid hydrolysis of the glucoside and further hydrolyzed into d-glucose and rhamnose. Scillarenase is a desmo-enzyme which remains in the cell residues and cannot be exd. by  $\text{H}_2\text{O}$  and  $\text{MeAc}$  but is highly active in aq. suspension. It is injured by  $\text{EtOAc}$  and  $\text{MeOH}$  and inhibited by dil.  $\text{EtOH}$ . Its optimum  $\text{pH}$  is 5.6 and optimum temp.  $37^\circ$ . It is highly specific for scillarene A and does not attack the digitalis glucosides with terminal glucose grouping. Other glucosidases, however, can split off glucose from scillarene A. A. W. Dox

**The lipoids of animal organs. VIII. The occurrence of lignocerylphosphosine in beef spleen.** Caspar Tropp and Volker Wiedersheim. *Z. physiol. Chem.* 222, 39-43

(1933).—The lignocerylphosphosine obtained by Pränkel and Bielschowsky (*C. A.* 27, 3955) in 0.06% yield from mammalian liver has now been isolated from beef spleen. The yield in the 1st 2 runs was the same as that reported by F. and B., but that of the 3rd run was more than twice as great. The difference is attributed to seasonal variation caused by access of the animals to green fodder. Although 75 kg. of spleen was worked up, no evidence was obtained of the presence of any other ceramide. A. W. Dox

**Callicrein. VIII. The detection and occurrence of callicrein in blood.** H. Kraut, E. K. Frey and E. Werle. *Z. physiol. Chem.* 222, 73-80(1933); cf. *C. A.* 26, 3551.—Callicrein forms an inert compd. with a pharmacologically inactive substance present in the blood. The behavior of this compd. toward acid reveals 2 distinct forms of inactivation. In one the liberation of callicrein occurs rapidly (2 min.) and in the other only slowly and incompletely (hrs. or days). When free callicrein is mixed with blood or serum, the labile inactivation form is first produced, and this is gradually converted into the more stable form. The former is therefore encountered only rarely and in small quantity in the blood. The stable form, on the other hand, is found regularly and abundantly in the blood. By treatment of serum or plasma with  $\text{AcMe}$  a reaction, probably enzymic, liberates all of the callicrein in 24 hrs. The velocity of this liberation is dependent on temp., substrate concn. and H-ion concn., being greatest between  $\text{pH}$  7 and 9. The inactivator present in the lymphatic and parotid glands of ruminants is different from that contained in the blood of all animals examd. The callicrein combined with the glandular inactivator can be liberated only by acidifying and not by the  $\text{MeAc}$  treatment. In the blood of ruminants the glandular inactivator often occurs in small amt. along with the serum inactivator. The quantity of inactive callicrein in the blood varies greatly with different mammals. In man the av. was 2.6 callicrein units per cc. of serum, more in hog sera, but less in the ape, steer, horse and dog. A. W. Dox

**Kinetics of ester hydrolysis by enzymes. V. The behavior of esterases toward ester anhydrides of the lactide and lactylactic acid type. The cause of the relative specificity of lipases.** Eugen Bamann, Ernst Schweizer and Maria Schmeller. *Z. physiol. Chem.* 222, 121-30 (1933); cf. *C. A.* 25, 1268.—The amenability of ester-like anhydrides of the lactylactic acid and lactide type, as contrasted to lactones and esters, to enzymic cleavage depends on their ability to form intermediate compds. with the enzyme. This ability to form an enzyme-substrate addn. product is detd. by the electrochem. character of the groupings in proximity to the ester group. Electroneg. groups like carboxyl or phenyl are inhibitory. Acid esters such as lactylactic acid have no affinity for the enzyme and are not cleavable unless the influence of the carboxyl is diminished by greater distance from the ester group. Lactide, and to a lesser extent glycolide, are hydrolyzed by lipase, while diphenylglycolide, benzilide, tetrasalicylide and polysalicylide are resistant. With lactide and glycolide the reaction stops at 50% hydrolysis because the resulting lactylactic and glycolylglycolic acids contain an electroneg. carboxyl which blocks hydrolysis of the 2nd ester grouping. The resistance of lactones to enzymic hydrolysis is due to an entirely different cause, the failure of the substrate-enzyme addn. product to break down. A. W. Dox

**Preparation of protaminase.** Ernst Waldschmidt-Leitz and Ernst Kofranyi. *Z. physiol. Chem.* 222, 148-50 (1933); cf. *C. A.* 25, 3673.—Protaminase, the pancreatic enzyme which splits off basic amino acids from the carboxyl end of protamines, has not previously been sepd. from protease but is demonstrated in the mixt. by means of the specific inhibition of protease by albumin. A sepn. has now been effected by means of the specific adsorption of

protease on ovalbumin. The enzyme mixt., after removal of peptidases by  $\text{Al}(\text{OH})_3$  adsorption, is treated with  $\frac{1}{4}$  vol. of 5% ovalbumin, then pptd. with  $\text{MeAc}$  (to 37%) and centrifuged. The mother liquor is acrated to remove  $\text{MeAc}$ . It contains protaminase free from protease. Lnterukinase does not activate protaminase. A. W. D.

Comment on the paper of Alfred Herzog: "The prosthetic group of the blood pigment, its crystalline isolation and its synthesis with native globin to hemoglobin." Hans Fischer and Karl Zeile. *Z. physiol. Chem.* 222, 151-4(1933); cf. *C. A.* 27, 5764.—The "hematoprostheticin" on which Herzog bases his contention that hemin contains 33 and not 34 C atoms is shown to be an  $\text{NH}_4$  salt. Contrary to H.'s claim it is readily converted into the typical Teichmann crystals of chlorohemin. Further identification was obtained by the prepn. of mesoporphyrin ester which gave no m.-p. depression with a synthetic product. There is no occasion to shorten the accepted formulas of the porphyrins by 1 C atom. A. W. Dox

Recent investigations on the laws of action of enzymes. Victor Henri. *Ann. physiol. physicochim. biol.* 9, 685-706(1933).—A review. Harry Eagle

The effect of temperature upon the digestion of starch by amylase. S. Trautmann and L. Ambard. *Ann. physiol. physicochim. biol.* 9, 707-12(1933).—The temp. coeff. of the action of amylase upon starch paste involves 2 distinct reactions: (1) the activation of the enzyme by the coenzyme, in this case an anion and a  $\text{H}^+$ , and (2) the hydrolysis of the starch by the activated enzyme. Harry Eagle

The effect of very high pressures upon enzymes. Michel A. Macheboul, James Basset and Georgette Levy. *Ann. physiol. physicochim. biol.* 9, 713-22(1933).—The activity of enzymes is not affected by pressures <5000 or 6000 atm. At higher pressures (up to 17,000 atm.), the degree of inactivation varies with the particular enzyme, its biol. origin, the  $p_{\text{H}}$ , the duration of exposure, the chem. nature of the soln., etc. The rate at which the pressure is increased or decreased has no significant effect. In general, the enzymes are less resistant than bacterial spores, more resistant than the non-spored forms, viruses or bacteriophage and approx. as resistant as bacterial toxins. Harry Eagle

[Spectrum absorption] studies of the oxidized form of yeast cytochrome. E. J. Bigwood, J. Ansay and J. Thomas. *Ann. physiol. physicochim. biol.* 9, 837-42(1933); cf. *C. A.* 27, 3726-7. Harry Eagle

The conditions for the oxidation of iron in the blood. Franz Hendrych and Shigeharu Mori. *Arch. expul. Path. Pharmacol.* 172, 1-4(1933).— $\text{Fe}^{++}$  salts are not oxidized to  $\text{Fe}^{+++}$  in reduced blood or in blood completely satd. with CO in the absence of O. Such oxidation does take place, with the formation of a ferric globulin complex, when O is added to completely reduced or to CO-satd. blood, but not in proportion to the amt. of O added. Less is formed at low O tensions, presumably because the affinity of the reduced hemoglobin for the O is greater than that of the  $\text{Fe}^{++}$ . Neither HCN nor quinine inhibits this Fe oxidation by hemoglobin. H. Eagle

The conditions for the formation of lipid-soluble salts in dissolved chloride-sulfate mixtures. Emil Starkenstein and Gerhard Hahnel. *Arch. expul. Path. Pharmacol.* 172, 55-74(1933).—A study of the amt. of lipid-sol.  $\text{MgCl}_2$  formed upon adding  $\text{NaCl}$  to  $\text{MgSO}_4$  soln.,  $\text{Na}_2\text{SO}_4$  to  $\text{MgCl}_2$  soln. and  $\text{HCl}$  to  $\text{MgSO}_4$ . Harry Eagle

The effect of very small doses of therapeutic agents and chemicals upon enzymes: urease, diastase and trypsin. W. M. Persson. *Arch. intern. pharmacodynamie* 46, 240-67(1933). Harry Eagle

Enzyme studies in cases of disturbed glycogen storage. W. Hertz. *Klin. Wochschr.* 12, 1725-7(1933); cf. *C. A.* 27, 5401.—In these cases, the blood and organs contain diastase, the glycogen is not abnormal and glucolysis in the blood proceeds normally. In a few cases the serum lipase was increased, because of the appearance of quinine-resistant liver lipase. The true serum lipase was not significantly affected. Harry Eagle

Post-mortem changes in fat tissue, and sex differences. Takeshi Inoue. *Tôhoku J. Exptl. Med.* 21, 532-41(1933).—The I no. and % of tissue fat are lower in male than in female pigs. Castration causes an increase in both factors, exceeding the values observed in female animals. As the fatty tissue ages at 25°, its acid no. rapidly increases, the % falls, and the I no. at first increases and then decreases. The changes in the acid no. can be used in detg. the time since the animal was killed. Harry Eagle

Vegetable proteins. Some properties of purified edestin and edestan. G. Florence, J. Renselme and M. Pozzi. *Bull. soc. chim. biol.* 15, 1113-16(1933); cf. *C. A.* 27, 1808.—Edestin contg. 18.71% N yielded edestan contg. 17.92% N. No change in phenol groups was found. Spectral absorption curves of edestin and edestan in various acid and alk. solns. are given. L. E. Gilson

Comparative hydrolysis of the polysaccharides acted upon by invertase. A. Chaudun. *Bull. soc. chim. biol.* 15, 1117-20(1933).—The action of invertase on sucrose, raffinose and stachyose is discussed. L. E. Gilson

Influence of  $p_{\text{H}}$  on the rate of diffusion of the chloride ion through collodion membranes. K. Hrynakowski. *Bull. soc. chim. biol.* 15, 1146-53(1933).—The rate of diffusion through collodion membranes of Cl ions in dil. solns. of  $\text{NaCl}$ ,  $\text{KCl}$ ,  $\text{CaCl}_2$  or their mixts. decreases with decrease in H-ion concn. The presence of Ca ions also decreases the rate. Numerous graphs and tables of exptl. data are given. L. E. Gilson

Action at a distance of oxidation reactions on rabbit bone marrow. Appearance of atypical karyokineses. R. Branner and Eugénie Soru. *Compt. rend. soc. biol.* 114, 297-9(1933); cf. *C. A.* 27, 2706.—The oxidation of glucose by  $\text{KMnO}_4$  soln. in a quartz tube produced mitogenetic rays, which stimulated karyokinesis in exposed rabbit bone marrow. Numerous atypical mitoses were also observed. L. E. Gilson

Action of radon on amino acids. J. Loiseleur. *Compt. rend. soc. biol.* 114, 589-91(1933).—Radon causes the liberation of more or less  $\text{NH}_3$  from all amino acids, and, in addn., urea from arginine and a little  $\text{H}_2\text{S}$  from cystine. L. E. Gilson

Comparison of the choline-esterase activities of the blood serums from various species. Edgar Stedman, Ellen Stedman and Adam C. White. *Biochem. J.* 27, 1055-60(1933).—Choline esterase and esterase are present in many serums. Lipase is probably present in some serums. In addn. to hydrolyzing esters of choline, choline esterase exerts some slight action on Me butyrate and possibly on tributyrin. The serum esterase may similarly hydrolyze esters of choline to a very small extent. Benjamin Harrow

The excretion of urine in the dog. VII. Inorganic phosphate in relation to plasma phosphate level. R. F. Pitts. *Am. J. Physiol.* 106, 1-8(1933).—In normal dogs the urine is phosphate-free when the plasma concn. of phosphate is low, 1.1-1.5 millimols. per l. As the plasma concn. is raised the phosphate clearance rises and approaches the xylose or sucrose clearance but never exceeds the latter. J. F. Lyman

The reversible heat shortening of elastic connective tissue, and an examination of the possible effects of certain factors on the heat shortening of connective tissues. G. D. Shafer. *Am. J. Physiol.* 106, 125-33(1933).—Yellow elastic tissues shorten with increased temp. up to 47° and lengthen with falling temp. down to 8°. White connective tissue does not change in length with temp. changes until a permanent contraction is obtained at about 62° for mammalian tendons and 48° for frog tendons. J. F. Lyman

The water of the cerebrospinal fluid, variations of its rate of flow with variation of ventricular pressure. L. B. Flexner. *Am. J. Physiol.* 106, 170-4(1933).—The rate of formation of  $\text{H}_2\text{O}$  of the cerebrospinal fluid appears to be a linear function of the difference between the effective hydrostatic pressure in the capillaries of the choroid plexus and the hydrostatic pressure in the ventricles. J. F. Lyman



**Heavy metal catalysis in smooth muscle contracture.** J. O. Schmitt and P. A. Nicoll. *Am. J. Physiol.* 106, 225-37(1933).—Contractions of smooth muscle, normally caused by drugs and chem. stimulants, are inhibited by NaCN, H<sub>2</sub>S and CO. The inhibition caused by CO is reversed during illumination, provided sufficient O is present. Sustained tonic contraction of smooth muscle requires a hemin-like catalytic oxidative mechanism.

J. F. Lyman

**The alleged occurrence of acetylcholine in ox blood.** H. W. Dudley. *J. Physiol.* 79, 249-54(1933).—Two specimens of ox blood examed. at Freiburg yielded 25 and 27 mg. of acetylcholine per l. of blood. Four specimens of ox blood obtained at Hampstead, Eng., contained not more than a trace.

J. F. Lyman

**The renal elimination of injected urea and creatinine.** W. W. Kay and H. L. Sheehan. *J. Physiol.* 79, 359-415 (1933).—After intravenous injections of creatinine or urea into rabbits, comparisons between the amts. of these substances reaching the kidneys in the arterial blood and leaving it in the venous blood permit the calcn. of extn. ratios for the compds. concerned. If it is assumed that creatinine is not directly absorbed from the blood, about 40% of the plasma is filtered off in the glomeruli and 66% of the filtered urea is reabsorbed and returned to the blood. Either the filtration or secretion theory of urinary secretion or a combination of both is compatible with the results.

J. F. Lyman

**A revised analysis of the initial heat production of muscle.** W. Hartree. *J. Physiol.* 79, 492-9(1933).—A modified arrangement of the thermopile makes it possible to eliminate disturbances in heat measurement in the initial phase of muscle contraction, because of shifting of the position of the thermopile on the muscle, etc. When this is done the heat production of a single twitch occurs in 2 phases only—contraction and relaxation. J. F. L.

**The effect of ions on the cutaneous sensory endings of the frog.** M. Talbot. *J. Physiol.* 79, 500-7(1933).—Action currents were measured in nerve attached to an isolated piece of frog skin. When Ca ions are absent from the soln. bathing the skin, there is a much less rapid adaptation of the sensory endings to a prolonged stimulus.

J. F. Lyman

**Actual and apparent amylase quantities in different cereals before and during germination.** T. Chrzaszcz and J. Janicki. *Biochem. Z.* 265, 260-81(1933).—The amylase content of aq. exts. is only apparent, the actual quantity being detd. only in the presence of peptone. The difference between these 2 detns. represents the sistaamylase. The latter is found in the ungerminated seed, but its amt. varies with the kind of cereal. During germination the sistaamylase increases, slowly at first but very rapidly once the seedling has been formed. The smallest amt. is found in oats, the largest in buckwheat. Not only are there quant. differences in the amylase in various cereals and at different stages of germination but the relative strength of the liquefying, dextrinizing and the saccharifying properties vary likewise. The max. effectiveness is attained first by the saccharifying and last by the liquefying properties in all malts, except that of buckwheat where the situation is just the reverse.

S. Morgulis

**The action of organ extracts on adrenaline.** Frauz Schultz. *Biochem. Z.* 265, 282-90(1933); cf. C. A. 27, 316. The ext. of fresh liver from rats contains an active substance which stimulates the oxidative decompn. of adrenaline. This substance is thermolabile and very active even in relatively small amts., reddening *l*-adrenaline most vigorously within a *pH* range 0.1-0.4. It reddens *d*-adrenaline more vigorously but the difference in reaction of the 2 forms becomes equalized in 16-24 hrs. This substance has no effect on *l*-tyrosine and on *l*-dihydroxyphenylalanine (Dopa) it has a slight effect in stimulating the development of the black pigment but not nearly to the same extent as it stimulates the development of the red coloration in adrenaline solns. S. Morgulis

**Studies on the respiration of *Diphyllobothrium latum* L.). Study of the respiratory enzymes.** E. A. H.

Friedheim and J. G. Baer. *Biochem. Z.* 265, 320-37 (1933).—The respiration of the intestinal parasitic worm *Diphyllobothrium* (of its eggs and different developmental forms) cannot be inhibited by CO in the presence of 8% O<sub>2</sub>, and in this respect there is no difference between the anaerobic worm or its aerobically developing eggs. However, KCN suppresses the respiratory activity of the egg completely but that of the adult worms only partially. The CO-resistant respiratory activity inhibits at least partly the enzymic reaction. Both the worms and the larvae must be regarded as facultative anaerobes and the eggs as obligate aerobes. The presence of cytochrome C has been demonstrated by its characteristic double-banded spectrum which is not displaced by pyridine, but this is not the respiratory enzyme. In the reduced condition it does not form CO complexes but requires for its oxidation a CO- and KCN-sensitive oxidase, which corresponds to the respiratory activity of the worms, which is affected not only by CO but also to some extent by KCN. Although a no. of instances are known of respiratory activity which is only partially inhibited by KCN, the CO-resistant type of respiration is a rarer occurrence, and has hitherto been observed only with avian erythrocytes and with Rous sarcoma.

S. Morgulis

**The applicability of the mass action law to the reaction of proteins with acids and bases.** G. Ettisch and Günter V. Schulz. *Biochem. Z.* 265, 338-69(1933); cf. C. A. 27, 4151. The combination of serum globulin or albumin with bases presents a momentary primary reaction followed by a secondary reaction requiring several hrs. for its completion. The secondary reaction seems of no consequence in the combination reaction with acid. The primary reaction is regarded as an ionic reaction, in accordance with Bjerrum's scheme:  $R-COO + H^+ \rightarrow R-COOH$ , or  $R-NH_3^+ + OH^- \rightarrow R-NH_2 + H_2O$ . The equil. between the free and bound  $H^+$  or  $OH^-$  follows the law of mass action. In accordance with their dissoen. consts. 3 alkali-binding and 2 acid-binding groups can be differentiated, and the isoelec. point of the albumin can be detd. from these data. On the basis of their consts. the 5 different base- or acid-binding groups can be identified as definite amino acids. It is suggested that acid and base titration curves may serve to identify and to characterize different proteins.

S. Morgulis

**The secondary reaction between ovalbumin and acid.** G. Ettisch and Günter V. Schulz. *Biochem. Z.* 265, 370-4(1933).—With increasing temp. the secondary phase of the acid-binding reaction of ovalbumin is greatly increased.

S. Morgulis

**Mitogenetic spectrum analysis of polyglucide decomposition.** I. S. Klenitzkil and E. G. Prokovieva. *Biochem. Z.* 265, 375-9(1933).—A study of the spectra of hydrolysis of sucrose (by acid or yeast sucrose) and of salicin or starch shows that soln. of different mol. structures are assocd. with specific mitogenetic spectra which are characteristic for that structural arrangement. S. M.

**Mutual effect between amino acid and nicotine.** I. S. Yaichnikov. *Biochem. Z.* 265, 426-8(1933); cf. C. A. 27, 2702. Nicotine and glycine do not react upon each other, but 5 cc. 0.02 N hippuric acid combines with 1 cc. 0.1 N nicotine. Leucine does not react with nicotine. With glutamic acid nicotine combines in practically equimol. amts., whereby a H<sub>2</sub>O-sol. but alc.-, ether- or CHCl<sub>3</sub>-insol. substance is formed. Similar results were obtained with aspartic acid. Asparagine does not react with nicotine.

S. Morgulis

**Influence of mitogenetic rays on enzymic processes.** S. Mardashev and M. Mogilevskii. *Biochem. Z.* 265, 429-36(1933).—The system: enzyme + substrate is employed as a detector of mitogenetic radiation, to which it gives a definite response, most generally an inhibition of the enzymic activity.

S. Morgulis

**Aminosulfonic acids. II. Synthesis of some taurine derivatives.** Rertil Josephson. *Biochem. Z.* 265, 448-55(1933); cf. C. A. 27, 5732. The following derivs. were prepd.: ethylenechlorobromide, chloroethylenethiocyanate,  $\beta$ -chloroethane- $\alpha$ -sulfonic acid, methyltaurine, di-

methyltaurine, propyltaurine, heptyltaurine, phenyltaurine and benzyltaurine. All these substances differ markedly from taurocholic acid. They are difficultly sol. in alc. and have high m. ps. III. The dissociation constants of taurine derivatives. *Ibid* 266, 9 17.—Even in taurine derivs. with an alkyl-substituted  $\text{NH}_2$  group the const. for the sulfonic acid radical is high, while the const. for the  $\text{NH}_2$  group depend upon type and no. of substituents but are all low. In benzyltaurine 2 dissoci. const. are discernible but in taurodeoxycholic acid only, the sulfonic acid group is effective, the  $\text{CO}_2\text{H}$  group apparently not being free. S. Morgulis

**Spectroscopic demonstration of the oxygen-transferring enzyme in the presence of cytochrome.** Otto Warburg, Erwin Negelein and Erwin Haas. *Biochem. Z.* 266, 1 8 (1933); cf. *C. A.* 27, 4268.—In a proposed mechanism of the respiration of aerobic cells the reaction consists of alternate oxidation and reduction of Fe in a series of compds. Only the first of these, the  $\text{O}_2$ -carrying enzyme, can absorb  $\text{O}_2$  which, in turn, oxidizes the first of three cytochrome components. The oxidation-reduction process then proceeds through these components and through a series of unknown enzymes and coenzymes. CO inhibits the oxidation of the  $\text{O}_2$ -carrying enzyme; KCN inhibits its reduction.  $\text{Fe}^{++}$  bands in the spectrum of respiring cells must belong to the respiratory enzyme if they are shifted by CO and fade out entirely on satn. with  $\text{O}_2$ , even on complete suspension of respiration by KCN. The  $\text{Fe}^{++}$  bands of cytochrome are unaffected under the same conditions. In an 8 vol. % concn. suspensions of *AcOH* bacteria show 3 cytochrome bands: 550, 553 and 563  $\text{m}\mu$ . Under anaerobic conditions a suspension of the bacteria (in alc. NaCl) shows an addnl. band in the yellow at 589  $\text{m}\mu$  which disappears with the 2 other bands of cytochrome when the suspension, free from KCN, is shaken with  $\text{O}_2$ , but reappear as soon as this is discontinued. If shaken in the presence of KCN only the band at 589  $\text{m}\mu$  disappears and on discontinuing the shaking it slowly comes back. The band in the yellow behaves like that of a respiratory enzyme. When the respiration of the bacteria is suppressed by KCN a band appears in the red portion of the spectrum at 639  $\text{m}\mu$ , which coincides with the position of the  $\text{Fe}^{+++}$  form of a hemin compd. A theory is developed to account for this newly discovered band (639  $\text{m}\mu$ , which assumes that 2 hemins of different oxidation potentials are involved. S. Morgulis

**The amide-splitting ability of *Torula utilis*, a study of the dependence of the formation of plant enzymes upon the nitrogenous food.** Gunther Gorr and Joachim Wagner. *Biochem. Z.* 266, 96 101 (1933).—*Torula utilis* grown on nutritive media with different N sources,  $(\text{NH}_4)_2\text{SO}_4$ , urea,  $\text{AcNH}_2$ , glycine, alanine, aspartic acid or malt ext.), possesses varying concns. of the asparaginase and acetamidase. On an  $(\text{NH}_4)_2\text{SO}_4$  medium the organism is practically free from these enzymes. These expts. illustrate the extreme ease with which the enzyme app. of an organism may be altered by the nature of its nutrients. S. Morgulis

**Nucleoproteins. IV. Native nucleoproteins.** St. J. Przylecki, S. Frajberger and W. Giedroyć. *Biochem. Z.* 266, 107-27 (1933); cf. *C. A.* 27, 5769.—The nucleins are regarded as a well-defined class of substances. The ratio of nucleic acid to protein is, however, variable. Even in cases where this ratio is known it is impossible to judge the structure unless the different groups are also known. The constitution does not tally with the simple formula (nucleic acid) $_m$ (protein) $_n$ , because in systems contg. much nucleic acid and salt not all the valences are satisfied by the proteins. The nuclein would therefore behave more like a polycomponent micelle of the constitution:  $A_x - P_n \text{NA}_m K_n$ , where A and K are salt ions, P is protein and NA nucleic acid. S. Morgulis

**Colloidal behavior of muscle proteins. V. Quantitative relationship between muscle proteins and its significance for the structure of striated rabbit muscle.** H. H. Weber and Klaus Meyer. *Biochem. Z.* 266, 137-52 (1933).—About 85% of the total N of white muscle and 75% of the N of red muscle can be extd. if finely ground

rabbit muscle is treated at  $10^\circ$  with 0.6 M KCl of  $pH$  8-9 five times followed 3-5 times by treatment with KCl of  $pH$  9.5. The yield is less at  $pH$  7-8. The KCl can be replaced by  $\text{NH}_4\text{Cl}$ . Myosin, myogen and globulin X can be sepd. from such muscle exts., whereas in muscle juice obtained by mech. pressure only myogen and globulin X are present, but these are identical with the substances in the salt ext. These proteins are sepd. on the basis of their solubilities. Myosin is pptd. completely at  $pH$  above 7 in 0.03-0.04 M KCl; globulin X begins to ppt. at  $pH$  7 in 0.005 M KCl and is pptd. completely at  $pH$  5-5.5 in 0.016 M KCl-acetate; the myogen remains in soln. under all these conditions. These proteins are identified by the viscosity of 1% soln., their ability to form characteristic strands and by their isoelec. point. Myosin obtained from the muscle previously extd. still has all the characteristic properties of myosin. The white muscle contains 22% myogen, 22% globulin X and about 40% myosin; red muscle contains 17% myogen, 17% globulin X and 40% myosin. The nonprotein N is about 12-13% of the total. Myogen and part of the globulin X constitute the proteins of the fluid sarcoplasm, the myogen making a concn. of 7% but the concn. of the globulin X is not yet definitely known. The stroma certainly contains no globulin X nor myogen and only very little myosin. S. Morgulis

**Protein systems. II. Rapidity of freezing and the form of the particles in protein solutions.** H. H. Weber and Carl Pullen. *Biochem. Z.* 266, 153 61 (1933); cf. *C. A.* 25, 4015.—Protein sols with spherical particles in a concn. of 0.01-0.10% block the rate of freezing by 10-20°, independently of the  $pH$  or degree of undercooling, but this phenomenon is not observed with protein sols with rod-like particles. S. Morgulis

**Influence of cell lipids on the nature and degree of swelling of gelatin.** Philipp Bamberger. *Biochem. Z.* 266, 175 89 (1933).—The proportion of bound water in the total swelling of gelatin is increased by  $\text{K}_2\text{SO}_4$ ,  $\text{Na}$  taurocholate <  $\text{OII}^-$ , and is decreased by KI, and lecithin. Cholesterol, Na oleate, triolein, glycogen and  $\text{H}^+$  are without influence. At low temp. the conditions are complicated by the formation of  $\text{H}_2\text{O}$  crystals, but at the true equil. the relation between frozen and non-frozen  $\text{H}_2\text{O}$  is const. from  $-4$  to  $-35^\circ$ . The biol. significance of these facts as regards the resistance of seedlings to freezing is discussed. S. Morgulis

**Cytoflav.** K. Laki. *Biochem. Z.* 266, 202 (1933).—Cytoflav, a reversible oxidation-reduction pigment obtained by Banga and Szent-Gyorgyi (*C. A.* 26, 3559) from various tissues, yeast or milk, gives a fairly sharp absorption band in the visible spectrum between 450 and 460  $\text{m}\mu$  which identifies it with Warburg's yellow enzyme. S. Morgulis

**Adsorption of  $\alpha$ -amylase.** Oskar Holmbergh. *Biochem. Z.* 266, 203 15 (1933); cf. *C. A.* 27, 2464.— $\alpha$ -Amylase is adsorbed by starch, about a third becoming adsorbed within 5 min., but the process goes much slower subsequently (53% adsorbed after 2 hrs.). Temp. below  $0^\circ$  increases the adsorption. At room temp. the rate of adsorption does not vary over a  $pH$  range 4.7 to 7.7, at  $1^\circ$  the percentage of adsorption diminishes from 73 to 35 within this  $pH$  range, but that is due to differences in the rate of adsorption at low temp. and is equalized, if sufficient time is given for adsorption. The opt. activity of the  $\alpha$ -amylase is between  $pH$  4.7 and 5.2. S. M.

**Preparation of glycyl-L-proline according to Emil Fischer's procedure.** Emil Abderhalden and Wilhelm Nussler. *Biochem. Z.* 266, 216 20 (1933).—Good yields of glycyl-L-proline are obtained by coupling L-proline with  $\text{ClCH}_2\text{COCl}$  and subsequent amination. However, alanylproline could not be prepd. in satisfactory yield by a similar procedure. S. Morgulis

**Analysis of serum by means of the ultracentrifuge.** Paul v. Mutenbecher. *Biochem. Z.* 266, 225-49 (1933); cf. *C. A.* 27, 4823.—Serum albumin and globulin can be sepd. by means of the ultracentrifuge and their quant. relation also detd. Horse serum was found to

have 4 different mols. whose sedimentation consts. at infinite diln. are 4.5, 6.8, 9 and 17. The first 2 are identical with the pure albumin or globulin fractions; they constitute the largest components of the serum proteins, and are in a ratio of 2:1. With increasing concn. of the serum the sedimentation consts. diminish, more in the case of human than of horse serum. In undil. serum it is possible to demonstrate easily mols. half the size of albumin. These smaller mols. are not present in fresh horse serum but appear as the serum ages. Under pathol. conditions very striking deviations in the amt. of protein are observed. In one instance, a protein which ordinarily is found only in traces increased to 50% of the total protein content. S. Morgulis

**Dissociations and associations of serum proteins.** Paul v. Mutzenbecher. *Biochem. Z.* 266, 2A 65 (1933).—On adding increasing amts. of  $(\text{NH}_4)_2\text{SO}_4$  to serum smaller and smaller mols. appear until they almost cease to form a sediment. The sedimentation const. of the albumin fraction diminishes.  $(\text{NH}_4)_2\text{SO}_4$  causes the breakdown of the albumin mol. Electrodialysis of the serum causes partial assocn. of the mols. remaining in soln. which may be reversible or irreversible. Within a  $p_{\text{H}}$  range from 3.5 to 11.5 the serum proteins show definite stability as far as the sedimentation const. is concerned. S. Morgulis

**The serum fractions.** Paul v. Mutzenbecher. *Biochem. Z.* 266, 250 8 (1933).—Serum globulin obtained by means of 1% satn. with  $(\text{NH}_4)_2\text{SO}_4$  is a polydisperse substance with the mol. of  $7.1 \times 10^{11}$  sedimentation const. predominating. The mol. wt. of this predominant mol. is probably 138,000. The serum albumin contains a variable admixt. of smaller or larger mols. depending upon the method of its prepn. Cryst. serum albumin contains an impurity which is not sepd. by the ultracentrifuge. The conalbumin obtained from the mother liquor as albumin pptd. by satn. with  $(\text{NH}_4)_2\text{SO}_4$  contains assocns. of several albumin mols. The principal mol. of albumin has a sedimentation const.  $4.5 \times 10^{11}$ . S. Morgulis

**Differences in the autolysis of skin from pigmented and unpigmented animals.** S. Blarso. *Biochem. Z.* 266, 203 1 (1933). Unpigmented rabbit skins autolyze at about the same rate at  $p_{\text{H}}$  3.8 to 7.3, but the skins from pigmented rabbits frequently show a three-fold greater autolysis at  $p_{\text{H}}$  3.8. This difference in autolyzing capacity is not only observed in skins from different rabbits but also in the unpigmented and pigmented portions of skin from the same animal. The skins from young rabbits, because of the higher water content, have a lower total N content, but their autolysis is not different from that of skins from older animals, on the basis of the same wt. S. Morgulis

**Physicochemical studies on the colloidal state of cholesterol, cholesterol esters and lecithin. VIII. Further studies on the catalytic properties of cholesterol.** Igor Kucuzov and Olga Sepalova. *Biochem. Z.* 266, 330 6 (1933). cf. C. A. 26, 3530.—Catalytic dehydrogenation of diamines as well as of pyrogallol, phenol or naphthol by cholesterol does not occur under strictly anaerobic conditions, so that atm.  $\text{O}_2$  must take part in these reactions. But this reaction takes place at once in a system cholesterol + diamine +  $\text{H}_2\text{O}$  in a pure  $\text{N}_2$  atm. This reaction inhibited by such narcotics as the alc. In certain concns. cholesterol sols produce a "catalase" action as shown by decomp.  $\text{H}_2\text{O}_2$  which must also be in a proper concn. S. Morgulis

**Increase of yeast fermentation by urine from healthy and diseased individuals. IX.** Heinrich Zeller. *Biochem. Z.* 266, 300 6 (1933); cf. C. A. 21, 925. The addition of midnight urine from healthy adults to yeast increases the fermentation up to 100%, but the increase caused by midday urine is not so great. Urines from various patients (rheumatism, pyelitis, lymphogranuloma) had a much smaller stimulating action on the fermentative process and in some instances there was an obvious toxic effect in the great concns. of urine. Neither oxidation by  $\text{KMnO}_4$  nor by  $\text{I}_2$  diminishes the effectiveness of the urine, but boiling does diminish it. S. Morgulis

**The yellow enzyme and its functions.** Otto Warburg and Walter Christian. *Biochem. Z.* 266, 377-411 (1933).—The yellow enzyme consists of a colloidal carrier and an active group, the reversible yellow pigment, which can be split off from its colloidal anchorage when aq.  $\text{MeOH}$  acts upon the enzyme for days at  $38^\circ$ . The nature of the colloidal portion is not known but the active group, when illumined in an alk. soln., gives a cryst. deriv., closely related to the original pigment by its spectrum, of the compn.  $\text{C}_{12}\text{H}_{12}\text{N}_4\text{O}_2$ . On heating this with  $\text{Ba}(\text{OH})_2$ , urea and a compd.  $\text{C}_9\text{H}_{10}\text{N}_2\text{O}_2$  are formed. The leuco form of the yellow enzyme reacts with  $\text{O}_2$  to form yellow pigment and water; with methylene blue to form yellow pigment and leuco methylene blue. Thus, it is not only an  $\text{O}_2$  transferer but an enzyme for respiration without  $\text{O}_2$ . The yellow enzyme, which has no physiol. function in the anaerobic cells, is ubiquitous in distribution; in the aerobic cells it does not exercise its purely chem. property of  $\text{O}_2$  transfer but reacts physiologically with bound  $\text{O}_2$ . The coenzymes I and II have been prepd. from horse red blood cells, and the intermediary enzyme from rat cells. Coenzyme I is easily destroyed by 0.1  $N$   $\text{NaOH}$  at room temp. but much less so at  $0^\circ$ ; by 0.1  $N$   $\text{HCl}$  it is destroyed quickly at boiling temp. but not at room temp. The activity of the purified coenzyme II is inhibited by  $\text{HCN}$  but not by  $\text{CO}$ . Coenzyme II is more easily adsorbed than coenzyme I (for instance by Paserton, Merck). S. Morgulis

**The membrane potentials of peroxidases and oxidases in equilibrium with metal ions.** M. Padoa and G. Fedeschi. *Biochem. Z.* 266, 452 7 (1933).—Since peroxidase and oxidase are Fe- and Mn-contg. enzymes, detn. of the membrane potential of these in contact with an ionizable salt of the same ions was attempted according to Donnan's theory. So far no satisfactory method was found for studying peroxidase, but better success was obtained with Bertrand's oxidase prepn. and a 0.001  $M$  soln. of  $\text{MnSO}_4$ . At  $p_{\text{H}}$  6.2 the enzyme manifests no membrane potential, the potential, however, increases to 40 mv. at  $p_{\text{H}}$  7. The enzymic activity was checked up by the color reaction with  $\alpha$ -naphthol and  $p$ - $\text{C}_6\text{H}_4(\text{NH}_2)_2$ . Under proper exptl. conditions it is possible to det. at which  $p_{\text{H}}$  the  $\text{Mn}^{++}$  ceases to act as a catalyst; it is between  $p_{\text{H}}$  6.2 and 6.4. S. Morgulis

**Studies on alcohol oxidase.** Hiroshi Mizusawa. *J. Biochem. (Japan)* 18, 243 58 (1933).—The alc. oxidase which brings about the reaction  $\text{EtOH} \rightarrow \text{AcH}$  is found almost exclusively in the liver. The reaction proceeds at an opt. rate with a concn. of 0.04  $M$  alc. The alc. oxidase acts not only on  $\text{EtOH}$ , but also on  $\text{MeOH}$ ,  $\text{PrOH}$ , as well as glycol, glycerol, erythritol, sorbitol and sugar. On the addn. of methylene blue to the enzyme-substrate system there is a sharp fall in the reduction potential. The alc. oxidase is inhibited by  $\text{KCN}$ , pyrrole, adrenaline, also by ultra-violet or x-ray radiation, but is activated by the adrenal cortex ext. The enzyme can be prepd. as a dry powder or in a more stable form as an ether ext. Animals which have been treated with alc. have a higher alc. oxidase activity. S. Morgulis

**Effect of pepsin preparations of varying activities on muscle globulins and collagen.** I. A. Smorodintzev and A. N. Adova. *J. Biochem. (Japan)* 18, 325-32 (1933).—Pepsin digests the acid muscle globulin more easily than the basic collagen. During peptic digestion of collagen, unlike that of gelatin, the viscosity of the mixt. increases but there is no increase in the amt. of alkali used. However, as the viscosity of the digestion mixt. decreases there is an increase in alkali used. The first stage of the digestion is therefore marked by an aggregation of protein micelles without hydrolysis of peptide linkages resulting in an increased viscosity. S. Morgulis

**Influence of temperature of protein metabolism. II. Nitrogenous extractives of the toad liver during the winter.** Hiroshi Makino. *J. Biochem. (Japan)* 18, 387-93 (1933).—The liver of hibernating toads contains more leucine, alanine and valine, and this is thought to furnish the material for the greater glycogen formation in the

liver during the winter. The tyrosine content of the winter liver is practically negligible while in the summer liver it is the most abundant (0.48%) amino acid.

S. Morgulis

**Deamination of amino acids in the animal organism.** Y. Kotake, Sr., Y. Kotake, Jr., and I. Taniguchi. *J. Biochem.* (Japan) 18, 395 415(1933).—The investigation was carried out with the aid of a micro method for detg. hydroxyphenylpyruvic acid in urine. Ext. 2 cc. of filtered urine acidified with 4 drops 15%  $H_2SO_4$ , 3 times with 10 cc. ether (distd. several times over Na) in a separatory funnel. Filter the exts. through a small paper, wash with ether, evap. to dryness, dissolve the residue in 10 cc. warm water and filter again. Pipet 5 cc. of the aq. soln., add 2 cc. 0.005  $N$   $KIO_3$  and heat 15 min. on a vigorously boiling water bath. Acidify with 2 cc. 10%  $H_2SO_4$  and submerge in water at 15° for 15 min., then add 5%  $KI$  soln. and after 5 min. titrate with 0.005  $N$   $Na_2S_2O_3$ . To the residue obtained from the ether ext. of another 2 cc. urine sample add 10 cc. satd.  $NaHSO_3$  and heat for a while at 70°. On cooling, ext. the soln. 3 times with 10 cc. ether, filter the exts. and wash with ether. Wash the combined ether exts. twice with a little water, evap. and titrate the residue as before. The difference between the 2 titrations corresponds to the keto acid value. The  $KIO_3$  value for concns. ranging from 0.004 to 0.040% can be calcd. with the aid of the formula  $y = 105.1 x^{1.4}$ , where  $x$  = concn. and  $y$  =  $KIO_3$  value. Feeding expts. with tyrosine show that under physiol. conditions this substance is converted in the organism chiefly to hydroxyphenyllactic acid, so that the deamination is partly hydrolytic and partly oxidative.

S. Morgulis

**The effect of water containing the isotope of hydrogen upon fresh-water organisms.** H. S. Taylor, W. W. Swingle, H. Eyring and A. H. Frost. *J. Chem. Physics* 1, 751(1933).—Expts. on the action of heavy water upon the vital activities of fresh-water organisms have led to the following results: water contg. the isotope of H in high concn. (92%) is toxic for the animals tested; (a) tadpoles of the green frog, *Rana clamitans*, died within an hr. after being placed in the water; (b) the fish, *Lebistes reticulatus*, died within 2 hrs. and (c) flatworms, *Planaria maculata*, were destroyed in 3 hrs.; (d) the protozoan, *Paramecium caudatum*, was killed in 48 hrs. Water contg. 30% heavy water had no effect in 24 hrs. in cases (a) and (b) or in 3 days in case (c); 15-20% of the heavy isotope had no effect in case (d) within 3 days.

Morris Muskat

**Effect of iron on the establishment of the oxidation-reduction potential of alloxantin.** Edgar S. Hill and Leonor Michaelis. *Science* 78, 485-6(1933).—Oxidation-reduction potentials in dil. solns. of alloxantin are rapidly established if 4-40 mg. Fe as  $FeSO_4$  is added per l. The Fe is unnecessary in concd. solns. The effect is most evident at  $pH$  4-6. Fe cannot be replaced by Cu, Mn, Co, Ni or org. dyestuffs. The effect is due to a complex compd. of Fe and dialuric acid (which is present in solns. of alloxantin).

Gerald M. Petty

**Heparin. II. Heparin in various tissues.** A. F. Charles and D. A. Scott. *J. Biol. Chem.* 102, 431 5(1933).—The highest concns. of heparin, as detd. by the method described in C. A. 28, 801<sup>7</sup>, were in muscle, liver and lung (about 2 units per g.), but anticoagulant was also present in heart, thymus, spleen and blood.

K. V. Thimann

**Further experiments on the physiological effect of heavy water and of ice water.** T. Cunliffe Barnes and R. J. Larson. *J. Am. Chem. Soc.* 55, 5059-60(1933); cf. C. A. 27, 578<sup>3</sup>.—Data are given for short lengths of a filament of *Spargyria nitida* and *Oscillatoria*. The heavy water effect may be due to its influence on enzyme.

C. J. West

## B- METHIONS AND APPARATUS

STANLEY R. BENEDICT

**A micro method for determination of histidine, especially a procedure for separation of histidine and tyrosine.** Konrad Lang. *Z. physiol. Chem.* 222, 3-5(1933).—The

method, which consists essentially in pptg. the histidine as a Hg complex and measuring the color intensity of its diazo reaction, is applicable to 30-40 mg. of hydrolyzed protein. To 1 cc. of the HCl hydrolyzate in a centrifuge tube add satd.  $Na_2CO_3$  to exact neutrality, then 1 drop of  $N$  HCl. Add 1 cc. of the Hg reagent (150 cc. satd.  $HgCl_2$  + 70 g. crystd.  $NaOAc$  + 10 g.  $NaCl$ ) and 2 cc. of 4%  $Na_2B_4O_7$  and mix thoroughly. Centrifuge the ppt. and wash twice with  $H_2O$ . Dissolve the residue in 2-3 drops of 5%  $NaCN$  and rinse into a 50 cc. graduated flask. Add 4 cc. of the diazo reagent (20 cc. of 0.5% sulfanilic acid in 1.75% HCl + 6 cc. of 2%  $NaNO_2$ , dild. to 50 cc. and kept in ice-water), dil. to the mark and observe the max. color intensity in a photometer with an S 53 filter interposed. Compare with the calibration curve. Tyrosine, which also gives the diazo reaction, is not pptd. by the Hg reagent.

A. W. Dorr

**Oxygen prepared electrolytically and furnished at a constant rate of supply for the maintenance of surviving isolated organs.** Jean La Barre and Jules Ledrut. *Ann. physiol. physicochim. biol.* 9, 733-4(1933). H. Eagle

**The biological determination of Callicrein.** H. Weese. *Arch. expil. Path. Pharmacol.* 173, 36-41(1933).—The difference in the blood depressor action of urine injected into dogs before and after heating is an accurate index of its callicrein content. Rabbits and cats are not suitable for the detn.

Harry Eagle

**Determination of the thyrotropic action of the anterior pituitary lobe by means of the effect upon the basal metabolism [of guinea pigs].** Wolf Schoedel. *Arch. expil. Path. Pharmacol.* 173, 314-32(1933). Harry Eagle

**The diagnostic value of determinations of ammonia in the blood.** Heinz Fuld. *Klin. Wochschr.* 12, 1304 6(1933).—The detn. is of diagnostic and prognostic value in evaluating hepatic insufficiency.

Harry Eagle

**The determination of indican in blood serum without the use of a standard solution.** P. Schlierbach. *Klin. Wochschr.* 12, 1569-70(1933).—Instead of colorimetric comparison with a standard, which is difficult to prep. and is unstable, S. uses the extinction coeff. as measured in a photometer as a quant. index, calibrating the instrument once with a known soln. of indican treated in the same manner as the unknown serum.

Harry Eagle

**A simple method for the demonstration of spirochetes in single sections.** D. Nieto. *Klin. Wochschr.* 12, 1775-6(1933).—A preliminary report. Frozen sections of material fixed in formalin 15-20 $\mu$  thick (or paraffin or celloidin sections after removal of the imbedding substance) are placed for 10 min. in concd. pyridine, washed 3 times in distd.  $H_2O$ , placed in a 1% aq. soln. of uranium nitrate for 15 min. at 37°, washed twice in distd.  $H_2O$ , and then heated in 0.2%  $AgNO_3$  until the fluid forms very small bubbles. It is then cooled for 2 min., and placed in 10 cc. fresh 1%  $AgNO_3$ , and 2 cc. of 5% tartaric acid is added. After thorough mixing, 10 cc. of a 1% aq. soln. of pyrogallol acid is added. As soon as the sections have become yellowish brown, they are placed in distd.  $H_2O$ , dried in increasing concns. of EtOH and xylene in the usual manner, and mounted in Canada balsam.

Harry Eagle

**A paper test for the detection of mastitis.** B. E. Horrell. Indiana (Purdue) Agr. Expt. Sta., *Bull.* 377, 3 5(1933).—Dissolve 0.4 g. of bromothymol blue in 25 cc. of approx. 98% EtOH and dil. to 100 cc. with distd.  $H_2O$ . Adjust the  $pH$  to 6.8 by the addn. of NaOH. Saturate strips of paper with this indicator and dry. Milk 1 strain of milk from the cow's teat, then milk 1-2 drops on the end of the test paper. Note the color of the strip both while wet and after drying. Max. blue color appears after 1-1½ min. The paper test detected 94.6% of the normal samples from the abnormal samples of milk as shown by leucocyte counts. The test is likewise fully as accurate as the usual bromothymol test for mastitis.

C. R. Fellers

**The determination of bile acids in the blood by the spectrophotometric method.** N. Scheinfinkel. *Biochem. Z.* 265, 380-5(1933).—The blood is extd. twice with alk.,

the first extn. lasting 24 hrs. A further modification of the Aldrich-Bledsoe procedure (C. A. 22, 2762) consists in the omission of the Norit treatment, and after the addn. of a soln. of  $\text{Ba}(\text{OH})_2$ , the filtration is made after 24 hrs., and repeated again after a long time. The soln. contg. the Ba salt of the bile acids is clear and colorless because the ppt. of  $\text{BaCO}_3$  forming on standing adsorbs the coloring substances. Furthermore, the Pettenkofer color is examd. spectrophotometrically, which insures its specificity. By this modified procedure dog blood was found to contain 0.8 mg. % bile acid.

S. Morgulis

**Studies in microanalysis of urine and blood with the step photometer. X. Determination of blood sugar.** Carl (rbach. *Biochem. Z.* 265, 390-400(1933); cf. C. A. 27, 2705.—Both a macro and a micro procedure are described for the Benedict modification of the Folin-Wu sugar method. For the micro method, however, for which 0.1 cc. blood is used, a dil. tungstic-molybdic reagent is employed; it is made by adding 5 cc. of the 0.62  $N$   $\text{H}_2\text{SO}_4$  to 5 cc. of the reagent previously dild. with about 150 cc.  $\text{H}_2\text{O}$  and making the vol. to 250 cc. This soln. should be freshly prepd. every few days. To 5 cc. of this soln. 0.1 cc. blood is added in a centrifuge tube, well shaken and centrifuged. To 2 cc. of the clear ext. 1 cc. of the copper reagent, contg. 2 drops of the bisulfite per cc., is added. The rest of the procedure is the same as in the original method, the colors being examd. in the step photometer with the aid of filter S 91.

S. Morgulis

**A new micro method for the determination of glycogen.** Stefan Simonovits. *Biochem. Z.* 265, 437-43(1933).—Saliyun's procedure is criticized because of the losses occasioned through the use of charcoal. The new procedure requires 1-4 g. fresh tissue; add to this 3 times the amt. of hot 6% KOH in a 15-cc. centrifuge tube. Keep in a boiling bath until soln. is completed. Cool, add 0.5 cc. satd. NaCl soln., 2 vols. 96% alc., mix well, let stand 1 hr. and centrifuge for  $\frac{1}{2}$  hr. Dissolve the pptd. glycogen in 3 cc. hot  $\text{H}_2\text{O}$ , add 0.5 cc. satd. NaCl, and again ppt. with 2 vols. of alc. Dissolve the glycogen ppt. in 1 cc. hot  $\text{H}_2\text{O}$ , neutralize to litmus with 1%  $\text{H}_2\text{SO}_4$ , transfer to a volumetric flask and dil. to vol. Filter off the ppt. of alkali metaproteins. Transfer 13 cc. of filtrate to a centrifuge tube, add 1.5 cc. satd. NaCl and ppt. the glycogen with 2 vols. alc. Mix thoroughly, let stand at least 5 hrs., centrifuge  $\frac{1}{2}$  hr., and dissolve the glycogen in 5 cc. hot  $\text{H}_2\text{O}$ . Add 5 cc. 2  $N$   $\text{H}_2\text{SO}_4$  and heat for 2 hrs. in a boiling water bath. Cool, neutralize with 2  $N$  NaOH, transfer to a volumetric flask and det. the sugar by reduction. A little as 0.6 mg. glycogen can thus be detd.

S. M.

**Titrimetric microdetermination of cholesterol.** Gabriel Monasterio. *Biochem. Z.* 265, 444-7(1933).—Add 1 cc. 1% digitonin in 80% alc. to 2 cc. cholesterol in  $\text{CHCl}_3$ , leave in the water bath until the vol. is reduced to about 1 cc., let stand 6 hrs. and centrifuge. Wash the ppt. 3 times with 3 cc. 95% alc., and free the ppt. from alc. in the water bath. Add 5 cc.  $\text{Ag-K}_2\text{Cr}_2\text{O}_7\text{-H}_2\text{SO}_4$  reagent (dissolve 5 g.  $\text{AgNO}_3$  in 25 cc.  $\text{H}_2\text{O}$  and mix with 5 g.  $\text{K}_2\text{Cr}_2\text{O}_7$  dissolved in 50 cc.  $\text{H}_2\text{O}$ . Wash the ppt. 2 times with  $\text{H}_2\text{O}$ , using the centrifuge. Dissolve the ppt. in 50 cc. concd.  $\text{H}_2\text{SO}_4$ . Heat 15 min. at  $160^\circ$  on a sand bath. Transfer to a larger test tube (18  $\times$  3) and continue the oxidation for another 45 min., adding more reagent if necessary. Heat a similar tube contg. 5 cc. reagent on the sand bath. Transfer the contents of each to a 200 cc. flask and wash the tubes repeatedly with  $\text{H}_2\text{O}$ . Cool, add 10 cc. 10% KI to each flask and titrate with 0.1  $N$   $\text{Na}_2\text{S}_2\text{O}_3$ . The difference in titration between the reagent and the digitonin cholesterolide gives the cc. of 0.1  $N$  chromic acid reduced, and this divided by 10.48 gives the wt. of the cholesterol. In the case of blood, serum or plasma ext. 2 cc. with boiling alc. and ether mixt. (21 and 7 cc., resp.); reext. the ppt. after filtration with the alc.-ether mixt. Evap. the filtrate to dryness, dissolve in small quantities of  $\text{CHCl}_3$ , filter into a 10 cc. volumetric flask and dil. with  $\text{CHCl}_3$  to the mark. The analysis is carried out on 2 cc. aliquots. For the total cholesterol detn. saponify 4 cc. of the ext. at  $70^\circ$  for 2 hrs. in a stoppered tube with 2 cc. 3% Na alcoholate. Add 1 cc. 6% HCl in alc., evap.

to dryness, ext. the cholesterol with  $\text{CHCl}_3$  on the boiling water bath, repeating this 4 times. Evap. the extracts to 4 cc., of which 2 cc. is used for the detn. as previously described.

S. Morgulis

**Photometric method for the determination of carbon monoxide in blood.** I. J. K. Parnas and J. Sienlowski. *Biochem. Z.* 266, 101-6(1933).—The detn. of CO in blood by means of a Pulfrich photometer is described.

S. Morgulis

**A simple method for the preparation of ultrafiltration collodion sacs and a new ultrafiltration outfit.** Paul Kallos and Gunter Hoffmann. *Biochem. Z.* 266, 128-31(1933).—Suitable objects (glass rod, test tube) are immersed in melted caramel at  $200^\circ$  with which they should be evenly coated. The caramel is allowed to harden for about 2 hrs., and the form is dipped in the collodion soln. The latter gives membranes impermeable to protein or Congo red if it is made in 6% concn. in alc.-ether with the addn. of 3%  $N$  Bu alc. The dipped form is rotated for 3 min. and is then dried 6 hrs. at  $37^\circ$  in an upright position. This is repeated 3 times. The forms are then placed in 30% alc. at  $80^\circ$  and the sepd. sacs are washed free from sugar in running warm water and can be preserved indefinitely in 70% alc. covered with toluene. These membranes will sustain 1 atm. pressure; at 600 mm. Hg pressure 100 cc. distd. water will filter in 10 min.; they allow electrolytes and compds. with mol. size up to that of Congo red to pass. These membranes cannot be used for filtering alc.-ether solns. or strong acid and alkali solns.

S. Morgulis

**A new micro method for the determination of pyrocatechol and its application to the determination of phenolase.** S. Blazso. *Biochem. Z.* 266, 281-6(1933); cf. C. A. 27, 746.—Essentially this is an application of the Hagedorn-Jensen sugar method to the detn. of pyrocatechol. With 0.25 mg. in a 1:10000 soln. it was found necessary to boil at least 25 min., but by increasing the  $\text{Na}_2\text{CO}_3$  concn., boiling 15-20 min. is sufficient. A reagent is therefore prepd. contg. 162 g. cryst.  $\text{Na}_2\text{CO}_3$  per l. 0.01  $N$   $\text{K}_3\text{Fe}(\text{CN})_6$  soln. A table gives the mg. pyrocatechol directly from the cc.  $\text{Na}_2\text{S}_2\text{O}_3$  used in the titration. The method is employed for detg. phenolase activity. Equal amts. of skin ext. and pyrocatechol soln. are mixed and incubated. From time to time a 0.5-cc. sample is removed for the detn.

S. Morgulis

**A new method for determining the residual nitrogen and its fractions in organs.** I. Liver. H. Elias and H. Kaunitz. *Biochem. Z.* 266, 323-8(1933).—Quickly freeze in  $\text{CO}_2$  snow a weighed sample (about 20 g.) of thinly sliced liver. Det. the sp. vol. of liver on another sample by placing in a 50-cc. volumetric flask and measuring from a buret the vol. of water required to fill the flask to the mark. Rub up the frozen sections quickly with quartz sand, then with 40 cc.  $\text{H}_2\text{O}$ , to a fine sludge. The vol. of the aq. suspension of the liver is the vol. of liver tissue (calcd. from its wt. and its sp. vol.) plus 40 cc. On an aliquot of the suspension det. residual  $N$  according to Folin-Wu.

S. Morgulis

**Extraction of a hemin from heart muscle which is different from blood hemin.** E. Negelein. *Biochem. Z.* 266, 412-16(1933).—A hemin was extd. with acetone-HCl from horse heart muscle which dissolved in aq. pyridine gives an absorption band at 587  $m\mu$ , which corresponds to the hemochromogen bands of pheohemin b and *Spirographis* hemin (584  $m\mu$ ) but is different from ordinary blood hemin (557  $m\mu$ ). This hemin was obtained as cryst. pyridine hemochromogen, but the chlorohemin could be obtained only in the amorphous state. The amorphous compd. contains 6.5% Fe and 4 N to 1 Fe. The absorption spectrum of the hemin dissolved in 25% pyridine and reduced by alk. hyposulfite is reproduced. Method of prepn. of the hemin: Wash 5 kg. of finely ground fresh horse heart free from blood in running water, and press dry. The final wt. should be 85% of the original. Ext. the material with acetone, 4.25 l. + 35 cc., 37% HCl being employed per kg. material. Shake this for 15 min. and filter. Evap. the acetone ext. at room temp. in *vacuo*

until the soln. foams strongly, and reduce the acetone vol. to  $\frac{1}{2}$ . Filter the combined concentrates. Adsorb the hemin on Merck's "Faserton," using 1.0 g. washed with  $H_2O$  per kg. heart muscle. Reduce the acidity by adding 92 cc. of a soln. of 40 g. NaOAc in 100 cc. Shake the mixt. 15 min. and collect the Faserton by centrifuging. Wash the Faserton with the adsorbate by shaking for 30 min. each time with a mixt. of 750 cc. acetone, 150 cc.  $H_2O$ , 60 cc. 2 N AcOH and 40 cc. 2 N NaOH, until about  $\frac{1}{4}$  of a l. has been used. Finally wash the Faserton by shaking successively with 75% acetone, pure acetone and benzene. Wash the Faserton (filtered dry) with  $CHCl_3$ . Ext. the dry Faserton with 120 cc. acetone + 3 cc. 2 N HCl by brief shaking and centrifuging. Repeat the elution 4 times, diminishing the HCl so that altogether only 10 cc. 2 N is used. Reduce the filtered exts. at  $30^\circ$  in *vacuo* to  $\frac{1}{2}$  vol., add part of  $H_2O$  for every 2 parts of acetone and keep the soln. on ice 1 hr. Filter off the colorless ppt. Amorphous hemin forms a fine ppt. on the addn. of 2 cc. of the NaOAc soln. which is centrifuged off after keeping the soln. 1 hr. on ice. Rub up the dry ppt. twice with 10 cc. acetone and centrifuge, take up the residue in 4 cc. acetone acidified with 2 drops 2 N HCl and again centrifuge. Evap. the soln. to dryness in *vacuo*; 163 mg. is obtained from 5 kg. heart muscle. From the spectroscopic examn. of its pyridine soln. this quantity (163 mg.) is shown to contain  $1.07 \times 10^{-4}$  mol. hemin. Sep. this hemin from protohemin by the soln. of the chloridric compd. in 5 cc. neutral acetone, filtering and keeping in the cold with 45 cc. benzene. This treatment causes some more of the protohemin to crystallize and is removed by strong centrifuging. Evap. the soln. to dryness in *vacuo*. S. M.

**Method of electrodialysis. Serum electrodialysis with glycine membranes.** G. Ettisch and J. A. de Lencastre. *Biochem. Z.* 266, 422-35(1933).—Membranes are prep'd from collodion contg. glycine, 1:20,000, which decreases the viscosity. Add 2 mg. powd. glycine to 50 cc. collodion, shake for a few min. and pour on a glass plate after standing about  $\frac{1}{2}$  hr. The glycine suspension should be preferably fresh. Electrodialysis proceeds very rapidly with these membranes because they are permeable to anions, and after 35 min. the  $pH$  reaches a definitive value. Because of the shortness of time during which the  $pH$  drops from 7.8 to 6.8, usually about 10 min., a large part of the globulin is pptd. quickly. If a dry glycine-collodion membrane is used at the anode the end  $pH$  value is not attained so rapidly. It does not affect the results whether a parchment or cellulose membrane is used at the cathode.

S. Morgulis

**The fractionation of serum by electrodialysis.** G. Ettisch. *Biochem. Z.* 266, 436-40(1933).—The advantages of fractionating the serum proteins by electrodialysis over that by the salting-out process are shown.

S. Morgulis

**Preparation of pure hemoglobin solutions by electrodialysis.** G. Ettisch and G. Groscurth. *Biochem. Z.* 266, 441-7(1933).—The conditions essential for the prepn. of hemoglobin solns. for definite purposes are defined. The prepn. of hemoglobin solns. by electrodialysis is the most practical. By use of a glycine-collodion membrane at the anode and a parchment membrane at the cathode hemoglobin soln. is obtained from a red blood cell pulp which is electrolyte-free and has a 100% O<sub>2</sub>-binding capacity.

S. Morgulis

**Studies on cholesterol determination in blood. I. Criticism of some extraction methods and a simplified gravimetric method.** Kenzo Kusui. *J. Biochem. (Japan)* 18, 227-36(1933).—The extn. must precede sapon. Ext. 5 cc. oxalate blood with 125 cc. of 3:1 alc-ether mixt., filter after a few hrs. and wash the residue with the alc-ether mixt. Evap. the ext. to dryness, ext. the residue with ether, evap. and reext. the residue 3 times with 3 cc. quantities of alc. Make up the alc. ext. to 10 cc. Transfer 5 cc. to a small beaker, warm, add 2 cc. hot 1% alc. soln. of digitonin, and leave over night. Filter through a small Gooch crucible, wash the ppt. once with 1 cc. alc. and twice with ether, dry the crucible at  $100^\circ$  to const. wt. Since the wt. multiplied by 0.25 gives the chole-

sterol in 2.5 cc. blood, multiplying the wt. by 10 gives mg. % of free cholesterol. Transfer the remaining 5 cc. of the alc. ext. to a 50 cc. flask and wash twice with 5 cc. alc. Add about 0.6 g. Na and heat 4 hrs. on a sand bath under a reflux. Wash the soln. with 30 cc. ether in a separatory funnel, then add 10 cc.  $H_2O$ , shake and let stand until the soln. is clear. Transfer the aq. alc. layer to another funnel, wash the ether once more with water and add to the second funnel and again shake the contents of the latter with 50 cc. ether. Repeatedly wash the combined ether exts. with small amts. of dil. NaOH, then with  $H_2O$  until no reaction is given with phenolphthalein. Evap. the ether, dissolve the residue in 5 cc. hot alc., add 4 cc. 1% alc. digitonin and carry out the detn. as before. II. A combination of the colorimetric with the digitonin method. *Ibid.* 237-44.—Ext. 2.5 cc. oxalated blood or serum with 60 cc. of 3:1 alc-ether mixt., filter and wash with alc. ether. Ext. with ether the residue left after evapn., then, after evapn., with 5 cc. alc. Det. the free cholesterol in this soln. by digitonin pptn. as described in the previous paper. Evap. the filtrate from the digitonin-cholesterol and ext. the cholesterol esters twice with 20 cc. ether. Evap. the ext. partly, transfer to a 25 cc. flask and adjust the vol. with ether. Evap. 5 cc. in a small beaker, dissolve the residue in 3 cc.  $CHCl_3$ , transfer to a 10 cc. stoppered graduate, add 5 cc.  $CHCl_3$ , 2 cc.  $Ac_2O$  and 0.1 cc.  $H_2SO_4$ , and match the color against a standard.

S. Morgulis

**Biochemical studies on carbohydrates. I. Micro method for determining menthol, borneol and  $\beta$ -naphtholglucuronic acid in blood.** Hajime Masamune. *J. Biochem. (Japan)* 18, 259-76(1933).—Take 1 cc. blood

with 1 cc.  $H_2O$ , dil. with abs. alc. to 10 cc., shake and filter. Evap. gently 5 cc. of filtrate, dissolve the dry residue in 3 cc. 0.1 N NaOH and add 1 cc. 4%  $CdSO_4$ . The mixt. should be neutral to litmus. Filter into a Kumagawa-Suto extn. app., wash twice with 3.7 cc.  $H_2O$  then add 1 cc. 2 N  $H_2SO_4$ . Ext. with 20 cc. ether at a temp.  $50-70^\circ$  for 1 hr., but continue for 3 hrs. if  $\beta$ -naphtholglucuronic acid is present. Evap. ether, add 6 cc.  $H_2O$  and place in a boiling water bath to expel volatile products, cool, acidify with 2 cc. 4 N HCl, dil to 8 cc. with water and hydrolyze under a reflux on a water bath. Menthol- and borneol-glucuronic acid are hydrolyzed in 30 min. and  $\beta$ -naphtholglucuronic acid in 3 hrs. Cool, neutralize exactly with 2 N NaOH, then add 4 cc. 0.005 N  $K_2Fe(CN)_6$  soln. Heat again in the water bath for 15 min., add 3 cc. salt mixt. (2.5 g. KI, 5 g.  $ZnSO_4 \cdot 7H_2O$  and 25 g. NaCl in 100 cc. soln.), followed by 4 cc. 6.2% HCl and titrate with 0.005 N  $Na_2S_2O_4$ . Calc. the amt. of glucuronic acid in mg. per 100 cc. blood by the formula:  $200/5.6$ ,  $200/5.6 \times 0.989$  and  $200/5.6 \times 0.983$  for the borneol-, menthol- and  $\beta$ -naphtholglucuronates, resp.

II. Microcolorimetric method for the determination of free and conjugated menthol in blood and tissues. *Ibid.* 277-83.—Mix 1 g. tissue pulp with 1 cc.  $H_2O$ , deproteinize with enough abs. alc. to give 6 cc. vol. and filter. Place 3 cc. filtrate together with a teaspoonful of anhyd.  $Na_2SO_4$  in a special distn. app., the condenser of which is in a cooling mixt. at  $-10^\circ$ . Suck air (washed in  $H_2SO_4$ ) slowly through the app. while filling the jacket about the distn. tube with water at  $70^\circ$ . Introduce into the distn. tube 1 cc. abs. alc. at the end of 15 and 20 min. and after 30 min. discontinue the aeration. Note the vol. of distillate. Measure 1 cc. into a test tube, add 5 cc. of the color reagent, place for 2 min. in boiling water, closing the tube with a cork provided with a  $CaCl_2$  tube, then cool under running water. To make the reagent dissolve 0.5 g. dimethylaminobenzaldehyde in 100 cc. of a mixt. consisting of 1.6 vols. concd.  $H_2SO_4$  and 1 vol.  $H_2O$ . Match the unknown against a standard which is made from an aq. soln. of 0.1 g. phenol red and 5.7 cc. 0.05 N NaOH in 100 cc. Pipet 0.3 cc. of this soln. into 10 cc. of a borate-HCl soln. of  $pH$  7.93, add 10 cc.  $H_2O$  and set in a colorimeter at 8.2 mm. This equals the color produced by 0.1 mg. menthol at 10 mm. The detn. on blood is made the same way, except that the total vol. is made up to 8 cc. with abs. alc. and 4 cc. filtrate is used. Det. the conjugated



menthol in the remaining portion of the filtrate, following the preliminary treatment described in the previous paper.

S. Morgulis

**The Hammarsten cholic acid reaction.** Kazumi Yamasaki. *J. Biochem. (Japan)* 18, 311-22(1933); cf. C. A. 28, 169.—The Hammarsten reaction has been modified so that it can be employed with pure as well as impure cholic acid. Add to about 2 mg. cholic acid 0.5 cc. 37% fuming HCl, in a small test tube and heat carefully for 3 min. in a water bath. Let it stand at room temp. when the soln. assumes an intense violet color changing soon to a beautiful blue-violet, and on diln. either with concd. HCl or alc. analyze in the spectroscope where the distinct adsorption band 560-400 m $\mu$  appears. This reaction is much more sensitive than the original Hammarsten reaction, and is obtained in mixts. of cholic acid which by the original method give only neg. results. S. M.

**Studies on the determination of bile acids in blood. II. A new and easy method for determining the bile acids in blood serum.** Kenzo Kusui. *J. Biochem. (Japan)* 18, 345-68(1933); cf. C. A. 26, 5598.—Prep. standard solns. from recrystd. glycocholic acid by dilg. a stock 0.08% in alc. by further addn. of alc. (0.08, 0.04, 0.02, 0.01, 0.005, 0.0025 and 0.00125%). Measure 2 cc. of each diln. into a test tube, add 0.2 cc. 1% sucrose soln. and 2 cc. concd. H<sub>2</sub>SO<sub>4</sub>, shake the contents for 1/2 min. and cool in ice water 1 min. The color scale ranges from a beautiful yellow, through orange and red to purple red (0.8 mg. glycocholic acid), depending upon the glycocholic acid content. A table has been worked up empirically which gives the glycocholic acid content of the unknown when this is matched in the colorimeter against a standard of known concn. set at 15 min. The standard solns. do not keep and must be prepd. fresh. Add to 1 cc. serum, drop by drop, and with const. shaking 25 cc. alc., leave for 30 min. and filter. Ext. the residue 3 times with 5-cc. quantities of alc. Quickly evap. the alc. ext., ext. the residue 3 times with 2 cc. ether to remove cholesterol and fats. The ether ext. should be centrifuged. Take up the residue undissolved in 3 cc. alc. in ether and add the soln. to the residue in the tube in which the ether ext. was centrifuged, measure 2 cc. of the clear (centrifuged) soln. into a test tube and develop the color just as in the case of the standard. Calc. the bile acid content with the aid of the table. The av. bile acid content of human and dog serum is 8.78 and 7.31 mg. %. The method was also applied to lymph. S. Morgulis

**Heparin. I. The preparation of heparin.** A. F. Charles and D. A. Scott. *J. Biol. Chem.* 102, 425-9 (1933); cf. Howell, C. A. 17, 3349.—After autolysis for 4 hrs., 100 lb. of beef liver is extd. with 62 l. 0.5 N NaOH and 7.5 l. satd. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> for 1 hr. at 50°. If heated to 70° the protein is coagulated, and the heparin is pptd. by acidifying the filtrate to pH 2. The ppt. is washed with hot dil. H<sub>2</sub>SO<sub>4</sub>, suspended in 95% EtOH for 20 hrs., centrifuged, dissolved in 6 l. water, and treated for 36 hrs. with 25 g. trypsin at pH 8 and 30 in presence of xylene. The heparin is pptd. with 12 l. 95% EtOH and a little HCl, redissolved in alkalized water, heated to 70° and reprecip. with Me<sub>2</sub>CO. Finally the product is suspended in 0.8% (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> at pH 4.3 and heated at 70° for 1 hr., filtered and again pptd. with Me<sub>2</sub>CO. The water-sol. ppt. contains 5 units anticoagulant per mg. III. **The purification of heparin.** D. A. Scott and A. F. Charles. *Ibid.* 437-48; cf. C. A. 28, 7957.—Heparin is largely destroyed by HCl at pH 2.5, or by 0.25 N NaOH, in 4-5 hrs. at 80°. By fractionation of the crude product described above with Lloyd's reagent, CdCl<sub>2</sub> and finally with Me<sub>2</sub>CO, a microcryst. prepn. contg. about 30% ash was obtained. It contained 460 units per mg., contained N, lost its activity on treatment with HNO<sub>3</sub>, and appeared to form salts with both acids and bases. It gave no color with naphthoresorcinol and seems quite different from the product of Schmitz and Fischer (C. A. 27, 3227). K. V. Thimann

**Formalin titration of proteins (Struait) 7.** Colorimetric detn. of P (van der Lingen) 7.

**Baker, John R.: Cytological Technique.** London: Methuen & Co. 131 pp. 3s. 6d. Reviewed in *Stain Tech.* 8, 118(1933).

## C—BACTERIOLOGY

CHARLES B. MORREY

**Pertussis toxin or antigen.** John A. Toomey and Joseph E. McClelland. *Proc. Soc. Exptl. Biol. Med.* 31, 34-5(1933).—Whooping cough bacillus No. 778 of the American Culture Collection was grown for 19 days on a medium consisting of veal infusion 250 cc., brain infusion 80 cc., peptone 3.3 g., NaCl 1.6 g. and Na phosphate 1.6 g. The culture was strained, passed through an N or V and then through a W Berkefeld filter and preserved with 0.2% tricesol. Intradermal injections of 0.1 cc. of the filtrate caused a local skin reaction in 6-24 hrs. in all of 680 individuals. Filtrates of the unplanted medium caused reactions in less than 1% of the subjects tested. C. V. B.

**The chemical properties of an E. coli bacteriophage.** W. L. Dulière and M. Adant. *Ann. physiol. physicochim. biol.* 9, 777-9(1933).—Oxidation of a soln. contg. bacteriophage with H<sub>2</sub>O<sub>2</sub> destroys the former; subsequent reduction with hyposulfite has no effect. Bacteriophage does not dialyze through a parchment membrane, even with the aid of electrodialysis. As soon as the concn. of Cl falls below 0.01%, the bacteriophage activity disappears irreversibly. Thymol used as preservative does not affect the phage. Dialyzed, but active, preps. are inactivated by extn. with CHCl<sub>3</sub> at 56°, despite the fact that the latter has no effect when added to the original soln. Harry Eagle

**The differentiation between whooping cough and influenza bacilli.** Michio Kasahara. *Klin. Wochschr.* 12, 1609-11(1933).—*Haemophilus influenzae* inoculated into rabbits or guinea pigs subcutaneously causes a sharply circumscribed inflammatory edema reaching a max. in 24-48 hrs. and never resulting in necrosis. *H. pertussis* similarly inoculated causes a more severe inflammatory reaction which always necrotizes. Another point of differentiation is the fact that live pertussis bacilli are more readily stained by Nile blue sulfate than live influenza bacilli. The former are stained by as little as a 0.00001-0.000005% soln., while the latter stain very slightly with a 0.0003% soln., and require 0.001% for definite strong coloration. A 0.0001% soln. is a convenient practical method of differentiation. Harry Eagle

**Preparation and chemical properties of a biologically active substance ( $\beta$ -tuberculin) isolated from the nutritive medium of tubercle cultures.** Paul Kallos and Gunter Hoffmann. *Biochem. Z.* 266, 132-6(1933).—By pptn. with alc. (ther. mixt.) a highly active substance ( $\beta$ -tuberculin) is obtained from an ultrafiltrate of the media in which tubercle cultures have been grown. This substance was also obtained from tuberculous skin, as well as from the serum and urine of tuberculous patients. The prepn. is entirely protein-free. The tryptophan reaction bears a direct relation to the biol. activity of the prepn. and serves as a colorimetric method for estg. the  $\beta$ -tuberculin content. S. Morgulis

**Bacteria destroy pipe line in California (Beckwith, Bovard) 13.** Rept. of the director of the Dairy Research Inst. [on bacteria and gas-producing organisms] (Davel) 12.

**Test tube for bacteriological experiments.** Arnold Renshaw. *Ger.* 578,807, June 17, 1933.

## D—BOTANY

THOMAS G. PHILLIPS

**Root knots and mycorrhiza.** Johannes Richter. *Pharm. Zentralhalle* 74, 653-60(1933).—The function of the knotty excrescences long observed on certain plant rootlets, their relation to N assimilation by the plant and to mycorrhiza are discussed. W. O. E.

**Three species of *Zygadenus* (death camas).** O. A. Beal, H. F. Eppson, J. H. Draize and R. S. Justice.

- Wyo. Agr. Expt. Sta., *Bull.* 194, 3-39(1933).—Chem. analyses show the distribution of the alkaloid, *sydadenine* in *Z. gramineus*, *Z. paniculatus* and *Z. elegans* at representative stages of growth. The alkaloidal potency did not vary appreciably with altitude. All 3 species had similar seasonal alkaloidal trends. *Z. elegans* is only  $\frac{1}{3}$  as toxic as the other 2 species. The M. I. D. of *Z. gramineus* and *Z. paniculatus* to sheep was 15-20 oz. of plant per 100 lb. of sheep. Apparently the ramos alkaloid is not transmitted to the milk as nursing lambs of poisoned ewes showed no symptoms of poisoning. The seed heads and leaves normally contained a higher content of the alkaloid than the stems or bulbs. C. R. Fellers
- The nature of the causative agent of the mosaic disease of tomatoes. S. V. Desai. *Indian J. Agr. Sci.* 3, 626-38 (1933).—Cultures of the organism fermented glucose, sucrose and lactose without the formation of gas; the reaction of the medium changed from  $pH$  7.2 to 5.6-5.9 in 48 hrs. and then to  $pH$  7.9 after 1 week. The organism rapidly peptized litmus milk. K. D. Jacob
- A soft rot of apple. P. K. Dey and B. S. Nigam. *Indian J. Agr. Sci.* 3, 603-72(1933).—*Aspergillus niger* was isolated from apples affected with a type of rot which changes the entire apple into a soft pulpy mass within a few days, sour varieties of apples being the most susceptible to attack. When the fungus was grown in Czapek's soln., adjusted to different degrees of acidity by the addition of malic acid, the greatest mycelial development occurred at  $pH$  3.4-3.8. The fungus did not grow in the absence of O. K. D. Jacob
- Physiological factors associated with the productiveness of pecan shoots. A. H. Finch and H. L. Crane. National Pecan Assoc., *Rept. Proc. 30th Ann. Conv.* 1931, 98-107. In the early spring, starch is present in all shoots formed during the previous season. With the formation of new growth the starch is depleted more rapidly from the old wood at the base of strong fruiting shoots than from the wood at the base of weak fruiting shoots. The rate and completeness with which starch disappears from the 1-yr.-old wood appear to be related to the no. and rate of growth of the new shoots formed; later, starch begins to reappear in the old wood at the base of new shoots. Starch appears earlier in the bases and tips of new weak fruiting shoots than in those of new strong fruiting shoots. The young kernels of nuts from strong shoots are higher in reducing sugars than are those of nuts from weak shoots. K. D. Jacob
- Etiology of the chocolate spot disease of broad beans C. J. Magee. N. S. Wales Dept. Agr., *Sci. Bull.* 43, 8 pp.(1933).—The disease is caused by the deposition of honey dew by aphids on the leaves of the plants. Lesions similar to those produced by honey dew were formed when droplets of sucrose and glucose (which are constituents of honey dew) and bees' honey were applied to the foliage. Species of *Saccharomyces* and *Cladosporium* were the only organisms found in honey dew. K. D. Jacob
- Blue panic grass (*Panicum antidotale*). Anon. *Queensland Agr. J.* 40, 327-8(1933).—The crude protein content of moisture-free samples of the grass grown in Queensland ranged from 11.5% in old growth to 20.6% in stemmy leafy growth up to 2.5 ft. in height. The plant does not contain HCN. K. D. Jacob
- Foot-rot diseases of cereals. T. A. Russell. *Trans. British Mycol. Soc.* 16, 253-69(1932).—Results of pot expts. indicated that wheat seedlings growing in soil with a high ratio of N to K may be specially liable to foot-rot, which is caused by *Fusarium culmorum* and *Helmintosporium sativum*. K. D. Jacob
- A study of some Phoma species. M. Grimes, M. O'Connor and H. A. Cummins. *Trans. Brit. Mycol. Soc.* 17, 97-111(1932).—A new species, *P. hibernica*, was isolated from milk, cream, butter and water, and its cultural characteristics were studied. The fungus made good growth on nutrient lactose agar at  $pH$  7.0 and, in contrast to other species of *Phoma*, also at  $pH$  3.5. Good growth, without apparent action, was obtained on calcified milk and it rendered litmus milk slightly alk. in 6 days. A very slight liquefaction of gelatin was produced in 3 weeks. The fungus had no diastatic action on starch in nutrient lactose agar, potato agar or mineral salt glucose agar cultures and it caused no production of gas from glucose, lactose, mannitol, dextrin and glycerol. K. D. Jacob
- Measuring germination [of fungus spores]. R. G. Tomkins. *Trans. Brit. Mycol. Soc.* 17, 147-9(1932).—The latent period of germination is slightly prolonged in the presence of narcotics ( $Et_2O$ ,  $CHCl_3$ , acetone, etc.),  $SO_2$  and certain acids; it is noticeably prolonged in the presence of  $AcH$ ,  $HCN$ ,  $H_2S$ ,  $NH_3$  and the salts of heavy metals. K. D. Jacob
- Measuring growth [of fungi] by the Petri dish method R. G. Tomkins. *Trans. Brit. Mycol. Soc.* 17, 150-6 (1932).—In the presence of growth inhibitors, such as  $CO_2$ ,  $CHCl_3$ ,  $Et_2O$ , etc., the rate of spread, though reduced, suffers no marked change of phase sequence and comparisons of size at various time intervals give approximately the same relative values. The retarding effect of acetaldehyde,  $H_2S$  and  $HCN$  is considerable in the early stages of growth. When  $NH_3$  and  $H_2S$  are introduced into the culture atm. considerable time is required for the gas to dissolve in the agar and come into equil. with the pressure of gas in the air, thus delaying the effect of the gas on growth. When growing colonies are taken from an atm. and placed in an atm. contg. acetaldehyde,  $HCN$  or  $H_2S$  the spread of the colony is immediately checked or reduced; later the growth begins again or increases in rate and finally attains a const. value. K. D. Jacob
- Bacterial diseases of stone-fruit trees in Britain. IV. The organism causing bacterial canker of plum trees H. Wormald. *Trans. Brit. Mycol. Soc.* 17, 157-69 (1932). The causal organism is *Pseudomonas mors prunorum*; its cultural characteristics and reactions in a wide variety of media are given in detail. The organism has no diastatic action on starch, does not produce gas from dextrose, lactose, sucrose or glycerol and does not reduce nitrate to nitrite or produce indole from tryptophan; it produces an acid reaction in 2% lactose nutrient agar contg. bromocresol purple and is thus distinguished from *P. prunicola*. K. D. Jacob
- Effect of cultural conditions on the growth and sporulation of an organism belonging to the group species *Aspergillus glaucus*. B. L. Chona. *Trans. Brit. Mycol. Soc.* 17, 221-8(1932).—The amt. of growth and sporulation (both conidial and perithecial) increase with the concentration of sugar in the medium up to about 3%; beyond this concentration conidial formation decreases, whereas growth and formation of perithecia continue to increase. Omission of  $MgSO_4$ ,  $KCl$  and  $FeSO_4$  from Czapek's medium does not alter the type of growth, but growth is definitely reduced in the absence of  $K_2PO_4$ . Growth and perithecial formation are slightly increased when either  $KH_2PO_4$  or  $K_2HPO_4$  is substituted for  $K_3PO_4$ . The cultures are extremely thin in the absence of  $NaNO_3$  and the growth is poor when  $NaNO_3$  is replaced by  $NH_4Cl$ . Replacement of sugar by peptone (in Richards' soln.) produces a markedly fluffy type of growth; formation of conidia is much intensified and there is a corresponding reduction in the no. of perithecia. Only a slight effect was produced by varying Czapek's soln. from 0.16% alk. ( $NaHCO_3$ ) to 0.16% acid (as malic acid). K. D. Jacob
- Germination of the spores of *Merulius lacrymans* (Wulf) Fr. W. P. K. Findlay. *Trans. Brit. Mycol. Soc.* 17, 334-5(1933).—No germination was observed in dist. water, malt agar, prune agar or in malt agar plus 0.4%  $KOH$ . Approx. 25% germination was obtained on 8% malt agar plus 1% malic acid or 1%  $H_3PO_4$ . K. D. Jacob
- The action of various stimulants upon plant organisms, with special consideration of gaseous substances. Werner Liebisch. *Angew. Chem.* 46, 635-8(1933).—The action of a no. of stimulating processes and stimulants upon the life functions of plants are discussed. Thirty-one references. Karl Kammermeyer
- Soluble sugars in *Mercurialis perennis* L. Mme. M. Bouillenne and Ray Bouillenne. *Bull. sci. acad.* 101

Belg. 19, 840-66(1933).—Methods for the extn. and detn. of sol. sugars and the technics employed to assure accuracy are discussed in detail. Extns. were made with boiling  $H_2O$  plus  $CaCO_3$ . Neutral Pb acetate was used for defecation.  $Na_2HPO_4$  and  $Na_2CO_3$  are recommended for decoloring. Preference is given to  $H_2SO_4$  over  $HCl$ , as a hydrolyzing agent. The Folin-Wu and the Shaffer-Hartman methods of sugar detn. gave sufficiently accurate results. F. W. Marsh

**Destruction and utilization of protein by molds.** T. Chraszcz and F. Pisula. *Biochem. Z.* 266, 29-45(1933).—Expts. were carried out with 77 species of mold. Growth on milk these show a very variable capacity for development because they do not possess equal ability to assimilate the nourishment of milk. They all can decompose the milk protein even to  $NH_3$ , but the rate of decompn. as well as the nature of the end products differs greatly for different species. Frequently the acidity of the milk decreases, and in some instances the reaction becomes neutral, when molds are grown on milk, because of the  $NH_3$  production. Molds grown on milk generate a variety of odors, such as foul, skatole, esters, ammoniacal, but some are not odorless. S. Morgulis

**Methods for the study of the metabolism of molds.** A. J. Kluyver and L. H. C. Perquin. *Biochem. Z.* 266, 81(1933).—As a general principle in such studies it is stated that a homogeneous material is required under homogeneous conditions which are unfavorable to growth. This is best attained by using large quantities of material and greatly reducing the time. The procedures for securing these conditions are discussed. S. Morgulis

**Conditions for the formation of kojic acid by *Aspergillus flavus* Link.** A. J. Kluyver and L. H. C. Perquin. *Biochem. Z.* 266, 82-95(1933).—The formation of kojic acid from glucose has been studied by the procedures outlined in the preceding paper. The yield of acid is very much affected by the conditions under which the mycelium has been grown, the best yields being obtained from cells grown on a mineral-sugar nutritive medium. The optimum results were obtained at  $pH$  2.2, with a sugar concn. of  $10^4$ , a lack of assimilable N compds., and a rich supply of O. Under favorable conditions the yield of kojic acid reached 67% of the theoretical. S. Morgulis

**A contribution to the biochemistry of seed germination with particular reference to *Zea mays*.** R. C. Malhotra. *Biochem. (Japan)* 18, 173-97(1933).—A study of germinating peas, maize and wheat shows that starch and hemicelluloses are utilized most, fats somewhat, while protein is used only by peas. The accumulation of sugar during germination is due to the fact that its utilization fails to keep pace with its formation from polysaccharides. During germination the greatest decrease in fats and glucose value is in the embryo, while in the endosperm the greatest loss is in the starch and hemicelluloses. The wt. of the whole seedling is less than that of the seeds and it contains a higher percentage of N and ash which is not used up by the growing seedling. Maize embryos, separated from the endosperm, show a decrease in fat, starch, hemicelluloses as well as in caloric content during germination, but the isolated endosperm showed only a decrease in sugar and starch content, probably due to enzymic hydrolysis. S. Morgulis

**The effect of human tissue fluids on germinating plants.** Gustav Papp. *Magyar Orvosi Arch.* 24, 455-8(1933).—Human serum or spinal fluid, whether normal or pathological, retards germination of plants. Normal human milk or colostrum is without influence, while menstrual milk retards growth. Parathyroid hormone has a beneficial effect; other hormones have none. Henry Tauber

**Concentration of inorganic ions as related to growth of excised root-tips of wheat seedlings.** Philip R. White. *Plant Physiol.* 8, 489-508(1933).—The effect upon growth of varying the concns. of Ca, K, Mg, Fe,  $NO_3^-$ ,  $SO_4^{--}$ ,  $Zn^{++}$ ,  $Cl^-$  and Na in Uspenski's standard nutrient soln. *Z. Botan.* 17, 273(1925) is described. The omission of  $NO_3^-$  and also of  $CO_3^{--}$  exerted no significant effect on growth in these two-week tests.  $Fe_2(SO_4)_3$  is a better

source of Fe than either  $Fe_2Cl_3$  or the citrate. The exptl. conditions were identical with the earlier preliminary expts. (C. A. 27, 326). Walter Thomas

**Coloring matter on the stems of the tomato.** B. H. Blount. *J. Chem. Soc.* 1933, 1528-9.—The coloring matter on the stems of the tomato (*Lycopersicon esculentum*) is rutin. C. J. West

**Influence of the [culture] medium on the baking value of wheats (Chopin) 12.**

## E—NUTRITION

PHILIP B. HAWK

**Relation of milk ingestion to calcium metabolism in children.** A. L. Daniels, M. K. Hutton, E. Knott, G. Everson and O. Wright. *Proc. Soc. Exptl. Biol. Med.* 30, 1062-3(1933).—Poorly nourished children retained more Ca, P and N during metabolism periods when 1 pint of milk and sufficient vitamin D were included in the diet, than in succeeding periods when they were better nourished and twice the amt. of milk was given. C. V. B.

**Oxidation-reduction potential of ascorbic acid (vitamin C).** Henry Borsook and Geoffrey Keighley. *Proc. Natl. Acad. Sci.* 19, 875-8(1933).—Data regarding the thermodynamically reversible reduction potentials of ascorbic acid are presented. Rachel Brown

**The effect of dicalcium phosphate, without vitamin D, in the nutrition of chicks.** Geo. M. Higgins and Charles Sheard. *Anal. Record* 56, 395-408(1933).—Dicalcium phosphate, without vitamin D, is not adequate to maintain growing chicks and will not protect them against leg weakness and other skeletal deficiencies which arise as a result of a disturbed Ca metabolism. B. C. Brunstetter

**Vitamin therapy in pulmonary tuberculosis. III. The effect of viosterol on the absorption, retention and excretion of calcium.** Paul D. Cramm, J. W. Strayer, H. L. Watson and G. Heimann. *Am. Rev. Tuberc.* 28, 202-16(1933); cf. C. A. 27, 774.—There is a direct correlation between the amt. of Ca intake and the fecal Ca output in man. During the early administration of viosterol there is a decrease in urinary and fecal Ca. Continued administration increases the urinary Ca and decreases the fecal Ca. Viosterol increases the absorption of Ca, as indicated by the elevation of serum and urinary Ca. Increased dosage of vitamin D increases the absorption and the retention of Ca in the tissue fluids to effect a state of hypercalcemia. Intravenous saline soln. is a sp. antagonist to a state of hypercalcemia effected by vitamin D. H. J. Corper

**The dietetics of apple pulp and fruit flour.** Camillo Borgnino. *Ind. sacchar. ital.* 26, 528-30(1933).—The beneficial effects of these products are discussed. L. Cusachs

**The vitamin A content of rat liver after feeding with  $\alpha$ -,  $\beta$ - and  $\gamma$ -carotene, and the antimony trichloride reaction of vitamin A preparations.** Hans Brockmann and Maria-Luise Tecklenburg. *Z. physiol. Chem.* 221, 117-28(1933).—Rats previously deprived of vitamin A were given daily doses of 1 mg. of  $\alpha$ - and  $\beta$ -carotene during a 19-day period and the liver oil was then examd. for vitamin A by the  $SbCl_3$  reaction and by its growth-promoting action. A much greater yield of vitamin A was obtained from  $\beta$ -than from  $\alpha$ -carotene. This was to be expected from the sym. structure of  $\beta$ -carotene which should enable it to form 2 mols. of vitamin A by addn. of  $2H_2O$ . The actual yield, however, was only 8%. Either the transformation is inefficient or loss of carotene occurs during absorption and transportation. On the basis of the relative protective doses of  $\beta$ -carotene and vitamin A the yield should be 20%. Both  $\alpha$ - and  $\gamma$ -carotene undergo transformation into vitamin A but the yields here are much smaller. Theoretically they should be half as great as the yield from  $\beta$ -carotene, but were actually less than half for  $\alpha$ -, and not detd. for  $\gamma$ -carotene because of scarcity of material. The biologically inert carotenoids, lutein, zeaxanthin and lycopin, did not form vitamin A. Spectroscopic study of the  $SbCl_3$  color reaction of the liver oils showed the

characteristic absorption band of vitamin A at 620 m $\mu$  in both series ( $\alpha$  and  $\beta$ ), and a transient band at 540 m $\mu$  in the  $\alpha$ -series. This difference in spectrum may indicate the existence of 2 colorless vitamins or may be due to some other substance. The rat liver oils differ from fish liver oils in that they show the 620 band before as well as after sapon. A displacement of the 620 band to 573 m $\mu$  results from oxidation and is accompanied by loss of vitamin activity. A. W. Dox

The growth action of carotenes and xanthophylls. Richard Kuhn, Hans Brockmann, A. Scheunert and M. Schieblich. *Z. physiol. Chem.* 221, 129-36(1933); cf. *C. A.* 27, 5818.— $\beta$ -Carotene, which can yield 2 mols. of vitamin A, is twice as effective in growth promotion as  $\alpha$ - and  $\gamma$ -carotenes which yield only one. If the liminal dose is defined as that quantity which, fed daily to rats deprived of vitamin A, causes a 10 g. increase in wt. in 70% of the animals in 35 days, then the liminal doses are 5, 2.5 and 5  $\gamma$ , resp., for  $\alpha$ -,  $\beta$ - and  $\gamma$ -carotene. Lutein, zeaxanthin and violaxanthin, even in 60  $\gamma$  doses, exert no growth-promoting action. Azafurin Me ester, dihydrocrocin and chlorophyll are also inert. A. W. Dox

A study of canned shrimp with reference to the presence of vitamins A, B and D. Margaret C. Moore and Hal W. Mosley. *Science* 78, 368-9(1933). Feeding tests with shrimp fat showed the presence of vitamins A and D, but B is absent or present in very small quantities. F. L. D.

Digestive mineral equilibria and their effects on the mineral composition of the rat. Lise Emerique. *Ann. physiol. physiol. chim. biol.* 9, 765-8(1933). H. Eagle

The results of a 25 month feeding experiment with low protein intake. B. Zuskind. *Arch. Verdauungskrankh.* 54, 197-225(1933). Analysis of a single case. H. E.

Vitamin A in Indian fish-liver oils. A. R. Ghosh, P. N. Chakravorty and B. C. Guha. *Indian J. Med. Research* 21, 141-6(1933). Harry Eagle

The nutritive values of Indian foodstuffs. I. A. R. Ghosh and B. C. Guha. *Indian J. Med. Research* 21, 447-50(1933). Harry Eagle

Poultry feeding experiments II. B. Hinds. *Ariz. Agr. Expt. Sta., Bull.* 143, 79-120(1933).—Dried butter-milk was the most economical protein supplement for egg production. Meat scraps also gave good results. No mortality resulted from feeding cottonseed meal. It is a mistake to feed a ration with a wide nutritive ratio if quick max. growth in young chickens is desired. The contention that the development of feathers, muscle, blood, bone, tissue, etc., calls for a narrow nutritive ratio, is correct. The efficiencies for growth promotion for nutritive ratios are: 1:3.6, 100%; 1:4.8, 88%; 1:6, 82%; 1:7.7, 72%. The rations with the narrower nutritive ratios contg. a greater proportion of concentrates are more palatable as evidenced by a greater feed consumption. C. R. F.

Biochemistry and pathology of avitaminosis. I. Hematopoietic function in deficiency disease. Barnett Sure, M. C. Kik, Dorothy J. Walker and Margaret Elizabeth Smith. *Ark. Agr. Expt. Sta., Bull.* 286, 3-39(1933).—No connection was found between avitaminosis and pernicious anemia in rats. However, in vitamin G deficiency, a dermatitis develops together with secondary anemia, and the condition is characterized by a marked reduction in the concn. of hemoglobin in the blood. No definite anemia was found in vitamin B deficiency, though a reduction in the concn. of the serum proteins does occur along with large wt. losses. In vitamin B deficiency, particularly in the last stages, there is a marked rise in both the erythrocytes and hemoglobin. The rise is accompanied by a marked loss of water from the blood produced by pronounced inanition. The avitaminosis has no sp. effect on the total leucocyte count. In polyneuritis there is a slight edema of the tissues to the extent of about 6.5%. Mothers whose young are developing uncomplicated vitamin B deficiency, because of sub-optimum amts. of vitamin B for normal lactation, show no change in the concn. of the hemoglobin, slight reduction in the concn. of erythrocytes, but a notable concn. of serum proteins. Forty-two references. C. R. Fellers

Continual cornified vaginal cells as an index of avitaminosis in rats. S. B. D. Aberle. *J. Nutrition* 6, 1-10(1933).—Continual cornified vaginal cells appeared in 100% of the rats on diets deficient in vitamin A, where the animals lived to show avitaminosis. Cornification invariably preceded other symptoms of avitaminosis; the time elapsing was positively correlated with the amt. of vitamin contained in the diet or stored in the animal. C. R. Fellers

Comparison of apricots and their carotene equivalent as sources of vitamin A. Agnes Fay Morgan and Evelyn O. Madsen. *J. Nutrition* 6, 83-93(1933).—The carotene content of fresh frozen, sulfured sun-dried, and unsulfured sun-dried apricots was detd. by pyridine and by acetone-RtO<sub>2</sub> extn. followed by colorimetric estn. The pyridine gave better yields of carotene. The loss of carotene in the dried fruit was 36-41%. The vitamin A activity was detd. biologically and was 50-75% of the original. The vitamin A activity of crude carotene, m. 162-4°, was less than that of the cryst. carotene, m. 180°, made from it. A close correlation exists between carotene content and vitamin A in apricots. C. R. Fellers

Vitamin A content of yellow-tissued and white-tissued apples. Myra T. Potter. *J. Nutrition* 6, 99-102(1933).—Essentially no differences were noted in vitamin A content of McIntosh, a white-meated variety, and Red Delicious or Golden Delicious, yellow-meated varieties. The unit for vitamin A as defd. for these varieties is approx. at the 1.5 g. level. C. R. Fellers

Fish meal versus cottonseed meal as a feed for dairy cows. L. W. Ingham. *Md. Agr. Expt. Sta., Bull.* 342, 413-22(1932).—The total digestible protein in the ration being the same, there was practically no difference in feeding value between the ration contg. cottonseed meal and the ration contg. fish meal whether compared on the basis of total milk and total butter fat, or on the basis of butter fat test. C. R. Fellers

Phosphorus deficiency in the rations of cattle. C. H. Fekkes, T. W. Gullickson and L. S. Palmer. *Minn. Agr. Expt. Sta. Tech. Bull.* 91, 5-118(1932); cf. *C. A.* 26, 3008.—Serious P deficiencies exist in Minn. and in many other parts of the West. Induced exptl. aphosphorosis in cattle is identical with the naturally occurring condition. Low P content in feeds, particularly roughages, produces aphosphorosis which varies in severity in proportion to the P deficiency. A copious milk flow in lactating cows may seriously deplete the body store of P. All stages of aphosphorosis in cattle were produced experimentally. The concn. of inorg. P in the blood plasma in cattle suffering from P deficiency is an important index of the severity of the disease. Blood compn. may thus be employed in the rapid field diagnosis of aphosphorosis. The daily fluctuations of P concn. in the blood plasma of cattle are relatively large. Though inorg. forms of P showed slight superiority over org. sources in curing aphosphorosis in cattle, little difference was noted among various sources of P. The addn. of P to the rations of cattle suffering from aphosphorosis brings about an immediate stimulation of the appetite and a more efficient utilization of the food consumed; in mature animals, milk production increased 50-146%. The presence of MgSO<sub>4</sub> in the drinking water had little or no significant effect in producing P deficiency. P deficiency reduces the ash content of the bones and increases the lipide content. An abnormally low Ca:(PO<sub>4</sub>)<sub>2</sub>:CaCO<sub>3</sub> ratio, similar to a rachitic condition, in the fat-free and moisture-free bones was characteristic of P deficiency. Analytical methods and complete data are given. Fifty-one references. C. R. Fellers

Effect of storage and canning upon the vitamin content of carrots. Dorothy D. Lafigley, Jessie E. Richardson and Erlene J. Andes. *Mont. Agr. Expt. Sta., Bull.* 276, 3-32(1933).—Carrots are an excellent source of vitamin A, a good source of vitamin B<sub>1</sub>, and a fair source of vitamin C. Winter storage of carrots for 4 months in either cool, damp or warm, dry cellars has no deteriorating effect on vitamins A, B<sub>1</sub> and C. However, there appears to be a slight increase in the vitamin C potency during storage.

When carrots are cooked in the fall, there is a noticeable loss in vitamins A and B<sub>1</sub> but none in vitamin C. When carrots are cooked, after being stored for 4 months in either cool, damp or warm, dry cellars, the loss in vitamin B<sub>1</sub> is the same as in the cooked carrot in the fall; vitamin C shows some loss; while with vitamin A, its potency appears to be slightly greater than in the raw carrot. When carrots are canned in the fall by either the pressure cooker or oven method and are tested at once for their vitamin content, there seems to be no loss in vitamin A, slight evidence of loss in vitamin B<sub>1</sub>, but a decided loss in vitamin C. When canned carrots are kept for a period of 6 months a noticeable loss occurred in vitamin A, a decided loss in vitamin B<sub>1</sub>, and vitamin C reduced to about one-third of its initial potency. Storage is a better method of preserving the vitamin content of carrots than canning.

C. R. Fellers

**Nutritional requirements of the chick.** Albert G. Hugan and Robert V. Boucher. *Mo. Agr. Expt. Sta., Research Bull.* 198, 3-24(1933).—Simplified diets adequate for rats are grossly inadequate for young chicks. A synthetic diet contg. the usual percentage of yeast proved inadequate, and was improved only by the addn. of more yeast. The addn. of vitamins A and D had no effect. Various sol. supplements were examd. in an attempt to discover the factor in which yeast is deficient. The B<sub>12</sub>O ext. of egg yolk, tiki tiki ext., acid-hydrolyzed yeast and liver ext. contain the factor in varying amts. However, 10% of liver ext. was required in the ration to render the latter adequate for chicks. It is believed that each of the vitamin carriers contains an essential factor which is not present in the others in large amts. A successful ration was formulated which contains all the vitamins in sol. form. The carriers are acid-hydrolyzed yeast, the B<sub>12</sub>O ext. of egg yolk, a liver ext., and tiki tiki. This ration was adequate for 1, and probably for 2, generations.

C. R. Fellers

**Factors influencing the vitamin B and vitamin G contents of hays.** Charles H. Hunt, P. R. Record, W. Wilder and K. M. Bethke. *Ohio Agr. Expt. Sta., Bimonthly Bull.* 18, 104 6(1933).—As the hays mature, the protein and vitamin G contents decrease and the quality becomes poorer. A high protein content and a good green color are correlated with a high vitamin G content, provided all other factors are the same during curing. Rain removes more vitamin G and color than protein. Colorado alfalfa meals did not have a higher protein or vitamin G content than Ohio products.

C. R. Fellers

**Should the mineralization and vitaminization of milk become general?** W. E. Krauss. *Ohio Agr. Expt. Sta., Bimonthly Bull.* 18, 126 9(1933).—The question is answered in the negative, though the desirability of adding vitamin D to milk to help lower the present high incidence of rickets in children is granted.

C. R. Fellers

**Sorghum silage as a source of vitamin A for dairy cows.** C. C. Copeland and G. S. Fraps. *Tex. Agr. Expt. Sta., Bull.* 473, 12 pp.(1932).—Butter fat from a cow fed only cottonseed meal and hulls for a long period contained only 2.5 units of vitamin A per g. Cows restricted to cottonseed meal and hulls became ill and suffered from night blindness. The disease was cured by adding either fresh green grass or cod-liver oil to the ration, showing the animals were suffering from vitamin A deficiency. When sorghum silage was fed in large quantity there was scarcely sufficient vitamin A to maintain health or to produce butter fat of normal vitamin A potency. Cows receiving pasture in addn. to cottonseed meal, hulls and sorghum silage gave milk 9 times as rich in vitamin A as cows not receiving pasture. An est. that the cow received 106,000 units a day of vitamin A but produced only 1900 units a day indicates that the dairy cow has a high requirement for vitamin A, either on account of destruction during the process of digestion or high maintenance requirements during lactation, or both.

C. R. Fellers

**Studies on the nutritive value of oysters.** E. J. Coulson. U. S. Dept. Commerce, Bur. Fisheries, *Investigational Rept.* 17, 30 pp.(1933); cf. *C. A.* 27, 123.—Hemato-

poiesis progressed at the same rate when the rats were fed either dried oysters, an acid soln. of oyster ash, or a soln. contg. only Fe, Cu and Mn. The inorg. elements present in the oyster are responsible for its antianemic potency. The effectiveness of the oyster in nutritional anemia can be accounted for on the basis of its Fe, Cu and Mn contents and these metals are in a form easily available for blood-building purposes. The oyster is equaled or exceeded only by liver in the amts. of Fe and Cu that it furnishes to the diet in an av. serving. These metals in the oyster are readily used by animals for hemoglobin production. The antianemic potency of oysters is correlated with their Fe content. Green oysters are not better sources of Fe. The Fe and Cu contents of oysters are correlated with the Fe and Cu contents of the food they consume.

C. R. Fellers

**Distinctive characters of the specific minimum nitrogen excretion and exogenous protein metabolism.** Emile F. Terroine and Germain Boy. *Compt. rend.* 197, 702-4 (1933).—Comparative data on the partition of N in the various compds. in the urine are given for the pig, rabbit and rat on protein and non-protein diets.

L. E. G.

**Inactivity of "nuoc-mam" in experimental beriberi.** H. Violle and E. R. Rosé. *Compt. rend. soc. biol.* 114, 255-7(1933).—Nuoc-mam, a hydrolyzed protein product used as a food in the Orient, had no effect on exptl. polyneuritis in pigeons.

L. E. Gilson

**Determination of the vitamin C value of ascorbic acid.** Kathleen Mary Key and Barbara Gwyneth Emily Morgan. *Biochem. J.* 27, 1030-5(1933).—On the assumption that lemon juice contains a const. amt. of vitamin C (and there is no conclusive evidence that it has) the ascorbic acid appears to have about 1/2 the antiscorbutic potency of most of the samples examd. by other workers.

Benjamin Harrow

**The potentials of ascorbic acid.** David F. Green. *Biochem. J.* 27, 1044-8(1933).—The potentials of ascorbic acid, like those of glutathione, do not depend upon the concn. of oxidant. Addn. of oxidant to a soln. of reductant is without effect on the final potential. However, the potentials of glutathione, unlike those of ascorbic acid, depend upon the abs. concn. of reductant. The colorimetric measure of glutathione potentials is more pos. than the potentiometric measure. The reverse is true for ascorbic acid. Between  $pH$  3 and 8, the empirical equation,  $E_A = +0.375 - 0.000 pH$ , holds for ascorbic acid. G. has confirmed the presence of ascorbic acid in lemon juice by potentiometric measurements.

B. Harrow

**Influence of fat-soluble vitamin upon the amounts of cholesterol bodies in the bile in rabbits.** Senji Kusaka. *Japan. J. Gastroenterol.* 5, 31-5(1933); cf. *C. A.* 27, 1384.—From very limited data Kusaka claims the liver excretes the excess cholesterol from the blood of rabbits.

C. M. McCay

**Protein and vitamin B. I. Vitamin B and the alimentary equilibrium in the utilization of proteins in the organism.** Raoul Leroq. *Bull. sci. pharmacol.* 40, 470-8(1933); cf. *C. A.* 27, 2714.—Diets high in carbohydrates accelerate the appearance of symptoms of B deficiency, whereas lipoids delay it. Polyneuritis appears still later, when proteins are given, which are as rapidly assimilated as sugar (peptones). The addn. of yeast and peptone and absence of sugars cure the avitaminosis; however, this is permanent only if a strict alimentary equil. is obtained. Avitaminosis developed with a large supply of peptone is relieved when the latter is substituted by non-peptonized protein. II. The development of avitaminosis B in the pigeon in relation to the digestibility and nature of the proteins in the diet. *Ibid.* 527-31.—Fibrin, muscle protein and egg albumin have been investigated, both in natural and peptonized form. A definite influence on the development of avitaminosis B has been observed. The quantity of B required for the utilization of the proteins is in relation to the rapidity of intestinal absorption and the structure of the protein. The natural proteins have a vitamin-B-saving action, but not the peptones.

A. E. Meyer

**Carotene and vitamin A.** Luis N. Pizzorno. *Rev.*

farm. (Buenos Aires) 75, 281-93(1933).—A review.

A. E. Meyer

**Fundamental food requirements for the growth of the rat. VII. An experimental study of inheritance as a factor influencing food utilization in the rat.** H. P. Morris, L. S. Palmer and Cornelia Kennedy. *Minn. Agr. Expt. Sta. Tech. Bull.* 92, 56 pp.(1933); cf. *C. A.* 25, 2408.—Two lines of inbred rats, descendants of a single pair of animals, were selected for different levels of efficiency of food utilization; diet and environment were kept const. through 9 generations. At that point the lower efficiency line was more variable and about 40% less efficient than the high efficiency line. Complex heritable factors influence efficiency of food utilization. The female rat consumes more dry matter per unit of gain per unit of body wt. than does the male. The efficiency quotient (cf. Palmer and Kennedy, *C. A.* 25, 2408) of the female was 1.7 times that of the male. The female carcass was higher in dry matter, fat and ash, and lower in N and fat-free dry matter than the male. No significant relationship was found between length of intestine and amt. of dry matter consumed. The correlation coeff. between gain and dry matter consumed was  $+0.68 \pm 0.03$ , and  $+0.64 \pm 0.03$  for males and females, resp. The efficiency quotients of the males were higher and less variable than the females in 2 three-week periods. Conclusion: The male rat is more desirable than the female for use in growth studies, and selection and in breeding may be useful in securing a more uniform lab. animal.

II. P. Morris

**Comparative study of the paired and ad libitum feeding methods for determining amino acid deficiencies of feeds.** C. L. Shewsbury and J. W. Bratzler. *J. Assoc. Official Agr. Chem.* 16, 582-4(1933).—Data culcd. statistically according to the method of Student (*Biometrika* 6, 1 (1908)), from nutrition expts. with rats in which the paired and ad libitum feeding methods were employed, indicate that the paired feeding method, in which feed consumption was equalized, gives the more trustworthy results.

A. Papineau-Couture

**Experimental scurvy. XVI. Purine metabolism of guinea pigs fed on a vitamin C free diet.** Kozo Tomita. *Sei-i-kwai Med. J.* 51, No. 7, 1-12(1932) (English Abstract 1).—The animals were fed Sherman's vitamin-C-free diet plus raw white radish for 6 days, the urine from each 2 days being analyzed for total N,  $\text{NH}_3$  N, urea N, uric acid, allantoin and purine bases. From the 7th day on, raw radish was replaced by boiled, and a similar urinary analysis made. The results show that total N, purine bases, including uric acid and allantoin, gradually decrease in the course of scurvy, but increase at the terminal state, except uric acid. Urea runs parallel with total N, but  $\text{NH}_3$  increases with the progress of the disease. The uricolytic index and the purine base coeff. are gradually decreased, but return to normal at the end. Since changes of purine metabolism in scurvy are similar to those in the case of inanition, these results may not necessarily indicate specific metabolism in scurvy. S. T.

The vitamin contents of potato residues (Scheuvert, Schieblich) 16.

Rose, Mary Swartz: *The Foundations of Nutrition*. Revised ed. New York: Macmillan Co. 630 pp. \$3.00.

## F--PHYSIOLOGY

HOMER W. SMITH

**Heat of combustion of ethyl alcohol in homeothermal animals.** Eliane Le Breton and Georges Schaeffer. *Compt. rend.* 197, 1066-8(1933).—Contrary to the findings of Terroine and Bonnet (*C. A.* 24, 3537) oxidation of EtOH produces no extra heat under basal metabolic conditions.

M. L. C. Bernheim

**Choline in the human uterus when non-pregnant, during pregnancy, during labor and in puerperal fever.** (The relation between choline content of the uterus and uterine contraction.) L. Cattaneo. *Atti Accad. Lincei* 17, 968-73 (1933); cf. *C. A.* 27, 5800.—Four subjects each studied

1 out of pregnancy, during pregnancy, labor, and in puerperal fever failed to show presence of choline.

A. W. Contieri

**The demonstration of an acetylcholine-like substance in the skin.** Kl. Gollwitzer-Meier and A. Bingel. *Arch. exptl. Path. Pharmacol.* 173, 173-9(1933).

H. E.

**Thermal regulation and internal secretion.** E. Geiger. *Klin. Wochschr.* 12, 1313-17(1933).—A review. H. E.

**The so-called glucolysis of blood and its clinical significance.** Wilfried Loewenstein and Georg Botstiber. *Klin. Wochschr.* 12, 1402-4(1933).

Harry Eagle

**The excretion of the gonadotropic hormone of the anterior pituitary lobe in functional ovarian disorders.** C. Kaufmann and Otto Muhlbock. *Klin. Wochschr.* 12, 1480-3(1933).

Harry Eagle

**The structure of the erythrocytes. A preliminary report.** Karl Glaser. *Klin. Wochschr.* 12, 1494-5(1933).

Harry Eagle

**The role of the liver in cholesterol and phosphatide metabolism.** H. Heinlein. *Klin. Wochschr.* 12, 1513-17(1933).—A review and preliminary report. H. E.

**The treatment of amenorrhea with large doses of ovarian hormones.** C. Kaufmann. *Klin. Wochschr.* 12, 1557-62(1933).

Harry Eagle

**The iodine-combining power of the blood in normal and pathological conditions.** K. Hinsberg and G. Holland. *Klin. Wochschr.* 12, 1601-2(1933).—A preliminary report.

Harry Eagle

**The metabolic effects of the anterior pituitary thyrotropic substance.** H. Eitel, G. Lohr and A. Lösser. *Klin. Wochschr.* 12, 1770-7(1933).—A preliminary report.

Harry Eagle

**The colloid-osmotic pressure of the blood in normal and pathological conditions. VIII. The colloid-osmotic pressure of the blood in hunger.** Juzo Hatafuku and Fusakichi Nakazawa. *Tôhoku J. Exptl. Med.* 21, 226-37(1933); cf. *C. A.* 27, 1394.—Withdrawal of food and water from dogs causes an increased blood protein, but the colloid-osmotic pressure per unit protein at first decreases, and then increases markedly. In hyperthyroid dogs the blood protein decreases, and the colloid-osmotic pressure per unit protein decreases. Hunger in such animals causes an immediate and pronounced increase in both factors.

Harry Eagle

**Variations in the sugar content of the skin and blood under various conditions.** Susumu Tsukada. *Tôhoku J. Exptl. Med.* 21, 347-410(1933).

Harry Eagle

**Chemical composition of sweat collected in the hot room of the Roman baths at Plombières-les-Bains.** M. Chatron. *Bull. soc. chim. biol.* 15, 1107-12(1933). Analyses of fresh samples of sweat collected from several normal persons after 5-15 min. in the hot room are given. Considerable individual differences in compn. are noticeable. Twenty references.

L. E. Gilson

**Changes in blood sugar and lactic acid during perfusion of the spleen.** Noël Fiessinger, Henri Bénard, R. Cattin and M. Herbain. *Compt. rend. soc. biol.* 114, 479-81(1933).—When dog spleen was perfused with defibrinated dog blood the blood glucose was greatly decreased and the blood lactic acid was increased, but not in proportion to the decrease in glucose. Attempts to show the presence of a hypoglycemic hormone in the perfused blood failed. Perfusion with oxalated blood gave uncertain results.

L. E. Gilson

**Formation of bilirubin during perfusion of the spleen.** Noël Fiessinger, Henri Bénard, A. Gajdos and L. Derrmer. *Compt. rend. soc. biol.* 114, 481-3(1933).—When dog spleens were perfused with defibrinated dog blood a little bilirubin was formed. When citrated or oxalated blood was used no formation of bilirubin could be detected.

L. E. Gilson

**The proteins and peptides in the plasma after perfusion of a dog spleen.** Noël Fiessinger, S. Gothié and René Lançon. *Compt. rend. soc. biol.* 114, 617-19(1933).—When a dog spleen was perfused with citrated or defibrinated dog blood the polypeptide content of the plasma was increased at the expense of the proteins.

L. E. Gilson



**Action of folliculin on the hypophysis.** Z. Bialek-Lapinska. *Compt. rend. soc. biol.* 114, 727-8(1933).—In female rats folliculin inhibits the increase in the sexual exciting action of the hypophysis which usually follows castration. **Action of folliculin on the thyroid.** *Ibid.* 733-5. **Histological. Action of folliculin on ovarian grafts.** *Ibid.* 735-7.

**Action of extract of the anterior hypophysis on the adrenals.** B. A. Houssay, A. Biasotti, P. Mazzocco and R. Sammartino. *Compt. rend. soc. biol.* 114, 737-9(1933).

**The nonprotein sulfur of the blood and its relation to the adrenals.** R. H. de Meis. *Compt. rend. soc. biol.* 114, 807-9(1933); cf. *C. A.* 28, 499.—In dogs the non-protein S of the blood increases after adrenalectomy but the increase is parallel to that of the non-protein N; hence it is probably the result of renal insufficiency and blood concn.

**Elementary composition and caloric value of the fatty acids of the phospholipins of human skeletal muscle.** David P. Cuthbertson. *Biochem. J.* 27, 1099-1102(1933).—The av. values given in percentage were C 76.03, H 11.98, O 11.99. The R. Q. was 0.709; the calorific value was 9.521 per g. at const. pressure; and the caloric equiv. of 1 l. of O at const. pressure was 4.75 cal. The av. I value was 111.

**The degree of unsaturation of the fats of human adipose tissue in relation to depth from skin surface.** David P. Cuthbertson and Sidney L. Tompsett. *Biochem. J.* 27, 1103-6(1933).—The av. I values of the fats of the panniculus adiposus abdominalis, omental, perinephric, epicardial and liver tissues of normal men are 70, 63.5, 63, 61.5 and 127, resp. In obese women the av. I values for the fats of the outer and inner layers of the panniculus adiposus abdominalis, the omentum, the perinephric and liver fats are 70, 70, 69, 63 and 89, resp.

**Inorganic constituents of cerebrospinal fluid IV. The potassium in serum, serum-ultrafiltrate and cerebrospinal fluid.** Elsie Watchorn and Robert A. McCance. *Biochem. J.* 27, 1107-12(1933); cf. *C. A.* 26, 3558.—The whole of the K of serum is found to be ultrafiltrable and the level of K found in hydrocele, pleural and ascitic fluids may be explained in this way. The K in cerebrospinal fluid is lower than that in serum.

**A comparison of the clearances of creatinine and of various sugars.** H. L. White and Betty Monaghan. *Am. J. Physiol.* 106, 16-27(1933).—In unanesthetized dogs without phlorhizin the clearance of xylose is less than that of sucrose, which is less than that of creatinine. The effect of phlorhizin on the rates of excretion is best interpreted as an action on glomerular circulation and on tubular reabsorption of xylose rather than as an effect on tubular secretion of creatinine. The clearance, either of glucose under phlorhizin, or of creatinine represents a better measure of glomerular filtration than does either sucrose or xylose, which give figures 15 to 45% too low.

**Surface area in a monkey, *Macacus rhesus*.** M. O. Liss and P. L. Liss. *Am. J. Physiol.* 106, 91-4(1933).—Measured skin areas of 6 monkeys conform to the formula  $S = 11.7 W^{.667}$ , in which S = surface in sq. cm. and W = wt. in g.

**Absorption of water by fatigued or otherwise impaired skeletal muscle cells in relation to heat rigor.** G. D. Shaver. *Am. J. Physiol.* 106, 115-24(1933).—Fatigued skeletal muscle cells have an increased osmotic pressure; they take up water from their tissue fluids and go into heat rigor at a lower temp. than do normal non-fatigued muscles.

**The excretion of cesium by the albino mouse.** C. F. Graham and A. W. Wright. *Am. J. Physiol.* 106, 314-17(1933).—In the 24-hr. period following the subcutaneous injection of 0.026 mg. CsCl, albino mice excrete 17.5-20% of the Cs, and in the second 24-hr. period a further 3% is excreted. The urine contains 84-85% of the excreted Cs and the feces 15-16%.

**Lactic acid formation in medullated nerve.** F. O.

Schmitt and C. F. Cori. *Am. J. Physiol.* 106, 339-49(1933).—Frog nerve, freshly removed or kept in air, contains about 33 mg. of lactic acid per 100 g. tissue. In H or in a mixt. of CO and O, 94:6, the nerve forms lactic acid at a rate of about 20 mg. per 100 g. per hr. Lactic acid which has accumulated in H or CO may be partially removed upon readmission of O. Stimulation of the nerve in CO:O mixt. results in the formation of no excess lactic acid as compared with the unstimulated control.

**Blood lactic acid in man during rest.** L. C. Cook and R. H. Hurst. *J. Physiol.* 79, 443-54(1933).—Wide variations in blood lactic acid at rest were observed. These variations are due to stimulation or depression of glycolytic activity and assist the organism to maintain a const. blood reaction.

**Adrenaline in the suprarenal medulla.** H. Schild. *J. Physiol.* 79, 455-69(1933).—The existence of adrenaline in the adrenal gland as a complex, novadrenine, of enhanced activity, is not confirmed.

**The respiratory quotient of the eviscerate cat.** J. M. Peterson. *J. Physiol.* 79, 508-18(1933).—In the decerebrate-eviscerate cat, the loss of CO<sub>2</sub> from the blood and the accumulation of lactate therein are stoichiometric. High respiratory quotients, obtained with such animals, are elevated above the true value by the CO<sub>2</sub> displaced from the tissues.

**Physicochemical theory of growth.** Ludwig v. Bertalanffy. *Biol. Zentr.* 53, 639-45(1933).

**Problem of the terminology of vitamins.** Joachim Kuhnau. *Z. Vitaminforschung* 1, 184(1932); *Bull. soc. chim. hyp. aliment.* 21, 294. —A review.

## G - PATHOLOGY

H. GIDRON WELLS

**Effect of irradiating nongoitrogenic cabbage.** J. J. Westra and Viola Hunter. *Proc. Soc. Exptl. Biol. Med.* 30, 1157-8(1933).—Finely hashed nongoitrogenic cabbage was exposed in thin layers 50 cm. from a Cooper-Hewitt Hg vapor lamp for 30-120 min.; rabbits fed exclusively on this cabbage for 12 weeks did not develop goiter.

**Lipolytic activity of rat lepromas during treatment with various antileprotics.** George Emerson, H. H. Anderson and C. D. Leake. *Proc. Soc. Exptl. Biol. Med.* 31, 18-20(1933).—The low lipase content of rat lepromas and of other tissues of infected rats (cf. *C. A.* 27, 4293) is probably due to the invasion of normal tissue by great nos. of *Mycobacterium leprae muris*, organisms which seem to be devoid of lipase. The lipolytic activity of lepromas was unchanged after treatment for 6 months with each of the following antileprotic drugs: ethyl chaulmoograte, "alepol," ethyl diheptylacetate, Na dihydrochaulmoogryl-p-phenetidine-sulfonate and Na chaulmoogryl-p-phenetidine-sulfonate.

**The chemical nature of the toxin in intoxications due to protein decomposition.** H. Lieb and E. Schadendorff. *Arch. exptl. Path. Pharmacol.* 172, 343-58(1933).

**Carbohydrate metabolism in Addison's disease.** O. Porges and D. Adlersberg. *Arch. exptl. Path. Pharmacol.* 172, 433-43(1933).—The blood-sugar level in most cases of Addison's disease is at the lower limits of normal. The hypoglycemic phase of the alimentary hyperglucemia was accentuated in 1 case. A carbohydrate-poor diet causes hypoglycemia in these patients. Cortical adrenal hormone causes the carbohydrate metabolism to return toward normal.

**Conductivity measurements upon normal and pathological serums.** Felix Steiger-Waldt and Bruno Reiser. *Arch. exptl. Path. Pharmacol.* 173, 15-25(1933).—The sp. cond. of normal serum is 0.0146-0.0155, largely detd. by the NaCl concn. The serum of carcinomatous patients shows a decreased cond. in 75% of the cases. The effect of various factors upon the sp. cond. of serum is discussed.

Harry Eagle

**The chlorine metabolism in Basedow's disease.** Franz Heermann. *Arch Verdauungskrankh* 54, 176-82(1933) — In severe Basedow's disease there occurs achylia, which does not disappear upon the administration of histamine. The Cl concn of the gastric contents is low, and varies irregularly after the administration of a test drink or of histamine. The blood Cl never rises after the test drink or histamine, but occasionally falls to very low values.

Harry Eagle

**The diagnostic value of serum protein changes in kala-azar.** M. R. Guruswami Mudaliyar, S. K. Sundaram and A. S. Ramachandran. *Indian J Med Research* 21, 361-78(1933) — In kala-azar the serum globulin increases, the albumin decreases and the proportion of euglobulin to total globulin increases. The ratio of serum protein and the albumin/globulin ratio is of value but is not absolutely diagnostic, as similar changes are observed in other diseases.

Harry Eagle

**Studies on the antigenic structure of vibrio cholerae.** III. Further analyses of specific carbohydrates. Richard W. Linton and D. L. Shrivastava. *Indian J Med Research* 21, 349-84(1933). cf. *C A* 27, 5400. — Of the carbohydrates prep'd from the 10 strains of vibrios so far exam'd, 5 yielded galactose upon hydrolysis and 5 yielded arabinose. It is significant that with only 2 exceptions, the vibrios derived from cases of cholera yielded galactose, and the strains obtained from water yielded arabinose. IV. A preliminary examination of carbohydrates in the rice water stools of cholera patients. Richard W. Linton, D. L. Shrivastava and B. N. Mitra. *Ibid* 385-8. Polysaccharides were isolated which upon hydrolysis yielded reducing sugars tentatively identified as galactose and arabinose.

Harry Eagle

**Disturbances in the lipid metabolism in hereditary diseases of the central nervous system.** W. Spulmeyer. *Klin Wochschr* 12, 1273-6(1933). A review. H. I.

**The adsorption, elution and adsorptive separation of haptens.** Hermann Rudy. *Klin Wochschr* 12, 1273-4(1933). — A review. Harry Eagle

**The serodiagnosis of tuberculosis.** Adolf Beck and Otto Schiedtler. *Klin Wochschr* 12, 1280-2(1933). Seventy % of cases of pulmonary tuberculosis and 5% of extrapulmonary tuberculo- give pos complement fixation tests with the Witbsky-Klingenstein-Kuhn antigen, 45% of non-tuberculous controls also reacting pos. The pptn test of Ichimann-Lam-Feschke is more sensitive but gives 11% false pos reactions.

Harry Eagle

**Iodine metabolism in thyroid disease.** I. Schefter. *Klin Wochschr* 12, 1285-6(1933). — A preliminary report. In Basedow's disease the excretion of I daily exceeds the intake, while normally they are in approx balance. In simple goiter, the normal excretion of I in the urine and skin is reduced, while the fecal excretion is somewhat increased. Whether the I is actually retained in the body in such cases or is excreted in the expired air is as yet unknown.

Harry Eagle

**A new substrate for a blood test for syphilis.** Hans J. Fuchs, M. v. Lilkenhausen and H. Kowatzky. *Klin Wochschr* 12, 1288(1933). A preliminary report.

Harry Eagle

**The blood-sugar level in experimental hypertension.** Erwin Netter. *Klin Wochschr* 12, 1317-18(1933). — Removal of the nerves from the aortic and carotid sinus in dogs and rabbits causes a lasting hypertension. The blood sugar in these animals is not increased, and they show normal endogenous adrenaline hyperglucemia upon the injection of morphine. The hypertension is, therefore, not due to an increased secretion of adrenaline.

Harry Eagle

**The pathogenesis of hypertension.** H. Marx and K. Hefke. *Klin Wochschr* 12, 1318-22(1933). — Autx of the blood of patients with acute nephritis and secondarily contracted kidneys have a pressor effect when injected intravenously into dogs. There is no parallelism between the efficacy of the ext and the degree of hypertension. Similar exts from patients with essential hypertension were ineffective.

Harry Eagle

**The production of specific tumor antibodies after the injection of serum containing tumor antigen.** Hans J. Fuchs and Hugon Kowatzky. *Klin Wochschr* 12, 1334-5(1933). — A preliminary report. Harry Eagle

**Hepatic insufficiency and amino acid metabolism.** K. Hirsch and Ch. Suveret. *Klin Wochschr* 12, 1357-8(1933). In hepatic insufficiency, the intravenous injection of 1 g glycine is not followed by an increase in the urine urea content, the rise in the blood amino N persists for more than 2 hrs instead of 20 min, and the bound amino N in the blood initially high, falls over a period of hrs instead of increasing as in normal subjects.

Harry Eagle

**The alkali reserve of the blood and local acidosis in bone tuberculosis.** B. Koldayev and M. Akhuker. *Klin Wochschr* 12, 1375(1933). In cases of bone tuberculosis without secondary infection, the alkali reserve of the blood is high and the  $pH$  of the exudate does not differ from that of normal tissue fluid. In cases with mixed infection, the local exudate is distinctly acid ( $pH$  as low as 7.8) and the alkali reserve of the blood is correspondingly low.

Harry Eagle

**The significance of the posterior pituitary lobe for the appearance of eclampsia.** H. Ohligsmacher. *Klin Wochschr* 12, 1401-5(1933).

Harry Eagle

**Complement fixing antibodies in human organs.** Alexandra Stöhl and Alfred Waisitzky. *Klin Wochschr* 12, 1433-4(1933). — In children dying of diphtheria at various intervals after the therapeutic administration of horse antitoxin complement fixing antibodies against horse serum were most often demonstrated, and in the highest amt in the spleen and thymus. The liver contained less antibody and the skin least of the 4.

H. L.

**The pathogenesis of the experimental acute and erosive gastritis caused by the parenteral administration of various pharmaceutical agents (morphine, pilocarpine, caffeine).** Ilan Hanke. *Klin Wochschr* 12, 1524-6(1933). — The subcutaneous injection of large quantities of morphine, caffeine and pilocarpine into rats causes the appearance of erosive lesions in the stomach duodenum and esophagus which seem peptic in origin and are ascribed to the sudden liberation of very acid gastric juice.

Harry Eagle

**Post splenectomy polycythemia in hemolytic jaundice.** M. Netousck. *Klin Wochschr* 12, 1529-31(1933). A case report.

Harry Eagle

**The significance of the examination of the gastric contents for the diagnosis of duodenal ulcer.** Reply to Heinz Kalk. G. C. Loria. *Klin Wochschr* 12, 1531(1933). cf. *C A* 27, 5100.

Harry Eagle

**The effect of a high protein diet in nephrosis.** G. C. Meyer and St. Weber. *Klin Wochschr* 12, 1566-9(1933). A high protein diet (180 g animal protein daily) given to patient with nephrosis over a period of 4 to 10 days does not affect the low serum albumin, but does increase the daily urinary excretion of protein by 40 to 100%. Diuresis increased, and body wt therefore falls.

Harry Eagle

**The effect of cephalin and heparin upon the formation of antibodies.** K. Pickar. *Klin Wochschr* 12, 1674-8(1933).

Harry Eagle

**The appearance of an estrogenous substance in the blood and tissues under pathological conditions.** VI. Comparison of the estrogenous substances demonstrable in the blood and organs. F. Silberstein, P. Ingel and K. Mohr. *Klin Wochschr* 12, 1693-4(1933). cf. *C A* 26, 2745-2748. The estrogenous substance sol in 10% NaOH and acetone which appears in the blood of male dogs after ka irradiation is more conc'd in the blood than it is in the liver, lungs, kidney, adrenals or heart. VII. The destruction of menformone in the blood and organs. *Ibid* 1691-5. Blood or an emulsion of liver tissue from male dogs renders relatively large quantities of menformone inactive.

Harry Eagle

**The lactic acid metabolism in disturbed thyroid function.** I. Variations of the blood lactic acid level after injections of lactate. Katsutaka Kato. *Tôhoku J Exptl Med* 21, 24-30(1933). — The oxidation and re-synthesis of Na lactate injected intravenously are

disturbed in hyperthyroid and thyroidectomized rabbits, and in cases of Basedow's disease. II. Lactic acid and gas metabolism during muscular work. *Ibid.* 257-79.—The increase in the blood lactic acid level and O consumption caused by muscular contraction is more pronounced in hyperthyroid rabbits than in normal animals. Resynthesis of lactic acid is delayed, and the O debt incurred by exercise correspondingly greater. The R. Q. is decreased in these animals by exercise. In thyroidectomized animals the effect of exercise upon the blood lactic acid level, O consumption and CO<sub>2</sub> output is not significantly abnormal. III. The lactic acid metabolism in the liver after the injection of lactate. *Ibid.* 280-97.—The lactic acid content of arterial, portal and venous (hepatic vein) blood normally decreases in the order named, indicating that it is resynthesized to glycogen during its passage through the liver. The intravenous injection of Na lactate causes all 3 values to increase without affecting their relative magnitude. In hyperthyroid rabbits the order is reversed (venous > portal > arterial) and the injection of lactate again does not affect their relative magnitude, evidence that glycogen is being mobilized more rapidly than it is resynthesized. Thyroidectomized animals behave like normal rabbits except for a particularly large increase in the lactic acid content of the hepatic vein after the injection of the lactate, because of its slow resynthesis in the liver. Harry Eagle

**Organ-specificity.** Tetsurō Ishikawa and Hiroyuki Yamamoto. *Tōhoku J. Exptl. Med.* 21, 524-31 (1933).—As detd. by pptn. tests, with rabbit antiserum vs. cross red cell nuclei as antibody, the lens, vitreous humor and cornea of fish, the lens and vitreous humor of fowl and the naked nuclei of fowl red cells contain a common antigenic factor. The nuclei of the hepatic cells, freed of protoplasm by peptic digestion, are organ-specific; that is, upon injection into rabbits an antibody is formed which reacts specifically with similar nuclei of dog, rabbit or fowl liver cells, but not with the intact cells of any of these species. Harry Eagle

**The organic-specificity of a hemoglobin-precipitating antiserum.** Kahoru Yorimitsu. *Tōhoku J. Exptl. Med.* 22, 1-6 (1933).—Exts. of rabbit or guinea-pig leucocytes, or exts. of rabbit testicle carefully freed of hemoglobin and injected intravenously into rabbits, guinea pigs or ducks, cause the appearance of pptg. antibodies reacting with aq. exts. of the homologous red cell. Harry Eagle

**The peculiarity of thyroid extracts in cases of Basedow's disease with respect to the increase in oxygen consumption.** I. The increased oxygen consumption in rabbits following the injection of thyroid extracts from cases of Basedow's disease, [commercial] thyroid preparations and extracts of normal glands. Kenji Saito. *Tōhoku J. Exptl. Med.* 22, 85-104 (1933).—The subcutaneous injection of 1/2 0.3 mg. thyroxine into rabbits causes a 20% increase in the rate of O consumption in 8-24 hrs. The injection of "Thyreoglandol" and of aq. or EtOH beef thyroid exts. had similar but less pronounced effects. Exts. of the goiter of patients with Basedow's disease were less active than normal exts. but much more toxic, causing loss of appetite, diarrhea, loss in weight, restlessness, etc. There seemed to be some parallelism between the increased basal metabolism in the patient and the increased O consumption caused by exts. of the gland in rabbits. II. Variations in the oxygen consumption of rabbits after the injection of splenic extracts, spleen preparations and solutions of potassium iodide. *Ibid.* 105-15 (1933).—All cause a decreased rate of O consumption. Large doses of KI (70-100 mg./kg.) cause a slight increase, while even larger doses are toxic. Harry Eagle

**Serum proteins in pulmonary tuberculosis.** Iwao Sato. *Tōhoku J. Exptl. Med.* 22, 116-25 (1933).—The globulin-albumin ratio increases in pulmonary tuberculosis in proportion to the extent and severity of the inflammatory process. There is no quant. correlation between this ratio and either the sedimentation rate of the red blood cells or the complement-fixation reaction. Harry Eagle

**The carbohydrate metabolism in pulmonary tuberculosis.** Seisuke Shimizu. *Tōhoku J. Exptl. Med.* 22, 132-48 (1933). Harry Eagle

**Studies on the colloid-osmotic pressure of the blood in normal and pathological conditions.** VIII. The colloid-osmotic pressure in experimental ileus. Jiro Izumi. *Tōhoku J. Exptl. Med.* 22, 149-58 (1933).—In exptl. ileus in rabbits, produced by artificial closure of the pylorus, ileum, duodenum or rectum, the serum protein concn. increases, but the colloid-osmotic pressure per unit protein decreases. Harry Eagle

**The quantity of the glomerular filtrate.** II. Glomerular filtrate in cardiac insufficiency and hypertension. Fusakichi Nakazawa, Jiro Izumi and Ichiya Seki. *Tōhoku J. Exptl. Med.* 22, 159-66 (1933).—The quantity of glomerular filtrate and creatinine excretion decrease in cardiac decompensation in proportion to the degree of decompensation. Cases of hypertension fall into 2 groups: those without kidney involvement (essential hypertension) have only a slight decrease in glomerular filtrate and creatinine secretion; those associated with kidney disease have a const. decrease in both factors. In the latter group, there may be a decreased tubular reabsorption, with resultant polyuria, despite the decreased glomerular filtration. Harry Eagle

**Changes in glucemia provoked by surgical operations.** J. P. Lamarque, M. Larget, F. Darnis and R. Lecoq. *Bull. soc. chim. biol.* 15, 1124-45 (1933); cf. C. A. 26, 5143.—Operations under anesthesia are often followed by hyperglucemia, especially if the sympathetic nerves are excited. In the cases reported good results were obtained by giving 15 units of insulin. L. E. Gilson

**Action of metallic nickel on normal human blood serum.** Adeline Siegler. *Compt. rend. soc. biol.* 114, 282-3 (1933).

Normal human serum which has been in contact with metallic Ni for several hrs. shows a pos. complement-fixation reaction with syphilitic and other antigens. Horse serum is much less affected by Ni, and the action of Ni on human serum is very slight at 0° or *in vacuo*. Physicochemical determinations on human serum left in contact with metallic nickel. Adeline Siegler and Eugénie Soru. *Ibid.* 283-5. The physicochem. consts. of the treated serum were detd. In time the Ni reacts with the euglobulin, forming a ppt. Action of metallic nickel on ultrafiltrate of normal human serum and solutions of its components in respect to the modified Hecht reaction. *Ibid.* 310-12.—The protein-free ultrafiltrate, after several hrs. contact with Ni, gave a positive modified Hecht reaction. Other expts. are mentioned. L. E. Gilson

**Influence of the antagonism of ions on hemolysis.** Edward Falik. *Compt. rend. soc. biol.* 114, 355-7 (1933); cf. C. A. 27, 333.—The effects of various mixts. of the chlorides of Ca, Ba, Sr, Mg, Co, Ni and Mn on hemolysis were studied. L. E. Gilson

**The polysaccharides from cultures of Proteus X.** H. Meisel and E. Mikulaszek. *Compt. rend. soc. biol.* 114, 364-8 (1933).—Polysaccharides were isolated from cultures of diverse strains of *Proteus X* and used as antigens in complement-deviation reactions. In some cases the reactions were very specific. L. E. Gilson

**Action of lecithin on the fractionation of antitoxic serums and the transformation of pseudoglobulin into euglobulin.** I. Pirotsky and F. Modern. *Compt. rend. soc. biol.* 114, 387-9 (1933). L. E. Gilson

**Bile secretion in experimental uremia.** Etienne Chabrol, R. Charonnat, M. Maximin and Jean Cottet. *Compt. rend. soc. biol.* 114, 464-6 (1933).—Normal dogs and dogs with ligated ureters were used. The urea content of the bile varied with that of the blood and was usually the same or slightly lower. L. E. Gilson

**Influence of ligation of the portal vein and its branches on glucemia in the dog.** Noël Ficssinger and R. Cattau. *Compt. rend. soc. biol.* 114, 483-6 (1933).—Ligation of the veins causes a marked hyperglucemia. The several factors involved are briefly discussed. L. E. Gilson

**Blood calcium during consolidation of fractures.** J. Perves. *Compt. rend. soc. biol.* 114, 526-8 (1933); cf.

C. A. 26, 5642.—Blood Ca is normally increased during consolidation but in cases of infected fractures it undergoes wide and irregular fluctuations. Numerous graphs are shown.

L. E. Gilson

Uranium nephritis. Polyuria and vasodilation of the kidneys. L. Brull and C. Roersch. *Compt. rend. soc. biol.* 114, 919-20(1933); cf. C. A. 27, 1400.—Previous conclusions were confirmed.

L. E. Gilson

Studies on staphylolysin. J. Forssman. *Biochem. Z.* 265, 291-319(1933).—The staphylolysin activity diminishes directly with diln. and with the increase in the number of red blood cells. Generally its max. effect is exerted upon the cells by preliminary incubation at 37° followed by a low temp. though some cells are hemolyzed almost equally well at 0°. The lysin is adsorbed by the cells if these are in contact for a very long time, but the degree of adsorption is very variable. Even lysin-resistant cells adsorb lysin strongly, while sensitive blood cells, as sheep corpuscles, do not adsorb the lysin at all. There is obviously no relation between the adsorption and hemolysis. At 0° in the case of certain of the lysin-sensitive blood corpuscles there is very rapid adsorption of lysin but the combination is also easily broken.

S. Morgulis

Metabolism of heterotransplanted tumors. Otto Rosenthal. *Biochem. Z.* 265, 413-21(1933).—The carbohydrate metabolism of mouse sarcoma S 37 transplanted into rats is like that of the Jensen rat sarcoma and not like that of the original tumor. This may be interpreted as showing that transplantation is possible either only when the metabolism of the transplant can adjust itself to that of the host, or that the heterotransplant is really made up of host cells which were changed to tumor cells under the influence of the transplanted tumor. S. M.

Potentiometric method for the determination of an antibody-hapten equilibrium. H. Erlenmeyer, E. Berger and M. Leo. *Biochem. Z.* 266, 355-9(1933). The detn. depends upon the reduction-oxidation potential between  $H_2NC_6H_4AsO_3H_2$  and  $H_2NC_6H_4AsO_2H_2$ . Atoxy anti-serum affects only the oxidized phase, leaving the concn. of the reduced phase const., so that addn. of the antibody alters the potential.

S. Morgulis

The diazo compound in typhoid urine. Masaki Miyazaki. *J. Biochem. (Japan)* 18, 379-85(1933).—The diazo reaction of urine is due to antoxyproteinic acid, which though a normal constituent of urine is present in large amts. in certain pathological conditions. Injected intravenously into rabbits, antoxyproteinic acid to a very large degree disappears rapidly from the blood, but only an insignificant amt. is eliminated in the urine. The ext. of feces of typhoid patients as well as of normal persons or those with other diseases gives a strong diazo reaction, so that there is no relationship between a diazo-positive or diazo-neg. urinary reaction and the diazo-positive reaction of feces extract.

S. Morgulis

Is there any relationship between the function of the liver and the decrease in the amount of the complement of the blood in anaphylactic and histamine shock? B. Paul and H. Popper. *Magyar Orvosi Arch.* 34, 371-80(1933).—A decrease in the amt. of complement, resembling that in anaphylactic shock, may be observed during histamine shock. An analogy between histamine shock and anaphylaxis is suggested.

Henry Tauber

Lipids in the liver and blood of rabbits in normal and pathological conditions. Sándor Lajos. *Magyar Orvosi Arch.* 34, 381-401(1933).—Insulin caused a decrease in neutral fats and an increase in phosphatides, of the liver, and the blood. Adrenaline produced a decrease in neutral fats of the blood and an increase in phosphatides. Insulin increased the cholesterol while thyroxine produced a decrease. In P poisoning adrenaline caused an initial decrease with a subsequent rise in total fat of the liver but it was not as marked in the diseased animals as in normals. Insulin produced a more marked decrease in the total fat of the pathol. animals. Thyroxine diminished the liver fat and increased cholesterol and phosphatides, but the lipoids of the blood decreased. The posterior lobe of the pituitary caused a slight increase in

liver fat with a decrease in blood cholesterol and increase in blood phosphatides. Genital hormones are without effect.

Henry Tauber

Chemoimmunological studies on the soluble specific substance of pneumococcus. I. The isolation and properties of the acetyl polysaccharide of pneumococcus Type I. Oswald T. Avery and Walther F. Goebel. *J. Exptl. Med.* 58, 731-55(1933).—Details are given for the isolation of the acetyl polysaccharide (I), the principal difference from other methods being the avoidance of the use of an excess of alkali. I gives solns. of high viscosity; aq. solns. have a sp. rotation of about 270°; I contains 4.85% N, 45% of which is liberated in the  $NH_3$  form with  $HNO_3$  in the cold; alk. hydrolysis gives  $AcOH$ ; I is pptd. by tannic acid but not by  $UO_3(NH_4)_2$ ; hydrolysis of I gives a polysaccharide identical with that hitherto known as the sol. sp. substance. I in highly purified form adsorbs from Type I antipneumococcus serum all demonstrable type-sp. precipitins, agglutinins and protective antibodies. Mice injected intraperitoneally with minute quantities of I develop active immunity to subsequent infection with pneumococcus Type I. The immunity thus induced is type-sp. No type-sp. precipitins, agglutinins or protective antibodies were demonstrable in the serum of rabbits after repeated intravenous injections of the Type I I. The treated rabbits were not immune to subsequent infection with pneumococcus Type I. The immunological significance of I and its possible relationship to the sp. substances isolated from pneumococcus Type I by other workers are discussed.

C. J. West

Serum. Josef Vorschütz. *Ger.* 582,558, Aug. 17, 1933. Immunizing serum is prepd. by introducing the desired microorganisms into a culture medium contg. blood, adding a physiol. NaCl soln. at 37° and leaving for 24-48 hrs. The organisms are then removed by filtration.

## II—PHARMACOLOGY

A. N. RICHARDS

Effect of Antuitrin "S" on weights of the pituitary, adrenal and thyroid. George M. Leiby. *Proc. Soc. Exptl. Biol. Med.* 31, 14-15(1933).—In the oophorectomized rat, the daily injection of 25-50 rat units of Antuitrin "S" (Parke Davis & Co.) for 5-9 days caused an increase in wt. of the pituitary gland 29.7%, of the adrenals 37.5% and of the thyroid 8.4% as compared with controls. Effect of theelin on weights of pituitary, adrenal and thyroid. *Ibid.* 15-17. In the oophorectomized rat the daily injection of 100 rat units of theelin (Parke Davis & Co.) for 6 days caused an increase in wt. of the pituitary 91%, of the adrenals 112.5% and of the thyroids 25%. Combined effect of Antuitrin "S" and theelin on weights of pituitary, adrenal and thyroid in the normal rat. *Ibid.* 17-18. Normal adult albino rats were injected with 2 rat units of Antuitrin "S" and 20 rat units of theelin (Parke Davis & Co.) daily for 9 days, the pituitary glands increased in wt. 22% and the adrenals 27.5% as compared with the controls. Antuitrin "S" alone had a greater effect than when injected along with theelin.

C. V. Bailey

Diuretics and their uses. D. Murray Lyon. *Brit. Med. J.* 1933, II, 853-7.

J. B. Brown

Antagonism in curarization. L. Lapicque and M. Lapicque. *Ann. physiol. physicochim. biol.* 9, 887-96(1933).

Harry Eagle

The effect of adrenaline upon the blood-sugar level in adrenalectomized dogs. R. Carrasco-Forniguera. *Ann. physiol. physicochim. biol.* 9, 905-11(1933).—In adrenalectomized dogs, the injection of adrenaline in pressor doses causes no hyperglucemia; instead, there is a slow fall over a period of 24 hrs., which is probably not related to the adrenaline injection.

Harry Eagle

The action of adrenaline upon the isolated horn of an infantile guinea-pig uterus. L. Launoy. *Ann. physiol. physicochim. biol.* 9, 913-22(1933).

Harry Eagle

The effect of 1,2,4-dinitrophenol in pigeons. J. Cotte. *Ann. physiol. physicochim. biol.* 9, 961-4(1933).—Pri-

marily, dinitrophenol is an excitatory substance. It causes increased cellular oxidation, motor stimulation, peripheral vasoconstriction and central vasodilatation, and a disturbance in the thermoregulatory app. H. E.

Polypnea in pigeons intoxicated with 1,2,4-dinitrophenol. J. Cotte. *Ann. physiol. physicochim. biol.* 9, 965-7(1933).

Chronaximetric studies on the effect of local anesthetics upon motor nerves. Walther Laubender and Magda Saum. *Arch. expl. Path. Pharmacol.* 171, 619-49(1933).

The pharmacology of inflammation. IX. The effect of water- and salt-mobilizing agents upon the inflammatory reaction. Werner Lipschitz and Else Reuter. *Arch. expl. Path. Pharmacol.* 171, 650-67(1933); cf. *C. A.* 26, 3298.—The intravenous injection of NaCl (0.5 g./kg.) into white rabbits inhibits the inflammatory response to mustard oil applied as late as 16 hrs. after the injection. Both NaCl and H<sub>2</sub>O are retained for 24 hrs. after the injection, and although the blood Cl has returned to approx. normal values in 48 hrs., the Cl injected has not been excreted quantitatively at that time. Glucose (7.5 g./kg.) injected as a 25% soln. also inhibits the inflammatory response; this inhibition is observed even if the oil is applied 16 hrs. after the injection, at a time when the body contains less water and salt than before the injection. Salyrgan has no definite effect. The antiphlogistic action of hypertonic crystalloid solns. is not due to the substance as such, but to changes in the water and ion economy of the tissues caused by the injection.

The production of a tonic dilatation and hypertrophy of the right side of the heart in animals by the injection of large quantities of histamine. Eugen Kirch. *Arch. expl. Path. Pharmacol.* 171, 691-715(1933).

The cause of the varying intervals between the intravenous injection of hypnotics and their effects. Karl Klimesch. *Arch. expl. Path. Pharmacol.* 172, 10-17(1933).—Most hypnotics are immediately effective upon intravenous injection; others, e. g., Na barbital and Na phenobarbital, show a variable latent period. This is due to the fact that the effective hypnotic is the free acid; and the Na salts differ in the ease of dissociation within the body.

The effect of mineral waters upon the composition of the blood. I. The effect of Karlsbad water upon the serum calcium level. Emil Stransky. *Arch. expl. Path. Pharmacol.* 172, 149-60(1933).—Rabbits given Karlsbad water instead of cond. water for a 25-day period, the diet being otherwise the same, showed a considerably greater increase in weight and serum solids. The serum Ca was also increased by at least 1 mg. %, the free Ca and the total/free Ca ratio were not significantly affected, the variations being within the physiol. range.

Changes in the electrostatic charge of the tissues as a cause of the so-called vascular permeability. Hans Weden. *Arch. expl. Path. Pharmacol.* 172, 161-9(1933).

Inflamed rabbits' ears perfused with various dyes show an increased vascular permeability only for those with a neg. charge, indicating that the inflamed tissue is more positively charged than normal tissue. This charge contributes to the exudation, increased metabolism and leucocytic infiltration. The action of cinchophen in inhibiting inflammation is ascribed to a decrease in the positivity of the inflamed tissue; and that of Ca is believed to be due to the fact that it prevents the passage of pos. and neg. substances alike.

The effect of various vegetative nerve toxins upon bioelectric processes in isolated ovarian tubes of pigs. Run-ichi Hasama. *Arch. expl. Path. Pharmacol.* 172, 213-26(1933).

Pharmacological studies with derivatives of aminocaffeine. Alfred Fröhlich and Susi Kann. *Arch. expl. Path. Pharmacol.* 172, 272-84(1933).

The effect of tobacco smoking upon dog heart-lung preparations. G. Mansfeld and Katharina Hecht. *Arch. expl. Path. Pharmacol.* 172, 362-72(1933).—Dog heart-lung preps. allowed to "smoke" cigars and cigarettes by

means of a Starling pump show the max. nicotine effects within a few min. The diastolic vol. increases, but the performance of the cardiac muscle is not affected even by large quantities. The most pronounced and invariable effect of the tobacco smoke, appearing almost immediately, is coronary vasodilatation, increasing the rate of flow through the heart as much as 7-fold, an effect which can be reproduced by pure nicotine. The rhythm of the cardiac contractions is not affected.

The reactions of some inhibitors of blood coagulation with calcium ion in aqueous solutions. I. K. Mulli, T. Pillewizer and W. Laves. *Arch. expl. Path. Pharmacol.* 172, 384-8(1933).—Na citrate, "germanin," "liquoid" and "novirudin" all inhibit blood coagulation by combining with Ca<sup>++</sup> to form non-ionizing complexes.

Can one change the concentration of alkali and alkaline earths in the hepatic bile experimentally? Ernst Neubauer. *Arch. expl. Path. Pharmacol.* 172, 393-401(1933).—The concn. of K, Ca and Mg in rabbit bile is approx. const. Na dehydrocholate depresses the Ca and Mg; the Mg salt depresses the Ca concn., but increases that of Mg. The K salt depresses the Ca and Mg and increases the K. Since inorg. salts have no effect upon the cation concns. it seems probable that the dehydrocholates pass through the liver directly into the bile.

The mineral metabolism during salyrgan diuresis. M. Nothmann. *Arch. expl. Path. Pharmacol.* 172, 402-6(1933).—The injection of salyrgan into human beings regularly causes an increased blood K, reaching a max. in 24 hrs., and an increased urinary excretion of K. The blood P does not increase.

The effect of insulin, adrenaline and thyroxine upon galactose assimilation. Leo Pollak and Gabriele Fehér. *Arch. expl. Path. Pharmacol.* 172, 407-28(1933).—Insulin promotes the assimilation of galactose administered by mouth or intravenously. Adrenaline injections promote the assimilation of peroral galactose without affecting that of intravenous galactose. Hyperglucemia caused by the peroral or intravenous administration of glucose has the same effect as adrenaline. Thyroxine inhibits the assimilation of peroral galactose.

The pungent principle of *Polygonum hydropiper* L. W. R. Witanowski and H. P. Krynska. *Arch. expl. Path. Pharmacol.* 172, 463-70(1933).—The ether ext. of the plant contains an ethereal oil with a pungent taste contg. a ketone (polygenon). This ketone forms a cryst. thio-semicarbazone, m. 194-195°, and forms a solid but amorphous Ag salt. The oil causes a fall in blood pressure because of vasodilatation and cardiac insufficiency. It paralyzes and decreases the tension of isolated sections of intestine and uterus.

The action of tonephin and the antagonistic effect of narcotics. M. Haferkorn and L. Lendle. *Arch. expl. Path. Pharmacol.* 172, 501-24(1933).—Tonephin, the pressor fraction of the posterior pituitary ext., is not "sympathicomimetic" like ephedrine, insofar as its action is accentuated by cocaine. Pharmacologically, it lies between ephedrine and adrenaline, acting more directly upon the muscle than the latter. As in the case of adrenaline, its effect upon a frog vessel prep. is decreased by local anesthetics (procaine). Unlike adrenaline, the tonephin effect is also impaired by deep anesthesia (permocton). The mechanism of this antagonism is obscure.

The effect of ammonium chloride upon [salyrgan] diuresis. H. Marx and D. Storch-de Grazia. *Arch. expl. Path. Pharmacol.* 172, 525-34(1933).—Despite large individual variations, NH<sub>4</sub>Cl (3 g. by mouth) approx. doubles the diuretic action of salyrgan in patients with cardiac decompensation.

The cardiac output per beat and per minute of cardiac patients under digitalis (strophanthin) therapy. A. Böger and F. Diehl. *Arch. expl. Path. Pharmacol.* 172, 551-67(1933).

The gas metabolism of the decompensated heart. I. Cardiac insufficiency by histamine. A. Rühl. *Arch. expl. Path. Pharmacol.* 172, 568-85(1933).—In cardiac decompensation caused by histamine (Starling dog heart-

lung prepn.) the O consumption decreases despite the marked cardiac dilatation. The R. Q. increases. There is no relationship between the diastolic vol. and O consumption. The efficiency (cardiac work in proportion to the O consumption) increases, evidence that some of the energy is furnished by anoxic reactions. The O deficiency is ascribed to edematous changes in the capillary walls. Similar changes in the O consumption, R. Q. and capillary walls were observed in spontaneous decompensation.

Harry Eagle

**The pharmacology of optically active secondary butyl alcohol.** Friedrich Viditz. *Arch. expl. Path. Pharmacol.* 172, 608-80(1933).—The isomers of BuOH do not differ with respect to their anesthetic (tadpoles), muscle excitatory or cardiac (frog heart) action. They do differ in enzymic processes. The sapon. of BuOAc by sheep liver esterase is more strongly inhibited by the l-rotatory than by the d-rotatory form; the latter is more readily oxidized aerobically by yeast.

Harry Eagle

**The harmful effect of liquid paraffin and fatty oils upon frogs.** H. Fuhrer and E. Schwarz. *Arch. expl. Path. Pharmacol.* 172, 681-92(1933).—The injection of liquid paraffin, olive oil or "Lebertran" into the abdominal lymph sac of frogs causes vascular emboli and hemorrhages in the lungs, brain, liver and skin.

Harry Eagle

**The causes of the cumulation phenomena of digitalis glucosides. I. Results of physiological methods.** Hellmut Bauer. *Arch. expl. Path. Pharmacol.* 172, 699-736(1933); cf. C. A. 28, 209.—Cumulation phenomena with digitoxin are not due to a prolonged storage and cumulation of the substance in the heart muscle, but are due to a summation of effects. Citalm-Kraft is much less cumulative in its effect than digitoxin, and digalen lies between the 2.

Harry Eagle

**The excretion of barbital and Quadronox.** Hans Schlossmann. *Arch. expl. Path. Pharmacol.* 173, 32(1933). Approx. 70-80% of barbital taken by mouth is excreted in 72 hrs., and 45-50% in 24 hrs. Combination with small doses of antipyretic drugs (Quadronox) does not affect excretion.

Harry Eagle

**The effect of pitressin upon circulation and respiration.** Karl Hartl. *Arch. expl. Path. Pharmacol.* 173, 133-45(1933).—Pitressin causes an increased diastolic pressure and a decreased cardiac min. vol. because of increased peripheral resistance. Because of decreased tissue permeability, there is an increase in the O debt and ventilation vol.

Harry Eagle

**Cholesterol metabolism and chlorophyll.** C. Blumer, T. Gordonoff and L. Reznikoff. *Arch. expl. Path. Pharmacol.* 173, 42-61(1933).—The administration of chlorophyll ("Chlorosan") to rabbits has a favorable therapeutic effect upon the arteriosclerosis induced by the ingestion of a large quantity of cholesterol. Its action is most pronounced when given prophylactically, along with the cholesterol.

Harry Eagle

**The peripheral paralytic action of hypnotics, in particular of the amide and ureide group.** K. Fromherz. *Arch. expl. Path. Pharmacol.* 173, 78-85(1933). II. E.

**The inhibitory action upon parasympathetic nerve endings of compounds resembling atropine structurally.** K. Fromherz. *Arch. expl. Path. Pharmacol.* 173, 86-128(1933). Sixteen substances (the tropic acid ester and other esters of 3-diethylamino-2,2-dimethyl-1-propanol and their deriv.) were examd. for their pharmacol. properties.

Harry Eagle

**Temperature and sensitivity to toxin.** H. Fuhrer and W. Breipohl. *Arch. expl. Path. Pharmacol.* 173, 146-58(1933).—Unlike eulethime, which is 400 times as toxic for frogs at 30° as it is for frogs kept in the cold, physostigmine, adrenaline, sympathol, ephedrine, strophanthin, cymarin, MeOH, EtOH and strychnine do not differ in their toxicity for frogs at 30° and 19°. Picrotoxin is 3 times as toxic for the former as it is for the latter.

Harry Eagle

**Glycogen formation in the liver without insulin, and a theory of substituting carbohydrate.** H. Kosterlitz. *Arch. expl. Path. Pharmacol.* 173, 159-72(1933).—The administration of glucose to pancreatectomized dogs causes

no significant formation of glycogen in the liver in the absence of insulin. Levulose and d-sorbitol do, however, cause the deposition of significant quantities even without insulin. The glycogen content of the heart muscle of diabetic dogs is 1-1 1/2%, unaffected by the administration of glucose.

Harry Eagle

**The effect of arsenic upon the course of gastric digestion.** Richard Frank. *Arch. expl. Path. Pharmacol.* 173, 180-6(1933).—Peroral As (Fowler's soln.) does not cause gastric secretion, but does transiently intensify secretion already in progress. This increased secretion is more pronounced after the absorption of As from the skin, and causes an increased emptying time.

Harry Eagle

**The effects of very small quantities of copper upon the mammalian organism. III. The effect of feeding copper compounds upon the phenylhydrazine anemia of dogs.** Hans Handovsky and Daisy v. Cotzhausen. *Arch. expl. Path. Pharmacol.* 173, 187-91(1933); cf. C. A. 28, 211.—A Cu-tyrosine compd. has a favorable effect, prophylactic and therapeutic, upon phenylhydrazine anemia in dogs.

Harry Eagle

**Detoxication of the thyroid hormone. II.** Frich Hesse, Hans Vonderlinn and Liesbeth Zeppmeisel. *Arch. expl. Path. Pharmacol.* 173, 192-204(1933). Cu acetate, FeSO<sub>4</sub>, As<sub>2</sub>O<sub>3</sub>, Ni(NO<sub>3</sub>)<sub>2</sub> and mineral water protect against and cure the otherwise fatal intoxication of dogs with powd. thyroid and throxine. Ca, I, B, Al, Si, Sr, Fe and NH<sub>4</sub> are ineffective.

Harry Eagle

**The combination of morphine with some local anesthetics for the testing of the participation of the analgesic action of morphine in the total anesthesia.** H. Killian and G. Schworer. *Arch. expl. Path. Pharmacol.* 173, 242-7(1933).—A threshold dose of morphine (barely insufficient to affect the corneal reflex or cause general narcosis) contributes 5, 9 and 25% to the local analgesic action of percaïne, cocaine and procaine, resp., as tested on the rabbit cornea.

Harry Eagle

**The central action of adrenaline upon the blood pressure.** Hans Heller. *Arch. expl. Path. Pharmacol.* 173, 291-300(1933).—The intracisternal injection of 1.5 mg. adrenaline into dogs has very little effect upon the blood pressure. Similar injection into cats causes a definite fall in blood pressure, the degree depending upon the quantity injected. This effect is not prevented by section of the cervical vagus or by atropine. The intracisternal injection of pituitrin into cats protects them from otherwise fatal doses of intracisternal adrenaline, and reverses the adrenaline effect upon blood pressure from depressor to pressor. Adrenaline is not absorbed from the spinal fluid into the blood in cats or dogs.

Harry Eagle

**Experimental changes in the toxicity of digitalis. IV. Experiments with isolated frog hearts and cat heart-lung preparations.** Richard Kohn. *Arch. expl. Path. Pharmacol.* 173, 341-56(1933); cf. C. A. 27, 5814-15.—Concns. of cardiazole, caffeine and theophyllin ineffective *per se* accelerate strophanthin intoxication in frogs. Hypertonic Ringer or urea soln. also accelerates the strophanthin effect. The purines in doses of 0.03-0.2 g. cause a 25% decrease in the amt. of glucosides necessary to cause cardiac cessation in the cat heart-lung prepn. Cardiazole causes a 25% increase in the min. lethal dose in cats, but accelerates the glucoside action in frogs.

H. I.

**Studies on intestinal motility. VI. Total analysis of the alkaloids of the morphine group.** W. Straub and Maxamich Ozaki. *Arch. expl. Path. Pharmacol.* 173, 374-80(1933).—The intestinal action of opium is due largely to its morphine content. None of the opium alkaloids paralyzes intestinal contractions. There is no basic difference in the effect of the isoquinoline and phenanthrene alkaloids.

Harry Eagle

**The effect of urotropine. V. The effect of urotropine upon uterus and intestine.** Ernst Ruickoldt. *Arch. expl. Path. Pharmacol.* 173, 357-62(1933); cf. C. A. 27, 5815.—Uterine tonus and contraction are increased; intestinal tonus is decreased by low concns.; high concns. stimulate contraction. VI. The effect of urotropine upon the blood pressure and isolated frog heart. *Ibid.* 363-9.—The blood pressure increases in warm-blooded animals, and the



performance of isolated frog heart is improved. The effects of ion antagonism,  $\text{CHCl}_3$ , and aconite upon the heart are not affected. In an isolated intestinal prep. it is an antagonist to pilocarpine. VII. The effect of urotropine upon skeletal muscle. *Ibid.* 370 3.—The fatigue time of frog striated muscle is prolonged by urotropine. Harry Eagle

The inhibition of diuresis by hypnotics. Robt. P. Walton. *Arch. intern. pharmacodynamie* 46, 97-104 (1933).—Paraldehyde and Na phenobarbital inhibit diuresis in dogs. The former is a safe anesthetic; the latter is un-safe. "Metrazol" effectively counteracts the depressant action of paraldehyde; picrotoxin is not suitable because effective doses are convulsive. Stimulants do not effectively counteract Na barbital or similar hypnotics which act over a long period and cause motor excitation. Harry Eagle

II. E. The vasomotor and vascular action of ergotamine. C. Hymans and J. J. Bouckaert. *Arch. intern. pharmacodynamie* 45, 129 36(1933). Harry Eagle

Oxygen consumption, respiration, circulation and carbohydrate distribution during pentobarbital anesthesia in dogs. Victor E. Hall and Melville Sahyun. *Arch. intern. pharmacodynamie* 46, 160 8(1933). Pentobarbital anesthesia in dogs does not affect the body temp., O consumption, the glucose or lactate concn. of the blood or glycogen or lactate concn. of the muscle. The respiratory rate and min. vol. increase; the arterial pressure and liver glycogen decrease. The total carbohydrate content of the body decreases approx. 0.25 g./kg. H. E.

The action of urethan and urea on the intestine. Friedrich Beinlein. *Arch. intern. pharmacodynamie* 46, 169-73(1933). Urethan and urea added to guinea-pig intestine in 1:100 or 1:200 concn. cause immediate relaxation due to a direct action on the parasympathetic nerve endings. Harry Eagle

The "sympatholytic" action of a new derivative of dioxane. E. Fournieu and D. Bovet. *Arch. intern. pharmacodynamie* 46, 178 91(1933). cf. *C. A.* 27, 1300. Diethylaminomethylbenzodioxane resembles ergotamine and yohimbine in its pharmacol. properties. Harry Eagle

Comparative actions of sympathomimetic compounds: phenyl and substituted phenyl derivatives, non-phenylic ring compounds and aliphatic amines. M. L. Tainter. *Arch. intern. pharmacodynamie* 46, 192-232(1933); cf. *C. A.* 27, 1400.—A pharmacol. study of 44 compds. There is an extensive bibliography. Harry Eagle

Comparative studies on the toxicity of respiratory stimulants for fish. R. H. Behrens and Kogoro Hiki. *Arch. intern. pharmacodynamie* 46, 233 8(1933).—Although there is no strict parallelism, central respiratory stimulants (cardiazole, camphor, picrotoxin, lobeline, totonine) are generally toxic for fish. Harry Eagle

Pharmacology of potassium permanganate. III. Effect upon blood pressure and heart. S. K. de Jongh. *Arch. intern. pharmacodynamie* 46, 239-48(1933); cf. *C. A.* 27, 5816.—Both  $\text{KMnO}_4$  and  $\text{MnSO}_4$  cause a fall in blood pressure in anesthetized rabbits because of a direct action upon the heart. The active agent is probably a manganous salt formed in the body. Harry Eagle

Comparative actions of various alcohols upon the nervous and muscular excitability. R. Bonnet and Paul Lelu. *Arch. intern. pharmacodynamie* 46, 13-31(1933). Harry Eagle

The pharmacological effect of squill upon the heart. S. de Boer. *Arch. intern. pharmacodynamie* 46, 32-44 (1933).—Toxic doses of squill decrease the contraction rate of frog hearts, the height of systole and the tonus of the ventricles. The ventricular latent period is prolonged. There may be pulsus alternans in either the ventricle or auricle, or a 1:2 ventricular:auricular rhythm. Luciani periods could be demonstrated prior to the final cessation. In general, the toxic manifestations resemble those of digitalis and antiarin. Harry Eagle

The effects of acapnia, anoxemia, carbon dioxide, eserine, prostigmine and numal upon the cardioinhibitory reflexes of the carotid sinus. P. vander Linden. *Arch.*

*intern. pharmacodynamie* 46, 63-75(1933).—Pulmonary hyperventilation and numal inhibit the cardioinhibitory reflexes of the carotid sinus;  $\text{CO}_2$  inhaled in large quantities, eserine, and to a less extent, prostigmine, intensify the reflexes. There is a large bibliography. H. E.

Studies on barbiturates. Theodore Koppany, Wm. S. Murphy and Stephen Krop. *Arch. intern. pharmacodynamie* 46, 76-96(1933).—Barbiturates can be detd. colorimetrically by adding  $\text{Co}(\text{AcO})_2$  and  $\text{Ba}(\text{OH})_2$  dissolved in abs. MeOH to a  $\text{CHCl}_3$  ext. of the unknown. Human beings, dogs and cats excrete 40-90% of barbital taken by mouth in the urine; fowls excrete approx. 30%. The rate and degree of excretion are not affected by diuretics. The excretion of the other barbiturates (dial, neonal, phenobarbital, pernoston and amytal) is less than that of barbital, decreasing in the order named. The blood concn. of barbital in the first 2 hrs. after its administration decreases sharply (fixation by the tissues), followed by a slow decrease (renal excretion). Barbital added to blood *in vivo* or *in vitro* is changed to diethylbarbituric acid. The ratio of plasma:erythrocyte concn. is 3:1. The brain does not store more barbital than other organs. Harry Eagle

Neuromuscular action of some substances of the aniline group. R. Bonnet, F. Faye and G. Mourou. *Arch. intern. pharmacodynamie* 46, 277-84(1933).—Aniline and its Me derivs. (toluidines and xylydines) have a very slight neural and a very pronounced muscular action and must be considered curare-like muscular poisons. With increasing no. of Me groups the slight toxicity for nerves disappears. There does not seem to be any relationship between the toxicity for muscles and the position or no. of the Me groups. Harry Eagle

Comparative action of some substances of the aniline group (aniline, toluidines and xylydines) on cardiac excitability. R. Bonnet and Paul Lelu. *Arch. intern. pharmacodynamie* 46, 285-99(1933).—Aniline and its methylated deriv. are cardiac poisons, decreasing the excitability of the heart muscle. Substitution of a Me group for a H in the benzene nucleus increases the toxicity. *m*-Substituted derivs. are the most toxic of the toluidines, and *m*- or *p*-substituted are the most toxic of the xylydines. Harry Eagle

The action of ephedrine and adrenaline upon diuresis by water, sodium chloride and urea. Edgard Zunz, Olga Vessclovsky and Simon Iagnov. *Arch. intern. pharmacodynamie* 46, 315 46(1933); cf. *C. A.* 27, 3525.—Adrenaline and ephedrine inhibit all 3 types of diuresis. They increase the uric output in fasting dogs and decrease that of Cl. The ingestion of urea tends to increase the Cl output in animals with a previously low Cl excretion due to water diuresis. Adrenaline and ephedrine inhibit this action of urea. They also accelerate the increased uric output following its ingestion, and ephedrine may cause an increased excretion. Harry Eagle

The pharmacology of the Caspian lotus blossom. I. A. Lerman. *Arch. intern. pharmacodynamie* 46, 347-61 (1933).—The EtOH ext. inhibits the contractions of isolated cat intestine and uterus, causes mydriasis in frogs, strengthens systolic contraction in isolated frog hearts, causes a fall in blood pressure in cats, and is a central nervous system stimulant in frogs. H. E.

The tolerance to the parenteral atabrin-plasmochin treatment in malaria. A. E. Eckhardt. *Arch. Schiff-Tropen-Hyg.* 37, 475-9(1933); cf. *C. A.* 27, 778.—The advantage of the intramuscular combined injection of atabrin (0.1-0.3 g.) and plasmochin (0.01-0.03 g.) is the fact that the entire daily dose may be safely given at one time. Harry Eagle

The treatment of malaria with intravenous atabrin. Martin Mayer. *Arch. Schiff-Tropen-Hyg.* 37, 470-84 (1933).—Good results were obtained with the daily injection of 0.3 g. in 9 cc. water for 3 successive days. Harry Eagle

The diagnostic significance of an increase in the blood reticulocyte count following the intramuscular administration of quinine in malaria. Niko Machwladze and M.

**Kurpanova.** *Arch. Schiffs- Tropen-Hyg.* 37, 499-504 (1933).—The intramuscular injection of quinine dihydrochloride into malaria patients causes a markedly increased reticulocyte count, a sp. reaction in malaria not observed in other patients similarly treated. The max. increase is reached 4-5 days after the administration of the drug, and is at least 300-400%. **Harry Eagle**

**The fuadin treatment of schistosomiasis.** **Werner Frégonneau.** *Arch. Schiffs- Tropen-Hyg.* 37, 515-28 (1933).—Report of 124 cases, with excellent results. **Harry Eagle**

**The effect of adsorbents upon gastric secretion.** **R. Pfaffenberg.** *Arch. Verdauungskrankh.* 54, 191-6 (1933).—The effect of adsorbents taken by mouth upon the total and free acids in the gastric juice is very transitory, and is not the explanation of their therapeutic value. **H. E.**

**Anatomical changes of the pancreas after toxic doses of dodeca- and decamethylenediguanidine and the effect of feeding pancreas.** **Zacharias Dische and Helene Goldhammer.** *Arch. Verdauungskrankh.* 54, 319-27 (1933).

Although the administration of dried pancreas by mouth does not protect dogs from fatal doses of the compounds, it does prevent the appearance of widespread histological changes in the pancreas. **Harry Eagle**

**Pharmacological action of certain derivatives of cotarnine.** **Khem Singh Grewal, Bhasheshwar Das Kochhar and Jnanendra Nath Ray.** *Indian J. Med. Research* 21, 249-53 (1933). **Harry Eagle**

**The pharmacological action and antimalarial properties of anhydrocotarnineresorcinol hydrochloride (a derivative of narcotine).** **R. N. Chopra, B. Mukherjee and H. G. M. Campbell.** *Indian J. Med. Research* 21, 255-60 (1933).—The substance has no antimalarial action. **Harry Eagle**

**The pharmacological action of an alkaloid obtained from Rauwolfia serpentina. A preliminary note.** **R. N. Chopra, J. C. Gupta and B. Mukherjee.** *Indian J. Med. Research* 21, 261-71 (1933).—A cryst. alkaloid was prepd. which stimulates intestinal and uterine contractions, causes a fall in blood pressure, and is a cerebral depressant. Its use in folk medicine is thus justified by its pharmacol. properties. **Harry Eagle**

**The pharmacological action of Kurchicine (an alkaloid of Holarrhena antidysenterica).** **R. N. Chopra, J. C. Gupta and G. S. Chopra.** *Indian J. Med. Research* 21, 277-81 (1933).—The alkaloid is a protoplasmic poison like emetine. It stimulates intestinal and uterine contraction, causes a fall in blood pressure, and has a direct depressant action on the heart, in particular, the auricular-ventricular bundle of His. **Harry Eagle**

**The effects of quinine, atabrin and plasmochin on experimentally induced malaria in the Macacus and on some of the pathological changes observed.** **R. Row, N. P. Dalal and G. V. Gollerkeri.** *Indian J. Med. Research* 21, 205-8 (1933). **Harry Eagle**

**The mode of action of quinine in malaria.** **K. V. Krishnan.** *Indian J. Med. Research* 21, 331-42 (1933).—K. concludes that quinine accelerates the multiplication and activity of phagocytic cells, increases the susceptibility of the parasites and infected red cells to phagocytosis by altering their elec. charge, slows down asexual reproduction, increases the output of young red cells and causes the removal of old cells, and finally promotes the formation of humoral antibodies. **Harry Eagle**

**Atabrin, a new therapeutic agent against malaria.** **H. Mauss and F. Mietsch.** *Klin. Wochschr.* 12, 1276-8 (1933).—A review of the chem., pharmacol. and therapeutic properties of atabrin. **Harry Eagle**

**The treatment of thyrotoxic auricular fibrillation with dilitodotyrosine.** **G. W. Parade.** *Klin. Wochschr.* 12, 1320-32 (1933).—Case reports with beneficial results. **Harry Eagle**

**The physiological and therapeutic effect of skin extract A preliminary report.** **Wilhelm Milbradt.** *Klin. Wochschr.* 12, 1335-6 (1933). **Harry Eagle**

**Coramine as a stimulant in experimental intoxications with narcotics.** **Otto Gessner and Adolf Behrends.** *Klin. Wochschr.* 12, 1450-2 (1933).—With salamander

larvae as test objects, coramine was found to be an efficient stimulant in terminating anesthesia by EtOH, chloral hydrate, avertin and veronal. It is also prophylactic, retarding paralysis and accelerating recovery if given before the narcotic. **Harry Eagle**

**The cardiac action of the purine bodies.** **E. Flaum and R. Rössler.** *Klin. Wochschr.* 12, 1489-91 (1933).—Caffeine, theobromine and theophylline increase the cardiac output per beat of dog hearts (Starlinger heart-lung prepn.) experimentally damaged with CO<sub>2</sub>, CHCl<sub>3</sub>, and barbituric acid derivs. Their effects are not due to increased coronary blood flow, but to a direct action on the heart muscle. **Harry Eagle**

**The treatment of heart-block and the Adam-Stokes disease with ephetonine.** **Franz Seebew.** *Klin. Wochschr.* 12, 1648-50 (1933).—Good results are reported in 2 of 3 cases. **Harry Eagle**

**The storage of thorotrast and iron metabolism.** **Georg Barkan.** *Klin. Wochschr.* 12, 1658 (1933).—The injection of thorotrast into rabbits, with the resultant storage of the particles by the cells of the reticulo-endothelial system, does not affect the serum bilirubin or the concn. of readily split or acid-sol Fe in the blood. **Harry Eagle**

**The use of the timing principle for prolonging the action of hypnotics.** **Siegmund Hermann.** *Klin. Wochschr.* 12, 1689-90 (1933).—Allylbutylbarbituric acid is an efficient hypnotic, with no demonstrable cumulative action in rabbits, with a wide therapeutic range, causing prolonged sleep, but only after a long latent period. Attempol, a condensation product of bromodiethylacetylurea with citric acid, acts rapidly, but only for a short period. By administering 0.25 g. Attempol together with 0.015 g. allylbarbituric acid one obtains a considerably prolonged normal sleep in rabbits. If one adds to the foregoing mixt. 0.015 g. of the barbituric acid deriv. specially treated with fatty acids (method not described) so as to prevent gastric absorption, this third portion is acted upon only by the alk. intestinal juices and begins to exert a hypnotic action just as the effect of the other 2 components is wearing off, thus resulting in a considerable prolongation of sleep. **Harry Eagle**

**Clinical experiences with the timed hypnotic agent "Profundol."** **Ed. Gamber and Hedwig Horn.** *Klin. Wochschr.* 12, 1690-2 (1933).—Given to patients in doses of 0.5 g., this compd. (a mixt. of Attempol, allylbutylbarbituric acid and some of the latter protected against gastric absorption by treatment with some fatty acids (see preceding abstr.) induces sleep within 1 hr., lasting for 7 hrs. It is especially valuable in psychiatric sleep disturbances. **Harry Eagle**

**Does radium emanation pass through human skin? Preliminary report.** **A. Janitzky, W. Kaschig, O. Steinke and W. Wichmann.** *Klin. Wochschr.* 12, 1692-3 (1933).—Contrary to previous reports, when human beings bathe in water contg. Rn, the latter passed through the skin, to reach the circulation and be demonstrable in the expired air. **Harry Eagle**

**The effect of heparin upon the Takata-Ara reaction.** **Konrad L. Zirm.** *Klin. Wochschr.* 12, 1695-6 (1933).—Heparin added to serum or ascitic fluid giving a pos. Takata-Ara reaction makes it react negatively. **H. E.**

**The effect of a sarsaparilla preparation (renotrat) in chronic nephritis, with particular reference to the uric acid content of blood and urine.** **Fritz Humpert.** *Klin. Wochschr.* 12, 1696 (1933).—Besides causing subjective improvement, "renotrat" causes an increased urinary excretion of uric acid, with a corresponding fall in the blood uric acid concn. averaging 30%. **H. E.**

**Late harmful effects of thorium dioxide in lymph glands, three years after the intravenous injection.** **Th. Naegeli and A. Lauche.** *Klin. Wochschr.* 12, 1730-1 (1933); cf. C. A. 27, 780.—As late as 3 years after the injection there is no evidence for the excretion of ThO<sub>2</sub> in significant quantities. It is gradually shifted from the original site of deposition to the lymph glands, where it causes widespread necrosis upon reaching sufficiently high concn. Its diagnostic use is contraindicated. **Harry Eagle**

**The absorbability of salicyl compounds through the skin.** 1 H. Benzinger and R. Wyrsh. *Klin. Wochschr.* 12, 1734-5(1933).—After the percutaneous administration of free salicylic acid,  $\frac{9}{10}$  of that excreted in the urine is present in a bound form. In testing the degree of percutaneous absorption of any salicylic compd. by urinary excretion the ester in the urine must therefore be completely hydrolyzed.

Harry Eagle

**The effect of removal of various parts of the central nervous system upon the hyperglucemia caused by pyramidone and magnesium.** Fr. Hogler and F. Zell. *Klin. Wochschr.* 12, 1735-6(1933).—A preliminary report.

Harry Eagle

**The effect of the exclusion of various sections of the central nervous system upon the fasting blood sugar and the alimentary hyperglucemia after the administration of sugar.** Fr. Hogler and F. Zell. *Klin. Wochschr.* 12, 1736(1933).

Harry Eagle

**The effect of various pharmacological agents upon the alimentary hyperglucemia caused by the administration of galactose.** Fr. Hogler and F. Zell. *Klin. Wochschr.* 12, 1736 7(1933).

Harry Eagle

**The hyperglucemic and insulin-antagonistic action of tonephin, pitressin and orasthin.** Hermann Schroeder. *Klin. Wochschr.* 12, 1766 8(1933).—The pressor fractions of posterior pituitary ext. (pitressin and tonephin) are hyperglucemic, explaining the antagonism of the ext. to insulin. The uterus-active principle (orasthin) is inactive in this respect.

Harry Eagle

**The hypoglucemic action of insulin in rabbits after bilateral adrenalectomy or splanchnicotomy.** Fumio Ohmi. *Tôhoku J. Exptl. Med.* 21, 211-20(1933); cf. *C. A.* 27, 4588.—Bilateral adrenalectomy or splanchnicotomy in rabbits increases their susceptibility to the hypoglucemic action of insulin, and increases the incidence of insulin convulsions.

Harry Eagle

**The effect of adrenaline and insulin upon the lactic acid metabolism in the liver.** Katsutaka Kato and Kotaro Kimura. *Tôhoku J. Exptl. Med.* 21, 298-313 (1933).—Adrenaline increases the formation of lactic acid in the musculature and in the organs drained by the portal vein, with a corresponding increase in the lactic acid content of arterial and portal blood; but the mobilization of glycogen from the liver and the attendant liberation of lactic acid are accelerated to an even greater degree, causing the lactic acid content of the hepatic vein to exceed that in the arteries and portal vein. Splanchnicotomy significantly decreases this adrenaline effect. Insulin does not greatly affect the lactic acid level in arterial or portal blood, but causes a definite increase in that of the hepatic vein. The hypoglucemia caused by insulin depends largely upon the transformation of glucose to lactic acid, and the mobilization of glycogen in an attempt to counteract the hypoglucemia causes a further increase in the venous lactic acid content. Splanchnicotomy does not affect this insulin effect.

Harry Eagle

**The [hypo] glucemic action of histamine in rabbits.** Fumio Ohmi. *Tôhoku J. Exptl. Med.* 21, 314 22(1933).

Harry Eagle

**Effect of histamine upon the blood pressure in adrenalectomized rabbits.** Fumio Ohmi. *Tôhoku J. Exptl. Med.* 21, 323-8(1933).—The normal depressor response was obtained.

Harry Eagle

**Action of morphine on the adrenaline output, blood-sugar content and blood pressure in dogs.** Hiroshi Sato and Fumio Ohmi. *Tôhoku J. Exptl. Med.* 21, 411-32 (1933).—The subcutaneous injection of morphine into dogs (10-40 mg./kg.) causes a 5-25 fold increase in the secretion of adrenaline and a somewhat retarded hyperglucemia. Blood pressure was not regularly affected.

Harry Eagle

**Adrenaline secretion and blood-sugar content in dogs after chloralose.** Hiroshi Sato and Fumio Ohmi. *Tôhoku J. Exptl. Med.* 21, 433-43(1933).—Chloralose causes hypoglucemia, a decreased secretion of adrenaline because of the decreased blood supply to the adrenal glands, and does not increase the blood pressure.

Harry Eagle

**The effect of pyrrole upon frogs.** Mamoru Tomimaga.

*Tôhoku J. Exptl. Med.* 21, 444-57(1933).—Pyrrole stimulates the intramedullary motor component of the reflex arc in summer frogs, but inhibits the sensory component. Reflexes to central stimulation (sound) are thus increased, but those to, e. g., pin-prick are inhibited. Large doses paralyze the central nervous system. The secretory activity of the skin glands is inhibited, there is vasoconstriction, and with large doses, muscular rigidity.

Harry Eagle

**The effect of pyrrole upon the general behavior of mice.** Mamoru Tomimaga. *Tôhoku J. Exptl. Med.* 21, 458 65 (1933).

Harry Eagle

**Adrenaline liberation during insulin hypoglucemia.** Teh-Jun Yen, Tetsutaro Aomura and Tatsusaburo Inaba. *Tôhoku J. Exptl. Med.* 21, 542 55(1933).—The intravenous injection of insulin (0.25 10 units/kg.) into dogs causes an increased secretion of adrenaline. Usually the mean arterial blood pressure falls somewhat, body temp. increases, and respiratory rate increases.

Harry Eagle

**The effect of an increased concentration of the perfusion fluid upon the isolated frog heart.** Hiraku Takahashi. *Tôhoku J. Exptl. Med.* 21, 592-600(1933).—The effect observed upon increasing the concn. of the Ringer soln. used as perfusion fluid depends largely upon the rate at which the concn. is increased.

Harry Eagle

**The effect upon the isolated frog heart of increasing the concentration of the perfusion fluid by the addition of nonelectrolytes.** Hiraku Takahashi. *Tôhoku J. Exptl. Med.* 21, 601 12(1933).—Dextrose and urea added to Ringer soln. exert not only an osmotic, but also a sp., effect upon isolated frog hearts.

Harry Eagle

**The effect of insulin in accelerating the discharge of adrenaline.** Hiroshi Sato, Fumio Ohmi and Shimpei Kanowaka. *Tôhoku J. Exptl. Med.* 22, 53-64(1933).

Harry Eagle

**The effect upon the isolated frog heart of increasing the concentrations of the individual components of Ringer solution.** Hiraku Takahashi. *Tôhoku J. Exptl. Med.* 22, 65 73(1933). The effects of increasing the concns. of NaCl, CaCl<sub>2</sub>, KCl and NaHCO<sub>3</sub> were detd. The effect upon the isolated frog heart of decreasing the concentration of Ringer solution. *Ibid.* 71 84.

Harry Eagle

**The effect of benzene and its nuclear homologs upon lumbricalis muscle.** Shizuka Uchimi. *Tôhoku J. Exptl. Med.* 22, 126 31(1933).—Naphthalene, benzene and phenanthrene all increase the tonus and stimulate the contraction of lumbricalis muscle, their efficacy decreasing in that order. Anthracene is ineffective, possibly because of the difficulty of soln. The stimulating action of santonin, and possibly its anthelmintic action, are due to its naphthalene ring, rather than its lactone group.

H. E.

**Studies in fluid exchange. XVIII. The effect of hydrocyanic acid upon the formation of urine.** Takeshi Kikuta and Jiro Izumi. *Tôhoku J. Exptl. Med.* 22, 167-73 (1933).—NaCN perfused through toad kidney temporarily decreases urine excretion, because of a direct action upon the kidney epithelium.

Harry Eagle

**The effect of morphine upon rabbit pupils.** Chikao Kinukawa. *Tôhoku J. Exptl. Med.* 22, 174-95(1933).—Morphine in small doses causes miosis in rabbits acting through the parasympathetic system. The site of action of the morphine is the cortical substance of the cerebrum. Larger doses cause mydriasis due in part to subcortical stimulation of the sympathetic centers.

H. E.

**Action of folliculin on the development of the ovary.** Zulema Biale-Laprida. *Compt. rend. soc. biol.* 114, 376-80(1933).—Action of folliculin on the adult ovary. *Ibid.* 381-2. Action of folliculin on the compensatory

**hypertrophy of the ovary [after partial removal].** *Ibid.* 383-4.—In all the above cases injections of folliculin hindered development of the ovary.

L. E. Gilson

**Some physiological effects of mitraphylline.** Raymond-Hamet. *Compt. rend. soc. biol.* 114, 692-4(1933).—In dogs mitraphylline (cf. Michiels, *C. A.* 26, 3070) has a hypotensive action but does not counteract the hypertensive and renal vasoconstrictive action of adrenaline.

L. E. Gilson

**Action of histamine on the glands of the gall bladder.** J. H. Cascao de Anciaes. *Compt. rend. soc. biol.* 114, 853-5(1933). L. E. Gilson

**Blood concentration under the influences of amytal and urethan.** E. F. Adolph and M. J. Gerbasi. *Am. J. Physiol.* 106, 35-45(1933).—The circulating blood of dogs is greatly diluted after Na amytal is administered intraperitoneally and greatly coned. after ethylurethan is given in the same way. The compn. of the blood is changed relatively little when the anesthetics are given by stomach. J. F. Lyman

**Lactic acid in blood and tissues following intravenous injection of sodium bicarbonate.** John Haldi. *Am. J. Physiol.* 106, 136-41(1933).—NaHCO<sub>3</sub> injected into the blood of dogs, produces a marked rise in blood lactic acid. Increased blood lactic acid occurred before there was any change in the lactic acid of the brain. Lactic acid in the muscle of the injected animals increased from 58.2 mg. per 100 cc. of tissue before injection to 68.5 mg. after injection. J. F. Lyman

**A study of blood calcium after the administration of sodium oxalate to normal and thyroparathyroidectomized cats.** Wm. Salant, Wm. M. Parkin and Lillian L. Sheppard. *J. Lab. Clin. Med.* 19, 142-52(1933).—The reduction in the Ca content of the serum of normal cats after repeated subcutaneous injections of small amts. of Na oxalate or single injections of large amts. appears to be due to injury to the parathyroid gland. The wide range in the reduction in Ca after intravenous injections of oxalate may be caused by variations in the concn. of diffusible Ca resulting from differences in the amt. of parathyroid hormone present. The decrease in serum Ca caused by the intravenous injection of 30-40 mg. per kg. after extirpation of the thyroid and parathyroid glands is about 0.25 as great as that produced by injection of the same amts. into normal cats. The reduction produced by injection of large amts. is less than 0.5 as great. The small decrease in Ca observed in thyroparathyroidectomized cats may be attributed to the low concn. of diffusible Ca. E. R. Mann

**Influence of amino acids on the alcohol content of the**

**blood.** Erik M. P. Widmark. *Biochem. Z.* 265, 237-40(1933).—Neither fat nor carbohydrate has any marked effect on the disappearance of alc. from the blood; however, it is increased by proteins. Expts. with glycine and alanine show that when a few g. is administered with the alc. the blood alc. level is lowered and the alc. disappears more rapidly. S. Morgulis

**Effect of the rare earths on metabolism.** A. Bickel and M. Kojima. *Biochem. Z.* 266, 18-24(1933).—Administration of the water-sol. chloride salts of Th, Ce, Sm, Pr, Nd, La, U and Zr has a variable influence on the oxidative processes in the organism. Sm, Pr, Nd, Zr and Y exert practically no action while CeCl<sub>3</sub> and LaCl<sub>3</sub> have an inhibiting effect, and ThCl<sub>3</sub> has a somewhat similar stimulating effect. S. Morgulis

**Physiological action of (-) and (+) derivatives of morphine alkaloids.** Kakuji Goto and Toraichi Takebe. *Proc. Imp. Acad. (Tokyo)* 9, 390-3(1933).—The physiol. actions of 6 pairs of morphine derivs. prepd. from sinomenine (I) were studied. The (-) and (+) forms of dihydrocodeinone (II), dihydrothebainone (III),  $\beta$ -tetrahydrodesoxycodeine (V), dihydrothebainol (V), 1-bromosinomenine (VI), and  $\alpha$ -dihydrosinomenine (VII) were tested for toxicity, tail reaction, analgesic action, convulsant action, and influence on respiration and blood pressure. The *d*-derivs. of I are chiefly convulsive poisons and show no tail response, analgesic action or respiratory depression. In the *l*-derivs. II, III and IV display all these properties, but V has no convulsant action, VI shows only weak analgesic effects and VII provokes no tail reaction although the other characteristic reactions are pos. Conclusion: These properties of morphine derivs. depend on configuration as well as constitution. E. W. Scott

**Genuine glucosides of *Digitalis lanata* (Stoll, Kreis) 10.** Arsonic acids of the fluorenone and the fluorenol series (Morgan, Stewart) 10. Physiological activity of onium compounds (Renshaw, Searle) 10.

**Poulsson, E.: Lehrbuch der Pharmakologie. Fur Ärzte und Studierende 10th ed., enlarged. Leipzig: S. Hirzel. 602 pp. M. 14, bound, M. 16.50.**

## 12 -FOODS

F. C. BLANCK AND H. A. LEPPEL

**Proposed federal food and drugs act: Its public health features.** Walter S. Frisbie. *Am. J. Pub. Health* 23, 1232-6(1933). J. A. Kennedy

**The chemical composition of certain foods.** Joseph S. Hepburn, N. Albert Fegley, Keum Sung Sohn, John R. Cox, Emerson A. Read and Richard F. Wallace. *Am. J. Pharm.* 105, 547-9(1933).—Results of analyses including detns. of total solids, moisture, crude fat, crude fiber, crude protein, ash and N-free extractives of the following foods are tabulated: apple butter, a "Pennsylvania Dutch" product; dried ale yeast, manufd. by a Canadian brewery; breakfast foods (prepd. products requiring no cooking), (I and II) some derived primarily from rice, (III) some from wheat and (IV) some from malted barley; 3 samples of cashew nut kernels: (1) a raw sample consisted of kernels as imported; (2) a fried sample consisted of kernels which had been prepd. for the market by frying in coconut oil (a fried and salted sample was examd. for its ash content only); diabetic bread prepd. from casuin, palm-nut flour and eggs; *gefüllter fisch*; pidan or Chinese pickled egg; pineapple (slices and sirup), a diabetic food, canned without the addn. of sugar; prunes (these were cooked as usual, the pits removed and discarded; the juice was permitted to drain from the meat and each was analyzed separately); red banana; soy-bean milk prepd. in the Korean fashion. The caloric value and the wt. of a 100 cal portion of each food were calcd. and the results are tabulated. W. G. Gaessler

**Oxalic acid content of vegetable foodstuffs.** Erik M. P. Widmark and Gosta Ahludin. *Biochem. Z.* 265, 241-4(1933).—The edible portions only were analyzed, 15-25 g.

of the finely ground substance being first extd. with 50-100 cc. 10% HCl. The mixt. is warmed, left over night, filtered and the residue washed until a neutral reaction was obtained. The filtrate and wash water are dild. to 1 l. The oxalic acid is detd. in an aliquot by Holmberg's procedure (*C. A.* 21, 2486). Results obtained by the authors are higher than those given by Esbach. The oxalic acid content of a large variety of vegetable foodstuffs is tabulated. S. Morgulis

**Results of general interest obtained by the investigations of the Danish Home-Grown-Wheat Committee, 1929-1933.** Holger Jørgensen. *J. Soc. Chem. Ind.* 52, 383-91(1933).—The baking test formula used by the Comm. is discussed. The most important point in detg. the dough compr. and baking procedure is to have the dough compn. (especially percentage of yeast) and the dough time well balanced against each other. This balancing must be done in such a way that starvation of the yeast does not occur even if the flour is very low in diastatic power. The A. A. C. C. basic method was found very unsatisfactory with respect to keeping the "strength" sepd. from the diastatic activity, the amt. of yeast prescribed being far too great relatively to the dough time. A study was made of the N content of wheat and its influence on baking strength. Larmour's results of the effect of bromate on baking have been confirmed, namely that it enhances the baking capacity of high N wheat flours. This strong correlation between the N content of the wheat and ability of the flour to acquire improved baking strength through the addn. of bromate holds good also for Danish wheat. F. L. Dunlap

The quality of the 1933 German wheat crop. Paul Pelschenke. *Mühlentab.* 3, 169-78(1933).—Detns. of moist gluten, gluten quality (by the gluten-swelling method of Berliner and Koopman) and test weight were made on 3000 wheat samples from various German districts. Moist gluten exceeded 22.5% in 46.3% of the samples, as compared with 24.1% in 1932 and 35.3% in 1931. Distribution of wheat according to gluten content is shown on a map. The gluten quality of the 1933 crop was better than in the 2 preceding years. Test weight bears no relation to flour yield and baking quality and is not a satisfactory index of wheat quality. C. L. B.

Fundamentals of the determination of quality of wheat flours by mechanical means. C. W. Brabender. *J. Soc. Chem. Ind.* 52, 395-400(1933).—A description of the fundamental principles of the Brabender Farinograph and Fermentograph. Diagrams from these machines are given to show how the requirements for a complete detn. of the baking value of wheat flour are satisfied by a mech. testing of its properties. The properties studied are the changes in the phys. condition of the dough and the rate of CO<sub>2</sub> production. F. L. Dunlap

Influence of the [culture] medium on the baking value of wheats. M. Chopin. *J. agr. prat.* 97, 326-7(1933).—The ratio of the sp. work of deformation of dough from the massive state up to the rupture of the membrane for a variety of wheat grown on one medium to that for the same variety grown on a second medium has been detd. for a no. of varieties. This ratio is sensibly const. and seems to indicate that the modifications brought about in the compn. of the proteins by the medium in which the plant develops are, in general, the same for all varieties. J. R. Adams

Gluten formation. H. L. Bungenberg de Jong. *J. Soc. Chem. Ind.* 52, 391-5(1933).—Gluten is not a simple phys. mixt. of gliadin and glutenin, but its existence is dependent on an interaction between its components. This interaction is caused by the opposition of charges on the 2 components of the complex. In the region of the complex formation, gliadin is always the pos. and glutenin the neg. component. The result of this is that the gliadin as well as the glutenin particles in the complex is hydrated quite differently from the hydration that each of the components would show independently in that medium. The gliadin-glutenin ratio can influence to a large extent the phys. properties of a gluten, but this factor is not the only cause of the difference in properties between strong and weak glutes. It is possible that the particle size may be an important factor in the strength problem. The presence in the flour of other proteins—albumin, globulin and peptones—can alter to a large extent the phys. properties of the gluten system. A study was made of the "consistency" of doughs at various  $pH$  values, with a Brabender farinograph. The max. was found at a  $pH$  of about 6.1. This decreases on both sides to  $pH$  7 and  $pH$  5. Beyond  $pH$  7 and  $pH$  5 the height of the max. gradually increases. According to the theory of complex formation such a max. in the farinogram would be expected, because somewhere between  $pH$  7 and  $pH$  5 the total protein system must have a max. coherence. The author gives his views of the influence of charge on a protein system. Without the opposition of charge the proteins of flour would not show the special properties necessary for the formation of a well-developed loaf. F. L. Dunlap

Bleaching and improving of flour. D. W. Kent-Jones. *J. Soc. Chem. Ind.* 52, 409-11(1933).—A general discussion of some of the problems connected with the bleaching and improving of flour. F. L. Dunlap

Baking value of flours. de Conde and Heudebert. *Compt. rend.* 197, 1150-3(1933).—The quality of flour gluten is given by the value of the coeff.  $K = 100(P - p)/p$ , where  $P$  and  $p$  are the percentage contents of moist and dry gluten, resp. The value of  $P - p$  should be about 22% while for a good flour  $K$  should be between 180 and 200. K. V. Thimann

The phosphorus of potato flour. Theodore Posternak. *Compt. rend.* 197, 1157-8(1933).—The potato flour was hydrolyzed with pancreatin or malt ext., the filtrate pptd.

with Pb(OAc)<sub>2</sub> and NH<sub>3</sub>; the resulting ppt. was redissolved, pptd. first with alc. and then again with Pb(OAc)<sub>2</sub>, decompd. and converted to Ba salts. The product contained 1.8-2.5% of P and consisted of a Ba polyglutemonomophosphate; after hydrolysis with 2% H<sub>2</sub>SO<sub>4</sub> dextrose was set free and alc. pptn. yielded a Ba bisglutemonomophosphate, C<sub>12</sub>H<sub>21</sub>O<sub>14</sub>P<sub>2</sub>Ba,  $[\alpha]_D^{25}$  65.1°. In this compd. the ratio P: reducing groups was 1; it is probably a maltose deriv. On subsequent prolonged hydrolysis an undetd. hexosemonophosphoric acid was isolated. K. V. T.

Pearl barley infected with smut. P. H. Jones. *Analyst* 58, 754(1933).—Some samples of com. barley were found to have dark grains caused by the action of a fungus. W. T. H.

Annual report of the director of the Dairy Research Institute, 1929-1930. H. H. Davel. Union S. Africa Dept. Agr., *Sci. Bull.* 98, 23 pp.(1931).—Neutralization of cream with 5% NaHCO<sub>3</sub> soln. to 0.08-0.10% acidity (calcd. as lactic acid), followed by deodorization by the Murray process, caused a 98.4-99.9% reduction in the bacterial count. Red colorations on butter and cheese: Butter contg. 0.5% or less of NaCl is a suitable medium for the growth of *Torula glutinis* which causes the appearance of pink or reddish patches that may penetrate 2-3 cm. below the surface of the butter. The organism decomposes proteins, carbohydrates and certain org. acids, giving rise to objectionable by-products; it does not withstand pasteurization temps. *Actinomyces ruber* causes red spots on butter wrappers and liners but does not grow to any extent on butter itself. Growth of the organism is prevented by soaking the papers in 15% NaCl or in formalin (1:500) or by boiling in water for 10 min. Growth of *A. ruber* on cheese is prevented by rubbing the surface of the cheese with NaCl or wiping with formalin (1:500). The *E. coli* and *A. aerogenes* groups of bacteria and the *Torula cremoris* group of yeasts were the most common gas-producing organisms isolated from numerous samples of milk, cream and cheese. Studies with pure cultures indicated that *S. lactis* has a decided inhibitive action on *E. coli* and *T. cremoris*, the effectiveness depending on the initial H-ion concn. of the media, the temp. of incubation and the presence of carbohydrates. K. D. Jacob

The effects of hand and machine milking on the milk yield, its composition and purity. H. B. Davel and H. L. Neethling. Union S. Africa Dept. Agr., *Sci. Bull.* 111, 23 pp.(1932).—Milk produced by hand was somewhat higher in butter fat and milk solids-not-fat than that produced by machine. K. D. Jacob

Milk yield and iodine content of the milk from cows fed on iodine-fertilized pastures. K. Scharrer, W. Schropp and J. Schwaibold. *Biedermanns Zentr. B. Tierernähr.* 5, 676-700(1933).—Favorable effects on the estrous cycle were noted, a higher milk yield was obtained, the lactation period was prolonged, but the effect on the fat content and sp. gr. of the milk was negligible. The I level of the milk was considerably higher, though subject to much fluctuation. This level showed two maxima, one corresponding to the time of the addn. of the I to the pastures, the other to the max. I content of the feed itself. F. L. Dunlap

Readjustment of salts in milk by base-exchange treatment. J. F. Lyman, E. H. Browne and H. E. Otting. *Ind. Eng. Chem.* 25, 1297-8(1933).—Passage of raw milk through zeolite removes more Ca and P when the milk has been acidified. Milk of artificially increased acidity (0.3% as lactic) lost 22% each of its Ca and P. After this treatment rennin fails to produce a curd unless the milk is first boiled. On boiling, the tendency to coagulate is greater when HCl has been used previously to acidify the milk than when citric acid has been used. The Na:K ratio or content need not be disturbed if the zeolite is revived with the proper salt combination. Revival with NaOH is necessary to affect P removal. Previous treatment with HCl lowers the alk. of the ash obtained from zeolite-treated milk but treatment with lactic or citric acid raises it. Butter fat does not interfere with base exchange and the milk is not appreciably changed in taste. H. K. Salzberg

**Colorimetric method for the determination of milk proteins.** A. D. Stewart and Durga Das Mitra. *Indian Med. Gaz.* 68, 558-8(1933).—The method is based on the estn. of color given by Folin's phenol reagent (*C. A.* 16, 1790; 21, 3210) with tyrosine and tryptophan and gives accurately the total protein content of those milks having a reasonably const. proportion of tyrosine and tryptophan to total protein. Application of the method to fresh cow and buffalo milks, but not always to human milk, was found possible. To a sample of 0.2 cc. of the milk and to 4 cc. of standard tyrosine soln. (0.02% in 0.1 N HCl) are added 25 cc. of  $H_2O$ , 2 cc. of 5 N NaOH and 3 cc. of the reagent, the soln. is made up to 100 cc., shaken and kept 10 min., filtered and the liquids are compared colorimetrically after 5 min. of filtration. If the tyrosine standard be set arbitrarily at 20 in the colorimeter then protein percentage by vol. in cow milk is given by the formula  $96/x$  and in buffalo milk by  $121.6/x$ , where  $x$  is the colorimeter reading of the milk sample when balanced against the standard at 20. In a no. of samples of cow milk  $x$  varied from 23.0 to 32.0. H. K. Salzberg

**Raw versus pasteurized milk, with special reference to the vitamins.** Chalmers Watson. *Scottish J. Agr.* 16, 394-404(1933).—A review of the literature dealing with the value of raw milk as a source of vitamins. The compulsory pasteurization of milk is inherently unsound and retrograde. K. D. Jacob

**Disease-producing organisms in milk.** F. C. Minett and E. J. Pullinger. *J. Soc. Chem. Ind.* 52, 379-83T (1933).—Data are given as to the incidence and distribution in different classes of raw milk of 3 kinds of disease-producing bacteria: *M. tuberculosis*, *Br. abortus* and the streptococci of mastitis in cows. A study has been made of the effect of pasteurization by the holding method on these organisms, as practiced commercially at a no. of plants. F. L. Dunlap

**Metals and condensed milk.** R. C. Thompson, R. P. Mears, H. E. Searle and F. L. Laque. *Ind. Eng. Chem.* 25, 1311-16(1933). Cu, Ni, Sn, bronze, Inconel, Monel, soft solder, Ag solder, Cr-Fe and Cr-Ni-Fe were exposed in the form of insulated disks in units of evapd. and sweetened condensed milk manuf. during actual operation. Corrosion was measured by wt. decrease. In evapd. milk manuf. greatest corrosion occurred in the preheater, hot well, evaporator and drip tank, and less in storage tanks. Corrosion was generally less in condensed milk manuf. and likewise was greatest in the above-named units though even in these units several of the metals, notably Cr-Ni-Fe, showed no corrosion. All other metals showed an advantage over Cu in the hot wells and evaporators. Condensed milk picks up about 1.6 and evapd. milk 2.5 p. p. m. of Cu from evaporators of this metal. In time, film forms on specimens in the preheater and evaporator which exerts a protective action against further corrosion in all cases except Cu. H. K. S.

**Legal standards for butter fat and solids-not-fat.** John Houston. *J. Ministry Agr. Northern Ireland* 4, 47-61 (1933).—Data are given on the factors affecting the fat and solids-not-fat contents of milk. Detn. of the percentage of solids-not-fat is not a reliable test for the adulteration of milk with water; the cryoscopic method should be used. K. D. Jacob

**Biacetyl in butter.** W. L. Davies. *Food Manuf.* 8, 346-8(1933).—Lactose on fermentation yields acetoin which is readily oxidized by air to biacetyl (I), to which butter largely owes its aroma and flavor. I is probably not formed until butter is churned and stored. One disadvantage of acetoin in butter is that it acts as an oxidation catalyst accelerating deterioration of the fat. Butter from ripened cream may contain 0.05-0.5 p. p. m. of I. I is not stable but is subject to reduction to acetoin through absorption of  $O$  by bacteria or fat and to loss by evapn. It is lost more rapidly from butters of higher acidity. A relatively high I content assoc. with low acidity should indicate that I has been added artificially. The Voges-Proskauer color reaction for I is discussed and details of the dimethylglyoxime method for its detn. are given. H. K. Salzberg

**A brief guide to the manufacture of sour-cream butter.** E. Haglund and E. Samuelsson. *Medd. Kgl. Lantbrukshögskolan*, No. 295, 1-26(1933).—Directions are given for the pasteurizing, souring and ripening of the cream, the churning, washing, working and packing of the butter and the control analysis of milk and other dairy products. Clinton L. Brooke

**Some remarks on the metabolism of the lactic acid bacteria and on their role in butter making.** A. J. Kluyver. *J. Soc. Chem. Ind.* 52, 367-73T(1933).—A general review with 34 references to the literature. F. L. Dunlap

**Humidity control in cheese-curing rooms.** G. M. Moir. *New Zealand J. Agr.* 47, 280-4(1933).—The humidity should be maintained at 80-85%. K. D. J.

**Bacteriological examination of canned meat.** Thomas McLachlan and Margaret Ida Stern. *Food Manuf.* 8, 378-80(1933).—The bacteriol. examn. of canned meat is necessary in tracing causes for spoilage. The cans are incubated at blood heat for 1 month. The gas formed is collected by a special app. over brine satd. with  $CO_2$ . Any liquid in the can or pieces of fat-free meat obtained with a sterile cork-borer are placed in an egg-meat medium for the isolation of the bacteria. Amy LeVesconte

**Occurrence and origin of lead in canned sardines.** L. H. Lampitt. *Analyst* 58, 733-8(1933).—From 0 to 150 parts per million of Pb were found in canned sardines. The source of Pb was proved to be the metal used in turning the grills over which the fish were cooked. The methods used in the analysis are outlined. W. T. H.

**Color in tomato products.** M. B. Matlack and Charles E. Sando. *Fruit Products J.* 13, 81-2, 90(1933). Lycopene, the red pigment of tomato, forms a yellow oxidation product, but this alone cannot explain all the browning that occurs in tomato products. Washing the solids, including lycopene, with 50-85% alc. prevents browning. Possible causes of browning are: coagulation of protein or other colloidal matter, adsorption of chlorophyll or its decompn. products on the colloids, soln. of lycopene in the fatty matter, caramelization, polymerization of fural derivatives, reaction between amino acids and sugars, oxidation of lecithin or changes in phenolic bodies. Methods used to prevent browning will also protect the carotene present. Also in *Canning Age* 14, 481-2(1933). Amy LeVesconte

**Bacterial studies of defrosted peas, spinach and lima beans.** Elizabeth B. Brown. *J. Home Econ.* 25, 887-92 (1933).—Defrosted vegetables deteriorate in about one-half the time of fresh vegetables. Spinach was the most affected and peas were least affected. Amy LeVesconte

**Large-scale experiments in sulfuring apricots. II Effect of dehydrating, shade-drying and blanching.** E. M. Chace, C. G. Church and D. G. Sorber. *Ind. Eng. Chem.* 25, 1366-70(1933); cf. *C. A.* 25, 1006. Blanching as a pre-treatment of apricots intended for drying does not improve the quality of the dried fruit or affect the quantity of  $SO_2$  that is retained. While dehydration has some advantage over sun-drying, results did not show that the fruit retained less  $SO_2$  or was of better grade. Drying in the shade shows no material advantage and requires more time and equipment. The extent of the penetration of  $SO_2$  shown by freshly sulfured fruit is not a satisfactory guide for estg. either the amt. of  $SO_2$  which will be retained in the dried fruit or its grade. J. R. Adam

**Sooty blotch on citrus fruits.** J. E. van der Plank. Union S. Africa Dept. Agr. *Sci. Bull.* 121, 12 pp.(1933); cf. *C. A.* 27, 4870. When oranges were treated by the bleaching-powder process and thoroughly washed the fruit showed no alteration in the sugar:acid ratio or the general flavor during storage for 5 weeks. The treatment caused no increase in the Cl content of the fruit rind. Spraying the trees with lime-S solns. greatly reduced the incidence of sooty blotch, but the spray residue rendered the fruit unsightly. K. D. Jacob

**Examining jams by the spectroscope.** S. Judd Lewis. *Food Manuf.* 8, 421-4(1933).—A study was made of the



absorption spectra of strawberry and other jams, pure and after the addn. of artificial color, other fruit juices, or preservatives as benzoic acid. The difference was great enough to suggest this as an improved method for the detection of adulteration. Amy LeVesconte

The presence of reducing sugars in soda waters sweetened with sucrose. B. Ricca and P. Meduri. *Ann. chim. applicata* 23, 450-4 (1933).—In the presence of small quantities of org. acids, such as citric, sucrose is inverted to a marked degree, i. e., up to 2% in 9 days in the presence of 0.20% citric acid. The Italian laws specify that addn. of glucose to soda waters shall be stated. Therefore, the above reaction must be watched or samples may be wrongly condemned. A. W. Contieri

Composition of bees' honey. Th. v. Fellenberg and J. Ruffy. *Mitt. Lebensm. Hyg.* 24, 367-92 (1933).—On account of the presence of melezitose and dextrin in honey, the detns. of sucrose and invert sugar as usually carried out are in error. Sucrose must therefore be detd. in the filtrate left after detn. of acids and proteins by heating 75 cc. (contg. 10 mg. honey per cc.) with 3.75 cc. 4 N NaOH for 1.5 hrs. at 100°, neutralizing with HCl and pptg. by the addn. of 2.5 cc. standard Pb(OAc)<sub>2</sub> soln. The filtrate is freed from Pb with excess Na<sub>2</sub>HPO<sub>4</sub>, and the reducing sugars are then detd. before and after inversion in 0.02 N HCl, the difference between the 2 values being the sucrose. Results of complete analyses of 16 samples of honey show that 2-14% of the honey is still unaccounted for; on the av., titrable acids total 0.2%, of which about one-tenth is volatile, ash 0.5%, sucrose 0.9%, dextrose 24.42% and levulose 30.37%. By pptg. with alc., purifying with Pb(OAc)<sub>2</sub> and NH<sub>3</sub>, and finally pptg. the MeOH soln. with HCl and Et<sub>2</sub>O, a dextrin free from ash and dextrose was obtained. Two samples of this, prepd. from conifer and flower honey, resp., had  $[\alpha]_D^{20}$  160.7° and 163.5°, resp., and both gave 100% reducing sugar on hydrolysis; hence they were probably identical. K. V. Thimann

Tannin in tea. D. B. Dott. *Pharm. J.* 131, 627 (1933).—The Cu(OAc)<sub>2</sub> method (cf. C. A. 10, 540) gives more const. and quicker results than the hide-powder method. To 4 g. of the sample add 400 cc. boiling H<sub>2</sub>O, digest for 30 min. on the water bath, filter through cloth, wash with about 150 cc. hot water and press. To the infusion add a soln. of 2 g. Cu(OAc)<sub>2</sub>·H<sub>2</sub>O in 25 cc. H<sub>2</sub>O with 5 cc. of 30% AcOH. Filter the ppt. through a tared filter, wash and dry at 105° to const. wt. Incinerate the ppt. and weigh the ash as CuO. Two samples of Indian tea gave, resp., 19.43, 16.81% tannin; 2 samples of China tea, 10.82 and 9.36%. These results are a measure of the relative astringencies of the samples. S. Waldbott

Determination of chlorogenic acid in coffee. W. Plucker and W. Keilholz. *Chem.-Ztg.* 57, 875-6 (1933); cf. Grubel and also Plucker and Keilholz, C. A. 27, 5838.—Tests were made of the method proposed by G. The results were found unsatisfactory because of the fact that chlorogenic acid is not very stable. W. T. H.

Chemistry of cider. V. L. S. Charley. *Chemistry & Industry* 1933, 743-5.—Apple pulp contains water 83, invert sugar 17, sucrose 1.5, malic acid 0.2-1.2, tannin 0.07-0.5, N 0.01-0.07, pectin 0.3, ash 0.2-0.4, and starch 0.5%. Cider should contain 0.5% malic acid to stabilize the tannin and prevent bacterial decompn. Pectin gives body to the juice, but makes clarification difficult. High N content, causing too rapid fermentation, occurs in fruit grown on plowed land. The type of yeast on the apples varies with the variety. Added yeast cultures have not been successful. Centrifuged ciders have more flavor than filtered ciders but are less clear. Amy LeVesconte

Problems of the cider maker. Pickford. *Chemistry & Industry* 1933, 742-3.—Problems in cider making include: the best variety of fruit trees, the proper blending of culls, storage of fruits while ripening, methods of washing, milling, and pressing the fruit, and storing the cider. The rate of fermentation is governed by the variety of the fruit, the soil conditions of the orchard, and the temp. Filtration checks fermentation more effectively than centrifuging or pasteurization. Amy LeVesconte

Animal nutrition research. M. H. French. Tanganyika Territory Dept. Vet. Sci., *Ann. Rept.* 1931, 32-46 (1932).—Compn. of grasses near Amani.—Detailed analyses are given of samples of *Amphilophis insculpta* Stapf., *Cymbopogon giganteus* Stapf., *Digitaria minusiflora* Stapf., *Panicum trichotladum* Haek., *Melinis minusiflora* Beauv., *Panicum maximum* Jacq., *Brachiaria mutica* Stapf., *Cynodon dactylo* Pers., *Sorghum verticilliflorum* Stapf., *Pennisetum purpureum* Schum., *Paspalum dilatatum* Pers., *Paspalum conjugatum* Berg., *Paspalum scrobiculatum* Stapf., *Chloris gayana* Kunth, *Desmodium adscendens* and *Ipomoea batatas*, cut at different stages of growth and maturity. In general, the grasses are very deficient in N and sol. ash constituents and the mineral elements, particularly P and K, are below the normal values for natural English pastures. Feeding stuffs.—Analyses are given of peanut, simsim and coconut cakes, oats, beans, linseed, red mtama bran and dried mtama grains produced in Tanganyika. Dried mtama grain is characterized by a very high SiO<sub>2</sub> content (29.75%). A sample of coffee berry pulp contained a considerable amt. of caffeine. The results of digestibility expts. with Tanganyika kays are given. *Ibid.* 1932, 20-71 (1933).—Compn. and digestibility of feeding stuffs available in Tanganyika Territory.—Extensive data are given on "Muharagi" beans (*Phaseolus vulgaris*), "Kundi" cowpeas (*Vigna sinensis*), peanut cake, blue-lupine seed, lucerne hay, cotton seed, dried locusts, peanut tops, leaves of *Disperma trachphyllum*, pods of *Acacia sprocarpa* and *A. albidia*, corn and millet brans, corn silages, cassava roots, grass silages and hays. K. D. Jacob

Field curing of hay as influenced by plant physiological reactions. II. The role of leaves in the dehydration of hay plants. T. N. Jones and L. O. Palmer. *Agr. Eng.* 14, 156-8 (1933). K. D. Jacob

Fodder from wood. Carl G. Schwalbe. *Angew. Chem.* 46, 707-11 (1933).—The raw fiber of wood can be made more digestible even without sepg. the lignin. A digestibility of the raw fiber of 60% can be obtained for the ruminant, which corresponds to that of good meadow hay. This can be accomplished by alk. hydrolysis combined with swelling by means of a swelling agent like carbohydrates and simultaneous or subsequent mech. treatment. A digestibility of 63% can be reached by swelling with carbohydrates and subsequent lactic acid fermentation, while it can be raised to 77% by swelling or by maceration with lactic acid only. The digestibility of the N-free exts. can be raised to 100% with lactic acid fermentation or maceration. Exptl. results are presented. Eleven references. Karl Kammermeyer

Detg. amino acid deficiencies of feeds (Shrewsbury, Bratzler) 11E. Njombe stock farm [pasture grasses] (Hornby, et al.) 15. Eliminating foam in the treatment of milk (U. S. pat. 1,935,235) 13.

Sherman, Henry C.: Food Products. 3rd ed., rewritten. New York: Macmillan Co. 674 pp. \$3.00.

Food preservation. Hermann Tautz. Ger. 579,952, July 3, 1933. Flesh, fish, grain, cheese, etc., is preserved by embedding it in a gelatin mass contg. 10% glycerol, 2-3% AcOK and a little CH<sub>2</sub>O.

Protein-free infants' cereal foods, etc. Lazar Rosenthal (to Mead Johnson & Co.). U. S. 1,935,890, Nov. 21. Cereal or milk foods, etc., substantially free from protein and contg. lysozyme are prepd. by use of lysozyme from egg white, etc.

Flour. Jean Mayor. Fr. 752,201, Sept. 20, 1933. The germs are sepd. from the rest of cereal grain, roasted and mixed with the ground kernel of the same or other cereal. The germs may be treated with ultra-violet rays or mixed with NaCl before roasting.

Milk. Chemische Fabrik Joh. A. Benckiser G. m. b. H. and Fritz Draibach. Ger. 578,608, June 15, 1933. Water-sol. alkali m-phosphates are added to milk before evapg. the latter.

Dried milk. Hanseatische-Mühlenwerke A.-G. Fr.

completely coated in the ordinary way and the completed material may be impregnated with insulating material, e. g., oil, paraffin, varnish, rosin.

**Insulation for electrical apparatus.** Alexander Meissner (to Telefunken Ges. für drahtlose Telegraphie m. b. H.). U. S. 1,935,885, Nov. 21. In devices such as transformers subject to heating from the effect of an elec. field, an insulating and heat-conducting layer is used comprising quartz granules held together with a binder having an asphalt base, the layer having a breakdown strength of substantially 100,000 v. and being of a thickness of about

15-20 mm. to insure rapid abduction of heat from a transformer winding or the like.

**Insulating compound for electric cables.** Derby Cables, Ltd. and Richard Johnston. Brit. 397,263, Aug. 24, 1933. The polarity of different strands of a multicore elec. cable is identified by using as insulating material a rubber compd. that contains mineral rubber and (or) vulcanized bitumen and has its dark color suppressed by the addn. of pigments or dyes, e. g., crimson Sb sulfide, ultramarine. In an example the compd. contains mineral rubber 10, crimson Sb sulfide 10 and a non-bleeding dye 2%.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Ground water in crystalline rocks.** Richard Stappenbeck. *Gas u. Wasserfach* 76, 769-72, 789-91, 805-7 (1933).—A review of literature relative to the occurrence and flow of ground water in cryst. rocks, with extensive bibliography.

R. W. Ryan

**The trend of water purification and treatment during the year 1933.** Norman J. Howard. *Eng. Contract Record* 47, 1193-5, 1198 (1933).—Activities during 1933 centered chiefly around the conditioning of water for filtration and the use of activated C for taste removal. The use of  $O_3$  for sterilization is increasing somewhat.  $O_3$  was found to be just as effective as chlorination, with the added advantages of freedom from taste troubles and marked reduction in color.

R. E. Thompson

**New type of silt sampler developed for water studies.** A. H. Frazier. *Eng. News-Record* 111, 491 (1933).—An illustrated description of a device suitable for collection of pint samples from any point in the cross-section of a stream to a depth within less than 1 ft. of the bottom.

R. E. Thompson

**Magnesium metal for water treatment.** II. Bach. *Gesundh.-Ing.* 56, 545-7 (1933).—Filters of Mg turnings are efficient for the removal of excess  $Cl_2$  and for decreasing the acidity of a water. The completeness of reaction may be controlled by controlling the rate of flow. A Mg filter is both simple in operation and economical, and requires less space than a marble filter. As the  $MgCl_2$  formed is sol. no coating is formed to decrease the efficiency. When used to remove  $CO_2$  the rate of flow should be such that the Mg goes into soln. as bicarbonate and no carbonate is formed. The Mg filter may be used to give a water an alk. reaction; a  $p_H$  as high as 8 can be obtained.

M. G. Moore

**Electrically produced ozone offers promising results for water sterilization.** T. Rich. *Eng. Contract Record* 47, 847-8 (1933).—The use of  $O_3$  for water sterilization is rapidly increasing in France. The  $O_3$  generator consists of 2 parallel plates a few mm. apart, sepd. by 2 dielec. sheets to prevent sparking. A high-voltage, high-frequency current discharge ozonizes air drawn through the app. which is mixed with the water by means of an injector, the water subsequently flowing over cascades to remove excess gases. Intimate mixing is essential. The power consumption is about 0.0125 kw. hr. per cu. m., i. e., 18,000 gals. per kw. hr. A modified app. has been developed for domestic use.

R. E. Thompson

**New rapid filter plant at the Breslau municipal water works.** Erwin Kirchner. *Gas u. Wasserfach* 76, 749-53 (1933).—From exptl. studies the new Breslau rapid filter was designed with a 1.5 m. layer of 1 mm. diam. sand. No layer of coarser material was used at the base of this filter and the spray heads had a slit opening 0.75 mm. wide. The filter is cleaned by washing 1 min. with air 6 min. with air and water together and 1 min. with water. This method of washing the filter gave better Fe and Mn removal. Under normal conditions a filtration velocity of about 4 m. per hr. was used, although this could be approx. doubled in emergency.

R. W. Ryan

**Adsorption of copper sulfate by aluminum floc.** C. J. Brockman. *Ind. Eng. Chem.* 25, 1402-3 (1933); cf. *C. A.* 28, 2374.—Tabular results of lab. expts. using

buffered solns. indicate that when the residual  $p_H$  is 6.3 or above, Cu ions are completely removed by the Al floc even when the  $CuSO_4$  dosage is high (25 p. p. m. Cu). At  $p_H$  6.0-6.4 there is an av. of 90% removal; at  $p_H$  5-6 there is better than 50% removal.

W. A. Moore

**Deterioration in metal pipes and their avoidance.** L. W. Haase. *Z. Gesundheitstech. Stadtehyg.* 25, 25-34 (1933).—A review. H. considers corrosion injuries, injuries caused by plants and animals after the pipes are installed in water works, and defects of manuf. Pipes of different materials are discussed.

B. C. Brunstetter

**Sewage-treatment costs at thirty Illinois plants.** W. Horner Wisely and Harry F. Ferguson. *Eng. News-Record* 111, 780-2 (1933).—Technical supervision does not appreciably increase operating costs.

R. E. T.

**Designing and operating a small sewage plant.** Lynn J. Arthur. *Eng. News-Record* 111, 645-8 (1933).—The plant at the Indiana Girls' School, housing 500 persons, includes an Imhoff tank, dosing chamber, trickling filter, secondary settling tank and a glass-covered sludge-drying bed. The effluent is chlorinated during the summer months for protection of bathing beaches. The total cost of the plant was \$13,900 or slightly less than \$20 per capita on the basis of designed capacity (700 persons).

R. E. Thompson

**Statistics on city drainage or sewage systems.** Moller-Ing. *Arch. Gemeindeblatt* 36, 257-9 (1933).—Tables give the length of sewage mains of the various materials (concrete, stoneware, etc.) in use in 94 German cities of over 50,000 population for the years 1926-7 and 1927-8.

M. G. Moore

**Collection and use of gases arising from the digestion of sewage.** Franz Fries. *Gesundh.-Ing.* 56, 533-7 (1933); cf. *C. A.* 27, 4905.—Such gas contains  $CH_4$  70-85,  $CO_2$  9-30 and  $N_2$  1.5-7.5%. Gas from 2-stage units is poorer in  $CO_2$  than that from 1-stage units. Methods of collecting the gas are discussed. Floating conical covers for the purpose minimize the danger of explosion, since the internal pressure prevents the entrance of air to form an explosive mixt. Such gas may be pumped into the municipal gas lines for use as fuel or may be used as a power fuel. The heat value of the gas is 6000-7500 Cal. When used for power 400-500 l. supply 1 h. p. Under normal conditions the gas collected from an activated sludge plant should be sufficient to supply all power demands of the plant.

M. G. Moore

**The chemical point of view in the selection of concrete or stoneware sewage pipes.** Kruger. *Gesundh.-Ing.* 56, 521-5 (1933).—Concrete pipes are attacked by free acids, sulfates, Mg salts and to a lesser extent by other salts. The compn. of various types of cements and concretes and the action of these agents on them are discussed. Purely domestic sewage, in general, does not attack concrete pipes, but such pipes are attacked externally by ground waters. They should be protected by a resistant coating and should generally not be exposed to waters of  $p_H$  under 6 or those high in sulfates. Stoneware pipes are resistant to both acids and alkalis.

M. G. Moore

**The ecology of sewage fungus.** R. W. Butcher. *Trans. Brit. Mycol. Soc.* 17, 112-24 (1932).—*Sphaerotilus natans* and its varieties are widely distributed, in the

waters of polluted rivers in England; they may be found in either soft or hard waters contg. a large amt. of org. matter (particularly effluents from beet-sugar factories), with a  $pH$  of 6-8, a low NaCl content and a current not less than 20 cm./sec. *Carchesium* spp. are always present when the source of org. matter is sewage. *Leptomitus lacteus* occurs rarely and then usually where an org. effluent enters a river and becomes immediately dild. *Fusarium aqueductum* was observed in (1) the settling pit of a beet-sugar factory where the water had a  $pH$  of 3.5 due to lactic and butyric acid fermentations; (2) in a river below a rayon factory where the acetate process was being used and the  $pH$  was 5.0; (3) in a channel conveying effluent from a sewage works where fat was extd. from the sewage by means of  $H_2SO_4$ . *Beggiatoa alba* has been observed in the outlets of sewers in the Tees and Clyde estuaries. Thirty-three references. K. D. J.

Studies on the ecology of rivers. I. The distribution of macrophytic vegetation in the rivers of Britain. R. W. Butcher. *J. Ecology* 21, 58-61(1933).—Data are given on the distribution of macrophytic vegetation in non-calcareous and acid rivers (total hardness < 2 parts  $CaCO_3$  per 100,000 and av.  $pH$  < 6.5), slightly calcareous and almost neutral rivers (hardness 2-10 and  $pH$  7.0-7.5), moderately calcareous and alk. rivers (hardness 10-20 and  $pH$  7-8) and highly calcareous and alk. rivers (hardness > 20 and  $pH$  7.5-8.0). The species of vegetation occurring in each group of rivers varies somewhat with the velocity of the current and the original source of the water. The increased N and adsorbed O contents of rivers, resulting from contamination with sewage, favor the growth of *Cladophora*. Forty-one references. K. D. Jacob

Sanitary improvement program solves pollution problem. [Sewage-treatment plant at Findlay, O.] T. B. Henry. *Eng. News-Record* 111, 703 5(1933).—The recently completed plant, serving a population of 19,000, was constructed to correct pollution of the Blanchard River. It consists of bar screens, screenings incinerator, chlorination equipment (for odor control), grit chamber, settling tanks, digestion tank and glass-covered drying bed. Provision was made for addn. of activated sludge treatment at a later date. The cost of the plant was \$198,000. R. E. Thompson

Modern mechanical layout for a swimming pool. James M. Forsyth and J. A. Zeller. *Eng. News-Record* 111, 535 6(1933).—A new 280,000-gal. pool at the Agricultural and Mechanical College of Texas has a recirculation system consisting of a surge tank, pressure filters and a heat exchanger. The water is treated with alum,  $H_2SO_4$  (because of high alk.),  $NH_3$  and  $Cl_2$ . Overflow occurs around the entire periphery of the pool and the purified water is introduced at 10 points in the bottom. R. E. Thompson

Reducing the toxicity of cyanide wastes. E. F. Eldridge. *Eng. News-Record* 111, 677(1933).—See C. A. 27, 1741. R. E. Thompson

Carbon monoxide surveys of two garages. A. H. Sluss, R. K. Campbell and Louis M. Farber. *Heating, Piping, Air Conditioning* 5, 626 9(1933).—Test conditions and results of cooperative studies are tabulated and discussed. In most garages there is no CO hazard except in cold weather when it is necessary to close the doors and windows. A. W. Furbank

App. for aerating sewage (U. S. pat. 1,936,305) 1.

Whyte, Wm. E., et al.: Third Report of the Scottish Advisory Committee on Rivers Pollution Prevention. Rivers, Leven and Ore (Fife). Edinburgh: H. M. Stationery Office. 46 pp.

Purifying water. Karl Glaessner and Emanuel Klausner. Fr. 750,538, Aug. 11, 1933. Water is first treated to remove hardness, then salts and acids are removed by electrochem. means, gas is removed and the water distd. Addns. are made according to the use to which the water is put.

Apparatus for controlling the flow of water through filter beds, etc. Walter J. Hughes (to General Zeolite Co.). U. S. 1,934,713, Nov. 14. Structural and mech. features.

Apparatus suitable for controlling the flow of water in filtration and treating plants, etc. Samuel L. Adelson (to General Zeolite Co.). U. S. 1,936,373, Nov. 21. Various structural, mech. and operative details are described.

Device for automatic control of the flow of water in filtration plants. Samuel L. Adelson (to General Zeolite Co.). U. S. 1,934,759, Nov. 14. Structural and mech. features.

Liquid-flow control valve, particularly adapted for use with water-softening apparatus. Aktiebolaget Filtrum. Brit. 397,344, Aug. 24, 1933.

Electrolytic system for removing and preventing boiler incrustation. Anton Schirmer. Brit. 397,941, Sept. 7, 1933. See Austrian 131,390 (C. A. 27, 2514).

Electrical means for preventing scale formation on evaporation apparatus, etc. Ludwig Krenyi. Fr. 751,908, Sept. 12, 1933.

Apparatus for clarifying sewage, etc., by sedimentation and use of clarifier material. Wm. C. Laughlin (to Filtration Equipment Corp.). U. S. 1,935,642, Nov. 21. Various structural and operative details are described.

Purifying sewage water. Heinrich Blunk and Max Prüss. Ger. 582,965, Aug. 25, 1933. A process for treating sewage water in stages with biol. purifying agents is described.

Purifying polluted water such as various industrial wastes. Oliver M. Urbain (to Charles H. Lewis). U. S. 1,935,963, Nov. 21. For removing carboxylic acids from water, it is treated with a thionylaniline to react with the carboxylic acids and ppt. insol. anilides.

Purifying polluted water. Oliver M. Urbain (to Charles H. Lewis). U. S. 1,935,964, Nov. 21. For eliminating O-consuming org. compds. including org. acids, mercaptans, alcs. and amines from waste waters in which such compds. are present in true soln., the waste water is treated with a reagent such as a (thionylamino)-acylhalide capable of reacting with at least one of such compds. to produce a reaction product capable of reaction with each of the remaining compds. Cf. C. A. 27, 5855.

Purifying waste water from tanneries, etc. Otto Kammann. Ger. 582,662, Aug. 19, 1933. Water contg. microorganisms is purified by treatment with slurry contg. Cu salts and a small amt. of O-carrying catalyst such as Ni salts, and filtering through sand.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

The Wolf centrifuge in the mechanical analysis of soils. I. Peyrot. *Ann. chim. applicata* 23, 435-8(1933); cf. C. A. 25, 370.—The Wolf method for classifying soils is improved by agitating 50 g. of sample  $1/2$  hr. in 100-200 cc. water, allowing to settle 1 min., and pouring off into the centrifuge, leaving the heavier sludge behind. Centrifuge this liquid, washing the sides of the centrifuge to avoid caking onto the partitions. Again shake the sludge with water, and repeat the above operation 10 times. In this

way, blocking the centrifuge with heavy particles at the start is avoided. A. W. Contieri

Modified dry combustion method for the determination of organic carbon in soils. T. R. Seshadri. *Madras Agr. J.* 21, 413-21(1933).—The chief characteristics of the modification are (1) sufficient 100-mesh soil to give approx. 0.1 g.  $CO_2$  is mixed with 10 g. of specially ignited  $CuO$  and burned at red heat in a current of air; (2) to retain oxides of S, the tube is filled with a mixt. of wall-

ignited CuO (wire form) and PbCrO<sub>4</sub> (hempseed size); (3) halogens are removed by a 15-cm. length of closely packed fine Ag wire or wool maintained at red heat; and (4) oxides of N are removed by passing the combustion gases through a U-tube contg. pumice soaked in concd. H<sub>2</sub>SO<sub>4</sub>. Detns. on 14 samples of soil contg. different amts. of carbonates indicated that combustion of the org. matter and decompn. of the carbonates (other than alkali carbonates) are complete in approx. 30 min.; excellent results were also obtained on pure org. compds. contg. different amts. of N, S, C and halogens. The method is inaccurate on soils contg. Na<sub>2</sub>CO<sub>3</sub> because of slow and incomplete decompn. of the carbonate. K. D. Jacob

**Njombe stock farm. Development of an experimental farm in the southern portion of Tanganyika Territory.** H. E. Hornby, R. R. Staples and M. H. French. *Tanganyika Territory Dept. Vet. Sci., Ann. Rept. 1932*, 78-91 (1933).—The soils are of granitic origin and consist of 3 main types, (1) a very deep reddish brown loam, (2) a brownish black top soil with yellow clay subsoil and (3) an almost black top soil gradually changing through chocolate-brown to red loam. The soils are slightly acid, contain no free CaCO<sub>3</sub>, are very low in citric-sol. P and are definitely deficient in K and Ca, the greatest Ca deficiency occurring in the brownish black soils and the greatest K deficiency in the red loam. The red loam is deficient in N. The brownish black soils are comparatively high in Na. Detailed analyses of dry and green pasture grasses from the district are given. The grasses are deficient in protein and inorg. elements, particularly K, Ca, Na and Cl; grazing increased the percentages of inorg. constituents and lowered the fiber content, but had no effect on the protein. Stock grazed on the pastures showed a low content of inorg. P in the blood. In expts. with sheep, the hay showed low digestibility coeffs., particularly that of the protein fraction. A natural "salt" lick, which consisted of a soft pink earth with thin layers of small quartz crystals, contained only 0.0186% H<sub>2</sub>O-sol. material; the aq. ext. contained traces of Cl, Na, Fe, Ca and Al. K. D. Jacob

**Waste products of agriculture; their utilization as humus.** Albert Howard. *Fertilizer, Feeding Stuff, Farm Supplies J.* 18, 403-4 (1933).—The prepn. of artificial manure from farm wastes is briefly discussed, with particular reference to the Indore process. K. D. Jacob

**The nitrogen hunger of the world** Frederick Keeble. *Scottish J. Agr.* 16, 381-93 (1933).—An address dealing with the relation of N to plant life. K. D. Jacob

**Nitrogen optimum and border effect in sugar cane.** C. van Dillewijn and L. Levert. *Arch. Suikerind.* 41, 509-82 (1933).—The optimum effect on sugar cane was obtained with 4 quintals per hectare of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. Beyond this, the no. of stalks did not increase; the no. of suckers, and infection by *Fusarium* increased up to 8 quintals, and then became const. The ripening process is retarded by N. With increasing quantities of N the cane yield first rises sharply, then more slowly; the rendement is highest without N, and slowly falls with increased quantities of N. The sugar yield rises rapidly to the optimum and then gradually decreases. The frequency curve of stalk lengths is regular when N is not added, but shows 2 maxima at 16 quintals (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The border effect is very pronounced between adjacent plots, untreated and treated with the largest amt. of N fertilizer. F. W. Zerban

**Summary of results of field tests on sugar cane in Java. Results of potash experiments, 1908-1932.** I. E. Demandt. *Arch. Suikerind.* 41, 111, *Mededeel. Proefsta. Java-Suikerind.* 885-983, plus 229 pp. of tables (1933).—This 1st part of the comprehensive summary gives only the results of the tests themselves, with a statistical analysis, but not their practical application. In Java as a whole, K is, like P, of much smaller importance than N. KCl is preferable to other forms, an application of 3 quintals per hectare being generally sufficient. Addn. of org. materials or of lime, to stimulate the effect of K, has not given any results. K has a larger effect when combined with either too low or too high doses of N and P. K

increases the rendement, but only slightly when the proper amts. of N and P are given. Nitrophoska or Ammophoska is not any more effective than the single constituents. The effect of K on the sugar yield increases regularly as the percentage of available K in the soil decreases. On the soils of east Java K has little or no value, but in central and west Java there are soils that respond to it, especially in east Pekalongan. Further K expts. should be initiated only after consulting the exact genetic soil maps which have been prepd. F. W. Z.

**Conservation of farmyard manure at Lyallpur.** S. Labh Singh and Ch. Karam Rasul. *Agr. Live-stock India* 3, 352-3 (1933).—Conservation of the N in excrement from bullocks fed and worked under exactly comparable conditions was increased 100% by absorbing the urine in a 6-in. layer of canal silt and earth and by storing the solid manure in covered pits, as compared with storage of the manure in open heaps and allowing the urine to go to waste. The N content of the solid manure alone was increased approx. 30% by storage in covered pits as compared with storage in open heaps. K. D. Jacob

**The acidity or basicity of fertilizers and their action on soils and soil acidity.** H. P. Cooper and W. R. Paden. *Am. Fertilizer* 47, No. 13, 9, 22 (1933).—Analyses of 1374 samples of cultivated Piedmont soils and of 1999 Coastal Plain soils in S. C. showed that 18% of the former and 51% of the latter are strongly or extremely acid. The toxicity of such elements as Al, Mn and Fe is very probably an important factor in the lack of satisfactory growth of crops on certain Piedmont soils. Since the Coastal Plain soils contain much less Al, Mn and Fe, they may grow satisfactory crops in the presence of high soil acidity. Soils that have become unproductive as a result of soil acidity may be restored to their original fertility by addn. of liming materials either mixed with the fertilizer or as a sep. application. High soil acidity favors the loss of such elements as Mg and Mn and these must be supplied if satisfactory response is to be secured from applications of com. fertilizers. On some of the strongly acid soils a basic fertilizer may produce a satisfactory crop whereas an acid fertilizer mixt. on the same soil may result in an almost complete crop failure. W. H. Ross

**Fineness and distribution of natural phosphate used as fertilizer.** G. H. A. Leijenaar. *Dissertation, Wageningen, Arch. Suikerind.* 41, 676-8 (1933).—The soly. of Algerian phosphate in 2% citric acid increases with the fineness of the particles, but in Nubaner tests it was found that the fraction between 0.05 and 0.03 mm. gave the best results. The still finer particles have a tendency to form aggregates which, like the grains larger than 0.05 mm., are less effective. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and other NH<sub>4</sub> salts increase the availability of the phosphate, because they are physiologically acid. F. W. Zerban

**Metals that we eat.** Lee Van Derlinden. *Am. Fertilizer* 79, No. 13, 5, 24, 26, 27 (1933).—A discourse reviewing the role of the minor metals in the metabolism of plants and animals, and emphasizing the importance of including an adequate supply of these metals in the prepn. of mixed fertilizers. W. H. Ross

**Mineral deficiency in the southern coastal belt of New South Wales. A preliminary survey.** Max Henry and M. S. Benjamin. *N. S. Wales Dept. Agr., Sci. Bull.* 42, 21 pp. (1933).—See *C. A.* 27, 2518, 3276. K. D. J.

**Tea yellows disease.** H. H. Storey and R. Leach. Nyasaland Protectorate Dept. Agr., *Bull.* [N. S.] 3, 12 pp. (1932); cf. *C. A.* 27, 3282. —The results of numerous field expts. showed that tea yellows can be largely controlled by the application of S or sulfate-contg. fertilizers to the soil. NaNO<sub>3</sub> increased the severity of the disease and plants fertilized with urea or Nitrophoska showed but little improvement. When tea seedlings were grown in nutrient soln. serious scorching of the leaves occurred in the absence of K, Cl or Mg, but the exact symptoms of yellows disease were produced only in the absence of S. As compared with the leaves and stems of healthy plants, those from diseased plants were markedly low in S. K. D. Jacob

**Wetting, spreading and emulsifying agents for use with**

spray fluids. VI. The effect of varying proportions of water and aid to solution on miscible oil formation and on the character of the emulsions subsequently formed from these miscible oils. R. M. Woodman. *J. Soc. Chem. Ind.* 52, 351-2T(1933); cf. *C. A.* 27, 4869.—The system emulsifier—aid to soln.—water appears to be the logical starting point in the prepn. of miscible oils contg. any toxic oil. In this particular example it is possible to select a ternary soln. in the isotropic soap phase of optimum compn. for incorporating any toxic oil. Addn. of excess of water up to a certain amt. before incorporation of the toxic oil does not seem to influence markedly the stable and non-creaming characteristics of the oil-in-water emulsions subsequently formed by addn. of water in bulk; similar addns. of the aid to soln. (phenol) before incorporation of the toxic oil cause undesirable instability and rapidity of creaming in the emulsions so obtained. There appears to be no reason why a turbid miscible oil should not form good spraying emulsions. VII. The effect of gelatin on water losses from leaves. R. M. Woodman and H. R. Barnell. *Ibid.* 352-4T.—Gelatin films on leaves exert practically a negligible effect on water losses. Thus the inclusion of glue or gelatin in a spray fluid is not likely to prove dangerous by clogging the stomata or by interfering with cuticular water losses. J. R. Adams

The method of action of copper mixtures at the moment of use. J. Branas and J. Dulac. *Compt. rend.* 197, 938-41(1933).—The ordinary means of applying acid, neutral or alk. Bordeaux or Burgundy mixt. deposits enough Cu in soln. (at least 1/20,000) to assure, at the moment of their use, a certain protection to vineyards. The quantity of dissolved Cu in these solns. lessens in proportion as the addns. of  $\text{Na}_2\text{CO}_3$  or CaO increase. J. R. Adams

The changes in calcium cyanamide in storage. A. I. Akhromeiko. *Trans. Sci. Inst. Fertilizers (Moscow)* No. 92, 149-63(1932).—In storage,  $\text{CaCN}_2$  increased in wt 60%. The time of such a wt. increase varied with the humidity. No loss of N takes place.  $\text{H}_2\text{O}$  and  $\text{CO}_2$  are responsible for the wt. increase. In a moist atm.  $\text{CaCN}_2$  is converted chiefly into dicyanodiamide and only slightly into urea. In dry air only a small portion of the  $\text{CaCN}_2$  is converted into dicyanodiamide. The poor results obtained with  $\text{CaCN}_2$  are ascribed to the formation of the unavailable dicyanodiamide. For the best results,  $\text{CaCN}_2$  should not be kept long in storage. J. S. Joffe

Spray value of nicotine supplements for aphids. H. C. Hockett. N. Y. Agr. Expt. Sta., *Tech. Bull.* 210 3-20 (1933).—Soaps and mineral oils served in a marked degree to improve the aphicidal properties of nicotine sulfate and aq. sprays. With Bordeaux mixt. the improvements were not so significant. In general, a 1:800 soln. of nicotine sulfate was required for max. kills. At 1/2 this concn., the results were variable and sometimes unsatisfactory. The lower concns. were most effective against potato and melon aphids. Soaps, miscible oils, mineral and vegetable oils and a gum, when used as nicotine supplements in sprays, enhanced the effectiveness of the sprays against aphids. C. R. Fellers

Arsenic in spray residue on apples grown in New Mexico. Anco. N. M. Agr. Expt. Sta., *3rd Annual Rept.* 51-2(1932).—Right varieties of apples and 1 of pears were sprayed 2-5 times with As sprays during the growing season and sampled for As content. The  $\text{As}_2\text{O}_3$  was less than 0.01 grain per lb. at harvest time on apples sprayed twice. Samples taken on Aug 15th showed 0.015 grain per lb.; on Aug. 30th, 0.006; and on Oct. 10th, 0.005. The decrease resulted more from the increase in size of the fruit than from rain washing. Apples receiving more than 2 As sprays exceeded the tolerance of 0.01 grain per lb. C. R. Fellers

The insecticidal action of some furan compounds. Henry Gilman, L. C. Heckert, A. P. Hewlett and J. B. Dickey. *Iowa State Coll. J. Sci.* 7, 419-28(1933).—A no. of furan compds. have been examd. for correlations between constitution and insecticidal action, the method of Peet and Grady on flies being used. Counts were made at intervals of 10 min., 30 min. and 24 hrs., and the range of effectiveness was extended from 85 downs with 2-

benzoylfuran to 5 downs with *p*-hydroxyphenyl furylacrylate, at 30 min. Some correlations are indicated between constitution and insecticidal action of the 31 compds. studied. *Tetrahydrofurfuryl trimethylacetate*,  $b_p$  137-8°,  $d_4^{20}$  0.9704, odor pleasant; *m*-cresyl furoate, m. 39.5°,  $b_p$  155°; *guaiacol furoate*, m. 76°,  $b_p$  175°; *p*-cresyl furoate, m. 55°,  $b_p$  152°; *resorcinol difuroate*, m. 130°; *hydroquinone difuroate*, m. 200°; *phenyl furylacrylate*,  $b_p$  185°; *guaiacol furylacrylate*, m. 105°,  $b_p$  210°; *p*-cresyl furylacrylate, m. 75°,  $b_p$  195°; *m*-cresyl furylacrylate,  $b_p$  185°,  $d_4^{20}$  1.0728,  $n_D^{20}$  1.5980; *p*-hydroxyphenyl furylacrylate, m. 173°; *resorcinol difurylacrylate*, m. 112°; *catechol difuroate*, m. 116°; *m*-hydroxyphenyl furylacrylate, m. 128°; *o*-hydroxyphenyl furylacrylate, m. 132°; *tetrahydrofurfuryl oxalate*,  $b_p$  203°,  $d_4^{20}$  1.1835,  $n_D^{20}$  1.4650; *tetrahydrofurfurylpropyl oxalate*,  $d_4^{20}$  1.1045,  $n_D^{20}$  1.4675, decomposed on attempted distn. at 4 mm.; *tetrahydrofurfuryl salicylate*,  $b_p$  166°, pleasant odor,  $d_4^{20}$  1.1831,  $n_D^{20}$  1.5217; *tetrahydrofurfuryl dichloroacetate*,  $b_p$  106 8°,  $d_4^{20}$  1.3095, odorless; *2-chloroethyl furoate*,  $b_p$  116 17°, d. 1.2962, pungent taste; *tetrahydrofurfuryl  $\beta$ -furylacrylate*,  $b_p$  163 7°,  $d_4^{20}$  1.1450; *tetrahydrofurfuryl cinnamate*,  $b_p$  180-1°, d. 1.120; *2-chloroethyl  $\beta$ -furylacrylate*,  $b_p$  130-2°,  $d_4^{20}$  1.2343. F. E. Brown

Codling-moth investigations. John Ryer and R. F. Crawford. New Mex. Agr. Expt. Sta., *43rd Annual Rept.* 38-42(1932); cf. *C. A.* 27, 799.—The most attractive baits for codling moths in summer bait pan tests were cane sirup, malt sirup and isobutylphenyl acetate. The sugar sirups are dild. with water 1:10 and contain 0.2%  $\text{BzONA}$  as a preservative. In an effort to avoid As residues, the usual  $\beta$ -spray Pb arsenate program was modified by the use of oil-nicotine,  $\text{NaF-ALF}$ , nicotine tannate and oil-pyrethrum in the last 3 sprays of the season. Of these the  $\text{NaF-ALF}$ , nicotine tannate and oil-pyrethrum showed promise in codling moth control and the sprayed fruit contained only 0.001-0.004 grain of  $\text{As}_2\text{O}_3$  per lb. as against 0.043 for the fruit sprayed with Pb arsenate. C. R. Fellers

The effect of seed disinfection upon the oat crop. Arthur E. Muskett and Hugh Cairns. *J. Ministry Agr. Northern Ireland* 4, 105-15(1933).—Dusting the seed grain with org. Hg compds. was nearly as effective as treatment with formaldehyde in controlling smut diseases of oats. Cu compds. were of some value as fungicides but caused definite crop injury; S had no fungicidal value for oat smuts. As general seed disinfectants the org. Hg compds. were more effective and caused greater increases in crop yields than formaldehyde. K. D. Jacob

Control of rose rust by summer spraying. Arthur E. Muskett and J. C. Taylor. *J. Ministry Agr. Northern Ireland* 4, 62-6(1933).—The effectiveness of sprays in controlling rose rust was in the descending order (1) Sulsol, a proprietary colloidal S prepn., plus soft soap, (2) Bordeaux mixt., (3) Bouisul, a colloidal Cu prepn., plus soft soap, and (4) liver of S plus soft soap. Bordeaux mixt. and Bouisul caused either severe leaf marking or leaf discoloration. K. D. Jacob

Control of finger and toe [disease] of broccoli in County Down. D. W. Baillie and A. E. Muskett. *J. Ministry Agr. Northern Ireland* 4, 44-6(1933).—Good control of the disease was obtained by treating the soil with a 0.1%  $\text{HgCl}_2$  soln. applied at the rate of 0.5 pint per plant at time of planting. Treating the soil with air-slaked lime and dipping the roots of the plants in powd.  $\text{HgCl}_2$  were ineffective. K. D. Jacob

Sooty blotch on citrus fruits (van der Plank) 12. Fertilizers (Ger. pat. 582,924) 18.

Annuaire Lambert (Statistique des engrais et produits chimiques destinés à l'agriculture). 12th ed. years 1930, 1931, 1932. Paris: Bur. d'études économiques, industrielles et agricoles, 16 rue de Miromesnil (8e). 74 pp. F. 20. Reviewed in *Chem. Trade J.* 93, 274(1933); cf. *C. A.* 26, 796.

Fertilizer. Herman L. Hartenstein. U. S. 1,934,707,

Nov. 14. Cornstalks or similar plant residues are cut or shredded, mixed with pyrophoric iron, phosphate rock and water, and the mixt. is allowed to age in the presence of air and moisture.

**Fertilizer.** I. G. Farbenind. A.-G. (Hermann Klippel and Ernst Jaenecke, inventors). Ger. 582,552, Aug. 28, 1933. See U. S. 1,916,841 (C. A. 27, 4622).

**Fertilizers.** Eisen- und Stahl-A.-G. Fr. 751,724, Sept. 8, 1933. Hot Martin slags having a high Mn content are treated with crude phosphate from acid slags and silicic acid, the mixt. being afterward ground as fine as possible.

**Treatment of phosphatic slag.** Hoesch-Köln Neuessen A.-G. für Bergbau und Hüttenbetrieb. (Friedrich Heinrich, inventor). Ger. 583,856, Sept. 11, 1933. Addn. to 577,342 (C. A. 27, 4340). The process of Ger. 577,342 is modified by using  $H_2SO_4$  or HF in the first stage in place of  $HNO_3$ .

**Treating ores such as in producing phosphatic fertilizers.** Isaac N. Waggoner and Arthur E. Skeats. U. S. 1,936,002, Nov. 21. Gypsum is mixed with a plurality of unaggregated ores such as amblyonite mixts. contg. alumina and metals of the alkali group in certain proportions, the mixt. is heated and lixiviated with water, the soln. is drawn off and solubles such as Al and alkali metal compds. are recovered from the soln.

**Insecticides.** Antoine C. Gillet. Fr. 751,827, Sept. 11, 1933. Liquid insecticides are obtained in a colloidal form by emulsification in a medium contg. a Na or K resinates or soap, an appropriate protective colloid (e. g., casein) and an excess of resin or fat. The medium is prepd. by energetic grinding at 60–80°.

**Insecticide, etc.** I. G. Farbenind. A.-G. (Adolf Steindorf and Kaspar Pfaff, inventors). Ger. 582,702, Aug. 21, 1933. See Fr. 746,268 (C. A. 27, 4623).

**Fungicide, etc.** I. G. Farbenind. A.-G. (Kaspar Pfaff and Michael Erlenbach, inventors). Ger. 578,972, June 19, 1933. A wet or dry preserving agent for fruit trees, vines, cereals, etc., is prepd. by treating  $CuCl_2$  soln. with alkylene oxide and removing the excess of the latter.

**Disinfecting seeds.** Morris S. Kharasch (to E. I. du Pont de Nemours & Co.). U. S. 1,934,803, Nov. 14. A mercurized deriv. of a thiophene compd. such as  $\alpha$ -chloromercurithiophene or the like is used as active agent in seed-disinfecting compns. U. S. 1,934,804 relates to the similar use of a Hg compd. of the type R-Hg-OH, in which R is a hydrocarbon radical, such as an alkyl or aryl mercuric hydroxide.

**Plant preservation.** Joseph Bader. Ger. 578,685, June 16, 1933. Diseases of trees, especially elm trees, are prevented by introducing a benzene contg. a mixt. of mineral oil and naphthalene into the tree.

**Protecting vegetables.** Samuel Miaulet. Fr. 750,227, Aug. 7, 1933. Vegetables are protected by a fungicide such as cupric mud mixed with a colloidal emulsion of resin.

**Herbicides.** Paul L'aurquin. Fr. 751,644, Sept. 7, 1933. A herbicide consists of a finely ground natural salt of K (kainite, sylvinit, etc.) and anhyd.  $CaO$ , approx. in the proportion of 4 to 1.

**Herbicides.** Georges Truffaut and Isaac Pastac. Fr. 751,842, Sept. 11, 1933. Solns. of nitrites with or without sol. salts of uni- or bi-valent metals are used as herbicides.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

**Alcohol from potatoes—technical methods on the Continent.** A. E. Williams. *Chem. Trade J.* 93, 335-6 (1933).—A discussion of the sources of supply of potatoes in England, prepn. of the wort, fermentation and distn. and the by-products of the industry. W. H. Boynton

**The vitamin contents of potato residues.** A. Scheunert and M. Schieblich. *Biedermanns Zentr. B. Tierernuhr.* 5, 653-6 (1933).—The residues of potatoes from the distn. of spirits showed  $1/10$ – $1/100$  the B and G vitamin contents of dried yeast. B was somewhat higher than G.

F. L. Dunlap

**Effect of light on the carbon monoxide inhibition of butyric acid fermentation.** Walter Kempner and Fritz Kuhowitz. *Biochem. Z.* 265, 245-52 (1933).—Butyric acid fermentation is an anaerobic process which is reversibly inhibited by  $CO$ . But the sensitivity to light could be demonstrated only at low temp and with illumination of very great intensity. Under these conditions the fermentation can be completely and reversibly inhibited, but even then the light sensitivity is very much smaller than that of the respiration. The  $CO$  compd. of the butyric acid enzyme absorbs light within the spectrum range of 650 to 306  $m\mu$ .

S. Morgulis

**The preparation and importance of glyceric acid-monophosphoric acid.** Carl Neuberg and Maria Kolbe. *Angew. Chem.* 46, 711-13 (1933).—A method for the prepn. of the acid is described, based upon the action of yeast on hexoses. A detailed account of the exptl. work is presented. Thirteen references. Karl Kammermeyer

**Formation of glucuronic acid by *Aspergillus niger*.** E. Kardo-Susoeva. *Biochem. Z.* 266, 337-51 (1933).—The fermentative processes are affected by decreasing the normal salt content of the nutritive medium. A nutritive salt content of only  $1/30$  concn. is most favorable to the production of glucuronic acid, which is further increased through the addn. of  $CaCO_3$ . The excess of N-contg. salts has a stimulating effect on the accumulation of glucuronic acid only in an acid medium. The glucuronic acid yield is also increased by cultivating the molds on changing media. At 33–35° the development of the mold

in one nutritive soln. should proceed 3 days, then 5 days in the second soln.

S. Morgulis

**Kinetics of the accumulation of organic substances in cultures containing two species of yeast.** G. F. Gause. *Biochem. Z.* 266, 352-4 (1933).—Theoretical. S. M.

**Yeast-growth stimulants in white sugars (Hall, et al.) 28.**

**Acetone and alcohols.** Maschinenbau-A.-G. Gölzern-Grimma. Fr. 751,623, Sept. 7, 1933. Acetone, EtOH and BuOH are obtained in a continuous manner from worts or other aq. solns. The distillate enriched in a distn. column, in acetone, EtOH and BuOH from a wort or aq. soln. is submitted immediately after condensation and removal of non-condensable gases to a continuous rectification comprising several steps. In the first step acetone and EtOH are sep'd. from BuOH and water, from which the constituents are then sep'd.

**Propionic acid.** Hugh R. Stiles (to Commercial Solvents Corp.). Brit. 396,968, Aug. 17, 1933. Carbohydrates are fermented in presence of bentonite, or a hydrated  $Al_2O_3$  such as activated  $Al_2O_3$ , by means of various strains of *B. acidi propionici*, with or without other bacteria such as those that produce lactic acid, hydrolyze nitrogenous substances, e. g., the *Proteus* group, ferment salts of org. acids, e. g., the *Alkaligenes* group, and form mannitol, e. g., *B. mannitolpocum*, *B. gayoni* and *Lactobacillus fermentum*. The inoculation with the different bacteria may be successive or simultaneous. The process may be effected at 30–1° with an acidity of  $pH$  5.4–6, maintained by an excess of  $CaCO_3$ . Cf. C. A. 28, 565<sup>2</sup>.

**Vinegar generator.** Alfred W. Hinchliffe (to Buffalo Foundry and Machine Co.). U. S. 1,934,712, Nov. 14. Structural features of sparge arms, etc.

**Fermentation glycerol.** Wallace H. Carothers, Julian W. Hill and Frank J. L. Van Natta (to E. I. du Pont de Nemours & Co.). U. S. 1,936,497, Nov. 21. Sugar is fermented in an alk. medium, the glycerol formed is distd. from other fermentation products, the distd. glycerol is



rendered alk. with lime, and the liquid is blown with air to destroy phenols.

**Fermentation processes.** Frédéric Lévi. *Fr.* 753,152, Oct. 9, 1933. The  $\text{CO}_2$  evolved is purified by adsorbents, particularly active charcoal. The alc. carried over by the  $\text{CO}_2$  is also recovered thereby. Adsorbents are also used for purifying *pyroligneous acid*.

**Plant for distilling fermented wort and mash.** Wilhelm

Vogelbusch. *Ger.* 582,609, Aug. 17, 1933. Addn. to 564,876 (*C. A.* 27, 1085).

**Device for extracting hops.** Wilhelm Greiner. *Ger.* 578,559, June 15, 1933.

**Yeast.** Hans Braasch and Arnold Braasch. *Fr.* 750,158, Aug. 5, 1933. The air introduced during the period of multiplication of the yeast contains about 1-3% of  $\text{CO}_2$ . Cf. *C. A.* 27, 5471.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**Fougère types of perfumes.** Alfons M. Burger. *Riechstoff Ind. u. Kosmetik* 8, 175-6(1933).—A discussion and formulas.

**Raw materials of cosmetics.** Karl Pfaff. *Riechstoff Ind. u. Kosmetik* 8, 177-9(1933); cf. *C. A.* 27, 565.—A discussion of (1) *beeswax*, its properties and uses in water-free cerates and cerates contg.  $\text{H}_2\text{O}$  and cold creams, (2) *wax soaps*, (3) *artificial waxes* and their compn. and (4) *spermaceti*. Formulas are included. H. M. B.

**Microchemistry of the opium alkaloids.** L. Kosler. *Pharm. Monatsh.* 14, 220-2(1933).—Different cryst. forms (all belonging to the rhombic system) of morphine are prepared: (a) one contg. water of crystn. and (b) two anhyd. forms (metastable, m.  $197^\circ$ , and stable, m. with decompn.  $240^\circ$ ). The stable form upon microsublimation yields crystals of three types ( $\alpha$ ,  $\beta$ ,  $\gamma$ ) with  $n = 1.653$ , 1.657 and 1.671, resp. The metastable modification upon the same treatment yields crystals with  $n = 1.573$ , 1.625 and 1.630; (a) yields crystals with  $n = 1.582$ , 1.623 and 1.644. *Codeine* in a micro melting pt. app. shows crystals contg. water of crystn. (m.  $63^\circ$  and  $68^\circ$ ) and water-free cryst. (m.  $155^\circ$ ). Similar detns. are reported for morphine-HCl.

**Sulfur-containing remedies and their analysis.** E. Schuele. *Pharm. Monatsh.* 14, 228 9(1933).—To det. elementary S weigh in a 30-cc. beaker a quantity of substance equiv. to 1-2 mg. S. Scatter 0.2 g. KCN upon the sample, add 8-10 drops  $\text{H}_2\text{O}$  and 15 cc.  $\text{Me}_2\text{CO}$ , and evap. to dryness. To the residue add 5 cc.  $\text{Me}_2\text{CO}$  and again evap. to dryness. Dissolve the residue in a little  $\text{H}_2\text{O}$ , filter if necessary and dil. to 50-60 cc. To the soln. contained in a 100-cc. flask add 1 g. boric acid and coarse pumice, and boil for 10 min. By Schuele's method det. the thiocyanate formed. Slight modifications of the usual methods for organically bound S in the presence and absence of N as well as total S are discussed. H. M. B.

**Microchemistry of antipyrine.** C. van Zijp. *Pharm. Weekblad* 70, 1243-8(1933).—The color reaction of antipyrine with  $\text{HNO}_3$  is described in detail. The nitro deriv. obtained in white crystals by evapg. the reaction mixt. has characteristic appearance, soly. and optical properties. Crystallographic data are given.

**Communications from the laboratory of the Dutch society for the promotion of pharmacy.** Nos. 36-40. **Examination of tablets.** H. J. van Giffen. *Pharm. Weekblad* 70, 1270-8(1933); cf. *C. A.* 27, 4344.—Methods of examn. and reports of analyses are given for the following tablets manufd. by European pharmaceutical houses: dicodid bitartrate, eucodal, dilaudid, ephedrine, ephedron and ephetonine.

**Variations in the strength of cardiac-active glucosides as determined by means of frogs.** S. Rosenkranz. *Arch. expl. Path. Pharmacol.* 172, 18-25(1933).—The sensitivity of frogs to glucosides derived from digitalis, scylla, convallaria and strophanthus may vary as much as 43% when tested daily over a period of a month. The sensitivity is min. in the first months of the year. H. Eagle

**The standardization of digitalis infusion and tincture with respect to their therapeutic use.** S. Rosenkranz. *Arch. expl. Path. Pharmacol.* 172, 26-35(1933).—Although infusion exhausts the leaves of the active glucosides, the infusion is less active than the tincture, and does not keep. Tinctures prepd. with 50-70% EtOH are most active, but do not keep as well as those prepd. with 96-

9% EtOH which are significantly less active. The opt. procedure is to use 70% EtOH and keep the tincture in the ice chest. It should be replaced every 3 months.

Harry Eagle

**The catalytic effect of iron salts upon the decomposition of nicotine during smoking.** Emil Starkenstein and Wilhelm Stejskal. *Arch. expl. Path. Pharmacol.* 172, 119 36(1933).—The addn. of Fe salts to cigars decreases the amt. of nicotine in the smoke by 25%. This is not due to combination of the nicotine with the Fe, but to a catalytic increase in the decompn. of nicotine at the C-Fe surface.

Harry Eagle

**The standardization of digitalis by means of cats.** H. Bauer and K. Fromherz. *Arch. expl. Path. Pharmacol.* 172, 693-8(1933).—The type of anesthesia has only a slight effect upon the standardization of digitalis alkaloids by means of cats. The Magnus method of detg. digitoxin and digitoxin-contg. glucosides gives lower values than the original method of Hatcher and Brody. The term cat unit has no abs. significance; the method used must be exactly described.

Harry Eagle

**Estimation of essential oil in camomile flowers.** R. Hofmann and R. Brachvogel. *Apoth. Ztg.* 48, 1394 (1933).—Until a better method is available, the D. A. B. 6 procedure should be followed.

W. O. E.

**Pinene from Nectandra olacophora Bar. Rod. N. Botafogo Gonsalves.** *Arch. Pharm.* 271, 461-2(1933).—The reddish yellow crude oil obtained from the tree by tapping had  $d_4^{20}$  0.8960,  $n_D^{20}$  1.471,  $[\alpha]_D^{20}$   $58^\circ 22'$ , and gave on fractionation a pinene having  $d_4^{20}$  0.8656,  $n_D^{20}$  1.466,  $[\alpha]_D^{20}$   $66^\circ 32'$ .

W. O. E.

**Detection of local anesthetics.** R. Fischer. *Arch. Pharm.* 271, 460-70(1933).—A procedure is described by means of which cocaine and 12 synthetic local anesthetics can be quickly and definite detected. The alkaloid is pptd. on the object glass by means of a suitable reagent. The resulting crystals are thereupon washed, dried and then subjected to a micro m.-p. detn. whereby a positive identification can be effected in from 20 to 30 min.

W. O. E.

**Characterization and testing of tinctures.** A. Mayrhofer and Anatol Beck. *Pharm. Presse, Wiss.-prakt. Heft* 1933, 129 37.—A review is given of procedures previously suggested for the characterization and evaluation of tinctures, notably those involving factors of color. The present paper reports the results obtained in the examn. of a series of tinctures with respect to their color tone and relation of the latter to quality. The color measurements were based on the Ostwald color theory and carried out with the aid of a simple app. (illustrated) specially constructed for this line of work.

W. O. E.

**Present status of our chemical knowledge of plant laxatives.** L. Rosenthaler. *Pharm. Presse, Wiss.-prakt. Heft* 1933, 137-9.

W. O. E.

**Pharmacopeia Helvetica Editio Quinta.** L. Rosenthaler. *Pharm. Zentralhalle* 74, 670-4, 701-5(1933).—A digest.

W. O. E.

**Recovery of nicotine from the steam-distillation residues of tobacco.** Constantin Pyriki. *Pharm. Zentralhalle* 74, 717-21(1933); cf. *C. A.* 27, 3287.—From tobacco residues completely exhausted of nicotine by alk. (NaOH) steam distn. a positive test with silicotungstic acid resulted on further distn. of such residues after they had stood for some time. The dipicrate obtained with the 2nd distn. was

identified as that of nicotine. The sepn. of nicotine takes place slowly and hence requires a long time for its complete elimination; even boiling before a reflux did not hasten the operation. Contact of the residues with MgO failed to promote sepn. of the alkaloid. The quantities of nicotine obtained from cigar and cigaret tobaccos were 0.139-0.153 and 0.072-0.081, resp. The reason for the above phenomena is probably the fact that tabacin, a glucoside of tobacco, by the action of strong alkali releases nicotine.

W. O. E.

**Change in certain pharmaceutical tinctures and alkaloidal salt solutions on exposure to sun and ultra-violet light. II.** With especial reference to optical rotation. C. A. Rojahn and Edgar Haase. *Pharm. Zentralhalle* 74, 625-31(1933); cf. *C. A.* 26, 5173. —This paper is a continuation of R. and Herzog's investigations in the same field. A year's exposure to sunlight produced changes in tinct. hydrastis (about 25%) and in tinct. capsici (35%); while the tincts. aconiti, arcaeae, belladonnae, granati (?) and strophanthi were relatively stable (losses under 5%). With ultra-violet light the changes were: tinct. arcaeae 28, hydrastis 23.6 and capsici 35.1%, the tincts. aconiti, belladonnae, granati and strophanthi being stable. Alkaloidal and alkaloidal salt soln., after 24-hr. exposure to ultra-violet light, suffered losses in content up to 31.3% (cinchonidine), cocaine being least affected. The optical rotation also is lessened. The color content of tinct. capsici is decreased by daylight exposure; it is increased, however, with tincts. granati, hydrastis and arcaeae; it is retained after temporarily fading in the case of tincts. aconiti and strophanthi. On exposure to ultra-violet light for 48 hrs. the color of tincts. aconiti, belladonnae and capsici fades, but increases, however, in the case of tincts. arcaeae, hydrastis and strophanthi, while that of tinct. granati remains practically unchanged.

W. O. E.

**Viscosity measurement in evaluating tinctures.** Hellmuth Schrader. *Pharm. Ztg.* 78, 1159 61(1933). —The results obtained in the examn. of a series of tinctures with the Hoppler viscometer are presented in the form of a graph and numerical values.

W. O. E.

**Iodine and iodized surgical dressings.** Max Sido. *Pharm. Ztg.* 78, 1188-9(1933). —The conditions under which I was discovered, as also the use of I-carrying products several centuries earlier, are discussed.

W. O. E.

**Natural and synthetic menthol.** Fritz Unger. *Pharm. Ztg.* 78, 1203 4(1933). —Certain criteria are suggested for the evaluation and use of these two products in pharmacy and medicine.

W. O. E.

**Sterilization of urotropine solutions.** A. Pfister. *Pharm. Ztg.* 78, 1228 9(1933). —In order to dissipate certain contradictory statements relative to sterilization of urotropine solns., and on the assumption that the amt. of  $\text{CH}_2\text{O}$  liberated at a fixed temp. suffices to sterilize the soln., expts. were carried out with 10 and 25% solns. of urotropine in glass ampoules at room temp. over varying periods. While 25% solns. were found to be sterile at the end of 48 hrs., it appears that those of 10% strength should be heated  $\frac{1}{4}$  hr. at  $40^\circ$  in order to acquire sterility.

W. O. E.

**Evaluation of white petrolatums.** V. O. Schmatolla. *Pharm. Ztg.* 78, 1214-15(1933). —The conception and importance of viscosity in petrolatum are discussed notably the many erroneous views still pertaining thereto. The following procedure is suggested as affording a satisfactory method of evaluation: On a relatively large watch glass weigh out 1 g. of the sample, spreading it to a uniform depth of 1 mm. and over an area of  $40 \times 40$  mm. Cover with 3 g. concd.  $\text{H}_2\text{SO}_4$  and rub the petrolatum layer by short quick movements with the dry round base of a wide test tube. A genuine, sufficiently pure pharmaceutical petrolatum will under this treatment become at the most brownish and never after 5 min. quick rubbing form a fine flaked, emulsion, but remain coherent or possibly develop into larger agglomerated adherent flakes. A tech. "white" petrolatum becomes rapidly brown or acquires a red rusty tone under these circumstances, thereby forming an emulsion and on account of the finer distribution ap-

pears to become again lighter in color, a phenomenon that may deceive.

W. O. E.

**Comparative study of the assays of cinchona bark.** Margarethe Oakley. *Am. J. Pharm.* 105, 535-46 (1933). —The 1 titration method of Dubreuil and the silicotungstic procedure of Beal and North were employed on the mixts. of the pure alkaloids successfully and are compared with the U. S. P. method. The official method of removing the alkaloids from the crude drug was found to be capable of a high degree of accuracy. In this comparison it is pointed out that by evapn. of the ethereal solvent without effort to purify, much extraneous material is weighed with the alkaloids. The shaking out process removes some of this impurity, but not by any means all of it. The 1 titration gives low results on residues obtained in the assay. The silicotungstic acid pptn. gives concordant results and may be employed without subjecting the alkaloid to the shaking out process. The following procedure is recommended: Weigh 5 g. of the powd. (No. 60 fineness) bark into a 500-cc. Erlenmeyer flask. Add 15 cc. of 3% HCl. Mix so that the bark is evenly wet. Digest on a water bath for 1 hr. Cool. Add 200 cc. ether-chloroform (3 parts ether and 1 part  $\text{CHCl}_3$ ) and 10 cc. strong ammonia. Stopper and shake in a mech. shaker 1 hr. Allow to stand overnight. Shake for an addnl. 30 min. Decant 100 cc. of the ethereal solvent (representing 4 g. of bark) and evap. to dryness. Dissolve the crude alkaloids in 10 cc. of ether and add 100 cc. of approx. 0.6 N HCl. Warm on a water bath until the ether has evapd., transfer to a 200-cc. vol. flask and make up to the mark with 0.6 N acid. To a 50-cc. aliquot of this soln. add 50 cc. of the 0.6 N acid and 15 cc. of 6% silicotungstic acid. Stir vigorously and then allow to settle. Decant the supernatant liquid through a weighed Gooch crucible, add the ppt. to the crucible and wash with 1% HCl. Dry at  $100^\circ$  and ignite at a bright red heat. Cool in a desiccator and weigh. The wt. of the anhydride multiplied by 21.72 equals the percentage of alkaloid in the drug. ( $2 \times \text{av. mol. wt. of cinchona alkaloids} \times 100$ )/mol. wt. of  $\text{SiO}_2 \cdot 12\text{WO}_3 = 21.72$ . A bibliography is appended.

W. G. Gaessler

**Achillea Millefolium, Linne. Constituents of the petroleum ether extract of the blossoms.** R. L. McMur-ray. *Am. J. Pharm.* 105, 573 82(1933). —The percentage of extractive sol. in petr. ether amounted to 2.019% with 100 lb. of air-dried, ground blossoms in a Lloyd extractor. Org. compds. isolated from this ext. and not previously reported in the literature are: (a) satd. fatty acids myristic acid, palmitic acid, undetd. acid, cerotic acid; (b) unsatd. fatty acids—linoleic acid, oleic acid; (c) satd. alc.—cetyl alc.; (d) unsatd. alc.—sterol; (e) satd. hydrocarbon tricacontane.

W. G. Gaessler

**Recent developments in pharmacopoeial vitamin standardization.** E. Fullerton Cook. *Am. J. Pharm.* 105, 583 7(1933). —The U. S. P. Vitamin Advisory Board recommend the following standards for the official cod-liver oil: the min. standard for vitamin A for U. S. P. cod-liver oil shall be not less than 600 international units. The min. vitamin D standard for U. S. P. cod-liver oil shall be not less than 85 international units. One U. S. P. X. Sherman or A. D. M. A. unit of vitamin A equals 1.4 international or new U. S. P. units. One Steenbock unit of vitamin D equals 2.7 international or new U. S. P. units. One international or U. S. P. unit of vitamin D equals 3.25 A. D. M. A. units.

W. G. Gaessler

**A study of fluidextract of cinchona.** Zdeněk Rektorič. *Časopis Českoslov. Lékárnictva* 13, 249-58(1933). —In the extn. of cinchona bark the yield of alkaloids in the fluidext. was 40% of the total alkaloids present using 90% alcohol as specified by the British pharmacopeia and 55% using water-glycerin mixt. acidulated with HCl as proposed for the next Czechoslovakian pharmacopeia. Volumetric detns. of the alkaloids in the preps. by the methods of Frerichs-Mannheim and the British pharmacopeia were in good accord but the latter gave slightly higher results for the bark.

William J. Husa

**Fowler's arsenical solution, Ph. A. VIII.** B. Rakušan

and J. Fanta. *Časopis Českoslov. Lékárnictva* 13, 277-80 (1933).—Discrepancies between the  $As^{III}$  content required in Fowler's soln. and the values found in recently prepd. solns. are not due to oxidation, which is very slow.

William J. Husa

The preservation of preparations of coca. A. and C. Chalmers. *Bull. sci. pharmacol.* 40, 577-81 (1933).—The fluidexts. of coca leaves show the same characteristics of stability as solns. of cocaine base in  $H_2O$ -EtOH: the higher the EtOH content, the less hydrolysis occurs. Acidification also improves the stability of dil. solns.

A. E. Meyer

Retamine. M. H. Wunschendorff and P. Valier. *Bull. sci. pharmacol.* 40, 601-4 (1933).—For the prepn. of the alkaloid, ext. the dried branches of *Retama sphaerocarpa* Boiss with 90% EtOH, slightly acidified with  $H_2SO_4$ . Evap. *in vacuo*, redissolve in 95% EtOH, filter, evap., dissolve the residue in  $H_2O$  and ext. with  $Et_2O$ . Alkalinize the aq. liquid with NaOH and ext. again with  $Et_2O$ . The white alkaloid crystallizes after evapn. of the  $Et_2O$ . The yield is 5 g. per kg. of the drug. It is a strong base, sol. in  $CHCl_3$ , petr. ether and EtOH, almost insol. in  $H_2O$ . It m.  $168^\circ$ , is dextrorotatory and has the compn.: C 72.0, H 10.40, N 11.20 and O 6.40% corresponding to the formula  $C_{14}H_{15}N_2O$ .

A. E. Meyer

A new method for the determination of stovaine. Juan A. Sánchez. *Semana méd.* (Buenos Aires) 1933, 11, 1419-20.—See C. A. 27, 1985.

A. E. Meyer

Biochemical studies on tobacco drying and fermentation. III. Are ammonia, methylamine and pyridine produced from nicotine during fermentation? J. Bodnár and Ladislav Barta. *Biochem. Z.* 265, 386 9 (1933); cf. C. A. 27, 1986.—Of the various Hungarian tobaccos the Kopa loses most nicotine during fermentation. This diminution is probably due to an oxidation as it cannot be accounted for by  $NH_3$ ,  $MeNH_2$ , or pyridine formation. The higher the H-ion concn. of the tobacco the less is the loss of its nicotine content.

S. Morgulis

Analysis of Spanish digitalis. Francisco Giral. *Anales soc. espan. fis. quim.* 31, 746 9 (1933).—Samples of Spanish digitalis were analyzed by the Perrot and Bourcet method (C. A. 22, 2437); 0.52 g. of cryst. digitalis was found per kg. of dried leaf of pharmaceutical grade, or 0.85 g. from a com. grade from Salamanca.

E. M. Symmes

Sterilization of solutions of sodium bicarbonate. Ar. Mihalovici. *J. pharm. chim.* 18, 418 21 (1933); cf. C. A. 28, 2561.—Pure sterile  $NaHCO_3$  is pptd. from aq. sterile soln. of crystd.  $Na_2CO_3$  by excess of gaseous  $CO_2$  under strictly sterile conditions, which are extended to the filtration and soln. of  $NaHCO_3$  in  $H_2O$ .

S. Waldbott

Liquor cresolis saponatus, British Pharmacopeia 1932. J. C. Roberts and R. V. Lloyd. *J. Pharm. J.* 131, 677 (1933).—Sapon. of linseed oil is difficult when its acid no. is low, e. g., 2.5 instead of the max. of 5.0 (Brit. Pharm.), but is rendered easy when oleic acid is added to the oil before sapon. To make 100 cc. of pale brown lysol, mix linseed oil 17 g. with oleic acid 1 g., heat the mixt. on the water bath and add a heated soln. of 4.2 g. KOH in 25 cc.  $H_2O$ . Heat and stir until sapon. is complete, replacing the evapg.  $H_2O$ . Cool, then add 50 cc. cresol and  $H_2O$  to bring the vol. to 100 cc. (cf. Berry, C. A. 27, 2532).

S. Waldbott

Detn. of elemental S (Allport) 7. Detn. of Fe (Ben-nett, Campbell) 7. Antimalarials (Miki, Robinson) 10. Phenol ketones of diphenylmethane, -ethane, -propane and their reduction products (Wojahn) 10. Intermediates and dyes [with bactericidal properties] (Fr. pat. 751,711) 25. Purifying ether (U. S. pat. 1,935,658) 10. Resin acid derivs. [products used for therapeutic purposes] (Ger. pat. 578,927) 26.

Zamarini, Guido: Formulario experimentado para perfumes, cosméticos, jabones, licores, vinos y jarabes. 2nd ed. Mexico, D.F.: Imprenta F. E. Graue. 347 pp.

Therapeutic preparations. Salomo Gerhard Tekla Budien. *Brit.* 397,516, Aug. 23, 1933. The elec.

charge of a therapeutic serum is adjusted by addn. of substances which influence the lability of the albumins contained in the serum, e. g.,  $CaCl_2$ ,  $MgCl_2$ , Ca gluconate and lactate, colloidal S. The charge is so adjusted that on adding 0.0-1.3 parts 0.1 N  $Na_2VO_4$  and 8.7-10 parts N AcOH to a test sample contg. 1 part treated serum and 1 part  $H_2O$  the albumin seps. in flocks.

Therapeutic preparations. I. G. Farbenind. A.-G. (Willy Ludwig and Otto Schaumann, inventors). Ger. 578,996, June 20, 1933. Pulverized cardiac muscles are extd. with water or aq.-org. solvent and filtered. The lipids, etc., in the filtrate are used for treating heart diseases.

Therapeutically active preparations. Pharmaceutische Werke "Norgine" A.-G. and Siegwart Hermann. Ger. 578,594, June 15, 1933. Nutritive solns. contg. carbohydrates are subjected to the action of pure cultures of *bacterium gluconum*. The resulting gluconic acid is converted into Ca salt and used for treating illnesses due to senile decay.

Detoxicant therapeutic compound. Winford P. Larson and Mortimer Bye (to Wm. S. Merrell Co.). U. S. 1,936,456, Nov. 21. For neutralizing and combating toxins in body cavities, as in treating infections of the lower intestine, a salt such as Na ricinoleate is used (suitably together also with other substances such as an aq. or oleaginous vehicle and antiseptic substances). Various details and examples are given. U. S. 1,936,457 relates to the treatment of disorders of the colon, etc., or exposed tissues such as those of wounds by use of ricinoleates such as those of Na, K, Li,  $NH_4$ , Rb or Cs.

Magnesium citrate solution suitable for medicinal use. Richard Pasternack and Clinton P. Ammerman (to Charles Pfizer & Co.). U. S. 1,936,304, Nov. 21. A stable soln. is formed contg. Mg citrate and gluconic acid with substantially no excess of citric acid.

Camphoric acid preparations. Carl A. Rojahn. Ger. 582,805, Aug. 23, 1933. Addn. to 571,501 (C. A. 27, 4349). Sol. preps. of the above character for therapeutic purposes are made by treating camphoric acid with mono- or diethanolamine under conditions in which no esterification of the OH group of the ethanolamine, or acid amide formation occurs, but only neutralization of the COOH group. The diethanolamine may be replaced by hydroxyethylbromoethylamine. Examples are given.

1-Methoxy-2-hydroxy-3-aminobenzene-5-sulfonic acids. Karl Streitwolf, Alfrid Fehle and Hans Hilmer (to Winthrop Chemical Co.). U. S. 1,935,960, Nov. 21. 1-Methoxy-2-hydroxy-3-amino-benzene-4- and -5-sulfonic acids are obtained, e. g., by reducing the corresponding 3-nitro compds. (various details being given) and are suitable for therapeutic use in combating protozoa diseases.

Bismuth salts of organic carboxylic acids. Rudolf Berendes and Ludwig Schütz (to Winthrop Chemical Co.). U. S. 1,934,785, Nov. 14. Bi salts generally sol. in fatty oils, sol. in org. solvents and very difficultly sol. in water, and which are suitable for therapeutic use, are obtained by heating Bi oxide or hydroxide on the water bath (and if desired with a solvent such as water) with acids such as dimethylacetic acid, methylallylacetic acid, diallylacetic acid, crotylpropylacetic acid, ethylisoamylacetic acid, isopropylphenylacetic acid, methylcyclohexylacetic acid, ethylbenzylacetic acid, isobutyltolylacetic acid, ethylanisylacetic acid, dicyclopentylacetic acid, heptylcyclohexenylacetic acid, etc. Several examples with details of procedure are given. Cf. C. A. 26, 3623.

Nitrogen-containing compounds of the pyridine and quinoline series. Max Bockmühl, Walter Krohs and Gustav Ehrhart (to Winthrop Chemical Co.). U. S. 1,936,547, Nov. 21. Details are given of the production of various therapeutic compds. which form water-sol. hydrochlorides, such as 1-dicyclohexylaminoethylpyridine-2-imide, 1-dicyclohexylaminoethylquinoline-2-imide, 2-dicyclohexylaminoethylaminopyridine, b<sub>2</sub> 190-5° and forming a dihydrobromide m.  $198^\circ$ , 1-dihexahydrobenzylaminoethylpyridine-2-imide, 1-(1'-dicyclohexylamino-pentyl-4')pyridine-2-imide, di-p-methylcyclohexylaminoethylpyridine-2-imide, 1-dicyclohexylaminoethyl-5-

hydroxypyridine-2-imide and 1-dicyclohexylaminoethyl-5-ethoxypyridine-2-imide.

**Asymmetrical arseno compounds.** I. G. Farbenind. A.-G. (Karl Streitwolf, Alfred Fehrlé and Walter Herrmann, inventors). Ger. 578,312, June 12, 1933. Addn. to 554,951 (C. A. 26, 6071). The method of 554,951 for prep. the above by reducing phenoxyacetic acid-arsonic acid or arylarsonic acids contg. a nitrogenous heterocyclic ring, is modified by carrying out the reduction in the presence of pyridine- or quinoline-arsonic acids. Thus, 4-acetyl-amino-2-phenoxyacetic acid-1-arsonic acid is mixed with 2-pyridonecarsonic acid and reduced with  $H_2PO_4$ . Other examples are given. The products have therapeutic uses.

**Metallic mercapto compounds.** Schering Kahlbaum A.-G. Brit. 397,293, Aug. 24, 1933. See Ger. 573,629 (C. A. 27, 4349).

**Salicylates.** Carl A. Rojahn. Ger. 582,148, Aug. 9, 1933. Addn. to 561,523 (C. A. 27, 1093). Salicylic acid or its 1 substitution products are treated in the cold with mono- or diethanolamine or a mixt. of both to give salts useful in therapy. Examples are given.

**Carvacrol.** Chemische Fabrik von Heyden A.-G. (Curt Philipp, inventor). Ger. 582,968, Aug. 25, 1933. Carvacrol is iodinated in the nucleus by treatment with alkali and agents used for the nuclear iodination of PhOH, up to 2 mols. of alkali being used to each mol. of carvacrol. Thus, carvacrol is treated with NaOH, NaI and  $NaIO_3$  to give an iodinated product. These products are useful as disinfectants.

**Santonin derivatives.** Schering-Kahlbaum A.-G. (Erwin Schwenk and Hans Goebel, inventors). Ger. 578,941, June 19, 1933. Basic solns. of santonin acid or solns. obtained by treating santonin with basic substances, are treated with an acylating agent under conditions which cause the soln. to remain basic. The resulting acyl deriv. is sepd. by acidification. In an example, 1 mol. of santonin is shaken with 2 mols. of NaOH.  $AcCl$  or  $Ac_2O$  is then added. On acidification of the soln. with  $HCl$ , the acetyl deriv., m. 143°, seps. The prepn. of the benzoyl and stearyl derivs. is also described.

**Ointments.** Firma Johann Trimmel and Hugo Weil. Ger. 587,142, Oct. 30, 1933. Ointment bases are prepd. by treating alkali silicate solns. with aliphatic or hydroaromatic monocarboxylic acids contg. more than 9 C atoms. Examples are given.

**Dealbuminizing therapeutic serums or other liquids.** Salomo Gerhard Tekla Rendien. Brit. 397,515, Aug. 23, 1933. See Ger. 571,404 (C. A. 27, 2974).

**Hormones.** Schering-Kahlbaum A.-G. Brit. 396,581, Aug. 10, 1933. A thyreotropic hormone which causes development of the parenchyma and shrinkage of the colloid of the thyroid gland is obtained from aq. exts. of the anterior lobe of the hypophysis by treatment thereof with an albumin precipitant and sepn. of the active substance from the ppt. The mother liquors from the pptn. contain the gonadotropic hormone. Suitable pptg. agents are picric, sulfosalicylic and trichloroacetic acids, heavy metal salts, e. g.,  $Pb(OAc)_2$ , or colloids, e. g., hydroxides of Fe or Al.

**Hormone extract.** Schering-Kahlbaum A.-G. (Johann Plesch, inventor). Ger. 582,593, Aug. 17, 1933. Hormone exts. with an action on the heart are obtained by extg. the auricles of the heart with  $MeOH$ , etc.

**Cystographic medium.** Arnold E. Osterberg (to Chemical Foundation, Inc.). U. S. 1,635,661, Nov. 21. A medium for cystography comprises a cold-water-sol. alk. Bi tartrate contg. at least about 65% Bi, forming non-irritating and freely flowing non-viscous solns.

**X-ray examinations.** Béla Moskovits. Fr. 750,173, Aug. 5, 1933. Aq. suspensions of  $BaSO_4$  for x-ray ex-

aminations are prepd. by agitating  $BaSO_4$  with water in the presence of artificial  $SiO_2$ -gels or natural silicates forming gels. Neutral substances such as kaolin may also be present.

**Antiseptic compositions.** Soc. nouvelle des mines de Saint-Champ. Fr. 750,342, Aug. 8, 1933. Oils contg. org. S compds. obtained, e. g., by distg. certain bituminous rocks, are mixed with fatty substances and used for antiseptic and insecticide purposes. Cf. C. A. 27, 805.

**Antiseptic absorbent material.** Regina J. Woody and McIlver Woody. U. S. 1,935,170, Nov. 14. Cellulosic fibers such as those of paper pulp stock are formed into a web which is transferred to a drying roll and while the web is in contact with this roll antiseptic material such as  $H_2BO_3$  is distributed over its exposed surface in the presence of sufficient moisture to cause the antiseptic to cement itself directly to the fibers of the web. App. is described.

**Disinfectant.** Peter Schestakoff. Ger. 578,663, June 10, 1933. Prepns. contg. 1 salts and O, for liberating free I for application to the skin, etc., are made by mixing water-sol. stable salts of HI with neutral mineral salts which liberate I from the I salts in acid soln. These are fused or pressed into tablets and used with acid in tablet form. Thus, a mixt. of  $KNO_3$ ,  $KNO_2$  and KI is made into tablets. When I is required, these tablets are mixed with tablets of  $Al_2(SO_4)_3$  and water.

**Disinfectants.** I. G. Farbenind. A.-G. Fr. 750,306, Aug. 8, 1933. An actin. product of  $HCOOH$  with a formate, e. g.,  $HCOOH$ ,  $HCOONa$ , is used with or without a support or fillers for disinfecting and preserving perishable substances.

**Disinfecting, etc., agents.** I. G. Farbenind. A.-G. Fr. 753,149, Oct. 7, 1933. Products of the formula  $R.X.R_1SO_3H$  (R is an aliphatic or cycloaliphatic radical or a radical of an acid of high mol. wt. and may contain substituents, X is O, N or S and  $R_1$  is a hydrocarbon radical which may contain substituents and contains less C atoms than R) or salts thereof are used alone or with other agents for disinfecting, deodorizing, etc. Such compds. include  $\gamma$ -cresoxy- $\beta$ -hydroxyoleylpropanesulfonic acid, Na acylcyclohexanol-sulfonate, Na oleylphenyl-iminoethanesulfonate, butyltauride of stearic acid, methyltauride of dichlorostearic acid, etc.

**Rambiazina oil.** Jean J. F. Trovalet. Fr. 752,093, Sept. 15, 1933. An essential oil, called Rambiazina oil, is obtained by steam-distg. green leaves of Rambiazina. The product is of use in perfumery, soap making, therapeutics and photography.

**Perfumes.** I. G. Farbenind. A.-G. Ger. 582,051, Aug. 7, 1933. Addn. to 566,994 (C. A. 27, 2534). The employment of monoalkyl or monoaryl ethers of glycol or its homologs as solvents or fixatives for perfumes as described in 566,994 is extended by using also org. acid esters of monoalkyl or monoaryl ethers of glycol or its homologs. Thus, oil of lavender is dissolved in an equal amt. of the salicylic acid ester of the monomethyl ether of glycol. Other examples are given.

**Cosmetic creams, etc.** Ludwig Konstandt. Fr. 751,939, Sept. 12, 1933. Pastes of alkali stearates prepd. by sapon. of stearin (e. g., to 36%) by means of a concd. alk. lye and preferably contg. substances such as oils or fats which have no wetting power in themselves are used for making cosmetic creams, etc. Only water formed by the sapon. is present.

**Hair dye.** Eugen Basch. Ger. 582,521, Aug. 16, 1933. A dye for living hair consists of aromatic diamines, (except *p*-phenylenediamine), aminophenols, hydroxyalkylamine, soap and org. solvent. Thus, the dye may contain triethanolamine, ethylene glycol monoethyl ether, distd. water, stearic acid, sulfonated dinitrophenol, *m*-phenylene-diamine, alc. and resorcinol.

## 18 -ACIDS, ALKALIES, SALTS AND SUNDRIES

I. M. SYMMES

**Sulfuric acid production by the lead chamber method.** P. Guareschi. *Industria chimica* 8, 1227-31 (1933), cf

C. A. 27, 5890. Math. The classical chamber method is compared with the more intensive tower system. The

chamber acid consumes less  $\text{HNO}_3$ , the tower system is less costly to install, but consumes more  $\text{HNO}_3$  and, because of the high temps., corrodes the lead chambers rapidly.

A. W. Contieri

"Blue acid." A reply to W. Manchot. E. Berl, K. Winnacker and H. H. Saenger. *Z. anorg. allgem. Chem.* 214, 354(1933); cf. *C. A.* 27, 1839, 5153.—Polemical.

E. M. Symmes

The lead chamber process. V. The mechanism of oxygen transfer by nitrosylsulfuric acid to sulfurous acid. E. Berl, H. Hillebrandt, and K. Winnacker. *Z. anorg. allgem. Chem.* 214, 369-79(1933); cf. *C. A.* 27, 4351.—(Oxidation of  $\text{SO}_2$  by residual  $\text{O}_2$  in the burner gas is a reaction proceeding under the catalytic effect of the intermediate products  $\text{SO}_2\text{NH}$  and violet acid ( $\text{SO}_2\text{NH}_2$ ) (*Z. angew. Chem.* 19, 881(1906)). This was tested on a lab. scale, and again showed the great influence of these intermediate compds. To obtain the highest possible reaction velocity, the dissolved  $\text{SO}_2\text{NH}$  must have a max. lability without complete decompn. If  $\text{HNO}_3$  were the catalyst, greater hydrolysis of  $\text{SO}_2\text{NH}$ , leading to  $\text{HNO}_2$  formation, would be most favorable, but the contrary is true. Tests with addn. of  $\text{HNO}_3$ , instead of  $\text{SO}_2\text{NH}$ , show that the N in the stable  $\text{HNO}_3$  hardly catalyzes  $\text{O}_2$  transfer. During a clearly observed induction period, with strong acid concns., the  $\text{HNO}_3$  is reduced to the labile, reactive  $\text{SO}_2\text{NH}$ , which then transfers  $\text{O}_2$ .

E. M. Symmes

The production of alumina from aluminum silicates. Yagoro Kato. *J. Electrochem. Assoc. (Japan)* 1, 154-9 (1933).—Upon standing for 2 or 3 hrs. a mixt. of Al silicates and concd.  $\text{H}_2\text{SO}_4$  at  $200^\circ$  showed 95% conversion into  $\text{Al}_2(\text{SO}_4)_3$ . No stirring under high pressure is required but slight heating is necessary in some cases. Upon extrn. pure cryst.  $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$  free from Fe and Ti was obtained with but 0.1% of FeO based upon  $\text{Al}_2\text{O}_3$  even from the aq. soln. contg. 10% of ferric salt. Action of  $\text{NH}_3$  gas on  $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$  in aq. soln. gives easily washable, cryst.  $\text{Al}(\text{OH})_3$ . Ferric salt is pptd. before the  $\text{Al}(\text{OH})_3$ ; upon igniting the  $\text{Al}(\text{OH})_3$ , very pure alumina is obtained.

K. Konda

Three and a quarter centuries of the potash industry in America. H. I. Smith. *Eng. Mining J.* 134, 514-18 (1933).—Historical.

W. H. Boynton

Recovery of potassium and aluminum salts, and silicic acid, from natural alkali-clay silicates. B. Granigg. *Monat. Rundschau* 25, No. 21, 1-9(1933).—The literature on methods of production of potash and Al salts is reviewed, and cost calcs. are made for the various raw materials found in quantity in various countries.

E. M. Symmes

Agar, its iodine content. Arai Itano. *Proc. Imp. Acad. (Tokyo)* 9, 398-401(1933).—The seaweeds from which agar is made contain I in amts. of 430-790 p. p. m. depending on the variety. Agar from these materials contains 24.5-101.9 p. p. m. in proportion to the amt. originally present in the seaweeds. The amt. of I in agar is controlled somewhat by the mfg. process and can be reduced 40-50% by washing with  $\text{H}_2\text{O}$ .

E. W. Scott

Synthetic plastic materials. Herbert Chase. *Machinery* (New York) 40, 137-9, 203 6(1933).—A review of different types of plastic materials available, and an outline of the methods used in their production.

A. W. F.

Commercial conversion of feldspar to kaolin. Robert Schwarz and Georg Trageser. *Z. anorg. allgem. Chem.* 215, 190-200(1933); cf. *C. A.* 27, 1595.—Treatment of feldspar at  $330^\circ$  with  $\text{N HCl}$  for 250 hrs. gives a product which is identical with kaolin in rate of loss of  $\text{H}_2\text{O}$  and x-ray pattern. The same result was obtained at  $320^\circ$  with 0.5  $\text{N HCl}$  in 115 hrs. At  $250^\circ$  for 180 hrs. with 0.5  $\text{N HCl}$  kaolin was not formed; instead, unchanged feldspar and  $\text{H}_2\text{SiO}_3$  were present. Anorthite was converted at  $340^\circ$  with 0.5  $\text{N HCl}$  in 60 hrs. Lewzite also required  $320^\circ$  for conversion. Unlike Badger and Ally (cf. *C. A.* 27, 2114) conversion with  $\text{H}_2\text{SiF}_6$  was unsuccessful, even at  $320^\circ$ . Conversion with  $\text{H}_2\text{CO}_3$  was unsuccessful. Treatment of kaolin at  $320^\circ$  with 0.5  $\text{N HCl}$  for 50 hrs.

altered the rate of loss of  $\text{H}_2\text{O}$ , because of some formation of  $\text{H}_2\text{SiO}_3$ .

Foster Dee Snell

Passau graphite for technical use. Erich Buchholz. *Feuerfest Ofenbau* 9, 140-2(1933).—A short review.

B. J. C. van der Hoeved

Metasilicate, its detergent applications. T. K. Cleveland. *Soap* 9, 19-21(1933).—A discussion of the use of metasilicate in laundries, and for glassware, households and the metal industry.

E. Scherubel

App. for  $\text{NH}_4$  sulfate production (U. S. pat. 1,936,308) 1.

Hou, Te-Pang: Manufacture of Soda, with Special Reference to the Ammonia Process. A Practical Treatise. Am. Chem. Soc. Monograph Series No. 65. New York: The Chem. Catalog Co., Inc. 365 pp. \$8.00.

Dilute acids. I. G. Farbenind. A.-G. Fr. 753,097, Oct. 6, 1933. Dil. acids are prepd. by enclosing substances which will form the acid in contact with water, in hermetically closed containers, which are pierced and placed in water. The containers may be weighted so that the substance dissolves without danger.

Purifying hydrochloric acid gas. George P. Adamson (to General Chemical Co.). U. S. 1,936,078, Nov. 21. Arsenical impurities are removed from  $\text{HCl}$  gas by contacting it with an adsorbent such as activated C, silica gel, activated bauxite or charcoal. App. is described.

Hydrocyanic acid. Gesellschaft für Kohlentechnik m. b. H. Fr. 752,296, Sept. 20, 1933.  $\text{HCN}$  is obtained by treating compds., contg. a SCN radical, in the form of a gas or fine division at a high temp., separately or in the presence of other gases or vapors, by air in the presence or not of catalysts. The heat necessary for volatilization of the SCN compd., evapn. of the materials accompanying it and oxidation of the SCN radical is obtained by introducing the SCN compds., into hot combustion gases contg. an excess of air and causing the mixt. to pass through an oxidation chamber.

Nitric acid. Hermann Frischer. Fr. 750,655, Aug. 16, 1933.  $\text{HNO}_3$  of high concn. is obtained from oxides of N by interposing between the usual condensation and absorption app. oxidation chambers in which the heat produced by the reaction is dispersed by indirect cooling, while freeing as far as possible the gases introduced into the oxidation chambers of water which they contain or drying the gases as much as possible. Cf. *C. A.* 27, 813.

Nitric acid. Harry Pauling. Fr. 752,042, Sept. 15, 1933.  $\text{HNO}_3$  is made from N oxides by bringing N oxides at about  $250^\circ$  into direct heat exchange in countercurrent with  $\text{HNO}_3$ , without previous sepn. of the water of combustion, the gases being first satd. with  $\text{HNO}_3$  up to the dew point. The gases become oxidized and cooled with sepn. of the  $\text{HNO}_3$  they contain, after which their transformation to  $\text{HNO}_3$  takes place, while the  $\text{HNO}_3$  heated by exchange is sublimated to a vacuum evapn. or by blowing in inert gases. The vapors produced by the evapn. serve to conc. by rectification the  $\text{HNO}_3$  obtained by absorption of the N oxides.

Chlorosulfonic acid and sulfur dioxide. Soc. pour l'ind. chim. à Bâle. Fr. 750,258, Aug. 8, 1933. See Brit. 393,546 (*C. A.* 27, 5902).

Ammonia-synthesis apparatus with purifier systems for the gases used operating under pressure. Walter H. Kniskern (to Atmospheric Nitrogen Corp.). U. S. 1,936,167, Nov. 21. Various details of app. and operation are described.

Apparatus for the synthesis of ammonia. Lawaczek G. m. b. H. Ger. 579,987, July 4, 1933.

Products containing alkali cyanamides. Stickstoffwerke G. m. b. H. (H. Heinrich Franck and Fritz Hochwald, inventors). Ger. 582,025, Aug. 18, 1933.  $\text{NH}_3$  is caused to react on alkali carbonates at  $500-700^\circ$  with exclusion of reducing gases. Cf. *C. A.* 27, 4744.

Alkali hydroxides. Società italiana potassa. Fr. 751,093, Sept. 7, 1933. Silicates such as leucite are treated

with steam at a high temp. to form alkali hydroxides, the steam being condensed and re-evapd to sep the hydroxides and is used again.

**Alkali nitrate.** Alfred Mentzel Ger 578,777, June 16, 1933. App for producing alkali nitrate, especially  $\text{NaNO}_3$  and  $\text{HCl}$ , from  $\text{HNO}_3$  and alkali chloride is described.

**Alkali nitrates** Chemieverfahren G m b H Ger 579,649, July 4, 1933  $\text{KNO}_3$  or  $\text{NaNO}_3$  and  $\text{NH}_4\text{Cl}$  are produced by treatingylvine-like minerals with  $\text{HNO}_3$ ,  $\text{NH}_3$ ,  $\text{Na}$  and  $\text{CO}$ . The stages are as follows: a, the crude salt is treated with lye contg  $\text{NH}_4\text{NO}_3$ ,  $\text{NH}_4\text{Cl}$  and  $\text{NaCl}$ , to ppt solid  $\text{NH}_4\text{Cl}$ ; b, the lye contg  $\text{KNO}_3$ ,  $\text{NaNO}_3$ ,  $\text{NH}_4\text{Cl}$  and  $\text{NaCl}$  is heated with  $\text{NaHCO}_3$ , whereby  $\text{NH}_3$  and  $\text{CO}_2$  go off as gas, leaving  $\text{KNO}_3$ ,  $\text{NaNO}_3$ , and  $\text{NaCl}$  in soln. The  $\text{NaCl}$  is obtained by evapn and the  $\text{KNO}_3$  and  $\text{NaNO}_3$  crystallize out on cooling; c, the  $\text{NaCl}$  from b is treated with the  $\text{NH}_3$  and  $\text{CO}_2$  from b by the Solvay process to give  $\text{NaHCO}_3$  for further use in the stage b; d, the mother liquor from c is treated with  $\text{NH}_3$  and  $\text{HNO}_3$  to generate  $\text{CO}_2$  for the process c and gives the lye for stage a. Examples are given.

**Tri-alkali phosphate from ferro phosphorus** Nils C Lindberg (to Victor Chemical Works) U S 1,936,307, Nov 21. Ferro-P and an alkali metal carbonate such as  $\text{Na}_2\text{CO}_3$  are heated to a reacting temp below the fusion temp and the reacting materials are passed through a heating zone counter-current to the heated gases while gradually increasing the temp of the materials to a point above the fusion point of the initial mixt (the initial reaction temp being 550-700° and the final reaction temp being 1100-1250°).

**Alkali dichromates** Bozel Maltra (Société industrielle de produits chimiques) Ger 578,842, June 17, 1933. See Brit 376,661 (C A 27, 4035).

**Dichromates** Jules L. Demant (to Bozel Maltra (Société industrielle de produits chimiques)) U S 1,935,082, Nov 14. A monochromate such as that of  $\text{Na}$  in a proportion at most equal to that theoretically required to form dichromate is mixed with metallic  $\text{C}$  and (suitably after a chem reduction such as in a current of  $\text{H}_2$ ) the product obtained is subjected to an oxidizing disaggregation by the dry method above 300° under pressure. Cf C A 27, 5488.

**Chromates** Bozel-Maltra (Soc industrielle de produits chimiques) Fr 42,786, Oct 10, 1933. Addn to 710,771 (C A 26 1721). The alkali or monochromate necessary for the reaction of Fr 710,771 is replaced by substances capable of liberating then alk principle during the oxidation process. Substances such as nitrates, chlorates, persalts, ferricyanides, etc., which act as oxidizing agents at the same time are preferred, or these substances may be used along with alkalis or substance yielding alk substances. Fr 42,787, Oct 10, 1933. Addn to 683,604 (C A 24, 4593). The modification of Fr 42,786 is applied to the process of Fr 683,604.

**Carbamates** The Mathieson Alkali Works. Fr 751,699, Sept 7, 1933. Alkali metal carbamates are made by treating the bicarbonate with anhyd  $\text{NH}_3$  or in aq soln thereof of 35% or more, preferably 75-90%. Fr 751,700.  $\text{NH}_4\text{CO}_2\text{Na}$  is made by adding  $\text{NaCl}$  and  $\text{CO}_2$  to an  $\text{NH}_3$  until the liquid is approx satd with  $\text{NH}_4\text{Cl}$ , sep the pptd  $\text{NH}_4\text{CO}_2\text{Na}$ , carbonating again and sep the pptd  $\text{NH}_4\text{Cl}$ . The aq  $\text{NH}_3$  is used again.

**Rare earth chlorides** I G Irbekund A-G. Fr 752,255, Sept 20, 1933. Chlorides of metals of the Ce group free from  $\text{Th}$  are obtained by increasing the concn of  $\text{Cl}$  ions in an aq soln of rare earth chlorides until a sepn of hydrated chlorides of metals of the Ce group takes place.  $\text{HCl}$  gas may be used and the soln cooled to at least 0°, or  $\text{HCl}$  and  $\text{CaCl}_2$  or  $\text{MgCl}_2$  may be added without cooling.

**Peroxides and salts** Oesterrichische Chemische Werke Ges m b H. Fr 750,125, Aug 5, 1933. Peroxide and persalts having a high content of  $\text{O}$  are prepd by mixing dry metal oxides or salts free from water of crystn with a soln of  $\text{H}_2\text{O}_2$  limited in amt in such a manner and proceeding in such a fashion that a moist

mixt is not produced even momentarily and afterward diminishing, either by drying in vacuum or by dehydration in a current of air, the content of water of the product obtained. The  $\text{H}_2\text{O}_2$  soln may be added in several portions, a reduction of the water content being made between the addns.

**Phosphates** Aktiebolaget Kemiska Patentet. Fr 751,903, Sept 12, 1933. Crude phosphates are disaggregated by  $\text{H}_2\text{SO}_4$  or other mineral acids in the presence of  $\text{SO}_4$  radicals, the reaction mass during or after disaggregation being submitted to a vapor tension of the soln such that the  $\text{CaSO}_4$  formed, as semi-hydrate or having a lower water of crystn content or as anhydride, is stable enough to be submitted to washing by aq liquids or water, without appreciable modification of its water of crystn content. This is obtained by regulating the concn of the  $\text{H}_2\text{PO}_4$  during or after the reaction and by regulating the temp preferably according to the formula  $2P + t^\circ \geq 186$  ( $P$  is the concn of  $\text{H}_2\text{PO}_4$  expressed in percentages by wt of  $\text{P}_2\text{O}_5$  in the mother liquor and  $t$  is the temp).

**Thiosulfates** I tabissements Mirret, Bonnin, Lebel et C<sup>ie</sup> Fr 751,135, Sept 16, 1933. An alc instead of an aq soln of  $\text{AuCl}_3$  is added to a soln of  $\text{Na}_2\text{S}_2\text{O}_3$  to form a double thiosulfate of  $\text{Au}$  and  $\text{Na}$ ,  $\text{Au}(\text{S}_2\text{O}_3)_2\text{Na}$ .

**Cyanogen compounds** Georg Bridg and Leon Hlod. Ger 578,826, June 17, 1933.  $\text{HCN}$  and compds of  $\text{CN}$  are prepd by the action of  $\text{CO}$  on  $\text{NH}_3$  in the presence of catalysts consisting of oxides of the rare earths, especially  $\text{Ce}$ , or of  $\text{U}$ ,  $\text{Mo}$  or  $\text{V}$ . Non-metallic carriers and oxides of  $\text{Al}$ ,  $\text{Th}$ ,  $\text{I}$  or  $\text{Zr}$  may be present. Thus,  $\text{CO}$  is treated with  $\text{NH}_3$  in the presence of a catalyst consisting of granulated earthenware impregnated with  $\text{V}_2\text{O}_5$ . Other examples are given.

**Aluminum oxide** Gustav Schoenberg. Ger 578,917, June 19, 1933.  $\text{Al}_2\text{O}_3$  is prepd by reducing aluminiferous substances such as bauxite with  $\text{C}$  in the presence of sulfide, the latter constituting not more than 3% of the total charge.

**Diammonium phosphate** Markus Larsson (to Kunst- und Patent Verwertungs A-G.) U S 1,936,168, Nov 21. A soln contg mono- $\text{NH}_4$  phosphate is heated to about its b p, an excess of gaseous  $\text{NH}_3$  is introduced into the preheated soln until the latter is satd substantially to the stage of  $(\text{NH}_4)_2\text{HPO}_4$ , and the escaping  $\text{NH}_3$  and steam are supplied to a second soln contg free  $\text{H}_3\text{PO}_4$  and previously preheated to about its b p (steam escaping from the second soln being used for preheating the  $\text{H}_3\text{PO}_4$ ). An arrangement of app is described.

**Dibarium phosphate** Kali-Chemie A-G. Ger 582,923, Aug 23, 1933.  $\text{BaHPO}_4$  pptd during the manuf of  $\text{H}_2\text{O}$  from  $\text{BaO}$  and  $\text{H}_3\text{PO}_4$  is worked up by treatment with  $\text{HNO}_3$  or nitrates so that  $\text{Ba}(\text{NO}_3)_2$  is pptd and the  $\text{H}_3\text{PO}_4$  soln filtered off. Foreign acids are expelled by volatilization and the  $\text{H}_3\text{PO}_4$  sep'd for use in making more  $\text{H}_2\text{O}$ .  $\text{BaCl}_2$  may be used instead of  $\text{HNO}_3$ ,  $\text{BaCl}_2$  being then pptd. Examples are given.

**Beryllium fluoride** Comp de produits chimiques et métallurgiques Alais, Frogès et Camargue. Ger 583,581, Sept 7, 1933. Addn to 566,030 (C A 27, 1106). The method of Ger 566,030 is modified by using a mixt of  $\text{H}_2\text{SiF}_6$  and  $\text{SiO}_2$  produced *in situ* from  $\text{SiF}_4$  and  $\text{H}_2\text{O}$ . Cf C A 28, 546.

**Chlorine peroxide** Isaac Lévy. Fr 751,782, Sept 9, 1933. An app is described for making  $\text{ClO}_2$  by dry distn at 85° of a powd mixt of  $\text{KClO}_3$  and  $(\text{COOH})_2$ , with or without  $\text{H}_2\text{SO}_4$ .

**Copper sulfate** August Nussbaum. Fr 753,062, Oct 6, 1933. See Austrian 133,126 (C A 27, 3786).

**Iron chlorides and sulfur dioxide from iron pyrites and dilute chlorine** Carl F. Prutton (to Dow Chemical Co.) U S 1,936,543, Nov 21.  $\text{FeS}$  is caused to react with dil  $\text{Cl}$  contg  $\text{O}$  in at least as large a proportion as that of the  $\text{Cl}$  at temps of 210-315°. Various details of procedure are described.

**Colloidal manganese dioxide** R & O Weil Chemische Pharmazeutische Fabrik. Ger 578,035, June 9, 1933. Addn to 538,645 (C A 26 2284). Solns of the



above with increased stability are prepd. by oxidizing Mn compds. in aq. soln., the method of 538,645 being varied by causing the oxidation to take place in the presence of hydroxyaldehydes or ketols instead of salts of org. acids. Examples are given.

**Potash.** Alfred Mentzel. Ger. 582,504, Aug. 16, 1933.  $K_2CO_3$  or KOH is prepd. by heating  $K_2SO_4$  with C and treating the heated mixt. with steam and  $CO_2$ . The product is heated with N to give KCN. This is then treated with steam to give  $NH_3$ , KOH and  $K_2CO_3$ , the latter compds. being leached out of the reaction mass.

**Potassium sulfate.** Charles F. Ritchie and Grant E. Warren (to American Potash & Chemical Corp.). U. S. 1,936,070, Nov. 21. Glaserite and KCl are digested in insufficient aq. soln. to dissolve separately the glaserite, while pptg.  $K_2SO_4$ .

**Potassium sulfate.** Wintershall A.-G. and Curt Beil. Ger. 577,051, May 22, 1933. Addn. to 551,928 (C. A. 26, 1921). The method of 551,928 for obtaining  $K_2SO_4$  from kievite is varied by treating the latter with KCl and  $K_2SO_4$  mother liquor. The double salt  $K_2SO_4 \cdot MgSO_4$  is pptd.

**Silver permanganate.** Robert Winzer. Fr. 750,280, Aug. 8, 1933. Pure stable  $AgMnO_4$  is made by adding to sufficiently dil. solns. of alkali or alk. earth permanganates and Ag salts, an acid, e. g.,  $HNO_3$ , which does not react on the constituents of the solns.

**Caustic soda.** Elektrochemische Fabriken G. m. b. H. (Walter Zisch, inventor). Ger. 578,792, June 17, 1933. Addn. to 572,895 (C. A. 27, 4358). In prepg. NaOH by the continuous process described in 572,895, the  $Na_2SiF_6$  is replaced by  $BaSiF_6$ . The process is as follows: a,  $CaF_2$ ,  $SiO_2$  and  $BaF_2$  are allowed to react to give  $BaSiF_6$ ,  $CaCl_2$  and water; b,  $BaSiF_6$  is treated with  $NH_4OH$  to give  $NH_4F$ ,  $BaF_2$ ,  $SiO_2$  and water; c, NaCl is treated with  $NH_4F$  to give NaF and  $NH_4Cl$ ; d, NaF is treated with  $Ca(OH)_2$  to give NaOH and  $CaF_2$ ; e,  $NH_4Cl$  is treated with  $Ca(OH)_2$  to give  $NH_4OH$  and  $CaCl_2$ .

**Sodium carbonate.** Alfred Mentzel. Ger. 582,890, Aug. 24, 1933. Addn. to 558,750 (C. A. 27, 571). In making  $Na_2CO_3$  by the Leblanc method of 558,750, with  $NH_3$  and  $Na_2SO_4$  as by-products, the reaction mixt. is finely ground and briquetted before subjection to the cyanization process. Thus  $Na_2SO_4$ , coal and lime are mixed, finely ground and made into briquets. These are then cyanized by heating to  $1000^\circ$  with N. The product is then treated with steam, giving  $NH_3$  and  $Na_2CO_3$ .

**Sodium carbonate; fertilizers.** Chemieverfahren G. m. b. H. Ger. 582,924, Aug. 25, 1933. The process of Ger. 540,070 (C. A. 26, 1725) is modified to yield  $NaNO_3$ - $KNO_3$  mixts. in place of  $KNO_3$ . For this purpose, the proportions and conditions of the prior process are varied so that all the KCl present in the crude sylvinite is converted into glaserite, which is then treated directly with  $HNO_3$ . Details are given.

**Disodium carbimide.** The Mathieson Alkali Works. Fr. 753,038, Oct. 5, 1933.  $(NaCO_3)_2NH$ , which may be called *disodium carbimide*, is made by heating dry  $NH_3$ - $COONa$  to a high temp., though below  $200^\circ$  in a dry medium.

**Sodium dichromate.** I. G. Farbenind. A.-G. Fr. 750,468, Aug. 11, 1933.  $Na_2Cr_2O_7$  is made by causing  $O_2$  to act under high pressure on  $Na_2CrO_4$  at above  $50^\circ$ . The process may be carried out in 2 stages, the  $NaHCO_3$  formed in the 1st stage being eliminated before the 2nd is begun.

**Zinc oxide.** Eugène Sterkers and Louis C. Humbert. Fr. 750,529, Aug. 11, 1933. Pure ZnO, free from Pb, is obtained by introducing CO under pressure into the volatilization retort. Thus, an increased pressure of 5 mm. and a temp. of  $1,200^\circ$  may be maintained.

**Basic alum from normal alum solutions.** Kalunite Co. Fr. 753,225, Oct. 11, 1933. See U. S. 1,914,175 (C. A. 27, 4355).

**Removing arsenic from acids.** Metallges. A.-G. (Conway von Girsawald and Wolfhart Siecke, inventors). Ger. 587,036, Oct. 28, 1933. In removing As from strong acids by pptn. as  $As_2S_3$ , H is generated in the acid by

addn. of Al or Mg, preferably in powder form, before, during or after the pptn. The  $As_2S_3$  ppt. is entrained by the gas and collects on the surface of the acid. Cf. C. A. 27, 2540.

**Hydrogen.** George F. Jaubert. Fr. 42,776, Oct. 10, 1933. Addn. to 698,706 (C. A. 25, 3136). H is made by mixing Si in powder or its alloys with NaOH in powder or pieces and adding the dry mixt. to water or water to the mixt. or the Si and water may be mixed and added to powd. NaOH.

**Hydrogen and nitrogen.** Wintershall A.-G. and Carl T. Thorssell. Ger. 578,629, June 15, 1933. A process for producing a mixt. of H and N, especially suitable for the synthesis of  $NH_3$ , by passing steam and air over heated Fe is described.

**Pure iodine.** Coulter W. Jones (to Jones Chemical Co.). U. S. 1,936,553, Nov. 21. A soln. of NaI contg. some iodate is mixed with a  $CaCl_2$  soln. in substantially chem. equiv. proportion to the iodide and iodate; the  $Ca$  iodate is filtered off and the filtrate is evapd. to crystallize out NaCl and leave an approx. 60-65%  $CaI_2$  soln.; the latter is chlorinated to liberate I while the temp. of the reaction mixt. is raised above  $114^\circ$  and liquid I is sep'd. from the aq. soln. of  $CaCl_2$ .

**Furnace for sulfur ores with helicoidal hearth.** Paul Flajollet-Bracq. Fr. 752,168, Sept. 18, 1933.

**Producing and storing liquid oxygen.** Frank P. Kinson (to Linde Air Products Co.). U. S. 1,936,059, Nov. 21. Various details of app. and operation are described.

**Separating carbon dioxide.** I. G. Farbenind. A.-G. Fr. 753,253, Oct. 12, 1933.  $CO_2$  is sep'd. from gases contg. it by a soln. of an alkali monochromate under high pressure and a high temp. The  $CO_2$  is liberated by removing the pressure and, if desired, increasing the temp.

**Decomposing hydrocarbons.** I. G. Farbenind. A.-G. (Gustav Wietzel, Wilhelm Haller, and Wm. Hennicke, inventors). Ger. 578,824, June 17, 1933. In subjecting hydrocarbon gases to decompn. by treatment with steam,  $CO_2$  and O or air in the presence of a catalyst, to obtain a mixt. of H and  $CO$ , the hydrocarbons and the steam, etc., are pre-treated to remove inorg. or org. S compds. Examples are given.

**Solutions of titanium.** Verein für chemische und metallurgische Produktion. Ger. 578,791, June 17, 1933. HCl solns. of Ti are prepd. by introducing an aq. soln. of  $TiCl_4$  below the surface of dil. HCl. App. is described.

**Treating solutions obtained from phosphate rock by leaching with nitric acid.** Bengt Wadstedt (to Kunst- und Lager-Patent-Verwertungs-A.-G.). U. S. 1,936,316, Nov. 21. In treating solns. obtained in the leaching of phosphate rock with  $HNO_3$  and pptn. of the  $Ca$  dissolved by means of  $(NH_4)_2SO_4$ , the soln. is neutralized with  $NH_3$  to form a single  $NH_4$  phosphate, the main portion of the latter is sep'd. from the soln. by evapn. and subsequent cooling, the remaining mother liquor is purified from its content of  $NH_4$  phosphate by pptn. of the phosphate as an insol. phosphate such as that of  $Ca$ , and  $NH_4NO_3$  is recovered from the purified mother liquor by evapn.

**Working up crude salts.** Chemieverfahren G. m. b. H. Ger. 578,377, June 13, 1933. Addn. to 571,949 (C. A. 27, 4355). The method of 571,949 for working up kieserite and sylvinite is applied to crude K salts contg.  $MgSO_4$ .

**Synthetic yellow spinel.** Max Jaeger and Hermann Espig (to I. G. Farbenind. A.-G.). U. S. 1,935,717, Nov. 21. Mn oxide about 4% and Fe about 1% are incorporated in a synthetic yellow spinel contg. alumina and magnesia in suitable proportions, in order to serve as coloring agents. ZnO 1-2% also may be added to enhance the color.

**Fusing silica.** Henri George (to Société Quartz & Silice). U. S. 1,936,476, Nov. 21. In fusing silica in a carbon resistor furnace, a mass of moist silica particles is formed around the resistor, and an envelope of the products resulting from the dissociation of the moisture contained in the mass is maintained around the melting silica mass and serves to facilitate production of a white compact product. App. is described.

**Monazite sand.** I. G. Farbenind. A.-G. Fr. 753,023,

Oct. 5, 1933. The phosphate in monazite sand is reduced by adding oxide or carbonates of alk. earth metals or Mg in amt. of 3 mols. per mol. of earth oxide and an amt. of C just sufficient for the reduction. A temp. of 1650-1750° in an elec. furnace is used.

**Quartz.** Klinker- u. Steinzeugwerke Mertendorf G. m. b. H. Ger. 579,960, July 3, 1933. Quartz is converted to SiO<sub>2</sub> modifications such as tridymite, of lower sp. wt., by heating it in the presence of Cu, Sn, Sb, Pb, Cr, Mn, Ni, Co or their alloys or silicides, in a weakly reducing atm.

**Rare earths.** I. G. Farbenind. A.-G. Fr. 753,052, Oct. 6, 1933. H<sub>3</sub>PO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub> in excess are sepd. from sulfates of rare earths (obtained by treating monazite sand by means of concd. H<sub>2</sub>SO<sub>4</sub>) by introducing the paste of sulfates into ketones or aliphatic alics., preferably at a low temp., sepg., washing and drying the residue.

**Absorbent charcoals.** Compagnie française de produits organochimiques. Fr. 42,779, Oct. 10, 1933. Addn. to 742,153, (C. A. 27, 3508). Active charcoal is impregnated with a soln. of NaOH or KOH, dried and reheated to 600-700°. The product is moistened with water and is particularly useful in the catalytic hydrolysis of phosgene. Fr. 42,784, Oct. 10, 1933. Addn. to 745,987 (C. A. 27, 4325). Active charcoal treated with NaOH or KOH is used in gas masks, etc., as a protection against phosgene, chloropicrin and other gases.

**Increasing the efficiency of adsorbents such as waste dusts from cement manufacture.** Oliver M. Urbain (to Charles H. Lewis). U. S. 1,935,961, Nov. 21. Finely subdivided particles of the material are passed in a liquid carrier such as water through a shearing mill, the rotor and stator of which have been previously adjusted to the exact particle size of the material.

**Catalysts.** Soc. anon. française pour la fabrication des essences et pétroles. Fr. 750,443, Aug. 10, 1933. Al silicates, to be used as catalysts, are freed from impurities (Fe<sub>2</sub>O<sub>3</sub>, CaO, MgO, etc.) so as not to contain more than 10% of these, and particularly less than 3% of Fe<sub>2</sub>O<sub>3</sub>. The product is molded in the form of rods or tubes and cut up in small sections. No binding material is used.

**Catalysts.** The Goodyear Tire & Rubber Co. U. S. 750,648, Aug. 14, 1933. Catalysts are prepd. by pulverizing a suitable support in the presence of a salt of a metal whose at. wt. is 57-64, introducing a basic carbonate capable of reacting with the salt to give a ppt. of the metal carbonate and finally reducing the carbonate. Thus, a basic Ni carbonate is formed on kieselguhr and afterward reduced to Ni.

**Catalysts suitable for various purposes.** Maurice E. Barker. U. S. 1,936,563, Nov. 21. An alloy contg. Cu, Fe and Mn is treated with an acid such as HCl and the substances formed by reaction of the acid on the surface of the alloy are calcined to produce mixed oxides. U. S. 1,936,564 relates to similar catalysts in which the oxides are reduced to spongy metal. U. S. 1,936,565 also relates to generally similar catalysts which may be formed from ground particles of Cu, Fe and Mn alloys.

**Oxidizing catalyst suitable for treating exhaust gases from internal-combustion engines.** Joseph C. W. Frazer. U. S. 1,934,795, Nov. 14. Fe(OH)<sub>3</sub> is mixed with a chromic acid soln. and the resulting Fe chromate soln. is applied to a support such as a Monel metal screen and the wetted support is heated to convert the chromite which it carries to an Fe chromite coating which is strongly adherent and highly active at high temps.

**Catalytic masses such as those suitable for oxidizing sulfur dioxide to trioxide.** Gerald C. Connolly and Jeremiah A. Pierce (to Silica Gel Corp.). U. S. 1,935,177, Nov. 14. A batch of carrier material such as silica hydrogel is charged with a soln. of a reactant substance such as NaOH. Another bath of carrier material is charged with a metal compd. such as vanadyl sulfate capable of reacting with the reactant substance in the first-mentioned batch to form an active compd. of the metal, and the two batches are mixed and dried without washing.

**Cleaning catalytic material such as platinized asbestos used in sulfur trioxide production.** Bernard M. Carter (to

General Chemical Co.). U. S. 1,936,154, Nov. 21. The catalytic material is agitated by vibration without substantial disarrangement of its particles and a gas such as air is passed through the material to remove foreign substances. An app. is described.

**Catalytic gels.** Max Latshaw and Wm. L. Judefind (to Silica Gel Corp.). U. S. 1,935,188, Nov. 14. A reacting gas such as H<sub>2</sub>S is adsorbed in a highly adsorbent gel such as silica gel and the treated gel is then contacted with a soln. of a compd. of a catalytic metal such as Pt chloride capable of being converted by the adsorbed gas into a catalytically active substance.

**Gels such as those of silica.** Gerald C. Connolly (to Silica Gel Corp.). U. S. 1,935,176, Nov. 14. For making a hard porous gel of low apparent d., a washed hydrogel (such as one formed from Na silicate and HCl) is impregnated with a volatile salt such as NH<sub>4</sub>Cl and then dried to convert the gel into hard porous conditions and liberate the volatile salt.

**Hard porous gels such as those of silica, alumina or various metal compounds.** Gerald C. Connolly (to Silica Gel Corp.). U. S. 1,935,178, Nov. 14. For making a hard porous gel of low apparent d., an inorg. washed hydrous oxide gel is impregnated with a sol. salt such as CaCl<sub>2</sub>, dried, and leached to remove the sol. salt.

**Condensation products.** I. G. Farbenind. A.-G. Fr. 751,641, Sept. 7, 1933. Products which have wetting, dispersing, cleansing and emulsifying properties are made by condensing one mol. of an org. compd. contg. at least one radical with at least 8 C atoms directly joined and besides one or more of the groups —CON(R')R" or —SO<sub>2</sub>N(R')R" (R' is H, alkyl, aralkyl, aryl, cycloalkyl, hydroxyalkyl or polyhydroxyalkyl and R" is H, hydroxyalkyl or polyhydroxyalkyl) with at most 3 mols. of alkylene oxides for each of the atoms of H capable of reacting in the above groups. The products obtained may form with polybasic acids combinations having an acid function. Examples are given of the prepn. of products from ethylene oxide and dibutynaphthalenesulfamide or products prepd. according to Brit. 384,665.

**Films and foils of condensation products.** Wolff & Co., Komm.-Ges. auf Aktien und Richard Weingand. Ger. 578,873, June 17, 1933. Addn. to 536,839 (C. A. 26, 1077). The method of 536,839 for making the above from urea-CH<sub>2</sub>O condensation products by adding aq. softening agents such as glycerol or cyclohexanol is modified by arresting the hardening process so that the finished product still contains water.

**Artificial masses.** Allgemeine Elektrizitäts-Gesellschaft. Ger. 579,948, July 3, 1933. Molded masses are prepd. by treating sawdust, straw or other cellulosic materials with alkali, acidifying, washing, drying and hot-pressing with basic compds. such as alk. earth hydroxides. Synthetic resins may be added prior to pressing.

**Plastic materials.** Jean de Granville and Léopold Davion. Fr. 42,729, Sept. 14, 1933. Addn. to 749,733 (C. A. 28, 591). The solvents used for the extn. of proteins from vegetable materials are used only at the b. p. The b. p. is preferably below 76°.

**Adhesive.** Boston Blacking Co. G. m. b. H. (Hermann Hering, inventor). Ger. 578,958, June 19, 1933. An adhesive is prepd. by adding chromates or dichromates to an aq. dispersion of rubber. Size, glue, sugar, albumin, etc., may also be added.

**Adhesive.** Julien Rousseau. Fr. 750,403, Aug. 10, 1933. A glue suitable for veneering is made by dipping a light cloth into a bath contg. agar-agar 2%, sugar 12, CH<sub>2</sub>O 5 and water 9.3%, drying and dipping into a bath contg. phenol 0.5, glycerol 1.5, oxalic acid 1.5, kaolin 5% and glutin, and again drying. The required amt. is cut off and gluing is obtained by applying heat and pressure.

**Adhesive.** Yves Cornic. Fr. 750,477, Aug. 11, 1933. A compn. for glueing various materials is made by adding cement to an aq. dispersion of natural, vulcanized or synthetic rubber. Aluminous cement may be used directly, but with portland and other cements stabilization of the latex may be necessary.

**Wood adhesives.** Firma Gebr. Thalheimer. Fr.

751,658, Sept. 7, 1933. To a mixt. contg. water, dispersed rubber and glue materials (casein, vegetable protein, starch, etc.),  $\text{Ca}(\text{OH})_2$  is added within the limits of 0.1–8.5% with respect to the content of org. colloids, the total amt. of dry substance being 15–75%. The  $\text{Ca}(\text{OH})_2$  may be replaced by the equiv. amt. of  $\text{NaOH}$ . An example contains casein 100, concd. latex (33% water) 500,  $\text{NaOH}$  2 and water 750 parts.

**Adhesive paste.** Oscar H. Bahr. U. S. 1,936,152, Nov. 21. Clay 27,  $\text{ZnO}$  6.5 and "vegetable starch" 6.5 parts are used in prep. a paste which is suitable for uniting paper to enameled surfaces.

**Glue sizing suitable for use on ceilings, etc.** Charles le Bos d'Espinoz (to Malcolm C. Rorty). U. S. 1,935,789, Nov. 21. A sizing is prep. contg. water,  $\text{CaCO}_3$ , glue or gelatin, and sufficient infusorial or diatomaceous earth to retard coagulation of the glue or gelatin during application at ordinary temps.

**Dispersions of solids.** The International Latex Processes Ltd. Fr. 750,305, Aug. 8, 1933. Friable substances are dispersed by bringing them into the form of moderately small pellets and submitting them to mech. disaggregation in the presence of a dispersing fluid.

**Cores for electromagnets.** Jean Schneider. Fr. 753,151, Oct. 9, 1933. The cores are made by mixing  $\text{Fe}_2\text{O}_3$  of low sp. gr. and fine sulfurized Fe powder with a resinous or waxy binder. The Fe is prep. by wetting fine Fe powder with oil contg. S and heating. The oil evaps. and the S combined with the Fe on the surface gives it a high ohmic resistance.

**Working up fuel ash.** Wm. Guertler. Ger. 578,831, June 17, 1933. The magnetic constituent of furnace ash  $\text{Fe}_2\text{O}_3$  is removed and  $\text{Al}_2\text{O}_3$  is then removed by treatment with acid. The residue is treated with material contg.  $\text{CaO}$  to form *portland cement*.

**Furnace for making lime nitrogen.** Herbert Wittek. Ger. 578,841, June 17, 1933.

**Reflectors.** Irving S. Crocker (to The British Thomson Houston Co. Ltd.). Brit. 397,397, Aug. 24, 1933. A reflector which withstands high temps. for extended periods is made by cleaning a glass surface, silvering while wet, applying a coating of Ni, coating the Ni with a refractory paint comprising  $\text{ZnO}$ , talc and Na silicate and covering the paint with a coating of lacquer.

**Projection screens.** Trans-Lux Daylight Picture Screen Corp. Brit. 396,714, Aug. 8, 1933. The screen comprises a sheet of translucent material, e. g., gelatin, glycerol,  $\text{CH}_2\text{O}$  and  $\text{H}_2\text{O}$  together with other materials as described in Brit. 368,723 (C. A. 27, 2774), cellulose acetate, which is intimately assoc. with and adheres to a sheet of knit or net fabric, e. g., silk, and a light-diffusing material which permits of rear projection uniformly distributed through the translucent material.

**Polishing liquid.** Otto Mathiesen. Fr. 750,525, Aug. 11, 1933. A polishing liquid for cellulose lacquer contains liquid varnish 1, alc. 2.4, solvent liquid 0.5, thinning agent 0.2, filtered varnish 0.3 and powd. yeast 0.1 part.

**Composition for cleaning articles of aluminum, zinc and tin.** Fritz Drasbach (to Chemische Fabrik Joh. A. Beckman G. m. b. H.). U. S. 1,935,834, Nov. 21.

<sup>1</sup>  $\text{Na}_2\text{PO}_4$  is mixed with 15–20% of  $\text{Al}_2(\text{SO}_4)_3$  to prevent corrosion of the metal by the phosphate.

**Fish silver.** Vogt & Co. G. m. b. H. (Heinz Hundsdiecker, inventor). Ger. 582,816, Aug. 23, 1933. Fish scales are treated with a warm soln. of high mol. esters or ethers of cellulose, starch or rubber, to give a suspension of fish silver.

**Emulsifying, cleansing and other agents.** I. G. Farbenind. A.-G. Fr. 751,744, Sept. 8, 1933. Products which find application in the textile, leather, rubber, lacquer and paper industry and in dyeing, etc., are prep. by causing a glycidic to react with an org. compd. contg.  $\text{OH}$ , and(or)  $\text{COOH}$ , and(or) a carbonamide, and(or) a sulfonamide group, provided these compds. contain active H atoms. Examples are given of compds. prep. from glycidic and iso-BuOH, undecylamine, linseed oil fatty acid and hydroxyethylamide of the acids of coconut oil.

**Wetting and other agents.** Soc. pour l'ind. chim. à Bâle. Fr. 42,757, Oct. 10, 1933. Addn. to Fr. 713,082 (C. A. 26, 1733). Appropriate basic solvents or diluents, e. g., pyridine, are used for the production of the esters of Fr. 713,082.

**Wetting and other agents.** H. Th. Bohme A.-G. Fr. 753,189, Oct. 9, 1933. Quaternary  $\text{NH}_4$  salts having a relatively high mol. wt. are made by causing esters of alkylmonosulfonic acids or their salts to react with secondary or tertiary amines. An example is given of a product obtained from pyridine,  $\text{CH}_3\text{SO}_3$  and lauryl alc. The products may be used in ore flotation, purifying waste waters, prep. emulsions, mordanting cotton and in tanning, etc.

**Waterproofing composition.** Sylvania Industrial Corp. Fr. 750,281, Aug. 8, 1933. The compn. contains a cellulose deriv., e. g., nitrocellulose 50–75, a plastifying agent 20–50 and wax 0.8–2%.

**Brake lining.** Robert L. Herzinger and John S. Gabriel. U. S. 1,935,713, Nov. 21. Cast brake linings for vehicles are formed from Cu 80, Pb 19, Sn 1 part and carbonaceous shale about 1.5–5.0%.

**Blank for stencil sheets.** Louis E. Fuller. U. S. 1,935,875, Nov. 21. Open fibrous material such as Yoshino paper is impregnated with protein such as gelatin and a higher fatty acid anhydride such as stearic anhydride, and glycerol.

**Composition for dental fillings.** Friedrich Hauptmeyer. U. S. 1,935,266, Nov. 14. A dental cement is used with about an equal quantity of a powd. Cr-Ni steel or Fe alloy resistant to chem. reagents.

**Fire extinguishers.** The Pyrene Co. Ltd. and Richard Zieschang. Brit. 396,524, Aug. 10, 1933.

**Fire extinguishers.** Kommet Kompagnie für Optik Mechanik und Electro-Technik G. m. b. H. Fr. 750,554, Aug. 12, 1933.

**Fire-extinguishing installation for vehicles.** Job Arthur Neville. Brit. 395,826, July 27, 1933.

**Device for ejecting fluids under pressure, e. g., in fire-extinguishing apparatus.** Job A. Neville. Brit. 395,994, July 27, 1933. Divided on 395,826 (preceding abstr.).

**Method and apparatus for introducing foam-producing chemicals into a stream of water.** Cedric Morris. Brit. 396,835, Aug. 17, 1933.

## 19 GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

**Significance of scientific research in the technic of glass manufacture and the value of international cooperation.** Karl Quasehart. *Glastech. Ber.* 11, 349–91(1933).

**Old glass factories in the Böhmerwalde and Fichtelgebirge districts of upper Bohemia.** Herbert Kühnert. *Glastech. Ber.* 11, 368–73(1933).

**Effect of gases upon the properties of glass.** V. Effect of the heat treatment of glass upon its silver plating. K. Nakanishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding

595–6(1933); cf. C. A. 27, 4643.—On glasses which were heated in air below their softening temp., the reduction of Ag was found to proceed more slowly than on those which were not heat treated or those which were heated above their softening temp. and in the latter case the reduction of Ag was found to be the most rapid of the 3. In the first case, the heating temp. and the time were found to be inversely proportional to the reduction velocity of Ag, while in the latter case, they were found to be directly proportional. It was also found that, on glasses which

had been heated in O the reduction of Ag advances more rapidly than on those which had been heated in air or on those which had had no heat treatment K K

**Alumina glasses** G Keppeler and R Scholte *Glastech Ber* 11, 357-05, 392-7(1933) —The influence of  $Al_2O_3$  on the properties of glasses in the  $Na_2O$ - $CaO$ - $SiO_2$  field was systematically studied. Varying amounts of  $SiO_2$  were replaced by equiv amounts of  $Al_2O_3$  and the m. pt. detd on small samples under carefully controlled conditions. When the  $Al_2O_3$  content is increased up to a certain point for a particular glass, there is a marked lowering of the m. p. This min is reached with higher  $Al_2O_3$  content, the more the lime content is. The lowering of the m. p. is covered up in glasses rich in alkali by increased viscosities. The effect is therefore to broaden the glass field by suppressing devitrification, increasing the working range, and making it possible to cut down the alkali content. In all cases stability is increased. The effect of  $Al_2O_3$  on expansion is only slight. Bibliography of 30 references J I Hyde

**Roller plate glass from tanks** Gustav Keppeler *Glastech Ber* 11, 398-404(1933) J I Hyde

**Feeder machines for bottle leers** H Alt *Glastech Ber* 11, 405-7(1933) J I Hyde

**X-ray investigation of tridymite glass** M I Nahmias *Nature* 132, 857-8(1933) X-ray powder analysis of a devitrified glass of initial compn  $SiO_2$  75,  $CaO$  12,  $Na_2O$  10 (glass B) gives an unmistakable picture of tridymite. Thermal expansion curves for the identification of either tridymite or cristobalite are unreliable. Tridymite is found in artificial mullites (bauxites calcined at 1300°) containing free  $SiO_2$ . P S Roller

**X-ray examination of ceramic raw materials** V T Nakai and Y Iukami *J Soc Chem Ind, Japan* 36 Suppl. binding (611-6)(1933) cf C A 28 90 Results obtained on so called Mitsubishi rosaka silicate relatively high in  $Al_2O_3$  (35-40%), are presented. They were subjected to temps of 400-1500°. K K

**Petrographic methods applied to refractories research** I J Irostell *Ceram Age* 22, 171-8(1933)

**Chief defects of saggars and ways of eliminating them** S G Lunanov *Keram i Steklo* 9, No 7, 19-21(1933) M V Kondoidy

**Glasses without lead for terra cotta** C C Bernau *Keram i Steklo* 9, No 7, 21-7(1933) A successful leadless glaze for Seger cone 05 was one corresponding to the Seger formula 112  $SiO_2$ , 0.5  $Al_2O_3$ ,  $RO$ , 0.15  $Fe_2O_3$ . Its compn was 39.40 feldspar, 29.42 quartz, 11.48 cryolite, 8.69  $ZnO$ , 6.96  $Na_2CO_3$ , 4.05 chalk. A preliminary fritting of the batch is recommended. M V Kondoidy

**Majolica enamels free from lead** Berndt *Glashutte* 63, 374-8(1933) —A brief discussion of the development of wet majolica (enamel free from Pb). M V Kondoidy

**Applying enamel** R Aldinger *Glashutte* 63, 375-1(1933). M V Kondoidy

**Enameling sheet iron ware** R Manschke *Sheet Metal Ind* (London) 7, 239-40(1933) *Ironmaking Ind* 10, 312-13(1933) Compns are given also pigments employed for colors. M V Kondoidy

**Preparation [for enameling] of the surface of sheet iron by cleansing** A W Bruins *Maillierie* 1, 16-21(1933) M V Kondoidy

**Practice in the enamel shop, regenerative and recuperative heat recovery** Ludwig Stuckert *Ceram Age* 22, 163-5(1933), cf C A 27, 4645-28, 2761. H S W

**Grog for enameling kilns** Vukobrat *Ironmaking Ind* 10, 248-9(1933) M V Kondoidy

**Rotary furnaces [use for the glass industry]** (1 unit) 1

**Glass** Frederick Gelstharp and James H Sherts (to Pittsburgh Plate Glass Co) U S 1,936,231 Nov 21 A clear glass having a total visible incident light transmission through a sheet of 2 mm thickness of about 85-90% contains 14-0.2-1.0% as its sole coloring, oxide and

of such a compn to exhibit a dark green color when viewed edgewise

**Glass** Erich Heinz *Pr* 750,548, Aug. 11, 1933 *Sci Brit* 393,907 (C A 27, 5917)

**Glass** Jakob Dahter *Pr* 753,257, Oct 12, 1933 Means for transporting cut tubes to the blowing or forming molds

**Apparatus for feeding mold charges of molten glass** Wm J Miller U S 1,934,811, Nov 14 Structural and mech features

**Decolorizing glass** Deutsche Gasgluhlicht-Auer (in b H (Hans Löffler, inventor) Ger 578,866, Jun 20, 1933 Glass is decolorized by addn of oxides of Ca, Sr and other trivalent rare earths such as La, Nd and Li

**Apparatus for sheet-glass manufacture** John M Fisher (to Pittsburgh Plate Glass Co) U S 1,934,791 Nov 14 Structural and mech features

**Cooling reinforced glass sheets in autoclaves under pressure** Robert Delloye U S 1,934,642, Nov 14 A water spray is used for cooling while injecting air into the autoclave and the pressure is subsequently gradually diminished. App is described

**Apparatus for rolling reinforced glass** Pilkington Bros Ltd *Pr* 752,145, Sept 18, 1933

**Apparatus for rolling wire-netting glass** Soc unio des manufactures des glaces et produits chimiques de Saint Gobain, Chauny & Ciry *Ger* 578,865, June 17, 1933

**Apparatus for uniting glass sheets with intervening sheets of pyroxym composition or the like** James H Sherts (to Duplate Corp) U S 1,934,772, Nov 14 Structural and mech features

**Composite glass** Ioma (usines électriques et chimiques) (Soc anon) *Pr* 753,271, Oct 12, 1933 The plastic layer, or layers, is made translucent or opaque by various addns, or has designs worked thereon, to give marble, metal and other effects. The sheets find various decorative uses

**Safety glass** Fritz Eckert *Pr* 750,150, Aug 11, 1933 Safety glass is composed of sheets of tempered glass combined with one or more intermediate elastic sheets

**Compound glass** Fritz Eckert *Brit* 396,313, Aug 3, 1933 Compound glass comprises 1 or more sheets 1 toughened or hardened glass bonded to a flexible layer such as celluloid. One or more ordinary glass sheets may be included

**Laminated glass** Schlesische Spiegelglas-Manufaktur Carl Tusch G m b H *Pr* 751,686, Sept 7, 1933 The glass is made up of a no of thin sheets, one or more of which give special effects such as of color or design

**Laminated glass sheets** James I Walsh (to Celluloid Corp) U S 1,934,011, Nov 21 Glass sheets are united by a plastic compn comprising a cellulose deriv such as cellulose nitrate or acetate plasticized with 70-75% of dibutyl phthalate, diethyl phthalate, dibutyl tartrate, triacetin to render the material flowable under the action of heat and pressure. Cl C A 27, 3576

**Manufacture of insulating glass for walls of buildings, etc** Frederick Gelstharp (to Pittsburgh Plate Glass Co) U S 1,934,798 Nov 14 Mech features

**Double-walled container suitable for insulating fractionating columns, etc** Walter J Podbielniak *Pr* 753,588, Nov 21 Various details are described of a device formed in part of fused quartz and in part of low expansion heat resistant glass joined and sealed to the quartz

**Composite heat-insulating and structural units** George A Bole and John D Sullivan (to Battelle Memorial Institut) U S 1,934,788, Nov 14 A backing of burned cellular ceramic material is joined with a sheet metal facing such as Cu or Cu alloy over which is applied a vitreous coating

**Clay, etc** *Pr* Chemie A-G *Ger* 582,096, Aug 21, 1938 Sulfates are formed in clays, mortars, etc., by adding Ba aluminate, Ba ferrite, Ba ferrate or mixts of these to the clay, etc., prior to working. Thus, Ba aluminate is added to clay contg 0.1%  $SO_2$ , before working the clay

**Apparatus and method for ornamenting bricks.** Bertrand C. Lamb and Antony E. Lamb (trading as South Eastern Brick & Terra Cotta Co.). Brit. 397,331, Aug. 24, 1933.

**Ceramic products.** Soc. anon. de carbonisation et de distillation des combustibles. Fr. 750,370, Aug. 9, 1933. Clay is added to the thinning agent in the form of an impalpable powder with the necessary amt. of water to bind the paste. The final paste is composed of thinning agent at least 90 and plastic clay at most 10%, without the introduction of any foreign material.

**Ceramic articles.** Rudolf E. Heerd. Ger. 587,097, Oct. 30, 1933. A compn. for making lustrous translucent ceramic articles comprises feldspar and subordinate amts. of kaolin and quartz, the latter having been previously fused and comminuted. The compn. is molded and then given a single firing.

**Stoneware articles, etc.** Jean M. Large. Fr. 751,726, Sept. 8, 1933. Mg sands contg. 28-32%  $MgCO_3$  are used in making stoneware pipes, tiles, etc., and in making champagne bottles.

**Refractory masses.** Arthur Sprenger. Ger. 582,235, Aug. 11, 1933. Addn. to 577,932 (C. A. 28, 605\*).

<sup>1</sup> Fireproof masses are obtained by fusing Cr ores. The resulting mass contains  $MgO$ ,  $Cr_2O_3$ ,  $MgO \cdot Al_2O_3$ , and  $Al_2O_3 \cdot SiO_2$ , with an excess of  $Cr_2O_3$ .

**Refractory masses.** Friedrich Siemens A.-G. Ger. 582,534, Aug. 16, 1933. The liquation of silicates in molding fused fireproof masses of oxides of Cr, Al, Mg and Si, etc., is prevented by casting the mass in thin layers so that it quickly solidifies.

<sup>2</sup> **Refractory masses.** Ture R. Haglund. Ger. 582,800, Aug. 23, 1933. Highly fireproof masses are produced by fusing materials contg. 80% or more of oxides of Mg, Al and Cr, the residue being oxides of Si and Fe, with optional small amts. of  $CaO$ . Cf. C. A. 27, 3577.

**Refractory and ceramic products.** Gewerkschaft Westend. Ger. 582,393, Aug. 12, 1933. Addn. to 524,534 (C. A. 25, 4375). In producing fire clay, stone products, etc., the total addn. of flux and plasticity-diminishing agent is about 4%.

<sup>3</sup> **Fireproof stone.** Victor Moritz Goldschmidt. Ger. 582,893, Aug. 24, 1933. Refractory products are made by heating a mixt. of granular olivine and finely ground serpentine,  $MgO$  or substances yielding  $MgO$ . The product contains Mg silicates.

## 20—CEMENT AND BUILDING MATERIALS

J. C. WITT

**Experimental cement plant at University of California.** W. Kelly. *Eng. News-Record* 111, 519-21 (1933).—An illustrated description of the complete dual-kiln unit and 3-stage continuous grinding mill. The fineness of the ground cement is detd. by means of a recently developed suspension turbidimeter, which consists of a light source producing a beam of parallel rays, heat filter, sample container, and a light-tight box contg. a photronic cell connected to a microammeter. Fineness is expressed in terms of sp. surface (surface area of particles in sq. cm. per g.). Clear castor oil is used as the suspending medium.

R. E. Thompson  
**New test data aid quality control of gunite.** E. P. Stewart. *Eng. News-Record* 111, 558-61 (1933). Additional observations (cf. C. A. 26, 542) made during relining of a second reservoir (Woodland) in Syracuse are described in detail. With a 1.25-in. nozzle, gunite of max. strength and density was obtained with an air velocity of 110 ft. per sec., with the nozzle held approx. 4 ft. from the work. The av. mix employed was 1:3.8, with the sand contg. 4% moisture by wt. The strength of the gunite increases as the water content decreases, but there is a practical limit to the dryness of the mix (10% under and 10% above the reinforcing mesh). R. E. Thompson

**Silo wall protective coatings.** G. F. Steigerwalt. *Apr. Eng.* 14, 154-5 (1933).—The results of lab. tests on disks immersed for different periods of time in various concns. of acetic and lactic acids indicated that the following materials offer possibilities as protective coatings for silo walls: (1) portland cement plus Fe filings contg.  $NH_4Cl$ ; (2) coal tars when applied on rough surfaces; (3) emulsified asphalts plus portland cement or Cumar resin solns.; (4) Cumar resin solns., either clear or with rubber, portland cement or emulsified asphalts; (5) Stonite; and (6) S. D. O. Favorable results with these materials depend on clean walls, complete coating, proper mixts. of the materials, and sufficient time and proper curing for the coatings to set and harden. K. D. Jacob

**Preservative treatments for silo walls.** F. C. Fenton. *Apr. Eng.* 14, 153-4 (1933).—Applications of  $MgSiF_6$  and of Na silicate improved the resistance of new masonry and concrete silo walls to the action of silage, but were of little, or no, value on old walls. Concrete paint, Al foil and portland cement wash with Fe filings gave poor protection. The best results were obtained by the application of thin coatings of water-gas tar dild. with gasoline or tar thinner; synthetic resin (Cumar) in benzene soln. also gave promising results. K. D. Jacob

Results of tests on the effect of molasses on concrete.

Miles N. Clair and M. A. Morrissey. *Eng. News-Record* 111, 775 (1933).—Exposure to molasses was found to cause appreciable softening and disruptive cracking of neat cement briquets, particularly at early ages of hydration. Action is but slight on 28-day-old briquets. Light refined molasses is more destructive than the dark partly refined product. It is believed that disruption is due to the formation of Ca succinate. Protective coatings of  $Na_2SiO_3$ ,  $MgSiF_6$  or a paraffin-base waterproofing liquid were effective for a few months only,  $Na_2SiO_3$  giving the best results. R. F. Thompson

**Road-tar consistency conversion chart.** E. O. Rhodes. *Eng. News-Record* 111, 474-5 (1933).—A set of conversion curves shows the relationship between the consistencies of road tars made from normal by-product coke-oven tars as detd. by different methods. In general, the Engler sp. viscosity test at 40 and 50° was found most satisfactory for the lower range of consistencies and float tests at 32° and 50° for the higher ranges. R. E. Thompson

**The qualities of tars for use on roads.** W. E. Cone. *Gas World* 99, 576-7; *Gas J.* 204, 714-15 (1933).—A general discussion. P. J. Wilson, Jr.

**Timber for aeronautical use.** A. W. Seeley. *Aircraft Eng.* 5, 281-4 (1933).—A complete guide to the treatment and inspection of woods for ground engineers.

A. W. Furbank

**Selection of concrete sewage pipes (Kruger) 14.** App. for heating or cooling cement (Ger. pat. 578,652) 1. Working up fuel ash [in manuf. of portland cement] (Ger. pat. 578,831) 18.

**Cement.** Elias R. Wilner (to Advance Cement Process Corp.). U. S. reissue 19,005, Nov. 21. A reissue of original pat. No. 1,785,508 (C. A. 25, 574).

**Cement.** Chemische Fabrik Grünau Landshoff & Meyer A.-G. (Walter Kirchner, inventor) Ger. 578,716, June 16, 1933. See U. S. 1,910,297 (C. A. 27, 4053).

**Cement.** Georg Wieland. Ger. 582,877, Sept. 15, 1933. A hydraulic binding agent is made by intimately mixing non-hydraulic or hydraulic binding agents such as lime or cement with the residue known as "Natrolite" obtained from processes for making  $Al_2O_3$  or Al from bauxite. Catalysts such as gypsum, which promote hydration, may be added.

**Cement.** C.B.R. (Cimenteries et briqueteries Réunies) (Soc. anon.). Fr. 750,215, Aug. 7, 1933. White portland cement is made from materials as poor in Fe as possible in a rotary furnace, the reducing atm. being

produced by projecting wood, lignite or charcoal in pieces on to the incandescent cement clinker which has passed the baking zone.

**Cement.** Soc. anon. des hauts-fourneaux, forges et aciéries de Pompey. Fr. 751,853, Sept. 11, 1933. A setting accelerator for slag cement is composed of an alkali chloride (about 1%).

**Cement.** Paul Ducret. Fr. 752,365, Sept. 21, 1933. See Ger. 561,037 (C. A. 27, 1132).

**Rotary drum for burning crude cement slurry.** Fried. Krupp Grusonwerk A.-G. Ger. 582,915, Aug. 25, 1933.

**Paving.** David B. Andrews and Henry B. H. Hurd. U. S. 1,934,680, Nov. 14. A playing ground suitable for tennis courts, etc., has a firm resilient surface composed of a homogeneous mixt. of clay, hydrated lime, anthracite screenings and ZnO baked together and reduced to a powd. condition (there being a preponderance of clay in the mixt.).

**Road-surfacing tar from crude tar.** Thermal Industrial & Chemical (T.I.C.) Research Co. Ltd. Ger. 577,520, June 1, 1933. See Brit. 339,640 (C. A. 25, 2839).

**Tar-bitumen mixtures.** Soc. anon. des établissements Jean François. Fr. 751,956, Sept. 13, 1933. A tar-bitumen mixt. for road use is obtained without heating by mixing tar with finely ground kieselguhr suitably wetted with water and then adding the bitumen as an emulsion. A homogeneous mixt. is obtained by heating.

**Emulsions for road surfacing.** Robert J. Lacau. Ger. 582,907, Aug. 26, 1933. Natural asphalt or mineral oil distn. residues are mixed with crude coal tar at temps. between 400° and 450° and emulsified with addn. of water, to give a road-surfacing compn.

**Bituminous emulsions.** Heinrich Kretzer. Ger. 584,-695, Sept. 22, 1933. Addn. to 575,101 (C. A. 27, 3580). The process of Ger. 575,101 is modified by using waxes such as bees wax, carnauba wax or Japan wax as the emulsifying agent.

**Asphalt emulsions.** Erwin Bergel. Austrian 134,983, Oct. 25, 1933. Varieties of asphalt which are not easily emulsified with aq. alkalis, e. g., petroleum asphalt, are mixed with 5-10% of a natural asphalt of high sapon. no., e. g., Trinidad or Bermuda asphalt. Stable emulsions are thus obtained. If the proportion of natural asphalt is raised, e. g., to 25-50%, emulsions are obtained which break readily when mixed with the usual road-making materials.

**Artificial stone resembling marble.** Hynek Oberherr (to American Artificial Marble Co.). U. S. 1,935,985, Nov. 21. Artificial stone is formed with a body portion formed of chalk and portland cement and a polished surface formed of a layer of Ca oxalate crystals, MgF<sub>2</sub> and water glass.

**Hardening ground.** The Francon Cementation Co. Ltd., Abram R. Neclauds and Anthony Gee. Brit. 396,-

1 939, Aug. 17, 1933. Soil or other measures are hardened by introducing chem. substances in soln. into the measures, either continuously or intermittently and before, during or after the introduction of compressed air or other gas, the solns. reacting to form ppts. or deposits of a siliceous or petrifying nature. A slurry of cement, lime or other grouting material may also be added. The solns. may contain Na silicate, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, MgCl<sub>2</sub>, etc.

**Building material.** Ivan Kardos and Maschinenfabrik Komnick G. m. b. H. Ger. 579,961, July 3, 1933. Material suitable for pressing into blocks for building purposes consists of limestone, chalk, or mixts. of pumice, kieselguhr, sand blast-furnace slag, etc., impregnated with molten bitumen or tar, and with lime or cement added as binding agent.

**Constructional materials.** Bart T. Neervoort and Jan S. Volker. Fr. 752,144, Sept. 16, 1933. Building stones, tiles, etc., are made by adding bagasse freed from sugar to a hydraulic binder and mixing with air to a magma. The proportion of bagasse is such that in the finished product it is wholly enveloped.

**Sheet material suitable for use as a wall covering.** Louis C. Fleck (to Paper Patents Co.). U. S. 1,936,355, Nov. 21. An embossed cellulose sheet is coated with a dry and highly flexible waterproof protective material comprising a shellac base which has been emulsified with a relatively small quantity of rubber latex (suitably not over 4% the quantity of the shellac).

**Wallfacings.** Heinrich Borsari-Fischer and Eugen Borsari-Welti (trading as Borsari & Co.). Brit. 396,247, Aug. 3, 1933. Plates of fusible bituminous material are secured to walls, inner surfaces of concrete tanks, etc., by heating the inner surface of the plates and pressing them, if necessary with a roller, onto the heated face of the wall.

**Impressing colored designs on wood or the like for decorative purposes.** John W. Beiger (to Carrom Co.) U. S. 1,936,182-3, Nov. 21. Various details of operation are described.

**Cork-board substitute and "artificial lumber."** Masuzo Shikata. U. S. 1,936,040, Nov. 21. A compressor is filled with water-soaked peat having a high elec. resistance board inserted therein, and the peat is then dehydrated and consolidated into the form of a board by pressure and the action of an elec. current. App. is described.

**Preserving fibrous materials such as insulation board or wood.** Elbert C. Lathrop and Fergus A. Irvine (to Celotex Co.). U. S. 1,935,196, Nov. 14. A colloidal complex comprising Fe(OH)<sub>3</sub> and arsenious acid is used as an impregnating material.

**Treating wooden timbers to prevent cracking.** Carl H. Siever. U. S. 1,936,439, Nov. 21. After forming canals in timbers, they are dried, impregnated with a water proofing liquid such as creosote under heat and pressure and the ends of the canals are closed to confine some of the liquid in them.

## 21 FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Certain technical aspects of motor fuels.** Jacques C. Morrell. *Agr. Eng.* 14, 220 2(1933). The characteristics and properties of gasoline are discussed and compared with those of alc. and alc.-gasoline mixts. The conclusions are unfavorable to the use of the mixts. as motor fuel.

**Gas as motor fuel: a German view.** W. G. Rumbold. *Gas World* 99, No. 2576, Ind. Gas Suppl. 12, 2(1933).—A survey of the motor fuel situation in Germany indicates that the use of gas for this purpose is worthy of consideration.

**The calculation of the heating value of fuels from the elementary analysis.** R. Vondracék. *Brennstoff-Chem.* 14, 404-5(1933).—Heating values calcd. from the formulas of Dulong, Grumell and Davis (C. A. 27, 5511) and V. (C. A. 21, 1532) are compared with calorimetric values for a no. of fuels and other combustible substances. The

formula of G. and D. like that of Dulong gives low values with high O and high with high H contents. That of V. is unsuited for coke unless modified but gives the best agreement with pure substances with the exception of naphthalene. Values for naphthalene vary widely when calcd. by all 3 formulas. V. recommends his formula to check calorimetry with a tolerance of 50 cal. F. W. J.

**Calculating the calorific value of solid fuels.** A. J. V. Underwood. *Gas World* 99, 528(1933).—A nomogram to facilitate use of the Grumell and Davis formula (cf. C. A. 27, 5511).

**The place of oil in the world of fuel.** John Cadman. *Gas World* 99, 562-3(1933).—See C. A. 28, 2837.

**Combustion of hydrocarbons.** Wm. A. Bone. *Chemistry & Industry* 1933, 908-6; cf. C. A. 27, 3060. —Hydroxylation is the primary reaction; in the rare cases



where peroxides have been found they follow hydroxylation. Howard Agnew Smith

**Anthracites: peranthracites and true anthracites.** P. La Beau. *J. usines gas* 57, 392-7, 417-28, 472-9; *Compt. rend.* 197, 1234-6 (1933).—See C. A. 27, 5512.

**The thermal reaction and the hydrogenation of coal.** B. J. C. van der Hoeven  
III. **Berginization of Fushun coal at an initial hydrogen pressure of 100 kg./sq. cm.** R. Abe, S. Fujikawa and K. Sugiyama. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 606-9 (1933); cf. C. A. 27, 1135. The results with an initial  $H_2$  pressure of 100 kg./sq. cm. are much the same as with 75 kg./sq. cm. reported previously. Berginization does not represent a simple hydrogenation; an important relation exists with the thermal reaction of the  $O_2$  combination of the coal.

**Production of gasoline by hydrogenation of coal.** Norman Taylor. *Soc. Chem. Ind., Victoria, Proc.* 32, 740 (1932).—Destructive hydrogenation is composed of 4 types of reactions: (1)  $PhOH$ ,  $PhSH$  and  $PhNH_2$  are reduced by  $H_2$  to  $C_6H_6$ ; (2) unsatd. compds. are satd., as  $C_6H_{12} = C_6H_{14}$ , and benzene  $\rightarrow$  cyclohexane; (3) cracking, as  $C_{14}H_{30} + H_2 = 2C_7H_{14}$ ; and (4) gas formation, as  $C_7H_{16} + H_2 = C_4H_{10} + CH_4$ . Conditions of hydrogenation are chosen to favor reactions (1) and (3). The coal is ground and mixed with heavy oil, then with  $H_2$  and all subjected to 3-4000 lb. pressure per sq. in., heated to  $450^\circ$  and pumped through the converter which contains solid catalyst. The following products are formed: heavy oil contg. coal ash and unconsumed coal, boiling above  $300^\circ$ ; middle oil, boiling  $170-200^\circ$  to  $300^\circ$ ; gasoline, boiling below  $170-200^\circ$ ; and hydrocarbon gases. Yields are heavy oil 3%, medium oil 30%, gasoline 22%, gas 22%, liquor 10%, insol. residue 4%;  $H_2$  absorbed 80%, all based upon 100 parts of ash-free coal, tar or oil. Gas-phase hydrogenation treats oils boiling below  $300^\circ$ , at 3-4000 lb. pressure and  $450^\circ$  in the presence of a catalyst. From both the liquid and vapor processes the products of hydrogenation are sep'd. by ordinary refinery methods. In vapor-phase hydrogenation a low-temp. catalyst yields a naphthenic, while the high-temp. catalyst yields an aromatic, gasoline. The following reactions, taking place in the presence of catalyst, furnish the  $H_2$  for the process:  $CH_4$  and  $C_2H_6$  + steam  $\rightarrow$   $CO$  +  $H_2$ ,  $CO$  + steam  $\rightarrow$   $CO_2$  +  $H_2$ ,  $C$  + steam  $\rightarrow$   $CO$  +  $H_2$ . From 3.65 tons of coal there is obtained 1 ton of gasoline, with an overall thermal efficiency of 43%. Gasoline made from lignite gave a 41.9% thermal efficiency. The gasoline has a sp. gr. of 0.72-0.78, 10-20% distils over below  $75^\circ$ , 28-45% below  $100^\circ$ , final b. p.  $195-200^\circ$ . The knock rating or octane number is 67-72. T. recommends blending natural-gas gasoline with the product. Products of the process other than gasoline are kerosene, Diesel or gas oil, fuel oil, lubricating oils and  $(NH_4)_2SO_4$ . Hydrogenation gasoline cannot compete against petroleum gasoline. H. E. Messmore

**Coal carbonization by internal heat.** Samuel Moore. *Gas J.* 204, 504-8; *Gas World* 99, 517-19 (1933).—Two Moore gas-making machines with a combined capacity of 90,000 cu. ft. per 24 hrs. have been operated since 1928 at Burnham-on-Sea, and in that time have saved 1 1/2 times their cost of £6000. Each consists of a metal shell contg. a vertical coal-gas retort superimposed on a water-gas generator, the retort being surrounded by a series of twin regenerative heating chambers. The plant-operating results are not representative of the retorts alone due to addn. of gas from inefficient horizontal retorts. From a suitable coal in a one-stage operation, coal, carburated water, blue water or mixed gas, and a domestic coke of good quality and any desired volatile may be produced. The coke can be entirely gasified if desired. Operation is simple. P. J. Wilson, Jr.

**The determination of sulfur in fuels.** Review of the most important work appearing since 1929. Egbert Bittich. *Brennstoff-Chem.* 14, 383-8 (1933).—A comprehensive bibliography of methods for solid, liquid and gaseous fuels bringing that of Muhlert, C. A. 24, 2863, up to date. F. W. Jung

**A method for determining the behavior of coal during fusion and formation of coke.** K. Bunte, H. Bruckner and W. Ludwig. *Glückauf* 69, 765-70 (1933).—A method is described whereby plastic resistance to  $N_2$  (C. A. 18, 2064), rate of loss in wt., rate of gasification and expansion can be detd. simultaneously under the same heating conditions. Complete test results are given for 7 German coals, covering the range in rank of those used for coke and gas making. J. D. Davis

**The ash melting point of coal and coke.** H. A. J. Pieters and G. Smeets. *Helv. Chim. Acta* 53, 446-8 (1933). The m. ps. were detd. by the cone method for 5 samples of coal ash with melting index ( $SiO_2 + Al_2O_3$ )/( $FeO + CaO + MgO$ ) varying from 13.9 to 0.3. The cones of 25 mm. height, 7.5 mm. base, were heated in a kryptol furnace at a rate of  $5^\circ$  per min.; the temp. was measured by a Pt-PtRh couple. The m. ps. in an oxidizing atm. (temp. at which the top of the cone touches the base plate) were little different, some above  $1370^\circ$ , the lowest  $1350^\circ$ . For a reducing atm., particularly if  $C$  rods were present in the furnace (11-13%  $CO$ , and 9-15%  $CO_2$ ), the m. p. varied from more than  $1370^\circ$  to  $1100^\circ$ . The temps. measured agreed well with those of standard Seger cones. The m. p. detd. in a reducing atm. satisfactorily follows the melting index. The Fe content is instrumental in detg. the drop from oxidizing to reducing atm. m. p. The latter temp. checks fairly well the results of Bunte ash-softening expts. (C. A. 22, 1457; 23, 5301). By shaking coal with crude  $HCl$  acid for 5 min., the ash m. p. can be raised from  $1145^\circ$  to  $1340^\circ$  and by boiling 50 g. coal with 100 cc. 4  $N$   $HCl$  the ash m. p. can be raised from  $1145^\circ$  to more than  $1100^\circ$ . B. J. C. van der Hoeven

**Clarification of turbid waters from coal washeries.** R. de Izaguirre. *Anales soc. españ. fis. quim.* 31, 760-75 (1933).—The coagulating action of various salts and colloids upon turbid water from coal washeries was exam'd. The turbid water acts as a negatively charged suspension, and coagulation is caused by cations.  $Ca(OH)_2$  assumes a special position among the electrolytes, and its strong coagulating action seems to be caused by destructive action on the bicarbonates. According to this conception,  $HCO_3^-$  ions should have a peptizing action. In coagulation by positively charged colloids, and particularly by protective colloids, irregular series are often encountered, making it necessary to test each substance systematically, because otherwise the most effective concns. can easily be passed over. The best results were obtained with tannin at concns. of 1-4 g. per cu. m. E. M. Svanmies

**Flow coal from lignite.** G. Benthin. *Angew. Chem.* 46, 742-4 (1933).—Flow coal is an intimate mixt. of extremely fine coal particles and oil which has the properties of oil as far as handling is concerned. The suspension of lignite particles can be obtained by incorporation of about 1.5% of soap which forms a gel, but this introduces certain disadvantages and a search was made for methods of using the lignite itself as a source of gel. It was found that creosote oil is an excellent material if small amts. of alkali soaps are added also (0.3-0.5% alkali). Addns. of pyridine or org. bases are preferable to those of alkali. The swelling action of creosote upon lignite is due to the orientation introduced by the  $OCH_3$  group of the ring which causes the formation of a stable gel with the likewise oriented humic acid in the lignite. The possibility of partial de-ashing of the lignite by peptization with creosote and small amts. of alkali salts is also mentioned. Five references. Karl Kammermeyer

**Modern gas-works policy and development.** J. E. Wakeford. *Gas World* 99, 574-5; *Gas J.* 204, 716-18 (1933).—The favorable results secured at Brighouse with gas dehydration, naphthalene removal,  $C_6H_6$  recovery and detn. of the comparative monetary value of coals by carbonization tests are described. Some difficulty was experienced in evapg. the  $NH_3$  liquor, but it is now sold. The hot-cold system of dry gas purification requires a heater for the gas entering each box. Revivification and absorption of the last traces of  $H_2S$  are speeded, and the capacity of the boxes is increased considerably. P. J. Wilson, Jr.

The use of gas in bottles in Denmark. Smidth. *J. usines gas* 57, 505-11(1933). B. J. C. van der Hoeven.

Town gas supply from coke works. G. P. Lishman. *Gas J.* 204, 657-9; *Gas World* 99, 559-61(1933).—At the Lambton Coke Works there are 35 Smet-Solvay waste heat ovens consuming 75% of their gas make, and 35 regenerative Simplex ovens consuming about 55%. Operating results from these ovens, the naphthalene removal, and gas dehydration plants are given.

P. J. Wilson, Jr.

The working of a dry gas meter. A. W. Sharman. *Gas World* 99, 606-7(1933). P. J. Wilson, Jr.

Losses due to unaccounted for gas. T. H. Williams. *Gas World* 99, 527-8(1933).—A discussion of the method of calcg. unaccounted for gas, and of the types of losses.

P. J. Wilson, Jr.

Application of radiation and convection theory to the practical calculation of the capacity and efficiency of gas-burning appliances. Werner Geck. *Gas u. Wasserfach* 76, 817-23, 833-40(1933).—G. discusses the application of black body calculations to gas-using appliances, noting that the wave length and energy maximum of radiated energy depends on the temp., introduces the idea of "black gas radiation," and gives the wave lengths of absorption bands of carbon dioxide and water, and the fraction of energy absorbed by these bands, the energy radiated by carbon dioxide and water, the radiation of layers and cylinders, influence of wall reflection on radiation and heat transfer by convection. The heat-transfer number increases with decreasing size of jet so that numerous small burner openings are preferable to one large opening. Flue-gas removal, friction in pipes and other flow resistances are discussed as well as effect of excess air.

R. W. Ryan

Mechanism of explosive combustion of gaseous hydrocarbons. Alfred W. Francis. *Chemistry & Industry* 1933, 926-7.—A criticism of Bone's conclusions that preliminary partial decompn. does not occur and that the affinity of ethylene and acetylene for  $O_2$  in flames exceeds that of H. It is suggested that part of the hydrocarbon mixt. burns, furnishing energy for decompn. of the remainder of the mixt. Cf following abstract.

Howard A Smith

Mechanism of explosive combustion of gaseous hydrocarbons. W. A. Bone. *Chemistry & Industry* 1933, 928-9.—B., basing arguments on exptl. evidence, disagrees with Francis (preceding abstract). H. A Smith

Dry purifying materials (for manufactured gas). K. Runte, H. Bruckner, W. Ludwig and O. Runge. *Gas u. Wasserfach* 76, 785-9(1933).—The activity of an iron oxide purifying material depends on its content of hydrated iron oxide (which can be calcd. from the combined  $H_2O$ ) rather than on its total  $Fe_2O_3$  content. Wetness and total  $H_2O$  content were detd. on a series of nine artificial and natural iron oxide purifying materials. Wetness was detd. by shaking 10-30 g. of material (depending on its water content) with 50 cc. of 95% isopropyl alc., filtering, mixing 25 cc. of the filtrate with 25 cc. of petroleum and detg. the rise in temp. The wetness of the purifying material was then read from a calibration chart prepd. by using alc. of known water content. Ordinary methods of detg. total  $H_2O$  content give low results. A table of loss of wt. of the purifying materials under various drying conditions is given. The most accurate results are obtained by igniting 1-3 g. of the purifying material up to dark redness in an unglazed porcelain boat in a quartz tube through which a stream of nitrogen is passed, and detg. the wt. of  $H_2O$  absorbed in a  $CaCl_2$  tube. This is the total moisture. Combined or bound  $H_2O$  is equal to the total  $H_2O$  less the wetness. On spent oxides, wetness is detd. as above and combined  $H_2O$  by digesting 10 g. of the material for 1 hr. with alc., filtering off the alc. on a Gooch crucible, washing the material with water-free ether, removing S with repeated portions of  $CS_2$ , drying by suction, and igniting 1 to 3 g. as above, and detg. the  $H_2O$  by  $CaCl_2$  absorption. Humic acid may be present in some bog ores and a method for its detn. is given as well as the humic acid contents of 3 bog iron ores. The ca-

pacities of the nine purifying materials for absorbing  $H_2S$  are given as well as curves for reaction velocity activity as detd. by a static method.

R. W. Ryan

Some new methods for the control of dry purification. W. A. Currie, Jr. *Gas World* 99, 553-7; *Gas J.* 204, 721, 837-9(1933).—Lab. methods for detn. of  $H_2O$  and Fe in the oxide are described. Sensitivity of the oxide to fouling is detd. by fouling a portion of the oxide under controlled conditions and extg. the S formed with  $CS_2$ . The percentage of available Fe oxide =  $500 S/3(100 - S)$ , where S is per centage of S extd.  $NH_3$  in the gas to the boxes is detd. by absorbing the  $NH_3$  from 200 cc. of gas in 5 cc. of 1%  $H_2SO_4$ . The acid soln. in a Nessler tube is treated with Nessler reagent, and the color compared with the yellow color from 0.0025 N  $NH_4Cl$ . The Nessler reagent has shown no sign of being affected by the  $H_2S$  extd. from the gas with the  $NH_3$ .  $H_2S$  is detd. by absorbing it from a similar sample in a 2% NaOH soln. and comparing the color formed by addn. of Na nitroprusside to this soln. in a Nessler tube with the color of a standard  $H_2S$  soln. The optimum  $H_2O$  content of bog ore fouled to various degrees and the influence of the gas temp. are discussed. Precautions to prevent drying out of the oxide are recommended. In the discussion the use of a tube of bromothymol blue, the only indicator not affected by  $H_2S$ , for detg.  $NH_3$  quickly in the gas is mentioned. P. J. W., Jr

The determination of small amounts of nitric oxide and their removal from coke-oven gas. A. Guyer and R. Weber. *Brennstoff-Chem.* 14, 405-8(1933); cf. *C. A.* 26, 2849.—A rapid colorimetric method is described which requires less gas and time. The gas is passed 20-30 l./hr. through a spiral washing bottle with a No. 1 Jena filter supporting 5 cm. fresh Griess reagent (0.25%  $\alpha$ -naphthylamine + 0.4% sulfanilic acid in 20% HOAc). Comparisons are made with colorations obtained with known amts. of N/3000  $NaNO_2$  soln. added to similar amts. of reagent. A table is given for detg. the true content from the found oxidized NO. Amts. to 0.00002% by vol. may be detd. Greatest absorption from the gas of a no. of treated and untreated  $Fe_2O_3$  and  $Fe(OH)_3$  purifying agents was obtained with "Luxmasse" after treatment with  $H_2S$ . Expts. at  $-100^\circ$  show 2-5 parts per million NO will not sep. in air as  $NO_2$  with cyclopentadiene to form gums.

F. W. Jung

The testing of commercial activated carbon for the determination of benzene in coke-oven gas. R. Kattwinkel. *Brennstoff-Chem.* 14, 424-7(1933); cf. *Glückauf* 67, 1409-11(1931); 69, 853-8(1933).—The absorbabilities of 3 samples for 3 different types of benzenes have been detd. both by vapor and by liquid in a series of repeated tests. Distn. temps. with superheated steam at  $240^\circ$  to recover absorbed material were found inadequate and were raised to  $330^\circ$  to reduce losses from vapor soly. in  $H_2O$ , adhesion in the app. and retention in the C. Recovery was less complete with smaller absorptions. Factors for correcting to 100% recovery depended upon the type of benzene and the test conditions. An uncorrected recovery of < 95% by distn. of 20 cc. absorbed material from an unstated amt. of C indicates insignificant absorbability.

F. W. Jung

Increasing benzene yield in the Ruhr area. Rettenmaier. *Gas u. Wasserfach* 76, 791-2(1933).—The value of light-oil products from coal carbonization as well as the wt. of light oil produced per ton of coal carbonized has gradually increased since 1928, the present av. yield of light oil being 10.3 kg. per metric ton of coal. The yield of gas and crude tar has also increased. These increases are attributed to the use of new ovens with silica refractories which increase light oil yields at the expense of the phenols, to the lower rate of oven operation during the depression and to improvements in light oil recovery and refining.

R. W. Ryan

The extraction of phenols from caustic phenolate solutions. K. Drees and G. Kowalski. *Brennstoff-Chem.* 14, 382-3(1933); cf. *C. A.* 26, 6100.—The extractive properties of ether,  $C_6H_6$ ,  $CCl_4$  and aniline are compared. The first 3, mixed 80:20 with pyridine, are 3 times as effective

as ether alone while aniline, acetone and Me Et ketone, mixed 20:30 with ether, are twice as effective.

F. W. Jung

**Ammoniacal liquor problem at Oldham.** Norman Partington. *Gas J.* 204, 719-20(1933).—Concn. of a fixed  $\text{NH}_3$  soln. by the W. C. Holmes & Co. process in which hot gases from the retorts were used resulted in a loss of 22.9% of the  $\text{NH}_3$  over a 2-year period. About 16% of this is attributable to the process itself. After consideration of other processes for evapn. of the liquor a condensing and washing plant consisting of a cyclone tar extractor, primary and secondary water-cooled condensers, a Livesey and finally a rotary brush washer was installed. In this app. 30 gallons of liquor per ton of coal carbonized was produced for sale. The  $\text{NH}_3$  concn. varied from 9 to 11 oz. Attention to steaming in the retorts and maintenance of the  $\text{CO}_2$  concn. in the gas below 3.5% were necessary.

P. J. Wilson, Jr.

**The behavior of a primary tar solution in dialysis.** G. Free. *Brennstoff-Chem.* 14, 401-4(1933).—The phys. and chem. properties of 6 fractions and a residue obtained from the glacial HOAc soln. have been examd. The fractions in HOAc were sub-divided with benzine,  $\text{C}_6\text{H}_6$ , and acetone and the contents of solid paraffins, bases, phenols and neutral oils were detd. in the benzene-sol. fractions. Paraffins are sepd. practically completely by the collodion membrane. Benzene-sol. and neutral material increased in the fractions with continued dialysis. Possible use in tar study is indicated.

F. W. Jung

**Primary, low-temperature tar.** R. Biayna Nicolau. (*Quim. e ind.* 10, 276-9(1933).—A review. E. M. S.

**The chemistry of pitch.** Fritz Hofmann and Leo Boente. *Brennstoff-Chem.* 14, 381-2(1933); cf. *C. A.* 27, 2558. The bases in the liquid portions of a distillate obtained in carbonizing pitch have been studied. Primary bases appear to have increased in concn. by the distn.; *o*-toluidine and 2-naphthylamine and several unidentified higher-boiling bases, apparently pyrene derivs., were isolated.

F. W. Jung

**A general review of the achievements and tendencies in the coke-oven industry today.** M. E. Nicklin. *Gas World* 99, No. 2574, Coking Sect. 129-32(1933).—A review of progress in coke cleaning and blending, use of domestic and blast-furnace coke, and of coke-oven gas, and recovery and purification of by-products.

P. J. Wilson, Jr.

**Preparation of coke for the market.** H. Singleton. (*Gas J.* 204, 601-3; *Gas World* 99, 557-8(1933).—Coke of 1:20%  $\text{H}_2\text{O}$  was placed in a suitable hopper and completely dried by blowing through it a current of hot waste gases from a retort setting. Some reduction in the S content was also effected.

P. J. Wilson, Jr.

**The dependence of the characteristics of coke upon conditions of preparation.** III. W. J. Muller and E. Jundl. *Brennstoff-Chem.* 14, 421-4(1933); cf. *C. A.* 27, 5940. The relationship between ignition point and temp. and rate of carbonization for both slowly and rapidly gasified coke is shown with surface diagrams. Both a modified Melzer app. and the Müller-Courard tube were used with air and  $\text{O}_2$  in detg. ignition points for which time-temp. curves are given of various industrial coxes.

F. W. Jung

**The commercial sampling and analysis of coke.** R. A. Mott and R. V. Wheeler. *Colliery Guardian* 147, 869-71, 912-16(1933).—Tests were made to det. the probable error in the sampling and analysis of coke by specified methods, and to show how the errors could be minimized. The coke in a quenching car was divided into a large no. of zones, and from each zone a 5-, a 2.5- and a 1-lb. increment was taken, on each of which the  $\text{H}_2\text{O}$  was detd. The results showed that for a true av. sample the wt. of each increment should approximate the av. wt. of the unbroken pieces in the consignment, 2-3 lb. In the 5- and the 2.5-lb. increments the av. deviation from the mean  $\text{H}_2\text{O}$  content increased rapidly up to a  $\text{H}_2\text{O}$  content of 5%, but did not increase much thereafter. This is because there is a max. amt. of  $\text{H}_2\text{O}$  that a particular coke quenched in a particular way can absorb. A figure and formula are

given by use of which can be calcd. the no. of increments necessary from different parts of the consignment to ensure a  $\text{H}_2\text{O}$  content within 1% of its true value. Cokes ranging in  $\text{H}_2\text{O}$  from 3 to 13% could be crushed to pass  $\frac{1}{4}$  in. without appreciable loss of  $\text{H}_2\text{O}$  before analysis. In sampling 50 lb. of coke of through  $\frac{1}{4}$  in. size for  $\text{H}_2\text{O}$ , the sample should not be less than 1 lb., and should be collected by at least 20 increments. This sample is too small for correct detn. of ash; but normally, if a 2-lb. sample were taken for  $\text{H}_2\text{O}$ , it would serve also for the general analysis. Despite the concn. of ash in coke of through 1 in. size, the exclusion of less than 2 in. sizes in the original sample does not introduce material error. A practical scheme for sampling coke is outlined.

P. J. Wilson, Jr.

**Pneumatic cleaning of gas coke.** C. W. H. Holmes. *Gas J.* 204, 827-30(1933).—In order to remove from coke, slate and other incombustible matter which provide planes of weakness along which fracture occurs, the raw coke from the ovens is fed onto a triangular perforated metal sheet. This forms the upper surface of an air chest which is reciprocated at high speed in the direction of its length. Air is supplied to the under surface of the fan at a pressure of 3 in. water gage. Under the action of the air and jiggling the bats sink to the bottom of the layer, are trapped behind riffles, and gradually are jigged off at one point, while the cleaned coke leaves at another. On this table coke nuts from unscreened Durham gas coal had their ash content reduced from 12.4% to 8.3. The refuse was 68.5% ash. The process may also be used for the sepn. of reasonably closely sized coke into light, porous and heavy coke of lower porosity. The decrease in the  $\text{H}_2\text{O}$  content of the coke in passing over the table is not great.

P. J. Wilson, Jr.

**The manufacture of household coke in coke ovens.** H. O. H. Cercel. *Gas J.* 204, 831-3(1933).—A brief description of the production of coke suitable for open grates in metal and firebrick retorts, *narrow ovens* operated at 750°, as at the Bruay plant, and *Lecocq coke ovens*.

P. J. Wilson, Jr.

**Wood gas (Luck) 22.** Blast-furnace operations with peat fuel (Chizhevskii, et al.) 9. Formation of coal (Niggli) 8. Tars for use on roads (Cone) 20. Refining [gaseous products of pyrogenic decompos.] (Ger. pat. 578,630) 22. Valves for use with gas holders (Brit. pat. 396,307) 1.

**Carbonizing fuel.** Compagnie générale de construction de fours. Fr. 752,009, Sept. 15, 1933. The fuel is agglomerated to a shape such that it fits the interior of the distn. retort without appreciable play. It may be formed in one or several pieces, preferably as truncated cones.

**Dressing fuel.** Erz- u. Kohle-Flotation G. m. b. H. (Wilhelm Schäfer and Willy Mertens, inventors). Ger. 582,723, Aug. 21, 1933. Fibrous fuel is sepd. from hard coal by flotation by using as an addn. agent dextrin or starch treated with HCl, or inorg. chlorides or org. acid chlorides. Examples are given.

**Motor fuels.** André P. Siréjols. Fr. 750,375, Aug. 9, 1933. Liquids obtained by the distn. of rubber, if desired after rectification or refining, are added to motor fuels.

**Gaseous fuel for engines.** Luis de Florez (to Texas Co.). U. S. 1,936,155, Nov. 21. A fuel suitable for internal-combustion engines of lighter-than-air craft contains H about 52 and butane about 48%. U. S. 1,936,156 relates to a fuel contg. H about 27.5 and propane about 72.5%.

**Gels suitable for fuels.** James W. McBain (to S. Sternau & Co.). U. S. 1,934,725, Nov. 14. About 2.5-5.0% of a nitrocellulose, insol. in the alcs. used at ordinary temps., is dissolved in alcs. such as anhyd. EtOH at a low temp. of about -30° to -60° and the temp. is then permitted to rise to normal temp. without evapn. to produce a solid gel suitable for use as a fuel.

**Liquid fuel and coke.** Pape & Co. G. m. b. H. Fr. 750,337, Aug. 8, 1933. Tar, pitch and other combustible liquids are passed in a finely divided state through a

strongly heated chamber to form vapors of hydrocarbons and coke and the vapors are brought without condensation to a 2nd chamber in which they are "cracked" to form more volatile liquids suitable as motor fuels. The uncondensed gases are used to pulverize the starting material.

**Device suitable for filtering oils and liquid fuels.** Napoleon R. Thibert. U. S. 1,935,136, Nov. 14. Structural details.

**Apparatus for distilling bituminous fuels.** I. G. Farben-ind. A.-G. (Adolf Traut, inventor). Ger. 578,822, June 22, 1933.

**Directly heated fuel-distilling furnace.** Kohlenveredlung und Schwelwerke A.-G. Ger. 578,563, June 15, 1933.

**Furnace for pre-drying and burning pulverulent fuel.** Elektrowerke A.-G. (Bernhard Kramer, inventor). Ger. 578,500, June 14, 1933. Addn. to 508,919 (C. A. 25, 625).

**Drying fuels with superheated steam.** Rudolf Steiner and Viktor Skutl. Austrian 135,007 and 135,008, Oct. 25, 1933. Addns. to 121,405 (C. A. 25, 2548). Ger. 583,907, Sept. 12, 1933. Addn. to 527,021 (C. A. 25, 5275).

**Superheating steam.** Charles E. Lucke (to Babcock & Wilcox Co.). U. S. 1,934,723, Nov. 14. Various details of app. and operation are described. U. S. 1,934,724 also relates to app. for steam production and superheating and desuperheating.

**Control device for steam generators.** Marcus Lothrop. U. S. 1,935,981, Nov. 21. Various structural and operative details are described.

**Apparatus for desuperheating steam.** Charles W. Gordon (to Superheater Co.). U. S. 1,935,195, Nov. 14. Structural features.

**Hydrogenation of carboniferous materials in the liquid phase.** Imperial Chemical Industries Ltd. (Charles F. R. Harrison, inventor). Ger. 579,626, July 14, 1933. See Brit. 311,193 (C. A. 24, 670).

**Hydrocarbons.** Charles J. Greenstreet. Brit. 307,468, Aug. 18, 1933. Hydrocarbons, free from phenols and suitable as fuel for internal-combustion engines, are obtained by subjecting a mixt. of mineral oil with creosote oil, tar acids or coal-distn. products contg. tar acids, in finely divided form and with or without the addn. of steam or residual gases of the process, to extensive surface contact with catalysts, e. g., Fe, Ni, steel, Cu, Co, Mn, Cr, Mo, Sn, Al, alkali metals, alk.-earth metals, Si, B, pumice, firebrick, SiO<sub>2</sub>, Carborundum, carbides, nitrides, etc., at 350-650° and withdrawing the product as soon as it is free from phenols. The high pressures used in hydrogenation processes are not used. Cf. C. A. 27, 4378.

**Vertical retorts for carbonizing coal.** Frederick J. West, Ernest West and West's Gas Improvement Co. Ltd. Fr. 750,656, Aug. 16, 1933.

**Means for compressing coal in discontinuously operated coke ovens.** Gustav Hilger. Ger. 587,035, Oct. 30, 1933.

**Crushing apparatus for working up lignite.** Maschinenfabrik Buckau R. Wolf. A.-G. Ger. 578,894, June 17, 1933.

**Distilling crude lignite.** Rheinisch-Westfälisches Elektrizitätswerk A.-G. and Theo. Schmidt. Fr. 752,300, Sept. 20, 1933. The retort is in the form of a series of chambers one above the other.

**Fuel gas.** Vergasungs-Industrie A.-G. Austrian 134,812, Oct. 10, 1933. In a generator for the manuf. of mixed distn. gases and water gas from fuels such as brown coal, lignite or peat, the gases evolved (mainly CO<sub>2</sub> and steam) from that part of the shaft in which the fresh fuel is preheated to about 400° are separately withdrawn and mixed with the steam for the water-gas reaction. Gas of low CO<sub>2</sub> content and high-calorific value is obtained.

**Gas mixtures.** Edmond Voiturem. Ger. 582,664, Aug. 19, 1933. A mixt. contg. C<sub>2</sub>H<sub>2</sub>, H and CO is produced by treating gaseous satd. hydrocarbons with H and O in a reaction chamber at temps. above 1300°.

**Purifying gases.** The Gas Light & Coke Co. Fr. 42,691, Sept. 1, 1933. Addn. to 721,898 (C. A. 26, 4114). Active charcoal used for purifying gases is re-

generated by hydrogenation with a compd. of V, U, Cr, Fe or W as catalyst. Thus, used charcoal is treated with a soln. of NH<sub>4</sub> vanadate in water and heated to 440-50° under pressure.

**Purifying gases.** Christian J. Hansen. Fr. 750,531, Aug. 11, 1933. NH<sub>3</sub> is removed from gases which are then treated to remove H<sub>2</sub>S by solns. of salts of HCNS, while adding SO<sub>2</sub> to the washing liquid or to the gas. Cf. C. A. 27, 830.

**Gas washing.** Établissements Ernest Arnoult. Fr. 750,662, Aug. 16, 1933. Residual waters from gas washing, contg. principally H<sub>2</sub>S, are oxidized in contact with air, with or without a catalyst such as colloidal Ni sulfide. An app. is described.

**Device for testing gases.** Apparat-Bauanstalt Ing. Hans Klinkhoff (Leonhard Kneissler, inventor). Ger. 578,517, June 14, 1933. The quantity of CO<sub>2</sub>, CO or H<sub>2</sub>, especially in flue gases, is measured by noting the changes of heat cond. of a wire as a current of the gas passes over it.

**Hydrogen-containing gases.** Wm. L. Spalding (to American Cyanamid Co.). U. S. 1,935,675, Nov. 21. Gases contg. CO, such as water gas, producer gas or cracked natural gas, are satd. with water vapor, steam is added if necessary and reaction is effected to produce CO and H<sub>2</sub>; water is condensed from the reacted gases; the gases are compressed after satn. and they are passed to the condensing step at a higher relative gas pressure than that of the satg. step, and excess water from the satg. step is passed to the condensing step. App. arrangement and various details of operation are described.

**Gas generator.** Heinrich Steinfeldt. Ger. 582,629, Aug. 18, 1933. Addn. to 423,555.

**Gas generator fed by waste vegetable materials.** Humboldt-Deutzmotoren A.-G. Fr. 750,554, Aug. 16, 1933.

**Gas generation from materials such as gasoline, alcohol, etc.** Carl O. Wannack (to S. H. G., Inc.). U. S. 1,935,925, Nov. 21. Various details of app. and operation are described for mixing and utilizing liquid fuel and air.

**Gas producers.** Harald Kenner. Ger. 582,539, Aug. 16, 1933. In treating broken fuel such as coke with steam a max. yield of fuel gases is obtained by mixing a catalyst such as furnace dust with the steam.

**Operating slagging gas producers.** Louis Chavanne. Ger. 584,798, Sept. 25, 1933. Addn. to 507,082 (C. A. 27, 1489). Details are given of an alternative method of regulating the height of the fusion zone and the temp. of the gas.

**Coal-gas retort.** Gerhard Verse. Ger. 578,800, June 17, 1933.

**Weighting gas-holders.** R. & J. Dempster Ltd., Joseph W. Scott and Arthur J. Sheeran. Brit. 396,667, Aug. 10, 1933.

**Device for removing sulfur, etc., from gases.** C. Otto & Co. G. m. b. H. Ger. 578,710, June 16, 1933.

**Desulfurizing gas.** Gastechnik G. m. b. H. Fr. 753,127, Oct. 7, 1933. The purifying material is used in a solid porous form instead of a powder and may be made by agglomeration with sulfite lyc, sol. glass, cement, etc. The porosity may be increased by the incorporation of org. materials or salts which are afterward decomposed by heat. The material may be used in columns or towers, used material being drawn off at the bottom and fresh material introduced at the top.

**Apparatus for removing hydrogen sulfide from gases.** Trinidad Leaseholds, Ltd. Ger. 579,938, July 4, 1933.

**Tar emulsions.** Fernando Elosequi. Fr. 752,178, Sept. 18, 1933. Montan wax and suint are used along with a soln. of NaOH for emulsifying tar.

**Coking coal.** Kohlenveredlung und Schwelwerke A.-G. Ger. 578,564, June 15, 1933. Coal is conveyed over perforated surfaces on its way to the coking or distg. chamber for pre-treatment with hot furnace waste gases contg. O.

**Coking briquets.** Emilie Gevers-Orban and Julien Pieters. Ger. 578,628, June 15, 1933. Fine granular

fuel with a high content of volatile substances is subjected to a pre-distn after which it is briquetted with a binding agent. These briquets are mixed with a further amt of the crude fuel and the whole is subjected to a further distn so that the briquets are completely coked and the fuel is partly coked ready for making further briquets.

Retorts for the production of coke or gas Friedrich Goldschmidt Fr 753,136, Oct 7, 1933

Chamber oven for producing gas and coke Didier Wörke A-G Ger 582,557, Aug 15, 1933

Coke oven with a vertical shaft Johann Lutz Ger 578,789, June 17, 1933

Regenerative coke oven Carl Still G m b H Ger 582,663, Aug 19, 1933

Coke-oven doors C Otto & Co G m b H Brit 397,385, Aug 24, 1933

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W F FARAGHLR

Bibliography of Soviet (Russia) patents on petroleum A A Bochtlingk *Foreign Petroleum Tech* 1, 13 22, 99-109, 115 19(1933) A A Bochtlingk

Vapor pressure and vaporization of petroleum fractions Donald I Katz and Geo Granger Brown *Ind Eng Chem* 25, 1373 94(1933) —A crit survey of the methods of calcg the equil compns of liquid and vapor under all conditions is summarized conveniently for engineering use in the design of distn equipment for hydrocarbon mixts.

L W I Cummings  
Petroleum fuels I W I Cummings *Chem Eng* *Using Rev* 25, 417 20(1933) —An attempt to correlate the chemistry of petroleum fuels with their performance in practice. The fuels discussed include (1) liquefied gaseous fuels, (2) motor spirits, (3) kerosenes, (4) Diesel fuel oils and (5) bunker fuels. W H Boynton

Improved lamp for determination of sulfur in light petroleum products I R Gillis *Ind Eng Chem*, *Anal Ed* 5, 421(1933) —A modification of the lamp prescribed in A S I M method D90 301 consists in surrounding the wick tube with a larger glass tube so that the wick can be raised or lowered without removing the lamp from the chimney. This is very good for either light or heavy gasolines or illuminating oils. J I F

The distillation of bituminous schists from the department of Jura, province of Franche Comte (France) Jean Barlot *Compt rend* 197, 450 2(1933) cf C A 27 3322 —Org matter ranges from 13 to 27%, lime 35-40%, SiO<sub>2</sub> 35-40%, and pyrites 1-5%. The best results are obtained at about 500°. It is concluded that the character of the crude oils obtained depends more upon the particular process used than on the place of origin, that their content in those hydrocarbons which distil off before 205° is never less than 30% and may under favorable conditions be 50% higher than this. These beds average 5 m in thickness, though some reach 50 m, and represent enormous fuel reserves. A W Iurbank

Assay of gas oil for carburation purposes J A van Dijk *Het Gas* 53, 419 53(1933) —Natural gas oils contain aromatic and naphthenic ring mols and paraffins, but no olefins. Olefins found in them, e g, by the 41 SO<sub>4</sub> method (sp gr 1.73), are due to sulfonation of aromatic compds. General objections are raised to this method that will remove with the aromatic rings important paraffinic side chains. Application of the Waterman, et al (C A 26 4702) and Vlughter, Diss Delft (1932) methods to gasoline assay is advocated by hydrogenation of olefins and aromatic compds, the no of double bonds is detd (olefins separately by the McIlhenny Br no) in the resulting paraffin naphthenic mixt and the ratio of the 2 is detd by the sp refraction method. For practical reasons a somewhat modified method is made up from the methods of Waterman and of Carpenter (C A 22, 3766). The McIlhenny Br no is detd and if little or no olefins are found (for cracked oils of high olefin content hydrogenation is necessary), 50 cc of oil is shaken for 1 hr with H<sub>2</sub>SO<sub>4</sub> of d = 1.84, sepd and shaken twice for 2 hrs with a mixt of 80% of 1.84 H<sub>2</sub>SO<sub>4</sub> and 20% (by wt) of 25% oleum. The aniline point and sp refraction have now reached const values. The change (rise) in aniline point before and after the H<sub>2</sub>SO<sub>4</sub> treatments is a measure for the aromatic ring content of the oil (the vol contraction of the oil indicates the total amt of aromatic compds.) A factor of 0.8-0.87% by wt. of aromatic rings per 1° aniline point

rise is used. The treated oil is twice shaken with pure concd H<sub>2</sub>SO<sub>4</sub> to remove sulfonic acids before the aniline point detn. For subsequent analysis it is neutralized by heating on a steam bath with a small amt of anhyd Na<sub>2</sub>CO<sub>3</sub> and shaking, and is dried overnight with CaCl<sub>2</sub>. After filtration the acid-free and water free oil, a mixt of paraffins and naphthenes is analyzed from sp refraction (Abbe), sp gr (d<sub>20</sub> in 4 decimals, Sprengel's pycnometer), and mol wt (in pure C<sub>12</sub>H<sub>26</sub> by f p lowering of about 11°) by using the Waterman-Vlughter charts. The naphthenic content is calcd back to the original vol of the oil before acid treatment. The paraffin content of the oil is found by difference 100 - (aromatic ring + naphthenic ring content). For sp gr detn of the original oil, d<sub>20</sub>, the Mohr balance is used. The Rutten app is used with a few changes to det the boiling curve of the oil at 60 mm Hg pressure. CO<sub>2</sub> is sucked through the boiling capillary to prevent oxidation, the flask is heated in an air-bath and is protected by asbestos against radiation (sketch). The distn rate (initial flame 3 cm) is 50 drops per min. total distn takes 1 hr, fractions are collected between 0°, 150°, 200°, 250°, 300° and residue. For 10 oil samples the results of the methods are given: paraffin content 60-76%, one had more than 20% distg below 150°. The upper limit in a good gas oil is 20%, or perhaps only 10% of this fraction. Paraffin content together with boiling range are the most significant factors for the evaluation of the oils. B J C van der Hoeven

Spectrographic detection of formaldehyde in an engine prior to knock Gerard M Risswiler and Lloyd Withrow *Ind Eng Chem* 25, 1359 66(1933) —The formation of CH<sub>2</sub>O in the non-inflamed gases in the knocking zone of an Otto cycle engine running under knocking conditions with several different fuels is proved by characteristic absorption bands. The presence of CH<sub>2</sub>O has not been detected in fuels which do not knock, and its incorporation into a fuel does not produce knock.

L W I Cummings  
The dielectric losses of insulating oils at very high frequencies Harald Beck *Physik Z* 34, 721 9 (1933) —The dielec losses of oils at frequencies from 10<sup>7</sup> to 10<sup>8</sup> were measured with the aid of a differential calorimeter with an accuracy of 2%. From the loss angles at these frequencies no conclusions could be drawn concerning the low frequency breakdown potential, since impurities in the oil greatly lower the latter without influencing the former. In high-potential fields purification of the oils also had no effect on the loss angle. The losses are attributed almost exclusively to mol dipoles, since curves for various kinds of insulating oils show maxima characteristics of pure dipole substances. The influence of viscosity on the max agrees qualitatively with the Debye theory. L F Steiner

Effect of lubricating oils on the spontaneous ignition temperature of motor fuels Tsuruo Araki and Saburo Otsu *J Soc Chem Ind, Japan* 36, suppl binding 589 (1933) —It was found that the spontaneous ignition temps of various gasolines were lowered by the addn of lubricating oils. Mineral oils lowered the temps more than castor oil. Karl Kammermeyer

Lubricating oils M Roger *J agr prat* 97, 319 20 (1933) —A list of the qualities of good lubricating oils and of the standard tests used to compare various oils.

J. R. Adams





**Cracking hydrocarbon oils.** Soc. anon. "Le carbone." Ger. 583,802, Sept. 9, 1933. Addn. to 540,088 (C. A. 26, 1764). The liquid or vaporized oil is passed at a raised temp. through blocks, rolls, spirals or disks of active C prep'd. from loose or woven fibers, e. g., from cotton wadding or from lamp-wick fabric.

**Apparatus for cracking hydrocarbon oils.** Panhandle Refining Co. Ger. 582,793, Aug. 23, 1933.

**Bubble tower suitable for fractionating hydrocarbon oils.** Frank W. Hall (to Texas Co.). U. S. 1,935,709, Nov. 21.

**Refining cracked hydrocarbon vapors of motor-fuel boiling-point range.** Jacque C. Morrell (to Universal Oil Products Co.). U. S. 1,935,162, Nov. 14. The vapors are passed upwardly through a descending subdivided flow of an acid refining agent such as  $H_2SO_4$  or  $H_3PO_4$  and the vapors are then passed through a tortuous path to sep. entrained reaction products and are subsequently filtered through a filtering medium contg. an alk. substance such as fuller's earth and lime. App. is described. Cf. C. A. 28, 625.

**Refining hydrocarbon oil distillates.** Jacque C. Morrell and Gustav Egloff (to Universal Oil Products Co.). U. S. 1,935,160, Nov. 14. Vapors obtained as an overhead product of motor-fuel-boiling range from an oil-cracking process are subjected in heated condition to treatment with  $SO_2$  and steam in the presence of an added metal such as Zn or Sn, Ca, Mg, Al, Cu, Pb, Hg, Co, Ni, Cr, Mn, Mo, V or W in order to remove S, gum-forming compds., etc. U. S. 1,935,161 relates to a generally similar process in which the treatment with  $SO_2$  and steam is effected in the presence of a metallic oxide such as Fe oxide. Cf. C. A. 27, 2797.

**Treating hot tarry residuum from hydrocarbon oil cracking.** George Armistead, Jr. (to Texas Co.). U. S. 1,936,283, Nov. 21. See Can. 331,532 (C. A. 27, 3810).

**Purifying crude hydrocarbon material such as gas oils or paraffin oils.** Max Harder and Wilhelm Dietrich (to I. G. Farbenind. A.-G.). U. S. 1,935,207, Nov. 14. The material is treated simultaneously with  $H_2SO_4$  and with an oxide of N at a temp. not exceeding  $30^\circ$ .

**Removing paraffin from hydrocarbon oils.** Deutsche Petroleum-A.-G. Ger. 582,646-7, Aug. 19, 1933. Paraffin is removed from hydrocarbon oils, especially lubricating oils, by thinning if necessary with easily boiling liquids such as benzene or petroleum and treating with  $H_2SO_4$  in the cold. The paraffin-acid product is then sep'd. by a centrifuge (582,646). Alternatively, the oil may be dissolved in low-boiling liquids, acidified and treated with soda or NaOH, the paraffin being removed as before by a centrifuge (582,647).

**Removing wax from admixture with oil.** Clarence A. Ward (to Standard Oil Development Co.). U. S. 1,936,181, Nov. 21. A dild. wax-contg. oil is chilled and while chilled is mixed with a finely divided granular material such as infusorial earth in the proportion of about 8-10 lb. per bbl. of material under treatment; the oil is settled while it is at a temp. of about  $-18^\circ$  to  $-13^\circ$ , the oil is withdrawn from the wax and settled granular material, and the diluent is removed from the oil.

**Separating waxes from oils.** I. G. Farbenind. A.-G. (Karl F. Goetze, Bruno Engel and Fritz Christmann, inventors). Ger. 578,505, June 14, 1933; Brit. 397,169, Aug. 14, 1933. Paraffin or wax-like substances are sep'd. from hydrocarbon oils to give refined oils for lubricating purposes, by adding a precipitant and cooling. Highly polymerized or condensed high-mol. paraffins obtained by treating hard or white paraffin are preferred as the precipitant. Derivs. of these contg. halogen, O or S are still more effective as precipitants. Examples are given.

**Purifying crude paraffin.** Hans Klein, Hans Kaehler and Hermann Zorn (to I. G. Farbenind. A.-G.). U. S. 1,936,453, Nov. 21. For purifying ppt'd. crude paraffin wax by removal of impurities comprising oils and colored asphalt-like substances, the wax is washed with a mixt. of a formate of a lower alc. such as methyl formate and an org. solvent such as a mixt. of  $C_6H_6$  and MeOH which has

greater solvent power for the asphalt-like substances than the formate.

**Oils.** Sigbert Seelig. Ger. 582,717, Aug. 21, 1933. A process is described for obtaining oils by heating distn. residues in a rotating-drum furnace without cracking the resulting vapor.

**Refining oils, etc.** Heliöder Rostin. Ger. 578,630, June 15, 1933. Oil, hydrocarbons, liquid or gaseous products of pyrogenic decompns., etc., are refined by leading them with  $H_2S$  over finely divided freshly reduced Fe. The Fe may be present with a carrier such as pumice. The Fe and  $H_2S$  may be recovered after the process by leading H or gas mixts. contg. II over the used Fe. Examples are given.

**Refining oils.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 753,229, Oct. 11, 1933. Oils contg. S are purified by distg. to obtain fractions and treating the fractions separately so that the S compds. therein are converted into other S compds. having different volatilities, distg. the fractions again to remove the greater part of the S and mixing the resulting fractions freed from S. The conversion of the S compds. may be by treatment with plumbite with or without the addn. of free S, treatment with clay or fuller's earth in the vapor phase, treatment with  $H_2SO_4$  or with nascent H. It is not always necessary to so treat all the fractions, and those of lowest b. p. may be treated only with NaOH lye.

**Mineral oils.** Texaco Development Corp. Fr. 752,104, Sept. 16, 1933. The constituents of low viscosity index are sep'd. from fractions of lubricating oils contg. paraffin without previous removal of paraffin by submitting the oil to an extn. by means of furlurol at about  $52-93^\circ$ . The extd. matter is eliminated without appreciable cooling of the oil.

**Refining mineral oils.** Standard Oil Co. Ger. 575,610, Apr. 29, 1933. Mineral lubricating oils are refined by treatment with an acid such as  $H_2SO_4$ . After such treatment and before neutralization the oil is treated in one or more stages with dehydrated  $AlCl_3$  to remove acids sol. in the oil. The oil is then sep'd. from the  $AlCl_3$  sludge and the acid removed.

**Solidified mineral oils.** Eduard O. Ornfeldt. Fr. 752,368, Sept. 21, 1933. Mineral oils, such as petroleum, etc., are dispersed in the presence of small amts. of soap preferably mixed with org. solvents, such as EtOH, with small amts. of beeswax or constituents of this wax; a part of the beeswax may be replaced by paraffin, etc.

**Mineral oil distillation.** Arthur E. Pew, Jr., and Henry Thomas (to Sun Oil Co.). U. S. 1,935,953, Nov. 21. A stream of oil is flowed through a series of vaporizers maintained under low subatm. pressure so that a rapid flow of a substantially unbroken thin sheet of oil passes over the floor of each vaporizer; partial vaporization of the oil is effected by heat interchange with and condensation of Hg vapor, and the oil vapors, after they leave the surface of the liquid oil, are maintained out of heat-exchange relation with the heating medium. App. is described.

**Mining oil sands.** Wm. C. Laughlin (to Filtration Equipment Corp.). U. S. 1,935,643, Nov. 21. A tunnel is formed below a bed of the sands, heat and water are applied to the sands from various points in the tunnel and the sands and oil are caused to flow into the tunnel, and are there disintegrated and pumped to a sepn. plant at some distance. App. is described.

**Return bend fitting for oil stills.** Fred C. Fantz. U. S. 1,936,386, Nov. 21. Structural details.

**Return bend for oil-cracking tubes.** Herbert C. Stockham (to Fred C. Fantz). U. S. 1,935,233, Nov. 14. Mech. features.

**Pipe-coil system suitable for heating oil in cracking furnaces.** Donald J. Bergman (to Universal Oil Products Co.). U. S. 1,936,284, Nov. 21. Structural details.

**Motor fuel.** N. V. de Bataafsche Petroleum Maatschappij. Ger. 582,718, Aug. 21, 1933. See Fr. 742,957 (C. A. 27, 3812).

**Cracked gasoline.** Charles P. Wilson, Jr. (to Texas Co.). U. S. 1,935,967, Nov. 21. For the production of cracked gasoline of good stability, oil such as gas oil or the

like is cracked in a cracking zone in which sepn. of vapors from liquid takes place and high superatm. pressure is maintained on the vapors during their sepn.; sepd. vapors are cooled to a temp. below an active cracking temp. and are digested in a polymerizing chamber in the absence of a solid adsorptive contact material, at an elevated temp. below the cracking temp. and under superatm. pressure to effect polymerization of unstable compds. of potential gum-forming character and the polymerization products are sepd. from the stabilized gasoline, as by rectification. App. is described.

**Lubricating oils.** Standard Oil Development Co. Ger. 582,853, Aug. 24, 1933. A prepn. for lowering the pour pt. of lubricating oils is obtained by condensing hard or soft paraffin and removing the undesired constituents by a selective solvent. Thus, kerosene is condensed by the aid of  $AlCl_3$  and extd. with amyl alc. to remove the constituents which do not lower the pour point of oils.

**Lubricating oils.** Gulf Refining Co. Fr. 751,640, Sept. 7, 1933. Refined lubricating oils are obtained by mixing non-filterable distillates contg. wax, and which do not lend themselves to centrifuging, with distn. residues capable of modifying the wax. The proportion of distillates to residues is controlled according to their viscosities, so as to obtain a mixt. capable of being freed from its wax by centrifuging. The percentage of residues is between the values  $(65-5.6\sqrt{V-50})$  and  $(85-5.6\sqrt{V-50})$ ,  $V$  being the viscosity of the distillates. The distillates and residues may be derived from different crude oils, the residues being derived from oil contg. relatively less asphaltic impurities.

**Lubricating oils.** C. C. Wakefield & Co. Ltd. Fr. 752,113, Sept. 16, 1933. A lubricant for bearings comprises a vegetable oil such as castor oil, and a small amt. of an org. compd. of Sn or metallurgical Sn, e. g., Sn iodide of Sn. An org. compd. of Pb, such as  $Et_4Pb$  or Pb oleate, may also be present.

**Apparatus for reclaiming used lubricating oil.** Joseph G. Sarvent. U. S. 1,936,033, Nov. 21. Various details are described of an app. comprising a retort in the upper portion of which air inlets are provided, fans and an atomizing disk also being provided which are mounted on a single shaft for simultaneous rotation and serve to facilitate sepn. of water vapors, etc.

**Multiple-layer filter for used lubricating oil, etc.** Wellington I. Clayes. Ger. 587,222, Oct. 31, 1933. This corresponds to Brit. 382,001 (C. A. 27, 4072).

**Asphalt.** Richard Lichtenstern. Ger. 578,934, June 19, 1933. The elasticity of asphalt masses is improved by adding Chinese wood oil and a condensing agent such as  $FeCl_3$  or  $AlCl_3$ .

**Asphalts.** Standard Oil Development Co. Fr. 753,036, Oct. 5, 1933. Asphalt is composed of a mixt. of asphaltic residues from the distn. of petroleum oil and an ext. obtained by extn. of the high-boiling fractions of petroleum oil. The extn. is made with a solvent such as  $PhOH$ ,  $SO_2$ , or furfural.

**Emulsifying apparatus suitable for preparing bituminous emulsions, etc.** Frederick O. W. Loomis and Daniel M. Loomis. U. S. 1,935,884, Nov. 21. Various structural, mech. and operative details are described.

**Bituminous masses.** Deutsche Asphalt-A.-G. der Linmer und Vorwöhrer Grubenfelder (Hans Wirth, inventor). Ger. 582,676, Aug. 19, 1933. Colored masses are prepd. by mixing clear bitumen such as steam pitch with asphalt-limestone meal and org. coloring matter of the type known as lime-coloring.

**Bitumen.** Cuthbert H. Grimshaw. Ger. 582,608, Aug. 17, 1933. Bitumen emulsions are colored by mixing them with org. dyes and white clay. An emulsifying agent may also be present.

**Retention of kaolin in print-paper.** I. G. Kulev. *Bumashnaya Prom.* 12, No. 7, 22 39(1933). -The discussion of the processing methods for addn. and retention of kaolin in print paper is based on general factory practice and the literature on the subject.

**Flax waste for production of cardboard.** L. Evin and N. Dovgalyuk. *Bumashnaya Prom.* 12, No. 7, 457 (1933). -A good grade of cardboard was obtained from flax waste by cooking with 3 pts. of 10%  $CaO$  at a pressure of 3-4 atm., and with a mixt. of 4%  $NaOH$  and 10%  $CaO$  at 100°.

**Bagasse.** 111. Hemicellulose (Hachihama) 28. Sugar from wood (Bergius) 28. Bagasse utilization [production of cellulose] (Honig) 28. Treating sulfite liquor (U. S. pat. 1,936,250) 13.

**Vogel, W.:** Die Herstellung und Untersuchung der Sulfitzellulose Extrakte sowie ihre Anwendung in der Gerberei. Freiburg i. Sa.: Verlagsanstalt E. Mauckisch. 72 pp. Reviewed in *J. Intern. Soc. Leather Trades Chem.* 17, 707(1933).

**Cellulose.** Wolff & Co. Komm.-Ges. auf Aktien and

## 25- CELLULOSE AND PAPER

CARLETON F. CURRAN

**Oxycellulose.** Karl H. Bergmann. *Angew. Chem.* 46, 713 16(1933). -A reliable method for the detn. of oxy-cellulose is given and an attempt is made to define it chemically. Oxycellulose prepd. with (1)  $KClO_4$  and  $HCl$ , (2)  $NaOCl$  (acid and alk.), (3)  $Br$  and lime, (4)  $H_2O_2$ , (5)  $HNO_3$  and (6)  $KMnO_4$  (acid and alk.) were investigated by dissolving the oxycellulose from the fiber by means of boiling alkali and also by treatment in the cold. The hot treatment gave 0.1-0.3% yield of a product analyzing  $(C_6H_6O_6)$  and cold treatment gave 2-3% of presumably polyglucuronic acid  $(C_6H_6O_7)_x$ . Considerable exptl. data are presented. Nine references.

**Studies on iodine colorimetry of cellulose dextrins and the foundation of an iodocolorimetric method for determining cellulose.** Lauri Paloheimo and Viljo Valavaara. *Biochem. Z.* 266, 301 22(1933). -The cellulose dextrins obtained by means of 70%  $H_2SO_4$  are colored an intense red upon the addn. of a  $KI-I_2$  soln. By dilg. the acid concn. to 50% the hydrolysis may be stopped and the soln. examd. photometrically. The celluloses of different origins are equiv. to each other colorimetrically. By preliminary alkali treatment of cellulose most of the non-cellulose substances which are sol. in the 70%  $H_2SO_4$  can be removed without affecting the cellulose itself.

**Ultra-violet light and nitrocellulose films.** A. Kraus. *Farbe u. Lack* 1933, 545-6, 556-8. -Expts. were made to clarify the relations among effects of ultra-violet light upon plasticizers, nitrocellulose and films contg. them. The following detns. were made either on the plasticizers, on films contg. nitrocellulose and plasticizers or on both: yellowing,  $n$ , acid no., acetone-insol. matter, alc.-sol. matter, N content, tensile strength, distensibility. No simple relation exists among these properties.

G. G. Sward

Richard Weingand. Ger. 582,795, Aug. 23, 1933. Foils of regenerated cellulose or of cellulose compds. are prevented from cracking when stored by a thin coating of wax or wax-like substance without solvent.

**Cellulose.** Papeteries Navarre (Soc. anon.). Fr. 42,741, Sept. 14, 1933. Addn. to 750,032 (C. A. 28, No. 2). The invention is extended to cover the cellulose itself treated by the sizing process of Fr. 750,032.

**Cellulose.** The Mathieson Alkali Works. Fr. 753,037, Oct. 5, 1933. Fibrous cellulose is treated to swell, parchmentize or gelatinize the fibers, by submitting it to the action of one or more sol. salts of the group Na, K or NH<sub>4</sub>, e. g., NaI, NaNO<sub>3</sub>, NH<sub>4</sub>NO<sub>3</sub> or KI, dissolved in aq. NH<sub>3</sub>, and limiting the concn. and duration of the treatment to avoid complete dispersion of the cellulose.

**Cellulose solutions.** Emil Scheller. U. S. 1,936,483, Nov. 21. Solns. suitable for rayon manuf. are prepd. by dissolving cellulose in a suitable solvent such as cuprammonium soln. or a caustic alkali-CS<sub>2</sub> viscose-producing mixt. in the presence of a definite quantity of O predetd. in accord with the desired viscosity.

**Centrifugal apparatus for refining cellulose.** Aleksander Lampén. Ger. 587,088, Oct. 30, 1933.

**Alkali cellulose.** Franz Steinmigg. Fr. 751,617, Sept. 7, 1933. Alkali cellulose for manuf. of viscose is prepd. and ripened by passing cellulose in the form of a ribbon or thin band from a roll through a mercerizing lye, freeing it from excess lye by pressing rollers and passing it immediately, still in the form of ribbon, into a ripening chamber. The temp. of the ripening chamber is preferably 40°.

**Cellulose capsules.** Chemische Fabrik von Heyden A.-G. Ger. 578,642, June 16, 1933. These are prepd. by dipping molds into viscose in its most viscous condition. The covered molds are then plunged into a pptg. liquid consisting of a neutral or weakly acid salt bath, e. g., AcONH<sub>4</sub> and AcONa, or Na<sub>2</sub>SO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> at 20-40°.

**Porous cellulose articles.** C. F. Burgess Laboratories, Inc. Ger. 577,656, June 2, 1933. See Brit. 317,330 (C. A. 24, 2296).

**Hydrolyzing cellulose.** Henry Dreyfus. Fr. 750,495, Aug. 11, 1933. Cellulose is hydrolyzed by a soln. of a salt having an acid character or an acid salt, e. g., a bisulfate, or sulfate of Cu, sulfate of Ni or Al or ZnCl<sub>2</sub>.

**Hydrolysis of pentosans.** Roland Runkel. Ger. 576,498, May 11, 1933. Addn. to 574,921 (C. A. 27, 4670). In hydrolyzing vegetable matter rich in pentosans by the method of 574,921, the hydrolysis is carried out in diffusion batteries under raised pressure.

**Hydroxyalkylcellulose.** Henry Dreyfus. Brit. 397,116, Aug. 14, 1933. Cellulose is caused to react with a hydroxyalkylating agent in the presence of a primary or secondary org. base contg. at least 1 alkyl, aralkyl or alicyclic radical free from OH groups. The org. base may be replaced by its reaction product with alkylene oxide or chlorohydrin, e. g., oxyethylmethylamine, oxyethylethylamine. Etherifying agents specified are ethylene oxide (I), propylene oxide (II), butylene oxide, epichlorohydrin, glycidic acid. In examples cotton linters are (1) heated in an autoclave with I in presence of Et<sub>2</sub>NH, (2) moistened with PrNH<sub>2</sub> and treated with I under pressure and (3) heated with oxypropylmethylamine and an excess of II. The products may be used as sizes or further esterified or otherwise etherified to produce products for use in the manuf. of filaments, films, plastics or varnishes.

**Cellulose derivatives.** Zellstoffabrik Waldhof and Otto Faust. Brit. 397,404, Aug. 24, 1933. Cellulose esters and ethers for use in the prepn. of plastic masses, foils, varnishes, etc., are prepd. from a soda or sulfate pulp made from a single kind of wood which has been sorted to eliminate all pieces of other species. The esters and ethers so obtained give bright colored transparent products. Examples are given of the prepn. of (1) cellulose acetate to be worked up, after ripening to give Me<sub>2</sub>CO soly., into foils with the use of methylglycol and plasticizer and into varnishes with the aid of Me<sub>2</sub>CO, methylglycol, BuOH and

plasticizer and (2) nitrocellulose to be worked up into plates with the aid of BuOAc and camphor.

**Cellulose ethers.** Henry Dreyfus. Brit. 397,117, Aug. 14, 1933. See Fr. 749,401 (C. A. 28, 636°).

**Cellulose ethers.** "Châtillon" Società anon. italiana per la seta artificiale. Austrian 134,991, Oct. 25, 1933. Alkali cellulose is treated with an alkyl or aralkyl halide or sulfate in the presence of caustic alkali, water and a water-insol. org. solvent, e. g., benzene. The concn. of caustic alkali in the reaction mixt. is increased as the reaction proceeds by distg. off an azeotropic mixt. of water and org. solvent. The solvent may be condensed and returned to the mixt. The method is particularly useful in prepg. benzylcellulose. App. is described.

**Cellulose ether.** I. G. Farbeund. A.-G. (Otto Leuchs, inventor). Ger. 582,726, Aug. 21, 1933. Ethers insol. or sol. with difficulty are converted to easily sol. form by treatment with degradation or hydrolyzing agents with or without addn. of solvents or swelling agents. Thus, ethylcellulose is treated with concd. H<sub>2</sub>SO<sub>4</sub> in the presence of alc. and water to give a swelled sol. mass.

**Cellulose ester and ether compositions.** Henry Dreyfus. Brit. 397,191, Aug. 21, 1933. In producing plastic masses, molding powders and other (semi-) solid compns. contg. cellulose esters or ethers, plasticizers or other materials are incorporated by means of media contg. methylene ethylene ether (I). Thus the plasticizer may be dissolved in I or a mixt. of I with another solvent or non-solvent, the soln. sprayed or otherwise incorporated with the cellulose deriv. and the mass worked up in the usual manner. In an example a soln. comprising tricresyl phosphate, mono-methylated isomeric xylene sulfonamides, I, C<sub>6</sub>H<sub>5</sub> and alc. is incorporated with Me<sub>2</sub>CO-sol. cellulose acetate or cellulose acetate of 58-60% Ac content and the mass molded into sheets, plates, etc.

**Esterifying cellulose.** Ruth-Aldo Co. Inc. Ger. 578,706, June 16, 1933. See Brit. 282,793 (C. A. 22, 3988).

**Mixed cellulose esters.** Kodak A.-G. Ger. 577,704, June 7, 1933. See Brit. 360,058 and 360,417 (C. A. 27, 600, 1167).

**Cellulose acetate.** Henry Dreyfus. U. S. 1,936,180, Nov. 21. Cellulose is pretreated with formic acid and then acetylated with Ac<sub>2</sub>O in the presence of pentachlorides of congeners of N such as SbCl<sub>5</sub> or PCl<sub>5</sub> and of HCl, each present in a proportion of about 5-15% the wt. of the cellulose.

**Cellulose acetate compositions.** Kodak A.-G. Ger. 587,240, Nov. 1, 1933. See Brit. 342,444 (C. A. 25, 4421).

**Partly hydrolyzed cellulose acetate.** Kodak A.-G. Ger. 579,652, July 1, 1933. See Brit. 356,012 (C. A. 26, 5753).

**Dehydrating cellulose nitrate and other nitrated compounds.** N. V. de Bataafsche Petroleum Maatschappij. Brit. 397,309, Aug. 24, 1933. See Fr. 743,520 (C. A. 27, 3819-20).

**Saccharification of wood, etc.** Henry Dreyfus. U. S. 1,936,190, Nov. 21. Cellulosic material such as sawdust is treated with an org. acid anhydride such as Ac<sub>2</sub>O and hydrolyzed, one or more stages of treatment being under such conditions as to degrade the cellulose material to sugars.

**Carbohydrate derivatives.** Henry Dreyfus. Fr. 750,493, Aug. 11, 1933. Derivs. of cellulose and other carbohydrates are made by causing unsatd. org. compds. such as C<sub>2</sub>H<sub>4</sub> to act thereon. A catalyst may be used and the reaction may be carried out under pressure and at 100-200°.

**Viscose products.** H. Th. Bohme A.-G. Chemische Fabrik, and Heinrich Bertsch. Ger. 582,900, Aug. 25, 1933. The properties of viscose rayon films, etc., are improved by adding the sulfonation products of oils and fats in the presence of acid chlorides or anhydrides. Examples are given.

**Colored filaments, etc., from viscose.** Courtaulds Ltd. Ger. 587,224, Oct. 31, 1933. See Brit. 342,606 (C. A. 25, 5578).

**Rayon from viscose.** Theodoor Koch (to American

Enka Corp.). U. S. 1,886,479, Nov. 21. At any stage in the viscose production before normal ripening has taken place there is added to the viscose a small proportion (suitably about 0.05-2%) of a sulfonated fatty acid with a sulfonation degree of about 100% and contg. so small a quantity of unsulfonated fat or fatty acid that the viscose shows no turbidity with an excess of lye. The unripened treated viscose is spun in an acid pptg. bath. Cf. C. A. 27, 5530.

**Cellulose fiber of low viscosity** George A. Richter (to Brown Co.). U. S. 1,935,129, Nov. 14. A product which is suitable for viscose manuf., etc. is prepd. by treating cellulose fiber such as refined wood fiber or cotton with a soln. contg. NaOH and a sol. permanganate under non-mercerizing temp. conditions, and then under mercerizing temp. conditions.

**Artificial fibers.** Soc. Nobel française. Fr. 751,824, Sept. 11, 1933. Condensation products of polyvinyl alc. with aliphatic aldehydes are spun into threads by a wet or dry process.

**Creped threads.** Henry Dreyfus. Fr. 751,822, Sept. 11, 1933. Creped threads of high torsion are composed of unsapond. filaments and sapond. filaments of cellulose ester. The degree of sapon. corresponds to a loss of 10-30% of the wt. in the case of cellulose acetate and a corresponding amt. for other esters. The sapond. filaments may be 25-75% of the thread. Cf. C. A. 27, 1769.

**Films, threads, etc.** Henry Dreyfus. Fr. 749,792, July 29, 1933. Halogenated cyclic dicarboxylic acids, their anhydrides or esters, e. g., the diethyl ester of 3,5-dichlorophthalic acid, 3'-chlorobenzophenone-2,4'-dicarboxylic acid, are used as softening or plasticizing agents or solvents for cellulose derivs. in the manuf. of products therefrom.

**Artificial filaments from cellulose organic derivatives such as cellulose acetate.** Henry Dreyfus and Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,935,203, Nov. 14. A soln. such as one comprising cellulose acetate is extruded in filament form into an evaporative medium and (by a special described app.) the filaments are stretched over only a portion of their length in which they are in a semi-solid condition. Cf. C. A. 27, 3331.

**Extrusion device for manufacture of artificial threads or filaments.** Joshua Bower (to Celanese Corp. of America). U. S. 1,935,200, Nov. 14. Mech. details including an automatic cut-off valve are described.

**Films, sheets, etc.** Henry Dreyfus. Fr. 749,914, Aug. 1, 1933. Films, etc., are made from artificial products contg. lower and higher fatty acid derivs. of cellulose, e. g., cellulose acetate and cellulose palmitate.

**Artificial ribbons, etc.** Henry Dreyfus. Fr. 752,271, Sept. 20, 1933. Flattened products of thick cross section are obtained by uniting a series of continuous long filaments, e. g., of cellulose acetate, in the form of a flattened thread composed of individual filaments and passing this thread into contact with one or more surfaces to distribute on the thread a liquid having a softening action. An app. is described.

**Artificial ribbon, foil, etc.** Soc. pour la fabrication de la soie "Rhodaseta." Fr. 751,828, Sept. 11, 1933. Hair, ribbon and foil are made from a bundle or sheet of cellulose ester filaments particularly the acetate, the bundle or sheet being caused to pass by the entraining means as soon as possible after being wetted by a solvent or swelling agent, and before the filaments have become plasticized, swollen or sticky.

**Apparatus for dry spinning artificial filaments, etc.** British Celanese Ltd., Edward Kinsella and Reginald H. J. Riley. Brit. 397,114, Aug. 10, 1933.

**Apparatus for spinning rayon.** Breda Visada Ltd. Ger. 582,999, Aug. 30, 1933.

**Spinning centrifuge for rayon.** N. V. Intern. Spinpot Exploitatie Maatschappij (I. S. E. M.). Ger. 587,223, Nov. 1, 1933.

**Apparatus for continuously spinning rayon.** Industrial Rayon Corp. Fr. 751,941, Sept. 12, 1933.

**Apparatus for spinning and after-treating rayon.**

**Barmer Maschinenfabrik A.-G.** Ger. 582,107, Aug. 9, 1933. Addn. to 572,706 (C. A. 27, 4398).

**Apparatus for spinning cuprammonium rayon.** Seta Bemberg S. A. Ger. 579,171, June 23, 1933. Addn. to 577,726 (C. A. 28, 639<sup>4</sup>).

**Rayon.** Hans Altwegg. Ger. 582,855, Aug. 24, 1933. Cellulose acetate rayon is spun in a soln. contg. more than 20% of amyl ketone or its homologs. Examples are given.

**Rayon.** I. G. Farbenind. A.-G. Fr. 751,728, Sept. 8, 1933. Rayon is washed free from acid, dried, twisted and wound on bobbins of variable diams. and treating liquids are applied by sprinkling.

**Rayon.** Giuseppe Salimei. Fr. 753,290, Oct. 12, 1933. Filaments are obtained in the form of spindles of any desired length by the application of pulsations of regulated frequency and length to the spinning soln.

**Rayon.** Henry Dreyfus. Fr. 42,662, Sept. 1, 1933. Addn. to 702,174. Rayon of diminished luster is obtained by spinning a soln. of cellulose or cellulose deriv. contg. a practically white condensation product of the ketone-aldehyde type. The product may be obtained by condensing 1 mol. of acetone with 6 mols. of CH<sub>2</sub>O in the presence of aq. NaOH.

**Rayon.** Henry Dreyfus. Fr. 752,143, Sept. 16, 1933. In dry spinning the evapp. agent is caused to pass through the mass of spinning soln. to temper it in its path toward the spinning nozzles. An app. is described.

**Rayon, etc.** Henry Dreyfus. Fr. 750,549, Aug. 11, 1933. Rayon and textiles made therefrom having a high tenacity and affinity for cotton dyes are obtained by submitting to sapon. filaments of cellulose acetate or other org. esters of cellulose which have been submitted to a drawing with the aid of softening agents. Fr. 750,550.

**Filaments, etc., having a relatively high tenacity and affinity for cotton dyes are obtained by submitting to sapon. filaments, etc., made from org. esters of cellulose of high viscosity, particularly cellulose acetates the viscosity of which (measured by the speed of flow of a 6% soln. in acetone) is above 30 when compared with a standard of glycerol (viscosity equal to 100).** Fr. 750,551, Aug. 12, 1933. Cellulose acetate and other esters of cellulose are sapond. by treating them with an agent contg. a sapon. agent and another alk. reagent of lower alkalinity, e. g., NaOH and CaO. Fr. 750,552. In making filaments, etc., from artificial materials, finely divided insol. substances are incorporated therein by means of an agent in which they are insol. or by incorporating a substance in the spinning soln., the products being afterwards treated with a reagent which will convert such substance to its final form. Examples are given of the formation in the filaments of phosphates of Sn and Zn and of BaSO<sub>4</sub>. Cf. C. A. 28, 639<sup>1,2,3</sup>, 640<sup>1</sup>.

**Rayon, etc.** Soc. pour la fabrication de la soie "Rhodiaseta." Fr. 751,893, Sept. 11, 1933. Rayon filaments having very different titers, particularly filaments of 1-3 deniers and filaments of 12-15 deniers, are spun in the same manner as natural fibers. The products have a hairy or swollen aspect.

**Apparatus for denitrating in rayon' manufacture.** George Juer (to Tubize Chatillon Corp.). U. S. 1,935,637, Nov. 21. Various details are described of an app. in which material such as nitrocellulose is supported on a porous medium such as a perforated false bottom of a vat while immersed in liquid such as denitrating soln. which is artificially cooled and circulated.

**Device for distributing wood chips in pulp digesters.** Walter H. Swanson (to Paper Patents Co.). U. S. 1,936,341, Nov. 21. Mech. features.

**Apparatus for straining aqueous suspensions of wood pulp, etc.** Firma J. M. Voith. Ger. 587,011, Oct. 28, 1933.

**Pulping raw fibrous materials.** George A. Richter (to Brown Co.). U. S. 1,935,728, Nov. 21. Raw material such as manila, sisal or ramie is treated with an oxidizing reagent such as Cl water and hypochlorite liquor; the material is then pulped in a Na sulfite liquor. Cf. C. A. 27, 3077.

**Device for regulating the density of pulp in paper making.** Franz Hassmann. Ger. 578,549, June 15, 1933.

**Dyeing paper or pulp.** Soc. pour l'ind. chim. à Bâle. Brit. 396,992, Aug. 17, 1933. Dyeings or printings fast to  $H_2O$  are produced on paper (pulp) by treating, either simultaneously or separately, with a  $H_2O$ -sol. dye contg. 1 or more  $HSO_3$  and (or)  $COOH$  groups and a  $H_2O$ -sol. salt of a compd. that contains at least 1 basic N and an aliphatic satd. residue comprising at least 10 C atoms (other than a salt of an unsym. mono- or di-acylated diamine or a corresponding quaternary  $NH_4$  compd.). In examples (1) paper half-stuff is dyed vivid green by treating with Benzyl Green B and then with a soln. of the stearic acid ester of oxyethylpyridinium chloride and (2) tissue paper is dyed with Direct Safranin B or Kiton Blue A and treated in a bath contg. octadecyltrimethylammonium methosulfate.

**Paper.** Wm. E. Bair, Jr. (to The Mead Corp.). Brit. 396,063, July 26, 1933. See U. S. 1,875,208 (C. A. 26, 6138).

**Paper.** Harry H. Nelson and Guillaume Becker. Fr. 42,723, Sept. 14, 1933. Addn. to 735,525 (C. A. 27, 1174). The cellulose thiosulfocarbonate is pptd. on the fibers in a non-coagulated sol. form by means, e. g., of a soln. of  $NaCl$ ,  $Na_2SO_4$  or  $NH_4Cl$ . The alkali cellulose for the manuf. of the thiosulfocarbonate is made at a low temp. The  $NaOH$  is made at a concn. higher than that required and dild. by the addn. of ice to obtain the soln. at a low temp. A small amt. of resin soap or castor-oil soap is added to the thiosulfocarbonate.

**Clarifier for paper manufacture, etc.** August H. Popp. Ger. 577,239, May 26, 1933. Addn. to 561,892 (C. A. 27, 1231).

**Hollander for paper making.** Anton D. J. Kuhn. Ger. 578,522, June 15, 1933.

**Water-extracting apparatus for cylinder paper machines.** Charles L. Ellis (to Downingtown Mfg. Co.). U. S. 1,935,837, Nov. 21. Structural and mech. features.

**Indicating weight and moisture variations in webs in paper-making apparatus.** Arthur E. Broughton. U. S. 1,936,225, Nov. 21. Various details of app. and operation are described.

**Sizing paper.** Antoine C. Gillet. Fr. 741,876, Sept. 11, 1933. A stable suspension of colloidal resin in the presence of a basic resinat (of  $Na$ ,  $K$  or  $NH_4$ ) or an acid salt, e. g.,  $Al_2(SO_4)_3$  is used for sizing or waterproofing paper. The resin is ground in the presence of the solvent which is used in amt. such that the mixt. forms a paste at ordinary temp. Fr. 751,877 describes a pulverizing app. for obtaining emulsions of resin for sizing paper. Cf. C. A. 28, 614<sup>2</sup>.

**Porous paper for the suction bags of vacuum cleaners.** Air-Way Electric Appliance Corp. Brit. 396,142, Aug. 3, 1933. See U. S. 1,854,427 (C. A. 26, 3378).

**Transparent grease- and moisture-proof sheet material**

**suitable for making transparent bags.** Chester E. Beecher (to Glassine Paper Co.). U. S. 1,936,375, Nov. 21. Supercalendered sheets of greaseproof paper are joined by an intermediate film of wax substantially confined to the inner faces of the sheets.

**Apparatus for coating or impregnating paper with regenerated cellulose.** Papeteries Navarre Soc. anon. Ger. 587,012, Oct. 28, 1933. This corresponds to Brit. 395,197 (C. A. 28, 324<sup>3</sup>).

**Vulcanized fiber.** Ernst Becker and Karl Letters (to I. G. Farbenind. A.-G.). U. S. 1,935,892, Nov. 21. Paper is parchmentized with a  $ZnCl_2$  soln. contg. up to about 3% of an alkali metal or alk. earth metal chloride or  $NH_4Cl$ , which serves to regulate the sp. gr. of the product.

**Applying mineral coating compositions to paper.** Donald H. Bradner (to Champion Coated Paper Co.). U. S. 1,936,286, Nov. 21. Various details of operation are described for producing a uniform smooth homogeneous coating. Cf. C. A. 28, 644<sup>7</sup>.

**Safety paper.** Felix Schoeller & Bausch Feinpapierfabrik (Victor Bausch, Jr. and Adolf Schroth, inventors). Ger. 582,530, Aug. 16, 1933. In the manuf. of safety paper by using benzene- or naphthalenecarboxylic acids or their derivs., compds. such as  $Fe_2O_3$  salts and ferrocyanides sol. in acids but insol. in water are added to the pulp. The pulp is given a  $pH$  value of 3-5 before addn. of the carboxylic acids. The  $pH$  value of the latter may be about 3.

**Waterproofing paper.** Manifattura italiana carte e affini (Soc. anon.). Fr. 753,158, Oct. 9, 1933. Paper for making containers for food products is treated with colloidal solns. which have been purified by treatment with wood charcoal, alkali bromides and gelatins. The compn. may contain nitrocellulose in scales, denatured alc. and solvents for the nitrocellulose.

**Waterproofing paper or cardboard.** Benno R. Ruiss. Austrian 134,997, Oct. 25, 1933. An emulsion of wax in wax-soap soln. is prepd. by heating a wax such as Japan wax with an appropriate amt. of an alkali carbonate or like saponif. agent. The emulsion is treated with  $Al_2(SO_4)_3$  and then added to paper or cardboard stuff at 80-95°.

**Playing-cards.** François du Pour. Brit. 396,254, Aug. 3, 1933. The cards are made by coating a sheet of paper or cardboard bearing the card figures with a compn. comprising at least 1 cellulose ester or ether, e. g., the nitrate, acetate or ethylate, and filling, coloring or plasticizing substances. The cellulose compd. may be applied as a soln. in  $Me_2CO$ ,  $AmOAc$ ,  $BuOH$ ,  $Et_2O$ , etc., to which may be added filling and glazing materials (e. g., resin), plasticizers (e. g., camphor, triacetin, tricresylphosphate, palatinol, sipalin, castor oil, linseed oil), dilg. liquids (having no solvent action on the cellulose esters or ethers (e. g., gasoline,  $C_6H_6$ ,  $EtOH$ , etc.)) The slippery quality is increased by adding Japan wax, montan wax, carinauba, etc., in colloidal state or in soln.

## 24 EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNKER AND C. G. STORM

**Verification of the law of combustion of colloidal powder.** H. Muraour and G. Aunis. *Compt. rend.* 197, 1117 20 (1933). - Values for the speed of combustion of a double-base smokeless powder (non-solvent type) at pressures up to 1508 kg./sq. cm., based on a series of experimental firings in a 150 cc. pressure bomb, are compared with values calcd. by 3 different methods. C. G. Storm

**The causes of the progressive disappearance of diphenylamine in colloidal powders.** Henri Muraour. *Compt. rend.* 197, 758 40(1933). - Diphenylamine acts as a reducing agent on nitric esters. Cu salts catalyze this reaction. Chlorides of the alkalis and alk. earths reinforce the effect of the Cu salts, but org. salts (oxalates and tartrates) retard the action. Salts of Cu and chlorides also favor the denitration of guncotton by alc. sym. Diethylphenylurea is as useful as diphenylamine in stabilizing nitrocellulose. P. R. Brown

**Analogs of tetryl. I. Trinitrophenylnitraminoethyl nitrate (Pentryl).** LeRoy V. Clark. *Ind. Eng. Chem.* 25, 1385 90(1933). - C. has investigated various chem., phys. and explosive properties of "Pentryl." This explosive is particularly effective as a base charge in compound detonators. It is comparable with tetryl in most of its explosive properties. C. G. Storm

**Mechanical effects observed in the rapid overheating of lead azide in a vacuum.** W. Schumacher. *Compt. rend.* 197, 917-18(1933). - When heated rapidly on a metal plate in a vacuum,  $PbN_3$  detonated, causing indentation or penetration of the plate. Similar effects were obtained with  $AgONC$ , whereas  $Hg(ONC)$ , invariably decompd. without detonation and with no effect on the plate, even of 0.03 mm. thickness. C. G. Storm

**Theory of explosive reactions.** Henri Muraour. *Rev. gen. sci.* 44, 567 71(1933). - An excellent résumé and

elaboration of theories of combustion and detonation of explosives previously advanced by M. (cf. C. A. 21, 1185, 2086; 22, 3992; 25, 2293; 26, 2057; 27, 603, 3334, 5189, 5540). C. G. Storm

**Experimental study of the influence of certain factors on the ability of dust deposits to propagate explosions.** Etienne Audibert and Louis Delmas. *Ann. mines* [13], 4, 89-125 (1933).—Using a cylindrical steel explosion gallery 1.8 m. diam.  $\times$  150 m. long, the authors conducted an extensive series of expts. to study the effects of variations in content of volatile matter in coal dust, and in the fineness of the dust, on the ability of the latter to propagate explosions initiated by means of a charge of black powder. C. G. Storm

**The application of ammonite in the coal industry.** F. A. Pershakov. *Ugol i Zhelazo* 1933, No. 90-91, 94-104.—Tests of various ammonites show a rate of explosion of about 3000-4000 m./sec. as compared to 5000 for 63% dynamite. The strength is about 50-60%, and the cost under Soviet conditions is about 60% that of 63% dynamite. H. W. Rathmann

**Explosive combustion of gaseous hydrocarbons** (Francis) 21.

**Device for ascertaining the presence of, and estimating the amount of, explosible gases or vapors in mines.** Henry T. Ringrose. *Ger.* 578,931, June 19, 1933.

**Apparatus for indicating the presence of inflammable vapors or gases.** Henry T. Ringrose. *Ger.* 582,618, Aug. 18, 1933.

**Blasting cartridges.** Alexander C. Scott. *Brit.* 397,203, Aug. 24, 1933. The cartridge comprises in combination a pressure-resistant but rupturable container in which is placed a quantity of non-explosive salt, decomposable by heat to yield non-inflammable decompn. products, and a heating element consisting of a self-combustible mixt., inadequate by its own combustion to burst the container, with means to ignite the same so that the salt may be decompd. and the container ruptured. In an example the salt is  $\text{NH}_4\text{NO}_3$ , to which  $\text{NH}_4\text{Cl}$ ,  $\text{NaCl}$ ,  $(\text{NH}_4)_2\text{C}_2\text{O}_4$ ,  $\text{NaHCO}_3$ ,  $\text{ZnSO}_4$ ,  $\text{MgSO}_4$ , or  $\text{Na}_2\text{SO}_4$  may be added. From 1 to 2% asbestos may be mixed therewith to prevent binding and recrystn. The heating element may be black powder or a mixt. of  $\text{KClO}_4$  or  $\text{KClO}_3$  with a fuel, e. g., cellulose acetate.

**Blasting charges.** Air liquide L' (Soc. anon. pour l'etude et l'exploitation des procédés Georges Claude). *Fr.* 752,086, Sept. 15, 1933. Liquefied or solidified gases used as blasting charges for mines are rapidly evapd. by a heating compn. composed of oxygenated mineral compds. and combustible fatty substances, e. g.,  $\text{KClO}_3$  90 and paraffin 10%.

**Chemical time fuse.** Otto Treichel and Ludwig Flörshcim. *Ger.* 582,783, Aug. 22, 1933. The components of an explosive mixt. are kept apart till one or other passes a capillary filter.

**Pyrotechnical devices somewhat similar to "sparklers."** Milton M. Adler. U. S. 1,936,221, Nov. 21. A compn. formed of  $\text{Ba}(\text{NO}_3)_2$ , shellac,  $\text{KClO}_3$ , and kyanolith may be applied to a support such as a stick and granules of a bi-metallic alloy such as an alloy of Cu and Mg or Al are applied to the surface of the compn.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Chemical resistance of materials in the production of sulfur dyes.** G. E. Bonvech. *Anilinokrasochnaya Prom.* 3, 263-7 (1933).—The destructive action of chemicals used and generated in the production of S dyes on various grades of iron equipment is discussed. Chas. Blanc

**Brown vat dyes.** M. A. Il'inskii and M. M. Shchuykin. *Anilinokrasochnaya Prom.* 3, 253-7 (1933).—A systematic survey was undertaken of the foreign patents for production of various brown vat dyes with a view of selecting the best suitable dyes and methods for domestic production. Chas. Blanc

**A brilliant rose (dye) of the thioindigo group.** Indanthrene brilliant rose R. V. I. Munaev and A. N. Nikolaeva. *Anilinokrasochnaya Prom.* 3, 258-62 (1933).—Indanthrene brilliant rose R (I) (IG) is a mixt. of 70% I, 20% dextrin and some unknown substance, probably some wetting materials. The chem. structure of 4,4'-dimethyl-6,6'-dichloro-2,2'-bisthionaphtheneindigo (II) ascribed to I (cf. *Tiba* 9, 371, 603 (1931)) was verified by synthesizing I by following the method of Herz (*Ger. pats.* 364,822, 367,346, 367,493, 371,258, 408,021). The product in all its chem. and tinctorial properties is identical with the com. I and *Helindon rose B*. Chas. Blanc

**Aniline black for printing without potassium ferrocyanide.** E. A. Rakhlin. *Anilinokrasochnaya Prom.* 3, 312-21 (1933).—Several recipes were developed for aniline black (I) for printing without the use of  $\text{K}_4\text{Fe}(\text{CN})_6$ . The following formula was used in the factory production for 6 months, giving a good shade of black with no impairment of the strength of the textile and decreased cost:  $\text{PhNH}_2$  72,  $\text{HCl}$  (18 B $\epsilon$ .) 70, 50% lactic acid (II) 30, 7.7%  $\text{Al}(\text{OH})_3$  160,  $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$  (III) 3,  $\text{NaClO}_4$  40,  $\text{VCl}_5$  (1:1000) 50 and  $\text{NH}_4\text{Cl}$  10 parts. I at  $p\text{H}$  4 gives a satisfactory black and durable goods. To obtain a good black without III the  $p$  of I must be below 4, which causes weakening of the textile. Substitution of  $\text{AcOH}$  for II is also impracticable, because of considerable increase in  $p\text{H}$ , which impairs the strength of textile. The deterioration of I in storing is caused by decompn. of III with

formation of phenazine. Partially decompd. I can be improved by addn. of III. Chas. Blanc

**Determination of basic dyestuffs by means of silicotungstic acid.** E. B. Johnson. *J. Soc. Chem. Ind.* 52, 354 F (1933); cf. Trotman and Frearson, *C. A.* 26, 2321.—Dissolve 0.1 g. dye in  $\text{H}_2\text{O}$  (acidified with few drops of  $\text{HCl}$ ), and dil. to 100 cc.; add a slight excess of 5% silicotungstic acid (acidified with  $\text{HCl}$ ), heat on the water bath until the ppt. coagulates; settle, filter and wash twice in a beaker with hot dil.  $\text{HCl}$ , then several times with hot water, filter, dry and weigh, at  $110^\circ$ . Then ignite, and weigh the residue, which is silica and tungstic oxide, and calc. the dye by difference. For any given dye, once a factor is established, it is not necessary to dry to const. wt., but partially dry and ignite. With methylene blue, the factor for converting residue, after ignition, into methylene blue hydrochloride is 0.2368. For aminoazobenzene 1 part ash equals 0.3127 base. H. E. S.

**The determination of specific gravity. II. The influence of dyeing and of superficial saponification on the specific gravity of acetate rayon.** P. M. Heertjes, W. Coltof and H. I. Waterman. *Rec. trav. chim.* 52, 1001 (1933); cf. *C. A.* 27, 3615.—Sp. gr. detms. by the method previously described showed an apparent decrease in sp. gr. for acetate rayon dyed with Cellitfast Red B, but no change for the rayon partially sapon. or partially sapon. and dyed with Benzopurpurine 4 B. The apparent sp. gr. decrease for the former is explained by a clogging of the pores by the dye, so that the imbibition gas cannot enter. After sapon., there are no more pores to be clogged by the Benzopurpurine, and the sp. gr. is that of the original rayon. L. E. Steiner

**Throwing illustrated, with reference to changes caused by piece-dyeing trend and rayon.** A. Weiss. *Textile World* 83, 2191-4 (1933).—Twenty-four photographs illustrate the processes occurring in a throwing plant from the time the raw silk is received in the bale or the rayon in cases to the prepn. for shipping of the finished yarns. Ruby K. Wornor

**Throwing silk and rayon.** Dale S. Chamberlin. *Tex-*



*sile World* 83, 1984-5(1933).—Extracting and drying are discussed from the chemical-engineering standpoint.

Ruby K. Worner

**Fine structure of silk.** V. Swelling phenomena in fibroin fibers. Kametaro Ohara. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 22, 216-32(1933); cf. *C. A.* 27, 4403.—In the presence of some neutral salts at room temp. fibroin fibers swell and may dissolve. Photomicrographs show that the outer zone swells first, the central zone either breaking up into fibrils or swelling into spheroids, or in some cases remaining insol., with spiral or irregular bending. If the swelling is active spherical enlargements develop at certain points. The active salts include Ba and Ca thiocyanates, Ba, Ca and Sr iodides, Li and Mg bromides, Ba, Ca, Sr and Ni nitrates, Na, Ca, Sr, Co, Mg, Zn, Al and Fe chlorides, Ba(ClO<sub>3</sub>)<sub>2</sub> and Na<sub>2</sub>SiO<sub>4</sub>. In Cu(OH)<sub>2</sub>-glycerol mixts. and in NaOBr the swelling is of a different type, the fibers breaking into short pieces which then dissociate into fibrils. The various forms of swelling indicate that the fibers consist of relatively short micelles parallel to the long axis of the fiber, and more closely packed in the center than at the outside. At intervals this oriented structure is interrupted by a region of random arrangement, which is the first to show swelling, and which thus allows the fibers to break across.

K. V. Thimann

**The action of alkaline copper solution on silk fibroin.** IV. The fibroin-copper-amine compounds in the system fibroin-copper-amine (1-2). Yujiro Takamatsu. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 506 604(1933); cf. *C. A.* 28, 332<sup>3</sup>.—Exptl. data for the compns. of the 2 compds., established in previous work, are presented, showing that the ratios of fibroin:Cu:ethylenediamine are 1:1:1 and 1:2:2. Equations for the formation of the compds. are given and the effects of excess of ethylenediamine are discussed.

Karl Kammermeyer

**Finishing glove silk.** T. P. Sheridan. *Textile World* 83, 1999(1933).—An outline of the processes and a discussion of precautions to be observed are given.

Ruby K. Worner

**The swelling of protein fibers. II. Silk gut.** I). Jordan Lloyd and R. H. Marriott. *Trans. Faraday Soc.* 29, 1228-40(1933); cf. *C. A.* 27, 2864.—Silk fibers (fibroin) were subjected to the action of water, to NaOH 0.5-10 *N*; to HCl 0.5-10 *N*, to 2 *M* solns. of the salts: NaCl, NaNO<sub>3</sub>, LiI; and to satd. solns. of urea and thiourea. The fibers absorb H<sub>2</sub>O to about 30% of their wt. The absorption increases with the addn. of NaOH up to 6 *N* and decreases slightly for higher concns. The swelling is accompanied by splitting into fibers, and a permanent ability to swell in pure water more than before alkali treatment. The water is imbibed and the alkali aids by irreversibly breaking the coordinate linkages between the imino group of one chain and the carbonyl group of a parallel chain. The swelling is not increased much by acids less than 2 *N* but the strength of the fibers is destroyed. At 10 *N* concn., HCl dissolves the silk in 24 hrs. Salt, urea and thiourea cause slight swelling and weakening of fibers. The strong birefringence of silk fibers falls off slowly in acid and rapidly in alkalis. None of the treatments affected the x-ray diagrams.

F. E. Brown

**Effect of previous starching upon ease of washing cotton fabrics.** Lawrence E. Stout and Knapel F. Schiermeier. *Ind. Eng. Chem.* 25, 1403-5(1933).—Soil is more easily removed in washing a garment which has been starched. The order of decreasing value is boiled wheat and rice starch, sol. wheat and rice starch, boiled corn starch. Quant. data indicate their relative value. F. D. Snell

**Processing men's high-grade novelty suitings taxes finisher's skill.** G. L. Atkinson. *Textile World* 83, 1994(1933).—A finishing routine, beginning with the scouring of the gray goods, is given.

R. K. Worner

**Warp-sizing practice.** Ghent R. Robertshaw. *Textile World* 83, 1988(1933).—A table gives the approx. wts. of corn starch and softener to each 100 gal. of water for sizing various numbers of cotton yarns from 10s to 100s.

Ruby K. Worner

**Waste heat.** William R. Clendinning. *Textile World*

83, 2174-5(1933).—Suggestions are given for recovering waste heat in textile finishing plants. R. K. Worner

**Chemical examination of furs in relation to dermatitis.** H. E. Cox. *Analyst* 58, 738-48(1933).—Details are given concerning the kind of fur and mode of dyeing 216 specimens suspected of having caused dermatitis; of these 37 were undyed and probably did not cause the disease. It was proved experimentally that *p*-phenylenediamine penetrates the dead skin easily but does not penetrate living skin under normal conditions. It seems likely that irritation is caused by the abnormal penetration of the dye into the skin followed by local reaction with certain constituents of the blood or serum. Tests are described for distinguishing *p*-phenylenediamine from Baudrowski's base and a colorimetric method is given for detg. small quantities of the diamine. W. T. H.

**Arylides of 1-(carboxyphenyl)pyrazolone** [products used in prepn. of dyes] (Ger. pat. 582,806) 10. Oxidation products of sulfurized hydrocarbons [assistants in the treatment of textiles] (Ger. pat. 583,853) 10. Weighting agents from aq. solns. of Ti-H<sub>2</sub>SO<sub>4</sub> compds (U. S. pat. 1,934,778) 29. App. for distg. dry cleaners' solvent (U. S. pat. 1,935,183) 1. Aminoaralkylaryl compds. [products used in production of dyes] (U. S. pat. 1,936,090) 10.

**Thorpe, J. F., and Linstead, R. P.: The Synthetic Dyestuffs and Their Intermediate Products.** 7th ed. of "Cam and Thorpe." Rewritten and enlarged. London: C. Griffin & Co., Ltd. 472 pp. 30s. Reviewed in *Chem Trade J.* 93, 322(1933).

**Dyes.** L. B. Holliday & Co. Ltd., Joe Kitson and Cecil Shaw. Ger. 578,735, June 20, 1933. See Brit. 293,110 (*C. A.* 23, 1511).

**Dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 579,633, June 29, 1933. Dyes are produced by condensing leuco compds. of  $\alpha$ -polyhydroxy- or  $\alpha$ -aminohydroxyanthraquinone, in which at least 2 OH groups or 1 OH and 1 NH<sub>2</sub> group are in the *p*-position to each other, with aromatic amines contg. either COOH or HSO<sub>3</sub> groups. The condensation takes place in aq. suspension with addn. of H<sub>2</sub>BO<sub>3</sub>. Sulfonic acids of the leuco compds. may be used, HSO<sub>3</sub> groups in the  $\beta$ -position being split off on condensation. The prepn. of the leuco compd. and the condensation may take place in one operation. In an example, 1-hydroxy-4-aminoanthraquinone-5-sulfonic acid is warmed in water with *p*-aminophenol, H<sub>2</sub>BO<sub>3</sub>, hyposulfite and glacial AcOH. On neutralizing the liquid, a dye which colors wool in green shades is produced. Other examples are given.

**Dyes.** J. R. Geigy A.-G. Ger. 582,680, Aug. 21, 1933. Addn. to 494,531 (*C. A.* 24, 3651). The method of 494,531 for producing basic *o*-hydroxynitroso dyes is modified by introducing the NO group into the nucleus of 1,3-aminophenols in which the NH<sub>2</sub> group is substituted by a strongly basic residue. The resulting nitroso compds. are then converted to their metal lakes. Thus, an aq. soln. of pyridylacetyl-*m*-aminophenol is treated with NaNO<sub>2</sub> and HCl. The resulting nitroso compd. is treated with glacial AcOH, crystd. AcONa and Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>. The resulting metal lake imparts a grass-green color to silk. Other examples are given.

**Dyes.** I. G. Farbenind. A.-G. (Walter Albrecht, inventor) Ger. 578,502, June 14, 1933. Dyes are produced by treating 1-amino-2-alkoxy-4-haloanthraquinone with H<sub>2</sub>SO<sub>4</sub>, in optional presence of H<sub>2</sub>BO<sub>3</sub>, under conditions of temp. and concn. at which the halo atom is replaced by OH and no sulfonation occurs. Examples are given.

**Dyes.** I. G. Farbenind. A.-G. Fr. 42,029, Aug. 23, 1933. Addn. to 728,650 (*C. A.* 26, 6154). Dyes for cellulose esters and ethers are prepd. by heating polyaminoanthraquinones with Et<sub>2</sub>SO<sub>4</sub>, whereby Et is introduced into the amino groups.

**Dyes.** I. G. Farbenind. A.-G. Fr. 753,137, Oct. 7, 1933. Dyes of the anthracene series are prepd. by oxida-

tion of leuco sulfuric acid esters of  $\beta$ -aminoanthraquinones their acyl derivs. or substituted products, by  $\text{PbO}_2$  in an alk. aq. soln. or in a suitable org. solvent. Examples are given.

**Dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 750,480, Aug. 11, 1933. Dyes obtained from 1-diazo-2-hydroxynaphthalene-4,6-disulfonic acid and coupling component such as  $\beta$ -naphthol are treated with metallizing agents, the metals of which are capable of forming complex metal compds. with the dyes. Compds. of Cr, Cu, Fe, Co, Ni, Mn, Zn, V and Ti may be used.

**Dyes.** Chemische Fabrik vorm. Sandoz. Fr. 752,240, Sept. 20, 1933. Water-sol. dyes of the anthraquinone series are prepd. by treating with sulfonating agents anthraquinone derivs., of which at least 2  $\alpha$ -positions are substituted, the one by a  $\beta$ -naphthylamine radical or that of one of its substitution products, and the other by an acylamino group. A cyclization as well as a sulfonation takes place. Examples are given of dyes prepd. from 1-benzoylamino-4- $\beta$ -naphthylaminoanthraquinone and its 2-methyl and 2-bromo derivs., and 1-acetylamino-2-methyl-4- $\beta$ -naphthylaminoanthraquinone.

**Dyes (nitrogenous compounds of anthraquinone series).** Soc. pour l'ind. chim. à Bâle. Brit. 396,976, Aug. 17, 1933. Leuco-1,4,5,8-tetrahydroxyanthraquinone (I) or leuco-1,4-dihydroxy-5,8-diaminoanthraquinone, or a *N*-alkylated deriv. thereof, is heated at above  $100^\circ$  in an aq. soln. of  $\text{NH}_3$  or a primary aliphatic amine, preferably in the presence of a small proportion of a reducing agent, and the leuco compd. thus formed is oxidized to the corresponding anthraquinone deriv. which, if desired, is sulfonated. A modification consists in starting from the corresponding unreduced anthraquinone deriv. and conducting the process in the presence of a correspondingly larger proportion of reducing agent. 1-Hydroxy-4,5,8-triaminoanthraquinone or its *N*-alkylated derivs. are obtained; these are dyes for acetylcellulose and, on sulfonation, yield sol. wool dyes. In examples (1) I is heated at  $120^\circ$  in presence of a little  $\text{Na}_2\text{S}_2\text{O}_4$  with aq.  $\text{NH}_3$ ,  $\text{MeNH}_2$  or hydroxyethylamine to give 1-hydroxy-1,5,8-triamino-, trimethylamino- and tris(hydroxyethylamino)-anthraquinones, resp., on oxidation and (2) I is heated at  $120^\circ$  with aq.  $\text{NH}_3$  alone in a closed vessel to give a triamino deriv. as above; it dyes acetylcellulose blue shades.

**Azo dyes.** Otto Sobst (to General Aniline Works). U. S. 1,934,773, Nov. 14. Red dyes of good fastness are formed (suitably on the fiber) from components such as 2',3'-hydroxynaphthoyl-4-methyl-2-methoxy-5-chloro-1-aminobenzene or a similar 2',3'-hydroxynaphthoylamino-halocresol ether by coupling with a diazo compd. of the benzene series which does not contain a sulfonic or carboxylic group, e. g., the diazo compd. of 4-chloro-2-methyl-1-aminobenzene, asym. *m*-xylydine or the like. Several examples are given with details of procedure.

**Azo dyes.** Leopold Laska and Arthur Zitscher (to General Aniline Works). U. S. 1,934,807, Nov. 14. Azo dyes of good fastness, especially to light, and which dye red to blue to black are formed from components such as 2',3'-hydroxynaphthoyl-2-amino-6-methoxy (or ethoxy)-naphthalene and various amino derivs. of the benzene and naphthalene series. Numerous examples are given.

**Azo dyes.** George H. Ellis, Henry C. Olpin and Denis H. Mosby (to Celanese Corp. of America). U. S. 1,935,624, Nov. 21. Azo dyes which are suitable for dyeing cellulose acetate and like materials are obtained by coupling an aromatic diazo compd. such as may be derived from amines of the benzene or naphthalene series with an unsulfonated  $\alpha$ -naphthylamine coupling component substituted in an  $\alpha$ -amino group by an aliphatic radical contg. at least one hydroxyl group, such as  $\omega$ -hydroxyethyl- $\alpha$ -naphthalene or the like.

**Azo dyes.** Denis H. Mosby, Henry C. Olpin and George H. Ellis (to Celanese Corp. of America). U. S. 1,935,657, Nov. 21. Azo dyes which are suitable for dyeing cellulose acetate and the like are formed from components such as 3,5-dinitro-*o*-anisidine and  $\alpha$ -naphthylamine or the like. Several examples are given.

**Azo dyes.** Scottish Dyes Ltd. Ger. 579,840, July 5, 1933. See Brit. 333,507 (C. A. 25, 604).

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 582,612, Aug. 17, 1933. Azo dyes are produced in the substance or on the fiber by coupling the *m*-nitroanilide of 2,3-hydroxynaphthoic acid with a diazotized substituted monoacetyl deriv. of 2,5-dialkoxy-1,4-diaminobenzene. Thus, cotton is impregnated with a soln. of 1-(2',3'-hydroxynaphthoylamino)-3-nitrobenzene and treated with the diazo soln. of 4-(1'-methyl)-phenoxyacetylamino-2,5-dimethoxy-1-aminobenzene.

**Azo dyes.** I. G. Farbenind. A.-G. (Werner Lange, inventor). Ger. 582,644, Aug. 19, 1933. Dyes are produced by coupling nitroarylhydroxy-1,2-naphthotriazolesulfonic acids with diazo compds. in an alk. bath. Thus, Na 4'-nitrophenyl-5-hydroxy-1,2-naphthotriazole-7-sulfonate is coupled with 1-aminobenzene-4-sulfonic acid in alk. soln. to give a bluish red color to chromed leather. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Gerhard Schrader, inventor). Ger. 582,645, Aug. 19, 1933. Azo dyes insol. in water are produced in the substance or on the fiber by coupling diazonium compds. of *Bs*-1-aminobenzanthrone or its substitution products with coupling components contg. no soly.-inducing groups. Thus, cotton is soaked in a soln. of 1-(2',3'-hydroxynaphthoylamino)-3-nitrobenzene and treated with a soln. of diazotized *Bs*-1-aminobenzanthrone neutralized by  $\text{AcONa}$ , to obtain fast blue-black-violet shades. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Richard Stüsser, inventor). Ger. 582,899, Aug. 24, 1933. Azo dyes are produced in the substance or on the fiber by coupling arylthiazolepyrazolone with diazo or tetrazo compds. contg. no soly.-inducing groups. Thus, nitro-1-aminobenzene is diazotized and coupled with dehydrothiitoluidinepyrazolone to give a yellow dye suitable for use as pigment in the lacquer industry. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 42,638, Aug. 23, 1933. Addn. to 728,186 (C. A. 26, 5764). Azo dyes are prepd. by monodiazotizing and coupling with any components, substitution products of 4-nitro-1,3-diaminobenzene, with the exception of those having strongly acid substituents such as  $\text{Cl}$ ,  $\text{NO}_2$ , and  $\text{SO}_3\text{H}$ . Examples are given of dyes from 1-methyl-(and 1-methoxy)-2,4-diamino-5-nitrobenzene.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 750,328, Aug. 8, 1933. Azo dyes, insol. in water, are prepd. by diazotizing or tetrazotizing a component free from solubilizing groups and combining with 1 or 2 mols. of a pyrazo-

lone of the formula  $[\text{S.Ar.N}:\text{C}:\text{Ar}'][\text{N}:\text{N}:\text{CX}:\text{CH}_2:\text{CO}]_n$  (the N atom of the pyrazolone group is joined to a C atom of an aromatic group of the  $\text{C}_6\text{H}_5$  or  $\text{C}_{10}\text{H}_7$  series designated by Ar or Ar', and X is an alkyl, phenyl or esterified carboxyl group). Examples of dyes prepd. from the pyrazolone of dehydrothiitoluidine and dehydrothioxylydine are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,653, Sept. 7, 1933. 4-Diazo-3-alkoxydiphenylamine is coupled with an arylamide of 2,3-hydroxynaphthoic acid or one of its derivs., formed by linkage of a benzene radical. Thus, a 4-amino-3-methoxydiphenylamine  $\rightarrow$  2',3'-hydroxynaphthoyl-1-amino-2,5-dimethylbenzene is a greenish blue dye. A large no. of examples is given. The dyes are sol. in water.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 753,054, Oct. 6, 1933. Azo dyes insol. in water are prepd. by coupling arylamides of hydroxyarylcarboxylic acids or  $\beta$ -keto-carboxylic acids, diazo compds. of asym. mono- or dibenzyl-*p*-diamines which are substituted in the benzyl radical and may be substituted in the diamine radical by any substituents, but do not contain arylsulfonyl groups or groups which render the products sol. in water. Thus, 1-amino-4-(2',4'-dichlorobenzylamino)-2,5-dimethoxybenzene  $\rightarrow$  2-(2',3'-hydroxynaphthoylamino)naphthalene gives an indigo-blue shade. Several examples are given.

**Metalliferous azo dyes.** Fritz Straub and Walter Hanhart (to Soc. pour l'ind. chim. à Bâle). U. S. 1,936,276, Nov. 21. Monoazo dyes such as those formed from 1-amino-2-hydroxynaphthalene-4,6-disulfonic acid with  $\beta$ -naphthol or other coupling component are treated with metallizing reagents such as Cr fluoride or a Cu, Fe, Co, Ni, Mn, Zn, V or Ti compd. in order to obtain metalliferous products which give fast dyeings on various materials. U. S. 1,936,277 relates to products dyeing cotton various orange to violet to blue to gray tints produced by the action of metallizing reagents on disazo dyes such as those formed from tetrazotized 4,4'-diaminostilbene-3,3'-dicarboxylic acid and various coupling components.

**Monoazo dyes.** Bernhard Richard (to J. R. Geigy S. A.). U. S. 1,936,266, Nov. 21. Dyes giving fast red dyeings on wool and silk, resistant to fulling, light and sea water, are obtained from components such as diazotized 2-aminodiphenyl ether-4-sulfonic acid-(N)- $\alpha$ -thyl-anilide and *p*-toluenesulfonyl-1-aminouyl-8-hydroxynaphthalene-3,6-disulfonic acid or the like.

**Disazo dyes.** I. G. Farbenind. A.-G. Brit. 395,820, July 27, 1933. Disazo dyes are made by coupling tetrazo compds. of diamines, obtained by condensing 2 mols. of an aromatic amine with 1 mol. of an aliphatic ketone, with  $C_6H_5$  derivs. contg. at least 1 OH group attached to the nucleus, all the components being free from  $HSO_3$  and  $COOH$  groups. They are sol. in oil and are used for coloring varnish lacquers, oil varnishes and intaglio printing inks. In examples (1) condensation product from  $Me_2CO$  (1 mol.) and  $PhNH_2$  or *o*- or *m*-toluidine (2 mols.)  $\Rightarrow$  *p*-cresol, 4-chloro-3-methylphenol, 2,4-dimethylphenol or an *o*- and *p*-cresol mixt. and (2) product from  $Me_2CO$  (1 mol.) and *o*-anisidine or aminohydroquinone dimethyl ether (2 mols.)  $\Rightarrow$  *p*-cresol.

**Disazo dyes.** I. G. Farbenind. A.-G. Brit. 396,078, July 28, 1933. Disazo dyes of the type  $R':N:NR:N:NR''$ , in which R is a diphenyl- or diphenylurea-dicarboxylic acid residue, R' an acetoacetic arylide residue and R'' a pyrazolone residue, are sulfonated. The dyeings when after-treated with Cu salts are fast to light and washing. In examples (1) the dye acetoacetic-*o*-aniside (I)  $\leftarrow$  4,4'-diaminodiphenylurea-3,3'-dicarboxylic acid  $\rightarrow$  1-*m*-aminophenyl-3-methyl-5-pyrazolone (II) is treated with  $H_2SO_4 \cdot H_2O$ ; an orange shade is obtained on cotton by after-treatment with Cu salts and (2) the dye I  $\leftarrow$  benzidine-3,3'-dicarboxylic acid  $\rightarrow$  II is sulfonated as above (brown on cotton on after-treatment with Cu salts).

***o*-Hydroxyazo dyes.** I. G. Farbenind. A.-G. (Walther Benade, inventor). Ger. 582,688, Aug. 21, 1933. See Brit. 396,895 (C. A. 28, 652<sup>a</sup>).

**Vat dyes.** Wilhelm Eckert and Otto Braunsdorf (to General Aniline Works). U. S. 1,935,945, Nov. 21. Vat dyes which dye cotton fast yellow are produced by condensing a naphthoyle-arylimidazole-*peri*-dicarboxylic acid with a compd. such as aniline,  $\beta$ -naphthylamine, *o*-toluidine or cyclohexylamine by heating the materials together in an inert diluent such as an excess of the amine. Cf. C. A. 27, 1518.

**Vat dyes.** I. G. Farbenind. A.-G. (Georg Kranzlein, Heinrich Vollmann, Hermann Boedeker and Hans Becker, inventors). Ger. 576,404, May 10, 1933. Addn. to 574,966 (C. A. 27, 4682). Vat dyes are produced by treating 5-amino-2,1-anthraquinoneacridone with halogenated aromatic or aromatic-aliphatic ketones or polyketones of open or cyclic structure with no quinone character. Thus, 5-amino-2,1-anthraquinoneacridone is treated with *p,p'*-dibromobenzophenone,  $AcONa$  and  $(AcO)_2Cu$  in  $PhNO_2$  to give a light-fast dye. Other examples are given.

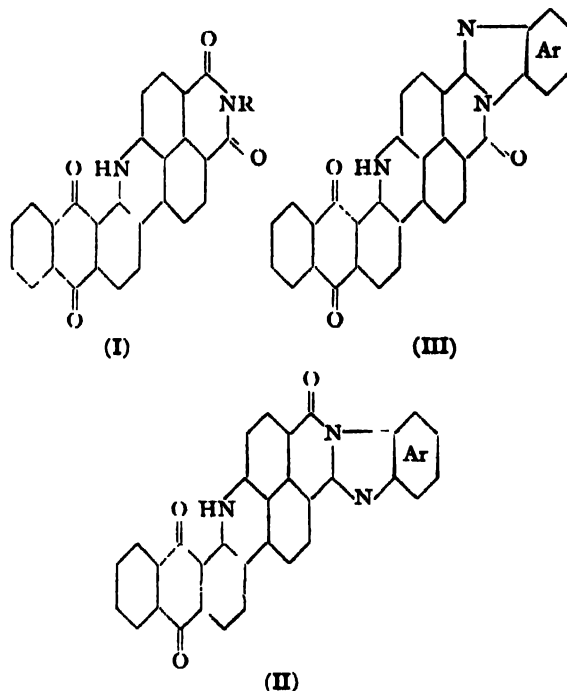
**Vat dyes.** I. G. Farbenind. A.-G. (Heinz Scheyer, inventor). Ger. 576,466<sup>a</sup> May 11, 1933. Addn. to 550,712 (C. A. 26, 4958). Condensation products from glyoxal or its derivs. and anthrone or its substitution products are heated with acid-condensing agents such as  $AlCl_3$  to give vat dyes. Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. (Karl Köberle, inventor). Ger. 578,503, June 14, 1933. Nitro compds., mol. in water and capable of use as vat dyes, are reduced by treatment with metals in the presence of concd.  $H_2SO_4$ .

1 Thus, 4-nitro-3',5'-dichloroanthraquinone-2,1-benzene-acridone is treated with Cu powder and concd.  $H_2SO_4$  to give the 4-amino deriv. which colors vegetable and animal fibers from a violet vat in fast greenish blue shades. Other examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 41,546, Jan. 28, 1933. Addn. to 609,194 (C. A. 25, 3404). Vat dyes of the anthraquinone series are prepd. by replacing naphthalene-2,6-dicarboxylic acid by the dicarboxylic acids of *m*- or *p*-diphenylbenzene in the process of Fr. 609,194.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 753,185, Oct. 9, 1933. Dyes of the anthraquinone series are prepd. by treating with condensing agents (fused caustic alkalis) at a high temp. 4-(anthraquinonylamino)naphthalimides or 4-(anthraquinonylamino)-1,8-naphthoyle-arylimidazoles or mixts. of isomers of these compds. or their derivs. or substitution products. The dyes from the 1st 3 have the formula I, and from the 2nd the formula II or III.



Examples are given of the prepn. of dyes and of bromo-1',-8'-naphthoyle- (m. 241-3°, this is sepd. into isomers, m. 223° and m. 280°) and 4'-bromo-1',8'-naphthoyle-4-chloro-benzimidazole, m. 230°, and di(4'-bromo-1',8'-naphthoyle)benzimidazole, m. above 360°.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 750,545, Aug. 11, 1933. Dye preps. contain a vat dye, a hyposulfite and a tertiary alkali phosphate, e. g., tetrabromindigo 3,  $Na_2S_2O_4$  1 and  $Na_3PO_4$  10 parts.

**Vat dyes of the anthraquinone series.** Johann Rosenbach and Willy Lassmann (to General Aniline Works). U. S. 1,934,771, Nov. 14. Dyes generally of yellow to red color are formed by condensing an  $\alpha$ -aminoanthraquinone compd. such as 1-aminoanthraquinone, 1-amino-4-benzamidoanthraquinone, 1-amino-5-benzamidoanthraquinone or 1-amino-4-methoxyanthraquinone by heating with compds. such as diphenyl ethers and benzophenones contg. one  $COCl$  group in 3- or 4-position or contg. two  $COCl$  groups in 4,4'-, 3,3'-, 4,3'-, or 4,2'-positions (and which may also contain other substituents) or with carboxylic acid bromides, in an inert solvent such as  $PhNO_2$ ,  $PhCl$ ,  $C_6H_5Cl$ , or an excess of diphenyl ether-carbonyl chloride or benzophenonecarbonyl chloride. Numerous examples with details of procedure are given.

**Vat dyes of the anthraquinoneacridine series.** Heinrich Neresheimer (to General Aniline Works). U. S. 1,935,724, Nov. 21. Vat dyes which dye cotton bluish

green to olive shades are prepd. by causing a 2'-benzanthronyl-1-aminoanthraquinone contg. an aliphatic carboxylamino group in the 4-position of the anthraquinone radical to react with an acid-condensing agent such as  $\text{AlCl}_3$ ,  $\text{H}_2\text{SO}_4$ , or chlorosulfonic acids.

**Indigoid vat dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 582,890, Aug. 21, 1933. Addn. to 552,927 (C. A. 26, 5767). Asym. dyes of the above type are prepd. by condensing 5,6-dihalo-3-hydroxythionaphthenes or their 2-derivs. with suitable compds. and halogenating the resulting dyes. Thus, 5,6-dichloro-3-hydroxythionaphthene is condensed with the *p*-dimethylamino anil of 4-methyl-6-chloro-3-hydroxythionaphthene to give a dye which colors cotton in fast blue-green shades. A table of compds. and colors of dyes produced is given.

**Indigoid dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 582,613, Aug. 17, 1933. Addn. to 552,927 (C. A. 26, 5767). Asym. indigoid vat dyes are prepd. by condensing 5-halo-6-methyl-3-hydroxythionaphthene and its 2-derivs. with suitable compds. such as  $\alpha$ -isatinilide, 5-bromo- $\alpha$ -isatin chloride, the *p*-dimethylaminoanil of 6-chloro-3-hydroxythionaphthene, etc. A table of components and color of dye produced is given.

**Indigoid dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 582,614, Aug. 14, 1933. Hydroxythionaphthene of the

general formula aryl CO aryl-CO-CH<sub>2</sub>-S, their oxidized product or 2-derivs. are condensed with suitable components. Thus, the 2-(*p*-dimethylamino)anil of 5-benzoyl-7-methylhydroxythionaphthene, and 2,1-naphthothioindoxyl are condensed to give a dye which colors cotton brown shades. Other examples are given.

**Thioindigo dyes.** I. G. Farbenind. A.-G. (Franz Wieners, inventor). Ger. 582,852, Aug. 24, 1933. Sym. dyes of the thioindigo series are prepd. by heating methyl ketones of multinuclear aromatic hydrocarbons or their substitution products with a free  $\alpha$ -position in the keto group, with sulfur halide, in optional presence of indifferent org. solvents. Thus,  $\alpha$ -naphthyl methyl ketone in  $\text{PhNO}_2$  is treated with a mol. amt. of  $\text{SCl}_2$  at 90° to give 2,1-naphthoxythiopheneindigo. Other examples are given.

**Treating molten materials with liquids as in indigo manufacture.** Joseph E. Jewett (to National Aniline and Chemical Co.). U. S. 1,934,716, Nov. 14. Molten material such as that for indigo production is introduced into a circulating stream of liquid such as aq. liquid. App. is described.

**Dye preparations.** I. G. Farbenind. A.-G. Ger. 578,939, June 19, 1933. Crystd. or coarsely dispersed dyes are mixed to an aq. paste; polyacrylic acid or its homologs or salts are added with a solvent which does not dissolve the product. Thus, dimethoxydibenzanthrone is mixed with water and dextrin. Na ligninsulfonate and the Na salt of polyacrylic acid are then added. The product is used for printing fabrics.

**Green sulfur dyes.** I. G. Farbenind. A.-G. (Friedrich Muth, inventor). Ger. 582,716, Aug. 21, 1933. Indophenols or leuco indophenols from alkyl- or aralkyl-1-naphthylamine-6- or -7-sulfonic acids and *p*-aminophenols are fused in the presence of Cu or its salts. Aq. polysulfide solns. may be present. Thus, the leuco phenol from ethylnaphthylamine-6-sulfonic acid and *p*-aminophenol is added to a polysulfide soln. with  $\text{Na}_2\text{S}$  and S.  $\text{CuSO}_4$  is then added and the water distd. off till the temp. becomes 103°. The dye is pptd. in the mass by an air current. Other examples are given.

**Anthraquinone dyes.** I. G. Farbenind. A.-G. Fr. 750,329, Aug. 8, 1933. Dyes are prepd. by condensing a 1-amino-4-haloanthraquinone-2-sulfonic acid or a substitution product thereof with a monoacylated arylendiamine, substituted or not, the acyl group corresponding to  $\text{R}(\text{CH}_2\text{CH})_x\text{CO}$ — (R is an aromatic group substituted in any manner and  $x$  is 1 or 2). Examples are given.

**Azine dyes.** Robert Lantz and Andre Wahl (one-half to Société anon. des matières colorantes & produits chim. de Saint-Denis). U. S. 1,935,849, Nov. 21. For prep. azines, primary phenylamines are caused to react on di-

1 naphthoxazines in order to substitute for the O of the oxazines the NR group in which R designates a carboxylic aryl radical; e. g., for obtaining asymmetric phenylimino-*N*-phenyldinaphthazine, 1 part of asymmetric phenyliminodinanaphthoxazine is boiled with 5 parts of  $\text{PhNH}_2$ , the resulting liquor is poured into an excess of  $\text{HCl}$ , and the liquor thus obtained is purified by dissolution with boiling alc. and pptn. with  $\text{NaHCO}_3$ . Some other examples also are given with details of procedure.

**Acid dyes of the anthraquinone series.** Karl Zahn and Heinrich Koch (to General Aniline Works). U. S. 1,935,929, Nov. 21. Dyes producing blue tints on animal fiber from an acid bath are obtained by causing 1-amino-4-haloanthraquinone-2-sulfonic acids or their salts such as alkali metal salts to react with a *m*- or *p*-aminoaryalkyl-sulfone or a substitution product substituted in either or both the alkyl or aryl radicals. Several examples with details of procedure are given. Cf. C. A. 28, 337<sup>a</sup>.

**Anthraquinone derivatives.** Imperial Chemical Industries Ltd. Fr. 752,272, Sept. 20, 1933. Derivs. contg 2 anthraquinone rings joined in other than the *meso* position by one or 2 atoms of N are prepd. by causing a chloroanthraquinone to react with an arylsulfonamidoanthraquinone or by causing 2 mols. of chloroaryl-sulfonamidoanthraquinone to react. The arylsulfonamidoanthraquinone need not be isolated from the medium in which it is prepd. Thus, *p*-toluenesulfonamide is caused to react with 1-chloro-5-benzoylaminoanthraquinone in an org. medium with a substance absorbing the acids and a catalyst, then the 1-benzoylamino-5-*p*-toluenesulfonamidoanthraquinone is caused to react with a further amt. of 1-chloro-5-benzoylaminoanthraquinone. The product may be treated with concd.  $\text{H}_2\text{SO}_4$  and an oxidizing agent to obtain an orange vat dye.

**1-Methylamino-4-aminoanthraquinone.** Soc. pour l'ind. chim. à Bâle. Fr. 753,089, Oct. 6, 1933. 1-Methoxy-4-aminoanthraquinone is heated with an alk. soln. of  $\text{MeNH}_2$  until a sample shows the reaction complete. It dyes acetate silk very strong bluish violet shades.

**Halogenated 4,5,8,9-dibenzopyrene-3,10-quinones.** Georg Kraenzlein, Heinrich Vollmann and Hans Becker (to General Aniline Works). U. S. 1,935,720, Nov. 21. Vat dyes of the 4,5,8,9-dibenzopyrene-3,10-quinone series contg. different halogen atoms possess especially good fastness properties, particularly to washing, and, moreover, partly yield the valuable scarlet tint of the unhalogenated dye where iso-(4,5,8,9)-dibenzopyrene-3,10-quinone yields on introduction either of Cl alone or Br alone dyes whose tints considerably differ from that of the dyes free from halogen. These 4,5,8,9-dibenzopyrene-3,10-quinones contg. different halogen atoms may be obtained by after-chlorination of brominated dibenzopyrenequinones, as well as by after-bromination of chlorinated dibenzopyrenequinones. The position of the halogen atoms, first of all that of the Br atoms, influences the tint. As halogenated agents there may be used both halogen itself or an agent splitting off halogen. The reaction is preferably carried out in the presence of a solvent, such as chlorosulfonic acid, concd.  $\text{H}_2\text{SO}_4$ , oleum or the like. It may also be advantageous to gently heat the soln. or to add a catalyst, such as, for instance, I, Fe, etc. The halogenation may likewise be effected in a melt of alkali and  $\text{AlCl}_3$ . Several examples with details of procedure are given. Cf. C. A. 27, 5197.

**Aryl amides of hydroxycarbazolecarboxylic acids.** I. G. Farbenind. A.-G. (Friedrich Muth, inventor). Ger. 576,966, May 19, 1933. These are prepd. by converting 2-hydroxycarbazole-3-carboxylic acids substituted by hydrocarbon residues in the ring imino group, into their arylamides. Thus, 9-methyl-2-hydroxycarbazole-3-carboxylic acid and *p*-chloroaniline are dissolved in toluene.  $\text{PCl}_5$  is added drop by drop. The liquid is then made alk. by  $\text{Na}_2\text{CO}_3$  and steam blown through. The product, 9-methyl-2-hydroxycarbazole-3-carboxylaminochlorobenzene, m. 377-8°. The following are prepd. similarly, designating 9-methyl-2-hydroxycarbazole-3-carboxylamino-as [1], [1]-

benzene, m. 254°, [1]-2'-methoxybenzene, m. 188-90°, [1]-2'-methylbenzene, m. 193°, [1]-2'-methyl-4'-methoxybenzene, m. 183°, [1]-2',5'-dimethoxybenzene, m. 245°, [1]-2'-methoxy-4'-chlorobenzene, m. 222°, [1]-1'-naphthalene, m. 232°, [1]-2'-naphthalene, m. 183°, 9-ethyl-2-hydroxycarbazole-3-carboxylamino-2'-methylbenzene, m. 187°, and 9-phenyl-2-hydroxycarbazole-3-carboxylamino-2'-methylbenzene, m. 135°. The compds. are used as dye intermediates. See Brit. 372,301 (C. A. 27, 3616).

**Alkylthiosulfonic acids.** Deutsche Hydrierwerke A.-G. Ger. 578,508, June 15, 1933. High-mol. alkylthiosulfonic acids or their salts etherified in the  $\alpha$ -position are prep'd. by condensing aliphatic, alicyclic or aliphatic-aromatic alcs. contg. at least 8 C atoms, with low-mol. aliphatic aldehydes and dry hydrohalide. The resulting  $\alpha$ -monohalogenated ethers are treated with stable salts of  $H_2S_2O_4$  in the presence or absence of indifferent diluents, at ordinary or raised temp. and pressure. Thus, lauryl alc. is ppt'd. by addn. of AcH or paraldehyde and the liquor sat'd. with dry HCl. The resulting lauryl  $\alpha$ -chloroethyl ether seps. as a layer and b. 148-53° at 15 mm. It is then treated with  $Na_2S_2O_4$  to give the thiosulfonic acid deriv. Other examples describe the prep'n. of lauryl  $\alpha$ -chloromethyl ether, b. 162-3° at 18 mm., naphthyl bromomethyl ether, and octadecyl chloromethyl ether, m. 27°. These are treated with  $Na_2S_2O_4$ . The products are useful as wetting or penetrating agents in acid wool dyebaths.

**Color lake.** I. G. Farbenind. A.-G. (Hodo Zschimmer, inventor). Ger. 578,957, June 19, 1933. See U. S. 1,912,878 (C. A. 27, 4428).

**Nitrogenous compounds (dyes and dye intermediates)** from perylenequinone, etc. Max A. Kunz and Karl Koberle (to General Aniline Works). U. S. 1,935,721, Nov. 21. N-contg. compds. which are in part suitable as intermediate products for the manufacture of dyes and in part as dyes, are obtained when perylenequinone, ms-benzodanthrone, ms-naphthodanthrone, allo-ms-naphthodanthrone, ms-anthradianthrone or their methyl or halogen derivs. are subjected to the action of hydroxylamine or its salts, preferably in an acid inorg. dissolving or suspending medium capable of splitting off water, such as for example  $H_2SO_4$ ,  $H_3PO_4$ , chlorosulfonic acid, etc. Condensing catalysts, for example metals or metal compds., such as Fe, Cu, Hg, etc., or iron or copper sulfate, may be added to the reaction mixt. Various examples with details and modifications of procedure are described.

**Dyes and intermediates.** Imperial Chemical Industries Ltd. Ger. 579,804, July 4, 1933. See Brit. 358,121 (C. A. 26, 6152).

**Intermediate and dyes.** I. G. Farbenind. A.-G. Fr. 753,104, Oct. 7, 1933. 4-Amino-1,8-naphthalenedicarboxylic acid and its derivs. are prep'd. by treating 4-sulfo-1,8-naphthalenedicarboxylic acid or its anhydride or one of its salts by cyclohexylamine, alkylamines (or their substitution products), hydrazine,  $NH_3$  or compds. yielding  $NH_3$ . Examples are given of the prep'n. of the above and of the methylaminonaphthalenemethylamide, m. 256-8°, undecylaminonaphthalundecylamide, m. 84-6°, hydrazinonaphthalhydrazide, m. above 300°, cyclohexylaminonaphthalcyclohexylamide, heptadecylaminonaphthalheptadecylamide, sulfocyclohexylaminonaphthalheptadecylamide (dyes animal fiber greenish yellow shades) and hydroxyethylaminonaphthalhydroxyethylamide, m. 214°. The products may be used as dyes or intermediates for dyes.

**Intermediates and dyes.** I. G. Farbenind. A.-G. Fr. 750,501, Aug. 11, 1933. New compds., 2-(3'-hydroxy-2'-naphthyl)-4-hydroxy-6,7-benzopseudoasimidobenzene (2-(3'-hydroxy-2'-naphthyl)-4-hydroxy- $\alpha$ -naphtholtriazole) and its derivs. are prep'd. by coupling diazotized 2-amino-3-hydroxynaphthalene, the H of the OH group of which is replaced by an appropriate radical such as acyl or alkyl, with a 2-amino-3-hydroxynaphthalene in which the H of the OH group is also replaced by an appropriate radical, transforming the  $\alpha$ -aminoazo dye thus formed to the pseudoazide by known methods and removing the radicals joined to the OH groups. Examples are given of the prep'n. of the compd. itself, m. 289-3° (uncor.), and of the 7',8'-dibromo, m. above 320°, the 7'-methoxy-8-

1 methoxy, m. 265-7° (uncor.), the 8-bromo, m. 296-7° (uncor.), derivs., and of 2-amino-3,3'-dimethoxy-1,2'-azonaphthalene, m. 196° (uncor.). Examples and a table of dyes prep'd. from these compds. are given.

**Intermediates and dyes.** Chemische Fabrik vorm. Sandoz. Fr. 751,711, Sept. 8, 1933. Radicals of biliary acids are introduced into aminonaphtholsulfonic acids by treating the latter with functional derivs. of biliary acids. The products may be converted to dyes by coupling diazotized mono- or poly-amines or aminoazo dyes. The products and the dyes have pronounced bactericidal properties. Examples are given of the prep'n. of 1,8,3,6-, 1,8,4,6-, 1,8,3,6-desoxy- and 1,8,2,4-cholylaminonaphtholdisulfonic acid and 1,8-diformyldeoxycholylaminonaphthol-4-sulfonic acid, and dyes prep'd. therefrom.

**Intermediates.** Soc. pour l'ind. chim. à Bâle. Ger. 579,918, July 3, 1933. Intermediates substituted in the naphthalene nucleus, with at least 1 COOH group, and contg. a heterocyclic nucleus, are prep'd. by converting mercapto-, or aminonaphthalenecarboxylic acids into naphthothioindoxyl or naphthindoxyl derivs. substituted in the naphthalene nucleus by at least 1 COOH group. Thus, 2-mercaptanaphthalene-3-carboxylic acid is treated with alkali and  $CH_2ClCO_2H$  to give 2-naphthylthioglycolic 3-carboxylic acid. This is heated in a water bath with  $PCl_5$  in  $o$ - $C_6H_4Cl_2$  to obtain the dicarboxylic acid chloride.  $AlCl_3$  is added to this to give 2,1-naphthothioindoxyl-3-carboxylic acid chloride. Sapon. of this gives the free carboxylic acid m. 250°. Designating naphthothioindoxyl as [1], the prep'n. of the following is also described; 2,1-[1]-4-carboxylic acid, m. 230°, 2,1-[1]-5-carboxylic acid, m. 240°, 3-carboxy-2,1-[1], 2,3-[1]-1-carboxylic acid, m. 174.5°, the *p*-dimethylaminonil of 2,1-[1]-3-carboxylic acid, m. 350°, and 2,1-naphthothioisatin-3-carboxylic acid, m. 296-7°.

**Intermediates for dyes.** I. G. Farbenind. A.-G. Fr. 751,757, Sept. 9, 1933. Acenaphthalic acids substituted in the ring and 1,4,5,8-naphthalenetetracarboxylic acids are prep'd. by sulfonating, nitrating or halogenating acenaphthalic acid in known manner and if desired submitting the products to transformation reactions or oxidation to form the tetra acids, or to both kinds of reactions and in any order. Examples are given of the prep'n. of 2-sulfo-, 2-hydroxy-, 2-methoxy-, a dinitro- a diamino- and a monochloro-1,4,5,8-naphthalenetetracarboxylic acid, m. 300°, a dinitro- and a monochloro-acenaphthalic acid, m. 208.10°.

**Safranine dye intermediates.** Walter C. Meuly (to E. I. du Pont de Nemours & Co.). U. S. 1,934,727, Nov. 14. Cresidine is condensed with *p*-nitrochlorobenzene-*o*-sulfonic acid in the presence of an alk. comp'd. such as  $NaHCO_3$  and the resulting product is reduced (suitably with Fe and HCl) to obtain the corresponding amino comp'd. An intermediate thus prep'd. is readily converted into a dye of greenish blue color and good fastness to light and to washing. Various details of procedure are given.

**Dyeing.** I. G. Farbenind. A.-G. Brit. 397,016, Aug. 17, 1933. Azo dyes are made on the fiber, e. g., cotton, regenerated cellulose or animal fibers, by coupling thereon a diazo, tetrazo or diazoazo comp'd. with a 2',3'-hydroxynaphthoyl-2-amino-6-alkoxynaphthalene (from the corresponding acid and amine according to customary methods), the resulting dyes being free from groups lending soly. In examples cotton is padded with the 6-methoxy deriv. and developed with diazotized 1-amino-2,4-dimethylbenzene or 1-amino-4-methyl-2,3-dichlorobenzene or padded with the 6-ethoxy deriv. and developed with diazotized 1-amino-2-methoxy-4-nitrobenzene.

**Dyeing.** I. G. Farbenind. A.-G. (Arthur Zitscher and Wilhelm Seidenfaden, inventors). Ger. 578,648, June 15, 1933. Azo dyes insol. in water are produced on the fiber by treating the latter with hydrazinesulfonic acids from

bases of the general formula  $CH:CY.C(NH_2):CH.CY:C-NHAcyl$  (where Y represents similar or different substituents contg. no soly.-inducing group) and azo components contg. OH groups, in an alk. medium, and steaming the

product. Thus, Na 4-benzamido-2,5-dimethoxybenzene-1-diazosulfonate is suspended in AcOH and heated with addn. of Zn dust. When the color disappears, the soln. is made alk., giving Na 4-benzamido-2,5-dimethoxybenzene-1-hydrazinesulfonate. Calico is treated with a soln. contg. the above and 4,4'-di(acetoacetylaminio)-3,3'-dimethylbiphenyl, thiodiglycol, NaOH and  $\text{Na}_2\text{CrO}_4$ . The calico is then steamed and rinsed. Other examples are given.

**Dyeing.** Soc. pour l'ind. chim. à Bâle. Ger. 578,838, June 17, 1933. Textiles of vegetable origin, such as cotton or rayon goods, are immunized against direct dyeing by treatment with anhydrides or chlorides of org. carboxylic acids in the presence of tertiary bases. Thus, cotton is treated with phthalic anhydride or BzCl and pyridine. The product is immune from direct-acting or acid dyes.

**Dyeing.** I. G. Farbenind. A.-G. Ger. 579,936, July 3, 1933. Liquid or fusible org. materials are dyed by introducing the dye with phosphalides, especially lecithin. Thus, a mixt. of stearin and ceresin is fused and colored with a dye to which textile lecithin is added. If mordant dyes are used, lake-forming metal compds. are added.

**Dyeing.** I. G. Farbenind. A.-G. (Leopold Laska and Arthur Zitscher, inventors). Ger. 582,966, Aug. 25, 1933. Azo dyes are produced on the fiber by impregnating the fiber with a soln. of 2-(2',3'-hydroxynaphthoylamino)-6-alkoxynaphthalene and treating the impregnated fiber with diazo, tetrazo or diazoazo compds. A table of components and colors of dyes produced is given.

**Dyeing textiles.** Marcel Guinet. Fr. 751,846, Sept. 11, 1933. Textiles, particularly rayon, are impregnated by a colloid or colloidal soln. having a basis of animal gelatin or pickled hide, immersed in a tanning bath comprising vegetable tanning agents or salts of Cr and then dyed.

**Dyeing textiles.** Henry Dreyfus. Fr. 753,128, Oct. 7, 1933. Deep dyeings are obtained by dyeing textiles which already have a deep gray or other deep color due to the presence of a pigment in the textiles. Suitable pigments are lampblack,  $\text{Fe}_3\text{O}_4$  and aniline black. The process is particularly suitable for products of cellulose esters and ethers.

**Printing materials containing cellulose esters.** British Celanese Ltd. and George H. Ellis. Brit. 397,470, Aug. 10, 1933. In producing discharge effects on materials made of or contg. cellulose esters the materials are saponified after coloration with a ground color but prior to discharge thereof. Saponig. agents are NaOH, KOH,  $\text{Na}_2\text{CO}_3$ ,  $\text{K}_2\text{CO}_3$ , Na silicate or  $\text{Na}_3\text{PO}_4$ , which may be used, if desired, in aq. or alc. soln. and, if desired, with other substances, e. g., swelling agents. In examples (1) a woven cellulose acetate fabric, dyed red with 4-nitro-2-methoxybenzene-1-azo-4'-dimethylaminobenzene, is saponified, to an extent corresponding to about a 10% loss, by cover-padding with a  $\text{Na}_2\text{CO}_3$  soln. contg. starch thickening, dried, steamed, washed off, dried, printed with a paste contg. Zn  $\text{CH}_3\text{O}$ -sulfoxylate, methylated spirits, Et lactate and gum arabic thickening, dried, aged, washed and dried to yield a white discharge on a red ground and (2) a fabric of equal parts of cotton and cellulose acetate, dyed in contrasting shades with 2-nitro-4-methylbenzene-azo-*p*-xylylene on the acetate and Chlorazol fast blue 2 BNS on the cotton, is padded with sodium carbonate soln., dried on a stenter, steamed, printed as in (1), steamed or aged, washed and dried to yield discharges on a 2-color ground.

**Printing textiles.** I. G. Farbenind. A.-G. Fr. 41,789, Apr. 13, 1933. Addn. to 727,727 (C. A. 26, 577Q). The hydroxynaphthraquinones of Fr. 727,727 are replaced by S-contg. derivs. of anthraquinones, particularly mercaptans, their salts or ethers, rhodanides or dianthraquinonyl mono- or di-sulfides, or their substitution products or reduction products contg. O in the *meso* position.

**Printing fabrics.** I. G. Farbenind. A.-G. (Richard Fischer and Hermann Freund, inventors). Ger. 578,649, June 15, 1933. Addn. to 562,823 (C. A. 27, 1206). Textiles, etc., are printed with a paste contg., in addn. to the

1 diazoamino compd. and coupling component of 562,823, an ester salt of a leuco vat dye. The printed fabric is dried and treated with a soln. of an oxidized dye prepn. contg. org. acid,  $\text{H}_3\text{PO}_4$  or acid-yielding salts. It is then dried on heated cylinders or in heated chambers, and developed by steaming. In an example, cotton goods are printed with a paste contg. an azo dye,  $\text{H}_2\text{SO}_4$  ester of the leuco vat dye 5,7,5',7'-tetrabromoinidigo,  $\text{C}_6\text{H}_4(\text{OH})_2$ , alc., thickening, ZnO, water and NaOH, dried and treated with a prepn. 2 contg. a salt of  $\text{PhNH}_2$ , tragacanth,  $\text{NaClO}_3$ , AcOH,  $\text{HCO}_2\text{H}$ , and  $\text{NaNO}_2$ . The product has red shades on a black background. Cf. C. A. 28, 341', 342'.

**Printing fabrics.** Joh. G. Kastner. Ger. 578,776, June 17, 1933. A printing paste contains a soln. or decoction of ground carob beans which has been reduced to produce sugar-like disintegration products by treatment with acids or diastases. Other thickening agents may also be present. In the example, the paste contains the above thickening with indanthrene blue,  $\text{K}_2\text{CO}_3$ , glycerol, NaOH, and hyposulfite.

**Printing fabrics.** I. G. Farbenind. A.-G. (Ludwig Biffander and Georg Böhner, inventors). Ger. 578,821, June 17, 1933. A vat dye paste for printing fabrics has a content of polyglycerol. Thus, the paste may consist of indanthrene blue, polyglycerol (obtained by treating glycerides with alcoholic KOH at  $10^\circ$ ), starch-tragacanth thickening,  $\text{Na}_2\text{CO}_3$ ,  $\text{C}_2\text{H}_5\text{O}$  and sulfoxalate. Other examples are given.

**Printing wool.** H. Th. Rohme. A.-G. Ger. 578,916, June 19, 1933. In printing wool with substantive or acid dyes, a 4-10% addn. of pyridine or its homologs or derivs. is given to the paste. Thus, the printing paste may consist of 2.7% dye, 21.3% water, 4% pyridine, 67% tragacanth, 3%  $\text{Na}_3\text{PO}_4$  and 2% NaCl.

5 **Printing wool.** I. G. Farbenind. A.-G. Fr. 753,141, Oct. 7, 1933. Fast printings are obtained on wool by application or discharge, with vat dyes, by adding amino-acetic acid or one of its salts to the printing or discharge pastes.

**Coloring cellulose derivatives such as cellulose acetate, etc.** George H. Ellis, Denis H. Mosby and Henry C. Olpin (to Celanese Corp. of America). U. S. 1,935,623, Nov. 21. The material is treated with unsulfonated azo dyes contg. an anthraquinone nucleus and an aminonaphthoic acid nucleus (no sapon. of the material taking place during the treatment). Numerous examples are given.

**Coloring cellulose acetate and similar cellulose esters.** George H. Ellis (to Celanese Corp. of America). U. S. 1,935,205, Nov. 14. Dyes are used such as those formed by coupling diazotized unsulfonated aminoxanthene derivs. with *p*-xylylene, cresidines, anisidines, *m*-phenylenediamine, nitro-*m*-phenylenediamine, *m*-aminophenol, monoacetyl-*m*-aminophenol, dimethyl-*m*-aminophenol,  $\alpha$ -naphthylamine,  $\beta$ -naphthylamine or 1-amino-2-methoxynaphthalene. The dyes or components may be applied to the cellulose esters or ethers in the form of aq. solns. of their salts, such as the hydrochlorides, or in the form of aq. suspensions or dispersions. Several examples with details of procedure are given. Cf. C. A. 28, 342'.

8 **Yarn-dyeing machine.** Friedrich Faigle and Carl Faigle. Ger. 578,938, June 20, 1933.

**Apparatus for producing mixed colors on fabrics, etc., by spraying.** Leopold Radó. Ger. 578,937, June 19, 1933.

**Fast-color reserves under ground dyeings.** Philippe Brandt, Emil Gubler and Ernst Tschan (to Durand & Huguenin, S. A.). U. S. 1,934,788, Nov. 14. See Fr. 40,862 (C. A. 27, 1520).

9 **Vats for dyeing stockings, etc.** Charles Callebaut and Julien de Blicquy. Fr. 42,694, Sept. 1, 1933. Addn. to 725,236 (C. A. 26, 4963).

**Fibrous materials.** Heberlein & Co. A.-G. Fr. 752,367, Sept. 21, 1933. Materials made from vegetable fibers are improved by treatment with a hydroxycuprammoniacal soln. contg. a small amt. of alkali hydrate, such that the amt. of free alkali is always below 1.5%. This treatment may be followed by mercerization with a concd. alk. soln.



**Greasing textile fibers and fabrics.** Walther Schrauth. U. S. 1,936,484, Nov. 21. Materials are treated with an ester of a fatty acid having less than 13 C atoms in the mol. and an aliphatic alc. having 8 or more C atoms in the mol. and having an I value below 15, *e. g.*, with lauryl propionate, cetyl acetate, etc.

**Bleaching fibers.** Kurt Schumacher. Fr. 752,283, Sept. 20, 1933. Fibers of linen, hemp, etc., are bleached by boiling with  $\text{Na}_2\text{CO}_3$ , treating with Cl, treating with  $\text{H}_2\text{O}_2$ , decocoting and finally treating with Cl.

**Wetting-out fibers.** A. Röchberg G. m. b. H., Georg Braun G. m. b. H. and Eduard Voit. Ger. 578,775, June 16, 1933. Animal fibers are wetted out in acid dye baths by using the products obtained by treating mineral oils with  $\text{H}_2\text{SO}_4$ . These may be washed before use. Examples describe the method applied to wool.

**Dressing textiles.** Georges Lefranc. Ger. 578,502, June 15, 1933. Textiles, especially rayon, are dressed with emulsions of oils, fats or resins to which colloidal  $\text{SiO}_2$  is added in addn. to the usual protective colloid. Examples are given.

**Oil emulsions for treating textiles.** August Chwala and Edmund Waldmann. Austrian 134,993, Oct. 25, 1933. A mixt. of a mineral oil with an animal or vegetable oil, fat or wax is treated with a strong sulfonating agent, *e. g.*, oleum or  $\text{HSO}_3\text{Cl}$ , and the product is washed, *e. g.*, with a salt soln., neutralized with an alkali or an org. base, and dild. with water. Alternatively, an animal or vegetable oil, fat or wax is treated with a strong sulfonating agent and the product, before it is washed or neutralized, is mixed with a mineral oil. Sulfonation may be effected in the presence of org. acids or their anhydrides, phenols, hydroaromatic or halogenated hydrocarbons, alcs., ketones, or  $\text{H}_2\text{P}_2\text{O}_7$  or its salts, or these substances may be added after the sulfonation but before neutralization. The emulsions may be mixed with an aq. casein soln. Examples are given.

**Apparatus for the wet treatment of textiles.** Richard Weise. Ger. 577,046, May 22, 1933. Addn. to 562,735 (C. A. 27, 1208).

**Bowking cotton goods.** Hanseatische Mühlenwerke A.-G. Ger. 578,561, June 15, 1933. The bowking lye is given an addn. of lecithin.

**Apparatus for conditioning yarn by moistening.** Charles F. Dulken. U. S. 1,935,261, Nov. 14. Various structural and operative details are described.

**Rayon Glanzstoff-Courtaulds G. m. b. H.** Brit. 397,253, Aug. 24, 1933. Rayon spinning-cakes or other bobbinless windings that have been treated with liquids and dried are wound off so that the inner and middle thread layers which correspond to the approx. horizontal portion of the shrinkage curve are wound separately from the outer layers. The thread obtained from the inner and middle layers shows very uniform shrinkage when subsequently wetted and dyes uniformly and is particularly suited for the production of woven fabrics. The non-uniform layers, which may be wound off first onto bobbins or into hanks, are moistened and dried to improve their shrinkage properties.

**Rayon.** Heberlein & Co. A.-G. Fr. 752,258, Sept. 20, 1933. Rayon threads are improved by submitting them to a torsion at least 4 times greater than the normal torsion, and preferably as accentuated as possible, winding or unwinding them in this state, moistening at a high temp., drying them and submitting them to a counter torsion in the opposite direction. The moistening may be effected by dipping the thread on a bobbin into boiling water.

**Silk and rayon.** Cäemische Fabrik vorm. Sandoz. Fr. 752,337, Sept. 20, 1933. These are dulled by treating the fibers successively by sol. salts of acids, the anion of which contains a metal of the 6th group and by sol. salts of polyvalent metals, the treatments being in either order. Thus a cloth contg. viscose and cotton is printed with a paste contg. Na tungstate, water and tragacanth, dried and passed into a soln. of  $\text{BaCl}_2$ . The cloth becomes dulled in places. If a dye is added to the printing paste,

colored mat effects are obtained. Other examples are given.

**Treating fabrics of cellulose derivatives such as cellulose acetate to render them less liable to develop faults.** George H. Ellis (to Celanese Corp. of America). U. S. 1,935,203, Nov. 14. The fabrics are impregnated with substances, such as xylene and a sulfonated soap, capable of swelling, without dissolving, the cellulose derivs., so as to increase the cohesion and coeff. of friction between the yarns of the fabric.

**Artificial threads.** British Celanese Ltd. and Percy F. C. Sowter. Brit. 397,137, Aug. 8, 1933. Yarns, especially of cellulose acetate or other org. derivs. of cellulose, having the appearance of spun yarn, *i. e.*, yarn made from staple fiber, are produced by subjecting a bundle of filaments in a softened condition to an operation, *e. g.*, stretching, whereby individual filaments are broken. For example, threads of  $\text{Me}_2\text{CO}$ -sol. cellulose acetate may be softened in 40–50% dioxane, or an equiv. concn. of diacetone alc., Et lactate, glycol monoacetate, Me glycol monoacetate or the like, and stretched to 300–500%. The yarn may be treated to lay the projecting ends and subjected to a gassing operation. The final twisting is preferably effected in the presence of a softening agent, *e. g.*, by means of a Topham box, whereby a more crinkled yarn is obtained.

**Apparatus for coating threads or ribbons with Cellophane, etc.** Soc. anon. des textiles synthétiques. Fr. 751,881, Sept. 11, 1933.

**Apparatus for bleaching textiles.** Firma Fr. Gebauer. Ger. 587,034, Oct. 28, 1933. Addn. to 492,058 (C. A. 24, 2616).

**Curling artificial fibers.** Heberlein & Co. A.-G. Brit. 397,046, Aug. 17, 1933. Artificial fibers are given a permanent wool-like curliness by twisting to at least 4 times the normal amt., preferably as much as possible, moistening at a relatively high temp., drying and then twisting in the opposite direction. Moistening is effected by steaming under pressure or by immersing the bobbins in (nearly) boiling  $\text{H}_2\text{O}$ , with or without wetting agents. Examples are given of the production of curled fibers from cuprammonium, viscose and acetate rayon yarns.

**Rubber-coated fabric.** John R. Couture (to E. I. du Pont de Nemours & Co.). U. S. 1,936,500, Nov. 21. In finishing rubber-coated fabric sheet material, an intermediate coat of varnish is applied over the rubber, and, over this intermediate coat, there is applied a final coat of steam-refined petroleum residue asphalt, and the product is baked. The intermediate coat is of a character to produce a more flexible film than the final coat.

**Rubber-coated sheet material.** Chester E. Linscott (to American Rubber Co.). U. S. 1,935,189, Nov. 14. Fibrous sheet material such as a textile fabric is coated on both sides with a solid deposit from latex having a subnormal content of water-solubles, the deposit on one side being insufficient in thickness to mask or completely level up the surface irregularities of the material and the rubber of this deposit being at least superficially combined with a heavy metal soap such as Zn stearate and a halogen such as Br, etc.

**Coated fabric for tire covers, etc.** Dale G. Higgins (to E. I. du Pont de Nemours & Co.). U. S. 1,934,711, Nov. 14. A textile fabric such as a teal or duck has superposed on its outer surface a light colored cellulose nitrate film contg. casein and glycerol, by which migration of the antioxidant contained in the tire and resulting discoloration is prevented when the material is used as a tire cover. Cf. C. A. 27, 5990.

**Washing and cleansing textile materials such as cotton, wool or shoddy.** Heinrich Ulrich and Curt Schuster (to General Aniline Works). U. S. 1,935,217, Nov. 14. An aq. bath is used comprising a soap, stripping reagent, etc., and an aliphatic ammonia deriv. contg. at least one hydroxyalkyl group, such as diethanolamine.

**Apparatus for removing the dirt and solid impurities in fatty water from wool washers.** James W. Adams. Ger. 578,856, June 17, 1933.

**Laundering method.** Robert A. Phair (to H. Kohn-

stamm & Co.). U. S. 1,935,603, Nov. 21. There is added, to wash water contg. suspended colored mineral matter such as Fe and Mn compds., a softener prepd. from a water-sol. fluoride such as NaF or Na silicofluoride,  $\text{Na}_2\text{CO}_3$  and an alkali metal phosphate, and washing is effected directly in the resulting wash water.

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

**Practical evaluation of paints by exposure to weather and wind.** A. A. Kraeff. *Verfkronek* 6, 255 66(1933).—A description of the procedure for outdoor testing of paints on metal or wood at Bandung, Java. Loss of luster, of elasticity, pulverization, mold growth, bleaching, cracking, "alligatoring," blistering, chipping, erosion, beading, wrinkling, etc., were observed; photographs of the effects are given and details discussed. One conclusion is that no paint in one coat is able to protect iron against rust; a double coat is many times as durable as a single one. Single thick coats are liable to crack. Mold growth is prevented by the use of aged linseed oil (raw or boiled), no excess oil, fast drying, use of paint which gives a smooth, hard coat with high  $\text{BaSO}_4$  content. Added fungicides should be resistant to sunlight and mold and should not attack iron; none of the customary preps. has been found entirely successful. B. J. C. v d H.

**Carbon black in the paint industry.** J. W. Snyder. *Official Digest, Fed. Paint & Varnish Production Clubs* No. 130, 285 92(1933).—The color of C black is greatly influenced by mech. action, e. g., shaking, tamping, etc., moisture content, grinding conditions and vehicle. Until recently, the color has also been proportional to the oil absorption, but such is not the case with "new Process" pigments. G. G. Sward

**Is cork important in paint technology?** Fr. Kolke. *Farben-Chem.* 4, 338 40(1933).—Ground cork imparts to paints heat-insulating, shock-absorbing, acoustical and anticorrosive properties. In protecting the contents of a vessel from external heat, cork paints are very good, but in preserving heat in a vessel, cork paint is superior to most others. G. G. Sward

**Establishing technical expressions.** W. van Wullen-Scholtten. *Farben-Ztg.* 38, 1581-3(1933). Definitions of a no. of words used in paint technology are discussed. G. G. Sward

**Oil requirements and the structure of paints.** Hans Wolff and G. Zeidler. *Paint & Varnish Production Mgr.* 9, No. 12, 18, et seq.(1933); cf. C. A. 27, 3348, 28, 3186. G. G. Sward

**Examination of a few dry pigments.** W. L. A. Warner. *Verfkronek* 6, 267-8(1933); cf. C. A. 27, 5556.—For the analysis of chromate green (mixture of Prussian blue and chromate yellow) the methods of Kappelmeyer (C. A. 25, 5302) for sulfate content, basic Fe and  $\text{Fe}(\text{CN})_6$  content are recommended. For total Pb content the electrolytic method is proposed. For direct Pb chromate detn.: weigh 550 mg. pigment and transfer to a 100-10 cc. volumetric flask, add 10 cc. 4 N NaOH and heat gently to decompose, cool, fill up to 110 cc., shake and filter dry. Transfer 100 cc. filtrate to a 300-cc. stoppered Erlenmeyer flask, add 4 g. KI, 20 cc. 25% HCl and place the flask for 2 hrs. in the dark, then titrate with 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3$ . B. J. C. van der Hoeven

**Chemical and physical properties of iron oxides.** Joseph W. Ayers. *Official Digest, Fed. Paint & Varnish Production Clubs* No. 130, 298-307(1933).—The following properties of typical Fe oxide pigments are given: chem. analysis, tinting strength, particle size, sp. gr., oil absorption, brightness, effect on drying time, hiding power and anticorrosiveness. G. G. Sward

**The role of ferrous chloride in the manufacture of Prussian blue and Mars yellow.** Geo. Zerr. *Farbe u. Lack* 1933, 533-4, 544.—Prussian blue prepd. with  $\text{FeCl}_2$  has a softer texture than that prepd. with  $\text{FeSO}_4$ . This property is probably assocd. with the gelatinous nature of the intermediate white prep of the former as contrasted with the low consistency of the sulfate white pulp. A sp. gr. table of  $\text{FeCl}_2$  solns. is given. G. G. Sward

**Printing inks—their composition and manufacture.** L. F. Engelhardt. *Oil, Paint and Drug Reporter* 124, 30M(1933).—The relation between printing inks and paint is briefly outlined. Printing processes are briefly described. G. G. Sward

**Some experiences with fires in varnish factories.** H. Deekert. *Farbe u. Lack* 1933, 496-7, 520, 535-6.—Ten cases of fires in varnish plants are discussed. G. G. S.

**The influence of the solvent on the viscosity of oleo varnishes.** Carl Boller. *Farben-Chem.* 4, 400-11(1933). The chem. influence of solvents on varnishes is very slight. On the other hand, the phys. influence is great. Tests with  $\text{C}_6\text{H}_6$ , benzine, trichloroethylene and  $\text{CCl}_4$  indicate that vis. of thinned varnishes are proportional to the vol. ratios of thinner used. G. G. Sward

**Coloring of black enamels.** W. Hutter. *Farbe u. Lack* 1933, 471.—The use of nigrosin, etc., in black enamels instead of lamp black or vine black avoids settling difficulties but introduces slow drying, a condition often resulting from the use of aniline dye pigments. G. G. Sward

**Chemical problems of the linoleum industry.** A. B. Miller and Foster D. Snell. *Ind. Eng. Chem.* 25, 1307 11(1933).—The oxidized oil-rosin binder of linoleum, while excellent for covering floors, has the faults of low water resistance and alkali resistance. Modification with synthetic resinoids offers promise. Chem. modification of the binder and processing would tend to reduce the h. p. and equipment required. Foster Dee Snell

**Decolorizing and bleaching processes for resins.** H. Anshagen. *Farbe u. Lack* 1933, 523, 532.—A brief review citing 45 patents. G. G. Sward

**The preparation of coumarone resin.** Shōzo Masai. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 583(1933).—As a source of prep. coumarone resin the fraction of crude benzene distg. between  $160^\circ$  and  $185^\circ$  was found best, the yield of resin was 0.17% by wt. of crude benzene. As polymerizing agent 1 to 3 vols. % of 66° B $\phi$ .  $\text{H}_2\text{SO}_4$  was found preferable. Karl Kammermeyer

**Azo dyes [pigment in the lacquer industry]** (Ger. pat. 582,890) 25. Oils from rubber [use in the prep. of paints and varnishes] (Brit. pat. 397,136) 30. Hydroxy-alkyl cellulose [products for use in the manuf. of varnishes] (Brit. pat. 397,116) 23. Cellulose ethers [products used in the manuf. of varnishes] (Brit. pat. 397,117) 23. Cellulose derivs. [use in the prep. of varnishes] (Brit. pat. 397,404) 23. Disazo dyes [use in coloring varnish lacquers] (Brit. pat. 395,820) 25.

**Paint.** Albert G. Rodwell. *Fr.* 753,182, Oct. 9, 1933. A pigment or coloring material is added to a vehicle prepd. by impregnating gelatinous  $\text{SiO}_2$  with a soln. of rubber latex (in water or a soln. of borax or other alkali) and adding a soln. of an alkali silicate. The proportion of gelatinous  $\text{SiO}_2$  or latex soln. in the mixt. of these 2 constituents is between 3% and 66%. Lithopone or Al powder may be used as coloring material.

**Priming composition for paints.** Egon Meier. *Ger.* 578,154, June 10, 1933. Addn. to 548,992 (C. A. 26, 4180). The compn. contains tetrahydronaphthalene,  $\text{Ca}(\text{OH})_2$ , cellulose lacquer, oil or fatty acids, and filling material.

**Cleaning and preparing metal for painting.** Howard R. Neilson (to H. E. Westervelt). U. S. 1,935,911, Nov. 21. A cleaning compn. is formed contg.  $\text{H}_3\text{PO}_4$  and a soap-like glucoside such as saponin and is substantially free from oils, waxes and greases. The mono-butyl ether of ethylene glycol and a small proportion of oleic acid also may be used.

**Pigments.** Imperial Chemical Industries Ltd. Fr. 751,957, Sept. 13, 1933. Inorg. or org. pigments are improved by grinding with a sulfonic acid or a sulfuric ester, the mol. of which contains an aliphatic chain of at least 8 C atoms, *e. g.*, the sulfuric ester of dodecyl, cetyl, oleyl or stearyl alc. The grinding is carried out in the absence of water, or with water and subsequent drying.

**Titanium pigments.** Titanium Ltd. Ger. 578,736, June 16, 1933. See Fr. 685,893 (C. A. 24, 6040) and Can. 305,012 (C. A. 25, 833).

**Luminescent colors.** I. G. Farbenind. A.-G. Fr. 751,709, Sept. 8, 1933. Luminescent colors are incorporated in polymerized styrene, polymerized vinyl naphthalene, polymerized vinyl tetrahydronaphthalene or their homologs.

**Stabilizing organic salts used as driers.** I. G. Farbenind. A.-G. Brit. 397,276, Aug. 24, 1933. Heavy, earth metal or alk.-earth metal driers, *e. g.*, Co naphthenate or resinate, are stabilized and their solubilities in org. solvents improved by adding up to 10% of solid satd. fatty acids or solid free carboxylic acids of the lower members of the olefin or aromatic series, their substitution products, which may have the Me, OH, Cl, NO<sub>2</sub> or sulfo group at the nucleus, and derivs. with at least 1 free COOH group in the side chain. The following stabilizers are referred to: stearic, palmitic and benzoic acids, mixed crotonic and arachidic acids, mixed hippuric and salicylic acids, mixed mandelic, and cinnamic acids, mixed anthranilic and hydrocinnamic acids and mixed aminophenylacetic, palmitic, benzoylbenzoic acids. The stabilizers are added immediately after the manuf. of the drier or, where the drier is produced by the action of an alkali metal salt of the drier acid on a salt of the drier metal, during the course of pptn. if desired. Cf. C. A. 27, 2050.

**Lithographic ink.** John G. Goedike. U. S. 1,935,629, Nov. 21. A plate oil is used together with wool fat, an aq. dispersion of gum arabic and a pigment.

**Lithographic materials.** Richard Berger. Brit. 397,365, Aug. 24, 1933. Siccativ materials of the kind used in oil painting, *e. g.*, Zn salts, Pb<sub>3</sub>O<sub>4</sub>, PbO, Pb(OAc)<sub>2</sub>, pyrolusite and manganous oxalate and borate, are used in the production of sheet metal or paper lithographic plates inscribed with lithographic ink from a typewriter ribbon or otherwise produced for office purposes. The siccatives, which may be mixed with the ink immediately before hand inscribing or dusted on afterward if the inscription is done with a typewriter, are suitable for use with ordinary inscribing inks contg. waxes, fats, resins, soaps, solvents and coloring matter.

**Coating compositions.** Herbert O. Albrecht (to E. I. du Pont de Nemours & Co.). U. S. 1,936,534, Nov. 21. A coating compn. which is suitable for baking on metals comprises a drying oil and a soln. in a hydrocarbon solvent of a phosphate of a triethanolamine ester of a fatty or resinic acid.

**Coating compositions.** The Goodyear Tire & Rubber Co. Fr. 753,027, Oct. 5, 1933. Coatings are made by mixing a pigment and a deriv. or transformation product of rubber in a cylinder grinding mill until a homogeneous sheet is obtained and dissolving the sheet in an appropriate solvent. The rubber deriv. may be that obtained by the action of chlorostannic acid on Sn. A plastifying agent such as linseed oil, butyl stearate or ethyl abietate may be added.

**Protective coating.** Elektrochemische Werke München A.-G. Fr. 752,222, Sept. 19, 1933. A protective coating for more or less porous surfaces consists of an aq. colloidal soln. of wood oil, polymerized by heating.

**Varnishes, paints, etc.** I. G. Farbenind. A.-G. (Friedrich Meidert, inventor). Ger. 578,586, June 29, 1933. The deposition or gelatinization of drying substances in volatile org. solvents, *e. g.*, in varnishes, etc., is prevented by addn. of free aromatic carboxylic acids, their homologs, substitution products or derivs. BzOH and its derivs. are especially effective.

**Varnishes and priming compositions.** Erich W. Frenkel and Alexander Brust (to Pittsburgh Plate Glass Co.). U. S. 1,936,230, Nov. 21. Blown linseed oil is treated

with less than 5% of S chloride, and the material is mixed with a thinner and a drier.

**Apparatus for testing the hardness of materials such as painted and varnished surfaces.** George G. Sward. U. S. 1,935,752, Nov. 21. Mech. features.

**Lacquers.** Lanning P. Rankin (to Hercules Powder Co.). U. S. 1,935,917, Nov. 21. Nitrocellulose is used together with products of a terpene alc. such as  $\alpha$ -terpineol having one double bond which has been ozonized and then heat treated.

**Colored lacquers, etc.** Soc. pour l'ind. chim. à Bâle. Ger. 583,650, Sept. 7, 1933. Addn. to 564,067 (C. A. 27, 1203). As equalizing agents for lacquers, plastic masses, etc., contg. dyes insol. in water and in alc., use is made of org. acid amides which are readily sol. in alc. but scarcely sol. in water.

**Ornamenting surfaces.** Leo J. Mitchell. U. S. 1,935,213, Nov. 14. Metal or wood surfaces are coated with a resinous base compn. such as a varnish or lacquer and over this there is applied a thin layer of a halogen salt of Bi such as Bi oxychloride and the article is then baked in order to give a lustrous finish.

**Plastic masses.** Xenia Winter. Ger. 582,936, Aug. 25, 1933. Masses for hot pressure molding are prepd. by introducing cement into dry or hot water-swelled Japanese lacquer.

**Plastic and resinous compositions.** Soc. Nobel française. Fr. 750,318, Aug. 8, 1933. Violent reactions are avoided in the polymerization of vinyl esters and the final resin is more easily removed from the vessel if water is added during the polymerization. The later the addn. of the water the harder is the resin obtained. Examples are given of the polymerization of vinyl acetate in the presence of benzoyl peroxide. Fr. 750,349. Plastic materials are composed of polymerized vinyl acetate and cellulose esters, with or without plastifiers. They may be used as a substitute for celluloid. Fr. 750,350. Condensation products are obtained by the action of aldehydes on vinyl esters, more or less saponified. Org. solvent and external heat are not required.

**Resin acid derivatives.** Chemische Fabriken Kurt Albert G. m. b. H. Ger. 578,827, June 17, 1933. Addn. to 554,701 (C. A. 26, 6165). Resin acids are treated with compds. of the general formula R<sub>1</sub>-CONR<sub>2</sub>R<sub>3</sub>, where R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> represent H or org. residues, which b. above 200°. Thus, Congo copal is heated to 300° with AcNH<sub>2</sub> to give a copal amide product m. 58-67°. Other examples are given. The products are used for therapeutic and chem. purposes.

**Resins.** Bakelite G. m. b. H. (Ernst Elbel, inventor). Ger. 578,712, June 16, 1933. Resin is rendered non-inflammable by leading a gaseous flame extinguisher, such as NH<sub>3</sub> or HCl, into the plastic mixt. of resin and org. filling material (*e. g.*, sawdust) before molding.

**Resins.** Firma Louis Blumer. Ger. 582,546, Aug. 16, 1933. Resin-like products are obtained by partly or wholly esterifying the free OH groups in phenolic resins. Thus, the resin obtained by condensing cresol alc. and CH<sub>3</sub>CICH<sub>2</sub>OH is heated with colophony in an atm. of CO<sub>2</sub> to give a resin-like product. Other examples are given.

**Resins.** Friedrich C. Bunge. Ger. 582,728, Aug. 21, 1933. Phenols are heated with primary monohydric alcs. and O under pressure in the presence of O-carrying catalysts such as V salts, Pd or Pt. Thus, PhOH is heated with MeOH and O at 20 atm. in an autoclave, alk. V soln. being present. Other examples are given.

**Resins.** I. G. Farbenind. A.-G. (Karl Ott and Friedrich Frick, inventors). Ger. 578,570, June 15, 1933. Resin-like products are obtained by condensing tertiary org. bases contg. at least 2 hydroxyalkyl groups attached to the N atom with monobasic or polybasic acids or both in the warm, till the product is insol. in aq. acids. Thus, trihydroxyalkylamine may be condensed with fresh natural resins such as colophony. Or dihydroxyethylaniline may be condensed with (CO<sub>2</sub>H)<sub>2</sub>. Other examples are given. The products can be used as elec. insulators.

**Resins.** I. G. Farbenind. A.-G. (Josef Binapfl, inventor). Ger. 581,956, Aug. 8, 1933. Resins are produced by condensing phenols with natural resins at about room temp. in the presence of a condensing agent, such as  $\text{BF}_3$ . Thus, colophony is condensed with cresol in the presence of  $\text{CCl}_4$  and  $\text{BF}_3$  to give a thick mass suitable for use in the varnish industry. Other examples are given.

**Condensation products.** I. G. Farbenind. A.-G. (Josef Binapfl, inventor). Ger. 582,846-7, Aug. 23, 1933. Addns. to 581,956 (preceding abstr.). The method of 581,956 for condensing phenols with natural resins is modified by condensing esters of the latter with phenols in the presence of condensing agents, at high or low temps. Thus, the glycerol ester of colophony is condensed with crude cresol in the presence of  $\text{BF}_3$ . Other examples are given (582,846). The phenol-natural resin condensation products of 581,956 can be treated with aldehydes to give resins. Examples are given (582,847).

**Condensation products.** August Nowack A.-G. (Reinhard Beutner and Richard Hessen, inventors). Ger. 582,195, Aug. 10, 1933. Addn. to 536,552 (C. A. 26, 1400). The method of 536,552 for obtaining resins by treating crude tar oils to which hydrocarbons are added, with  $\text{CH}_2\text{O}$ , is applied to the fraction boiling below  $205^\circ$  obtained by distg. crude tar oil, alk. condensing agents being present. The addn. of further hydrocarbons is optional in the later patent. Examples are given.

**Condensation products.** Chemische Fabriken Kurt Albert G. m. b. H. Ger. 582,954, Aug. 25, 1933. Diarylketone carboxylic acids are heated with polyhydric alcs. at temps. above  $150^\circ$ , with or without condensing agents, till a resinous mass results. Diarylketone carboxylic acids of the general formula  $\text{HOOC-R-CO-R'-COOH}$ , in which R and R' are aromatic residues, are used. Thus, glycerol is condensed with benzophenone-2,4'-dicarboxylic acid. Natural resin acids, fatty oils or drying oils may be added.

**Synthetic resins.** Allgemeine Elektrizitäts-Ges. (to International General Electric Co., Inc.). Brit. 395,880, July 27, 1933. Molding substances are manufd. from the ingredients of aromatic amine-aldehyde resins in a single condensation process by working the resin-forming components and filling materials, with or without coloring material and plasticizing agents, in the absence of solvents on a heated rolling mill, with or without previous mixing. Condensation and polymerization accelerators may be added. Among examples (1) wood meal, paraformaldehyde,  $\text{PhNH}_2$ , phthalic acid and coloring matter are

worked in a rolling mill at  $120-40^\circ$  to produce compacted sheets which may be further worked on the roller and (2) wood meal,  $\beta$ - and (or)  $\alpha$ -naphthylamine, crotonaldehyde,  $\text{BzOH}$  and coloring matter are similarly worked and the product is powdered. Cf. C. A. 28, 352<sup>a</sup>.

**Synthetic resins.** Allgemeine Elektrizitäts-Ges. Ger. 578,707, June 16, 1933. In prep. synthetic resins from polyhydric alcs. and polybasic acids, a drying oil is added before or during the process. The oil may be added to one of the components, e. g., the acid. Thus, linseed oil is dissolved in phthalic acid anhydride. Glycerol is then added and the whole heated to give a resin.

**Synthetic resins.** I. G. Farbenind. A.-G. (Josef Binapfl, inventor). Ger. 582,848, Aug. 23, 1933. Resin-like products obtained by condensing natural resins or resin acids with phenols or their substitution products are esterified by alcs. and the products treated with aldehydes. Thus, colophony in  $\text{CCl}_4$  is condensed with crude cresol in the presence of  $\text{BF}_3$ . The product is esterified by heating with glycerol and the final product treated with  $p\text{-CH}_3\text{O}$ . Other examples are given.

**Synthetic resins.** I. G. Farbenind. A.-G. Fr. 753,001, Oct. 5, 1933. A methylol compd. of urea is submitted to an acid condensation in an alc. solvent in the presence of an ester contg. an OH group and derived from a fatty acid contg. at least 10 C atoms, the reaction mixt. is neutralized, the solvent removed and the resinous product is heated to  $80-130^\circ$  until it becomes sol. in aromatic hydrocarbons. Glycerol esters of linoleic and ricinoleic acids may be used.

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Fr. 751,801, Sept. 11, 1933. Condensation products sol. in water and having the character of reversible gels are prepd. in the dry state or as solns. by condensing urea or thiourea or their derivs. or mixts. with  $\text{CH}_2\text{O}$  or substance yielding it, without going beyond the hydrophilic stage, carefully drying the solns. obtained, preferably in the absence of condensation accelerators, and dissolving the dry product to a clear hydrosol suitable for the prepn. of varnishes, impregnating materials or molding powders, in the presence or absence of fresh amts. of substances capable of condensing. Cf. C. A. 28, 605<sup>a</sup>.

**Synthetic resins.** Armin Spitzer. Fr. 752,231, Sept. 19, 1933. Hardenable resins fast to light are made by causing aldehydes to react with at least 3 materials, one an aromatic sulfamide, one a phenol and one a carbamide. In an example a resin is made from  $p$ -sulfotolueneamide 500,  $\text{PhOH}$  50, urea 250 and  $\text{CH}_2\text{O}$  soln. (37%) 1500 g.

## 27.-FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The reaction of castor oil with citric acid and phthalic anhydride. Ryohei Oda. J. Soc. Chem. Ind., Japan 36, Suppl. binding 623 5(1933); cf. C. A. 28, 608<sup>a</sup>.—Expts. were carried out at atm. and reduced pressure and temps. of  $150^\circ$  to  $170^\circ$ . Some reaction between the substances was noted in both cases. K. Kammermeyer

**Bleaching of palm oil with bleaching earths.** W. Schaefer and G. Bitter. Seifensieder Ztg. 60, 789-91 (1933).—S. and B. describe a bleaching process for palm oil in which the oil is rapidly stirred at  $130^\circ$  for 1 min. with 4% of bleaching earth plus 0.10-0.30% concd.  $\text{H}_2\text{SO}_4$  (exact amt. detd. by preliminary test); 10 min. addnl. stirring results in a color equal to a bleach with 10% earth. P. Escher

**Bleaching of palm oil at Serdang.** C. D. V. Georgi and T. D. Marsh. Malayan Agr. J. 21, 505-6(1933).—Air bleaching tests with a catalyst Co borate were carried out as follows: oil from a De Laval separator was heated to  $90^\circ$  with closed steam in an iron tank while being agitated with air through a perforated pipe. About 0.01% of powd. Co borate was then dusted over the oil and color changes were noted at the end of 1 and 2 hrs. The max. change occurs at  $2\frac{1}{2}$  hrs. The bleaching effect is permanent for more than 1 yr. E. Scherubel

**Sampling of oil-press cakes.** R. Heublyum. Seifensieder Ztg. 60, 807-8, 828(1933).—The oil content of press cakes decreases from the top of the press toward the middle and increases again toward the bottom. In the individual cakes the oil content decreases from the center toward the edge, the difference amounting to 1% and over. Protruding edges may contain a high percentage of oil. A sampling method is outlined according to which a no. of samples are cut, increasing from the center to the edge, to represent the av. oil content. P. Escher

**Examination of soy-bean lecithin products.** L. Allen. Fettchem. Umschau 40, 218-19(1933).—To distinguish between soy-bean lecithin and egg lecithin A. exts. the oil with acetone, evaps., saponifies, seps. the liquid fatty acids and dets. in the latter the hexabromide no. which is considered proof of the presence of soy-bean oil, accompanying the soy lecithin. P. Escher

The influence of package and storage upon the quality of toilet soaps. F. W. F. Freise. Seifensieder Ztg. 60, 833-4(1933).—Toilet soaps in colored wrappers lose aroma when exposed to direct sunlight for 4-6 weeks in the following color order: violet, blue, yellow, red; green and black protect the aroma well. A list of some 20 essential oils is given in the order of greatest permanence, headed by pine-

needle and -cone oil and gaultheria. In cold-made soaps the addn. of lard or refined castor oil seems to destroy the original coconut oil aroma in sunlight as well as diffused daylight more quickly than addn. of olive oil, although chem. analysis shows no change in the soap. Very dry and very moist air are detrimental to aroma and surface appearance; 70-75% humidity at 23° is most favorable (in Brazil) for unwrapped cold-made soaps. Among the injurious gases are CO, SO<sub>2</sub>, kettle vapors, CO<sub>2</sub>, etc.

P. Escher

**Testing the cleansing ability of soap solutions by means of washing tests.** B. Tyutyunnikov and A. Soboli. *Seifensieder Ztg.* 60, 787-9, 808-9 (1933).—An elaborate washing test has been developed to imitate factory conditions: Standardized test pieces of fabrics are cleansed and their whiteness is detd. by a photometer; they are formed into sacks and filled with 15 g. of glass beads; they are soiled in 3 different standardized ways, washed in a rotating chambered drum at 20-40° and at 85° with soap solns. equal to 0.40% fatty acids at 60 revolutions per min. for 7½ min., then rinsed 3 times (the last rinsing with acidified H<sub>2</sub>O), dried, ironed and tested again for whiteness; a soiled test piece washed only in distd. H<sub>2</sub>O is used as a standard. The detergent power is expressed as the ratio of how much better than distd. H<sub>2</sub>O the soap has removed the dirt.

P. Escher

**Sodium petroselinate as a soap.** Jirō Mikumo. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 632-3 (1933); cf. C. A. 21, 1041.—CH<sub>3</sub>(CH<sub>2</sub>)<sub>10</sub>CH:CH(CH<sub>2</sub>)<sub>4</sub>COONa dissolves well in water at room temp. and the viscosity of the fresh aq. soln. is practically identical with that of Na oleate at 20° in the concn. range of 0.1-1.0%. The surface tension of the soln. is smaller than that of Na oleate and somewhat greater than that of Na elaidate above 45°. Exptl. data for surface tension at 20, 45 and 60° and suspending power for TiO<sub>2</sub> powder are presented. Petroselinic acid will make a soap similar to oleate soap or better in detergency.

Karl Kammermeyer

**Antibacterial properties of soaps.** Emil Klarmann. *Soap* 9, No. 12, 23-7, 107-9, 111, 113, 115 (1933).—A survey of work on this subject to date is reported. There are many regularities to be found in the relationship between the chem. constitution and the antibacterial action of c. p. soaps. In the homologous class of soaps of satd. fatty acids the antibacterial action is a direct function of the length of the C chain, the position of the max. effect varying with regard to the different bacteria. The soaps of unsatd. fatty acids display an almost specific efficacy against pneumococci and certain streptococci while showing little action upon staphylococci or the organisms of the typhoid-colon group under conditions comparable to those in practical use. Among the several homologous series of substituted soaps studied that of the α-bromo soaps contains some compds. of a rather extraordinary bactericidal potency. A no. of investigations demonstrate conclusively that certain important pathogenic microorganisms are not likely to succumb to the action of the tech. soaps under the customary conditions of use.

E. Scherubel

**New kettle practice.** Geo. S. Tate. *Soap* 9, No. 12, 59-60 (1933).—A method using lyes of unusually high concn. has been worked out as follows for tallow, coconut-oil soaps: Grain the nigre and at the same time add enough tallow more than to take up the free alkali. After settling, draw off the spent lye. Bring the mass to a boil and run in the coconut oil. Concurrently, in the proper sapon. proportions lye of 45-50° Bé. is run in with steam on. At the same time salt is added to the extent of 6-8%. After the coconut oil, run in the tallow and treat with alkali in the same manner and at the same time add enough 8° Bé. brine to keep the mass to 20-30% H<sub>2</sub>O content. About 0% salt should always be present in the kettle contents. When the fat charge is all in, 98-99% of the NaOH should be in. By this method the kettle has the appearance of an opaque stiff paste and boils in a puffy manner. The advantage of this method is that the kettle is at all times under chem. control and no "middle soaps" are formed. Charging can also be done in one

operation and larger charges made because the mass boils down instead of swelling up. A saving in steam consumption is also attained as much greater use is made of the heat of reaction. A distinctly better appearing and keeping product is also obtained.

E. Scherubel

Rambiazina oil [used in soap making] (Fr. pat. 752,093)

17. Device for filtering oils (U. S. pat. 1,935,136) 21.

**Hydrophilization of fats.** Emilio Gottardo. Fr. 751,951, Sept. 13, 1933. Fatty substances, particularly of mineral origin, are hydrogenated and rendered hydrophile by the action of supersatd. salt solns. of all kinds. Thus, petrolatum is heated to boiling with a supersatd. soln. of NaCl, MgCl<sub>2</sub>, CaCl<sub>2</sub> or FeCl<sub>3</sub>. The properties of the hydrophile petrolatum obtained vary according to the salt used.

**Device for charging rotary cooling drums with liquid fats, fat emulsions, etc.** Schroder & Co. Kuhlstrommel-u. Apparatebau and Rudolf Knollenberg. Ger. 578,093, June 16, 1933.

**Greases.** Gustav J. C. Beckmann. Fr. 751,935, Sept. 12, 1933. Consistent greases are made by mixing whale oil decomposed to about 56% and castor oil decomposed to about 49% with one or more other fatty acids decomposed to about 75%, e. g., bone grease or suet, and adding a mineral oil in the presence of NaOH or KOH.

**Fatty acids.** I. G. Farbenind. A.-G. (Christoph Beck, and Heinrich Diekmann, inventors). Ger. 578,779, June 16, 1933. Fatty acids and technically useful salts or salt solns. are obtained by sapon. the oxidation products of hydrocarbons and treating the resulting fatty acid salts of alk. or alk. earth metals with dil. aq. HNO<sub>3</sub> at temps. below 100°. The dil. HNO<sub>3</sub> is led into the aq. soap soln. from below and is not allowed to come into contact with the upper fatty acid layer. This is removed leaving the lower aq. salt soln., which can be worked up into the solid salt if desired. Examples are given. Cf. C. A. 27, 4817.

**Separating mixtures of stearin and olein.** Ernst A. Mauersberger. Ger. 578,858, June 17, 1933. The mixt. is heated and dissolved in toluene or xylene. The soln. is given an addn. of a low-mol. alc. or ketone and cooled. The stearin seps. out and is filtered off and the olein is obtained by driving off the hydrocarbon and the alc. Examples are given. Cf. C. A. 27, 4945.

**Separating fatty acid mixtures.** Ernst A. Mauersberger. Ger. 579,937, July 3, 1933. Addn. to 578,858 (preceding abstr.). The method of 578,858 for sepg. stearin and olein by dissolving them in toluene or xylene is modified by adding water, or aq. alc. or ketone during or after the dissolving process.

**Apparatus for distilling fatty acids, mineral oils, etc.** Carl H. Keutgen. Ger. 578,857, June 17, 1933.

**Sulfonated higher fatty acid esters.** Alfred Rheiner and Jacob Link (to Chemische Fabrik vorm. Sandoz). U. S. 1,936,205, Nov. 21. Products having good wetting, cleansing and emulsifying properties are obtained by the action of H<sub>2</sub>SO<sub>4</sub> on esters of fatty acids of high mol. wt. of derivs. of polyhydric alcs. in which the hydroxylic groups are partly or completely replaced by halogen, alkoxy, aryloxy, aralkyloxy or carboxyalkyl groups, such as the oleic ester of the monoethyl ether of glycol, the oleic ester of α-glycerol monoxylyl ether, the oleic ester of com. glycerol dichlorohydrin, the oleic ester of diethylene glycol monobutyl ether or the oleic ester of glycerol monochlorohydrin (details of treatment of all of which are given).

**Hydrogenated oils.** Dietrich Hildisch. Fr. 751,735, Sept. 8, 1933. See Brit. 397,039 (C. A. 28, 609<sup>a</sup>).

**Tall oil.** I. G. Farbenind. A.-G. (Robert Held and Hans Franzen, inventors). Ger. 578,843, June 17, 1933. High-mol. fatty acids are obtained from tall oil by esterifying the acids with di- or trihydric aliphatic alcs. and subjecting the resulting product to an autoclave cleavage, so that only the fatty acids are effected. The liberated fatty acids are then sepd. from the resin acid esters and alcs. in the usual way. In an example, tall oil refined by distn.

contg. 35% resin acids and 8% unsaponifiable substance is treated with excess of glycerol and a small amt. of Sn powder. On heating for 4 hrs. to 230°, the fatty acids are esterified. The product is then heated to 180° in an autoclave with an equal amt. of water and a small amt. of Zn dust. The fatty acids are freed and are obtained by steam distn. The distillate contains an 85% yield.

**Use of solvents such as xylene and gasoline for extracting oils from waste fish and similar materials.** Charles S. Ash (to Calif. Packing Corp.). U. S. 1,934,677, Nov. 14. Various details of app. and operation are described in connection with which an azeotropic mixt. of the solvent with water is formed and vaporized, water being sepd. and the solvent used cyclically.

**Disemulsifying and improving soy-bean material.** Egon C. Winkler and Hubert Goller. U. S. 1,936,281, Nov. 21. Readily sol. substances are extd. by dialysis with water at a pressure other than atm. pressure (suitably either sub- or super-atm. pressure) and at a temp. of 65-80° so that the seed cases of the beans act like a semi-permeable diaphragm. App. is described.

**Material for candle manufacture.** James Egan and Victor Mills (to Procter & Gamble Co.). U. S. 1,935,946, Nov. 21. Paraffin scale is mixed with split fatty acid of a hydrogenated oil hydrogenated to an I value of 5 or less.

**Wax conversion products.** I. G. Farbenind. A.-G. Fr. 751,795, Sept. 9, 1933. Natural or artificial ester waxes, such as carnauba or beeswax, wool grease or spermaceti are heated with amines contg. at least one replaceable H atom joined to N, e. g., ethanalamine, NH<sub>2</sub>, MeNH<sub>2</sub>, PhNH<sub>2</sub>, piperidine, etc., to form products which are more easily dispersed in water and have a higher reactivity in chem. transformations, e. g., sulfonation. The hydrophilic properties may be further increased by alkylation, acylation or salt formation. Examples are given.

**Soap.** Adolf Welter. Ger. 587,063, Oct. 30, 1933. Soap which has been bleached with HOCl is deodorized by heating it under pressure with a soln. of caustic alkali or alkali carbonate or with NH<sub>3</sub> or an amine or a salt thereof.

**Cleaning and other agents.** Oranienburger chemische Fabric A.-G. (Kurt Lindner and Johannes Zickermann, inventors). Ger. 582,790, Aug. 23, 1933. An agent for cleaning, emulsifying, wetting, etc., is prepd. by treating natural or synthetic fats, fatty acids or fat-like substances with condensable lactones, alcs. or ketones, in the presence of water-removing sulfonating agents such as H<sub>2</sub>SO<sub>4</sub> halohydrins; the product is then partly or wholly neutralized. Thus, olein, iso-PrOH and ClHSO<sub>3</sub> are heated to give a wetting agent. Other examples are given.

**Wetting and other agents.** Deutsche Hydrierwerke A.-G. Brit. 396,774, Aug. 11, 1933. Products resembling Turkey-red oils are prepd. from unsubstituted, unsatd. ali-

phatic and cycloaliphatic alcs. contg. not less than 8 C atoms by treating with an acylating agent and then with sulfonating agent. The sulfonation produces satn. of the double bond(s) but with further treatment the OH group is replaced by a sulfuric ester group with removal of the acyl group. If the 2nd stage is effected with ClHSO<sub>3</sub>, the acylating agent may be recovered, e. g., as AcCl. By hydrolysis of the disulfonated products dihydroxy derivs. are obtained. Among examples (1) com. oleic alc. is acetylated with AcCl, sulfonated with H<sub>2</sub>SO<sub>4</sub> and neutralized and (2) the fatty alcs. from sperm oil are treated with Ac<sub>2</sub>O and then with H<sub>2</sub>SO<sub>4</sub>; after prolonged treatment the product is boiled with H<sub>2</sub>O and the hydrolysis completed with soda lyc, whereby a hard wax is obtained which may be emulsified by means of soapy substances.

**Wetting and other agents.** Henkel & Cie., G. m. b. H. Brit. 397,445, Aug. 24, 1933. Org. thiosulfates having saponaceous properties are prepd. by reaction of salts of H<sub>2</sub>S<sub>2</sub>O<sub>4</sub> with esters, including thioesters, of aliphatic, hydroaromatic or aliphatic-aromatic OII or SH compds., having at least 6 C atoms, with carboxylic acids contg. reactive halogen atoms. In an example dodecylchloroacetic ester is treated with Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>. The esters may be derived from benzyl, β-phenylethyl, naphthene and resin alcs., polyhydric alcs. and mercaptans, hydroxy fatty acids and their esters and amides, oxyalkylethers and oxyalkylthioethers of the higher alcs. and oxyalkyl esters of fatty acids. Other halogenated acids mentioned are monobromosuccinic, dichloroacetic, α-bromolauric, benzylchloride-4-carboxylic, 2-chlorobenzoic and 5-sulfo-2-chlorobenzoic.

**Wetting and other agents.** I. G. Farbenind. A.-G. Fr. 751,652, Sept. 7, 1933. Sulfonation products of aliphatic carbinols are prepd. by reducing the condensation products of aliphatic ketones or of a mixt. of ketones and treating with the usual sulfonation agents. Condensation products of ketones obtained by alk. or acid treatment may be used. Examples are given of products obtained from mesityl oxide, a mixt. of mesityl oxide and phorone (from crude acetone) and from condensation products of methyl ethyl ketone and methyl propyl ketone.

**Wetting and other agents.** Soc. anon. des matières colorantes et produits chimiques de Saint-Denis and Jean P. Sisley. Fr. 753,055, Oct. 6, 1933. Wetting, cleansing dispersing agents are made by simultaneously sulfonating oleyl oleate and one or more fatty alcs. of high mol. wt. (e. g., cetyl or oleyl) in the presence of catalysts.

**Wetting and other agents.** Ernst A. Mauersberger. Fr. 753,080, Oct. 6, 1933. Wetting, bleaching, dispersing, impregnating agents are made by esterifying aliphatic alcs. of higher or very high mol. wt. with boric acid and sulfonating the esters with anhyd. sulfonating agents, without dissociating the boric acid groups. Examples are given.

## 28- SUGAR, STARCH AND GUMS

J. K. DALR

**Nomogram for the recovery of sucrose in sugar factories.** Auguste Esnouf. *Arch. Suikerind.* 41, 678-9 (1933).—Three nomograms have been prepd. which give the sucrose recovery, calcd. by the *s-i-m*-formula, and the recovery of sugar of given sucrose content, from raw materials ranging in purity from 40 to 60, from 60 to 75, and from 75 to 95.

F. W. ZERBAN

**Effect of single ions on the solubility and on the rotation of sucrose.** H. W. Kunst. *Arch. Suikerind.* 41, 657 (1933); cf. C. A. 27, 5571.—In the previous study on this subject the effect of the salts or ions on the rotation of sucrose was not considered. This effect has now been detd. and the necessary corrections to the soly. data have been applied, but they did not alter the sequence of the ions previously found. The effect of the ions on the rotation closely follows the lyotropic series: Mg-Ca-Sr-Ba; F-NO<sub>3</sub>-Cl-CNS-Br-I, instead of F-Cl-Br-NO<sub>3</sub>-I-CNS; and Li-K-Na, instead of Li-Na-K. In general the polarization depression is the greater, the smaller the

hydration of the ions, but other factors evidently also play a part.

F. W. ZERBAN

**Electrical control and regulation of  $p_H$  in sugar factories.** V. Khainovsky. *Arch. Suikerind.* 41, 111, Mededel. Proefsta. Java-Suikerind. 631 729(1933).—An instrument has been developed for factory use, to be placed at the various stations for guiding the operators. The electrode pair consists of an Sb rod with surface oxide film and a calomel half-cell with satd. KCl soln. The electrode vessels are arranged in various ways to suit the different factory operations, but always so that the juice passes through the vessel at a given const. velocity. The  $p_H$  meter is a Wheatstone bridge with triode tubes, and a ma. meter as indicating instrument, visible at a distance. Detailed directions, with drawings, are given for the construction of the entire equipment in the factory work shop, for its installation, calibration, practical use and periodic inspection. A complete list of the parts to be purchased is appended.

F. W. ZERBAN



**Filtration in the sugar industry. Specification of the filterability of precipitates.** P. Honig and W. Thomson. *Arch. Suikerind.* 41, 111, *Mededel. Proefsta. Java-Suikerind.* 803-83 (1933).—In a systematic investigation of new filtration procedures it was found necessary to study the filtering qualities of the pptts. obtained in factory operation. Special small-scale equipment constructed for the purpose is described and illustrated. If there is no initial resistance or other disturbing factor, the square of the volume  $V$  of filtrate, obtained under const. pressure, multiplied by a const., equals the time  $t$ . The const. varies with the properties of the slurry. In filtration through cloth or other material,  $C'V^2 + C'V = t$ , where  $C'$  is a 2nd const. depending on the properties of the cloth and some other factors. In actual expts. on pptts. from juice clarification the so-called filtration const.  $C$  is detd. from 2 points on the curve by making use of the formula:  $V = C \times \sqrt{1/\eta} \cdot \sqrt{1/g} \cdot \sqrt{t}$ , where  $\eta$  is the viscosity, and  $g$  the concn. of insol. matter in the slurry. The filtering quality of a ppt. is characterized also by  $C'$ , which equals  $C$  uncor. for viscosity and insol. matter, and found from the equation:  $V = C' \sqrt{t}$ . Values of the filtration const. found for juices treated by defecation, sulfitation and carbonatation are given. The sweetening-off process has also been studied. The amt. of wash water required is least when the pressure is kept low, and more time allowed. The effect of the pressure applied during filtration varies from case to case. The temp. effect also varies, because hot water passes through the cake more rapidly and may thus be less effective than cold water. For the same reason thick cakes may be sweetened off more readily than thin ones. F. W. Zerban

**Studies relating to boiling in the manufacture of cane sugar. Brasmoscope charts for boiling in 4 stages.** J. G. Thume. *Rev. ind. agr. Tucuman* 22, 316-23 (1932).—After detn. of the calcd. real purities (cf. *C. A.* 27, 3843) at 4 stages of boiling in each pan, a chart for each stage is given, based on the boiling tables (*C. A.* 27, 3843) which shows the relation of vacuum to b. p. of the massecuite at a supersatu. of 1.2. By use of these charts, better control of the process and elimination of personal errors are effected. Nelson McKaig, Jr.

**Purification and acidification of polysaccharide solutions by electricity.** V. R. Hardy. *Ind. Eng. Chem.* 25, 1395-9 (1933). The work of Heubaum (*C. A.* 27, 4949) has been continued with a larger app. Diffusion juices from Jerusalem artichokes, of varying concn., were electro-dialyzed under varying conditions. Increase in the concn. or flow of the juice or decrease in the current  $d$  increased the  $pH$  of the final soln. With less-permeable diaphragms in the cells the final  $pH$  of the juice is only slightly higher than with more permeable ones. The final  $pH$  depends mainly on the amt. of K or ash removed. The optimum  $pH$  for hydrolysis is 4.2. At 2¢ per kw. hr. the cost of current to produce this  $pH$  is 0.04 to 0.1¢ per lb. of sirup produced. The process removes about 40% of the colloids present. The concn. of the juice changes little during the treatment. F. W. Zerban

**Complete condenser equipment for vacuum pans, operating as, or in conjunction with water-jet pumps.** L. H. de Langen. *Arch. Suikerind.* 41, 545-47 (1933).—Three types of such equipment are described and illustrated. In the Schutte-Koerting design the condenser and water-jet pump are combined into one, the air and condensed steam being carried off through the same pipe. This system is very simple, but requires a large amt. of water. In the app. designed by Stork, part of the water is by-passed through an injector, and the remainder goes to the condenser proper. The water from the injector can be used over again, because its temp. is raised only slightly. But the installation is not economical, because the pump pressure must be kept high for the injector, while this is not necessary for the condenser. In the design of the Java Sugar Expt. Station the water is first used in the injector, and then enters the condenser after the air has been removed from it. This app. requires less water and less power than the other types, and can also be

equipped with an automatic vacuum regulator.

F. W. Zerban

**Automatic measuring and application of wash water for centrifugals.** Th. G. Ninaber. *Arch. Suikerind.* 41, 583-7 (1933).—The app. of van Kleef-Meinecke is described, with diagrams. It has given very satisfactory results in practice, reducing the color of the sugar to 0.5 of that obtained with washing by the old hand method.

F. W. Zerban

**Milling losses.** Th. K. L. van Dort. *Arch. Suikerind.* 41, 663-74 (1933); cf. *Houmaes, C. A.* 27, 1539.—An important factor affecting the ratio between the purities of the last and 1st mill juices is destruction of sucrose by microorganisms. The latter affects also the juice lost % fiber, which depends on the purity of the last mill juice. A study of control data shows that the polarization of bagasse, which also enters into the juice lost % fiber, is not subject to sucrose destruction, because the bagasse juice is largely held in unruptured cells. It follows that in the interpretation of juice lost % fiber, the ratio between the purities of last and 1st mill juice must be considered, and that this ratio gives a valuable measure of sucrose destruction by microorganisms. Infection was found to be particularly heavy in the imbibition pipe lines carrying the last mill juice to the front of the mill train. The use of Cu for these pipe lines, and for the juice conduits and tanks largely prevents this infection, and is a paying investment.

F. W. Zerban

**Sugar from wood.** Friedrich Bergius. *Chem. Trade J.* 93, 356-8 (1933); cf. *C. A.* 27, 4947.—The strong-acid process has reached the commercial stage. The acid is reduced to 1.2% in the concd. sirup by atomization with air pressure and drying in a stream of hot air. The removed acid is recovered and used again. The commercial plant at Mannheim-Rheinau, completed in May 1933, is briefly described. Lignin recovered from the process can be briquetted without a binder and has a calorific value of 9000 B. t. u. A pure and hard charcoal can also be obtained from these briquets. The sugars from conifers consist of glucose, mannose and pentoses; those from foliaceous trees chiefly pentoses, in addn. to glucose. W. H. Hoynton

**Yeast-growth stimulants in white sugars.** H. H. Hall, Lawrence H. James and L. S. Stuart. *Ind. Eng. Chem.* 25, 1052-4 (1933); cf. *C. A.* 27, 2596-7.—Various samples of com. sucrose varied in their ability to support yeast growth. In some samples insufficient N was present. Upon purification of the sugars by recrystn., the yeast crop was reduced in every case. The ash of sugars when added to suitable media exerted no yeast-stimulating action. The yeast-stimulating substances in sugar contain N, are org. in nature, and are sol. in 80% EtOH.

C. R. Fellers

**Studies on bagasse. III. Hemicellulose.** Yoshikazu Hachihama. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 634 5 (1933); cf. *C. A.* 27, 4122.—Hemicellulose extd. from Formosan bagasse free from water-sol. substance consisted of 12.8% araban and 87.2% xylan.

Karl Kanimmermeyer

**Progress in bagasse utilization.** P. Honig. *Arch. Suikerind.* 41, 545-54 (1933).—A résumé of modern developments in this field is presented. The Pomilio process (*C. A.* 26, 5202) for the production of cellulose, and the manuf. of paper board from bagasse in Hawaii (*C. A.* 25, 416) are described in detail. F. W. Zerban

**Technically important properties of starch in connection with its constitution.** M. Samco. *J. Soc. Chem. Ind.* 52, 389 91T (1933).—A brief review. F. L. Dunlap

**Field tests on sugar cane in Java (Demandt) 15** Effect of molasses on concrete (Clair, Morrissey) 20. N optimum and border effect in sugar cane (van Dillewijn, Levert) 15.

**Corn sugar.** Charles Ebert (to International Patents Development Co.). U. S. 1,936,157, Nov. 21. Corn

sugar is obtained in the form of sep. cryst. dextrose granules aggregated in pellet-like form with shaved slab dextrose, by mixing shaved slab sugar with sep. granules of cryst. dextrose and tumbling and drying the mixt.

Continuous diffusion apparatus for sugar, etc. Auguste E. Vasveux. Fr. 751,884, Sept. 11, 1933.

Method and apparatus for decolorizing sugar solutions with bone black. Paul Kuichalik. Ger. 587,108, Oct. 30, 1933.

Unevenly heated boiler for sugar compositions, caramel, etc. Albert Henkel (Alfred Richter, inventor). Ger. 587,009, Oct. 28, 1933.

Starch. Akt.-Ges. fur chem. Ind., Fabrik Rannersdorf

(Wilhelm Goldlust, inventor). Austrian 135,600, Oct. 25, 1933. Starch which forms a paste with cold water is prepd. by dry-mixing crude starch or starchy materials in the cold with about 4-5% of caustic alkali and a similar or higher proportion of an oxide or salt of a bivalent metal, e. g., Zn or Cd.

Starch. Henkel & Cie G. m. b. H. Ger. 582,679, Aug. 21, 1933. A cold water starch is prepd. by intimately mixing starch with solid or dissolved caustic alkali in the presence of a small amt. of an org. solvent immiscible with water, and drying to form a granular mass. The org. solvent is present as an aq. emulsion. An example is given.

## 29- LEATHER AND GLUE

ALLEN ROGERS

The use of collodion cotton in leather finishes. Anon. *Farbe u. Lack* 1933, 521 2.—Typical formulas are given in which nitrocellulose is used in priming, second and finishing coatings for leather. G. G. Sward

Mol. wt. of gelatin (Atkin) 2. Measurement of  $p_H$  (Thompson) 2. Azo dyes [for chromed leather] (Ger. pat. 582,644) 25. Purifying waste water from tanneries (Ger. pat. 582,662) 14.

Frasers' Leather Products Directory of Canada. 1934 ed. Montreal: Fraser Pub. Co. 392 pp. \$2.00.

Leather Trades' Year Book, 1933. London: Leather Trades' Pub. Co., Ltd. 276 pp. 10s.

Leather. Chemische Fabrik Pott & Co. G. m. b. H. Ger. 578,785, June 20, 1933. Mineral-tanned leather is rendered more durable by treatment in the undyed state with neutral alkali salts of aromatic sulfonic acids, e. g., chrome leather is treated with Na naphthalene-2,6-disulfonate.

Tanning and weighting agents from aqueous solutions of titanium-sulfuric acid compounds. Ludwig Teichmann and Franz Specht (to I. G. Farbenind. A.-G.) U. S. 1,934,778, Nov. 14. An aq. soln. corresponding to about equimol. proportions of  $TiO_2$  and  $H_2SO_4$  is treated with such a quantity of a basic agent such as  $CaCO_3$  or  $SrCO_3$

forming a water-insol. compd. with  $H_2SO_4$  that the remaining soln. contains 0.5-0.9 mol.  $H_2SO_4$  per mol. of  $TiO_2$ .

Detanning leather. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Fritz Stather and Erich Böhme, inventors). Ger. 582,919, Aug. 25, 1933. Undyed chromed leather waste is detanned for use in making glue by treatment with solns. of HCN salts, the resulting complex Cr-CN compd. being removed by washing.

Detanning chromed leather. Otto Gerngross. Ger. 582,628, Aug. 18, 1933. Chromed leather waste is detanned to render it suitable for the manufacture of glue by treatment with hydroxides and water-sol. salts of alk earth metals (Mg being excepted)

Artificial leather (coated fabric). Andrew J. Hemmer (to E. I. du Pont de Nemours & Co.). U. S. 1,934,709, Nov. 14. A coated fabric such as a coated flexible sheeting is provided with a final coating of baked polyhydric alc.-"polybasic" acid resin asphalt varnish contg., in combined form, the acid radical of an oil having drying properties such as linseed oil.

Glue. Alfred Mentzel. Ger. 582,691, Aug. 21, 1933. Dried bones are treated to restore the lost hydration water before treatment with inorg. or org. acids to make glue. The water is restored by treatment with solns. with a  $p_H$  value of 4.7 5, e. g., weak acid solns. Cf. C. A. 27, 3636.

## 30- RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Molecular weight and chain length of natural and synthetic rubber. A. J. Wildschut. *Rec. trav. chim.* 52, 935-40 (1933).—The mol. wts. of natural rubber and synthetic rubbers were detd. as dil.  $C_6H_6$  solns. by the viscometric method of Staudinger (cf. *Hochmolekulare Verbindungen*, C. A. 26, 3513). Staudinger's formula gives good results for synthetic rubber and for plasticized natural rubber, whereas for crude unworked rubber such data are of value only in a relative way. The chain length of synthetic methylrubber is approx. the same as that of plasticized natural rubber. However, the mol. wts. of natural rubbers of different origins vary considerably, and this in turn explains their different behavior during the process of plasticization. In this latter process, the mol. wt. diminished rapidly at first to less than 0.5 its original value, after which there was little change. Heating natural rubber causes a much more extensive polymerization than mastication, and upon heating a condition is reached where the sp. viscosity is proportional to the concn. C. C. Davis

The status of the question of the technical synthesis of rubber. M. A. Lur'e. *J. Chem. Ind.* (Moscow) 1933, No. 6, 71-7. H. M. Leicester

Modifications of the gutta-percha hydrocarbon. III. A. W. K. de Jong. *Rec. trav. chim.* 52, 1028 31 (1933); cf. C. A. 27, 6015. When a petr. ether soln. of gutta-percha hydrocarbon is cooled to 0°, 2 different products

are obtained; one on drying forms a compact mass, the other a porous mass with either open or closed pores. When the pores are closed, the product contracts in the dilatometer, because on evacuation the petr. ether passes through the walls of the pores, with no opportunity for air to take its place. When the porous product is heated to its m. p. in the dilatometer, the walls of the pores collapse and contraction takes place. Moreover when the product with closed pores is immersed in petr. ether, contraction takes place, either because of weakening and collapse of the pore walls, or because of penetration of petr. ether through the walls. The formation of these products may be explained with the aid of the hypothesis of Bungenberg de Jong (C. A. 22, 2865; 23, 16; 24, 2934) if it is assumed that the character of the network is independent of the size of the particles. C. C. Davis

Odorants for rubber. F. Jacobs. *Rev. gén. caoutchouc* 10, No. 95, 3-7 (1933).—A review and discussion of historical aspects and present developments in the use of various org. compds. to make the odor of vulcanized rubber products less unpleasant. Tests by J. of various com. products show that  $S_2Cl_2$  cures are most destructive (few com. odorants survived); vulcanization in hot air is less destructive, vulcanization in steam is still less so; while vulcanization in molds is least destructive to the odorants. By the proper choice and use of odorant, the normal odor of the vulcanizate can be masked under all conditions of

manuf. For a certain time after vulcanization the intrinsic odor of the vulcanizate is abnormally strong, but upon standing the effect of the odorant becomes relatively more prominent. C. C. Davis

**Service tests and performance.** T. L. Garner. *India Rubber J.* 86, 586-8(1933).—A review and discussion of present developments in correlating lab. tests with performance in service (cf. Dinsmore, *C. A.* 26, 4730).

C. C. Davis  
**Rubber testing.** J. R. Scott. *India Rubber J.* 86, 593-6(1933).—Though in comparing the properties of different vulcanizates, as in the examn. of fillers, accelerators, antioxidants, etc., all mixts. should be vulcanized to the same state of cure, published data show that there has been insufficient attention to this factor. Expts. show that "inert" fillers like barytes, blanc fixe and whiting differ markedly in their effect on the rate of vulcanization (judged by optimum phys. properties) of mixts. accelerated by org. compds. Various criteria of the optimum cure which have been suggested by various authors are discussed. The individual methods lead to very different times of cure, and each method has its advantages and objections. Too little attention has been paid to quality after aging and particularly to quality after repeated stresses, both of which represent important factors in service conditions.

C. C. Davis  
**Effect of oils and chemicals on Duprene compounds.** O. M. Hayden and E. H. Krisman. *Ind. Eng. Chem.* 25, 1219-23(1933).—The synthetic rubber Duprene (polymerized 2-chloro-1,3-butadiene, *C. A.* 26, 78) and natural rubber in comparable compds. contg. ZnO, C black and whiting were immersed in a variety of oils and solvents and their swelling, tensile strength and elongation compared. A wide variety of vegetable, animal and mineral oils and petroleum distillates all had much less effect on Duprene than on natural rubber and caused no disintegration of the former even after long immersion. The effect was particularly marked at elevated temps. Aromatic and chlorinated hydrocarbons swelled both rubbers to about the same extent, but caused much less loss of strength in Duprene. It was also much less affected by 50% H<sub>2</sub>SO<sub>4</sub>, and practically not at all by 50% NaOH. The selection of compounding ingredients for Duprene stocks resistant to various materials is discussed. Arnold M. Collins

**The use of titanium white (titanium dioxide) in cold-vulcanized rubber.** Erich Wurm. *Kautschuk* 9, 148-50, 171 2(1933).—Two samples of TiO<sub>2</sub> with  $p_H$  values of 6.5-7.5 and 1 sample of an older type with a  $p_H$  value of 4.0, and a com. ZnS were tested in rubber (contg. 2% MgO) cured in S<sub>2</sub>Cl<sub>2</sub> soln. and aged in a 70° Geer oven. Judged by ultimate elongation, tensile strength and tensile product, the closer to neutral is a TiO<sub>2</sub>, the better is the aging of rubber contg. it, i. e., after a short time in the Geer oven the vulcanizates contg. the TiO<sub>2</sub> with the higher  $p_H$  values were the poorer, both judged by hand and in tensile strength. In agreement with earlier work (cf. *C. A.* 23, 5351) the results show that a neutral grade of TiO<sub>2</sub> can be used advantageously in cold vulcanization without any danger of poor aging. For such use TiO<sub>2</sub> is more economical than ZnS, for 11 parts of TiO<sub>2</sub> give the same whiteness as do 20 parts of ZnS. The effects of small proportions of active ZnO and of stearic acid and Mg carbonate in the usual proportions were also investigated. No deleterious effect on aging was noticeable with 0.1% ZnO (based on the rubber). Slightly acidic TiO<sub>2</sub> ( $p_H$  not below 6.5) can, by the addn. of small proportions of active ZnO, be rendered harmless to aging. Discoloration through oxidation on aging is less with active ZnO present. Mg carbonate (15%) and stearic acid (1%) have greater beneficial effects on the aging. C. C. D.

Rubber-coated sheet material (U. S. pat. 1,935,189) 25.  
Rubber-coated fabric (U. S. pat. 1,936,500) 25.

**Apparatus for refining crude rubber or latex by treatment with steam, etc.** Electrical Research Products, Inc. *Ger.* 582,407, Aug. 15, 1933.

**Rubber.** Società italiana Pirelli. *Ger.* 578,472, June 14, 1933. Addn. to 554,992 (*C. A.* 26, 6182). In making rubber objects by coagulating rubber latex by the method of 554,992, the latex is heated to 40-60° prior to coagulation.

**Rubber.** I. G. Farbenind. A.-G. (Walter Bock and Eduard Tschunkur, inventors). *Ger.* 578,905, June 19, 1933. See U. S. 1,911,672 (*C. A.* 27, 4133).

**Rubber.** I. G. Farbenind. A.-G. (Hans Tochtermann, inventor). *Ger.* 582,526, Aug. 16, 1933. Natural or synthetic rubber is colored by mixing into the rubber aq. suspensions, or pastes of coloring matter insol. in water. Examples are given. Cf. *C. A.* 27, 2801; 28, 685<sup>4,4,4</sup>.

**Rubber.** Hermann Plauson. *Ger.* 582,566, Aug. 17, 1933. A paint or impregnating agent is prepd. by treating natural or synthetic rubber, regenerated rubber or semi-polymerized rubber, mixed with lacquer-forming resins and hydrocarbon solvents, with H<sub>2</sub> at high temp. and pressure, in the presence of a hydrogenation catalyst. The products may be treated with AlCl<sub>3</sub>, ZnCl<sub>2</sub>, or O<sub>2</sub>.

**Rubber.** The B. F. Goodrich Co. *Fr.* 750,473, Aug. 11, 1933. Diarylamines in the aromatic ring in which is substituted at least one aliphatic hydrocarbon radical contg. at least 2 C atoms, and in which hydroxyalkyl groups may also be present, are used for retarding the deterioration of rubber, etc. Such compds. include *p*-isopropyl-, tertiary *p,p*-dibutyl- and *p*-hydroxyethyl-*p*-isopropyl-diphenylamine. *Fr.* 750,474. Deterioration of rubber, etc., is retarded by treating it with a *meso*-disubstituted acridane, e. g., *meso*-dimethylacridane.

**Rubber.** The Naugatuck Chemical Co. *Fr.* 751,811, Sept. 11, 1933. Products obtained by the reaction of an aminodiarylamine and an acid chloride or anhydride, called acylaminodiarylamines, are incorporated in rubber to increase the resistance thereof to aging. Examples are given of the prepn. of *m*-acetamido- (*m*. 136°), and *m*-(*p*-toluenesulfonamido)phenyl- $\beta$ -naphthylamine, *m*. 155°, *p*-acetamido- (*m*. 160°) and *p*-(*p*-toluenesulfonamido)-diphenylamine, *m*. 147°, and *p*-(*p*-toluenesulfonamido)-phenyl-*p*-tolylamine, *m*. 168°.

**Rubber.** Imperial Chemical Industries Ltd. *Fr.* 752,236, Sept. 19, 1933. The age-resisting properties of rubber are increased by incorporating therewith a salt of a compd. obtained by causing boric acid to react with an aromatic *o* dihydroxy compd., such as catechol, 3,4-dihydroxytoluene or 2,3-dihydroxynaphthalene. The salt may be one of Zn, Na, K, NH<sub>4</sub>, an alkylamine, pyridine, piperidine, PhNH<sub>2</sub>, 2,4-tolylene diamine, diphenylguanidine, di-*o*-tolylguanidine or a naphthylamine.

**Rubber.** Soc. anon. des pneumatiques Dunlop. *Fr.* 753,187, Oct. 9, 1933. Crude or unvulcanized rubber is prepd. in crumbs or small pieces by putting the rubber in bulk in contact with water or other appropriate fluid, such as an aq. soln. of a liquid miscible with water, so that the rubber absorbs the fluid, and then dividing up the rubber as desired. Before dividing up, a fluid paste consisting of a suspension of Spanish white, clay or other inert material or Ca(OH)<sub>2</sub> may be applied to the rubber.

**Rubber compositions.** Paul Meyersberg and Georg Wolf. *Austrian* 134,982, Oct. 25, 1933. In the manuf. of rubber compns. contg. org. fillers, e. g., leather, cork, wood meal or textile fibers, the rubber is mechanically treated until it has acquired a viscous fluid consistency and is simultaneously or subsequently kneaded with the filler until the moisture content of the latter has been reduced by at least 50%. Various methods of procedure are indicated.

**Rubber compositions.** Norman Swindin and Nordac Ltd. *Ger.* 587,239, Nov. 1, 1933. See *Brit.* 339,002 (*C. A.* 25, 2597).

**Rubber compositions.** The International Latex Processes Ltd. *Fr.* 752,249, Sept. 19, 1933. Porous or microporous materials are made by mixing fibrous materials with floccular or granular ppts. prepd. from aq. dispersions of rubber, rendering the mixt. compact by filtration and vulcanizing while preventing evapn. of the liquid contained therein. The material may be molded before vulcanization.

**Solutions of rubber.** Nikolaus Lebedenko, Max Naphtali, Nikolaus Kroll and Hermann Meyer. Fr. 752,350, Sept. 20, 1933. Solns. of vulcanized rubber in fine colloidal and even mol. dispersion in org. solvents are obtained by first forming gels of the intermediate vulcanized products and chemically destroying the gels *in statu nascendi*. Thus, smoked sheets are heated in a mixt. of xylene, toluene and  $C_6H_6$  and  $S_8$  ( $CH_2$ )<sub>6</sub>( $NH_2$ )<sub>4</sub> and ZnO are added and the temp. is increased to 140–5°. The mixt. is vulcanized and forms a spongy gel. The pressure increases but after 15–20 min. the mass becomes liquid. Other examples are given.

**Apparatus for distilling rubber.** Intertropical-Comfina. Fr. 750,393, Aug. 9, 1933.

**Apparatus for mixing, kneading and plasticizing rubber and other materials.** Albert Lasch and Ernst Stromer (to Baker Perkins Co.). U. S. 1,936,248, Nov. 21.

**Sheet rubber.** Nicolaas H. van Harpen (to Algemeene Vereeniging van Rubberplanters ter Oostkust Sumatra). U. S. 1,936,490, Nov. 21. In prepg. sheet rubber which can be rapidly dried, a coagulated rubber cake is laminated to a sheet 1.5–2.5 mm. in thickness (measured in moist condition) and the sheet is passed through a printer comprising a set of helically grooved rollers to form a ribbed sheet having uninterrupted parallel ribs on each side spaced 2.5–3.5 mm. apart, the ribs on one side intersecting the ribs on the other side and the thickness of the sheet over the ribs being less than 3 mm. (measured in humid condition), and the ribbed sheet is finally dried and smoked.

**Treating rubber to retard deterioration.** Wm. P. ter Horst (to Naugatuck Chemical Co.). U. S. 1,935,279, Nov. 14. Rubber is treated with about 0.75% of the reaction product of a ketone such as acetone and a di-(arylamino)diaryldialkylmethane such as *p,p'*-di-(naphthylamino)diphenyldimethylmethane or the like. Cf. C. A. 28, 3761<sup>1,2</sup>.

**Rubber articles formed from aqueous dispersions.** Win. A. Steidle (to Morgan & Wright). U. S. 1,935,165, Nov. 14. For increasing the gas impermeability and tear resistance of rubber deposited directly from aq. dispersions, a deposit formed from an aq. dispersion is superficially dried and is treated under differential pressure with a soln. of glycerol which is permanently retained in the deposit, then further dried and vulcanized.

**Apparatus for making threads or filaments from dispersions of rubber.** The International Latex Processors Ltd. Fr. 753,148, Oct. 7, 1933.

**Rubber cement.** James B. Crockett. U. S. 1,936,106, Nov. 21. Rubber latex which may have a solids content of about 80–80% is used with a larger quantity of a rubber solvent such as gasoline and sufficient acid to give the mixt. a  $pH$  less than 7 and form a continuous, sticky, viscous mass through which the water of the latex is distributed.

**Oils from rubber.** Hermann Plauson. Brit. 397,136, Aug. 9, 1933. Oils for use in the prepn. of paints and varnishes and as impregnating media for paper, cloth, leather, etc., are produced by the catalytic hydrogenation of natural or synthetic rubber in the presence of solvents such as petroleum hydrocarbons. Hardening agents, natural or artificial copals, amber or other resins and drying oils may be added to the liquid. In examples equal parts of natural or synthetic rubber and a petroleum distillate boiling at 130–200° are heated with a Ni catalyst in the presence of H<sub>2</sub> in an autoclave 3–6 hrs. at 200–300° and 50–150 atm. The resultant liquid, with or without added resins, is used as a paint or varnish. Vulcanization may be effected or treatment with Cl or chloride of lime, followed by  $K_2CO_3$ , may be used to make the product lighter in color; alternatively the product may be treated with oxidizing agents or ozonized air. The rubber and solvent may be heated with  $AlCl_3$ ,  $ZnCl_2$  or  $FeCl_3$  previous to hydrogenation.

**Plastic materials.** I. G. Farbenind. A.-G. Fr. 750,500, Aug. 11, 1933. Plastic materials which may be used

for making molded articles, artificial leather, etc., are obtained by treating natural rubber, vulcanized or not, with HF.

**Synthetic rubber.** Eduard Tschunker and Walter Bock (to I. G. Farbenind. A.-G.). U. S. 1,935,733, Nov. 21. Hydrocarbons of the butadiene series suitable for the manuf. of synthetic rubber are emulsified with an aq. viscous soln. of an emulsifying agent such as blood albumin and polymerization is caused to proceed in the emulsions in the presence of a substance such as Mn borate and air acting as an oxidizing agent on the hydrocarbons at the temp. of polymerization (which may be 60°).

**Rubber substitute.** Louis Laurin and Émile Bidot. Fr. 751,798, Sept. 9, 1933. A rubber substitute contains approx. strong glue 100, salicylic acid 0.2, gum tragacanth 25, wood flour 435, water 200, glycerol 125, castor oil 18, colza oil 11, fatty soap 6, suet 3, resinat treated with  $CH_2O$  3, soln. of resin (e. g., bakelite in naphtha) 5,  $K_2Cr_2O_7$  3 and K alum 6 parts. Cf. C. A. 27, 1236.

**Nitrophenylbenzothiazyl sulfide.** Robert L. Sibley (to Rubber Service Laboratories Co.). U. S. 1,936,099, Nov. 21. A mercapto-benzothiazole is heated with a nitrochlorobenzene in water, to form a product which may be used as a rubber vulcanization accelerator.

**Rubber vulcanization accelerator.** I. G. Farbenind. A.-G. (Max Bogemann, inventor). Ger. 582,567, Aug. 17, 1933. Accelerators for the vulcanization of rubber

consist of unsym. disulfides of the type  $S.R.N:CSSX$ , in which R represents arylene with N and O in the *o*-positions, and X and aryl residue substituted by NO<sub>2</sub>. An example mentions  $\mu$ -benzothiazolyl *p*-nitrophenyl disulfide.

**Rubber vulcanization.** Frederick L. Kilbourne, Jr. and John N. Street (to Firestone Tire & Rubber Co.). U. S. 1,936,561, Nov. 21. An accelerator is used prepd. by dissolving a mixt. of di-*o*-tolylguanidine, 2-mercapto-benzothiazole and phthalic anhydride in stearic acid. U. S. 1,936,562 (Frederick L. Kilbourne, Jr.) relates to prepn. of an accelerator by fusing together di-*o*-tolylguanidine, 2-mercaptobenzothiazole and phthalic anhydride or mixing them in acetone soln. or the like.

**Vulcanizing rubber.** Clayton O. North (to Rubber Service Laboratories Co.). U. S. 1,936,115, Nov. 21. In vulcanizing rubber with S, a reaction product of substantially 3 mol. proportions of mercaptobenzothiazole and 1 mol. proportion of 2,4-diaminodiphenylamine is used as a vulcanization accelerator. Cf. C. A. 28, 3761<sup>1,2</sup>.

**Vulcanizing rubber.** I. G. Farbenind. A.-G. (Wilhelm Lommel and Rudolf Schroter, inventors). Ger. 578,673, June 16, 1933. In vulcanizing rubber, a small amt. of a high-mol. amine with a long or branched aliphatic chain is added in addn. to the usual accelerator. Thus, a vulcanization mixt. contains crepe latex, ZnO, S, stearic acid, mercaptobenzothiazole disulfide and a small addn. of a 2-aminononadecane. Other examples are given.

**Vulcanizing rubber.** I. G. Farbenind. A.-G. Fr. 751,796, Sept. 9, 1933. A thiuram sulfide having no tendency to prevulcanization (e. g., dimethyl- or diethyl diphenylthiourea disulfide, tetrabutylthiourea disulfide, dipentamethylene thiourea monosulfide, and dicyclohexyldiethylthiourea monosulfide) and an accelerator having a tendency to prevulcanization (e. g., dithiocarbamates, xanthates and mercaptoarylenethiazoles) are added to rubber and the mixt. is vulcanized.

**Vulcanizing rubber.** Schering-Kahlbaum A.-G. Fr. 753,026, Oct. 5, 1933. Dithiocarbamates of the formula  $RR'N:CSSH.R''R'''NH$  ( $R, R'$  represent residues, the same or different, which may be joined in a ring;  $R'', R'''$  also represent radicals, the same or different, which may be joined into a ring, the 2 rings may contain substituents) are used as vulcanization accelerators. The compds. are made by the action of  $CS_2$  on an equimol. mixt. of piperidine or its homologs with other primary or secondary bases, or free dithiocarbamic acid with a base differing from the corresponding base used as primary material. An example is given of the use of pentamethylenedithiocarbamate of cyclohexylamine.

# CHEMICAL ABSTRACTS

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## 1-APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Development of new equipment materials for chemical manufacture. W. R. Huey. *Ind. Eng. Chem.* 26, 10-16(1934). E. H.

New laboratory glass filters. P. H. Prausnitz. *Chem.-Ztg.* 57, 885-6(1933).—Jena glass Büchner funnels with plane fritted bottoms 65-120 mm. diam. and with wedge-perforated glass bottoms 45-110 mm. diam. and a rapid filtering analytical glass funnel are described. P. S. R.

Design of fractionating columns. I. Entrainment and capacity. Mott Souders, Jr. and Geo. G. Brown. *Ind. Eng. Chem.* 26, 98-103(1934). E. H.

A more sensitive design of the Geiger-Müller counter. Trevor R. Cuykendall. *Rev. Sci. Instruments* 4, 676 8 (1933). E. H.

A new apparatus for determination of apparent volume (compacted) of powders. Erich A. Becker. *Farben-Ztg.* 38, 1085-6(1933).—An app. for detg. the apparent vol. of powders consists of a cylinder supported on a platform which is caused to rise and fall by means of a cam. The no. of strokes is 250 per min. and the distance of fall is 3 mm. Two and one-half min. is usually enough, but with needle-shaped pigments, 10 min. may be required. 5

Apparatus for working with substances sensitive to moisture. H. Grubitsch and N. Skalla. *Z. anal. Chem.* 95, 103-5(1933).—An ingenious glass app. is shown which permits weighing suitable samples for a gas-evolution analysis or for a furnace combustion without danger of the sample being affected by atm. moisture, as is advantageous in work with substances such as the dihalides of Sm or Eu or  $CaC_2$ . W. T. H.

The sources of error of liquid thermometers resulting from the behavior of the indicators used. Walter Grundmann. *Z. Physik* 86, 550-4(1933).—The precision obtainable with thermometers contg. liquids as indicators is mainly detd. by the compressibility, the gas absorption, distn. and contraction of the liquid. The coincidence of these influences can diminish the reliability of the thermometers to a much higher degree than is usually believed. 7

Portable vacuum tube voltmeter for measurement of glass electrode potentials with examples of  $p_H$  estimations. Floyd DeEds. *Science* 78, 556 8(1933). E. H.

Air-ionization chamber for measuring low-voltage x-ray intensities in Röntgens. Fred M. Uber. *Rev. Sci. Instruments* 4, 649-50(1933). E. H.

Advances in the construction of gas-heated industrial furnaces. O. Wolff. *Z. Ver. deut. Ing.* 77, 1273-6 (1933). E. H.

Calorimeter for heats of fusion (Rossini) 2. [App. for] measuring the viscosity of surfaces (Bergami) 2. App. for dividing liquids into drops (U. S. pat. 1,938,219) 29. Device for taking samples of liquids from tanks (U. S. pat. 1,938,224) 22. Means for supplying air or gas in finely divided form to liquid in a tank (Brit. pat. 397,841) 14.

Industrial Piping. A Case Book of Proven Practices and Methods. Chicago: Eng. Publications, Inc. 286 pp. \$3.50. Reviewed in *J. Western Soc. Engrs.* 38, 296 (1933).

Buret with a mechanical suction device. Oskar E. Peters. *Ger.* 580,848, July 17, 1933.

Apparatus for carrying out exothermic catalytic reactions. I. G. Farbenind. A.-G. (Joseph Bayer, inventor). *Ger.* 581,075, July 27, 1933. Addn. to 548,962 (C. A. 26, 3963).

Apparatus for chemical and physical reactions between liquids and gases. Harry Pauling. *Fr.* 750,923, Aug. 22, 1933.

Vessels resisting chemicals. Müller & Krieg. *Ger.* 581,806, Aug. 4, 1933. A method of constructing the above from ceramic plates vulcanized together is described.

Automatic device suitable for mixing chemicals with water, etc. Daniel R. Murray. *U. S.* 1,937,582, Dec. 5, 1933. Structural and operative details.

Digester with internal flanges for mixing the contents. Giesserei & Maschinenfabrik Oggersheim Paul Schütz & Co. A.-G. (Georg Knerr, inventor). *Ger.* 580,511, July 12, 1933.

Device for removing froth in sedimentation apparatus. The Dorr Co., Inc. *Ger.* 580,778, July 21, 1933.

Colorimeter for solutions. Virgil A. Schoenberg (to Light Research Corp.). *U. S.* 1,938,544, Dec. 5, 1933. Structural and operative details are described.

Crystallizers. Roy Pitcairn. *Brit.* 397,432, Aug. 24, 1933.

Photometric apparatus suitable for various turbidity and colorimetric tests. Martin W. Baden. *U. S.* 1,938,004, Dec. 5, 1933. Structural features.

Spatulas. Gustav Ruth A.-G. (Lothar Barenfeld, inventor). *Ger.* 580,593, July 13, 1933. Spatulas with a cellulose ester or ether base are prep'd. by using softening agents consisting of org. substances sol. in water. Examples are given. 6

Pyrometer tube. Arthur T. Kathner. *U. S.* 1,937,199, Nov. 28. The body portion of a pyrometer tube is formed of steel contg. Cr 25-35% and Ni about 1% or less and which is sufficiently dense and compact to exclude gases at temps. above 980°. 7

Thermometer for furnaces. Henri Soumille and Georges Guiguet. *Fr.* 750,756, Aug. 18, 1933.

Columns of filling material for reactions, filtering, etc. Garvenswerke Maschinen-, Pumpen- und Waagenfabrik W. Garvens. *Ger.* 580,215, July 7, 1933. Addn. to 578,650 (C. A. 28, 690°).

Filters. Jesus de la Torre and Luis R. de la Torre (trading as J. de la Torre e Hijo). *Brit.* 398,055, Sept. 7, 1933. See *Fr.* 748,842 (C. A. 27, 5221).

Edge filters. The Stream-Line Filter Co. Ltd., Henry S. Hele-Shaw and Stanley Baker. *Brit.* 397,867, Aug. 25, 1933.

Filter for liquids. Frederick G. Seeley. *Ger.* 583,639, Sept. 7, 1933.

Filter for fluids. Raphaël Malbay. *Fr.* 752,703, Sept. 29, 1933. The filter is made up of a series of superposed hollow perforated round members projecting from a central hollow spindle.

Filtering apparatus provided with a rotary or oscillatory brush or scraper which assists the reverse flow in cleaning the filter. Serck Radiators Ltd. and Charles O. Wagner. *Brit.* 397,471, Aug. 14, 1933.

Filtering apparatus provided with an oscillatory pump vanes which causes a reverse flow through a portion of the filtering medium while the flow of filtrate is maintained.

- Auto-Klean Strainers Ltd. and W. R. Beldam. Brit. 397,907, Sept. 4, 1933.
- Apparatus suitable for filtering liquids such as motor fuels. Arthur A. Sidney. U. S. 1,937,415, Nov. 28.
- Device for removing filter cakes from rotating filters. Filtration Engineers Inc. Ger. 581,777, Aug. 2, 1933.
- Filters for mine products. Blomfield Engineering Co. Ltd. Fr. 753,544, Oct. 18, 1933.
- Filter press with plates of ceramic material. Wilhelm Schuler G. m. b. H. (Ernst Bauder, inventor). Ger. 583,557, Sept. 5, 1933.
- Double plate for filter presses. Mayer Wilderman. Ger. 583,558, Sept. 6, 1933.
- Filter plates. Élie Assié. Fr. 752,803, Oct. 2, 1933. A filter plate is made by baking a mixt. contg. quartz, sand, SiC, etc., an agglomerate such as clay, kaolin or feldspar and an org. material such as sawdust.
- Apparatus for separating moisture from a flowing stream of compressed air. James A. Stuard. U. S. 1,937,855, Dec. 5. Structural features.
- Still for continuous separation of volatile solvents. Henri Venturino. Fr. 752,608, Sept. 27, 1933.
- Device for removing granular materials from flowing liquids. Akt.-Ges. für chemische Produkte vorm. H. Scheidemandel (Wilhelm Wachtel, inventor). Ger. 579,915, July 3, 1933.
- Apparatus for separating minerals of different specific gravities by use of water, etc. Wm. D. McAdoo (10% to Ernest J. Schabelitz). U. S. 1,938,087, Dec. 5. Structural and mech. features.
- Apparatus for aerating liquids, separating solids from liquids, emulsifying immiscible ingredients, etc. Cyril F. Morgan and Watney Combe Reid & Co. Ltd. Brit. 398,114, Sept. 7, 1933.
- Apparatus for treating granular solids with gases. Kristian Middelboe. Fr. 752,541, Sept. 25, 1933.
- Apparatus for evaporating liquids. Metallgesellschaft A.-G. (Friedrich A. Oetken and Paul Roepstorff, inventors). Ger. 580,928, July 19, 1933.
- Device for mixing liquids in determined proportions. Willy Kordatzki. Ger. 581,594, July 29, 1933.
- Centrifugal apparatus for purifying washing liquids such as trichloroethylene. Ramesohl & Schmidt A.-G. Ger. 584,501, Sept. 21, 1933. Addn. to 530,722 (C. A. 26, 5).
- Column apparatus for treating organic liquids with gases or vapors. I. G. Farbenind. A.-G. (Adolf von Friedolsheim and Martin Luther, inventors). Ger. 581,832, Aug. 8, 1933.
- Apparatus and method for separating gases from liquids. Anglo-Persian Oil Co. Ltd. and Arthur C. Hartley. Brit. 397,540, Aug. 28, 1933.
- Device for dispensing uniform mixtures of liquids and gases such as carbon dioxide and ethylene oxide from receptacles. Thomas C. Martin and Simon Meyer (to Carbide and Carbon Chemicals Corp.). U. S. 1,938,036, Dec. 5. Structural and operative details.
- Device for breaking down foam into its gaseous and liquid constituents. Ernst Jantzen. Ger. 580,847, July 18, 1933.
- Apparatus (with a shell and superposed decks) for contact of gases with liquids as in washing, rectification, etc. Raymond R. Collins (to Lummus Co.). U. S. 1,938,247, Dec. 5. Structural details.
- Container for transporting and storing liquefied gases. Harry D. Edwards (to Linde Air Products Co.). U. S. 1,937,877, Dec. 5. Structural features.
- Gas-scrubbing tower and electrical precipitator. Alexander N. Crowder (to Research Corp.). U. S. 1,937,265, Nov. 28. Various structural and operative details are described.
- Gas-washing apparatus. Robert R. Harmon and Peabody Engineering Corp. Brit. 397,802, Aug. 22, 1933, 397,809, Aug. 22, 1933, divided on 397,802, and 397,870, Aug. 22, 1933, divided on 397,802.
- Gas-washing apparatus. Erwin Falkenthal. Ger. 579,686, June 29, 1933.
- Filling material for gas-washing towers, etc. Metallges. A.-G. (Helmuth Wendeborn, inventor). Ger. 579,885, July 5, 1933. Porous irregular sinter products of non-combustible materials such as clay or quartz are used.
- Device for moistening hot gases, especially those to be electrically cleaned. Siemens-Schuckertwerke A.-G. (Richard Heinrich, inventor). Ger. 580,979, July 19, 1933.
- Apparatus for purifying gases by contact with wet surfaces. Ateliers J. Hanrez (Soc. anon.). Fr. 751,099 and 751,100, Aug. 26, 1933.
- Control valves for gas purifiers. Harry Bott and Newton, Chambers & Co. Ltd. Brit. 398,866, Aug. 17, 1933.
- Means for increasing the sensitivity of gas detectors for gases having inflammable constituents. Abraham L. Marshall (to The British Thomson-Houston Co. Ltd.). Brit. 397,815, Aug. 31, 1933.
- Gas-analysis apparatus. Aktiebolaget Carba. Ger. 581,505, July 31, 1933.
- Holder and pendulum apparatus for measuring the specific gravity of gases by oscillations. Hendrik A. Romp. U. S. 1,937,437, Nov. 28. Structural and operative details.
- Apparatus for recovering gases and vapors by adsorption in active charcoal, etc. Edgar R. Sutcliffe. Brit. 397,128, Aug. 8, 1933.
- Apparatus for adsorbing gases or vapors by solid adsorbents. Soc. de recherches et d'exploitations pétrolières. Fr. 753,818-19, Oct. 25, 1933.
- Apparatus for introducing cooling gases into rotating drum kilns. Fried. Krupp Grusonwerk A.-G. Ger. 581,711, Aug. 1, 1933.
- Cooler for rotary drum kilns. Arno Andreas. Ger. 579,962, July 3, 1933.
- Cooling tower for lyes. Maschinenbau- A.-G. Balcke. Ger. 583,787, Sept. 9, 1933.
- Jet apparatus for evaporating salt solutions under reduced pressure. Paul H. Müller. Ger. 583,763, Sept. 9, 1933.
- Laboratory device for quickly drying liquids. Georg F. Stieger. Ger. 583,848, Sept. 11, 1933.
- Rotating drum for heating, cooling or drying. Friedrich Ulde. Ger. 580,626, July 13, 1933.
- Rotary drying and grinding apparatus. Ofenbau-Ges. m. b. H. and Heinrich Bangert. Brit. 398,000, Sept. 7, 1933.
- Rotary drum drier. Benno Schilde Maschinenbau-A.-G. Ger. 584,077, Sept. 22, 1933.
- Plate drier. Max Herlitz. Ger. 584,502, Sept. 21, 1933. Addn. to 572,603 (C. A. 27, 4380).
- Tubular driers. Humboldt-Deutzmotoren A.-G. Ger. 579,541, June 28, 1933.
- Tube drier. I. G. Farbenind. A.-G. (Karl Heil, inventor). Ger. 580,822, July 17, 1933. Addn. to 574,930 (C. A. 27, 4447).
- Tube drier. Theodor Baucr. Ger. 581,721, Aug. 1, 1933.
- Tube drier. Maschinenfabrik Buckau R. Wolf A.-G. Ger. 584,679, Sept. 22, 1933.
- Tube drier. Maschinenfabrik Buckau, R. Wolf A.-G. Ger. 584,939, Sept. 26, 1933. Addn. to 550,818 (C. A. 26, 4735).
- Drying kiln. Siemens-Schuckertwerke A.-G. (Hans v. Droste, inventor). Ger. 579,505, June 27, 1933.
- Apparatus for drying granular material, e. g., small coal, stones, sand. Sidney Bates and The Mickley Coal Co. Ltd. Brit. 397,297, Aug. 24, 1933.
- Device for drying or slowly burning fine granular masses. Ludwig Honigmann. Ger. 580,628, July 13, 1933.
- Drier for dyes, clays, etc. Philip W. Bur. Ger. 579,540, June 28, 1933.
- Apparatus for drying, carbonizing and oxidizing substances. Robert Glinka. Ger. 579,640, June 29, 1933.
- Drying device for moist materials which are powdery when dry. Maschinenfabrik Friedrich Haas G. m. b. H. and Ludwig Honigmann. Ger. 584,503, Sept. 20, 1933.
- Rotary drying furnaces. Félix L. M. Deneden. Fr. 752,393, Sept. 21, 1933.



- Annealing furnace.** Siemens-Schuckertwerke A.-G. <sup>1</sup> Ger. 579,822, July 1, 1933.
- Regenerative furnaces.** Paul Müller. Fr. 751,509, Sept. 5, 1933. Construction of baffles is described.
- Reverberatory turning and semi-turning furnaces.** Wm. F. Wiltshire. Fr. 754,190, Nov. 2, 1933.
- Air- and water-cooled furnace wall.** Maxwell Alpern (to American Engineering Co.). U. S. 1,937,003, Nov. 28.
- Annular kilns.** Friedrich Meyer. Ger. 580,693, July 14, 1933.
- Rotary drum kiln.** Johan-S. Fasting. Ger. 580,572, July 13, 1933.
- Heat-exchange apparatus suitable for cooling liquids.** Wm. W. Barnum. U. S. 1,937,804, Dec. 5. Structural features.
- Heat-transfer apparatus suitable for various purposes.** Wm. E. Oakley (to Revere Copper and Brass, Inc.). U. S. 1,937,713, Dec. 5. Structural features.
- Tubes for heat-exchangers.** Roger S. Brown. Brit. 397,064, Aug. 31, 1933.
- Gilled tubes for heat-exchangers.** Hilding Sandberg. Brit. 397,358, Aug. 24, 1933.
- Gilled tubes for heat-exchangers.** Allmanna Svenska Elektriska Aktiebolaget. Brit. 397,360, Aug. 24, 1933.
- Plate heat-exchangers for liquids.** Holstein & Kappert Maschinenfabrik "Phonix" G. m. b. H. Brit. 397,706, Aug. 31, 1933.
- Method and apparatus for heat-treating comminuted material.** National Electric Heating Co., Inc. Brit. 397,666, Aug. 31, 1933. Comminuted material, *e. g.*, coal, filter clay, cement, is heated by being suspended in a fluid medium and passed through a tubular heater directly heated by elec. current, whereby the suspension is raised to a high temp. for a short time. In an example a rich coal, ground to 250 mesh, is passed through a Ni-Cr tube 40 ft. long at about 1300° F. in 0.8 sec. App. for *coking coal*, mixed with gas, and for *making cement* is described.
- Photoelectric apparatus suitable for regulation of "self-firing" furnaces.** Albert W. Hull (to General Elec. Co.). U. S. 1,938,426, Dec. 5. Various structural and operative details are described.
- Photoelectric cells.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 42,448, July 19, 1933. Addn. to 679,145.
- Photoelectric cell.** Max A. E. Pressler. Fr. 752,378, Sept. 21, 1933. The light-sensitive layer is produced by vaporization of an alkali metal on a metal base previously covered with a chem. compd., *e. g.*, an oxide or a fluoride. The metal base is roughened before the active layers are applied.
- Photoelectric tube.** Ernest E. Charlton (to General Elec. Co.). U. S. 1,938,374, Dec. 5. Various structural and operative details are described.
- Photoelectric tubes.** Werner Kluge (to General Elec. Co.). U. S. 1,938,431, Dec. 5. The interior of the envelope is coated with a layer of foundation metal such as Ag and after introducing O into the tube a glow discharge is passed to oxidize the metal layer; alkali metal is admitted into the tube and is vaporized by heating the tube, and a voltage is applied to the tube during the heating period to cause current to flow through the tube and sensitize the alkali metal. Cf. C. A. 27, 5590.
- X-ray apparatus.** Oscar H. Pieper. Fr. 752,849, Sept. 30, 1933. Method of mounting the tubes.
- X-ray apparatus for radiographic and fluoroscopic examinations.** Montford Morrison and Stanley E. Lundquist (to Westinghouse X-Ray Co.). U. S. 1,937,835, Dec. 5. Structural and elec. features.
- X-ray tube.** Montford Morrison (to Westinghouse Lamp Co.). U. S. 1,937,834, Dec. 5.
- Anticathodes for x-ray tubes.** Compagnie générale de radiologie. Fr. 753,864, Oct. 14, 1933.
- Cathode-ray tubes.** Fernseh A.-G. Fr. 751,280, Aug. 30, 1933. A continuous fall of potential is provoked on the interior walls.
- Cathode-ray tubes.** Radioaktiengesellschaft D. S. Loewe and Kurt Schlesinger. Fr. 753,487, Oct. 17, 1933.
- Braun tubes.** Hans E. Hollmann. Brit. 397,785, Aug. 31, 1933. Elec. and structural features.
- Discharge apparatus.** Max A. E. Pressler. Brit. 397,254, Aug. 24, 1933. A hot cathode, which may be indirectly heated, is placed between an anode and a plate-shaped control electrode which is arranged apart from the envelope and very near the cathode, said control electrode having a recess and a photoelec. coating, *e. g.*, a monolat. layer of Cs on an oxidized Ag surface, and being provided with a terminal for suitably biasing.
- Discharge apparatus.** Siemens-Schuckertwerke A.-G. Brit. 397,712, Aug. 31, 1933. At least those parts of the main arcing chamber most subject to the (heat) effects of the discharge consist wholly or in part of vitrified  $Al_2O_3$ . This may be used, in addn., for internally disposed insulating members of metal vapor rectifiers, or such members may consist of pure vitrified insulating oxides, *e. g.*,  $ZrO_2$ , spinel, corundum,  $MgO$ .
- Discharge apparatus.** Walter L. W. Schallreuter. Brit. 397,933, Sept. 7, 1933. To prevent hardening, a gas-filled tube has a stream of gas or vapor added to the discharge space, said gas being such as to form (1 or more constituents of) the filling by chem. change when subjected to the discharge, and an absorbent, in communication with the tube, takes up the excess unchanged gas, particularly when no discharge is taking place. The substance evolving the gas is connected with 1 part of the tube and the absorbent with another part. Among examples a tube has a side branch contg.  $CaCO_3$  evolving  $CO_2$ ; during discharge  $CO_2$  is decompd. in the presence of a catalyst, *e. g.*, Si on an electrode, to form CO, giving a luminous discharge, and O which is absorbed by the electrodes, preferably of Al or Mg, or by P or alkali or alk.-earth metal. A sec. side branch contains KOH which absorbs  $CO_2$  but not CO. Other examples are given. Cf. C. A. 27, 4965.
- Discharge device for passing current in both directions.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 397,972, Sept. 7, 1933.
- Discharge tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 752,520, Sept. 25, 1933. App. for making.
- Electric discharge tubes.** Le matériel téléphonique (Soc. anon.). Fr. 752,668, Sept. 28, 1933.
- Electric discharge tubes for the production or reception of electric oscillations.** Radioröhrenfabrik G. m. b. H. Fr. 753,815, Oct. 25, 1933.
- Electron-discharge tube.** Leo Szilard. Ger. 579,679, June 29, 1933.
- Electron-discharge tube.** Osram G. m. b. H. Komm.-Ges. (Edmund Germer, inventor). Ger. 581,872, Aug. 4, 1933.
- Thermionic valve grids.** N. V. Philips' Gloeilampenfabrieken. Brit. 398,101, Sept. 7, 1933.
- Two-stage thermionic valves.** Radioaktiengesellschaft D. S. Loewe and Paul Kapteyn. Brit. 397,612, Aug. 31, 1933.
- Thermionic cathodes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 397,291, Aug. 24, 1933. An indirectly heated cathode consists of a metal, preferably Ni, open-ended tube contg. a compressed mixt. of an electron-emitting material and an initially non-coherent metal mass, preferably BaO and powd. W.
- Thermionic cathodes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 397,939, Sept. 7, 1933. Structural features.
- Thermionic cathodes.** Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 397,350, Aug. 24, 1933. An indirectly-heated cathode has a bifilar heating winding, carried on an insulating body having portions of greater diam. than that carrying the winding, and a metallic screen with a roughened or blackened outer surface fitting on the enlarged portions so as to leave a space between the winding and the screen, the structure being surrounded by a cathode. A Ni screen may be roughened by applying a coating of powd. W or Zr.
- Thermionic cathodes.** The General Electric Co. Ltd.

- and John T. Randall. Brit. 397,656, Aug. 31, 1933. 1  
Cathodes, particularly for discharge lamps, consisting of a self-supporting mass heated by means, e. g., a W spiral, that does not contribute to the rigidity of the mass, are prepd. by forming a mass of the desired shape from alk.-earth peroxide and decomp. by heat. Powd. metal, e. g., W, may be mixed with the peroxide, which may be bound with a 10% soln. of nitrocellulose in AmOAc, e. g., 20 g. BaO<sub>2</sub> to 4.5 g. binder. Gum tragacanth is not suitable.
- Thermionic cathodes. The M-O Valve Co. Ltd. Fr. 750,898, Aug. 21, 1933. The core is made of an alloy of Ni with Ti and/or Al, e. g., Ni contg. 2% of Al. Cf. C. A. 28, 382<sup>a</sup>.
- Incandescent cathode. Allgemeine Elektrizitäts-Ges. Fr. 751,598, Sept. 6, 1933.
- Use of celluloid sleeves at the end of condenser tubes for preventing corrosion and electrolytic action. Leo H. Spanyol. U. S. 1,937,600, Dec. 5. Structural details.
- Shipping drum suitable for tars, pitches, rosins, etc. George E. Black (to Pittsburgh Steel Drum Co.). U. S. 1,937,806, Dec. 5. Structural details.
- Apparatus (with a foraminous rotatable drum) for calcining materials such as clay, gypsum or ores. Hugo Roth (to "Müllag" Mühlenbau und Industrie A.-G.). U. S. 1,937,413, Nov. 28. Various structural, mech. and operative details are described.
- Apparatus suitable for regulating various valve-control systems. Raymond E. Olson and Robert D. Cleveland (to Taylor Instrument Cos.). U. S. 1,937,666, Dec. 5. Structural and mech. details.
- Emulsifying apparatus. Guy C. Hurrell. Brit. 397,621, Aug. 31, 1933.
- Automatic apparatus for evacuating muds from purifiers, decanters, separators, etc. Compagnie Industrielle Franco-Africaine (Pierre Mercier, inventor). Fr. 753,900, Oct. 26, 1933.
- Apparatus for bringing viscous masses into a finely divided state. Lonza Elektrizitätswerke und Chemische Fabriken A.-G. Fr. 754,246, Nov. 3, 1933.
- Device for preparing emulsions. Alfred Hoffmann. Ger. 581,826, Aug. 3, 1933.
- Apparatus for distributing oils, etc., over contact masses. Gewerkschaft Kohlenbenzin. Ger. 584,647, Sept. 22, 1933.
- Apparatus for classifying granular materials. Fried. Krupp Grusonwerk A.-G. Fr. 751,159, Aug. 28, 1933.
- Automatic apparatus for taking samples of ore, coal or cement on conveyors, etc. James F. Geary and Harry C. Jennings. U. S. 1,937,473, Nov. 28. Mech. features.
- Apparatus for determining the specific gravity and temperature of liquids held under pressure in tanks, such as petroleum oils. Frank M. Ginger and Charles K. Francis (to Skelly Oil Co.). U. S. 1,937,755, Dec. 5. Various structural and operative details are described.
- Apparatus suitable for extraction of the fatty content of materials, by use of a solvent. Philip A. Goldfisch (to Laboratory Construction Co.). U. S. 1,937,694, Dec. 5. Structural details.
- Apparatus for producing highly porous slag. Ludwig v. Reiche and Julius Giersbach. Ger. 583,555, Sept. 5, 1933.
- Acid-resistant reservoirs. Didier-Werke A.-G. Fr. 754,064, Oct. 31, 1933. Construction of interior lining is described.
- Apparatus for signaling the presence of carbon monoxide and methane. Joanny Vergnais. Fr. 753,932, Oct. 27, 1933.
- Reservoir for absorption, condensation, etc., processes. Bama-Meguain A.-G. Fr. 752,571, Sept. 26, 1933. Method of mounting by suspension is described.
- Annealing plant. Felten & Guillaume-Eschweiler Draht A.-G. Ger. 580,831, July 17, 1933.
- Acetylene generators. Habran Frères et Dubé (S. a. r. l.). Fr. 754,201, Nov. 3, 1933.

## 2-GENERAL AND PHYSICAL CHEMISTRY

FREDERICK I. BROWNE

- Karl Elbs. K. Brand. Z. Elektrochem. 39, 923-6 (1933).—Obituary. E. H.
- Walter Morley Fletcher. J. C. G. L. Biochem. J. 27, 1333-6 (1933).—Obituary notice. Benjamin Harrow
- The life and works of Henri Pélabon (1866-1933). F. François. Bull. soc. chim. 53, 993-1000 (1933). E. H.
- Scientific method in general chemistry laboratory work. Ira D. Garard. J. Chem. Education 11, 42-4 (1934). E. H.
- Class exercises in the industrial chemistry course. III. Research and product development. Kenneth A. Kobe. J. Chem. Education 11, 40-2 (1934); cf. C. A. 28, 385<sup>a</sup>. E. H.
- Undergraduate organic laboratory chemistry. IIIA. Diversification, relative importance, and comparative cost of laboratory experiments. E. F. Degering, R. F. McCleary and A. R. Padgett. J. Chem. Education 11, 46-50 (1934); cf. C. A. 27, 3608. E. H.
- Simple yet widely applicable transport number apparatus. Edward M. Collins. J. Chem. Education 11, 52-3 (1934). E. H.
- The story of zinc. III. H. R. Hanley. J. Chem. Education 11, 33-9 (1934); cf. C. A. 28, 9<sup>a</sup>. E. H.
- Color measurement. G. S. Fawcett. Chemistry & Industry 1933, 1005-7. E. H.
- The literary style of the German chemical publications in the year 1932. XII. Edmund O. v. Lippmann. Angew. Chem. 46, 771-2 (1933).—A crit. discussion with numerous citations of bad style. Karl Kammermeyer
- Thermoelements at high temperatures. A. Schulze. Z. Ver. deut. Ing. 77, 1241-2 (1933).—Discussion of the properties of thermoelements for the range 1000° to 2000° including: Pt-Pt, 0 to 100% Rh; Pt-Pt, 8% Re; Pt-Pt, 4.5% Re, 5% Rh; Rh-Pt, 8% Re; Rh-Rh, 8% Re; Ir-Rh, 40% Ir; Ir-Ir, 10% Ru. The couple Ir-Rh, 40% Ir shows a practically linear relation between e. m. f. and temp. from 0° to 2000°, giving 10.85 mv. for the 2000° interval. F. D. Rossini
- A natural classification of chemical elements and compounds. F. M. Shemyakin. Uspekhi Khim. 2, 630-42 (1933); cf. C. A. 27, 213.—A review discussing the periodic table from the standpoint of nuclear structure, isotopes, abundance in nature and the chem. compds. formed. F. H. Rathmann
- Pseudoatoms and isosteric compounds. II. Comparison of the groups N<sub>2</sub> and CO. H. Erlemeyer and Martin Leo. Helv. Chim. Acta 16, 897-904 (1933); cf. C. A. 27, 213.—Comparison of isosteric compds. is of importance in a study of the relationship between structure and properties, since chem. and phys. behaviors depend upon the no. and arrangement of external electrons. The assumption is made that N<sub>2</sub> and CO, which are isosteric, are obtained from the atoms in such a way that external electron shells form common to the whole mol. They exhibit similar properties. N<sub>2</sub>O and CO<sub>2</sub> are also isosteric. Isosteres of the N<sub>2</sub> group are .N(:N)., .N.N., .N:CH., .CH:CH.; isosteres of the carbonyl group are .C(:NH)., and .C(:CH<sub>2</sub>). A table of 27 possible isosteres of N<sub>2</sub>O and CO<sub>2</sub> groupings is given. Isomorphism of typical compds. contg. the N<sub>2</sub> and CO groupings was investigated. Melting-point diagrams of azobenzene and benzophenone, also of *p*-aminoazobenzene and *p*-aminobenzophenone, show the formation of eutectics, but no mixed crystals. Azobenzene does form mixed crystals with stilbene and benzalaniline. The dibenzyl esters of H<sub>2</sub>N<sub>2</sub>O<sub>3</sub> and H<sub>2</sub>CO<sub>3</sub>, contg. the isosteric groups N<sub>2</sub>O and CO<sub>2</sub>, form mixed crystals. PhMgCl, PhN<sub>2</sub>Cl and PhCO-

Cl decompose thermally in much the same way, indicating the chem. similarity of isosteric compds. The behavior of  $N_2$  and CO toward metals appears anomalous, since N compds. analogous to the metal carbonyls are not known. However, the reduction of both gases by  $H_2$  in contact with metals which form carbonyls is comparable. Since those metals that form carbonyls are best suited for  $NH_3$  synthesis, it is regarded as highly probable that metal  $N_2$  compds., analogous to the carbonyls, may be capable of transitory existence.

L. F. Audrieth

Recent researches on paramagnetism and the atomic moments. G. Foëx. *J. phys. radium* [7], 4, 517-32 (1933); cf. *C. A.* 28, 12<sup>a</sup>.—In this comprehensive survey of recent theoretical and exptl. work in paramagnetism, theories are checked against exptl. results. Present theories seem to give a fairly satisfactory representation of the variation of magnetic moment with at. no., especially since the moments have been calcd. from spectroscopic data without the introduction of any arbitrary consts. However, the theories fall far short of accounting for the "fine structure" of the phenomena, doubtless because of the difficulty of introducing satisfactorily the conditions imposed by the solid state. In particular, no satisfactory interpretation has yet been given for the Weiss law, especially in its application to strongly hydrated crystals and solns., and cases in which  $\Theta$  varies linearly with  $C$ . Again, theory seems to indicate that an  $lgn$  may exist in many magnetic states, corresponding to the various spectral states, with progressive passage from one state to another with variation in temp. Exptly., however, all the atoms seem to be in the same state if the substance is pure magnetically. This uniformity is probably a consequence of the solid state, for which theory at present makes no provision. Further, it is found exptly. that if the magnetic moment varies, the changes are discontinuous, usually less than one Bohr magneton, and frequently equal to an integral no. of Weiss magnetons. These, and other discrepancies between theory and expt., indicate the necessity for much further investigation.

W. W. Stiffler

Effect of magnetic fields on the energy transference in paramagnetic gases. H. Senfleben and J. Pictet. *Physik. Z.* 34, 834-5 (1933); cf. *C. A.* 27, 3863.—The heat cond. of a paramagnetic gas is diminished by a magnetic field. Exptly., over a wide range, this effect depends only on the quotient  $H/p$ , ( $p$  = pressure), and approaches a satn. value as  $H/p$  increases. Because no satisfactory theoretical explanation has yet been given, expts. were made on mixts. of  $O_2$  with diamagnetic gases such as  $H_2$ ,  $He$ ,  $N_2$ ,  $A$ ,  $CO_2$  and  $Kr$ . The results are similar to those for pure  $O_2$  but the effect is much reduced. This reduction is greater for gases like  $Kr$  and  $H_2$ , whose mol. wt. differs considerably from that of  $O_2$ , than it is for  $N_2$ ,  $A$  and  $CO_2$ . The ratio of the effect at satn. in  $O_2$  to that in the mixt. is taken as the measure of the effect of the foreign gas. For mixts. with  $CO_2$ ,  $N_2$  and  $A$ , the measured and the calcd. values of this ratio agree well if it is assumed that the effect of the magnetic field on the  $O_2$  mol. is (1) independent of whether it is in a mixt. or in pure  $O_2$ , and (2) independent of the nature of the mol. with which it collides. For  $H_2$ ,  $He$  and  $Kr$ , agreement between exptl. and calcd. results is obtained by assuming that the nature of the "collision partner" alters the effect of the field on the  $O_2$  mol. Hence the field affects the energy transfer between the  $O_2$  mol. and those of the foreign gas.

W. W. S.

Effect of magnetic fields on the diffusion of paramagnetic gases. H. Senfleben. *Physik. Z.* 34, 835-6 (1933); cf. *C. A.* 27, 639.—From the results obtained for its effect on heat cond. (cf. preceding abstr.) a magnetic field probably would diminish the rate of diffusion of  $O_2$  into a diamagnetic gas by a few tenths of 1%. Expts. were made by a differential elec. method, sensitive to a change in rate of diffusion of  $1/100\%$ . A definite effect was observed for diffusion of  $O_2$  into  $CCl_4$  but the interpretation of the results is complicated by unavoidable magneto-constructive effects produced by the field.

W. W. Stiffler

A law of discontinuous distribution of the ferromagnetic Curie points. IV. Applications to the variation of the Curie point in solid metallic solutions. Robert Forrer.

*J. phys. radium* [7], 4, 501-12 (1933); cf. *C. A.* 28, 12<sup>a</sup>.—F.'s law that  $\Theta = F\sqrt{N}$  (where  $\Theta$  denotes the abs. temp. of the Curie point,  $N$  the no. of effective contacts of the electron lattice, and  $F$  the const. corresponding to  $N = 1$ ) is applied to the interpretation of the data for a no. of alloys contg. solid solns. The no. of contacts varies linearly with the appropriate at. standard, and the const. slope of the line gives  $\Delta N$ , the change produced by replacing an atom of one of the constituents by an atom of the other. To analyze the tabulated data of several investigators, two methods are used. For low concns. the atoms are treated as individuals, while for higher concns. the problem is attacked by considering the distribution of electrons collectively between the atoms of the alloy. The analysis of Fe-Ni and Ni-Fe alloys by the first method shows that Ni dissolved in Fe possesses an elec. doublet, and that Fe dissolved in Ni has a magnetic triplet. This method is applied also to Fe-Co, Co-Fe, Fe-Si, Fe-Au and Fe-Sn alloys. The Ni-Co, Ni-Pd, Ni-Cu and Fe-Co alloys are treated by the second method. The results fall into 3 categories: (1) the dissolved atom with its participating electrons may contribute to a pos. mol. field, as in Fe-Ni, Fe-Si, Fe-Co, etc.; (2) it may serve merely as a diluent, as in Ni-Pd and Fe-Co; or (3) the participating electron of the dild. atom may furnish some neg. contacts as in the case of Ni-Cu.

W. W. Stiffler

Magnetic anisotropy of the naphthalene molecule. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 5-7 (1933).—The math. theory by which the magnetic anisotropy of the naphthalene mol. can be calcd. from its optical anisotropy, by the method used by Ramanadham, is outlined. The value is calcd. as  $204 \times 10^{-14}$ .

W. W. Stiffler

Method and experimental arrangement for measuring the indexes of refraction of substances in the fused state. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 8-12 (1933).—Measurements of the  $n$  of a liquid by means of a hollow prism may be in error because of lack of parallelism of the glass windows, etc. Methods of minimizing these errors are discussed and the math. theory of an interpolation method, for detg. the  $n$  of a given liquid in terms of the known  $n$ s of two others is developed. The exptl. arrangement described consists of an elec. furnace with suitable apertures in the sides, which fits onto the prism table of the spectrometer. An equilateral hollow brass prism, with Pyrex windows, fits into this furnace.

W. W. Stiffler

The invariant of magnetic rotation for some organic substances rendered liquid by fusion. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 13-15 (1933).—According to Mallemain's theory, the expression  $\Delta n/d$  ( $n - 1$ )<sup>2</sup>, in which  $\Delta$  is Verdet's const.,  $n$  is the refractive index, and  $d$  is the density, should be invariant for any given substance and independent of its state. A table is given, showing the values of  $n$ ,  $d$  and  $\Delta$  for naphthalene from 84° to 188°,  $\beta$ -methylnaphthalene from 34° to 174°, triphenylmethane from 100° to 180°, and phenanthrene from 100° to 170°, with the corresponding value for  $\Delta n/d/(n - 1)$ <sup>2</sup>.  $\beta$ -Methylnaphthalene shows a progressive increase of about 5% for this invariant, but for the other 3 compds. it remains const. within 2%, thus confirming the theory, at least to a first approximation.

W. W. Stiffler

Measurements of the magnetic rotatory power on some fused organic substances. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 16-19 (1933).—Measurements of the magnetic rotatory power and the dispersion were made on several org. compds. for the 3 standard Hg lines. Values of  $\Lambda$  (the Verdet const.) and of  $\Lambda/d$  are given for  $\alpha$ -methylnaphthalene from 19° to 164°. In this interval  $\Lambda/d$  is approx. const. with a mean value of  $4.62 \times 10^{-2}$ . Similarly for phenanthrene between 104° and 217°,  $\Lambda/d$  decreases gradually from 5.48 to  $5.32 \times 10^{-2}$ , and for benzyl, in the interval 100° to 204°,  $\Lambda/d$  decreases only from 2.66 to  $2.58 \times 10^{-2}$ . Some data are also given for the dispersion. The magnetic birefringence is a mol. phenomenon while the magnetic rotation is at.

W. W. Stiffler

Calculation of Verdet's constant  $\Lambda$  as a function of the atomic refractivities, for some substances rendered liquid by fusion. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 20-3 (1933).—Details of the calcn. of  $\Lambda$  from the at. refractivities according to Mallemain's theory are given for triphenylmethane, naphthalene and phenanthrene. The calcd. results agree with the exptl. values within 2 to 5%, thus verifying the theory for these compds. to a first approximation. W. W. Stiffler

Verification of the law of rotatory magnetic dispersion for some organic substances rendered liquid by fusion. Constantin Sălceanu. *Bull. sect. sci. acad. roumaine* 16, 24-6 (1933).—Mallemain's general equation for magnetic rotatory dispersion can be verified indirectly by showing that the ratio of the rotatory magnetic dispersion to the dispersion due to elec. birefringence is equal to the inverse ratio of the corresponding wave lengths. The data for  $\beta$ -methylnaphthalene and phenanthrene do not satisfy this condition, and hence the law is inadequate. This is attributed to failure to consider the effects of the absorption bands in the ultra-violet. W. W. Stiffler

Magnetic anisotropy in crystals of trans-dinitrotetraminecobaltic chloride. Lester W. Strock. *Z. Physik. Chem.* B23, 235-8 (1933).—The structure of  $\text{Co}(\text{NH}_2)_4(\text{NO}_2)_2\text{Cl}$  was investigated and the const. of the crystal are given. It belongs to the rhombic group and there are 16 mols. to the unit cell. In a magnetic field it crystallizes with the  $\beta = [100]$  plane parallel to the lines of force and the crystals are magnetically anisotropic. G. M. M.

Magnetic susceptibility of ions. Kiyoshi Kido. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 835-67 (1933).—The theoretical equations of Pauling, Slater, Angus and others, for calcg. the diamagnetic susceptibilities of ions, are reviewed. The susceptibilities of many ions calcd. by these formulas generally fail to agree with K.'s exptl. values. Further, when susceptibility,  $\chi$ , is plotted against valency no.,  $n$ , the exptl. and theoretical curves are different in nature. The ionic susceptibility is the sum of a paramagnetic and a diamagnetic term:  $\chi_{\text{ion}} = \chi_p + \chi_d$ . The existence of the  $\chi_p$  term indicates distortion of an electron orbit due to an assocn. of the ions in the mol. By using K.'s exptl. values for  $\chi_{\text{ion}}$ , the mol. susceptibilities of a no. of inorg. compds. are calcd. with the assumption of an additive law. The agreement with exptl. detd. values is excellent for homeopolar compds. The additive law holds also for some org. compds. For ions with the same nuclear charge, a pair of electrons in the outer surface of the same total quantum no. produces the same change in  $\chi$ . A double-bond linkage between atoms decreases the diamagnetic susceptibility. Many tables of ionic susceptibilities are given. W. W. Stiffler

Dielectric-constant studies. I. An improved voltage-tuning resonance method and its application to aqueous potassium chloride solutions. J. Gilbert Malone, A. L. Ferguson and L. O. Case. *J. Chem. Physics* 1, 830-41 (1933).—The behavior of various types of app. used in detg. dielec. const. of aq. solns. of electrolytes is studied. While the voltage-tuning method is theoretically unaffected by the cond. of the soln., other disturbing factors are present. The change in dielec. const. detd. by this method depends more or less on the characteristics of the particular generating and receiving circuits used. Dielec. const. are given for aq. KCl in concns. up to 0.050  $M$  at 25° and  $\lambda = 31.7$  m. The dielec. const. rises with concn. II. The Drude method applied to aqueous solutions of potassium chloride. J. Gilbert Malone, L. O. Case and A. L. Ferguson. *Ibid.* 842-6.—The Drude method was used for detg. dielec. const. of  $\text{H}_2\text{O}$ -EtOH and aq. KCl solns. Values obtained with 3 distinct types of detectors were concordant for  $\text{H}_2\text{O}$  and for  $\text{H}_2\text{O}$ -EtOH solns., but discordant for aq. KCl solns. The change in dielec. const. of electrolytic solns. detd. by this method depends at least in part on the characteristics of the app. Gerald M. Petty

Dielectric properties of solutions of electrolytes in a non-polar solvent. Charles A. Kraus and Gilman S. Hooper. *Proc. Nat. Acad. Sci.* 19, 939-43 (1933).—Dielec. const.-concn. curves are given for tetraisoamyl-

and triisoamylammonium picrate, tetraisoamylammonium bromide,  $\text{AgClO}_4$  and  $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$  at 25°. Values are given for the molar polarization, elec. moment and distance between the centers of charge in an ion pair. It is suggested that the symmetry of the ions has an effect on the dielec. behavior of an electrolyte at high concns.

Howard A. Smith  
The dielectric constants of aqueous solutions at very high frequency. Ernst Plotze. *Ann. Physik* 18, 288-98 (1933).—Dielec. const. of aq. solns. of  $\text{CuSO}_4$ ,  $\text{La}(\text{NO}_3)_3$  and  $\text{K}_4\text{Fe}(\text{CN})_6$  at max. concns. of 0.002  $M$  were detd. by Drude's method. The measurements were made at  $\lambda = 60.0$  cm., and at 17°. The results agree with the Debye-Onsager-Falkenhagen theory. Gerald M. Petty

Dipole moments of the chlorobenzophenone oximes. George S. Parsons and C. W. Porter. *J. Am. Chem. Soc.* 55, 4745-6 (1933).—The  $\alpha$  and  $\beta$  forms, resp., of *o*-, *m*- and *p*-chlorobenzophenone oxime (m. 131°, 96-7°, 122-3°, 105-6°, 162-4° and 91-2°, resp.) have dipole moments of 161, 161, 1.50, 1.61, 2.320 and 2.381  $\times 10^{-18}$  e. s. u., resp. The values for the *o*- and *p*-compds. were obtained in dioxane soln., in which assocn. is slight. These results do not give an unambiguous answer to the question of oxime structures. H. A. Beatty

Simplified formulas for the calculation of expansion coefficients and compressibilities of gases at low pressures from the Beattie-Bridgeman equations of state. J. B. M. Coppock. *J. Phys. Chem.* 37, 995-9 (1933).

P. H. Emmett  
Acoustical studies. II. The behavior of a gas with several independent internal-energy states. Wm. T. Richards. *J. Chem. Physics* 1, 863-79 (1933); cf. *C. A.* 27, 1791.—Einstein's method of describing the acoustical behavior (Richards and Reid, *C. A.* 28, 387) of a disocg. gas is extended to a nondissocg. gas in which five groups of internal-energy states have different relaxation times. The variation of the velocity of sound with frequency demonstrates different relaxation times; variations with pressure show effects due to three-body collisions or to radiation from optically active states. Math. Gerald M. Petty

Hydrodynamic equations with capillary terms. Theory of surface tension. Y. Rocard. *J. phys. radium* [7], 4, 533-48 (1933).—For a complete formulation of the equl. and the movement of a fluid composed of mols. having mutual attraction according to the kinetic theory, a system of pressures and tensions dependent on the 2nd space derivative of the  $d$ . must be considered in writing, for a non-uniform  $d$ . distribution, the hydrodynamic equations for the movement. The tensions represent the effects of capillarity. A quantity  $H$  is set up for the surface tension; a numerical calcn. of  $H$  agrees well with expt. and justifies the empirical rule of Ramsey and Shields.  $H$  divided by the crit. pressure and the diam. of the mol. is a unique function of  $T/T_c$  ( $T_c$  = crit. temp.) for all substances having the same kind of intermol. forces. No new hypothesis was necessary to obtain these results. L. R. S.

Measurement of surface tension of liquids by the parallel-plate method. Naoyasu Sata and Katuzo Kurano. *Kolloid-Z.* 65, 191-5 (1933).—The surface tensions detd. by this method approach the theoretical curves as the thickness of the plate is increased. For  $\text{H}_2\text{O}$ , the thickness is 7-8 mm.; for EtOH, PhNO<sub>2</sub> and PhNH<sub>2</sub>, 5-6 mm.; for  $\text{CHCl}_3$  and  $\text{CHBr}_3$ , 4-5 mm. These values agree with the plate thicknesses at which the creeping height reaches a max. value for these liquids. Expts. with flint, crown, and soda-lime glasses, and quartz show that plate compn. is not a factor. Arthur Fleischer

Molecular diffusion of light in liquids. E. Canals and P. Peyrot. *Bull. soc. chim.*, 53, 741-4 (1933).—Light diffused by pure liquids is only partially polarized, which leads to the conclusion that mols. are optically anisotropic. The amt. of mol. anisotropy can be estd. by the measure of depolarization. This depolarization was measured for several halogen derivs. of ethane, propane, isopropane and amylene, as well as  $\text{C}_6\text{H}_6$ , heptane, isopentane,  $\text{CH}_3\text{CHCl}$  and  $\text{CHCl}_3$ . James H. Hibben

Evaporation and diffusion of volatile materials into an

inert gas stream. Eric Preston. *Trans. Faraday Soc.* 29, 1188-98(1933).—Vapor-tension measurements by a dynamic method for glasses of the approx. compns. 30% PbO, 70% SiO<sub>2</sub>; 80% Na<sub>2</sub>O, 50% SiO<sub>2</sub>; and 80% K<sub>2</sub>O, 50% SiO<sub>2</sub> were theoretically evaluated. It is concluded that evapn. at normal pressures is in essence a process by which a thin vapor in equil. with the liquid phase according to the Herz-Knudsen equations, diffuses into the passing gas. This diffusion seems to be sensibly governed by the same considerations as those deduced from the kinetic theory for the diffusion of gases into an enclosed space. It appears correct to assume that in the vapor PbO, Na<sub>2</sub>O and K<sub>2</sub>O are unimol. Frank Urban

The vapor-pressure curve of nitrobenzene. Maria T. Toral and E. Moles. *Anales soc. españ. fis. quim.* 31, 735-45(1933).—Vapor pressures of pure PhNO<sub>2</sub> were detd. from 95.8° to 207.9°. Results can be expressed by the equation  $\log p = 8.172443 - (2552.683/T)$ . Calcd. b. p. at 760 mm. pressure is 209.6°, not agreeing well with the literature. From the values found, the heat of evapn. can be obtained from the equation  $L = 94.84 \text{ cal./g.}$ , and the ebullioscopic const.  $E = 49.13$ , agreeing with the values obtained by Biltz, Bachmann and Dziewonski. If vapor-pressure detns. are made by using an exposed-stem thermometer, and the results corrected as usual, values are obtained which deviate considerably from those obtained by the use of thermometers with unexposed stem. E. M. Symmes

The equation of state and the parachor. A. Eucken. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 340-9.—The parachor relation  $V^{1/3}\sigma$  or  $V^{1/3}/\sigma = \text{const.}$ , where  $V$  is the mol. vol. and  $\sigma$  the surface tension, can be derived from a general equation of state applicable to liquids even at high pressure and in agreement with the London attraction law. The additivity of the parachor is explained by the fact that the latter represents about 2.9 times the zero-point vol. P. H. Emmett

Wall effect in the falling-ball method for viscosity. Alfred W. Francis. *Physics* 4, 403-6(1933).—The wall effect of balls falling in a vertical cylindrical tube in a viscous fluid is probably independent of the abs. radii of the ball and tube and only slightly dependent on the abs. viscosity. The bottom effect is negligible. The revised formula proposed for liquids of high viscosity is:  $\eta = 2gR^2(\rho_1 - \rho_2)(1 - R/r)^{3.25}/9u$ , where  $\eta$  is the viscosity in poises,  $R$  and  $r$  are the radii of ball and tube in cm.,  $g = 980 \text{ cm. per sec.}^2$ ,  $u$  is the observed velocity in cm. per sec., and  $\rho_1$  and  $\rho_2$  are the ds. of ball and liquid, resp. The function agrees well with observations at least to the ratio,  $R/r = 0.83$ , while the limit of agreement for Ladenburg's formula is the ratio 0.09. L. E. Steiner

Fluidity measurement of liquids, solutions, emulsions, etc. A. R. Matthis. *Ind. chim. belge* [2], 4, 497-502 (1933).—A simple fluidimeter is described. A. L. H.

The determination of the coefficients of viscosity of viscous liquids, and the application of Le Chatelier's formula. B. Deryagin. *J. chim. phys.* 30, 548-55 (1933).—The variation of viscosity with temp. as measured with falling spheres in potato molasses and in a 42% soln. of sugar in glycerol, is expressed by Le Chatelier's equation:  $\log \log(\eta/\eta_0) = A - B/T$ . L. E. Steiner

Fluidity of dioxane-water mixtures. John A. Geddes. *J. Am. Chem. Soc.* 55, 4832-7(1933).—The fluidity-concn. curves reveal the hydrate, C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>·5H<sub>2</sub>O. S. Bradford Stone

Measurement of the surface tension of solid substances. V. P. Berdennikov. *Physik. Z. Sowjetunion* 4, 397-419 (1933).—Griffith's theory of the widening of surface cracks in glass was tested and applied to the surface-tension measurement of solid substances. For glass in *vacuo*, and in water the surface energies in ergs are 1214 and 290; in other media the values are intermediate. The order for glass is not valid for quartz. L. E. Steiner

Recrystallization and coloration. IV. Karl Przibram. *Sitzber. Wiss. Wien Math.-naturw. Klasse Abt. IIa*, 142, 251-7(1933); cf. *C. A.* 27, 3400.—Micrometric measurements of grain growth in pressed KBr show that the hindrance of recrystn. by Ra irradiation affects formation of

crystal nuclei and not the grain growth. The recrystn. time-pressure diagram for NaCl is carried to a pressure of 10,000 kg./sq. cm. It seems that recrystn. of KCl and KBr after pressure compared with unpressed melted crystals causes a lessening of the lattice disturbance, since pressed samples change color more quickly. O. E. S.

Remarkable optical properties of the alkali metals. R. de L. Kronig. *Nature* 132, 601(1933).—The optical behavior observed by R. W. Wood (*C. A.* 27, 5240) can be fully accounted for by means of the quantum theory of metallic dispersion developed by K. Frank Urban

The theory of forced double refraction. K. F. Herzfeld and R. H. Lee. *Phys. Rev.* 44, 625-31(1933).—The double refraction produced in NaCl and KCl crystals through elastic stress is calcd. but the results contain too many unknown consts. to be checked against expt. L. S. Kassel

Isothermic crystallization or transformation of a given mass independent of time. G. Tanmann. *Z. anorg. allgem. Chem.* 214, 407-13(1933).—Two types of formation of crystn. centers in isothermal transformations are described (1) on the surface of melts and (2) regular distribution of centers throughout the mass. The derivation of the formula relating the total vol. of centers and time is given. Examples of the transformation process are given which include monoclinic to rhombic S and the reverse, of NH<sub>4</sub>NO<sub>3</sub> below and above 32° and of Al<sub>2</sub>Zn<sub>3</sub> decompn. Certain Ni and Mn steels are also described. R. H. L.

The Faraday effect at high frequencies. G. P. Harnwell, W. Bleakney, S. N. Van Voorhis and J. B. H. Kuper. *Phys. Rev.* 44, 785(1933).—The result of preliminary expts. on the Faraday effect at high frequencies is not conclusive but the general method of investigation with continuous oscillations is considered feasible. The method has the advantages of steadiness of operation and great flexibility. Allen S. Smith

Free rotation in the lattice of silicon hydride. Klaus Clusius. *Z. physik. Chem.* B23, 213-25(1933).—Pure SiH<sub>4</sub> was prepd. from Mg silicide and HCl and its sp. heat measured from 10° abs. to the b. p. At 63.4° abs. a break in the curve indicates a rotation in the solid state. Below the m. p., the solid is weakly birefringent but below the transition point the double refraction is strong. The results are compared with those obtained with CH<sub>4</sub>. The unsym. form of the transition curve is ascribed to strong coupling of the rotators. G. M. Murphy

The electron conduction of cuprous oxide. W. Schottky and F. Waibel. *Physik. Z.* 34, 858-64(1933).—The Hall effect of Cu<sub>2</sub>O in the temp. range —180 to about 850° was investigated to det. whether the mechanism of cond. changes near 500°. The possibility of a change from an excess electron cond. to a defect cond. with increasing temp. was considered to account for discrepancies in exptl. results. In the temp. range where one or both mechanisms are predominant the Hall const.  $R$  is inversely proportional to the concn. of the conductors. The latter shows unusual variation with the O content at room temp. Between 400° and 500° the curve of  $R$  vs.  $1/T$  passes through 0 and becomes pos. above 500°. The quantity  $R \times \kappa$  ( $\kappa = \text{cond.}$ ) is proportional to the mobility. In the excess-electron region the latter decreases with increasing temp.; in the defect region the course is not well established. The results substantiate a defect-conductor theory of the blocking layer, and serve to clarify the blocking-layer effect and photocurrent. A. S. Smith

The plasticity and hardness of alkali halide crystals. Karl Przibram. *Sitzber. Akad. Wiss. Wien Math.-naturw. Klasse Abt. IIa*, 142, 259-61(1933); cf. *C. A.* 27, 3372.—The plasticity coeff.  $b$  and the Brinell hardness for NaBr, NaI and KI crystals were detd. Crystal lattice const. plotted against  $b$  gives a nearly straight line when the cation of the halide is the same. O. E. Sheppard

The densities of organic crystals. Asutosh Mukherjee. *Indian J. Physics* 8, 147-9(1933).—The flotation method of d. detn. was applied to a large no. of org. compds. The purest crystal is assumed to be the one with the greatest d. The crystal was subjected to repeated subdivision each time only the particle with the greatest d.

was retained. The  $d$ . measured in this manner compares very closely with the values calcd. from x-ray data.

Calvin Brous

The structure of carbon. Investigations by means of electron diffraction. Ferdinand Trendelenburg, E. Franz and O. Wieland. *Z. tech. Physik* 14, 489-95(1933); cf. *C. A.* 27, 2870.—C of various crystallite sizes (natural graphite, com. graphite and lampblack) was studied. The lattice parameters agree with those obtained by x-rays (cf. *C. A.* 18, 3128). The electron diffraction method gives information on the nature of the surface layers; x-rays on deeper layers. The 001 interferences, observed with x-rays, are not found with 30-kv. electrons. The basal planes are parallel to the electron-optically smooth graphite surfaces; the electron absorption in the long path resulting is too great to permit interference. The surfaces perpendicular to the basal planes are electron optically rough, permitting interferences. Thirteen references.

Victor Hicks

Crystallographic investigations with the electrical electron microscope. E. Bruche and H. Johansson. *Z. tech. Physik* 14, 487-8(1933); cf. *C. A.* 27, 1268-9.—The changes in crystal structure of a carefully polished hot Ni cathode coated with Ba azide were observed. Objects of 10  $\mu$  were resolved.

Victor Hicks

The reflection of x-rays from anthracene crystals. B. Wheeler Robinson. *Proc. Roy. Soc. (London)* A142, 422-47(1933).—The abs. intensity of reflection from the (001) planes of anthracene was measured for  $\lambda$  1.539 and  $\lambda$  0.709 A. U., on crystals up to 0.5 mg., exposed to a uniform monochromatic beam. Measurements were made with a recording ionization spectrometer with valve amplification. Errors due to non-monochromatism of the beam and to extinction and absorption in the crystal were investigated. A method of applying the extinction correction to small crystals is developed. The structure factors for the (001) planes are 30.5 for  $\lambda$  1.539 and 32.8 for  $\lambda$  0.709 A. U. The difference is discussed. The latter factor may be taken as a standard for org. crystal structure analysis.

Victor Hicks

The crystalline structure of naphthalene. A quantitative x-ray investigation. J. Monteath Robertson. *Proc. Roy. Soc. (London)* A142, 674-88(1933).—The intensities of reflection were measured photographically. The structure was obtained by trial and error, by starting from the orientation found for anthracene (cf. *C. A.* 27, 3373). These results were refined by a double Fourier analysis about the zones of the crystal axes. The electron distribution is plotted in abs. units. The orientation of the mol. in the crystal and the coordinates of the atoms are given. The structure differs from that of anthracene chiefly in the larger inclination of the long axis of the mol. to the (010) plane. The electron count agrees well with the chem. structure.

Victor Hicks

X-ray investigation of konjak mannan. Ichiro Sakurada and Keiroku Futino. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 21, 287-301(1933).—Konjak mannan has 2 modifications:  $\alpha$ , amorphous and water-sol.;  $\beta$ , cryst. and water-insol.  $\beta$  has a tetragonal lattice with 3 hexose residues in the elementary cell with  $a_0 = b_0 = 8.5$ ,  $c_0 = 7.5$  A. U. when water-free and with  $a_0 = b_0 = 8.7$ ,  $c_0 = 8.2$  A. U. when air-dried. Under tension the micelles are oriented with the  $c$  axis parallel to the tension. The micelles of dried films and frozen sheets are also oriented. Twelve references.

Victor Hicks

Fourier analysis of the durene structure. J. Monteath Robertson. *Proc. Roy. Soc. (London)* A142, 659-74(1933).—Results of the crystal analysis of durene, 1,2,4,5-tetramethylbenzene (cf. *C. A.* 27, 5604) were subjected to a double Fourier analysis about the zones of the crystal axes. The results are given in contour diagrams drawn to abs. scale. The mol. has a regular plane hexagon benzene ring, with the Me group in the plane of the ring but displaced about 3° toward the unsubstituted positions. The orientation of the mol. in the crystal and the atomic parameters are given. An electron count shows the effect of the H atoms.

Victor Hicks

An x-ray study of the binary alloys of Si with Ag, Au,

Pb, Sn, Zn, Cd, Sb and Bi. Eric R. Jette and Emery B. Gebert. *J. Chem. Physics* 1, 753-5(1933).—The measured lattice consts. of the elements in these alloys are practically identical with those of the pure elements. Thus mutual soly. occurs to only a very slight extent. Si forms no compds. with any of these elements.

Victor Hicks

A note on the vapor pressure of zinc bromide. M. S. Desai. *Bull. Acad. Sci. United Provinces Agra Oudh India* 3, 31-2(1933).—The note corrects a mistake in a former paper (*C. A.* 27, 3865). The mistake is math., and the former equation should be  $\log P = -(A/T) + \log T + B$ , where  $A = 5839.781$  and  $B = 9.066$ . The latent heat of evapn. is therefore 25.68 kg.-cal. instead of 27.60 kg.-cal. as reported.

H. W. Leahy

The ultra-violet absorption of aldehydes. H. Conrad-Billroth. *Z. physik. Chem.* B23, 315-18(1933).—The absorption of 0.015  $M$  hexane soln. of the following substances was studied: RCHO, where R = Me, Et, Pr, Am, Bu,  $C_6H_{13}$ ,  $C_7H_{15}$ ,  $C_8H_{17}$ ,  $Me_2CHCH_2$ ,  $Me_3CH$ ,  $MeEtCH$ ,  $Me_2C$ .

G. M. Murphy

Thermodynamic properties of trifluorotrichloroethane and difluorotetrachloroethane. Frank Hovorka and Francis E. Geiger. *J. Am. Chem. Soc.* 55, 4759-61(1933).—For  $(CFCl_2)_2$  and  $CClF_2CCl_2F$  are given b. ps., m. ps.,  $E_{\text{évap}}$  consts., mol. heats of vaporization, crit. temps., Sugden's parachors,  $\eta$ , viscosities and surface tensions.

A. L. Henne

Thermodynamic properties of 2-methyl-2-pentanol. Frank Hovorka, H. P. Lankelma and K. K. Naujoks. *J. Am. Chem. Soc.* 55, 4820-2(1933).—Measurements of surface tension,  $d$ .,  $\eta$ , abs. viscosity and vapor pressure, in the range 5° to 120°, are reported.

F. D. Rossini

The sorption error in measurements involving easily sorbable gases at low pressures. Marcus Francis. *J. Phys. Chem.* 37, 1019-27(1933).—Below a pressure of 0.1 mm. of Hg, the gas sorbed on the walls of a glass app. may approach or even exceed in amt. that contained in the free space of the system. Expts. with  $SO_2$  showed a disengagement of sorbed gas amounting to more than 50% of the free gas at an arbitrary starting point.

P. T. N.

Activated adsorption of gases on charcoal. R. Burshstein, P. Levin and S. Petrov. *Physik. Z. Sowjetunion* 4, 197-211(1933).—The adsorption of  $H_2$ , CO,  $N_2$ ,  $C_2H_4$  and  $C_2H_6$  on ash-free charcoal (I) and on the same charcoal contg. 0.2% Pt (II) showed, for  $N_2$ , no effect of the Pt and, for  $C_2H_4$  and  $C_2H_6$ , the same end values for I and II but a more rapid approach to equil. for II. For H between -183° and 100°, and for CO from 20° to 400° the difference in amt. adsorbed by II and by I is a pos. const. with respect to temp. and pressure, and it varies with the Pt content. At 20° the H can be completely pumped off from I, but from II only the H adsorbed by the C, not that adsorbed by Pt. Slow, activated adsorption occurs for H at 300° and for CO at 400°. For H,  $A \propto \sqrt{P}$  and for a short time  $A \propto \sqrt{t}$  where  $A$  is the amt. adsorbed,  $P$  the pressure and  $t$  the time. For CO at 400°,  $A \propto \sqrt{t}$ ; this relation holds at 600°, 700° and 800° for I but not for II.

J. E. Steiner

Active charcoal. I. Activity of charcoals made under various conditions of carbon dioxide current. Setsuro Tamaru and Osamu Kamiike. *J. Chem. Soc. Japan* 54, 1088-110(1933).—Coconut charcoal was activated by heating in a current of  $CO_2$  at 900°. The sorption and desorption of water by the charcoal were studied by means of a thermobalance. Water could not be completely desorbed below 900°. II. Sorption equilibrium of water, sulfur chloride and silicon tetrachloride vapors in coconut charcoal. *Ibid.* 1101-8.—The repeated sorption and desorption of (1) water vapor, (2)  $SiCl_4$ , and (3)  $SiCl_4$  by coconut charcoal were studied. The charcoal was prepd. by heating at 935° in a current of  $CO_2$  for 1 hr. With (1) there was observable hysteresis in sorption and desorption but not much with (2) and (3). III. Sorption equilibrium of various organic vapors in coconut charcoal. *Ibid.* 1109-21.—Sorption equil. between coconut charcoal and  $C_6H_6CH_3$ ,  $n-C_4H_9OH$ ,  $CH_3COOH$ ,  $n-C_4H_9NH_2$ .



$C_6H_6$ ,  $C_6H_5OH$ , was studied. IV. Sorption equilibrium of less volatile organic vapors in coconut charcoal. *Ibid.* 1122-8.—Sorption equil. between coconut charcoal and the difficultly volatile substances  $C_6H_5NO_2$ , decalin,  $C_6H_5OH$  and cyclohexanone was studied. Hysteresis in sorption and desorption appears only with  $C_6H_5NO_2$ . V. Manufacture of mask charcoal by gas-activation method. Setsurō Tamaru, Yosiki Imai and Sōsuke Kanō. *Ibid.* 1129-44.—The activation of coconut charcoal and of wood charcoals by means of water vapor,  $CO_2$  and air was studied. With respect to a charcoal every gas exerted almost the same activating action. The activity of the charcoal may be detd. principally by loss of charcoal due to combustion and by the temp. of heating. VI. Sorption equilibrium of benzene vapor in charcoals prepared by impregnation method and gas-activation method. Yosiki Imai. *Ibid.* 1145-54.—Sorption equil. of benzene vapor in (1) coconut charcoal, soaked with  $Na_2SO_4$  soln. and then heated and (2) Norit charcoal was studied. Sorption and desorption were reproducible at lower pressure, but there was hysteresis at higher pressure. VII. Sorption equilibrium of benzene vapor in various charcoals made by the impregnation method. *Ibid.* 1155-67.—Filter paper of low ash content was dipped into  $H_2SO_4$ ,  $Na_2SO_4$ ,  $H_3PO_4$ , and then heated. The activity of the charcoal thus obtained was examd. by studying the sorption of benzene vapor.  $Na_2SO_4$  and  $H_3PO_4$  promoted activity. VIII. Properties of points inside the hysteresis loop of sorption equilibrium and the mechanism of sorption. *Ibid.* 1168-76.—The phenomenon of hysteresis is explained on the basis of surface adsorption and capillary condensation. T. K. Ion adsorption on metals and charcoal. A. Frumkin. *Physik. Z. Sowjetunion* 4, 239-61(1933).—A review.

L. E. Steiner  
The surface oxides of charcoal and the adsorption of electrolytes. L. Lepin. *Physik. Z. Sowjetunion* 4, 282-91(1933).—Three surface oxides of charcoal are postulated having 1, 2 and 3 valences, resp., of the surface C atoms attached to O. These react with water to form hydroxides, the first 2 being basic and the last acidic. L. E. S.  
Adsorption and capillary condensation. M. Polanyi. *Physik. Z. Sowjetunion* 4, 144-55(1933).—The "potential" theory and the capillary condensation theory of adsorption are compared and the limits of the latter discussed.

L. E. Steiner  
Capillary condensation of vapors on porous sorbents. M. Dubinin. *Physik. Z. Sowjetunion* 4, 156-71(1933).—A review. For solids with coarse pores, adsorption is largely capillary condensation; for fine pores, Polanyi's theory holds best; for intermediate cases, both types of adsorption coexist.

L. E. Steiner  
Relation between van der Waals' and activated adsorption on chromium oxide gel. John Howard. *Nature* 132, 603(1933).—Activated adsorption of  $H_2$  and  $N_2$  on a surface of  $Cr_2O_3$  diminished van der Waals' adsorption to a marked extent, showing that the 2 types of adsorption do not take place independently of each other. F. Urban

The effect of the alkali and the alkaline earth ions on the adsorption of thorium B by silver bromide crystals. J. F. King and U. T. Greene. *J. Phys. Chem.* 37, 1047-59(1933).—The adsorption of Th B ions on AgBr crystals in the presence of various concns. of the alkali and alk. earth bromides was studied. The order of repression of the adsorption of Th B is  $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$  at all concns. measured. There appears to be a relation between the adsorbability of these cations and their heats of hydration, their ionic size and solubilities of their bromide salts. There is little difference in the repressing effect of Ba, Ca and Sr ions. P. T. Newsome

The adsorbabilities of the ions. K. S. Gururaja Doss. *Indian Chem. Soc.* 10, 503-8(1933).—In general, Mukkerjee's equation (cf. *C. A.* 16, 3018) is confirmed. The adsorbability of the H ion in comparison with the Ba ion is greater than predicted, probably because of secondary factors which affect adsorption. F. E. Brown  
Exchange of energy between inert gas atoms and a solid surface. J. M. Jackson and A. Howarth. *Proc. Roy. Soc. (London)* A142, 447-50(1933).—The theory of the

thermal accommodation coeff. (cf. *C. A.* 26, 5489) for a one-dimensional exponential field is extended over the normal modes of vibration of the solid. Agreement with the work of Roberts (*C. A.* 26, 2357) on temp. variation of the accommodation coeff. of He on W was secured for the value  $4 \times 10^6$  cm.<sup>-1</sup> of the exponential index  $\alpha$ . This is in agreement with the magnitude suggested by Born (*C. A.* 26, 3968) and Slater (*C. A.* 25, 3886). Calvin Brous

Decrease of surface energy and increase of dispersibility of solid substances through the formation of an adsorption layer. Sclerometry in the physical chemistry of mechanical dispersions. III. P. Rebinder, N. Kalinovskaya and Eugenie Venstroem. *Physik. Z. Sowjetunion* 4, 365-96(1933); cf. *C. A.* 26, 638.—Solids dispersed by various mech. means in solns. of various adsorbates gave dispersibility isotherms (hardness-decrease-concn.-of-adsorbate curves) similar to adsorption curves. The isotherms followed Traube's rule for adsorption from aq. solns., and its reverse for adsorption from hydrocarbon solns.

L. E. Steiner  
Mechanical properties of adsorption layers and the stability of foams and emulsions. D. L. Talmud. *Physik. Z. Sowjetunion* 4, 420-30(1933).—A review.

L. E. Steiner  
Technic for measuring the viscosity of surfaces. Gino Bergami. *Boll. soc. ital. sper.* 8, 1276-8(1933).—The technic previously described (*Arch. sci. biol.* (Italy) 18(1933)) was modified so as to make possible the detn. of the viscosity of surfaces within wide limits—from distd. water to hydrophile colloids. The app. is essentially a differential torsion balance in which the degree of torsion of the wire is a function of the resistance of the surface of the liquid under test.

Peter Masucci  
Surface chemistry. Irving Langmuir. *Chem. Rev.* 13, 147-91; *Angew. Chem.* 46, 719-33(1933).—A summary of L.'s contributions.

Louise Kelley  
The range of surface forces. F. P. Bowden. *Physik. Z. Sowjetunion* 4, 185-96(1933).—The top plate of a pair of highly polished plates of glass, steel or ZnS in a dust-free cylinder sank on the bottom plate to a distance dependent on the limit of polish (1000 Å. or more) regardless of whether the plates were in a high vacuum, air, satd. vapors of alc.,  $H_2O$ , or nitroethane, or the liquids, alc.,  $H_2O$  or oleic acid. Friction expts. in dust-free alc. showed no friction until the equil. position (sepn.: 3600 Å.) was reached. A limited amt. of alc. between portions of the glass plates pulled the plates to 1000 Å. at these parts, the surface tension crushing the dust particles and buckling the plates. No evidence was found for oriented mol. chains up to 50,000 Å. long as suggested by others. Solid myristic acid crystd. between polished plates in a thin film has a characteristic adhesion for each solid, greater than that for the solid acid in the bulk. Between differing plates the break of the film occurs at the weaker surface at its characteristic value. Solid surfaces affect the growth of crystals in the film, but do not exert any effect through the solid film.

L. E. Steiner  
New studies in colloid chemistry. V. A. Naumov. *Uspekhi Khim.* 2, 521-50(1933).—A review, chiefly of work done in 1931 and 1932. Disperse-phase metals, inorg. and org. sols, size and shape of particles, highly polymerized natural substances as studied by optical, elec., adsorption and surface-tension methods are discussed.

F. H. Rathmann  
The optics of white sols. II. The diffuse scattered reflection. Torbjorn Caspersson. *Kolloid-Z.* 65, 162-70(1933); cf. *C. A.* 26, 5474.—A characteristic of white sols is that the particles do not absorb but reflect light to the sides. By use of Shoulejkin's (cf. *C. A.* 18, 3320) and Mie's theories, tables are calcd. showing the intensities of scattered light in different directions on varying the particle size, the difference in  $n$ s of the particles and the dispersing medium, and the wave length of the incident light. The mutual action of colloidal particles in relation to Beer's law is discussed. Arthur Fleischer

The composition of arsenious sulfide sols and its change on aging and under the influence of light. V. Krestinskaya and V. Yakovleva. *Kolloid-Z.* 65, 187-91(1933).—

Unless  $H_2S$  is passed till no test for  $H_2AsO_3$  is obtained on a filtered sample,  $As_2S_3$  sols contain  $As_2O_3$  in both the micelles and intermicellar liquid. On aging, the total S content remains unchanged, but  $As_2O_3$  is formed by oxidation with most of the equiv. sulfide changing to S. O is essential for aging. Light catalyzes the aging reaction.

Arthur Fleischer

Preparation and properties of zirconium sulfosalicylic acid jellies. Satya Prakash. *Z. anorg. allgem. Chem.* 215, 240-54 (1933).—See C. A. 27, 5612.

Capillary-electrical investigations on silver halides. H. R. Kruyt. *Physik. Z. Sowjetunion* 4, 295-303 (1933).—Capillaries of Ag halides, and coarse crystals prepd. by grinding the fused salt can be charged negatively only. Fine crystals of colloidal size may be charged positively.

L. E. Steiner

Mechanism of the formation of Kohlschütter's silver sol. Harry B. Weiser and Max F. Roy. *J. Phys. Chem.* 37, 1009-19 (1933).—The formation of Kohlschütter's Ag sol by the reduction of  $Ag_2O$  with  $H_2$  at 50-60° is accomplished only in the presence of solid  $Ag_2O$ . Satd. solns. of  $Ag_2O$  that have not been ultrafiltered ordinarily contain appreciable amts. of colloiddally dispersed oxide. In a quartz or Ag vessel an ultrafiltered  $Ag_2O$  soln. undergoes no reduction with pure  $H_2$  at 80-90°; in a glass vessel the reduction is confined to the surface, giving a thin mirror of metal; in a Pt vessel the reduction is at the surface, depositing relatively large hexagonal plates of Ag. The reduction in Pt results from catalytic activation of the  $H_2$  at the Pt surface. There is no catalytic activation and no reduction at the surface of quartz or Ag. Mirror formation at a glass surface is preceded by the formation of a film of  $Ag_2O$ , which is subsequently reduced. The oxide film results chiefly from pptn. by alkali from the glass. The ease with which solid  $Ag_2O$  is reduced by  $H_2$  indicates that the latter is readily activated at the surface of  $Ag_2O$  or at the interface Ag- $Ag_2O$ . Pauli's view that sol formation will not take place except in the presence of alkali or sulfide that can furnish a complex stabilizing electrolyte is not in accord with the exptl. observations.

H. B. Weiser

Protective action of colloids. III. Effect of sucrose and sodium oleate on the stability of colloidal manganese dioxide. Shridhar S. Joshi and Avadh N. Lal. *J. Indian Chem. Soc.* 10, 307-71 (1933); cf. C. A. 27, 4986.—The prepn. of  $MnO_2$  sols by adding solns. of sucrose (25 and 50%) and Na oleate (0.334 and 0.167%) in various amts. was studied. The viscosities of the mixts. were detd.

Frank Urban

Structure of emulsoid sol particles and their hydration film. N. H. Kolkmeijer and J. C. L. Favejee. *Nature* 132, 802-3 (1933).—The prevailing view that powder photographs of cellulose, starch and similar substances originate in the crystal structure of those substances may be erroneous. The powder lines are those of the hydration film surrounding the particles. The water film has the structure of ordinary ice.

Frank Urban

Change of stability of sols of various concentrations with their purity. S. Ghosh and R. N. Mitra. *J. Indian Chem. Soc.* 10, 471-6 (1933).—As a result of the study of 25 sols (data are given for  $MnO_2$  only), it is concluded that when a sol is coagulated by an electrolyte such that the ions carrying the same charge as the colloid particles are not adsorbed in appreciable amts., the sol: (a) behaves normally toward diln. when coagulated by ions of varying valencies, (b) does not develop ionic antagonism, (c) does not show the phenomenon of acclimatization.

F. E. Brown

Effect of the reaction of the medium at the moment of coagulation on the structure of silica gel. I. M. O. Kharmandar'yan and V. K. Markov. *Physik. Z. Sowjetunion* 4, 172-84; *Ukrain. Khim. Zhur.* 8, Wiss. Teil 1-13 (1933).—Silica gels prepd. in acid (I), neutral (II) and alk. (III) media had the following decreasing order of properties: pore vol., adsorption capacity (for vapor) and true sp. gr., III, II, I; apparent sp. gr. (with pores) I, II, III. The radii ( $r$ ) of the pores were calcd. from Minkowsky's formula; for III, 85% of the pore vol., and for I, 14%, was contributed by pores with  $r > 2.14 \times 10^{-7}$  cm.

Very few pores have any given value of  $r$ . X-ray analysis showed that the amt. of cryst. material in the gels decreased in the order III, II, I. The same order held for speed of coagulation, and the time of beginning and the extent of syneresis.

L. E. Steiner

Kinetics of the coagulation of colloids. V. Variation of viscosity during coagulation. Shridhar S. Joshi and K. S. Viswanath. *J. Indian Chem. Soc.* 10, 329-40 (1933); cf. C. A. 27, 3869.—The slow flocculation of  $As_2S_3$ ,  $As_2S_5$ -gelatin and gelatin sols by KCl was followed viscometrically.

Frank Urban

The kinetics of slow coagulation. I. D. N. Ghosh. *J. Indian Chem. Soc.* 10, 509-16 (1933).—When coagulation of a sol is rapid Smoluchowski's equation represents its rate satisfactorily. The divergence of the observed rate from the rate predicted for slow coagulation cannot be explained by: (a) autocatalysis, (b) the polydisperse nature of the colloid, or (c) the presence of traces of electrolytes. The exptl. work was done on S sols whose rates of coagulation were measured both by a tyndallmeter and by light absorption. II. *Ibid.* 517-27.—If each colloidal particle with its double layer is considered a charged condenser, energy is evolved whenever 2 particles of different potentials unite. If all particles have the same potential there is no evolution of energy on union but the larger particle has a different potential and its union with original particles causes a decrease in free energy. The S-shape of the curve which represents slow coagulations is due to: (a) a slow formation of complex particles from simple particles of equal potential, (b) a rapid union of complex particles with simple particles and (c) a slow union of complex particles after the simple particles have become few. The addn. of some coarse particles early in coagulation should straighten out the S-curve and expts. show that it does. The disappearance of autocatalytic nature on continued dialysis is due to increase in no. of complex particles. Acclimatization and aging effect are also due to changes in no. of complex particles.

F. E. Brown

Water filtration through membranes and membrane resistance. W. W. Lepeschkin. *Kolloid-Z.* 65, 184-6 (1933); cf. C. A. 26, 5512.

Arthur Fleischer

Edometer observations as aid in investigation of gel structure. K. v. Terzaghi. *Kolloid-Z.* 65, 129-48 (1933); cf. C. A. 21, 1388; *Erdbaumechanik* (1925); Auerbach and Hort, *Handbuch physik. tech. Mechanik* Vol. IV, Pt. 2 (1931); Alexander, *Colloid Chemistry*, III (C. A. 26, 1180).

Arthur Fleischer

Gels. IV. Swelling of silica gel. D. G. R. Bonnell. *Trans. Faraday Soc.* 29, 1217-20 (1933); cf. C. A. 26, 3714.—When silica gel which has undergone syneresis is kept in hot distd. water, it again absorbs a large quantity of water if the electrolyte concn. is low. This water is not exuded when the temp. is lowered to 20° and the gel is kept stored under water. V. Effect of neutral electrolytes on the syneresis of silica gels. *Ibid.* 1221-6.—Comparatively low concns. of electrolytes ( $K_2SO_4$ ,  $Na_2SO_4$ , KCl, NaCl) do not seriously affect the syneresis of silica gels at const. pH. The main electrolyte effect is an increase of coagulation, which is reflected in the decrease of the setting time and the period of induction.

Frank Urban

Electrophoresis of lecithin in the presence of neutral salt; dual nature of the charge. Christopher W. Price and W. C. M. Lewis. *Trans. Faraday Soc.* 29, 1181-8 (1933); cf. C. A. 27, 4464.—A lecithin dispersion with the addn. of not too great a concn. of  $BaCl_2$  may be regarded as a dispersion of a simple amphoteric substance, free from its adsorption charge. An attempt was made to sep. the net charge on a lecithin dispersion into its 2 parts: the charge due to ionization of the amphoteric groups, and that due to the adsorption of neg. ions by the fatty surfaces of the particles.

Frank Urban

The influence of the underlying surface on the cataphoretic mobility of adsorbed proteins. A. Dummett and Philip Bowden. *Proc. Roy. Soc. (London)* A142, 882-401 (1933).—Measurements of the electrokinetic properties of proteins adsorbed on different surfaces was made in aq. soln. In gelatin, the cataphoretic mobility was independent of the nature of the underlying surface.

Measurements on the rate of adsorption showed that surface equil. of the protein was secured in a few sec. in strong solns. ( $10^{-1}$  g./l.), but for dil. solns. required several hrs. Oxy- and carboxy-hemoglobin gave sharp adsorption maxima, an indication of satn. of the surface. The cataphoretic mobility and apparent isoelec. point were markedly dependent on the nature of the underlying surface. The two compds. had identical electrokinetic properties when adsorbed. No evidence was found for two forms of hemoglobin with different isoelec. points.

Calvin Brous

**Electrophoretic mobilities and the isoelectric point of protein-coated particles.** Otto Halpern. *J. Chem. Phys.* 1, 882-4(1933).—A math. explanation is given of the isoelec. action of quartz or glass particles of microscopic size suspended in a liquid and coated with a superficial protein layer.

Gerald M. Petty

**The distribution of the electrical charge in the protein molecule.** V. Vlassopoulos. *Praktika (Akad. Athenon)* 7, 50-3(1932)(in German).—The dielec. const. of solns. of hemoglobin was studied by addn. of acid or alkali in order to study the distribution of the reactive groups amino and carboxyl at the surface of the protein mol. The const. is similar to that of water; therefore previous measurements do not permit any clear conclusions to be drawn.

Lucien V. Dyrenforth

**Solubility of gases. II. Solubility of argon.** B. Znskind and I. Kasarnovskii. *Z. anorg. allgem. Chem.* 214, 385-95(1933); cf. *C. A.* 26, 358.—The soly. of A in 23 solvents, including homologous series of alcs., ketones, and aromatic and cyclic hydrocarbons, was studied. Contrary to the electrostatic theory, the elec. moment plays an unimportant part. The soly. of various noble gases increases with their polarizability, in agreement with the theory of London (*C. A.* 25, 1715). C. L. Wilson

**A rule for the expression of the partition of associating substances.** H. J. Almquist. *J. Phys. Chem.* 37, 991-4(1933).—The distribution of assocg. substances between water and various solvents obeys the equation  $C_s/C_w = K_s C_w + K_i$ , where  $C_s$  and  $C_w$  represent the molar concns. in the non-aq. solvent and in water, resp., and  $K_s$  and  $K_i$  are const. By making a few simple assumptions this equation is derived with the help of the mass-law relations for assocn. in each of the phases.

P. H. Emmett

**Rotatory power of very dilute solutions. I.** Psychès. *J. phys. radium* [7], 4, 594-608(1933).—A polarimetric method is described for precision measurement of the rotation of solns. on the order of 0.001 M. All the sp. rotation-concn. curves of the alkali tartrates, when extrapolated to zero concn., give  $[\alpha]_{D}^{20} = 45.7^\circ$  for the tartrate ion. From this value,  $[\alpha]$  for the Cs, Rb and K tartrates increases constantly with concn. (greatest increase for the Cs tartrate), while  $[\alpha]$  for the Na and Li tartrates passes through a max. For K tartrate,  $[\alpha]_{D}^{20} = 45.68 + 0.0642 \sqrt{C}$  ( $C$  in millimoles/l.) for the range 0.002-2.0 M.

L. E. Steiner

**Molar refraction in dilute solutions. II. Precise interferometric measurement of the refractive index.** W. Geffcken and A. Kruis. *Z. physik. Chem.* B23, 175-92(1933); cf. *C. A.* 27, 2865.—A modified form of the Haber-Loewe interferometer is described with chambers 10 and 50 cm. in length. Monochromatic light is used so that high orders of interference can be obtained. For solns. up to 2 N, the abs. precision is  $5 \times 10^{-7}$ ; for solns. below 0.1 N,  $3 \times 10^{-6}$ . The errors involved are discussed in detail. A few graphs show results for KCl, NaCl and  $\text{NH}_4\text{NO}_3$ .

G. M. Murphy

**Electroendosmosis and electrolytic water transport. III. Solutions of copper salts.** H. C. Hepburn. *Proc. Phys. Soc. (London)* 45, 755-64(1933); cf. *C. A.* 26, 359.—The electroosmotic ( $v$ ) and electrolytic water transport through parchment membranes in contact with  $\text{CuCl}_2$  and  $\text{Cu}(\text{NO}_3)_2$  solns. was detd.  $v$  is very much greater for  $\text{CuSO}_4$ . The effect of sulfate ion is too great to be accounted for by the effect of valency alone.

F. Urban

**The thermodynamics of ionized water in potassium and sodium bromide solutions.** Herbert S. Harned and

Walter J. Hamer. *J. Am. Chem. Soc.* 55, 4496-507(1933).—Measurements were made of the e. m. f. of the cells  $\text{H}_2 | \text{MOH} (0.01 M), \text{MBr} (M) | \text{AgBr} | \text{Ag}$  and  $\text{H}_2 | \text{HBr} (0.01 M), \text{MBr} (M) | \text{AgBr} | \text{Ag}$  in aq. soln. from 0.01 to 3 molal and from  $0^\circ$  to  $60^\circ$ , M being Na or K. From these data were calcd.: the values of the normal potential of the Ag-AgBr electrode; the activity coeff. of HBr and the ionic activity coeff. product of  $\text{H}_2\text{O}$  in both KBr and NaBr solns.; the partial molal heat content of HBr in KBr and NaBr solns.; and the total heat of the disson. of  $\text{H}_2\text{O}$  in aq. KBr and NaBr.

F. D. R.

**Evidence for electrolytic dissociation in sulfuric acid from Raman effect.** I. Raniakrishna Rao. *Indian J. Physics* 8, 123-35(1933).—Electrolytic disson. in  $\text{H}_2\text{SO}_4$  was studied qualitatively by using the Raman effect. Lines were observed with frequency shifts of 416, 562, 742, 910, 1043, 1171 and 1365  $\text{cm}^{-1}$ . Lines 562, 910, 1171 and 1365  $\text{cm}^{-1}$  decrease rapidly in intensity with diln. Line 1043  $\text{cm}^{-1}$  increases in intensity and is attributed to the formation of  $\text{HSO}_4^-$  through electrolytic disson. With increased diln. a new line  $\Delta\nu = 980 \text{ cm}^{-1}$  appears. This also occurs in the Raman spectra of solns. of sulfates and is considered to be caused by  $\text{SO}_4^{--}$  from further disson.  $\text{HSO}_4^-$ . Lines, 562, 1171 and 1365  $\text{cm}^{-1}$ , being analogous to the Raman lines for  $\text{SO}_2$  in soln., are attributed to mols. of the type  $\text{SO}_2(\text{OH})_2$ . This conclusion is supported by some chem. behavior and by the rapid disappearance of the lines with very slight diln. of the concd. acid.

Calvin Brous

**The ionizing effect of solvents.** A. H. W. Aten and Louise Boerlage. *Rec. trav. chim.* 52, 1046-51(1933).—The theory is advanced that a mixed solvent contg. pos. and neg. partial moments causes increased ionization, because of assocn. of the pos. ion with a solvent mol. having a neg. moment and the neg. ion with a mol. of pos. moment. Expts. on the soly. and cond. of substituted  $\text{NH}_4$  salts in  $\text{PhNO}_2$ - $\text{PhNH}_2$  mixts. are in accord with the theory.

A. B. F. Duncan

**The determination by fractional distillation of the ionization constant of weak acids that are little volatile.** P. Jaulmes. *J. chim. phys.* 30, 556-9(1933); cf. *C. A.* 27, 3870, 4487.—From the distn. of a dil. soln. of a weak volatile acid whose ionization const. is known, such as HOAc, in the presence of the salt of another weak acid that is little volatile, the ionization const. of the second acid can be calcd.

L. E. Steiner

**A thermodynamic study of lithium sulfate.** Yuji Ueda. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 879-91(1933).—The e. m. f. of the reversible galvanic cell, Li-amalgam (0.035%)  $| \text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ , satd. soln.,  $\text{Hg}_2\text{SO}_4 | \text{Hg}$ , was given by  $E = 2.67489 - 0.000241(t - 25)$  v. from  $20^\circ$  to  $30^\circ$ . The vapor pressures of the systems  $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ -satd. soln. and  $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O} - \text{Li}_2\text{SO}_4$  were 20.11 and 2.25 mm., resp., at  $25^\circ$ . The following heats of reaction were measured, at  $25^\circ$ , in cal. per mol.:  $\text{Li}_2\text{SO}_4(s) + 400 \text{ H}_2\text{O}(l), Q = 6783$ ;  $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}(s) + 399 \text{ H}_2\text{O}(l), Q = 3765$ ;  $\text{Li}_2\text{SO}_4 \cdot 17.75 \text{ H}_2\text{O}(l) + 382.25 \text{ H}_2\text{O}(l), Q = 1072$ . From these and other data the following values were calcd. for  $25^\circ$ :  $2 \text{ Li}(s) + \text{S}(s, \text{rhombic}) + 2 \text{ O}_2(g) = \text{Li}_2\text{SO}_4(s), \Delta F^\circ = -313,614, \Delta H^\circ = -338,099, \Delta S^\circ = -82.3$ ;  $\text{Li}_2\text{SO}_4(s), S^\circ = 38.7$  (the units are cal., deg., mols.).

F. D. Rossini

**The electrometric titration of creatine ester hydrochloride and some related compounds.** Crawford F. Failey and Erwin Brand. *J. Biol. Chem.* 102, 767-71(1933).—The following log disson. consts. are reported: creatine (I) 2.67, *N*-methyl-*N'*-carboxymethylguanidine (isocreatine) 2.88, guanidoacetic acid (II) 2.86, creatinine 4.84 (cf. Cannan and Shore, *C. A.* 23, 162), glycoxyamidine 4.80. The Me esters of I and II undergo irreversible change in alk. solns. to the corresponding anhydrides; so on reacidification the disson. consts. obtained are those of creatinine and glycoxyamidine, resp. Disson. consts. for the Me esters of I and II therefore could not be detd.

K. V. Thimann

**Contact potentials and the effects of unimolecular films on surface potentials. I. Films of acids and alcohols.** Wm. D. Harkins and E. K. Fischer. *J. Chem. Physics* 1,

852-62(1933).—An app. was constructed for the simultaneous detn. of film pressure and surface potential, and for the detn. of the location and contour of continents and islands of condensed film. Surface potentials and film pressures were detd. for stearic, palmitic, lauric, penta-decylic and oleic acids, and cetyl and myristyl alcs. at 17°. The relations between surface potentials, dipole moments and mol. orientation in surfaces are discussed. Surface potential varies with the length and shape of the hydrocarbon part of the org. mol., the nature, no. and position of the polar groups in the mol.,  $p_H$ , temp., concn. of the film-forming substance in the film, the nature of ions in the soln. and the time. The films studied exhibited hysteresis in the surface potential. Gerald M. Petty

Derivation of equations for regular solutions. J. H. Hildebrand and S. E. Wood. *J. Chem. Physics* 1, 817-22 (1933).—Menke's probability function is used in the statistical treatment of the intermol. potentials in solns. of those sym. mols. whose entropy of mixing equals that of an ideal soln. of the same compn. The departure of 1 soln. from ideal solns. laws is calcd., and agrees with expt. Gerald M. Petty

Calculation of characteristic values for periodic potentials. Harold D. Koenig. *Phys. Rev.* 44, 657-65 (1933).—Math. L. S. Kassel

Effect of supersonic waves on chemical phenomena. II. Mechanical passivity. Nobuo Moriguchi. *J. Chem. Soc. Japan* 54, 1047-53(1933); cf. *C. A.* 28, 3987.—When a plate of an electroneg. metal was dipped into an aq. soln. of metallic salt and supersonic waves were applied, the colloid of the depositing metal was obtained. With Zn in  $\text{CuSO}_4$  soln. colloidal Cu resulted. Stable colloids of Al, Zn, Fe, Sn, Cu, Sb and Bi were prepd. by applying supersonic waves to metallic powders in water. Similarly the colloids of S, blood charcoal and  $\text{BaSO}_4$  were obtained. The evolution of  $\text{CO}_2$  by the action of  $\text{H}_2\text{SO}_4$  on marble was considerably accelerated when supersonic waves were applied, and colloidal  $\text{CaSO}_4$  was produced. T. Katsumi

The equilibrium among carbon monoxide, hydrogen, formaldehyde and methanol. I. The reactions  $\text{CO} + \text{H}_2 \rightleftharpoons \text{HCHO}$  and  $\text{H}_2 + \text{HCHO} \rightleftharpoons \text{CH}_3\text{OH}$ . Roger H. Newton and Barnett F. Dodge. *J. Am. Chem. Soc.* 55, 4747-59(1933).—A trace of  $\text{CH}_3\text{O}$  is synthesized from CO and H over a Cu-Zn catalyst at 225-50° and 3 atm.; the equil. approached from both sides gives  $\log K_p = (374/T) - 5.431$  approx.  $\text{CH}_3\text{O}$  is readily hydrogenated at 120-200° and 1 atm. over various Cu-alloy and other catalysts, but Os, Pt and pure Zn are inactive:  $\log K_p = (4600/T) - 6.470$  approx. A change in the compn. or structure of the catalyst has a marked effect on the nature and amt. of side reaction, Ni catalysts promoting decompn. of  $\text{CH}_3\text{O}$ , while some Cu catalysts yield 53-72%  $\text{HCO}_2\text{Me}$ . Conclusion: Direct thermal synthesis of  $\text{CH}_3\text{O}$  is not feasible; its production from MeOH requires a temp. of 400°. H. A. Beatty

Displacement of equilibrium at constant volume. R. Étienne. *Compt. rend.* 197, 986-8(1933); cf. *C. A.* 27, 5624.—Theoretical. Howard A. Smith

The rate of solution of oxygen in acetone solution of anhydrous stannous chloride. Susumu Miyamoto and Eiyo Utunomiya. *J. Chem. Soc. Japan* 54, 1053-60 (1933).—By means of an app. similar to that of Ledig and Weaver (cf. *C. A.* 18, 1412) the soln. velocity of O in  $\text{Me}_2\text{CO}$  soln. of  $\text{SnCl}_2$  was measured. When the concn. of  $\text{SnCl}_2$  is small the initial soln. velocity of O does not change with the concn., but when the concn. is greater the initial soln. velocity increases with concn. T. Katsurai

Effect of electric poles on linear speed of crystallization of salol. G. E. Mikhlin and S. S. Urazovskii. *J. Phys. Chem.* (U. S. S. R.) 1, 419-25(1930).—Elec. fields reduce the speed of crystn. of salol independently of the order of effect of fields and of seeding. The after-effect of the field was studied. The elec. cond. of salol under the influence of a field is not changed. G. Facrman

The kinetics of the reaction between hydrogen and nitrous oxide. I. H. W. Melville. *Proc. Roy. Soc. (London)* A142, 524-45(1933).—The kinetics of the

reaction between H and  $\text{N}_2\text{O}$  was investigated in silica bulbs at 50-400 mm. pressure and 550-700°. The reaction rate is faster than the decompn. rate of  $\text{N}_2\text{O}$ ; the main products are N and  $\text{H}_2\text{O}$ . The rate is directly proportional to the pressure of  $\text{N}_2\text{O}$  and nearly independent of that of H except when the pressure of the  $\text{N}_2\text{O}$  is high. The reaction rate increases with the width of the vessel but the increase is not proportional to the square of the diam. The apparent activation energy is 32 kg.-cal. N and A have no effect. Mechanisms for the initiation, propagation and termination of the reaction are given. C. B.

The rate of oxidation of hydrogen peroxide by chlorine in the presence of hydrochloric acid. Benjamin Makower and Wm. C. Bray. *J. Am. Chem. Soc.* 55, 4765-76 (1933); cf. *C. A.* 19, 3411.—The rate of oxidation of  $\text{H}_2\text{O}_2$  by  $\text{Cl}_2$  measured at 0.6°, 10° and 25° in 0.4-5.2 M HCl, is detd. by the bimol. reaction between  $\text{H}_2\text{O}_2$  and  $\text{HOCl}$ , the electronic mechanism of which is discussed. At low HCl concn. the velocity const. falls off in a marked degree, and no kinetic explanation can as yet be offered for this. H. A. Beatty

The rate of bromate formation in aqueous solutions containing hypobromous acid and its anion. Herman A. Liebhafsky and Benjamin Makower. *J. Phys. Chem.* 37, 1037-46(1933).—At low bromide-ion concns. the time for half decompn. of  $\text{HBrO}$  solns. was about  $10^4$  times as long as indicated by one rate law given by Skrabal and Webersich for the rate of the reaction  $5\text{HBrO} = \text{BrO}_3^- + 2\text{Br}_2 + \text{H}^+ + 2\text{H}_2\text{O}$ . Addnl. expts. and a reexamin. of the data of S. and W. indicate that the rate is approx. proportional to  $[\text{HBrO}]^2[\text{BrO}^-]$ . This rate law is analogous to that found for the formation of  $\text{ClO}_3^-$  and  $\text{IO}_3^-$  from  $\text{HClO}$  and  $\text{KIO}$ , resp. P. H. Emmett

The reaction between hydrogen iodide and chlorine. Ronald B. Mooney and Hugh G. Reid. *J. Chem. Soc.* 1933, 1315 18.—The reaction of  $\text{Cl}_2$  with HI is homogeneous and bimol., proceeding in 2 stages: (1)  $\text{HI} + \text{Cl}_2 \rightarrow \text{HCl} + \text{ICl}$ ; (2)  $\text{HI} + \text{ICl} \rightarrow \text{HCl} + \text{I}_2$ . When solns. of III and  $\text{Cl}_2$  in  $\text{CCl}_4$  are mixed, the  $\text{I}_2$  coloration appears at once. With initial concns. of HI and  $\text{Cl}_2$  in the mixed solns. varying from 0.05 M to 0.0005 M, the reaction was half complete in 0.0085 sec., which is the time required for the solns. to mix in the app. used, and is therefore an upper limit only for the time of half-reaction. The collision efficiency is  $< 2.6 \times 10^{-6}$  at room temp. The reaction is too fast to be accounted for by the mechanism  $2\text{HI} + \text{Cl}_2 \rightarrow 2\text{HCl} + \text{I}_2$ . The rapid reaction is not due to traces of moisture. Neither does reaction occur at the glass surfaces. In  $\text{C}_2\text{H}_4$  at -78° and in iso- $\text{C}_4\text{H}_{10}$  at -110° as solvents, the time required for half-reaction was 0.2 sec. This gives a value  $E < 5.5$  kg.-cal. as an upper limit for the heat of activation of the bimol. reactions 1 and 2. The reaction of III with  $\text{Cl}_2$  does not proceed by a chain of ternary collisions involving Cl atoms, e. g.,  $\text{Cl} + \text{HI} + \text{Cl}_2 \rightarrow \text{ClH} + \text{ICl} + \text{Cl}$  because all homogeneous reactions leading to the production of Cl atoms from III and  $\text{Cl}_2$  require more than 9 kg.-cal. activation and could not supply sufficient  $\text{Cl}^0$  to give the observed velocity at -110°. Ternary collisions of the type  $\text{HI} + \text{Cl}_2 + \text{M}$  ( $\text{M} = \text{any mol.}$ ) leading to  $\text{HCl} + \text{ICl}$  either directly or by way of an intermediate addn. compd.  $\text{HICl}_2$  are possible. Louise Kelley

The reaction between hydrogen iodide and the cyanogen halides. Ronald B. Mooney and Hugh G. Reid. *J. Chem. Soc.* 1933, 1318 23.—The reactions in  $\text{CCl}_4$  were followed colorimetrically by means of the free  $\text{I}_2$  formed. The reaction went to half completion in 0.02 sec. with 0.001 M concns. The velocity const. was  $1.6 \times 10^4$ . The reaction of HI with  $\text{BrCN}$  in  $\text{CCl}_4$  is not instantaneous. With concns. approx. M/200 half-reaction required about 30 sec. In carefully dried solns. the time required for half-reaction was about 10 min. The bimol. velocity const. calcd. on the assumption of the comparatively slow reaction  $\text{HI} + \text{BrCN} \rightarrow \text{HBr} + \text{ICN}$  followed by the rapid reaction  $\text{HI} + \text{ICN} \rightarrow \text{HCN} + \text{I}_2$  was 0.2 at room temp. The time for half-reaction of HI and  $\text{ClCN}$  in  $\text{CCl}_4$  is a few hrs., and the rate is retarded by using carefully dried solns. The reaction is not bimol. The reac-

tions of HI with ICN and BrCN are too rapid to be followed manometrically in the gas phase. The slower reaction of HI with C<sub>2</sub>ICN (both dry) was studied at 14° and 15° and with partial pressures of the reactants between 15 and 120 mm. The decrease in pressure obtained when the reaction was allowed to go to completion was approx. 3 times as much as would be expected from the reaction  $2\text{HI} + \text{CICN} \rightarrow \text{HCl} + \text{HCN} + \text{I}_2$  (cryst.). The solid deposit formed was probably CH<sub>3</sub>NCI, formimide chloride, and the change in pressure is accounted for by the reaction  $2\text{HI} + \text{CICN} \rightarrow \text{CH}_3\text{NCI} + \text{I}_2$  (cryst.). At 14° the gas reaction was about 20 times and at 25° 100 times as fast as in CCl<sub>4</sub> at comparable concns. If the reactions are homogeneous and proceed at rates governed by binary collisions between HI and cyanogen halide, the energies of activation of the rate-dtg. reaction can be calcd. as 9, 15 and 18 kg.-cal. for the reactions of HI with ICN, BrCN and CICN, resp.

**Kinetics of the reaction of sulfonation and monosulfonation of naphthalene.** I. S. Ioffe. *Anilinokrasochaya Prom.* 3, 298-304(1933).—Exptl. evidence is given, contradicting the observation of Guyot (C. A. 14, 404), that the concn. of spent H<sub>2</sub>SO<sub>4</sub> depends not only on the temp. of the reaction and the nature of the sulfonated compd., but also on the proportions of the 2 reagents. In the sulfonation of *p*-MeC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub>, studied by Martinson (C. A. 2, 2640), the observed process is the algebraic sum of the reactions of sulfonation and hydrolysis:  $dx/dt = (dx_1/dt) - (dx_2/dt) = k_1(A - x)(S - x) - (H + x)\tau$ , in which  $k_1$  and  $k_2$  are variables and are detd. by the acidity of the medium, or  $x$ . These equations apply only to the initial stage of sulfonation and to the compds. giving only 1 isomer. By direct sulfonation of C<sub>10</sub>H<sub>8</sub> at a moderate temp. the equil. in the ratio of  $\alpha$ - to  $\beta$ -C<sub>10</sub>H<sub>7</sub>SO<sub>3</sub>H, and thereby the equil. of the sulfonation, is reached after a very prolonged heating with formation of considerably smaller proportion of  $\beta$ - in the mixt. of the isomers than is claimed by Kuwes (C. A. 3, 2702). The ratio  $\alpha$ - to  $\beta$ -C<sub>10</sub>H<sub>7</sub>SO<sub>3</sub>H at the state of equil. is equal to the ratio of the velocity coeffs. of the formation of the 2 isomers divided by the ratio of the velocity coeffs. of their hydrolysis, and depends only on these coeffs. The formula is applicable to all cases of sulfonation producing several isomers. At the state of equil. there must be 22.6% and not 80%  $\alpha$ -C<sub>10</sub>H<sub>7</sub>SO<sub>3</sub>H, as generally claimed, which value closely approximates 29.3%  $\alpha$ -C<sub>10</sub>H<sub>7</sub>SO<sub>3</sub>H obtained by prolonged heating of C<sub>10</sub>H<sub>8</sub> with H<sub>2</sub>SO<sub>4</sub> at 100°. Math. analysis of the process of sulfonation shows that with a mixt. of 2 unequally hydrolyzable isomers the ratio of the 2 is variable, whereby the proportion of the more easily hydrolyzed isomer is gradually decreased.

**The kinetics of diazotization.** I. E. Abel, H. Schmid and W. Sidon. *Z. Elektrochem.* 39, 863-71(1933).—The reaction of glycine with HNO<sub>2</sub> in an atm. of NO was followed by measuring the rate of N<sub>2</sub> evolution. The rate is  $dN_2/dt = k_1[{}^+\text{H}_3\text{NCH}_2\text{COOH}][\text{NO}_2][\text{HNO}_2]$ . At 25°  $k_1 = 2.6 \times 10^3$  (concn. in mols./l., time in min.). The kinetic equation is identical with that formulated for the decompn. of NH<sub>4</sub>NO<sub>2</sub> (cf. C. A. 25, 5338) but  $k_1$  (glycine) = 1000  $k_1$ (NH<sub>4</sub>NO<sub>2</sub>). Variations of  $k_1$  with total ionic concn. and sp. effects of excess NO<sub>2</sub><sup>-</sup> and H<sup>+</sup> are discussed. A mechanism of diazotization is suggested involving an intermediate compd. contg. 3 N atoms.

**Slow combustion of benzene. Velocity of reaction.** Jean Amiel. *Compt. rend.* 197, 984-6(1933).—Curves for the velocity of reaction vs. percentage of carbon transformed at different times after the start of the reaction are given for temps. from 693 to 773°K. The velocity is const. for the first part of the reaction and can be expressed as  $\log V = (12,300/T) + 18.21$ . Toward the end of the reaction the velocity falls off more or less rapidly, depending upon the reaction temp.

**Reaction between ethylene and bromine in the dark.** Shinroku Mitsukuri, Susumu Kinumaki and Tadatomo Asaoka. *J. Chem. Soc. Japan* 54, 1061-8(1933).—The formation of C<sub>2</sub>H<sub>4</sub>Br<sub>2</sub> by the reaction between C<sub>2</sub>H<sub>4</sub> and Br<sub>2</sub> was studied within the temp. range 0-15°. The

reaction velocity was expressed by the formula  $d[\text{C}_2\text{H}_4\text{Br}_2]/dt = k[\text{Br}_2]/[\text{C}_2\text{H}_4\text{Br}_2]$ , in which  $t$  is time and  $k$  a const.

T. Katsural

**Rates of the thermal decomposition of certain triphenylmethyl alkyl ethers.** James F. Norris and Arthur Creswell. *J. Am. Chem. Soc.* 55, 4946-51(1933).—Data are given for the Me, Et and iso-Pr ethers. The Et ether at the lower temps. and up to about 11% decompn. showed the characteristics of a reaction of the 1st order and the rate doubled for a rise of 10°. Similar results were obtained with the iso-Pr ether up to about 28% decompn. The calcd. 1st-order velocity consts. for the Me ether increased rapidly with time. Ph<sub>3</sub>CH, a product of the decompn., had a marked accelerating effect on the decompn. The presence of a small amt. of air increased greatly the rate of pyrolysis.

C. J. West

**The transformation of cyclopentadiene into its dimeride.** R. G. V. Barrett and L. J. Burrage. *J. Phys. Chem.* 37, 1029-35(1933).—The vapor pressure of cyclopentadiene was measured at various temps. during the change from 100% monomeride to 100% dimeride. The extent of transformation was detd. from the vapor pressure-compn. curve of known mixts. of the two. The amt. of monomeride remaining after 93 days at 12° was 0.73%. The transformation was apparently complete after one year. The dimeride forms liquid crystals.

P. T. Newsome

**The effect of substituents on the heat of activation of a simple addition reaction.** Eduard Hertel and Jutta Dressel. *Z. physik. Chem.* B23, 281-90(1933); cf. C. A. 27, 5228.—The rate of the reaction:  $p\text{-XC}_6\text{H}_4\text{NMe}_2 + \text{C}_6\text{HY}(\text{NO}_2)_2\text{OMe} \rightarrow [p\text{-XC}_6\text{H}_4\text{NMe}_2][\text{C}_6\text{HY}(\text{NO}_2)_2\text{O}]$ , where X = Br, H, Me, OMe, OEt and Y = H and Me was studied at 15°, 25° and 35°. The reaction is bimol. with the Me group of anisole entering into the NH<sub>2</sub> group of aniline. From the reaction rate const. the heat of activation is calcd. from the Arrhenius equation,  $\ln k = -(A/T) + B$ . If B is const. for each temp. and independent of the substituting groups, the heat of activation is an additive property.

G. M. Murphy

**Purification and physical properties of chemical compounds. IV. Development of a theoretical basis for the behavior of controlled time-temperature curves.** Evald L. Skau and Wendell H. Langdon. *Proc. Natl. Acad. Sci.* 19, 943-7(1933); cf. C. A. 27, 3912.—Mathematical development of exptl. considerations for a particular type of equipment.

Howard Agnew Smith

**The boiling points of concentrated solutions of the system (K.NH<sub>4</sub>)(NO<sub>2</sub>,Cl).** S. I. Aronova and Z. N. Lunskaya. *Trans. Sci. Inst. Fertilizers (Moscow)* No. 92, 139-48(1932).—Satd. KCl soln.  $b_{748}$  108.7°, 100 g. of the soln. contg. 38.01 g. of the salt. Satd. KNO<sub>3</sub>  $b_{748}$  117°, 100 g. of the soln. contg. 76.72 g. KNO<sub>3</sub>. NH<sub>4</sub>Cl soln.  $b_{748}$  118°, 100 g. of the soln. contg. 46.52 g. of the salt. NH<sub>4</sub>NO<sub>2</sub> m. 170°, decomposes to H<sub>2</sub>O and N<sub>2</sub>O at 245°. A soln. contg. KNO<sub>3</sub> 58.3, KCl 9.3, and H<sub>2</sub>O 22.4 g.  $b_{748}$  121.4°. A soln. of NH<sub>4</sub>Cl 40.8, KCl 8.0, and H<sub>2</sub>O 51.2 g.  $b_{748}$  117°. Adding NH<sub>4</sub>NO<sub>2</sub> to a satd. soln. of boiling KNO<sub>3</sub> raises the b. p. The temp. increased to 165° when the soln. became thick and the expt. could not be continued. At 144.5° the compn. was: KNO<sub>3</sub> 49.2, NH<sub>4</sub>NO<sub>2</sub> 42.4 and H<sub>2</sub>O 8.3 g. KCl + KNO<sub>3</sub> + NH<sub>4</sub>Cl b. above 165°. NH<sub>4</sub>NO<sub>2</sub> by itself or in the presence of KCl does not decompose until all the water has been driven off.

J. S. Joffe

**Thermodynamic considerations on a new kind of transition point.** Otto Halpern. *J. Chem. Physics* 1, 880-1(1933).—The coexistence of two phases is observable only if the two phases show a discontinuity in energy as well as in sp. heat.

F. D. Rossini

**Binary systems. IV. Ethane-systems.** F. E. C. Scheffer and J. Smittenberg. *Rec. trav. chim.* 52, 982-6(1933); cf. C. A. 27, 4995.—In the system ethane-*p*-dichlorobenzene no phase separates because of large mutual soly. In the system ethane-1,3,5-trichlorobenzene there is phase separation over a small temp. interval. Ethane-*p*-chlorobromobenzene has a quadruple point at 40° and 53.0 atm. pressure. Ethane-*p*-chloriodobenzene has a quadruple point at 34.4° and 49.3 atm.

A. B. F. D.

The Hall effect and resistance of hydrogen-bearing alloys of palladium with silver and gold. Justus Wurmman. *Ann. Physik* 18, 233-50 (1933).—The Hall, photoelec. and thermoelec. effects in H-free Pd-Ag alloys are parallel, all showing maxima at 40% Ag. In H-free Pd-Au alloys the photoelec. and thermoelec. effects have maxima at 40% Au; the Hall effect is greatest at 65% Au. Absorbed H raises the photoelec. and thermoelec. effects, and decreases the Hall effect. The data do not agree with the Sommerfeld electron theory. Data are presented in both tabular and graphical form. Gerald M. Petty

Electrical conductivity and equilibrium diagrams of binary alloys. VIII. The system: lithium-cadmium. G. Grube and H. Vosskuhler. *Z. anorg. allgem. Chem.* 215, 211-24 (1933); cf. C. A. 27, 934.—The compd.  $\text{Li}_2\text{Zn}$  was confirmed; the compd.  $\text{LiZn}$  (C. A. 27, 2407) could not be confirmed. A new compd.  $\text{LiZn}$ , formed by cooling below 93°, was found. Curtis L. Wilson

Hydrolytic decomposition of tricalcium silicate. R. Tavasci. *Ann. chim. applicata* 23, 413-27 (1933).—The complete equil. of the system  $\text{CaO-SiO}_2\text{-H}_2\text{O}$  was detd. at ordinary temp. and pressure, by hydrolysis of  $3\text{CaO} \cdot \text{SiO}_2$ . In the presence of the liquid phase, the solid phase in equil. with cryst.  $\text{Ca}(\text{OH})_2$  is essentially  $5\text{CaO} \cdot 3\text{SiO}_2 \cdot \text{aq}$ . The hydrosilicate formed behaves like zeolites. There are also discontinuities in the concn. of  $\text{CaO}$  in the liquid phase when the solid has the comps.  $\text{CaO} \cdot \text{SiO}_2 \cdot \text{aq}$ . and  $\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{aq}$ . A. W. Contieri

The system: cadmium nitrate-nitric acid-water. A. Slevaters and W. Petzold. *Z. anorg. allgem. Chem.* 214, 396-402 (1933); cf. C. A. 27, 4156, 5626.—Isotherms were detd. between 0° and 50°. All ternary eutectics and transformation points lie below 0°.  $\text{Cd}(\text{NO}_3)_2$  is practically insol. in 100%  $\text{HNO}_3$ . Acid nitrates of Cd do not exist. Curtis L. Wilson

The ternary system mercurous oxide-nitrogen pentoxide-water. Henry G. Denham and Clifford V. Fie. *J. Chem. Soc.* 1933, 1416-19.—A study of the system  $\text{Hg}_2\text{O}-\text{N}_2\text{O}_5-\text{H}_2\text{O}$  at 25° was made by the well-known residue method of Schreinemakers. The existence of the following solid phases was established:  $2\text{Hg}_2\text{O} \cdot \text{N}_2\text{O}_5 \cdot \text{H}_2\text{O}$ ,  $5\text{Hg}_2\text{O} \cdot 3\text{N}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$ ,  $4\text{Hg}_2\text{O} \cdot 3\text{N}_2\text{O}_5 \cdot \text{H}_2\text{O}$  and  $\text{Hg}_2(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$ . The last-named compd. exists in an  $\alpha$  and a  $\beta$  modification, both belonging to the orthorhombic system and tabular in the plane of the lateral axes. The  $\beta$ -crystals show different crystal faces and are possibly hemimorphic. H. S. v. Klooster

The system allyl alcohol-iodine-diiodopropyl alcohol. F. G. Caughley and P. W. Robertson. *J. Chem. Soc.* 1933, 1323-6.—The reversible reaction:  $\text{CH}_2=\text{CHCH}_2\text{OH} + \text{I}_2 = \text{CH}_2\text{ICHICH}_2\text{OH}$  was studied at 25° and 50° in  $\text{CCl}_4$ , toluene, benzene and hexane. In  $\text{CCl}_4$  at M/20 concn. and 25° the disson. of  $\text{CH}_2\text{ICHICH}_2\text{OH}$  is 28% and at M/100 it is 58%. At 50° and M/20 the disson. increases from 28 to 51%. The disson. is a unimol. reaction and the reverse reaction is bimol., both reactions being only slightly sensitive to catalytic disturbances either in the light or in the dark. Light accelerates both forward and reverse reaction but leaves the equil. unchanged. Solvents change the rate of the two opposing reactions without appreciably influencing the final state of equil. H. S. v. Klooster

Catalysis of gaseous reactions by chlorine. S. Baird-stow. *Trans. Faraday Soc.* 29, 1227-8 (1933).—Decompn. of gaseous  $\text{Et}_2\text{O}$  is catalyzed by Cl about  $1/5$  as effectively as by I (cf. C. A. 28, 401<sup>a</sup>). The purely chem. theory of the mechanism of catalysis is untenable for Cl and is improbable for I. Frank Urban

Oxidation of sulfhydryl compounds by hydrogen peroxide. II. Catalysis of oxidation of cysteine by thiocarbamides and thioglyoxalines. Norman W. Pirie. *Biochem. J.* 27, 1181-8 (1933); cf. C. A. 26, 1504.—Thiocarbamide catalyzes the oxidation of cysteine to cystine by  $\text{H}_2\text{O}_2$  in acid soln. Dithioformamidine oxidizes cysteine to a sulfenic acid; this is reduced to cystine by cysteine. Substituted thiocarbamides and related substances (e. g., ergothioneine) are catalytically active. Glutathione behaves like cysteine. B. Harrow

The mechanism of heterogeneous catalysis. Etienne Audibert. *Ann. mines* [13], 4, 138-62 (1933).—The nature of the catalyst surface is discussed critically. It is suggested that "active points" consist of abnormally spaced surface atoms. P. H. Emmett

The state of hydrogen dissolved in palladium and its relation to hydrogenation catalysis. J. Franck. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 263-6.—With the help of previously published data and evidence for the formation of  $\text{PdH}^+$  ions within samples of Pd to which  $\text{H}_2$  has been added, the heat of adsorption of a proton by Pd is calcd. as approx. 11 volts. This is more than twice the magnitude of the work function of Pd for electronic emission. The large energy is attributed to the clustering of electrons around the protons in the metal in much the same way that neg. ions cluster around pos. ions in solns. according to the theory of Debye. A correlation between the ideas of F. and the concepts of O. Schmidt in regard to hydrogenation catalysis is discussed. P. H. Emmett

A study of the effect of salts on the catalytic decomposition of hydrogen peroxide by colloidal platinum. Merle A. Heath and James H. Walton. *J. Phys. Chem.* 37, 977-90 (1933).—The effect of addns. of  $\text{NaCl}$ ,  $\text{BaCl}_2$ ,  $\text{AlCl}_3$ ,  $\text{ThCl}_4$ ,  $\text{NaNO}_3$ ,  $\text{Al}(\text{NO}_3)_3$  and  $\text{Th}(\text{NO}_3)_4$  on the catalytic decompn. of  $\text{H}_2\text{O}_2$  at 25° was detd. and compared with the effect on the migration velocity of the colloidal Pt particles in an elec. field. In general, a relation between the change in the rate of decompn. of  $\text{H}_2\text{O}_2$  and the migration velocity of the colloidal Pt particles is found. Salts of Th prove somewhat of an exception to this relation. Chloride ions, but not nitrate ions, exert a sp. inhibiting effect on the rate of decompn. P. H. Emmett

The promoter action of lead in hydrogenation with sodium amalgam. Gabriel Bertrand and Mme. S. De-launey-Auvray. *Bull. soc. chim.* 53, 1126-9 (1933).—See C. A. 27, 4997. G. G.

A comparison of the catalytic activities of liquid and solid surfaces. The decomposition of methanol on solid and liquid zinc. E. W. R. Steacie and E. M. Elkin. *Proc. Roy. Soc. (London)* A142, 457-65 (1933).—The temp. effect on the decompn. rate of gaseous  $\text{MeOH}$  over solid and liquid Zn was investigated between 360° and 440°. The catalytic activity of the Zn depends directly on the temp. There is no discontinuity at the m. p. of the catalyst. Catalytic activity is attributed to the entire uniformly active surface of the metal rather than to some limited part. Calvin Brous

Relationships between structure of catalyst and chemical change. III. J. Eckell. *Z. Elektrochem.* 39, 807-15; 855-63 (1933); cf. C. A. 27, 4996.—Catalysts of mixed crystals were chosen in which known amts. of the incorporated second component caused definite changes in the unit cell dimensions of the basic substance. Catalysts of  $\text{Fe}_2\text{O}_3$  and mixed crystals of  $\text{Fe}_2\text{O}_3\text{-Al}_2\text{O}_3$  were chosen to study the catalytic burning of CO with  $\text{O}_2$  to  $\text{CO}_2$ . The reaction was studied for the 3 mixts.  $\text{CO}:\text{O}_2 = 1:1, 2:1, 3:1$  and at temps. of 204°, 190°, 175° and 160°. The reaction is unimol. both for pure  $\text{Fe}_2\text{O}_3$  and for the mixed crystals  $\text{Fe}_2\text{O}_3\text{-Al}_2\text{O}_3$ . The manner in which the reaction proceeds is discussed in connection with the exptl. values of the velocity const.,  $k$ . From the temp. coeff.  $(d \ln k)/dT$ , a value for the "apparent" heat of activation  $Q$  can be obtained and compared for the various mixts. and catalysts. The value of  $Q$  in the temp. range 204-160° varied markedly with the different catalysts and with the gas mixt. With increasing  $\text{Al}_2\text{O}_3$  content of the catalyst the heat of activation decreases steadily ( $\text{Fe}_2\text{O}_3$ ,  $Q = 19,790$  cal.;  $\text{CO}:\text{O}_2 = 2:1$ ); ( $\text{Al}_2\text{O}_3$ , 21.9%,  $Q = 16,300$ ;  $\text{CO}:\text{O}_2$ , 2:1). With pure  $\text{Fe}_2\text{O}_3$ ,  $Q = 16,800, 19,790, 18,000$  cal. for mixts. of  $\text{CO}:\text{O}_2 = 1:1, 2:1, 3:1$ , resp. The decrease of the space lattice const. of the unit  $\text{Fe}_2\text{O}_3$  cell with correspondingly increasing amts. of  $\text{Al}_2\text{O}_3$  was measured and the change of the space-lattice parameter found to be proportional to the change of heat of activation measured on the same catalysts. There seemed to be no relation between dispersion of the catalyst particles as detd. by Röntgen measurements and the velocity const.



or heat of activation. When the dispersion of the particles was detd. more accurately by means of electron diffraction, it was found that the velocity const. increased with increased dispersion of the particles. Calcd. values of the activity and the activation energy of the catalysts, however, appeared to be independent of dispersion of the particles but decreased with rise of  $Al_2O_3$  content. From the results of this work, a definite relation between the change of lattice structure of the catalyst and its activity appears certain.

H. H. Rowley

**Low-temperature specific heats.** IV. The heat capacities of potassium chloride, potassium nitrate, and sodium nitrate. J. C. Southard and R. A. Nelson. *J. Am. Chem. Soc.* 55, 4865-9 (1933); cf. *C. A.* 28, 30.—From heat-capacity data, obtained in the range 15° to 290°K., are calcd. the following values of the entropy at 298.16°K.: KCl,  $19.75 \pm 0.06$ ;  $KNO_3$ ,  $31.77 \pm 0.10$ ;  $NaNO_3$ ,  $27.87 \pm 0.08$ , cal. deg.<sup>-1</sup> mol.<sup>-1</sup>.

F. D. Rossini

**Correlation of heat capacity, absolute temperature and entropy.** George A. Linhart. *J. Chem. Physics* 1, 795-7 (1933).—By assuming  $(dC_p/dS)_p = K$ , a const., as  $T \rightarrow 0$ , and  $(dC_p/dS)_p = 0$ , as  $T \rightarrow \infty$ , the following equations are derived for the heat capacity and entropy, resp.:  $\log(C/(C_\infty - C)) = K \log T + \log k$ ,  $S = 2.3(C_\infty/K) \log(C_\infty/(C_\infty - C))$ .  $K$  and  $k$  are consts. for each substance;  $C_\infty$  is the limiting high temp. heat capacity. The data on about 30 substances were found to be in accord within exptl. error with the above equations.

F. D. Rossini

**The heat capacity and entropy of nitrogen. Heat of vaporization.** Vapor pressures of solid and liquid. The reaction  $1/2N_2 + 1/2O_2 = NO$  from spectroscopic data. W. F. Giauque and J. O. Clayton. *J. Am. Chem. Soc.* 55, 4875-80 (1933).—Heat-capacity data were obtained on  $N_2(c,l)$  from 15°K. to the transition temp. 35.61°K.; on  $N_2(c,l)$  to the m. p. 63.14°K.; and on  $N_2(l)$  to the b. p. 77.32°K. The heats of transition, fusion and vaporization (at 1 atm.) were found to be 54.71, 172.3 and 1332.9 cal. per mol. resp. From the calorimetric data, the entropy of the ideal gas at 77.32°K. was calcd. to be 36.5  $\pm$  0.1 cal. deg.<sup>-1</sup> mol.<sup>-1</sup>; from spectroscopic data were calcd.  $S_{77.32}^\circ = 36.416$  and  $S_{298.16}^\circ = 45.788$  cal. deg.<sup>-1</sup> mol.<sup>-1</sup> (not including nuclear spin). The spin entropy is  $R \ln 9$ . The vapor pressures of solid and liquid  $N_2$  were measured:  $N_2$ , solid, 54.78° to 63.14°K.,  $\log_{10} p_{\text{mm}} = -381.6/T + 7.41105 - 0.0062372/T$ ;  $N_2$ , liquid, 63.14° to 78.01°K.,  $\log_{10} p_{\text{mm}} = -339.8/T + 6.71057 - 0.0056286/T$ . Values of  $\Delta(F^\circ - F^\circ)/T$ ,  $\Delta F^\circ/T$ , and the equil. const. were calcd. from 298.1 to 5000°K., for the reaction  $1/2N_2 + 1/2O_2 = NO$ .  $\Delta F_{298.1}^\circ = 20.65$  kg.-cal. mol.<sup>-1</sup>. Although lack of equil. between the non-combining rotational states of  $N_2$  persists into the solid at 13°K., no mol. rotation remains in the solid at this temp.

F. D. R.

**A simple calorimeter for heats of fusion.** Data on the fusion of pseudocumene, mesitylene ( $\alpha$  and  $\beta$ ), hemimellitene, *o*- and *m*-xylene on two transitions of hemimellitene. Frederick D. Rossini. *Bur. Standards J. Research* 11, 553-9 (1933) (Research Paper No. 607).—A vacuum flask with a thermoelement serves as a simple calorimeter for measuring heats of fusion quickly and economically, with an accuracy of a few %. The following heats of fusion, in kg.-cal. per mol., were obtained: pseudocumene,  $-44.1^\circ$ ,  $2.75 \pm 0.06$ ; hemimellitene,  $25.5^\circ$ ,  $2.00 \pm 0.05$ ; mesitylene ( $\alpha$ ),  $-44.8^\circ$ ,  $2.28 \pm 0.06$ ; mesitylene ( $\beta$ ),  $-51.7^\circ$ ,  $1.91 \pm 0.05$ ; *o*-xylene,  $25.3^\circ$ ,  $3.33 \pm 0.07$ ; *m*-xylene,  $-47.9^\circ$ ,  $2.76 \pm 0.05$ . Hemimellitene was found to have 2 transitions below the f. p.:  $-58 \pm 2^\circ$ ,  $0.28 \pm 0.04$ ;  $-46 \pm 1^\circ$ ,  $0.36 \pm 0.04$ , kg.-cal. per mol.

F. D. Rossini

**Is the melting of a crystalline substance related to its fore- and after-history?** M. Le Blanc and E. Möbius. *Ber. Verhändl. sächs. Akad. Wiss. Leipzig, Math.-phys. Klasse* 85, 75-96 (1933).—A vacuum calorimeter of the Nernst type is described with which heat capacities can be measured to  $\pm 0.1\%$  with a temp. rise of  $0.1^\circ$ . The heat capacities of 3 different samples of benzene (having impurities, resp., of  $2.9 \times 10^{-4}$ ,  $5.8 \times 10^{-7}$  and  $4.7 \times 10^{-7}$  mols. per g.) were measured at 6 or 8 temps. between  $0^\circ$  and

$5.5^\circ$ . Data were also obtained on ethylene bromide (impurity,  $2 \times 10^{-4}$  mols. per g.) at 5 temps. in the range  $10^\circ$  to  $25^\circ$ . From the data on benzene, the rapid increase in the observed heat capacity of the solid as the true f. p. is approached is related to the amt. of impurity—the purest sample giving the sharpest break in the heat capacity-temp. curve at the f. p. The shape of the observed heat capacity-temp. curve is given by the equation,  $C_p' = C_p + n R T^2/(T_f - T)^2$ , where  $C_p'$  is the measured heat capacity and  $C_p$  is the true heat capacity at the temp.  $T$ ,  $n$  is the amt. of impurity in mols. per g. and  $T_f$  is the true f. p.

F. D. Rossini

**Determination of the internal heat of rotation of ethane.** A. Bucken and K. Weigert. *Z. physik. Chem.* B23, 285-80 (1933).—The sp. heat of  $C_2H_6$  was measured from  $143^\circ$  to  $280^\circ$  abs. by differential measurement of thermal cond. with  $C_2H_6$ . The results are precise enough to det. the part of the molal heat due to the hindered rotation of the 2 Me groups. The depth of the potential energy curve is detd. to about 20%.

G. M. Murphy

**The heats of dilution of aqueous solutions of zinc, cadmium and copper sulfates and sulfuric acid at  $25^\circ$ .** R. Lange, J. Monheim and A. L. Robinson. *J. Am. Chem. Soc.* 55, 4733-44 (1933); cf. *C. A.* 27, 2088.—Calorimetric data are given on aq.  $H_2SO_4$  from 0.05 to 0.00005 *M* and on aq.  $CdSO_4$ ,  $ZnSO_4$  and  $CuSO_4$  from 1 to 0.00005 *M*. From these data are calcd. the relative partial molal heat contents of the solvent and solute. Addnl. heat effects accompanying the diln. of very dil. solns. due to the displacement of the equil.  $H_2O = H^+ + OH^-$  are discussed.

F. D. Rossini

**The heats of formation of binary liquid solutions from their liquid components.** J. J. Coleman and Frank E. H. Germann. *J. Chem. Physics* 1, 847-51 (1933).—The empirical equation  $\Delta H = N_1(1 - N_1)(\alpha + \beta \gamma N_1)$ , in which  $\Delta H$  is the heat of formation per mol. of soln. from its liquid components,  $N_1$  is the mol. fraction of one of the components, and  $\alpha$ ,  $\beta$  and  $\gamma$  are consts. or functions of temp., accords with the data for 59 systems.

F. D. R.

**The thermodynamic constants of iodine monochloride, iodine monobromide and bromine monochloride in carbon tetrachloride solutions.** Charles M. Blair, Jr., and Don M. Yost. *J. Am. Chem. Soc.* 55, 4489-96 (1933).—The following exptl. data were obtained: the vapor pressures of ICl and of  $Cl_2$  above their resp.  $CCl_4$  solns.; the heats of soln. of  $I_2$  and of  $Br_2$  in  $CCl_4$ ; the heats of formation of ICl, IBr and  $BrCl$  in  $CCl_4$ . From these and other data were calcd.  $\Delta F^\circ$ ,  $\Delta H^\circ$  and  $S^\circ$  for  $I_2$ ,  $Br_2$ ,  $Cl_2$ , ICl, IBr and  $BrCl$ , each in soln. in  $CCl_4$ .

F. D. Rossini

**Detn. of the solvent power of org. liquids for cellulose esters (Sakurada, Kido) 23. Corrosion of metals and colloid electrochemistry (Kistjakovskil) 9.**

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G. Fischer. M. 60 each. Cf. C. A. 27, 1265. London: Chiswick Press. 68 pp.

### 3--SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

**Matter and spatiality.** M. v. Laue. *Scientia* 54, 402-12(1933).—A discussion, chiefly concerning at. dimensions and structure. L. E. Gilson

**Non-relativistic theory of the continuous x-ray spectrum.** Fritz Sauter. *Ann. Physik* 18, 486-96(1933).—Previous treatments suffer from the defect of over-simplification of the problem in order to employ rigorous methods of solution. S. avoids this objection by relying on perturbation methods (Born-Dirac collision theory and Dirac radiation theory). The method yields the correct results and is applicable to potential fields of any given form. S. also indicates the limits of applicability of the results. Calvin Brous

**Theory of complex electronic collisions.** L. Goldstein. *J. phys. radium* [7], 4, 576-93(1933).—Math. treatment of complex, inelastic collisions in which at least 2 at. electrons take part. L. B. Steiner

**Experimental proof of the spin-conservation principle in atomic collision.** R. Döpel and K. Gailer. *Physik. Z.* 34, 827-31(1933).—By collision of He upon Hg there is obtained triplet excitation of the Hg without triplet excitation of the He. As this disagrees with results to be expected from the electron-spin-conservation principle one is forced either to give up that principle or to alter the present picture so that it may continue to serve. G. M. E.

**Ionization function of argon through argon-atom beams of less than one hundred ion-volt-equivalent.** Otto Beeck. *Physik. Z.* 34, 840-1(1933).—A discharge method has been worked out for producing and measuring fairly const. beams of atoms or ions in their own gases. For A the function is  $N = 4.5 - 6.5$  at  $0^\circ$  and 1 mm. Hg. Gregg M. Evans

**Quantitative study of the collisions of electrons with atoms.** Robert B. Brode. *Rev. Modern Physics* 5, 257-79(1933).—A survey of expts. dealing with probabilities of collision, excitation, ionization and scattering. A theoretical treatment is given in agreement with the exptl. results. A. B. F. Duncan

**Dispersion in electrically excited gases.** Rudolf Ladenburg. *Rev. Modern Physics* 5, 243 56(1933).—The anomalous dispersion of red-yellow Ne lines was measured and the results were used to calc. transition probabilities and the populations of excited levels. The population curves indicate that statistical equil. between excited atoms and electrons is reached at high currents. At very high currents equil. between different excited levels is reached. A. B. F. Duncan

**The scattering of electrons by metal vapors. II. Zinc.** E. C. Childs and H. S. W. Massey. *Proc. Roy. Soc. (London)* A142, 509-18(1933); cf. C. A. 27, 5241.—Investigations of the scattering of electrons by metal vapors were extended with measurements of the angular distributions of electrons of energy range 4-143 v. scattered elastically in Zn vapor. The exptl. curves are in good agreement with theoretical curves of the angular distributions calcd. by the use of a modified Fermi-Thomas field for Zn and Faxén and Holtsmark's theory of scattering (C. A. 22, 1273). Allen S. Smith

**Magnetic deflection method for angular distribution of electrons scattered by gas molecules.** A. Phago Gage. *Phys. Rev.* 44, 808-14(1933).—The theory of the method is developed and the app. described. As an illustration of its value, several scattering curves in Hg are shown, revealing some new details. L. S. Kassel

**Electron-deflection experiments on the variation of semiconducting crystal surfaces by electron bombardment.** R. Suhrmann. *Physik. Z.* 34, 878(1933).—Electron-deflection expts. were made to investigate a suspected connection between the change in contact potential apparent

after bombardment of a semiconducting surface with slow electrons and the appearance of the blocking effect. Results with galena, stibnite and pyrites crystals showed that the deflection max., present initially, disappear after bombardment for 5 min. with  $10^{-8}$  amp. and 100 v. accelerating potential; they reappear 1-2 hrs. later. Conclusion: The change in contact potential and perhaps also the blocking effect may be traced to a disturbance in the crystal lattice. Allen S. Smith

**Electron interference from emery-smoothed and polished surfaces.** H. Raether. *Physik. Z.* 34, 839-40(1933).—The Debye-Scherrer rings are attributed to small crystal points through which the electrons travel. Lowering of these by use of finer emery or polishing increases the brightness of the rings. Polished or hammered surfaces show only a metallic luster. With non-metals, FeS<sub>2</sub> and C gave lattice, and NaCl, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub> powder diagrams. Careful polishing of some NaCl and CaF<sub>2</sub> specimens gave filament-structure indications, while in other cases CaF<sub>2</sub> and CaCO<sub>3</sub> gave single-crystal structure with refractive effect. Gregg M. Evans

**Helium hydride ion.** George Glockler and D. L. Fuller. *J. Chem. Physics* 1, 886-7(1933).—Math. The HeH<sup>+</sup> ion is composed of a He ion and a H atom rather than an excited He atom and a proton. Gerald M. Petty

**Photoelectric sensitization of cesium.** W. Kluge. *Physik. Z.* 34, 844-6(1933).—At  $-39^\circ$  and 5400 A. U., the photoelec. work function is of the order of  $10^{-8}$  coulombs per cal. For a Cs—Cs<sub>2</sub>O—Ag sensitized layer the max. emission is, for mirror surfaces, at about 7500 A. U., and for rough surfaces, at about 8600 A. U. Gregg M. Evans

**The emission constants of metals in the near infra-red.** C. Hurst. *Proc. Roy. Soc. (London)* A142, 466-80(1933).—The emissivity for a given wave length was measured directly as the ratio between the energy received from a given area of the radiating metal and the energy received from an equal area of a black-body slot cut in the metal and radiating, therefore, at the same temp. as the metal. Data were obtained for Cu over a wave-length range 1.5-5  $\mu$  at 2 temps.,  $700^\circ$  and  $850^\circ$ , and for Ni over the range 1.25-6.5  $\mu$  at  $850^\circ$  and the range 1-6.5  $\mu$  at  $1000^\circ$ . The emissivity (in percentage) of Cu at  $850^\circ$  is 6.1 at 1.5  $\mu$  and 3.55 at 5  $\mu$ . For Ni at  $850^\circ$  it is 21.1 at 1.5  $\mu$  and 10.2 at 5  $\mu$ . The results are compared with the values predicted by the classical theory of Drude and by the quantum-mech. theory of Krönig; the former theory is shown to fit the facts better than the latter. W. F. Meggers

**Field electron emission from liquid mercury.** J. W. Beams. *Phys. Rev.* 44, 803-7(1933).—The field strength needed to pull electrons from a liquid Hg surface was detd. by an impulse method as  $1.8 \times 10^6$  v. per cm. for the cleanest surfaces, falling to  $0.35 \times 10^6$  for impure Hg. The current obtained is about  $10^{10}$  times that calcd. from the Fowler-Nordheim theory on the assumption that the surface is perfectly plain; the discrepancy is probably due to irregularities in the surface. L. S. Kassel

**Total secondary electron emission from metal faces.** S. Ramachandra Rao. *J. Annamalai Univ.* 2, 249 57(1933); cf. C. A. 27, 4478.—An explanation was attempted of the peculiar shape of the total-emission curves and the differences observed between polycryst. and single-crystal faces as due to the absorption of the secondary electrons in the medium of the photoelec. target. Exptl. results agree well with an equation derived for the ratio  $R$  of secondary to primary current. The equation holds for single-crystal faces and offers an explanation for the observed difference in  $R$  for the polycryst. and single-crystal surfaces. The influence of adsorbed gases on  $R$  is discussed. Allen S. Smith

The external photoelectric effect at low temperatures. R. Suhrmann. *Physik. Z.* 34, 877(1933).—The theory of the effect of temp. on the photoelec. sensitivity of a clean metal, given by Fowler (*C. A.* 25, 5082) on the basis of the Sommerfeld-Fermi electron theory, and confirmed at high temps., predicts a greater effect in reducing the temp. from 293° to 83° than from 83° to 20° abs. Expts. with 2 Be surfaces gave the same decrease in photoelec. sensitivity, within the limits of error, in cooling from 83° to 20°. The expected effect was obtained with at. K surfaces on Ag. The temp. influence of the spectral max. at 343 mμ is also much smaller in cooling from 83° to 20° than from 293°.

Allen S. Smith

Photoelectric secondary currents. W. Lehnfeldt. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 263 70.—With ZnS crystals the magnitude of the photoelec. secondary current is limited by the no. of excited phosphorescent centers and shows the same temp. coeff. as the latter. Crystals of AgCl give at low temps. very pronounced photoelec. secondary currents. Two different kinds of centers having markedly different times of duration exist in the case of AgCl; furthermore, for these crystals the phosphorescence is normally weak but can be greatly enhanced by the application of higher potentials. Conclusion: The photoelec. secondary currents are electronic rather than ionic.

P. H. E.

Constitutive parts of atomic nuclei. D. Ivanenko. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 50-2.—The abs. value of the mass defect of the neutron (or proton) cannot exceed  $2mc^2$ , where  $m$  is the mass of the electron.

S. Bradford Stone

Pauli's principle in the nucleus. W. M. Elasser. *J. phys. radium* [7], 4, 549-56(1933).—Based on Bartlett's procedure, a system of envelopes of protons and neutrons is postulated for nuclei, and quantum nos. are assigned to these particles, at least for the lighter elements. Closed envelopes have particularly large binding energies. This scheme explains more nuclear properties than the hypothesis of nuclei composed of  $\alpha$ -particles. Before emission, the  $\alpha$ -particles must be formed by an internal rearrangement. The distribution of kinetic and potential energies in the nucleus indicates specially large potential energies.

L. E. Steiner

The production of high-velocity ions and electrons. J. W. Beams and L. B. Snoddy. *Phys. Rev.* 44, 784 5 (1933).—A method is described for producing high-velocity electrons and ions in which the electron or ion is accelerated by a field which is so adjusted as to move with the same velocity as the ion or electron. With this arrangement, electrons have been obtained with a max. velocity of 80 90 kv. representing a threefold multiplication. It is believed that this method should be capable of producing electrons having velocities corresponding to several million v.

Allen S. Smith

The use of the ionization chamber at high pressures for the study of  $\gamma$ -rays and neutrons. P. Savel. *J. phys. radium* [7], 4, 608-12(1933).—An ionization chamber filled successively with H, N and A gases under pressures up to 30 atm. showed the advantage of high pressures for measuring the ionization due to  $\gamma$ -rays from Ra, and to the complex radiation resulting from the irradiation of Be by  $\alpha$ -particles from Po. For  $\gamma$ -radiation from radioactive substances, and that emitted by light elements bombarded by  $\alpha$ -particles, A under pressure is best; for a study of neutrons H at 30 atm. is best.

L. E. Steiner

Reflection of  $\alpha$ -particles from atom nuclei. III. Ilse Merhaut and Helmut Wallner. *Sitzber. Akad. Wiss. Wien Math.-naturw. Klasse, Abt. IIa*, 142, 297-306(1933); cf. *C. A.* 19, 3213.—A very accurate measurement of the scattering of wide-angled ( $128^\circ$ ,  $142^\circ$  and  $158^\circ$ )  $\alpha$ -particles from Ra C by the elements Ag to Te (at. no. 47 to 52) showed certain anomalies especially between the odd and even at. numbered elements. The even at. numbered elements cause less scattering than the theoretical but the curve closely parallels the theoretical curve, whereas with odd at. numbered elements the scattering is subnormal, does not parallel the theoretical curve and shows several points of inflection.

Oden E. Sheppard

Distribution of cosmic-ray nuclear disintegration in time. C. G. Montgomery and D. D. Montgomery. *Phys. Rev.* 44, 779(1933).—Data from observations on the occurrence of nuclear disintegrations produced by cosmic rays are in good agreement with the hypothesis that the disintegrations are randomly distributed in time.

Allen S. Smith

The positive electron. Paul Kunze. *Physik. Z.* 34, 849-57(1933).—Different methods of producing and various interpretations of the positron are considered. It is represented in the usual manner as having the charge of the proton and the mass of the electron. Positron formation by  $\gamma$ -rays, the possibility that the positron is an unstable particle according to the theory of Dirac, and the conception of it as a stable particle are discussed in detail. All results concerning the origin of the positron from  $\gamma$ -rays appear to be adaptable to an electron-twinning process. The question of the stability of the positron remains unexplained.

Allen S. Smith

Study of the physical properties of the positron. Jean Thibaud. *Compt. rend.* 197, 915-17(1933).—The charge on the positron is not less than half or more than double the charge on the electron. Radon and radiothorium emit positrons spontaneously, probably through the action of  $\gamma$ -radiation, in analogy to the photoelec. effect. The coeff. of absorption of positrons is of the same order as that for electrons. All the results obtained so far are in accord with the theoretical predictions of Dirac.

A. B. F. Duncan

Neutrons from cosmic-ray "Stösse." Gordon I. Locher. *Phys. Rev.* 44, 779-81(1933).—Preliminary results of cloud photography of cosmic-ray "Stösse," or ionization bursts, in A are described. Numerous neutron-recoil atom tracks, 2 long nuclear tracks, and groups of simultaneous tracks that converged at different points were found.

Allen S. Smith

Neutrons from deuterons and the mass of the neutron. M. Stanley Livingston, Malcolm C. Henderson and Ernest O. Lawrence. *Phys. Rev.* 44, 781-2(1933); cf. *C. A.* 27, 4162. —Further observations on the instability of the deuteron confirm the view that it disintegrates with the release of about 4.8 million v. of energy. Neutrons produced in the process have, accordingly, a mass of about 1.0006 mass units. The expts. demonstrated the production of neutrons and afforded a quant. check. The energy of the bombarding deuterons was raised from 1.2 to 3.0 million v. with fair agreement in the observations.

Allen S. Smith

Neutrons from beryllium bombarded by deuterons. M. Stanley Livingston, Malcolm C. Henderson and Ernest O. Lawrence. *Phys. Rev.* 44, 782-3(1933).—In the bombardment of Be by deuterons, it appears that the neutrons result from the disintegration of Be<sup>9</sup> with capture of the deuteron to form Be<sup>10</sup> and a neutron. It is calcd. that these neutrons have about 14 million v. of kinetic energy, on the assumption that their mass is 1.0006 and that no  $\gamma$ -radiation is given off in the process. The yield of neutrons from Be increases linearly with the range of the deuteron for ranges from 1 to 9 cm.

Allen S. Smith

Atomic disintegration during neutron emission. Josef Schintlmeister. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 197-200(1933).—Neutron emission of Pb, Mg, Cu and Ni under irradiation of  $\alpha$ -rays from Po was investigated by means of the tube electrometer. The results fully confirm the work of Trattner (*C. A.* 27, 5001) using the Wilson chamber. Oden E. Sheppard

The excitation of neutron emission from beryllium and boron by  $\alpha$ -rays. Walter Slonek. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 185-96(1933); cf. Kirsch and Slonek, *C. A.* 27, 2091.—The neutron emission from Be and B under the influence of  $\alpha$ -rays from Po was measured by means of the Geiger chamber. A wide variety of exptl. conditions was used, including "forward" and "backward" measurements. The results indicate the existence of 8 excitation energies for Be in the range of Po  $\alpha$ -rays, depending, apparently, on the differences in hardness of the  $\alpha$ -ray groups. The measurements with B do not seem to be in complete

agreement with those of Curie and Joliot (*C. A.* 27, 2873).

The velocity of neutrons from beryllium. Gerhard Kirsch and Hertha Wambacher. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 241-9(1933); cf. *C. A.* 27, 3604 and preceding abstr.—By use of the photographic method of Blau (*C. A.* 20, 1943 and 22, 3841) the velocities of neutrons from Be were investigated. This method indicates the presence of about 15 velocity-homogeneous groups or about double the no. indicated by the work of Slonek (see preceding abstr.). The neutron velocity groups are apparently distributed uniformly from about 1 to  $5 \times 10^8$  cm./sec. Oden E. Sheppard

Heavy water. K. F. Bonhoeffer. *Angew. Chem.* 46, 776 9(1933).—A summary of the methods of sepg. the isotopes of H and of the properties of heavy water. Nineteen references. Karl Kammermeyer

Technic for the electrolytic production of  $\text{H}^2\text{H}^2\text{O}$ . Hugh S. Taylor, Henry Eyring and Arthur A. Frost. *J. Chem. Physics* 1, 823-4(1933); cf. *C. A.* 27, 5630.—The electrolyte from com. electrolytic cells is electrolyzed in 3 stages, yielding  $\text{H}_2\text{O}$  in which 2.5% of the H was  $\text{H}^2$ . This is electrolyzed in 4 stages, the  $\text{H}_2$  being burned in a quartz tube. Six hundred and ten gal. of com. electrolyte yielded 420 cc. of  $\text{H}_2\text{O}$  in which 93% of the H was  $\text{H}^2$  in the sixth stage, and 82 cc. of 99%  $\text{H}_2\text{O}$  in the seventh stage. App. and technic are described in detail. Gerald M. Petty

Electrolytic separation of hydrogen isotopes and the mechanism of the cathode process. B. Topley and H. Eyring. *J. Am. Chem. Soc.* 55, 5058 9(1933).—Electrolysis of  $\text{H}_2\text{O}$  contg. approx. 7%  $\text{H}^2$  at 26° with Pt anode and various metals as cathodes gave values for  $\alpha$  ( $\alpha = d$  in  $n_H/d$  in  $n_D$ , where  $n_H$  and  $n_D$  are the nos. of  $\text{H}^1$  and  $\text{H}^2$  atoms in the electrolyte) in KOH: Pb 7.4, 7.2; Fe 7.6, 6.9; Pt 7.6, 5.6; Cu 6.8; Ni 5.5; Ag 5.3, 5.0; in  $\text{H}_2\text{SO}_4$ , Pt 5.7; Cu 5.5, 5.8. The mechanism of the cathode process is discussed. C. J. West

The satellites of the  $K\beta$  line of potassium. Hideo Taraki. *J. Sci. Hiroshima Univ.* A3, 321-5(1933) (in English).—The wave lengths of the  $K\beta^1$ ,  $K\beta^2$  and  $K\beta^3$  lines of K are 3475.7, 3438.3 and 3429.1 Å., resp. G. M. P.

The L-absorption spectrum of tellurium in various chemical compounds. J. G. Tandberg. *Arkiv. Mat. Astron. Fysik*, 24A, No. 6, 4 pp.(1933).—The L-absorption edges observed for Te in various compds were found to be displaced toward shorter wave lengths as compared with their positions detd. with elementary Te. For certain compds. fine structure of the L III and L II edges was observed, but could not be detected with certainty for elementary Te or the halides. C. C. K.

The dynamic reflection of x-rays by ideal, especially absorbent crystals. Max Kohler. *Ann. Physik* 18, 265 87(1933).—Math. Gerald M. Petty

Diffuse scattering of x-rays from sodium fluoride. II. Scattering at the temperature of liquid air. G. E. M. Jauncey and P. S. Williams. *Phys. Rev.* 44, 794-7(1933); cf. *C. A.* 27, 5245.—The ratio of the diffuse scattering intensity for polychromatic x-rays from a single crystal of NaF at 86°K. to that at 295° is detd. for several angles between 10° and 42°; the results agree with values calcd. from  $f$  values which had been calcd. by Shonka (*C. A.* 27, 4165), assuming zero-point energy. L. S. Kassel

Changes in the x-ray diffraction pattern of nitrobenzene produced by an electric field, changes in temperature and circulation. F. C. Todd. *Phys. Rev.* 44, 787-93(1933).—No change in the intensity of the  $\text{PhNO}_2$  diffraction pattern due to an elec. field of 10 kv. per cm. could be detected; the contrary result obtained by McFarlan (*C. A.* 24, 5213) is shown to have been caused by increased temp. and circulation of the sample in his expts. when the field was applied. L. S. Kassel

A ring-target x-ray generator adapted to scattering, fluorescence and irradiation experiments. Paul Kirkpatrick and P. A. Ross. *Rev. Sci. Instruments* 4, 645-8 (1933). E. H.

Experimental proof of the quantum theory of the funda-

mental line width. Wilhelm Schütz. *Physik. Z.* 34, 831-3(1933).—A math. derivation from the quantum standpoint is given. The values calcd. from classical and quantum theory, compared with the exptl. values, confirm the latter theory. Gregg M. Evans

Limitations of the theory of complex spectra. H. H. Marvin. *Phys. Rev.* 44, 818-20(1933).—The theory of two-electron systems is extended to  $d^2p$  and  $d^2d$ , the results being compared with data for Ni I. The discrepancies are greater than for  $d^2s$  or  $p^2p$  but the multiplets are still placed in the right order. L. S. Kassel

Standard copper wave lengths in the region 100 to 450 Å. P. Gerald Kruger and F. S. Cooper. *Phys. Rev.* 44, 826-30(1933).—A table is given. L. S. Kassel

Nuclear moments of xenon. E. Gwynne Jones. *Nature* 132, 781(1933).—For the isotope  $\text{Xe}^{130}$ , the nuclear moment,  $I$ , is  $1/2$ , and for  $\text{Xe}^{131}$ ,  $I$  is greater than  $1/2$  (probably  $3/2$ ). Exptl. data are given for the hyperfine sepn. for  $\text{Xe}^{130}$ . L. E. Steiner

Hyperfine structure of the red cadmium line 6438, and of the krypton lines 5649 and 5562. Marie Romanova and Alice Ferkhmin. *Compt. rend. acad. sci. U. R. S. S.* 1933, 55-7. S. Bradford Stone

Ionization potential of Be III. Hengt Edlén. *Phys. Rev.* 44, 778(1933).—New wave-length measurements in series  $1s^2\ ^1S_0-1s\ np\ ^1P_1$  of Be III and a calcn. of the series limit confirm an earlier value (*C. A.* 25, 2640), and indicate that the series limit reported by Kruger and Cooper (*C. A.* 27, 5640) must be in error. Allen S. Smith

New terms in the spectra of N III, N IV, N V, O III, O IV and O V. Willoughby M. Cady. *Phys. Rev.* 44, 821-5(1933).—The terms are obtained from lines between 105 and 796 Å. produced in a new type of condensed discharge. L. S. Kassel

Spectra of potassium in successive stages of ionization. Mela Ram. *Indian J. Physics* 8, 151-61(1933).—The important lines of K III, K IV and K VI in the extreme Schumann region below 1100 Å. U. have been identified and formed into completed multiplets which are included with the terms. Of K V only the  $3s^23p\ ^4S-3s3p\ ^4P$  multiplet could be located. Calvin Brous

Spectrum of doubly ionized A, A III. T. L. de Bruin. *Proc. Acad. Sci. Amsterdam* 36, 724-9(1933); cf. *C. A.* 27, 661. A. B. F. Duncan

Spectra of trebly and quadruply ionized calcium. Mela Ram. *Indian J. Physics* 8, 163-70(1933).—R. has analyzed the existing data for the spark lines of Ca. Important combinations with the fundamental states of Ca IV and Ca V have been identified; 14 terms with 27 lines of Ca IV and 24 terms with 36 lines of Ca V are tabulated. Calvin Brous

Regularities in the spectrum of doubly ionized cerium. P. N. Kalia. *Indian J. Physics* 8, 137-45(1933); cf. *C. A.* 27, 4479.—The Ce III spectrum between 3544 and 2203 Å. is analyzed. A  $^3F$  term of  $5d^2$  configuration is the fundamental state. Other states originate from  $5d^2$ ,  $6s^2$ ,  $5d6s$  and  $4f6s$  configurations. Other terms are included whose nature could not be detd. without ambiguity. Strong similarity with the spectrum of La II is shown. Calvin Brous

Magnetic rotatory dispersion and absorption of the cerous ion on solution. R. W. Roberts, L. A. Wallace and I. T. Pierce. *Nature* 132, 782(1933); cf. *C. A.* 27, 902.—By use of Rovenfeld's quantum mech. theory of the Faraday effect, instead of Ladenburg's formula, the rotation of the  $\text{Ce}^{+++}$  ion in more concd. solns. throughout the range 5780-3341 Å. was found to be controlled by 2 absorption bands with  $\lambda_{2900}$  and  $\lambda_{2540}$  Å., resp. For the range,  $\lambda_{5780}-3341$  Å., the strengths ( $f$  values) for the transitions  $4^3F_4 \rightarrow 5^3D_3$  and  $4^3F_4 \rightarrow 5^3D_1$  are  $1.40 \times 10^{-3}$  and  $2.20 \times 10^{-3}$ , resp. L. E. Steiner

Structural analysis of the molybdenum spectrum. II. M. A. Catalan and Pilar de Madariaga. *Anales soc. españ. fis. quim.* 31, 707-34(1933).—Results of Kieck (*C. A.* 17, 3453) and Catalan (*C. A.* 18, 1427) are reviewed and extended from the viewpoint of the modern theory of multiplets. There are classified 644 lines as 120 levels of quintets and septets. High and low levels

are arranged in terms. Of the middle levels only the lowest are arranged in terms. Interval, intensities and Zeemann effect rules do not hold in this spectrum, indicating great departure from the Russell-Saunders coupling. The Mo I spectrum is closely analogous to that of Cr I, but line intensity is more uniform in Mo I, so that some weak intercombination lines not appearing in Cr I appear in Mo I, but the strong lines become weaker. Rydberg denominators obtained in Mo I with the Kiess fundamental limit 59500 do not agree in the case of 6s and 5d electrons with those of the elements of the same period as well as with those of Cr I. If the denominator of the 5d electron is assumed to have a value in good agreement with the rest of the elements, the fundamental limit of 57200 = 200 is obtained. With this value, denominators are recalcd., and values found are analogous to those of the other elements except those of the 7s, which, together with 6s and 5s, were used by Kiess to det. the base values. The supposed 7s term is rejected as a numerical coincidence. When applied to Mo I terms, whose Mo II limit is yet unknown, it is possible to fix approx. values of deep terms of Mo II. With the new value of the base term, the ionization potential is 7.06 v. (old value 7.35 v.).

E. M. Symmes

Analytical and quantitative lines of silver, arsenic, bismuth, cadmium, copper, mercury, lead, antimony and tin in the arc spectrum between  $\lambda = 2330$  A. and  $\lambda = 3400$  A. S. Piña de Rubies and M. Amat Bargues. *Z. anorg. allgem. Chem.* 215, 205-10(1933).—A table of wave lengths and their sensitivities for each of 3 sizes of spectrographs is given.

Howard A. Smith

Application of electron tubes and undamped high-frequency oscillations to quantitative spectrochemical analysis. G. Potapenko. *Z. anorg. allgem. Chem.* 215, 14-8(1933).—An app. is described for generating sparks by means of undamped high-frequency oscillations at voltages ranging from 80 to 100 kv. The discharge circuit is coupled inductively to an exciting oscillatory circuit controlled by a 500-w. electron tube. The advantages of this mode of excitation are: (1) constancy of the spark with resultant reproducibility of the spectrograms; (2) almost complete absence of air lines from the spectra.

C. C. Kiess

The spectrum of Nova Ophiuchi No. 3 (RS Ophiuchi). Christine Westgate. *Astrophys. J.* 78, 372-3(1933).—A list of the emission lines appearing in the spectrum of the nova of 3 different dates.

C. C. Kiess

Some intensity measurements on the band spectrum of helium ( $\text{He}_2$ ). R. C. Johnson and R. C. Turner. *Proc. Roy. Soc. (London)* A142, 574-87(1933).—Line intensity measurements on the first 5 members of the main line series of  $\text{He}_2$  bands are made by photographic photometry. These bands represent the transitions  $n^1\Pi \rightarrow 2s^1\Sigma$  and give lines near 4650, 3676, 3356, 3206 and 3120 A. The predicted distribution is of the correct type, but agreement with observation is not complete. Notably the P and R branches are much stronger, relatively to the Q branch, than the theory indicates. Effective temps. were computed: (1) from the position of the max. intensity in the branches and (2) from intensity factor considerations. The 2 methods show remarkable agreement, the max. variation being only 5%. The mean effective temp. obtained from the bands is 750°K., but this effective temp. obtained by assuming Maxwell-Boltzman distribution is much higher than the true temp. of the source. The fall of intensity down the series is examd. and it is found that the relative intensities of the bands are given by a formula which is similar in some respects to that found for the Balmer series of H.

W. F. M.

Zeeman effect and uncoupling phenomena in the CaH bands. W. P. Cunningham and Wm. Watson. *Phys. Rev.* 44, 815-17(1933).—The effect of the strong J-uncoupling in the  $^3\Pi$  state on the Zeeman patterns of the lines of the  $^3\Pi \rightarrow ^3\Sigma$  CaH band at 7000 A. is discussed.

L. S. Kassel

The titanium oxide and zirconium oxide bands in stellar spectra. R. S. Richardson. *Astrophys. J.* 78, 354-8(1933).—The degrees of disoccn. of the components of

ZrO and TiO are calcd. for different temps. and pressures from the data afforded by the analyses of their spectra and their heats of disoccn. The results of the calcs. furnish a basis for interpreting the behavior of ZrO and TiO bands in the spectra of stars of classes S and M.

C. C. Kiess

Investigations in the near infra-red. R. Freymann. *Ann. Phys.* 20, 243-343(1933).—A thalofide cell in conjunction with a vacuum-tube amplifier has proved to be a sufficiently sensitive detector to permit the use of a grating spectrograph of high dispersion to investigate the near infra-red absorption spectra of various org. liquids between 0.8  $\mu$  and 1.2  $\mu$ . With this app. the well-defined max. of absorption bands can be detd. to within 5 A. New bands have been detected in various compds. contg. the groups CH, OH, NH, etc., and new wave lengths for the bands have been measured. These permit a study of the following effects: (1) length of the C chain; (2) isomerism; (3) double bonds; (4) substitutions; (5) temp.; (6) dila.; and (7) the effect of the absorption bands on the rotatory power of active substances.

C. C. Kiess

An unusual nitrogen tube. Joseph Kaplan. *Phys. Rev.* 44, 783(1933); cf. *C. A.* 27, 898.—Twelve new members of the Lyman bands of N have been discovered in the improved tube. A characteristic of the tube is a strong N afterglow in which bands arising on the very high vibrational states of the  $b^3\Pi$  level have been visually observed. It also has characteristics of value in auroral studies.

Allen S. Smith

The continuous absorption spectrum of polyatomic molecules. III. Yosioyige Fukumoto. *Science Reports Tohoku Imp. Univ. First Ser.*, 22, 868-78(1933).—The procedure used in previous work (*C. A.* 27, 4170) has been followed in investigating the ultra-violet absorption of some halogen alkyls in the gaseous state, and of mols. of the type  $\text{XCl}_4$  in both gaseous and liquid states. These compds. exhibit a continuous absorption without a neighboring band spectrum and convergence limit. It was found that the absorption limit shifts redward when the compds. are liquefied or their vapor pressures are increased, although the absorption max. remains unaltered.

C. C. Kiess

Spectrum of the afterglow of carbon dioxide. A. Fowler and A. G. Gaydon. *Proc. Roy. Soc. (London)* A142, 362-9(1933).—A discharge tube contg.  $\text{CO}_2$  was operated with an induction coil and a Hg break with a shutter adapted so as to cut off the light from the spectrograph when the discharge was passing and to allow it to pass in the intervals between discharges when the afterglow was visible. The spectrum of the afterglow of  $\text{CO}_2$  is different from any known spectrum given by oxides of C in vacuum tubes but resembles that given by the flame of CO burning in air or O. The spectrum of the exciting discharge indicates that the afterglow is generated by the interaction of excited neutral mols. of CO with neutral mols. of  $\text{O}_2$ . Under the conditions which gave rise to the afterglow, there was no evidence of disoccn. of the  $\text{CO}_2$  other than into neutral mols. of CO and  $\text{O}_2$ . The probability that the characteristic bands of the afterglow represent  $\text{CO}_2$  mols. is also strongly suggested by the great complexity which is revealed by the use of spectrographs of adequate resolving power.

W. F. Meggers

Investigation in the infra-red absorption spectrum of the change of the solvent by the dissolved substance. II. Influence of the state of association of water by hydrogen and hydroxyl ions. R. Suhrmann and F. Breyer. *Z. physik. Chem.* B23, 193-212(1933); cf. *C. A.* 27, 1821. —Infra-red absorption was studied for 5.5 and 2.75 M HCl, 2.8 and 1.4 M  $\text{H}_2\text{SO}_4$  and 10.9, 5.47 and 2.74 M KOH. For the acid solns. the bands at 0.98 and 1.2  $\mu$  are less intense, the band at 1.96  $\mu$  is only slightly changed but the band at 1.45  $\mu$  is considerably less intense and the absorption on the low-frequency side of the band is strongly raised. These phenomena are ascribed to the formation of hydroxonium ions and the no. per H ion is estd. The hydroxonium absorption curves are continuous and it is concluded that the H ion forms no definite chem. compd.

with the  $H_2O$  mol. Similar results are obtained for the base solns. with  $2H_2O$  mols. per OH ion and continuous absorption on both sides of the bands due to the influence of the OH ions on the  $H_2O$  mol. G. M. Murphy

The change in the absorption spectrum of cobalt chloride in aqueous solution with increasing concentration of hydrochloric acid. Owen R. Howell and Albert Jackson. *Proc. Roy. Soc. (London)* A142, 587-97 (1933).—It has been suggested that both in the crystal and in the soln. the Co atom is in assocn. with 6 other atoms or groups when the color is red, and with 4 when the color is blue. The absorption spectra of a series of solns. contg. the same amt. of  $CoCl_2$  with increasing concn. of HCl have now been measured and it has thus been possible to follow quantitatively the conversion of the Co from red to blue grouping, and to det. its dependence on environment. The extinction coeffs. at the max. of the 4 principal bands, 695, 666, 626 and 610  $m\mu$  plotted against the concn. of acid, show that no blue constituent is formed until a crit. concn. of acid (5.0 N) is reached. The amt. of the blue constituent then increases rapidly with increasing concn. of acid, the relation soon becoming linear. The linear relation begins at 7.1 N acid and for the 695 and 666  $m\mu$  bands it is complete at 9.0 N acid. The ratio of the relative nos. of Cl atoms to  $H_2O$  mols. at these 3 crit. concns. of acid is 2:3:4, which also expresses the relative no. of Cl atoms in the cobaltous compds. at the 3 stages. The state of the Co atom is therefore detd. only by the environment and is independent of the relative concn. of the Co to the other constituents. This has been demonstrated by measuring the absorption spectra of solns. contg. varying amts. of Co in the same concn. of acid; the extinction coeff. for each band is directly proportional to the concn. of Co. For the bands 626 and 610  $m\mu$  the extinction coeff. continues to increase with increasing concn. of acid beyond 9.0 N. This is explained by the depression of ionization of the complex; the suggestion therefore follows that the 2 major bands, 695 and 666  $m\mu$ , relate to the principal valences and the 2 minor, 626 and 610  $m\mu$ , to the 2 auxiliary valences, which alone are affected by further increase in the concn. of acid. W. F. Meggers

The absorption spectra of uranium compounds. Fritz Ephraim and Martin Mezener. *Helv. Chim. Acta* 16, 1257-72 (1933).—In addn. to the rare earths U is the only element that in numerous compds. exhibits line absorption spectra. Wave lengths are presented of the absorption lines that appear in the reflection spectra of various compds. of trivalent, quadrivalent and hexavalent U at temps. of  $18^\circ$  and  $-190^\circ$ . Differences in the spectra attributable to temp., type of compd., effect of solvent, are pointed out. Attempts to prep. uranates of the heavy metals through digestion of uranyl salts with the hydroxides of the heavy metals are described. C. C. Kiess

The ultra-violet absorption of alkylcyclohexanones and allylcyclohexanones. Mme. Ramart-Lucas and Cornubert. *Bull. soc. chim.* 53, 744-53 (1933).—The ultra-violet absorption spectra of  $\alpha$ -propyl-,  $\alpha,\alpha'$ -dipropyl-,  $\alpha$ -allyl-,  $\alpha,\alpha'$ -diallyl-,  $\alpha,\alpha'$ -triallyl-,  $\alpha,\alpha,\alpha'$ -tetraallyl- and  $\alpha,\alpha,\alpha',\alpha'$ -tetramethylcyclohexanones are given. This investigation is concerned with the variations of color and chem. properties of ketones as a function of the no. and nature of the fixed radicals. As the no. of radicals increases, the max. of the absorption band approaches the visible. The satd. and unsatd. ketones measured have an absorption max. in approx. the same position, but there is a difference in intensity. The allylcyclohexanone possesses an absorption coeff. greater than that of the satd. ketone. James H. Hibben

The ultra-violet absorption of substances containing two benzene nuclei. M. Chaix. *Bull. soc. chim.* 53, 700-11 (1933).—The substances examd. were the mono- and disulfide derivs. of biphenyl and the corresponding Se derivs., as well as compds. with substituents in the Ph group. In general, chromophores may be arranged in descending order according to the following: —Se — Se —; —CO —; —S — S —; —Se —; —S —; —SO —; SeO;

$SO_2$ ;  $CH_3$ , where the above-named groups sep. the 2Ph or substituted Ph groups. James H. Hibben

Spectroscopical characterization of organic dyestuffs and other colored substances. Jaroslav Formánek. *Collection Czechoslov. Chem. Communications* 5, 411-14 (1933); cf. Chloupek, C. A. 27, 4172 and Formánek, C. A. 22, 1240.—Polemical. W. T. H.

The absorption spectra of the mixed fatty acids from cod-liver oil. Wm. J. Dann and Thomas Moore. *Biochem. J.* 27, 1166-9 (1933).—The duration of the sapon. (in the prepn. of the fatty acids) exerts a profound influence upon the absorption spectrum of the acids. If the time taken for the sapon. is prolonged, the absorption becomes more intense. Benjamin Harrow

Correlation of spectroscopy and photochemistry. W. Albert Noyes, Jr. *Rev. Modern Physics* 5, 280-7 (1933).—A survey, in which the O-O<sub>2</sub> reaction and acetone decompn. are discussed. A. B. F. Duncan

Fluorescence. C. C. Pines. *Am. J. Pharm.* 105, 663 (1933).—A no. of specimens of fluorite were exposed to the radiation of an A-filled ultra-violet glow lamp for some seconds in a dark room. Of the specimens exposed, 4 were found which produced, in each case, a bright blue color of great beauty. Calomel produced a beautiful light orange-red color; the sample contained a few crystals of  $Hg_2Cl_2$ , which remained colorless. For purposes of comparison with the Hg arc vapor lamp, calomel and a no. of other specimens were exposed to both lamps. Results of the exams. are tabulated. W. G. Gaeckler

Optical determination of the amounts of photochemical reaction products. E. Miescher. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 329-34.—M. colored NaCl crystals by heating them in Na vapor to  $760^\circ$ . By an optical method he then compared the no. of color centers before and after heat-treating the crystals for a short time in an elec. oven at  $360^\circ$ . This heat treatment was sufficient to flocculate the color centers into small colloidal aggregates and to shift the absorption max. from 4600 A. to about 5600 A. The total no. of color centers, however, remained the same. Heating 1 hr. to  $450^\circ$  resulted in larger colloidal particles, a shift in the absorption max. to 6000-6500 A., and a decrease of about 50% in the no. of color centers. P. H. Emmett

The formation of formaldehyde by the action of ultra-violet light on carbon dioxide and water: an application of the Allison magneto-optic apparatus. John H. Yoe and R. E. Wingard. *J. Chem. Physics* 1, 886 (1933).— $H_2O$  satd. with  $CO_2$  yields  $HCHO$  in proportion to its irradiation with ultra-violet light.  $O_2$  is liberated in the reaction. Detns. were made with Allison's magneto-optic app. Gerald M. Pettv

Influence of  $p_H$  on amino dyes of triphenylmethane and the decomposition of these dyes by light. P. Cohen Henriquez. *Rec. trav. chim.* 52, 991-1000 (1933).—The intensity of color of certain triphenylmethane dyes was studied in solns. of definite  $p_H$ . The influence of ultra-violet light on the equil. resulting from light absorption by the colorless tautomer is considered. With crystal violet a photochem. reaction takes place, Me groups being replaced by H. A. B. F. Duncan

The photochemistry of solid lithium hydride. F. Barch and K. F. Bonhoeffer. *Z. physik. Chem.* B23, 256-64 (1933); cf. C. A. 27, 1573.—An app. is described for prepng. thin layers of LiH on  $CaI_2$  and obtaining their absorption spectra. A sharp band at  $2517 \pm 2$  A. falls off toward the ultra-violet. A broader region of absorption begins at 1900 A. but no structure is discernible. H $\nu$  irradiation with the Hg line at 2537 A. H is liberated and the quantum yield is 5%. It is concluded that most of this comes from H stuck in the crystal lattice. Large crystals of LiH are colored greenish blue by ultra-violet light. Visible light or heat decolorizes them again. G. M. M.

The reaction mechanism of the photochemical conversion of *o*-nitrobenzaldehyde to *o*-nitrobenzoic acid in ultra-violet light. Karl C. Zimmer. *Z. physik. Chem.* B23, 239-55 (1933).—Infra-red absorption measurements



show that  $o\text{-ONC}_6\text{H}_4\text{CHO}$  is not a mixt. of 2 tautomers. Expts. at 4360 and 4050 Å. show it to be dichroic. No appreciable fluorescence or photoelec. effect was observed. The primary process in the photochem. decompn. is disson. of the  $o\text{-ONC}_6\text{H}_4\text{CHO}$ . The products then either unite to form  $o\text{-ONC}_6\text{H}_4\text{CO}_2\text{H}$  or recombine to form  $o\text{-ONC}_6\text{H}_4\text{CHO}$ . This mechanism explains the low quantum yield. The temp. coeff. between 45° and 70° is smaller than unity. G. M. Murphy

The photochemistry of the silver chloride crystal. F. Löhle. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 271-7.—The photochem. reaction products in crystals of AgCl show absorption bands that must be due to flocculated colloidal particles. The production of discoloration in the crystals at -186° and the taking of absorption measurements within 1½ min. after the conclusion of the color-producing exposure leads to the same results as when carried out at room temp. P. H. Emmett

The Weigert effect. Influence of dye concentration on the photodichroism. W. Kemula. *Z. physik. Chem.* B23, 305-14 (1933).—Gelatin colored with various dyes was irradiated with white and linearly polarized monochromatic light and the Weigert effect studied. The influence of type of gelatin, concn. of the dye and wave length of the light on the change of the photodichroism with wave length was detd. The effect of concn. of the dye was explained as due to 2 modifications of the dye and the filter effect of the gelatin plates. G. M. M.

A new light absorption in alkali halide crystals. R. Hilsch and R. W. Pohl. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 322-8; cf. *C. A.* 27, 673.—A new alkali halide absorption band occurring between 2000 and 2400 Å. is described. Light absorption in this region is accompanied at room temp. by formation of color centers in the visible. At -183° the photochem. yield of color centers is very low. The relation between the 2 bands is considered important in connection with problems of phosphorescence, latent-image formation, and photoelec. cond. effects in crystals. P. H. Emmett

Fluorescence phenomena of cerium and other rare earths. Oberst M. Haitinger. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 339-42 (1933).—By means of a strongly lighted fluorescence microscope (*C. A.* 25, 4470) Ce, Eu, Sm, Gd, Tb, Dy, Im, and Ho preps. were examd. with the naked eye and by use of the camera and found to exhibit fluorescence. La, Pr, Nd, Er, Yb and cassiopeium did not show fluorescence. The smallest quantity and the smallest concn. of the oxides that can be distinguished by fluorescence phenomena were detd. Oden E. Sheppard

Thermoluminescence spectra of fluorites. I. Thermoluminescence spectra of fluorites from Obira. Eliichi

Iwase. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 22, No. 461, 233-41 (1933); cf. *C. A.* 27, 3143, 5249.—The thermoluminescence of several colored and colorless fluorites was photographed and the intensities of the bands were measured. The intensity of luminescence after exposure to a quartz Hg arc was detd. and found related to the no. of short-wave bands in the thermoluminescence spectra. These bands are also related to the rare-earth content of the fluorites. A. B. F. D.

The fluorescence of the fluorites. Herbert Haberlandt and Karl Przibram. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 235-9 (1933); cf. *C. A.* 27, 5005.—Spectrograms of several fluorites at -180° are shown to demonstrate the marked change in fluorescence color due to the temp. change. Red fluorescence frequently vanishes reversibly at 40-50°. Ordinary blue fluorescence of fluorites and radio photofluorescence are destroyed by heating and regenerated by Ra irradiation and hence closely related. Fluorescence ability under ultra-violet exposure can be weakened (over-irradiated) by too long Ra irradiation but restored by cautious heating. Over-irradiated samples are found in nature. Oden E. Sheppard

Aluminum oxides capable of luminescence and their crystal-chemical relation to the natural and synthetic precious stones of the corundum type and their colors. Erich Tiede and Heinz Lüders. *Ber.* 66B, 1681-9 (1933); cf. *C. A.* 26, 1517.—Luminescent  $\text{Al}_2\text{O}_3$  was prepd. by heating  $(\text{NH}_4)_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3$  to form  $\alpha\text{-Al}_2\text{O}_3$ , in the presence of different activating agents.  $\text{Ti}_2\text{O}_3$  caused no red fluorescence or luminescence. With  $\text{TiO}_2$  present blue cathode fluorescence and blue-green phosphorescence are obtained. With  $\text{TiO}_2$  as with Pt and Mn  $\alpha\text{-Al}_2\text{O}_3$  shows 2 emission bands. Luminescence was weak with Fe and Ga. The luminescence of the Cr blend was not as expected (cf. Deutchbein, *C. A.* 26, 5847). Only sesquioxides in the corundum lattice are luminescent. Rh and V show bright fluorescent bands. Ruby shows no luminescence, differing from artificial Cr products. The series in increasing degree of deformation of the long axis and in breadth of band are Al, Ga, Cr, Ti, Fe, Rh, V. Foster Dee Snell

State of H dissolved in Pd and its relation to hydrogenation catalysis (Frank) 2. Quant. x-ray analysis of the concn. of metal phases in an alloy or mixt. (Glocker) 9. [Absorption spectra of] cryst. chlorocruorin (Fox, Roche) 10. Electrolytic disson. in  $\text{H}_2\text{SO}_4$  from Raman effect (Rao) 2.

Focusing device for cathode rays. Charles M. Slack (to Westinghouse Lamp Co.). U. S. 1,937,849, Dec. 5.

#### 4—ELECTROCHEMISTRY

COLIN G. PINK

Direct and indirect reduction of ferromanganese in the electric furnace. M. S. Maksimenko. *Metallurg* 8, No. 3, 4-10 (1933).—Under ordinary conditions only 14% of the reduction is accomplished by CO, but this can be increased to 33% by increasing the CO pressure. This results in a saving of C fuel and elec. energy, a decrease of MnO in the slag, a decrease in the temp. of the exit gases to 250-300°, longer electrode life, and less possibility of disson. of  $\text{Mn}_2\text{C}$ . The furnace should operate at full capacity, ore < 25 mm. diam., depth of charge 1.5 m., with low c. d. in electrodes at about 60 v. H. W. Rathmann

Obtaining iron from magnetic ore by electrolysis. J. J. Pittard. *Arch. sci. phys. nat.* 15, 418-35 (1933).—Previous methods for electrolytically purifying Fe, including the analysis of scrap Fe and the Fe obtained by electrolysis and the possible advantages of electrically treated Fe, are detailed. With concd. HCl as the electrolyte surrounding the Fe ore anode and a double sulfate

of Fe and Al surrounding the sheet Fe cathode, Cl is evolved. In expts. in which 50%  $\text{H}_2\text{SO}_4$  was substituted for the HCl and the temp. and current were varied,  $\text{FeSO}_4$  was deposited in the anode compartment. The cost of the current is too high in every case to make this method of electrolysis of the Fe ore a profitable one. Leona Marsh

The anodic behavior of the iron metals. Konrad Georgi. *Korrosion u. Metallschutz* 9, 302-7 (1933); cf. *C. A.* 27, 5650.—A theoretical discussion of the potential phenomena with Fe, Ni and Co anodes based on the assumption of adsorbed layers on the surface. Leopold Peschl

The electropotential of iron as a function of its mechanical or thermal pretreatment. Heinz Domschke. *Korrosion u. Metallschutz* 9, 261-8 (1933).—Potential measurements were made on electrodes of compressed pure Fe powder. Anode polarization and potential vary with the mech. pressure used on the powder. With specimens

which had been subjected to a thermal and to a combined thermal-mech. after-treatment, the potential and corrosion resistance were functions of the no. of active centers per unit surface. The same applied to electrolytic Fe electrodes. Accordingly, the final potentials showed differences of up to 50 mv., while the overvoltages showed differences of up to 185 mv. Leopold Pessel

Hydrolysis and oxidation-reduction potential in the ferrous-ferric system. P. A. Kriukov and G. P. Avseevich. *Z. Elektrochem.* 39, 884-91 (1933).—Solns. of  $\text{FeSO}_4$  and  $\text{Fe}_2(\text{SO}_4)_3$  were titrated by NaOH under an atm. of  $\text{N}_2$ , a glass electrode being used for  $p_{\text{H}}$  measurement and a polished Pt electrode for the oxidation-reduction potentials. For the  $p_{\text{H}}$  range 3.5-6.0,  $E_{\text{h}} = E_{\text{h}}^0 - 0.058 \log \text{Fe}^{++} - 0.174 p_{\text{H}} + E_{\text{h}}^0 = E_{\text{h}}^0 + 0.058 [\log K_{\text{Fe}(\text{OH})_3} - 3 \log K_{\text{Fe}}] = 1.011 \pm 0.006 \text{ v.}$ , from which the soly. product ( $K_{\text{Fe}(\text{OH})_3}$ ) is calcd to be  $0.32 \times 10^{-38}$ . In the more alk. range the anticipated relation  $E_{\text{h}} = 0.183 - 0.058 p_{\text{H}}$  is not in good agreement with the exptl. results. This is explained by the occurrence of certain complications, e. g., partial reduction of sulfate to sulfide, especially in mixts. of  $\text{Fe}(\text{OH})_2$  and  $\text{Fe}(\text{OH})_3$ , and formation of ferrous ferrite (ferrosoferric hydroxide). Approx. soly. products derived from the titration curves are  $10^{-14}$  for  $\text{Fe}(\text{OH})_2$  and  $10^{-17}$  for  $\text{Fe}(\text{OH})_3$ . Cf. Britton, C. A. 20, 26-7; Elder, C. A. 24, 2057.

Purification of mercury by an electrolytic method. Martin F. Hauke and Martha Johnson. *Science* 78, 414-15 (1933).—Hg is made the anode at 110 v. d. c. with Pt electrodes in a stoppered bottle, first in 10%  $\text{H}_2\text{SO}_4$  and then in 5% NaCl. Finally in 10%  $\text{H}_2\text{SO}_4$  the Hg is made the cathode. The Hg loss is from 2 to 4%. L. M.

Electrochemical properties of germanium. J. Ivan Hall and Alfred R. Koenig. *Trans. Electrochem. Soc.* 65, 4 pp. (preprint) (1934).—Ge can be deposited electrolytically from strong aq. KOH solns. of  $\text{GeO}_2$ . When coherent coatings of Ge are obtained, the under metal has no effect on the electrochem. behavior. Ge can be deposited from a molten electrolyte that dissolves  $\text{GeO}_2$ . The most consistent potential for the chain  $\text{Hg} | \text{Hg}_2\text{Cl}_2 | N \text{ ZnSO}_4 | \text{Ge}$  is 0.56 v., in which the N calomel cell is the more pos. when the Ge is electrolytic. The chain potential with massive Ge is lower, being about 0.28 v.  $\text{H}_2\text{SO}_4$  lowers the potential of Ge against  $N \text{ ZnSO}_4$  and also against a soln. of its ions. Wide variance in  $\text{H}_2\text{SO}_4$  concn. has very little effect on the single-electrode potential of Ge when Zn and Ge ions are absent. The voltage of the chain  $\text{Hg} | \text{HgO}, N \text{ KOH} | 3 N \text{ KOH} | \text{Cu}$  at which Ge commences to plate out on Cu from  $3 N \text{ KOH}$  soln. of  $\text{GeO}_2$  is less than the voltage necessary to liberate H on Cu under the same conditions, and greater than the voltage required to liberate H at an electrodeposited Ge surface from the same soln. These facts probably account, in part at least, for the scabbing of Zn cathodes. The H overvoltage of electrodeposited Ge is about 0.32 v., that of massive Ge about 0.25 v. From this it is evident that the H overvoltage of Ge is not affected as much by a change in the surface of the metal as is the single-electrode potential. Ge replaces Ag from  $\text{AgNO}_3$  soln. but does not replace Cu, Hg, Sn, As, Sb or Bi from their chlorides or Pb from the nitrate. C. G. F.

The electroreduction of acid perrhenate solutions. The complex chloride of quinquivalent rhenium. W. F. Jakob and B. Jczowska. *Z. anorg. allgem. Chem.* 214, 337-53 (1933).—See C. A. 27, 4740. Curtis L. Wilson

The deposition of chromium from solutions of chromic and chromous salts. Charles Kasper. *Bur. Standards J. Research* 11, 515-28 (1933) (Research Paper No. 604).—Bright deposits at high efficiencies are obtained by maintaining a low concn. of H ions and a high concn. of Cr ions in the cathode film. Violet solns. of trivalent Cr, in which the green undissoc. mol. ions are not formed, do not increase the efficiency. Expts. to show whether a trivalent bath is comparable to the chromic acid bath are as follows: Chromic fluoroborate, producing a violet bath, required a high c. d., produced uniform, bright deposits with difficulty and had a narrow plating range.

1 A soln. of  $\text{KCr}(\text{SO}_4)_2$ ,  $\text{Na}_2\text{SO}_4$  and  $\text{H}_2\text{SO}_4$  also required a high c. d., had a narrow plating range and produced bright but pitted deposits. Prep'd. pure  $\text{CrSO}_4$  with  $\text{Na}_2\text{SO}_4$  in the anode compartment gave no better results. Complex Cr compds., as  $\text{NH}_4$  chromoborate, gave still lower efficiencies. Conclusion: The chromic acid bath as used today is superior to a soln. of a lower-valence compd. Leona Marsh

Chromium-plating literature. XX. L. H. Decke. *Platers' Guide* 29, Dec. 13-14 (1933); cf. C. A. 28, 712. General references. W. H. Boynton

Electroplating metals with lead-tin alloys. P. P. Belyaev and L. M. Berman. *Khimstrof* 5, 2430-42 (1933).—A discussion of general practice. Chas. Blanc

Local reinforcing of electrodeposits with special reference to silverware. Richard Justh. *Metalware-Ind. u. Galvano-Tech.* 31, 403, 442-4, 461-4 (1933).—

3 Practical methods are described, with their patent nov. Curtis L. Wilson

The mechanism of electrodeposition. L. B. Hunt. *Trans. Electrochem. Soc.* 65, 11 pp. (preprint) (1934).—The mechanism of electrodeposition is discussed in detail from the point of view of the supply of metal ions and their distribution at the cathode-electrolyte interface, the supply of electrons from the cathode and the factors detg. the electron transitions and subsequent lattice development. The concept put forward by Volmer (C. A. 23, 3393) is criticized and an alternative hypothesis is advanced to account for lattice development and the observed polarization phenomena. An accumulation of metal ions by adsorption in the double layer until a continuous lattice layer can be formed therefrom over the face of any particular crystal is suggested. The movement of electrons through the cathode surface is dependent upon the presence of adsorbed ions in a condition permitting their acceptance of electrons. C. G. F.

Measurement of internal stresses in electroplates. R. J. Piersol. *Metal Cleaning and Finishing* 5, 456-9 (1933).—Equipment and methods for detns. of stresses in electroplated coatings are described. D. Thuesen

Measurement of adhesion of electroplates. R. J. Piersol. *Metal Cleaning and Finishing* 5, 503-6, 516 17 (1933).—The phys. nature of electroplate adhesion and the various methods for measuring it are discussed. D. Thuesen

Electrocleaning with sodium metasilicate. F. J. Henning and T. K. Cleveland. *Metal Cleaning and Finishing* 5, 497-502 (1933).—Detailed directions are given for the prepn. and operation of  $\text{Na}_2\text{SiO}_3$  baths for the cleaning of various types of metal products prior to plating. D. Thuesen

7 Current distribution at the anode in the electrolytic preparation of sodium persulfate. O. A. Esin and B. Alifimova. *Z. Elektrochem.* 39, 891-4 (1933).—With varying c. d., current concn., HIF addn. and cell construction, the current yields of active O resulting from the electrolysis of  $\text{H}_2\text{SO}_4 + \text{Na}_2\text{SO}_4$  solns. are in agreement with values calcd. from the previously derived equation (cf. C. A. 27, 2322). L. W. Elder

Protection of aluminum against corrosion. José M<sup>a</sup>. Fernández-Ladreda. *Anales soc. españ. fis. quim.* 31, 776-8 (1933).—The best protection in moist atm. is obtained by anodic treatment in an aq. bath contg. cryst.  $\text{Na}_2\text{CO}_3$  125,  $\text{Na}_2\text{CrO}_4$  8, concd.  $\text{NH}_4\text{OH}$  25 cc. per l. at 50-60° for 10 min. E. M. Symmes

Elec. purification of blast-furnace gases (Richarme) 9. Elec. furnace refractories in the brass foundry (St. John, et al.) 19. Treating Zn sulfide ores, concentrates, etc. (U. S. pat. 1,937,633) 9. Mistensing hot gases, esp. those to be electrically cleaned (Ger. pat. 580,979) 1. Cooling gases [for elec. cleaning] (Ger. pat. 581,865) 13. Electrodeposition of rubber (Budiloff) 30.

Dry battery. Siemens & Halske A.-G. (Kurt Schenkel, inventor). Ger. 583,832, Sept. 9, 1933. Details of construction.

**Dry cell.** Cyril E. Delbel and Walter G. Waitt. Ger. 584,981, Sept. 27, 1933. Details are given.

**Dry cell assemblies.** Walter B. Schulte and John S. Zook (to Burgess Battery Co.). U. S. 1,937,045 6, Nov. 28. Structural details.

**Liquid batteries.** Le Carbone. Fr. 753,905, Oct. 27, 1933. The pos. electrode is of porous C, the neg. of Zn and the electrolyte is a soln. of NaOH and NaCl. A salt capable of preventing carbonation of the electrolyte, e. g., lithine, may be added.

**Primary cells.** Elise Pollak née Hirschberg and Philipp Burger. Ger. 579,832, July 1, 1933. Addn. to 570,939 (C. A. 27, 4178). The depolarizers for primary cells with a neutral or alk. electrolyte described in 570,939 are improved by varying the addn. of rare earth compds. The 5% addn. of the latter consists of 0.9 of an O compd. of Th and 0.1 of an O compd. of Ce.

**Storage battery.** Lawrence J. Pearson (to Philadelphia Storage Battery Co.). U. S. 1,937,714, Dec. 5. Structural features.

**Storage batteries.** Werner Kuhn. Fr. 751,501, Sept. 5, 1933. Short-circuiting and corrosion of the terminals by splashed acid is prevented by a suspension in an insulating medium, such as linseed oil, of oxides, carbonates or other salts insol. in water, of Pb, Ba or Sr, which form insol. sulfates.

**Storage-battery separator.** John H. Reilly (to Richardson Co.). U. S. 1,937,205, Nov. 28. Jute fiber is treated with Na silicate and is subjected to beating; asphaltum and filler material such as gritty non-porous material is added to the beaten fiber to form a mixt. comprising approx. 50% of beaten fiber, 10% asphaltum and 40% filler; acid such as HCl is added and the mixt. is formed into a pulp in aq. suspension, felted upon a screen and dried to produce a porous acid-proof sheet.

**Storage batteries.** Compagnie générale d'électricité. Fr. 751,398, Sept. 2, 1933. Construction is given of a porous insulating envelope for the plates.

**Storage batteries.** Soc. anon. des accumulateurs monoplaque. Fr. 752,654, Sept. 28, 1933. Construction of Pb plates is given.

**Storage batteries.** Émilien Vié. Fr. 753,382, Oct. 14, 1933. Iodometallic storage batteries function by electrolysis of iodides of light metals such as Al, Mg, Li, Cd and Be, and reversal of the reaction to form the iodide of the metal used.

**Storage batteries.** Pierre A. Pissoot. Fr. 754,065, Oct. 31, 1933. Construction of porous pos. elements capable of being satd. with a reactive substance under pressure. The elements are surrounded by catalytic material such as oxides of Mo or Sb, or these may be incorporated in the porous mass. The catalysts may also be introduced in liquid form into the electrolyte, e. g.,  $\text{NH}_3$  or bromides or acetates of metals more metallic than the metal of the neg. electrode.

**Storage-battery electrodes.** I. G. Farhenind. A.-G. (Ernst Thorsausch and Leo Schlecht, inventors). Ger. 583,869, Sept. 11, 1933. A method for making electrodes by compressing metal powder obtained by the thermal decompn. of carbonyls is described.

**Soft rubber lids for storage batteries.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 397,750, Aug. 31, 1933.

**Electrical condenser.** Albert E. Maibauer (to Haloway Corp.). U. S. 1,937,490, Nov. 28. Electrode elements are used with dielectric comprising a halogenated phenyl ether, halogenated phenanthrene, liquid halogenated hydroxy derivs. of such compds. or liquid hydroxy derivs. of halogenated diphenyl.

**Electrolytic condenser.** Preston Robinson (to Sprague Specialties Co.). U. S. 1,938,464, Dec. 5. A coating of Cr, V or Mn is used on Al electrodes. Cf. C. A. 28, 7161.

**Electrolytic condenser.** Elektrizitäts A.-G. Hydrawerk. Fr. 752,832, Sept. 30, 1933. The dielectric is composed of a layer of oxide. All metal parts joined to the electrodes and not covered with a layer of oxide are coated with an insulating layer.

**Electrodeposition of iron.** Franz Pawlek (to Ernst Kelsen and Edgar Ausnit). U. S. 1,937,068, Nov. 28. For maintaining substantially const. the H absorption in successive increments of deposition of Fe in the electrolytic production of Fe, and for controlling the crystal structure of the deposited metal, there is initially passed through the electrolytic bath a current of approx. 2 amps. per sq. dm. of cathode area, and the c. d. is thereafter increased by successive stages to a max. of about 5 amps. per sq. dm. (the increase from min. to max. c. d. covering a time period of about 30-45 min.).

**Electrodeposition of alloys.** Gottfried Fuchs. Brit. 397,780, Aug. 31, 1933. A bush for a hung-hole or faucet-hole is electroplated with an alloy of W, Cr and Ni to prevent corrosion. A suitable alloy is W 1-40, Cr 1-40% and the remainder Ni.

**Chromium plating.** Oscar Bornhauser. Fr. 754,299, Nov. 3, 1933. Chromic acid baths contg. Na tetrachromate are used which permits the use of c. ds. above 200 amps. per sq. dm. The tetrachromate is formed by adding Na ions ( $\text{Na}_2\text{Cr}_2\text{O}_7$ , neutral chromate or  $\text{NaOH}$ ) to the bath. A temp. below  $40^\circ$  is used. The coated metal may be heated to below its m. p. but sufficiently high to cause the Cr to alloy therewith.

**Nickel plating.** Franz de Wurtemberg. Fr. 751,330, Aug. 31, 1933. See Brit. 395,979 (C. A. 28, 4197).

**Electroplating.** Oscar Bornhauser. Fr. 753,671, Oct. 21, 1933. The electrolysis chamber has flexible walls to envelop as closely as possible articles disposed in the chamber. Fr. 753,672. The layer of oxide or Al or its alloys is replaced by  $\text{AlH}_3$  so as to obtain a solid and lasting galvanic deposit thereon. The Al may be heated to above  $100^\circ$  and treated with HCl.

**Apparatus for electroplating.** Albert W. Ritter (to Sargent & Co.). U. S. 1,937,359, Nov. 28. Structural and mech. features.

**Portable electroplating outfit.** Grace E. Adey. Brit. 397,609, Aug. 31, 1933.

**Galvanic metal-plating apparatus.** Württembergische Metallwarenfabrik. Ger. 577,747, June 3, 1933.

**Printing rollers.** Langbein-Pfannhauser-Werke A.-G. Ger. 579,064, June 20, 1933. Addn. to 574,902 (C. A. 27, 4490). The method of 574,902 for making Cu-coated printing rollers is improved by prep. the roller surface for deposition of the Cu by coating it with a polished layer of Fe, Ni or Co.

**Electrolytic cell.** Albert E. Knowles. Ger. 580,850, July 17, 1931.

**Electrolytic cells for generating gases.** Siemens & Halske A.-G. Brit. 398,021, Sept. 7, 1933.

**Cell for carrying out electrolysis under pressure.** Jakob E. Nöggerath. Ger. 580,704, July 15, 1933.

**Cell for electrolytic production of persulfuric acid.** Gustav Baum (to E. I. duPont de Nemours & Co.). U. S. 1,937,621, Dec. 5. A centrally located anode assembly consists of an anode member in a narrow anode chamber which is formed by an impervious cylinder and a concentric porous diaphragm, around which is a concentric cathode chamber.

**Electrolytic apparatus for making thin metal sheets.** Anaconda Copper Mining Co. Fr. 753,805, Oct. 25, 1933.

**Apparatus for carrying out electrolytic decomposition.** Jakob E. Nöggerath. Ger. 579,648, June 29, 1933.

**Electrolytic production of beryllium.** Louis Burgess. U. S. 1,937,509, Dec. 5. A fluid alloy of Be and a metal or metals such as Cu relatively more dense than Be and less electropos. than Be in relation to F is at least in part covered by a floating layer of fluid electrolyte contg. fluorides of higher disocn. potential than Be fluoride together with Be fluoride or oxide, and the electrolyte is electrolyzed in series with the alloy as cathode and with a suitable anode, this liberating Be at the cathode and adding to the Be in the fluid alloy (various other details of operation and app. being described).

**Refining chromium.** Erik Liebreich. Ger. 584,580, Sept. 21, 1933. Cr and Cr-Fe is refined by electrolysis in a bath contg. succinic acid or succinates,  $\text{H}_2\text{CrO}_4$ .

being simultaneously formed. Other acids such as  $\text{HClO}_4$ ,  $\text{HClO}_3$ ,  $\text{H}_2\text{S}_2\text{O}_8$ , or Caro's acid may also be present. Examples are given.

**Apparatus for treating metals as in refining and carburizing iron and steel.** Wm. H. Moore (to Pittsburgh Research Corp.). U. S. 1,937,064, Nov. 28. An open-topped vertical shaft with a refractory lining contains a stationary filling of granular carbonaceous material such as coke or SiC which constitutes a resistor; elec. current is passed through this material to heat it and metal such as iron or steel is poured through the heated filling.

**Gold recovery.** Benjamin G. Nicholl. Australia 8475/32, Aug. 10, 1933. Au is recovered from colloidal slums, etc., by adding an aq. cyanide soln. thereto to form a slurry, electrically charging the suspended solid particles in the slurry so formed with ions of opposite polarity to the ions causing stabilization of said particles, this producing a high degree of flocculation, and regenerating the cyanide content of the slurry by adding an alkali.  $\text{Al}_2(\text{SO}_4)_3$  may be used to cause flocculation.

**Nickel.** Hirsch, Kupfer- und Messing-Werke A.-G. Ger. 583,545, Sept. 5, 1933. Electrolytic Ni is prep'd. from  $\text{Ni-H}_2\text{SO}_4$  residues obtained as a by-product in Cu electrolysis processes by neutralizing the excess of  $\text{H}_2\text{SO}_4$  by addn. of  $\text{Ca}(\text{OH})_2$  or other substances forming insol. sulfates, removing the pptd. sulfate, concg. the  $\text{NiSO}_4$  soln. and electrolyzing this.

**Alloys containing boron.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine and Jean L. Andrieux. Fr. 753,394, Oct. 14, 1933. Alloys contg. B are produced directly by electrolyzing, by means of cathodes formed of the metal to be allied to the B (Fe, Ni, Co, etc.), a bath composed of boric anhydride or borates in the molten state and contg. alkali or alk. earth halogen salts, e. g., fluorides. The temp. is preferably maintained a little above the f. p. of the eutectic which has a compn. near that of the alloy to be obtained.

**Electrolytic oxidation of aldoses.** Edward L. Helwig (to Rohm & Haas Co.). U. S. 1,937,273, Nov. 28. In oxidizing aldoses such as glucose for producing monocarboxylic acids such as gluconic acid, the aldose is electrolyzed in alk. soln. with an insol. anode in the presence of a salt (such as KI or  $\text{CaBr}_2$ ) contg. a halogen of higher at. wt. than Cl and which serves to facilitate obtainment of a pure product even on first crystn.

**Formaldehyde.** Gutehoffnungshütte Oberhausen A.-G. Ger. 580,580, July 15, 1933.  $\text{CH}_2\text{O}$  is prep'd. by passing a high-frequency high-tension elec. current through a mixt. of  $\text{CH}_4$  and  $\text{CO}_2$ , the  $\text{CO}_2$  concn. being equal to or greater than the  $\text{CH}_4$  concn. The reaction is carried out at reduced, raised or ordinary pressures, and indifferent gases may be added. App. is indicated.

**Purifying hydrocarbons.** Jean F. A. Bruzac. Fr. 752,690, Sept. 28, 1933. Hydrocarbons are submitted to the action of an elec. field so that the impurities are electrolyzed and collect at the electrodes.

**Sugar sirup.** Ulrich Heubaum. Fr. 752,717, Sept. 29, 1933. Sirup is made from plant juices contg. polysaccharides, by obtaining the acid necessary for hydrolysis completely or partly by electrolysis. Thus the acidification takes place either in the central compartment of a cell divided into 3 by appropriate diaphragms or in the anodic space of a cell divided into 2 compartments. The hydrolyzed juices are neutralized by hydrolysis.

**Sterilization.** Siemens & Halske A.-G. Fr. 751,578, Sept. 6, 1933. In sterilizing aq. liquids in movement by electrolytic introduction of a substance having an oligodynamic action, cathodic losses in the substance having an oligodynamic action is avoided by interposing a diaphragm between the electrodes.

**Electrically sterilizing flat sheets, etc.** Godfrey Steerup (to American Can Co.). U. S. 1,937,536, Dec. 5. A surface to be sterilized is placed in close proximity to spaced electrodes between which a leakage path of moisture vapor is provided, and a high-tension elec. current is passed between the electrodes and along the leakage path by which an arc having increased spacial limits is

formed and caused to impinge upon the surface. App. is described.

**Electric furnace for high temperatures.** Gotthardwerke A.-G. für elektrochemische Industrie und Arturo Paoloni. Fr. 751,092, Aug. 28, 1933.

**Electrically heated furnace (with a centrally located resistor) for annealing wire, etc.** Nelson Webb (to Eastwood-Nealley Corp.). U. S. 1,938,306, Dec. 5. Structural features.

**Electric induction furnace suitable for melting metals.** Wm. E. Moore (to Pittsburgh Research Corp.). U. S. 1,937,065, Nov. 28. A crucible for holding material which is to be melted is provided with a narrow pocket projecting downwardly from its bottom, and elec. connections are provided for causing an alternating magnetic flux to traverse the pocket from side to side in the direction of its smallest dimension. Various structural and elec. details are described.

**Induction furnace for smelting metals.** Berlin-Ilsenhurger Metallwerke A.-G. (Otto Hoffmann, inventor). Ger. 581,741, Aug. 2, 1933. The metal in the canal leading from the hearth of an induction furnace is artificially cooled.

**Induction furnace without an iron core.** Berlin-Ilsenhurger Metallwerke A.-G. Ger. 580,796, July 17, 1933.

**Regenerative furnace head.** Fritz Brand. Ger. 580,932, July 19, 1933.

**Regenerative furnace gas ports designed to obtain maximum heat release in minimum time.** David Russell. Brit. 396,826, Aug. 17, 1933.

**Apparatus for the continuous smelting of zinc ores in an electric furnace.** St. Joseph Lead Co. Ger. 579,519, June 28, 1933.

**Electric systems suitable for controlling the current supplied to electric-arc melting-furnace electrodes.** Edward A. Hanff (to Wm. Swindell & Bros.). U. S. 1,937,695 6, Dec. 5.

**Apparatus for carrying out electrical processes.** Anton Kratky. Ger. 580,849, July 17, 1933.

**Electric arc.** Presslicht-Patent-Verwertungsgesellschaft mbH. Ger. 579,682, June 29, 1933. App. for producing an elec. arc in which a gaseous hydrocarbon is led between two concentric C electrodes is described.

**Electric motor utilizing the kinetic energy of gaseous ions.** Henri Chaumat. Fr. 753,363, Oct. 14, 1933.

**Electrical device for measuring the heat conductivity of gases and vapors.** I. G. Farbenind. A.-G. (Arnold Nitsche, inventors). Ger. 581,800, Aug. 3, 1933.

**Purifying gases from roasting processes.** I. G. Farbenind. A.-G. Brit. 397,851, Aug. 29, 1933. The gases are passed through an elec. precipitator to remove dust, then cooled indirectly to below  $100^\circ$  and moistened by spraying in  $\text{H}_2\text{O}$ . The  $\text{H}_2\text{SO}_4$  fog is then sep'd. as relatively strong acid, together with other impurities, by passage through a 2nd elec. pptn. plant.

**Cleaning metal surfaces.** Jacob Glaymann and Jacques Martin. Fr. 754,044, Oct. 30, 1933. Metal surfaces to be cleaned are made the electroneg. element of a battery, the electropos. element of which is any more electropos. metal. The alk. electrolyte is such that, under the conditions of working, min. solution of the anode occurs and polarization is impossible.

**Oils for electrical apparatus.** Soc. artsienne de force et lumière. Fr. 752,857, Oct. 2, 1933. The oils are protected against alteration by keeping them in closed app. in the presence of inert gases, the variations in vol. being allowed for by the use of a gasometric bell.

**Drawing wire.** Allgemeine Elektrizitäts-Ges. Ger. 579,797, June 30, 1933. Rolled wire, before drawing, is subjected to a short electrolysis in  $\text{Ca}(\text{OH})_2$  soln., the wire forming the anode.

**Copper oxide rectifiers for use with high voltages.** Herbert Kahler (to Westinghouse Elec. & Mfg. Co.). U. S. 1,936,792, Nov. 28. In producing rectifier elements, Cu is heated to  $1000\text{--}1025^\circ$  for a few min. in an oxidizing atm. and then cooled during a period of several min. to about  $490^\circ$ , further cooled at room temp. during several

min. and finally quenched (suitably in water at room temp.).

**High-frequency apparatus for making ozone.** Edmond Bégot. Fr. 753,352, Oct. 14, 1933.

**Apparatus for producing and utilizing ozone.** Louis E. Beuret and Roger Cazaud. Fr. 750,951, Aug. 24, 1933.

**Arc lamps.** Siemens & Halske A.-G. Brit. 397,680, Aug. 31, 1933. In a high-pressure arc lamp having a metallic vapor filling, e. g., Cd or Zn, the wall through which the rays are transmitted is protected against positions by covering it, at least in part, by openwork metallic structures which are not connected to an external source of potential.

**Carbon-electrode arc lamps with magnetic arc control.** James O. Armstrong. Brit. 397,517, Aug. 25, 1933.

**Discharge lamps.** Patent-Treuhand Gesellschaft für elektrische Glühlampen m. b. H. (to the General Electric Co. Ltd.). Brit. 397,774, Aug. 31, 1933. To prevent excessive strains in a luminous tube 2 or more parts of the glass tubing are joined with gas-tight joints by flexible

metal tubes which may be of spring steel or bronze and, preferably, are partially or wholly corrugated. Cf. C. A. 27, 5012.

**Electron lamps.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 753,772, Oct. 24, 1933.

**Electron lamps with adjustable cathode.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 751,059, Aug. 26, 1933.

**Electric lamps.** Royal Frank Strickland (to The British Thomson-Houston Co. Ltd.). Brit. 397,887, Aug. 24, 1933. In lamps in which a sealed bulb, e. g., of borosilicate glass transmitting ultra-violet rays, filled with inert gas or vapor, e. g., Hg, contains current leads, e. g., of Ni with W parts sealed into the stem, arc electrodes, e. g., of W, and a filament, e. g., of W, across the leads so that, on starting, the filament glows first and the arc then strikes, the electrodes are formed as coils and parts of the filament adjacent its ends are disposed within these coils, the difference between the starting and operating voltages being thus reduced.

## 5—PHOTOGRAPHY

E. P. WIGHTMAN

**Color cinematography.** Wm. van D. Kelley. U. S. 1,937,823, Dec. 5. A positive film strip has alternate frames carrying red values and blue-green values, resp., one series of the frames being given a color corresponding to its color values, and the other frames being grayed to balance the light-transmitting qualities of the colored frames.

**Anti-halation photographic layers.** Kodak-Pathé. Fr. 751,146, Aug. 28, 1933. Salts of cellulose esters of a dicarboxylic acid are prep'd. by esterifying regenerated cellulose with a dicarboxylic acid anhydride, in the presence of an org. base such as pyridine, decomposing the resulting product with an acid stronger than the 2nd carboxylic group of the dicarboxylic acid corresponding to the anhydride used, and neutralizing the acidity of the product by means of a base, such as an alkali or an amine, to obtain a sol. salt. Examples are given of the prep'n. of an acetophthalate and an acetosuccinate of cellulose and triethanolamine, and others are mentioned. The products are used to make anti-halation layers.

**Photographic anti-halation layers.** I. G. Farbenind. A.-G. Fr. 751,299, Aug. 30, 1933. Filtering or anti-halation layers are composed of colloids with which are incorporated dyes obtained by condensing mol. aunts. of aromatic or cyclic aldehydes with compds. having reactive CH<sub>2</sub> groups. Examples are given of the prep'n. of compds. from 4-dimethylamido-benzaldehyde-2-sulfonic acid with (1) barbituric acid, (2) thiobarbituric acid and 3-hydroxythionaphthene with (1) Na *o*-benzaldehyde-sulfonate, (2) *m*-hydroxybenzaldehyde, (3) Na benzaldehyde-disulfonate and 3-hydroxyselenonaphthene with Na *p*-benzaldehydesulfonate. Cf. C. A. 28, 57<sup>a</sup>.

**Light-sensitive layers.** Maximilian P. Schmidt and Edward Sprongerts (to Kalle & Co. A.-G.). U. S. 1,936,957, Nov. 28. A suitable base such as paper carries as a single coloring matter an aromatic diazo comp'd., such as that derived from "H-acid" or the like, which contains at least 2 benzene nuclei and which, in the benzene nucleus not contg. the diazo group, contains at least one free coupling position and is therefore capable of coupling with itself on exposure to light and treatment with a suitable alk. soln.

**Light-sensitive emulsions.** I. G. Farbenind. A.-G. Fr. 751,416, July 19, 1933. Addn. to 731,508. Carbo-cyanines which are substituted by alkyl groups in the polymethine chain are used for sensitizing Ag halide emulsions to red and infra-red. The formulas are given of halides of 3,3'-dimethyl-6,6'-dimethyl- $\alpha,\alpha'$ -di-, 3,3'-dimethyl- $\beta,\beta'$ -di-, 3,3'-dimethyl- $\beta,\delta,\beta'$ -tri-methylhepta-thiocarbocyanine, 3,3'-diethyl- $\beta$ -naphthothio- $\delta$ -, 3,3'-diethyl- $\alpha$ -naphthothio- $\beta,\beta'$ -di- and 1,1'-dimethyl-2,2'-quino- $\delta$ -methylheptacarbocyanine, 3,3'-diethyl-5,5'-

dimethoxy- $\gamma$ -methylpenta- and 3,3'-diethyl- $\delta$ -methylhepta-selenocarbocyanine, 1,1'-diethyl-3,3'-tetra-methyl- $\alpha,\alpha'$ -dimethyl- $\gamma$ -ethylindocarbocyanine and the methylsulfate of 1,1'-dimethyl-4,4'-quino- $\delta$ -methylheptacarbocyanine.

**Photographic emulsions.** Bruno Claus. Fr. 752,847, Sept. 30, 1933. Very finely granular emulsions are obtained by subjecting the emulsions, during or after mixt., to mech. vibrations or oscillations, preferably of high frequency.

**Toning photographic images.** E. Mayer & Benedik. Fr. 751,594, Sept. 6, 1933. A coloring or toning bath for photographic images is composed of phosphates or arsenates and molybdates mixed in stoichiometric aunts. or not, and with the addn. of strong acids such as HCl, HF, HCNS or H<sub>2</sub>SO<sub>4</sub>.

**Maintaining photographic fixing baths at a substantially uniform silver concentration.** Louis Weisberg and Willard F. Greenwald (to Weisberg & Greenwald, Inc.). U. S. 1,937,179, Nov. 28. A portion of the bath is continuously withdrawn, electrolyzed at a cathode c. d. of 25-75 amp. per sq. ft. to effect sepn. of Ag in the form of non-colloidal Ag<sub>2</sub>S, and the pptd. Ag<sub>2</sub>S is sepd. from the soln.; the temp. of the latter is suitably adjusted and it is then returned for further use in the fixing bath.

**Photographic developer.** Marion C. Reed (to B. F. Goodrich Co.). U. S. 1,937,844, Dec. 5. Developers are used contg. compds. such as *m*-methyl-*p*-hydroxy-*N*-phenylmorpholine or the like as active developing agent.

**Photographic plates and films.** I. G. Farbenind. A.-G. Brit. 397,740, Aug. 31, 1933. See Ger. 570,991 (C. A. 27, 4183).

**Photographic plates and films.** I. G. Farbenind. A.-G. Ger. 584,662, Sept. 22, 1933. A halation-preventing coating sol. in alk. developing or fixing baths, consists of a colored colloidal layer insol. in water, the binding agent for the coloring matter being a synthetic resin contg. a salt-forming OH or COOH group. Thus, the plate or film is coated on its rear side with a colloidal prep'n. contg. a resin made by condensing salicylic acid with *p*-CH<sub>3</sub>O, and fuchsin and iso-BuOH. Cf. C. A. 27, 4183.

**Treating photographic negatives.** Alfred Glowa. Ger. 584,663, Sept. 22, 1933. Developed and fixed negatives or transparencies are immersed in a bath contg. an aq. soln. of Na<sub>2</sub>PO<sub>4</sub>, Na<sub>2</sub>CO<sub>3</sub> and Na<sub>2</sub>SiO<sub>3</sub> for 1-2 min. before further washing. The process reduces the time required for washing and drying.

**Photographic paper.** Kalle & Co. A.-G. (Rudolf Zahn inventor). Ger. 581,697, Aug. 1, 1933. Light-sensitive surfaces for producing tanned prints are prep'd. by coating the surfaces with a colloidal layer contg. diazo compds.

whose light-decompn. products have tanning properties. 1 Thus the paper may be coated with a layer of an emulsion contg. gelatin,  $\text{Fe}_2\text{O}_3$ ,  $\text{AcOH}$ , water and the  $\text{ZnCl}_2$  double salt of the diazo compd. of 4-amino-1-(*N*-methyl-4,5,6,7-tetrahydro-2-naphthyl)-aminobenzene.

**Lecithin photographs.** Elizabeth Wolter. Ger. 584,562, Sept. 21, 1933. A sensitive layer for the above consists of lecithin, an org. Fe salt and nitrocellulose.

**Photomechanical printing.** Ralph E. Hurst and Charles E. Meulendyke. U. S. 1,938,290, Dec. 5. A basic metallic sheet such as Cu plated with an inert metal such as Ag, Ni or Cr and carrying a colloid layer contg. a sensitive Ag salt is exposed, the Ag image is developed,

and the colloid dissolved out (suitably by  $\text{H}_2\text{O}$  soln.) under the selective control of the Ag image. U. S. 1,938,291 also relates to sensitized plated metal plates as used in this process.

**Engraving printing cylinders.** Nerses Bechak. U. S. 1,938,313, Dec. 5. The cylindrical surface of a metal roller is coated with a sensitized acid-resisting soln. having a shellac base; a flexible transparent pos. film is attached to the circumference of the roller, and after the design is printed on the sensitized surface development is effected in a developing bath contg. a coloring material, forming a colored resist surface upon the roller, and the exposed parts of the surface are subsequently etched.

## 6 -INORGANIC CHEMISTRY

A. R. MIDDLETON

**A study of some reactions between dry inorganic salts.** E. H. Thomas and Lyman J. Wood. *J. Am. Chem. Soc.* 56, 92 7(1934).— $\text{KCl}$ - $\text{NaBr}$  mixts. were examd. above and below the fusion temp. and double decompn. was found to occur in both cases. Several other reactions ( $\text{KCl}$ - $\text{NaF}$ ,  $\text{KCl}$ - $\text{NaI}$ ,  $\text{KCl}$ - $\text{NaNO}_3$ ,  $\text{KCl}$ - $\text{AgBr}$ , etc.) were also investigated by means of the x-ray spectrograph and are reported.

**Formation of carbonyls and related compounds.** Arthur A. Blanchard, John R. Raffet and Wm. B. Adams, Jr. *J. Am. Chem. Soc.* 56, 16 17(1934); cf. *C. A.* 27, 3416.—Carbonyls of Ni and Co and cobalt nitrosyl tricarbonyl were prepd. by the treatment of alk. suspensions of sulfide or cyanide with CO or CO-NO mixt. Vapor pressure and vapor density data for  $\text{CoNO}(\text{CO})_3$  are given.

**Constitution of neodymium, samarium, europium, gadolinium and terbium.** F. W. Aston. *Nature* 132, 930 1(1933).—By use of the mass spectrograph the isotopes 142, 144 and 146 of Nd (in decreasing order of abundance) are shown present, with 143 and 145 also occurring. Sm gives a strong pair, 152 and 154, and a triplet, 147, 148 and 149. Eu contains 151 and 153 in roughly equal abundance. Gd shows 155, 156, 157, 158 and 160 to be present; faint effects at 152 and 154 are attributed to Sm impurities. Tb shows only one line, 159, although its at. wt., 159.2, would suggest a second.

**Addition reactions with hydrogen and oxygen atoms at low temperatures.** K. H. Gebel and P. Hartek. *Ber.* 66B, 1815 25(1933).—The reactions of H atoms at  $-190^\circ$  with  $\text{HCN}$ ,  $(\text{CN})_2$ ,  $\text{SO}_2$ ,  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$  and  $\text{C}_2\text{H}_6$ , and of O atoms at  $-183^\circ$  with  $\text{NO}$ ,  $\text{CO}$ ,  $\text{SO}_2$ ,  $\text{NH}_3$ ,  $\text{MeNH}_2$ ,  $\text{Me}_2\text{N}$ ,  $\text{HCl}$ ,  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$  and  $\text{C}_2\text{H}_6$  were studied. H atoms did not react with  $\text{NH}_3$ ,  $\text{N}_2\text{O}$  and  $\text{MeNH}_2$ , and O atoms did not react with  $\text{HCN}$ ,  $\text{N}_2\text{O}$  and  $\text{H}_2$ . No evidence was found for the existence of an oxide of Xe. L. E. Steiner.

**The reciprocal salt pair  $\text{Ca}(\text{NO}_3)_2 + 2\text{KCl} \rightleftharpoons 2\text{KNO}_3 + \text{CaCl}_2$  at  $-10^\circ$ .** I. Klichevskii and R. K. Izkovich. *Z. anorg. allgem. Chem.* 215, 103 4(1933).—The authors have studied the equil. shown in the title and found that to obtain the max. yield of  $\text{KNO}_3$  (74.5% of initial  $\text{Ca}(\text{NO}_3)_2$ ) the soln. after the crystn. of  $\text{KNO}_3$  must be satd. with respect to  $\text{CaCl}_2$  and  $\text{KCl}$ . Conclusion: The prepn. of  $\text{KNO}_3$  from  $\text{Ca}(\text{NO}_3)_2$  at  $-10^\circ$  is not economically feasible.

**The colors of the copper salts.** Wilder D. Brainerd and Harris W. Rogers. *J. Phys. Chem.* 37, 1061-73 (1933).—Hantzsch's theory is supported that color identity for solid, vapor and soln. occurs when the chromophoric group is the same and that change of color connotes a difference in the chromophoric group; this is independent of the degree of ionization but becomes less intense at lower temps. The anhyd. cupric ion is colorless; with 3 or 2 mols. of  $\text{H}_2\text{O}$  the ion is green; with 3 or more blue.  $\text{NH}_3$  has practically the same effect in Cu complexes as  $\text{H}_2\text{O}$  but the shade of blue is different. Certain anhyd. double Cu salts are red and must have the same chromophoric group as  $\text{CuCl}_2$  vapor, which is probably a pseudo salt.

A. P. Sachs

**The solubility of cupric chloride in water and the transition temperatures of its hydrates.** The tetrahydrate. Erich Boye. *Z. anorg. allgem. Chem.* 215, 75 80(1933).—The soly. of  $\text{CuCl}_2$  in water has been detd. between  $-43.4^\circ$  (cryohydrate  $\text{H}_2\text{O}-\text{CuCl}_2(\text{H}_2\text{O})_4$  with 39.9%  $\text{CuCl}_2$ ) and  $116.8^\circ$  (b. p. of satd. soln. with 55.0%  $\text{CuCl}_2$ ) by analysis of satd. solns. at 31 temps. The transition temps. between hydrates are 4:3:  $15.0^\circ$ , 3:2:  $25.78^\circ$ ; 2:1:  $42.2^\circ$ . A new hydrate  $\text{CuCl}_2(\text{H}_2\text{O})_4$  is described: it has light-blue needles, which do not become green in presence of moisture; it is unstable, losing  $\text{H}_2\text{O}$  slowly even at  $0^\circ$ .

**A phosphide of nitrogen.** P. Renaud. *Bull. soc. chim.* 53, 692 7(1933).—The action of Na on  $\text{PNCl}_2$  gives an impure form of PN contg. 10% Cl. The action of  $\text{NH}_3$  and  $\text{PNCl}_2$  gives a product contg. 2% Cl; if this is heated *in vacuo* a rather pure form of PN is obtained. The compd. is grayish black, has an odor like  $\text{H}_2\text{S}$ , is insol. in  $\text{H}_2\text{O}$ ,  $\text{EtOH}$ ,  $\text{Et}_2\text{O}$  and  $\text{CS}_2$ , but reacts readily with  $\text{Na}_2\text{O}$  and fused  $\text{NaNO}_3$ .

**Some reactions of anhydrous thorium tetrabromide with organic liquids.** Ralph C. Young. *J. Am. Chem. Soc.* 56, 29 31(1934).—The reactions of anhyd.  $\text{ThBr}_4$  with a no. of org. liquids were studied. Such compds. as  $\text{ThBr}_4 \cdot 4\text{C}_2\text{H}_5\text{OH}$ ,  $\text{ThBr}_4 \cdot 3\text{C}_6\text{H}_5\text{COOC}_2\text{H}_5$  and  $\text{ThOBr} \cdot 0.5\text{C}_6\text{H}_5\text{COCH}_3 \cdot \text{H}_2\text{O}$  were obtained. Their prepn. and properties are given.

**Fission of carbon monoxide on iron oxide and iron.** II. A. Bahr and V. Jessen. *Ber.* 66B, 1238 47(1933); cf. *C. A.* 24, 561. —Pure  $\text{Fe}_2\text{O}_3$  (9.7% C) can very probably be prepd. from Fe and CO at  $225^\circ$  or lower; at 230–400 a mixt. of  $\text{Fe}_2\text{O}_3$ ,  $\text{Fe}_3\text{C}$ , with free C probably results; while above  $400^\circ$  only  $\text{Fe}_3\text{C}$  (8.68% C) is formed. Carbonized products obtained by means of Fe oxide always contain O; detection of combined C by hydrogenation with H is not quite trustworthy in this case and must be performed at  $255-60^\circ$ . The products obtained with Fe up to  $330^\circ$  are free from O; at higher temps. the oxidizing action of the liberated CO is observed. The hydrogenation of combined C with H can take place at  $280-300^\circ$ . Carbon formation occurs relatively rapidly; subsequently, the main reaction is the sepn. of free C. W. C. Fernelius.

**The reversible conversion of the dimetaphosphates in to the condensed salts of Graham.** Paul Pascal and Bonnemaman. *Compt. rend.* 197, 381 4(1933).— $\text{Na}(\text{PO}_3)_2 \cdot 6\text{H}_2\text{O}$  is obtained by heating  $\text{Ag}_2\text{P}_2\text{O}_7$  at  $145^\circ$  for 15 days,  $\text{Ag}_2\text{P}_2\text{O}_7 = \text{Ag}_2(\text{PO}_3)_2 + 2\text{Ag}$ , treating with aq.  $\text{NaCl}$  at  $0^\circ$ , and pptg. by alc. (cf. *C. A.* 27, 2898). If heated for a shorter time the product is gummy, because of incomplete transformation; if for longer, complex poly metaphosphates (Graham's salts), pptd. as oils, are formed.  $\text{Ag}_2\text{H}_2\text{P}_2\text{O}_7$ , heated at  $320^\circ$  and similarly treated, gives an uncrystallizable, oily, hydrated Na polymetaphosphate (apparent mol. wt. in dil. soln. is 488; viscosity of a 1% soln. is 25 times that of  $\text{H}_2\text{O}$ ). After 3 weeks the mol. wt., cond. and viscosity become those of the dimetaphosphate, the ready change of which to acid pyrophosphate explains the slightly acid character of solns. of Graham's salts.

W. C. Fernelius



The decomposition of Vyatka phosphorite by hydrochloric acid and the precipitation of the obtained phosphoric acid by limestone and milk of lime. I. Mirkin, S. Perel'man and I. Nikonova. *J. Chem. Ind. (Moscow)* 1933, No. 7, 56-62; cf. *C. A.* 25, 4650.—The full theoretical amt. of HCl must be used when this acid decomposes phosphorite. It is best to use 10% HCl soln., to avoid too much later washing. The phosphorite does not have to be finer than 20-mesh. Finely ground limestone will ppt. all the  $H_2PO_4$  formed if sufficient time is allowed, but in practice it is best to end the neutralization with  $Ca(OH)_2$ .

Hetero- and iso-poly acids. A. R. Middleton. *J. Chem. Education* 10, 720-32 (1933).—An outline of the nature and properties of hetero- and iso-poly acids and of the theories regarding their structure. Special consideration is given to the work of Roschheim (*C. A.* 16, 1194) and of Jander (*C. A.* 27, 4187). Louise Kelley

Intermediate states of reduction of chromic acid. T. R. Ball and Keith D. Crane. *J. Am. Chem. Soc.* 55, 1800-4 (1933).—In the reduction of chromic acid with  $FeSO_4$ ,  $Hg_2SO_4$ ,  $SnCl_2$  and  $H_2C_2O_4$ , quinquivalent Cr was detd. as an intermediate product; there was no evidence of quadrivalent Cr. A preliminary indication of trivalent Sn will be further investigated. M. McMahon

Decomposition of formic acid by sulfuric acid. Robert I. DeRight. *J. Am. Chem. Soc.* 55, 4761-4 (1933).—Measurements of the decomn. of  $HCO_2H$  by  $H_2SO_4$  in large excess, by means of a rotary shaker, have been extended to a concn. of 100%  $H_2SO_4$ . If  $HCO_2H$  is in large excess the decomn. proceeds indefinitely. Qualitatively the effect of  $SO_2$  on the reaction is similar to that obtained in cases of oxalic, citric and malic acids by Wiig (*C. A.* 25, 568).

Constitution of hydrazoic acid and the azides. A. Hantzsch. *Ber.* 66B, 1349-54 (1933).—Alkyl azides (non-

electrolytes) show discontinuous or selective ultra-violet

absorption and are assigned the structure  $\begin{array}{c} N \\ \diagup \quad \diagdown \\ N \end{array} NR$  (cf. *C. A.* 27, 3459). The cyclic structure is also assigned to  $HN_3$  because of its similarity to  $N_3R$  and its existence in  $H_2SO_4$  soln. as the trisulfate. Since liquid  $HN_3$  is assord., the

structure is expanded to  $NH \begin{array}{c} N \dots N \\ \diagup \quad \diagdown \\ N \dots N \end{array} NH$ . The alkali

and  $NH_4$  azides are electrolytes with continuous or general absorption in which the pos. metals, as cations, are equally bound to all the neg. atoms of the anions. The feebly pos. metals are united in their salts (pseudo salts) to a single N atom and exhibit a markedly different absorption. It is assumed, therefore, that the azide ion is sym. and is thus distinct from nearly all other anions in the absence of a central atom. Cyanogen azide (cf. *C. A.* 22, 3138) is more strongly absorbent than other azides, is hydrolyzed normally to  $N_2CONH_2$  and  $N_2COOH$ , and therefore con-

tains 2 CN; it is  $NC.N \begin{array}{c} N \dots N \\ \diagup \quad \diagdown \\ N \dots N \end{array} N.CN$ .

W. C. Fernelius

Magnetic anisotropy in crystals of *trans*-dinitrotetraminecobaltic chloride (Strook) 2. Reaction between HI and  $Cl_2$  (Mooney, Reid) 2.

Bourion, F., Conduché, A., Isabey, Jean, Meyer, F., Olmer, L. J., and Tourneux, C. *Traité de chimie minérale*. T. VIII. Éléments des terres rares, cuivre, argent, or, mercure. Published under the direction of Paul Pascal. Paris: Masson et Cie. 1205 pp. F. 210. Cf. *C. A.* 27, 3893.

## 7- ANALYTICAL CHEMISTRY

W. T. HALL

Titration with adsorption indicators. III. New adsorption indicators for the argentometric titration of iodine. Yumitsu Uzumasa and Yasuo Miyake. *J. Chem. Soc. Japan* 54, 1043-6 (1933); cf. *C. A.* 27, 5673. Bromocresol purple (I), phenolphthalein (II), methyl red (III), phenol red (IV), cochineal (V) and azolitmin (VI) are excellent adsorption indicators for the titration of  $I^-$  with  $AgNO_3$ . The change in color at the end point: I violet  $\rightarrow$  green, II pink  $\rightarrow$  purple, III yellow  $\rightarrow$  orange red, IV pink  $\rightarrow$  blue, V violet  $\rightarrow$  green, VI brown  $\rightarrow$  dark green. The indicators are sensitive to 0.01 N iodide soln., except VI which cannot be used for the titration of a soln. less than 0.02 N. The titration is made in a slightly alk. condition, with a few drops of 1% indicator soln.

K. Kitsuta  
The indicator properties of *p*-nitrophenylacetylhydrazine, 2,4-dinitrophenylacetylhydrazine, and 2,4,6-trinitrophenylacetylhydrazine. Albert Bloom and Arthur Osol. *Am. J. Pharm.* 105, 551-3 (1933).—All 3 indicators were found to be satisfactory in the titration of strong acids. In alk. solns. the colors fade and are unreliable.

W. G. Gaessler  
Azo coupling in volumetric analysis. E. Rostovtzeva. *Imitokra. ochnaya Prom.* 3, 308 (1933).—In the titration of diazonium salts some compds. give coagulated azo dyes, which form coarsely granulated ppts. with occlusion of the component and the resulting low values. By use of protective colloids, such as gum arabic and gelatin, the coagulation of the dye and the necessity of using excessive diln. of the titration medium are precluded, the results are more accurate and the time required is shortened.

Chas. Blanc  
Cerimetry. Reinaldo Vanossi and Raoul Ferramola. *Ann. chim. anal. chim. appl.* 15, 529-44 (1933).—See *C. A.* 27, 40.

W. T. H.  
Separation of beryllium from the related elements of

the third group. P. Adami. *Ann. chim. applicata* 23, 428-32 (1933). Be can be sepd. from Fe and Al by first evap. to dryness twice with  $HCO_2H$ . The resulting formates are then placed in a Pt boat, and heated with  $HCO_2H$  in a long glass tube, sealed at one end and connected at the other end to a vacuum pump. Ignited under vacuum at 180-200°,  $Be(CO_2H)_2$  sublimates and crystallizes in the cold part of the tube. It is then dissolved in concd.  $HNO_3$ , reprecip. with  $NH_4OH$  and detd. as oxide. The Al and Fe formates are converted to oxides and detd. directly. The above method is not applicable in the presence of Ti, when there are low results because of incomplete sublimation of Be.

A. W. Contieri

The nephelometric determination of small amounts of bismuth. Luigi Malossi. *Rend. accad. sci. (Napoli)* [4], 2, 83-90 (1932).—This method is an adaptation of the microscopical method of Vanino and Treubert (*Ber.* 31, I, 1113 (1898)), whereby Bi is pptd. by the action of  $Na_2SnO_3$ . The method is sensitive to concns. of Bi from 0.0004% to 0.04% and is useful for detg. Bi in samples of com. Cu. Dissolve 20 g. of Cu in concd.  $HNO_3$ , evap. on the water bath with addn. of HCl until N oxide fumes cease to appear. Dil. and filter. To the filtrate add a satd. soln. of  $(NH_4)_2CO_3$  in slight excess. Filter and dissolve the residue which contains Bi, Pb, Fe and small amts. of Cu in hot dil. HCl and evap. the soln. to about 10 cc. Add 5-6 cc. of hot, filtered 0.5% agar agar soln. and 10-14 cc. of freshly prepd.  $Na_2SnO_3$  soln. (a slight excess of 20% NaOH added to 20%  $SnCl_2$  soln.) and compare the resulting turbidity with that obtained with standard solns.

Anne E. White

Determination of chromium by the mercurimetric method. Al. Ionesco-Matiu and S. Herscorici. *Bull. soc. chim.* 53, 1032-8 (1933).—The procedure consists in adding a soln. of  $HgNO_3$  to one of  $CrO_4^{2-}$  or  $Cr_2O_7^{2-}$  contg. no halide nor much  $H_2SO_4$ , removing the ppt. of

Hg<sub>2</sub>CrO<sub>4</sub> and washing it with the aid of the centrifuge and then detg. the Hg in the ppt. or titrating the excess Hg-NO<sub>3</sub>. In the former case, the ppt. is dissolved in 1-4 cc. of HNO<sub>3</sub>, the soln. is transferred to an Erlenmeyer flask, 8 cc. of H<sub>2</sub>SO<sub>4</sub> added and water to make a total vol. of 100 cc.; 2% KMnO<sub>4</sub> is added to effect oxidation and 10-20 drops of a 10% soln. of Na nitroprusside. The soln. is then titrated with 0.1 N NaCl soln. until the turbidity of nitroprusside disappears. The procedure was tested with solns. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, K<sub>2</sub>CrO<sub>4</sub> and chromic alum. In the latter case the Cr was first pptd. as hydroxide and then oxidized in alk. soln. with H<sub>2</sub>O<sub>2</sub>. W. T. H.

**Direct determination of chromium and vanadium in steel. o-Phenanthroline ferrous complex as indicator.** Hobart H. Willard and Philena Young. *Ind. Eng. Chem., Anal. Ed.* 6, 48-52 (1934).—The method depends upon the oxidation of Cr to chromic acid and of V to vanadic acid, reduction to Cr<sup>++</sup> and VO<sup>++</sup> by a measured vol. of standard FeSO<sub>4</sub> soln. and titration of the excess Fe with KMnO<sub>4</sub>, with o-phenanthroline as indicator, in a soln. of acidity so great that VO is not oxidized. Then the acidity is lowered, the temp. raised and the VO<sup>++</sup> oxidized to HVO<sub>3</sub> with KMnO<sub>4</sub>. Take 0.25 g. of steel and heat slowly with 20-5 ml. of 70% HClO<sub>4</sub>. Boil the resulting soln. 15-20 min. Cool, add 25 ml. of water and boil 3 min. to remove Cl<sub>2</sub>. Dil. to 250-300 ml., cool under running water, add 15 ml. of H<sub>3</sub>PO<sub>4</sub>, d. 1.37, a measured vol. of standard FeSO<sub>4</sub> soln. and 2-3 drops of indicator soln. (Dissolve the phenanthroline in 0.025 M FeSO<sub>4</sub> soln. so that the ratio of org. compd. to Fe is 3:1.) Titrate at once with 0.05 N KMnO<sub>4</sub> till the color changes from pink to a clear green. Add sufficient NaOAc to react with all the free HClO<sub>4</sub> present (1.6 g. for each ml.), heat to 50° and titrate at once with KMnO<sub>4</sub> to the same end point. W. T. H.

**Separation of gold from tellurium.** Victor Lenher, G. B. L. Smith and D. C. Knowles, Jr. *Ind. Eng. Chem., Anal. Ed.* 6, 43-5 (1934).—At a  $p_{H_2}$  somewhat greater than 1, Au can be pptd. quantitatively by HNO<sub>3</sub>. Suitable conditions are obtained by the presence of 1.5% HCl and Rochelle salt as a buffer. Au is also pptd. completely by FeSO<sub>4</sub> in the presence of 1-2% HCl. Under these conditions Te is not pptd. Detailed directions are given for carrying out the analysis. W. T. H.

**Determination of lead with picrolonic acid.** Friedrich Hecht, Wilhelm Reich-Rohrig and Hermann Brantner. *Z. anal. Chem.* 95, 152-63 (1933).—In a previous paper (Dworzak and Reich-Rohrig, *C. A.* 25, 5865) it was shown that picrolonic acid is a suitable reagent for the macro- and microdetn. of Ca. With this reagent, Pb forms a ppt. corresponding to the formula Pb(C<sub>10</sub>H<sub>7</sub>N<sub>3</sub>O<sub>4</sub>)<sub>2</sub>·1.5H<sub>2</sub>O. In water at 0° the soly. of the salt corresponds to about 7 mg. Pb per l. The reaction takes place best in a soln. which is neutral to litmus in a vol. of about 50 cc. per 0.1 g. Pb and in the absence of much alkali or NH<sub>4</sub> salt. As reagent a soln. of 2.64 g. picrolonic acid per l. is recommended. Special app. is described and shown for the microdetn. The procedure is particularly suitable for detg. Pb in the presence of small quantities of Pt such as are present in solns. after the use of Pt vessels. W. T. H.

**Determination of lead as lead hydrogen arsenate.** C. L. Dunn and H. V. Tartar. *Ind. Eng. Chem., Anal. Ed.* 6, 64 (1934).—An attempt was made to det. Pb as PbHAsO<sub>4</sub>, and it was found that at  $p_{H_2}$  = 4.6 fairly satisfactory results could be obtained, but the method is not as adaptable as is either the sulfate or chromate method for detg. Pb. W. T. H.

**Determination of lead as carbonate and its separation from silver by means of carbonic acid in the presence of a little pyridine.** A. Jilek and J. Kota. *Collection Czechoslov. Chem. Communications* 5, 396-410 (1933) (in French).—To the neutral soln. contg. not more than 0.2 g. Pb or 0.2 g. Ag, add an aq. 10% pyridine soln. until the reaction is alk. to methyl orange. Allow the mixt. to stand 5 min., add 5 ml. of 98% alc. and 15 ml. of the dil. pyridine soln. Introduce a stream of CO<sub>2</sub> for 45 min. Filter and wash with 100 ml. of water satd. with CO<sub>2</sub> and

contg. 4 ml. of alc. and 4 ml. of dild. pyridine. Weigh as PbCO<sub>3</sub> after drying at 100°. Make the filtrate acid with AcOH, evap. to a convenient vol. and det. the Ag as AgCl in the usual way. W. T. H.

**Iodometric determination of silver.** M. L. Josien. *Compt. rend.* 197, 1324-6 (1933).—The best conditions for the titration are obtained by adding the AgNO<sub>3</sub> soln. to an alkali iodide soln. contg. a drop of I<sub>2</sub> in alc. of such diln. that 1 drop of the AgNO<sub>3</sub> soln. will decolorize the soln. in the absence of halide. In this way the oxidation of I<sup>-</sup> to IO<sub>3</sub><sup>-</sup>, which takes place in the presence of considerable Ag<sup>+</sup>, is avoided. W. T. H.

**The titration of bivalent tin with potassium chlorate.** E. Azzarello and F. Abramo. *Ann. chim. applicata* 23, 438-50 (1933).—Polemic (cf. Kulwarskaja, *C. A.* 26, 5020). A. W. Contieri

**Conditions for the precipitation of zinc sulfide and of hydrated alumina add a method for the gravimetric separation of zinc and aluminum. III. Conditions for the precipitation and weighing of hydrated alumina.** J. N. Frers. *Z. anal. Chem.* 95, 113-38 (1933); cf. *C. A.* 28, 4312.—The literature concerning the pptn. and handling of Al<sub>2</sub>O<sub>3</sub>·xH<sub>2</sub>O ppts. is reviewed carefully and some further expts. are performed; as a result the following procedure is recommended: To 200 cc. of soln. contg. the equiv. of about 0.2 g. of Al<sub>2</sub>O<sub>3</sub> and 4 g. of NH<sub>4</sub>Cl or NH<sub>4</sub>NO<sub>3</sub>, add 10 drops of phenol red indicator soln., heat to boiling and add, while the soln. is cooling, some fresh NH<sub>3</sub> soln. (prepd. by passing NH<sub>3</sub> for 5 min. through about 200 cc. of water) until the indicator shows a color change. Boil 2 min. and filter through a 15-cm. ashless paper. Wash the ppt. with a hot soln. contg. 2% of NH<sub>4</sub> salt which has been made barely alk. to phenol red. Ignite at 1200° for 10 min. after careful drying and burning of the paper. Allow the uncovered crucible to remain 1 hr. in the desiccator and 10 min. in the balance case before weighing. IV. Separation of zinc from aluminum. *Ibid.* 138-42

The soln. should not contain more than 0.5 g. of Zn. Dil to 400 cc. and add 16 g. of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 20 drops of tropaeolin 00 indicator soln. and sufficient freshly prepd. NH<sub>3</sub> soln. to make the soln. of the same color as that which the indicator gives with a comparison soln. prepd. by taking 400 cc. of water, 20 drops of tropaeolin 00 indicator soln. and just sufficient H<sub>2</sub>SO<sub>4</sub> to cause the change in color. Use some of this same soln. hot and satd. with H<sub>2</sub>S as a wash water. If the original soln. is alk. to the indicator, add sufficient H<sub>2</sub>SO<sub>4</sub> to give it the same color as that of the comparison soln. To the soln. to be analyzed add finely shredded filter paper pulp equal to 1/2 of an 11-cm. ashless filter, heat to boiling, remove the flame and conduct a stream of H<sub>2</sub>S through the soln. at a lively rate for 10 min. Continue passing the gas at a slower rate for 30 min. In this way a ppt. of pure ZnS is obtained which will not run through a good filter paper if it has been allowed to stand in the funnel covered with water for 1 hr. Filter off the ZnS and wash thoroughly. Ignite the ppt. and filter in a glazed crucible with abundant access of air for about an hr. until all the C of the filter paper is consumed. Then heat in a glazed Rose crucible for 10 min. at dull redness in a stream of H<sub>2</sub>S. Allow to cool 5 min. in the H<sub>2</sub>S stream, and weigh as ZnS. In the filtrate det. Al as described in Part III of this paper. W. T. H.

**Determination of nitrogen by combustion in the electric arc.** W. D. Treadwell and Th. Zurrer. *Helv. Chim. Acta* 16, 1180-7 (1933).—The detn. of N in gaseous mixts. has been accomplished by Antropoff (*C. A.* 14, 1470) by oxidation in the elec. arc and absorption of the nitrous oxides formed in strong KOH soln. A considerable improvement consists in keeping the gas moving across the arc formed between 2 stout Pt wires and interposing a soln. of dil. NaOH in the path of the gas. Then, by measuring the decrease in elec. cond. of the NaOH soln. the percentage of N absorbed can be computed. The necessary app., procedure and method of computing the results are explained in detail. The loss in cond. is proportional to the N content of the gas provided it is in the presence of sufficient O<sub>2</sub>. Pure N<sub>2</sub> has no effect upon the cond. The NaOH soln. contains a mixt. of nitrite and nitrate after

the absorption, but the relative proportions of these constituents depends largely upon the prevailing conditions under which the expt. is conducted. W. T. H.

**The bromine method for determining ammonia nitrogen in chemically pure salts.** B. I. Levi. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 92, 165-8 (1932).—L. shows that the error involved in detg.  $\text{NH}_3$  by measuring the vol. of  $\text{N}_2$  evolved by the action of  $\text{Br}_2$  in an alk. soln. lies in the method of adding the  $\text{Br}_2$  water. J. S. Joffe

**The bromine method for the determination of nitrogen in technical products and in fertilizers.** M. L. Chepelevetzkii, S. I. Pozdnyakova and R. D. Fain. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 92, 168-76 (1932). In detg. N present as  $\text{NH}_4$  salt by the  $\text{Br}_2$  method, as outlined by L. (preceding abstract), the  $p_{\text{H}}$  of the medium is important. The most satisfactory reaction is in the  $p_{\text{H}}$  interval of 7.5 to 9.5. The authors suggest the use of buffer phosphate solns. in place of the  $\text{NaHCO}_3$  used by Levi. In the presence of  $\text{Fe}^{+++}$  some of the  $\text{NH}_3$  may be oxidized to  $\text{NO}_2$ . By adding  $\text{PO}_4^{---}$  the  $\text{Fe}^{+++}$  effect is eliminated. J. S. Joffe

**The bromine method in determining total nitrogen in calcium cyanamide.** M. L. Chepelevetzkii and R. D. Fain. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 92, 177-80 (1932).—To 5 g. of  $\text{CaCN}_2$  in a 500-cc. Kjeldahl flask add 15 g. of powd.  $\text{K}_2\text{SO}_4$  mix., and add 50 cc. of concd.  $\text{H}_2\text{SO}_4$ . Heat slowly over an open flame for 30 min. and then keep slowly boiling for 45 min. Transfer the soln. to a 500 cc. measuring flask, make up to the mark and take 50 cc. of soln. for the analysis, first filtering if necessary. J. S. Joffe

**Determination of nitrates by the bromine method.** M. L. Chepelevetzkii and R. A. Fiskina. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 92, 180-4 (1932).—By means of Al powder (3 g. for 0.25 g.  $\text{KNO}_3$  in 50 cc. of 10%  $\text{H}_2\text{SO}_4$  soln.) the nitrate is reduced to  $\text{NH}_4$ . J. S. Joffe

**Use of aeration in Kjeldahl distillations.** W. B. Melman, R. Melampy and W. D. Myers. *Ind. Eng. Chem., Anal. Ed.* 6, 63-4 (1934).—Studies on the recovery of  $\text{NH}_3$  during aeration at different temps. illustrate the advantage to be gained with respect to time required and lack of lumping. W. T. H.

**Direct determination of cementite in iron.** Walter Paulkloh and Oskar Klockl. *Z. anorg. allgem. Chem.* 215, 1-54 (1933).—Carbide C is usually detd. by subtracting the graphite from the total C. In this paper an attempt is described to make the direct analysis depending on the detn. of the Fe content of the residue insol. in dil.  $\text{H}_2\text{SO}_4$  and the analysis of the evolved gases, which contain over 90%  $\text{H}_2$ . The results were not altogether satisfactory, as the results are dependent upon the time spent in dissolving the same in dil.  $\text{H}_2\text{SO}_4$ , the temp. employed and the physical condition of the cementite. W. T. H.

**Detection and determination of fluorides.** I. M. Korenman. *Z. anorg. allgem. Chem.* 216, 33-40 (1933).—Fluoride can be detd. by measuring the loss in color which a soln. of  $\text{H}_2[\text{TiO}_2(\text{SO}_4)_2]$  undergoes when it reacts with  $\text{F}^-$  to form colorless  $\text{H}_2\text{TiF}_6$ . A soln. contg. 0.15 mg. Ti per cc. is a suitable standard. To the  $\text{F}^-$  soln. add 5 cc. of the standard, followed by 3 cc. of 3%  $\text{H}_2\text{O}_2$  and water to make 25 cc. Compare with a standard in the colorimeter, dilg. the stronger soln. until it matches the weaker one. A sensitive test paper for  $\text{F}^-$  can be prepd. by taking 0.25 g.  $\text{Zn}(\text{NO}_3)_2$  in 60 cc. of water, mixing with a filtered soln. of 0.15 g. of Na alizarine sulfonate in 40 cc. of alc. and dipping pieces of ashless filter paper in the mixt. The dry paper should be moistened with dil. HCl when used as a test. The intense violet-red lake becomes yellow when  $[\text{TiF}_6]^-$  is formed. W. T. H.

**Argentometric estimation of iodides with cinchonine-bismuth nitrate as indicator.** R. Uzel. *Collection Czechoslov. Chem. Communications* 5, 383-95 (1933) (in English).—In an acid soln.,  $\text{Bi}^{+++}$ , cinchonine and  $\text{I}^-$  give an orange-red ppt. of  $\text{C}_{20}\text{H}_{27}\text{N}_3\text{O}_2\cdot\text{HBiI}_4$ . The reaction can be used as a test for  $\text{I}^-$  or for  $\text{Bi}^{+++}$ . For the volumetric detn. of  $\text{I}^-$ , add a little of the reagent (dissolve 2.33 g. of  $\text{Bi}_2\text{O}_3$  in 10 ml. of hot, concd.  $\text{HNO}_3$ , dil. somewhat with water and add 2.94 g. of cinchonine; dil. to 100 ml., add

0.1 g. of urea to remove any  $\text{HNO}_3$  present) and titrate with standard  $\text{AgNO}_3$  soln. until the red color disappears and the ppt. is all AgI of pale yellow color. The titration takes place best at  $p_{\text{H}}$  about 4. Before starting the titration, therefore, add 3-5 drops of 2 N  $\text{HNO}_3$  to 10-50 ml. of iodide soln. and 0.5-1 ml. of the indicator soln. The results given averaged 0.5% too low. The titration succeeds fairly well in the presence of considerable  $\text{Br}^-$  provided some isopropyl alc. is added to suppress the ionization of the halides; about 50% of the alc. should be used. If  $\text{CN}^-$  is present, it is necessary to use more  $\text{HNO}_3$  and titrate more slowly toward the last. If considerable  $\text{Fe}(\text{CN})_6^{---}$  is present, it is well to add some  $\text{Zn}^{++}$ . Similarly,  $\text{Zn}^{++}$  should be added if  $\text{Co}(\text{CN})_6^{---}$  is present. With nitroprusside, it is best to work at a greater diln. and match the end point with a suspension of AgI in nitroprusside soln. W. T. H.

**New volumetric method for determination of sulfate.** V. R. Damerell and H. H. Strater. *Ind. Eng. Chem., Anal. Ed.* 6, 19-21 (1934).—A procedure is described in which the end point of the reaction between  $\text{BaCl}_2$  and  $\text{SO}_4^{--}$  is detd. by counting the time necessary to produce a yellow coloration of "turpeth" when a portion of the titrated soln. is added to a suitably prepd. nearly neutral soln. of  $\text{Hg}(\text{NO}_3)_2$  on a spot plate. As long as appreciable quantities of  $\text{SO}_4^{--}$  remain in the soln., the color quickly assumes a tint exceeding that of a color standard made from dil.  $\text{K}_2\text{Cr}_2\text{O}_7$ ,  $\text{K}_2\text{SO}_4$  and  $\text{BaCl}_2$ . When less color develops in 30 sec. the reaction is considered finished. The  $\text{BaCl}_2$  soln. should be standardized similarly, as the results do not correspond precisely to the stoichiometric equivalents. The procedure is recommended for routine work. W. T. H.

**The effect of acetic acid upon traces of lead chromate.** Lawrence T. Fairhall and Keiji Akatsuka. *J. Am. Chem. Soc.* 56, 14-15 (1934).—As little as 0.01 mg. of Pb in 50 ml. of soln. contg. 1 drop of glacial  $\text{AcOH}$  and a little  $\text{K}_2\text{CrO}_4$  gives a clearly visible Tyndall beam, but when the acid is absent no Tyndall effect is observed. The reason lies in the fact that  $\text{PbCrO}_4$  forms a *cryst.* ppt. in the former case and an amorphous ppt. in the latter. The  $\text{AcOH}$  has no appreciable effect on the soly. of  $\text{PbCrO}_4$ . W. T. H.

**Toxicological detection of hydrocyanic acid.** Pedro Peluffo. *Anales asoc. quim. farm. Uruguay* 36, 95-118 (1933).—A discussion, with bibliography. L. E. G.

**The silver iodide test for hydrocyanic acid.** Denis L. Fox. *Science* 79, 37 (1934).—Guignard's test with Na picrate paper is very delicate for detecting traces of HCN in the air but is not altogether specific. The following test, therefore, is valuable for confirmation. Place 1 drop of 5% KI soln., 1 drop of 0.001 N  $\text{AgNO}_3$  and 1 cc. of 5% KOH in a small clean test tube. A faint bluish cloud of AgI will form. Draw air through the liquid, and if HCN is present in the air, the turbidity will disappear. W. T. H.

**Determination of borate ion in ores of borax.** H. L. Pavuc. *Ind. Eng. Chem., Anal. Ed.* 6, 45-6 (1934).—Digest 2.5 g. of sample with 5-10 ml. of water and 10 ml. of 6 N HCl in a covered vessel heated on the water bath. Filter into a 250-ml. measuring flask. To the filtrate (about 200 ml.) add strong NaOH soln. until nearly neutral to methyl red. Boil 15 min. under a reflux condenser to remove  $\text{CO}_2$ . Cool, wash down the sides of the condenser and complete the neutralization with  $\text{Ca}(\text{OH})_2$  soln. added up to the 250-ml. mark. Mix, filter, and to an aliquot part of the filtrate add methyl red and sufficient HCl to give an acid reaction. Then add NaOH from a buret until a full lemon color is obtained. To the soln. then add resorcinol and titrate to a phenolphthalein end point. W. T. H.

**Determination of mercurous mercury, chloride or bromide ion.** L. v. Zombory and L. Pollak. *Z. anorg. allgem. Chem.* 215, 255-6 (1933).—Z. has already recommended bromophenol blue and bromocresol green (C. A. 24, 569) as indicators for titrating  $\text{Hg}^+$ ,  $\text{Cl}^-$  or  $\text{Br}^-$ . In this paper, chlorophenol red or bromocresol green is shown to serve a similar purpose. To det.  $\text{Cl}^-$  or  $\text{Br}^-$  add 5-10 drops of a soln. contg. 0.1 g. of the indicator in 100 cc

of 20% alc. and titrate with standard  $\text{HgNO}_3$  soln. until the indicator changes to a lilac color. To det.  $\text{Hg}^+$ , add an excess of  $\text{KBr}$  or  $\text{KCl}$  and titrate the excess with standard  $\text{HgNO}_3$  soln. W. T. H.

**A rapid method for quantitative estimation of arsenic in arsphenamine.** Harold N. Wright. *Proc. Soc. Exptl. Biol. Med.* 31, 170 2(1933). In Gaebel's method (C. A. 5, 2895) of direct titration of As in arsphenamine with a standard I soln., the reaction is incomplete. If the initial  $p_H$  is not below 2, the reaction reaches a point of equil. when  $7.55 \pm 0.03$  mols. of I (theoretical 8.0) has been used. If this is taken into consideration, the results are good. C. V. Bailey

**A manometric micro method for determination of carbon in organic compounds.** Donald D. Van Slyke, Irvine H. Page and Esben Kirk. *J. Biol. Chem.* 102, (35-49) (1933). Modifications of the original method of Backlin (C. A. 25, 1887) are described, the org. material being oxidized with a mixt. of  $\text{CrO}_3$ ,  $\text{H}_2\text{SO}_4$  and  $\text{H}_3\text{PO}_4$  and the  $\text{CO}_2$  detd. in the chamber of the Van Slyke-Neill blood-gas app. After absorption with  $\text{NaOH}$  the  $\text{CO}_2$  is set free by acidifying and its vol. detd. With 0.2-0.6 mg. C the error is below 0.7%, and the time required for 1 analysis is 10 min. K. V. Thimann

**Qualitative method for selenium in organic compounds.** M. J. Horn. *Ind. Eng. Chem., Anal. Ed.* 6, 34-5(1934).

To detect Se in plants grown on soil contg. Se, digest 1 g. of the dried sample in a Kjeldahl flask with 40 cc. of concd.  $\text{H}_2\text{SO}_4$  and 0.2 g. of  $\text{HgO}$  until the mixt. is colorless. Cool and make up to a definite vol. with concd.  $\text{H}_2\text{SO}_4$ . To 5 cc. of the cooled digest, add 2 drops of 3% aq. soln. of codeine sulfate, cooling and shaking after each drop. A green color changing to blue develops if Se is present. To test a soil, centrifuge the cooled digest and apply the test to the clear, supernatant soln. The depth of color shows, by comparison with the standards, the quantity of Se present. W. T. H.

**Platinized silica gel as a catalyst in gas analysis. II. Oxidation of the methane hydrocarbons.** Kenneth A. Kobe and E. Bruce Brookbank. *Ind. Eng. Chem., Anal. Ed.* 6, 35-7(1934); cf. C. A. 27, 2107. The conclusions drawn from a series of tests are: (1) No oxidation occurs with  $\text{C}_2\text{H}_6$  at  $350^\circ$ , with  $\text{C}_2\text{H}_4$  at  $230^\circ$ , with  $\text{C}_2\text{H}_2$  at  $130^\circ$  or with  $\text{C}_2\text{H}_6$  at  $120^\circ$  when heated with  $\text{O}_2$  in a tube contg. platinized silica gel. Oxidation starts at about  $20-5^\circ$  higher but is incomplete even at  $400^\circ$ . (2)  $\text{H}_2$  and  $\text{CO}$  can be oxidized simultaneously at  $300^\circ$  in the presence of  $\text{CH}_4$ , but the results are inaccurate if higher homologs are present as in city gas. (3) A comparison of the  $\text{CuO}$  method with that of the catalyst tube method shows that the catalyst introduced no more error, due to absorption, than do the liquid reagents. W. T. H.

**Critical study of the determination of ethane by combustion over platinum in the presence of excess oxygen.** Martin Shepherd and Joseph R. Branham. *Bur. Stand. J. Research* 31, 783-97(1933) (Research Paper No. 625). The slow combustion of  $\text{C}_2\text{H}_6$  over glowing Pt in the presence of  $\text{O}_2$  was followed by measuring the contraction in vol., the vol. of  $\text{CO}_2$  produced and the  $\text{O}_2$  consumed. The observations invariably gave too high values for the first and last and too low values for the  $\text{CO}_2$  formed. This may be due to loss of ethane and  $\text{CO}_2$  in the distributor and  $\text{CO}_2$  absorbed by the  $\text{H}_2\text{O}$ . Fairly good values are obtained by applying corrections for these errors. The results conform closely to the equation  $\text{C}_2\text{H}_6 + 3.153 \text{ O}_2 = 1.994 \text{ CO}_2 + 2.520 \text{ H}_2\text{O}$ , where  $\text{TC}$  is the total contraction of the gas vol. W. T. H.

**Detection of trichloroethylene and other organic solvents containing halogen.** A. Bruning and M. Schnetka. *Arch. Gewerbehyg. Gewerbehyg.* 4, 740 7(1933).—The Fujiwara reaction was used for the detn. of  $\text{C}_2\text{HCl}_3$ . White rats were killed with  $\text{C}_2\text{HCl}_3$  and kept for 27 days. The organs were then removed, slightly acidified with tartaric acid and st. am-distd. Fractions of the distillate were tested colorimetrically with the following amts. of  $\text{C}_2\text{HCl}_3$  per g. organ: brain 0.02 mg., lungs 0.2 mg., liver 0.13 mg., heart and kidneys 0.09 mg., stomach and intestines 0.14 mg. Helen Lee Gruel

**A new method for determining acetic acid anhydride.** E. Berl and H. Türck. *Z. anal. Chem.* 95, 143-52(1933).—A calorimetric method is proposed in which the detn. of  $\text{Ac}_2\text{O}$  is based upon the measurement of the heat of sapon when the reaction between the anhydride and 15%  $\text{AcOH}$  is made to take place adiabatically in a Weinhold-Dewar vessel. The method is rapid and accurate. W. T. H.

**Microdetermination of lactose.** J. M. Clavera and F. Moreno Martin. *Bull. soc. chim.* 53, 1103(1933).—Fromageot and Moulin (C. A. 27, 3184) have recently described an adaptation of a well-known method for detg. dextrose to the detn. of lactose. C. and M. have described a similar method (C. A. 25, 203). W. T. H.

**A new color reaction for the microestimation of *d* fructose.** Kichinosuke Yamada. *Japan. J. Med. Sci. II. Biochem.* 2, 93-105(1933).—"Cryogénine Lumier," a French dye, is  $\alpha$ -benzamidsemicarbazide. It forms characteristic compds. with sugars. A hot soln. of glucose acidified with  $\text{HCl}$  to which a small quantity of the cryogénine is added develops a reddish violet color. With a levulose soln. the dye develops a bluish violet color. In alk. soln. both sugars develop a yellowish orange color, but regain the original color upon acidification. A 12%  $\text{HCl}$  concn. is optimum. Heating for 3 min. in a water bath brings out the max. color. The test tube is then cooled with running water. Under some conditions, however, concns. of glucose, equiv. to those found in blood, fail to yield the color reaction. Levulose, on the other hand gives a pos. reaction in as small a quantity as 0.002 mg. This new reaction exceeds the diphenylamine method for the estn. of levulose in simplicity and definiteness. B. S. Levine

**New method for determining pyridine in dilute solution.** Mircea V. Ionescu and Horia Siusanschi. *Bull. soc. chim.* 53, 1087-96(1933).—A dil. aq. soln. of pyridine (Py) unites with an aq. soln. of  $\text{HgCl}_2$  or  $\text{CdCl}_2$  to form a ppt. of  $[\text{CdPy}_2]\text{Cl}_2$  or  $[\text{HgPy}_2]\text{Cl}_2$ . By measuring the time that it takes to give a noticeable ppt. the quantity of pyridine can be detd. A very complete bibliography is given. W. T. H.

**Determination of small quantities of nitrobenzene in oils.** C. E. Anding, Jr., B. Ziebel and W. M. Mulisoli. *Ind. Eng. Chem., Anal. Ed.* 6, 41-3(1934).—The method described depends on heating the sample under a reflux condenser with a measured vol. of standard  $\text{Ti}_2(\text{SO}_4)_3$  soln. in an atm. of  $\text{CO}_2$  while constantly agitating the liquid. After the heating, the soln. is cooled and the excess  $\text{Ti}$  detd. by titrating with standard ferric alum soln., adding  $\text{NH}_4\text{CNS}$  toward the last. When 20%  $\text{Ti}^{4+}$  in excess is added, the reduction of the nitrobenzene is about 98%, complete but with  $\text{SnCl}_2$  only 80% reduction is obtained even when an excess of 150% is added. W. T. H.

**Aminometry.** D. Vorländer, Josef Fischer and Felicitas Wildner. *Ber.* 66B, 1789 9(1933).—Vorländer and Wolferts (C. A. 17, 3169) in their studies with amino-azo compds. have shown that the change in color which they undergo on treatment with  $\text{HCl}$  in the absence of water is to be regarded as an addn. of  $\text{HCl}$  to the amino group rather than a mere salt formation. In other words, they regard the amino function as not merely that of a base. In this paper it is shown that many other amines, such as tripropylamine, benzylmethylamine, diethylamine, piperidine, toluidine, xylydine, cumidine, naphthylamine, an. choline, strychnine and brucine, can be titrated in  $\text{CHCl}_3$  soln. with an anhyd. soln. of  $\text{HCl}$  in  $\text{CHCl}_3$  with a soln. of dimethylaminoazobenzene in alc. as indicator. At the end point the soln. changes from yellow to red. W. T. H.

**Technic in chemical analyses of casein.** R. S. Snyder and H. C. Hansen. *Ind. Eng. Chem., Anal. Ed.* 5, 400-12(1933).—The conditions suitable for detg.  $\text{H}_2\text{O}$ , N, fat and  $p_H$  are described. Cond. values are given and shown to be related to acidity, ash content and soly. The borax soly. test needs further investigation. H. K. Salzberg

**Detn. of nitrate N by Devarda's method (Bach) 11B.** Analytical and quant. lines of Ag, As, Bi, Cd, Cu, Hg, Pb, Sb and Sn in the arc spectrum (Péla de Rubies, Anat. Barges) 3.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIER

Some relationships between the reflectivities of sulfide ore minerals. F. Coles Phillips. *Mineralog. Mag.* 23, 458-62(1933).—See C. A. 27, 2114. A. M. Brant

The solubilities of metallic sulfides in alkali sulfide solutions. John W. Gruner. *Econ. Geol.* 28, 773-7(1933).—Expt. indicates that hot alkali sulfide solns. do not play an important role as carriers of metals, with the possible exception of Sb, As and Hg. A. M. Brant

The occurrence of gallium in the sulfide ores of Ridder, Altai. A. A. Grinberg, A. N. Filippov and I. I. Yasvonskii. *Compt. rend. acad. sci. U. R. S. S.* 1933, 69-71. The richest source of Ga was the Zn concentrate obtained by flotation. It contained 5-8 mg. Ga per kg., chiefly in assocn. with sphalerite. S. Bradford Stone

Silver- and bismuth-bearing galena from Leadville. E. P. Chapman and R. E. Stevens. *Econ. Geol.* 28, 678-85(1933).—The mineral is light- to steel-gray in color and has a brilliant metallic luster and dark gray streak. The cubic cleavage is poorly developed, and the etch patterns with HCl, HNO<sub>3</sub> and FeCl<sub>3</sub> differ from galena. Analysis shows 6.40% Ag, 12.15% Bi, but the x-ray pattern resembles galena. It is probably a solid soln. of Ag<sub>2</sub>S.Bi<sub>2</sub>S<sub>3</sub> in galena. A. M. Brant

Pyrite in coal beds of the Ruhr. H. Winter and G. Free. *Gedachn.* 69, 794-801(1933).—Pyrite is present mostly in massive form—"sulfur balls." It does not contain noble metals. During formation, vitrain has taken it up more readily than durain. Pyrite is also found as an incrustation on the cell walls of fusain, and sometimes fills the cells. In the Ruhr the mineral may be pyrite, marcasite or a mixt. of the 2. J. D. Davis

Portlandite, a new mineral from Scawt Hill, Co. Antrim. E. Tilley. *Mineralog. Mag.* 23, 419-20(1933).—Crystals of Ca(OH)<sub>2</sub> were found assocd. with coarse-grained asfwillite and calcite. The phys. and optical properties agree with those of artificial rhombohedral Ca(OH)<sub>2</sub>. The name *portlandite* is proposed. A. M. Brant

A new barium plagioclase feldspar. S. R. Nockolds and E. G. Zies. *Mineralog. Mag.* 23, 448-57(1933). The Ba content of a rock from the Broken Hill district proved to be present in a *barium-anorthite*. The recalcd. av. analysis is: SiO<sub>2</sub> 44.6, Al<sub>2</sub>O<sub>3</sub> 33.0, CaO 14.0, BaO 5.7, Na<sub>2</sub>O 2.0, K<sub>2</sub>O 0.7, sum 100%; sp. gr. 2.872. It is optically -; optic angle 78°;  $\alpha = 1.571$ ,  $\beta = 1.580$ ,  $\gamma = 1.585$ . The cleavage (010) and (001) are well developed, the angle being approx. 94°. A. M. Brant

Piedmontite in quartz-muscovite-schist from Shotover Valley, western Otago, New Zealand. F. J. Turner. *Mineralog. Mag.* 23, 416-18(1933).—The piedmontite occurs as slender prismatic crystals assocd. with muscovite. It is intensely pleochroic,  $\alpha$  clear canary-yellow,  $\beta$  pale anethyst,  $\gamma$  deep purplish red. Sign of elongation is +, and the optic angle is large. A. M. Brant

The crystal form and molecular unit of rinkite. R. Gossner and O. Kraus. *Centr. Mineral. Geol.* 1933A, 369-74. Rinkite is orthorhombic with  $a = 18.47$ ,  $b = 5.67$ ,  $c = 7.46$  A. U. The space group could not be definitely detd., but may be  $V_h^{22}$  or  $V_h^{24}$ , with 4 mols. in the unit cell;  $d = 3.458$ . Ce is probably quadrivalent, replacing Ti. Michael Fleischer

Zeolites. V. Mesolite. Max H. Hey. *Mineralog. Mag.* 23, 421-47(1933); cf. C. A. 27, 2010. New and compiled chem. data, optical and x-ray data indicate that mesolite is an independent species, iso-structural but not isomorphous with natrolite and scolecite. The unit cell has dimensions  $a = 56.7$ ,  $b = 6.56$ ,  $c = 1844$  A.,  $\beta = 90.01^\circ$ , and contains  $\text{Na}_{10}\text{Ca}_{10}\text{Al}_{10}\text{Si}_{10}\text{O}_{400}\cdot 64\text{H}_2\text{O}$ . The space group is  $C_2$ . A small but definite pyroelectric effect was obtained,  $b$  being the polar axis. Goniometric data are given and optical properties, vapor pressure and base exchange are discussed in detail. A. M. Brant

The dusky apatites of the Eakdale (Cumberland)

granite. Brian Simpson. *Geol. Mag.* 70, 375-8(1933).—Large amts. of finely divided inclusions occur in the apatite crystals. Lack of uniformity of disposition indicates their prior existence and incorporation by the apatite as it crystd., rather than simultaneous crystn. A. M. B.

Meteoritic iron and silica glass from the meteorite craters of Henbury (Central Australia) and Wabar (Arabia). L. J. Spencer. *Mineralog. Mag.* 23, 387-404(1933); cf. C. A. 26, 4775; 27, 2911.—The meteoric irons from these localities are similar in structure and compn. Both are medium octahedrites with 7.3% Ni. The larger pieces show normal lamellar structure, but the smaller show a granulation which indicates heating above 850°. Analyses of the meteoric irons and iron-shale which occurred in large quantities, also of silica glass and sandstone, are given. Black spots in the vesicular silica glass abundant at Wabar proved to be nickel-iron. Indications are that on impact of the mass of meteoric iron with the earth's crust an explosion occurred which backfired everything out to form the crater. Part of the meteorite was vaporized and also the sandstone, forming the vesicular glass. Small pieces were torn from the meteorite and their structures altered by heating. A. M. Brant

The depth zones in ore deposition. L. C. Craton. *Econ. Geol.* 28, 513-55(1933).—The depth relations of hydrothermal ore minerals are discussed and a classification into 5 zones is made. A. M. Brant

Prospecting in Kenya by earth-augering. A. J. P. Walter. *Mining Mag.* 49, 329-41(1933).—Over 60,000 ft. of sampling by this means has been completed in the Kakamega gold field and hardly a hole has failed to reveal at least a speck of Au. The granite penetrating the underlying metamorphic rocks is remarkable for its marginal basic differentiates, and a series, gradually increasing in acidity, can be traced from the chilled, highly basic edge to the coarse porphyritic granite itself, within less than 5000 ft. Au is found in quartz veins, as a mineralization along fault-planes (but with little or no vein quartz), in contact deposits with pyrite and arsenopyrite, in mineralized dikes, and in highly oxidized leached sulfide lodes. Mineralized fault-planes are likely to prove the most valuable. The procedure adopted in sampling is described in detail. A. W. Furbank

Wall-rock mineralization along Ontario gold deposits. George W. Rain. *Econ. Geol.* 28, 705-43(1933).—A study of wall-rock mineralization along Au lodes in this district gives a rough measure of the ore value and aids in the interpretation of diamond-drill results. Mineralization fringes of a rotation type on pyrite metacrusts indicate high-grade lodes in the Pearl Lake deposit, while compressional fringes indicate low-grade lodes, and absence of fringes barren lodes. The relative amt. of replacement of feldspars and groundmass of brittle intrusive rocks by chlorite indicates the grade of ore in the adjacent lode at Kirkland Lake. A. M. Brant

Special features of fine gold from Snake River, Idaho. Thomas H. Hite. *Econ. Geol.* 28, 686-91(1933); cf. *Ibid.* 250-65.—The flour Au is in flattened oval or disk-shaped flakes. Many disks are coated with CaCO<sub>3</sub> or clay and have thickened rims. The av. ratio of thickness to diam. is 1:5. The wt. varies from 5000 grains or "colors" per 1 cent value of the typical flour Au down to 4,400,000 colors. A. M. Brant

The chalcocite and native copper types of ore deposits. Edson S. Bastin. *Econ. Geol.* 28, 407-46(1933).—The standard types of Cu deposits contg. chalcocite and pyrite or pyrrhotite are thought to indicate an abundance of Fe and S in the solns. from which they were deposited. Deposits characterized by rich Cu minerals, native Cu, chalcocite and bornite have resulted from a removal of Fe and S from ores of the standard type by a process of chalcocite downward enrichment, deposition from ground waters within bodies of sedimentary rocks and from waters of shallow lagoons. The presence of org. remains or bac-

terial action generating  $H_2S$  are considered to cause the reduction. A 2nd group of ores carrying rich Cu minerals, in which native Cu is abundant, appear to have resulted from the removal of Fe and S from the magmatic solns. by interaction with wall-rock. The Lake Superior and Corocoro deposits are of this type. A selected bibliography on Cu deposits of the Red Beds type is given.

A. M. Brant

**Formation of the copper deposits of Corocoro, Bolivia.** Friedrich Ahlfeld. *Centr. Mineral. Geol.* 1933A, 375-82.—Contrary to Bastin (preceding abstr.), there is no evidence of hydrothermal action. The deposits were probably formed by slow deposition from cold descending solns. contg. reducing agents such as  $FeSO_4$ . M. Fleischer

**A chalcocite deposit, Great Bear Lake, Canada.** Christopher Rikv. *Econ. Geol.* 28, 496-501(1933).—A 1-2 ft. vein of massive chalcocite lies in sharp contact with granite country rock which has been altered to a distance of 4 ft. on each side of the vein. Bornite, covellite, klaprotholite, quartz and barite are present. Microscopic evidence favors a hypogene origin. A. M. Brant

**The temperature of formation of the Mississippi lead-zinc deposits.** W. H. Newhouse. *Econ. Geol.* 28, 744-50(1933).—Liquid inclusions contg. a bubble are present in the sphalerite. By heating a polished section and inspecting with a microscope the temp. at which the bubble disappeared could be detd., and may well be the temp. of deposition. The results harmonize with data on assocd. mineralization and paragenetic relations. In the Tri-state district the temp. of deposition was 115-35° and in the upper Mississippi valley 80-105°. A. M. Brant

**The Miami-Picher zinc-lead district.** W. A. Tair. *Econ. Geol.* 28, 463-79(1933); cf. C. A. 26, 1547.—T. agrees with the magmatic origin theory, but holds that the chert is primary, laid down at the same time as the limestone. The breccias were formed by soln. of the limestone by ground water, after which magmatic solns. deposited jasperoid, sulfides and later minerals in the brecciated zones. A. M. Brant

**Catalysis and its bearing on origin of Lake Superior iron-bearing formations.** Carl Zapffe. *Econ. Geol.* 28, 751-72(1933).—The physicochem. and biochem. pptn. of Fe and Mn from soln. in run-off ground waters is discussed. Expts. at Brainerd, Minn., indicate that both catalysis and bacterial action may cause the pptn. and that some similar action in nature may have operated to produce the Lake Superior Fe formations. A. M. Brant

**Magnetite ores of northern New Jersey.** Laurence L. Smith. *Econ. Geol.* 28, 654-77(1933).—The ore bodies conform to the foliation of the country rock. Structural and microscopic evidence indicates an origin by both displacement and replacement. The ore solns. were end-phase aqueo-igneous differentiates from the same magma from which the granitic gneisses were derived. The ore deposition was preceded by injection of pegmatites and followed by hydrothermal solns. A structural weakness detd. the places of ore deposition. A. M. Brant

**The origin of Chilean saltpeter.** Julius Stoklasa and Josef Penkava. *Chem.-Ztg.* 57, 913-15(1933); cf. Kautter, C. A. 27, 2401.—Arguments are given in favor of the theory that the nitrates were formed by oxidation of  $NH_4$  salts of volcanic origin. Michael Fleischer

**The composition and origin of certain commercial clays of northern Idaho.** Edward L. Tullis and F. B. Laney. *Econ. Geol.* 28, 480-95(1933).—Residual clays from granitic and metamorphic rocks and from basalt are found. The clay minerals were formed from feldspar, biotite and muscovite. Kaolinite and the intermediate products in each case are described and chem. analyses given. The origin of the clays is attributed to weathering and not hydrothermal action. Chem. analyses of both residual and transported clays are given. A. M. Brant

**The origin of the asphalt deposits of western Kentucky.** Wm. L. Russell. *Econ. Geol.* 28, 571-86(1933).—Field relations suggest that the oil from which the asphalt was produced came from the shales in the Chester series. The deposits in general are not related to faults. Wells in the Cypress at shallow depths contain brackish water in the

lower part and heavy oil and asphalt above, indicating that the oil was altered by circulating ground water before it reached the surface. A. M. Brant

**The question of the origin of petroleum.** Karl Krejci-Graf. *Kali* 27, 235-7, 251-2, 263-5(1933).—A discussion of the question of the origin of petroleum and of the petroleum matrix, including in particular recent investigations of F. Hecht (Senckenbergiana 14, 199-200(1932)) and Potonié, (C. A. 26, 4535). Marion E. Headington

**A territory which may justify the testing for petroleum.** V. Charrin. *Chaleur & ind.* 14, 487-90(1933).—The Tertiary basin of Alès is a possible oil or asphalt-bearing field. Karl Kammermeyer

**The determination of rock constituents by semi-micro methods.** Winifred C. A. Guthrie and Christina C. Miller. *Mineralog. Mag.* 23, 405-15(1933).—The app. and details of procedure are given for a more rapid analysis of igneous rocks. A. M. Brant

**Some theoretical aspects of contamination in acid magmas.** S. R. Nockolds. *J. Geol.* 41, 561-80(1933).—The importance of the volatile constituents of the magma is emphasized. Their chief function is to form a medium of low viscosity between the xenolith or margin rock and the magma through which material can diffuse with comparative freedom. This diffusion constitutes a reciprocal reaction which tends to stabilize the mineral phases of the xenolith by equil. with the magma. Mech. disintegration of the xenolith may be brought about by (1) soln. of certain phases by the magma, (2) the wedging action of crystg. material from the magma which gradually enters the xenolith and (3) actual injection of magmatic material, especially into schistose rocks. A. M. Brant

**Pegmatites.** Frank L. Hess. *Econ. Geol.* 28, 447-61(1933).—Pegmatites are divided into 3 groups with subgroups: (1) dikes, granitic and feldspathic; (2) veins, in insol. and sol. rocks; (3) metamorphic pegmatites, progressively replaced dikes or pipes. A survey of the literature dealing with the different types is made, and the term pegmatite is defined. A. M. Brant

**A tholeiite dike near Buxton, Derbyshire.** F. Wollerton Cope. *Geol. Mag.* 70, 414-22(1933).—The rock consists of augite and plagioclase crystal-aggregates sep'd. by a glassy mesostasis with Fe ore and a chlorite mineral. The chem. analysis compares fairly well with those of other tholeiites. *Xenoliths* are also described. A. M. Brant

**The genesis of oligoclase in certain schists.** F. J. Turner. *Geol. Mag.* 70, 529-41(1933).—The mineralogical changes in green schists and related quartz-feldspathic schists of sedimentary origin are discussed. Oligoclase normally appears as a product of dynamothermal metamorphism at relatively high grades. A zone of oligoclase may be recognized in areas of progressive regional metamorphism, and the mineral forms readily during purely thermal metamorphism of medium grade in the absence of stress. A. M. Brant

**An unusual occurrence of myrmekite, and its significance.** Edwin S. Hills. *Geol. Mag.* 70, 294-300(1933). This intergrowth of plagioclase and vermicular quartz was observed in a micatoscanite. It is thought to have developed during contact-metamorphism, a transfer of material taking place in the solid state under favorable physicochem. conditions. A. M. Brant

**Contact metamorphism of the slates of Minnesota by granite and gabbro magmas.** Frank F. Grout. *Bull. Geol. Soc. Am.* 44, 989-1040(1933).—Analyses show about av. compn. for the slates— $SiO_2$  about 61%. Granite and syenite intrusions changed the slates to biotite schists in zones from a few feet to several miles wide. The chem. compn. of these schists indicates that they received no contribution from the intruded magma except by liquid injection. Slates in the gabbro contact zone became hornfels. The sequence of minerals involves a change from sericite and chlorite to cordierite and biotite and later to pyroxene, plagioclase and magnetite. The amt. of quartz is reduced and the feldspars are recrystd. and become more calcic, coarser and fresher. The contact rocks for a few feet contain more  $CaO$ ,  $MgO$ , Fe oxide and



TiO<sub>2</sub> and less K<sub>2</sub>O, SiO<sub>2</sub> and H<sub>2</sub>O than the slates. Biotite schists formed by granite contact were later changed to non-schistose hornfels by gabbro intrusions. Factors of the different contact actions of granite and gabbro are the higher temps. and lower mineralizer content in the case of gabbro and pronounced dynamic effects in the walls in the case of the granite injections. A. M. Brant

The problem of serpentinization and the origin of certain chrysotile asbestos talc and soapstone deposits. H. H. Hess. *Econ. Geol.* 28, 634-57(1933).—Serpentinization is an autometamorphic alteration occurring during the last stages of the same cycle of igneous activity as the intrusion of the ultrabasic. The talc-soapstone type of alteration called steatitization occurs at a later time; it is hydrothermal in character and can be traced to nearby younger acid intrusions. Granular ultrabasics alter to soapstones, while serpentinized ultrabasics are altered to talc along their margins and fractures. The theory of serpentinization is drawn from a consideration of field evidence of the lack of vol. change, and distribution of alteration as unrelated to borders of the ultrabasic. Other factors are the apparent immobility of the serpentinizing solns. and the failure of minerals other than serpentine, magnetite and rarely chromite to develop. The addn. of water and silica to a rock of peridotitic or dunitic compn. is thought to account for most of the serpentine formed. A. M. Brant

Studies of the mountain materials in the Björnberg field. Sven Gavelin. *Geol. Fören. Förh.* 55, 455-98(1933).—Descriptive. Several new analyses are given. W. S.

An olivine-bearing conglomerate from the island of Raasay, Inverness-shire. Charles F. Davidson. *Geol. Mag.* 70, 272-4(1933).—The coarse sandy groundmass is composed of rounded grains of olivine, with augite and plagioclase feldspar. The cementing medium is largely calcite. The olivine and augite show little decomposition. A. M. Brant

The precipitation of calcium carbonate on the Great Bahama bank. Maurice Black. *Geol. Mag.* 70, 455-56(1933).—Org. agencies are extg. only a small amt. of CaCO<sub>3</sub> from the water. In the lee of Andros Island, the sea is floored by a deposit of aragonite mud, the aragonite being in extremely small needles which remain uncemented.

1 The deposit in part is due to the physicochem. pptn. of CaCO<sub>3</sub> from the water. The important centers of pptn. are the mangrove swamps, where ammonifying and sulfate-reducing bacteria bring about the formation and pptn. of CaCO<sub>3</sub>. The probable reactions are given. These aragonite needles are carried out onto the shoals by tidal action during rough weather. A. M. Brant

Helium and the problem of geological time. Wm. D. Urry. *Chem. Rev.* 13, 305-43(1933).—A discussion of the He method of detg. the age of a mineral, including such topics as the comparison of this method with the Pb method, the limitations and the reliability of the method, and the exptl. technic. References are given. L. K.

Beryllium and helium. I The helium contained in beryls of varied geological age. Lord Rayleigh. *Proc. Roy. Soc. (London)* A142, 370-81(1933); cf. *C. A.* 27, 4164.—The He content of over 60 specimens of beryl has been detd. and assocd. with the geological age of the samples. The median and max. quantities of He in cu. mm. per g. of sample assocd. with the different ages are, resp.: Archean 6.08, 77.6; Paleozoic 1.47, 16.8; Mesozoic 0.157, 2.27; Tertiary 0.0758, 0.384. The He in beryl has thus accumulated during geological time, and was not present initially. It does not arise from the decay of any short-lived radioactive constituent, and from previous work it is known not to be due to U or Th. Calvin Brous

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## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Metal resources of New Mexico and their economic features. S. G. Lasky and T. P. Wootton. *New Mexico School Mines Bull.* No. 7, 178 pp.(1933); *Econ. Geol.* 28, 766.—A summary of metal resources, descriptions of all mining districts and individual mines, production, uses and marketing. E. J. C.

Gold outputs and mining activity of Southern Rhodesia, 1907 to 1932. S. Brooke Norris. *Southern Rhodesia Geol. Survey Bull.* No. 25, 20 pp.(1933); *Econ. Geol.* 28, 703 Statistical. E. J. C.

The story of McIntyre. J. P. Bickell, et al. *Eng. Mining J.* 134, 445-96(1933).—A symposium dealing with the gold mining and metallurgical operations of the McIntyre Porcupine Mines, Ltd., described by the members of the tech. staff. W. H. Boynton

Milling methods and cost at the concentrator of the Mount Isa Mine Ltd., Mount Isa, Queensland. L. K. Jacobsen. *Proc. Australasian Inst. Mining Met.* No. 90, 191-225(1933).—The ores are complex mixts. of Pb, Zn, Fe and Ag in oxidized, semi-oxidized and sulfide form. A Pb concentrate is made by tabling, midlings being retabled. Tailings are reground. For flotation there are used per ton of ore: secondary ball mill—thiocarbamide 0.10; first series conditioning tanks—Na<sub>2</sub>S 4.00, Et xanthate 0.20, Aerofoat No. 25 0.10; second series conditioning tanks—Na<sub>2</sub>S 1.00, Et xanthate 0.20, Aerofoat 0.02 lb. For 1931-2, ore assayed Ag 5.5 oz., Pb 10.7% and Zn 4.1%. Pb concentrate assayed Ag 21.9 oz., Pb 44.4% and Zn 5.5%. Tailings contained Ag 1.6 oz., Pb 2.6% and Zn 3.8%.

Recoveries were Ag 77.1, Pb 80.1 and Zn 25.7%. Costs totaled 31.1330 s. per ton concentrates. A. H. Emery

Sintering and smelting mixed lead carbonate-lead sulfide concentrates at Mt. Isa, Queensland. F. A. Forward. *Proc. Australasian Inst. Mining Met.* No. 90, 125-89(1933).—The plant is described exhaustively. Alden H. Emery

The recovery of zinc and lead from blast-furnace slag at Trail, B. C. G. E. Murray. *Trans. Can. Inst. Mining Met.* 1933(in *Can. Mining Met. Bull.* No. 260), 562-5; cf. *C. A.* 27, 3176.—Discussion. Alden H. Emery

The solubility of tellurides in cyanide solution. P. F. Thompson. *Chem. Eng. Mining Rev.* 26(7), 90(1933).—"The detn. of the soly. products of the various tellurides and the measurement of the oxidation and reduction potentials of the tellurides would help to a better understanding of the process of dissolution." W. H. Boynton

Large cupola furnaces. Try-Chalons. *Rev. fonderie moderne* 27, 307-9(1933).—The work of Ehrhardt (*C. A.* 27, 3902) is discussed and suggestions are derived for greater economy in operation of a cupola furnace by reduction of height and improvement of combustion conditions. Max Hartenheim

Preheating of air blast in the cupola furnace. Try-Chalons. *Rev. fonderie moderne* 27, 316-18(1933).—It is shown how by preheating the air blast in cupola furnaces the output can be increased; instead of only 8-9 kg. of metal, 12.25 kg. for each kg. of burnt coke can be melted, and about 1/5 less air is required for each ton of

metal as the amt. of air required per kg. of coke remains the same. This, in turn, again reduces oxidation of the metal in the charge. Max Hartenheim

**Electric purification of blast-furnace gases.** M. Richarme. *Rev. met.* 30, 402-17, 423-52, 471-7 (1933).—Principles of electrostatic pptn. are given. Elec. equipment of different makes is described. Several plant installations are described in detail with their operating practice. J. Gat

**The fettling shop and efficiency.** W. G. Morgan. *Foundry Trade J.* 49, 337-9 (1933). D. Schaaf

**An apparatus for the growth of metal single crystals.** Maurice F. Hasler. *Rev. Sci. Instruments* 4, 656-60 (1933). R. II.

**Determination of dust content of new and waste gases in steel mill operation.** F. Lueth and K. Guthmann. *Arch. Eisenhüttenw.* 7, 343-51 (1933).—The necessity and economical advantages of removal of dust from gases used in metallurgical processes are pointed out; recent developments in dedusting installations and measurements of coarse and fine dust are described and different methods compared. In order properly to compare results obtained by different methods it is proposed to use as the unit of dust content of gases g. per cu. m. of dry gas at 0° and 760 mm. Hg. Max Hartenheim

**The manufacture and application of centrifugal castings.** T. R. Twigg. *Foundry Trade J.* 49, 321-3 (1933) D. Schaaf

**Commercial molding sand control for the modern iron-founder.** F. Hudson. *Foundry Trade J.* 49, 351-2, 360, 369-72 (1933). Downs Schaaf

**Structure of cast iron.** Maximilian Frh. v. Schwarz. *Forschungsarb. Metallkunde Röntgenmetallographie Folge* 10, 1-104 (1933).—A text dealing with all phases of the metallurgy of cast iron but with particular attention to microstructure. One hundred references. J. L. Gregg

**The design and construction of a precision high-power metallographic apparatus.** Francis P. Lucas. *Trans. Am. Soc. Steel Treating* 21, 1112-34 (1933).—See C. A. 27, 5096. W. A. Mudge

**Grain size and grain growth.** M. A. Grossmann. *Trans. Am. Soc. Steel Treating* 21, 1079-104 (1933).—See C. A. 27, 5096. W. A. Mudge

**The influence of the rate of cooling on the structure of eutectics.** G. Tammann and G. Moritz. *Z. anorg. allgem. Chem.* 214, 414-26 (1933).—On very slow cooling of a eutectic mixt. only grains form rather than bundles as with rapid cooling. The equation representing rate of cooling and crystal. is discussed. Expts. with binary eutectic mixts. of metals such as Cd, Sn, Pb, Bi and Zn show very different crystal. formations for a given sample depending on the time of heating. The structure of eutectic mixts., in wire form, altered in a definite manner on stretching. Certain ternary and quaternary eutectic mixts. of these metals were also studied. An analogy of dye distribution present in org. substances during crystal. is cited. R. H. Lambert

**Aluminum melting losses.** Wm. Ashcroft. *Metallurgia* 9, 42 (1933).—A general discussion with practical recommendations. J. L. Gregg

**Does aluminum have a transformation point?** Otto Tiedemann. *Metallwirtschaft* 12, 669-71 (1933).—The fact that the temp.-phys. properties curves of pure Al are straight lines without any irregularities has been set forth by some investigators as proof that Al has no transformation point, but in T.'s opinion it does not prove the case. He gives the examples of Fe, Ni, Co, Zn, Cd, Ag and Cu to show that in some cases changes in the temp.-phys. properties curves are not due to transformation points and in some cases transformations occur without noticeable changes in the curves. T. claims that Al does have a transformation point. Fourteen references. C. E. M.

**Investigations on the supposed allotropy of aluminum.** A. Schulze. *Metallwirtschaft* 12, 667-9 (1933).—The results are briefly reviewed of 20 published investigations on Al in which elec., thermal and x-ray methods are used. All of the more recent investigations agree in the conclusion that pure Al has no allotropic transformation point up

to 600°, but has a face-centered cubic lattice. The slight irregularities observed by some in the elec. resistance curves are caused by the presence of impurities in the Al. C. E. Macfarlane

**The solubility of copper in zinc.** M. Hansen and W. Stenzel. *Metallwirtschaft* 12, 539-42 (1933).—The samples were made from 99.99% pure Zn and electrolytic Cu and contained 0.58-4.03 at. % Cu. X-ray precision measurements were made on a series quenched from 395° Up to 2.08% Cu the  $\eta$  phase only appeared, with 3.10 and 4.15% Cu  $\eta + \epsilon$ . With rising Cu content the  $\eta$  diffraction lines are shifted. In the 3 and 4% Cu alloys there is no change in the  $\eta$  lines, but addnl.  $\epsilon$  lines appear. The 3 and 4% Cu alloys were also drawn at various temps. and examd. The soly. of Cu in Zn at 100-424° is shown diagrammatically. It is higher than it was formerly thought to be. The peritectic point, 424°, is at 2.73 at. % Cu or 2.68% by weight. The soly. at 395° is 2.43 at. %. The calcd. vol. decrease of the peritectic alloy against pure Zn is 1.4% or sp. gr. 7.236. Reheating should theoretically decrease this 0.005. Actual tests showed a decrease of 0.008 and 0.007. Samples quenched at 415° and drawn various lengths of time at 240°, 350°, 295° and 200° were examd. microscopically. The results agreed with the x-ray exams. Seventeen references. C. E. M.

**Zinc in lead-base bearing metals.** K. L. Ackermann. *Metallwirtschaft* 12, 618-19 (1933).—Small amts. of Zn added to Pb-Sb alloys form ZnSb, which changes to coarsely cryst. ZnSb at lower temps. When Sn is present, the structure is more complicated and secondary crystal. of free Zn takes place with lower Zn content than in the Sn-free alloys. The hardness and elastic limit of compression are increased, and the impact strength is lowered by Zn addns. to Pb-Sb and Pb-Sb-Sn alloys. The casting properties of bearing metals contg. Zn are very poor and are worse with increasing Zn content. The addn. of Cu, Ni, Fe or As has a very bad influence on the casting properties. The hardness and elastic limit of compression of Pb bearing metals contg. Cu are increased by the addn. of Zn provided the Sb content is high. Seven references. C. E. Macfarlane

**Zinc in bearing bronzes.** E. R. Thews. *Chem.-Ztg.* 57, 923-5 (1933).—A review. Zn exerts a favorable influence in many cases. Leopold Pöschel

**Mechanical properties of electrolytic zinc sheets.** O. Bauer and J. Weerts. *Metallwirtschaft* 12, 615-18 (1933).—From 0.01 to 0.06% of Pb, Fe, Cu and Cd have an appreciable effect on the mech. properties of hot-rolled sheet made from electrolytic Zn. Sheets which are rolled in one heat to 2 mm. thickness with a final temp. of 60-90°, but with various initial temps., have practically the same mech. properties at room temp. Zn alloyed with 0.9% Pb has about 25% higher tensile strength at room temp. than the av. Pb-free Zn, but its elongation and bending properties are lower. The properties of the alloyed Zn are still within the wide limits in which the pure Zn varies. The addn. of 0.9% Pb does not have much effect on the tensile strength at elevated temps., but the crit. temp. range for hot-working is widened. Twelve references. C. E. Macfarlane

**Zirconium.** G. H. Chambers. *Metals & Alloys* 4, 199-201 (1933).—History, properties and uses of finely divided Zr metal. Downs Schaaf

**Precipitation from supersaturated solid solutions after cold-working according to the thermal expansion diagram.** Franz Bollenrath. *Metallwirtschaft* 12, 569-73 (1933). Elektron (10.09% Al, 0.40% Mn, balance Mg), Lantal (4.20% Cu, 1.62% Si, balance Al) and duralumin (3.67% Cu, 0.48% Mg, balance Al) were heated above the soln. temp. and quenched in water. Bars of the first 2 were stretched in a tensile machine 9 and 18%, resp., immediately after quenching, and the duralumin was cold-rolled with reductions from 4 to 48%. The bars were then heated in a dilatometer to 600° and the results are given in graphs together with the differential quotient curves. Before the pptn. stage is reached a slight increase in thermal expansion indicates a rearrangement of atoms. With an increasing amt. of cold-working the coeff. of

expansion at the lower temp. is decreased and the temp. of the start of pptn., the greatest acceleration, the highest speed, and the end of pptn. are all reduced. With increasing cold-work the greatest acceleration of pptn. is increased and the temp. range of pptn. is narrowed. The effect is considerable with small amts. of deformation, but does not increase much after a certain point. In solid solns. supersatd. with 2 constituents the 2 ppt. in different temp. ranges without much influence on one another. The pptns. at low temps. changed more than those at higher temps. The soln. of both constituents takes place at the same temp. Micrographs of duralumin after being cold-worked 11% and reheated to various temps. are given. Fourteen references. C. E. Macfarlane

**Influence of chemical composition of cast iron upon its wear.** E. Soehnchen and E. Piwowarsky. *Arch. Eisenhüttenw.* 7, 371-2(1933).—The effects of Si, Ni, P, Cr, Cu and N upon the wear of cast Fe under rolling and gliding friction were investigated. The resistance against wear depends mainly on the kind of wear; the same material may behave very well under one kind of wear and may not stand up at all under another. Increased hardness is frequently connected with increasing resistance against wear but this is no general rule; deviations from this rule are due mostly to structural differences. A pearlitic gray Fe possesses considerably more resistance to wear than a ferritic gray Fe. Rolling friction depends to a great extent on the treatment of the surface. All processes which increase surface hardness (nitriding) or reduce simultaneously the tendency to oxidize (chrome plating) increase resistance against wear. The actions of the above-named elements with respect to these effects are described. Max Hartenheim

**Formation of graphite nucleuses in cast iron.** Erich Scheil, W. Ruff and E. H. Schulz. *Arch. Eisenhüttenw.* 7, 533-5(1933).—Different kinds of cast irons were studied to find in what manner the graphite nucleuses present in the melt grow. By examg. the different structures it was found that the no. of graphite nucleuses depends on the conditions of solidification; their no. increases with undercooling which means that the crystn. of graphite does not begin immediately at the residual nucleuses but that a certain starting time is required. The size of the graphite nucleuses decreases, however, with undercooling, as the crystn. velocity of the cementite eutectic increases faster than the crystn. velocity of the graphite eutectic. This is the reason the edges of castings tend more to white solidification than the core in spite of a higher no. of graphite nucleuses, but these conditions very likely bring about also the inverted hard-casting, i. e., a gray edge zone and a core wholly or partially solidified white. Besides nucleus-destroying conditions in the melt, there exist also nucleus-propagating conditions of which the most important is the access of O from the surface; as soon as an oxide film was formed on the surface of the melt an increase of nucleus formation was observed. Max Hartenheim

**Tempering black and white cast irons.** Heinrich Springkamper. *Giesserei* 20, 541-8(1933).—The effects of C content, annealing temp. and time on black-heart and white-heart castings are described. C. L. Wilson

**Wear investigations on various automobile-cylinder cast irons.** A. Wallich and Joh. Gregor. *Giesserei* 20, 517-21, 548-55(1933).—The relations between wear and hardness, Ni-Cr content and structure were studied. Curtis L. Wilson

**Some experiments on the heat treatment of malleable cast iron.** J. E. Hurst. *Foundry Trade J.* 49, 355-9(1933). Downs Schaaf

**The role of lime in desulfurization of iron and steel.** Ivan Trifonov and D. Mirev. *Arch. Eisenhüttenw.* 7, 337-41(1933).—Transformations going on between mixts. of  $\text{CaO} + \text{FeS}$ ,  $3\text{CaO} + \text{FeS}$ ,  $\text{CaS} + \text{FeO}$ , at different temps. were investigated by lab. tests with finely powd. mixts., and the S content was detd. from the end product. Reaction between  $\text{CaO}$  and  $\text{FeS}$  begins at about  $500^\circ$ , increases with temp. at first exponentially and has a max. at  $775^\circ$  with 39.56% sol. S in the form of  $\text{CaS}$ . A retardation in the reaction curve sets in at  $730^\circ$  and at  $910^\circ$  a

min. with only 3.8%  $\text{CaS}$  is reached; from this point the reaction increases again and reaches 48.4% at  $1100^\circ$ , remaining const. for higher temps. The curve shows that up to  $730^\circ$  the reaction proceeds according to  $\text{CaO} + \text{FeS} \rightarrow \text{CaS} + \text{FeO}$  which has an equil. between  $500^\circ$  and  $730^\circ$ . The simultaneous sudden decrease of  $\text{CaO}$  and  $\text{CaS}$  in the reaction product between  $730^\circ$  and  $910^\circ$  points to a compd. between  $\text{CaO}$  and  $\text{FeS}$  or between  $\text{CaS}$  and  $\text{FeO}$  of which the former is the more probable. Seven references. Max Hartenheim

**Thermal conductivity of irons and steels and some other metals in the temperature range 0 to  $600^\circ$ .** S. M. Shelton and W. H. Swanger. *Trans. Am. Soc. Steel Treating* 21, 1001-77(1933).—The conductivities in  $\text{w./cm.}^{-1}/\text{degree}^{-1}$  have been detd. over temp. ranges between  $0^\circ$  and  $600^\circ$  for Zn, Ni, a few Cr-Ni alloys and 20 irons and steels selected as typical examples of com. materials used for a variety of purposes. The method and app. are described. A comparative method of measurement was used, all values being referred to the thermal cond. of Pb, assumed to be  $0.352 \text{ w./cm.}^{-1}/\text{degree}^{-1}$  at  $0^\circ$ . For the pure metals and the irons and low alloy steels the thermal cond. decreases with increase in temp. The cond. of the high-alloy steels and that of the Ni alloys increase with increase in temp. In general, the conductivities of all the materials tested are linear functions of the temp. within the range in which measurements were made. A noteworthy exception is Ni for which a sharp change from a neg. to a pos. temp. coeff. of thermal cond. occurs at the temp. of the magnetic transformation. For the ferrous alloys, an increase in the amt. of alloying constituents in Fe causes, in general, an increase in the temp. coeff. of thermal cond. Many conflicting factors make generalizations impossible. W. A. Mudge

**Notch-toughness and width of lines in exposure of steel to x-ray interferences.** R. Siebel, R. Berthold and P. Koetzschenke. *Arch. Eisenhüttenw.* 7, 355-8(1933).—No relations could be found between notch-toughness and width of spectral lines of hard and heat-treated steels. Max Hartenheim

**Influence of quenching conditions upon the internal stresses of steels.** II. Buchler and E. Scheil. *Arch. Eisenhüttenw.* 7, 359-63(1933).—The influence of different cooling conditions upon the residual stresses which are produced by the co-action of heat stresses and transformation stresses was studied in Ni steels. The actions of the 3 most important influences on magnitude and distribution of residual stresses, i. e., thermal shrinking before transformation, expansion after transformation proper, and thermal shrinking after transformation, disappear one after the other with reduction of quenching temp. If the quenching temp. is lowered to the beginning of martensite formation, the influence of transformation on the residual stresses increases; the latter become smaller if heat stresses already exist, and already existing transformation stresses are increased. Lowering of quenching temp. in the range between beginning and end of martensite formation has the reverse effect. At quenching temps. below the end of martensite formation only heat stresses exist which become smaller with decreasing quenching temp. A practical consequence is that the temp. of baths for hardening of low-C steels should preferably be in the neighborhood of the lower end of martensite formation if residual stresses are to be reduced, and somewhat above the beginning of martensite formation for steels which possess predominantly transformation stresses. Care should, however, be exercised to make sure that the cooling velocity is sufficiently great to secure uniform hardening. Max Hartenheim

**Scaling of steel at heat-treating temperatures.** C. Uphogrove. *Univ. Mich. Eng. Research Bull.* No. 25, 36 pp.(1933).—The effects of temp., time, rate of flow and the partial pressure of the oxidizing agent were studied in relation to the scaling of S.A.E. 1015 steel. Investigation was made of the scaling of steel at  $927^\circ$  with different mixts. of  $\text{CO}_2$  and  $\text{H}_2\text{O}$  vapor; a flow of 30 ft. per min. and a time of contact of 2 hrs. were used. The effects of

various gas-air combustion atms. on the scaling of S.A.E. 1015, C steels and alloy steel were studied at 927°.

Downs Schauf

**Influence of different alloying elements upon the hardenability of steel by quenching.** H. Esser, W. Ellender and H. Majert. *Arch. Eisenhüttenw.* 7, 367-70 (1933).—Influence of Cr, Co, Mn, Ni, Si, V and W upon the velocity of quenching required in steels with 0.3-1.5% C for transformation of martensite was investigated. For all C contents Mn and Ni shift the crit. quenching velocity to lower values, while Cr, Si and W increase it for higher contents. V behaves similarly but the crit. cooling velocity increases with V content if quenched from temps. up to about 100° above the  $A_{c1}$  point. Co always reduces hardenability. The reason for the different actions of the alloying elements is seen in influence on the range of permanency and transformation velocity of the  $\gamma$ -solid soln.

M. Hartenheim

**Low-temperature impact strength of some normalized low-alloy steels.** John J. Egan, Walter Crafts and A. B. Kinzel. *Trans. Am. Soc. Steel Treating* 21, 1136-46 (1933).—C-Cu, Zr, Chromanil, Ni-V and Ni-Cu steels were studied. Many are suitable for engineering application down to -80°. High impact resistance at a temp. down to -80° may be obtained in low alloy normalized steels having a strength of less than 80,000 lb./sq. in. by combining a deoxidizing or austenite-forming element (Zr or V) with a carbide-forming element (Cr). When suitably combined with another alloy, Cr, Ni, Cu, Mn and Mo improve the low-temp. impact strength. The Cr-Cu combination gave highest values.

W. A. Mudge

**Steel in sea water examined after 31 years' exposure.**

J. S. Ungar. *Eng. News-Record* 111, 593-4 (1933).—Observations were made on 6-in. diam., solid section steel piles installed in the waters of the Gulf of Mexico 31 years ago. The piles were found to be encrusted with a considerable thickness of scale; loss of metal from corrosion varied from  $\frac{1}{2}$  in. at the top to  $\frac{1}{16}$  in. 4 feet from the top; and there was a min. of localized pitting.

R. E. T.

**Principles of quantitative x-ray analysis of the concentration of metal phases in an alloy or mixture.** R. Glockner. *Metallwirtschaft* 12, 599-602 (1933).—No general rules can be set down for x-ray analysis of metal phases, such as the rules for x-ray spectrum analysis. For each individual case equations must be deduced and several correction factors detd. The most difficult to det. are the temp. and the extinction factors. Twenty-eight references.

C. E. Macfarlane

**Light alloys for aeronautical purposes with special reference to magnesium.** Leslie Aitchison. *Metallurgia* 9, 49-52 (1933).—A lecture.

J. L. Gregg

**Protal process for the protection of light alloys.** J. Cournot. *Chemistry and Industry* 52, 891-2 (1933).—A brief discussion of this process which is based upon immersion in solns. of complex salts of the heavy metals.

Leopold Pessel

**Thermal measurements on heat-treated aluminum alloys.** W. Fraenkel. *Metallwirtschaft* 12, 583-5 (1933). The alloys contained (1) 4% Cu, (2) 4% Cu and 0.5% Mg, (3) 4% Cu, 0.5% Mg and 0.5% Mn. One alloy rod and one pure Al rod, each insulated with asbestos, were carefully placed in an elec. furnace so that they would heat up at the same rate. One thermocouple registered the temp. of the alloy bar and another the difference in temp. between the 2 bars. The furnace was heated at the rate of about 12° per min. up to the m. p. of the alloy. The samples had all been quenched from 500° and some were tested immediately; others aged. The differential curves show a max. near 250°, a pronounced min. at 310-60° corresponding to pptn., and 2 maxima at about 400° and 490°. The amt. of pptn. indicated by the curves is greater in the aged than in the freshly quenched condition. Apparently no pptn. takes place during aging. In the Mg-free alloy the various points occur at higher temps. than in the other 2 alloys. There is less variation in the curves between the 3 alloys than between the same alloy with various treatments.

C. E. Macfarlane

**The aluminum bronzes.** E. J. Marsh and E. Mills. *Aircraft Eng.* 5, 251-5, 280-8 (1933).—Although the normal 10% Al bronze is very popular and possesses excellent mech. properties and high resistance to fatigue, it can be improved by the introduction of one or more other alloying elements. Fe, Ni, Mn and Pb are the principal metals employed; the effects of these addns. are studied separately. In choosing die or core materials for casting this alloy, a good grade of cast iron should be chosen, and particular attention paid to ensure that neither a S content of 0.10% nor a P content of 0.35% should be exceeded. Surface protection of the mold can be afforded by calorizing or by Cr electroplating; details and analyses for these processes are given. The mechanism of solidification is discussed with the aid of an Al-Cu equil. diagram, and the properties of each metallographic constituent are dealt with in detail. The  $\delta$ -constituent is hard and brittle, and in most applications treatments with particular reference to cooling rates have to be selected to ensure its absence. But it is of great value as a constituent for bearing journals, and a comparison is made with other classes of alloy, such as those with Sn-base or Pb-base, in this field. The effects of heat treatment are fully illustrated with photomicrographs. In cleaning this material it is found that the Al content is not too high to prohibit the use of caustic or other alk. cleaners. Pickling in strong nitrosulfuric acid mixts. should not be adopted; the compns. of safe cleaners are given. The corrosion resistance as compared with that of other non-ferrous alloys is tabulated.

A. W. Furbank

**Some temper-hardening copper alloys containing nickel and aluminum.** H. W. Brownson, Maurice Cook and H. J. Miller. *Engineering* 136, 695-8 (1933).—See C. A. 27, 5702.

G. G.

**The behavior of copper and zinc and their alloys toward tap water.** L. W. Haase. *Gesundh.-Ing.* 56, 577-82 (1933); cf. C. A. 27, 3019.—Waters contg. dissolved  $O_2$  will dissolve out Zn from brass pipes. The softer and more acid the water the more rapid is this action. The Cu and Zn act as a galvanic element, the Zn going into soln. Cu is superior to other metals usually used for water pipes in phys. and chem. properties and from the standpoint of health. When Cu is exposed to  $O_2$  and moisture,  $Cu(OH)_2$  is first formed, which in contact with metallic Cu is then reduced to  $Cu_2O$ . The very thin, very tenacious film of the latter formed serves to protect the Cu from further attack. This process may require years in the atm., is complete in a week or so in cold water, and in less time in hot.  $O_2$  must be present. The patina, a porous layer of difficultly sol. basic Cu salts subsequently formed (its compn. depends upon the salts present in the water), has no protective action, protection being due solely to the underlying  $Cu_2O$  layer. This is proved by the fact that although a patina forms in  $O_2$ -free water where no oxide can form, the Cu continues to dissolve. In the absence of the oxide film the patina actually favors the soln. of the Cu, since its electrode potential is higher than that of Cu. The formation of the  $Cu_2O$  film may be hastened by the addn. of nitrates, nitrites and bicarbonates to the water. The role of protective metal coatings on other metals is discussed, especially those of Sn and Zn. Corrosion of the more base metal may "enoble" it, reverse the p. d., and thus favor the soln. of the other metal. The working of brass and Cu pipes and methods of making connections are discussed.

M. G. Moore

**Should copper be coated with tin?** L. W. Haase. *Gesundh.-Ing.* 56, 593-5 (1933); cf. preceding abstr.—Sn used to coat Cu pipes carrying drinking water should be very low in Pb. A high Pb content decreases porosity and brittleness, but the Pb tends to dissolve as the anode of a Pb-Cu galvanic element and render the water unsafe for drinking. In the Cu-Sn element formed at a break in the Sn surface, the Sn at first goes into soln., protecting the Cu.  $O_2$ ,  $CO_2$  and Ca salts attack the Sn, forming an incrustation more electro-pos. than Cu, so that the Cu then dissolves. In contact with such waters Sn-coated pipes deteriorate faster than uncoated pipes. Sn-coated

pipes are recommended for only very soft cold water high in  $\text{CO}_2$  and low in  $\text{O}_2$ . Such waters will dissolve sufficient Cu from uncoated pipes to acquire a taste. Heat treatment of Sn-coated pieces leads to the formation of a Sn bronze alloy which, being more electropositive than Sn, causes the latter to dissolve.

M. G. Moore

**Examination of Roman copper from Wigtownshire and North Wales.** G. Clement Whittick and J. A. Smythe. *Proc. Univ. Durham Phil. Soc.* 9, 99-104 (1932-33).—Analyses of a metal cake showed it to be a leaded  $\alpha$ -bronze.

Leopold Pessel

**Investigation of systems gold-copper through measurement of resistance at low temperatures.** V. Pospisil. *Ann. Physik* 18, 497-514 (1933).—Fifty-nine Au-Cu alloys with 10-100% of the atoms being Au were investigated in the quenched and tempered condition by detg. the ratios of the elec. resistance at  $-195^\circ$  and  $-252.4^\circ$  to the value at  $0^\circ$ . The method appears as advantageous as that of sp. resistance measurement. The  $r$  (ratio)-isotherms of the quenched alloys indicate the formation of solid solns. The  $r$ -isotherms of tempered alloys possess deep, sharp minima at 25 and 50 atom % Au, indicating the formation of  $\text{AuCu}_2$  and  $\text{AuCu}$ . At 75 atom % Au the  $r$ -isotherms of the tempered alloys proceed higher than that of the quenched alloy. This points to the formation of a special modification of the solid solns. in this concn. region. The results are compared with those of other investigators.

Calvin Brous

**Etching procedure for the metallographic examination of the alloys of the platinum metals.** F. Beck. *Metallwirtschaft* 12, 636-7 (1933).—Ordinary etching solns. and fused salt mixts. are not satisfactory for Re-Pt, Re-Rh and Re-Ir alloys. Good results are obtained by pouring molten NaCl into a small graphite crucible contg. a Pt triangle which serves as cathode. The NaCl is kept molten at about  $860^\circ$  by means of a gas burner, and the specimen to be etched, which is attached to a Pt wire, is immersed in the crucible and forms the anode. A current of 3 amps./sq. cm. at 2.5 v. is passed through the bath for 5-15 secs., depending on the compn. of the alloy. The specimen is then dipped in distd. water, dried in alc. and is ready for examn.

C. E. Macfarlane

**The iron corner of the system iron-manganese-aluminum.** W. Koester and W. Tonn. *Arch. Eisenhüttenw.* 7, 365-6 (1933); cf. C. A. 28, 4434.—The structure of Fe-Mn-Al alloys up to 30% Al and 50% Mn shows in the solid phases only  $\alpha$ - and  $\gamma$ -solid solns. The heterogeneous ( $\alpha + \gamma$ )-space extends from the Fe corner across the investigated range to high Mn contents and is bordered here by the equilibria of the  $\beta$ -transformations of Mn.

Max Hartenleum

**The constitution of magnesium-zinc-silicon alloys rich in magnesium.** E. Elchardus and P. Laffitte. *Compt. rend.* 197, 1125-7 (1933).—The ternary diagram for the region  $\text{Mg}_2\text{Si-Mg-MgZn}_2$  is given. The limits of miscibility in the ternary system for the 2 liquid phases of the Zn-Si binary system are shown. There is no ternary compd. The ternary eutectic Mg 53.3, Zn 43.5, Si 3.2 melts at  $338^\circ$ .

P. S. Roller

**Problems of the corrosion of metals and colloid electrochemistry.** V. A. Kistjakovskii. *Uspekhi Khim.* 2, 237-48 (1933).—A review, chiefly of K.'s work, in the light of recent developments. Passivity, surface films and electrochem. effects on phase boundaries are discussed. (Cf. C. A. 20, 2047.)

F. H. Rathmann

**Influence of solution concentration on the severity of corrosion fatigue.** A. J. Gould. *Engineering* 136, 453-4 (1933).—Expts. were made on mild steel specimens by the rotating-beam method. The inhibiting effect of corrosion inhibitors varied widely between weak solns., which showed the corrosive effect of distd. water, and concd. solns. in which the specimens stood up better than in ordinary air. Conc'd. saline solns. corroded far more severely than distd. water. KCl solns. between 2 M and M/40 showed practically identical corrosion effects. With M/40 the effect diminished, approaching finally that of distd. water. No evidence for a definite corrosion-fatigue limit could be found on a 10 million reversals basis,

and tests of far greater length are considered necessary.

Leopold Pessel

**Protection against corrosion and corrosion resistance of a binary solid solution.** L. Graf. *Metallwirtschaft* 12, 585-7, 602-3 (1933).—A review and summary of recent literature on the subject, especially the work by G. Tammann. Twenty-two references.

C. F. Macfarlane

**Protection of cooling systems in internal-combustion engines against corrosion.** V. O. Krenig and S. E. Pavlov. *Korrosion u. Metallschutz* 9, 268-73 (1933).—The individual potentials in multi-metal combinations were measured at  $20^\circ$  and  $80^\circ$ , with tap water and solns. of  $\text{K}_2\text{Cr}_2\text{O}_7$  in tap water as electrolytes. Combinations of Fe, 64-36 brass, Al contg. 9% Cu, and of Fe, 64-36 brass, Al contg. 9% Cu, Zn, were used. The qual. corrosion picture of these metals was observed.  $\text{K}_2\text{Cr}_2\text{O}_7$  forms quickly protective coatings on the metals under test, 0.05% being found sufficient at  $20^\circ$ . Protective properties of the film are retained after removing the metal from the liquid and exposing it to air and water vapors. At  $80$ - $90^\circ$  the concn. of the  $\text{K}_2\text{Cr}_2\text{O}_7$  must be increased to 0.2% to induce protection. Under these conditions Fe becomes nobler than Al. The presence of nobler metals, such as brass, decreases the protective effect of  $\text{K}_2\text{Cr}_2\text{O}_7$  upon Fe, requiring greater concn. of the former or the introduction of Zn as protector. The presence of chlorides in the water requires an increase of the  $\text{K}_2\text{Cr}_2\text{O}_7$  concn. up to 1%. Even a concn. of 5% cannot protect Fe against sea water.

Leopold Pessel

**Hot-shortness and intercrystalline corrosion of austenitic chromium-nickel steels.** Max Schmidt and Otto Jungwirth. *Korrosion u. Metallschutz* 9, 293-302 (1933); cf. C. A. 27, 4199.—From phys. tests, performed on austenitic alloys at different temps., it is concluded that hot-shortness is due to reversible changes taking place in the temp. range of approx.  $600$ - $900^\circ$ . Bars of a steel contg. Cr 18, Ni 8, Ta 1, Mo 1.5% were forged from the initial temp. of  $1080^\circ$  to final temps. varying between  $1000^\circ$  and  $600^\circ$ . In another series of forging expts. the bars were forged from initial temps. varying between  $700^\circ$  and  $1000^\circ$  to a final temp. of  $600^\circ$ . Etching of the cross-sections proved the bars to be perfectly sound. In test bars heated to  $1100^\circ$  before being cooled to the breaking temp., no hot-shortness was found, while it was well in evidence in bars that had been heated from room temp. to the breaking temp. In tests made at  $700^\circ$  and  $870^\circ$ , the ductility increased sharply with increasing breaking speed. Pptn. phenomena causing hot-shortness can be suppressed by high initial temps. and by quick deformation, which explains their absence in hot-forged austenitic Cr-Ni steels. Intergranular corrosion of these steels and the means available for its prevention are discussed. Diagrams are given showing the influence of the C contents of an 18% Cr-8% Ni steel, annealed at  $700^\circ$ , upon its magnetic satn. and its potential.

Leopold Pessel

**The corrosion of zinc in chloride solutions.** C. W. Borgmann and U. R. Evans. *Trans. Electrochem. Soc.* 65, 24 pp. (preprint) (1934).—The corrosion of Zn was studied, in the cast and rolled conditions and in various degrees of purity, under conditions of partial immersion in KCl solns., sea water and distd. water. The results in KCl soln. show some striking differences to former expts. on wholly immersed Zn and to those on Fe (wholly or partly immersed). The corrosion of the sheet specimens continues to rise with the concn. instead of falling off at high concns., as in cases where the corrosion rate is limited by "O starvation." On the cast specimens, the absence of H evolution is a surprising feature. The results provide little hope of materially increasing the resistance of Zn to any of the liquids studied by eliminating or adding other metals, by protecting the cut edges or by avoiding abrasion of a rolled surface.

C. G. F.

**Elec. cond. and equil. diagrams of binary alloys (Grube, Vosskühler) 2.** App. for taking samples of ore on conveyors (U. S. pat. 1,937,473) 1. App. for calcining ores (U. S. pat. 1,937,413) 1. Furnace for burning ores (Ger. pat. 579,615) 20. App. for removing water from, or

579,754, June 30, 1933. The adhesion of superposed thin metal sheets during annealing is prevented by dipping the stacked sheets, after pickling and washing, in a soln. of Cr salt which, during the annealing, leaves a layer of oxide between the sheets. Solns. of alkali chromate or bichromate are preferred.

**Metal articles.** Egyesült Izzólámpa és Villamossági R.T. Fr. 753,776, Oct. 24, 1933. Articles (wires, rods, incandescent substances, etc.) consisting of a single crystal or large crystals of a metal of high m. p. are made by compressing the metal powder, fritting in a neutral medium, working mechanically, and then reheating to the temp. corresponding to a rapid growth of the crystals or to recrystn., in a medium contg. O or compds. contg. O.

**Light metals.** Heraeus Vacuumsmelze A.-G. and Wilhelm Rohn. Ger. 581,590, July 29, 1933. Addn. to 563,652 (C. A. 27, 941). App. for obtaining light metals by reducing their oxides with C is described.

**Noble metals.** W. C. Heraeus G. m. b. H. (Georg Bauer, inventor). Ger. 584,844, Sept. 25, 1933. Pt, Au, etc., are extd. from slags, concentrates, ores, etc., by fusing with Cu and a Cu mat contg. 60% Cu in a reverberatory or elec. furnace under reducing conditions. The Cu mat contg. the desired amt. of Cu is produced by fusing Cu with sulfidic ores such as pyrites, adding oxides such as  $\text{Fe}_2\text{O}_3$  to oxidize the foreign metals, and reducing these to slag by addn. of  $\text{SiO}_2$ .

**Iron.** Eugen A. A. Gronwall and Harry J. H. Nathorst. Ger. 581,809, Aug. 4, 1933. A shaft furnace for obtaining Fe by reducing Fe ores with C is described.

**Iron.** Christian E. Kluijtmans. Ger. 583,765, Sept. 9, 1933. A black-short cast Fe contains C less than 2.00, Si 1.10-1.50, Mn 0.42-0.75, S less than 0.2 and P less than 0.2%. The metal is obtained by fusing white cast Fe in a cupola furnace and adding Fe-C, Fe-Mn, Fe-Si and coke as required.

**Malleable iron.** Walter Cotterill. U. S. 1,938,516, Dec. 5. Cast iron is subjected in a receptacle contg. an inert non-oxidizing gas such as N and CO to a preliminary heating and a further heating at an elevated temp. until substantially all the graphitic C in the cast iron has been absorbed by the iron; the temp. is then reduced to allow C pptn. to take place and a relatively small controlled proportion of an oxidizing gas such as air or O is admitted during at least a portion of the C-pptn. range to cause pptn. of the C as "temper carbon" and the oxidation of at least a portion of it.

**Making forging tools, etc., from cast iron.** Lucien I. Yeomans (to Universal Products Co.). U. S. 1,936,652, Nov. 28. The metal is cast in a chill mold, the casting is removed from the mold promptly after solidification and is immediately subjected to pressure in master dies to produce flow of the metal; the casting is removed from the master dies while at a temp. above that at which the tool is to be used, subjected to soaking at about 540-650° and then quenched.

**Water-absorbent pulverized iron.** Herbert E. A. McCarthy. Australia 8201/32, Aug. 24, 1933. Pulverized Fe is made water-absorbent by heating it to a temp. at which the surface and pores are freed from the water-repellent film. The Fe is used as a dressing for concrete surfaces and for the prepn. of metallic waterproofings.

**Steels.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 494,566, July 31, 1933. Addn. to 741,871 (C. A. 27, 3439). The thermal process of Fr. 741,871 is applied to Co-steels contg. Cr and Mo, e. g., Co 36, Mo 8, Cr 5.5, C 1% and Fe the rest.

**Steels.** Frederick Regar Bonte. Fr. 751,533, Sept. 5, 1933. A steel having a high C content or an Fe alloy contg. a ppt. of C is rolled or forged to manuf. an object, and this is heated to a temp. above the critical pt. to cause a large amt. of the C to pass into the graphite form. Steels contg. C 1.5-2 and Si 0.6-0.9% may be so treated.

**Steel.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 752,599, Sept. 26, 1933. Steels are recarburized before the action of the deoxidizing slag to reduce the amt. of slag and calmatives and to

improve the quality of the steel. The recarburization thus made is such that no final recarburization is necessary.

**Testing metals such as steel for soft spots.** Leslie E. Howard (to Simonds Saw and Steel Co.). U. S. 1,937,820, Dec. 5. The surface of the metal is abraded or polished with an abrasive material which produces scores varying in depth according to the relative softness of different portions of the surface; the surface is then illuminated and light effects are observed which indicate relative degrees of hardness and softness.

**Refining steel, etc.** Paul Girod. Fr. 42,584, Aug. 23, 1933. Addn. to 738,493 (C. A. 27, 1857). Feldspars (K or Na or mixed) are used to give fluidity to the slags used in Fr. 738,493.

**Rustless steel.** Soc. industrielle et commerciale des aciers. Fr. 754,263, Nov. 3, 1933. Steel contg. Cr 6-40, Mn 0.8-40 and C up to 1% contain also Ti and (or) V in such a proportion that the C is fixed by one of these constituents and the max. is not above 6%. A preferred compn. is Cr 15-25, Mn 0.8-40, C up to 1 and Ti or V up to 4%. Part of the Mn may be replaced by Ni. Up to 6% total of Cu, Co, Mo and Si and up to 10% of Al may also be present.

**Steel alloy.** James P. Gill (to Vanadium-Alloys Steel Co.). U. S. 1,938,221, Dec. 5. A steel alloy for dies used in the die-casting of Al contains C 0.2-0.5, Si 0.1-1.5, Mn 0.1-1.0, Cr 3-8, Mo 1.5-2.75, W 0.5-2.0 and Ni 0.5-2.0%, the remainder being mainly Fe.

**Steel alloys containing molybdenum.** Joseph V. Simmons (to Cleveland Twist Drill Co.). U. S. 1,937,334, Nov. 28. Steel alloys which are suitable for cutting tools, etc., contain, besides Fe, C 0.5-1.3, Cr 0.2-10.0, Mo 0.6-15.0, Si 0.1-0.45 and W in a proportion of about 5-40% the amount of Mo present (with at least 0.2% W).

**Alloys.** Siemens-Schuckertwerke A.-G. (Ger. 577,709, June 3, 1933. An alloy with coefficient of expansion values which form a sym. curve for heating and cooling consists of Fe with Mn 15-30%, C less than 0.5, and up to a 10% total addn. of any or all of the following, Si, Cu, Co or W.

**Alloys.** Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Ger. 579,694, June 29, 1933. Alloys free from C are prepd. by reducing oxides of metals of the 5th and 6th groups of the periodic table, which m. above 1000°, with commercially pure H in the presence of a metal which is chemically or physically united to the metals liberated by the reduction. Thus, oxides of Ni or Fe are reduced in the presence of Fe or Ni, resp.

**Alloys.** Henri Durand. Fr. 753,702, Oct. 23, 1933. Alloys resistant to  $\text{H}_2\text{SO}_4$  and particularly useful for elec. accumulators contain either (1) Sn 60, Pb 40, (2) Sn 80, Sb 5, Cu 15 or (3) Sn 60, Cu 20 and Zn 20%. To each of the molten alloys is added at the last moment before casting 15 g. of  $\text{CuSO}_4$  and then 10 g. of  $\text{Bi}_2(\text{SO}_4)_3$  for each 25 kg. of metal.

**Dental alloys.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Fr. 754,056, Oct. 31, 1933. Dental alloys contain Ag 60-90, Pd 40-10 and Sn 0.5-5 parts. Zn, Mn and Cd may be present up to 3-5%. Part of the Pd may be replaced by Pt or Au.

**Dental alloys.** Soc. industrielle de thérapeutique scientifique appliquée (S. I. T. S. A.). Fr. 751,425, Sept. 4, 1933. Alloys for making dental amalgams are reduced to fine powder and made into tablets which are suitably grooved for easy division into required proportions.

**Aluminum alloys.** Gustaf N. Kirsebom and Callow Ltd. Brit. 307,844, Aug. 25, 1933. See Fr. 749,346 (C. A. 27, 5711).

**Aluminum alloys.** Charles Delassus. Fr. 750,703, Aug. 17, 1933. Alloys for pistons, etc., contain Al 90-2, Cu 4-5, Mg 1-2, Ni 0.5-0.7, Mn 0.06-0.1, Ti 0.05-0.1, Cr 0.1-0.3 and W 0.5-1%.

**Aluminum alloys.** Aluminium Ltd. Fr. 750,760, Aug. 18, 1933. Alloys contain Si 5-25, Mg 0.02-3% and the rest Al.

**Aluminum alloy.** Oscar T. Lemmens. Fr. 751,154, Aug. 28, 1933. An alloy contains Al 91, Ni 3, Sn 2, Cr 2, Mg 1, Cd 0.5 and Cu-B 0.5%.



**Aluminum alloys.** Bezault Frères (S. à r. l.). Fr. 754,266, Nov. 3, 1933. Alloys of Al contain Cu, Si and Mg with or without Ti. Examples are Al 97, Cu 1, Si 1 and Mg 1% and Al 95, Cu 3, Si 1 and Mg + Ti 1%. The proportion of Ti is not above 0.3%.

**Separating constituents of aluminum-silicon alloys.** Oskar Schober (to American Lurgi Corp.). U. S. 1,938,046, Dec. 5. For sepg. Al-Si alloys into a higher-Si and a lower-Si fraction, the fluid fraction of the mixt. at a temp. at which the higher-Si fraction of the alloy is present in a solid state and the lower-Si fraction in a liquid state is forced through a filter bed contg. grains or small lumps of alumina, which retain the solid fraction.

**Copper alloys.** Donald K. Crampton (to Chase Cos., Inc.). U. S. 1,938,172, Dec. 5. Alloys contg. no Ni or at most substantially less than 1% Ni are formed of Cu 75-95, Al 0.5-4.0, Sn 0.25-2.0%, the balance being mainly Zn. These alloys are resistant to corrosion by saline waters.

**Copper alloys.** Naraina Das-Chopra. Fr. 753,562, Oct. 10, 1933. Hard alloys of Cu are prep'd. by heating together Fe, Al and Cu to a temp. at which an exothermic action is produced, whereby the temp. of the molten metal is notably increased. An example contains Cu 80, Fe 1, Al 2, Zn 13 and Sn 4%.

**Refining a copper-calcium alloy.** Harvey N. Gilbert (to E. I. du Pont de Nemours & Co.). U. S. 1,937,650, Dec. 5. An alloy contg. Cu and Ca is melted and H, N or NH<sub>3</sub> is passed through the melt.

**Copper-zinc alloys.** Maurice Legu. Fr. 750,947, Aug. 22, 1933. A white alloy of high resistance contains approx. Cu 47, Zn 38, Ni 12.5, Mn 1.5, Pb 0.6 and Al 0.4%.

**Gold alloys.** G. Siebert G. m. b. H. Ger. 584,549, Sept. 21, 1933. Au alloys consist of 5-25% of metals of the Pt group, 0.05-5% of metals of the Fe group and the rest Au. Alternatively, the Au may be replaced by a mixt. of Au and Ag contg. at least 60% Au. Also, Cu up to 5% may be added. The alloy is heated just below its m. p. (900°), chilled, and tempered at 500-50°.

**Iron alloys.** Karl Arnds. Ger. 575,000, Sept. 13, 1933. A hard Fe alloy for casting consists of C 2-3, Si 0.5, Mn 1.5-2.5, P 0.1, S 0.03 and at least 20% of spongy Fe.

**Iron and chromium alloys.** Bernhard Vervoort. Fr. 533,968, Oct. 28, 1933. See Brit. 392,264 (C. A. 27, 3303).

**Nickel alloys.** Reinhard Straumann. Fr. 42,520, Aug. 4, 1933. Addn. to 735,009 (C. A. 27, 946). An example of an alloy suitable for watch springs, particularly for thermo-compensated oscillating systems, contains Ni 60, Fe 16, Cr 15, Mn 2, Mo 6.5 and Be 0.5%.

**Hard tantalum alloy for cutting tools.** Clarence W. Balke (to Ramet Corp. of America). U. S. 1,937,185, Nov. 28. Ta carbide powder is degasified in a vacuum at a temp. above 1600°, then mixed with 3-15% of powd. Ni, and the mixt. is heated in a vacuum to 1350-1400°. (C. A. 27, 4210).

**Treating brass with sodium.** Wm. F. Zimmerli (to E. I. du Pont de Nemours & Co.). U. S. 1,937,934, Dec. 5.

1 A Na-Zn alloy is employed for incorporation of Na with brass.

**Coating aluminum.** Aluminum Colors Inc. Fr. 754,077, Oct. 31, 1933. Al surfaces covered with oxide are dipped into a soln. of a salt, e. g., an acetate or sulfate of Ni or Co, whereby a practically insol. ppt. is obtained.

**Coating metal objects with molybdenum.** Patent-Treuhand-Ges. für elektrische Glühlampen m. b. H. (Hans Wolff, inventor). Ger. 580,748, July 15, 1933. 2 The objects are given a thin coating of a colloidal soln. of a reducible Mo compd. and then heated to above 900° in a reducing atm. Colloidal MoO<sub>3</sub> obtained by heating crystd. (NH<sub>4</sub>)<sub>2</sub>MoO<sub>4</sub> *in vacuo* is preferred. The resulting coating adheres strongly to the object.

**Black-finishing chromium-plated metal articles.** Hector R. Carveth (to E. I. du Pont de Nemours & Co.). U. S. 1,937,629, Dec. 5. Cr plated articles are treated in a molten salt bath contg. an alkali metal or alk. earth metal cyanide, e. g., in a bath formed from NaCN 45, Na<sub>2</sub>CO<sub>3</sub> 35 and NaCl 20%.

**Welding electrode.** David L. Mathias (to Westinghouse Elec. & Mfg. Co.). U. S. 1,936,799, Nov. 28. An electrode of welding metal is coated or filled with a resinate such as that of Na to supply a reducing gas for protecting metal in welding, together with a deoxidizer such as ferro-Mn, Ti or V to protect the resinate from oxidation, an alk. compd. such as CaCO<sub>3</sub> and flux.

**Coated welding electrode.** Robert S. Johnston (to John A. Roebbing's Sons Co.). U. S. 1,937,574, Dec. 5. A metal core is coated with asbestos and with an overlying coating contg. at least 46% of silica and also contg. a flux such as Ca, Ti and Mn oxides. Various details relative to the proportionate thickness of the coatings, etc., are described.

**Welding rod for use in arc welding.** Richard Stresau (to A. O. Smith Corp.). U. S. 1,936,693, Nov. 28. A rod of metal is provided with an extruded coating contg. finely divided cellulosic material, Na silicate and a material such as kaolin which facilitates even distribution of the ingredients in the extruded coating.

**Arc-welding steel.** N. V. Machinerieën-en Apparaten Fabrieken. Fr. 752,528, Sept. 25, 1933. The core of the electrodes carrying an appropriate covering is composed of cast steel obtained by a Siemens-Martin acid process from pure Fe. Fr. 752,529. The covering for the electrodes is composed of a paste of silicates of Na, K and Mg, as pure as possible and free from constituents carrying O or steel, other impurities particularly constituents liberating CO<sub>2</sub> and easily reducible oxides. It may contain reducing constituents or metals which will alloy with steel.

**Soldering aluminum bronze.** Paul Odani. Fr. 751,370, Sept. 2, 1933. A cleaning agent which permits Al bronze to be tinned and soldered is composed of a hydric acid and a volatile base such as NH<sub>3</sub>, hydrazine, MeNH<sub>2</sub> or EtNH<sub>2</sub>, in soln. in H<sub>3</sub>PO<sub>4</sub>.

**Copper solder.** Fried. Krupp A.-G. (Josef Hinnüber, inventor). Ger. 581,748, Aug. 2, 1933. A solder for sintered or fused carbide, nitride, silicide and boride alloys consists of Cu with 0.1-10% Al or Mn.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

The isolation of free methyl and ethyl by the reaction of sodium vapor with methyl and ethyl bromide. E. Horn, M. Polanyi and D. W. G. Style. *Z. physik. Chem.* B23, 291-304 (1933).—The reactions: Na + RBr = NaBr + R were studied, where R = Me and Et. The presence of the free radicals at distances as great as 8 cm. from the point of formation was det'd. by reaction with Cl and I. By varying the pressure of Na vapor from  $2.5 \times 10^{-4}$  to  $90 \times 10^{-4}$  mm. and the temp. from 210° to 290°, the yield of the free radical dropped from 7 to 2%. The decrease in yield under these conditions is attributed to bimol. reaction. The rate const. of the reunion of the free radicals is of the order of  $10^{14}$ .

G. M. Murphy

**Pyrolysis of unsaturated hydrocarbons.** Charles D. Hurd. *Ind. Eng. Chem.* 26, 50-5 (1934).—A review.

E. H.

**Acetylene formation in thermal decomposition of hydrocarbons.** H. H. Storch. *Ind. Eng. Chem.* 26, 58-60 (1934).

E. H.

**Halogens and halogen compounds in heat treatment of hydrocarbons.** A. W. Nash and J. Mason. *Ind. Eng. Chem.* 26, 45-50 (1934).

E. H.

**Preparation of methyl or ethyl iodide from iodoform.** R. H. Kimball. *J. Chem. Education* 10, 747 (1933).—By boiling CHI<sub>3</sub> with KOH in 95% EtOH, distg. off the EtOH, acidifying, filtering, making the filtrate alk. with

NaOH, and then heating it with com.  $\text{Me}_2\text{SO}_4$ , a 78% yield of MeI can be obtained, or, with com.  $\text{Et}_2\text{SO}_4$ , an 80% yield of EtI.

Louise Kelley

**Highly polymerized compounds. LXXXIV. Constitution of the polyoxymethylenes.** H. Staudinger and W. Kern. *Ber.* 66B, 1843-6 (1933); cf. Signer and Gross, *C. A.* 27, 4987. — Staudinger and Kern do not agree with the theoretical conclusions of Singer and Gross; the differing phys. behavior of the different polyoxymethylene hydrates can be simply explained by differences in the length of the chain in the mols.

C. A. R.

**The transformation of acetylene and acetaldehyde into acetone by the contact method.** N. D. Zelinskii, M. I. Ushakov, V. M. Mikhailov and Yu. A. Arbuzov. *J. Chem. Ind. (Moscow)* 1933, No. 7, 63-5. — An Fe-Mn catalyst is best. Natural Fe ores are unsuitable.  $\text{AcH}$  and  $\text{H}_2\text{O}$  give 96%  $\text{Me}_2\text{CO}$ ;  $\text{C}_2\text{H}_2$  and  $\text{H}_2\text{O}$  give 88%. If the gases from the latter reaction are again passed over the catalyst the yield is increased to 98%. Optimum conditions are  $440^\circ$ , a ratio of  $\text{C}_2\text{H}_2$  to  $\text{H}_2\text{O}$  of 1:10, and a rate of passage of the gas over the catalyst of 20.9 cc. per min.

H. M. Leicester

**Fluorination of organic compounds. Monofluoroacetone.** P. C. Ray, P. B. Sarkar and Anit Ray. *Nature* 132, 749 50 (1933). —  $\text{CH}_3\text{COMe}$  was prepd. from  $\text{CH}_3\text{CICOMe}$  and when it was refluxed with TlF in the presence of  $\text{Et}_2\text{O}$ ,  $\text{CH}_3\text{FCOMe}$ , b.  $72^\circ$ , was obtained. R. Brown

**A simplified method for the preparation of butyric acid.** Lallance A. Adair and E. J. Simmons. *Field and Lab.* 2, 31-2 (1933). The prepn. is carried out in 3 stages: (1) hydrolysis of  $\text{AcOBu}$  to the alc. (yield 56%), (2) oxidation of the alc. by means of  $\text{K}_2\text{Cr}_2\text{O}_7$  and  $\text{H}_2\text{SO}_4$  to  $\text{PrCO}_2\text{H}$ , and (3) sepn. of the acid as the Ca salt, treatment with concd.  $\text{H}_2\text{SO}_4$  and distn.

W. A. Moore

**Unsaturated aliphatic acids and their derivatives. IX. The configuration of  $\gamma$ -linoleotetrabromostearic acid.** Tsutomu Maruyama. *J. Chem. Soc. Japan* 54, 1073 81 (1933). — See *C. A.* 27, 1614. **XI. The configuration of  $\beta$ -linoleotetrabromostearic acid.** *Ibid.* 1082 7. —  $\beta$ -Linoleic acid (I) is made by debromination of  $\beta$ -linoleotetrabromostearic acid (II). Oxidation of I in acetone- $\text{KMnO}_4$  soln. gives caproic (III), malonic (IV), oxalic (V) and azelaic acid (VI). Treatment of II in alk. KOH at  $25^\circ$  for 1.5 hrs. gives octadeca-7,10-dibromo-6,9-dien-18-oic acid (VII); at  $150^\circ$  for 10 hrs. it gives octadeca-6,9-dien-18-oic acid (VIII). The Me ethers of VII and VIII, on oxidation with acetone- $\text{KMnO}_4$  soln., give III, IV, V and VI. Obviously the 2 Br atoms on the C atoms 6 and 7 and those on 9 and 10 in II take the *trans*-positions to each other. K. K.

**The cerebronic acid fraction. II.** P. A. Taylor and P. A. Levene. *J. Biol. Chem.* 102, 535-40 (1933); cf. *C. A.* 23, 817. — The higher-boiling fraction of the acids obtained on oxidizing cerebronic acid (I) was esterified and distd. from the middle fractions was isolated *lignoceric acid* (II),  $\text{C}_{24}\text{H}_{48}\text{O}_2$ , m.  $79.5-80.5^\circ$ , mixed m. p. with a sample of II from peanut oil,  $79.5-80.5^\circ$ . To ensure that II was really an oxidation product, the original I was esterified and fractionally distd., but II was completely absent.

K. V. Thimann

**Cerebronic acid. IX.** P. A. Levene and P. S. Yang. *J. Biol. Chem.* 102, 541 56 (1933). — Highly purified cerebronic acid (I),  $\text{C}_{24}\text{H}_{48}\text{O}_2$ , m. between  $98^\circ$  and  $102^\circ$  with different preps.,  $[\alpha]_D^{25}$   $3.95^\circ$  (2.1% in pyridine), was oxidized with  $\text{KMnO}_4$  and the product, m.  $73-6^\circ$ , extensively fractionated. About 7% consisted of acids of mol. wt. 340 3,  $\text{C}_{24}\text{H}_{48}\text{O}_2$ , m.  $71.5-4.5^\circ$ ; 32% had a mol. wt. 352 7,  $\text{C}_{24}\text{H}_{46}\text{O}_2$ , m.  $77-8^\circ$ , while 32% had a mol. wt. of 367-71,  $\text{C}_{24}\text{H}_{46}\text{O}_2$ , m.  $80.5-82^\circ$ . Since, from the preceding abstr., the  $\text{C}_{24}$ -acid was not previously present in I, the oxidation of I leads to the formation of 3 acids, and hence I is not, as claimed by Klenk (*C. A.* 23, 1415; 27, 2157) a homogeneous substance. The mol. wt. of I was confirmed by formation of *Me methoxycerebrionate*,  $\text{C}_{27}\text{H}_{50}\text{O}_3$ , m.  $58-9^\circ$ ,  $[\alpha]_D^{25}$   $17.9-19.7^\circ$  (1.2 1.9% in pyridine), and thence *methoxycerebronic acid*,  $\text{C}_{24}\text{H}_{46}(\text{OMe})\text{CO}_2\text{H}$ ,  $[\alpha]_D^{25}$   $17.5^\circ$  (1% in pyridine). The formula assigned to I by Klenk is therefore incorrect.

K. V. Thimann

**Oxidation and derivatives of *dl*- $\alpha$ -hydroxystearic acid.**

P. A. Levene and P. S. Yang. *J. Biol. Chem.* 102, 557 62 (1933); cf. preceding abstr. — In order to control the expts. with cerebronic acid (I), it is shown that by repeatedly esterifying crude *dl*- $\alpha$ -hydroxystearic acid (II), and sapon. with cold alc. NaOH, II could be obtained pure, m.  $84-6^\circ$ . Further, on oxidizing II with  $\text{KMnO}_4$ , esterifying and distg., all 3 fractions consisted only of margaric acid, *i. e.*,  $\text{KMnO}_4$  removes only 1 C atom (cf. Witzemann, *C. A.* 26, 2702). The 3 acids obtained on oxidation of I are hence derived from 3 compds. in the original I, which is therefore not a homogeneous substance. The following derivs. of II are described: *Me ester* (III), m.  $64-6^\circ$ , *dl*- $\alpha$ -hydroxystearyl hydrazide,  $\text{C}_{18}\text{H}_{33}\text{O}_3\text{N}_2$ , m.  $136-7^\circ$ , *Me dl*- $\alpha$ -methoxystearate, from III, b.p.  $138-4^\circ$ , m.  $37-8^\circ$ , and *dl*- $\alpha$ -acetylsteoric acid, m.  $64-5^\circ$ .

K. V. Thimann

**Some unsymmetrical tetramethylene glycols.** C. F. H. Allen, C. V. Wilson and W. L. Ball. *Can. J. Research* 9, 432-5 (1933). — As intermediates for obtaining unsym. 1,4 dibromides several tetramethylene glycols have been prepd., by means of various procedures. Reduction of  $\text{EtO}_2\text{CCHPhCH}_2\text{CO}_2\text{Et}$  with Na and EtOH (Manske, *C. A.* 25, 1832) gives the *mono-Na salt* (I) of  $\text{HOCH}_2\text{CHPhCH}_2\text{CH}_2\text{OH}$  (II), m.  $70^\circ$ . Attempts to convert II into the dibromide which might be suitable for making a Grignard reagent were unsuccessful. A similar reduction of 2,4  $(\text{MeO})_2\text{C}_2\text{H}_4\text{CH}(\text{CO}_2\text{Et})\text{CH}_2\text{CO}_2\text{Et}$  gives  $\beta$ -(2,4-dimethoxyphenyl)butane-1,4-diol (III), m.  $89^\circ$ ; liquid diacetate, b.p.  $221-4^\circ$ . III gives no dibromide because of a tendency to lose HBr. III also readily dehydrates. Reduction of  $\text{EtO}_2\text{CCHMeCH}_2\text{CO}_2\text{Et}$  with Na and BuOH gives  $\text{H}(\text{CH}_2)_2\text{CHMe}(\text{CH}_2)_2\text{OH}$  (IV). The dibromide of IV gives no detectable amt. of Grignard reagent.  $\text{MeCH}(\text{OAc})(\text{CH}_2)_2\text{OAc}$  with HBr gives only *bromobutyl acetate*, b.  $92-4^\circ$ .  $\text{Br}(\text{CH}_2)_2\text{Cl}$  gives a small amt of Grignard reagent.

R. B. Sandhu

**Replacement of strongly positive hydrogen by halogen. III. Novel transformations of hypohalites.** Fritz Straub and Ruth Kuhnle. *Ber.* 66B, 1834 46 (1933); cf. *C. A.* 25, 73. — To bring out again the special role of the acetylenic bond in the reaction  $\text{R}_2\text{C}(\text{OH})\text{C} \equiv \text{CH} + \text{X}_2\text{O} \rightarrow \text{R}_2\text{C}(\text{OH})\text{C}(\text{X})\text{C}(\text{OH})\text{X}$  (X = halogen), the reaction has been applied to the corresponding ethylenic alcs. The result was a very peculiar transformation of an entirely different kind.  $\text{Me}_2\text{C}(\text{OH})\text{CH}:\text{CH}_2$  (I) shaken with the usual, strongly alk., 0.5 N KOBr soln. uses up 1 mol. in about 1 hr., giving 60% of 2-methyl-4-bromo-2,3-oxidobutane,  $\text{Me}_2\text{C}(\text{O})\text{CCH}_2\text{Br}$  (II), smoothly hydrolyzed to 2-methyl-1-

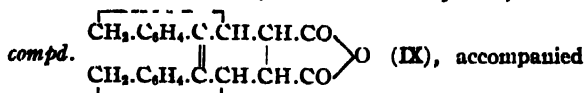
bromobutane-2,3-diol,  $\text{Me}_2\text{C}(\text{OH})\text{CH}(\text{OH})\text{CH}_2\text{Br}$  (III), which can be degraded by oxidation to  $\text{CH}_3\text{BrCO}_2\text{H}$  or  $\text{Me}_2\text{C}(\text{OH})\text{CO}_2\text{H}$ . As with the acetylenic alcs., the reaction depends greatly on the content of free alkali in the soln., provided it is kept within the range where the soln. no longer fades out and the formation of bromate is prevented. The reaction proceeds much less smoothly than with the acetylenic alcs., however, because the KOBr reacts further, although more slowly, on the oxide, yielding higher-boiling, more highly brominated products (including CBr<sub>4</sub> when 2.4 mols. KOBr are used). Hypoiodite (1 m KI added to the suspension of I in alkali) yields the *l analog* (IV) of II, which is likewise hydrolyzed to the *l*-glycol (V), while NaOCl does not attack I.  $\text{Et}_2\text{C}(\text{OH})\text{CH}:\text{CH}_2$  (VI) and  $\text{Me}_2\text{C}(\text{OH})\text{CH}:\text{CHMe}$  (VII) behave like I, whereas  $\text{Me}_2\text{C}(\text{OH})\text{CH}:\text{CHPh}$  does not; with the latter there is, to be sure, an extremely slow consumption of KOBr (approx. 1 mol. in 5 days) which, however, manifests itself only by the appearance of a little BzOH in the carbinol remaining for the most part unchanged. Even VI and VII react less smoothly than I and with widely differing velocities, VI requiring 24 hrs. for the consumption of 1 mol. KOBr while VII requires 15-20 min., and in both cases CBr<sub>4</sub> is already formed with only 1 mol. KOBr although much of the carbinol remains unchanged. As with the acetylenic alcs., it must be assumed that the first step in the process is a reaction of the hypohalite ion, in this case with the pos. H atom of the OH

group, and that the resulting unstable hypobromous ester stabilizes itself by rearrangement:  $I + BrO^- \rightleftharpoons [Me_3C(OBr)CH:CH_2] + OH^- \rightarrow II$ . The reaction of hypohalites with the at. grouping  $-CO_2CH_3-$  is also probably a reaction of the enol form, the pos. H being attacked and the halo ketone resulting from a rearrangement of the intermediate hypohalite ester:  $-C(OH):CH- + X.O^- \rightleftharpoons [-C(OX):CH-] + OH^- \rightarrow -CO_2CHX- + OH^-$ . Re-enolization makes the 2nd H atom susceptible to attack by the hypohalite ion.  $CH_2(CO_2H)_2$ , with NaOCl and KOBr in strongly alk. soln. readily yields the di-Cl and di-Br deriva., the bromination, under the same conditions, being 8-9 times more rapid than the chlorination. By this method  $CCl_2(CO_2H)_2$  has been obtained in cryst. form; in common with  $CBBr_2(CO_2H)_2$ , it is remarkably indifferent toward  $SOCl_2$ , from which it can advantageously be crystd. The strongly alk. KOBr soln. converts  $Me_3C:CHMe$  into its oxide:  $Me_3C:CHMe + OBr^- \rightarrow Me_3C.O.CHMe + Br^-$ ; the reaction is relatively slow

and its use for preparative purposes is limited by the fact that secondary reactions soon result in the splitting out of a Me group as  $CBr_4$ . This formation of  $CBr_4$  also always occurs in the prepn. of the brominated oxides from tertiary allyl alcs. Even the simple satd. tertiary alcs. are likewise broken down, very slowly, to  $CBr_4$  by strongly alk. KOBr;  $Me_3COH$  and  $Me_3EtCOH$  with 1 mol. KOBr reacted completely only after 10 days; no intermediate products could be isolated. With the primary alcs.

$MeOH$  and  $BzOH$  the difference in the reaction velocities is very characteristic;  $BzOH$  in 20 parts ether shaken with KOBr uses up 1 mol. in 10 min. while with  $MeOH$  only a little more than half reacts in 1 hr.  $BzH$  with 2 mols. KOBr is completely converted into  $BzOH$  in 10-15 min. while with NaOCl only 0.34 mol. reacts in 16 hrs. The dehydrogenation of  $PhCH_2OH$  to  $BzH$  is materially lower, even with KOBr; since the subsequent conversion to  $BzOH$  is instantaneous, half of the KOBr used up is to be attributed to the dehydrogenation to  $BzH$ . About 4 hrs. is required for the consumption of half of the KOBr; with 1 mol. KOBr, half of the alc. remains unchanged and very little of the intermediate  $BzH$  can be isolated. Both reactions are considered to be dehydrogenations through the intermediate hypohalite esters:  $PhCH_2OBr \rightarrow BzH + HBr$ , and  $PhCH(OH)OBr \rightarrow BzOH + HBr$ .  $PhCH:CHCHO$ , on the other hand, with 2 mols. KOBr gives phenylglycidic acid (VIII); the secondary reaction with the 2nd mol. of KOBr must again be very rapid, for with only 1 mol. KOBr half of the aldehyde remains unchanged. VIII itself reacts further, although more slowly, with the KOBr and is broken down to  $BzOH$ , which is found in small amt. among the by-products. The latter are quite unhomogeneous, easily sol. in water and in part brominated;  $PhCH:CHCO_2H$  was obtained in some expts. in about 5% yield. With 2.4 mols. NaOCl, the velocity of oxidation of  $PhCH:CHCHO$  is not markedly different but no VIII is formed; the aldehyde is oxidized chiefly to  $BzH$  (70%); even with only 1 mol. NaOCl, about 20%  $BzH$  is obtained. As with the tertiary alc., therefore, hypobromites and hypochlorites react quite differently with  $PhCH:CHCHO$ . II,  $b_p$  50.5-1.5°,  $d_4^{20}$  1.3907,  $n_D^{20}$  1.46265, 1.47232, 1.46522 for  $\alpha$ ,  $\beta$  and D at 20.1°,  $n_D^{20}$  1.47796. III, m. 48-9°. IV,  $b_p$  59°,  $d_4^{20}$  1.4613. V sublimes *in vacuo* at 35°, m. 54.5°. 3-ethyl-1-bromo-2,3-oxidopentane, from VI with KOBr,  $b_p$  72-3°. 2-Methyl-4-bromo-2,3-oxidopentane, from VII, obtained in not quite pure form (C, 1.36% low; H, 0.66% low; Br, 2.19% high),  $b_p$  63-4°,  $d_4^{20}$  1.208; glycol, m. 96-7°. Trimethylethylene oxide,  $b_p$  73.4°. Dichloromalononic acid, exceedingly hygroscopic needles, m. 109.11° (decompn.);  $PhNH_2$  salt, m. 101.5° (decompn.); dianilide, from the acid and  $PCl_5$  treated with excess of  $PhNH_2$  in ether, m. 129-30°.  $CBBr_2(CO_2H)_2$ , m. 130-1.5°. IV. Transformations of 1,1,3-trihaloindenes. Fritz Straus, Ruth Kühnel and Ruth Haensel. *Ibid* 1847-62.—The halogen in 1,1,3-trichloro- (I) and 1,1,3-tribromoindene (II) is not very reactive; II with

2.5% NaOMe loses only 0.5 atom in 6 hrs. and 1 atom in 24 hrs., and even the HI-AcOH method recommended for the detn. of pos. halogen in bromomalononic acids (Backes, West and Whiteley, C. A. 15, 2070) is very slow, requiring 8 hrs. for the replacement of 1 atom. Long boiling in aq. acetone, however, quite readily effects hydrolysis to the 3-haloindones, and these can be halogenated to the 2,3-dihaloindones. With NaI in acetone, II loses both 1,1-Br atoms and 2 of the residues combine to form 3,3'-dibromo-1,1'-biindenylene (III). With Zn dust in pyridine-AcOH or in boiling alc., III takes up 2 atoms H at the 1,1'-positions and at the same time the Br atoms are replaced by H, giving 3,3'-biindenyl (IV), which can be degraded to  $(o-HO_2CC_6H_4CO)_2$ . IV is also formed with surprising ease by rearrangement of the 1,1'-isomer with alkali. Whereas only 15 min. boiling is required for the complete conversion of II into III, I does not react completely even after 48 hrs. and the resulting 3,3'-dichloro-biindenylene (V) contains considerable amts. of 1,1',3,3'-tetrachloro-1,1'-biindenyl (VI), from which it can be sepd. only by quite tedious recrystn. This intermediate VI, when once formed, is strikingly resistant to further dehalogenation; it is practically unchanged by 24 hrs. boiling with NaI in acetone and does not react smoothly even with mol. Ag or Cu bronze in indifferent solvents. Only by very cautious treatment with Zn wool and AcOH can it be dechlorinated with any degree of certainty; the resulting V is merely an intermediate stage of a more deep-seated hydrogenation and can to some extent be isolated only because of its characteristic property of sepg. as a firmly adherent coating on the surface of the metal. III and V form beautiful,  $CrO_3$ -like crystals which are difficultly sol. and melt very high with decompn. From their structure, 2 stereoisomeric forms are possible; a more sol., lower-melting form of V, which rearranges into V at its m. p., has been isolated. III and V add halogens to form tetrahalides; which of the double bonds are involved has not been established. No evidence of autoxidation or sensitivity to light has been observed. The solns. of III and V are deep yellow; the absorption curve for III is given. IV, unlike the colorless, stable 1,1'-isomer, is orange-yellow and quickly autoxidizes in soln. in the air. It adds Br instantaneously to form a very characteristic 6 difficultly sol. dibromide (VII) (of which a more sol. form was observed) readily regenerating IV. Further bromination, however, is difficult and it has not always been possible to isolate the tetrabromide (VIII). Both dibromides are light lemon-yellow. The position of the Br atoms has not been established. The presence of a conjugated system in IV is readily shown by the formation, with maleic anhydride, of the



by 2 isomers, 1 of which (X) is colorless and is probably a stereoisomer, while the other (XI), obtained in only very small amt., is yellow and is perhaps formed by addn. with simultaneous shifting of the H atoms. Catalytic hydrogenation of IV gives a non-cryst. tetrahydro deriv. (XII), presumably 1,1'-bihydrindenyl. With NaOEt in alc., IV undergoes with  $(CO_2Et)_2$ ,  $BzH$ ,  $PhCH:CHCHO$  and anisaldehyde (but not with phenylpentadienal) the condensations through the methylene groups which are characteristic of indene; partial condensation (with only 1 of the  $CH_2$  groups) was never observed. The products obtained with  $BzH$  and  $PhCH:CHCHO$ , viz., 1,3-diphenyl-2,4,5,7-diphenyleneoctatetraene,  $PhCH:C:CH:CC:CH:C:$

$\text{C}_6\text{H}_5$   $\text{C}_6\text{H}_5$   
CHPh (XIII), and 1,12-diphenyl-4,6,7,9-diphenylenedecaheptaene (XIV), contain the C chain of the diphenylpolynes, but in them the uniform conjugation of the strepto-vinylene chain is disturbed by the 2 phenylene groups. XIII and XIV melt about 15° lower than the corresponding diphenylpolynes with the same no. of vinyl groups, and apparently not without decompn. In

marked contrast to IV, they are not autoxidizable; XIII in benzene in the light of a strong arc lamp does not take up O. No stereoisomeric forms have yet been obtained. They have a pronouncedly slighter tendency than the diphenylpolyenes to form mol. compds.; no compds. are obtained with picric acid and  $C_6H_5(NO_2)_2$ ; fused  $SbCl_5$  dissolves them with green color; only XIV gives with  $HClO_4$  in  $Ac_2O$  (but not in  $AcOH$ ) a green soln. and with  $SbCl_5$  in  $CHCl_3$  a green insol. product; on the other hand, XIII and XIV dissolve in  $SOCl_2$ ,  $AsCl_3$ ,  $CCl_3CO_2H$ , quinone and chloranil without characteristic colors, and in contact with Br vapor or I they form no deeply colored compds. The color of the XIII and XIV themselves is deeper than that of the corresponding diphenylpolyenes; XIII forms dark brown-orange needles with strong surface luster and yellow-orange streak, XIV light blood-red needles with red-orange streak; the concd.  $H_2SO_4$  soln. of XIII is blue, that of XIV green. The difference produced in the 2 series of compds. by the disturbance of the conjugation is most strikingly shown in the absorption curves. 3-Bromoindone, yellow, m. 57.5–8°, gives with  $H_2SO_4$  a deep violet color soon changing to red, and is characterized by its conversion into 3-anilinoindone, m. 205.6° (decompn.); with Br in  $AcOH$  it gives 2,3-dibromoindone, golden-yellow, m. 123°, giving a red-brown color with  $H_2SO_4$ , and with Cl it yields 2-chloro-3-bromoindone, golden-yellow, m. 98°, also giving a red-brown color with  $H_2SO_4$ . 3-Chloroindone, yellow, m. 57–7.5°; 2,3-dichloroindone, golden-yellow, m. 89°; 2-bromo-3-chloroindone, golden-yellow, m. 111–12°. III is sol. to the extent of about 0.1% in cold benzene, difficultly in concd.  $H_2SO_4$  with reddish yellow color and green fluorescence, the absorption limits of the soln. being 670 and (very sharply) 485 m $\mu$  down; tetrabromide, yellowish white prisms with blue indescence, m. 179° (decompn.). V, m. 231.5–2.5° (decompn.), mol. wt. in boiling benzene 285; tetrachloride, m. 209–11° (decompn.). VI, m. 172.2–3.2°, mol. wt. in freezing benzene 351, gives with Zn wool and  $AcOH$  in act. concn., along with V, an orange stereoisomer, m. 165.5–6.5°, of V. IV, m. 139.5–1.5°, mol. wt. in freezing benzene 233, dissolves in concd.  $H_2SO_4$  with dirty reddish brown color soon changing to olive-brown. IX, decompn. about 310° (Cu block). X, m. 254–6°. XI, m. 255.5–61°. XII, b<sub>p</sub> 194.5°, d<sub>4</sub><sup>20</sup> 1.0660, is insol. in concd.  $H_2SO_4$  and stable toward  $KMnO_4$ . VII, light yellow needles, m. 135.6° (decompn.), and amber-yellow prisms, m. 106–6.5° (decompn.). VIII, light yellow, turns brown around 150°, does not m. 250° (in another attempt to prep. the tetrabromide there was obtained a 3rd dibromide, leaflets with brownish shimmer, m. 184–6° (decompn.)). XIII, m. 217.5°, mol. wt. in freezing  $PhNO$  395; absorption in the  $H_2SO_4$  soln. appears from about 400 and 630 m $\mu$  down, with a weak band, in not too dil. solns., at about 550 m $\mu$ . XIV, m. 251°; absorption of the  $H_2SO_4$  soln. appears at about 440 and 630 m $\mu$  down. Anisaldehyde condensation product of IV, brown-orange needles with bluish surface luster, m. 214°, sol. in  $H_2SO_4$  with green color (absorption limits, 650 and 450 m $\mu$  down). Di-*tert* oxalate condensation product, Cu-red, m. 195–7°, sol. in concd.  $H_2SO_4$  with blue color (absorption limits, 450 and 600 m $\mu$ , with a distinct band at 502 m $\mu$ ). C. A. R.

Polymers of ring systems. II. An improved synthesis of hexamethylenimine. K. Ziegler and Ph. Orth. *Ber.* 66B, 1867–71 (1933), cf. C. A. 28, 117°. In the Müller and Sauerwald process of prep. hexamethylenimine (I) from dibromohexane in alc. with *p*- $MeC_6H_4SO_2NH_2$  and 2 mols.  $NaOH$  (C. A. 22, 3133), the reaction  $MeC_6H_4SO_2NHNa + Br(CH_2)_6Br \rightarrow MeC_6H_4SO_2NNa(CH_2)_6Br$  precedes the cyclization  $MeC_6H_4SO_2NNa(CH_2)_6Br \rightarrow MeC_6H_4SO_2N(CH_2)_6$ . If it is carried out in very high diln. the 1st phase is slowed up extraordinarily so that if the reagents are poured in slowly their concn. gradually increases until the  $Br(CH_2)_6Br$  and  $NaOEt$  are present together in considerable amts. and may give rise to a series of disturbing side reactions. Z. and O. have therefore effected the 2 steps separately by gradually adding to an equimol. mixt. of  $MeC_6H_4SO_2NH_2$  and  $Br(CH_2)_6Br$  in just the necessary amt. of boiling  $BuOH$  0.5 mol.  $BuONa$ , then dilg. with water, washing the  $BuOH$  layer with 2 *N*  $NaOH$  until free

from  $MeC_6H_4SO_2NH_2$ , removing the aq.  $BuOH$  and finally the  $Br(CH_2)_6Br$  in *vacuo* and effecting the cyclization of the resulting crude  $MeC_6H_4SO_2NH(CH_2)_6Br$  (yield, 65–70%) either by adding it gradually with 1 mol. alcoholate to a hot reaction medium or by slowly adding a cold concd. soln. of its Na salt to a hot solvent. To speed up the reaction, a solvent of higher b. p. than  $EtOH$  is preferable;  $PhCH_2OH$  is especially effective and is easily recovered. In this way pure cryst. I can be obtained in 50–60% yield (based on the  $Br(CH_2)_6Br$  used) in 2 hrs. C. A. R.

Basis for the physiological activity of onium compounds. XIII. Betaine amides. R. R. Renshaw and H. T. Hotchkiss, Jr. *J. Biol. Chem.* 103, 183–6 (1933); cf. C. A. 20, 3688; 21, 279; 27, 2432–3; 28, 751°. The max. muscarine action of *N*-substituted betaine amides is given by the *Me* deriv. in the alkyl series. The *Ph* deriv. gives a remarkably strong stimulating nicotine action but no muscarine action is found with the aryl compds. The following *N*-substituted betaine amides ( $RNHOCCH_2NMe_2Cl$ ) and their method of prep. are described: *R* = *Me*, m. 171–2°; *Et*, m. 203–4°; *Pr*, m. 165°; *Bu*, m. 177°; *Ph*, m. 223° (and bromide, m. 215°); *p*- $MeC_6H_4$ , m. 235° (decompn.); *p*- $HOC_6H_4$ , m. 198°; *o*-, m. 195°, and *p*- $MeOC_6H_4$ , m. 218°; *o*-, m. 160°, and *p*- $EtOC_6H_4$ , m. 215°; *p*- $N(C_2H_5)_2$ , m. 143–4° (and bromide, m. 235–6°),  $\alpha$ -, m. 165.5°, and  $\beta$ - $C_{10}H_7$ , m. 188°;  $(CH_3)_3$ , m. 219°.

XIV. Aryl ethers of choline. R. R. Renshaw and W. D. Armstrong. *Ibid.* 187–9; cf. C. A. 26, 2704.  $\beta$ -Phenoxyethyltrimethylammonium bromide produces a very marked stimulation of the blood pressure and the respiration. "The *Ph* radicals of the *N*-phenylamide of betaine and of the *Ph* ether of choline tend to have the same space relation with regard to the N atom of the  $(CH_3)_3N^+$  group in each substance, and the compds. would tend, therefore, to show the same selective adsorption on the nerve element producing similar types of physiol. response. This has been found to be true."  $\beta$ -Phenoxyethyltrimethylammonium bromide, prep. by the condensation of  $\gamma$ - $BrC_6H_4OPH$  and  $(CH_3)_3N$ , m. 167° (cor).  $\gamma$ -Phenoxypropyltrimethylammonium bromide, which results from the condensation of  $\gamma$ - $BrC_6H_4OPH$  and  $(CH_3)_3N$  in  $C_2H_5$ , m. 156° (cor). A. P. Lothrop.

The preparation and the quaternary ammonium decomposition of formocholine. T. D. Stewart and H. P. Kung. *J. Am. Chem. Soc.* 55, 4813–19 (1933).  $Me_3N(CH_2OAc)Cl$  (from  $AcOCH_2Cl$  and  $NMe_3$ ) hydrolyzed in 5 *N*  $HCl$  gives 34%  $Me_3N(CH_2OH)Cl$  (I), crystals from  $BuOH$ ; chloroplatinate m. 246° (decompn.).  $Et_3N(CH_2OH)Cl$  (II) is similarly prep. The rate of decompn. per min. of I and II at 25° and  $pH$  2–4 is given by  $\log K = a + pH$  where *a* is  $-4.017$  and  $-3.213$ , resp. This, and the relative stability of the  $OEt$  and  $OAc$  derivs., indicate a rapid disocn. of the quaternary ion to  $H$  ion and  $R_3NH^+CH_2O^-$ , which react slowly, giving  $R_3NH$  ion and  $HCHO$ .

H. A. Beatty. Anhydrides of mannitol. Percy Brigl and Hans Grunert. *Ber.* 66B, 1945–9 (1933).—In the older literature are recorded many observations on the elimination of 1 mol. water from mannitol (I) to form mannitanes and of 2 mols. to form mannides; the conditions under which this occurs are generally quite drastic and it is not surprising that the products are mostly amorphous and apparently not homogeneous. One of the chief reasons that mixts. are formed is probably that the 6 free HO groups in I can split off as water in a variety of ways. It seemed, therefore, that it might greatly simplify matters by starting with derivs. of I in which some of the HO groups are occupied, and 1,6-dibenzoylmannitol (II) (C. A. 26, 3233) was accordingly chosen. When it is heated above 220° or, better, a long time in boiling tetrachloroethane, it yields a mono- (II) and a dianhydride (III) still contg. the original Bz groups. II is apparently not an intermediate product in the formation of III, for it is not converted into III by further heating in  $C_2H_5Cl$ ; it would seem that II and III are formed by elimination of water in different ways from I. If the splitting off of the water involved 2 adjacent HO groups, with formation of a double bond, the resulting enol should easily rearrange into a ketone, but neither II nor III shows ketone

properties; they do not react with  $\text{PhNHNH}_2$  and do not reduce Fehling soln. There remains the other possibility that the water is eliminated from 2 HO groups with the formation of an O bridge. Of the presence of an ethylene oxide ring in II and III there is no evidence; they can be boiled under quite rigorous conditions with water (III even with  $\text{Ac}_2\text{O}$ ) without cleavage of a ring. The water must therefore be split off from HO groups which are further apart. Examin. of models shows there are 2 possibilities: (1) anhydization between the 2- and 5-HO groups, leaving the 3- and 4-HO groups which are in *trans*-positions to each other and should therefore split off as water only under very severe conditions; (2) elimination of water from the 2- and 4-HO groups, resulting in a 4-membered hetero ring, and furthermore from the 3- and 5-HO groups, thus giving a quite sym. dianhydride. II would then be a 2,5-anhydride, III a 2,4,3,5-dianhydride. To be sure, the chem. properties, especially of II, thus far observed are not easy to reconcile with such structures. The 2 HO groups in II can be detected by esterification with *p*- $\text{MeC}_6\text{H}_4\text{SO}_3\text{H}$ , but that they are adjacent cannot be proved; in all attempts to couple it with acetone,  $\text{HCHO}$  or  $\text{BzH}$ , II remains unchanged, nor does it react with  $\text{Pb}(\text{OAc})_4$ . Then, too, it is assumed that in the anhydization the Bz groups do not migrate from their original 1,6-positions; such a migration is conceivable although not very probable. The above structures are therefore only provisional suggestions. *Dibenzoylanhydromannitol* (II), m.  $137-8^\circ$ ,  $[\alpha]_D^{25} 3.2^\circ$  (abs. alc.). *Dibenzoyldianhydromannitol* (III), m.  $133^\circ$ , mol. wt. in freezing benzene  $343$ ,  $[\alpha]_D^{25} 225.7^\circ$  ( $\text{CHCl}_3$ ). *Di-p-toluenesulfonate* of II, m.  $142^\circ$ ,  $[\alpha]_D^{25} 57.9^\circ$  ( $\text{CHCl}_3$ ), is identical with the product obtained by Muller and v. Vargha as a by-product in the toluenesulfonation of I (C. A. 27, 4775). *1,2,5,6-Tetrabenzoyldi-p-toluenesulfonylmannitol* (IV), from tetrabenzoylmannitol and  $\text{MeC}_6\text{H}_4\text{SO}_2\text{Cl}$  in pyridine, m.  $136-7^\circ$ ,  $[\alpha]_D^{25} -4.8^\circ$  ( $\text{CHCl}_3$ ), gives with boiling  $\text{Ac}_2\text{O}$ - $\text{NaOAc}$  a sirup which does not crystallize when seeded either with the original IV or with tetrabenzoyldiacetylmannitol; under the same conditions in *ac*-benzoylmannitol is unchanged by  $\text{Ac}_2\text{O}$ - $\text{NaOAc}$ .

C. A. R.

The preparation of crystalline lactic acid. Henry Rosook, Hugh M. Huffman and Yun-Pu Liu. *J. Biol. Chem.* 102, 449 (1933).—The com. sirup was distd. at  $105^\circ$  and  $0.1$  mm., and the middle fraction, which resembled the prepn. of Krafft and Dyes (*Ber.* 28, 2589(1895)), was redistd. and recrystd. 3 times from a 1:1 mixt. of  $\text{Et}_2\text{O}$  and iso- $\text{Pr}_2\text{O}$ ; both *sarco*-(*l*+) and *d*-lactic acids were thus obtained pure. The *l*+ and the *d*- forms were also prepd. via the  $\text{Zn NH}_4$  salts by seeding (Purdie and Walker, *J. Chem. Soc.* 67, 616(1895)). The active forms both m.  $52.8^\circ$ , and had  $[\text{M}]_D^{25} +2.3^\circ$  and  $-2.3^\circ$ , resp., (8% aq. soln.); the *dl*-form m.  $16.8^\circ$ ; all 3 have the same disson. const.,  $pK_{25} 3.81 \pm 0.02$ .

K. V. Thimann

The preparation of pure thioglycolic acid. Franz Schutz. *Angew. Chem.* 46, 780-1(1933).—The Klason-Carlson method of prep.  $\text{HSCl}_2\text{CO}_2\text{H}$  from  $\text{ClCH}_2\text{CO}_2\text{H}$  +  $\text{NaHS}$ , which frequently gives low yields, was improved by the use of freshly prepd.  $\text{NaHS}$  which resulted in a completely pure product with 99% of the theoretical yield. The prepn. of  $\text{NaHS}$  and the exptl. procedure are described.

Karl Kammermeyer

Addition compounds of cystine and picric acid. Gerrit Tonnes. *Z. physiol. Chem.* 222, 1-2(1933).—When hot satd. aq. solns. of *l*-cystine and picric acid are mixed and cooled there occurs a sepn. of the amorphous complex: *l*-cystine + 1 picric acid, which has higher sp. rotation in  $\text{MeOH}$  than cystine alone. Addn. of  $\text{C}_6\text{H}_6$  to a soln. contg. this complex and  $0.5$  *M* picric acid in  $\text{MeOH}$  ppts. a 2nd complex: 6 *l*-cystine + 1 picric acid.

A. W. Dox

The diamino acid, canavanine. III. The constitution of canaline. Matsunosuke Kitagawa and Shin-ichi Monobe. *J. Biochem. (Japan)* 18, 333-43(1933); cf. C. A. 27, 2939.—Canaline is a monoamino acid resulting from the hydrolysis of canavanine by the liver enzyme canavanase. Canaline contains N which is not detected either by Van Slyke's or by the formal reaction but which on reduction, whereby 2 atoms of H are absorbed, is liber-

ated as  $\text{NH}_3$ . This non-amino N group in canaline is considered to be in combination with O as  $-\text{ONH}_2$ , which yields a  $\gamma$ -OH group on reduction. It resembles, therefore, in its behavior  $\text{PhCH}_2\text{ONH}_2$ , which is likewise converted on reduction to benzyl alc. and  $\text{NH}_3$ . S. M.

The methylphenylhydrazones of glyoxylic acid and its methyl ester. M. Busch and W. Reuner. *Ber.* 66B, 1770-1(1933).—It was reported (C. A. 10, 328) that the methylphenylhydrazones of  $\text{OHCCO}_2\text{H}$  and its esters could be obtained in only 1 form, but as Meyer had described a hydrazone of the Me ester m.  $159-60^\circ$  (*Ber.* 37, 3592(1904)) while Busch and his co-workers gave  $61-2^\circ$  as the m. p., Meyer's work has been repeated and it has been found that his product was the hydrazone of the acid, not of its Me ester. His *p*-nitrophenylhydrazone, charing at  $170-80^\circ$ , is likewise a deriv. of the acid, not the Me ester.

C. A. R.

Preparation of galacturonic acid from plant materials, with a note on some of its derivatives. Homi Ruttonji Nanji. *Biochem. J.* 27, 1163-5(1933).—Lemon peel was first extd. with 60% alc., the residue dried and hydrolyzed with 3%  $\text{H}_2\text{SO}_4$ , the  $\text{H}_2\text{SO}_4$  removed as the Ba salt, the filtrate partially evapd. and then decolorized with norite, and from the soln. the Ba galacturonate was pptd. by pouring into an excess of alc. The Ba salt was decompd. with  $\text{H}_2\text{SO}_4$  (see Link and Nedden, C. A. 26, 966). The cinchonine *d*-galacturonate and the phenylhydrazone of phenylhydrazine *d*-galacturonate were also prepd.

Benjamin Harrow

Ester enolates and ketene acetals. XVI. Carbon suboxide tetraethyl acetal as intermediate product in the transformation of ethyl  $\beta,\beta$ -diethoxyacrylate into diethyl diethylmalonate. Ilmuth Scheibler and Hans Stein. *Ber.* 66B, 1784-9(1933); cf. C. A. 27, 3195.—While the K salt of  $\text{PhCH}_2\text{CO}_2\text{Et}$  forms, with acyl halides, both *O*- and *C*-acyl derivs., it has thus far not been possible to obtain *O*-acyl derivs. of  $\text{CH}_2(\text{CO}_2\text{Et})_2$  (I) from its Na salt. Repetition of the expts. with  $\text{BzCl}$  gave only the known *C*-mono- and *C*-di-Bz derivs., and with  $\text{ClCO}_2\text{Et}$  were obtained the same results as by Adickes, Brunner and Licker (C. A. 25, 3625) who, because of an 8% deficit in the yield of *C*-derivs. ( $\text{CH}(\text{CO}_2\text{Et})_2$  and  $\text{C}(\text{CO}_2\text{Et})_2$ ), believe that there was also formed the *O*-deriv.,  $\text{EtO}_2\text{CCH}_2\text{C}(\text{OEt})\text{OC}_2\text{H}_5$  (II), and that this, during the reaction, lost  $\text{CO}_2$ , forming  $\text{EtO}_2\text{CCH}_2\text{C}(\text{OEt})_2$  (III), which could not be sepd. from the I (resulting from the reaction of the  $\text{CH}(\text{CO}_2\text{Et})_2$  and the Na salt of I). III, which has been prepd. by distn. of  $(\text{EtO})_2\text{CCH}_2\text{CO}_2\text{Et}$  (IV), stands, with its ester and acetal groups, between I and the hypothetical C suboxide tetra-Et acetal,  $(\text{EtO})_2\text{C}:\text{C}:\text{C}(\text{OEt})_2$  (V). Attempts were made to prep. V from III by 1 of the methods leading from  $\text{AcOEt}$  to  $\text{CH}_2:\text{C}(\text{OEt})_2$ . III differs from  $\text{CH}_2:\text{C}(\text{OEt})_2$  in the considerably greater ease with which it is hydrolyzed, and it was therefore not advisable to effect the "ketene acetal cleavage" on the "primary reaction product" obtained from the ester with  $\text{NaOEt}$ . The enolate was accordingly prepd. by means of  $\text{Ph}_3\text{CNa}$ ; as it is easily sol. not only in ether but also in petroleum ether, it could not be sepd. from the  $\text{Ph}_3\text{CH}$  formed simultaneously and the mixt. was therefore heated with  $\text{BzOEt}$  and then extd. with ether. The ether-insol. residue contained a little  $\text{BzONa}$ , indicating that some ketene acetal cleavage had occurred, but the product present, along with  $\text{BzOEt}$ , in the ether ext. could not be isolated. In another expt. the enolate and an equiv. amt. of free III (i. e., 2 mols. ester and 1 mol.  $\text{NaOEt}$ ) were heated a long time at  $130^\circ$  under reduced pressure and the product was extd. with ether. The only ether-sol. portion, b.  $106-9^\circ$ , was a mixt. of I and its *C*-mono- and *C*-di-Et derivs., and decompn. of the ether-insol. salts with anhyd.  $\text{HCO}_2\text{H}$  in ether gave more I and  $\text{CHEt}(\text{CO}_2\text{Et})_2$  (VI), together with much  $\text{CO}_2$ . The reaction is explained thus: III, by migration of an Et group from the O to an adjacent C atom, gives VI, a part of which is converted by the  $\text{NaOEt}$  into the enolate and is found as such in the ether-insol. salts. The I and its enolate (in the ether-insol. salts) come from the original III, for in its prepn. by distg. IV the latter breaks down not only into III +  $\text{EtOH}$  but also into I +  $\text{Et}_2\text{O}$  and the b. ps. of I and



III are so close together that the sepn. of the 2 esters by distn. is probably incomplete. The formation of  $\text{Et}_2\text{C}(\text{CO}_2\text{Et})_2$  (VII) presupposes the intermediate formation, through the enolate, of V which immediately rearranges into VII by migration of Et groups from the O atoms to the central C atom. C. A. R.

Glutaconaldehyde: acetals, oxime and ring closure of the latter to pyridine-*N*-oxide. Paul Baumgarten, Rudolf Merländer and Jörn Olshausen. *Ber.* 66B, 1802-9 (1933).—Of the 5 acetals which can theoretically be derived from the 2 isomeric forms  $\text{OHCCH}_2\text{CH}:\text{CHCHO}$  and  $\text{HOCH}:\text{CHCH}:\text{CHCHO}$  of glutaconaldehyde (I), its Na salt treated in MeOH with enough HCl to give a 1% soln. of free HCl yielded 3, *vis.*, 2-pentene-1,5-dial 1-di-Me acetal,  $\text{OHCCH}_2\text{CH}:\text{CHCH}(\text{OMe})_2$  (II),  $\delta$ -methoxy- $\alpha,\gamma$ -butadien- $\alpha$ -aldehyde di-Me acetal,  $\text{MeOCH}:\text{CHCH}:\text{CHCH}(\text{OMe})_2$  (III), and the bis(di-Me acetal)  $(\text{MeO})_2\text{CHCH}_2\text{CH}:\text{CHCH}(\text{OMe})_2$  (IV). That II has not the structure  $(\text{MeO})_2\text{CHCH}_2\text{CH}:\text{CHCHO}$  is established by the fact that it is also formed by cautious acid hydrolysis of III. It cannot be acylated or converted into an alkali salt; it behaves like an aldehyde (forming a well-characterized *p*-nitrophenylhydrazone (V)), adds 2 atoms Br and has phys. consts. agreeing with the aldehyde structure. Unlike other acetals, however, it is hydrolyzed by alkalis as well as by acids. III, as would be expected, does not react with alkalis and is hydrolyzed by dil. acids, which first split off the ethereal Me group. It smoothly adds 2 Br atoms; excess of Br results in substitution. IV likewise does not react with alkalis; toward dil. acids 1 of the acetal groups is more sensitive than the other so that with  $p\text{-O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$  in AcOH IV gives also the hydrazone (V) of II. In the cold IV adds Br (2 atoms) only on long standing, a fact which can be made use of to det. whether IV is contaminated with II or III. Advantage must be taken of the differing behavior of II, III and IV toward acids and alkalis to sep. them, for their b. ps. are relatively so close to each other that sepn. by fractional distn. would be difficult. If the mixt. is poured into  $\text{K}_2\text{CO}_3$ , II is saponified, and III and IV can be sep. by distn. On the other hand, if the mixt. is poured into a soln. of a neutral salt, III and IV are partially saponified to II which is thus obtained almost exclusively. The Na salt of I with 1 mol.  $\text{NH}_4\text{OH} \cdot \text{HCl}$  and 1 mol. free  $\text{NH}_4\text{OH}$  in MeOH forms the *dioxime* (VI),  $\text{HON}:\text{CHCH}_2\text{CH}:\text{CHCH}:\text{NOH}$  or  $\text{HON}:\text{CHCH}:\text{CHCH}:\text{CHNHOH}$ , m. 88°, but it also reacts in a different way (especially with  $\text{NH}_4\text{OH} \cdot \text{HCl}$ ); in MeOH there are formed deep cherry-red solns. which with alkalis turn intensely blue but from which no definite products could be isolated. An especially striking property of VI is the ready ring closure to pyridine-*N*-oxide-HCl. II,  $b_p$  99-103°,  $d_4^{20}$  1.0228,  $n_D^{20}$  1.4520,  $\gamma$  37.2,  $E_D^{20}$  0.29,  $-P$  345.9. V, yellow-brown, m. 160-1°. III,  $b_p$  108-12°,  $b_n$  103-7°,  $d_4^{20}$  1.0324,  $n_D^{20}$  1.4348,  $\gamma$  36.1,  $E_D^{20}$  -2.02,  $-P$  375.4. IV,  $b_p$  115-18°,  $d_4^{20}$  1.0127,  $n_D^{20}$  1.4288,  $\gamma$  33.6,  $E_D^{20}$  -0.78,  $-P$  452.0. Glutaconaldehyde anil oxime, like VI, is readily converted into pyridine-*N*-oxide (by short boiling in  $\text{PhNO}_2$ ). The acyl derivs. of the enol form of I, which had previously been described as colored (C. A. 19, 517), can be obtained perfectly white by suitable recrystn.;  $\delta$ -acetoxy- $\alpha,\gamma$ -butadien- $\alpha$ -aldehyde, m. 75.5°;  $\delta$ -BzO compd., m. 118-19° (the phenylhydrazones of the latter has the correct compn.,  $\text{C}_{14}\text{H}_{15}\text{O}_2\text{N}_2$ ; *o*-nitrophenylhydrazones, cinnabar-red needles with golden luster, m. 183-4°; azine, yellow, m. 187°).

C. A. R.

*d*-Xyloketose. Otto Th. Schmidt and Rudolf Treiber. *Ber.* 66B, 1765-9 (1933).—Xylose (I), refluxed 4-5 hrs. in dry pyridine, is converted to the extent of 13.5-24% into *d*-xyloketose (II) (judging from the rotation of the product (8-12°) and assuming that xylose is simultaneously formed in very small amt. at most). Most of the unchanged I is removed by crystn., whereby the proportion of II in the product is increased to 83-9%, and the II is isolated as the *p*-bromophenylhydrazones (III), which is considerably less sol. in water and aq. alc. than the corresponding deriv. (IV) of I. III, m. 128-9°,  $[\alpha]_D^{20}$  23.7  $\pm$  0.3° in  $\text{C}_6\text{H}_5\text{N}$  15 min. after soln.,  $-31.2 \pm 0.3^\circ$  after 7 days, depresses

the m. p. of IV to 110-15°. II, hygroscopic sirup,  $[\alpha]_D^{20}$   $-33.2 \pm 0.4^\circ$ , reduces cold Fehling soln. in a few sec. and cold Pierson soln. much more rapidly than fructose or I, cold  $\text{NH}_3\text{-AgNO}_3$  in a few min.,  $\text{KMnO}_4$  in  $\text{Na}_2\text{CO}_3$  immediately, neutral  $\text{KMnO}_4$  in a few min., dil. Br water in a few hrs. The equil. between I and II cannot be measured by the Willstätter-Schudel method, as II is attacked by alk. I. I does not reduce 2,6-dichlorophenol-indophenol or acid I soln. In the Wheeler and Tollens phloroglucinol test for pentoses it behaves differently from the aldopentoses; the soln., instead of becoming violet-red, quickly turns yellow, then brown, and, in 30 sec., black. With  $\text{PhNHNH}_2$  it gives *d*-xylosazone readily and in good yield. The yield, based on the I used, is small (5 g. III from 27.2 g. I). C. A. R.

The action of pyridine on sugars. P. A. Levene and Douglas W. Hill. *J. Biol. Chem.* 102, 503-71 (1933). By gently refluxing solns. of sugars in 8 times their wt. of pyridine, evap. off the pyridine and taking up in water, part of the aldose is converted into the corresponding ketose, which can be detd. by the difference between aldose and total sugar figures. With dextrose the yield of fructose was only 11.7% and not 30% as claimed by Danilov, *et al.* (C. A. 25, 920). Mannose, however, gave a 30% and rhamnose a 16% yield of the ketoses, *i. e.*, *cis*-2,3-sugars are more easily converted than *trans*-2,3-sugars. Correspondingly xylose and ribose gave 11 and 8% yields, while xylose and arabinose gave none. The reaction is reversible, the yields representing equilibria, and varying with the temp. of heating. By refluxing fructose for 4 hrs. in pyridine, 44% was converted to aldose.

K. V. Thimann

Nitrogenous sugars. V. Synthesis of peptide-like substances from amino sugars and amino acids. III. Acetylated glucopeptides. Alfred Bertho and Joseph Maier. *Z. physiol. Chem.* 222, 139-47 (1933); cf. C. A. 26, 3778, 5910.—A peptide linkage between the  $\text{NH}_2$  of glucosamine and the  $\text{CO}_2\text{H}$  of amino acids is effected by condensation of the tetraacetylglucosamine, in which the  $\text{NH}_2$  is unsubstituted, with an azidoacyl halide, and catalytic hydrogenation of the product. Tetraacetylglucosamine in  $\text{CHCl}_3$  when treated with  $\text{N}_3\text{CH}_2\text{COCl}$  and pyridine yielded 75-80% of tetraacetyl(azidoacetyl-*N*)-glucosamine, m. 131°,  $[\alpha]_D^{20}$  6.1°, which was hydrogenated in AcOEt by  $\text{PtO}_2$  catalyst to 70-75% of tetraacetyl(glycyl-*N*)-glucosamine (I), m. 161-2° (decompn.). The latter reacted with  $\text{NH}_3$  in MeOH to form  $\text{AcNH}_2$  and a hygroscopic amorphous product which easily reduced Fehling soln. and could not have been a cyclic anhydride such as that previously obtained with the corresponding alanyl deriv. Condensation of I with  $\text{MeCHBrCOCl}$  in the presence of pyridine yielded 60% of tetraacetyl( $\alpha$ -bromopropionylglycyl-*N*)-glucosamine, m. 162°. Similarly, I and  $\text{Me}_2\text{CHCH}_2\text{CHBrCOCl}$  gave 50% of tetraacetyl( $\alpha$ -bromoisocaprolylglycyl-*N*)-glucosamine, m. 174-5°. Treatment of the latter with  $\text{NH}_3$  in MeOH converted it into leucylglycyl-*N*-glucosamine, decompn. 132°. Tetraacetyl(alanyl-*N*)-glucosamine (II) and  $\text{Me}_2\text{CHCH}_2\text{CHBrCOCl}$  yielded tetraacetyl( $\alpha$ -bromoisocaprolylalanyl-*N*)-glucosamine, m. 169-70°,  $[\alpha]_D^{20}$  10.7°. II and  $\text{MeCHN}_3\text{COCl}$  gave tetraacetyl( $\alpha$ -azidopropionylalanyl-*N*)-glucosamine, m. 139° (evolution of gas), which was hydrogenated to tetraacetyl(dialanyl-*N*)-glucosamine, m. 212° (decompn.). Chondrosamine condensed with  $\text{MeCHBrCOCl}$  to  $\alpha$ -bromopropionyl-*N*-chondrosamine, m. 181.5°, a mutarotating substance representing the  $\alpha$ -form, which yielded with  $\text{NH}_3$  a viscous sirup lacking the properties of a glucopeptide anhydride. A. W. Dorr

Sulfur-sugars and their derivatives. XVIII.  $\beta,\beta$ -Diglucoosyl sulfoxysulfide. Wilhelm Schneider and August Bansa. *Ber.* 66B, 1973-5 (1933); cf. C. A. 25, 4232.—Tetraacetyl-*d*-glucosido-*S*-thiuronium bromide (I) (C. A. 22, 4108) with  $\text{KNO}_3$  and AcOH gives a compd.  $\text{C}_{24}\text{H}_{38}\text{O}_{12}$  (II), m. 169°, mol. wt. in boiling  $\text{CHCl}_3$  680 ( $c$  1.75), 707 ( $c$  0.99),  $[\alpha]_D^{20}$   $-41.34^\circ$  to  $-41.91^\circ$  in  $(\text{CHCl}_3)_2$ . II is also obtained from  $\beta$ -glucothiosine tetraacetate (III) with  $\text{NaNO}_2$ -AcOH through an unstable thionitrite (as evidenced by a transitory reddening of the reaction mixt.),



In its formation from I, the  $\text{HNO}_3$  evidently first splits out the 2 N atoms and the resulting glucoacid thiocarbonate decomps. into  $\text{CO}_2$  and III which then forms II as above.  $\beta, \beta$ -Diglucoosyl disulfide octaacetate (IV) in  $\text{AcOH}$  with  $\text{H}_2\text{O}_2$  likewise yields II. These facts suffice to prove that II is *octaacetyldiglucoosyl sulfoxysulfide*,  $\text{Ac}_8\text{C}_{12}\text{H}_{20}\text{O}_{17}\text{S}_2\text{O}$ .  $\text{C}_6\text{H}_5\text{O}_4\text{Ac}$ . On hydrolysis according to Zemplén it yields a sirup from which, by acetylation with  $\text{Ac}_2\text{O}-\text{C}_6\text{H}_5\text{N}$ , is obtained IV.

**Carbohydrates. XVIII. Benzoates of glucofuranose.** Percy Brigl and Hans Grüner. *Ber.* 66B, 1977–83 (1933); cf. C. A. 27, 4216.—The 2,6-benzoate of glucose obtained by the  $\text{H}_3\text{BO}_3$  method gives, again by the  $\text{H}_3\text{BO}_3$  method, a tribenzoate (I) which with  $\text{BzCl}$  in  $\text{CHCl}_3-\text{C}_6\text{H}_5\text{N}$  yields glucofuranose pentabenzoate, m. 143–4°,  $[\alpha]_D^{20} -55.1^\circ$  ( $\text{CHCl}_3$ ). As it had already been shown that none of the Bz groups in I is in the 1-position and as the diacetate of I is a sirup,  $[\alpha]_D^{20} 32.3^\circ$  ( $\text{CHCl}_3$ ), which does not crystallize when seeded with the  $\alpha$ -form, m. 162–3°,  $[\alpha]_D^{20} 140.6^\circ$  ( $\text{CHCl}_3$ ), or the  $\beta$ -form, m. 202°,  $[\alpha]_D^{20} 111.9^\circ$  ( $\text{CHCl}_3$ ), of 1,4-diacyl-2,3,6-tribenzoylglucopyranose obtained from 1,2,3,6-tetrabenzoylglucose with  $\text{Ac}_2\text{O}-\text{ZnCl}_2$ , I must be the 2,5,6-compd. Attempts were made to prep. it in another way; 3-acetyl-5,6-dibenzoylacetoneglucose with  $\text{AcOH}-\text{H}_2\text{SO}_4$  at 50° gives 5,6-dibenzoylglucose (II), m. 135–6°,  $[\alpha]_D^{20} -15.0^\circ$  in abs. alc. 10 min. after soln., 19.9° (const.) after 2 hrs., which strongly reduces Fehling soln., but attempts to introduce another Bz group into the 2-position with, e. g.,  $\text{H}_3\text{BO}_3$  were unsuccessful;  $\text{BzCl}$  in  $\text{C}_6\text{H}_5\text{N}-\text{CHCl}_3$  gave  $\alpha$ -pentabenzoylglucofuranose, m. 119–20°,  $[\alpha]_D^{20} 60.3^\circ$ . A no. of reactions were carried out with II, however. With  $\text{Ac}_2\text{O}-\text{C}_6\text{H}_5\text{N}$  it gave crystals, m. 80–125°,  $[\alpha]_D^{20} 8.68^\circ$  ( $\text{CHCl}_3$ ), apparently a mixt. of the  $\alpha$ - and  $\beta$ -1,2,3-triacetates, which on renewed treatment with  $\text{Ac}_2\text{O}-\text{ZnCl}_2$  yielded a homogeneous product, presumably the  $\beta$ -triacetate, m. 97–8°,  $[\alpha]_D^{20} -41.6^\circ$  ( $\text{CHCl}_3$ ). With  $\text{HCl}-\text{Me}_2\text{CO}$ , II gave the *monoaacetone compd.*, m. 118°,  $[\alpha]_D^{20} 41.4^\circ$  ( $\text{CHCl}_3$ ), entirely different from the sirupy product described by Ohle and Dickhauser (C. A. 20, 3081) under the same name; with  $\text{Ac}_2\text{O}-\text{C}_6\text{H}_5\text{N}$  it yields the 3-acetate used for prep. II. Nor can O. and D.'s product have been anywhere near pure 3,6-dibenzoylacetoneglucose (IV), since the sirupy 3-benzoate,  $[\alpha]_D^{20} 26.5^\circ$  (alc.) (5,6-diacyl-2,3,6-tribenzoylglucose, m. 77–8°,  $[\alpha]_D^{20} -26.7^\circ$  ( $\text{CHCl}_3$ )), with  $\text{BzCl}-\text{C}_6\text{H}_5\text{N}$  yields IV as crystals, m. 108–9°,  $[\alpha]_D^{20} -4.6^\circ$  ( $\text{CHCl}_3$ ), which form the 5-*p*-toluenesulfonate, m. 143°,  $[\alpha]_D^{20} -23.8^\circ$  ( $\text{CHCl}_3$ ) (Ohle *et al.*, C. 1 24, 1351).

**Septanose derivatives. III. Hydrolysis of  $\alpha$ -methylgalactoseptanoside.** Fritz Micheel and Fritz Suckfüll. *Ber.* 66B, 1957–8 (1933); cf. C. A. 28, 110–11.—For an approx. 1% soln. in 0.01 N HCl of the septanoside,  $[\alpha]_D^{20}$  (water), the half-time value of hydrolysis at 95° is about 28 min. and the velocity const. is around  $2 \times 10^{-3}$  time in min., natural logs, as compared with  $3-12 \times 10^{-2}$  for furanosides and  $2-7 \times 10^{-4}$  for pyranosides under the same conditions. The 7-membered septanose ring is not strained, even if the angle between the O valences should be materially smaller than 110°. The ease with which furanosides are hydrolyzed can therefore not be ascribed to a possible ring strain resulting from an assumed smaller angle. On the other hand there seems to be some indication of a parallelism between the instability of the free sugars (furanoses, septanoses) and the ease of hydrolysis of their glucosides.

**Reactions catalyzed by aluminum chloride. VIII. Action of aluminum chloride on hexane and heptane, alone and in the presence of halogen derivatives. A conversion of paraffin into cycloparaffin hydrocarbons.** Costin D. Nemitescu and Alexander Drăgan. *Ber.* 66B, 1892–900 (1933); cf. C. A. 27, 4781.—The study of the action of  $\text{AlCl}_3$  on cyclic hydrocarbons has been extended to normal paraffins. These were found to undergo not only isomerization, dehydrogenating condensation to higher hydrocarbons and cleavage of the chain to lower paraffins but also another unexpected reaction, *vis.*, a dehydrogenating cyclization to mono- and bicyclic cycloparaffins. Hexane at the b. p. (68–9°) evolves no or only very little combusti-

ble gases, and the  $\text{AlCl}_3$  (either freshly sublimed or hydrated) remains unchanged in appearance. The greater part of the hexane is converted into a lower-boiling isomer, probably 2- or 3-pentane or a mixt. of the 2. The hydrogenation product is pentane and the only dehydrogenation product identified with certainty is cyclohexane. No product boiling higher than cyclohexane (80°) is formed. In the presence of a halogen deriv. ( $\text{AcCl}$ ) there are obtained the same pentane, hexane and cyclohexane fractions in about the same relative amts., and in addn. higher-boiling, benzene-like fractions (up to 248°) which are completely satd. but contain less H than the paraffins of the same b. p. The 100–40° fractions have the compn.  $\text{C}_8\text{H}_{18}$ , and therefore have but 1 ring; evidence was obtained of the probable presence of 1,3-dimethylcyclohexane in the 120–5° fraction. The fractions boiling around and above 200° are bicyclic cycloparaffins,  $\text{C}_{10}\text{H}_{18}$ , rich in those of the compn.  $\text{C}_{12}\text{H}_{22}$ . Heptane is more sensitive toward  $\text{AlCl}_3$  than hexane, and there is a distinct difference in the action of anhyd.  $\text{AlCl}_3$  and of  $\text{AlCl}_3$  to which water has been added. The former remains solid and powdery, even after long boiling, while the latter quickly liquefies to a brown lower layer; the anhyd. salt yields only satd. products while the hydrated  $\text{AlCl}_3$  gives, in addn., considerable amts. of polymerized olefins which remain combined with the  $\text{AlCl}_3$  in the lower layer. With hydrated  $\text{AlCl}_3$  heptane yields considerably more gaseous cleavage products (propane, butane) than with anhyd.  $\text{AlCl}_3$ . If not enough water has been added, the evolution of gas soon ceases but begins vigorously again as soon as more water is added. Heptane, too, gives both lower- and higher-boiling hydrocarbons than the original  $\text{C}_7\text{H}_{16}$ . The former are exclusively paraffins (propane, isobutane, a pentane fraction and a hexane fraction (2- or 3-methylpentane), but no  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$  or butane, were isolated). A large part of the heptane is recovered as isoheptanes b. 87–93°. The higher-boiling products are cycloparaffins, both monocyclic (including 1,3-dimethylcyclohexane) and bicyclic (chiefly  $\text{C}_{10}\text{H}_{18}$ ). The lower layer obtained with hydrated  $\text{AlCl}_3$  gives with water a fraction volatile and one not volatile with steam; the former contains, together with small amts. of an olefin b. around 100° (probably a heptene or methylcyclohexene), chiefly compds. of the compn.  $\text{C}_{10}\text{H}_{18}$ ; the non-volatile part has approx. the compn.  $(\text{C}_7\text{H}_{14})_n$ . In the presence of halogen derivs. ( $\text{Et}$ ,  $\text{Pr}$ ,  $\text{iso-Pr}$ ,  $\text{Bu}$  chloride) heptane reacts very vigorously, the halide being reduced to the hydrocarbon ( $\text{PrCl}$  gives 90% propane); the heptane is broken down to only a very small extent to lower paraffins but gives much higher-boiling cycloparaffins and a lower layer contg. olefins.

**Ferric chloride and other metallic chlorides in the Friedel-Crafts reaction.** E. Wertyporoch, I. Kowalski and A. Roeske. *Ber.* 66B, 1232–8 (1933).— $\text{FeCl}_3$  dissolves at 0° in  $\text{Et}$ ,  $\text{Pr}$ ,  $\text{iso-Pr}$ ,  $\text{Bu}$ ,  $\text{iso-Bu}$ ,  $\text{Am}$ ,  $\text{iso-Am}$  and hexyl chlorides to the extent of 0.2–0.5%; in  $\text{EtBr}$  to the extent of 0.9%. The cond. of these solns. increases with the concn. The molar conds. are const. in concd. soln. with the alkyl chlorides (about 0.02 mol.  $\text{FeCl}_3$  per l.) and in moderate concns. with acyl chlorides,  $\text{BzCl}$  and  $\text{AcCl}$ , (0.1–0.3 mol.  $\text{FeCl}_3$  per l.), indicating the formation of stable complexes. On standing the sp. and molar conds. of solns. of  $\text{FeCl}_3$  in all the chlorides increase, with weak evolution of  $\text{HCl}$ , because alkylenes are formed which enter the complexes and form well-conducting salts. At 18°  $\text{FeCl}_3$  is sol. in  $\text{BzCl}$  to the extent of 14.2%, in  $\text{AcCl}$  14.7%. The color of the solns. and strong cond. without evolution of  $\text{HCl}$  show that the carbonyl O is the reason for a highly colored and well-conducting complex. On addn. of  $\text{C}_2\text{H}_5$  or  $\text{C}_6\text{H}_5$  to  $\text{EtCl}$  or  $\text{EtBr}$  solns. of  $\text{FeCl}_3$ ,  $\text{HCl}$  is gradually evolved, and there is an increase in cond. This slight increase compared with the high value of  $K$  in  $\text{AlCl}_3-\text{C}_6\text{H}_5$  complexes in  $\text{EtCl}$  is due to the fact that  $\text{FeCl}_3$  is very slightly sol. in  $\text{EtCl}$  or  $\text{EtBr}$  and that these solns. become conducting, partly as the result of the formation of unsatd. compds. and their introduction into the complex and subsequent displacement by the  $\text{C}_2\text{H}_5$  or  $\text{C}_6\text{H}_5$  added. In solns. of  $\text{FeCl}_3$  in  $\text{BzCl}$  and  $\text{AcCl}$  a deep red-brown color develops on addn. of the corresponding ketones,  $\text{Ph}_2\text{CO}$

and PhCOMe. In the very highly conducting solns. of  $\text{FeCl}_3$  in  $\text{AcCl}$  the cond. is not increased; in  $\text{BzCl}$   $K_c$  increases after 15 min. to 1.5 times its original value, a proof that the formation of the complex takes place gradually through conversion of  $\text{Ph}_2\text{CO}$  into the  $\text{BzCl-FeCl}_3$  complex. This behavior leads to the assumption that the formation of alkyl- or acylbenzenes from hydrocarbons and alkyl or acyl chlorides in the presence of  $\text{FeCl}_3$ , as well as in the case of the Al-halogen compds., is restricted by the formation of a conducting ternary complex, and that in this complex a loosening of the halogen bond in the alkyl or acyl chloride and of the H bond in the hydrocarbon takes place. The stabilization results from escape of  $\text{HCl}$  and formation of alkyl- or acylbenzenes. The complexes are formed in much smaller quantity than with the easily sol.  $\text{AlCl}_3$  or  $\text{AlBr}_3$ . A mixt. of  $\text{EtBr}$ ,  $\text{C}_6\text{H}_6$  and  $\text{FeCl}_3$  (sublimed) was boiled on a water bath 2-4 hrs. The liquid was decompd. at  $0^\circ$ , extd. with  $\text{Et}_2\text{O}$ , and the  $\text{Et}_2\text{O}$  soln. distd. The yield (about 3.4%, calcd. on  $\text{C}_6\text{H}_6$ ) was a mixt. of mono-, di-, tri- and tetraethylbenzenes, together with about 0.1% of solid  $\text{C}_6\text{Et}_6$ , m.  $127^\circ$ . When  $\text{FeCl}_3$  was used in the prepn. of  $\text{Ph}_2\text{CH}_2$ ,  $\text{Ph}_2\text{CH}$ ,  $\text{Ph}_2\text{CCl}$ ,  $\text{Ph}_2\text{CO}$  and  $\text{PhCOMe}$ , the yields were usually only about half those obtained when  $\text{AlCl}_3$  was used. The reaction of 47 g.  $\text{C}_6\text{H}_6$ , 17 g.  $\text{CH}_2\text{Cl}_2$  and 33 g.  $\text{FeCl}_3$  gave in the  $\text{C}_6\text{H}_6$  layer 0.5 g.  $\text{Ph}_2\text{CH}_2$ , traces of  $\text{Ph}_2\text{CH}$  and 0.5 g. of a resin, and in the water layer 13 g. of a condensation product which could not be distd. From the reaction of 125 cc.  $\text{C}_6\text{H}_6$ , 25 g.  $\text{PhCH}_2\text{Cl}$  and 48 g.  $\text{FeCl}_3$  there was obtained in the  $\text{C}_6\text{H}_6$  layer 8.5 g.  $\text{Ph}_2\text{CH}_2$ , 0.5 g.  $\text{PhCH}_2\text{I}$ , 3.5 g. of a yellow oil b<sub>m</sub>  $300^\circ$ , 5 g. of a brown yellow oil b<sub>m</sub>  $270-80^\circ$ , and 5 g. of a non-distillable resin; 11 g. of a resin was obtained from the aq. layer. The reaction of 100 g.  $\text{C}_6\text{H}_6$  with 20 g.  $\text{CHCl}_3$  and 18 g.  $\text{FeCl}_3$  gave in the  $\text{C}_6\text{H}_6$  layer 0.5 g.  $\text{BzH}$ , 4.5 g.  $\text{Ph}_2\text{CHI}$ , 0.5 g.  $\text{Ph}_2\text{COH}$ , and 1 g. residue. From 40 g.  $\text{C}_6\text{H}_6$ , 16 g.  $\text{CCl}_4$  and 15 g.  $\text{FeCl}_3$  was obtained 8 g. of  $\text{Ph}_2\text{CCl}$ . Reaction of 20 g.  $\text{C}_6\text{H}_6$  with 18 g.  $\text{AcCl}$  and 40 g.  $\text{FeCl}_3$  gave 4 g. of  $\text{PhCOMe}$  and 2 g. of undistillable condensation products. From the reaction of 55 g.  $\text{C}_6\text{H}_6$  with 15 g.  $\text{BzCl}$  and 18 g.  $\text{FeCl}_3$  was obtained 13.5 g.  $\text{Ph}_2\text{CO}$ , 1 g. of a higher condensation product and 4 g.  $\text{BzOH}$ .  $\text{BeCl}_2$  in  $\text{EtBr}$  did not react with  $\text{C}_6\text{H}_6$ .  $\text{PhCCl}_2$  (10 cc.) was heated with 2 g. sublimed  $\text{BeCl}_2$  for 4 hrs. at  $150^\circ$ . The  $\text{Et}_2\text{O}$  ext. gave 0.5 g. *m*-trichloromethyldiphenyldichloromethane, b<sub>m</sub>  $150-60^\circ$ . In the presence of chlorides of Hg, Tl, Th, Ti and Sn,  $\text{C}_6\text{H}_6$  and  $\text{EtBr}$  do not form ethylbenzenes even at  $150^\circ$  in a bomb tube; neither does  $\text{CHCl}_3$  react with  $\text{BzCl}$  or  $\text{C}_6\text{H}_6$  in the presence of  $\text{ZnCl}_2$ .

Louise Kelley

**Chemistry of organic radicals.** Juan C. Chiarino. *Anales asoc. quim. farm. Uruguay* 36, 119-44 (1933).—Some reactions of phenols, amines and aldehydes are discussed.

L. E. Gilson

**Production of phenol from chlorobenzene.** N. N. Vorozhtsov, Jr., and A. G. Oshuev. *Anilinokrazochinaya Prom.* 3, 245-52 (1933).—The foreign literature is reviewed.

Chas. Blanc

**Organic sulfur compounds. XXIV. "Free" radicals with univalent sulfur.** A. Schönberg, E. Rupp and W. Gumlich. *Ber.* 66B, 1932-45 (1933); cf. *C. A.* 27, 3197.—The investigations which led Schönberg to accept, with reserve, the view that diaryl disulfides and thiacyl disulfides of the aromatic series can disoc. into free radicals have been completed and confirm this view. The name *thyl* is suggested for these radicals with univalent S. Dil. solns. of  $(\alpha\text{-C}_{10}\text{H}_7\text{CS})_2\text{S}_2$  (I) in  $(\text{CH}_2\text{Br})_2$  at  $97^\circ$ ,  $\text{PhOMe}$  at  $100^\circ$ ,  $\text{C}_{10}\text{H}_7$  at  $100^\circ$  and phenanthrene at  $110^\circ$  do not obey Beer's law; the deviations are extraordinarily large (the results in  $\text{Ph}_2\text{O}$  and xylene are not reported for lack of space). The same is true of  $\text{Ph}_2\text{S}_2$  (II) in  $\text{C}_{10}\text{H}_7$ ,  $\text{PhOMe}$  and  $(\text{CH}_2\text{Br})_2$  at  $100^\circ$ , while biphenylene disulfide in phenanthrene at  $110^\circ$  does obey the law. The intensely green soln. of Schlenk's  $\text{Ph}(p\text{-PhC}_6\text{H}_4)\text{C(ONa)}\cdots$  (III) added to II or I in ether immediately becomes colorless; this is ascribed to the reaction  $\text{III} + \text{PhS}\cdots \rightarrow [\text{Ph}(\text{PhC}_6\text{H}_4)\text{C(ONa)SPh}] \rightarrow \text{PhC}_6\text{H}_4\text{COPh} + \text{PhSNa}$ . I reacts instantaneously with  $\text{CH}_3\text{N}_3$  (the structure of the resulting amorphous product has not been established) and II with

$\text{Ph}_2\text{CN}_3$  gives  $\text{Ph}_2\text{C(SPh)}_2 + \text{N}_2$ , just as  $\text{Ph}_2\text{C}\cdots$  gives  $\text{CH}_2(\text{SCPh})_2 + \text{N}_2$  with  $\text{CH}_3\text{N}_3$ . Even under mild temp. conditions, solns. of I dissolve heavy metals, like Zn and Ag:  $\text{C}_{10}\text{H}_7\text{C}(\text{:S})\text{S}\cdots + \text{Ag} \rightarrow \text{C}_{10}\text{H}_7\text{C}(\text{:S})\text{SAg}$ . Although I and II in solid form and in soln. are stable toward atm. O, this does not disprove the radical disocn. theory, for the diarylnitrogen radicals and the phenanthroxyls are relatively quite stable. Certain problems in connection with the thyls are briefly discussed, such as: the fact that it has thus far not been possible to detect disocn. by mol.-wt. detns.; the possibility of applying the results of optical measurements to the detn. of the disocn. const.; the role of disproportionation, etc.

C. A. R.

**Arylthioniums.** Ch. Courtot and T. Y. Tung. *Compt. rend.* 197, 1237-9 (1933).— $\text{AlCl}_3$  acting on diphenylsulfone in benzene at  $40^\circ$  for 4 days yields triphenylthionium chloride (I),  $\text{Ph}_3\text{SCl}$ , m.  $277^\circ$ . I unites with  $\text{HgCl}_2$ , forming  $\text{Cl}_2\text{HgPh}_3\text{SCl}$ , m.  $214^\circ$ . Condensation of diphenylsulfone with *o*- and *m*-xylene yields *o*-xylyldiphenylthionium chloride (failed to crystallize) and the *m*-isomer, m.  $179^\circ$  (monohydrate, m.  $123-4^\circ$ ). *p,p'*-Ditolylsulfone treated similarly in benzene, toluene, *o*-xylene, *p*-xylene and cumene give the following: phenylditolylthionium chloride, m.  $193-4^\circ$  (monohydrate, m.  $125-7^\circ$ ; trihydrate, m.  $63^\circ$ ); triolylthionium chloride, m.  $228^\circ$  (monohydrate, m.  $138-40^\circ$ ; tetrahydrate, m.  $51-2^\circ$ ); *o*-xylylditolylthionium chloride, m.  $118-20^\circ$  (dihydrate, m.  $56-7^\circ$ ); *p*-xylylditolylthionium chloride, not cryst. but with  $\text{HgCl}_2$ , m.  $86-7^\circ$ . The tetramethyl-2,4,2',4'-diphenylsulfone condensed with toluene and *o*-xylene gives dixylylditolylthionium chlorides, m.  $94-7^\circ$ , and trixylylthionium chloride, m.  $103-5^\circ$  (trihydrate, m.  $102-5^\circ$ ). Phenyl-*p*-tolylsulfone, m.  $73^\circ$ , condenses with benzene, *o*- and *p*-xylene, yields thioniums with 3 different aryl radicals: diphenyl-*p*-tolylthionium chloride, m.  $232-4^\circ$ , *o*-xylylphenylditolylthionium chloride, m.  $74-6^\circ$  (trihydrate, m.  $59-60^\circ$ ), and *m*-xylylphenylditolylthionium chloride, m.  $73-4^\circ$ .

W. J. Peterson

**Derivatives of *o*-aminophenol.** Lukas Galatis. *Ber.* 66B, 1774-9 (1933).—When an excess of  $\text{Ac}_2\text{O}$  is allowed to react some hrs. at  $100-20^\circ$  on *o*- $\text{PhCH:NC}_6\text{H}_4\text{(OH)}$ , the anil gives 50% each of the *O*-acetate,  $\text{PhCH:NC}_6\text{H}_4\text{(OAc)}$  (I), and of the stable isomer *N*-acetyl-2-phenylbenzoxazoline (II), m.  $98.5^\circ$ . The yield of II cannot be increased by heating for several hrs. or by satg. the  $\text{Ac}_2\text{O}$  with  $\text{NaOAc}$ , and at room temps. only small amts. of it are formed. The  $\text{AcOH}$  liberated in the formation of I evidently adds to the azomethine group of a 2nd mol. of the anil, forming the intermediate compd.  $\text{HOOC}_6\text{H}_4\text{NACCH(OH)Ph}$  (III) which gives II by elimination of water. III is so stable in the cold that when the  $\text{Ac}_2\text{O}$  is allowed to react on the anil at room temp. and the gradually liquefied mass is poured into  $\text{NaHCO}_3$  there is obtained a thick oil consisting chiefly of a mixt. of equal parts of I and III, for when it is poured into  $\text{HCl}$  it gives at once  $\text{BzH}$ ,  $\text{HOOC}_6\text{H}_4\text{NHAc}$  and 2-methylbenzoxazole, with  $\text{AcOC}_6\text{H}_4\text{NH}_2$  as an intermediate product. If the thick oil is heated 2 hrs. at  $100-20^\circ$ , it yields 50% II on hydrolysis. The addn. of  $\text{AcOH}$  to the azomethine group does not occur in the absence of  $\text{Ac}_2\text{O}$ . In working up the acetylation product with acids there were sometimes formed small amts. of  $\text{AcNHC}_6\text{H}_4\text{OAc}$ , m.  $124^\circ$ , especially when the  $\text{Ac}_2\text{O}$  was satd. hot with  $\text{NaOAc}$ . II is easily isolated, but at the expense of I, by freeing the reaction product of excess of  $\text{Ac}_2\text{O}$  by pouring into  $\text{NaHCO}_3$ , taking the pptd. oil up in ether, shaking with  $\text{HCl}$  to destroy the I, evapg. and removing the  $\text{BzH}$  and methylbenzoxazole with steam. It is slowly decompd. by hot dil. mineral acids into  $\text{AcNHC}_6\text{H}_4\text{OH}$  and  $\text{BzH}$ , likewise by boiling alkalis. It slowly dissolves in concd.  $\text{HCl}$  with intermediate formation of a thick yellowish oil which after a few hrs. changes into a thick felt of needles of the  $\text{HCl}$  salt of a substance m.  $245-55^\circ$ .

C. A. R.

**Some derivatives of  $\alpha$ -bromoisovaleric acid.** Mario Covello. *Rend. accad. sci. (Napoli)* [4], 2, 73-83 (1932).—C. prepd. the  $\alpha$ -bromoisovaleryl derivs. of salicylamide, *o*-anisidine, pseudocumidine,  $\alpha$ -naphthylamine and bromodithiylacetylurea. The last was included in the hope of detg. whether the Br would increase its hypnotic action,

but the deriv. obtained was much less sol. and less active. All compds. prepd. were recrystd. to const. m. p. and analyzed for Br and N. The physiol. action was detd. by the technic of Dubois by the effect on fish. Four g. salicylamide and 5.2 g.  $\alpha$ -bromoisovaleryl bromide (I) were mixed in a chilled flask and slowly heated on a sand bath. At 160° much HBr was evolved; the mixt. was then cooled and washed repeatedly with dil.  $\text{Na}_2\text{CO}_3$  soln. The crude product was dissolved in 70% alc. and decolorized with animal charcoal. From the filtrate  $\alpha$ -bromoisovalerylsalicylamide (II), m. 198°, crystd. In water it gave an intense violet color with  $\text{FeCl}_3$  showing that the phenolic OH had not been acylated. To 4 g. I in 20 cc. benzene was added a soln. of 3 g. *o*-anisidine and 2.4 g.  $\text{Na}_2\text{CO}_3$ . After the lively effervescence subsided the mixt. was refluxed 4 hrs. and the soln. filtered and allowed to evap. to half its vol. to give crystals of  $\alpha$ -bromoisovaleryl-*o*-anisidine (III), m. 110.5°. The similarly prepared soln. of  $\alpha$ -bromoisovalerylpseudocumidine (IV) was filtered hot and allowed to crystallize; IV m. 109°.  $\alpha$ -Bromoisovaleryl- $\alpha$ -naphthylamine (V) m. 106°, and  $\alpha$ -bromoisovalerylbromodiethylacetyleurea m. 110.5°. Aq. solns. tested with Clark's indicators had the following  $p_{\text{H}}$  values: 5.8, 4.5, 6.1, 6.8 and water 6.6. Their partition coeffs. in water-oil were, resp., 1.08, 1.04, 0.98, 0.94, 0.49. The times required to cause a fish swimming against the current in a rotating vessel to reverse its direction and to completely narcotize it show a definite parallel between the hypnotic strengths of these compds. and their partition coeffs.

Anne E. White

***p*-Nitro-*o*-anisidine.** A. A. Gribov, E. A. Ivanov and / Salomatina. *Antinokrasochayaya Prom.* 3, 238 45 (1933).—Lab. investigation of the existing methods of prepn. of *p*-nitro-*o*-anisidine (I) produced the following optimum results. *p*-Toluenesulfonanisidine, m. 127.5–29° (from alc.), was gradually added at room temp. to 1.3 mols.  $\text{HNO}_3$  dild. to 10%, and the whole was refluxed with much stirring in a water bath for 8 hrs. at 80–90°, then the *nitrotoluenesulfonanisidine* (II) was filtered off and dried at 70–80°, producing 94% II, m. 167–9° (theory 169–70°). The spent acid in the filtrate can be used again by adding fresh acid to 10%  $\text{HNO}_3$ . The addn. of Hg salts failed to catalyze the reaction. Higher concns. and higher temps. caused excessive resinification of the reaction products. II, m. 168–70° (from xylene), sapond. by stirring with 3 vols. of 90%  $\text{H}_2\text{SO}_4$  for 20 hrs. at 18–20° (or for 2–3 hrs. at 25–30°), cooling the reaction mass to 10° and pouring into cold water, filtering and drying at 60–70°, produced 91% I, m. 135–7° (resp. 136–9°), which gave dycings on  $\beta$ - $\text{C}_6\text{H}_5$  of a dirtier and different shade than the standard I. By dilg. the reaction mass with small pieces of ice from 90 to 60%  $\text{H}_2\text{SO}_4$ , filtering off the mixed ppt. of the sulfate of I and *p*- $\text{MeC}_6\text{H}_4\text{SO}_3\text{H}$ , and sepg. I from the mixt. with  $\text{Na}_2\text{CO}_3$  in  $\text{H}_2\text{O}$ , there was obtained 87% I, m. 134–9°, which gave dycings equal to the standard. The work is being continued.

Chas. Blanc

**Preparation of *p*-azoxyanisole.** B. M. Bogoslovskii. *Antinokrasochayaya Prom.* 3, 304–7 (1933).—The method of Davies and Down (C. A. 23, 2953) for the production of *p*- $\text{MeOC}_6\text{H}_4\text{N}:\text{N}(\text{O})\text{C}_6\text{H}_4\text{OMe}$  (I) was improved. A yield of 80% *p*- $\text{C}_6\text{H}_4(\text{NO}_2)\text{OMe}$  (II), m. 52–3°, was obtained from *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  by the method of Ger. pat. 580,618. To a soln. of 50 g. metallic Na in 500 cc. 99–100% MeOH was added at once 50 g. II, and the mixt. was heated under an upright bulb condenser for 6 hrs. at 65–70°; the reaction mixt. was then poured into 1 l. cold  $\text{H}_2\text{O}$ , I was filtered off, washed with 300 cc. cold  $\text{H}_2\text{O}$  and dried at 60–70°, giving 96–7% I, m. 116.5–7°, transformation point 132–3°. Equal results were obtained when in the last 3 hrs. of heating a part (1/3) of the MeOH was allowed to distil off through an inclined condenser. The product without any further purification is equal to Kahlbaum I, showing a similar liquid anisotropic phase. Chas. Blanc

**Cleavage of aldehyde groups as formic acid from aromatic aldehydes. II. Polynitrobenzaldehydes.** Gunther Lock. *Ber.* 66B, 1750–55 (1933); cf. C. A. 28, 125–2, 4-(HO) $_2\text{C}_6\text{H}_3\text{CHO}$  on alkali fusion gives *m*- $\text{C}_6\text{H}_4(\text{OH})_2$  and  $\text{K}_2\text{CO}_3$  but no appreciable amts. of  $\text{HCO}_2\text{H}$

(about 1%); on the other hand, almost 1 mol.  $\text{H}_2$  is evolved. The CHO group is therefore not eliminated; the reaction consists in hydroxylation and simultaneous dehydrogenation to  $(\text{KO})_2\text{C}_6\text{H}_3\text{CO}_2\text{H} + \text{H}_2$ , the acid, under the conditions of the expt., splitting off  $\text{CO}_2$ . 2,1- $\text{C}_6\text{H}_3(\text{OH})_2\text{CHO}$  likewise gives 2- $\text{C}_6\text{H}_3(\text{OH})_2$ , without forming  $\text{HCO}_2\text{H}$ , and 2,4,6-(HO) $_3\text{C}_6\text{H}_2\text{CHO}$  yields phloroglucinol and  $\text{K}_2\text{CO}_3$ . 3,2,6- and 3,4,6- $\text{MeO}(\text{O}_2\text{N})_2\text{C}_6\text{H}_2\text{CHO}$  both give 2,4-( $\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{OH}$  and  $\text{HCO}_2\text{H}$ , and 2,6-dinitroisovanillin yields 3,5-dinitroguaiacol and  $\text{HCO}_2\text{H}$ . 3,4,6-HO( $\text{O}_2\text{N})_2\text{C}_6\text{H}_2\text{CHO}$ , 2,4-( $\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{CHO}$  and 2,4,6-( $\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{CHO}$  behave in the same way. The rule that only those aromatic aldehydes in which both H atoms adjacent to the CHO group are substituted by Cl eliminate the CHO group with alkalis therefore holds also for aldehydes with 2 nitro groups in the *o*- and *p*-position.

C. A. R.

**Alkylation of hydroxy aldehydes.** Sofiya I. Kanevska. *Arch. Pharm.* 271, 402 6 (1933).—The difficulties encountered in the alkylation of hydroxy aldehydes by methods commonly followed are pointed out, and a more generally applicable procedure is suggested for this purpose, which involves the use of *p*-toluenesulfonic esters (cf. Rodionov and K., *J. vns. chem. tech. Inst.* 1921; Rodionov, C. A. 20, 1795). Following this procedure expts. are described leading to the formation of veratric aldehyde, and ethyl ether of vanillin from vanillin, *amyl ether of vanillin (oxime)*,  $\text{C}_{11}\text{H}_{19}\text{O}_3\text{N}$ , m. 73–4°, *o*- and *p*- $\text{MeOC}_6\text{H}_4\text{CHO}$ , *o*- $\text{EtOC}_6\text{H}_4\text{CHO}$ , veratric aldehyde from protocatechuinaldehyde.

W. O. E.

**Addition of alkali alcoholates to acid esters. VIII. Sodium alcoholates and esters at high temperatures.** F. Adickes, S. v. Mullenheim and W. Simson. *Ber.* 66B, 1901 9 (1933); cf. C. A. 26, 4793. Scheibler (C. A. 26, 4794) believes that the formation of  $\text{NaOEt}$  when  $\text{BzOEt}$  and  $\text{NaOEt}$  are heated on the water bath according to Claisen, which Adickes attributes to sapon. of the  $\text{BzOEt}$ , is produced by the reaction  $\text{BzOEt} + \text{NaOEt} \rightarrow \text{BzONa} + \text{C}_6\text{H}_5 + \text{EtOH}$ . It had already been shown that when water is excluded at room temp. or in petr. ether at 45°, only traces of  $\text{BzONa}$  are formed. Two parallel expts. were now run in which both reaction mixts. were heated 1 hr. on the water bath and then 1 of them was heated another 8 hrs.; the increase in  $\text{BzONa}$  in the latter was only 4% (based on the total Na used). The far larger amt. of  $\text{BzONa}$  in much shorter time found by Claisen cannot therefore have been formed by the reaction suggested by Scheibler. The study of the action of Na alcoholates on esters at about 180° has been extended to a no. of other esters. Just as the alkyl halides and the esters of  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$  give ethers with alcoholates, so also were ethers obtained with  $\text{BzOMe}$ ,  $\text{BzOCH}_2\text{Ph}$ ,  $\text{CO}(\text{OC}_6\text{H}_5)_2$  and *o*- $\text{C}_6\text{H}_4(\text{CO}_2\text{CH}_2\text{Ph})_2$ . Side reactions always seem to occur, however, which result in the formation of water and hydrolysis of the esters, so that the yield of ethers is only 50–83% of that to be expected from the amt. of acid formed and 50–100% of the missing ether is found as the alc. Repetition of Scheibler's expts. gave results different from his. The reaction by no means proceeds solely according to the equation given by him. Apparently he identified  $\text{C}_6\text{H}_5$  in the evolved gas only qualitatively. Quantitatively, it contains 96% CO to 4%  $\text{C}_6\text{H}_5$ , and there is no relation between the amt. of  $\text{C}_6\text{H}_5$  and that of  $\text{BzONa}$  formed. The evolution of CO is doubtless analogous to the decompn. of  $\text{HCO}_2\text{Et}$ .  $\text{PhOEt}$  would be expected instead of EtOH but none was detected; the decompn. fragments ( $\text{Ph}$ ,  $\text{EtO}$ , CO, H,  $\text{C}_2\text{H}_5$ ) combine in all kinds of ways. Some  $\text{PhCOMe}$  and  $\text{CH}_3\text{Bz}$  were found.  $\text{HCHO}$  was detected in the decompn. of *o*- $\text{C}_6\text{H}_4(\text{CO}_2\text{Et})_2$  under the same conditions, by the formation of methylenebisindandione, resulting from condensation of the  $\text{HCHO}$  with 2 mols. indandione formed intramol. analogously to the reaction  $\text{ester} \rightarrow \text{o-acetylbenzoic ester} \rightarrow \text{indandione}$ . In view of the small amt. of  $\text{C}_6\text{H}_5$  evolved and the possibility of the formation of water by side reactions, there is no exptl. evidence that the Scheibler reaction predominates.  $\text{BzOPr}$  with  $\text{PrONa}$  behaves like  $\text{BzOEt}$  as regards the amts. of CO,  $\text{BzOH}$ ,  $\text{PrOH}$  and un-

changed ester found. BzOPh reacts with sufficient velocity only at 250–70°. No ether is formed. Partial reification apparently supplies the water for the sapon. of a large part of the ester, 8%, of which is also rearranged into *p*-HOCH<sub>2</sub>COPh. CO(OEt)<sub>2</sub> boils so low that no reaction occurs under atm. pressures; no expts. were made in sealed tubes. C. A. R.

**Arylaliphatic β-hydroxy acetals and their products of hydrolysis.** Marcu Rothbart. *Compt. rend.* 197, 1225–7 (1933).—A series of hydroxy acetals and their corresponding aldehydes have been prepd. conforming to a technic previously described by R. (C. A. 27, 3918): *Benzoyloxyacetal* b<sub>11</sub> 143°, d<sub>4</sub><sup>20</sup> 1.0020, n<sub>D</sub><sup>20</sup> 1.4875; *benzoyloxyacetaldehyde* b<sub>11</sub> 109–11°, d<sub>4</sub><sup>20</sup> 1.1107, n<sub>D</sub><sup>20</sup> 1.5345; *anisoyloxyacetal* b<sub>11</sub> 181°, d<sub>4</sub><sup>20</sup> 1.0398, n<sub>D</sub><sup>20</sup> 1.492; *anisoyloxyacetaldehyde* b<sub>11</sub> 157–60°, d<sub>4</sub><sup>20</sup> 1.1110, n<sub>D</sub><sup>20</sup> 1.5119 (semicarbazone, m. 160–0.5°); *β-phenylethoxyacetal*, b<sub>11</sub> 126–8°, d<sub>4</sub><sup>20</sup> 0.9785, n<sub>D</sub><sup>20</sup> 1.4770; *β-phenylethoxyacetaldehyde*, b<sub>11</sub> 120°, d<sub>4</sub><sup>20</sup> 1.068, n<sub>D</sub><sup>20</sup> 1.5216 (semicarbazone, m. 88.5°); *β-phenyl β-methylethoxyacetal* b<sub>11</sub> 130–2°, d<sub>4</sub><sup>20</sup> 0.9831, n<sub>D</sub><sup>20</sup> 1.475; *β-phenyl β-methylethoxyacetaldehyde*, b<sub>11</sub> 134–6°, d<sub>4</sub><sup>20</sup> 1.054, n<sub>D</sub><sup>20</sup> 1.520 (semicarbazone, m. 80–80.5°); *α-phenylethoxyacetal*, b<sub>11</sub> 138–40°, d<sub>4</sub><sup>20</sup> 0.9772, n<sub>D</sub><sup>20</sup> 1.4671; *2-phenyl-2-propoxyacetal*, b<sub>11</sub> 150–2°, d<sub>4</sub><sup>20</sup> 0.9756, n<sub>D</sub><sup>20</sup> 1.4780; *3-phenyl-2-methyl-2-propoxyacetal*, b<sub>11</sub> 115–18°, d<sub>4</sub><sup>20</sup> 0.9730, n<sub>D</sub><sup>20</sup> 1.4775. The hydrolysis of the acetal deriv. of PhCH<sub>2</sub>CH<sub>2</sub>OH with 7% H<sub>2</sub>SO<sub>4</sub> gives 60% aldehyde. The acetal deriv. of hydratropic alc. yields 76% aldehyde on treatment with 5% H<sub>2</sub>SO<sub>4</sub>. The benzoyloxy and anisoyloxy derivs. are more easily hydrolyzed, the 1st yielding 61% of the aldehyde (with 1% H<sub>2</sub>SO<sub>4</sub>); the latter some anisic alc. but no aldehyde. W. J. Peterson

**Syntheses with acids of the type RCH:CHCH<sub>2</sub>CO<sub>2</sub>H, and some mixed organomagnesium derivatives.** D. Ivanov and G. Pchenichni. *Compt. rend.* 197, 1230–1 (1933).—PhCH:CHCH<sub>2</sub>CO<sub>2</sub>H (I) with the Mg derivs. of iso-PrCl and α-C<sub>10</sub>H<sub>15</sub>Br yields after carbonation 2-phenylethenylmalonic acid, m. 133°. I with *m*-MeC<sub>6</sub>H<sub>4</sub>MgBr gives 6-phenyl-3-*m*-tolyl-2-phenethenyl-3-hydroxy-5-hexen-1-*oic* acid, m. 138–9°. With *p*-MeC<sub>6</sub>H<sub>4</sub>MgBr I yields the 6-*p*-tolyl isomer, m. 165°. With the PhMgBr, the 3,6-di-*Ph* compd., m. 142–3°, is obtained. With RCH:CHCH<sub>2</sub>CO<sub>2</sub>H (II) as starting material, iso-PrMgCl reacts to form 2-*α*-butenylmalonic acid, m. 100°. PhMgBr reacts with II to give 3-phenyl-2-*α*-butenyl-3-hydroxy-5-octen-1-*oic* acid, m. 145°. *p*-MeC<sub>6</sub>H<sub>4</sub>MgBr and VI give the 3-*p*-tolyl homolog, m. 124.5°. W. J. P.

**Constituents of the kawa root. XIV. Cinnamoyl-acetic ester.** W. Borsche and M. Lewinsohn. *Ber.* 66B, 1792–801 (1933); cf. C. A. 27, 3716.—The characteristic constituents of kawa root are derivs. of γ-unsatd. β-ketonic acids, RCH:CHCOCH<sub>2</sub>CO<sub>2</sub>H, whose esters can be prepd. synthetically by deacetylation of the corresponding acylated acetoacetic esters. As these esters contain the characteristic grouping COCH<sub>2</sub>CO<sub>2</sub>Et of AcCH<sub>2</sub>CO<sub>2</sub>Et, they should be capable of being used for all kinds of syntheses, just like AcCH<sub>2</sub>CO<sub>2</sub>Et itself. Some of these syntheses have been carried out with the initial member, *Et* cinnamoylacetate (I), of this series of esters. I, obtained in about 50% yield, together with PhCH:CHAc, PhCH:CHCO<sub>2</sub>H, etc., by partial hydrolysis of PhCH:CHCOCH<sub>2</sub>AcCO<sub>2</sub>Et with 75% AcOH on the water bath, m. 46°; *Cu* deriv., (C<sub>15</sub>H<sub>11</sub>O<sub>4</sub>)<sub>2</sub>Cu, deep green, almost black, prisms, m. 185–7°; 2,4-dinitrophenylhydrazones, red, m. 170–1°. With PhNHNH<sub>2</sub> in hot AcOH it yields, through the intermediate phenylhydrazones, 1-phenyl-3-styryl-5-pyrazolone, brownish, m. 148–9°. *Et* α-(2,4-dinitrophenyl)cinnamoylacetate, from I in ether, Na in alc. and 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Cl in boiling ether, orange, m. 120–1°, hydrolyzed by water at 130° to *ω*-cinnamoyl-2,4-dinitrophenyl, brown, m. 152–3°. *Et* dicinnamoylacetate (4 g. from 4.4 g. I in ether, NaNH<sub>2</sub> and PhCH:CHCOCl), canary-yellow, m. 129°, converted by water at 120–30° into CH<sub>3</sub>(COCH:CHPh)<sub>2</sub>, m. 142°. When I is heated under 15 mm., only a small portion distills over unchanged; most of it remains in the flask as a brown resin changed by MeOH into a brown cryst. powder which after repeated extrn. with hot MeOH m. 162°; it is the corresponding

1 dehydracetic acid, 6-styryl-3-cinnamoyl-2,4-pyrone. With Pd and H in alc. I gives *Et* 8-phenyl-β-ketovalerate (II), b<sub>11</sub> 170–1° (3 g. from 4.4 g. I) (2,4-dinitrophenylhydrazones, orange-yellow, m. 78°); the residue remaining in the vacuum distn. of the ester yields 6-(*ω*-phenylethyl)-3-dihydrocinnamoyl-2,4-pyrone, m. 95°, converted by fuming HCl at 120° into 2,6-bis(*ω*-phenylethyl)-4-pyrone, m. 140°. 4-(*ω*-phenylethyl)-7-hydroxycoumarin, from II and *m*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> in concd. H<sub>2</sub>SO<sub>4</sub>, m. 175–6°. *Et* 1,6-diphenyl-1,4-diketohexane-3-carboxylate, from II and Na in ether with PhCOCH<sub>2</sub>Br, yellow oil converted by concd. NH<sub>4</sub>OH and MeOH into the iminoketo ester, m. 147°, and by PhNH<sub>2</sub> in AcOH on the water bath into *Et* 1,5-diphenyl-2-(*ω*-phenylethyl)pyrrole-3-carboxylate, m. 139–40°. *Et* 8-phenyl-α-cinnamoyl-β-ketovalerate, from II, NaNH<sub>2</sub> and PhCH:CHCOCl, yellowish, m. 57° (*Cu* compd., light green, m. 204–5°), converted on heating into 1,7-diphenyl-3,5-diketo-1-heptene, m. 84–5° (*Cu* compd., green, m. around 200°). *Et* 8-phenyl-α-acetyl-β-ketovalerate (III), from AcCH(COCH:CHPh)CO<sub>2</sub>Et with colloidal Pd and H in alc., b<sub>01</sub> 130° (*Cu* compd., blue, m. 136°), gives with 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NHNH<sub>2</sub> in MeOH and HCl on the water bath a yellow cryst. ppt. consisting chiefly of *Et* 1-(2',4'-dinitrophenyl)-5-methyl-3-(*ω*-phenylethyl)pyrazole-4-carboxylate (IV), m. 144–5° (1 g. from 1 g. of III), with a very small amt. of the pyrazolone

4 (O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>N:N:C(CH<sub>2</sub>CH<sub>2</sub>Ph).CHAc.CO, m. 178° (the

structures of these 2 compds. have not been established; the isomers with the substituents on the 3- and 5-C atoms interchanged might well be formed). IV is in part hydrolyzed to 1-phenyl-3,5-diketohexane, b<sub>11</sub> 153–5°, which is more readily obtained pure by catalytic hydrogenation of PhCH:CHCOCH<sub>2</sub>COMe and with *m*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub> in AcOH satd. cold with HCl gives methyl(*ω*-phenylethyl)-7-hydroxybenzopyrylium chloride, very hygroscopic yellow crystals, isolated as the FeCl<sub>3</sub> complex, C<sub>15</sub>H<sub>11</sub>O<sub>4</sub>Cl.FeCl<sub>3</sub>, brown tables with bronze luster, m. 154°. *Et* α-(3,4-methylenedioxy)cinnamoylacetate (15 g. from 19.2 g. CH<sub>3</sub>(O)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH:CHCO<sub>2</sub>H converted with SOCl<sub>2</sub> in benzene into the chloride and treated with AcCHNaCO<sub>2</sub>Et in ether), yellow, m. 104° (*Cu* compd., light green, m. 208°), gives with 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NHNH<sub>2</sub> in MeOH-HCl a pyrazole, 6 C<sub>22</sub>H<sub>18</sub>(O<sub>2</sub>N)<sub>4</sub>, dark yellow, m. 212°, and a (methylenedioxy)cinnamoylacetone dinitrophenylhydrazones, C<sub>15</sub>H<sub>10</sub>O<sub>4</sub>N<sub>4</sub>, brick-red, m. 200°. Boiling 75% AcOH breaks down the ester almost exclusively into Cl<sub>2</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH:CHCO<sub>2</sub>Et, but in *N* NaOH satd. cold with NH<sub>3</sub> gas it yields *Et* (3,4-methylenedioxy)cinnamoylacetate (1.5 g. from 3 g. of the acetoacetate), yellowish, m. 58–60° (*Cu* compd., dark green, m. 222°; 2,4-dinitrophenylhydrazones, red, m. 204°). *Et* 8-(3,4-methylenedioxyphenyl)-α-acetyl-β-ketovalerate has thus far been obtained only as an oil and therefore analyzed as the *Cu* compd., dull blue prisms, m. 173°, sol. in ether with deep blue color; with 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NHNH<sub>2</sub> it gives a dark yellow pyrazole, m. 175°, and a 1-(methylenedioxyphenyl)-3,5-diketohexane dinitrophenylhydrazones, brownish yellow, m. 116°. *Et* (α-phenylcinnamoyl)acetoacetate, from PhCH:CHCO<sub>2</sub>Et, through the chloride, with AcCHNaCO<sub>2</sub>Et, oil (*Cu* compd., light gray-green, m. 125°), gives with water at 130° 1,2-diphenyl-3,5-diketo-1-hexene, yellow, m. 81°, and with 75% AcOH on the water bath *Et* (α-phenylcinnamoyl)acetate (9.5 g. from 13.5 g. of the acetoacetate), yellowish, m. 91° (*Cu* compd., bright green, m. 213°), hydrolyzed to PhCH:CHCOMe, m. 56°.

C. A. R.

**Lichen substances. XXXII. Tenuiorin, a methyl glyrophosphate monomethyl ether.** Yasuhiko Asahina and Masaiti Yanagita. *Ber.* 66B, 1910–12 (1933); cf. C. A. 28, 134.—The pith of *Lobaria pulmonaria* f. *tenuior* Hu gives no color with KOH and therefore contains no stictic acid but there has been isolated from the thalli, in addn. to some mannitol, 1.6% of a new depside, *tenuiorin*, C<sub>22</sub>H<sub>24</sub>O<sub>10</sub> (I), m. 178–80°, then resolidifies and decomps. 238°, gives no color in alc. with FeCl<sub>3</sub> or bleaching powder, forms a colorless alk. soln. which on boiling becomes red and shows blue fluorescence; it is somewhat sol. in K<sub>2</sub>CO<sub>3</sub>, insol. in KHCO<sub>3</sub>, sol. in cold H<sub>2</sub>SO<sub>4</sub> without color, in hot

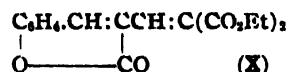
acid with brown color. On exhaustive methylation with  $\text{CH}_3\text{N}_3$  it yields a tri-Me ether, m.  $195^\circ$ , identical with Me gyrophorate tetra-Me ether. *Triacetate*, prepd. with  $\text{Ac}_2\text{O}-\text{H}_2\text{SO}_4$ , m.  $195^\circ$ . With KOH in boiling MeOH I gives Me everninate and Me orsellinate. I is also formed by partial methylation of gyrophoric acid with  $\text{CH}_3\text{N}_3$ . I is assigned the structure  $2,6,4\text{'-Me(HO)}\{2',6',4'\text{-Me(HO)}\{2'',6'',4''\text{-Me(HO)}\}(\text{MeO})\text{C}_6\text{H}_2\text{CO}_2\}\text{C}_6\text{H}_2\text{CO}_2\text{Me}$ . C. A. R.

The coumarin group. II. Synthesis of certain coumarinaldehydes; the catalytic hydrogenation of acid chlorides. Theodor Boehm and G. Schumann. *Arch. Pharm.* 271, 490-513 (1933); cf. C. A. 25, 2145.—The odorous and non-odorous properties of the various coumarin derivs. are discussed from the standpoint of their chem. compn. Of the 6 possible coumarinaldehydes, only 1 was heretofore known. Accordingly, the question arose whether and to what extent the relative position of the CHO group affected the aroma. Attempts to prep. the unknown isomeric aldehydes, for the present notably the synthesis of coumarin-3-aldehydes, are described. In addn. thereto and for purposes of comparison, *umbelliferone-3-aldehyde* (IV) and *coumarin-3-acrylaldehyde* (VII) were also prepd. The general procedure followed was that of Rosenmund and the initial materials employed were the corresponding carboxylic acids, whose acid chlorides were reduced catalytically in presence of Pd. With respect to the physiol. properties of the new aldehydes, coumarin-3-aldehyde (I) no longer possesses the typical odor of coumarin, but has on the other hand the property of irritating the mucosa of the nose and throat. Since both odorous and irritant effects are not unrelated factors, it follows that the osmophoric aldehyde group in the osmophoric lactone ring of coumarin effects an increase in strength or potency of the coumarin itself. Reference is made to a similar phenomenon in the case of  $\text{PhCH:CH-CHO}$  (II) and  $\text{PhC:CClO}$  (III), wherein the double bond of the side chain of the former becomes a triple bond in the latter; while the odor of III is still reminiscent of II, it is no longer pleasant, but on the contrary irritating. This effect is obviously, as with coumarinaldehyde, due to superimposition of the osmophoric groups. In contrast to coumarinaldehyde IV behaves rather indifferently, merely emitting on heating a weak phenol-like odor. I and IV are therefore opposed to one another like coumarin and umbelliferone. No regularity exists, however, in this analogy. This is apparent in the following example: Et coumarincarboxylate (V) is odorless, while the corresponding umbelliferone ester (VI) smells strongly of coumarin, a marked reversion of the relationship previously noted. Worthy of note too is the fact that IV still remains indifferent when the phenolic HO is replaced by  $\text{AcO}$  or the  $\text{OCOC}_2\text{Me}$  group. Normally, VII is odorless, but on heating to the m. p. emits a weak coumarin-like odor. Substitution of the osmophoric  $\text{NO}_2$  group for the CHO radical effects no change therein. This  $\text{NO}_2$  deriv., coumarin-3- $\alpha$ -nitroethylene (VIII), was obtained by condensation of I with nitromethane. I also reacts in a normal manner with  $\text{CH}_2(\text{CN})_2$ ,  $\text{CH}_2(\text{CO}_2\text{H})_2$ ,  $\text{CNCH}_2\text{CONH}_2$  and  $\text{CN-CH}_2\text{COCH}_2\text{CO}_2\text{Et}$ . Contrary to expectation, all these condensation products were odorless. An abnormal result was observed in the condensation with  $\text{CH}_2\text{COCH}_2\text{CO}_2\text{Et}$ , the reaction being carried out in alc. in the presence of  $\text{C}_6\text{H}_5\text{N}$ . In this instance a well-defined cryst. product of the compn.  $(\text{C}_7\text{H}_5\text{O}_3)_n$  was formed, the constitution of which is as yet unexplained. The condensation with  $\text{CH}_2(\text{COEt})_2$  was equally irregular, in that the substance obtained had the constitution IX. Only after treatments with  $\text{Ac}_2\text{O}$  and consequent splitting off of  $\text{H}_2\text{O}$  did it yield the unsatd. compd. (X), which should have been the immediate product of condensation. IX merits especial interest, since, if the formula given is correct, which there is no reason to doubt, here for the first time no unsatd. compd., but instead a  $\beta$ -HO compd. results from a Knoevenagel condensation. This is insofar of importance since the character of the Knoevenagel reaction has in spite of all attempts to clarify it remained more or less a mystery. A broader basis has thus been created for the future treat-

ment of the problem. The results of the first attempts to prep. I were unfavorable. Only after numerous expts. had shown that a partial poisoning of the catalyst by introduction of certain foreign material via Rosenmund and co-workers did not necessarily lead to satisfactory yields of aldehydes, more attention was directed, and with success, to the temp. (relatively low) prevailing in the soln. (xylene) during the catalytic reduction. *Coumarincarboxylic*

$\text{C}_6\text{H}_4\text{CH:CCCH(OH)CH(CO}_2\text{Et)}_2$

(IX)



chloride,  $\text{C}_{10}\text{H}_7\text{O}_2\text{Cl}$ , obtained from the corresponding acid with  $\text{CSCl}_2$ , m.  $147.8^\circ$ , yielded on reduction I, m.  $131.2^\circ$  (*p*-nitrophenylhydrazone,  $\text{C}_{16}\text{H}_{11}\text{O}_4\text{N}_3$ , yellow, m.  $287.8^\circ$  (decompn.); *semicarbazone*, yellow, m.  $265-6^\circ$  (decompn.); *oxime*, m.  $207^\circ$  (decompn.)). [With II. H. Hansen.] *Coumarin-3-acrylic acid*, m.  $266^\circ$  (*Et* ester, yellow, m.  $122^\circ$ ; *acid chloride*, yellow, m.  $197.8^\circ$ ); the acid yielding on reduction VII, faintly yellow, m.  $155.6^\circ$  (*p*-nitrophenylhydrazone, m.  $289.90^\circ$  (decompn.); *oxime*, m.  $207^\circ$ ; *semicarbazone*, m.  $242^\circ$ ). VIII, m.  $143.4^\circ$ . IX, yellowish needles with 1 mol.  $\text{H}_2\text{O}$  of crystn., m.  $207^\circ$ . I condensed with  $\text{CH}_2(\text{CO}_2\text{H})_2$  gave *coumarin-3-methylenemalononic acid*,  $\text{C}_{12}\text{H}_8\text{O}_6\text{H}_2\text{O}$ , yellow, m.  $207^\circ$ . I with  $\text{CH}_2(\text{CO}_2\text{Et})_2$  gave IX, m.  $117^\circ$ , which with  $\text{Ac}_2\text{O}$  gave X, brilliant leaflets, m.  $93-5^\circ$ . Condensation of I with  $\text{Ac-CH}_2\text{CO}_2\text{Et}$  yielded the product  $(\text{C}_7\text{H}_5\text{O}_3)_n$ , m.  $81-2^\circ$ . With  $\text{CH}_2(\text{CN})_2$ , I gave *coumarin-3-methylenemalononic dinitrile*, yellow, m.  $198^\circ$  (decompn.). Among other condensation products characterized are: *coumarin-3-[ $\alpha$ -cyanoacrylic amide]*,  $\text{C}_{12}\text{H}_8\text{O}_2\text{N}_2$ , yellow, m.  $233^\circ$ ; *Et coumarin-3-acryloxyacrylate*, yellow, m.  $202^\circ$ ; *condensation product*,  $\text{C}_{17}\text{H}_{11}\text{O}_4\text{N}$ , from resorcinol aldehyde,  $\text{CH}_2(\text{CO}_2\text{Et})_2$ , and  $\text{C}_6\text{H}_5\text{N}$ , m.  $152-4^\circ$ , yields with  $\text{Na}_2\text{CO}_3$  soln. the strong odor of  $\text{C}_6\text{H}_5\text{N}$ , and on addn. of HCl the *Et* umbelliferone-3-carboxylate, m.  $171^\circ$ , previously described by Pechmann and Graeger (*Ac deriv.*,  $\text{C}_{14}\text{H}_{11}\text{O}_6$ , m.  $153-4^\circ$ , in neutral alc. soln. fluoresces faintly blue; the corresponding acid,  $\text{C}_{12}\text{H}_7\text{O}_6$ , m.  $210-11^\circ$ , is likewise faintly fluorescent in aq. alc. soln., and the *chloride*, m.  $189-90^\circ$ , the latter on reduction giving the aldehyde, faintly yellow, m.  $165.6^\circ$ , faintly bluish green fluorescent (*p*-nitrophenylhydrazone, m.  $280^\circ$  (decompn.)). *Carbomethoxyumbelliferone-3-carboxylic acid*,  $\text{C}_{14}\text{H}_9\text{O}_7$ , m.  $214-15^\circ$ . The corresponding *carbomethoxy deriv.*, m.  $167^\circ$  (*acid chloride*, m.  $144.5^\circ$ ; *aldehyde*, m.  $134.5^\circ$ , fluoresces strongly bluish green (*p*-nitrophenylhydrazone, m.  $263.5^\circ$ )). IV forms yellow prisms carbonizing above  $300^\circ$  (*p*-nitrophenylhydrazone, red, carbonizes above  $300^\circ$ ); *oxime*, yellow, m.  $224.5^\circ$ . *Di-daphnetin-3-carboxylate*,  $\text{C}_{12}\text{H}_9\text{O}_6$ , yellow, m.  $231-2^\circ$  (*di-Ac deriv.*, m.  $129.30^\circ$ ); *free acid*, yellow, m.  $263^\circ$  (*di-Ac deriv.*, m.  $213-14^\circ$ ). W. O. E.

*d-Epicamphor*. Yasuhiko Asahina and Morizo Ishide, with T. Joyama. *Ber.* 66B, 1913 17 (1933).—*d*-5-Ketocamphor (I), m.  $210-12^\circ$ ,  $[\alpha]_D^{25} 106^\circ$ , in ether and KCN in cold water treated with  $\text{CO}_2$  give 86% of a mixt. of hydroxy nitriles hydrolyzed by fuming  $\text{H}_2\text{SO}_4$  in the ice chest to 2 stereomeric *5-hydroxy-camphor-5-carboxamides* (or structural isomers):  $\alpha$ -, m.  $248-9^\circ$ ,  $[\alpha]_D^{25} -1.24^\circ$  (abs. alc.), and  $\beta$ -, m.  $190-1^\circ$ ,  $[\alpha]_D^{25} 44.79^\circ$  (abs. alc.). The free  $\alpha$ -acid, from the amide and 10% HCl heated 20 hrs. at  $100^\circ$  in sealed tubes, m.  $151.2^\circ$ ,  $b_p$  about  $250^\circ$  almost without decompn.,  $[\alpha]_D^{25} -0.48^\circ$  (abs. alc.) (*semicarbazone*, m.  $267^\circ$  (decompn.)); *quinine salt*, m.  $178^\circ$ , is oxidized by  $\text{Na}_2\text{Cr}_2\text{O}_7-\text{H}_2\text{SO}_4$  at  $60^\circ$  to I. Free  $\beta$ -acid, obtained from the amide with 10% HCl after only 2 hrs., m.  $153^\circ$ , boils without decompn. *in vacuo*,  $[\alpha]_D^{25} 21.58^\circ$  (*semicarbazone*, m.  $225^\circ$  (decompn.)); *quinine salt*, m.  $219^\circ$ , is also oxidized to I by  $\text{Na}_2\text{Cr}_2\text{O}_7$  in the cold. The semicarbazone of the  $\alpha$ -acid heated with Na and alc. 20 hrs. at  $180^\circ$  gives *5-hydroxy-camphane-5-carboxylic acid*, m.  $151^\circ$ ,  $[\alpha]_D^{25} -59.2^\circ$  (abs. alc.);  $\beta$ -isomer, m.  $130^\circ$ ,  $[\alpha]_D^{25} -39.8^\circ$ . These 2 acids with  $\text{CrO}_3-\text{H}_2\text{SO}_4$  on



the water bath give *d*-epicamphor (II), m. 183–4°,  $[\alpha]_D^{25}$  50.0° (abs. alc.); semicarbazone, m. 236° (decompn.); Br deriv., from II and Br in  $\text{CHCl}_3$  on the water bath, prisms, m. 133–4°,  $[\alpha]_D^{25}$  80.9° (abs. alc.). As can be shown with models, II (5-ketocamphane) is the mirror image of the 3-isomer (ordinary 1-epicamphor). Since epicamphor can be converted through the bornylene-2-hydroxamic acid into a camphor of opposite rotation it is possible by the above method to pass from *d*-camphor through II to *l*-camphor. C. A. R.

**Degradation of 4-phenylcamphor to phenylisocamphoric acid.** Maria Brädt-Savelberg and Joseph Buchkremer. *Ber.* 66B, 1921 32(1933); cf. C. A. 25, 3982.—To establish beyond doubt the position of the Ph group in "4-phenylcamphor" (I) (Naruckin, *et al.*, C. A. 24, 841), the authors attempted to degrade it, like the 4-Me analog, to *sym*-phenylisocamphoric acid (II) but met with such unexpected difficulties that for a time they thought I must be the 6-Ph compd. The oxime of I with boiling  $\text{Ac}_2\text{O}$  gives a viscous, honey-like acetate,  $b_p$  150–60°, which on distn. decomposes in part into  $\text{AcOH}$  and phenyl- $\alpha$ -campholenic nitrile (III) but the greater part resinifies. III, m. 80°, mol. wt. in benzene 230.5, is obtained more readily by boiling the oxime with dil.  $\text{H}_2\text{SO}_4$  (d. 1.18), while 50%  $\text{H}_2\text{SO}_4$  gives a compd.  $\text{C}_{10}\text{H}_{16}\text{O}_2$ ,  $b_p$  143–5°, m. 52–3°, which is probably phenyl- $\beta$ -campholenolactone. III is best prepd. by heating the oxime with  $\text{PhSO}_2\text{Cl}$  in pyridine, although there is formed as by-product an extraordinarily stable compd.,  $\text{C}_{10}\text{H}_{16}\text{ON}$ , m. 203–4°, which is unchanged by boiling 50%  $\text{H}_2\text{SO}_4$  and hardly at all by fusion with  $\text{KOH}$ ; long heating with 30%  $\text{KOH}$  in  $\text{MeOH}$  at 180° converts it to a small extent into phenyl- $\alpha$ -campholenic acid (IV) and it is therefore thought to be the campholenolactam. III heated in a Ag vessel 20 hrs. at 150° with a mixt. of 12 g.  $\text{KOH}$ , 6 g. water and 30 g. alc. gives the amide, m. 126–7°, and the free acid (IV) (4.5 g. from 6 g. III), m. 123–4° (Ag salt, darkens somewhat in the light), which can also be obtained, but in poorer yield, by fusion with  $\text{KOH}$  of the  $\omega$ -sulfonic acid of I, pearly leaflets, darkens 200°, m. 239–40° (decompn.), formed by allowing I to stand in a mixt. of 2 mols.  $\text{Ac}_2\text{O}$  and 1 mol. concd.  $\text{H}_2\text{SO}_4$ . Et ester of IV, from the Ag salt and  $\text{EtI}$ ,  $b_p$  125–6°, MR 79.97, 80.46, 1.70, 2.74 for  $\alpha$ , D,  $\beta$ - $\alpha$  and  $\gamma$ - $\alpha$ ,  $b_D$  -0.092, -0.092, 4.9%, 4.98%. Me ester, prepd. with  $\text{CH}_3\text{I}$ ,  $b_p$  122–3°. IV is for the most part unchanged by cold  $\text{HNO}_3$  (d. 1.4), but 2 g. neutralized with 0.1 N  $\text{KOH}$  gives with 1%  $\text{KMnO}_4$  (1.5 atoms O) 2.25 g. phenyldihydroxydihydro- $\alpha$ -campholenic acid (V), m. 252–3° (Ag salt, leaflets with 1  $\text{H}_2\text{O}$ , Na salt, difficultly sol. leaflets with 2  $\text{H}_2\text{O}$ ). Unlike the Me analog, V is very resistant to oxidation; it is not appreciably attacked by either  $\text{Ph(OAc)}_3$ , fused  $\text{KOH}$  or  $\text{HNO}_3$  (d. 1.3). Aq.  $\text{CrO}_3$  does not attack it (perhaps because of its slight soly.) but  $\text{CrO}_3$  in  $\text{AcOH}$  gives 2 products: a neutral compd.  $\text{C}_{10}\text{H}_{16}\text{O}_4$  (VI), m. 177–8° (semicarbazone, m. 200° (decompn.)), and a monobasic acid,  $\text{C}_{10}\text{H}_{16}\text{O}_4$ , m. 185°. The acid is supposed to be a phenylterphenylic acid and VI a "ketolactone." With  $\text{KOH}$  in boiling  $\text{MeOH}$  VI forms a monobasic acid  $\text{C}_{10}\text{H}_{16}\text{O}_4$  (VII), m. 205–6°, which decolorizes  $\text{KMnO}_4$ , gives a faint green color with  $\text{FeCl}_3$ , reduces Fehling soln. weakly, reacts with neither  $\text{NH}_4\text{OH}$  nor semicarbazide, is unchanged by boiling dil.  $\text{H}_2\text{SO}_4$  and with alk. Br soln. yields a dibasic acid  $\text{C}_{10}\text{H}_{16}\text{O}_6$ , m. 240–1° (decompn.). This acid was also isolated from the  $\text{KMnO}_4$  oxidation products of VI and VII. As these reactions offered no definite proof of the position of the Ph group in I, degradation of IV with  $\text{O}_3$  was attempted. IV itself gave no well-defined product other than a little  $\text{H}_2\text{O}$  but 10 g. of its Me ester in 80%  $\text{AcOH}$  yielded 7 g. of neutral products, sep'd. by means of  $\text{NH}_4\text{OH}$  into 2 oximic acids (m. 290° (decompn.) and 133–4°), and 2 g. phenylsoketocamphoric acid dilactone, m. 207–8°; the corresponding free acid is stable only in the form of its salts but with alk. Br soln. gives II, m. 184° (tri-K salt, powder with 1  $\text{H}_2\text{O}$ ). The 1st disocn. const. of II is 1.57 and  $1.39 \times 10^{-4}$  as det'd. with the quinhydrone and the H electrode, resp., in water. C. A. R.

**Asymmetric syntheses with platinum black.** G. Vavon

and Boleslawa Jakubowicz. *Bull. soc. chim.* 53, 1111–25 (1933).—See C. A. 27, 3027. G. G.

**2-Methyl-1,4-naphthoquinone.** Juan Madinaveita. *Anales soc. españ. fis. quim.* 31, 750–9(1933).—Addn. reactions of 2-methyl-1,4-naphthoquinone were exam'd. The diene addn. is much more difficult than with 1,4-naphthoquinone. On bleaching in daylight there is obtained a homogeneous product comprising a union of 2 mols. through its active double bonds. E. M. Symmes

**Course of the alkylation of enolates.** II. F. Adickes. *Ber.* 66B, 1984(1933); cf. C. A. 27, 3700.—The observation of Vanags (C. A. 28, 474) that the rearrangement of hindone into isobindone, which is not effected by boiling with alc. and  $\text{K}_2\text{CO}_3$ , occurs in the hydrolysis of the pure *O*-ether under the same conditions is not contrary to but in harmony with A.'s findings in the alkylation of malonic esters that *C*-alkylations do not necessarily proceed through *O*-ethers. C. A. R.

**Anthracene derivatives.** X. Edward de Barry Barnett, Norman F. Goodway and John Wm. Watson. *Ber.* 66B, 1876 91(1933); cf. C. A. 27, 287.—When the condensation of  $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$  (I) with *m*- $\text{C}_6\text{H}_4\text{Cl}_2$  (Goldberg, C. A. 26, 723) is carried out in tetrachloroethane instead of an excess of *m*- $\text{C}_6\text{H}_4\text{Cl}_2$  as solvent, there is formed very little of the acid *o*-(2,4- $\text{Cl}_2\text{C}_6\text{H}_3\text{CO})\text{C}_6\text{H}_4\text{CO}_2\text{H}$  (II); a by-product, m. 176°, is obtained which is very probably 3,3-bis(2',4'-dichlorophenyl)phthalide. II boiled in aq.  $\text{NH}_4\text{OH}$  with Zn dust and  $\text{CuSO}_4$  gives 2',4'-dichlorodiphenylmethane-2-carboxylic acid, m. 128°, dehydrated in concd.  $\text{H}_2\text{SO}_4$  at room temp. to 2,4-dichloroanthrone (III), yellow, m. 161°, which with  $\text{Ac}_2\text{O}$ - $\text{C}_6\text{H}_5\text{N}$  yields an anthranil acetate (IV), m. 170°. 2,4-Dichloro-10-bromoanthrone (V), from III and Br in  $\text{CS}_2$ , yellow, m. 157°; gives with  $\text{PhNH}_2$  at room temp. a 10-anilino deriv., yellow, m. 187°. 10-piperidino compd., m. 154°; 10-Ph deriv., from V with benzene and  $\text{AlCl}_3$ , m. 164°, yields with 3 mols.  $\text{PhCH}_2\text{MgCl}$  and subsequent treatment of the resulting dihydroanthranol with  $\text{HCl}$ - $\text{AcOH}$  2,4-dichloro-9-benzyl-10-phenylanthracene, yellow, m. 175°. 2,4-Dichloro-9-benzylanthracene, from III with  $\text{PhCH}_2\text{MgCl}$ , yellow, m. 163°, yields

with Br in  $\text{CS}_2$  the  $\omega$ -Br deriv.,  $\text{PhCHBrC} \begin{array}{c} \text{C}_6\text{H}_4 \\ \text{C}_6\text{H}_4\text{Cl}_2 \end{array} \text{CH}$ ,

6 yellow, m. 138° (slight decompn.), which in turn gives an  $\omega$ -piperidino deriv., yellow, m. 168°. 2,4-Dichloro-10-nitroanthrone, from IV slowly heated to 65° with  $\text{AcOH}$ - $\text{HNO}_3$ , m. 137° (decompn.), is rapidly decomp'd by  $\text{Ac}_2\text{O}$  in cold pyridine. 1,3-Dichloroanthrone (VI), from 1,3- $\text{Cl}_2\text{C}_6\text{H}_3(\text{CO})_2\text{C}_6\text{H}_4$  with Al powder-concd.  $\text{H}_2\text{SO}_4$ , m. 194°; anthranil acetate, m. 200°. 1,3-Dichloro-10-bromoanthrone (VII), m. around 180° (decompn.), 10-anilino deriv., m. 180°. With piperidine, VII, like 10-bromoanthrone itself but unlike V, yields 1,3,1',3'-tetrachloro-10-bromo-10,10'-bianthronyl, decompn. around 220–30°. Again, VI with  $\text{PhCH}_2\text{Cl}$  and  $\text{KOH}$  in boiling water gives 1,3-dichloro-10,10-dibenzylanthrone, m. 232°, like anthrone, while III forms only resinous products. 1,3-Dichloro-9-benzylanthracene, m. 127°, is obtained like the 2,4-isomer and with Br in  $\text{CS}_2$  gives 1,3-dichloro-10-bromo-9-benzylidene-9,10-dihydroanthracene, pale yellow, m. 197° (decompn.) (this and the corresponding deriv. of III are probably tautomeric mixts., with the I form predominating in the I case and the other form in the other), 10-piperidino deriv., m. 148°. 1,3-Dichloro-10-nitroanthrone, m. 154° (violent decompn.), forms with  $\text{Ac}_2\text{O}$ - $\text{C}_6\text{H}_5\text{N}$  an anthranil acetate, light yellow, m. 207°; the nitro derivs. of III and VI thus obey the law that they can be acetylated in pyridine only when there is no Cl atom in the *peri*-position to the  $\text{NO}_2$  group. 3,4,4',5'-Tetrachloro-9-benzophenone-2'-carboxylic acid, from 4,5- $\text{Cl}_2\text{C}_6\text{H}_3(\text{CO})_2\text{O}$ , *o*- $\text{C}_6\text{H}_4\text{Cl}_2$  and  $\text{AlCl}_3$ , m. 183°, is dehydrated by concd.  $\text{H}_2\text{SO}_4$  on the water bath to 2 tetrachloroanthraquinones; the orientation of the Cl atoms in these products was not proved directly, but it is probable that the less sol., pale yellow isomer, m. 348°, is the 2,3,6,7-compd. (VIII), and the other, golden yellow needles, m. 242°, is the 1,2,6,7-compd. (IX). VIII is only very slightly sol. in concd.  $\text{H}_2\text{SO}_4$  at 100° with orange color but easily in oleum

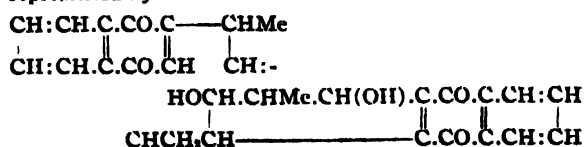


with red color, while IX is easily sol. in cold concd.  $H_2SO_4$ . Both give the anthraquinol test, VIII with some difficulty. Because of its insol., VIII with Al powder- $H_2SO_4$  did not give more than 5% of the anthrone m. 300° (decompn.), even after 6 hrs. at 30–40°. Attempts to obtain the anthrone by reduction and subsequent dehydration of the phthaloyl acid also failed. 3,4-Dimethyl-4',5'-dichlorobenzophenone-2'-carboxylic acid, from 4,5- $Cl_2C_6H_3(CO)_2O$ , *o*-xylene and  $AlCl_3$  in tetrachloroethane, m. 184°, gives chiefly what is almost certainly 6,7-dichloro-2,3-dimethylanthraquinone, m. 305°, reduced by Al powder- $H_2SO_4$  to the anthrone (X), pale yellow, m. 295° (anthranyl acetate, m. 226°); further reduction of the anthrone with Zn dust,  $CuSO_4$  and KOH in water splits off Cl with formation of 6-chloro-2,3-dimethylanthracene, m. 299° (under the same conditions 2,3-dichloroanthrone is smoothly reduced to the anthracene in about 3 hrs. but reduction of the anthraquinone is far from complete even after 50 hrs.; 2-chloroanthracene is obtained in the latter case). 10-Br deriv. of X, decomp. violently 175°, gives with piperidine in cold  $CHCl_3$  a difficultly sol., N-free product behaving like a dianthraquinone. With  $PhCH_2Cl$ ,  $PhCH_2OH$  and KOH in boiling water, X gives both the strongly fluorescent 10-benzylanthranil benzyl ether, m. 188°, and the 10,10-dibenzylanthrone, m. 252°. With  $PhCH_2MgCl$ , X yields the 9-benzylanthracene, yellow, m. 233°, easily converted into a 10-Br deriv., m. 220°. 2,3,6,7-Tetramethylanthracene, m. 299°, is obtained in 15 g. yield from 75 cc  $CH_2Cl_2$  and 100 cc *o*-xylene with  $AlCl_3$  in tetrachloroethane at 60–5°; it is easily converted into the 9,10-di-Br deriv., light yellow, m. 290° (decompn.), and oxidized by  $CrO_3$ -AcOH to the quinone, m. 326°. Contrary to the statements of Morgan and Coulson (C. A. 26, 447), the quinone, if finely divided (by rubbing or pouring a concd.  $H_2SO_4$  soln. into water), is readily reduced by Al powder- $H_2SO_4$  to the anthrone, pale yellow, m. 271° (anthranil acetate, pale yellow, m. 241°). With  $PhCH_2Cl$ ,  $PhCH_2OH$ , KOH and water the anthrone gives the 10,10-dibenzyl deriv., m. 244°; with  $PhCH_2MgCl$ , the 9-benzylanthracene, pale yellow, m. 235°, whose 10-Br deriv., yellow, m. 227°. Of the 16 derivs. of 9-benzylanthracene (XI) with 1 or more Me groups or Cl atoms on the side rings thus far studied, 6 with no  $\alpha$ -substituents behave like XI itself; the 10 others yield Br derivs. with a reactive Br atom, although the 1-Cl compd. also yields the normal 10-Br compd. 1,5-Dichlorobenzophenone-2-carboxylic acid, from 4,5- $Cl_2C_6H_3(CO)_2O$ , benzene and  $AlCl_3$  in tetrachloroethane, m. 208°, is dehydrated by concd.  $H_2SO_4$  to 2,3-dichloroanthraquinone, m. 265°, which with  $PhCH_2MgCl$  yields the 9-benzylanthracene, pale yellow, m. 164°, whose 10-Br deriv., light yellow, m. 169°. Zn dust (activated with  $CuSO_4$ ) and KOH reduce the anthrone to the anthracene. *o*-2-Fluorophenylbenzoic acid, m. 229°, from fluorene and I with  $AlCl_3$ , is reduced by Zn dust,  $CuSO_4$ ,  $NH_4OH$  and KOH in water to 2'-fluorophenylmethane-2-carboxylic acid, m. 190°, dehydrated by  $ZnCl_2$  at 180–90° to *lin*-indenanthrone, m. 207° (anthranil acetate, m. 203°); Br deriv., decomp. about 190°. With  $CrO_3$ -AcOH the anthrone gives *lin*-phthalofluorene, yellow, m. 269°, forms a red vat with alk.  $Na_2S_2O_4$  and is oxidized by  $CrO_3$  in AcOH- $H_2SO_4$  to the fluorenone, m. 367°, of Ullmann and Dasgupta (C. A. 8, 1584). With Zn dust,  $CuSO_4$  and NaOH the anthrone is smoothly reduced to *lin*-naphthofluorene, m. 317°, sol. in benzene with light blue, in concd.  $H_2SO_4$  with light green fluorescence, forms a di-Br deriv., m. 245° (deep seated decompn.), which does not visibly fluoresce either in benzene or in the green  $H_2SO_4$  soln. *o*-2-Fluorovindichlorobenzoic acid, from fluorene, 3,6- $Cl_2C_6H_3(CO)_2O$  and  $AlCl_3$ , m. 172°, is reduced by Zn dust,  $CuSO_4$ , KOH and  $NH_4OH$ , to a compd., m. 218°, whose compn.,  $C_{21}H_{14}Cl$ , indicates that a Cl atom has been split off. Addendum - *lin*-Benzofluorene had been synthesized from fluorene and succinic anhydride (cf. Koclsch, C. A. 27, 5070) some time ago; the results were almost completely identical with those of K. C. A. R.

Coloring constituents of alkanet root (*Anchusa tinctoria*, Lam.): I. Constitution of alkanin. II. Constituents

of the wax from alkanet root. Mangesh V. Betrahnet and Gopal Chandra Chakravarti. J. Indian Inst. Sci. 16A, 41–51, 52–3 (1933).—Powd. alkanet root was completely extd. with petr. ether. The residue from the concn. of the petr. ether was extd. with  $CHCl_3$ , and the viscous mass, left by the  $CHCl_3$ , was treated with cold  $Me_2CO$ . After removing the  $Me_2CO$ , the residue was extd. with 5% NaOH. The resulting soln. was partly neutralized by HOAc and finally by HCl, and a sticky mass pptd. The NaOH, and subsequent, procedure was twice repeated and the final residual solid was extd. with  $C_6H_6$ . A 1.2–1.5% yield of a dark red powder, alkanin (I), resulted. With fused NaOH and excess  $Ac_2O$  for 5 hrs. at 140° I gave a 70–80% yield of a tetra-Ac deriv.,  $C_{40}H_{34}O_{12}$  (II), brown crystals from HOAc. It decompd. at high temps., is sol. in AcOEt, and in  $Me_2CO$ , and is insol. in MeOH, EtOH, anil. alic.,  $Et_2O$ , and  $C_6H_6$ . After hydrolysis with KOH, in MeOH, and acidification, II gave I,  $C_{40}H_{34}O_{12}$ , a violet-red cryst. powder, shrinks 180°, and decomp. 220°. I, refluxed with aq. KOH and  $Me_2SO$ , gave a solid upon acidification; extn. with  $CHCl_3$ , and treatment with HOAc yielded brown crystals of dimethoxyalkannin (III),  $C_{40}H_{34}O_8(OMe)_2$ . BrCl in  $C_6H_5N$  with I gave brown crystals, from EtOH, of tetrabenzoylalkannin,  $C_{40}H_{34}O_8Bz_4$ . With  $NH_4OH$ -BaCl<sub>2</sub>, I, in abs. EtOH, gave blue ( $C_{40}H_{34}O_8$ )<sub>2</sub>Ba, insol. in  $H_2O$ , EtOH, and  $Et_2O$ . The K deriv. of I with  $PhCl$ , gave ( $C_{40}H_{34}O_8$ )<sub>2</sub>Ph. III, benzoylated in  $C_6H_5N$ , gave  $C_{40}H_{34}O_{10}$ , a dimethoxydibenzoylalkannin, brown crystals from HOAc. I, in  $C_6H_5N$ , was warmed for 2 hrs. at 100° with  $ClCO_2Et$ , and with HCl dicarbethoxyalkannin,  $C_{40}H_{34}O_8(OC_2H_5)_2$ , scpd., deep brown needles from dil. HOAc, decomp. 270°, and is hydrolyzed readily with dil. alkali. Dry Br<sub>2</sub> vapor on I gave a viscous mass, which, when washed with EtOH, dissolved in AcOEt, and filtered into petr. ether, gave hexabromoalkannin,  $C_{40}H_{34}O_8Br_6$ , a deep brick-red cryst. powder from HOAc, decomp. upon heating. I, treated with Br<sub>2</sub> in HOAc and kept at room temp. for 12 hrs., gave a ppt. with  $H_2O$ . Some of the ppt. was sol. in  $Et_2O$ . Tetrabromoalkannin,  $C_{40}H_{34}O_8Br_4$ , a brick-red powder from HOAc, blackened at 260°. The ether-insol. part was dibromoalkannin,  $C_{40}H_{34}O_8Br_2$ , red aggregates from HOAc. In HOAc at 100° for 3 hrs., Br<sub>2</sub> acted upon I, giving the hexa-Br compd. II was dissolved in HOAc and slowly treated with Br in HOAc at 100° for 1 hr. With  $H_2O$  a brown ppt. formed. This was extd. with  $CS_2$ ; the residue in HOAc plus 1 drop  $H_2O$  pptd. brown granular tetraacetyltetrabromoalkannin,  $C_{40}H_{34}O_8Br_4Ac_4$ , decomp. at about 280°. I was treated with  $HNO_3$  (d. 1.5) at 0°, and slowly warmed to room temp. Ice was added, and a part of the product dissolved. The insol. portion was a red-brown cryst. powder, from EtOH, m. 287°, with explosion. The structure has not yet been detd. The aq. filtrate was evapd. and the residue was extd. with  $Et_2O$ , which left, as a powder, colorless needles, m. 101°, from EtOH. This is ( $CO_2H$ )<sub>2</sub>. No definite compd. was isolatable from the  $Et_2O$  soln. I was treated with  $HNO_3$  (d. 1.2) for 48 hrs. at 100°, and  $H_2O$  pptd. an orange compd., prismatic crystals from HOAc, m. 297° (decompn.). The filtrate, evapd. and extd. with  $Et_2O$ , left a white powder from which ( $CO_2H$ )<sub>2</sub> was isolated. The ether soln. contained ( $CH_3CO_2H$ )<sub>2</sub>. II, in  $Ac_2O$ , was treated with  $HNO_3$  (d. 1.5) in  $Ac_2O$  and cooled. After 12 hrs.  $H_2O$  pptd. a red-brown cryst. powder,  $C_{40}H_{34}O_8N_2$ , dinitrotriacetylalkannin, from  $Ac_2O$ , blackens at 260°. I distd. *in vacuo* with Zn dust gave a yellow product from which  $\beta$ -methylanthracene, m. 198–200°, was isolated by dissolving in  $C_6H_6$ , washing with  $Na_2CO_3$  and with NaOH, evapg. and treating with EtOH.

A continuation of the research is in progress. I is best represented by



The petr. ether ext. of alkanet root was evapd. and treated with  $\text{Me}_2\text{CO}$ , leaving a reddish white wax. This was purified by soln. in  $\text{MeCOEt}$  and by refluxing with bogue-black for 4 hrs. Concn. of the filtrate gave white flakes, from  $\text{AcOEt}$  m.  $78^\circ$  (yield 0.18–0.2%),  $d^{20}_D$  0.9876,  $n^{20}_D$  1.488, sapon. no. 60.16, acid no. 12.92, unsaponifiable matter 58.56, I no. 12.2, mol. wt. of mixed acids 380. After sapon. by alc.  $\text{NaOH}$ , the soap was extd. with  $\text{Et}_2\text{O}$ ; the residue, acidified with  $\text{HCl}$ , gave 2 acids: one, m.  $68^\circ$ , is of undetd. nature; the other, m.  $76^\circ$ , is cerotic acid. The  $\text{Et}_2\text{O}$  ext. of the soap was evapd. and the residue, recrystd. from  $\text{EtOH}$ , m.  $68^\circ$ . It is carnaubyl alc. On oxidation with  $\text{CrO}_3$  in  $\text{HOAc}$  it gave a white solid, m.  $72^\circ$ , from  $\text{Et}_2\text{O}$ , which is carnaubic acid. Hence, the wax is chiefly carnaubyl cerotate.

G. Albert Hill

**Rotenone**, the active constituent of derris root. **XI**. **Rotenone resin**. Determination of rotenone and deguelin in rotenone resin. Sankichi Takei, Shikiro Miyajima and Minoru Ono. *Ber.* 66B, 1826–33 (1933); cf. *C. A.* 27, 3212; Clark and Claborn, *C. A.* 27, 80, and earlier papers. — The so-called rotenone resin (I) which accompanies cryst. rotenone (II) in derris exts. has about the same physiol. action on animals as II itself. Of the various cryst. substances which have thus far been isolated from I, only II and deguelin (III) are toxic. I–III, obtained in 15 g. yield from 300 g. I in ether shaken out twice with 2%  $\text{NaOH}$ , then washed with dil.  $\text{H}_2\text{SO}_4$  and water, kept over  $\text{Na}_2\text{SO}_4$  and repeatedly recrystd. from alc., m.  $160^\circ$ ,  $[\alpha]^{20}_D$  –23.22° (benzene), depresses the m. p. of II to  $140$ – $50^\circ$ , is not hydrogenated by H and Pd– $\text{BaSO}_4$  in alc. alkali but is racemized; oxime, m.  $220^\circ$ ; isoxime, m.  $160^\circ$ , gives a deep blue color with  $\text{FeCl}_3$ . Dihydrodeguelin (IV), from III in  $\text{AcOEt}$  with H and Pd– $\text{BaSO}_4$ , m.  $170^\circ$ , is identical with the  $\beta$ -dihydrorotenone obtained by Clark from isodihydrorotenone with concd.  $\text{H}_2\text{SO}_4$ . Application to III of the process for obtaining rotenolone from II gave deguelinol I (tephrosin), m.  $197^\circ$ , and II (isotephrosin), m.  $251^\circ$ , which with alc.  $\text{H}_2\text{SO}_4$  lose 1 mol.  $\text{H}_2\text{O}$  and yield dehydrodeguelin, m.  $227^\circ$ , and this in boiling alc. KOH takes up 2 mols.  $\text{H}_2\text{O}$  to form deguelinic acid, m.  $177^\circ$ . Sapon. of III, as in the prepn. of tubaic acid from II, yields  $\beta$ -tubaic acid, m.  $161^\circ$ , which gives an intense violet color with alc.  $\text{FeCl}_3$  and with H and Pd– $\text{BaSO}_4$  in  $\text{AcOEt}$  forms a *dshydro deriv.*, m.  $170^\circ$ , giving a red-violet color with alc.  $\text{FeCl}_3$  and also obtained by hydrolysis of IV. III in concns. of 0.02–0.002% is about half as toxic to the mud fish (*Cobitis fossilis*) as II, and in concns. of 0.001–0.0001% it is only  $1/10$  to  $1/100$  as active as II; I in high concns. is about as toxic as II but its toxicity decreases with diln. much more rapidly than that of II. Dehydrorotenone (V) and dehydrodeguelin (VI), which are formed quantitatively by the oxidation of II and III, resp., under certain conditions, crystallize with extreme ease and are very difficultly sol. in various solvents, and only V undergoes the isodihydro reaction, yielding quantitatively the alkali-sol. isodihydrodehydrorotenone, while VI remains unchanged. By means of these 2 reactions it is possible to det. quantitatively the II and III content of derris preps.; on 7 preps. the following results were obtained: total ether ext. 15.14–21.22, cryst. II 0–6.58, I 15.14–21.87, rotenolone and deguelinol in I 0–0.58, II in I 0.97–4.74, III in I 3.90–8.64, total II 0.97–7.75, total III 3.90–9.63%.

C. A. R.

**The work of Paresch Chandra Dutta: indigoid dyes.** **III**. R. Tobler. *Ber.* 66B, 1757 (1933); cf. D., *C. A.* 27, 5332. — Indigoid dyes from 1,2-naphthoxythiophenes and isatins, as also from acenaphthenequinone, had already been described in Ger. pat. 453,087 (U. S. pat. 1,679,277, *C. A.* 22, 3786).

C. A. R.

**2-Benzoylimidazole**. Adolf Sonn and Paul, Greif. *Ber.* 66B, 1900–3 (1933). — Oddo and Mingoa (*C. A.* 23, 1641) assign the structure of 2-benzoylimidazole,  $\text{C}_{10}\text{H}_7\text{ON}_2$  (I), to the compd. (II), m.  $202$ – $3^\circ$ , obtained from imidazolylmagnesium bromide with  $\text{BzCl}$  and by Bamberger and Berlé (*Ann.* 273, 351 (1903)), who describe it as bis(benzoylamino)ethylene,  $\text{C}_{10}\text{H}_{10}\text{O}_2\text{N}_2$ , from imidazole with  $\text{BzCl}$  and  $\text{NaOH}$ . S. and G. have prepd. the true I by oxidation of 2-benzylimidazole (III) with  $\text{CrO}_3$

in boiling  $\text{AcOH}$  and find it m.  $161$ – $2^\circ$ , depresses the m. p. of II to  $148$ – $52^\circ$  and on bromination gives a 4,5-di-Br deriv. m.  $218$ – $20^\circ$  instead of O. and M.'s compd. m.  $255^\circ$ . In the bromination there are also formed red needles, m.  $117$ – $20^\circ$ , of a 1-bromo-2-benzoylimidazole perbromide,  $\text{C}_{10}\text{H}_5\text{ON}_2\text{Br}_3$ , which regenerates I with cold  $\text{NaHSO}_3$ . 2-Benzylimidazole-4,5-dicarboxylic acid (80 g. from 125 g. tartaric acid converted with red fuming  $\text{HNO}_3$  and concd.  $\text{H}_2\text{SO}_4$  into dinitrotartaric acid, filtered, dried *in vacuo* over KOH, taken up in ice water, extd. with ether and treated in the ether ext. with  $\text{PhCH}_2\text{CHO}$  and satd. alc.  $\text{NH}_3$ ) decomps.  $248^\circ$ ; 30 g. of the acid, heated with 150 g. anthracene at  $300^\circ$  until the evolution of  $\text{CO}_2$  ceases, gives 13–18 g. III, m.  $125$ – $6^\circ$ ; picrate, yellow, m.  $172^\circ$ . 2-Imidazolylphenylcarbinol (1 g. from 1.7 g. I with H and Pd in  $\text{AcOH}$ ), m.  $199$ – $201^\circ$ . C. A. R.

**Thiazoles.** **XIX**. **Synthesis of 2-(m-nitrophenyl)-benzothiazolyl p,p'-disulfide**. Marston T. Bogert and Richard B. Conklin. *Collection Czechoslov. Chem. Communications* 5, 443–7 (1933); cf. *C. A.* 26, 4815–4, 3- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_4\text{COCl}$  (22 g.) and (*o*- $\text{NH}_2\text{C}_6\text{H}_4\text{S}_2\text{Zn}$  (15.7 g.), after being heated 1 hr. on a steam bath, gave upon extn. with dil.  $\text{NaOH}$  2-(m-nitro-p-chlorophenyl)benzothiazole (I), m.  $105.5$ – $6.5^\circ$  (76% yield). I (17.43 g.), refluxed with 108 g. technical  $\text{Na}_2\text{S}$  in 300 cc.  $\text{EtOH}$  and 1.44 g. powd. S, gave 2-(m-nitrophenyl)benzothiazolyl p,p'-disulfide, yellow, m.  $292$ – $3^\circ$  (decompn.).

Julius White

**Homarine**, a hitherto unknown animal base. F. A. Hoppe-Seyler. *Z. physiol. Chem.* 222, 105–15 (1933). — The trigonelline isomer, isolated from lobster, Noah's ark and *Arbatia pustulosa*, is the methylbetaine of picolinic acid and is now designated *homarine*. When heated at  $200^\circ$  with concd.  $\text{HCl}$  it yields picolinic acid. Unlike trigonelline it gives the pine-shaving reaction which distinguishes  $\alpha$ - from  $\beta$ - and  $\gamma$ -pyridine derivs. The following salts of homarine are described: *HCl*, decomposes  $170$ – $5^\circ$ , *regular chloroaurate* (1:1), m.  $188$ – $90^\circ$ , *irregular chloroaurate* (4:3), m.  $138$ – $41^\circ$ , *chloroplatinate*, m.  $197$ – $8^\circ$  (decompn.), *picrate*, m.  $155$ – $60^\circ$  (decompn.), *Et ester chloroplatinate*, m.  $199$ – $206^\circ$  (decompn.). For purposes of comparison homarine was prepd. synthetically by methylation of picolinic acid with  $\text{Me}_2\text{SO}$  and  $\text{Ba}(\text{OH})_2$ . The salts of the synthetic product showed the same m. ps. as those of the natural homarine. The 2nd isomer, the methylbetaine of isonicotinic acid, was prepd. in the same manner by methylation of isonicotinic acid ( $\gamma$ -pyridine-carboxylic acid). This formed a *HCl salt*, m.  $255$ – $60^\circ$  (decompn.), *regular chloroaurate*, m.  $233$ – $4^\circ$  (decompn.), *chloroplatinate*, m.  $222$ – $3^\circ$  (decompn.), and *picrate*, m.  $215$ – $7^\circ$ , and was therefore not identical with homarine. Although trigonelline is widely distributed in plants and occurs also in animals, homarine has thus far been found only in animals. Its possible derivation from lysine, arginine, citrulline, ornithine, proline and glutamic acid by simple chem. reactions is pointed out.

A. W. Dow

**Pyrimidines: their amino and aminooxy derivatives** Treat B. Johnson and Dorothy A. Hahn. *Chem. Rev.* 13, 193–303 (1933). — A review with numerous references.

Louise Kelley

**Alkaloids of the cactus Trichocereus candicans Br. and Rose**. L. Reti. *Compt. rend. soc. biol.* 114, 811–14 (1933). — The fresh plant (approx. 95% water) contains 0.05% each of hordenine (anhaline) and p-HOC $\text{C}_6\text{H}_4\text{CH}_2\text{CH}_2\text{NMe}_2\text{OH}$ , also traces of other alkaloids. L. E. G.

**Cichoriin and the constitution of esculin and scopolin** K. W. Merz. *Arch. Pharm.* 271, 449 (1933). — Supplemental to an earlier paper (cf. *C. A.* 27, 3685), the formula proposed for esculin as *O*-gluco-6,7-dihydroxycoumarin was first accepted by Head and Robertson, and later corroborated by Macbeth. Seka and Kallir showed that the 6-hydroxy-7-methoxycoumarin is identical with the hydrolytic product of methylated esculin; they found subsequently that, contrary to statements of Glaser and Kraus, in the introduction of the glucose residue in 6,7-dihydroxycoumarin no esculin but rather an isomeric glucoside is formed, identical with the natural glucoside cichoriin, and that scopolin is its Me ether. W. O. E.

The identity of corynantheine and the amorphous alkaloid extracted from *Pseudocinchona africana*. Raymond-Hamet. *Compt. rend.* 197, 860-2 (1933).—An amorphous alkaloid extd. by Fourneau (1929) and by R.-H. from *Pseudocinchona africana* is identical with one extd. from yohimbine by Karrer and Solomon (*C. A.* 21, 588).

W. Gordon Rose

**Hedyotine**, an alkaloid from the root of *Hedyotis auricularia*. B. B. Dey and S. Lakshminarayanan. *Arch. Pharm.* 271, 485-90 (1933).—The root of *H. auricularia* contains the alkaloid "hedyotine" (I),  $C_{18}H_{22}O_4N_2$ ; the free base is golden yellow and, when freshly prepd., is stable when suspended in  $H_2O$ , but changes rapidly on drying. Meyer's reagent and silicotungstic acid afford the most delicate tests for the alkaloid. Of the 2 N atoms, only 1 possesses basic properties. *I.HCl*,  $C_{18}H_{22}O_4N_2Cl$ , m. about 250° (decompn.); *nitrate*, m. about 252° (decompn.); *picrate*, deep yellow prisms practically insol. in the usual org. solvents, m. 205° (decompn.); *aurate*, bright yellow powder, m. 305 10° (decompn.); *platinate*,  $I.HCl \cdot 0.5PtCl_4$ , yellow; *tetrachloroiodide*, pale yellow, m. 167 70° (decompn.). The alkaloid contains no OMe groups.

W. O. E.

**Lupine alkaloids. VIII. Synthesis of  $\beta$ -lupinine.** K. Winterfeld and F. W. Holschneider. *Ber.* 66B, 1751 6 (1933); cf. *C. A.* 27, 725.—Although the work of W. and H. on the constitution of lupinine indicated clearly that the  $CH_2OH$  side chain is on C atom 1 (Stelzner notation for quinolizine, with N = 10), Clemo and Raper suggested recently that it might be on another C atom 3. W. and H. have accordingly synthesized a 1-methylated norlupinine ring, which proved to be identical with "natural"  $\beta$ -lupinine (I), thus confirming their earlier work.  $CH_3(CH_2Br)_2$  was converted with  $NaOEt$  into  $Br(CH_2)_4OEt$  and the latter treated with Mg and  $\alpha$ - $C_6H_5NCOMe$  (II), giving  $\alpha$ -pyridyl( $\omega$ -ethoxypropyl)methylcarbinol (III) (8.2 g from 8.2 g. of the ketone),  $b_p$  142 4°, stable to  $KMnO_4$ , whose  $HCl$  salt was hydrogenated in abs. alc. with  $Pt(O_2)_4$  black to the *piperidyl* compd. (IV),  $b_p$  152 3° (yield, almost quant.), and this with boiling  $H_2$  yielded I,  $b_p$  16 7° (III salt, m. 261 2°; *picrate*, m. 163°; chloroaurate, m. 143-4°).  $Br(CH_2)_4OPh$ ,  $b_p$  125-8°, with Mg and II gave, instead of the analog of III, 1,6-diphenoxyhexane, m. 83°, almost exclusively. With  $PBr_3$ , IV likewise gave a product with a lupinine-like odor but the yield was materially smaller than with III.

C. A. R.

**Mitragyna and its alkaloids.** Raymond-Hamet and L. Millat. *Bull. sci. pharmacol.* 40, 593 600 (1933).—The botanical description of different species is given. *M. purifolia* contains a gum, resin, wax and 0.15% of a cryst. alkaloid. *M. rotundifolia* contains 0.27% of the alkaloid mitravarsine, m. 237°, easily sol. in acids and alkali. It contains 2 MeO groups and has probably the formula  $C_{22}H_{26}O_4N_2$ . The  $HCl$  salt m. 208 10°. *M. perica* contains an amorphous alkaloid *mitragynine*, m. 102 6°. It can be distd. at 5 mm. pressure between 230-40°. It is prepd. by means of the cryst. *picrate*, m. 223-4°. The  $HCl$  salt m. 243°, the acetate m. 142° and the trichloroacetate m. 157°. The pharmacol. action of the alkaloid is reviewed and the reactions with the usual alkaloid reagents are described.

A. E. Meyer

**Chemical investigation of *Toddalia aculeata* Pers. I. Two new alkaloids and a neutral crystalline substance from the root bark of *T. aculeata*.** B. B. Dey and P. Parameswaran Pillay. *Arch. Pharm.* 271, 477-85 (1933).

*T. aculeata* (Hindu: Janglikalmirch; Tamil: Milakutani) is a climbing shrub occurring in the lower Himalaya and in west and southern India. The entire plant but especially the root bark finds use in medicine as a tonic, stimulant and antipyretic, the last-named action being greater than that of quinine, its tonic effect greater than that of Calumba. Its utility in malaria is now questioned. Contrary to the finding of Perkin and Hummel berberine does not occur in the plant. The root bark does contain, however, 2 alkaloids: *toddaline* (I), a tertiary colorless monacid base,  $C_{26}H_{34}NO_4$ , m. 269-70°, totally insol. in hot  $H_2O$ , in contrast to both modifications of berberine, almost insol. in abs. alc. This base like berberine contains 2

OMe groups, but no *N*-Me group. The other alkaloid, *toddalinine* (II),  $C_{18}H_{24}O_4N \cdot 0.5H_2O$ , m. 180-200° (decompn.), is a very strong base, passing readily on manipulation of its  $HCl$  salt into an isomeric non-basic substance of like compn.; it contains a OMe and a NHMe group. Both alkaloids are apparently closely related and probably belong among the alkaloids of the berberine group. The  $MeOH$  ext. of the root bark yielded *toddaline* 0.1-0.12, *toddalinine* 0.1, lactone 0.8, resin 7.0, glucoside (crude) 0.8, fatty oil 3.0, lac-like substance 0.1%. The following substances are more particularly described: *lactone*,  $C_{18}H_{22}O_6$ , rhombic prisms m. 132 132.5°; I, first isolated as white amorphous powder m. 255-8°, slowly changing on evap. its  $CHCl_3$  soln. into needles, which after washing with  $EtOAc$  m. 269 70°; the crude alkaloid undergoes a remarkable change on treatment with abs. alc. and rubbing with a drop of strong  $NH_3$ , thereby yielding a white cryst. powder m. 204-6°, apparently another form of the alkaloid; it gives the same  $HCl$  salt as the pure base m. 269-70°; I.  $HCl$  contains 1 mol.  $H_2O$ , yellow needles m. 205 6° (*aurate*, m. 201 2°; *platinate*, m. 254 6°; *picrate*, m. 237 8°; *nitrate*, m. 235-9° (decompn.); *sulfate*, m. 236 9° (decompn.)). II yields salts for the most part insol. (acetate excepted) in  $H_2O$  and alc. II.  $HCl$ , bright yellow needles, m. 283 5° after losing 2 mols.  $H_2O$  of crystn. at 110°; *platinate*,  $(C_{18}H_{24}O_4N)_2 \cdot H_2PtCl_6$ , orange-yellow, m. about 280 5°; *aurate*, yellow, m. 231 2° (decompn.); *picrate*, bright yellow, m. 230 5° (decompn.). The relative behavior of the 2 alkaloids and berberine, when treated with various alkaloidal reagents, is appended.

W. O. E.

**Sempervirine, oxygen-free alkaloid of *Gelsemium sempervirens*.** V. Hasenfratz. *Bull. soc. chim.* 53, 1084-7 (1933).—See *C. A.* 27, 5333.

G. G.

**The constitution of the glucosides. VII. Glucoside of *Sanguisorba officinalis*.** Shigehiro Abe and Munio Kotake. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 44 8 (1933).—See *C. A.* 28, 1861.

G. G.

**Vegetable cardiac poisons. I. The constitution of uzarin.** R. Tschesche. *Z. physiol. Chem.* 222, 50 7 (1933).—Uzarin, the aglucone of uzarin, a glucoside present in the root of an African species of *Gomphocarpus*, is shown to contain the same C skeleton as the genins from digitalis glucosides. Hydrolysis of uzarin does not yield the genin as such but splits off 2  $H_2O$  to form an  $\alpha$ -dianhydrouzarin, m. 263-5°. Catalytic hydrogenation of the acetate then sat. 3 double bonds and yields a mixt. of  $\alpha$ -hexahydrodianhydrouzarin *acetate*, m. 248°,  $[\alpha]_D^{25}$  3.9°, and its  $\alpha$ -isomer, m. 205°,  $[\alpha]_D^{25}$  20.2° sepd. by fractional crystn. Hydrolysis of the acetates gave  $\alpha$ -hexahydrodianhydrouzarin (I), m. 217°,  $[\alpha]_D^{25}$  11.4°, and the  $\alpha$ -isomer (II), m. 230°,  $[\alpha]_D^{25}$  20.2°. Oxidation of I with  $CrO_3$  in  $AcOH$  converted the tertiary alc. grouping into  $CO$ , yielding the  $\alpha$ -ketone, m. 248-9°,  $[\alpha]_D^{25}$  39.3° (*oxime*, decomp. 275 8°), which was reduced by  $Hg-Zn$  to the  $\alpha$ -lactone, m. 178°,  $[\alpha]_D^{25}$  11.3°. Oxidation of I by  $CrO_3$  at a higher temp., sepn. of the acid and neutral products, and further oxidation of the latter, gave the  $\alpha$ -lactonedicarboxylic acid, m. 270°,  $[\alpha]_D^{25}$  37.6° (*di-Me ester*, m. 134-5°,  $[\alpha]_D^{25}$  18.7°). By similar procedures the  $\alpha$ -ketone, m. 216-7°,  $[\alpha]_D^{25}$  42.5° (*oxime*, decomp. 251 3°),  $\alpha$ -lactone (III), m. 180°,  $[\alpha]_D^{25}$  24.3°, and  $\alpha$ -lactonedicarboxylic acid (IV), m. 245-6°,  $[\alpha]_D^{25}$  38.5° (*di-Me ester*, m. 146-7°,  $[\alpha]_D^{25}$  25°) were obtained. Distn. of IV with  $Ac_2O$  gave the *pyroktonone*, m. 215°,  $[\alpha]_D^{25}$  150.9° (*oxime* decomp. 248-50°). From the pyridine mother liquor of the crude dianhydrouzarin,  $\beta$ -dianhydrouzarin, m. 236-7°,  $[\alpha]_D^{25}$  4.95° (*acetate*, m. 167-8°,  $[\alpha]_D^{25}$  4.9°), was obtained in small yield. This likewise took up 3  $H_2$  on catalytic hydrogenation. III gives no m.-p. depression with the octahydrotrianhydroperiplogenin of Jacobs, and both are crystallographically identical. The structural differences between the aglucones of heart poisons from various sources are due merely to the no. and position of OH groups on the same C skeleton. II. The dehydrogenation of uzarin with selenium. (Preliminary paper.) R. Tschesche and H. Knick. *Ibid.* 58-62.—Dehydrogenation of uzarin with Se at 320-40° yields a hydrocarbon  $C_{18}H_{16}$ , m. 124-5°, which is identical with



groups was detd. by the Van Slyke method. Below are the increases, in percentage of the original values, after heating 24, 72, 120 and 216 hrs., resp.: I, 0, 11.0, 12.8, 17.1; II, 10.2, 21.3, 25.9, 35.2; III, 4.3, 11.4, 17.1, 24.3; IV, 7.2, 18.8, 29.5, 42.8. This would indicate that in a series of polypeptides of analogous structure the velocity of hydrolysis increases as the chain is lengthened up to a certain point but tends to a const. value as the chain is still further lengthened; in any case there is nothing to indicate that polypeptides become more resistant to hydrolysis as the length of the chain is increased. That with gelatin hydrolysis becomes detectable only quite late may perhaps be due to the fact that immediately after soln. more or less intact gelatin micelles may still be present in the hot soln. and the peptide unions are for a time protected to a certain extent from hydrolytic attack. C. A. R.

**Crystalline chlorocruorin.** H. M. Fox and J. Roche. (*Compt. rend.* 197, 874-6 (1933).—Elementary analyses and absorption spectra of chlorocruorin are reported.

W. Gordon Rose

**The bile acids.** XLI. Martin Schenck. *Z. physiol. Chem.* 222, 131-8 (1933); cf. *C. A.* 28, 1664.—In the conversion of the blue nitroso compd.  $C_{26}H_{47}NO_3$ , obtained from the dioxime of bilianic acid by  $HNO_3$  treatment whereby 1 oxime is split off and the other rearranged, into biloidic acid by further  $HNO_3$  treatment, a colorless intermediate product seps. in gelatinous form. This product is neither a ketonitrilic acid nor the corresponding acid amide but a *nitro deriv.*  $C_{26}H_{45}NO_3$ , decomp. 250° 8°. With  $Ph_2NH$  and  $H_2SO_4$  it gives an intense blue color. The same substance may be obtained by treatment of the blue nitroso deriv.  $C_{26}H_{47}NO_3$  with  $HNO_3$ . Excess of 10%  $NaOH$  at room temp. converts it into bilianic acid.  $HNO_3$  at water-bath temp. converts it into biloidic acid, and  $Zn-AcOH$  reduces it to the 7-monoxime of bilianic acid. In this last reaction the formation of a transient blue color was not observed, probably because the intermediate nitroso deriv. immediately passes into the same. The nitroso deriv. was, however, obtained by treatment of the oxime with  $HNO_3$ . A. W. Dox

**An oxidation product of  $\alpha$ -ergosterol.** Th. Achternann. *Z. physiol. Chem.* 222, 70-2 (1933).—Oxidation of ergosterone by  $CrO_3$  in  $AcOH$  gave 25% of an unsatd. diketone,  $C_{28}H_{44}O_2$ , m. 183°,  $[\alpha]_D^{25}$  105.9°, and not the  $\alpha$ -diketone product described by Heilbron (*C. A.* 26, 4340). Catalytic hydrogenation of the diketone gave  $\alpha$ -ergosterol. This oxidation product therefore retains the original C skeleton of ergosterol. The oxidation consists merely in the conversion of a  $CH_2$  at  $C_7$  or  $C_{11}$  to  $CO$ .

A. W. Dox

**Glucosides of digitalis (Léger) 17.** Thermal decompn. of certain triphenylmethyl alkyl ethers (Norris, Cresswell) 2. Dipole moments of the chlorobenzophenone oximes (Parsons, Porter) 2. Kinetics of diazotization (Abel, et al.) 2. Pseudobatoms and isosteric compds. (Prkenmeyer, Leo) 2. Biochemistry of molds. III. Metabolic product of *Aspergillus melles* Yukawa (Nishikawa) 11D. Addn. reactions with H and O atoms (Geib, Hartek) 6. Biochemistry and physiology of glucuronic acid (Pryde, Williams) 11A. Transformation of cyclopentanone into its dimeride (Barrett, Burrage) 2. Relationship between chem. constitution and physiol. action (Lasson, Stedman) 11A. Ultra-violet absorption of alkylcyclohexanones and allylcyclohexanones (Ramiart-Lucas, Cornuclert) 3. Ultra-violet absorption of substances contg. 2 benzene nuclei (Chaix) 3. Kinetics of the reaction of sulfonation and monosulfonation of naphthalene (Ioffe) 2. Phosphorous and phosphoric acid esters (U. S. pat. 1,930,985) 18. Solvents (Fr. pat. 763,801) 13. Oxidation catalyst (U. S. pat. 1,937,381) 18.

**Hydrocarbons.** I. G. Farbenind. A.-G. (Hermann Zorn and Friedrich Vogel, inventors). Ger. 579,565, June 29, 1933. High-boiling hydrocarbons are converted into lower-boiling forms by hydrogenation under pressure in the presence of catalysts consisting of carbonyl compds. of metals of the 6th group of the periodic system, alone,

mixed, or mixed with carbonyl compds. of the 8th group. Carbonyls of W and Mo are mentioned.

**Hydrocarbons.** I. G. Farbenind. A.-G. (Hans Krzika and Werner Wolff, inventors). Ger. 583,536, Sept. 5, 1933. Crude hydrocarbons are purified by treatment with  $\alpha,\beta$ -unsatd. aliphatic carbonyl compds. such as maleic anhydride.

**Hydrocarbons.** I. G. Farbenind. A.-G. Fr. 754,000, Oct. 28, 1933. Gaseous hydrocarbons are transformed into hydrocarbons having a double bond and the mols. of which contain less H than the original hydrocarbons by heating them to 570-1200° under practically normal pressure and in the presence of a small amt. of a gas contg. free O.

**Aromatic hydrocarbons.** I. G. Farbenind. A.-G. Brit. 397,901, Aug. 28, 1933. Aromatic OH compds. in the vapor phase are circulated with H under pressure over customary catalysts, the time of contact being so short that a substantial part, preferably 10-40%, of the OH compd. remains unconverted. Examples are given of the conversion into corresponding hydrocarbons of (1) PhOH, over Mo sulfide, (2) the crude phenolic oil mixt. obtained by dephenolizing low-temp. carbonization water from brown coal over a pressed mixt. of graphite and W sulfide and (3) crude cresol, over V sulfide.

**Heat treatment of hydrocarbons.** I. G. Farbenind. A.-G. Fr. 750,869, Aug. 21, 1933. In processes, such as the conversion of aliphatic to aromatic hydrocarbons, polymerization of  $C_2H_4$  and its homologs and  $C_2H_2$ , splitting or destructive hydrogenation of oils, etc., the substances to be heated are enclosed in a vessel interiorly coated with a metal, particularly Cr, Mo, Fe or Pb, obtained by decompn. of a volatile compd. of the metal. Alkyl or CO compds. of the metal or volatile chlorides may be used.

**Apparatus for the high-pressure heat-splitting of hydrocarbons.** Sigbert Seelig. Ger. 579,502, June 27, 1933. **Oxidizing hydrocarbons.** I. G. Farbenind. A.-G. (Christoph Beck and Heinrich Diekmann, inventors). Ger. 579,988, July 3, 1933. Solid or liquid non-aromatic hydrocarbons, waxes, etc., are oxidized by treatment with  $HNO_3$  at high temps., the amt. of  $NO_2$  in the reaction mixt. being kept at a high value by increasing the pressure or by leading in  $NO_2$ .

**Stabilizing chlorinated hydrocarbons.** The Roessler & Hasslacher Chemical Co. Brit. 397,915, Sept. 4, 1933. See Fr. 732,569 (*C. A.* 27, 304). Amylene is excluded. Brit. 397,914, Sept. 4, 1933, is confined to the use of amylenes.

**Recovery of unsaturated hydrocarbons from gaseous mixtures.** Martin Müller-Cunradi, Otto Eisenhut and Heinrich Schilling (to I. G. Farbenind. A.-G.). U. S. 1,938,083, Dec. 5. A gaseous mixt. contg. unsatd. hydrocarbons, such as a mixt. contg.  $C_2H_4$  and H, is washed with a normally liquid alicyclic ketone contg. more than 3 C atoms, such as cyclohexanone to dissolve the unsatd. hydrocarbons.

**Olefins.** I. G. Farbenind. A.-G. Ger. 583,564, Sept. 6, 1933. High-mol. olefins with more than 6 C atoms are prepd. by leading suitable alcs. over water-splitting catalysts at reduced pressure. Thus, dodecyl alc. is led over active C impregnated with  $H_3PO_4$  at 22 m. pressure and 250° to give a 90% yield of dodecylene. Other examples are given.

**Olefins.** I. G. Farbenind. A.-G. (Hans Hauber, inventor). Ger. 583,685, Sept. 7, 1933. Olefins contg. S compds. as impurities are heated in the presence of a Si catalyst to give transformation products. Thus, the gas from a lignite distn. is led through a steel tube contg. powd. Si. The  $C_2H_4$  of the distn. gas is converted to butylene,  $C_2H_6$ ,  $C_4H_8$  and toluene. About 74% of the  $C_2H_4$  is converted to  $C_2H_6$  and toluene.

**Hydrogenating heterocyclic compounds.** The Good-year Tire & Rubber Co. Fr. 750,852, Aug. 21, 1933. Compds. such as pyridine, pyridylpyrroles, benzopyrrole, quinaldine, lepidine, acridine, etc., are hydrogenated under pressure of 100-220 atm. at about 225°, using Ni on a support as catalyst. Examples are given of the prepn. of

2- (b, 135.5-8.5°) and 4-phenethylpiperidine (b, 126-30°).

**Dehydrating organic liquids.** I. G. Farbenind. A.-G. (Theodor Wallis, inventor). Ger. 584,705, Sept. 28, 1933. Addn. to 573,539 (C. A. 27, 4240). In dehydrating vaporized org. liquids by the aid of  $\text{CaSO}_4$  as described in 573,539, the  $\text{CaSO}_4$  is prevented from coagulating into a solid mass by intermixing inert finely powd. substances such as talcum,  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ , gel, etc.

**Organic bases.** Knoll A.-G. Chemische Fabriken, Karl F. Schmidt and Wilfrid Klavohn. Ger. 583,565, Sept. 21, 1933. Org. bases contg. the group  $-\text{C}=\text{N}-\text{C}-$ , or their cleavage or transformation products, are prepd. by the action of  $\text{N}_2\text{H}$  on org. compds. in the presence of a catalyst. Org. compds. contg. only 1 double linkage, except aromatic ring compds., or 1 OH group or a halogen atom are used. Thus,  $\text{BuCl}$  is treated with  $\text{N}_2\text{H}$  in the presence of  $\text{CHCl}_3$  and concd.  $\text{H}_2\text{SO}_4$  to give an 80% yield of the base  $(\text{CH}_3)_3\text{C}:\text{NCH}_3$ . The prepn. of the following is also described; the acetate of 3-methyl-1-hydroxy-7-octanone, b. 131.2° at 8 mm., 7-amino-3-methyl-1-octanol, b. 135.45° at 11 mm., 2-methyl-1,6-diaminoheptane, b. 130.3° at 9 mm., N-dehydro-6-methyl-3-isopropylhexamethylenamine, b. 195.7°, N-dehydro-2-methylhexamethylenamine, b. 158.62°, antihomomethylene-N-dehydrocamphidine, b. 214.16° at 7 mm.; campholsidine acid nitrile, b. 111°, N-dehydrocampholsidine acid nitrile, b. 154.5° at 10 mm., and dehydropiperidineundecane acid, m. 97.9°.

**Catalytic processes involving carbon monoxide.** E. I. du Pont de Nemours & Co. Brit. 397,852, Aug. 29, 1933. Reactions in the gaseous phase involving CO, other than the catalytic decompn. of CO to form C black, are accelerated by small amts. of halogens, H halides, alkyl halides or N oxides, e. g., 0.1-5% by vol. Solid catalysts or inert materials acting as catalysts in the presence of the above substances are preferably also used. The halogens and H halides are suitable in reactions between ales. and CO to form acids, esters and ethers; H halides, for the formation of esters from alkyl ethers and CO, org. acids from paraffin hydrocarbons and CO and org. amines from  $\text{NH}_3$  and CO; and alkyl halides, for the prepn. of acyl chlorides from alkyl chlorides and CO. Other reactions are the formation of acyl chlorides from hydrocarbons, Cl and CO, ales and aldehydes from CO and steam and aldehydes from hydrocarbons and CO. In an example a mixt. of CO,  $\text{HCl}$ ,  $\text{MeOH}$  vapor, H and  $\text{H}_2\text{O}$  vapor is passed under 700 atm. pressure through a reaction chamber contg.  $\text{CuCl}_2$  supported on charcoal and maintained at 350°.  $\text{AcOH}$  and  $\text{MeOAc}$  are obtained.

**Aliphatic alcohols from alkyl halides.** Wm. J. Hale (to Dow Chemical Co.). U. S. 1,938,453, Dec. 5, 1933. In reactions such as that of  $\text{EtCl}$  with aq.  $\text{NaOH}$  soln. to form  $\text{EtOH}$ , the formation of alkyl ether is restrained by adding such ether to the reacting materials.

**Aromatic alcohols.** Ludwig Valik and Irene Valik. Brit. 398,136, Sept. 7, 1933. In the production of aromatic ales., especially phenylethyl ales. and their homologs, by the action of alkylene oxides upon aromatic hydrocarbons in presence of a condensing agent, e. g.,  $\text{AlCl}_3$ , the alkylene oxide is dild. with an inert gas, e. g., air,  $\text{N}$ ,  $\text{CO}_2$ . The temp. should not exceed 55° and may be maintained at 5-10°. An aliphatic or aromatic amine or  $\text{NH}_3$  may be introduced with the alkylene oxide to neutralize the  $\text{HCl}$  produced, at least 0.75 parts  $\text{AlCl}_3$  to each part of hydrocarbon being used. The ales. are sep'd from the hydrocarbon by distn. and may be purified by treatment with  $\text{KMnO}_4$  and  $\text{NaHSO}_3$  or with a mineral oil or wax.

**Araalkyl alcohols.** I. G. Farbenind. A.-G. Fr. 752,478, Sept. 23, 1933. Araalkyl ales. are prepd. by causing an alkylene oxide or halohydrin to act on approx. the equimol. amt. of a metal compd. of an aromatic hydrocarbon contg. up to 2 condensed rings. Thus, p-tolylethyl alc., b. 113.7° (its phenylurethan, m. 115°), is obtained from Na p-tolyl and ethylene oxide.

**Dehydrating aqueous alcohol.** Adolf Gorhan (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,936,836, Nov. 28. Vapors of aq. alc. are

contacted with a dehydrating liquid in such amt. as to render the alc. water-free (the dehydrating liquid comprising KOAc and NaOAc is rendered anhyd. by heat and dissolved in abs. alc. without passing through the solid state). Cf. C. A. 27, 1983.

**Secondary alcohols.** Wm. Engs and Richard Z. Moravec (to Shell Development Co.). U. S. 1,938,177, Dec. 5, 1933. See Can. 335,977 (C. A. 27, 5761). U. S. 1,938,178 relates to hydrolyzing esters obtained from olefins, at a temp. below that at which the alc. formed distills off while neutralizing the generated acid, reducing the free acid content to a value substantially below that maintained during hydrolysis, and then recovering the alc. produced.

**Diacetone alcohol.** Henri Guinot (to Usines de Melh). U. S. 1,937,272, Nov. 28. In producing diacetone alc. by the catalytic condensation of acetone, acetone is subjected to the action of an alk. condensing agent such as KOH dissolved in a solvent such as alc. which is miscible with acetone and diacetone alc., the condensing agent being present in a quantity, as free alkali, of about "one-thousandth mol." per l. of acetone.

**Alcohols and esters.** E. I. du Pont de Nemours & Co. Brit. 397,938, Sept. 7, 1933. The catalytic reduction by H of aliphatic monocarboxylic acids to produce ales. and (or) esters is effected by means of a catalyst prepd. by dissolving  $\text{Zn}(\text{NO}_3)_2$  (preferably predominating),  $\text{Cd}(\text{NO}_3)_2$  and  $\text{Cu}(\text{NO}_3)_2$  in  $\text{H}_2\text{O}$  and pptg. the metal chromates by adding a soln. of  $\text{CrO}_3$  and  $\text{NH}_3$ ; the reaction mixt. is neutralized by more  $\text{NH}_3$  and the ppt. washed, dried at 100°, ignited at 400°, granulated and pressed into tablets. Among examples the catalyst is heated to 550° in a stream of H in a steel pressure vessel, the H pressure is then raised to 2000 lb. per sq. in. and lauric acid is pumped over the catalyst while H is drawn through the app. the product contains lauryl alc. and lauryl laurate. High yields of esters are obtained by high rates of flow and relatively low temps. Cf. C. A. 27, 4240.

**Esters of isoborneol.** Karl Stephen. Ger. 580,111, July 13, 1933. These are prepd. by treating pure  $\text{HCl}$  and  $(\text{HCO}_2)_2\text{Pb}$  with 10-12 times the theoretical amt. of 95-100%  $\text{HCO}_2\text{H}$  in the absence of Zn salts. Yield of 90% are obtained. Examples are given.

**Esters of high specific gravity from castor oil.** Cosimo Rosselli Del-Tureo (50% to French Society Legendre & Guillet). U. S. 1,936,831, Nov. 28. See Brit. 385,021 (C. A. 27, 4434).

**Catalysts for preparing esters.** Jerome Martin and Ignace J. Krehma (to Commercial Solvents Corp.). U. S. 1,937,281, Nov. 28. Catalysts initially comprising metal uranyl carbonates such as those of Ca, Sr, Ba, Mg, Zn, Ag or Pb and Ag carbonate are used for promoting reactions such as the production of  $\text{EtOAc}$  from  $\text{EtOH}$ . Hydroxides of Al, Th, Zr and Be also may be used. U. S. 1,937,285 relates to the similar use of catalysts initially comprising metal uranyl compds., a Ag compd. such as Ag carbonate and a compd. of Cu, Ni, Fe or Co, such as Ni carbonate.

**Aromatic aldehydes.** Imperial Chemical Industries Ltd. Fr. 750,842, Aug. 19, 1933. Aromatic aldehydes are prepd. by treating, at 60° or more, an aromatic hydrocarbon or an ether of a mono- or poly-hydric phenol or a halogenated aromatic hydrocarbon having one or more side chains (the halogen being in the ring and (or) the side chain) with  $\text{AlCl}_3$ ,  $\text{HCN}$  (or a metal cyanide) and  $\text{HCl}$ , the proportion of  $\text{AlCl}_3$  being in excess of 1 mol. of  $\text{AlCl}_3$  for each CN group.

**Ketones; esters.** Schering-Kahlbaum A.-G. Brit. 397,505, Aug. 21, 1933. Aromatic hydrocarbons, aromatic amines, phenols and naphthols are condensed with carboxylic acids and their anhydrides at 100-350° in the presence of surface catalysts, e. g., active C, silica gel, bleaching earths. Aryl ketones are obtained from the hydrocarbons, amino ketones from the amines and phenol esters and hydroxy ketones from phenols (except in the case of phthalic anhydride, when phenolphthaleins are produced). Examples include the prepn. of (1)  $\beta$ -naphthyl phenyl ketone from  $\text{C}_{10}\text{H}_8$  and  $\text{BzOH}$  or  $\text{BzO}$  in presence of tansil (I), (2) a mixt. of anisic acid o-tolyl



ester and 1-methyl-2-hydroxy-5-anisoylbenzene from *o*-cresol and anisic acid in presence of I, (3) a mixt. of BzOH *o*-tolyl ester and *p*-benzoyl-*o*-cresol from *o*-cresol and BzOH in presence of I, silica gel or animal charcoal, (4) 1-hydroxy-2-benzoylnaphthalene from  $\alpha$ -naphthol and BzOH or Bz<sub>2</sub>O, using I, (5) phenolphthalein from PhOH and phthalic anhydride in presence of "frankonit" and (6) a mixt. of  $\alpha$ -naphthylbenzoylamine and 1-amino-2-benzoylnaphthalene from  $\alpha$ -naphthylamine and BzOH or Bz<sub>2</sub>O in presence of I.

**Amines.** I. G. Farbenind. A.-G. (Ludwig Mack and Otto Nicodemus, inventors). Ger. 580,517, July 12, 1933. Secondary or tertiary amines are reduced to a lower substitution stage by treatment with NH<sub>3</sub> under raised temp. and pressure. The process may be carried on in soln. Thus, NH<sub>3</sub>Cl, aq. NH<sub>3</sub> and aq. Me<sub>2</sub>NH are heated to 320° in a steel bomb. The reaction product is diluted with water and heated with NaOH. On removing the NH<sub>3</sub>, the product contains MeNH<sub>2</sub>, Me<sub>2</sub>NH and a little Me<sub>3</sub>N. Other examples are given.

**Amines.** The Goodyear Tire & Rubber Co. Fr. 751,286, Aug. 30, 1933. Tertiary heterocyclic amines are prepd. by causing a hydroxy compd. and a heterocyclic compd. contg. N and replaceable H attached to the N of the ring, to react at 175–250° in the presence of a catalyst such as reduced Ni. Examples are given of the prepn. of *N*-ethyl-, b. 125–9°, *N*-ethyl- $\alpha$ -methyl-, b. 145–7°, *N*-butyl- $\alpha$ -methyl-, b. 185–90°, *N*-butyl-, b. 167–72°, *N*-cyclohexylpiperidine, b. 98–100°. Cf. C. A. 28, 778, 779<sup>1</sup>.

**Hydrogenating amines.** The Goodyear Tire & Rubber Co. Fr. 750,903, Aug. 22, 1933. Primary aromatic amines are hydrogenated under pressure in the liquid phase at 175–250° in the presence of a reduced Ni catalyst on an appropriate support. The catalyst may be prepd. by adding a support contg. a sol. Ni salt, adding a basic carbonate and reducing the pptd. Ni carbonate.

**Lactones.** Rohm & Haas Co. Fr. 754,183, Nov. 2, 1934. Lactones, specially lactones of gluconic acid, are prepd. by heating an aq. soln., e. g., of gluconic acid with a glycol ether, extg. the water by distn. with a little glycol ether and crystg. the lactone. The gluconic acid may be made by the action of H<sub>2</sub>SO<sub>4</sub> on Ca gluconate in an aq. soln. of a glycol ether.

**Mercaptans.** Henkel & Cie. G. m. b. H. Fr. 751,117, Aug. 28, 1933. Hydroaromatic and aliphatic mercaptans of high mol. wt. are obtained by treating di- or polythiols with reducing agents. An example is given of the prepn. of *dodecyl mercaptan*, b. 142–5°, from didodecyl disulfide.

**Phenols.** Chemische Fabrik von Heyden A.-G. Fr. 751,008, Aug. 20, 1933. Phenols are dehydrated by adding a liquid such as PhCl which forms a min. b. p. mixt. with water, and distg.

**Phenols.** Chemische Fabrik von Heyden A.-G. Fr. 751,118, Aug. 28, 1933. Phenols are prepd. from aromatic chloro hydrocarbons by an alk. sapon. under pressure, in the presence of KCl or NaCl. The resulting soln. contains less dissolved phenol.

**Conversion of phenols and low-temperature tars to hydrocarbons.** Soc. des carburants synthétiques. Fr. 750,977, Aug. 16, 1933. The hydrogenation is carried out at a low pressure, e. g., 5–20 kg. per sq. cm. in the presence of oxides of Al, Cr, W, Mo, etc., which have been activated by heating to 700° or more. The temp. used is 360–430°, being kept below that at which reduction of the oxides begins.

**Nitrophenyl sulfones.** Hermann Landers (to General Aniline Works). U. S. 1,936,721, Nov. 28. By the reaction of a sulfonic acid salt on an *o*-dinitro compd. of the benzene series (preferably while heating in a solvent or diluent), products are obtained such as: 2-nitro-4'-methylidiphenyl sulfone, m. 156–7°; 5-chloro-2-nitro-4'-methylidiphenyl sulfone, m. 191°; 2-nitro-3'-methyl-4'-hydroxy-5'-carboxydiphenyl sulfone, decomp. 226–7°; 5-chloro-2-nitrophenyldihydroxyphenyl sulfone, m. 158–9°; 2-nitro-4'-chlorodiphenyl sulfone, m. 137–8°; 4,5-dichloro-2-nitro-4'-methylidiphenyl sulfone, m. 167°; and 2-nitro-4'-methoxydiphenyl sulfone, m. 149.5°. These

nitro compds. yield corresponding amino compds. on reduction. Various details of procedure are given.

**Terpenes.** Schering-Kahlbaum A.-G. (Hans Meerwein, inventor). Ger. 584,965, Sept. 27, 1933. In transforming terpenes, catalysts consisting of inorg. or inorg.-org. complex acids which do not give stable addn. products with terpenes are used at high temps., at reduced or ordinary pressures, and preferably in a current of in different gas, such as steam. Thus, terpenes are heated to 150° in the presence of H<sub>2</sub>SbO<sub>4</sub> to give nopinene  $\rightarrow$  pinene  $\rightarrow$  camphene. Other examples are given. Cf. C. A. 27, 4815.

**Anthrapyridone derivatives.** Chemische Fabrik vorm. Sandoz. Ger. 580,283, July 8, 1933. Addn. to 578,995 (C. A. 28, 781<sup>1</sup>). Further derivs. are prepd. by condensing the haloanthrapyridones of 578,995 with aromatic amines at temps. below 170°. Thus, acetyl-2,4-dibromoanthrapyridone is heated to 130–40° with *m*-xylylene, AcOK and CuSO<sub>4</sub> to give a condensation product. A table of haloanthrapyridones, aromatic amines and the colors of the resulting condensation products in H<sub>2</sub>SO<sub>4</sub> and PhNO<sub>2</sub> is given. Cf. C. A. 27, 4094.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. (Paul Nawiasky and Berthold Stein, inventors). Ger. 580,047, July 14, 1933.  $\alpha$ -Azidoanthraquinone-*o*-sulfonic acid is treated with Cl or agents yielding Cl. The resulting chloroazidoanthraquinone compds. are used as starting material for dyes. In an example, Na 1-azidoanthraquinone-2-sulfonate (obtained by treating the diazo compd. of 1-aminoanthraquinone-2-sulfonic acid with NaN<sub>3</sub>) is treated with concd. HCl and an aq. soln. of NaClO<sub>2</sub>. The product is 1-azidochloroanthraquinone. The prepn. of 1,5-diazido-2,6-dichloroanthraquinone is also described.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. Fr. 751,236, Aug. 20, 1933. Aminoanthraquinone sulfonyl chlorides of the formula NH<sub>2</sub>.A.SO<sub>2</sub>Cl (A is anthraquinone, substituted or not) are prepd. by causing PCl<sub>5</sub> to act on an aminoanthraquinonesulfonic acid or a salt thereof, preferably in the presence of POCl<sub>3</sub>. Examples are given of the prepn. of the 2-amino-3-, m. 207–8°, 1-amino-4-bromo-2-, m. 209–10°, and 1-amino-2-sulfonyl chloride, m. 220–2°, and of the 1-amino-4-bromo-2-sulfonamide, m. 220°, and 2-sulfonylhydroxyethylamide, m. 227–8°.

**Alkylisoquinoline derivatives.** Karl Kindler (Wilhelm Peschke, inventor). Ger. 579,819, July 1, 1933. Chlorides of 1-hydroxy-2-alkylisoquinolinetetrahydride-1,2,3,4 are prepd. by heating a hydrocarbon soln. of the formyl compd. of *N*-alkyl- $\beta$ -phenylethylamine with SOCl<sub>2</sub>. Examples describe the prepn. of hydrastinine chloride, m. 210°, lodal chloride, m. 186° and ethylnorhydrastinine chloride, m. 175°.

**Benzanthrone derivative.** I. G. Farbenind. A.-G. (Georg Kranzlein and Martin Corell, inventors). Ger. 579,653, June 20, 1933. The compd. 6,7-diphthaloylbenzanthrone, m. 325.6°, is prepd. by reducing linear diphthaloylbenzene to half-sided anthronol and treating this with an acrolein-forming substance in such as glycerol in strong H<sub>2</sub>SO<sub>4</sub>.

**Carbazole derivatives.** I. G. Farbenind. A.-G. Fr. 754,224, Nov. 3, 1933. Carbazole derivs. substituted by SO<sub>2</sub>H and OH groups in the 2-, 3-, 6- and 8-positions are prepd. by sulfonating carbazole at moderate temps. by sulfonating agents capable of fixing water, and fusing with caustic alkalis. Examples are given of the prepn. of 2,3,6,8-tetra-, 2-hydroxy-3,6,8-tri- and 2,8-dihydroxy-3,6-disulfocarbazole and 2,8-dihydroxycarbazole, m. 246–7°.

**Naphthalene derivatives.** I. G. Farbenind. A.-G. (Herbert Kracker, inventor). Ger. 580,519, July 12, 1933. 2-Hydroxy-3-arylaminoanthraquinones in which one of the H atoms of the amino group is replaced by a substituted or unsubstituted carbocyclic or heterocyclic residue and the other is unsubstituted or replaced by an alkyl, aralkyl or aryl group, are prepd. by heating 2,3-dihydroxynaphthalene with primary or secondary amines of the carbocyclic or heterocyclic series contg. no further NH<sub>2</sub> or OH groups in the *o*-position to the amino group. The

heating is carried to temps above 170° and the water formed in the reaction is distd off. The prepn of the following derivs of 2-hydroxynaphthalene is described: *i*-*p*-tolueno, m 144.5°, *i*-(*o*-methoxyanilino), m 105-6°, *i*-(*p*-methoxyanilino), m 95-6°, *i*-(*o*-chloroanilino), m 139.40°, *i*-(*p*-chloroanilino), m 179.40°, *i*-(*p*-ethoxyanilino), m 124.5°, *i*-(2-naphthylamino), m 159.60°, *i*-*o*-tolueno, m 152.3°, *i*-(1-naphthylamino), m 119.20°, *i*-phenylmethylamino, m 112.13°, *i*-(2-pyridylamino), m 62.4°, *i*-(6-quinolylamino), m 108.10°, *i*-(6-azadazolylamino), m 154.9°, *i*-(2-carbazolylamino), m 243-4°.

**Paraffin derivatives** I G Iarbennd A G Ger 570,651, June 29, 1933. Hydroxyalkoxy compds of the paraffin series are prep'd by reducing the corresponding oxy compds in the liquid phase in the presence of a finely divided catalyst. Thus, a mixt of  $\beta$ -methoxybutyraldehyde and MeOH is heated with H under a pressure of 5 atm in the presence of a Ni pumice catalyst. On removal of the catalyst, a 95.8% yield of methoxy-1-butanol, b<sub>158.9</sub>, can be distilled off. The prepn of ethoxy-1-butanol, b<sub>189.41</sub>°, 1,1-butylene glycol *i* butyl ether, b<sub>71</sub>°, methoxy-1-propanol, b<sub>76</sub>°, and *i* ethoxy-1-propanol, b<sub>77</sub>°, is also described.

**Pyrazolone derivative** Baptist Reuter Ger 580,696, July 14, 1933. The deriv 4-bromodithylacetylaminio-1-phenyl-2,2-dimethyl-5-pyrazolone, m 130°, is obtained by the action of 1 mol of bromodithylacetyl bromide or chloride on 2 mols of 4-amino-1-phenyl-2,2-dimethyl-5-pyrazolone in an indifferent solvent.

**Quinoline derivatives** Fritz Schouhofer and Hans Andersag (to Winthrop Chemical Co.) U S 1,935,047, Dec 5. By methods of the same character as described in U S 1,747,531 (C 1 24, 170) there are obtained 5-alkoxy-4-aminoquinolines contg basic substituents in the amino group are produced, more particularly quinoline derivs in which the alkoxy groups may be methoxy, ethoxy, allyloxy, isopropoxy, butoxy, isomethoxy and hexyloxy, and the substituted amino group NR<sub>2</sub> in which R<sub>2</sub> is a basic radical containing N and R<sub>1</sub> stands for hydrogen, an alkyl group or likewise for a basic radical containing N. These basic radicals may contain one or more N atoms, they may be represented by aliphatic, alicyclic, aromatic or heterocyclic N contg radicals. Likewise such radicals where aliphatic and alicyclic or aromatic or heterocyclic radicals are connected with each other may be used. These radicals may contain other like bound O and S atoms and may be substituted by other substituents, for example, hydroxyl group. Basic radicals of the most different kind may be employed, for example, dimethylaminoethyl, ethylaminobutyl, diethylaminopentyl, aminocyclohexyl or cyclopentyl, imino hydroxypentyl, N-piperidylmethyl, N-pyrrolidylpropyl, etc. Various examples with details and modifications of procedure are given.

**Quinoline derivative** J D Riddell de Huen A-G (Leo Schulte, inventor) Ger 583,705, Sept 8, 1933. The deriv 8-hydroxyquinoline is prep'd by heating one of its ethers with a salt of a strong inorg. acid and an aromatic base. Thus, the methyl ether of 8-hydroxyquinoline is heated with PhNH<sub>2</sub> and concd HCl.

**Vinylacetylene derivatives** I I du Pont de Nemours & Co. Ir 753,465, Oct 17, 1933. Monovinylacetylene is caused to react with an alkali metal, an alk. metal amide or a Grignard reagent, preferably in the presence of a solvent or diluent. The product of this reaction is caused to react with an aldehyde, ketone, carboxylic acid, ester, CO, a nitric, oxyanate, isothiocyanate, SO<sub>2</sub>, acid chloride, org. halide, arylsulfonic acid, metal halide or an ether such as ethylene oxide or Li orthoformate, and the product may be hydrogenated or polymerized by light or heat. The polymerization may be stopped at an intermediate stage to obtain coating, molding or impregnating compns. Examples are given of the prepn of Na vinylacetylide, vinylthiynylmethylthyl- (b<sub>75</sub>°, [α]<sub>D</sub><sup>20</sup> 1.4802, d<sub>4</sub> 0.8878), vinylthiynylmethyl (b<sub>67</sub>°), vinylthiynylethyl- (b<sub>62</sub>°, [α]<sub>D</sub><sup>20</sup> 1.48, d<sub>4</sub> 0.8875), vinylthiynylpropyl- (b<sub>48</sub> 9°, [α]<sub>D</sub><sup>20</sup> 1.4715, d<sub>4</sub> 0.875), vinylthiynyl

1-methyloctyl- (b<sub>4</sub> 98.5-9.5°, [α]<sub>D</sub><sup>20</sup> 1.4734, d<sub>4</sub> 0.8681), vinylthiynylmethylphenyl- (b<sub>4</sub> 125-6°, m 40-1°), vinylthiynyldiphenyl-, vinylthiynylmethyl- (b<sub>73</sub> 65°, [α]<sub>D</sub><sup>20</sup> 1.4851, d<sub>4</sub> 0.9112), vinylthiynylpropyl- (b<sub>10</sub> 74.6°, [α]<sub>D</sub><sup>20</sup> 1.4775, d<sub>4</sub> 0.892) and dimethylvinylthiynyl-carbinol, m 59-61°, 1-vinylethynylcyclopentanol, b<sub>7</sub> 104.5°, [α]<sub>D</sub><sup>20</sup> 1.5228, d<sub>4</sub> 1.0181, 1-vinylethynylcyclohexanol, b<sub>3</sub> 84, [α]<sub>D</sub><sup>20</sup> 1.5169, d<sub>4</sub> 0.9742, methylvinyl- (b<sub>73</sub> 5.59.2°, [α]<sub>D</sub><sup>20</sup> 1.4406, d<sub>4</sub> 0.7401), ethylvinyl- (b<sub>73</sub> 84.5.5.3°, [α]<sub>D</sub><sup>20</sup> 1.4522, d<sub>4</sub> 0.7492), butylvinyl- (b<sub>10</sub> 59.00°, [α]<sub>D</sub><sup>20</sup> 1.450, d<sub>4</sub> 0.783) and heptylvinyl acetylenic, b<sub>74</sub> 5.5°, [α]<sub>D</sub><sup>20</sup> 1.466, d<sub>4</sub> 0.7962, vinylthiynyltriphenylmethane, m 134.5°, and naphthylamide of vinylpropionic acid, m 125.5°. The prepn of various polymerized products, lacquers, varnishes, enamels, etc., is also given.

**Formyl halide addition compounds** I G Iarbennd A G Ir 750,871, Aug 21, 1933. See Brit 391,400 (C A 27, 5085).

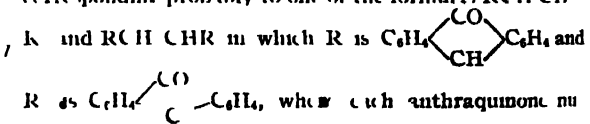
**Aliphatic sulfuric acid compounds** Fritz Schlotterbeck Ger 579,655, June 29, 1933. Addn to 454,458. Mixt. of aliphatic H<sub>2</sub>SO<sub>4</sub> compds and polymerized H<sub>2</sub>SO<sub>4</sub> compds are obtained by sulfonating oils with excess of H<sub>2</sub>SO<sub>4</sub> at low temps and sepg the resulting layer of polymerized reaction product from the soln of monomeric H<sub>2</sub>SO<sub>4</sub> compds.

**Tetrazo compounds** I G Iarbennd A-G Ir 751,300, Aug 31, 1933. See Ger 580,353 (C A 28, 18).

**Condensation products** I G Iarbennd A-G (Otto Irosbach and Ernst Rott, inventors) Ger 551,122, Sept 2, 1933. Products of the type Ph<sub>3</sub> are obtained by passing vaporized hydrocarbons, preferably diluted by mixing with other gases, over catalysts comprising difficultly reducible oxides of alk. earth or earth metals and C at temps above 700°. Thus a catalyst of MgO and C obtained by heating MgO with C<sub>2</sub>H<sub>4</sub> is used to convert vaporized C<sub>2</sub>H<sub>2</sub> to Ph<sub>3</sub> in 90% yield is obtained.

**Condensation products from acetylene and ammonia** Leo Schlicht and Hans Rotger (to I G Iarbennd A-G) U S 1,936,993, Nov 28. A mixt of NH<sub>3</sub> and C<sub>2</sub>H<sub>2</sub> is passed, at 200-400°, over a catalyst comprising several oxide metal compds which are not reduced or melted by the reaction gases at the temp employed, such as Zn and Pb oxides and alumina or silica gel, etc., in order to produce acetonitrile and pyridine bases for denaturing alc. Cf C 1 27, 817.

**Condensation products of the anthraquinone series** Heinz Scheyer (to General Aniline Works) U S 1,939,045, Dec 5. By treating a dimolecular conversion product of methylenedianiline or its substitution product corresponding probably to one of the formulas R<sup>1</sup>HC(CH<sub>2</sub>)<sub>2</sub>HR<sup>2</sup> and RCH<sub>2</sub>CHR<sup>3</sup> in which R is C<sub>6</sub>H<sub>4</sub> and



**Reactions with ketene** Carbide & Carbon Chemical Corp. Ir 750,801, Aug 19, 1933. See Brit 397,022 (C A 28 7502).

**Alkyl chlorides** Paul Ernst (to A Wacker Gas- und elektrochemische Industrie) U S 1,937,269, Nov 28. See Ger 541,066 (C A 26, 2468).

**Alkyl chlorides** Alexander Wacker Gas- und elektrochemische Industrie G m b H (Paul Ernst, inventor) Ger 583,471, Sept 4, 1933. Addn to 541,566 (C 1 26, 2468). Alkyl chlorides are prep'd by leading vaporized alcs and HCl over catalysts contg P acids at temps above 220°. Thus, EtOH vapor and HCl are led over active C impregnated with H<sub>3</sub>PO<sub>4</sub> at 240-300° to give EtCl.

**Acetylene tetrachloride** I G Iarbennd A G

Brit. 397,961, Sept. 7, 1933. See Fr. 739,183 (C. A. 27, 1894).

**Organic acid chlorides.** Monsanto Chemical Works. Brit. 397,775, Aug. 31, 1933. Org. acid chlorides, contg. acid impurities and sometimes  $H_2O$ , are treated in the liquid state with inorg. basic substances (excluding  $NH_3$ ), whereby the acidic impurities react, and the acid chloride is then sepd. therefrom. In examples  $AcCl$ ,  $BzCl$ , phthalyl chloride and *p*-toluenesulfonyl chloride are freed from traces of  $HCl$  and the resp. org. acids by treatment with  $CaO$ ,  $MgO$  or  $Ca(OH)_2$ , filtered and distd.  $CuCl$ ,  $ZnO$ ,  $PbO$  and  $Al_2O_3$  are also specified. The carbonates of the above metals and of alkali metals may be used while inferior results are obtained by using alkali metal hydroxides.

**Carbamic acid chloride.** Erich Theis (to I. G. Farbenind. A.-G.). U. S. 1,937,328, May. 28. See Brit. 396,840 (C. A. 28, 488<sup>9</sup>).

**Acid chlorides such as those of coconut oil acids.** Robert V. Townend (to Pilot Laboratories, Inc.). U. S. 1,936,739, Nov. 28. For producing an acid chloride, a higher aliphatic acid material is reacted with  $PCl_5$ , the phosphorous acid is removed from the resulting product (suitably by stratification) and remaining trichloride is converted to pentachloride by passing  $Cl$  through the mixt., and the  $PCl_5$  is sepd.

**Chlorides of aminoanthraquinonesulfonic acids.** I. G. Farbenind. A.-G. (Georg Kranzlein, Hans Schlickebaum and Ludwig Schörnig, inventor). Ger. 580,648, July 14, 1933.  $PCl_5$  is caused to react on the acids in the presence of  $POCl_3$ . Thus, Na 2-aminoanthraquinone-3-sulfonate is treated with  $PCl_5$  and  $POCl_3$  to give a sulfonyl chloride m. 208<sup>9</sup>. Another example describes the prepn. of the sulfonyl chloride of 1-amino-4-bromoanthraquinone-2-sulfonic acid, m. 209–10<sup>9</sup>.

**Alkyl hypohalites.** Richard M. Deanesly (to Shell Development Co.). U. S. 1,938,175, Dec. 5. For prepg. an alkyl hypohalite, a monohydric aliphatic alc. is caused to react with water and a halogen such as  $Cl$  or  $Br$  in the presence of an alk. agent such as  $NaOH$  or  $KOH$  present in substantially equiv. proportion to the alc., the water being present in such limited quantity that the reaction is carried out in a two-phase mixt. which is maintained under agitation.

**Halogenated pyridinoanthraquinones.** Max A. Kunz, Karl Koerberle and Gerd Kochendörfer (to General Aniline Works). U. S. 1,937,154, Nov. 28. By the halogenation of pyridinoanthraquinone or its substitution products, various pyridinoanthraquinones are formed contg.  $Cl$ ,  $Br$  or  $I$  (or 2 or more halogens) which may be used as dye intermediates or for prepg. other compds. and which in general form yellow to orange solns. with concd.  $H_2SO_4$ . Numerous examples with details and modifications of procedure are given.

**Biphenylene sulfide.** I. G. Farbenind. A.-G. (Eduard Ischmur and Eugen Himmer, inventors). Ger. 579,917, July 3, 1933.  $Ph_2$  is heated with  $S$  in the presence of  $Al$  halide. An 80% yield is obtained.

**Organic thiocyanates and their derivatives.** Hans P. Kaufmann. Ger. 579,818, July 3, 1933.  $Cu(SCN)_2$  or an intimate mixt. of a cupric salt and a salt of  $HCNS$  are treated with the desired org. compd. Thus,  $PhNH_2$  in  $MeOH$  is treated with  $Cu(SCN)_2$  to give *p*-aniline thiocyanate. The same result is obtained by treating  $PhNH_2$  with a mixt. of  $CuSO_4$  and  $NH_4CNS$ . The prepn. of the following is also described, bis(1-phenyl-2,3-dimethyl-5-pyrazolone-4)disulfide, m. 256<sup>9</sup>, 6-methyl-, 6-chloro-, 6-ethoxy- and 6-carbethoxy-2-aminobenzothiazole.

**Organic thiocyanates.** Kali-Chemie A.-G. Fr. 753,557, Oct. 10, 1933. Thiocyanates are made by treating quaternary  $NH_4$  bases of cyclic compds. (the  $N$  atom of which is combined with a  $COOH$  or  $OH$  group in the form of a ring of the kind of betaine) by means of  $HSCN$  or treating their salts by means of thiocyanates. Examples are given of the prepn. of thiocyanates of pyridine- and quinoline-betaine.

**Thallium triethyl, etc.** Herbert P. A. Groll (to Shell Development Co.). U. S. 1,938,179, Dec. 5.  $Et_3Tl$  is formed by the action of  $LiEt$  on  $Tl$  diethyl chloride.

Mention is made of the similar obtainment of corresponding compds. of  $Au$ ,  $Ga$  and  $In$ .  $Tl$  diethyl triphenylmethyl is obtained by the reaction of  $Tl$  diethyl chloride with  $Na$  triphenylmethyl in ether. U. S. 1,938,180 relates to similar reactions, among which is described the production of  $R_4Pb$  by reaction of  $PbCl_4$  with  $LiEt$  in petroleum ether.

**Addition products of the pyridine series.** Max Hartmann and Max Seiberth (to Soc. pour l'ind. chim. à Bâle). U. S. 1,938,253, Dec. 5. Addn. products (suitable for use in isolation of the component pyridine compds. or as therapeutic agents) are formed by causing pyridine series compds. such as nicotinic acid, hydroxyhalo- or amino-pyridinecarboxylic acids or esters, or halides, amides, anhydrides or salts of these acids to react with alk. earth metal salts such as  $CaCl_2$ ,  $Cu(CNS)_2$ ,  $CaBr_2$ ,  $Ca$  salicylate,  $MgCl_2$ ,  $SrCl_2$ . Numerous examples are given with details of procedure involving the prepn. of addn. products of nicotinic acid, picolinic acid,  $\alpha$ -hydroxypyridine- $\beta$ -carboxylic acid, nicotinic acid chloride, nicotinic acid ethyl ester, nicotinic acid diethylamide, nicotinic acid methyl propylamide, picolinic acid diethyl amide, nicotinic acid amide and 2,4,6-trimethylpyridine-3,5-dicarboxylic acid diethyl ester.

**Arylides of hydroxybenzocarbazolecaboxylic acid.** I. G. Farbenind. A.-G. (Georg Kranzlein, Otto Limpach and Karl Hager, inventors). Ger. 580,581, July 13, 1933. The acid is condensed with an aromatic amine. Thus, 7,8-benzocarbazole-3'-hydroxy-2-carboxylic acid is suspended in  $PhCl$  and heated with  $PhNH_2$  in the presence of  $PCl_5$  to give the anilide of the acid. Other examples are given. These arylides can be coupled with bases to give fast black dyes.

**Hydroxy carboxylic acid arylides.** Karl Zahn and Heinrich Koch (to General Aniline Works). U. S. 1,936,926, Nov. 28. By condensing 2,3-hydroxynaphthoic acid or a substitution product with a 4-aminobiphenyl or a substitution product (inclusive of compds. such as 2-aminofluorene, 2-aminofluorenone, 2-aminocarbazole, 2-aminobiphenylene oxide or their substitution products), arylides are obtained of good affinity for vegetable fiber and suitable for coupling to form *azo dyes*. Among the products are 4-(3-hydroxy-2-naphthovlamino)biphenyl (I), m. 283<sup>9</sup>; 4'-ethoxy-I, m. 275<sup>9</sup>; 4'-nitro-I, m. 324<sup>9</sup>; 4'-chloro-I, m. 304-6<sup>9</sup>; 3-methoxy-I, m. 214-16<sup>9</sup>; 2,5-dimethoxy-I, m. 219-20<sup>9</sup>; 2,4',5-trimethoxy-I, m. 221-4<sup>9</sup>; 2,5-dimethoxy-4'-phenyl-I, m. 221-2<sup>9</sup>; 2'-methoxy-I, m. 214<sup>9</sup>; 4'-methoxy-I, m. 295-6<sup>9</sup>; 2'-nitro-I, 264-6<sup>9</sup>; 1-4'-sulfondimethylamide, m. 263-4<sup>9</sup>; 1-4'-sulfondimethylamide, m. 263-4<sup>9</sup>; 3-chloro-I, m. 257-8<sup>9</sup>; 3-methyl-I, m. 239<sup>9</sup>; 4-(7-bromo-3-hydroxy-2-naphthovlamino)biphenyl (II), m. 322-3<sup>9</sup>; 4-(6-methoxy-3-hydroxy-2-naphthovlamino)biphenyl, m. 302-3<sup>9</sup>; 2,5-dimethoxy-II, m. 233-4<sup>9</sup>; 2',3'-hydroxynaphthoyl-2-aminofluorene, m. 279-80<sup>9</sup>; 2',3'-hydroxynaphthoyl-2-aminofluorenone, m. 295-8<sup>9</sup>; 2',3'-hydroxynaphthoyl-2-aminocarbazole; and 2',3'-hydroxynaphthoyl-2-aminodiphenylene oxide, m. 300<sup>9</sup>. Various examples with details of procedure are given.

**Organic acids.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Karl Wiesler, inventor). Ger. 583,702, Sept. 8, 1933. Volatile org. acids are prepd. by suspending their salts in a powd. condition in an org. solvent and treating the suspension with concd.  $H_3PO_4$ . The resulting acid is sepd. from the mono and (or) di-phosphates formed by extrn. Thus, powd.  $AcONa$  is suspended in acetone and treated with concd.  $H_3PO_4$  to give  $AcOH$  and  $NaH_2PO_4$ . Other examples are given.

**Neutralizing aliphatic acids containing froth-producing substances.** Camille Dreyfus and Clifford L. Haney (to Celanese Corp. of America). U. S. 1,936,754, Nov. 28. Material such as dil.  $HOAc$  recovered from the acetylation of cellulose and contg. a froth-producing substance is treated at a temp. above 60° with an alk. substance such as  $Na_2CO_3$  which generates gas, and toward the end of the reaction a coagulant such as an  $Al$  or  $Fe$  salt is added in order to ppt. org. substances.

**Fatty acids.** I. G. Farbenind. A.-G. (Christoph Beck

and Helmut Weishach, inventors). Ger. 581,829, Aug. 3, 1933. In prepg. fatty acids by oxidizing paraffin hydrocarbons by treatment with  $\text{HNO}_3$  or oxides of N, the presence of polybasic acids in the end product is avoided by stopping the oxidation when the product is about 80% saponifiable. An example is given.

**Aromatic carboxylic acids.** Gewerkschaft Mathias Stinnes. Ger. 580,820, July 17, 1933. Mono- or polybasic aromatic acids are decarboxylated by heating their Ca salts in soln. or in the dry state in the presence of a small amt. of alkali, and at ordinary or raised pressure. Thus, phthalic acid is heated with water, CaO and NaOH to give a 90% yield of  $\text{C}_6\text{H}_6$ .

**Aralkylaryl carboxylic acids.** Alphons O. Jaeger and Lloyd C. Daniels (to Selden Co.). U. S. 1,937,963, Dec. 5. By effecting reaction of phthalide (or a homolog or substitution product), in the presence of  $\text{AlCl}_3$ , with  $\alpha$ -chloronaphthalene, 2-chlorobiphenyl, 4-chlorobiphenyl, diphenyl oxide, 2- or 4-chloro- or bromo-diphenyl oxide, methylnaphthalene, tetralin or acenaphthene or its halogen substitution products, corresponding aralkylaryl carboxylic acids are produced various of which are suitable for use as dye intermediates. Numerous examples with details of procedure are given.

**Arylamino-2-hydroxynaphthalene-3-carboxylic acids.** Leopold Laska and Oskar Haller (to General Aniline Works). U. S. 1,936,722, Nov. 28. By heating, to a temp. above  $200^\circ$ , an alkali metal salt of a 5- or 7-arylamino-2-naphthol with  $\text{CO}_2$  under pressure above 50 atm. (suitably 80–120 atm.), products are obtained such as: 6-anilino-3-hydroxy-2-naphthoic acid, m.  $230^\circ$ ; 6-(*p*-toluino)-3-hydroxy-2-naphthoic acid, m.  $245^\circ$  (decompn.); 8-anilino-3-hydroxy-2-naphthoic acid, m.  $214\text{--}15^\circ$ ; 6-(*p*-methoxyanilino)-3-hydroxy-2-naphthoic acid, m.  $240^\circ$ ; and 6-(1-naphthylamino)-3-hydroxy-2-naphthoic acid, m.  $272^\circ$ .

**Formic acid.** Schering-Kahlbaum A.-G. (Karl Rohde, inventor). Ger. 583,704, Sept. 12, 1933.  $\text{HCO}_2\text{H}$  is prepd. by treating alk. earth formates with  $\text{H}_2\text{SO}_4$  in the presence of volatile hydrocarbons. Thus,  $(\text{HCO}_2)_2\text{Ca}$  is treated with coned.  $\text{H}_2\text{SO}_4$  in the presence of  $\text{C}_6\text{H}_6$  to give a 93–5% yield of  $\text{HCO}_2\text{H}$ .

**Acetic acid.** Chemische Fabrik von Heyden A.-G. (Kurt Buchheim, inventor). Ger. 583,703, Sept. 8, 1933. AcOH is rendered anhyd. by rectification with addn. of dialkyl carbonate to lower the b. p. of the water. Thus, 50% AcOH is distd. with  $\text{Et}_2\text{CO}_3$  to give AcOH of 99.8–100% purity. Cf. C. A. 27, 4248.

**Acetic acid.** I. G. Farbenind. A.-G. (Walter Flemming and Walter Speer, inventors). Ger. 583,704, Sept. 13, 1933; Pt. 751,160, Aug. 28, 1933. AcOH is prepd. by subjecting methyl ethyl ketone in the liquid phase to a catalytic oxidation with gaseous O at high temps. Examples are given.

**Acetic acid from aldehyde.** Horace F. Oxley and Walter H. Groombridge (to Celanese Corp. of America). U. S. 1,937,528, Dec. 5. Oxidation of aldehyde to HIOAc in the liquid phase is effected under such conditions that the concn. of the HIOAc does not rise to the point at which vigorous reaction would be prevented, as by maintaining the HIOAc concn. at 60–70% in a continuous process.

**Separating acetic acid and water.** C. F. Boehringer & Soehne G. m. b. H. (Richard Muller, Hans Hatzig and Erich Rahald, inventors). Ger. 584,571, Sept. 23, 1933. Mixts. of  $\text{Ac}_2\text{O}$ , AcOH and water are sepd. by reducing the temp. till the water and some of the AcOH freezes and seps. Further cooling results in total sepn. of first the water then the AcOH.

**Concentrating acids such as acetic acid.** Henry Dreyfus. U. S. 1,936,755, Nov. 28. Vapors of the aq. acid are mixed with vapors of a solvent for the acid comprising at least one ether of a monohydric phenol at a temp. about the b. p. of the acid, and the resulting mixt. is cooled to a temp. intermediate between the b. p. of water and the aliphatic-acid-solvent mixt. under the prevailing conditions, in order to effect fractional condensation. Various modifications of procedure are described.

**Apparatus for ketonizing acetic acid vapor.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Max Klar, Hans Walter and Hermann Schulz, inventors). Ger. 579,916, July 4, 1933.

**Lactic acid.** Chemisches Werk Klopfer G. m. b. H. Ger. 581,778, Aug. 2, 1933. Addn. to 533,853 (C. A. 26, 730). The method of 533,853 for solidifying pure lactic acid by cold-mixing with powd. pectin is modified by replacing the latter with solidified powd. vegetable mucous.

**Glycolic acid.** Consortium für elektrochemische Industrie G. m. b. H. (Martin Mugdan and Johann Stin, inventors). Ger. 581,828, Aug. 3, 1933. Glycolic acid is prepd. by heating  $(\text{AcO})_2\text{Cu}$  and alkali or alk. earth acetate solns. to 180–200° under pressure.

**Chlorinating propionic acid.** Röhm & Haas A.-G. Ger. 579,654, June 29, 1933.  $\text{EtCO}_2\text{H}$  and its liquid compds. free from N are chlorinated without the aid of a solvent and using less than the mol. amt. of Cl necessary for complete chlorination, and at temps. below the b. p. of  $\text{EtCO}_2\text{H}$ . Examples are given.

**Benzoic acid.** Bozel-Malétra (Soc. industrielle de produits chimiques). Fr. 753,918, Oct. 27, 1933.  $\text{H}_2\text{O}_2$  and its salts are prepd. by heating toluene with solns. of salts of hexavalent Cr to above  $100^\circ$  under pressure and in the presence of agents capable of neutralizing the alkali liberated and allowing easy sepn. of the  $\text{H}_2\text{O}_2$  or benzoates by filtration and subsequent concn. Examples are given of the use of  $\text{Na}_2\text{Cr}_2\text{O}_7$ .

**Benzoic acid.** Courtney Conover (to Monsanto Chemical Co.). U. S. 1,937,383, Nov. 28. A mixt. of benzoic and phthalic acids is treated with a reagent such as Na benzoate or  $\text{Na}_2\text{CO}_3$  capable of forming a phthalic salt which is non-volatile under the subsequent treatment, in insufficient quantity to combine with the benzoic acid, and the benzoic acid is then recovered from the mixt. by steam distn.

***p*-Hydroxybenzoic acid.** Lindley E. Mills and Win W. Allen (to Dow Chemical Co.). U. S. 1,937,477, Nov. 28. In prepg. *p*-hydroxybenzoic acid, with production of hydrated di-K *o*-hydroxybenzoate as an intermediate product, the latter is completely dehydrated by heating under sub-atm. pressure.

**Side-chain oxidations such as benzoic acid production from toluene.** Alphons O. Jaeger (to Selden Co.). U. S. 1,937,962, Dec. 5. Initial material to be oxidized such as toluene is vaporized and mixed with an O-contg. gas such as air in excess of that theoretically required and the mixt. is passed in series through a plurality of converters filled with a catalyst promoting side-chain oxidation such as K vanadyl vanadate. By use of other catalysts such as did zeolite catalysts contg. Ta, Mo, W and U, aldehydes such as benzaldehyde are mainly obtained.

**Sulfonic acids.** Hyman Limburg (to Flintkote Corp.). U. S. 1,937,521, Dec. 5. For obtaining sulfonic acids (such as those of acid sludge from spindle-oil refining) in purified form from an aq. liquid also contg. electrolyte, the liquid is treated with an org. base such as aniline with which the said electrolytes either form no compds. or only compds. which are water-sol., and the pptd. compds. of the org. base and sulfonic acids are sepd. from the remaining aq. liquid. Cf. C. A. 27, 4916.

**Iodomethanesulfonic acid or salts.** I. G. Farbenind. A.-G. (Heinrich Kloss, inventor). Ger. 581,818, Aug. 3, 1933. Addn. to 532,766 (C. A. 26, 480). Salts of  $\text{HSO}_3\text{I}$  or  $\text{H}_2\text{S}_2\text{O}_4$  or a mixt. of these are heated with a suspension of  $\text{CHI}_3$  in the presence or absence of acid-binding agents till the  $\text{CHI}_3$  disappears, the resulting iodomethanesulfonic acid or salt being sepd. Thus, a mixt. of  $\text{CHI}_3$ ,  $\text{CaCO}_3$ ,  $\text{Na}_2\text{SO}_4$  and water are heated to give the Na salt of the above acid. Cf. C. A. 27, 1010.

**Ketocholanic acids.** J. D. Riedel-E. de. Haën A.-G. (Friedrich Bordecker and Hans Volk, inventors). Ger. 584,704, Sept. 22, 1933. Addn. to 582,727 (C. A. 28, 782). In prepg. the above acids by the method of 582,727, i. e., by treating hydroxycholanic acid with aq.  $\text{H}_2\text{CrO}_4$  at mid temps., the hydroxycholanic acid is brought to the requisite finely divided condition by the aid of an

indifferent liquid insol. in water, such as xylene. Examples are given. Cf. *C. A.* 27, 5786.

**Haloanthraquinone- and haloanthraquinone-carboxylic acids.** I. G. Farbenind. A.-G. (Georg Kränzlein, Martin Corell and Ernst Diefenbach, inventors). Ger. 583,562, Sept. 6, 1933. The above acids and their aldehydes are prepd. by completely or nearly completely chlorinating benzophenones contg. a  $\text{CH}_3$  group in the *o*-position to the keto group, and contg. also a further  $\text{CH}_3$  group and a Cl atom. The product is treated with concd.  $\text{H}_2\text{SO}_4$  to produce anthraquinone-carboxylic acids or -aldehydes, or sapon. without  $\text{H}_2\text{SO}_4$ , to give chlorobenzophenone-carboxylic acids or -aldehydes, the ring being closed in the latter case by treatment with concd.  $\text{H}_2\text{SO}_4$ . Thus, 2,5-dimethyl-4-chlorobenzophenone of m. p.  $50^\circ$  (obtained by the condensation of 2-chloro-*p*-xylene with benzyl chloride) is dissolved in  $\text{C}_2\text{H}_5\text{Cl}$  and treated with Cl and ultraviolet light to give *o*-hexachloro-2,5-dimethyl-4-chlorobenzophenone, m.  $182^\circ$ . This is treated with concd.  $\text{H}_2\text{SO}_4$  to give 2-chloroanthraquinone-3-carboxylic acid, m.  $280^\circ$ . The prepn. of the following is also described, 2,6-dichloro-3,7-anthraquinonedicarboxylic acid, m.  $300^\circ$ , 2,7-dichloro-3,6-anthraquinonedicarboxylic acid, *o*-pentachloro-2,5-dimethyl-4-chlorobenzophenone, 2-chloroanthraquinone-aldehyde, m.  $230^\circ$ , 2,5,8-trichloro-3-anthraquinonecarboxylic acid, m.  $204^\circ$  and 4-chlorobenzophenone-3,6-dicarboxylic acid.

**Aliphatic anhydrides.** Henry Dreyfus. Brit. 397,472, Aug. 22, 1933. See Fr. 749,015 (*C. A.* 28, 492<sup>3</sup>).

**Mixed anhydrides.** Henkel & Cie. G. m. b. H. Fr. 751,571, Sept. 6, 1933. Mixed anhydrides of silicic acid and higher carboxylic acids are prepd. by the action of a Si halide or an anhydride of silicic acid and another acid on a carboxylic acid contg. at least 6 C atoms. Thus, silico-stearic anhydride is prepd. by the action of  $\text{SiBr}_4$  or silico-acetic anhydride on stearic acid. Other examples are given including the prepn. of silicobenzoic anhydride,  $(\text{C}_6\text{H}_5\text{COO})_2\text{Si}$ . The products may be used for hydrogenation.

**Mixed anhydrides of boric and organic acids.** Henkel & Co. G. m. b. H. Brit. 398,064, Sept. 7, 1933. Triacyl borates are prepd. by heating  $\text{H}_2\text{BO}_3$  or  $\text{B}_2\text{O}_3$  with 1 or more org. acids (other than  $\text{AcOH}$ ) in the presence of at least an equiv. quantity of an inorg. acid chloride or org. acid anhydride. In examples (1) tristearyl borate is obtained by heating stearic acid with  $\text{H}_2\text{BO}_3$  or  $\text{B}_2\text{O}_3$ , and  $\text{Ac}_2\text{O}$  and distg. off the excess  $\text{Ac}_2\text{O}$  with the  $\text{AcOH}$  formed and (2) cinnamic boric anhydride is prepd. by heating cinnamic acid with  $\text{H}_2\text{BO}_3$  in presence of  $\text{SOCl}_2$  until evolution of  $\text{HCl}$  ceases.

**Apparatus for catalytic reactions such as oxidation of naphthalene to form phthalic anhydride.** Benjamin E. Thomas (to Monsanto Chemical Co.). U. S. 1,936,610, Nov. 28. Various structural and mech. detail are described, adapted for use with fused salt baths or the like for heat control.

**Alkylating acid nitriles.** Karl Ziegler. Ger. 581,728, Aug. 2, 1933. Addn. to 570,594 (*C. A.* 27, 4251). The method of 570,594 for alkylating nitriles by treating them with halogenated alkyl or aralkyl compds. and  $\text{NaNH}_2$  is modified by replacing the latter by hydrides or org. substituted amides of the alkali or alk. earth metals. Thus, isobutyric acid nitrile is treated with  $\text{NaH}$  and benzyl chloride to give *o*-benzylisobutyric acid nitrile, b.  $117-18^\circ$  and 1.57<sup>1</sup>.

**Tertiary acid nitriles.** Karl Ziegler. Ger. 583,561, Sept. 6, 1933. Sec. nitriles of the general formula  $\text{R}_3\text{CHCN}$ , in which R represents alkyl (except vinyl) or aralkyl groups, are treated with alkali metal-, Mg- or halogen-Mg-substitution products of secondary aliphatic or hydroaromatic amines to form metal substitution products, these being then treated with halogen alkylene compds. or dialkyl sulfates. Thus, diallylacetonitrile is treated with dicyclohexylamine and  $(\text{C}_2\text{H}_5\text{Br})_2\text{Mg}$  soln. The product is then treated with allyl bromide, to give triallylacetonitrile. The prepn. of diethylallylacetonitrile, b.  $78^\circ$  at 15 mm., dimethylbenzylacetonitrile, m.  $57^\circ$  and

1 ethyldiundecylacetonitrile, b.  $195-200^\circ$  at 0.5 mm., is also described.

**Aminoanthraquinone nitriles.** Max Kugel (to General Aniline Works). U. S. 1,938,029, Dec. 5. By heating 1-amino-4-amino (or substituted amino) anthraquinone-2-sulfonic acid with KCN in aq. soln. to a temp. above  $65^\circ$  (suitably in a closed vessel for some time at above  $100^\circ$ ), products are obtained such as 1-amino-2-cyano-4-hexahydroanilinoanthraquinone, m.  $211-12^\circ$ ; 1-amino-3-cyano-4-hexahydroanilinoanthraquinone, m.  $239-40^\circ$ ; 1-amino-2-cyano-4-*p*-tolylaminoanthraquinone, 1-amino-3-cyano-4-*p*-tolylaminoanthraquinone, 1-amino-2-cyano-4-anilinoanthraquinone, 1-amino-2,3-dicyano-4-butylaminoanthraquinone, 1-amino-2-cyano-4-butylaminoanthraquinone, 1-amino-2-cyano-4-methylaminoanthraquinone and 1,4-diamino-2,3-dicyanoanthraquinone. Details of procedure are given for making all these compds. which, in general, form blue crystals.

**3-Methylalpentane.** Alexander Wacker Ges. fur elektrochemische Industrie G. m. b. H. Fr. 752,516, Sept. 25, 1933. One mol. of butyraldehyde is condensed with 1 mol. of  $\text{AcH}$  to form 3-methylal-2-pentanol  $\rightarrow$  3-methylal-2-pentene  $\rightarrow$  3-methylalpentane by fixation of H. The fixation of H may be pushed as far as the satd. alc. which is then dehydrogenated.

**3-Methylal-3-hydroxymethylpentane.** Alexander Wacker Ges. fur elektrochemische Industrie G. m. b. H. Fr. 752,493, Sept. 23, 1933. See Brit. 390,658 (*C. A.* 28, 492<sup>2</sup>).

**Acetylene.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 751,284, Aug. 30, 1933.  $\text{C}_2\text{H}_2$  is extd. from gaseous mixts. contg. it by one or more solvents of the class comprising polyglycols, their esters, ethers or mixed ethers, e. g., diethylene glycol, dipropylene glycol, diethylene glycol diacetate or the acetate of the mono-Et ether of diethylene glycol.

**2-Butene.** I. G. Farbenind. A.-G. (Franz Runge and Martin Müller-Curadi, inventors). Ger. 583,790, Sept. 13, 1933. See U. S. 1,914,674 (*C. A.* 27, 4252-3).

**Copper-containing catalyst suitable for use in methanol synthesis from hydrogen and carbon monoxide.** Henry H. Storch (to E. I. du Pont de Nemours & Co.). U. S. 1,937,728, Dec. 5. A cuprammonium salt such as the sulfate or nitrate is treated (as by heating with  $\text{NaOH}$ ) to form a Cu-O compd. and the latter is reduced at a temp. below the m. p. of Cu.

**Isopropyl alcohol.** James W. Woolcock (to Imperial Chemical Industries Ltd.). U. S. 1,938,162, Dec. 5. Gases contg.  $\text{C}_3\text{H}_8$  are brought into contact with  $\text{H}_2\text{SO}_4$  contg. not more than a few percent of water dild. with about an equal amt. of glacial  $\text{HOAc}$ , at a temp. of about  $40^\circ$  so as to produce a reaction mixt. contg. a substantial amt. of iso-Pr H sulfate, which may then be converted into iso-Pr alc. by heating to eff. et hydrolysis.

**Acetone.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Hans Walter, inventor). Ger. 584,517, Sept. 21, 1933. Addn. to 577,705 (*C. A.* 28, 493<sup>4</sup>). The method of 577,705 for prepg. acetone by leading  $\text{C}_2\text{H}_2$  and H over an impregnated porous C catalyst free from Fe, at high temps., is varied by using catalysts consisting of active porous C impregnated with Cd, Zn and alkali or alk. earth metal compds. Examples are given.

**Acetaldehyde, etc.** Consortium für elektrochemische Industrie G. m. b. H. (Hans Deutsch and Willy O. Herrmann, inventors). Ger. 583,975, Sept. 14, 1933.  $\text{AcH}$ , acetone and  $\text{AcOH}$  are obtained by passing  $\text{C}_2\text{H}_2$  and H through a fused acid-reacting salt contg. less than 5% of water of crystn., at temps. between  $300^\circ$  and  $450^\circ$ . A fused mixt. of  $\text{ZnCl}_2$  and  $\text{AlCl}_3$  may be used.

**Benzanthronealdehydes.** I. G. Farbenind. A.-G. Fr. 753,970, Oct. 28, 1933. See Ger. 581,239 (*C. A.* 27, 5083).

**Vinyl ethers.** I. G. Farbenind. A.-G. (Walter Reppe, inventor). Ger. 584,840, Sept. 25, 1933. The ethers are prepd. by the action of  $\text{C}_2\text{H}_2$  on org. hydroxy compds. in the liquid phase at temps. above  $100^\circ$  in the presence of basic substances. Thus, a soln. of Na in abs. alc. is

subjected to a stream of N and  $C_2H_2$  in an autoclave to give a 95% yield of ethyl vinyl ether, b.  $36^\circ$ . The prepn. of the following is also described; vinyl amyl ether, b.  $111^\circ$ , ethylene glycol ethyl vinyl ether, b.  $128^\circ$ , ethylene glycol divinyl ether, vinyl phenyl ether, b.  $155-6^\circ$ , vinyl *m*-tolyl ether, vinyl  $\beta$ -tetrahydronaphthyl ether, b.  $143^\circ$ , vinyl isopropyl ether, b.  $64^\circ$ , di- and triethylene glycol vinyl ether, b.  $90-7^\circ$  and b.  $100^\circ$ , resp., vinyl octyl ether, b.  $75^\circ$ , ethyl octadecyl ether, b.  $190^\circ$ , vinyl decyl ether, b.  $110^\circ$ , vinyl dodecyl ether, b.  $120^\circ$ , monovinyl ether of diethanolamine, b.  $100-10^\circ$ , the divinyl ether of triethanolamine, b.  $120-30^\circ$ , vinyl butyl ether, vinyl tetradecyl ether, b.  $140-5^\circ$  and vinyl oleyl ether, b.  $170-5^\circ$ . Cf. C. A. 27, 730.

**Urea.** Alphonse Zieren. Ger. 579,567, June 29, 1933. Urea is prepd. by leading a gaseous mixt. contg. dry  $CO_2$  and  $NH_3$  in the proportion 1:2 over active C at  $100-140^\circ$ . The urea is removed from the catalyst by a liquid solvent such as alc. Yields of 88-9% are obtained. Examples are given.

**Urea synthesis.** Harry C. Hetherington (to E. I. du Pont de Nemours & Co.). U. S. 1,937,116, Nov. 28. In effecting urea synthesis by heating  $NH_3$  and  $CO_2$  to a temp. of at least  $150^\circ$  and under a pressure of at least 100 atm., unconverted  $NH_3$  carbamate is sepd. from the synthesis melt by distn. and the hot distillate is condensed by cooling it in the presence of substantial amounts of urea and free  $NH_3$ . Cf. C. A. 27, 3724.

**Bornyl oxalates.** Léon Darrasse, Etienne Darrasse, Lucien Dupont and Egon Elod. Fr. 751,275, Aug. 30, 1933. See Ger. 562,879 (C. A. 27, 1015).

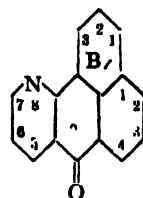
**Tetrahydronaphthylamine.** I. G. Farbenind. A.-G. (Carl Wulff, inventor). Ger. 581,831, Aug. 3, 1933. Pure tetrahydronaphthylamine is obtained by sepg. a mixt. of *ar*-tetrahydro- $\alpha$ - and  $\beta$ -naphthylamine or *ar*- and *ac*-tetrahydro- $\beta$ -naphthylamine. This is effected by treating the mixt. with solvents in which *ar*-tetrahydro- $\beta$ -naphthylamine is insol. or only partly sol. below its m. p. and cooling to between  $15^\circ$  and  $-20^\circ$ . Thus, a mixt. of *ar*-tetrahydro- $\alpha$ - and  $\beta$ -naphthylamine is dissolved in benzene. The soln. is cooled to between  $-7^\circ$  and  $-10^\circ$ . The  $\beta$ -base is crystd. out and the  $\alpha$ -base remains in soln., from which it can be recovered, after filtration, by distn.

**Substituted acetamide.** Schering-Kahlbaum A.-G. (Karl Junkermann and Otto von Schiekh, inventors). Ger. 581,830, Aug. 3, 1933. Substitution products are obtained by introducing an acetyl group into the  $NH_2$  group of alkyl-, alkylalkenyl- or alkenyl-acetamides.

Thus, triallylacetamide is treated with  $Ac_2O$  to give acetyltriethylacetamide, m.  $92-3^\circ$ . The prepn. of acetyl-diethylpropylacetamide, m.  $74^\circ$ , and acetyltriethylacetamide, m.  $109^\circ$ , is also described.

**Cyclohexylcyclohexanol.** Howards & Sons Ltd., John W. Blagden and George C. H. Clark. Brit. 397,883, Sept. 1, 1933. Cyclohexylcyclohexanol and its homologs are prepd. by hydrogenating cyclohexylidenecyclohexanone or its homologs in presence of a catalyst belonging to the non-noble metal group, e. g., Fe, Ni or (and) Cu. The catalyst may contain a promoter, e. g.,  $MgO$ ,  $Cr_2O_3$ , and may be carried on a support. The hydrogenation is preferably under pressure, e. g., 10 atm. and at  $150^\circ$ . The cyclohexylidenecyclohexanone may be prepd. from cyclohexanol by condensation with agents such as caustic alkalis,  $NaOEt$ ,  $Ba(OH)_2$  or  $HCl$ .

**Pyrobenzanthrones.** I. G. Farbenind. A.-G. Fr. 753,828, Oct. 25, 1933. N condensation products are made by causing compds. capable of reacting like acrolein, e. g., acrolein, glycerol, aldol, crotonaldehyde and cinnamaldehyde, to react with pyridinonaphthalenes, the isocyclic rings of which contain at least one substituent chosen from the group  $=O$  and  $-OH$ , e. g., 3-hydroxy-1(*N*)-2- or 3-hydroxy-2(*N*) methyl-1(*N*)-2-pyridinonaphthalene, 1-naphthoquinoline-3,4-quinone and 2,3-phthaloylpyridine and their substitution products. To obtain good yields, oxidizing agents are added if the starting materials contain  $OH$  groups and reducing agents if they contain a quinone group. Examples are given of the prepn. of *N*(*N*)-1,9-pyrobenzanthrone of the formula



and of a *Bz*-3-hydroxy, a dibromo (m. above  $300^\circ$ ), a mononitro (m.  $285-6^\circ$ ), a monoamino (m.  $267-8^\circ$ ), a methoxy, a sulfo (m. above  $300^\circ$ ), a monocyano (m.  $305-7^\circ$ ), a carboxylic, a *Bz*-1-bromo and a *Bz*-1- $\alpha$ -anthraquinone deriv., also the 5-(*N*) compd. and derivs. thereof, also dyes obtained by condensing these compds. with pyrazoleanthrone.

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Method for the separation of enzymes.** M. Sreenivasaya and N. Keshava Iyengar. *Nature* 132, 604 5(1933). About 20 cc. of enzyme ext. is frozen in a centrifuge tube and the frozen mass centrifuged at about 6000 r. p. m. for 15 min. Three distinct layers will form. The topmost layer is water, contg. the more easily diffusible enzyme fractions; the bottom layer represents the most concd. fraction of enzymes with high mol. or micellar wts. The method has been applied to the fractionation of intulase and invertase. Philip D. Adams

**Inhibitors in the decomposition of hydrogen peroxide by catalase.** Hubert N. Alyea and James Pace. *J. Am. Chem. Soc.* 55, 4801-6(1933).—No parallelism appears between the relative inhibitory powers of 19 org. compds. in the decompn. of  $H_2O_2$  by catalase at  $24^\circ$  and by light at  $75^\circ$  (C. A. 27, 1800). Mixing 12 inhibitors with catalase for 20 min. before addn. of  $H_2O_2$  does not increase the inhibitory powers; 7 other inhibitors appear to deactivate the catalase somewhat. The min. chain length is 2000. H. A. Beatty

**Pyrophosphatase in the placenta.** Isao Horii. *Arb. drilt. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No.

4, 10 14(1933).—The amt. of pyrophosphatase in the human placenta decreases as pregnancy advances, while the opposite is true of orthophosphatase. M. L. C. B.

**The phosphatase content in various histological alterations of organs.** Isao Horii. *Arb. drilt. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 23-48(1933); cf. C. A. 27, 1647.—Cases of nephritis showing damage to the tubular epithelium show also a diminution of phosphatase activity. Atrophied testicles contain less phosphatase than active ones. Liver damaged by  $CCl_4$ ,  $CHCl_3$ , or P shows a decreased phosphatase content. Carcinoma mas show less phosphatase after irradiation. Phosphatase therefore occurs in connection with the cell cytoplasm. M. L. C. Bernheim

**Sulfatase.** Shinzaburo Fujita and Yasunobu Hosoda. *Arb. drilt. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 130 42(1933).—The ethereal sulfates of phenol and cresol are hydrolyzed by the sulfatase in takadiastase, with an optimum  $pH$  of 9.0. The deriv. of *p*-cresol is attacked more rapidly than its *o*- or *m*-isomers. M. L. C. Bernheim

**The fluorescence spectra of hyporcin and mycoporphyrin.** Ch. Dhéré. *Compt. rend.* 197, 948-50(1933).—The absorption and fluorescence spectra of hyporcin and



mycoporphyrin in both pyridine and alc. solns. indicate that they are identical.

Rachel Brown

The lipases of [human] blood serum. J. Nitzulescu, I. Ornstein and D. Herescu. *Compt. rend. soc. biol.* 114, 747-9(1933).—In general, serum lipase is greatly decreased in old age. Some exceptions were found.

L. E. Gilson

Influence of salts on the action of fumarase. Kurt P. Jacobsohn and Fernando Bela Pereira. *Compt. rend. soc. biol.* 114, 858-60(1933); cf. *C. A.* 27, 4822.— $Mg^{++}$  accelerates the action of fumarase;  $Ca^{++}$  does not. Inorg. phosphates have an activating effect but Na diphenylpyrophosphate does not.

L. E. Gilson

Lactic fermentation. E. Aubel and E. Simon. *Compt. rend. soc. biol.* 114, 905-7(1933).—Dried yeast, powd. dog muscle, acetone-extd., and muscle ext. prepd. by Thunberg's method had no effect whatever on the system, a glycerophosphate-pyruvic acid, but all 3 readily formed AcCHO and lactic acid from Mg hexosephosphate.

L. E. Gilson

Action of polyhydric phenols on urease; the influence of thiol compounds. Juda H. Quastel. *Biochem. J.* 27, 1116-22(1933). The high toxicities of catechol and hydroquinone toward urease are probably due to the presence of the corresponding quinones in the aq. solns. of the dihydric phenols. The protective effects of thiol compds. can then be explained as due to the reduction of the quinones to the dihydric phenols.

B. Harrow

Interaction of haloacetates and SH compounds. The reaction of haloacetic acids with glutathione and cysteine. The mechanism of iodoacetate poisoning of glyoxalase. Frank Dickens. *Biochem. J.* 27, 1111-51(1933).—Neutral solns. of  $ICH_2CO_2Na$  and glutathione form a thio-ether by elimination of NaI. The reaction follows the bimol. law. Bromo- and chloroacetates behave similarly but less vigorously. The iodoacetate inhibition of glyoxalase activity is reversed completely by the addn. of glutathione to the inactivated ext.

Benjamin Harrow

The biochemistry and physiology of glucuronic acid. I. The structure of glucuronic acid of animal origin.

John Pryde and Richard T. Williams. *Biochem. J.* 27, 1197-204(1933).— $\beta$ -Bornyl-*d*-glucuronide (I) was isolated as the Zn salt from the urine of human beings and dogs fed with borneol. I gives cryst. 2,3,4-trimethyl- $\beta$ -bornyl-*d*-glucuronide Me ester (II) by methylation with  $Ag_2O$  and MeI. II is converted into a mixt. of  $\alpha$ - and  $\beta$ -2,3,4-trimethylmethyl-*d*-glucuronide Me esters by the action of 0.2 *N*  $H_2SO_4$  in MeOH at 100°. Oxidation of the fully methylated glucuronic acid with  $HNO_3$  yields *d*-dimethoxysuccinic acid, *dl*-xylotrimethoxyglutaric acid (IV) and 2,3,4-trimethyl- $\delta$ -saccharolactone (III). The last 2 of these were identified as the cryst. diamides, while III was identified as the cryst. Me ester. The isolation of IV and III establishes a pyranoid structure for the glucuronic acid residue of bornylglucuronide. II. The methylation of glucurone of animal origin. *Ibid.* 1205-9.

—Glucurone (I), the anhydride of glucuronic acid, is obtained directly by the hydrolysis of borneolglucuronide. Methylation of I with  $Ag_2O$  and MeI gives 2 cryst. solids, trimethylglucurone and an unsatd. deriv., trimethylglucuralone. The bulk of I undergoes more extensive methylation because of the opening of the lactone ring. III. The structure of benzoylglucuronic acid. *Ibid.* 1210-15. —Conjugated glucuronates are either the glucoside-“ether” type, the glucoside-“ester” type (I) or a combination of these 2. Benzoylglucuronic acid (II), a type I, has been prepd. in a state of purity. Like all glucosides contg. a 1-Bz radical, II reduces sugar reagents because the Bz is easily hydrolyzed.

B. H.

The proteolytic enzymes of yeast. Thomas F. Macrae. *Biochem. J.* 27, 1229-30(1933).—The liberation of dipeptidase, aminopolypeptidase and protease by the autolysis of English top-yeast and Dutch bakers' yeast differs in several respects from the liberation of these enzymes from Löwenbriau yeast. Preps. of dipeptidase free from protease and aminopolypeptidase free from

dipeptidase and protease have been obtained from English top-yeast.

Benjamin Harrow

Studies on the relationship between chemical constitution and physiological action. V. Molecular dissymmetry and physiological activity. Leslie H. Easson and Edgar Stedman. *Biochem. J.* 27, 1257-66(1933); cf. *C. A.* 27, 315, 5313.—On the assumption that 3 of the groups linked to the asym. C atom in an optically active drug are concerned in its attachment to its specific receptor in the tissues, mol. dissymmetry and its assocd. optical activity have no direct influence on the magnitude of the physiol. activity of the drug. The same holds true for the relationship between mol. dissymmetry in a substrate mol. or in a sp. inhibitor and their power of combining with an enzyme. The theory is supported by the fact that the pressor activities of *d*-adrenaline and 3,4-(HO) $_2$ C $_6$ H $_3$ CH $_2$ CH $_2$ NIHMe are equal. A comparison of the mitotic activities of a no. of urethans shows agreement with theory.

Benjamin Harrow

The chemist and the public health. E. Gabriel Jones. *Chemistry & Industry* 1933, 1024-30.

E. H.

Urochrome and the participation of lyochromes in cell respiration. Kurt G. Stern and Guy D. Greville. *Naturwissenschaften* 21, 720(1933). The urochrome of urine contains a substance similar to the lyochromes (lactochrome, cytoflavine, yellow oxidation enzyme). The urochrome prepd. by adsorption on C or fuller's earth, AcOH or pyridine-McOH elution and purification by fractionated Me $_2$ CO-EtOH pptn. contains C 30.9, H 6.64, N 13.19, S 1.13%; the mol. wt. (Northrop-Anson method) is 2600; it contains 2% of paired glucuronic acid. Its aq. soln. gives continuous absorption from the visible violet on and blue-green fluorescence; it is only slightly toxic. Hyposulfite reduces it to a less colored substance, resistant to  $KMnO_4$ ; hence it is not urochromogen. The urochrome raises the spontaneous respiration of human or rabbit erythrocytes 2-4 times; rat cells do not react; it converts dissolved cryst. hemoglobin (horse or rat) into methemoglobin rapidly and almost quantitatively under aerobic or anaerobic conditions. Liver lyochrome has a similar action; both substances reduce oxidized cytochrome-c and helicorubin. On the basis of present results and those of Warburg a mechanism for cell respiration is suggested:  $O_2 \rightarrow$  Warburg's respiration enzyme  $\rightarrow$  cytochrome  $\rightarrow$  lyochrome  $\rightarrow$  substrate  $\leftarrow$  dehydrogenase.

B. J. C. van der Hoeven

Properties and occurrence of inducing substances. Joh. Hultfreter. *Naturwissenschaften* 21, 766-70(1933).—A review of work on “inductors” (Spemann), chem. substances which cause development of the embryonal ectoderm of amphibia into the central nervous system. They are present in certain parts of the embryo, e. g., the preformed mouth musculature, etc. Details on temp. and chem. stability are given. The inductor is present in exts. from many different organisms and animals: worms, molluscs, Crustacea, insects, fishes, amphibia, reptiles, birds and mammals; vegetable material is generally inactive. Evidence is given that glycogen itself is not the inductor, contrary to Fischer and Wehmeier (*C. A.* 27, 5379). The inductor is ether-sol. and occurs in glycogen-free hen embryo. The substance has not been chemically identified as yet; it is readily available, e. g., from calf liver (cf. H., *Arch. Entwicklungsmech. Organ.* (Abt. D., Z. Wiss. Biol.) 129(1933); Needham, *Chem. Embryol.* (*C. A.* 26, 1311)).

B. J. C. v. d. H.

The physical chemical nature of the “organisor.” C. H. Waddington, J. Needham and D. M. Needham. *Naturwissenschaften* 21, 771-2(1933).—A short review of studies on the chem. nature and action of the inductor (preceding abstr.). Conclusion: A chem. inducing substance is present in the cell-free ext.; it is decidedly ether-sol. and probably of lipid nature. Many references are given.

B. J. C. van der Hoeven

Amylosynthase. XVI. X-ray spectrography on synthetic starch. Toyosaku Minagawa. *J. Agr. Chem. Soc. Japan* 9, 907-15(1933); cf. *C. A.* 27, 5347.—Synthetic starches, polymerized from dextrin prepd. by enzyme, and from glycogen, gave a cryst. x-ray spectro-

gram. Natural starch has also a cryst. structure but differs somewhat from that of synthetic starch. Synthetic starch polymerized from sol. starch of glutinous rice was amorphous. XVII. *Ibid.* 916-19.—Natural dextrin was isolated from the grain and polymerized by amylosynthase into starch. A product obtained by heating glycogen with glycerol at 190-210° was also polymerized by amylosynthase. Amylosynthase lost the property of being salted out by  $(\text{NH}_4)_2\text{SO}_4$  after further purification. XVIII. *Ibid.* 919-21.—Two kg. of yeast was treated with a l. of  $\text{H}_2\text{O}$  and a small amt. of  $\text{PhMe}$  for 2 days at 25°. Alc. or  $\text{Me}_2\text{CO}$  was added to the ext. The ppt. was repeatedly reprecipitated with alc. or  $\text{Me}_2\text{CO}$ . The white powder thus obtained had no amylolytic action on starch, but accelerated the action of amylase. It appears to contain an enzyme complement which does not lose its activity at 80°.

Y. Kihara  
Enzymes of *Bombyx mori*. III. Tyrosinase and catalase in the blood of *Bombyx mori*. Kazuo Yamafuji. *J. Agr. Chem. Soc. Japan* 9, 940 8(1933); cf. C. A. 27, 3989.

The action of tyrosinase in the blood was optimum at  $\text{pH}$  6.6 and at 37°. It was stronger in the male than in the female. The Japanese or Chinese species of the silk worm has much more tyrosinase in the blood than the European. The optimum  $\text{pH}$  and temp. of catalase in the blood were, resp., 6.6° and 23°. Catalase was more abundant in the blood of the male and during vigorous growth. Variations in enzyme content during the life cycle of the silk worm were investigated. Y. Kihara

Bios. IX. So-called Bios I and II. Yasuji Hamamura and Mitsugi Chikamatsu. *J. Agr. Chem. Soc. Japan* 9, 1018-21(1933).—So-called Bios I and II were sepd. by  $\text{Ba}(\text{OH})_2$  from the rice bran by Luca's method. Bios II has only a growth-promoting action on yeast. The growth of the yeast must be compared for 20 days and more. Mixing Bios II with Bios I or inositol did not increase its action. The sepn. of Bios I and II was tried on tea leaves. The action of Bios II from tea leaves was very weak. Bios can be decomposed by treatment with  $\text{Ba}(\text{OH})_2$ . It is supposed that there are 2 kinds of Bios, one stable and another unstable to  $\text{Ba}(\text{OH})_2$ . X. Distribution of Bios in animals. Yasuji Hamamura and Kyoji Ohata. *Ibid.* 1090-4.—Bios was found abundantly in the leaves of plants and in the various organs of the fowl, especially the pancreas and the liver. Bios seems to have an important role in the animal body. Y. Kihara

Glucosulfatase. VII, VIII. Tokuro Soda and Iujio Egami. *J. Chem. Soc. Japan* 54, 1069-73(1933); cf. C. A. 27, 5354. The decompn. of glucose sulfate by the enzyme reached 90.6% at 30' when the phosphate was removed from the enzyme prepn. Glucosulfatase and phenolsulfatase cannot be sepd. by adsorption of the latter on active C. Glucosulfatase is also prepd. from *Polypus vulgaris*, *Ommastrephes sloani pacificus* and *Astrucyus manni*. K. Kutsuta

Studies on maltase. I. Maltase in the blood. Takezo Kokuryo. *Japan. J. Med. Sci. II Biochem.* 2, 115-30 (1933).—Maltase is present in the blood serum of the following animals: pig, dog, horse and sheep. Its presence was not detected in the blood serum of the cat, guinea pig, rabbit and man. In the dog, maltase is present in the serum and is absent from the red blood cells. The enzyme is most generally associated with the pseudoglobulins. Amylase always accompanies maltase. It is, however, associated more generally with the albumin fraction of the blood. II. The origin of maltase in the blood and urine. *Ibid.* 132-50.—The maltase of the blood and of urine originates partly from the pancreas and partly from the intestine. It is difficult to ascertain to what extent other body organs participate in the generation of the enzyme. The concn. of maltase in the blood and urine increases during starvation, after which it may regain its normal level or fall below it. Starvation does not affect the activity or concn. of amylase. III. Conditions influencing the action of maltase in the blood serum. *Ibid.* 161-74.—A 0.5% soln. of  $\text{NaF}$  used as an antiseptic augments the hydrolytic action of the maltase present in the blood serum of the dog. The addn. of 0.9%  $\text{NaCl}$  also activates the

maltase activity of blood serum. The blood serum of the dog and of swine shows a wide range of activity, the optimum being most likely at  $\text{pH}$  6.6. IV. Maltase of human urine. *Ibid.* 175 84.—The amt. depends on the sex. It varies in amt. with the density and acidity of the urine and in different diseases; e. g., in achylia pancreatica and in beriberi it is absent, while it is present in large amts. in Basdow's disease. It is more frequently found in the urine of persons giving a pos. Pirque reaction.

B. S. Levine

Photochemical changes of hydroxyproline and proline caused by x- and by ultra-violet radiation. J. P. Becker. *Strahlentherapie* 48, 296 307(1933).—The absorption spectra of l-proline (I) and of l-hydroxyproline (II) were detd. after radiation. I shows a band at 313  $\text{m}\mu$ . II radiated in soln. gives 2 bands at 257 and 313. The latter does not appear if the solid is radiated. Milton Levy

Light and metabolism. Ludwig Pincussen. *Strahlentherapie* 48, 308-18(1933); cf. C. A. 27, 4836. A lecture. Milton Levy

The influence of light on nutrition and metabolism of farm animals. Ernest Mangold. *Strahlentherapie* 48, 319 28(1933).—A lecture. Milton Levy

Enzyme and carbohydrate investigations of the aqueous humor. I. Permeability of the membrane and the enzyme contents of the aqueous humor. Josef Bock and Hans Popper. *Z. ges. expil. Med.* 90, 319 30(1933)

The amt. of diastase in the aqueous humor may be an index of the permeability of its membrane. The first humor obtained from rabbits is very low in enzyme content. The humor obtained an hr. later is very much higher and the amt. diminishes subsequently. The amt. of enzyme parallels the protein concn. III. Comparison of the sugar contents of first and second aqueous humors. *Ibid.* 604 7. The glucose concn. of the newly formed aqueous humor of the rabbit eye was compared with the other, normal, humor. The sugar was about 25% higher in the former, probably because of local hyperglucemia induced by the injury. Milton Levy

Human milk studies. XIV. A critique of the determinations of nitrogenous constituents. Betty Nina Fickson, Neva Stoner and Icie G. Macy. *J. Biol. Chem.* 103, 235 48(1933); cf. C. A. 26, 4086. A modified method for the complete pptn. of the proteins of breast milk is described involving the use of 0.1 cc. of 10%  $\text{Na}_2\text{WO}_4$  and 0.2 cc. of 0.666  $N$   $\text{H}_2\text{SO}_4$  per 1 cc. of milk. The filtrate may be used for the standard procedures of blood analysis and gasometric detns. for non-protein N constituents. A comparative study of  $\text{H}_2\text{WO}_4$  and  $\text{CCl}_3\text{CO}_2\text{H}$  as protein precipitants shows that fresh breast milk contains polypeptides and that there is a gradual increase of polypeptide N in the milk after removal from the breasts, indicating the presence of a proteolytic enzyme. There is also an enzyme present which is capable of converting urea to  $\text{NH}_3$ . The increase of amino N after the hydrolysis of the protein-free filtrates with  $\text{HCl}$  showed the presence of simple peptides or conjugated amino acids in fresh breast milk. Differences obtained with various methods of protein pptn. make possible a more comprehensive study of the N constituents of breast milk which have been little investigated and which promise to be of definite significance in the physiology and abnormalities of milk secretion. Forty references. A. P. Lothrop

The basic amino acids of serum proteins. Richard J. Block. *J. Biol. Chem.* 103, 261-7(1933).—Fractionation of fresh cattle serum by various concns. of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{MgSO}_4$  and  $\text{NaCl}$  yielded fractions which differed in arginine, histidine and lysine contents. The results seem to indicate that the serum does not contain several independent proteins and that the fractions isolated by physicochem. methods are not pre-existent in the serum but result from the technic employed. The non-dissociable components contg. the higher percentage of lysine usually comprise the more sol. albumin fractions with which the lysine-low components might unite to form globulins. The results are consistent with Sørensen's hypothesis that the serum proteins are constructed from a large no. of nondissociable components. A. P. Lothrop

**The inactivation of mussel catalase by oxygen.** Graham W. Marks and Denis L. Fox. *J. Biol. Chem.* 103, 269-83 (1933).—Catalase in exts. prepd. from the mussel, *Mytilus californianus*, Conrad, is inactivated directly or indirectly by  $O_2$ , and also by  $N_2$  although at a lower rate. The quantity of  $H_2O_2$  decompd. is directly proportional to the enzyme concn. except at high concns. of enzyme and is independent of the  $H_2O_2$  concn. over certain ranges. The inactivation is a pseudounimol. reaction and the Arrhenius equation expresses the rate at lower temps.

**Sedimentation constants, molecular weights and isoelectric points of the respiratory proteins.** The Svedberg. *J. Biol. Chem.* 103, 311-25 (1933); cf. C. A. 27, 3255, 3960.—"Respiratory proteins contained in blood corpuscles have low sedimentation constns. and comparatively low mol. wts. Hemoglobin only occurs in the higher classes of the vertebrates. The corpuscle pigment of the lowest vertebrate, *Myxine*, has a lower sedimentation const. and lower mol. wt. than the hemoglobin of the higher vertebrates. Respiratory proteins dissolved in the blood plasma have, as a rule, high sedimentation constns. and high mol. wts. The only exception is the blood pigment of the *Chironomus* larvae. Within a well-defined animal group all species have, as a rule, the same sedimentation const. Biol. kinship, therefore, is usually accompanied by identity in the sedimentation const. Detns. of mol. wts. by means of sedimentation equil. measurements indicate that a system of simple multiples seems to obtain among the mols. of the blood pigments. Detns. of the isoelec. points of the respiratory proteins show that the blood pigments of the invertebrates so far studied are all much less alk. than the hemoglobin of the vertebrates. The isoelec. point varies from species to species. Even closely related forms have different isoelec. points. For a genus including several subgenera the isoelec. points lie closer together within a subgenus. The situation of the isoelec. point is therefore to a certain degree a measure of kinship."

**Nerve catalase.** F. O. Schmitt and R. K. Skow. *Am. J. Physiol.* 106, 404-13 (1933).—Frog nerve contains relatively little catalase. Nerve tissue contains a thermostable substance that actively catalyzes the oxidation of unsatd. fatty acids. It is unlikely that the oxidation catalyst is the heme residue of catalase alone.

**The presence of fibrinogen and pseudoglobulin in fibrin digests.** W. H. Welker, Geo. Gilman and Ludvig Hektoen. *Am. J. Physiol.* 106, 475-7 (1933).—Autolysis of beef fibrin and pepsin digestion of beef and horse fibrins yield free substances with the antigenic properties of fibrinogen and pseudoglobulin.

**The relationship of azo dyes to the coagulation of blood.** A. St. George Huggett and F. M. Rowe. *J. Physiol.* 80, 82-95 (1933).—The best anti-coagulant dyes are disazo direct dyes prepd. from tetrazotized diamines coupled with ammonaphtholsulfonic acids. Purification of the dye is essential.

**The chemistry of hormones and vitamins.** F. P. Mazza. *Boll. soc. ital. biol. sper.* 8, 945-1000 (1933).—The chem. and biol. relations between vitamins, hormones and enzymes are discussed. The review covers the chemistry of vitamins A, D, E, B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, C and the follicular and testicular hormones. Two hundred and twenty references.

**The proteins of the striated muscles of the frog. Elementary analysis.** G. Bucciardi. *Boll. soc. ital. biol. sper.* 8, 1190-3 (1933).—The water-insol. substances extd. from striated frog muscles by a satd. oily soln. of chloral hydrate have the following elementary compn. based on an ash-free and HCl-free product: C 54.06; H 8.07; N 16.37; and S 1.10%. The water-sol., non-coagulable fraction contains: C 57.44; H 7.55; N 14.21; O 21.8%. The water-sol., heat-coagulable fraction contains: C 52.81; H 7.14; N 16.93; S 1.16%.

**Precipitation of proteins by neutral salts.** G. Sandor, A. Bonnefoi and J. J. Perez. *Compt. rend.* 197, 1254-6 (1933).—The pptn. of natural proteins by neutral salts is not due to an isoelec. precipitability; the soly. on the

contrary passes through a max. at the isoelec. point ( $p_H$  6) for globulins and is excessively increased at the isoelec. point ( $p_H$  4.8) for albumins. The soly. curve shows a sharp break with albumins. The soly. begins to diminish, then increases, and finally decreases again, reaching a max. at  $p_H$  6.6. The precipitability of natural proteins by neutral salts appears to be comparable to those of the classic ampholytes.  $(NH_4)_2SO_4$  ppts. proteins because the protein sulfates are slightly sol. salts; they ppt. then, when their dissocn. diminishes because of an excess of sulfate or of H ions. The proteins are kept in soln. by the same forces as those which disperse crystalloids. The soly. curve of albumin shows further that proteins are not simple ampholytes, but resemble mixts. of several chem. species.

**Oxidations by erythrocytes and the catalytic influence of methylene blue. I. The oxidation of lactate to pyruvate.** Wm. B. Wendel. *J. Biol. Chem.* 102, 373-83 (1933).—Defibrinated dog blood or the washed erythrocytes are able to oxidize lactic to pyruvic acid in the presence of methylene blue, but only very slightly in its absence. Pyruvic acid itself is not oxidized. As the oxidation proceeds, the spectrum of methemoglobin appears. From the O consumption in the presence of  $d$ -glucose it appears that about 80% of the latter is oxidized by channels other than via lactate to pyruvate. **II. Methemoglobin and the effect of cyanide.** *Ibid.* 385-401.—Solns. of methemoglobin in presence of normal dog erythrocytes or erythrocytes in which the pigment has been converted to methemoglobin by  $AmNO_2$  are able to oxidize lactic to pyruvic acid, but the oxidation is inhibited by HCN. If, however, methylene blue is added the oxidation is greatly increased, and the increase is not inhibited, or is even accelerated, by HCN. The increased oxidation is therefore not due to methemoglobin (cf. Warburg and Christian, C. A. 26, 5976). The rate of oxidation is proportional to the amt. of methylene blue added at concns. below  $3.10^{-3} M$ . Further, since both HCN and semicarbazide accelerate the oxidation, while addnl. pyruvic acid inhibits it, the reaction is probably reversible, as it is in other biol. systems (cf. Baumberger, Jurgensen and Bardwell, C. A. 27, 5621, and Wurmser and DeBoc, C. A. 26, 5819).

**The action of sulfhydryl compounds on insulin.** Oskar Wintersteiner. *J. Biol. Chem.* 102, 473-88 (1933).—Insulin was treated with cysteine in  $N_2$  and the rates of cysteine oxidation and of insulin inactivation were followed. Cryst. insulin was completely inactivated when about  $1/2$  of the total S present was calcd. to have been reduced from the S-S form. Although the reactions were roughly parallel, the max. reduction was not proportional to the physiol. activity, so that if the activity depends upon S-S groups it must involve only relatively few of the total no. present in the mol. Insulin is also inactivated by thioglycolic and thiolactic acids as fast as by cysteine, between  $p_H$  6 and 8. HCN has no effect on the inactivation by any of these compds. The rate of inactivation increases very rapidly with  $p_H$  between 6 and 8. The liberation of  $NH_3$  is not involved in the reaction, although the reduced product appears to lose  $NH_3$  faster than the original insulin.

**Gas and electrolyte equilibria in blood. XVII. The effect of oxygenation and reduction on the carbon dioxide absorption curve and the  $pK'$  of whole blood.** Donald D. Van Slyke and Julius Sendroy, Jr. *J. Biol. Chem.* 102, 505-19 (1933).—The increase in combined  $CO_2$  caused by removing 0.001  $M$  of  $O_2$  at  $p_H$  7.4 is, for horse blood, 0.00052  $M$  and for dog blood, 0.00045  $M$ . The difference is thus of the same order as the corresponding difference between the 2 cryst. hemoglobins. A similar difference between the total buffer values of dog and horse blood is also parallel to the difference between the same property of the cryst. hemoglobins. The older data on whole blood are recalcd.

**The heat precipitation of insulin.** Vincent du Vigneaud, Robert H. Sifferd and Robert R. Sealock. *J. Biol. Chem.* 102, 521-33 (1933).—The liberation of  $NH_3$  from insulin in 0.1  $N$  HCl at 70-100° shows no connection with the

formation of a ppt. of the heat-denatured protein. The heat ppt. can be redissolved in dil. NaOH of  $pH$  11.4, and if after 5 mins. the soln. is acidified the insulin remains in soln. However, it is in changed form, since it is now more readily pptd. by heat or acid than the original insulin. The temp. coeff. for heat pptn. of insulin is only 4 for  $10^\circ$ , as against values of 50 to 9000 for other proteins. Insulin inactivated by  $H_2S$  or  $HCN$  lost the property of being pptd. by heat. K. V. Thimann

The first dissociation constant,  $pK'_1$ , of carbonic acid in hemoglobin solutions and its relation to the existence of a combination of hemoglobin with carbon dioxide. Rodolfo Margaria and Arda Alden Green. *J. Biol. Chem.* 102, 611-34 (1933).—The first dissocn. const.,  $pK'_1$ , of  $H_2CO_3$  in the presence of hemoglobin varies approx. linearly with  $pH$ , and at const. ionic strength varies with the hemoglobin concn., the deviation from the normal value being greater with reduced than with oxidized hemoglobin solns. The effects can be simply explained on the basis of combination between hemoglobin and  $CO_2$  (cf. Henriques, *C. A.* 25, 4019). This is confirmed by the fact that the O dissocn. curve of hemoglobin is moved to the right in the presence of  $CO_2$ . The presence of hematin does not alter  $pK'_1$ . The changes in combined  $CO_2$  on oxygenating blood are thus due to changes both in  $pH$  and in  $CO_2$  bound to hemoglobin. K. V. T.

The existence of a urea precursor depot in kidney tissue. Isben Kirk. *J. Biol. Chem.* 102, 683-90 (1933).—The expts. of Rehberg and Hlem (*C. A.* 27, 126) are confirmed, more  $NH_3$  being set free from a mixt. of frog kidney and jack bean than corresponds to the urea detd. by the xanthidrol reaction. The kidneys of dog and rat do not give this effect. Tests for arginase in frog kidney were pos., but in rat and dog kidney neg. Hence it is probable that the excess  $NH_3$  arises from the action of arginase on the jack-bean ext., and not from any urea precursor in the kidney tissue. K. V. Thimann

Studies on oxidation-reduction. XX. Adrenaline and related compounds. Eric G. Ball and Tung-Fon Chen. *J. Biol. Chem.* 102, 691-719 (1933); cf. *C. A.* 27, 5622.—The app. of Ball and Clark (*C. A.* 25, 4561) for detn. of potentials in flowing mixts. is reduced in size and modified; no change in c. m. f. is introduced by streaming of the mixt. past the electrodes. With this app. the oxidation-reduction potentials of the unstable dihydroxybenzene derivs. were detd. For 10 derivs. of catechol, including adrenaline and adrenalone,  $E_0'$  at  $30^\circ$  lies between 0.713 and 0.809 v., while for 3 derivs. of hydroquinone,  $E_0'$  is between 0.696 and 0.793. The normal potential of catechol is 96 mv. more pos. than that of hydroquinone, and a similar relation holds in general for the derivs. The introduction of a  $CO_2H$  makes the potential about 90 mv. more pos. In all the cases studied the curve of potential against  $pH$  has a slope of 0.06 v. At alk. reactions the acid groups of the reductants may dissociate and the dissocn. consts. may be detd. from the potential- $pH$  curves; the dissocn. consts. of catechol are  $6.61 \cdot 10^{-10}$  and  $5.25 \cdot 10^{-12}$ . Also at alk. reactions the oxidants of all the systems are much more unstable, the ring becoming readily broken; introduction into the mol. of an ionizable side chain increases the instability. All the dihydroxybenzene derivs. studied would be in the completely reduced state in living tissues. K. V. T.

Buffer intensities of milk and milk constituents. II. Buffer action of calcium phosphate. E. O. Whittier. *J. Biol. Chem.* 102, 733-47 (1933); cf. *C. A.* 23, 4487.—Equations for the ionic equilibria in solns. of Ca phosphates in presence of solid  $CaHPO_4$  or  $Ca_3(PO_4)_2$  are developed. K. V. Thimann

Fibrinogen and a plasma globulin which promotes clotting. Adolf Schmitz. *Z. physiol. Chem.* 222, 155-60 (1933).—Fibrinogen prepn. by Hammarsten's method of salting out with NaCl and by Mellanby's method of pptn. with AcOH are not identical. The Hammarsten prepn. is a mixt. of closely related proteins which cannot be fractionated, while the Mellanby prepn. is a mixt. of actual fibrinogen and a globulin precipitable by half satn. with  $(NH_4)_2SO_4$ . The globulin promotes coagulation and

appears to be identical with Mellanby's prothrombase. Its flocculation max. lies at  $pH$  5.3-5.6. The coagulation velocity is independent of the concn. of fibrinogen except at dilns. greater than 0.04% where coagulation is incomplete. A. W. Dox

The diamino acid, canavanine (Kitagawa, Monohe) 10. Electrometric titration of creatine ester hydrochloride, etc. (Failey, Brand) 2. Bile acids (Schenck) 10.

Lechers Lehrbuch der Physik: für Mediziner, Biologen und Psychologen. 7th ed. Edited by Stefan Meyer and Egon Schweidler. Leipzig: B. G. Teubner. 473 pp. M. 16.20.

Enzyme solutions. Richard Voss. Ger. 581,894, Aug. 4, 1933. Stable aq. solns. of enzymes of  $pH$  value 8-9 are obtained by using borax and weak acids as buffer mixts. Thus, pancreatin is dissolved in an aq. soln. of borax and salicylic acid, with an addn. of 0.25% toluene.

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Pinacyanol as a histological stain. Frederick Proeschel. *Proc. Soc. Exptl. Biol. Med.* 31, 79-81 (1933).—A stable stock soln. consists of 0.5 g. of pinacyanol in 100 cc. of abs. EtOH or MeOH; this may be dild. 1:3 or 1:5 according to the required staining intensity. It is a nuclear and protoplasmic stain and permits detailed morphological and histochem. cell studies. C. V. Bailey

Industrial preparation of redistilled water for biological purposes. Physicochemical characteristics of the product. R. Cliquet, J. Guilbert and H. Péneau. *Bull. soc. chim. biol.* 15, 1044-69 (1933).—See *C. A.* 28, 576 L. E. Gilson

Determination of adrenal-cortex hormone by morphine resistance. L. F. Leloir and A. Novelli. *Compt. rend. soc. biol.* 114, 798-9 (1933).—Adrenalectomy makes rats more sensitive to morphine. Ext. of adrenal cortex can be assayed by detg. the quantity required to enable an adrenalectomized male rat to survive what would otherwise be a lethal dose (8 mg./100 g.) of morphine-HCl. L. E. Gilson

Technic of determining the true toxicity of tetanus toxin. S. Mutermilch, M. Helin and E. Salamon. *Compt. rend. soc. biol.* 114, 1005-8 (1933). L. E. Gilson

A stainless steel, high-pressure ultra-filter. Sidney J. Folley and Alexander T. Robert Mattick. *Biochem. J.* 27, 1113-15 (1933). The app. has proved valuable for clarification of biol. solns. unaffected by centrifuging, sterilization of bacteriol. media without application of heat and fractionation of colloidal solns. by ultrafiltration. Benjamin Harrow

Approximate determination of spermine in single human organs. Geoffrey A. Harrison. *Biochem. J.* 27, 1152-6 (1933). The dried material is extd. with trichloroacetic acid. An aliquot part of the filtrate is pptd. with picric acid. The crude spermine picrate is converted into the hydrochloride and then into the phosphate which is m. sol. in 25% alc. The spermine phosphate is sepd., washed, dried and weighed. The spermine contents of individual normal prostates obtained post-mortem vary enormously. Benjamin Harrow

The technic of assaying posterior pituitary extracts for oxytocic activity. John M. Gulland. *Biochem. J.* 27, 1216-17 (1933).—The outlet of the bath is joined by a sleeve of rubber tubing to a two-way glass tap; one limb of this can be closed by a pinch-clip and is also fitted with a side-tube. Warm Ringer soln. enters the side-tube by a siphon which has neither tap nor pinch-clip. The bath is emptied through the outlet, and simultaneously the siphon from the reservoir is flushed out with warm Ringer soln. by opening the pinch-clip. When the pinch-clip is closed, the bath is filled by turning the barrel of the glass tap through  $180^\circ$ , and then through  $90^\circ$  to close the tap. Benjamin Harrow

Cholesterol determination in blood. Alfred Bloch. *Schweiz. med. Wochschr.* 63, 1106-7 (1933).—For the col-

orimetry of the Leiberman Burchard reaction elec. light is better than daylight. The spectral compn. of the light and the presence of a brown pigment in the reaction are the detg. factors.

Milton Levy

The determination of the iodine number of the fatty acids of blood. Wilhelm Brandt, Karl Hinsberg and Georg Holland. *Z. ges. expl. Med.* 90, 216-24(1933).—Extn. of blood fat is best accomplished with EtOH, petr. ether mixt. (9 : 1). Sapon. should be avoided but if necessary is best done with NaOH. Rupp and Brachmann's (C. A. 20, 2758) soln. gave the best values for I no. M. L.

Sugar determination with the step photometer. W. Neuweiler. *Z. ges. expl. Med.* 90, 534-9(1933). The Folin and Malmros (C. A. 23, 4492) detn. of blood sugar can be used successfully with the step photometer.

Milton Levy

Preliminary results on certain biochemical applications of polarographic studies with the dropping mercury cathode. A. Roncato. *Holl. soc. ital. biol. sper.* 8, 1163-8 (1933).—The applications of polarography in biochemistry may be classified into 3 groups: (1) qual. and quant. studies; (2) studies on "maxima phenomena;" (3) studies directed toward interpreting the nature and mode of action of cathodic reduction processes. Examples given are detn. of lactic acid and the polarographic measurements of the surface activity of bile and EtOH. Lactic acid is easily transformed into AcH which can be detd. by the polarographic method with an accuracy of 0.01 mg. Bile in a concn. of 1 : 50,000 reduces the height of the O max.  $\frac{1}{2}$  and in a concn. of 1 : 6666 suppresses it completely. The action of bile on O maxima may be detected polarographically in a diln. of 1 : 200,000, and since the concn. of biliary acids in the bile is about 0.1% then a concn. of 1 : 20,000,000 of biliary acids can displace the O adsorbed on the surface of the Hg. On the contrary, EtOH tends to become adsorbed on the cathode Hg drop and displace the adsorbed O with a force which is 10,000 times less than that exerted by bile. The polarographic method, therefore, may be used to study surface phenomenon from the kinetic side.

Peter Masucci

The determination of nitrate nitrogen by Devarda's method; its application in biological media. D. Bach. *bull. sci. pharmcol.* 40, 459-70(1933). The 5 cc. of soln. employed should contain the nitrates in a concn. of not more than 0.05 N and represent 0.2 N NaOH. Add 0.25 g. of Devarda's alloy and heat to 70°. The reduction of  $\text{NH}_4^+$  is complete in less than 10 min. The  $\text{NH}_3$  is carried off by steam *in vacuo* and detd. in the usual way. The error for quantities of nitrate contg. about 1.75 mg. N is approx. 1%. Most biol. substances do not yield  $\text{NH}_3$  in the conditions of the assay. The  $\text{pH}$  must be about 10. The presence of substances which reduce the disocn. of the alkali requires a readjustment of the  $\text{pH}$ . The concn. Devarda's alloy frequently includes traces of  $\text{NH}_3$ .

A. E. Meyer

The diagnostic use of iodine in thyrotoxicosis. J. H. Means. *Ann. Internal Med.* 7, 439-44(1933).

John T. Myers

Electrolytes in human tissue. I. The digestion of tissue and other biological material and the subsequent determination of various electrolytes. Glenn E. Cullen and Walter E. Wilkins. *J. Biol. Chem.* 102, 403-13 (1933).—The tissue is dried at 105-110° for 10-40 hrs. and 10 cc. of 1 : 1  $\text{HNO}_3$  added per g. dry tissue. Soln. is complete after about 2 days and the filtrate is then used for the detn. of all ions. Ca is detd. by adding oxalic acid, centrifuging and titrating the supernatant liquid with  $\text{KMnO}_4$ ; Mg, K, Na and phosphate are detd. by modifications of standard methods. The accuracy is about 1%, and the methods are rapid. II. The electrolyte content of hearts and other tissues from cases with various diseases. *Ibid.* 415-23.—A large no. of analyses of the inorg. constituents of muscle, heart, liver and kidney from human subjects are given. K. V. T.

Improvements in manometric micro-Kjeldahl and blood urea methods. Donald D. Van Slyke and Victor H. Kugel. *J. Biol. Chem.* 102, 489-97(1933).—Sep. solns.

of NaOH and Br<sub>2</sub> in KBr are used for gasometric analysis of urea solns. in place of NaOBr. Substances other than urea which are capable of giving  $\text{N}_2$  when treated with NaOBr are pptd. with the blood proteins in Somogyi's method; the filtrate from this method is suitable for urea detns.

K. V. Thumann

Determination of ammonia in blood. Donald D. Van Slyke and Alma Hiller. *J. Biol. Chem.* 102, 499-504 (1933).—The  $\text{NH}_3$  is aerated off and detd. by Berthelot's PhOH-NaOCl reaction, (cf. Thomas, C. A. 6, 3241). The method is sensitive to about 0.001 mg.%, and thus has an accuracy of 1.2% for blood.

K. V. T.

A new method for separating pressor and oxytocic substances from the posterior lobe of the pituitary gland. Raymond L. Stehle. *J. Biol. Chem.* 102, 573-90(1933).—The active material is pptd. from the 0.5% HOAc ext. of the glands with EtOH, redissolved, freed from inert compds. with  $\text{Fe}_2(\text{SO}_4)_3$ , Ba(OH)<sub>2</sub> and colloidal Fe, evapd. to dryness and dissolved in 96% alc. Addn. of EtOAc then yields 3 fractions, in the first of which the pressor, and in the last the oxytocic, substance predominates. The 2 end fractions are purified by fractional pptn. with EtOH and EtOAc, giving glassy preps. from which 95% of the oxytocic and 91% of the pressor constituent, resp., had been removed. The pressor fraction appears to be of protein nature.

K. V. Thumann

A convenient and accurate method for the determination and detection of carbon monoxide in blood. A. A. Christman and E. L. Randall. *J. Biol. Chem.* 102, 595-600 (1933). The blood is diluted with 2 vols. water, treated with acid ferricyanide, and the gases are passed into a bulb contg. 3 cc. of a soln. of 500 mg.  $\text{PdCl}_2$  in 500 cc. 0.05N HCl. After shaking for 20 min., 0.1 cc. of 10% aq.  $\text{Al}_2(\text{SO}_4)_3$  is added to flocculate the colloidal Pd, and the excess  $\text{PdCl}_2$  is detd. colorimetrically by addn. of water, excess KI and 1% gum ghatti soln. The method is convenient and can be used with CO satns. of 1.50%, and is not affected by the presence of  $\text{H}_2\text{S}$  or embalming fluid in the blood; the presence of 100 mg. NaCN per 100 cc. blood increases the apparent amt. of CO.

K. V. T.

Comparison of gasometric, colorimetric and titrimetric determinations of amino nitrogen in blood and urine. Donald D. Van Slyke and Esben Kirk. *J. Biol. Chem.* 102, 651-82(1933).—The detn. of amino acids in urine by the formalin titration agrees satisfactorily with detn. by the gasometric method. In blood, both of these methods agree with the titration in Me CO soln., providing that lactic, acetoacetic or other org. acid are not present in quantity. On grounds of convenience the micro-gasometric method is preferred for detn. of the amino acids of blood and the formalin titration for those in urine.

K. V. Thumann

The action of ammonia on phenols. Benjamin Harrow, I. M. Chamelin and Harry Wagreich. *Science* 78, 514 (1933).—Some 20 phenol-like compds. were investigated in an attempt to det.  $\text{NH}_3$  in urine by means of the phenol-NaClO color reaction; the color developed with phenol is the most stable. Results compare favorably with those obtained by Folin's aeration method.

R. C. Vanden Bosche

Determination of cholesterol in blood. Hirendranath Banerji. *J. Indian Chem. Soc.* 10, 573-6(1933).—Fat-free filter paper on which 0.25 cc. of oxalated blood has been placed is dried at 37° and then extd. for 2 hrs. with 3 cc. of  $\text{CHCl}_3$ . The vol. is made up to 5 cc. with  $\text{CHCl}_3$ , 2 cc.  $\text{Ac}_2\text{O}$  and 0.1 cc. concd.  $\text{H}_2\text{SO}_4$  are added and the mixt. is allowed to stand for 15 min. The color developed is matched with a cholesterol standard.

R. C. Vanden Bosche

Detection of trichloroethylene and other org. solvents contg. halogen (Brüning, Schnetka) 7. Detn. of Fe—adaptation of the mercaptoacetic acid colorimetric method to blood (Leavell, Ellis) 12.

Jettmar, H. M.: Das Verhalten von Blutkörperchen sowie von Mikroben in abgestuften Essigsäure-Vanadatgemischen. Ein biochemische Methode zum Studium der Artpezifität. Heft 14 of "Abhandlungen aus dem

"*der Hygiene*" edited by R. Grassberger. Berlin: Urban & Schwarzenberg. 121 pp.

**Determination of urea.** Germaine Vindevogel (née Duvai). Fr. 782,400, Sept. 21, 1933. Urea in blood serum is detd. by nephelometry; a special reagent is used and the clouding formed in a given time in a mixt. of the liquid to be analyzed and the reagent is observed. The reagent contains Mayer albumin 5 drops, AcOH 5 cc. and MeOH soln. of xanthidrol 20 drops.

**Apparatus for irradiating extracts with ultra-violet rays.** Kurt Hembd and Vitam Fabrik biologische Präparate G. m. b. H. Ger. 568,900, July 24, 1933.

**Irradiating extracts with ultra-violet rays.** Kurt Hembd and Vitam Fabrik biologische Präparate G. m. b. H. Ger. 577,170, Aug. 10, 1933. Addn. to 568,900 (preceding abstr.).

## C-BACTERIOLOGY

CHARLES B. MORREY

**The carotenoids of bacteria.** Erwin Chargaff. *Compt. rend.* 197, 946-8(1933).—*S. lutea* contains 2 carotenoids: a hydrocarbon with strong absorption bands at 460 and 440 and a weak band at 415  $m\mu$ , which is adsorbed on alumina fibers, and a xanthophyll with strong absorption bands at 460 and 440  $m\mu$ , which is adsorbed by alumina fibers but not by  $CaCO_3$ . *S. aurantiaca* contains  $\beta$ -carotene and partially esterified zeaxanthin with absorption bands at 485 and 455  $m\mu$ . *Staph. aureus* contains only a xanthophyll, probably zeaxanthin, with absorption at 483 and 453  $m\mu$ . *M. phlei* contains  $\beta$ - and  $\gamma$ -carotenes. The latter is 4% of the total hydrocarbon content. A small amt. of nonesterified xanthophyll with absorption bands at 460 and 427  $m\mu$  and lutene are also present.

Rachel Brown

**Transfer of fixed nitrogen from bacterium to host in soy bean.** G. Bond. *Nature* 132, 748-9(1933). A definite quant. relation exists between the fixation and the transfer of N from bacterium to host, a fact which favors the theory of excretion.

Rachel Brown

**Hitherto unknown activators for the growth of lactic acid bacteria.** A. D. Orla-Jensen. *J. Soc. Chem. Ind.* 52, 374-9T(1933). Of all the lactic acid bacteria tested, *S. liquefaciens* is the only one able to ferment glucose sterilized alone in distd. water. If tap water is used, fermentation as a rule takes place if the temp. has been high enough. The small amt. of alkali present in tap water is sufficient to transform the sugar mol. into a less stable condition. If sugar is sterilized together with methylglyoxal, or this is added to the finished substrate, there is no activation, or but a slight amt. But if methylglyoxal is heated with autolyzed yeast, the activating power is exerted at once. The activating matter cannot be methylglyoxal as such, but must be one of its compds. with certain nitrogenous substances. AcH is quite ineffective toward lactic acid fermentation, but furfuraldehyde has nearly the same activating influence as methylglyoxal. The fact that the pentoses have the same activating power as methylglyoxal and that the activation sets in only when the compds. are heated with certain nitrogenous substances (found in great abundance in yeast ext.) leads to the view that the activating substances must be similar in nature to cozymase. The main result of this work is that by sterilization of the nutrient matters used in bacteriol. technic not only are undesired fermentations impeded, but also under certain conditions desired fermentations can be promoted.

F. L. Dunlap

**The action of nitrates on the fermentation of glucose by *Es. coli*.** J. Tikka. *Acta Chem. Fennica* B6, 317(1933) (In German).—The action of  $KNO_3$  in preventing the swelling in cheese formation, etc., has been shown to be due to its effect on changing the course of the fermentation. It acts as an acceptor of H, inhibits the growth of gas-forming bacteria, and is reduced to the nitrite state, which also inhibits the growth of gas-forming bacteria.

S. A. Karjala

**The influence of oxygen tension on the respiration of**

**Rhizobia.** C. E. Georgi and P. W. Wilson. *Arch. Mikrobiol.* 4, 543-64(1933).

Milton Levy

## D-BOTANY

THOMAS G. PHILLIPS

**Preliminary experiments on bluing and chlorosis of *Hydrangea opuloides*.** P. Chouard. *Bull. mens. soc. natl. hort. France* 6, 289-91(1933).—Fe, Cr and Al can be bluing agents but Fe alone can prevent chlorosis. Ferric Fe was employed and did not seem to lack efficacy although it is considered that ferrous Fe is absorbed better by plants.

J. R. Adams

**The formation of citric acid in lemons.** A. Ricevuto. *Ann. chim. applicata* 23, 411-13(1933).—The wt., acidity, reducing sugars, pentosans, fibrin and essential oils were detd. every 15 days on lemons from the same tree. The citric acid is formed during the warm months at the expense of the reducing sugars and pentosans, while in the colder months, from the pentosans only. Thus the change is due to enzymic action which is most active during the warmer weather. The enzymes are probably derived from *Aspergillus* which abound in the soil.

A. W. C.

**Distribution of saponins in the plant kingdom.** Th. Solacolu and Ecaterina Welles. *Arch. Pharm.* 271, 470-7(1933).—The authors have undertaken anew the examination of species belonging to the phanerogams for saponins by means of the biol. method, thereby locating these products in species never before reported as contg. saponins. In the seed of the Gramineae saponin was found only in the ripened product; in the Rhamnaceae, however, (*Frangula* and *Cathartica*) saponins occur in the unripe, not in the ripe, fruit. These facts justify the assumption that possibly the saponins play a role in the life of plants akin to that of all other glucosides. Their formation and disappearance may be due to various causes, among others perhaps enzymic action. Characteristic for this assumption is the fact that as a rule saponins occur for the most part at those points where growth is pronounced, as with the glucosides, localized in the seed. A compilation is given of all plants in which saponins have been detected, together with their hemolytic activities.

W. O. F.

**Some physicochemical properties of seed extracts.** Charles A. Shull and John W. Mitchell. *Bot. Gaz.* 95, 258-78(1933).—There are appreciable amts. of both ash elements and carbohydrates in the substance of seeds, and these substances are capable of going into soln. quickly when the finely divided substance is immersed in water. The depression of f. pt., and the osmotic concn. shown by finely powd. seed substance when frozen with water are caused by the salts and the sugars. The proteins can be neglected.

Benjamin Harrow

**Chlorophyll content of grain sorghums.** J. C. Ireland and Parks A. Yeats. *Bot. Gaz.* 95, 300-15(1933). A photoelec. colorimeter was used to make a comparative est. of the cl. of the ext. The chlorophyll content in Kalir increases generally to the stage of seed maturity in the plant. It begins to decrease as the grain hardens.

Benjamin Harrow

**Notes on the Ascobolaceae.** H. C. I. Gwynne-Vaughan and H. S. Williamson. *Trans. Brit. Mycol. Soc.* 18, 127-34(1933).—When *Ascobolus viridulus* was grown on sheep-dung agar contg. 0.2%  $NH_4Cl$  or  $(NH_4)_2SO_4$  the spores were smooth and colorless until approx. 1 month after inoculation, but with  $NH_4$  phosphate, nitrate, molybdate or tartrate normal striated, purple spores were formed. On sheep-dung agar with 0.2%  $NH_4$  sulfate, chloride, nitrate or tartrate the spores of *A. levellii* were colorless and smooth, lacking a mucilage halo, but with 0.2%  $NH_4$  phosphate or molybdate a few spores were faintly colored and showed the verrucose markings and the characteristic halo. On dung agar with 0.2%  $(NH_4)_2SO_4$ , *A. furfuraceus* formed fruits which did not reach maturity, while in the presence of other  $NH_4$  compds. the mycelium gave rise only to oidia. On dung agar contg. 0.2%  $NH_4$  sulfate, chloride, nitrate, molybdate or tartrate *Dasybolus immersus* formed mostly colorless spores; in the presence of 0.2%  $NH_4$  phosphate most of



the spores were colored. Urea was harmful to all 4 species. In the presence of  $\text{KNO}_3$ , *A. furfuraceus* produced oidia only, but the other species fruited normally.

K. D. Jacob

The stimulation by dilute antiseptics of "sectoring" in mold colonies. L. D. Galloway. *Trans. Brit. Mycol. Soc.* 18, 161-2 (1933).—A concn. of 0.003-0.005% of the Na salt of salicylanilide did not appreciably affect the rate of growth of *Aspergillus terreus* on flour agar (2% wheat flour, 1.5% agar) but caused the development of sectors of a lighter color in the majority of colonies. The "sectoring" persisted through 4 subcultures on wort agar slopes, and both types showed approx. the same resistance to salicylanilide when transferred back to a medium contg. this antiseptic.

K. D. Jacob

The chemistry of Australian timbers. III. Chemical composition of four pale-colored woods of the genus *Eucalyptus*. W. E. Cohen, A. G. Charles and A. B. Jamieson. *Australia Council Sci. Ind. Research Pamphlet No. 44*, 22 pp. (1933); cf. *C. A.* 27, 753.—Analyses of 49 samples of the following species of *Eucalyptus* are given: *E. gigantea*, *E. obliqua*, *E. regnans* and *E. sieberiana*. Many differences and few resemblances between these woods and the hardwoods of N. America are revealed. Regular chem. differences between the eucalypts examd. may be used as an aid in identification. The results with respect to cellulose, lignin and NaOH solv. are of interest in connection with the proposed Australian wood-pulping industry.

A. I. K.

Carbohydrates in the bulbs of *Narcissus tazetta*. III. Comparison with carbohydrates in the bulbs of *Lycoris radiata*. Yoshijiro Kihara. *J. Agr. Chem. Soc. Japan* 9, 1005-7 (1933). Carbohydrates in the bulbs of *Lycoris radiata* were sepd. and analyzed. Total sol. carbohydrates, 57% (air-dried), sugar sol. in hot alc. 3.74%, reducing sugar 0.27%, carbohydrates sol. in cold water 18.28%, carbohydrates sol. in hot water 21.95%, carbohydrates sol. in superheated water 18.65%. The content of the lower sugars was less than that in *Narcissus tazetta*. The cold- $\text{H}_2\text{O}$  ext. contained fructan with 6% of glucan. It was sol. in  $\text{H}_2\text{O}$  but not hygroscopic. It is different from nulin or scorodose. Mauman could not be found. The carbohydrates consist chiefly of starch, which was extd. with hot and superheated  $\text{H}_2\text{O}$ . The starch granule is oval and slightly smaller than that of the potato.

Y. Kihara

Biochemistry of molds. III. A metabolic product of *Aspergillus melleus* Yukawa. (2). Fijiro Nishikawa. *J. Agr. Chem. Soc. Japan* 9, 1050-3 (1933). Mellein has no methoxy group. Monoacetylmellein, hexagonal plates, m. 126°, does not give the  $\text{FeCl}_3$  reaction. Dinitromellein, light yellow prisms, m. 160°,  $[\alpha]_D^{20} = +508.68^\circ$ , was prepd. by treating mellein with hot concd.  $\text{HNO}_3$ . When mellein was fused with KOH at 200°, melleic acid,  $\text{C}_{10}\text{H}_{10}\text{O}_4$ , m. 170°, was obtained, monobasic acid, optically inactive, Ac deriv., m. 110°, dihydro deriv., m. 116°, and monomethyl ester, m. 59°. When mellein was heated with KOH at 300°, 6-hydroxy-2-methylbenzoic acid, needles, m. 170°, was obtained. It was previously found as a metabolic product of *Penicillium griseofulvum* Dierckx by Anslow and Raistrick. These facts indicate that melleic acid is 2,6- $\text{C}_6\text{H}_4(\text{HO})\text{C}_2\text{H}_4\text{CO}_2\text{H}$ , and, hence, mellein is the lactone of 6-[ $\alpha$ (or  $\beta$ )-hydroxypropyl]- $\alpha$ -cyclic acid.

Y. Kihara

The content of pectic acid and methanol in tobacco leaves produced in Japan. III. Saichi Machida. *J. Agr. Chem. Soc. Japan* 9, 1140-2 (1933); cf. *C. A.* 27, 5150. Tobacco leaves of various varieties cultivated under the same condition were taken. The contents of pectic acid and MeOH were, resp., 10-15% and 0.3-0.64%.

Y. Kihara

The vegetable auxins and their influence on monocellular organisms. Methodi Popov. *Biol. Zentr.* 53, 661 (1933).—Exts. from cornseed sprouts have, in high concn., an inhibiting effect on the development of cysts of *Euglena gracilis* Khrb. The dil. exts. have a growth-stimulating effect, those from the top being the most active, less from

the stem and the weakest from the root. The active principle is undiminished in the dried plants.

A. F. Meyer

The action of cyanide salts on the development of yeasts. M. N. Meissel. *Zentr. Bakt. Parasitenk.* II, Abt. 88, 449-50 (1933).—The following salts were toxic to yeasts in the order given:  $\text{Hg}(\text{CN})_2 > \text{NaCN} < \text{KCN} > (\text{NH})_4\text{CNS}$ . Long exposure to a weak cyanide soln. causes a loss of fat in yeast cells, but brief exposure to stronger solns., did not have this effect. John T. Myers

The products of fermentation by *Mucor* groups. II. The products of fermentation in the presence of calcium carbonate. Teizo Takahashi and Toshinobu Asai. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 81-4 (1933); cf. *C. A.* 27, 5376.—The following products were identified:  $\text{AcH}$ ,  $\text{C}_2\text{H}_5\text{OH}$ , pyruvic acid, succinic acid. John T. Myers

The relationship between infection types and the course and products of metabolism in the presence of different mineral salts in the plant food. Karl Böning and Elizabeth Böning-Seubert. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 85-106 (1933).—The reaction of plants to a parasitic invasion is related to metabolism, and depends on the amt. and kind of ions in the food and their special properties. The effect of an ion will vary with the characteristics of the parasite and the plant host. John T. Myers

Effect of excess carbon dioxide on growing mushrooms. Edmund B. Lambert. *J. Agr. Research* 47, 599 (1933).—An accumulation of 5% or more of  $\text{CO}_2$  in the air causes abnormal growth, stunting and even death of mushrooms. This harmful effect is due principally to the  $\text{CO}_2$  surrounding the sporophores rather than to that in the interstices of the compost of the bed. Approx. 1% of  $\text{CO}_2$  is the lowest concn. that is noticeably injurious. This concn. was not encountered in com. mushroom houses or caves except where they had been closed up tightly for 24 hrs. or more. An abnormally high concn. of  $\text{O}_2$  seems to produce more compact and heavier mushrooms.

W. H. Ross

Factors influencing resin concentration in loblolly and slash pine. G. Norman Bishop and Gordon D. Marckworth. *J. Forestry* 31, 953-60 (1933). H. K. Salzberg

Improvements of the pollen-analysis technic. Lenneart v. Post. *Geol. Foreh. Forh.* 55, 523-7 (1933). P. discusses the quant. refinements proposed by G. and H. Erdtman (*C. A.* 27, 1657) in relation to certain uncontrolled natural conditions which exert a greater difference in the pollen count than the errors pointed out by E. and F.

Wilhelm Segerblom

A new example of exudation and volatilization of alkaloids in plants. J. Chaze. *Compt. rend.* 197, 1148-50 (1933). Young stems, leaves and flowers of *Conium maculatum* exude, principally through the stomata, quantities of conine which can be detected microchemically. Smaller amts. are present in the surrounding cells. After exposure to bright sunlight very little conine can be observed, the alkaloid having largely volatilized. The exudation continues after application of  $\text{KI}$ , and other reagents.

K. V. Thimann

Occurrence of rotenone in species of *Derris* and *Lonchocarpus*. Howard A. Jones. *J. Wash. Acad. Sci.* 23, 493-6 (1933).—Rotenone (I) was present only in very small amts. in the roots of *Derris* spp., but in *Lonchocarpus nuou* (S. American culm) the fine roots contained up to 8% and the coarser roots 2-3%, the cortex contg. about twice as much as the remainder. A sample root of Brazilian timbo contained 16% of I. In no case were appreciable amts. of I found in stems or leaves of *Derris* or *Lonchocarpus* spp.

K. V. Thimann

Physiologically balanced culture solutions with stable hydrogen-ion concentration. Sam F. Trelease and Helen M. Trelease. *Science* 78, 438-9 (1933).—Wheat plants grown in a salt soln. cause an increase of acidity when the ratio  $\text{NO}_3^-/\text{NH}_4^+$  is low, and a decrease when the ratio is high. This change in  $\text{pH}$  cannot be easily prevented by increasing the phosphate buffering of the soln., but may be stabilized by suitable ratios of  $\text{NO}_3^-/\text{NH}_4^+$ . Thus, ratios of 1, 5.7 and 19 maintain the  $\text{pH}$  at 4.3, 5.1 and

6.0, resp. Such soils change by about 0.2  $pH$  unit in 8 days of growth of wheat plants. K. V. Thimann

Acidity and alkalinity produced by changes in the nitrogen, sulfur and carbon cycles. John P. Conrad. *Plant Physiol.* 8, 509-24(1933).—A theoretical inquiry based on simple chem. reactions. Transformations from one form of N to another within the group  $N_2$ , urea,  $NH_4NO_3$ ,  $NH_4NO_2$  and proteins cause very little or no change in titratable acidity or alk. Transformations from any one or all of this group to  $NH_3$  produce about one equiv. of titratable alk. for each g.-atom of N changed and transformations from this same group to  $HNO_3$  or nitrates result in 1 equiv. of titratable acidity for each g.-atom of N changed. When weak acids and bases are formed the  $pH$  of the medium is important in detg. the titratable acidity and alk. produced. Exptl. data will be given in a subsequent paper. Walter Thomas

Photodynamically induced tropisms in plant roots. H. F. Blum and K. G. Scott. *Plant Physiol.* 8, 525-36 (1933); cf. C. A. 26, 2523.—The roots were suspended in a nutrient soln. at  $pH$  4.5 with a W-filament lamp as the light source. The presence of 1 part in 500,000 of tetraiodo-fluorescein brought about a definite bending of the roots toward the light within a few hrs. This orientation occurs only in the region of the root tip. The phenomenon is the resultant of 2 reactions, the dark reaction and the photo-reaction. The wave lengths active in producing phototropic bending, namely, 400 and 507  $m\mu$ , correspond to the absorption spectrum of the dye, indicating that the dye acts as a photo-sensitizer. W. T.

Spike disease of sandal (*Santalum album*). XIII. Hexone bases. Y. V. S. Rao. *J. Indian Inst. Sci.* 16A, 91-3(1933); cf. C. A. 27, 3771.—Basic amino acids in general, and histidine especially, are higher in the diseased leaves than in the normal. XIV. Mosaics associated with spiked areas. *Ibid.* 94-5. In many areas of spiked sandals the weeds show a mosaic disease. Analysis of healthy and normal leaves of *Ageratum* and *Gyssetia* spp. showed lower  $P_2O_5$  and much higher  $NH_4$  in the latter, while there was no difference in the basic amino acids and  $CaO$ . J. J. Willaman

Occurrence of growth substance in marine algae. H. G. van der Weij. *Proc. Acad. Sci. Amsterdam* 36, 759-60(1933).—By means of the test on coleoptiles of oats, the growth-promoting substance, auxin, was demonstrated in both sap and cell walls of *Valonia macrophylla*. J. J. Willaman

Growth substance in *Elaeagnus angustifolia*. H. G. van der Weij. *Proc. Acad. Sci. Amsterdam* 36, 760-1 (1933).—By means of the test on coleoptiles of oats, it was shown that young leaves contained the substance; young sprouts did not. The substance is transferred from the leaves through the stems downward only. J. J. Willaman

Growth vitamin. V. Cryptoxanthin (Kuhn, Grunemann) 10. Reductions with Zn dust in pyridine. III. Reversible hydrogenation and dehydrogenation of chlorophylls (Kuhn, Winterstein) 10.

## F. NUTRITION

PHILIP B. HAWK

Use and misuse of carbohydrates. J. Hunter P. Paton. *Edinburgh Med. J.* 40 (1933); *Trans. Medico-Chirurgical Soc. Edinburgh Session* 112, 177-90(1932-33).—P. suggests that improvement in the quality and reduction in the quantity of carbohydrate intake would produce beneficial effects in public health and that this could be effected in reform in methods of milling cereals and by restriction in the use of sugar. John Paton. *Edinburgh Med. J.* 40 (1933); *Trans. Medico-Chirurgical Soc. Edinburgh Session* 112, 191-208(1932-33).—A review dealing with carbohydrate foods, disease and pathol. conditions. Rachel Brown

Ascorbic acid from iris and other plants by a simplified method. Emil J. Baumann and Nanette Metzger. *Proc. Soc. Exptl. Biol. Med.* 30, 1268-72(1933).—Specific instructions are given for the extn. of 5-20 g. of ascorbic

acid from 5-10 kg. of German iris leaves (*Iris germanica*) or skunk cabbage (*Symplocarpus foetidus*). C. V. B.

Preparation of vitamin C from lemon juice. W. A. Waugh, O. A. Bessey and C. G. King. *Proc. Soc. Exptl. Biol. Med.* 30, 1281-3(1933).—A detailed description of a procedure which yields 100-150 mg. of cryst. vitamin C per l. of lemon juice. C. V. Bailey

The influence of vitamin C on the gas metabolism of normal and scorbutic guinea pigs. J. Mosonyi and L. Rigo. *Z. physiol. Chem.* 222, 100-4(1933).—The gas exchange of scorbutic guinea pigs is greater than that of normal animals. It falls after administration of vitamin C (ascorbic acid) and the R. Q. then rises. In normal animals the administration of vitamin C causes an increase in gas exchange and a slight rise in the respiration quotient. A. W. Dox

The question of the antiscorbutic activity of compounds similar to ascorbic acid. O. Dalmer and Th. Moll. *Z. physiol. Chem.* 222, 116-20(1933).—The acid  $HO_2C:C(OH)CH(OH)CHOCH_2OH$ , described by Maurer

and Schiedt (C. A. 27, 4777) and having the same empirical formula as ascorbic acid, was tested on guinea pigs for vitamin C action. Orally it was about  $1/40$  and subcutaneously about  $1/30$  as effective as ascorbic acid. The hydroxytetronic acid  $OCC(OH):C(OH)CH_2O$ , prepd.

by Michael (C. A. 27, 5723) by condensation of 2 mols of glycolic acid, represents the lactone ring of ascorbic acid without the attached glycol. This was wholly devoid of antiscorbutic activity. A. W. Dox

Distribution of irradiated ergosterol (vitamin D) in the animal organism after administration by mouth. Ph. A. Coppens and G. A. Metz. *Arch. n'erland. physiol.* 18, 407-15(1933).—Ten hrs. after dogs were fed irradiated ergosterol (vitamin D) the most important organs were extd. with  $Et_2O$ . These exts., after sepn. of the phosphatides, were fed to young rachitic rats to test for the presence of irradiated ergosterol. The vitamin was detected in the liver, suprarenal capsule, lungs, blood, spleen, mesentery and in 2 out of 4 cases also in the kidneys. The exts. of the heart, brain, skin and pancreas showed no vitamin D. F. L. Dunlap

Vitamin B and resorption in the intestine. H. G. K. Westenbrink and G. A. Overbeek. *Arch. n'erland. physiol.* 18, 416-28(1933).—In the absence of the thermolabile and thermostable B vitamins, the resorption of glucose is lessened. F. L. Dunlap

B vitamins and liver glycogen. H. G. K. Westenbrink. *Arch. n'erland. physiol.* 18, 429-45(1933).—In the different B avitaminoses, the liver is capable of forming glycogen in a normal manner. F. L. Dunlap

Comparative studies of the nutritive value of raw and pasteurized milks. J. C. Drummond. *J. Soc. Chem. Ind.* 52, 400-3T(1933).—No exptl. evidence was obtained which showed that pasteurization adversely affected the nutritive value of milk. Raw milk supplemented with biscuit prep'd. from white flour was found insufficient to enable a young female rat to produce and rear a normal litter of young. The expts. suggest that addnl. vitamin B may adjust the balance of this diet so that satisfactory reproduction can occur and D. thinks that amts. of Cu and Fe above those required to maintain a normal blood picture may influence reproduction beneficially. F. L. Dunlap

Comparison of the nutritive value of raw and pasteurized milks for mice. G. S. Wilson and M. P. Cowell. *J. Soc. Chem. Ind.* 52, 403-6T(1933).—A basal diet of either raw or pasteurized milk, together with white-flour biscuit, was quite inadequate to promote normal growth. The addn. of a Cu and Fe mixt. to this basal diet improved growth and development and prevented the occurrence of anemia, but was not sufficient as a rule to enable the females to rear their litters. The addn. of Yeastrel (a source of vitamin B) to the basal diet, together with the mineral mixt., brought about growth, reproduction and rearing of litters almost as well as a normal stock diet. There is little difference between the nutritive value of raw and

pasteurized milks in influencing general development, survival time, production of litters or successful rearing of the young. With mice brought up from birth, however, on the milk and biscuit diet, the av. wt. of the mice at time of weaning was significantly heavier in the raw than in the pasteurized milk groups. F. L. Dunlap

**Value of yeast bread.** J. Vargas Ryre. *J. Soc. Chem. Ind.* 52, 406-9T(1933).—A discussion of the inadequacies of white bread, especially with respect to the vitamin B complex. It is suggested that the vitamin B complex in white bread be increased by the addn. of dry yeast.

**Nutritive value of bread.** Wm. Jago. *J. Soc. Chem. Ind.* 52, 412-14T(1933).—A brief historical discussion, especially with respect to the nutritional factors involved. F. L. Dunlap

**The dehydrating effect of a carbohydrate-poor diet and its practical utility.** D. Adlersberg and O. Porges. *Klin. Wochschr.* 12, 1446-50(1933).—A carbohydrate diet causes a retention of water in the tissues, primarily the skin. Conversely, a carbohydrate-poor diet causes dehydration and is of therapeutic value in edemas, inflammatory exudation and bronchiectasis with profuse sputum. There is an extensive bibliography. Harry Eagle

**The effect of the nutrition upon the hydrogen-ion concentration of the bile. Clinical observations.** H. Bronner. *Klin. Wochschr.* 12, 1502 3(1933).—In normal individuals, a vegetable diet causes the  $p_H$  of the bile to rise to approx. 7.5; a meat diet causes it to fall to 6.5. Infection, stones and medication also affect the  $p_H$  of the bile. Harry Eagle

**Hypervitaminosis A. I. The symptomatology of the hypervitaminosis caused by feeding pure vitamin A to young rats.** J. A. Collazo and J. Sánchez Rodríguez. *Klin. Wochschr.* 12, 1732 4(1933).—Trophic skin changes, cessation of growth, inflammatory conditions of the eyes, spastic contractures of the extremities and death were caused by feeding an excess of pure vitamin A to young rats. If one stops at the right time, the eye condition improves, and the animals resume growth. Harry Eagle

**Specific dynamic effect of foodstuffs in anemias and leucemias. I. Protein.** Saburo Kunura. *Tōhoku J. Exptl. Med.* 21, 613 28(1933).—The basal metabolism is increased, or at the upper limits of normal in chronic anemia and is definitely increased in myeloid leucemias. In both diseases the specific dynamic action of protein is somewhat less than in normal. In chlorosis both the sp. dynamic action and the basal metabolism are within normal limits. II. The specific dynamic effect of carbohydrates. *Ibid.* 22, 18 28. —The sp. dynamic effect of carbohydrate (peroral glucose) and its effect upon the P:Q are normal in cases of chlorosis, but are decreased in chronic leucemia and anemia. The basal metabolism in the latter is increased. III. The specific dynamic effect of amino acids in experimental anemia. *Ibid.* 29-40. —In rabbits rendered anemic by hemorrhage or by phenylhydrazine, the sp. dynamic effect of glycine introduced into the duodenum with a sound is significantly decreased. IV. The specific dynamic effect of liver substance in experimental anemia. *Ibid.* 41 52. —The sp. dynamic effect of liver is decreased in exptl. anemia. Harry Eagle

**The role of salt in poultry nutrition. I. Salt in the nutrition of the chick.** J. H. Prentice. *J. Ministry Agr. Northern Ireland* 4, 72 90(1933).—Expts. were carried out with White Wyandotte chicks. Birds receiving rations contg. no NaCl or other Na salt made poor growth, utilized food inefficiently and were susceptible to disease and the pullets showed retarded sexual maturity. Steamed bone flour, KCl,  $Fe_2O_3$ , S and KI, when used to supplement a normally constituted mash, had no apparent effect on the birds, either in the presence or absence of NaCl. The beneficial effects which accompany the use of NaCl appear to be a function of the Na rather than of the Cl. In the absence of a supplement of NaCl there was no response of any kind from the addn. of protein to a cereal mash, even when a chloride was supplied also. There was striking evidence that grass plays an important part in helping to balance a ration which is deficient in Na.

Chick mash should contain 0.5% NaCl. II. Salt in the nutrition of the laying hen. *Ibid.* 92-104. —In the absence of NaCl from the laying mash the rate of egg production and the size of eggs decreased, and the birds lost wt. and were prone to cannibalism, particularly when they were deprived of access to grass; these conditions were overcome by addn. of 0.5% NaCl to the rations. Omission of KCl,  $Fe_2O_3$ , S and KI from the mash had no effect on the health of the birds or on egg production; the effect of steamed bone flour was doubtful.

**A deficiency disorder induced in suckling young rats bred on a purified synthetic diet with "glaxo casein" (caseinogen) as a sole source of protein.** Leslie Wm. Mapson. *Biochem. J.* 27, 1061-8(1933); cf. C. A. 27, 122. —The deficiency is marked by failure of growth, loss of fur and eventual death. "Physin," the growth-promoting factor in liver, and the Coward factor (C. A. 24, 402) cure the deficiency. Benjamin Harrow

**The role of carotene in human health.** Albert F. O. Germann. *J. Chem. Education* 11, 13-16(1934). E. H.

**A statistical analysis of some experiments on slipped tendon.** T. T. Milby. *Poultry Sci.* 12, 352-5(1933). —An analysis of the results reported by different investigators indicated that the correlations between the percentage of slipped tendons in chickens and the amts. of protein, ash and Ca in the feed were not significant in the data studied. The amt. of P in the ration is positively correlated with the percentage of slipped tendon, the value of the correlation being 0.6303. The amt. of P in the ration gives practically as good an est. of the amt. of slipped tendon as do protein, ash, Ca and P combined. The results do not justify the conclusion that P is the chief causative factor of slipped tendon, but merely indicate that high percentages of slipped tendon are associated with high P in the ration. K. D. Jacob

**Mineral content of tibiae from chicks with slipped tendon.** Arthur D. Holmes, Madeleine G. Pigott and Wm. B. Moore. *Poultry Sci.* 12, 356-61(1933). —There was no significant difference between the size and mineral content of tibiae from slipped-tendon chicks and those of normal chicks. K. D. Jacob

**Oat hulls as a source of vitamins B and G.** N. B. Guarrant and R. Adams Dutcher. *Poultry Sci.* 12, 373-7(1933). —Oat hulls contain an appreciable quantity of vitamins B and G. Addn. of 5% of oat hulls to a basal diet greatly extended the life of rats; a 10% addn. resulted in slow but consistent growth and a 20% addn. resulted in a 5-g. gain in wt. per week during the 8 weeks of the expt. Vitamin B and G concentrates were about equally effective in stimulating addnl. growth. Addn. of 20% of alc.-extd. hulls to the basal diet was not sufficient to stimulate growth but there was some evidence that it did prolong life. K. D. Jacob

**Effect of fluorine in the nutrition of the chick.** C. H. Kick, R. M. Bethke and P. R. Record. *Poultry Sci.* 12, 382-7(1933). —Chicks can tolerate more F in their ration in the form of  $CaF_2$  than as rock phosphate or NaF; the last 2 materials exert similar effects on growth and feed consumption. When the rations of chicks contained more than 0.036% F, as NaF or rock phosphate, growth and feed consumption were decreased in direct proportion to the F content of the ration; the clotting time of the blood decreased with increase in the amt. of F in the ration. F ingestion did not significantly affect the percentage of bone ash in the tibiae at 8 weeks. K. D. Jacob

**The nutritive protein value of five varieties of rice.** A. J. Icarmano. *Philippine J. Sci.* 51, 567-72(1933). —The nutritive value of rice as detd. by rat growth is not correlated with the protein content. The Mancaser variety contains less protein than others but it excels in promoting growth in rats. Amy LeVesconte

**Effect of fatty acids on nutrition. II. Experiments with diets composed of rice, oil and lipid containing linoleic or linolenic acid.** Ume Tange. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 22, 1-14(1933); cf. C. A. 27, 1664. —Rice starch was inferior to potato starch for rat growth. Linoleic acid or alc. yeast ext. could not cure

rats that had been fed on rice starch but whole dried yeast did. Lecithin, soy-bean oil and chrysalis oil promoted growth, while rice bran oil did not. Fatty acids from cod-liver oil did not maintain growth and large doses caused gastro-intestinal disturbance. Linoleic acid did not spare vitamin B<sub>1</sub> or B<sub>2</sub>. A. LeVesconte

**Sodium chloride requirement and its relationship to mineral metabolism.** Hans Glatzel. *Z. ges. expil. Med.* 90, 59-77(1933). Bunge (Z. Biol. 10, 275(1874)) believed that the dietary use of NaCl served to balance high K intake on vegetable diets. On analyzed diets of potatoes or rice G. finds that high K in the diet did not increase the urinary Na. The potato diets which are customarily used with added salt produce alk. urines whereas rice diets, for which salt is not used, produce acid urines. The NaCl is supposed to prevent excessive urine alk. Milton Levy

**The dietary production of fatty livers in rats.** N. R. Blatherwick, E. M. Medlar, Phoebe J. Bradshaw, Anna L. Post and Susan D. Sawyer. *J. Biol. Chem.* 103, 93-106(1933). Cholesterol in ingested liver is one substance capable of producing the fatty condition found in young rats fed diets contg. whole liver. Fat is not deposited on diets contg. a residue from the aq. extn. of liver or a 70% alc. ppt. of the aq. ext. Deposition of fat and cholesterol in the liver also occurs on diets contg. egg but the results are less striking than those with liver on account of the relatively poor nutritive condition of the animals on the egg diet. Any role of lecithin in opposing the laying down of liver fat is not apparent with the liver diets. The lecithin content of the fatty livers tends to decrease with increasing amts. of fat. The fat of the fatty livers appears to be that normally present and the lipides of the blood and kidney are not significantly altered.

A. P. Lothrop

**Diet of tuberculous and nontuberculous children. Effect of increased supply of vitamin B concentrate and minerals.** Paul D. Crimm, Isador J. Raphael and Louise F. Schulte. *Am. J. Diseases Children* 46, 751-6(1933).--A group of children with latent or suspected tuberculosis, receiving daily a special cereal mixt. (cf. C. A. 25, 2174) which supplied liberal amts. of Ca, P, Fe, Cu and vitamins B<sub>1</sub>, B<sub>2</sub> and C, showed greater increases in wt. and in the hemoglobin content of the blood than control groups receiving regular diets or diets contg. added quantities of vitamin B or minerals. Increases in the Ca and P contents of the serum were also observed. The vitamin B complex appeared to be responsible for the gains in wt. and the minerals for the increase in hemoglobin. The addn. of vitamin B or of minerals to the diet did not appear to be as effective as the feeding of the combination of the 2 in the form of the special mixt. which contained in addn. vitamins A and E. E. R. Main

**The interrelation of a gonotropic hormone and vitamin A.** S. B. D. Aberle. *Am. J. Physiol.* 106, 267-72(1933).--A placental ext., capable of producing nucoid vaginal cells in normal female rats, was incapable of producing any effect on the vaginal cells of rats suffering from vitamin A deficiency disease. J. F. Lyman

**Fluorine in the nutrition of the rat. I. Its influence upon growth.** A. R. Lamb, P. H. Phillips, E. B. Hart and G. Hohstedt. *Am. J. Physiol.* 106, 350-5(1933).--Growth in rats is inhibited when F is added to their rations to the extent of 18-20 mg. F per 100 g. body wt. per day in the form of NaF or 36-40 mg. F per day in the form of rock phosphate or as CaF<sub>2</sub>. II. Its effect upon reproduction. P. H. Phillips, A. R. Lamb, E. B. Hart and G. Hohstedt. *Ibid.* 356-64. --Chronic F poisoning does not inhibit reproduction in the rat. Lactation is suppressed when F is fed above the upper limit of safety. J. F. Lyman

**The nutritional anemia of the rat. IX. The anemia of pregnancy.** H. H. Beard and V. C. Myers. *Am. J. Physiol.* 106, 449-53(1933); cf. C. A. 27, 3988. --An anemia develops in the rat during pregnancy, the hemoglobin being reduced about 20% and the red cells about 40%. The addn. of Fe salts to the diet retards the drop

in hemoglobin; while neither liver ext. nor yeast has any anemia-preventing effect. J. F. Lyman

**Factors which determine renal weight. XV. The relation between vitamin B (complex) and protein intake.** E. M. MacKay. *Am. J. Physiol.* 106, 571-3(1933), cf. C. A. 27, 4562. --The increase in the wt. of the kidneys of the white rat produced by a high-protein diet is greatly lessened, but not entirely prevented, by maintaining the same vitamin B: protein ratio in the high- and low-protein diets. J. F. Lyman

**Disturbances of reproduction and ovarian changes in the guinea pig in relation to vitamin C deficiency.** M. M. Kramer, Mary T. Harman and Alice K. Brill. *Am. J. Physiol.* 106, 611-22(1933). --Diets free from vitamin C were supplemented with varying amts. of orange juice. Quantities of orange juice about 100% in excess of the scurvy-protecting dose, and sufficient to give nearly normal growth, did not permit the birth of living young. J. F. Lyman

**The energy metabolism of phosphorus-deficient dairy cattle.** W. H. Riddell, J. S. Hughes and J. B. Fitch. *Am. J. Physiol.* 106, 676-81(1933). --Lactating dairy cows, fed a ration contg. 0.18% of P with a slight surplus of digestible nutrients, produced 3135 cal. per sq. m. per 24 hrs. After adding 100 g. NaH<sub>2</sub>PO<sub>4</sub> daily, heat production fell to 2701. J. F. Lyman

**Effect of lactose on rickets in rats.** Gertrude Sunderlin. *Am. J. Diseases Children* 46, 786-93(1933). --The administration of lactose to rats receiving rachitic diet produces a definite prophylactic effect, assoc. with a decrease in the  $p_{H}$  of the intestinal tract. Since the effect is much less marked than that resulting from the administration of cod-liver oil, which also reduces the intestinal  $p_{H}$ , other factors than this must be concerned in the etiology of rickets. The administration of lactose causes little or no healing of active rickets. E. R. Main

**The value of cod-liver oil in the treatment of anemia.** Arthur D. Holmes, Madeleine G. Pigott and Lawrence P. Bowser. *New Engl. J. Med.* 209, 839-42(1933). The administration of cod-liver oil alone does not appear to promote blood regeneration in anemic rats. Rats maintained on daily rations contg. 0.5 mg. of Fe and 0.05 mg. of Cu in addn. to cod-liver oil supplements show a somewhat more rapid rate of blood regeneration than rats receiving Fe and Cu without cod-liver oil. However, when the quantity of Fe administered is increased to 1.5, 2.5 or 3.0 mg., the rate of hemoglobin increase does not differ from that of the controls. Similar results are obtained when peanut oil free from vitamin A is substituted for cod-liver oil. E. R. Main

**The factor E (vitamin of reproduction).** V. Zagani. *Arch. Physiol.* 32, 301-40(1933). --A review. Zu and Chu have a favorable influence in E deficiency. A. E. Meyer

**Destruction of the antirachitic power of irradiated ergosterol (Vitamin D) by lung tissue.** Ph. A. Coppin and C. A. Metz. *Biochem. Z.* 266, 169-74(1933). Vitamin D is destroyed, or at any rate inactivated, *in vitro* by lung tissue, but not by liver tissue. Blood also attacks the vitamin *in vitro*. This inactivating action of the lung is thought to account for the difference in vitamin D content of mammalian and fish livers. S. Morgulis

**Substances affecting the non-protein nitrogen increase in cats brought about by vitasterol.** Siegwart Hermann and Margot Zentner. *Biochem. Z.* 266, 418-21(1933). Vigantol fed to cats causes a 100% increase in the blood non-protein N, but this can be prevented completely by feeding Kombuchal at the same time. The latter is a prepn. obtained by the fermentation of sugar in a tea infusion by certain molds, the chief product of which is gluconic acid. Gluconic acid, itself prevents the non-protein N rise only in about 40% of the cases, and such substances as citric acid and tea infusion have no effect at all. S. Morgulis

**Vitamin A content of barley.** E. H. Hughes. *J. Agr. Research* 47, 487-94(1933). --Barley as the only source of vitamin A in the diet does not produce normal growth in rats. In the sexually immature rat the addn. of vitamin A to a diet in which barley is the only source of this

vitamin results in a decided increase in growth and a normal estrous cycle. Barley contains more vitamin A than white corn but less than  $\frac{1}{10}$  as much as yellow corn.

W. H. Ross

**Losses of vitamin A in drying fresh raw carrots and sweet potatoes and canned spinach.** G. S. Fraps and Ray Treichler. *J. Agr. Research* 47, 539-41 (1933).—A study of the effect of drying on the vitamin A content of certain vegetables showed that raw carrots lose approx. 50% of their vitamin A during drying in a vacuum oven, sweet potatoes about 29% and canned spinach about 65%. The results do not show whether or not loss of vitamin A occurs on storing the fresh material, but they indicate that fresh green vegetables may contain much higher amts. of this vitamin than might be expected from tests of the dried material.

W. H. Ross

**The vitamin C content of commercially canned sauerkraut produced under known conditions.** Helen T. Parsons and Carolyn Horn. *J. Agr. Research* 47, 627-34 (1933).—A study of 4 brands of com. sauerkraut manufd. under known and fairly comparable conditions showed that 2 of these brands practically duplicated their previous antiscorbutic content (Clow, Parsons and Stevenson, *C. A.* 24, 5350) when observed under routine conditions in the factory. The other 2 brands did not show any antiscorbutic potency when fed to guinea pigs at a 10-g. level. This record is inferior to previous results on the same brands although one of these brands showed a low vitamin C content in the previous tests. No satisfactory correlation can be traced between the comparative vitamin C content in the 4 individual brands on the one hand and variations in processes of manuf. on the other.

W. H. Ross

**Comparative nutritional value of diets containing rancid fat, neutral fat and no fat.** Dorothy V. Whipple. *Oil and Soap* 10, 228-9 (1933).—Feeding tests with rats showed that slightly oxidized fat does not have the same nutritional value as neutral fat.

E. Scherubel

**Role of B vitamins in the utilization of sugars by the pigeon. Comparative influence of some hexoses and disaccharides (holosides) incorporated to the extent of 66% in the diet.** Raoul Lecoq. *Compt. rend.* 197, 1155-7 (1933); cf. *C. A.* 27, 2714. —The curative action of dried yeast on pigeons with avitaminosis-B whose diet contains 66% of sugars is not the same as previously found for diets contg. 35% of sugars. With 66% dextrose or maltose, 0.5 g. of dried yeast daily is curative, while with galactose even 4 g. yeast is without effect. Levulose is somewhat less effective than dextrose, sucrose being intermediate. Lactose is only slightly more effective than galactose. The disaccharides thus possess essentially the properties of their constituent monosaccharides, but to a less degree.

K. V. Thimann

**Arginine metabolism. II. The relation of the arginine content of the diet to the creatine-creatinine production during growth.** Curtis E. Meyer and Wm. C. Rose. *J. Biol. Chem.* 102, 461-71 (1933).—The formation of creatine and creatinine by rats on a diet low in arginine is much greater than can be accounted for by the arginine ingested, and is therefore probably a true endogenous reaction.

K. V. Thimann

**Mineral supplement to farm foods.** Frank E. Corrie. *Chemist and Druggist* 119, 444-5 (1933); cf. *C. A.* 27, 3200. —The metabolisms of Ca, Fe, P and I in farm foods as studied by E. B. Hart (*C. A.* 26, 2221), Halnan (*C. A.* 25, 5447; 26, 4656), Musschl (*C. A.* 26, 2221; 27, 1032), Weiser (*C. A.* 26, 5650; 27, 135), etc., are discussed; recipes for mineral foods with KI are given.

S. Waldbott

**Biological relation between carotene and vitamin A.** Jack C. Drummond and Roy J. MacWalter. *Biochem. J.* 27, 1342-7 (1933).—Injection of carotene into the portal circulation of rabbits gives no increase in the vitamin A in the liver until after 8 days. Attempts to convert carotene into vitamin A *in vitro* by incubation of liver tissues were unsuccessful. Benjamin Harrow

**Growth vitamin (Kuhn, Grundmann) 10.** *Biochemistry of cacao* (Heim de Balsac) 12.

**Phillips': Vitamin Charts. No. 1. Vitamin Values of Foods. No. 2. Diseases Resulting from a Lack of Vitamins.** London: Geo. Philip and Son, Ltd. 8s. 6d. each. Reviewed in *Nature* 132, 300 (1933).

**Antirachitic preparation.** I. G. Farhenind. A.-G. Ger. 583,791, Sept. 9, 1933. A prepn. of the above type is prepd. by irradiating lumisterol with ultra-violet light. The product is preferably converted to the crystd. dinitrobenzoate.

## F—PHYSIOLOGY

HOMER W. SMITH

**Reaction of anterior hypophysis of immature rat to placental hormones.** J. M. Wolfe, Doris Phelps and Rucker Cleveland. *Proc. Soc. Exptl. Biol. Med.* 30, 1092-4 (1933).—Immature female rats were given 2 subcutaneous injections of a relatively crude estrin-free ext. of placenta daily for 6-8 days. The ovaries were markedly increased in size. The hypophyses were swollen and hyperemic; the anterior lobes had a definite decrease in eosinophilic cells, the basophilic cells were enlarged and had lost all or a greater part of their granular material. Castration 2-3 days before the beginning of the injection period prevented the loss of basophilic granules.

C. V. Bailey

**Saliva and coagulation of blood.** Carroll J. Bellis and F. H. Scott. *Proc. Soc. Exptl. Biol. Med.* 30, 1373-5 (1933).—Human saliva, collected from the mouth, hastened the coagulation of dog, bovine and human blood; similar results were obtained with dog saliva collected by cannula and with fluid obtained by abdominal or intrathecal paracentesis.

C. V. Bailey

**Comparison of inorganic phosphate contents of serum, fluoride plasma and native plasma.** H. L. White and Betty Monaghan. *Proc. Soc. Exptl. Biol. Med.* 31, 1-5 (1933).—The presence of NaF in concns. up to 0.9% did not inhibit the production of color when the Benedict-Thies method (cf. *C. A.* 18, 3398) was applied to standard solns. of inorg. phosphates. When 0.3% NaF was used as an anticoagulant in blood the plasma inorg. P was lower than that of native plasma obtained by immediately centrifuging the blood and lower than the amt. found in hirudin plasma; NaF, by its osmotic effect, dild. the plasma. The inorg. P. content of serum was the same as that of native plasma.

C. V. Bailey

**Proportion of cystine yielded by hemoglobins of the horse, dog and sheep.** Hubert B. Vickery and Abraham White. *Proc. Soc. Exptl. Biol. Med.* 31, 6-7 (1933).—By use of the cuprous mercaptide method (cf. *C. A.* 27, 2170) hydrolyzed hemoglobin of the horse, sheep and dog yielded 0.41%, 0.6% and 1.16% of cystine, resp.

C. B. Bailey

**Periodicity of carbohydrate metabolism and rhythmic functioning of the liver.** Jakob Mollerström. *Arch. Internal Med.* 52, 649-63 (1933). See *C. A.* 27, 4564.

J. V. Brown

**Iron in the liver of the calf fetus.** G. Roussel and Mme. Z. Gruzewska. *Compt. rend.* 197, 943-4 (1933).—The quantity of Fe in the liver of the calf fetus is min. at 6-7 months, 0.0035-0.027 parts per 100, and max. at 8.5-9 months, 0.128-0.179 parts per 100.

Rachel Brown

**The pathophysiology of acute inflammatory dermatoses. III. The regularity of the different distributions of ions between skin and blood. The Donnan membrane equilibrium law.** Alfred Perutz and Andreas E. Klein. *Arch. Dermatol. u. Syphilis.* 168, 161-72 (1933).—The application of the concept of the Donnan membrane equilibrium affords an explanation of the differences in distribution of the electrolytes in the blood and skin. The content of protein,  $\text{CO}_3$  and  $\text{Na}^+$ , and osmotic pressure due to colloids, in skin blister fluid is lower than in serum; with respect to  $\text{Cl}^-$  and  $\text{OH}^-$  the reverse is true. The differences are considerable in the cases of  $\text{Cl}^-$  and  $\text{CO}_3$ , slight in the case of  $\text{Na}^+$ , and more pronounced with respect to  $\text{OH}^-$ .

B. C. Brunstetter

**The anterior pituitary sexual hormone from gravid urine.** Felix Haurowitz, Max Reiss and Josef Balint.

*Z. physiol. Chem.* 222, 44-9 (1933).—New observations are reported on the activation, chem. properties and individuality of the hormone. Adsorption of the EtOH ppt. on BzOH gave regularly an unexpected increase in activity to 100-300 times the initial value, e. g., from 500 to 150,000 mouse units. A less striking activation was also obtained by warming the aq. soln. 24 hrs. at 38°. It is suspected that the activation consists in the severance of a loose linkage between hormone and inhibitor, or the removal or destruction of the latter. The active prepn. contains 7% sugar but no P and S, and gives several of the protein reactions. It causes both follicle ripening and luteinization. This twofold activity is attributed to a single hormone, since the ratio cannot be altered by adsorption, activation and inactivation. The hormone obtained from urine is not identical with that obtained from the pituitary but is probably a transformation product of the latter contg. the specifically active grouping. For manifestation of full activity it requires complementation by non-specific substances of the hypophysis.

A. W. Dox

**The sulfhydryl and ascorbic acid contents of eye lenses.** Hans v. Buler and Carl Martius. *Z. physiol. Chem.* 222, 65-9 (1933).—Direct colorimetric detn. of glutathione in beef eye lenses by Na nitroprusside gives values considerably lower than those obtained by subtracting the I no. from the indophenol indicator value. About 20% of the total reducing power is due to vitamin C. Both glutathione and vitamin C are greatly decreased in cases of human cataract as compared to normal.

A. W. Dox

**Ammonia and nitrogen metabolism.** Michel Polonovski, Gaston Bizard and Paul Boulanger. *Ann. physiol. physicochim. biol.* 9, 759 (1933); cf. *C. A.* 27, 125. The kidney and pancreas both liberate  $\text{NH}_3$  into the blood, the  $\text{NH}_3$  content of the blood leaving the organ being higher than that of the arterial supply, even when the latter has been artificially increased by the injection of  $\text{NH}_4$  salts. Resting muscles, on the other hand, take up  $\text{NH}_3$  from the circulating blood.

Harry Eagle

**The adrenal gland and the sulfhydryl compounds.** Léon Binet. *Ann. physiol. physicochim. biol.* 9, 803 (1933).—The adrenal gland contains more reduced glutathione (500-600 mg. % in dogs) than any other organ, including the liver. The cortex contains more than the medulla. If adrenal glands are perfused with citrated blood contg. cystine and glutamic acid, the reduced glutathione in both the perfusion fluid and the gland are definitely increased (approx. 40%). A kidney similarly perfused causes no change. The glutathione content of the adrenal glands is increased in pregnancy (dogs), is decreased after removal of the ovaries and is slightly decreased by pancreatectomy or by dinitrophenol.

Harry Eagle

**Nitrogen reserves in animals.** Andrée Roche. *Ann. physiol. physicochim. biol.* 9, 933 (1933). If the protein ingested is insufficient, the body catabolizes a labile muscle protein.

Harry Eagle

**The spleen and glucide metabolism.** F. Rathery and R. Cosmulesco. *Ann. physiol. physicochim. biol.* 9, 939-42 (1933).—Splenectomy in dogs usually causes hyperglucemia, and appears to accentuate the artificial hyperglucemia caused by the injection of glucose. Hepatic glycogen and glycogen formation are decreased. None of these effects is invariable.

Harry Eagle

**The biologic effect of intermediary products of tissue decomposition. I. The effect of pancreatolyzate upon the blood-sugar level.** S. G. Genes and S. Ph. Epstein. *Arch. expl. Path. Pharmacol.* 171, 733-43 (1933).—The protein-free products of pancreatic autolysis cause hypoglycemia when administered to rabbits perorally or intravenously.

Harry Eagle

**The excretion of citric acid by rabbit kidneys.** Hedwig Langecker. *Arch. expl. Path. Pharmacol.* 171, 744-55 (1933).—Fasting rabbits excrete 2-3.5 mg. citric acid daily in the urine, increased to as high as 50 mg. by a green vegetable diet. It comprises 0.5-2% of the total org. acids excreted. The ingestion of citric acid or Na citrate does not affect the quantity excreted in the urine; nor

is any demonstrable in the feces. The normal urinary citric acid is therefore endogenous.

Harry Eagle

**Changes in the serum calcium level in rabbits throughout the year.** Siegwart Hermann and Margot Zentner. *Arch. expl. Path. Pharmacol.* 172, 5-9 (1933).—The total serum Ca and the ratio of total/free Ca are max. during the winter and min. in the spring.

H. E.

**A ferric compound of globulin appearing in the intermediary iron metabolism.** E. Starkenstein and Z. Harvalik. *Arch. expl. Path. Pharmacol.* 172, 75-92 (1933); cf. following abstr. Approx. 500 mg.  $\text{FeCl}_2$  can be oxidized by 100 cc. fresh defibrinated blood. Red cells washed and resuspended in physiol. salt soln. are only  $1/10$  as active in this respect as whole blood; and the slight activity of serum is due to traces of hemoglobin. The complete oxidizing activity is restored by mixing the washed cells and serum. The active substance is the hemoglobin Fe, 1 mol. of which can convert 4 mols. of  $\text{FeCl}_2$ , and can be then reactivated by oxidation. Serum globulin is an adequate substitute for serum in furthering the reducing activity of the blood cells; serum albumin or egg albumin is inactive. The ferric globulin complex is pptd. upon  $1/2$  satn. with  $(\text{NH}_4)_2\text{SO}_4$  or dialysis. The latter ppt. is insol. in water, but readily swells and dissolves in serum. In contrast, the ferric albuminate pptd. from serum by the addn. of  $\text{FeCl}_2$  is sol. in water, but only slowly in serum. The ratio of Fe to N in the ferriglobulin increases with the amt. of  $\text{FeCl}_2$  used, up to about 500 mg.  $\text{FeCl}_2$  per 100 cc. blood, when it attains a limiting value of 1:4.

Harry Eagle

**The oxidation and reduction of iron in the organs.** Emil Starkenstein and Franz John. *Arch. expl. Path. Pharmacol.* 172, 93-103 (1933); cf. preceding abstr. The Fe of the liver is water insol. but can be extd. in hot 5N HCl. Na ferriurate added to macerated liver is immediately reduced to a partially water sol. form. The reducing activity is greatly impaired by heating the liver, or by the addn. of 2 N HCl, and is increased in a  $\text{CO}$  atm. Ferriurate added to blood is only partially reduced, and only in the presence of considerable  $\text{CO}$ .  $\text{FeCl}_2$  is not affected by liver, but is oxidized by the blood. Part of the ferric salt so formed is gradually converted to a water-insol. basic salt.  $\text{K}_4\text{Fe}(\text{CN})_6$  is reduced to  $\text{K}_4\text{Fe}(\text{CN})_6$  by both liver and blood; the ferri cyanide remains free as such.

Harry Eagle

**The appearance of an acetylcholine like substance in the coronary venous blood of warm-blooded animals upon stimulation of the vagus nerves.** W. Feldberg and G. Kraver. *Arch. expl. Path. Pharmacol.* 172, 170-9 (1933). After dec. vagal stimulation, the substance can be demonstrated in the blood of the coronary vein in dogs and cats, provided that the acetylcholine-destr. activity of normal blood is previously inhibited by the intravenous injection of physostigmine. The acetylcholine activity disappears within a few min. after the stimulation, and is believed due to acetylcholine as such.

Harry Eagle

**Plasma phosphate and lactic acid in normal and adrenalectomized animals during changes in the carbohydrate metabolism.** Carl F. Cori and Gerty T. Cori. *Arch. expl. Path. Pharmacol.* 172, 219-60 (1933).—The intravenous injection of non-convulsive doses of crystd. insulin into rabbits causes a fall of approx. 1.5 mg. % in the inorg. plasma P within a hr. In adrenalectomized animals the fall averages only 0.27 mg. %. The subcutaneous injection of adrenalectomized animals causes a decrease in both normal and adrenalectomized animals. The effect of insulin upon the inorg. P and lactic acid levels in normal rabbits is ascribed to the secretion of adrenalectomized animals. The intravenous injection of glucose has no significant effect upon the inorg. plasma P.

Harry Eagle

**The effect of human urine upon the muscular activity of the surviving uterus.** Erich Ringelhart. *Arch. expl. Path. Pharmacol.* 172, 267-71 (1933); cf. *C. A.* 27, 5389.—Human urine contains a thermostable org. substance insol. in EtOH or ether, diffusing through Cellophane and adsorbed by animal charcoal, which stimulates the contractions of rat, guinea pig and rabbit uteri



vitro. The active substance is not adrenaline, pituitrin, adenosinephosphoric acid or padutin. Harry Eagle

The autonomic innervation of the [pancreatic] islet system. I. The role of the vagi in the production of warmth hypoglycemia. F. Geiger. *Arch. expl. Path. Pharmacol.* 172, 295-301(1933). Warming the carotid vessels in dogs under chloralose anesthesia causes an increased blood insulin content, prevented by sectioning of the vagi. The islet stimulating impulses are carried by the right vagus. Harry Eagle

The effect of vaginectomy upon the blood sugar. F. Hogler. *Arch. expl. Path. Pharmacol.* 172, 325-42(1933).—Neither unilateral nor bilateral vaginectomy affects the blood-sugar level in rabbits. The inhibition of the alimentary hyperglucemia by ergotamine is also unaffected. Harry Eagle

The effect and site of action of isolated posterior pituitary hormone upon the carbohydrate metabolism. S. Thudicum and A. Waly. *Arch. expl. Path. Pharmacol.* 172, 535-50(1933). Unlike orasthin, tonephin causes hyperglucemia in rabbits because of a mobilization of hepatic glycogen. This hyperglucemia is decreased in hyperthyroid animals, and is not observed after exptl. liver damage. In the latter animals tonephin does not antagonize insulin hypoglycemia. Harry Eagle

The functional significance of the structural elements of the thyroid glands. Werner Grab. *Arch. expl. Path. Pharmacol.* 172, 586-629(1933); cf. *C. A.* 27, 5389.—From  $\frac{2}{3}$  to  $\frac{1}{4}$  of the fresh or dry weight of normal resting sheep thyroid gland consists of colloid. Fresh colloid contains 0.065-0.074% I, of which  $\frac{2}{3}$  is thyroxine I, the remainder being acid-sol. I compds., probably diiodotyrosine. In the acetone-soluble and metabolized expt. colloid is at least as active as the corresponding quantity of thyroxine. Fresh epithelial tissue contains only 0.0072-0.0094% I, of which  $\frac{1}{3}$  is thyroxine I. Here also, the tissue is at least as active as the quantity of purified thyroxine corresponding to it: thyroxine I content. Colloid must therefore be considered the storage form of the active thyroid hormone. The ratio of thyroxine to diiodotyrosine in colloid and epithelium is approx. the same, indicating that colloid represents a mobilization of substances performed in the epithelium in the proper proportions. Of the active I compds. in dried thyroid prepns., 95% is in the colloid. Colloid contains 20% solids; its isoelectric point (opt. pptn.) is at pH 4; and its compn. when dried *in vacuo* is C 45, H 6 $\frac{1}{2}$ , N 13, S 3, P 0.2, 10.3%, 0.26.6%. Upon stimulation of the thyroid gland, as by the injection of thyrotropic anterior pituitary hormone into cats, the I content of the colloid decreases and its H.O. content increases. Colloid as such is an *inert protein carrier of the effective thyroid substances, thyroxine and diiodotyrosine.* Harry Eagle

Histamine-like substances and late toxins in blood. K. Zipl and P. Hulsmeier. *Arch. expl. Path. Pharmacol.* 173, 1-14(1933). Aq. and aq.-alc. exts. of fresh or old blood contain adrenaline-like substances, but no demonstrable histamine. They do contain an oxytocic principle with no effect upon blood pressure, the "late" toxin of Freund. Harry Eagle

The occurrence of melanophore hormone in human organs. A. Jores and W. Velde. *Arch. expl. Path. Pharmacol.* 173, 26-30(1933), cf. *C. A.* 27, 2992. Only the eye and midbrain of mammals contain melanophore hormone, other organs give neg. results. Harry Eagle

The occurrence of melanophore hormone in human body fluids. Arthur Jores. *Arch. expl. Path. Pharmacol.* 173, 31-5(1933); cf. *C. A.* 27, 2992.—Human blood contains melanophore hormone. The urine contains a substance causing melanophore expansion, but which differs in its chem. properties from the true hormone. Rabbit spinal fluid obtained by occipital puncture contains the hormone; human spinal fluid, whether occipital or lumbar, contains none. The aqueous humor of rabbits kept in the dark contains the hormone. Harry Eagle

Anterior pituitary lobe and thyroid glands. The effect of the thyrotropic substance of the anterior pituitary lobe

upon the adrenal glands. Arnold Loeser. *Arch. expl. Path. Pharmacol.* 173, 62-71(1933).—Injected intraperitoneally into guinea pigs, the thyrotropic substance also causes a 150-200% increase in the vol. and weight of the adrenal glands. This increase presupposes the presence of functionally active thyroid gland, and is not observed after thyroidectomy. Harry Eagle

Relationship between the thyrotropic substance of the anterior pituitary gland and the adrenal glands. Arnold Loeser. *Klin. Wochschr.* 12, 1614(1933).—The hormone causes an increased vol. of the adrenal glands in guinea pigs. A preliminary report. Cf. preceding abstr. Harry Eagle

The mechanism of the action of the diuretic liver hormone. J. Mosonyi and L. Voith. *Arch. expl. Path. Pharmacol.* 173, 72-7(1933).—Fluid perfused through the liver and thence to the kidneys in frogs causes increased diuresis. If both the tubules and glomeruli are perfused, the urine contains more Cl than if the tubules only are perfused. Harry Eagle

Anterior pituitary lobe and the thyroid glands. The effect of thyrotropic substance upon liver glycogen and blood ketone bodies. H. Eitel, G. Lohr and A. Loeser. *Arch. expl. Path. Pharmacol.* 173, 205-20(1933).—Intraperitoneal injection of the pituitary thyrotropic substance into rats causes a decreased liver glycogen and increased blood acetone bodies, returning to normal 24 hrs. after the injection. The effect can be prolonged by daily injections, presupposes the presence of the thyroid glands and is not observed after thyroidectomy. H. E.

The effect of experimental mitral insufficiency upon the metabolism. Dietrich Jahn. *Arch. expl. Path. Pharmacol.* 173, 221-41(1933).—The circulation slows, the concn. of blood lactic acid increases because of insufficient O<sub>2</sub> supply, the respiratory quotient increases; with increasing cardiac decompensation, the basal metabolism increases and the alimentary hyperglucemia becomes more pronounced. Harry Eagle

The mineral economy after the administration of posterior pituitary substance. Rudolf Engel, Irvine McQuarrie and Mildred Ziegler. *Arch. expl. Path. Pharmacol.* 173, 248-59(1933).—Posterior pituitary substance causes an increased excretion of K, Na and Cl, even during the inhibition of diuresis. The excretion of Ca, Mg, P, S and N is not affected. Harry Eagle

The dependence of the structure of tissue proteins upon the metabolism of the organism. II. Hormones, metabolic products and agents which injure the protoplasm. E. G. Schenck and H. Wollschitt. *Arch. expl. Path. Pharmacol.* 173, 260-8(1933); cf. *C. A.* 27, 4569.—Agents which injure the protoplasm (Röntgen rays, toxins, As, quinine, monobromoacetic acid, Witte peptone), hormones (adrenaline, insulin and thyroxine), metabolic products (urea, lactic acid) and nerve toxins (atropine, choline) all cause chem. changes in the protoplasm and tissue proteins of rats, as judged by the tryptophan per unit tissue, the tryptophan per unit protein, and the amino acids per unit tissue in the liver, kidney, heart and muscles. III. The behavior of cystine and tyrosine. *Ibid.* 269-77.—The administration of cystine, tyrosine or tryptophan causes them to replace other amino acids in the tissue proteins, to a varying extent in the various organs. The concns. of cystine and tyrosine in the tissue proteins under the influence of the various factors listed in the preceding paper usually change in opposite directions. IV. Changes with age; avitaminoses. *Ibid.* 278-82.—The relative weights of the various organs of rats and their protein structure change with age. Significant changes in the organ protein compn. are observed in avitaminosis-A. Harry Eagle

The central effect of pituitary circulatory hormone (vasopressin) upon blood pressure. Hans Heller and G. Kusunoki. *Arch. expl. Path. Pharmacol.* 173, 301-13(1933).—Urethan anesthesia decreases the susceptibility of dogs to the pressor action of intracisternal pituitrin or pitressin. The latent period is also prolonged. Atropine has no effect. The cardiac and coronary complications of intravenous injections of pituitrin are not observed after intracisternal injection, and the latent period is not

significantly different. The blood-spinal fluid barrier is impermeable for pituitrin; the pressor action of intracisternal injections is due to a direct central action. Intracisternal histamine, acetylcholine and "Padutin" do not affect the blood pressure.

**Gastric studies.** Chlorine in the gastric juice. I. Gelman and D. Sheveluchin. *Arch. Verdauungskrankh.* 54, 183-90(1933).—The total Cl in the gastric juice varies from 0.05 to 0.6%. There is a definite but not necessary parallelism between the Cl and HCl excretion.

**The chemistry of the oxytocic hormone of the pituitary gland.** I. B. C. Culha and P. N. Chakravorty. *Indian J. Med. Research* 21, 429-30(1933).—The oxytocic principle is most stable (1 hr. autoclaving at 1 atm.) at  $pH$  3-5. It is not adsorbed by fuller's earth ( $pH$  1.5 or 4.5) or by kieselguhr ( $pH$  4.5). The effects of  $HNO_3$ ,  $HNO_2$ ,  $H_2O_2$ ,  $SO_2$ , benzoyl chloride, acetyl chloride, picrolonic acid and phosphotungstic acid were also studied.

**The effect upon the ovarian action of prolactin of a simultaneous injection of folliculin.** M. A. Magath and R. M. Rosenfeld. *Klin. Wochschr.* 12, 1288(1933). A preliminary report. The injection of horse urine folliculin accentuates the luteinizing action of prolactin B upon the infantile ovaries of rats and mice.

**Which fraction of pituitrin affects the velocity of [water] absorption from the skin?** D. Adlersberg, and B. Paul. *Klin. Wochschr.* 12, 1320-9(1933).—Pituitrin accelerates the absorption of the intradermal saline wheal. Its vasopressor constituent acts similarly, but is less effective; the oxytocic fraction is practically inactive. Anterior pituitary ext. has no effect.

**Investigations in the melanophore hormone.** III. F. G. Dietel. *Klin. Wochschr.* 12, 1354-64(1933); cf. C. A. 27, 4569.—The melanophore hormone of the pituitary gland is an independent hormone, not related to the other components of the ext. (1) It differs from these in sol., being less sol. in BuOH and more sol. in EtOH; (2) it is pptd. by acetone; (3) it is not destroyed by alkali; (4) it is not strongly adsorbed; (5) it diffuses through collodion more slowly than the other active principles in pituitary exts.

**Coefficients of the thyroxine effect in biological experiments.** H. Buefinger and J. Gottlieb. *Klin. Wochschr.* 12, 1307-402(1933).—Normal blood antagonizes the effect of thyroxine in accelerating the metamorphosis of tadpoles, the inhibiting factor being assoc. with the serum proteins. Vitamin A is also antithyroidal in this respect. The antithyroidal action of the blood is decreased in the pregnancy toxicoes, possibly because of a disturbance in the hepatic formation of vitamin A. The peroral administration of vitamin A to such cases restores the normal antithyroidal activity of the blood. Guanidine accentuates the metamorphosis-accelerating action of thyroxine; choline, carbamylcholine and acetylcholine increase its growth-inhibiting action.

**The bromine content of the blood.** Comments on the papers by H. Zondek, A. Bier and co-workers. F. Holtz and Chr. Roggenbau. *Klin. Wochschr.* 12, 1410-11(1933).—The methods developed by Pincussen (C. A. 27, 744) and by Zondek and Bier (C. A. 27, 2201) are wholly inadequate, as shown by the failure of these workers to analyze correctly samples with known Br content. Reply. Hermann Zondek *Ibid.* 1411-12. L. Pincussen. *Ibid.* 1412.

**The non-saponifiable components of pig liver.** Godo Lohr and Ernst Fränkel. *Klin. Wochschr.* 12, 1413(1933).—A preliminary report.

**The pancreatotropic substance from the anterior pituitary lobe.** I. The preparation and properties of the pancreatotropic substance. K. J. Anselmino and Fr. Hoffmann. *Klin. Wochschr.* 12, 1435-6(1933).—II. The metabolic effects of the pancreatotropic substance. Fr. Hoffmann and K. J. Anselmino. *Ibid.* 1436-8.—The physiol. effects of the substance, obtained by ultrafiltration of the entire aq. pituitary ext. at weakly acid ( $pH$

5.2) reaction, suggest that it causes an increased secretion of insulin.

**The physiological decomposition of the blood pigment.** III. The derivation of the urine pigment from hemoglobin. R. Nothhaas. *Klin. Wochschr.* 12, 1438-41(1933).

**A new rapid pregnancy test with urine.** ("Thirty hour reaction.") Woldemar Reiprich. *Klin. Wochschr.* 12, 1441-4(1933).—Infantile rats (40-50 g.) are used instead of mice as test animals. From 10 to 14 cc. of urine is injected subcutaneously over a period of 6-9 hrs., and the animal killed 30 hrs. after the first injection. In pos. results (pregnancy) the ovaries are hyperemic and 3-4 times as large as in the control animal.

**The synthesis of uric acid in birds.** II. Werner Schuler and Wilhelm Reindel. *Klin. Wochschr.* 12, 1470-80(1933), cf. C. A. 27, 4570; 28, 512<sup>2</sup>.—The liver cells of doves and geese form a precursor of uric acid from amino acids by way of  $NH_3$ . This reaction is enzymic, with a temp. opt. at 41° and a  $pH$  opt. at 7.6. This precursor substance can be extd. from muscle, but is not formed there. This precursor is converted to uric acid in the kidney by living cells, the opt.  $pH$  being 7.1.

**The appearance of the gastric juice upon drying.** N. Henning and L. Norpoth. *Klin. Wochschr.* 12, 1531-2(1933).—If a drop of gastric juice is allowed to dry, it forms a grayish center contg. salt crystals, surrounded by a raised ring. Frequently this is in turn surrounded by a glassy transparent layer. This ring phenomenon is apparently caused by protein, and its size is a measure of the protein content of the juice.

**Melanophore hormone and the eye.** Arthur Jouts. *Klin. Wochschr.* 12, 1599-601(1933); cf. C. A. 27, 2892.—Melanophore hormone dropped into the conjunctival sac of human beings shortens the adaptation time to darkness. Rabbits kept in the dark, or whose eyes were closed surgically, have an increased melanophore hormone content in the blood, eyes and aqueous humor. The hormone content of the pituitary gland of chickens, human beings, guinea pigs and cats is in the ratio 0.05; 0.2; 0.8; 3.0, resp., that is, directly proportional to the visual acuity in the dark.

**Adrenal cortical hormone and circulation.** G. Nohm and C. R. Skoglund. *Klin. Wochschr.* 12, 1614-15(1933).—Cortical adrenal ext. ("Eschatin") had no demonstrable circulatory action in 2 human beings when injected in doses of 2-5 cc.

**The collaboration of the cells and the colloid in the endocrine activity of the thyroid glands.** Werner Grab. *Klin. Wochschr.* 12, 1637-40(1933).—The colloid of the thyroid gland is a storage form of the active hormone bound to an inert protein in a readily dissolved adsorption complex. The presence of significant quantities of acid-sol. I compds. in the colloid and its excretion into the blood along with thyroxine during functional activity of the thyroid indicates that such acid-sol. compds. are physiologically important. The function of the epithelial cells is to take up I-contg. substances from the blood, transform them into active compds. and secrete them into the colloid, 500,000 times as concd. as they are in the blood. These are the relationships in the normal gland. In colloid goiter, the massive amt. of colloid contains *in toto* the same amt. of active hormone as the normal gland, but in a much lower concn.

**Substances in the serum of pregnant women combining with posterior pituitary hormone.** F. G. Dietel. *Klin. Wochschr.* 12, 1683-6(1933).—The serum of pregnant women contains a substance which adsorbs the melanophore-expanding component of the posterior pituitary ext. There is a 2nd substance which inactivates the anti-diuretic component of the ext. This inactivating agent is present in highest concn. in the last few months of pregnancy, and begins to disappear on the 5th or 6th day *post partum*. Normal serum to which a small quantity of pregnant serum has been added also inactivates the anti-diuretic component of pituitary ext.

**The intermediary iron metabolism in childhood.** F. Thoenes. *Klin. Wochschr.* 12, 1686-8(1933).—The serum

Fe is highest in the newborn (av. 0.17 mg. %), falling to approx 0.08 mg. % during the nursing period and rising to 0.12 mg. % in later childhood. These are av. values, individual children varying widely. It is to be noted that in general the serum Fe parallels the hemoglobin content of the blood. In anemias the serum Fe content generally falls, as it does also in the early stages of acute infections (diphtheria, scarlet fever). Just as in animals, complete elimination of iron from the food does not cause a fall in the serum Fe; conversely, the ingestion of iron preps. for therapeutic purposes does not cause more than a transitory and insignificant increase. Blockade of the reticuloendothelial system by the injection of metallic colloids (thorotrast, collargol) and splenectomy both cause a decreased serum Fe, not due to an impaired intestinal absorption of alimentary Fe. T. concludes that most of the acid-sol. serum Fe arises from the breakdown of hemoglobin to bilirubin and Fe. The decreased serum Fe caused by infection or by the injection of bacterial toxins is unexplained.

**The excretion of prolan in the urine during the involution period or in senility.** Haakon Saether. *Klin. Wochschr.* 12, 1727 9(1933).—In 137 of 139 women at or after the climacterium there was an increased urinary excretion of prolan without an increased blood prolan concn. Both exceptions were less than 5 years after the beginning of the menopause. In the pre-puberty and puberty periods, before the beginning of menstruation, there is no demonstrable urinary prolan.

**The role of prothrombin and heparin in the proliferation and differentiation of tissues. II. Studies in vitro.** Z. Zakrzewski. *Klin. Wochschr.* 12, 1658 9(1933); cf. C. A. 26, 3837.—A preliminary report. Tissue cultures grow as slowly in serum rendered prothrombin-free as they do in heparinized plasma. Heparin preps. and other antiprothrombic factors inhibit the growth of tissue cultures in proportion to their anticoagulating activity. Tissue cells have an affinity for prothrombin, which promotes their multiplication; and the removal of prothrombin, by inhibiting multiplication, makes the culture viable for a much longer period of time.

**Mechanism of the transformation of pyruvic acid into lactic acid in the liver.** E. Aubel, Y. Khouvine and G. Attagon. *Bull. soc. chim. biol.* 15, 1070 82(1933); cf. C. A. 26, 3569.—Hashed dog liver in Ringer soln. at  $pH$  3 reduced Na pyruvate to Na lactate. An excess of lactic acid was found, the source of which could not be detd. More  $CO_2$  was also produced than could be accounted for by the reactions believed to occur. Attempts to identify the H donor involved in the reduction also failed. Fourteen references.

**Action of red corpuscles on acetoacetic acid.** P. E. Grégoire. *Bull. soc. chim. biol.* 15, 1094-1106(1933).—Washed red corpuscles from dog blood, suspended in a NaCl-phosphate buffer mixt., slowly converted  $MeCOCH_2CO_2H$  into acetone and  $CO_2$ . The addn. of glucose and methylene blue (which enables the corpuscles to oxidize glucose) did not affect the rate of reaction. The corpuscles equiv. to 50 cc. blood decompd. 12-13 mg. of the acid per hr. It is calculated that the blood of a 70 kg. man could decompose 1.25 g. per hr. or about 28% of the  $MeCOCH_2CO_2H$  produced in a severe case of diabetes. Twenty references.

**Maximum concentration of urinary urea in rabbits.** J. J. Bouniol. *Compt. rend. soc. biol.* 114, 700 2(1933).—Urea was fed to rabbits in conjunction with a limited food and water intake. The max. concn. of urea found in the urine was 70 g. per l. for adult and 65 g. for young rabbits.

**The uric acid of human saliva and its relation to that of the blood serum.** J. Maupetit. *Compt. rend. soc. biol.* 114, 707-8(1933).—The uric acid content of normal saliva is 15-45 mg. per l. In cases of N retention it may be 80-120 mg. The ratio of the uric acid content of the saliva to that of the serum is usually 0.6-0.7 but is sometimes as low as 0.4 or as high as 1.0. The detn. of salivary uric acid may be useful clinically provided proper precautions

are used to prevent bacterial action before analysis of the sample.

**The lipid contents of the parathyroids of several animal species.** C. I. Parhon and I. Ornstein. *Compt. rend. soc. biol.* 114, 753 4(1933).—The total wt. of the fresh parathyroid glands was for dogs 9 36 mg., cats 2 10 mg., and rabbits 6 16 mg. The lipid contents of the fresh glands were, for dogs 5-57%, av. 32.3; cats 41 71%, av. 57.9; rabbits 38 82%, av. 61.

**Hyperglucemic action of extract of the posterior hypophysis.** B. A. Housay and Elena Di Benedetto. *Compt. rend. soc. biol.* 114, 793 5(1933).—Blood-sugar curves for dogs treated with the ext. are shown. A transient hyperglucemia was produced. Roles of various organs and the nervous system in the production of hyperglucemia by extract of the posterior hypophysis. *Ibid.* 795 7.

**Causes of the determinism of childbirth.** Joaquim Fontes. *Compt. rend. soc. biol.* 114, 855 8(1933); cf. C. A. 25, 1566.—A strongly ocytoca ext. was prepd. from placental tissue.

**Copper balance of normal rats after ingestion of variable quantities of copper [sulfate].** R. Guillemet. *Compt. rend. soc. biol.* 114, 1038 40(1933); cf. C. A. 27, 1037.

**Regulation of blood sugar after alimentation with carbohydrates.** J. Mella. *Z. ges. expil. Med.* 90, 22 7(1933).—Gargling of a glucose soln. reduces glucemia and a subsequent dose of glucose produces less rise than in a control. The effect is absent if the oral membranes are anesthetized. The effect is due to a reflex stimulating insulin secretion.

**Contra-insulin hormone of the anterior pituitary and pancreatic diabetes.** H. Lucke, E. R. Heydemann and O. Berger. *Z. ges. expil. Med.* 90, 120-9(1933); cf. C. A. 27, 3510.—Depancreatized dogs respond with a much more marked rise of blood sugar than normal dogs to the anti-insulin hormone of the pituitary. The hypoglucemic action of insulin is antagonized in the depancreatized dogs. An animal rendered sugar free by insulin treatment after depancreatization and with a normal glucemia became diabetic after a few days of injection with the hormone. After withdrawal of the hormone the animal came back to the previous metabolic equil. in a few days.

**Relationships between serum and plasma nitrogen.** A. A. Schmidt and Klara Tulichinska. *Z. ges. expil. Med.* 90, 150-8(1933).—Serum contains more N than plasma from the same blood. The increase is in the albumin fraction, the globulins being slightly lower because of fibrin removal. The source of the extra albumin is perhaps the autolyzing blood cells.

**The effects of various preparations of the anterior pituitary on the depancreatized dog.** H. Lucke, E. R. Heydemann and O. Berger. *Z. ges. expil. Med.* 90, 102-72(1933).—Two com. anterior pituitary exts. are shown to contain anti-insulin. Prolan and the thyreotropic hormone do not have an antagonistic effect to insulin.

**The resorptive power of the skin for iodine.** Alexander Sturm and Helmut Schultze. *Z. ges. expil. Med.* 90, 173 207(1933).—The amt. of I absorbed through the skin and found in the urine depends on the prepn. used.

**The lactic acid metabolism of the isolated dog heart.** H. Rolshoven. *Z. ges. expil. Med.* 90, 225 36(1933).—The isolated, denervated dog heart removes lactic acid from the coronary blood. This effect is independent of artificially produced insufficiency but cyanide and pitressin cause the venous lactic acid to be higher than the arterial.

**The serous fluid of the pleural cavity of normal men.** S. Yamada. *Z. ges. expil. Med.* 90, 342-8(1933).—A small amt. of serous fluid is present in the pleural cavity of normal men. Analysis shows protein 1.77%,  $pH$  7.64, Ca 7.2, Na 324, K 22.5 mg./100 cc. Lipase and antitypsin are present.

**Spectrographic investigations on tissue sections of**

human organs with the high-frequency spark. Walter Benoit. *Z. ges. exper. Med.* 90, 421-64 (1933).—Reproductions of spark spectra from tissue sections and detailed data are given. Lines of Zn and Cd as well as P, Mg, Na, Fe, K, Ca and Cu were found. Milton Levy

The blood phosphate during work. Hans Günther. *Z. ges. exper. Med.* 90, 479-88 (1933).—The increase in total acid-sol. P of blood during exercise is mostly an expression of the increased blood cell content. Milton Levy

The source of urinary ammonia. H. Rasold. *Z. ges. exper. Med.* 90, 502-7 (1933).—Whereas in rats surviving strips of kidney deaminate alanine 5 times as rapidly as do liver strips, in rabbits and young goats the difference is not nearly as marked. Milton Levy

Fermentable sugar in heart and skeletal muscle. Gerty T. Cory, John O. Closs and Carl F. Cori. *J. Biol. Chem.* 103, 13-24 (1933).—"Fermentable sugar in skeletal muscle of rats amounted to 10-12 mg. % at plasma sugar levels of 80-120 and to 13-53 at plasma sugar levels of 140-380 mg. %. Adrenaline injections caused a larger increase in fermentable sugar of muscle than could be accounted for by the rise in plasma sugar. Apparently breakdown of muscle glycogen is associated with the formation of small amounts of fermentable sugar. Moderate insulin hypoglycemia was accompanied by a decrease in fermentable sugar of muscle. When the plasma sugar level had fallen below 30 mg. %, there occurred a marked rise in muscle sugar, so that it equaled or even surpassed the plasma sugar concn. In adrenalectomized animals this rise in muscle sugar was absent and hence its occurrence in intact animals was attributed to adrenaline secretion elicited by the hypoglycemia. Adrenaline, by causing an increase in fermentable sugar in muscle, may abolish gradients of diffusion between blood and muscle and thus prevent a further drop in blood sugar. Heart muscle of rabbits at plasma sugar levels of 130-180 contained 46-59% of fermentable sugar. During insulin hypoglycemia fermentable sugar was reduced to 14-24 mg. %, while glucose injections caused it to rise to very high values. The large no. of open capillaries in active muscle may account for the observation that heart muscle is more permeable to injected glucose than resting skeletal muscle. The diaphragm contained more fermentable sugar than resting skeletal muscle at comparable blood-sugar levels. Short tetanic stimulation of rat muscle *in situ* and of isolated frog muscle was invariably accompanied by an increase in fermentable sugar." A. P. Lothrop

The regulation of gastric acidity. I. The influence of acid on the secretion of hydrochloric acid by fundic pouches and by the whole stomach. C. M. Wilhelmj, Irwin Neigum and F. C. Hill. *Am. J. Physiol.* 106, 381-97 (1933).—The secretion from the fundic pouch of the dog stomach contains about 578 mg. Cl per 100 cc. of secretion and has the same Cl concn. when collected under these 4 conditions: (1) pure secretion, (2) from a pouch filled with H<sub>2</sub>O, (3) from a pouch filled with 0.101 N HCl and (4) from a pouch filled with 0.173 N HCl. The Cl concn. of the combined secretions found in the intact stomach is definitely lower than that of pure fundic secretion and the lowering is proportional to the amt. of bile present in the gastric sample. J. F. Lyman

Carbohydrate metabolism, respiration and circulation in animals with basal metabolism heightened by dinitrophenol. V. E. Hall, J. Field, 2nd, M. Sahyun, W. C. Cutting and M. L. Tainter. *Am. J. Physiol.* 106, 432-40 (1933).—1,2,4-Dinitrophenol given intramuscularly to dogs in doses of 3-15 mg. per kg. body wt. may increase O consumption to over 10 times the resting rate. Liver and muscle glycogen decreases; while blood sugar and lactates rise. The decreases in carbohydrate account for less than 0.5 of the O consumed; therefore, the principal fuel of the accelerated metabolism must be other than carbohydrate. J. F. Lyman

Simultaneous study of the constituents of the sweat, urine and blood; also gastric acidity and other manifestations resulting from sweating. XI. Phosphorus and sulfur. G. A. Talbert, F. Stinchfield and H. Staff. *Am. J. Physiol.* 106, 488-90 (1933); cf. *C. A.* 27, 4288.—P in

the sweat varies from a trace to 4.8 mg. per 100 cc. and S from a trace to 7.37 mg. per 100 cc. P in the sweat is increased as a result of a high P diet and it is higher in work sweat than in heat sweat. J. F. Lyman

The effects upon the hydrogen-ion concentration of dog serum and urine of the  $\alpha$ - and  $\beta$ -fractions of posterior-lobe pituitary extract. A. R. McIntyre. *Am. J. Physiol.* 106, 505-8 (1933).—Pitressin injected subcutaneously into dogs causes a slight shift in the blood serum toward alk.; while pitocin causes a slight shift toward acidity. Both fractions cause a definite increase in the alk. of the urine. J. F. Lyman

Respiratory metabolism of active and inactive rats. E. A. Rundquist and C. J. Bellis. *Am. J. Physiol.* 106, 670-5 (1933).—Two strains of white rats, one relatively inactive, the other active, differed in basal metabolism; the active animals have decidedly higher rates of metabolism. J. F. Lyman

The possible mechanism of contracting and paying the oxygen debt and the role of lactic acid in muscular contraction. R. Margaria, H. T. Edwards and D. B. Doll. *Am. J. Physiol.* 106, 689-715 (1933).—Tests on man show that no extra lactic acid appears in the blood up to a rate of work corresponding to about 66% of the max., after which it increases rapidly, with an increment of 7.0 c.c. per 1 l. of O debt. The removal of the lactic acid is very slow, 50% being removed in 15 min. Such a speed seems limited by the slowness of the process of oxidation of a fraction of the lactic acid itself. Therefore, the lactic acid mechanism does not play an important part in muscular contraction except in very strenuous exercise, probably involving an anaerobic condition in the muscles. That portion of the O debt (1) other than the lactic acid debt is approx. a linear function of time and is probably related to the oxidation of substances furnishing the energy for the re-synthesis of phosphagen. The reaction by which (A) is repaid is 30 times as fast as the mechanism for removal of lactic acid. J. F. Lyman

Hyperguanidinemia associated with dehydration in parathyroidectomized dogs. W. R. Bryan, A. S. Minor and L. I. Chastain. *Am. J. Physiol.* 106, 738-44 (1933). The variabilities in the guanidine content of the blood of dogs in the early stages of parathyroid tetany can be explained largely on the basis of differing degrees of dehydration. The removal of the parathyroid glands has in itself no influence on the concn. of guanidine bases in the blood. J. F. Lyman

The rate of oxygen utilization by rat kidneys at different rates of urea excretion. Wm. Dock. *Am. J. Physiol.* 106, 745-9 (1933).—The increase in work done by the rat kidney, due to a 50-fold increase in osmotic work done in urea elimination, was 22.6%. The extra heat formed in the kidney excreting large amts. of urea is 5 times as great as the caloric equiv. of the extra osmotic work of urea elimination. J. F. Lyman

Carbohydrate metabolism and the effect of decapitation and decerebration under nitrous oxide anesthesia. J. S. L. Browne and C. L. Evans. *J. Physiol.* 80, 1-19 (1933).—Anesthesia is easily induced in a large majority of cats by means of N<sub>2</sub>O contg. 5-12% O. It can be maintained for long periods; recovery is rapid and complete. Its effects on blood sugar, blood lactic acid and liver glycogen are discussed. After inactivation of the adrenal glands, the depletion of liver glycogen caused by anesthesia with N<sub>2</sub>O, decapitation or decerebration, was less than with the suprarenals intact. J. F. Lyman

The utilization of blood sugar and lactate by the heart lung preparation. C. L. Evans, A. C. DeGraff, T. Kosaka, K. Mackenzie, G. E. Murphy, T. Vacek, D. H. Williams and F. G. Young. *J. Physiol.* 80, 21-40 (1933).—When the heart lung prepn. is ventilated with air, the heart (90 to 100 g.) removes from the blood about 7 mg. glucose and 234 mg. lactic acid per hr. No appreciable amt. of lactic acid is removed by the lungs. The normal resting blood lactic acid arises by glycolysis, and is not produced by muscle as often supposed. J. F. Lyman

The formation of liver glycogen in the cat, under various conditions, following infusion of ammonium lactate.

Rhoda Grant. *J. Physiol.* 80, 41-7(1933).—The infusion of  $\text{NH}_4$  lactate into the superior mesenteric vein of cats resulted in formation of liver glycogen. Removal of the spleen reduced or abolished this conversion. The simultaneous infusion of acetylcholine restored the ability of the liver to convert lactate to glycogen in splenectomized animals. J. F. Lyman

The influence of the autonomic nerves on alimentary hyperglucemia and on the absorption of glucose. E. A. Horne, E. J. McDougall and H. E. Magee. *J. Physiol.* 80, 48-64(1933).—The effects of ergotoxine, atropine, vagotomy and splanchnotomy upon the absorption of glucose from the digestive system and upon blood sugar indicate that alimentary hyperglucemia is due to overflow of absorbed glucose through the liver. J. F. Lyman

The effect of parathyroid hormone and of irradiated ergosterol upon the calcium content of the parotid saliva of the dog. L. Andreyev and L. I. Pugsley. *J. Physiol.* 80, 96-100(1933).—An increased serum Ca brought about by parathyroid hormone or irradiated ergosterol was accompanied by an increase in the saliva Ca which exceeded the rise in serum Ca. J. F. Lyman

Histological changes in the thyroid and testicles after treatment with anterior pituitary, and thyroxine plus synthetic diiodotyrosine. Nora Andreis. *Boll. soc. ital. biol. sper.* 8, 1157-62(1933). Peter Masucci

Changes in the blood  $p_{\text{H}}$  after muscle activity of different types. Rodolfo Margaria and Cesare Talenti. *Arch. fistol.* 32, 165-75(1933).—See C. A. 27, 1041. A. E. Meyer

The influence of the liver on the heart function. Bruno Bassani. *Arch. fistol.* 32, 223-31(1933).—Hepatic blood has a stimulating effect on the heart. This is due to a substance, which is not glucose or a bile ingredient. A. E. Meyer

Liver metabolism. I. B. Bassani. *Arch. fistol.* 32, 341-60(1933).—Hepatic perfusion expts. are described and criticized. A. E. Meyer

Intermediate metabolism in endocrine glands. A. Utevskii and S. Epstein. *Biochem. Z.* 265, 320-8(1933).—Both the thyroid and thymus gland contain small amts. of glycogen but in Basedow or goiterous persons this glycogen may be greater. The thymus gland (beef) contains more lactic acid than the thyroid, and in Basedow or goiterous patients the lactic acid content is much greater than normal. The lactic acid is formed from glucose but not from glycogen, and the lactic acid formation is considerably greater in the diseased than in the normal glands. Alanine, which causes an increased lactic acid formation in the thymus but not in the thyroid gland, causes a small rise in lactic acid formation in the Basedow gland. Pyruvic acid has but a slight stimulating action on the production of lactic acid. The formation of  $\text{CH}_3\text{COH}$  occurs in both thymus and thyroid glands but is very slight, indicating a low carboxylase content, but the amt. of  $\text{CH}_3\text{COH}$  is increased in the presence of glucose or glycogen. The thymus and thyroid are able to metabolize glucose both aerobically and anaerobically, but the former glycolyzes more actively and contains more lactic acid. The young gland likewise glycolyzes more actively than the old gland, and the diseased gland has a higher glycolytic power than the normal. S. Morgulis

The conditions for the formation of a colloidal calcium phosphate complex in serum. M. Laskowski. *Biochem. Z.* 265, 401-12(1933).—Since increasing the Ca concn. of serum causes a lowering of the concn. of the ultrafilterable P, the  $\text{Ca} \times \text{P}$  product of the ultrafiltrate has a const. value. On the contrary, increasing the serum P concn. leads to a lowering of the ultrafilterable Ca concn. only to about 3.5-4 mg. % so that the  $\text{Ca} \times \text{P}$  product of the ultrafiltrate increases with the P concn. On increasing the serum Ca and P simultaneously, provided the  $\text{Ca/P}$  is not over 1, the concn. of the ultrafilterable Ca is sometimes left unaffected, but this depends upon a variety of conditions, the initial Ca concn. being not without significance. The supersatd. state of the serum water is only stable in the presence of the serum colloids. S. Morgulis

Studies on the ability of carbon dioxide to permeate living tissues. J. Wehrli-Hegnner and Oscar A. M. Wyss. *Biochem. Z.* 266, 46-67(1933).—The permeability of the living venous wall to  $\text{CO}_2$  and other acids ( $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ ) was investigated; the change in the  $\text{H}$ -ion concn. of the venous blood was used as an indicator. The change was followed by means of a galvanometer registering every 6 sec., an Sb electrode being inserted directly into the lumen of a closed-off segment of the vein.  $\text{CO}_2$  permeates the vessel wall with remarkable ease and rapidly while the mineral acids fail to pass. S. Morgulis

Mechanism of deamination in skeletal muscles. T. Mann. *Biochem. Z.* 266, 162-8(1933).—The deamination of adenosine triphosphate or of adenylic acid, as well as the  $\text{NH}_3$  formation in muscle pulp, is inhibited by Mg salts. The  $\text{NH}_3$  formation from adenylic acid by the Meyerhof muscle ext. does not vary with the quantity. Addn. of Mg ions inhibits the deamination; it varies with the quantity of Mg, but is the same in dialyzed or undialyzed muscle ext. The deamination of adenylic acid decreases with the age of the ext. The effect of the Mg is apparently upon the substrate and not the enzyme, and its inhibition of deamination is not assocd. with its activation of the glycolytic coenzyme. S. Morgulis

The isoelectric point of hemoglobin at high altitudes. M. Rubowitz. *Biochem. Z.* 266, 190-6(1933).—The isoelec. point of oxyhemoglobin, reduced hemoglobin and CO-hemoglobin of man or animals is at high altitudes shifted to the alk. side as compared with that at low levels. The isoelec. point of the oxyhemoglobin is at  $p_{\text{H}}$  7.0 to 7.2; of reduced hemoglobin at 6.9 to 7.1; of CO-hemoglobin at 7.2. S. Morgulis

New biochemical properties of the bile pigments. II. Influence of calcium cations on the hemagglutinating and hemolytic capacity of the bilirubin. A. Clementi and F. Condorelli. *Biochem. Z.* 266, 221-5(1933); cf. C. A. 25, 5706.—The characteristic agglutinating effect of bilirubin upon red blood cells suspended in Ringer soln. proceeds very slowly if the cells are suspended in a 0.9% soln. of purest  $\text{NaCl}$ , because the  $\text{Ca}^{++}$  exerts a strongly stimulating action upon this agglutination.  $\text{Ba}^{++}$  and  $\text{Sr}^{++}$  act in a similar manner. S. Morgulis

Studies on muscle autolysis. II. Changes in the total amount of reducing substances, of lactic and phosphoric acids. I. A. Smorodintzev, N. V. Shirokov and L. A. Philipova. *Biochem. Z.* 266, 274-80(1933); cf. C. A. 27, 4840.—The reducing substances in meat increase with time. At 24 hrs. this increase is on the av. 50% and after 72 hrs. it is more than 100%. This increase is greatly affected by temp., being 50% in 3 days at 4-8°, and reaching 200% at 17-25°. The lactic acid content is tripled, reaching the max. in about 24 hrs. This also depends upon the temp. at which the meat is kept, being 185% at 4-8° and 238% at 17-25° as compared to the value at the end of the first hr. Changes in the org. and inorg.  $\text{H}_3\text{PO}_4$  vary within the narrow limits of 20-25% of the first-hr. value. S. Morgulis

A blood-sugar-raising substance from the pancreas. II. Tangl and F. Than. *Biochem. Z.* 266, 448-51(1933).—A substance can be extd. from the pancreas with acidified  $\text{CCl}_4$ , which is removed from the latter by shaking with  $\text{H}_2\text{O}$ ; on injection it causes the blood-sugar level to increase 100-200%. The aq. soln. is evapd. at 40°, leaving a residue easily sol. in alc. or  $\text{CHCl}_3$ . From 0.1 to 0.8 g. of the substance is obtained from 3 kg. pancreas. S. Morgulis

The chemical nature of thrombin. Fr. Kraus and H. J. Fuchs. *Biochem. Z.* 266, 458(1933).—Comment on Fischer's paper in C. A. 27, 5351. S. Morgulis

Absorption and elimination of folliculin in man. Tage Kemp and Kaj Pedersen-Bjergaard. *Endokrinol.* 13, 156-67(1933).—Folliculin is absorbed from the intestinal tract and evenly distributed between the corpuscles and plasma of the blood. A large part of the absorbed folliculin is destroyed in the organism and a small, but const. percentage is eliminated in the urine. In normal adult males less than 10 mouse units of folliculin is recovered per l. of urine, while in the feces 30-70 mouse units is elimi-

nated per day. In 2 pregnant women as much as 3000 and 7000 mouse units were found in the daily feces. After the oral administration of a large dose of folliculin to men about 6% is eliminated in the urine, while after subcutaneous injection only 3%, with traces appearing in the feces. In pregnant women toward the end of their period the blood contains 5.6-7.6% of the folliculin eliminated in a similar vol. of urine.

**Artificial sectioning of the sperm ducts and its effect on sexually mature and senile rat testes.** Rulo Welker. *Endokrinol.* 13, 167-80(1933).—Principally a histological study. No evidence of a rejuvenating effect has been found.

**Effect of adrenal cortex extract on cholesterolemia.** J. A. Collazo, G. Marañón, E. Roda and Isabel Torres. *Endokrinol.* 13, 186-96(1933).—A repetition of the expts. with a freshly prepd. adrenal cortex ext. (according to Swingle-Pfiffner's method (cf. C. A. 26, 489)) shows that in animals (dogs, rabbits), in normal persons or in patients with Addison's disease injection of the cortigen prepn. produces hypercholesterolemia.

**The role of bile acids in carbohydrate metabolism. XXIX. Effect of bile acids on tissue oxidation and carbohydrate oxidation.** Ziro Uraki. *J. Biochem.* (Japan) 18, 207-25(1933); cf. C. A. 27, 5383.—Cholic acid inhibits the dehydrogenase activity of rabbit or frog muscle and of rabbit liver; this increases with the quantity of acid added. Cholic acid also inhibits, in proportion to its concn., the decolorization of methylene blue by tissue exts. Cholic acid inhibits the oxidation of glucose by frog muscle tissue, also the oxidation of fructose, glycogen, glycerophosphoric, lactic or succinic acid by rabbit liver or muscle. The decolorization of methylene blue in the presence of hexosediphosphate or hexosemonophosphate is not affected by the addn. of cholic acid.

**Occurrence of taurocholic acid in chicken bile.** Kazumi Yamasaki. *J. Biochem.* (Japan) 18, 323-4(1933).—Taurocholic acid is present only in very min. amts. in chicken bile.

**Clinical and experimental studies on bromine metabolism. II. The relation between bromine content and internal secretion.** Teikichi Kuranami. *J. Biochem.* (Japan) 18, 417-43(1933); cf. C. A. 26, 5637.—The Br content of the blood increases during pregnancy, reaching a max. value shortly before parturition. In one woman this value was 1.57 mg.%, and 3 days after parturition it was 1.24 mg.%, dropping to 0.62 mg.% after 3 weeks. The blood of the umbilical cord contains on the av. 0.75 mg.% Br and is fairly const. This is considerably above the level for adult human blood. The Br blood content varies much in pathol. states. In diabetes it is increased; it is higher than normal in Basedow's and below normal in simple struma. In dogs the blood Br content is very const., but is increased by subcutaneous injection of thyroxine and adrenaline, but is lowered by insulin or posterior pituitary hormone. Castration causes a temporary rise in the blood Br, but subcutaneous administration of ovarian hormone lowers the Br level. Injection of the anterior pituitary hormone increases the Br content markedly, and is even greater and more enduring in castrated dogs, so that the sex hormones of the gonads and of the anterior lobe of the pituitary have a definite antagonistic effect. The rise in blood Br level during pregnancy is attributed to the increased hypophyseal activity. Pilocarpine lowers and atropine or adrenaline raises the Br blood content, so that the vagus or sympathetic stimulation also exerts an antagonistic effect. Physiol. saline by itself does not affect the Br level in a manner to account for these results. It is suggested that, although the Br level is the resultant of the interplay of various factors and of a coordination of org. functions, the anterior hypophysis is the center of the control mechanism.

**Influence of the spleen on bile and bile acid excretion.** Toshiyuki Tanaka. *J. Biochem.* (Japan) 18, 369-77(1933).—The spleen apparently exerts a hormonal influence on the bile and bile acid production by the liver. After splenectomy the secretion of bile acids and generally

also of bile is increased, but this increase disappears if spleen ext. or atropine is also administered.

**Influence of glutathione and monolodoacetic acid on the production of lactic acid from hexosediphosphoric acid by animal tissues.** Samuro Yamazoye. *J. Biochem.* (Japan) 18, 445-56(1933).—It is shown that in the conversion of hexosediphosphoric acid to lactic acid by the enzyme system contained in a liver dialyzate, glutathione exerts an accelerating action only upon the glyoxalase, where the inhibitory effect of  $\text{CH}_3\text{ICO}_2\text{H}$  was likewise exerted upon this enzyme by combining with its coenzyme, the glutathione.

**The toxicity of urine and serum proteic acid fraction.** Yoshio Gamo. *J. Biochem.* (Japan) 18, 457-78(1933).—After bilateral nephrectomy in rabbits, their urine and serum have a toxic effect when injected. This is only slightly due to urea, creatine or creatinine; a substance which gives a water-sol. but alc.-insol. Ba salt, and is dialyzable through collodion, is toxic. Its toxic action lost on hydrolysis by acid. This substance, oxyproteic acid, has a min. lethal dose per kg. of nephrectomized rabbit corresponding to 0.27-0.30 mg. N, while alloxypoteic acid contains 3.28-3.30 mg. N in the lethal dose. About the time of appearance of uremic symptoms in nephrectomized rabbits, which is 72 hrs. after the operation, the blood contains 0.8-1.2 mg. % oxyproteic acid.

**Calcium and phosphorus metabolism. I. Influence of carotene and bile sterols.** Inao Ishida. *J. Biochem.* (Japan) 18, 479-93(1933).—Subcutaneous administration of  $\beta$ -carotene increases the assimilation of Ca and P in rabbits so that even a neg. balance becomes pos. under its influence. But whereas the Ca balance can only be maintained while the carotene is administered and becomes neg. upon the cessation of the treatment, the P continues to show a pos. balance, even an increasing pos. balance, several days after the carotene administration had been stopped. The Ca and P balance is increased or becomes pos. also upon treatment with vitamin A + choleic acid. However, the effect is different from that exerted by carotene in that the behavior of the Ca and P balance upon cessation of the treatment is just the opposite. The effect of the vitamin A + choleic acid on raising the Ca balance is greater than that of the bile acids.

**Studies on the character and cause of physiological changes occurring in the tubal epithelium.** Jenő Baumann and Lajos de Thanhofer. *Magyar Orvosi Arch.* 34, 431-7(1933).—Physiol. changes identical with those in pregnancy can be produced in the tubal epithelium of rats by injection of urine of pregnant women.

**The fate of mannitol and mannitan in the animal body.** C. Jelleff Carr, Ruth Musser, Jacob E. Schmidt and John C. Krantz, Jr. *J. Biol. Chem.* 102, 721-32(1933).—The feeding of mannitol to rats results in an increase of liver glycogen and of blood sugar, but causes no change in the fasting R. Q. Mannitan, on the other hand, is not stored as glycogen, does not increase the blood-sugar level, and increases the fasting R. Q. from 0.718 to 0.766. Anhydride formation thus greatly changes the metabolism of these compds.

**Studies of phosphorus of blood. I. The partition of phosphorus in whole blood and serum, the serum calcium and plasma phosphatase from birth to maturity.** Genevieve Stearns and Edna Warweg. *J. Biol. Chem.* 102, 749-65(1933).—The inorg., lipid and ester P contents of whole blood and serum all reach a max. in early childhood but all at different times. The plasma phosphatase shows the same behavior, but maintains a value close to the max. from the first to about the 20th month. The vol. of the corpuscles varies parallel with the total P of whole blood, both reaching a marked max. at about 5 days after birth. Fifty-four references.

**The relation of thyroid to the conversion of cyanides to thiocyanate.** Emil J. Baumann, David B. Sprinson and Nannette Metzger. *J. Biol. Chem.* 102, 773-82(1933); cf. Marine, et al., C. A. 26, 6004.—After injection of KSCN into rabbits about 90% of it was recovered in the



urine within 5 days. Similarly, after injection of KCN or PhCN, 80% was recovered as KSCN in the urine, and thyroidectomy did not reduce the KSCN excretion. However, injection of MeCN was followed by partial excretion as KSCN by normal rabbits and no excretion by thyroidectomized animals. Hence the thyroid has no effect on cyanide metabolism but does control demethylation of MeCN, a reaction similar to that observed by Stuber, *et al.* (*C. A.* 18, 2199).

**Methods and effects of increasing the urinary constituents in the body.** F. W. Hartman. *J. Exptl. Med.* 58, 649-62(1933).—Five methods are presented for the slow continued reabsorption of urine in the exptl. animal. The most striking changes noted in the blood chemistry in the expts. of long duration are the elevation in non-protein N and the reduction of the CO<sub>2</sub>-combining power of the plasma; however, the acidosis was not severe until late in the process. Large and rapid increase of urinary constituents in the body is definitely destructive to the kidney.

**The supposed new formation of fibrinogen caused by Congo red.** Boris Belonoschkin and Edgar Wöhlisch. *Klin. Wochschr.* 12, 1371-2(1933).—The finding of Wedekind that Congo red causes an increase in the blood fibrinogen content both *in vivo* and *in vitro* was not confirmed. With a gravimetric method, no significant changes were observed. Wedekind was not justified in using the refractive index as a criterion of protein concn.

Harry Eagle

## G—PATHOLOGY

H. GIDRON WELLS

**Phosphatase in tuberculosis.** Ison Horii. *Arb. dritt. 1bt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 49-51(1933).—Phosphatase is present in exts. from tuberculous human lungs.

**The incidence of pulmonary disease following exposure to vesicant and asphyxiating gases.** W. N. Abbott. *Brit. Med. J.* 1933, 11, 862-5.

**The mechanism of Henry's reaction in malaria.** V. Chorine and R. Gillier. *Compt. rend.* 197, 950-2(1933).—A disequil. between the proportions of the substances which are dissolved in the serum and are insol. in formalized H<sub>2</sub>O and the mol. concn. of the blood control Henry's reaction in the course of malaria.

**Sex hormones in psychopathic patients.** Huakon Saethre. *Klin. Wochschr.* 12, 1409-10(1933).

**Hypophysis and blood glutathione.** Helena Maveroff de Lissner. *Compt. rend. soc. biol.* 114, 726(1933).—In dogs, removal of the hypophysis causes a 10% decrease in blood glutathione; on the other hand treatment with ext. of the anterior hypophysis causes an increase above normal, even in the absence of the hypophysis or thyroid.

**Relation of the glucose, nitrogen and cholesterol contents of the blood to each other.** M. R. Castex and M. Scheingart. *Compt. rend. soc. biol.* 114, 745-6(1933).—From a study of 900 pathol. cases it is concluded that the 3 vary independently of each other.

**The lactic acid of the blood of dogs after thyroparathyroidectomy.** C. I. Parhon and C. Urzica. *Compt. rend. soc. biol.* 114, 751-2(1933).—The operation usually caused tetany and a 35-40% decrease in blood lactic acid. In one case, where no tetany occurred the decrease in lactic acid was very slight.

**A new form of bilirubin, extractable by ether, in icteric serum.** B. Varela and C. Viana. *Compt. rend. soc. biol.* 114, 786-8(1933); cf. *C. A.* 27, 5390.—Ordinarily no bilirubin can be extd. from serum by Et<sub>2</sub>O. In 3 cases of icterus with cancer of Vater's ampulla, part of the serum bilirubin was in a new form, readily extd. by Et<sub>2</sub>O but not by CHCl<sub>3</sub>. Nature of the ether-extractable bilirubin in certain icteric serums.

**Metabolism of normal and tumor tissue.** IX. Ammonia and urea formation. Frank Dickens and Guy D. Greville. *Biochem. J.* 27, 1123-33(1933); cf. *C. A.* 28,

208<sup>a</sup>.—Little NH<sub>3</sub> or urea is formed by rat liver or yolk-sac either in presence or absence of sugar. With kidney, spleen, Jensen rat sarcoma and embryo (chick and rat), the aerobic NH<sub>3</sub> formation was large in the absence of sugar, but was arrested by glucose. In all cases where glucose reduced the NH<sub>3</sub> production, fructose acted similarly. Anaerobic NH<sub>3</sub> elimination under the same conditions as the aerobic expts. are usually small compared to the latter. Urea formation by 5-day chick embryo and by Jensen rat sarcoma is very small. The assumption is confirmed that in a glucose medium the protein oxidation is so small as to have no material influence on the R. Q. X. Effects of lactate, pyruvate and deprivation of substrate. *Ibid.* 1134-40.—The inhibitory effect of lactates on the anaerobic glucolysis of brain, testis and tumor is very variable. In tissues and under conditions in which spontaneous activation is observed, an equal activation is achieved on addn. of pyruvate. After 20 min. preliminary anaerobic substrate deprivation the glucolysis of the brain recovers to 12% of its normal value, while with other tissues tested the recovery is almost complete.

**The evaluation of galactose in physiological and pathological conditions.** V. The use of galactemia and glucemia after galactose ingestion for the diagnosis of liver function. H. Kosterlitz. *Z. ges. exptl. Med.* 90, 465-78(1933); cf. *C. A.* 27, 2986i.—Galactemia and glucemia were followed in 74 patients after 40 g. of galactose by mouth. The galactemia is high and prolonged in icterus simplex where the glucemia is normal. In diabetes mellitus the galactemia is normal but the glucemia is high and prolonged. The conversion of galactose to glucose is a function of the liver not dependent on insulin. Data are given for other pathol. states.

**The output of adrenaline from the adrenal glands during anaphylactic shock.** M. B. Cohen, J. A. Rudolph, P. Wasserman and J. M. Rogoff. *Am. J. Physiol.* 106, 414-15(1933).—Anaphylactic shock in dogs sensitized with horse serum does not cause any change in the rate of adrenaline secretion.

**Eye reactions in pancreatic diabetes.** M. E. M. Sawyer. *Am. J. Physiol.* 106, 491-504(1933).—The sensitization of both the nictitating membrane and iris to adrenaline which occurs in cats after removal of the pancreas results from secondary factors accompanying diabetic acidosis that affects the permeability of the eye tissues to adrenaline.

**Lactation in diabetes.** I. L. Chaikoff and W. R. Lyons. *Am. J. Physiol.* 106, 716-20(1933).—Six dogs whose pancreatic glands had been completely removed and which were kept alive with insulin and a special diet were given the lactation hormone of the anterior pituitary. In only one case could lactation be induced. All the controls produced milk.

**The contents of glucose and lactic acid, the  $n_D$  and  $p_H$  in blood and the fluid of blisters produced by various methods.** R. D. Policaro. *Arch. fisiol.* 32, 566-90(1933).—Sugar and lactic acid are of equal concn. in the blood and in fresh heat blisters in guinea pigs; both increase in older blisters. Lactic acid is higher than in blood in human blisters produced by various methods. The  $p_H$  is higher in fresh heat blisters, identical with blood in old heat and cantharidine blisters. The  $n_D$  is slightly lower in the fresh heat blisters; in older and in cantharidine blisters it is considerably lower than in blood. The results are discussed.

**Noorden, C. v.: Neuzzeitliche Diabetesfragen.** Vienna: Urban & Schwarzenberg. 55 pp. Reviewed in *Nutrition Abstracts & Reviews* 3, 643(1933).

## H—PHARMACOLOGY

A. N. RICHARDS

**Chronaxie in morphine-addicted rats on high and low calicum diets.** L. E. Detrick and J. M. D. Olmsted. *Proc. Soc. Exptl. Biol. Med.* 30, 1102-4(1933).—In the normal rat and in the rat subjected to morphine addiction

and withdrawal, a diet rich in Ca and injections of "parathormone" did not change the chronaxie of a typical motor nerve nor that of the flexion reflex. C. V. B.

**Purgative effect of some aliphatic alcohols.** David I. Macht. *Proc. Soc. Exptl. Biol. Med.* 30, 1272-3 (1933).—An emulsion of finely divided animal charcoal contg. 1% of the test alc. was introduced into the stomach of the rat; the distance travelled by the emulsion in 1 hr. was recorded in percentage of the total length of the intestine and compared with that of controls (cf. C. A. 25, 5955). All the primary alcs. contg. 13-18 C atoms exhibited more or less laxative action. Hexadecyl or cetyl alc. was the most effective, but not as powerful as that of the ester, cetyl acetate. Mineral oils studied by this method showed no special laxative action. C. V. Bailey

**Local anesthetic properties of some aliphatic alcohols.** David I. Macht and Mary E. Davis. *Proc. Soc. Exptl. Biol. Med.* 30, 1294-5 (1933).—Concs. of alcs. of 1 : 1000 in 9.5% ethanol were used in tests on the conjunctival and corneal reactions of rabbits and on living frogskin by the standard methods. Local anesthetic properties were exerted by octyl, heptyl, nonyl, decyl, undecyl, dodecyl and hexyl alcs. (arranged in descending order of potency). Local anesthesia was not induced by Pr, Bu or Am alcs. of the primary, secondary or tertiary varieties, or by alcs. contg. 13-18 C atoms. C. V. Bailey

**Effect of adenylic acid on gastric secretion.** John Vandolah. *Proc. Soc. Exptl. Biol. Med.* 31, 28-9 (1933).—Extn. of the blood obtained after the ingestion of meat gave a vasodepressor substance with a pos. Pauly reaction; the subcutaneous injection of the substance did not produce a gastric response in the dog. Adenylic acid, a vasodepressor substance found in the blood (cf. C. A. 26, 504), likewise produced no gastric response. C. V. Bailey

**Action of digitalis on the kidney.** A. Howard Shanberg, Robert Hemmer and Louis N. Katz. *Proc. Soc. Exptl. Biol. Med.* 31, 39-43 (1933).—The immediate effects of digalen, digitalone and ouabain were studied in anesthetized dogs by comparing the urine flow of the kidney, into whose renal artery the drug was injected, with the urine flow of the opposite kidney. No diuresis occurred; in most of the expts. urinary secretion was inhibited. C. V. Bailey

**Comparative effects of dinitrophenol and thyroxine on tadpole metamorphosis.** C. C. Cutting and M. L. Tainter. *Proc. Soc. Exptl. Biol. Med.* 31, 97-100 (1933).—Dinitrophenol in up to lethal concns. had no effect on the metamorphoses of tadpoles of *Bufo halophilus*; thyroxine 1 : 500,000 caused complete metamorphosis in 30 days. The substances are comparable in their stimulating effect on metabolism; dinitrophenol lacks the power of thyroxine to accelerate developmental processes; it should not be used therapeutically to replace thyroxine in true thyroid deficiencies. C. V. Bailey

**Skin changes after subcutaneous injection of adrenaline.** M. Caroline Hrubetz. *Proc. Soc. Exptl. Biol. Med.* 31, 103-5 (1933).—Rats were given subcutaneous injections of 0.1 mg. of adrenaline-HCl in 0.25 cc. of isotonic NaCl soln. per 250 g. of body wt.; 54% of the animals developed localized loss of hair, 13% had local necrosis and 34% were not injured. The injection of solns. of HCl of equal pH caused no skin changes. C. V. Bailey

**Yatoconin therapy in iridocyclitis serosa tuberculosa.** Konin Okamoto. *Arb. drith. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 15 (1933); cf. C. A. 27, 1941.—One case was treated with good results. M. L. C. Bernheim

**The influence of phosphoric acid esters on the blood sugar of rabbits.** Kuniaki Shibuya. *Arb. drith. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 54-60 (1933).—A comparison of the effects on the blood sugar of injected glucose, fructose and galactose with those of their resp. monophosphoric acid esters. The esters produce a more prolonged but less marked effect. M. L. C. Bernheim

**The treatment of tuberculous lung lesions with yatoconin.** Isamu Nagai. *Arb. drith. Abt. Anat. Inst. Kaiser.*

*Univ. Kyoto Ser. C*, No. 4, 61-100 (1933).—One hundred and thirty-three cases are reported of which 77 cases improved or recovered after yatoconin injections. M. L. C. Bernheim

**Yatoconin therapy in tuberculous lesions.** Seigo Funaoka. *Arb. drith. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 101-7 (1933).—The healing of tuberculous wounds and abscesses is aided by injection of yatoconin. M. L. C. Bernheim

**The biological properties of some alkaloid salts of phosphoric acid ester.** I. Yoshiki Imagawa. *Arb. drith. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 108-22 (1933).—The toxicity of strychnine, brucine and quinine fructose monophosphates is less than that of the free alkaloids. II. *Ibid.* 123-9.—The toxicity of strychnine brucine and quinine diethyl phosphates is less than that of the free alkaloids. M. L. C. Bernheim

**Yatoconin therapy in trachoma.** Konin Okamoto. *Arb. drith. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 145-9 (1933).—Five cases yielded to treatment. M. L. C. Bernheim

**Toxic cirrhosis caused by cinchophen.** James F. Weir and Mandred W. Comfort. *Arch. Internal Med.* 52, 685-724 (1933).—Many cases of toxic cirrhosis are described after the use of cinchophen. The universal presence of the quinoline radical in different preps. suggests that this is the offending part of the compd. J. B. Brown

**Effect of alkali on the absorption of thyroxine from the gastro-intestinal tract.** Willard O. Thompson, Phoebe K. Thompson, Lois F. N. Dickie and Joseph M. Alper. *Arch. Internal Med.* 52, 809-20 (1933).—In 3 patients with myxedema oral doses of thyroxine in alk. soln. or equiv. doses of Na thyroxine were less effective on the basal metabolism than when administered intravenously. Synthetic and natural thyroxine were equally effective intravenously. J. B. Brown

**How do drugs act?** W. Langdon Brown. *Brit. Med. J.* 1933, 11, 1007-10. J. B. Brown

**The action of morphine on the small intestine and its clinical application in the treatment of peritonitis and intestinal obstruction.** Thomas G. Orr. *Ann. Surgery* 98, 835-40 (1933).—Morphine and related opium derivs. when given hypodermically stimulate the tone, rhythmic contraction, and in some degree peristaltic waves of the small intestine for at least 6 hrs. To prevent over-distention of the small intestine morphine is indicated in acute peritonitis, intestinal obstruction and so-called paralytic ileus. Rachel Brown

**Nicotine sulfate as a vermifuge for the removal of ascarids from poultry.** Wm. L. Bleecker and R. M. Smith. *J. Am. Vet. Med. Assoc.* 36, 645-55 (1933).—Nicotine-contg. vermifuges are effective in removing *Ascaris lineata* from fowls harboring this parasite and combined with kamala are effective against tape worms. Rachel Brown

**Pulmonary embolism from arsenicals injected intravenously.** Geo. C. Shivers. *Arch. Dermatol. Syphilol.* 27, 901-22 (1933).—A large part of the deaths due to injection of arsenicals are caused by pulmonary embolism resulting from a combination of the drugs with the plasma proteins. An acid reaction of the drug appears to be the cause of the pptn. of the drug in the blood. It is suggested that bromothymol blue be combined with the arsenical in ampoules to check on the acidity at the time of injection. B. C. Brunstetter

**The sensitivity of the intestine of various animals to adrenaline.** M. N. Achutin. *Arch. exptl. Path. Pharmacol.* 171, 668-71 (1933).—The sensitivity of guinea pig, cat and rabbit intestine to adrenaline decreases in the order named. The concns. necessary to cause inhibition of contraction are  $10^{-3}$ ,  $8 \times 10^{-3}$  and  $1.5 \times 10^{-3}$ , resp. Harry Eagle

**A case of exceptional tolerance to "Vigantol" given in large doses over a long period of time to a cat.** Siegwart Hermann. *Arch. exptl. Path. Pharmacol.* 171, 756-8 (1933). Harry Eagle

**Pharmacological and chemical studies on the effective constituents of *Urtica dioica* and *Urtica urens*.** E.

Starkenstein and Th. Wasserstrom. *Arch. expl. Path. Pharmacol.* 172, 137-48(1933).

Report on tsetse investigations. H. M. O. Lester. *Nigeria Rept. of Med. & Health Dept.* 1931, 89-98; *U. S. Pub. Health Eng. Abstracts* 13, Ma, 15(July 22, 1933).—Of some 5000 cases of African sleeping sickness treated with a full course of 20-30 g. of trypanamide, 83% were apparently cured.

C. R. Fellers  
Assimilation of sugars by dogs with an Eck fistula. Glucemia after intravenous injection of sugars. S. Livierato, M. Vagliano and A. Dervenaga. *Compt. rend. soc. biol.* 114, 462-4(1933); cf. *C. A.* 27, 5819.—Glucose produced a much greater hyperglucemia in operative dogs than in the controls. Similar, but slight, differences were observed with lactose and levulose.

L. E. Gilson  
The proteins and reduced glutathione of the blood after injection of sulfurized oil.—M. Michaux, P. Mollaret and J. Tonnet. *Compt. rend. soc. biol.* 114, 516-18(1933).—Hyperthermia was produced in paralytic, tabetic and dementia precox cases by injection of 5-25 mg. S in oil. In general the reduced glutathione of the blood was somewhat increased. The changes in the blood proteins were irregular.

L. E. Gilson  
Cancerigenic power of 1,2,5,6-dibenzanthracene. J. Maisin and P. Liégeois. *Compt. rend. soc. biol.* 114, 536-8(1933).—One drop of a satd. soln. of 1,2,5,6-dibenzanthracene in  $\text{CaH}_2$  was applied to the skin of mice 3 times a week until 50 drops had been applied. Numerous cases of apapilloma, cancer and mediastinal neoplasm were produced.

L. E. Gilson  
Production of cancer in rabbits by 1,2,5,6-dibenzanthracene. A. Lacassagne. *Compt. rend. soc. biol.* 114, 660-2(1933).—Injected into the mammae the compd. caused some proliferation of the epithelium of the ducts. Intravenously, it produced hyperplastic patches in the broncho-alveolar epithelium. In 1 of 6 rabbits injected in the testicle epithelioma was produced.

L. E. Gilson  
Influence of various barium salts on the metabolism of normal and cancerous cells. J. Maisin and Y. Pourbaix. *Compt. rend. soc. biol.* 114, 538-42(1933); cf. *C. A.* 27, 5107.— $\text{BaCl}_2$ , 0.00018 M, inhibited the respiration of liver sections *in vitro*, but the gluconate or saccharate in the same concn. had no effect. The results with various tumor sections were irregular but in general respiration was accelerated.

L. E. Gilson  
Absence of anti-tumoral properties toward experimental epithelioma in mice treated with injections of adrenaline or some of its quinonic oxidation derivatives. F. Arloing, A. Morel, A. Jossier and A. Badinand. *Compt. rend. soc. biol.* 114, 631-3(1933); cf. *C. A.* 27, 1938.—In mice, adrenaline and the colored compds. formed by its spontaneous oxidation in air or by treatment with  $\text{FeCl}_3$  and  $\text{NH}_4\text{OH}$  had no anti-tumoral action whatever.

L. E. Gilson  
Sulfur and temperature. J. Sivadjan. *Compt. rend. soc. biol.* 114, 686-7(1933).—Intramuscular injections of "sulfosine" or sulfurized oil produce little or no hyperthermia in rabbits or guinea pigs; hence they are of no value in the study of antipyretics.

L. E. Gilson  
Influence of some vital stains on the asphyxia of certain marine animals. B. S. Levin. *Compt. rend. soc. biol.* 114, 689-91(1933).—Very small quantities of various dyes considerably prolonged the survival period of shrimps and ascidians in un-aerated water. Influence of some vital stains on the resistance of marine animals to arsenious acid. *Ibid.* 909-12.—In well-aerated sea water the dyes increased the resistance of *Ascidia* and *Actinia* to As poisoning. Under conditions of asphyxia the action of vital stains promotes poisoning by arsenious acid. *Ibid.* 1053-6.—Expts. with shrimps and young turbot are described.

L. E. Gilson  
Use of sodium nitrite and thiosulfate together in the treatment of hydrocyanic acid poisoning in dogs. E. Hug. *Compt. rend. soc. biol.* 114, 711-14(1933); cf. *C. A.* 28, 526<sup>9</sup>.—The expts. previously reported for rabbits were repeated with dogs; the same results were obtained.

L. E. Gilson  
Effect of lipid extract of the adrenals on the chemical

composition of the blood and various organs. C. I. Parhon and G. Werner. *Compt. rend. soc. biol.* 114, 749-51(1933).—Dogs were given 6 daily injections of 50 mg. of lipid extd. from adrenal cortex. Some dehydration was produced. The K of the brain and muscles was somewhat increased. Other changes were slight or uncertain.

L. E. Gilson  
Pharmacodynamic action of extract of *Trichocereus candicans* Br. and Rose. F. P. Luduena. *Compt. rend. soc. biol.* 114, 809-11(1933).—In dogs the ext. causes an increase in respiration and heart beat, hypertension, exophthalmia, mydriasis and muscular incoordination. In toads it produces a syndrome like nicotine intoxication. These effects are characteristic of *p*-hydroxyphenylethyl-trimethylammonium salts, which are present in the ext. Action of extract of *T. candicans* and its active principles, hordenine (anhaline) and salts of *p*-hydroxyphenylethyl-trimethylammonium, on adrenaline secretion. J. T. Lewis and F. P. Luduena. *Ibid.* 814-16.—The ext. acts directly upon the adrenals and provokes adrenalinic secretion even though the glands are enervated. Effects of cocaine on the action of extract of *T. candicans* and its active principles on the splanchnic nerve. F. P. Luduena. *Ibid.* 950-1.—Effect of sparteine sulfate on the action of extract of *T. candicans* on the splanchnic nerve. *Ibid.* 951-3.—Effect of yohimbine on the action of extract of *T. candicans* on the splanchnic nerve. *Ibid.* 953-4.

L. E. Gilson  
Chloral hydrate narcosis in thyroidectomized and hyperthyroidized animals. C. Kucera. *Compt. rend. soc. biol.* 114, 822-5(1933).—Expts. with rats, dogs, goats and sheep are reported. Hypothyroidism makes the animals more sensitive, and hyperthyroidism less sensitive, to the narcotic action of chloral hydrate. Suckling lambs tolerate larger doses, in proportion to their wt., than adult sheep. For operations on sheep a profound narcosis lasting 30-60 min. is produced by 0.2-0.25 g./kg. intraperitoneally. Overdoses can be combated by injections of thyroxine and caffeine.

L. E. Gilson  
Hypercalcemic action of intravenous injections of potassium chloride in thyroparathyroidectomized animals. J. Toscano Rico. *Compt. rend. soc. biol.* 114, 847-8(1933); cf. *C. A.* 26, 5658.—The effect is but slightly weaker than in normal animals.

L. E. Gilson  
Action of some respiratory excitants on respiratory paralysis caused by magnesium. J. Toscano Rico. *Compt. rend. soc. biol.* 114, 849-50(1933).—Camphor, cardiazole, lobeline, etc., combat respiratory paralysis produced by  $\text{MgCl}_2$  without affecting the curariform paralysis also produced.

L. E. Gilson  
Calcium-magnesium and potassium-magnesium antagonisms studied on the isolated small intestine of a mammal. J. Toscano Rico. *Compt. rend. soc. biol.* 114, 851-3(1933).—Isolated rabbit intestine is paralyzed by  $\text{MgCl}_2$ , but not by  $\text{MgCl}_2$ - $\text{CaCl}_2$  and  $\text{MgCl}_2$ -KCl mixts.

L. E. Gilson  
Insulin hypoglycemia tests with epileptics. A. Baudouin, E. Azérad and J. Lewin. *Compt. rend. soc. biol.* 114, 902-3(1933).—The blood glucose of epileptics (17 cases) and the effects of insulin were practically the same as in normal persons.

L. E. Gilson  
Influence of anesthetics on the excitability of the vasodilator nerves. A. Chauchard and B. Chauchard. *Compt. rend. soc. biol.* 114, 907-9(1933).

L. E. Gilson  
Methemoglobin-forming action of sodium nitrite and methylene blue *in vivo*. E. Hug. *Compt. rend. soc. biol.* 114, 947-50(1933); cf. *C. A.* 28, 526<sup>9</sup>.—In dogs, after the injection of  $\text{NaNO}_2$  or methylene blue methemoglobin reaches a max. in about 15 min. and gradually disappears during the following 5 hrs. The action of methylene blue is weak compared to that of  $\text{NaNO}_2$ .

L. E. Gilson  
Histochemical investigation of polyphenols injected into guinea pigs and rats. R. Jonnard. *Compt. rend. soc. biol.* 114, 1000-1(1933).—Pyrocatechol, resorcinol, hydroquinol or phloroglucinol, 0.6 g./kg. disappeared from the blood within a few min. after injection. None could be detected in any of the tissues.

L. E. Gilson  
Antagonistic action on the tone of isolated intestine of

two theoretically synergic compounds, arecoline and pilocarpine. H. Busquet. *Compt. rend. soc. biol.* 114, 1083-4(1933).

**Research on trypanosomiasis.** H. R. Hornby and H. W. Bailey. Tanganyika Territory Dept. Vet. Sci., *Ann. Rept.* 1931, 10 25(1932).—A 1:250,000 concn. of tartar emetic in a nutrient medium composed of equal parts of fresh sheep serum and saline glucose (0.2% glucose in normal saline) killed trypanosomes of *T. congolense* in 2 hrs.; 1:500,000 and 1:1,000,000 concns. were effective in 4 and 7 hrs., resp. Tartar emetic was slightly more effective than an equiv. amt. of total Sb in the form of Antimosan; this is in accordance with the expectation that the more complex compd. has a lower dissociation const. and yields a smaller concn. of therapeutically active ions than does tartar emetic in equiv. concn. A 1:500,000 concn. of tartar emetic, or Antimosan soln. of the same Sb content, killed trypanosomes of *T. brucei* in less than 3 hrs. *in vitro*. Evidence is presented which indicates that antimonials contg. trivalent Sb act directly on trypanosomes and that the success of the treatment depends on the extent to which the Sb ions come in direct contact with the parasites. Certain protein substances (not necessarily cellular) in the blood seem to have a pronounced affinity for Sb ions and correspondingly reduce the effectiveness of the Sb treatment. **Notes on trypanosomiasis research.** H. E. Hornby. *Ibid.* 1932, 24 8(1933). Intravenous injection of either Antimosan or peptone induced a no. of the trypanosomes of *T. congolense* present in the open capillaries of oxen to let go their hold and be swept into the general circulation, as indicated by an increase in the concn. of trypanosomes in the unit amt. of blood represented by 100 fields of a smear. Trypanosomes do not become Sb-fast unless first rendered fast to an arsenical, like atoxyl. K. D. Jacob

**Antispasmodics of the papaverine type.** K. H. Slotta and G. Halerland. *Angew. Chem.* 46, 766 71(1933).—Three  $\beta$ -arylethylamines, 2 alkoxybenzoic acids and nine 1-phenylisoquinolines were prepd.; the latter were obtained by reaction of the first 2 kinds of compds. The pharmacol. tests of the 1-phenylisoquinolines showed that the size and no. of the alkoxy groups in the mol. are of great importance. If 5 methoxyl groups are present the compd. in nontoxic quantities has a paralyzing action upon smooth muscle tissue. Introduction of 2 ethoxyl and 3 methoxyl groups greatly increases the action, but a decrease occurs when 5 ethoxyl groups are present and the action disappears with 6 methoxyl groups. The most effective compd. prepd. so far is the 1-(3', 4', 5'-trimethoxyphenyl)-6,7-diethoxyisoquinoline which was examd. and compared with papaverine and atropine. The lethal dose and the action upon the stomach and the small and large intestine were detd. for these substances. Exptl. data are presented for all substances which were prepd. Thirty-one references. Karl Kammelmeyer

**Methylene blue in the treatment of hydrocyanic acid gas poisoning.** J. A. Trautman. *U. S. Pub. Health Repts.* 48, 1443-7(1933).—It is apparent from expts. on rabbits, white rats and guinea pigs that injections of 1% methylene blue soln. were of no value in the treatment of HCN gas poisoning when the animals had absorbed, by breathing, lethal or near-lethal doses of gas in a short period of time. J. A. Kennedy

**The effect of menthol on the metabolism in phosphorus poisoning.** M. Kojima. *Z. ges. expil. Med.* 90, 1 12 (1933).—The C:N ratio in the urine of rats is increased by peroral menthol, more so after P poisoning. The "vacat" O:N (see Kanitz, *C. A.* 26, 4622) is not affected in a regular way. Milton Levy

**The effect of natural carbonic acid thermal baths on diuresis and the hydrogen-ion concentration of urine.** Vladimir Bojuklysky and Claus Buchholz. *Z. ges. expil. Med.* 90, 13 21(1933). The Bad Nauheimer CO<sub>2</sub> waters are diuretic and the urine pH diminishes after bathing in it. Milton Levy

**The influence of saponins on the cardiac action of strophanthin.** R. A. Holkstra and A. Schleusing. *Z. ges. expil. Med.* 90, 36 44(1933).—Non-toxic doses of saponin

increased the toxicity of strophanthin by 20% in cats. Milton Levy

**Enzyme and carbohydrate investigations of the aqueous humor. II. Pharmacological effects.** Hans Popper and Josef Böck. *Z. ges. expil. Med.* 90, 596-603(1933); cf. *C. A.* 28, 1064<sup>1</sup>.—Eserin increases the permeability of the aqueous humor membrane to diastase. Pilocarpine and pituitrin are without effect. Adrenaline decreases the permeability. Milton Levy

**The physiology of sleep. X. The effect of alcohol and caffeine on motility and body temperature during sleep.** F. J. Mullin, N. Kleitman and N. R. Cooperman. *Am. J. Physiol.* 106, 478-87(1933).—In human male subjects 300-375 cc. of 19% alc., taken 1 hr. before retiring, causes a lowering of motility and body temp. during the first half of the night, with an increase in both during the last half of the night's sleep. Large doses of caffeine (4-6 grains) produce a marked increase in motility and body temp. during sleep. J. F. Lyman

**The emetic action of two secondary alkaloids of Lobelia, lobelanine and lobelanidine.** A. Clementi. *Boll. soc. ital. biol. sper.* 8, 1132-4(1933).—The emetic action of fluidext. of *Lobelia inflata* must not be attributed to lobeline; although the latter strongly excites the respiratory centers, it has no emetic action. The emetic action is due to 2 secondary alkaloids of *L. inflata*, namely, to lobelanine which simultaneously exerts a slight respiratory action and a slight emetic action, and to lobelanidine which is not endowed with any respiratory action but has a marked emetic action. These divergent results are explained by the fact that C. worked with pure lobelanine-HCl while previous investigators used a mixt. of alkaloids extd. from *L. inflata*. Peter Masucci

**The action of sympathetic and parasympathomimetic drugs on gaseous exchange. III. The associated action of adrenaline and pilocarpine.** G. Orestano. *Boll. soc. ital. biol. sper.* 8, 1145-6(1933); cf. *C. A.* 27, 5822. —The simultaneous introduction of large doses of adrenaline and pilocarpine in animals (cats, dogs) does not modify in any way the action of each drug injected alone. If the 2 drugs are injected in smaller doses, the action is one of summation, incomplete for doses which alone would give an increase greater than 50% of the basal metabolism, complete for smaller doses. Large doses of both drugs injected into rabbits produce only a slight increase in the intensity of the gaseous exchange. **IV. The influence of atropine on the excitometabolic action of adrenaline.** *Ibid.* 1146-8. —Atropine injected into rats before the administration of adrenaline or simultaneously with adrenaline does not change noticeably the excitometabolic action of the latter regardless of the dose introduced. **V. The influence of ergotamine on the excitometabolic action of adrenaline.** *Ibid.* 1148-50. —Ergotamine tartrate injected subcutaneously into albino rats in large doses produces a lowering of the basal metabolism. Injected simultaneously with adrenaline, ergotamine inhibits partially the excitometabolic action of the former. The min. active dose of ergotamine tartrate on normal metabolism is 0.003 g. per kg. of rat; that against the exciting action of adrenaline is 0.0011 g. per kg. Doses between 0.003 g. and 0.0011 g. while exerting no influence on the normal metabolism are capable, however, of hindering partially the action of adrenaline. **VI. The influence of ergotamine on the excitometabolic action of pilocarpine.** *Ibid.* 1150-1. —Ergotamine in proper doses completely impedes the excitometabolic action of pilocarpine. The min. active dose of ergotamine tartrate against pilocarpine is 0.0003 g. per kg. of rat. The min. active dose for normal metabolism is 0.003 g. per kg. The ability of ergotamine to suppress gaseous exchange is manifested in a decreasing manner from a metabolism under the action of pilocarpine to a metabolism under the action of adrenaline and from this to a normal metabolism. Peter Masucci

**The pharmacologic action of platinum chloride.** G. Orestano. *Boll. soc. ital. biol. sper.* 8, 1152-4(1933).—The immediate M. L. D. of H<sub>2</sub>PtCl<sub>6</sub> (soln. previously neutralized with NaOH) is 0.1801 g. per kg. of rabbit when the velocity of injection is 0.0045 g. per kg. per min. When

the velocity is 0.0023 g. the immediate M. L. D. is 0.125 per kg. The delayed M. L. D. is 0.0229 g. per kg. (period of survival 3 days). The salt does not destroy red blood corpuscles *in vivo* although it does hemolyze them *in vitro*. Detn. of Pt in the organs 3 days after injection of the salt shows that the kidneys contain the most, followed by the spleen, liver, lungs and muscle tissue. The kidneys eliminate 30% of the Pt introduced during the first 72 hrs. after injection. Peter Masucci

The pharmacologic action of palladium chloride. G. Orestano. *Boll. soc. ital. biol. sper.* 8, 1154-6 (1933).—In the organism  $\text{PdCl}_2$  is transformed into metallic Pd directly and after conversion to  $\text{PdCO}_3$  and  $\text{Pd}_3(\text{PO}_4)_2$ . The Pd cation acts intensely and immediately on the heart and on the red corpuscles, less quickly on the kidneys. Death is rapid through cardiac lesions, gradual through renal lesions. The immediate M. L. D. is 0.05 g. per kg.; the delayed M. L. D. is 0.0186 g. per kg. of rabbit (period of survival 12 days). In proportion to the wt. of organ, the fixation of Pd is as follows: spleen > bone marrow > kidneys > liver > lungs > muscle tissue. P. M.

The physiologic action of methylglyoxal. Emilio Martini. *Boll. soc. ital. biol. sper.* 8, 1200-1 (1933).—Methylglyoxal was prepd. by oxidizing  $\text{Me}_2\text{CO}$  with  $\text{SeO}_2$ . The substance had a marked action on the vagus center but without any action on the peripheral vagal endings; it had an inhibiting effect on the peristaltic action of the guinea pig isolated intestine and diminished the height of the contractions of the isolated heart of the frog or rabbit without noticeable change of rhythm. P. M.

Benzoic acid intoxication. I. Benzoic acid and sodium glycolate. Marco Stassi. *Boll. soc. ital. biol. sper.* 8, 1224-6 (1933).—Na glycolate impeded the development of marasmus produced by Na benzoate when the latter was administered to guinea pigs in a daily dose of 1 g per kg. and also checked the decrease in wt. The urea-N ratio in animals receiving both substances fell within normal limits. The beneficial action of Na glycolate does not seem to be due to the formation of glycocon; the hippuric acid in the urine of the animals so treated showed only a small fraction of the total N. II. Benzoic acid and ammonium glycolate. Cataldo Zunino. *Ibid.* 1226-8. —The administration of  $\text{NH}_4$  glycolate to guinea pigs subjected to the action of Na benzoate did not arrest or diminish the endogenous destruction observed in such animals. The animal organism is incapable of utilizing  $\text{NH}_4$  salts. III. Benzoic acid and sodium citrate. Ugo Lombroso. *Ibid.* 1228-9. —Guinea pigs which received Na benzoate and Na citrate not only maintained but showed a tendency to increase their wt. The beneficial action of Na glycolate is, therefore, not due to the glycolate radical which is supposedly transformed to glycocon and subsequently synthesized into hippuric acid, but like Na citrate, it is due to the common radical Na. Org. salts in which the alkali metal is linked to an easily combustible org. acid and capable of maintaining and increasing the alk. reserve have this beneficial property. P. M.

The absorption of nitrogenous substances. II. The absorption of a casein suspension introduced into a Vella loop. Gaetano Sarzana. *Boll. soc. ital. biol. sper.* 8, 1230-2 (1933); cf. *C. A.* 27, 5800. —A casein suspension introduced into an intestinal segment was absorbed 25-30% within  $\frac{1}{2}$  hr. The non-absorbed fraction when mixed with intestinal secretion *in vitro* would require 24 hrs. to give by formal titration a N figure equal to that absorbed by the intestinal segment. If casein and pancreatic juice were introduced into the loop, the absorption in  $\frac{1}{2}$  hr. was very rapid (60%), approaching that of peptone. Formal titration *in vitro* of the non-absorbed portion showed that after 24 hrs the N figure did not reach that absorbed by the loop. These results do not favor the hypothesis that absorption takes place only after digestion in the intestine has proceeded to the amino acid stage.

III. Absorption of serum proteins introduced into a Vella loop. *Ibid.* 1232-4. —Serum proteins were not absorbed in any noticeable amts. by the intestinal epithelium within the period of 1 hr. The addn. of pancreatic juice to the serum proteins did not influence the absorption. IV.

Absorption of amino acid solutions introduced into a Vella loop. *Ibid.* 1235-7. —Solns. of amino acids (glycocon, alanine, glutamic acid, aspartic acid) introduced into a Vella loop were absorbed to a lesser degree than peptone. While peptone was absorbed about 60%, the amino acids, excluding alanine, were absorbed about 30%. Alanine was absorbed 50%. Peter Masucci

Studies on the metabolism of water. III. The influence of acids and alkalies, administered intravenously, on diuresis. Mario Saviano. *Boll. soc. ital. biol. sper.* 8, 1237-42 (1933).—Physiol. salt soln., 0.01N HCl or 0.01N NaOH were introduced into the jugular vein of a dog, at a rate of 3 cc. per min. and in a dose of 10 cc. per kg. body wt. The vol. of urine collected during the injection and  $3\frac{1}{2}$  hrs. after was noted. The results show: The amt. of urine eliminated during the injection and  $3\frac{1}{2}$  hrs. later is almost double after the administration of HCl, while the urine eliminated after the administration of NaOH is slightly less than that eliminated after the administration of NaCl. The amt. of urine eliminated  $3\frac{1}{2}$  hrs. after the administration of HCl is greater than the amt. of liquid introduced in circulation. The diuresis produced by HCl is ascribed to the passage of water from the tissues to the plasma. This hypothesis is supported by the facts that the protein content of the blood is reduced from 9% before to 7.2% after the HCl injection, and by a marked hypotonicity of the urine. P. M.

Alkalosis and excitability of the cortical sensory-motor centers. G. Martino and L. De'Palmis. *Arch. fisiol.* 32, 361-78 (1933). —Oral doses of 2-10 g. of  $\text{CaCl}_2$  or  $\text{NH}_4\text{Cl}$  have no influence on the excitability of the cortical centers of the dog. Pulmonary hyperventilation after doses of these salts does not cause changes, whereas it increases the excitability in non-treated dogs. The latter effect is probably caused by alkalosis. A. E. Meyer

The action of quinine, picrotoxin and atropine on the neuromuscular reflex activity. R. De Marco. *Arch. fisiol.* 32, 405-13 (1933). —Quinine and picrotoxin increase the reflex activity, the duration depending on the dose. Atropine has no influence. The action of caffeine, cocaine, strychnine and morphine on the neuromuscular reflex activity. *Ibid.* 414-20. Caffeine causes an increase even in small doses, cocaine also, but the effect is more accentuated in larger doses; its effect is less prompt but longer lasting than that of caffeine. Strychnine causes an increase in proportion with the dose. Small doses of morphine do not cause much change; large doses cause a very slight increase. A. E. Meyer

Pharmacodynamics and toxicology of tryptaflavine, rivanol and some other acridine derivatives. Marcel Levrat and François Morelon. *Bull. sci. pharmacol.* 40, 582-92 (1933); cf. *C. A.* 28, 2108, 5283. —The bactericidal action on *Staphylococcus*, *Es. coli* and *Fl. typhi* of the following substances was investigated: (1) Tryptaflavine, (2) Gonarine (3,6-diamino-10-methylacridinium chloride), (3) Rivanol, (4) 2,7-dimethyl-3,6-bis(methylamino)-10-methylacridinium chloride, (5) 3,6-diamino-2,7-dimethylacridinium chloride, (6) Rheonine, (7) Flavicide, (8) 3,6-bis(methylamino)acridine-HCl, (9) 2,7-dimethyl-3,6-diaminoacridinium chloride, (10) acridine-HCl. Nos. 1-3 are of highest antiseptic power; 10 is almost ineffective. The immediate lethal dose of (1) is 40 mg. per kg. in the rabbit, but 5 mg. is sufficient to produce lasting and often fatal lesions in the kidneys. The injurious effect on the kidneys does not permit the use of larger therapeutic doses than 0.1 g., which is frequently not sufficient in the treatment of gonorrhea. No. 2 shows the same characteristics as No. 1. The lethal dose of No. 3 is 60 mg. Doses of 40 mg. cause eventually some kidney irritation, which, however, is of short duration and never causes death. The other products tested have a toxicity at least equal to that of tryptaflavine. A. E. Meyer

The parenteral administration of magnesium sulfate in hypertension. Hurton L. Zohman and Bernard Sternberg. *Ann. Internal Med.* 7, 643-52 (1933). —It had a beneficial effect. John T. Myers

Experimental and clinical studies of ergotamine. V.

The action of ergotamine on the sympathetic nervous system stimulated by adrenaline. Studies of the metabolic rate, pulse rate, blood pressure, blood sugar and the total leucocyte count. John B. Youmans, Charles Trabue, Ralph S. Buvinger and Helen Frank. *Ann. Internal Med.* 7, 653-63(1933); cf. C. A. 25, 5929.—Ergotamine in 0.5 cc. subcutaneous doses partially inhibited the increase in the metabolic rate and the hyperglucemia induced by 1 mg. of adrenaline. It had no effect on 0.5 cc. doses of adrenaline. The injection of both substances gave a greater increase in blood pressure than adrenaline alone.

John T. Myers

Iodized oil in bronchiectasis, including a study of two cases following lobectomy. Joseph A. Weinberg. *Arch. Surgery* 27, 545-54(1933).

John T. Myers

Combination avertin-ether rectal anesthesia. Experiments on animals. Geo. H. Hunt. *Arch. Surgery* 27, 960 9(1933).—The combination is useful.

John T. Myers

Radiothorium in myelogenous leucemia. II. Small doses. I. Zadek. *Folia Hematol.* 51, 1-31(1933); cf. C. A. 27, 5425.

John T. Myers

The relation of iron and copper to reticulocyte response in anemic rats. M. O. Schultz and C. A. Elvehjem. *J. Biol. Chem.* 102, 357-71(1933).—In severely anemic rats the administration of 0.3 mg. Fe with 0.01 mg. Cu causes a very rapid increase in the no. of reticular red blood cells to a max. of  $1.5 \cdot 10^6$  per cu. mm. in 4 to 5 days. The nos. then decrease rapidly while the hemoglobin and erythrocytes increase. The response to Cu alone is only about half as great as that to Cu + Fe, while Fe alone has no effect. This indicates that Cu can be supplemented by Fe stored in the body. Intraperitoneal injection of 0.08 g. hemoglobin has an effect similar to that of Cu with Fe. The feeding of liver fractions, active in pernicious anemia, but low in Cu and Fe, was without effect. The reticulocyte response from Fe alone obtained by Beard, Baker and Myers (C. A. 26, 759) is ascribed to the presence of sufficient Cu in the diet.

K. V. Thimann

Glycogen formation in the white rat after oral administration of propionic, butyric, valeric and caproic acids. H. C. Eckstein. *J. Biol. Chem.* 102, 591-4(1933).—The administration to rats by stomach tube of 0.2-1.0 g. of  $\text{EtCO}_2\text{H}$  led to an increase of 0-1% only in the liver glycogen. However, butyric, valeric and caproic acids, though absorbed, did not lead to the formation of any glycogen.

K. V. Thimann

Permeability of the placenta for barbituric derivatives. R. Faltre. *J. pharm. chim.* 18, 417 18(1933).—See C. A. 27, 5418.

S. Waldbott

Habituation and cumulation phenomena. III. The antagonism of some barbituric acid derivatives. M. R. Bohnemann. *Arch. expl. Path. Pharmacol.* 172, 645 56(1933); cf. C. A. 27, 5816.—The administration of phanodorn to dogs prevents the antidiuretic action of phanodorn, phenobarbital or prominal given later the same day. The antidiuretic action of tonephin cannot be so prevented. The efficacy of hypnotics in preventing antidiuresis varies inversely with the ease of detoxication *in vivo*.

Harry Eagle

Physiol. activity of onium compds. (Renshaw, Hotchkiss) 10. Mitragyna and its alkaloids (Raymond-Hamet, Millat) 10.

## I—ZOOLOGY

R. A. GORTNEK

Physiological products of the lac insect. I. A preliminary investigation. N. K. Ranga Rao and M. Sreenivasaya. *J. Indian Inst. Sci.* 16A, 76-83(1933); cf. C. A. 27, 5429.—The resinous incrustations, including the bodies of the lac insects, were extd. with NaCl and centrifuged. The fat is a mixt. of a true fat and a wax. The nitrogenous material was fractionated and analysis showed a globulin and a protamine-like substance, also some unidentified polypeptides. II. Investigation of the water-soluble nitrogenous constituents. N. K. Ranga Rao. *Ibid.* 97-102.—The water-sol. nitrogenous substances ob-

tained from lac were sepd. into basic and non-basic fractions by pptn. with phosphotungstic acid. They were not identified. Free tyrosine accounted for 2.5% of the total water-sol. N. #

M. L. C. Bernheim

Comments on the paper of O. Riesser and A. Hansen, "Chemical analytical investigations on muscles of marine invertebrates." D. M. Needham, J. Needham, R. Baldwin and J. Yudkin. *Z. physiol. Chem.* 222, 63-4(1933); cf. C. A. 27, 4849.—Polchemical, regarding the occurrence of creatinephosphoric acid in crustaceans and molluscs.

A. W. Dox

The respiratory intensity of libellulid larvae in air and in water. Anne Raffy. *Ann. physiol. physico chim. biol.* 9, 1122 34(1933).

Harry Eagle

The hydrogen-ion concentration in the intestinal canal of some blood-sucking arthropods. P. P. Popov and R. D. Golzova. *Arch. Schiffs-Tropen Hyg.* 37, 465-6(1933).—The values ranged from pH 6.2 to 7.8.

Harry Eagle

Utilization of proteins and iron of vegetable origin in the maturation of eggs of *Culex pipiens*. P. de Boissezon. *Compt. rend. soc. biol.* 114, 487-9(1933).

L. E. Gilson

Inhibition of chorda formation of Triton embryos by chemical means. F. E. Lehmann. *Naturwissenschaften* 21, 737 8(1933).—The influence of chemicals (chlorotone) on the lens formation of *Rana fusca* has recently been described (*Rev. suisse Zool.* 40(1933)). The chorda formation of *Triton* can be influenced likewise while the development of other organs remains normal. Treatment of sprouts of *T. alpestris* during the first half of the gastrulation phase with LiCl soln. of increasing strength during 24 hrs. at const. temp. followed by growth in an indifferent medium resulted in larvae with typically changed organs, all deprived of the trunk chorda. The effect of Li is attributed to a change in carbohydrate metabolism which in turn influences the chorda formation. Cf. Woordeman (C. A. 27, 4312); Fischer and Wehner (C. A. 27, 5379); Lindahl, *Arch. Entwicklungsmech. Organ.* (Abt. D., Z. Wiss. Biol.) 128, 663(1933).

B. J. C. van der Hoeven

Protozoa. IV. Lethal effects of x-radiation of a sterile culture medium for *Colpidium campylum*. C. V. Taylor, J. O. Thomas and M. G. Brown. *Physiol. Zool.* 6, 467-92(1933); cf. C. A. 27, 3234.—The protozoan was killed by x-rays whether these were applied directly to the organism, to the sterile media or to the tap water used in prep. the medium. The toxicity was due to  $\text{H}_2\text{O}_2$ , the presence of which was demonstrated by the use of  $\text{TiCl}_4$ . If the water was carefully freed from  $\text{O}$  before radiation no peroxide or toxicity appeared. Org. materials added to the water before or after radiation nullified the toxicity.

Milton Levy

The action of hormone extracts injected into anura tadpoles. Giorgio Schreiber. *Boll. soc. ital. biol. sper.* 8, 1181 4(1933).

Peter Masucci

Reduction of the wings in *Selepia bilunaria* Esp. after feeding with leaves impregnated with manganese. H. Lemche. *Biol. Zentr.* 53, 591-600(1933).—The leaves were treated with a 1.3% soln. of  $\text{MnSO}_4$ . Twelve out of 735 individuals had reduced wings; in 2 they were missing. No reduction was found in 1185 controls.

A. E. Meyer

Protein digestion in gastropods. Sven Hörstadius. *Biol. Zentr.* 53, 645-50(1933).—Colloidal Au imbedded into fibrin was used for the investigation. Some species show a protein assimilation by phagocytosis. Generally a true extracellular digestion is observed.

A. E. Meyer

Mineral content of muscle tissue of fresh water fish under the influence of increasing mineral salt content of the water. S. Kaplauskil and N. Boldireva. *Biochem. Z.* 265, 422-5(1933).—Increasing the NaCl and  $\text{CaCl}_2$  content of the water to 1.5-2% causes a corresponding rise in the cation content of the muscles but has no effect upon the compn. of the blood. On the contrary, the Cl content of the blood increases markedly while in the muscle substance it is unchanged.

S. Morgulis

The purine content of fish and amphibians. Emil Stransky. *Biochem. Z.* 266, 287-300(1933).—The end products of protein metabolism in fishes and amphibians are urea and  $(\text{CH}_3)_2\text{NH}_2\text{O}$ , and of purine, urea and  $\text{NH}_3$ ;



in reptiles and birds the corresponding end products are uric acid; in mammals, urea and allantoin, while in man and anthropoid apes, urea and uric acid, *ssp.* Neither uric acid nor allantoin can be detected in fish or amphibian urines. The livers of these animals change allantoin and uric acid to urea which was definitely identified as the xanthidrol compd. Oxalic acid is not obtained in the enzymic decompn. of purine bodies. The application of Ehrlich's aldehyde reaction is not applicable since it is given by both allantoin and allantoic acid. It is also pointed out that the Fosse glyoxylic acid reaction for allantoic acid is not characteristic. S. Morgulis

**Chemotactic response of *Rhabditis filiformis* B. Ryoseki Taniguchi.** *Proc. Imp. Acad.* (Tokyo) 9, 432-5(1933).—*Rhabditis filiformis* B., a soil nematode, is generally attracted to acids, to inorg. more than org. acids and less to alkalis. It acts independently for most salts except  $\text{KMnO}_4$ ,  $\text{AgNO}_3$ ,  $\text{HgCl}_2$ , alum,  $\text{CuSO}_4$  for which it has no attraction. The nematode displays a slight attraction for MeOH and EtOH, but not for  $\text{CHCl}_3$ . It is not attracted by acid or basic dyes. E. W. Scott

**Analyses of eggs in relation to the adaptation of fish to environments of different salt contents.** Th. Busniti and N. Gavrilescu. *Bull. sect. sci. acad. roumaine* 15,

208-14(1932).—Analyses of the eggs of *Cyprinus carpio* and *Alosa pontica* (Danube herrings) are given. With the latter, those obtained from fresh water tend to have a higher ash content (mean 6.5%) than those living in salt water (mean 5.7%). The differences in fat content, 13.2 and 14.6%, and I no., 59 and 82, resp., are in the opposite sense. Figures are calcd. on the dry wt.

K. V. Thimann

**Studies on the constituents of the leaves of *Solanum tuberosum* determining the nutrition of larvae of *Leptotarsa decemlineata*.** M. Raucourt and B. Trouvelot. *Compt. rend.* 197, 1153-4(1933).—The larvae of *Leptotarsa decemlineata* will not eat the aq. ext. of potato leaves, but will eat the residue. The edible material is completely extd. with alc., the ext. being eaten and the residue not. On recombination, the mixt. is eaten as readily as the original leaves. On fractionating the alc. ext. the edible material remains in the unsaponifiable fraction; it is not extd. with benzene,  $\text{Et}_2\text{O}$ ,  $\text{CHCl}_3$ ,  $\text{Me}_2\text{CO}$  or petr. ether; it is not destroyed by drying for 8 hrs. at  $105^\circ$  and is non-volatile. It is destroyed when the leaf ext. is allowed to ferment, but if fermentation is prevented by  $\text{CHCl}_3$  it keeps for some weeks.

K. V. Thimann

## 12—FOODS

F. C. BLANCK AND H. A. LEPPER

**Air conditioning reduces loss in stored raw materials.** Harry Stiner. *Food Ind.* 5, 498-500, 528(1933).—Controlled humidity prevents loss in quality of nuts, flour, cereal grains, corn meal and dried fruits through the action of microorganisms at increased moisture contents. Refrigeration is often a necessary adjunct to controlled humidification. C. R. Fellers

**Preservative action of benzoic acid.** G. Biermann. *Z. Fleisch-Milchhyg.* 43, 21-29, 41-45(1933).—A study of the preservative action of Na benzoate and the effect on color of blood and meat. George R. Greenbank

**The determination and significance of the gluten content of flour.** I. K. Greisenegger and V. Hafner. *Mühlenlab.* 3, 217-24(1933).—The principal errors involved in the washing of gluten are evaluated, and an improved method is proposed. Clinton L. Brooke

**The influence of  $p_H$  on the baking quality of wheat flour.** Holger Jørgensen. *Mühlenlab.* 3, 193-200(1933); cf. *C. A.* 27, 5830.—Expts. on 4 flours of like extn. and varying N contents (1.66-2.60), milled from soft Danish winter wheat and baked at different  $p_H$  levels with sufficient sugar always present to preclude yeast starvation, indicate that at least within a given varietal class, response to acid, like response to bromate ( $\text{KBrO}_3$ ), is closely correlated with N content. The literature on  $p_H$  and baking quality is reviewed and 13 references are given. Clinton L. Brooke

**The importance of soy-bean flour as a baking improver for wheat flours.** R. Dietz. *Mühlenlab.* 3, 209-14(1933); cf. *C. A.* 27, 5835.—The importance of soy-bean flour as a baking improver, especially for flour from German wheats, has been overstd. Although the addn. of soy-bean flour results in higher dough yield, accelerated fermentation, and improved crust color, the disadvantages as lowered vol., lowered fermentation tolerance in the proof, poor oven spring, coarse grain and texture, and undesirable crumb color are so great that its use is profitable neither for the miller nor for the baker. When used to increase the protein content of bread and other baked goods, soy-bean flour should be added in the final stage of fermentation. Since the flour has high water absorption, it may prove useful in tightening up weak and slack doughs. Baking expts. are reported showing the superior action of malt and chemicals as improvers. C. L. B.

**Determination of the grade of flour in bread.** K. Eble and R. Bretschneider. *Z. Untersuch. Lebensm.* 66, 314-17(1933).—The  $\text{P}_2\text{O}_5$  contents of 34 rye flours are given and mean values obtained. A method for the detn. of

$\text{P}_2\text{O}_5$  in bread is described and its use in estg. the flour grade used for bread production is discussed.

F. L. Dunlap

**The biuret reaction, the Trommer sugar test, and a simple new colorimetric sugar determination.** Ernst Berliner and E. Schmidt. *Mühlenlab.* 3, 187-92(1933).—The "hot biuret reaction" of Köhl (*C. A.* 27, 2734) is misleading when applied to flour suspensions, since the reducing sugars present give the yellow color of the Trommer reaction, which masks the blue-violet to violet-pink color of the true biuret reaction. In cold soln. the Trommer reaction is absent and the biuret reaction is more reliable. Colorimetric sugar detn.: Digest a 25% aq. flour suspension 30 min. at  $27^\circ$ , filter, add 5 cc. N NaOH to a 15 cc. aliquot, heat 5 min. in a boiling water bath, and compare the yellow to orange color with standards made with pure maltose in steps of 0.1%. The results check closely with the Lane and Eynon method. Köhl's hot biuret reaction is found useful for detecting rye flour in bread by means of foamy to red-brown turbidity characteristic of fructose.

Clinton L. Brooke

**The biuret reaction.** Hugo Köhl. *Mühlenlab.* 3, 205-8(1933).—Polemical with Berliner (preceding abstr.).

Clinton L. Brooke

**The use of refrigeration in the dairy industry.** Ch. Porcher. *Lait* 13, 1126-40(1933).—The use of refrigeration as a means of controlling chem. and bacteriol. changes in milk, cheese and butter is discussed.

A. H. Johnson

**Advantages of grading market milk.** James A. Tobey. *Milk Plant Monthly* 22, No. 12, 28(1933).

A. H. Johnson

**Pasteurizing milk.** F. Kieferle and L. Eisenreich. *Milchwirtschaft. Forsch.* 15, 348-66(1933).—A study of the effect of different temps. in various types of pasteurizers on total N, casein N, albumin N, albumose N, peptone N, residual N and acidity. The quantity of albumin coagulated indicated by loss of albumin N at  $74^\circ$  varies from 2.5 to 11%. The same pasteurizers at  $84^\circ$  coagulate 20-23%. The holding method which is most common in this country coagulates 20% by holding at  $63^\circ$  for 30 min. George R. Greenbank

**Composition of milk as affected by the amount of protein feed.** A. E. Perkins. Ohio Agr. Expt. Sta., *Bull.* 516(51st Annual Rept.), 69(1933); cf. *C. A.* 27, 4563.—None of the major constituents of milk such as fat, lactose, casein and ash, was perceptibly affected by even the most radical change in the protein content of the ration.

Approx. twice as much non-protein N was present in the milk of cows receiving very high protein rations as compared with cows receiving low-protein rations.

C. R. Fellers

**Bacteriological analysis of milk.** Irene Lipska. *Lait* 13, 1090-8(1933).

A. H. Johnson

**Effect of the addition of small quantities of iodine to milk on the rate of bacterial growth.** T. S. Sutton and W. E. Krauss. Ohio Agr. Expt. Sta., *Bull.* 516(51st Annual Rept.), 69-70(1933).—The presence of a small amt. of I in milk increases the rate of bacterial growth, probably through an increase of the rate of metabolic processes. Approx. 0.0001 g. of I per 100 cc. of milk seemed most favorable for bacterial growth. Bacterial growth was retarded in milk contg. 0.004 g. of I per 100 cc.

C. R. Fellers

**The freezing point and electrical conductivity of milk.** J. Krenn. *Milchwirtschaft. Forsch.* 14, 513-37(1933).—The av. f. p. for milk from individual cows and herds is  $-0.545^{\circ}$ . A correction formula is given when sour milk is used instead of fresh. Cond. at  $18^{\circ}$  varies between  $38.0 \times 10^{-4}$  and  $68.4 \times 10^{-4}$  reciprocal ohms. No relationship was found between f. p. and cond.

George R. Greenbank

**The detection of the salting of milk by the determination of the phosphorus to chlorine ratio.** R. Vivario and C. Stainier. *Lait* 13, 1073-81(1933).—These investigators found that the detn. of the P to Cl ratio as a method of detecting whether a milk had been watered and salted was inexact except for milks of known origin. This was due to the fact that P and Cl did not vary in the same manner or degree throughout the lactation period. Total Cl, total P, mineral P and sol. P, were detd. for milks obtained throughout the lactation period.

A. H. J.

**Determination of iron. Adaptation of the mercaptoacetic acid colorimetric method to milk and blood.** Gladys Leavell and N. R. Ellis. *Ind. Eng. Chem., Anal. Ed.* 6, 46-7(1934).—Take 5 cc. of milk, 0.5 g. of dried milk or 0.01-0.02 ml. of blood. Digest with 1-3 ml. of concd.  $H_2SO_4$  and 1-2 ml. of concd.  $HClO_4$  to oxidize org. matter. When the oxidation is complete, transfer to a 150-ml. beaker, dil. and make neutral to litmus by adding  $NH_3$  soln. Then make acid with 5-10 drops of concd.  $H_2SO_4$ . Add 1 ml. of mercaptoacetic acid reagent (4 ml. of the acid and 8 ml. of concd.  $NH_3$  soln. in 50 ml. of water) and 1-2 ml. of concd.  $NH_3$  soln. Compare the color with that of standards.

W. T. II.

**Use of dry skim milk in the manufacture of cultured buttermilk.** E. E. Alldredge and A. D. Burke. Ala. Agr. Expt. Sta., *Bull.* 239, 3-39(1933).—The addn. of dry skim milk to normal skim milk in quantities sufficient to raise the total solids 1% prior to heating and fermentation improves the body, texture and flavor of the resulting buttermilk. The addn. of dry skim milk also increases the viscosity of normal skim milk buttermilk and produces a product the curd of which is easier to break and smoother than that prepd. solely from normal skim milk. The dry skim milk also is beneficial in preventing the sepn. of whey. At a storage temp. of  $35-38^{\circ}F$ . the desirable phys. properties of buttermilk may be satisfactorily maintained for a period of several days.

C. R. Fellers

**The special position of goat milk and the composition of goat blood.** F. E. Nottbohm and K. Philippi. *Z. Unters. Lebensm.* 66, 289-301(1933).—So far as most of the constituents are concerned, there is no tangible difference between cow and goat milk. The Cl content of the latter is twice as great as that of the former. An attempt is made to account for this high Cl content in goat milk in the compn. of the ash constituents of the goat blood and goat-blood serum. Goat blood differs from that of other ruminants by having a high K content. In this respect goats may be classified between sheep and swine. No tangible difference is found in the ash constituents of the blood serum of cattle, sheep and goats.

F. L. D.

**The composition of the casein of goat milk.** Siegfried Rauchning. *Milchwirtschaft. Forsch.* 15, 390-401(1933).—The amino acids from the acid hydrolysis of goat-milk

casein are compared with those of casein from cow and "globin." The presence of cystine, hydroxyproline and hydroxyglutamic acid is not able to be established at this time.

George R. Greenbank

**Casein.** J. Brigandó. *Lait* 13, 657-77, 843-66, 965-89, 1098-1115, 1230-49(1933).—Casein was considered to exist in milk as a colloidal complex with dicalcium phosphate. Acid-casein and rennet-casein are obtained by action on this complex. On theoretical grounds the production of acid-casein results in a conversion of dicalcium phosphate to monocalcium phosphate and a progressive decalcification of Ca caseinate. This is accomplished by the use of  $HCl$ ,  $H_2SO_4$ ,  $AcOH$  or spontaneously by lactic acid produced in fermentation. Theoretically pure casein should be salt-free. This, however, is rarely the case. Theoretically, rennet-casein is an assocn. of 2 salts: one, the Ca paracaseinate obtained by reaction from the original Ca caseinate of the milk, the other, dicalcium phosphate which is entrained by the Ca paracaseinate during pptn. Rennet-casein is high in ash, contg. about 7.5%. Rennet-casesins lower in ash are obtained when acid milks are used in the prepn., although neutralization of the acid operates to yield rennet-casein of the usual ash content. In order to prep. an acid-casein low in ash content, it is necessary to ppt. the casein at a low temp. (not above  $25^{\circ}$ ) and to wash the curd with distd. water, the last washing water preferably acidified with  $HCl$  to  $pH$  4.7. Excess of acid for pptn. of the casein and vigorous stirring above what is required to distribute the acid do not lower the ash content of the acid-casein. Alkali caseinates ( $K$ ,  $Na$ ,  $NH_4$ ) are subject to perfect coagulation with rennet on the addn. of sufficient  $CaCl_2$ . The paracaseinate is obtained by acidification of the alk. casein soln. to which the rennet has been added. Methods of detg. the acidity of acid and rennet casesins are discussed. A moisture and salt-free acid-casein had a titrable acidity equiv. to 8.10 g. of lactic acid per 100 g. of casein. A rennet-casein had a titrable acidity of 2.1 g. of lactic acid per 100 g. of the dry product.

A. H. Johnson

**Bacterial analysis of ice cream.** F. W. Fabian. *Milk Plant Monthly* 22, No. 12, 68-70; *Ice Cream Trade J.* 29, No. 12, 19-20(1933).

A. H. Johnson

**Eliminating stale, metallic flavor from strawberry ice cream.** P. H. Tracy, R. J. Ramsey and H. A. Ruche. *Ice Cream Trade J.* 29, No. 12, 40(1933).—Stale, metallic or tallowy flavor was found to be due to oxidation of the butter fat and was hastened by the presence of Cu salts and a certain min. quantity of strawberries. The defect could be controlled by reducing the Cu content of the ice cream mix, by using dairy products of high quality, and by homogenizing at a high pressure (3000 lb.). The strawberry juice contained the material responsible for increasing the rate of oxidation of the fat, while strawberry seeds and fiber contained the material which operated to retard oxidation. Other fruits such as oranges, lemons and pineapples had similar oxidizing effects on butter fat when used in ice cream.

A. H. Johnson

**Iron determination in cream, butter and curd with respect to the manufacture of butter from cream containing iron.** G. Schwarz and Edith Müller. *Milchwirtschaft. Forsch.* 15, 321-48(1933).—The authors employ a colorimetric method which detects both forms of Fe in dilns. of 1-10 million. The reagent used is dimethylglyoxime which produces a rosy red color in this diln. Ashing in crucibles of various materials showed that porcelain crucibles gave the least variation. The authors study the effect of small amts. of Fe on the keeping quality as indicated by the von Fellenberg reaction. The methods for various products are described.

George R. Greenbank

**Studies of the consistency of Swedish butter. II. Influence of different factors on the hardness of butter.** Gunnar Wode. *Medd. Centralanst. försöksväsendet jordbruks. Mejeriavdel.* No. 46, 34 pp.(1933); cf. C. A. 25, 1918.—Standard samples of butter, contg. 1%  $NaCl$ , were packed in paper cartoons, sealed in glass containers and stored in ice and water ( $2^{\circ}$ ) for different periods. Hardness measurements were then made at  $15.0^{\circ}$ ; averages

are reported for 24 tests on 4 portions of each sample. Factors tending toward harder butter are: chilling the cream before or after ripening; holding cream at a low temp.; rapidity of warming chilled cream for churning; low ripening temp. in cream chilled before ripening, but high ripening temp. and low chilling temp. quickly reached, in cream chilled after ripening; length of storage time, with max. effect at about the f. p.; cooling the butter before working, in butter with soft tendency. In butter tending to be hard, this last factor decreases hardness. Greasiness and crumbliness apparently depend on the amt. of free fat and its degree of crystn. While King's theory of butter structure and the crystn. properties of butter fat do not fully explain the influence of hardness factors, it seems probable that hardness is governed by distribution of butter fat between fat globules and free fat, by the lubricity of the free fat, and by the firmness of the fat globules.

Julian F. Smith

**A study of seasonal variation in butter fat. I. Seasonal variations in carotene, vitamin A and the antimony trichloride reaction.** Roland G. Booth, Stanislaw K. Kon, Wm. J. Dann and Thomas Moore. *Biochem. J.* 27, 1189-96 (1933).—Colorimetric methods were used. Detns. of the intensity of the yellow color (carotene) were carried out on the untreated butter fats.  $\text{SbCl}_3$  blue values (vitamin A) were detd. on the untreated fats and the non-saponifiable residues. Data obtained on yellow color and blue value as detd. on the non-saponifiable residue were in good agreement with the established variations of the carotene and vitamin A contents of the butter corresponding with the quantity of grass or of green fodder available in the diet of the cow. Blue values on untreated butter fat proved valueless. In the practical assay of the total vitamin A content (with colorimetric methods), it is necessary that both the vitamin A and carotene contents should be taken into account.

Benjamin Harrow

**Butter flavors.** B. W. Hammer. *Natl. Butter and Cheese J.* 24, No. 23, 28-30 (1933).—H. reviews research to det. the constituents responsible for the characteristic odor of butter. Methods are given by which high biacetyl and acetylmethylcarbinol contents can be obtained in butter cultures. The addn. of biacetyl, acetylmethylcarbinol and other flavoring materials to butter is discussed.

A. H. Johnson

**Methods for the investigation of eggs.** K. Braunsdorf and H. Brinckmeier. *Z. Unters. Lebensm.* 66, 301-14 (1933).—A satisfactory detn. of the freshness or age of eggs is assocd. with all sorts of difficulties. The most advantageous of the methods for use in lab. investigations are discussed and critically evaluated. F. L. Dunlap

**Conserving the goodness of eggs by sharp freezing.** Leo D. Ovson. *Food Ind.* 5, 502-4, 508 (1933).—The carefully graded eggs are broken, strained, churned and frozen in 30-lb. cans at  $-12$  to  $-15^\circ\text{F}$ . About 72 hrs. are allowed for the freezing process. Storage of the frozen eggs is at  $0^\circ$  to  $-5^\circ\text{F}$ . The use of 5% by wt. of glycerol in the frozen yolks prevents gummy, lumpy particles from forming in bakery products, and permits the yolk to thaw out smoothly. Yolks packed with glycerol give increased baking vol. because of the affinity of glycerol for water. If sucrose or invert sugar is added to the yolks, the concn. is usually 10%.

C. R. Fellers

**The distribution of chlorine in developing hen eggs.** Kichinosuke Yamada. *Japan. J. Med. Sci.* II. *Biochem.* 2, 71-9 (1933).—Eggs of white leghorns fed a const. diet were used as the study material. The fresh eggs contained 162.6-178.7 mg. % of Cl, nearly three-fifths of which was found in the white of the egg. The shell contained only a trace of Cl. With the progressive development of the embryo a redistribution of the Cl in the different parts of the egg occurs. The same is essentially true of the water content, which serves to control the osmotic pressure. Generally the changes in the osmotic pressure are parallel to those of the Cl content. Five tables of data are given.

B. S. Levine

**The colorimetric determination of hydrogen-ion concentration of meat extracts and the use of this method in**

**judging meat.** C. F. van Oyen. *Z. Fleisch- Milchhyg.* 43, 429-31, 449-53 (1933).—A study of a no. of kinds of meat. Ten g. of fat-free finely ground meat is extd.  $\frac{1}{4}$  hr. with 100 cc. boiled distd.  $\text{H}_2\text{O}$  and filtered clear. Indicators are then added to the ext. and it is compared with  $\text{pH}$  standards. Most meats which have a  $\text{pH}$  6.2 are considered of good quality; for pork  $\text{pH}$  6.4 is required.

George R. Greenbank

**Studies on the chemistry and nutritive value of Miongtāš (Alaska pollack, *Theragra chalcogramma*) and its products, and on the improvement of the methods employed in its drying process.** Z. Ogura, K. Fujikawa and Y. Okuda. *Bull. Fishery Expt. Sta. Govt.-Gen. Chosen Ser. B*, No. 2, 229 pp. (1929).

E. J. C.

**Studies of the vitamin A contents of Norwegian canned fish products and their raw materials.** Gulbrand Lundé, Hans Kringstad and Kristoffer Vestly. *Tids. Hermetikind.* 19, 305-13 (1933).—Vitamin A contents were detd. in various fish products in terms of the blue value (B. V.) in a 20% soln., as measured by a modified Carr-Price test. The normal vitamin A content of cod-liver oil is 6-10 B. V.; in this study the following B. V. nos. were found: fresh bristling sardines, in the total fat 0.30-1.97; bristling liver oil 13.2; herring-body oil 0.15; herring-liver oil 8; herring sardine fat 0.7-1.8; mackerel-body oil (autumn catch) 0.3-0.4; mackerel-liver oil 200+ (about 25 times as high as in cod-liver oil); small mackerel-body oil 0.14-0.25; small mackerel-liver oil 15-20. Canned bristling sardines showed practically no loss as compared with the fresh fish; after 2 years storage, either in tins or in Al cans, the B. V. was the same as when newly canned. In the tabulated data figures are given both for B. V. (in 20% soln.) and for blue units in 1 g. of the product.

Julian F. Smith

**Regeneration of the reducing properties of oxidized lemon juice.** Sydney W. Johnson. *Biochem. J.* 27, 1287-9 (1933).—J. confirms Tillmans' observation (C. A. 26, 5619) that lemon juice, oxidized with indophenol, I or  $\text{H}_2\text{O}_2$ , can regain its reducing capacity when treated with  $\text{H}_2\text{S}$  immediately after oxidation.

B. H.

**Vinegar and its use in canning, especially of marine products.** Erling Mathiesen. *Tids. Hermetikind.* 19, 319-22 (1933).—Production and uses of wine vinegar and vinegar essence are described. In canning sardines, mackerel, etc., the  $\text{HOAc}$  concn. of the vinegar should not be over 2%, giving about 0.5% in the product after storage; higher strengths detract from the flavor and are more corrosive. Tests were made with herring sardines, canned with 2.0, 2.5, 2.9, 3.8, 4.2 and 4.9% strengths of vinegar and stored 2 years at  $10-15^\circ$ . At 2% the sardines kept well and there were no swells; above 4% all the cans were swells. For a like  $\text{HOAc}$  concn. some cans were packed in strongly salted vinegar (15%  $\text{NaCl}$ ), others with only 0.3%  $\text{NaCl}$ . Corrosion was more severe in the cans with 15%  $\text{NaCl}$ .

Julian F. Smith

**How to calculate sirup strengths quickly.** Wm. F. Robertson. *Food Ind.* 5, 501, 508 (1933); cf. C. A. 23, 2223.—The desired sirup strengths are readily made by adding water or sugar according to a series of experimentally made curves.

C. R. Fellers

**Recent acquisitions regarding the biochemistry of cacao. Their importance to its production.** F. Heim de Balsac. *Compt. rend. acad. agr. France* 19, 862-71 (1933).—Kernels of the cacao contain vitamin A and 2 sterols which the authors have called theabromosterols. These sterols possess antirachitic properties and appear worthy of consideration in evaluating cacao. The shells of the cacao are a particularly rich source of these sterols. From preliminary tests on animals the use of large amts. of chocolate in the daily ration does not appear harmful. For the use of cacao in chocolate manuf. it is proposed that the biochem. processes in the bean immediately after harvesting be stopped by autoclaving in alc. vapor and that no fermentation be allowed to take place until it can be carried out under carefully controlled conditions in the industrial plant.

J. R. Adams

**Chemistry of coffee.** Mario Taveira and Francisco F.

Córtes. *Rev. soc. brasil. quim.* 4, 145-60(1933).—The types of coffees, methods of analysis and typical analyses of the coffees are given. John Ladino

**Determination of caffeine in coffee.** Francisco F. Córtes. *Rev. soc. brasil. quim.* 4, 105(1933).—Place 1 g. of finely pulverized coffee in a 200-cc. beaker, add 2 cc. concd.  $H_2SO_4$  and place on a water bath for 15 min. Add 50 cc. boiling water, allow to remain on the water bath 15 more min. and filter while hot through a plaited filter, washing many times with boiling water. Allow to cool and add strong NaOH soln. until alk. Add 60 cc. of  $CHCl_3$ , stir and decant through a filter paper moistened with  $CHCl_3$ , receiving the filtrate in a weighed dish. Wash 2 or 3 times with 25 cc.  $CHCl_3$ . Carefully evap. to dryness and place over  $H_2SO_4$  in a desiccator until const. J. Ladino

**Tea leaves. Tannin from fresh tea leaves.** Yasuyoshi Oshima and Teruo Goma. *J. Agr. Chem. Soc. Japan* 9, 948-52(1933).—The dry leaves were extd. with  $H_2O$ , and Pb acetate was added to the ext. The first brown ppt. was removed and then the yellowish white ppt., which occurred next, was collected and decompd. with  $H_2S$ . The filtrate was neutralized with  $Na_2CO_3$  and evapd. in  $CO_2$ . The concd. soln. was extd. with  $EtOAc$ .  $CHCl_3$  was added to the ext. The ppt. was dissolved in hot  $H_2O$  and kept in an ice box. Tannin crystd. out as a white needle, m. 227°. The yield for the fresh leaves was 0.2%. The residue of the  $EtOAc$  ext. was acidified with  $H_2SO_4$  and then extd. with ether. Quercetin, m. 296°, was obtained from the ext. The Ac deriv., m. 188°, and the Me deriv., m. 166°, were prepd. Five OH groups were proved in the mol. The formula  $C_{14}H_{14}O_7$  was detd. \*The chem. and phys. properties were somewhat different from Tsujimura's tea tannin. Cryst. tannin was oxidized with  $O_3$  in  $Me_2CO$ . A red needle,  $C_{12}H_{12}O_8$ ,  $[\alpha]_D^{25} = -70.22^\circ$ , was obtained. V. Kihara

**Analyses of live stock feed with respect to their albuminoidal substances.** Stan. Reynaert. *Agricultura* 36, 238-45(1933).—The albuminoidal substances are divided into 3 groups: crude, pure and indigestible, and from these is derived a fourth group of crude and pure digestible materials. The crude albuminoidal material is detd. by the Kjeldahl method, while the pure albuminoidal substance content is detd. by the Stutzer procedure. The indigestible material is detd. by treating a 2-g. sample with 200 cc. of distd.  $H_2O$ , 2 g. of pepsin, a little thymol and 0.2 cc. of HCl (sp. gr. 1.20-1.21°). This mixt. is held at 37° for 48 hrs., and every 2 hrs. 0.2 cc. of HCl are added until there is 2 cc. present in the mixt. The solid is filtered off, washed with distd.  $H_2O$  to a neutral reaction and the N is detd. by the Kjeldahl method. The results obtained by these methods give very satisfactory and comparable figures. J. R. Adams

**Studies of feed value of early hay.** Ford S. Prince, Paul T. Blood and G. P. Percival. *N. H. Agr. Expt. Sta., Circ.* 41, 6 pp.(1933).—Early-cut grass hay carries a greater percentage of protein and more protein per acre than later cuttings. In general, to be of greatest nutritive value, grass hay should be cut previous to the period of bloom. A difference of only 30 days in time of cutting hay means a difference of at least 50% in the digestible protein per acre in favor of the early-cut hay. Early-cut hay carries more moisture and is thus more difficult to make. C. R. Pellers

**A type of laboratory silo and its use with *Crotalaria*.** W. M. Neal and R. B. Becker. *J. Agr. Research* 47, 617-25(1933).—Typical silage was produced in lab. pit silos of 2000-2500 lb. capacity with *Crotalaria* forage. Chem. changes and losses of nutrients were of the same order as usually are encountered in large silos with other crops. Conditions more nearly comparable to those in large silos were secured than appear to have been obtained heretofore by others working with small exptl. silos of other kinds in the ensiling of legumes. *Crotalaria incana* and *C. intermedia* forages made palatable silage which was eaten readily by cattle. *C. spectabilis* silage was also eaten readily, but its possible toxicity requires further

investigation. *C. striata* does not seem to be adapted for use as a livestock feed. W. H. Ross

**Surface tension of edible oils (Canals, Ramahenina-Ranaivo)** 17. Buffer intensities of milk and milk constituents (Whittier) 11A. Biuret reaction as applied to food chemistry (Kühl) 17. Pb crystal glass and its investigation from a hygienic standpoint (Keim, Raeder) 9 19. Baking yeasts (Fr. pat. 751,602) 16.

**Concentrated food.** Schokoladenfabrik Mauxion m. b. H. Ger. 581,567, July 29, 1933. Cocoa powder is heated with an aq. soln. of sugar and an acid such as  $HCO_2H$  of concn. 0.05 to 0.15 N.

**Flour.** Tres Gyógyszer-Végyészeti Ipari És Kereskedelmi R. T. Fr. 751,265, Aug. 30, 1933. See Brit. 385,796 (C. A. 27, 3261).

**Soy-bean flour.** Wm. L. Shellabarger (to Shellabarger Grain Products Co.). Brit. 397,692, Aug. 31, 1933. See U. S. 1,867,541 (C. A. 26, 4657).

**Treating soy beans, etc.** Michele Bonotto. Brit. 397,482, Aug. 21, 1933. Soy beans and other leguminosae contg. acrid tasting and pigmented substances are immersed in an aq.  $SO_2$  soln. until the tissues are thoroughly penetrated and the material expanded, moderate heat being then applied to liberate the  $SO_2$  from the soln. in the tissues and expel excess  $SO_2$ . The treated beans may be ground to flour.

**Composition for use as an auxiliary ingredient in making yeast-leavened bread.** Charles H. McIntosh (to C. J. Patterson Corp.). U. S. 1,936,636, Nov. 28. A mixt. which may be formed of Ca acid phosphate 0.2,  $(NH_4)_2SO_4$  0.028,  $KBrO_3$  0.0005 and  $KIO_3$  0.0004 parts per 100 parts of flour used is employed in bread making.

**Baking powder.** Heinrich Schott. Ger. 583,779, Sept. 9, 1933. Baking powder is made up of basic K salt, especially carbonate, acid phosphates and a moisture-absorbent such as kieselguhr.

**Shortening composition for bakery products.** Stroud Jordan (to Ross and Rowe, Inc.). U. S. 1,936,718, Nov. 28. A fat is used with a preformed emulsion of lecithin in an aq. soln., the lecithin being present in small proportion as compared to the amt. of the fat.

**Sea water.** Abel Boulet. Fr. 752,895, Oct. 2, 1933. The nutritive and vital properties of sea water are rendered available by using it for breadmaking or in the cooking of other food.

**Margarine, etc.** Bruno Behrend. Fr. 751,123, Aug. 28, 1933. Malt wort or malt ext. and lipid substances, particularly lecithin, or substances resembling lipoids, such as sterols, e.g., cholesterol, are used in the manuf. of margarine or other edible fats.

**Cheese.** Felix M. Frederiksen (to Premier-Pabst Corp.). U. S. 1,936,872, Nov. 28. For improving the texture of emulsified, processed cheese to which a Na salt emulsifier such as  $Na_3PO_4$  has been added, the plastic emulsified product is thoroughly mixed with a small proportion (suitably about 1%) of a highly sol. edible alk. earth salt such as  $MgCl_2$ .

**Cheese.** Fernand Reignier. Fr. 752,990, Oct. 4, 1933. Melted cheese is subjected to a surface washing with pure or slightly salted water to refine it and form a crust.

**Desiccated milk product.** Herbert E. Otting (to M. & R. Dietetic Laboratories, Inc.). U. S. 1,937,527, Dec. 5. A product emulsifiable with water is prepd. by adding to a normal high-fat liquid milk product a portion of non-fat milk solids, desiccating the resulting mixt. and mixing it with a separately desiccated normal low-fat milk product. On standing, an emulsion of the product with water develops a cream line.

**Vegetable oil.** Enrique Delucchi. Fr. 752,876, Oct. 2, 1933. An oil for use as a food or lubricant is obtained from the seed of *Silybum marianum* (thistles) by any extn. method.

**Apparatus and method for preserving animal and vege-**

table materials during storage and transport by controlling the composition of the surrounding atmosphere by treatment with reversible physical or chemical absorbents for carbon dioxide. Franklin Kidd. Brit. 397,848, Aug. 29, 1933.

Use of glucose in preparing extracts from animal and vegetable substances. Francis C. Nicholas. U. S. 1,937,410, Nov. 28. Materials such as carrots, beets, onions, soy beans, lettuce, celery, liver, pancreas or "ordinary meat" are reduced to a pulpy state, the pulpy material is treated with glucose, and the pulp and fluid are subsequently sepd.

Amino acid salts from albuminous material. Karl Bromig. U. S. 1,938,512, Dec. 5. Albuminous material such as offals or malting barley is digested with  $H_2SO_4$  until the material is decompd. into amino acids of low mol. wt.; a Ca compd. such as lime is added to the resulting soln. to ppt. the  $H_2SO_4$  as  $CaSO_4$ , the latter is filtered out, the filtrate is neutralized (suitably with NaOH), and the resulting neutral filtrate is decolorized with decolorizing C and then evapd. to recover a dry pulverulent salt mixt. which may be used instead of NaCl for flavoring foods.

Apparatus for concentrating fruit juices. Mihan K.

Seraillan. Fr. 42,620, Aug. 23, 1933. Addn. to 644,180 (C. A. 23, 1699).

Deaerating freezing system for liquids such as citrus fruit juices. Ralph V. Grayson (50% to organizers of a corp. to be formed and known as Refrigeration Patents and Processes, Inc.). U. S. 1,938,522, Dec. 5. Various features of construction and operation of a vacuum freezing system are described.

Coffee preparations. Hanns Dyckerhoff. Fr. 753,692, Oct. 21, 1933. See Brit. 394,621 (C. A. 27, 5841).

Food for animals. Kenneth Cookson. Brit. 398,167, Aug. 28, 1933. A N-rich food, comprising products of animal origin and (or) vegetable products, which has not been heated, is triturated, and salts of Ca, K, Fe, P and Cl and (or) I are incorporated in amt. not less than 5% of the total wt., the mixt. being molded. Thus bean meal, bran,  $Ca_3(PO_4)_2$ , NaCl,  $CaCO_3$ ,  $Fe_2O_3$ , and KI are triturated, heated to reduce the moisture content, mixed with molasses and molded into tablets or cakes.

Preserving forage. I. G. Farbenind. A.-G. Fr. 754,001, Oct. 30, 1933. Green forage is preserved by mixts. or solid mol. compds. of  $H_2PO_4$  and primary alkali or Ca phosphate, e. g.,  $NaH_2PO_4 \cdot H_2PO_4$

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Reform of teaching methods of chemical technology. A. W. Schmidt. *Angew. Chem.* 46, 791-2(1933).—A discussion of the problems of German chem. engineering institutions with regard to lab. training. K. K.

Modern solvent industry. E. W. Reid. *Ind. Eng. Chem.* 26, 21-3(1934). E. H.

Solving difficult solvent-recovery problems with silica gel. Adolf Koopmann. *Kunststoffe.* 23, 205-7(1933).—The advantages of silica gel in solvent-recovery systems are discussed and illustrated. J. W. Perry

A study of solvents for methane. V. A. Karzhavin and S. Yu. Gerchikova. *J. Chem. Ind. (Moscow)* 1933, No. 7, 26-32.—The soly. of  $CH_4$  in low-boiling benzene is sufficient to warrant its use in removing this gas from H-N mixts. Low temp. and high pressure should be used. Kerosene and heavier oils are not satisfactory.

H. M. Leicester  
Studies in agitation. III. The simple agitator as a classifier. A. McLaren White and S. D. Sumnerford. *Ind. Eng. Chem.* 26, 82-3(1934); cf. C. A. 27, 5842.—Further expts. on the distribution of sand suspended in water are reported. The coarse material was found to be coned. beneath the paddle agitator and the fine was distributed irregularly throughout the water. L. W. T. C.

Cooling condensing water. F. Johnstone Taylor. *Steam Engr.* 2, 545-7; 3, 25-7(1933). A. H. Emery

Problems of technical reactions. I. Decomposition of carbon compounds (cracking, sugar splitting). Otto Schmidt. *Z. Elektrochem.* 39, 969-81(1933); cf. C. A. 28, 233.—A review. E. H.

Air-raid protection by artificial fogs. Wilhelm Holzamer. *Kolloid-Z.* 65, 377-8(1933).—A review of ideal specifications and patents relating to the manuf. of artificial fogs. Arthur Fleischer

A systematic classification of chemical warfare agents. Albert Hloch. *Z. ges. Schiess-Sprengstoffes.* 28, 396-8(1933).—The chem. warfare agents are classified on the basis of their physiol. action into 2 main groups, irritant agents with secondary toxic action (Group I) and toxic agents with secondary irritant action (Group II). Each of these groups is subdivided into 2 subgroups. Several agents which do not comply strictly with the properties of any subgroup are classified separately under the subgroup to which they most nearly belong. German wartime code names and the markings on German wartime shell in which they were used are also indicated. Group I, subgroup 1 (eye irritants, secondary toxic action, high volatility (more than about 0.1 mg./l.)): xylyl bromide, benzyl bromide, benzyl iodide, bromobenzyl cyanide, bromoethyl acetate,

iodoethyl acetate, chloroacetone, bromoacetone, iodoacetone, bromoethyl methyl ketone, phenylcarbamylamine chloride, acrolein. Chloroacetophenone and bromoacetophenone are classified separately under this subgroup. Subgroup 2 (nose and throat irritants, secondary toxic action, low volatility (less than 0.005 mg./l. at 20°), smoke agents): diphenylchloroarsine, diphenylcyanoarsine, diphenylaminechlorarsine. Group II, subgroup 1 (respiratory poisons with little irritant action, high volatility (more than 20 mg./l. at 20°)): chlorine, phosgene, trichloromethyl chloroformate. Chloropicrin, ethyldichloroarsine and methyldichloroarsine are classified separately under this subgroup. Subgroup 2 (vesicants with lasting effect, low volatility (less than 0.6 mg./l. at 20°)): dichlorodiethyl sulfide, dibromodiethyl sulfide, chlorovinylidichloroarsine. A. L. Kibler

The gas mask in the service of the worker. (The gas mask in industry.) Erich Neitzel. *Gasmaske* 5, 158-65(1933).—Accidents are described which occurred in industrial plants in Germany during the year 1931 and which could have been prevented by the use of gas masks. Injuries from such causes amounted to 1408 of which 249 proved fatal. A. L. Kibler

The design and equipment of a gas-protected station for the care of war-gas casualties. Otto Muntsch. *Gasmaske* 5, 175-85(1933).—The Gas Station is designed for erection by large manufacturers of poison gases but is also intended to be used in the general scheme of protection against war gases in case of a war on German territory. A. L. Kibler

Gas war on the Vulcano Island (analysis of volcanic gases). F. Bernauer. *Gasmaske* 5, 166-73(1933).—Analyses were made of volcanic gases collected on the Vulcano Island in the Lipari group. Of 19 samples collected in shallow water off shore the analyses ranged as follows:  $H_2S$  10-25% (extreme values 4.5-52%),  $CO_2$  30-96%,  $O_2$  0-8%. Samples collected in the crater ranged as follows: acid gases ( $SO_2$  and  $CO_2$ ) 82-92%;  $H_2S$  6-11%; undetd. 1-12%. Temps. as high as 560° were measured where the gases emerged. A. L. Kibler

Heat transfer in mercury systems. W. T. Moore. *Mech. Eng.* 55, 748-50(1933).—Superheated Hg vapor was cooled and condensed inside an exptl. coil condenser. Water was heated, vaporized and superheated outside the coil to abstract the heat content of the Hg. Approx. overall heat-transfer coeffs. from condensing Hg to boiling water were estd. to be between 200 and 400. L. W. T. Cummings

The recent laws of heat flow by convection. Jean

Merlan. *Chaleur & ind.* 14, 467-77(1933).—A math. discussion of the more recent developments in heat flow by convection. Exptl. verifications are presented as far as available for gases and liquids. Karl Kammermeyer

Notes on the heat insulation of a vacuum still. Otto Krebs. *Chem.-Ztg.* 57, 861-3(1933).—Detailed calcs. for the insulation of a still, column, heat exchanger, and pipe lines are carried out with the latest available data. Karl Kammermeyer

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Moyer, J. A., Calderwood, J. P., and Potter, A. A.: *Elements of Engineering Thermodynamics*. 5th ed., revised. New York: John Wiley & Sons, Inc. 192 pp. \$2.50. Reviewed in *J. Soc. Western Engrs.* 38, 299(1933).

Schack, Alfred: *Industrial Heat Transfer*. Translated from the German by Hans Goldschmidt and Everett P. Partridge. New York: John Wiley & Sons, Inc. 371 pp. \$5.

Cooling gases. Siemens-Schuckertwerke A.-G. (Richard Heinrich, inventor). Ger. 581,865, Aug. 12, 1933. Hot gases, especially furnace gases, are cooled ready for elec. cleaning by intermixing with a current of supercooled gas supersatd. with a mist.

Separating gases by liquefaction. Mapag Maschinenfabrik Augsburg-Plattling A.-G. Fr. 753,726, Oct. 23, 1933. In sepg. gaseous mixts. of low b. p. into their constituents, with recovery in the liquid or gaseous state of the constituent of highest b. p., the vaporization of this constituent is effected only by the sensible heat of a part of the gaseous mixt. which is cooled not to satn. in an expansion machine. The washing liquid necessary for the rectification is produced independently of the vaporization of the above constituent in a particular liquefier by the sensible cold of the constituent. The process is applied to the sepn. of O from air.

Removing dust from gases by injecting steam and water. Joseph Jacquemotte. Fr. 754,264, Nov. 3, 1933.

Purifying liquefied gases. Lawrence J. Bowditch. Fr. 754,117, Nov. 2, 1933. Gases are passed through a heat exchanger to produce a change of heat such that several phases coexist in the heat exchanger, and a purified gaseous fraction is sepd. An app. is described.

Purifying liquefied gases. Walter F. Moeller. Fr. 754,118, Nov. 2, 1933. Liquefied gas is passed into a heat exchanger to vaporize a part of the liquid therein. A gaseous fraction is drawn off from the exchanger and cooled for recondensation. An app. is described.

Separating liquids. Compagnie des Fives-Lille. Fr. 752,960, Oct. 4, 1933. Mixed liquids obtained by the azeotropic method from distg. app. are sepd. by a decanter under pressure which allows the visible line of sepn. of the liquids to be brought to any level. The decanter is completed by the addn. of accumulator vats giving elasticity to the operation and allowing the various columns to be fed in a const. manner.

Separating colloidal mixtures. Gaston Laubier. Fr. 752,870, Oct. 2, 1933. The constituent elements of a colloidal gel are sepd. by a centrifuge, the speed of which is automatically regulated according to the nature of the gel to be treated, by a cam or other mech. or elec. arrangement.

Separating and recovering constituents of sea water. Alfred M. Thomsen. U. S. 1,937,995, Dec. 5. Suspended impurities are removed by the addn. of a sol. hydroxide such as lime. Lime and magnesia are jointly removed by adding an alk. carbonate such as  $\text{Na}_2\text{CO}_3$ . The residual sea water is partially concd. by evapn., Cl is then passed into it to recover Br, and the evapn. is continued until remaining salts are recovered.

Solvents. Fabrication française de produits du lait. Fr. 753,891, Oct. 26, 1933. A calcd. amt. of anhyd. Cl is caused to react directly with vapors of EtOH to convert it to AcOEt, passing through the stages of AcH and AcCl. Acetylacetone is prepd. by causing anhyd. Cl to react on a mixt. of vapors of EtOH and  $\text{C}_6\text{H}_6$  in the presence of anhyd.  $\text{AlCl}_3$ , then treating the resulting product with water to sep. acetylacetone. Cf. C. A. 27, 4670.

Coloring solvents, fats, etc. I. G. Farbenind. A.-G. (Hermann Rohrbach, inventor). Ger. 581,845, Aug. 3, 1933. Org. solvents, fats, waxes, etc., are colored by using azo dyes contg. no COOH or  $\text{HSO}_3$  groups and contg. 1 or more hydrogenated rings. Thus, the solvents, etc., are colored with the dyes, aminobenzene-azo  $\rightarrow$  tetrahydro-2-naphthol, or 1-aminonaphthalene-azo  $\rightarrow$  tetrahydro-1-naphthol.

Oil emulsions. Charles F. Pitts. Brit. 397,317, Aug. 24, 1933. A permanent colloidal suspension of oil in  $\text{H}_2\text{O}$ , suitable for removing oil, grease and dirt from locomotives, machinery, etc., is made by injecting minute amts. of oil into a high-pressure stream of  $\text{H}_2\text{O}$ , both being heated to approx. the same temp., e. g., 110-60° F. App. is described.

Deodorizing "industrial" carbon dioxide. Ralph H. McKee. U. S. 1,937,832, Dec. 5.  $\text{CO}_2$  is freed from odorous impurities by contacting it under pressure with about 0.01% of  $\text{O}_3$ . App. is described.

Apparatus for liquefying and storing gases such as carbon dioxide supplied in solid form. Thomas F. Lundy (to  $\text{CO}_2$  Appliance Co.). U. S. 1,938,034, Dec. 5. Various structural and operative details are described.

Solid carbon dioxide. I. G. Farbenind. A.-G. (Wilhelm Meiser, inventor). Ger. 579,624, July 1, 1933. A process is described for forming solid  $\text{CO}_2$  from precooled liquid  $\text{CO}_2$  by compression and cooling.

Apparatus for producing solid carbon dioxide. Maschinenfabrik Sürth Zweigniederlassung der Gesellschaft für Linde's Eismaschinen A.-G. Ger. 581,727, Aug. 1 1933.

Refrigerating system for separating gases such as in removing water vapor from air. Mathias Fränkl (to American Oxythermic Corp.). U. S. 1,936,622, Nov. 28. Various details of app. and operation are described.

Heat-exchange apparatus suitable for refrigerating systems. Alvin H. Baer (to Frick Co.). U. S. 1,937,802, Dec. 5. Structural features.

Refrigerating agents. Soc. anon. des ateliers de constructions mécaniques Escher Wyss. Fr. 753,946, Oct. 27, 1933.  $\text{BCl}_3$  is used as a refrigerating agent in cycles in which the agent is compressed.

Refrigerating liquid. Allgemeine Elektrizitäts-Ges. Ger. 583,683, Sept. 7, 1933. The working liquid of a refrigerator consists of  $\text{HCOOCH}_3$  and a 5-10% addn. of a low-boiling alc. such as  $\text{MeOH}$  or  $\text{EtOH}$ .

Respirators. Deutsche Gasglühlicht-Auer-G. m. b. H. Ger. 579,874, July 1, 1933. Catalytically acting water-sensitive filter layers of respirators contain a nitride of a metal of the 2nd group of the periodic table so that exhaustion of the air is indicated by development of  $\text{NH}_3$ .

Gas-proof masks. Maurice Baudou. Fr. 751,103, Aug. 28, 1933. One or more sheets of Cellophane are inserted between sheets of rubber or rubberized cloth, the Cellophane being perforated, if necessary, to adhere to the rubber, forming a mask impervious to yperite, etc.

Dielectric compositions. Frank M. Clark (to The British Thomson-Houston Co. Ltd.). Brit. 397,333, Aug. 24, 1933. A dielec. compn. comprises an aryl phosphate and a phenolic material, mixed or assoc. together without heat treatment, e. g., tritolyl or triphenyl phosphate and cresol or  $\text{PhOH}$ . Paper, e. g.,



kraft paper, is impregnated with the mixt. and used as the dielec. in condensers. Cf. C. A. 28, 52<sup>1</sup>.

**Dielectric materials.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 42,469, July 31, 1933. Addn. to 711,858. The material is composed of mixts. of neutral phosphoric esters, preferably arylphosphoric, with phenols or alcs. Cf. C. A. 28, 548<sup>2</sup>.

**Compound sheet material.** The British Thomson-Houston Co. Ltd., Geo. R. R. Bray and Reginald I. Martin. Brit. 397,243, Aug. 24, 1933. Fire-resistant, sound and heat-insulating compd. sheet material comprises surface layers of fibrous material, e. g., cotton or linen cloth, paper, asbestos, bonded by synthetic resin, and interior layers of felt, with or without layers of other

material, e. g., woven or sheet asbestos, the layers being united by synthetic resin or by intermediate layers of fabric or paper treated with synthetic resin.

**Cables, etc.** E. I. du Pont de Nemours & Co. Brit. 398,225, Sept. 11, 1933. A rubber insulated conductor is rendered oil-proof by a sheath of cotton, silk, asbestos or rayon fabric, impregnated with a (synthetic) resin soln., over which may be applied a cellulose lacquer or varnish coating. Modifiers, e. g., tritoly phosphate, triacetin, may be added to the resin to increase its flexibility.

**Electrical insulation.** Wm. B. Wiegand (to Binney & Smith Co.). U. S. 1,938,308, Dec. 5. Rubber insulation such as that used on wire contains dry raw carbon black 1.4-3% which serves to give increased resistivity.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**The water supplies of large and middle-sized German cities.** E. O. Stein. *Gesundh.-Ing.* 56, 583-5(1933).—Statistical data. M. G. Moore

**A comparison of hardness in the Dallas water before and after treatment in the city water plant.** W. D. Frazell and Henry Lewelling. *Field and Lab.* 2, 8-10(1933).—Data are given for total alky., and temporary and permanent hardness. M. G. Moore

**Water pretreatment works at Sacramento.** Don M. Hoffman. *Western Construction News* 8, No. 3, 75-8 (1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 50(Apr. 29, 1933).—The treatment consists of coagulation, mech. filtration and chlorination. The new pretreatment works consists of a detritor with rotary traction agitator and sand-cleaning unit, aeration fields, mixing tanks, clarifiers and surfassetlers with sludge-removal units. From the surfassetlers the water goes to the filter beds. The pretreatment plant was built in 1924 and serves 100,000 people. C. R. Fellers

**Delicate floc formed in Ottawa water makes necessary a plant with unusual features.** A. D. Stalker. *Water Works Eng.* 86, 1143-6(1933).—The construction and operation of the plant are described. The raw water is dosed with alum, is very gently mixed so as not to break up the delicate floc by passing with spiral motion through the mixing basins, passes through settling basins without baffles (90% of the floc can be settled), and then to rapid sand filters. M. G. Moore

**Industrial water purification research.** Sheppard T. Powell. *J. Am. Water Works Assoc.* 25, 1577-88(1933).—Emphasis is given to embrittlement, boiler-scale and steam-purification research. D. K. French

**Progress in water purification.** George W. Fuller. *J. Am. Water Works Assoc.* 25, 1566-76(1933).—The survey covers the period 1869 to 1933. D. K. French

**The purification of water by activated charcoal.** Franz Krczil. *Kolloid-Z.* 65, 249-54(1933).—History of development and patent review covering methods of treating sewage, industrial waste waters, especially phenolic liquors, dechlorination, and special app. Arthur Fleischer

**Certification of water supplies used by common carriers.** R. E. Tarbett. *Trans. 30th Ann. Conf. State and Territorial Health Officers with U. S. Pub. Health Service*, 66-80; *U. S. Pub. Health Eng. Abstracts* 13, W, 32-3(Mar. 18, 1933).—Increased cooperation among states in the use of standard procedures has greatly improved certification. C. R. Fellers

**Mechanism of the sterilization of water by "verdunization."** P. Reiss and E. Téhoueyres. *Compt. rend. soc. biol.* 114, 1046-8(1933).—Hypochlorite equiv. to 0.1 mg. per l. added to well water having an oxidation-reduction potential of +387 mv. ( $r_H$  28.2,  $p_H$  7.4) raised the potential to +584 mv. ( $r_H$  34.5). This is high enough to kill *B. coli* and pathogenic bacteria. L. E. Gilson

**Successful experiments in use of prechlorination in the removal of manganese.** M. J. Davis. *Water Works Eng.* 86, 1192-3(1933).—The raw water of Wellsburg, W. Va. first passes over a coke aerator, then through a sedimentation basin, a pressure sand filter, and a clear well. Then

1/4 of the discharge flows through a zeolite softener of the pressure type, 3/4 being by-passed directly to the reservoir. It was found that the 1.0 p. p. m. of Mn in the raw water could be successfully removed by chlorination with 8.9 p. p. m. Cl<sub>2</sub> between the aerator and the sedimentation basin, all of the pptd. MnO<sub>2</sub> being removed in the latter or on the filter. The treated water showed no Mn. M. G. Moore

**Removal of aggressive carbon dioxide by contact beds of limestone or marble.** C. R. Cox. *J. Am. Water Works Assoc.* 25, 1505-22(1933).—Results at several exptl. plants are recorded. The softer limestones and marbles are preferable. For 1 m. g. d. beds 85 to 185 cu. yds. are considered ample. Size 1-a is recommended. The method provides automatic treatment for corrosion prevention for water of low alky. without aeration, and water of 50-100 p. p. m. alky. with aeration. D. K. F.

**Control of iron and manganese in filter sand.** Paul W. Frisk. *J. Am. Water Works Assoc.* 25, 1537-50(1933).—Fe and Mn oxides accumulated on filter sand can be removed by 6 to 12 hrs. soaking in a 10% NaOH soln. followed by washing. Apparently 0.1% Mn and 0.2% Fe in the sand bed have no effect on the quality of the effluent. Oxidation, coagulation and catalytic agents in the sand can completely remove Mn and Fe in a raw water. D. K. French

**Some aspects of trickling filter design.** H. G. Furphy. *Commonwealth Engr.* 21, 71-4(1933).—Such filters should be constructed so that (1) every particle of sewage comes in contact with O<sub>2</sub> and with the microorganisms which coat the filter medium; (2) air circulation is sufficient to supply enough O<sub>2</sub> and carry off CO<sub>2</sub> fast enough to prevent its concn. reaching more than 0.2%; and (3) vigorous growth of the organisms of the filter coating is maintained. A balance must be struck between small filter material which favors (1) and material of large size which favors (2). An organism continually bathed with sewage will not receive sufficient O<sub>2</sub>, so (3) requires intermittent flow, the length of interval between flow being unimportant. If no dry surface is available about the filter the breeding of the filter fly, *Psychoda alternata*, is retarded. M. G. Moore

**Proposed plan for ammonia-chlorine treatment in Chicago.** A. E. Gorman and H. H. Gerstein. *J. Am. Water Works Assoc.* 25, 1482-9(1933).—To meet the problem of increasing bacterial pollution, Chicago is prepg. to substitute the use of NH<sub>3</sub> and Cl for simple chlorination. Decreased velocity in action of NH<sub>3</sub>-Cl treatment has led to the idea of application at the intake cribs, rather than at the pumps. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> will be applied near the top of the intake shaft and Cl near the bottom, at the eye of the tunnel. There will be continuous control at the 68th St. Pumping Station. D. K. French

**Report of Committee on Control of Tastes and Odors in Public Water Supplies.** Martin E. Flentje, et al. *J. Am. Water Works Assoc.* 25, 1490-1504(1933).—A final report. A complete summary is given of the field covered, also the

detailed results of cooperative work with the "Spaulding threshold method of odor determination," in which increased confidence is placed. D. K. French

Sodium aluminate as an adjunct to lime-soda feed-water treatment. C. N. Ridley. *Steam Engr.* 3, 105-7(1933).—Suspended matter ( $Mg(OH)_2$ ) passing the filters after lime-soda treatment was removed satisfactorily by means of Na aluminate. Alden H. Emery

Automatic control instruments applied to the zeolite water-softening process. Eric Pick. *Instruments* 6, 215-18(1933). E. H.

Disposal of sludge at water-purification and softening works of the Mahoning Valley Sanitary District. W. H. Dittoe. *J. Am. Water Works Assoc.* 25, 1523-33(1933).—The wet sludge is pumped into artificial ponds, where further settling occurs. It is believed that when a pond is filled under favorable conditions the sludge will dry to about 50% moisture. The ultimate disposal is not settled. D. K. French

Should a water works treating river water return the sludge to the river? P. Timler. *Gesundh.-Ing.* 55, 66(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 34-5(Mar. 25, 1933).—In Glauchau there is insufficient flow in the River Mulde to prevent settling, putrefaction and nuisance. In general, the sludge should not be returned. C. R. Fellers

Water as a carrier of pathogenic bacteria. Hunziker. *Schweiz. Ver. Gas- Wasserfach. Monats-Bull.* 11, 301-10(1931); *U. S. Pub. Health Eng. Abstracts* 13, W, 34(Mar. 25, 1933).—According to the Swiss law pipes or tanks to hold drinking water must not be made of Pb, Pb-coated Fe or tin-coated Pb. After standing in the pipes water must not contain more than 1 mg. of Pb per l. Low pressure in pipes may lead to pollution from factory supplies. Swiss water supplies have improved greatly in sanitary quality by the installation of properly operated filters and chlorination plants. C. R. Fellers

Current research in water bacteriology. John F. Norton. *J. Am. Water Works Assoc.* 25, 1473-81(1933). Special reference is made to Brilliant Green Bile and the Dominick-Lauter Medium and the various methods for differentiation within the coli-aerogenes group. The present "standard" methods are far from perfect, and the more newly developed methods should be used with caution. D. K. French

Sanitary survey of artificial-ice plants. Warren J. Scott. *Conn. Health Bull.* 47, 11-15(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 32(Mar. 18, 1933).—Forty-one of the 50 plants obtained water from pure public supplies. All but 3 plants were equipped with pressure filters and used alum as a coagulant. Only 2 plants were rated "poor." C. R. Fellers

Ayr and its municipal works. J. Young. *J. Munic. County Eng.* 58, 1533(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 48(Apr. 29, 1933).—Sewage is screened and discharged at selected spots in the Firth of Clyde. The 2 sources of water supply are spring water and impounded moorland water. The latter is acid and must be neutralized to prevent Pb soln. The spring water has a hardness of 12° and is mixed with the moorland water and stored in a reservoir holding 2 days' supply. After settling, the water is filtered. C. R. Fellers

Industrial sewage in city sewage systems. H. Möhle. *Tech. Gemeindeblatt* 36, 205-9(1933).—Troubles in the mains due to industrial wastes include attacks upon the pipes by acids, production of poisonous or explosive gases or gas mixts., and clogging of the pipes by heavy sediment, particularly when fibers, as from paper mills, are also present. M. G. Moore

The chief line of development in sewage technic. K. Imhoff. *Gesundh.-Ing.* 56, 585-6(1933). M. G. M

Extending the settling basins at the sewage-treatment plant at Halle. Heilmann and Müller. *Gesundh.-Ing.* 56, 571-3(1933).—As ample digestion space was already available, the 4 adanl. 2-story units added had only 1 cu. m. of digestion space to 9.5 cu. m. of settling space, the settled sludge being transferred to the old plant for digestion. M. G. Moore

Apple wastes create operating difficulties in sewage plant. P. P. Pilcher. *Munic. Sanit.* 3, 485(1931); *U. S. Pub. Health Eng. Abstracts* 13, S, 22(Apr. 1, 1933).—Acid apple-plant wastes discharged into sewers cause heavy foaming and objectionable odors in Imhoff-tank sprinkling-filter plants. Remedies applied consist of spraying foam with liquor taken from just above the sludge line by pump, and use of chloride of lime. C. R. Fellers

Sanitation works in small towns. Tuckfield. *Gas- u. Wasserfach* 75, 30(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 34(Mar. 25, 1933).—The water and sewage works in Luben, 8000 population, are described. The ground water supply from 5 wells corroded Fe and Zn piping so badly that Cu and asphalt coating was applied. After this treatment the  $CO_2$  content increased from a trace to 18 mg. per l. Treatment by aeration, by spraying for Fe removal and rapid filtration was then supplemented by de-acidification by lime water at the rate of 900 l. per hr. for an hourly water demand of 64 cu. m. This gave the water an Fe content 0.15 mg. per l., no aggressive  $CO_2$  and a total hardness (German) of 3.36°. C. R. F.

Sterilization of water by silver. Sarrot du Bellay. *La Nature* No. 2887, 149-50(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 33(Mar. 18, 1933).—The catadyn process makes use of very finely divided Ag as a filtering medium. About 0.00006 g. of Ag per l. goes into soln. as Ag ion in combination with dissolved  $O_2$  of the water, and creates an elec. field fatal to bacteria and to some molds and enzymes. This small quantity of Ag is of no health significance. Water sterilized by the catadyn method possesses to a limited degree, the power of sterilizing adanl. raw water. The process is thus useful in maintaining the sanitary quality of the water in swimming pools. No preliminary treatment is required, and the cheapness of the equipment adapts the process to use on small supplies. C. R. Fellers

Some factors involved in the use of chloramines for the disinfection of swimming pools. A. H. Fletcher and E. C. Link. *Am. J. Pub. Health* 23, 1255-61(1933).—The use of chloramines instead of  $Cl_2$  alone requires certain extra tests and control to guard against its limitations. Some of these are (1) higher residuals—0.7 to 1 p. p. m., (2) control of the ratio of  $NH_3$  to  $Cl_2$  and of the free  $NH_3$  content of the water, (3) routine control of  $pH$  and (4) collection of all samples in  $Na_2S_2O_5$ -treated bottles. The duplicate series of tests run on ordinarily collected samples and dechlorinated collected samples showed a lag in the killing power of chloramines over the  $Cl_2$  on *Es. coli*. A moderate excess of  $Na_2S_2O_5$  when used as an antichlor was found to have no disinfecting effect.  $CuSO_4$  definitely and completely controlled algae or slime growth if added every second night at a dosage of 5 lb. to each 100,000 gal. of water. J. A. Kennedy

Recent progress made in plants for the purification and re-utilization of the water for swimming baths. W. A. Hoveman. *J. Inst. Sanit. Eng.* 36, 87(1932); *U. S. Pub. Health Eng. Abstracts* 13, Sw,5(Apr. 29, 1933).—The development of the present continuous purification systems is described. The best modern practice is to draw the water from the deepest part of the pool through a strainer. It may or may not be aerated before passing to the filters. Alum and soda are normally added as needed before filtering at the recommended rate of 200 gal. per sq. ft. per hour. After filtration, the water is aerated, heated and chlorinated so that a  $Cl$  residue of 0.2-0.5 p. p. m. is maintained in the bath. Ammonia- $Cl$  treatment is optional. C. R. Fellers

Bacterial pollution of swimming baths. III. Presence of bacteriophage in fresh, sea and sea-bath waters. B. L. Davis. *J. Roy. Army Med. Corps* 61, 18-25(1933); *U. S. Pub. Health Eng. Abstracts* 13, Sw,9(July 22, 1933).—Fresh sea water has a low bacterial count, but the count increases when the water is stored in sea-baths. After a short period the bacteria again decrease irrespectively of the no. of bathers. No demonstrable bacteriophage against staphylococci, pneumococci, dysentery types, *Es. typhi* or *Salmonella schottmülleri*, could be demonstrated i

the sea-bath water. Hence the decreased nos. of bacteria are not due to a bacteriophage. C. R. Fellers

**Experimental studies of natural purification in polluted waters. VIII. Dissolved oxygen in the presence of organic matter, hypochlorites and sulfite wastes.** Emery J. Theriault and Paul D. McNamee. *U. S. Pub. Health Repts.* 48, 1363-77 (1933).—Expts. were undertaken to test the extent of interference with the Winkler method by various forms of org. matter. The apparent loss of dissolved oxygen is progressively greater with increasing amts. of glucose, irrespective of the procedure used. The reaction between  $\text{MnSO}_4$  and the alk. iodide reagent is practically complete in 15 sec. at ordinary temp. when intimate contact between the dissolved O and the  $\text{Mn}(\text{OH})_2$  is maintained through the soln. Reasonably accurate results for dissolved O can be obtained even in the presence of 5000 pts. per million of glucose, provided the period of alkalization does not exceed 15-25 sec. Abbreviation of the period of alkalization is also effective in reducing interference due to peptone. Interference by sulfite wastes could not be overcome by use of the various modifications of the Winkler method. For these wastes add enough alk. hypochlorite reagent (1 M NaOCl in 0.1 M NaOH) to oxidize the sample, avoiding a great excess, mix well by inverting rapidly a few times, acidify the sample by adding 1 ml. of 10%  $\text{H}_2\text{SO}_4$  and add 1 ml. of 1 M KI or NaI to release  $\text{I}_2$ , shake, neutralize the liberated  $\text{I}_2$  with 0.1 or 0.025 M  $\text{Na}_2\text{SO}_3$ , with 0.2 ml. of starch soln. as indicator. Relatively low results will be obtained when more than 3 ml. of 0.05 M sulfite is required for the neutralization of the  $\text{I}_2$ . If only about 0.1 ml. of 0.05 M sulfite is required, insufficient alk. hypochlorite has been used. Add 1 ml. of the usual  $\text{MnSO}_4$  soln. and 1.3 ml. of alk.  $\text{I}_2$  soln. The period of contact with the  $\text{MnSO}_4$  should not exceed 40-50 sec. Titrate without delay, as a measurable loss of  $\text{I}_2$  occurs on standing. J. A. Kennedy

**Charcoal as a diluent for Paris green in the destruction of Anopheles larvae.** Paul F. Russell and Augustus P. West. *Philippine J. Sci.* 48, 291-7 (1932); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 5 (Mar. 25, 1933); cf. C. A. 27, 800.—A dust spray of wood charcoal with 1% Paris green kills over 80% of *Anopheles* larvae in 4 hrs., and 100% of the larvae in 24 hrs. The particles of Paris green must be small enough to be ingested by the larvae, must be distributed to all parts of the breeding area, must float long enough for the larvae to devour them, and must not be dangerous to other living creatures. Charcoal floats much longer than Paris green, is inexpensive and easily distributed.

C. R. Fellers  
**Further observations on Chara fragilis in relation to mosquito breeding in Queensland.** R. Hamlyn-Harris. *Ann. Trop. Med.* 26, 519-24 (1932); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 6 (Mar. 25, 1933).—*Chara fragilis* in its full-growing, fruiting or decomp. states has no deterrent value whatever on the breeding of *Stegomyia fasciata*, *Culex fatigans* or *Aedes notoscriptus*. C. R. F.

**Behavior of Cu and Zn and their alloys toward tap water (Haase) 9.** Should Cu [pipes] be coated with Sn? (Haase) 9.

**Purifying water.** Permutit A.-G. Ger. 584,696, Oct. 12, 1933. Water is aerated and deacidified by atomization in an air current. The treated water is then filtered.

**Purifying water.** Gustav Rittler. Fr. 751,543, Sept. 5, 1933. Water is purified by adding  $\text{H}_3\text{PO}_4$  and a sol. Ba salt (proportional to the amt. of sulfate in the water) and then adding a hydroxide of Ca, Mg or  $\text{NH}_4$ .

**Water purification.** Maufice Fontaine, François Sen-

tenac and Robert Cambier. Fr. 753,402, Oct. 16, 1933. Waste waters are purified by mixing them with activated muds at the origin, the purification taking place by simple contact during the flow.

**Apparatus for treating water with chlorine.** Filtration & Water Softening Proprietary Ltd. (Michael J. Martin and Walter R. Terry, inventors). Australia 7969/32, July 27, 1933.

**Means for preventing water containing chlorine from reaching apparatus for controlling the supply of chlorine for the treatment of water.** John C. Baker. Brit. 398,124, Sept. 7, 1933.

**Base-exchange water-softening apparatus.** Eric Pick (to Permutit Co.). U. S. 1,937,324-5, Nov. 28. Structural and operative details.

**Base-exchange water-softening apparatus.** Norman E. Brice (to Permutit Co.). U. S. 1,937,330, Nov. 28. Structural, mech. and operative details.

**Base-exchange water-softening apparatus.** United Water Softeners Ltd. Brit. 398,130, Sept. 7, 1933.

**Apparatus for regenerating zeolites.** Ward S. Calvert (to Refinite Co.). U. S. 1,937,034, Nov. 28. Various structural and operative details are described.

**Degassing water for boilers.** Rudolf Oertel. Ger. 583,526, Sept. 5, 1933. The gas is removed by active C and heating.

**Apparatus for controlling the concentration of boiler waters.** Gustav H. Karlsteen (to Dunlop Tire and Rubber Corp.). U. S. 1,938,072, Dec. 5. The flow of water is controlled in accord with the d. of a test portion of the boiler water cooled to a predtd. temp. for testing.

**Apparatus for regulating supply of anti-corrosive liquids to boiler feed water.** Frank O. Hutton. U. S. 1,937,893, Dec. 5. Various structural and operative details are described.

**Removing boiler scale.** David W. Haering. U. S. 1,936,714, Nov. 28. Fermented cactus juice is used as a scale-removing agent. Various details of prepn. are given.

**Destruction of microorganisms in water or sewage.** Georg Ornstein. U. S. 1,937,780, Dec. 5. Algae, bacteria, etc., are destroyed by the joint action of a Cu-contg. substance such as Cu chloride and dissolved Cl. App. is described.

**Method and means for supplying air or gas in finely divided form to sewage or other liquid in a tank.** Activated Sludge Ltd., Ernest R. Jones, Arthur B. Denton and James A. Coombs. Brit. 397,841, Aug. 22, 1933.

**Device for separating light liquids from sewage water.** Elise Reichwaldt née Schulze. Ger. 580,643, July 14, 1933.

**Sewage filtration and disposal.** Wm. Raisch and Arthur Wright (to Underpinning & Foundation Co.). U. S. 1,937,481, Nov. 28. Cellulose pulp is added to a stream of sewage passing to a vacuum filter having a rotary filter member under low vacuum to form continuously a relatively wet cake that can be easily repulped; the cake is continuously removed from the rotary filter member, and is repulped with the sewage in the stream passing to the filter. App. is described.

**Tank for treatment of sewage by the activated-sludge method.** Wm. M. Piatt. U. S. 1,937,434, Nov. 28. Various detail of a circulating system are described.

**Bacterial filters for septic effluents.** Bureau technique d'hygiène (Établissements Hygea-Simplex). Fr. 751,483, Sept. 4, 1933.

**Circulating system for purifying the water of swimming pools, comprising a heater, means for treatment with ozonized air and means for sterilization by ultra-violet light.** Waldo M. Bailey. Brit. 398,312, Sept. 14, 1933.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

**A soil survey of the Hundreds of Laffer and Willalooka, South Australia.** J. K. Taylor. *Australia Council Sci. Ind. Research Bull.* 76, 41 pp. (1933).—The Hundreds of

Laffer and Willalooka are typical of considerable areas in South Australia and Victoria covered by mallee and heath vegetation, under a 15-20 in. rainfall. Seven groups of

soil types have been distinguished. All are mature soils. The  $pH$  values of the surface soils and subsoils range from 6.2 to 9.3. An examn. for replaceable bases shows that none of the total base figures is low, and some are moderately high. All the soils are very poor in plant nutrients with the exception of  $K_2O$ , and require material building up particularly by legumes and the const. use of superphosphate. The total sol. salt concn. in all surface and sub-surface sands is low.

J. R. Adams

An index for rating the agricultural value of soils. R. Earl Storie. Calif. Agr. Expt. Sta., *Bull.* 556, 3-44 (1933).—Soils are rated by means of the various profile characteristics, texture and such modifying conditions as acidity, alky., drainage, etc. The relative productive capacity can be well estd. by means of the proposed index for rating soils. The wts. to be given to the several factors are given in detail.

C. R. Fellers

The various forms of organic matter in the soil. F. Yu. Gel'tzer, Yu. A. Rubinchik and T. P. Lasukova. *Chemisation Socialistic Agr.* 1933, No. 5, 37-43.—The authors studied the org. matter content of gray soils of the cotton belt in Turkestan. The org. matter of podzols and chernozems was compared. It is shown that the cellulose and hemicellulose contents vary. Thus the podzols contain 60, the gray soils 52 and the chernozems only 30% of these constituents. On the other hand, the chernozem contains more lignin, up to 70%.

J. S. Joffe

Measurement of size-frequency distribution in soils. Richard Bradfield, G. W. Conrey, J. G. Steele, T. C. Green and F. G. Loughry. Ohio Agr. Expt. Sta., *Bull.* 516 (51st Annual Rept.), 32-3 (1933); cf. *C. A.* 27, 1435.—The study of the efficiency of the methods of dispersion recommended by the Intern. Soc. Soil Sci. and of the modification suggested by the U. S. Bureau of Soils shows that the destruction of org. matter by  $H_2O_2$  is unnecessary in most soils, if they are treated with any of the more efficient deflocculating agents. The methods which gave satisfactory deflocculation are (1) removal of exchangeable bivalent bases by leaching with dil. acids or electro-dialysis, followed by the addn. of sufficient  $Na_2CO_3$  or  $NaOH$  to sat. the sample completely with Na, and (2) the addn. of a liberal excess, 100-400%, of  $Na_2CO_3$  or  $Na_2C_2O_4$  over that required to sat. the sample completely with Na.

C. R. Fellers

The iodine content of soil solution as related to the hydrological history. W. F. J. M. Krul. *Ingenieur* 48A, 216-19 (1933).—The I distribution in the soil of the Netherlands is given on a map, based on numerous borings and analyses. In the north and west, I content of the soil soln. is high as a result of "marine transgression"; only in old dune land the I content is lower. High I was found in the subsoil, little leached out, of polders (100  $\gamma$  per l.). In the east and south, diluvial soil, the I content is low except for a few special cases of unleached marine soil in which high I (up to 200  $\gamma$  per l.) is usually accompanied by high Cl and alkali.

B. J. C. van der Hoeven

The acidity of raw humus in relation to natural covers. W. B. Haines and K. S. Pillay. *J. Rubber Research Inst. Malaya* 5, No. 1, 14-21 (1933).—Nine different fresh plant materials were allowed to decompose in the shade under optimum conditions of moisture and aeration. Highly nitrogenous plants as *Cassia hirsuta* and rubber debris decompd. in 1-2 months while stagmoss and bracken were not fully decompd. at the end of 9 months. Decayed timber and leaves of mixed forest plants had  $pH$  values of 3.29 and 3.84, resp., about 2 units lower than the humus from the material studied.

K. C. Beeson

The acidity of the soils of our (Vercellese) regions. F. De Rege. *Giorn. risicoltura* 23, 173-7 (1933).—Detns. of the  $pH$  of 14 clay, loam and sandy soils, cultivated to clover, grass, tomato, rice and maize, show them to be slightly acid except those submerged (rice culture), which are neutral. The  $pH$  of the irrigation water is 7.2-7.8.

A. R. Merz

A comparison of the methods for the determination of hydrolytic acidity. O. K. Kedrov-Zikhman and A. A. Osina. *Chemisation Socialistic Agr.* 1933, No. 4, 71-8.—

The authors tested the methods of Kappen, Vagel and Waltersdorf for the detn. of hydrolytic acidity and found them inadequate. The Calky method gives slightly better results, but it is not adequate. The method of washing the soil on a funnel, with a 25 g. sample, is considered most reliable although time-consuming.

J. S. Joffe

The influence of soil reaction on the germination of corn and millet. Valentine Schaffer-Kircher. *Arch. Pflanzbau* 10, 324-48 (1933).—Good growths of various corns and millet were obtained within a  $pH$  range of 4.15-8.00 with a max. growth at about  $pH$  7.00. At a  $pH$  of 8.50 a noticeable reduction of yield was found in all cases. Better germination of seeds in cane-sugar soln. at osmotic pressures of 2 and 4 atm. was obtained than at 6 atm.

K. C. Beeson

The influence of acidifying ordinary chernozem on the yield of rye and wheat. I. P. Zaev. *Chemisation Socialistic Agr.* 1933, No. 5, 44-9.—If  $NaHSO_4$  (3-8 tons per hectare) was added to a chernozem soil the yield of rye increased by 2.85 and that of wheat by 3.71 centners per hectare. The  $pH$  of an aq. ext. decreased from 6.61 to 6.0. The water-sol.  $P_2O_5$  increased, but the nitrate content decreased upon the addn. of  $NaHSO_4$ . The yield increase is attributed to the release of  $P_2O_5$ .

J. S. Joffe

The cultivation of grasses and the change in the quantity of available nutrients in the soil. A. V. Vladimirov. *Chemisation Socialistic Agr.* 1933, No. 5, 49-55.—Pot and field expts. with the 3 essential elements usually deficient (N, K and P) on a podzolic soil with grass in the rotation show that K is highly important. The crops following the grasses responded most to K fertilization, next to  $P_2O_5$  and least to N.

J. S. Joffe

Manganese in Malayan soils. C. G. Akhurst. *J. Rubber Research Inst. Malaya* 5, No. 1, 29-34 (1933).—Examn. of a no. of Malayan soils indicated that only 3 had Mn contents that would class them as manganiferous. These were of limestone origin and had a  $pH$  range of 7.7-8.4. Most of the soils showing only a trace up to 0.04% of Mn ranged in  $pH$  from 3.9 to 7.0. Five p. p. m. of Mn were tolerated by rubber plant seedlings, but 10 p. p. m. proved toxic. Seedlings grown in Mn soln. show abnormal quantities of Mn in the root of the rubber plant.

K. C. Beeson

Views on irrigation and water supply. H. T. Burgers. *J. S. African Inst. Engrs.* 32, 3-13 (1933).—A general examn. is made of the phys. and chem. processes relating to conditions within the soil, and of biol. activities and their effect upon microscopic plant life.

A. W. F.

Fixation and penetration of phosphates in Vermont soils. V. L. Weiser. Vt. Agr. Expt. Sta., *Bull.* 356, 3 31 (1933).—Superphosphate penetrates slowly in soils, penetration may be enhanced by various salts of Na, K,  $NH_4$ , and Mg. Na,  $NH_4$  and certain org. phosphates penetrate more quickly in soils than does superphosphate. Exposure of a phosphate to relatively large amts. of soil results in enhanced fixation. Vt. soils have comparatively high fixing power for P. This is explained by the presence of much of the B horizon in the surface soil, due to the loss of a considerable portion of the A horizon through cultivation and erosion. Phosphate fixation in such soils is thought to be brought about chiefly by Fe and Al compds. Certain hydrated oxides and pptd. salts of Fe and Al fix large amts. of P. Certain silicates and minerals, when applied to soils, reduce their fixing power. Org. matter (e. g., specially prepd. humus) also reduces fixation. Liming increases the ability of a crop to recover P. However, chem. studies indicate that liming may sometimes increase fixation. The influence of frequency of application on phosphate recovery varies with the form of phosphatic fertilizer used. Recovery from  $Na_2PO_4$  was greater when small and frequent applications were made, but recovery from superphosphate and Ammophos was greater when large and less frequent applications were made.

C. R. Fellers

The influence of anions on the fixation and mobilization of the phosphoric acid in the soils. A. Demolon and E.

**Bastisse.** *Compt. rend* 197, 1247-9(1933).—The presence of an active anion, one which is fixed by clay, in a soln. of phosphate in contact with the soil lowers the amt. of  $P_2O_5$  fixed by the soil. Inversely the presence of an inactive anion, one not retained by clay, increases the  $P_2O_5$  fixation. An increase in the anion concn. accentuates these phenomena. The presence of active anions gives a higher mobilization of the fixed  $P_2O_5$  in the soil than the presence of inactive anions. Among the active anions are phosphate, silicate, citrate, oxalate and humate; the inactive anions include chloride, nitrate, sulfate and acetate.

J. R. Adams

**Behavior of the Jones lime-requirement determination with progressive decrease in soil acidity.** W. H. Metzger. *J. Am. Soc. Agron.* 25, 789-96(1933); cf. *C. A.* 27, 4009.—Two series of acid soils treated with increasing increments of  $Ca(OH)_2$  were examd. by a modified Jones  $CaO$ -requirement detn. The decrease in  $CaO$  requirement corresponding to a given treatment with  $CaO$  was in all cases below the theoretical value. The agreement was fairly close to theoretical if the change in Jones  $CaO$  requirement was corrected by adding the calcd. amt. of  $CaO$  which would be needed to change the soil alone from the  $pH$  value of the untreated soil in equil. with the  $Ca(C_2H_3O_2)_2$  soln. to the similar  $pH$  value for the treated soil. A zero  $CaO$  requirement value was not obtained until enough  $CaO$  had been added to a soil to raise its reaction considerably above  $pH$  7.0.

J. R. Adams

**The "Lion d'Angers" experiment field.** J. Valentin. *Engrais* 48, 689-91(1933).— $K_2O$  is indispensable for the production of grain, not only in increasing the wt. but more particularly in improving the quality of the crop. Relatively large amts. (400 kg. of  $KCl$  per hectare) of  $K_2O$  are advisable and it is necessary from the beginning of vegetation.  $K_2O$  also has a very favorable effect on the production of the straw, not only in increasing the quantity, but when used in sufficient amt. in increasing its rigidity and resistance to beating down.

J. R. Adams

**Microbiological methods in determining the fertilizer requirements of soils.** V. S. Butkevich and O. G. Naidina. *Chemisation Socialistic Agr.* 1933, No. 4, 62-70.—The authors report a series of expts. with *A. niger* and *A. oryzae* as indices of the fertilizer requirements of the soil. The expts. cover tests with various sources of P, sterilized and unsterilized cultures, and effects of  $pH$  and antiseptics on the reliability of the tests. Comparisons of this method with those of Arrhenius, Mitscherlich, Neubauer and Lemmerman show that the last method gives similar results.

J. S. Joffe

**Microbiological methods in determining the fertilizer requirements of soils.** V. S. Butkevich and O. G. Naidina. *Chemisation Socialistic Agr.* 1933, No. 5, 56-68.—The authors describe in detail the method of detg.  $P_2O_5$  and deficiencies in soils; *Aspergillus oryzae* was used as an index. It has some advantages over *A. niger*. The K deficiency in soils is more easily detected by this method than the deficiency of  $P_2O_5$ , and in general this method compares very favorably with other methods in use.

J. S. Joffe

**Determining fertilizer needs by test.** S. F. Thornton. *Canning Age* 14, 483-4, 503(1933); cf. *C. A.* 27, 4336.—Simple and rapid tests for N, P and K in plant materials are outlined (cf. *C. A.* 26, 5372). Single plants often fail to give reliable data and 6-8 plants should be used for a sample. The results of the tests indicate the relative nutrient level as compared with other possible limiting factors and are of most value when all the tests are made together and compared with observable conditions of growth in the field.

C. R. Fellers

**The influence of mineral fertilizers on the botanical composition of meadow vegetation.** B. D. Onoshko. *Chemisation Socialistic Agr.* 1933, No. 4, 46-51.—Exptl. evidence is presented showing that nitrates stimulate the grain type of grasses and crowd out the legumes. A mixed K-P fertilizer favors the legumes. It appears that of the 2 ingredients K is more important for the legumes. With a complete fertilizer the grain-bearing grasses are

more favored. The response of various types of meadows to different fertilizer units has also been tested and the results are discussed.

J. S. Joffe

**Apatite as a fertilizer.** L. J. Vuitchikov. *Chemisation Socialistic Agr.* 1933, No. 4, 60-2.—The effects of apatite alone and in combination with  $(NH_4)_2SO_4$  and manure on several crops were tested for 2 years on a podzolic soil. The results indicate the feasibility of utilizing apatite directly as a source of P, especially on acid soils, and of having the rock ground to a fine powder. The residual effects of apatite are sometimes more marked than the effects of the initial application. Winter rye and vetch-oats mixt. respond to apatite; oats alone do not respond so well.

J. S. Joffe

**Recent developments in nitrogen fertilizers.** C. L. Burdick. *Chem. & Met. Eng.* 40, 638-41(1933).—See *C. A.* 28, 556<sup>4</sup>.

G. G.

**A statistical determination from field tests of nitrogen balances.** Hans Sandhoff. *Arch. Pflanzenbau* 10, 297-323(1933).—A N balance detd. on various soils over a period of years showed that an unfertilized, cultivated soil lost the least or gained the most in soil N, while the application of only a N fertilizer caused the greatest loss of N. Both K and P exerted a favorable action on the N balance. The presence of appreciable amts. of N in the soil on unfertilized plots is due to the fixation of atm. N by soil microorganisms.

K. C. Beeson

**Assimilation of fixed nitrogen by grasses and clovers.** A. B. Beaumont, W. S. Eisenmenger and W. J. Moore, Jr. *J. Agr. Research* 47, 495-503(1933).—In a study of the assimilability of different chem. forms of fertilizer N, 5 grasses and 3 clovers were grown in nutrient solns. contg.  $NaNO_3$ ,  $(NH_4)_2SO_4$  and  $CO(NH_2)_2$ , resp. The order of assimilability of the N in these salts is:  $NaNO_3$ ,  $CO(NH_2)_2$  and  $(NH_4)_2SO_4$  for the grasses; and  $CO(NH_2)_2$ ,  $NaNO_3$  and  $(NH_4)_2SO_4$  for the clovers. The addn. of  $CaCO_3$  to the soln. contg.  $(NH_4)_2SO_4$  for the purpose of buffering it against physiol. change in reaction did not change the order. The results obtained are not meant to be applied to field conditions under which nitrification and other salutary soil processes may considerably alter the condition of applied N.

W. H. Ross

**The source of nitrogen and the active acidity of the medium as factors in the growth of meadow grasses.** V. V. Tzerling. *Chemisation Socialistic Agr.* 1933, No. 4, 52-7.—Expts. are recorded showing that the active acidity of the soil is influenced by the type of N source in the fertilizer. With  $NH_4$  fertilizers and an optimum  $pH$  the plants are enriched with N and mineral substances and also give a high yield. Timothy responds to nitrates in a more acid medium and to  $NH_4$  salts in a more alk. medium. A no. of other grasses and their behaviors are enumerated.

J. S. Joffe

**The influence of nitrogen fertilizers on the activity of phosphates.** A. V. Sokolov. *Chemisation Socialistic Agr.* 1933, No. 4, 33-9.—Expts. are recorded showing that the physiologically acid nitrogenous fertilizers, like  $(NH_4)_2SO_4$ , in combination with raw phosphates do not make the  $P_2O_5$  available unless they are mixed together and placed in the hill. By broadcasting or otherwise mixing the fertilizers with the soil the acidity produced by the acid fertilizer is neutralized by the large bulk of the soil.

J. S. Joffe

**The effects of potassium on the nitrogen availability from ammonia and nitrate for plants.** L. S. Lyubarskaya. *Chemisation Socialistic Agr.* 1933, No. 4, 40-6.—Soln. culture expts. with combinations of  $KCl$  and  $NH_4$  salts have shown that  $KCl$  increased the  $NH_4$  intake by beet seedlings. It is suggested that the Cl and not the K ion is responsible for the increased  $NH_4$  intake. The percentage of org. N also increased. With increased utilization of N there is a corresponding increase in carbohydrate utilization. The combination of  $KCl$  and nitrate increased the nitrate intake. It appears that the K increases the utilization of N by plants.

J. S. Joffe

**Determination of potash in fertilizers.** F. B. Carpenter and R. O. Powell. *Ind. Eng. Chem., Anal. Ed.* 6, 62

(1934).—It is recommended to det. available rather than water-sol.  $K_2O$ . W. T. H.

Potash fertilization of the sugar beet. M. Zehentner. *Zuckerrübenbau* 15, 22-30, 51-3(1933).—An av. crop of sugar beets withdraws about 0.6% of its weight of  $K_2O$  from the soil; an excess of  $K_2O$  in the soil raises the sugar content in somewhat larger proportion than the tonnage of roots. There is evidence that a liberal supply of K salts decreases damage from dry weather; K also appears to give more vitality to young beets; an excess of K hastens ripening. O. W. Willcox

Absorption, utilization and recovery of nitrogen, phosphorus and potassium by apple trees grown in cylinders and subjected to differential treatment with nutrient salts. Walter Thomas. *J. Agr. Research* 47, 565-81(1933).—A study with the pure salts  $NaNO_3$ ,  $Ca(H_2PO_4)_2$  and  $K_2SO_4$  showed that the omission of any one of the nutrient elements from the complete fertilizer is followed by a decreased absorption of the remaining elements. This decreased absorption results in a nutritional lack of balance as exhibited in reduced growth and flowering. The percentage recovery by the trees of added N, P and K is relatively low under all treatments. There appears to exist a sp. ratio in which N, P and K are absorbed by the trees having optimum growth and reproduction. This ratio is approx. 6:1:4. The wide discrepancy shown between the ratio in which these principal nutrient elements are absorbed by the trees and the ratio in which the nutrient salts were applied is indicative of soil effects, viz., leaching of nitrates, and of high fixing capacities of P and K. W. H. Ross

Nutrient elements used by leaves and growth of apple trees. Edmund Burke and H. E. Morris. *Plant Physiol.* 8, 537-44(1933).—Analytical data are given on the amts. of N, P, K, Ca and Mg absorbed by 2 apple trees each 20 years old of equal vigor, growing in a soil low in available nutrients. One (D) was removed and analyzed at the end of the dormant period (April 9) and the other (A) when the leaves had attained max. growth. 66.9% of the N, 66.1% of the Mg, 97.9% of the P, 100% of the K and 83.2% of the Ca of (A) were removed from the roots and soil and utilized for the growth of leaves and season's branch growth. Walter Thomas

Influence of Bordeaux mixture and oil sprays on some of the water relations of plants. J. D. Wilson and H. A. Runnels. Ohio Agr. Expt. Sta., *Bull.* 516(51st Annual Rept.), 44-5(1933).—Transpiration is accelerated by Bordeaux mixt. more during the night than during the day period. A no. of other Cu sprays tested did not cause increased transpiration in tomato leaves. If the Cu is kept const. each addnl. increment of lime added to Bordeaux mixt. increases the influence of the mixt. on the transpiration rate until the quantity of lime becomes about  $1\frac{1}{2}$  times as great as that of the Cu. High-Mg limes are fully as effective as Ca limes. However,  $Ca(OH)_2$  is less effective in increasing transpiration rate than the equiv. amt. of lime. Certain sulfates, other than  $CuSO_4$ , likewise increase transpiration rate. C. R. F.

Injury to apple by petroleum-oil sprays. Paul A. Young and H. E. Morris. *J. Agr. Research* 47, 505-22(1933).—The effects of petroleum-oil emulsions on apple were tested by spraying 25 kinds of oils on the leaves of 2566 apple limbs during 7 yrs. Oils for applications to Hibernial apple leaves and apple buds should not be more than 15 and 45% sulfonatable, resp. The different sulfonatable chemicals in the oils appear to differ in their effects on apple leaves; this explains why low concns. of some oils are more injurious than higher concns. of some other oils. Cresoap emulsions of 1-8% oils are more easily diluted, more uniformly applied and less injurious to leaves than the corresponding Ca caseinate-oil emulsions. The speed with which an oil kills cells or causes plesionecrotic symptoms is an important index of its toxicity as a spray oil. W. H. Ross

The method of action of copper mixtures—role of drying. J. Branas and J. Dulac. *Compt. rend.* 197, 1245-7(1933); cf. *C. A.* 28, 849<sup>a</sup>.—The Cu compds., sol. at the moment of prepn. of the mixt., are rendered totally or

partially insol. depending on the type of mixt. and the method of drying. After drying, the mixts. can be classed in 2 categories: those whose deposits contain enough sol. Cu to render an aq. soln. toxic and those no longer having Cu sol. in pure  $H_2O$  but which require a certain solvent action from impurities of the rain water. J. R. Adams

Chloropicrin and its use for the disinfection of stored materials. L. Mesnil. *Bull. mens. soc. natl. hort. France* 6, 234-7(1933).—A crit. review of the use of chloropicrin as an insecticide shows that it is of unquestionable value although its use is limited by its action on the insect-carrying materials. This action is dependent on the temp., the humidity of the substances to be treated and the length of treatment. J. R. Adams

Sterilization of narcissus bulbs by immersion in silver nitrate-potassium cyanide solution in vacuo. W. Newton, R. J. Hastings and J. E. Boshier. *Can. J. Research* 9, 31-6(1933); *Sci. Agr.* 14, 51(1933).—A mixt. of  $AgNO_3$  0.05% and KCN 0.15%, combined in the ratio of 1 to 3, proved most effective. C. R. Fellers

Rotenone. Its insecticidal value. Joseph M. Ginsburg. N. J. Agr. Expt. Sta., *Circ.* 273, 1-2(1933).—Rotenone dust or ext. is an effective poison for both sucking and chewing insects, particularly aphids, and is non-toxic to plants. Rotenone readily decomposes in sunlight and loses its toxic properties in a few days; hence frequent sprays are needed. One qt. of acetone ext. contg. 5% rotenone and 20% extractives is used in 100 gal. of water for a spray. Rotenone dusts are preferably prepd. by grinding very fine derris roots contg. approx. 3% rotenone with 4-5 parts of inert material. C. R. Fellers

Pyrethrum: its value in exterminating insects. Joseph M. Ginsburg. N. J. Agr. Expt. Sta., *Circ.* 272, 4 pp. (1933).—Formulas for household, greenhouse and garden, and cattle sprays, as well as a mosquito larvicide, are given. Pyrethrum insecticides are affected by sunlight and lose their toxicity in 2-3 days out-of-doors. Pyrethrum vapors are not toxic to insects and are only mildly repellent to flies and mosquitoes. C. R. Fellers

The fungicidal and insecticidal action of Tabacol. Nicola A. Barbieri. *Bull. mens. soc. natl. hort. France* 6, 237-44(1933).—See *C. A.* 27, 4868. J. R. Adams

Acetic ether and carbon tetrachloride with rubber as a killing agent for insects. H. M. Pendlebury. *J. Rubber Research Inst. Malaya* 5, No. 1, 75-7(1933).—Insects placed in tubes contg. a mixt. of crepe rubber, 15% of  $CCl_4$  and 85% of  $EtOAc$  remain in a flaccid state for a considerable time after death. The possibility of the use of such mixts. as insecticides is suggested. K. C. B.

Fumigation of cane grubs. E. Jarvis. *Rept. Bur. Sugar Expt. Stas. Queensland* 33, 62-3(1933).—The economic value of  $CS_2$  and *p*-dichlorobenzene as soil fumigants against cane grubs (larvae of scarabacids) has been proved by several years of farm experience. The kill ranges from 87 to 100%. O. W. Willcox

The control of foot rot of grains. E. W. Schmidt and W. Feistritzer. *Arch. Pflanzenbau* 10, 391-421(1933).—Fertilization with N, P or K alone or in combinations did not materially affect the loss of wheat due to foot rot. Treatment of the stubble before plowing under with 2000 kg. of  $H_2SO_4$  per hectare suppressed the disease somewhat, but a special bleaching powder prepn., "Caporit," and kaolin failed to give any satisfactory results. K. C. B.

Hygroscopicity and caking of  $NH_4NO_3$  and mixts. of  $NH_4NO_3$  and  $(NH_4)_2SO_4$  (Gorshtein) 18. Decreasing the degree of hygroscopicity and caking of  $NH_4NO_3$  (Krichevskii, et al.) 18. Qual. method for Se [in soil] (Horn) 7. Bactericides (Fr. pat. 753,802) 17.

McRae, W., and Shaw, F. J. F.: Influence of Manures on the Wilt Disease of *Cajanus Indicus* Spreng and the Isolation of Types Resistant to the Disease. Scientific Monograph of the Imperial Council of Agricultural Research No. 7. Delhi: Manager of Publications, Civil Lines. 60 pp. Reviewed in *Current Science* 2, 72(1933).



**Soil treatment.** I. G. Farbenind. A.-G. (Albrecht Schmidt, Adolf Steindorff and Wilhelm Staudermann, inventors). Ger. 579,597, June 28, 1933. Plants are protected against rust fungus by treating the soil with a mixt. of thiourea or salts of thio- or dithiocarbamic acid and fertilizer.

**Fertilizers.** Mathurin J. Oliviero. Fr. 751,355, Sept. 2, 1933. A fertilizer is prepd. by adsorption of alkali silicates or phosphates by substances contg. humic acid, as dried pulverized peat. Other fertilizers may be added.

**Fertilizer.** I. G. Farbenind. A.-G. Fr. 754,095, Oct. 31, 1933. A mixed fertilizer is made by treating materials contg. KCl and NaCl with  $\text{NH}_4\text{NO}_3$  so as to obtain  $\text{KNO}_3$ ,  $\text{NaNO}_3$  and  $\text{NH}_4\text{Cl}$ . The  $\text{NH}_4\text{Cl}$  is removed by mech. means.

**Fertilizer.** Hubert Kappen. Ger. 579,551, June 28, 1933. Crude phosphates are treated with the HCl developed by treating KCl with steam, and the product is used as a fertilizer.

**Fertilizer.** Gustav Pfarrius. Ger. 579,573, June 28, 1933. See Fr. 741,374 (C. A. 27, 2753).

**Fertilizer.** Heinrich Koppers A.-G. and Christian J. Hansen. Ger. 580,915, July 18, 1933. A mixt. contg.  $(\text{NH}_4)_2\text{SO}_4$  and  $(\text{NH}_4)_3\text{PO}_4$  is made by treating  $\text{NH}_4$  salts of  $\text{H}_2\text{SO}_4$ ,  $\text{H}_2\text{S}_2\text{O}_8$  or polythionic acids with com.  $\text{H}_3\text{PO}_4$  in presence or absence of  $\text{NH}_4\text{CNS}$ . The reaction takes place at temps. above the m. p. of S. The solns. are mixed outside the app. so that the pptd. S and other impurities can be removed before the clear solns. are subjected to heat and pressure. Examples are given.

**Fertilizer.** Carl Ehrenberg. Ger. 581,558, July 29, 1933. A humus fertilizer rich in N is prepd. by treating peat, lignite, coal, etc., with  $\text{CO}_2$  and  $\text{NH}_3$  or gases or liquids contg. these, at high temp. and pressure. Water may be added during the process. Examples are given.

**Superphosphate.** Chemische Werke Rombach G. m. b. H. Fr. 753,914, Oct. 27, 1933. A dry pulverulent superphosphate is obtained in a single operation in a furnace provided with agitating mechanism and directly heated. The temp. is maintained between  $110^\circ$  and  $250^\circ$  according to the nature of the crude phosphate. The mass is moistened before or after its introduction into the furnace and before or during the introduction of acid.

**Insecticides.** I. G. Farbenind. A.-G. Fr. 42,512, Aug. 4, 1933. Addn. to 723,510 (C. A. 26, 4128). Oils having an insecticidal or fungicidal action are used as solvents for the esters of Fr. 723,510. The solns. may be mixed or emulsified with water in any proportion. Suitable oils are light oil, white oil, lubricating oil, lighting oil, paraffin oil and gasoline.

**Insecticide.** Albert C. Malzac. Fr. 750,708, Aug. 17, 1933. An insecticide is composed of a viscous soln. contg. HCN which is liberated progressively, e. g., glycerol contg. water 20 and HCN 4%.

**Insecticides, etc.** Peter Speece & Sons Ltd. Fr. 754,128, Nov. 2, 1933. An active insecticide, bactericide or fungicide ( $\text{S}$  or  $\text{C}_{10}\text{H}_8$ ) is fused and dispersed in or on pptd., dry, light and finely divided absorbent  $\text{SiO}_2$ .

**Insecticides, etc.** Hercules Glue Co. Fr. 751,239, Aug. 29, 1933. A spreading agent for powd. insecticides, etc., contains a protein and lime, e. g., casein 4-8, lime (calc.) as  $\text{Ca}(\text{OH})_2$  90-96 and a deflocculator such as skin glue 1-2%. Cf. C. A. 27, 2754.

**Insecticide, etc.** I. G. Farbenind. A.-G. (Walther Speer and Walter Flemming, inventors). Ger. 580,678, July 14, 1933. A preventive for plant pests consists of the products formed by treating aliphatic ketones with  $\text{HCOONH}_4$  or  $\text{HCONH}_2$ .

**Oil emulsifier and insecticide.** Hugh Knight (to Emulsoids, Inc.). U. S. 1,937,969, Dec. 5. Esters such as butyl acetylricinoleate are used in prepg. insecticides contg. oil emulsified with water. Cf. C. A. 27, 159.

**Emulsifying oils.** Gérard Lafarge and Roger Chanut. Fr. 751,045, Aug. 25, 1933. A homogeneous oily mixt. of d. above 1 is added to oil of d. below 1 to form a stable suspension in water. Thus, the emulsifying agent may contain a vegetable oil, trichloroethylene and  $\text{NH}_3$  soln. The oils are used as insecticides and complementary insecticides may be added.

**Copper compounds.** Daniel W. Marsh and Benjamin H. Marsh. U. S. 1,937,524, Dec. 5. A voluminous light green insol. Cu compd. which may be used as an insecticide or fungicide is obtained by treating metallic Cu while immersed in a heated bath of a sol. Cu salt capable of forming a basic Cu salt, such as  $\text{CuSO}_4$ , by forcing O or air through the soln. and collecting the resulting ppt.

**Fungicide, etc.** I. G. Farbenind. A.-G. (Karl Marx and Karl Brodersen, inventors). Ger. 579,701, June 30, 1933. Fungicides contain sulfonates of mineral-oil hydrocarbons or their mixts. with aromatic or hydroaromatic hydrocarbons or derivs. and colloidal or dispersed S.

**Parasiticides, etc.** Jean Maurin. Fr. 752,602, Sept. 27, 1933. Sulfides of As or arsenides which are not toxic when used but become toxic by oxidation in contact with atm. agents are used to combat parasites and for treatment of vegetable diseases.

**Anticryptogamic powder.** Lelio Ferri. Fr. 751,277, Aug. 30, 1933. A powder having a basis of Cu oxychlorides is made by causing  $\text{NH}_4\text{Cl}$  in ammoniacal soln. to act on Cu in the presence of air at ordinary temp. The mother liquors are removed and the product is treated with quicklime, whereby water and  $\text{NH}_3$  are removed. An app. is described.

**Cauterizing seeds.** Chemische Fabrik Marktedwitz A.-G. (Rolf Tropitzsch, inventor). Ger. 580,504, July 12, 1933. A fungicide especially effective against diseases of barley and rye contains Cd compds. mixed with inert substances or other fungicides.

**Cauterizing seed.** Emil Molz. Ger. 583,605, Sept. 6, 1933. Seeds are cauterized by treatment with a small amt. of highly concd. HCl in a drum.

**Plant preservation.** I. G. Farbenind. A.-G. (Kaspar Pfaff and Michael Erlenbach, inventors). Ger. 579,598, June 28, 1933. A spray or dusting powder for preserving plants from the attacks of fungi or insects is prepd. by mixing fungicide or insecticide with reversible colloidal metal hydroxides obtained by treating aq. solns. of salts of heavy or alk. earth metals with alkylene oxides. Thus, a 25% aq. soln. of  $\text{AlCl}_3$  is treated with an aq. soln. of  $\text{C}_2\text{H}_4\text{O}$ . The mixt. is evapd. to dryness and the product mixed with  $\text{CuSO}_4$  and a little  $\text{CaO}$ . Other examples are given. Cf. C. A. 28, 852<sup>1</sup>.

**Plant preservation.** Emil Molz. Ger. 581,603, July 31, 1933. A dusting powder for preventing diseases of conifers contains  $\text{CH}_2\text{O}$  polymers, e. g., kaolin and paraformaldehyde.

**Sulfurizing plants, etc.** Georg Rupprecht. Ger. 579,514, June 27, 1933. Addn. to 523,965 (C. A. 25, 3764). In treating plants, trees, etc., with a S mist to kill insects by the method of 523,965, substances or mixts. b. or vaporizing above  $50^\circ$  are used to load the S particles. Examples mention naphthalene and  $p\text{-C}_6\text{H}_4\text{Cl}_2$ .

**Herbicides.** Compagnie de produits chimiques et électrométallurgiques Alais, Frogès et Camargue. Fr. 753,684, Oct. 21, 1933. Chlorates are used alone or with salts of K, Mg or  $\text{NH}_4$  in such high diln. that a selective herbicidal action is obtained.

**Chlorates.** I. G. Farbenind. A.-G. Ger. 583,106, Aug. 29, 1933. Addn. to 549,645 (C. A. 26, 4920). The method of 549,645 for prepg.  $\text{Ca}(\text{ClO}_3)_2$  by treating a boiling soln. of  $\text{NaClO}_3$  with  $\text{CaCl}_2$  is improved by adding a mol. equiv. amt. of  $\text{CaCl}_2$ . As the soln. is evapd.  $\text{NaCl}$  seps. out and is removed by centrifuge. On evapn. to dryness, a mixt. of  $\text{Ca}(\text{ClO}_3)_2$  and  $\text{NaClO}_3$  is left. This may be used as weed killer.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

The use of shredded asbestos in methane fermentations. C. R. Breden and A. M. Buswell. *J. Bact.* 26, 379-83(1933); cf. *C. A.* 27, 1980.—It furnishes a support for the methane producers. John T. Myers

Qualitative evaluation of starch and protein in barleys from different sources. N. N. Ivanov and V. A. Kirsanova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 35-52(1933).—The common belief that high-protein barleys are more resistant than low-protein barleys to malting is erroneous; in fact, the diastatic effect is often superior, with better germination and higher starch conversion, in the high-protein grain. Hence barleys which have hitherto been considered fit only for feed, because of high protein content, are actually well suited for use in brewing.

Chemical stimulation of sprouting in barley. E. S. Tzetkova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 3-34(1933).—Germination of barley is accelerated by  $H_2O_2$  (optimum concn. of soln. 0.5%), so that malting is hastened and molding is prevented; but  $H_2O_2$  is too expensive for large-scale use. Treatment with  $C_2H_2$  did not improve germination or diastatic power. Trials with  $H_3PO_4$ , formalin, Br water, tannin and salts of Na, Mg, Mn and Fe showed stimulation only with Mn salts and  $FeCl_3$ . Use of  $PcCl_3$  blackens the barley; but the possibility of using Mn salts to accelerate malting should be investigated. It is possible that cheap electrolytic  $H_2O_2$  may lower the future cost of chem. stimulation sufficiently for com. utilization.

Distilling beverages from grain. Gustave T. Reich. *Chem. & Met. Eng.* 40, 618-24(1933). E. H.

Chemistry of strongly alcoholic drinks. Mario Taveira, José Eduardo Alves Filho and Jorge Bandeira de Mello. *Rev. soc. brasil. quim.* 4, 106-44(1933).—Classifications of alcs., methods of analysis and related tables are given.

John Ladino

Condensation products from  $C_2H_2$  and  $NH_3$  [for denaturing alc.]. (U. S. pat. 1,936,995) 10.

Alcohol. Usines de Melle and Henri M. Guinot. *Fr.* 752,666, Sept. 28, 1933. Alc. of high degree is obtained by treating low wines in a column having a concg. zone and an exhausting zone. The vapors from the concg. zone are directed wholly or almost wholly into a 3rd zone in which an entraining substance works, so as to ensure free heating of this 3rd zone, the concn. of the alc. being assured by a retrogradation of alc. from the entraining zone. Alc. of high degree is available in a region intermediate between the concg. zone and the entraining zone. Cf. *C. A.* 27, 4022.

Absolute alcohol. Eloi Ricard and Henri M. Guinot (to U. S. Industrial Alc. Co.). U. S. 1,937,786, Dec. 5. In a continuous process, mashers are exhausted in one zone and, after concg. the vapors thus produced in another zone, the alc. is dehydrated in a third zone (the liquid in the dehydrating zone being heated by alc. vapors issuing from the exhausting zone). App. is described.

Production of citric acid, etc., by fermentation. Cecil H. Lilly (to Imperial Chemical Industries Ltd.). U. S. 1,936,983, Nov. 28. An app. is described, in which a regulated stream of sterilized nutrient liquor contg. fermentable carbohydrate is passed by gravity flow through the inside of a flat porous-walled tube the outer surface of which is aerated and inoculated with felt-forming organisms. The tubes used may be formed of earthenware, canvas, etc.

Propionic acid production by fermentation. James M. Sherman (to Wilbur White Chemical Co.). U. S. 1,937,672, Dec. 5. In fermentations such as that of molasses soln. contg. meat scrap by the action of organisms of the type of *Bacterium acidipropionici*, a mass of the organ-

isms is propagated on the surfaces of finely divided particles of inert solid absorptive material such as "Filter-Cel" and the medium is fermented in the presence of such mass of organisms; fermented medium is withdrawn from and fermentable medium is supplied to the organisms during that period of their growth cycle which follows the dormancy phase but precedes the period during which the death rate is more rapid than the reproduction rate, and before the fermentation has proceeded to completion.

Biacetyl. Thomas H. Verhave, Sr. *Ger.* 579,743, June 30, 1933. See U. S. 1,899,094 (*C. A.* 27, 2757).

Apparatus for purifying carbon dioxide obtained from fermentation processes. Hansena A.-G. *Ger.* 583,681, Sept. 7, 1933.

Malting grain. Brauerei "Zur Eiche" vorm. Schwensen & Fehrs. *Ger.* 583,971, Sept. 13, 1933. The germinating grain is arranged in layers of 5-8 cm. depth in chambers in which the temp., amt. of air and moisture can be regulated.

Foam separators for fermentation plants, etc. Ernst Jantzen. *Brit.* 398,046, Sept. 7, 1933.

Device for suppressing frothing in fermentation vats, etc. The Distillers Co. Ltd. and Alexander V. Montgomery. *Brit.* 397,722, Aug. 31, 1933.

Apparatus for fermenting or storing liquids at controlled temperature. Rudolf Horch. U. S. 1,937,226, Nov. 28. An app. suitable for use in breweries, etc., comprises a metal vessel electrically insulated from the earth and surrounded by a jacket adapted to contain a gas such as air, the temp. of which may be controlled by a fluid circulated through a pipe coil in the jacket. Various modified forms of app. are described.

Beverages. Chemische Werke Marienfelde A.-G. *Fr.* 42,513, Aug. 4, 1933. Addn. to 735,639 (*C. A.* 27, 1086). The clarifying agent is composed of pitch or pitch and another substance and is added at the top in such a form that it descends slowly.

Spirits. Anton J. H. Philipsky. *Ger.* 584,855, Sept. 25, 1933. The age of spirits, especially brandy and whisky, is estimated by adding standard test yeast and observing the degree of fermentation.

Beer. Hilde Krönig. *Ger.* 581,143, July 21, 1933. Addn. to 561,725 (*C. A.* 27, 1086). In prepg. beer contg. vitamins, yeast physically disintegrated by passage through a colloid mill is introduced into the liquor before the end of the fermentation.

Yeast. Ejnar A. Meyer (to Standard Brands Inc.). U. S. 1,938,081, Dec. 5. Yeast is propagated in a nutrient liquid in a fermenter to which is continuously added one or more solns. contg. yeast nutrient materials and from which is continuously withdrawn yeast-contg. liquid (at least one of the added solns. contg. a substance such as Cl which, in the fermenter, maintains a condition inhibiting the growth of undesirable organisms).

Yeast. Erste Hessische Presshefefabrik und Dampfbrennerei Inhaber Josef Pleser Söhne (H. Rössler, I. Schmitt and Joseph Pleser, inventors). *Ger.* 579,909, July 3, 1933. The Mg content of yeast is raised by adding Mg compds. to a nutritive medium contg. yeast cultures. Examples are given.

Yeast. Georges Collette. *Fr.* 750,998, Aug. 24, 1933. Beet juice is concd. to preserve it and dild. when required for the manuf. of yeast.

Yeast. Pfeifer & Langen A.-G. *Fr.* 751,268, Aug. 30, 1933. In producing yeast, inorg. N salts are not used. Unless a salt is present which will react with the inorg. N salt to give an org. N salt. N compds. which are easily assimilable by the yeast and which in the yeast are transformed with the sugar to albumin are present from the start of the fermentation, whereas the aminoacids, which are assimilated more slowly and which are transformed to albumins without cooperation with the sugar are added over a period of 5-6 hrs. A too high content of the yeast produced in albuminous materials, caused by the amino-

acids, is lowered by a short complementary fermentation using a sugar soln. contg. ammoniacal N.

**Baking yeasts.** Pfeifer & Langen A.-G. Fr. 751,602, Sept. 7, 1933. Pressed yeasts are enriched in enzymes by a secondary fermentation in a sugar liquor prep'd. from

molasses, a part (at least 5%) of the sucrose of the molasses being replaced by maltose in the form of sweet malt, after which the liquor, dild. to 12-15°Bé. and with a  $p_H$  value of 4.8-5.1, is subjected to a rapid fermentation without aeration at 20-27°.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. RMERY

**Petrolatum as salve base.** E. Rupp. *Apoth. Ztg.* 48, 1408-9(1933).—The advantageous use of high-grade (official) petrolatum, in preference to lard, is emphasized in the prepn. of many salves carrying resorbent drugs.

W. O. E.

**Scientific contributions to practical pharmacy.** XXIV. Reddening of talcum D. A.-B. 6 and salves or pastes admixed therewith and "fined" oleum vaselini flavum. Hermann Kunz-Krause. *Apoth. Ztg.* 48, 1441-2(1933); cf. C. A. 27, 3287.—White petrolatum should not be used in salves and pastes contg. talc fined with tropeolin, which causes reddening in such combinations. The various types of steatite are discussed, notably their chem. compn.

W. O. E.

**Areca nuts and aloes.** H. Oettel. *Apoth. Ztg.* 48, 1457-9(1933).—The use of areca nuts and aloes in human medication and their pharmacol. effects are discussed.

W. O. E.

**Pharmacopeia Helvetica V.** Hans Dietmann. *Pharm. Presse, Wiss.-Prakt. Heft.* 1933, 152.—A commentary.

W. O. E.

**Linimentum ammoniatum.** Wolfgang Brandrup. *Pharm. Zentralhalle* 74, 749-51(1933).—This prepn. is discussed (with illustrations of the oil dispersion) mainly from the standpoint of the D. A.-B. VI.

W. O. E.

**Biuret reaction as applied to medicinal and food chemistry.** Hugo Köhl. *Pharm. Zentralhalle* 74, 51-4(1933).

W. O. E.

**Reaction mechanism in the purification by the sodium method of anesthetic ether decomposed by autoxidation.** O. Tonn. *Pharm. Zentralhalle* 74, 765-9(1933).—An address in which T. classifies the contaminants of anesthetic ether into 4 groups: peroxides, alcs., aldehydes and org. acids, emphasizing the fact (by expt.) that purification by the Na method is really due to the action of the caustic and not of the metal. NaOH (KOH even more so) converts the aldehydes by the Cannizzaro reaction into alcs. and acids, which on distn. are thus eliminated.

W. O. E.

**Estimation of extract in alcoholic liquors.** Curt Luckow. *Pharm. Zentralhalle* 74, 709-71(1933).—In the estn. of ext. a distinction must be made between spirituous liquors low and high in ext. In the former preps. it suffices to det. the d. of the alc.-freed soln. with an aerometer (15°) or the Mohr-Westphal balance (15°), and to refer the resulting values to the table (Windisch) for aq. sugar soln. For preps. high in ext. recourse is had to liquor-ext., saccharometers having 0.5% divisions.

W. O. E.

**Simple method for the estimation of alkaloids in tincture and fluid extract of hydrastis, as also in certain other homeopathic original tinctures.** H. Neugebauer. *Pharm. Ztg.* 78, 1077(1933).—The method is essentially applicable to homeopathic preps. and involves after suitable isolation of the alkaloidal material titration with standard alkali and acid. In addn. to tincture of hydrastis and its fl. ext., details are outlined for the examn. of tinctures of aconitum napellus, gelsemium, nux vomica and ignatia.

W. O. E.

**Changes in acid solutions of adrenaline.** L. A. Had-dock. *Quart. J. Pharm. Pharmacol.* 6, 496-501(1933).—The racemization of l-adrenaline is comparatively rapid in HCl solns. at approx.  $p_H$  0.1, but at  $p_H$  values of 1.4-3.7 it becomes negligibly small. The changes produced by light are also small from a quant. standpoint, consisting mainly in slight oxidation, racemization being negligible. The total visible spectrum is more effective than

either the ultra-violet spectrum alone, or pure red light, and the presence of substances such as chloretone assists the action of the light. Ultra-violet light, however, produces true racemization in dil. solns. such as Liq. adrenalinæ-HCl, but not in stronger solns. Sterilization at 80° for 1 hr. causes slight destruction of adrenaline, but the amt. of racemization seems negligibly small in both weak and strong solns.

W. O. E.

**Tinctura ephedrae and tinctura ephedrae benzoica.** Walter Meyer. *Süddeut. Apoth.-Ztg.* 73, 386-7(1933).

J. D. S.

**Tinctura ephedrae benzoica.** F. Gstirner. *Apoth. Ztg.* 48; *Deut. Apotheker* 2, 321-2(1933); cf. preceding abstr.

W. O. E.

**Antiseptic and sterilizing power of oil of cinnamon and some derivatives of cinnamic acid.** A. Morel, A. Rochaix and P. Genton. *Compt. rend. soc. biol.* 114, 645-7(1933). Antiseptic power of some phenols and phenol ethers with allyl, propenyl or aldehyde groups [found in volatile oils]. A. Morel, A. Rochaix and L. Perrot. *Ibid.* 1118-20.

L. E. Gilson

**Chemical examination of trichloroethylene.** Herman L. Tschentke. *Ind. Eng. Chem., Anal. Ed.* 6, 21-2(1934).—A series of chemical and 2 physical tests are described which enable one to det. whether a commercial product is suitable for producing local anesthesia. The product used for dry cleaning is not suitable for medicinal work.

W. T. H.

**Can sodium nipasol be used as a disinfecting material in body fluids?** G. Northof. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 138-43(1933).—It is not satisfactory in the animal body.

John T. Myers

**The determination of the phenol coefficient of disinfectants by the cover glass method.** Vilh. Jensen and Elsa Jensen. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 144-57(1933).—See C. A. 27, 5367.

John T. Myers

**Synthesis of acridine derivatives for treatment of malaria.** O. Yu. Magidson and A. M. Grigorovskii. *Khim. Farm. Prom.* 1933, 187-8.—The synthesis is effected by condensation of 9-phenoxy or 9-chloroacridines with diamines. The activity on *Plasmodium praecox* was detd. on: 2-ethoxy-6-nitro-9-diethylaminoethylaminoacridine; 2-ethoxy-7-nitro-9-diethylaminoethylaminoacridine; 2-ethoxy-6-(and 7)-nitro-9-diethylaminopropylaminoacridine; 2-methoxy-7-nitro-9-diethylaminohydroxypropylaminoacridine; 2-methoxy-6-chloro-9-diethylaminopropylaminoacridine; 2-methoxy-6-chloro-9-diethylaminobutylaminoacridine; 2-methoxy-6-chloro-9-diethylaminoisopentylaminoacridine; 2-methoxy-9-diethylaminopropylaminoacridine. The compds. with 7-nitro groups are more powerful than 6-nitro and increasing the C chain to C<sub>4</sub> also increases the activity.  $\beta$ -Hydroxypropyl derivs. approach atebriin in efficiency.

L. Nasarevich

**Russian creolin.** P. I. Chebotarev. *Khim. Farm. Prom.* 1933, 221-4.—A tabular study of creolin constituents, suggesting the necessity of better information regarding their germicidal and toxic properties.

L. Nasarevich

**Increasing the activity of heparin and pneumin (anti-thrombine) preparations.** N. P. Kretchetova and V. D. Yankovskii. *Khim. Farm. Prom.* 1933, 225.—Benzidine, quinidine-HCl and quinine sulfate are used as precipitants. The complex salt is washed with alc., decomposed with weak acid and pptd. with aq. acetone and acetone-ether. The increase in activity is as high as 230%.

L. Nasarevich

**Substitution of cherry-tree gum for gum tragacanth.**

- M. B. Shvartzman and E. B. Sklyutovska. *Farm. Zhur.* 3, 113-14(1933).—In the methods of German Pharm. IV for detn. of alkaloids 1 g. of powd. cherry-tree gum is effectively substituted for gum tragacanth. Comparative tables are given. L. Nasarevich
- Oil of Bordeaux pine needles. J. de Fayard. *Bull. inst. pin* 1933, 215.—The compn. of the oil varies with the season. Percentage yield, d.,  $[\alpha]_D$  and esters (%) (as bornyl acetate) for Nov.-Dec. were 0.68, 0.870, +31.5°, 3.76; for Jan.-Feb.-March 0.75, 0.875, 34.2, 3.68; for April-May 0.79, —, 33.6°, —.
- A. Papineau-Couture
- Surface tension of medicinal and edible oils. E. Canals and Ramahenina-Ranaivo. *J. pharm. chim.* 18, 438-43(1933); cf. *C. A.* 27, 2593, 5204-5.—Results on 26 samples of oils in the detn. of surface tension by the formation of drops in air, in  $H_2O$ , in 0.0005 *N* NaOH and by Lecomte du Nouy's method, together with data on  $d_{20}^{20}$ ,  $n_D^{20}$ , oleorefractometer and viscosity readings are tabulated and discussed. S. Waldbott
- The glucosides of digitalis. E. Léger. *J. pharm. chim.* 18, 482-502(1933).—A succinct review is given of the chemistry of digitalis glucosides, with 41 references and a summary showing the close chem. relations of the different aglucons. S. Waldbott
- Assay of kamala. J. Stamm and K. Killinen. *Pharmacia* 13, 109(1933); *Schweiz.-Apoth. Ztg.* 71, 513-14(1933).—The vermifuge properties of kamala reside in phloroglucinol derivs. The assay method is analogous to that for male fern. Ext. the drug with  $Et_2O$ ; from this soln. remove the phenols with  $Ba(OH)_2$  soln., re-ppt. with HCl, take up with  $Et_2O$ , distil off the  $Et_2O$ , dry the residue at 100° and weigh. Drugs contg. not more than 6% ash yielded 30-34% crude kamalin. A kamalin content of about 39-40% should be required. S. Waldbott
- Standardization of drugs and detection of adulterations especially with the aid of capillary analysis and the analytical quartz lamp. Paul Kämpf. *Pharm. Acta. Helv.* 8, 170-8, 214-21(1933).—The materials studied were *Datura stramonium* L., *Hyoscyamus niger* L. and their possible substitutes. Twenty-three references. S. W.
- John Thurlbeck Humphrey, pharmacist-editor. 1862-1933. Anon. *Pharm. J.* 131, 705-6, 724-5, 751, 774; *Chemist and Druggist*, 119, 728-30, 749, 751(1933).—Obituary, with portraits and memorial letters. S. W.
- The (British) Pharmacopeia Commission laboratory. Anon. *Pharm. J.* 131, 718-19; *Chemist and Druggist*, 119, 725-6(1933).—A description, with photographs. S. Waldbott
- The alcoholic strength of ext. senegae liquid., Brit. Pharm. T. Tusting Cocking. *Pharm. J.* 131, 766(1933).—From the percentage of  $H_2O$  in air-dry senega and the quantities of solids and fluids used in the official prepn. of the liquid ext., it is shown by calcn. that the min. official figure for the alc. content is too high; the max. figure is unattainable. New limits suggested are: max. 44-54%, min. 38-44% by vol. As the tincture of senega, Brit. Pharm., is made by dila. of the liquid ext. with 60% alc., the corresponding limits for the tincture should be: max. 57-60%, min. 55-58% alc. S. W.
- Fluorescence analysis of pharmaceutical products. J. A. Radley. *Chemist and Druggist* 119, 295, 340(1933); cf. Ernst and Jentschitsch, *C. A.* 23, 3304.—An address. Typical examples of results on the examn. of 140 drugs in ultra-violet light are given. S. Waldbott
- Derivs. of  $\alpha$ -bromoisovaleric acid (Covello) 10. *Toddalia aculeata* Pers. 1. 2 new alkaloids and a neutral crystalline substance from the root bark (Dey, Pillay) 10. Industrial prepn. of redistd. water for biol. purposes (Cliquet, et al.) 11B. Addn. products of the pyridine series (U. S. pat. 1,938,253) 10. Naphthol derivs. [products are intermediates for therapeutic products] (Fr. pat. 751,237) 25.
- Bentley and Driver's Text-Book of Pharmaceutical Chemistry. 2nd ed., revised by John E. Driver. New York: Oxford Univ. Press. 538 pp. \$7.00. Reviewed in *Analyst* 58, 724; *J. Am. Pharm. Assoc.* 22, 1205(1933).
- Therapeutic product from stomach tissue. Elwood A. Sharp, Cyrus C. Sturgis and Raphael Isaacs (to the Regents of the Univ. of Mich.). U. S. 1,937,133, Nov. 28. A product which stimulates the growth of red blood cells and may be used for combating pernicious anemia comprises powd. desiccated defatted hog stomach (various details of prepn. are given).
- Arsenic compounds. Baptist Reuter. Fr. 752,688, Sept. 28, 1933. A soln. ready for use and keeping for a long time, of the mono-Na salt of 3,3'-diamino-4,4'-dihydroxyarsenobenzenemonomethylenculfonic acid is prepd. by adding to crude diaminodihydroxyarsenobenzene (by reduction of 3-nitro-4-hydroxybenzenearsonic acid) used in the moist state while observing the known precautions such as working in the absence of air, a sterilized air-free soln. of glucose and afterward adding an amt. corresponding to 1 mol. or less of a concd. soln. of  $CH_3O$ -sulfoxylate, heating to about 70°, then sepg. the deposited impurities after a prolonged rest, and bringing the soln. to the desired content by the addn. of a sterilized soln. of glucose.
- Bismuth carboxylates. Boot's Pure Drug Co. Ltd., Frank L. Pyman and Alexander P. T. Easson. Brit. 397,249, Aug. 24, 1933. The basic Bi salts of  $\alpha$ -carbalkoxycyclohexylacetic acids, 1-acyloxyhexahydrobenzoic acids or malonic acid esters of formula  $RCH \begin{matrix} \swarrow COOR' \\ \searrow COOH \end{matrix}$ , where R contains at least 7 C atoms and has 1 or more branch chains and R' is alkyl, are prepd. in oil solns. by double decompn. between an inorg. basic Bi salt, e. g., the nitrate, and an alkali salt of the acid in the presence of a vegetable oil, e. g., olive. The oil soln. is extd. from the aq. mixt. by  $Et_2O$ , the  $Et_2O$  soln. filtered and dried and the  $Et_2O$  distd. off. The oil soln. may be used medicinally for injection purposes. Cf. *C. A.* 27, 3950.
- Gold compounds. Soc. des usines chimiques Rhône-Poulenc. Fr. 753,401, Oct. 16, 1933. Compds. of Au sol. in oils are made by causing phosphorous ethers, e. g., triethyl or tributyl phosphite to act on compds. of Au, e. g., halides, sulfides,  $NCSAu$ , mercaptides, xanthates, thiosulfocarbamates, auromercapto-benzoxazoles, -benzothiazoles and -benzimidazoles.
- Magnesium hydroxide. Jan Becka. Ger. 579,843, July 1, 1933.  $Mg(OH)_2$  is obtained in finely divided, almost colloidal form for therapeutic purposes by digesting  $MgO$  with an aq. soln. of  $MgCl_2$  or  $MgSO_4$  in water of at least 10 degrees of hardness. Cf. *C. A.* 27, 4031.
- Metallic mercapto compounds. Schering-Kahlbaum A.-G. Brit. 398,020, Sept. 7, 1933. See Ger. 575,598 (*C. A.* 27, 4890).
- Barbituric acids. F. Hoffmann-La Roche & Co. A.-G. Brit. 398,132, Sept. 7, 1933. 5,5-Phenylethyl-N-propylbarbituric acid is prepd. by the catalytic hydrogenation of 5,5-phenylethyl-N-propylbarbituric acid. The product has therapeutic properties. Examples are given of hydrogenation in (1) MeOH soln. at ordinary temp. and pressure in presence of  $PdCl_2$  and (2) EtOH soln. by using a Ni catalyst and heating in an autoclave.
- Reduction products of keratins. Firma Johann A. Wülfing. Ger. 582,000, Aug. 5, 1933. Keratins obtained by the alk. or acid hydrolysis of keratin are reduced by treatment with Na-amalgam or  $Na_2SO_3$ . The reduction may be arrested when the SH group has been formed in the keratinate. Examples are given. The products are used in therapy.
- Plants containing alkaloids. I. G. Farbenind. A.-G. Fr. 750,870, Aug. 21, 1933. Plants contg. alkaloids, particularly tobacco plants, are improved by treatment with exciting agents used for forcing, interrupting germinatory rest or accelerating the coloration of fruits. Examples are given of the use of  $C_2H_4$ , the content of alkaloids in the plants being thereby reduced, whereas aroma, etc., are improved.
- Vitamin concentrates. Atherton Seidell. U. S.

1,937,671, Dec. 5. In eliminating non-vitaminic nitrogenous and other substances from aq. vitamin solns. such as those derived from brewers' yeast, substances contained in the soln. are subjected to benzylation of such character as to effect an increase in the differential solubilities of vitaminic and non-vitaminic substances thus facilitating their sepn. by use of acetone as a selective precipitant. By repeated pptn., a cryst. vitaminic product of high antineuritic potency is obtained.

**Hormones, etc.** Siegfried Loewe. Fr. 750,730, Aug. 17, 1933. See Brit. 353,635 (C. A. 27, 375).

**Hormones.** Bernhard Zondek and Carl van Eweyk. Ger. 583,910, Sept. 12, 1933. Female sexual hormones are pptd. by treating the weakly acidified urine of pregnant females with water-sol. heavy metal salts of org. acids such as (AcO)<sub>2</sub>Pb.

**Hormone preparations.** Bernhard Zondek and Carl van Eweyk. Ger. 584,966, Sept. 27, 1933. Addn. to 583,910 (preceding abstr.). The method of 583,910 for obtaining hormone preps. by treating the urine of pregnant females with heavy metal salts of org. acids is modified by using salts insol. instead of sol. in water, e. g., Fe stearate and (AcO)<sub>2</sub>Fe.

**Hormone preparations.** Soc. pour l'ind. chim. à Bâle. Ger. 579,820, July 1, 1933. Female sexual hormones are obtained in cryst. form by treating hormone exts from human or animal urine with aq. solns. of hydroxides of the second group of the periodic table and filtering off the ppt. The latter is thoroughly washed with water; the washings are acidified and extd. with a solvent non-miscible with water. The ext. is then washed with alkali carbonate soln. and the hormones crystd. out. Examples are given. Cf. C. A. 27, 2763.

**Hormone preparations.** Schering-Kahlbaum A.-G. Ger. 583,854, Sept. 11, 1933. Derivs. of sexual hormones sol. in water are prepd. by treating the hormones with acylating agents which also form salts. Thus, the oil obtained by extg. male urine is treated with phthalic anhydride at 120–40°. On neutralizing with soda, extg.

with ether, and evapg. off the latter, a sol. prepn. is obtained. Other examples are given. Cf. C. A. 28, 262.

**Hormone solutions.** Schering-Kahlbaum A.-G. Ger. 581,528, July 29, 1933. Hormone solns. are rendered stable for some time and given a strong subcutaneous action by addn. of alc. bases such as triethanolamine.

**Mentholated talcum powder.** Alfred J. Lautmann. U. S. 1,936,845, Nov. 28. A talc base powder is mixed with about 4% or less of diatomaceous earth impregnated with menthol, etc.

**Dentifrice.** John S. R. Heath. Australia 6785/32. Apr. 27, 1933. A dye or stain, such as a small amt. of crystal violet and brilliant green in alc., is added to a dentifrice to make visible any film on the teeth.

**Disinfectant.** F. Raschig G. m. b. H. Ger. 579,897, July 4, 1933. A disinfectant sol. in water consists of a mixt. of chlorothymol, m. 62–4°, and soap.

**Disinfectant.** F. Raschig G. m. b. H. Ger. 580,880, July 17, 1933. Addn. to 579,897 (preceding abstr.). The method of 579,897 for producing a disinfectant sol. in water by mixing chlorothymol with soap is improved by using a resin soap.

**Disinfecting with iodine.** Johann P. Schönthan. Brit. 397,238, Aug. 24, 1933. See Fr. 734,494 (C. A. 27, 1007).

**Bactericides, etc.** Louis Genevois and Eugène Delauney. Fr. 753,862, Oct. 26, 1933. Esters of mono-haloacetic acids, particularly bromo- and iodo-acetic acids of higher fatty alcs., polyalcs., or aromatic alcs. are used as antimycotic and anticryptogamic agents, non-toxic to animals.

**Coloring hair.** Wm. B. Stoddard, Jr. and Willard F. Greenwald (to Victor J. Thill). U. S. 1,937,365, Nov. 28. Two solns. are used, one contg. a Bi compd. such as Bi nitrate and an anti-hydrolytic agent such as glycerol in an amount sufficient to prevent substantial hydrolysis, the other comprising a S-contg. compd. such as Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to form a coloring compd. on hair capable of reacting with the Bi compd. (the 2 solns. being mixed before application to the hair).

## 18--ACIDS, ALKALIES, SALTS AND SUNDRIES

R. M. SYMMES

Modern methods of preparing phosphoric acid, especially by the wet process. H. Lehrcke. *Chem. Fabrik* 1933, 505–7.—The conditions of temp. and concn. for the formation of CaSO<sub>4</sub> that settles and filters well in concd. H<sub>2</sub>PO<sub>4</sub> solns. are discussed, and a new filter is shown (cf. C. A. 27, 5899; Tiedemann and Gundelach, C. A. 28, 580°).

J. H. Moore

The problem of theoretical interpretation of the intensification of the production of sulfuric acid. Ya. Delch. *Khimstrof* 5, 2371–3(1933).—Lab. expts. and factory observations showed that the modern methods of processing H<sub>2</sub>SO<sub>4</sub> are inconsistent with the latest scientific conceptions and the physicochem. nature of the process. The process constitutes a series of chem. reactions, each of which takes place in a corresponding phase, and is interpreted by 2 schemes in the light of the electron-ionic theory. The gaseous N oxides do not act as catalysts in the process, but enter into the formation of the intermediate product of nitrosyl of sulfuric acid, [O<sub>2</sub>S(OH)]<sub>2</sub>.NO (not to be confused with nitrosylsulfuric acid), which is a factor of intensification in the production of H<sub>2</sub>SO<sub>4</sub>. Theoretically the process proceeds without any loss of N oxides (i. e., HNO<sub>3</sub>). The common losses of N oxides in the production of H<sub>2</sub>SO<sub>4</sub> can be averted by improvements in the installation and careful control of the factors of intensification of the process. Chas. Blanc

Coke-oven gas as one of the basic sources for production of hydrogen for synthetic ammonia. V. I. Borodkin. *Khimstrof* 5, 2417–22(1933).—Economic advantages of the use of H<sub>2</sub> derived from coke-oven gas are discussed. Chas. Blanc

A study of poisoning of ammonia catalysts by hydrogen sulfide and phosphine. V. P. Kamzolkin and A. V.

Avdeeva. *J. Chem. Ind. (Moscow)* 1933, No. 7, 32–5.—Concns. of 0.001% of H<sub>2</sub>S and PH<sub>3</sub> in the gas for the synthesis of NH<sub>3</sub> suffice to poison the catalyst. This effect is less above 500° and increases rapidly at lower temps. and higher pressures. H. M. Leicester

**Decreasing the degree of hygroscopicity and caking of ammonium nitrate.** I. Krichevskii, L. Kantorovich and M. Bergauz. *J. Chem. Ind. (Moscow)* 1933, No. 7, 41–7.—NH<sub>4</sub>NO<sub>3</sub> is treated with 0.05% of its wt. of paraffin dissolved in CCl<sub>4</sub>. The thin film formed when the CCl<sub>4</sub> evaps. practically prevents absorption of moisture by the salt. The paraffin can also be added in the fused state without the use of solvents. Coating NH<sub>4</sub>NO<sub>3</sub> with compds. contg. polar groups does not decrease the rate of absorption of H<sub>2</sub>O. The treated salt is non-explosive and its fertilizing properties are unchanged. H. M. L.

**The hygroscopicity and caking of ammonium nitrate and mixtures of ammonium nitrate and ammonium sulfate.** G. I. Gorshtein. *J. Chem. Ind. (Moscow)* 1933, No. 7, 47–56.—NH<sub>4</sub>NO<sub>3</sub> is usually as hygroscopic as a mixt. of NH<sub>4</sub>NO<sub>3</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, but with increasing temp. and decreasing humidity, the mixt. becomes less hygroscopic. For a moisture content in the NH<sub>4</sub>NO<sub>3</sub> varying between 0.5 and 30–40% there is no difference in further absorption of H<sub>2</sub>O. Thick layers of NH<sub>4</sub>NO<sub>3</sub> absorb little moisture, and if they are covered with a thin layer of sand, the H<sub>2</sub>O absorption is still further decreased. The size of the lumps is almost without effect. At 32° NH<sub>4</sub>NO<sub>3</sub> changes from one modification to another. If more than 0.1% H<sub>2</sub>O is present in the salt, this change causes severe caking. Drying the moist salt has the same effect, but dry NH<sub>4</sub>NO<sub>3</sub> will not cake. Although methods of mixing and small variations in the relative amts. of NH<sub>4</sub>NO<sub>3</sub> and

( $\text{NH}_4$ ) $_2$  $\text{SO}_4$  in a mixt. of these compds. do not affect their absorption of  $\text{H}_2\text{O}$ , increase in the relative amt. of ( $\text{NH}_4$ ) $_2$  $\text{SO}_4$  decreases the caking tendency. If a double salt has formed, the mixt. cakes about as much as  $\text{NH}_4\text{NO}_3$  alone, but if there is only a mech. mixt., caking is less.

H. M. Leicester

The preparation of lime-ammonium nitrate and its hygroscopic properties. A. Guyer and H. Schütze. *Angew. Chem.* 46, 763-6(1933).—The method of prepn. has a definite influence upon the degree of conversion of  $\text{CaCO}_3$  and  $\text{NH}_4\text{NO}_3$ . Loose mixing in the cold results in a lower conversion, because of the less intimate contact of the components. Subsequent pressing increases the conversion. Addn. of ( $\text{NH}_4$ ) $_2$  $\text{SO}_4$  improved slightly the hygroscopic properties of the product and simultaneously gives rise to the reaction  $\text{CaCO}_3 + \text{NH}_4\text{NO}_3 \cdot \text{aq.}$  to a small extent. The content of sol. lime is increased likewise by the reaction between  $\text{CaCO}_3$  and ( $\text{NH}_4$ ) $_2$  $\text{SO}_4$ . Addn. of  $\text{Ca}(\text{NO}_3)_2$  slows up the reaction, reduces the N losses during the reaction and scarcely changes the hygroscopic properties. Exptl. data and figures of the app. are given. Twelve references.

Karl Kammermeyer

Recrystallization of potassium chloride for the production of potassium chlorate. Ya. V. Pupko and S. S. Shraibman. *Khimstrof* 5, 2427-31(1933).—Tech. KCl is freed from impurities of  $\text{K}_2\text{SO}_4$  and  $\text{K}_2\text{CO}_3$  by double decompn. with  $\text{CaCl}_2$ ; mother liquor from the previous crystn. is used as the solvent.

Chas. Blanc

Sodium sulfate. Oscar Peña i Lillo. *Bol. minero soc. nacl. mineria* (Chile) 45, 73-6(1933).—Several processes for extn. are described briefly and some com. applications outlined. The chem. and phys. properties of the deposits in Chile are described.

A. W. Furbank

Formation of hydrogen peroxide in catalytic dehydrogenation. Thomas F. Macrae. *Biochem. J.* 27, 1248-52(1933).—The test is based upon the fact that when a suspension of  $\text{Ce}(\text{OH})_3$  is treated with  $\text{H}_2\text{O}_2$  the suspension changes from a white to a deep yellow-orange, because of the formation of the sparingly sol. ceric hydroperoxide (I):  $2\text{Ce}(\text{OH})_3 + 3\text{H}_2\text{O}_2 \rightarrow 2\text{Ce}(\text{OH})_4\text{OOH} + 2\text{H}_2\text{O}$ . I can be detd. iodometrically or colorimetrically.  $\text{H}_2\text{O}_2$  is an intermediate product in the catalytic combination of  $\text{H}_2$  and  $\text{O}_2$ .  $\text{H}_2\text{O}_2$  can also be detected in the catalytic aerobic dehydrogenation of  $\text{CH}_3\text{OH}$  and  $\text{C}_2\text{H}_5\text{OH}$ . This substantiates the Wieland theory of dehydrogenation.

Benjamin Harrow

The preparation of sulfur dioxide and portland cement from gypsum. S. Royak, M. Gershman, K. Miloslavskii and E. Nagerova. *J. Chem. Ind. (Moscow)* 1933, No. 7, 35-41.—A mixt. of  $\text{CaSO}_4$ , clay and coke burned in  $\text{N}_2$  contg. 1-2%  $\text{O}_2$  yields portland cement and  $\text{SO}_2$ . The C reduces  $\text{CaSO}_4$  to  $\text{CaS}$ , which reacts with the remaining  $\text{CaSO}_4$  to give  $\text{CaO}$  and  $\text{SO}_2$ .  $\text{Fe}_2\text{O}_3$  helps the process. Burning of the mixt. should be slow. H. M. Leicester

The modernization of lime plants. Development of the plant "Bousquet et de la Vernhe. Chaux de Rantell-Albi." L. Puech. *Rev. matériaux construction trav. publics* 1933, 362-9.—Modernization of the equipment and mfg. process and the resulting improvements are discussed. K. K.

The bleaching clays. P. G. Nutting. *U. S. Geol. Survey Circ.* 3, 51 pp.(1933); cf. C. A. 27, 2793.—A discussion of the source, prepn. and theory of the bleaching action of various clays. Wt.-humidity curves, dehydration curves and miscellaneous tabular data are given.

W. A. Moore

Some comments on the practical use of casein. Erich Kunze. *Forbe u. Lack* 1933, 581-2. G. G. Sward

Inefficiency of calking compounds a challenge to industry. C. R. Shaffer. *Paint, Oil & Chem. Rev.* 95, No. 26, 18-19(1933).—The principal requirements of calking compds. are adhesion, elasticity, freedom from sagging and ease of application. As a rule, only a very small percentage of the compds. on the market are satisfactory.

G. G. Sward

Chemical investigation of bamboo. XII. The adsorption of acetic acid from aqueous solution by charcoal. 2. Sutezō Oguri and Jirō Kashima. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 630-2(1933); cf. C. A. 27,

5986.—Exptl. results are reported on absorption tests with 8 bamboo and 4 wood charcoals on solns. of  $\text{AcOH}$  varying in concn. from 0.00125 to 0.4 N. K. Kammermeyer

The new detergents. R. A. Duncan. *Ind. Eng. Chem.* 26, 24-6(1934).

Carboxide gas: a new insecticidal fumigant for bedbugs and cockroaches. E. W. Brown. *U. S. Naval Med. Bull.* 31, 253-68(1933).—Carboxide (a liquid mixt. of 1 part ethylene oxide to 9 parts of  $\text{CO}_2$ ) was tested in a 2000 cu. ft. room on deeply buried insects. The following min. lethal concns. per 1000 cu. ft. are recommended for both bedbugs and cockroaches: 5 lbs. for 3 hrs.; 3 lbs. for 6 hrs.; 3 lbs. for 12 hrs.; 2 lbs. for 18 hrs.; and 2 lbs. for 24 hrs.

B. C. Brunstetter

Solvents for  $\text{CH}_4$  [for sepn. from H-N mixts.] (Karzhavin, Gerchikova) 13.

Saufrignon, R.: Le graphite. Pt. II. Étude technique. 51 pp. Paris: Mines carrières. F. 10.

Borates. 2nd Ed. (1920-1932). London: H. M. Stationery Office. 44 pp. 9d. (by post 10d.). Reviewed in *J. Soc. Glass Tech.* 17, 128-9A(1933).

Hydrocyanic acid. I. G. Farbenind. A.-G. Fr. 42,-610, Aug. 23, 1933. Addn. to 715,052 (C. A. 26, 1719). Derivs. of hydrocarbons, particularly those contg. O or halogens, e. g.,  $\text{MeOH}$ ,  $\text{EtOH}$ ,  $\text{C}_2\text{H}_5\text{Cl}$  or  $\text{C}_2\text{H}_4\text{Cl}_2$ , are used instead of hydrocarbons in the process of Fr. 715,052. Cf. C. A. 27, 4034.

Hydrocyanic acid from heavy metal cyanides. Henry L. Sulman and Hugh F. K. Picard (to General Engineering Co.). U. S. 1,938,469, Dec. 5. A heavy metal cyanide such as that of residual liquors from cyanide plants is heated in a reducing H-contg. atm. and in the presence of an added metallic sulfide such as ground pyrites to a temp. sufficient to set free HCN and to cause the heavy metal to combine with the S set free from the metallic sulfide. An arrangement of app. is described. Cf. C. A. 27, 5902.

Hydrofluoric acid. I. G. Farbenind. A.-G. (Julius Söhl, inventor). Ger. 580,633, July 14, 1933. HF technically free from  $\text{SiO}_2$  is prepd. by distg. the impure HF till  $\text{SiF}_4$  appears in the distillate. Cf. C. A. 27, 4884.

Hydrofluoric acid. I. G. Farbenind. A.-G. (Julius Söhl, inventor). Ger. 581,714, Aug. 1, 1933. HF contg. very little  $\text{SiO}_2$  is prepd. by treating fluorspar contg.  $\text{SiO}_2$  with  $\text{H}_2\text{SO}_4$ , the paste of fluorspar and  $\text{H}_2\text{SO}_4$  being stirred for some time with a slight rise of temp. prior to driving off the HF to ensure removal of nearly all the  $\text{SiO}_2$  as  $\text{SiF}_4$ .

Fluosilicic acid. Walker Penfield (to Pennsylvania Salt Mfg. Co.). U. S. 1,938,533, Dec. 5. In the manuf. of  $\text{H}_2\text{SiF}_6$  solns. of about 20-30% strength from a gas contg.  $\text{SiF}_4$  and water vapor, the gas is cooled to a temp. (suitably about  $50^\circ$ ) at which the formation and condensation of  $\text{H}_2\text{SiF}_6$  takes place by immediately contacting it, without the introduction of addnl. water, with a soln. of  $\text{H}_2\text{SiF}_6$  of 20-30% concn. maintained at such temp., the water necessary for the reaction and prepn. of the concd. acid from the gas being thus obtained. App. is described.

Tungstic acid. Fritz Best. Ger. 579,509, July 1, 1933. Addn. to 567,571 (C. A. 27, 2662). The method of 567,571 for producing  $\text{WO}_3$  by treating finely crushed W ores with  $\text{HCl}$  or  $\text{HBr}$  is modified by using  $\text{HCl}$  of 1.195 sp. gr., at  $38-40^\circ$  and at a pressure of 40 cm. of water, or  $\text{HBr}$  of 1.502 sp. gr. at  $55-6^\circ$  and at the same pressure.

Ammonia synthesis. Patentwertungs A.-G. "Alpina." Ger. 583,559, Sept. 5, 1933. A mixt. of N and H for the synthesis of  $\text{NH}_3$  is purified by passing the mixt. over a catalyst comprising various alkali and alk. earth metals at  $2-500^\circ$ .

High-pressure-resisting joint suitable for synthetic ammonia apparatus. Sydney R. Boyce and Frank S. Lundy (to Imperial Chemical Industries Ltd.). U. S. 1,937,329, Nov. 28.

Recovering alkali metal compounds from waste lyes. George H. Tomlinson. Brit. 397,787, Aug. 31, 1933.



Waste liquors from cellulosic pulp, especially sulfate pulp, manuf. are spray-dried in the upper region of a recovery chamber, combustion of the dried product being substantially confined to a combustion and reducing zone below the drying zone. App. is described.

**Alkali cyanides.** Stickstoffwerke G. m. b. H. (H. Heinrich Franck and Carl Freitag, inventors). Ger. 579,886, July 3, 1933. Alkali carbonates are heated to redness in a current of HCN and H or  $\text{NH}_3$ , CO and H. Thus, soda is heated to 770–875° in a current of HCN and H to give a 99.6% yield of NaCN.

**Alkali metal nitrates.** Marius Fauvart and Gérard Mulliez. Fr. 750,945, Aug. 22, 1933. Vapors of oxides of N from the catalytic oxidation of  $\text{NH}_3$  are passed into a soln. of KCl or NaCl to form nitrates. An app. is described.

**Alkali metal phosphates.** Conway Freiherr von Girschwald and Hans Weidmann (to American Lurgi Corp.). U. S. 1,938,057, Dec. 5. A metal-P compd. such as ferro-P is heated with a basic alkali metal compd. such as  $\text{Na}_2\text{CO}_3$  to a reaction temp. below the fusion temp. of the reaction mixt. while the mixt. is moved in contact with a current of O-contg. gas in such an amt. that the issuing gas still contains at least 5% O.

**Alkali phosphates.** Metallgesellschaft A.-G. (Conway Freiherr von Girschwald and Hans Weidmann, inventors). Ger. 580,138, July 6, 1933. Addn. to 576,503 (C. A. 27, 5903). See U. S. 1,938,057 (preceding abstr.).

**Alkali sulfite solutions.** Patentaktiebolaget Gröndal-Ramén (Gustav Haglund, inventor). Ger. 583,850, Sept. 11, 1933. Alkali mono- and bisulfite solns. practically free from Ca salts and for use in obtaining cellulose are prepd. from the waste lye of cellulose processes. The waste lye is first burned to remove org. impurities, sulfides and thiosulfates. The residue is then dissolved in water and treated with  $\text{SO}_2$  and finely divided  $\text{CaCO}_3$ , or other Ca salts which form  $\text{Ca}(\text{HSO}_3)_2$  with  $\text{SO}_2$ , till the alkali salts present are all converted to bisulfite. The soln. is then treated with sufficient finely powd.  $\text{CaCO}_3$ , CaO or  $\text{Ca}(\text{OH})_2$  to ppt. the  $\text{Ca}(\text{HSO}_3)_2$  as  $\text{CaSO}_3$ , this causing some of the alkali bisulfite to be converted into the monosulfite. The pptd.  $\text{CaSO}_3$  is filtered off, this leaving a soln. of alkali mono- and bisulfite.

**Kiln for burning alkaline earth carbonates.** Dwight and Lloyd Metallurgical Co. Ger. 581,575, July 31, 1933.

**Caustic lyes.** I. G. Farbenind. A.-G. Fr. 751,312, Aug. 31, 1933. Alk. caustic lyes are made by decomposing amalgams by a countercurrent of water, e. g., in a tower filled with coke, charcoal, Fe, Fe-Ni or Cr in small pieces.

**Aluminum salts.** Zschimmer & Schwarz chemische Fabrik Dörlau. Fr. 752,805, Sept. 30, 1933. See Ger. 575,597 (C. A. 27, 4817).

**Ammonium salts.** Harry Pauling. Fr. 751,128, Aug. 28, 1933. In the formation of  $\text{NH}_4$  salts by neutralization of  $\text{NH}_3$  gas by acids in countercurrent, the gas is divided into several partial currents which are introduced in different horizontal planes. Larger quantities of gas can thereby be treated in the same space than previously.

**Ammonium double salt.** I. G. Farbenind. A.-G. Ger. 581,867, Aug. 4, 1933. The double salt  $(\text{NH}_4)_2\text{SO}_4 \cdot 2\text{NH}_4\text{NO}_3$  is prepd. by adding  $\text{NH}_3$  and  $\text{H}_2\text{SO}_4$  to  $\text{NH}_4\text{NO}_3$  lye, or by adding  $\text{NH}_3$  and  $\text{HNO}_3$  to  $(\text{NH}_4)_2\text{SO}_4$  lye in quantities sufficient to cause evapn. of the water by the heat of neutralization.

**Bismuth salts.** Soc. des usines chimiques Rhône-Poulenc. Fr. 752,768, Sept. 30, 1933. Stable solns. of Bi salts in vegetable oils are obtained by treating Bi with an org. acid having in the  $\alpha$ -position an alkoxy, phenoxy, phenylalkoxy, alkylmercapto, phenylmercapto or phenylalkylmercapto group. Examples are given of the prepn. of solns. of  $\alpha$ -phenoxycaproate,  $\alpha$ -phenoxisobutyrate,  $\alpha$ -butoxyphenylacetate, and  $\alpha$ -ethoxy-, mono- and tri- $\alpha$ -butoxy-, mono- and tri- $\alpha$ -phenoxy-,  $\alpha$ -benzylmercapto-,  $\alpha$ -phenylmercapto- and  $\alpha$ -butylmercapto-laurate of Bi.

**Calcium compounds.** Chemische Fabrik vorm. Sandoz. Fr. 750,940, Aug. 22, 1933. New Ca compds. are made

by causing  $\text{CaBr}_2$  to react on Ca salts of polyhydroxy-monocarboxylic acids obtained by oxidation of polyaldoses. Examples are given of the prepn. of compds. from  $\text{CaBr}_2$  and the maltobionate and lactobionate. The oxidation of the polyaldose and the combination may be carried out in one step.

**Lead salts.** René J. Daloze. Fr. 752,674, Sept. 28, 1933. Pure Pb salts are obtained from impure  $\text{PbSO}_4$  by a double decompn. in aq. soln. between  $\text{PbSO}_4$  and a large excess of  $\text{AcONa}$ , sepn. of insol. substances, and pptn. of Pb from the  $\text{Pb}(\text{OAc})_2$  by adding a Na salt corresponding to the insol. Pb salt desired.

**Working up crude potassium salts.** Chemieverfahren G. m. b. H. Ger. 579,925, July 1, 1933. Crude sulfate-free K salts such as sylvine, carnallite, etc., are treated with  $\text{NH}_4\text{Cl}$  lye and a current of  $\text{NH}_3$ . The pptd. KCl is sepd. The mother liquor is then treated to obtain by-products. In the case of sylvine, the lye is treated by the Solvay process. In the case of carnallite,  $\text{CO}_2$  is passed into the lye to ppt. the double salt  $\text{MgCO}_3 \cdot (\text{NH}_4)_2\text{CO}_3$ . Cf. C. A. 28, 8667.

**Soluble salts from silicates.** Società italiana potassa. Fr. 752,374, Sept. 21, 1933. Silicates, which may be mixed with other substances to effect the reaction, are placed in the upper part of a closed vessel and an aq. soln. of acid is placed in the lower part and heated to form steam. The steam condenses and carries down sol. substances, forming a cyclic process.

**Working up silicates.** Hans L. Lehmann. Ger. 580,712, July 14, 1933. Crude silicates are crushed, suspended in strong  $\text{NH}_4\text{Cl}$  soln. and heated with HCl. The product is an 82% yield of good quality fuller's earth.

**Metal silicates.** Philip Nathan Engel. Ger. 583,974, Sept. 13, 1933. A soln. of an alkali silicate is mixed with an acid and a soln. of a salt of a metal forming an amphoteric hydroxide. The latter may be mixed with the acid before addn. to the silicate. Thus,  $\text{Al}_2(\text{SO}_4)_3$  is added to concd.  $\text{H}_2\text{SO}_4$ . On cooling, the mixt. is added to a soln. of  $\text{Na}_2\text{SiO}_3$  to give a gelatinous mass contg.  $\text{Al}_2(\text{SiO}_3)_3$ . Other examples are given. The dried products are used as adsorption agents.

**Complex compounds of fluorine and aluminum.** I. G. Farbenind. A.-G. Ger. 584,964, Sept. 27, 1933. Solns. of complex F and Al compds. are obtained by the action of aq. mineral acid on a mixt. of crude  $\text{Al}_2\text{O}_3$  material such as clay, bauxite, etc., and difficultly sol. F compds., such as fluorspar,  $\text{AlF}_3$ , etc.

**Metal carbamates.** The Mathieson Alkali Works. Fr. 751,346, Aug. 31, 1933. Metal carbamates sol. in water, e. g.,  $\text{NH}_2\text{COONa}$  or  $(\text{NH}_2\text{COO})_2\text{Ca}$ , are made by causing  $\text{NH}_2\text{COONH}_4$  to react with a salt of the metal in aq. soln. at a temp. below 10°.

**Carbides.** N. V. Philips' Gloeilampenfabrieken. Brit. 397,372, Aug. 24, 1933. Refractory carbides are obtained by heating a body consisting at least partly of C in an atm. consisting of 1 or more volatile compds. of the element(s) whose carbides are to be produced. The atm. may also contain reducing gases, e. g., H. The carbides of Si, Zr, Hf, Ti, Ta, V, etc., may thus be obtained from their volatile halogen compds. In an example a C filament is heated by an elec. current to 2400° in vaporous  $\text{ZrCl}_4$  until the resistance of the filament remains const., the resulting tubular  $\text{ZrC}$  filament being washed with  $\text{H}_2\text{O}$  and alc.

**Carbides.** Mathias Fränkl (to Société Oxythermique). Brit. 397,744, Aug. 31, 1933. Addn. to 396,698 (C. A. 28, 4544). The process of 396,698, in which a self-sustaining column of material is formed in the enlarged lower end of a shaft furnace by sintering the charge, is modified for the manuf. of Ca and Si carbides from materials that do not sinter by heating. The raw materials, in correct proportions for the final product, are finely ground, intimately mixed and formed into briquets or long bars which are arranged in a rectangular section shaft in layers, the bars or briquets in adjacent layers being at right angles.

**Cyanamides.** Bayerische Stickstoffwerke A.-G. Ger. 583,533, Sept. 5, 1933. Carbide is rapidly azotized by employing several vertical chambers charged with carbide,

the heat being applied at the bottom. The N is applied under pressure.

**Nitrates.** Norsk Hydro-Elektrisk Kvaestofaktieselskab. (Henry Johnsen, inventor). Fr. 42,410, July 19, 1933. Addn. to 738,253 (C. A. 27, 1720). The base-exchange substances are flushed out with pure water between the passage of the NaCl and the  $\text{Ca}(\text{NO}_3)_2$  solns., so that the nitrate soln. is not contaminated by the chloride soln.

**Phosphates.** Chemische Fabrik Budenheim A.-G. (Guido Hedrich, inventor). Ger. 581,655, July 31, 1933. Crude phosphates, especially  $\text{Ca}_3(\text{PO}_4)_2$  contg. compds. of Fe and Al and org. substances as impurities, are refined by treatment with gaseous Cl and HCl at high temps. Small amts. of alkali chloride and steam may be added during the process.

**Phosphates.** Camille Matignon and Pierre Kachkaroff. Fr. 753,638, Oct. 20, 1933.  $(\text{NH}_4)_2\text{PO}_4$  and a Ca salt, e. g., the nitrate, are obtained from natural phosphates or bones,  $\text{NH}_3$  and an acid such as  $\text{HNO}_3$ , by dissolving the phosphate in the min. amt. of acid, pptg. the  $\text{Ca}(\text{H}_2\text{PO}_4)_2$  as  $\text{CaHPO}_4$  by the action of  $\text{CaCO}_3$ . The pptd.  $\text{CaHPO}_4$  is treated with an excess of a concd. soln. of  $(\text{NH}_4)_2\text{CO}_3$  or  $\text{NH}_4\text{HCO}_3$ , with or without  $\text{NH}_3$ , to form  $(\text{NH}_4)_2\text{PO}_4$  and  $\text{CaCO}_3$ , the latter being used to ppt.  $\text{Ca}(\text{H}_2\text{PO}_4)_2$ .

**Phosphates.** Victor Chemical Works. Fr. 754,104, Nov. 2, 1933. See U. S. 1,926,747 (C. A. 27, 5903). Fr. 754,105. A caustic alkali is added to the lixiviating liquid in amt. such that the final liquor has an alk. above 1.06, preferably above 1.08.

**Phosphates.** Rozel-Malétra (Soc. industrielle de produits chimiques). Fr. 754,294, Nov. 3, 1933. See U. S. 1,935,474 (C. A. 28, 5857).

**Pyrophosphates.** Chemische Fabrik Joh. A. Benckiser G. m. b. H. and Albert Reimann. Fr. 751,131, Aug. 28, 1933. See Brit. 395,642 (C. A. 28, 5879).

**Thiocyanates.** Emil Hene. Ger. 551,776, July 24, 1933. Addn. to 517,759 (C. A. 25, 2818). The method of 517,759 for forming thiocyanates is modified by using with thiourea oxides or hydroxides, instead of anhyd. hydrosulfides of alkali or alk. earth metals. Thus,  $\text{CaO}$  is mixed with  $\text{CS}(\text{NH}_2)_2$  and heated to 150–80° to give  $\text{Ca}(\text{CNS})_2$  and  $\text{NH}_3$ .

**Purifying alumina.** John G. Stein & Co. Ltd., Joseph F. Hyslop and Ralph Mackenzie. Brit. 397,288, Aug. 24, 1933. Fe oxide is sepd. from  $\text{Al}_2\text{O}_3$  by heating in a reducing atm., e. g., H, CO, at (over) 1000°, cooling to at least 800° in said atm. and then to ordinary temp. in air or other oxidizing atm., e. g., O.  $\text{Fe}_2\text{O}_3$  formed is dissolved from the mixt. by acid, e. g., HCl. The  $\text{Al}_2\text{O}_3$  is suitable for refractories.

**Alumina extraction from aluminous materials such as bauxite or clay.** John J. Crawford. U. S. 1,938,173, Dec. 5. A soln. contg. Al and Fe chlorides is formed by treating aluminous material with HCl; this soln. is treated with  $\text{NaHCO}_3$ ; the resulting mixt. of  $\text{NaHCO}_3$ ,  $\text{Al}(\text{OH})_3$  and Fe oxide is heated, residual Na aluminate and Fe oxide are treated to dissolve the Na aluminate, the latter is combined with  $\text{CO}_2$  and alumina is pptd. An arrangement of app. is described.

**Leaded ammonium chloride.** Charles P. Weise (to Grasselli Chemical Co.). U. S. 1,936,811, Nov. 28.  $\text{NH}_4\text{Cl}$  is crystd. from an alk. soln. contg. Pb and the lead  $\text{NH}_4\text{Cl}$  is treated with an acidified  $\text{NH}_4\text{Cl}$  soln., in order to obtain a light-colored product.

**Ammonium sulfate.** Appareils et Évaporateurs Kestner. Brit. 397,271, Aug. 24, 1933. See Fr. 733,594 (C. A. 27, 1105).

**Ammonium sulfate.** Emil Baerwald and Henry Goldmann. Ger. 585,502, Oct. 4, 1933.  $(\text{NH}_4)_2\text{SO}_4$  is prepd. by oxidizing  $\text{SO}_2$  (e. g., in gases from roasting pyrites, etc.) by means of oxides of N obtained by passing a high-tension current through air, and admitting  $\text{NH}_3$  and steam. The  $(\text{NH}_4)_2\text{SO}_4$  is collected by an electrofilter as a fine white powder.

**High-speed centrifugal drier and associated apparatus for drying ammonium sulfate.** Joseph van Ackeren (to

Koppers Co. of Del.). U. S. 1,936,866, Nov. 28. Various structural, mech. and operative details are described. **Ammonium sulfate nitrate.** Gewerkschaft Victor. Brit. 397,532, Aug. 28, 1933.  $\text{NH}_4$  sulfate nitrate is produced by introducing  $\text{NH}_3$  into a mixt. of  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  with utilization of the heat of reaction for evapn. of  $\text{H}_2\text{O}$ , the neutralization being effected under pressure so that evapn. cannot occur and said evapn. being conducted in a sep. part of the app. under a pressure less than that in the neutralization space.

**Barium hydrosulfide, etc.** Albert T. Mertes (to Krebs Pigment & Color Corp.). U. S. 1,936,849, Nov. 28. An aq. soln. of Ba sulfide is treated with  $\text{CaCl}_2$  in an amount substantially less than that equiv. to the Ba sulfide, and the  $\text{Ca}(\text{OH})_2$  is sepd. from the remaining soln. of Ba salts, which may be used for  $\text{BaCl}_2$  production, etc.

**Cadmium sulfate.** Harry P. Corson (to Grasselli Chemical Co.). U. S. 1,936,830, Nov. 28. Cd is dissolved in hot dil.  $\text{H}_2\text{SO}_4$ , and compressed air is introduced into the reaction mixt. while it is maintained at superatm. pressure.

**Chloride of lime.** Società elettrica ed elettrochimica del Caffaro, Achille Carughi and Carlo Paoloni. Fr. 42,505, Aug. 4, 1933. Addn. to 715,229 (C. A. 26, 1724). The interruption of the chlorination takes place after 9/10 of the operation is complete instead of 2/3 as in Fr. 715,229. The 1st phase of the reaction is carried out at 33–7°, the 2nd at 31–3° and the last at 27–31°.

**Shaft kiln for burning lime, etc.** Josef Rohm. Ger. 579,881, July 1, 1933.

**Calcium hypochlorite.** Francis N. Kitchen (to Imperial Chemical Industries Ltd.). U. S. 1,937,230, Nov. 28. A suspension of lime in water is chlorinated to produce basic Ca hypochlorite, the latter is sepd. from mother liquor, suspended in water and further chlorinated to produce normal  $\text{Ca}(\text{OCl})_2$ .

**Calcium hypochlorite.** Matthew Weber, Jr. (to Mathieson Alkali Works). U. S. 1,937,613, Dec. 5. Basic Ca hypochlorite is pptd. from an aq. soln. contg. Ca, chloride, OH and OCl ions, and after sepn. the chlorinated intermediate is caused to react with a NaOCl compd. and is dried.

**Copper chloride and sodium sulfate.** Giovanni Mosselli. Fr. 754,184, Nov. 2, 1933.  $\text{CuCl}_2$  and  $\text{Na}_2\text{SO}_4$  are made and sepd. from an aq. soln. of NaCl and  $\text{CuSO}_4$ , preferably in equimol. proportions, by cooling the soln. to between –10° and –20° and sepg. the crystd.  $\text{Na}_2\text{SO}_4$  by centrifuging or filtering.

**Cyanogen chloride.** Paul Dieterle (to National Aniline & Chemical Co.). U. S. 1,938,324, Dec. 5. Reaction is effected between Cl and an alkali metal cyanide in the presence of a halogenated aliphatic hydrocarbon such as  $\text{CCl}_4$  and of an org. monocarboxylic acid such as glacial HOAc which is sol. in the halogenated hydrocarbon used, in the substantial absence of water. By the use of Br instead of Cl, a similar reaction may be effected.

**Ferrous chloride.** Carl F. Prutton (to Dow Chemical Co.). U. S. 1,938,461, Dec. 5. A  $\text{FeCl}_2$  soln. is evapd. to ppt.  $\text{FeCl}_2 \cdot 2\text{H}_2\text{O}$  crystals, and the latter are sepd. from their mother liquor at a temp. above 90° (in order to avoid formation of tetrahydrate) and may be completely dehydrated by heating to about 230°.

**Ferric oxide.** Vereinigte Stahlwerke A.-G. (Leopold Brandt, inventor). Ger. 581,657, July 31, 1933. Pure  $\text{Fe}_2\text{O}_3$  is prepd. by reducing  $\text{Fe}(\text{CO})_5$  by heating to obtain pure Fe, treating the latter with  $\text{HNO}_3$  or  $(\text{CO}_2\text{H})_2$  and finally converting the resulting salt to  $\text{Fe}_2\text{O}_3$  by heating.

**Ferric oxide.** I. G. Farbenind. A.-G. (Hans Dohse, inventor). Ger. 584,646, Sept. 22, 1933.  $\text{Fe}_2\text{O}_3$  is obtained in a very finely divided condition by treating  $\text{FeCl}_3$  with alc. and  $\text{NH}_3$  in the presence of a small amt. of water. The alc. is distd. off and the  $\text{Fe}_2\text{O}_3$  freed from  $\text{NH}_4\text{Cl}$  and dried. In practice, anhyd.  $\text{FeCl}_3$  is treated with anhyd.  $\text{NH}_3$  and high-percentage alc.

**Ferric sulfate.** Titan G. m. b. H. Ger. 580,851, July 17, 1933. App. for treating solid powd.  $\text{Fe}_2(\text{SO}_4)_3$  with gaseous  $\text{NH}_3$  to produce  $\text{Fe}_2\text{O}_3$  and  $(\text{NH}_4)_2\text{SO}_4$  is described.

**Iron carbonyl.** Compagnie de produits chimiques et électrometallurgiques Alais, Froges et Camargue and James Basset. Fr. 753,683, Oct. 21, 1933. Fe carbonyl is made by causing CO to react under a pressure of 800 kg. per sq. cm. or more on compact Fe, divided simply by mech. means, *e. g.*, Fe turnings or filings.

**Purifying anhydrous magnesium chloride.** Société de produits chimiques des terres rares (to Johnson Matthey & Co. Ltd.). Brit. 397,481, Aug. 22, 1933. Divided on 397,479 (C. A. 28, 717<sup>a</sup>). See Fr. 736,416 (C. A. 27, 1285).

**Manganese dioxide.** Leslie G. Jenness (to Intermetal Corp.). U. S. 1,937,488, Nov. 28. Catalytic MnO<sub>2</sub> suitable for use in oxidizing CO at low temps. is prep'd. by heating a Mn ore such as pyrolusite ore contg. Mn of a valence greater than 2 in a stream of MeOH vapors to reduce the ore to compds. contg. both bivalent and quadrivalent Mn; the bivalent Mn is dissolved out with HNO<sub>3</sub>, and the resulting foraminite product is subjected to filtration, washing, pressing, crushing, sizing and drying.

**Nickel sulfate.** Harry P. Corson (to Grasselli Chemical Co.). U. S. 1,936,829, Nov. 28. A Ni-Cu-Fe alloy is treated with hot dil. H<sub>2</sub>SO<sub>4</sub>, and a gas contg. free O is introduced into the reaction mixt., as by use of air with steam, to give a suitable partial pressure of O greater than that in air alone, while a superatm. pressure and a temp. above 100° is maintained.

**Potassium aluminum fluoride.** Arthur H. Henninger (to General Chemical Co.). U. S. 1,937,956, Dec. 5. Al<sub>2</sub>O<sub>3</sub> is dissolved in a soln. of KOH, and HF is added. Various details of procedure are described.

**Potassium carbonate and sodium sulfate.** Kali Chemie A.-G. Fr. 752,507, Sept. 25, 1933. K<sub>2</sub>SO<sub>4</sub> is transformed to K<sub>2</sub>CO<sub>3</sub> by means of BaCO<sub>3</sub>, and the BaSO<sub>4</sub> is retransformed to BaCO<sub>3</sub> by means of Na<sub>2</sub>CO<sub>3</sub> in aq. suspension, preferably under pressure and heat. The mother liquor from the BaCO<sub>3</sub> is treated with CO<sub>2</sub> to sep. NaHCO<sub>3</sub>, and the mother liquor from the NaHCO<sub>3</sub> is cooled to sep. Na<sub>2</sub>SO<sub>4</sub>. The NaHCO<sub>3</sub> is heated in the presence of water to form Na<sub>2</sub>CO<sub>3</sub> and CO<sub>2</sub>.

**Potassium nitrate.** Kali-Forschungs-Anstalt G. m. b. H. (Oskar F. Kaselitz and Walter Katz, inventors). Ger. 581,656, July 31, 1933. KCl is treated with gaseous oxides of N obtained by heating Ca(NO<sub>3</sub>)<sub>2</sub> with KCl.

**Potassium phosphate.** Kali-Forschungs-Anstalt G. m. b. H. (Oskar F. Kaselitz and Walther Schuppe, inventors). Ger. 580,422, July 10, 1933. Addn. to 575,747 (C. A. 27, 4888). In prep'g. KH<sub>2</sub>PO<sub>4</sub> by the method of 575,747 from KCl and H<sub>3</sub>PO<sub>4</sub>, a sat'd. soln. of KH<sub>2</sub>PO<sub>4</sub> and the double salt KH<sub>2</sub>PO<sub>4</sub>·H<sub>3</sub>PO<sub>4</sub> is obtained. KCl and H<sub>3</sub>PO<sub>4</sub> are introduced into this soln. in equimol. proportions. The mixt. is heated till the Cl is driven off. The liquid is then cooled and the deposited KH<sub>2</sub>PO<sub>4</sub> sep'd.

**Silicon carbide.** Otis Hutchins (to Carborundum Co.). U. S. 1,937,060, Nov. 28. SiC in the form of allotropic crystal units joined to form a massive substantially continuous solid mass is prep'd. by a special described furnace operation and is of high purity and has a high elec. resistance.

**Sodium carbonate monohydrate.** Wm. H. Allen and Charles F. Ritchie (to American Potash & Chemical Corp.). U. S. 1,937,937, Dec. 5. In producing Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O from complexes of Na<sub>2</sub>CO<sub>3</sub> and Na<sub>2</sub>SO<sub>4</sub>, a major part of the Na<sub>2</sub>SO<sub>4</sub> is first ppt'd. from the soln. while it is being replaced with NaCl, and NH<sub>3</sub> is then added to the soln. to ppt. Na<sub>2</sub>CO<sub>3</sub>·H<sub>2</sub>O. App. is described.

**Soda and ammonia.** Alfred Mentzel. Ger. 583,396, Sept. 2, 1933. Addn. to 582,504 (C. A. 28, 865<sup>1</sup>). The process of 582,504 for producing K<sub>2</sub>CO<sub>3</sub> and NH<sub>3</sub> from K<sub>2</sub>SO<sub>4</sub> is applied to Na<sub>2</sub>SO<sub>4</sub>. Thus Na<sub>2</sub>SO<sub>4</sub> is heated with C, steam and N to give NaCN. This is then treated with steam to give Na<sub>2</sub>CO<sub>3</sub>, NH<sub>3</sub> and NaOH.

**Sodium bicarbonate.** Henri Lawarree. Fr. 42,546, Aug. 4, 1933. Addn. to 730,997 (C. A. 27, 3787). NaHCO<sub>3</sub> is made by adding NaCl to a soln. circulating in a cycle contg. nitrates of amines and of NH<sub>4</sub>, (1/4) of the nitrate N being combined with the amines), then adding (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> or NH<sub>3</sub> and CO<sub>2</sub> until pptn. of an amt. of

<sup>1</sup> NH<sub>4</sub>Cl corresponding to the NaCl added, removing the NH<sub>4</sub>Cl and treating by CO<sub>2</sub> to ppt. NaHCO<sub>3</sub>. The NaCl may be replaced by other sol. Na salt, and instead of NH<sub>4</sub>NO<sub>3</sub> in the starting soln. NaNO<sub>3</sub> may be used. Cf. C. A. 27, 4358.

**Sodium cyanide.** Gesellschaft für Kohlentechnik m. b. H. Fr. 751,191, Aug. 28, 1933. Na<sub>2</sub>CO<sub>3</sub> contg. water of crystn. is subjected to dehydration under a temp. such that there is no solution, fusion or fritting of the salt, and HCN is afterward directed at a higher temp. onto the dehydrated salt. In a modification NaHCO<sub>3</sub> is heated under vacuum to a temp. not above 102° and HCN is directed onto the calcined salt at a higher temp.

**Sodium nitrate.** George H. Gleason (to Compania Salitrera Anglo-Chilena). U. S. 1,937,757, Dec. 5. "Commercial" NaNO<sub>3</sub> is heated to liquefy its actual NaNO<sub>3</sub> without liquefaction of assoc'd. impurities, and the molten NaNO<sub>3</sub> is sep'd.

**Sodium nitrate and ammonium chloride.** Wilhelm Steudemann. Brit. 397,290, Aug. 24, 1933. See Fr. 741,213 (C. A. 27, 2768).

**Sodium nitrite.** Synthesia chemické tovarny akc. spol. and Bedrich Batik. Fr. 750,886, Aug. 21, 1933. See Ger. 568,942 (C. A. 27, 2768).

**Stannic chloride.** Jacques Wolf and Georges A. Favre. U. S. 1,937,419, Nov. 28. In treating molten Sn with Cl, about 5% or more of Sb is added to the Sn as a catalyst. App. is described.

**Strontium carbonate.** Otho L. Thomas (to Grasselli Chemical Co.). U. S. 1,936,806, Nov. 28. Crushed celestite ore is subjected to ball milling in a Na<sub>2</sub>CO<sub>3</sub> soln. at a temp. above about 65°, the solid product is sep'd. from Na<sub>2</sub>SO<sub>4</sub> soln. formed, reground as a slurry in water in a ball mill at a temp. above about 65°, and the resulting SrCO<sub>3</sub> is sep'd. from the reaction liquor.

**Zinc oxide.** Metallgesellschaft A.-G. Fr. 753,330, Oct. 13, 1933. ZnO is made by the combustion in powd. coal burners of a mixt. of fuel and a material contg. ZnSO<sub>4</sub>, *e. g.*, smoke dust from the roasting of Zn ores, without an excess of combustion air and at a temp. above the decomposition temp. of ZnSO<sub>4</sub>. The gases are cooled by pulverized water to ppt. ZnO and to oxidize the Zn formed.

**Active carbon.** N. V. Algemeene Norit Maatschappij. Ger. 583,053, Aug. 28, 1933. Addn. to 547,516 (C. A. 26, 3632). In prep'g. active C by the method of 547,516, *i. e.*, by heating coal and inorg. binding agent, the activating heating is carried out in a rotary-drum furnace. A small amt. of H may be introduced into the furnace.

**Colloidal carbon.** George Antonoff and Jean Freedland. Ger. 580,962, July 19, 1933. Colloidal C free from ash is prep'd. by carbonizing vegetable materials with H<sub>2</sub>SO<sub>4</sub>, and subjecting the product to an alk. peptization. The vegetable material may be subjected to a treatment with alkali before carbonization. Cf. C. A. 27, 5906.

**Carbon and hydrogen.** Adolf Köpke. Ger. 584,538, Sept. 21, 1933. App. for the simultaneous production of C and H by heating hydrocarbons, especially CH<sub>4</sub>, is described.

**Solutions of chlorine.** Electrochlore (Soc. anon.). Fr. 752,897, Oct. 2, 1933. Solns. of Cl in water are obtained by the use of a blast pump in which water under pressure acts to draw in the Cl and then dissolves it. The solns. are particularly for *delignification of cellulose*.

**Fluorine compounds of aluminum.** Walter H. Gitzen and Glenn H. Wagner (to Aluminum Co. of America). U. S. 1,937,885, Dec. 5. See Brit. 383,780 (C. A. 27, 4355).

**Hydrogen production.** Roger Williams (to E. I. du Pont de Nemours & Co.). U. S. 1,938,202, Dec. 5. A mixt. of steam and CH<sub>4</sub> under pressure and at a temp. of 300–550° is subjected to the combined action of a Ni catalyst and a preponderating proportion of an alk. earth oxide such as lime. When oxides of C begin to appear in the H, the catalyst is regenerated by heating.

**Hydrogen.** Hans Harter. Ger. 581,986, Aug. 5, 1933. H or a mixt. of H and N for the synthesis of NH<sub>3</sub> is obtained from CH<sub>4</sub> in two parallel processes. In one process, the CH<sub>4</sub> is treated with excess of steam in the presence of

fused Fe and a catalyst, to produce H and CO<sub>2</sub>. In the other, the CH<sub>4</sub> is treated with O or air to produce a mixt. of H and CO or N, H and CO, the H and CO being used to regenerate the catalyst used in the CH<sub>4</sub>-Fe-steam process. App. is indicated.

**Hydrogen or hydrogen-nitrogen mixture.** Hans Harter. Ger. 583,205, Aug. 31, 1933. Addn. to 581,986 (preceding abstr.). The method of 581,986 for producing H or H and N from CH<sub>4</sub> and steam, or CH<sub>4</sub>, steam and air, is modified by carrying out the two parallel processes described in 581,986 in one app., the waste gases, H and CO from one process being used to reduce the catalyst used in the other process.

**Hydrogen.** L'oxyhydrique française. Fr. 751,384, Sept. 2, 1933. H is made by charging Fe-Si in pieces, NaOH in pieces and then water into an autoclave, so that the rise in temp. due to the reaction assures progressive attack of the Fe-Si, without boiling.

**Oxygen.** I. G. Farbenind. A.-G. (Kurt Fischer, inventor). Ger. 583,788, Sept. 12, 1933. O is removed from gas mixts. contg. O by absorption with a complex Co compd., and is then recovered from the latter by treatment with NH<sub>3</sub>. Thus, crystd. Co(NO<sub>3</sub>)<sub>2</sub> and NH<sub>4</sub>NO<sub>3</sub> are dissolved in water and treated with an aq. soln. of NH<sub>3</sub>. Air is bubbled in to cause absorption of the O by the complex Co NH<sub>3</sub> compd. present. The O causes pptn. of the oxidized complex compd. This is filtered off and treated with gaseous NH<sub>3</sub>, causing evolution of O.

**Masses giving off oxygen.** Käte Wurster née Bode (Albert Hloch, inventor). Ger. 580,634, July 14, 1933. Masses giving off O on heating consist of a mixt. of O-yielding agents such as alkali or alk. earth oxides or peroxides and asbestos fiber.

**Phosphorus from phosphates.** Stapleton D. Gooch and Friedrich P. Kerschbaum (to Pembroke Chemical Corp.). U. S. 1,938,557, Dec. 5. A shaft furnace is supplied with a charge comprising a silica-contg. phosphate material in the form of lumps which will not disintegrate in passing through the shaft of the furnace and lumps of coke, the proportion of the coke being about one-third to two-thirds the quantity of the phosphate material; the charge is blasted with air preheated to at least 700°, and the throughput of the furnace based on coke consumption is maintained at from 200 kg. to 800 kg. per hr. per sq. m. of hearth. Cf. C. A. 27, 816.

**Phosphorous and phosphoric acid esters.** Wilhelm Lommel and Rudolf Engelhardt (to I. G. Farbenind. A.-G.). U. S. 1,936,985, Nov. 28. Phosphorous or phosphoric esters contg. Cl or Br are obtained by reaction of compds. such as ethylene or propylene oxides or epichlorohydrin with PCl<sub>3</sub>, POCl<sub>3</sub> or PBr<sub>3</sub> (suitably at about the b. p. of the alkylene oxide used). Oily products may be thus obtained such as tri(dichloropropyl) phosphate b<sub>p</sub> 67°, which hydrolyze when boiled with water and which may be used as impregnating and softening agents capable of reducing the inflammability of org. materials.

**Pure sulfur from crude material.** Koloman von Szombathy. U. S. 1,936,959, Nov. 28. In a continuous operation, the crude material is treated to produce H<sub>2</sub>S and SO<sub>2</sub> which are then simultaneously conducted into a polythionate soln. (using an excess of H<sub>2</sub>S and maintaining the temp. of the soln. at 45-65°). An arrangement of app. is described.

**Sulfur.** I. G. Farbenind. A.-G. (Paul Herold and Hans Dorsch, inventors). Ger. 581,147, July 21, 1933. Addn. to 565,538 (C. A. 27, 2541). See Fr. 726,380 (C. A. 27, 4361).

**Sulfur.** I. G. Farbenind. A.-G. (Fritz Winkler, Fritz Giller and Hans Dorsch, inventors). Ger. 581,654, July 31, 1933. See Fr. 747,250 (C. A. 27, 4889).

**Sulfur from sulfur dioxide.** Daniel Tyrer (to Imperial Chemical Industries Ltd.). U. S. 1,936,809, Nov. 28. A carbonaceous fuel such as coal is carbonized by heating it in contact with a preheated SO<sub>2</sub> gas contg. insufficient O to maintain the fuel at carbonizing temp., the carbonization being started at a temp. of about 400-500°; an O-contg. gas is added to the resulting reaction gases, and the gas mixt. is passed through a bed of highly heated carbo-

naceous fuel maintained at a temp. above 1000° by reactions between the fuel and the gas mixt.; reaction gases are withdrawn and elemental S is recovered from them. Cf. C. A. 27, 3788.

**Sulfur and arsenic.** Patentaktiebolaget Gröndal-Ramén. Ger. 581,557, July 29, 1933. See U. S. 1,917,725 (C. A. 27, 4637).

**Freeing sulfate solutions from iron.** Arthur Fleischer (to Kalumite Co.). Brit. 397,412, Aug. 24, 1933. Solns. of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> or alum are freed from ferric Fe by treating the neutral or basic soln. with dehydrated alunite, base exchange being effected between the Fe<sub>2</sub>O<sub>3</sub> and the Al<sub>2</sub>O<sub>3</sub> of the alunite.

**Aluminum sulfate.** Katherine Steuart (to Kalumite Co.). Brit. 397,407, Aug. 24, 1933. A finely divided basic NH<sub>4</sub> alum is heated to 400-620° to expel its (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and obtain a basic Al sulfate which may be treated with H<sub>2</sub>SO<sub>4</sub> to reduce its basicity and increase its soly. Thus aluminiferous material, e. g., burnt clay, may be treated with H<sub>2</sub>SO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> to obtain an NH<sub>4</sub> alum soln., BaS added to reduce the Fe therein, the soln. filtered and crystd., a soln. of the alum heated as in Brit. 397,408 or 397,410 (following abstr.) to ppt. the basic NH<sub>4</sub> alum and obtain a mother liquor contg. H<sub>2</sub>SO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and residual normal alum, the basic alum treated as above and the ammoniacal vapors recovered in soln. and used with the mother liquor to attack fresh burnt clay. Cf. C. A. 27, 4356.

**Basic alums.** Katherine Steuart (to Kalumite Co.). Brit. 397,408 and 397,410, Aug. 24, 1933. See U. S. 1,914,175 (C. A. 27, 4355).

**Alumina.** Louise D. Sanders (to Kalumite Co.). Brit. 397,409, Aug. 24, 1933. A basic Na or K alum, obtained as in Brit. 397,408 or 397,410 (preceding abstr.), is calcined at 750-1000° and the undecompd. alkali sulfate-leached out. Residual SO<sub>3</sub> may be removed from the Al<sub>2</sub>O<sub>3</sub> by leaching with aq. Na, K or NH<sub>4</sub> hydroxide or carbonate. The alum is preferably first dehydrated at 500-600° and the SO<sub>3</sub> and SO<sub>2</sub> driven off at the higher temps. converted into H<sub>2</sub>SO<sub>4</sub>. In 397,411, Aug. 24, 1933, basic NH<sub>4</sub> alum, similarly obtained, is dehydrated at 500-600° and calcined at 700-1000°.

**Carbon monoxide.** Jean Mauclet. Fr. 753,658, Oct. 21, 1933. Carbonates are decomposed in a closed vessel, and the CO<sub>2</sub> is transformed to CO by contact at a high temp. with a material contg. C, e. g., an Fe-C alloy.

**Hydrogen peroxide.** Friedrich Boedecker and Jon Seemann (one-half each to E. I. du Pont de Nemours & Co. and to Buffalo Electro-Chemical Co.). U. S. 1,937,682, Dec. 5. Superheated steam is injected upwardly through a body of acid persulfate soln. in a continuous process, and the atomized soln. and H<sub>2</sub>O<sub>2</sub> vapor are drawn through a heated zone (of a described app.) by the action of a vacuum.

**Hydrogen peroxide.** Alfred Rieche. Ger. 580,710, July 14, 1933. A stable H<sub>2</sub>O<sub>2</sub> prepn. is obtained by treating urea derivs. of sugar with H<sub>2</sub>O<sub>2</sub> in the presence of water or stabilizers. Thus, glucose uride is treated with H<sub>2</sub>O<sub>2</sub> to give a stable product contg. 1.5-2% H<sub>2</sub>O<sub>2</sub>.

**Hydrogen peroxide.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 42,600, Aug. 23, 1933. Addn. to 733,201 (C. A. 27, 816). Steam is introduced at one or more points into the circulating soln. which is in process of being distd.

**Sulfur dioxide from acid sludges.** Ingenieur Hechenbleikner (to Chemical Construction Corp.). Brit. 398,023, Sept. 7, 1933. See U. S. 1,900,239 (C. A. 27, 3069).

**Catalysts.** "S. I. R. I." (Società italiana ricerche industriali). Brit. 397,309, Aug. 24, 1933. See Fr. 738,880 (C. A. 27, 1996).

**Catalysts.** Alexander Wacker Ges. für elektrochemische Industrie m. b. H. (Hans Anselm and Eugen Galitzenstein, inventors). Ger. 579,566, June 29, 1933. See Fr. 742,924 (C. A. 27, 3721).

**Oxidation catalyst.** Harlan A. Bond and Lee B. Smith (to E. I. du Pont de Nemours & Co.). U. S. 1,937,381, Nov. 28. A catalyst suitable for use in reactions such as production of aldehydes from alcs. comprises electrolytic Ag

crystals carrying a small amt. of an oxide of W, V, Mo, Ce, Th, Zn, Al or Cr.

**Oxidation catalyst.** Joseph C. W. Frazer. U. S. 1,937,689, Dec. 5. A catalyst suitable for use in the oxidation of CO at low temps. is prepd. by converting a Ni or Co compd. such as  $\text{Co}(\text{NO}_3)_2$  to oxide contg. less than the limit of poisoning impurities tolerable for such activity and heating the oxide in an oxidizing atm. at an elevated temp. not exceeding about  $350^\circ$ . Cf. C. A. 28, 867.

**Catalyst for ammonia oxidation.** Mayor F. Fogler (to Atmospheric Nitrogen Corp.). U. S. 1,936,936, Nov. 28. In producing a catalyst, a material comprising a soln. of Co nitrate and alumina is heated to remove liquid and produce an agglomerated mass; the mass is broken up to form granules and fines, and fines in the solid phase are sepd. and are used for producing addnl. catalyst in granular form, by mixing with a Co salt soln. such as the nitrate and granulating.

**Manganese dioxide catalysts, etc.** Leslie G. Jenness (to Intermetal Corp.). U. S. 1,937,499, Nov. 28. Substantially all the bivalent Mn is removed from Mn sesquioxide (suitable by use of dil.  $\text{H}_2\text{SO}_4$ ) to obtain a catalyst which is suitable for use in the low-temp. oxidation of CO. Ni aluminate may be treated with NaOH.

**Catalyst for absorbing olefins.** N. V. de Bataafsche Petroleum Maatschappij. Ger. 580,929, July 19, 1933. Addn. to 541,628 (C. A. 26, 2466). In absorbing olefins by strong acids in the presence of catalysts to form hydrolyzable products, the catalysts of 541,628 are replaced by the complex compds. obtained by treating metal CN compds. with unsatd. hydrocarbons and acid under conditions which result in polymerization of the hydrocarbons. Thus, strong  $\text{H}_2\text{SO}_4$  is stirred with KCN and  $\text{C}_2\text{H}(\text{CH}_3)_2$  to give a catalyst used in absorbing  $\text{C}_2\text{H}_4$ .

**Nickel catalysts.** Wm. W. Myddleton. Brit. 397,295, Aug. 24, 1933. Catalysts are prepd. by mixing Ni oxide with a Si ester, decompd. the ester and heating the mixt. in a reducing atm. In an example NiO, prepd. from  $\text{NiCO}_3$ , is mixed with a PhMe soln. of Et orthosilicate and  $\text{NH}_4\text{OH}$  is added. The coagulated product is broken into granules, dried and reduced in H. The catalyst may be used for the hydrogenation of cottonseed oil.

**Artificial materials.** Soc. pour l'ind. chim. à Bâle. Fr. 754,100, Oct. 31, 1933. In making lamellar artificial masses, a fusible non-hardening resin having a base of amine of the type of the anhydride of aminobenzyl alc. and its homologs, is used as binder. The layers provided with this binder are assembled by the action of heat and pressure.

**Condensation products.** Bakelite G. m. b. H. (Fritz Seebach, inventor). Ger. 579,748, July 3, 1933. Products capable of being hardened are formed by treating urea or its derivs., or thiourea, or mixts. of these, with  $\text{AcNH}_2$  and  $\text{CH}_2\text{O}$  in the presence or absence of catalysts. The product is dried, powd. and given the usual optional addns. of coloring matter, filling materials, plasticizing agent, etc., and is molded. The products are hardened by hot pressing. The  $\text{AcNH}_2$  may be partly or wholly replaced by  $\text{C}_2\text{H}_5\text{NHC}_2\text{H}_5\text{O}$ . Examples are given.

**Condensation products.** I. G. Farbenind. A.-G. (Heinz Scheyer, inventor). Ger. 580,010, July 5, 1933. The condensation products obtained in Ger. 571,523 (C. A. 27, 4415) by treating methyleneanthrone or its substitution products with a mild acid condensing agent are treated with  $\text{SO}_2\text{Cl}_2$ . The product can be subjected to the action of a mild alk. condensing agent by the method of 577,560 (C. A. 28, 654). Examples are given.

**Condensation products.** H. Römmler A.-G. Ger. 583,563, Sept. 6, 1933. Products are obtained by treating 1 mol. of thiourea and 1 mol. of urea with less than 4 mols. of  $\text{CH}_2\text{O}$ , the  $p_K$  value being 5. The products have a hydrophobe character. Examples are given.

**Condensation products.** I. G. Farbenind. A.-G. (Karl Daimler and Berthold Vahlberg, inventors). Ger. 584,703, Sept. 22, 1933. Condensation products contg. silicates are obtained by treating taurines with fatty acid chlorides and Na silicate contg. free alkali (obtained by

heating sand with NaOH) at  $0-50^\circ$ . Thus, an aq. soln. of Na taurine is treated with crude Na silicate contg. excess of NaOH and palm oil acid chloride. The product is used as a washing agent. Another example is given.

**Condensation products.** Herbert Hönel. Ger. 584,858, Sept. 27, 1933. Addn. to 563,876 (C. A. 27, 1220). The method of 563,876 for producing stable high mol. products by adding excess of the therein described almost neutral condensation products to  $\text{CH}_2\text{O}$ -PhOH products, is modified by reducing the amt. of the excess. High temps. are employed. Thus, thymol is condensed with  $\text{CH}_2\text{O}$  in an alk. medium and is added at  $160^\circ$  to excess of a linseed oil-wood oil product to give a viscous oil useful as a binding agent, etc. Oxidation hardens the spread oil. Other examples are given.

**Condensation products.** Ambi Verwaltung A.-G. (Stefan Goldschmidt and Emil Gerische, inventor). Ger. 584,856, Sept. 28, 1933. In prepg.  $\text{CH}_2\text{O}$ -urea condensation products with a predetd. gelatinization period, lower alcs. are added immediately after the condensation in a weakly acid medium, without removal of the water. Thus,  $p$ - $\text{CH}_2\text{O}$ , urea, and a small amt. of 2 N NaOH are heated in a reflux condenser.  $\text{H}_2\text{SO}_4$  is then added and the whole heated till the mass becomes viscous. Alc. (96%) is then added to the hot mass which is allowed to cool. The mass remains fluid for several days and then gelatinizes. Other examples are given.

**Plastic condensation products.** Joseph C. Patrick. Ger. 579,692, June 20, 1933. Dihalogenated paraffins such as  $\text{C}_2\text{H}_4\text{Cl}_2$  are condensed with an aq. polysulfide soln. in the presence of freshly pptd.  $\text{Mg}(\text{OH})_2$ , the  $p_K$  value being maintained between 7 and 12 and preferably between 8 and 10. Polysulfides of the general formula  $\text{XS}_n$  are used,  $n$  being greater than 3.75 and X being a metal. The resulting latex is isolated by coagulation. Examples are given. Cf. C. A. 27, 2260, 5160.

**Plastic masses.** Bakelite Corp. Ger. 579,553, June 28, 1933. Urea and solid polymers of  $\text{CH}_2\text{O}$  are mixed to a plastic mass with filling material and cellulose derivs. stable at  $165^\circ$ , e. g., cellulose acetate. A plasticizing agent such as dialkyl esters, is added and the mass homogenized ready for pressing or molding.

**Plastic masses.** Franz Gassner. Ger. 579,720, June 30, 1933. See Fr. 734,382 (C. A. 27, 1114).

**Plastic masses.** Walter Hengstmann, Wolf Hengstmann and Anna-Marie Hengstmann née Wolf. Ger. 581,675, July 31, 1933. Addn. to 499,676 (C. A. 25, 568). The plastic mass of 499,676 consisting of cellulose ethers and aliphatic dicarboxylic acids, is improved by addn. of polymerized styrene. The product is useful for making dental plates, etc.

**Plastic materials.** Helmut Fritz and Emil Glaser. Fr. 752,452, Sept. 23, 1933. Powd. substances or mixts. which are hardened by water are transformed by anhyd. liquids into homogeneous plastic masses, and kept out of contact with moisture until the time of use. Thus,  $\text{ZnO}$  45,  $\text{ZnSO}_4$  20, monoacetin 15 and dichlorohydrin 20 parts are mixed, or portland cement 72.5 and an alc. soln. of  $\text{ZnCl}_2$  27.5 parts. Other examples are given.

**Plastic materials.** Fabriques de produits de chimie organique de Laire, and René Armand. Fr. 752,705, Sept. 29, 1933. Plastic materials contg. combined S are made by producing  $\text{H}_2\text{S}$  in the nascent state by double decompn. in the presence of urea- $\text{CH}_2\text{O}$  solns., either before or after the formation of methylolurea, the  $p_K$  of the medium being controlled so that it remains at the optimum value. The  $\text{H}_2\text{S}$  may be formed by the addn. of a sulfide or polysulfide and an acid.

**Resitols.** Aug. Nowack A.-G. and Richard Hessen. Ger. 580,560, July 12, 1933. Soluble condensation products from phenols and aldehydes capable of hardening and melting are heated in thin layers, e. g., on rollers, to high temps. till the resol is converted to resitol, the greater part of the volatile constituents being simultaneously removed. Novolack and hardening material may be used instead of resol.

**Adhesives.** George E. Heyl. Brit. 397,678, Aug. 31, 1933. Tiles, slabs, etc., particularly of glass, are secured

to surfaces by a plastic compn. consisting of concd., *e. g.*, 75%, rubber latex 15,  $\text{SiO}_2$  flour 3-12 and gum 0.5-1 parts. Coloring matter may be incorporated or painted on the tje back. Cf. *C. A.* 27, 4891.

**Adhesives.** I. G. Farbenind. A.-G. Fr. 752,565, Sept. 26, 1933. A covering material resistant to water such as linoleum is fixed to a substratum by an aq. emulsion of a resinous condensation product contg. radicals of a polyhydric alc., of a polybasic org. acid and of a drying fatty acid. Thus an emulsion of a condensation product contg. radicals of glycerol, phthalic acid and linseed oil fatty acid and a soln. of casein in aq.  $\text{NH}_3$  may be used. Pitch and finely powd. lignite may also be present. Cf. *C. A.* 28, 607<sup>2</sup>.

**Adhesive mass.** Ivo Giordano and Odoardo Diena. Fr. 751,348, Aug. 31, 1933. A plastic adhesive mass is made by heating rubber, if desired already vulcanized and aged, to 200-350°, and treating with an inorg. acid such as  $\text{HNO}_3$ . The products may be used for impregnating bandages made of cloth, paper or spun glass.

**Adhesive foil, etc.** Hugo Wilckcn. Ger. 581,968, Aug. 5, 1933. Foil, etc., which adheres under application of heat and pressure, is coated with albumin, a hygroscopic substance, and rubber latex.

**Adhesive for paraffined paper.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 753,542, Oct. 18, 1933. Solns. of chlorinated rubber in org. solvents are used.

**Asbestos cement products.** Giovanni Morbelli. Ger. 583,554, Sept. 5, 1933. The products are rendered harder and more resistant to water by using 70 to 85% of fine ground slag contg.  $\text{SiO}_2$  as binding agent, and steam-hardening.

**Dental cement.** Pierre J. A. Husnot. Ger. 584,720, Sept. 23, 1933. A dental cement consists of chemically pure Sn in cryst. form and  $\text{ZnHPO}_4$ .

**Albumin.** Soc. pour l'ind. chim. à Bâle. Ger. 581,518, July 28, 1933. Solns. of albumin and its disintegration products are obtained by using liquid addn. products of alkylating agents and pyridine bases, with or without addn. of water-free diluents, as solvents. Cellulose may be added. The soln. may be treated with esterifying agents to acylate the solute. In an example, powd. casein is dissolved in a mixt. of pyridine and benzylpyridinium chloride. Cellulose may be added. Other examples are given. The solns. are used for the production of films, fibers, etc.

**Objects of molten silica.** Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey (Gaston Delpéch, inventor). Fr. 752,926, Oct. 3, 1933. Objects made of molten  $\text{SiO}_2$  are subjected after leaving the furnace to a scraping at a temp. as high as possible and not below the temp. of transformation of the cristobalite, then the surface is subjected to a refusion at a temp. of at least 1000°.

**Cleansing agents.** Léon A. L. Morot. Fr. 752,898, Oct. 2, 1933.  $\text{PhNH}_2$  is mixed with a liquid soap or a lye and used for washing, cleaning, pickling, etc.

**Cleaning composition.** Paul Régeard. Fr. 751,240, Aug. 29, 1933. A cleaning compn. for paint, etc., contains peanut oil 55, a drying liquid or powder 35 and Prussian blue or other color 10%. The peanut oil may be replaced by a smaller proportion of linseed, colza, olive or other oil.

**Cleaning and dispersion agent.** Deutsche Hydrierwerke A.-G. Ger. 584,688, Sept. 22, 1933. Agents for cleaning and dispersing are prepd. by adding high mol. alcs. or ketones, optionally mixed with hydrocarbons, to alk. salts such as carbonates, borates, silicates, etc., and using salts of aliphatic sulfonic acids as emulsification promoters. Thus, an aq. soln. of the Na salt of naphthalene sulfonic acid is added to  $\text{Na}_2\text{CO}_3$  and cyclohexanol. Other examples are given.

**Cleaning and disinfecting metal articles.** Hermann Kantorowicz. U. S. 1,937,229, Nov. 28. Articles of metal such as Al or other receptacles or utensils are treated with a soln. contg. hypochlorite, alkali metal silicate and caustic alkali.

**Drain-pipe cleaning composition.** Oliver W. Hunter

(one-half to Robert A. Northcott). U. S. 1,938,560, Dec. 5. Caustic alkali and Al particles are used together with vegetable matter such as a powd. spice in such a proportion that fumes formed when the compn. is contacted with water will be rendered fragrant and non-irritating.

**Preservative composition suitable for treating paintings.** Hyman Deitchman. U. S. 1,937,813, Dec. 5. Gelatin and wood creosote are heated to 160-250° and the resulting vapors are condensed and then further cooled to form a colloidal mass.

**Extrusion process for pencil manufacture.** Jorgen E. Thomsen (to Joseph Dixon Crucible Co.). U. S. 1,937,104, Nov. 28. Various details of app. and operation are described.

**Composition for manufacture of pencil sheaths.** Jorgen E. Thomsen (to Joseph Dixon Crucible Co.). U. S. 1,937,103, Nov. 28. Wood flour is used with a non-water-absorbent comminuted cellulose fibrous material such as rice hulls and a water-sol. binder such as an alkyl cellulose, etc.

**Self-hardening graphite lead for pencils.** Jorgen E. Thomsen (to Joseph Dixon Crucible Co.). U. S. 1,937,105, Nov. 28. A marking material for pencils is formed comprising a comminuted wax-satd. calcined graphite and a water-sol.-binder such as one contg. an alkyl cellulose, etc.

**Bleaching agent.** Soc. anon. des cires Sultane. Fr. 754,112, Nov. 2, 1933. New bleaching salts are made by passing Cl into a soln. contg. a uni-, bi- or tri-basic alkali salt of  $\text{H}_3\text{PO}_4$  and a caustic alkali. The products are of the type  $\text{PO}_3\text{Na}(\text{ClONa})_2$ ,  $\text{PO}_2\text{Na}_2(\text{ClONa})$  and  $(\text{PO}_2\text{Na})_3(\text{ClONa})_3$ .

**Antifreeze agents.** Henkel & Cie. G. m. b. H. Fr. 751,084, Aug. 26, 1933. See Brit. 392,876 (*C. A.* 27, 5495).

**Compound sheet material.** General Electric Co. Brit. 396,405, Aug. 2, 1933. A molded laminated material, relatively bullet-proof, comprises alternate layers of fibrous material, *e. g.*, paper, and an abrasive, *e. g.*, powd. glass or quartz, the layers being bonded together with a resinous compn. or a varnish which hardens when heated and subjected to pressure.

**Laminated sound records.** Howard J. Billings (to Arthur D. Little, Inc.). U. S. 1,937,680, Dec. 5. A moldable material is used which comprises fibrous material such as paper pulp and a binder consisting of hardwood pitch and a gum of "low susceptibility factor" such as copal gum. Various details of laminated record manuf. are described.

**Flexible tubing.** Leopold Rado. U. S. 1,937,069, Nov. 28. Tubing is formed with a casing of flexible material such as rubber and a lining consisting of helically wound cellulose film coated with metal foil constituting in the lining a plurality of sepd. layers.

**Packing.** Eugene V. Hayes-Gratz. Brit. 397,219, Aug. 24, 1933. A calking, lagging and packing material is prepd. from unspun fibers, preferably sisal, hemp or coir, which are first softened by treatment with a neutralized sulfonated oil electrically ionized as described in Brit. 363,651 (*C. A.* 27, 1768), and then carded or formed into a loose blanket-like mass. The material is shaped into suitable form after addn. of any suitable binding material.

**Blanket for printing apparatus.** Louis Smith and Fred Vogel (to Louis Smith). U. S. 1,938,301, Dec. 5. A base of alternate layers of fabric and rubber cemented and pressed together and having an upper surface of a fabric layer carries on the latter a "dope coating" comprising nitrocellulose, castor oil and rape-seed oil and superposed varnish coatings over this "dope" coating.

**Waste products from galvanization.** Polskie Zakłady Przemysłu Cynkowego Spółka Akcyjna w. Bedzinie. Fr. 751,132, Aug. 28, 1933.  $\text{ZnCl}_2$  and oxides of Fe are obtained by treating  $\text{ZnO}$  ash from galvanization operations with used HCl contg.  $\text{FeCl}_3$ , while passing a current of air therethrough.

**Fly paper.** Chemische Fabrik Ludwig Meyer (Karl



Beier, inventor). Ger. 579,858, July 13, 1933. Fly papers are prepd. with a layer of hygroscopic mucin contg. chemically bound  $\text{CH}_2\text{O}$  or  $(\text{CH}_2)_n\text{N}_x$ . Examples are given.

**Fireproof bodies.** Ture R. Haglund. Ger. 579,530, June 27, 1933. Fused masses contg. at least 50%  $\text{Al}_2\text{O}_3$  or  $\text{MgO}$  and oxides which do not form spinel, e. g.,  $\text{SiO}_2$ ,  $\text{CaO}$ , etc., are molded; the amts. are adjusted so that 8–

30% of the product is a compd. of m. p. 100–500° below that of spinel.

**Fire extinguishers.** Soc. auxiliaire de matériel d'incendie. Fr. 752,621, Sept. 27, 1933. An aq. soln. of an energetic emulsifying agent in combination with an alkali or salt of alk. reaction is used for *extinguishing burning oil, fats, waxes*, etc. The emulsifying agent may be a Na alkylsulfonaphthenate. Cf. C. A. 27, 1121.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

**Essentials of glass technology.** Based on American practice. Samuel R. Scholes. *Ceram. Ind.* 22, 29–32 (1934); cf. C. A. 28, 595.

**Modern glass-works costing.** Practical guide to the compilation of glass-making accounts and costs. S. Howard Withey. *Glass* 10, 499–500 (1933). H. S. W.

**Methods and conditions of controlling the rate of drawing of glass ribbons in Fourcault machines.** N. P. Krasnikov. *Keram. i Steklo* 9, No. 8, 12–18 (1933).—K. discusses factors affecting the rate of drawing of glass ribbon, e. g., (1) thickness of the ribbon, (2) viscosity of the glass (its compn.), (3) the power of drawing, (4) power of friction. The obtaining of high-quality glass depends chiefly on how these factors are stabilized.

M. V. Kondoidy  
**Viscosity-time-temperature relations in glass at annealing temperatures.** Howard R. Lillie. *J. Am. Ceram. Soc.* 16, 619–31 (1933); cf. C. A. 25, 4986.—The viscosity of a newly drawn fiber increases with time of heat treatment according to a definite law which may be explained on the basis of a change in the state of aggregation in the glass. A finite equil. viscosity is indicated at each temp.; this limit is approachable from either side depending upon previous heat treatment. This is taken to indicate a equil. av. size of aggregate for any temp., the groups starting to break up again if the temp. is increased after a long treatment. The expression of Sheppard and Houck is used for estg. effective mol. or aggregate wts. in equil. at various temps., an example being 112,000 at about 500°. The variation of viscosity with time is at least one reason why glasses fail to conform to Adams' and Williamson's annealing equation at low temps.

C. H. Kerr  
**The electrical behavior of glass at room temperature.** E. M. Guyer. *J. Am. Ceram. Soc.* 16, 607–18 (1933).—Glass at room temp. is an excellent dielectric, also a conductor of electricity, its resistivity being  $10^8$ – $10^{14}$  ohms. Methods of study have been greatly improved by the development of plotron vacuum tubes. The time required to reach a steady flow of current may vary from a few min. to several hrs. Just as the elec. history of the glass at low temps. detrs. its subsequent behavior, so also does the thermal history as shown by pronounced variations produced by chilling or by prolonged heating above the annealing point. The effects of chilling are not due solely to the resulting mech. strain. A radio-frequency field applied to a sample of glass during d. c. cond. detns. produced no effect which could not be duplicated without the glass in the circuit. The work is exploratory and being continued.

C. H. Kerr  
**Effect of heat treatment on the expansivity of a Pyrex glass.** J. B. Saunders and A. Q. Tool. *Bur. Standards J. Research* 11, 799–810 (1933) (Research Paper No. 626).

E. H.  
**Lead crystal glass and its investigation from a hygienic standpoint.** P. Keim and Fr. Raeder. *Tech. Gemeinnutz* 36, 281–3 (1933); cf. C. A. 27, 2108.—Pb is not dissolved from Pb glass by acid solns. in amts. sufficient to affect health, and as foods are not alk. its soly. in alk. solns. is not important hygienically.

M. G. Moore  
**Physicochemical principles of the colored decorations of glass.** Jacques Wolf. *Rev. belge ind. verrieres* 4, 272–3 (1933); cf. C. A. 27, 5914.—Mosaics and stained-glass windows are discussed.

Herbert S. Willson  
**Scientific principles of fuel economy in the glass indus-**

try. Combined low-temperature carbonization and total gasification of coal. David Brownlie. *Glass* 10, 503–9 (1933); cf. C. A. 28, 596°.

Herbert S. Willson  
**The classical methods for the complete analysis of clays and refractory products, feldspar, kaolin, glass.** A. Noel. *Rev. belge ind. verrieres* 4, 266–8 (1933).

Herbert S. Willson  
**De-airing of clay as applied to the stiff-mud process.** W. Wurth Kriegl. *Bull. Am. Ceram. Soc.* 12, 338–40 (1933).

C. H. Kerr  
**Factors involved in the production of glazed brick by the dry-press process.** W. C. Rueckel. *J. Am. Ceram. Soc.* 16, 10–13 (1934).

C. H. Kerr  
**Water-tight terra cotta masonry.** F. O. Anderegg. *J. Am. Ceram. Soc.* 16, 634–8 (1933).

C. H. Kerr  
**Terra cotta cracking.** Fred. B. Ortman. *J. Am. Ceram. Soc.* 16, 639–42 (1933).

C. H. Kerr  
**British chemical stoneware.** G. N. Hodson. *Chemistry & Industry* 1933, 986–90.

E. H.  
**Approximate composition of the lowest fusing mixture of barium oxide, magnesium oxide and silica.** Cecil H. Turner. *J. Am. Ceram. Soc.* 17, 14–15 (1934).—The lowest fusing mixt. as detd. by a series of test cones was approx.: BaO 46, MgO 8,  $\text{SiO}_2$  46% by wt. The first signs of fusion occurred when standard cone 1 had fused to 3 o'clock position.

C. H. Kerr  
**Notes on cone 10 sagger bodies with talc as a component.** H. Thiemecke. *J. Am. Ceram. Soc.* 17, 3–6 (1934).—Adding talc in amts. up to 15% improved plastic working properties, increased both dry and fired mech. strength, decreased absorption, lowered thermal expansion, increased heat-shock resistance, decreased sag tendency, made smoother fired surface, and darkened the color. Over 15% gave no appreciable increase in benefits.

C. H. Kerr  
**Note on the discovery of a kaolin deposit in New Mexico.** L. M. Richard. *J. Am. Ceram. Soc.* 16, 632–3 (1933).—The kaolin deposit is plastic and suitable for whiteware, refractories or paper. Four samples analyzed:  $\text{SiO}_2$  45.20–48.25,  $\text{Al}_2\text{O}_3$  32.40–37.55,  $\text{Fe}_2\text{O}_3$  0.42–2.36,  $\text{Na}_2\text{O}$  0.24–3.30,  $\text{H}_2\text{O}$  12.28–13.86%.

C. H. Kerr  
**Effect of grain sizing on shrinkage and porosity of Georgia kaolin refractories.** F. H. Norton. *Bull. Am. Ceram. Soc.* 12, 336–7 (1933).—Porosities as low as 22% in a dry, packed condition were obtained in mixts. of crushed grog without discarding much of the product from the crusher. Grog mixts. of low porosity when fired gave both low porosity and low firing shrinkage.

C. H. K.  
**Electric furnace refractories in the brass foundry.** H. M. St. John, et al. *Metals & Alloys* 4, 183–91 (1933).

Downs Schaaaf  
**Notes on the coloration of glazes by light.** C. W. Parmelee and A. E. Badger. *J. Am. Ceram. Soc.* 17, 1–2 (1934).—Actinic darkening is described.

C. H. K.  
**App. for calcining clay and gypsum** (U. S. pat. 1,937,413) 1. Purifying  $\text{Al}_2\text{O}_3$  [suitable for refractories] (Brit. pat. 397,288) 18. Impregnating porous ceramic products with bituminous material (U. S. pat. 1,937,417) 20. Adhesives [for tiles, glass, etc.] (Brit. pat. 397,678) 18. Drier for clays (Ger. pat. 579,540) 1.

**Glass.** Jenaer Glaswerk Schott & Gen. Ger. 574,755, Aug. 8, 1933. Glass resistant to metal vapors con-

- sists of  $B_2O_3$ , up to 45%  $Al_2O_3$ , and from 6 to 80% of bivalent oxides such as  $MgO$ ,  $CaO$ ,  $BaO$ ,  $ZnO$  and  $PbO$ . The glass is practically free from quadrivalent oxides and oxides of alkali metals.
- Glass.** Soc. anon. d'études et de constructions d'appareils mécaniques pour la verrerie. Fr. 751,357, Sept. 2, 1933. Means for continuous withdrawal of glass from the furnace. Cf. C. A. 27, 2270.
- Glass.** I. G. Farbenind. A.-G. Fr. 751,524, Sept. 5, 1933. Colorless glass of high resistance to water and permeable to ultra-violet rays is composed for the greater part of Ba metaphosphate. Metaphosphates of Ca and Mg may also be present.
- Glass.** Compagnies réunies des glaces et verres spéciaux du Nord de la France. Fr. 752,548, Sept. 25, 1933. Perforated pouring device, the perforations of which increase in size from the interior to the exterior.
- Glass.** Soc. des verreries de Folembay (François Doutriaux and Lucien Lavère, inventors). Fr. 753,908, Oct. 27, 1933. A new glass contains  $SiO_2$  less than 70,  $B_2O_3$  12-25,  $Na_2O$  5-8,  $PbO$  2-10 and  $Al_2O_3$  1-5%. Good results are obtained with  $SiO_2$  67,  $B_2O_3$  20.26,  $Na_2O$  6.49,  $PbO$  3.9 and  $Al_2O_3$  2.37%.
- Apparatus for gathering mold charges of molten glass by suction.** Karl E. Peiler (to Hartford-Empire Co.). U. S. 1,937,479, Nov. 28. Structural and mech. features.
- Flux for glass.** Erich Heinz. Ger. 580,596, July 13, 1933. In making plain or colored silicate glass contg. B and Ba, the latter are introduced as powd. Ba borosilicate.  $Al_2O_3$  and alkali may also be added.
- Glass-making furnace.** George E. Howard (to Hartford-Empire Co.). U. S. 1,937,321, Nov. 28. Various structural and operative details are described.
- Tank furnace for glass manufacture.** Thomas C. McKinley and Clarence A. Rhonemus (to Libbey-Owens-Ford Glass Co.). U. S. 1,937,390, Nov. 28.
- Cylindrical fusion furnace for glass, etc.** François Schwallier. Fr. 753,472, Oct. 17, 1933.
- Apparatus for burning waste glass from glass articles such as shades or globes.** Theodore H. Sloan (to Macbeth-Evans Glass Co.). U. S. 1,937,723, Dec. 5. Structural and mech. features.
- Tunnel leer and associated apparatus for annealing glassware.** Wm. A. Morton and Paul L. Geer (to Amster-Morton Co.). U. S. 1,938,346, Dec. 5. Structural and mech. features.
- Muffle-heated tunnel furnace for annealing glass, earthenware or metal articles.** Chauncey E. Frazier. Brit. 397,729, Aug. 31, 1933.
- Canal annealing furnace for glassware.** Glaceries de la Sambre Soc. anon. Ger. 583,805, Sept. 9, 1933.
- Cooling furnace for glass plates.** Yvon Brancart. Ger. 580,568, July 13, 1933.
- Apparatus for melting glass, especially for preparing glass fibers.** Firma Oscar Gossler (Gedeon von Pазiczky, inventors). Ger. 580,502, July 12, 1933.
- Apparatus for making fibers of glass, etc.** N. V. Maatschappij tot Beheer en exploitatie van Octrooien. Ger. 579,689, June 29, 1933. Addn. to 539,738 (C. A. 27, 579).
- Apparatus for spinning glass fibers.** Walter Rössler. Ger. 564,700, June 28, 1933.
- Machine for making mats of glass wool.** Walter Rössler. Ger. 581,677, Aug. 1, 1933.
- Apparatus for manufacture of glassware such as bottles.** Karl E. Peiler (to Hartford-Empire Co.). U. S. 1,937,913, Dec. 5. Mech. features.
- Apparatus for making tubular glass objects.** Alfred Hofmann & Cy. Fr. 753,782, Oct. 24, 1933.
- Apparatus for blowing articles from glass tubing.** Jakob Dichter. Fr. 752,723, Sept. 29, 1933.
- Apparatus for drawing glass tubes.** Leopoldo Sanchez-Vello. Ger. 579,506, June 28, 1933.
- Device for drawing glass tubes.** Paul Bornkessel. Ger. 581,505, July 28, 1933.
- Device for drawing glass rods or tubes.** Compagnie des Lampes. Ger. 579,687, June 28, 1933.
- Device for drawing glass rods.** N. V. Maatschappij tot
- Beheer en Exploitatie van Octrooien and Leopoldo Sanchez-Vello.** Ger. 579,588, July 8, 1933.
- Fluid-cooled rolls suitable for use with sheet glass.** Carroll Cone (to Libbey-Owens-Ford Glass Co.). U. S. 1,937,382, Nov. 28. Various details are described of a roll construction and circulating system by which cooling fluid such as water is fed to the roll at a const. predetd. temp.
- Apparatus for manufacture and annealing of sheet glass.** James C. Blair (to Libbey-Owens-Ford Glass Co.). U. S. 1,937,380, Nov. 28. Mech. features.
- Apparatus for tempering glass by jets of air.** Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey. Fr. 42,533, Aug. 4, 1933. Addn. to 720,348.
- Polishing glass.** Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey. Fr. 753,909, Oct. 27, 1933. A small amt. of salts, particularly chlorides, is added to the water used for mixing with the Fe oxide or emery dust, so as to lower the vapor tension of the water and reduce its speed of evapn.
- Use of fused silver chloride for joining glass to metals such as in joints of chlorine-supply apparatus.** John C. Baker (to Wallace & Tiernan Co.). U. S. 1,937,865, Dec. 5.
- Protective glass.** Verreries de Goetzenbruck S. A. Fr. 752,615, Sept. 27, 1933. A glass which absorbs ultra-violet and infra-red rays contains CdS and FeO, with or without other metal compds. The fused glass must be protected from the influence of the atm. of the furnace by covering the crucibles with refractory materials.
- Laminated glass.** Harry T. Neher and Charles S. Hollander (to Röhm & Haas Co.). U. S. 1,937,323, Nov. 28. Glass sheets are used conjointly with a film comprising a polymer of a mixt. of at least 2 unsatd. org. compds. such as ethyl  $\alpha$ -methacrylate and methyl acrylate.
- Laminated glass.** George B. Watkins (to Libbey-Owens-Ford Glass Co.). U. S. 1,937,396, Nov. 28. Various details of app. and operation are described.
- Compound glass sheets.** Adolf Kämpfer and Adolf C. Plötze. Fr. 751,396, Sept. 2, 1933. The elastic sheet is formed by adding a soln. of rubber to a soln. of a natural or artificial resin, if necessary with the addn. of suppling agents and afterward vulcanizing the rubber. Cf. C. A. 27, 4646.
- Glassware reinforced with wire mesh.** Thomas W. McCreary. U. S. 1,938,540, Dec. 5. Various details of manuf. are described.
- Ceramic materials.** General Ceramics Co. Fr. 752,998, Oct. 4, 1933. The compactness of ceramic materials and materials which may be worked by processes used in ceramics, such as metals or metal carbides, is increased by eliminating air or gases contained in the primary materials by known means.
- Ceramic products.** Alfred Wanklin. Ger. 584,833, Sept. 29, 1933. App. is described for working up, conveying and firing objects made from a mixt. of clay and hot filling material.
- Porous products such as brick or tile.** Harry T. Belamy. U. S. 1,938,170, Dec. 5. See Brit. 392,465 (C. A. 27, 4896).
- Drying brick kiln products.** Erduin Schondorff. Ger. 580,627, July 13, 1933.
- Sagger suitable for use in firing porcelain, etc.** August Weber, Jr. (to Weber Elec. Co.). U. S. 1,937,450, Nov. 28. A sagger is formed with its exposed wall provided with corrugations for increasing the heating surface and reducing the wt. of the sagger.
- Firing ceramic ware.** John Thomas Bamford. Brit. 397,339, Aug. 24, 1933. To avoid danger of silicosis from use of powd. flint a bedding material contg. Sr is used for firing pottery. Thus a calcined mixt. of  $SrSO_4$  and  $Al(OH)_3$  with the ratio  $SrSO_4:Al_2O_3$  of 2:1 is used for china and of 3:1 for earthenware and glazed tiles.
- Vitrified product.** Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey. Fr. 752,636, Sept. 27, 1933. A material of low d.

having insulating properties toward heat and sound is made by fusing vitrifiable materials contg. boric acid and a carbonaceous substance, and carrying the fused mass to the neighborhood of its softening pt., preferably after solidification. Thus, a glass formed of sand 100, borax 94, ZnO 97, hydrated  $\text{Al}_2\text{O}_3$  5 and charcoal 8 gives on heating to  $1000^\circ$  a product of apparent d. of 1.68.

**Refractory bricks.** Joseph Neidhart. Fr. 753,340, Oct. 13, 1933. Moisture in amt. only strictly necessary for molding the bricks is used so that no preliminary drying is necessary and deformations by shrinkage are avoided.

**Molding and vibration apparatus for manufacture of refractory bricks, etc.** Elisabeth Lux, Wilhelm H. Daniels and Eberhard Kühn (to Koppers Co. of Del.). U. S. 1,937,028, Nov. 28. Structural and mech. features.

**Refractory objects.** Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey (Gaston Delpech, inventor). Fr. 752,967, Oct. 4, 1933. The extremities of graphite molds or formers, corresponding to the edges of the objects to be molded, are maintained at the temp. of the fused material while the temp. in the other parts of the mold or former is regulated before, during, and after contact with the fused material according to a law detd. for each of these parts.

**Abrasive and polishing articles such as abrasive wheels.** Harry C. Martin (to Carborundum Co.). U. S. 1,937,043, Nov. 28. To form a substantially uniform article and to prevent segregation of abrasive and assocd. binder, a synthetic resin is mixed with an abrasive material in an

atm. which is conditioned to maintain the temp. below that at which the resin begins to soften and the humidity below that at which the resin takes up water to the extent of forming lumps, the mixt. is molded under pressure and below the said crit. temp. and the shaped article is heated to transform the binder.

**Abrasive articles.** Raymond C. Benner, Prescott H. Walker and Wm. G. Soley (to Carborundum Co.). U. S. 1,936,820, Nov. 28. In forming articles such as abrasive wheels, an abrasive mixt. is transferred to a mold in an atm. of controlled humidity, in order to facilitate production of a uniform product. App. is described.

**Sharpening compositions.** Leo Steiner. Brit. 397,529, Aug. 28, 1933. An abrading compn. for application to the rollers of a razor-blade-sharpening machine comprises finely divided corundum 70, ozocerite 7 and paraffin 23 parts. The corundum may be partly replaced by powd.  $\text{Fe}_2\text{O}_3$ .

**Glazing earthenware.** Porzellanfabrik Ph. Rosenthal & Co. A.-G. Ger. 579,563, June 28, 1933. The glaze is fused and sprayed on to the heated earthenware.

**Enamel.** Ignaz Kreidl. Ger. 580,570, July 13, 1933. White enamel rendered turbid by gas is applied to objects by admixing materials which evolve H during firing. Thus, an enamel mass may be given an addn. of Zn, clay and water. The Zn may be replaced by other metals or metalloids such as Si, which evolve H with water.

**Device for coating iron objects with enamel.** Warsteiner und Herzoglich Schleswig-Holsteinische Eisenwerke A.-G. Ger. 581,693, Aug. 1, 1933.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The liquid phase of portland cement in practical mixing proportions. Tutomu Maeda and Ryûzô Syôzô. *Ser. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 137-52(1933)(in Esperanto); cf. *C. A.* 27, 5506.

The liquid phase was extd. with a high-pressure ultra filter or with a hand-screw filter press. Preliminary expts. with mixts. contg. 27, 40, 50 and 60%  $\text{H}_2\text{O}$  at  $25^\circ$  indicate that in the early stage of hardening the concns. of  $\text{SO}_4^{--}$  and  $\text{Na}^+ + \text{K}^+$  are greater, and that of  $\text{Ca}^{++}$  is less, with a small amt. of  $\text{H}_2\text{O}$ . In 50:50 cement- $\text{H}_2\text{O}$  mixts. the alky. due to alkali-metal hydroxide in the liquid phase is rather large; e. g., one sample was 0.17 *N* from this cause after 36 hrs., at which time only 7.8% of the total alky. was due to  $\text{Ca}(\text{OH})_2$ . The alkali-metal compd. in one cement gave up all its alkali to the soln. after about 3 weeks. Austin M. Patterson

The cause of the influence of added substances on the rate of hardening of gypsum cement. I. II. Sigeru Yamane. *Bull. Inst. Phys. Chem. Research (Tokyo)* 12, 871-83(1933)(Abstracts (in Esperanto) published with *Ser. Papers Inst. Phys. Chem. Research (Tokyo)* 22, Nos. 457-67); cf. *C. A.* 26, 3352.—Revised solubilities in moles per kg. at  $25^\circ$ , of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}(S)$  and  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}(N)$ , resp., are: for  $\text{H}_2\text{O}$ , 0.055, 0.015; for  $\text{CuSO}_4$  soln. (0.783%), 0.054, 0.012; for  $\text{MgSO}_4$  soln. (0.999%), 0.052, 0.011; for  $\text{NaCl}$  soln. (1.006%), 0.075, 0.026; for  $\text{NH}_4\text{Cl}$  soln. (0.527%), 0.069, 0.023; for  $\text{NH}_4\text{NO}_3$  soln. (1.947%), 0.087, 0.029; for  $\text{NH}_4\text{OAc}$  soln. (3.709%), 0.118, 0.052; for sucrose soln. (18.537%), 0.050, 0.014; for gelatin, 0.053, 0.015. For  $\text{CuSO}_4$ ,  $\text{MgSO}_4$ ,  $\text{NaCl}$ ,  $\text{NH}_4\text{Cl}$  and  $\text{NH}_4\text{NO}_3$ , which accelerate the hardening,  $S-N$  is greater than for  $\text{H}_2\text{O}$ ; for sucrose and gelatin, which retard it,  $S-N$  is less than for  $\text{H}_2\text{O}$ . However, for  $\text{NH}_4\text{OAc}$  (which retards)  $S-N$  is greater; this may be due to adsorption of  $\text{NH}_4\text{OAc}$  by the crystal nuclei, as microscopic examn. seems to show. The formula  $(S-N)/N$  of Weiser and Moreland does not fit these cases as well as  $S-N$ . Austin M. Patterson

**Volcanic ash cement.** H. Brintzinger and W. Bubam. *Agnew. Chem.* 46, 779-80(1933).—The volcanic ash from the volcano Acetenango in Guatemala (June 25, 1925) and that fallen around Buenos Aires (April 11-13, 1932)

were examd. as addns. to cement. The Acetenango ash formed an excellent cement when mixed with  $\text{Ca}(\text{OH})_2$  or portland cement in the proportion 1:2(ash):9(sand). No regression in strength was observed after 1 year. The other ash, however, was totally unsuited as addn. to cement. It was found to be an acid silicate which was hardly attacked by concd. acid. The  $n$  was  $< 1.515$  and  $> 1.489$ . Both volcanic ashes were extremely fine in texture. Chem. analyses and test data are given. The authors point out that volcanic ash must consist of reactive silicates in order to be suitable for addns. to cements.

Karl Kammermeyer

**Air-slaked lime-mortars.** I. Ad. Stois and F. W. Meier. *Agnew. Chem.* 46, 794-6(1933).—Expts. were carried out with a no. of aged limes and it was found that aging generally increases the dispersion of lime. The older lime generally shows a higher  $\text{CaO}$  or  $\text{Ca}(\text{OH})_2$  content. The degree of dispersion greatly influences the quality of a lime. Not every lime aged for a long period, however, is better than one aged for a short period or a freshly slaked one; in general, the importance of aging time is overstd. Eight references. K. Kammermeyer

**Effect of steam sterilization on susceptibility of wood to blue-staining and wood-destroying fungi.** A. Dale Chapman. *J. Agr. Research* 47, 369-74(1933).—Expts. with heated and unheated pine wood on the effect (1) of staining fungi on strength properties and (2) of wood-destroying fungi on the loss in wt. of wood indicate that even the relatively mild treatments ordinarily used in disinfecting blocks for wood-decay expts. may so change the wood as to make it a more congenial substratum than normal unheated wood for at least some of the wood-deteriorating fungi. Any conclusions that may be drawn from expts. in which the wood has been steam sterilized are subject to considerable error unless due consideration is given to the effect of such sterilization in the interpretation of results. In view of the evidence submitted it seems necessary to qualify the acceptance of some of the past expl. work that has been done with wood disinfected by heat. Tests were made with a number of methods, most of them chem., involving the use of volatile toxic materials, but with little assurance that their application does not

change the compn. of certain constituents of the wood.

W. H. Ross

**New test methods for the protection of wood from combustion.** Carl G. Schwalbe and Käte Berling. *Chem.-Ztg.* 57, 881-3(1933).—A fire is kindled under the test specimen which is in the form of a square fluc. In a second method of test, combustion gases at about 550° impinge on a board. In this test the less the initial water content of the wood the greater is the inflammability. The protection of impregnating agents extends to dried-out wood. A test of the resistance to short circuit is described in which grooved boards with a wire passing through the grove are used.

P. S. Roller

**Photomicrographic swelling experiments on pine wood and beechwood on microtomic sections in transmitted light and on small blocks in reflected light.** W. Beiser. *Kolloid-Z.* 65, 204-11(1933).—Observations on microtomic sections, 10-15  $\mu$  thick, swollen in damp air, water, 0.1%  $\text{SO}_2$ , and 0.1%  $\text{NaOH}$  soln., showed a thickening of the cell walls and different expansions in the radial and tangential directions. The results were not directly comparable with the microscopic observations on small blocks or with the macroscopic results, probably because of the absence of restraining forces existing in blocks of wood and in the original wood. The results on blocks of late wood are several % lower than on the microtomic sections and are in agreement with the macroscopic results. The tangential and radial swelling of late wood with thick walls is somewhat greater than that of early wood, which often shows a slight decrease in the radial direction. For wood blocks cut against the grain, swelling is greater in the tangential direction than in the radial.

A. F.

**Studies in the decomposition of timber under industrial conditions. II. The decay of greenheart.** Ernest A. Rudge. *J. Soc. Chem. Ind.* 52, 447-9T(1933); cf. *C. A.* 27, 5927.—The mechanism of decay of greenheart is related to the presence of Ca in the woody tissues. The Ca is assocd. with the "Cross and Bevan" cellulose. In the presence of  $\text{H}_2\text{O}$  the hemicelluloses are degraded into pentoses, including xylose and Ca salts of uronic acids.

Alfred L. Kammerer

**Fuel problem in the manuf. of lime (Dérubéré).** 21. Hydrolytic decompn. of tricalcium silicate (Tavasci) 2. Prepn. of portland cement from gypsum (Royak, *et al.*) 18. App. for taking samples of cement on conveyors (U. S. pat. 1,937,473) 1. Water-absorbent pulverized Fe [as dressing for concrete surfaces] (Australian pat. 8291/32) 9. Tar for preserving wood (Fr. pat. 753,889) 21. Heat-treating comminuted material [cement] (Brit. pat. 397,666) 1.

**Cement.** Firma K. Schwenk. Ger. 580,777, July 15, 1933. Raw material contg.  $\text{CaCO}_3$  is intimately mixed with finely ground fuel and heated to sintering temp. in a shaft kiln. The conditions are arranged so that no de-oxidizing zone occurs in the kiln.

**Cement.** Paul Mecke. Fr. 754,113, Nov. 2, 1933. The hardening of cement is accelerated by mixing it with a powder formed of Si material (residues from the manuf. of  $\text{Al}_2(\text{SO}_4)_3$ ),  $\text{CaO}$  and calcined soda. The addn. of water forms a plastic mass which sets in a few min.

**Cement.** Soc. anon. des ciments français et des Portland de-Boulogne-Sur-Mer et Compagnie des Portland de Desvres. Fr. 754,296, Nov. 3, 1933. To obtain a deeply tinted cement a material rich in  $\text{MgO}$  is added to the raw material in amt. so as to obtain a clinker contg. 0.85-2% of  $\text{MgO}$ . Salts or other metal oxides which have a regular coloring effect may be used instead of  $\text{MgO}$ .

**Cements.** I. G. Farbenind. A.-G. Fr. 42,475, July 31, 1933. Addn. to 682,581 (*C. A.* 24, 4607). Cements are prepd. by mixing hydrated silicates, easily sol. and gelatinified, with substances capable of binding the  $\text{SiO}_2$  of the sol. silicates in the form of insol. silicates resistant to acids. Such substances include Ba silicate, fused  $\text{Al}_2\text{O}_3$  cement,  $\text{VO}$ , and double silicates of Ca and Al.

**Hydraulic cement.** Carl Pontoppidan. Fr. 752,671,

1 Sept. 28, 1933. A cement having a hydraulicity modulus (ratio between the basic and acid substance) above 2.2 and a moderate  $\text{SiO}_2$  modulus (ratio of  $\text{SiO}_2$  to  $\text{Al}_2\text{O}_3$  and  $\text{Fe}_2\text{O}_3$ ) is obtained by grinding the raw materials to a degree of fineness adopted for normal portland cement, so that the content of  $\text{CaO}$  is above the normal satn. pt., and, after fixing the clinker, reducing all or part of the excess  $\text{CaO}$  during or after the subsequent grinding of the clinker. The temp. is such (80-210°) that while the excess  $\text{CaO}$  is rapidly reduced, the cement is not or only slightly hydrated. The excess  $\text{CaO}$  is converted to hydrate.

**Apparatus for cooling cement clinker and simultaneously extracting moisture from slurry.** Lester E. Palmer (one-half to Wabash Portland Cement Co.). U. S. 1,937,094, Nov. 28. The hot clinker is fed through a revolvable cylinder, heat-conducting fins projecting from which extend into receptacles for the slurry.

**Stable foam suitable for incorporation with cement slurries.** Richard Ericson (to U. S. Gypsum Co.). U. S. 1,937,472, Nov. 28. Starch is mixed with cold water and there is then added to the mixt. sufficient boiling water to raise the temp. of the mixt. to the gelatinizing point of the starch; soap bark is dissolved in the starch soln. while the latter is hot, and air is dispersed into the resulting hot mixt. to form a foam and the foam is allowed to cool.

**Device for spraying cement slurry, etc., into a rotary-drum furnace for burning.** Fellner & Ziegler A.-G. Ger. 584,758, Sept. 27, 1933.

**Apparatus for dehydrating cement pulp.** Jacques J. Durieu and Francisque L. Dubois. Fr. 754,218, Nov. 3, 1933. The pulp is pressed through a system of tubes perforated by holes through which the water exudes.

**Apparatus for filtering, drying and burning raw cement sludge.** Alfred Schmid (to Fried. Krupp Grusonwerk A.-G.). U. S. 1,936,861, Nov. 28.

**Cement kiln.** Fried. Krupp Grusonwerk A.-G. Ger. 580,573, July 13, 1933.

**Cement kiln.** Lepol Internationale Patentverwertungs-G. m. b. H. and N. V. Solopol, Ingenieur-Bureau tot Exploitatie van het System Polysius. Ger. 584,937, Sept. 26, 1933.

**Rotary cement furnace.** Kristian Middelboe. Fr. 752,540, Sept. 25, 1933.

**Rotary cement furnace.** Lucien P. Basset. Fr. 753,622, Oct. 20, 1933.

**Rotary furnace for cement by the wet process.** Mikael Vogel-Jørgensen. Fr. 754,020, Oct. 30, 1933.

**Rotary-drum furnace for burning cement, ores, etc.** Vickers-Armstrong Ltd. Ger. 579,615, June 29, 1933.

**Shaft furnaces for burning cement.** Fried. Krupp Grusonwerk A.-G. Ger. 580,692, July 14, 1933. Details of a closing device are given.

**Kiln for burning portland cement.** Mathias Fränkl. Ger. 583,641, Sept. 11, 1933.

**Aggregates from refuse suitable for use in concrete.** Maxwell M. Upson. U. S. 1,936,810, Nov. 28. Combustible matter recovered from relatively large ash particles is utilized for incinerating bulky constituents of refuse such as that of the ash to reduce its bulk and convert the refuse into a state in which it is suitable for sintering; the incinerated material is then sintered and formed into aggregate. App. is described.

**Impregnating concrete and porous ceramic products with bituminous material.** Edwin C. Wallace (to Warren Bros. Co.). U. S. 1,937,417, Nov. 28. After drying, the product to be impregnated is immersed in a bath of a penetrating, mobile, volatile hydrocarbon oil with which asphalt is miscible; surplus oil is drained off, and the product is then submerged in asphalt heated to a temp. sufficient to vaporize part of the oil to facilitate impregnation.

**Bituminous material suitable for use as a binder in road construction.** Alfred R. Ebberts (to Colprovia Roads, Inc.). U. S. 1,937,749, Dec. 5. A cracking still residue is mixed with a fluid flux oil to increase its solvent power for a finely divided high-melting bitumen and the

flux-oil mixt. and bitumen are then amalgamated with-out heating.

**Road materials.** Soc. J. R. Geigy S. A. Fr. 754,119, Nov. 2, 1933. Chlorinated rubber is added to bituminous materials used for road construction.

**Road surfacing.** Robert J. Lacau. Ger. 584,936, Sept. 26, 1933. Addn. to 582,997 (C. A. 28, 875<sup>a</sup>). Emulsions for road surfacing are prep'd. by adding 2-5% of middle oil to fused bitumen or low-temp. tar.

**Treating stone, bricks, etc.** Eugène Garapon. Fr. 753,719, Oct. 23, 1933. Saltpeter in stone, marble, bricks, lime, cement or plaster is suppressed by preventing the growth of bacteria by treatment with a bactericide.

**Building material.** Arthur Sprenger. Ger. 580,491, July 12, 1933. Addn. to 577,932 (C. A. 28, 806<sup>a</sup>). The method of 577,932 for making highly fireproof building material by fusing together  $MgO$ ,  $Al_2O_3$ ,  $Cr_2O_3$  and  $SiO_2$  is modified by adjusting the amt. of oxides so that the  $Cr_2O_3$  and  $MgO$  together constitute 50% or more of the mass.

**Building material.** Ernst Weber. Ger. 583,556, Sept. 5, 1933. Blocks for building purposes are made by mixing long fibrous material, such as wood fiber, with gypsum and cement, and pressing.

**Building blocks.** Carl Francke. Ger. 583,969, Sept. 13, 1933. Material for building is made by mixing clay with pine bark, molding and firing the blocks.

**Apparatus for spray coating walls or other surfaces with asphalt, etc.** James E. String (to Vortex Mfg. Co.). U. S. 1,936,997, Nov. 28. Various structural, mech. and operative details are described.

**"Acoustical" plaster.** Leslie B. Eaton (to Kalite Co., Ltd.). U. S. 1,937,011, Nov. 28. An under-coat comprises a finely ground aggregate such as pumice, a plaster binder such as a gypsum stucco plaster and an aq. soln. of a gelatinous material such as glue and alum forming wall cells throughout the under-coat during its wet application and forming intercommunicating pores when the under-coat is dry, and a finish coat of similar materials contg. a more finely ground aggregate than the under-coat and troweled to a smooth surface. Cf. C. A. 27, 3381.

**Brown coat plaster.** George F. Moore. U. S. 1,937,202, Nov. 28. A "synthetic gypsum" formed as a by-product in the manuf. of  $H_3PO_4$  from phosphate rock, free from active acid and contg. as impurities at least some sol. phosphates, is calcined to the "first settle" and  $Al_2(SO_4)_3$  introduced at the end of the "first settle."

**Lacquer coatings on plaster.** Charles Rogin (to Commercial Solvents Corp.). U. S. 1,937,484, Nov. 28. A bare plaster base or the like is provided with at least one coat of a casein-contg. undercoating (the last of which coats contains at least 15% casein) and over this there is applied at least one coat of a brushing nitrocellulose lacquer or the like.

**Wall coverings.** Jules A. Barbier dit Barbier-Daumont. Fr. 752,912, Oct. 8, 1933. An antiphonetic, insulating and incombustible covering for walls is made by causing  $(NH_4)_2CO_3$  to react on gypsum and adding a silicate, preferably  $K_2SiO_3$ , to give sufficient solidity after setting, and naphtha oil in amt. sufficient to harden the product and prevent hydration. An example contains  $(NH_4)_2CO_3$  3.5-4.5,  $K_2SiO_3$  10-15, naphtha oil 15-20, gypsum 450-420 and water 500-1000 parts.

**Waterproof insulating board suitable for use on milk-cooling tanks, etc.** Everett S. Penn (to Armstrong Cork Co.). U. S. 1,938,351, Dec. 5. An insulating corkboard is enclosed in a waterproof reinforcing envelope including fabric substantially coextensive with the surface of the corkboard, a continuous imperforated layer of asphalt mastic bonding the fabric and the corkboard and a similar united layer overlying the fabric.

**Wall board.** John A. Wiener and John B. Harmon. U. S. 1,937,679, Dec. 5. A wall board is formed with a base including fibers and mica, impregnated with  $(NH_4)_2SO_4$ , borax and  $ZnCl_2$ , which serve as fireproofing agents of successively higher m. ps.

**Cellular product suitable for wall board, etc.** Hugh M. Spencer (to Upson Co.). U. S. 1,936,887, Nov. 28. A mixt. is formed of relatively finely divided inorg. material such as ground limestone and sulfite liquor soln., and the mixt. is heated to cause it to intumesce and form a cellular product.

**"Composition board."** George D. King and James S. Offutt (to U. S. Gypsum Co.). U. S. 1,937,907, Dec. 5. A bonding agent such as molasses slop is continuously applied to a moving strip of paper and a cementitious core material composed mainly of gypsum is then applied to the treated surface. App. is described.

**"Synthetic lumber" from cornstalks.** Orland R. Sweeney (to Iowa State College of Agriculture and Mechanical Arts). U. S. 1,937,366, Nov. 28.  $HgCl_2$  is injected into a mass of cornstalks broken up into particles, in order to serve as an insecticide and the mass is then formed into "lumber" by pressing and drying.

**"Synthetic lumber" not attacked by insects.** Orland R. Sweeney (to Iowa State College of Agriculture and Mechanical Arts). U. S. 1,938,227, Dec. 5. Fine pieces of cornstalks are mixed with water, the mass is formed into "lumber" by heat and pressure and the product while still warm is sprayed with  $HgCl_2$  soln.

**Preserving wood.** Soc. Sep. Fr. 754,219, Nov. 3, 1933. A compn. which preserves and polishes wood is composed of a soln. of wax in a heavy solvent, such as a dichlorobenzene having insecticidal properties.

**Impregnating wood.** Wacaw Iwanowski and Josef Turski. Ger. 581,948, Aug. 5, 1933. Wood and other vegetable material is impregnated with tri- or poly-chlorophenolates in the pure state or in soln. to prevent rotting. Other antiseptics or nitrochlorophenolates may be admixed.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Ethyl alcohol motor fuel.** K. R. Dietrich. *Automobiltech.* Z. 36, 519-20(1933).—A general discussion on the advantages of alcohol-gasoline-benzene motor fuels.

A. A. Boetlingk

**The desirable characteristics of fuels for high-speed compression-ignition engines.** J. Kewley. *Petroleum Times* 30, 593(1933).—The essential properties for a high-speed Diesel fuel are considered to be (1) a good ignition quality, (2) suitable viscosity, (3) absence of dirt, and (4) low pour point.

Chas. Wirth, III

**Carbureted charcoal gas for automobile engines.** Erwin Wawrziniok. *Automobiltech.* Z. 36, 546-9(1933).—The efficiency of an automobile gas producer operated with charcoal was considerably augmented by the introduction of alc. The gas mixt. was forced through the hot zone of the producer whereby gum-forming substances were

destroyed. Diagrams reproducing the performance of the motor are given.

A. A. Boetlingk

**Summary of factors causing formation of carbon deposits in internal-combustion engines.** W. A. Gruse. *Oil and Gas J.* 32, No. 27, 15-16(1933); cf. C. A. 27, 2288.—Oxidation tests are very valuable in predicting the amt. of deposit likely to form in an engine, but have not yet established any significance for ordinary service, nor have the distn. tests.

J. R. Strong

**The fuel problem in the manufacture of lime.** M. Dérubert. *Rev. matériaux construction trav. publics* 1933, 357-61.—Ten fuels for lime kilns (coals and oils) are discussed with respect to their suitability and economy. Data for sp. gr., proximate analysis, heating value, theoretical and actual air vols. are presented and a heat balance is carried out for a sp. case.

Karl Kammermeyer

**Proximate analysis of Chinese coals.** K. Y. King and T. C. Hung. Contribution from Sin Yuan Fuel Laboratory, *Geol. Survey China* No. 13, 170 pp.(1933); *Bull. Geol. Survey China* No. 21; cf. C. A. 28, 284<sup>a</sup>.—Analyses of over 2000 samples of Chinese coals are tabulated.

Alden H. Emery

**Recent investigations on the nature, preparation, storage and coking of typical coals from the Sydney Area, Nova Scotia.** R. E. Gilmore and R. A. Strong. *Trans. Can. Inst. Mining Met.* 1933 (in *Can. Mining Met. Bull.* No. 260) 549-61; cf. C. A. 27, 4902.—Discussion.

Alden H. Emery

**The latest developments in hydrogenation of coal and tar.** M. Pier. *Automobiltech. Z.* 36, 492-3(1933).

A. A. Boehtlingk

**Spontaneous combustion of coal.** Donald Andrews. *Steam Engr.* 3, 93-4(1933).—General discussion.

Alden H. Emery

**The swelling of coal during the determination of the volatility.** D. J. W. Kreulen. *Chem. Weekblad* 30, 770-1 (1933).—The form of the coke after the detn. of the volatility is dependent upon the way the particles are packed in the crucible before the detn. This is in accordance with the expts. of Lambris (cf. C. A. 23, 4324).

E. Schotte

**The role of water conditions in the formation and differentiation of common (banded) coals.** David White. *Econ. Geol.* 28, 556-70(1933).—The formation of peat and the biochem. decompn. products of microbial activities are discussed. The initial role of water is to cover the vegetable debris, excluding atm. O. It also stabilizes the temp., acts as a solvent and a medium for microbial or plant growth and may conc. or dissipate biochem. decompn. products. The proportions in which the principal components of coal are deposited depend on the state of the water into which the ingredient material falls. With low biochem. action the coal will be distinctly humic or with nearly all the plant matter lost will be more hydrogenous because of the remaining spore exines, resins and waxes. The laminas of banded coals are records of periodic fluctuations in environment, the factors being seasonal variations in rainfall and temp. A. M. Brant

**Spontaneous combustion. XVI. The layers A and C of the Tandjoeng-Enim coal.** D. J. W. Kreulen. *Chem. Weekblad* 30, 718-22(1933); cf. C. A. 27, 5513.—Numerous curves expressing the analyses of the Tandjoeng-Enim coal are presented. The temp. of max. rate of evolution of volatile matter is the only property that is a function of the percentage content of volatile matter. The heat of combustion varies with the degree of carbonization of the humic nucleus in coals that do not contain free humic acid. For coals contg. free humic acids the heat of combustion varies according to the content of these acids. E. Schotte

**Mildew formation on briquets (compressed coal).** Sandor Gömöry. *Angew. Chem.* 46, 781(1933).—The flour which is added as binder to the lignite, or coal screenings, frequently results in considerable mildew formation and consequent mech. decompn. of briquets. The use of antiseptics was investigated for prevention of mildew formation (1) as addn. before pressing to the mixt. and (2) by immersion of the briquets into an aq. soln. The latter method gave better results. Forty-two chemicals and mixts. were tested and a 5% soln. of Napyroborate was found most effective. K. K.

**Chemical technical uses for a resinous pitch lignite coal. II. Borneo coal.** H. H. Müller-Neuglück. *Angew. Chem.* 46, 792-3(1933); cf. C. A. 28, 729<sup>a</sup>.—Expts. are reported on the use of extd. resin as well as of the coal itself, distributed as powder in a solvent, for com. purposes. The ether-extd. resin can be used in the *lacquer industry*, while the coal suspension in oil of turpentine, with addn. of linseed-oil varnish, gives an excellent *coating material*, which has the addnl. advantage of showing good *insulating properties* for elec. purposes. The covering power of the resinous substances can also be used to advantage in *shoe polishes* and *dyes*. A table gives test results on various formulas with asphalt, resinous and resin-free Borneo

coal, for *film thickness*, *drying time* and *elec. breakdown resistance*.

Karl Kammermeyer

**Chemical and microscopical detection of lignite in bituminous coal dust.** F. Roll and E. Stach. *Giesserei* 20, 563-5(1933).—The dust is heated at 350° and the distillate caught in water, dissolved in hot acetone, and the clear soln. cooled in ice water. Silky needles of paraffin indicate lignite. Confirmation is made by microscopic examn. of the dust (cf. C. A. 25, 3150). With oil immersion the lignite appears darker. C. L. W.

**Production of oil from [brown] coal.** R. Heinze. *Automobiltech. Z.* 36, 493(1933).—A general discussion.

A. A. Boehtlingk

**The development of gas as an industrial fuel.** Joseph B. White. *Inst. Gas Engrs.* Communication No. 72, 46 pp.(1933); cf. C. A. 27, 3584.—The use of oxy-coal gas for metal cutting is described. With O<sub>2</sub> costing 18d., C<sub>2</sub>H<sub>2</sub>, 39d., and gas 3.3d. per 100 cu. ft., the cost of cutting 27.5 ft. of 1/2 in. rusty ship's plate is 14.34d. for O-C<sub>2</sub>H<sub>2</sub> and 8.16d. for O-coal-gas. The use of gas for carburizing and general heat treating is general. Costs on a battery of Gibbons furnaces were £11 5s.; on the coal furnaces displaced, costs were £15 10s. Two tons of coal were used per ton of steel carburized against 99-100,000 cu. ft. of gas. The same amt. of heavy forging was done with 137,000 cu. ft. of gas as with 10-12 tons of coal, and the substitution reduced time for heating up 1 1/2-2 hr. per day, reduced repairs, released fireman, etc. Results on use of town's gas in a rolling mill are described. Gas consumed was 3377 cu. ft. per ton (including heating up) at a cost (2.475d. per therm) of 3s. 5-3/4d. per ton. Cost figures for 6 months show 8-10% saving over producer gas. Uses in motor vehicles, in a steam plant, in a bakery, etc., are described briefly.

Alden H. Emery

**Gum formation and compression of city gas.** A. Pignot. *J. usines gas* 53, 414-17(1933).—The attack of bottled gas containers by typical gas gum, deposited in them after 7-8 months use, is shown in photomicrographs. It is recommended to use an aq. lubricant for the compressor (colloidal aq. suspension of oil or of graphite) in order to reduce the dehydration of the gas by the compression.

B. J. C. van der Hoeven

**Benzene and coal tars.** F. Müller. *Automobiltech. Z.* 36, 493(1933).—A general discussion on the production of C<sub>6</sub>H<sub>6</sub> and motor fuels from coal tar. A. A. B.

**Development of the coal-tar industry.** August Mers. *Official Digest Fed. Paint Varnish Production Clubs*, No. 131, 324-35(Dec., 1933).—Lecture. G. G. Sward  
**Coal tar as Diesel fuel.** Ihder. *Automobiltech. Z.* 36, 493(1933).—Coal tar oil is suitable for Diesel engines if used with a compressor. Special precautions are needed for compressorless Diesel engines. A. A. Boehtlingk

**Pyrite in coal beds of the Ruhr (Winter, Frey) 8. Fuel economy in the glass industry (Brownlie) 19. Coke-oven gas (Borodkin) 18. Testing and evaluation of carbureting oils [for water gas] (Schläpfer, Schaffhauser) 22. App. for taking samples of coal on conveyors (U. S. pat. 1,937,473) 1. Heat-treating comminuted material [coal] (Brit. pat. 397,666) 1. Pitch and tar (Brit. pat. 397,484) 22. SO<sub>2</sub> [prepn. of granular fuel] (Brit. pat. 398,023) 18. Conversion of low-temp. tars to hydrocarbons (Fr. pat. 750,697) 10.**

**Motor fuel.** Fabrication française de produits du lait. Fr. 753,890, Oct. 26, 1933. A fuel contg. Et<sub>3</sub>CH and Me<sub>3</sub>CH is obtained by passing a mixt. of vapors of AcCl and EtOH over Ni or Fe-Ni heated to 200-50°, or a gaseous mixt. of AcCl, ethylene chloride, C<sub>2</sub>H<sub>2</sub> and H over the same catalyst at 250-300°.

**Smokeless fuel.** Préparation industrielle des combustibles. Fr. 753,838, Oct. 25, 1933. Smokeless fuel agglomerated by flour not resistant to moisture, is completely surrounded by a thin layer of a product resistant to water.

**Briquetting fuel.** Marcel H. Hue. Ger. 579,646,



July 1, 1933. In making fuel briquets, the binding agent consists of petroleum pitch dissolved in mazout with a small addn. of semi-drying vegetable oil such as cotton-seed oil.

**Agglomerating fuel.** Carl Nimz (trading as Hugo Dau & Co.). Brit. 398,007, Sept. 7, 1933. Coal dust is mixed with sorghum meal, *e. g.*, 1.5–2%, and steam is supplied to the mixt. in a closed container, *e. g.*, a kneading or pugging mill, briquets then being made as with coal-pitch mixts.

**Gasifying solid fuel.** S. I. R. I. (Società italiana ricerche industriali). Ger. 580,566, July 12, 1933. Gases with a high CO content are prepd. by gasifying solid fuels with O and steam or CO<sub>2</sub>, the ash being removed as dust, the temp. being raised to over 1500° and the gases being led in at not less than 10 m. per sec.

**Apparatus for the pressure-hydrogenation of solid fuels.** J. G. Farbenind. A.-G. (Ernst Pfeiderer, inventor). Ger. 583,789, Sept. 12, 1933.

**Low-temperature distillation of solid fuel.** Compagnie des mines d'Aniche. Fr. 750,763, Aug. 18, 1933.

**Retort with horizontal chambers for distilling fuel.** Société générale de fours à coke systèmes Lecocq (Soc. anon.). Ger. 583,847, Sept. 11, 1933.

**Apparatus for distilling bituminous fuels.** Didier-Werke A.-G. Ger. 583,913, Sept. 12, 1933.

**Continuous furnace for carbonization and distillation.** Maurice Lambot. Fr. 753,783, Oct. 24, 1933.

**Carbonizing pulverized coal.** Archibald H. Davis, Jr. (to National Aniline & Chemical Co.). U. S. 1,937,552, Dec. 5. Coal particles are heated to a carbonizing temp. while the particles are kept from contact with each other by inducing a like electrostatic charge upon each particle. App. is described.

**Method and apparatus for the low-temperature carbonization of coal.** Wm. A. Caunt. Brit. 397,072, Aug. 17, 1933.

**Distilling coal.** Harold Stevens. U. S. 1,938,121, Dec. 5. A column of coal in a vertical retort is heated from within the column outwardly by a centrally located elec. resistor, elec. current being passed through this resistor and through progressively coked portions of the coal column, and the column is also simultaneously heated externally through the retort walls. App. is described. U. S. 1,938,122–3–4–5 also relate to generally similar app. and operation for coal distn.

**Distilling coal, etc.** Edgar W. Brocklebank and Wm. B. Mitford. Fr. 751,011, Aug. 25, 1933. See Brit. 393,602 (C. A. 27, 5493).

**Low-temperature distillation of coal.** Harald Nielsen and Wm. G. Trower. Ger. 580,978, July 19, 1933. In carrying out the above process in a rotating drum furnace, 1.6 cu. m. of a flushing gas is used per kg. of coal. O may be used as the flushing gas.

**Apparatus for distilling coal, etc.** Sigismund Sternberg (Julius Geller, inventor). Ger. 584,608, Sept. 30, 1933.

**Chamber furnace for distilling coal, etc.** Carl Still (a. m. b. H. Ger. 583,925, Sept. 12, 1933. Details of removing the distn. gases by suction are given.

**Retort for low-temperature distillation of coal, etc.** André Guagnino. Fr. 751,176, Aug. 28, 1933.

**Heat treatment of coal and tar together.** Harold J. Rose and Wm. H. Hill (to Koppers Co. of Del.). U. S. 1,936,882, Nov. 28. Coal and tar are heated together in thin layers in the presence of steam and substantially all the tar oils are vaporized to obtain a homogeneous mass of undecompd. coal and pitch suitable for gas manuf., etc. App. is described.

**Hydrogenating coal, etc.** I. G. Farbenind. A.-G. Fr. 750,296, Aug. 8, 1933. The catalysts used are org. sulfonic acids along with metals of the 4th to the 8th group or their compds. or org. carboxylic acids or acid salts or oxygenated mineral acids derived from S or N, or anhydrides of these acids. Acid salts of Sn, Mo, W, Mn, Mg, Zn, Cd, Al, V or Cr may be mentioned. Acid salts of alkali metals do not give as good results. As mineral acids H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub> may be used, as carboxylic acids AcOH, HCOOH and oxalic acid and as sulfonic

acids PhSO<sub>3</sub>H, C<sub>10</sub>H<sub>7</sub>SO<sub>3</sub>H and unsatd. sulfonated hydrocarbons may be used.

**Hydrogenation of coal, oil, etc.** Deutsche Hydrierwerke A.-G. Fr. 750,850, Aug. 19, 1933. Metal salts of org. acids of high mol. wt., excluding alkali, alk. earth and precious-metal salts, are used as catalysts. Examples are given of the use of resinates, oleates, linoleates and pulmitates of Co, Zn, Al, Cu and Hg.

**Hydrogenation products of coal.** I. G. Farbenind. A.-G. (Karl Schönmann, inventor). Ger. 584,763, Oct. 16, 1933. The products obtained by hydrogenating coal are worked up by stirring with an equal or less than equal amt. of kerosene or gas oil, whereby the mass seps. into asphalt and oil layers. The kerosene or gas oil, after sepn. of the layers, can be recovered by steam distn.

**Coal-washing plant.** Léon Hoyois. Ger. 580,507, July 12, 1933.

**Apparatus for removing water from, or washing, fuel, ores, etc.** Gutehoffnungshütte Oberhausen A.-G. and Ludwig Altpeter. Ger. 583,679, Sept. 7, 1933.

**Montan wax.** A. Riebeck'sche Montanwerke A.-G. Ger. 581,891, Aug. 4, 1933. The m. p. of crude montan wax is raised by heating the wax with about 1% of a metal hydroxide, basic oxide or carbonate to above 100° in the presence of water. In examples, the wax is heated with NaOH, CaO or K<sub>2</sub>CO<sub>3</sub>.

**Montan wax.** A. Riebeck'sche Montanwerke A.-G. Ger. 583,333, Sept. 1, and 583,494, Sept. 8, 1933. Addns. to 581,891 (preceding abstr.). In raising the m. p. of crude montan wax by treating the fused wax with a small amt. of metal hydroxide, or basic metal oxide or carbonate in the presence of water, the reaction is carried out at temps. between 100° and the m. p. of the wax (583,333). Instead of fusing the wax, it may be treated with the metal hydroxide, etc., while dissolved in an org. solvent, in which case the reaction is carried out at temps. up to 200° (583,494).

**Montan wax.** A. Riebeck'sche Montanwerke A.-G. (Fritz Zschoch, inventor). Ger. 583,872, Sept. 11, 1933. The wax is obtained by extg. lignite which has been pre-dried to reduce the water content to less than 15%. Extn. agents such as C<sub>6</sub>H<sub>6</sub> are used. Cf. C. A. 28, 613<sup>h</sup>.

**Tube driers for lignite, etc.** I. G. Farbenind. A.-G. (Karl Heil, inventor). Ger. 583,757, Sept. 8, 1933.

**Lignite-tar oil.** Kohlenveredlung und Schwelwerke A.-G. (Paul Rosin, inventor). Ger. 579,729, June 30, 1933. The oil is desulfurized by the action of ZnCl<sub>2</sub> at raised temp. and pressure.

**Device for dehydrating peat by heating.** Wilhelm Nachtigall. Ger. 579,914, July 3, 1933.

**Removing carbon deposits from internal-combustion engines.** Wheeler G. Lovell and Thomas A. Boyd (to General Motors Research Corp.). U. S. 1,936,681, Nov. 28. A mixt. such as may be formed of carvone 40, C<sub>6</sub>H<sub>6</sub> 30 and alc. 30% is used. U. S. 1,936,682 relates to the similar use of a mixt. such as may be formed from methyl furoate 50, C<sub>6</sub>H<sub>6</sub> 25 and alc. 25%. Cf. C. A. 27, 5518.

**Gas purification.** Gilbert A. Bragg (to Koppers Co. of Del.). U. S. 1,936,570, Nov. 28. For sepg. acidic constituents such as H<sub>2</sub>S, HCN and CO<sub>2</sub> from gases such as fuel, oil or refinery gases, the flowing gas is treated with a non-aq. solvent immiscible with water such as a hydrocarbon oil by which the acidic substances are absorbed, the fouled solvent is removed from the gas, treated with an aq. alk. absorbent soln. such as Na<sub>2</sub>CO<sub>3</sub> to effect a transfer of the acidic substances to the latter, and the regenerated solvent is recirculated for further gas treatment. The soln. is treated for removal of absorbed acidic material and is then recirculated to treat further fouled solvent from the gas treatment. App. is described. Cf. C. A. 27, 5519; 28, 615<sup>h</sup>.

**Purifying gases.** Gewerkschaft Mathias Stinnes. Brit. 398,047, Sept. 7, 1933. See Fr. 741,406 (C. A. 27, 2790).

**Purifying fuel gas.** Joseph A. Shaw (to Koppers Co. of Del.). U. S. 1,936,862, Nov. 28. In treating fuel gas by recirculating through it cooling liquor which removes

tar and  $\text{NH}_3$  from the gas, an alk. liquid contg. tar acid is added to the cooling liquor.

**Fuel gas.** Dessauer Vertikal-Ofen G. m. b. H. Ger. 583,334, Sept. 1, 1933. Addn. to 539,731 (C. A. 26, 2306). App. for making the fuel gas of 539,731 from distn. gas and water gas has a number of distn. chambers and at least two water-gas producers arranged so that the distn. gas is swept into the mixing chambers of the water-gas producers before its arrival at the collecting chamber.

**Fuel-distillation gases.** Ida Brown née Altmann and Concordia Berghau. A.-G. Ger. 580,876, July 17, 1933. Gases obtained by the distn. of fuel are led, while still hot and mixed with water vapor, over catalysts at  $500^\circ$  to remove the CO; the S is then removed by cooling. The gases are then subjected to the usual processes.

**Oil gas.** Charles A. Rosier. Brit. 398,037, Sept. 7, 1933. See Fr. 744,910 (C. A. 27, 4380).

**Producer gas.** Sven C. G. Ekelund. U. S. 1,938,139, Dec. 5. For producing, from solid fuel such as coal or a mixt. of coal and coke, a producer gas having a temp. above  $1000^\circ$  and composed essentially of CO, H and N, hot air is injected into a lower coke zone in a gas producer, thus generating producer gas and forming molten slag; a portion of the hot producer gas is passed into a superposed fuel preheating and distn. zone in which the fuel is coked; mixed producer gas and distn. vapors and gases are withdrawn and the mixt. is passed into the incandescent coke zone and the vapors are decompd. and fixed into gas; hot producer gas is withdrawn from the upper part of the incandescent zone and from below the superposed preheating and distn. zone, and molten slag is withdrawn from the lower portion of the incandescent zone. App. is described.

**Treating coke-oven gas.** Victor Fischer. Ger. 580,421, July 10, 1933. Addn. to 567,894 (C. A. 27, 2790). App. for liquefying and sepg. constituents of coke-oven gas to obtain a mixt. of H and N is described.

**Apparatus (with a light-sensitive cell) for measuring dust concentration in blast-furnace gas, etc.** Alfred W. Simon, Leonard C. Kron, Coleman H. Watson and Henry Raymond. U. S. 1,937,721, Dec. 5. Structural features. U. S. 1,937,722 (Alfred W. Simon, Leonard C. Kron and Henry Raymond) also relates to app. for the same general purpose.

**Separating a gas rich in hydrogen from a gaseous mixture.** Mathias Pier and Ernest Donath (to Standard-I. G. Co.). U. S. 1,938,087, Dec. 5. A gaseous mixt. contg. H, such as waste gases from the destructive hydrogenation of brown coal tar is washed at a temp. of  $100\text{--}200^\circ$  and under a pressure of 50–200 atm. with a hydrocarbon liquid such as a middle oil having a pos. temp. coeff. of solvent power for H and a gas rich in H is recovered from the soln. thus obtained by cooling.

**Gasifying heavy oils by partial combustion.** Constantin Chilowsky. Fr. 42,553, Aug. 23, 1933. Addn. to 732,260 (C. A. 27, 836).

**Apparatus for the catalytic treatment of gases and vapors obtained by distilling fuels.** Braunkohlen- und Brikett-Industrie A.-G. Bubiag. Ger. 579,650, July 1, 1933.

**Flue-gas cleaner.** Arthur Tittel and Ernst Wenger. Ger. 583,803, Sept. 11, 1933. Addn. to 546,519 (C. A. 26, 3653).

**Gas generator with an upright shaft suitable for production of fuel gas from coal.** Henry O. Loebell (to Henry L. Doherty). U. S. 1,937,580, Dec. 5. Structural and operative details.

**Gas producer for a mixture of water gas and coal gas.** Vergasungs-Industrie A.-G. (Pierre de Brouwer, inventor). Fr. 751,323, Aug. 31, 1933.

**Device for introducing air into gas producers.** Imbert-Gasgeneratoren. G. m. b. H. Ger. 580,664, July 14, 1933.

**Rotary fuel supports for gas producers.** Paul A. J. Cousin (to Établissements Ernest Arnoult, Soc. anon.). U. S. 1,938,517–18, Dec. 5. Structural and mech. details.

**Gas-producer plants.** James A. Macdonald. U. S. 1,938,296, Dec. 5. Structural and operative details.

U. S. 1,938,297 relates to generating producer gas by supplying air to a closed firing chamber through a restricted inlet to create a highly incandescent zone adjacent to the delivery end of the inlet and delivering water onto this zone in excess of the reaction requirements to localize the zone and maintain the base of the chamber wet.

**Chamber oven for the production of gas and coke.** Carl Still. U. S. 1,937,853, Dec. 5. Various details of a system for drawing off volatile distn. products, etc., are described.

**Plant for producing water-gas.** The Western Gas Construction Co. Ger. 579,552, July 3, 1933.

**Horizontal gas retorts.** Établissements Tourtellier (S. à. r. l.). Fr. 753,324, Oct. 13, 1933. Charging means is described.

**Ammonia recovery from fuel gas.** Frederick W. Sperr, Jr. (to Koppers Co. of Del.). U. S. 1,936,864, Nov. 28.

Ammoniacal liquor and tar are condensed from the gas by cooling, and the gas is then scrubbed with an aq. liquid which removes a further quantity of  $\text{NH}_3$  and thus becomes ammoniated; condensed ammoniacal liquor is sepd. from tar and at least a part of such condensed liquor is recirculated to cool a further quantity of gas; excess liquor is withdrawn from the cooling system, and the ammoniated scrubbing liquor is separately collected and distd. to remove free  $\text{NH}_3$  from it, then cooled and recirculated to scrub  $\text{NH}_3$  from a further quantity of gas. Excess liquor is withdrawn from the scrubbing system, combined with that from the condensing system, and the combined liquor is treated to remove free and fixed  $\text{NH}_3$  from it. App. is described. Cf. C. A. 27, 1740.

**Removing naphthalene from gases.** Wilhelm Mühlendyck. U. S. 1,937,460, Nov. 28. Naphthalene is washed out of gases by use of a fine mist-like spray of water. App. is described.

**Removing phenols from various waste effluents.** Charles E. Braun (to Barrett Co.). U. S. 1,937,941, Dec. 5. Coal-tar oil of a different sp. gr. from that of the liquor under treatment, and contg. its original content of tar acids is used as an extg. medium for removing phenols.

**Phenols.** Jacob Meyer. Ger. 584,857, Sept. 25, 1933. Pure phenols are obtained by extg. lignite and shale tars with alkali, oxidizing the ext. and driving impurities off from the product by steam at a temp. of at least  $150^\circ$ .

**Refining tar oils and phenols.** Gilbert T. Morgan and Alfred E. J. Pettet. Brit. 397,847, Aug. 29, 1933. Phenols and neutral tar oils from low-temp. or vertical-retort carbonization processes are purified so as to eliminate or prevent the formation of red color by heating with a small proportion of  $\text{CH}_3\text{O}$ , or substance yielding  $\text{CH}_3\text{O}$ , e. g., formalin, paraformaldehyde, trioxymethylene, methylal,  $(\text{CH}_2)_3\text{N}_4$ , and an acid or alk. catalyst, e. g., NaOH or concd. HCl, and distg.

**Ammonium sulfate.** Fred Denig (to The Koppers Co. of Delaware). Brit. 397,537, Aug. 21, 1933.  $\text{NH}_3$  is removed from fuel gas by continuously treating the gas to remove tar and  $1/3$  its  $\text{NH}_3$  content, forming  $\text{NH}_4\text{HSO}_4$  with the  $\text{NH}_3$  so removed by reaction with  $\text{SO}_2$  and O in presence of  $\text{H}_2\text{O}$  in 1 or more vessels and continuously contacting the treated gas with the aq. bisulfate in another vessel to form  $(\text{NH}_4)_2\text{SO}_4$ . App. is described.

**Tar.** Werschen-Weissenfelder Braunkohlen-A.-G. Ger. 584,707, Sept. 26, 1933. Distn. and generator tar from lignite and shale is worked up by first treating it with alkali and centrifuging to remove the cresol, and then with concd.  $\text{H}_2\text{SO}_4$  to remove resins. The purified tar is then distd. Examples are given.

**Tar for preserving wood.** Gaëtan P. Lièvre. Fr. 753,899, Oct. 26, 1933. The tar is obtained by neutralizing the alk. residual lyes from the chem. refining of petroleum with the vitriolic muds obtained from another part of the refining.

**Hydrogenating tar, etc.** I. G. Farbenind. A.-G. (Mathias Pier and Karl Winkler, inventors). Ger. 581,941, Aug. 5, 1933. Coal tars, mineral oils, etc., are subjected to a pressure-hydrogenation process and the gases from the reaction chamber are treated with washing oil before condensing the more readily condensable con-

- stituents. A Mo-Zn contact agent is employed during the hydrogenation. Cf. C. A. 28, 612<sup>1</sup>.
- Apparatus for dehydrating tars.** Bergedorfer Eisenwerk A.-G. Astra-Werke. Ger. 584,860, Sept. 25, 1933.
- Centrifugal apparatus for removing tar, etc., from gases.** Émile A. Barbet. Fr. 750,670, Aug. 16, 1933.
- Destructive hydrogenation of tars, mineral oils, etc.** Mathias Pier and Walter Simon (to Standard-I. G. Co.). U. S. 1,938,542, Dec. 5. The initial material is treated with a large excess of H in the presence of a catalyst comprising active C and an O compd. of P or As such as  $H_3PO_4$  at an elevated temp. within the destructive hydrogenation range and under a pressure of at least 50 atm. App. is described.
- Coking fuels.** Luigi Vertù and Giuseppe Pisanello. Ger. 584,607, Sept. 21, 1933. A briquetted mixt. of powd. coal and 15-20% naphtha or crude petroleum is subjected to a high-temp. coking process to give coke and light oils.
- Coking bituminous fuel.** Gustav Hilger. Ger. 583,992, Sept. 13, 1933. Details of coking app. and devices for removing the distn. gases by suction are given. Cf. C. A. 27, 1150.
- Apparatus for coking bituminous materials.** The American Tar Products Co. Ger. 580,632, July 14, 1933.
- Apparatus for coking coal.** National Fuels Corp. Ger. 583,926, Sept. 14, 1933.
- Coking coal.** Harold J. Rose and Wm. H. Hill (to Koppers Co. of Del.). U. S. 1,936,881, Nov. 28. A mixt. of coal with naphthalene (suitably in equal quantities) is heated in a closed chamber to the carbonizing temp. of the coal but below the crit. temp. of the naphthalene (suitably to about 450°) and after the carbonization naphthalene and tar are sepd. from the coke.
- Oven for coking coal.** Gustav Hilger. Ger. 579,747, July 5, 1933.
- Charging coking chambers with coal.** C. Otto & Co. G. m. b. H. Ger. 579,727, June 30, 1933.
- Coke ovens.** C. Otto & Co. G. m. b. H. Ger. 581,074, July 20, 1933. Addn. to 579,727 (preceding abstr.). Details of an internal coal distributor are given.
- Coke oven.** C. Otto & Co. G. m. b. H. Ger. 581,940, Aug. 5, 1933.
- Coke-ovens.** Pierre E. H. Forsans. Fr. 42,543, Aug. 4, 1933. Addn. to 736,303 (C. A. 27, 1487). Construction of door is described.
- Coke ovens.** Evence Coppée & Cie. Fr. 750,829, and 750,830, Aug. 19, 1933.
- Coke ovens.** Pierre E. H. Forsans. Fr. 753,309, Oct. 14, 1933.
- Coke ovens with horizontal chambers.** C. Otto & Co. G. m. b. H. Fr. 750,825, Aug. 19, 1933.
- Device for introducing gases and vapors into coke ovens, etc.** C. Otto & Co. G. m. b. H. Ger. 584,508, Sept. 20, 1933. Addn. to 578,993 (C. A. 28, 694<sup>1</sup>).
- Leveling bar for coke ovens.** Charles E. Underwood (to Bethlehem Steel Co.). U. S. 1,937,734, Dec. 5. Structural details.
- Means for withdrawing distillates from coke ovens.** Carl Still. Brit. 397,050, Aug. 17, 1933.
- Continuously operating, vertical coking or gas-generating chambers.** C. Otto & Co. G. m. b. H. Brit. 397,082, Aug. 17, 1933.
- Oven for the production of coke and coal gas.** Heinrich Stöter-Tillmann. Fr. 752,432, Sept. 22, 1933.
- Coke.** N. V. Maatschappij Voor Keramische En Chemische Industrie "Kero-Chemica." Fr. 752,468, Sept. 23, 1933. Coal, particularly bituminous, is coked at a medium temp. by mixing it in broken or powd. state, preferably dry with the product obtained by treating coal at a high temp.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. PARAGHER

- Application of tube stills to petroleum refining.** C. M. Johnson. *Refiner Natural Gasoline Mfr.* 12, 383 (1933). J. L. Essex
- A theoretical comparison of petroleum distillation systems.** Percy Meyer. *J. Inst. Petroleum Tech.* 19, 819-34 (1933).—A criterion or coeff. has been worked out to express the degree of fractionation accomplished in a distn. of a petroleum mixt. whether by batch or continuous distn. or by equil. flash vaporization. It was M.'s purpose that the coeff. should depend upon the app., the no. of bubble plates, the reflux ratio and the mode of operating. Exptl. data in the literature available for testing the correctness of the expressions reached are scanty. Calcs. from the data of Leslie and Good (cf. C. A. 21, 2182) and of Fancher (cf. C. A. 25, 1977)\* for flash vaporization showed a fair approach to equality between overlap and underlap, that is, between the light ends in the residue and the heavy ends in the overhead. The av. numerical value of the overlap for a no. of crude oils of wide boiling range flash-vaporized between 300° and 500°F. was 20. With a given overlap coeff., the compn. of the overlap is nearly const. when batch distn. is compared with batch distn. or continuous with continuous, though operating conditions are varied; but this does not hold when batch and continuous distn. are compared. The vol. of the overlap and the degree of sepn. are not affected by the vol. of material boiling outside of the range of the overlap-underlap. With a high reflux ratio and a given no. of plates, batch distn. affords sharper cutting than continuous operation. At commercially practicable reflux ratios, the continuous process has the advantage.
- Emma E. Crandal
- Economics of petroleum cracking.** Gustav Egloff. *Ind. Eng. Chem.* 26, 41-5 (1934). E. H.
- Heat-flow diagram of the cracking still.** G. Vandenberg. *Refiner Natural Gasoline Mfr.* 12, 380 (1933); cf. C. A. 27, 2023.—An excellent diagram showing the step-by-step heat balance for every stage of cracking is given. Calcs. show that the distillate carries off only 5 million B. t. u. out of the 25 million furnished by the furnace and 50 million retained by the oil in the system. Tars are the sources of greatest heat losses. J. L. Essex
- Use of continuous vacuum filters in contact treating.** L. C. Trescott. *Refiner Natural Gasoline Mfr.* 12, 396 (1933); cf. C. A. 27, 5524.—The adaptation of the metallurgical filter to large-scale refinery operations is discussed. J. L. Essex
- The nitrobenzene process—installation and operating costs.** S. W. Ferris, W. A. Myers and A. G. Peterkin. *Refiner Natural Gasoline Mfr.* 12, 435 (1933).—A discussion of plant installation and its operation when nitrobenzene is used as the solvent. J. L. Essex
- Study of oil-field water analysis. III. Estimation of sodium by dihydroxytartaric acid.** Abol H. K. Radjy and Charles E. Wood. *J. Inst. Petroleum Tech.* 19, 845-62 (1933); cf. C. A. 27, 1741.—Na can be correctly estd. by pptg. with K dihydroxytartrate if it is present in a concn. of 8-16 g. per l. or 20-40 g. of NaCl. The K salt soln. should be added, drop by drop, to the soln. contg. Na, and the ppt., after 4.5-5 hrs., should be filtered off at a temp. not exceeding 5°. The washed ppt. and paper are placed in a flask contg. an excess of  $KMnO_4$  soln. acidified with definite quantities of  $H_2SO_4$  and  $H_3PO_4$ , together with a catalyst consisting of freshly prepd. 0.05%  $NH_4$  metavanadate soln. The excess of  $KMnO_4$  is titrated back with standard  $(COOH)_2$  soln.  $Ce(SO_4)_2$  may be used as the oxidizing agent instead of  $KMnO_4$ . Emma E. Crandal
- Determination of water in hydrocarbons.** Hans Broche and Wolfram Scher. *Brennstoff-Chem.* 14, 408-9 (1933).—The use in a previously described method (C. A. 26, 5196) of a polystyrene-resin capsule,  $C_6H_5$ -sol. but impervious

to H<sub>2</sub>O vapor, is explained. Errors due to changing temp. and barometric pressure can be corrected by recalc.

F. W. Jung

**Anomalies in the viscosity of mineral oils at low temperatures.** Louis, Jordachescu and Thiebault. *Physica* 4, 401-2(1933).—Viscosity measurements at low temps. show that after a temp. change an oil may require several weeks to attain an equil. state. The oil shows no "yield value," since it flows under very slight pressure.

L. E. Steiner

**Stabilizing and refining shale-oil gasoline by means of pressure hydrogenation.** A. D. Petrov, D. N. Andreev and E. A. Pozhiltzeva. *Foreign Petroleum Tech.* 1, 135-48(1933).—A shale-oil gasoline obtained from Veimarn-shale tar, having a final b. p. of 230°, S content of 0.889% (by the lamp method) and a max. gum formation of 658 mg., was hydrogenated at 50 atm. and 330-350° for 1 hr. in the presence of 5-10% MoS<sub>2</sub> and 5-10% CuO catalysts. Numerical data obtained on the hydrogenation of various gasoline cuts as well as of amylene (trimethylethylene), diisobutylene and C<sub>6</sub>H<sub>6</sub> in the presence of the above catalysts are given. The S content was lowered to 0.644% for the wide fraction, to 0.44% for the 90-100° and to 0.48% for the 110-120° fractions. The O-contg. compds., namely, aldehydes, ketones and peroxides, which represent the natural transition link toward the formation of gum, as well as diene hydrocarbons, were completely eliminated. To establish a possible change in the structure of the olefin and paraffin hydrocarbons, the product was treated with mercuric acetate and free cyanide. It was found that the Hg no. decreased after hydrogenation. This change is probably due to a lowering in the amt. of olefins with normal structure, while changes in the thiocyanate no. indicate that olefins of the isostructure were hydrogenated to paraffins.

A. A. Bochtlingk

**Effect of gasoline volatility on engine economy.** Neil MacCough. *S. A. E. Journal* 33, 363-70T(1933).

H. A. Beatty

**Ozone, knock-inducer extraordinary.** Donald H. Brooks. *J. Inst. Petroleum Tech.* 19, 835-44(1933).—The chance connection of a Cottrell precipitator to the intake manifold of a CFR testing engine led to the discovery that O<sub>3</sub> in the intake air greatly increased the knocking of a fuel. The lowering of the octane no. appeared to be linear in relation to the percentage of O<sub>3</sub> in the air. The "O<sub>3</sub> equivalents" of Ph(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub>, C<sub>6</sub>H<sub>6</sub> and EtOH in Fuel A-2 (a working-standard fuel for CFR engine tests) were compared by adding enough of the resp. antiknock agents to portions of the fuel to give an octane no. of 59.6, and detg. the amts. of O<sub>3</sub> that must be added to the intake air to match the fuels with 4 reference fuels, one of them the untreated A-2. Roughly 30% more O<sub>3</sub> was necessary to overcome the effect of the C<sub>6</sub>H<sub>6</sub> than of the Ph(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub>, and 60% more to overcome the effect of the abs. EtOH. A fact not yet explained is that a richer mixt. was necessary for max. detonation when the air contained O<sub>3</sub>. The rating of the fuels contg. cracked gasoline was less influenced by O<sub>3</sub> than that of the other fuels. "Depreciation" of the fuels by the CFR motor method, power, efficiency and spark advance were scarcely affected by the presence of O<sub>3</sub>.

Emma E. Crandal

**The testing and evaluation of carbureting oils.** P. Schläpfer and S. Schaffhauser. *Schweiz. Ver. Gas Wasserfach. Monats. Bull.* 13, 125-43, 159-68, 193 204(1933).—An effort was made to find a reliable lab. method for the evaluation of carbureting oils for water gas. Method and app. are described for gasification of oil, giving results reproducible to within 3%. The effects of temp. and flow of oil on the results are shown for Echelbronn No. 6 oil. For rising temp. of gasification (650-790°) (vaporization at 400°) there is an increase in the amt. of gas made, and increases in the sp. wt. of the tar and in the percentages of H<sub>2</sub> and CH<sub>4</sub>; heating value drops. The product of a l. of gas per 100 cc. oil and heating value in kg.-cal. per cu. m. (Hempels "effective value") for any given flow of oil goes through a max. Each type of gas oil has its own optimum gasification temp.; the effective values at optimum temp. vary with the oil compn. The

1 Holmes no. (C. A. 26, 2582) gives good results for evaluation of good carbureting oils. For poor oils the gasification test is more reliable. The influence of chem. compn. on sp. gr., distn. curve and H content is discussed at length. Paraffins are best suited for carburetion (high effective values) with the exception of the lower-boiling, stabler ones; the aromatic hydrocarbons are least suited. Oils with more than 50% boiling below 300° are unsuitable.

2 The tar yield is not related to the effective value but depends on the oil compn. as well as on temp. and rate of gasification. A considerable amt. of H<sub>2</sub> is added to the unsatd. compds. of the vapors (calcd. by difference). For each H<sub>2</sub> concn. a temp. of max. H addn. exists. The olefin yield of the oil remains practically const. with rising H concn. but it is appreciably higher than that without H<sub>2</sub> present. The Ostwald figure alone is an unsatisfactory index; if, however, it is multiplied by wt. percentage of H<sub>2</sub> of the oil and divided by the sp. gr., it becomes a useful value index, better even than the Holmes value. The usefulness of these figures is limited to the best gasification temp. range of 700° to 790°; with certain restrictions, depending on the chem. compn., they can be used also down to 650° B. J. C. van der Hoeven

**Scope and flexibility of the Edeleanu process.** O. P. Cottrell. *Refiner Natural Gasoline Mfr.* 12, 432(1933).

J. L. Essex

4 **Duo-sol process in manufacture of lubricating oils.** Malcolm Tuttle and Max B. Miller. *Refiner Natural Gasoline Mfr.* 12, 453(1933).—This process makes use of 2 solvents for extrn., but no mention is made of their identity.

J. L. Essex

**Continuous acid treatment effective in Belgian lubricating-oil plant.** M. Grisard. *Refiner Natural Gasoline Mfr.* 12, 388(1933).—A discussion of the De Laval S-N trichloroethylene process for acid treatment of lubricating oils.

J. L. Essex

**Use of phenol as selective solvent in the production of high-grade lubricating oils.** R. K. Stratford, O. S. Pokorny and J. L. Huggett. *Refiner Natural Gasoline Mfr.* 12, 458(1933).—Results from the use of phenol as solvent are described.

J. L. Essex

**Synthetic lubricating oils.** A. D. Petrov and E. A. Pozhiltzeva. *Foreign Petroleum Tech.* 1, 23-6, 43-9(1933).—Synthetic AlCl<sub>3</sub> was caused to act on the kerosene fraction from sapropelite tar. The oils b. 150-240°. Other properties are d<sub>4</sub> 0.8350, n<sub>D</sub><sup>20</sup> 1.4650, I no. 83.5, aniline pt. 31.4° before and 74.8° after treatment with 3 1/4% H<sub>2</sub>SO<sub>4</sub>, and content of 65% of unsatd. and aromatic compds. as detd. by the Kattwinkel method. The treatment at atm. pressure and low temp. produced very low yields of oils with high b. ps., and, therefore, expts. with the application of 7 atm. pressure and a temp. up to 200° were run, yielding up to 25% of a fraction b. above 240°. A detailed investigation of fractions obtained by the above treatment revealed that olefins only are polymerized to naphthenes (together with the polymerization of the olefins with aromatic compds. to alkylaromatic hydrocarbons); and that a condensation of olefins with naphthenes also takes place, whereby bicyclic naphthene hydrocarbons are most probably obtained. The AlCl<sub>3</sub>-treated fractions are characterized by a higher content of aromatic compds. than those produced on condensing unsatd. gases. Properties of these fractions are tabulated. In the condensation of gaseous hydrocarbons with naphthalene at 150°, 6% AlCl<sub>3</sub> and a duration of 10-12 hrs., an oil was obtained which was almost completely sol. in H<sub>2</sub>SO<sub>4</sub> and had a very high absolute viscosity and a high temp.-viscosity coeff. A gas oil subjected to vapor-phase cracking produced a fraction b. 100-180° which contained 30% unsatd. and aromatic compds., the latter being in great excess. On condensation with AlCl<sub>3</sub>, a fraction boiling above 180° (12 mm.), amounting to 20% and having the following properties, was obtained: d<sub>4</sub> 0.8938, n<sub>D</sub><sup>20</sup> 1.4970, I no. 10.2, aniline pt. 74.5° before and 92.4° after H<sub>2</sub>SO<sub>4</sub> treatment and an Ostwald viscosity at 20° of 19.8 and at 50° of 6.5. Conclusion: Oils obtained by condensing olefins with naphthalene have a great similarity, par-

ticularly in their temp.-viscosity coeffs., to Davis and Blackwood's paraffin (cf. C. A. 26, 1107). A. A. B.

**The chemical nature of Ural crude oil.** N. D. Zelinskii. Acad. of Sci. of U. S. S. R. Trans. of the June Session dealing with the problems of the Ural-Kuznetak district. Petrograd 1932, 14 pp. Petrograd Acad. of Sci. (Translation in *Foreign Petroleum Tech.* 1, 27-30, 51-56(1933).—A kerosene fraction from the Ural (Perm) crude oil was investigated. It had the following properties: b. p. 150-240°,  $n_D^{20} = 1.4856$ ,  $d_4^{20} = 0.8529$ , and S by the Engler method 1.58%. The S was removed with Hg salts. The kerosene was then washed, dried and distd. (over freshly reduced Cu) with a Vigreux dephlegmator. Six fractions were obtained (sp. gr.,  $n_D^{20}$  and max. aniline points are tabulated for each fraction). The fractions were treated with  $H_2SO_4$  (monohydrate). The content of aromatic compds. was 43.5-62%. The naphthenes were then detd. by catalytic dehydrogenation (cf. C. A. 25, 41(12), which was carried out at 310°, 330° and 350°. The content of aromatic compds. was 13-28%. The residue left after these operations consisted of paraffin and polymethylene hydrocarbons, the latter increasing in the higher-boiling fractions. The sulfo acids obtained in the removal of aromatic compds. were decompd. with steam, washed, dried and redistd. over metallic Na. Naphthalene was not found. In the oxidation of aromatic compds. by the Ullmann method (cf. *Ber.* 36, 1797-1806(1903)) mono- and di-substituted compds. were traced, and benzoic acid and phthalic acids (terephthalic acids prevailing) were established. Thus, the kerosene b. p. 150-250° showed monosubstituted aromatic compds. in the 225-240° cut, and no trace of decahydronaphthalene which was found in the Baku crude oils.

A. A. Bochtlingk  
**Investigation of blended bitumens.** Carl Ziegs. *Bitumen* 3, 190-5(1933).—Details are given of testing methods, with typical results.

Howard A. Smith  
**Acetylmethylcarbinol and biacetyl in wood vinegar.** J. Pritzker. *Chem.-Ztg.* 57, 793-4(1933).—In some samples of vinegar 0.5-12 g. per l. of acetylmethylcarbinol and 0.1-1.92 g. of biacetyl were found present. Suitable methods for making the analysis are described.

W. T. H.  
**Gasoline survey for 1932.** H. McD. Chantler. Can. Dept. Mines, Mines Branch, *Memorandum Series* No. 60, 29 pp.(1933); cf. C. A. 27, 3322.—Detailed data are given for 134 gasoline samples collected in July, 1931 and 125 samples in July, 1932. Averages for 1931 and 1932, resp., are: 1st drop 104°, 102°F.; distn. 10% 157°, 154°F.; 20% 186°, 183°F.; 50% 258°, 254°F.; 70% 304°, 299°F.; 90% 366°, 361°F.; end point 406°, 408°F.; recovery 96.9, 97.9%; residue 1.3, 1.2%; index no. 167.7, 165.9°F.; sp. gr. 0.741, 0.742; A. P. I. 59.5, 59.2, S 0.05, —; vapor pressure —, 7.4; and octane no. (212°F., 600 r. p. m.) —, 65.

A. H. E.  
A territory which may justify the testing for petroleum (Charrin) 8. Problems of tech. reactions. I. Decompn. of compds. [cracking] (Schmidt) 13. Origin of petroleum (Krejci-Graf) 8. App. for filtering motor fuels (U. S. pat. 1,937,415) 1. Destructive hydrogenation of mineral oils (U. S. pat. 1,938,542) 21. Esters of high gravity from castor oil [use as lubricants with mineral oils] (U. S. pat. 1,936,831) 10. Hydrogenating tar [mineral oils] etc. (Ger. pat. 581,941) 21. Hydrogenation products of coal (Ger. pat. 584,763) 21. Catalytic treatment of oils (Fr. pat. 753,335) 27. Hydrogenation of oil (Fr. pat. 750,850) 21. Polymerizing, condensing and oxidizing crude tall oil (U. S. pat. 1,938,532) 26. Vegetable oil [for use as lubricant] (Fr. pat. 752,876) 12.

**Petroleum oil distillation.** Otto Behimer (to Texas Co.). U. S. 1,936,657, Nov. 28. In a continuous process of distg. petroleum oil to evolve heavy lubricating oil fractions having a decomp. temp. below their vaporizing temp. when heated under a substantial vacuum, while substantially preventing decompn., material contg. such

heavy fractions and lighter lubricating oil fractions is fed into a single distn. zone maintained at substantially a const. temp. below the decomp. temp. of the heavy fractions and under a reduced pressure to vaporize the heavy fractions in the presence of vapors of the lighter fractions; mixed vapors and residue are continuously withdrawn from the distg. zone in such relation of vol. and speed as to cause the vaporization of both the heavy and light lubricating oil fractions, and the material is thereafter condensed into a plurality of distillates of different b. p. range. App. is described.

**Desulfurizing petroleum distillates.** Wm. A. Smith. U. S. 1,938,117, Dec. 5. A distillate is desulfurized, without materially decreasing its antiknock properties, by contact with Cu silicate and a relatively small proportion of Zn compd. such as Zn silicate. Cu nitrate, etc., also may be used.

**Deodorizing petroleum distillates.** Wm. A. Smith. U. S. 1,938,116, Dec. 5. Metallic Cd is used for treating distillates while in liquid phase.

**Gum-inhibiting treatment of cracked petroleum distillates.** Herman P. Lankelma (to Standard Oil Co. of Ohio). U. S. 1,938,456, Dec. 5. Volatile cracked distillates are treated with a small proportion of an acyl-substituted aminophenol such as *p*-acetylaminophenol.

**Breaking petroleum emulsions.** Truman B. Wayne. U. S. 1,937,259, Nov. 28. A water-in-oil emulsion is treated with a complex condensation product prepd. from a sulfonated aromatic amine such as sulfonated aniline and an alc. of aldehyde of the aliphatic series. Various examples are given.

**Breaking petroleum emulsions.** Melvin De Groote and Louis T. Monson (to Tretolite Co.). U. S. 1,938,322, Dec. 5. A sulfonic acid or sulfuric acid ester such as the sulfuric ester of cetyl alc. (or its NH<sub>4</sub> salt) is used as a demulsifying agent. U. S. 1,938,323 relates to the similar use of a demulsifying agent such as the Na salt of a sulfonic acid derived from lauryl alc. Cf. C. A. 27, 5960.

**Pump for liquefied petroleum gas.** Roswell W. Thomas (to Phillips Petroleum Co.). U. S. 1,937,859, Dec. 5. Mech. features.

**Cracking hydrocarbon oils.** Joseph G. Alther (to Universal Oil Products Co.). U. S. 1,937,863, Dec. 5. A reflux condensate formed in the process is passed through a heating coil in which it is heated to a cracking temp. under pressure in a furnace; the heated product thus formed is discharged into an enlarged reaction zone whence vapors are passed to a dephlegmating zone for indirect heat exchange with fresh charging oil for the process. The charging oil is then passed through a second coil in a cooler portion of the furnace (than the coil first mentioned) and is then passed in direct contact countercurrent to the vapors of the reflux condensate introduced to the reaction zone. Unvaporized oil is isolated from the process, and condensed heavier fractions from the dephlegmating zone are supplied to the first-mentioned heating coil as reflux condensate, vapors uncondensed in the dephlegmating zone being removed and condensed. App. is described. Cf. C. A. 28, 309<sup>a</sup>.

**Cracking and coking hydrocarbon oils.** Harry L. Pelzer (to Sinclair Refining Co.). U. S. 1,937,163, Nov. 28. A hydrocarbon oil is vaporized and is cracked in the vapor phase; hot vapor mixt. from the vapor phase cracking operation is released at a temp. above 480° in a coking receptacle into which there is simultaneously introduced a heavy hydrocarbon oil to be coked at a rate at least as great as that at which oil is supplied to the vapor phase cracking operation and at a temp. not more than about 80° lower than the temp. prevailing in the coking receptacle, and the heavy oil is reduced to coke. An arrangement of app. is described.

**Purifying and cracking hydrocarbon materials such as gas oil, etc.** Mathias Pier (to I. G. Farbenind. A.-G.). U. S. 1,938,086, Dec. 5. Liquid carbonaceous materials which contain compds. of S or O or of both are first treated to remove such compds. by heating the initial materials to 300-450° without addn. of H in the presence of a

catalyst comprising a metal of the 6th or 7th periodic group or Co under such pressure that the main portion of the initial materials remains liquid, and then the resulting hydrocarbon products are subjected to a cracking treatment at 350-650°. An arrangement of app. is described.

**Apparatus for the pressure-heat cracking of hydrocarbon oils.** Universal Oil Products Co. Ger. 581,873, Aug. 4, 1933.

**Apparatus for "cracking" oil vapor.** Jean Mercia. Ger. 579,582, June 28, 1933.

**Cracking oils to produce gasoline.** Eugene C. Herthel (to Sinclair Refining Co.). U. S. 1,937,759, Dec. 5. In the production of gasoline by cracking oils of higher b. p. at temps. above 480°, the raw cracked gasoline fraction is sepd. into 2 liquid fractions, one contg. those constituents of higher b. p. than butane and the other contg. butane and lower-boiling constituents; the higher-boiling sepd. fraction is contacted with an adsorptive catalyst such as fuller's earth at a temp. of about 175° or higher and below its crit. temp. under a pressure sufficient to maintain it substantially in liquid phase and a fraction is distd. free from unduly high-boiling constituents. Propane and lower-boiling substances are sepd. from the lower-boiling initially sepd. fraction and the latter is then refined with caustic alkali and combined with the distd. gasoline fraction. An arrangement of app. is described.

**Treating residuum from hydrocarbon-oil cracking.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,937,946, Dec. 5. Residuum from pressure-oil cracking is removed from the cracking process and while still hot is treated with an oil-sol. acidic material and a metal reacting therewith to form H<sub>2</sub> and hydrogenating conditions of temp. and pressure are maintained, to form an increased yield of satd. products of low b. p. Various details and examples are given.

**Column for fractional distillation of materials such as hydrocarbon oils.** Hugo F. Huff (to Universal Oil Products Co.). U. S. 1,937,958, Dec. 5. Structural features.

**Fractionating hydrocarbon oil vapors.** Harold R. Snow (to Standard Oil Co. of Ind.). U. S. 1,938,118, Dec. 5. Hot vapors contg. asphaltic matter are introduced into a fractionating column, and reflux formed in the column and free from asphaltic matter is mixed with the vapors directly before their discharge into the column. App. is described.

**Heating system for hydrocarbon oil conversion.** Joseph B. Weaver (to Gyro Process Co.). U. S. 1,936,699, Nov. 28. Various details of operation are described, and of app. including a converter and preheater successively supplied with heating gases the temp. of which may be regulated by admixture with recirculated gases.

**Refining hydrocarbon oil products containing sulfur.** Thomas T. Gray (to Gray Processes Corp.). U. S. 1,937,113, Nov. 28. Vapor of the desired portion of products from hydrocarbon oil cracking is contacted with an adsorbent polymerizing agent such as fuller's earth and with a sweetening material such as Cu oxide both before and after the contact with the adsorbent polymerizing agent. App. is described, in which the treating materials may be arranged in layers.

**Refining light hydrocarbon oils.** Philip L. Krauel and George W. Watts (to Standard Oil Co. of Ind.). U. S. 1,936,629, Nov. 28. A light oil such as a light pressure-still distillate is subjected to the action of a Na plumbite soln. under conditions to leave dissolved org. Pb-S compds. in the oil, heated to decompose such dissolved compds. and form insol. PbS while simultaneously vaporizing a portion of the oil and sepg. the vaporized from the unvaporized portion, insol. PbS is sepd. from the unvaporized portion, and the latter is recombined with the vaporized portion. App. and various details of operation are described. Cf. C. A. 28, 624°.

**Refining hydrocarbon oils such as cracked gasolines.** Roland B. Day (to Universal Oil Products Co.). U. S. 1,937,873, Dec. 5. For removing color, gum-forming and S-contg. substances, the heated material is subjected to the action of HCl while in contact with a catalyst such as

1 brass or other metallic material which has been pre-conditioned and activated by a previous treatment with HCl. App. is described. Cf. C. A. 27, 4916, 4918.

**Apparatus for refining hydrocarbon oil by adsorption agents.** Imperial Oil Ltd. Ger. 581,635, July 31, 1933.

**Desulfurizing hydrocarbon oils.** Herman Pines (to Universal Oil Products Co.). U. S. 1,937,914, Dec. 5. Materials such as cracked distillates are contacted in the vapor phase and in substantially anhyd. condition, with sodamide. Cf. C. A. 28, 628°.

**Dewaxing hydrocarbon oils.** Frederick W. Sullivan, Jr. (to Standard Oil Co. of Ind.). U. S. 1,938,548, Dec. 5. MeOAc is used as a diluent.

**Hydrocarbon oils from carbonaceous material such as tar, coal, wood or crude oil.** Richard Bayer (to Friedrich Uhdde). U. S. 1,936,819, Nov. 28. Carbonaceous material, together with liquid water and a metal such as spongy Fe capable of reacting with water to produce nascent H at temps. above 380°, is heated to at least this temp. in a closed reaction zone to build up a self-generated pressure and effect hydrogenation while preventing substantial vaporization, and the elevated temp. and pressure are maintained until low-boiling oils are formed and hydrogenated. Cf. C. A. 27, 3587°.

**Catalytic hydrogenation of heavy liquid hydrocarbon distillates.** Manfred Dunkel and Eugen Dorrer (to Standard-I. G. Co.). U. S. 1,937,554, Dec. 5. Material such as a mineral coal tar is treated in the liquid phase, at 300-430°, with a H-contg. gas under at least 10 atm. pressure in the presence of a S-immune catalyst such as may be prepd. from W sulfides and Co oxide under conditions milder than those required for substantial splitting reactions. The initial material is rendered readily mobile before the treatment by mixing it with a solvent such as tetrahydronaphthalene. An arrangement of app. is described.

**Destructive hydrogenation of high-boiling hydrocarbons or derivatives.** Roland H. Griffith (to Gas Light & Coke Co.). U. S. 1,938,328, Dec. 5. Materials such as low-temp. tars are heated to about 440° with H under about 200 atm. pressure in the presence of a catalyst mixt. comprising Mo and a promoter comprising Li, B, Si, P or Ca in specified proportions. Various details are given.

**Destructive hydrogenation of materials such as gas oil, etc.** Mathias Pier and Walter Simon (to Standard-I. G. Co.). U. S. 1,937,588, Dec. 5. A catalyst is used comprising at least 3 different constituents: (a) Al, alumina or an aluminous clay; (b) an oxide or hydroxide of a metal of group 6 of the periodic system such as molybdenic acid and (c) an oxide or hydroxide of a different metal of group 6 of the periodic system such as chromic acid. Cf. C. A. 27, 5173°.

**Apparatus for separating the constituents of liquid mixtures of hydrocarbon oils, acid resins and acids.** Aktiebolaget Separator-Nobel. Ger. 581,584, July 29, 1933.

**Hydrocarbons.** I. G. Farbenind. A.-G. (Mathias Pier, inventor). Ger. 580,828, July 17, 1933. Tars, mineral oils, etc., are treated with H in one or more stages under raised temp. and pressure and in the presence of catalysts to produce low-boiling hydrocarbons of the benzine, middle oil and illuminating oil types. In the first stage, the vaporized products are passed over a contact agent such as Mo-Zn prior to further treatment to render them innocuous. The second contact agent may be MoO<sub>3</sub> and CrO<sub>3</sub>. Cf. C. A. 27, 2799°.

**Decolorizing hydrocarbon distillates.** Sumner E. Campbell. U. S. 1,938,094, Dec. 5. A stream of a distillate such as a gasoline or kerosene distillate is passed through a dil. H<sub>2</sub>SO<sub>4</sub> soln. in the presence of contact material such as inert solid material and then through an alk. soln. such as NaOH and then through a plurality of chambers contg. contact material and concd. H<sub>2</sub>SO<sub>4</sub> and arranged in series relation, and the passage of distillate is continued until the concd. H<sub>2</sub>SO<sub>4</sub> is substantially exhausted in the chambers in rotation; exhausted H<sub>2</sub>SO<sub>4</sub> and reaction products are removed from successive chambers and are treated with



water to obtain the dil.  $\text{H}_2\text{SO}_4$  used in the process. An arrangement of app. is described. Cf. C. A. 27, 3601.

**Mineral oils.** The Sharples Specialty Co. Fr. 752,463, Sept. 23, 1933. Mineral oils are fractionally distd. with a min. of cracking by submitting the oil to vaporization in contact with an entraining vapor to form one or more primary distillates and a primary residue. The primary residue is submitted separately to contact with entraining vapor and with a reflux. The reflux is composed of the primary distillate(s), e. g., the distillate of highest b. p. An app. is described.

**Refining mineral oils, etc.** Aktiebolaget Separator-Nobel. Fr. 42,423, July 19, 1933. Addn. to 659,725 (C. A. 23, 5313). App. for measuring and delivering the purifying liquid to the oil in a continuous manner.

**Cracking mineral oils.** Henry Thomas (to Sun Oil Co.). U. S. 1,938,406, Dec. 5. The crit. temp. of the oil to be subjected to the cracking operation is detd., and the oil is rapidly heated for a relatively short time to a gradually increasing temp. ranging from the temp. at which it starts substantially to crack to a temp. close to the initially detd. crit. temp. but somewhat below the crit. temp., while maintaining the oil under sufficient superatm. pressure that it is largely in liquid phase and heating under such conditions is continued to effect most of the cracking operation desired. App. is described.

**Filtration apparatus for separating paraffin from mineral oils.** Texaco Development Corp. Fr. 754,185, Nov. 2, 1933.

**Bituminous shale.** Sven V. Bergh. Ger. 579,623, June 29, 1933. See Swed. 70,948 (C. A. 27, 3069).

**Apparatus for testing the dielectric strength of oil.** David B. Clark (to Goulds Pumps, Inc.). U. S. 1,937,744, Dec. 5. An app. is described in which flow of oil through a testing device to a receiving tank is automatically stopped when any oil of less than a predetd. dielec. strength passes through the testing device. Cf. C. A. 27, 5586.

**Device for taking samples of oils or other liquids from tanks, etc.** Benjamin F. Remington and Clarence C. Stevenson (Remington to Texas Co.). U. S. 1,938,224, Dec. 5. Structural and mech. details.

**Motor fuels.** I. G. Farbenind. A.-G. (Wilhelm Gaus, inventor). Ger. 508,917, July 17, 1933. Addn. to 448,620. Motor fuels of the gasoline type are improved by adding  $\text{Fe}(\text{CO})_2$  and hydrocarbons contg. O or N, except those contg. halogen also. Thus,  $\text{Fe}(\text{CO})_2$  is added with toluidine, quinone, benzaldehyde, etc. The addns. prevent knocking.

**Motor fuels.** I. G. Farbenind. A.-G. (Wilhelm Wilke, Ernst Kuss and Gerhard Ritter, inventors). Ger. 518,232, July 24, 1933. Addn. to 508,917 (preceding abstr.). The method of 508,917 for improving motor fuel by adding  $\text{Fe}(\text{CO})_2$  and sol. org. compds. of the  $\text{C}_2\text{H}_5$  series contg. O or N but no halogen is applied to Diesel-engine fuels. Thus,  $\text{Fe}(\text{CO})_2$  and iso-BuOH, aldehydes, ketones, esters, amines, etc., are added to prevent knocking.

**Motor fuel.** Standard Oil Co. of Indiana. Fr. 752,981, Oct. 4, 1933. An antiknock fuel for motors is obtained by cracking hydrocarbons of high b. p. under pressure, but without catalysts or the use of inert gases. The hydrocarbons are completely vaporized by a rapid heating from below decompn. temp. (about  $370^\circ$ ) to a decompn. temp. of  $455\text{--}525^\circ$  while a pressure of 100–400 pounds is maintained for a time sufficient to obtain a min. proportion of decomposed products having the desired characteristics per passage (2.5 at 100 to 15% at 400 lb.). The rapid heating is such that about 85% of the total conversion per passage is effected at above  $455^\circ$ . A part of the decompn. takes place in a coil and the rest in an enlarged chamber. An app. is described. Fr. 752,982. In decomposing hydrocarbons by heating in a coil and discharging them to an enlarged chamber in which decompn. takes place, a liquid and vaporizable cooling agent, e. g., vaporizable hydrocarbons forming part of the stock of fresh materials for conversion, is introduced into the vaporous products when they leave the enlarged chamber, and is carried along with the vapors.

**"Nonknocking" motor fuels.** Frits Winkler, Hans

Haeuber and Paul Feiler (to I. G. Farbenind. A.-G.). U. S. 1,937,619, Dec. 5. In the production of low-boiling non-knocking hydrocarbon products contg. aromatic hydrocarbons by dehydrogenation of vaporized paraffinic hydrocarbons and subsequent condensation of the resulting dehydrogenated products, the dehydrogenation and condensation are effected in sep. vessels of which at least the parts coming into contact with the reacting substances are constructed of a material comprising free Si such as by use of a Si reaction tube. Various details of app. arrangement are described.

**Gasoline recovery from natural gas.** Edwin R. Cox (to Texas Co.). U. S. 1,937,871, Dec. 5. Gasoline is absorbed in oil in a zone from which the gas passes in a substantially gasoline-free condition; the absorbent oil, relatively rich in gasoline, is passed to an evapg. zone in which gasoline-like constituents are vaporized; resulting vapors are partially condensed to sep. heavier gasoline-like constituents; uncondensed vapors are compressed to form a bulk supply of a refrigerant comprising the lighter condensable hydrocarbons and a portion of this bulk supply is used in a compression refrigerating system. Various details of app. and operation are described. U. S. 1,937,872 relates to various features of app. and operation for absorbent recovery of gasoline from natural gas.

**Non-detonating gasoline.** Frederick W. Sullivan, Jr. and Vanderveer Voorhees (to Standard Oil Co. of Ind.). U. S. 1,938,546, Dec. 5. Hydrocarbon compds. of Pb suitable for use with gasoline are prepd. by establishing a silent elec. discharge in the presence of metallic Pb, within a body of gaseous or vaporized hydrocarbon which yields free alkyl radicals on decompn., such as  $\text{C}_2\text{H}_5$ ,  $\text{C}_3\text{H}_7$ ,  $\text{C}_4\text{H}_9$  or  $\text{C}_4\text{H}_{11}$ . App. is described.

**"Leadized" gasoline.** Frederick W. Sullivan, Jr. and Fred F. Diwoy (to Standard Oil Co. of Ind.). U. S. 1,938,547, Dec. 5. A high-tension arc is established within a body of hydrocarbon material yielding free alkyl radicals on disocn., and the hydrocarbon disocn. products thus formed are immediately contacted with metallic Pb to form hydrocarbon derivs. of the latter which are then immediately removed from the zone of the arc. App. is described.

**Hydrocarbon wax.** Lawrence M. Henderson, Seymour W. Ferris and Henry C. Cowles, Jr. (to Atlantic Refining Co.). U. S. 1,937,518, Dec. 5. A substantially oil-free hydrocarbon wax m.  $25\text{--}50^\circ$  and having a  $\eta$ , measured at  $80^\circ$ , greater than that derived from the expression  $\eta = 1.425 + 0.00075 T$  and less than 1.48, where  $T$  denotes the m. p. of the wax, is prepd. by various described modifications of treatment.

**Working up naphthenic acid soap-containing oily residues.** Richard Brunck, Alfred Kreutzer and Walther Boeck (to Deutsche Gasolin A.-G.). U. S. 1,938,513, Dec. 5. Oily residues obtained in the distn. of acid-contg. mineral oils over alkalis or alk. earths are treated in the water-free state with concd.  $\text{H}_2\text{SO}_4$  by which the naphthenic acids removed from the oil by the alkali or alk. earth are liberated so that they may be sepd.

**Lubricating oil.** Alfred Henriksen and Bert H. Lincoln (to Continental Oil Co.). U. S. 1,936,670, Nov. 28. A small proportion of a halogenated diphenylene oxide (suitably about 0.1–10% of a mono- or di-chlorinated deriv.) is added to a hydrocarbon lubricating oil in order to give lubricating films of greater strength.

**Lubricating oils.** Wilhelm Pungs, Hans Rabe and Hermann Zorn (to I. G. Farbenind. A.-G.). U. S. 1,938,088, Dec. 5. For producing a lubricating oil, a mixt. of a cyclic hydrocarbon such as naphthalene, anthracene or cyclohexane with liquid products obtained by cracking paraffin wax in the vapor phase is subjected, at ordinary temp. or a temp. which may be up to  $150^\circ$ , to the action of any anhyd. halide such as  $\text{AlCl}_3$  which gives rise to a strong evolution of heat when treated with water. App. is described. Cf. C. A. 27, 1161.

**Lubricating oil.** Edeleanu G. m. b. H. Ger. 580,875, July 17, 1933. Refined oil for lubricating is obtained by

extg. crude oil with liquid  $\text{SO}_2$  in the presence of org. substances sol. in liquid  $\text{SO}_2$ . Cf. C. A. 27, 2800.

**Petroleum lubricating oil.** Arthur E. Pew, Jr. (to Sun Oil Co.). U. S. 1,937,782, Dec. 5. A petroleum distillate lubricating oil is produced which has a flash point of about the range 300–350° and a higher fire point within about the range 330–400° and which has an org. acidity as tested by the A. S. T. M. method not exceeding 0.02 neutralization number and with a Conradson C content of 0.4–1.0%. App. and various details of distn., etc., are described.

**Lubricating composition.** Edward A. Nill (to P. E. Selby, Inc.). U. S. 1,937,462, Nov. 28. A mineral oil is used with the addn. of a small proportion (suitably about 5%) of an amide of a fatty acid such as stearanilide serving as a stiffening agent, and of a metallic soap (suitably about 0.75% of Na soap and 2.75% of Zn soap) to raise the m. p. U. S. 1,937,463 relates to an app. and method for prepg. lubricating mixts. by mixing a mineral oil with a stiffening agent (such as stearanilide and a metallic soap) at a temp. above the m. p. of the latter and then rapidly and uniformly cooling to a temp. at which the mixt. is of semi-solid consistency.

**Automatic feed-control device for liquids such as engine lubricating oil.** Sanford E. White. U. S. 1,936,778, Nov. 28. Various features of valve control are described.

**Apparatus suitable for filtering engine lubricating oil.** Jerome Brown (to Briggs & Stratton Corp.). U. S. 1,937,943, Dec. 5.

**Funnel suitable for use with fuel oils, etc.** Percy L. Downs. U. S. 1,938,138, Dec. 5. Structural features.

**Lubricating grease.** Erwin R. Lederer. U. S. 1,936,632, Nov. 28. A grease suitable for lubricating engine rocker arm bearings, etc., is prepd. by mixing a high-viscosity steam-refined paraffin base residual mineral oil of approx. 150 Saybolt viscosity at 99° with about 10% Al oleate and Al stearate which is solid at 100°.

**Waste lubricating oils.** Ferdinand J. F. Karthaus. Fr. 752,497, Sept. 23, 1933. Waste oils are purified for reuse by heating them to 80–100° with an emulsion of a mineral, vegetable or animal oil. The emulsion is prepd.

by adding water, or a soln. of a volatile inorg. base or a basic salt in water to a colloidal system, comprising an anhyd. soap and oil and heating to 100°.

**Purifying waste oils.** Soc. du naphthe S. A. Fr. 752,047, Sept. 27, 1933. Waste oils are purified by acidifying with a fatty acid or appropriate vegetable oil, then adding an alkali to make a soap which absorbs the impurities and which is sepd. by decantation.

**Renovating oil recovered from journal-box waste.** Leonard T. Evans. U. S. 1,936,901, Nov. 28. A heated mixt. of the oil together with Na silicate, water and saponifiable fatty material such as "red oil" is agitated, and the mixt. is then permitted to stratify and the renovated oil is drawn off.

**Pitch and tar.** Otto Reynard and Errol H. Thompson. Brit. 397,484, Aug. 23, 1933. Tars, tar oils and pitches are consolidated by treating with com.  $\text{H}_2\text{SO}_4$ , heating the mixt. to 150–180° and blowing compressed air therethrough. The mixt. may be preliminarily treated by passage over a cascade of shallow trays heated progressively from 100° to 150°, the system being under reduced pressure. Cf. C. A. 27, 4657.

**Bitumen emulsions.** Wilhelm Ackermann. Ger. 581,540, Sept. 21, 1933. Stable high percentage aq. emulsions of bitumen are prepd. by the aid of soap and a buffer soln. of  $p_{\text{H}}$  value of about 10.

**Retort and associated apparatus for wood distillation.** John T. Myers. U. S. 1,938,494, Dec. 5. Various structural and operative details are described.

**Drying oils and resins from pine extracts.** Samuel M. Cooper (to Gulf Refining Co.). U. S. 1,938,320, Dec. 5. A pine ext. is caused to react with  $\text{AlCl}_3$  in the presence of an inert solvent such as naphtha or  $\text{CCl}_4$  at temps. below 50°, the solvent and any unreacted turpentine are distd. off, and a drying oil is recovered from the residue.

**Charcoal.** Paul Guillaume. Fr. 751,031, Aug. 25, 1933. An economical wood charcoal of high calorific power is obtained from sound, creosoted wood, such as old railway sleepers or paving blocks. The app. used is interiorly coated with a refractory compn. having 25–42% of  $\text{Al}_2\text{O}_3$ .

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**Modern developments in applied cellulose chemistry.** Gustavus J. Esselen. *Ind. Eng. Chem.* 26, 26–30 (1934). E. H.

**Unit cell of cellulose in cotton stalks and cusps.** J. P. Saunders and F. K. Cameron. *Ind. Eng. Chem.* 25, 1371–3 (1933).—The cellulose of the stalks and cusps is found to be the same as that from cotton, spruce, pine and poplar. The fundamental structure obtained by chem. means is the same irrespective of the origin of the cellulose. The differences in phys. properties are to be found in the micelle or fibroid structure. P. S. Billington

**The structure of cellulose.** Alexander Gerö. *Naturwissenschaften* 21, 693–4 (1933).—An effort is made to explain the formation of mellitic acid by slow oxidation of charcoal on the basis of cellulose structure. The glucose units are assumed to be linked in the cellulose mol. not by O but by direct C bonds giving 6-membered rings in which 3 "head" and 3 "tail" ends of 6 glucose chains are held, i. e., in sym. arrangement 3 carbinol and 3 aldehyde groups. Trihydroxycyclohexane contg. 6 side chains is the basis of the cellulose molecule. From this structure are explained the  $(\text{C}_6\text{H}_{10}\text{O}_5)_n$  formula, the hydrolysis reaction, the absence of reducing power in native cellulose and its appearance on partial hydrolysis. Opposed to this structure are the absence of preformation of cellobiose and the failure of mellitic acid to be formed directly from cellulose. This failure is attributed to hydrolysis. The yield in mellitic acid from charcoal checks with the original cellulose content of charcoal. There is no evidence that mellitic acid is formed from the lignin of charcoal. B. J. C. van der Hoeven

**Formylcellulose. IV. Conditions of formation of formylcellulose.** Yoshisuke Uyeda and Koji Fujiwara; *Cellulose Ind.* (Tokyo) 9, 274–5 (in English 35) (1933). cf. C. A. 27, 188.—Formylation was carried out with 4.0 g. regenerated cellulose, 40.0 g.  $\text{HCO}_2\text{H}$  (100%) and 3.0 g.  $\text{H}_2\text{SO}_4$  (sp. gr. 1.84) which were kept at 20° for a definite time and then poured into water. Duration of formylation in hrs., percentage of  $\text{HCO}_2\text{H}$ , sp. gr., film strength in kg./sq. mm. and percentage of elongation were summarized as follows: 20, 34.68, 4.53, 3.53, 15.5; 24, 37.21, 4.00, 3.79, 8.0; 32, 39.40, 3.10, 4.32, 6.5; 40, 39.90, 2.80, 4.6, 4.5; 45, 38.74, 2.51, 4.64, 4.3; 48, 37.88, 2.45, 4.62, 4.3; 55, 37.72, 2.56, 4.94, 4.5. K. Konda

**A method for determination of the solvent power of organic liquids for cellulose esters.** Ichiro Sakurada and Ichiro Kido. *Cellulose Ind.* (Tokyo) 9, 238–46 (in German 27–33) (1933).—The method consists in comparing the solvent-power curves of the same cellulose esters in a series of liquid mixts. which are composed of a non-polar indifferent liquid, e. g.,  $\text{C}_6\text{H}_6$ , and the solvent in question. This curve, usually S-formed, follows a different course for the same cellulose ester in different solvents, and it serves as a measure of the solvent power of various solvents. The order of solvent power has been detd. as follows:  $\text{Me}_2\text{CO} > \text{MeEtCO} > \text{Ac}_2\text{O} > \text{AcOEt} > \text{AcOPr} > \text{C}_6\text{H}_6\text{N} > \text{AcOAm} > \text{HCO}_2\text{Me} > \text{MeCHOHCO}_2\text{Et}$  (for higher nitrocellulose with 13.7% N);  $\text{Me}_2\text{CO} > \text{MeEtCO} > \text{C}_6\text{H}_6\text{N} > \text{Ac}_2\text{O} > \text{AcOEt} > \text{AcOAm} > \text{AcOMe} > \text{HCO}_2\text{Me} > \text{PhNO}_2$  (for lower nitrocellulose with 11.6% N). K. Konda

**Manufacturing viscose film on a small scale.** Johann Eggert. *Kunststoffe* 23, 229–31 (1933).—Methods and

app. as well as the economic side of the manuf. of viscose foil on a small scale are discussed. J. W. Perry

New types of packagings from cellulose esters. Kafa. *Kunststoffe* 23, 231-3 (1933).—A general discussion.

J. W. Perry  
Sulfur forms in crude viscose rayon yarn. Philip C. Scherer, Jr. *Ind. Eng. Chem.* 25, 1319-21 (1933).—A portion of the S present is easily removed by aq. solns. It is probably present as an easily hydrolyzable or  $H_2O$ -sol. sulfate of org. residues. The difficultly removable residues may be in the form of a sulfide of cellulose. P. S. B.

The elimination of stretch drying. Zentaro Kawata. *Cellulose Ind.* (Tokyo) 9, 248-9 (in English 33) (1933).—The elimination of preliminary drying under tension, which is carried out before viscose threads are submitted to desulfurization and other treatment, does not affect the length of threads but causes a little injury to the luster. However, it slightly improves the feel, strength and elongation of threads and somewhat strengthens the absorbing power of threads for dyes. It is advantageous in reducing the manuf. cost. K. Konda

The utilization of wood for the production of foodstuffs, alcohol and glucose. Friedrich Bergius. *Chemistry & Industry* 1933, 1045-52; *Trans. Inst. Chem. Engrs.* (London) Nov. 15, 1933, 12 pp. (preprint). E. H.

The cooking process. V. Cooking wood with sodium sulfite. S. I. Aronovsky and Ross A. Gortner. *Ind. Eng. Chem.* 25, 1349-54 (1933); cf. *C. A.* 28, 317<sup>a</sup>.—The residual wood (after cooking) is very light in color. It contains less lignin, and more pentosans and Cross and Bevan cellulose than corresponding water cooks. The destruction of  $\alpha$ -cellulose is hindered by  $Na_2SO_3$ , which is shown to be a strong pulping agent. P. S. Billington

The acidity of paper. Kaare Haug. *Papir-J.* 21, 184-7, 196-8, 205-7, 240-4, 251-4 (1933).—Relative  $p_H$  values in papers can be detd. by extn. with cold  $H_2O$ . Heating of the suspension causes formation of H ions not previously present in the paper and does not accelerate equil. between the 2 phases, which is attained immediately in cold suspension, and is dependent on other than H ions. This explains variations in the  $p_H$  of papers cooked at the same  $p_H$ . Quant. extn. of H ions from paper requires an interchange with other pos. ions. The abs. acidity of paper cannot be detd. by  $p_H$  detn. after one extn. with  $H_2O$  or neutral salt soln., although it is possible that a rough detn. could be made by extn. with a high concn. of a neutral salt. Because of the difficulty of making accurate  $p_H$  detns. and the fact that the acids and salts responsible for the  $p_H$  are the same for most papers, detn. of total acidity by titration after extn. with a neutral salt soln. or in the suspension itself is preferable to  $p_H$  detn. Sufficient information can be obtained by titration to a given  $p_H$  with a suitable indicator. Clinton L. Brooke

De-inking and reprocessing paper accomplished by new method. Sidney D. Wehs. *Chem. & Met. Eng.* 40, 634-7 (1933).—See *C. A.* 28, 633<sup>a</sup>. G. G.

Practical values of various sizes. Mitsunori Higaki. *Cellulose Ind.* (Tokyo) 9, 275-81 (in English 36) (1933).—Of rosin, soy-bean oil, tallow, lard, Na aluminate, etc., examd. for sizing effect, soy-bean oil, tallow and lard are inferior to rosin. If paper sized with soy-bean oil, tallow or lard is dried at a somewhat higher temp., the sizing effect is stronger than that of rosin; these sizes can therefore be satisfactorily used for paper of ordinary quality. The addn. of lard to rosin results in a considerable lowering of the m. p. of the latter; sizing can, however, scarcely be effected because the emulsified size is electrically inactive; such a size is therefore unfit for engine sizing. The  $p_H$  and temp. bear a certain intimate relation to gelatinization or coagulation of size. K. Konda

Paper dyeing. A. Myasnikov. *Bumashnaya Prom.* 12, No. 7, 48-54 (1933).—A discussion of problems of production of colored paper as affected by present and projected conditions of the dye industry in U. S. S. R. Chas. Blanc

Factors influencing resin concn. in loblolly and slash pine (Bishop, Marckworth) 11D. Solns. of Cl [for delignification of cellulose] (Fr. pat. 752,897) 18. Artificial materials [products for making films, threads] (Fr. pat. 750,873) 26. Albumin [production of films, fibers] (Ger. pat. 581,518) 18. Adhesive for paraffined paper (Fr. pat. 753,542) 18. Recovering alkali metal compds. from waste [cellulose liquors] (Brit. pat. 397,787) 18.

Cellulose. Otto Engel and Edgar Wedekind. Ger. 581,806, Aug. 3, 1933. Fibrous vegetable material is disintegrated by treatment with dioxane in the presence of a catalyst. Thus, pine wood meal is treated with dioxane and HCl to give a 60% yield of cellulose.

Device for obtaining cellulose from fibrous materials. The Bauer Brothers Co. Ger. 584,560, Sept. 21, 1933.

Apparatus for purifying cellulose. Papeteries Navarre (Soc. anon.) Ger. 579,075, June 21, 1933. Addn. to 556,838 (*C. A.* 27, 412).

Cellulose esters. Henry Dreyfus. U. S. 1,936,585, Nov. 28. Cellulose is esterified by the action of an aliphatic acid anhydride such as  $Ac_2O$  in the presence of at least 2% the wt. of the cellulose of a H halide and at least 2% of a halide of a metal of at. wt. between 53 and 65, such as  $FeCl_3$ .

Cellulose esters. Henry Dreyfus. U. S. 1,936,586, Nov. 28. A cellulosic material such as cotton is pre-treated with a lower aliphatic acid such as formic acid and then esterified with an aliphatic acid anhydride in the presence of a ferric halide as sole catalyst. U. S. 1,936,587 relates to a process in which cellulosic material is rendered more reactive to subsequent esterification by previous treatment with a halide of a metal of at. wt. between 53 and 65, such as  $FeCl_3$  or  $SnCl_4$ . U. S. 1,936,588 specifies conducting at least part of the esterification of cellulose in the presence of a ferric halide catalyst contg. Fe in ferric form in greater quantity than is equiv. to the halogen present in the catalyst, e. g.,  $FeCl_3$  and  $Fe(OH)_3$ , used together. U. S. 1,936,589 relates to the treatment of cellulosic material such as cotton linters with less than 2% its wt. of H halide such as HCl without disintegration, and then esterifying, e. g., by treatment with  $Ac_2O$ , etc. U. S. 1,936,590 relates to treatment of cellulosic material with an acid anhydride such as  $Ac_2O$  in the presence of a H halide and of at least 2% of catalyst including a halide of Fe, Mn, Co, Ni or Cu, e. g.,  $FeCl_3$ .

Cellulose esters. George A. Richter (to Brown Co.). U. S. 1,938,299, Dec. 5. Cellulose fiber is hydrolyzed to lower its soln. viscosity to below 1, the hydrolyzed fiber is blended with about 20-50% (based on the total wt. of the blend) of substantially unhydrolyzed cellulose fiber, and the blend is esterified as for the production of cellulose nitrate or xanthate which has a low soln. viscosity.

Cellulose esters. Georg Jayme. Brit. 397,638, Aug. 31, 1933. See Fr. 738,760 (*C. A.* 27, 2033).

Cellulose esters. C. F. Boehringer, & Soehne G. m. b. H. (Richard Müller, Martin Schenck and Wilhelm Wirbatz, inventor). Ger. 581,827, Aug. 3, 1933. Cellulose is esterified by treatment with fatty acid anhydride in the presence of  $CH_3(HSO_3)_2$  as catalyst. Thus, cellulose is treated with  $Ac_2O$ ,  $CH_2Cl_2$  and  $CH_3(HSO_3)_2$  to give an esterified product useful for making artificial products.

Cellulose esters such as cellulose acetate. Franz Becker (to I. G. Farbenind. A.-G.). U. S. 1,936,976, Nov. 28. A starting material such as bleached linters is treated, in the presence of a diluent such as HOAc, with an amt. of  $H_2SO_4$  comprising less than 2% of free  $H_2SO_4$  calcd. on the wt. of the cellulose compd.; an aliphatic acid anhydride such as  $Ac_2O$  is added, partial esterification is effected, and the reaction product thus obtained is treated with a mixt. of free  $H_2SO_4$  and a neutral or acid salt or ester of  $H_2SO_4$  such as  $NaHSO_4$  or  $Et_4SO_4$  in order to minimize the cooling required to control the reaction. Cf. *C. A.* 27, 840.

Cellulose nitrate-acetate esters. Camille Dreyfus and George W. Miles (to Celanese Corp. of America). U. S. 1,938,176, Dec. 5. Cellulosic material such as cotton

1. of timber under industrial conditions (Rudge)  
20. Chemistry of Australian timbers (Cohen, et al.) 11D.

liners is treated with  $\text{Ac}_2\text{O}$  and fuming nitric acid in one bath.

**Esters of carbohydrates.** Albrecht Schmidt, Gerhard Balle and Hans Lange (to I. G. Farbenind. A.-G.). U. S. 1,938,044, Dec. 5. Esterification reactions such as the treatment of cotton liners with  $\text{Ac}_2\text{O}$  are effected in a bath contg. liquid  $\text{SO}_2$  and a sol. inorg. oxidizing agent such as  $\text{CrO}_3$  which will form  $\text{H}_2\text{SO}_4$  or sol. acid-reacting sulfates with the  $\text{SO}_2$ . Cf. C. A. 28, 639<sup>1</sup>.

**Wood sugar.** Holzhydrolyze A.-G. (Hugo Koch, inventor). Ger. 584,838, Sept. 25, 1933. Xylose is refined without loss by treatment with alk. earth metal oxides at low temps. after bringing its reducing capacity to below 15%.

**Benzylcellulose.** I. G. Farbenind. A.-G. (Eduard Dörr, inventor). Ger. 583,560, Sept. 6, 1933. Pure benzylcellulose is obtained by converting the crude substance to an emulsion, preferably with soap, before extg. impurities. Thus, crude benzylcellulose is washed with water to remove  $\text{NaCl}$  and  $\text{NaOH}$ , emulsified with K soap and purified by extn. with  $\text{MeOH}$ .

**Benzylcellulose compositions.** Louis Light. Brit. 397,773, Aug. 31, 1933. Viscous chlorinated biphenyl isomers are admixed as plasticizers with benzylcellulose and suitable liquid media to yield films, lacquers, filaments and plastic masses. Resinous chlorinated biphenyl isomers may be added also. Examples are given.

**Ethers of cellulose.** David Traill (to Imperial Chemical Industries Ltd.). U. S. 1,938,360, Dec. 5. Cellulose such as wood pulp or cotton pulp is mercerized in a soln. such as a soln. of  $\text{NaOH}$  of 18–20% strength, pressed to a wt. 2–4 times that of the raw material, matured by storing at a temp. within the range of  $-10^\circ$  to about  $50^\circ$  to secure the desired viscosity characteristics in the product, and treated with alkali corresponding to at least 50% as much  $\text{NaOH}$  as the wt. of the cellulose; the resulting mixt. of alkali and alkali cellulose is then treated with an alkyl halide such as  $\text{MeCl}$  or  $\text{EtCl}$  or with an aralkyl halide such as benzyl chloride.

**Cellulose derivatives.** Leon Lilienfeld. U. S. 1,938,033, Dec. 5. Products suitable for the manuf. of films, etc., are produced by treating cellulose, in the presence of an alkali, with an alkyl isothiocyanate. Cf. C. A. 27, 4927.

**Cellulose derivatives.** Soc. pour l'ind. chim. à Bâle. Ger. 583,398, Sept. 5, 1933. Addn. to 554,781 (C. A. 26, 6159). Partly esterified or etherified cellulose products sol. in org. solvents are condensed with heterocyclic compds. contg. one or more  $\text{N}=\text{C}$ —halogen groups, in the presence of a tertiary base. Thus, acetylcellulose contg. 41.5% acetyl, sol in acetone, is kneaded with dimethylaniline, cyanuric chloride and  $\text{CHCl}_3$  to give a viscous product. Other examples are given.

**Cellulose carboxylates.** Hans T. Clarke and Carl J. Malm (to Kodak Ltd.). Brit. 397,906, Sept. 4, 1933. Cellulosic material, e. g., reverted cellulose, cotton, wood pulp, cellulose ethers or partially acylated cellulose, is esterified with an unsubstituted aliphatic (including cycloparaffinic), an aromatic or an aralkyl monocarboxylic acid in the presence of a methoxy, ethoxy or propoxy fatty acid anhydride as impeller. The reaction may be in the presence of solvents, e. g., glacial  $\text{AcOH}$ , ethylene chloride, alkoxy fatty acids, or of non-solvents, e. g., ligroin. Among examples (1) cotton fibers are esterified by glacial  $\text{AcOH}$  in presence of ethoxyacetic anhydride (I) and (2) lower cellulose acetate is esterified by lauric acid in presence of I and methyl methoxyacetate.  $\text{MgClO}_4 \cdot 3\text{H}_2\text{O}$ , *p*-toluenesulfonyl chloride,  $\text{ZnCl}_2$ , benzenesulfonic acid, red P and  $\text{Cl}$  may be used as catalysts. The products are used to produce artificial filaments, leathers, plastics, etc.

**Cellulose composition suitable for coatings, films, etc.** Marcel J. L. Ledru, Florentin Bidaud and Paul Berger (to E. I. du Pont de Nemours & Co.). U. S. 1,937,280, Nov. 28. A cellulose deriv. such as cellulose acetate or ethylcellulose is used with an *N*-alkylol sulfamide of benzene or a homolog as a suppling agent.

**Machines for producing bands of regenerated cellulose.** Soc. anon. La Cellophane. Ger. 584,807, Sept. 25, 1933.

**Apparatus for drying cellulose films.** Otto Sindl. Ger. 579,900, July 3, 1933.

**Plasticizing agents.** I. G. Farbenind. A.-G. Fr. 754,178, Nov. 2, 1933. Plasticizers and softening agents for cellulose are composed of neutral esters prepd. by combination of diglycolic acid and polyhydric alc. ethers which still contain a free OH group. Examples of such ethers are 3-butoxy- and 3-methoxy-1-butanol and 2-methoxy-ethanol.

**Cellulose ester lacquers.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. (Eugen Galitzstein, inventor). Ger. 580,592, July 13, 1933. These are made by mixing 1,1,3-trimethyl-3-cyclohexen-5-one with spirit and collodion wool or other cellulose esters.

**Plastic materials, varnishes, etc.** Zellstoffabrik Waldhof and Otto Faust. Fr. 752,797, Sept. 30, 1933. Cellulose derivs. used for making plastic sheets, masses or varnishes of the type of celluloid are made from cellulose obtained from a single kind of wood suitably selected.

**Digester for making celluloid.** Caliqua Wärmegesellschaft m. b. H. Ger. 583,682, Sept. 7, 1933.

**Viscose products.** Algemeene Kunstzijde Unie N. V. Ger. 584,876, Sept. 25, 1933. Silk and other products are obtained by working up viscose solns. contg. small amts. of an emulsion of lanolin, and fat solvents such as  $\text{C}_6\text{H}_6$ ,  $\text{CCl}_4$ , oil of turpentine, etc.

**Viscose solutions.** Richard Elssner (to American Glanzstoff Corp.). U. S. 1,937,110, Nov. 28. A salt, such as the Ca or Ba salt, of dithiocarbonic acid *O*-isobutyl ester is used in viscose solus. and serves to give filaments a dull luster similar to that of real silk.

**Thin shrinkable viscose products such as bottle caps, etc.** Earle H. Morse. U. S. 1,937,836, Dec. 5. Coagulation, without substantial drying or regeneration, is effected by heating a viscose soln. in a mold; the coagulated product is then regenerated and desulfurized.

**Artificial threads, etc., from cellulose derivatives such as viscose.** Leon Lilienfeld. U. S. 1,938,032, Dec. 5. A dissolved cellulose compd. such as viscose is treated with a halogen deriv. of a polyhydric alc. such as  $\alpha$ -dichlorohydrin and the resulting reaction product is isolated (suitably as a ppt. which forms), dissolved (suitably in a  $\text{NaOH}$  soln.), brought into desired shape, coagulated and plasticized not later than immediately after coagulation.

**Cellulose tubing from viscose.** Alfred G. Hewitt (to Visking Corp.). U. S. 1,937,225, Nov. 28. Viscose is extruded through an annular orifice to form seamless tubing and the tubing is passed repeatedly through a regenerating bath in such a manner that the gas evolved during the regeneration operation will collect in approx. equal quantities in a plurality of long lengths of the tubing extending above the bath. App. is described.

**Rayon.** Henry Dreyfus. Fr. 42,607, Aug. 23, 1933. Addn. to 679,618 (C. A. 24, 3902). The point of introduction of the evapg. agent can be varied by the use of a tube with a no. of holes, any one of which can be opened singly.

**Rayon.** Édouard Haegelin. Fr. 750,909, Aug. 22, 1933. Construction of viscose pump is given.

**Rayon, etc.** Henry Dreyfus. Fr. 752,724, Sept. 29, 1933. In dry-spinning solns. of cellulose derivs., a current of evapg. agent is introduced in the neighborhood of the spinning nozzles from an exterior source and is produced by heat. This current may be supplementary to a main evapg. current moving in the opposite direction to the filaments.

**Rayon filaments.** Harry P. Bassett and James H. Torrence (to Tubize Chatillon Corp.). U. S. 1,938,312, Dec. 5. Pigment-like particles such as  $\text{TiO}_2$  are thoroughly mixed with a low-viscosity viscose soln. or the like, and this mixt. is further mixed with a larger bulk of soln. such as viscose from which filaments are to be spun to incorporate the pigment-like particles evenly throughout the mass.

**Apparatus for spinning rayon.** J. P. Bemberg A.-G. Ger. 583,873, Sept. 11, 1933.

**Device for spinning rayon.** J. P. Bemberg A.-G.

Ger. 579,005, June 22, 1933. Addn. to 530,911 (C. A. 26, 3608).

Apparatus for wet-spinning acetate rayon. August Rosse, August Seidel and Hugo Sedlacek. Ger. 579,981, July 4, 1933.

Rayon spinning pot. Soc. de constructions mécaniques de Stains. Fr. 753,657, Oct. 21, 1933.

Device for spinning artificial fibers. J. P. Bemberg A.-G. Ger. 584,579, Sept. 21, 1933. Addn. to 566,537 (C. A. 27, 2578).

Device for after-treating artificial fibers in the spinning pot. Ernst Berl. Ger. 584,802, Sept. 25, 1933.

Spinning bobbins. I. G. Farbenind. A.-G. Fr. 751,596, Sept. 6, 1933. The bobbins are made of fibrous material impregnated with a resinous or waxy polychloro-hydrocarbon, e. g., polychloronaphthalenes.

Dry spinning of artificial filaments from cellulose derivative solutions such as those of cellulose acetate or the like. Wm. Whitehead (to Celanese Corp. of America). U. S. 1,937,614, Dec. 5. A heated soln. such as a soln. of cellulose acetate in 95% acetone is forced through a passage surrounded by a relatively large vol. of a heating medium such as oil or water by which the soln. is maintained at a uniform temp. of about 55° and then extruded through the orifices of a spinneret into an evaporative atm. drawn through the spinning cell. App. is described.

Artificial threads. British Celanese Ltd. and Wm. I. Taylor. Brit. 397,509, Aug. 18, 1933. Artificial filaments are stretched continuously with production, the stretching force being prevented wholly or partly from extending back to the liquid filaments at the point of extrusion by a tensioning device or devices applied initially at points which are successively brought closer to the point of extrusion. Stretching of the filaments when in a condition too weak to withstand the shock of the initial application of the tensioning means may be effected thus.

Apparatus and method for producing imitation spun yarn from continuous filamentous material, e. g., of cellulose acetate or other organic cellulose derivative, reconstituted cellulose, silk. British Celanese Ltd., Matthew M. Taylor and Stephen M. Fulton. Brit. 397,138, Aug. 8, 1933.

Artificial fibers. A. Formhals. Ger. 584,801, Sept. 25,

A device for spinning fibers by rapidly rotating a wheel, etc., in the spinning soln. and catching the fibers on a second rotating wheel, etc., is described, the soln. being subjected to an elec. field.

Artificial fibers, films, etc. Aceta G. m. b. H. Ger. 581,971, Aug. 5, 1933. Fibers, films, etc., are made from a soln. of cellulose derivs. contg. halogenated hydrocarbons and not more than 10% of org. substances which will bind HCl, such as substitution products of cellulose,  $\alpha$ - $\beta$ -unsatd. ketones or org. oxido compds. Thus, rayon is spun from a mixt. of cellulose acetate,  $\text{CH}_2\text{Cl}_2$ , alc. and mesityl oxide. Other examples are given.

Thin sheet material. Henry Dreyfus. Fr. 753,314, Oct. 13, 1933. Thin films or sheets, particularly for wrapping, are made by extruding solns. of org. derivs. of cellulose, e. g., the acetate, receiving the product in a coagulating bath contg. softening agents for the cellulose deriv. and drawing the product as it is made. The softening agent may be diacetone alc., ethyl tartrate or ethyl lactate. An app. is described.

Seasoning pyroxylin sheets, etc. Gustavus J. Easelen and Irving Weber (to Fiberloid Corp.). U. S. 1,937,687, Dec. 5. Material such as pyroxylin sheets contg. alc. is treated with  $\text{EtOAc}$ , then treated with V. M. P. naphtha and dried.

Fiber from wood chips. Jonas Jonsson. U. S. 1,936,000, Nov. 28. Various details of app. and operation are described for comminuting wood in water between rolls which are rotated at greatly different peripheral speeds.

Digester for cellulose, etc. Anton Gentil. Ger. 583,786, Sept. 9, 1933.

Device for introducing steam into cellulose digesters. Einar Morterud. Ger. 583,820, Sept. 9, 1933.

Drying plates of wood pulp, etc. Ewald Slompelkamp. Brit. 397,785, Aug. 31, 1933. Plates of wood pulp, etc.,

contg. binding agents are dried by subjecting to a temp. below that at which binding occurs, while compressed to the desired ultimate thickness, and then applying a higher temp. to effect binding under pressure. In the first stage the temp. is above the b. p. of  $\text{H}_2\text{O}$ , and the duration of the sec. stage may be sufficient for complete polymerization of the binder.

Paper pulp from wood chips. John Traquair (to Mead Research Engineering Co.). U. S. 1,936,697, Nov. 28. Raw uncooked hard deciduous wood chips together with caustic liquor at a temp. below 50° are introduced into a rod mill, and the chips are milled in the liquor while passing through the mill.

Apparatus for screening paper pulp. Thomas O'Connor. U. S. 1,937,526, Dec. 5. Mech. features.

Treating paper pulp in beater units arranged in groups. Wm. V. Knoll (to Midwest-Fulton Machine Co.). U. S. 1,937,156, Nov. 28. Various details of app. arrangement and operation are described.

Apparatus for continuous bleaching of paper pulp. International Paper Co. Fr. 751,230, Aug. 20, 1933.

Dehydrating apparatus for pulp and paper making. F. H. Banning & Seybold Maschinenbau-G. m. b. H. & Co. Ger. 580,972, July 25, 1933.

Purifying sulfite liquors. James D. Butler (to General Chemical Co.). U. S. 1,937,944, Dec. 5. A water-sol. sulfide such as that of Na is added to liquors such as an alk. impure  $\text{Na}_2\text{SO}_3$  liquor to ppt. impurities such as Fe, Pb, etc.

Apparatus for treating cellulose with sulfite lye. Metallges. A.-G. Fr. 750,769, Aug. 18, 1933.

Device for evaporating waste cellulose lye. Industriemiska Aktiebolaget. Ger. 579,524, June 29, 1933.

Paper. Justus C. Sanburn (to Strathmore Paper Co.). U. S. 1,938,543, Dec. 5. During the manuf. of a web from paper-making material there is incorporated with the latter a multiplicity of detecting-fibers of a certain color and a multiplicity of other fibers of the same certain color but treated differently so that when the finished paper is treated with certain reagents such as ink removers one only of the kinds of colored fiber used will change its appearance. The paper is suitable for documents to prevent their alteration. Various details and examples are given.

Paper. Brown Co. Brit. 396,980, Aug. 17, 1933. Paper contg. viscose is deodorized by treatment with an oxidizing agent, e. g.,  $\text{Cl}_2$  as gas or in soln.,  $\text{O}_3$ ,  $\text{NaClO}$ ,  $\text{Na}_2\text{O}_2$ ,  $\text{H}_2\text{O}_2$ . Either the finished paper or paper during process of manuf. may be treated, e. g., a web of paper material impregnated with viscose is treated. The paper may be partially dried before treatment.

Paper. Marcel Demouy. Fr. 751,000, Aug. 24, 1933. Paper pulp is made from the stems, branches or trunks of banana trees.

Paper. Papeteries de Malaucène (Soc. anon.) (Louis P. Schweitzer and Albert Renard, inventors). Fr. 752,628, Sept. 27, 1933.  $\text{TiO}_2$ , pure or mixed with other products, is used as a charge for thin paper weighing 10-50 g. per sq. cm. The  $\text{TiO}_2$  is fixed by mordanting with tannin,  $\text{Al}_2(\text{SO}_4)_3$ , etc.

Paper-making apparatus. Benjamin E. Teale. U. S. 1,936,609, Nov. 28. Mech. features.

Paper-making machine. Wm. H. Millspaugh. Ger. 583,743, Sept. 8, 1933.

Paper-making apparatus of the fourdrinier type. John P. Pederson. U. S. 1,937,125, Nov. 28. Mech. features.

Horizontal sieve paper-making machine. Francis S. McDonnell. Ger. 581,807, July 31, 1933.

Suction cylinder mold for paper-making machines. Theodore L. Formaini. U. S. 1,937,426, Nov. 28. Structural and mech. features.

Suction roller for paper machines. Downingtown Manufacturing Co. Ger. 579,638, June 29, 1933.

Oscillating suction box for paper-making machines. Wm. P. Muir (to Dominion Engineering Works Ltd.). U. S. 1,937,478, Nov. 28.

Wet-presses for paper-making and like machines. Fibroplast G. m. b. H. Brit. 396,632, Aug. 10, 1933.

- Bleaching hollander for paper making.** I. G. Farbenind. A.-G. (Erich Opfermann, Walter Fischer and Gustav A. Feldtmann, inventors). Ger. 583,895, Sept. 11, 1933.
- Machine for drying paper.** Netzschkauer Maschinenfabrik Franz & Söhne. Ger. 579,525, June 27, 1933.
- Drying paper, etc.** Jaroslaw's, Erste Glimmerwarenfabrik. Ger. 580,705, July 15, 1933.
- Waxing and drying paper.** Charles C. Willis (to John Waldron Corp.). U. S. 1,937,317, Nov. 28. Paper to be waxed is passed through a bath of melted wax, then through a cold water bath to harden the coating and is thoroughly dried on its way to the reel. App. and various details of operation are described.
- Sizing paper.** Philip W. Codwise (to Certain-teed Products Corp.). U. S. 1,937,317, Nov. 28. Sizing of low penetrating power is applied to the paper after the latter has been subjected to drying, and the paper is then subjected to a compacting pressure (suitably by the action of rolls) which leaves the sizing mainly as a surface coating.
- Sizing paper.** Soc. anon. Ferdinand Dohler. Fr. 753,871, Oct. 26, 1933. A very small amt. of an acid substance, preferably a salt of  $Al_2O_3$ , is added to the pulp before its arrival on the paper machine, and the paper is passed, after a suitable degree of drying according to the quality of the paper, into a resinous sizing bath, with or without the addn. of animal or vegetable glues. The paper is then dried.
- Emulsions of resin.** Antoine C. Gillet. Fr. 752,970, Oct. 4, 1933. Stable emulsions of resin for *sizing papers*, etc., are obtained by sapon. about 15% of the mass of resin with a mixt. of  $Na_2CO_3$  and  $NaHCO_3$ , and then sapon. about 10% of the remainder by means of  $NH_3$ . An app. is described.
- Apparatus for coloring paper rolls, etc.** I. G. Farbenind. A.-G. (Gebhard Blaser, inventor). Ger. 580,903-4, July 18, 1933.
- Coloring rolls of paper, etc.** I. G. Farbenind. A.-G. (Gebhard Blaser, inventor). Ger. 581,032, July 22, 1933. Addn. to 580,903 (preceding abstr.).
- Waterproofing paper, etc.** Papeteries Navarre (Soc. anon.). Fr. 42,521, Aug. 4, 1933. Addn. to 720,333 (C. A. 26, 3923). Coagulants other than  $CH_3O$  are used in the process of Fr. 720,333, e. g.,  $CaO$  or salts thereof.
- Waterproofing fibrous materials.** I. G. Farbenind. A.-G. Fr. 753,510, Oct. 18, 1933. Paper, textiles, leather, etc., are waterproofed by impregnation with an aq. agent contg. a substance of the nature of an aliphatic acid of at least 8 C atoms, a salt sol. in water of a multivalent basic metal giving rise to an insol. salt with the acid, and a protective colloid sol. in water of the formula  $RO(C_2H_5O)_xH$  or  $RO(CH_2CHOH.CH_2O)_xH$  ( $x$  is a whole no. equal to or higher than 2 and R is an org. radical contg. at least 6 C atoms). Several examples are given.
- Filter paper.** Eugène H. Agrenier. Fr. 751,013, Aug. 25, 1933. App. for applying a reënforcing canvas to the paper is described.
- "Glassine" paper.** Roy C. Charron and Willard E. Swift (to U. S. Envelope Co.). U. S. 1,938,133, Dec. 5. "Glassine" paper or the like, rendered transparent by high hydration and heavy calendering, is first softened to improve its texture, and a film of nitrocellulose is then deposited on its surface to counteract the impairment of its transparency by the softening. An arrangement of app. is described. The softening may be effected by a glycerol bath or the like.
- Preventing expansion and contraction of printing paper.** Joseph L. Kelly, Rudolf Brenner and John P. Hoffer. U. S. 1,937,703, Dec. 5. Paper in stacks or rolls is treated at the edge portions of the stack or roll with a pore sealing soln. contg. beeswax and paraffin oil.
- Copying papers.** Soc. anon. des anciens établissements Braunstein frères. Fr. 751,410, Sept. 4, 1933. Paper is impregnated with a fatty substance before applying the ink, or the fatty substance, e. g., stearic acid, is added to the paper pulp. A sol. stearate may be used and decomposed by oxalic acid.
- Device for working up waste paper.** Fredrik Grewin. Ger. 584,561, Sept. 21, 1933.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

- Limit charge of initiating explosives.** J. Barcikowski and J. Kielczewski. Z. ges. Schiess-Sprengstoffw. 28, 340-1 (1933); cf. C. A. 28, No. 645<sup>2</sup>. C. G. Storm
- Effect of low temperatures on brisance of explosives.** L. V. Clark. Z. ges. Schiess-Sprengstoffw. 28, 345-8 (1933) (in English).—C. has investigated the effect of low temps. ( $-80^\circ$  and  $-183^\circ$ ) on the performance of various types of elec. detonators as indicated by (1) their action on unconfined cartridges of liquid O explosives (L. O. X.), (2) Pb plate tests and (3) small Trauzl block tests. Only detonators of the mannitol hexanitrate type gave complete detonation of an insensitive L. O. X. when cooled to  $-183^\circ$  by being left in the cartridge for 1-3 min. Brisance, as indicated by Pb plate tests, is greatly reduced by low temp.; strength (Trauzl block tests) is not greatly affected. Rate of detonation tests (in Pb tubes) of various explosives commonly used in detonator charges showed that low temp. does not affect the rate of detonation.
- C. G. Storm
- The combustion of black powder.** Satoshi Watanabe. Bull. Inst. Phys.-Chem. Research (Tokyo) 12, 884-6 (1933) (Abstracts 12 (in English) published with Sci. Papers Inst. Phys.-Chem. Research (Tokyo) 22, Nos. 457-67).—The combustion of black powder is accompanied by complicated steps of evolution and absorption of heat caused by the combustion and transformation of its constituents.
- K. Konda
- The influence of pressure on the spontaneous ignition of inflammable gas-air mixtures. II. Pentane-air mixtures.** Donald T. A. Townend and M. R. Mandlekar. Proc. Roy. Soc. (London) A143, 168-76 (1933); cf. C. A. 27, 5189.—As with  $C_4H_{10}$ , the spontaneous ignition points of  $C_5H_{12}$ -air mixts. lie in 2 groups, one above  $490^\circ$  and the other below  $350^\circ$ . The transference of the ignition points from the higher to the lower group occurred at crit. pressures dependent on the compn. of the mixts., the value for rich mixts. being 1.25 atm. At pressures near the crit. pressure, Et.Pb raised the ignition points to the higher group; at all pressures above 1 atm. small amts. of AcH lowered the points to the lower group. L. E. Steiner
- The action of nitric acid on different sugars.** Stan. v. Monasterski. Z. ges. Schiess-Sprengstoffw. 28, 349-50 (1933).—Pure octonitrates of sucrose and maltose, resp., were prep'd. and their chem., phys. and explosive properties det'd. Before nitrating, the sugars were mixed with urea nitrate or pinene-HCl to eliminate N oxides from the nitrating acid, thereby preventing oxidation reactions. The properties of an explosive composed of a mixt. of maltose octonitrate and dinitrobenzene (designated Maltobenzit) were also det'd.
- C. G. Storm
- The color reaction for the detection of disubstituted urethans.** Fr. Becker and G. A. Hunold. Z. ges. Schiess-Sprengstoffw. 28, 372-6 (1933).—The usual test for substituted urethans in *smokeless powders*—production of a red coloration on treatment with EtOH and NaOH after previous treatment with  $HNO_3$ —is not specific. A study of the resulting reaction products showed that if the nitroaniline or nitrodiphenylamine produced contains a substituted alkyl group, the red color does not appear. In the case of methylphenylurethan or ethylphenylurethan, if dil.  $HNO_3$  (d. 1.18) is used, the final product is methyl-nitroaniline, which gives no red color; if concd.  $HNO_3$  (d. 1.42) is used, the product is dinitroaniline and the red color results.
- C. G. Storm
- Progress in pyrotechnics.** A. Foulon. Z. ges. Schiess-Sprengstoffw. 28, 376-8 (1933).—A review. C. G. S.



**Explosions in Colorado coal mines, 1883 to 1932.** B. M. Kintz and E. H. Denny. Bur. Mines, *Information Circ.* 6753, 20 pp. (1933).—Data on 119 explosions are tabulated and generalizations are drawn. A. H. Emery

**Explosions in Utah coal mines, 1900-1932.** D. J. Parker. Bur. Mines, *Information Circ.* 6752, 15 pp. (1933). Alden H. Emery

**Explosives.** Luis E. d'A. Callery. Brit. 397,600, Aug. 31, 1933. See Fr. 738,900 (C. A. 27, 2036).

**Explosives.** Akt.-Ges. Lignosc. Ger. 579,815, July 1, 1933. The addn. product of PbO and neutral Pb salt of picric acid is used as the principal constituent of blasting charges for use in mining.

**Explosives.** Heaters Ltd. Fr. 754,087, Oct. 31, 1933.

1 An explosive charge for mines consists of  $\text{NH}_4\text{NO}_3$  or other salt decomposed to gases by heat and a heating element consisting of a combustible mixt., and means for lighting this, all enclosed in a container which had a relatively easily broken closing disk.

**Explosive mixture.** Dynamit-A.-G. vorm. Alfred Nobel & Co. (Ph. Naoum and R. von Sommerfeld, inventors). Ger. 581,814, Aug. 3, 1933. See Fr. 742,312 (C. A. 27, 3612).

**Vacuum drying apparatus for explosives.** Berthold Block. Ger. 580,557, July 13, 1933.

**Purifying trinitrotoluene.** Wm. H. Rinckenbach. U. S. 1,936,607, Nov. 28. The material is recrystd. from a solvent mixt. comprising  $\text{CCl}_4$  and "ethylene dichloride."

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Quantitative investigations of the action of added substances in the dyeing of acetate rayon with basic dyestuffs.** Peter F. Bernoulli. *Helv. Chim. Acta* 16, 1226-48 (1933).—The Na salts of sulfonic acids of certain aromatic hydrocarbons have an effect in the dyeing which cannot be referred to any change in the degree of swelling of the acetate fiber but is a true soly. effect. This is confirmed by the extensive parallelism between the partition coeffs. for the dyestuff for  $\text{H}_2\text{O}/\text{EtOAc}$  and  $\text{H}_2\text{O}/\text{acetate rayon}$ . A. P. Sachs

**Some studies of the yolk in New Zealand wools. II. A study of yolk in the fleece during one year.** Wm. G. Sutton. *J. Textile Inst.* 24, 341-50T (1933); cf. C. A. 25, 5294. —Samples of wool were taken at approx. monthly intervals for a year from 40 New Zealand Romney sheep and were analyzed for the ether-sol. and water-sol. fractions of the yolk. A sudden marked increase in the quantity of yolk was found at the beginning of winter. Half the sheep were covered to det. the effect of leaching by rain. The water-sol. fraction was removed more than the ether-sol. fraction. The finer wool appears to be accompanied by a higher proportion of yolk than the coarser. Ruby K. Worner

**A photographic study of stretching, twisting and swelling of wool and other fibers.** P. W. Cunliffe. *J. Textile Inst.* 24, 417-20T (1933).—Photographs show the visible damage in structure that occurs when a fiber is stretched or twisted in aq. medium, or when it is swollen in  $\text{Na}_2\text{S}$  soln. Results of studies on negro hair are included. R. K. W.

**Behaviors of aqueous solutions of domestic cocoons. XV. Apparent specific gravities of sericin A and B.** Hideo Kaneko. *J. Agr. Chem. Soc. Japan* 9, 905-7 (1933); cf. C. A. 27, 5984. —The apparent sp. grs. of sericin A and B were, resp., 1.356 and 1.309 from the estn. in  $\text{H}_2\text{O}$  at  $15^\circ$ . The apparent sp. gr. of sericin A was generally larger than that of sericin B, even though the estn. was performed in various org. solvents. XVI. **Sericin as a protective colloid.** *Ibid.* 1049-55. —The gold no. of sericin was 0.02-0.038. It is approx. equal to that of egg globulin, gelatin and egg albumin. The more reatable the cocoon is, the smaller the gold no. is. Sericin has the max. gold no. at its isoelec. point ( $p_H$  4.2-4.3). The gold no. decreased with the elevation of the temp. of the soln. Sericin A generally has a smaller gold no. than sericin B in the same condition. Sericin protects the oxidation of pyrogallol by Co complex salts and the decompn. of  $\text{H}_2\text{O}_2$  by Pt sol. XVII. **Separation of sericin.** *Ibid.* 1056-9. —By the electrodialysis of sericin soln. sericin A coagulated rapidly in the elec. field and sericin B remained in soln. Sericin sol may be considered as a colloid suspending sericin A particle in sericin B soln. Y. K.

**Bleaching with strongly alkaline hydrogen peroxide.** Walter Fehre. *Rev. gén. mat. color.* 37, 466-7 (1933). —It has been found that different vegetable fibers require different alk. strengths for the best bleaching and that weak org. acids develop from these fibers during bleaching, weakening the desired alky. As a practical matter, it is

recommended to bleacheries treating a variety of fibers to check the alky. at intervals, with phenolphthalein as indicator against 0.1 N oxalic acid and renew to the desired strength. Halsey E. Silliman

**Influence of  $p_H$  on amino dyes of triphenylmethane and the decompn. of these dyes by light (Henriquez) 3. Indigo dyes (Tobler) 10. Chem. tech. uses for a resinous pitch lignite coal [resins for use in dyes] (Müller, Neuglück) 21. Anthraquinone derivs. (Ger. pat. 580,647) 10. Aralkylaryl carboxylic acids (U. S. pat. 1,937,963) 10. Arylides of hydroxybenzocarbazolecaboxylic acid (Ger. pat. 580,581) 10. Soap [for protecting wool, etc., against moths] (Ger. pat. 581,990) 27. Dyeing (Brit. pat. 397,129) 29. Drier for dyes (Ger. pat. 579,540) 1. Halogenated pyridinoanthraquinones (U. S. pat. 1,937,154) 10. Waterproofing [textiles] (Fr. pat. 753,510) 23. Pyrobenzanthrones (Fr. pat. 753,828) 10. Condensation products of the anthraquinone series (U. S. pat. 1,938,043) 10. Hydroxy carboxylic acid arylides (U. S. pat. 1,936,926) 10. Anthrapyridone derivs. (Ger. pat. 580,283) 10.**

**Barker, S. G.:** Coir: Report on the Attributes and Preparation of Coconut Fibre. Published by the Empire Marketing Board (E.M.B. 71). London: H. M. Stationery Office. 60 pp. 1s. Reviewed in *J. Textile Inst.* 24, P288 (1933).

**Bruggemann, Heinrich:** Zwirne: Ihre Herstellung und Veredelung. Berlin: R. Oldenbourg. 461 pp. M. 40. Reviewed in *J. Textile Inst.* 24, P207 (1933).

**American Society for Testing Materials Standards on Textile Materials.** By Committee D-13 of the A. S. T. M., Philadelphia: A. S. T. M. Headquarters, 1315 Spruce St., 164 pp. \$1.00. Reviewed in *Am. Dyestuff Repr.* 22, 683; *J. Textile Inst.* 24, P287 (1933).

**Dyes.** Compagnie nationale de matières colorantes et manufactures de produits chimiques du nord réunies établissements Kuhlmann. Ger. 583,871, Sept. 11, 1933. **Leuco compds. of hydroxyanthraquinones are treated with aliphatic or aromatic aldehydes or their bisulfite compds. and the resulting products reoxidized and, if desired, sulfonated. The aldehydes may be replaced by aldehydic acids such as glyoxalic acid. Thus,  $\alpha$ -hydroxyanthraquinone is treated with  $\text{Na}_2\text{S}_2\text{O}_4$  to form the leuco compd. which is then treated with  $\text{CH}_2\text{O}$ . The product is oxidized by an air current and  $\text{NaHSO}_3$  added. A dye giving an orange soln. in  $\text{H}_2\text{SO}_4$  results. Other examples are given. Cf. C. A. 27, 5547-8.**

**Dyes.** I. G. Farbenind. A.-G. (Paul Nawiasky, Berthold Stein and Albert Palm, inventors). Ger. 583,715, Sept. 8, 1933. Dyes of the anthraquinone series are prep'd. by treating nitroanthrimide with the  $\text{NO}_2$  group in the  $\sigma$ -position to the imino group, with alc. caustic alkalis. Thus, 1-nitro-2,1'-anthrimide is heated with KOH and MeOH to give a dye. Other examples are given.

**Azo dyes.** Erwin Hoffa and Eugen Glietenberg (to General Aniline Works). U. S. 1,936,979, Nov. 28. Dyes of good fastness and which are insol. in alk. solns., dyeing red shades, are formed from components such as a 2,5-dimethyl-4-halo-1-aniline and an arylamide of 2-hydroxynaphthalene-3-carboxylic acid.

**Azo dyes.** Arthur Zitscher (to General Aniline Works). U. S. 1,937,181, Nov. 28. Azo dyes of good fastness to soaping (generally of orange or various red shades) which may be formed on the fiber are produced by coupling 1-amino-2-methyl-5-chlorobenzene, 2-amino-3-hydroxynaphthalene and other components with a 2-(3'-hydroxynaphthyl-2')-4-hydroxy-6,7-benzopseudoazaminobenzene. Numerous examples are given.

**Azo dyes.** Ernst Fellmer (to General Aniline Works). U. S. 1,938,012, Dec. 5. Tetrakisazo dyes which generally dye silk bluish black to black shades are prep'd. by tetrazotizing a benzidine sulfonic or carboxylic acid or a deriv., such as benzidine-*o*-disulfonic acid, coupling with 2 mols. of a middle component such as cresidine, capable of further diazotization, again diazotizing, and coupling with one mol. each of different naphthalenesulfonic acid compds. such as 2,8-aminonaphthol-3,6-disulfonic acid and butyl-2-amino-8-naphthol-6-sulfonic acid (some other examples with details of procedure also being given). Cf. C. A. 27, 1189.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 750,915, Aug. 22, 1933. Azo dyes insol. in water are prep'd. by coupling with a diazo component an arylamide of 2-hydroxy-5,6-dihydro-7,8-benzocarbazole-3-carboxylic acid (I), the components being free from groups causing soly. in water. I is prep'd. from 2-hydroxy-5,6-dihydrobenzocarbazole, m. 183° (from 2-amino-5,6-dihydro-7,8-benzocarbazole) by the Kolbe synthesis. An aniside, m. 244°, 2'-methyl-4'-aniside, m. 234°, 2'-chloroaniside, m. 237°, 4'-chloroaniside, m. 264°, 2'-toluide, m. 247°, 4'-aniside, m. 251°, 3'-nitroaniside, 2'-naphthylamide and a 2'-carbazolylamide of I, m. above 300°, are referred to and a list of components with the colors obtained from the dyes is given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,088, Aug. 28, 1933. Azo dyes insol. in water are prep'd. by coupling with a diazo component an arylamide of 2-hydroxy-5,6- (I), -6,7- (II), or -7,8-benzocarbazole-3-carboxylic acid (III). Examples are given of the prep'n. of 5,6-, m. 245°, and 7,8-benzo-2-hydroxycarbazole, m. 241°, and of I, m. 245°, and III m. 241°, and of a *m*-, m. 273°, and *p*-chloroaniside, m. 292°, *o*-toluide, m. 254°, aniside, m. 251° of I and an *o*-, m. 237°, *m*-, m. 249°, and *p*-chloroaniside, m. 257°, *m*-nitroaniside, m. 257°, *o*- and *p*-aniside, m. 246°, *o*-toluide, 2'-methoxy-4'-chloro-1'- (m. 248°), 2'-methoxy-5'-chloro-1'- (m. 248°), 2'-methyl-4'-chloro-1'- (m. 248°), 2'-methyl-5'-chloro-1'- (m. 243°), and 2'-methyl-4'-methoxy-1'-phenylamide and a 2'-carbazolylamide (m. above 300°) of III. Examples of dyes prep'd. from these are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,087, Aug. 26, 1933. The products obtained by condensing aromatic amines with aliphatic ketones, e. g., acetone and PhNH<sub>2</sub>, *o*-toluidine or *o*-anisidine are tetrazotized and combined with hydroxybenzenes or their derivs. free from SO<sub>2</sub>H or COOH groups, to form dyes.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,183, Aug. 28, 1933. Substantive azo dyes are prep'd. by linking together 2 mols. of azo dyes, derived from 4'-nitro-4'-aminostilbene- (or -dibenzyl)-2,2'-disulfonic acid by appropriate transformation of their NO<sub>2</sub> groups, or by linking 2 mols. of 4'-nitro-4'-aminostilbene- (or -dibenzyl)-2,2'-disulfonic acid, tetrazotizing (if necessary after reduction) the intermediate products and combining with appropriate coupling components. Several examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,258, Aug. 30, 1933. As many mols. of one or more diazotized aromatic amines as the pyridinonaphthol contains OH groups is caused to react, on each mol. of a pyridinonaphthol. Thus, 4-hydroxy-1(*N*)-2-pyridinonaphthalene (from 1(*N*)-2-pyridinonaphthalene-4-sulfonic acid) coup-

led with diazotized *o*-chloroaniline dyes cotton yellow. A list of coupling components with the shades obtained is given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,581, Sept. 6, 1933. Dia- and poly-azo dyes are prep'd. by combining a tetrazo comp'd. with a hydroxy comp'd. in which the azo radical enters into the position next to the OH group, first unilaterally one or more times in the presence of acid so that only one diazonium group is united, then combining the free diazonium group or groups of the tetrazo comp'd. with the same or another OH comp'd. in feebly acid, neutral or alk. soln., with formation of di- or poly-azo dyes. Thus, benzene-1,4-bis-diazonium-borofluoride is combined with 1-(2'-hydroxycarbazole-3'-carboxylamino)-4-chlorobenzene and  $\beta$ -naphthol giving a violet-black dyeing. Several examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 751,582, Sept. 6, 1933. Azo dyes are prep'd. by coupling malonylureas or malonylthiourcas with any diazo or tetrazo compds. not contg. OH groups. Thus, barbituric acid, diphenyl-, di-*o*-tolyl- or di-*o*-anisylthiobarbituric acid may be combined with 1-diazo-2-methoxy-4-nitrobenzene or 1-diazo-2,5-dichlorobenzene. Several examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 753,589, Oct. 19, 1933. Azo dyes are prep'd. by coupling diazotized *Bz*-1-aminobenzanthrone or its 2-methoxy or 2-ethoxy derivs. with suitable coupling components, e. g., 1-(2',3'-hydroxynaphthoylamino)-3-nitrobenzene (gives a violet-black dye) or 2-hydroxy-3-naphthoyl- $\beta$ -naphthylamide (gives a bright metallic blue-black dye). Other examples are given in tabular form.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 754,028, Oct. 30, 1933. Azo dyes giving reddish violet to bluish violet shades are prep'd. by coupling an arylamide of 2,3-hydroxynaphthoic acid with a diazotized pseudoazimine of

the formula (2-R'O-4-H<sub>2</sub>N-5-R'OC<sub>2</sub>H<sub>2</sub>)N:N:R:N (R is a C<sub>6</sub>H<sub>5</sub> radical and R' is an alkyl radical), e. g., 2-(4'-amino-2',5'-dimethoxyphenyl)-6,7-benzopseudoaziminobenzene.

**Azo dyes.** Soc. anon. des matières colorantes et produits chimiques de Saint-Denis and Robert Lantz. Fr. 751,387, Sept. 2, 1933. Azo dyes are prep'd. by coupling with known coupling components nitroaminodiphenyl sulfides, substituted or not, having the following characteristics: the NO<sub>2</sub> group is ortho or para to the S in one of the rings, the NH<sub>2</sub> is ortho or para to the S in the other ring and one *o*-position with respect to the S in one of the rings is occupied by a substituent which may be the NO<sub>2</sub> or NH<sub>2</sub> group. Thus, 2-nitro-4'-aminodiphenyl  $\rightarrow$  1-(4'-sulfo-phenyl)-3-methyl-5-pyrazolone dyes wool fast yellow.

**Mono azo dyes.** J. R. Geigy A.-G. Brit. 397,668, Aug. 31, 1933. See Ger. 573,555 (C. A. 27, 4408).

**Triazo dyes.** Henry Jordan and Harold E. Woodward (to E. I. du Pont de Nemours & Co.). U. S. 1,938,182, Dec. 5. Fast green dyes are formed from components such as *m*-4-xylylidine-5-sulfonic acid, 1-amino-2-naphthol methyl ether-6-sulfonic acid, 1-amino-8-naphthol-3,6-disulfonic acid and acetoacetanilide or the like.

**Triazo dyes.** Imperial Chemical Industries Ltd. and Clifford Payne. Brit. 397,879, Aug. 28, 1933. Triazo dyes are obtained by coupling a diazotized amine of the C<sub>6</sub>H<sub>5</sub> or C<sub>10</sub>H<sub>7</sub> series with a 1-(*m*- or *p*-aminoaryl)-3-methyl(or 8-carboxy)-6-pyrazolone, diazotizing the resulting aminoazo comp'd., coupling with a usual middle component, again diazotizing and coupling, in acid, neutral or alk. medium, with a naphthol, naphthylamine or aminonaphthol, or a sulfonic acid of these, or a naphthol-carboxylic acid or a *N*-substituted naphthylamine or aminonaphtholsulfonic acid, the end component being other than a 1,8-aminonaphtholsulfonic acid, or a *N*-acyl deriv. thereof, when the third component is a 1-amino-2-naphthol ether or a deriv. thereof. When the *N*-substituent contains a diazotizable amino group the triazo product may be diazotized and coupled with a component in substance or on the fiber. Among examples (1) sulfonic acid  $\rightarrow$  1-(*m*-aminophenyl)-3-methyl-6-pyrazolone  $\rightarrow$  2,5-dimethoxyaniline  $\rightarrow$  (in NH<sub>3</sub> soln.) 1-(*p*-amino

benzoylamino)-8-naphthol-4-sulfonic acid, which dyes cotton clear bluish green and may be diazotized and developed on the fiber with 1-phenyl-3-methyl-5-pyrazolone to give clear yellowish green shades, (2) *m*-aminobenzoic acid  $\rightarrow$  1-(*p*-aminophenyl)-5-pyrazolone-3-carboxylic acid  $\rightarrow$  1-naphthylamine  $\rightarrow$  (in  $\text{NH}_3$  soln.) 1-amino-8-naphthol-2,4-disulfonic acid, which dyes cotton green and (3) metanilic acid  $\rightarrow$  1-(4'-amino-1'-naphthyl)-3-methyl-5-pyrazolone  $\rightarrow$  1-amino-2-ethoxynaphthalene-6-sulfonic acid  $\rightarrow$  (in ammoniacal pyridine soln.) 2-phenylamino-5-naphthol-7-sulfonic acid, which dyes cotton blue-green.

**Vat dyes.** Durand & Huguenin S. A. Fr. 754,235, Nov. 3, 1933. Sulfuric ester salts of leuco derivs. of vat dyes which are sol. in water are obtained by transforming sulfuric acid esters of leuco derivs. of vat dyes into their alkylolamine salts. Examples are given.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 42,574, Aug. 23, 1933. Addn. to 738,251 (C. A. 27, 1765). Vat dyes which are substituted 1,3-diaminoanthraquinones contg. residues capable of being vatted in both amino groups, one at least of the residues being different from the rest of the 1-aminoanthraquinone group are described. They may be prep'd. by causing 2 mols., the same or different, capable of being vatted and each contg. an  $\text{NH}_2$  group, to react with 1 mol. of 1,3-dihaloanthraquinone, or by condensing 2 mols. of a 1,3-dihaloanthraquinone with 1 mol. of a deriv. capable of being vatted and contg. at least 2  $\text{NH}_2$  groups, then condensing the product thus obtained with 2 mols. of a deriv. capable of being vatted but contg. at least 1  $\text{NH}_2$  group. Derivs. capable of being vatted contg. one or 2 amino groups capable of reacting with the 1,3-dihalo compds. include 1- and 2-amino-, 1,4-, 1,5-, 1,8-diamino-, monobenzoyldiamino-, monoacetyldiamino-, mono(*p*-methoxy)benzoyldiamino- and aminonitroanthraquinones, aminodibenzanthrones, aminopyranthrones, aminoanthanthrones, aminoanthrimides, aminoanthrimidecarbazoles, aminoanthraquinoneacridones, monobenzoyldiaminoanthrimidecarbazoles and the  $\text{NO}_2$  derivs. of these compds. The products are also intermediates for other dyes. Several examples are given.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 581,583, July 29, 1933. Vat dyes and their intermediates are prep'd. by treating *Bz*-1,*Bz*-1'-dibenzanthronyl with a nitrating agent and fusing the product, optionally after reduction, with caustic alkali. The product can then optionally be halogenated, nitrated, oxidized or alkylated. Thus, *Bz*-1, *Bz*-1'-dibenzanthronyl is dissolved in  $\text{H}_2\text{SO}_4$ - $\text{H}_2\text{O}$  and treated with  $\text{HNO}_3$ . The resulting dye is fused with  $\text{KOH}$ , and the product halogenated.

**Solid dye preparation.** J. R. Geigy A.-G. Ger. 583,700, Sept. 8, 1933. A solid prep'n. is obtained by mixing undreduced vat dyes, excepting those of the anthraquinone series, with solid alkali salts of polyhydric alcs. Thus, the Na salt of glycol is mixed with 2-thionaphthencacenaphthene indigo.

**Basic dyes.** I. G. Farbenind. A.-G. (Alfred Blömer, inventor). Ger. 580,591, July 13, 1933. Carbon tetrahalide is caused to react with bases derived from heterocyclic  $\text{NH}_2$  salts with reactive Me groups in  $\alpha$ - or  $\gamma$ -positions to the N atom. Thus, the base trimethylmethylenindoline is treated with  $\text{CCl}_4$  to give a dye which imparts a red-violet color to cotton mordanted with tannic acid. Other examples are given.

**Acid wool dyes.** I. G. Farbenind. A.-G. (Karl Zahn and Heinrich Koch, inventors). Ger. 584,872, Sept. 25, 1933. 1-Amino-4-haloanthraquinone-2-sulfonic acids are treated with *m*- or *p*-aminoaryl alkyl sulfones or their derivs. substituted in the aryl, alkyl or both residues. Thus, Na 1-amino-4-bromoanthraquinone-2-sulfonate is treated with an aq. soln. of *m*-aminophenyl methyl sulfone in the presence of  $\text{NaHCO}_3$  and  $\text{CuCl}$  to give a blue dye. Several other examples are given. Cf. C. A. 27, 607.

**Anthraquinone dyes.** Donald G. Rogers, James Ogilvie and Joyce H. Crowell (to National Aniline & Chemical Co.). U. S. 1,937,531, Dec. 5. By the condensation of hydroxyanthraquinone such as 2-chloroquinizarin

with an arylamine such as aniline, a product is obtained which in the form of its sulfonic acid dyes chrome mordanted wool a redder shade than the sulfonic acids of the related polyarylaminoanthraquinone derivs. resulting from the condensation of the corresponding hydroxyanthraquinone with the corresponding arylamine. A like product may be produced by the partial elimination of arylamino groups from a polyarylaminoanthraquinone.

**Azine dyes.** I. G. Farbenind. A.-G. Fr. 753,534, Oct. 18, 1933. Dyes of the azine series are obtained by introducing into the mol. one or more residues of the formula  $-\text{CH}_2\text{CH}_2\text{SO}_2\text{H}$ , or by replacing the H atom of the amino group cont'd. in azine dyes by the ethanesulfonic acid group, e. g., by treatment with chloroethanesulfonic acid. Thus, 1,3-bis(phenylamino)naphthalene-8-sulfonic acid is oxidized with 4-aminoethylphenylamine to give a dye, 9-[ethyl( $\beta$ -sulfoethyl)amino]-5,7-dihydro-7-phenyl-5-phenylimino- $\alpha$ -benzophenazine-4-sulfonic acid.

**Polymethine dyes.** I. G. Farbenind. A.-G. Fr. 752,563, Sept. 26, 1933. Polymethine dyes, the central C of which is substituted, are prep'd. by causing quaternary N bases having a reactive Me group in their  $\alpha$ -position to react with alkyl esters of *o*- $\alpha$ -thiophenic acid, preferably in the presence of condensing agents and solvents. Examples are given of dyes prep'd. from the Et ester of *o*-thiophenic acid and the Et iodide of methylbenzoxazole and the diethyl sulfate of methylbenzothiazole, methyl- $\beta$ -naphthothiazole and methylbenzoselenazole. Pyridine is used as solvent. Cf. C. A. 28, 336°.

**Nitrogenous anthracene dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 579,841, July 1, 1933. Solns. of leuco 1,4,5,8-tetrahydroxyanthraquinone are heated in aq. solns. of  $\text{NH}_3$  or primary amines, preferably in the presence of a reducing agent, to temps. above  $100^\circ$ . The resulting leuco compds. are oxidized to form the corresponding anthraquinone derivs. Examples are given.

**Green dyes.** Bruno Francke (to General Aniline Works). U. S. 1,938,014, Dec. 5. Dyes producing clear yellowish green shades of good fastness on wool are obtained by oxidizing bis(*p*-dialkylaminophenyl)sulfonaphthylmethanes. Several examples with details of procedure are given.

**Hydroxythionaphthene compounds.** Norbert Steiger and Walter Brunner (to General Aniline Works). U. S. 1,938,053, Dec. 5. Dye intermediates corresponding to

the general formula  $\text{C}_6\text{X}_4\text{COCH}_2\text{S}$  (where 2 X's mean methyl, the third X an alkoxy group and the fourth X H or halogen), which compds. are nearly colorless powders of a definite m. p. are produced by converting dimethylalkoxybenzenes which contain an amino group or a sulfonic acid group and a free position ortho thereto, or both such groups in *o*-position to each other and which may contain halogen, into dimethylalkoxybenzenethioglycolic acids which contain in the *o*-position relative to the thioglycolic acid group H or substituents such as  $\text{NH}_2$ , CN,  $\text{CONH}_2$  or COOH and which may contain halogen, and subjecting the latter (after elimination or transformation of the groups in *o*-position if desired) to a ring-closing reaction. Details are given of the production of 4,7-dimethyl-6-ethoxy-3-hydroxythionaphthene, m.  $94-6^\circ$ , 6,7-dimethyl-5-methoxy-3-hydroxythionaphthene, m.  $150^\circ$ , 4,7-dimethyl-5-chloro-6-methoxy-3-hydroxythionaphthene, m.  $128-30^\circ$ , and some similar and related compds. suitable for use in the production of indigoid dyes.

**Indigoid dyes.** Norbert Steiger and Walter Brunner (to General Aniline Works). U. S. 1,938,054, Dec. 5. Dyes of various shades and good fastness are obtained by oxidizing the hydroxythionaphthenes produced as described in U. S. 1,938,053 (preceding abstr.) to form sym. dyes. Asymmetrical dyes are obtained by condensing the same hydroxythionaphthenes with an isatin or a reactive  $\alpha$ -deriv. of this isatin or of a 2,3-diketodihydrothionaphthene, these components being of the benzene or naphthalene series. Furthermore such dyes are produced by condensing an isatin of U. S. pat. 1,938,055 (following abstr.) or a reactive  $\alpha$ -deriv. thereof or a 2-deriv. of the 2,3-diketodihydrothionaphthene corresponding to the

hydroxythionaphthenes described in our U. S. pat. 1,958,053 with a hydroxythionaphthene of the benzene or naphthalene series. Dyes contg. halogen may be prepd. either by starting from halogen-contg. materials or by an after-halogenation of the dyes if either of their components is still capable of being halogenated. Numerous examples with details of procedure are given.

**Isatins.** Norbert Steiger and Walter Brunner (to General Aniline Works). U. S. 1,938,055, Dec. 5. New isatins suitable for use as intermediates in producing indigoid dyes, and which correspond to the general formula

$C_6X_4CO.CO.NH$  (wherein two X's are methyl groups, the third X an alkoxy group and the fourth X H or halogen), which compds. represent light colored powders having a definite m. p., are obtainable from the dimethylalkoxyaminobenzenes or halodimethylalkoxyaminobenzenes, resp., contg. a free *o*-position to the amino group, *e. g.*, according to the known isatin synthesis of Sandmeyer. Moreover, the halodimethylalkoxyisatins may be obtained by after-halogenating the dimethylalkoxyisatins. 4,6-Dimethyl-7-methoxyisatin, m. 210-12°; 5-chloro-4,6-dimethyl-7-methoxyisatin, m. 268-70°; 5-bromo-4,6-dimethyl-7-methoxyisatin, m. 274-6°. Corresponding ethoxy compds. are mentioned. 6-Chloro-4,7-dimethyl-5-methoxyisatin, m. 238-40°. 5-Methoxy-6,7-dimethylisatin, m. 181-3°. The corresponding isonitrosoacetanilide m. 192-4°. 4-Chloro-5-methoxy-6,7-dimethylisatin, m. 264-8°, and the corresponding isonitrosoacetanilide m. 154-6°. 7-Chloro-4,6-dimethyl-5-methoxyisatin m. 229°. 4,6-Dimethyl-5-methoxyisatin m. 223-4°. 4,7-Dimethyl-5-chloro-6-methoxyisatin m. 259-61°.

**Indigoid dyes.** I. G. Farbenind. A.-G. (Karl Thiess and Theodor Meissner, inventors). Ger. 583,649, Sept. 11, 1933. See Brit. 383,543 (C. A. 27, 4411).

**Thioindigoid dyes.** Imperial Chemical Industries Ltd., Frank Lodge and Colin H. Lumsden. Brit. 398,161, Aug. 29, 1933. Dyes contg. 2,1(*S*)-anthracene or anthraquinone residues are prepd. by treating an anthracene- or anthraquinone-1-thioglycolic acid where the 5- and 8-positions are substituted by halo (particularly Cl or Br), NO<sub>2</sub>, sulfo, COOH, (substituted) OH or (substituted) NH<sub>2</sub> and the anthracene or anthraquinone nuclei may contain further substituents, with ClSO<sub>3</sub>H, with or without H<sub>2</sub>SO<sub>4</sub>. When the substituent in the 5- or 8-position is a substituted NH<sub>2</sub> group the substituent of said group may form part of a ring structure attached to the anthracene or anthraquinone residues. The products are vat or acid dyes, according to the substituents. Among examples the lactam from 1-aminoanthraquinone-2,5-dithioglycolic acid (prepd. according to example (1) of Brit. 398,162 (following abstr.)) is treated with ClSO<sub>3</sub>H at 20-5° to give a brown vat dye for cotton; the lactam ring may be hydrolyzed by alkali and the product then applied to wool as described in Brit. 377,740 (C. A. 27, 4097); reduction of above lactam with Zn dust and NH<sub>2</sub> and treatment of the resulting anthracene compd. with ClSO<sub>3</sub>H also gives a brown vat dye.

**Dye intermediates.** Imperial Chemical Industries Ltd., Frank Lodge and Colin H. Lumsden. Brit. 398,162, Aug. 29, 1933. 1-Amino-2,5- (or 2,8)-dimercaptoanthraquinones are prepd. by treating 1-amino-5- or -8-sulfoanthraquinone with hot alkali sulfide or by treating 1-chloro-5- or -8-nitroanthraquinone with hot alc. alkali H sulfide in an autoclave. In examples (1) 1-amino-5-sulfoanthraquinone is heated with Na<sub>2</sub>S at 140°; the resulting 2,5-dimercapto deriv. is condensed with Na chloroacetate and the resulting thioglycolic deriv. converted to the lactam form by hot HCl and (2) 1-chloro-5-nitroanthraquinone is converted to 1-amino-2,5-dimercaptoanthraquinone by treatment with aq. alc. NaHS in a closed vessel at 110-15°.

***m*-Hydroxyphenyl arylamino carboxylic acids.** Leopold Laska and Oskar Haller (to General Aniline Works). U. S. 1,938,031, Dec. 5. By the action of CO<sub>2</sub> (at an elevated temp. and under pressure) on starting materials such as are derived by condensing resorcinol with aniline or its homologs, alkoxyanilines, aryloxyanilines or halogen

substitution products of these compds., dye intermediates are obtained such as the following derivs. of 3-hydroxydiphenylamine-4-carboxylic acid: 2'-methyl, m. 180-2°; 3'-methyl, m. 176-7°; 4'-methyl, m. 185-6°; 2'-methoxy, m. 199-200°; 4'-methoxy, m. 176-7°; 2'-chloro, m. 198°; 3'-chloro, m. 189-90°; 4'-chloro, m. 188-90°; 2',4'-dimethyl, m. 175°; 2',5'-dimethyl, m. 175-6°; 3'-methyl-4'-methoxy, m. 165°; 2'-methyl-4'-chloro, m. 180-1°; 2'-methyl-5'-chloro, m. 208-10°; 3'-methyl-4'-chloro, m. 195-7°; 4'-methyl-3'-chloro, m. 190°; 2',4'-dichloro, m. 215°; 3',4'-dichloro, m. 199°; 3',4'-dichloro-6'-methyl, m. 203°; and 4'-phenoxy, m. 180°.

**Aminoanthraquinone derivatives.** Henry Dreyfus. Fr. 750,838, Aug. 19, 1933. Anthraquinone derivs. contg. an OH in one  $\alpha$ -position, an amino group, free or non-aromatically substituted, in a 2nd  $\alpha$ -position and an arylamino group in 3rd  $\alpha$ -position form new dyes for cellulose ester and other materials. The dyes may be applied in the reduced state as leuco compds., in soln. or aq. suspension or after being brought to the colloidal state. Examples are given of the prepn. of 1-amino-4-*o*-tolylamino- and 1-amino-4-anilino-5-hydroxyanthraquinone. Fr. 750,839. Compds. such as the above which also contain addnl. substituting radicals are used for the same purpose. Examples are given of the prepn. of 4-amino-8-phenylamino-1,5-di-, 4-amino-5-phenylamino-1,8-di-, 4-amino-5-*p*-tolylamino-1,8-di-hydroxyanthraquinone and products obtained by arylation of 1,4,5-trihydroxy-8-aminoanthraquinone with *o*-anisidine and with PhNH<sub>2</sub>. Fr. 750,840. Improved products are obtained by substituting the aryl groups of  $\alpha$ -arylaminanthraquinones by alkoxy or other ether groups, particularly when these groups occupy the position ortho to the N atom. Examples of dyes are 1-amino-4-*o*-methoxyphenylamino-, 1-*o*-hydroxyethylamino-4-*o*-methoxyphenylamino-, 1-amino-4-(2,5-dimethoxyphenylamino)-, 1-amino-4-(2-methoxy-5-methylphenylamino)-, 1,3-di-amino-4,6-di-*o*-methoxyphenylamino-, 1,8-dihydroxy-4-*o*-methoxyphenylamino-, 1-amino-4-*o*-phenoxyphenylamino-, 1,5-di-(2-methoxyphenylamino)-4,8-diamino- and 1-amino-4-(2-methoxyphenylamino)-anthraquinone. Fr. 750,841. Improved products are obtained by introducing acylamino groups into the aryl residues of arylaminanthraquinones. Examples of dyes are 1-hydroxy-4-*p*-acetamidophenylamino-, 1-hydroxy-4-(4-acetamido-3-methylphenylamino)-, 1-*p*-acetamidophenylamino-4,5-dihydroxy-, 1-amino-4-*p*-acetamidophenylamino-, 1-hydroxy-4-(4-acetamidophenylamino)- and 1,8-dihydroxy-4-(4-acetamidophenylamino)-anthraquinone.

**Naphthol derivatives.** Chemische Fabrik vorm. Sandoz. Fr. 751,237, Aug. 29, 1933. 1-Iodo-8-naphthol sulfonic acids are prepd. from the 1-diazo compds. by known methods. Examples are given of the prepn. of 1-iodo-8-naphthol-4-, -4,6-di- and -7,6-di-sulfonic acid. The products are intermediates for dyes and therapeutic products.

**Derivatives of the benzanthropepyrazoleanthrone series.** Karl Wilke, Josef Stock and Fritz Schubert (to General Aniline Works). U. S. 1,938,059, Dec. 5. Dyes and dye intermediates are obtained by treating a negatively substituted benzanthropepyrazoleanthrone in the presence of an inert org. solvent with a compd. of the general formula  $R-NH-X$  in which X stands for eH and R for methyl, acyl, benzyl or aryl or in which X and R represent methyl groups. The condensation is effected generally during heating by using a suitable solvent of high-b. p. in the presence of an acid-binding agent and an agent accelerating the reaction, such as NaOAc, Cu carbonate, Cu<sub>2</sub>Cl<sub>2</sub> or the like. In some cases, the amine used as reaction component at the same time has a dissolving and an acid-binding action. In the presence of volatile substances it is necessary to work in a closed vessel under pressure. Also the same or similar derivs. of the benzanthropepyrazoleanthrone are obtained by causing aminobenzanthrone-pyrazoleanthrones to react with such compds. as have a substituting action upon the H attached to N. Compds. of this kind are, for instance, acid anhydrides, acid halides, negatively substituted, especially halogen-contg. compds.

of different classes, aldehydes, quinones, etc. Numerous examples with details of procedure are given.

**Condensation products of the anthraquinone series.** Paul Nawiasky and Berthold Stein (to General Aniline Works). U. S. 1,936,948, Nov. 28. Dye intermediates are produced by condensing a 1-amino-2-haloanthraquinone in which both of the H atoms of the amino group are replaced by the carbonyl groups of an aromatic dicarboxylic acid capable of forming a monomolecular anhydride, with a 1-aminoanthraquinone. Examples are given of the use of 1-phthalimido-2-bromoanthraquinone with 1-aminoanthraquinone, etc. The dicarboxylic acid radical may be split off from the condensation products by heating with  $\text{NH}_3$  or alkali metal phenolates or the like, and the 1,2-diaminoanthraquinones substituted in the N atom in the 2-position thus obtained are readily condensed to form dyes of the *N*-dihydro-1,2,2',1'-anthraquinonazine series. Numerous examples with details are given.

**Halogenation products of acenaphthindandione diketimide.** I. G. Farbenind. A.-G. (Wilhelm Eckert and Heinrich Sieber, inventors). Ger. 580,518, July 12, 1933. These are prepd. by treating the above with halogenating agents in neutral or acid soln. In an example, the diketimide of acenaphth-*peri*-indandione is treated with water, concd. HCl and  $\text{KClO}_3$  to give a chlorinated product m. 193°. Other examples are given. The products are useful as dye intermediates. Cf. C. A. 27, 5754.

**Dyes and intermediates.** Cecil Shaw and John Thomas (to Scottish Dyes Ltd.). U. S. 1,937,718, Dec. 5. Phthalic anhydride is heated with nitrodibenzanthrone or nitrosodibenzanthrone at a temp. (suitably about 250°) at which the phthalic anhydride is in the liquid phase, in order to form a product dyeing cotton gray to black shades.

**Dye intermediates; vat dyes.** Soc. pour l'ind. chim. à Bâle. Brit. 398,053, Sept. 7, 1933. See Fr. 745,841 (C. A. 27, 4415).

**Dyeing.** British Celanese Ltd., Henry C. Olpin and George H. Ellis. Brit. 397,534, Aug. 17, 1933. Materials made of or contg. cellulose esters and ethers are colored by applying thereto and retaining therein a compd. contg. 2 aryl radicals or aromatic residues united directly by a single linkage, said compd. contg. a single  $\text{NH}_2$  group and a single  $\text{NO}_2$  group in *o*-position to each other. The  $\text{NH}_2$  group and the nuclei may be further substituted. In examples cellulose acetate, alone or mixed with cotton or viscose (which may be dyed with a direct cotton dye) is colored with (1) 3-nitro-4-aminobiphenyl, (2) 3-nitro-4-amino-4'-chlorobiphenyl, (3) 3-nitro-4-amino-2,2'-bitolyl. Yellow shades, fast to light and volatilization, are obtained.

**Dyeing.** Imperial Chemical Industries Ltd., Mordecai Mendoza and Wilfred A. Sexton. Brit. 398,163, Aug. 29, 1933. Azo dyes are formed on the fiber by coupling an arylamide of 2,3-hydroxynaphthoic acid with the tetrazo compd. of a diamine obtained by condensing an *o*-alkyloxyaniline, or a deriv. thereof (2 mols.), and an aromatic aldehyde (1 mol.), the components being free from  $\text{H}_2\text{O}$ -solubilizing and  $\text{NO}_2$  groups. Claret shades fast to kier-boiling and Cl are obtained. In an example cotton is impregnated with  $\alpha$ -naphthylamide and developed with tetrazotized 4,4'-diamino-2,2'-dimethyl-5,5'-dimethoxytriphenylmethane.

**Coloring bone articles.** Soc. pour l'ind. chim. à Bâle. Ger. 584,062, Sept. 27, 1933. See Swiss 162,206 (C. A. 28, 657°).

**Machine for dyeing piece goods.** Hans W. Mettler. Ger. 584,595, Sept. 21, 1933.

**Dyeing vat.** Théophile E. Foulon. Fr. 753,546, Oct. 18, 1933.

**Textile fibers.** Leo Nordmann. Ger. 581,527, July 29, 1933. Flax fibers, etc., are obtained from raw flax, etc., by removing the pithy substances by treatment with solns. or emulsions of  $\text{H}_2\text{SO}_4$ ; the flax is then irradiated with ultra-violet rays and finally treated with alkali to neutralize the acid. The treatment with  $\text{H}_2\text{SO}_4$  may be replaced by treatment with NaOH, alkali carbonate,  $\text{Na}_2\text{BO}_3$ ,  $\text{Na}_2\text{PO}_4$ , HCl, AcOH, etc.

**Separating fibers of fibrous plant material.** Bernard R. Wood. U. S. 1,938,060, Dec. 5; Brit. 398,033, Sept. 7, 1933. See Fr. 743,462 (C. A. 27, 3833).

**Machine for decorticating and cleaning fibrous leaves and stems, e. g., of sisal, flax, hemp, ramie.** The Hydraulic Engineering Co. Ltd. and Arthur R. Mangnall. Brit. 397,193, Aug. 24, 1933.

**Bleaching animal fibers.** Josef Müller (to E. I. du Pont de Nemours & Co.). U. S. 1,937,710, Dec. 5. Material to be bleached such as rabbit hair stumps is treated with an acid soln. contg. a sol. Al salt such as K alum and a compd. capable of liberating active O, such as  $\text{H}_2\text{O}_2$ .

**Protecting animal fibers.** I. G. Farbenind. A.-G. (Oskar Palek and Hans Seifert, inventors). Ger. 583,533, Sept. 5, 1933. Animal fibers are protected against harmful influences by treatment with glycine or its salts.

**Sizing textile fibers.** Maurice Cordier. Fr. 753,628, Oct. 20, 1933. Volatile solvents such as white-spirit are added to oils, superoxidized or not, and the mixt. is treated with a neutralizing agent, the oils being then emulsified for sizing textiles, etc.

**Treating textiles.** Résines et vernis artificiels (Soc. anon.). Fr. 753,559, Oct. 19, 1933. Textiles of a cellulosic nature are impregnated by sol. condensation products of  $\text{CH}_3\text{O}$  with  $\text{NH}_4$  sulfides or  $\text{NH}_4\text{SCN}$  in the presence of urea, or thioaldehydes with urea, dried and heated to polymerize the condensation products. Wet-ting or plastifying agents, dyes or fillers may be added to the impregnation bath.

**Treating textiles.** Kalle & Co. A.-G. Fr. 753,728, Oct. 23, 1933. Textile materials of various kinds are desized and purified by amylase preps. with the addn. of basic N compds., e. g., amines, polyanines, oxoamines, hydroxyamines, hydrazines and their substitution compds.

**Finishing textiles.** Max Cassvan. Fr. 751,447, Sept. 4, 1933. A finishing agent is composed of solubilized starch with the addn. of a small amt. of alkali or alk. earth peroxides, percarbonates, persulfates or perborates.

**Decolorizing textiles.** Imperial Chemical Industries Ltd. Fr. 752,728, Sept. 29, 1933. Textiles dyed with azo dyes are decolorized with a reducing liquor contg. an amine or an amine salt (preferably a quaternary  $\text{NH}_4$  salt) of which one radical does not contain less than 10 C atoms, e. g., cetyltrimethylammonium,  $\beta$ -hydroxyethyl-*N*-octadecylmorpholinium and octadecylpyridinium bromides and  $\beta$ -diethylaminoethylol:thylamide acetate.

**Decolorizing textiles.** I. G. Farbenind. A.-G. Fr. 752,831, Sept. 30, 1933. Dyeings made with vat dyes are removed by an aq. bath contg. an alk. reducing agent, adding a Mg compd. to the bath toward the end of the treatment of elimination, and preferably adding initially a protective colloid. Examples are given of the use of  $\text{MgCl}_2$ ,  $\text{MgSO}_4$ , and  $\text{Mg}(\text{OH})_2$ .

**Apparatus for fulling textiles.** Krafft Göbel and Georg Friede. Ger. 584,773, Sept. 27, 1933.

**Treating fabrics.** British Celanese Ltd. Brit. 397,711, Aug. 31, 1933.  $\text{H}_2\text{O}$ -insol., polymerized vinyl compds. are incorporated in relatively small amts. in textile fabrics to improve their wear-resistance, reduce their tendency to slip or ladder and render them waterproof. Fabrics thus treated may be used for making tops of fancy shoes. The compds. may be used in various states of polymerization and are preferably applied as solns. in alc.,  $\text{C}_6\text{H}_6$ , PhMe, etc. They may be applied as aq. dispersions with the aid of soap or Turkey-red oil. In an example a twill weave fabric of yarns of cellulose acetate is impregnated with a 1-2.5% soln. of polymerized vinyl acetate in  $\text{C}_6\text{H}_6$ .

**Device for the wet treatment of textile pieces.** Marcel 9 Cassé. Ger. 584,598, Sept. 21, 1933.

**Device for the wet treatment of fabrics.** Eduard Esser & Co. G. m. b. H. Ger. 584,599, Sept. 22, 1933.

**Air-drying sizing machine for fabrics.** Hans G. Benade. Ger. 581,650, July 31, 1933.

**Wetless cord fabric.** Boutwell H. Foster (to Morgan & Wright). U. S. 1,937,558, Dec. 5. Various details of app. and operation are described for coating parallel cords with a soln. such as a rubber dispersion and then drying.

**Delustering knit fabrics formed of cellulose derivatives** such as cellulose acetate. Wm. McC. Cameron and Cyril M. Croft (to Celanese Corp. of America). U. S. 1,937,544, Dec. 8. The knit fabric is subjected to the action of a delustering agent such as hot aq. soap soln. while under tension.

**Machine for mercerizing fabrics.** Paul Buschmann. Ger. 579,822, June 29, 1933.

**Filaments from solutions of natural silk.** Camille Dreyfus and George W. Miles (to Celanese Corp. of America). U. S. 1,936,753, Nov. 28. Natural silk is dissolved in a strong acid such as  $H_2SO_4$  and the soln. is extruded into a coagulating medium such as water or EtOH maintained at a temp. below  $10^\circ$ .

**Treating silk.** Heberlein & Co. A.-G. Brit. 397,838, Aug. 25, 1933. Silk is modified in transparency, luster, dyeing properties and feel by treatment with a mineral acid in the presence of a reagent preventing decompn. of the silk. Decompn.-preventing agents are (1) a mono- or poly-hydric alc., e. g.,  $AmOH$ , glycol, glycerol, (2) pyridine or a homolog or deriv. thereof, e. g., pyridine-HCl, pyridine sulfate, picoline, lutidine, (3)  $CH_2O$ , or a polymer, or a compd. yielding  $CH_2O$ , e. g.,  $(CH_2)_nN_4$ , or (4) an  $NH_4$  salt that is not a swelling agent for silk, e. g.,  $(NH_4)_2SO_4$ ,  $NH_4Cl$ ,  $NH_4OAc$ .  $H_2SO_4$  of at least  $45^\circ$  Bé.,  $HCl$  of at least  $20^\circ$  Bé.,  $H_3PO_4$  of at least  $50^\circ$  Bé. or another mineral acid, except  $HNO_3$ , of the same order of concn. may be used. An example is given in which degummed and bleached silk fabric is passed through  $52^\circ$  Bé.  $H_2SO_4$ , contg. a little  $CH_2O$ , and then through  $25^\circ$  Bé.  $NaOH$  with intermediate and final washings. In 397,878, Aug. 23, 1933, the silk is modified by treatment with a swelling agent followed by washing. Swelling agents are (1) alkali hydroxide soln. of at least  $20^\circ$  Bé., (2) mineral acids of strengths stated above or (3) solns. of known swelling agents for cotton, e. g.,  $ZnCl_2$ , thiocyanates, ammoniacal  $CuO$  or  $NiO$ , alk. Cu-glycerol soln. Examples are given.

**Sizing silks.** Soc. de recherches et d'exploitations petrolifères. Fr. 752,683, Sept. 28, 1933. Silk is sized by a soln. of linseed oil, etc., in org. solvents. The solvents are recovered and the oil oxidized by a current of air at a low temp. (below  $25^\circ$ ) whereby contamination by oil of the solid absorbing agent is avoided.

**Rayon.** Henry Dreyfus. Fr. 42,454, July 31, 1933. Addn. to 697,216 (C. A. 25, 2849). The solvent used to soften the threads in the process of Fr. 697,216 is spread over a fibrous or porous material. The evapg. agent used for the 2nd evapn. is led to the 1st evapn. stage.

**Rayon.** Marcel Guinet. Fr. 751,430, Sept. 4, 1933. Mat effects are obtained by dipping rayon into a colloidal bath formed by dissolving animal gelatin or pickled hide in a boiling alk. soln. contg.  $CaO$ ,  $BaO$  or  $SrO$  so as to form salts of  $Ca$ ,  $Ba$  or  $Sr$ . Fr. 751,431. Rayon is weighted by immersion 1st. in a bath contg. a colloidal soln. of animal gelatin or pickled skin and then in a bath contg. a vegetable tannin or salts of  $Cr$ . The process may be repeated a no. of times.

**Drying spools of rayon.** Vereinigte Glanzstoff-Fabriken A.-G. Ger. 583,837, Sept. 9, 1933.

**Apparatus for unwinding rayon cakes.** Vereinigte Glanzstoff-Fabriken A.-G. Brit. 398,126, Sept. 7, 1933.

**Apparatus for shrinking rayon fabrics.** Zittauer Maschinenfabrik A.-G. Ger. 580,763, July 15, 1933.

**Apparatus for cleaning wool.** Ernst Voigt and Erich Mittelsteiner. Ger. 581,985, Aug. 10, 1933.

**Recovering neutral grease from wool-washing water.** Eugene Mertens. U. S. 1,937,291, Nov. 28. See Fr. 705,894 (C. A. 26, 320).

**Yarn-washing machine.** L. Ph. Hemmer G. m. b. H. Ger. 581,640, July 31, 1933.

**Device for treating spools of yarn with various liquids in succession.** Vereinigte Glanzstoff-Fabriken A.-G. Ger. 584,600, Sept. 23, 1933.

**Composition suitable for coating fabrics, etc.** Gustave D. Fortman (one-half to Charles S. Harper). U. S. 1,938,553, Dec. 5. A coherent but nonsticky compn. is formed comprising principally particles of solid elastic vegetable matter such as cork, sawdust or leather scraps united by gelatinous casein residue of a hydrocarbon soln. of casein.

**Coating cloth with rubber.** Les établissements Maréchal. Fr. 753,873, Oct. 26, 1933. An emulsion of rubber for coating cloth is treated with alk. earth oxides in soln. or by metal hydrates pptd. in this emulsion, with the exclusion of all products having a pos. elec. potential. All charges and pigments compatible with the results to be obtained may be added.

**Apparatus and method for coating paper or fabric with wool fiber to obtain an imitation woolen fabric.** Harald Baltzer. Brit. 396,591, Aug. 10, 1933.

**Cleaning agent.** Ernst H. Riesenfeld. Ger. 584,515, Sept. 22, 1933. A non-inflammable agent for cleaning spots from fabrics consists of up to 30%  $C_6H_6$  or benzine mixed with  $CH_2Cl$  or chlorinated aliphatic hydrocarbons such as  $CHCl_3$ ,  $CH_2Cl_2$ ,  $CCl_4$ , etc.

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

**Mildew prevention on painted surfaces.** Henry A. Gardner, L. P. Hart and G. G. Sward. *Natl. Paint, Varnish, Lacquer Assoc. Circ. No. 448*, 17-32 (1934); cf. C. A. 27, 4694.—The results contained in the previous report are in general confirmed. Microscopic examn. is usually necessary to detect growing mildew. G. G. S.

**Sun exposure of test panels.** O. J. Sieplein. *Natl. Paint Varnish Lacquer Assoc. Circ. No. 447*, 1-10 (1934).—By means of solar observations and calcs. the energy reaching the surfaces of exposed paint panels was obtained for Lat. of Miami, Fla. ( $25^\circ 48'$ ) and  $42^\circ$  N. Curves are given for surfaces facing the 4 cardinal directions, both vertical and inclined. The relation of the solar energy and other climatic conditions upon variously placed panels is discussed. G. G. Sward

**Pigmented bitumastic compounds.** J. Mitchell Fain and Foster Dee Snell. *Ind. Eng. Chem.* 26, 88-91 (1934).—Pigmented bitumens are widely used in the manuf. of floor tilings, enamels, floor coverings, paints, lacquers and cements. Aluminum-asphalt paints give a good protective covering and are lustrous. W. A. Moore

**Darkening of chrome oxide green by high temperatures.** Raquin. *Farben-Chem.* 4, 458 (1933).—Polemical with Vanino (cf. C. A. 27, 5556). True  $Cr$  oxide green prepd.

by reduction of dichromates with  $^4S$ ,  $C$ , etc., has a compn.,  $Cr_2O_3$ , and is practically unaffected by heating to red heat. G. G. Sward

**The chemistry of sea slime.** F. Krauss and Annie Kollath. *Farben-Chem.* 4, 415-16, 447-52 (1933).—Review with 47 references extending back to 1857. The chemically unsatd. character of sea slime is denied. Cf. Carprow, C. A. 27, 1525. G. G. Sward

**Oil requirements and thixotropy of linseed oil paints.** Hans Wolff. *Paint & Varnish Production Mgr.* 10, No. 1, 22-5 (1934).—Calcn. of factors ( $F$ ) from the sp. wt. of the oil-enveloped particles and the crit. pigment vol. agrees in many cases with those obtained from the ratio of pigment vol. at crit. and min. oil contents ( $F_w$ ) (cf. C. A. 28, 915<sup>a</sup>). In the cases in which it did not agree (being less) the paint system was plastic and thixotropic. Min. oil contents greater than 15% usually indicate plastic systems. It is possible by means of a few easily detd. values to predict a large no. of properties of oil paints. G. G. S.

**Viscosity of oil colors.** Hans Wolff. *Kolloid-Z.* 65, 228-33 (1933); cf. C. A. 26, 2330, 5436, 6161. A. F.

**The viscosity of oleo varnishes.** Johannes Scheiber. *Farbe u. Lack* 1933, 580.—Boller's statements that the viscosity of a varnish depends upon the vol. ratio of the



thinner rather than upon its nature are shown to be erroneous. The errors are ascribed to faulty use of the Engler viscometer.

**Requirements of silver varnishes.** H. Nolte. *Farbe u. Lack* 1933, 559-60, 569-70, 583, 605-6.—The wide variety of requirements for metal decorating, food can and metal-sign coatings are discussed.

**Picture finishing.** C. R. Bragdon. *Ind. Finishing* 10, No. 2, 11-14(1933).—A description of the materials and methods to be used in applying transparent preservative coatings such as dammar, shellac and synthetic resin varnishes and nitrocellulose lacquers to photographs, paintings, color prints, maps, blue prints, sketches and drawings on paper or canvas.

**The velocity of the hardening process.** K. Brandenburger. *Kunststoffe* 23, 251-3(1933).—It is suggested that the use of high-frequency elec. current would permit the pre-heating of resin masses to temps. in the vicinity of the hardening temp. and thus greatly reduce the time required for hardening in the press.

**Manufacture of linoleum.** Giles B. Cooke. *J. Chem. Education* 11, 3-13(1934).

**Liquo-crystalline resins and lacquers.** D. Vorländer. *Trans. Faraday Soc.* 29, 907-10(1933).—If one increases the ramification and bifurcation of mols. too far, one gets stationary super-cooled resins and lacquers; if only one dimension predominates, one gets resins and lacquers stable at room temp.

**Poly-vinyl resin masses.** Siegfried Malowan. *Kunststoffe* 23, 225-6(1933).—A general discussion.

**Hydraulic precision presses.** Wilh. Weuringh. *Kunststoffe* 23, 204(1933).—A new precision press for molding artificial resins is described with the aid of a diagram.

**Modern developments in synthetic resins.** Carleton Ellis. *Ind. Eng. Chem.* 26, 37-40(1934).

**The possibility of skin diseases from synthetic resins.** Walter Meyer. *Farben-Chem.* 4, 453-7(1933).—Eczema of the lower lip was traced to the use of a cigar holder made of synthetic resin. Other authorities are cited to show that a real hazard exists in the manuf. and use of articles made of phenol formaldehyde condensation products. Hydrolysis of the resin by the body fluids is given as a possible cause.

**Factors influencing resin concn. in loblolly and slash pine** (Bishop, Marckworth) 11D. Dctn. of apparent vol. of [pigments] (Becker) 1. Physiol. products of the lac insect (Rao, Sreenivasaya) 11I. Chem. tech. uses for a resinous pitch lignite coal [resins for the lacquer industry] (Müller-Neuglück) 21. Transformation products of rubber [for making paints, varnishes] (Fr. pat. 752,502) 30. Treating Zn sulfide ores [production of pigments] (U. S. pat. 1,937,638) 9. Drying oils and resins from pine exts. (U. S. pat. 1,938,320) 22. Cellulose ester lacquers (Ger. pat. 580,592) 23. Varnishes (Fr. pat. 752,797) 23. Vinylacetylene derivs. [prepn. of lacquers, varnishes, enamels] (Fr. pat. 753,465) 10.

**Paint, etc.** I. G. Farbenind. A.-G. (Hermann Friedrich and Walter Droste, inventors). Ger. 581,844, Aug. 3, 1933. The covering properties of coloring materials such as zinc white,  $\text{TiO}_2$ , rouge or lithopone, etc., is improved by addn. of monoacidylalkylenediamine or monoacidylpolyalkylenediamine or their alkylated products including quaternary  $\text{NH}_4$  bases. Thus,  $\text{TiO}_2$  is ground up and mixed with linseed oil, benzine and monoethyl-ethylenediamine. Other examples are given. Cf. C. A. 27, 5994.

**Painting.** Rudolf W. Moll. Fr. 750,777, Aug. 18, 1933. Porous objects to be painted are first coated with a soln. in a common solvent of a mixt. of chlorinated rubber and neutral suint.

**Painting or printing on cellulosic materials.** Pierre L. Herbinet. Fr. 753,365, Oct. 14, 1933. The colors used are dissolved in AcOH or other solvent of low volatility.

<sup>1</sup> The AcOH is preferably dild. with solvents having a moderating influence on its action, e. g., MeOH, EtOH or eucalyptol.

**Pigments.** I. G. Farbenind. A.-G. (Hans Georg Grimm and Ekbert Lederle, inventors). Ger. 580,701, July 18, 1933. Yellow pigments are prepd. by pptg.  $\text{PbCrO}_4$  together with  $\text{SrCrO}_4$  or  $\text{BaCrO}_4$ , or by treating  $\text{PbO}$  or other difficultly sol. Pb compds. with alk. earth chloride and pptg. with chromate. The resulting pigment is a yellow double chromate of varying compn. Examples are given.

**Pigments.** I. G. Farbenind. A.-G. (Friedrich A. Henglein and Oswin Nitzschke, inventors). Ger. 584,766, Sept. 23, 1933. A homogeneous mixt. of  $\text{CrO}_3$  and alk.-earth sulfate is obtained by heating alk.-earth chromate to glowing in an atm. of  $\text{SO}_2$  or  $\text{SO}_3$ .

**Titanium oxide pigment.** Marion L. Hanahan (to Krebs Pigment & Color Corp.). U. S. 1,937,037, Nov. 28. For sepg. a calcined  $\text{TiO}_2$  pigment into fractions of different particle sizes, a suspension of the pigment in a liquid such as water is deflocculated and the deflocculated suspension is elutriated at a predetd. speed of flow.

**Zinc sulfide pigment.** Niels C. Christensen. U. S. 1,937,639, Dec. 5. Finely divided solid  $\text{ZnO}$  is treated with  $\text{H}_2\text{S}$  and the resulting sulfidic material is calcined, quenched and ground.

<sup>4</sup> **Colloid mill suitable for treating pigments, enamels, etc.** Oscar A. Ross. U. S. 1,937,788, Dec. 5. Numerous structural, mech. and operative details are described.

**Printing ink.** Hans Kurz and Karl Albert. Brit. 396,654, Aug. 10, 1933. Addn. to 371,527 (C. A. 27, 3627). The process of 371,527 for the prepn. of a body for intaglio printing inks is modified by first sponging the resin with aq. solus. of alkalis and (or)  $\text{NH}_3$  and then adding alc. or other volatile  $\text{H}_2\text{O}$ -sol. org. solvent or a soln. of a resin in such a solvent. Examples are given. Cf. C. A. 27, 5995.

**Printing inks.** Walter Denzler. Brit. 396,618, Aug. 10, 1933. A printing ink, particularly for intaglio printing, consists of an emulsion the continuous phase of which is an aq. liquor not contg. an agglutinant but contg. colloidal substances, e. g., soaps, saponins, Turkey-red oil or other high-mol. sulfonated org. compds. or their salts, alkylated or oxyalkylated salts of amines or amides of the higher fatty acids, proteins, tannins, pectins, vegetable mucus, gums, pigments, with or without solids in soln. or suspension which act to stabilize the emulsion, e. g., phenols, higher alcs., and the dispersed phase, a  $\text{H}_2\text{O}$ -insol. agglutinant, e. g., a resin or bituminous substance, wax, cellulose ester, linseed or other drying oil, especially in the oxidized or polymerized form, India rubber, balata, in soln. in a  $\text{H}_2\text{O}$ -immiscible volatile org. solvent, e. g., a  $\text{C}_6\text{H}_6$  hydrocarbon, petroleum distillate, hydrogenated derivs. of  $\text{C}_6\text{H}_6$  and  $\text{C}_{10}\text{H}_8$ , turpentine, org. acid ester. The pigment may be partly or wholly replaced by  $\text{H}_2\text{O}$ -insol. coloring matter dissolved in the dispersed phase. The pigment is ground with either liquid prior to emulsification or with the prepd. emulsion. Examples are given.

**Printing inks and colors.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. Fr. 752,492, Sept. 23, 1933. Paraffin hydrocarbons contg. a small amt. of solvents known in the lacquer industry, e. g., benzine and 10% of alc. or ethyleneglycol monoethyl ether, are used instead of the usual benzoic hydrocarbons in the manuf. of printing colors and inks.

**Drying extracts.** I. G. Farbenind. A.-G. (Friedrich Meidert and Hermann Schatz, inventors). Ger. 578,416, July 21, 1933. Addn. to 576,939 (C. A. 28, 351<sup>4</sup>). In prepg. homogeneous drying exts., by the method of 576,939, the fatty acid solvent is partly replaced by linseed, wood, soy-bean, poppy-seed or other oils.

**Drying extracts.** I. G. Farbenind. A.-G. (Friedrich Meidert, inventor). Ger. 579,683, June 29, 1933. Addn. to 576,939 (C. A. 28, 351<sup>4</sup>). In prepg. drying exts. for use in the paint and varnish industry by the method of 576,939, the free fatty acids of the drying and semi-drying oils are wholly or partly replaced by free lower olefinic carboxylic acids or their aromatic homologs, or by  $\text{NaOH}$

or its derivs. with free COOH groups. Examples are<sup>1</sup> ketone such as methylene ethyl methyl ketone, vinyl methyl ketone or the like (suitably by heating with or without addn. of emulsifying agents, etc.). Various examples with details of procedure are given.

**Varnish.** Bernhard Baumeister. Ger. 581,526, July 29, 1933. An oil for making varnishes is prepd. by heating wood oil with an aq. soln. of an org. acid such as (CO<sub>2</sub>H)<sub>2</sub>, sepg. the oil layer and further heating it.

**Varnish.** Soc. de gaz de Paris. Fr. 751,305, Aug. 31, 1933. A varnish contains coal-tar pitch 65, PhOH 5 and benzene 30% by wt.

**Varnish or enamel for producing imitation leather finishes.** Dale M. Phillippi (to Kay and Ess Chemical Corp.). U. S. 1,936,913, Nov. 28. A synthetic resin formed of cresol, formaldehyde and colophony is used with PbO, Mn linoleate, Co linoleate, China wood oil and linseed oil. Cf. C. A. 27, 434.

**Nitrocellulose lacquer.** Garrett H. Peters (to Hercules Powder Co.). U. S. 1,936,989, Nov. 28. A lacquer free from water-miscible ingredients and capable of forming an unclouded film on evapn. of volatile ingredients contains nitrocellulose, water, BuOAc, toluene ester gum and tricresyl phosphate (the water being emulsified in dispersed phase in the liquid ingredients).

**Lacquer-drying furnace.** Siemens-Schuckertwerke A.-G. Ger. 584,938, Sept. 26, 1933.

**Electrically heated drying oven for lacquered ware.** Siemens-Schuckertwerke A.-G. (Johann Schnepf, inventors). Ger. 583,839, Sept. 9, 1933.

**Rotating-drum furnace for heating lithopone, etc.** Eisenwerk Albert Gerlach G. m. b. H. Ger. 579,895, July 3, 1933.

**Artificial materials.** Röhm & Haas A.-G. Fr. 750,873, Aug. 2, 1933. Polymerization products of acrylic acid or its derivs. or homologs, or vinyl alc. or its esters or ethers or vinyl ketones, taken separately or in admixt., are treated with Cl preferably with heat and pressure and in the presence of a catalyst. The products may be used for making lacquers, films, threads, artificial leather, etc. Cf. C. A. 28, 270<sup>a</sup>.

**Polymerizing, condensing and oxidizing crude tall oil.** Richard H. Patch and Fritz Dambacher (to E. F. Houghton & Co.). U. S. 1,938,532, Dec. 5. Crude tall oil is subjected to the action of O at a temp. (suitably about 110° with air and Fe resinate) and for a time (suitably about 40 hrs.) sufficient to condense and refine the material and form a substantially odorless, non-sludging, dark, clear oil which is suitable for use as a cooling oil in cutting metals and for various other purposes.

**Resinous materials.** Imperial Chemical Industries Ltd. Fr. 751,605, Sept. 7, 1933. Bubbles of air are removed from plates, blocks or other compact masses of thermoplastic resinous materials by submitting the material under pressure to a temp. sufficient to soften the mass, but insufficient to cause decompn. or loss of plasticity. The free surface of the material is covered with an inert liquid.

**Shellac-like resins from agatho-copal resins.** Johannes Scheiber (to Walter Dux). U. S. 1,938,468, Dec. 5. Agatho-copal resins are dissolved in a soln. of an alkali such as NaOH or KOH and this soln. is mixed with an alk. soln. of a polyhydroxy-carboxylic aliphatic acid such as trihydroxystearic acid and the mixt. is pptd. with an inorg. acid such as HCl and the filtered ppt. is heated until the melt is sol. in cold alc. Cf. C. A. 27, 3350.

**Artificial resins.** Kurt Meisenburg, Walter Bock and Otto Bächle (to I. G. Farbenind. A.-G.). U. S. 1,937,063, Nov. 28. Artificial resins, which are generally colorless or but slightly colored and which are more sol. in benzene than the corresponding ketone resins and less brittle than the corresponding olefin benzene and naphthalene resins, are obtained from a mixt. of styrene (or  $\alpha$ -alkylstyrenes, divinylbenzene, or a vinyl naphthalene) with a

ketone such as methylene ethyl methyl ketone, vinyl methyl ketone or the like (suitably by heating with or without addn. of emulsifying agents, etc.). Various examples with details of procedure are given.

**Synthetic resin.** Israel Rosenblum. U. S. 1,937,533, Dec. 5. A permanently fusible and oil-sol. synthetic resin is produced by the reaction of glycerol with cracked rosin and with the acids obtained by hydrolysis of linseed oil. Cf. C. A. 27, 3096.

**Synthetic resins.** N. V. Philips' Gloeilampenfabrieken. Brit. 397,690, Aug. 31, 1933. See Fr. 743,859 (C. A. 27, 4110).

**Synthetic resins.** Isidor Feinmann. Brit. 397,609, Sept. 4, 1933; Fr. 752,431, Sept. 22, 1933. In the manuf. of resins by condensing aldehydes with other compds, e. g., urea, PhOH, in the presence or absence of an acid, basic or neutral catalyst the reaction product is fractionated by treatment with H<sub>2</sub>O into portions with different affinities for H<sub>2</sub>O and the sepd. fractions are mixed in desired proportions to produce the final product. Thus the min. amt. of distd. H<sub>2</sub>O necessary to effect sepu. into 2 layers on cooling to 15° is added to the hot reaction mixt., the lower layer formed, contg. the highest condensation products, is sepd. and the aq. upper layer further dild. to ppt. middle condensation products.

**Synthetic resins.** Allgemeine Elektrizitäts-Ges. Ger. 580,931, July 22, 1933. In making resins by treating polyhydric alcs. with polybasic acids, an org. acid contg. the group HSO<sub>3</sub> is added to the starting materials. A monobasic org. acid may also be present. In an example, a resin is formed by heating together phthalic anhydride, 4-aminotoluene-2-sulfonic acid and glycerol.

**Synthetic resins.** F. Raschig G. m. b. H. Ger. 581,907, Aug. 4, 1933. The surfaces of hardened PhOH-aldehyde resins are colored blue or black by cold or slightly warm treatment first with an aq. soln. of *p*-phenylenediamine and then with H<sub>2</sub>O<sub>2</sub>.

**Synthetic resins.** F. Raschig G. m. b. H. Fr. 751,161, Aug. 28, 1933. Molding compns. are made by condensing phenols with CH<sub>2</sub>O, or substances yielding CH<sub>2</sub>O, in amt. of 1 mol. of PhOH for more than 1.5, preferably 2, mols. of CH<sub>2</sub>O, hardening this resin at a moderate temp. until the solidified resin gives a powder which does not assume a concretionary state at 70-100°, and removing volatile substances by heating to 80-100° under vacuum.

**Synthetic resin.** Soc. française Duco. Fr. 752,620, Sept. 27, 1933. A resin of the glyptal type which is insol. in water, neutral and sol. in org. solvents is obtained at a low temp. (140-60°) by sepg. the neutral glycerol phthalate formed during this reaction. The reaction mass is taken up in an org. solvent (acetone, alc.), the acid and neutral phthalates are dissolved and addn. of an alk. substance or soln. ppts. the desired resin.

**Synthetic resins and resinous compositions.** Standard Oil Development Co. Brit. 397,699, Aug. 31, 1933. Resins and plastic resinous products, which may be used as constituents of paints, varnishes, lacquers, rubber compns., etc., or as paving or coating materials or for molding, are prepd. or extd. from tars obtained in cracking petroleum oils by (a) subjecting the tar to the action of a condensing agent, e. g., AlCl<sub>3</sub>, with or without the addn. of unsatd. hydrocarbons to take part in the condensation, and sepg. the condensation products so formed together with the resinous products already contained in the tar, or (b) subjecting the tar to distn. to sep. an oil which boils at 330-660°F. at 1 mm. Hg pressure and sepg. by appropriate extn. or other method the resins from the residue (which contains also asphaltenes) or (c) distg. off the oil as in (b) and then subjecting said oil to condensation, with or without addn. of reactive hydrocarbons, and sepg. the resinous condensation products therefrom.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The kernel fats of some members of the Palmae: *Acrocomia selerocarpa* Mart. (gru-gru palm), *Manicaria*

*saccifera* Gaertn., *Astrocaryum tucuma* Mart., *milliana caribaea* Griseb., *Attalea excelsa* Mart. (*pallia*

palm) and *Cocos nucifera* Linn (coconut). Geoffrey Collin. *Biochem. J.* 27, 1366-72(1933).—Data for 6 seed fats of this family are given. Benjamin Harrow

Comparison of various methods of determining iodine values and their effect on the calculated results of fat analysis. A. D. Barbour. *Oil and Soap* 11, 7-9(1934).—The Wijs and Margosches methods give the highest I nos., the Rosenmund-Kuhnheim method gives the lowest and the Margosches the most variable. The Kaufmann method is outstanding for ease of prepn. and convenience in use. The reagent is superior to the Wijs in stability and to the Hanus in ease and convenience of prepn. It is also neutral and does not show a recurrent end point.

E. Scherubel

Composition of fatty acid mixtures. II. Twitchell mixed-melting-point method—for the determination of individual saturated fatty acids? Robert N. Wenzel. *Ind. Eng. Chem., Anal. Ed.* 6, 1-7(1934); cf. C. A. 28, 6057.—A distinct improvement in the results by the mixed m.-p. method is obtainable by an improvement in the m.-p. detn. with Burk's app. and an extremely slow rate of heating in a closed m.-p. tube. There are 8 tables of results.

E. Scherubel

The chemistry of some little-known oils. E. Bursch. *Chimie & industrie Special No.*, 1056-77(June, 1933).—*Peach kernel oils*, obtained by extn. with  $\text{Et}_2\text{O}$ , cold petr. ether, boiling petr. ether,  $\text{CHCl}_3$ ,  $\text{CCl}_4$ ,  $\text{CS}_2$  and  $\text{C}_6\text{H}_6$ , differed but little in compn.; the best quality (as judged by the acid no.) was obtained with  $\text{CHCl}_3$  and the poorest with boiling petr. ether. The characteristics were: yield 33.3-49.0%,  $d_{20}^{20}$  0.911-0.920, acid no. 9.29-27.77, sapon. no. 196.12-198.82, I no. (Hübl) 97.39-104.41, I no. (Hanus) 97.64-104.92, Reichert-Meissl no. 0.403-1.53, Polenske no. 0.615-0.856, Hehner no. 92.54-94.08, Ac no. (on  $\text{Et}_2\text{O}$ -extd. oil only) 22.90-24.56, ester no. 173.68-188.98, glycerol 9.50-10.34%. The oil contains the following acids 55-60% oleic, 45-20% linolic and not over 5% satd. acids consisting chiefly of stearic and palmitic with probably a small amt. of myristic acid. The oil contains about 0.01% phytosterol, m. 129°. *Oils of para nut kernels*, obtained by extn. with the same solvents as above, differed but little in compn. and had the following characteristics: yield 50.75-68.80%,  $d_{20}^{20}$  0.909-0.917, acid no. 0.80-4.00, sapon. no. 196.80-206.90, I no. (Hübl) 92.23-99.50, I no. (Hanus) 93.40-102.12, Reichert-Meissl no. 0.960-1.859, Polenske no. 0.140-3.140, Hehner no. 89.15-95.94, Ac no. (on  $\text{Et}_2\text{O}$ -extd. oil only) 8.20-13.73, ester no. 195.77-202.59, glycerol 10.71-11.08%. The oil contains the following fatty acids: 50-55% oleic, 15% linolic and 15% satd. acids consisting mainly of palmitic with some stearic. The oil contains 0.04-0.08% phytosterol, m. 130°. *Apricot kernel oils*, obtained by extn. with  $\text{Et}_2\text{O}$ , petr. ether,  $\text{CHCl}_3$ ,  $\text{CCl}_4$ ,  $\text{CS}_2$ , cold  $\text{C}_6\text{H}_6$  and boiling  $\text{C}_6\text{H}_6$ , differed but little in compn. and had the following characteristics: yield 26.3-49.0%,  $d_{20}^{20}$  0.944-0.956, acid no. 9.07-29.92, sapon. no. 191.30-205.82, I no. (Hübl) 95.17-113.78, I no. (Hanus) 98.97-116.39, Reichert-Meissl no. 0.877-3.275, Polenske no. 1.567-2.987, Hehner no. 89.30-94.60, Ac no. (only on oil extd. with boiling  $\text{C}_6\text{H}_6$ ) 26.65-33.82, ester no. 173.74-196.40, glycerol 9.50-10.74%. The oil contains the following fatty acids: 65% oleic, 15% linolic and 2-3% satd. acids consisting of palmitic and stearic. The oil contains 0.19% phytosterol, m. 133.5-134°, I no. (Hanus) 139.5, giving phytosterol acetate, m. 119-20°, and hexabromophytosterol acetate, m. 80-1°. *Pear-seed oils*, obtained by extn. with cold  $\text{Et}_2\text{O}$ , boiling  $\text{Et}_2\text{O}$ , petr. ether,  $\text{CHCl}_3$ ,  $\text{CCl}_4$ ,  $\text{CS}_2$  and  $\text{C}_6\text{H}_6$ , showed but little difference in compn. The oil obtained with boiling  $\text{Et}_2\text{O}$  m. 21-2° and has  $d_{20}^{20}$  0.918. The characteristics were: yield 14.1-25.5%,  $d_{20}^{20}$  0.914-0.918, acid no. 22.16-28.34, sapon. no. 196.20-200.62 I no. (Hübl) 119.95-122.26, I no. (Hanus) 119.11-121.85, Reichert-Meissl no. 1.21-1.75, Polenske no. 0.851-0.988, Hehner no. 90.14-93.05, ester no. 160.99-175.66, glycerol 8.81-9.61%. The oil contains stearic acid 5-6%, palmitic 2-3%, lauric up to 0.5%, linolic 4-6%, oleic about 65%. The phytosterol m. 115°. *Oils of horse-radish (Raphanus raphanistrum) seed*, obtained by extn. with  $\text{Et}_2\text{O}$ , cold

petr. ether, boiling petr. ether,  $\text{CHCl}_3$ ,  $\text{CCl}_4$  and  $\text{C}_6\text{H}_6$ , differed but little in compn. The oil obtained with boiling petr. ether m. 23-4° and has  $d_{20}^{20}$  0.914. The characteristics were: yield 26.5-29.3%,  $d_{20}^{20}$  0.910-0.932, acid no. 2.12-4.39, sapon. no. 175.36-178.99, I no. (Hübl) 105.59-109.72, I no. (Hanus) 105.22-109.40, Reichert-Meissl no. 0.652-1.39, Polenske no. 0.657-0.949, Hehner no. 92.34-93.84, ester no. 172.91, 176.48, glycerol 9.46-9.65%. The oil contains: arachidic acid 1.5-2%, linolic 8-10%, linolenic 5-7%, rapic about 80%, oleic trace, solid unsatd. 1-1.5%. The oil contains 0.2-0.3% phytosterol m. 128°.

A. Papineau-Couture

Refining losses on edible vegetable oils. Alan P. Lee. *Oil and Soap* 11, 12-16(1934).—Statistical. E. S.

Yield calculations for oil extractions. M. Junker. *Seifensieder-Ztg.* 60, 833-4(1933).—The usual analytical oil extns. of several hrs.' duration dissolve besides oil the phosphatides and other substances while factory extns. of  $\frac{1}{4}$  hr. do not; the  $\text{H}_2\text{O}$  contents of lab. and factory residues are not the same; these 2 factors cause the differences between the calcd. and actual oil yields. P. Escher

The ultra-violet absorption capacity of olive oils. Gulbrand Lunde, Hans Kringstad and Harald W. Weedon. *Angew. Chem.* 46, 796-8(1933); cf. C. A. 27, 3099.—A no. of virgin olive oils, as well as refined, pressed and extd. oils were examd. at  $\lambda$  = about 2750 Å., as the various types of olive oils showed marked differences in the absorption at this wave length. The extinction per cm. was  $E = 10-22$  for virgin oils, 35-55 for the refined pressed oils and 54-90 for the refined extd. oils. Stronger ultra-violet absorption was accompanied by a stronger blue fluorescence. The change of extinction was examd. for heat treatment and neutralization in the hot and cold. The absorption curves of 4 representative oils are presented and are very characteristic, particularly for the refined pressed oil, which shows a flat portion at 2600-2700 Å. Both absorption in the ultra-violet and measurement of the fluorescence are suitable for the detns. of the quality of olive oils. Six references. Karl Kammermeyer

Absorption spectra in relation to the constitution of fish oils. Joseph R. Edisbury, Richard A. Morton and John A. Lovern. *Biochem. J.* 27, 1451-60(1933).—The well-defined narrow absorption bands owe their origin to unsatn. in the absorbing mols. The highly absorbing acids are not present in the original oils as the corresponding glycerides. The hypothesis that the absorbing acids are straight-chain compds. with conjugated double bonds is not in harmony with the evidence. During sapon., unsatd. acids with low absorption are changed to unsatd. acids with high and selective absorption. Cyclization is a probable explanation of this change. B. Harrow

The A. L. C. A. methods of analysis for sulfonated oils. Ralph Hart. *J. Am. Leather Chem. Assoc.* 28, 593-602(1933). H. discusses criticisms by Burton and Robertshaw (C. A. 26, 613; 27, 3630). The difference between results for so-called total oil in the A. L. C. A. and in the Burton-Robertshaw methods is one merely of nomenclature and method of calcn. The ether-abs. alc. method for salts gives low results for NaCl. Detn. of active groups is considered more important than a complete fractionation of the oil. H. B. Mcerrill

Qualitative test for waxes. D. Holde. *Fettchem. Umschau* 40, 233(1933).—The usual qual. test for unsaponifiable oil, wax, paraffin, etc., in fats and oils consists in boiling for 2 min. 6-8 drops of the oil with 2-3 cc.  $N$  KOH and adding dropwise 1-10 cc.  $\text{H}_2\text{O}$ , when the unsaponifiable substances cause a turbidity, with the exception of spermaceti oil, and bottlenose oil. G. Buchner reports that a long-continued boiling also keeps beeswax, spermaceti and other waxes dissolved in the hot soap soln.; only spermaceti seps. as a turbidity on cooling. P. Escher

Change in the composition and analytical constants of beeswax at 150-200°. G. Buchner. *Fettchem. Umschau* 40, 234(1933).—When heating pure beeswax or its mixts. with paraffin to 150-250°, the acid no. decreases, the ester no. and sapon. no. increase, but on further heating a re-esterization or estolide formation occurs which again decreases the ester no. and sapon. no. P. Escher

**Extraction of triethanolamine oleate from aqueous solution.** Frank M. Biffen and Foster Dee Snell. *Ind. Eng. Chem., Anal. Ed.* 6, 78(1934).—In extn. of oil from triethanolamine soap-oil emulsions, fatty acid accompanies the extd. oil. Prolonged extn. with correction of the extd. oil for the free fatty acid so extd. may be used.

Foster Dee Snell

**Some new detergents.** A. S. Richardson. *Oil and Soap* 11, 10-11(1934).—One class of new detergents consists of alkyl sulfates, e. g., Na lauryl sulfate. To date they have been sold mainly in the textile industry; and their most interesting property is resistance to pptn. in hard water. Another class of new cleansing agents may be called acylated sulfonates, one type of which consists of the fatty acid esters of hydroxysulfonates of low mol. wt. Another type consists of the corresponding acid amides in which the O involved in the ester linkage is replaced by NH or NR. These compds. have cleansing and sudsing power similar to that of soap or of alkyl sulfates. The mol. formula is capable of variations similar to those of the alkyl sulfates.

E. Scherubel

**Effects of sulfonates of aliphatic alcohols upon shaving soaps and shaving creams.** Welwart. *Seifensieder-Zig.* 60, 872-3(1933).—The lathering power of shaving soaps on the skin is not improved by adding up to 8% of sulfonated lauric or cetyl alc. or of "lanette wax," especially when using regular com. products which contain a high percentage of Na<sub>2</sub>SO<sub>4</sub>. An addn. of 10% of these sulfonates may increase stability of soap toward Ca compds. but this effect can be obtained more cheaply with other preps.

P. Escher

**Disinfectants in soap base.** R. Voss. *Seifensieder-Zig.* 60, 855-6, 875, 893-4(1933).—Disinfecting soaps should kill coli bacteria or staphylococci in 3-5 min. in 1-2% soln. without irritating the skin. Soaps without disinfectants have varying degrees of bactericidal properties. Expts. are tabulated in which Na soaps of satd. fatty acids contg. phenols were superior in power to kill bacteria to similar K soaps of satd. or unsatd. fatty acids.

P. Escher

**Fire extinguishers [for extinguishing burning oil, fats, waxes]** (Fr. pat. 752,621) 18. Recovering neutral grease from wool-washing water (U. S. pat. 1,937,291) 25. Oxidizing hydrocarbons [waxes, etc.] (Ger. pat. 579,988) 10. Ni catalysts [for hydrogenation of cottonseed oil] (Brit. pat. 397,295) 18. Vegetable oil (Fr. pat. 752,876) 12. Fatty acids (Ger. pat. 581,829) 10.

**Fats.** Deutsche Hydrierwerke A.-G. Ger. 579,806, July 3, 1933. See Fr. 738,505 (C. A. 27, 2056).

**Sulfonating fats and fatty acids.** H. Th. Böhme, A.-G. Chemische Fabrik. Ger. 581,658, July 31, 1933. Addn. to 553,503 (C. A. 26, 5780). The method of 553,503, whereby fats, etc., are sulfonated by treatment with H<sub>2</sub>SO<sub>4</sub> in the presence of anhyd. org. acids, anhydrides or acid chlorides, is applied to unsatd. fatty acids. Anhydrides or chlorides of aliphatic carboxylic acids contg. more than 3 C atoms are used. Thus, oleic acid is sulfonated with H<sub>2</sub>SO<sub>4</sub> in the presence of Ac<sub>2</sub>O.

**Still suitable for distillation of fatty acids, etc.** Wilhelm Gensecke (to American Lurgi Corp.). U. S. 1,936,964, Nov. 28.

**Distillation of volatile substances such as free fatty acids from vegetable and animal oils and fats.** Hans Franzen and Max Schellmann (to I. G. Farbenind. A.-G.). U. S. 1,937,320, Nov. 28. A volatile liquid such as water in the form of a continuous capillary stream at a velocity of at least 40 cm. per sec. is introduced into oil or fat in the liquid state, such as peanut oil heated to above the b. p. of the volatile liquid introduced. App. is described.

**Oils and fats.** Metallgesellschaft A.-G. Fr. 753,947, Oct. 27, 1933. Free fatty acids present in animal or vegetable oils or fats are neutralized by solns. of alkali and the alkali soap formed is transformed to an alk. earth soap by suitable solns. The alk. earth soaps obtained are split into neutral oil and fatty acid soap by means of a solvent such as benzene, and the fatty acid soap is decom-

posed by a mineral or org. acid into fatty acid, which dissolves in the solvent. The solvent is removed from the fatty acid by distn.

**Aromatizing oils, fats, etc.** Georges H. Dupont. Fr. 752,693, Sept. 28, 1933. Oils, fats, margarine, etc., are aromatized by tartaric acid, dihydroxymaleic acid and dihydroxytartaric acid, alone or in admixt. The esters may be used instead of the free acids.

**Detectors for oils, fats, etc.** I. G. Farbenind. A.-G. Fr. 751,608, Sept. 7, 1933. Colorless or colored compds. of 1,2,4-trihydroxybenzene from which the trihydroxybenzene is liberated by strong HCl, if necessary in the presence of reducing agents, are incorporated in very small amts. in oils or animal or vegetable fats whereby the presence of these may be detected. Examples are given of the use of 1,2,4-triacetoxybenzene and a dye-prepd. from diazotized o-toluidine and tributyrat of hydroxyhydroquinone.

**Refining fatty oils, etc.** Ludwig Rosenstein and Walter J. Hund. Ger. 580,874, July 17, 1933. See U. S. 1,885,859 (C. A. 27, 1225).

**Catalytic treatment of oils, etc.** Soc. anon. français pour la fabrication des essences et pétroles. Fr. 753,335, Oct. 13, 1933. Means is provided to vary the capacity of the contact mass in circuit according to the state, in the stage considered, of the matter admitted to the contact chamber, at the same time as the temp. is varied inversely. The flow of oil, etc., is maintained as nearly as possible the same during the successive stages. An app. is described.

**Soluble oils.** Gustav J. C. Beckmann. Fr. 754,228, Nov. 3, 1933. Sol. oils, soaps, etc., are made by mixing animal, mineral or vegetable oils with resin as a catalyst and sapon. with NaOH lye.

**Apparatus for extracting oil from oleaginous fruits.** Fried. Krupp Grusonwerk A.-G. Fr. 751,523, Sept. 5, 1933.

**Recovery of solvents from animal skins.** Alexander Wacker Ges. für elektrochemische Ind. G. m. b. H. Fr. 751,088, Aug. 26, 1933. Volatile solvents used to ext. fats, etc., from skins, etc., are recovered by appropriate gases in the presence of hot water.

**Sulfonation products.** Oranienburger chemische Fabrik A.-G. (Kurt Lindner and Johannes Zickermann, inventors). Ger. 583,686, Sept. 7, 1933. High-mol. products are obtained by treating natural fats, fatty acids or fat-like substances with about 50% of their wt. of a strong sulfonating agent such as ClHSO<sub>3</sub>, in the presence of aromatic hydrocarbons or their derivs.

**Terpineol sulfonic acids.** Soc. pour l'ind. chim. à Bâle. Brit. 398,086, Sept. 7, 1933. H<sub>2</sub>O-sol. derivs. of terpineol are obtained by treatment thereof with a sulfonating agent at a comparatively low temp. In examples ClSO<sub>3</sub> and 30% fuming H<sub>2</sub>SO<sub>4</sub> are used. The products are used as wetting, emulsifying and washing agents in the prepn. of lubricants, dressings and sizes for textiles.

**Soap.** I. G. Farbenind. A.-G. (Hermann Stötter and Theodor Hermann, inventors). Ger. 581,990, Aug. 5, 1933. A soap for cleaning wool, feathers, hair, etc., and for protecting them against moths, etc., comprises a mixt. of neutral or acid soap and a mothicide which remains on the fiber, such as 1,3-dichlorobenzene-4-sulfo-1,3-phenylenediamine. Salts of quaternary phosphonium bases or sol. salts of selenic or selenious acids or the free acids are accepted as mothicides. Cf. C. A. 27, 2056.

**Soap.** Robert P. Bordier. Fr. 750,972, Aug. 24, 1933. An activated and stabilized inorg. material, such as colloidal clay, is incorporated with the fatty material before sapon., to obtain a conveniently regulatable acceleration of the sapon., and increased detergent power.

**Soaps.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Fr. 42,548, Aug. 4, 1933. Addn. to 740,401 (C. A. 27, 4707). Difficultly sol. compds. of Ag, e. g., sub-halides or rhodanide of Ag, are incorporated in soap. The ions of Ag necessary for the disinfectant action are liberated, while, on account of the low soly., undesirable colorations are not produced.

**Acid soap.** Neoukh Baskin. Fr. 752,879, Oct. 2, 1933. Different fatty acids are mixed with sulfonated

fatty acids or sulfonic acids of high mol. wt. and partially neutralizing the mixt. with alkalis.

**Wetting agents.** Gaëtan P. Lièvre. Fr. 751,422, Sept. 4, 1933. Solns. having a high wetting power for textile fibers are obtained by neutralizing with a suitable base org. acid, sulfonated or not, contained in the washing residues obtained during the refining of combustible liquids. Salts of org. acids not only sulfonated but sulfured are preferably added. An example contains Na sulfonaphthenates 97 and  $\text{NH}_4$  ichthyolsulfonate 3%.

**Wetting, agents, etc.** Deutsche Hydrierwerke A.-G. Fr. 752,756, Sept. 30, 1933. Wetting, cleaning, dispersing and froth-producing agents are composed of free or neutralized hydroxyalkylsulfonic acids, having a max. of 6 C atoms in the mol., and in which one or more OH groups are etherified by alkyl groups contg. at least 6 C atoms. These substances are particularly useful for processes carried out at a low temp.

**Wetting, agents, etc.** Chemische Fabrik vorm. Sandoz. Fr. 753,752, Oct. 24, 1933. Wetting, washing,

emulsifying and dispersing agents are prepd. by condensing, with the aid of appropriate agents, aryl or aralkyl ethers of polyalcs. with aliphatic mono- or poly-alcs. or with derivs. of these alcs. contg. at least one OH, or with mixts. of such alcs. Sulfonic groups may be introduced before, during or after the condensation. Thus, the monocresyl ether of glycol is condensed with BuOH in the presence of  $\text{H}_2\text{SO}_4$ . Other examples are given. Cf. C. A. 28, 670,1,2,3.

**Wetting, agents, etc.** Deutsche Hydrierwerke A.-G. Fr. 753,753, Oct. 24, 1933. Amino- or aminohydroxy-sulfonic acids which are substituted in the  $\text{NH}_2$  group by at least one hydrocarbon radical of the aliphatic or alicyclic series of high mol. wt. contg. at least 8 C atoms, and which may contain a substituted hydroxy group or groups are used as wetting, impregnating, dispersing, froth-producing and cleansing agents. Examples are given of the prepn. of the Na salts of 1-dodecylaminonaphthalene-, 2-dodecylamino-6,8- and 2-octadecylamino-3,6,8-trisulfonic acid.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

Problems of tech. reactions. I. Decompn. of C compds. (sugar splitting) (Schmidt) 13. How to calculate sirup strengths quickly (Robertson) 12. Potash fertilization of the sugar beet (Zehentner) 15. Fumigation of cane grubs (Jarvis) 15.

**Sugar juices.** Soc. industrielle et agricole de la Somme. Fr. 42,530, Aug. 4, 1933. Addn. to 742,018 (C. A. 27, 3633).  $\text{Al}_2\text{O}_3$  in the form of a hydrosol is used for purifying sugar juices.

**Apparatus for leaching sugar sap out of cut-up beet or cane.** Hermann Claassen. Ger. 583,037, Sept. 7, 1933.

**Apparatus for concentrating solutions of sugar sap.** Paul Knichalik. Ger. 579,621, June 29, 1933.

**Filter press for sugar refineries, etc.** Fritz Scheibler Maschinenfabrik. Ger. 583,994, Sept. 13, 1933.

**Diffusion battery for extracting sugar.** C. Tixier & Compagnie (S. à r. l.). Fr. 751,534, Sept. 5, 1933.

**Diffusion batteries for sugar refining.** W. Eismann. Ger. 583,623, Sept. 6, 1933.

**Sugar.** Oskar Spengler, Georg Bartsch and Jochen Wigand. Ger. 583,624, Sept. 6, 1933. App. for pptg. lime and other undesired constituents of sugar sap by introduction of gases is described.

**Betaine hydrochloride and potassium hydrochloride**

from waste molasses. Yoshitaro Takayama. Ger. 581,819, Aug. 3, 1933. See U. S. 1,870,319 (C. A. 26, 5783 4).

**Starch.** Arthur P. Bryant (to Clinton Corn Syrup Refining Co.). U. S. 1,937,543, Dec. 5. For making a thicker boiling starch without decreasing the amount of  $\text{SO}_2$  normally added to the starch milk, the starch milk contg. normal amounts of  $\text{SO}_2$  is treated with NaOCl soln. in quantity sufficient to remove all of the  $\text{SO}_2$  and render the starch softer, more sterile and better adapted for the production of a thicker boiling starch than if the NaOCl were not used; the product is then dewatered, washed and dried.

**Corn starch.** International Patents Development Co. Fr. 754,127, Nov. 2, 1933. Corn is subjected in a fragmented state to sepn. operations in water to remove the germs and bran. Water is removed from the starch and the concd. starch is treated to remove the gluten. The water is used in another sepn. operation.

**Dextrin from corn starch.** Arthur D. Fuller (to National Adhesives Corp.). U. S. 1,937,752, Dec. 5. Wet starch is reacted with a Cl-contg. compd. such as  $\text{Ca}(\text{OCl})_2$ , and an alk. medium is added to produce a Cl reaction starch product having a  $p_H$  between the neutral point and the normal  $p_H$  of purified starch, and the product is then heated to form dextrin.

## 29—LEATHER AND GLUE

ALLEN ROGERS

**Apparatus for determining non-tannin in tanning materials.** F. Pothier. J. Intern. Soc. Leather Trades Chem. 17, 719-22(1933).—The app. combines the principles of the shake and filter-bell methods. Data indicate that reproducible results are obtained. H. B. Merrill

**Valonia and its tannins.** L. Todeschini. Boll. ufficiale staz. sper. ind. pelli mat. concianti 11, 541-7(1933).—The prepn. and compn. of exts. prepd. from valonia are discussed. J. W. Perry

**The flavonic compounds in wood, their fluorescence and relations with the tannins.** F. Vignolo-Lutati. Boll. ufficiale staz. sper. ind. pelli mat. concianti 11, 436-48 (1933).—The uncertainties and difficulties involved in detecting or detg. tannins by means of Woods's light are discussed. Evidence is presented indicating that the yellow fluorescence due to fisetin is dependent on its phys. state, while the action of inhibiting substances seems to be of secondary importance at most. Various theories of the biochem. significance of compds., such as fisetin, and their glucosides are briefly reviewed. The author suggests that the formation of such compds. in

heartwood occurs during the death of cellular plasma and is analogous to that of lignin. J. W. Perry

**Tanning with pine and oak extracts hides cut from the bellies of pigs by the side-cut method.** A. I. Zhemochkin. Ouladenie Tekhniki: Koshobuynoe Proizvodstvo 1932, No. 4, 44. —Pig belly skin should be preliminarily treated with S. This operation should precede the oak or pine tanning. The leather obtained can be used for uppers. A. A. Boehltigk

**The determination of iron and manganese in vegetable products.** Andrea Ponte and Renato Allegrini. Boll. ufficiale staz. ind. pelli mat. concianti 11, 297-305(1933).—Several samples of chestnut bark were found to contain approx. 10-40 times as much Fe and Mn as the wood from the same logs. Colorimetric methods were used, Fe being detd. as  $\text{Fe}(\text{CNS})_3$  and Mn as permanganate. J. W. Perry

**Tannery bates. II. The combination of pancreatin with hide substance.** A. Vlček and J. Pospíšil. Gerber. 59, 99-100, 111-14(1933); cf. C. A. 27, 5214.—The ability of hide powder to remove pancreatin from aq.

soln. was studied. It was found that the enzymic action on casein of salt-free, aq. pancreatin solns. was greatly decreased by allowing 200 cc. of the latter to stand in contact with 0.25-8.0 g. of hide substance for 35 min. at lab. temp. This was taken to indicate that the pancreatin was in some way bound by the hide substance. Since the decrease in enzymic activity was not, however, directly proportional to the amt. of hide powder used, it was concluded that certain fractions of the pancreatin combined more readily with the hide substance. No one method appears adequate for detg. the strength and suitability for practical use of enzyme preps. used as tannery bates.

J. W. Perry

**Skinner rabbits and hares and the treatment of furs.** G. S. Katzevas and V. N. Sveshnikova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Kozhevennoi Prom.* 1932 No. 2, 23-4. After the coarse hair had been cut off, the skins were treated with 8-12% soln. of NaOH, dried, soaked in water at 18° for 20-30 hrs., fleshed, immersed in a soln. of 0.2% NaOH at 30°, washed for 20 min., immersed in a second bath at 25°, contg. 0.4% NaHCO<sub>3</sub>, for 1-2 hrs., washed for 15-20 min., immersed in a third bath contg. 0.4% NaHCO<sub>3</sub>, 0.4% H<sub>2</sub>BO<sub>3</sub>, 3% "sozhal" (prepd. by fermentation with *Aspergillus orizae*) at 35°. This method yielded a satisfactory skin as well as good down. Use of pancreatic ext. produced a good soft leather, but the down was of a lower quality.

A. A. Boehlingk

**A cause of discrepancy in Procter-Searle acidity results.** I. D. Clarke and R. W. Frey. *J. Am. Leather Chem. Assoc.* 28, 580 3(1933).—Data are presented which show that variations in rate of heating may cause a 200 % increase in the apparent percentage of H<sub>2</sub>SO<sub>4</sub> in leather tanned with sulfite cellulose ext. Smaller differences are produced with leathers tanned with sulfited exts., and rate of heating makes no difference with leathers tanned with unsulfited exts.

H. B. Merrill

**Determination of acidity of vegetable-tanned leather.** I. D. Burton, et al. *J. Intern. Soc. Leather Trades Chem.* 17, 710-19(1933).—Collaborative tests showed that the Innes and Atkin-Thompson methods lead to practically the same conclusions when applied to different leathers, some of which were treated with H<sub>2</sub>SO<sub>4</sub>. The Procter-Searle method gave discordant results and in some cases neg. results even when 2% H<sub>2</sub>SO<sub>4</sub> was added to the leather.

H. B. Merrill

**Deterioration of vegetable-tanned leather on storage.** V. Protective action of non-tans. R. Faraday Innes. *J. Intern. Soc. Leather Chem.* 17, 725-56(1933); cf. C. A. 26, 1823. Premature rotting is generally, but not always, assocd. with the presence of catechol tannin. In rotted leathers of catechol tannage the  $p_{H_2O}$  value of the aq. ext. is lower than in that from rotted leathers of pyrogallol tannage. Neither degree of tannage nor grease content has much effect on deterioration. The H<sub>2</sub>SO<sub>4</sub>-H<sub>2</sub>O<sub>2</sub> accelerated aging test (C. A. 26, 1823) is shown to be valid by application to protected portions of old bindings, of which some were sound and some had rotted in exposed parts. Rate of rotting in the test varies with relative humidity; the max. is at 70%. A high content of H<sub>2</sub>O-sol. matter (non-tannin) protects against deterioration. This was demonstrated by impregnating leathers with solns. of tannin and non-tannin (sepd. by absorption of tannin by hide powder and subsequent extrn. with acetone) from sumac, mimosa and gambier, and subjecting the leathers to the peroxide test. This protective action of non-tans may account for more rapid deterioration of catechol-tanned leather, since catechol tanning materials usually have a low non-tannin content. It explains the greater deterioration of dyed as opposed to crust leather. Salts, including NaCl and Na<sub>2</sub>SO<sub>4</sub>, and especially salts of org. acids, are highly effective in protecting against deterioration. The best results were obtained with Na citrate and tartrate. The effect cannot be accounted for by the neutralizing effect of the salts on H<sub>2</sub>SO<sub>4</sub>. Tests with upholstery leathers gave results similar to those with book leathers. A few rotted leathers that do not obtain

1 excessive H<sub>2</sub>SO<sub>4</sub> are found to contain excessive Fe.

H. B. Merrill

**The origin of certain yellowish orange spots which developed on the skins of furs during the finishing operations.** Paolo Buzzi. *Boll. ufficiale staz. sper. ind. pell. mat. concianti* 11, 513-15(1933).—B. traces the development of yellowish spots on the hide parts of furs to incomplete removal of H<sub>2</sub>SO<sub>4</sub> taken up by the hide during the acid-alum tanning process. It is suggested that the spots were due to reaction of the H<sub>2</sub>SO<sub>4</sub> with the cholesterol in the skin. At any rate the removal or neutralization of the free H<sub>2</sub>SO<sub>4</sub> in the hide prevented or corrected the defect.

J. W. Perry

**Studies in the physiology of molds. IV. Molding of chrome-tanned skins.** Irvin H. Blank. *J. Am. Leather Chem. Assoc.* 28, 583-93(1933).—By use of *A. niger* spores on Czapek's medium, the concn. required to (a) inhibit growth and (b) kill the spores was detd. for 28 org. and inorg. compds. Data so obtained are not directly applicable to molding of chrome-tanned skins. By use of chrome-tanned pieces soaked in a 1 to 100 soln. of the compd., and inoculating with *Penicillium* sp., growth was inhibited for 40 days by HgCl<sub>2</sub> and *p*-nitrophenol, 10 15 days by *p*-chlorophenol and Na salt of *p*-chloro-*m*-cresol, 4-7 days by *p*-cresol and HCHO, while CuSO<sub>4</sub>, *o*-nitrophenol, NaH<sub>2</sub>PO<sub>4</sub>, and phenol had no effect. *p*-Nitrophenol, 1 to 20,000, inhibits growth on skins for 13 days. The ratio *p*-nitrophenol : H<sub>2</sub>O governs, not *p*-nitrophenol : skins. Tests with pieces split after impregnation with *p*-nitrophenol showed no mold growth on the split side, indicating good penetration of the antiseptic. Comparative tests showed that *p*-nitrophenol is as effective as 3 times its wt. of the widely used  $\beta$ -naphthol.

H. B. Merrill

**The effect of injuries caused by acarids on finished leather.** Augusto Ganner. *Boll. ufficiale staz. sper. ind. pell. mat. concianti* 11, 230-7(1933).—A careful microscopical examn. of several damaged leathers revealed that defects, which a casual examn. had attributed to various other causes, were very probably actually due to acarids (mites). The need of a close, careful examn., if such mistakes are to be avoided, is emphasized.

J. W. P.

**A. L. C. A. methods of analysis for sulfonated oils (Hart) 27. Waterproofing [leather] (Fr. pat. 753,510) 23. Artificial materials [products for making artificial leather] (Fr. pat. 750,873) 26.**

**Tanning agents.** J. R. Geigy A.-G. Brit. 397,672, Aug. 31, 1933. The agents are prepd. by condensing a non-sulfonated dihydroxydiphenylsulfone with an aromatic sulfonic acid and CH<sub>2</sub>O or S chloride. Particularly suitable sulfonic acids are those of substituted phenol ethyl ethers, such as obtained by etherifying PhOH with glycolchlorohydrin or ethylene dichloride. Among examples (1) naphthalenesulfonic acid (I) is condensed with dihydroxydiphenylsulfone (II) and CH<sub>2</sub>O, (2) the product obtained by sulfonating diphenylglycol ether with 93% H<sub>2</sub>SO<sub>4</sub> is condensed with II and CH<sub>2</sub>O and (3) I and II are condensed with S chloride.

**Tanning compositions.** Johann Huismann and Gustav Mauthe (to I. G. Farbenind. A.-G.). U. S. 1,938,022, Dec. 5. Tanning compns. are obtained by condensing bis(3-aminobenzenesulfonyl)benzidine - *m,m'*-disulfonic acid with 1,2-dichlorobenzene-4-sulfonyl chloride or by other described reactions which form condensation products of the general probable formula R<sup>1</sup>SO<sub>2</sub>-NHRNHSO<sub>2</sub>R<sup>2</sup> where R stands for a benzene, naphthalene or diphenyl radical, both nuclei of the diphenyl radical being linked together directly or by means of a bridge, and R<sup>1</sup> and R<sup>2</sup> represent di- or poly-nuclear aryl-sulfonylarylamide derivs. of the benzene or naphthalene series with chain-like linkage in which the sulfonylimide groups combining the aryl nuclei may be partly replaced by aliphatic or aromatic carboxamide groups, and where at least one nucleus contains a sulfonic acid group, and where all nuclei may be further substituted by halogen or



alkyl or hydroxy or carboxylic or alkylacetyl amino groups. Several examples with details of procedure are given.

**Tannin extract.** Erik Schirm. Ger. 584,541, Sept. 21, 1933. Vegetable tannin exts. are improved by subjecting them to the action of diazonium compds. in order to convert constituents capable of coupling, into azo dyes. Diazonium compds. of  $\text{PhNH}_2$ , its homologs or substitution products, such as aminobenzenesulfonic acids, are preferred. Examples are given.

**Tanning and dyeing.** Matthew M. Merrit (to United Shoe Machinery Corp.). Brit. 397,129, Aug. 11, 1933. Tanning or simultaneous tanning and dyeing is effected by treating the skins, etc., in a bath in which the treating materials are gradually dissolved as treatment proceeds. The skins are placed in the usual salt soln. in a drum with tanning material contained in waxed paper bags, enclosed in outer fabric bags, with or without similarly enclosed dyeing material. The paper bags are ruptured when drumming is commenced, and the material slowly dissolves.

**Tanning hides.** Alphons O. Jaeger (to Selden Co.). U. S. 1,938,388, Dec. 5. Hides are treated with an aq. soln. contg. at least one salt of a condensation product of a carbohydrate such as old sulfite paper pulp, starch or sugar,  $\text{H}_2\text{SO}_4$ , and the polymerization residue from the vaporization of a crude aromatic hydrocarbon such as that from crude anthracene. U. S. 1,938,389 relates to the similar use of an aq. soln. contg. a salt of a condensation product of a carbohydrate, phthalic anhydride, an aromatic hydrocarbon such as crude naphthalene residue and  $\text{H}_2\text{SO}_4$ . U. S. 1,938,390 relates to the similar use of an aq. soln. contg. a condensation product of a carbohydrate such as cellulose, an aromatic hydrocarbon such as crude naphthalene residue and  $\text{H}_2\text{SO}_4$ , after the condensation product has been subjected to the action of a bleaching agent such as a hypohalite. U. S. 1,938,391 relates to the use of an aq. soln. contg. a condensation product, obtained by reaction of a carbohydrate such as cellulose and an aromatic hydrocarbon such as a crude anthracene residue with  $\text{H}_2\text{SO}_4$  and an aldehyde such as formaldehyde or an alkali metal salt of such a condensation product.

**Tanning leather.** J. R. Geigy A.-G. Ger. 579,634, June 29, 1933. Skins and hides are treated with ext. of animal organs such as the liver, spleen, kidney, stomach or blood, and enough  $\text{H}_3\text{BO}_3$  or  $\text{AcOH}$  to give the ext. a  $\text{pH}$  value of 5-6.

**Leather.** La Chevette (Soc. anon.). Fr. 750,728, Aug. 17, 1933. One or more layers of a soln. composed of  $\text{Al}_2(\text{SO}_4)_3$ , oxalic acid,  $\text{BzOH}$ , water, alc. and acetone, in which a dye of any shade is incorporated, is applied to leather.

**Artificial leather.** Julius Votteler's Nachfolger G. m. b. H. Brit. 397,741, Aug. 31, 1933. See Fr. 747,253 (C. A. 27, 4952).

**Artificial leather, etc.** Arthur H. Kilner. Ger. 584,606, Sept. 21, 1933. Fabric such as cotton is impregnated or coated with viscose and passed through a pptg. bath. The product is then passed through a bath of glycerol or other softening agent and finally dried. The product can then be worked up to resemble leather, oil-cloth, etc.

**Finishing furs and skins.** I. G. Farbenind. A.-G. Brit. 396,495, Aug. 10, 1933. Pelts and skins are finished by incorporating with the hairs a prepn. comprising a mono ester of a polyhydric alc. and a soap-forming carboxylic acid, the prepn. being free from alkali. The prepn. may be applied by means of wood shavings impregnated therewith. Suitable esters are those obtained by heating coconut oil and glycerol in the presence of potash soap and the mono esters of the fatty acids of olive, castor, peanut and rape oils, tallow or other vegetable and animal fats and lauric, stearic and oleic acids combined with glycol, glycerol, polyglycerol, sorbitol, manitol, erythritol, etc., and derivs. of such compds., e. g., sulfuric and phosphoric esters thereof.

**Glue.** Breslauer Bankverein E. G. m. b. H. Ger. 581,634, July 31, 1933. Animal glue is caused to exert tension when dry by admixing cork meal and anhyd.  $\text{CaSO}_4$ . A small amt. of talcum may also be added.

**Apparatus for dividing glue solutions or other liquids into drops.** Gustaf Eckerbom (to Stockholms Benmjölsfabriks Aktiebolag). U. S. 1,938,219, Dec. 5. Structural features.

### 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The automobile tire of 1933 and why it gives outstanding service. C. R. Park. *Ind. Eng. Chem., Anal. Ed.* 11, 343 6(1933).--A semi-popular review, dealing with improvements in construction and compn., with special attention to the use of org. accelerators, protective agents and reinforcing powders as the chief factors in the greatly increased resistance to abrasion of present-day tread rubber mixts.

C. C. Davis

Is litharge an antioxygen or a prooxygen toward rubber? The practical consequences. Charles Dufraisse, Nicolas Drisch and Mme. Denise Pradier-Gibello. *Rev. gén. caoutchouc* 10, No. 94, 3 23(1933); cf. Dufraisse and Drisch, C. A. 26, 3697; 27, 6017.--Systematic expts. on the comparative behaviors upon oxidation of rubber mixts. accelerated with litharge (I) and with diphenylguanidine (II), resp., in the raw state and vulcanized to different degrees, lead to certain conclusions regarding the part played by I during hot and cold oxidation, a subject hitherto unsettled in spite of the work of various investigators (references to which are cited). II was chosen as a control accelerator because of its relatively insignificant effect on autooxidation and its similar activity to that of I. At room temp., mixts. with I absorbed O much more rapidly than did the corresponding mixts. with II, irrespective of the state of vulcanization. Mixts. vulcanized the most oxidized most rapidly. At higher temps. (80-100°) these differences between I and II diminished. There was no proportionality between the rate of oxidation and the percentage of I. To prove whether the more rapid absorption of O with I present is

catalytic or results from the reaction:  $\text{PbS} + 4\text{O} \rightarrow \text{PbSO}_4$ , oxidation was carried far beyond the stage corresponding to transformation of all PbS to  $\text{PbSO}_4$ . The absence of a change in the rate at the satn. point indicated no preferential absorption of O by PbS, but rather a catalytic effect. With the aid of tensile strength and extensibility measurements, a comparison was made of vulcanizates contg. I and those contg. II, both after equal periods of aging (hot and cold) and after equal proportions of O had been absorbed. With II mixts. the extent of deterioration was the same for the same O absorption, both when hot and at room temp., whereas with I mixts. deterioration was far more advanced at a given state of oxidation when the latter was carried out at elevated temp. than at room temp. Judged by the mech. properties, mixts. vulcanized with I or with II behaved in the same way on aging at room temp. (cf. Tener, Smith and Holt, C. A. 21, 4095). On the contrary, the oxidation of mixts. contg. I was 4 times as great as that of mixts. contg. II, and in general at room temp. a given proportion of O was less deleterious in the presence of I. On the basis that I diminishes the bad effect of O on the mech. properties, but promotes O absorption catalytically, the effects of antioxygens were tested. In their diminishing order of effectiveness as antioxygens stood phenyl- $\beta$ -naphthylamine, aldol- $\alpha$ -naphthylamine, dinaphthylamine, hydroquinone, diphenylhydrazine,  $\beta$ -naphthol, cupferron, benzidine, *m*-toluylenediamine, naphthohydroquinone, *p*-nitrosodimethylaniline, *m*-propylguaiacol, trioxymethylene, benzil and quinoline, while *o*-cresotic acid,

hydrazobenzene, piperidine, pyridine and triphenylamine were prooxygen with activities increasing in the order given. The expts. in general show that (1) I is a prooxygen and not an antioxygen as believed in the past; (2) I does not protect rubber against heat; (3) I diminishes the harmful effect of O on the mech. properties of rubber; and (4) this favorable effect of I is more pronounced at room temp. than at elevated temps. The exptl. technic and quant. results are given in detail.

C. C. Davis

Studies on the electrical behavior of rubbers. Takao Hasumi. *J. Soc. Rubber Ind. Japan* 6, 517-24(1933).—Samples were prepd. by compounding 60-80% rubber with S and vulcanizing. Both a. c. and d. c. (1000 cycle) were used for the test. The resistivity (ohm. per cc.) varied inversely with the temp. The dielec. const. was not influenced by a change of temp. (0-100°) except for a few samples which might have been influenced by the percentage of combined S. The puncture voltage (kv. per mm.) was not influenced by an increase of temp. (0-100°).

K. Kitsuta

Effect of changing angles in the aging test by exposure of rubber and a few other articles. Shobei Saito. *J. Soc. Rubber Ind. Japan* 6, 525-32(1933).—Raw and vulcanized rubbers, rubber-coated cloth, silk and vulcanized bitumen were exposed to direct sunlight at angles of 30°, 45°, 60° and 90°, after which chem. and phys. tests for aging were made. The deterioration was not only influenced by the amt. of ultra-violet light received, but the difference in the temps. at the different angles is another factor which should not be overlooked.

K. Kitsuta

A new type of rubber flooring. H. P. Stevens and W. H. Stevens. *Bull. Rubber Growers' Assoc.* 15, 537-44 (1933).—It is practicable to manuf. flooring of any dimensions from mixts. which cure at low temps. and which therefore make possible curing in air at relatively low temps. such as those used for linoleum. Mixts. of rubber, wood flour, color, S, ZnO, ultra-accelerator and a suitable softener and inorg. filler are recommended. These ingredients can be varied according to the phys. properties desired, and a product competitive with linoleum can thus be made.

C. C. Davis

The antioxidants of rubber latex. I. H. F. Bondy, with G. G. Lauer. *Ber.* 66B, 1611-21(1933).—The object of the investigation is to identify the natural antioxidant in raw rubber, to isolate it, and to establish its constitution and mode of action. Contrary to previous investigators, it was believed that changes in viscosity would be a more precise indication of autoxidation and its retardation than would O absorption measurements. Purified balata and purified Et<sub>2</sub>O-sol. *Hevea* rubber were used, and all measurements were carried out in a Ubbelohde viscometer. In agreement with Staudinger and Leopold, it was found that rubber solns. do not autoxidize in darkness. In light the solns. decompd. in the same way, whether or not the natural antioxidant was present. There was no decompn. on exposure in N to light, and only in light and air were pos. results obtained. Ultra-violet light was used for greater uniformity. Heating of the rubber or balata resin in air at 120° increased its protective action. A study of the effects of various components of the acetone-sol. material from rubber showed that stearic acid, the neutral components and acid amides are inactive, that the acids, amino acids and bases of the serum, and that phenols have a slight antioxidant effect, while the basic components account for practically the whole effect of the complete acetone-sol. part of both the rubber and of balata. Those solns. which had the deepest brown color had the least tendency to autoxidize, and further expts. showed that a dye is present in the rubber which retards autoxidation by absorbing the radiation which promotes autoxidation. Tests of known dyes proved that some have a very marked protective effect, whereas others have only a slight effect. The activity of the dyes is sp., with the color alone determinative, so that no chem. action is involved. In general only dyes with a particular absorption spectrum are effective, and later work will correlate their absorption curves with the curve

of the natural antioxidant. In this way wave lengths which influence autoxidation can be detd. C. C. D.

Sulfuric acid as a latex coagulant. J. L. Wiltshire. *Rubber Chem. and Tech.* 6, 415-21(1933).—See C. A. 27, 2336.

C. C. Davis

Diphase rubber. The diphase-forming tendency of rubber as shown by the action of pigments. F. B. Menadue. *India Rubber J.* 85, 689-92, 717-22; 86, 53-4, 56 (1933).—Below certain proportions, the incorporation by milling of pigments into raw rubber does not change materially its soly. in org. solvents. With higher proportions, however, the hardness of the mixt. becomes disproportionately great in view of the increasing mastication. By sepn. of the pigments (e. g., Mg carbonate by AcOH and Et<sub>2</sub>O) and treatment of the rubber with C<sub>6</sub>H<sub>6</sub>, the rubber can be sepd. into an *insol.* A (I) fraction and a *sol.* B (II) fraction. I is also formed when pigments are added to rubber already dissolved in a solvent, though only after the pigmented rubber has been mechanically masticated in the dry state is I formed to any considerable extent. The phenomenon is complex, for continued mastication diminishes the proportion of I, and in general the quantity finally obtained by any particular method varies inversely with the extent of mastication. In general, the smaller the particle size and the greater the sp. surface of the pigment the more effective is the ability of the pigment to form I. Thus under similar conditions, ZnO, MgO, ZnCO<sub>3</sub>, PbO, S, dextrin and Na borate yielded 82, 78.3, 68, 84, 47.2, 32, 2, 0 and 40% of I. With all pigments, the percentage of I increases rapidly to a max. at a definite proportion of pigment, above which it slowly diminishes. The formation of I has an unfavorable effect on the phys. properties of the pigmented rubber when vulcanized, as shown by the low tensile product of vulcanized I compared with that of vulcanized II, in spite of I and II combining with S at about the same rate. I is not an individual substance of definite phys. properties, and its hardness, toughness, resistance to solvents, etc., increase with increase in the proportion formed from the original rubber. The yields of I from different types of rubber are almost the same, but the phys. properties differ; e. g., the product from *Ficus elastica* is softer than that from *Hevea*. The formation of I takes place in industrial mixing, and to a disproportionately great extent in localized parts of a batch where the pigment concn. is momentarily high. Since its formation is a function of the concn. of pigment, time of mastication and method of mixing (pressure and deformation), and since I gives vulcanizates of better quality than does II, certain variations in the quality of com. products may be accounted for thus. On heating I in the absence of air it partially reverts to II, while on heating in air it oxidizes rapidly.

C. C. Davis

The state of rubber in solutions. II. The effect of the temperature on the viscosity of solutions of various concentrations. B. Dogadkin and M. Lawrenenko. *Rubber Chem. and Tech.* 6, 436-41(1933).—See C. A. 27, 4953.

C. C. Davis

The electrodeposition\* of rubber from Revertex and Revultex. N. Budiloff. *Rubber Chem. and Tech.* 6, 422-35(1933).—See C. A. 27, 4125.

C. C. Davis

The influence of time on the elongation of soft rubber under constant load. W. W. C. Everts. *Rubber Chem. and Tech.* 6, 520-4(1933).—See C. A. 27, 4126.

C. C. Davis

Studies on the nature of the action of organic accelerators for rubber vulcanization. IV. The detection and analysis of organic accelerators. 1. Systematic identification of organic accelerators. Keiichi Shimada. *Rubber Chem. and Tech.* 6, 507-9(1933).—See C. A. 27, 3111.

VI. Detection and analysis of organic accelerators. 3. The analysis of water-soluble ultra-accelerators, and a new colorimetric method for the microanalysis of copper and manganese. Keiichi Shimada. *Rubber Chem. and Tech.* 6, 510-11(1933).—See C. A. 27, 4128.

C. C. Davis

Comparison of eighteen accelerators in a non-loaded stock. T. R. Dawson. *India Rubber J.* 86, 711-12, 714-17(1933).—A practical rather than a strictly scientific comparison was made of 18 com. org. accelerators and

a few mixts. of accelerators in a rubber-S-ZnO mixt., including aging at 70°. The data are tabulated in complete form.

C. C. Davis

**Temperature coefficient of vulcanization. III. Determination for mixes accelerated with various compounds.** R. E. Morris. *Ind. Eng. Chem.* 25, 1400-2 (1933); cf. *C. A.* 27, 3853.—The temp. coeffs. of a base mixt. of rubber-S-ZnO accelerated with (1) mercapto-benzothiazole (I), (2) I + diphenylguanidine (II); (3) I + neutral II succinate; (4) dibenzothiazyl disulfide (III), and (5) III + Zn dimethyldithiocarbamate, and vulcanized at various temps. (172-306°F.) were detd., and the results compared with temp. coeff. data of other investigators. As judged by modulus data and combined S values, the results were 1.41 and 1.54, 1.41 and 1.54, 1.43 and 1.43, 1.50 and 1.52, and 1.48 and 1.51, for the mixts. accelerated with (1), (2), (3), (4) and (5), resp.

C. C. Davis

**Latex and jute.** F. Harriss Cotton. *India Rubber J.* 86, 598-603 (1933).—Expts. are described which indicate that it should be practical commercially to rubberize jute fabrics by impregnation with latex. Latex of 60% concn., e. g., "Jatex," is recommended, and this may be compounded by known methods to give any type of vulcanizate desired. Vulcanization is effected in hot air or on heated rotary drums, and smooth finishes are obtained by calendering when semi-cured. A wide variety of uses is suggested for rubberized jute. Expts. are described and illustrated which led to the technic and suggestions resulting from the work.

C. C. Davis

Mn in Malayan soils [effect on rubber plant] (Akhurst) 15. Coating cloth with rubber (Fr. pat. 753,873) 25.

**Rubber.** Mario Paldini (to Società italiana Pirelli). U. S. 1,938,011, Dec. 5. A plastic dough is formed of disintegrated rubber together with an emulsion of oxygenated alicyclic compds. such as cyclohexanol in which rubber is insol.; the dough is emulsified in water contg. a water-miscible colloid such as soap and rubber compounding ingredients such as S, ZnO and an accelerator are added to form a compn. which is suitable for manuf. of articles by dipping, etc.

**Rubber.** Lucien Gaisman. Fr. 750,938, Aug. 22, 1933. See Brit. 386,846 (*C. A.* 27, 6030).

**Rubber.** Duhois & Kaufmann G. m. b. H. Fr. 753,476, Oct. 17, 1933. Factice, before mixing with rubber for vulcanization, is heated in the presence of water or steam toward 100°, with or without pressure, and with the addn. of substances which combine with the HCl formed, until the unstable Cl in the factis is eliminated. The vulcanization accelerators are incorporated with the factice before its introduction into the rubber soln.

**Rubber solutions.** I. G. Farbenind. A.-G. Fr. 751,535, Sept. 5, 1933. Rubber solns. of high concn. but of very reduced viscosity are made by dissolving rubber in the unmasticated state in a suitable solvent under the influence of air or O and in the presence of compds. of metals which are O carriers. High temps. are preferred and chemically active rays accelerate the process. The solns. obtained may be chlorinated, ozonized or sulfonated, alone or mixed with aromatic hydrocarbons, or may be submitted to the action of compds. causing cyclicization, such as AlCl<sub>3</sub>, POCl<sub>3</sub> or ClHSO<sub>3</sub>. Examples are given.

**Rubber compositions.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 42,447, July 19, 1933. Addn. to 683,772. Rubber and an alkyl resin are assocd. to give a flexible product resistant to the action of mineral oils and hydrocarbons. Thus a suspension of an alkyl resin in a soln. of NH<sub>3</sub> is made and mixed with a concd. soln. of latex, e. g., "Revertex," and the whole is coagulated by AcOH. The product is mixed with S, a vulcanization accelerator, fillers, etc., and vulcanized.

**Rubber compositions.** Paul Bary and Lucien Graffé. Fr. 752,736, Sept. 29, 1933. Pptd. basic carbonates, e. g., of Zn, are used as dry powders or aq. pastes as reinforcing substances for rubber. The Zn compd. is sol.

in rubber to above 5% and gives clear products therewith.

**Rubber-like compositions.** Waldo L. Semon (to The B. F. Goodrich Co.). Brit. 398,091, Sept. 7, 1933; Fr. 751,504, Sept. 5, 1933. See U. S. 1,929,453 (*C. A.* 28, 371).

**Anti-agers for rubber, etc.** I. G. Farbenind. A.-G. (Brich Rietz, inventor). Ger. 583,342, Sept. 2, 1933. Addn. to 564,912 (*C. A.* 27, 1235). Aging in natural or synthetic rubber is prevented by the products obtained by condensing *ar*-tetrahydro-*a*-naphthylamine with AcH, crotonaldehyde or aldol in the presence of a water-sol. alc. in weakly acid soln., the product being finally treated with hot water. Examples are given. Cf. *C. A.* 27, 3112.

**Rubber oxides.** The International Latex Processes Ltd. Fr. 754,030, Oct. 30, 1933. In making threads, filaments or tubes of rubber, etc., from aq. dispersions by passage from orifices into a dehydrating and solidifying liquid, this liquid is composed of a concd. soln. of a salt of a weak acid capable of being highly dissoed. and hydrolyzed (the *pH* value is preferably not below 5), and to the aq. dispersions are added inactive substances which are decomposed when they come in contact with the feebly acid liquid to give substances causing coagulation of the dispersions, e. g., NH<sub>4</sub> soaps, ethanolamine, fatty acids and colophony.

**Rubber thread.** The International Latex Processes Ltd. Fr. 754,241, Nov. 3, 1933. Apparatus for making and drawing the thread is described.

**Elastic threads.** Dunlop Rubber Co. Ltd. and Felicite A. H. Heynert. Brit. 397,890, Sept. 1, 1933. Rubber threads are coated and ornamented by rendering the surface adhesive, e. g., by treating with solvents or application of rubber, celluloid and cellulose, varnishes, (synthetic) resins, linseed oil, glue, and then applying a coating thereto, e. g., of cork dust, paper, comminuted cotton linters, powd. crumb rubber, asbestos.

**Apparatus for making sheets, threads or filaments of rubber.** The International Latex Processes Ltd. Fr. 753,974, Oct. 28, 1933.

**Filaments, films, etc., from rubber.** I. G. Farbenind. A.-G. (Otto Schmidt, inventor). Ger. 583,145, Aug. 29, 1933. Addn. to 568,906 (*C. A.* 27, 2845). The method of 568,906 for producing filaments, etc., by treating rubber-like butadiene condensation products with sulfurizing agents is modified by using inorg. S compds. such as S<sub>2</sub>Cl<sub>2</sub>. Examples are given.

**Apparatus for making rubber bands or sheets.** The B. F. Goodrich Co. Fr. 754,033, Oct. 30, 1933.

**Rubber articles.** Jacques Aumaréchal. Fr. 751,531, Sept. 5, 1933. See Brit. 386,464 (*C. A.* 27, 6022).

**Apparatus for making dipped rubber goods such as finger cots or nipples.** John R. Gammeter. U. S. 1,938,420, Dec. 5. Structural and mech. features.

**Transformation products of rubber.** The Walpamur Co. Ltd. Fr. 752,502, Sept. 23, 1933. Crude or laminated rubber is treated in the presence of an agent formed exclusively or partly of a compd. contg. P, O and Cl, the proportion of O in the compd. being higher than that in POCl<sub>3</sub>. The reagent may be obtained by partially hydrolyzing PCl<sub>5</sub> or POCl<sub>3</sub> or as the residue from the distn. of a mixt. of H<sub>3</sub>PO<sub>4</sub> and PCl<sub>5</sub> or POCl<sub>3</sub>. The Cl may be replaced by Br and the products may be chlorinated or brominated. The products are used for making plastics, films, paints, varnishes and elec. insulators, etc.

**Inner tubes, etc.** The Goodyear Tire & Rubber Co. Brit. 397,467, Aug. 16, 1933. Pneumatic rubber articles are coated with a gas-impermeable extensible film that adheres to the article and stretches therewith. The film preferably comprises a gel-forming colloid, e. g., gelatin, glue, casein, hemoglobin and a plasticizer, e. g., glycerol, polyglycerol, and may be applied to the article prior to vulcanization, in which case vulcanization must be effected in the absence of solvents for the colloid. Rubber latex may be added to assist adhesion to the surface of the article. In an example an inner tube is coated with a

film consisting of 6 coats having varying proportions of latex to gelatin.

**Inflated balls, etc.** Dunlop Rubber Co. Ltd., Douglas P. Twiss, Albert E. T. Neale and Albert S. Carpenter. Brit. 397,209, Aug. 24, 1933. The inflation pressure of tennis balls and other permanently sealed objects is maintained or rehabilitated by a continuous generation of gas at an appropriate rate inside the object by embodying therein a substance or substances generating gas. One or more of the gas-generating substances is preferably incorporated in the material of the walls or in a mixt. applied to the inner surface of said walls. A suitable mixt. is rubber 100, mercaptobenzothiazole 1.3, S 3, ZnO 5, stearic acid 1 and  $Al_2C_3$  30 parts. Such a mixt. can be vulcanized and in the presence of  $H_2O$  generates  $CH_4$  at a suitable rate. Alternatively the gas-generating substance (s) may be supported in gelatin-glycerol jelly, the rate of generation being controlled by the H-ion concn. Suitable gas-generating substances are Al, Zn,  $BaO_3$  and  $MnO_2$ , urea and oxalic acid with a soln. of  $NaNO_2$ ,  $H_2O_2$ , etc.

**Covering balls.** Dunlop Rubber Co. Ltd., Samuel G. Hall and Ernest W. Allen. Brit. 396,530, Aug. 10, 1933. In the application of a cover of unvulcanized rubber, balata, gutta-percha, etc., or a mixt. thereof, to the core of a golf, etc., ball a thin layer is applied and then a sec. layer to complete the ball which is allowed to dry, vulcanized or semivulcanized by a gas or "cold" process and finally molded. The final molding may include such steps as rolling or cold pressing and is completed by heat treatment in a 2-part mold.

**Rubber coatings.** Accumulatoren-Fabrik A.-G. Fr. 750,937, Aug. 22, 1933. A viscous material which may be used for coating articles is obtained by adding to aq. dispersions of rubber, besides the usual filling materials and vulcanizers, cations of one or more metals, anions of one or more weak acids,  $NH_3$  and sol. glass, e. g.,  $ZnCO_3$ ,  $Na_2SiO_3$  and  $NH_4$ .

**Coating articles.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd., Edward A. Murphy and David N. Simmons. Brit. 397,270, Aug. 24, 1933. A coating compn. for producing a smooth mat finish on articles, e. g., on fabric or rubber surfaces consists of a flocculent ppt. of rubber, obtained from an aq. dispersion thereof, admixed with starch. In an example 100 parts of 60% latex are dild. to 5%, a 5% soln. contg. 120 parts  $Na$  silicate and then a 5% soln. contg. 96 parts  $Al_2(SO_4)_3$  are stirred in to form the ppt. which is drained on a filter plate to a mass contg. 15-16% solids and starch, equal in wt. to that of the solids, is ground in until a smooth cream is obtained which may be dild. as required. Vulcanizing, compounding, etc., ingredients may be added.

**Coated articles.** Dunlop Rubber Co., Ltd., The Anode Rubber Co. Ltd. and Geoffrey W. Trobridge. Brit. 397,277, Aug. 24, 1933. Fibrous sheets, e. g., woven or

knitted fabric, felt, papier mâché, cardboard, compressed paper, are coated by applying aq. dispersions of rubber, including coagulated, vulcanized, synthetic, waste or reclaim rubber, gutta-percha, balata or similar vegetable resins, by spreading, dipping or spraying, superposing a sheet or sheets of heat-conducting material, e. g., Al, which may be embossed or engraved, subjecting to heat and pressure and removing the heat-conducting sheet(s). The manuf. of a floor mat is described.

**Rubberizing difficultly penetrable materials such as rope, belting, etc.** Merwyn C. Teague (to General Rubber Co.). U. S. 1,936,999, Nov. 28. The material is treated with an aq. rubber dispersion contg. sulfonated castor, cottonseed, olive or peanut oils, *o*-toluidine, Na sulfanilate, thiourea, Na salicylate,  $NH_4$  linolenate or isolinolenate, saponin, Na dihydroxynaphthalenedisulfonate, K oleate or Na naphthalenesulfonate, and is then dried.

**Rubber insulation for electrical conductors such as wire.** Harold D. Rice (to National India Rubber Co.). U. S. 1,936,994, Nov. 28. Insulation is formed of vulcanized and grainless unmilled rubber compn. contg. not more than 5% of natural non-rubber constituents.

**Artificial rubber dispersion suitable for use as an adhesive.** Charles P. MacIver (to Dispersions Process, Inc.). U. S. 1,938,078, Dec. 5. A stable adhesive compn. is prepd. contg. dried formaldehyde-treated rubber latex having the rubber suspended in finely divided form in an aq. menstruum contg. a water-sol. soap.

**Adhesive.** Wm. F. Zimmerli and Robert S. Havenhill (one-half each to B. F. Goodrich Co. and to Chrysler Corp.). U. S. 1,937,861, Dec. 5. A non-aq. adhesive compn. suitable for securing rubber matting to floors comprises approx. equal proportions of reclaimed rubber of high-rubber content and rosin and a small proportion of a lime soap.

**"Imitation rubber."** Shozo Fuji and Tatsuzo Fukuda. U. S. 1,938,015, Dec. 5. A vegetable oil such as perilla oil is heated to about  $250^\circ$  and mixed with 5-10% of Pb carbonate. The mixt. is gradually heated to about  $300^\circ$  and the heating is continued until the Pb carbonate decomposes, liberating  $CO_2$  and forming a Pb salt with the oil. The product thus obtained may be used for coating metals, wood or cloth, etc.

**Carbon for use in vulcanizing rubber.** Carbonfix Soc. anon. Ger. 580,886, July 18, 1933. In vulcanizing rubber with addn. of C, the C obtained by the wet coking of lignite in the presence of heavy metal catalysts is used. The C is washed with alkali carbonate soln. and dried at low temps. in the absence of air before use. Examples are given.

**Regenerating vulcanized rubber.** Ernest Bemelmans. Ger. 584,892, Sept. 26, 1933. Vulcanized rubber is regenerated by heating in air till a dry distn. ensues. Preferably the rubber is heated to  $130^\circ$ . The heated mass may be heated by hot rollers and may be revulcanized.

# CHEMICAL ABSTRACTS

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## 1-APPARATUS AND PLANT EQUIPMENT

W. L. RADGER

An improved melting-point apparatus and a comparative study of several types of apparatus for melting-point determinations. Chao-Lun Tseng. *J. Chinese Chem. Soc.* 1, 143-82(1933).—Mulliken's m.-p. app., modified to use a smaller flask and shorter thermometer, is superior to an open beaker, the Thiele tube and Fisher's app.

New apparatus and method for mechanical phase analysis. F. V. Suiromyatnikov. *Mineral. Svir's* 8, Nos. 8-9, 17-25(1933).—A somewhat modified lab. centrifugal separator is described.

Unitized gas-analysis apparatus. Maryan P. Matuszak. *Ind. Eng. Chem., Anal. Ed.* 6, 72-8(1934).—The app. combines the advantages and eliminates the disadvantages of the Hempel and Orsat systems, and is described with 15 cuts and 17 references.

A new color comparator. J. W. Forrest. *Paper Trade J.* 97, No. 22, 38-9(1933).—A brief review of the Munsell color system, together with a description of the Bausch & Lomb color comparator developed to utilize the Maxwell rotating-disk procedure in a way that provides greater ease of manipulation.

New apparatus for determination of size distribution of particles in fine powders. Robert T. Knapp. *Ind. Eng. Chem., Anal. Ed.* 6, 66-71(1934).—The "Microneter," based on the sedimentation principle, is described in detail with 13 cuts and 5 references.

An automatic, modified falling-sphere viscometer. R. A. Jones. *Ind. Eng. Chem., Anal. Ed.* 6, 80-4(1934).—A description, with 5 cuts and 11 references, of an electrically indicating app. designed primarily for factory control of the consistency of rubber cements, but applicable to other viscosity detns.

Technic of combustion with chlorine. Józef Brdós and Béla Groák. *Z. anal. Chem.* 95, 327-9(1933).—An app. is shown which is suitable for destroying org. matter by the action of HCl and a satd. soln. of NaClO<sub>2</sub>. It consists of an 800-ml. Kjeldahl flask with provision in the glass stopper for a dropping funnel and a short condenser. At the top of the condenser is a 2-bulb tube contg. NaOH soln. to prevent the escape of Cl<sub>2</sub> fumes. Details are given for decomp. 200 g. of stools prior to the detn. of Pb.

A new method of producing maximum pressures and temperatures. Carl Ramsauer. *Physik. Z.* 34, 890-4(1933).—An app. for exptl. work with gases is shown with 4 cuts, and the method is discussed mathematically.

Glass and other electrodes for measuring  $p_{\text{H}}$  values of very dilute buffers and of distilled water. John O. Burton, Harry Matheson and S. F. Acree. *Ind. Eng. Chem., Anal. Ed.* 6, 79(1934).—A modified Partridge glass electrode-potentiometer system (cf. *C. A.* 23, 1312) gives a sensitivity of 0.007 mv. per mm. scale division with 0.0001 M Na acid phthalate soln. and 1 mv. for distd. water. Glass electrode values for  $p_{\text{H}}$  agree with those detd. by the isohydric indicator method but are more trustworthy for colored, turbid, oxidizing or reducing solns.

New type of antimony electrode for  $p_{\text{H}}$  measurements. T. R. Hall, Webster B. Schmidt and Karl S. Bergstresser. *Ind. Eng. Chem., Anal. Ed.* 6, 80-1(1934).—Data on the prepn. of, and results obtained with, sulfide-coated electrodes are given.

Vacuum photoapparatus. V. I. Arkharov. *J. Tech.*

*Phys.* (U. S. S. R.) 3, 493 9(1933).—Six diagrams are shown.

Pyrometric economies. W. Bowen. *Ice and Cold Storage* 36, 168(1933).—The various metals used in thermocouples are discussed. The so-called Pyrofer thermocouple was recommended.

The use of the thyatron for temperature control. R. M. Zabel and R. R. Hancox. *Rev. Sci. Instruments* 5, 28-9(1934).

Coating W wire [core for discharge-tube cathodes] (Ger. pat. 588,414) 9.

Stohn, Rudolf: Temperaturregler. Berlin: V. D. I.-Buchhandlung. 177 pp. M. 6; bound, M. 7.

Chemical distilling apparatus, etc. Rudolf Lowag. Ger. 584,283, Sept. 18, 1933 (Cl. 12a. 1). Addn. to 567,979 (C. A. 27,2604).

Apparatus for effecting exothermic catalytic gas reactions. L'Air Liquide (Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude). Ger. 585,278, Nov. 14, 1933 (Cl. 12g. 4.02). See Brit. 268,722 (C. A. 22,1444) and 275,592 (C. A. 22,2248).

Apparatus for effecting exothermic catalytic gas reactions under pressure. Hans Harter. Ger. 589,014, Dec. 1, 1933 (Cl. 12b. 3). See Brit. 325,028 (C. A. 24,3678).

Apparatus for sampling liquids. Ed. Sprenger optisch-mechanische Werkstätten. Ger. 589,048, Dec. 1, 1933 (Cl. 42l. 18). The app. is combined with means for detg. the temp. and sp. gr. of the liquid.

Liquid-sampling and -testing device suitable for testing milk for dirt or sediment. Christian E. Brackbill. U. S. 1,939,873, Dec. 19. Various structural and operative details are described.

Core-taking apparatus suitable for taking samples of material in drilling. Granville A. Humason (to Reed Roller Bit Co.). U. S. 1,940,866, Dec. 26. Mech. features.

Apparatus for controlling or indicating the level of material, e. g., a conducting liquid, in a container. Joakim U. F. Andersen. Brit. 398,065, Sept. 7, 1933.

Glass colorimeter plunger. Gustave Fassin (to Bausch & Lomb Optical Co.). U. S. 1,939,547, Dec. 12. Structural details.

Temperature indicators. British Celanese Ltd., George H. Ellis and Alexander J. Wesson. Brit. 397,520, Aug. 25, 1933. A solid mass of a compn. contg. fusible and (or) sublimable substance(s), e. g., BiBr<sub>3</sub>, Se, K pyrosulfite, 1,5-dinitronaphthalene, anthraquinone-disulfonic acid, anthracene (I) and a filler, e. g., chalk, fuller's earth, ZnO, powd. pigments, is applied to surfaces to be tested, e. g., of an iron or calender for textile operations, and leaves a deposit of filler if the temp. thereof is above the melting or subliming point. Substances, e. g., C<sub>12</sub>H<sub>11</sub> in the case of I, may be added to lower the m. p. The fillers may be colored by dyes, e. g., Lithol Fast Yellow 2G, Sudan 2G, *p*-chloro-*o*-nitroaniline, 2,6-dinitro-4-methylaniline, Fast Oil Orange T, Fast Oil Scarlet 2R, which sublime and (or) change color at about the desired temp. of the surface.

Differential pressure gage for use with liquid flow

- meters. **Electrode Meters Co. Ltd. and Friedrich V. A.** *E. Engel. Brit. 398,558, Sept. 21, 1933.*
- Vacuum pumps.** **The British Thomson-Houston Co. Ltd. and Frank P. Whitaker.** *Brit. 398,902, Sept. 25, 1933.*
- Apparatus (with parallel shafts carrying rotating disks) for classifying ores, coal, etc.** **Hans-Joachim Jöhlige (to Fried. Krupp Grusonwerk A.-G.). U. S. 1,941,147, Dec. 26. Structural and mech. features.**
- Filters.** **Maurice Hanslin and Charles Kyburz.** *Fr. 755,265, Nov. 22, 1933.* Each filtering unit is composed of a vat in which are disposed 2 or more perforated hollow plates connected alternately to a lead-in and a lead-out for the liquid, the entry and exit plates being sepd. by an appropriate filtering mass.
- Ultrafilter.** **Eugen Haas.** *Ger. 585,947, Oct. 13, 1933.*
- Air filter.** **Gordon Wallace.** *U. S. 1,940,034, Dec. 19.*
- Air filter suitable for use with sterilizing chambers.** **Ronald G. Canti and Joseph Robinson.** *U. S. 1,939,103, Dec. 12.*
- Filter for ultra-violet light.** **Robert B. Withrow (to General Development Laboratories, Inc.). U. S. 1,938,734, Dec. 12. A relatively thin sheet of flexible regenerated cellulose has adsorbed in its surface a filtering substance such as phthalic anhydride, K H phthalate or Na benzoate substantially opaque to wave lengths in the ultra-violet region lying below 2900 Å.**
- Filter suitable for use with oils.** **Lewis L. Scott.** *U. S. 1,938,934, Dec. 12.*
- Oil filter.** **Wm. A. McLean (to C. Schnackel's Sons, Inc.). U. S. 1,941,311, Dec. 26.**
- Oil and gas separator (having an upright tank with baffles).** **Jay P. Walker and Elmer R. Williams (to National Tank Co.). U. S. 1,941,028, Dec. 26. Structural features. *U. S. 1,941,030 (Elmer R. Williams to (Nat'l Tank Co.))* also relates to a separator construction.**
- Apparatus for separating oil and water or other liquids (or liquids and solids) of different specific gravities.** **Wm. R. Mobley.** *U. S. 1,938,604, Dec. 12.* Various structural and operative details are described.
- Apparatus suitable for filtering liquids by gravity or suction.** **Arthur P. Dieman.** *U. S. 1,940,208, Dec. 19.* Structural details are given of a filter comprising a grid having a hollow hub provided with an axial bore and a covering of filtering material such as cloth.
- Filtering material.** **Henry S. Montgomery (one-half to H. A. Brassert & Co.). U. S. 1,939,860, Dec. 19. A material suitable for filtering hydrocarbon liquids, etc., is prepd. from the lighter portion of screened, washed and elutriated mineral wool, mixed with diatomaceous earth which has been cleaned to remove colloidal, clayey and sandy matter.**
- Laboratory apparatus for separating finely divided particles of minerals of high specific gravity, e. g., gold, platinum, from raw material by currents of water.** **Carl T. Rauschenbusch and Felix Rauschenbusch.** *Brit. 397,319, Aug. 24, 1933.*
- Apparatus (with an air-pervious table) for separating different solids such as those of ores or coal mixtures.** **Richard Peale (to Peale-Davis Co.). U. S. reissue 19,021, Dec. 12. A reissue of original pat. No. 1,832,048 (C. A. 26, 683).**
- Apparatus for separating mixtures of materials, e. g., coal and stone, having different rolling or sliding velocities.** **James A. Cook.** *Brit. 398,210, Sept. 5, 1933.*
- Apparatus for separating dust and small particles from granular materials, e. g., coal.** **The General Electric Co. Ltd. and Arnold Kay.** *Brit. 396,828, Aug. 17, 1933.*
- Classifier suitable for separating ground cement clinker, etc., from gas currents.** **Marcel A. Lissman (to International Precipitation Co.). U. S. 1,939,710, Dec. 19. Various structural and operative details are described.**
- Device and method for removing dust from gases.** **Eugene C. Saint-Jacques.** *Brit. 398,779, Sept. 21, 1933.*
- Differential-flow apparatus for separating solids or liquids from gases or vapors.** **Eugen Haber.** *Ger. 585,277, Oct. 10, 1933.*
- Centrifuge for the continuous separation of solids from liquids.** **Herbert Schulz.** *Brit. 398,821, Aug. 17, 1933.*
- Centrifugal apparatus for separating dust from gases.** **Gebrüder Bühler.** *Ger. 587,474, Nov. 3, 1933.*
- Centrifuge for purifying liquids.** **Maskin-och Bruyggnads Aktiebolaget.** *Ger. 588,263, Nov. 16, 1933 (Cl. 82b. 7).*
- Centrifugal apparatus for producing foam by agitating a foam-forming liquid with a gas.** **Drysdale & Co. Ltd. and John W. W. Drysdale.** *Brit. 398,002, Sept. 7, 1933.*
- Centrifugal hydro-extractors.** **Edward L. Clapham.** *Brit. 396,863, Aug. 17, 1933.*
- Adjustable feed device for centrifugal drum.** **Maschinenfabrik Buckau R. Wolf A.-G.** *Ger. 585,138, Sept. 29, 1933.*
- Apparatus for testing gases.** **Siemens-Schuckertwerke A.-G. (Emil Duhme, inventor).** *Ger. 588,383, Nov. 17, 1933 (Cl. 42f. 4.10).* An app. is described of the type in which the gas to be tested surrounds an electrically heated conductor, the resistance of which varies with variations in the thermal cond. of the gas.
- Diffusion apparatus for indicating foreign gases in air.** **Paul Sewerin and Heinrich Sewerin.** *Ger. 588,180, Nov. 13, 1933 (Cl. 42f. 4.12).*
- Means for mixing gases in flow in proportionate quantities.** **Ferdinand P. Choubry.** *Brit. 397,675, Aug. 31, 1933.*
- Gas-cleaning apparatus suitable for dust separation.** **Frederick H. Wagner.** *U. S. 1,940,190-7-8-9, Dec. 19.* Various structural and operative details are described.
- Apparatus for treating gases such as smoke by passing through water.** **Edward A. Bertram.** *U. S. 1,939,949, Dec. 19.* Structural features.
- Gas compressor, which may be built into an armature of an electric driving motor.** **Robert Bosch A.-G.** *Brit. 398,719, Sept. 21, 1933.*
- Device for introducing gases into flowing liquids.** **Gustav Schlick.** *Ger. 583,849, Sept. 11, 1933.*
- Device for introducing gases into flowing liquids.** **Gustav Schlick.** *Ger. 585,595, Oct. 7, 1933.* Addn. to 583,849 (preceding abstr.).
- Apparatus for mixing gases and liquids.** **Fritz Garthe.** *Ger. 586,830, Sept. 27, 1933 (Cl. 12e. 4.01).*
- Device for washing two mutually insoluble liquids by countercurrents.** **Heinrich Koppers A.-G.** *Ger. 585,517, Oct. 10, 1933.*
- Apparatus for heating and cooling flowing liquids.** **Walter König.** *Ger. 585,534, Oct. 5, 1933.*
- Apparatus (of the drum and coil type) for cooling liquids such as water.** **Richard H. Brewer (to Halsey W. Taylor Co.). U. S. 1,940,741, Dec. 26. Structural features.**
- Apparatus for emulsifying liquids.** **Wm. M. Melmore and Fluid Pressure Pumps Ltd.** *Brit. 399,014, Sept. 28, 1933.*
- Apparatus for thickening liquid suspensions.** **John F. Borden (to Oliver United Filters Inc.). U. S. 1,940,903, Dec. 26. Various structural and operative details are described.**
- Flexible walled bags or like containers for liquids, e. g., rubber latex, intended to form the inner members of double-walled transport cases.** **Marcel Dupret.** *Brit. 397,644, Aug. 31, 1933.*
- Drying apparatus.** **Büttner-Werke A.-G.** *Ger. 589,141, Dec. 2, 1933 (Cl. 82a. 1.02).* App. is described in which the material to be dried is circulated in suspension in a heated gas. The cycle includes means for sepg. dried and wet material by taking advantage of the difference in sp. gr.
- Drying apparatus (plate type).** **Karl Neynaber.** *Ger. 589,009, Dec. 2, 1933 (Cl. 82a. 1.01).*
- Device for rapidly drying liquids.** **Georg F. Stieger.** *Ger. 585,515, Oct. 12, 1933.* Addn. to 583,848 (C. A. 28, 936<sup>b</sup>).
- Rotary-drum drier.** **Heinrich Kröger.** *Ger. 586,503, Oct. 21, 1933 (Cl. 82a. 21.01).*
- Rotary drying drums, furnaces, etc.** **I. G. Farbenind. A.-G. (Karl Heil, inventor).** *Ger. 588,339, Nov. 18, 1933 (Cl. 82a. 19.01).* Means is described for sealing an aperture in a wall through which a rotary tube or drum extends.
- Drying drum with connected cooling drum.** **Maschinen-**



- fabrik Buckau R. Wolf A.-G. Ger. 588,262, Nov. 16, 1933 (Cl. 82a. 19.04).
- Drying drum for sludges and pastes. Fritz Haas. Ger. 588,261, Nov. 20, 1933 (Cl. 82a. 19.01).
- Vacuum drier. Mako & Vacuumtrockner G. m. b. H., Ges. für industrielle Chemie und Technik. Ger. 585,800, Oct. 11, 1933.
- Circulatory evaporating apparatus. Wilhelm Vogelbusch. Ger. 581,653, Aug. 1, 1933. Addn. to 537,185 (C. A. 26, 879).
- Tubular evaporators of the barometric type for evaporating acid liquors. James Strachan, James Holmes and Henry A. Kingcome. Brit. 398,004, Sept. 7, 1933.
- Evaporation or distillation system for high-boiling substances such as fatty acids. Metallges. A.-G. Ger. 589,013, Dec. 1, 1933 (Cl. 12a. 47).
- System for heating evaporators, driers, distillation vats, etc., by superheated steam. Metallgesellschaft A.-G. Fr. 754,919, Nov. 16, 1933.
- Device for the rapid estimation of the water content of solid bodies by evaporation. Norddeutsche Seekabelwerke A.-G. (Gustav Becker and C. Traugott, inventors). Ger. 586,696, Oct. 24, 1933 (Cl. 42f. 9.50).
- Device for filling (and preventing overfilling) of warm evaporators for liquefied gases. Christian W. P. Heylandt (to Flüga A.-G.). U. S. 1,941,304, Dec. 26. Various structural details are described.
- Gas-fired furnaces. Julius Pintsch A.-G. Ger. 585,436, Oct. 11, 1933. A device for regulating the admixture of the gas with air is described.
- Regenerative flame furnace fired with cold coke-oven gas. Hoesch-Köln Neuessen A.-G. für Bergbau und Hüttenbetrieb. Ger. 589,395, Dec. 12, 1933 (Cl. 24c. 6). Addn. to 507,211 (C. A. 27, 2351).
- Rotary furnace for burning asphalt, tar, acid resin and other difficultly combustible materials. Metallges. A.-G. (Carl P. Debusch, inventor). \*Ger. 588,232, Nov. 21, 1933 (Cl. 24b. 2.01).
- Furnace for drying, carbonizing and like thermal processes. André Bourdet. Ger. 587,510, Nov. 4, 1933 (Cl. 10a. 38.01). Addn. to 514,068 (C. A. 25, 1346-7). The furnace for calcining gypsum described in Ger. 514,068 is used for other thermal processes, e. g., for distg. wood. Modifications in the construction of the furnace are described.
- Inclined furnace suitable for conditioning adsorbent clays, activated carbon or other finely divided adsorbent materials by heating and treatment with air, etc. Norris S. Evans and Carl H. Alsborg (to L. Sonneborn Sons, Inc.). U. S. 1,939,678, Dec. 19.
- Apparatus for circulating the atmosphere in a tunnel furnace. Stanley R. Hind and Brittain Adams, Jr. Brit. 399,436, Oct. 5, 1933.
- Tunnel kiln with parallel drying channels. Erika Lengersdorff. Ger. 575,106, Nov. 23, 1933 (Cl. 80c. 5).
- Safety device for gas-fired furnaces. Franz Baessler. Ger. 589,030, Dec. 1, 1933 (Cl. 24c. 3).
- Burner and tuyère suitable for use with gaseous fuel. Garnet W. McKee. U. S. 1,938,851-2, Dec. 12.
- Pressure gas burners for furnaces. Walter Jönsson and Selas A.-G. Brit. 397,813, Aug. 31, 1933.
- Hydraulic apparatus for tilting converters. Demag A.-G. Ger. 588,216, Nov. 14, 1933 (Cl. 18b. 17).
- Hydraulic apparatus for tilting furnaces, etc. Demag A.-G. Ger. 588,436, Nov. 18, 1933 (Cl. 18b. 3).
- Regenerative preheater for air suitable for use with boiler furnaces. Armando S. Villasuso. U. S. 1,939,153, Dec. 12. Numerous structural details are described.
- Bottom for slag-tap furnaces. Bartley E. Broadwell (to Republic Carbon Co.). U. S. 1,940,115, Dec. 19.
- slag-tap steam-boiler furnace bottom comprises a monolithic carbon layer supported by a layer of unbonded granular material such as sand.
- Apparatus for swelling and rendering porous liquid furnace products such as slag. Carl H. Schol. U. S. 1,939,138, Dec. 12. Mech. details of an app. in which successive portions of the material may be treated with various liquids, etc.
- Heat exchanger (plate type). John E. Watson and V. S. Lewis. Ger. 585,189, Sept. 30, 1933. This corresponds to Brit. 372,961 (C. A. 27, 2354).
- Tubular heat-exchange apparatus suitable for use as a surface condenser. Francis C. W. Wilkinson (one-half each to Crane Packing Co. and Crane Packing Ltd.). U. S. 1,941,194, Dec. 26. Structural features.
- Heat-exchange apparatus suitable for heating air or water, etc. Charles C. Hansen (to Chase Cos.). U. S. 1,938,588-9, Dec. 12. Structural features.
- Heat-exchange apparatus suitable for condensing steam and heating water. Fred H. Schaub. U. S. 1,939,415, Dec. 12. Various structural and operative details are described.
- Apparatus for effecting heat exchange between gases and solids or liquids. Arno Andreas. Ger. 585,497, Oct. 9, 1933. Addn. to 535,056 (C. A. 26, 880).
- X-ray apparatus. Oscar H. Pieper. U. S. 1,941,270, Dec. 26. Structural and elec. details.
- X-ray-tube cooling system. Julius Wantz (to General Elec. X-Ray Corp.). U. S. 1,938,946, Dec. 12. Various structural and operative details are described.
- Cathode-ray tubes. Electric & Musical Industries Ltd. Fr. 754,518, Nov. 8, 1933. Means for concentrating and delimiting the electron pencil emitted from the cathode.
- Anticathodes, with tungsten reflecting surfaces, for Röntgen tubes. Heraeus Vacuumschmelze A.-G. and Wilhelm Rohn. Ger. 589,322, Dec. 8, 1933 (Cl. 21g. 17.02). Manufg. details are described.
- Electron tube. The M-O Valve Co. Ltd. Fr. 754,967, Nov. 17, 1933. Construction of cooling grating is given.
- Protection means for thermionic and like tubes. N. V. Thermion Radiolampenfabriek. Fr. 754,773, Nov. 14, 1933.
- Thermionic valves. Radio Patents Corp. and Hans E. Hollmann. Brit. 398,263, Sept. 14, 1933.
- Thermionic valves. The M-O Valve Co. Ltd., Colin J. Smithells and Geoffrey W. Warren. Brit. 398,607, Sept. 21, 1933.
- Thermionic valves. Eugene A. Giard and Earl A. Fritz (to Igranic Electric Co. Ltd.). Brit. 399,311, Oct. 5, 1933.
- Thermionic valves. N. V. Philips' Gloeilampenfabrieken. Brit. 399,477, Oct. 2, 1933.
- Safety or indicating device for use with liquid-cooled thermionic valves and operated by failure of liquid flow. Marconi's Wireless Telegraph Co. Ltd. and Harry A. Ewen. Brit. 398,880, Sept. 25, 1933.
- Operating luminescent tubes such as those containing neon. Daniel P. A. A. Kayser. U. S. 1,939,903, Dec. 19.
- A high-frequency current is caused to flow through the tube, and the tension of the current is slowly and gradually varied, in order to control operation.
- Coating composition for electron-emitting elements. Leon McCulloch (to Westinghouse Elec. & Mfg. Co.). U. S. 1,939,075, Dec. 12. A compn. suitable for coating filaments comprises an alk. earth metal carbonate or oxalate with a binder including an aq. soln. of an alk. earth metal acetate, formate or azide.
- Light-sensitive cell. Arthur W. Carpenter (to United Research Corp.). U. S. 1,940,245, Dec. 19. A transparent support such as glass carries a conductive support comprising both Pt and Pd with which Se is in contact.
- Photoelectric tube. Vladimir K. Zworykin (to Westinghouse Elec. and Mfg. Co.). U. S. 1,939,531, Dec. 12. Structural features.
- Photoelectric cells. Richard A. Hartley (to The Westinghouse Brake & Saxby Signal Co. Ltd.). Brit. 398,552, Sept. 18, 1933. In a photoelec. cell comprising a metal body with a compd. of the metal formed thereon, elec. connection with the layer of compd. is effected through a conductor formed as an integral part of the layer of compd. The cell may be produced by heating a Cu blank to form superposed layers of Cu<sub>2</sub>O and CuO, the latter being removed and the surface being coated with beeswax to leave exposed spaced areas of the Cu<sub>2</sub>O. The blank is placed in an electrolytic bath to reduce the exposed Cu<sub>2</sub>O

to Cu and the wax is then removed. Alternatively the blank may be formed with a layer of  $\text{Cu}_2\text{O}$  and an outer layer of  $\text{CuO}$ , which is chemically reduced to Cu, a protective coating of wax is applied to spaced areas and the blank placed in a soln. to dissolve the exposed Cu and leave the  $\text{Cu}_2\text{O}$  formed as an integral part of a Cu grid when the coating is removed.

Apparatus (with a photoelectric cell) for sorting articles in accord with their light-modifying properties. Malcolm M. Rich (to Westinghouse Elec. & Mfg. Co.). U. S. 1,940,882, Dec. 26. Various structural, elec. and operative details are described.

Discharge apparatus. N. V. Philips' Gloeilampenfabrieken. Brit. 399,041, Sept. 28, 1933. An anode, particularly for a gas-filled rectifier or a triode, consists of a body having at least 1 cavity which is closed by a plug. Thus a graphite or C cylinder may have its end closed by a graphite or C plug screwed or pressed into position. The anode may have several apertures drilled into it, each closed by a graphite plug.

Electric discharge tubes. N. V. Philips' Gloeilampenfabrieken. Fr. 754,579, Nov. 9, 1933.

High-tension electric discharge tubes. C. H. F. Müller A.-G. Fr. 755,334, Nov. 23, 1933.

Luminous thermionic discharge tubes. Compagnie des lampes. Fr. 754,459, Nov. 8, 1933.

Electron discharge tubes. Compagnie des lampes. Fr. 755,326, Nov. 23, 1933. The tube is filled with a mixt. of gases, the metastable potential of the principal gas being higher than the ionization potential of the added gas. It has 2 principal electrodes, an auxiliary electrode adjacent to each of these and means for producing a discharge between the auxiliary and the principal electrodes.

Coating electrodes for discharge tubes. Telefunken Ges. für drahtlose Telegraphie m. b. H. (Horst Rothe, inventor). Ger. 587,886, Nov. 3, 1933. See U. S. 1,902,185 (C. A. 27, 3124).

Discharge-tube cathodes. N. V. Philips' Gloeilampenfabrieken (Hans J. Spanner, inventor). Ger. 588,487, Nov. 18, 1933 (Cl. 21g. 13.03). Borides, arsenides and tantalides of metals such as Th, Zr, Er, Mg or Cs are used as emitting substances in the manuf. of cathodes for gas-filled discharge tubes, particularly rectifying tubes. Wire of Ni, Mo or W may be used as the support for the emitting substance. Cf. C. A. 28, 8<sup>a</sup>.

Membranes for acoustic apparatus, etc. Telefunken Ges. für drahtlose Telegraphie m. b. H. (Walter Schottky, inventor). Ger. 587,370, Nov. 2, 1933. A mineral of high elasticity and low d., e. g., corundum or beryl, is vaporized, e. g., in an arc furnace, and condensed on a support of the desired shape. Various details are given.

Nickel vessels for organic acids. Vereinigte deutsche Nickelwerke A.-G. vormalig Westfälisches Nickelwalzwerk, Fleitmann, Witte & Co. Ger. 586,556, Oct. 23, 1933 (Cl. 48d. 4.02). Vessels for org. acids such as lactic, acetic, citric or formic acids are made from Ni, Ni alloys or Ni plate, and are given a protective coating by surface oxidation.

Sifting apparatus. Soc. anon. mécanique et outillage (to Soc. anon. ateliers J. Hanrez). Brit. 397,754, Aug. 31, 1933.

Vibratory sifting and screening apparatus. Pegson Ltd. and Charles H. Green. Brit. 397,009, Aug. 17, 1933.

Apparatus for preparing graded products from scrap mica by sorting, air blasting, etc. Conrad L. Johnson. U. S. 1,941,212, Dec. 26. Various structural and mech. details are described.

Bone and other crushers. Sven B. M. Wiberg. Brit. 398,107, Sept. 7, 1933.

Vapor engines. Henri M. R. Barjot. Brit. 398,586, Sept. 21, 1933. A binary vapor cycle utilizes anhyd.  $\text{AlBr}_3$  and steam, the condenser for the  $\text{AlBr}_3$  functioning as the steam generator.

Air-humidifying apparatus. Sewell M. Corbett. U. S. 1,940,787, Dec. 26. Various details of app. are described including a vaporizer with a thermostatically controlled valve.

Tungsten tubes. N. V. Philips' Gloeilampenfabrieken (Johannes A. M. van Liempt and Wilhelmus D. van Wijk, inventors). Ger. 587,330, Nov. 2, 1933. See Brit. 342,648 (C. A. 25, 4513).

Ozonizer. Siemens & Halske A.-G. (Richard Wiche, inventor). Ger. 585,666, Oct. 7, 1933.

Acetylene generators. Habran frères et Dubé. Fr. 754,850, Nov. 14, 1933.

Thermostatic device suitable for serving as an indicator by color change. John H. Derby. U. S. 1,938,583, Dec. 12, 1933. Structural features of a device which may include a wax and a dye.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

In memory of Angelo Angeli. Livio Cambi. *Gazz. chim. ital.* 63, 527-60(1933).—An obituary with portrait, a discussion of important org. chem. investigations, and a bibliography of 238 publications of A. and his collaborators from 1880 to 1931. C. C. Davis

Franz Wilhelm Dafert. Wolfgang Himmelbauer. *Oesterr. Chem.-Ztg.* 36, 183-6(1933).—Obituary with a bibliography. E. H.

Alfred Edward Johnson. Ernest V. Jones. *Analyst* 59, 2(1934).—Obituary. W. T. H.

The work and life of James Marsh. A. Cardoso Pereira. *Arch. inst. med. legal Lisboa* [B], 6, 1-88(1929-32). E. H.

Some hitherto unpublished letters of Pettenkofer, relating especially to his correspondence with Liebig on the hygienic value of meat extract. Alfons Fischer. *Munch. med. Wochschr.* 80, 1665-71(1933). Milton Levy

Liebig's death. R. Carrière. *Munch. med. Wochschr.* 80, 1670-1(1933).—Correspondence relating to Liebig's last days between his son-in-law and Wöhler and Kopp. Milton Levy

Perkin Medal award to Colin G. Fink. Accomplishments of the medalist. Harold Hibbert. *Ind. Eng. Chem.* 26, 232-4(1934). Chemistry and art. Colin G. Fink. *Ibid.* 234-8. G. G.

The terrestrial abundance of the permanent gases. Henry N. Russell and Donald H. Menzel. *Proc. Natl.*

*Acad. Sci.* 19, 997-1001(1933).—Consideration of the rate of escape of the permanent gases and of their cosmic distribution leads to the hypothesis that most, but not all, of the primitive A, N, and Ne escaped rapidly during the initial cooling of the earth's surface. J. B. Austin

A nomogram for the conversion of potentiometer readings to hydrogen-ion concentration. Alec Webster. *Chemistry and Industry* 1934, 38. E. H.

Origin of atmospheric ozone—observations made at Scoresby Sound during the polar year. A. Dauvillier.

*Compt. rend.* 197, 1339-41(1933).—Two hundred and fifty observations on the east coast of Greenland from November, 1932, to August, 1933 show an increase of ozone content during spells of high winds, but no connection with barometric pressure or the aurora. G. M. Evans

The errors arising in measurements of surface temperature. E. V. Polovnikova and L. S. Eigenson. *J. Tech. Phys.* (U. S. S. R.) 3, 518-24(1933).—Theoretical. F. H. Rathmann

Types of graphic classifications of the elements. I. Introduction and short tables. G. N. Quam and Mary Battell Quam. *J. Chem. Education* 11, 27-32(1934).—A bibliography of periodic tables, beginning with the work of Mendeléeff and Meyer, is presented. The tables are classified into 5 definite types and each type is treated chronologically with illustrations and descriptions. E. H.

**The periodic table.** B. S. Hopkins. *J. Western Soc. Eng.* 38, 307-18(1933).—All studies of the elements go back to the periodic system. W. H. Boynton

**Effect of oxygen and sulfur on the photoelectric effect from alkali metals.** V. V. Nalimov and P. V. Timofeev. *J. Tech. Phys.* (U. S. S. R.) 3, 602-9(1933).—Max. photo-effect occurs when  $4 \times 10^{-7}$  g.  $O_2$  is present per sq. cm. surface on K or  $6 \times 10^{-7}$  on Na. There is also a max. effect at  $5 \times 10^{-7}$  g. F. H. Rathmann

**Structure of inorganic peroxides.** I. A. Kazarnovskii. *J. Phys. Chem.* (U. S. S. R.) 1, 93-8(1930).—A review of the possible existence of asym. mols. of  $H_2O_2$  in which the bond of the second O atom with the  $H_2O$  mol. is realized by purely polarization forces. Calcn. reveals that the stability of the bond cannot exceed approx. 0.58 kg.-cal. but exptly. the stability proved to be about 100 times as large. If the possibility of the polar bond of the O with the ion of O is neglected the asym. formula for  $H_2O_2$  is impossible. F. H. Rathmann

**The chemical bond and quantum mechanics.** Yu. B. Rumer. *Uspekhi Khim.* 2, 393-411(1933).—The elements from H to He are considered from the classical and the Schrödinger viewpoints. Valences are derived from theoretical considerations. F. H. Rathmann

**Exchange of energy between gas atoms and solid surfaces.** III. Accommodation coefficient of neon. J. K. Roberts. *Proc. Roy. Soc. (London)* A142, 518-24(1933); cf. *C. A.* 26, 2357.—The accommodation coeff. of Ne on a clean W surface is 0.07 at 295° abs. and increases slightly down to 79° abs. A comparison with the values for He indicates that the atoms do not behave as elastic spheres. If the repulsive potential energy between a gas atom and a solid atom at a distance  $r$  be expressed by  $Ce^{-\lambda r}$ ,  $C$  and  $\lambda$  const., the upper value of  $\lambda$  is approx.  $6 \times 10^8$  cm.<sup>-1</sup> for Ne and W. E. J. Rosenbaum

**Chemical thermodynamics and molecular spectra.** Ya. A. Gerasimov. *Uspekhi Khim.* 2, 475-92(1933).—Theoretical and review. Entropies as calcd. by the third law are compared with those given by spectroscopic data for many substances. F. H. Rathmann

**Dia- and paramagnetism in metallic mixed crystal series.** II. Eckhart Vogt and Hans Krueger. *Ann. Physik* 18, 755-70(1933); cf. *C. A.* 26, 5233.—Expts. on 4 alloys of Au-Ni, contg. 1, 2, 4 and 6% of Ni by wt. indicate that Ni enters the Au lattice up to the limit of soly. with a paramagnetism which is const. between 300° and 200°K. with  $\chi'_A = +380 \times 10^{-4}$  per g. atom of Ni. Below 200°K. there is an accelerated increase in paramagnetism that does not appear in the 1% alloy. If this increase is due to the  $Ni^{2+}$  ions, whose moments obey the Curie law, the concn. of which below 200°K. gradually increases from zero, the results indicate that this concn. attains only a few tenths % of the dissolved Ni atoms. Expts. were made on the alloys CuPd, Cu<sub>2</sub>Pd, and Cu<sub>3</sub>Pt to study the relation between magnetism and the superlattice previously found\* in the CuAu series. The effects of various heat treatments on magnetic susceptibility, elec. resistance and elasticity are tabulated and discussed in connection with the results of other investigators. The magnetic superlattice effect indicates that the at. susceptibility of mixed-crystal alloys is not a purely additive property of the dissolved atoms. The common valence electron system furnishes a definite contribution and probably the source of the magnetic superlattice effect should be sought in the changes in configuration produced in this system by the transformations in the superlattice. III. Magnetic atomic moments of the transition metals in dilute mixed crystal solutions. Eckhart Vogt. *Ibid.* 771-90.—The results of several investigations on a series of alloys of the transition metals are tabulated and discussed in connection with the most recent theories. Because of the strong reciprocal action between ion moments, the transition elements, when pure, as a rule show either ferromagnetism, or paramagnetism independent of temp. But in dil. mixed-cryst. solns. in the diamagnetic noble metals, to a first approximation, they exhibit the properties of free or almost

free moments. When there are fewer than 10  $d$ -electrons, there occurs a paramagnetism that follows the Curie-Weiss law. The effects of various modifications of the  $d$ -10 shell are considered. Linde's observations on the increase in elec. resistance of the noble metals, produced by addns. of the transition metals, confirm the deductions from magnetic data on the effect of the no. of electrons in the  $d$ -shell. Sardron's work on ferromagnetic satn. and Neel's on paramagnetism show that Pd enters the Ni lattice with a moment equal to that of Ni itself. W. W. Stiffler

**Fluctuations of the molecular field and the equation of the magnetic state of nickel.** L. Neel. *Compt. rend.* 197, 1310-12(1933).—The equation of the magnetic state of Ni can be interpreted completely by assuming that the no. of magnetic electrons varies with the magnetization, being 0.83 per atom for no magnetization and 0.61 per atom at satn. The shape of the isothermal near the Curie point is explained by making a distinction between the mol. field at a short distance, with considerable fluctuations, and the mol. field at a great distance with negligible fluctuations. Without giving the math. details of its derivation, a rather complicated equation is set forth which involves these assumptions and expresses  $\sigma$ , the intensity of magnetization of Ni as a function of the temp., the abs. satn., the mol. field and various other const. The mol. field itself is expressed as  $H_m = 2400\sigma$ . The values of  $\sigma$  calcd. by this equation between 100° and 288°K. agree remarkably well with the observed values. Although this equation appears essentially different from the  $T^{3/2}$  law of approach, given by wave mechanics, the difference is really negligible. W. W. Stiffler

**Absolute magnetic susceptibility of water and its dependence upon temperature.** Hermann Auer. *Ann. Physik* 18, 593-612(1933).—Accurate data on the magnetic susceptibility of pure  $H_2O$  and its variation with temp. are increasingly important because many at. moments are detd. in aq. solns. By means of an improved app. designed to minimize the exptl. errors of the Quincke method,  $\chi_a$  is found to be  $(0.72183 \pm 0.00048) \times 10^{-4}$  at 20°. Results are given for the abs. susceptibility at 13 temps. from 1° to 70°. The temp. coeff.,  $(\frac{1}{\chi_a} \frac{d\chi_a}{dT})$  decreases continuously from  $2.9 \times 10^{-4}$  at 5° to  $0.62 + 10^{-4}$  at 70°. The results are compared with those of other observers. W. W. Stiffler

**Molecular orientations in  $p$ -diphenylbenzene crystals.** K. S. Krishnan and S. Banerjee. *Nature* 132, 968-9(1933); cf. *C. A.* 27, 3373.—The crystal structure can be detd. from the principal diamagnetic susceptibilities of the mol. S. Bradford Stone

**Experimental determination of the magnetic susceptibility of the free radical  $C_2H_5O_2N$  and the comparison with the theory by van Vleck.** Franz Galavics. *Helv. Phys. Acta* 6, 555-64(1933).—The molar magnetic susceptibility of di- $p$ -anisyl nitrogen oxide,  $(CH_3O_2C_6H_4)_2N:O$ , was detd. as a function of temp. in  $(CH_3)_2CO$  soln. and found at 19° to be  $1.28 \times 10^{-4}$  after subtraction of the diamagnetism. This agrees with van Vleck's calcn. if the paramagnetism is attributed to  $S = 1/2$  and the high-frequency elements are neglected. Egon Bretscher

**Liquid insulators.** J. B. Whitehead. *Trans. Electrochem. Soc.* 65, 12 pp.(preprint)(1934).—Dielec. loss in insulating liquids is in large measure a conduction phenomenon. In certain liquids there is evidence of decaying charge and discharge currents similar to those occasioned by dielec. absorption in solids. It is suggested that this is due to the presence of polarized mol. aggregates or ionic dipoles of large size, and with relaxation times of the order  $10^{-3}$  sec. C. G. F.

**Research on the amorphous state. II. Electrical conductivity of amorphous substances in the softening interval.** P. P. Kobeko and I. G. Nelidov. *Physik. Z. Sowjetunion* 4, 516-30(1933); cf. following abstr.—The elec. conductivities of phenolphthalein, brucine, tartaric acid, glycerol, citric acid, EtOH, rosin, sugar and sugar with 10% water were measured over a range of temps. including the softening temp. In all cases the elec. cond. varied

inversely with the temp. Deviations of the homeopolar liquids and the amorphous substances are due to their higher softening temps.

Howard A. Smith

**Research on the amorphous state. III. Dielectric constants of amorphous substances in the softening interval.** P. P. Kobeko and B. Kuvshinskii. *Physik. Z. Sowjetunion* 4, 680-94(1933); cf. preceding abstr.—Brucine, phenolphthalein, cane sugar and 90% EtOH were studied in the temp. interval between the m. p. and the temp. of vitrification ( $T_g$ ). Changes in the static and dynamic polarization consts. are assoc. with a change in the relaxation time, and with a change in the no. of rotating dipoles. This is explained by the loss in rotary motion of the mol. as  $T_g$  is approached. A departure from the Debye model above  $T_g$  is due to assocn. Below  $T_g$  the regular variation of the dielec. const. with frequency, which is analogous to that of compact cryst. bodies, cannot be connected with the internal friction. Dielec. loss below  $T_g$  is very low. Cond. is unaffected in this temp. region. In the region in which the static dielec. const. changed rapidly the potential distribution remained linear. **IV. Electrical conductivity of mixtures in the softening interval.** P. P. Kobeko and I. G. Nelidov. *Ibid.* 695-702.—In amorphous substances and mixts., the elec. cond. and the temp.  $T$  are connected by the equation  $\log_{10} \rho = (A - K) + (KT_g/T)$ , or  $\rho = Ae^{B/T}$ , where  $\rho$  is the resistance,  $T_g$  is the temp. of vitrification, and  $A$ ,  $B$  and  $K$  are consts. Values of  $T_g$ ,  $A$ ,  $B$  and  $K$  are given for EtOH, glycerol, citric acid, sugar; molar mixts. of glycerol with EtOH, citric acid and sugar; 1 mol. of glycerol with 2 mols. EtOH; and for a mixt. of 5 components. The  $\log_{10} \rho$  plotted against  $(1/T_g - 1/T)10^3$  is linear for values of the second term between 0 and 1.2. The  $T_g$  of a mixt. lies between that of its components. **V. Relation between the temperature coefficient of the electrical conductivity and the viscosity in amorphous substances.** *Ibid.* 703-8.—The relation between viscosity  $\eta$  and temp.,  $\log \eta = A' + B'/T$ , is linear and is similar to the relation between elec. cond. and temp. Values of  $T_g$ ,  $B$  and  $B'$  are given for 94% EtOH, PrOH, lutidine, 1:1 and 1:2 molar mixts. of glycerol and EtOH, tributyrin, citric acid, glycerol, glycerol-citric acid and glycerol-sugar solns., triacetyl, Rochelle salts, betol, piperine, sugar, sugar + 10% H<sub>2</sub>O, rosin, salicin, brucine and phenolphthalein.

Gerald M. Petty

**The determination of the valency angles of the oxygen and sulfur atoms and the methylene and sulfox groups, from electric dipole moments.** G. C. Hampson, R. H. Farmer, and L. E. Sutton. *Proc. Roy. Soc. (London)* A143, 147-68(1933).—The polarizations were measured and dipole moments calcd. for Ph<sub>3</sub>CH<sub>3</sub>, (*p*-BrC<sub>6</sub>H<sub>4</sub>)<sub>3</sub>CH<sub>3</sub>, Ph<sub>3</sub>O, *p*-BrC<sub>6</sub>H<sub>4</sub>OPh, (*p*-BrC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>O, (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>O, *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OPh, (*p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>O, *p*-BrC<sub>6</sub>H<sub>4</sub>Me, Ph<sub>3</sub>S, *p*-ClC<sub>6</sub>H<sub>4</sub>SPh, (*p*-ClC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>S, (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>S, Ph<sub>3</sub>SO, *p*-ClC<sub>6</sub>H<sub>4</sub>(SO)Ph, (*p*-ClC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>SO and (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>SO. The angles between the Ph groups in Ph<sub>3</sub>CH<sub>3</sub>, Ph<sub>3</sub>O, Ph<sub>3</sub>S and their derivs. are 115° ± 5, 142° ± 8 and 118° ± 8, resp. The angles for anisoles and phenols are estd. at 150° and 137° and the moments of the O-Me and O-H links at 2.33 and 2.37 Debye units, resp. For Ph<sub>3</sub>SO and its derivs., the angles are about 115°, and the moment of the S → O link is 2.63.

L. E. Steiner

**Interpretation of electric polarization coefficients.** Frank R. Goss. *J. Chem. Soc.* 1933, 1341-5.—The dielec. const. for C<sub>6</sub>H<sub>6</sub> was detd. by a heterodyne method at 20°, 40° and 60°. From these data, the at. and electronic polarizations were calcd. The temp. coeff. of total polarization for liquid C<sub>6</sub>H<sub>6</sub> is the same as that for the electron polarization, the at. polarization is const. and the dipole moment is zero.

E. J. Rosenbaum

**Electric moments of cyclic 1,1-dicarboxylic esters in relation to the valency-deflection hypothesis.** E. Harold Farmer and N. J. H. Wallis. *J. Chem. Soc.* 1933, 1304-9.—The elec. moments were measured by a sensitive heterodyne method. The values found are: cyclopropane-1,1-dicarboxylic Et ester,  $2.40 \times 10^{-18}$  e. s. u.; cyclobutane-1,1-dicarboxylic Et ester,  $2.22 \times 10^{-18}$  e. s. u.; cyclopentane-1,1-dicarboxylic Et ester,  $2.14 \times 10^{-18}$  e. s. u.;

cyclohexane-1,1-dicarboxylic Et ester,  $2.23 \times 10^{-18}$  e. s. u. The change from one ring to another apparently disproves the Thorpe-Ingold hypothesis of valency deflection. This disagreement may be due to changes in the moment of the carboxyl group or to rotation of the carboxyl group about the C—C bond.

E. J. Rosenbaum

**Absorption of electromagnetic energy in ionized gases during the process of working.** M. A. Bouch-Bruevich. *J. Tech. Phys. (U.S.S.R.)* 2, 375-88(1932).

**Study of the motion of gases in heating stoves according to the system of V. E. Grum-Grzhimallo.** M. A. Mikheev. *J. Tech. Phys. (U.S.S.R.)* 3, 504-8(1933).—Regularity of gas circulation was in accord with the theory.

F. H. Rathmann

**Effect of the change of composition on ignition region of methane-oxygen mixtures.** M. B. Neumann and A. I. Serbinov. *Physik. Z. Sowjetunion* 4, 433-42(1933); cf. C. A. 26, 6139.—Between compns. of 3 and 37% CH<sub>4</sub> in O<sub>2</sub> there exist 3 ignition limits at temps. between 635° and 680°. Argon added to CH<sub>4</sub>-O<sub>2</sub> mixts. does not change the time lag of ignition but extends the compn. of the lower and the higher limits at 650°. The change of the lower limit by such addns. follows Semenov's law.

Howard A. Smith

**Flame speeds during the "inflammation" of moist carbon monoxide-oxygen mixtures.** Wm. A. Bone and J. Bell. *Proc. Roy. Soc. (London)* A143, 1-15(1933).—The max. initial "uniform" flame speed for CO-O<sub>2</sub> mixts., ranging in compn. (CO/O<sub>2</sub>) from 55/45 to 4/1, which were ignited at the open end of a horizontal glass tube (the other end being closed) occurred at the compn. 3/1 for the mixts. satd. with H<sub>2</sub>O at 15°, and at the compn. 7/3 for the mixts. with H<sub>2</sub>O vapor at 4.8 mm. Almost anhyd. mixts. showed a const. initial flame speed of about 35 cm./sec. If the mixt. is ignited near the closed end, rather than at the open end, the flame speed is 15-30 times greater, but it has no fundamental significance.

L. E. Steiner

**A stationary flame and its utilization.** Mataka Kurokawa. *J. Fuel Soc. Japan* 12, 1346-57(1933)(in English 125-8).—To maintain a steady flame at the orifice of a burner the ignitable gas and air, mingled by diffusion, must flow upward at a rate just balancing that at which the flame is propagated downward. If it is assumed that combustion takes place at the conical boundary surface between the flame and a theoretical air, and that neither thermal decompn., nor partial ignition occurs in the

flame, the following relation exists,  $v = \frac{(1 + \alpha)Q}{\pi \sqrt{L^2 + r^2}}$ , in

which  $v$  is the velocity of ignition under the theoretical air mixt.,  $Q$  the quantity of gas issuing from the orifice,  $\alpha$  the theoretical air vol. for complete combustion of unit vol. of gas,  $L$  the length of the flame and  $r$  the radius of the orifice. When the supply pressure of gas is  $h$ , the sp. gr.  $S$ ,

and the orifice const.  $K$ ,  $Q = K\pi r^2 \sqrt{\frac{h}{S}}$ . Therefore,

$L = K(1 + \alpha)r \sqrt{h/v} \sqrt{S}$ , when  $r$  is much less than  $L$ .

Experimentally, the relation holds within certain limits. The velocity of flame propagation was detd. by Corsinglia (C. A. 26, 1752) and found inversely proportional to the square root of the sp. gr. Moreover, since the velocity  $v$  may be considered the velocity of the gas and air mixt. produced by diffusion and gas flow from an orifice, the same relation may be derived from kinetic theory. For this reason, the product  $v \sqrt{S}$  is const. This relation is expressed in a straight-line equation,  $H = A + BL$ , in which  $A$  and  $B$  are consts.  $A$  and  $B$  were detd. with a

modified type of Payman's app. (C. A. 19, 571) for 5 varieties of gas and  $H$  was calcd. Gases rich in hydrocarbons give a comparatively satisfactory result, while gases contg. much inert or H<sub>2</sub> do not.

F. I. Nakamura

**The collision areas of 1,3,5-mesitylene and of the most highly branched heptanes.** W. A. Everhart, W. A. Hare and Edward Mack, Jr. *J. Am. Chem. Soc.* 55, 4894-8(1933).—Viscosity data, Sutherland consts. and collision areas for 1,3,5-mesitylene and 2,2,3-trimethyl-

butane are tabulated for a wide temp. range. The collision areas agree excellently with the shadow-graphically computed values of the models made to scale. A type of space isomerism similar to that found in biphenyl is predicted for 2,2,3-trimethylbutane and for hexamethyl-ethane. M. McMahon

Diffusion coefficients of bromine-argon, bromine-methane, bromine-hydrogen chloride, and bromine-nitrous oxide. John E. Mackenzie and Harry W. Melville. *Proc. Roy. Soc. Edinburgh* 53, 255-9(1933).—The diffusion coeffs. of  $\text{Br}_2\text{-Ar}$ ,  $\text{Br}_2\text{-CH}_4$ ,  $\text{Br}_2\text{-HCl}$  and  $\text{Br}_2\text{-N}_2\text{O}$  were detd. by a visual method. The results agree with measurements by a photoelec. method. I. J. P.

Dalton's law and the paradox of Gibbs. B. Kedrov. *J. Phys. Chem. (U.S.S.R.)* 1, 433-7(1930).—A theoretical investigation of the limits of application of Dalton's law. G. Faerman

The specific gravity of acetone-water mixtures. W. Young. *J. Soc. Chem. Ind.* 52, 449-50T(1933).—The percentage of  $\text{Me}_2\text{CO}$  in  $\text{Me}_2\text{CO-H}_2\text{O}$  mixts. is tabulated for each 0.002 interval in the sp. gr.  $d_4^{20}$  of pure  $\text{Me}_2\text{CO}$  was 0.79061. A. M. Brant

The constitution of liquids. P. Bogdan. *J. chim. phys.* 30, 581-627(1933).—By following the reasoning of van't Hoff, numerical values were obtained for  $K$  in the expression  $\gamma^{1/3} = K(O - T)$ . A parallelism is established between  $K$  and the dielec. const.  $E$ . Mol. assocn. in the liquid state increases  $\gamma$  and  $K$ . The rule of Stefan was established by several methods. Independently of the theory of van der Waals the expression  $\lambda = 2RT \log \frac{p}{p^0}$  was developed for the heat of evapn. W. J. P.

Partial vapor pressures and refractivities of mixtures of benzene with nitrobenzene, phenol, benzyl alcohol or *p*-dichlorobenzene. A. R. Martin and C. M. George. *J. Chem. Soc.* 1933, 1413-16.—Of the mixts. of  $\text{C}_6\text{H}_6$  and its polar derivs. studied, the vapor pressures and refractivities of the  $\text{PhCH}_2\text{OH}$  and  $\text{PhOH}$  solns. show the greatest deviations from ideal solns. Of the others, *p*- $\text{C}_6\text{H}_4\text{Cl}_2$  is slightly assocd. The results are discussed from the point of view of dipolar and van der Waals forces. H. F. Johnstone

Density discontinuities at the critical temperature. C. A. Winkler and O. Maass. *Can. J. Research* 9, 613-29 (1933); cf. Tapp, Steacie and Maass, *C. A.* 28, 14<sup>a</sup>.—A technic for measuring  $d_s$  in various parts of a one- or two-component system, raised above its crit. temp., is described. Propylene and Me ether were the 2 media examd. The following generalizations regarding aberrations from the continuity of state were found for both. When either liquid was heated above the temp. at which the visible meniscus disappeared, the  $d$ . below this point of disappearance was greater than that above. The  $d$ . was uniform throughout each portion, undergoing a relatively sharp change in the small region where the meniscus was last seen. After 1 hr. of temp. equil., the difference in  $d$ . between top and bottom became const. and remained unaltered for 6 hrs. Const. stirring or temp. fluctuations of the order of 0.02° do not alter this  $d$ . difference. A decrease in the vol. available for the medium increases the  $d$ . difference between the top and bottom, a continuous relation existing between available space and  $d$ . difference. With decrease in available space, the  $d_s$  of both upper and lower portions of the medium increase, the  $d$ . of the lower more rapidly than that of the upper. These results were reproducible quantitatively in the expts. carried out to date. The  $d$ . difference for a fixed available space decreases with rise in temp. and is measurable up to at least 10° above the crit. temp. J. W. Shipley

Density of propylene in the liquid and vapor phases near the critical temperature. C. A. Winkler and O. Maass. *Can. J. Research* 9, 610-12(1933); cf. *C. A.* 27, 5226.—The  $d$ . of propylene in the liquid and vapor phases was measured over the range 66-92° by a refined dilatometer method and at the higher temps. at the same time by a float method. Good agreement was found between the 2 methods; the latter being preferable in the neighborhood

of the crit. temp. It was found that at temps. below the crit., no variation in vapor  $d$ . accompanied a change in the relative vol. of the liquid. J. W. Shipley

Barometric formula for real gases and its application near the critical point. R. Ruedy. *Can. J. Research* 9, 637-40(1933); cf. preceding abstrs.—According to the theory of the continuity of liquid and gaseous states, as expressed in van der Waals equation, pronounced  $d$ . differences may exist in a short column of fluid maintained, throughout its length, at the crit. temp. The point in the tube at which the  $d$ . of the contents has decreased a given percentage from the crit. value is higher the larger the ratio of the crit. temp. to the mol. weight. For substances like Ne the variations are so large that a measurable sepn. of isotopes may be expected at or near the crit. point; for other substances the computed results are at least of the magnitude found by expt. Also, in order to obtain, at or near the crit. point, a column of gas of uniform  $d$ . a temp. gradient must be allowed to exist along the column. J. W. Shipley

Systems with mixed dimensions. D. Vorländer. *Trans. Faraday Soc.* 29, 899-902(1933).—On combining a surface with a line, a system of "mixed dimensions" is obtained. The predominance of one dimension is of importance for the mol. nature of liquid-crystals. L. Waldbauer

Polymorphism of liquid crystals. D. Vorländer. *Trans. Faraday Soc.* 29, 913-14(1933).—The idea that liquid crystals exist in only 2 types is erroneous. The existence of substances with 3 and 4 liquid-cryst. phases is demonstrated. L. Waldbauer

A simple arrangement to demonstrate liquid crystals. G. van Iterson, Jr. *Trans. Faraday Soc.* 29, 915-19 (1933).—The general principle is that of the Lehmann crystn. microscope. The prepn. is warmed to a temp. slightly higher than that required for observation and cooled by a jet of air. Transformation temps. can be maintained for an unlimited time. L. Waldbauer

Forces causing the orientation of an anisotropic liquid. V. Fredericksz and V. Zolina. *Trans. Faraday Soc.* 29, 919-30(1933); cf. *C. A.* 26, 2356-7.—Expts. on *p*-azoxy-phenetole and anisaldazine in a magnetic field suggest that the orientation of the liquid is detd. by the orientation of the mols. and swarms in contact with the glass, and also by the interaction between the mols. or swarms within the liquid. The orienting action of the magnetic field depends on the diamagnetic properties of the substance. Kast's x-ray results are attributed to the motions of an anisotropic liquid. The motion is caused by the elec. anisotropy of the liquid together with electrostriction. Expts. on the elastic deformation of an anisotropic liquid indicate a change of orientation by mech. means. Under certain conditions it seems likely that resonance occurs. Intense excitation produces a semblance of boiling. L. W.

New arguments for the swarm theory of liquid crystals. L. S. Ornstein and W. Kast. *Trans. Faraday Soc.* 29, 931-44(1933).—In a swarm all the mols. are arranged in parallel; the no. of mols. being of the order 10<sup>4</sup>. The swarms are anisotropic, optically, diamagnetically and dielectrically. In nematic swarms, the mol. anisotropies are additive; in cybotactic swarms, they are largely canceled out. L. Waldbauer

Effect of a magnetic field upon the nematic state. H. Zocher. *Trans. Faraday Soc.* 29, 945-57(1933).—Mol. orientation is taken to vary continuously from one position to another within the substance because of Brownian motion and convection currents. L. Waldbauer

Magnetic properties of mesomorphic substances: analogies with ferromagnetics. G. Poëx. *Trans. Faraday Soc.* 29, 958-72(1933).—Nematic substances, smectic substances, crystn. in a magnetic field, diamagnetism and mol. structure are considered. A normal liquid corresponds to a paramagnetic substance, and a nematic one to a ferromagnetic substance; a transition point exists between the 2, analogous to the Curie point. Satn. is more difficult with smectics than with nematics, pointing to an arrangement in the former case on parallel surfaces (focal, conic or planar structures). L. Waldbauer

Inclination of molecules in some crystalline-fluid substances. Karl Herrmann. *Trans. Faraday Soc.* 29, 972-8(1933).—In Tl stearate, the angle at which the mols. slope is  $47^\circ$  for the liquid crystal, and  $37^\circ$  for the solid. In Tl oleate the angles are  $53^\circ$  and  $34^\circ$ , resp. L. W.

Rotating molecules and the liquid crystalline state. T. Malkin. *Trans. Faraday Soc.* 29, 977-82(1933).—It is suggested that the mols. in the liquid cryst. state are rotating about their long axes. This is typical in the  $\alpha$ -form of the esters of long-chain acids. L. Waldbauer

Alterations in the nature of a fluid from a gaseous to liquid crystalline conditions as shown by x-rays. G. W. Stewart. *Trans. Faraday Soc.* 29, 982-90(1933).—Much larger mol. groups are present in liquid crystals than in liquids, but the semi-ordered arrangement is nearly alike for both. Cybotactic groups are found in either condition; the liquid cryst. state is presumably composed of companies of mols. or of cybotactic groups. L. W.

Arrangement of chain molecules in liquid *n*-paraffins. A. Müller. *Trans. Faraday Soc.* 29, 990-3(1933); cf. C. A. 26, 3159.—Discussion of Stewart's theory of cybotactic structure. The diffraction ring in *n*-paraffins is due to assemblies of mols.; the av. distance of nearest approach (near the m. p.) is between 4.5 and 5 Å.

L. Waldbauer

Anisotropic melts: a study in change of state. F. I. G. Rawlins. *Trans. Faraday Soc.* 29, 993-4(1933).—The liquid cryst. condition is much more general than is usually supposed. The process of sublimation is discussed. L. Waldbauer

Study of crystalline orientation by electron diffraction. J. J. Trillat. *Trans. Faraday Soc.* 29, 995-1002(1933).—Cryst. orientation of metals, structure and orientation of various thin layers, and surface structure of liquids are discussed. In general, only a very small amt. of material is necessary, and electron analysis gives information about very thin layers. L. Waldbauer

Anomalous viscosity in mesomorphic melts. Wo. Ostwald. *Trans. Faraday Soc.* 29, 1002-5(1933).—These melts exhibit strong structural viscosity, resembling gelatin or rubber sols. L. Waldbauer

Viscosity of liquid crystals. R. O. Herzog and H. Kudar. *Trans. Faraday Soc.* 29, 1006-8(1933).—The experimentally detd. viscosity was traced back to the translational and rotational motions of the mols. This was applied to liquid crystals with some success. The values for  $\eta(\eta - \omega)$  are smaller for the amorphous phase than for the anisotropic phase.  $\eta$  is the sp. vol. and  $\omega$  the ratio of van der Waals vol. const. at the m. p. to the mol. wt. L. Waldbauer

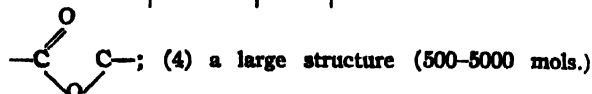
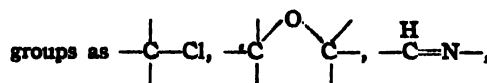
Lyotropic mesomorphism. A. S. C. Lawrence. *Trans. Faraday Soc.* 29, 1006-15(1933).—(1) Crystalloidal mesoforms of soap, (a) anhyd., (b) plus water, (2) anisotropic soap sols.—the true colloidal mesoform, and (3) structure in crystalloidal systems are discussed. In anomalous flow, the center of the tube (max. velocity) is also a region of anomalous flow, this flow being caused by the structure of the soln. Near the walls, the travel is faster than that given by the parabolic relationship, because elastic forces come into action. L. Waldbauer

Paracrystallinity. F. Rinne. *Trans. Faraday Soc.* 29, 1016-32(1933); cf. C. A. 27, 4456.—A detailed discussion of liquid crystals under the heads of: method of formation, miscibility, inclusion of natural org. objects in the paracryst. group and notes on nomenclature. L. W.

Liquid crystals produced by evaporation or cooling of an aqueous solution of tartrazine. Paul Gaubert. *Compt. rend.* 197, 1436-8(1933).—Tartrazine does not give liquid crystals at high temps., but does so at room temps. Tartrazine crystallizes in small acicular orthorhombic crystals, has neg. elongation, is very refractive and strongly birefringent. The anhyd. crystals do not melt and can be heated to  $300^\circ$  without decompn. They are sol. in cold  $H_2O$  and in all proportions in hot water. When a drop of a soln. of tartrazine (satd. by heat at  $50^\circ$ ) is placed on a slide, crystals form around the edges of the drop. Some isolated birefringent regions exist in the middle of an isotropic soln. By protecting with a cover

glass to prevent evapn. the phenomenon is of longer duration. The properties of these birefringent regions are similar to those of the solid crystals. Convergent light shows that the isotropism is not due to a new orientation normal to the optic axis and that the liquid is very isotropic. H. E. Mesmore

Crystalline phases of some substances studied as liquid crystals. J. D. Bernal and D. Crowfoot. *Trans. Faraday Soc.* 29, 1032-49(1933).—Liquid crystals seem to require the following conditions for their formation: (1) the mols. must be geometrically anisotropic either rod-shaped, flat or lath-shaped; (2) not more than 1 group capable of providing intense fields must be present in the mol.; (3) mols. should contain such moderately active



appears fundamental for cholesteric types. Such compds. are optically neg. although their optical activity is probably irrelevant from a structural standpoint. L. W.

Application of x-rays to the study of elastic strain in crystalline substances. A. P. Komar. *J. Tech. Phys.* (U. S. S. R.) 2, 519-28(1932); cf. C. A. 27, 2877.—A review. F. H. Rathmann

The interpretation of the asymmetrical asterism of Laue diagrams of deformed crystals of sodium chloride. A. Komar. *Physik. Z. Sowjetunion* 4, 563-4(1933).—The differences in the lengths of the tails of symmetrically located spots are measured for several thickness of deformed crystals. These indicate that slipping occurs principally along one of the possible slip planes with a simultaneous bending of the individual slip layers.

Victor Hicks

The crystal structure of NdAl. Charles W. Stillwell and Elmer E. Jukkola. *J. Am. Chem. Soc.* 56, 56-7(1934).—The compd. NdAl has the CsCl type of lattice with  $a_0 = 3.73 \pm 0.01$  Å. The ratio of the no. of valence electrons to the no. of atoms is 3:2 if the valence of Nd is assumed to be zero. Victor Hicks

A chamber for the precise determination of the lattice constants of crystals. P. A. Palibin. *J. Tech. Phys.* (U. S. S. R.) 3, 645-52(1933).—X-ray diagram photographs are given for the structure of Al by means of Fe and Cu K lines. F. H. Rathmann

X-ray study of arsenical struvite. R. Salvia. *Anales soc. españ. fis. quim.* 31, 822-4(1933).—Struvite,  $NH_4MgAsO_4 \cdot 6H_2O$ , pyramidal-rhombic,  $a:b:c = 0.568:1:0.912$ ,  $d_1 1.932$ , was used to form Weissenberg diagrams of a revolving crystal to show abs. dimensions of the elementary crystal. It was necessary to double the Schulten values (*Bull. soc. franç. minéral.* 26, 95(1903); 27, 107(1904)) for the axial relations  $a/b$  and  $c/b$ . The lattice is  $T_1$  (simple parallelepipeds). The no. of mols. in the fundamental lattice is 2. The group frequency is  $C_1^2D$ .

E. M. Symmes

Lattice dimensions of some solid solutions in the system  $MgO-Al_2O_3$ . G. L. Clark, E. B. Howe and A. E. Badger. *J. Am. Ceram. Soc.* 17, 7-8(1934).—The lattice dimension of  $MgO \cdot Al_2O_3$  is  $a_0 = 8.064 \pm 0.002$  Å. The lattice dimension of solid solns. of this spinel with  $\alpha-Al_2O_3$  decreases progressively with increase of  $Al_2O_3$ . C. H. K.

The crystal structure of  $CaSO_4 \cdot CO(NH_2)_2$ . Sterling B. Hendricks. *J. Phys. Chem.* 37, 1109-22(1933).— $CaSO_4 \cdot CO(NH_2)_2$  crystallizes in a face-centered ionic triclinic lattice with  $a_0 = 14.74$ ,  $b_0 = 14.98$ ,  $c_0 = 6.47$  Å;  $\alpha = 91^\circ 26'$ ,  $\beta = 90^\circ 22'$ ,  $\gamma = 86^\circ 42'$ . The space group is either  $P1$  or  $P\bar{1}$ . The at. parameters are given graphically. Optically,  $a:b:c = 0.9836:1:0.8645$ . The crystals are highly anisotropic, with  $n_g = 1.523$ ,  $n_o = 1.583$ ,  $\gamma = 1.615$ ;  $2V$  calcd. is  $70.0^\circ$ . Victor Hicks

Theory of recrystallization. E. F. Bakhmetev, A. A. Bocharov, G. S. Zhdanov and Ya. S. Umanakli. *J.*



**Tech. Phys. (U. S. S. R.)** 2, 161-72(1932).—Nuclei, recuperation, energy distribution and polycrystallinity are discussed.

**Supra-crystallinity of *p*-azoxybenzoic acid.** D. Vörländer. *Trans. Faraday Soc.* 29, 902-6(1933).—When the mol. structure breaks down more easily than the cryst. structure, the mols. in the crystal are more firmly combined with one another than are the atoms in the mol., and there is the highest possible degree of crystallinity. A no. of azoxy compds. are discussed.

**The relationship between the densities of some salts in the solid and the liquid state. Determination of the diameters and densities of molecules of salts and of the atoms of alkali metals.** A. E. Makovetskii. *J. Phys. Chem. (U. S. S. R.)* 4, 423-30(1933).—The ds. of solid alkali halide salts were obtained by calcn. from data for d. of salts in the liquid state. On this basis empirical relationships are found.

**Contact measurements at low temperatures.** R. Holm and W. Meissner. *Z. Physik* 86, 787-91(1933).—The contact resistance of Cu, Au and Ni is about  $1-50 \times 10^{-9} \Omega$  and independent of temp. It obeys Ohm's law.

**Superconductivity and the Hall effect.** B. Lazarev. *Physik. Z. Sowjetunion* 4, 567-8(1933).—In superconducting metals the product of Hall's const. and the cond. ( $R_H$ ) is small and for nonsuperconducting metals it is large. In the Tl-Bi alloys with Bi contents up to 63% ( $\text{Bi}_4\text{Tl}_4$ )  $R_H \cong 20$  while above 65% Bi  $R_H \cong 120$ . In the Pb-Bi system up to 18% Bi (solid soln.)  $R_H \cong 10$  and the product is much higher above this amt. of Bi.

**Hall effect and the internal photoelectric effect in cuprous oxide.** I. Kikoin and M. Noskov. *Physik. Z. Sowjetunion* 4, 531-50(1933).—The elec. cond. and Hall const. at room temp. and at liquid-air temp. are, resp.,  $3.7 \times 10^{-10} \Omega^{-1} \text{ cm.}^{-1}$  and  $0.96 \times 10^7 \text{ abs. e. m. units}$ ; and  $2.8 \times 10^{-12} \Omega^{-1} \text{ cm.}^{-1}$  and  $0.94 \times 10^{11} \text{ abs. e. m. units}$  for  $\text{Cu}_2\text{O}$  when not illuminated. The cond. at liquid-air temp. illuminated is  $1.28 \times 10^{-10} \Omega^{-1} \text{ cm.}^{-1}$ . The spectral distribution of the internal photoelec. current presents a max. at 4600 Å. The electron concn. at equil. when illuminated is  $8 \times 10^4$  electrons per cc. The free electron paths at room and liquid-air temps. are  $4.4 \times 10^{-7} \text{ cm.}$  and  $2.3 \times 10^{-7} \text{ cm.}$ , resp. Electron mobilities at room and liquid-air temps. are 36 and 120 cm. per sec., resp.

**Preparation of thin metallic layers by means of cathode sputtering.** O. G. Keiko. *J. Tech. Phys. (U. S. S. R.)* 3, 653-6(1933).—Diagrams show app. used to prep. thin layers of Cu, Ag, Ni, Pt, Cd, Pb, Sn, Bi and mixts. of Cu + Ag, Cu + Ag + Cd in presence of 0.1-0.2 mm. of  $\text{H}_2$ , A,  $\text{N}_2$ , Ne or He.

**Preparation and properties of thin lead sulfide films with special reference to their detector action.** II. Gerhard Brückmann. *Kolloid-Z.* 65, 148-61(1933); cf. C. A. 28, 389<sup>b</sup>.—PbS mirror films are transparent at 300  $\mu$ , while at 40  $\mu$  there is a strong change in reflection and absorption. Interference colors are not observable when a glass substrate is used. At 60  $\mu$ , there is a transition to a gray-blue color. The Haidinger law of complementary colors was found valid for the films. Above 200  $\mu$ , with increasing thickness, reflection from the surface side increases slowly, probably because of grain coarsening. For anomalous films, in which mirroring has been disturbed, the reflection is nil, transparency poorer than for the same thickness of normal mirrored films, and the films have a higher dispersity. Detector action increases rapidly with film thickness to 100  $\mu$ , above which it increases very slowly, similar to the curves of sp. cond. and  $\pi$  curves of metals. At 0.10  $\mu$ , the current-voltage characteristic curves are similar to that of sensitive galena crystals. On polished substrate surfaces, there is no relation for detector action on various metal substrates for equal thicknesses because prepn. details and grain size seem more important. Etched surfaces cause an orienting effect and better film reproducibility is obtained. Above 200  $\mu$  where grain size increases, detector action increases. Where the grain size is so thick that reflection shows interference

detector action is at a max. Polishing of the film surface has no effect. No difference was found for films prepd. from ordinary and from highly purified reagents. Treatments intended to sulfurize the surface did not increase detector action. Aging effects were absent, and removal of any  $\text{PbSO}_4$  coating of the films by NaOH or  $\text{NH}_4$  citrate showed no effect. Addn. of  $\text{Tl}_2\text{S}$  by direct occlusion to 10% diminished the effect, while Th B occlusion caused no change. The electron flow was from metal contact to PbS film except for polished Pb, Sn and Ag substrates. With Ag, current flowed in both directions; with Pb and Sn, direction was reversed. Flow was normal when the surfaces of these metals were etched or sand-papered prior to film formation. For graphite point contact, the flow was always from film to C. A combination of the theories of van Geel, Ogawa and Zwickler is advanced as the basis of a theory of contact detectors.

**Pseudocrystalline structure of water.** R. H. Fowler and J. D. Bernal. *Trans. Faraday Soc.* 29, 1049-56(1933).—The two facts upon which the theory is based are: water is not an ideal close-packed liquid, and the water mol. is asymmetrical. The following continuous scheme is deduced: water I "tridymite-like" (light, viscous); water II "quartz-like" (heavy, semiviscous); water III "liquid-ammonia-like" (light, nonviscous). There is no difference of mol., but different arrangements of the same mol. exist in small regions of vol.

**Cyclopentanone and cyclohexanone.** D. Vorländer. *Trans. Faraday Soc.* 29, 910-12(1933).—Values of the birefringence show that the directional stability of mol. movement is more than twice as great in cyclopentanone as in cyclohexanone.

**The Wiedemann-Franz constant, heat conductivity and thermoelectric forces of tellurium.** C. Hawley Cartwright. *Ann. Physik* 18, 656-78(1933).—A new exptl. method is described for measuring these quantities and tested with Au, Pt and Pb. Te with less than 0.01% impurities in the form of single crystals and polycryst. materials was tested at room temp. and liquid- $\text{O}_2$  temp. The departure of the Wiedemann-Franz const. from its normal value is explained by the assumption that heat cond. is a sum of terms, one due to cond. electrons and one due to mutual attraction of atoms. For good conductors the atomic term is very small but with semiconductors it is much larger. Thermoelec. forces and the Wiedemann-Franz const. for thin films of sublimed Te were measured.

**Some physical properties of silicon and ferrosilicon.** Ch. Bedel. *Ann. chim.* 20, 439-519(1933).—A sample of Si prepd. from ferrosilicon revealed some microscopic porosity and contained 99.86% Si, as compared to industrial Si, which contains 98.4% Si and exhibits Fe silicide regions. Si was etched with a mixt. of 9 parts  $\text{H}_2\text{O}$ , 30 alc. to 1 of KOH and showed cryst. structure clearly. With only 10 parts alc. ferrosilicons as well as Si are etched. The following data for the d. of Si were obtained: Si from Al, d. =  $2.326 \pm 0.0033$ ; Si from Zn, d. =  $2.329 \pm 0.0030$ ; Si, powdered and washed with HF, d. =  $2.333 \pm 0.0004$ ; fused Si, d. =  $2.307 \pm 0.0008$ ; Si, crushed but not washed with HF, d. =  $2.331 \pm 0.0014$ ; Si, crushed and washed with HF, d. =  $2.331 \pm 0.0046$ ; powd. Si, washed with HF, d. =  $2.330 \pm 0.0023$ . Ferrosilicons contg. 10.41, 50.59 and 85.86% Fe, and pure Fe gave ds. 2.53, 4.792, 6.755 and 7.859, resp. The formation of  $\text{SiFe}_2$  and  $\text{SiFe}$  caused an increase in the detd. ds., while compds. contg. less Si than  $\text{Fe}_2\text{Si}_4$  caused less variation from the theoretical. Some compds. of Fe and Si showed distinct magnetic susceptibility, while pure Si is diamagnetic. The coeff. of sp. magnetization for  $\text{SiFe}$  is  $163.70 \times 10^6$  and for  $\text{Si}_2\text{Fe}$  is  $112.28 \times 10^6$ . For a 56.86% Si alloy it is  $10.80 \times 10^6$ . From 65.48% Si to pure Si the values are  $1.63 \times 10^6$  to 0.0. Thermal treatment of samples of ferrosilicon has a marked effect upon their magnetic properties. The elec. resistance of Si increases while current flows from 21.85 to 30.52 ohms after 8 hrs. Interruption in the current causes an abrupt increase in resistance. Electrode pressure causes variations in the

resistance; hence a dielec. substance (adsorbed gas layer) must exist between the electrodes and the Si. The temp. coeff. of elec. resistance changes markedly at about 200°. This change confirms Koenigsberger and Schilling's detn. of the transition of  $\alpha$ -Si to  $\beta$ -Si at 215°. Si contg. 1.38% Fe shows a min. in resistance at about 210°; the coeff. changes from neg. to pos. at 210°. Amorphous Si showed soly. of 7-13% in HF. Si from Ag was 33-68% sol., from Zn and not powdered 12-15%, from Zn, powdered, 18-60%, from Zn and washed with HCl 23-6%, and from Zn, fused, and powdered 8-19%. Forty-two % HF showed least soly. action on Si, corresponding to 2HF.3H<sub>2</sub>O. Thirteen % HF, or HF.7H<sub>2</sub>O, exhibited the max soly. B. believes the HF dissolves only SiO<sub>2</sub> formed by oxidation (atm. or otherwise). H. E. Messmore

**Adsorption of gases by glass walls. IX. Nitric oxide.** M. Crespi. *Anales soc. españ. fis. quim.* 31, 825-9 (1933).—Adsorption of pure, dry NO on glass walls was detd. by using the same app. and technic as for N<sub>2</sub>O (C. A. 26, 5812). NO gas was prepd. by the action of Hg on a soln. of NaNO<sub>2</sub> in concd. H<sub>2</sub>SO<sub>4</sub> satd. at 40°. The correction for detn. of gas d. by the Regnault method, with various flasks and various pressures, is  $-3 \times 10^{-6}$  g. for 1000-ml. flasks under ordinary conditions and  $-5 \times 10^{-6}$  for 600-ml. flasks at 0.33 atm. pressure. E. M. S.

**A study of the absorption of gases by magnesium and calcium.** V. P. Saraev. *J. Tech. Phys.* (U. S. S. R.) 2, 442-9 (1932).—Mg absorbs only ionized N<sub>2</sub> or H<sub>2</sub>. At higher temps. Mg gives off absorbed N<sub>2</sub>, Ca absorbs more. Absorption by Ca is not proportional to ionization.

F. H. Rathmann

**The adsorption of nitrogen by iron synthetic-ammonia catalysts.** P. H. Emmett and Stephen Brunauer. *J. Am. Chem. Soc.* 56, 35-41 (1934); cf. C. A. 27, 2372.—The rates of adsorption of N<sub>2</sub> by promoted and by pure iron catalysts were measured over the temp. range 273° to 450°. The energy of activation of the adsorption process is about 16,000 cal. Isotherms at 400° and 450° indicate a heat of adsorption of about 35,000 cal. Isotherms taken at -189° are linear with respect to pressure between 100 and 760 mm. P. H. Emmett

**The sorption of vapors by activated, highly evacuated sugar charcoal over long periods of time.** James W. McBain and R. F. Sessions. *J. Am. Chem. Soc.* 56, 1-4 (1934).—Sorption isotherms of various vapors on highly purified and evacuated charcoal reach satn. values at very low pressures; furthermore, they change only a few % during runs lasting several years, provided the charcoal-vapor system is kept sealed. P. H. Emmett

**Studies on adsorption. The relation of water held by charcoal at zero pressure to the ash content.** L. J. Burrage. *J. Phys. Chem.* 37, 1095-101 (1933); cf. C. A. 27, 4981.—The ash content of several charcoals was detd. by a method that prevented loss of ash due to sublimation. The ash content cannot account for the quantity of water held by charcoal at zero pressure. It is suggested that the ash plays no part in the retention of water at zero pressure, but that the latter is held in a quasi-chem. manner by the active centers and C<sub>2</sub>O<sub>2</sub> complex. P. T. Newsome

**Surface condensation.** N. Fuchs. *Physik. Z. Sowjetunion* 4, 481-7 (1933).—The Frenkel theory postulating a sharply defined crit. temp. for condensation is criticized. Recent exptl. results point to the significance of surface discontinuities. This latter conception can be satisfactorily explained by the general Gibbs-Volmer theory. Howard A. Smith

**Spectrographic adsorption measurements with metal ion solutions on powder surfaces.** E. Berl and B. Schmitt. *Kolloid-Z.* 65, 264-7 (1933).—The concns. of very dil. solns. were detd. after adsorption by cstn. of intensity of last lines. The last lines are those few lines that at the highest dilns. of salt solns. still appear when the soln. is vaporized in an arc lamp. From 10 to 12 g. of solid of detd. dispersity was shaken with 10-20 cc. of 0.01% soln., and after adsorption the solid was sepd. by centrifuging. Expts. with Cu, Cd, Pb and Zn ion solns. with sphalerite, galena, CaCO<sub>3</sub>, BaSO<sub>4</sub>, SiO<sub>2</sub>, CaF<sub>2</sub>, and pyrite confirmed

<sup>1</sup> Fajans' rule qualitatively. Freshly ground pyrite adsorbs Cu completely from 0.001% soln., incompletely from 0.01%. Quant. measurements of Cu ion adsorption on sphalerite indicate a dependence on initial concn. and increase with fineness. Arthur Fleischer

**Relation between adsorption, solubility and nature of solvent. III.** Naoyasu Sata and Katuzo Kurano. *Kolloid-Z.* 65, 283-90 (1933); cf. C. A. 24, 4201; 26, 4741.—Adsorption of benzoic and picric acids by "Carbo medicinalis Merck" from 0.01 M solns. in binary mixts. of H<sub>2</sub>O, EtOH, Me<sub>2</sub>CO, Et<sub>2</sub>O, PhNO<sub>2</sub>, PhMe, C<sub>6</sub>H<sub>6</sub>, and CCl<sub>4</sub> was detd. at 25°. Soly. and adsorption curves are antibiotic except for picric acid in Me<sub>2</sub>CO mixts. In Me<sub>2</sub>CO, the absorption max. is at 4500 Å., behavior in this solvent being anomalous. Arthur Fleischer

**Monomolecular films of the polyesters.** Sanford A. Moss, Jr. *J. Am. Chem. Soc.* 56, 41-3 (1934).—The polymeric acid and neutral ethylene succinates form a regular series of stable unimol. films on dil. acid substrates similar to vapor expanded films of fatty acid esters. It appears that the mol. chains are flexible and can be closely packed before immersion or compression occurs. The closeness of approach was 5.85 Å.; the value 5.25 Å. was obtained from x-ray data. Reuben Roseman

**Colloidally divided arsenic dust as a condensation aerosol.** A. Winkel and G. Jander. *Kolloid-Z.* 65, 290-4 (1933); cf. C. A. 27, 3128.—As<sub>2</sub>O<sub>3</sub> aerosols, 73 mg. to 520 mg. per cu. m., were prepd. by cooling rapidly a gas stream contg. As<sub>2</sub>O<sub>3</sub> vapor obtained by passing over the oxide at 190° to 250°, and filtering out the dust particles. Below 100 mg. the aerosol is homogeneous, while from 100 to 500 mg., homogeneity is reached after sedimentation. The time required increases with concn. The particle size at given times is a linear function of concn. A. P.

**Determination of size and charge of fog droplets.** N. Fuchs and I. Petryanov. *Kolloid-Z.* 65, 171-4; *J. Phys. Chem.* (U. S. S. R.) 4, 567-72 (1933).—The principle of the Wells and Gerke method (cf. C. A. 13, 424) was combined with that of Millikan-Ehrenhaft so that the charge and size were simultaneously obtained from photographs. Special precautions for good photographs are use of intensive illumination, careful adjustment of the system and photographic app., grounding of cuvette and one electrode, and adjustment of fog concn. The method is not applicable below 0.3  $\mu$ , where Brownian movement becomes too large, or above 40  $\mu$ , where Stokes' law fails, but which is above the limit for sizes found in fogs. A mineral-oil fog, droplets 1.2 to 2.6  $\mu$ , revealed no relation between size and charge. Arthur Fleischer

**Studies in emulsions. I.** Joseph B. Parke and Hugh Graham. *J. Chem. Soc.* 1933, 1214-17.—The systems (a) C<sub>6</sub>H<sub>5</sub>-Na oleate-H<sub>2</sub>O, (b) tetrahydronaphthalene-Na oleate-H<sub>2</sub>O, (c) C<sub>6</sub>H<sub>5</sub>-sulfonated fish oil-NaOH-H<sub>2</sub>O, and (d) tetrahydronaphthalene-sulfonated fish oil-NaOH-H<sub>2</sub>O were examd. for viscosity, cond., and appearance under the microscope. Systems (a) and (b) were of the oil-in-water type throughout and the viscosity decreased continuously with increase in content of H<sub>2</sub>O. Systems (c) and (d) were water-in-oil and the viscosity increased with the water content up to 23 and 27%, resp., at which points the systems changed suddenly into oil-in-water types and the viscosity increased enormously, after which the viscosity decreased sharply with further increase in water content. F. L. Browne

**Electrostatics of colloids.** Ya. K. Suirkin. *J. Phys. Chem.* (U. S. S. R.) 1, 455-67 (1930).—A lecture. G. Faerman

**The action of electric waves on colloids.** E. Wilke and R. Müller. *Kolloid-Z.* 65, 257-60 (1933).—The changes in As<sub>2</sub>S<sub>3</sub> sol on exposure to high-frequency electro-magnetic alternating fields are presented as typical of the behavior of mastic, Berlin blue, Congo red, Night blue, hemoglobin, and Ag sols. The velocity of reaction depends on the energy in the oscillating circuit, wave length and sensitization by added electrolytes. Momentary changes are detd. by following the changes in cataphoresis and cond.; slow reaction (after-effects) by

changes in viscosity, color and flocculation. Viscosity changes of  $\text{As}_2\text{S}_3$  are slight with a min. at 180 m. Flocculation and color show max. at this wave length.

Arthur Fleischer  
Optics of white sols. III. Optical relations in coagulation. Torbjörn Caspersson. *Kolloid-Z.* 65, 301-7(1933); cf. *C. A.* 28, 950.<sup>2</sup>—Application of Mie's theory of light absorption and of Smoluchowski's coagulation equations leads to a very complicated expression for the change of absorption on coagulation or increase in particle size. From a series of calcd. curves for various wave lengths, definite initial particle sizes, and known  $\kappa$ s, the change of particle size on coagulation can be detd. from the exptl. absorption coeff.

Arthur Fleischer  
The capillary rise of hydrosols and of solutions of dyes. I. Effect of concentration and electrolytes. Augustin Bouteir and Marius Peyraud. *Compt. rend.* 197, 1218-20(1933).—Capillary rise when strips of ash-free filter paper were dipped into the sols. was detd. in a satd. atm. With low concns. (0.1 g./l.) neg. semicollodial dyes rise more rapidly than pos. dyes, but at concns. from 1 to 2 g./l. the velocities are about the same and may be reversed. The rise of neg. colloids and dyes is retarded by electrolytes; the effect is independent of the anion but increases as the valence of the cation increases. The rise of pos. colloids is retarded by  $\text{Na}_2\text{SO}_4$  and  $\text{Na}_2\text{PO}_4$ , is barely affected by  $\text{NaCl}$ , but  $\text{HCl}$ ,  $\text{BaCl}_2$ ,  $\text{AlCl}_3$  and  $\text{ThCl}_4$  accelerate; the latter effect varies with the valence of the cation and reaches a max. with increased concn.

E. G. Vanden Bosche  
Measurements of isotherms of specific wetting. A. B. Taubman. *J. Phys. Chem.* (U. S. S. R.) 1, 562-71 (1930).—A study of the effect of saponin sols. of various concns. on the wetting of paraffin by water and the rate of change of surface tension on the boundary: saponin soln.-air. In measuring the angle of contact on the boundary soln.-air on a paraffin wall with change of concn. of the saponin a change from an obtuse to an acute angle as a result of the adsorption of saponin on the interface is observed. Beginning with a concn. of saponin of 0.01%, paraffin is wet by a water soln. It was assumed that the Rebiner equation for the kinetics of adsorption was applicable. (Cf. Rebiner, *J. Russ. Phys.-Chem. Soc.* 56, 530(1924).)

G. Faerman  
The determination of combined water in disperse systems. I. Refractometric and polarimetric methods. A. V. Dumanskii. *Kolloid-Z.* 65, 178-84(1933).—Part of the  $\text{H}_2\text{O}$  content of a colloidal system is present in a combined state, oriented and under a high pressure, and characterized by a lower vapor pressure, absence of freezing on cooling, and lower solvent activity than ordinary water. For easily filtering systems, sugar is added, thoroughly mixed with the colloidal system, filtered, and sugar detd. in the filtrate by refractometric or polarimetric measurements. Powdered sand,  $\text{BaSO}_4$ , talc and  $\text{Al}_2\text{O}_3$ , previously dried at 105°, showed 0.041, 0.015, 0.030 and 0.069 g. of combined water per g. of material by the refractometer, and 0.034, 0.018, 0.029, 0.056, resp., by the polarimeter. The following were obtained for potatoes: raw 0.567, frozen 0.344, dried 0.540, boiled 1.506 g. per g. of dry substance; for sugar beets, 5.4% combined against a total water content of 71.6%.

Arthur Fleischer  
Colloidal solutions of sulfur from sulfur nitride. S. A. Voznesenskii. *J. Phys. Chem.* (U. S. S. R.) 1, 510(1930). The reaction of sulfur nitride with alkali in anhyd. media gives colors in the order: red, blue, yellow, milk-white. The rate of color change varies with diln. The obtained sol is hydrophylic and consists of the particles  $[\text{S}_2\text{-O}_2, \text{H}_2\text{O}, \text{S}_4]^- + \text{H}^+$ .

F. H. Rathmann  
The reaction of ethylene oxide with solutions of earth- and heavy-metal halides. A new method for the preparation of sols and reversible gels of metal-oxide hydrates. Walter Ziese. *Ber.* 66B, 1965-72(1933).—The halides of Al, Cr, Fe, Th and Zn in dil. soln. react slowly with ethylene oxide to form sols or gels of the metal-oxide hydrates and ethylene halohydrin, which can be sepd. from the soln. by extn. (with  $\text{Et}_2\text{O}$ ) or distn. If not more than 90% of the metal halide is converted to the hydroxide,

1 sols are formed which can be dried, and then redissolved in  $\text{H}_2\text{O}$  or concd. alc. or glycerol sols. If less than 5% of the original halide remains unconverted, the sol is unstable and a gel is slowly formed; an excess of the ethylene oxide forms gels, after some hrs., which show the phenomena of "humming," syneresis and dehydration. For  $\text{ZnO}$  and  $\text{MnO}$  the sol phase is unstable, unless a protective colloid is present, and gels are quickly formed. Propylene oxide and epichlorohydrin may be substituted for the ethylene oxide.

L. E. Steiner  
The stability toward rupture of adsorbed films on the air-saponin boundary of aqueous solutions. N. M. Lubman. *J. Phys. Chem.* (U. S. S. R.) 1, 721-7(1930); cf. *C. A.* 27, 216.—By the method of a spinning float the stability of an adsorbed film of saponin soln. of varying concns. and the speed of its formation were studied.

G. Faerman  
Existence of micelles in aqueous solutions of saponin. Wm. Kleinberg. *Proc. Soc. Exptl. Biol. Med.* 31, 113-14 (1933).—In sols. of surface-active substances, there are certain crit. concns. in which the static surface tension is at a min. and these minima occur when the mols. in the surface layer form regular patterns. In aq. sols. of saponin, well-marked minima occurred at concns. of 1:12, 500, 1:24,500 and 1:37,500. By the method of du Nouy (A. C. S. Monograph Series No. 27, 1921) the dimensions of the saponin mol. would be  $6.3 \times 10^{-8}$  cm.,  $3.2 \times 10^{-8}$  cm. and  $2.1 \times 10^{-8}$  cm., which are about 10 times the expectation for the saponin mol. The dimensions must be those of agglomerates, in orderly arrangement, capable of orienting themselves in 3 different ways corresponding to their length, breadth and thickness. C. V. Bailey

Colloidal solutions by hydrolysis of ceric sulfate. A. Janek and A. Schmidt. *Kolloid-Z.* 65, 295-7(1933).—The turbidity of sols formed by pouring Ce sulfate soln. into  $\text{H}_2\text{O}$  at 20°, 45°, 70° and 100° increases with decreasing temp. and the max. turbidity is displaced to higher concn. with decreasing temp. The best sols result when 0.5 to 3.75 cc. of Ce sulfate soln. contg. 1 g. of salt, 60%  $\text{Ce}_2\text{O}_3$ , per 15 cc. is poured into 100 cc.  $\text{H}_2\text{O}$  at room temp.  $\text{Na}_2\text{SO}_4$  addn. clarifies the sol. The particles are negatively charged and are hydrophobic.

Arthur Fleischer  
The behavior of concentrated ferric hydroxide sols in capillary viscometers. A. Rabinerson and G. Fuchs. *Kolloid-Z.* 65, 307-16(1933).—Sols, 7.82 to 20.42 g.  $\text{Fe}_2\text{O}_3$  per 100 cc., were prepd. by peptization of Merck's *Ferrum oxydatum dialysatum*. The 20% sol set to a thixotropic gel in several days. At 20°, sols above 17% showed structure viscosity, which increased with age. Compared to most colloids, the structure viscosity is small. After aging the thixotropic properties of the 17% sol are apparent from the different viscosities obtained by filling the pipet at different rates. The Reynolds no. decreases with increase in  $\text{Fe}_2\text{O}_3$  concn.; for a 17% sol the value is 13 to 16% of that of water. Arthur Fleischer

The correlation between swelling action and permeating power of electrolytes. Margarete von Dellingshausen. *Planta (Abt. E, Z. wiss. Biol.)* 21, 51-97(1933).—A study was made of the effect of neutral salts on the swelling of gels, as influenced by (1) the d. and sp. charge of the gel, (2) the degree of adsorption and the hydrophilic nature of the ion and (3) the concn. of the electrolyte. With permeable homogeneous gels (gelatin, agar) swelling depends on the hydrophilic character of the adsorbed ion; non-adsorbed ions (of the same charge) hinder swelling to an extent dependent on the affinity of the ions for water. An increase in electrolyte concn. favors the swelling of permeable gels and checks the swelling of impermeable gels. Whether the adsorbed ions increase or decrease the swelling of a gel depends also on the hydrophilic character of the gel micelles. With gelatin gels in which the structure of the diffusion path has not been affected the permeation velocity of the cations of chloride sols. corresponds to their mobility in free soln.:  $\text{Al} < \text{Mg} < \text{Ca} < \text{Ba} < \text{Li} < \text{Na} < \text{K}$ . In gels already at swelling equil. with electrolyte sols. the mobility of the cations of chlorides, as detd. by increased swelling, is in the order  $\text{K} < \text{Na} < \text{Li}$  and  $\text{Al} < \text{Mg} < \text{Ca}$ . With lupin-seed husks the swelling effect

of ions in low concn. depends on their permeating power, in high concns. on their degree of free mobility. With Cellophane membranes the swelling-effect curve agreed approx. with the mobility of the ions at the concns. tested. In all gels tested the sp. cond. of the electrolytes was highest at the lowest concns. In a Cellophane osmometer the  $J$ -value for isosmotic solns. was in the order  $KCl < NaCl, LiCl < sucrose$ . Sixty-five references.

K. D. Jacob

**Liesegang rings.** Bruno Kisch. *Kolloid-Z.* 65, 316-19 (1933); cf. *C. A.* 24, 284-5.—Liesegang rings form on evapn. of a solvent, such as  $HOAc$ , from a soln. contg. such salts as  $KCl, NaCl, K_2SO_4, K_2Cr_2O_7$  or  $CuSO_4$  if a solid particle, the central body, is present. The central body may be silica. Aq. solns. of  $K_2Cr_2O_7$  show the same effect when rapidly evapd. Rings of the 2nd order obtained with  $AgNO_3$  diffusing into dichromate gels are not exactly concentric with the 1st-order rings. Light causes a stronger development of the rings. Arthur Fiescher

**The question of the structure of silica gel.** M. V. Polyakov, P. M. Stadnik, M. V. Paritzkil, I. M. Malkin and F. S. Dukhina. *J. Phys. Chem.* (U. S. S. R.) 4, 454-6 (1933).—Drying of  $SiO_2$  gel in vapors of  $C_2H_6, PhMe, xylene, naphthalene$  and  $S_2$  leads to an increase in the general adsorptive activity of  $SiO_2$  gel as measured by  $C_2H_6$ . In this preliminary report a relation is sought between activity of  $SiO_2$  gel and the mol. wt. of the substance in the vapors of which desiccation is produced.

G. Faermann

**The conductance of bases in liquid ammonia.** Wm. W. Hawes. *J. Am. Chem. Soc.* 55, 4422-30 (1933).—The elec. cond. of  $NaNH_2$  and  $KNH_2$  in liquid  $NH_3$  was measured up to dilns. of 36,000 and 52,000 l., resp. Deviation from the simple mass-action theory and the theory of Kraus and Fuoss may possibly be ascribed to the small size of the amide ion.

L. F. Audrieth

**Electric conductivity of cellulose ethers.** B. V. Kuvshinskii. *J. Tech. Phys.* (U. S. S. R.) 3, 634-44 (1933).—Acetyl, ethyl, nitro and benzyl cellulose derivs. were studied.  $H_2O$  increases the cond.  $10^6$  times. Plasticizers also increase it by the same amt.

F. H. Rathmann

**Solubility of inorganic compounds in liquid ammonia.** II. Martin Linhard and M. Stephan. *Z. physik. Chem.* A167, 87-102 (1933); cf. *C. A.* 27, 2865.—The solubilities of the following salts were detd. in liquid  $NH_3$  at  $-0.1 \pm 0.1^\circ$ :  $LiCl, RbCl, CsCl, AgCl, NH_4Cl, RbBr, CsBr, AgBr, NH_4Br, RbI, CsI, AgI, NH_4I, MgBr_2, CaBr_2, SrBr_2, BaBr_2, MgI_2, CaI_2, SrI_2, BaI_2, Ca(NO_3)_2, Sr(NO_3)_2, Ba(NO_3)_2$ . The results are discussed and compared with those obtained in aq. soln.

G. M. Murphy

**Solubility. XIII.** The solubility of iodine in certain solvents. G. R. Negishi, L. H. Donnelly and J. H. Hildebrand. *J. Am. Chem. Soc.* 55, 4793-4800 (1933).—In extension of work previously reported (*C. A.* 23, 1559) the soly. of  $I_2$  in mols. %, was detd. in  $TiCl_4$  ( $0.8633_{10.0} - 4.939_{10.0}$ );  $SiCl_4$  ( $0.1713_{10.0} - 0.8801_{10.0}$ );  $C_2H_5Br$  ( $4.925_{10.0} - 35.26_{10.0}$ ) and 2,2,4-trimethylpentane ( $0.5900_{24.0} - 0.8711_{10.0}$ ). Violet "regular" solns. are formed in each case. The relation between soly. and internal pressure and applicability of an equation by Scatchard are discussed.

E. R. Schierz

**The solubility of hydrogen in water at  $0^\circ, 50^\circ, 75^\circ$  and  $100^\circ$  from 25 to 1000 atmospheres.** R. Wiebe and V. L. Gaddy. *J. Am. Chem. Soc.* 56, 76-9 (1934); cf. *C. A.* 26, 4228, 5245; 27, 2615.—The soly. shows a min. within the exptl. range similar to that of  $N_2$  in  $H_2O$ . It seems that the existence of minima is a general phenomenon that can be deduced from the known behavior of mixts. and is not necessarily dependent on sp. properties of the solvent or solute.

Reuben Roseman

**The solubility of silver bromate in mixtures of alcohols and water.** Edward W. Neuman. *J. Am. Chem. Soc.* 56, 28-9 (1934).—The solubilities of  $AgBrO_3$  in mixts. of  $MeOH, EtOH, PrOH$  and iso- $PrOH$  with  $H_2O$  were detd. at  $25^\circ$ . The results are incompatible with the Born electrostatic formula, as expressed by Scatchard (*C. A.* 21, 1216).

E. R. Smith

**The solubility of acetyl- $\alpha$ -toluidine in various solvents.**

J. L. Hall, A. R. Collett and C. L. Lazzell. *J. Phys. Chem.* 37, 1087-94 (1933).—The solubilities of acetyl- $\alpha$ -toluidine in  $MeOH, EtOH, PrOH, iso-PrOH, BuOH, iso-BuOH, Me_2CO, CHCl_3, C_2H_6, Et_2O$  and  $H_2O$  were detd. over the temp. range  $25^\circ$  to  $110^\circ$ . The calcd. molal heats of fusion varied from 5500 to 5900 cal. P. T. N.

**The solubility of the hydrates of nickel chloride in water.** Erich Boye. *Z. anorg. allgem. Chem.* 216, 29-32 (1933).—The soly. of  $NiCl_2$  from the cryohydric point ( $-45.3^\circ$ ) to the b. p. of the satd. soln. ( $+117.9^\circ$ ) was detd. The phase diagram shows 4 hydrates, the transition points of which are: ice +  $NiCl_2 \cdot 7 aq. - 45.3^\circ$ ;  $NiCl_2 \cdot 7 aq. + NiCl_2 \cdot 6 aq. - 33.8^\circ$ ;  $NiCl_2 \cdot 6 aq. + NiCl_2 \cdot 4 aq. - 28.8^\circ$ ;  $NiCl_2 \cdot 4 aq. + NiCl_2 \cdot 2 aq. - 64.3^\circ$ . H. H. Rowley

**Limitations of solubility method for determining dissociation constant.** W. V. Bhagwat and S. S. Doosaj. *J. Indian Chem. Soc.* 10, 477-90 (1933).—Dissoen. consts.

were detd. for the weak acids: formic, acetic, citric, benzoic and salicylic, by adding their Na salts to satd. solns. of the sparingly sol. acids: benzoic, salicylic and cinnamic, and using the formula,  $K_2 = K_1 - a(c - b + a)/(b - a)^2$ , in which  $K_2$  is the required dissoen. const.,  $K_1$  is the known dissoen. const. of the sparingly sol. acid whose soly. in water is  $a$  and whose soly. is  $b$  in the Na salt soln. when the salt concn. is  $c$ . The values of the const. are fair when the concn. of Na salts is varied from 0.0 to 0.8-2.5  $N$ . The value of  $K_2$  is affected by both degree of ionization and hydrolysis. With diln. the former decreases the no. of acid mols.,  $(b - a)$ , while the latter increases the soly.,  $(b - a)$ . The change of  $K_2$  with diln. is detd. by the relative importance of increase in ionization and increase in hydrolysis. For acids not monobasic the formula must be made:  $K_2 = nK_1 - a(nc - b + a)/(b - a)^2$ , where  $n$  is the basicity of the acid. The formula is absolutely correct when  $K_2 = K_1$ . When  $NaCl$  is added to one of the sparingly sol. acid const. value of  $K_2$  is found. It cannot be called a dissoen. const. for  $HCl$ , but it can be used in calcs. of the soly. of the acid in other concns. of  $NaCl$ .

F. E. Brown

**The solution of metals in acids.** Maria Schunkert. *Z. physik. Chem.* A167, 19-28 (1933).—Addn. of albumin, agar, dextrin, gelatin, casein, starch and saponin lowers the rate of evolution of  $H$  in the action of concd. and dil.  $H_2SO_4$  on  $Fe$  and  $Zn$ . Methyl violet and methylene blue lower the rate of soln. of  $Fe$  in concd.  $H_2SO_4$  but raise the rate for  $Zn$  in dil.  $H_2SO_4$ . The activity is proportional to the adsorption of the compd. Highly ionized salts either raise or lower the rate.

G. M. Murphy

**Comparison of extraction formulas.** Carroll W. Griffin. *Ind. Eng. Chem., Anal. Ed.* 6, 40-1 (1934).—The variables in 2 extraction formulas are compared. The limits are evaluated for the case of finite and infinite vol. of extracting liquid.

G. M. Murphy

**The effect of concentration on the compressions of aqueous solutions of certain sulfates and a note on the representation of the compressions of aqueous solutions as a function of pressure.** R. E. Gibson. *J. Am. Chem. Soc.* 56, 4-14 (1934).—Exptl. measurements of the compressions up to 1000 bars of various solns. of 11 sulfates were made over the whole range of concn.; for those sulfates not greatly hydrolyzed in soln. the bulk compressions of solns. of the same molality are approx. the same. A deviation function,  $A$ , giving the difference between the sp. compression of pure  $H_2O$  and  $H_2O$  in any soln., is expressible by the equation  $A = am + bm^2$ . Tait's equation, modified by a procedure suggested by a hypothesis of Tammann, represents very accurately the vol.-pressure relations in salt solns. The melting curve of pure  $C_2H_6$  between 500 and 1000 bars is given by the equation  $P = 518.8 + 37.4(t - 20) + 0.104(t - 20)^2$ , where  $P$  is the pressure in bars and  $t$  the temp.

Reuben Roseman

**The specific effect of the solvent in electrolytic dissociation.** D. J. G. Ives. *J. Chem. Soc.* 1933, 1360-5.—The increase in cond. of aq. solns. of  $Cu$  malonate when pyridine is added to the soln. is due to the breaking down of the solvated sheath of the  $Cu$  ion in the aq. solns. The behavior of this class of electrolyte is detd. in general by

the electron-accepting tendency of the cation and the coordinating tendencies of the anion and of the solvent. The effect of the solvent change is small in the case of the malonates of Zn and Ni.

H. F. Johnstone

The electrical properties of sea water for alternating currents. R. L. Smith-Rose. *Proc. Roy. Soc. (London)* A143, 135-46 (1933).—The elec. properties of sea water under a. c. conditions, particularly at radio frequencies, were investigated. The sp. cond. of sea water obtained from the English Channel was found to increase from  $3.9 \times 10^{10}$  at 500 cycles to  $5.4 \times 10^{10}$  e. s. u. at a frequency of 10,000 kilocycles/sec., corresponding to resistivity values of 23 and 16.5 ohm-cm., resp. In detg. the current flowing, it is concluded that the dielec. const. has a negligible influence compared with the effect of the cond. The value of the dielec. const. is probably about 80. Between 0° and 40° the mean temp. coeff. of cond. is about +2.7%/°C. A sudden decrease in cond. occurs at -2°, and the coeff. has a much smaller value below this transition point.

Allen S. Smith

The effect of dissolved electrolytes on the boundary tension of water. W. G. Eversole and Dallas S. Dedrick. *J. Phys. Chem.* 37, 1205-14 (1933).—A specially designed app., employing the drop-vol. method, was used to det. the interfacial tensions, at 40.00°, of the following systems: aq.  $\text{CH}_3\text{COONa}$ -mineral oil, aq.  $\text{HCOONa}$ -mineral oil, aq.  $\text{CH}_3\text{COONa}$ -toluene, and aq.  $\text{HCOONa}$ -toluene. The interfacial tension of aq.  $\text{CH}_3\text{COONa}$ -mineral oil decreased hyperbolically with increasing salt concn. from 0 to 6 molal. In the other 3 systems, however, the surface tension passed through a min. as the salt concn. increased, the value at higher salt concns. often being greater than at zero concn. The effect of these salts is explained on the basis of the Langmuir theory of mol. orientation and the increased interionic attraction in the interface due to the dielec. const. gradient in the interfacial layer.

Don Brouse

The effect of sodium acetate on the interfacial tension of the benzene-water system at 40°. Dallas S. Dedrick and Maurice H. Hanson. *J. Phys. Chem.* 37, 1215-21 (1933).—"At very low concns., the interfacial tension of aq.  $\text{CH}_3\text{COONa}$ -benzene systems decreases markedly with increasing concn. of the salt. After passing through a decided min. at about 0.1 molal, the interfacial tension increases with a small increase in concn. It then passes through a max., the value of which is greater than the initial tension between benzene and water, and finally decreases hyperbolically as the soln. becomes more nearly satd." The theory of Eversole and Dedrick (cf. preceding abstr.) is extended to include the boundary effects of strong electrolytes at higher concns.

Don Brouse

The cryoscopic behavior of alcohol in aqueous solution. Andre Berner. *Ber.* 66B, 1917-21 (1933).—Dil. solns. of alc. in  $\text{H}_2\text{O}$  are normal in f.-p. behavior, contrary to the opinion of Beiser and Pringsheim. The f.-p. lowering of an alc.-insulin soln. in  $\text{H}_2\text{O}$  is the sum of the lowerings of the alc. and insulin in sep. solns.

L. E. Steiner

The molecular-weight determinations of carbohydrates. Max Ulmann and Kurt Hess. *Ber.* 66B, 1975-7 (1933).—The normal b. p. rise is obtained for cane sugar if the sugar is not dried at too high temp. and if the boiling in the b. p. app. is stopped while the sugar is added. The sugar may be dried at room temp. or with boiling  $\text{CHCl}_3$ .

L. E. S.

The partial pressure of water vapor and oxides of nitrogen over a solution of nitrosylsulfuric acid in sulfuric acid. A. V. Tikhonov. *J. Chem. Ind. (Moscow)* 1933, No. 8, 58-60.—The pressures are given at 3 concns. of  $\text{H}_2\text{SO}_4$  and over a wide variety of temps. and concns. of  $\text{N}_2\text{O}_5$ .

H. M. Leicester

Water vapor equilibria on vanadium and its oxides. Masami Kobayashi. *Science Repts. Tôhoku Imp. Univ.*, 1st Ser. 22, 1240-55 (1933).—See C. A. 28, 24°. G. G.

The partial pressures of water in equilibrium with aqueous solutions of sulfuric acid. Edward M. Collins. *J. Phys. Chem.* 37, 1191-1203 (1933).—Based upon a redetn. of aq. partial pressures over aq. solns. of  $\text{H}_2\text{SO}_4$ , a table of relative vapor pressures is compiled from which

can be ascertained the aq. partial pressures between 0 and 70%  $\text{H}_2\text{SO}_4$  for any temp. from 20° to 140°. The heats of vaporization of water from solns. of the above range of concn. and temp. are tabulated.

Don Brouse

Individuality of the osmotic conduct of the alkali halides. G. Damköhler and J. Weinzierl. *Z. physik. Chem.* A167, 71-86 (1933); cf. C. A. 25, 2350.—The cryoscopic method previously described was used to measure f. p. lowering of LiBr, NaBr, KBr and CsBr soln. The method of prepg. the ice and the thermocouple were improved. The Haber-Loewe interferometer was used to measure concn. but it was found necessary to place the instrument in a thermostat in order to get reproducible results. Temp. coeffs. of interferometer readings are given for the salts named.

G. M. Murphy

Velocity of permeation of electrolytes through a membrane. Shinnosuke Matsuura. *Sci. Repts. Hiroshima Higher Tech. School* 2, 67-187 (1933) (in English).—Largely a review of C. A. 24, 3692; 25, 3542; 26, 4994-5; 27, 11, 1261.—Correction: the following relations hold for the permeation of a single electrolyte through a membrane: (1)  $(1/t) \log (C_0 - C_\infty)/(C - C_\infty) = \lambda A (V - v)/2.3 V v = k$ ; (2)  $(1/t) \log (c_0 - c_\infty)/(c - c_\infty) = \lambda A (V + v)/2.3 V v = k$ ; (3)  $C_\infty = c_\infty = (C_0 V + c_0 v)/(V + v)$ , where  $C_0$  is the initial concn. of the inside soln. (I),  $c_0$  is that of the outside soln. (III),  $C$  the concn. of I at time  $t$ ,  $c$  that of II at time  $t$ ,  $C_\infty$  and  $c_\infty$  are the concns. of I and II at time  $\infty$ ,  $V$  and  $v$  the initial vols. of I and II,  $A$  is the surface area of the membrane and  $k$  a const. when  $V$ ,  $v$  and  $A$  are const.

W. C. Fernelius

Accelerated and retarded diffusion in aqueous solution. James W. McBain and Charles R. Dawson. *J. Am. Chem. Soc.* 56, 52-6 (1934).—The principles governing the acceleration or retardation of all ions in the presence of other ions, whether diffusion with or against them or present in uniform concn. throughout, are discussed. These are illustrated by expts. with KCl and HCl. Collision effects of diffusing columns modify the results at higher concns. High rates of diffusion were found for all constituents in expts. in which glycine diffused against HCl. In the case of Cl ion in dil. soln. the increase was as much as five-fold, although the Cl ion was not reacting.

E. R. Smith

The Kohlrausch theory of migrating boundaries. Jnanendra Nath Mukherjee. *Kolloid-Z.* 65, 297-301 (1933); cf. C. A. 23, 558, 1549.—The principles to be observed in detg. transport nos. by the moving-boundary method, as previously deduced by M., are shown to be valid.

Arthur Fleischer

The dissociation constants of glycine at various temperatures. Benton B. Owen. *J. Am. Chem. Soc.* 56, 24-7 (1934); cf. C. A. 25, 634-5.—The acid and basic dissoc. consts. and heats of dissoc. of glycine were detd. in aq. soln. from 10° to 40°, and from 10° to 45°, resp. At 25°,  $K_A = 4.47 \times 10^{-3}$ ,  $K_B = 6.04 \times 10^{-4}$ ,  $\Delta H_A = 1159$  cal.,  $\Delta H_B = 2765$  cal.

E. R. Smith

Spectroscopic investigation of the dissociation relations of mercuric halides in solution. Hans Fromherz and Kun-Hou Lih. *Z. physik. Chem.* A167, 103-28 (1933).—Absorption curves are given for aq. solns. of  $\text{Hg}(\text{ClO}_4)_2$ ,  $\text{HgO}$ ,  $\text{HgCl}_2$ ,  $\text{HgBr}_2$ , and  $\text{HgI}_2$ ; mixts. of  $\text{HgCl}_2$  with LiCl and KCl;  $\text{HgBr}_2$  with LiBr and KBr;  $\text{HgI}_2$  with KI; and abs.-alc. solns. of  $\text{HgBr}_2$ ,  $\text{HgI}_2$ ,  $\text{HgBr}_2 + \text{NaBr}$  and  $\text{HgI}_2 + \text{NaI}$ . In all concns. in aq. soln. the halides are unionized and show no assocn. In alc. soln. the max. are displaced to the red compared with the aq. soln. and are lowered by diln. In the alkali halide solns. complex salts are formed for which the degree of assocn. is detd. The ultra-violet frequencies of the compd.  $\text{HgX}_2$  and  $\text{HgX}_2$  show a simple relationship similar to Raman frequencies.

G. M. Murphy

The use of the equation of Henglein for solutions and mixtures. V. A. Kireev. *J. Gen. Chem. (U.S.S.R.)* 3, 622-7 (1933); cf. C. A. 27, 3654.

E. J. C.

Determination of acidity in ethyl alcohol by velocity of acetal formation. Alden J. Deyrup. *J. Am. Chem. Soc.* 56, 60-4 (1934).—The rate of formation of  $\text{MeCH}(\text{OEt})_2$  is suitable as a measure of acidity in abs.-alc. soln. HCl,



HBr, HI and HClO<sub>4</sub> are completely ionized strong acids; HNO<sub>3</sub> and picric acid are weak acids of about the same strength in this solvent. The effect of change of electrolyte concn. and solvent on the dissocn. consts. of a no. of weak acids and bases was detd. The inhibition of the reaction by traces of H<sub>2</sub>O can be ascribed to its basic character. Catalysis in the presence of CaCl<sub>2</sub>, Ca(NO<sub>3</sub>)<sub>2</sub>, and LiCl is due to traces of strong acids. R. Roseman

The temperature coefficients of the electromotive force of the cell Cd (metal), CdSO<sub>4</sub>, Cd (saturated amalgam). W. George Parks and Victor K. La Mer. *J. Am. Chem. Soc.* 56, 90-1 (1934); cf. *C. A.* 28, 30<sup>2</sup>.—From e. m. f. measurements of cells, Cd/CdSO<sub>4</sub> 0.5M/Cd(s, satd. with Hg) at 0°, 10°, 20° and 30°, using various types of annealed Cd electrodes,  $E_t \times 10^3 = 5538 - 14.8t - 0.385t^2 + 0.0075t^3$ . These data were used for calcn. of free energy, entropy and heat content changes for the transfer of Cd to Cd satd. amalgam and for the same thermodynamic properties for Cd(s) + PbSO<sub>4</sub>(s) = CdSO<sub>4</sub> + Pb(s). L. P. Hall

The magnesium electrode in ether solution and the free energy of formation of magnesium bromide. Geo. A. Scherer and Roy F. Newton. *J. Am. Chem. Soc.* 56, 18-20 (1934).—Exptl. data are given for the e. m. f. of the cell Mg(s), satd. ether soln. of MgBr<sub>2</sub>·2(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>O, Hg<sub>2</sub>Br<sub>2</sub>(s), Hg(l), and for the vapor pressures of the mono- and di-ethers of MgBr<sub>2</sub>. From these and other data, the authors calc. for MgBr<sub>2</sub>(s),  $\Delta F_{298}^\circ = -114.0$  kg.-cal. per mol. F. D. Rossini

Modern theory of overvoltage. O. A. Esin. *Uspekhi Khim.* 2, 493-516 (1933); cf. *C. A.* 28, 397<sup>2</sup>.—Intermediate compds., surface tension, intermediate discharge of ions, and quantum-theory considerations are discussed. F. H. Rathmann

The oxidation-reduction potential of the system hypoxanthine = uric acid. Sabine Filitti. *Compt. rend.* 197, 1212-14 (1933).—Hypoxanthine (I), in the presence of xanthine-oxidase, reduces the whole series of oxidation-reduction indicators, including  $\gamma, \gamma'$ -bipyridyl dimethochloride; uric acid (II) oxidizes the leuco derivative of this indicator. The equil. potential for the above indicator, diastase and an equimol. mixt. of I and II, is  $-0.410$

For C<sub>5</sub>H<sub>4</sub>ON<sub>4</sub> + 2H<sub>2</sub>O = C<sub>5</sub>H<sub>4</sub>O<sub>2</sub>N<sub>4</sub> + 2H<sub>2</sub>, the normal potential at 38°, the free energy and the heat of the reaction are  $-0.031$  v., 2861 cal. and  $-1700$  cal., resp.

E. G. Vanden Bosch

Decomposition pressures of nitrates and sulfates. II. Vanadyl sulfate and lead nitrate. Bernhard Neumann and August Sonntag. *Z. Elektrochem.* 39, 799-806 (1933).—The decompn. of VOSO<sub>4</sub> into V<sub>2</sub>O<sub>5</sub>, SO<sub>3</sub> and SO<sub>2</sub> begins at 410° and  $p_{\text{SO}_2}$  reaches 1 atm. at 610°. The reaction is reversible. The heat of formation of the sulfate from its elements is estd. from the vapor-pressure data to be 314.2 Cal. The decompn. of Pb(NO<sub>3</sub>)<sub>2</sub> begins at approx. 250°. Because of the further decompn. of N<sub>2</sub>O<sub>5</sub>, the reverse reaction takes place very slowly. The decompn. occurs in steps with the successive formation of 4 PbO·2Pb(NO<sub>3</sub>)<sub>2</sub>, 5PbO·Pb(NO<sub>3</sub>)<sub>2</sub>, and PbO. The calcd. heats of formation of these compds. are 448.1, 391.1 and 322.9 Cal., resp.

H. F. Johnstone

A method for the direct determination of the dissociation pressure of metallic oxides. A. Kapustinskii and L. Shamovskii. *Z. anorg. allgem. Chem.* 216, 10-16 (1933).—A method is described for the direct detn. of heterogeneous chem. equil. between metals and gases by measurement of the electron emission. The dissocn. equil. of NiO was investigated and the value 106.3 kg.-cal. for the heat of formation of NiO calcd.

H. H. Rowley

Calculation of chemical equilibria in gaseous reactions. A. V. Frost. *Uspekhi Khim.* 2, 445-74 (1933).—Theoretical and review. Equilibria are calcd. by application of the third law and by application of statistical methods, and compared with exptl. values. The effect of isotopes is considered. Entropies as detd. by spectroscopic and sp.-heat data are compared. F. H. Rathmann

The thermal decomposition of solids. W. E. Garner, A. S. Gomm and H. R. Hailes. *J. Chem. Soc.* 1933, 1393-8.—The decompn. of solids begins at nuclei on either the external or the internal surfaces of a crystal. The reaction

spreads uniformly from these nuclei only within the individual grains composing the crystal and from grain to grain only at a few points on the boundaries. The rate of the reaction in its early stages follows a branching mechanism, while in the final stages it follows the first-order law.

H. F. Johnstone

The chain theory and oxidation processes. N. N. Semenov. *Uspekhi Khim.* 2, 590-621 (1933); cf. *C. A.* 26, 5482; 27, 889.—A review of work done to show the kinetics and chain nature of the combustion of S, P, H<sub>2</sub>, PH<sub>3</sub>, CO, etc., and the effect of vessel shape and size, of pressure, of admixtures, and of light. F. H. R.

Oxidase-like oxidizing action of certain metallic complex salts. IX. The action of some metallic complex salts on the oxidation of diphenylaminesulfonic acid and *N*-methyl-*p*-aminophenol. Yuji Shibata and Kazuo Yamasaki. *J. Chem. Soc. Japan* 54, 1207-14 (1933); cf. *C. A.* 24, 5773.—The change of the Ba salt of diphenylamine-sulfonic acid (I) and *p*-MeNHC<sub>6</sub>H<sub>4</sub>OH (II) by an addn. of complex salts of Co and Cr was studied by measuring the O<sub>2</sub> absorption and the effect of poisons, KCN, NH<sub>4</sub>OH, complex salt of Cr, etc., which have no oxidizing power. The absorption of O<sub>2</sub> by I is not affected by the addn. of complex salts but that of II is decreased by their presence; the stronger the oxidizing power of the salts, the less the O<sub>2</sub> absorption. K. Kitsuta

The slow combustion of ethylene. Wm. A. Bone, A. E. Haffner and H. F. Rance. *Proc. Roy. Soc. (London)* A143, 16-37 (1933).—The reaction between C<sub>2</sub>H<sub>4</sub> and O<sub>2</sub> at 300° and 1 atm., for compns. (C<sub>2</sub>H<sub>4</sub>/O<sub>2</sub>) ranging from 5/1 to 1/2, is homogeneous, and is preceded by an induction period in which aldehyde is formed. Previous addn. of 1% NO or AcH eliminates the induction period, and either (but not ethylene oxide) accelerates the reaction. The 2/1 mixt. is most reactive and the initial stage of oxidation involves, not "peroxidation" but rather "hydroxylation" of the C<sub>2</sub>H<sub>4</sub> to vinyl alc. which forms the other C<sub>2</sub>H<sub>4</sub>O isomers in ratios dependent on the temp. and pressure. H<sub>2</sub>O vapor does not affect either induction or reaction period. L. E. Steiner

The reaction of nitrous oxide with hydrogen atoms. J. K. Dixon. *J. Am. Chem. Soc.* 56, 101-2 (1934); cf. *C. A.* 27, 5.—The reaction H + N<sub>2</sub>O → N<sub>2</sub> + OH must possess considerable activation energy even though it is exothermic and obeys the spin rule. From the data obtained on the formation of H<sub>2</sub>O in the reaction, the approx. lower limit for the activation energy is 10 kg.-cal. Since the reaction is slow, it seems probable that in the relatively fast Hg-photosensitized reaction of H<sub>2</sub> and N<sub>2</sub>O (Taylor and Marshall, *C. A.* 19, 3418 9) the excited Hg transfers most of its energy, which is given up in collision, to the N<sub>2</sub>O (Manning and Noyes, *C. A.* 26, 5848).

Reuben Roseman

The rate of reduction of carbon dioxide by graphite. Martin A. Mayers. *J. Am. Chem. Soc.* 56, 70-6 (1934).—The rate of reduction of CO<sub>2</sub> by graphite was measured in terms of cc. of CO produced per sec. from CO<sub>2</sub> at 1 atm. in contact with 1 sq. cm. of graphite surface. It is given, for temps. between 950° and 1300°, by the equation  $\log A_1 = 5.07 - (38,700/4.575 T)$  and for temps. between 850° and 950°, by  $\log A_2 = 3.40 - (32,360/4.575 T)$ . The significance of the appearance of 2 stages in the oxidation of graphite by CO<sub>2</sub> and its relation to the surface oxide complex are discussed.

Reuben Roseman

The speed of crystallization and the number of nuclei of tin, bismuth and lead. G. Tammann and H. J. Rocha. *Z. anorg. allgem. Chem.* 216, 17-25 (1933).—The speed of crystn. and the number of large nuclei formed were investigated by supercooling the molten metal to various temps. for different periods of time. The number and length of the large crystals were detd. by means of etch figures. With increased supercooling, the speed of crystn. rose to a max. (2 cm./min. for Bi; 5 cm./min. for Pb; 200 cm./min. for Sn). Under the same conditions, the number of large crystals also increased with greater supercooling. The effect of the size of the mold was studied. Only with very small cross sections was there a marked effect on the speed of crystn. and no. of nuclei but with



larger diams., the liberated heat of crystn. kept the metal at its m. p. for considerable time. H. H. Rowley

Kinetics of the reaction of the alkaline earth metals with nitrogen and other gases. II. Kinetics of the reaction of the alkaline earth metals with nitrogen. A. v. Antropoff and K. H. Krüger. *Z. physik. Chem.* A167, 49-53 (1933); cf. *C. A.* 23, 2095.—N begins to react with Sr at 350°; with Ba at 200°. Passivity phenomena are not observed but nitride formation takes place through the whole metal. Results are compared with those obtained with Be, Mg, Ca and Li. III. Effect of sodium and other substances as "exciters" of the reaction between calcium and nitrogen. *Ibid.* 54-61.—The passivity of Ca toward N at 700° is not removed by the action of Na. The latter acts as an "exciter"; after the reaction is started by Na it proceeds more rapidly if the Na is removed from the surface of the Ca and the reaction is slowed up if the Na is not removed. Similar effects are shown by NaOH, Na<sub>2</sub>O<sub>2</sub>, Na<sub>2</sub>O and NH<sub>4</sub>NO<sub>3</sub>. IV. Kinetics of the reaction between calcium and nitrogen in the presence of argon. A. v. Antropoff and H. Klingebiel. *Ibid.* 62-70.—Very small amts. of A cause the reaction between Ca and N to stop. Ca may be activated by treatment with Na or NaOH and will then react 100 times faster than untreated Ca. Spectroscopically pure A was easily prepd. in this way. G. M. Murphy

Remarks on the paper of K. Neumann "The kinetics of the chemical reaction of the process of combustion." (G. A. Varshavskii and L. S. Eigenson. *J. Tech. Phys.* (U. S. S. R.) 3, 659-64 (1933); cf. *C. A.* 26, 5741.—Theoretical. F. H. R.

Kinetics of reactions between colloids. V. A. Kargin. *J. Phys. Chem.* (U. S. S. R.) 1, 691-701 (1930).—Similarly charged sols of UO<sub>3</sub> and V<sub>2</sub>O<sub>5</sub> react with each other forming a colloidal complex UO<sub>3</sub>·2V<sub>2</sub>O<sub>5</sub>. Spectrophotometric measurements of the velocity of reaction indicate zero order with a large period of induction. The reaction takes place between the dissolved portions of colloidal acid, forming a colloidal complex, rather than between particles. G. Faerman

Studies on homogeneous first-order gas reactions. IV. The decomposition of parabutylaldehyde and paraisobutylaldehyde. C. C. Coffin. *Can. J. Research* 9, 603-9 (1933); cf. *C. A.* 26, 5482.—The gaseous decompns. of parabutylaldehyde and paraisobutylaldehyde to butylaldehyde and isobutylaldehyde, resp., are homogeneous and first order over the pressure and temp. range investigated (1.3 to 55 cm. Hg; 215° to 261°). Under these conditions the reactions go to completion at a measurable rate without complications. Within exptl. error the activation energies of these reactions are equal and are approx. the same as that of the paracetaldehyde decompn. This value is between 42,000 and 44,000 cal. per mole. The rates of decompn. of the two parabutylaldehydes are very nearly the same at any temp. At 500° abs. the velocity const. of the iso compd. is about 15% greater than that of the normal and about 100% greater than that of paracetaldehyde. The velocity consts. at any temp. are given by the equations: parabutylaldehyde,  $\ln k = 33.12 - (42,000/RT)$ ; paraisobutylaldehyde,  $\ln k = 34.06 - (42,800/RT)$ . The data are consistent with the idea that, for a series of reactions with the same energy of activation, an increase in the number of contributory internal degrees of freedom of a mol. increases the probability of reaction. J. W. Shipley

The mechanism of gaseous reactions. I. The thermal decomposition of methyl ethyl ether. Wm. Ure and John T. Young. *J. Phys. Chem.* 37, 1169-82 (1933).—The thermal decompn. of MeEtO was studied over the temp. range 457° to 565°. At 457° the process is mainly a unimol. decompn. of the ether into CH<sub>3</sub>CHO and CH<sub>4</sub>. At 565°, the rate-detg. step is the bimol. decompn. of the CH<sub>3</sub>CHO, the primary decompn. of the ether occurring very rapidly by comparison. The mathematical treatment of the process at intermediate temps. is developed. II. Homogeneous catalysis in the decomposition of methyl ethyl ether. *Ibid.* 1183-90.—The addn. of EtI markedly increases the rate of decompn. of MeEtO at

temps. near 500°. The catalytic process consists mainly of the unimol. decompn. of the ether followed by the unimol. decompn. of the CH<sub>3</sub>CHO formed. P. T. N.

Reaction kinetics in films. The hydrolysis of  $\gamma$ -stearolactone. Russel J. Fosbinder and Eric K. Rideal. *Proc. Roy. Soc. (London)* A143, 61-75 (1933).—Surface potentials and pressures were measured for films of  $\gamma$ -hydroxystearic acid and  $\gamma$ -stearolactone. The :CHOH group of the hydroxy acid can be removed from the surface by pressure. Complexes between lactone and substrate are indicated. The kinetics of the hydrolysis of the lactone are explained by the treatment used for sols. L. E. Steiner

Interaction of benzoyl chloride and aniline in carbon tetrachloride and in hexane solution. G. H. Grant and C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1351-7.—The reaction between BzCl and PhNH<sub>2</sub> in CCl<sub>4</sub> and in hexane soln. is approx. bimol., but the velocity consts. show a decrease with diln. The anomalies are greater in hexane than in CCl<sub>4</sub> soln. The reaction is catalyzed by solid particles of PhNH<sub>2</sub>·HCl. In CCl<sub>4</sub> soln. the energy of activation is approx. 8000 cal. In hexane it is approx. 5000 cal. in the early part of the reaction and approx. 500 cal. in the later stages. The rate of the homogeneous part of the reaction is much less than the possible rate of activation. E. J. Rosenbaum

Mechanism of chemical reactions. C. N. Hinshelwood. *J. Chem. Soc.* 1933, 1357-60.—Chem. reactions can be divided into those for which the rate is equal to the rate of activation and those for which the rate is only a small fraction of the rate of activation. The first group can be correlated with the mol. process discussed by Eyring and Polanyi, the second with resonance transitions. In the first group are simple gas reactions and a no. of bimol. reactions in soln. In the second group are unimol. gas reactions, such as gas reactions as that between Na vapor and (CN)<sub>2</sub>, and some bimol. reactions in soln. exemplified by the reaction between BzCl and PhNH<sub>2</sub> (cf. preceding abstract). E. J. Rosenbaum

Freezing points and triple points with water. Walter P. White. *J. Am. Chem. Soc.* 56, 20-4 (1934).—An ice point at atm. pressure, const. to 0.0001° for a day at least, can be made with good com. ice by protecting the bath proper against melting from external sources and by washing the completed bath with thoroughly chilled H<sub>2</sub>O. By repeating the washing occasionally the constancy can be maintained almost indefinitely. The triple point, while convenient and reliable for a short job, is less so than the described "ice point" for continuous work. Reuben Roseman

Phase equilibria in hydrocarbon systems. I. Methods and apparatus. Bruce H. Sage and Wm. N. Lacey. *Ind. Eng. Chem.* 26, 103-6 (1934).—Methods and app. are described for studying these equilibria at pressures up to 200 atms. and temps. from 20° to 100°. W. A. Moore

Transformation of the  $\alpha$ -phase of copper-tin alloys after deformation. S. Konobeyevskii and V. Tarasova. *Physik. Z. Sowjetunion* 4, 571-5 (1933).—The work of Westgren and Phragmen (*C. A.* 23, 587) on the detn. of the phase boundary between the  $\alpha$  and the  $\alpha + \delta$  phases of the Cu-Sn system is criticized because W. and P. disregarded the effects of deformation in the x-rayed samples. The work is repeated; proper annealing preceded by deformation indicates a decreased soly. of  $\alpha$  in  $\delta$  as the temp. is lowered. It is thought that deformation aids heat in reaching equil. by redistributing the components in a metastable state thus increasing the diffusion potential. Howard A. Smith

The boiling of melted reciprocal salt pairs. The system (NaK) (ClI). Ernst Jänecke. *Z. anorg. allgem. Chem.* 215, 49-65 (1933).—From data of Greiner and Jellinek (cf. *C. A.* 27, 4456) it is shown that Roozeboom's graphic method for expressing the relations of vapor pressure and compn. of binary sols. can be applied to boiling mixts. of reciprocal salt pairs. The diagram is a rectangular prism with vapor pressure as ordinates. The liquid-vapor equil. is represented by a surface. E. R. Schierz

System cadmium bromide-ethyl alcohol. Fusao Ichi-

kawa, Ichiro Mori and Toyosaku Murooka. *Science Repts. Tôhoku Imp. Univ.* 1st Ser. 22, 1163-78(1933).—See C. A. 27, 16. G. G.

The system sodium disilicate-sodium fluoride. Harold S. Booth, Bernard A. Starrs and Monroe J. Bahnsen. *J. Phys. Chem.* 37, 1103-7(1933).—"The system, Na disilicate-NaF, has one eutectic at a compn.  $39.5 \pm 0.1$  moles % NaF and at a temp. of  $797 \pm 1.0^\circ$ ." D. B.

Ternary systems: water, pyridine and salts at  $25^\circ$ . P. M. Ginnings, Bailey Webb and Emi Hinohara. *J. Am. Chem. Soc.* 55, 4898-9(1933).—Empirical equations for the solubilities of salts in aqueous pyridine solns. are derived by a procedure previously described (C. A. 27, 2087). M. McMahon

A new relation between viscosity, vapor pressure and density. Frank Hovorka. *J. Am. Chem. Soc.* 55, 4899-4900(1933).—The empirical equation  $S = \eta P^{1/2} d^{1/2}$  where  $\eta$  is viscosity,  $P$  vapor pressure,  $d$  density and  $S$  a const. characteristic of the substance under consideration holds very closely for many org. liquids. M. McMahon

The system sodium carbonate-calcium carbonate-water. C. R. Bury and R. Redd. *J. Chem. Soc.* 1933, 1160-2.—A 2-coördinate diagram suffices to show the temps. and concns. of solns. in equil. with the various solid phases because the concn. of  $\text{CaCO}_3$  in the soln. is too small to measure. The solid phases are ice,  $\text{CaCO}_3$ ,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ,  $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$ ,  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ ,  $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3 \cdot 5\text{H}_2\text{O}$  (gaylussite), and  $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3 \cdot 2\text{H}_2\text{O}$  (pirssonite). F. L. Browne

Aqueous solubility of salts at high temperatures. II. The ternary system  $\text{Na}_2\text{CO}_3$ - $\text{NaHCO}_3$ - $\text{H}_2\text{O}$  from  $100^\circ$  to  $200^\circ$ . Wm. F. Waldeck, Geo. Lynn and Arthur E. Hill. *J. Am. Chem. Soc.* 56, 43-7(1934); cf. C. A. 26, 2363.—The system  $\text{Na}_2\text{CO}_3$ ,  $\text{NaHCO}_3$ ,  $\text{H}_2\text{O}$  was studied from  $100^\circ$  to  $200^\circ$  and isotherms were drawn for 5 temps. The isothermally invariant concns. of solns. satd. with 2 salts were detd. at 5 other temps. Trona was found to be a stable double salt up to  $195^\circ \pm 5^\circ$ . Wegscheider's double salt,  $3\text{NaHCO}_3 \cdot \text{Na}_2\text{CO}_3$ , is stable throughout the entire temp. range. The soly. of pure  $\text{NaHCO}_3$  from  $100^\circ$  to  $200^\circ$ , under the natural pressure of the system, was detd. by a method of extrapolation. E. R. Smith

The system:  $\text{CdSO}_4$ - $\text{H}_2\text{SO}_4$ - $\text{H}_2\text{O}$ . Rene Arditti. *Compt. rend.* 197, 1209-11(1933).—When  $\text{H}_2\text{SO}_4$  is poured into a satd. aq. soln. of  $\text{CdSO}_4$ , from about 40-75% acid the salt that ppts. is always  $\text{CdSO}_4 \cdot \text{H}_2\text{O}$ ; at lower concns. of acid the monohydrate is transformed into  $\text{CdSO}_4 \cdot \frac{3}{2}\text{H}_2\text{O}$ , and at higher concns.  $\text{CdSO}_4 \cdot \text{H}_2\text{SO}_4$  is formed. A min. in the property-compn. curve for  $d$ ,  $n$  and viscosity and a max. in the cond.-compn. curve indicate the transition between the 2 hydrates. E. G. Vanden Bosche

Catalytic oxidation of acenaphthene in solution. Roger Duckert. *Arch. sci. phys. nat.* 15, 244-63, 343-71(1933).—Acenaphthene (I) is oxidized by O to naphthalic acid (II) and acenaphthenequinone (III) (II:III = 9:<1). The percentage oxidation of I is (a) at atm. pressure, 0 without and 2 with a catalyst in presence of a solvent, (b) at  $200^\circ$  and 8 kg./sq. cm. initial pressure, in absence of a solvent, <5, (c) at  $175$ - $300^\circ$  and 2-8 kg./sq. cm. with various catalysts in  $\text{H}_2\text{O}$ ,  $\text{AcOH}$ ,  $\text{PhCl}$  or  $\text{C}_6\text{H}_5\text{Cl}$ , 2-24 (best with  $\text{Mn}(\text{NO}_3)_2$  in  $\text{C}_6\text{H}_5\text{Cl}$  at  $300^\circ$  and 3-5 kg./sq. cm.). Catalysts investigated are oxides and nitrates of various metals, oxides of N, etc. Decompn., always considerable, is very great in case (b). The article includes a good bibliography and a discussion of the sepn. of II and III from much I and resin. W. C. Fernelius

Effect of catalysts on the reaction between olefins and hydrogen sulfide. H. R. Duffey, R. D. Snow and D. B. Keyes. *Ind. Eng. Chem.* 26, 91-3(1934).—The effect of various catalysts and of temp. upon the conversion of propylene to mercaptan was detd. Some catalysts promote polymerization and decompn. The best catalysts found for the conversion of propylene were  $\text{H}_3\text{PO}_4$  on activated charcoal, Ni on kieselguhr and bentonite. The max. conversion ranged from 17% at  $200^\circ$  and space velocity 2 to about 9 at  $300^\circ$  and space velocity 23. Ni on kieselguhr proved the best catalyst for the conversion of

ethylene, 22% being converted at  $250^\circ$  and space velocity 3. W. A. Moore

Catalyzed reaction of hydrogen with water and the nature of overvoltage. J. Horiuchi and M. Polanyi. *Nature* 132, 931(1933).—The inertia in the electrolytic formation of  $\text{H}_2$  from  $\text{H}_2\text{O}$  which must be overcome by overvoltage, for the case of a Pt electrode, is not attributed to the reaction of  $\text{H}_2$  with Pt to form adsorbed atoms but is ascribed to the transition of adsorbed H atoms to H ions. This conclusion was reached after comparing the rates of ionization of the different solns. with which the Pt electrode was used. With the rate in pure  $\text{H}_2\text{O}$  as unity, the approx. rates in other solns. were as follows: in  $\text{N HCl}$  0.7; in  $\text{N H}_2\text{SO}_4$  0.2; in 0.25  $\text{N KOH}$  0.4; in  $\text{C}_2\text{H}_5\text{OH} + 2\%$   $\text{H}_2\text{O}$  0.4; in  $\text{C}_2\text{H}_5\text{OH} + 2\%$   $\text{H}_2\text{O} + 0.25 \text{ N KOH}$  less than 0.02. Calvin Brous

Catalytic decomposition of vapors of hydrogen peroxide. V. A. Roiter and S. S. Gaukhman. *J. Phys. Chem.* (U. S. S. R.) 4, 465-8(1933).—A comparison of activity of decompn. of  $\text{H}_2\text{O}_2$  in the liquid and the vapor states, on smooth and on platinized Pt, on  $\text{MnO}_2$  and on  $\text{PbO}_2$  shows that the catalytic activity in both cases changes in the same order. The reaction for both the liquid and vapor states of  $\text{H}_2\text{O}_2$  is unimol. The assumption is made that the film of water capable of forming on the pores of the catalyst at a pressure of about 0.1 mm. and room temp., is sufficient for the mechanism of the catalyst in vapor and soln. to be the same. Similar conditions may have a place in the majority of technical catalytic processes. G. Faerman

Effect of the sorption of gases on the catalytic activity of catalysts for the decomposition of hydrogen peroxides. II. V. A. Roiter and I. G. Shaffan. *J. Phys. Chem.* (U. S. S. R.) 4, 461-4(1933); cf. preceding abstract.—Low pressure (below 0.1 mm.) for a period of several days reduces the catalytic activity of platinized Pt for the catalysis of  $\text{H}_2\text{O}_2$ . The previous observation of the authors (*Trudii 3 Fizik-Khimich. Konferentsii*) explained the poisoning of the catalyst by volatile admixts. in the  $\text{P}_2\text{O}_5$ . Expt. showed that removal of adsorbed gases from platinized and smooth Pt increases the activity of the catalyst. Readsorption again decreases activity. As this effect was observed even in low vacuum it follows that the activation lies in the removal of the gases from the inactive centers. The authors see in this proof that in the catalytic process there takes part not only centers with large energy of adsorption but also the remaining surface of the Pt. F. H. Rathmann

The transition point of carbon tetrachloride as a fixed point in thermometry. The melting point. Heats of transition and fusion. Herrick L. Johnston and Earl A. Long. *J. Am. Chem. Soc.* 56, 31-5(1934).—The following temps. and heats of transition and fusion, resp., of  $\text{CCl}_4$  (impurity <  $10^{-3}$  mol. %) were measured in a modified Nernst vacuum calorimeter:  $-47.66^\circ \pm 0.05^\circ$ ,  $1080.8 \pm 3.0$  cal. mol.<sup>-1</sup>;  $-22.87^\circ \pm 0.05^\circ$ ,  $577.2 \pm 1.0$  cal. mol.<sup>-1</sup>. A value of the transition temp. in accord with the above was detd. by using a suspension of solid  $\text{CCl}_4$  in methanol. The transition in solid  $\text{CCl}_4$  is sharp and reproducible, and a simple procedure is outlined for employing this temp. as a satisfactory secondary fixed point for calibrating thermometric instruments. F. D. Rossini

Determination of the specific heat of aqueous solutions of phosphoric acid. M. M. Popov, S. M. Skuratov and N. N. Feodosiev. *Z. physik. Chem.* A167, 42-8(1933).—The true sp. heat of  $\text{H}_3\text{PO}_4$  was detd. in aq. soln. from 0 to 89.72% and from  $20.5^\circ$  to  $22.0^\circ$ . The mean sp. heat between  $20^\circ$  and  $100^\circ$  was detd. from 0 to 60% and is given by  $C = 1.0109 - 0.00709x$ , in which  $x$  is the concn. in percentage. From 60 to 89.72% the mean sp. heat is given from  $20^\circ$  to  $t_b$ , where  $t_b$  is a temp. near the b. p. of the soln. G. M. Murphy

The heat capacity and entropy of potassium chlorate form  $13^\circ$  to  $300^\circ\text{K}$ . The entropy of chlorate ion. Wendell M. Latimer, Philip W. Schutz and J. F. G. Hicks, Jr. *J. Am. Chem. Soc.* 56, 88-9(1934).—Measurements of  $C_p$  from  $14^\circ$  to  $293^\circ\text{K}$ . gave for  $\text{KClO}_3$  (c),  $S_{298.1}^\circ =$

34.17  $\pm$  0.02 cal. deg.<sup>-1</sup> mol.<sup>-1</sup>. These and other data yield for  $\text{ClO}_2^-$  (aq., hypothetical 1 molal),  $S_{298.1}^\circ = 39.3$  cal. deg.<sup>-1</sup> mol.<sup>-1</sup> and  $\Delta F_{298.1}^\circ = 3.7$  kg.-cal. mol.<sup>-1</sup>.

F. D. Rossini

Exact measurement of the specific heats of metals at higher temperatures. XII. Specific heat of metallic rhenium. F. M. Jaeger and E. Rosenbohm. *Proc. Acad. Sci. Amsterdam* 36, 786-8(1933); cf. C. A. 27, 3389.—The sp. heat of Re was measured with a metal calorimeter for the temp. range of 0-1200°. The values at  $t^\circ$  may be expressed by the formula  $c_p = 0.03256 + 0.6625 \times 10^{-4} t$ , the mean value between 0° and 20° being 0.03262. The value of  $3R$  for the at. heat is surpassed at -66°.

Morris Muskat

Method of determining heat of solution. M. M. Popov, K. G. Chomyakov, N. N. Feodosiev and P. K. Shirokikh. *Z. physik. Chem.* A167, 29-34(1933).—An adiabatic calorimeter is described. The results are the same as those obtained with an ordinary calorimeter. The heat of soln. of KCl in 200 moles of  $\text{H}_2\text{O}$  at 20° is -4.367  $\pm$  0.1% kg.-cals.

G. M. Murphy

Heats of solution and dilution of potassium and ammonium phosphates. K. G. Chomyakov, S. Yavorovskaya and P. K. Shirokikh. *Z. physik. Chem.* A167, 35-41 (1933).—Heats of soln. and diln. were detd. for  $\text{KH}_2\text{PO}_4$ ,  $\text{NH}_4\text{H}_2\text{PO}_4$  and  $(\text{NH}_4)_2\text{HPO}_4$ . The integral heats of soln. are expressed by an interpolation formula showing the dependence on concn. Soly. was detd. by investigating the dependence of the d. of the soln. on the concn.

G. M. Murphy

Heats of solution of sugars in water. B. Clifford Hendricks, Warren H. Steinbach, Jr., Royce H. LeRoy and A. G. Moseley, Jr. *J. Am. Chem. Soc.* 56, 99-101 (1934).—The following calorimetric detns. are reported for the heat of soln. at  $t^\circ$  in  $n$  mols. of water, in cal. per g.:  $d$ -galactose, 21.7°, 2500 $\text{H}_2\text{O}$ , -21.4;  $\beta$ - $d$ -glucose, 21.6°, 2500 $\text{H}_2\text{O}$ , -5.65;  $d$ -glucose, 25.2°, 3333 $\text{H}_2\text{O}$ , -14.5;  $d$ -glucose hydrate, 25.07°, 3333 $\text{H}_2\text{O}$ , -25.2;  $\alpha$ -methyl- $d$ -glucoside, 25.4°, 3333 $\text{H}_2\text{O}$ , -3.13;  $\alpha$ -methyl- $d$ -mannoside, 25.0°, 2500 $\text{H}_2\text{O}$ , -11.0. Heats of mutarotation for  $d$ -galactose and  $d$ -glucose are zero, and proposed as pos. for  $\beta$ - $d$ -mannose and  $\alpha$ - $d$ -fructose.

F. D. Rossini

Heats of solution and heats of reaction in liquid ammonia. I. Charles A. Kraus and John A. Ridderhof. *J. Am. Chem. Soc.* 56, 79-86(1934).—A liquid  $\text{NH}_3$  calorimeter operating at -33.4° is described. For exothermal reactions the heat effect is measured by the amt. of  $\text{NH}_3$  vaporized. Exptl. data are given for the heats of soln. in liquid  $\text{NH}_3$  at -33.4° of the following solid substances:  $\text{NaNO}_3$ ,  $\text{NaBr}$ ,  $\text{NaI}$ ,  $\text{KNO}_3$ ,  $\text{KBr}$ ,  $\text{KI}$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{NH}_4\text{NO}_3$ ,  $\text{NH}_4\text{Br}$ ,  $\text{NH}_4\text{I}$ ,  $\text{LiNO}_3$ ,  $\text{AgNO}_3$ ,  $\text{AgI}$ ,  $\text{Na}$ . The heats of the following reactions at -33.4° were measured:  $\text{NH}_4\text{Br} + \text{NaNH}_2 = \text{NaBr-am} + 2\text{NH}_3(l)$ ;  $\text{NH}_4\text{Br} + \text{KNH}_2\text{-am} = \text{KBr-am} + 2\text{NH}_3(l)$ ;  $\text{PbBr}_2\text{-am} + 6\text{Na} = 2\text{NaBr-am} + \text{Na}_4\text{Pb}$ ;  $\text{PbBr}_2\text{-am} + 2\text{Na} = 2\text{NaBr-am} + \text{Pb}$ ;  $\text{PbBr}_2 + 2\text{Na-am} = 2\text{NaBr-am} + \text{Pb}$ ;  $4\text{Na} + 9\text{Pb} = \text{Na}_4\text{Pb}_9\text{-am}$ ;  $2\text{Na-am} + \text{S} = \text{Na}_2\text{S}$ ;  $2\text{Na-am} + 2\text{S} = \text{Na}_2\text{S}_2$ ;  $2\text{Na} + \text{Te} = \text{Na}_2\text{Te}$ ;  $2\text{Na-am} + \text{Te} = \text{Na}_2\text{Te}$ ;  $\text{Na}_2\text{Te} + \text{Te} = \text{Na}_2\text{Te}_2\text{-am}$ ;  $\text{Na}_2\text{Te}_2 + \text{am} = \text{Na}_2\text{Te}_2\text{-am}$ ;  $\text{Na}_2\text{Te}_2\text{-am} + 2\text{Te} = \text{Na}_2\text{Te}_4\text{-am}$ . The foregoing data yield among other things values for the heats of formation of  $\text{NH}_3(l)$ ,  $\text{NaI}$ ,  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{S}_2$ ,  $\text{Na}_2\text{Te}$ ,  $\text{Na}_2\text{Te}_2$  and the heat of neutralization in liquid  $\text{NH}_3$  of  $\text{KNH}_2$  with  $\text{NH}_4\text{Br}$ . II. Charles A. Kraus and Ralph F. Prescott. *Ibid.* 86-8.—Improvements in the liquid  $\text{NH}_3$  calorimeter are described and exptl. data are given for the heats of soln., in liquid  $\text{NH}_3$  at -33.4°, of the following solid substances:  $\text{AgNO}_3$ ,  $\text{Hg}(\text{CN})_2$ ,  $\text{PbI}_2$ ,  $\text{Pb}(\text{NO}_3)_2$ ,  $\text{NaClO}_3$ ,  $\text{NaBr}$ . F. D. R.

The heat of formation of cadmium oxide, cadmium hydroxide and zinc oxide. G. Becker and W. A. Roth. *Z. physik. Chem.* A167, 1-15(1933).—A new method for completely burning a pure metal in a calorimeter is described. Indirect measurements from heats of diln. serve as a check on the results. The most probable results from calorimetric and other available data give for the heat of formation for  $\text{CdO}$  and  $\text{ZnO}$ , resp., at const. pressure and 20°, 62.2  $\pm$  0.2 and 83.2  $\pm$  0.2 kg.-cals.

The heat of soln. of  $\text{Cd}(\text{OH})_2$  is 133.41 kg.-cals. at 20°. The heat of hydration of  $\text{CdO}$  is 4.0 kg.-cals. The following results were also obtained at 20°:  $\text{HCl}(10.058\text{H}_2\text{O}) \rightarrow \text{HCl}(200\text{H}_2\text{O}) + 1.136 \pm 0.001$  kg.-cals.,  $\text{HCl}(10.184\text{H}_2\text{O}) \rightarrow \text{HCl}(200\text{H}_2\text{O}) + 1.121 \pm 0.001$  kg.-cals.,  $\text{HCl}(10.309\text{H}_2\text{O}) \rightarrow \text{HCl}(200\text{H}_2\text{O}) + 1.101 \pm 0.001$  kg.-cals.

G. M. Murphy

The heats of formation of columbium and tantalum pentoxides. G. Becker and W. A. Roth. *Z. physik. Chem.* A167, 16-18(1933).—The heats of formation at const. pressure and 20° for  $\text{Cb}_2\text{O}_5$  and  $\text{Ta}_2\text{O}_5$  are, resp., 463.1  $\pm$  0.7 and 484.5  $\pm$  0.5 kg.-cals. The d. of Ta detd. with a Mohr balance at 19.6° is 16.64. G. M. Murphy

The energy of dissociation of water by symmetrical vibrations and the products of this dissociation. Michel Magat. *Compt. rend.* 197, 1216-18(1933).—From spectrum analyses carried out by Mecke (cf. C. A. 27, 3399) the heat of disson. of  $\text{H}_2\text{O}$  into 2 H and O is calcd. to be 269  $\pm$  3 Cal. Activated rather than normal O atoms are obtained, with the energy of activation given as 45.2 Cal.

E. G. Vanden Bosch

The thermodynamic constants of chlorine monoxide. Don M. Yost and Robert C. Felt. *J. Am. Chem. Soc.* 56, 68-9(1934).—The vapor pressure of  $\text{Cl}_2\text{O}$  over its solns. in  $\text{CCl}_4$  was measured at 0° and 25°, the consts. of Henry's law being  $p_{\text{mm}}/N = 662$  and 1830, resp., where  $N$  is the mol. fraction of  $\text{Cl}_2\text{O}$ . Combination of these with other data yields for  $\text{Cl}_2(g) + \frac{1}{2}\text{O}_2(g) = \text{Cl}_2\text{O}(g)$ ,  $\Delta F_{298.1}^\circ = 21.21$  kg.-cal. mol.<sup>-1</sup>. If  $\Delta H_{298.1}^\circ$  is taken as 18.26, then for  $\text{Cl}_2\text{O}(g)$   $S_{298.1}^\circ = 67.9$  cal. deg.<sup>-1</sup> mol.<sup>-1</sup>. F. D. Rossini

Sapon. of ethylene bromide with alc. alkali hydroxide (Bernoulli, Kambli) 10. Free nitrogenated radicals—structure of diarylnitroxides (Cambì, et al.) 10.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

- The cooling of a radioactive sphere. Arnold N. Lowan. *Phys. Rev.* 44, 769-75(1933).—The problem of the cooling of a radioactive sphere is studied mathematically and its solution is applied to a discussion of the thermal history of the earth. Bernard Lewis
- Experimental demonstration of Einstein's radiation recoil. R. Frisch. *Z. Physik* 86, 42-8(1933).—A very fine beam of Na atoms is excited with light from a Na lamp. As the emission of the resonance light is accompanied with an impulse the beam is broadened on irradiation. Egon Bretscher
- Electromagnetic mass. Max Born and L. Infeld. *Nature* 132, 970(1933).—By means of a recent modification of the Maxwell field equations, it is shown that the mass appears as self energy. This justifies the suppression of the corresponding terms, occurring in the quantum-mech. treatment of the interaction of several bodies. The Dirac wave equation is the adequate expression for the quantum-mech. motion of the electron in external fields. S. Bradford Stone
- Generation of electrons from collisions of two electrons. Various mechanisms for annihilation of positive electrons. Francis Perrin. *Compt. rend.* 197, 1302-4(1933).—An electron having a kinetic energy of more than  $6\text{ mc}^2$ , incident upon a static electron can give rise to 4 electrons. (The 2 original plus a pos. and a neg.) Annihilation by combination of a low-velocity pos. and neg. electron can ensue with emission of 2 photons, each with an energy of  $h\nu = mc^2$  or, in the presence of a nucleus, a single photon of twice that energy. This energy may be divided between the photon and projected electron with equal and opposite momentum, or between a pair of electrons ejected in opposite directions. Gregg M. Evans
- Problems of quantum valence. Yu. B. Rumer. *J. Phys. Chem.* (U. S. S. R.) 4, 668-73(1933).—Light and heavy elements of the third group are considered from the viewpoint of almost degenerated states. F. H. R.
- The breakdown of Coulomb's law for the hydrogen atom. E. C. Kemble and R. D. Present. *Phys. Rev.* 44, 1031-2(1933).—The fact that all the doublets of light  $H_2$  are about 3% narrower than predicted by relativistic fine structure theory is attributed to the breakdown of Coulomb's law near the nucleus. By means of Schrödinger functions the displacements of energy levels as functions of  $a$ , the distance to which the field is Coulomb, were found giving results in agreement with expt. For the observed narrowing  $a = 5 \times 10^{-13}\text{ cm}$ . L. Goldman
- The electronic structure of inorganic complexes. Wm. A. Noyes. *J. Am. Chem. Soc.* 55, 4889-93(1933).—An explanation of the ionic charges of inorg. complexes based on Sidgwick's assumptions in "The Electronic Theory of Valency" (C. A. 22, 544) is given. The sharp distinction between "potentially polar" covalences and fully polar or ionic valences is emphasized. M. McMahon
- A convenient proton source. E. S. Lamar and Overton Lühr. *Phys. Rev.* 44, 947-8(1933).—A low-voltage arc is described. The current removed through a slit in the cathode is 80-90% proton current when the neg. voltage on the cathode is 100 v. with respect to the anode. A mechanism for the disocc. of H depending on the thermal equil. between high-speed ions and mols. is given. L. Goldman
- Electron attachment and negative-ion formation in oxygen and oxygen mixtures. Norris E. Bradbury. *Phys. Rev.* 44, 883-90(1933).—A direct method is employed to det. the probability of electron capture in  $O_2$  and  $O_2$  mixts. The principle of the method lies in the analysis of a mixed current stream at 2 points along its path by means of wire grids which permit only the ionic fraction of the current to pass when a high-frequency field is applied between adjacent wire grids. A means of measuring the mobility of the electrons is also possible. The probability of the attachment has been detd. for  $O_2$ , air and mixts. of  $O_2$  with rare gases. The probability is a marked function of the electronic energy, decreasing with increase in electronic energy. In  $O_2$  and in all mixts. of  $O_2$ , however, there is an increase in the probability that attachment will occur at approx. 1.6 v. electronic energy. This can be explained as being due to the appearance of low-energy electrons following inelastic impacts with  $O_2$  mols. The energy at which these inelastic impacts begin is correlated with the first excited level of the  $O_2$  mols. which is 1.62 v. above the ground state. B. L.
- Influence of argon admixture on the neon discharge. Ya. S. Vuigodskii and B. N. Klyarfeld. *J. Tech. Phys.* (U. S. S. R.) 3, 610-13(1933).—Curves show that 2.5% A lowers light emission 30-70%, depending on the current used. F. H. Rathmann
- Potential of ionization and formation of the hydrogen molecule. J. Savard. *Compt. rend.* 197, 397-9(1933); cf. C. A. 28, 694<sup>a</sup>. A comparison of the results of the calcs. of Hylleraas (C. A. 26, 1859-60) with the exptl. value of the ionization potential of the H mol. and atom. W. C. Fernelius
- Some properties of ionized gases in high-frequency fields. V. I. Bunimovich. *J. Tech. Phys.* (U. S. S. R.) 1, 445-80(1931).—The pos. column of a Hg arc in a const. high-frequency field ( $1.7-2.8 \times 10^9$  Hertz) shows resonance at 3 values of the ionization d. The Langmuir-Tonks-Gutton theory (cf. C. A. 24, 3429, 4457; 25, 5078) of electronic vibration is superfluous and wrong in principle. F. H. Rathmann
- Emission of secondary electrons from electrodes placed in an electric discharge in mercury vapor. S. D. Gvozdover. *J. Tech. Phys.* (U. S. S. R.) 3, 587-95(1933). F. H. Rathmann
- Space-charge increase in gaseous discharge. N. A. Kaptzov. *J. Tech. Phys.* (U. S. S. R.) 2, 200-17(1932).—The v. Hippel-Franck theory is extended and Rogowski's short time values for discharges are explained. F. H. Rathmann
- Ionization of the rare gases by slow alkali ions. Otto Beeck. *Ann. Physik* 18, 414-16(1933).—Corrections are given for previously published work: Mouzon (C. A.

26, 5831) and O. Beeck and J. C. Mouzon (*C. A.* 26, 905). Curves showing the ionization of Ne, A, Kr and Xe by alkali ions are given. The curves of Mouzon for Ne and A are also given and agree with those of B. except for  $K^+$  ions in A. Because of the different types of app., this shows that there was no scattering of primary ions through a large angle ( $> 20^\circ$ ) except in the case of  $K^+$  ions in A.

Helen S. Hopfield

**Atomic constants deduced from secondary cathode ray measurements.** H. R. Robinson, J. P. Andrews and E. J. Irons. *Proc. Roy. Soc. (London)* A143, 48-60 (1933).—Energies of the secondary cathode rays expelled from Au, W, Ag and Cu by the  $K$  series x-rays of Cu were measured, and compared with the energies expected from x-ray spectroscopic data. The results are consistent with the observed Compton shift and with recent work on electron diffraction, rather than with accepted values of  $h$  and  $e$ .

L. E. Steiner

**Polarization of electrons.** G. P. Thomson. *Nature* 132, 1006 (1933).—The diffraction rings of scattered electrons reported by Rupp (*C. A.* 27, 3663) were obtained. However, they were not asym., as claimed by Rupp.

Gerald M. Petty

**Diffraction of fast electrons.** M. Kosman and A. Alichanian. *Physik. Z. Sowjetunion* 4, 551-6 (1933); cf. *C. A.* 27, 3391.—The p. d. from a Lange-Marx impulse generator was used on a cold cathode discharge tube to produce high-voltage electrons which were diffracted by an evapd. Ag film. The De Broglie wave length of the electrons is 0.0136 Å., corresponding to an energy of 530 kv.

Howard A. Smith

**Reflection of electrons from liquid mercury.** Robert B. Brode and Edward B. Jordan. *Phys. Rev.* 44, 872-5 (1933).

Bernard Lewis

**Electron diffraction by hydrocarbons.** H. R. Nelson. *Phys. Rev.* 44, 717-19 (1933).—Thin films of petrolatum, paraffin and tap grease were prepd. (1) by evapn. from a heated filament onto a metal surface, (2) by allowing an ether soln. to evap. from a water or metal surface leaving the hydrocarbon film and (3) by smearing the greases on metal surfaces. When 25-50-kv. electrons were reflected at grazing incidence from these films the diffraction patterns consisted of rows of spots similar to an x-ray single crystal rotation picture. The resolving power of all but the smeared films is much better than has been reported previously. Observed reflections are in good agreement with the structure of normal hydrocarbon crystals found by Müller (*C. A.* 23, 30). The patterns indicate films are largely, if not completely, cryst., with the long axes of individual crystals perpendicular to the plane of the film.

Bernard Lewis

**Electron scattering in methane, acetylene and ethylene.** A. L. Hughes and J. H. McMillen. *Phys. Rev.* 44, 876-82 (1933).—The scattering coeffs. for elastic collisions between electrons and mols. of  $CH_4$ ,  $C_2H_2$  and  $C_2H_4$  have been measured over the following ranges: For  $CH_4$ , 10 to 625 v.,  $10^\circ$  to  $150^\circ$ , and for 800 v.,  $10^\circ$  to  $50^\circ$ ; for  $C_2H_2$ , 10 to 100 v.,  $10^\circ$  to  $150^\circ$ ; for  $C_2H_4$ , 10 to 225 v.,  $10^\circ$  to  $150^\circ$ . Total absorption coeffs. due to elastic scattering were computed by integration. For 100 v. and above, the scattering coeffs. of electrons by the mols. with 2 C atoms were far smaller than the coeff. for  $CH_4$  with 1 C atom, but for 10-v. electrons the scattering was much less in  $CH_4$  than in the other gases. Evidence for interference effects between the electron waves scattered by individual atoms was indicated by the presence of max. in the curves for the ratios of the scattering coeffs. for  $C_2H_4$  and  $CH_4$  (also for the pair  $C_2H_2$  and  $CH_4$ ) expressed as functions of scattering angles. Provided the assumption is made that the scattering is done by H atoms alone, fairly satisfactory agreement between expt. and calcn. (computation by the formula for intensity of resultant waves emitted by a mol.) was obtained for the ratio for  $C_2H_4$  and  $CH_4$ . Presumably the slow electron does not penetrate enough to come under the influence of the C atom. In order to obtain satisfactory agreement with  $C_2H_4$ , however, it was necessary to assume that the C atoms exerted their full effect.

Bernard Lewis

**Orientations in thin evaporated metallic films by the method of electron diffraction.** K. R. Dixit. *Phil. Mag.* 16, 1049-64 (1933).—The orientations in thin films of Ag, Al and Zn were studied from room temp. nearly to the m. p. of the metal. This orientation does not depend on the nature of the base, provided the surface is smooth and amorphous. Orientation is produced in thin films,  $10^{-6}$  cm. thick, more easily than in thick films. Each orientation is strongest at some definite temp. If the first layer of the deposit is considered as a two-dimensional gas, it is possible to calc. the temp. at which each orientation should occur. Calcd. and exptl. temps. are in agreement.

E. J. Rosenbaum

**Electron diffraction by mechanically worked surfaces.** H. Raether. *Z. Physik* 86, 82-104 (1933); cf. *C. A.* 28, 964.—Electron diffraction is used to study the phys. state of the surface of metals and insulators after mech. treatment. The surface is treated with emery paper, rouge and a polishing steel. Debye-Scherrer rings are obtained which increase in intensity with perfection of polish. Highly polished metals give the same rings and have therefore identical lattice constns. A monoatomic metal layer of 2.8-2.9 Å. thickness is assumed to cover the surface (steel, Cu, Ni, Au, Sn, Zn, Cd, Pb and hematite were studied). NaCl,  $CaCO_3$ ,  $CaF_2$ , FeS, and graphite give partly powder diagrams or plane lattice spectra. A highly polished surface may possess a fibrous structure.

Egon Bretscher

**Observations with the help of an electron microscope on the migration of the emitting substance on oxide cathodes.** E. F. Richter. *Z. Physik* 86, 697-709 (1933).—Lines are drawn on a BaO cathode and their image is focused on a photographic plate or fluorescent screen by means of an elec. or magnetic electron lens. In the course of formation the pattern is found to reverse, e. g., the lines which were previously not emitting and therefore dark, become active. This is shown to be due to a migration of Ba metal, which detrs. the electron emission (and not the oxide).

Egon Bretscher

**Photoelectric investigation of the temperature dependence of the work function for electrons from a nickel surface covered with atomic barium.** R. Suhrmann and R. Deponte. *Z. Physik* 86, 615-34 (1933).—See *C. A.* 27, 5632.

Egon Bretscher

**The effect of temperature on the energy distribution of photoelectrons. I. Normal distribution.** Lee A. DuBridge and R. C. Hergenrother. *Phys. Rev.* 44, 861-5 (1933).—An exptl. test has been made of DuBridge's (*C. A.* 27, 3663) theory of the distribution of normal energies of photoelectrons. By use of a modified parallel-plate method of analysis, photoelectrons were ejected from a strip of Mo foil maintained at any desired temp. Current-voltage curves for temps. from  $300^\circ$  to  $965^\circ K$ . show good agreement with theory. Values of  $V$  max. at  $0^\circ K$ . can be detd. These were found to fit the Binstein equation at any fixed temp. For a fixed wave length the values of  $V$  max. are independent of  $T$ , as required by theory.

Bernard Lewis

**The effect of temperature on the energy distribution of photoelectrons. II. Total energies.** Walter W. Roehr. *Phys. Rev.* 44, 866-71 (1933).—The expts. were carried out to test DuBridge's (*C. A.* 27, 3663) theory of the total energy distribution of photoelectrons. Photoelectrons were released from an outgassed Mo filament placed at the center of a large collecting sphere. Current-voltage curves were obtained for filament temps. from  $300^\circ$  to  $1000^\circ K$ . The effect of temp. on the tails of these curves is pronounced and shows excellent agreement with theory. The derived energy-distribution curves are also in general agreement with theory, and show at room temp. a most probable energy much closer to the max. energy than obtained by other investigators. Analysis of the theoretical curves shows that the temp. effect has probably not introduced appreciable errors in the detn. of  $h$  by the photoelec. method.

Bernard Lewis

**Photoelectric yields in the extreme ultra-violet.** Carl Kenty. *Phys. Rev.* 44, 891-7 (1933).—The photoelec. yields for various surfaces (Ni, W, Mg, W-O and con-

stantan) illuminated by the extremely short wave radiation given out by the pos. columns in He, Ne and A, resp., have been detd. The effect of the extremely short wave radiation was sepd. from that of the complete radiation by the use of a quartz disk which, when inserted, cut off all radiations below 1500 Å. The yields obtained (in electrons per 100 quanta) range from 11 in the case of constantan and He, to 0.14 in the case of Mg (surprisingly) and Ne. The yields for well-degassed Ni, for He, Ne and A were 4.4, 1.6 and 0.6, resp.; those for the other surfaces except Mg varied with the gas in the same general way. Thus the max. in the yield for most ordinary metal surfaces probably lies on the short side of 584 Å. W-O gave greater yields than W (except in A) and in general undegassed metals gave yields several times greater than well-degassed ones. The size of the yields suggests that the photoelec. emission from probe and cathode surfaces in the rare gases may be of considerable importance.

Bernard Lewis

The emission of electricity from columbium. H. B. Wahlén and L. O. Sordahl. *Phys. Rev.* 44, 1030 (1933).—Cb yields pos. ions of the metal when vaporization is appreciable. Values for the work functions of the electron and pos. ion are given.

L. Goldman

The magnetic moment of the proton. Alfred Landé. *Phys. Rev.* 44, 1028-9 (1933).—It is shown that nuclei of odd at. no. and odd mass no. have mech. and magnetic moments due to the orbit and spin of one proton. For a series of such nuclei the magnetic moment is calcd. with Goudsmit's formula—giving a magnetic moment of about 2 magnetons for the proton. The values of the orbital quantum no. assigned to the proton in the series of nuclei indicate that the proton circles around inside or on the surface of the neutron shells.

L. Goldman

The electronic atomic weight and  $e/m$  ratio. R. C. Gibbs and R. C. Williams. *Phys. Rev.* 44, 1029 (1933).—The at. wt. of the electron was found from a measurement of the interval between corresponding components of the  $H^{\alpha}$  and  $H^{\beta}$  lines, the at. wts. of  $II^{\alpha}$  and  $H^{\beta}$  reported by Bainbridge, Houston's value for  $\nu(H^{\alpha})$ , and the relation that the ratio of the wave numbers for such a transition is the same as the ratio of the corresponding Rydberg nos. The at. wt. of the electron is found to be  $(5.491 \pm 0.002) \times 10^{-4}$ .

L. Goldman

The Heisenberg theory of atomic nuclei. H. Mandel. *Physik. Z. Sowjetunion* 4, 646 50 (1933) (in German).

Gerald M. Petty

Wave-statistical theory of radioactive disintegration. K. C. Kar and A. Ganguli. *Phil. Mag.* 16, 1097-1109 (1933).—A model of the nucleus is considered which consists of a hard core surrounded by a spherical shell filled with circulating neutral He atoms. Theoretical values of the disintegration consts. agree with exptl. data.

E. J. Rosenbaum

Heights of nuclear potential barriers. E. Watson Pollard. *Phil. Mag.* 16, 1131-41 (1933).—Heights of potential barriers are estd. from  $\alpha$ -particle scattering and from the min. energies of  $\alpha$ -particles required for nuclear disintegration. The height of the barrier of the 7 light elements for which data are available is a linear function of the at. no. This is confirmed by a calcn. based on the Heisenberg nuclear theory, provided the no. of protons equals the no. of neutrons. The barrier heights from disintegration by protons are lower than those for  $\alpha$ -particle disintegration, but the linear relation between height and at. no. is valid.

E. J. Rosenbaum

Atomic disintegration and cosmic radiation. E. Rupp. *Z. Ver. deut. Ing.* 77, 1277-9 (1933).—Review.

A. B. F. Duncan

Energy distribution in cosmic rays. W. G. Pollard. *Phys. Rev.* 44, 703-6 (1933).—Examm. shows that the energy band of cosmic ray particles has probably preserved the energy distribution with which it was originally emitted, despite traveling through space for  $5 \times 10^{14}$  years. A Maxwell distribution in energy corrected for relativity is applied to functions which approximate Lemaitre's and Vallarta's curves for the latitude effect and fairly good agreement with Compton's observations

is obtained when 16.7% of the radiation has the Maxwell distribution, the remainder being composed of particles unaffected by the earth's magnetic field. These results are applied to Lemaitre's theory of the radioactive origin of the radiation. The distribution found has many features which suggest such an origin, although the recent findings indicating that there are more pos. than neg. electrons in the rays seem to discredit such a theory.

Bernard Lewis

The presence of neutrons in cosmic radiation. Pierre Auger and G. Monod-Herzen. *Compt. rend.* 197, 1406-7 (1933).—In testing the freedom of Wilson cloud chambers from contamination by radioactive matter 1076 pairs of plates were taken with a 10-cm. chamber and 400 plates with an 8-cm. chamber, both contg. H at normal pressure. Twenty tracks were observed to come from the walls and could be attributed to the radioactivity of the wall materials. In addn. 3 tracks of a different origin were found. One track of the first series was due to a fast nucleus and showed accompanying tracks of ejected electrons but having their origin in the midst of the gas, and 2 short tracks lying entirely in the gas. The second series showed another short track lying entirely in the gas. These tracks are similar to those which neutrons produce in H, and it is possible that the tracks observed here are due to neutrons emitted by the Cu and Pb covers of the chambers under the influence of cosmic rays.

M. M.

Cloud photographs of cosmic-ray "Stösse." Gordon L. Locher. *J. Franklin Inst.* 216, 673-82 (1933); cf. *C. A.* 28, 966<sup>4</sup>.—Photography of cloud tracks of the disintegration products of Stösse as a means of investigating the origin and source of energy of the ejected particles has been undertaken with a modification of the method of Blackett and Occhialini (*C. A.* 27, 2874). The exptl. arrangement is described. It is believed that neutrons are generated, or liberated, in cosmic-ray Stösse but it is impossible to tell from what material they arise. Their energy and ionization characteristics are unknown.

Allen S. Smith

Collisions of neutrons with light nuclei. H. N. Feather. *Proc. Roy. Soc. (London)* A142, 689-709 (1933); cf. *C. A.* 27, 4730. —Cloud chamber photographs were taken of tracks, in O and O-H mixts. and in  $C_2H_2$ -He mixts., produced by collisions of O and C nuclei with neutrons from a Po-Be source. The range distribution curves for elastic collisions were obtained. A criterion for the assignment of observed tracks to the atoms responsible is discussed; it is based on the linear d. of ionization in the tracks of different atoms. Eight disintegrations of O nuclei have been observed but only 1 of a C nucleus. The deficiency of the present knowledge of range-velocity relations is emphasized.

E. J. Rosenbaum

Conservation laws and  $\beta$ -emission. G. Beck. *Nature* 132, 967 (1933).—The energy of the continuous  $\beta$ -ray spectrum varies between the limits  $mc^2$  and  $\Delta E$ , where  $\Delta E$  is the energy difference of the 2 nuclei. A generalized expression for the conservation law is supported by data on the branch decompn. of Ra C and Act C. U Z appears to be a deriv. of an unknown U isotope.

S. B. S.

Reversed fine structure of the  $\alpha$ -rays. A. Polessitak. *Nature* 132, 969 (1933).—The fine structure of the  $\alpha$ -rays indicates that the following element will emit groups of  $\alpha$ -rays with energies greater than the normal value, an effect described as reversed fine structure. The calcd. intensity of the reversed fine structure group from Act A is close to the limiting sensitivity of present methods.

S. Bradford Stone

Excitation of the boron nucleus to proton emission by polonium  $\alpha$ -radiation. Franz Heidenreich. *Z. Physik* 86, 675-93 (1933).—The yield of proton emission from B on bombardment with  $\alpha$ -rays from Po is studied as a function of the primary energy of the  $\alpha$ -particles. Three H-groups are found. The 1st has a max. range of 14 cm., the 2nd 30 cm. and the last 76 cm. The yields are 4 and 0.4 protons per  $10^4$   $\alpha$ -particles, for the 2nd and 3rd groups, resp. The intensity of the 2nd group agrees with the nuclear  $\gamma$ -radiation emitted at the same time.

Egon Bretcher



**Disintegration of fluorine nuclei by neutrons and the probable formation of a new isotope of nitrogen ( $N^{14}$ ).** Wm. D. Harkins, David M. Gans and Henry W. Newton. *Phys. Rev.* 44, 945-6(1933); cf. *C. A.* 28, 405<sup>7</sup>.—In the decompn. of difluorodichloromethane by neutrons in a Wilson cloud chamber the energy and momentum relations (values given) show that the F nucleus captures a neutron and forms  $N^{14}$  and a He atom. Energy for decompn. by neutron capture is given for N, F, O and Ne. L. Goldman

**The production of positives by nuclear  $\gamma$ -rays.** Leo Nedelsky and J. R. Oppenheimer. *Phys. Rev.* 44, 948-9 (1933).—The probability of internal absorption of  $\gamma$ -rays from a nucleus by pair formation is computed for light elements. Results check with the value of Curie and Joliot for the no. of positives produced by bombardment of Be but not of Al (*C. A.* 27, 5635<sup>7</sup>). L. Goldman

**Chemical detection of artificial transmutation of the elements.** V. Sokolov and M. Gurevich. *Nature* 132, 679(1933); cf. F. A. Paneth and P. L. Gunther, *C. A.* 27, 3394.—The gas produced by artificial disintegration of elements was collected by means of app. of very high precision. The disintegration of Al by  $\alpha$ -rays revealed the formation of greater quantities of H than were shown by the scintillation method. Bombardment of LiI with  $\beta$ -rays gave traces of He; of NaI with  $\beta$ -rays gave traces of He and Ne. KI gave no rare gases but emitted small quantities of H even without the action of  $\beta$ -rays. Helen S. Hopfield

**Two modifications of hydrogen.** Yu. Khariton. *Uspekhi. Fiz. Nauk.* 10, 95-110(1930).—Review of ortho- and para-H. F. H. Rathmann

**Isotope report. The chemical elements and atom species according to isotope investigations (Report on the work from the end of 1932 to the end of 1933).** Otto Hahn. *Ber.* 67A, 1-8(1934); cf. *C. A.* 27, 895. G. G.

**Separation of hydrogen isotopes by diffusion through palladium.** L. Harris, W. Jost and R. W. B. Pearse. *Proc. Natl. Acad. Sci.* 19, 991-4(1933).—The diffusion of H through Pd under a 100-fold decrease in pressure gave an enrichment in  $H^2$  of 10 times in a single step. Conclusions: The diffusion is an at. process and there is an activation factor favorable to the lighter isotope. J. B. Austin

**Heavy hydrogen in contact with normal water.** M. L. Oliphant. *Nature* 132, 675(1933).—A mixt. of  $H^2$  with pure He, stored over water in an aspirator, after 6 weeks had the same total H content, but less than  $1/20$  of the original  $H^2$  remained. The loss was proved not to be due to leakage or soln.; hence it is thought that there was an exchange between the  $H^2$  mols. and the H of the water until the concn. of  $H^2$  was the same in the liquid as in the gas. Helen S. Hopfield

**The isotopic fractionation of water.** Edward W. Washburn, Edgar R. Smith and Mikkel Frandsen. *J. Chem. Physics* 1, 288(1933); cf. *C. A.* 28, 706<sup>7</sup>. E. R. S.

**The magnetooptic method and the isotopes of radioactive elements.** V. P. Ruskov. *Uspekhi Fiz. Nauk.* 13, 762-7(1933).—A review, with a discussion of the significance of the existence of various isotopes in radioactive disintegrations. F. H. Rathmann

**The magnetic deflection of the isotopic hydrogen molecules and the magnetic moment of the deuteron.** I. Estermann and O. Stern. *Z. Physik* 86, 132-4(1933); cf. *C. A.* 28, 34<sup>3</sup>.—The nuclear magnetic moment of the  $H^2$  isotope seems to be smaller than that of  $H^1$  though the nuclear spin is twice that of  $H^1$ . Egon Bretscher

**A redetermination of the half period of thorium.** Hans Jesefeldt. *Z. Physik* 86, 605-10(1933).—The discrepancy between old detns. of the half life of Th due to Geiger and Rutherford (*C. A.* 5, 1232) and new measurements by Knisch (*C. A.* 25, 3913) is decided in favor of G. and R. The new values are:  $T_{1/2} = 1.3 \times 10^{10}$  years, 1 g. Th emits  $4.7 \times 10^4$   $\alpha$ -particles per hr. Egon Bretscher

**Study of Th C'.** C. Chamié. *Compt. rend.* 197, 1037-9 (1933).—Th C' is sepd. from Th C by recoil in an elec. field. The half-life period of the purified product is 3.1 min. The decay curve shows an anomaly at the beginning which

may be due to the fine structure of  $\alpha$ -rays from Th C. J. B. Austin

**Fractional crystallization of radium-bearing barium chloride.** Mme. Branca Edmee Marques. *Compt. rend.* 197, 1314-15(1933); cf. *C. A.* 27, 3665.—The function  $\lambda = \log [Ra]_0/[Ra]_\infty + \log [Ba]_0/[Ba]_\infty$ , in which  $[Ra]$  is the concn. of Ra ions in soln. and subscripts 0 and  $\infty$  mean before and after crystn., resp., is calcd. In slow crystn.  $\lambda$  is const. but in rapid crystn.  $\lambda$  decreases as the concn. increased. Gregg M. Evans

**Radium and uranium from Great Bear Lake ore.** Anon. *Can. Chem. Met.* 17, 251-2, 253(1933).—Ra and U have recently been extd. from the ores of the Great Bear Lake region. The ore is crushed, roasted, pulverized to 35-mesh, boiled with HCl, filtered on a stoneware filter, and washed with water. The residue contg. the Ra is treated with satd. NaCl soln. to dissolve the  $PbCl_2$ . A certain amt. of Ba must be present before boiling with  $Na_2CO_3$  to convert both Ba and Ra to carbonate. Filtering leaves the carbonates along with the  $SiO_2$ . The carbonates are dissolved in HCl and Ba and Ra repptd. as sulfates. The sulfate mixt. contains 2-10 mg. Ra/kg. The sulfates are again converted to carbonate, washed, dissolved in HBr and the soln. is purified by the use of  $Ba(OH)_2$ . Ra and Ba bromides are sepd. by fractional crystn. U is recovered as Na salt, recovery beginning at the point where the HCl leach gives the U in soln. W. H. Boynton

**Radioactivity of zinc.** Hans Fiesefeldt. *Z. Physik* 86, 611-14(1933).—Contrary to Ziegert (*C. A.* 22, 4365) no natural radioactivity is found with very pure Zn. Egon Bretscher

**Experimental study of the widths and shapes of the  $K_\alpha$  x-ray doublet from Ca (20) to Ni (28).** Lyman G. Parratt. *Phys. Rev.* 44, 695-702(1933). Bernard Lewis

**Fine structure of the absorption spectra of x-rays.** A. Venderovich. *Uspekhi Fiz. Nauk* 13, 752-61(1933).—A review. The strength of the chem. bond in compds. can be detd. by a study of x-ray spectra. The strength of a given bond for a given element varies from compd. to compd. F. H. Rathmann

**The photographic action of ultra-soft Röntgen rays.** M. Renninger. *Z. Physik* 86, 382-6(1933).—The half breadth of the C  $K_\alpha$  line is detd. from photographic spectrograms with the help of a photometer. The half breadth is found to increase with the height of max. of the line. Explanation is lacking. Egon Bretscher

**Absolute measurements of the scattering intensity of Cu  $K_\alpha$  radiation in argon.** Gerhard Herzog. *Helv. Phys. Acta* 6, 508-54(1933).—See *C. A.* 27, 5637.

**Methods for evaluation of röntgenograms.** N. D. Borisov. *J. Tech. Phys. (U. S. S. R.)* 2, 501-4(1932). F. H. Rathmann

**Röntgen spectroscopic experiments on orientation of palmitic acid on mineral surfaces.** E. Berl and B. Schmitt. *Kolloid-Z.* 65, 261-4(1933).—With monochromatic Cu  $K_\alpha$  radiation and the rotating-crystal method,  $d_1$  obtained for palmitic acid was 35.7 Å, in good agreement with previous work. Films, showing good interference patterns, were deposited satisfactorily on glass surfaces from 60% alc. soln.; from 40% soln. the lines disappeared. Orientation on glass, mica and gypsum surfaces is due to the formation of a unimolecular Na or Ca soap layer. Acidification of such a surface prevents formation of this soap layer and explains the weak, diffuse lines obtained on a quartz substrate. Films formed on metal foils, especially by deposition from  $AcOH$ , showed sharp patterns contg. the metal soap lines as well as those of the acid. Films on sphalerite, pyrite, calcite and cerussite gave no soap pattern. Arthur Fleischer

**Absorption spectra resulting from the excitation of the inner electrons.** I. General. H. Beutler. *Z. Physik* 86, 495-515(1933); cf. *C. A.* 27, 227.—Absorption spectra of metal vapors in the region 600-1200 Å. are studied. Beyond the ionization threshold line absorption is found again, because of the excitation of electrons of a shell below the valency electron. A general diffuseness of the

excited terms is due to the transition of the atom into an ion with emission of the valency electron. Selection rules for this process are stated. The limits of the new terms are identical with the excited states of the spark spectra. Approx. values of the new terms can be obtained from the arc spectrum of the next element in the periodic system. The  $\text{He}_2$  continuum and a vacuum grating spectrograph were used. The spectrum is called  $I^1$  if the shell below the valence shell is involved. II. The mercury spectrum between 1190 and 600 Å. due to excitation of the  $(5d)^{10}$  shell of Hg  $I^1$ . *Ibid.* 710-18.—Absorption spectra of Hg with the He or A continuum as light sources give lines belonging to the following transitions:  $(5d)^{10} (6s)^1 1S_0 \rightarrow (5d)^9 (6S)^4 m P^1 P_1$  or  $D_1$  or  $(5d)^9 (6S)^3 m f^1 P_1$  or  $P_1$ . The lowest term,  $(5d)^9 (6S)^3 6P^1 P_1$ , lies below the normal series limit. This series  $m^1 P_1$  converges to  $\text{Hg}^{+2} D_{5/2}$ . The terms near the normal absorption limit are very diffuse. E. Bretscher

Interpretation of the spectra of the hot stars. Bengt Edlén. *Z. Astrophys.* 7, 378-90(1933).—Unobserved lines of C III, C IV, N IV, N V, O IV, O V and O VI, which fall in the spectral region of astrophysical importance, have been calcd. from known terms, and the results are used to identify the emission lines appearing in the spectra of hot Wolf-Rayet stars and to interpret the stellar conditions responsible for their appearance. C. C. Kiess

A preliminary table of lines in the spectrum of  $\delta$  Cephei. C. J. Krieger. *Astrophys. J.* 79, 98-139(1934).—Wave lengths of 380 absorption lines in the spectrum of  $\delta$  Cephei are presented together with their chem. origins. C. C. Kiess

The hydrogen line widths in 5 K Draconis. Ralph Van Arnam. *Astrophys. J.* 79, 140-2(1934).—From measurements of the contours of  $H_\beta$ ,  $H_\gamma$  and  $H_\delta$  in the spectrum of 5 K Draconis no correlation was found between the intensity of the emission lines and the widths of the absorption lines. This evidence supports the view that the emission and absorption lines originate at different levels in the star. C. C. Kiess

Series in the spark spectrum of radium, Ra II. Ebbe Rasmussen. *Z. Physik* 86, 24-32(1933).—The spectrum of Ra II is obtained from 11000 to 1880 Å. The ground term is  $81842.31 \text{ cm}^{-1}$  and the ionization potential 10.099 v. Egon Bretscher

Arc spectrum of silicon in the red and infra-red. C. C. Kiess. *Bur. Standards J. Research* 11, 775-82(1933) (Research Paper No. 624).—Wave lengths have been measured for 130 new lines in the arc spectrum of Si between 6125 Å. in the orange and 11290 Å. in the infra-red and beyond the longest previously recorded line. Most of these new lines appear in absorption in the solar spectrum. Many of them have been classified as combinations between new triplet and singlet terms arising from configurations  $contg.$  the  $4p$ ,  $4f$  and  $5f$  electrons and terms known from Fowler's analysis of Si I (C. A. 23, 3161). C. C. Kiess

The arc spectrum of sulfur. K. W. Meissner, O. Bartelt and L. Eckstein. *Z. Physik* 86, 54-76(1933). Egon Bretscher

The spark spectrum of sulfur S II. O. Bartelt and L. Eckstein. *Z. Physik* 86, 77-81(1933). Egon Bretscher

The arc spectrum of sulfur in the ultra-violet. J. E. Ruedy. *Phys. Rev.* 44, 757-60(1933).—A Schüler tube with a water-cooled Al cathode with He gas for maintaining the discharge was attached to a vacuum spectrograph employing a 1.5-m. grating of 15,000 lines per in. The S spectrum was excited by vaporizing some S in the tube while the discharge was in operation. The wave length range photographed was 0-2600 Å., and in the region 1050-2400 Å. many new lines were observed and classified. It was thus possible to establish the low singlet terms of the arc spectrum and some of the higher terms built on the doublet P and D states of the ion as well as some higher members of the series built on the quartet S of the ion. Bernard Lewis

Asymmetries of pressure-broadened spectral lines. Henry Margenau. *Phys. Rev.* 44, 931-4(1933). B. L.

Pressure effects of nitrogen on potassium absorption lines. Wm. W. Watson and Henry Margenau. *Phys. Rev.* 44, 748-52(1933).—Pressure effects on the first 3 doublets of the principal series of the K absorption spectrum have been produced by  $\text{N}_2$  up to 80 atm. pressure. The 4045 and 3446 Å. pairs show shifts of the absorption max. to the red and half-widths more than twice as large as those for the resonance lines. In the range of  $\text{N}_2$  pressures above "relative density" 10, both the shifts and half-widths increase more rapidly than linearly with density. The  $^3P_{1/2}$  components exhibit this departure from the linear relation more markedly than the  $^3P_{1/2}$  components. Possible explanations of these variations are suggested. Quant. results are summarized in the figures and tables. Bernard Lewis

Absorption of light near the mercury resonance line 1850 Å. I. M. Frank. *Physik. Z. Sowjetunion* 4, 637-45 (1933) (in German).—The absorption of the Al line at 1854.62 Å. by Hg is proportional to the thickness of Hg vapor, and is 0.53 at  $306^\circ$  for a layer of Hg 16 mm. thick. Absorption decreased with increase in temp. The absorption is due to scattering of the light by the Hg atom because of the close proximity to the 1849.6 Å. line of Hg. Gerald M. Pettit

Quenching of light from flames produced by various chemicals. C. D. Child. *Phil. Mag.* 16, 1141-50(1933).—

The quenching effect of a variety of salts and acids on the light of a flame sprayed with a soln. of a salt of Ca, Sr, Na or K was studied. With flames of the alk. earth salts, the effect of a quenching substance depends on both its pos. and neg. constituents. With alkali salt flames the effect of all added substances is about the same. The behavior of the alk. earth salts is explained by assuming that equil. is reached in the flame, so that the no. of uncombined metal atoms depends on the nature and of the acid radicals present. E. J. Rosenbaum

Determination of the excitation function of some terms of the mercury atom. Richard Seiler. *Z. Physik* 83, 789-805(1933).—The energy loss of electrons on diffusion through Hg vapor is used to obtain the probabilities of excitation as a function of the electron energy. The max. probability for the transition  $1S_0 \rightarrow 2^3P_1$  lies between 6.4 and 7 v., 4-5% of the gas kinetic collisions being effective. Two maxima are found for  $1S_0 \rightarrow 2^1P_1$ , at 7 and 18-20 v. resp. The yields are 1% for the former and 3% for the latter. Egon Bretscher

Theory of the Stark effect in variable time fields. D. I. Blokhintzev. *Physik. Z. Sowjetunion* 4, 501-15(1933) Howard A. Smith

The positive-ion excitation of mercury vapor. Ernest J. Jones. *Phys. Rev.* 44, 707-10(1933).—Hg vapor was bombarded with  $\text{Li}^+$  and  $\text{K}^+$  ions, the resulting spectra were photographed with a quartz spectrograph and the plates photometered to give an approx. intensity-velocity curve. Voltages used ranged from 150 to 1500 v. The results indicate that the velocity rather than the energy is the important factor to be considered in the mechanism of the collision process. A preference seems to exist for the excitation of levels of higher L values. The spark lines 2827, 2280 and 2224 Å. appear at 1000 v for  $\text{Li}^+$  ions. A powerful source of pos. ions has been developed. Bernard Lewis

Doppler effect in spectra of positive rays of uniform velocity in argon, neon and helium. Anna I. McPherson. *Phys. Rev.* 44, 711-16(1933). Bernard Lewis

Configuration interaction in complex spectra. C. W. Ufford. *Phys. Rev.* 44, 732-9(1933).—The electrostatic energies and magnetic splitting are calcd. for the terms of  $nd^2n's$ ,  $nd^3$  and  $ndn's^2$  from quantum mech. considerations of the electrostatic interaction between the terms in Russell-Saunders coupling of the electron configurations. The values are compared with those observed in Ti II and Zr II. The latter agrees particularly well, especially if the observed  $^3D$  terms are arranged. Bernard Lewis

Characteristic values of the two-minimum problem and quantum defects of f states of heavy atoms. Ta-You Wu. *Phys. Rev.* 44, 727-31(1933). Bernard Lewis

**Relative multiplet transition probabilities from spectroscopic stability.** E. U. Condon and C. W. Offord. *Phys. Rev.* 44, 740-3(1933).—The relative multiplet transition probabilities are given for the transitions  $p^2\ ^3P^o \rightarrow p^2\ ^3P$ ,  $d^2\ ^3P^o \rightarrow d^2\ ^3P$ , and  $p^2\ ^3P^o \rightarrow p^2\ ^3P$ . Bernard Lewis

**Relative intensity tables for spectrum lines.** H. E. White and A. Y. Ellason. *Phys. Rev.* 44, 753-6(1933).—Relative intensities for a large no. of multiplets have been calcd. from well-known theoretical formulas. These intensities have been tabulated for future reference in making analyses of spectra. The tables are grouped under each resultant spin, from singlets  $S = 0$ , to octets  $S = 7/2$  and include all probable values of  $L$  and  $J$ . It is shown how the same tables apply to  $jj$ -coupling, to hyperfine structure and to related multiplets. B. L.

**Variation in spectra of some gases in relation to the discharge frequency in Geissler tubes.** A. V. Savel'ev. *J. Tech. Phys.* (U. S. S. R.) 3, 622-9(1933).—Photographs of the spectra of Ne, He and H are shown.

F. H. Rathmann  
**Wave lengths of the red lines of neon and their use as secondary standards.** C. V. Jackson. *Proc. Roy. Soc. (London)* A143, 124-35(1933).—To det. definitely whether the Ne lines can be used as secondary standards the wave lengths of the red lines of Ne have been compared with the primary standard by means of a Fabry-Perot interferometer of resolving powers ranging from 70,000 to 800,000. Results: With resolving powers greater than about 250,000, the Ne lines have const. wave lengths showing a systematic difference of 0.0001 Å. and a mean accidental difference of  $\pm 0.0002$  Å. from the values of Burns, Meggers and Merrill (*C. A.* 13, 1419). With lower resolving powers the apparent wave lengths become systematically lower until const. values are reached at about 100,000. The Ne lines form satisfactory secondary standards for use with app. of low resolving powers when corrections, which are given, are applied to the standard. Conditions are given for exciting lines accurately reproducible in wave length and free from self-reversal.

Allen S. Smith  
**The line absorption of sodium vapors of the  $D$  lines.** W. Zehden. *Z. Physik* 86, 555-82(1933).—The  $f$  value of each  $D$  line (isolated by Wood's method) is detd. from measurements of the "line absorption"  $f_{D_1} = 0.207$ ,  $f_{D_2} = 0.532$ . Qual. agreement with the value from measurements of the magneto-rotation is obtained if the hyperfine structure is taken into account.  $1/2$  and  $3/2$  are assumed for the nuclear spins of Na. Directions for sealing Suprax glass plates to tubes are given. E. B.

**Sodium glow-lamp.** F. H. Newman. *Phil. Mag.* 16, 1109-14(1933).—Na was added to A- or Ne-filled bee-hive lamps by electrolyzing through the glass walls. When the lamp is lighted, the A lines disappear leaving only intense and narrow  $D$  lines of Na, suitable for calibration. Ne lines do not disappear entirely.

E. J. Rosenbaum  
**Width of spectral lines in gases.** V. Veiskopf. *Uspekhi. Fiz. Nauk.* 13, 552-92(1933).—The Hg 2537 and the Na  $D$  lines were measured for width in H<sub>2</sub>, He, A, Ne, N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub> and CO.

F. H. Rathmann  
**Analysis of Zeeman patterns.** Russell A. Fisher. *Phys. Rev.* 44, 724-6(1933).—A method for the representation and analysis of Zeeman patterns is explained. B. L.

**Relation between fine structure of spectral lines and the rotation of the nucleus.** S. Frish. *Uspekhi. Fiz. Nauk.* 10, 570-80(1930).

F. H. Rathmann  
 **$Li$  fine structure and wave functions near the nucleus.** John A. Wheeler and G. Breit. *Phys. Rev.* 44, 948(1933).—The fine structure of the  $(1s2p^2P)$   $P$  level of  $Li^+$  was calcd. theoretically. In the formula for the energies of the triplet  $j = 0, 1, 2$ :  $E_j = [-3(C + D), 2(D - C), 0]$  the computed values of  $C$  and  $D$  are  $-0.334$  and  $-1.040$  cm.<sup>-1</sup> as against the observed values of  $0.016$  and  $-1.033$  of Schüller (*C. A.* 25, 1734). L. Goldman

**Nuclear moments of sodium and potassium.** S. Frish. *Physik. Z. Sowjetunion* 4, 557-62(1933).—A review of the spectroscopic work on the magnetic moments.

Howard A. Smith

**The nuclear spin and magnetic moment of sodium from hyperfine structure.** L. P. Granath and C. M. Van Atta. *Phys. Rev.* 44, 935-42(1933).—The hyperfine structure of the Na  $D$  lines from a liquid-air-cooled Schüller tube was observed with a Fabry-Perot interferometer. Each line has 2 resolvable components; the sepns. are: for  $D_2$  ( $\lambda 5890$ ),  $0.0555$  cm.<sup>-1</sup>, for  $D_1$  ( $\lambda 5896$ ),  $0.0612$  cm.<sup>-1</sup>. The total hyperfine structure splitting for the  $3^2S_{1/2}$  state is  $0.0583$  cm.<sup>-1</sup>, for  $3^2P_{1/2}$ ,  $0.0050$  cm.<sup>-1</sup> and for  $3^2P_{3/2}$ ,  $0.0083$  cm.<sup>-1</sup>. Relative intensity measurements are consistent with a nuclear spin of  $3/2$ . The nuclear magnetic moment is calcd. as  $2.7/1840$  Bohr magnetons.

Bernard Lewis

**The magnetic moments of the rubidium isotopes.** D. A. Jackson. *Z. Physik* 86, 131(1933).—By combination of J.'s results (*C. A.* 27, 3139) with those of Kopfermann (*C. A.* 27, 4733) the isotope shift for Rb<sup>85</sup> and Rb<sup>87</sup> is found to be 0.

Egon Bretscher

**The hyperfine structure intensities of the  $2^1S_1$ - $2^3P_{0,1,2}$  triplet in optically excited mercury vapor.** M. L. Pool and S. J. Simmons. *Phys. Rev.* 44, 744-7(1933).—The hyperfine structures of the Hg lines 5461, 4358 and 4047 Å. in fluorescence emission were obtained in the 2nd order of a 30,000-line, 21-ft. grating. The ratio of the intensity of the central component to the intensity of any one of the other components was found greater than a similar ratio for the emission from the excited arc. This anomalous increase in intensity of the central component in fluorescence may be accounted for by making use of the absorption coeff. of the components of 4047 Å. B. L.

**Hyperfine structure in the tantalum arc spectrum.** Edwin McMillan and Norman S. Grace. *Phys. Rev.* 44, 949-50(1933).—The intervals and no. of components in the lines  $\lambda 5997.24$  and  $\lambda 6020.69$  in the arc spectrum of tantalum show that the nuclear spin is  $7/2$ . The level scheme for  $\lambda 6020.69$  is shown. L. Goldman

**Measurement of the light emission in the argon and mercury spectrum on excitation with electron collisions.** Otto Fischer. *Z. Physik* 86, 646-66(1933).—The excitation functions of the violet lines of the spark spectrum and the blue lines of the spark spectrum of A are detd. at low pressure. The intensity ratio in the blue part of the A spectrum is measured with the help of a W ribbon lamp as light source for comparison. A new method is developed for detg. the abs. yield  $A$  of excited atoms by direct comparison of the light emission with the standard W lamp.  $A$  is found in the case of Hg 4358 to be  $7.9/1000$ . This agrees with the value obtained by Hanle and Schaffernicht by a totally different method (cf. *C. A.* 24, 1283).

Egon Bretscher

**The natural width of neon lines in the visible spectrum.** I. Statement of the problem, theoretical foundation of the method of investigation and discussion of the available results. Wilhelm Schutz. *Ann. Physik* 18, 705-20(1933). II. Description of apparatus and methods of measurement, quantitative results. Horst Shillbach. *Ibid.* 721-45.

W. F. Meggers

**The intensity of the visible neon lines of the positive column as a function of the current strength.** Wilhelm Schutz. *Ann. Physik* 18, 746-54(1933). W. F. Meggers

**Infra-red region of the spectrum.** M. A. Levitskaya. *J. Tech. Phys.* (U. S. S. R.) 2, 351-70(1932).—A review. F. H. Rathmann

**The inert gas molecules.** K. G. Emelius and O. S. Duffendack. *Phys. Rev.* 44, 945(1933).—Band spectra in helium show that the mol. is formed from a normal and a metastable atom and is further excited by an electron. Heavier inert gases do not give band spectra because of the lower metastability of mols. having a larger no. of electrons. L. Goldman

**The action of light on vapors of rubidium iodide.** Remark on the publication of Manohar S. Desai. G. H. Visser and A. C. S. van Heel. *Z. Physik* 86, 694-6(1933).—Priority claim and criticism of D.'s paper (*C. A.* 28, 45).

Egon Bretscher

**Influence of nitrogen and carbon dioxide upon the absorption spectrum of mercury vapor.** R. W. Wood and M. W. Straub. *Phys. Rev.* 44, 1030(1933).—The history

of the effect of chemically inert gases on the absorption spectrum of Hg is given. For added N a broad absorption band on the short-wave side of the resonance line appeared when the width of the pressure-broadened Hg-line was less than 10 Å, its distance from the line was about 8 Å, the excess energy being 0.014 v. Similar data are given for admixed CO. L. Goldman

A new band system in nitrogen. Joseph Kaplan. *Phys. Rev.* 44, 947(1933); cf. *C. A.* 27, 24, 25.—A new band system was discovered in the N afterglow corresponding to some of the  $\epsilon$ -series of Vegard in the luminescence of solid N and in the aurora borealis. The electronic energy of the upper state is 6.41 v. and the initial level is probably a new electronic level. L. Goldman

Further analysis of the  $N_2^+$  bands. Allen E. Parker. *Phys. Rev.* 44, 914-18(1933).—The  $\Delta v = 3$  sequence of the  $^2\Sigma - ^2\Sigma N_2^+$  bands has been photographed in the second and third orders of a 21-ft. grating. Rotational analyses have been made of the (4,7), (5,8), (6,9) and (7,10) bands. The  $B$  values obtained fit well the expressions previously given for  $Bv'$  and  $Bv''$ . The perturbation in the (5,8) band has been investigated. The present data on the perturbing  $^2\Pi$  state are discussed. Additional measurements in the (13,15) band are also given. Bernard Lewis

Light of the night sky and active nitrogen. Joseph Kaplan. *Nature* 132, 1002-3(1933); cf. *C. A.* 27, 898.—The afterglow of the  $N_2$  tube has been photographed in the visible region. It is made up of the bands  $v = 18, 19, 20$ , etc.; they are emitted by  $N_2^+$ . It is possible to reproduce completely the light of the night sky in the  $N_2$  afterglow. Gerald M. Petty

Nuclear spin of phosphorus from band-spectrum analysis. Muriel F. Ashley. *Phys. Rev.* 44, 919-28(1933).—The emission spectrum of  $P_2$  has been photographed in the 1st and 2nd orders of the 21-ft. grating. A strong alternation in intensity is observed in the successive rotational lines of many bands. The intensity ratio is found to be 3:1; hence the nuclear spin of P is  $1/2$ . A fine-structure analysis was made of the (6,22), (6,23) in addn. to the (8,27), (8,28) and (9,28) bands previously reported by Herzberg (*C. A.* 27, 1572). Only  $P$  and  $R$  branches are present. The transition involved is  $^2\Sigma \rightarrow ^2\Sigma$ . The odd levels of the ground state have the greater statistical weight. The following mol. consts. are obtained:  $\tilde{\nu}_0 B_0' = 0.2415 \text{ cm.}^{-1}$ ,  $B_0'' = 0.3058 \text{ cm.}^{-1}$ ;  $\alpha' = 0.00164$ ;  $\alpha'' = 0.00165$ . Bernard Lewis

Spectroscopic detection and structure of the PN molecule. J. Curry, L. Herzberg and G. Herzberg. *Z. Physik* 86, 348-66(1933); cf. *C. A.* 28, 411<sup>1</sup>.—The emission spectrum of  $N_2$ -contg. P vapors is analyzed. The configuration is a  $\Pi \rightarrow ^2\Sigma$  transition. The formula for the zero lines is given. The at. distances are 1.4869 and 1.542 Å. for the ground and the excited states, resp. The energy of dissocn. from the ground state is about 7.8 v. (extrapolated). The PN mol. is compared with a series of other diatomic mols. Egon Bretscher

Spectrum of  $O^+H^+$ . Herrick L. Johnston and David H. Dawson. *Phys. Rev.* 44, 1031(1933); cf. *C. A.* 27, 2380.—Five hundred lines distributed in 8 bands in the spectrum of  $OH^+$  were studied. Corrections necessary in calcg. isotope shifts are given. L. Goldman

New bands in the electronic band spectrum of neutral OH. Katherine Chamberlain and Harold B. Cutter. *Phys. Rev.* 44, 927-30(1933); cf. *C. A.* 27, 3880.—With a very rapid flow of  $H_2O$  vapor a discharge tube and high-frequency excitation, it was possible to bring out portions of 2 new bands in the spectrum of neutral OH. These have been identified as the (3,0) and (3,1) bands. Faint lines have also been found between the lines of the  $^{18}R_{11}$  singlet series of the 3064 Å. band. These lie where approx. calcs. indicate that the  $^{18}R_{11}$  branch of the (0,0) band of the isotope  $OH^+$  should fall. The singlet series  $^{18}R_{11}$  of the (2,0) band appears on the plates. There is also a group of 9 lines extending from 2539 to 2565 Å. This may be a portion of the (4,1) band but it has not been found possible to establish this definitely. Bernard Lewis

The  $\lambda$  3240 band of NH. R. W. B. Seares. *Proc. Roy. Soc. (London)* A133, 142-20(1933); cf. *C. A.* 27, 3880.—A band at 3240 Å. observed near the 3360 Å. band of NH in the spectrum of a heavy-current discharge tube contg. N and H is also attributed to NH. Its occurrence in other sources contg. N and H was investigated. Analysis of the band photographed under high dispersion showed that it possessed the intensity distribution and no. of "missing lines" characteristic of a  $^1\Pi \rightarrow ^1\Delta$  transition.

The narrow doubling occurring in each of the  $P$ ,  $Q$  and  $R$  branches is attributed to  $\Delta$ -doubling of the  $^1\Pi$  levels. Rotational term differences are obtained and rotational consts. calcd. The relation of the electronic levels of the mol. NH to the lowest levels of the atom N is discussed. Wave lengths are tabulated. Allen S. Smith

New  $O_2^+$  bands. Dissociation energy of  $O_2^+$  and ionization potential of  $O_2$ . R. S. Mulliken and D. S. Stevens. *Phys. Rev.* 44, 720-3(1933).—Three new bands are reported in the 1st neg. and several in the 2nd neg. system of  $O_2^+$ . The numbering of the vibrational levels of the normal state of  $O_2^+$ , hitherto in doubt, is definitely established. The observed ionization potentials,  $I$ , of  $O_2$  at 12.5 and 16.1 v. are discussed. From the known  $O_2^+$  energy levels it is shown that the dissocn. energy  $D$  of  $O_2^+$  cannot be less than 6.0 v.; by extrapolation from the known levels 6.54 v. is obtained. The latter value would require 12.11 v. as the ionization potential of  $O_2$ . It is suggested that  $D = 6.45 \pm 0.1$  v. and  $I = 12.2 \pm 0.1$  v. as a reasonable compromise between the ionization potential and the band spectrum data. B. L.

The band spectrum of bismuth oxide. Chandrasekhar Ghosh. *Z. Physik* 86, 241-8(1933).—Four band systems are found between 4300 and 6700 Å. Egon Bretscher

A band system of ionized aluminum hydride. W. Holst. *Nature* 132, 1003(1933); cf. *C. A.* 27, 5246.—The AlH band at 3600 Å. has been analyzed. It belongs to a  $^2\Pi_2 \rightarrow ^2\Sigma$  transition, and is attributed to  $AlH^+$ . New bands have been found at 2700 and 3380 Å. Gerald M. Petty

The infra-red spectrum of heavy ammonia. S. Silverman and J. A. Sanderson. *Phys. Rev.* 44, 1032(1933).—The observed and calcd. values for the bands of the infra-red absorption of  $NH_3$  agree. The structures of the envelopes of the 4 bands are similar to the corresponding frequencies of  $NH_3$ . L. Goldman

The rotation oscillation spectrum of methane. II. Vedder and R. Mecke. *Z. Physik* 86, 137-56(1933).—The  $CH_4$  spectrum is studied in the region from 7000 to 11,000 Å. The absorbing column was 20 m. at 5 atm  $CH_4$  pressure. Seven bands were found. All the 23 bands observed up till now can be reduced to the following 4 normal oscillations:  $\nu(a) = 3015 - 15v$ ,  $\nu(s) = 2945 - 50(v_s + v_a)$ ,  $\delta(a) = 1320 - 15(v_s + v_a)$ ,  $\delta(s) = 1530 - 10(v_s + v_a)$ . The rotational structure has not yet been analyzed. Egon Bretscher

The absorption spectra of lead oxide and lead sulfide. R. S. Sharma. *Bull. Acad. Sci. United Provinces Agra and Oudh Allahabad, India* 3, 17-22(1933).—For  $PbO$  2 regions of continuous absorption were observed beginning at 3000 and 2240 Å. Similarly,  $PbS$  exhibits 2 continuous absorption bands beginning at 3500 and 2450 Å. In each case the first absorption band represents the photochem. dissocn. of the mol. into 2 free atoms; the second absorption band represents the dissocn. of the mols. with the O and S atoms in the metastable  $^1D_2$  state. C. C. Kies

The absorption spectra of the vapors of the lower chlorides of elements of the fifth group of periodic table. Hrishikesh Trivedi. *Bull. Acad. Sci. United Provinces Agra and Oudh Allahabad, India* 3, 29-30(1933).—The trivalent chlorides of P, As, Sb and Bi have bands of continuous absorption in the ultra-violet with long-wave limits at 2957, 3468, 3256 and 3656 Å., resp. The corresponding energies are greater than  $1/2$  but less than  $3/4$  the heats of dissocn. calcd. from thermochem. considerations. The trichloride mol. probably dissocn. into a Cl atom and a dichloride of the metal. C. C. Kies

Quenching of iodine fluorescence by iodine and argon.

James F. Kochler. *Phys. Rev.* **44**, 761-8(1933).—Fluorescence was excited monochromatically in  $I_2$  below 0.8 mm. pressure, by the Hg green and yellow lines and measured by photographic photometry with a spectrograph. Absorption measurements were made under similar conditions with 2 compensating photoelec. cells. Beer's law holds here. Argon does not alter the absorption of  $I_2$ . The ratio of probability that an excited mol. will lose all energy in an I collision to probability of radiation is evaluated per unit time. The ratio exceeds unity for pressures of about 0.05 mm. The yellow excited series is quenched more than the green by both  $I_2$  and A. The complex nature of A quenching is discussed. B. L.

The magnetic extinction of the fluorescence of diatomic molecules of sulfur. J. Geuard. *Compt. rend.* **197**, 1102-4(1933); cf. *C. A.* **28**, 708<sup>6</sup>.—The extinction by a magnetic field of the fluorescence of  $S_2$  vapor excited by Hg radiation was studied for wave lengths from 2894 to 5132 Å. and a field strength of 40,000 gauss. The effects are more complex than those previously observed for I and Te. Besides multiplets which showed strong extinction, others were but slightly affected while some were increased in intensity. The extinction is more marked for the shorter exciting wave lengths. Van Vleck's theory of magnetic predissocn. does not seem to be applicable to  $S_2$ . Morris Muskat

The molecular spectra of some indium and gallium halides. A. Petrikain and J. Hochberg. *Z. Physik* **86**, 211-30(1933).—The absorption and emission spectra of  $InCl$ ,  $InCl_2$ ,  $InBr$ ,  $GaCl_2$ ,  $GaBr_2$  and  $GaI$  are studied. The bi and trivalent compds. give at high temp. continuous spectra, the univalent, two band systems, both of singlet character. Egon Bretscher

The absorption of iodine vapor in the presence of foreign gases. Ion I. Agarbiacan. *Compt. rend.* **197**, 1198-9(1933); cf. *C. A.* **27**, 4480. Absorption bands of  $I_2$  mixed with  $O_2$  or  $N_2$  (at pressures of from 1 mm. to 1 atm.) are intensified but no new bands appear; apparently excited mols. of  $I_2$  are rendered less active during collision. E. G. Vanden Boche

Rotational structure of the Raman band (0000)  $\rightarrow$  (020  $\pm$  2) in linear symmetrical molecules  $YX_2$ . J. Rud Nielsen. *Phys. Rev.* **44**, 911-13(1933).—In connection with an attempt to interpret 2 faint lines in the Raman spectrum of  $CO_2$  (Langseth and Nielsen (*C. A.* **27**, 1272)) the intensities have been calcd. of the rotational lines associated with the transition (0000)  $\rightarrow$  (020  $\pm$  2) in linear symmetrical mols.  $X-Y-X$ . The results agree with the more general formulas recently obtained by Placzek and Heller (*C. A.* **27**, 4171). Bernard Lewis

The diffusion of light and molecular rotation in liquids. A. Rousset. *Compt. rend.* **197**, 1033-5(1933).—The polarization factor of scattered light is detd. spectroscopically for  $\lambda$  4358 with several slit widths ( $s$ ) for  $CaH_2$ ,  $CS_2$ ,  $HIOAc$  and  $SO_2$ . Conclusions: The mols. do not make complete rotations but change their orientation with variable speed. The forces that promote assocn. oppose certain rotations. J. B. Austin

The Raman effect in ammonia and some other gases. Charlton M. Lewis and Wm. V. Houston. *Phys. Rev.* **44**, 903-10(1933).—The Raman rotation spectra of polyatomic mols can be interpreted in terms of the polarizabilities of the mols., without explicit knowledge of the electronic states. This point of view makes possible the calcn. of the relative intensities of all rotation lines to be expected. The spectrum of gaseous  $NH_3$  shows the calcd. intensity relations when a suitable shape is assumed for the mol. Measurements tend to support the flat pyramid inferred from infra-red data. The larger moment of inertia is  $2.79 \times 10^{-40}$  g. sq. cm.  $CH_4$  shows no pure rotation band in spite of the presence of a vibration-rotation band which has not been interpreted.  $C_2H_4$  gives a pure rotation band which indicates a moment of inertia of about  $300 \times 10^{-40}$  g. sq. cm with alternating intensities as in  $H_2$ . Bernard Lewis

The Raman effect of solutions of ammonium nitrate in nitric acid. Louis Médard and Thérèse Petitpas. *Compt. rend.* **197**, 1221-2(1933).—The addn. of  $NH_4NO_3$

to  $HNO_3$  increases the values of the frequencies of the Raman rays ( $n_1, n_2, \dots, n_8$ ) previously found for  $HNO_3$ ; the  $n_1$  and  $n_2$  values are most easily affected by diln. For solns. of  $NH_4NO_3$  in  $HNO_3$  the frequencies of the  $NO_2$  ion are 728, 1053 and 1339  $cm^{-1}$ . E. C. V. R.

The multiplicity of some Raman frequencies of the nitrate group found in nitrates with more than one valence. Z. Ollano and G. Prongia. *Nuovo cimento* **10**, 306-15(1933).—The Raman frequencies 1440, 1030, 980 and 720  $cm^{-1}$  of the nitrate group have been studied in solns. of  $LiNO_3$ ,  $NaNO_3$ ,  $KNO_3$ ,  $NH_4NO_3$ ,  $AgNO_3$ ,  $HgNO_3$ ,  $Mg(NO_3)_2$ ,  $Mn(NO_3)_2$ ,  $Ba(NO_3)_2$ ,  $Ca(NO_3)_2$ ,  $Cd(NO_3)_2$ ,  $Pb(NO_3)_2$ ,  $Al(NO_3)_3$ ,  $Ce(NO_3)_3$ ,  $La(NO_3)_3$ ,  $Bi(NO_3)_3$ . In all the univalent salts the lines are single. In the bivalent salts the lines 1440 and 720  $cm^{-1}$  are very wide, probably double. In the trivalent salts these lines are clearly double with a sepn. of 30-40  $cm^{-1}$ . The duplicity, which corresponds to oscillations of the elec. moment of the nitrate group in a direction perpendicular to the axis of symmetry, is attributed to the existence in soln. of ions of the type  $[M(NO_3)]^+$  in which the metal ion lies on the axis of symmetry. J. B. Austin

The Raman effect in aluminum salts. A. da Silveira. *Compt. rend.* **197**, 1035-7(1933).—The Raman displacements in  $cm^{-1}$  for satd. solns. of  $Al(NO_3)_3$  and of  $Al_2(SO_4)_3$  are as follows, where the intensities are marked as  $f$ —very faint,  $f$ —faint,  $m$ —medium,  $s$ —strong,  $ss$ —very strong:  $Al(NO_3)_3$ : 396  $f$ , 446  $f$ , 537  $f$ , 627  $f$ , 721  $m$ , 819  $f$ , 1052  $ss$ , 1241  $f$ , 1312  $m$ , 1414  $s$ , 1530  $f$ , 1639  $f$ ;  $Al_2(SO_4)_3$ : 270  $f$ , 396  $f$ , 461  $m$ , 527  $f$ , 612  $m$ , 686  $f$ , 981  $ss$ , 1109  $f$ . The possible origins of these lines are discussed. J. B. Austin

The Raman spectra of some substituted cycloolefins. Marcel Godchet, Etienne Canals and Germaine Cauquil. *Compt. rend.* **197**, 1407-9(1933); cf. *C. A.* **27**, 2023. As a whole the Raman spectra of the substituted cycloolefins are similar to those of the unsubstituted compds. Thus the strong line in the region of 1200  $cm^{-1}$  is found in the substituted compds. as well as in the unsubstituted compds., and the same is true except for minor details of the line at 1440  $cm^{-1}$ , characteristic of the  $CH_2$  group. Furthermore, for both sets of compds. there is found a group of fine lines, beginning at 132  $cm^{-1}$ , which are distributed over the spectrum. The main differences lie in the splitting into a doublet in the case of the substituted compds. of the line, previously single, at about 800  $cm^{-1}$  which is characteristic of the C—C bond, and a small shift toward longer wave lengths of the line at 1600  $cm^{-1}$ , characteristic of the double bond. Morris Muskat

The complete Raman spectrum of benzene from 5100 Å. to 4100 Å. P. Grassmann and J. Weiler. *Z. Physik* **86**, 321-37(1933).—The Raman spectrum of benzene is obtained with high dispersion (10.8-16.6 Å./mm. for 4560 and 4260 Å., resp.). Forty-one Raman frequencies are found; 18 are new. Most of them are combinations of 10 fundamental frequencies. The line for 984  $cm^{-1}$  is attributed to  $C^{13}$ . Egon Bretscher

Change from aromatic to metallic electrons in organic compounds. A. R. Ubbelohde. *Nature* **132**, 1002(1933).—A study of the elec. polarizability, magnetic susceptibility and dielec. strength of compds. which contain several condensed aromatic rings should yield data of importance to the theory of metallic conduction. Gerald M. Petty

The absorption spectra of biphenols in alkaline media. Albert Saint-Maxen and Emile Dureuil. *Compt. rend.* **197**, 1411-13(1933).—The intensities in the absorption spectra of hydroquinone, pyrocatechol and resorcinol in the range of 5800-2200 Å. were detd. when these compds. were in pure water and in alkali media. The results were: (1) The absorption spectrum of the hydroquinone in alk. media becomes similar to that of quinone; (2) the nature of the alkali has little effect on the spectra; (3) the alk. medium changes the spectrum only when the biphenol can change to a quinone form. M. M.

Raman spectrum of fluorobenzene. N. Gopala Pai. *Nature* **132**, 968(1933).—The Raman frequency, 1220

cm.<sup>-1</sup>, appears to be characteristic of the C—F bond.

S. Bradford Stone

**Molecular light scattering by binary mixtures.** Richard Gans, H. A. Stuart and Wilhelm Müller. *Z. Physik* 86, 765-77 (1933).—The fact that the degree of depolarization of light is generally much smaller in the gaseous state than in the liquid is partly due to the necessity of taking d. and temp. into account to obtain the mol. anisotropy, partly to real assocn. in the liquid state. The degrees of depolarization of light is detd. for the following mixts.: benzene-hexane, CCl<sub>4</sub>-benzene, nitrobenzene-hexane, nitrobenzene-CCl<sub>4</sub>, toluene-AcOH, MeOH-CS<sub>2</sub>. E. B.

**Photoelectric measurements of magnetic rotatory dispersion in the ultra-violet.** G. Bruhat and A. Guinier. *Compt. rend.* 197, 1028-30 (1933).—The magnetic rotatory dispersion is detd. for H<sub>2</sub>O, heptane, heptene and heptene between  $\lambda$  5893 and  $\lambda$  2804. Also in *J. phys. radium* [7], 4, 691-714 (1933). J. B. Austin

**Remarkable optical properties of the alkali metals.** Clarence Zener. *Nature* 132, 968 (1933).—By treating the electrons as free, it is possible to calc. the approx. values of the crit. wave lengths at which the alkali metals become transparent to ultra-violet. S. Bradford Stone

**The absorption of thin films of copper, silver and gold in the visible and ultra-violet region.** Alexander Smakula. *Z. Physik* 86, 185-94 (1933). The curves of transparency of Ag, Au and Cu have band character. Only Ag has at 320 m $\mu$  a min. of absorption, while Au and Cu have none in the ultra-violet. Egon Bretscher

**Preparation of light filters from gelatin and Soviet produced dyestuffs.** V. Ginzburg and B. Levin. *J. Tech. Phys.* (U. S. S. R.) 2, 1053-67 (1932).—Graphs show the absorption curves of 40 different aniline dyes. F. H. Rathmann

**The theory of phosphorogens.** A. A. Guntz. *Compt. rend.* 197, 1030-3 (1933).—A statement of the present status of the theory as based on recent work of Coustalet (*C. A.* 27, 3070). J. B. Austin

**The appearance and disappearance of color in pressed rock crystals.** Magdalene Huberfeld. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse, Abt. IIa*, 142, 135-54 (1933).—This work is similar to that of Smakula, *C. A.* 24, 5613. The absorption spectrum of pressed rock-salt crystals has been photographed before and after radium irradiation and the changes have been analyzed. A simple expression is given to describe the behavior of the absorption max. at 470 m $\mu$ . Disappearance of color is more rapid when the form alteration is greater; the excitation decreases during the process. In the pressed as well as the unpressed salt, about one quantum is required to liberate one electron. Albert L. Henne

**Additive coloring of alkali halide crystals. III. Spectrophotometric results.** Ernst Rexer. *Z. Physik* 86, 1-13 (1933); cf. *C. A.* 26, 5807. The influence of tempering on the absorption spectrum of colored rock salt and KCl crystals is studied with specimens from various sources. The max. absorption is independent of the metal inserted into the crystals lattice (Na, Li, K, Sr, Ba). These absorption regions are not changed by temp. if the crystal has previously been tempered at about 700°, though they disappear with ordinary crystals at 450°. E. B.

**Thermoluminescence spectra of fluorites. II. Division of the bands in thermoluminescence spectrum of fluorite into two groups.** Eiichi Iwase. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 22-33 (1933); cf. *C. A.* 28, 9741.—Thermoluminescence is destroyed by continued heating but is restored by exposure to x-rays. After luminescence is restored 1 group of bands appears at low and the other only at high temp. Low-temp. bands are absent in some natural crystals but after exposure to x-rays they appear. The relative intensities and frequencies of bands are related in one colorless sample. A. B. F. Duncan

**The light absorption of p-nitrosodimethylaniline.** J. F. H. Custers and C. J. Dippel. *Z. Physik* 86, 516-20 (1933).—The light absorptions of an aq. soln. of p-ONC<sub>6</sub>H<sub>4</sub>N(CH<sub>3</sub>)<sub>2</sub> and the hydrochloride are detd. The

addn. of HCl to the base changes the ultra-violet spectrum considerably. The HCl salt is useful as a light filter, cutting off in a layer of depth 0.623 cm. (1/1000 m.) the region between 300 and 470 m $\mu$  and allowing the passage of half the intensity at 254 m $\mu$ . The soln. is only advantageous if the light intensity is not too great, as the absorption spectrum is changed by long irradiation with ultra-violet light. Egon Bretscher

**Some chemical reactions involving active nitrogen.** R. H. Ewart and W. H. Rodebush. *J. Am. Chem. Soc.* 56, 97-8 (1934); cf. Willey, *C. A.* 21, 2093.—When N and HBr at low pressures are passed through an electrodeless discharge NH<sub>2</sub>Br and Br are formed and a yellow to orange afterglow is noticed in the tube if traces of water vapor are present, but the afterglow is absent if the N is free from O or O compds. and dry. With HI an intense brilliant blue color is obtained but no afterglow is present with HCl. Plausible suggestions are made to explain these phenomena. Oden E. Sheppard

**Luminescence in the reaction of alkali metals with sulfur and selenium.** A. Seidel. *Physik. Z. Sowjetunion* 4, 565-6 (1933).—Chemiluminescence in the low-pressure reaction of Na and K with S and Se were observed at temps. of 300° and above. The Na reaction displays the D lines with a continuous background while the spectra of the various K reactions are continuous but are differentiated by the intensity distribution. H. A. S.

**Evidence for the formation of active hydrogen.** A. B. Van Cleave and A. C. Grubb. *Nature* 132, 1001 (1933).—A previous study of active H (*C. A.* 25, 3917) showed no evidence for the formation of SiH<sub>4</sub> as proposed by Hiedemann (*C. A.* 27, 2865). The authors again find no evidence for SiH<sub>4</sub> or for at. H. This active H has spectrographic and chem. properties that do not point to at. H. Active H and H<sup>+</sup> seem to be present in about the same proportions. Gerald M. Petty

**Photographic-photometric method for the measurement of the absorption of solutions in the visible region.** W. F. Beyer. *Z. Physik* 83, 806-13 (1933).—The absorptions of solns. of (Co(NH<sub>3</sub>)<sub>6</sub>)Cl<sub>2</sub> and (Co(NH<sub>3</sub>)<sub>5</sub>Cl)Cl<sub>2</sub> are detd. with the König-Martens spectro-photometer and with a combination of a spectrograph, a rotating sector, and a Moll's microphotometer. The measurements of these compds. by Samuel (*C. A.* 25, 5096) disagree with B.'s results. Egon Bretscher

**Photochemistry and fluorescein dyes.** H. F. Blum and C. R. Spealman. *J. Phys. Chem.* 37, 1123-33 (1933).—A study was made of the possible source of the peroxide formed when fluorescein dyes are irradiated in aq. solns. It is concluded that the peroxide is probably H<sub>2</sub>O<sub>2</sub> formed from H<sub>2</sub>O and O<sub>2</sub>. It is suggested that the bleaching of the dyes by light is an oxidation of the dye by the H<sub>2</sub>O<sub>2</sub>, this reaction requiring activation of the dye mol. by light. P. T. Newsome

**Influence of the kind of chemical binding of triatomic molecules on photochemical processes, the structure of the solution, the boiling point and other properties.** A. Butkov. *Physik. Z. Sowjetunion* 4, 577-605 (1933) (in German).—Absorption spectra of PbCl<sub>2</sub>, PbBr<sub>2</sub> and PbI<sub>2</sub> in aq. soln. and in the vapor state, and CdI<sub>2</sub>, ZnI<sub>2</sub>, HgI<sub>2</sub> and HgBr<sub>2</sub> in aq. and EtOH soln. and in the vapor state were studied. A relation between the b. ps. of salts of the MX<sub>2</sub> type and the ionization potential of the metals is shown: in the order of increasing polarity of the chem. bond they are HgX<sub>2</sub>, TeX<sub>2</sub>, BeX<sub>2</sub>, ZnX<sub>2</sub>, CdX<sub>2</sub>, PbX<sub>2</sub>, MgX<sub>2</sub>, CaX<sub>2</sub> and SrX<sub>2</sub>. The ionization potential of Ti is 10.3 v. In weakly polar triatomic mol., such as HgX<sub>2</sub>, at least one of the diatomic products is found to occur in the excited state; in strongly polar mol. these may occur in the unexcited state. The thermodynamically calculated dissociation energies of PbX<sub>2</sub> disagree with the law of Kimura and Uchida. Data are presented in 11 figures and 16 tables. Gerald M. Petty

**Chemical decompositions by radiations.** G. Harker. *Chem. Eng. Mining Rev.* 26 (?), 103-4 (1933).—A brief discussion of the effects of  $\alpha$ -,  $\beta$ -,  $\gamma$ - and x-rays. W. H. Boynton

The acceleration of the decomposition of solids by the



emission from radium. W. E. Garner and C. H. Moon. *J. Chem. Soc.* 1933, 1398-1400.—The thermal decompn. of crystals of  $\text{BaN}_2$  is accelerated by the emission from Ra. The effect is due to an acceleration of the growth of the nuclei and not to an increase in their no. No action of the stimulus could be observed unless the temp. was sufficiently high for thermal decompn. to occur. The decompn. of Hg fulminate is unaffected by the presence of Ra.

H. F. Johnstone  
The action of penetrating radiation from radium on substances in solution. G. Guéhen. *Arch. phys. biol.* 10, 292-303(1933); cf. Kailan, *C. A.* 26, 1191.—Solns. of  $\text{AgNO}_3$ ,  $\text{Na}_2\text{C}_2\text{O}_4$ , fumaric acid and maleic acid irradiated by a prepn. contg. 83 mg. Ra E were unaffected as far as could be detd. by comparing absorption curves (usually in the ultra-violet) detd. by use of the spectrophotometer with those of non-irradiated solns. Solns. were irradiated 180-524 days. Small differences in the absorption curves of irradiated and non-irradiated solns. of  $\text{KMnO}_4$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$ ,  $\text{CaI}_2$ ,  $\text{KI}$ ,  $\text{BzONa}$ , succinic acid and malonic acid were observed.

Oden E. Sheppard  
Ion yield in the decomposition of ammonia by  $\alpha$ -rays. Harry Essex and Dorothea FitzGerald. *J. Am. Chem. Soc.* 56, 65-7(1934).—A direct method for detg. ion yields for reactions induced by  $\alpha$ -radiations is used to study ammonia decompn. The ion yield for the ammonia decompn. by this new method is 1.09 at 22° and 1 atm. pressure.

Oden E. Sheppard  
A few photochemical reactions in solution. L. Farkas. *physik. Chem.* B23, 89-99(1933).—The quantum yield for the following photochem. reactions was studied:

1 hydrolysis of  $\text{CH}_3\text{CICO}_2\text{H}$ , the decompn. of  $\text{AcOH}$ ,  $\text{AcONa}$ ,  $\text{AcOAg}$ ,  $\text{EtCO}_2\text{H}$ ,  $(\text{CH}_3\text{CO}_2\text{H})_2$ , and the decompn. of hexane sensitized by  $\text{NH}_3$ . G. M. Murphy

Photochem. reactions in the series of *o*-nitrobenzylidene acetal derivs. (Tanasescu, Macovski) 10.

Andrade, E. N. da Costa: The Mechanism of Nature. 2 Enlarged ed. London: Geo. Bell & Sons. 4s. 6d. Reviewed in *Current Sci.* 2, 74(1933).

Gibson, Chas. R.: Electrical Conceptions of To-day: A Lucid Explanation of Many of the Latest Theories Concerning Atoms, Electrons and Other Matters Relating to Electricity. Philadelphia: J. B. Lippincott Co. 284 pp. 6s., net.

Moot, N. F., and Massey, H. S. W.: The Theory of Atomic Collisions. New York: Oxford Univ. Press. 283 pp. \$6.00.

Venable, Wm. Mayo: The Sub-Atoms. An Interpretation of Spectra in Conformity with the Principles of Mechanics. Baltimore: Williams & Wilkins Co. 148 pp. \$2.00.

Handbuch der Physik. Edited by H. Geiger and K. Scheel. Bd. 23, Tl. 2: Röntgenstrahlung ausschliesslich Röntgenoptik. 2nd ed., edited by H. Geiger. Berlin: J. Springer. 541 pp. M. 54. Cf. *C. A.* 27, 4175.

Protective screen against secondary rays in taking radiographic (Röntgen) views. Friedrich Hansen. *Fr.* 754,566, Nov. 9, 1933.

#### 4—ELECTROCHEMISTRY

COLIN G. FINK

High-frequency induction furnaces. C. A. Adams, J. C. Hodge and M. H. Mackusick. *Elec. Eng.* 53, 194-205 (1934).—An illustrated outline of the theory of the elec. induction furnace and of the application of that theory to the operating characteristics and limitations of such furnaces. Outstanding metallurgical advantages obtained from the use of the induction furnaces are: freedom from contamination of the melt, the high temps. obtainable, and the circulation of the molten charge by the electromagnetic forces within it. A good bibliography is included.

W. H. Boynton  
Preparation of ferro-chromium in the electric furnace. W. Boynton. *Compt. rend.* 197, 1417-19(1933).—A special elec. furnace, with graphite electrodes, was designed to contain 300 k. w. with a voltage drop of 100-120 per arc. The electrodes do not dip into the material to be reduced. Chromite contg. 51.2%  $\text{Cr}_2\text{O}_3$  and 16.5%  $\text{FeO}$  was mixed with 16% C and reduced to ferro-chromium contg. Fe 80.3, Cr 40.1 and C 0.3%. Twenty-three % of the Cr was reduced. When the chromite was mixed with 28% granular C a ferrochrome resulted contg. Fe 24.5, Cr 69.7 and C 6.2%; 95% of the Cr was reduced. Preps. were made contg. intermediate quantities of C and reduced Cr. At 1700° C the metal oxidized slowly, at 1900° C rapidly and above 1900° C  $\text{O}_2$  dissolved in the molten metal to form CO which was expelled with explosive violence.

H. E. Messmore  
Electro-metallurgical progress in 1933. S. Wernick. *Ind. Chemist* 10, 13-15(1934).

E. H.  
Cast iron and its production. M. V. Healey. *Elec. Eng.* 53, 120-3(1934).—A brief description of cast iron and a comparison of the cupola and the elec.-furnace processes. In the latter, the production of iron of any compn. with accurate control is possible while the cupola produces only a high-C iron (3% or more C). Cupola cast iron is coarse-grained and non-uniform, while the superheating in the elec. furnace dissolves this suspension and permits the production of a fine-grained uniform material. Elec.-furnace control is pos., yet flexible in operation.

W. H. Boynton  
Rocking indirect arc electric furnaces. E. L. Crosby.

*Elec. Eng.* 53, 132-8(1934).—The elec. furnace of the rocking type with indirect arc can now be used in the production of castings of various types of iron and steel with accurate control. This permits many new cast irons with properties vastly superior to the cast iron produced by any other means. Several photomicrographs illustrate the improved structure of iron from these furnaces.

W. H. Boynton  
Electrolytic preparation of sodium perborate. I. Fumikazu Kawamura. *J. Electrochem. Assoc. (Japan)* 1, 262-7(1933).—In the electrolysis of aq. solns. of  $\text{Na}_2\text{B}_4\text{O}_7$  and  $\text{Na}_2\text{CO}_3$  at 10-12° with 3 amps. current concn. and about 8.6 amps./sq. dm. anode c. d., smooth Pt electrodes give the highest current efficiency; Sn, Cu, Ni, etc., though inferior to Pt, can be used as cathode, and the current efficiency is about the same. Next to Pt, graphite is best as anode. Addn. of  $\text{KCl}$ ,  $\text{H}_2\text{SiF}_6$  and  $\text{Na}_2\text{SiO}_3$  to the electrolyte gives good results; the current efficiency is raised with an increase in concn. of  $\text{Na}_2\text{CO}_3$  and  $\text{Na}_2\text{B}_4\text{O}_7$ .

K. Konda  
Mechanism of the oxygen electrode. T. P. Hoar. *Proc. Roy. Soc. (London)* A142, 628-46(1933).—The processes occurring at an O electrode were studied. The irreversibility is explained in terms of an impervious oxide film contg. cracks and pores. By extrapolating cathodic and anodic polarization curves, a value of  $1.20 \pm 0.03$  v. at 25° is obtained for the reversible O potential referred to a H electrode in the same soln. The results indicate that the total electrode process is  $\text{O}_2 + 2\text{H}_2\text{O} + 4e \rightleftharpoons 4\text{OH}^-$ . The rate of the reverse reaction is very small.

E. J. Rosenbaum  
Silver electrodes. Friedrich L. Hahn. *Z. anal. Chem.* 95, 337-8(1934); cf. W. Hiltner, *C. A.* 28, 4287.—Priority claim.

W. T. H.  
The kinetics of electrode processes. III. The behavior of platinum and gold electrodes in sulfuric acid and alkaline solutions containing oxygen. G. Armstrong, F. R. Himsforth and J. A. V. Butler. *Proc. Roy. Soc. (London)* A143, 89-103(1933); cf. *C. A.* 27, 1828.—The expts. support the view that on the anodic polarization of Pt in  $\text{H}_2\text{SO}_4$  or alk. solns. a single layer of ad-

sorbed O atoms is formed. On cathodic polarization the reduction of the adsorbed layer occurs simultaneously with depolarization by dissolved O in soln. The formation of a definite oxide begins at +1.27 v. when Au electrodes are polarized in dil.  $H_2SO_4$ . The efficiency of oxide formation decreases from 100% to a const. value of about 0.9% as electrolysis proceeds. The behavior of Au and Pt is similar in alk. solns. Reducing agents such as  $K_4Fe(CN)_6$  and hydroquinone are able to reduce the oxide, the rate of reduction by the latter being proportional to its concn.

Allen S. Smith

**The application of x-rays in the field of electrodeposition.** N. Promisel. *Metal Ind.* (London) 43, 437-41 (1933).—A review of recent work on electrodeposition based on x-ray studies and summary of problems of practical importance that may be solved by this method.

H. F. Johnstone

**Hidden sources of defects in degreasing of materials.** R. Justh. *Oberflächentechn.* 10, 271-2(1933).—Unsatisfactory results in plating are often due to the degreasing process applied immediately before plating. Passivation of the surface produced in degreasing should be removed by rinsing 1 min. in 5% HCl or 2-5%  $H_2SO_4$  and subsequently rinsing in clean water. Brittle deposits might be due to electrolytic degreasing which had been carried out too long and at too high current densities; this is particularly the case for Ni-Cr plating. Electrolytic degreasing should be done for 1.5 min. max., at 6 to 8 v. max. In most degreasing processes it is advisable that the pieces should not be dried after degreasing and be plated as soon as possible. An acid treatment of cold-deformed parts before plating is recommended to obtain an absolutely clean metallic surface on which the deposit adheres firmly. Treatment by various solns. is described.

M. Hartenheim

**Purification of substances by electrodialysis.** Albert L. Elder, Russell P. Easton, Harold E. Fletcher and Floyd C. Peterson. *Ind. Eng. Chem., Anal. Ed.* 6, 65-6 (1934).—Quick purification of acid casein to an ash content of 0.069% was obtained. Tartrates were removed from grape juice. Galactose and arabo-galactose were purified to 0.01-0.02% ash content; this procedure is therefore suitable for purification of these sugars. Cellophane membranes were used.

A. L. Elder

**Reduction of self-discharge in the lead storage battery.** Yagoro Kato and Risaburo Takase. *J. Electrochem. Assoc.* (Japan) 1, 268-73(1933).—Self-discharge, a frequent phenomenon with Pb-Sb alloy grids, is due to the evolution of H on Sb deposited on the cathode and to H on the grid itself contg. Sb. The grid proposed by K. and T. consists of a Pb alloy contg. Sn or Cd (or further, a small quantity of Ba, Mg, etc.) but no Sb. Since the H overvoltage of Sn, Cd or their Pb alloy is almost that of Pb, H is not evolved and there is no self-discharge. This grid is  $H_2SO_4$ -proof and its tensile strength is equal to that of Pb alloy with 5-6% Sb.

K. Konda

**The alkaline storage battery. IV. The alkali zincate battery with nickel-mesh cathode.** 2. Shosaburo Tanaka and Kohei Iwasa. *J. Electrochem. Assoc.* (Japan) 1, 253-6(1933); cf. C. A. 28, 714<sup>4</sup>.—The falling off of Zn, because of the formation of an ion-concn. cell during storage, cannot be prevented. The porous Fe plate or Ni-Fe plate is, however, very effective and prevents also the formation of the deposit at the lower end of the anode. Amalgamation is most effective for the preliminary treatment of the anode. KOH soln. (6.7 N) contg. ZnO in a wt. ratio KOH/ZnO = 12-15 is the best electrolyte.

K. Konda

**A new galvanic cell.** A. Thielemann. *Z. Elektrochem.* 39, 783-91(1933).—A study of the  $MnO_2$ -Pb cell. The most efficient cell, contg. 2 N  $HNO_3$ , produced 0.1 amp. for 7 hrs. with a decrease of only 0.2 v. from the original 1.5 v. These cells contained a corrosion inhibitor, such as rhodinal or glycine developer, or  $(NH_4)_2S$  to protect the Pb. Polarization was due primarily to consumption of the acid. Cores contg. a binding material composed of  $Mg(NO_3)_2$ ,  $NH_4NO_3$  and graphite gave the best results.

H. F. Johnstone

**Dry cells of standard sizes. II.** Saburo Makino. *J. Electrochem. Assoc.* (Japan) 1, 257-61(1933); cf. C. A. 28, 714<sup>4</sup>.—Exptl. results are given on the characteristics of dry cells as detd. by the (Japanese) Research Committee for Standard Instruments of Telegraphy and Telephony.

K. Konda

**Electrolysis of underground metallic structures.** M. Horioka, et al. *J. Inst. Elec. Eng. Japan* 53, 943-55 (1933).—Photographs and results are given of tests on joints and on conduits of alloys of Pb with Sb, Zn, Sn and Cd. The effect of the  $CO_3^{--}/Cl^-$  ratio in soil is considered. Means of protection is given. C. F. Bonilla

**Measurement of small alternating-current voltages by means of cuprous oxide detectors.** K. B. Karandeev. *J. Tech. Phys.* (U. S. S. R.) 2, 412-24(1932).— $Cu_2O$  acts as a rectifier at as low as  $10^{-4}$  v. F. H. Rathmann

**The mechanism of rectification in copper sulfide-magnesium rectifiers.** Michel Anastasiades. *Compt. rend.* 197, 1307-9(1933).—The rectification of the Elkon  $CuS$ -Mg rectifier is attributed to the formation of  $Cu_2S$  at point contacts which are welded by arcs formed between the  $CuS$  and Mg. The resultant contact in which the rectification takes place has the composite form given by:  $Pb-CuS-Cu_2S-Mg$ .

Morris Muskat

**Power-loss phenomena in liquid dielectrics.** W. Jackson. *Proc. Roy. Soc.* (London) A142, 603-20(1933).—Dielec. loss measurements were made on benzene, toluene, chlorobenzene and nitrobenzene in the frequency range  $2 \times 10^6$  to  $2 \times 10^8$  cycles per sec. The loss can be accounted for in terms of ionic conduction, since small amounts of water are present. A preliminary application of a steady voltage has an "elec. cleaning" action which lowers the loss.

E. J. Rosenbaum

**Heterogeneous chemical reactions in the silent electric discharge. VIII.** Susumu Miyamoto. *J. Chem. Soc. Japan* 54, 1223-32(1933); cf. C. A. 27, 5353. —The reactions between  $H_2$  and the following 8 substances under silent discharge have been studied:

Substance	Reaction products
(1) $Cu(NO_3)_2 \cdot 3H_2O$	$CuO$ , $Cu$ , $NO$ , $NO_2$ , $NH_4NO_3$ , $NH_3$ , $NH_4NO_2$ , $NH_4NO$
(2) $Zr(NO_3)_4 \cdot 5H_2O$	$NH_4NO_3$ , $ZrO_2$ , $NH_4NO_2$ , $NO_2$ , $NO$
(3) $TiNO_3$	$TiNO_2$ , $TiOH$ , $Ti$ (metallic), $NH_3$ , $NO$
(4) $UO_2(NO_3)_2 \cdot 6H_2O$	$NH_4NO_3$ , $U(NO_3)_4$ , $U(OH)_4$ , $NO_2$ , $NH_4NO_2$
(5) $Fe(NO_3)_3 \cdot 6H_2O$	$NH_4NO_3$ , $Fe(OH)_3$ , $NH_4NO_2$ , $NO_2$ , $NO$
(6) $Cr(NO_3)_3 \cdot 9H_2O$	$NH_4NO_3$ , $Cr(OH)_3$ , $NH_4NO_2$
(7) $CaSO_3 \cdot 2H_2O$	$CaS$ , $H_2S$
(8) $Na_2SO_3$	$H_2S$

T. Katsura

**Determination of the value of a gas for tungsten lamps by means of the observation of tungsten sputtering.** A. P. Stvolin. *J. Tech. Phys.* (U. S. S. R.) 2, 1031-52 (1932).—Traces of  $O_2$  or  $H_2O$  cause oxide formation between  $1400^\circ$  and  $2600^\circ$ .  $N_2$  and still more A catalyze the reaction.  $H_2O$  yields  $W_2O_6$ ;  $O_2$  yields  $WO_3$ . Pressure increases oxide formation.

F. H. Rathmann

**Glycerol complexes in volumetric analysis (Wagner) 7. Elec. purification of coke-oven gas or tar (Nazarenko, Savchenko) 21. Cl smelting with chloride electrolysis (Ashcroft) 9. Incrustations on porous pottery [removal by electroosmosis] (Pink) 19. Insulating splices in rubber-insulated wire (U. S. pat. 1,939,843) 30. Cast Fe (Pr. pat. 754,993) 9. Use of Ag-Cd alloys for contacts of elec. circuit breaker devices (U. S. pat. 1,940,962) 9.**

**Stansel, N. R.: Industrial Electric Heating.** New York: John Wiley & Sons, Inc. 444 pp. \$5. Reviewed in *Nature* 132, 557(1933).

**Jahrbuch des Forschungs-Instituts der Allgemeinen Elektrizitäts-Gesellschaft.** Bd. III, 1931-32. Berlin: J. Springer. 205 pp. Cf. C. A. 24, 4984.

**Zinc-carbon primary cell.** Heinrich Rehm.

- 4,003, Sept. 13, 1933 (Cl. 21b. 10.02). Addn. to 489,800 (C. A. 24, 2062). Details of the arrangement of the depolarizing mass are given.
- Storage batteries.** Le Carbone. Fr. 754,802, Nov. 1-1, 1933. A battery having multiple electrodes is provided with 2 series of chambers; one series allows for the expansion of the electrolyte while the other, in communication with the exterior, allows for the respiration of the depolarizing electrodes, the 2 series having no communication with one another.
- Storage batteries.** James Veith. Fr. 755,188, Nov. 21, 1933. See Swiss 161,659 (C. A. 28, 4193).
- Apparatus for making carbon rods for dry batteries.** Autom. Spezial-Maschinen G. m. b. H. Ger. 585,503, Oct. 4, 1933.
- Storage-battery electrode.** Karl Ackermann (to I. G. Farbenind. A.-G.). U. S. 1,940,385, Dec. 19. Neg. electrodes for use with alk. electrolytes and of substantially uniform porous structure are formed of Fe and strips of an Fe-Ni alloy.
- Electrode for storage batteries.** Max Schneider. Ger. 585,601, Oct. 5, 1933. Details of an electrode made from Pb and Pb paste are given.
- Wood separators for storage batteries.** Eugene A. Giard (to Vesta Consolidated Inc.). U. S. 1,940,714, Dec. 26. Wood separators are treated with hot caustic alkali soln. to dissolve alkali-sol. constituents without dissolving substantial quantities of lignin, neutralized with acid such as  $H_2SO_4$  and the resulting liquor contg. pptd. and dissolved substances is mixed with the Pb oxides of which the plates are formed and is stated to increase the efficiency of the battery.
- Matted glass wool suitable for manufacture of storage-battery separators.** Edward W. Smith. U. S. 1,938,982, Dec. 12. Various details of app. and operation are described.
- Machine for pasting grids such as storage-battery plates.** Monark Battery Co., Inc. Brit. 398,328, Sept. 11, 1933.
- Filling vent for storage-battery cells.** Joseph L. Woodbridge. U. S. 1,938,989, Dec. 12.
- Filling plug for storage batteries.** Curtis C. Wallace. U. S. 1,938,988, Dec. 12.
- Composition containers such as those for storage batteries.** Leland E. Wells and Edward Fairclough (to Willard Storage Battery Co.). U. S. 1,941,193, Dec. 26. Heated plastic material such as a bituminous compn. is compressed in a mold under relatively low pressure until the resistance of the material stops the compression; the walls of the article are then partially cooled, and the article is further compressed under heavy pressure. App. is described.
- Kerr cell.** Vladimir K. Zworykin (to Westinghouse Elec. & Mfg. Co.). U. S. 1,939,532, Dec. 12.
- Electrolytic condenser.** Allgemeine Elektrizitäts-Ges. Ger. 586,902, Oct. 27, 1933 (Cl. 21g. 10.02). The electrolyte consists of a mixt. of  $CuS$  and  $Cu_2S$ .
- Dry electrolytic condenser.** Süddeutsche Apparate-fabrik G. m. b. H. Ger. 589,321, Dec. 6, 1933 (Cl. 21g. 10.02). The electrolyte corresponds in compn. to  $NH_4$  glycerophosphate or to a mixt. thereof with glycerol.
- Electrodeposition of aluminum.** Donald B. Keyes and Sherlock Swann, Jr. (to Ellis-Foster Co.). U. S. 1,939,397, Dec. 12. Articles of metal such as steel to be plated with Al are subjected as cathode to an elec. current in a soln. of an org. compd. of Al such as an Al complex of the Grignard type dissolved in an org. solvent such as ether.
- Apparatus for producing endless metal bands by electrolytic deposition.** Allgemeine Elektrizitäts-Gesellschaft (Franz Pawlek, inventor). Ger. 585,633, Oct. 12, 1933.
- Plating.** Richard Kopf. Ger. 585,708, Oct. 7, 1933. In plating Cr or Cr alloys, acid baths of  $p_H$  value below 2.5 are used. Thus, stainless steel is given a plating of Ni by electrolysis in a bath of  $NiSO_4$ ,  $Na_2SO_4$ ,  $H_2BO_3$ ,  $NH_4Cl$  and  $H_2SO_4$ , of  $p_H$  value below 2.5.
- Metal plating.** Posschl's Apparatebau- und Export-G. m. b. H. Ger. 585,709, Oct. 7, 1933. A device for electrolytic metal plating with a movable anode is described.
- Metal plating.** Paul Fassbender. Ger. 586,639, Oct. 24, 1933 (Cl. 48b. 2). Fused chloride plating baths of soft metals such as Zn are regenerated by dissolving in water and treating with HCl.
- Metal coatings on chromium.** Württembergische Metallwarenfabrik. Fr. 754,483, Nov. 8, 1933. To obtain a metal coating, e. g., of Cu, on Cr or an alloy thereof, such as stainless steel, an abnormally acid bath is used, e. g., one having a  $p_H$  value below 2.5.
- Chromium plating.** Siemens & Halske A.-G. Fr. 754,360, Nov. 6, 1933. Black Cr coatings are obtained by electrolysis with a c. d. of 10-20 times the normal c. d., i. e., about 10,000-20,000 amp. per sq. m. The electrolyte may contain  $AcOH$ .
- Anode for use in electrolytic baths such as fused magnesium chloride.** Pierre Camescasse (to Magnesium Production Co., Ltd.). U. S. 1,941,387, Dec. 26. Anodes are used comprising a lower section of carbon, an upper section of non-conductive refractory oxide which is resistant to the heat of the bath and the liberated gases, and a conducting rod such as iron extending downwardly through the upper section and having its lower end embedded in the lower section (the upper and lower sections being of about equal and uniform cross-sectional area throughout).
- Nickel anodes.** George F. Geiger (to International Nickel Co.). U. S. 1,941,256, Dec. 26. Rolled or cast Ni anodes contg. S 0.002-0.0075% and contg. O corrode with smooth surfaces and substantially no anode sludges. U. S. 1,941,257 relates to a similar addn. of S in small proportion to Ni-bearing material before pouring.
- Cathode drum (with an outer silver layer) for electrolytic apparatus suitable for copper sheet manufacture.** Richard A. Wilkins (to Industrial Development Corp.). U. S. 1,941,376, Dec. 26. Structural features.
- Cell for the electrolytic decomposition of water.** Siemens & Halske A.-G. (Franz Petz, inventor). Ger. 585,596, Oct. 10, 1933.
- Electrolysis of halides.** Wintershall A.-G. Fr. 755,388, Nov. 23, 1933. The cathodes used for electrolysis of fused alkali or alk. earth metal halides, particularly  $MgCl_2$ , are made of steels alloyed with Cr or Ni or both. An example contains Ni 3.5, Cr 0.75, Mn 0.5, Si 0.35 and C 0.1-0.17%.
- Electrolytic production of Carrel-Dakin solution.** Orland R. Sweeney (to Iowa State College of Agriculture and Mechanical Arts). U. S. 1,940,612, Dec. 19. A NaCl soln. of suitable concn. (such as a 2.5% soln.) is passed in a continuous uniform stream with a const. head past a single set of spaced electrodes consisting of a Rh anode and a Pt-Ir cathode (the products of the electrolysis passing the electrodes in the direction of the stream). App. is described.
- Electrothermic reduction of materials such as in producing iron alloys.** Paul L. J. Miguët. U. S. 1,939,913, Dec. 19. In operating an elec. furnace having a vertical electrode, the charge is formed in alternating conducting and non-conducting strata, the former extending from the electrode to the walls of the furnace and the non-conducting strata extending for only a portion of the distance from the electrode to the walls of the furnace. Current is allowed to spread through the conducting strata above the lower end of the electrode to heat the charge laterally.
- Aluminum ware.** Vereinigte Aluminium-Werke A.-G. Ger. 585,728, Oct. 10, 1933. A coating of  $Al_2O_3$  is produced on Al or Al alloy ware to increase its resistance to corrosion by electrolysis. The electrolyte is sprayed on to the ware which forms the anode and the spraying pistol is connected to the cathode.
- Magnesium.** Pierre Camescasse. Ger. 589,403, Dec. 7, 1933 (Cl. 40c. 6.02). See Fr. 732,226 (C. A. 27, 670).
- Stainless steel.** Stainless Steel Corp. Fr. 754,910, Nov. 16, 1933. See U. S. 1,924,153 (C. A. 27, 5259).
- Calcium cyanamide.** K. Hibi. U. S. 1,941,172, Dec. 26. See Japan 93,520 (C. A. 27, 1285).

- Fluorine.** E. I. du Pont de Nemours & Co. Fr. 755,296, Nov. 22, 1933. F is produced by electrolysis of HF in a cell having a non-polarizing anode not appreciably attacked by HF and F, e. g., Ni or an alloy of Ni. The anodic wall between the anode and cathode is gas-tight above the level of the electrolyte but sufficiently permeable below that level to allow the electrolyte to pass. The cathode is made of Fe, Ni, Co, Cu, Cr, Mg or alloys thereof.
- Metallic oxides or hydroxides.** Siemens & Halske A.-G. (Hellmut Fischer and Johannes Fischer, inventors). Ger. 586,585, Oct. 23, 1933 (Cl. 124.1). The prepn. of finely dispersed oxides or hydroxides of metals by electrolysis is described. The prepn. of hydroxides of Al, Cu and Be is described in examples.
- Purifying hydrogen peroxide solutions by electrolysis.** Österreichische chem. Werke G. m. b. H. Ger. 588,267, Nov. 15, 1933 (Cl. 124.16). See Austrian 123,168 (C. A. 25, 4476).
- Acetylene production in the electric arc from other hydrocarbons.** Otto Eisenhut, Robert Stadler and Paul Baumann (to I. G. Farbenind. A.-G.). U. S. 1,941,077, Dec. 26. A gas comprising hydrocarbons such as  $\text{CH}_4$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_3\text{H}_4$ , and H is treated in an elec. arc having a consumption of energy of at least 2 kw. per sec. and per cc. of the space filled by the arc. Cf. C. A. 27, 2888.
- Ozone-producing apparatus.** Eugène Royer. Fr. 755,431, Nov. 24, 1933.
- Electric induction furnace.** Ludwig Dreyfus (to Allmänna Svenska Elektriska Aktiebolaget). U. S. 1,941,076, Dec. 26. Structural features.
- Electric induction furnace suitable for melting and refining metals.** Walter O. Krebs (to Youngstown Sheet and Tube Co.). U. S. 1,940,256, Dec. 19. Various structural, elec. and operative details are described.
- Electric induction furnace operations.** Guiliam H. Clamer (to Ajax Electrothermic Corp.). U. S. 1,940,622, Dec. 19. The rate of reaction of treating materials or the rate of admixture of alloying materials is increased by supplying the treating or alloying materials locally to the charge and by abnormally concg. induced stirring current at the locality of treating application. App. is described.
- Coreless induction furnace.** Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Ger. 589,283, Dec. 5, 1933 (Cl. 214.18.03). Addn. to 572,445 (C. A. 27, 2888).
- Electrically heated open-hearth furnace for reducing iron ore, etc.** Doherty Research Co. Ger. 586,593 (Cl. 186.21.02).
- Electrode-fused bath furnace for producing metals.** Allgemeine Elektrizitäts-Gesellschaft. (Hermann Blomberg, inventor). Ger. 586,651, Oct. 24, 1933 (Cl. 186.5.40).
- Plant for feeding electric furnaces for carbide manufacture, etc.** Gustav Hilger. Ger. 585,150, Oct. 3, 1933. Addn. to 439,153 and 435,596.
- Electric resistance device and insulator.** Charles O. Terwilliger (to Ward Leonard Elec. Co.). U. S. 1,938,674, Dec. 12. An insulating refractory support comprising talc and phosphate such as apatite, clay and flint carries a metallic resistive conductor and an overlying fused insulating coating. Various details and examples are given.
- Spark-plug electrodes.** Taine G. McDougal (to A C Spark Plug Co.). U. S. 1,940,314, Dec. 19. Electrodes are made of stainless steel contg. Cr and a stable sulfide such as Zr sulfide 0.4%, which serves to increase resistance to corrosion, with or without 0.4% of Ba, which offsets the increase in sparking voltage.
- Slagging molten metal pools in electric induction furnaces.** Guiliam H. Clamer (to Ajax Electrothermic Corp.). U. S. 1,939,023, Dec. 12. Various details of furnace operation are described.
- Cleaning precious metals such as silver.** Carl Mann. U. S. 1,941,040, Dec. 26. A bath of  $\text{NaHCO}_3$  soln. is used contg. a Zn electrode and a catalyst of activated carbon.
- Annealing metals.** Wilhelm Hammer. Ger. 587,296, Nov. 2, 1933. A protective atm. of wood-distn. products is maintained in an elec. annealing furnace by continuously feeding wood to the furnace and removing wood charcoal therefrom.
- Apparatus for electrical conductivity tests of materials such as insulation on wire.** Donald S. Bond, Calvin S. Fuller and Charles L. Erickson (to Bell Telephone Laboratories, Inc.). U. S. 1,938,684, Dec. 12. Various elec. and mech. details are described.
- Treating gases electrically.** Siemens-Lurgi-Cottrell Elektrofilter-G. m. b. H. für Forschung und Patentverwertung. Brit. 398,724, Sept. 21, 1933. In the elec. pptn. of suspended particles from gases, particularly from those contg. dust of poor cond., the polarity of the electrodes is changed at such intervals (from 0.2 sec. upward) that positively and negatively charged layers of dust are deposited alternately on the electrodes, the formation of a highly charged layer of badly conducting dust thereon being thus prevented.
- Electrofiltration of gases.** Siemens-Schuckertwerke A.-G. (Hans Wachter, inventor). Ger. 588,040, Nov. 11, 1933 (Cl. 12e. 5). Hot gases, e. g., blast-furnace gases, are deionized before electrofiltration by cooling a part of the gases nearly to the dew point and mixing the cooled gases with the uncooled gases.
- Apparatus for preventing deposition of dust on discharge electrodes of electrofilters.** Siemens-Schuckertwerke A.-G. (Richard Heinrich, inventor). Ger. 565,152, Oct. 17, 1933 (Cl. 12e.5).
- Electrostatic dust depositors.** Fumivorite et dépoussiérage industriel. Fr. 42,851, Nov. 15, 1933. Addn. to 719,354 (C. A. 26, 3191).
- Electrical precipitation apparatus.** Société industrielle d'applications électriques. Brit. 398,394, Sept. 14, 1933.
- Apparatus (with adjustable curtains) for gas-flow control as in electrical precipitation apparatus.** Charles H. Weiskopf (to International Precipitation Co.). U. S. 1,941,287, Dec. 26. Structural and mech. details.
- Mercury-arc rectifiers.** Aktiengesellschaft Brown, Boveri & Cie. Brit. 398,528, Sept. 8, 1933.
- Mercury-arc rectifiers.** The General Electric Co., Ltd. and Enrico Gallizia. Brit. 399,195, Sept. 25, 1933.
- Oxidized copper plates for use in rectifiers.** Allgemeine Elektrizitäts-Ges. (Walter Krauss, inventor). Ger. 587,284, Nov. 1, 1933. A Cu plate is coated with an aq. sludge of  $\text{Cu}_2\text{O}$  and then heated for a short time in the air.
- Electrodes for arc lamps.** National Carbon Co., Inc. Fr. 754,526, Nov. 8, 1933. The electrodes are composed of charcoal having a core of volatilizable material, the core contg. at least 2 of the metals: Fe, Mn, Ti and Cr. The core preferably contains only about 55% of volatilizable material, the rest being charcoal and a binder such as an alkali silicate.
- High-pressure metal-vapor arc lamps.** Quarzlampen-G. m. b. H. Brit. 399,317, Oct. 5, 1933.
- Arc discharge lamps.** The British Thomson-Houston Co. Ltd., Royal F. Strickland, Harold D. Blake and Stuart McLean. Brit. 398,290, Sept. 14, 1933.
- Discharge lamps.** Hans J. Spanner (to The British Thomson-Houston Co., Ltd.). Brit. 398,799, Sept. 19, 1933. A lamp of the type described in Brit. 397,162 (C. A. 28, 4241) and provided with an activated cathode having on its surface, in addn. to force electron-active metals the work-function of which is less than 3 v., substances which are poor conductors of heat and electricity as described in Brit. 356,234 (C. A. 27, 3150), has the following dimensions: the distance between the electrodes is approx. 10 times the diam. of the tube; the inner radius curvature at the apex is approx. twice the diam. of the tube; the direct distance between the electrodes is approx., but not less than,  $\frac{1}{2}$  the distance measured along the center of the tube. Conveniently the tube is parabolically shaped and constructed of borosilicate glass 1 mm. thick. In addn. to Hg, it may contain A at 3 mm. pressure and be provided with a starting strip as described in 356,234. In 398,815, Sept. 19, 1933, divided on 398,799, the lamp

of the type described in 397,162 with a cathode of the type described in 356,234 is supplied with alternating voltage and has at least 2 discharge paths and at least 3 electrodes, so connected that the currents in the paths are phase-displaced relatively to each other. In 398,824, Sept. 19, 1933, divided on 398,799, a source of light comprises 2 lamps of the type described in 397,162 provided with cathodes of the type described in 356,234 connected in parallel and the starting voltage of 1 lamp is greater than both starting and normal running potentials of the other. If 1 has a filling of A in addn. to metal vapor the other may be given a higher starting potential by adding J, Ne or He to the filling.

**Discharge lamps.** Anton Lederer. Brit. 398,829, Sept. 19, 1933. In d. c. elec. gaseous discharge lamps of the kind described in Brit. 364,088 (C. A. 27, 2069) and 371,372 (C. A. 27, 2392) the anode is formed of rods or wire so as to have a small total surface area and surrounds the electron-emissive electrode or its imaginary extension so as to provide a substantially uniform, or at least sym., elec. field around said electrode.

**Discharge lamps.** Claude-Lumière (Soc. anon. pour les applications des gaz rares à la lumière, procédés Georges Claude). Brit. 398,830, Sept. 22, 1933. Addn. to 393,308 (C. A. 27, 5658). The open hollow electrode coated with a dielec. on the edge of its rim only, described in 393,308, is covered with material, e. g., an alk.-earth metal or an oxide, peroxide or suboxide of a rare earth, which gives rise to a cathodic drop of less than 20 v.

**Cathode glow-discharge lamp.** Patent-Treuhand-Ges. für elek. Glühlampen m. b. H. Ger. 585,348, Oct. 2, 1933. A cathode glow-discharge lamp, having electrodes

coated with an alkali or alk. earth metal, is filled with a mixt. of A and N contg. more A than N but more than 5% of N, the pressure of the mixt. being more than 6 mm., e. g., 10-12 mm. Manufg. details are given.

**Discharge lamps for television receivers.** Compagnie pour la fabrication des compteurs et matériel d'usines à gaz. Brit. 398,860, Sept. 18, 1933. Addn. to 384,086 (C. A. 27, 4963).

**Means for utilizing electron lamps as generators and amplifiers of oscillations.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 755,004, Nov. 18, 1933.

**Thermionic lamps.** Compagnie des lampes. Fr. 755,-136, Nov. 20, 1933.

**Electric lamps.** George Sperti (to General Foods Corp.). Brit. 398,840, Sept. 18, 1933. An outer bulb transparent to visible and ultra-violet light contains 3 resistances in series circuit across the terminals and 2 electrodes connected to the circuit so that, on passage of current, an arc forms between the electrodes in Hg vapor or other ionizable medium in the bulb, the arc being in parallel with 1 resistance and in series with the other 2. One or all of the resistances are incandescent to correct the color of the light from the arc and they are protected from the Hg vapor by an inner evacuated bulb or sheath sealed to the ends of the electrodes, which may be of  $ZrO_2$  or other refractory oxide that becomes conductive when hot. The sheath may be of glass or quartz and the outer bulb of quartz or of such glass, or so coated, that wave lengths above 3000 Å. are transmitted and shorter wave lengths cut off.

**Miners', etc., electric lamps.** Ernest A. Hailwood. Brit. 397,904, Sept. 4, 1933.

## 5—PHOTOGRAPHY

E. P. WIGHTMAN

**The Gaspar process of color photography.** K. Jacobson. Brit. J. Phot. Colour Suppl. 27, 29-31 (1933); Phot. Abstracts 13, 254.—Color prints are produced on triple-coated paper. The top coat is sensitive to blue, the next to green, and the bottom one to infra-red, a compromise made necessary because of the absorption of red light by an overlying blue layer. Printing is done from a pos. color transparency, and the time of exposure is similar to that for gaslight paper. Development and fixation are as usual. Next, dye images are produced in the 3 coatings through the agency of the Ag image, either by the production of dyes from such substances as leuco esters or by the destruction of dyes already in the coatings, the latter method being preferable. For the production of 2 color motion-picture films the material used is a pos. film coated on both sides, one side being dyed orange-red and one blue-green. Printing is done on both sides, and after development and fixation the dye images are produced as described, the whole process taking 12-15 min. The prepn. of 3-color films is stated to be not much more complicated.

**Gaspar color process.** L. N. Cox. Brit. J. Phot. Colour Suppl. 27, 37-8 (1933); Phot. Abstracts 13, 254.—A description is given of the production of a 2-color film from 2-color selection negatives on double-coated pos. stock. Thiocarbamide is stated to be one of the reagents by which the dyes are destroyed in accordance with the disposition of the Ag image.

**Retouching in Ives' polychrome color process.** F. E. Ives. Brit. J. Phot. Colour Suppl. 27, 38-9 (1933); Phot. Abstracts 13, 229.—The process lends itself to retouching, because the reds can be reduced by rubbing with a brush charged with  $H_2O$ , and the yellows by similar treatment with 70% alc. The addn. of K citrate to the  $H_2O$  increases the speed with which the red is removed, while alc. contg. K citrate removes both colors. Various dyes are mentioned which may be used for strengthening tints. Before they are applied, the paper should be wetted with dil.  $AcOH$ , and then blotted. The cyan-blue toned base print should not require alteration if

correctly made, and retouching by the above method is only necessary to compensate for incorrect balancing of exposures and ds., or to make modifications to suit individual tastes.

**A review of color printing and the use of photography in color-printing processes.** A. J. Bull. Phot. J. 74, 14-19 (1934).

**Use of thiourea in photography.** L. Houben. Photo-Revue 45, 179-80, 199-200 (1933).—A soln. contg. thiourea and  $K_2CO_3$  is suggested as a substitute for the sulfide soln. used in sepia toning. Its use is stated to be more convenient and the warmth of tone may be controlled by adjusting the concns. of thiourea and carbonate. A review is given of the uses of thiourea in other toning processes, and in procedures for intensification and reduction.

**Study of development.** M. Lucas. Rev. franç. phot. cinémat. 14, 320-4 (1933).—A study of contrast control was made to choose a method by which negatives of const. contrast can be obtained with subjects of varying contrasts. L. measures the subject contrast, calcs. the  $\gamma$  for the desired compression of contrast and then, from a curve, decides upon the degree of diln. of his stock developer soln. which will give that  $\gamma$ . The time of development is const. He finds that the diln. of the developer does not affect either latitude or speed but only time for a given  $\gamma$ . The presence of small concns. of bromide shortens the useful part of the curve for low gammas with higher development concns. but has no such effect with considerably dil. developers. At high gammas the bromide effect disappears. In the choice of emulsions on the basis of latitude, 3 classes of emulsions are recognized: those having latitudes, resp., (a) 10, (b) 40-50 and (c) 100-200.

**Fine-grain development.** H. Funk. Z. wiss. Phot. 32, 83-96 (1933); Phot. Abstracts 13, 203.—Grain sizes in various com. emulsions, with metol-hydroquinone and some fine-grain com. developers, have been estd. by (a) visual examn. of enlargements of photographs of a test object, (b) statistics of av. grain diams., (c) densitometric

curves for 8 wave lengths of light with varying development times and (d) measurement of grain variation with a recording photometer. Results by (a) are inconclusive. The difficulties and errors of methods (b) and (c) are discussed. The finest grain was obtained with Perutz Special film and Agfa 12 or Agfa 15 developer.

**Fine grain and fine-grain development.** E. Stenger and R. Mutter. *Phot. Ind.* 31, 712, 736, 760-1, 777(1933); cf. *C. A.* 27, 4182.—An investigation was made of the metol-hydroquinone-borax developer with respect to the effect of variations in the concns. of each of the constituents on the time of appearance of the image, the d. developed in a given time and the graininess of the developed image. Conclusion: In this developer the hydroquinone has no effect either on the rate of development or on the graininess. H. Parker

**Negative development in unshielded candle-light.** Lüpke-Cramer. *Phot. Rundschau* 70, 412(1933).—Tests made with about 20 color-sensitive films and plates are said to show that all are sufficiently desensitized by a preliminary bathing (2.5 min.) in pinakryptol green (1:5000) to permit subsequent development to be carried out in unshielded candle-light. P. W. Vittum

**The photographic development of slip lines on deformed silver chloride crystals.** G. Tammann and G. Bandel. *Z. anorg. allgem. Chem.* 214, 403-6(1933).—AgCl sheets which after bending are developed under special conditions show black lines under the microscope. These are Ag specks 0.5 to 2.0  $\mu$  in diam. arranged at edges of glide lines in the crystals. The effect is explained by assuming the presence of impurities. AgBr being considerably more brittle does not give such a noticeable effect although undoubtedly it occurs. Photomicrographs are included which demonstrate clearly the results. R. H. Lambert

**Comparison of fine-grain developers.** B. H. Casebolt. *Camera Craft* 40, 457-61(1933).—Several fine-grain developers from the literature are compared by 20 $\times$  enlargements. Odell's phys. developer gives fine grain but is difficult to use. *p*-Phenylenediamine with sulfite gives fine grain but requires a long development time and increased exposure. *p*-Phenylenediamine with glycine and sulfite is said to give fine grain with much shorter development times. H. Parker

**Structure and developing properties of the naphthalene series.** R. B. Forster and H. T. Hanson. *Phot. J.* 73, 466-70(1933); *Phot. Abstracts* 13, 202.—Nietz's rules regarding the developing properties of reducing agents are summarized and the effect of the position of the "active" groups on the developing function is qualitatively investigated in 11 types of naphthalene compds. The prepn. and purification of these substances are considered. Detailed results are given of the action of these substances without the addn. of alkali.

**Theory of the persulfate reducer.** Mate Mudrovčić. *Phot. Korr.* 69, 182-4(1933).—The superproportional reducing properties of the persulfates are explained by certain workers (Schuller, Stenger and Heller) as a catalytic phenomenon. Opposed to this theory, L.-C. and others view the action as best explained by a dispersoid theory. M. uses colloidal Ag in gelatin in a wide range of concns. and the data appear to support the catalytic theory. He reconciles previous results. L. E. Meulendyke

**Standardized determination of sensitivity.** J. Eggert. *Phot. Ind.* 31, 599 600(1933).—Details are given for the standardized procedure for German manufacturers for the sensitometric testing of negative materials. The light source, sensitometer, filter, developing solns., etc., are precisely defined. C. E. Meulendyke

**Sensitivities with Nitra light.** C. Emmernann. *Phot. Rundschau* 70, 424-6(1933).—Using daylight and Nitra light of equal optical intensity, E. has detd. the speeds for 2 panchromatic emulsions, one orthochromatic and one not dye-sensitized. His speed values for the Nitra light are much lower than those claimed for the films.

P. W. Vittum

**Tests on the selenium toning bath.** II. E. van Beugen.

*Focus* 20, 670-3(1933); cf. *C. A.* 27, 2642.—Working details. C. E. Ives

**Preparation of a slow positive chloride emulsion.** R. Namias. *Il prog. fot.* 11, 363-4(1932); *Phot. Abstracts* 13, 200.—Improved quality and gradation were obtained when, in the prepn. of a slow gelatin-AgCl emulsion for development papers, the gelatin was added partly to the AgNO<sub>3</sub> soln., and partly to the NaCl soln. The 2 solns., (a) NaCl 2 g. [this probably should be 20 g.], gelatin 60 g., H<sub>2</sub>O 500 cc.; and (b) AgNO<sub>3</sub> 10 g., gelatin 10 g., H<sub>2</sub>O, 250 cc., are mixed at 40°, and the emulsion is used without ripening or washing. It can be preserved for several days by adding 100 cc. of pure alc.

**Formation of silver in the photographic film under the influence of x-rays.** P. Günther and H. Tittel. *Z. Elektrochem.* 39, 646-55(1933); *Phot. Abstracts* 13, 221.—At wave lengths 0.245 Å, 0.63 Å, 1.09 Å and 1.54 Å, 920, 363, 210 and 148, resp., atoms of Ag were liberated per absorbed quantum, agreeing approx. with the values of Eggert and Noddack (*C. A.* 23, 565). The Ag was detd. potentiometrically. The secondary electron energy was calcd., and at each wave length approx. 1000 kg cal. was shown to be necessary to form 1 g.-atom of Ag.

**Tests on gelatin-bromide plates 30 years old.** K. Kieser. *Phot. Ind.* 31, 276(1933); *Phot. Abstracts* 13, 221.—Sensitometric and photographic tests have been made on 2 plates (of brand now extinct) which had been stored for 30 years in their original wrappings, without any special precautions. The fog d. was 0.76, and the speed 12° Scheiner; on one of the plates a negative was obtained which was of good quality except for heavy marginal fog.

**Scientific control of radiographic results.** C. Weyl, S. R. Warren, Jr., and D. B. O'Neill. *Radiology* 21, 516 55 (1933).—For comparisons of x-ray films, intensifying screens and the output of radiographic machines, W., W. and O'Neill suggest the use of an Al stepladder with a densitometer for the measurement of film ds. Pinhole radiographs should be made of focal spots at frequent intervals. Uniformity of degree of development should be maintained by close control of the temp. and time of development, as well as by a suitable test for the effect of exhaustion. R. B. Wilsey

**Photoactivity of dichromated colloids.** H. Mills Cartwright and Hywel Murrell. *Nature* 132, 603-4(1933).—In the photogravure process gelatin-coated paper is sensitized by immersion in a soln. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. The addn. of alkali to the dichromate bath increases the contrast of the image. A theoretical explanation follows. F. U.

Cellulose acetate compns. [for photographic films] (U. S. pat. 1,941,262) 23.

**Color photography.** Dürkoppwerke A.-G. Ger. 587,479, Nov. 3, 1933. See Brit. 389,843 (*C. A.* 27, 5263).

**Color photography.** Dürkoppwerke A.-G. Brit. 397,884, Sept. 1, 1933. In producing color photographs by printing from 2 complementary negatives onto opposite sides of a film coated on both sides the negatives are obtained by single exposure of a bipack and are accurately focused and brought into register on a ground-glass screen and copied by projection on the double-coated film. Weak transparencies are made which are weakly colored in complementary colors and provided with a reflecting support for viewing. To produce a 3-color picture the colored transparency is bathed with a chromate soln. and exposed from 1 side, the unhardened portions on the other side being then colored with an acid pigment. The negatives are produced on a bipack comprising a front plate, mainly sensitive to green and slightly sensitive to blue, and a rear, red-sensitive plate, which may be partly sensitive to green, an orange filter being placed between the plates or coated on the rear of the front plate. A yellow filter dye is added to the front emulsion or exposure is made through a yellow filter. The 2 negatives are each mounted in a projection app. and focused and



registered on opposite sides of a ground-glass screen, registration being facilitated by projection through red and green filters. When registered, the screen is replaced by a double-coated film having an intermediate screening layer which is removed in the developer. The exposed film is developed in a hardening developer, *e. g.*, pyrocatechol without sulfite, mordanted in a permanganate bath and colored by suitable basic pigments, *e. g.*, pyronin B for the red side and thionin blue for the blue. After clearing in a bath of K metabisulfite, the picture is washed a few min. in an  $(\text{NH}_4)_2\text{CrO}_4$  bath, dried and exposed to strong light from the red side; a yellow acid dye is then washed into the unhardened portions of the blue side. The finished film is mounted on white paper or is coated on the rear with a white pigment which may be lightly colored with blue or yellow to obtain different tone effects.

**Color cinematography.** Carl Alstrup. Brit. 399,013, Sept. 28, 1933. Cinematographic films, colored in series and especially adapted for being directly projected with natural color effects, are characterized by the different colors being present in the substance of the raw film before applying the emulsion.

**Photographic diazotype processes.** Kalle & Co. A.-G. Brit. 398,671, Sept. 21, 1933. Sensitive films contg. only the diazo compd. are developed by the vapors of aromatic amines. The supports may be paper, films or glass plates and films sensitized in the mass may be used. Metallic salts, lake-forming salts, hygroscopic substances, *e. g.*, glycerol,  $\text{CaCl}_2$  and stabilizers, *e. g.*, org. acids, thiourea, may be added to the layers. In examples cellulose foil is impregnated with (1) diazodiphenylamine sulfate (I), glycerol (II) and citric acid, (2) the  $\text{ZnCl}_2$  double salt of diazo-*p*-aminodiethylamine, glycol and tartaric acid (III), and (3) tetrazodanisole, a gelatin layer on a nitro-cellulose film is sensitized with the  $\text{ZnCl}_2$  double salt of diazo-*p*-aminoethylbenzylaniline, II and III and a cellulose hydrate film is sensitized with I, resorcinol and glucose. Suitable developers are *m*-toluylenediamine,  $\alpha$ -naphthylamine, *m*-aminophenol, dimethylaniline and *o*-anisidine. Development may be effected by placing the exposed papers in contact with dry film impregnated with the amines, by exposing the papers to vapors of the amines produced in heated vessels or by passing them between felt-covered rollers impregnated with the developer. Cf. C. A. 27, 5264.

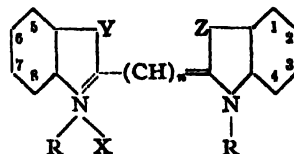
**Photographic reversal process.** Merrill W. Seymour (to Eastman Kodak Co.). U. S. 1,939,231, Dec. 12. For producing a reversed photographic image, a photosensitive Ag halide film is exposed to a light image, developed in an ordinary non-staining developer, subjected to a 2nd controlled exposure to white light, then developed in a developer which produces a dye image assocd. with a Ag image, both Ag images and any remaining Ag halide being then removed. Cf. C. A. 27, 2642.

**Photographic materials.** Heinz Gossler. Ger. 587,334, Nov. 2, 1933. Compds. in which Ag replaces H in an  $-\text{NH}$  group, and which are readily sol. in acids but scarcely sol. in alkalies or weak acids, are used for prep. photographic paper, etc., of relatively low sensitiveness. Development is effected in a weak alk. bath. Suitable compds. are Ag derivs. of imidazoles, triazoles, tetrazoles and guanidine. The use of compds. liable to split off S is excluded.

**Photographic materials.** Kalle & Co. A.-G. (Wilhelm Krieger and Walther Spietschka, inventors). Ger. 589,471, Dec. 7, 1933 (Cl. 57b. 12.04). Light-sensitive layers comprising a diazo compd. and an azo-dye component are coated on the sensitive side with a lacquer, *e. g.*, a cellulose ester or ether lacquer. The coating protects the film against moisture but does not obstruct the action of the gaseous  $\text{NH}_3$  used for development.

**Photographic emulsions.** I. G. Farbenind. A.-G. Ger. 587,333, Nov. 2, 1933. Gelatin-silver halide emulsions are sensitized with dyes of the formula below, in which Y and Z are O, S, Se,  $-\text{CH}\cdot\text{CH}-$  or  $-\text{CR}_2$ , R is an alkyl group, any of the positions 1 to 8 is substituted by a thio- or seleno-alkoxy or -aryloxy group, X is an acid residue such as Cl, Br, I,  $\text{SO}_4$  or  $\text{ClO}_4$ , and *n* is an odd no.

The dyes may be prep. by standard processes for the manuf. of polymethine dyes. Particulars of the sensitizing action of specific dyes are given.



**Photographic emulsions.** I. G. Farbenind. A.-G. Fr. 755,228, Nov. 21, 1933. Emulsions are sensitized by polymethine dyes substituted in the  $\text{C}_5\text{H}_5$  rings by thioalkyl, thioaryl, selenoalkyl or selenoaryl groups. Examples are given of the prep. of the following: 1,1'-diethyl-5,5'-di(methylthio)-, 1,1'-diethyl-5,5'-di(methylseleno)- and 1,1'-diethyl-5,5'-di(methylthio)-0,0'-dimethoxybenzothiocarbocyanine, 1,1'-diethyl-6-(ethylseleno)-0'-methylbenzothio-pseudocyanine and 1,1'-diethyl-5,5'-di(methylseleno)benzothio-meso-methyl (and ethyl)-carbocyanine.

**Hardening photographic films.** I. G. Farbenind. A.-G. Ger. 585,920, Oct. 12, 1933. Addn. to 538,713 (C. A. 26, 2129). Photographic films, especially gelatin films, are hardened by treatment with derivs. of dialdehydes with the aldehyde group transformed to groups of the type  $-\text{HCOXOY}$ , where X and Y are H or an acid residue. Thus, a gelatinous film contg. Ag halide emulsion is hardened by treatment with glyoxal- $\text{NaHSO}_4$  soln.

**Regenerating photographic fixing baths.** Karl Kieser. Ger. 589,204, Dec. 4, 1933 (Cl. 57b. 13.04). After Ag has been removed in known manner, the bath is freed from sol. iodides or bromides by addn. of a sol. salt of Ti, *e. g.*,  $\text{Ti}_2\text{SO}_4$ .

**Cinematographic materials.** Reinhold Kupfer. Ger. 589,137, Dec. 4, 1933 (Cl. 57b. 5.01). A support for pictures to be shown by episcopic projection is made from an Al-Ni or Al-Cu-Ni alloy contg. small proportions of Ag, Th and V or Pd. Typical alloys contain Cu + Ni 2-5, Ag 0.2-1, Th 0.02-0.2 and V or Pd about 0.1%, the remainder being com. Al. The alloys have good reflecting properties and can be rolled to form very thin films.

**Colored images.** I. G. Farbenind. A.-G. Fr. 755,177, Nov. 21, 1933. Colored images are prep. from Ag images by incorporating in the film, either before or after the formation of the Ag image, an azo dye which may be reduced by hyposulfite and is only regenerated slowly by the action of O, treating the film after formation of the image by an acid soln. contg. a reducing agent and an agent forming a complex Ag compd., and afterward fixing the image obtained.

**Coloring silver images.** Robert Kaufhold, Matylda Lamezan-Salins, Anna Hardtmuthová, Anna Hardtmuthová, Jr., Frantisek Hardtmuth, Jr., Marie Princezna de Rohan, Bedrich H. Frankensdorf and Jan H. Frankensdorf (trading as "Koh-I-Noor" Pencil Factory L. & C. Hardtmuth). Brit. 398,644, Sept. 21, 1933. In coloring Ag images, 1 or more layers of colored pigment are applied thereto, the layers are coated with a layer of (colored) colloid and the product is bleached, washed and fixed, the pigment being retained in those parts where the colloid is hardened by the bleaching bath in the presence of the Ag image. The colors may be applied by colored chalks, powd. pigment, ground colored metals or other pigment in which no colloid is present and may be applied over each other, side by side or intermingled. The colloid may be uncolored gelatin or gelatin contg. dark particles. A suitable bleaching bath consists of  $\text{CuSO}_4$ , chromic acid and KBr or NaCl. In a modification, pigments, mixed with a suitable oil, *e. g.*, linseed, are applied in dots and dashes, the Ag image is bleached in the uncolored areas, the oil is removed, the pigment being left *in situ*, a layer of gelatin is applied and the product is bleached as before.

**Photographic film.** Edwin E. Jelley (to Eastman Kodak Co.). U. S. 1,939,213, Dec. 12. A support such

as a film or plate carries a colloid layer in which is incorporated a Ca org. salt such as the benzoate, lactate or acetate having a soly. in water greater than 1% and less than 30%, which serves to facilitate obtainment of either a mat or clear coating according to the ingredients of the developer used, etc.

**Photographic films.** W. M. Still & Sons Ltd. and Andrew G. Adamson. Brit. 398,226, Sept. 11, 1933. In producing film supports such as described in Brit. 378,394 (C. A. 27, 2893) the rubber layers are slightly vulcanized before application of the varnish, *e. g.*, by passage through H<sub>2</sub> vapor at 60–70°F., to increase the resistance to moisture, the tensile strength and the flexibility. The resistance to moisture may be further increased by adding about 2% of a mineral oil or fatty substance, *e. g.*, petroleum jelly, to the rubber coating soln. The tackiness of the rubber layers being removed by the vulcanization, proper adhesion of the varnish layers is insured by adding 10% of a rubber solvent to the varnish coating liquid. In 398,288, Sept. 14, 1933, the core of such film supports is rendered more resistant to moisture by adding K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> to the casting soln. and exposing the core to light after casting. Less CH<sub>2</sub>O is required when dichromate is used. The casting soln. may also contain a trace of glycerol.

**Photographic films.** Deutsche Celluloid-Fabrik. Fr. 754,507, Nov. 8, 1933. Films are made by coagulating in baths composed of water and an aliphatic alc., solns. of cellulose derivs. the solvents of which are formed by mixts., the constituents of which are not in themselves solvents for the cellulose deriv. used and one constituent is miscible in all proportions with water. Thus, acetylcellulose is dissolved in a mixt. of CH<sub>2</sub>Cl<sub>2</sub> 62, MeOH 5 and alc. 10 parts and coagulated in a bath contg. MeOH 75 and water 25 parts. Other examples are given.

**Photographic films.** W. M. Still & Sons Ltd. and John L. Howell. Fr. 754,635, Nov. 10, 1933. Non-inflammable films comprise a layer of gelatin, forming a core, contg. K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, and coated on each side with a thin layer of rubber and an exterior layer of celluloid, collodion or other varnish which takes the sensitive emulsion. About 2% of a satd. soln. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> is added to the soln. of gelatin from which the core is made.

**Film manufacture from materials such as cellulose acetate or nitrate.** Samuel E. Sheppard and Leon W. Eberlin (to Eastman Kodak Co.). U. S. 1,942,840, Jan. 9. Particles of material such as an emulsion of cellulose acetate or nitrate are sprayed on a smooth surface such as a hot plate or drum and the film formed is simultaneously rendered transparent and adhesive with a cement contg. a volatile solvent such as acetone and a plurality of the resulting layers are laminated together.

**Photographic film base.** Kenneth C. D. Hickman (to Eastman Kodak Co.). U. S. 1,939,171, Dec. 12. A non-balation film comprises a supporting layer, a photographically sensitive layer on one face of the support, and a layer of a water-sol. cellulose deriv. such as cellulose aceto-lactate and a light-absorbing material such as a dye or pigment on the other face of the supporting film.

**Cinematograph films.** Fernseh A.-G. Brit. 398,858, Sept. 22, 1933. The proportion of light reflected by a cinematograph film is made large by including metal in the light-sensitive film or by coating the light-sensitive emulsion on metal foil, *e. g.*, Al. Alternatively, the picture strip may be metallized after development.

**Coating photographic and cinematographic films.** I. G. Farbenind. A.-G. (Max Hagedorn and Eugen Gühring, inventors). Ger. 585,411, Oct. 3, 1933. The films are treated with solns. of non-albuminous colloids in non-solvents for the film material and of such diln. that a single application yields a coating less than 200 mμ thick. Examples are given.

**Film blanks for imbibition printing.** Bertha S. Tuttle (to Technicolor, Inc.). U. S. 1,939,738, Dec. 19. A film of solidified gelatin emulsion contg. a hardening agent such as (NH<sub>4</sub>)<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> is formed and is simultaneously or successively treated with a sufficiently concd. acid soln. such as HOAc to effect the acidification and facilitate

subsequent uniform penetration of an acid dye, and the film is hardened by light or heat or both.

**Color film.** George E. Baxter. U. S. 1,939,947, Dec. 19. A photographic film comprises a body of material on one face of which is an emulsion, the outer face of the emulsion having a picture image in relief and the emulsion being sensitive and of such character as to act as a filter. Various details of toning solns., etc., are described.

**Printing colored pictures.** Anton Jasmatzi. Ger. 585,262, Sept. 30, 1933. A colored gelatin wash-out relief is treated to convert the dye into a water-insol. compd. and, after washing, is printed on gelatinized paper contg. a reagent capable of combining with the insolubilized dye. Thus, a relief image colored with a salt of an acid dye may be treated in a weak acid bath, to ppt. the insol. dye acid, and then washed and printed on gelatinized paper which has been pretreated with alkali or in which Na<sub>2</sub>PO<sub>4</sub> has been incorporated. The gelatinized paper also contains Cu(CNS)<sub>2</sub>, a thiophenol, a phosphotungstomolybdic acid, BaCO<sub>3</sub>, or other compd. capable of combining with the dye to form a water-insol. compd. In prepg. wash-out reliefs for use in the process, the exposed layer is treated in an alk. bath before development, whereby the absorption of the dye by the tanned image is facilitated.

**Photographic prints.** N. V. Philips' Gloeilampenfabrieken. Fr. 754,578, Nov. 9, 1933. Prints are obtained from negatives using a luminous source emitting ultra-violet rays, by means of a sensitive material contg. an inorg. colorless oxidant, *e. g.*, HNO<sub>3</sub> or a salt thereof, and an org. cyclic amino compd., *e. g.*, aminophenol or benzidine. This mixt. gives a colored oxidation product with ultra-violet rays but is practically insensitive to the visible part of the spectrum. After exposure the paper is washed in a solvent for the org. compd. but in which the colored substance produced is insol.

**Colored photographs.** Anton Jasmatzi. Ger. 586,815, Oct. 27, 1933 (Cl. 57b. 14.02). See Fr. 749,922 (C. A. 28, 425<sup>1</sup>).

**Colored gelatin relief images.** Douglas A. Spencer, Humphrey D. Murray and Lealie W. Oliver (one-half to Douglas A. Spencer and Humphrey D. Murray and one-half to John E. Thornton). U. S. 1,939,026, Dec. 12. For the production of positive cinematograph films having relief images in colored colloid thereon, the surface of the film is coated with a thin layer of hot liquid or plastic soln. of a transparent emulsoid and a transparent pigment and the coated set film is passed through a soln. contg. a bleaching agent to transform the metallic Ag of the Ag image to a salt and a hardening agent to harden the colored colloid layer on the bleached Ag image; the bleached hardened film is treated with hot water until surplus non-hardened gelatin not required in the bleached image has been dissolved and washed away, and the film is treated in a fixing bath to fix the bleached Ag image, and finally is washed and dried.

**Preparing motion pictures by dye transfer.** Charles B. K. Mees (to Eastman Kodak Co.). U. S. 1,939,219, Dec. 12. An uncoated motion picture film support has a hydrolyzed surface which is mordanted and dyed with a plurality of dye images without any substantial diffusion of the dye.

**Recording designs, etc., by heat-induced chemical reactions.** Samuel E. Sheppard and Waldemar Vanselow (to Eastman Kodak Co.). U. S. 1,939,232, Dec. 12. A film of material contg. a substance such as Ag oxalate capable of darkening under the influence of heat is treated with a substance such as NH<sub>4</sub>CNS which catalyzes the darkening reaction, thus producing a substantial proportion of free metal and the film is heated to develop an image.

**Metal printing blocks.** Kodak-Pathé. Fr. 755,414, Nov. 25, 1933. The photographic reliefs on colloids such as gelatin, from which the blocks are to be obtained, are coated with a very thin layer of an org. liquid having a b. p. higher than the temp. of the alloy at the time of molding. Isoamyl or butyl phthalate, quinoline, isopropyl lactate, anisaldehyde, cinnamaldehyde and decalhydronaphthalene are mentioned.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

**Rhodonitrites of ammonium, potassium, rubidium, cesium, thallium, barium and lead.** A. Ferrari and C. Colla. *Atti accad. Lincei* 18, 45-52 (1933).—The rhodonitrites of  $\text{NH}_4$ , K, Ba, Cs, Tl, Rb and Pb have been prepd. by treating Na rhodionitrite with excess of salts of the above metals. Only the compds. of  $\text{NH}_4$ , K and Ba have been previously described. They are all white compds., except the Tl salt, which is yellow. Their x-ray structures have been detd. by the powder method with Fe anticathode. The sides of the elementary cells have been detd. as follows:  $(\text{NH}_4)_2\text{Rh}(\text{NO}_2)_2$ ,  $\text{K}_2\text{Rh}(\text{NO}_2)_2$ ,  $\text{Rb}_2\text{Rh}(\text{NO}_2)_2$ ,  $\text{Cs}_2\text{Rh}(\text{NO}_2)_2$ ,  $\text{Tl}_2\text{Rh}(\text{NO}_2)_2$ :  $a = 10.91$ ,  $b = 10.63$ ,  $10.83$ ,  $11.30$  and  $10.91$  Å., resp. The compds. of Ba and Pb have been found to be anhyd.;  $\text{H}_2\text{O}$  found in compds. dried at lower temps. is zeolitic in nature. The structure is cubic or pseudo-cubic with sides  $\text{Ba}[\text{Rh}(\text{NO}_2)_2]_2$ ,  $a = 10.70$ , and  $\text{Pb}_2[\text{Rh}(\text{NO}_2)_2]_2$ ,  $a = 10.53$  Å.

A. W. Contieri

**The mutual action of the chlorides and bromides of phosphorus.** II. A. Renc. *Roczniki Chem.* 13, 509-18 (French 519) (1933).—Analysis of the clear red liquid showed the X (halogen) to P ratio to be greater than 1. Further sepn. of crystals from the liquid by cooling with  $\text{CaCl}_2$  (approx.  $-54^\circ$ ) showed the liquid had the compn.  $\text{PX}_3$ . Crystals analyzing very closely to  $\text{PCl}_2\text{Br}$  were obtained when the following reagents were used in the indicated mol. ratios:  $\text{PCl}_3 + 2.5\text{PBr}_3$ ;  $\text{PBr}_3 + 0.5\text{PCl}_3$ ;  $\text{PBr}_3 + \text{PCl}_3$ ; they were also obtained from 3 g.  $\text{PCl}_3$ - $\text{Br}_2$  + 2.94 g.  $\text{PCl}_3$  + 2.84 g.  $\text{PBr}_3$ .  $\text{PCl}_2\text{Br}$  and  $\text{PClBr}_2$  were also obtained. C. T. Ichniowski

**Four crystalline hydrates of sodium metasilicate.** Chester L. Baker, H. Teynham Woodward and Adolf Pabst. *Am. Mineral.* 18, 206-15 (1933).—Crystals of the 9, 8, 6 and 5 hydrates of  $\text{Na}_2\text{SiO}_3$  were prepd. The crystals are very hygroscopic and are carbonated quickly on exposure to air. The chem. analyses agree closely with the theoretical values. Phys. and crystallographic data not given. A. M. Brant

**The formation of silicon carbide.** Kurt Arndt and Ewald Hausmann. *Z. anorg. allgem. Chem.* 215, 66-74 (1933). Anthracite, charcoal or petroleum coke was heated with  $\text{SiO}_2$  to form SiC. With inadequate  $\text{SiO}_2$ , conversion of the C particles was incomplete and they retained their form. Anthracite proved to be most satisfactory. Reduction of  $\text{SiO}_2$  by C begins at  $1600^\circ$ . Microscopic needles and filaments of SiC result, which can be sepd. by burning off excess C and removing  $\text{SiO}_2$  with  $\text{HF}$ . The size of crystals increases with increasing temp. and the filaments disappear. The crystals do not grow by longer heating. At  $2250^\circ$  the crystals are decompd. to form graphite, which retains the form of the SiC crystals. The existence of "Siloxicon" is questioned; it probably was a mixt. of SiC and  $\text{SiO}_2$ . Foster Dee Snell

**The reduction of alumina with carbon.** W. D. Treadwell and A. Gyger. *Helv. Chim. Acta* 16, 1214-25 (1933).

The equilibria in the system  $\text{Al}_2\text{O}_3$ -C were studied up to  $1900^\circ$ . The method used consisted of circulating A through the mixt. maintained at const. temp. and analyzing the gas for CO by means of a hot-wire gage. With fast heating the formation of Al rather than  $\text{Al}_2\text{C}_3$  is favored. A *microchem. method for the detn. of Al and  $\text{Al}_2\text{C}_3$*  in a fused reaction mixt. is described. The Al is detd. by reduction of  $\text{FeCl}_3$  in a current of  $\text{CO}_2$  with slow addn. of HCl soln. so that no  $\text{H}_2$  is evolved. The carbide is detd. by treatment with HCl soln. and measurement of the vol. of  $\text{H}_2$  and  $\text{N}_2$  evolved. H. F. Johnstone

**Conditions for the fixation of  $\text{HSbO}_3$  by some aromatic monoacid-monoalcohols.** Duquenois. *Compt. rend.* 197, 1335-6 (1933).—Compds. similar to those previously described (cf. C. A. 28, 1054 and Volmar and Betz, C. A. 27, 5019) are obtained from  $\text{H}_2\text{SbO}_3$  and an equimol. mixt. of one of the following acids and its neutral salt: mandelic acid, K salt,  $\beta$ -phenyllactic acid, Na and K

salts; benzilic acid, Na, K and  $\text{NH}_4$  salts. No compd. is formed from  $\beta$ -phenylhydracrylic acid. H. A. B.

**Haüy-Bravais lattice and other crystallographic data for sodium molybdo-tellurate.** J. D. H. Donnay and J. Mélon. *Am. Mineral.* 18, 225-47 (1933).—The method of detg. the axial elements is described, and crystallographic and optical data are given. This new compd.  $(3\text{Na}_2\text{O} \cdot \text{TeO}_3 \cdot 6\text{MoO}_3 \cdot 22\text{H}_2\text{O})$  is biaxial, optically neg.;  $n_\alpha = 1.577$ ,  $n_m = 1.602$ ,  $n_\beta = 1.683$ ;  $2V = 50.75^\circ$ . The crystals belong to the holohedral class of the triclinic system. A. M. Brant

**Fusion diagrams of the systems  $\text{NaOH}$ - $\text{NaNO}_2$  and  $\text{KOH}$ - $\text{KNO}_2$ .** N. Martin Retortillo and E. Moles. *Anales soc. españ. fis. quim.* 31, 830-9 (1933).—Fusion diagrams of the systems  $\text{NaNO}_2$ - $\text{NaOH}$  and  $\text{KOH}$ - $\text{KNO}_2$  were prepd. In the former, the formation of the Jänecke compds.  $\text{NaNO}_2 \cdot 2\text{NaOH}$  and  $\text{NaNO}_2 \cdot \text{NaOH}$  (C. A. 24, 2685) was confirmed. In the latter system, the formation of the compd.  $\text{KNO}_2 \cdot 2\text{KOH}$  in the dry way is shown for the first time. All these compds. can be written as salts of the hypothetical orthonitric acid, e. g.,  $\text{Na}_2\text{NO}_3 \cdot \text{H}_2\text{O}$ ,  $\text{Na}_2\text{HNO}_4$  and  $\text{K}_2\text{NO}_4 \cdot \text{H}_2\text{O}$ . E. M. Symmes

**Compounds of bivalent metallic selenates with aniline.** Chung-Hsi Kao and Tsing-Lien Chang. *J. Chinese Chem. Soc.* 1, 116-19 (1933).— $\text{CuSeO}_4 \cdot 5\text{H}_2\text{O}$ ,  $\text{ZnSeO}_4 \cdot 6\text{H}_2\text{O}$  and  $\text{CdSeO}_4 \cdot 2\text{H}_2\text{O}$  unite with  $\text{PhNH}_2$  at room temp.;  $\text{CoSeO}_4 \cdot 5\text{H}_2\text{O}$  does so at  $80^\circ$ , and  $\text{NiSeO}_4 \cdot 6\text{H}_2\text{O}$  at  $100^\circ$ , while  $\text{MnSeO}_4 \cdot 5\text{H}_2\text{O}$  not at all. The compds. produced all have the formula  $\text{M}^{++}\text{SeO}_4 \cdot 2\text{C}_6\text{H}_5\text{NH}_2$ . W. H. A.

**The oxidation of hypophosphoric acid by bromine.** Bruno Blaser and Paul Halpern. *Z. anorg. allgem. Chem.* 215, 33-43 (1933); cf. Nylén and Stelling, C. A. 27, 3891.—The rate of oxidation of  $\text{H}_2\text{P}_2\text{O}_6$  by  $\text{Br}_2$  depends largely on the  $p_H$ , with a max. at  $p_H$  8. The resulting curve agrees with a composite curve of the oxidizing strength of  $\text{Br}_2$  solns. with variation in  $p_H$  and the reducing strength of  $\text{H}_2\text{P}_2\text{O}_6$ . This is not altered in the max. range by traces of Cu or by addn. of gluc., which alter the rate of oxidation at other parts of the curve. The acid shows little reducing action; its ion is a strong reducing agent, indicating that the acid and its ion have different structures. The possibility of a chain reaction is also suggested. Foster Dee Snell

**Dichromic acid.** E. Carrière and H. Sendras. *J. chim. phys.* 30, 628-33 (1933).—Dichromic acid is prepd. by the action of HCl on  $\text{K}_2\text{CrO}_4$ . Cond. detns. suggest the formula  $\text{H}_2\text{Cr}_2\text{O}_7$ , as first proposed by Ostwald (*Z. physik. Chem.* 2, 78 (1888)) rather than  $\text{H}_2\text{CrO}_4$ , as suggested by Walden (*Z. physik. Chem.* 2, 71 (1888)). W. J. P.

**The constitution of hyponitrous acid and nitramide.** A. Hantzsch. *Ber.* 66B, 1566-8 (1933); cf. C. A. 28, 9854 and Hunter and Partington, C. A. 27, 2671.—The inability of nitramide to give  $\text{NH}_3$  and  $\text{NO}_2^-$  upon hydrolysis with alkali, its non-formation from  $\text{RNO}_2$  and  $\text{NH}_3$ , and its weak but distinctly acid character are in harmony with the structure  $\text{HN} \cdot \text{NO} \cdot \text{OH}$ . Hyponitrous acid is a weak dibasic acid, the mono- and di-metallic salts of which are, resp., neutral and alk. in  $\text{H}_2\text{O}$ . Its alkyl esters are O-esters. A comparison of the properties of hyponitrous acid with those of other N compds. leads to the anti-structure  $\text{HO} \cdot \text{N} \cdot$ . W. C. Fernelius

N.OH

**Complex iron compounds of  $\alpha$ -pyridylhydrazine.** Bruno Emmert and Oskar Schneider. *Ber.* 66B, 1875-8 (1933).—Although the inner complexes of  $\alpha$ - $\alpha'$ -dipyridyl with  $\text{Fe}^{++}$  salts are oxidized only with difficulty, formation of the  $\alpha$ -pyridylhydrazine complex with  $\text{FeCl}_3$  can only be accomplished in the absence of air, in which the  $\text{FeCl}_3$  complex is formed. H. F. Johnstone

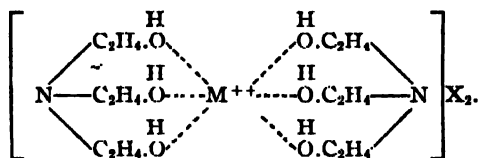
**Some inner complex salts of bivalent iron.** Bruno Emmert and Hermann Grottschneider. *Ber.* 66B, 1871-4 (1933); cf. C. A. 25, 3586.—Complex salts of bibenzoylmethane with Fe and  $\text{NH}_3$ , pyridine, piperidine, nicotine,

and ethylenediamine were prepd. These complexes are deep blue, or green, insol. in  $H_2O$  but sol. in org. reagents. The  $NH_2$  complex evolves  $NH_3$  when heated to give the diketone Fe (bivalent). The latter does not absorb NO but solns. of the pyridine complex absorb the gas, mol. for mol., with dissoen. of the pyridine. The bivalent Fe compds. are all oxidized by air to the red diketone trivalent Fe. With  $FeSO_4$ , acetylacetone and  $o-C_6H_4-(NH_2)_2$  undergo a condensation to form *dimethyl-(benzohexapladiazine)-ferrous sulfate*. H. F. Johnstone

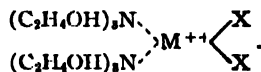
The influence of the strength of bases on the formation of aluminotartrate complexes. Pariselle. *Compt. rend.* 197, 1214-16 (1933).—Whereas NaOH or KOH, together with tartaric acid and Al salts, forms complex tartrates (cf. C. A. 20, 3321),  $NH_4OH$  also forms aluminotartaric acid but the diammonium tartrate is only incompletely formed and there is not a rapid drop in  $\alpha$ . With piperidine results are similar, but with the still weaker pyridine bases no complex is formed and at higher concns. of bases values for  $\alpha$  are neg. E. G. Vanden Bosche

Some complexes which form benzidine and metallic salts. J. Barceló. *Anales soc. españ. fis. quim.* 31, 852-80 (1933).—Prepn. and properties of several benzidine (Bzd) complexes are given, those not heretofore described being  $(HgBzd)(CN)_2$ ,  $(CdBzd)SO_4$ ,  $(ZnBzd)SO_4$  and  $(AgBzd)NO_3$ . E. M. Symmes

Compounds formed by triethanolamine with certain metallic salts. A. Tettamanzi and B. Carli. *Gazz. chim. ital.* 63, 566-70 (1933).—When pure, anhyd.  $N(C_2H_4OH)_3$  (I) reacts with concd. aq. solns. of metal salts, the reaction is different from that described by Jaffe (cf. C. A. 27, 4189). Basic salts are not formed, but cryst. complex compds. composed of 1 mol. of inorg. salt and 2 mols. of org. base are formed. Thus when heated, concd. aq.  $NiCl_2$  and I form the compd.  $NiCl_2 \cdot 2N(C_2H_4OH)_2$  (II), lustrous light blue; its aq. solns. are of the green color of Ni salts. The compd.  $CdSO_4 \cdot 2N(C_2H_4OH)_2$  and  $CaCl_2 \cdot 2N(C_2H_4OH)_2$  (III) are prepd. similarly. Hot aq. solns. of III are opalescent. No ppts. are obtained directly with  $SrCl_2$  and  $MgCl_2$ , but when the reaction liquors are evapd., there are obtained, after purification, the compds.  $SrCl_2 \cdot 2N(C_2H_4OH)_2 \cdot 3H_2O$  and  $MgCl_2 \cdot 2N(C_2H_4OH)_2$  (IV). Under no conditions was a complex compd. of I and  $BzCl_2$  obtained. The constitution of these new compds. may be accounted for in at least 2 ways. The 6 OH groups of 2 I mols. are united by secondary valences of the O atoms to the central metal atom, similarly to the complex glycol and glycerol compds. of Grün, thus:



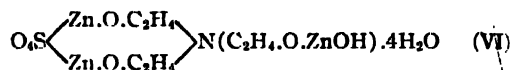
In this case the compds. are interposition compds. Alternately it is possible that the I units are united through their N atoms by secondary valences to the metal atom, in which case the compds. would be simple addn. compds., thus:



The blue color of II, which resembles the color of Ni amines, is in favor of the 2nd hypothesis, whereas the tendency of Mg to unite by secondary valences to N would suggest that the 1st hypothesis is at least valid for IV. C. C. Davis

Alcoholysis of some metal salts brought about by triethanolamine. F. Garelli and A. Tettamanzi. *Gazz. chim. ital.* 63, 570-5 (1933); cf. preceding abstr.—Unlike the reaction of anhyd. triethanolamine (I) with  $NiCl_2$ ,  $CdSO_4$ ,  $CaCl_2$ ,  $SrCl_2$ , and  $MgCl_2$ , its reaction with  $CoCl_2$ ,  $CoBr_2$ ,  $Cu(SCN)_2$ ,  $Co(SCN)_2$ ,  $CdCl_2$ ,  $ZnCl_2$  and  $ZnSO_4$  involves double decomp. with the formation of compds. in which 1 or more metal atoms replace the H atoms of the

OH groups in I. The products are thus mixed *halide alcohols*. The mobility of the H in the OH groups of I was previously demonstrated by Knorr (*Ber.* 30, 910 (1898)). At room temp. aq.  $CoCl_2$  and I ppt. slowly the compd.  $ClCoOC_2H_4N(C_2H_4OH)_2$  (II), lustrous violet-purple. The reaction is:  $CoCl_2 + 2I \rightarrow II \times N(C_2H_4OH)_2 \cdot HCl$ , with the evolution of heat. Aq. solns. of II turn pink (color of cobaltous solns.), and then blue on addn. of concd. HCl. Boiling aq. solns. of II ppt. an olive-green compd., probably a basic chloride. Aq.  $CoCl_2$  and I (2 mols.) concd. *in vacuo* ppt. the compd.  $BrCoOC_2H_4N(C_2H_4OH)_2$ , intense lustrous violet color. It is also pptd. directly on addn. of I to a soln. of  $CoCl_2$  and  $NaBr$ . In water it decomp. like II. Aq. KSCN added to aq.  $CoSO_4$  and I ppts. the compd.  $NCSCoOC_2H_4N(C_2H_4OH)_2$  (III), intense opaque violet. The mother liquor is a viscous colloidal soln. contg.  $N(C_2H_4OH)_2 \cdot HSCN$  (IV), so that the reaction is:  $Co(SCN)_2 + 2I \rightarrow III + IV$ . In water III decomp. like II. Similarly KSCN,  $CuSO_4$  and I yield the compd.  $NCSCuOC_2H_4N(C_2H_4OH)_2$ , light green. IV is also formed as before. Aq.  $CdCl_2$  (4 g.) and I (6 g.) ppt. overnight the compd.  $(ClCdOC_2H_4)_2NC_2H_4OH$  (V), formed by the reaction:  $2CdCl_2 + 3I \rightarrow V + N(C_2H_4OH)_2 \cdot 2HCl$ . It hydrolyzes in hot water. Aq.  $ZnCl_2$  and I ppt. the compd.  $ClZnOC_2H_4N(C_2H_4OH)_2$ . Aq.  $ZnSO_4 \cdot 7H_2O$  (5.74 g.) and I (6 g.) ppt. a compd. contg. Zn 37.38-36.87, SO<sub>4</sub> 16.75 and N 2.80%, probably of the constitution:



formed by the reaction:  $3ZnSO_4 + 3I \rightarrow VI + 2N(C_2H_4OH)_2 \cdot H_2SO_4$ . The expts. show that I has a much greater alcoholyzing power than have ordinary alcs. with the same salts. This indicates that the union of 3 alc. mols. by ammonia N increases the mobility of the H of the OH groups, thus conferring on the OH groups themselves an acid character almost as great as that of phenolic OH groups. The only compds. approaching these are those formed from pyrocatechol and from  $o-HOOC_6H_4CO_2H$ , described by Weinland (C. A. 14, 2308) and Rosenheim (C. A. 26, 932). C. C. Davis

Asymmetric quaternary arsonium compounds and attempts to separate them into the optically active components. Gilni Kamai. *Ber.* 66B, 1779-83 (1933).  $MeEtAsI$  with  $PhMgBr$  in a  $N_2$  atm. gives a 96% yield of *methyl ethyl phenyl arsine* (I),  $b_p$  89-90.5°,  $d_4^{20}$  1.2161,  $n_D^{20}$  1.5665. This forms *methyl ethyl phenyl benzyl arsonium chloride* (non-crystallizable) and *iodide* (m. 140°) with the benzyl halides. In the same way  $Et-n-PrAsI$  (I) gives 97.4% *ethyl-n-propyl phenyl arsine*,  $b_p$  120°,  $b_{ref}$  245°,  $d_4^{20}$  1.1431, which also forms the corresponding *benzyl arsonium chloride*, m. 156°. With the *p*-tolyl Grignard reagent, (I) gives 80% *ethyl-n-propyl-p-tolyl arsine*,  $b_p$  127-8°,  $d_4^{20}$  1.1198,  $n_D^{20}$  1.5448; the corresponding *benzyl arsonium iodide* m. 119-20°. With the naphthyl Grignard reagent (I) gives 74% *ethyl-n-propyl- $\alpha$ -naphthyl arsine*,  $b_p$  181°,  $d_4^{20}$  1.2169, which also forms the *benzyl arsonium iodide* (II), m. 154-5° and with  $\pi$ -bromoacetophenone 8 gives the corresponding *phenacyl arsonium bromide*, m. 136-7°. With the exception of II, the salt of the arsonium base formed by treatment of the halide with the Ag salt of *d*- $\alpha$  and *d*- $\pi$ -bromocamphorsulfonic acids did not crystallize. The *d*- $\alpha$  salt of II was fractionally crysld. into 3 portions for which the m. ps. were 137°, 135-6° and 120-6°, resp., and in aq. soln.  $[\alpha]_D^{25}$  values were 49.71°, 45.49° and 44.6°, resp. With KI soln., the first fraction formed the arsonium iodide for which in acetone  $[\alpha]_D^{25}$  was 9.11. The *d*-component racemized quickly. H. F. Johnstone

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## 7—ANALYTICAL CHEMISTRY

W. T. HALL

**X-ray crystal analysis of unstable precipitates.** Pierre Jolibois and Georges Poureticr. *Compt. rend.* 197, 1322-3 (1933).—Pptd. yellow  $\text{HgI}_2$  is identical with that obtained by heating the red form. G. M. E.

**Gravimetric and polarigraphic determination of total alkalinity.** Vladimir Majer. *Z. anal. Chem.* 92, 401-5 (1933).—A math. discussion of the errors involved in attempting to est. the total alk. by weighing the anhyd. chlorides or sulfates and a comparison of the resulting errors with the error of the polarigraphic method. The sulfate and chloride methods give results that agree substantially if not over 5% of the minor constituent is present. The polarigraphic method agrees with the sulfate method when the substance analyzed does not contain more than 10% of the minor constituent. W. T. H.

**Separation of alkaline earths.** Otozo Funakoshi. *J. Chem. Soc. Japan.* 54, 1215-22 (1933).—To a soln. contg.  $\text{Ba}^{++}$ ,  $\text{Sr}^{++}$  and  $\text{Ca}^{++}$  which is 0.06-0.2 N in  $\text{HCl}$  add warm, 10%  $(\text{NH}_4)_2\text{SO}_4$  soln. slowly. After 24 hrs. add 21%  $\text{NH}_4\text{OAc}$  soln. and filter off the  $\text{BaSO}_4$ . T. Katsurai

**Qualitative analysis without hydrogen sulfide.** L. A. Munro. *Can. Chem. Met.* 17, 240 1 (1933).—A brief outline of Brockman's scheme, and a comparison with the normal  $\text{H}_2\text{S}$  pptn. method. R.'s scheme gives better identification for 4 ions ( $\text{Hg}^+$ ,  $\text{Hg}^{++}$ , As and Ni), equal accuracy for 8 ions and less satisfactory for 9. It is, however, much more rapid. W. H. Boynton

**Comment on the paper by C. Mahr entitled "A new volumetric method for determining bismuth."** G. Spacu and P. Spacu. *Z. anal. Chem.* 95, 336-7 (1933); cf. Mahr (C. A. 27, 5023) and Spacu (C. A. 26, 4766).—Priority claim. W. T. H.

**Iodometric determination of copper, iron, zinc and aluminum in the presence of one another.** R. Lang and J. Feiler. *Z. anal. Chem.* 93, 161 72 (1933).—Neutralize the  $\text{Cl}^-$ -free soln. contg. 3-5 cc. of concd.  $\text{H}_2\text{SO}_4$  with  $\text{NH}_4\text{OH}$  and bring to a vol. of 50-60 cc. The total content of Cu, Fe, Zn and Al may amount to about 0.5 g. Cool the soln., add 2 g. of  $\text{KIIF}_2$  and 2-3 g. of  $\text{KI}$ . Titrate with 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3$  to a starch end point. In this way Cu alone is detd. If less than 12 cc. of thiosulfate is needed in this titration, a known amt. of Cu must be added and titrated to give sufficient  $\text{Cu}_2\text{I}_2$  to catalyze properly the Fe reaction. To det. the Fe, add 10-15 cc. of 5 N  $\text{H}_2\text{SO}_4$ , about 3 g. of  $\text{H}_2\text{BO}_3$  crystals and 1 g. of  $\text{KCNS}$ . In this way the  $\text{FeFe}^{+++}$  complex, which was formed in the Cu detn. to prevent interference of the  $\text{Fe}^{+++}$ , is decompd. and a second titration with  $\text{Na}_2\text{S}_2\text{O}_3$  now serves to det. Fe. Now add a small salt spoonful of  $\text{Na}_2\text{SO}_3$ , heat to boiling and filter. To the filtrate add a still warm soln. of  $\text{HPO}_3$  dissolved in a little water and some  $\text{Br}_2$  water or  $\text{I}_2$  soln. to oxidize the sulfite and  $\text{Fe}^{++}$ . Heat to boiling, cool to room temp. and remove any starch iodide color by the cautious addn. of 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3$ . Then, after adding 0.2 M  $\text{K}_3\text{Fe}(\text{CN})_6$ , titrate the Zn with  $\text{Na}_2\text{S}_2\text{O}_3$ . A quantity of  $\text{Fe}(\text{CN})_6^{---}$  equiv. to the Zn is reduced by the  $\text{I}_2$  present with liberation of  $\text{I}_2$  equiv. to the Zn. Now dil. to exactly 200 cc., allow the Zn ppt. to settle, filter and det. the Al in the filtrate as follows: To 100 cc. of soln. add 1 g. of Rochelle salt and 5 g. of  $\text{NH}_4\text{Cl}$ , make slightly ammoniacal and add a little  $\text{Na}_2\text{SO}_3$ . Heat to boiling and ppt. the Al by adding 2% 8-hydroxyquinoline soln. Add dropwise 1 cc. of concd.  $\text{NH}_3$  soln. and allow to stand 1 hr. on the water bath. Filter and wash the ppt. with hot water. Dissolve it in hot 15-20%  $\text{HCl}$  by vol. Add a few drops of 1% indigo soln. and sufficient  $\text{Br}^-$ - $\text{BrO}_3^-$  soln. to impart a pale straw color, add  $\text{KI}$  and starch and titrate with 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3$  soln. The utility

of this scheme of analysis is shown by the results obtained in the analysis of a sample of Devarda's alloy and of a zinc alloy. The results of 43 test analyses are given.

W. T. H.

**Comparative investigations on the colorimetric determination of potassium.** F. Alten, H. Weiland and B. Kurnies. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 171-82 (1933).—The cobaltinitrite colorimetric methods of I. v. Wrangell (C. A. 27, 3278), (II) Herzner (cf. C. A. 25, 5185) and (III) Tischer (cf. C. A. 25, 5641) were investigated. I, in which indole and  $\text{H}_2\text{SO}_4$  were used, was tested by measuring both the red color and extinction; the former is too fugitive and the latter exhibits proportionality only between 10 and 300  $\gamma$   $\text{N}_2\text{O}_5/100$  ml. In alc. soln. the results were poor. II, developing color with the well-known Griess-Ilosvay reagent ( $\alpha$ -naphthylamine and sulfanilic acid), was the most satisfactory method. Jander and Faber (cf. C. A. 22, 3370) are confirmed in that  $\text{K}_2\text{Co}(\text{NO}_2)_6 \cdot \text{Na}_2\text{Co}(\text{NO}_2)_6$  pptd. from  $\text{NaCl}$ -satd. soln. is more uniform in  $\text{NO}_2:\text{K}_2\text{O}$  ratio than the  $\text{K}_2\text{NaCo}(\text{NO}_2)_6$  obtained by most procedures, and pptn. by this method is recommended. The procedure is described in detail. Eleven references. C. J. S.

**Spectrographic determination of silicon in iron.** G. Scheibe, H. Hammerschmid and G. Linner. *Arch. Eisenhüttenw.* 7, 354 (1933).—To avoid falsification of results when the spark has to pass through the layer of slag formed by the spark the latter is produced in a H atm. which prevents formation of slag. M. H.

**The determination of sodium as tri-uranyl magnesium sodium acetate.** F. Alten, H. Weiland and E. Hille. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 129-40 (1933).—Kahane's (cf. C. A. 24, 3457) claim that the triple acetate dried at  $120^\circ$  retains 6  $\text{H}_2\text{O}$  is confirmed; the dried ppt. contains 1.536% Na. For removal of interfering elements,  $\text{BaCl}_2$  is recommended in preference to  $\text{Ca}(\text{OH})_2$ ,  $\text{UO}_2(\text{OAc})_2$  for  $\text{P}_2\text{O}_5$ , and tartaric acid in preference to  $\text{EtOH}$  for  $\text{K}_2\text{O}$ . The alc. reagent specified by K. is not useful in the presence of a large amt. of impurity. Procedures for estg.  $\text{Na}_2\text{O}$  in crude and refined  $\text{K}_2\text{O}$  salts, plant ash and soil exts., and recovery of  $\text{UO}_2$  salts from residues are described. Eight references. C. J. S.

**New micro-analytical methods for elementary analysis, for determining halogens and nitrogen and for the identification of organic substances.** Vladimir Staněk and Tibor Nemes. *Z. anal. Chem.* 95, 244-60 (1933).—The substance is oxidized in a test tube by a mixt. of  $\text{KIO}_3$  and concd.  $\text{H}_2\text{SO}_4$  at  $170-190^\circ$ .  $\text{I}_2$  is liberated, C is oxidized to  $\text{CO}_2$  which is absorbed and weighed, H forms water and N is left as  $\text{NH}_4\text{HSO}_4$  in the test tube. S gives  $\text{H}_2\text{SO}_4$ ; Cl and Br escape as  $\text{HCl}$  and  $\text{HBr}$  uniting in each case with H. The liberated  $\text{I}_2$  escapes as such and consumes 0.5 atom of O. By the reduction of the  $\text{KIO}_3$  in concd.  $\text{H}_2\text{SO}_4$ , the I remains in the soln. as  $\text{I}_2\text{O}_5$  which upon diln. is changed to  $\text{I}_2\text{O}_4$  and  $\text{I}_2$ ; the latter can be distd. off with steam and absorbed by Ni as  $\text{NiI}_2$  and can be detd. by the mercurimetric method. The reduction power of the substance analyzed is measured by the  $\text{I}_2$  collected. The requisite app. is shown, the exact manipulation described, the computations are explained and the results of numerous analyses tabulated. The results agree well and serve to characterize many substances.

W. T. H.

**Determination of fluorine. I. Precipitation of the fluorine ion as lead chlorofluoride.** Joseph Fischer and Hans Peisker. *Z. anal. Chem.* 95, 225 35 (1933).—Starck's method for detg. F as  $\text{PbClF}$ , gives good results only as a result of a compensation of errors. The  $p_K$  at which the pptn. takes place is of importance. A suitable reagent can be prepd. by shaking 12 g. of pure  $\text{PbCl}_2$  with 1 l.

of water for an hr. but the undissolved salt must not be used in prep. fresh reagent as it is already somewhat contaminated with basic salt. This reagent, because of the appreciable soly. of  $\text{PbCl}_2$ , must be used in liberal excess, 300 cc. for detg. 30-100 mg. of  $\text{F}^-$ . If this large vol. is unsuitable, a soln. of  $\text{PbCl}_2$  and  $\text{Pb}(\text{NO}_3)_2$  can be used; dissolve 20.5 g. of  $\text{Pb}(\text{NO}_3)_2$  and 15 g. of  $\text{KCl}$ , or 3.3 g. of  $\text{NH}_4\text{Cl}$ , in 1 l. of water. Of this last reagent, use 200 cc. To 100 cc. of soln. contg.  $\text{F}^-$  add methyl orange and neutralize with 0.5 *N*  $\text{HNO}_3$  to a distinct pink with methyl orange. Add 2-3 drops of the acid in excess. The proper end point is hard to det. when considerable  $\text{F}^-$  is present. While rotating the soln. add 300 cc. of the first reagent or 200 cc. of the second from a large pipet. Allow to stand 1 hr. and decant carefully through a filtering crucible. To the ppt. add 4 cc. of water, allow to stand 1 min. and then decant off all the liquid. Wash the ppt. and transfer it to the crucible with the aid of as little as possible (30-50 cc.) of a satd. soln. of  $\text{PbCl}_2$  in water. Drain as dry as possible with suction and heat for 30 min. at  $150^\circ$ . The ppt. contains 7.280% of  $\text{F}$ . The results are usually within 0.5% of the truth. Numerous expts. under varying conditions are described.

W. T. H.

**Method of exact analysis of electrolytic hydrogen.** V. V. Shishkin and B. P. Karnaukh. *Khimstroi* 5, 2475-7 (1933).—The detn. of  $\text{H}_2$  by combustion is made with accuracy of 0.01% in a specially designed app. as illustrated.

Chas. Blanc

**Rapid colorimetric method for the detection and determination of small quantities of oxygen in gases.** H. R. Ambler. *Analyst* 59, 14-15 (1934).—The method is based on the color imparted by  $\text{O}_2$  to an alk. soln. of pyrogallol; the color is compared with that of an  $\text{I}_2$  soln. of known strength.

W. T. H.

**Determination of phosphorus in titaniferous material.** Gunnar Hørgård. *Z. anal. Chem.* 95, 329-30 (1933).—The results obtained in the analysis of 68 samples show that the influence of Ti in preventing complete pptn. of  $\text{H}_2\text{PO}_4$  by the usual treatment with  $\text{NH}_4\text{molybdate}$  increases with quantity of Ti present. The effect of the Ti is not serious until 2.2 mg. of Ti is present in 100 ml. of soln. but when 35.2 mg. of Ti is present it is very difficult to effect complete pptn. When not over 17.6 mg. of Ti is present, the error can be overcome by using sufficient  $\text{HNO}_3$  and  $\text{NH}_4\text{NO}_3$  but if too much acid is present, the pptn. becomes incomplete. With 11 mg. of Ti, the presence of 6-7 ml. of concd.  $\text{HNO}_3$  together with the  $\text{HNO}_3$  in the reagent suffices for complete pptn. provided 10 g. of  $\text{NH}_4\text{NO}_3$  is added in addn. to that present in the  $\text{NH}_4\text{molybdate}$  reagent. The  $\text{HNO}_3$  and  $\text{NH}_4\text{NO}_3$  can be replaced by  $\text{HCl}$  and  $\text{NH}_4\text{Cl}$ .

W. T. H.

**Determination of iodine-bromine numbers by the rapid method.** L. W. Winkler. *Z. anal. Chem.* 93, 172-5 (1933).—An improved procedure for carrying out the rapid method is the following: Dissolve 0.08-0.15 g. of fat in 2-3 cc. of pure  $\text{CCl}_4$  and to the soln., add 0.1 g. of finely-powd.  $\text{NaOAc} \cdot 3\text{H}_2\text{O}$  and 0.5 g. of  $\text{HgCl}_2$ . While rotating the contents of the vessel (50-cc. Erlenmeyer flask) run in 0.1 *N*  $\text{Br-AcOH}$  from a buret until the liquid is a pale yellow color and is not bleached during 2-3 min. The nos. obtained in the examn. of over 20 oils are given and the results agree satisfactorily with those obtained with  $\text{KBrO}_3$  soln.

W. T. H.

**Analysis of magnesium alloys.** L. C. Nickolls. *Analyst* 59, 16-18 (1934).—To det. Al in the presence of considerable Mg, it is recommended to use  $\text{Na}_2\text{S}$  as the precipitant. Dissolve 1 g. of alloy in 6 *N*  $\text{HCl}$  and a little  $\text{HNO}_3$  or  $\text{Br}_2$ . Ppt.  $\text{SiO}_2$  by evapg. to dryness. Take up in 100 ml. of hot water contg. sufficient  $\text{HCl}$  to dissolve  $\text{Mg-OC}_2$  and add 20 g. of  $\text{NH}_4\text{Cl}$ . Filter off  $\text{SiO}_2$  and sat. with  $\text{H}_2\text{S}$  to remove metals of the Cu-Sn group. Filter and add  $\text{NH}_4\text{OH}$  until the soln. becomes dark green and a ppt. is formed. Dissolve carefully in as little  $\text{HCl}$  as possible but without removing the dark tint of  $\text{FeS}$  completely. Add 5 ml. of 6 *N*  $\text{Na}_2\text{S}$  and sat. with  $\text{H}_2\text{S}$ . Filter and wash the ppt. with dil.  $\text{NH}_4\text{NO}_3$  soln. Dissolve the ppt. in 20 ml. of  $\text{HCl}$  and a little  $\text{Br}_2$ , ppt. with  $\text{NH}_4\text{OH}$ ,

filter, weigh the ignited ppt. and correct for small quantities of Fe and Mn. Det. Ni in the filtrate with dimethylglyoxime and Zn in the filtrate from the Ni by treatment with pyridine thiocyanate. If much Mn, Ni or Zn is present, the procedure is modified somewhat. Before adding the  $\text{Na}_2\text{S}$ , the  $\text{HCl}$  is added only till the  $\text{FeS}$  color begins to fade: this takes care of Mn and Zn but if much Ni is present, merely add  $\text{NH}_4\text{OH}$  to the  $\text{H}_2\text{S}$  filtrate until a permanent black ppt. is formed, then 2-3 drops more. The soln. is then ready for the  $\text{Na}_2\text{S}$  treatment. With very large quantities of Zn, Mn and Ni, it is best to make a double pptn. with  $\text{Na}_2\text{S}$ . The results given show merely that the Al values are good; no data are given concerning the other detns.

W. T. H.

**Determination of chloride in the presence of bromide and iodide.** M. Shchigol. *Z. anal. Chem.* 92, 420-5 (1933).—Take 2 g. of the mixt. of alkali salts in a 100-cc. measuring flask. In 10 cc. of the soln. det.  $\text{I}^-$  by Kolthoff's method which consists in adding 1 drop of 0.1 *N*  $\text{KIO}_3$  soln. and a few drops of 4 *N*  $\text{H}_2\text{SO}_4$  whereby the soln. assumes a pale yellow tint due to free  $\text{I}_2$ . Starch indicator soln. and then 5-10 cc. of  $(\text{NH}_4)_2\text{CO}_3$  soln. are added. Thereupon the soln. is titrated slowly with shaking until a pure yellow ppt. of  $\text{AgI}$  is obtained. In a second 10-cc. portion det. the total halogen content by the argentometric method of Volhard, in the presence of 10 cc. of toluene. To a third 10-cc. portion in a 100-cc. measuring flask, add 35-40 cc. of 2%  $\text{NH}_3$  soln. and just sufficient  $\text{AgNO}_3$  to ppt. all of the halogen present. In this way practically all of the  $\text{Br}^-$  and  $\text{I}^-$  will be pptd. as  $\text{AgX}$  salt but the  $\text{Cl}^-$  will remain as sol.  $\text{Ag}(\text{NH}_3)_2\text{Cl}$ . Fill with water to the 100-cc. mark, mix, filter and take 50 cc. of the filtrate. Add 3-4 g. of  $\text{Na}_2\text{CO}_3$  and 15-20 cc. of arsenite soln. (8 g.  $\text{As}_2\text{O}_3$  and 21 g. of  $\text{Na}_2\text{CO}_3$  and 71 g. of water.) Heat and boil 20-25 min. whereby a yellow ppt. of  $\text{Ag}_3\text{AsO}_3$  is formed which by continual boiling begins to darken on account of  $\text{Ag}$  pptg. Cool, filter through a double filter and wash thoroughly with water. Dissolve the ppt. in 20 cc. of hot, concd.  $\text{HNO}_3$ , add  $\text{KMnO}_4$  soln. to a faint red coloration, remove the color with  $\text{FeSO}_4$  soln. and titrate to a pale pink color with 0.1 *N*  $\text{NH}_4\text{CNS}$  soln. This gives the  $\text{Ag}$  equiv. to the  $\text{Cl}^-$  present. For each  $\text{Cl}^-$  present 2  $\text{Ag}$  are pptd.

W. T. H.

**Microchemical titration of iodide, eventually in the presence of other halides.** Vladimír Staněk and Tibor Nemes. *Z. anal. Chem.* 95, 240-4 (1933); cf. C. A. 27, 2307.—The mercurimetric method for titrating halide with Na nitroprusside as indicator can be applied to the microchem. detn. of  $\text{I}^-$  in case not more than 30 mg. of  $\text{I}^-$  is present in 200 cc. of soln. By combining this mercurimetric titration with Winkler's method of transforming the  $\text{I}^-$  into  $\text{I}_2$  with  $\text{CCl}_4$  as indicator, it is possible to det.  $\text{I}^-$  in the presence of other halides. Since the presence of Na nitroprusside is not harmful, the 2 titrations can take place in the same soln.

W. T. H.

**The determination of nitrate in plants and soils.** Cecil Treschow and E. K. Gabrielsen. *Z. Pflanzenernähr. Düngung Bodenb.* 32A, 357-76 (1933).—The 2,4-xylenol colorimetric method of Blom and T. (cf. C. A. 23, 1994) was reinvestigated to eliminate sources of error and adapt it to direct detn. of  $\text{NO}_3^-$ . The  $\text{KMnO}_4\text{-H}_2\text{O}_2\text{-(COOH)}$  oxidation of org. matter originally specified is one source of error, as certain N compds. are oxidized to  $\text{HNO}_3$ . Expts. with fresh plant materials with and without added  $\text{NO}_3^-$  gave very consistent indications with quant. recovery of  $\text{NO}_3^-$  when no oxidation treatment was employed. Another important error is due to decompn. of nitroxylnol by org. matter on standing prior to distn. To avoid this, the nitration period should not exceed 30 min.; if the detns. must stand longer, diln. with 2-5 vols.  $\text{H}_2\text{O}$  will prevent loss for 48 hrs. Expts. with soils revealed a source of error common to most methods, viz., "negative loss," attributed to preferential absorption of pure  $\text{H}_2\text{O}$  rather than  $\text{NO}_3^-$  in soln. by the soil. Soils low in humus and not too poor in  $\text{NO}_3^-$  can be examd. by a direct method, avoiding this error. **Method for plant materials.**—Into a 300-ml. boiling flask measure 25 ml. 66 vol. %  $\text{H}_2\text{SO}_4$  and 0.1 ml. 2,4-xylenol, then add the sample of fresh plant



material, 0.1–1 g. Stopper and shake well, and leave at room temp. 15–30 min. for nitration. Dil. with 100 ml.  $H_2O$ , add pumice stone and connect to a 30-cm. condenser with Hopkins bulb. Distil rapidly into a 100-ml. flask contg. 25 ml. 0.2  $N$  NaOH until the flask is nearly filled. (Observe that no drops of yellow nitroxylenol are left in the condenser. Cool to 20°, make to vol. and compare the color with a suitable standard in a Dubosc-type colorimeter. If the plant material is dry, moisten thoroughly before adding to acid reagent. By this procedure, 100 analyses per day with  $\pm 2\%$  accuracy on up to 0.05 mg.  $NO_3^-$  per sample are possible. *Method for soils.*—(a) When the sample contains less than 300 mg. humus, weigh 5–10 g. freshly sifted fine earth into a 1-l. boiling flask, add 10 ml.  $H_2O$ , pour in quickly 100 ml. 66 vol. %  $H_2SO_4$  with 0.1 ml. 2,4-xylenol, stopper, shake and let stand 10 min. At the end of this nitration period, add 200 ml.  $H_2O$ , connect to the usual Kjeldahl app. and distil. (b) For soils high in humus and low in  $NO_3^-$ , weigh 50–100 g. fresh sample into 300-ml. Erlenmeyer flask, add 1%  $KAl(SO_4)_3 \cdot 12H_2O$  soln. to make the dry soil:liquid ratio as nearly as possible 1:1. Shake vigorously and frequently for 30 min., then filter. Add exactly 10 ml. soil ext. to a 1-l. flask contg. 100 ml. acid reagent, shake and observe if a yellow color appears quickly. If not, cool to 20°, add 10 ml. more soil ext. and so on until color appears, if more than 30 ml. soil ext. is added, corresponding  $H_2SO_4$  must also be added, as acid concn. must be 55–66 vol. % for nitration. Allow nitration to proceed at room temp. for 10 min. after the last addn., dilute and distil. The xylene used in this method is the  $OH:CH_3:-CH_3 = 1:2:4$  compd. listed by Kahlbaum. The former directions for the use of 5-nitro-2,4-xylene as standard for colorimetric comparison are repeated, with the statement that theoretical results are obtained if known sources of error are eliminated. C. J. Schollenberger

Nitron as a precipitant for nitrates. J. h. Heck and M. G. Mellon. *Analyst* 59, 19 25(1934).—In pptg.  $NO_3^-$  as nitron nitrate in solns. of various salts under varying conditions, there is no serious entrainment of other metallic cations or of precipitant. The reproducibility of the results was found satisfactory. On the assumption that the nitrate present is equiv. to the amt. of metal in the nitrates studied, the method was found to be reliable. W. T. H.

Gas volumetric determination of lead dioxide. A. P. Kuchkov and W. K. Ilyuchin. *Z. anal. Chem.* 93, 180–8 (1933). Attempts to analyze  $PbO_2$  and  $Pb_2O_3$  by heating with  $HNO_3$  and  $H_2C_2O_4$  and measuring the  $CO_2$  evolved over Hg led to low results indicating that some  $Pb(C_2O_4)_2$  was probably formed in the decompn. flask and escaped the reduction. A reagent was prepd. by dilg. 250 cc. of concd.  $HNO_3$  with an equal vol. of water and mixing this with 500 cc. of a mixt. of 300 cc. of water and 200 cc. of 1%  $H_2O_2$ . This reagent was satd. with  $O_2$  at the temp. at which the analysis was made. When 2.5 3 g. of  $Pb_2O_3$  was treated with 25 cc. of the acid soln. of  $H_2O_2$  in a suitable app. the  $CO_2$  evolved corresponded closely with the stoichiometric value. The results of 27 expts. compared with those obtained by a modified Diehl-Topf method recommended by the U. S. Bur. Standards indicated that the results obtained by the latter method are a little too low. W. T. H.

Osmium tetroxide as catalyzer for the oxidation of arsenous acid by permanganate and ceric sulfate. Karl Gku. *Z. anal. Chem.* 95, 305–10(1933).—If 3 drops of a soln. which is 0.01 molar in  $OsO_4$  and 0.1  $N$  in  $H_2SO_4$  are added to a soln. contg. about 0.1 g. of  $As_2O_3$  in 0.5–1  $N$   $H_2SO_4$ , the trivalent  $As$  can be titrated with  $KMnO_4$ ; the products are quinquevalent  $As$  and bivalent  $Mn$ . In the absence of catalyst the  $MnO_4^-$  is not reduced. If the  $H_2SO_4$  is replaced by 0.5  $N$   $HCl$ , the titration succeeds only when it takes place very slowly.  $Ce^{++++}$  and trivalent  $As$  do not react appreciably in the presence of  $H_2SO_4$  at room temp. If a little of the  $OsO_4$  soln. is added, the reduction of the yellow  $Ce^{++++}$  to colorless  $Ce^{+++}$  takes place smoothly. Three drops of 0.01 molar ferrous-phenanthroline indicates the end point. For this indica-

tor, which has been called the "phenolphthalein of oxidimetry," the trivial name *ferroin* is proposed for the red form and the name *ferriin* for the oxidized, colorless form. The effect of the  $OsO_4$  on this indicator is curious. The colorless form is not affected by either arsenious acid or ceric sulfate but if the soln. contains an excess of arsenious acid and then a little  $Ce^{++++}$  is added, the addn. of this oxidizing agent causes the reduction of the indicator to the red form. In 0.5–2  $N$   $H_2SO_4$ , therefore, a soln. of arsenious acid can be titrated with  $Ce(SO_4)_2$  if ferroin is used as indicator and  $OsO_4$  as catalyzer. For the reverse titration, it is necessary to add an excess of  $As_2O_3$  soln. and titrate back with  $Ce(SO_4)_2$ . These titrations, however, do not succeed in the presence of  $HCl$ . W. T. H.

Microchemical determination of carbonic acid in carbonates. Wilhelm Reich-Rohrwig. *Z. anal. Chem.* 95, 315–23(1933).—Excellent results were obtained in detg.  $CO_2$  in samples of various carbonates weighing 8–40 mg. The method is the same in principle as that used on the macro scale and here also the use of asbestos impregnated with NaOH proved the most satisfactory absorbent for  $CO_2$ . The original paper should be consulted for details concerning the interesting app. and the necessary technique. W. T. H.

Comparative investigations on the colorimetric and nephelometric estimation of phosphoric acid. F. Alten, H. Weiland and H. Loofmann. *Z. Pflansenernähr. Düngung Bodenk.* 32A, 33–50(1933).—The  $SnCl_2$ -Mo blue colorimetric methods of (I) Denigès (*C. A.* 15, 218), (II) Atkins (*C. A.* 18, 3093) and (III) Zinzadze (*C. A.* 24, 5255) and the  $C_6H_5NHNH_2$ -strychnine Mo red method of (IV) Terada (*C. A.* 19, 225) were investigated by use of the Leitz universal colorimeter for absolute measurements, and the strychnine-Mo nephelometric method of (V) Rauterberg (*C. A.* 26, 2141) with the Zeiss step photometer. None of the methods proved entirely satisfactory with respect to speed of development, constancy and freedom from interference by salts, etc. Colorimetric methods III and IV are best for detn. of 0.05–0.7 mg.  $P_2O_5$ /100 ml. soln. III is unaffected by less than 10 mg. and IV by less than 8 mg. citric acid/100 ml.  $K_2SO_4$  up to 400 mg./100 ml. did not affect IV. V is adapted to the estn. of 0.002–0.04 mg.  $P_2O_5$ . With less than 10  $\gamma$   $P_2O_5$ , the turbidity remains unchanged for several hours, but with larger amounts pptn. takes place proportionally more quickly. Up to 10 mg. of the usual salts have but slight effects. With all methods, the use of freshly prepared reagents is advisable; some authors' claims that reagents are good indefinitely were disproved. Twenty-four references. C. J. Schollenberger

Determination of silicic acid in silicates by difference. G. T. Galfayan and V. M. Tarayan. *Z. anal. Chem.* 92, 417–20(1933).—Moisten 0.5–1.0 g. of the finely powd. silicate in a Pt crucible with 15–20 drops of 18  $N$   $H_2SO_4$ , add 5–7 cc. of HF and evap. on the water bath. Evap. off excess  $H_2SO_4$  by careful heating on the water bath. Add a few more drops of  $H_2SO_4$  and again evap. to fumes. To the dry mass add 3–4 g. of  $NaPO_3$  (prepd. by heating  $NaNH_4HPO_4 \cdot 4H_2O$  to const. wt.) and heat the contents of the crucible carefully at first but eventually at a high heat to a const. wt. From the loss in wt. experienced by this treatment, subtract the loss in wt. which the original material experiences upon ignition and call the difference  $SiO_2$ . By the treatment with  $NaPO_3$ , sulfates of the alkali and alk. earth metals are changed to orthophosphates. W. T. H.

Phenanthroline-ferrous iron. II. Oxidation potentials at high acidities and the determination of vanadium. Geo. H. Walden, Jr., Louis P. Hammett and Sylvan M. Edmonds. *J. Am. Chem. Soc.* 56, 57–60(1934); cf. *C. A.* 25, 5863; 27, 3680.—Potentials relative to each other in 1, 3 and 5  $M$   $H_2SO_4$  and referred to a quinhydrone electrode also in 1, 3 and 5  $M$   $H_2SO_4$  were measured for the  $Fe^{+++}/Fe^{++}$ ,  $VO_3^+/VO^{++}$ ,  $VO^{++}/V^{+++}$  systems and for the oxidimetric indicator, phenanthroline-ferrous ion. In 5  $M$   $H_2SO_4$  V can be quantitatively reduced and the end point of the titration detd. with this indicator. L. P. Hall

**Analysis of salt cake.** Anon. *Paper Trade J.* 97, No. 18, 33-5(1933).—A description of the tentative standard methods of the Tech. Assoc. of the Pulp & Paper Ind.

A. Papineau-Couture

**Finger-print detection.** Henry L. Brose. *Analyst* 59, 25-7(1934).—Technical details are described for detecting finger-prints which have been left on multicolored objects, such as check-patterned cigaret cases. In one method the details of the print are isolated from the object by dusting with phosphorescent ZnS powder and the powder pattern is photographed after it has been rendered luminous by a source of ultra-violet light. In the second method, continuous illumination of the object by means of fluorescent light makes it possible to make the desired photograph.

W. T. H.

**Reactions and reagents for the detection of organic compounds.** II. Edwin Egriwe. *Z. anal. Chem.* 95, 323-7 (1933); cf. C. A. 26, 4709.—**Glyceric acid.**—To 1 drop of the soln. to be tested add a few ml. of a 0.01% soln. of naphthoresorcinol in 96%  $H_2SO_4$ ; and heat on the water bath for 30-50 min.; a blue coloration results with as little as 0.05 mg. of glyceric acid. **Lactic acid.**—Two tests are described which depend on the formation of  $AcH$  and its condensing with phenols. Place 1 drop of the soln. to be tested in a small dry test tube, add 1 ml. of 96%  $H_2SO_4$  and heat 2 min. at  $85^\circ$ , cool under the water tap to  $28^\circ$  and add a little solid *p*-hydroxybiphenyl. Shake to mix the ingredients and allow to stand 10-30 min. A violet coloration results with as little as 0.1 mg. of lactic acid. To another drop of the soln. in a dry test tube, add a small crystal of *p*-hydroxybiphenyl together with a little 96%  $H_2SO_4$ . Heat to  $85^\circ$  for 2 min. and look for a bluish fluorescence which is best observed against a background of black paper. **Pyroracemic acid.**—The above tests for lactic acid can serve for the detection of pyroracemic acid because it is easily reduced to lactic acid by reduction with Mg in  $H_2SO_4$  soln. Place 1 drop of the soln. to be tested in a small dry test tube, add some Mg powder and moisten with a small drop of concd.  $H_2SO_4$ . After the Mg has all dissolved, add a crystal of the reagent and a little 96%  $H_2SO_4$ . If a brown coloration results, it signifies an incomplete reduction of the pyroracemic acid and the test should be repeated with a fully reduced soln. After adding the acid, heat 2 min. at  $85^\circ$  and look for the violet coloration. As little as 0.01 mg. of pyroracemic acid gives a distinct test. **Tartaric acid.**—A green fluorescence characteristic of tartaric acid can be obtained by heating with concd.  $H_2SO_4$  contg.  $\beta, \beta$ -binaphthol.

W. T. H.

**Short-cut method of hydrocarbon analysis.** II. Application to analysis of stabilizer bottoms. R. Rosen and A. E. Robertson. *Ind. Eng. Chem., Anal. Ed.* 6, 12-18 (1934); cf. C. A. 25, 4817.—Application to stabilizer bottoms of the method described in the previous paper for the analysis of stabilizer gas and reflux is described. Routine sample of stabilizer bottoms can be analyzed by means of graphs prepd. from the distn. curves obtained by this short-cut method from synthetic samples covering the range of compns. normally found for stabilizer bottoms. Correction charts are given for use with these graphs when necessary. The method applied to stabilizer bottoms checks microfractionation analysis within 0.5% on the  $C_7H_{16}$ , 1% on the  $C_8H_{18}$  and 2% on the  $C_9H_{20}$  and  $C_{10}H_{22}$  plus heavier-hydrocarbon fractions.

D. F. Brown

**Determination of sulfur in benzene.** H. A. J. Pieters, J. Roessingh van Irterson and S. J. H. Spronck. *Chem. Weekblad* 30, 756-62(1933).—Investigation of the various methods for the detn. of S and S compds. in benzenes with recommendations for minor improvements.

E. Schotte

**The gas volumetric method for the determination of amino nitrogen according to Van Slyke in glycooll and peptides containing glycine.** O. Gerngross and W. Descke. *Ber.* 66B, 1813-14(1933).—The high values given by the Van Slyke method with glycine (10% above the theoretical) and glycylglycine (34% above the theoretical) are not due to gases absorbed by alk.  $KMnO_4$  ( $CO_2$ ) and only a fraction of 1% of  $CO$  could be detected by means of  $NH_3$ - $CuCl$  and of  $N_2O$  by combustion with

<sup>1</sup> H in a Drehschmidt capillary. The excess of gas evolved must, therefore, consist largely of  $N_2$ , and treatment with some appropriate absorbent will not serve to give correct results.

C. A. R.

**Glycerol complexes in volumetric analysis.** Hermann Wagner. *Z. anal. Chem.* 95, 311-15(1933).—The sulfates of Co, Ni, Cu and Zn unite with 3 mols. of glycerol to form sol. complexes. The free  $H_2SO_4$  in a plating bath can be easily titrated to a methyl orange end point with  $N NaOH$  if 30 ml. of neutral glycerol is added to prevent interference of the  $Cu^{++}$ . At the end point the indicator turns yellow and a slight turbidity appears. To det. Zn in a plating bath, it is recommended to destroy cyanogen complexes by evapg. to fumes under a good hood, remove  $NH_4$  salts if necessary by boiling with  $K_2CO_3$ , filter off the  $ZnCO_3$ , dissolve the ppt. in a measured vol. of stand. acid and titrate the excess with  $NaOH$  after adding 30 ml. of neutral glycerol. In the absence of  $NH_4$  salt it is best to ppt. the Zn by adding  $Na_2CO_3$  until a slight, permanent turbidity results, then add 2 drops of phenolphthalein indicator soln. and sufficient  $Na_2CO_3$  soln. to impart a pink color. In this way the basic Zn carbonate ppt. is formed free from excess alkali carbonate. Cd can be detd. as recommended for Zn except that the pptn. of carbonate must take place in the cold. Results obtained by these methods in the hands of 9 different operators are given and show good agreement.

W. T. H.

**A color test for glycerol.** K. Täufel and H. Thaler. *Z. anal. Chem.* 95, 235-9(1933).—Evap. a few cc. of the soln. to dryness, mix the residue with 2 g. of a 40%  $CaO$  paste and again evap. to dryness. Moisten with water, evap. to dryness and repeat these last 2 operations. Pulverize the residue with a glass rod and moisten the brittle mass with a little abs. alc. Ext. 3 times with 3-4 cc. portions of abs. alc. and evap. the alc. soln. to dryness on the water bath. Add 3 cc. of a mixt. of equal parts abs. alc. and ether, filter and wash the residue with 3 cc. more of the mixt. Carefully distil off the alc. in a small distg. flask of Jena glass. To the residue add a little pumice powder and about 15 drops of cryst.  $H_3PO_4$ . Fan with a small flame and heat for about 5 min. when the boiling will be practically over. To the few drops of distillate add 1 drop of 3%  $H_2O_2$  followed at once by 1 cc. of concd.  $HCl$ . Cool under the water tap and shake vigorously for 1 min. Then, to destroy the excess peroxide, add 1 drop of 10%  $KI$  soln. and remove the liberated  $I_2$  by cautious treatment with  $Na_2S_2O_3$  soln. To this soln. add 0.5 cc. of 15% phloroglucinol in ether and shake. A red color should result within 30 min. The test depends on the formation of acrolein which in turn is converted to epihydrinaldehyde that gives a red color with phloroglucinol. The test serves to detect glycerol in wine, vinegar, etc.

W. T. H.

**Determination of coumarin and melilotic acid in *Melilotus officinalis*.** Zofia J. Kanevska and Alexandra M. Fedorova. *Z. anal. Chem.* 93, 176-80(1933).—In 1863 Zwenger and Bodenbender showed that coumarin in *Melilotus officinalis* is combined with "melilotic acid" and Z. showed that this acid can be formed by reducing coumarin with Na amalgam. Since then no quantitative method seems to have been proposed for detg. these 2 substances. Coumarin, by treatment with a boiling soln. of alkali, is converted into a salt of coumarinic acid which cannot be extd. with ether. Acids, however, decompose the salt very easily and since free coumarinic acid is very unstable, the lactone ring soon closes again and coumarin is formed. By extg. 20 g. of the leaves of the plant with ether for 12 hrs. the coumarin, melilotic acid, etc., are removed. By evapg. off the ether, a thick dark green mass is obtained which yields a soln. of coumarin and melilotic acid when boiled 5 min. under a reflux condenser. By filtering, and repeating the boiling 4 times, all the desired constituents are obtained in aq. soln. If this soln. is boiled with 20 cc. of 10%  $NaOH$  soln., the undesirable impurities can be extd. by shaking the cold, alk. soln. 4 times with 50 cc. of ether. Then, by making acid to Congo red with 20%  $H_2SO_4$ , coumarin and melilotic acid are pptd. To sep. them, add  $Na_2CO_3$  to alk. reaction and ext.

4-5 times with ether. From the filtered ether ext. coumarin can be obtained by evapg. Then by adding 20%  $H_2SO_4$ , set free the melilotic acid, ext. it with 3-4 portions of ether, evapg. off the ether and weigh. Tests with synthetic mixts. as well as the results obtained with leaves of the plant indicate that the method is satisfactory.

W. T. H.

**Acidimetric method for determination of phenol in the melt.** M. M. Shemyakin. *Anilinokrasochnaya Prom.* 3, 403-4 (1933).—Rhodes, Jahnes and Bivans (*C. A.* 21, 3049) studied the production of phenol by fusing Na benzenesulfonate with NaOH and recommended an acidimetric method for detg. the phenol in the melt. A ppt. of  $C_6H_5Br_2OH$  was formed in an aliquot part of the aq. ext., which was filtered off, dissolved in a measured vol. of 0.05 N NaOH and the excess titrated with 0.05 N HCl. Detailed directions are given for carrying out a similar procedure which has been found more accurate than any other method. Stress is laid upon the treatment of the neutralized soln. with  $Br_2$  at  $0^\circ$ , removal of excess  $Br_2$  with  $Na_2S_2O_5$ , washing the ppt. with satd. NaCl soln. and finally with alc. and the use of considerable NaCl in the final soln. of the ppt. in NaOH.

Chas. Blanc

**Polarimetric determination of nicotine in tobacco and in tobacco smoke.** Ernst Toole. *Z. anal. Chem.* 93, 188-94 (1933).—Although Popovici (*Z. physiol. Chem.* 13, 445 (1889); *Chem.-Zig.* 13, 1030 (1889)), Degrazia (*C. A.* 5, 2507) and König (*C. A.* 5, 2876) have testified independently that the polarimetric method for detg. nicotine is sufficiently accurate, some doubt has been cast upon the method by Pyl and Schmitt (*C. A.* 22, 1214) who fear that errors may be introduced by the racemization of the nicotine as a result of heating but the expts. described here indicate that this is not the case under the usual exptl. conditions.

W. T. H.

Action of calomel on alkaloid salts and its value for

1 toxicological investigation (Zwicker) 17. Combustion with Cl [detn. of Pb] (Erdős, Groák) 1. Reduction of  $Al_2O_3$  with C [detn. of Al and  $Al_2C_3$ ] (Treadwell, Gyger) 6. Biochemistry of Cu. I. Microdetn. of Cu (Sarata) 11B.

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Laboratory Tables for Qualitative Analysis. Drawn up by the Demonstrators in Chemistry, Univ. of Manchester. 4th ed., rewritten by C. Campbell and J. B. M. Herbert. Manchester: Univ. Press. 17 sheets.

**Gas analysis.** Hilde Bergerhoff née Kiemle. *Ger.* 589,355, Dec. 6, 1933 (Cl. 42f. 4.16). To det.  $SO_2$ ,  $H_2S$ , Cl, HCl and oxides of N in flue gases or air, the gas is forced into a large vessel contg. an absorbent for the gases to be detd., e. g.,  $K_2CO_3$  soln., until a pressure of at least 10 atm. has been attained. The absorbent is then withdrawn and analyzed.

**Detecting and analyzing gaseous fluids.** Paul Malsalez. *Brit.* 398,722, Sept. 21, 1933. Gases, or impurities, e. g., smoke, dust, in gaseous fluids, are analyzed or detected by subjecting to the ionizing action of particles emitted by a radioactive substance in an elec. field, the elec. charges resulting from the dissocn. of the gaseous mols. forming an elec. current which is amplified and measured or operates controlling, signalling, ventilating or other app. App. is described.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

**Mercury in native silver.** W. H. Newhouse. *Am. Mineral.* 18, 295-9 (1933).—Hg was found to be present in the native Ag from many localities. Ag amalgam richest in Hg was found in deposits with cinnabar or with Co and Ni minerals. The Ag contg. Hg is probably of hypogene origin.

A. M. Brant

**Metallic minerals in anhydrite cap rock, Winnfield salt dome, Louisiana.** Virgil E. Barnes. *Am. Mineral.* 18, 335-40 (1933).—The minerals formed in parallel planes, producing distinct banding in the anhydrite. They are epigenetic and were deposited in the order: As, chalcocite and enargite-chalcopryrite.

A. M. B.

**X-ray study of pyrite or marcasite concretions in the rocks of the Cleveland, Ohio, quadrangle.** Frank R. Van Horn and Kent R. Van Horn. *Am. Mineral.* 18, 288-94 (1933).—Crystallographic observations and x-ray analysis show that these concretions are pyrite.

A. M. B.

**The occurrence of strontianite at Sierra Mojada, Mexico.** Philip Krieger. *Am. Mineral.* 18, 345-50 (1933).—Strontianite as a gang mineral is confined to the Suiza ore body. It is distinctly secondary and assocd. with anglesite and cerussite. Celestite, deposited by ascending hydrothermal solns., was the primary mineral assocd. with the ore deposition.

A. M. Brant

**Topaz from the deposits at Guta-Pisarevka Volodar region, Voluin.** L. A. Krizhanovskii. *Mineral. Suir'e* 8, Nos. 8-9, 14-17 (1933).—The discovery of deposits of topaz and smoky quartz in the pegmatite veins and their properties are described.

Chas. Blanc

**Bavenite: symmetry, unit cell.** C. J. Ksanda and H. E. Merwin. *Am. Mineral.* 18, 341-4 (1933); cf. *C. A.* 26, 5515.—Bavenite is given a new orthorhombic orientation with  $a:b:c = 0.839:1:0.429$ . X-ray data yielded a unit cell  $a_0 = 9.67$ ,  $b_0 = 11.53$ ,  $c_0 = 4.95$  Å., with one mol. of  $2 SiO_2 \cdot Al_2O_3 \cdot BeO \cdot 4 CaO \cdot H_2O$  per unit cell. The d.

6 is  $2.74$ . Optical orientation:  $\gamma = a = Bx_a$ ,  $\alpha = c$ ;  $+2V = 46-58^\circ$ ,  $n_D: \alpha = 1.583-4$ ,  $\beta = 1.585$ ,  $\gamma = 1.590$ . Cleavage (100) is perfect, (001) fair.

A. M. Brant

**Some properties of authigenic tourmaline from Lower Devonian sediments.** Stella West Alty. *Am. Mineral.* 18, 351-5 (1933); cf. *C. A.* 26, 4773.—Detrital grains of tourmaline from the Lower Monroe dolomite, in Monroe Co., Mich., were found to have a secondary authigenic growth of colorless tourmaline at one end. This end was shown to be the antilogous pole of the mineral by pyroelec. tests.  $n_w = 1.628$  and  $n_e = 1.610$  in the colorless portion of the grains.

A. M. Brant

**Brown tourmaline from Frontenac and Renfrew Counties, Ontario.** G. A. Harcourt. *Am. Mineral.* 18, 356-8 (1933).—Optical properties by the double variation method are charted for 2 finds of dark brown tourmaline. Qual. study by quartz wedge spectrograph indicated these to be Mg tourmaline with Cr present in the Frontenac mineral.

A. M. Brant

**Crystal cavities in lavas from the Hawaiian Islands.** Kingsley C. Dunham. *Am. Mineral.* 18, 369-85 (1933).—New chem. analyses are recorded for *nephelite*, *phillipsite*, *chabazite*, *hydronephelite*, *allophane*, *laumontite*, *heulandite* and *philolite*. The optical properties are given for these and other minerals occurring in veins, cavities and amygdulites in lavas at Moiliili quarry, Honolulu, Alexander dam, Kauai and Lanakai Hills, Hawaii. The zeolites are thought to indicate a hydrothermal stage of the lava-magma.

A. M. Brant

**Additional notes on laumontite and thomsonite from Table Mountain, Colorado.** E. P. Henderson and Jewell J. Glass. *Am. Mineral.* 18, 402-6 (1933).—Chem. analyses and optical data are given for golden brown laumontite and the assocd. thomsonite found in vesicular cavities in basalt.

A. M. Brant

Clay minerals and bauxitic minerals. A review and classification based on a statistical method. S. I. Tomkeieff. *Mineralog. Mag.* 23, 463-82 (1933).—Plotting of available analyses on triangular diagrams, and frequency curves for the important ratios, lead to a classification of the clay minerals into 5 groups on the basis of the  $\text{SiO}_2:\text{Al}_2\text{O}_3$  ratio, termed resp., fuller's earth, pyrophyllite, anauxite, kaolinite and bauxitic clay. In addn. there are bentonitic clay minerals, micaceous halloysite, beidellite, montmorillonite, etc. Many supposed species are thought to be mixts., hydration products, or colloidal hydrates of variable compn. No data as to phys., optical, crystallographic or structural features are taken into account.

A. M. Brant  
Corvusite and rilandite, new minerals from the Utah-Colorado carnotite region. Edward P. Henderson and Frank L. Hess. *Am. Mineral.* 18, 195-205 (1933).—Corvusite has a purplish blue black to dark brown color and is massive with a conchoidal fracture. Hardness is 2.5 to 3, and sp. gr. 2.82. The chem. analysis indicates the tentative formula  $\text{V}_2\text{O}_5 \cdot 6\text{V}_2\text{O}_3 \cdot \text{XH}_2\text{O}$ . Rilandite is a compact, dull pitch-like material with a dark brownish black color. It is very brittle with flat conchoidal fracture, hardness 2-3, and streak grayish brown. It is found on the outer surfaces of petrified wood, and its analysis shows 47.50%  $\text{Cr}_2\text{O}_3$ .

A. M. Brant  
The origin of the sand barites of the Lower Permian of Oklahoma. W. A. Tarr. *Am. Mineral.* 18, 260-72 (1933).—The barite concretions and rosetts in the Garber sandstone formation are local in horizontal and vertical distribution. The crystals in the rosetts have various orientations. The Ba is thought to have been derived from Ba silicates, Ba adsorbed in colloids or detrital barite through leaching by chloride waters. After being carried a short distance it was deposited as barite, by reaction with a sol. sulfate, as a cementing material in the sandstone. Analyses show 37-45% sand in these sand-barites.

A. M. Brant  
Origin of tectites. V. S. Dubey. *Nature* 132, 678 (1933); cf. L. J. Spencer, *C. A.* 27, 3899; *Nature* 131, 876 (1933).—The radioactive content of tectites from widely different parts of the earth is nearly const. (Ra content  $1.00 \times 10^{-12}$  per g.) and is very different from that of several kinds of glass. The radioactivity of tectites is approx. the same as that of granites and suggests that tectites may be derived from some mass similar in chem. compn. as well as in radioactivity to the granitic layer of the earth.

Helen S. Hopfield  
Origin of tectites. J. B. Scrivenor. *Nature* 132, 678 (1933); cf. preceding abstr. An argument against Spencer's suggestion that tectites are formed by the fusion of terrestrial material in meteorite craters is the fact that no tectite has been found contg. partially fused rock or sand. His suggestion is supported by the presence of metallic spheres in Darwin glass and tectites from Indochina, and by the presence of Ni in 3 Malayan tectites.

Helen S. Hopfield  
Production and value of minerals and mineral products in Michigan, 1927 to 1931 and prior years. W. Osgood

1 and O. F. Poindexter. *Michigan Geol. Survey Summary Rept. No. 1*, 46 pp. (1933). E. J. C.

Mineral industry of New Jersey for 1931. M. F. Johnson. *New Jersey Dept. Conserv. Dev. Bull. No. 40*, 18 pp. (1933); *Econ. Geol.* 28, 510.—Production statistics. E. J. C.

Mineral investigations in the Alaska railroad belt, 1931. S. R. Capps. *U. S. Geol. Survey Bull.* 844-B, 16 pp. (1933). E. J. C.

2 Geology and mineral resources of the Middletown Quadrangle, Pennsylvania. Geo. W. Stose and Anna I. Jonas. *U. S. Geol. Survey Bull.* 840, 86 pp. (1933); *Econ. Geol.* 28, 610.—Stratigraphy, structure, geologic history, and mineral resources (non-metallics). E. J. C.

3 Metalliferous deposits of the Greater Helena Mining Region, Montana. J. T. Pardee and F. C. Schrader. *U. S. Geol. Survey Bull.* 842, 309 pp. (1933). E. H.

Geology of the central part of the Mazoe Valley gold belt. R. Tyndale-Biscoe. *Southern Rhodesia Geol. Survey Bull. No. 22*, 120 pp. (1933); *Econ. Geol.* 28, 702. General geology, stratigraphy, petrology, structure and economic geology. Numerous rock analyses are given. E. J. C.

Clay and shale resources in Southwestern Pennsylvania. H. Leighton and J. B. Shaw. *Penna. Topog. Geol. Survey Bull. M-17*, 190 pp. (1932); *Econ. Geol.* 28, 702.—General treatment, plus descriptions and tests of all clay occurrences. E. J. C.

Brucite deposit, Paradise Range, Nevada. E. Callaghan. *Univ. Nevada Bull.* 27, No. 1, 34 pp. (1933); *Econ. Geol.* 28, 510.—Brucite and magnesite in Triassic dolomite are due to hypogene magnesian solns. from granodioritic intrusive. E. J. C.

Kyanite in Virginia. A. I. Jonas and J. H. Watkins. *Virginia Geol. Survey Bull. No. 38*, 52 pp. (1932); *Econ. Geol.* 28, 611.—Description of the geology of a belt of kyanite-bearing quartzites and pegmatites. E. J. C.

5 Thorium minerals as age indicators. Roger C. Wells. *J. Wash. Acad. Sci.* 23, 541-4 (1933). Monazite and thorianite seem to be less easily altered than uraninite. In urano-thorites it cannot be assumed that the Pb isotopes have been sep'd. by leaching and a loss of U would have to be postulated to bring the Ra G/U and Th D/Pb ratios in agreement. It is suggested that the lower ratios and shorter ages be accepted in some cases and that the origin of the pegmatites and condition of the specimens should be carefully studied and described. A. M. B.

Four cryst. hydrates of Na metasilicate (Baker, et al.)  
6. Haüy-Bravais lattice and other crystallographic data for Na molybdo-tellurate (Donnay, Mélon) 6.

7 Boswell, P. G. H.: On the Mineralogy of Sedimentary Rocks. A Series of Essays and a Bibliography. London Thos. Murby & Co. 393 pp. 21s. net. Reviewed in *Mineralog. Abstracts* 5, 340 (1933).

Crook, Thomas: History of the Theory of Ore Deposits: with a Chapter on the Rise of Petrology. New York: D. Van Nostrand Co., Inc., 163 pp. 10s. 6d. net

## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Gold and silver in 1931. J. P. Dunlop. *Bur. Mines, Mineral Resources of the U. S. 1931, Pt. I*, 679-710 (preprint No. 30, published October 25, 1933). E. H.

Gold, silver, copper, lead and zinc in California and Oregon in 1931. V. C. Heikes. *Bur. Mines, Mineral Resources of the U. S. 1931, Pt. I*, 633-77 (preprint No. 29, published October 31, 1933). E. H.

Scientific research—its possible future bearing on the nonferrous metal industries. Colin G. Fink. *Eng. Mining J.* 135, 81-3 (1934). W. H. Boynton

The chemical basis of flotation. I. W. Wark. *Proc. Australasian Inst. Mining Met.* No. 90, 88-123 (1933).—Contact angles between pure minerals and collectors contg.

$\text{CH}_3$  group were  $50^\circ$ ,  $\text{C}_2\text{H}_5$  group  $60^\circ$ ,  $\text{C}_6\text{H}_5$  group  $74^\circ$ , benzyl  $71^\circ$ , etc. W. postulates adsorption leaving the nonpolar group always exposed. Curves of  $p_H$  vs. NaCN concn. show limiting conditions for contact for various minerals. The function of alkali present with NaCN as a depressant is solely to control the cyanide-ion concn., which in turn is the factor detg. whether or not contact can occur. Alden H. Emery

Mechanism of the flotation process. D. L. Talmud. *J. Tech. Phys. (U. S. S. R.)* 3, 540-9 (1933).—Sepn. of  $\text{PbS}$  and  $\text{CaCO}_3$  is discussed to illustrate selective flotation.

F. H. Rathmann  
Oxygen-free flotation. I. Flotation of galena in ab-

sence of oxygen. S. Frederick Ravitz and Robert R. Porter. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 513, 17 pp.* (1933).—O<sub>2</sub> content of the solns. used was less than 0.8 parts per 100,000,000. Pure unoxidized galena will float completely and rapidly with terpineol soln. alone, even at very low concns., or Na ethylxanthate alone, or in the complete absence of any reagents. The oxidation products on the surface of galena exert an inhibiting effect on its flotation. Explanations are offered. A. H. E.

Flotation of Rammelsberg lead-zinc ore. A contribution to the flotation of complex lead-zinc ores. A. Götze and E. Kraume. *Metall u. Erz* 30, 509-14 (1933).—Collective and selective flotation and the effects of various flotation agents are studied. H. Stoertz

Progress in the realm of ore-dressing technic. H. Madel. *Metall u. Erz* 30, 493-509 (1933).—New developments in grinding, grain-size detn., amalgamation, flotation and magnetic sepn. are discussed. H. S.

Milling methods at the oxide concentrator of the International Smelting Co., Tooele, Utah. J. J. Bean. *Bur. Mines, Information Circ. 6759, 8 pp.* (1933).—Siliceous oxidized Pb ores are concd. by flotation. The flow sheet is described. In Sept., 1930, heads assayed Cu 0.18, Pb 18.43, Fe 7.32, insol. 56.35%, Au 0.0567 oz. and Ag 24.85 oz. per ton. The Pb concentrate assayed Cu 0.36, Pb 47.02, Fe 13.94, insol. 16.73%, Au 0.114 oz. and Ag 58.76 oz. and contained 94.6% of the Pb, 43.7% of the Fe, 74.6% of the Au and 87.7% of the Ag. The tailing assayed Cu 0.08, Pb 1.58, Fe 6.56, insol. 79.69%, Au 0.023 oz. and Ag 4.87 oz. Reagent consumption was Na amylxanthate 1.5, Na<sub>2</sub>S 6.0, Na silicate 4.0, ethylxanthate 1.2 and pentasol (frother) 0.30 lb. per ton. Alden H. Emery

Direct recovery of metals from sulfidic copper ores, with special reference to Mansfeld copper shale. C. Goetz. *Metall u. Erz* 30, 469-80 (1933).—Cu is recovered from Cu shales by heating at temps. of 600-800° in an inert gas and in contact with Fe<sub>2</sub>O<sub>3</sub>. H. Stoertz

Precipitation of copper by nickel mat. Walter Savelsberg. *Metall u. Erz* 30, 445-8 (1933).—In the pptn. of Cu from soln. by Ni mat, the metallic part of the Ni mat is not effective, but the Cu is pptd. as sulfide by the sulfidic part of the mat. X-ray analysis confirms this. H. Stoertz

Separation of cobalt and nickel in aqueous solution for the practical recovery of the individual metals. H. Grotle. *Metall u. Erz* 30, 449-55 (1933).—If the original soln. contains no more than 5 parts of Ni to 100 parts of Co, Co can be pptd. with NH<sub>4</sub>OH + (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The ppt. will contain no more than 1 part of Ni per 100 parts of Co. H. Stoertz

The application of low-temperature reduction to certain Ontario iron ores. J. R. Gordon and O. W. Ellis. *Can. Mining Inst. Bull. No. 260, 772-4* (1933); cf. C. A. 28, 4367. - Discussion. Alden H. Emery

Reduction of iron ores by means of natural gas. C. Căndea and J. Kühn. *Roczniki Chem.* 13, 482-94 (1933) (in German).—The reducing efficiency of the natural gas (contg. 94% CH<sub>4</sub>) found at Sărmasel (Roumania) on pure Fe<sub>2</sub>O<sub>3</sub>, magnetite, limonite, siderite and hematite was studied. Expts. carried out on Fe<sub>2</sub>O<sub>3</sub>, show that the reduction of this oxide to Fe<sub>3</sub>O<sub>4</sub> begins at 450° and to FeO at 750-850°, while at 850° metallic Fe is obtained. The amt. of C formed in the course of the reaction increases, since the metallic Fe catalytically hastens the decompn. of CH<sub>4</sub> to C and H<sub>2</sub>. It is possible to keep the amt. of C a min. by controlling temp. and rate of flow of gas within narrow limits. The authors modified the course of the reaction so as to obtain Fe with a low C content. A catalyst added to the sample being reduced partially decomposed the CH<sub>4</sub>, yielding a gas enriched by H<sub>2</sub>. The conditions and course of reduction for limonite, magnetite, siderite and hematite were the same as for Fe<sub>2</sub>O<sub>3</sub>, higher temps. being required to attain the same degree of reduction. C. T. Ichniowski

Basic open-hearth bottom-cast practice and iron-oxide control. W. J. Reagan. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 520, 15 pp.* (1934).—Basic open-hearth bottom-cast ingots can be produced commercially free from cracks, free from excessive pipe, with yields usually greater than that obtained from top-cast ingots, and

with comparative freedom from nonmetallic inclusions. Control of FeO is described; it decreases cost of steel mfg. as a result of greater efficiencies of addns., higher yields and better quality of steel. Alden H. Emery

Can grinding costs be reduced? Byron M. Bird. *Eng. Mining J.* 135, 26-9 (1934).—Over-grinding is responsible for a major portion of grinding costs. Tabling, laundering processes and jigging are discussed in their relation to the liberation of mineral and gang at coarse sizes. A desliming classifier of the vertical current type is needed to reduce the tendency to over-grinding. W. H. Boynton

Chlorine smelting with chloride electrolysis. Edgar A. Ashcroft. *Bull. Inst. Mining Met. No. 351, 1-27* (1933); cf. C. A. 28, 438°. - Discussion. Alden H. Emery

Experiments in flash-roasting. Frank S. Wartman. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 514, 12 pp.* (1933).—Flash-roasting expts. were made on chalcocite and chalcopyrite in a furnace 2 by 60 in. From 1000° to 1100°, variations in particle size below 100 mesh produced no significant effect on the S content of the calcine provided up draft and excess air were used. At temps. < 1000° or with down draft, the S content was greater with larger av. particle size. From 1000° to 1250°, variations in temp. produced no marked effect. A calcine with higher S was produced below 1000°. Below 700° very little roasting was done. Up draft gave more complete S removal than down draft. At 1100°, with mineral grains finer than 100 mesh, there was little difference in furnace chambers of 2 1/2 or 5 ft. high. At temps. above 1000°, utilization of O<sub>2</sub> was practically complete up to the point at which most of the S was removed. Use of excess O<sub>2</sub> had little effect in reducing S in the calcine. From chalcocite, both Cu<sub>2</sub>O and CuO are formed; from bornite or chalcopyrite, cupric ferrite and CuO are formed. Cuprous ferrite (Cu<sub>2</sub>O.Fe<sub>2</sub>O<sub>3</sub>), d. 5.47, hexagonal, slightly magnetic, black, may be formed by direct union of the oxides at high temps., by using excess Cu<sub>2</sub>O, and quenching. CuO.Fe<sub>2</sub>O<sub>3</sub> occurs in 2 forms. One is cubic, d. 5.3, strongly ferromagnetic, steel-gray in color, and is formed by heating a mixt. of oxides in suitable proportions at 800-900° and cooling rapidly. Heated for some time at 350° it transforms to a tetragonal variety, d. 5.29, brown and feebly magnetic. All are readily sol. in strong HCl and in HCl mixed with H<sub>2</sub>O, less rapidly in strong HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>, and almost insol. in strong NH<sub>3</sub> and in boiling 8% NaCN. Calcines from chalcocite were leached readily with acid Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>. Presence of Fe results in ferrite formation. Ferrites are practically insol. in all leaching reagent at present regarded as commercially practicable. Formation of ferrites may be prevented by keeping the roaster temp. < 700° and using a very fine feed. Alden H. Emery

The use of special atmospheres for industrial furnaces. W. W. Young. *Gas Age-Record* 73, 56-8 (1934).—The production of artificial atms. for use in metallurgy is discussed. H. L. Olin

Vacuum furnaces in metallurgy. N. A. Zeigler. *Metals & Alloys* 5, 5-9 (1934).—Various types of lab. induction and resistance vacuum furnaces for melting and annealing are described and many suggestions are offered toward their com. utilization on a larger scale. D. S.

Construction and operation of Siemens-Martin furnaces fired with cold coke-oven gas. Otto Schweitzer. *Stahl u. Eisen* 54, 1-11, 29-36 (1934). E. H.

Influence of the most important slag formers upon the temperature-viscosity relationship of Mansfeld slags. K. Endell, W. Müllensiefen and K. Wagenmann. *Metall u. Erz* 30, 425-31 (1933).—At 1300° the viscosity of the slag is lowered by addn. of CaO, MgO, K<sub>2</sub>O and is raised by SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>. Under 1300°, the influence of temp. upon viscosity increases more than the influence of chem. compn., and is very great at lower temps. H. S.

Some metallurgical aspects of the present production of steel and other ferrous castings. R. A. Bull. *Metals & Alloys* 5, 1-4 (1934).—Comments regarding purchase specifications and metallurgical terminology of ferrous castings. Downs Schaeff

The present-day position of the science of steel making.

Andrew McCance. *J. West Scot. Iron Steel Inst.* **41**, 3-12 (1933). E. H.

Production of Hadfield steel by blending Bessemer steel with ferro-manganese melted in a cupola furnace. I. E. Brainin. *Metallurg* **8**, No. 6, 21-7(1933).—Fe-Mn was melted in a cupola furnace by using the blast as little as possible and then mixed in a ladle with the converter steel. Satisfactory results were obtained if Fe-Si was added to the converter charge to raise the temp. of the steel.

H. W. Rathmann

Mechanical properties of metals at low temperatures. II. Non ferrous materials. E. W. Colbeck and W. E. MacGillivray. *Trans. Inst. Chem. Engrs.* (London) **1933**, Nov. 29, 13 pp.(preprint); cf. *C. A.* **27**, 5289.—Metals tested were: Cu; Cu-Ni, 80/20, 55/45, 30/70; Ni; Ni-Ag; brass 70/30; Al; Al bronze; Y alloy; solder. It was difficult to generalize on the large no. of results reported except, possibly, the Cu, Ni and their alloys are valuable metals for low-temp. work where ductility is of importance. Greatest improvement in elongation values in the Cu-Ni series is between  $-120^{\circ}$  and  $-180^{\circ}$ . There was marked deterioration of ductility in solder at  $-180^{\circ}$ , probably because of high Sn content. H. E. Sillman

Creep testing of metals and the application of creep-test data to industry. Elbert S. Rowland. *Mineral Industries, Penna. State Coll.* **3**, No. 4, 1-2(1934).—General.

Alden H. Emery

The use of the radioactive isotope of lead, thorium B, in the study of metallurgical problems. G. Tammann and G. Bandel. *Z. Metallkunde* **25**, 153-6, 207-9(1933).—Th B is prep'd. by pptg. an active deposit from the emanation on a metal sample strip connected to the neg. pole of a lighting circuit (220 v.) in a glass vessel covered by Cu connected to the pos. pole. 1.3 mg. radio-Th ppts.  $8 \times 10^{-4}$  mg active deposit in 24-48 hrs., 10% of which is deposited on the metal sample strip; the deposit is chiefly Th B. The metal strip is melted under H<sub>2</sub>, polished (not etched) and laid upon a photographic plate to effect photographic registration of  $\alpha$ -particles. A large no. of such contact radiographs are shown: solid Pb dissolves Th B and thus only a general darkening is obtained; Tl is similar; Mg shows stars which disappear to uniform blackening on annealing the sample; Bi, Sn, Sb, Ag, Au and Cu show deposition of Th B in dendrites, Ni at grain boundaries; Cd shows dendritic structure, which on annealing gives way to uniform blackening because of diffusion, thus showing Th B (and Pb) to be slightly sol. in Cd. Solid soly. of Pb in metals shown in this way is remarkably low; for some metals it is lower than  $10^{-4}$ , though the effect of Pb already present in the sample confuses the point somewhat; previous data showing higher soly. of Pb in thin metals are probably wrong. Th B preferentially dissolves in liquid inclusions and thus offers a means for recognizing them even when submicroscopic, such as oxides, sulfides, and phosphides in Fe and steel. The primary casting structure is also shown, by reason of the concn. of Th B between dendrites and at grain boundaries. This concn. is not affected by any transformation in the solid state, thus offering an unaffected record of the original casting structure, as exemplified by the pearlite transformation in steels and transformations in the systems Ag-Zn ( $\beta$ ), Cu-Zn ( $\beta$ ), Mg-Cd, Au-Cd. Cast Al shows Th B to be between dendrites; Th B dissolves in the included  $Al_2O_3$ . Th B also dissolves preferentially in MgO and thus records this comp'd. in Mg ingots. When liquid Al contg. Th B is shaken with liquid Pb, the Th B migrates entirely to the Pb; a similar parting is shown when Al is shaken with Bi, Tl or Cd, the latter metals taking the Th B; similarly Th B migrates to Pb and Tl from molten Zn. Cast Cd shows Th B at grain boundaries and in dendritic structure; cold rolling elongates these films, and this elongation may be perceived even after lower-temp. recrystn., though high-temp. annealing destroys the record by the progressive soln. of the Th B in solid Cd. R. F. Mehl

The broadening of the Debye-Scherrer lines on the röntgenograms of metals after cold working and annealing. S. Konobeyevskii and I. Seliskii. *Physik. Z. Sowjetunion* **4**, 459-80(1933).—This phenomenon was studied with Cu,

Fe, Al, Zn, Mg and the Al-Zn-Mg alloy "Electron AZM." For Mg, the width of the line is an exponential function of the annealing time for temps. below recrystn. For "Electron," a triplet instead of the  $K_{\alpha}$  doublet is found for high-order lines; this is explained by diffusion of the Al and Zn atoms in the deformed solid-soln. lattice. It is theoretically shown that, in certain temp. intervals, elastic strains can be relieved through a redistribution of the atoms of the components of the solid soln.

Victor Hicks

Can metal surfaces be made passive? H. Hebbingling. *Oberflächentechn.* **10**, 257-8(1933).—The question is discussed to what extent rusting and oxidation of Fe can be prevented by rendering the surface passive and then applying protective coats or paint. According to the theory that metal corrosion is an electrochemical process, rusting of Fe takes place between the potential range of  $-0.2$  v. (subpassive state) and  $+0.4$  v. (subactive state); the state of "superactivity" or "cathodic passivity" is characterized by an interval of  $+0.5$  to  $+0.9$  v., the state of "anodic passivity" from  $-0.2$  to  $-0.9$  v. In the range of these 2 extremes Fe remains absolutely free of rust, in the first case, however, only in the presence of alk. solns. of low concn. A number of expts. which have been made to elucidate this behavior and to decide whether such passivation is indeed the reason for non-rusting are reviewed. Only in the case of Fe embedded in lead peroxide could the existence of a passive layer be proved with certainty. A practically useful treatment of the surface has so far not been developed. M. Hartenhein

Methods of preparation of graphitized metals and alloys. M. P. Slavinskii and A. C. Turnarev. *Metallurg* **8**, No. 4-5, 70-91(1933).—Antifriction bronze contg. graphite was produced by mixing the graphite with the powdered alloy, briquetting under a pressure of 1-3000 kg. per sq. cm., and heating to a temp. between the solidus and the liquidus in a H atm. After furnace cooling the specimens were again pressed to increase their d. and hardness. A 10% Sn bronze mixed with 10% graphite, heated to  $880^{\circ}$  and subjected to 3000 kg. per sq. cm. before heating and 2400 kg. after heating, had a Brinell hardness of 35 and a compressive strength of 24.2 kg. per sq. mm. Satisfactory results were also obtained with a crude copper contg. Sn 5.51, Pb 7.18 and Zn 1.81%. Brass and Al bronze gave poor results because of the small temp. interval between the solidus and the liquidus. H. W. R.

Gases evolved from ferrosilicons under the influence of water. H. Delomenie. *J. pharm. chim.* **18**, 289-92 (1933); cf. Lebeau, *C. A.* **3**, 867; Schut and Jansen, *C. A.* **26**, 2951; Wilmet, *Study and Analysis of Gaseous Mixtures*. Thesis. Paris, 1929.—Powd. samples of ferrosilicon kept under water *in vacuo* for 3 days gave off H, PH<sub>3</sub> and AsH<sub>3</sub>. They were sep'd. by a concd. soln. of Cd-(AcO)<sub>2</sub> which absorbs AsH<sub>3</sub> only. PH<sub>3</sub> was then absorbed by a viscous soln. of H<sub>2</sub>SeO<sub>4</sub> (Wilmet). With samples contg. (I) 20-30% Si, H is evolved chiefly, up to 2000 l. per ton. With (II) 30-60% Si, PH<sub>3</sub> 10-230 l., AsH<sub>3</sub> 5-39 l. per ton, and very little H were given off. With samples (III) above 60% Si, much H, AsH<sub>3</sub> not more than 3 l. and PH<sub>3</sub> 3-60 l. per ton were set free. Formation of H in group I is caused by electrolysis; in II mainly by decompn. of Ca silicide (A) with H<sub>2</sub>O; in III by decompn. of A and action of Ca(OH)<sub>2</sub> and H<sub>2</sub>O on free Si. PH<sub>3</sub> and AsH<sub>3</sub> are formed from phosphides and arsenides notably of Al; they are readily decomposed by H<sub>2</sub>O. A pure alloy of 50% Si remained compact and unaltered in moist air; addn. of these impurities caused disintegration. S. Waldbott

Segregation. G. Masing and E. Scheuer. *Z. Metallkunde* **25**, 173-8(1933).—A review. Cf. *C. A.* **27**, 5040.

R. F. Mehl

Methods of stripping plated coatings. A. Brenner. *Metal Cleaning and Finishing* **5**, 464-6, 475(1933).—Methods for the removal of Ni, Cu and Cr deposits from steel or from each other for analytical purposes and for replating are described. Also in *Monthly Rev. Am. Electroplaters' Soc.* **20**, No. 3, 7-12(Nov., 1933).

D. Thuesen

Developments in fluxing practice for hot-dip zinc coating



Wallace G. Imhoff. *Metal Cleaning and Finishing* 5, 471-3, 507-8, 517-18(1933).—Review of recent progress.

D. Thuesen

The effect of the temperature of liquid hydrogen ( $-252.8^\circ$ ) on the tensile properties of forty-one specimens of metals comprising (a) pure iron 99.85%; (b) four carbon steels; (c) thirty alloy steels; (d) copper and nickel; (e) four non-ferrous alloys. W. J. de Haas and Robert Hadfield. *Phil. Trans. Roy. Soc. (London)* A232, 297-332(1933).—To follow further the changes in the tensile properties of Fe and its alloys observed at the temp. of liquid air,  $-182^\circ$  (described in *Proc. Roy. Soc. (London)* A74, 326(1904)), and to det. whether a regular progression occurs in these changes or whether any critical change of behavior happens on going to lower temps., various samples of Fe and its alloys and of some non-ferrous alloys were tested at the temp. of liquid H<sub>2</sub>,  $-252.8^\circ$ . The app. and method used in the expts. are described in detail. Fe, ordinary steels and most of the alloys of Fe, which at  $-182^\circ$  retained a slight degree of toughness, had lost all ductility at  $-252.8^\circ$ . Alloys comparatively high in Ni, however, still retain remarkable ductility; e. g., an alloy of Fe with 57.5% Ni exhibits an elongation of 35.5% with a tenacity of 73.3 tons per sq. in. Pure Ni is actually stronger, tougher and harder at  $-252.8^\circ$  than at room temp. Similarly, the mechanical properties of Cu and Al improve with the lowering of the temp. to  $-252.8^\circ$ . C in amounts of 0.1 to 0.3% minimizes the tendency of Fe toward increased brittleness and causes its tenacity to increase below  $-182^\circ$ . The effects of low temp. on the mechanical properties are temporary, the various materials recovering their normal condition at ordinary temps.

C. C. Kiess

Oxygen in cast iron. Wm. F. Chubb. *Metallurgia* 8, 125-6, 147-8; 9, 53-4(1933).—A review. J. L. G.

New etching agents for the phosphide eutectic in gray cast iron. W. Heike and J. Gerlach. *Giesserei* 20, 561-3(1933).—Specimens are etched first in 2% HNO<sub>3</sub> in alc., washed, then polished with a soln. contg. 100 cc. H<sub>2</sub>O, 100 cc. alc., 10 cc. concd. HNO<sub>3</sub>, 10 g. tartaric acid, 10 g. ammon. 10 g. FeCl<sub>3</sub> and 10 g. Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, then placed in a 10% KOH soln. and finally in a cold 10% KOH soln. satd. with KMnO<sub>4</sub>.

Curtis L. Wilson

Experiments on the resistance to wear of nitrogen-hardened cast iron. J. E. Hurst. *Engineering* 137, 50-1(1934).—See C. A. 27, 5287. G. G.

Impact resistance of cast iron at elevated temperature. I. B. Dahle. *Metals & Alloys* 5, 17-18(1934).

Downs Schaaf

Chromium stainless cast iron. V. V. Skorcheletti, A. I. Shultin and V. I. Naumov. *Metallurg* 8, No. 4-5, 23-36(1933).—Forty-seven alloys contg. C 0.9-4.0, Si 0.8-4.5 and Cr 20-37% were prepd. and tested for phys. properties and corrosion resistance. Micrographs show the eutectic structure at 2.4% C in an alloy contg. 30% Cr. Alloys contg. C 2.0-2.8, Si 1.3-1.4, Mn 0.5 and Cr 34-5% resist corrosion very well in oxidizing solns. but are rapidly attacked in reducing solns., have high mechanical properties, especially in bending tests and can be satisfactorily machined despite their high hardness (about 350 Brinell). These alloys showed a loss in wt. in 66% hot HNO<sub>3</sub> of 1.84-2.37 g. per sq. m. per hr. as compared to 1.37 g. for Krupp V2A steel (18-8).

H. W. Rathmann

Iron or permalloy. K. V. Grigorov. *J. Tech. Phys. (U. S. S. R.)* 2, 371-4(1932). F. H. Rathmann

A comparative evaluation of the methods for the determination of slag and gas inclusions in steel. N. Leve. *Stal* 3, No. 4-5, 37-45(1933).—A description of chem. and metallographic methods for detg. inclusions, with micrographs. Thirty-four references. H. W. R.

Mechanical properties of alloy steels at high temperatures. M. Vratzki and I. Frantzevich. *Stal* 3, No. 4-5, 52-68(1933).—Steels of the 3310, 3335, 52,100 and 4130 types were tested for tensile strength, elongation and reduction of area at temp. from 600° to 1200°. At 600° the tensile strengths were 24.6, 27.4, 54.7 and 34.0 kg. per sq. mm., resp., while at 1200° all tested approx. 2.5-3.0. The formula  $R = R_0 e^{-\alpha T}$  is proposed, where  $T$  is

the abs. temp. and the const.  $m$  varies for the  $\alpha$ ,  $\beta$  and  $\gamma$  phases, depending on the internal energy of the space lattice. H. W. Rathmann

The chemical nature of structural transformations in plain and alloy steels. G. Nesselshaus. *Stal* 3, No. 4-5, 46-51(1933).—The theory of hardening and factors to be considered in heat treating are given. N. believes that "temper brittleness" in Ni-Cr steels is due to pptn. hardening. H. W. Rathmann

The influence of a second alloying metal on the properties of copper-alloy steel with special regard to red-brittleness. W. Raedeker. *Mitt. Forschungsinst. Ver. Stahlwerke Dortmund* 3, 173-98(1933).—Improvement in tensile strength of C steel caused by addn. of Cu in small amts., as influenced by further addn. of Ni, Cr, Mo, V, Co and Ti, was investigated. Cu alone of about 1% increases tensile strength by about 7-8 kg./sq. mm. which is only slightly reduced by addn. of Ni, Cr, Mo and V. The greatest difference in strength between temper-hardened and soft-annealed Cu steel is about 14 kg./sq. mm. while with the other addns. it was 14.7. The curve of notch-toughness is shifted, in all steels, to higher values. The temp. of tempering for 1.5 hrs. to the max. of hardness is for both pure Cu steels and alloyed Cu steels 500°; cold-deformation shifts the max. hardness to lower temps. The addnl. metals do not influence segregation velocity of Cu. Red-brittleness occurs in Cu steels only above the m. p. of Cu, and it is necessary that liquid metallic Cu which is formed in the oxidation of steel be present on the steel surface; red-brittleness is also influenced by O diffusing into the steel. Ni can prohibit red-brittleness of Cu steels; on the one hand, it forms with the segregated Cu solid solns. of higher m. p.; on the other, it protects the steel very likely from too strong penetration of O. Cu steels alloyed with Mo, Co, V and 0.9% Ti incline to red-brittleness; steels contg. 1.3% Ti, however, do not. Twenty-seven references. M. Hartenheimer

Preferred orientation produced by cold-rolling low-carbon sheet steels. W. A. Sisson. *Metals & Alloys* 4, 193-8(1933).—An x-ray investigation of the course of changes in crystal fragmentation and orientation during successive stages in the rolling process. D. Schaaf

Constitutional diagram of alloys formed of two alkali metals; sodium-rubidium alloys. E. Rinck. *Compt. rend.* 197, 1404-6(1933); cf. C. A. 27, 5705.—There is no indication of the formation of a compd. Na<sub>2</sub>Rb, analogous to the Na<sub>2</sub>K clearly shown by the solidification curve for Na-K alloys. Morris Muskat

The gray coloring of copper alloys by pickling in arsenic. Georg Gross. *Oberflächentechn.* 10, 267-70(1933).—The process of gray coloring of Cu alloys used for parts of instruments by immersion in a soln. of 83 g. As<sub>2</sub>O<sub>3</sub> and 83 g. FeSO<sub>4</sub> in 1000 g. commercial HCl was investigated with respect to an eventual improvement in compn. and quality of product. The soln. can be applied without having been first heated and cooled again. The coloring velocity increases with temp., but 45° should not be exceeded for a steel-gray color. Instead of commercial also chemically pure HCl can be used. Coloring can be accelerated by repeated rinsing and drying of the ware; the gray tone can be obtained more easily on mat surfaces than on polished. The rapidity of pickling can be increased 50% by using 100 g. HCl, 21 g. FeSO<sub>4</sub>·7H<sub>2</sub>O and 14 g. As<sub>2</sub>O<sub>3</sub> at room temp. A soln. of 11.2 g. FeSO<sub>4</sub>·7H<sub>2</sub>O and 10.3 g. As<sub>2</sub>O<sub>3</sub> in 100 g. HCl reduces coloring time from 25 min. to 10 sec.; it can be used for Zn sheet, brass, tombac, red brass, cast bronze, rolled bronze and Cu sheet to obtain gray tones. M. Hartenheimer

Ordinary and special bronzes. IV. Ordinary aluminum bronzes. Leon Guillet. *Cuivre et laiton* 6, 543-4(1933).—Properties and uses of Al bronzes are described for Al contents of 0-12%. M. Hartenheimer

Chromium-nickel as a corrosion-resistant alloy. R. J. McKay. *Metals & Alloys* 4, 202-4(1933); cf. C. A. 28, 4484.—Phys., mech., working and corrosion-resisting properties of Inconel (12-14% Cr, 5-6% Fe, balance Ni) are discussed. Downs Schaaf

Corrosion and protection of metals. U. R. Evans.

*Rev. met.* 30, 502-8(1933).—A general survey with 36 references. J. Gat

Corrosion, metal protection and metal improvement. Walter Savelsberg. *Chem.-Ztg.* 57, 882-5(1933).—A discussion of the principles of metal corrosion, and of protection by paint, enamel, metal coatings and alloying. P. S. Roller

Metallic materials in water-pipe construction (Haase, Naumann) 14. Electrolysis of underground metallic structures (Horioka, *et al.*) 4. Phys. properties of Si and ferrosilicon (Bedel) 2. Transformation of the  $\alpha$ -phase of Cu-Sn alloys after deformation (Konobeyevskii, Tarasova) 2. Prepn. and properties of thin Pb sulfide films (Brückmann) 2. Compound metal sheets (Brit. pat. 398,318) 20. Mixed acid solns. [for pickling metals] (Ger. pat. 585,473) 18. Jigging app. for screening or classifying ores, etc. (Brit. pat. 396,807) 21. Lab. app. for sepg. finely divided particles of Au or Pt from raw materials (Brit. pat. 397,319) 1. App. for sepg. ores (U. S. pat. 19,021) 1. App. for classifying ores (U. S. pat. 1,941,147) 1.

Sainte-Claire Deville, Henri É.: Aluminum (Its Manufacture, Properties and Uses). Translated from the French by Robt. J. Anderson. Cleveland, O.: The Sherwood Press. 204 pp. \$5.

Deutsch-Englisches Fachwörterbuch der Metallurgie (Eisen- und Metallhüttenkunde). Edited by H. Freeman. Pt. 1. Deutsch-Englisch. Leipzig: O. Spamer. 327 pp. Reviewed in *Foundry Trade J.* 50, 6(1934).

National Metals Handbook. Cleveland, O.: Am. Soc. for Steel Treating. 1453 pp. \$10.00. Reviewed in *Metal Ind.* (N. Y.) 31, 412(1933).

Standards Association of Australia No. A. 20 for Zinc-Coated (Galvanized) Sheets Together with Standard Methods of Determining the Weight of Coating on Galvanized Sheets. Sydney: Standards Assoc. of Australia, Science House.

Apparatus for predeterminedly proportioning the flow of materials as in metallurgical processes. Edward M. Hamilton and Selim E. Woodworth (to Hamilton, Beauchamp & Woodworth). U. S. 1,940,946, Dec. 26. Various structural, mech. and operative details are described.

Ores. Fried. Krupp Grusonwerk A.-G. Ger. 585,542, Oct. 10, 1933. In sintering fine ores, etc., with air admission, pure Fe slurry is used entirely or partly as the fuel.

Copper ore flotation separation. Reginald J. Lemmon (to Imperial Chemical Industries Ltd.). U. S. 1,939,068, Dec. 12. Ore in which Cu occurs combined both with O and with S and substantially free from Au and Ag is crushed and subjected to froth concn. in stages in the first of which principally the sulfide values are sepd. (no cyanide compd. being present), while in a succeeding stage a cyanide compd. is present to enhance the floatability of the oxidized Cu compds.

Treatment of ores. Carl Goetz. Ger. 589,448, Dec. 7, 1933 (Cl. 40a. 11.70). Sulfidic or arsenical ores of Cu and other metals are heated in the absence of air and in the presence of Fe or a compd. of Fe to a temp. below the m. p. of the ore. The metals in the ore are liberated, and agglomerate to coarse particles. The ore may be heated for some hrs., first at 600° and then at 800°, in a stream of inert gas, which may be mixed with a combustible gas, with or without steam. Ores contg. a substantial proportion of Fe are treated without further addn. of Fe. Exptl. results are given.

Treatment of ores, etc., containing lead and zinc. Edgar A. Ashcroft. Ger. 588,314, Nov. 15, 1933 (Cl. 40a. 2.60). Sulfide ores or other materials contg. Pb and Zn are heated gradually to about 350° with FeCl<sub>3</sub> and the mixt. is then heated to 750-950° to distill off ZnCl<sub>2</sub> and PbCl<sub>2</sub>.

Treatment of ores, etc. Milo W. Krejci. Ger. 588,315, Nov. 17, 1933 (Cl. 40a. 11.70). See U. S. 1,915,540 (C. A. 27, 4205).

Crushing and amalgamating mills for gold ores. Empire Crushing Mill Proprietary Ltd. (Henry G. Taylor, inventor). Australia 9096/32, Oct. 19, 1933.

Apparatus (with annular grooves on a rotating disk with sloping sides) for recovery of gold and other precious metals from gravel or sand, etc. Drayton A. Silver and Jesse W. Silver. U. S. 1,939,148, Dec. 12. Mech. features.

Separator for recovering particles of gold. John Murray. Australia 8837/32, Sept. 28, 1933.

Treating sulfur-bearing ores and concentrates in reverberatory furnaces. Kenneth M. Simpson (to International Chromium Process Corp.). U. S. 1,940,977, Dec. 26. A charge of material such as a Cu-ore concentrate is introduced to the smelting section of the furnace and smelted by projecting flame in an unobstructed path downwardly from the upper portion of the furnace at high velocity onto the major portion of the entire surface of the charge; the resultant slag and mat is flowed into the settling section of the furnace and there heat of lesser intensity is applied to the surface of the material sufficient to maintain the slag in fluid condition and slag and mat are stratified and sepd. App. is described.

Treating ores such as those of iron and manganese. Grover J. Holt, Richard O. Hocking, Amel E. Matson and Arthur K. Knickerbocker. U. S. 1,939,119, Dec. 12. The ore is comminuted, delimed, thickened, slimes are thickened and then subjected to flotation; concentrates from the flotation are subjected to a second flotation and tailings from the latter are mixed with unthickened slimes.

Upright shaft and associated apparatus for treating iron ore. Louis F. Clark and Carl L. Wallfred (to A. V. Smith Corp.). U. S. 1,940,246, Dec. 19. Mixts. of gas and air are burned in a plurality of combustion chambers mounted on the shaft, to heat the ore; gases from the top portion of the shaft are returned to the combustion chambers to reduce the temps. of the flames therein, the compn. of the atm. in the shaft is suitably controlled; heated ore from the shaft is transferred to a quenching tank and during this transfer is prevented from coming into contact with oxidizing atms.

Roasting oxidic iron ores to produce the magnetic oxide. Bayerische Berg-, Hütten- und Salzwerke A.-G. Ger. 586,866, Oct. 26, 1933 (Cl. 1b. 2). App. is indicated.

Mechanical sintering or roasting apparatus for ores, etc. Metallges. A.-G. Ger. 585,367, Oct. 10, 1933.

Sintering ores such as those of copper and zinc. Thomas H. Bennett (to Matthiessen & Hegeler Zinc Co.). U. S. 1,940,935, Dec. 26. Ore is continuously supplied and is roasted while conveyed along an endless path of travel such as a rotatable table and different layers of the ore are separately removed as the roasting is completed. App. is described. Cf. C. A. 27, 1311.

Roasting ores. Metallgesellschaft A.-G. (Hans Klencke, inventor). Ger. 585,658, Oct. 12, 1933. Addn. to 458,604. Sulfidic ore slurry is mixed with roasted ores prior to roasting thoroughly.

Refining metals. Richard Walter. Ger. 589,256, Dec. 4, 1933 (Cl. 18b. 9). Iron and other metals are deoxidized and desulfurized by treatment in the fused state with an alkali carbonate mixed with 2-40% of CaF<sub>2</sub>.

Refining metals. Arthur Kirchhof. Ger. 575,412, Nov. 28, 1933 (Cl. 40a. 15.01). Fused metals contg. unfused impurities such as oxides are treated with a powd. mixt. of a mineral and an org. substance, *e. g.*, a mixt. of kieselguhr or chalk with glue or horn. The gas evolved from the org. substance carries the impurities to the surface of the melt. The method is particularly useful when the oxides or other impurities are heavier than the fused metals.

Distilling metals. René H. L. Aubert and Charles St. Martin. Fr. 754,894, Nov. 16, 1933. An app. is described with air-tight joints for the rapid distn., under vacuum, of metals such as Zn and Cd.

Purifying light metals. Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. Fr. 754,627, Nov. 10, 1933. Crude light metals or their alloys in the molten state, particularly alkali and alk. earth metals, are purified

by maintaining the bath in an inert atm. at a temp. at which the impurities solidify, and sepg. the impurities by filtration. An app. is described.

**Purifying metallic particles such as copper.** Wm. H. Osborn and Harry H. Stout, Jr. (to Coalescence Products Co.). U. S. 1,938,608, Dec. 12. Metallic particles are treated at an elevated temp. somewhat below their m. p. with a gaseous mixt. of reducing character with respect to oxides of the metallic particles but oxidizing character to carbon, such as a mixt. of steam with about 1-15% H by vol.

**Purifying magnesium.** Edwin O. Barstow and John A. Gann (to Dow Chemical Co.). U. S. 1,940,618, Dec. 19. The molten metal is agitated in a closed vessel with a fluid flux of  $\text{CaCl}_2$  and  $\text{NaCl}$  in the presence of a protective atm. such as S vapor to inhibit oxidation.

**Eliminating impurities from zinc sulfide ores.** Wm. T. Isbell and George F. Weaton (to St. Joseph Lead Co.). U. S. 1,940,912, Dec. 26. For eliminating impurities such as Pb and Cd, the ore is subjected to an oxidizing roast at a temp. above  $800^\circ$  and the dust and fume in the roaster gases is differentially sepd. into portions of relatively coarse and relatively fine particle size, and the relatively coarse portion is returned to the roasting operation.

**Apparatus for obtaining pure zinc by distilling.** The New Jersey Zinc Co. Ger. 585,627, Oct. 12, 1933.

**Refining zinc.** Philip McL. Ginder (to The New Jersey Zinc Co.). Brit. 397,061, Aug. 17, 1933. Zn contaminated with Pb is redist. in a no. of retorts each fitted with a reflux condenser for purifying the Zn vapor from Pb, the purified vapor being led from all the condensers to a common collecting chamber. App. is described.

**Zinc blende.** Xavier de Spirlet. Ger. 585,625, Oct. 6, 1933. Fine granular Zn blende is pretreated ready for roasting by moistening and mixing with 5-15% of the blende which has been roasted and treated with  $\text{H}_2\text{SO}_4$ , and 1-3% powd. clay contg.  $\text{SiO}_2$ . The whole is then briquetted ready for roasting.

**Casting metals.** Vereinigte Stahlwerke A.-G. Fr. 755,973, Nov. 18, 1933. Crystn. in large grains during the solidification of cast metal pieces is avoided by adding to the molten mass a solid material composed of crystals of the same sort as, or isomorphous with, those which form during the solidification.

**Casting iron.** Edouard Mairy. Ger. 585,361, Oct. 2, 1933. Molds for centrifugal casting are lined with Al or an alloy or mixt. contg. Al, e. g., an Al-Fe mixt. contg. 3-10% of Al with or without graphite. The mixt. may be homogenized by heating it to  $400-600^\circ$  in the absence of air.

**Encasing iron with copper or nickel or their alloys.** Tricer Walzwerk A.-G. Ger. 589,298, Dec. 5, 1933 (Cl. 49/ 5). Mech. and manipulative features are described.

**Casting iron and its alloys.** Wilhelm Klepsch. Austrian 135,213, Nov. 10, 1933 (Cl. 31b). Castings having a high resistance to heat, acids and alkalis are made by casting ordinary iron or its alloys in molds to which a decarbonizing agent has been applied in a sufficient amt. to reduce the C content of the surface of the casting to between 0.25 and 2.6%. Thus, the metal may be cast in a mold prepd. from a mixt. of sand and  $\text{Fe}_2\text{O}_3$ , or in a sand mold wetted with NaOH soln. Alternatively, a decarbonizing gas or vapor, e. g., O or vaporized NaOH, may be forced into the mold before, during or after casting. The decarbonizing agent may act during the casting operation or during the annealing of the casting in the mold.

**Castings of aluminum or its alloys.** Helumin-Leichtmetall G. m. b. H. Ger. 587,000, Oct. 28, 1933 (Cl. 40a. 15.60). See Fr. 752,127 (C. A. 28, 734\*).

**Degreasing system suitable for treating metal castings with vapors.** Arthur L. Koch (to Carrier Research Corp.). U. S. 1,938,841, Dec. 12. Various details of app. and operation are described.

**Extrusion and forming dies such as those faced with tungsten carbide.** Jean H. L. De Bats. U. S. 1,939,768, Dec. 19. A die is formed with a body portion of relatively soft metal and having a central aperture provided with a plurality of annular ridges therearound, and a

1 wear-resistant facing formed of material such as W carbide and Co, Ni or Fe on the annular surface and fused and compacted in place. Various details of app. for such die manuf. are described.

**Drawing dies.** Aaron Simons. U. S. 1,939,468, Dec. 12. A die is formed with a casing contg. an interior body material comprising abrasive particles such as  $\text{SiC}$ , W carbide or  $\text{SiO}_2$  held in place by an interstitial metal matrix such as a Cr-Ni alloy.

2 **Mold materials.** Edwin H. Moore. Brit. 399,124, Sept. 28, 1933. Molds for casting easily oxidized metal, e. g., Mg (alloys), are made from sand mixed or sprayed with a  $\text{ZnCl}_2$  soln. A satd. soln. in  $\text{Me}_2\text{CO}$ , mixed with an equal vol. of  $\text{CCl}_4$  may be used.

**Metallurgical furnaces.** Deutsche Babcock & Wilcox Dampfkessel-Werke A.-G. Ger. 589,157, Dec. 4, 1933 (Cl. 31a. 1.70). A channel is described in which flowing molten metal is mixed with added materials, e. g., Si.

**Inclined horizontal ore-reducing furnace suitable for treating iron ores.** Olaf A. Ilougen and Kenneth M. Watson. U. S. 1,938,832, Dec. 12. Various structural, mech. and operative details are described.

**Continuous muffle furnace for melting metal foil.** Ludwig Hilgert and Karl Hilgert. Ger. 588,316, Nov. 23, 1933 (Cl. 40a. 15.60).

**Muffle for zinc smelting.** The New Jersey Zinc Co. Ger. 586,960, Oct. 28, 1933 (Cl. 40a. 40.50).

**Furnace for melting copper.** The American Metal Co. Ltd. Ger. 588,238, Nov. 17, 1933 (Cl. 40a. 30).

**Melting furnace and associated apparatus for refining lead such as that of scrap battery plates.** Philip W. Davis. U. S. 1,938,582, Dec. 12. Various structural and operative details are described.

**Furnace and associated apparatus for treating molten metals as in refining and deoxidizing aluminum.** John Schmeller, Sr. (to Schmeller Holding Co.). U. S. 1,940,021, Dec. 19. Structural and mech. features.

**Dwight-Lloyd sintering apparatus.** Blei- und Silberhütte Braubach G. m. b. H. and Paul Wefelscheid. Ger. 585,626, Oct. 5, 1933 (Cl. 40a. 3.60). Details of the hearth are given.

**Grate for Dwight-Lloyd sintering apparatus.** Blei- und Silberhütte Braubach G. m. b. H. and Paul Wefelscheid. Ger. 586,912, Oct. 27, 1933 (Cl. 40a. 3.60). Addn. to 585,626 (preceding abstr.).

**Rotating furnace for roasting sulfides.** Metallgesellschaft A.-G. (Hans Klencke, inventor). Ger. 586,834, Oct. 27, 1933 (Cl. 40a. 5.01).

**Shaft furnace plant for treating solids with gases.** Aktieselskapet Norsk Staal (Elektrisk-Gas-Reduktion). Ger. 585,543, Oct. 11, 1933.

6 **Blast furnace.** Ignaz Loeser. Ger. 585,808, Oct. 9, 1933.

**Apparatus for regeneratively heating gases as in blast-furnace operation.** Percy H. Royster (to Research Corp.). U. S. 1,940,371, Dec. 19. Various structural and operative details are described.

**Charging scrap metal into blast furnaces.** Joshua K. Clutts. U. S. 1,938,580, Dec. 12. Successive charges of scrap metal are delivered to the furnace in proximity to its vertical axis, and other materials such as fuel and ore are delivered in a surrounding relation to the scrap metal so that the latter is kept from the furnace lining.

**Device for burning lustrous soot from metal surfaces by oxygen.** Gust. E. Rehborn. Ger. 586,673, Oct. 24, 1933 (Cl. 24g. 4.03).

**Metal-heating furnaces.** Ralph Halkett, Henry Alexander Fells and James Brown. Brit. 397,640, Aug. 31, 1933. A gaseous atm. which prevents the formation of scale on metals during heating is produced by cooling neutral combustion products, i. e., contg. no free O or unburnt gas, to remove the  $\text{H}_2\text{O}$ -vapor content. The last traces of  $\text{H}_2\text{O}$  vapor may be removed by addn. of a suitable reagent, e. g., coal gas.

**Furnace suitable for heat-treating or "normalizing" metal sheets.** Henry A. Drefflein. U. S. 1,938,814, Dec. 12.

**Furnaces for heat treatment for metal sheets and trans-**

porting means therein. Alfred Smallwood and John Fallon. Fr. 754,415, Nov. 7, 1933.

Furnace for tempering tools. Allgemeine Elektrizitäts-Gesellschaft (Victor Paschkis, inventor). Ger. 586,653, Oct. 24, 1933 (Cl. 18c. 9.01).

Annealing furnace for iron objects. The Singer Manufacturing Co. Ger. 585,745, Oct. 12, 1933.

Hydrogen furnace for annealing metal blanks. Allgemeine Elektrizitäts-Ges. Ger. 586,977, Oct. 28, 1933 (Cl. 18c. 8.90).

Apparatus (with an inclined hearth) for separating metals of different melting points such as solder from other scrap metal by partial melting and action of gravity. Frank R. Corwin and Leon W. Booton (to Nichols Copper Co.). U. S. 1,940,448, Dec. 19. Various structural, mech. and operative details are described.

Metal bodies. Franz Skaupy. Ger. 586,621, Oct. 23, 1933 (Cl. 48b. 11.01). A suspension of metal powder is sprayed on a core, dried, sintered and the core removed by chem., phys. or mech. means.

Mechanical treatment of metal articles. C. T. Petzold & Co. Austrian 135,668, Nov. 25, 1933 (Cl. 48b.). Addn. to 128,624 (C. A. 26, 5060). The method of Austrian 128,624 is modified by applying, instead of a softer metal coating, a coating of nonmetallic material having lubricating properties, e. g., a coating contg. an oil or fat, talc or graphite. The modified method is useful for articles, the manuf. of which involves only a few mech. treatments, all of which are effected in the cold.

Rolls for working metals, etc. Deutsche Edelstahlwerke A.-G. Ger. 589,124, Dec. 2, 1933 (Cl. 7a. 19). Smooth or collared rolls are made by casting around a steel core an alloy contg. Cr 25-35, Co 45-55, W 15-25 and C 2.5-4%.

Pickling metals. Vereinigte Stahlwerke A.-G. Fr. 755,107, Nov. 20, 1933.  $H_2SO_4$  which has been used for refining petroleum hydrocarbons is dild. with water to 35.40° Bé. and heated to 90° for  $\frac{1}{2}$  to 1 hr., or is heated to the same temp. and for the same time to the same concn. by the introduction of steam and is then used for pickling Fe and steel.

Pickling metals. Imperial Chemical Industries Ltd. Fr. 755,281, Nov. 22, 1933. A quaternary  $NH_4$  compd., e. g., cetyl pyridinium bromide, is added to the pickling acid to reduce the attack of the acid on the metal without preventing the dissolving of the rust.

Pickling stainless steel. Maurice Taylor (to Merrimac Chemical Co.). U. S. 1,939,241, Dec. 12. A bath is used contg. HOAc 40-50,  $HNO_3$  10-15 and HCl 4-8%.

Dies suitable for working sheet metals. Wm. G. Calkins (to Chrysler Corp.). U. S. 1,940,294, Dec. 19. Die parts are formed comprising a compressed mass of sponge-iron particles of a high degree of porosity, particles of Cu fused to the sponge-iron particles to bond them, and a solid lubricant comprising powd. graphite distributed through the mass.

Heat treatments of metal articles. John W. Harsch (to Leeds & Northrup Co.). U. S. 1,940,948, Dec. 26. App. and details of operation are described in which a gas such as air or  $NH_3$  in swirling motion is used as a heat-transfer agent.

Heat-treating magnetic materials. Victor E. Legg (to Electrical Research Products, Inc.). Brit. 397,134, Aug. 16, 1933. Magnetic material comprising Fe, Ni and Co, with or without small amts. of other substances, e. g., Mo or other elements specified in Brit. 323,222, is conditioned by subjecting to an intense magnetic field and then heating to 400-600°, preferably at least 8 hrs. The material may be annealed before subjecting to the magnetic field. In an example a ring of spirally wound tape of an alloy contg. Ni 45, Co 25, Fe 23 and Mo 7% is annealed 1 hr. at 700°, strongly magnetized and heated 48 hrs. at 440°. Cf. C. A. 27, 4763.

Heat-treating alloys. Arnold Tross. Brit. 397,017, Aug. 17, 1933. The lightly heated part of a firebox and the less heated part are made of different alloys or of the same material differently heat-treated to give high resiliency to the former part and high ductility to the latter.

Thus a firebox may be made of an alloy, contg. Cu 98, Ni 0.6-1.5, Si 0.7-0.4 and Fe up to 1%, which is ductile when unhardened and highly resilient when hardened, even when heated. Other suitable alloys are those contg. at least 95% Cu and at least 2 of the following elements: Fe, Si, Ni, Mn, Sn, Cr, Be, Al, Co. The entire box may be hardened by heating, quenching and reheating and then the parts to be of high ductility heated to a red heat or, after heating and quenching only, the parts to be of high resiliency are subjected to a tempering heat. In another method only the parts to be hardened are quenched, the other parts being cooled slowly.

Apparatus for hardening rails. Vereinigte Stahlwerke A.-G. (Arthur Otto, inventor). Ger. 587,785, Nov. 8, 1933 (Cl. 18c. 2.23). Addn. to 550,128 (C. A. 26, 4024).

Vibration treatment of ferrous metals and alloys to effect surface hardening, etc. Georges Mahoux. U. S. 1,939,712, Dec. 19. The metal is subjected to vibrations of the order of ultra-audible sound without establishing a marked differential between the temp. in the surface portions and the temp. in the interior of the material treated. App. is described.

Apparatus for carburizing ferrous metal articles. Adolph W. Machlet. U. S. 1,938,599, Dec. 12. Liquid carburizing gas such as liquid  $C_2H_2$  is supplied through a reducing valve and through a power-driven mixer having a free air intake, to dilute the gas, into an externally heated closed carburizing retort.

Joining thin layers of metal as in forming shims from brass or steel. Norman L. Derby. U. S. 1,940,850, Dec. 26. The flat surfaces of thin metal sheets are cleaned and fluxed, and the loosely superposed sheets are immersed in a bath of solder and the assembled sheets are pressed to leave only a thin film of solder as a connecting layer between the previously assembled metal layers. App. is described.

Centrifugal apparatus for granulating fused metals. Johann Eder. Austrian 135,675, Nov. 25, 1933 (Cl. 48b.).

Apparatus for separating fine metal shavings from liquids. Vogtländische Maschinenfabrik (vorm. J. C. & H. Dietrich) A.-G. Ger. 585,516, Oct. 4, 1933.

Carbides of elements of the tungsten group. Floyd C. Kelley (to General Elec. Co.). U. S. 1,940,308, Dec. 19. A powd. metal such as W is heated together with about 6% of C in powder form, in a suitable receptacle, at an elevated temp. but below the m. p. of the element of which a carbide is to be formed and in the presence of a hydrocarbon gas which at that temp. is in a state of equil. with the C. App. is described.

Removing carbon from rare metals. Fansteel Products Co., Inc. Ger. 585,904, Oct. 12, 1933. C is removed from "high-melting rare metals," especially Ta, by intimately mixing and heating the metal with an oxide of a metal which is volatile below the m. p. of the rare metal, e. g., MgO.

Bonding bronze to ferrous metals in bearing manufacture or the like. Charles R. Short and Roland P. Koehring (to Moraine Products Co.). U. S. 1,939,467, Dec. 12. The ferrous metal is Cu-plated; the bronze structure is pressed against the Cu-plated metal with a thin intervening layer of Sn, and the assembly is heated below the m. p. of Cu to cause the entire thickness of the Sn layer to alloy with both the Cu plating and the bronze.

Jacketing one metal with another. Alfred J. Liebmann (to Crucible Steel Co. of America). U. S. 1,939,628, Dec. 12. A jacket of metal such as Cu is cast around a core of material such as iron which oxidizes at the m. p. of the material of the jacket, while the core is kept below such m. p. to prevent such oxidation; the core and jacket are then heated above the m. p. of the jacket.

Cobalt. Richard Rosendahl. Ger. 585,368, Oct. 6, 1933. An aq. sludge contg.  $Co(OH)_2$ , a higher hydroxide of Mn, and hydroxides of Zn, Ni and Cu is treated with an aq. soln. of a ferric or cupric salt, in an excess of 20-50% over the amt. which is equivalent to the hydroxides of Zn, Ni and Cu present. The latter hydroxides are thus dis-

solved. The residue contg.  $\text{Co}(\text{OH})_2$  and hydroxide of Mn is treated with a reducing agent, e. g.,  $\text{FeCl}_2$  or  $\text{SO}_2$ , to produce a soln. contg. Co and Mn, from which the metals are sepd. in known manner.

**Copper ingots.** Soc. générale métallurgique de Hoboken. Fr. 42,844, Nov. 4, 1933. Addn. to 739,615 (C. A. 27, 2126). The mold used in the process of Fr. 739,615 is cooled at its lower part.

**Lead highly resistant to the action of hot sulfuric acid.** Theodor Wallis and Oskar Falek (to I. G. Farbenind. A.-G.). U. S. 1,939,799, Dec. 19. Soft lead is alloyed with Ni 0.01–0.05 and Se 0.01–0.1%.

**Apparatus (with an atomizer and blades rotated at high speed) for producing pulverized lead from molten lead.** Yoshio Takata. U. S. 1,938,876, Dec. 12. Various structural, mech. and operative details are described.

**Processing magnesium.** Edwin O. Barstow, John A. Gann and John E. Hoy (to Dow Chemical Co.). U. S. 1,940,619, Dec. 19. In order to prevent oxidation, the molten metal is treated in a tilting crucible in which there is also maintained a fluid flux such as  $\text{MgCl}_2$ ,  $\text{KCl}$ ,  $\text{BaCl}_2$  and  $\text{CaF}_2$  which is heavier than the Mg, does not spread over its top surface and substantially prevents the Mg from adhering to the crucible walls, and a protective atm. is supplied over the metal. App. is described.

**Manganese or chromium.** Helge Löfquist. Fr. 755,021, Nov. 18, 1933. Alloys contg. Fe and Mn or Fe and Cr are fused with agents contg. O and S, e. g.,  $\text{FeO}$  and  $\text{FeS}$  so as to form a slag rich in Mn or Cr and having a relatively low m. p. The Mn or Cr is recovered from the slag.

**Platinum, etc.** W. C. Heraeus G. m. b. H. Ger. 586,284, Oct. 19, 1933 (Cl. 40a. 20.50). Addn. to 584,844 (C. A. 28, 1011<sup>9</sup>). In obtaining Pt, Au and similar metals, the method of 584,444 is varied by using an Fe stone contg. at least 3% Cu as the collecting agent. Ores, concentrates, dross, etc., are smelted in the presence of the above stone, the fused Fe collecting the noble metal, which is then recovered by usual methods.

**Molded objects of platinum metals.** W. C. Heraeus G. m. b. H. Ger. 586,622, Oct. 23, 1933 (Cl. 48b. 13). Hard non-corrosive objects are obtained by molding Pt or Pt alloys and surface hardening by a small addn. of Si or B, the latter being added by heating the object in an atm. of  $\text{SiCl}_4$ ,  $\text{SiHCl}_3$  or volatile B compds.

**Tin and similar metals.** "Berzelius" Metallhütten-G. m. b. H. (Max Gerhard Freise, inventor). Ger. 585,628, Oct. 24, 1933. Sn, Pb, Sb, Bi and similar metals are obtained by reduction of ores, etc., contg. oxides of Sn at temps. at which the metals are fused. A flux of alkali salts, such as soda, borax or water glass is used. The process is carried out in a rotary furnace.

**Iron.** A. Borsig G. m. b. H. and Heinrich Lanz A.-G. Ger. 573,017, Oct. 18, 1933. Fe contg. 4–4.3% of C + Si is held in the fused state for a sufficient time to ensure the formation of a eutectic of graphite and ferrite. The metal is then cast, and the casting is cooled in known manner under conditions promoting the formation of lamellar pearlite.

**Iron.** Vereinigte Stahlwerke A.-G. and Karl Emmel. Ger. 584,841, Sept. 25, 1933 (Cl. 18b. 1.02), and 585,869, Oct. 12, 1933 (Cl. 18c. 12.10). Addns. to 512,391 (C. A. 25, 908). The process of Ger. 512,391 is supplemented by a second stage in which the C content of the metal in the furnace is raised to above 3%. Iron particularly useful for the manuf. of thin-walled castings is obtained (584,841). Cast iron made by the process of Ger. 512,391 is improved by annealing for up to 20 hrs. at about 850° (585,869).

**Iron.** Eugen Piwowarsky and Heinrich Nipper. Ger. 589,257, Dec. 4, 1933 (Cl. 18d. 1.20). In the manuf. of malleable cast iron, the Si ordinarily added to promote the formation of graphite is replaced wholly or in part by an addn. of 0.2–1.5% of Al. The method may be applied in the manuf. of malleable cast iron contg. a small proportion of Co, Cr or Ti.

**Spongy iron.** Alfred Wilhelmi. Ger. 579,753, Nov. 1, 1933 (Cl. 18a. 18.08). App. for making spongy Fe by

smelting Fe ore on a traveling grate in currents of reducing gas is described.

**Spongy iron.** Alfred Wilhelmi. Ger. 581,578, Nov. 6, 1933 (Cl. 18a. 18.08). Addn. to 579,753 (preceding abstr.). Details of the app. for heating the reducing gas are given.

**Cast iron.** Ceskomoravská-Kolben-Danek and Miroslav Jandacek. Fr. 754,993, Nov. 17, 1933. Gray cast Fe is hardened by introducing H into the surface thereof and, preferably, producing at the same time a metal coating on the treated surface. The introduction of H may be made electrolytically which may take place during chroming.

**Cast iron.** Alexandre Polliet and Nicolas Sainderichin. Fr. 755,341, Nov. 23, 1933. The phys. characteristics of cast Fe are improved by placing it in a mixt. of Al,  $\text{Al}_2\text{O}_3$ , one or more carbides of a metal or semimetal and preferably a small proportion of anhyd. chromic chloride and heating to 800–1150° in the absence of air.

**Cast iron.** Soc. franco-sarroise de constructions mécaniques. Fr. 755,410, Nov. 24, 1933. Coke of inferior quality may be used in cupola furnaces for the production of cast Fe by using the coke in large pieces and breaking it as little as possible during charging.

**Container suitable for use in nitriding steel or cast iron articles.** Adrien J. P. Duval (to Aubert & Duval Frères). U. S. 1,941,128, Dec. 26. Structural features.

**Converting iron baths into steel.** Hugo Bansen and Karl Löbbecke (to Fried. Krupp A.-G.). U. S. 1,940,341, Dec. 19. Water in liquid state is introduced into an iron bath (in a described app.) so as to cause its decompn. and the combustible gases of decompn. are burned by supplying air immediately above the surface of the bath.

**Deoxidizing iron and steel.** Frank G. Norris (to American Rolling Mill Co.). U. S. 1,938,716, Dec. 12. Metallic Na is injected beneath the surface of the molten iron or steel, in small increments, through the bottom of a container (of a described app.) holding the molten metal (the Na being vaporized by the heat of the metal).

**Hardening iron and steel.** Issar Budowski and Hans Bardt. Fr. 755,516, Nov. 25, 1933. The metals to be heated are first coated with a paste contg. a support for C, finely divided metals or metal compds., alkali or alk. earth compds. of org. acids and a free alk. substance. An example contains coke 100, Ni hydroxide 20, Ba oxalate 15, Ba formate 15,  $\text{SrCO}_3$  10 and KOH 10 parts, this being mixed with 150 parts of water contg. 5% of glue.

**Steel.** Herman A. Brassert (to H. A. Brassert & Co.). U. S. 1,939,874, Dec. 19. Ore is reduced and melted in a shaft furnace into which it is charged with C; gaseous products of combustion are passed upwardly through the charge, impurities are removed by blowing a blast of air through the metal; ferrous scrap is melted in a sep. shaft furnace, the C content of the 2 metal products is suitably controlled and proportioned and they are mixed with each other and further refined. App. is described.

**Steel.** Theodor Czepl. Austrian 135,535, Nov. 25, 1933 (Cl. 18b.). Steel of high resistance to hot or cold  $\text{H}_2\text{SO}_4$  or HCl contains C up to 1, Ni 20–40, Mo 2–6 and Cu 1.5–3%.

**Steel.** Österreichische Schmidtstahlwerke A.-G. (Leo Klüger, inventor). Ger. 585,070, Sept. 28, 1933. See Austrian 129,586 (C. A. 26, 5541).

**Dephosphorization of steel.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 755,451, Nov. 25, 1933. Steels which are highly oxidized and have a relatively low P content are dephosphorized by the process of Fr. 724,368 (C. A. 26, 4789) but the content of oxides of Fe in the slag used is greatly reduced or removed.

**Hollow-steel aircraft propeller blades with nitrided exterior surfaces.** John Squires. U. S. 1,940,333, Dec. 19.

**Steel of reduced tendency to brittleness due to ageing and blue fracture.** Hans Meyer. U. S. 1,941,101, Dec. 26. Soft ingot steel is subjected to initial heat working in the zone above the  $A_1$  point and the working is continued down to a temp. between the  $A_1$  point and 700° to produce

a pronounced crystallographic directional effect in the steel and attain a sufficient toughness largely to overcome brittleness arising from ageing and blue fracture.

**Alloy steels.** Henry A. de Fries (to Ludlum Steel Co.). U. S. 1,941,202, Dec. 26. Alloy steels of easy machinability and forgeability contain Cr 1-30, Cu 0.2-1.2 and S 0.1-0.5%, the remainder being Fe. These alloys have a resistance to corrosion comparable to that of an alloy steel contg. Cr in a similar proportion together with less than 0.1% of S. U. S. 1,941,203 relates to similar alloy steels, in making which Cu mat is added to give a S content of 0.1-0.5%.

**Steel alloys.** Wm. H. Hatfield and Joseph F. Bridge. Brit. 396,809, Aug. 14, 1933. An austenitic steel for use in turbine blading, etc., comprises Cr 16-30, Ni 6-15, C 0.20-0.8, Si 0.8-2 and Ti 0.8-2.5%. Other elements, *e. g.*, Mn, V, Mo or Be, may be present up to about 1%. The steel may be softened by air-cooling from about 800-1150°.

**Hard steel alloy.** John L. Cox. U. S. 1,939,390, Dec. 12. A hard steel alloy suitable for valves of internal-combustion engines contains C about 0.2-1.0, Ni 0.5-8.0, Cr 6-15 and Al 0.5-7.0%, the remainder being substantially Fe and the amount of Ni being less than 2.5 times the amt. of Al.

**Chromium steel.** Kenneth M. Simpson (to International Chromium Process Corp.). U. S. 1,939,795, Dec. 19. A furnace is charged with Cr ore and an exothermic reducing agent such as ferro-Si or Al and the charge is heated by fuel firing to reduce the ore and form slag and metal; the slag is removed from the furnace and steel is added to the reduced metal in the furnace to form Cr alloy steel.

**Chromium steels.** Russell Franks (to Electro Metallurgical Co.). Brit. 397,646, Aug. 31, 1933. High-Cr steels, particularly those contg. 15-35% Cr, contain also an amt. of combined N considerably higher than that normally present in steels, *e. g.*, 0.2-0.4%. They may contain 0.1-2% C and are produced by melting a C steel or high-Cr steel and adding nitrides, N-contg. ferrochrome and Cr. In 397,717, Aug. 31, 1933, addn. to 397,646, the alloy steel contains Cr, at least 15; Ni, at least 5 and alloyed N, at least 0.1%.

**Chromium-nickel steels.** Compagnie des Forges de Chatillon, Commentry & Neuves-Maisons. Brit. 397,373, Aug. 24, 1933. A corrosion-resistant austenitic Cr-Ni steel contains 0.1-0.75% As. The alloys may contain C 0.05-1, Cr 0.5-30, and Ni 2-40%, with or without up to 8% of Si, Mn, Mo, W, Co, V, Cu, Ti, Al or Zr.

**Steel drums for oil cracking.** Robert T. Pollock (to Wm. S. Gluck). U. S. 1,941,271, Dec. 26. The interior surface of steel drums used in oil cracking is rendered more resistant to injury from corrosion by a preliminary treatment with gases having a hardening effect, such as H, N or CO, at a temp. of about 650°.

**Armor plate.** Fried. Krupp A.-G. Brit. 397,079, Aug. 17, 1933. Armor plate, hardened on 1 side, is made from a steel alloy contg. C 0.05-0.65, Cr 1-4.5, Mo 0.1-1.5 and Co (and Ni) 1.5%, the Co being at least 1%. The Mo may be wholly or partly replaced by 1.5-3 times as much W.

**Armor plating.** Fried. Krupp A.-G. Fr. 755,131, Nov. 20, 1933. An armor plating steel hardened on one side only contains C 0.2-0.65, Cr 2-4.5, Mo 0.2-1.5 and Ni 0.5-4%, the Ni being replaced wholly or in part by Co.

**Alloys.** Aktieselskapet Elektrisk Bureau. Brit. 397,684, Aug. 31, 1933. An elec. cooking-plate is made from an alloy with a heat expansion coeff. of not more than  $0.04 \times 10^{-4}$  per °C. and with properties similar to Ni steels contg. up to 36% Ni as regards tendency to increase permanently in vol. upon heating. Suitable alloys are Ni steels having 21-33% Ni with not more than 0.2% C and an alloy contg. Fe 61, Ni 34 and Mo 5%.

**Alloys.** W. C. Heraeus G. m. b. H. Ger. 589,449, Dec. 7, 1933 (Cl. 40b. 4). Metals of the Pt group, or alloys thereof with one another, are alloyed with up to 5% of an alk. earth or earth metal. The alloys obtained are

less volatile than Pt and are useful for making furnace resistances and other articles exposed to high temps.

**Alloys.** Soc. anon. de Commentry, Fourchambault et Decazeville. Fr. 42,849, Nov. 4, 1933. Addn. to 698,724 (C. A. 25, 2965). Al 1-7 and Ti up to 5% are added simultaneously as hardening agents to the alloys described in Fr. 698,724, before the heat treatment. Other hardening elements such as C, Cu, Si and Be may also be added. The heating varies from 800° to 1300°.

**Alloys resistant to halogen hydric acids.** Hermann Frischer. U. S. 1,939,890, Dec. 19. Alloys suitable for resisting hot HCl, etc., are formed contg. Fe 1-30% and Sb 99-70%. Small amounts of W or Mo also may be added.

**Alloy for pistons of internal-combustion engines.** Ernst Mahle (to Elektronmetall G. m. b. H.). U. S. 1,940,629, Dec. 19. A ring-bearing portion of the piston is formed of a Be bronze contg. Cu together with Be 1-5%, and another portion such as the head is formed of a different metal such as a light alloy, which, however, has about the same coeff. of expansion as the Be bronze.

**Motor pistons.** Elektronmetall G. m. b. H. Fr. 42,833, Nov. 4, 1933. Addn. to 734,449. Examples of alloys are (1) Cu 9-11, Mn 0.1-0.5, Fe 1 and Al at least 87%, (2) Cu 4, Mg 1.5, Ni 2, Al 92.5%, (3) Cu 12, Ni 2.5, Si 4, Al 81.5%, (4) Sn 3, Si 2 and Mg 95%.

**Alloys for making electric resistances.** Berndorf Metallwarenfabrik Arthur Krupp A.-G. (Rudolf Krulla, inventor). Austrian 135,521, Nov. 25, 1933 (Cl. 18b.). Use is made of alloys contg. Mn 25-35, Ni 5-15 and Fe 55-65%. The alloys have good mech. properties, a high resistance and a low temp. coeff.

**Alloying metals such as those of brass alloys.** Elbert E. Fisher and Malvin A. Baernstein (to National Pigments and Chemical Co.). U. S. 1,940,678, Dec. 26. Tribarium aluminate is used as a flux and purifier. Na Ba aluminate also may be used.

**Bronze alloys.** Oetzberger & Co., Konstruktions-Bronzen G. m. b. H. Ger. 585,962, Oct. 13, 1933. A bronze alloy suitable for use in construction consists of 6-9% Sn, 0.1-3.8% Ni, 0.1-1.8% Ag and at least 90% of the remainder Cu. A max. of 2% of a hardening metal such as Zn may be added.

**Hard alloys.** Tool Metal Manufacturing Co. Ltd. Brit. 396,940, Aug. 17, 1933. A sintered alloy for tools and other working implements contains ZrC<sub>2</sub> and (or) ThC<sub>2</sub> 1-14%, metal(s) of lower m. p., *e. g.*, Fe, Co, Ni, Mn, up to 25% and W<sub>2</sub>C and (or) Ta carbide, the carbides of the alloy consisting, at least in part, of a heterogeneous mixt.

**Making articles from hard alloys.** Heinz Fasching. Austrian 135,324, Nov. 10, 1933 (Cl. 40b.). A powd. mixt. of a refractory carbide or nitride with a metal of higher m. p. is heated in a mold under pressure to a temp. just above the m. p. of the carbide or nitride, and then allowed to cool under pressure. Use may be made of a mixt. of a carbide or nitride of Si, Ti, Al, Zr, W, Mo or Ta with up to 60% of a metal such as W, Ta, Ti or Mo. The granule size of the mixt. may be 0.1-0.001 mm.

**Molded articles of hard alloys.** Philipp A. Kurt. Austrian 135,669, Nov. 25, 1933 (Cl. 40b.). Addn. to 106,973. Hard, acid-resistant articles are prepd. by fusing in a mold at 1700-1800° a powd. mixt. of Ni and Mo contg. 2-12% of B or Ti and sufficient C to form B<sub>4</sub>C or TiC.

**Hard alloys for tools, armored rollers, etc.** Heraeus-Vacuumschmelze A.-G. and W.-Rohn. Ger. 585,823, Oct. 11, 1933. The alloys comprise 8-15% Al, 2-7% B, 1-5% Mo or W, 0-1.5% C, 0-2.5% Ti and the remainder Ni or Co or both. Alternatively, 70% of the remainder may be Fe.

**Magnetic alloys.** International Standard Electric Corp. Ger. 588,381, Nov. 21, 1933 (Cl. 40b. 14). The manuf. of powd. magnetic alloys contg. Fe, Ni and a metal of the Cr group, with or without Co, is improved by including up to 4% of Cu in the alloys. The addn. of Cu prevents the alloys from becoming brittle in the hot-rolling process which generally precedes pulverization. A specified alloy contains Ni 78.5, Fe 13.5, Mo 4 and Cu 4%.



**Ferromagnetic substances.** Siemens & Halske A.-G. (Frans Noll, inventor). Ger. 585,770, Oct. 9, 1933. Addn. to 576,509 (C. A. 28, 735<sup>1</sup>). The method of 576,509 for improving the magnetic properties of Ni-Fe or Si-Fe alloys by coating them with water glass and heating to glowing is improved by carrying out the heating in the presence of Fe or steel filings.

**Aluminum alloys.** Louis W. Kempf (to Aluminum Co. of America). U. S. 1,940,139, Dec. 19. Alloys which are suitable for casting washing-machine parts, etc., contain Al together with Cu 4-10, Mg 2-6, Fe 0.5-2.0 and Si 0.5-3.0%. Cf. C. A. 28, 460<sup>2</sup>.

**Aluminum alloys.** Court C. Titus. Fr. 755,359, Nov. 23, 1933. Light, hard alloys of Al contain B 0.05-2 and Mg 0.25-2.25%. At least one of V, W, Mo, Cr, Cu, Zn and Co, in amt. of 0.25-5%, may also be added.

**Treatment of aluminum alloys.** Aluminium Ltd. Ger. 588,024, Nov. 11, 1933 (Cl. 48b. 9). In coating Al alloys with Al or other Al alloys, the alloy to be coated is cast in a heat-conducting mold lined on one or more sides with Al or Al alloy. The compd. casting is then rolled, etc., in known manner, but at a sufficiently low temp. to prevent any substantial diffusion of components of the coated alloy into the coating.

**Wire of aluminium alloys.** Hackethal-Draht- und Kabel-Werke A.-G. (Carl Haase, inventor). Ger. 585,942, Oct. 18, 1933. Mixed-crystal alloys of Al are hot-rolled or hot-pressed at a temp. below 250°, cold-drawn, and finally annealed at temps. below 250°.

**Aluminum-copper alloys.** Compagnie de produits chimiques et électrometallurgiques. Alais, Froges et Camargue. Fr. 754,539, Nov. 8, 1933. The ductility of Al-Cu alloys is increased by the addn. of 0.005-0.1% of Sn. Other metals such as Ni, Si and Zn, but not Mg, may be present.

**Aluminum-magnesium alloys.** Aluminium Ltd. Brit. 398,080, Sept. 7, 1933. Al-Mg alloys having enhanced resistance to corrosion and contg. about 5-16% Mg are made by using com. Al under such conditions that they have a low Fe impurity. Preferably the total impurity of the Al used is not less than about 0.7%, the Si being equal to, or greater than, the Fe and the latter being not more than 0.1%. A small amt. of Cu may be present. Cf. C. A. 28, 460<sup>3</sup>.

**Aluminum-silicon alloys containing phosphorus in small proportion.** Roland Sterner-Rainer (to American Lurgi Corp.). U. S. 1,940,922, Dec. 26. Alloys which are suitable for bearings, pistons, etc., contain Al together with Si 5-40% and P 0.001-0.1%.

**Beryllium-aluminum alloys.** Joseph K. Smith (to Beryllium Corp.). U. S. 1,941,230, Dec. 26. Alloys which are suitable for airplane parts, etc., contain Al 55-70, Be 25-40 and Mn, Mo and Zr 0.5-2.5% each. U. S. 1,941,231 relates to alloys contg. Al 55-70, Be 25-40 and Mn, Mo and V 0.5-2.5% each. Cf. C. A. 27, 3430.

**Copper alloys.** George H. Zenner (to The Linde Air Products Co.). Brit. 397,897, Aug. 31, 1933; Ger. 589,237, Dec. 4, 1933 (Cl. 40b. 6). See Fr. 747,146 (C. A. 27, 4708).

**Copper alloys.** Hirsch, Kupfer- und Messingwerke A.-G. (Eugen Vaders, inventor). Ger. 585,002, Sept. 27, 1933. Alloys suitable for making bearings or for casting in sand molds contain Cu 80-90, Si 2.5-4.5 and Zn 5.5-17.5%, with or without 0.1-1% of Al, Mn, Co, Ni, Cr, Zr, W, Mo, Ti and (or) Sn.

**Copper alloys.** Imperial Chemical Industries Ltd. Fr. 755,116, Nov. 20, 1933. Bolts, screws, rivets, etc., are made from a Cu alloy contg. Ni and Al which is capable of being hardened, the alloy being in the soft state at the commencement of the making and afterward hardened by heating to 300-600°. The initial alloy is softened by heating to 800-900° and cooling rapidly. An example contains Cu 87.5, Ni 6, Al 1.5 and Mn 5%. Fr. 755,117. Rough shapes are cut from a band or sheet of metal alloy having the properties described in Fr. 755,116. An example contains Cu 60, Zn 18, Ni 20 and Al 2%. Fr. 755,118. Coins, etc., are made from an alloy having the properties described in Fr. 755,116. An example contains

Cu 92.5, Ni 6 and Al 1.5% or Cu 70, Ni 28.5 and Al 1.5%. Fr. 755,119. Articles such as tubes are made from alloys having the properties described in Fr. 755,116. An example contains Cu 72, Zn 21, Ni 5.2 and Al 1.8%.

**Working copper alloys containing chromium.** Metallgesellschaft A.-G., Walter Fraenkel and Arthur Burkhardt. Brit. 398,385, Sept. 14, 1933. The mech. properties of alloys consisting of Cu and 0.2-3.0% Cr are improved by working at above 700°, cooling in air and then heating to 350-700°. The alloy may contain 1-10% Al and also 1 or more elements, other than Be, Ti or Si, which do not combine with Cr, e. g., Ni 1-10, Sn 1-10 and Zn 1-20%.

**Iron alloys.** Berndorfer Metallwarenfabrik Arthur Krupp A.-G. (Rudolf Krulla, inventor). Austrian 135,327, Nov. 10, 1933 (Cl. 18b.). Rust-resistant alloys are prep'd. by adding Cr 7-8 and Al up to 1.5% to fused Fe which has been deoxidized by addn. of Pb.

**Magnesium alloys.** Alexander Luschenowsky. U. S. 1,941,039, Dec. 26. Alloys which have good strength and resistance to corrosion contain Mg together with Zn 0.5-15, Mn 0.01-3, Fe 0.01-1.5 and Ag or Be 0.005-1.5%, with or without Al up to 5%.

**Magnesium alloys.** The Dow Chemical Co. Brit. 397,427, Aug. 24, 1933. Ternary Mg alloys consist of Mg not less than 80, Cd 0.5-18 and Mn 0.5-2%.

**Nickel alloys.** Joseph K. Smith (to Beryllium Corp.). U. S. 1,941,368, Dec. 26. An alloy which may be heat-treated to improve its hardness and strength contains Ni about 96% together with Be, Mn and Mg (with the Be not in excess of 2% and the Mg and Mn each not in excess of 1%).

**Palladium alloys.** W. C. Heraeus G. m. b. H. Ger. 585,545, Oct. 5, 1933. Alloys contg. Pd and Rh, Pd, Au and Rh, or Pd, Ag and Rh, contain 70-99% of Pd, 1-30% Au or Ag and 1-20% Rh. The alloy is used for spinning nozzles for rayon.

**Use of silver-cadmium alloys for contacts of electrical circuit-breaker devices.** Lynn H. Matthias (to Allen-Bradley Co.). U. S. 1,940,962, Dec. 26. An alloy contg. Ag 80 and Cd 20% is suitable for contacts.

**Zinc alloys.** Compagnie française des conduites d'eau and Henry Petot. Fr. 754,945, Nov. 16, 1933. An alloy resistant to corrosion and of good mech. properties contains electrolytic Zn 75-95 and pure Al 25-5%. Sb, Bi and Ti may also be present. The Zn, Sb and Bi are added to previously molten Al which may already contain Ti, at 700°. A protecting flux of AlCl<sub>3</sub> or anhyd. ZnCl<sub>2</sub> may be used.

**Springs for clocks, etc.** Reinhard Straumann. Ger. 585,151, Sept. 29, 1933. Addn. to 578,390 (C. A. 27, 4207). Fe alloys contg. Ni 35-70, Be 0.1-3, and W, Cr, Mo, Mn or other usual component up to 40% are used for making temp.-compensated springs for clocks, etc.

**Bimetallic strip for thermostats.** Howard Scott (to Westinghouse Elec. & Mfg. Co.). U. S. 1,939,085, Dec. 12. Fe alloys of relatively high and low expansion are used together, the higher-expansion alloy contg. Ni, Mn and C in such proportions that the Ni content plus 18 times the C content is 32-8%, the lower expansion alloy contg. Ni 20-45, Co from a trace to 25, Ti from a trace to 10 and Mn from a trace to 1%. Cf. C. A. 27, 3125.

**Protecting metals from corrosion.** Horace C. Hall. Brit. 398,180, Sept. 4, 1933. Metals and alloys, e. g., Fe, steel, Al (alloys), are immersed in a hot aq. soln. of H<sub>3</sub>PO<sub>4</sub> and 1 or more of the Cr compds., CrO<sub>3</sub>, chromic acid, chromates and dichromates. The treatment may be applied to non-ferrous metals and alloys that have been treated by the process of Brit. 396,746 (C. A. 28, 461<sup>4</sup>), the original phosphate coat being reinforced by the deposition of Cr phosphate. Steel tools may be treated by the process to remove the surface H to render the cutting edge less susceptible to corrosion fatigue.

**Preventing corrosion.** The Gas Light & Coke Co. and Sydney G. Barker. Brit. 399,210, Oct. 2, 1933. A pipe, cable, etc., are protected against corrosion by a covering comprising 1 or more wound-on layers of coir fiber in the form of sliver or lap, the fiber being preferably impregnated with bitumen, etc., before application. The pipe, etc.,

- may be provided with a preliminary coating film of bitumen.
- Preventing corrosion of metals such as iron and lead.** Braxton D. Avis. U. S. 1,940,041, Dec. 19. Na tetraborate, Na salicylate and  $\text{NaNO}_2$  are used for inhibiting corrosion of iron and Pb when in contact with aq. and aq. alc. solns. such as those of engine cooling systems.
- Metal tubes with linings of corrosion-resistant material.** Alfred E. Maskrey (to Plykrome Corp.). U. S. 1,938,633, Dec. 12. Various details of app. and operation are described suitable for the manuf. of tubes lined with stainless steel.
- Welding.** Elektro Themit G. m. b. H. Fr. 754,079, Nov. 17, 1933. In aluminothermic welding of rails a plate composed of an alloy which melts with the aluminogenetic Fe and alloys with it is suspended in the space between the ends of the rails. The plate may be Ni-Cr, Fe contg. C, Mn, Cr and V or cast Fe.
- Arc welding.** Heinz Pasching. Austrian 135,672, Nov. 25, 1933 (Cl. 48b.). Arc welding electrodes contain Zr 0.05-3, Si 0.15-2.5 and Mn at least 0.25%, and are provided with a core of standard compn., which may contain Zr.
- Welding steel.** Clarence L. Delachaux. Ger. 585,261, Sept. 30, 1933. See Brit. 352,714 (C. A. 26, 2695).
- Electrically welding frame bars, etc., of steel containing carbon and manganese.** Grover A. Hughes (to Truscon Steel Co.). U. S. 1,939,395, Dec. 12. Welding is effected with use of an intervening element of greater C and Mn content than the main bars to be welded.
- Welding electrodes.** John B. Austin (to Una Welding, Inc.). U. S. 1,940,572, Dec. 10. Fluxing material such as talc and  $\text{Fe}_2\text{O}_3$  is deposited in depressions formed in electrodes such as those of low-C steel and is held in place by portions of the electrode metal extending partly over the depressions.
- Welding electrodes.** John B. Austin (to Una Welding, Inc.). U. S. 1,940,574, Dec. 19. A base rod formed largely of Cu is assoc. with a deoxidizing material such as Si or Mn in a proportion which may be about 2% or less and with a tinning or brazing material also forming 2% or less the wt. of the complete electrode. U. S. 1,940,573 relates to app. and details of operation for manuf. of welding electrodes carrying flux in depressions in the electrode metal.
- Flux for use in welding non-ferrous alloys such as copper alloys containing silicon.** Arthur R. Lytle (to Linde Air Products Co.). U. S. 1,940,262, Dec. 19. Finely ground boric acid is used in admixt. with 2-12% of NaF, KF, Li borate, Na borate or K borate.
- Blowpipe suitable for cleaning molds, brazing and welding.** Francis S. Austin (to Carbo-Oxygen Co.). U. S. 1,940,111, Dec. 19.
- Soldering.** Klippers Metallwerke G. m. b. H. Fr. 755,099, Nov. 18, 1933. A solder more particularly for use with Al or its alloys is composed of a soft alloy of low m. p., in which are dispersed harder crystals of an alloy of higher m. p. which remain solid in the fused alloy. The alloy of low m. p. may contain Sn 90 and Zn 10%, and the other alloy may contain Zn, Sn and Ni.
- Solder for noble metals.** W. C. Heraeus G. m. b. H. Ger. 588,187, Nov. 13, 1933 (Cl. 49a. 26). Use is made of alloys of noble metals with up to 5% of Si, P and (or) B.
- Metal plating.** Vereinigte Isolatorenwerke A.-G. Ger. 585,914, Oct. 12, 1933. Pressed objects made from  $\text{PhOH}\cdot\text{CH}_2\text{O}$  condensation products generally, with filling materials and dyes optionally incorporated, are given a coating of Ag salt soln., such as  $\text{AgNO}_3$ , without addn. of an addnl. reducing agent.
- Coating metals.** The Pyrene Co. Ltd. Brit. 397,179, Aug. 21, 1933. A protective coating is formed on the surface of Fe, Zn, Mg or their alloys by treating with a hot acid phosphate soln. contg. a small amt. of a metal less basic than that to be coated. The soln. is prepd. from materials described in Brit. 346,401 (C. A. 26, 611) and is then treated with an alk. substance, e. g.,  $\text{ZnCO}_3$ ,  $\text{MnCO}_3$ ,  $\text{Na}_2\text{CO}_3$ , until the desired proportion of total acid to free acid (10-15:1 for spraying or 10-12:1 when allowed to flow over the metal surface) is obtained. Alternatively the freshly prepd. soln. may be used as a dipping bath as described in 346,401 until the amt. of free acid has been sufficiently reduced.
- Spray-coating surfaces with metals such as zinc melted in an electric arc.** Charles M. Saeger, Jr. U. S. 1,940,814, Dec. 26. Various details of app. and operation are described.
- Coating aluminum.** Martin Tosterud (to Aluminum Co. of America). U. S. 1,939,421, Dec. 12. An Al surface is treated with a soln. of an alkali metal stannate and an alkali metal dichromate, in order to form a gray coating.
- Coating aluminum alloys.** Vereinigte Leichtmetallwerke G. m. b. H. Ger. 589,415, Dec. 8, 1933 (Cl. 48b. 9). In coating Al alloys with pure Al, diffusion of alloy components into the coating is avoided by interposing a layer of  $\text{Al}_2\text{O}_3$  between the alloy and the coating. Alternatively, the alloy may be coated with two layers of pure Al between which a layer of  $\text{Al}_2\text{O}_3$  is interposed.
- Coating iron, etc.** Aladar Pacz. Brit. 398,353, Sept. 14, 1933. See Fr. 728,411 (C. A. 26, 5542).
- Coating iron, etc., with zinc or zinc alloys.** Henry Csanyi. U. S. 1,939,667, Dec. 19. The plating metal is melted in finely divided form in contact with the plate-receiving metal together with a liquid vehicle comprising  $\text{NH}_4\text{Cl}$  and chloride of Ba, Sr or Be.
- Coating tungsten wire.** Siemens & Halske A.-G. (Werner Espe, inventor). Ger. 588,414, Nov. 17, 1933 (Cl. 21g. 13.03). A coating of a lower oxide is produced on W wire by treating the wire at 500-700° with a mixt. of steam with air and (or) H in such proportions that the wire acquires a blue color. The wire may be run through a vessel in which it is subjected to the treatment. The product is useful as a core for discharge-tube cathodes. App. is described.
- Preventing cleaned ferrous metals from rusting.** James H. Gravell (to American Chemical Paint Co.). U. S. 1,938,961, Dec. 12. The cleaned surface is coated with a film of As by treating it with Na arsenite soln.
- Apparatus for galvanizing wire, rods or strip material.** Rylands Brothers Ltd. and Frederick W. Upton. Brit. 397,908, Sept. 4, 1933.
- Grinding and abrading tools.** Paul Hopf. Brit. 398,073, Sept. 7, 1933. See U. S. 1,935,798 (C. A. 28, 733').

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

- Mechanism of the polymerization of olefins by acid catalysts.** Frank C. Whitmore. *Ind. Eng. Chem.*, 26, 94-5(1934); cf. C. A. 27, 5715-16.—Isobutylene is used to illustrate the mechanism of the polymerization of olefins under the influence of acid catalysts. The theory may also be used to predict the structure of the components of certain olefin mixts. obtained by polymerization.
- W. A. Moore
- Some ethylene and saturated hydrocarbons of  $\text{C}_6$  to  $\text{C}_{11}$ .** Marcel Tuot. *Compt. rend.* 197, 1434-6(1933).—Below are given, resp., the b. p. (pressure in parentheses),  $d_{20}^{20}$ ,  $n_D^{20}$ , R. M.,  $\gamma_m$  and  $P$  for various olefins and the corresponding satd. hydrocarbons.  $\text{MeCH}:\text{CMeCH}_2\text{CH}_2\text{CH}_2\text{Me}$ , 121° (750), 0.7296, 1.4183, 38.71, 22.27, 333.70;  $\text{C}_6\text{H}_{12}$ , 116.5° (747), 0.7033, 1.3982, 39.14, 20.39, 344.70;  $\text{Me}_2\text{CHCH}_2\text{CMe}:\text{CHMe}$ , 109° (737), 0.7313, 1.4160, 38.39, 21.64, 330.60;  $\text{C}_7\text{H}_{14}$ , 108° (750), 0.6986, 1.3950, 39.12, 19.97, 345.20;  $\text{Me}_2\text{C}:\text{CHCH}_2\text{CHMe}_2$ , 111° (739), 0.7265, 1.4134, 38.49, 21.58, 332.60;  $\text{C}_8\text{H}_{18}$ , 107° (747), 0.6937, 1.3922, 39.12, 19.04, 343.50.  $\text{Me}_2\text{CHCH}_2\text{CMe}:$

$\text{CHCH}_2\text{Me}$ , 131° (749), 0.7358, 1.4198, 43.42, 22.40, 372.90;  $\text{C}_9\text{H}_{18}$ , 130° (749), 0.7128, 1.4023, 43.75, 20.49, 382.40.  $\text{Me}_2\text{CHCH}_2\text{CH}:\text{CMeCH}_2\text{Me}$ , 137° (747), 0.7382, 1.4217, 43.34, 22.89, 373.60;  $\text{C}_9\text{H}_{18}$ , 133° (741), 0.7147, 1.4033, 43.73, 21.09, 384.10.  $\text{Me}_2\text{C}:\text{CMeCH}_2\text{CHMe}$ , 125° (741), 0.7340, 1.4180, 43.26, 21.635, 370.50;  $\text{C}_9\text{H}_{18}$ , 129° (738), 0.7171, 1.4051, 43.76, 21.17, 382.90.  $\text{Me}_2\text{CHCH}_2\text{CMe}:\text{CHCH}_2\text{CMe}$ , 154° (752), 0.7497, 1.4256, 47.81, 23.00, 112.00;  $\text{C}_{10}\text{H}_{20}$ , 152.5° (746), 0.7259, 1.4090, 48.36, 21.79, 423.00.  $\text{Me}_2\text{CHCH}:\text{CMeCH}_2\text{CHMe}$ , 142° (740), 0.7355, 1.4208, 48.12, 22.12, 413.15;  $\text{C}_{10}\text{H}_{20}$ , 143° (746), 0.7210, 1.4057, 48.34, 21.18, 422.90.  $\text{Me}_2\text{CHCH}_2\text{CMe}:\text{CHCH}_2\text{CHMe}$ , 168° (739), 0.7539, 1.4280, 52.56, 23.35, 450.30;  $\text{C}_{11}\text{H}_{22}$ , 167.5° (746), 0.7344, 1.4132, 52.99, 22.26, 461.80.

Rachel Brown

**Saponification of ethylene bromide with alcoholic alkali hydroxide.** A. L. Bernoulli and Walter Kampli. *Helv. Chim. Acta* 16, 1187-200 (1933).—The sapon of  $\text{BrCH}_2\text{CH}_2\text{Br}$  (I) with  $\text{H}_2\text{O}$  and  $\text{K}_2\text{CO}_3$  gave a mixt. of  $\text{HOCH}_2\text{CH}_2\text{OH}$  (II) and  $\text{BrCH}_2\text{CH}_2\text{Br}$  (III) in which II predominated. In the presence of 50% aq. EtOH a similar mixt., consisting mainly of III, was formed. The quant. results obtained from these sapon. expts. had no significance for the study of reaction kinetics. The decompn. of I, with the exclusive formation of III, by sapon. with NaOH in abs. EtOH is purely a bimol. reaction. The reaction velocity is considerably reduced by the addn. of  $\text{H}_2\text{O}$  to the reaction mixt. The dependence of the reaction velocity on the temp. is given by the exponential formula  $k_t = k_0 \times e^{(u-t)/\tau} = k_0 \times 10^{(u-t)/\tau}$ . For reaction mixts. whose reaction const. have been reduced by the addn. of  $\text{H}_2\text{O}$ , the same temp. relation with the same coeffs.  $\tau$  or  $\tau'$  ( $\tau = 0.4343\tau'$ ) holds true.

C. R. A.

**Several reactions of carbon tetrachloride synthesis.** Colin G. Fink and Charles F. Bonilla. *J. Phys. Chem.* 37, 1135-67 (1933).—A study was made of several little-known reactions by which  $\text{CCl}_4$  might be commercially produced. New thermodynamic data were calcd. from available data. It was not possible to carry out appreciably the reaction  $\text{COCl}_2 + 2\text{MCl} = \text{CCl}_4 + \text{MeO}$ , where M is an equiv. of a metal (Si, Al, Sn). Ordinary animal charcoal was found to be a good catalyst for the reaction  $\text{CCl}_4 = \text{C} + 2\text{Cl}_2$  but the reverse reaction did not occur. The reaction  $2\text{COCl}_2 = \text{CO}_2 + \text{CCl}_4$  was attempted in both directions and indications obtained of false equilibria.

P. T. Newsome

**Alkyl and aryl bromosulfites.** P. Carré and D. Litvermann. *Compt. rend.* 197, 1326-8 (1933).—Unlike  $\text{SO}_2\text{Cl}_2$  (C. A. 27, 711, 3912),  $\text{SO}_2\text{Br}_2$  reacts with alic. to give alkyl bromides; however, with neutral alkyl or aryl sulfites, on standing at room temp. in anhyd. EtO, the corresponding bromosulfites are readily obtained:  $\text{EtOSOBr}$ ,  $b_p$  67-70°;  $\text{PrOSOBr}$ ,  $b_p$  90-3°;  $\text{iso-PrOSOBr}$ ,  $b_p$  72-4°;  $\text{BuOSOBr}$ ,  $b_p$  105-7°;  $\text{ClCH}_2\text{CH}_2\text{OSOBr}$ ,  $b_p$  118-20° (from  $\text{ClCH}_2\text{CH}_2\text{O})_2\text{SO}$ ,  $b_p$  146-8°);  $\text{PhOSOBr}$ ,  $b_p$  131-4°. These are less stable than the similar Cl compds.

H. A. Beatty

**Behavior of the hydrochlorides of organic bases toward chloroauric acid. Constitution of the abnormal auric chloride complexes.** Dinesh Chandra Sen. *J. Indian Chem. Soc.* 10, 497-501 (1933).—The following compds. of the types  $\text{XAuCl}_4$  and  $\text{X}_2\text{AuCl}_3$  (X = quaternary  $\text{NH}_4$  radical) have been prep'd. according to the procedure of Jenner and Tafel (*Ber.* 32, 3220 (1899)), by the addn. of chloroauric acid to the HCl salts of the org. bases, quinine, piperidine, EtNH<sub>2</sub>,  $\text{PhCH}_2\text{NH}_2$  and  $\text{NMe}_3$ :  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4$ , m. 238°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4 \cdot \text{C}_6\text{H}_5\text{NCl}$ , m. 180°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4$ , m. 206°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4 \cdot \text{C}_6\text{H}_5\text{NCl}$ , m. 183°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4$ , m. 195°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4 \cdot \text{C}_6\text{H}_5\text{NCl}$ , m. 70°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4$ , m. 168°;  $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_3\text{AuCl}_4$ , m. 220°. The normal salts,  $\text{XAuCl}_4$ , are always formed in aq. media, a max. yield being obtained with mol. proportions of the basic HCl salts and  $\text{AuCl}_3 \cdot \text{HCl}$ . In alc. HCl solns. of 2 mols. of basic HCl salts per mol. of  $\text{AuCl}_3 \cdot \text{HCl}$  max. yields of the compds.  $\text{X}_2\text{AuCl}_3$  were formed. Compds. of this type were also obtained by heating alc. solns. of  $\text{XAuCl}_4$  in the presence of HCl. They are unstable in

water and in acetone, and give abnormal values in b.-p. and mol.-wt. detns. in alc. From results of observations made on mol. vols. and sp. resistances it is definitely established that the abnormal auric chlorides of the type  $\text{X}_2\text{AuCl}_3$  are mol. compds. of the type  $\text{X}(\text{AuCl}_4) \cdot \text{XCl}$ . C. R. A.

**Hydrazide of 12-hydroxystearic (acid) and some of its derivatives.** J. Vorisek. *Collection Czechoslov. Chem. Communications* 5, 466-8 (1933).—12-Hydroxystearic acid, heated on a water bath for 12 hrs. with  $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ , gave  $\text{C}_{18}\text{H}_{35}\text{CH}(\text{OH})(\text{CH}_2)_{10}\text{CONHNH}_2$  (I), m. 115.5-16.5°. I, treated with HCl gas, gave the HCl salt, m. 162-3°; warmed with a slight excess of  $\text{Ac}_2\text{O}$ , it gave  $\text{C}_{18}\text{H}_{35}\text{CH}(\text{OH})(\text{CH}_2)_{10}\text{CONHNHAc}$ , m. 144-5°; when refluxed with  $\text{Ac}_2\text{O}$  for 15 min. it gave  $\text{C}_{18}\text{H}_{35}\text{CH}(\text{OAc})(\text{CH}_2)_{10}\text{CONHNHAc}$ . I (2 g.) added slowly to I (12 g.) in EtOH and then treated with 6 g. more of I at once gave  $[\text{C}_{18}\text{H}_{35}\text{CH}(\text{OH})(\text{CH}_2)_{10}\text{CONH}]_2$ , m. 153-4°.

J. White

**2,3-Dichlorodioxane.** Wilson Baker and A. Shannon. *J. Chem. Soc.* 1933, 1598. 2,3-Dichlorodioxane,  $b_p$  97-8°, m. 30°, reacts with  $\text{C}_2\text{H}_5\text{OH}$  to give a mixt. of two 2,3-ethylene-dioxycloxanes, so that inversion about 1 of the asym. C atoms must occur during the reaction. These 2 form a eutectic mixt., m. 86°, with 77% of the lower-melting isomer. Chlorination of 1,3-dioxacyclopentane gives an inseparable mixt. of 2-Cl and a smaller quantity of 4-Cl deriv.,  $b_p$  53-6°. 2,3-Dicyanodioxane could not be prep'd.

C. J. West

**Photochemical reactions in the series of o-nitrobenzylidene acetal derivatives.** VIII (I) (Di-o-nitrobenzylidene-1,2,5,6-dulcitol). Ioan Tanasescu and Eugen Macovski. *Bull. soc. chim.* 53, 1097-102 (1933); cf. C. A. 27, 2142. The condensation of dulcitol with o-o<sub>2</sub>N<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CHO in the presence of 75%  $\text{H}_2\text{SO}_4$  gave 1,2,5,6-bis(o-nitrobenzylidene)dulcitol (I),  $\text{C}_{30}\text{H}_{30}\text{N}_4\text{O}_{10}$ , m. 256°. The formation of I confirms the conception of Tollens (*Ann.* 310, 184 (1900)) that the acetalization of the polyols is favored by the trans-position of the OH groups. In dulcitol the 3,4-OH groups offer a steric hindrance to acetalization (C. A. 26, 4583). The existence of these OH groups is shown by the ready benzylation of I in pyridine to 1,2,5,6-bis(o-nitrobenzylidene)-3,4-dibenzoyldulcitol (II),  $\text{C}_{32}\text{H}_{32}\text{N}_4\text{O}_{12}$ , m. 310°. The photochem. isomerization of I gave a resin which could not be purified. I contains 3 active H atoms by the Zerewitinov method of detn. II was isomerized by light to 1,6-bis(o-nitrobenzoyl)-3,4-dibenzoyldulcitol (III),  $\text{C}_{34}\text{H}_{34}\text{N}_4\text{O}_{12}$ , m. 108-10°. This result verified the parallelism between the no. of mobile H atoms and the degree of photochem. isomerization and also afforded an explanation for partial isomerization as evidenced by the behavior of light on I in soln. The NO groups in III were apparent in the emerald-green of the substance in soln. and in the fused state. The existence of the 2,5-OH groups was proved by the formation of the di-Bz deriv., 1,6-bis(o-nitrobenzoyl)-2,3,4,5-tetra-benzoyldulcitol,  $\text{C}_{38}\text{H}_{38}\text{N}_4\text{O}_{14}$ , m. 110° (decompn.).

C. R. Addinall

**Thioketonic esters. IV.** Susil Kumar Mitra. *J. Indian Chem. Soc.* 10, 491-5 (1933); C. A. 27, 3914. Et ethylthioacetate (I), red oil,  $b_{14}$  85°, results in 80% yield from  $\text{AcCHEtCO}_2\text{Et}$  satd. with HCl at 0° and treated with  $\text{H}_2\text{S}$  for 8 hrs. at 0°. With  $\text{PhNHNH}_2$  I evolves  $\text{H}_2\text{S}$  and gives 1-phenyl-3-methyl-4-ethyl-5-ketopyrazolone (II), m. 108°. I, hydrolyzed with 10%  $\text{H}_2\text{SO}_4$ , gives MeCOPr. The Na deriv. of I and EtBr gives 60% of Et  $\beta$ -ethylmercapto- $\alpha$ -ethylcrotonate,  $b_{14}$  95°;  $\beta$ -iso-Bu deriv.,  $b_{14}$  100°; with  $\text{PhNHNH}_2$  there results II; on boiling with dil. acids these compds. evolve mercaptans and  $\text{CO}_2$ ; the absence of the thiol group is evidenced by the fact that they do not decolorize EtOH-I and do not yield Pb salts. Et  $\beta$ -acetylmercapto- $\alpha$ -ethylcrotonate,  $b_{12}$  105°, results from the Na compd. of I and AcCl or from  $\text{MeCSCH}_2\text{CO}_2\text{Et}$ , thioacetic anhydride and  $\text{C}_6\text{H}_5\text{N}$ ;  $\beta$ -Bz deriv.,  $b_{14}$  185°;  $\text{PhNHNH}_2$  gives II and Ac or Bz derivs. of  $\text{PhNHNH}_2$ . The Ac deriv. and EtMgBr give I and MeCOEt.

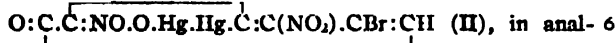
C. J. West

**Rotatory dispersive power of organic compounds. XXIV. Ascorbic acid.** T. M. Lowry and S. A. Pearman. *J. Chem. Soc.* 1933, 1444-9; cf. C. A. 28, 1111. Aq. solns. of ascorbic acid (I) do not undergo mutarotation in

the absence of  $O_2$  but they exhibit anomalous rotatory dispersion, with a max. in the violet. Alk. solns. also do not undergo mutarotation in the absence of  $O_2$  but the rotatory power is much higher and the rotatory dispersion is apparently simple. The rotatory power of I is increased by diln. and by the addn. of alkali but that of alk. solns. diminishes and then becomes neg. on atm. oxidation. Results are given in 3 tables and 5 curves.

C. J. West

A reagent of the enolic form. A. Dansi and A. Sempronj. *Gazz. chim. ital.* 63, 560 5(1933).—The new enol reaction of Zappi (C. A. 26, 2706; 27, 904) was applied to ketones, nitriles and mono- and polynitrophenols. Among ketones, MeEtCO, Me hexyl ketone, Me nonyl ketone and methylheptenone give pos. reactions. Others, like  $MeC_6H_4COMe$  and  $EtCOPh$ , have a reducing action, but form intermediate yellow compds., already noted by Z., with  $PhCOMe$  and  $Me_2CO$ . Passage to Hg takes place on heating. Attempts to isolate the yellow compds. were unsuccessful because of decompn. They are org. Hg compds. which evolve nitrous vapors when warmed. Among nitriles, MeCN prepd. from acetamide does not reduce  $HgNO_3$ , whereas when it is prepd. from  $Me_2SO$ , it does reduce, because of the presence of isonitrile. PhCN and *p*-nitrobenzonitrile are also without reducing power. Though Z. found no reduction with PhOH, prolonged heating of aq. PhOH with satd.  $HgNO_3$  gives a yellow ppt. which redissolves with deposition of a little Hg. Prolonged heating of the 3 aq. mononitrophenols with  $HgNO_3$  gives no reduction, but in EtOH they ppt. yellowish substances which turn dark. Though not observed by Z., aq.  $o-O_2NC_6H_4ONa$  with  $HgNO_3$  ppts. a greenish compd. which on heating decomp. to Hg. Under the same conditions *p*- $O_2NC_6H_4ONa$  ppts. a green compd. (I) mixed with Hg. The reduction is more rapid with *m*- $O_2NC_6H_4OK$ . Therefore the more highly disocd. is the nitrophenate the slower the reduction (cf. Ber. 8, 1556 (1875)). Hot aq. 5,2,4- $Br(O_2N)_2C_6H_3OK$  and  $HgNO_3$  ppt. the compd.  $C_6H_3O_2N_2BrHg$ , orange, turns green above 100°, becomes orange again at higher temps. and decomp. violently above 200°. It reduces  $AcCH_2CO_2Et$  instantly. Its constitution is probably



ogy with the anhydrides of mercurinitrophenols (cf. Ber. 39, 1105(1906); 40, 330(1907)). It was expected that K picrate would form an analogous compd., but actually there was pptd. a canary-yellow substance, with greenish reflection, contg. 50.75–51.15% Hg (between 1 and 2 Hg atoms per PhOH mol.). This mixt., partially sol. in hot water, yielded the  $(O_2N)_2C_6H_3(O):NO.O.Hg$  of Hantzsch.

With  $NH_4OH$  it ppts. a light yellow compd. which decomp. rapidly, particularly when warmed. It contains  $NH_3$ . The small proportion of water-insol. green product (III) contains both combined and free Hg, so that in this reaction most of the  $HgNO_3$  acts as a mercurating agent and does not form products of the II type. With cold  $AcCH_2CO_2Et$ , I, II and III are reduced immediately. Though Z. explained these reactions by the unsatd. active character of the enolic and the pseudo forms, it is possible that extremely unstable transition compds. between the enolic or pseudo forms and the mercurio compd. are formed, which are analogous to II. Thus with  $MeNO_2$ , formula II can be extended to a hypothetical unstable compd. of  $MeNO_2$ , where the 2  $-Hg.Hg-$  atoms are attached to the C and to the O of the  $NO_2$  group, resp. In an analogous way, the anhydrides of Hantzsch, formed in the mercuration of nitrophenols, are found in the aliphatic series in the mercuration of  $O_2NCH_2CO_2Et$  (cf. Scholl and Nyberg, Ber. 39, 1956(1906); D. and Ferri, C. A. 27, 2938), where the anhydride forms on a single C atom,

thus:  $EtO_2CC:NO.O.Hg$ . The introduction of the  $-Hg.-Hg-$  group in this type of product might originate from unstable compds. which would be immediately reduced to Hg.

C. C. Davis

**New derivatives of methoxymalonic acid.** John Pryde and R. Tecwyn Williams. *J. Chem. Soc.* 1933, 1627-8; cf. C. A. 27, 4217.— $MeOCH_2CO_2Me$ ,  $b_p$  129.5–30.5°,  $n_D^{20}$  1.3972 and  $(CO_2Me)_2$  with Na in dry Et<sub>2</sub>O give *M*,  $\alpha$ -*keto*- $\beta$ -methoxysuccinate, pale yellow,  $b_p$  110–20°,  $n_D^{20}$  1.4465; distn. at 745.5 mm. gives *Me methoxymalonic*, pale yellow,  $b_p$  215°; *methoxymalondiamide*, m. 203–4° (slight decompn.); the *methylamide* m. 115°.

C. J. West

**Structure of glutacnic acids and esters.** VIII. Some cyclic compounds of the glutacnic and the citraconic acid series. G. A. R. Kon and B. L. Nandi. *J. Chem. Soc.* 1933, 1628–34; cf. C. A. 27, 64.— $\Delta^2$ -Tetrahydrocyclophthalic acid (I) was prepd. in 2 ways. Cyclohexanone condenses with 2 mols.  $(CO_2Et)_2$ , using 2 mols. EtONa and gives, in addn. to Et cyclohexanone-2-glyoxylate, a small quantity of Et cyclohexanone-2,6-diglyoxylate, which on distn. yields Et cyclohexanone-2,6-dicarboxylate, which is more conveniently prepd. by Ushakov's method (C. A. 23, 4678); catalytic reduction gives Et cyclohexanol-2,6-dicarboxylate,  $b_p$  145.7°,  $d_4^{20}$  1.1202,  $n_D$  1.4679; dehydration with  $SOCl_2$  in  $C_6H_5N$  gives the *II* ester (II) of I,  $b_p$  149.51°,  $d_4^{20}$  1.0771,  $n_D$  1.4720.  $(CO_2Et)_2$  and Et tetrahydrobenzoate are condensed by EtONa to Et 3-carbethoxy- $\Delta^2$ -cyclohexenylglyoxylate (III), m. 105°, hydrolysis with 20% KOH gives the free acid, m. 221° (acid ester, m. 178°); oxidation of III or hydrolysis of II gives I, m. 197–8°; the action of  $O_3$  on I gives glutaric acid. II, Na and EtI give the *Et* ester,  $b_p$  145–50°,  $d_4^{20}$  1.0448,  $n_D$  1.4682, of 1-ethyl- $\Delta^2$ -cyclohexene-1,3-dicarboxylic acid, m. 162°. Heating I with 25% KOH in a sealed tube at 100° for 18 hrs. has no effect but with HCl at 180–90° for 4 hrs. I gives the  $\Delta^2$ -acid. Me  $\Delta^1$ -cyclobutene-1,2-dicarboxylate (Perkin, *J. Chem. Soc.* 67, 930 (1894)) with  $O_3$  gives Me  $\alpha,\alpha'$ -diketoadipate; the ester is not changed by EtONa at room temp. or by distn. at room temp. Et 1,2-dibromocyclobutane-1,2-dicarboxylate  $b_p$  150–8° (33% yield); reduction with Zn in EtOH gives Et  $\Delta^1$ -cyclobutene-1,2-dicarboxylate,  $b_p$  136.9°,  $d_4^{20}$  1.0870,  $n_D$  1.4571; with  $O_3$  it reacts as the Me ester. Attempts to prep. the  $\Delta^2$ - or  $\Delta^3$ -acid are reported.  $[CH(CO_2Et)]_4$ , Na and  $ClCH_2COCl$  give a mixt. of esters which could not be sep'd. by distn.; the phenylhydrazone, m. 128°, was probably derived from Et cyclobutan-3-one-1,1,2,2-tetracarboxylate; catalytic reduction and hydrolysis give a poor yield of 3-hydroxycyclobutane-1,1,2,2-tetracarboxylic acid(?), m. 191°. Et  $\Delta^1$ -cyclopentene-1,2-dicarboxylate with  $O_3$  gives Et  $\alpha,\alpha'$ -diketopimelate; the ester is not isomerized by EtONa nor is EtOH added, an acid ester,  $b_p$  135–40°, is formed in part; the acid is also unchanged by 25% KOH at 100° or by concd. HCl in a sealed tube. Et  $\Delta^2$ -tetrahydrophthalate,  $b_p$  155°,  $d_4^{20}$  1.0760,  $n_D$  1.4700; it is unchanged after 3 distns. at atm. pressure, after boiling 4 hrs. in a Geisler flask, after treatment with EtONa and after the last soln. has been boiled 4 hrs. The  $\Delta^1$ -isomer  $b_p$  160°,  $d_4^{20}$  1.0782,  $n_D$  1.4743, heating with EtONa for 4 hrs. gives a product with 12.4% EtO acid. The  $\Delta^1$ -acid is rapidly converted into the  $\Delta^2$ -acid on boiling with 12% alkali, the extent of the change being about 75% and practically complete in 15 min. The  $\Delta^2$ -acid is not changed by heating with 25% KOH at 100° for 6 hrs.

C. J. West

**Maleic acid and phthalic anhydride.** C. R. Downs. *Ind. Eng. Chem.* 26, 17 20(1934).—The diverse fields opened up commercially by the catalytic oxidation of benzene and naphthalene in the vapor phase to maleic and phthalic anhydrides are discussed. Correction. *Ibid.* 180.

W. A. Moore

**Ethyl and methyl esters of fluoroformic acid.** Harsh C. Goswami and Pulin B. Sarkar. *J. Indian Chem. Soc.* 10, 537–9(1933).—By the action of powd. anhyd. THF on  $ClCO_2Et$  and  $ClCO_2Me$  were produced the corresponding fluoroformic esters,  $FCO_2Et$ ,  $b_p$  57°,  $d_4^{20}$  1.11, and  $FCO_2Me$ ,  $b_p$  40°,  $d_4^{20}$  1.06. The substitution of Cl by F lowers the  $b.p.$  by 36° and 32° in the case of the Et and Me esters. A similar difference exists between  $AcCl$  and  $AcF$  and between  $EtCOCl$  and  $EtCOF$ . The Me ester is more dense than the Et ester; as with the initial chloroformic esters,

the combustion of the compds. for anal. purposes was carried out in a Cu tube, using a mixt. of CuO (80%) and PbO (20%) in a current of O. The analysis for F was effected by hydrolysis with 6 *N* NH<sub>4</sub>OH and pptn. as CaF<sub>2</sub>.

C. R. Addinall  
**Oxidation of uric acid in the presence of glycooal.** Frèrejacque. *Compt. rend.* 197, 1337-9 (1933).—Oxidation of uric acid, as previously described (C. A. 26, 1579), in the presence of glycine or alanine yields K salts of *N*-isoallantoylglycine (I) or *N*-isoallantoylalanine, resp. Treated with CuSO<sub>4</sub>, CuCl<sub>2</sub>, HgCl<sub>2</sub> or AgNO<sub>3</sub>, I forms slightly sol. cryst. double salts in which the K ion is replaced; in dil. HOAc, a double salt of I and the free base is obtained, but the latter alone is evidently unstable. Possibly such reactions occur in the *metabolism of uric acid*.

H. A. Beatty  
**Fructose anhydride. XIII. Synthesis of a difructose anhydride from fructose.** Hans H. Schlubach and Cessa Behre. *Ann.* 508, 16-24 (1933); cf. C. A. 27, 4780.—Fructose (10 g.) and 10 cc. dry HCl, allowed to stand in a sealed tube 5 hrs. at 14°, give a *difructose anhydride*, decomps. 250-70°,  $[\alpha]_D^{25}$  -43.9° (H<sub>2</sub>O, *c* 1.02); the half-period of hydrolysis with *N* H<sub>2</sub>SO<sub>4</sub> is 1071 min.; the hydrolytic product is pure fructose. The *Ac deriv.*, C<sub>24</sub>H<sub>40</sub>O<sub>10</sub>, m. 171-3°,  $[\alpha]_D^{25}$  -59.1° (CHCl<sub>3</sub>, *c* 1.02), -41.7° (C<sub>6</sub>H<sub>6</sub>, *c* 1.01); with 35% NaOH and Me<sub>2</sub>SO, there results a *hexa-Me deriv.*, m. 143-5°,  $[\alpha]_D^{25}$  -46.5° (CHCl<sub>3</sub>, *c* 1.00). Hydrolysis gives 3,4,5-trimethylfructose, b<sub>p</sub> 117°,  $n_D^{20}$  1.4723,  $[\alpha]_D^{25}$  -55.2° (CHCl<sub>3</sub>, *c* 1.07), -73.5° (H<sub>2</sub>O, *c* 0.70), -55.8° (CCl<sub>4</sub>, *c* 0.99), -57.9° (MeOH, *c* 0.93); osazone, oily.

C. J. West  
**Action of 2-hydroxycyclopentanecarboxylic acids on the electrical conductivity of boric acid. Mobility of the cyclopentane ring.** J. Böseken, G. Slooff, J. M. Hoeffelman and H. E. Hirsch. *Rec. trav. chim.* 52, 881-94 (1933).—Aliphatic  $\alpha$ -OH acids exert a very pronounced action on the elec. cond. of H<sub>3</sub>BO<sub>3</sub>, while  $\beta$ -OH acids are indifferent. Although aromatic *o*-hydroxy carboxylic acids are  $\beta$ -OH acids, they exert a pos. action on the conducting power of H<sub>3</sub>BO<sub>3</sub>, comparable with that of aliphatic  $\alpha$ -OH acids. Evidently the position of the OH and CO<sub>2</sub>H groups is very favorable to "aromatic tension"—the tension due to the fact that all the groups united directly with the benzene ring are forced to lie in the plane of the ring. It was to be expected that the *cis*-2-hydroxycyclopentanecarboxylic acids, being  $\beta$ -OH acids, could exert a pos. action on the cond. of H<sub>3</sub>BO<sub>3</sub>, not only because the complex activities of the open chain  $\beta$ -OH acids have disappeared, but also because the position of the OH and CO<sub>2</sub>H groups in the *cis*-isomers is favorable to the formation of a hexatomic ring. Results obtained by the authors in the investigation of certain acids have confirmed this hypothesis. Two 2-borneol-3-carboxylic acids are known, I (m. 102°) and II (m. 175°). I increases the cond. of H<sub>3</sub>BO<sub>3</sub> and is therefore the *cis*-isomer; this is also in accord with the values of the electrolytic dissocn. const. The fact that II is difficultly attacked by KMnO<sub>4</sub> is proof of its *trans*-configuration, for in the *trans*-isomer the OH and CO<sub>2</sub>H groups are not situated in such a way as to favor the formation of a complex with KMnO<sub>4</sub>. II does not react with Me<sub>2</sub>CO or chloral; I reacts with Me<sub>2</sub>CO to give a solid, m. 124°, and with chloral to give a chloralide, m. 191°. 2-Hydroxycyclohexanecarboxylic acid (III), only 1 form (m. 111°) of which the authors were able to obtain, decreased the cond. of H<sub>3</sub>BO<sub>3</sub>. The cyclohexane ring being much more mobile than the pentatomic ring, the OH and CO<sub>2</sub>H groups will occupy a much less fixed position in this acid than in the hydroxycyclopentanecarboxylic acids. In that case the situation in the *cis*-isomer may be almost as unfavorable as in the *trans*-isomer. Although a chloralide (m. 142°) of III was obtained, this is no more a proof that the acid has the *cis*-configuration than the neg. conduction with reference to H<sub>3</sub>BO<sub>3</sub> is a proof of the *trans*-configuration. From the mother liquors of some preps. of III was obtained a small quantity of a sirup. After distn. it crystd. slowly to a solid which m. 57-63° and increased the cond. of H<sub>3</sub>BO<sub>3</sub>. At best it may be said that III is probably the *trans*-acid. Cyclization of Et adipate by

Na, reduction of the product with H<sub>2</sub> and Ni, treatment with KOH in MeOH and addn. of acid gave a viscous oil which would not crystallize. This mixt. of *cis*- and *trans*-2-hydroxycyclopentanecarboxylic acids was sepd. by means of Me<sub>2</sub>CO, since only the *cis*-isomer forms a volatile cyclic acetal with Me<sub>2</sub>CO. During acetonization in the presence of P<sub>2</sub>O<sub>5</sub> the *trans*-acid was transformed into its *cis*-isomer. The Me<sub>2</sub>CO compds. when hydrolyzed gave acids which increased the cond. of H<sub>3</sub>BO<sub>3</sub>, indicating their *cis*-configuration. To Et 8-methyladipate in PhMe was added a few drops of abs. EtOH and some Na wire. After the vigorous reaction had ceased, the solid mass of Na salts was heated for a time at 150°, then suspended in Et<sub>2</sub>O and acidified. The product b<sub>p</sub> 130-5° and on reduction with H<sub>2</sub> and Ni at 150-60° under pressure gave a mixt. of the esters of 4- and 5-methyl-2-hydroxycyclopentanecarboxylic acids, b. 72-82° in cathode vacuum. Sapon. of the esters gave a mixt. of *cis*- and *trans*-acids, which was sepd. by acetonization in the presence of P<sub>2</sub>O<sub>5</sub>. No isomerization of *trans*-acid to the *cis*-acid occurred, owing to stabilization by the Me group of the cyclopentane ring. From the Me<sub>2</sub>CO soln. was obtained on distn. the Et ester of 5-methyl-2-hydroxycyclopentanecarboxylic acid, b<sub>p</sub> 115-7°. The marked difference between the increase in cond. of H<sub>3</sub>BO<sub>3</sub> (0.5 *M*) produced by borneolcarboxylic acid and that produced by the simple cyclopentanecarboxylic acids is attributed by the authors to a much more pronounced rigidity of the pentatomic rings of borneol.

Louise Kelley  
**Constituents of Filix mas. II. Synthesis of filicinic acid.** Alexander Robertson and Wm. F. Sandrock. *J. Chem. Soc.* 1933, 1617-18; cf. C. A. 27, 4800.—Partial hydrolysis of Me<sub>2</sub>C(CO<sub>2</sub>Et)<sub>2</sub> gives the *acid ester*, b<sub>p</sub> 114-16°, b<sub>p</sub> 185-6°; PCl<sub>5</sub> gives the *acid chloride*, b<sub>p</sub> 74-8° (*anhydride*, m. 47-8°); with the Na deriv. of CO(CH<sub>2</sub>CO<sub>2</sub>Et)<sub>2</sub>, there results Et 1,1-dimethylpentane-2,4-dione-1,3,5-tricarboxylate, yellow, b<sub>p</sub> 175-80°; ring closure with EtONa gives Et 1,1-dimethylcyclohexane-2,4,6-trione-3,5-dicarboxylate, m. 147-8°; simultaneous hydrolysis and decarboxylation gives filicinic acid (Boehm, *Ann.* 329, 289, 321 (1903)), which is 1,1-dimethylcyclohexane-2,4,6-trione.

C. J. West  
**Reactions of substituted cyclohexanones.** Robert E. Meyer. *Helv. Chim. Acta* 16, 1291-5 (1933).—The absorption of 376 g. of Cl by a well-stirred suspension of 265 g. cyclohexanol in 660 cc. H<sub>2</sub>O contg. 400 g. CaCO<sub>3</sub>, kept at 20-5° for 9.5 hrs., produced 42 g. cyclohexanone, 198 g. (56.6%) of 2-chlorocyclohexanone (I), b<sub>p</sub> 79°, m. 22-3°,  $d_4^{20}$  1.161,  $n_D^{20}$  1.4825, and 63 g. of a denser, more highly chlorinated product which on distn. gave 41 g. of 2,6-dichlorocyclohexanone (II), m. 72-3°, b<sub>p</sub> 106°,  $d_4^{20}$  1.2950,  $n_D^{20}$  1.5034. II was quantitatively dechlorinated on heating with K<sub>2</sub>CO<sub>3</sub> in 50% alc. Addn. of powd. KCN to alc. I yielded 64% 2-cyanocyclohexanone (III), b<sub>p</sub> 129-31°. On exposure to the air III is slowly converted into adipic acid (IV), m. 149.5-50°. The cyclohexanone ring is cleaved to 6-hydroxy-8-cyanocaproic acid which liberates HCN and yields HO<sub>2</sub>C(CH<sub>2</sub>)<sub>4</sub>CHO, transformed by atm. oxidation into IV. Steam distn. of III in 10% NaOH for 10 hrs. (to cessation of NH<sub>3</sub> evolution) gave 84.7% of pimelic acid (V), C<sub>7</sub>H<sub>10</sub>O<sub>4</sub>, m. 104-5°. The best method of prepg. V was found to consist in the treatment of the reaction product of KCN and I with tech. 25% NaOH. Quant. expts. showed that the acid is not volatile on steam distn.

C. R. Addinall  
**Free nitrogenated radicals. The structure of diarylnitroxides.** L. Cambi, Emilio Tremolada and G. Devoto. *Gazz. chim. ital.* 63, 579-84 (1933).—The magnetic susceptibilities of 3 nitroxides with quadrivalent N, viz., Ph<sub>2</sub>NO (I), (p-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>NO (II) and (p-MeOC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>NO (III), were detd. by a method already described in previous work (cf. C. and Szegö, C. A. 26, 887). The following data give the temp. (abs.),  $\chi_{mol.}$   $\times 10^4$  and  $\chi_{mol. cor.}$   $\times 10^4$  values at the temp., and the Weiss magneton, resp., for the 3 compds.: I, 291°, 1160, 1275, 8.45; II, 350°, 1083, 1234; 294°, 1318, 1469; 192°, 1960, 2111; 84°, 4220, 4391, 9.20; III, 243°, 954, 1087; 291°, 1160, 1293; 193°, 1760, 1893; 84°, 2550, 2683; 8.60. Because

of its instability, I could be measured only at 291° (abs.). The  $\chi_{\text{mol. cor.}} \times 10^4$  values of II between 343° and 193° (abs.) and of III at the lowest temp. show a zero value of the  $\theta$  coeff. in the  $\chi_m(T - \theta) = C$  formula of Weiss and Curie. II has a tendency toward Bohr magneton values below 1 at the lowest temps., though lack of data below 84° (abs.) leave the question unsettled. The structure of nitroxides in relation to their elec. moments is also discussed (cf. C. and Szegő, *Rend. ist. lombardo* 56, 439 (1933); C. A. 27, 3368). The magnetic susceptibility of  $R_2NO$  compds., the structure of which is indisputable, attest the general behavior of the NO group, which in both inorg. and org. derivs. has a magnetic moment of 1 Bohr magneton. There remains, however, the question whether the odd electron of the NO group belongs to the N. Based on analogy and on the chem. behavior of the NO group, the uncompensated active electron belongs to the N. Further examn. of the structure of diarylnitroxides is made possible by the data on the elec. moment. The moments ( $\mu$ ) of I, II and III are  $2.3 D \pm 0.2$ ,  $2.7 D \pm 0.5$  and  $3.3 D \pm 0.3$ , resp., i. e., of the same order of magnitude as that of PhNO ( $3.22 D$ ). These moments suggest a general form with semi-polar valences:  $R_2N \rightleftharpoons O$ , analogous to those of PhNO and PhNO<sub>2</sub>. Possibly there is a form with the following electronic arrangement:

R:



R:

C. C. Davis

**Influence of neutral salts on the optical rotation of  $\alpha$ -phenylethylamine hydrochloride.** Yen Ki Heng. *Compt. rend.* 197, 1316-18 (1933).—The sp. optical rotation of PhCHMeNH<sub>2</sub>Cl increases rapidly with the concn., and is augmented by the addn. of neutral salts. This effect depends on the charge, mass and structure of the anion added, and is a max. with phthalate ion; F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup> and I<sup>-</sup> ions increase in effectiveness in that order; LiI shows an influence of the cation.

H. A. Beatty

**Causes of discoloration of aniline and measures for its possibly long preservation without change.** P. K. Bulich. *Anilinokrasochynaya Prom.* 3, 405-12 (1933).—The dark discoloration of PhNH<sub>2</sub> (I) was investigated with I derived from pure and tech. coal-tar C<sub>6</sub>H<sub>6</sub> (d. 0.880-0.885) and petroleum C<sub>6</sub>H<sub>6</sub> (d. 0.8665), whereby the former was found to be more stable than the latter. The discoloration of I caused by a photochem. oxidation is directly related to the intensity of actinic light and the duration of exposure. The reaction is furthered by the presence of impurities of *o*- and *p*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>, but is retarded by *m*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>, and nearly completely inhibited in the absence of O<sub>2</sub>. The discoloration of I is considerably retarded or completely checked by contact with minute amts. of Na<sub>2</sub>S (preferably anhyd.), oxalic acid, emery-surfaced Zn and Fe plates, untreated or after boiling with 20% Na<sub>2</sub>S. Fe plates cleaned by heating with dil. H<sub>2</sub>SO<sub>4</sub> accelerate the oxidation even when treated with Na<sub>2</sub>S, the preserving action being somewhat restored by mild heating over a gas flame. Partially rusted Fe plates after boiling with 20% Na<sub>2</sub>S also have a retarding action on the oxidation of I. Several large samples of colorless tech. I stored with the addn. of little oxalic acid and anhyd. Na<sub>2</sub>S, Fe plates and Fe plates treated with Na<sub>2</sub>S, showed no discoloration after 2 months. Na<sub>2</sub>S and the acid do not undergo changes. The method was applied with satisfactory results to the storage and transportation of com. I in iron drums. The drums were flushed with hot H<sub>2</sub>O, and without further cleaning were boiled with 5-20% Na<sub>2</sub>S, sealed, allowed to cool, then emptied, flushed with H<sub>2</sub>O, and then twice with I and filled as soon as possible to prevent the oxidation of the FeS film. Chas. Blanc

**Diazotization of aromatic nitroamines and the prevention of diaryl formation in the Sandmeyer reaction.** Herbert H. Hodgson and John Walker. *J. Chem. Soc.* 1933, 1620-1.—The diazotization of weak bases is rapid and complete when a soln. of the nitroamine in glacial

AcOH is added to NaNO<sub>2</sub> in concd. H<sub>2</sub>SO<sub>4</sub>; reversal of this order of addn. ppts. the sulfate of the base and greatly retards the rate of diazotization. When the diazo soln. is added in the cold to a soln. of CuCl or CuBr in the corresponding concd. acid or to a satd. aq. soln. of KI, decompn. rapidly takes place and the almost pure halogen compd. is pptd. in at least 80% yield; diaryl formation has not been detected. If an equal vol. of EtOH is added, with cooling, to the undil. diazo soln. and the temp. gradually raised to 80°, elimination of the diazo group takes place. Examples are cited. 4,4'-Dichloro-3,3'-dinitrobiphenyl, m. 237° (80% yield); 1-bromo-2,4-dinitronaphthalene, m. 100°; 1-1 deriv., pale straw-colored, m. 183°.

C. J. West

**The basic properties of hydrazones.** VII. G. Ottolingo. *Gazz. chim. ital.* 63, 513 16 (1933); cf. Ciusa and O., C. A. 27, 494.—When PhCH:NNPh<sub>2</sub> (I) is condensed with BzH in the presence of HCl and air, the reaction varies with the proportion of BzH. Thus I (10 g.), BzH (2 g.) and concd. HCl (100 cc.), heated until the vol. is reduced 0.5, yield  $\alpha, \alpha$ -diphenyl-*p, p'*-dihydrazinotriphenylmethane, PhCH(C<sub>6</sub>H<sub>5</sub>NPhNH<sub>2</sub>-*p*)<sub>2</sub> (II), m. 120°, reduces Fehling soln. Attempts to obtain derivs. resulted in complete demolition of the mol., e. g., boiling Ac<sub>2</sub>O forms I, aq. HNO<sub>2</sub> forms *p*-ONC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, and *p*-ONC<sub>6</sub>H<sub>4</sub>CHO in boiling AcOH forms *p*-ONC<sub>6</sub>H<sub>4</sub>CH:NNPh<sub>2</sub>. On the other hand, I (10 g.) and BzH (5 g.) under the conditions above yield unidentified substances and the *dibenzylidene deriv.*, PhCH(C<sub>6</sub>H<sub>5</sub>NPhN:CHPh-*p*)<sub>2</sub>, of I, m. 226°. Again under the same conditions, but with a trace of HNO<sub>2</sub>, there is formed the dye PhCH:NNPhC<sub>6</sub>H<sub>4</sub>Cl<sub>4</sub>-C<sub>6</sub>H<sub>4</sub>:N(N:CHPh)PhCl green with violet reflection, m. 165°. PhCH:NNPhMe and BzH form a compd. (III), m. 155°, already described by Ciusa (C. A. 16, 2126) and by O. (C. A. 26, 4313) which has the constitution: PhCH:NNMeC<sub>6</sub>H<sub>4</sub>CHPhC<sub>6</sub>H<sub>4</sub>NMeNH<sub>2</sub>, i. e., a *monobenzylidene deriv.* of  $\beta, \beta$ -dihydrazino- $\alpha, \alpha'$ -dimethyltriphenylmethane, because it reduces energetically Fehling soln., and when refluxed with *p*-ONC<sub>6</sub>H<sub>4</sub>CHO and glacial AcOH it yields a mixt. of the *p*-nitrobenzylidene deriv. of  $\alpha, \alpha'$ -dimethyl-*p, p'*-dihydrazinotriphenylmethane, C<sub>6</sub>H<sub>4</sub>MeO<sub>2</sub>N<sub>2</sub>, orange, m. 162°, and its isomer, red, m. 138°.

C. C. Davis

**Chemical studies on cresols.** Shigeru Komatsu, Shozo Tanaka and Toichiro Waida. *J. Chem. Soc. Japan* 54, 794-834 (1933).—C<sub>6</sub>H<sub>4</sub>OH (I) and its Me derivs. (II) are prepd. from PhOH, *o*-, *m*- and *p*-cresols by catalytic reduction. I and II are then catalytically dehydrogenated or dehydrated to form C<sub>6</sub>H<sub>4</sub>O (III) and its Me derivs. (IV). The phys. and chem. properties of the products from the catalytic reduction of III and IV are studied.

K. Katsuta

**Substituted aminoquinones.** M. Covello. *Gazz. chim. ital.* 63, 517-24 (1933).—Though the literature shows numerous investigations on aminoquinones, there is no reference to aminoquinones with the amino H atoms replaced by unsatd. dibasic acid residues. Accordingly a study was made of this subject, with special attention to the influence of the double bond. Attempts to condense 2,4,6-(H<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>OH.HCl (I) with maleic anhydride (II) under the conditions used in earlier expts. (cf. C. A. 24, 1630), i. e., by heating I and II in an inert gas, yielded only a dark mass from which no definite product could be isolated. Resort was then had to the free base (III) of I, and because of its instability in air, a special app. had to be devised. This is described and illustrated, and made possible contact of II in N with III just liberated. Under these conditions a mixt. of II in C<sub>6</sub>H<sub>6</sub> and alc. I treated with aq. Na<sub>2</sub>CO<sub>3</sub> forms *trimaleinic picramine*, 2,1,6-

(OC:CH:CH.CO.N)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>OH (IV), light yellow, m. 200°. IV in aq. KOH (calcd.) treated with dil. HCl ppts. *picraminotrimaleinic acid*, 2,4,6-(HO<sub>2</sub>CCH:CHCONH)<sub>3</sub>-C<sub>6</sub>H<sub>2</sub>OH, brown powder, decomps. around 150°. Ag salt, C<sub>18</sub>H<sub>11</sub>O<sub>10</sub>N<sub>3</sub>Ag<sub>3</sub>, prepd. in red light, lustrous gray, cryst. IV and HNO<sub>3</sub> (d. 1.48), let stand and the product purified by EtOH, yield *dimaleindiaminoquinone*, OC:CH:-





decomps. around 180°, and malcinimide. V, added dropwise to alc. PhHNH<sub>2</sub>, gives the highest yield of the condensation compd. of V and PhHNH<sub>2</sub>, C<sub>20</sub>H<sub>15</sub>O<sub>5</sub>N<sub>2</sub>, yellow, decomps. 100°. C. C. Davis

Formation of complex oxidation and condensation products of phenols—origin and nature of humic acid. I. Reactivity of simple monocyclic quinones. H. G. H. Erdtman. *Proc. Roy. Soc. (London)* A143, 177-91. —Methoxyquinol (I) is prepd. from vanillin and H<sub>2</sub>O<sub>2</sub>; diacetate, m. 96-6°. I with anhyd. MgSO<sub>4</sub> and PbO<sub>2</sub> in C<sub>6</sub>H<sub>6</sub> gives methoxyquinone (II), m. 143-4°. Treatment of II with Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> yields 2,4,5-triacetoxy-1-methoxybenzene (III), m. 142°. Hydrolysis of III and methylation gives 1,2,4,5-tetramethoxybenzene (IV), m. 103°. III oxidizes easily to 2,5-dimethoxyquinone. HCl and II give 4,4'-dimethoxy-"diquinhydrone." 1,2,3-Triacetoxy-3,1-dimethoxybenzene (V), m. 93-4°, is obtained from 2,3-dimethoxyquinone in Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub>. m-Xyloquinone treated as in the prepn. of V gives 2,4,5-triacetoxy-1,3-dimethoxybenzene (VI), m. 103-4°. p-Xyloquinone yields 2,3,5-triacetoxy-1,4-dimethoxybenzene (V), m. 110°. By the same procedure 5-methoxytoluquinone gives 2,3,5-triacetoxy-4-methoxytoluene (VIII), m. 91-2°. Refluxing VIII in MeOH-H<sub>2</sub>SO<sub>4</sub> in an atm. of H<sub>2</sub> for 1 hr. gives 2,3,4,5-tetramethoxytoluene (IX); m. 51-2°. AcCl and 5-methoxytoluquinone give 3-chloro-2,5-diacetoxy-4-methoxytoluene (X), m. 126°. Bromination of creosol in glacial AcOH gives 6-bromocreosol (XI), m. 82-3°. Methylation of XI gives 6-bromoveratrole m. 35-6°; 6-nitrobromoveratrole, m. 121°. Thiele acetylation of thymoquinone yields fractions A, m. 87-8°, and B, m. 136-7°. Reductive acetylation of 3-hydroxythymoquinone gives 2,3,6-triacetoxy-1-methyl-4-isopropylbenzene (XII), m. 87-8°. 6-Hydroxythymoquinone gives 2,3,5-triacetoxy-1-methyl-4-isopropylbenzene (XIII). Mixed m. ps. of A and B with XII and XIII, resp., show no depression. II. Coupling of simple phenols and quinones to biphenyl derivatives. *Ibid.* 191-222.—Pyrogallol shaken with baryta soln. for 5 min. gives 2,3,4,2',3',4'-hexahydroxybiphenyl (I), m. 310-20° (decompn.); hexacetate, m. 163-4°, hexa-Me ether, m. 123°. Bipyrogallol hexa-Me ether brominated in CHCl<sub>3</sub> gives a dibromohexamethyl ether, m. 110-1°. Pyrogallol tri-Me ether with I and HgO gives 72% of 4-iodopyrogallol tri-Me ether (II), m. 40-2°. Heated with Cu powder, II yields 2,3,4,2',3',4'-hexamethoxybiphenyl, m. 110-1°. Electrolytic oxidation of pyrogallol gave neg. results. Electrolysis of pyrogallol tri-Me ether in Me<sub>2</sub>CO and 2 N H<sub>2</sub>SO<sub>4</sub> gives 2,6-dimethoxybiquinone, m. 255°; diacetate, m. 133°. Methoxyquinone and methoxyquinol in C<sub>6</sub>H<sub>6</sub> gives on evapn. methoxyquinhydrone (III), m. 97°. Thermal decompn. of III yields a coupled product which on oxidation yields 4,4'-dimethoxybiquinone (IV), m. 212-14°. In Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> IV gives 2(?) , 3,6,2',3',6'-hexa-acetoxy-4,4'-dimethoxybiphenyl. HCl (2 mol.) adds to IV, giving a chlorophenol which on boiling with Ac<sub>2</sub>O gives an anhydride (?), m. 253°. HI and PhNHNH<sub>2</sub> reduce IV to 4,4'-dimethoxybiquinol (V), m. 210°; tetraacetate (VI), m. 186-7°. Hydrolysis and subsequent methylation of VI yields 2,4,5,2',4',5'-hexamethoxybiphenyl (VII), m. 177-9°. VI, refluxed with HBr, gives 2,3,6,7-tetraacetoxybiphenylene oxide (VIII), m. 262°. Hydrolysis of VIII yields 2,4,5,2',4',5'-hexa-acetoxybiphenyl, m. 172-4°. Hydroxyquinol tri-Me ether and ICl<sub>3</sub> or H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> soln. yields VII. Anodic oxidation of the same ether in strongly or weakly acid soln. also gives VII. Dehydrovanillin with H<sub>2</sub>O<sub>2</sub> in acetylating soln. forms 3,3'-dimethoxybiquinol (tetraacetate) (VIII), m. 176-8°. Bromination of VIII in AcOH gives 6,6'-dibromo-3,3'-dimethoxybiquinol tetraacetate, m. 207-8°. Hydrolysis of VIII results in 2,3,5,2',3',5'-hexamethoxybiphenyl (IX), m. 119-20°. Bromination of IX in CHCl<sub>3</sub> gives the 6,6'-di-Br deriv. (X), m. 271-2°. 6,6'-Dinitro deriv. of IX, m. 300-1°. Nitration of X yields 6,6'-dibromo-3,3'-dimethoxybiquinone, m. 240-2° (decompn.). Toluquinol di-Me ether (XI), nitrated, gives the 5-nitro deriv., m. 117-

8°. 5-I deriv. m. 85°. With C<sub>6</sub>H<sub>5</sub>N, Ac<sub>2</sub>O and Zn dust, 4,4'-ditoluquinone gives tetraacetylbiphenyl, m. 137°, hydrolyzed and methylated to give 2,5,2',5'-tetramethoxy-4,4'-dimethylbiphenyl, m. 135-6°. Reduction of Nietzki's quinone with SO<sub>2</sub> gives 2,2'-diethoxy-5,5'-dimethoxy-4,4'-dimethylbiphenyl, m. 116-8°. Methylation of Noeltzing's reduced quinone gives 2,2'-dimethoxy-5,5'-diethoxy-4,4'-dimethylbiphenyl, m. 94-6°. Bitoluquinone with Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> yields 2(?) , 3,6,2'(?), 3',6'-hexa-acetoxy-4,4'-dimethylbiphenyl, m. 202-3°. Reduction of nitroquinol dibenzyl ether gives the amino deriv. (XII), m. 100-2°; Ac deriv., m. 86-7°. Fusion of XII and p-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CHO yields the p-nitrobenzylidene deriv.; m. 105°. The following derivs. of 2-iodo-4-nitroaniline were prepd.: p-nitrobenzylidene, m. 194-6°; m-nitrobenzylidene, m. 177-8°. III. Rearrangements of oxidation-reduction type in the biquinone group. *Ibid.* 223-8.—α-BrC<sub>6</sub>H<sub>4</sub>, satd. at 200° with dimethoxybiquinone, gives 6-hydroxy-2,7-dimethoxybiphenylene oxide quinone (1,4) (I), m. 250°; acetate, m. 252-4°. Reduction of I with Zn dust gives 1,4,6-tri-hydroxy-2,7-dimethoxybiphenylene oxide (II), m. 210° (decompn.); triacetate, m. 232°. Tri-p-nitrobenzoyl deriv. of II, m. 300°. Methylation of the triacetate of II which has been treated with Zn dust gives 1,2,4,6,7-penta-methoxybiphenylene oxide, m. 109-10°. Heating 4,4'-dimethylbiquinone with α-BrC<sub>6</sub>H<sub>4</sub> yields 6-hydroxy-2,7-dimethylbiphenylene oxide quinone (1,4), m. 218-20°. IV. Terminal polymerization products of p-benzoquinone, toluquinone, and α-naphthoquinone. *Ibid.* 228-41.—Polymerization of benzoquinone with H<sub>2</sub>SO<sub>4</sub> and AcOH gives diacetoxytriphenylene dioxide (I), m. 236-7°. Hydrolysis of I gives dihydroxyphenylene dioxide (II), m. 336-40°; di-Me ether (III), m. 210-1°. With Br<sub>2</sub> in CHCl<sub>3</sub> a di-Br deriv. is obtained (decompn.). Other derivs. isolated in the prepn. of I are sep'd.; the structures are questionable. Toluquinone polymerized as in I gives diacetoxytritolylene dioxide (IV), m. 285-6°. Dihydroxytritolylene dioxide (V), m. 260-7°, is obtained from IV. Methylation of V gives the di-MeO deriv. (VI), m. 233-4°. The mono-Br deriv. of VI m. 274-5°, and the mononitro deriv. m. 305°. α-Naphthoquinol polymerizes with concd. H<sub>2</sub>SO<sub>4</sub> and AcOH to diacetoxytrinaphthalene dioxide, m. 340-3°, and trinaphthobenzene trioxide (charred at 400° but did not melt).

W. J. Peterson

Preparation of phenacylcarbinol and some of its ethers. M. Darmon. *Compt. rend.* 197, 1328-9 (1933).—PhCH<sub>2</sub>MgCl and HOCH<sub>2</sub>CN yield PhCH<sub>2</sub>COCH<sub>2</sub>OH, m. 48°; b.p. 144-5° (semicarbazone, m. 134°; oxime, m. 118° (cf. C. A. 26, 3493), and (PhCH<sub>2</sub>)<sub>2</sub>C(OH)CH<sub>2</sub>OH. From MeOCH<sub>2</sub>CN and EtOCH<sub>2</sub>CN are obtained, resp., PhCH<sub>2</sub>COCH<sub>2</sub>OMe, b.p. 139-40° (semicarbazone, m. 127-8°), and PhCH<sub>2</sub>COCH<sub>2</sub>OEt, b.p. 116-18° (semicarbazone, m. 100°). PhCH<sub>2</sub>ONa, ClCH<sub>2</sub>CO<sub>2</sub>Et and NH<sub>3</sub> give PhCH<sub>2</sub>OCH<sub>2</sub>CONH<sub>2</sub>, m. 91°, which, with PhCH<sub>2</sub>MgCl yields PhCH<sub>2</sub>COCH<sub>2</sub>OCH<sub>2</sub>Ph, b.p. 235°; semicarbazone, m. about 105°.

H. A. Beatty

Glucosides. X. Synthesis of primeverin. Elfed T. Jones and Alexander Robertson. *J. Chem. Soc.* 1933, 1618-20; cf. C. A. 27, 511.—Me 4-methoxysalicylate (I) and O-tetraacetyl-α-glucosidyl bromide with Ag<sub>2</sub>O in quinoline give the O-tetraacetyl-β-glucoside of I, m. 138-9°; [α]<sub>D</sub><sup>20</sup><sub>CHCl<sub>3</sub></sub> -66° (Me<sub>2</sub>CO, c 0.83); NH<sub>3</sub> in MeOH gives the β-glucoside of I, m. 134-6°; the hemihydrate m. 124-6°; [α]<sub>D</sub><sup>20</sup><sub>CHCl<sub>3</sub></sub> -82.36° (Me<sub>2</sub>CO, c 0.41). Ph<sub>3</sub>CCl in C<sub>6</sub>H<sub>5</sub>N gives the 6-O-triphenylmethyl-β-glucoside, m. 120°; [α]<sub>D</sub><sup>20</sup><sub>CHCl<sub>3</sub></sub> -36.72° (Me<sub>2</sub>CO, c 0.31), the 2,3,4-triacetate of which m. 168-9°; [α]<sub>D</sub><sup>20</sup><sub>CHCl<sub>3</sub></sub> -103.41° (Me<sub>2</sub>CO, c 0.49); HBr in AcOH gives the 2,3,4-O-triacetyl-β-glucoside of I, m. 136°; [α]<sub>D</sub><sup>20</sup><sub>CHCl<sub>3</sub></sub> -40.82° (Me<sub>2</sub>CO, c 0.29); with O-triacetylxylosidyl bromide and Ag<sub>2</sub>O this yields an amorphous product, deacetylated to primeverin, whose hexaacetate m. 125°.

C. J. West

Action of halogens upon the nitrophenylazobenzoyletacetones. F. D. Chattaway and D. R. Ashworth. *J. Chem. Soc.* 1933, 1624-7.—p-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>N<sub>2</sub>Cl and BzCH<sub>2</sub>Ac with AcONa give quant. p-nitrophenylazobenzoyletacetone (I), yellow, m. 143°; o-NO<sub>2</sub> compd. (II), yellow, m. 145°. I and Br in AcOH-AcONa at 40° give ω-bromophenyl-

glyoxal *p*-nitrophenylhydrazones, pale yellow, m. 247° (decompn.); Cl in  $\text{CHCl}_3$  gives the  $\omega$ -Cl deriv., pale yellow, m. 243°; the corresponding *o*- $\text{NO}_2$  compd., yellow, m. 151°. In AcOH at 40° I and Cl give  $\omega$ -chlorophenylglyoxal 2-chloro-4-nitrophenylhydrazones, yellow, m. 183°; the 4-chloro-2-nitrophenylhydrazones, yellow, m. 157°. I and Br in boiling AcOH give quant.  $\delta$ -bromo- $\alpha,\beta,\gamma$ -triketo- $\alpha$ -phenylbutane  $\beta$ -*p*-nitrophenylhydrazones (III), yellow, m. 172° (decompn.); the *o*- $\text{NO}_2$  compds., yellow, m. 155° (decompn.); I and 2 mols. Br give the  $\delta,\delta$ -di-Br deriv. (IV), yellow, m. 170° (decompn.). III and AcOK in boiling EtOH give 4-hydroxy-3-benzoyl-1-*p*-nitrophenylpyrazole (V), yellow, m. 211-5°; the *o*- $\text{NO}_2$  compd., yellow, m. 121°. IV gives the 5-Br deriv. of V, yellow, m. 167°. V and Cl in  $\text{CHCl}_3$  give the 5,5- $\text{Cl}_2$  deriv. (VI), orange, m. 145°; the *o*- $\text{NO}_2$  compd., yellow, m. 166°. VI and KI in AcOH form the 5-Cl deriv. of V, pale yellow, m. 177°; the *o*- $\text{NO}_2$  compd., pale yellow, m. 120°. VI, boiled with EtOH for 5 min., gives Et  $\alpha,\beta,\gamma$ -triketo- $\gamma$ -phenylbutyrate  $\beta$ -*p*-nitrophenylhydrazones, yellow, m. 135°; this was also prepd. from  $p\text{-O}_2\text{NC}_6\text{H}_4\text{N}_2\text{Cl}$  and  $\text{BzCH}_2\text{-COCO}_2\text{Et}$ ; the *o*-nitrophenylhydrazones, yellow, m. 108° (Me ester, yellow, m. 119°). VI and aq. NaOH give  $\alpha,\beta,\gamma$ -triketo- $\gamma$ -phenylbutyric acid  $\beta$ -*p*-nitrophenylhydrazones, yellow, m. 154°.

C. J. West

3-Chlorophthalic acid. J. C. Smith. *J. Chem. Soc.* 1933, 1643-4.—3-Nitrophthalic anhydride (I) and  $\text{PCl}_5$ , heated 9 hrs. at 190-200°, give an anhydride, m. 126°, hydrolyzed to an acid, m. 200-2°; direct hydrolysis of the reaction product gives 90% of 3-chlorophthalic acid (II); impure I gives a product m. 185° (decompn.) (mixed m. p., 186°; Bogert and Boroschek's II m. 186° (*J. Am. Chem. Soc.* 23, 751(1901))). II is slightly sol. in cold  $\text{H}_2\text{O}$ .

C. J. West

1,3-Dioxins. IV. Condensation of 3,3'-dinitro-, 3,5'-dinitro-, and 5,5'-dinitro-2,2'-dihydroxybiphenyl with formaldehyde. Fernando Calvert and Ernesto Seijo. *Anales soc. españ. fis. quim.* 31, 889-95(1933).—Aldehydes condense with substituted phenols under certain conditions in different ways, depending upon their *o*- or *p*-structure. *o*-Substituted phenols give substituted alcs. or  $\text{Ph}_2\text{CH}_2$  derivs.; *p*-substituted phenols give benzodioxin derivs. It is shown here that the 3,3', 5,5'- and 3,5'-dinitro-2,2'-dihydroxybiphenyls condense with  $\text{HCHO}$  and react as if both nitrophenolic nuclei acted independently upon the aldehyde, in accordance with the general rule.  $[3,2\text{-O}_2\text{N}(\text{HO})\text{C}_6\text{H}_4]_2$  gives 5,5'-diformyl-3,3'-dinitro-2,2'-dihydroxybiphenyl (a monoxime, of which has been prepd.), which, on oxidation, gives the corresponding 5,5'-dicarboxylic acid.  $[5,2\text{-O}_2\text{N}(\text{HO})\text{C}_6\text{H}_4]_2$  gives 6,6'-dinitrobenzo-1,3-dioxinyl-(8,8'). 3,5'-Dinitrodihydroxybiphenyl condenses with  $\text{HCHO}$  to give 8-(5'-formyl-3'-nitro-2'-hydroxyphenyl)-6-nitrobenzo-1,3-dioxin, which forms a well-characterized oxime.

E. M. Symmes

Optical activity of a biphenyl derivative, the dissymmetry of which is caused by the space effect of only one group. Mary S. Lesslie and Eustace B. Turner. *J. Chem. Soc.* 1933, 1588-92.—Shaw and Turner (*C. A.* 27, 2144) have pointed out that for a 2,3'-disubstituted  $\text{Ph}_2$  to show mol. dissymmetry the 2-substituent either must, if an atom, have a radius equal to or greater than that of I (1.33 Å) or, if a group attached to the 2-position through an atom smaller than that of I, must exhibit a "dynamic" effect; 2 compds. of the latter type have been prepd. 2-Nitro-*N,N'*-dicarboxybenzidine and Br in boiling AcOH-AcONa give the 3-bromo-2'-nitro deriv., m. 145-7°, transformed by concd.  $\text{H}_2\text{SO}_4$  to 3-bromo-2'-nitrobenzidine, deep golden red, m. 155-6° (cor.); through the diazo reaction there results 3-bromo-2'-nitrobiphenyl, pale yellow, m. 53-4° (cor.); the 2'- $\text{NH}_2$  deriv., b.p. 195° m. 69-70° (cor.); 2'-dimethylamino deriv., m. 47-8° (chloroplatinate); MeI gives 3'-bromobiphenyl-2-trimethylammonium iodide, deliquescent, decomp. on heating; the *d*-camphorsulfonate and *d*- $\alpha$ -bromocamphor- $\alpha$ -sulfonate are deliquescent glasses, resolution of which proved impossible. 3'-Bromobiphenyl-2-arsonic acid, m. 189-90° (cor.); MeI gives 89% of 3'-bromobiphenyl-2-trimethylarsonium iodide, m. 183-4° (cor.); the *d*-camphor-10-sulfonate gave

1 fractions varying from 19.2° to 21.8° for  $[\alpha]_D^{25}$ , m. 219-20° (cor.); the *d*- $\alpha$ -bromocamphor- $\alpha$ -sulfonate gave a fraction m. 184-5°,  $[\alpha]_D^{25}$  46.5°,  $[\alpha]_D^{25}$  54.4° ( $\text{H}_2\text{O}$ ); an intermediate fraction having  $[\alpha]_D^{25}$  43° m. 180-3°; KI gives an arsonium iodide with  $[\alpha]_D^{25}$  1.5° (EtOH), gradually becoming inactive at room temp. All samples of the sulfonate underwent racemization at 100° in  $\text{H}_2\text{O}$ , giving the *dl*-arsonium salt with  $[\alpha]_D^{25}$  41.5°. The Grignard reagent from bromomesitylene and  $\text{Me}_3\text{AsI}$  give 2,4,6-trimethylphenyldimethylarsine, b.p. 138-9°; methiodide, m. 219-20° (cor.); ethiodide, m. 174-5° (cor.).

C. J. West

Nitration of 2,2'-dihydroxybiphenyl. A description of a new dinitro derivative. Fernando Calvert and Ernesto Seijo. *Anales soc. españ. fis. quim.* 31, 882-8(1933).—The nitration of (*o*- $\text{HOCH}_2$ )<sub>2</sub> has been described (*Ber.* 35, 309(1902)). When using concd.  $\text{HNO}_3$  and glacial AcOH as solvent, the isomers 3,3'- and 5,5'-dinitro-2,2'-dihydroxybiphenyl were isolated. This work was repeated, and the  $[5,2\text{-O}_2\text{N}(\text{HO})\text{C}_6\text{H}_4]_2$ , m. 240-50°, was found to be a mixt. of the 5,5'-isomer, m. 301°, and the 3,5'-isomer, m. 210-11°. These two were sepd. by fractional crystn. 3,5'-Dinitro-2,2'-dihydroxybiphenyl is dimorphic, crystg. either as yellow needles or orange-red rhombocyclic polyhedrons giving a di-Ac deriv. m. 122-5°, and a di-MeO deriv. m. 133-5°.

E. M. Symmes

Action of nitrous acid on dimethylaniline. I. John C. Earl and Alan W. Mackney. *J. Proc. Roy. Soc. N. S. Wales* 67, 231-9(1933); cf. *C. A.* 27, 275.—The main product from a soln. contg. equimol. quantities of  $\text{PhNMe}_2\cdot\text{HCl}$  and  $\text{NaNO}_2$  was *p*- $\text{C}_6\text{H}_4(\text{NMe}_2)_2$  formed by the oxidizing action of  $\text{HNO}_2$ , together with a little *p*- $\text{ONC}_6\text{H}_4\text{NMe}_2$ . By the action on  $\text{PhNMe}_2$  in the cold, of a large excess of  $\text{N}_2\text{O}_5$  prepd. from  $\text{HCl}$  and  $\text{NaNO}_2$  or by acting on  $\text{As}_2\text{O}_5$  with  $\text{HNO}_3$ , a substance (I), m. 157-8° (decompn.) (Cohen and Calvert, *J. Chem. Soc.* 73, 163(1898)) was produced together with 3,3'-dinitrotetramethylbenzidine, m. 189°, and *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{NMe}_2$ . I shows no reaction for nitrite and gives no pos. reaction for the NO group by the Liebermann test. It is cleaved by boiling NaOH to *p*- $\text{ONC}_6\text{H}_4\text{OH}$  and  $\text{NHMe}_2$ . A 0.02 *N* soln. has  $p_H$  3.0. I is evidently closely related to *p*- $\text{ONC}_6\text{H}_4\text{NMe}_2\cdot\text{HNO}_3$  but the strong yellow color of its at. soln. suggests a quinonoid structure. Cautious heating with AcOH yields *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{NMe}_2$  and a nitroso compd. m. 86° contg. 21.5% N.

C. R. Addinall

Pyro reaction of hydrogenated diphenic acids. Blanc's rule. Fritz Vocke. *Ann.* 508, 1-11(1933).—Catalytic reduction of di-Me diphenate and hydrolysis gives a mixt. of *perhydrodiphenic acid*, m. 245° (I) and m. 213° (II), and *hexahydrodiphenic acid*, m. 242° (III) and 220° (IV), sepd. by means of the Ba salts and crystn. from AcOH. III, heated above 300°, gives a mixt. of IV and a ketone, whose semicarbazone,  $\text{C}_{14}\text{H}_{11}\text{ON}_3$ , pale yellow, m. 220° (decompn.). The Me ester of III, heated 6-8 hrs. in methylcyclohexane, gives the Me ester of IV. IV gives the same ketone as III; with  $\text{Ac}_2\text{O}$  IV gives an anhydride, m. 120°, which yields the ketone on distn. at atm. pressure. At 300-25° about 50% of I sublimes unchanged; the remainder gives a ketone, whose semicarbazone,  $\text{C}_{14}\text{H}_{11}\text{ON}_3$ , m. 215° (decompn.);  $\text{Ac}_2\text{O}$  and I give the anhydride, m. 265°; on heating at 300-10° there results the ketone and an isomeric anhydride, m. 115°, which yields I on sapon. II sublimes unchanged at 290-310°;  $\text{Ac}_2\text{O}$  gives the anhydride, m. 86°, which loses little  $\text{CO}_2$  at 300° and atm. pressure. Catalytic reduction of diphenic acid in AcOH with Pt gives a mixt. of products, from which dodecahydrodiphenic acid, decomp. 273°, was isolated; di-Me ester, m. 57°; distn. of the acid with  $\text{Ac}_2\text{O}$  gives dodecahydrofluorenone, m. 87°; semicarbazone, m. 209-10° (decompn.); oxime, m. 172°.

C. J. West

Chemistry of the rubenes. A colorless hydrocarbon of violet fluorescence derived from diphenylditolylrubene. Léon Enderlin. *Compt. rend.* 197, 1332-4(1933); cf. *C. A.* 26, 1601, 2189.—Dehydration of the monoxide of the dihydroxydihydro deriv. of bis(*p*-tolyl)diphenylrubene yields 96%  $\text{C}_{24}\text{H}_{20}$ , colorless, shows violet fluorescence at a diln. of 1,000,000; free from solvent, it m. 875°. There

is also obtained a trace of yellow compd. with green fluorescence, m. about 350°.

**Sensitivity to light of aromatic nitro compounds. II. peri-Derivatives of 1-nitronaphthalene.** Robert E. Steiger. *Helv. Chim. Acta* 16, 1315-23 (1933); cf. C. A. 27, 4791.—Ten cc. of pyridine (I) and 2.72 g. 1,5-C<sub>10</sub>H<sub>7</sub>(NO<sub>2</sub>)SO<sub>2</sub>Cl (II) gave 1.56 g. of pyridinium 1-nitronaphthalene-5-sulfonate (III), recrystd. from alc. m. 194-5°. The K sulfonate (IV), m. 110°, was prepd. from 2.72 g. II in 10 cc. I and 20 cc. N KOH. To prep. pyridinium 1-nitronaphthalene-8-sulfonate (V), 8.16 g. of 1,8-C<sub>10</sub>H<sub>7</sub>(NO<sub>2</sub>)SO<sub>2</sub>Cl (VI) was dissolved in 50 cc. 1% NaOH on the water bath. The excess alkali was neutralized with 90 cc. N HCl and the soln. filtered after the addn. of charcoal. N HCl (35 cc.) and 6 cc. I were added and the mixt. was concd. to 60 cc. On cooling, crystals of V sepd. in 70% yield. Purification from I and C<sub>6</sub>H<sub>6</sub> gave a product m. 165-7°. A mixt. of 10 cc. I and 1.34 g. 1,8-C<sub>10</sub>H<sub>7</sub>(NO<sub>2</sub>)SO<sub>2</sub>Me in 20 cc. C<sub>6</sub>H<sub>6</sub> gave a quant. yield of the N-methylpyridinium salt (VII), m. 162-4°. VI (2.72 g.) was shaken with 32 cc. I and cooled to 5°. N KOH (20 cc.) was added and the mixt. allowed to warm; H<sub>2</sub>O was added and excess I removed by evapn. After clarification with charcoal 1.24 g. of K 1-nitronaphthalene-8-sulfonate (VIII) sepd. After recrystn. from alc. VIII m. 200°. Aq. and pyridine solns. of III were only slightly colored. V, VII and VIII were extremely sensitive to light.

**The composition of α-naphthalenesulfonic acid and analysis of the β-naphthalenesulfonic acid melt.** Z. E. Zin'kov. *Anilinokrasochnaya Prom.* 3, 387-91 (1933); cf. Vorozhtzov and Krasova, C. A. 27, 5321; Ioffe, C. A. 28, 957°.

**Polycyclic aromatic hydrocarbons. XII. Orientation of derivatives of 1,2-benzanthracene, with notes on the preparation of some new homologs and on the isolation of 3,4,5,6-dibenzophenanthrene.** J. W. Cook. *J. Chem. Soc.* 1933, 1592-7; cf. C. A. 28, 145°.—The following esters were prepd. by oxidation of the benzantraquinone derivs., forming the Ag salts and reacting with MeI: di-Me anthraquinone-1,2-dicarboxylate, pale yellow, m. 208°; tri-Me anthraquinone-1,2,3-tricarboxylate, m. 184-5°; 1,2,5-isomer, m. 212-3°; 1,2,6-isomer, m. 233.5-4.5°; 1,2,7-isomer, m. 204-4.5°; tetra-Me anthraquinone-1,2,6,7-tetracarboxylate, m. 188-90°, from 6,7-dimethyl- or 6,7-cyclopenteno-1,2-benzanthraquinone; 1,2,7,8-isomer, yellow, m. 237-9°. Heating 1,2,3-C<sub>10</sub>H<sub>7</sub>BzMe<sub>2</sub> at 415° for 5 hrs. gives 4-methyl-1,2-benzanthracene, m. 124.5-5.5° (picrate, m. 149-50°). The dehydrogenation of the crude carbinol from MeMgI and 5-keto-5,6,7,8-tetrahydro-1,2-benzanthracene gives 5-methyl-1,2-benzanthracene, m. 167.5-8.5° (picrate, dark red, m. 163-3.5°); oxidation gives 5-methyl-1,3-benzanthraquinone, orange-yellow, m. 173.5-4.5°. α-C<sub>10</sub>H<sub>7</sub>COCl and 2,3-C<sub>10</sub>H<sub>7</sub>Me<sub>2</sub> with AlCl<sub>3</sub> give 1-α-naphthyl-2,3-dimethylnaphthalene (I), yellow, m. 191°; the β-isomer m. 120-30°; heating either isomer at 445° for 2 hrs. gives 4-methyl-1,2,5,6-dibenzanthracene, m. 184-5° (picrate, light red, m. 200-1°). I and II<sub>2</sub>SeO<sub>3</sub>, heated 5 hrs. at 220°, give 1-α-naphthyl-6-methyl-2-naphthaldehyde, yellow, m. 185-6°. Catalytic reduction of 1,2,5,6-dibenzanthracene (II) with Ni at 205° and 200 lb. per sq. in. gives a small yield of the 9,10-dihydro deriv. (III), m. 198-8°. Oxidation of II with Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub> in AcOH gives 1,2,5,6-dibenz-3,4-anthraquinone (IV), dark red, m. 326-7° (decompn.), the asine of which, yellow, decomp. above 300°; oxidation of III gives about 10% IV, the other product being the 9,10-isomer. The crude mixt. of acids resulting from the Paschorr reaction with di-α-α-aminobenzylidene-β-phenylenediacetic acid (Weitzenböck and Klinger, C. A. 13, 423) could not be purified through the Na salts; oxidation gives 3,4,5,6-dibenzophenanthra-1,2,7,8-diquinone, dark red, m. above 360°; diisins, yellow, m. above 360°; the AcOH liquors from the oxidation contained 1,2,5,6-dibenzanthraquinone-1,8-dicarboxylic acid, m. above 360°. The original alc. ext. of the crude acids contained 3,4,5,6-dibenzophenanthrene, m. 177-8°; if this has any carcinogenic activity, it is of a very low order.

C. J. West

**Zierone.** A. E. Bradfield, A. R. Penfold and J. L. Simonsen. *J. Proc. Roy. Soc. N. S. Wales* 67, 200-5 (1933); cf. C. A. 21, 474.—The constitution of zierone (I) previously advanced is incorrect. I is a tricyclic sesquiterpene ketone, C<sub>15</sub>H<sub>22</sub>O, isomeric with crenophyllone. I, a viscous, colorless oil, b<sub>15</sub> 147-9°, mol. refraction [R<sub>L</sub>]<sub>D</sub> 66.98, gives a semicarbazone, m. 182°, and a 2,4-dinitrophenylhydrazones, m. 95-7°. The presence of the group CH<sub>3</sub>COCH<sub>3</sub> is shown by the formation of a liquid hydroxymethylene deriv. (2,4-dinitrophenylhydrazones, m. 155-7°), by the action of Na in HCO<sub>2</sub>Am and Et<sub>3</sub>O. Catalytic (Pd-norite) reduction of I gives a mixt. b<sub>15</sub> 110-4°, contg. an unidentified hydrocarbon. Reduction of I with Na and EtOH gives siorol (II), a colorless, viscous oil b<sub>17</sub> 151-2°, n<sub>D</sub><sup>20</sup> 1.5094, [α]<sub>D</sub><sup>20</sup> 37.4° (MeOH, c 8.5); oxidation gives I. Dehydration of II with HCO<sub>2</sub>H yields a hydrocarbon which when dehydrogenated with Se at 250-80° for 48 hrs. gives an asulene, b<sub>15</sub> 135-65°; picrate, m. 110-1°.

C. W. Soderström

**Some reactions of 2,4-dimethylmagnesiopyrrole.** F. Ingrassia. *Gazz. chim. ital.* 63, 584-91 (1933).—Because of the anomalous behavior of magnesiopyrrole with SOCl<sub>2</sub> (I) and CS<sub>2</sub> (cf. Oddo and Mingoa, C. A. 21, 1458), it was decided to study their action as well as that of ClCO<sub>2</sub>Et (II) on a little studied deriv. of pyrrole, viz., 2,4-dimethylpyrrole (III) in the form of its magnesiyl deriv. (IV), and on magnesiopyrroles with neg. radicals (to stabilize the ring). IV and II in anhyd. Et<sub>2</sub>O, heated, and decompd. with ice, yield Et 2,4-dimethyl-5-pyrrolecar-

boxylate, HN.CMe:CH.CMe:CCO<sub>2</sub>Et (V), slightly yellow, m. 124°. I in Et<sub>2</sub>O added to ice-cold IV (2 mols.) in Et<sub>2</sub>O, after standing decompd. with ice, neutralized with NaHCO<sub>3</sub> and purified with difficulty (Et<sub>2</sub>O, petr. ether, Me<sub>2</sub>CO and C<sub>6</sub>H<sub>6</sub>), yields 3,5,3',5'-tetramethylpyrro-

(2,2')-sulfone, (HN.CMe:CH.CMe:C)<sub>2</sub>SO<sub>2</sub>, dark violet, decomp. around 95°, stable toward hot alk. hydroxides, is not reduced by Zn and AcOH, is decompd. with evolution of H<sub>2</sub>S by Sn in hot HCl. Ag deriv., probably an α'-deriv. IV and CS<sub>2</sub> in Et<sub>2</sub>O heated, decompd. with ice, acidified with H<sub>2</sub>SO<sub>4</sub>, the Et<sub>2</sub>O-sol. product treated with aq. NaOH, and acidified when ice-cold, ppts. 2,4-dimethyl-5-

dithiopyrrolecarboxylic acid, HN.CMe:CH.CMe:CC(:S)SH (VI), also obtained directly but very impure by drying the Et<sub>2</sub>O-sol. portion (loc. cit.). It is unstable and immediately oxidizes to 2,4-dimethylthiopyrrole di-

sulfide, [HN.CMe:CH.CMe:CC(:S)S]<sub>2</sub>, red, m. 156°. With neutral Pb(OAc)<sub>2</sub>, the aq. Na salt (VII) of VI ppts.

the Pb salt, [HN.CMe:CH.CMe:CC(:S)S]<sub>2</sub>Pb, yellow. In darkness, aq. VI and AgNO<sub>3</sub> ppt. the Ag salt,

HN.CMe:CH.CMe:CC(:S)SAg, brick-red. No Zn salt is pptd. from aq. VII and Zn(OAc)<sub>2</sub>. It was then to be detd. whether with a compd. contg. a neg. CO<sub>2</sub>Et group, e. g., V, the reaction with EtMgBr is normal, and if so to det. the behavior of the new metal deriv. in comparison with III. Actually V and EtMgBr in anhyd. Et<sub>2</sub>O evolve C<sub>2</sub>H<sub>6</sub> and form the magnesiyl deriv. (VIII), BrMg-

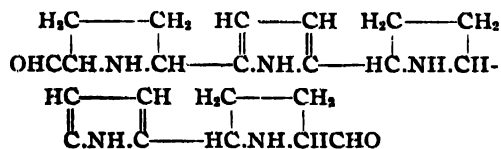
N.CMe:CH.CMe:CCO<sub>2</sub>Et or HN.CMe:C(MgBr).CMe:CCO<sub>2</sub>Et, yellowish oil. Heated with CS<sub>2</sub> or with AcCl in anhyd. Et<sub>2</sub>O, VIII remains unaltered. This incapacity to react probably depends upon the assumption of the

enolic form, N:CMe.CH:CMe.C:C(OMgBr)OEt, as was found with alkyl pyrrol ketones by Oddo (C. A. 19, 2492; *Gazz. chim. ital.* 40, ii, 15 (1910); cf. C. A. 4, 2460).

C. C. Davis

**Pyrrole blacks obtained by reduction.** G. Illari. *Gazz. chim. ital.* 63, 591-6 (1933).—A preliminary note. A survey of the literature shows that all pyrrole (I) blacks so far prepd. are products of a complex process of oxidation, combined with one of condensation, where an unknown no. of pyrrole nuclei take part. In the new expts.,

the I black which is described is formed by condensation in a strongly reducing medium, a condition not described heretofore. I dissolves slowly in warm concd. aq.  $\text{HCO}_2\text{H}$  to give a ruby-red soln. which remains clear on cooling and on diln. When this is made alk. with aq.  $\text{KOH}$ , a flocculent brown ppt. is formed, which is sol. in dil.  $\text{AcOH}$ , and which on purification from  $\text{EtOH}$  yields the compd.  $\text{C}_{22}\text{H}_{19}\text{O}_2\text{N}_4$  (II), brown, basic, insol. in aq. alkalies, gives a red soln. in  $\text{AcOH}$ ; its alc. soln. is red with green fluorescence; when heated it carbonizes without fusion (evolution of fumes which give an intense pine splinter- $\text{HCl}$  reaction); its alc. soln. reduces  $\text{NH}_3\text{-AgNO}_3$ . II is probably formed from 5 mols. of pyrrole, and taking into account that its 2 O atoms belong to CHO groups, the high H content, the strongly reducing medium, earlier chem. knowledge about pyrrole blacks (including the fact that hydroxybipyrrol and tripyrrole are intermediate products in their formation), and the constitution of tripyrrole, II is formed by the union of I nuclei and pyrrolidine nuclei, thus:



The same reaction between I and  $\text{HCO}_2\text{H}$  takes place at room temp. but more slowly. When the reaction is at room temp. or at an elevated temp., there is formed besides II, an unidentified black infusible substance, insol. in all solvents. Alc. II and picric acid ppt. a picrate,  $\text{C}_{22}\text{H}_{19}\text{O}_2\text{N}_4\cdot\text{C}_6\text{H}_3\text{O}_7\text{N}_3$ , reddish brown; when heated it deflagrates without fusion. C. C. Davis

**Improved preparation of selenophene and attempts to prepare tellurophene.** Francis A. McMahon, Thomas G. Pearson and Percy L. Robinson. *J. Chem. Soc.* 1933, 1644.—Roasted bauxite is a catalyst for the prepn. of selenophene (I); at  $400^\circ$  Al selenide gives 15% I. I could not be obtained from Na succinate and selenide. The liquid from Al telluride,  $\text{C}_4\text{H}_2$ , and bauxite is believed to contain tellurophene, boiling about  $136^\circ$ . C. J. West

**Reaction capacity of the methyl group. I. Synthesis of 6,6'-dibenzoylindigo.** Louis Chardonvans. *Helv. Chim. Acta* 16, 1295-302 (1933).—Under the influence of the 2 neg.  $\text{NO}_2$  groups the H atoms of the Me group of 2,4-( $\text{O}_2\text{N}$ ) $_2\text{C}_6\text{H}_3\text{Me}$  show a certain mobility which makes them capable of reacting, in the presence of catalysts, with the CO group of aromatic aldehydes and with the NO group of aromatic nitroso compds. It has been shown that one of the  $\text{NO}_2$  groups can be replaced, without loss of activity on the part of the Me group, by a Bz group. Heating a mixt. of 3.5 g. of 4,2-Bz( $\text{O}_2\text{N}$ ) $\text{C}_6\text{H}_3\text{Me}$  (I) (C. A. 23, 4687) and 3 cc. BzH contg. 10 drops of piperidine for 6 hrs. at  $150\text{--}5^\circ$  under a reflux gave 2.1 g. of 2-nitro-4-benzoylstilbene,  $\text{C}_{21}\text{H}_{15}\text{NO}_3$ , m.  $120\text{--}1^\circ$ . Condensation of I with  $p\text{-ONC}_6\text{H}_4\text{NMe}_2$  and  $p\text{-ONC}_6\text{H}_4\text{NEt}_2$  in boiling alc. in the presence of dry powd.  $\text{Na}_2\text{CO}_3$  gave the corresponding azomethines, 4,2-Bz( $\text{O}_2\text{N}$ ) $\text{C}_6\text{H}_3\text{CH}:\text{NC}_6\text{H}_4\text{NR}_2$  (R = Me and Et),  $\text{C}_{22}\text{H}_{15}\text{N}_3\text{O}_4$ , m.  $174\text{--}5^\circ$ , and  $\text{C}_{24}\text{H}_{17}\text{N}_3\text{O}_4$ , m.  $146\text{--}7^\circ$ . Both azomethines were hydrolyzed by  $\text{HCl}$  into 4,2-Bz( $\text{O}_2\text{N}$ ) $\text{C}_6\text{H}_3\text{CHO}$  (II), m.  $102.5\text{--}3^\circ$  (phenylhydrazone,  $\text{C}_{20}\text{H}_{13}\text{N}_3\text{O}_4$ , m.  $206^\circ$ ), oxidized by  $\text{CrO}_3$  in  $\text{AcOH}$  into the corresponding acid, m.  $187\text{--}9^\circ$ . Condensation of II with acetone in the presence of  $\text{NaOH}$  by the method of Baeyer (*Ber.* 15, 2856 (1882)) yielded 6,6'-dibenzoylindigo,  $\text{C}_{20}\text{H}_{11}\text{N}_2\text{O}_4$ , m.  $355\text{--}60^\circ$  (decompn.). This new blue-green dye has a clearer tint than indigo; its alk. vat is a beautiful faintly violet blue. C. R. A.

**Directive effect of substituents on the cyclization of substituted s-diarylthiocarbamides. II. Effect of the fluorine atom on the thiazole cyclization of p-fluoro-s-diphenylthiocarbamides by bromine.** Mohammad Omar Farooq and Robert F. Hunter. *J. Indian Chem. Soc.* 10, 465-70 (1933); cf. C. A. 27, 1883.—The condensation of  $p\text{-MeC}_6\text{H}_4\text{NH}_2$ ,  $p\text{-BrC}_6\text{H}_4\text{NH}_2$  and  $p\text{-ClC}_6\text{H}_4\text{NH}_2$  with  $p\text{-fluorophenylthiocarbamide}$  (C. A. 25, 4880) in benzene yielded the  $p\text{-fluoro-s-diphenylthiocarbamides}$ ,  $p\text{-FC}_6\text{H}_4\text{NHCSNH}(\text{C}_6\text{H}_5)_2$  (R = Me, Br and Cl), m.  $169^\circ$ ,  $164\text{--}5^\circ$  and  $159\text{--}9^\circ$ , resp. Under the usual conditions of thiazole cyclization of Br these carbamides gave rise to 4'-fluoro-1-

anilinobenzothiazoles,  $\text{FC}_6\text{H}_4\text{NHC}(\text{N}:\text{C}_6\text{H}_5)_2\text{S}$  (R = Me, Br and Cl), m.  $182^\circ$ ,  $222\text{--}3^\circ$  and  $222\text{--}3^\circ$ , resp., identical with the bases obtained by condensation of  $p\text{-FC}_6\text{H}_4\text{NH}_2$  with the corresponding 5-substituted-1-chlorobenzothiazoles. The cyclization of  $p\text{-FC}_6\text{H}_4\text{NHCSNH}(\text{C}_6\text{H}_5)_2$ , m.  $170\text{--}1^\circ$ , prepd. by the condensation of equimol. proportions of  $p\text{-nitrophenylthiocarbamide}$  (C. A. 18, 3363) and  $p\text{-FC}_6\text{H}_4\text{NH}_2$  in benzene, yielded a base isomeric with 4'-fluoro-5-nitro-1-anilinobenzothiazole, m.  $278\text{--}9^\circ$ , obtained from 5-nitrochlorobenzothiazole and  $p\text{-FC}_6\text{H}_4\text{NH}_2$ , which was shown to be 4'-nitro-5-fluoro-1-anilinobenzothiazole,  $\text{C}_{13}\text{H}_9\text{FN}_2\text{O}_2\text{S}$ , m.  $252\text{--}3^\circ$ , by its synthesis from  $p\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$  and 5-fluoro-1-chlorobenzothiazole obtained from 5-fluoro-1-aminobenzothiazole (C. A. 25, 4888).

The effect of the F atom falls into line with that of the halogens previously studied (C. A. 23, 2973; 24, 4036), the inhibitory effect of substituents on benzothiazole formation from thiocarbanilides being in the order:  $\text{NO}_2 > \text{F} > \text{Cl} > \text{Br} > \text{EtO} > \text{Me}$ . **III. Effect of carbethoxy group on the formation of anilinobenzothiazoles from p-carbethoxy-s-diphenylthiocarbamides and bromine.** *Ibid.* 563-71.—The  $\text{O}_2\text{N}$  and  $\text{NC}$  groups in  $p$ -substituted s-diphenylthiocarbamides do not direct thiazole cyclization by Br in the sense opposite to that of  $o,p$ -directing substituents, but give rise to anilinobenzothiazole derivs. in which the  $m$ -directive substituent appears in the 1-arylamino grouping (C. A. 24, 4036; 26, 2978). It appeared of interest to exam. the effect of the carbethoxy group whose  $m$ -directive tendencies are ascribed to the "electron sink" properties of the CO group (C. A. 20, 1608) on the thiazole cyclization of  $p$ -substituted s-diphenylthiocarbamides. The condensation of  $\text{PhNH}(\text{C}_6\text{H}_5)_2$ ,  $p\text{-MeC}_6\text{H}_4\text{NH}_2$ ,  $p\text{-BrC}_6\text{H}_4\text{NH}_2$  and  $p\text{-ClC}_6\text{H}_4\text{NH}_2$  with  $p\text{-carbethoxyphenylthiocarbamide}$  (C. A. 27, 294), purified by recrystn. from petr. ether, in benzene yielded the  $p\text{-carbethoxy-s-diphenylthiocarbamides}$  (I),  $p\text{-RC}_6\text{H}_4\text{NHCSNH}(\text{C}_6\text{H}_5)_2$  (R = H, Me, Br and Cl), m.  $129\text{--}30^\circ$ ,  $160\text{--}1^\circ$ ,  $158\text{--}9^\circ$  and  $159\text{--}40^\circ$ , resp. On treatment with Br under moderately vigorous conditions  $\text{PhNHCSNH}(\text{C}_6\text{H}_5)_2\cdot\text{CO}_2\text{Et}$  gave rise to Et 1-anilinobenzothiazole-4'-carboxylate,  $\text{EtO}_2\text{CC}_6\text{H}_4\text{NHC}(\text{N}:\text{C}_6\text{H}_5)_2\text{S}$  (II) (R = H), m.  $182\text{--}3^\circ$ , whose constitution was established by synthesis from 1-chlorobenzothiazole and  $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Et}$  (III). On prolonged bromination in the presence of excess Br nuclear substitution occurred with the formation of II (R = Br), m.  $227\text{--}8^\circ$ , whose orientation follows from its synthesis from  $\text{H}_2\text{NC}_6\text{H}_3\text{BrCO}_2\text{Et}$  and 1-chloro-5-bromobenzothiazole, m.  $101\text{--}2^\circ$ , prepd. in quantity by the conversion of 5-bromo-1-aminobenzothiazole obtained from 1-aminobenzothiazole. Although II (R = Br) was formed in the reaction between I (R = Br) and Br, it was not found possible to isolate the base in a pure state from the reaction mixt. Treatment with Br converted  $s\text{-p-carbethoxyphenyl-p-tolylthiocarbamide}$  (I, R = Me),  $\text{C}_{17}\text{H}_{15}\text{N}_2\text{O}_2\text{S}$ , into the benzothiazole (II, R = Me), m.  $206\text{--}7^\circ$ , identical with that obtained from III and 1-chloro-5-methylbenzothiazole, m.  $49\text{--}50^\circ$ , prepd. from 1-amino-5-methylbenzothiazole by means of the Sandmeyer reaction. The bromination of the thiocarbamide (I, R = Cl),  $\text{C}_{16}\text{H}_{13}\text{ClN}_2\text{O}_2\text{S}$ , produced the benzothiazole (II, R = Cl) in an impure state. The Et 5-chloro-1-anilinobenzothiazole-4'-carboxylate,  $\text{C}_{16}\text{H}_{13}\text{ClN}_2\text{O}_2\text{S}$ , m.  $226^\circ$ , was obtained in a satisfactory condition of purity by the condensation of III with 1,5-dichlorobenzothiazole,  $\text{C}_6\text{H}_3\text{Cl}_2\text{NS}$ , m.  $101^\circ$ , which was synthesized from 5-chloro-1-aminobenzothiazole (C. A. 24, 4036). The effect of the  $\text{EtO}_2\text{C}$  group falls well into line with that of the other  $m$ -directive substituents. The bromination of  $s\text{-p-carbethoxyphenyl-p-nitrophenylthiocarbamide}$  (IV),  $\text{C}_{17}\text{H}_{13}\text{N}_3\text{O}_4\text{S}$ , m.  $154\text{--}5^\circ$ , in which the inhibitory effects of the 2  $m$ -directing groups are in opposition, gave rise to Et 4'-nitro-1-anilinobenzothiazole-5-carboxylate,  $\text{C}_{17}\text{H}_{13}\text{N}_3\text{O}_4\text{S}$ , m.  $241\text{--}3^\circ$ , by a thiazole cyclization. This base is isomeric with the

benzothiazole (II,  $R = NO_2$ ), m. 242–3°, synthesized from III and 5-nitro-1-chlorobenzothiazole (V), m. 190°, prep'd. by the nitration of 1-chlorobenzothiazole. An attempt to synthesize V from *p*-nitrophenylthiocarbimide and  $PCl_5$  proved unsuccessful, the reaction being accompanied by considerable decompn. and charring. The effect of the pos. pole of the  $NO_2$  group outweighs the "electron sink" capacity of the CO group in  $EtOCOC_6H_4NHCSNH_2C_6H_4NO_2$ , thiazole cyclization taking place in this case on the nucleus which carries the *m*-directive  $CO_2Et$  group.

**Derivatives of 5-aminotetrazole.** R. Stollé and O. Roser. *J. prakt. Chem.* 139, 63–4 (1933); cf. *C. A.* 27, 2687.—5-Aminotetrazole (I) and picryl chloride in AcOH, heated 2 hrs., give 5-picrylamino-tetrazole, yellow, m. 224°; Ag salt; the Cu and Pb salts were prep'd. but not analyzed; both detonate on heating or percussion. The Na salt of I and 2,4-( $O_2N$ ) $_2C_6H_3Cl$  in  $C_6H_5Me_2$ , boiled 6 hrs., give 5-(2,4-dinitrophenyl)tetrazole, brown-red, m. 174° (decompn.); in AcOH only the Ac deriv. of I is formed.

**Conditions for the formation of rings attached to the positions of the benzene nucleus.** S. G. P. Plant. *J. Chem. Soc.* 1933, 1586–8.—*o*- $MeOC_6H_4CO(CH_3)_2$  in  $HNO_3$  (d. 1.5) at –5° to 0° gives the 5- $NO_2$  deriv., pale yellow, m. 112°; 5- $NH_2$  deriv., m. 118° (HCl salt, m. 168° (decompn.)); with alk.  $\beta$ - $C_{10}H_7OH$  the diazo soln. gives a red dye; the Bz deriv. m. 146°; the Ac deriv. m. 112°. No indications have been obtained of ring closure with the  $NH_2$  comp'd. or its derivs. Et cyclopentanone-2-carboxylate and *p*- $ClC_6H_4OH$  with  $P_2O_5$  give 6-chloro-2,3-dihydropentachromone, pale yellow, b<sub>m</sub> 233–5°, m. 129–30°; hydrolysis gives 5,5-chloro-2-hydroxybenzoylvaleric acid, m. 136°; 2-MeO deriv., m. 94°; this also results from the above 5- $NH_2$  deriv. through the Sandmeyer reaction.

**Attempted synthesis of primetin.** S. Sugawara. *J. Chem. Soc.* 1933, 1621–4.—Iattori and Nagai (*C. A.* 24, 3510) have assumed that primetin is 5,6-dihydroxyflavone; attempts to synthesize this comp'd. have failed thus far. 6,2,3- $H_2N(MeO)_2C_6H_3CO_2H$  through the diazo reaction gives the 6-Bz deriv., whose anilide m. 135–7°; with AcONa and (AcO) $_2Cu$  there results *o*-veratric acid. 6-Iodo-2,3-dimethoxybenzoic acid, m. 137–8°; with  $PhCH_2ONa$  there results the 6-benzoyloxy deriv., m. 128–9°; the acid chloride, m. 75–6°; with  $MeZnI$  gives 6-benzoyloxy-2,3-dimethoxyacetophenone, pale yellow, m. 90–1°; debenzoylation was carried out with HCl in AcOH and, as the product would not crystallize, it was fused with Bz $_2O$ , giving 5-hydroxy-8-methoxyflavone, bright yellow, m. 129–30° (Ac deriv., very pale yellow, m. 146–7°); HI gives 5,8-dihydroxyflavone (?), m. 179–80°. Et 2,4,3',4'-tetramethoxydiphenate, m. 124–5°, was prep'd. from  $I(MeO)_2C_6H_3CO_2H$ ; the ester could not be hydrolyzed with boiling EtOH-KOH.

**Synthesis of tricrin.** K. C. Gulati and K. Venkataraman. *J. Chem. Soc.* 1933, 1644.—Synthetic 5,7,4'-trihydroxy-3',5'-dimethoxyflavone (*C. A.* 27, 5239) is identical with tricrin.

**Reactions of dinitriles with aromatic hydroxy aldehydes.** Nirulananda Palit. *J. Indian Chem. Soc.* 10, 529–35 (1933).—Mohr (*J. prakt. Chem.* 56, 124 (1897)) found that 2 mols. of *o*- $HOC_6H_4CHO$  (I) reacted with 1 mol. of  $MeC(NH)CH_2CN$  with the elimination of 2 mols.  $H_2O$  to give a product,  $C_{10}H_{11}N_3O_2$ , of undetd. constitution in place of the expected 3-cyanoquinoline deriv. This is the general course of the reaction with I though a dicyanohydropyridine deriv. was obtained when  $MeC_6H_4C(NH)CH_2CN$  was condensed with I. Evidence has been brought forward to indicate the presence of a xanthidrol ring in the above products. In the condensation of MeCN with PhCN,  $MeC_6H_4CN$  and  $MeOC_6H_4CN$  by heating the mixt. with mol. Na in Et $_2O$  for 9 hrs. and letting stand overnight, improved yields were obtained of *p*-tolu- (II), benzo- (III) and *p*-anisylacetodinitrile (IV),  $C_{10}H_{11}N_3O$ , m. 117°. Condensation of I with II by heating the mixt. for 9 hrs. in boiling  $H_2O$  gave a cryst. comp'd.  $C_{20}H_{19}N_3O_2$ , m. 217–18° (Ac deriv.,  $C_{20}H_{19}$

$N_3O_2$ , m. 180–1°), hydrolyzed by heating in a sealed tube with concd. HCl at 180–5° for 4 hrs. into a NaOH-sol. vermilion powder,  $C_{20}H_{19}N_3O_4$ , m. 198°. In glacial AcOH I and II condense to form a substituted 3,5-di-cyanodihydropyridine deriv.,  $C_{21}H_{11}N_5O$ , m. 206–7°, sol. in hot NaOH, rep'd. on acidification. Condensation of I with III in  $H_2O$ , AcOH or AcOH in the presence of dry HCl invariably gave a comp'd.  $C_{20}H_{11}N_3O_2$ , m. 225–6°, having the same empirical formula as Mohr's comp'd. A comp'd. of this type was formed by the condensation of I and II in AcOH contg. dry HCl. IV gave a similar product,  $C_{20}H_{11}N_3O_2$ , m. 247–8°. Condensation of the dinitriles with *m*- and *p*- $HOC_6H_4CHO$  gave substituted 3,5-dicyanodihydropyridine derivs.

$RCH_2C(CN):CR'.NH.CR':CCN$  ( $R = m$ - and *p*- $HOC_6H_4$ ;  $R' = Ph, C_6H_4Me$  and  $C_6H_4OMe$ ): *m*- $HOC_6H_4CHO$  condensation products with II, III and IV, resp.;  $C_{20}H_{11}N_3O$  (V), m. 269–70°,  $C_{20}H_{11}N_3O$ , m. 267–8°, and  $C_{22}H_{13}N_3O_2$  (VI), m. 218–20°: *p*- $HOC_6H_4CHO$  isomers, m. 259–60°, 218–19° and 385°, resp. By oxidation with  $N_2O_5$  in warm glacial AcOH the dihydropyridines V and VI did not give the expected pyridines but the mol. was ruptured to yield a diketone  $HOC_6H_4CH:(COCN)_2$ , m. 256–7°. The oxidation of the dihydropyridines from *p*- $HOC_6H_4CHO$  proceeded normally to form the substituted pyridines  $C_{20}H_{11}N_3O$ , m. 245–6°,  $C_{20}H_{11}N_3O$ , m. 265°, and  $C_{22}H_{13}N_3O_2$ , m. 248–50°.

**Polymembered heterocyclic compounds.** I. Cyclo-octamethylenimine, cyclopentadecamethylenimine, cyclohexadecamethylenimine and dicyclopentadecamethylenedimine. L. Ruzicka, M. W. Goldberg, M. Hürbin and H. A. Bockennoogen. *Helv. Chim. Acta* 16, 1323–34 (1933).—On heating with 80%  $H_2SO_4$ , cyclooctanone oxime underwent a Beckmann rearrangement to give

85–90% of cyclooctanone isoxime (I),  $\dot{C}H_2.(CH_2)_6.CO.NH$ , b<sub>m</sub> 164–6°, m. 72–3°,  $d_4^{25}$  1.0087,  $n_D^{25}$  1.4889, M. R. 40.37 (calcd. 40.55). I was also formed by the condensation of cyclooctanone and  $N_2H$  in the presence of an ice-cold mixt. of concd.  $H_2SO_4$  and benzene together with a tetrazole deriv. The reduction of I with Na in abs. alc. gave 10% yields of the extremely hygroscopic cyclooctamethylenimine (II),  $C_8H_{11}N$ , b<sub>m</sub> 69°,  $d_4^{25}$  0.8905,  $n_D^{25}$  1.4771, M. R. 40.36 (calcd. 40.54) (picrate,  $C_{14}H_{11}N_3O_7$ , m. 148–9°), and 1-amino-octan-8-ol (III), (urea,  $C_8H_{11}N_3O_2$ , m. 94°; phenylurea deriv.,  $C_{22}H_{19}N_3O_2$ , m. 147–8°). II and III are alike in their narcotic action and both cause convulsions and death in equal doses. They restrict the movement of the isolated frog heart. II has a more powerful papaverine-like action on the intestine than III. Fruitless attempts were made to improve the yields of II by the electrolytic reduction of I. I was converted into the corresponding thioisoxime by the method of Kindler (*C. A.* 17, 2278). To a soln. of 5.1 g. of I in 25 cc. xylene at 80–5° were added 7.5 g. of finely powd.  $K_2S$  and 5 g.  $P_2S_5$  with stirring. The residue from a 5-fold extn. with 25 cc. xylene was recrystd. from benzene and gave 50% of cyclooctanone thioisoxime (IV),  $C_8H_{11}NS$ , m. 89°. The prep'n. was modified by omitting the  $K_2S$  and adding NaOH at the end of the reaction. By this procedure 10 g. of I gave 9.6 g. of IV. Attempts to reduce IV with Hg-Mg and moist Et $_2O$ , Hg-Al and aq. alc. or Zn dust and AcOH were unsuccessful. Reduction of 8 g. of IV in alc. with Na in glacial AcOH gave only 2.3 g. of II. Electrolytic reduction of 5 g. of IV in 110 cc. 55%  $H_2SO_4$  at 30–2° at a 90 sq. cm. Pb cathode with 18 amp. and 5 v. for 5.5 hrs. gave 3.5 g. (85%) of II. The 16- and 17-membered cyclic imines were similarly prep'd. from cyclopenta- and cyclohexadecanone. The Beckmann rearrangement, by heating with 80%  $H_2SO_4$ , gave a 90% transformation of cyclopentadecanone oxime into cyclopentadecanone isoxime (V),  $C_{15}H_{21}NO$ , m. 133–4°. V was converted by treatment with  $P_2S_5$  into cyclopentadecanone thioisoxime (VI),  $C_{15}H_{21}NS$ , m. 104–5°, which was reduced by Na in EtOH to cyclopentadecamethylenimine,  $C_{15}H_{21}N$ , m. 48–9°, b<sub>m</sub> 112–14°; picrolonate, m. 221–2°; HCl salt,  $C_{15}H_{21}NCl$ , m. 170–8°. Treatment



of cyclohexadecanone with  $N_2H_4$  in an ice-cold mixt. of concd.  $H_2SO_4$  and benzene gave *cyclohexadecanone isoxime*, m. 125-6°, converted at 100° with  $P_2S_5$  in an 85% yield of the corresponding *thioisoxime* (VII),  $C_{16}H_{31}NS$ , m. 104-5°. On account of its insol. in dil.  $H_2SO_4$ , the electrolytic reduction of VII was carried out in alc.  $H_2SO_4$  and gave *cyclohexadecamethylenimine*,  $C_{16}H_{31}N$ , m. 58-9°, b.p. 120-7°; *picrolonate*,  $C_{16}H_{31}N_2O_6$ , m. 208-10°; *tartrate*, m. 154° (used in prepn. of the pure base). The Beckmann rearrangement of the dioxime gave *cyclotriacetans-1,16-dione diisoxime*,  $C_{16}H_{31}N_2O_8$ , m. 178-9°, converted by Kindler's procedure into the *dithioisoxime* (VIII),  $C_{16}H_{31}N_2S_2$ , m. 177°. VIII was reduced by Na in AmOH to the *disimine* (IX),  $C_{16}H_{31}N_2$ , m. 62-3°; *HCl salt*,  $C_{16}H_{31}N_2Cl$ , m. 200° (decompn.); *acetate*, m. 120°. The Beckmann rearrangement of the dioxime may take place sym. or unsym. and so give rise to 2 isoximes. IX

may have 1 of the formulas  $HN(CH_2)_{15}.NH(CH_2)_{14}CH_3$ ,

$HN(CH_2)_{15}.NH(CH_2)_{15}CH_3$  or may correspond to a mixt. of both. II. 4,5-Cyclopolymethylenetetrazoles and 2,3-cyclopolymethylenesquinolines. L. Ruzicka, M. W. Goldberg and M. Hurbin. *Ibid.* 1335-9. By the condensation of cyclohexanone with excess  $N_2H_4$  Schmidt (C. A. 18, 2808) obtained 4,5-cyclopentamethylenetetrazole (I). Cycloheptanone (12 g.) and 11.5 g.  $N_2H_4$  (C. A. 26, 2306) in 280 cc. benzene were added in the course of 45 min. to an ice-cooled and well-stirred mixt. of concd.  $H_2SO_4$  (60 cc.) and benzene (100 cc.). After diln. with ice and  $H_2O$  the acidic layer was neutralized with NaOH and on extrn. with  $Rt_2O$  yielded 4,5-cyclohexamethylenetetrazole (II),  $C_6H_{11}N_4$ , m. 66-8°. Similarly were prepd. the corresponding *heptamethylene* and *octamethylene* homologs (III),  $C_8H_{13}N_4$ , b.p. 145-6°, and IV,  $C_{10}H_{15}N_4$ , m. 97-8°. II and III have physiol. properties similar to I, used medicinally under the designation "Cardiazole." The 16-membered ring compd. IV is physiol. less active. By a condensation, analogous to that of Borsche (C. A. 2, 2807), *o*- $H_2NC_6H_4CHO$  was condensed with alc. cyclooctanone in the presence of 10% NaOH to give 2,3-cyclohexamethylenesquinoline (V), b.p. 130-5°; *HCl salt*,  $C_{16}H_{23}ClN$ , m. 200-2°; *picrate*, m. 212°. Similarly was prepd. 2,3-cyclotridecamethylenesquinoline (VI),  $C_{18}H_{25}N$ , b.p. 197°; *picrate*,  $C_{18}H_{25}N_4O_7$ , m. 169-71°. V has a definite action on the heart but VI is relatively inactive. C. R. Addinall

**Antimonial analogs of the acridine series—dihydrostibacridines.** Gilbert T. Morgan and Glyn Rees Davies. *Proc. Roy. Soc. (London)* A143, 38-47 (1933).—Addn. of  $Sb_2O_3$  to diazotized *o*- $PhCH_2C_6H_4NH_2$ .  $HCl$  gives *diphenylmethane-2-stibonic acid* (I). Trituration of I gives the *diphenylmethane-2-stibine dichloride* (II), m. 129-30°. With NaI in  $Me_2CO$ , II gives the *diiodide*, m. 95°; with  $HBr$  the *tribromide*, m. 121°. II, washed with  $Ac_2O$  and dil.  $NH_3$  in the cold, yields the *oxide*,  $PhCH_2C_6H_4SbO$ , m. 82-3°. I with  $Ac_2O$  and  $H_2SO_4$  upon treatment with  $HCl$  gives *stibacridine trichloride* (III). Reduction of III with  $SO_2$  gives 10-chloro-9,10-dihydrostibacridine (IV), m. 105°; 10-I deriv., m. 160-2°; 10-Br deriv., m. 112°. With dil. alc.  $NH_3$  these halogeno derivs. give 10,10'-oxybis(9,10-dihydrostibacridine), m. 211-15°. *Stibacridinic acid* was sepd. in the prepn. of IV. The I deriv. from IV with  $MeI$  and  $MeMgI$  gives 10-methyl-9,10-dihydrostibacridine (V), m. 101°; *dichloride*, m. 177-8°. With  $NH_3$  in  $Me_2CO$ , II gives *tetrakis(diphenylmethane-2)stibine oxide* (VI), m. 117°. Concd.  $HCl$  with VI gives the chloride ( $C_6H_5CH_2C_6H_4$ ) $_4SbCl$ , m. 87.5°; *bromide*, m. 86.5°; *iodide*, m. 73-5°; *trichloride* (VII), m. 129°. With dil.  $NH_3$ , VII gives *bis(diphenylmethane-2)stibinic acid*, m. 248°. Heating VII to 150° gives 10-(diphenylmethane-2')-9,10-dihydrostibacridine oxide, m. 158-60°; *dichloride*, m. 224°.

W. J. Peterson

**Bis( $\beta$ -haloethyl)amines. III. *N*-Phenylpiperazine.** V. Prelog and G. J. Driza. *Collection Czechoslov. Chem. Communications* 5, 497-502 (1933); cf. C. A. 26, 2168.—( $ClCH_2CH_2$ ) $_2NH$  (40 g.), in  $MeOH$ , refluxed 16 hrs.

with  $PhNH_2$  (40 g.), gave *N*-phenylpiperazine (I), 156°.

250-2° piperazine, m. 96°; *HCl salt*, m. 213-4°. Similarly the following were obtained: *N*-benzoyl-*N*-phenylpiperazine, m. 96-7° (*HCl salt*, m. 244°); *N*-*p*-tolylsulfonyl-*N*-phenylpiperazine, m. 199-200°; 4'-nitro-4-piperazine-1-azobenzene, m. 250° (decompn.); *Na* 4'-piperazylazobenzene-4-sulfonate, m. about 210° (decompn.). The mother liquor of I contained *bis*( $\beta$ -phenylaminoethyl)amine, b.p. 268-76°; *HCl salt*, m. 237°. C. J. West

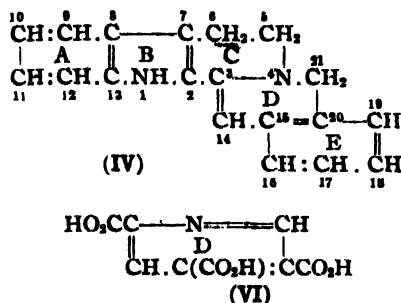
**Asymmetric arsenic atom.** Attempts to prepare optically active arsenicals. John D. A. Johnson. *J. Chem. Soc.* 1933, 1634-7.—If the difficulty in resolving asym. org. arsenicals lies in the ease of racemization, a factor which might assist in the resolution is restriction of the motion of the attached groups (a) by making the As atom common to 2 or 3 rings or (b) by increasing the bulk of the groups; a combination of (a) and (b) might also be very effective, e. g., a heterocyclic As atom attached to 2 bulky groups. Attempts to prep. spiro compds. conforming to (a) have not been successful.  $PhCH_2Br$  and 2-methyl-10-propyl-5,10-dihydrophenarsazine, heated 4 hrs. at 100°, give the *bromide* of the 10-benzyl deriv. I, m. 206-7° (decompn.); the 10-phenacyl deriv. was also prepd.; its *d*-camphor- $\beta$ -sulfonate is a gum. The *d*- $\alpha$ -bromocamphor- $\pi$ -sulfonate of I is a gum; the *d*-camphor- $\beta$ -sulfonate, m. 262° (decompn.),  $[\alpha]_D^{25}$ , 21° ( $EtOH$ ), and showed no resolution. 10-Chloro-2-methyl-5,10-dihydrophenarsazine and  $PhCH_2MgBr$  give the 10-benzyl deriv., pale yellow, m. 132.5°;  $BzCH_2Br$  gives 10-phenacyl-10-benzyl-2-methyl-5,10-dihydrophenarsazinium bromide, m. 203°; the *d*-camphor- $\beta$ -sulfonate, m. 184° and had  $[\alpha]_D^{25}$ , 17.25° ( $EtOH$ ), the least and most sol. fractions having the same rotation; KI gives the *iodide*, m. 179°, which reacts with moist  $Ag_2O$  to give presumably 10-benzyl-2-methyl-5,10-dihydrophenarsazinium dihydroxide with an indefinite m. p. 10,10'-bis(5,10-dihydrophenarsaziny) (II) and  $EtBr$ , heated 9 hrs. at 100°, give 10,10'-diethyl-5,10-dihydrophenarsazinium bromide, m. 152-3°; this was also prepd. from the 10-Et deriv. and  $EtBr$ ; the *iodide* m. 230° (decompn.).  $EtBr$  does not react with 10,10'-bis(5-acetyl-5,10-dihydrophenarsaziny) or with 5-acetyl-10-methyl-5,10-dihydrophenarsazine. 10-Methyl-5,10-dihydrophenarsazine reacts vigorously with  $(BrCH_2CO)_2O$  but definite products could not be isolated.  $(CH_2)_5Br$  and II give a compd., m. 160°, which is a mixt., some of the bromide having reacted with the :NH group also. In the reaction with  $EtBr$  there appeared to be no tendency for the :NH group to react. C. J. West

**Synthesis of *dl*-homolaudanosoline and its dehydrogenation.** Shigehiko Sugawa and Haruo Yoshikawa. *J. Chem. Soc.* 1933, 1583-5.—Homoveratrylamine and veratrylpropionyl chloride with NaOH in  $Et_2O$  give about 70% of  $\beta$ -3,4-dimethoxyphenylpropiono- $\beta$ -', $\beta$ '-dimethoxyphenylethylamide, m. 99-100°; 15 g. amide and 60 g.  $POCl_3$  in  $PhMe$ , heated 1.5-2 hrs. at 120-30°, give about 13 g. of 6,7-dimethoxy-1- $\beta$ -3',4'-dimethoxyphenylethyl-3,4-dihydroisoquinoline (I), m. 96-7°. I was also prepd. from divertyrideneacetone by reduction to bis( $\beta$ -3,4-dimethoxyphenyl)ethyl ketone and treating the oxime with  $POCl_3$  in  $PhMe$ . The methochloride of I, catalytically reduced, gives *dl*-homolaudanosoline (II), the perchlorate of which decomp. 183-5°. HI is the best reagent for the demethylation of II;  $AlCl_3$  does not give good results. Homolaudanosoline-HI and chloranil in  $AcOH$  give 80% of 2,3,11,12-tetrahydroxy-8-methyl-6,7,15,16-tetrahydro-5,18,9,14-dibenzopyridocolinum iodide, yellow-brown, decomp. 252-3°; methylation gives 2,3,11,12-tetramethoxy-6,7,15,16-tetrahydro-5,18,9,14-dibenzopyridocoline, whose methiodide, yellow, decomp. 237-8°; the methochloride, decomp. 204-5°, on decompn. gives a compd. m. 153.5-4.5°, which is being investigated. C. J. West

**Yohimbine.** Geo. Barger and Caesar Scholz. *Helv. Chim. Acta* 16, 1342-54 (1933); cf. C. A. 27, 4235—



By a modification of Wihaut's method (C. A. 25, 2730) 60 g. of yohimboic acid (I) was dehydrogenated by heating with 45 g. of powd. Se for 30 min. at 300° to give 14-15 g. tetrahydroyobyrine (II),  $C_{15}H_{25}N$ , m. 167°; 1.5-2.0 g. ketoyobyrine (III), m. 830° (slight decompn.); and 8-9 g. yobyrine (IV),  $C_{15}H_{25}N$ , m. 218-9° (the yields given refer to purified material). The difference of 4 H atoms between II and IV suggests the presence of a benzene nucleus E in IV, which is tetrahydrogenated in II and fully reduced in yohimbine (V). It is from this nucleus E that phthalic acid and  $(CH_3CO_2H)_2$  are, resp., derived in the oxidation of IV and of V.



The ring system A, B, C has already been related to that of harmann and to elucidate that of D II was oxidized with  $HNO_3$  to berberonic acid (VI), m. 249° (decompn.), identical with that prepd. by the oxidation of berberine (Ber. 12, 410(1879)) but differing from  $\alpha$ -carbocinchomeronic acid (Ann. 204, 88(1880)). This proposed ring system permits the fitting into it of all the degradation products previously obtained; even the puzzling appearance of isoquinoline in the Zn dust distn. of V (C. A. 22, 1592) can be explained by the assumption of a ring C cleavage. The alk. fusion method of Mendlik and Wihaut was refined and by heating with KOH in AmOH for 12 hrs. III was cleaved into norharman, m. 197-8° (identical with a sample synthesized from HCHO and tryptophan), and 2,3-dimethylbenzoic acid, m. 143-4°. The 2 Me groups correspond to the C atoms 14 and 21 and so the CO group of III must be attached to C atom 16 or 19. III may be formed by ring closure, most likely with atom 1, since diacetylyohimbine does not give III. Thus the CO group is probably attached at position 16. In the above reactions the C atom 14 remains attached to ring E. By the alk. fusion of I,  $m$ - $MeC_6H_4CO_2H$ , m. 109°, in which the C atom 14 has been split away from ring E, was formed together with 2-indolecarboxylic acid, m. 203°, and II. II was also prepd. (C. A. 9, 2888) by the dry distn. of I with CaO at 4 mm. V contains no NMe group and yields few definite cleavage products on degradation. The oxidation of I gives  $(CH_3CO_2H)_2$  as the only identified product. The meager results suggest that in V and I the rings C, D and E are fully reduced and, moreover, carry substituent groups. Apo- and desoxy-yohimbine (C. A. 17, 2585) may afford the clue to the detn. of the position of the OH group in V. The origins of the sufficiently described degradation products of V are reviewed in a tabular form provided with literature references. In this table the C atoms of the  $CO_2H$  group and the Me group are numbered 22 and 23, resp. It is suggested that V may be looked upon as originating from tryptophan and phenylalanine in the same way as the alkaloids of the berberine type are derived from 2 mols. of phenylalanine or tyrosine. C. R. Addinall

Sapic acid, a constituent of American pine resin. Fritz Vocke. Ann. 508, 11-15(1933).—The pine resin, freshly collected and protected from the air, slowly deposits sapic acid (I),  $C_{20}H_{30}O_8$ , m. 143°,  $[\alpha]_{D^{25}} -123^\circ$  (2.31 g. in 50 cc. 98% EtOH); the yield of I is 80-100 g. from 500 g. crude resin. Oxidation of I with  $HNO_3$  gives a very small yield of the acid  $C_{10}H_{16}O_4$ . Heating I in AcOH for 2-3 hrs. gives nearly quant. abietic acid. On illumination of I in 96% EtOH for 48 hrs. the rotation

changes to  $[\alpha]_{D^{25}} 81^\circ$ . On catalytic reduction I quickly takes up 1 mol.  $H_2$ , giving the acid  $C_{20}H_{32}O_8$ , m. 195°,  $[\alpha]_{D^{25}} 28.7^\circ$ ; further reduction gives hydroabietic acid, m. 173°,  $[\alpha]_{D^{25}} 28.3^\circ$ . C. J. West

Heart glucosides. IV. Desacetyldigilanides A, B and C. Arthur Stoll and Walter Kreis. Helv. Chim. Acta 16, 1390-407(1933); cf. C. A. 28, 7857.—By the careful treatment of the glucoside digilanides A, B and C with a 25-30% excess of  $Ca(OH)_2$  total deacetylation takes place with the formation of the corresponding desacetyldigilanides. Under the prescribed conditions the opening of the lactone ring of the aglucones and the formation of the isomeric compds. (C. A. 18, 2170) are almost entirely avoided. From a similar treatment, followed by acidification, the cryst. desacetyldigilanide C is recovered unchanged. To a soln. of 5.2 g. vacuum-dried digilanide A in 185 cc. MeOH was added 0.2525 g.  $Ca(OH)_2$  in 185 cc.  $H_2O$ . After 3.5 hrs. standing at room temp. and neutralization with 0.1 N HCl, the soln. was concd. *in vacuo* to 180 cc. and reneutralized. The crude glucoside (4.63 g.) was extd. with 25 cc. hot EtOH and the residue (4.4 g.) was dissolved in 55 cc. of a 5-1 mixt. of MeOH and  $H_2O$ . The cooled soln. was filtered through talc and the glucoside was thrown down by diln. with 45 cc.  $H_2O$ . After 15 hrs. standing the mixt. was filtered and yielded 3.2 g. of desacetyldigilanide A (I).  $C_{27}H_{40}O_{15}$ , mol. wt. 927 (detd. by lactone titration), m. 258° (decompn.),  $[\alpha]_D^{25} 10.3^\circ$ . A soln. of 3.5690 g. dry finely powd. I in a mixt. of 110 cc. 95% EtOH and 100 cc. 2 N  $H_2SO_4$  at 40° was dild. with 200 cc.  $H_2O$  at 40° after 2 hrs. standing. The hydrolysis was continued overnight and the resulting mixt. yielded 1.439 g. of digitoxigenin,  $C_{27}H_{40}O_8$ . The aglucone-free liquid was dild. to a 1%  $H_2SO_4$  content and covered with toluene. After 2 months the liquid yielded 1.20 g. (1 mol.) of the alc.-insol. diglanidobiose (II),  $C_{12}H_{20}O_8$  (81% in cryst. form), and 1.08 g. (2 mols.) of the alc.-sol. digitoxose (III),  $C_6H_{12}O_5$ . For the enzyme cleavage of I a glucoside-free enzyme prepn. was made from 1 kg. of the fresh leaves of *Dig. purpurea*. This was added to a soln. of 2 g. of I in a mixt. of 1 l.  $H_2O$  and 1 l. EtOH. After stirring for 3.5 days at room temp. the filtrate was extd. with  $CHCl_3$  and yielded digitoxin,  $C_{41}H_{64}O_{14}$ , with the phys. consts., aglucone and digitoxose content and physiol. properties as described in the literature. Desacetyldigilanide B (IV),  $C_{27}H_{40}O_{15}$ , mol. wt. 943, m. 240° (cor.) (decompn.),  $[\alpha]_D^{25} 20.4^\circ$ , was similarly prepd. IV gives the same blue zone in the AcOH layer (Keller-Killiani color reaction) as the A and C compds. but in contrast shows an intense red zone at the  $H_2SO_4$  interface. Acid hydrolysis of IV yielded digitoxigenin,  $C_{27}H_{40}O_8$ , 2 mols. III and 1 mol. II. The enzyme cleavage gave cryst. gitoxin,  $C_{41}H_{64}O_{14}$ ,  $[\alpha]_D^{25} 3.54^\circ$ , crystd. from and characterized by its difficult soly. in 75% alc. (1 in 1000). The corresponding C compd. was easily prepd. on account of its cryst. form. Desacetyldigilanide C (V),  $C_{27}H_{40}O_{15}$ , mol. wt. 943,  $[\alpha]_D^{25} 12.2^\circ$ , crystallizes with  $H_2O$  of crystn. which is firmly retained. From hot MeOH V yields a solvent-free modification, m. 265-8° (decompn.). The occurrence of these 2 modifications and their ease of conversion are similar to that of Scillaren A. V was hydrolyzed by acid, to digoxigenin,  $C_{27}H_{40}O_8$ , 2 mols. III and 1 mol. II. Enzyme cleavage gave cryst. digoxin,  $C_{41}H_{64}O_{14}$ , m. 260-5° (cor.),  $[\alpha]_D^{25} 13.2^\circ$ , agreeing in physiol. behavior with a prepn. according to Smith (C. A. 25, 1533). A Keller-Killiani test showed a blue color in the AcOH layer and a red-brown  $H_2SO_4$  zone. The desacetyldigilanides have the same effect on the heart as the original digilanides. Since the iso compds. have a greatly diminished activity it is evident that the mild alk. treatment used in the deacetylation does not give rise to any considerable isomerization. S. and K. consider this to be the first example of the removal of a part of a natural glucoside by a purely chem. reagent without any considerable effect on its activity. C. R. Addinall

Ergosteryl acetate-maleic anhydride and its hydro derivative. H. H. Inhoffen. Ann. 508, 81-8(1933).—

Ergosteryl acetate (40 g.), 15 g. maleic anhydride and 100 cc.  $C_6H_5Me_3$ , heated 8 hrs. at  $135^\circ$  in a tube, give 8-10 g. of the addn. product (I), m.  $216^\circ$ ,  $[\alpha]_D^{25} -19^\circ$  (1% in  $CHCl_3$ ); dibromide, m.  $252-3^\circ$ ; hydrolysis of I with  $EtOH-H_2SO_4$  gives ergosterol-maleic anhydride, m.  $202^\circ$ ; hydrolysis with 10%  $MeOH-KOH$  gives the acid, m.  $198-9^\circ$  (decompn.), which yields with  $CH_3N_3$  a di-Me ester (II), m.  $163^\circ$  (acetate, m.  $164^\circ$ ). I distills nearly undecompd. at 0.0002 mm. and  $240^\circ$ ; at a higher temp. and a water-pump vacuum, I is decompd. into its components in nearly quant. yield. I is unchanged after the action of  $HCl$  in  $CHCl_3$  at  $0^\circ$  for 1.5 hrs. Catalytic reduction of I in  $Me_2CO$  with  $Pd$  gives the dihydro deriv., m.  $202-3^\circ$ ,  $[\alpha]_D^{25} -9.1^\circ$  (48.2 mg. in 2 cc.  $CHCl_3$ ). II gives di-Me dihydroergosteryl acetate maleate, m.  $116-7^\circ$ . If I is reduced at  $80^\circ$  in  $AcOH$  there results a tetrahydro deriv., m.  $187-7.5^\circ$ ,  $[\alpha]_D^{25} -25.4^\circ$ , which is stable in vacuo at  $270^\circ$  for 1 hr.; alk. hydrolysis gives the maleic acid, m.  $218-20^\circ$  (decompn.), whose di-Me ester m.  $138^\circ$ ,  $[\alpha]_D^{25} -69.8^\circ$  (21.5 mg. in 2 cc.  $CHCl_3$ ). The formation of a tetrahydro deriv. is difficult to reconcile with the accepted formula for ergosterol. C. J. West

Addition product of maleic anhydride and dehydroergosterol and its reduction products. H. Honigmann. *Ann.* 508, 89-104(1933); cf. *C. A.* 25, 4007.—In some preps. of dehydroergosteryl acetate-maleic anhydride (I), a product m.  $205^\circ$  was obtained, while in others the I m.  $220-40^\circ$  (decompn.); on standing 14 days the product m.  $205^\circ$  had changed into the higher-melting form; this may be a case of crystal polymorphism; I is not changed by a further heating of 8 hrs. with maleic anhydride. I in  $CHCl_3$  gives a dibromide, m.  $245^\circ$  (decompn.),  $[\alpha]_D^{25} 68.6^\circ$  (21 mg. in 2 cc.  $CHCl_3$ ). Distn. of I at 0.0004 mm. and  $210-20^\circ$  gave unchanged I; at 0.1 mm. at  $240^\circ$  there results dehydroergosteryl acetate, m.  $146^\circ$ ,  $[\alpha]_D^{25} 203.7^\circ$ . The free acid from I m.  $170-5^\circ$  (decompn.),  $[\alpha]_D^{25} 67.5^\circ$ , and yields a di-Me ester, m.  $180^\circ$ . Catalytic reduction of I with  $Pd$  and  $H_2$  in  $Me_2CO$  gives a dihydro deriv. (II), m.  $216^\circ$ ,  $[\alpha]_D^{25} 81.6^\circ$  (27.7 mg. in 2 cc.  $CHCl_3$ ); the free HO acid,  $C_{28}H_{44}O_4$ , crystals with 0.5 mol.  $H_2O$ , m.  $180^\circ$  (decompn.),  $[\alpha]_D^{25} 96.5^\circ$  (19.7 mg. in 2 cc.  $CHCl_3$ ); di-Me ester is an oil, whose acetate m.  $163^\circ$ . Distn. of II at 0.0005 mm. and  $215-20^\circ$  gives 75% of 22-dihydrodehydroergosteryl acetate, m.  $128^\circ$ ,  $[\alpha]_D^{25} 219.8^\circ$  (23.2 mg. in 2 cc.  $CHCl_3$ ); reduction with  $Na$  and abs.  $EtOH$  gives tetrahydrodehydroergosterol, crystals with 1 mol.  $H_2O$ , m.  $132^\circ$ ,  $[\alpha]_D^{25} -12.5^\circ$  (22.4 mg. in 2 cc.  $CHCl_3$ ); it contains 2 double bonds; acetate, m.  $141^\circ$ ,  $[\alpha]_D^{25} -9.7^\circ$  (22.6 mg. in 2 cc.  $CHCl_3$ ); isomerization with  $HCl$  gave no definite product. Catalytic reduction of I with  $Pt$  and  $H_2$  in  $AcOH$  gives a tetrahydro deriv. of I, b.p.  $270^\circ$ , m.  $197^\circ$ ,  $[\alpha]_D^{25} 26.8^\circ$  (23.1 mg. in 2 cc.  $CHCl_3$ ); II gives the same product with possibly some hexahydro deriv.; the free HO acid, m.  $180^\circ$  (decompn.),  $[\alpha]_D^{25} 63^\circ$  (18.1 mg. in 2 cc.  $CHCl_3$ ); the di-Me acetate, m.  $135^\circ$ ,  $[\alpha]_D^{25} 46.2^\circ$  (20.8 mg. in 2 cc.  $CHCl_3$ ). Catalytic reduction of the tetrahydro deriv. in  $AcOH$  at  $70^\circ$  gives the hexahydro deriv., m.  $187^\circ$ , identical with tetrahydroergosteryl acetate-maleic anhydride. C. J. W.

22-Dihydroergosterol. A. Windaus and R. Langer. *Ann.* 508, 105-14(1933).—22-Dihydroergosteryl acetate-maleic anhydride, heated in portions of 1.5 g. 1 hr. in vacuo at  $220^\circ$ , gives the acetate (I), m.  $157-8^\circ$ ,  $[\alpha]_D^{25} -74.8^\circ$  (30.5 mg. in 2 cc.  $CHCl_3$ ), of 22-dihydroergosterol (II), m.  $152-3^\circ$ ,  $[\alpha]_D^{25} -109^\circ$  ( $CHCl_3$ ), which resembles ergosterol in its soly., its color reactions and its chem. behavior. I (3 g.) and 3 mg. eosin in 1 l.  $EtOH$ , treated with  $O_2$  in the light (500-watt lamp) for 96 hrs., give 1.2 g. of the peroxide, m.  $173^\circ$ ,  $[\alpha]_D^{25} 9.7^\circ$  (22.8 mg. in 2 cc.  $CHCl_3$ ); photochem. oxidation of II gives its peroxide, m.  $171^\circ$ ,  $[\alpha]_D^{25} 5.4^\circ$  ( $CHCl_3$ ); reduction with  $Zn$  and 10%  $EtOH-KOH$  gives an ergosteretriol, m.  $218^\circ$  (decompn.), and shows no rotation in  $C_6H_5N$ . I (0.9 g.) and 0.9 g. eosin in 170 cc.  $EtOH$  and 30 cc.  $C_6H_6$ , with  $O_2$  in the light for 72 hrs., give the diacetate, m.  $200^\circ$ ,  $[\alpha]_D^{25} -161^\circ$  (22 mg. in 2 cc.  $CHCl_3$ ), of 22-dihydroergosteretriol (III), m.  $197^\circ$  (decompn.),  $[\alpha]_D^{25} -204^\circ$ . Heating III at 0.1 mm. and  $180^\circ$  for 1 hr. gives dihydroneo-

ergosterol, m.  $150^\circ$ , whose acetate, m.  $118^\circ$ ,  $[\alpha]_D^{25} -3.1^\circ$  (35 mg. in 2 cc.  $CHCl_3$ ); this also results by catalytic reduction of neoergosteryl acetate. I, treated with  $HCl$  in  $CHCl_3$  at  $0^\circ$  for 2 hrs., gives a mixt. of isomers, from which dehydroergosteryl acetate, m.  $133^\circ$ , can be isolated. Catalytic reduction of I and hydrolysis give  $\alpha$ -ergosterol (IV); reduction of II with  $Na$  and  $PrOH$  gives a  $\gamma$ -ergosterol (V), m.  $145-6^\circ$ ; Ac deriv., m.  $157^\circ$ ,  $[\alpha]_D^{25} -5.3^\circ$  ( $CHCl_3$ ); benzoate (VI), m.  $179^\circ$ ; 3,5-dinitrobenzoate, yellow, m.  $209-10^\circ$  (that of IV, pale yellow, m.  $196-7^\circ$ ); V is unchanged on heating with maleic anhydride at  $135^\circ$ ; shaking with  $Pt$  or  $Pd$  and  $H$  gives IV, although no  $H$  absorption is observed. VI is isomerized by  $HCl$  in  $CHCl_3$  at  $0^\circ$  to  $\beta$ -ergosterol benzoate. C. J. West

Leucopterin, the wing pigment of common white butterflies. Heinrich Wieland, Hermann Metzger, Clemens Schöpf and Margarete Bülow. *Ann.* 507, 226-65(1933); cf. *C. A.* 21, 224.—Leucopterin (I), probably  $C_{18}H_{12}O_{11}N_{16}$  (39.1 g. crude product from 1164 g. wings, of which about 60% is lost in purification), does not react with  $CH_3N_3$  and is not affected by reducing agents, such as  $HI$ ,  $Na-Hg$  or  $Al-Hg$ , does not absorb  $O_2$  in alk. soln. but is oxidized by  $K_2Fe(CN)_6$  (7.7-7.8 mols. per mol. I); I gives the murexide reaction but the color is different from that with uric acid. I,  $Ac_2O$  and  $H_2SO_4$  give a tri-Ac deriv.,  $C_{18}H_{14}O_{10}N_{16}Ac_3$ ;  $Ac_2O$  alone or in  $C_6H_5N$  or  $BzCl$  in  $C_6H_5N$  or in alkali do not react with I. I,  $PCl_5$  and  $POCl_3$ , boiled 0.75 hr., give leucopteryl chloride,  $C_{18}H_{14}O_8N_{16}Cl_2$ , light yellow. I,  $NaNO_2$  and  $H_2SO_4$  give desimino-leucopterin,  $C_{18}H_{14}O_{10}N_{12}$  (II). I is isomerized by concd.  $H_2SO_4$  to isoleucopterin, a hexabasic acid, which yields a yellow acid Na salt. On heating 30 mg. I or II with 1 cc. concd.  $H_2SO_4$  2 hrs. at  $150^\circ$ , only traces of  $CO_2$  are eliminated and 20 mg. are recovered unchanged. I (1 mol) is hydrolyzed by concd.  $HCl$  at  $160-70^\circ$  to 3 mols.  $H_2N-CH_2CO_2H$  (III), 12 mols.  $NH_3$ , 9 mols.  $CO_2$  and 3 mols.  $CO$ ; under the same conditions uric acid gives 1 mol. III, 3 mols.  $NH_3$  and 3 mols.  $CO_2$ , while guanine gives 4 mols.  $NH_3$ , 2 mols.  $CO_2$  and 1 mol.  $CO$ . I in  $MeOH$ , brought into soln. by  $Cl$  gas and decompn. of the  $HCl$  salt with  $C_6H_5N$ , gives a triglycol hexa-Me ether (IV),  $C_{18}H_{18}O_{11}N_{16}(OMe)_6$ , darkens without melting at  $200^\circ$ ; crystn. of IV from  $H_2O$  gives the compd.  $C_{18}H_{17}O_{10}N_{16}(OH)_2(OMe)_4$ , darkens at  $180^\circ$ . Decompn. of the  $HCl$  salt of IV in aq.  $C_6H_5N$  gives the compd.  $C_{18}H_{19}O_{11}N_{16}(OH)_2(OMe)_4 \cdot 4H_2O \cdot 2C_6H_5N$ . IV and dil.  $HCl$  give the salt,  $C_{18}H_{19}O_{11}N_{16}(OH)_2(OMe)_4 \cdot 3HCl$ , which seps. with 1 or 8 mols.  $H_2O$ . The desimino compd. could not be isolated. I, shaken with  $Cl-H_2O$ , gives a triglycol (V),  $C_{18}H_{18}O_{11}N_{16}(OH)_6 \cdot 6H_2O$ , which becomes anhyd. at  $100^\circ$ , yellow; the tri-HCl salt has no definite decompn. point; concd.  $HNO_3$  gives a nitrate; the glycol does not give the murexide reaction; heating with 3 equiv. 0.1 N  $HCl$  at  $140-50^\circ$  gives 4.3-4.9 mols.  $CO_2$ , 3-3.4 mols.  $NH_4HC_2O_4$  and 1.27 mols. guanidine (VI) (acetate, m.  $224-6^\circ$ ). I and  $Cl_2$  in  $AcOH$ -2 N  $HCl$  give a diglycol (VII),  $C_{18}H_{21}O_{12}N_{16}(OH)_4 \cdot H_2O$  (tri-HCl salt); II similarly gives a compd.,  $C_{18}H_{20}O_{11}N_{16} \cdot 3HCl$ , hydrolysis of which by 0.1 N  $HCl$  at  $170^\circ$  does not give VI. I and Br give a compd.  $C_{18}H_{20}O_{11}N_{16}$ . IV is hydrolyzed by  $H_2O$  at  $65^\circ$  to  $CO$ ,  $MeOH$ , VI, an acid, probably  $H_2NCOCH(OMe) \cdot NHCOC_2H$  (Me ester, hydrolyzed by 2 N  $HCl$  to  $(CO_2)H$  and  $CHOCO_2H$ ) and a MeO-free compd.,  $C_{18}H_{22}O_{12}N_{16}$ ; the last 2 compds. are isolated by pptn. with  $Hg(OAc)_2$ .  $(CO_2)H$  is also formed by alk. hydrolysis of IV, V and VII. VII is hydrolyzed by aq.  $Ba(OH)_2$  to VI and by  $H_2O$  to a compd.  $C_{18}H_{21}O_{12}N_{16}$ , darkens at  $220^\circ$ . Soln. of I in  $Na_2CO_3$  and pptn. with  $HCl$  gives some anhydrous leucopterin,  $C_{18}H_{18}O_{10}N_{16}$ , which resembles I in its soly. and properties. The pigment obtained by extn. of the whole animals with aq.  $NH_3$  differs from I and is termed pseudoleucopterin, which does not give concordant analyses; concd.  $H_2SO_4$  gives an isomer of I;  $HNO_3$  gives desimino-pseudoleucopterin,  $C_{18}H_{18}O_{10}N_{12}$ . Xanthine and  $Cl_2$  in  $MeOH$  give  $NH_4Cl$  and Me 5-methoxyuramil-N(5)-carboxylate. Uric acid could not be isolated from the wings of *Pieridae* but it is readily isolable from the body

and excrement. Various structures are suggested for I.

C. J. West  
Occurrence of pterins in wasps and butterflies; leucopterins and xanthopterins. Clemens Schöpf and Erich Becker. *Ann.* 507, 266-96 (1933).—Soln. of xanthopterin (I), probably  $C_{11}H_{11}O_7N_3$ , in hot half-satd. (at  $20^\circ$ ) aq.  $Ba(OH)_2$  and cooling gives *Ba*  $\beta$ -xanthopterin (II),  $C_{11}H_{11}O_8N_3Ba$ , which is hydrolyzed by crystn. from  $H_2O$  to the salts  $(C_{11}H_{11}O_8N_3)_2Ba$  and  $(C_{11}H_{11}O_8N_3)_2Ba_2$ . The previously described *Ba* salt is termed the  $\alpha$ -isomer (C. A. 20, 902). The absorption spectrum of II in  $AcOH$  is given for 4 samples from *Gon. rhamni*, *Vespa crabro*, *V. germanica* and *V. vulgaris*. A concd. soln. of II in 2 N  $HCl$ , treated with concd. aq.  $AcONa$ , gives amorphous I; in more dil. solns. products of different cryst. forms are obtained, designated *xanthopterin hydrates a* and *b*, probably  $C_{11}H_{11}O_{10}N_3$ . I does not contain NMe groups; with 2,5- $Cl_2C_6H_3N_2X$  it gives the compd.  $C_{11}H_{11}O_7N_3Cl_2$  (xanthine gives the compd.  $C_{11}H_9O_7N_3Cl_2$ ); hydrolysis with aq.  $Ba(OH)_2$  gives 1 mol.  $NH_3$ . (With Erwin Bumm and Hans Stober.) *Gonepteryx rhamni* gives, in addn. to I, a mixt. of leucopterins *a* (III) and *b* (IV); the white female contains III but no I. III and IV are also isolated from the aurora butterfly (*E. cordamines*). III gives a  $Na_2$  salt, while IV forms a  $Na$  salt; IV may arise from III by the action of the  $HCl$  used in purification and may be identical with isoleucopterins. Details are given of the isolation of I, III, IV and a new pterin from *Vespa crabro*, *V. germanica* and *V. vulgaris*.

C. J. West

Conn. hydrogenation processes [hydrogenation of CO to alcs.] (Bosch) 13. Slow combustion of  $C_2H_4$  (Bone, et al.) 2. Detn. of the valency angles of the O and S atoms and the methylene and sulfoxo groups (Hampson, et al.) 2. Fixation of  $H_2SO_4$  by some aromatic monoarid-monoalcs. (Duquénnois) 6: Orientation of palmitic acid on mineral surfaces (Berl, Schmitt) 3. Inhibition of cathepsin and activation of papain by  $\alpha$ -thiocarboxylic acids (Maschmann, Helmert) 11A. Effect of catalysts on the reaction between olefins and  $H_2S$  (Duffey, et al.) 2. Catalytic oxidation of acenaphthene in soln. (Duckert) 2.  $CH_2O$  condensations with phenol and its homologs (Morgan, Megson) 26. Oxidase-like oxidizing action of metallic complex salts. IX. Action of some metallic complex salts on the oxidation of diphenylaminesulfonic acid and *N*-methyl-*p*-aminophenol (Shibata, Yamasaki) 2. Biol. transformation of CO to  $CH_4$  (U. S. pat. 1,940,941) 16.

Plimmer, R. H. A.: Organic and Bio-Chemistry. 5th ed. of "Practical Org. and Bio-Chemistry." New York: Longmans, Green & Co. 624 pp. \$7.50.

Taylor, F. S.: A Short Organic Chemistry. London: W. Heinemann, Ltd. 378 pp. 5s. Reviewed in *Chemistry & Industry* 1933, 853.

Hydrocarbons. I. G. Farbenind. A.-G. Ger. 586,800, Oct. 26, 1933 (Cl. 12o. 1.04). Polynuclear aromatic hydrocarbons of the  $Ph_2$  type are purified by treatment with a chem. agent with a condensing action, e. g., concd.  $H_2SO_4$  or  $H_3PO_4$ . Examples are given.

Liquid hydrocarbons from ethylene. Franz Eisenstecken. Ger. 588,158, Nov. 14, 1933 (Cl. 12o. 1.03). Liquid hydrocarbons are obtained by passing  $C_2H_4$  or gases contg. it at  $450-750^\circ$  over a catalyst, e. g., Cu, after addn. of about 0.1% of  $SO_2$ . The presence of  $SO_2$  prevents the formation of C. The gases are cooled after contact with the catalyst. App. is described.

Apparatus for making liquid hydrocarbons by thermal treatment of methane. C. Otto & Co. G. m. b. H. Ger. 587,494, Nov. 4, 1933. Addn. to 505,353 (C. A. 24, 5764).

Producing hydrocarbons of higher carbon content from aliphatic gaseous hydrocarbons. Franz Fischer and Helmut Pichler. U. S. 1,940,209, Dec. 19. Hydrocarbon material such as coke-oven gas or  $CH_4$  is burned in the presence of O in insufficient vol. for complete com-

bustion by subjecting the material to a temp. of not less than  $1000^\circ$  for a period of less than 0.01 sec. so that any subsequent action of the resulting steam upon the hydrocarbons of high C content produced is avoided. The product contains  $C_2H_2$ .

Oxidizing hydrocarbons to produce alcohols, aldehydes and acids. Gustav Egloff (to Universal Oil Products Co.). U. S. 1,939,255, Dec. 12.  $Et_4Pb$  is used to control and limit the oxidation in effecting reactions such as the oxidation of gasoline or fuel-oil constituents by heating in the presence of air to form alcs., aldehydes and acids.

Partial oxidation of hydrocarbons. Joseph H. James (to Clarence P. Byrnes). U. S. 1,941,010, Dec. 26. A mixt. of hydrocarbon material such as natural gas and O in gaseous phase is passed through a reaction zone, an oxidized hydrocarbon product such as formaldehyde is condensed and removed from the resulting gas stream, fresh hydrocarbon and O are added and the new mixt. is passed through a reaction zone. App. is described. Catalysts such as Mo oxides may be used.

Oxidation products of hydrocarbons. Wilhelm Dietrich (to I. G. Farbenind. A.-G.). U. S. 1,940,400, Dec. 19. In working up products from the liquid-phase oxidation of difficultly volatile hydrocarbons such as gas oil or paraffin by use of anhyd. gaseous oxidizing agents contg. free O, the oxidation products are heated to above  $150^\circ$  (suitably  $250^\circ$ ) while avoiding distn., in order to improve the recovery of fatty acids. Cf. C. A. 27, 4813.

Oxygenated organic compounds from carbon monoxide and hydrogen. I. G. Farbenind. A.-G. (Mathias Pier and Johannes Kleine, inventors). Ger. 587,818, Nov. 11, 1933 (Cl. 12o. 5.01). Addn. to 490,248 (C. A. 24, 2137), 548,434 (C. A. 26, 3513), 559,892 (C. A. 27, 730), 568,627 (C. A. 27, 2691) and 580,695 (C. A. 28, 1721). The cold or not very hot parts of the app. which come into contact with CO may be made of Fe, Ni or Co, provided that the gases used are dry.

Organic bases. I. G. Farbenind. A.-G. (Robert Griessbach and Siegmund Münch, inventors). Ger. 582,845, Aug. 23, 1933 (Cl. 12q. 14.03). Org. bases are sepd. from creosote oils by treating the latter with less than 10 times the theoretical amt. of  $H_3PO_4$  or acid phosphate solns. to combine with the bases. The ext. is washed and refined. Thus, lignite creosote oil contg. 2.3% pyridine is treated with 70%  $H_3PO_4$  to remove the pyridine.

Organic bases. I. G. Farbenind. A.-G. (Eduard Dörr and Albert Möhring, inventors). Ger. 588,044, Nov. 11, 1933 (Cl. 12p. 6). Mixts. of volatile org. bases are obtained by heating sucrose or materials contg. it, e. g., molasses or beet juice, with aq.  $NH_3$  or its derivs. or their salts to a temp. above  $100^\circ$  under pressure, e. g., to  $150-200^\circ$  under 20-50 atm. pressure. The yield may be raised by adding to the mixt. a sulfite, an acid sulfate, animal C or a heavy metal salt, e. g.,  $CuSO_4$ . The bases, which include pyrazine derivs., may be sepd. by distn. after addn. of alkali. Examples are given.

Sulfonation process. Soc. pour l'ind. chim. à Bâle. Fr. 754,361, Nov. 6, 1933. See Swiss 161,837 (C. A. 28, 487\*).

Sulfating olefins. Benjamin T. Brooks (to Standard Alcohol Co.). U. S. 1,940,073, Dec. 19. An initial quantity of aq.  $H_2SO_4$  is reacted with a liquid olefin such as  $C_2H_4$ ,  $C_3H_6$  or  $C_4H_8$  to effect sulfation of the olefin and the latter is added gradually in small amount to the  $H_2SO_4$ . App. is described.

Alcohol. Usines de Melle (Soc. anon.) and Henry Martin Guinot. Fr. 754,877, Nov. 16, 1933. Alc. is dehydrated in a continuous manner by mixing it with a suitable amt. of a liquid insol. in water, treating the mixt. with dehydrating agents generally used for drying org. liquids, finishing the dehydration by azeotropic distn. in a distg. column, the addnl. liquid, e. g., a petroleum fraction b. between  $80^\circ$  and  $85^\circ$ , playing the double role of diluent in the 1st stage and entraining liquid in the 2nd.

Alcohols. Imperial Chemical Industries Ltd. Fr. 755,489, Nov. 25, 1933. Alcs. are made by heating liquid or solid waxes with dry KOH or dry KOH and NaOH, and sepg. the alc. by distn.

**Alcohols.** H. Th. Böhme A.-G. (Hermann Prückner, inventor). Ger. 588,067, Oct. 18, 1933 (Cl. 12o. 5.02). Addn. to 574,834 (C. A. 27, 4539). The method of 574,834 for producing alcs. by treating Ca salts of fatty acids with at least 2 C atoms, with  $(\text{HCO}_2)_2\text{Ca}$  in the presence of a solvent and a catalyst, is modified by dispensing with the solvent, the formed alc. serving this purpose. Thus, Ca salt of cacao fatty acid is treated with  $(\text{HCO}_2)_2\text{Ca}$  in the presence of a Cu-Cr catalyst to give the corresponding alc. Cf. C. A. 27, 4813.

**Alcohols from waxes.** Imperial Chemical Industries Ltd., Wilfred A. Sexton and Denis Ward. Brit. 398,807, Sept. 18, 1933. Solid or liquid waxes, e. g., spermaceti, beeswax, Chinese wax, wool fat, carnauba wax, sperm oil and arctic sperm oil are sapon. by heating with dry KOH or NaOH or preferably with a mixt. thereof in equimol. proportions. Alcs. are sepd. from the sapon. mixt. by distn. in superheated steam at atm. or reduced pressure.

**Alcohols from waxes.** Deutsche Hydrierwerke A.-G. Ger. 588,201, Nov., 14 1933 (Cl. 12o. 5.02). Natural waxes are dissolved in an org. solvent and reduced with nascent H at a temp. above  $100^\circ$ . Free acids in the wax may first be esterified, if desired. Examples are given.

**Unsaturated alcohols.** I. G. Farbenind. A.-G. Brit. 398,982, Sept. 28, 1933. Unsatd., especially aliphatic, aldehydes and ketones contg. more than 15 C atoms are converted into unsatd. alcs. by catalytic hydrogenation under mild conditions. When using highly efficient catalysts, e. g., Pt, Pd, Co, Ni, their activity is reduced by poisoning with org. S compds. or by diln. with weaker catalysts. Preferred catalysts are Cu, Zn and Cd and their compds., e. g., chromates, chromites, manganates, manganites, molybdates, tungstates and uranates. Examples describe the hydrogenation of heptadecenyl methyl ketone (I) with Cu-Al and basic Zn chromate catalysts, oleic aldehyde with a Cu catalyst and I or diheptadecenyl ketone with a  $\text{CuCrO}_4$  catalyst.

**Amino alcohols.** Julius A. Brachfeld and Albert Smola. Austrian 135,351, Nov. 10, 1933 (Cl. 12e). Aliphatic amino alcs. are obtained by hydrating unsatd. aliphatic amines with the aid of mineral acids. Thus,  $\text{CH}_2=\text{CHCH}_2\text{NH}_2$  (I) may be treated at  $80\text{--}100^\circ$  with concd.  $\text{H}_2\text{SO}_4$ , and the resulting sulfuric ester ( $\text{MeCH}(\text{OSO}_3\text{H})\text{CH}_2\text{NH}_2$ ) boiled with water to produce  $\text{MeCH}(\text{OH})\text{CH}_2\text{NH}_2$  (II). Other concd. mineral acids, excepting H halides, may be used instead of  $\text{H}_2\text{SO}_4$ . II may also be prepd. directly by heating I under pressure to  $150\text{--}220^\circ$  with dil. mineral acids, including dil. H halides. Other unsatd. aliphatic amines, e. g., 1-amino-2-butene, react similarly to I. The amines may be prepd. *in situ* from the corresponding esters of isothiocyanic acid. Details are given. Cf. C. A. 27, 4813.

**Amino alcohols.** Knoll A.-G. chem. Fab., Gustav Hildebrandt and Wilfrid Klavehn. Ger. 585,667, Oct. 6, 1933 (Cl. 12g. 32.21). Addn. to 548,450 (C. A. 26, 3623). 1-Aminopropanols are prepd. from 1-keto alcs. of the formula  $\text{RCH}(\text{OH})\text{COMe}$ , where R is an alkyl, aryl or heterocyclic radical, by condensing the keto alcs. with amines, and simultaneously or subsequently reducing the products. Thus, 1-1-phenylpropan-1-ol-2-one, treated in  $\text{Et}_2\text{O}$  soln., without heating, first with  $\text{EtNH}_2$ , and then with activated Al and MeOH, yields 1-1-phenyl-2-ethylaminopropan-1-ol (HCl salt, m.  $220^\circ$ ). Examples are given also of the prepn. of 1-1-phenyl-2-nonylamino-propan-1-ol, b.  $193\text{--}5^\circ$  (HCl salt, m.  $219\text{--}20^\circ$ ), 1-1-p-methoxyphenyl-2-methylaminopropan-1-ol (HCl salt, m.  $247^\circ$ ), 1-1-(3',4'-methylenedioxyphenyl)-2-methylaminopropan-1-ol (HCl salt, m.  $225^\circ$ ) and 1-1-furyl-2-methylaminopropan-1-ol (HCl salt, m.  $130^\circ$ ).

**Optically active amino alcohols.** Helmut Legerlotz. Ger. 585,164, Sept. 29, 1933. Optically active amino alcs. of the formula  $\text{R}_1\text{CHOHCH(R}_2\text{)NHR}_3$ , where  $\text{R}_1$  is a phenyl or monohydroxyphenyl group,  $\text{R}_2$  is H or an alkyl group, and  $\text{R}_3$  is an alkyl group, are inverted by acetylation followed by sapon. Examples are given.

**Polymerized polyhydroxy alcohols and their esters**

**derivatives.** Karl Noack. Brit. 398,474, Sept. 6, 1933. Highly polymerized aliphatic alcs. contg. 3 or more OH groups, free from di- and tri-polymers, are made by heating the alc. at  $250\text{--}275^\circ$  in the presence of heavy metal salts as condensing agents, e. g.,  $\text{HgCl}_2$ ,  $\text{HgSO}_4$ ,  $\text{CuCl}$ ,  $\text{FeCl}_3$ , removing the  $\text{H}_2\text{O}$  formed by a stream of inert gas, e. g.,  $\text{CO}_2$ , N, and further heating to form a highly viscous product. In an example glycerol is heated at  $250^\circ$  with CuCl in a stream of inert gas, the catalyst is decompd. by treating the reaction mass with  $\text{H}_2\text{S}$  and the resulting ppt. removed. The glycerol may be replaced by chlorinated glycerol or by a mixt. of glycerol and a higher alc. contg. more than 3 OH groups.

**Apparatus for vaporizing and catalytically oxidizing alcohols,** the evaporation being produced independently of the oxidation by an electric heating resistance. Ch. Mildé Fils et Cie. Brit. 398,736, Sept. 21, 1933.

**Derivatives such as alcohols and esters from olefins.** Hyym E. Buc (to Standard Oil Development Co.). U. S. 1,939,384, Dec. 12. Olefinic material such as that from oil cracking is subjected to a preliminary esterification with a halogen-substituted aliphatic acid such as monochloroacetic acid followed by a treatment with water or an aliphatic acid of lower b. p. than the halo-substituted aliphatic acid used and adapted to regenerate the latter while also producing alcs. and esters which are finally sepd. App. is described.

**Aldehydes.** Friedrich W. Guthke (to General Aniline Works). U. S. 1,939,006, Dec. 12. In the production of an aldehyde such as benzaldehyde or p-chlorobenzaldehyde by the reaction of CO under superatm. pressure on an aromatic hydrocarbon such as  $\text{C}_6\text{H}_6$  or a halogen deriv. such as PhCl, the reaction is carried out in the presence of a catalyst comprising anhyd.  $\text{AlCl}_3$  together with a small proportion of Ti chloride. Cf. C. A. 27, 3944.

**Aromatic hydroxy aldehydes.** Franz Elger (to Hoffmann-La Roche Inc.). U. S. 1,939,491, Dec. 12. See Brit. 392,399 (C. A. 27, 5337).

**Ketones.** Walthey Dilthey. Ger. 575,857, Nov. 16, 1933 (Cl. 12o. 10). Deep colored ketones are prepd. by condensing aromatic o-diketones, their derivs. or reduction products with ketones or derivs. contg. a reactive  $\text{CH}_3$  group next to the CO group. The condensation may take place in acid or alk. mediums, with or without solvents. Thus, a boiling alc. soln. of benzil and dibenzyl ketone is given an addn. of alc. KOH to give a quantitative yield of the ketone *tetraphenylpentadione*, m.  $216\text{--}8^\circ$ . Other examples are given. The products are used as *starting materials for dye manuf.*

**Ketones.** Schering-Kahlbaum A.-G. (Erwin Schwenk and Erich Borgwardt, inventors). Ger. 584,373, Sept. 19, 1933 (Cl. 12o. 25). Addn. to 582,545 (C. A. 28, 779<sup>a</sup>). The method of 582,545 for prepg. ketones of the cycloolefin series by the action of  $\text{SeO}_2$  or  $\text{H}_2\text{SeO}_3$  on cycloolefins is modified by carrying out the reaction in the presence of solvents and, if necessary, under pressure. Thus, a soln. of 1-menthene in  $\text{EtOH}$  is treated with an alc. soln. of  $\text{SeO}_2$  to give an 85% yield of  $\text{C}_{10}\text{H}_{18}\text{O}$ . Other examples are given.

**Recovering ketones such as acetone from gaseous mixtures.** Donald F. Othmer (to Eastman Kodak Co.). U. S. 1,939,222, Dec. 12.  $\beta,\beta'$ -Dichloroethyl ether is used as an absorbent for the ketone.

**Ketones from shale-distillation products.** Johannes Döderlein. Ger. 587,784, Nov. 7, 1933 (Cl. 12o. 10). Addn. to 571,226 (C. A. 27, 9800). The distillate obtained in the process of Ger. 571,226 is treated with  $\text{NaHSO}_3$  soln. to ext. the ketones, which are then recovered by boiling the soln. without addn. of acid or alkali.

**Esters.** Edward H. Strange and Thomas Kane. Brit. 398,627, Sept. 8, 1933. Esters are made by the reaction of a fatty acid, having 5 or less C atoms, with an olefin, having 7 or less C atoms, in presence of a catalyst at above the b. p. of the ester under the reaction conditions and continuously withdrawing the ester from the reaction space as vapor. Suitable catalysts are chlorides, bromides, phosphates and sulfates of Zn, Al, Hg, Cu, Cd, Bi and

Sb, relatively non-volatile inorg. acids, e. g.,  $H_3PO_4$ ,  $H_2SO_4$ , and the metal acid salts and alkyl and aryl derivs. of these acids, e. g.,  $NaHSO_4$ , ethylsulfuric acid and benzenesulfonic acid. Among examples 500 parts adsorbent C are treated with 50 parts 75%  $H_3PO_4$  and heated to 150–250° for 2 hrs. in a current of air and a mixt. of  $AcOH$  vapor and  $C_2H_6$  is passed over this catalyst at 110°.

**Esters.** Invention Ges. für Verwaltung und Verwertung chemisch-technischer Patente G. m. b. H. Ger. 589,431, Dec. 7, 1933 (Cl. 12o. 11). See Fr. 741,293 (C. A. 27, 2694).

**Alkyl esters.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 755,155, Nov. 21, 1933. In making alkyl esters from olefins and strong acids, such as  $H_2SO_4$ ,  $H_3PO_4$  or certain sulfonic acids, the components of the reaction are caused to react in small amts., either by portions or continually as rapidly as possible and with cooling, and the reaction products are eliminated from the reaction zone immediately after they are formed. Thus, the components are passed through a rapidly rotating app. in the liquid state or are intimately mixed by an ejection action. Cf. C. A. 27, 997.

**Mixed neutral carboxylic acid esters of aliphatic alcohols and phenols.** Lucas P. Kyrides (to Monsanto Chemical Co.). U. S. 1,939,217, Dec. 12. Various examples and details are given of the production of esters such as ethyl phenyl phthalate,  $b_p$  195°, methyl phenyl phthalate,  $b_p$  191°, ethyl and methyl tolyl phthalates, ethyl phenyl succinate and methyl phenyl maleate, which are suitable for use as high-boiling solvents or plasticizers with cellulose esters, etc. Similar esters comprising butyl and benzyl, chlorophenol or chloronaphthol radicals, etc., also are mentioned and general claim is made to all mixed alkyl phenyl esters of dicarboxylic acids as being new products.

**Vinyl esters.** I. G. Farbenind. A.-G. (Walter Reppe, inventor). Ger. 588,352, Nov. 15, 1933 (Cl. 12o. 19.03). Vinyl esters of fatty acids contg. more than 4 C atoms are prepd. by treating the acids in the liquid phase with  $C_2H_2$  in the presence of an org. salt of Zn or Cd. The reaction is preferably effected at 160–180° under pressure. Dild.  $C_2H_2$  may be used, and a solvent may be present. The proportion of Zn or Cd compd. should be at least 2%, calcd. as oxide on the fatty acid. The esters can be polymerized by standard methods to yield waxy products or viscous drying or nondrying oils. Examples are given of the prepn. of vinyl valerate,  $b_p$  134°, caproate,  $b_p$  165–7°, caprylate,  $b_p$  94°, laurate,  $b_p$  123°, myristate,  $b_p$  150°, palmitate,  $b_p$  165°, stearate,  $b_p$  167° and oleate,  $b_p$  173°. Cf. C. A. 27, 4243.

**Vinyl ethers.** Walter Reppe (to I. G. Farbenind. A.-G.). U. S. 1,941,108, Dec. 26. For producing a vinyl ether such as vinyl ethyl ether, a vinyl halide contg. at least one H atom connected with the C atom of the double linkage which is free from halogen, such as vinyl chloride is treated with an alcoholate such as  $NaOEt$  in the presence of an org. diluent such as  $EtOH$  (suitably at a temp. of about 100°). Cf. C. A. 28, 1058°.

**Amides.** Chemische Fabrik von Heyden A.-G. (Curt Philipp, inventor). Ger. 585,740, Oct. 7, 1933. Amides of benzylated mono- or dihydroxyacetic acid are prepd. by treating esters or haloides of the acids with  $NH_3$  or primary or secondary amines. Thus, the Et ester of benzylglyoxyacetic acid is treated with a concd. aq. soln. of  $NH_3$  to give a 90% yield of *benzylglyoxylacetamide*, m. 95°. The prepn. of *dibenzylglyoxylacetamide*, m. 91°, and *N-methylphenyldibenzylglyoxylacetamide*, is described.

**Phenols.** Chemische Fabrik von Heyden A.-G. (Curt Rühl, Kurt Buchheim and Karl W. Rittler, inventors). Ger. 586,046, Oct. 25, 1933 (Cl. 12q. 14.02). See Fr. 751,158 (C. A. 28, 1049°).

**Purifying phenols.** Clyde O. Henke (to E. I. du Pont de Nemours & Co.). U. S. 1,939,591, Dec. 12.  $H_2SO_4$  is used for treating phenols such as those from coal tar, to eliminate catalyst poisons such as would interfere with subsequent catalytic hydrogenation of the material.

**Methylamines.** Henry Dreyfus. Brit. 398,502, Sept. 11, 1933. Methylamines are produced by hydrogenating aqueous mixts. comprising  $HCN$  in the presence of cata-

lysts consisting of cyanides of hydrogenating metals, e. g., Ni, Cu and Zn, with or without the free metals and with or without alkali or alk. earth cyanides. The catalysts may be supported on carriers, e. g., pumice, Carborundum, kieselguhr. In 398,503, Sept. 11, 1933, solns. or suspensions of cyanides are treated with H in the presence of a hydrogenating catalyst, e. g., a colloidal dispersion of Ni, Cu, Zn, Fe, Co, Sn or Ag. Suitable cyanides are alkali and alk. earth cyanides,  $K_4Fe(CN)_6$  and cyanides of the hydrogenating metals. In 398,504, Sept. 11, 1933, a gaseous mixt. comprising H and  $HCN$  is treated with a catalyst consisting of or comprising the above metals, with or without 1 or more alkali or alk. earth cyanides. Examples are given of the 3 processes.

**Glycidic acid amides.** Schering-Kahlbaum A.-G. (Otto von Schickh, inventor). Ger. 586,645, Oct. 25, 1933 (Cl. 12o. 16). Ketones or aldehydes are treated with low mol.  $\alpha$ -monohalogen fatty acid amides in the presence of solvents or suspension agents, and alk. condensing agents. Thus,  $CH_3ClCONH_2$  is treated with acetone in the presence of Na to give an 80% yield of  *$\beta$ -dimethylglycidic acid amide*, m. 121°. The prepn. of the following is also described:  *$\beta$ -dimethylglycidic acid diethylamide*,  $b_p$  122–4°, *ethylphenylglycidic acid amide*, m. 119–21°,  *$\alpha$ -methyl- $\beta$ -phenylglycidic acid methylamide*, m. 116°, and *citraalglycidic acid amide*, m. 118.5°.

**Dialkylamides of polyalkoxy benzoic acids.** Marcus Guggenheim (to Hoffmann-La Roche Inc.). U. S. 1,939,496, Dec. 12. The derivs. of di- or tri-methoxy- and -ethoxybenzoic acids are prepd. by transforming these acids into dimethyl- and diethyl-amides, resp., as by treating halides of the acids with dialkylamines. Veratric acid diethylamide,  $b_p$  205°. Veratric acid dimethylamide,  $b_p$  203°, forms crystals, m. 102–3°. 3,4,5-Trimethoxybenzoic acid dimethylamide,  $b_p$  218°, forms crystals, m. 74°. The corresponding diethylamide  $b_p$  220–6° and m. 54°. 2,3-Dimethoxybenzoic acid dimethylamide,  $b_p$  172°. 3-Methoxy-4,5-diethoxybenzoic acid diethylamide,  $b_p$  211–12°. 3,5-Dimethoxy-4-ethoxybenzoic acid diethylamide,  $b_p$  213°. Prepn. of these compds. is described.

**Hydroxybenzocarbazoles.** I. G. Farbenind. A.-G. (Erich Koehler and Otto Goll, inventors). Ger. 586,804 Oct. 26, 1933 (Cl. 12p. 2). The 2-hydroxy derivs. are prepd. from benzocarbazoles contg. a replaceable group in the 2-position. Thus, Na 5,6-benzocarbazole-2-sulfonate is mixed with powd. KOH and fused to give 2-hydroxy-5,6-benzocarbazole, m. 195°. The prepn. of 2-hydroxy-7,8-benzocarbazole, m. 241°, is also described.

**Arylisothiazolones.** I. G. Farbenind. A.-G. Brit. 398,947, Sept. 28, 1933. Ger. 585,333, Oct. 2, 1933. See Fr. 748,516 (C. A. 27, 5339°).

**Phenol derivatives.** Hyym E. Buc (to Standard Oil Development Co.). Brit. 398,218, Sept. 7, 1933. Alkylphenols, useful as *antiseptics* and *germicides*, are prepd. by the interaction of an unsulfonated phenol with an aliphatic or cyclic olefin (other than  $C_2H_4$ ) at below 70° in the presence of  $H_2SO_4$  of at least 90% strength. The *sec*- or *tert*-alkylphenol may be isolated, in admixt. with the arylalkyl ethers also formed, by dildn. with  $H_2O$  and sepn. of the upper layer but in some cases an intermediate hydrolysis is necessary by refluxing with  $H_2O$  or distg. with superheated steam. In examples a mixt. of hexylcresyl ethers and *sec*-hexylcresols is obtained from com. cresol and 2-hexene and a product comprising *sec*-hexylresorcinols from resorcinol and 2-hexene.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. (Karl Zahn and Heinrich Koch, inventors). Ger. 586,880, Oct. 27, 1933 (Cl. 12q. 37). New derivs. are prepd. by condensing mono- or poly(aminoarylamino)anthraquinones, which may also have other substituents in the anthraquinone and arylamino residues, with acyl acetic esters, aryl-bis-acetic esters or hydroxyarylcboxylic acids. Thus, 1,4-di(*p*-aminoanilino)anthraquinone is condensed with acetoacetic ester to give the diacetoacetyl deriv., m. 203–4°. Other examples are given.

**Anthraquinone derivatives.** Compagnie nationale de matières colorantes et manufactures de produits chimiques

du nord réunies établissements Kuhlmann. Ger. 586,515, Oct. 21, 1933 (Cl. 12p. 37). See Fr. 750,112 (C. A. 28, 487<sup>2</sup>).

**Anthraquinone derivatives.** Soc. pour l'ind. chim. à Bâle. Ger. 589,074, Dec. 1, 1933 (Cl. 12q. 37). Anthraquinone- $\beta$ -sulfonic acids, substituted by OH, NH<sub>2</sub>, alkyl and (or) arylamino groups, are desulfonated by treatment in aq. alk. soln. with the stoichiometric amt. of a reducing agent in the absence of air. The mixt. is kept at about 0° until the formation of leuco compd. is complete, and is then warmed to decomp. the leuco compd. Thus, 1-hydroxy-4-aminoanthraquinone-2-sulfonic acid, treated in aq. NaOH soln. with an equimol. amt. of Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> in the absence of air, first at 0 to -5° and then at 40°, yields 1-hydroxy-4-aminoanthraquinone. Other examples are given.

**Barbituric acid derivatives.** Chem. Fab. von Heyden A.-G. (Curt Rühl and Rudolf Gebauer, inventors). Ger. 589,146, Dec. 4, 1933 (Cl. 12p. 7.01). An alkali salt of ethylbarbituric acid is condensed with a *p*-nitrobenzyl halide to yield *p*-nitrobenzylethylbarbituric acid, m. 285-7°. This is reduced with SnCl<sub>2</sub> and HCl to the corresponding amine, m. 218°, and the latter is diazotized and then reduced first with Na<sub>2</sub>SO<sub>3</sub> and HCl and then with Zn and AcOH, this yielding the Zn compd. of *p*-hydrazinobenzylethylbarbituric acid. The latter is finally condensed with acetoacetic ester to produce the corresponding pyrazolone deriv., m. 252°. The *N*-methyl deriv., m. 300-5°, of the pyrazolone deriv. has also been prepd. The pyrazolone derivs. are of therapeutic value.

**Derivative of dihydrobenzocarbazole.** I. G. Farbenind. A.-G. (Otto Goll and Heinrich Morschel, inventors). Ger. 586,803, Oct. 26, 1933 (Cl. 12p. 2). The deriv. 2-hydroxy-5,6-dihydro-7,8-benzocarbazole, m. 183°, is prepd. from derivs. of 5,6-dihydro-7,8-benzocarbazole contg. a replaceable group in the 2-position. Examples are given.

**Pyrene derivatives.** I. G. Farbenind. A.-G. (Erwin Kramer, inventor). Ger. 589,145, Dec. 2, 1933 (Cl. 12a. 15). Pyrenoyl-*o*-benzoic acid, m. 225-6°, of the formula *o*-HO.CC<sub>6</sub>H<sub>4</sub>.COP, where P is the pyrene residue, is prepd. by treating pyrene with phthalic anhydride at a temp. not exceeding 80-100° in the presence of a halide of Al and an org. solvent or diluent. Pyrenoylhalo-*o*-benzoic acids are prepd. similarly from pyrene and halo-phthalic anhydrides. An example is given of the prepn. of pyrenoyl-3,6-dichloro-2-benzoic acid, m. 268-9°.

**Pyridine derivatives.** Chemische Fabrik von Heyden A.-G. (Hans Maier-Bode, inventor). Ger. 586,879, Oct. 27, 1933 (Cl. 12p. 1.01). Pyridine derivs. contg. basic groups are prepd. by treating 3- or 5-halopyridine, which may contain other substituents also, with NH<sub>3</sub> or NH<sub>4</sub> derivs. in the presence of catalysts. Thus, 3-bromopyridine is treated with a concd. aq. soln. of NH<sub>3</sub> in the presence of CuSO<sub>4</sub> to give a 75% yield of 3-aminopyridine, m. 64°. The prepn. of methylphenyl(pyridyl-3)amine, m. 245-50°, and *p*-dimethylaminophenyl(pyridyl-3)amine, m. 200-20°, is also described.

**Polyaminoarsenostibionic derivatives.** I. G. Farbenind. A.-G. Fr. 755,514, Nov. 25, 1933. Comps. giving neutral solns. are obtained by causing alkylene oxides and CH<sub>3</sub>O-bisulfite or CH<sub>3</sub>O-sulfoxylate to react on aminoarylarsoenostibionic compds. contg. at least 2 NH<sub>2</sub> groups. Examples are given of the prepn. of 4-hydroxy-3-dihydroxypropylamino-4'-hydroxy-3'-formaldehyde-bisulfiteamino- and the bisulfite-formaldehyde compd. of 4-hydroxy-3-amino-4'-carbmino-3'-dihydroxypropylamino-arsenostibiobenzene.

**Diazo compound.** I. G. Farbenind. A.-G. (Karl Schnitzspahn and Rudolf Jung, inventors). Ger. 587,644, Nov. 7, 1933 (Cl. 12q. 10). Addn. to 586,354 (C. A. 28, 780<sup>2</sup>). The diazo compd. of *m*-aminoazotoluene is pptd. from soln. as diazonium acid sulfate and dried. A stable product is obtained.

***N*-Sulfoethyl compounds of arylamino sulfonic acids.** I. G. Farbenind. A.-G. (Hans Grotowsky and Wilhelm Mühl, inventors). Ger. 586,973, Oct. 28, 1933 (Cl. 12q. 6.03). Primary or secondary arylamines which

1 have a HSO<sub>3</sub> group, are treated with C<sub>2</sub>H<sub>5</sub>ClHSO<sub>3</sub> in the presence of an acid-binding agent. Thus, monobenzyl-aniline-3'-sulfonic acid is treated with C<sub>2</sub>H<sub>5</sub>ClNaSO<sub>3</sub> to give the Na salt of *N*-*w*-sulfoethylbenzylaniline-3'-sulfonic acid. The prepn. of the di-Na salt of *disulfoethyl-m-toluidine* and the di Na salt of *N*-*w*-sulfoethyl-aniline-2-sulfonic acid is also described.

**Vinyl and polyvinyl compounds.** Henry Dreyfus, Brit. 398,173, Sept. 1, 1933. Divided on 385,978 (C. A. 27, 4247<sup>2</sup>). Vinyl compds., contg. hydrophile groups, *e. g.*, OH, COOH, HSO<sub>3</sub>, NH<sub>2</sub> or other acidic or basic groups, which render the compds. more readily sol. or dispersible in aq. liquids, are made by reaction of a vinyl halide with a compd. contg. a replaceable H atom and at least 1 hydrophile group. The replaceable H may be present in a OH, COOH or NH<sub>2</sub> group. The products may be polymerized, alone or in admixt. with each other or other vinyl compds., by heat and (or) light in the presence or absence of diluents and (or) polymerization catalysts, *e. g.*, Bz peroxide. In examples (1) vinyl chloride is heated to 80-100° in an autoclave with Na glycol to produce glycol monovinyl ether; the product may be polymerized by warming under a reflux condenser with Bz peroxide and under the radiation from a quartz Hg vapor lamp; the polymerized product may be dissolved in H<sub>2</sub>O and used directly as a size and (2) a mixt. of mono-K succinate, vinyl chloride and PhMe is heated in an autoclave to 100-130° to yield vinyl succinate ester. The vinyl chloride in both examples may be replaced by  $\beta$ -chloropropylene to produce the corresponding Me-substituted vinyl compds. Cf. C. A. 27, 1212.

**Polymerizing vinyl compounds.** Leland C. Striver (to Carbide and Carbon Chemicals Corp.). U. S. 1,938,870, Dec. 12. See Brit. 397,364 (C. A. 28, 780<sup>2</sup>).

**Polymerized vinyl compounds.** I. G. Farbenind. A.-G. (Arthur Voss, inventor). Ger. 578,996, Sept. 25, 1933 (Cl. 39b. 4.02). Addn. to 526,497 (C. A. 28, 173<sup>2</sup>). Plastic products of low soly. in water and org. solvents are prepd. by heating polymerized vinyl esters or ethers to above 100° in the presence of a small proportion of a condensing agent, *e. g.*, HCl or ZnCl<sub>2</sub>.

**Nonbenzenoid acetylene polymers.** E. I. du Pont de Nemours & Co. Ger. 588,283, Nov. 15, 1933 (Cl. 12a. 19.01). See Brit. 384,654 (C. A. 27, 4251<sup>2</sup>).

**Condensation products.** I. G. Farbenind. A.-G. (Ernst Roell, inventor). Ger. 586,878, Oct. 27, 1933 (Cl. 12a. 1.01). Addn. to 584,762 (C. A. 28, 1052<sup>2</sup>). The method of 584,762 for producing condensation products of the type Ph<sub>2</sub> by passing aromatic hydrocarbon vapor over heated alk. earth or earth metal oxide catalysts, is modified by using oxides of metals forming several oxides, and which are not reduced to the metal under the conditions of the reaction, as catalysts. These are coated with anthracite. WO<sub>2</sub> is mentioned as an example.

**Condensation products.** Hefkel & Cie. G. m. b. H. Fr. 42,834, Nov. 4, 1933. Addn. to 747,433 (C. A. 27, 5084<sup>2</sup>). The esters referred to on Fr. 747,433 are condensed with tertiary amines, such as NMe<sub>3</sub> and pyridine. The products sol. in water have soapy properties. Examples are given of the prepn. of CH<sub>3</sub>:CH CH<sub>2</sub>:CH N-

(Cl)CH<sub>2</sub>COOCH<sub>2</sub>(CH<sub>2</sub>)<sub>10</sub>CH<sub>3</sub>, and compds. from the octadecyl ester of ClCH<sub>2</sub>COOH and pyridine and NMe<sub>3</sub>.

**Condensation products of aromatic amines with butyraldehyde.** Ira Williams (to E. I. du Pont de Nemours & Co.). U. S. 1,939,192, Dec. 12. By the reaction of equimol. proportions of butyraldehyde with an aromatic amine such as aniline or *o*-toluidine or  $\alpha$ -naphthylamine in the presence of a weak org. acid such as HOAc and then eliminating the excess acid and water present, products are obtained suitable for use as antioxidants in making vulcanized rubber compns.

**Condensation products of glycidic acids with amines.** Schering-Kahlbaum A.-G. (Otto von Schickh, inventor). Ger. 588,045, Nov. 16, 1933 (Cl. 12p. 8.01). Heterocyclic condensation products are obtained by heating glycidic acids or their esters or amides with aliphatic primary or secondary diamines, or with cyclic primary



or secondary *o*-diamines, or with  $N_2H_4$  or its monosubstitution products. Thus,  $PhNHNH_2$  and dimethylglycidic amide (I) or Et ester, heated at  $150-180^\circ$  for 10 hrs., yield 1-phenyl-3,3-dimethyl-4-hydroxy-5-pyrazolone, m.  $182-3^\circ$ . Urea and I yield 4,4-dimethyl-2,6-diketo-5-hydroxypyrimidine, m.  $196-7^\circ$ . Compds. of unsaturated constitution, m., resp.,  $155-8^\circ$  and  $205-6^\circ$ , have also been prepd. from I and (1) *o*-phenylenediamine and (2)  $C_6H_4(NH_2)_2$ .

**Acridine salts.** I. G. Farbenind. A.-G. (Ludwig Benda and Otto Sievers, inventors). Ger. 585,597, Oct. 5, 1933. Aq. solns. of aminoacridine- or aminoacridinium salts of high-mol. fatty acids, olefin carboxylic acids and ester ethanesulfonic acids obtained from these, are prepd. by adding excess of an alkali salt of the fatty or other acid in the presence of water. Thus, 3,6-diaminoacridine stearate is stirred with Na oleate and water. More water is added and the whole boiled. The resulting soln. filters clear. Other examples are given. Cf. C. A. 27, 3722.

**Alkyl halides and carboxylic acid anhydrides.** Lucas P. Kyrides (to Monsanto Chemical Co.). U. S. 1,939,216, Dec. 12. An alkyl halide such as  $EtCl$  and a carboxylic acid anhydride such as phthalic anhydride are made by causing an alkyl ester of an unsubstituted carboxylic acid, such as diethyl phthalate to react with a carboxylic acid halide such as phthalyl chloride (suitably by heating with 0.2% of  $ZnCl_2$  to about  $130^\circ$ ).

**Acetyl chloride.** I. G. Farbenind. A.-G. Fr. 754,986, Nov. 17, 1933.  $AcCl$  is made by causing gaseous  $COCl_2$  to react at a high temp. on liquid  $AcOH$ , the  $AcCl$  being continuously removed by evapn. A catalyst such as  $MgO$ ,  $CaCl_2$  or  $Al(AcO)_3$  may be used. Cf. C. A. 27, 3350 and following abstr.

**Acetyl chloride.** I. G. Farbenind. A.-G. Fr. 755,052, Nov. 18, 1933.  $AcCl$  is made by causing  $COCl_2$  to act on gaseous  $AcOH$  in the presence of charcoal activated by  $H_3PO_4$  or charcoal of equal efficacy. A temp. not above  $250^\circ$  is used.

**Vinyl chloride.** I. G. Farbenind. A.-G. Ger. 585,793, Oct. 9, 1933.  $CH_2=CHCl$  is prepd. by passing  $C_2H_4Cl_2$  vapor mixed with inert gases over active C at temps. of  $230-350^\circ$ . An example is given.

**Aromatic amino sulfonyl chlorides, substituted in the amino group.** Hugo Schweitzer and Karl Burr (to I. G. Farbenind. A.-G.). U. S. 1,939,025, Dec. 12. Compds. of the probable general formula  $(CISO_2)_n-R-X$ , wherein R stands for an aromatic nucleus, such as a benzene or naphthalene nucleus which may be substituted by an alkyl or a hydroxy group, X stands for an amino group in which one H atom may be substituted by alkyl, aralkyl, aryl, acyl or the radical of a heterocyclic nucleus attached to the N atom of the amino group by means of a C atom, e. g., for the residue of the cyanuric nucleus, wherein the other H of the amino group may be substituted by alkyl, aralkyl, aryl, acyl, and wherein one or both H atoms may be substituted in such a manner that the N of the amino group is a member of a 5- or 6-membered heterocyclic nucleus attached to the aromatic nucleus R in *o*- or *peri*-position to the amino group, and "n" stands for 1, 2 or 3, are prepd. by causing to react upon each other,  $CISO_2H$  and an aromatic aminosulfonic acid, substituted in the amino group and which may be represented by the probable general formula  $(HO)_nS-R-X$  (R, X and n meaning the same as stated). The process may be carried out between about  $0^\circ$  and about  $140^\circ$ , and the reaction is complete either immediately after mixing together the two components or may last some hrs. or even several days, depending on the specific N-substituted aminoarylsulfonic acid used and the temp. According to the working conditions and the constitution of the aromatic aminosulfonic acid substituted in the amino group employed either the corresponding amino sulfonyl chloride is obtained or further sulfonyl chloride residues are introduced into the mol. From the reaction mixt. the amino sulfonyl chlorides may be isolated by pouring the mixt. onto ice and may be purified by recrystn. from a suitable org. solvent. They are generally colorless

to red cryst. substances, "rather stable," sol. in org. solvents, of high reactivity and split off  $HCl$  on heating with water which may contain an alkali or alc. 2-Acetyl-amino-5-naphthol-7-sulfonyl chloride swells at about  $180^\circ$  but does not melt even at  $290^\circ$ . 2-Acetyl-amino-8-naphthol-6-sulfonyl chloride has similar properties and 1-acetylaminonaphthalene-4-sulfonyl chloride m. about  $170^\circ$ . 1-Acetyl-amino-8-naphthol-3,6-disulfonyl chloride, m.  $188-9^\circ$ . There also may be obtained acetyl-amino-8-naphthol-4,6-disulfonyl chloride, yellow crystals from ether, m.  $145-7^\circ$ ; benzoylamino-naphthalene-6-sulfonyl chloride, weakly yellowish colored crystals ( $PhCl$ ), m.  $185-6^\circ$ ; 1,2-dihydro-1-keto-4-benzoxazole-sulfonyl chloride, colorless (glacial  $AcOH$ ), m.  $230-1^\circ$ ; 1,2-dihydro-1-keto-4,6-disulfonyl chloride, colorless, ( $PhCl$ ), m.  $210-14^\circ$ ; 1,2-dihydro-1-keto- $\alpha$ -naphthoxazolesulfonyl chloride, almost colorless (acetone), m.  $262-3^\circ$ ; 2,3-dihydro-2-keto-1,3-*peri*-naphthoxazine-5,8-disulfonyl chloride, yellowish ( $PhCl$ ), m.  $214-16^\circ$ ; 1-methylbenzoxazole-4-sulfonyl chloride, colorless ( $AcOH$ ), m.  $189-90^\circ$  (decompn.); 2-hydroxyperimidine-5,8-disulfonyl chloride, yellowish (glacial  $AcOH$ ), decompn. at  $250^\circ$ , no m. p.; 2-methylperimidinedisulfonyl chloride, yellow ( $PhCl$ ), m.  $200-4^\circ$ ; diphenylurea-4,4'-disulfonyl chloride, colorless crystals; 2-methylamino-1-methylbenzene-4-sulfonyl chloride, yellow (benzene), m.  $99-100^\circ$ ; dimethylaniline-3-sulfonyl chloride, yellow (ether), m.  $38^\circ$ ; dimethylaniline-4-sulfonyl chloride, yellow (ether), m.  $108-11^\circ$ ;  $\beta$ -naphthoxazole-disulfonyl chloride, yellow, m.  $131-2^\circ$ . From 2-dimethylaminonaphthalene-5-sulfonic acid two isomeric monosulfonyl chlorides, yellow crystals (ether), m.  $80^\circ$ , and red crystals (ether), m.  $108-10^\circ$ , were obtained.

**Organic phosphates.** Chemische Fabrik von Heyden A.-G. Brit. 398,650, Sept. 21, 1933. Tertiary org. phosphates, e. g., triphenyl, tributyl, diphenyl *o*-tolyl, monophenyl dibutyl, are made by oxidizing the corresponding tertiary phosphites. Suitable oxidizing agents are  $As_2O_5$ ,  $SO_2$ ,  $H_2SO_4$ ,  $V_2O_5$ , N oxides,  $H_2O_2$ ,  $BaO_2$ , persulfuric acid. Examples are given.

**Dinitrophenylbenzothiazyl sulfide.** Wm. P. ter Horst (to Rubber Service Laboratories Co.). U. S. 1,941,142, Dec. 26. Substantially equimol. proportions of mercaptobenzothiazole and  $Na_2CO_3$  are mixed in alc. in the substantial absence of water, and an equimol. proportion of dinitrochlorobenzene dissolved in alc. is added at a temp. of about  $50-70^\circ$ , the materials are heated to  $50-70^\circ$  to complete the reaction, water is added and dinitrophenylbenzothiazyl sulfide is sepd. Cf. C. A. 28, 9323.

**Potassium formate.** Emil Hene (to Rudolph Koepp & Co. Chem. Fabrik A.-G. Oestrich). U. S. 1,939,625, Dec. 12. An aq. soln. of Ca formate is caused to react with  $K_2SO_4$  in such proportions that the filtered soln. contains 40-70% K formate and 60-30% Ca formate; this soln. is caused to react with  $K_2SO_4$  so as to form syngenite, the latter is sepd. from the soln. of K formate, treated with an aq. soln. of Ca formate and the soln. is sepd. from the  $CaSO_4$ .

**Separating sodium and potassium acetates.** Charles J. Strosacker, Chester C. Kennedy and Earl L. Pelton (to Dow Chemical Co.). U. S. 1,940,611, Dec. 19. Mixed  $NaOAc$  and  $KOAc$  are dissolved in water,  $NaOH$  is added in such amt. that the combined Na in the soln. corresponds at least to the total acetate, and the  $NaOAc$  is crystd. as trihydrate.

**Basic aluminum acetylsalicylate.** Chinoin Gyógyszer és Vegyészeti Termékek Gyára R. T. (v. Kereszty and Wolf) and Emil Wolf. Ger. 585,986, Oct. 14, 1933. A soln. of acetylsalicylic acid or its salts is treated with a soln. of an Al compd. The solvent may be alc., the basic salt being pptd. by addn. of water. Examples are given. Cf. C. A. 28, 489<sup>a</sup>.

**Organic acids from alcohols and carbon monoxide.** Gilbert B. Carpenter (to E. I. du Pont de Nemours & Co.). U. S. 1,940,674, Dec. 26.  $HOAc$  and other org. acids are formed from  $MeOH$  or other alc. and CO by passing the alc. vapor and CO over a catalyst config. a titratable H ion, such as phosphoric, boric or arsenic acid

together with a promoter such as an oxide of Ti, Zr, Ce or Th, which may be carried on a support such as charcoal, fuller's earth or silica gel (preferably under 350-700 atm. pressure, and suitably at temps. below or above 300° according to whether or not ester formation, more of which takes place at higher temps., is desired).

**Organic acids from carbon monoxide and alcohols.** John C. Woodhouse (to E. I. du Pont de Nemours & Co.). U. S. 1,940,987, Dec. 26. In a synthesis such as the production of HOAc from CO and MeOH, the initial reacting materials are passed into a circulating gaseous medium contg. a high concn. of by-products of the reaction and the resulting gaseous mixt. is circulated over a heated catalyst such as silicotungstic acid followed by removal of the org. acid produced and further recirculation of the by-products in a reacting gaseous mixt. of substantially uniform concn.

**Organic acids from carbon monoxide and alcohols.** Alfred T. Larson (to E. I. du Pont de Nemours & Co.). U. S. 1,940,988, Dec. 26. CO together with a portion of an alc. such as MeOH with which it is ultimately to react is subjected to the action of a heated catalyst, more alc. is added to the resulting mixt. and further reaction is effected in contact with a heated catalyst and without adding more CO.

**Organic acid production from alcohols and carbon monoxide.** Alfred T. Larson (to E. I. du Pont de Nemours & Co.). U. S. 1,940,989, Dec. 26. In effecting reaction such as the production of HOAc from MeOH and CO, a catalyst such as Th oxide gel is heated to the reaction temp. (suitably about 350°) in an atm. of a circulating gaseous medium incapable *per se* of forming the desired product, such as a mixt. contg. CH<sub>4</sub> and gases for the reaction are thereafter continuously added for contact with the catalyst, the desired product such as HOAc is sep'd. and uncombined gases are recirculated while maintaining a substantially uniform concn. of the inert gases by withdrawal of portions of the circulating mixt. and replacement with fresh mixts. of gases for the reaction.

**Aliphatic amino acids.** I. G. Farbenind. A.-G. Fr. 755,144, Nov. 20, 1933. Aliphatic amino acids and their salts are prepd. by causing anhyd. HCN and NH<sub>3</sub>, preferably as gas, to react at 5-100° on an aliphatic aldehyde to produce a nitrile which is then sapon'd. Examples are given of the prepn. of Na alanine and Na salts of higher condensation products, particularly of imino-dipropionic acid, and K glycocoll.

**Apparatus for concentrating acetic acid by distillation.** Kodak A.-G. Ger. 586,801, Oct. 26, 1933 (Cl. 12o. 12).

**Dehydrating acetic acid.** Kodak A.-G. Ger. 585,050, Sept. 28, 1933. See Can. 321,229 (C. A. 26, 3265).

**Dehydrating aqueous solutions of propionic acid.** Herbert G. Stone (to Eastman Kodak Co.). U. S. 1,939,237, Dec. 12. Ethylene chloride is added and water and ethylene chloride are dist'd. from the mixt. App. and various details of operation are described.

**Glycolic acid.** Ges. für Kohlentechnik m. b. H. (Walter Klempt and Fritz Brodkorb, inventors). Ger. 585,160, Sept. 29, 1933. Cryst. glycolic acid is recovered from the crude acid by esterifying the latter completely with EtOH in the presence of HCl, and distg. and sapong. the ester.

**Malonic acids.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. Fr. 754,808, Nov. 14, 1933. Substituted malonic acids are prepd. by oxidizing the corresponding hydroxy or keto derivs. with oxygenated compds. of N. Examples are given of the prepn. of a diethyl- (m. 120°) and a methylethyl-malonic acid, m. 121°.

**Oxalic acid.** Consortium für elektrochem. Ind. G. m. b. H. (Josef Wimmer, inventor). Ger. 588,150, Nov. 13, 1933 (Cl. 12o. 11). Wood meal, straw or like cellulosic material is treated at about 50° with H<sub>2</sub>SO<sub>4</sub> of 70-75% concn., and the mixt. is filtered. The filtrate is treated at 60-75° with HNO<sub>3</sub> or an oxide of N in the presence of a catalyst, *e. g.*, V<sub>2</sub>O<sub>5</sub>, with or without O or gases contg. O, under pressure if desired. The mixt. is

then cooled, to effect crystn. of (COOH)<sub>2</sub>, and the mother liquor is conc'd. *in vacuo* and used to treat a fresh batch of cellulosic material. Details are given.

**Monocarboxylic acids such as benzoic acid from dicarboxylic acids such as phthalic acid.** Alphons O Jaeger (to Selden Co.). U. S. 1,939,212, Dec. 12. The wet dicarboxylic acid is heated with an oxide of a non-alkali-forming metal such as ZnO or Cu oxide at temps. of 325-450°.

**Benzoic acid and benzoates.** Bozel-Malétra (Société industrielle de produits chimiques). Ger. 585,332, Oct. 7, 1933 (Cl. 12o. 14). Addn. to 573,982 (C. A. 27, 4248). The method of 573,982 for producing benzoic acid or benzoates by oxidizing toluene with chromates at temps. above 100° in neutral aq. soln. is modified by using crude chromates such as sintered chromate obtained by the alk. decompn. of Cr alloys. Examples are given. Cf. C. A. 28, 1056<sup>4</sup>.

**Benzoic acid and benzoates.** Bozel-Malétra (Société industrielle de produits chimiques). Ger. 585,429, Oct. 3, 1933 (Cl. 12o. 14). Addn. to 573,982 (C. A. 27, 4248). In prepg. benzoic acid or benzoates by the method of 583,982, *i. e.*, by oxidizing toluene with chromates or dichromates the alkali formed is treated with dichromate to convert it to monochromates. Examples are given.

**Glucuronic acid.** Fritz Weinmann. Ger. 586,589, Oct. 25, 1933 (Cl. 12o. 7.03). The *d*-form of the above acid is prepd. by hydrolyzing vegetable gums. The unchanged glucosides present are decomposed by addn. of mineral acid, and impurities of a caramel-like or resinous nature are removed by fractional pptn. of their alk. earth salts with alc. Thus, gum Arabic is hydrolyzed by treatment with dil. H<sub>2</sub>SO<sub>4</sub> in boiling water. The CaSO<sub>4</sub> resulting is removed and the filtrate treated with 9% H<sub>2</sub>SO<sub>4</sub> and heated. A yield of 60 g. of the acid per kg. of gum is obtained. Other examples are given.

***d*-Glutamic acid from Steffen's waste water or the like.** Reiske Masuda (to Larowe-Suzuki Co.). U. S. 1,940,428, Dec. 19. A hot soln. of a hydrolysate of Steffen's waste water of a *pH* approx. 3.2 and a sp. gr. of about 1.47 at 65° is partially cooled to about 60° to cryst. out inorg. salts which would interfere with the subsequent procedure; the remaining soln. is dild. until it contains about 55 g. per l. of *d*-glutamic acid, and the latter is crystd. out in a relatively pure state on cooling.

**Catalysts for producing methanol, etc.** Alfred T. Larson (to E. I. du Pont de Nemours & Co.). U. S. 1,939,708, Dec. 19. A catalyst for gaseous phase reactions such as the production of MeOH from CO and H comprises the reaction product of a fused mixt. of Cu oxide, Mn oxide and an oxide of Mg, Al or Si. Cf. C. A. 27, 3724.

**Separating acetylene and ethylene from gaseous mixtures.** Robert G. Wulff. U. S. 1,938,991, Dec. 12. For sepg. C<sub>2</sub>H<sub>2</sub> and C<sub>2</sub>H<sub>4</sub> from a gaseous mixt. contg. them together with H<sub>2</sub> and CH<sub>4</sub>, the gaseous mixt. is cooled to a temp. of about -80°, washed with hexane at about this temp. to dissolve the C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub> and a small portion of the CH<sub>4</sub>, the hexane soln. is removed and heated to eliminate CH<sub>4</sub> from it and is then further heated to about 87° to discharge the C<sub>2</sub>H<sub>2</sub> and C<sub>2</sub>H<sub>4</sub> with a small admixt. of the hexane and these latter substances are then sep'd. in a described fractional liquefaction system.

**Propylene.** Henry Rosenthal (to Columbia Engineering & Management Corp.). U. S. 1,939,084, Dec. 12. A hydrocarbon gas mixt. consisting essentially of butane and isobutane is subjected to thermal decompn., the mixt. of decompn. products is subjected to pressure in excess of 300 lb. per sq. in. and the mixt. is fractionated at such pressure and at temps. above the crit. temps. of such light gases as H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>6</sub>; these light gases are sep'd. and the remaining liquid is refractionated at a lower pressure and at a temp. above the crit. temp. of C<sub>2</sub>H<sub>6</sub>, the latter is sep'd. in the form of a vapor which is then condensed to a liquid conc. contg. a high percentage of C<sub>2</sub>H<sub>6</sub>; this conc. is further refractionated at a still lower pressure, butane and butylene are sep'd. as vapor, condensed to liquid and this liquid is returned to

the thermal decompn. stage. An arrangement of app. is described.

**Separating and purifying *o*-, *m*- and *p*-xylenes.** Hans Spannagel and Eduard Tschunkur (to I. G. Farbenind. A.-G.). U. S. 1,940,065, Dec. 19. See Ger. 567,331 (C. A. 27, 1366).

**Tribromoethyl alcohol.** I. G. Farbenind. A.-G. (Erich Goth, inventor). Ger. 581,846, Aug. 3, 1933. Addn. to 469,625 (C. A. 23, 1217). Liquid products are obtained by treating  $\text{CBr}_3\text{CH}_2\text{OH}$  with subordinate amts. of acid amides, including ureas, urethans, and cyclic amides such as diketopiperazine. Examples are given. Cf. C. A. 28, 783<sup>a</sup>.

**Phenethyl alcohol.** Paul P. Shorugiu, Veitsche I. Isagulyantz, Anna R. Guseva, Klara S. Polyakova and Valetina P. Osipova. Brit. 398,561, Sept. 21, 1933; Swiss 159,939, Apr. 17, 1933. See Fr. 738,277 (C. A. 27, 1638).

**Hydrazine.** E. Merck chem. Fab. (Otto Seuffert and Iggon Ihwe, inventors). Ger. 578,486, Oct. 18, 1933. An aq. alk. soln. of urea is heated to 100° with an alkali hypochlorite in the presence of a colloid such as glue or gelatin or their degradation products.

**Benzanthrone.** Radio Patents Corp. Ger. 585,428, Oct. 7, 1933. See U. S. 1,893,575 (C. A. 27, 2163).

**Dibenzanthrone.** Scottish Dyes Ltd. Ger. 589,079, Dec. 2, 1933 (Cl. 22b. 2.02). Dibenzanthronyl prep. by the process of Brit. 278,112 (C. A. 22, 2668) is fused with caustic alkali.

**6-Bromo(and chloro)-2,4-dinitroaniline.** I. G. Farbenind. A.-G. Fr. 754,364, Nov. 6, 1933. These products, m. 151–2° and m. 155°, are prep. by submitting 2,4-dinitroaniline in aq. suspension to the progressive action of Br or Cl, with as rapid a distribution as possible, and preferably at 40–60°.

**Phenyl ether.** I. G. Farbenind. A.-G. Fr. 755,051, Nov. 18, 1933.  $\text{Ph}_2\text{O}$  is made by the action of an aq. soln. of NaOH on  $\text{PhCl}$  at temps. above 300° and in the presence of a catalyst, e. g., Cu, adding to the reaction mixt. an amt. of  $\text{PhOH}$  such that the reaction takes place in a homogeneous phase.

**Biphenyl from benzene.** John H. Reilly (to Dow Chemical Co.). U. S. 1,938,609, Dec. 12.  $\text{C}_6\text{H}_6$  vapors are mixed with steam superheated to a temp. sufficient to produce a mixt. temp. of 800–950°, in the presence of  $\text{Fe}_2\text{O}_3$ . Cf. C. A. 27, 5341.

**3-Carboxy-4-hydroxybiphenyl.** Adelbert W. Harvey (to E. R. Squibb & Sons). U. S. 1,941,207, Dec. 26. 4-Hydroxybiphenyl is converted into the Na phenolate, the dried pulverized phenolate is treated with  $\text{CO}_2$  at reaction temp. under superatm. pressure to form the Na carboxy deriv. of 4-hydroxybiphenyl, the latter is sep. from the product by heating in water and treating with  $\text{CO}_2$ , and the 3-carboxy-4-hydroxybiphenyl is pptd. by acidification. The product m. about 213° and is sol. in alc., ether,  $\text{C}_6\text{H}_6$  and  $\text{CHCl}_3$ . Mention is made of salts such as the mono-Na salt, and the compd. may be used as an intermediate in making pharmaceutical compds.

**1,8-Cineole.** Rheinische Kampfer-Fabrik G. m. b. H. (Josef Kathol, inventor). Ger. 585,162, Sept. 29, 1933. 1,8-Cineole is recovered from mixts. contg. it by treating the mixts. with a phenol, isolating the mol. compd. of 1,8-cineole with the phenol by a phys. process, and then decomp. the mol. compd. Thus, mixts. contg. 1,4-cineol, 1,8-cineole and terpene hydrocarbons may be treated with  $\text{PhOH}$  and then freed from hydrocarbons and 1,4-cineole in turn by fractional distn. The distn. residue is treated with aq. NaOH, to remove  $\text{PhOH}$ , and 1,8-cineole then crystd. Numerous details are given.

**1,2,3,4-Tetrahydronaphthalene 1-peroxide.** Soc. pour l'ind. chim. à Bâle. Fr. 754,799, Nov. 14, 1933. See Brit. 396,351 (C. A. 28, 494<sup>a</sup>).

**3-Hydroxyiselenaphthene and its derivatives.** I. G. Farbenind. A.-G. Fr. 754,786, Nov. 14, 1933. See Brit. 396,011 (C. A. 28, 494<sup>a</sup>).

**Purifying sublimable organic materials such as anthracene and phenanthrene.** Kurt F. Pietzsch (to Selden Co.). U. S. 1,939,224, Dec. 12. Vapors of the ma-

terial are absorbed in a recirculating stream of a solvent such as furfural having slower solvent power for the material than for the impurities, and portions of the soln. thus formed are withdrawn from the stream for recovery of the dissolved material. App. is described.

**1-Phenyl-2,3-dimethyl-5-pyrazolone.** Soc. des usines chim. Rhône-Poulenc. Ger. 581,779, Aug. 2, 1933. Addn. to 568,297 (C. A. 27, 1896). Fused 1-phenyl-3-methylpyrazolone is treated at about 120° with gaseous MeBr in the absence of a solvent.

**Diresorcinol isatin.** Walter G. Christiansen and Sidney E. Harris (to E. R. Squibb & Sons). U. S. 1,940,660, Dec. 26. Isatin and resorcinol are suspended in glacial HOAc,  $\text{H}_2\text{SO}_4$  is added drop by drop until the mixt. is homogeneous and of deep red color; the mixt. is then poured into cold water contg. a small proportion of NaOAc, filtered off, washed with water and dried at 60–80°. The compd. m. above 270°.

**Dioxane and its homologs.** Gerhard Steimmig and Otto Hambach (to I. G. Farbenind. A.-G.). U. S. 1,939,189, Dec. 12. A mixt. of homologous 1,2-glycols, obtainable from the mixt. of olefins evolved in cracking oils or tars is treated with  $\text{H}_2\text{SO}_4$  at the b. p. of the mixt., further initial material being added in an amt. corresponding to that of the mixt. of dioxane and its homologs distg. off. Cf. C. A. 27, 4252.

**Recrystallizing tetryl.** Wm. H. Rinkenbach and Eugene D. Regad. U. S. 1,940,811, Dec. 26. Tetryl is dissolved in about 1.7 times its wt. of ethylene chloride at about 80°, the soln. is allowed to cool to about 20°, and the solvent is removed.

**Phenolphthalein.** Max H. Hubacher (to Kavalco Products, Inc.). U. S. 1,940,494, Dec. 19. Phthalic anhydride is condensed with phenol in the presence of  $\text{ZnCl}_2$ , a relatively small amount of  $\text{H}_2\text{SO}_4$  and a decolorizing carbon. U. S. 1,940,495 relates to a process of producing phenolphthalein, in which an alkali metal salt of phenolphthalein is treated with an oxidation preventive such as Na metabisulfite or  $\text{Na}_2\text{SO}_3$ . Numerous details of procedure are described.

**Purifying phenolphthalein.** Harold P. Roberts (to Kavalco Products, Inc.). U. S. 1,940,146, Dec. 19. Phenolphthalein contg. resinous impurities is treated with an alkali carbonate such as with dil.  $\text{Na}_2\text{CO}_3$  soln. (suitably at its b. p.) to dissolve impurities without dissolving any substantial amt. of phenolphthalein.

**Thymol.** Rheinische Kampfer-Fabrik G. m. b. H. (Karl Schöllkopf, inventor). Ger. 587,645, Nov. 7, 1933 (Cl. 12g. 16). Addn. to 586,150 (C. A. 28, 483<sup>a</sup>). Mixts. of thymol isomers, prep. by the process of Ger. 586,150, are heated to 330–400° in the absence of a catalyst and preferably under pressure, whereby the position of the propyl or isopropyl group is altered. Mixts. of thymol and some of its isomers are thus obtained, from which thymol is recovered by fractional distn. Thymol may be recovered similarly from mixts. of *m*-cresol and polypropyl- or polyisopropyl-*m*-cresols. Details are given.

**Thymol.** Rheinische Kampfer-Fabrik G. m. b. H. (Karl Schöllkopf and Arthur Serini, inventors). Ger. 588,824, Nov. 27, 1933 (Cl. 12g. 16). Addn. to 586,150 (C. A. 28, 483<sup>a</sup>). Mixts. of thymol isomers, prep. by the process of Ger. 586,150, are converted into addn. compds. with inorg. substances, e. g.,  $\text{SbCl}_5$ ,  $\text{SbBr}_5$  or  $\text{SnCl}_4$ , or are treated with reagents which introduce an acid group into the mol., e. g.,  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ . When the addn. compds. or substitution products are heated to about 100°, the position of the propyl or isopropyl group is altered, and after the inorg. substance or the acid group has been removed in known manner, mixts. of thymol and some of its isomers are obtained, from which thymol is recovered by standard methods. Thymol may be recovered similarly from mixts. of *m*-cresol and polypropyl- or polyisopropyl-*m*-cresols. Numerous details and examples are given.

**Sterols.** Robert F. Light and Charles N. Frey (to Standard Brands Inc.). U. S. 1,941,097, Dec. 26. See Can. 828,325 (C. A. 27, 1092).

**Styrenes from alkyl benzenes.** Willis A. Gibbons and Omar H. Smith (to Naugatuck Chemical Co.). U. S. 1,938,827, Dec. 12. For producing a styrene from an alkyl benzene having at least 2 C atoms in an aliphatic side chain, such as ethylbenzene, the initial material is split into a styrene and H by heat in the presence of volatile S-free material comprising Cl or Br such as Cl<sub>2</sub>, Br<sub>2</sub>, CCl<sub>4</sub> or EtBr so that halogen is continuously combined with the liberated H<sub>2</sub> and the styrene formed is sepd. from the reaction products.

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Parallel adsorption of crystalline pepsin and peptic activity upon casein and ovalbumin.** James B. Sumner. *Proc. Soc. Exptl. Biol. Med.* 31, 204-6(1933).—Peptic activity and pepsin-protein were equally and completely removed from a soln. of cryst. pepsin-protein by repeated adsorption on casein or ovalbumin. Peptic activity was detd. by the method of Anson and Mirsky (cf. C. A. 27, 117). Pepsin-protein was estd. by adding 1 drop of 10% NaOH to 5 cc. of the test soln. and then adding 1 cc. of 0.5 N H<sub>2</sub>SO<sub>4</sub>; the resulting suspension of coagulated protein was measured nephelometrically. Contrary to Waldschmidt-Leitz and Kofrányi (cf. C. A. 27, 2971), Northrop's cryst. pepsin (cf. C. A. 24, 5318; 25, 5905; 27, 114) is not simply an enzyme adsorbed upon protein.

C. V. Bailey

**The chemical effects of radiations.** H. G. Chapman. *Chem. Eng. Mining Rev.* 26(?), 101-2(1933).—A study is desirable of the biol. effects which continue some days after irradiation. Changes taking place during the cure of a cancer depend upon the later biol. changes in the tissues.

W. H. Boynton

**Cetacea. XLIV. The isoelectric flocculation of porphyrins.** Yoshio Okahara. *Japan. J. Med. Sci.* 11. *Biochem.* 2, 189-94(1933).—The optimum flocculation of hematoporphyrin (I), uroporphyrin (II) and porphyrin from the whale intestine (III) depends upon the  $p_H$  more than upon the salt concn. Flocculation occurs at  $p_H$  3.9-4.2 with I, 2.2-2.9 with II and 3.2-3.8 with III. R. B.

**The amylase system of the liver.** Leonore Hollander. *Science* 79, 17-18(1934).—In the digestion of starch by rat liver preps. in a few instances the blue-violet I end point was reached without the formation of maltose. There are apparently 2 different components of liver amylase active in the digestion of starch with characteristic maltose levels, and an unstable inhibiting substance specific for the component showing more maltose formation.

Rachel Brown

**The action of oxidizing and reducing agents on papain. II. The influence of light, organoarsenic compounds and ascorbic acid.** Theodor Bersin. *Z. physiol. Chem.* 222, 177-86(1933); cf. C. A. 27, 5760.—Activation of glutathione-free papain and cathepsin is due to a reduction of SS groupings present in the enzyme-protein complex to SH. This reduction is accomplished by a variety of substances including SO<sub>2</sub>, H<sub>2</sub>S, cysteine, glutathione, HCN and succinate + dehydrogenase. The same result is obtained by ultra-violet irradiation, the reducing effect of which has recently been demonstrated in the formation of cysteine from cystine. This explains the increase in the proteolytic index of skin and blood after ultra-violet irradiation. The effect of org. As derivs. on enzymes offers a new approach to the mode of action of these chemotherapeutic agents. Certainly an activation or inactivation of the enzymes by such agents must exert an important influence on the metabolism of the cells. On the one hand the virulence of the parasitic microorganisms is assocd. with their capacity for producing endo- and ecto-enzymes, and on the other hand the resistance of the host organism may be a matter of enzyme activity as well as hormone and vitamin functions. Although phosphatase is not influenced by arsenic acids and arsenoxides, papain is activated by those As derivs. which reduce the SS to SH. *p*-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>AsO activates papain, while *p*-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>-AsO<sub>2</sub>H<sub>2</sub> and especially *p*-AcNHC<sub>6</sub>H<sub>4</sub>AsO<sub>2</sub>H<sub>2</sub> injure it.

The harmful effect of the latter is completely overcome by addn. of SH-glutathione. The reducing action of certain As derivs. on disulfides has been demonstrated in several instances. Arsenoxides react with disulfides to form mercaptan and arsonic acid; arseno compds. convert disulfides into dithioarsenites which then hydrolyze into arsonic acid and mercaptan. Thus the increased resistance of the host organism to bacterial invasion as a result of As therapy may be due to an activation of catheptic enzymes by reduction to their SH-form. The failure of ascorbic acid to activate papain may be attributed to its inability to form thiol derivs. from disulfides as illustrated in case of dithiodilactylic acid. A. W. Dox

**Tumor arginase. IV. The significance of concomitant substances for the activity of arginase in normal and malignant tissues.** G. Klein and W. Ziese. *Z. physiol. Chem.* 222, 187-202(1933); cf. C. A. 27, 737.—The activity of arginase is greatly influenced by the surrounding medium. The behavior of crude exts. and suspensions, except in high diln., is quite different from that of the enzyme purified by adsorption and elution. Purified arginase is strongly inhibited at all  $p_H$  values by SH compds., such as H<sub>2</sub>S, cysteine and glutathione, even in the absence of phosphate. Crude arginase, e. g., the prepn. obtained by extn. at 70°, is "activated" by these same SH compds. The activation is not suppressed by a previous O<sub>2</sub> treatment. Activation is also effected by Fe<sup>++</sup> and N<sub>2</sub>H<sub>4</sub>. Its mechanism is therefore characterized by a non-specific reduction of concomitant substances or possibly arginase carriers. A combination of heavy metal with SH-compd. is not essential for activation, but only one of the possibilities. Purified arginase is not inhibited by O<sub>2</sub> as are many crude preps. It even withstands the action of H<sub>2</sub>O<sub>2</sub> in alk. medium without loss of activity. Fundamental changes in medium, e. g., at the site of malignant tumors, can exert a profound influence on the enzymic processes of the tumors. The effects are mainly of a secondary character and may or may not be a detg. factor for the processes in operation at the site of malignancy. The origin of a tumor by perversion of enzyme action has not been proven.

A. W. Dox

**Inhibition of cathepsin and activation of papain by  $\alpha$ -thiocarboxylic acids.** Ernst Maschmann and Erica Helmer. *Z. physiol. Chem.* 222, 207-14(1933); cf. C. A. 27, 4820.—Papain is activated by  $\alpha$ - and  $\beta$ -SH-carboxylic acids regardless of whether the SH is on a primary, secondary or tertiary C-atom. Cathepsin is inhibited by  $\alpha$ -SH acids, e. g., HSCH<sub>2</sub>CO<sub>2</sub>H, MeCHSHCO<sub>2</sub>H, Me<sub>2</sub>CSHCO<sub>2</sub>H and thiomalic acid, but activated by  $\beta$ -SH acids such as cysteine, SH-glutathione and SHCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H. The inhibition by  $\alpha$ -SH is not overcome by the presence of  $\beta$ -SH or of ascorbic acid, but is diminished or even reversed by Fe<sup>++</sup>. The effect of the Fe in conjunction with  $\alpha$ -SH depends on the source of the cathepsin, i. e., the concomitant substances present. The development of a red or violet color at the neutral point suggests the formation of an Fe- $\alpha$ -SH complex, since no color is obtained with  $\beta$ -SH derivs. Ionized Fe is not initially present but is gradually liberated from complex linkage, mainly in the enzyme soln. The inhibition of catheptic action is probably due to a splitting off of Fe from a complex which at some stage plays an important part in the proteolysis. Dipyriddy derivs. have no particular influence on cathepsin or papain. The red color which gradually develops is less intense than in the SH- acid expts. and is attributed to Fe in the gelatin substrate rather than in the enzyme soln.

A. W. Dox

**Addendum to our paper on catheptic protease.** Ernst Maschmann and Erica Helmer. *Z. physiol. Chem.* 222, 215-19(1933); cf. *C. A.* 27, 2698, 4820.—The fully active cathepsin present in kidney preps. after complete removal of glutathione by repeated EtOH extn. amounts to about 80% of the total cathepsin initially present. Its activity is dependent on the presence of insol. SH-proteins which are unusually stable to atm. oxidation. The participation of cathepsin in intracellular protein transformation is a normal physiol. process and as such is not capable of causing pathol. alterations of the cell.

**The biological breakdown of chlorophyll. IV. Preparation of pheophorbide a from silkworm feces.** Hans Fischer and Albert Hendschel. *Z. physiol. Chem.* 222, 250-60(1933); cf. *C. A.* 27, 2461.—Pheophorbide a was obtained from silkworm feces by MeAc extn. and identified by sapon. to chlorine and esterification of the latter with  $\text{CH}_3\text{N}_2$  to the tri-Me ester. A small amt. of pheopurpurin 7 was obtained as a by-product in this reaction. Reduction of the pheophorbide by HI gave isopheophorphyrin  $a_8$  in the cold and pheophorphyrin  $a_8$  at 65°. Catalytic hydrogenation and re-oxidation in the air gave a mixt. of pheophorphyrin  $a_8$  and pheophorphyrin  $a_8$ . Phyllobombeycin is shown to be a mol. compd. of pheophorbide a with pheopurpurin 7. The breakdown of chlorophyll by the silkworm consists mainly in the formation of pheophorbide a by the splitting off of phytol and Mg.

**Glyceraldehyde-phosphoric acid as hydrogen donor.** B. Gössy. *Z. physiol. Chem.* 222, 279-80(1933).—Glyceraldehyde-diphosphoric ester is a very active H donor in the decolorization of methylene blue by washed thoracic muscle of the pigeon after addn. of coenzyme. Lactic acid and fructose diphosphate are the only other H donors active under these conditions.

**Plasmolysis and permeability. Preliminary communication.** Bruno Huber and Helmut Schmidt. *Protoplasma* 20, 203-8(1933).

**Definition of the lipid conception.** W. Halden. *Protoplasma* 20, 209-14(1933).—Twenty-six references.

**Absolute viscosity measurements with the aid of Brownian molecular movement. VI. The influence of temperature on cell fluid viscosity.** J. Pekarek. *Protoplasma* 20, 250-78(1933).

**The effect of ascorbic acid upon the action of arginase.** S. Edlbacher and Fr. Leuthardt. *Klin. Wochschr.* 12, 1843(1933).—Ascorbic acid in the presence of very small quantities of Cu increases the activity of arginase by 30-50%, presumably by virtue of its ability to combine with O. The same Cu-ascorbic acid mixt. inhibits urease, although the 2 components individually are ineffective.

**The fate of enzymes in the digestive canal.** W. Heupke and H. Wirtz. *Klin. Wochschr.* 12, 1866-7(1933).—Zymase and peroxidase are rapidly destroyed in the intestinal canal of mice. Myrosin, emulsin-urease and catalase remain active all the way to the large intestine. No absorption could be demonstrated, even with such readily demonstrated enzymes as emulsin and myrosin.

**The formation of cysteine from cystine by hydrolysis.** P. Holtz. *Klin. Wochschr.* 12, 1876(1933).—A preliminary report.

**Associated roles of the hydrogen and chloride ions in the activation of amylase.** L. Ambard and S. Trautmann. *Bull. soc. chim. biol.* 15, 1272-80(1933).—See *C. A.* 27, 3726.

**Blood cholesterol in man immediately after one irradiation by infra-red, solar or limited [Bucky lamp] rays.** S. Malczynski and J. Lankosz. *Compt. rend. soc. biol.* 114, 1126-8(1933); cf. *C. A.* 27, 5345.—A transient increase in blood cholesterol was produced in each case.

**The oxidase and dehydrogenase systems of the crystalline style of mollusca.** Cyril Berkeley. *Biochem. J.* 27, 1357-65(1933).—Glucose is oxidized to glucosone by the

activity of the cryst. style of *Saxidomus giganteus* in contact with air under the influence of an oxidase system, and out of contact with air under that of a dehydrogenase system. It is suggested that the oxidase system serves as a H-acceptor to promote the action of the dehydrogenase system.

**Component fatty acids of rat body fats.** Adam Banks, Thomas P. Hilditch and Edwin C. Jones. *Biochem. J.* 27, 1375-82(1933).—The body fat of the rat has, as component acids, palmitic (25-30%), myristic (4-5%), stearic (2-3%) and the remainder (65-70%) consists chiefly of oleic acid. Linoleic acid is absent. The addn. of cod-liver oil to the diet may introduce unsatd. acids of the  $\text{C}_{20}$  and  $\text{C}_{22}$  series in depot fats. The unsatd. acids present in the perinephric fat of a wild rabbit differ widely from rat fats, for linoleic acid is the main component, and considerable amts. of linolenic acid are also present. Two well-defined groups of depot fats characteristic of land (non-aquatic) animals are: (1) fats with component fatty acids contg. 30-35% satd. (usually 25-30% palmitic) acids and unsatd. acids of varying types (oleic, linoleic, etc.); (2) fats with component fatty acids made up of about 25-30% palmitic and small amts. of myristic acid, the remaining 65-70% consisting of stearic, oleic and linoleic acids. Under (1) come rodent body fats and probably bird depot fats. Under (2) come pig, ox, sheep, horse and reindeer.

**Effect of ultra-violet, radium and x-ray radiation on glutathione in pure solution.** Gladys Estelle Woodward. *Biochem. J.* 27, 1411-14(1933).—Both ultra-violet radiation and Ra produce a destructive effect on glutathione, the former much more so than the latter. The SH-group in glutathione is partially oxidized to the SS-form. x-Rays have no effect on glutathione.

**Hydrogenase. III. The bacterial formation of methane by the reduction of one-carbon compounds by molecular hydrogen.** Marjorie Stephenson and Leonard H. Stickland. *Biochem. J.* 27, 1517-27(1933); cf. *C. A.* 26, 5320.—The organism isolated is able to live anaerobically on an inorg. medium with formate as sole source of C. The formic acid is decompd. thus:  $4\text{HCOOH} \rightarrow \text{CH}_4 + 3\text{CO}_2 + 2\text{H}_2\text{O} + 39 \text{ kg. cal.}$  The reaction occurs in 2 stages: (1)  $\text{HCOOH} \rightarrow \text{H}_2 + \text{CO}_2$ ;  $4\text{H}_2 + \text{CO}_2 \rightarrow \text{CH}_4 + 2\text{H}_2\text{O}$ ; and is the work of 2 enzymes, formic hydrogenylase and hydrogenase. By means of mol. H the organism reduces the following to methane:  $\text{CO}_2$ ,  $\text{HCOOH}$ ,  $\text{CO}$ ,  $\text{HCHO}$  and  $\text{MeOH}$ . No compds. so far tested contg. more than 1 C atom are reduced by the organism with production of  $\text{CH}_4$ .

**Hydrogenylases. III. Further experiments on the formation of formic hydrogenylase by *Escherichia coli*.** Marjorie Stephenson and Leonard H. Stickland. *Biochem. J.* 27, 1528-32(1933).—The formation of formic hydrogenylase is probably a chem. reaction between the medium and the cells (cf. *C. A.* 26, 5320).

**Gluten-dissolving enzyme of wheat and barley seeds.** Andrey V. Blagoveshchenskiĭ and Nikolai I. Sosodov. *Biochem. J.* 27, 1575-7(1933).—The disintegration of gluten (including glutenin and gliadin) is an enzymic process. The enzyme acts in acid and alk. media and is formed in the seeds of wheat damaged by the "tortoise bug" and in the diastatic prepn. of malt.

**Monolayers of proteolytic enzymes and proteins.** Jack H. Schulman and Eric K. Rideal. *Biochem. J.* 27, 1581-97(1933).—The progress of reactions taking place at an air-liquid interface can be followed by observation of the rate of change of the phase boundary potential. When solns. of pancreatin are injected under monolayers of proteins such as egg albumin or caseinogen, proteolytic hydrolysis of the latter proceeds.

**Proteins of ox serum.** H. F. Holden and M. Freeman. *Australian J. Exptl. Biol. Sci.* 11, 185-95(1933).—Optical activity and soly. measurements indicate that serum euglobulin may be a mixt. of pseudoglobulin and a meta-protein.

**The ultrafiltration of malt amylase solutions.** Cornelia

T. Snell. *J. Biol. Chem.* 104, 43-51(1934).—Nitrocellulose membranes may be graded by means of  $C_2H_5(OH)_2$  and can be reproduced with reasonably good checks during periods of relatively low humidity, the mean of the av. deviations for membranes of the same grade being  $\pm 2.6\%$ . The membranes are ready for use in  $1/5$  the time required by Pierce's method (*C. A.* 22, 604). Malt ext. may be purified 3-fold in terms of solid content by ultrafiltration, by the use of membranes impermeable to the enzyme but permeable to more highly dispersed substances. Enzyme material is adsorbed by nitrocellulose membranes in the same way that egg albumin is adsorbed.

A. P. Lothrop

The effect of dilute alkali on the cystine content of casein. D. Breese Jones and Charles E. F. Gersdorff. *J. Biol. Chem.* 104, 99-106(1934).—The cystine content of casein which had been pptd. 5 times by acid from dil. NaOH soln. in the manner usually followed in prep. pure casein for scientific purposes was found to be only  $1/10$  of that present in the untreated casein. It is thus more readily acted upon by alkalis than most proteins. Attention is called to the dangers involved in the use of so-called purified casein both in chem. work and in exptl. feeding expts. in which it is used to supply the protein in basal rations.

A. P. Lothrop

The nature and amount of non-diffusible calcium in protein sols. W. G. Eversole, Leonard A. Ford and G. Wilson Thomas. *J. Biol. Chem.* 104, 107-14(1934).—The non-diffusible Ca in protein sols is present as a Ca-protein complex and not as a colloidal inorg. ppt. This has been shown by both electrometric and dialysis methods in sols made up of ash-free gelatin in solns. contg. only KCl and  $(AcO)_2Ca$ , thus avoiding the possibility of forming colloidal  $Ca_3(PO)_4$  or  $CaCO_3$ . Failure to correct properly for the vol. of the dispersed phase makes the published values for the amt. of combined Ca in protein sols erroneous. Making the proper corrections leads to somewhat higher values.

A. P. Lothrop

Summary of the isoelectric points of proteins. Arthur W. Thomas. *J. Am. Leather Chem. Assoc.* 29, 3-10, 52(1934).—Tabulation with bibliography. H. B. Merrill

The existence of a lipase in the tissue of adipose organisms. G. Quagliariello and G. Scoz. *Arch. ital. biol.* 89, 190-200(1933).—See *C. A.* 27, 1644. A. E. Meyer

The chain character of the decomposition reaction of hydrogen peroxide in the presence of peroxidase and catalase. A. N. Bakh. *J. Phys. Chem.* (U. S. S. R.) 4, 805-10(1933)(in German 510-11).—Peroxidase alone does not oxidize hydroquinone;  $H_2O_2$  must be present. No  $O_2$  is produced by the reaction of the 3 components. The system  $H_2O_2$ -catalase does not function as an oxidizing agent. The Haber-Willstätter mechanism (*C. A.* 26, 3774) with chains of  $HO-C_6H_4O_2$  and  $HO_2$  and  $OH$ , resp., cannot be verified experimentally. F. H. Rathmann

New investigations on "harmony." J. Straub. *Chem. Weekblad* 30, 790-2(1933); cf. *C. A.* 25, 860.—The contrast of ionic concn. in the white and the yolk of the hen egg is comparable to the contrasts found between yeast cells and their culture medium, *Valonia* and sea water, blood corpuscles and serum, where "harmony" dominates instead of equil. Living cells maintain themselves on an energy level above that of their environment by means of respiration energy. The harmonious relations of inner and outer ionic concns. are maintained by the const. diffusion of ionized products of metabolism, which is linked up with a potential gradient at the boundary. Diffusion of a nonelectrolyte does not influence the partition of ions. The unequal distribution of ions in white and yolk is a "harmony," for it is restored after being disturbed, and added  $NH_4NO_3$  undergoes an equally uneven distribution. It could not be ascertained as yet what ion is responsible for the maintenance of the harmonious state in the egg. E. Schotte

Isolation of a crystalline protein from pancreas and its conversion into a new crystalline proteolytic enzyme by trypsin. M. Kunitz and John H. Northrop. *Science* 78, 556-9(1933).—From fresh beef pancreas, by extg. with 0.385 *M*  $H_2SO_4$  and subsequently dissolving in 0.25 satd.

$(NH_4)_2SO_4$  at  $pH$  5 was crystd. a protein, chymotrypsinogen I, which had very slight proteolytic power. The addn. to 3 g. I of 1 mg. cryst. trypsin, however, led to the development of intense proteolytic power, reaching 100 times that of the trypsin added. It is supposed that I is converted by trypsin into a tryptic enzyme, chymotrypsin, II. The gelatin-hydrolyzing power of II is less than that of trypsin, but its casein-hydrolyzing and milk-clotting powers are much greater. Ten recrystns. of I, and 3 recrystns. of II, brought about no change in optical rotation, and with II, no increase in proteolytic activity; hence both I and II are probably pure proteins. Proteolytic activity is thus a property of the protein mol.

K. V. Thimann

Modern problems of alcoholic fermentation. Fernand Chodat. *Pharm. Acta Helv.* 8, 222-3(1933).—An address on the general significance for the living cell of the 3 principal intermediate steps: formation of methylglyoxal, phosphorylation and activation by cozymase. S. W.

LeComte, R. M.: Manual of Urology. Baltimore: Wm. Wood & Co. 317 pp. \$4.

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

A new type of centrifuge tube for preparation of blood serum for accurate  $pH$  work. Martin E. Haake. *Proc. Soc. Exptl. Biol. Med.* 30, 1129-31(1933).—In this tube the blood comes in contact only with glass and  $Hg$ ; no oil is used; the  $CO_2$  tension of the serum is unchanged.

C. V. Bailey

Microdetermination of oxalic acid in the blood. Shoichi Izumi. *Japan. J. Med. Sci. II. Biochem.* 2, 195-204(1933).—As little as 0.042 mg.  $CaC_2O_4$  may be pptd. with 0.25-0.5%  $CeCl_3$  and detd. by titration with  $KMnO_4$ . The presence of the alkali salts of HOAc, HOBu, HCOOH, HOPr,  $H_2SO_4$ , citric and tartaric acids, or of glucose, urea, uric acid, creatine, creatinine, adenine, guanine, hypoxanthine, lactate, malate, succinate, fumarate, HSCN and hexosephosphate did not affect the sensitivity of the reaction. Pptn. was quant. at  $pH$  2.3 and higher. For the detn. of  $H_2C_2O_4$  in the blood, protein was removed by the addn. of 2 cc. 20%  $CCl_3COOH$  to 4 cc. blood or serum dild. with 4 cc.  $H_2O$ . After 30-60 min. the soln. was filtered and to 10 cc. of clear filtrate a few drops of 0.25%  $CeCl_3$  soln. was added. After 30-60 min. the mixt. was centrifugalized, the ppt. washed twice with  $H_2O$  in the centrifuge tube and dissolved in 5 cc. *N*  $H_2SO_4$  and titrated at 70-80° with 0.01 *N*  $KMnO_4$ . Small amts. of oxalate in aq. soln. could be detd. colorimetrically as the  $Ce$  salt. Phosphate is also pptd. with the oxalate by  $Ce$  and has not yet been sepd. Rachel Brown

The biochemistry of copper. I. Colorimetric method for the microdetermination of copper. Uichiro Saruta. *Japan. J. Med. Sci. II. Biochem.* 2, 247-60(1933).—Cryogenin reacts with Cu salts forming a red color. Na, K, Cs, Mg, Ti, Al, Li, Pb, Ba, Sn, Ca, Bi, Sr, Rb, Hg, Ni, Cr, Co, Zn and Ag all fail to give the reaction. The shade and intensity of the color produced by Cu are affected by the presence of other metals. To det. Cu in biol. materials the org. matter is destroyed and the Cu converted into the nitrate. After the addn. of a 0.2% soln. of cryogenin and incubation at 40° for 40 min. the color is compared with standards. Quantities of Cu from 0.0005 to 0.03 mg. can be estd. with an error of  $\pm 1.5\%$ . II. The copper content of the blood with a method for its determination. *Ibid.* 261-75.—Expts. on the removal of org. matter from blood showed that  $H_2SO_4$  alone,  $HNO_3$  alone,  $H_2SO_4$  with the continuous addn. of  $HNO_3$  (Neumann) and  $H_2SO_4$  and  $HClO_4$  (Kennedy) were all unsatisfactory. The best results were obtained when 1 cc. of blood was digested with 2 cc.  $H_2SO_4$  (sp. gr. 1.84) until almost transparent and brown, cooled, treated with 5-10 drops perhydrol and heated for 10-15 min. The cryogenin reaction can be used without sepn. of the Cu or the Cu can be sepd. as follows and then detd. by the cryogenin reaction. After digestion the soln. is poured into a special centrifuge tube of small diam. at the



bottom, and the vol. made up to 30 cc. After the addn. of 0.5 cc. of 1%  $MgCl_2$ , 10 N NaOH is added to turbidity, then N  $H_2SO_4$  is added until the turbidity just disappears and 2 cc. in excess.  $H_2S$  is passed into the soln., which is then centrifugalized. After 3 washings in the tube the ppt. is dissolved in 2 cc.  $HNO_3$ (1:2). The soln. is evapd. to dryness on the water bath. Cu is detd. colorimetrically in a soln. of the residue by the cryogenin method. The Cu content of the blood varies with the species, that of the ox and horse being higher than that of the pig, rabbit, or man. Salt-water fish have more Cu in the blood than fresh-water fish. R. B.

Amplification of the method for the determination of phosphorus fractions in muscle, with particular reference to the determination of phosphagen in warm-blooded hearts. Hans Mücke. *Arch. expil. Path. Pharmacol.* 173, 333-40(1933).—In order to prevent chem. changes after removal from the organism, the tissues are frozen in liquid air (or ether- $CO_2$ ) and dried *in vacuo* over  $H_2SO_4$  in the ice box. Individual parts of the organ are now freed from blood, fat, etc., powd., extd.  $1\frac{1}{2}$ -2 min. with  $CCl_3CO_2H$  and treated with Ba salts by the method of Eggleton and Eggleton. So analyzed, the hearts of rabbits killed by a blow on the neck have a low phosphagen and a high orthophosphate content, but the hearts of rabbits under urethan anesthesia have a high creatine-phosphoric acid content, the phosphagen:orthophosphate ratio being not significantly different from that of skeletal muscle or frog heart. The decreasing functional capacity of isolated hearts is paralleled by the decreasing creatine-phosphoric acid content. Harry Eagle

The determination of the oxygen content and hemoglobin concentration in solutions of hemoglobin and in hemolyzed blood by a photoelectric method. Kurt Kramer. *Klin. Wochschr.* 12, 1875-6(1933). H. E.

Methods of staining plant tissues for differentiating the natural plant oils from petroleum spray oils. P. W. Rohrbough. *Stain Tech.* 9, 1-3(1934).—A technic involving Nile green and oil red O is described.

C. R. Fellers

Biological method for the concentration of hormones from biological fluids or tissues. M. de Gedroyc. *Compt. rend. soc. biol.* 114, 338-9(1933).—Red corpuscles, whole or hemolyzed, adsorb hormones from soln. After adsorption of the hormone the corpuscle material may be washed and dried and used for oral, subcutaneous or intravenous administration, or the hormone may be dissolved out by an org. solvent and recovered in a very pure form. Biological method of obtaining masculine hormone (androkinin) from male urine. *Ibid.* 340-2.—Twenty l. urine was concd. to 5 l. and mixed with 500 cc. hemolyzed red corpuscles. After sepn. and drying 110 g. of dry powd. active material was obtained.

L. E. Gilson

Precipitation of insulin in aqueous solution by hydrochloric acid. Norberto Lara. *Folia biol.* 1, 141-2(1933).—Insulin previously purified by pptn. at  $pH$  5 was dissolved to make a soln. contg. 600-800 units per cc. To the chilled soln. 10% by vol. of concd. HCl was added. The ppt. was redissolved and further purified by pptn. at  $pH$  5. The loss in total activity was about 18%, but the purified material contained 20 units per mg. of dry substance, whereas the original contained but 18 units per mg.

L. E. Gilson

Quantitative extraction of histamine from tissues by electrolysis. Robert G. Macgregor and Wm. V. Thorpe. *Biochem. J.* 27, 1394-9(1934).—The electrolysis method compares favorably with the alc. method (C. A. 21, 2140).

Benjamin Harrow

Microdetermination of pentoses, free and combined. I. Samuel Andrews and John A. Milroy. *Biochem. J.* 27, 1421-4(1934).—The principle of the method is the production of furfuraldehyde (I) from the action of  $AcOH$  on the pentoses, by means of evacuated and sealed tubes kept at  $170^\circ$  for some hours, and the subsequent direct detn. of the aldehyde colorimetrically with aniline acetate. The yields of I from purine nucleotides of muscle are

higher than those obtained by the usual steam distn. method from a HCl reaction mixt. Benjamin Harrow

Metabolism of normal and tumor tissue. XI. The measurement of respiratory quotient, respiration and glucolysis with the aid of the constant-volume differential manometer. Frank Dickens and Guy D. Greville. *Biochem. J.* 27, 1479-86(1933); cf. C. A. 28, 1097<sup>o</sup>.—An improved technic over that already described (C. A. 25, 308-9).

Benjamin Harrow

Microdetermination of bromine in blood. Arthur G. Francis and Cecil O. Harvey. *Biochem. J.* 27, 1545-50(1933).—A chromic-phosphoric acid mixt. is used for liberating the Br. The method is a modification of that of Evans (C. A. 25, 5871).

Benjamin Harrow

Some limitations of the Carius digestion for the measurement of chloride in biological material. Frederick W. Sunderman and Priscilla Williams. *Biochem. J.* 27, 1578-80(1933); cf. C. A. 27, 5768.—Failure to measure the chloride completely in desiccated biol. tissues must be attributed to other factors rather than to a loss of chloride.

Benjamin Harrow

A note on the use of Feulgen's reaction as a critical stain for wheat cytology. H. C. Gurney. *Australian J. Exptl. Biol. Med. Sci.* 11, 157-9(1933).—Hydrolysis of sectioned tissue with N HCl for 10 min. at  $60^\circ$  was necessary to liberate the proper amt. of aldehydic material in chromatin.

C. G. King

The precipitation of nitrogenous substances with alkaline mercuric reagents with special reference to urine. Mark R. Everett, Fay Sheppard and Erga O. Johnson. *J. Biol. Chem.* 104, 1-10(1934).—The degree of pptn. of Hg nitrogenous compds. in alk. soln. seems to be related to the structure of the substance, less pptn. occurring with alkylated and acylated N. Many amino acids, alkylamines, acid amides and heterocyclic compds. are found in the filtrates. Approx. 1.6% of urine N, 20% of muscle ext. N, 30% of liver ext. N and 70% of bile N is not pptd. Hippuric acid is the chief N-contg. constituent of the urine filtrate but urca, amino N and traces of creatinine and  $NH_3$  are also present. A method is described for the accurate detn. of small amts. of N in the filtrates from the Hg pptn. of nitrogenous substances in biol. fluids. A no. of new Hg compds. of certain acid amides and amino acids have been prepd. A. P. L.

An improvement in the Van Slyke method for blood-gas analysis. Friedrich Rappaport and Klara Köck-Molnar. *J. Biol. Chem.* 104, 29-31(1934).—The reagent described contains  $K_2Fe(CN)_6$  3.3 g., saponin 3.3 g., urea 450 g., octyl alc. 5 cc. and distd.  $H_2O$  to 1000 cc. When it is used, no clotting occurs in the app. as urea prevents protein pptn. even in acid soln. The reagent may be used for macro- and microanalysis of all blood gases in 1 sample and for detn. of CO in blood after absorption of the  $O_2$  with pyrogallol or hyposulfite. A. P. Lothrop

A comparison of the methods for the collection of blood to be used in the determination of gases. Joseph M. Looney and Hazel M. Childs. *J. Biol. Chem.* 104, 53-8(1934).—"A method of collecting and handling blood for gas analyses in a capped syringe is described and is shown to prevent error from exchange of blood gases with the air. Blood kept in 10 cc. portions for  $\frac{1}{2}$  to 2 hrs. under a layer of oil 5 cm. deep was found to lose  $CO_2$  and to absorb  $O_2$  from the air. The max.  $CO_2$  loss was 7.98 vols.%; the mean loss 1.86. For  $O_2$  the max. gain was 6.44 vols.%; and the mean gain 1.32. The effect of stasis on the gas content of blood can be avoided by allowing 1 min. to elapse after removing the tourniquet before drawing the blood."

A. P. Lothrop

A method for the quantitative estimation of indoxyl compounds in blood. Herman Sharlit. *J. Biol. Chem.* 104, 115-20(1934); cf. C. A. 27, 1024.—The method described for the estn. of indoxyl compds. in blood is essentially like the procedure for urine except that all reactions must be carried out at room temp. unless exceedingly high concns. of indoxyl are present in the blood samples. Normal blood contains less than 0.06 mg. % of indican but in cases of N retention 100 times the normal max. may be present.

A. P. Lothrop

**A method for the analysis of tissues.** James B. Gracser, Julius E. Ginsberg and Theodore E. Friedemann. *J. Biol. Chem.* 104, 149-55(1934).—A tissue crusher is described which can be cooled by CO<sub>2</sub> snow and can easily handle 1-10 g. samples. The entire operation of crushing and sampling can be carried out in 1-2 min. on tissues which have been frozen in liquid air. A comparison between the glucose and lactic acid content of tissue and blood samples obtained simultaneously suggests post-mortem changes in the tissues during the process of its prepn. for analysis even when the samples are immediately plunged into liquid air. A. P. Lothrop

**Controlled thermostats for physiological studies at low, non-freezing temperatures.** F. C. Steward. *Plant Physiol.* 8, 545-51(1933).—Description and construction of the app. consisting of a large cold-storage refrigerator cabinet and 3 accurately controlled low-temp. baths are given accompanied by 2 diagrams. The app. has been used to carry out expts. over long periods of time upon respiration and salt absorption at a variety of temps. between 0° and room temp. Walter Thomas

**Combustion with Cl [detn. of Pb] (Erdős, Groák) 1.**

**Handbuch der biologischen Arbeitsmethoden.** Edited by Emil Abderhalden. Lfg. 420. Abt. 2: Physikalische Methoden, Tl. 3, Heft 4. Nachweis der biologisch wichtigen Körper durch Fluoreszenz und Fluoreszenzspektren. Chas. Dhéré. Berlin: Urban & Schwarzenberg. pp. 3097-3306. M. 11.50. Cf. C. A. 27, 5770.

**Analytical apparatus for measuring the volume of gas evolved from a reaction mixture.** Werner Lanz. *Ger. 589,407*, Dec. 7, 1933 (Cl. 421.354). The app. is intended particularly for detns. of the urea content of blood serum.

## C—BACTERIOLOGY

CHARLES D. MORREY

**Decomposition of specific bacterial polysaccharides by a species of Myxobacterium.** W. T. J. Morgan and A. C. Thaysen. *Nature* 132, 604(1933); cf. C. A. 25, 4605.—An organism which appears to be a typical *Myxococcus thaxter*, isolated from decayed vegetable debris, attacked the sp. polysaccharides of *S. dysenteriae* Shiga, *S. dysenteriae* Flexner Y, pneumococcus (Type 11), and human tubercle bacillus and destroyed their power to form a sp. ppt. when mixed with homologous immune serum. Philip D. Adams

**Effect of urea upon activity of bacteriophage.** J. Bronfenbrenner and D. M. Hetler. *Proc. Soc. Exptl. Biol. Med.* 30, 1308-11(1933).—The lytic effect of bacteriophage on growths of *Es. coli* in agar medium decreased as the concn. of agar increased; with an agar concn. of 4-5%, lysis was completely absent. The addn. of urea to the medium intensified the lysis and permitted the bacteriophage to act in the higher concns. of agar. Urea prevents the binding of H<sub>2</sub>O by the agar and thus permits the swelling and subsequent bursting of the bacteria. C. V. Bailey

**Selective media for the isolation, cultivation and differentiation of *Escherichia coli* and *B. lactis aerogenes*.** W. J. Wilson. *J. Hyg.* 33, 404(1933); *U. S. Pub. Health Eng. Abstracts* 14, W, 3(Jan. 6, 1934).—By means of an agar medium contg. in each 100 cc. of nutrient agar, 1 g. each of anhyd. Na<sub>2</sub>SO<sub>3</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> and a small amt. of Pb(OH)<sub>2</sub>, *Es. coli* and *Aerobacter aerogenes* formed black coliform colonies without clear differentiation. When a cover of agar was added to the plates after the inoculated media had hardened, the growth of *Aer. aerogenes* was suppressed. Other partially selective media in which Na citrate, Na taurocholate and hexamethylenetetramine are used are described. The latter suppresses the growth of *Aer. aerogenes*. C. R. Fellers

**Action of acetone extracts of organs of healthy guinea pigs on the pathogenic properties of the filterable elements of tubercle bacilli.** L. Nègre, J. Valtis and F. van Deinsse. *Compt. rend. soc. biol.* 114, 438-9(1933); cf. C. A. 27, 3507.—Injections of lipides from the lungs, liver or kidneys of healthy guinea pigs, like injections of

the lipid substances from Koch's bacillus, increases the virulence, in guinea pigs, of the acid-resistant bacilli: developing from the filterable elements of *M. tuberculosis* cultures. L. E. Gilson

**Bacterial hemolysis and cholesterologenes.** V. de Laverne and P. Kissel. *Compt. rend. soc. biol.* 114, 1014-15(1933).—Hemolytic bacteria and their toxins liberate cholesterol from corpuscles *in vitro*. L. E. Gilson

**Physicochemical properties of the endocellular substance of the diphtheria bacillus.** H. Goldie. *Compt. rend. soc. biol.* 114, 1149-52(1933); cf. C. A. 28, 5032. L. E. Gilson

**Research on the catadyn method.** W. Grimmer and A. Grentz. *Milchwirtschaft. Forsch.* 15, 367-80(1933).—A study of bactericidal action in which the time and quantity of Ag were varied. Bactericidal action is proportional to the time and quantity of Ag but varies with the organism studied. George R. Greenbank

**Studies in the biochemistry of microorganisms. XXXII. Cynodontin (1,4,5,8 - tetrahydroxy - 2 - methylanthraquinone), a metabolic product of *Helminthosporium cynodontis* Marignoni and *Helminthosporium euschlaenae* Zimmermann. Harold Raistrick, Robert Robinson and Alexander R. Todd. *Biochem. J.* 27, 1170-75(1933); cf. C. A. 27, 5371.—Cynodontin, a hitherto undescribed cryst. coloring matter, is 1-hydroxy-helminthosporin (cf. C. A. 27, 3471). XXXIII. The mycelial constituents of *Penicillium brevi-compactum* Dierckx and related species. 1. Ergosteryl palmitate. Albert E. Oxford and Harold Raistrick. *Ibid.* 1176-80.—Ergosteryl palmitate has been isolated from the mycelia of 14 out of 15 strains in the *P. brevi-compactum* Dierckx series and also from the mycelium of *P. italicum* Wehmer. All the molds were grown on synthetic media. XXXIV. Mechanism of the production of phenolic acids from glucose by *Penicillium brevi-compactum* Dierckx. Albert E. Oxford and Harold Raistrick. *Ibid.* 1473-8; cf. C. A. 27, 1027.—The yield of mycophenolic acid, C<sub>17</sub>H<sub>10</sub>O<sub>6</sub>, increases continuously during the whole course of metabolism. In the early stages of metabolism the presence of the acid C<sub>10</sub>H<sub>10</sub>O<sub>6</sub> could not be detected with certainty. The yield of the acid C<sub>10</sub>H<sub>10</sub>O<sub>6</sub> increases rapidly to a max. 3,5-Dihydroxyphthalic acid is never present in large amts. but increases steadily during the course of metabolism. The acid C<sub>10</sub>H<sub>10</sub>O<sub>6</sub> is present in small amts. in the early stages of metabolism, but is absent in the later stages. Benjamin Harrow**

**Acetic acid bacteria produced in Formosa. III.** Shosuke Tanaka. *J. Agr. Chem. Soc. Japan* 9, 1104-16(1933); cf. C. A. 27, 5364.—Five varieties of *Bacterium xylinum* Brown were isolated from fermentation products in southern Japan. The membrane produced gave the cellulose reaction. Production of acid was 4.4-5.1%. The bacteria assimilated the AcOH produced. They were not found of any industrial value. Y. Kihara

**A method for cultivating and preserving the gonococcus.** M. Maino. *Boll. soc. ital. biol. sper.* 8, 1209-12(1933).—The gonococci, after a series of daily transplants on ascites agar, are transplanted on a fluid medium prepd. as follows: add to 1 l. of a slightly alk. broth contg. 10 g. peptone, 10 g. meat ext. and 5 g. NaCl, 2 g. glucose. Distribute the medium into tubes and cover the surface with a one-cc. layer of liquid petrolatum. Sterilize for 15 min. at 120° and add to each tube 1 cc. of sterile ascites fluid. Incubate to insure sterility and then inoculate the surface of the broth below the petrolatum with a loopful of a freshly planted culture of gonococcus. Incubate at 37°. After 12 hrs. a thin film of growth develops between the petrolatum and the surface of the broth. After 8-10 days the pellicle sinks to the bottom. Transplants on ascites-agar 60-70 days later show that the organism is still living, although growth is somewhat retarded. The addn. of glucose to the medium prevents rapid formation of alk. while the addn. of liquid petrolatum limits the amt. of O accessible to the medium. Peter Masucci

**The gaseous metabolism of *L. pentoceticus* with reference to several representative members of the lacto-**

bacillus group. George A. Hunt. *J. Bact.* 26, 341-60 (1933).—Most lactobacilli utilize O and produce CO<sub>2</sub> in the fermentation of carbohydrates, in relatively small amts., but *L. pentoceticus* uses large amts. of O and produces equiv. amts. of CO<sub>2</sub>. It can utilize xylose and lactose readily with O consumption and CO<sub>2</sub> production in the vol. ratios of 1:1. None of the lactobacilli studied is inhibited by KCN in less than 0.1% concn. All species were inhibited by NaF and CH<sub>3</sub>ICOOH in 0.1 N and 0.0001 N concn., resp. Methylene blue and pyocyanine accelerate the O consumption by *L. pentoceticus* whether KCN is present or absent. Slightly higher ratios of volatile to non-volatile acids are obtained under aerobic than anaerobic conditions. However, the formation of large amts. of volatile acids under anaerobic conditions suggests a sep. mechanism for aerobic and for anaerobic conditions.

John T. Myers

Differentiation between Gram-positive and Gram-negative microorganisms by the use of enzymes. D. W. Bruner. *J. Bact.* 26, 361-71 (1933).—Aged glycerol exts. of pancreas inhibited the growth of Gram-negative bacteria when added to a medium consisting of Na<sub>2</sub>CO<sub>3</sub> 0.1, KH<sub>2</sub>PO<sub>4</sub> 0.2 urea 0.2 and agar 2.0% in distd. water, with a pH of 7.2-7.4. Heat or acid destroys the inhibitory action. Neither pepsin, amylase nor lipase will differentiate between Gram-positive or Gram-negative organisms. Trypsin is the inhibitory substance. The negative bacteria are digested. This may aid in the sepn. of Gram-positive from Gram-negative organisms.

John T. Myers

Agar-digesting bacteria. Harry E. Goresline. *J. Bact.* 26, 435-57 (1933); cf. *C. A.* 27, 2469.—Three groups of microorganisms capable of digesting agar were isolated from an exptl. trickling filter. They are different from previously described species. Viscosity detns. indicate that a marked change was effected in the gel structure of agar by growth of these organisms. J. T. M.

An improved method of obtaining surface colonies of anaerobic bacteria. James R. Reeves. *J. Bact.* 26, 471-4 (1933).

John T. Myers

The utilization of certain sugars and their derivatives by bacteria. Stewart A. Koser and Felix Saunders. *J. Bact.* 26, 475-88 (1933); cf. *C. A.* 27, 1907.—Methyl derivs. of several of the commoner sugars, in which the Me group was substituted for the H of the OH group attached to the no. one C atom, were distinctly resistant to bacterial attack. Thus  $\alpha$ -methyl-*D*-glucoside was utilized by comparatively few of the organisms which ferment glucose.  $\alpha$ -Methyl-*D*-mannoside,  $\beta$ -methyl-*L*-arabinose and  $\beta$ -methyl-*D*-xyloside were not fermented by those organisms capable of breaking down the corresponding unaltered sugars: *D*-mannose, *L*-arabinose and *D*-xylose. The *D*-form of arabinose was usually fermented much more slowly than the common *L*-form. The Me pentoses, rhamnose and fucose, in which the Me group is attached to the fifth C atom, were fermented readily. Two sugars contg. 7 C atoms,  $\alpha$ -glucoheptose and  $\alpha$ -glucoheptulose, were not fermented by any organism tested. Glucosamine was used by most cultures which utilized glucose, though in some instances with apparent difficulty. Gluconic acid was used by many bacteria. A S-contg. sugar, glucose ethyl mercaptal, gave entirely neg. results.

John T. Myers

The decolorization of heated blood agar by streptococci. F. D'Arcey Hart and A. B. Anderson. *J. Path. Bact.* 37, 334-5 (1933).—The action is apparently a bleaching by H<sub>2</sub>O<sub>2</sub>. The addn. of catalase inhibits it. The green color produced in unheated blood agar by pneumococci and *Strept. viridans* is due to the formation of a green pigment from hemoglobin.

John T. Myers

The identification of *Escherichia coli* by means of the indole reaction. Ernst Gottsacker. *Zentr. Bakt. Parasitenk.*, 1 Abt. 129, 517-20 (1933).—The test for indole by the Na nitroprusside method is useful. J. T. M.

The growth of the so-called *Bacterium typhi flamm* in blood and bile. Schaefer. *Zentr. Bakt. Parasitenk.*, 1 Abt. 130, 21-4 (1933).—Defibrinated sheep blood is a

good medium at either 22° or 37°. Ox bile kills the organisms at 37° but not at 22°.

John T. Myers

Effect of meat-curing solutions on anaerobic bacteria. II. Sodium nitrate. Fred W. Tanner and Florence L. Evans. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 48-54 (1933); cf. *C. A.* 27, 2976.—NaNO<sub>2</sub> in concns. of 0.664-2.2135% did not inhibit any of the *Cl. botulinum* types A and B, *Cl. putrificum* or *Cl. sporogenes*. Concns. of NaNO<sub>2</sub> from 2.213 to 4.427% showed irregular inhibition of 7 strains of *Cl. botulinum*. The highest concn. prevents growth of 6 and toxin formation in 5 of the 7 strains. These expts. do not include the use of NaNO<sub>2</sub> in combination with other substances in meat-curing solns. It is also possible that different nos. of cells in the inoculum might influence the results.

John T. Myers

Bacterial proteins with special consideration of gonococcus and meningococcus. Alden K. Boor and C. Phillip Miller. *J. Exptl. Med.* 59, 63-74 (1933).—Methods of prepa. and certain properties of the nucleoproteins of gonococcus (I), meningococcus (II), *N. calarrhialis*, *R. pneumococcus*, *Str. hemolyticus* and *St. aureus* are described. No essential differences between the nucleoproteins and the intact cells of I and II were observed in their ability to engender immune substances, to induce bacterial allergy in rabbits or to elicit cutaneous reactions (of the delayed type) in rabbits rendered hypersensitive to these organisms. Measured by their lethal action in mice, the toxicity of I and II nucleoproteins was found to be but slightly less than that of the intact cells. It seems probable, therefore, that the toxic action of these organisms is due, chiefly or entirely, to some constituent of the nucleoprotein fraction. Extn. with Me<sub>2</sub>CO and Et<sub>2</sub>O in the cold did not reduce appreciably the toxicity of these organisms and their nucleoproteins, and did not alter their immunological behavior. Cross-precipitin reactions suggested that gonococcal nucleoprotein contains an antigenic factor in common with the non-encapsulated pneumococcus cell, and meningococcal nucleoprotein one in common with the capsular material of pneumococcus type III. Tryptic digestion destroys these antigenic factors but not those responsible for the cross-reactions within the genus *Neisseria*.

C. J. West

Carbohydrates of gonococcus and meningococcus. I. The alcohol-precipitable fraction. C. Phillip Miller and Alden K. Boor. *J. Exptl. Med.* 59, 75-82 (1933).—The EtOH-insol. polysaccharides of gonococcus and meningococcus were found to contain 4.2 and 3.7% N, resp., to be protein-free by chem. test, to reduce Fehling-Benedict soln. only after hydrolysis. They were non-toxic for rabbits and mice and failed to engender antibodies in rabbits. They produced no cutaneous reactions in normal, snuffle-free rabbits but caused typical allergic reactions of the delayed type in rabbits rendered hypersensitive to these organisms. Both carbohydrates reacted in high diln. with antipneumococcus serum Type III. For comparison, carbohydrates were prepd. also from *Neisseria calarrhialis*, *Streptococcus hemolyticus*, *Staphylococcus aureus* and a rough strain of pneumococcus.

C. J. West

Lipolytic bacteria (Horovitz-Vlasova, Livshitz) 12. Lactose broth fermenters (Keatley) 14. Phenol derivs. [germicides] (Brit. pat. 398,218) 10.

## D—BOTANY

THOMAS G. PHILLIPS

Ceryl alcohol from the grass, *Agrostis*. Charles E. Bills and Godfrey E. Steel. *Proc. Soc. Exptl. Biol. Med.* 31, 134-5 (1933).—The ceryl alc. of cocks foot and ryegrass is chiefly *n*-hexacosanol (cf. Pollard, Chibnall and Piper, *C. A.* 26, 2530). The ceryl alc. of bent grass (*Agrostis*) had a slightly higher mean C content; it is essentially hexacosanol.

C. V. Bailey

Direct transformation of nitrates into ammonia by the mycelium of lower fungi. D. Bach and D. Desbordes. *Compt. rend.* 197, 1463-5 (1933).—When *Aspergillus repens* is maintained in an acid medium of pH 1.61-2.36 the amt. of HNO<sub>3</sub> which disappears is equal to the amt. of NH<sub>3</sub> formed and no increase in the wt. of the mycelium

occurs. But at  $pH$  6.16 the amt. of  $NH_3$  formed is less than the amt. of  $HNO_3$  utilized, and the addnl.  $HNO_3$  is used in protein synthesis, as evidenced by the increase in wt. of the mycelium. Rachel Brown

The accumulation of ionizable benzene derivatives in yeast cells with special reference to the spontaneous reversal in the case of *o*-hydroxybenzoic acid. Fr. Axmacher. *Arch. expil. Path. Pharmacol.* 173, 722-36 (1933).—Of the simple acid and basic derivs. of benzene, those with the higher dissociation constants are preferentially adsorbed by yeast cells, the organic acids more strongly in acid reaction, the organic bases more strongly in alk. reaction. The degree of adsorption is not strictly parallel to the oil: water partition coefficient. Living yeast cells adsorb salicylic acid more strongly than dead cells, the adsorption being increased by multivalent cations and decreased by multivalent anions. The time curve of adsorption of salicylic acid suggests that it is subsequently re-dissociated from the cell surface, possibly as an  $NH_4$  salt. Harry Eagle

Effect of manganese deficiency on the growth and sugar content of plants. Lawrence P. Miller. *Am. J. Botany* 20, 621-31 (1933).—Wheat, corn, lettuce, cabbage, rye, barley, tobacco and tomato plants were grown under Mn-deficient conditions. The results indicate that Mn plays an important part in sugar formation and metabolism. Mn-deficient plants were much lower in sugar than the controls. Tomato fruits grown on low-Mn plants were lower in sugar content. The Mn salt solution necessary for the growth of tomato plants can be added directly into the stems of the plants with a fine pipet. It is thus possible to grow Mn-deficient plants in the same pot with plants receiving Mn. L. E. Gilson

Copper and iron in the tracheal sap of deciduous trees. J. P. Bennett and Jacob Oserkowsky. *Am. J. Botany* 20, 632-7 (1933).—The Fe, Cu and total electrolyte contents of the tracheal sap from branches of pear trees were detd. at intervals throughout the year. The parallelism shown in the curves indicates that the Fe, Cu and electrolyte concns. are controlled by the same factors. The tracheal sap from branches or roots of several varieties of fruit trees usually contained more Cu than Fe. No special relation of Cu to the functioning of Fe is indicated by the data. L. E. Gilson

Miscellaneous tropical and sub-tropical fruits. The papaya. Harold Mowry and L. R. Troy. Fla. Agr. Expt. Sta., *Bull.* 223, 88 pp. (1931).—Culture, fertilization of the papaya and other sub-tropical fruits are given together with some data on compn. The ripe papaya contains no papain, though this powerful digestive enzyme is present in the latex of the vegetable parts and in the immature fruit. C. R. Fellers

Production of mucus during the decomposition of plant materials. I. The effect of environmental conditions. Jageshwar Gopal Shrikhande. *Biochem. J.* 27, 1551-62 (1933).—In the presence of a mixed natural flora, the chief factors involved in causing stickiness in decomposing straw are the source of N supplied, the initial and final reactions of the material and the degree of decomposition. A  $pH$  of 9.5-10.0 seems to give the max. stickiness. II. Effect of changes in the flora. *Ibid.* 1563-74.—The production of stickiness in straws depends upon the presence of fungal tissue and the nature of the bacterium. Benjamin Harrow

The effect of various treatments of sugar-cane cuttings on the rate and extent of germination and the yield of cane. A. E. S. McIntosh. *Barbados Agr. J.* 2, No. 3, 20-5 (1933).—The rate and extent of germination of cane cuttings were increased by soaking the pieces for 48 hrs. in a satd. soln. of  $Ca(OH)_2$  or a 0.5% soln. of  $FeSO_4$ . Soaking in water alone or in satd.  $Ca(OH)_2$  plus 1 lb.  $MgSO_4$  per 50 gal. water had a smaller effect. The effect of soaking was most pronounced under conditions of low soil moisture. None of the treatments increased the vigor of the plants or the yield of cane. K. D. Jacob

Investigations on the development of prussic acid in cholam (*Berghum vulgare*). C. Narasimha Acharya. *Indian Agr. Sci.* 3, 551-60 (1933).—The HCN con-

tent of a normal crop of cholam decreases progressively from 0.2 to 0.3% at the early stages of growth till the flowering stage, at which it can be considered harmless. The leaves contain about 60% of the total cyanogen compds. present in the plant, and contain a higher percentage on the dry matter than do the stems and roots. The total HCN content of a plant and the percentage on the dry matter are lowest in the morning, then increase up to about 2 p. m., after which there is a slight decrease till 6 p. m., followed by a rapid decrease in the night. Young seedlings (less than 40 days old), plants stunted by drought, ratoons and secondary shoots contain the highest percentages of HCN on the dry matter. Seedlings grown in darkness contain as much HCN as those grown in sunlight. Drying the plants in the shade and in the sun decreased the HCN approx. 10 and 30 and 40%, resp. The poisonous principle is destroyed by heating the plants for several hrs. at  $100^\circ$  or by immersing for a short time in 10%  $H_2SO_4$ . Silages prepd. from seedlings and ratoons, originally contg. 0.1-0.2% HCN, showed only a trace of HCN after 2 months. There is evidence that the cyanophoric group in cholam may be present in less-stable combinations as well as in the glucosidal form. A simple I test is given for differentiating between poisonous and nonpoisonous cholam, based on the accumulation of starch in the stems of poisonous plants. A method for detg. the HCN content of cholam is described. Thirty-two references. K. D. Jacob

Physiological polarized mass exchange and photosynthesis in submerged water plants. I. K. Arns. *Planta (Abt. E., Z. wiss. Biol.)* 20, 621-58 (1933). The mechanism of the absorption and assimilation of  $CO_2$  by the leaves of water plants submerged in bicarbonate solns. and in distd. water is discussed in detail. Thirteen references. K. D. Jacob

The effect of some narcotics on the heterostyle flax variety *Linum austriacum* L. Maria Freiburg. *Planta (Abt. E., Z. wiss. Biol.)* 20, 659-87 (1933).—The effects of  $CHCl_3$ ,  $Et_2O$ , chloral hydrate and methylthylurthians on the chromosome alterations in *L. austriacum* were studied. Seventy-three references. K. D. Jacob

The significance of growth substance for the growth and the geotropic curvature of the roots of *Vicia faba* L. Boysen-Jensen. *Planta (Abt. E., Z. wiss. Biol.)* 20, 688-98 (1933); cf. *C. A. T.* 27, 4272.—When a root is geotropically induced for 2-4 hrs. a greater quantity of growth substance is recovered from the lower side than from the upper side of the root. The growth velocity of the root is retarded by the accumulation of growth substance. As a result of the geotropic curvature of the main root of *V. faba* the growth substance present in the root tip is shifted by the force of gravity into the lower side of the root; this causes a depression in the growth velocity of the lower side of the root in comparison with that of the upper side. K. D. Jacob

The assimilation of carbon dioxide at constant external conditions. II. The behavior of sun and shade plants. Richard Harder. *Planta (Abt. E., Z. wiss. Biol.)* 20, 699-733 (1933); cf. *Ibid.* 11, 283.—Species of *Fontinalis* were grown under natural and artificial light of relative intensities 1, 4, 64 and 256. The form of the  $CO_2$  assimilation curve depends both on the intensity of the light in which the plant is grown and on the intensity of the light in which assimilation takes place. Two extremes in the curves are observed, the one increasing to a max. in the course of hrs., the other showing little or no increase at 1st followed by a sharp decrease and then an irregular increase to a 2nd max.; all degrees of variation occur between these extremes. Under natural conditions the assimilation curves of shade and weak-light plants usually show 2 maxima, whereas those of sun and strong-light plants show only 1 max.; these relations do not hold, however, when the intensity of the exptl. light is altered. Fifteen references. K. D. Jacob

Seed germination in *Solanum lycopersicum*. A. W. Reinhard and M. Gorelik. *Planta (Abt. E., Z. wiss. Biol.)* 20, 792-4 (1933).—Germination was depressed in the presence of various esters of the expressed juice of

the fruit and in exts. of the mucous membrane surrounding the seed; aq. exts. of the ground seed were also harmful. The bad effect of the mucous membrane is due not only to O deficiency but also to the presence of some specifically harmful substance.

K. D. Jacob  
The effect of colored light on the genesis of chloroplastic pigments. Horst Rudolph. *Planta (Abt. E., Z. wiss. Biol.)* 21, 104-55(1933); cf. *C. A.* 28, 478<sup>a</sup>.—The mol. extinction coeff. of chlorophyll A and B is  $\lambda$  680-537  $\mu$  and of carotene and xanthophyll  $\lambda$  520-438  $\mu$ . As detd. by the polarization spectrophotometer the relative extinction coeff. of protochlorophyll is  $\lambda$  640-537  $\mu$ . With etiolated leaves the content of carotenoids depends on the leaf area; protochlorophyll does not show this relation and chlorophyll A and B are absent. Chlorophyll formation is strongest in leaves exposed to light filtered through red gelatin, and next strongest in those exposed to yellow-green and blue light, resp. Carotenoid formation is weakest in red light, stronger in yellow-green and strongest in blue. Protochlorophyll formation is not definitely connected with the kind of light. Production of all chloroplastic pigments was decreased in the absence of CO<sub>2</sub>. Young plants contain more chlorophyll per area of leaf surface than do older plants. Significant formation of chlorophyll was obtained by exposing leaves for 1 sec., at a distance of 30 cm., to unfiltered light from a 250-w. (osram lamp). After exposure to light, formation of protochlorophyll continued for 24 hrs. in leaves kept in the dark. A study of *Betula pendula* indicated no genetic relation between chlorophylls and carotenoids. Numerous references.

K. D. Jacob  
The phototaxis of chloroplasts. S. Heinz Voerkel. *Planta (Abt. E., Z. wiss. Biol.)* 21, 156-205(1933).—A study was made of the effect of light from different portions of the spectrum on the formation and development of chloroplasts and on the viscosity of the leaf plasma. In the visible range of the spectrum absorption of light by the carotenoids occurs. Numerous references.

K. D. Jacob  
The effect of growth substance on regeneration and wound-tissue formation [in plants]. O. Mrkos. *Planta (Abt. E., Z. wiss. Biol.)* 21, 206-10(1933). K. D. Jacob

The effect of nitrate supply on transpiration ratio in plants. L. A. T. Ballard. *Australian J. Exptl. Biol. Med. Sci.* 11, 161-76(1933).—Nitrate reduces the transpiration ratio (I) (water respired/dry matter produced, up to any point) by an effect on growth, and not by an effect upon the transpiration rate per unit wt. of leaf. A progressive reduction in I occurs with increasing age of plants. The transpiration rate also decreases with age.

C. G. King  
The mucilage from slippery elm bark. Ernest Anderson. *J. Biol. Chem.* 104, 163-70(1934).—The mucilage from slippery elm (*Ulmus fulva*) bark is a mixt. of 2 or more polyuronides with varying amts. of CaC<sub>2</sub>O<sub>4</sub> as impurity. On hydrolysis it yields definitely, galacturonic acid, l-rhamnose, d-galactose, and a colored non-saccharine X body; there are also indications of the presence of a pentose, a methylated hexose and a methylated uronic acid. The polyuronides seem to be composed of a uronic acid combined with 2 mols. of simple sugars and an H body in the following sequence: the uronic acid is combined through its CHO group with the Me pentose or pentose which, in turn, is combined through its CHO group with the hexose or Me hexose, the CHO group of which is united with the X body.

A. P. Lothrop  
The nature of the sheath material in the feeding punctures produced by the potato-leaf hopper and the three-cornered alfalfa hopper. Floyd F. Smith. *J. Agr. Research* 47, 475-85(1933).—A study was made of the chem. nature of the sheaths found in feeding punctures produced by the potato-leaf hopper (*Empoasca fabae*) and the 3-cornered alfalfa hopper (*Stictiocephala festina*). The sheaths made by the 2 species responded similarly in all tests. Color tests for mucin were neg. but certain color tests for proteins and amino acids showed that the sheath material is largely proteinaceous. The tests indicate the sheath is largely of insect origin and contains

no plant substance with the possible exception of pectose. The highly insol. sheath, persisting in the vascular tissue, probably interferes with the normal translocation of plant materials and accounts for the typical plant injuries caused by the feeding of these insects.

W. H. Ross  
Effect of weathering on composition of hardwood leaves. Herbert A. Lunt. *J. Forestry* 31, 943-5(1933).—Leaves of several hardwood species gained slightly in ash and N and lost considerably in K and P during 8 weeks on the ground. There was no change in Ca.

H. K. Salzberg  
Microchemical studies of tyloses. Irving H. Isenberg. *J. Forestry* 31, 961-7(1933).—Sections of 9 species of American hardwoods and 3 hardwoods from British India, in all of which tyloses are common, were examd. under the microscope simultaneously with the addn. of chemicals. The walls of the tyloses were found resistant to pectin solvents, but reacted to lignin and cellulose solvents. In ash the tylosis dissolves completely in lignin solvent but in the other woods this solvent acts only on an outer layer leaving an inner layer of cellulose.

H. K. Salzberg  
The action of potassium upon higher plants. August Rippel, Georg Behr and Rudolf Meyer. *Z. Pflansen-nähr., Düngung Bodenk.* 32A, 95-109(1933).—Oats and potatoes grown in pots of sand with complete nutrient solution and variation in K<sub>2</sub>O supply indicated that deficiency in K<sub>2</sub>O causes symptoms suggesting oversupply of N. Schmalfuss' (*C. A.* 27, 3500) observation that accumulation of NH<sub>3</sub> in the plant is a symptom of K<sub>2</sub>O deficiency was confirmed. Insufficient K<sub>2</sub>O did not cause (COOH), to accumulate in potato plants. No evidence was secured that the role of K<sub>2</sub>O is not in carbohydrate exchange.

C. J. Schollenberger  
Sand and solution culture experiments on the action of the copper ion. K. Scharrer and W. Schropp. *Z. Pflansen-nähr., Düngung Bodenk.* 32A, 184-200(1933).—Small grains grown in Neubauer dishes contg. 600 g. glass sand with 10<sup>-2</sup>-10 milliequivs. Cu as CuSO<sub>4</sub>.5H<sub>2</sub>O showed slight effects with up to 10<sup>-1</sup>, considerable injury with 1 and practically no growth with 10 milliequivs. Cu. Corn showed a stimulant effect, especially upon root growth, with up to 10<sup>-1</sup>, great injury with 1 and no growth with 10 milliequivs. Cu. Results with peas were similar but highly variable. The growth of corn seedlings transferred to Richter's soln. cultures with both 1-10 milliequivs. Cu and 0.5-2 milliequivs. Ca(NO<sub>3</sub>)<sub>2</sub>, indicated that Ca has an antagonistic effect upon Cu injury without lessening root stimulation, so that plants grew well in solns. contg. 10 and 2 milliequivs. Cu and Ca, resp. Extensive review and 88 references.

C. J. Schollenberger  
The effect of nitrogen nutrition on the protein and non-protein nitrogen of wheat. A. G. McCalla. *Can. J. Research* 9, 542-70(1933); cf. *C. A.* 27, 4852.—Wheat plants were grown in water cultures varied only with respect to N. The N as nitrate was supplied to half the plants continuously to maturity, and to the others only until the time of heading. Though uptake and reduction of nitrate continued in the former for some time after heading, org. N produced in vegetative parts of the plant, after heading, was not synthesized to protein but accumulated in the form of non-protein compds. Regardless of the extent of the N reserves in vegetative parts, translocation to the kernels during filling took place in about the same proportion. In plants with limited N supply, translocation to kernels consisted largely of decomposed proteins, and the kernels contained less gluten N than those of the plants with unlimited N supply which drew upon both protein and non-protein reserves. The N fractions of the gluten proteins were unaffected by the N nutrition of the plants. The total amount of non-gluten N was apparently also unaffected by the nutrition. Amide N was the most labile of the N fractions used.

J. W. Shipley  
A further note on catalase activity as a measure of seed viability. C. W. Leggett. *Can. J. Research* 9, 571-3(1933); cf. *C. A.* 24, 541.—Application of statis-

tical methods to the results of an investigation previously published has shown that viability, in the case of common wheat, can be estd. fairly closely from a detn. of total and thermostable catalase; this detn. can be completed within the course of a few hrs., as compared with the regular germination test requiring 12 days. The method has not yet been put on a practical routine basis.

J. W. Shipley

Investigation of the sensitiveness and differentiating power of the protoplasm of *Vallisneria* toward various  $\alpha$ -amino acids. Hans Fitting. *Jahrb. wiss. Botan.* 77, 1-103(1933); cf. *C. A.* 22, 796; 23, 3488. C. W. S.

Fixation of atmospheric nitrogen in the root bark of *Corallorrhiza innata* R. Br., also in the epiphytes *Cattleya bowringiana* Veit and *Laelia anceps* Ldl. Heinrich Wolff. *Jahrb. wiss. Botan.* 77, 857-84(1933).—The aerial roots of *Corallorrhiza* (I), *Cattleya* (II) and *Laelia* (III) are hosts of N-fixing mycorrhiza. Using his previously described method (*Jahrb. wiss. Botan.* 66, 1-34 (1926)) on the root bark of these plants W. found the fixation in 100 days was: I, 0.24-0.84 mg., N II and III 0.23-0.96 mg. in 100 cc. of culture soln. C. W. S.

Absorption tests with plants. VII. Absorption of phosphorus. F. Diaz Aguirreche. *Anales soc. españ. fis. quim.* 31, 896-904(1933); cf. *C. A.* 24, 454; 26, 3005; 28, 5061.—Tables show absorption of P by plants from various alkali phosphates and from their mixts. with KNO<sub>3</sub>.

E. M. Symmes

New method of arranging experiments with vegetables in sand cultures with flowing solution. Z. Zhurbitski. *Plant Physiol.* 8, 553-8(1933).—To the siphon which delivers the nutrient soln. to the culture vessels of Allison and Shive's app. (*C. A.* 18, 1006) is attached a Y tube (2 mm. in diam.) in the upper arm of which is a glass cock which regulates the flow of soln. The side tubes are drawn out to make outlets as uniform as possible. Delivery is uniformly distributed between 4 culture vessels by means of swinging curved tubes fastened to a common support. The app. is described in detail with 3 figures.

Walter Thomas

Character of hemicellulose in certain fruit trees. W. E. Tottingham. *Plant Physiol.* 8, 559-61(1933); cf. *C. A.* 18, 849.—Branch tissue taken in August from apple, cherry, pear, peach and plum trees was hydrolyzed with 1% (wt.) H<sub>2</sub>SO<sub>4</sub> after removal of lipides, sugars and starch. The proportions of galactose or galacturonic acid in the cherry and peach were 0.08 and 0.13%, resp., compared with 4.5% in apple, 3.7% in pear and 2.7% in plum tissues. Xylose in the cherry and peach is relatively high, 70 and 81.3%, resp., and in the apple 47.3%, pear 37.9%, plum 59.7%. The uronic acid equiv. of the free sugar fraction constitutes about 30% of the total hemicellulose of the tissues except in the plum where it reaches 64%. Free uronic acid ranged from 3 to 6% and the total uronic acid from 10 to 15% in the species studied. Conclusion: Glucose and xylose are equally significant reserve components in the hemicellulose fraction.

Walter Thomas

Detn. of nitrate in plants (Treschow, Gabrielsen) 7. Detn. of the varieties of sugar cane grown in Tucumán (Fawcett) 28.

Smith, Kenneth M.: Recent Advances in the Study of Plant Viruses. London: J. & A. Churchill. 423 pp. 15s.

## E—NUTRITION

PHILIP B. HAWK

Relative utilization of calcium from calcium carbonate and calcium gluconate by chickens. J. E. Hunter, R. Adams Dutcher and H. C. Knandel. *Proc. Soc. Exptl. Biol. Med.* 31, 70-5(1933).—CaCO<sub>3</sub> and Ca gluconate were equally efficient as sources of Ca for the growing chick when equiv. amts. of Ca were given. In the laying hen, Ca gluconate was more effective than CaCO<sub>3</sub> in the production of egg shell, shell ash and Ca in the egg contents.

C. V. Bailey

Influence of mineral oil on assimilation of vitamin A

from spinach. Helen S. Mitchell. *Proc. Soc. Exptl. Biol. Med.* 31, 231-3(1933).—In the rat, 10-12 times as much fresh green spinach was required to furnish a unit of vitamin A when accompanied by 1/2 cc. of mineral oil; and about 8 times as much when fed separately at least 6 hrs. apart. Paraffin oil with a higher m. p. and wax mixt. was less detrimental than the fluid oil.

C. V. Bailey

Chemical character of the blood and urine of colts. W. W. Demock and Daniel J. Healy. *J. Am. Vet. Med. Assoc.* 36, 806-9(1933).—Blood serum of normal and overfed fillies contained in mg. per 100 cc., resp., Ca 12.0, 12.5; K 15.4, 18.5; P 4.9, 5.0; non-protein N 28.1, 19.9; sulfate S 13.4, 10.0; sugar 106, 123. Urine from the same animals had d. 1034, 1038;  $\rho_H$  7.4, 6.6; albumin 0, 0; N11, 50.0, 100.0; Ca 128.5, 184.9; sulfate S 81.9, 63.1. When overfed fillies and colts were again put on a rational diet their leg trouble disappeared and the analyses of the blood and urine returned to normal.

Rachel Brown

Vitamin studies. VII. Vitamin C content of some little used foodstuffs. F. V. v. Hahn. *Z. Untersuch. Lebensm.* 66, 261-70(1933); cf. *C. A.* 24, 5342; 25, 4916; 27, 1920.—Pine needles contain large amts. of vitamin C, as do also the berries of the mountain ash. Various kinds of apples were examd. and the wild crab was found to contain more vitamin C than cultivated varieties. In quinces, those more closely related to the wild types contained more vitamin C than the cultivated kinds. The haw also contains this vitamin.

F. L. Dunlap

The vitamin content of Evianis (Vitaphos). A. Schenert, M. Schieblich and J. Reschke. *Z. Untersuch. Lebensm.* 66, 271-8(1933).—This study showed that Evianis (Vitaphos) contained no vitamins A and D and that the B complex was present in but very small amts.

F. L. Dunlap

The vitamin value of fermentation and artificial vinegars. Jaroslav Křizenecký and Michajl Nevalonnyj. *Z. Untersuch. Lebensm.* 66, 278-88(1933).—Two wine vinegars and 1 artificial vinegar prepd. from glacial acetic acid were investigated. The fermentation vinegars contained the antineuritic B vitamin and the water-sol. growth-promoting G. Vitamin C was not present in any significant amt. These vitamins were absent in the artificial vinegar. The AcOH of the artificial vinegar had a much more poisonous action than that from the fermentation vinegar.

F. L. Dunlap

Low-cost diets for emergency use. Harriet T. Barto, Julia Outhouse and Sybil Woodruff. *Ill. Agr. Expt. Sta., Circ.* 406, 3-12(1933).

C. R. Fellers

Growth of rats fed high-protein rations supplemented by different amounts and combinations of vitamins B (B<sub>1</sub>), G (B<sub>2</sub>) and B complex. Lillias D. Francis, Arthur H. Smith and Lafayette B. Mendel. *J. Nutrition* 6, 493-505(1933).—Unilateral nephrectomy *per se* did not impair the ability of rats to grow when fed rations contg. 18, 50 or 90% casein. The rats fed the ration contg. 50% casein made wt. gains equal to those on the 18% level, but were definitely superior to those on the 90% level. The optimum level of dietary protein lies between 18 and 50%. The high-protein groups of rats still made inferior wt. gains when the casein was supplemented with yeast alone. The best growth attained on the 18% casein ration was by the use of 0.8% of yeast and also by the 1.6 g. level of yeast plus tikitiki ext. In the absence of yeast, both an excess of B with a min. of G or an excess of G plus a small amt. of B are unsatisfactory growth stimulants. Probably autoclaved yeast and tikitiki ext. furnish only some of the necessary B vitamins. There is some evidence that better utilization of food for growth is possible by feeding high-protein rations in contrast to the control diet contg. 18% of casein.

C. R. Fellers

Calcium and phosphorus in the development of the turkey embryo. W. M. Insko, Jr., and Malcolm Lyons. *J. Nutrition* 6, 507-12(1933).—The daily increase in wet wt., dry wt. and ash content was very small until the 12th day, after which time increments of growth notice-



ably increase. The increase of Ca and P in the embryo was relatively slow until the 17th day. The Ca : P ratio was less than 1 until the 19th day of incubation, after which time it exceeded 1. The Ca content of the embryo can be used as a measure of growth provided the yolk material drawn into the body cavity is removed.

C. R. Fellers

Other factors than vitamins B and G in the vitamin B complex. Robert C. Lewis. *J. Nutrition* 6, 559-70 (1933).—A critical review with 57 references.

C. R. Fellers

Effect of fluorine on reproduction and lactation in swine. R. M. Bethke and C. H. Kick. Ohio Agr. Expt. Sta., *Bull.* 516, (51st Annual Rept.) 83 (1933).—The feeding of 1% or more of rock phosphate (3.5% F) or 30 or more g. of NaF per 100 lb. of basal feed mixt. to pigs for 2 or more years did not affect the no. or size of young at birth but influenced lactation through curtailment of feed consumption. Excessive F softened the teeth, increased the diam. of the mandibles and changed the type of marrow.

C. R. Fellers

Stage of maturity of hays as it affects their biological and chemical analyses. C. H. Hunt, R. M. Bethke, O. H. M. Wilder and D. S. Bell. Ohio Agr. Expt. Sta., *Bull.* 516, (51st Annual Rept.) 89-90 (1933).—Results of the first year's trials show that as alfalfa and timothy mature, the proteins and vitamins B and G decrease markedly. Timothy may have as high a vitamin G content as alfalfa providing it is cut at the proper time. Timothy cut on June 12th, 25th and July 13th yielded, resp., 6.6, 5.0 and 2.5 units of vitamin G per g. and 0.77, 0.66 and 0.50 unit of vitamin B. The expt. is being continued.

C. R. Fellers

Influence of radiant energy on the hematopoietic processes in the pig. R. D. Sinclair. *Sci. Agr.* 13, 737-42 (1933); cf. *C. A.* 27, 5787.—Radiant energy played no part and exerted no influence on red cell count or hemoglobin formation in the pig. While a decrease in red cell count, cell vol. and hemoglobin percentage occurred, the trend was seasonal rather than the result of exptl. factors. Low points were reached in Feb. with recovery occurring during Mar. and Apr. Pigs being fed supplemental minerals showed a more favorable blood condition than those on the basal diet. Leucocyte counts likewise failed to yield any information of interest.

C. R. Fellers

Note on pilchard oil for chicks. V. S. Asmundson and W. John Allardye. *Sci. Agr.* 13, 749-50 (1933); cf. *C. A.* 27, 5787.—Brit. Columbia pilchard oil, Calif. sardine oil and com. cod-liver oil, when fed at 1% levels, were equally effective in preventing rickets in chicks up to 5 weeks of age. Without any of these oils, the chicks developed severe rickets. The chicks fed the pilchard oil contg. 40% stearin gave equally good results as those obtained with cleared and uncleared oil from the same batch.

C. R. Fellers

Antirachitic value of pilchard oil (sardine oil) for growing chicks. Jacob Biely and V. Elvira Palmer. *Sci. Agr.* 14, 136-40 (1933); cf. *C. A.* 27, 5787.—Chicks fed a basic ration lacking vitamin D, which was supplemented with com. pilchard oil at 0.5 and 1% levels, showed practically the same ash analyses as chicks fed similar rations which were supplemented with 1% of the medicinal cod-liver oils.

C. R. Fellers

Vitamin A content of foods and feeds. G. S. Fraps and Kay Treichler. Tex. Agr. Expt. Sta., *Bull.* 447, 34 pp. (1933).—The units of vitamin A activity were estd. in over 107 samples of foods or feeds. These are tabulated together with all other estns. of vitamin A found in the literature or calcd. from data given. The quantity of vitamin A decreases during the storage of alfalfa, dried whole milk, yellow corn and other foods. There is a loss of vitamin A in drying moist foods. There is a direct quant. relationship between vitamin A in corn and the no. of genes for yellow pigmentation. There was a fairly const. gain of vitamin A in each grain during the period of growth of yellow corn, with the exception of the period of 21-28 days, when the gain was excessively rapid, and the last period, near maturity, when there

was little gain. The locality in which the corn was grown did not affect its vitamin A content. The vitamin A content of butter and eggs depended upon the food eaten by the animal. The vitamin A content of butter and eggs decreased during the period of feeding, when insufficient quantities of vitamin A were fed. Growing rats required 4 units per lb. per day for maintenance only and 6 units per lb. per day for both growth and maintenance. White Leghorn pullets required 32 units per lb. per day for maintenance and 6.3 units of vitamin A for each unit in the eggs. Milk cows have high requirements of vitamin A for maintenance and for production of butter of high potency. A man, woman or child requires 1000 units of vitamin A per day per person. Larger amts. may be required for higher vigor and better health. The 1000 units per person per day can be supplied at a low price by comparatively small quantities of collard greens, turnip greens, mustard greens, spinach or by somewhat larger amts. of bananas, carrots, yellow corn or sweet potatoes. Milk cows seem to require green pasture plants to produce milk of high potency and laying hens seem also to require green feed for the continued production of eggs of high potency. Orange peel and pulp contained 4-6 units of vitamin A per g. Cottonseed meal is very low in vitamin A. Hays and fodders may not supply enough vitamin A to maintain milk cows over a long period of time. Sorghum silage contg. 5.5-10 units of vitamin A per g. does not furnish enough vitamin A for cows to produce milk contg. normal amts. of vitamin A. Sixty-five references.

C. R. Fellers

Preliminary note concerning the appearance of experimental dermatitis (pellagra) in rats. Minerva Kellogg and Walter H. Eddy. *Science* 78, 609 (1933).—Rats were fed diets contg. graded amts. of vitamins B<sub>1</sub> and B<sub>2</sub> (G). The dermatitis developed more uniformly in practically all cases where B<sub>2</sub> was low and B<sub>1</sub> was high, the ratio of the 2 vitamins being more important than the abs. amt. of B<sub>2</sub>. This study, which is being continued, may result in giving support to the maize theory of the cause of pellagra.

S. B. Foster

The effect of washing and steaming rice at different polishing degrees on its content of vitamin B<sub>1</sub>. A. G. van Veen. *Mededeel. Dienst. Volksgezondheid Nederland. Ind.* 22, 181-9 (1933) (in German).—See *C. A.* 27, 5101.

Cystine and nephrotoxicity. Muriel E. Bell. *Biochem. J.* 27, 1267-70 (1933).—Feeding rats with diets contg. 1.0-2.0% free cystine fails to produce "cystine nephrosis."

Benjamin Harrow

Ascorbic acid as the antiscorbutic factor. Edmund L. Hirst and Sylvester S. Zilva. *Biochem. J.* 27, 1271-8 (1933).—Specimens of ascorbic acid from different sources do not altogether agree in their antiscorbutic effects. On the other hand, there are serious limitations in the biol. method of assaying. Ascorbic acid, regenerated from an oxidized product by reduction, showed a potency of the same order as several other samples of the untreated acid.

Benjamin Harrow

Silver nitrate staining reaction for ascorbic acid in the adrenal, pituitary and ovary of various species of animals. Jethro Gough and Sylvester S. Zilva. *Biochem. J.* 27, 1279-86 (1933).—If it is assumed that the substance reducing AgNO<sub>3</sub> is ascorbic acid (I), then I is present in the adrenals, pituitary and ovaries of all animals, whether they are susceptible to scurvy or not. On the other hand, the human subject and the guinea pig may be free from scorbutic symptoms and yet not show I in any of the organs by the AgNO<sub>3</sub> method. When the guinea pig receives decitrated lemon juice in amts. much above the min. protective dose, I was still absent in the adrenal cortex and in the pituitary. The anterior lobe of the pituitary of the ox is very potent antiscorbutically.

Benjamin Harrow

Vitamin content of the mango fruit. Margaret E. F. Crawford and Edith O. V. Perry. *Biochem. J.* 27, 1290-3 (1933).—The vitamins A, C and D of the 3 varieties of mango, Alphonso (I), Cawassi Patel (II) and Shendrya (III), were assayed. The vitamin A content of I was

approx. that of a good butter, and that of II and III was about  $1/2$ . The vitamin C content of I was about twice as active as lemon juice, II was a little less active and III was much less active. Vitamin D was absent in all 3 varieties. Benjamin Harrow

**Vitamin C in citrus juices.** Alexander H. Bennett and David J. Tarbert. *Biochem. J.* 27, 1294-301(1933).—Tillmans' reagent, dichlorophenolindophenol (C. A. 26, 5324), is used as a test for vitamin C. It is believed that in untreated juice (lemon or orange) the reducing factor is protected from atm. oxidation by the action of an enzyme. Benjamin Harrow

**Vitamin D activity of butter.** I. A chemical differentiation of the antirachitic factor of autumn and winter butter from irradiated ergosterol and the vitamin D of cod-liver oil. Stanislaw Kazimierz Kon and Roland Gordon Booth. *Biochem. J.* 27, 1302-9(1933).—The sapon. of butter causes a loss of 80% of its antirachitic potency. Neither irradiated ergosterol nor cod-liver oil loses its potency when treated similarly. B. H.

**Avian polyneuritis. Further studies on the action of vitamin B<sub>1</sub> concentrates in vitro.** Arnold P. Meiklejohn. *Biochem. J.* 27, 1310-19(1933).—The lesion in vitamin B<sub>1</sub>-deficient brain results in a lowered O uptake of the minced brain in the presence of lactate. The addn. of vitamin B<sub>1</sub> concentrate to the minced brain largely restores the lowered uptake but causes no corresponding increase in the removal of lactate. Benjamin Harrow

**An investigation of the cause of renal hypertrophy in rats fed on a high-protein diet.** Harry E. C. Wilson. *Biochem. J.* 27, 1348-56(1933).—Gelatin produces a more marked increase in kidney weight than either casein or liver. Glycine, glutamic acid and gluten all produce an increase which is approx. proportional to the addn. N consumed. It is possible that the hypertrophy is assoc. with some stage in the intermediate metabolism of protein. Benjamin Harrow

**Relation between lipochrome pigments and vitamin A in the nutrition of young fish.** Roy J. MacWalter and Jack C. Drummond. *Biochem. J.* 27, 1415-20(1933).—The ova of brown and rainbow trout contain a pigment similar to carotene. The amount of this pigment decreases in the development of the young fish, and there is a corresponding increase of absorption at 3280A., suggesting a conversion into vitamin A. Benjamin Harrow

**High-protein diets and acid-base mechanism.** Muriel Emma Bell. *Biochem. J.* 27, 1430-7(1933).—Addn. of alkali to diets (of rats) contg. a large percentage of casein or coagulated egg white does not improve the growth rate. Rats fed for 8 months on diets contg. 70% casein show no evidence of kidney damage. Uncoagulated egg white in the diet is fatal. Benjamin Harrow

**Variations in vitamin A content of fish-liver oils, with particular reference to seasonal fluctuations in the potency of halibut-liver oil.** John A. Lovern, Joseph R. Edisbury and Richard A. Morton. *Biochem. J.* 27, 1461-9(1933).—Oil obtained from any given halibut liver increases in mean annual potency as the fish grows older, and, in addn. fluctuates from season to season over a gradually increasing range. The extraordinary high proportion of vitamin A in some of the samples, together with these wide fluctuations in concn., suggests that, in the halibut at least, the vitamin A may play an addnl. role to that usually assoc. with the term "vitamin." The greater part of the carotene annually produced by the diatoms, and available for conversion into vitamin A by marine animal life, is synthesized during a comparatively short period in the spring or early summer. The best oils from the standpoint of vitamin A content are most likely to be obtained from large halibut caught in northern waters in the late spring or early summer, and in the autumn. Benjamin Harrow

**The diet of the halibut and intensity of feeding, in relation to the vitamin A potency of the liver oil.** John A. Lovern and James G. Sharp. *Biochem. J.* 27, 1470-2(1933).—The diet of the halibut does not include any outstandingly rich source of vitamin A. No relation exists between the intensity of feeding (the glycogen content

of the liver being taken as a criterion) and the vitamin A potency of the oil. In general, the livers of older fish afford a more potent oil than those of younger fish.

**Vitamins present in ox serum.** I. Joseph Fine. *Biochem. J.* 27, 1498-500(1933).—Ox serum contains vitamin A but not the vitamin B complex. B. H.

**Action of vitamin C on oxidation of tissues in vitro.** Douglas C. Harrison. *Biochem. J.* 27, 1501-5(1933). With scorbutic guinea pigs, thin slices of liver suspended in phosphate buffer ( $pH$  7.4) being used, the O uptake is lower than that of liver from normal animals. The addn. of 0.25 mg. of ascorbic acid increases the O<sub>2</sub> uptake from 5 to 57%. With normal guinea pigs, the O<sub>2</sub> uptake is unaffected. Benjamin Harrow

**Modern views of vitamins and their functions.** J. C. Drummond. *J. State Med.* 42, 3-39(1934). E. H.

**Nutritive value of the silk worm pupa produced in Manchuria.** I. The compositions of protein from the pupa of *Bombyx mori* and *Antheraea pernyi*. Seichi Izume, Yoshinori Yoshimaru and Kazuchika Yoshimaru. *J. Agr. Chem. Soc. Japan* 9, 922-31(1933).—Proteins of the pupa of *Bombyx mori* and *Antheraea pernyi* were similar to muscle protein from the standpoint of the content of diamino acids, cystine, tryptophan and tyrosine.

The nutritive value of the pupa of *Bombyx mori* was as high as that of beef protein. The nutritive value of the pupa of *Antheraea pernyi* was somewhat inferior to that of *Bombyx mori*. The addn. of the pupa improved remarkably the nutritive values of wheat protein and soybean protein. II. Vitamins A, B and D in the pupa of *Bombyx mori* and *Antheraea pernyi*. *Ibid.* 932-9.—The oil of the pupa was rich in vitamin A. The content of vitamin D was, however, insufficient. When the pupa oil was exposed to ultra-violet rays rickets in mice was cured with a dose of 10 mg. per day. The vitamin B<sub>1</sub> and B<sub>2</sub> contents of the pupa were very rich if the pupa was sepd. from fresh cocoons. Y. Kihara

**Vitamin A. V. Fractionation of the unsaponifiable matter of cod-liver oil by means of solvents.** Kozo Kawakami. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 825-33(1933)(Abstracts 7-8(in English) published with *Sci. Papers Inst. Phys.-Chem. Research (Tokyo)* 22, Nos. 457-67); cf. C. A. 27, 1861.—The crude biosterol (I) from cod liver was dissolved in petr. ether and extd. with 80% and 90% (vol.) MeOH; Ac<sub>2</sub>O may be used instead of 90% MeOH. Eighty % MeOH ext. (II) contained a toxic substance which, when injected subcutaneously to rats, produced severe cramps. Ninety % MeOH or cold Ac<sub>2</sub>O ext. (III) had a high vitamin A potency and consisted chiefly of an unsatd. compd. which had conjugated double bonds, forming a condensation product with maleic acid anhydride. Cod-liver oil units estd. for I, II and III and petr. ether ext., were 4800, 4220, 6500 and 2700. Other liver oils gave the same results. VI. The so-called vitamin A-choleic acid crystals. *Ibid.* 834-44(Abstracts 8-9(in English)).—Faint yellow crystals obtained from the mixt. of crude biosterol and desoxycholic acid and repeatedly recrystd. from EtOH, m. 185-90°, give, on decompn. with dil. alkali, a yellowish brown oil having far weaker vitamin A potency than that of the original biosterol or that of the mother liquor of the crystals. The mol. weight was about 323; analysis indicates that these crystals consist of one or more hydrocarbons having no vitamin A potency. Further a hydrocarbon obtained from cod-liver-oil by another method forms a cryst. choleic acid compd. resembling the crystals mentioned above. Vitamin A has, however, some affinity toward desoxycholic acid. VII. Certain naphthalene hydrocarbons isolated from commercial cod-liver oil. *Ibid.* 845-52(Abstracts 9(in English)).—Two naphthalene hydrocarbons obtained as picrate from the unsaponifiable substance of cod-liver oil, C<sub>21</sub>H<sub>14</sub>, orange, m. 105-6°, and C<sub>20</sub>H<sub>12</sub>, red, m. 126-7° give absorption spectra closely resembling that of 1,8-dimethylnaphthalene but not identical with it. K. Konda

**Inorganic salts in nutrition.** VII. Change in composition of bone of rats on a diet poor in inorganic constituents.

Richard O. Brooke, Arthur H. Smith and Paul K. Smith. *J. Biol. Chem.* 104, 141-8(1934); cf. *C. A.* 27, 2476.—"In rats restricted for 90 days to a ration extremely poor in inorg. salts, there occurs a reduction in the Ca, P and carbonate on the unignited bones. The  $\text{Ca}_3(\text{PO}_4)_2$  :  $\text{CaCO}_3$  ratio in the bone salt of these animals is significantly increased over that of the control animals but the non-carbonate Ca : P ratio remains normal. Mild inanition alters neither the phosphate : carbonate ratio nor the residual Ca : P ratio. These chem. changes are interpreted to mean that the persistent neg. Ca balance in the rats on the low salt ration exists at the expense of the carbonate to a greater extent than at the expense of the phosphate."

A. P. Lothrop  
The influence of acid- and alkali-forming diets on nitrogen metabolism. A. Rossi. *Arch. ital. biol.* 90, 38-47(1933).—See *C. A.* 27, 4283. A. E. Meyer

Natural coloring matters related to vitamins—Carotenes and flavines. R. Kuhn. *Chemistry & Industry* 1933, 981-6.—A review with 48 references. C. R. Moulton

Vitamin C. P. Karrer, K. Schöpp and F. Zehnder. *Helv. Chim. Acta* 16, 1161-3(1933); cf. *C. A.* 27, 5104.—The action of MeMgI on the substance represented by the lactone formula for acetonedimethylascorbic acid (I) should result in the introduction of 2 Me groups and the formation of 2 OH groups. But 1 Me and 1 OH would be introduced by the action of this reagent on the compd. represented by the furane formula of Michael (*C. A.* 27, 3503). Analysis of the viscous oil resulting from the action of MeMgI on I supports the lactone formula for this substance. The transformation of ascorbic acid to dehydroascorbic acid is thus completely analogous to the oxidation of dialuric acid to alloxan. W. Gordon Rose

True and apparent digestibility of oat hulls and alfalfa meal by swine, with special reference to the ability of swine to digest cellulose and crude fiber. H. H. Mitchell and T. S. Hamilton. *J. Agr. Research* 47, 425-35(1933).—The digestion and metabolism of 4 pigs were studied while they were consuming (1) a ration contg. 30% of oat hulls with starch, sugar and salts, and (2) a ration contg. starch, sugar and salts with paper pulp or Cellophane to furnish as much crude fiber as the oat hulls in the first ration. With 1 pig, a 3rd ration contg. about 30% of alfalfa meal and the rest of starch, sugar and salts was studied. The total digestible nutrients of the oat hulls as ordinarily computed amounted to 26.8 lb. and those of the alfalfa meal to 31.3 lb. per 100 lb. The metabolizable energy contents were 1168 and 1624 cal. per kg. of dry matter, resp. At the low levels of protein feeding prevailing the absorbed protein of both feeds was almost completely utilized in metabolism. The crude fiber of the oat hulls was digested to an av. extent of 2% and that of the alfalfa meal to approx. the same amt. The pure cellulose of the paper, as well as of the Cellophane, was digested to the extent of only 3.5% on an av. It appears that the crude fiber of oat hulls and of alfalfa meal, as well as pure cellulose, pass through the digestive tract of the pig almost, if not entirely, untouched by bacteria or other agencies of digestion. W. H. Ross

Some results that have been obtained by supplementing the dietary with cod-liver oil. Arthur D. Holmes. *Oil and Soap* 11, 3-8(1934).—The administration of cod-liver oil to the home dietary of certain types of persons is of definite value in improving their phys. well being. The investigations made supply a large vol. of data indicating that cod-liver oil is of value for reducing the prevalence of colds and similar infections. E. S.

Nervous system in deficiency diseases. II. Lesions produced in the dog by diets lacking the water-soluble, heat-stable vitamin B<sub>2</sub> (G). H. M. Zimmerman and Ethel Burack. *J. Exptl. Med.* 59, 21-34(1933); cf. *C. A.* 27, 1923.—Adult dogs maintained on an artificial, balanced ration adequate in all dietary essentials as far as is known, except H<sub>2</sub>O-sol., heat-stable vitamin B<sub>2</sub> (G) developed, after a sufficient time, a slowly progressive disease characterized by loss of wt., persistent vomiting and diarrhea and marked muscular weakness, which ended

1 fatally in 200-300 days. The clinical picture is quite different from black tongue. C. J. West

Nutritional myopathy in ducklings. Alwin M. Pappenheimer and Marianne Goettsch. *J. Exptl. Med.* 59, 35-42(1933).—Ducklings fed on a diet of skim-milk powder, casein, corn starch, lard, cod-liver oil, yeast, salts and paper pulp rapidly develop a disease characterized by extreme and progressive myasthenia, ending in death in a few days. The creatine content of the muscles is reduced in proportion to the muscle injury. Pathological changes are found in the skeletal muscles, while in chickens the injurious action is limited to the brain. C. J. West

Philippine rice-mill products—nutritive value of rice bran (West, Cruz) 12.

McCollum, E. V., and Becker, J. Ernestine: Food, Nutrition and Health. 3rd ed. Baltimore: Lord Baltimore Press. 146 pp. \$1.50. Reviewed in *Am. J. Sci.* 26, 613(1933).

## F—PHYSIOLOGY

HOMER W. SMITH

Control of the bill color of the male English sparrow by injection of male hormone. Warren N. Keck. *Proc. Soc. Exptl. Biol. Med.* 30, 1140-1(1933).—Castration in the English sparrow caused a gradual change in the color of the bill from blue-black to the ivory color characteristic of the capon. Male hormone was prepd. from the urine of young men and standardized in rat units by the seminal vesicle test. The daily injection of  $\frac{3}{4}$  of a rat unit for 25 days restored the color of the bill; the deposition of pigment was from the tip toward the base and the extent of the pigmentation was an index of the potency of the prepn.; a definite response was obtained within 10 days. C. V. Bailey

Excretion of inorganic phosphate by the aglomerular kidney. E. K. Marshall, Jr. and Allan L. Grafflin. *Proc. Soc. Exptl. Biol. Med.* 31, 44-6(1933).—Urine obtained from the bladders of 10 freshly caught goosfish (*Lophius piscatorius*) contained 0.0007-0.045 mol. inorg. phosphate per l.; the plasma contained 0.0042-0.0077 mol. per l. Intramuscularly injected inorg. phosphate 6 was not excreted in the urine. The large amt. of inorg. phosphate found in the urine of normal goosfish is probably formed in the kidney from some precursor other than Na glycerophosphate. It is assumed that injected inorg. phosphate is excreted only by glomerular filtration; in support of this hypothesis, it was found that the clearances of inorg. phosphate and xylose (cf. *C. A.* 26, 4370) agreed fairly closely in the frog. C. V. Bailey

7 Effect of parathormone on bone phosphatase activity in vitro. Harry Bakwin and Oscar Bodansky. *Proc. Soc. Exptl. Biol. Med.* 31, 64-5(1933).—Parathormone had no effect *in vitro* upon the glycerophosphatase activity of aq. exts. of rat and cattle bones. C. V. Bailey

Concerning the absorption of unsplit protein through the lacteals. Benjamin M. Banks. *Proc. Soc. Exptl. Biol. Med.* 31, 51-4(1933).—In the dog, absorption of 8 unaltered egg albumin from the intestinal tract by way of the lacteals and the thoracic duct was not demonstrated. C. V. Bailey

Growth-inhibiting agent in extracts of desiccated mammary gland. F. A. McJunkin and A. S. Yuskis. *Proc. Soc. Exptl. Biol. Med.* 31, 105-6(1933).—Saline exts. of lactating beef mammary gland, injected intraperitoneally, inhibited mitoses in adenocarcinomata of spontaneous origin in mice mammary glands. The inhibition was observed 24 hrs. after the injection; subsequently, tumor growth continued at the usual rate. C. V. Bailey

Gall-bladder function after pancreatectomy. B. N. Berg, T. F. Zucker and P. Robin. *Proc. Soc. Exptl. Biol. Med.* 31, 106-7(1933).—In the dog, the removal of the pancreas did not alter the function of the gall bladder as detd. by the dye method. C. V. Bailey

Blood flow to the kidney and creatinine clearance. Grace Medes and J. F. Harriek. *Proc. Soc. Exptl. Biol.*

**Med. 31, 116-19(1933).**—In the unilateral nephrectomized dog, a general parallelism but not a direct proportionality existed between the rate of blood flow to the kidney and the rate of urinary excretion of intravenously injected creatinine. C. V. Bailey

**Transudation through living membranes.** Raymond Ratnoff. *Proc. Soc. Exptl. Biol. Med.* 31, 124-7(1933).—By a modification of the mech. system of Gunn (*J. Physiol.* 71, 412 (1931)) the transudation rate of Locke's soln. through freshly killed rabbit mesentery at a pressure of 150 mm. Hg. at 26° was measured in 15-min. periods. The addn. of saponin 1-1000 or Na taurocholate 1-1000 decreased transudation; the effects of salts and alcs. were variable. C. V. Bailey

**Water shift in the muscle of adrenalectomized rats.** C. A. Winter and F. A. Hartman. *Proc. Soc. Exptl. Biol. Med.* 31, 201-3(1933).—Changes in wt. of a muscle in balanced salt soln. represent mostly a shift of water into or out of the muscle; the shift occurred more readily in muscle from an adrenalectomized rat than in normal rat muscle. C. V. Bailey

**The excretion of ovary-stimulating hormone in the urine during pregnancy.** Douglas P. Murphy. *Surgery, Gynecol. Obstet.* 56, 914-17(1933).—The amount of hormone secreted in 24 hrs. in the urine of pregnant women ranged from less than 100 to 12,000 rabbit units, the amt. being usually less than 2000. The individual excretion per day was relatively const. The amt. excreted is not influenced by the amt. of urine. J. B. Brown

**Creatine in the brain.** Matsuo Matsumoto. *Japan. J. Med. Sci. II. Biochem.* 2, 205-13(1933).—Fresh pig brain was extd. first with alc. and then with Et<sub>2</sub>O. The alc. ext. contained the major portion of the creatine. In 8 g. of the hydrolyzed Et<sub>2</sub>O extractive 12.28 mg. creatine was found by the method of Harding and Eagles. By the method of Folin 8 g. of the Et<sub>2</sub>O extractive gave 6.48 mg. creatinine. To det. whether this was a correct value pure creatinine was investigated. It was adsorbed on animal charcoal to the extent of 81% in acid soln. and 99% in alk. soln.; on kaolin and Adsol the adsorption was more effective in acid medium. Al(OH)<sub>3</sub> did not adsorb creatinine. The chromogenic substance in the Et<sub>2</sub>O extractive of brain behaved toward adsorbents similarly to creatinine. The chromogenic substance in lecithin and cerebroside from rabbit brain behaved in the same manner. Inositol boiled with H<sub>2</sub>SO<sub>4</sub> gave a false test for creatinine. The high creatinine content of the brain should therefore probably be ascribed to lipoids or their split products. Rachel Brown

**The sugar content of semen.** Kichinosuke Yamada. *Japan. J. Med. Sci., II Biochem.* 2, 245(1933).—Three samples of human semen contained 62.5, 140 and 83 mg. sugar, probably levulose, per 100 cc. Prostate fluid was practically free from reducing substance. Rachel Brown

**Carbohydrate content of the liver and muscle of wild and domestic ducks.** Saburo Suzuki. *Japan. J. Med. Sci. II. Biochem.* 2, 277-83(1933).—In winter the carbohydrate content of the liver of the wild duck decreased considerably with the lack of food while that of the muscle remained unchanged. The carbohydrate content of the breast muscle was greater than that of the bone muscle in both wild and domestic birds. The saccharification of the glycogen proceeds to a greater extent in the liver than in the muscle. Rachel Brown

**Oxygen affinity of muscle hemoglobin.** R. Hill. *Nature* 132, 897-8(1933).—Muscle hemoglobin has a greater affinity for O than blood hemoglobin. The distinctive properties of muscle hemoglobin are due to its globin, which in combination with blood hemin, shows the same absorption spectrum as the original muscle hemoglobin. With its high affinity for O muscle hemoglobin can be the intermediate carrier of mol. O from the blood to the oxidase-cytochrome system in the cells. Rachel Brown

**The affinity of individual parts of the brain to bromine as administered in "physiological" quantities.** Artur Bier. *Arch. exptl. Path. Pharmacol.* 173, 508-12(1933).—After administration of either org. ("multibrol") or inorg. (NaBr) Br into rabbits, it can be demonstrated in the

1 brain, largely in the midbrain and medulla rather than i

**The hormonal control of the metabolism of surviving thyroid tissue.** Hermann Paal. *Arch. exptl. Path. Pharmacol.* 173, 513-25(1933).—The subcutaneous injection of anterior pituitary ext. into guinea pigs causes a 3-fold increase in the *in vitro* O consumption of extirpated thyroid tissue; histologically, the gland is found in a state of active secretion. Folliculin, vogan, carotene, hypophysin and prolan were ineffective. Thyroid tissue placed for 24 hrs. in serum contg. pituitary ext. or thyroxine (0.15-0.5 mg. per 3 cc.) also shows an increased O consumption when placed in the Warburg app. Thyroxine has no effect upon thyroid tissue previously activated by pituitary ext. Harry Eagle

**The biological storage of the halogen elements in chicken eggs and in the animal organism.** II. Blá Purjesz, László Berkesy and Klára Gönczi. *Arch. exptl. Path. Pharmacol.* 173, 553-7(1933); cf. C. A. 27, 5387. —After intravenous injection of NaBr into chickens, the Br content of the eggs increases from a normal value of approx. 23% to as high as 7 mg., largely in the yolk. In rabbits as in chickens, NaBr injected intravenously is stored in the brain in high concn.; and the offspring of injected animals also contain Br, again largely in the brain. The blood, liver, muscles and skin also store Br, the concn. decreasing in the order named. As compared with iodide-injected chickens, those injected with bromide have eggs contg. more halogen, and the halogen concn. in the egg remains high for a longer period of time. Harry Eagle

**The permeability of animal membranes for aluminum salts.** G. Kürber. *Arch. exptl. Path. Pharmacol.* 173, 697-709(1933).—Frog and toad skin are not permeable to alum, AlCl<sub>3</sub>, basic Al acetate or complex tartrates. The intestinal wall of cats is only slightly permeable to the chloride and the nitrate. Saponin had no significant effect upon the permeability of frog skin for Al compds. Harry Eagle

**The effect of the central nervous system upon the action of insulin and adrenaline.** A contribution to the problem of insulin resistance. F. Höglér and F. Zell. *Klin. Wochschr.* 12, 1719-22(1933).—The removal of the cerebrum, corpus striatum and thalamus in rabbits does not affect the activity of insulin or adrenaline. Removal of the midbrain beyond the corpora quadrigemina, however, decreases the sensitivity to insulin and increases the hyperglucemic action of adrenaline. Sectioning the spinal cord as high as the 6th cervical does not affect the sensitivity to insulin. Harry Eagle

**The synthesis of uric acid in birds.** III. Werner Schuler and Wilhelm Reindel. *Klin. Wochschr.* 12, 1838-40(1933); cf. C. A. 28, 10888. —In chickens and geese, slices of either liver or kidney form uric acid from a precursor substance *in vitro*. This precursor is formed by an enzyme reaction which does not necessitate the presence of living cells, and which takes place in both these organs. The analogy to previously reported findings in pigeons is complete except for the fact that in the latter the kidney is the only organ which can form uric acid from the precursor substance. Harry Eagle

**Absorptive power of red corpuscles.** R. Brauner and E. Soru. *Compt. rend. soc. biol.* 114, 312-14(1933).—Washed corpuscles adsorb active principles from therapeutic serums and toxins from bacterial cultures. L. E. Gilson

**Pancreatic secretion and variations in blood calcium and potassium.** L. Bouisset and G. Duclos. *Compt. rend. soc. biol.* 114, 489-91(1933); cf. C. A. 27, 5390.

9 dogs intraduodenal injections of 0.4% HCl caused a decrease in alkali reserve, a slight increase in blood Ca and a slight decrease in blood K. Intravenous injection of secretin caused a large decrease in alkali reserve, an increase in blood Ca and no change in blood K. In both cases a return to normal occurred in about 1 hr. Changes in blood calcium and potassium after intravenous injections of hypertonic sodium chloride solution. G. Duclos and P. C. Fabre. *Ibid.* 491-2.—The alkali reserve was

increased and blood Ca slightly decreased for a short time.

**Origin of phenols in the organism.** A. D. Marenzi. *Compt. rend. soc. biol.* 114, 800-1 (1933).—In dogs phenols are formed principally, but not entirely, in the intestine. Phenols are also conjugated in the intestine. **Fixation of phenols by the tissues.** *Ibid.* 802-3.—The normal phenol contents of the tissues of the principal organs of the white rat were detd. Phenol, 2.5 mg./kg., injected into rats disappeared from the blood in 90 min.; at the same time the kidneys showed an increase in phenols, especially in the conjugated form.

**Determination of sex in rabbits.** M. Ferreira de Mita. *Compt. rend. soc. biol.* 114, 845-7 (1933).—Prolonged treatment of paired rabbits with thyroxine to maintain their metabolism at a high level increased the percentage of male young while decreasing the total no. of young produced.

**Adrenaline content of the adrenals of parathyroidectomized animals.** Léon Binet and Georges Weller. *Compt. rend. soc. biol.* 114, 985-7 (1933).—In dogs the adrenaline content of the adrenals decreases to a quantity too small to detect in the 8 days after parathyroidectomy. But if blood Ca is kept about normal by injections of Ca gluconate no decrease in adrenaline occurs.

**The action of the hormone of the corpus luteum on the mucosa and muscle of rabbit uterus is specific.** M. Klein and L. Klein. *Compt. rend. soc. biol.* 114, 1011-6 (1933).—Expts. with various hormones are discussed.

**Relation of blood cholesterol to the activity of the sex glands.** J. Didry. *Compt. rend. soc. biol.* 114, 1080-1 (1933).—In dogs the removal of the testicles or ovaries has little or no effect on blood cholesterol.

**Iodine content of the blood of female dogs after castration.** M. Franke and L. Ptaszek. *Compt. rend. soc. biol.* 114, 1129-30 (1933); cf. *C. A.* 27, 5390.—Results were the same as previously reported for male dogs, except that in 2 very old females with inactive ovaries no change in blood I occurred.

**Blood glutathione of aged persons.** J. Nitzulescu and I. Ornstein. *Compt. rend. soc. biol.* 114, 1134-6 (1933).—In the 18 cases studied (aged 50-85 yrs.) blood glutathione was within the normal limits.

**Sugar metabolism of aged persons.** Alimentary hyperglucemia tests. J. Nitzulescu, I. Ornstein and M. Silber. *Compt. rend. soc. biol.* 114, 1136-8 (1933). The effects of ingestion of 50 g. glucose were detd. in 38 persons aged 40-90 yrs. Blood-sugar curves were normal or nearly so. In no case did glucosuria occur.

**Distribution of vitamin A in the human organism.** Robert Debré and André Bussion. *Compt. rend. soc. biol.* 114, 1162-4 (1933); cf. *C. A.* 26, 2218, 3825. The livers of 3 normal persons killed in accidents were found to contain considerable vitamin A, while the lungs, kidneys and spleens contained none. **Vitamin A content of human livers according to age.** *Ibid.* 1164-5. The liver of the newborn infant is usually devoid of vitamin A, and the livers of nursing infants contain very little. Livers of children over 2.5 yrs. old usually contain 2 or more rat units per g.

**Iodine content of the thyroids and other organs of Argentine cattle.** G. Ruff. *Folia biol.* 1, 131-2 (1933).—The thyroids of bovine cattle contained 357-410 mg. I per 100 g. dry tissue. The values were independent of age or sex but were lower in summer than in winter. The I contents of other glands were, in mg. per 100 g. dry substance: spleen 10.3, adrenals 5.5, testicles 3.8, ovaries 1.2, pancreas 1.0, placenta 0.7, mammary glands 0.2, liver 0.2, anterior hypophysis 0.4-0.6 and posterior hypophysis 0.16-0.34.

**Contribution to the study of tubular resorption.** Giovanni Ferro-Luzzi. *Minerva med.* 1933, 11, 871-2.—Resorption of  $\text{NH}_3$  and amino acids in 10 persons was calcd. on the basis of a previously proposed formula. The concn. of these substances in the resorbed liquid did not vary greatly from the concn. of the same substances in the blood.

Helen Lee Gruel

**Relation of lactic acid and alanine to glycogen formation.** Thomas H. Hodgson. *Biochem. J.* 27, 1157-62 (1933).—Na *dl*-lactate is easily transformed into liver-glycogen, but *dl*-alanine is not so transformed. It is probable that in the normal animal the tissues take up the amino acid rapidly and release it so slowly that no appreciable glycogen can be detected.

**The oxytocic hormone of the posterior lobe of the pituitary gland. II. The action of nitrous acid and nitric acid.** John M. Gulland. *Biochem. J.* 27, 1218-28 (1933); cf. *C. A.* 26, 4367.  $\text{HNO}_2$  rapidly converts the hormone into a deriv. A with an oxytocic strength equal to 35% of that of the hormone.  $\text{HNO}_2$  (formed by oxidation of the  $\text{HNO}$ ) then acts alone or in conjunction with  $\text{HNO}_2$  and produces a substance B with an oxytocic strength of 20%. The prolonged action of high concns. of  $\text{HNO}_2$  gradually transforms B into a substance D with an oxytocic strength of 0.1%.  $\text{HNO}_2$  converts the hormone into a substance C (activity 90%) which differs from the other derivs. in being unstable at  $\text{pH}$  7.2.  $\text{HNO}_2$  transforms C into a substance which is stable at  $\text{pH}$  7.2 and has an activity of 20%; this is probably identical with B. **III. The action of preparations of plant proteolytic enzymes.** John M. Gulland and Thomas F. Macrae. *Ibid.* 27, 1237-47.—The hormone is inactivated by yeast dipeptidase, aminopolypeptidase and proteinase. The enzyme responsible for the inactivation is a fourth enzyme, present in these preps. which has an optimum  $\text{pH}$  of 7.4. Papain preps. also contain the same enzyme. **IV. The action of preparations of animal proteolytic enzymes, and some observations on the nature of the hormone.** John M. Gulland and Thomas F. Macrae. *Ibid.* 1283-93; cf. *C. A.* 28, 1068.—The apparent inactivation of the hormone by enzymes of which the substrates are proteins is not brought about by those enzymes themselves but by unidentified enzymes which accompany them. The hormone is probably not protein-like in character.

**Influence of variations in systemic acid-base balance upon carbohydrate tolerance in normal subjects.** Geoffrey Thompson, David M. Mitchell and Lawrence C. Kolb. *Biochem. J.* 27, 1253-6 (1933).—Ingestion of large amounts of  $\text{NH}_4\text{Cl}$  reduces the alkali reserve of the blood plasma to a level such as is found in diabetic coma, and the urinary excretion of acid is raised 100-200% and of ammonia 300%. There is a failure in glucose tolerance, shown by hyperglucemia and slow return of the blood sugar to the fasting level after glucose ingestion. The ingestion of  $\text{NaHCO}_3$  in large doses is not followed by marked increase in the  $\text{CO}_2$ -combining power of the plasma. Ingestion of alkali showed little variation in the blood-sugar response to glucose ingestion.

**Influence of the gonads on protein metabolism. III.** (a) The effect of injections of anterior pituitary extracts on urinary creatinine in normal and castrated rabbits. (b) The tolerance of normal and castrated animals to injected creatine. Isidore Schrire and Harry Zwarenstein. *Biochem. J.* 27, 1337-41 (1933); cf. *C. A.* 27, 2990.—Injection of antuitrin or of anterior lobe exts. of the pituitary leads to an increased excretion of urinary creatinine in normal rabbits but has no effect on the high creatinine output of castrated animals. Normal rabbits show a high, and castrated animals a low, tolerance to subcutaneous injections of large amts. of creatine.

**Conditions of hypertrophy of the seminal vesicles in rats.** John Freud. *Biochem. J.* 27, 1438-50 (1933).—Using young, castrated rats, F. finds that an optimum growth of seminal vesicles (S. V.) is not obtained with the male hormone (M.) alone. The effect of M. on smooth muscle is only moderate, its main effect being on the columnar epithelium. Estrin and trihydroxyestrin act on smooth muscle tissue, while they do not affect the columnar epithelium or induce degeneration. The combined effects of follicular and male hormones upon S. V. is a mutual reinforcement of each other's actions ("pace-making"). Simultaneous expts. on capons and on infantile male rats show loss of activity of M. after purification as regards rats, while the activity is retained as re-

gards capons. Estrin in crystalline form up to 1000 mouse units a day has no influence on comb growth; the seminal vesicles, however, are distinctly influenced. B. H.

A study of the composition of human milk. The influence of the method of extraction on the fat percentage. Sibyl Taite Widdows and Margaret Frances Lowenfeld. *Biochem. J.* 27, 1400-10(1933).—Differences in the method of extn. account for wide variations in the fat figures obtained by different workers. The percentage of fat present will depend inversely upon the quantity of milk present in the breast at the time of taking the sample, and directly upon the degree of pressure exerted upon the areola and nipple in the process of extn. The lowest percentage of fat is found in milk which has dripped spontaneously from the breast. Benjamin Harrow

Absorption of *n*-hexadecane from the alimentary tract of the rat. Mohammed Abdel Hamid El Mahdi and Harold J. Channon. *Biochem. J.* 27, 1487-94(1933).—*n*-Hexadecane (I) is absorbed to the extent of 50-100 mg. per day. After removal of the livers and the alimentary tracts, the carcasses of the animals were examd. for I, and of 35 g. of the latter not recovered from the feces, evidence was obtained of the presence of 1.85 g. in the tissues. The disappearance of the remaining 33.15 g. suggests that the animal organism can metabolize normal aliphatic hydrocarbons. Benjamin Harrow

The thermostability of prolactin. Frederic A. Askew and Alan S. Parkes. *Biochem. J.* 27, 1495-7(1933).—The ovary-stimulating substance in the urine of pregnancy (prolactin) is not readily destroyed at 100° when heated in the form of a dry powder, although heating in the presence of water results in complete and rapid destruction. Benjamin Harrow

Effect of testicular hormone on normal sexually mature rats. A method of biological assay. Vladimir Korenchevskii, Marjorie Dennison and Alice Kohn-Speyer. *Biochem. J.* 27, 1506-12(1933); cf. *C. A.* 27, 3980, 5798.—Judged by changes in the wt. of the organs, the effect of these hormone injections was small. B. H.

Simultaneous administration of testicular hormone with antuitrin and prolactin or with desiccated thyroid. Vladimir Korenchevskii, Marjorie Dennison and Alice Kohn-Speyer. *Biochem. J.* 27, 1513-16(1933).—Testicular hormone + gonad-stimulating hormone were not very different from testicular hormone alone in the effect on the sexual, endocrine and other organs of castrated male rats. Testicular hormone did not prevent the appearance of changes produced by thyroid feeding. B. H.

Human lactation. C. Vincent and M. J. Vail. *Lact.* 13, 686-97, 904 14, 969-1006, 1116-25, 1250-7(1933).—Analyses of human milk collected 3 times daily over the last 9 months of a lactation period are given. Effects of various stimuli on milk yield and fat elaboration are discussed. A. H. Johnson

Nitrogenous compounds of the excrement from the cecum of the fowl. Kozo Suzuki and Akio Kawabata. *J. Agr. Chem. Soc. Japan* 9, 1095-1103(1933).—The excrement in the cecum of the fowl contained H<sub>2</sub>O 78.80, crude protein 9.86, pure protein 6.25, crude fat 1.36, crude fiber 0.79, crude ash 3.83, sol. non-nitrogenous matter 5.36 and ammoniacal N 0.099%. The quantity of protein was markedly larger than that in ordinary feces. The distribution of N in the dried excrement in the cecum was: total N 6.584, pure protein N 5.225, non-protein N 1.359, H<sub>2</sub>O-sol. N 2.153, N in the ppt. with Pb acetate 0.648, N in the ppt. with phosphotungstic acid 0.840%. The excrement was dried by ether and alc., and then extd. with H<sub>2</sub>O. Tyrosine (0.4 g.) and valine (1.1 g.) were isolated from the ext. of 100 g. of the excrement. Diamino acids could not be detected. Y. Kihara

The standard metabolism of the Australian aborigines. C. S. Hicks and R. F. Matters. *Australian J. Exptl. Biol. Med. Sci.* 11, 177-83(1933).—The gaseous metabolism of 40 Australian aborigines living in the savage state were measured by the Benedict portable metabolimeter. Measurements made in the early morning (at temps. of -2° to 10°) gave values 23 to 90% above normal.

1 The Dubois formula for surface area gave values within 5% of observed values. C. N. King

Growth of animal, and tryptophan and lysine. Kinsuke Kondo. *J. Chem. Soc. Japan* 54, 1198-1206(1933).—Tryptophan (I) or lysine (II) used alone has no biol. value as a supplement of zein, but the combined use of I and II with the zein produces good growth. K. K.

The cation and chlorine content of the rabbit brain. Matsuo Matsumoto. *Japan. J. Med. Sci., II Biochem.* 2, 11-20(1933).—In the gray matter the compn. is: Ca 7.7 ± 0.14, Mg 14.6 ± 0.08, K 351.7 ± 4.03, Na 131.9 ± 3.46, Cl 181.9 ± 1.30, water 81.85 and N 1.95 mg. %. In the white matter the compn. is: Ca 6.6 ± 0.16, Mg 16.1 ± 0.09, K 340.1 ± 5.61, Na 121.7 ± 4.11, Cl 165.4 ± 2.50, water 69.42 and N 2.07 mg. %. The brain of young rabbits weighing between 600 and 800 g. appears to be incompletely developed. The white matter of full-grown rabbits contains more water than that of young rabbits, while the gray matter is richer in K and poorer in Ca. B. S. Levine

The chlorine and total and residual nitrogen contents of the blood of the chick embryo. Kichinosuke Yamada. *Japan. J. Med. Sci., II Biochem.* 2, 81-3(1933).—After incubation for 15 days, eggs contained Cl 0.459, reducing substances 0.125, total N 1.251, residual N 0.057%; after 20 days, Cl 0.491, reducing substances 0.135, total N 1.258, residual N 0.064%. B. S. Levine

The inorganic and phosphagen phosphorus contents of the brain. Matsuo Matsumoto. *Japan. J. Med. Sci., II Biochem.* 2, 85-91(1933).—Rabbits and albino rats were used in the detns. The inorg. phosphate content is higher in the gray than in the white matter. Phosphagen is contained abundantly in the latter. The proportion of phosphagen P to total inorg. phosphate in the gray matter is 9:28. A large part of the creatine exists in the gray matter as creatinephosphoric acid. Pyrophosphate in minute amounts also was found in the brain substance, as were all other forms of P found in the muscles. The labile P appears to be more stable in the brain substance than in muscle tissues. B. S. Levine

Gastric secretion. V. The composition of gastric juice as a function of its acidity. Franklin Hollander. *J. Biol. Chem.* 104, 33-42(1934); cf. *C. A.* 26, 5639

6 "Addnl. evidence has been adduced in support of the hypothesis, previously formulated, that 'the parietal secretion is essentially an isotonic soln. of HCl.' It has been shown not only that this secretion contains no neutral chloride, but that combined acid, inorg. phosphate, org. P and org. acids are all absent. Inorg. solids are probably also absent although this has not been established conclusively. The sp. gr. conforms to that of a HCl soln. of 170 mm. concn.; the f.-p. depression is such as to establish the isotonicity of the pure soln. In short, if any substance other than HCl and H<sub>2</sub>O is contained in the parietal secretion, their quantities are so small as to be negligible in the initial formulation of any hypothesis concerning the formation of this fluid. Having thus established the essential characteristics of the parietal secretion, it should now be possible to proceed with a study of the thermodynamics of its formation—and thereafter, perhaps, of its mechanics." A. P. Lothrop

8 Fluctuations of the blood sugar in vitro. Isaac Wirth. *J. Biol. Chem.* 104, 129-30(1934).—Diabetic and normal human and dog bloods with added dextrose have been analyzed for blood sugar at 20-min. intervals for 2 hrs. (in some cases after 160 min.). Any variations from the usual glycolytic curve can be ascribed to limitations of analytical methods. No such fluctuations as described by Kleiner and Halpern (*C. A.* 27, 4287) occurred. A. P. Lothrop

9 The effect of dehydration on the pancreatic and intestinal enzymes. John R. Ross and Margaret M. Shaw. *J. Biol. Chem.* 104, 131-9(1934).—Young rats were dehydrated by being placed in an incubator at 37.5° for alternate 12-hr. periods during 3-4 days while H<sub>2</sub>O was withheld but an adequate normal diet furnished. From 23 to 29% of their wt. was lost after 4 days. There was a decrease in the production of both pancreatic and inter-



tinal enzymes which was probably comparable to that found in dehydrated infants suffering from acute intestinal intoxication (acute fermentative diarrhea). There was considerable individual variation between rats probably because of variations in the amt. of digestive activity in progress when the animals were killed. A. P. Lothrop

The iron content of the whole blood of normal individuals. O. M. Helmer and Charles P. Emerson, Jr. *J. Biol. Chem.* 104, 157-61 (1934).—There is close agreement between the hemoglobin content of blood as detd. by the  $O_2$  capacity and the Kennedy (*C. A.* 21, 3379) Fe method so that the detn. of Fe offers an easy means of estg. the hemoglobin content of blood and of standardizing colorimetric methods of estg. hemoglobin. The Kennedy method gives distinctly higher results and is more satisfactory than the Wong method (*C. A.* 22, 2762) although the simplicity of the latter method recommends its use. The blood Fe content of 18 normal men and 10 normal women per 100 cc. was found to be 49.3-57.2 mg. (av. 52.5) and 42.0-49.8 mg. (av. 45.8), resp. A. P. L.

The cytological study of certain properties of living protoplasm. T. Terni. *Boll. soc. ital. biol. sper.* 8, 1001-1131 (1933).—A review with an extensive bibliography.

Peter Masucci

Chromosomes and heredity. Agreements and disagreements with the physicochemical theories on the constitution of the chromatic substances. Cesare Artom. *Boll. soc. ital. biol. sper.* 8, 895-909 (1933).—A critical review.

Peter Masucci

Studies on senescence. I. Senile structural transformations of the thyroid. G. C. Dogliotti and G. N. Nuzzi. *Boll. soc. ital. biol. sper.* 8, 1168-71 (1933). II. Acid-base equilibrium in advanced age. G. C. Dogliotti and M. Santi. *Ibid.* 1172-3.—The  $pH$  and alk. reserve were detd. on 50 patients over 60 yrs. of age. In 13 cases the  $pH$  varied from 7.35 to 7.40; in 17 cases 7.28-7.35; and in 20 cases 7.40-7.53. The  $CO_2$ -combining power was 50-70 cc. in 31 cases, and lower in 19 cases. These results do not permit the drawing of a general conclusion that there is a prevalence of acidosis or alkalosis in old age.

Peter Masucci

Studies on the chemical composition of the blood in early infancy. G. De Toni. *Boll. soc. ital. biol. sper.* 8, 1188-90 (1933).—The non-protein N of the blood varies within wide limits; the av. is slightly higher than that of older babies. Blood urea and uric acid are present only in traces. Compared with adult normal blood, the amt. of creatine is about the same, creatinine somewhat higher, cholesterol higher, lecithin lower, chlorides the same, Ca higher and inorg. P about  $\frac{1}{2}$  higher. Peter Masucci

Adrenalinemia and vagal tone. G. Viale. *Boll. soc. ital. biol. sper.* 8, 1196-7 (1933).—Animals with a high vagal tone have the most adrenaline circulating in the blood; those with no vagal tone have no adrenaline in the blood.

Peter Masucci

Glycogen distribution in the beef heart. Lucio Pace. *Arch. ital. biol.* 89, 45-52 (1933).—See *C. A.* 27, 4291.

A. E. Meyer

The alkali reserve and the acid or alkaline nature of foods. A. Rossi. *Arch. ital. biol.* 89, 159-71 (1933).—The alkali or acid content of the common foods does not influence the alkali reserve to an appreciable degree.

A. E. Meyer

The lipid metabolism in the central nervous system. Ichele Mitolo. *Arch. ital. biol.* 89, 172-81 (1933).—The cerebrospinal axes from *Bufo* showed the following lipid content: free cholesterol 1.7622%, lecithin + myelin 0.3564, cephalin 0.4887, galactose of sated. cerebroside 0.027, sulfatides 0.2978, sphingomyelin 0.5593. All lipids decrease during rest of the nervous tissue; the decrease is lowest in sulfatides, highest in phosphatides. During reflex activity, the sulfatides decrease most, the phosphatides less, whereas the other lipids decrease at the same rate as during rest. All lipids, except sulfatides, increase during narcosis. Excitation caused by convulsive poisons produces a greater loss of all lipids than occurs during rest.

A. E. Meyer

The oxidation in vitro of fat of adipose tissues. G.

Quagliaricello and G. Scoz. *Arch. ital. biol.* 90, 9-21 (1933).—The respiration of fresh muscle tissue decreases gradually and approaches zero after 13 hrs., when the cells die. The following increase of absorption of  $O$  is due to oxidative processes. Phosphate soln. is a more favorable medium for the oxidation than bicarbonates; borates have an inhibiting action. The optimal concn. for phosphates is 0.002 to 0.124 mol. per l. at  $pH$  between 7 and 8. The oxidation of cod-liver oil, in identical conditions, is independent of the anions and is favored by a higher  $pH$ . Heat and KCN inhibit the oxidation in tissue, but not in oil. The oxidation in tissue leads to formation of  $CO_2$ .

A. E. Meyer

Gas exchange of the ovary. A. Chiatellino. *Arch. ital. biol.* 90, 33-7 (1933).

A. E. Meyer

Variations in the size and hemoglobin content of erythrocytes in the blood of various vertebrates. M. M. Wintrobe. *Folia Hematol.* 51, 32-49 (1933). J. T. M.

Group specific properties of various fluids of the body. T. Putkonen. *Acta Soc. Med. Fenn. Duodecim.* 14, 1-113 (1932); *Medico-Legal Criminol. Rev.* 1, 150-1.—Isoagglutinin was found in the saliva in 30.9% of the O group, 10.4% of the A and 12.5% of the B; the titer was low (1 or 2, rarely 4 or 8); most of the salivas inhibited agglutination (this varied with different persons), which showed itself in 86.5% of A, 87% of B and 81.3% of AB. Isoagglutinogens were also found in the saliva. No isoagglutinin was found in urine (138 persons tested); the inhibitory effect of the urine on agglutinins was found in 22 out of 51 A persons, in 24 out of 30 B and in 6 out of 18 AB. Isoagglutinogens were not present in urine when the saliva did not show them, but in some cases the saliva contained them but not the urine. Isoagglutinins were found in the lacrimal secretion (25 persons examd.) of 5 out of 21 persons of A, B and O groups; in 14 out of 20 persons of the A, B and AB individuals, the agglutination was restricted. No isoagglutinins nor isoagglutinogens were found in the cerebrospinal fluid (20 persons). No isoagglutinins were found in the liquor amnii of 30 persons; isoagglutinogens were found in 29 cases. Of 7 persons examd., no isoagglutinins were found in the sperm, and isoagglutinogens were found in 6 cases. In all cases but 3 (175 examd.) the receptor once discovered in the saliva was always present in subsequent exams. and when it was once missing it was always absent when again sought.

A. Papineau-Couture

Cameron, A. T.: Recent Advances in Endocrinology. London: J. & A. Churchill. 365 pp. 15s.

## G—PATHOLOGY

H. GIDEON WELLS

Heterophile ophthalmic anaphylaxis. J. V. Chambers. *Proc. Soc. Exptl. Biol. Med.* 30, 874-5 (1933).—Rabbits locally sensitized by anterior chamber injections of sheep erythrocytes and guinea-pig kidney gave marked unilateral ophthalmic responses to intravenously injected homologous antigen; approx. 75% gave a demonstrable allergic cross-reaction to the heterophile antigen. Alc.-sol. lipoids from either antigen failed to sensitize the eye; and locally sensitized animals gave no ophthalmic response to intravenously injected alc.-sol. lipoids. The heterophile relationship in strictly local ophthalmic anaphylaxis is qualitatively different from systemic anaphylaxis and *in vitro* complement-deviation reactions.

C. V. Bailey

Microincineration of tubercles. Esmond R. Long. *Proc. Soc. Exptl. Biol. Med.* 30, 1090-2 (1933).—In tubercles microincinerated by the technic of Scott (cf. *C. A.* 26, 5640), degenerated and recently necrosed areas contained less ash than the corresponding undegenerated tissue; older necrotic tubercles were found to be remineralized. Viosterol given by mouth increased calcification in exptl. tuberculosis; in some cases it failed to do so.

C. V. Bailey

The mechanism of sodium depletion in Addison's disease. Robert F. Loeb, Dana W. Atchley, Ethel B. Gutman and Ruth Jillson. *Proc. Soc. Exptl. Biol. Med.*

31, 130-3(1933); cf. *C. A.* 27, 531, 2999.—The loss of Na from the body in Addison's disease is not dependent upon the excretion of unusual quantities of acid as detd. by the excretion of  $\text{NH}_3$  and titratable acid; the disorder is primarily a disturbance of the Na regulatory mechanism; the clinical condition parallels the concn. of Na in the blood and is dependent upon the amt. of Na ingested.

C. V. Bailey

**Heterophile ophthalmic allergy. Reactions to Landsteiner conjugates.** A. C. Kurtz and R. R. Madison. *Proc. Soc. Exptl. Biol. Med.* 31, 265-7(1933).—Horse serum, cow serum and egg white were strictly specific in their ophthalmic antigenicity when tested by the Segal technic (*J. Exptl. Med.* 54, 249(1931)); no cross-reaction or cross desensitization was found in 27 tests. Similar results were obtained with these proteins benzooylated (cf. *C. A.* 27, 3983) so that the protein mol. was the "carrier" of approx. 25 Bz radicals. A distinct "carrier" cross-reaction between egg white and Bz-egg white was found; a rabbit's eye locally sensitized by Bz-egg white reacted with equal severity to the intravenous injections of the benzooylated and the native protein if tested in that order. An eye sensitized to egg white reacted to intravenous egg white but did not react 24 hrs. later to Bz-egg white.

C. V. Bailey

**Stimulating effect of alum and T. A. B. vaccine in tetanus prophylaxis.** W. K. Chen. *Proc. Soc. Exptl. Biol. Med.* 31, 334-6(1933).—In the guinea pig the antigenic effect of tetanus toxoid and T. A. B. vaccine mixt. was equal to that of alum tetanus toxoid of Glenn (cf. *C. A.* 24, 5367). The addn. of  $\text{KAl}(\text{SO}_4)_2$  to the mixt. of T. A. B. vaccine and toxoid did not increase the antigenic value. In man, protection against both tetanus and enteric fever can be induced by a single series of 3 injections. C. V. B.

**Amount of material effective in pernicious anemia present in dog liver.** Maurice B. Strauss and Wm. B. Castle. *Proc. Soc. Exptl. Biol. Med.* 31, 360-3(1933).—Intramuscular injections of exts. of dog liver caused typical remissions in patients with pernicious anemia. The content of potent material in dog liver is approx.  $\frac{1}{6}$  that of the hog. Possibly a decreased amt. of specific thermolabile intrinsic factor (*Am. J. Med. Sci.* 178, 764(1929); cf. *C. A.* 27, 2981) is present in the gastric juice of the dog and this results in a decreased amt. of thermostable effective material stored in the liver. C. V. Bailey

**The ketogenic diet in the treatment of infections of the urinary tract.** D. C. Robb. *Brit. Med. J.* 1933, II, 1158-62.—In sixteen cases of infection of the urinary tract ingestion of a ketogenic diet lowered the urinary  $\text{pH}$  and resulted in clinical improvement. J. B. Brown

**Physicochemical study of the flocculation of myxoprotein by resorcinol.** Augustin Boutaric, Maurice Pictre and Mlle. Madeleine Roy. *Compt. rend.* 197, 1413-15(1933); cf. *C. A.* 27, 5106-7.—A 0.5% soln. of myxoprotein in physiol. saline is flocculated instantly by resorcinol in concn. greater than 2% and is not flocculated at all by a concn. of 1%. The resorcinol is adsorbed on the myxoprotein yielding a complex which is sol. in saline immediately after formation but which readily becomes insol.

Rachel Brown

**The induced oxidation of lactic acid by ascorbic acid and the cancer problem.** W. P. Jorissen and A. H. Belinfante. *Science* 79, 13(1934); cf. *C. A.* 27, 5811.—*In vitro* a soln. of lactic acid appeared to undergo considerable oxidation in the presence of oxidizing ascorbic acid. J. and B. ask if vitamin C can be applied in the treatment of cancer.

Rachel Brown

**The effect of vagotomy upon hyperglucemia.** F. Höglér and F. Zell. *Arch. exptl. Path. Pharmacol.* 173, 674-9(1933).—Unilateral or bilateral vagotomy does not significantly affect adrenaline, pyramidone or Mg hyperglucemias in rabbits. Harry Eagle

**Experimental animal studies on chlorine impoverishment.** I. J. Michelsen. *Arch. exptl. Path. Pharmacol.* 173, 737-45(1933).—Rabbits develop a neg. Cl balance after the administration of diuretin; this is independent of the water economy, and is fatal when it exceeds 10-12 millimols. per kg. body weight. There is also a neg. N

balance in the diuretin-treated animals, indicative of increased tissue breakdown. II. *Ibid.* 746-9.—The non-protein and urea N of the plasma are increased in the last stages of diuretin poisoning in rabbits, because of functional impairment of the kidneys. III. *Ibid.* 750-8.—The Cl impoverishment of diuretin-treated animals is accompanied by acidosis caused by the accumulation of lactic acid and other org. acids. The blood-sugar concn. and the ratio of the cell/serum Cl concn. are both increased. Harry Eagle

**The determination of lactic acid in gastric juice.** R. Enger. *Arch. Verdauungskrankh.* 54, 301-12(1933).—After the administration of caffeine or histamine, cases of gastric carcinoma show a sharp increase in the gastric lactic acid content, ascribed to a specific cellular reaction in the tumor itself. Harry Eagle

**The adsorption of dyestuff in the serum of cases of lead poisoning.** A. Seitz. *Klin. Wochschr.* 12, 1844-6(1933).—The addn. of serum markedly inhibits the diffusion of dyestuffs into gelatin. This inhibitory action is less pronounced with serum from cases of lead poisoning, provided that one uses naphthol yellow or orange II as the dyestuff. Other dyes show little or no difference. The addn. of  $\text{Ph}(\text{NO}_2)_2$  to normal serum makes it behave like that from cases of lead poisoning in this respect. Harry Eagle

**Value of the Vernes resorcinol reaction in pulmonary tuberculosis.** Nadzieja Berdo. *Rev. Tuberculose* Feb., 1933, 149; *Rév. hyg. méd. prévent.* 55, 795(1933).—The reaction is non-sp. for pulmonary tuberculosis. It had no diagnostic value when used on 355 cases. C. R. E.

**Photometric studies on the methods of Vernes, Kahn, and the Vernes cholesterolated perethynol tests (for syphilis).** G. H. Hufschmidt. *Bull. soc. derm. syph.* Apr., 1933, 679; *Rev. hyg. méd. prévent.* 55, 796(1933).—By photometric methods the Kahn and Vernes reactions may be considerably refined and the results made more accurate. The addn. of 4 mg. of cholesterol per cc. to perethynol did not favor the intensity or rapidity of either of the above reactions. C. R. Fellers

**Colloid-chemical experiments on the swelling of gelatin in serum from gynecological illnesses.** N. M. Mogilevskaya. *Kolloid-Z.* 65, 234-6(1933); cf. Hochloff, *C. A.* 27, 1801.—Swelling changes were detd. by an elastometer at the start, 30, 60, 90 min. and 24 hrs. after immersion in the serum. During the first 90 min. the loss of elasticity is marked for pathol. cases. The method provides a sensitive indicator. Arthur Fleischer

**Chemistry of haptens, especially of "lipoid haptens."** H. Rudy. *Kolloid-Z.* 65, 356-63(1933); cf. *C. A.* 28, 8154.—Review of literature, with bibliography, including definitions, immunological and chem. description of artificial and natural haptens, behavior of haptens with adsorbents, soly. of lipoid haptens, and concealment of haptens by lipoids. Arthur Fleischer

**Urinary albumose and Maillard's coefficient.** André Dufourt and P. Joet. *Compt. rend. soc. biol.* 114, 1114-15(1933).—Ninety tuberculous women aged 16-45 yrs. were examd. No direct relation was found to exist between the albumose content of the urine and the increase in Maillard's coeff. L. E. Gilson

**Antigenic power of a lecithin-diphtheria anatoxin complex.** Cesar E. Pico and Fernando Modern. *Folia biol.* 1, 132-4(1933); *Compt. rend. soc. biol.* 114, 1218-19(1933).—Lecithin decreases the toxicity of diphtheria toxin. Rabbits treated with a mixt. of lecithin and diphtheria anatoxin formed more antitoxin than those given anatoxin only. A precipitin for lecithin was found in the blood of rabbits which had been given injections of lecithin. L. E. Gilson

**Galactose tolerance in normogluceemic and pancreatic diabetics.** S. Battistini and L. Herlitzka. *Minerva med.* 1933, II, 762-5.—Five cases of normogluceemic diabetics were studied for glucose and galactose tolerance and the results compared with previously published results on pancreatic diabetics. The glucometric curve was practically normal, showing no sudden elevation after ingestion of galactose while the galactose curve reached higher values

and was more prolonged. A discussion is given of the probable pathogenesis of this galactose intolerance.

Helen Lee Gruehl

**Aminoacidemic curve in experimental uremia.** S. Cerequa. *Minerva med.* 1933, II, 802-9.—Amino N of blood was studied in dogs before and after ligation of the ureter and also after injection of 10% alanine into normal and ligatured animals. The amino N of ligatured dogs dropped below normal in the first 24 hrs., then rose to a max. a few hrs. before death which usually occurred 48-60 hrs. after the operation. In normal dogs the max. amino N was reached 15 min. after alanine injection with a return to normal in 60 min. while 48 hrs. after ligation the injection of alanine produced higher amino N value which persisted for 60 min. The increased amino N of the blood and its characteristic curve were considered an indication of an altered hepatic function in uremia.

Helen Lee Gruehl

**The pathogenesis of hypoglycemic phenomena.** Enrico Filia. *Minerva med.* 1933, II, 866-71.—A discussion and review of the subject are given.

Helen Lee Gruehl

**Lipuric diabetes and intermediate metabolism.** F. Galdi and C. Cassano. *Arch. ital. biol.* 89, 95-102 (1933).—Report of a case presenting hyperlipemia connected with lipuria. The quantity of lipoids eliminated was not in relation with the changing degree of lipemia.

A. E. Meyer

**Oxidations during fever. Dehydrogenating and oxidizing enzymes in the tissues during fever.** Antonio Spinelli. *Arch. ital. biol.* 89, 103-14 (1933).—Oxidation-reduction processes as well as simple oxidation are increased during fever. The content of oxidizing enzymes in the tissues is increased, with the exception of the liver.

A. E. Meyer

**Phosphatase studies. IV. Serum phosphatase of non-osseous origin. Significance of the variations of serum phosphatase in jaundice.** Aaron Bodansky and Henry L. Jaffe. *Proc. Soc. Exptl. Biol. Med.* 31, 107-9 (1933); cf. *C. A.* 27, 1375, 5092.—Serum phosphatase was decreased by prolonged fasting and increased by the feeding of dextrin; it was increased in about 50 patients with jaundice of liver origin, and the concn. varied directly with the icteric index and with the clinical condition of the patient. In jaundice assocd. with anemia the serum phosphatase was not increased. Evidently the liver and not the blood is the source of some of the serum phosphatase in jaundice.

C. V. Bailey

**Influence of ultra-violet irradiation on glucemia and glucosuria in healthy and in diabetic subjects.** A. Jona. *Minerva med.* 1933, II, 757-62.—Progressively increasing daily irradiations were given to 4 normal persons and 2 diabetics for about 1 month. In the normal cases there was a diminution in glucemia but no noticeable influence on provoked glucemia or glucosuria. In the diabetics while the glucemia and glucosuria were diminished, the general condition became aggravated and the acetoneuria increased.

Helen Lee Gruehl

**Influence of cod-liver oil on the hemolytic complement of human beings.** Thomas W. B. Osborn. *Biochem. J.* 27, 1425-9 (1933).—The injection of a dose of cod-liver oil by 50 exptl. subjects produced, on the av., a rise in hemolytic complement which was greater than that produced by olive oil (cf. *C. A.* 26, 2773).

B. H.

Soft curd milk and mastitis (Welch, Doan) 12.

**Burrows, Harold: Some Factors in the Localisation of Disease in the Body.** Baltimore: Win. Wood & Co. 290 pp. \$4.50. Reviewed in *J. Am. Med. Assoc.* 61, 1341 (1933).

**Oeuvres de Pasteur. Edited by Pasteur Vallery-Radot.** T. VI. *Maladies virulentes, virus-vaccins et prophylaxie de la rage. Fascs. 1 et 2.* Paris: Masson & Cie. 606 pp. F. 160. Reviewed in *Am. J. Pub. Health* 24, 177 (1934); cf. *C. A.* 23, 3300.

## H—PHARMACOLOGY

A. N. RICHARDS

Action of theelol (trihydroxyestrin) on uterine fistulas

<sup>1</sup> in the unanesthetized rabbit. Samuel R. N. Reynolds. *Proc. Soc. Exptl. Biol. Med.* 30, 1165-6 (1933).—The time of onset, the duration, amplitude and frequency of rhythmic motility of the uterus after the subcutaneous or intravenous administration of theelol were similar to the effects produced by comparable doses of theelin (keto-hydroxyestrin).

C. V. Bailey

<sup>2</sup> Action of pilocarpine and atropine on uterine fistulas in the unanesthetized rabbit. Samuel R. N. Reynolds. *Proc. Soc. Exptl. Biol. Med.* 30, 1167-8 (1933).—When uterine motility was rhythmic and of marked amplitude, the intravenous injection of 0.6-6 mg. of pilocarpine caused a sustained contraction lasting 1-4 min. and subsequent contractions of increased duration and frequency. The quiescent uterus did not react to pilocarpine; the quiescent uterus in the non-sensitized rabbit did not react to injected protein (cf. *C. A.* 25, 5928). Atropine sulfate, 1-5 mg., had no effect on the quiescent or contracting uterus; it prevented a contractile response to subsequent injections of pilocarpine and caused relaxation of a uterus already contracted under the influence of pilocarpine.

C. V. Bailey

<sup>3</sup> Oxygen and carbon dioxide dissociation studies on blood drawn after intravenous injection of pitressin. E. M. K. Geiling, N. J. Eastman and A. M. De Lawder. *Proc. Soc. Exptl. Biol. Med.* 30, 1168-71 (1933).—For a period of 5-10 min. after the intravenous injection of moderate doses of pituitrin or pitressin, the venous blood becomes rich in O<sub>2</sub> and lactic acid and low in CO<sub>2</sub> content; the O<sub>2</sub> consumption and cardiac output are lowered. In the succeeding 2 hrs. the findings are for the most part abnormally reversed with a gradual return to the basal levels. O<sub>2</sub> and CO<sub>2</sub> dissociation studies of venous blood before and after the injections showed only slight changes which could be attributed to the excess of lactic acid; evidently the phenomena are not due to any interference with the power of the blood to yield its O<sub>2</sub> at a given tension.

C. V. B.

<sup>4</sup> Effect of pitressin and pitocin on oxygen consumption of excised tissue. Morris H. Pincus. *Proc. Soc. Exptl. Biol. Med.* 30, 1171-4 (1933).—The O<sub>2</sub> consumption of fresh liver, heart or diaphragm tissue in the presence of pitressin was detd. in Warburg vessels with Barcroft manometers at 37.5°. Ringer-buffer-glucose and saline-buffer-glucose solns. were used. A low concn. of pitressin increased the O<sub>2</sub> consumption; higher concns. progressively lowered the consumption to a subnormal level. The various tissues had different threshold levels of activity. The results with pitocin were less conclusive. The results do not explain the initial lowering of metabolism produced by the intravenous injection of small doses of pitressin in the intact animal.

C. V. Bailey

<sup>5</sup> Inhibition of hypoglycemic perspiration by spinal anesthesia. Harry Koster and Arthur I. Mirsky. *Proc. Soc. Exptl. Biol. Med.* 31, 135-8 (1933).—Profuse perspiration is an early and prominent symptom of insulin hypoglycemia in man. Spinal anesthesia was induced by neocaine and hypoglycemia by the intravenous injection of 0.1 units of insulin per kg. of body wt.; when the anesthetic area was below the 5th dorsal segment hypoglycemic perspiration occurred only above the area of anesthesia; when skin anesthesia extended above the 5th dorsal segment no visible perspiration occurred anywhere. Lumbar sympathectomy inhibited the sweating of the legs; sweating occurred when 2 or 3 times the insulin dose was given. The low blood sugar stimulates the sympathetic centers in the midbrain directly or indirectly through the adrenals and adrenaline; anesthesia of the sympathetic nerves prevents the transmission of impulses to the sweat glands and perspiration does not occur. With large doses of insulin, circulating adrenaline is markedly increased, the sympathetic nerve endings in the sweat glands are directly stimulated and sweating occurs.

C. V. Bailey

<sup>6</sup> Removal of bromosulfalein from the blood stream by the reticuloendothelial system. R. I. Klein and S. A. Levinson. *Proc. Soc. Exptl. Biol. Med.* 31, 179-81 (1933).—In the dog, 2 mg. of bromosulfalein per kg. of body wt. was injected intravenously; the concn. of the dye in the blood serum was detd. 5 and 30 min. later.

There was a slight but definite retention of the dye after splenectomy and a considerable retention after reticulo-endothelial blockade with India ink which lasted 48 hrs. and disappeared in 3-4 days. The dye is removed from the blood by the Kupffer and the splenic endothelial cells.

C. V. Bailey

Comparative pharmacology of some thiomorpholine derivatives. David I. Macht. *Proc. Soc. Exptl. Biol. Med.* 31, 234-6(1933).—The pharmacology of thiomorpholineethanol and 7 of its esters was compared with that of sulfoxythiomorpholineethanol and 7 of its esters in respect to local anesthetic effect, toxicity and action on blood pressure and respiration. Only the benzoic ester of thiomorpholineethanol showed any appreciable local anesthetic effect, and none of the sulfoxythiomorpholine compds. revealed any definite local anesthetic action. The toxicity of both series of compds. is not very great but the sulfoxythiomorpholine derivs. are in general more toxic than the thiomorpholine derivs.

C. V. Bailey

Glycogen formation after oral administration of mannitol to white rats. Alfred K. Silberman and Howard B. Lewis. *Proc. Soc. Exptl. Biol. Med.* 31, 253-5(1933).—Young white rats, after 24 hrs. without food, were fed solns. contg. 214-505 mg. of mannitol; analyses of the livers after absorption periods of 2-6 hrs. failed to reveal any significant increases in glycogen as compared with controls.

C. V. Bailey

Effect of chaulmoogric acid derivatives on lipolytic activity in vitro. George A. Emerson, Hamilton H. Anderson and Chauncey D. Leake. *Proc. Soc. Exptl. Biol. Med.* 31, 272-3(1933); cf. *C. A.* 27, 4293 and following abstr. —Shaw-Mackenzie (*Med. Press and Circ.* 2, 122 (1920)) found that Na gynocardate activated *in vitro* the lipase of a glycerol ext. of the pancreas. The expts. were repeated with both an aq. ext. and a 60% glycerol ext. of fresh dog pancreas; the former inhibited, the latter apparently slightly activated, the lipolytic activity. The activation was probably an artifact due to the disturbance of equil. brought about by the introduction of a salt or a weak acid into an enzyme reaction system contg. large amts. of free glycerol. If the chaulmoogric acid exerts any indirect action in leprosy therapy, aside from bactericidal action, it is improbable that the fat-splitting enzyme is involved.

C. V. Bailey

Comparative biological activity of seven new water-soluble chaulmoogric acid derivatives. George A. Emerson, Hamilton H. Anderson and Chauncey D. Leake. *Proc. Soc. Exptl. Biol. Med.* 31, 274-7(1933).—On the bases of *in vitro* bactericidal and hemolytic action, intravenous toxicity, tolerance and effectiveness in experimental rat leprosy, Na dichaulmoogryl- $\beta$ -glycerophosphate ("chaulphosphate") appears superior for possible use in the intravenous treatment of leprosy than other representative water-soluble chaulmoogric derivs., such as Na hydncarpate ("Alepol"), K iodidihydrochaulmoograte, Na chaulmoogrylglycinate, Na chaulmoogryl- $\alpha$ -aminobenzoate, diethylethanolammonium chaulmoograte and choline chaulmoograte.

C. V. Bailey

The laxative principle in prunes. George A. Emerson. *Proc. Soc. Exptl. Biol. Med.* 31, 278-81(1933).—The laxative properties of prunes are not due entirely to colloidal or emollient effects in the intestine; they are in part due to the presence of an agent, sol. in water, alc. and pyridine, which increases both tonus and amplitude of contraction. This active principle in certain chem. and physiol. properties is similar to dihydroxyphenylisatin and to caffeic and chlorogenic acids.

C. V. Bailey

Ether hyperglucemia. R. A. Phillips and N. E. Freeman. *Proc. Soc. Exptl. Biol. Med.* 31, 286-9(1933).—Ether hyperglucemia was present but considerably reduced in (1) cats with inactivated adrenals and cut liver nerves, (2) cats completely sympathectomized for 3 weeks and (3) cats sympathectomized 2 weeks and the adrenals removed 7 hrs. before etherization. The expts. rule out a sympathico-adrenal factor and leave the mechanism of ether hyperglucemia unexplained.

C. V. B.

Toxic effect of sodium iodoacetate on trypanosomes. C. V. Smythe and L. Reiner. *Proc. Soc. Exptl. Biol.*

*Med.* 31, 289-92(1933).—Na iodoacetate was highly toxic to *Trypanosoma equiperdum*, *in vitro*. In the infected rat, the injection of 0.2 cc. of a 0.25 M soln. kept the blood free from these organisms for 2-10 days; repeated injections were equally efficacious. The toxicity for rat or trypanosome was not counteracted by thiol compds. Strains of trypanosomes resistant to As were not resistant to iodoacetate. The mechanism of the action of iodoacetate is discussed.

C. V. Bailey

Effect of reticulo-endothelial blockade on blood chemistry. R. I. Klein and S. A. Levinson. *Proc. Soc. Exptl. Biol. Med.* 31, 353-5(1933).—In the dog, the continuous intravenous injection of an 8% suspension of India ink in normal saline caused an immediate decrease in white cells and cholesterol and a rise in blood sugar; the  $pH$ ,  $CO_2$ , and viscosity fell more slowly; there was peripheral vasoconstriction and increased splanchnic activity. After 45 min. there was a change toward normal values. With continued injection the white cells and sugar decreased, non-protein N increased; fatigue and functional paralysis, acidosis and death ensued after 1000 cc. had been injected in a period of 4 hrs.

C. V. Bailey

Comparison of the antipyretic action and toxicity of *d*-glucono- $\beta$ -phenetidine and acetophenetidine. W. E. Hamburger. *Proc. Soc. Exptl. Biol. Med.* 31, 365-7(1933).—The antipyretic action of gluconophenetidine in equinol. proportions was about equal to the action of acetophenetidine when tested on rabbits made febrile with injections of hay infusion. Gluconophenetidine was non-toxic to rats in doses up to 50 g. per kg.; acetophenetidine caused occasional toxic symptoms in doses as low as 4 g. per kg., and was fatal in 3 out of 5 animals with a dose of 6 g. per kg. This indicates a definitely wider range between therapeutic and toxic doses for gluconophenetidine than for acetophenetidine.

C. V. B.

Dinitrophenol hyperglucemia. I. Its independence of asphyxia. V. E. Hall, C. A. Brown and M. Salyun. *Proc. Soc. Exptl. Biol. Med.* 31, 380-2(1933).—In the cat anesthetized with pentobarbital, the intramuscular injection of 20 mg. of 2,4-dinitrophenol caused a rise in rectal temp., respiration rate and blood sugar; in the blood, the  $O_2$  content was unchanged, the  $CO_2$  content decreased, the  $pH$  of the plasma increased. The hyperglucemia is not secondary to a general asphyxia.

C. V. B.

Potassium the adrenalinogenic element. René Hazard. *Compt. rend.* 197, 1455-8(1933).—KCl on intravenous injection in dogs stimulates a true secretion of adrenaline by excitation carried by the splanchnic beyond the ganglions.

Rachel Brown

The behavior of hematoporphyrin in the animal body. Rudolf Hutschenreuter. *Z. physiol. Chem.* 222, 161-76(1933).—Rats subsisting on a meat-free diet tolerate relatively large doses of Nencki's hematoporphyrin, given both orally and intramuscularly, over considerable periods of time. With moderate doses the animals gain in wt. and show no photodynamic effects. Hemateric acid and coproporphyrin normally occur in the feces. After oral administration of hematoporphyrin this substance is found in the feces but not in the urine or blood. On the other hand, it occurs in both blood and urine after intramuscular administration. There is no evidence that hematoporphyrin is converted into hemateric acid. The path of excretion of hematoporphyrin is fundamentally different for oral and intramuscular administration, although in both cases the excretion is nearly quant.

A. W. Dox

The effect of halogen acids and their esters upon yeast cells. P. Cayrol. *Ann. physiol. physicochim. biol.* 9, 999-1102(1933).—A large no. of substances were studied in detail. In general, their inhibiting action upon fermentation is a function of the  $CH_2XCOOR$  group, where X is either Br or I; and at  $pH < 5$ , the inhibition is the same, whether the substance is a bromoacetate, an iodoacetate or an org. ester of the 2 acids. At neutral reaction, the mineral salts of these acids become much less active, while the esters continue to inhibit fermentation. The org. bromoacetates kill the cells in acid reaction; at neutral reaction they exert a sp. inhibition upon fermentation, without affecting cellular multiplication. Their action is

independent of the alc. radical, whether it is aliphatic, cyclic, a poly-alcohol, an ether oxide or whether it contains 1 or 8 C atoms. The R'CHXCOOR type of substance is in general less active, and its activity decreases markedly with increasing size of the R' group. The metabolism and growth of yeast cells in the presence of these substances is studied in detail. There is an extensive bibliography.

Harry Eagle

The effect of corn smut (*Ustilago maidis*). Sv. Sp. Barjaktarović and S. B. Bogdanović. *Arch. expl. Path. Pharmacol.* 173, 381-7(1933).—Fresh aq. exts. of corn smut caused hyperglucemia in rabbits, but inhibit or reverse the hyperglucemia caused by adrenaline. H. E.

The absorption of ethyl alcohol, with special reference to alcohol habituation. Gottfried Jungmichel. *Arch. expl. Path. Pharmacol.* 173, 388-97(1933).—With the Widmark method for the detn. of blood EtOH, it was found that absorption following peroral intake by fasting human beings is complete after 40-60 min. The blood concn. attained, and the time required for the max. value to be reached, are not reliable criteria for the diagnosis of chronic alcoholism. In general, those habituated to EtOH have a lower blood concn. after its ingestion, because of a more rapid combustion.

Harry Eagle

The effect of synthetic thyroxine, diiodothyronine and diiodotyrosine on the gas metabolism of normal and castrated rats. L. De Caro and M. Giani. *Arch. expl. Path. Pharmacol.* 173, 398-404(1933).—Thyroxine and diiodothyronine cause an increased gas metabolism in rats, the effect of the former being relatively more prolonged. In certain doses diiodotyrosine causes a temporary slight increase, followed by a decrease. In general, the response in castrated rats is less pronounced. All 3 substances may cause a decreased metabolism in some animals.

Harry Eagle

The course of absorption of salicylic acid after peroral and rectal application. Wilhelm Blume and Fritz S. Nohara. *Arch. expl. Path. Pharmacol.* 173, 413-30(1933).—After either peroral or rectal application, salicylic acid appears in the blood of rabbits in  $1\frac{1}{2}$ -2 min. and in the urine in 60 min. The curve of urinary excretion after peroral ingestion shows no max., and the total excreted varies between 50% (green vegetable diet) and 70% (carrot diet). There is a sharp max. in the urinary excretion approx. 2 hrs. after rectal administration. The blood concn. in approx.  $\frac{1}{2}$  hr. reaches a max. of 5.4 mg. % after oral, and 8.9 mg. % after rectal, administration.

Harry Eagle

Crystalline insulin. I. The significance of the site of application for the intensity and duration of the insulin effect. M. Bürger and H. Kohl. *Arch. expl. Path. Pharmacol.* 173, 431-8(1933).—The true measure of the insulin effect is not only the degree of hypoglycemia, but its duration: that is, the area embraced by the usual curve of hypoglycemia. So measured, both cryst. and colloidal insulin are more effective upon intraperitoneal than upon intravenous injection. Cryst. insulin is the more effective for intravenous use, and colloidal insulin for intraperitoneal injection. II. Preparation and chemical properties. E. Bruch. *Ibid.* 439-51.—Abel's technique yields cryst. insulin uniformly only if Squibb's insulin is used as the amorphous source material. Abel's results as to analysis, m. p. and cryst. form are confirmed. Upon oxidation with  $K_2Fe(CN)_6$ , 1 mg. of cryst. insulin reduces a quantity corresponding to 0.0509 mg. O, 0.0116 mg. more than is reduced after inactivation of the prepn. in alkali at 95°. The  $NH_2$  liberated and the decreased reducing activity after heating in 0.01 N NaOH do not parallel the degree of insulin inactivation. III. The effect of suboccipital injections of insulin in rabbits. Hans Kohl. *Ibid.* 452-7.—Both cryst. and amorphous insulin are absorbed from the cerebrospinal fluid. Injected suboccipitally into rabbits in doses of 15-100  $\gamma$  per kg. it causes pronounced hypoglycemia, the effect beginning more slowly but lasting longer than after intravenous injection, the total effect being greater. Hypoglycemic convulsions were frequently observed, often after doses

which did not cause convulsions upon intravenous injection.

Harry Eagle

The pharmacology of indium. Hans Steidle. *Arch. expl. Path. Pharmacol.* 173, 458-65(1933).—Indium salts are absorbed only slightly after peroral ingestion by rats, and are correspondingly non-toxic. The M. L. D. after subcutaneous injection into rats is 0.15 mg./kg. The metal is stored in the liver, and is excreted by the kidneys, intestine and skin. In its pharmacol. effects it resembles Al and Hg. The organ most damaged is the kidney.

Harry Eagle

The effect of vagal sympathetic stimulation upon gas exchange in the lungs. H. Becker, M. Hochrein and K. Matthes. *Arch. expl. Path. Pharmacol.* 173, 466-78(1933).—One of the chief causes of anoxemia in deep anesthesia (evipan, morphine, ether) is a disturbance in the O transport from alveolar air to blood. Elec. stimulation of the vagus sympathetic nerves causes an increased O satn. in arterial blood; this is due primarily to the congestion of blood in the lungs and the correspondingly increased respiratory surface. There may also be a direct effect upon the permeability of the capillary walls.

Harry Eagle

The effect of germanin. I. B. v. Issekutz. *Arch. expl. Path. Pharmacol.* 173, 479-98(1933).—Unlike neosarsphenamine or trypanavine, germanin has no effect upon the O consumption of trypanosomes *in vitro*. Moreover, the blood of a rabbit injected with germanin does not inhibit the respiration of the organisms *in vitro*, again unlike neosarsphenamine. That the drug does have an effect *in vivo* is shown by the disappearance of the organisms from the blood of infected rats 16-22 hrs. after injection, by their decreased O consumption 6-9 hrs. after the injection, and by their decreased viability 12 hrs. after the injection. II. The serum of animals cured by germanin contains a trypanocidal substance effective only at room temp., which also decreases the O consumption of the organisms, and which is most active in the first few days after the cure. *Ibid.* 499-507.—Germanin is taken up by circulating organisms in infected animals only in traces, 5-10 mg. % as compared with 24-42 mg. % for serum withdrawn at the same time. Although the drug has no effect upon the O consumption of organisms suspended in Ringer-sheep serum, their virulence is greatly decreased, animals infected with the treated organisms dying in 9-16 days instead of 3-5; however, even exposure for 9 hrs. to germanin does not completely destroy pathogenicity.

Harry Eagle

The mucous membrane and vascular effects of astringents. Gerda Hemmerling. *Arch. expl. Path. Pharmacol.* 173, 536-48(1933).—Tannin,  $Al(OAc)_3$ , and boric acid applied daily for 4 weeks to rabbit oral mucosa cause a characteristic hyperkeratosis, and prevent the inflammation otherwise caused by the application of concd. soap soles. These effects do not depend upon the acidity of the astringent, for HCl causes severe inflammation. Unlike tannin, boric acid was not found to be definitely vasoconstrictor (frog tongue prepn.). The several types of astringents therefore differ in their anti-inflammatory properties.

Harry Eagle

The central effects in veronal-caffeine mixtures. Karl Steinmetzer. *Arch. expl. Path. Pharmacol.* 173, 580-8(1933).—Caffeine and veronal are antagonistic in mice with respect to sleep, convulsions and respiratory paralysis. Caffeine administered in  $\frac{1}{2}$  the dose of veronal may completely prevent the hypnotic effect.

H. E.

The disappearance of local anesthesia by habituation to alcohol. Kitty Balodis. *Arch. expl. Path. Pharmacol.* 173, 589-94(1933).

Harry Eagle

The fate of morphine in the animal body. E. Keeser, H. A. Oelkers and W. Raetz. *Arch. expl. Path. Pharmacol.* 173, 622-32(1933).—After the subcutaneous injection of morphine into guinea pigs, it is most concd. in the kidneys and liver, less in the muscles and blood and least in the brain. After 24 hrs., it is demonstrable only in the kidneys and blood (Fleischmann method of analysis). After daily injections for 3-6 weeks, all the organs contain some of the alkaloid 16-24 hrs. after the last injection. If guinea pigs are injected daily for 4 days, or

mice over a long period, the injected morphine is recovered quantitatively in the excretions (urine and feces) during that period and in the animal body. Morphine is therefore not decomposed in the body in significant quantities.

Harry Eagle

Quantitative studies of various commercial posterior pituitary preparations with respect to their labor-stimulating components. Konrad Schübel and Walter Gehlen. *Arch. expil. Path. Pharmacol.* 173, 642-61(1933).

Harry Eagle

The combination of labor-inducing agents. Konrad Schübel and Walter Gehlen. *Arch. expil. Path. Pharmacol.* 173, 652-61(1933).—Quinine and posterior pituitary ext. have a synergistic action in stimulating contractions in the puerperal uterus of cats. "Gravitol" has neither an additive nor synergistic effect with either quinine or the pituitary ext.

Harry Eagle

The convulsive action of local anesthetics and the effect of mineral salts and adrenaline. F. Eichholtz and G. Hoppe. *Arch. expil. Path. Pharmacol.* 173, 687-96(1933).—The convulsive action of intravenous procaine, tutocaine, cocaine and pantocaine in white rats increases in the order named. It is slightly increased by NaCl, KCl, MgCl<sub>2</sub>, and markedly (45-95%) increased by the previous administration of Ca salts. The addn. of 1:40,000 adrenaline to the anesthetics causes a 2-4-fold increase in their convulsive action and toxicity, and often results in pulmonary edema because of an increased toxicity of the adrenaline itself. The latter effect is not observed with procaine.

Harry Eagle

The effect of insulin upon body temperature. L. Dünner. *Arch. expil. Path. Pharmacol.* 173, 710-21(1933).—Guinea pigs regularly have a fall in body temp. of as much as 2-3° within 1-2 hrs. after the injection of 2-3 units of insulin, not casually related to the hypoglycemia. The hypothermia is caused by the insulin itself, and not by the inert protein; cryst. insulin inactivated by H<sub>2</sub>O<sub>2</sub> no longer causes hypothermia.

Harry Eagle

Fluorescent microscope studies in a case of poisoning with hypnotics. E. Emminger. *Klin. Wochschr.* 12, 1840-2(1933).—The urine, bile and liver contained porphyrin; none of the other organs contained porphyrin demonstrable with the fluorescence microscope.

H. R.

Comparison of cardiazole and coramine in the animal experiment. B. Behrens and E. Reichelt. *Klin. Wochschr.* 12, 1860-2(1933).—In rabbits, cardiazole is the more effective prepn., and more rapidly absorbed after subcutaneous injection.

Harry Eagle

The glycerol treatment of ureteral stones. Heinrich Gissel. *Klin. Wochschr.* 12, 1867-9(1933).—Although glycerol appears in the urine after the ingestion of > 30 g., much larger quantities must be taken before a significant urinary concn. is reached (6% after the ingestion of 200 g.). There is no change in urinary viscosity. Its therapeutic action in cases of ureteral stone would appear to rest upon the increased diuresis and the increased sp. gr. of the urine.

Harry Eagle

Effect of vagotonin on adrenalinic hyperglucemia. D. Santenaise, G. Fuchs, L. Merklen and M. Vidacovitch. *Compt. rend. soc. biol.* 114, 1021-3(1933); cf. C. A. 27, 4590.—Vagotonin, through its effect on the parasympathetic system, brings about a condition such that the usual dose of adrenaline does not produce hyperglucemia.

L. E. Gilson

Variations in intraarterial tension in man during inhalation of amyl nitrite. M. Gaucher, J. Lequime and A. van Bogaert. *Compt. rend. soc. biol.* 114, 1056-7(1933).—The conclusions of Dautrebaude (C. A. 27, 1401) are criticized.

L. E. Gilson

Action of diethylaminomethylbenzodioxan and some related compounds on experimental exophthalmia. L. Justin-Besançon, D. Bovet, D. Kohler and Mme. S. Schiff-Wertheimer. *Compt. rend. soc. biol.* 114, 1082-3(1933); cf. C. A. 27, 4300, 5738.

L. E. Gilson

Action of adrenalin during general anesthesia by tribromomethanol. L. Garrelon and Jean Leroux-Robert. *Compt. rend. soc. biol.* 114, 1086-9(1933).—The injection of ordinary doses of adrenaline into dogs anesthetized

with 0.08-0.35 g./kg. of CBr<sub>3</sub>CH<sub>2</sub>OH does not cause any untoward effects, but if much larger doses of CBr<sub>3</sub>CH<sub>2</sub>OH are used adrenaline may cause cardiac syncope.

L. E. Gilson

Vagotonin and the efficacy of acetylcholine. D. Santenaise, L. Merklen and M. Vidacovitch. *Compt. rend. soc. biol.* 114, 1166-9(1933); cf. C. A. 27, 4589.—In dogs the physiol. effects of acetylcholine are intensified by previous administration of vagotonin.

L. E. Gilson

Curarizing action of bromoacetic acid [on frog muscle]. Miguel Ozorio de Almeida. *Compt. rend. soc. biol.* 114, 1197-1200(1933).

L. E. Gilson

Fetal resorption in animal husbandry. R. B. Hinman. *Proc. Am. Soc. Animal Production* 1932, 282-3(1932).—Subjection of male rabbits to alc. to the point of intoxication for various periods of time before breeding greatly increased the no. of partially and completely resorbed young in the uterus of the female.

K. D. Jacob

Growth and longevity of the white mouse. II. The influence of the continuous administration of vegetable nucleic acid and the intermittent administration of thyroid upon growth and longevity. T. B. Robertson, M. C. Dabarn, J. W. Walters and J. D. O. Wilson. *Australian J. Exptl. Biol. Med. Sci.* 11, 219-35(1933); cf. C. A. 27, 5422.—The growth of mice was decreased by administration of 25 mg. of vegetable nucleic acid daily throughout life, and 3 mg. of thyroid (0.1% 1) for 1, 2 or 3 periods of 28 days. Duration of life was slightly greater than for a control group when one period of thyroid feeding was followed, but fell below the control group when thyroid was fed during 2 or 3 periods.

C. G. King

A case of poisoning with a derivative of barbituric acid. T. J. Orford. *Can. Med. Assoc. J.* 30, 65(1934).—A patient, who had swallowed 18 gr. of "Dial," passed into a state of coma in 1½ hrs. and showed all the signs of barbiturate poisoning; respirations were about 6 8 per min. Coramine, 3 cc., was given intramuscularly about 2½ hrs. after the tablets were swallowed and a cold bath was given. Respirations and pulse improved at once; the patient was kept awake for 4 hrs. and was then allowed to sleep 14. Another 3 cc. of coramine was given and the patient made a complete recovery.

G. H. W. Lucas

Does oxyacanthine, an alkaloid of *Berberis vulgaris*, possess a sympatholytic action? Raymond-Hamet. *Compt. rend.* 197, 1354-7(1933).—Oxyacanthine, an alkaloid which accompanies berberine and berbamine in the bark of the roots of *Berberis vulgaris* L., gives the color reactions of Fröhde, which are characteristic of substances having sympatholytic properties. In dogs, after chloralose anesthesia and double vagotomy in the neck and artificial respiration, this alkaloid has counteracted the action of adrenaline on blood pressure and renal constriction. The amt. necessary for this has varied from 15 to 35 mg. per kg. It has some resemblance to quinine.

G. H. W. L.

The influence of acetylcholine on the blood pressure. G. Pupilli. *Arch. ital. biol.* 89, 1-34(1933).—See C. A. 27, 2497.

A. E. Meyer

The influence of insulin on the skin temperature of the rabbit. R. Sapegno and G. Ceruti. *Arch. ital. biol.* 89, 34-44(1933).—See C. A. 27, 4305.

A. E. Meyer

The action of cocaine on the blood respiration. G. Feloni. *Arch. ital. biol.* 89, 69-75(1933).—Cocainized blood absorbs O<sub>2</sub> more slowly than normal blood. The effect is more pronounced in the blood of oviparous animals than in that from viviparous. The effect is greatest in fresh blood and decreases as the red corpuscles die.

A. E. M.

The action of formaldehyde on erythrocytes, hemagglutination and hemolysis; the transfusion of heterogeneous formalized blood. V. Ducceschi and A. Cardin. *Arch. ital. biol.* 89, 115-30(1933).—The agglutination of human erythrocytes is inhibited by 0.8-1% H<sub>2</sub>CO, but the agglutination returns after lavage with Ringer soln. The agglutination and hemolysis of heterogeneous blood are also inhibited. Transfusions of moderate quantities of such blood are possible.

A. R. Meyer

The influence of hypertonic sodium chloride solutions on the motility of the intestine. Ludovico Dacimo



*Arch. ital. biol.* 89, 131-9(1933).—The introduction of a 20% NaCl soln. into the intestine causes an increase of contractility, if the latter was moderate before. A decrease of the contractions occurs, if they were strong before. The application on the serosa always causes an increased motility.

A. E. Meyer

The action of amino acids on leucocytes and on the glumatic curve. C. Manzini and C. Arullani. *Arch. ital. biol.* 89, 201-12(1933).—Parenteral injections of amino acids showed in rabbits the following influence on the leucocytes: increase by glycine, asparagine, arginine, histidine, cystine, creatinine, alanine and tryptophan; decrease by tyrosine and leucine. Glycine, histidine, tryptophan, cystine and creatinine cause inversion of the ratio between polynuclears and lymphocytes. Cystine causes besides a relative basophilia. The other acids do not change the relative leucocyte count. Arginine, histidine, leucine, glycine and creatinine increase the blood sugar; tryptophan and asparagine decrease it; tyrosine produces an initial increase followed by decrease. Alanine and cystine give changing results.

A. E. Meyer

The influence of creatine on the muscle tonus. F. M. Chiancone. *Arch. ital. biol.* 90, 22-5(1933).—See C. A. 27, 5821.

A. E. Meyer

The distribution of fats introduced into the organism. G. Peretti, L. Reale and L. Cioglia. *Arch. ital. biol.* 90, 59-70(1933).—See C. A. 27, 342.

A. E. Meyer

Polymembered heterocyclic compds. (Ruzicka, *et al.*) 10. Heart glucosides (Stoll, Kreis) 10.

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## 1—ZOÖLOGY

R. A. GORTNER

Role of bacteria in the nutrition of mosquito larvae. The growth-stimulating factor. E. Harold Hinman.

*Am. J. Hyg.* 18, 224-36(1933); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 25 (Nov. 11, 1933).—A summary of 4½ years' research shows that moderate nos. of bacteria in culture media stimulate the growth of mosquito larvae, but excessive contamination invariably destroys the larvae. The autoclaving of culture media renders it unfavorable to larval development. Likewise the killing of bacterial cultures at low temp. destroys the growth-stimulating factor. Bacterial cells killed by HCHO also prevented the development of larvae. The vitamin-like growth stimulator could not be isolated, but was not extra-cellular because the bacterial filtrate failed to stimulate larva development. The factor is probably contained within the bacterial cells. Fungi and yeasts may play a similar role in the nutrition of culicid larvae. Microorganisms of various types have a marked influence in the nutrition and metabolism of invertebrates in supplying elements controlling their life processes.

C. R. Fellers

The copper content, and its variations, of the different organs of the snail. R. Guillemet and A. Sigot. *Compt. rend. soc. biol.* 114, 1041-3(1933).—Analyses are given. The hepato-pancreas is relatively low in Cu and evidently not an organ of storage as it is in vertebrates.

L. E. G.

Distribution of glycogen in the organs of the squid. M. Chaigne. *Compt. rend. soc. biol.* 114, 1103-5(1933).—Glycogen occurs in all the organs. Analyses for different seasons of the year are given.

L. E. Gilson

Detection of copper in snail blood by the electrolytic staining of a protein membrane. M. Chanoz, P. Ponthus and R. Niel. *Compt. rend. soc. biol.* 114, 1109-12(1933); cf. C. A. 27, 2973.—With the method previously described Cu can be detected in 0.05 cc. of snail blood.

L. E. Gilson

The colorimetric determination of the pigment content, carotenoids and flavones, of eggs of various species of silk worms and their hybrids. Carmela Manunta. *Boll. soc. ital. sper.* 8, 1278-82(1933).—Flavones were not present in *Awjiku-F.* 936; K. N.<sub>12</sub>; K. N.<sub>22</sub>; flavones were present in traces only in R.<sup>III</sup>; K. N.<sub>1</sub>; SB 333; F 367; A. L. III; and K. N.<sub>7</sub>. Carotenes were not present in F 789; K. N.<sub>12</sub>; S. V. 6<sup>III</sup>; V. W. 333; A. V. 222. Xanthophyll was present in all the species.

Peter Masucci

Leucopterin, the wing pigment of common white butterflies (Wieland, *et al.*) 10. Pterins in wasps and butterflies (Schöpf, Becker) 10.

## 12—FOODS

F. C. BLANCK AND H. A. LEPPER

Food values and their practical application in dietetics. J. A. Nixon. *Brit. Med. J.* 1934, I, 1-4.—A lecture.

J. B. Brown

Fluorescence comparisons in the examination of food. John Muir. *Food* 3, 9-10, 95-8(1933).—A brief description of the Muir Ultra-Violet Comparator together with a no. of typical examples of its application to the examn. of various foodstuffs.

A. Papineau-Couture

Determination of small quantities of tin in foodstuffs. H. Cheftel and Mme. J. Blass. *Ann. fals.* 26, 528-31(1933).—Take 1-2 g. of drained canned goods, dry at 100° on an ashless filter, place in a 100-cc. Pyrex flask (for liquid goods, introduce 1-2 cc. directly into the flask), destroy org. matter with 1 cc. concd. H<sub>2</sub>SO<sub>4</sub> and repeated addns. of 1 cc. concd. HNO<sub>3</sub>, heating to SO<sub>2</sub> fumes between each addn. of HNO<sub>3</sub>, cool, dil. to 4 cc., add 0.1 cc. concd. HCl and 1 drop of 0.5 N NiSO<sub>4</sub>, reduce by gentle boiling with 4 successive addns. of 0.1 g. Zn, while passing CO<sub>2</sub> through the soln., cool, while maintaining the current of CO<sub>2</sub>, add 2-3 cc. 0.004 N I (measured with a microburet), titrate with 0.004 N Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> from a microburet, adding 1 cc. of Tromsdorff's indicator (20 g. ZnCl<sub>2</sub>, 4 g. starch and 2 g. ZnI<sub>2</sub> per l.) toward the end of the titration. Titrations on 0.2-0.5 mg. Sn, with and without addn. of sucrose, Fe and (or) Pb, showed an error of ±3.5%. When Pb was first detd. on the same sample

as Sn (Macheboeuf, C. and B., C. A. 26, 4886-7), the error increased to -4.5 to -6.2%.

A. P.-C.

The microbiology of frozen foods. Lawrence H. James. *Ice and Cold Storage* 36, 150-1, 173-4(1933).—The type of the microorganism and the type of food material in which the microorganism is frozen det. the degree of survival. Fats and sugar soln. have a protective action on the microorganism during freezing, while acid materials produce a greater killing.

A. H. Johnson

Conserving food value, flavor and attractiveness in cooking vegetables. Rosemary Loughlin. U. S. Dept. Agr., *Circ.* 265, 1-12(1933).—General.

C. R. Fellers

Correlations between commercial and laboratory milling tests. C. H. Bailey and M. C. Markley. *Cereal Chemistry* 10, 515-30(1933).—If baking methods are used which tend to eliminate variations in diastatic activity, there is a correlation between the baking qualities of commercially and experimentally milled flours from the same wheat.

L. H. Bailey

Report of the 1932-33 committee on the standardization of laboratory baking. W. F. Geddes, *et al.* *Cereal Chemistry* 10, 531-2(1933).—The report includes recommendations for further study.

L. H. Bailey

Comparison of various baking formulas used in testing wheat quality for the plant breeder. R. K. Larmour, W. F. Geddes and A. G. O. Whiteside. *Cereal Chemistry*

10, 601-4(1933).—The malt-bromate-phosphate formula gave the greatest range of loaf vol., 335-500 cc.

L. H. Bailey

Further experiments with the "short fermentation method" in laboratory test baking. R. M. Sandstedt and M. J. Blish. *Cereal Chemistry* 10, 605-12(1933).—When baking experimentally milled flours by the short method (1½ hrs. fermentation) the use of 1% sugar and 0.5 mg. of KIO<sub>3</sub> will give baking characteristics (exclusive of crumb color) closely resembling those obtained when the same flour has been milled on a com. unit, given an av. bleaching and maturing treatment, and then baked by the short fermentation method with no sugar and no iodate.

L. H. Bailey

The wheat-meal fermentation time test. H. K. Wilson, M. C. Markley and C. H. Bailey. *Cereal Chemistry* 10, 619-20(1933).—A table shows correlation coeffs. between various baking characteristics and wheat-meal fermentation time test.

L. H. Bailey

Variability in experimental baking. I. Effect of mechanical mixing devices, time of dividing doughs and quantity of dough mixed on loaf characteristics. Ray Weaver, Philip Talbott and D. A. Coleman. *Cereal Chemistry* 10, 612-16(1933).—In mixing expts., the Hobart-Swanson mixer is preferred to the Hobart. Doughs mixed from 200 g. flour and divided immediately showed advantages over the doughs that were mixed and carried as a single dough until time of panning. Less variability in loaf vol. was shown when 200 g. doughs were mixed and then divided than when mixed as 100 g. doughs.

II. Yeast variability. *Ibid.* 617-18.—A table shows the effect of age and brand of yeast on loaf vol. values from 50 replicate bakes—first clear flour. III. The influence of experimental milling in evaluating wheat strength. W. F. Geddes, H. N. Bergsteinsson and S. T. Hadley. *Ibid.* 555-9.—Variations in flour characteristics due to exptl. milling must be considered in evaluating wheat strength. Correlations computed between loaf vol. and the scores assigned for crumb color and texture, while not of great magnitude, were pos. and significant. The correlation between texture and crumb color was of greater magnitude, this showing that the scoring of bread for crumb color is strongly influenced by differences in pore size.

IV. Studies on mixing, sheeting rolls, pan shape and 50- and 25-gram formulas. W. F. Geddes and L. D. Sibbitt. *Ibid.* 560-84.—There is less gluten modification by mechanized procedure than by hand treatment. The work indicates that it is necessary to conduct duplicate bakings on sep. mixings to secure a valid error for the estn. of significant differences between flour samples. Different characteristics of flour can be studied by small loaf baking tests.

L. H. Bailey

Diastatic supplements for the A. A. C. C. baking test. Quick Landis and Charles N. Fry. *Cereal Chemistry* 10, 388-92(1933).—Tables, formulas and discussion about adequately maintaining the sugar level in standard test baking.

L. H. Bailey

Studies on the A. A. C. C. standard baking test as applied to the testing of whole wheat flours. R. T. Bohn and F. D. Machon. *Cereal Chemistry* 10, 533-44(1933).—The A. A. C. C. standard baking test formula was used. Fermentation: 1st, punch 90 min.; 2nd, punch 45 min.; to pan 15 min., proof 35 min.

L. H. Bailey

Testing biscuit and cracker flour. J. A. Dunn. *Cereal Chemistry* 10, 628-31(1933).—Tests should include protein, ash, moisture, viscosity and the differential modified Werner test.

L. H. Bailey

The results of bleaching Michigan soft winter wheat cake flours by the Brabender electric bleaching apparatus. G. L. Alexander. *Cereal Chemistry* 10, 623-6(1933).—With this method there is a moderate whitening of the flour color, and a slight oxidizing effect on the gluten, starch and fatty constituents.

L. H. Bailey

Tests for biscuit and salt-rising flours. H. G. Walter. *Cereal Chemistry* 10, 635-41(1933).—Further work is suggested to include studies on shortening, temps. of doughs and absorption.

L. H. Bailey

The inorganic constituents of wheat and flour. B. Sullivan. *Cereal Chemistry* 10, 503-14(1933).—The av. analyses of the elements found in wheat, flour and bread (dry basis) are:

Constituents	Wheat	Patent Flour	Bread
Total Ash	1.85%	0.45%	2.77%
K	0.571%	0.168%	0.200%
P	0.428%	0.113%	0.140%
S	0.194%	0.165%	0.192%
Mg	0.173%	0.029%	0.040%
Cl	0.055%	0.051%	1.005%
Ca	0.048%	0.018%	0.089%
Na	0.009%	0.003%	0.069%
Si	0.006%	0.005%	0.005%
Zn	100 p. p. m.	40 p. p. m.	50 p. p. m.
Ni	35 p. p. m.	—	—
Fe	31 p. p. m.	8 p. p. m.	10 p. p. m.
Mn	24 p. p. m.	3 p. p. m.	8 p. p. m.
B	16 p. p. m.	4 p. p. m.	3 p. p. m.
Cu	6 p. p. m.	2 p. p. m.	5 p. p. m.
Al	3 p. p. m.	0.6 p. p. m.	—
Br	2 p. p. m.	1 p. p. m.	1 p. p. m.
I	0.006 p. p. m.	0.004 p. p. m.	—
As	0.1 p. p. m.	0.01 p. p. m.	—
Co	0.01 p. p. m.	—	—
F	present	—	—
V	present	—	—
Se	present	—	—

Selected bibliography.

L. H. Bailey

Cake-baking method for testing soft wheat flours. L. H. Bailey. *Cereal Chemistry* 10, 627-8(1933).—A standard procedure is described including supplementary tests for sugar and shortening tolerances. For exptl. flours the sugar is reduced by 5% and the water by 10% of that in regular formula.

L. H. Bailey

Tentative formula for testing cake flour. Laura K. Track. *Cereal Chemistry* 10, 632-4(1933).—Comparative results are shown when a tentative formula is compared with a more lean formula.

L. H. Bailey

A mechanical method for the determination of absorption in bread doughs. C. C. Fifield. *Cereal Chemistry* 10, 547-54(1933).—Absorption figures as detd. by the supercentrifuge did not closely agree with those obtained by the "touch" method.

L. H. Bailey

The effects of ammonium phosphate on loaf volume. R. K. Larmour and S. F. Brockington. *Cereal Chemistry* 10, 599-601(1933).—The quantity of (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> superimposed on the malt-bromate formula to produce the best results was 0.1%.

L. H. Bailey

Scoring crumb grain. C. H. Bailey and M. C. Markley. *Cereal Chemistry* 10, 545-7(1933).—Bread crumb from 13 loaves was scored by 6 collaborators with and without reference to crumb standards. Better correlation was secured when the standards were used.

L. H. Bailey

Some relationships between sugar, diastatic malt extract and potassium bromate in the baking formula. R. K. Larmour and S. F. Brockington. *Cereal Chemistry* 10, 593-8(1933).—As a general optimum formula for detg. strength, the authors have chosen tentatively the 0.001% bromate, sugarless dough contg. 0.5% malt ext. (200° Lintner).

L. H. Bailey

Phosphoric acid [fertilizers] and baking quality [of flour]. J. Lemmerz. *Phosphorsäure* 3, 589-93(1933).—Investigations relating to the effect of P fertilizers on the baking qualities of flour are briefly reviewed. Twelve references.

K. D. Jacob

Experimental use of dried yeast for baking bread. N. N. Ivanov and Ph. L. Trainina. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 110-19(1933).—A carefully dried top yeast with good initial leavening power still retained 75% of this leavening power after drying, and storage for 6 months in glass at room temp. caused no further loss in potency.

Julian F. Smith

Making bakers' yeast from sulfite liquor. L. N. Gurfein and V. Ya. Chastukhin. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vneshnei Prom.*, No.

9, 35 pp. (1932).—Sulfite liquor, if neutralized and enriched in nutrients yielding N and P, is an excellent medium for cultivation of bakers' yeast. Heating for 1 hr. with steam after neutralization increases the sugar content; excessive heating destroys the sugar. The optimum sp. gr. of the liquor is 1.050–1.060; higher concns. introduce plasmolytic effects. Yield depends on degree of aeration and may be 40–100% of the sugar. The yeast which is produced has a relatively high dry matter content, namely 29.6%. Yeast production is one of the most profitable means for biochem. utilization of sulfite liquor.

Julian F. Smith

**Yield and composition of milk from Aberdeen-Angus cows.** L. J. Cole and Ivar Johansson. *J. Dairy Sci.* 16, 565–80 (1933).—Lifetime records on milk production are presented for 7 purebred Aberdeen-Angus cows and compared with those for 2 Jersey and 6 Holstein-Friesian cows kept and fed under the same conditions. Because of a lower rate of milk secretion and a shorter lactation period the av. yield (3100 lbs.) per lactation period from Aberdeen-Angus cows was lower than that from the other breeds. Individual cows, however, may be found which yield equally as high as low- or medium-producing Jerseys. Butter fat averaged 4.06% and protein 3.56%, both decreasing slowly with increasing age of the cow. The av. fat content of the milks decreased in the following order: Jersey, Aberdeen-Angus, Holstein. The Aberdeen-Angus milk contains nearly the same amt. of ash and lactose as Jersey milk.

H. K. Salzberg

**Milk-energy formulas for various breeds of cattle.** O. R. Overman and W. L. Gaines. *J. Agr. Research* 46, 1109–20 (1933).—Formulas were derived for detg. the energy content of milk from the analysis. From a large no. of analyses of milk from Ayrshire, Guernsey, Holstein, Jersey and crossbreds the following energy values were found: fat,  $9.253 \pm 0.065$ ; protein,  $5.853 \pm 0.127$ ; and lactose,  $3.893 \pm 0.059$  cal. per g. While different breeds show slight differences, the formula  $4\%$  milk =  $0.4 M + 15F$ , in which  $M$  = wt. of milk and  $F$  = wt. of fat in the same units, is sufficiently accurate for practical purposes. One kg. of 4% milk = 750 cal. Whole milk usually contains between 43 and 49 mg. of protein per cal. of total energy. Feeding standards for dairy cattle may be detd. from the energy and protein content of the feed, and its digestibility coeffs. alone.

A. L. Mehring

**The enzymes of cow milk.** R. G. Lapsley. *Chem. Eng. Mining Rev.* 26(7), 99–101 (1933).—Enzymes normally present in cow milk are: galactase, a protease, amylase, peroxidase, catalase and reductase. Three tests are given for peroxidase. Its importance and that of catalase and reductase are noted. The peroxidase and reductase enzyme systems in milk afford an example of a typical bio. oxidation-reduction system.

W. H. Boynton

**A new method for determining the protein content of milk.** Luscar Buruiana. *Lait* 13, 1214–21 (1933).—A colorimetric method based on the reaction between  $\text{HNO}_3$  and protein is described for detg. the protein or casein content of milk. One cc. of milk is introduced into a test tube after which 6–7 cc. of concd.  $\text{HNO}_3$  is added. The test tube is closed with a rubber stopper equipped with a condenser. The liquid in the tube is boiled for 2 min., cooled and transferred to a 50-cc. graduated flask. The acid is neutralized with 40% caustic, cooling continually during the neutralization, and the liquid made to vol. and filtered. Color comparison is then made in a colorimeter, a standard casein soln. or a dichromate-permanganate standard (18.6 cc. of 0.1 N  $\text{K}_2\text{Cr}_2\text{O}_7$  plus 2.7 cc. of 0.1 N  $\text{KMnO}_4$  made to 100 cc.) being used. If the temp. is kept low enough in conducting the test, material other than protein in milk will not interfere. The concn. of protein used in the test should not exceed 70 mg. per 100 cc. Color comparison should be made within 15 min. after neutralization, as the color changes. The method has the advantages of being simple, exact and accurate.

A. H. Johnson

**A decade and a half of soft-curd milk studies.** Rueben L. Hill. *Utah Agr. Expt. Sta., Circ.* 101, 2–14 (1933);

cf. C. A. 26, 218.—The "curd-o-meter" and technic used in the Hill curd test are described. Goat milk is harder curded than cow milk, and shows a curd tension variation of 20–250 g. The curd from goat milk is granular in nature rather than rubbery as in cow milk. Pasteurization has little effect on curd hardness, but boiling softens the curd. Evapd. milks are soft curded because of the heat treatment they receive during sterilization. Homogenization of milk softens the curd to some extent. Digestibility of cow milk is almost inversely proportional to the curd hardness. Soft-curd milk is normal milk; it is unrelated to mastitis or other diseased condition in most cases. Hard-curd milk is preferable for the manuf. of cheese. The literature is critically reviewed.

C. R. Fellers

**Soft-curd milk and mastitis.** R. C. Welch and F. J. Doan. *Milk Plant Monthly* 22, No. 11, 30–6 (1933).—The curd tension of normal milk and the casein content showed a correlation, but such correlation was not perfect. The curd tension of milk from infected udders and the casein content also exhibited this relationship, the correlation being still less marked and the curd tension values being lower than for normal milk. The chief reason for lower curd tension in samples from infected udders was apparently the low casein content. The fact that a certain milk was low in curd tension was not evidence that it came from a diseased udder.

A. H. Johnson

**Inversion of sucrose in the manufacture of sweetened condensed milk.** Carl E. Haradine. *Natl. Butter Cheese J.* 24, No. 19, 7, 41; No. 20, 7, 16; No. 21, 16–20 (1933).—The development of the brown color of sweetened condensed milk was attributed to the formation of humin due to reactions between protein or amino acids and sugars. The preheating temp. used in the manuf. of sweetened condensed milk had little effect upon the brown coloration while temp. of storage had marked effects on the rate of its development. High storage temp. (e. g.,  $100^\circ \text{F}$ .) allowed rapid development of the brown color while at storage temp. below  $68^\circ$  the brown color formed slowly. Use of invert sugar sirup as a substitute for cane sugar in sweetened condensed milk caused a brown discoloration. It is suggested that the inversion of sucrose is responsible for the brown discoloration, this not being evident to the eye until 25% of the sucrose has been inverted. The crit. temp. at which the brown coloration develops is  $80\text{--}90^\circ \text{F}$ . The presence of Fe salts was found to facilitate the development of the brown color.

A. H. Johnson

**A comparative physiological evaluation of milk powder.** E. S. London, A. I. Kolotilov, R. M. Kutok, A. C. Gagina and N. I. Shokhor. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 121–40 (1933).—Parallel feeding tests (dogs) were made with cow milk and milk powder contg. protein 25.1, fat 26, carbohydrates 36.6, water 4.8 and ash 4.8%. Digestion expts. showed a slower rate for milk powder, evidently due to the different phys. condition; but food value and digestibility of the powder compare favorably with fresh milk. The protein was 94.6% assimilated in milk powder, 96% in fresh milk; but the digestion was slower in the powder than in fresh milk.

Julian F. Smith

**Freezing point of milk.** Hortvet method. Ernest V. Jones. *Analyst* 59, 29 (1934).—In the *Methods of Analysis of the A. O. A. C.*, no mention is made of the necessity of removing the freezing starter from the app. before tapping the thermometer. With the starter in place, it is often difficult to get a const. zero reading, possibly because the thermometer strikes the starter.

W. T. H.

**Higher aging temperatures in the manufacture of ice cream.** W. S. Mueller. *Mass. Agr. Expt. Sta., Bull.* 302, 2–16 (1933); C. A. 27, 3538.—In an ice cream mix contg. gelatin, the efficiency of the gelatin was increased by aging 4 hrs. at  $20^\circ$  whether this was followed by aging at a lower temp. or not. This increased gelatin efficiency was evidenced by improvement in body and texture, increase in melting resistance and a slight retardation in rate of whipping. Only  $\frac{1}{4}$  the usual amt. of gelatin was necessary when the aging was for 4 hrs. at  $20^\circ$ . No measurable effect occurred on bacteria,  $\text{pH}$ , or titratable

acidity of the mix. An ice cream mix contg. gelatin showed a slight decrease in viscosity when aged for 4 hrs. at 20° but a marked increase when this initial aging period was followed by 20 hrs. at 3°. The effects of high-temp. aging could not be correlated directly with basic viscosity values. High-temp. aging had no significant effect on the consistency and whipping ability of the mix or on the melting resistance, body and texture of the finished product when the ice cream mix contained no gelatin or other stabilizer. Unless the gelatin content of the mix was reduced by 25%, excessive retardation in melting and a curdled appearance resulted, if aging occurred at 20° for 4 hrs.

C. R. Fellers

Effect of lipins and of sulfonation of unsaturated fats on certain modified Babcock tests of fat in buttermilk. Emerson W. Bird. Ia. Agr. Expt. Sta., *Rept.* 1932, 49-50; cf. *C. A.* 26, 4386.—A comparison of values for the percentage of fat in the same samples of buttermilk by the Mojonniier, the Babcock, the Am. Assocn. and the Minn. tests yielded: 0.7191, 0.232, 0.652 and 0.513, resp. Analysis of the fatty substances from these tests show good agreement in I value, 44-8, a value which negatives the possibility of sulfonation of unsatd. fats in the Babcock test.

C. R. Fellers

An aid to the reading of Gerber milk-fat tubes. E. B. Grayson. *Analyst* 59, 29(1934).—From a light-tight box, which is a little taller than the Gerber tube and not over 3 in. wide, remove one face and replace with glass, of which the inner side is covered with grease-proof paper. Place an ordinary elec. light bulb in the box. Hang the box on the wall at a convenient height, forming a translucent window. Hold the Gerber tube about 1 in. from the glass.

W. T. H.

Amyl alcohol as a source of error in the Gerber test. B. L. Herrington. *J. Dairy Sci.* 16, 557-8(1933).—Fat values obtained by the Gerber test may average 0.6-1.5% higher than by the Babcock test, depending upon the particular isomeric AmOH used. Fusel oil AmOH, b. 128-32°, is recommended. H. K. Salzberg

The automatic acidity tester of the "Fermiers Reunis." Jean Pien. *Lait* 13, 1222-9(1933).—The acidity of milk is used as a criterion as to whether or not the milk can be accepted for pasteurization. The present methods of detg. milk acidity are so slow that they cannot be used commercially. Hence milks are accepted or rejected by their odor. As such a method is subject to so much personal error, an app. has been devised by which the experienced tester can det. the acidity of milk at the rate of 300 samples per hr. The app. consists of a small pump and piston by which measured dosages of standard alkali can be ejected into measured quantities of milk. If the dosage of standard alkali turns the phenolphthalein pink or red, the milk is accepted. If the milk contg. phenolphthalein remains white, the milk is rejected. A. H. J.

The workmanship of butter. R. M. Washburn. *Natl. Butter and Cheese J.* 24, No. 20, 8, 24-6(1933).—The workmanship of butter is discussed in relation to the constituent fats, the color and the manner in which the moisture is held.

A. H. Johnson

The microscopy of food products. II. Butter and margarine. Chas. H. Butcher. *Food* 3, 99-101(1933); cf. *C. A.* 28, 2178.—A brief description of the examn. of butter under the microscope, explaining more particularly the characteristics which may reveal the presence of foreign fat or which may distinguish between fresh and renovated butter.

A. Papineau-Couture

Autoxidation of fats and oils to be used for the manufacture of margarine. C. Wolf and Germaine Martin. *Lait* 13, 1201-14(1933).—Fats which have been subjected to oxidation undergo an increase in acidity, a decrease in I no. but no change in m. p. The induction periods of the different vegetable and animal fats are variable. The animal fats, peanut oil and cottonseed oil have short induction periods. Coconut fat and hydrogenated oils have very long induction periods. The addn. of water to a fat appears to prolong the induction period.

A. H. Johnson

A new method of determining glycerol in egg yolk.

Kai Ho and Tzu-Hui Cheng. *J. Chinese Chem. Soc.* 1, 199-207(1933).—Dry 5 g. egg yolk at 55° under 25-in. vacuum for H<sub>2</sub>O detn., and ext. the dried residue with acetone. After evapn. of the acetone, ext. the oil and fat in the residue with petroleum ether, and obtain the percentage of glycerol by difference.

Wm. H. Adolph

Guide for laboratories in meat-curing establishments. I. A. Oberhard. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate, 1931, 36-41.—Brief instructions are given for detn. of sp. gr., nitrites, nitrates, color and  $p_H$ , and for detection of Al. Needed items of app., reagents and materials are listed.

Julian F. Smith

Experimental study of the problem of salt pork production. L. M. Horovitz-Vlasova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate, 1931, 6-35.—Red staining of salted meat occurs only when nitrates in the brine are reduced by denitrifying bacteria. "Ripening" of brines is merely accumulation of nitrites and org. matter due to bacterial growth. Reddening can occur at nitrate concns. as low as 0.2%; com. brines use about 2% KNO<sub>3</sub>, which is injurious to muscle fiber. Addn. of 1% of a neutral phosphate helps to retard the transfer of phosphates and protein products from the meat to the brine. Most of the NaCl penetration occurs in the first week; nitrites and nitrates have little effect on the penetration process. Addn. of 0.1% NaNO<sub>2</sub> to the brine, instead of KNO<sub>3</sub>, eliminates the tedious "ripening" process and is harmless. Gas formation in brines is due to *B. halobius n. sp.*, an obligative halophile organism which reduces nitrates to nitrites, then to N<sub>2</sub>. A method is described for clarifying and decolorizing spent brines with AlCl<sub>3</sub>. Much improvement in meat curing can be accomplished by application of these findings under strict lab. control.

Julian F. Smith

Experimental study of the so-called sliminess of salt pork. L. M. Horovitz-Vlasova and M. I. Livshitz. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate, 1931, 42-6.—The organism causing sliminess in cured pork was found to be a lipolytic coccus and was named *Micrococcus lipolyticus*. Prevention is best accomplished by strict antiseptic control in slaughtering, prepg., curing and storing the meat.

Water for brines should be boiled. Storage should be at 5° or lower, with not over 70% relative humidity. Cf. following abstr.

Julian F. Smith

Problem of lipolytic bacteria. L. M. Horovitz-Vlasova and M. I. Livshitz. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate, 1931, 56-66.—The organism causing sliminess in cured pork, *M. lipolyticus*, resembles *M. albus* and *flavus liquefaciens*, occurring in air and in river water but never tested for lipolytic action. A statement of lipolytic action or its absence would be helpful in descriptions of bacteria. The Kreis test is pos. in any liquid contg. a trace of nitrite and is not reliable for the usual bacteriol. tests. Cf. preceding abstr.

Julian F. Smith

Signs of incipient meat spoilage. B. I. Guterman. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 53-84(1933).—For the chem. detection of incipient spoilage in beef the Eber test, performed with suitable precautions, is the most rapid and convenient; a pos. test agrees quite accurately with the accumulation of 0.016-0.02% NH<sub>3</sub> (detd. by the Folin method). The litmus test is about as accurate, but less convenient. The MgO test is too sensitive, often being pos. even in fresh-killed meat. Titrating the amino acids with formol gives a measure of the extent of decay, but the accuracy is low. Viscometry of aq. exts. is sufficiently accurate; viscosities higher than 1.01 (water = 1) indicate incipient spoilage. The urea test has more theoretical than practical significance, because of its relations to the problem of chem. structure of proteins. Tests for other meats than beef (e. g., mutton, pork, fish) are needed. No method involving water extn. is suited to rapid or routine testing.

Julian F. Smith

The Voges-Proscauer reaction in spent brines. L. M. Horovitz-Vlasova and I. A. Oberhard. *Izvestiya Tsentral.*

*Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom., Separate, 1931, 47-9.*—Spent meat-curing brines give a pos. Voges-Proscauer reaction because of the presence of AcMeCHOH (identified by qual. tests and by the m. p. of its osazone), formed by the action of *B. mesentericus vulgaris*, *B. corrugatus* and other organisms commonly occurring in the brines. Julian F. Smith

**Determination of fish fats in oil sardines.** Gulbrand Lunde and Erling Mathiesen. *Z. Untersuch. Lebensm.* 66, 435-44(1933).—Methods for the detn. are fully given and the general subject discussed, with literature references. Methods for the estn. of olive oil in the presence of fish fats are also given. F. L. Dunlap

**Influence of carbon dioxide on the keeping quality of fruits.** V. S. Zagoryanskii. *Schriften zentr. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 141-93(1933).—Expts. were made with various concns. of CO<sub>2</sub> surrounding apples, pears, oranges and grapes as a means of inhibiting mold growths. Good results were obtained a little above ordinary atm. concns., but high CO<sub>2</sub> concns. were harmful. Paper wrappings serve to accumulate CO<sub>2</sub> from the respiration of the fruit, and also to prevent transfer of moisture from one fruit to another. At temps. near 0° the respiration of the fruit is still sufficient to build up mold-inhibiting concns. of CO<sub>2</sub>, in presence of which the natural aging processes are also retarded. Some molds are more sensitive than others to CO<sub>2</sub>. As practical expedients for long keeping of fruits in storage, removal of accumulated CO<sub>2</sub> by ventilation should be avoided, and the fruit should be wrapped or packed to minimize the escape of the CO<sub>2</sub> given off in respiration. Julian F. Smith

**Influence of gassing with hydrocyanic acid on fruit.** Ferdinand Beran. *Z. Untersuch. Lebensm.* 66, 317-21(1933).—Various types of apples and pears were gassed with Zyklon-B and pure HCN. The HCN content of the gassed fruit was detd. and the influence observed of various lengths of gassing, for cyanide retention. F. L. Dunlap

**Cold storage of apples.** W. J. Williams. *Ice and Cold Storage* 36, 177-8(1933).—Biochem. and biophys. considerations involved in the storage of apples are discussed. A. H. Johnson

**The identification of whortleberry juice.** W. Diemair and G. Lix. *Z. Untersuch. Lebensm.* 66, 540-4(1933).—The Plahl blue coloration of whortleberry juice and of red wine adulterated with it depends in part on the presence of substances which are formed during the course of the reaction. Phloroglucinol, furfural and protocatechuic acid have been identified with certainty. Fe and metallic ions are responsible for the pos. result of the color reaction. F. L. Dunlap

**Analytical study of pure concentrated grape juice of Algerian origin.** J. H. Fabre and E. Bremond. *Ann. fals.* 26, 531-43(1933).—Addn. of small amts. of SO<sub>2</sub> reduces the possibility of premature fermentation, but can easily impair the flavor. Liability to crystn. of glucose can be reduced by careful filtration before and after concn. Crystn. of K bitartrate during concn. is inevitable and apparently facilitates crystn. of glucose. There seems to be no definite sugar concn. that absolutely ensures against incipient fermentation; a juice contg. 495 g. total sugars per l. contained 4.75% EtOH by vol., and one contg. 804 g. sugar contained 0.4% EtOH. Crystn. of considerable amts. of glucose was observed with a concentrate contg. only 623 g. total sugars per l. In the natural musts, the sugars consist of 50-52% levulose and 48-50% glucose; in the concentrates they consist of 51-56% levulose and 44-49% glucose. Fraudulent addn. of glucose is readily detected; the juice or concentrate contains sufficient acidity to invert rapidly any sucrose that might be added, and the levulose-glucose ratio would be practically unchanged. The acidity does not increase proportionally to the degree of concn., because of pptn. of K bitartrate. In a 3- to 5-fold concn. of a juice that was originally sulfited, 80-95% of the total SO<sub>2</sub> and 95-98% of the free SO<sub>2</sub> are eliminated. The Fe content of the original juice remains integrally in the concentrate, and may be in-

creased by soln. of Fe from the equipment, particularly in sulfited or very acid juices; Fe contents of 0.015-0.201 g. per l. (av. 0.121) were found in 17 com. samples. The following standard is suggested: alc. not over 0.5% by vol., total SO<sub>2</sub> not over 0.5 g. per l., total Fe not over 0.080 g. per l.; prohibition of adding any saccharine product; total reducing sugars and total acid (as H<sub>2</sub>SO<sub>4</sub>) should be stated on the labels and invoices. A. Papineau-Couture

**The detection of unheated fruit juice.** J. F. Reith. *Pharm. Weekblad* 70, 1358 61(1933).—The benzidine reaction for peroxidase is recommended for detg. whether fruit juice beverages have been heated. The max. blue color is obtained in 30-60 min. at pH 5.0 (Na acid phthalate buffer) with 0.01% H<sub>2</sub>O<sub>2</sub> and 0.1% benzidine. A. W. Dox

**The physicochemical properties of pectin.** Preliminary report. Paul B. Myers and G. L. Baker. *Del. Agr. Expt. Sta., Bull.* 179 (Annual Rept. for Year Ending June 30th, 1932), 28-9(1932); cf. *C. A.* 23, 5716.—A series of pectins was extd. from citrus albedo at 40°, 60°, 80° and 100° and subjected to phys. and complete chem. examn. Galacturonic acid made up 87.2-95.18%, AcOH 2.19-5.3 and MeOH 7.83-12.75% of the purified pectin. The more severe the hydrolysis (by heat) the more the pectin mol. breaks down, except that galacturonic acid remains approx. const. It is thus possible to have a pectin of low jellying power with a high percentage of pectic acid. The ratio of CO<sub>2</sub> to furfural was 0.982-1.11 which is taken as an indication that the pectin mol. contains arabinose. Insufficient data are at hand accurately to det. the arabinose. C. R. Fellers

**Philippine rice-mill products with particular reference to the nutritive value and preservation of rice bran.** Augustus P. West and Aurelio O. Cruz. *Philippine J. Sci.* 52, 1-76(1933).—A general résumé with many references to the literature. The topics covered are: rice cultivation; rice straw; Philippine process of milling rice; rice starch; rice hulls; polished and unpolished rice; nutritious parts of the rice grain; rice bran; rice-bran oil (rice oil); vitamins in rice bran; proteins and mineral constituents; nutritive value of rice bran; deterioration of rice bran; preservation of rice bran. F. L. Dunlap

**Effect of inoculation on the quality, chemical composition and bacterial flora of sauerkraut.** Carl S. Pederson. *N. Y. Agr. Expt. Sta., Tech. Bull.* 216, 3-21(1933); cf. *C. A.* 27, 349.—The addn. of a starter to shredded cabbage when packed for fermentation is of doubtful value. The best inoculum consisted of either *Streptococcus lactis* Löhnis or *Leuconostoc mesenteroides* Van Tiegham, but neither improved kraut quality over that obtained by natural fermentation. Definitely detrimental changes were brought about when either *Lactobacillus cucumeris* Bergey or *Lactobacillus pentoceticus* Fred predominated in a fermentation. If the juice has an acidity (lactic acid) of .3% or more, the kraut is usually of poor quality. If the acidity is .25% or less, the kraut produced is normal, but no better than when no inoculation is used. C. R. Fellers

**Investigation of California honeys.** W. Bartels and A. Fauth. *Z. Untersuch. Lebensm.* 66, 396-407(1933).—A considerable no. of North American, especially California honeys, were shown to have low diastase values, without evidence of heating or sugar feeding. Based on an investigation of the pollen, no relationship was found between the plant source of the honey and its diastase content. Just as little did the diastase value depend on the no. of pollen grains. It is not excluded that the high temp. to be found in certain portions of California and from which these honeys may have come, may be responsible for the low enzyme content. This hypothesis agrees in several cases with the results of the pollen investigation. F. L. Dunlap

**An investigation of honey cakes.** K. Braunsdorf. *Z. Untersuch. Lebensm.* 66, 524-39(1933).—The compn. is given of sweetening substances used in the mfg. of German honey cakes, of cakes prepared by B. and of honey and similar cakes of commerce. F. L. Dunlap

**Colloidal constituents of honey. Influence on properties and commercial value.** H. S. Paine, S. I. Gertler and R. E. Lothrop. *Ind. Eng. Chem.* 26, 73-81 (1934).—Honey can be freed from colloids by ultrafiltering a 20% aq. soln. through collodion films prepd. under standard conditions and of const. permeability. The colloids so obtained, constituting 0.07-0.80% of the honey, contained more than 50% protein, some waxes and 2.7-10% of ash. The colloid-free honey had a 22% higher surface tension, but a slightly lower viscosity, than the original. Its N content, apparently due to amino acids, was still more than half that of the original honey, and its dextrin content was the same. The clarification and increase of surface tension resulting from removal of colloids would be of com. value if a suitable flocculant could be devised.

K. V. Thimann

**Arrowroot.** P. H. Jones. *Food* 3, 87-8 (1933).—An outline of its distinctive characteristics and properties.

A. Papineau-Couture

**Composition and caloric value of English cider.** D. W. Stewart. *Analyst* 59, 27-28 (1934).—Complete analytical data are given for 8 samples of English cider. The caloric values varied from 465 to 218. In the last case the alc. content was low and saccharin was present. The caloric values were computed from the percentage ext. and percentage alc. present.

W. T. H.

**The caffeine content of maté.** F. Kraus, E. Kleucker and A. Kollath. *Z. Untersuch. Lebensm.* 66, 348-54 (1933).—Maté contains 0.3-1.5% of caffeine. It is not admissible to speak of "matein" or of caffeine-poor or caffeine-free maté. The method of Lendrich-Grossfeld is recommended for detg. caffeine in coffee and tea.

F. L. Dunlap

**The iodine content of the iodized table salt of commerce.** G. Prange. *Z. Untersuch. Lebensm.* 66, 369-74 (1933).—In 12 samples examd., the KI varied from 20.3 to 0.4 mg. per kg. Long storage does not seem to lessen materially the I content. A few of the samples gave, after storage for 10-12 months, differences of 4-22% of the original I content. Because of the uneven quality of these iodized table salts, regulation of their prepn. and marketing is needed. P. proposes that the I content of such salts be placed at 5 mg. KI per kg., with a permissible limit of error of 10%. He also would require that the date of prepn. be declared.

F. L. Dunlap

**Identification and estimation of iodine in bicarbonate-containing table salt, mineral waters and mineral water salts.** G. Prange. *Z. Untersuch. Lebensm.* 66, 556-64 (1933).—The identification of I may be carried out in 3 ways: (1) Up to a content of 6% of bicarbonate in table salt, the v. Fellenberg nitrite-starch reagent can be used, by increasing the concn. of the  $H_2SO_4$ . (2) If it is necessary to use a soln. of the salt mixt., v. Fellenberg's reagent in its original form may be employed after neutralization of the salt. (3) The I in the form of KI may, for the most part be extd. from salt mixed with bicarbonate and carbonate by means of alc. and detected colorimetrically by the v. Fellenberg method. The I microdetn. according to Winkler can be used if the salts are slowly and carefully neutralized prior to the oxidation of the I. The presence of Fe and Mn salts does not interfere seriously with the Winkler method, although the results obtained are a little higher when they are present.

F. L. D.

**Types and varieties of corn for silage. Yield of nutrients; composition; feeding value for milk production.** W. B. Nevins. Ill. Agr. Expt. Sta., *Bull.* 391, 67-124 (1933).—The most satisfactory stage of development (both palatability and keeping quality are considered) at which to ensile corn, was when it contained 30% dry matter. This detn. may be roughly made by drying representative stalks cut in short lengths, in a range oven at 105-120°. Reid Yellow Dent variety yielded highest digestibility, with Virginia Horsetooth, second, and Cocke Prolific, third. The varieties ranked in this same order in percentage of dry matter. Metabolizable energy was nearly proportional to the dry matter content of the silage as fed. All the silages were palatable to cows. The acidity is highest in fresh silage when made from immature corn.

1 There is a direct relationship between the water content of the corn at the time of ensiling and the percentage of acidity in the silage. The digestibility of silage made from sweet corn cannery refuse compared favorably with ordinary good silage. A thorough review of the literature as contained in 121 references is given. C. R. Fellers

**Range grasses in Hawaii.** J. C. Ripperton, R. A. Goff, D. W. Edwards and W. C. Davis. *Hawaii Agr. Expt. Sta., Bull.* 65, 58 pp. (1933).—Over 150 species of grasses are described, and the chem. compns. of 53 are given. Crude protein,  $Et_2O$  ext., crude fiber, ash, Ca and P were detd. The analysis of a grass is of little value unless the stage of maturity at which it was cut is considered. Protein is highest in immature plants; crude fiber is higher in the mature ones.

C. R. Fellers

**Feeding value of artificially dried young grass.** II. O. M. Camburn. Vt. Agr. Expt. Sta., *Bull.* 359, 3-14 (1933); cf. C. A. 27, 1059.—Artificially dried young grass contg. 20.4% protein, 40.24% N-free ext. and 3.4% fat ( $Et_2O$  ext.) was fed to 2 groups of young milking cows, together with  $\frac{1}{2}$  the usual allowance of timothy hay and corn silage, in comparison with grain and the usual allowance of hay and silage. The productions of milk, fat and solids-not-fat were practically identical on the 2 rations.

C. R. Fellers

**Feeding of mineral supplements to livestock.** II. H. Mitchell. Ill. Agr. Expt. Sta., *Circ.* 411, 3-8 (1933).—Minerals should be used in feeding livestock only as supplements to rations that have been properly balanced in other respects, particularly as to protein. A mixt. of 2 parts of ground limestone and 1 part of salt will supplement Ca deficiencies. A mixt. composed of 2 parts of steamed bone meal and 1 part of NaCl will supply both Ca and P in a favorable ratio and in readily available form. A mixt. composed of equal parts of finely ground limestone, steamed bone meal and NaCl will supply much more Ca than P, and for rations deficient in both Ca and P, it is an inexpensive and effective supplement. The use of ground rock phosphate is not recommended because of the harmful F content. The feeding of I-rich rations to cows results in a variable increase in the I content of the milk. Natural milk rarely contains over 50 parts per billion of I.

C. R. Fellers

**Comparison of cottonseed hulls and grass hays for milk production.** R. H. Lush, C. H. Staples, J. L. Fletcher, and S. Stewart. La. Agr. Expt. Sta., *Bull.* 238, 1-8 (1933).—Cottonseed hulls, supplemented with Ca, green feed and protein, are superior to hill land carpet and Bermuda grass hay, almost equal to high-grade Bermuda, and inferior to mixed clover for milk production.

C. R. Fellers

**Irradiated yeast as a feeding stuff to increase milk production.** H. Poelt. *Z. Vitaminforschung* 1, No. 4 (1932); *Deut. Landw. Presse*, 60, 16.—Three forms of protein were fed cows from Nov. to Feb.: (1) irradiated dry yeast contg. 50% protein, (2) soy beans contg. 46% protein and peanut meal contg. 48% protein, both vitamin poor and (3) vitamin-free casein contg. 78% protein. The yeast gave a max. increase of  $2\frac{1}{2}$  l. of milk, and the daily yield never dropped below  $\frac{1}{2}$  l. more than the initial quantity. Casein and the meal feeds caused a temporary increase of 1-1 $\frac{1}{2}$  l. which rapidly fell off to a yield of 4 l. less than that at the beginning of the expt.

K. C. Person

**Effects of feeding cottonseed on composition and quality of butter.** E. W. Neasham and A. J. Gelpi. *Natl. Butter Cheese J.* 25, No. 1, 12-13 (1934).—Whole cottonseed or cottonseed meal was used in comparative feeding expts. in quantities sufficient to supply the bulk of the protein required in the ration of dairy cows. The sapon. no. of the butter fat from these cows varied from 4 to 8 points lower for the cottonseed meal ration than for the whole cottonseed ration; the I no. was 0.7 to 2 points lower when cottonseed meal was fed; the Polenske no. varied from 0.18 to 0.50 points lower when whole cottonseed was fed; the Reichert-Meissl no. was 1.3 to 1.6 lower when cottonseed meal was fed and the m. ps. of the cottonseed lots ranged from 8 to 9 degrees higher than



those of the cottonseed meal lots. The butter obtained when whole cottonseed was fed was whitish, heavy-bodied and of a tallowy consistency with a sweetish, sickening flavor. Green pastures and corn silage counterbalanced somewhat the effects of cottonseed on the quality of the butter. Thus when cottonseed meal constituted 20% of the concn. in the dairy ration, a butter of fairly normal compn. and consistency could be produced, while when cottonseed meal constituted 40% of the concentrate, the butter might be abnormally hard. The effects of whole cottonseed meal were more pronounced than those of cottonseed meal even when green succulent feeds were supplied.

A. H. Johnson

The feeding value of tung-seed meal. W. Godden. *Bull. Imp. Inst.* 31, 352-8 (1930).—Tung-oil cake and exhd. meal are fairly rich in protein and carbohydrates. The meal contains some substance which makes it unpalatable and some irritant material which has a harmful effect on the mucous membranes of the intestine.

A. Papineau-Couture

The transformation of wood and wood products into feedstuffs rich in carbohydrate and containing protein. F. Honcamp. *Deut. med. Wochschr.* 59, 1437-9 (1933).—A review with analytical data. Arthur Grollman

Estn. of the alc. content of liquors and essences (Ant-Wuorinen) 16. Facts concerning the spray-residue problem pertinent to the fruit and vegetable industries (Cox) 15. Sudan grass as hay, silage and pasture for dairy cattle (Dawson, *et al.*) 15. Treatment of butter factory drainage (Harris, Gutteridge) 14. Culture of condiment plants (Rawetzky) 17. Sb poisoning due to the use of enameled vessels (Anon.) 19. Tropical and sub-tropical fruits (Mowry, Troy) 11D. Development of prussic acid in cholani (Acharya) 11D. Mixed acid solns. [for preserving green fodder] (Ger. pat. 585,473) 18. Dextrinizing starch in cereals (U. S. pat. 1,938,574) 28. Preserving foodstuffs (Ger. pat. 563,011) 17. Device for testing milk for dirt or sediment (U. S. pat. 1,939,873) 1.

Jordan, Stroud: Confectionery Standards. Vol. II. Philadelphia: Geo. S. Ferguson Co. 370 pp. \$5. Reviewed in *Am. Perfumer* 28, 422 (1933).

Scarborough, N. F.: Sweet Manufacture: A Practical Handbook on the Manufacture of Sugar Confectionery. London: Leonard Hill, Ltd. 123 pp. 7s. 6d.

Tanner, Fred W.: Food-Borne Infections and Intoxications. Champaign: Twin City Printing Co. 439 pp. \$5.50.

Waller, Dorothy Stewart: Nutritive Value of Foods. A Table. Ann Arbor, Mich.: G. Wahr. 17 leaves.

Handbuch der Lebensmittelchemie. Edited by A. Bomer, A. Juckenack and J. Tillmans. Bd. II. Allgemeine Untersuchungsmethoden. Tl. 1. Physikalische Methoden. A. Bömer. Berlin: J. Springer. 536 pp. M. 66; bound, M. 69. Cf. C. A. 37, 2224.

Inhibiting development of rancidity in cereal foods. Edwin Cox (to Phosphate Products Corp.). U. S. 1,938,999, Dec. 12. Materials such as cereal flours, etc., are mixed with a phosphate such as mono-Ca phosphate and with a reducing salt such as a phosphite which is eventually oxidized into a phosphate in the reaction which it undergoes.

Bread, etc. August Röttinger and Siegfried Plaschkes. Austrian 135,335, Nov. 10, 1933 (Cl. 2c.). Bread and other bakery products free from starch are prepd. from a mixt. of soy-bean meal with gluten. The gluten is prepd. for use by treating the dry com. product with a dil. weak acid, e. g., aq. lactic acid. Bran, vegetables, spices, etc., may be added to the mixt.

Medicinal bread. Johann Schwaiger. Ger. 589,184, Dec. 4, 1933 (Cl. 2c. 1.03). Dough prepd. with water ontg. I or an iodide is baked slowly in sealed containers lined with asbestos.

Estimating the fatty content of milk by its transparency to light. Walter Strauss. Ger. 589,762, Oct. 26, 1933 (Cl. 491.5.02).

1 Substantially pure milk fat. Milton E. Parker and Sidney Quam (to Research Laboratories of National Dairy Products Corp.). U. S. 1,941,415, Dec. 26. Milk or a milk product is heated to about 75-80° and then cooled and the temp. is adjusted (suitably to about 45-55°) as is also the pH (suitably to about 7.0-8.5) for enzymic digestion of the protein phase; an enzymic material such as trypsin or papain is added; digestion is effected; the digested material is heated to destroy the enzyme; and the milk fat is sep'd., as by centrifuging.

Improving the whipping properties of cream and milk. Grover D. Turnbow. U. S. 1,939,326, Dec. 12. The material is heated with addn. of about 0.3% of Na citrate.

"Synthetic" milk product rich in fat. Ragnvald Hellerud. U. S. 1,941,261, Dec. 26. Milk and a vegetable fat such as hardened earthnut oil are mixed with an emulsifying agent comprising proteins of egg yolk sol. in water, and the material is homogenized at a temp. of 70-90°.

"Artificial cream." Arne Bergsvik and Ragnvald Hellerud. U. S. 1,941,243, Dec. 26. Water-sol. proteins derived from egg yolk are added to milk; earthnut oil hardened to a m. p. of about 32° is injected into the material through an orifice of not more than 0.4 mm. diam. and at a pressure of not less than 130 atm., and the product is then heated to at least 70° to obtain a whippable "synthetic" cream.

Beverage containing modified milk and pectin. Clarence P. Wilson and James A. Finley (to Calif. Fruit Growers Exchange). U. S. 1,940,036, Dec. 19. Modified milk products are prepd. with a sufficient content of pectin to prevent agglomeration of solids present, and the material is dried to produce a beverage base in finely divided form.

Ice cream. Clarence W. Vogt (to Vogt Instant Freezers Inc.). U. S. 1,940,109, Dec. 19. In ice cream manuf., a layer of aerated mix is agitated in contact with a heat-transfer surface through which heat is withdrawn at such a rate that over 30% of the water content of the mix is frozen in less than one min., the volume and size of the ice crystals thus formed being such that their intercrystal spaces are of a magnitude that does not permit the forming of detectable crystals from the solids in soln. in the intercrystal spaces during hardening and storage of the product.

Treating sour cream for butter making, etc. Milton E. Parker (to Research Laboratories of National Dairy Products Corp.). U. S. 1,941,414, Dec. 26. An enzymic material such as pepsin or papain is added to sour cream and the curd is softened and dissolved by enzymic digestion without disturbing the acidity while the mixt. is maintained at substantially optimum conditions for the enzymic digestion, and the cream is sep'd.

Cheese treatment. Joel Taub. U. S. 1,940,031, Dec. 19. During the processing of cheese, there is added to it about 1-4% of an approx. neutral salt such as Na or NH<sub>4</sub> mucate, lactate or malate which serves as an emulsifier.

Nutrient fats. Hanseatische Mühlenwerke A.-G. Ger. 585,972, Oct. 13, 1933. The fats are improved by addn. of a small amt. of partly halogenated phosphatide.

Apparatus for ripening fruits with ethylene, etc. Frank A. L. Bloom. U. S. 1,938,880, Dec. 12. Various structural and operative details are described.

Coating fresh fruits. Ernest M. Brogden and Miles L. Trowbridge (to Brogden Co.). U. S. 1,940,530, Dec. 19. The surface of fruits such as oranges or grapefruit is subjected to an alk. treatment, as with borax or NaOH soln. and then is provided by heat and friction, with a thin coating comprising paraffin with a smaller proportion of carnauba wax. Numerous details and modifications of treatment are described.

Preserving fruit juices such as cider. Paul C. Petersen. U. S. 1,940,013, Dec. 19. Steam is passed through cider in a closed vessel to heat the cider to about 118°, and the cider is subjected to the heating for about 90 min.; evolved gases are allowed to escape and vapors are condensed so as to maintain a const. pressure on the cider, H<sub>2</sub>OAc being driven off and malic acid retained. App. is described.

**Liquefying frozen products such as frozen fruit juices.** Joe C. Jenkins. U. S. 1,940,353, Dec. 19. The frozen material is simultaneously comminuted and subjected to the action of heat to assist liquefaction and then immediately removed from the heat zone. App. is described.

**Apparatus (employing glycerol as a refrigerant) for quick freezing of food products such as fruits and fruit juices.** Clarence M. Davidson (to Pan American Frozen Products, Inc.). U. S. 1,939,109, Dec. 12. Various structural, mech. and operative details are described.

**Jellies, etc.** California Fruit Growers Exchange. Brit. 397,714, Aug. 31, 1933. Presetting is prevented in making jams and jellies from (the juice of) cranberries, blueberries, tart plums, etc., by first wholly or partially destroying or rendering innocuous, e. g., by enzymic action, the quick-setting pectin. Pectinase may be used or an enzyme prepn. from *Penicillium glaucum*, used in soln. or pptd. by alc., etc., and used solid, the fruit material being kept at optimum temp., e. g., 25–50°, during the treatment (about 12 hrs.).

**Fruit jellies.** Consortium für elektrochem. Ind. G. m. b. H. (Wolfram Haehnel and Willy O. Herrmann, inventors). Ger. 589,201, Dec. 4, 1933 (Cl. 53k. 1.01). Polyvinyl alc. and its water-sol. derivs. are used as gelatinizing agents in the manuf. of fruit jellies.

**Grained confections.** John M. Krno and Adolf Schildberger (to International Patents Development Co.). U. S. 1,939,990, Dec. 19. Fondants are prepd. by crystn., with agitation, an aq. soln. of dextrose and, after crystn. has advanced toward completion, mixing with the massculite a soln. of a sugar having a higher soly. than dextrose such as a soln. contg. dextrin, dextrose and levulose.

**Amylaceous products suitable for use in puddings, etc.** Wm. E. Stokes (to Royal Baking Powder Co.). U. S.

1,939,230, Dec. 12. A material such as corn starch or arrow-root starch or a cereal product such as oatmeal is heated with water to a temp. and for a time sufficient to disrupt the starch granules without substantial dextrinization of the starch, and the product is subsequently frozen and thawed which serves to facilitate sepn. of excess water and form a product which may be toasted for use in puddings or as a precooked breakfast food or for other purposes.

**Coffee.** Eduard Orno-Ornfeldt and Makoto Ottmar Loew. Ger. 566,264, Nov. 29, 1933 (Cl. 53d. 2.02). Coffee is improved by treatment with an aldehyde before roasting. Treatment for 10 hrs. with 50% of a 1% AclI soln. is suitable.

**Decaffeinizng and dethenizing coffee and tea extracts.** Cornelius Massatsch. Brit. 397,323, Aug. 24, 1933. See Fr. 743,900 (C. A. 27, 3996). Alternatively, solvents of lower sp. gr. may be fed through the exts.

**Preserving fodder.** I. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauf, inventors). Ger. 589,362, Dec. 6, 1933 (Cl. 53g. 5.01). Green fodder is preserved by addn. of lactates and acid compds. capable of liberating lactic acid therefrom. The lactates and acid compds. may be mixed together before they are added to the fodder.

**Stock food from molasses.** John P. Bartz (to Ralston Purina Co.). U. S. 1,940,837, Dec. 26. For changing a body of molasses from a liquid to a jelly-like state, the molasses is heated, then mixed with a soln. of a jellyfying material such as agar agar or gelatin in water, the mixt. (or the molasses) is dehydrated sufficiently that the mixt. has no greater water content than the untreated molasses, and the mixt. is allowed to cool. The product thus prepd is suitable for mixing with various other stock feed ingredients.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Fine chemical progress during 1933.** R. R. Bennett. *Ind. Chemist* 10, 15–16(1934). E. H.

**The British chemical industry in 1933.** M. D. Curwen. *Ind. Chemist* 10, 4–7(1934). E. H.

**German chemical industry in 1933. Politics and chemistry.** Walter Roth. *Ind. Chemist* 10, 10–12(1934). E. H.

**Some chemical discoveries which have influenced the development of South Africa.** Jas. Gray. *S. African J. Sci.* 30, 28–45(1933). E. H.

**Purification of the noble gases.** K. K. D'yakov. *J. Tech. Phys.* (U. S. S. R.) 1, 488–97(1931).—Metallic Na followed by high-frequency discharge was used to remove O<sub>2</sub>, N<sub>2</sub>, Cl<sub>2</sub>, CO<sub>2</sub>, CO, H<sub>2</sub>, NH<sub>3</sub>, H<sub>2</sub>S, HCl, C<sub>2</sub>H<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>O, etc. F. H. Rathmann

**Third-component method in fractional distillation.** E. C. Craven. *Ind. Chemist* 9, 414–17(1933).—The subject is considered with the third component as a gas, liquid or solid, the liquid being the more important, and given most consideration. Detns. on 4 mixts., MeOH with EtOH, acetone with MeOH, acetone with EtOH, EtOH with benzene, gave  $\alpha_0$  1.54, 0.90, 1.33, 0.90 and  $\alpha_1$  0.70 2.80, 2.00, nil, resp., where  $\alpha_0$  represents the relative volatilities in the absence of H<sub>2</sub>O and  $\alpha_1$  represents the relative volatilities at high diln. with H<sub>2</sub>O. Detns. are made on alc./ketone/water combination. In the case of solids, NaCl with HOAc and H<sub>2</sub>O are discussed. It was found that a point will be reached where the soly. of the salt falls to such an extent that further enrichment ceases. Halsey E. Silliman

**Inverted fractional-distillation analysis.** R. A. J. Bosschart. *Ind. Eng. Chem., Anal. Ed.* 6, 29–33(1934).—A detailed description of app. and method of fractionating mixts. of liquids or gases, commencing with components of highest b. p. J. H. Moore

**Theory of artificial drying. Calculation of operating**

**characteristics. Heat balance and control of an artificial drier.** G. Barberot. *Rev. matériaux construction trav. publics* 1933, 101–4B, 144–7B, 181–0B, 222–8B.—A discussion and math. treatment of the theory of drying, with sample calcs. of operating constants and illustrations of graphical solns. Various types of driers are treated. Karl Kammermeyer

**A study of the drying of solids. I–II.** Saburo Kamei and Tamotsu Sedohara. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 645–54(1933).—The mechanisms of the drying of different kinds of solids under varying conditions were studied and the authors concluded that in practice all drying processes for solids fall in the following 3 groups. (1) surface evapn. is the controlling resistance; and (2) internal diffusion resistance is controlling (both (1) and (2) are for the case where evapn. takes place at the surface of the solid); and (3) evapn. takes place in the interior of the solid with the internal diffusion resistance as the controlling factor. The app. and the expl. procedure are described. Karl Kammermeyer

**Problems of commercial hydrogenation processes** Carl Bosch. *Chem. Fabrik* 1934, 1–10.—An address on the hydrogenation of N to NH<sub>3</sub>, CO to alcs. and coal, petroleum and tar to benzene, as developed during recent years by the I. G. F., with 11 cuts and 3 tables (cf. C. A. 27, 2226). J. H. Moore

**Plastics as engineering materials.** Herbert W. Rowell. *Chemistry and Industry* 1934, 29–32. E. H.

**The danger of carbon monoxide poisoning in motor-driven vehicles.** I. Fisher and A. Hasse. *Arbeitsphysiol.* 6, 249–70(1933).—The CO content of the air of closed motor vehicles was detd. with PdCl<sub>2</sub>. After 1/2–1 hr. travel the air contained 150–240 cc. per cu. m. The blood of 10 conductors and drivers of motor busses contained before the beginning of the trips 10.17% carboxyhemoglobin as against 3.72% in 4 control subjects. At the end

of 9-hr. service with long pauses at the ends of the routes there was no essential rise in carboxyhemoglobin but with trips with the shortest pauses the highest values ranged from 14.7 to 18.0%. "Limousine sickness" may be due to a light CO poisoning and some of the otherwise unexplained accidents on the part of drivers may be due to the same cause.

T. M. Carpenter  
Water in refrigeration. Walter L. Fleisher. *Refrigerating Eng.* 27, 19-26 (1934).

A. H. Johnson

Protection from gases in industry (Wenzl) 23. Comparison of extn. formulas (Griffin) 2. Rendering fibrous materials [such as cotton insulation on wire] non-inflammable (U. S. pat. 1,938,746) 25.

Bennett, Harry: The Chemical Formulary; a Condensed Collection of Valuable, Timely, Practical Formulae for Making Thousands of Products in All Fields of Industry. Brooklyn: The Chem. Formulary Co. 492 pp. \$6. Reviewed in *Rayon & Melliand Textile Monthly* 14, 73 (1933).

Der Chemie-Ingenieur. Ein Handbuch der physikalischen Arbeitsmethoden in chemischen und verwandten Industriebetrieben. Edited by A. Eucken and M. Jakob. Bd. I. Physikalische Arbeitsprozesse des Betriebes. TI. 2. Mechanische Materialtrennung. Revised by C. Naske, H. Madel and W. Siegel. 385 pp. M. 36; bound, M. 38. Reviewed in *Chemistry & Industry* 1933, 998; TI. 3. Thermisch-mechanische Materialtrennung. Revised by S. Erk, et al. 327 pp. M. 30; bound, M. 31.50. Reviewed in *Ind. Eng. Chem.* 25, 1409 (1933); TI. 4. Elektrische und magnetische Materialtrennung. Materialverreinigung. Compiled by J. Reistötter, et al. About 280 pp. About M. 27. Bd. II. Physikalische Kontrolle und Regulierung des Betriebes. TI. 3. Messung von Zustandsgrößen im Betriebe. Rewritten by H. Ebert, et al. 275 pp. M. 26; bound, M. 28. Leipzig: Akad. Verlagsges. Cf. C. A. 27, 3998.

Drying. I. G. Farbenind. A.-G. (Siegfried Kiesskalt, inventor). Ger. 589,439, Dec. 13, 1933 (Cl. 82a. 1.01). See Fr. 744,831 (C. A. 27, 4324).

Separating gaseous mixtures. Société de recherches et d'exploitations pétrolières. Brit. 398,010, Sept. 7, 1933. See Ger. 576,772 (C. A. 27, 5124).

Separating gases by liquefaction. American Smelting & Refining Co. Fr. 755,226, Nov. 21, 1933. See Brit. 395,641 (C. A. 28, 6169).

Separating mixed gases such as oxygen and nitrogen from air by liquefaction and rectification. Niels C. Christensen. U. S. 1,939,104, Dec. 12. Numerous details of app. and operation are described.

Recovering oxygen from air by liquefaction. Mathias Fränkl. Austrian 135,454, Nov. 25, 1933 (Cl. 12d.). A method of procedure is described.

Liquefaction of gases such as those of air. Christian W. P. Heylandt (to Flüga A.-G.). U. S. reissue 19,031, Dec. 19. A reissue of original pat. No. 1,777,040 (C. A. 24, 5899).

Apparatus for supplying liquid oxygen for breathing apparatus, etc. Ewart G. Hickling (to Linde Air Products Co.). U. S. 1,939,592, Dec. 12. Various structural and operative details are described.

Apparatus for storage and dispensing of liquid carbon dioxide. Henry H. Purvis. U. S. 1,939,611, Dec. 12. Structural and mech. features.

Compressing, condensing and partial liquefaction system for recovery of sulfur dioxide from furnace gases. Rudolph L. Hasche (to American Smelting and Refining Co.). U. S. 1,939,693, Dec. 19. Various details of app. and operation are described. U. S. 1,939,694-5-6 also relate to app. and details of operation for the same or similar purposes.

Separating liquids. N. V. de Bataafsche Petroleum Maatschappij. Fr. 755,291, Nov. 22, 1933. A liquid mixt. is sep'd. into its constituents or groups of constituents A and B by treating the mixt. with a selective extg. agent

which dissolves A more easily than B and washing the soln. of the ext. by a liquid composed entirely or principally of A, this liquid being a portion of the soln. of ext. obtained before or after the washing and freed completely, or for the greater part, of extn. agent. Cf. C. A. 27, 4604.

Differential sedimentation process for separating solids from liquids. The Dorr Co., Inc. Ger. 587,293, Nov. 1, 1933. The process may be used to effect the sep. removal of  $\text{CaSO}_4$  and org. matter from the reaction product of crude  $\text{Ca}_3(\text{PO}_4)_2$  and  $\text{H}_2\text{SO}_4$ .

Gravity separation of emulsified oil and water. Francis D. Mahone (to Petroleum Rectifying Co. of Calif.). U. S. 1,940,762, Dec. 26. Various details of app. and operation are described.

Crystallizing. Metallges. A.-G. Fr. 754,432, Nov. 7, 1933. To feed crystals in a vacuum cooling app., the difference between the entry and exit temp. in the various stages of cooling of the soln. is increased beyond the scale of temp. of the metastable satn. zone to a max. of about double, while evapg. slowly and maintaining the crystals in suspension in the soln. by an agitator. An app. is described.

Thickening liquid suspensions. Henry Howard. U. S. 1,940,753, Dec. 26. Various details of operation are described, of a process in which settled solids are continuously removed, settling being accelerated by supplying steam solely to the free upper surface of the liquid to heat it.

Solvents and emulsifying agents. Mendel Burak. U. S. 1,938,804, Dec. 12. Olein and a combination of soap and cyclohexanol in specified proportions are used for producing aq. solns. or emulsions of water-insol. org. liquid compds. such as mineral oils, fatty acids,  $\text{CS}_2$ , turpentine or chlorinated hydrocarbon derivs.

Treating solids or liquids with gases or vapors. I. G. Farbenind. A.-G. (Georg Pfeiderer and Ernst Koch, inventors). Ger. 585,318, Oct. 2, 1933. The solid or liquid passes through a container divided into a no. of zones, the gas or vapor being absorbed by the solid or liquid in the first zone and driven off in a later zone. The process is particularly useful in the saccharification of wood and other vegetable materials with HF. App. is described.

Heating solids, liquids or gases. Wilhelm Schwarzenauer. Ger. 588,213, Nov. 14, 1933 (Cl. 12a. 2). Fuel under pressure is burnt beneath the surface of a heat-carrier which surrounds or is surrounded by the solid, liquid or gas to be heated. The material to be heated may be in direct or indirect contact with the heat carrier or may be mixed with the heat carrier, which may be a fused metal or salt or an oil. Various forms of app. are described. Applications of the invention include the distn. of oils, the evapn. of salt solns., the gasification of powd. coal, the manuf. of H and CO from Fe, C and steam and the manuf. of CO from  $\text{CO}_2$  and C.

Mixing pasty materials. Paul Hirschfelder. Ger. 589,430, Dec. 7, 1933 (Cl. 12e. 4.01). The materials are arranged in superposed layers in order of granule size, with the finest material underneath. Compressed gas is then forced into the bottom layer.

Sintering hydrated materials. Metallgesellschaft A.-G. Ger. 585,767, Oct. 9, 1933. In sintering decrepitating materials contg. hydrate water, such as garnierite, the material is reduced to a granular state not exceeding 5 mm. and preferably below 3 mm. before being admitted to the sintering furnace. About 8-10% C is admixed.

Granulating fusible materials. I. G. Farbenind. A.-G. (Walter Strathmeyer, inventor). Ger. 588,157, Nov. 13, 1933 (Cl. 12g. 1.01). Materials such as  $\text{C}_{10}\text{H}_8$ ,  $\text{C}_{14}\text{H}_{10}$  and S are fused and sprayed into a vessel contg. a mist of a nonsolvent for the material. Pearl-like granules are obtained.

Treating comminuted solids in suspension as in treating cacao waste with solvents. Max Luthy (to Monsanto Chemical Co.). U. S. 1,939,178, Dec. 12. In the continuous sepn. of liquid from solids as in treating cacao waste to ext. cacao butter and alkaloids, a suspension is caused to flow continuously through a duct in which the solids are permitted to settle so that most of the solids are

withdrawn while maintaining the flow of the suspension of material. App. is described.

Rendering  $\beta,\beta'$ -dichlorodiethyl sulfide innocuous. Chem. Fab. von Heyden A.-G. (Curt Philipp and Hans Mirau, inventors). Ger. 588,181, Nov. 13, 1933 (Cl. 78d. 1.02). Addn. to 557,081 (C. A. 27, 355). The dichloroamides used in the method of Ger. 557,081 are replaced by *N*-monochloro-amides or -imides, e. g., *N*-chloro-acetamide or -phthalimide.

Heat-transfer system for gas such as in preheating air by fine gases. Ward S. Patterson and Fay H. Rosenkrants (to International Combustion Engineering Corp.). U. S. 1,941,365, Dec. 26. Various app. and operative details are described.

Salt solutions for transferring heat or cold. Stratmann & Werner (chemische Fabrik. Ger. 585,737, Oct. 7, 1933. The aq. solns. contain one or more metal salts and an addn. of C to regulate the  $p_H$  value. The C is present as a finely divided powder.

Brine for transmission of heat "and cold." Fritz Werner. U. S. 1,939,937, Dec. 19. Brines such as those contg. corrosive substances and used in refrigerating systems, etc., contain also water-insol. adsorbents such as carbons in fine and uniform dispersion, which serve to minimize corrosion.

Freezing mixture. James J. Cronin. Australia 11,371/-33, Oct. 19, 1933. A refrigerant for cold cabinets, etc., is made up of solns. of  $\text{CaCl}_2$ ,  $\text{KNO}_3$ ,  $\text{NaCl}$  and  $\text{Na}_2\text{CO}_3$ .

Impregnating or coating porous materials. Bakelite Ges. m. b. H. (Ernst Elbel and Fritz Seebach, inventors). Ger. 589,071, Dec. 1, 1933 (Cl. 8l. 2). The materials are treated successively in either order with a finely divided synthetic resin and a drying oil. Thus, paper stuff may be mixed with a synthetic resin and the web treated with a drying oil on the paper-making machine. Various other methods of procedure are indicated.

Insulating compositions. Frank J. Groten (to The British Thomson-Houston Co. Ltd.). Brit. 397,405, Aug. 24, 1933. A cold molding compn. comprises a filler and a binder composed of an alkyd resin, a varnish base contg. an oil, a gum and an asphalt. The filler is coated with the binder, the compn. shaped in the cold and the formed article then heated to cure the binder. In an example the binder comprises equal parts of an alkyd resin and a mixt. of oil, e. g., linseed, chinawood, etc., gum, e. g., copal, kauri, and an asphalt, e. g., gilsonite; 14 parts thereof is mixed with 80 parts filler, e. g., asbestos. A suitable alkyd resin comprises phthalic anhydride 35.1, glycerol 19.1, linseed oil fatty acids 30.9, rosin 10 and castor oil 5 parts.

Insulating materials. Soc. pour l'ind. chim. à Bâle.

Fr. 755,269, Nov. 23, 1933. Cellulose esters insol. in org. solvents, prepd. from natural or regenerated cellulose by esterification to a degree beyond the diacyl deriv., while preserving the structure of the initial product, are used as heat and elec. insulators.

Electric insulating material. Emil C. Loetscher. U. S. 1,938,917, Dec. 12. A laminated product comprises a plurality of interior layers of kraft paper impregnated with a phenol condensation product, outer layers of thinner surface paper, and intermediate layers of a mixt. of equal parts of wood flour and resin, all consolidated together by heat and pressure.

Electric insulating material. Siemens & Halske A.-G. (Reinhold Reichmann, inventor). Ger. 589,341, Dec. 6, 1933 (Cl. 21c. 2.03). Highly sintered practically pure  $\text{BeO}$  is used as insulating material against high-frequency current.

Steel sheets with electrical insulation coatings. Vere B. Browne. U. S. 1,940,707, Dec. 26. A baked gelatinous coating is used contg. silicate of Ca or of Mg.

Heat- and sound-insulating material. Frédéric Merckling. Fr. 754,901, Nov. 16, 1933. Protein substances, e. g., yeast, albumin, casein or glue, are added to milk of lime used for mineralizing fibrous materials. The treated fibers are mixed with plaster, cement, etc., for making insulating materials.

Waterproof insulation suitable for use in sheets, blocks or slabs. George D. Shaver (to The Therminul Corp. of America). U. S. 1,940,974, Dec. 26. A heat-insulating material is prepd. by mixing mineral wool fiber with a relatively large quantity of a liquid emulsion of a water-repellent substance such as asphalt suitable for a size and binder for the mineral wool, agitating a batch of the mixt. to individualize and disperse uniformly the fibers throughout the liquid, pptg. the binder (as by use of alum) upon the individualized fibers to coat them thinly, and subsequently assembling the coated fibers and heating them to render the coating material plastic and coherent. U. S. 1,940,975 relates to app. for producing sheet heat-insulating material from mineral wool in combination with app. for forming the mineral wool from melted mineral matter.

Spark plugs. Hans Navratil. Brit. 396,567, Aug. 10, 1933. Substantially the whole igniter surface exposed to the fuel mixt. is composed of a material having catalytic properties for oxidation of C, an oxide of Cu, Ce, U or Th being used for the insulator while the metallic surface consists of Cu, Pt, Ag, Au or Sn or of Pt with an alkali oxide coating or of W with an earth-alkali coating. The action of metallic oxides on the insulator may be resisted by coating the same with an oxide of Be, Mg, Ca, Ba or Sr.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

St. Paul's successful water works. Anon. *Public Works* 64, No. 7, 25(1933).—This plant during 1932 furnished an average of 83.9 gal. per capita per day at a cost of 95 cents per month for each domestic consumer. Av. analysis for the year indicate turbidity 0, color 12.1, iron 0.04, permanent hardness 25, temporary hardness 140 and bacteria ( $37^\circ$ ) in plant effluent 9 per cc., in city taps 347. Over 99.3% of the population are connected to the city plant and the no. of metered services is 99.5%.

C. C. Ruchhoft

Operation of Columbus, O., water-purification plant. Anon. *Public Works* 64, No. 7, 27(1933).—A daily av. of 29.6 million gal. was softened and filtered in 1932 with a reduction of hardness from 202 to 85 p. p. m. Cost of lime, soda ash, alum, chlorine and coke was \$10.24 per million gal. Special equipment was installed to handle soda ash in carload lots. Hoppers which feed the dissolvers are fitted with weigh levers capable of feeding the material at any rate up to 2800 lbs. per hr. C. C. Ruchhoft

Water-purification studies. H. W. Streeter. *Public Works* 64, No. 6, 12-14(1933).—Data from an exptl.

water-purification plant operated at Cincinnati have provided the following facts: When using the  $37^\circ$  total count as an index the efficiency of filtration is higher in winter than in summer, while the reverse is true regarding the efficiency of chlorination. When using the same index the data show over-all efficiency of removal directly affected by variations in raw water turbidity. Variations in temp. or in turbidity showed little effect upon *Es. coli* removal. Data from 10 Ohio River plants indicated a general relationship between the yearly mean and the frequency with which bacterial counts equaled or exceeded various amts. Thus as increase in the mean river pollution results in an increase in the frequency of lapses below a given count. Excess lime treatment is not as advantageous as prechlorination. Prolonged storage when possible effects a desirable improvement in the bacterial and phys. qualities of highly polluted sources. Purification efficiency is definitely limited according to the law of diminishing returns as the degree of raw water pollution increases. C. C. Ruchhoft

Seelke water purifiers. J. M. Halv6. *Rev. ind. Aug.*

1932; *Génie civil* 102, 50(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 108(Dec. 9, 1933).—The Zerhyd water-softening filter, the Douso-Lux app., the Buron softener for domestic use, the semi-industrial Puro softener, and Permo softeners of industrial and portable types, are discussed (cf. *C. A.* 26, 2536). C. R. Fellers

The service of the laboratory to the water purification plant. Harry E. Jordan. *J. Penna. Water Works Operators Assoc.* 5, 47-52(1933).—The importance of regularly conducted plant control tests is stressed, and the unreliability of the *o*-tolidine tests under some conditions is mentioned. A modified procedure for the detn. of phenols is included. G. L. Kelso

Water purification and control. Frank R. Filz. *Paper Trade J.* 97, No. 16, 29-33(1933).—The "bottle test" and  $p_H$  methods of control are compared. The optimum alum requirement is a linear function of the total solids of the raw water and a power function of the alk. of the raw water. A. Papineau-Couture

Analysis of water. Anon. *Paper Trade J.* 97, No. 18, 36 9(1933).—A description of the tentative standard methods of the Tech. Assoc. of the Pulp and Paper Ind. A. Papineau-Couture

The influence of colloid chemistry on treatment of water and waste liquors. A. M. Buswell. *Water Works Eng.* 86, 1289-91(1933).—A review, with bibliography, including methods of detg. particle size; mechanism of pptn. as applied to the use of alum floc, activated sludge, etc.; the isoelec. point and coagulation; adsorption and its importance in filter beds, zeolite softeners, dehydration of sludge, etc.; and the treatment of emulsions in waste liquors. M. G. Moore

The evaluation of activated carbon. John R. Baylis. *Water Works and Sewerage* 80, 220-4(1933).—The adsorption of phenol by C is in accord with the theory of adsorption and the advantage that phenol can be detd. in extremely small amts. makes it a desirable test compd. for the evaluation of activated C. Com. carbons evaluated in this manner have shown an increase of 20% in adsorptive capacity over those first offered for sale in 1931. Different carbons can be compared in their adsorptive by detg. the amt. of each necessary to reduce the phenol content in water from 0.10 to 0.01 p. p. m. After detg. phenol values the carbons can be compared with respect to their power for removing tastes and odors from water supplies. Amts. of the carbons are added to the water being tested according to their phenol value and the cold and hot threshold no. is detd. for each as described in previous articles. Carbons must be compared on the basis of the amt. of C required to give equal reduction of a definite compd. and not on the percentage reduction obtained with definite amts. of C. C. C. R.

Copper sulfate treatment improved by adding chemical in mixing chambers at plant. J. K. Marquis. *Water Works Eng.* 86, 1284-5(1933).—Since only about  $1/10$  of the water drawn from the storage reservoir at Spartanburg, S. C., is used for the city supply, it is not economical to treat the water in the reservoir. The  $\text{CuSO}_4$  is added continuously to the water as it enters the mixing chambers. 0.2-1.6 p. p. m. of  $\text{CuSO}_4$  is fed, the 6-hr. retention period in mixing and filtration being sufficient to eliminate the algae. The water treated here does not contain algae in amts. sufficient to impart pronounced tastes and odors. The effectiveness of the method in such cases cannot be predicted. M. G. Moore

Removal of fluorides from drinking waters. C. S. Boruff. *Ind. Eng. Chem.* 26, 69-71(1934).—A report of lab. tests on tap water contg. 5 p. p. m. F. Single (stirring 30 min., letting stand 18-24 hrs., and filtering) with 170 p. p. m.  $\text{Al}_2(\text{SO}_4)_3$  or double coagulation with 85 and 50 p. p. m. reduced the F from 5 to 1.0 p. p. m. or less, the amt. removed increasing with the dosage. Optimum  $p_H$  is 6.7. Fresh, synthetic zeolites remove F, but the capacity is small. Satisfactory removal was secured by filtering through activated alumina, or agitating with this reagent and decanting. Only slight removal was obtained with  $\text{Na}_2\text{Al}_2\text{O}_4$ , com. bauxite, silica gel, Na sil-

cate and ferric salts. Softening, with addn. of excess lime, causes copptn. of considerable F. M. G. Moore

Colorimetric determination of fluorine. O. M. Smith and Harris A. Dutcher. *Ind. Eng. Chem., Anal. Ed.* 6, 61-2(1934).—To det. F in waters, first ppt. sulfate by adding 5 ml. of 2%  $\text{BaCl}_2$  soln. to 100 cc. of sample. Allow the ppt. to settle and take 50 ml. of the clear soln., add 3 ml. of 6 N HCl and 5 ml. of  $\text{Zr}(\text{NO}_3)_4$ -quinizarin reagent (mix equal parts of 0.14% soln. of 1,2,5,8-tetrahydroxyanthraquinone and an 0.87% soln. of  $\text{Zr}(\text{NO}_3)_4$ . Dil. the mixt. with 40 times as much water). After 20 min. compare with standards. The best range of concn. for the test is 0-0.1 mg. of F per 50 ml. W. T. H.

Simple chlorination equipment for small water supplies. F. E. Daniels. *Pub. Works* 64, Oct., 1933; *U. S. Pub. Health Eng. Abstracts* 14, W, 1(Jan. 6, 1934).—A small inexpensive, home-made hypochlorite plant is described. C. R. Fellers

Coagulation. Marsden C. Smith. *J. Penna. Water Works Operators Assoc.* 5, 56-62(1933); cf. *C. A.* 27, 2229.—Prechlorination can sometimes be used as an aid to coagulation, and the saving in coagulant may be more than the cost of the Cl. Reduction of industrial waste in raw water, installation of flocculators, and a check on coagulant dosages with a lab. stirring machine resulted in the following savings: coagulant 50, wash water 83, C 75-100%. No const. optimum  $p_H$  was found. The best taste and odor control were obtained by adding the entire dose to the top of a filter at the beginning of a run. G. L. Kelso

Water coagulation with ferric chloride. Robert N. Clark. *Public Works* 80, No. 7, 22(1933).—Comparative tests on  $\text{FeCl}_3$  and alum indicate a decided advantage for the former. Results indicate that a similar reduction in turbidity can be obtained by using an av. of 55% less of  $\text{FeCl}_3$  than of alum. The time of floc formation is shortened by use of the former and thus the use of smaller sedimentation basins is made possible. Coagulation is effective at any  $p_H$  above 5.0 in comparison with the limited  $p_H$  range of alum pptn. Overdosing does not affect filter efficiency and in the case of soft, colored waters,  $\text{FeCl}_3$  removes the color below the range of alum coagulation. C. C. Ruchhoft

Hydrogen sulfide and oxygen in natural waters. W. Stroede. *Z. Fischerei* 31, 345-51(1933); *Wasser u. Abwasser* 31, 224(1933).— $\text{H}_2\text{S}$  can be formed by purely biol. or purely chem. means. Bacteria produce  $\text{H}_2\text{S}$  by the decompn. of proteins, the reduction of sulfates, sulfites and thiosulfates. Sulfate-reducing bacteria, *Thiospira desulphuricans* and *T. aestuarii*, are present in water. In certain S springs,  $\text{H}_2\text{S}$  is formed by purely chem. means by the reduction of sulfates by carbonaceous layers. The min. lethal amt. of  $\text{H}_2\text{S}$  in waters inhabited by trout is 1 mg. per l.; for carp 8-12 mg. per l. *Chara* grows only in clean water but the roots may be embedded in slime contg. decomp. org. matter and  $\text{H}_2\text{S}$ . In general, the  $\text{H}_2\text{S}$  content of water increases with the depth.  $\text{H}_2\text{S}$ - $\text{O}_2$  relationships in water are discussed. C. R. F.

The construction and protection of drilled wells. A. G. Giedler. *J. Penna. Water Works Operators Assoc.* 5, 72-80(1933).—The "cable-tool percussion" and "hydraulic rotary" methods of well drilling are discussed. Methods for the protection of drilled wells from contamination and protection of the casing are given. A completed well may be chlorinated under pressure or by introducing strong chloride of lime solns. with a dump bailer. G. L. Kelso

Ice made from water treated with Caporit. N. van der Walle. *Geneeskund. Tijdschr. Nederland.-Indië* 72, 1759-69(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 109(Dec. 9, 1933).—Ice made from water contg. 2 mg. of Caporit per l. was practically free from bacteria. To make river water bacteria-free, 5 mg. per l. of Caporit was required. Only traces of Cl could be detected in the ice after 24 hrs. by the *o*-tolidine test. C. R. F.

Calculation of the  $p_H$  value of water from the free and combined carbon dioxide content. G. Naskitgall. *Gas u.*

**Wasserfach 76**, 833-4(1933); cf. Mayer, C. A. 27, 3270.—The  $p_H$  value of a water can be calcd. by the formula  $p_H = 6.517 + \log(2g/f)$ ; where  $f$  is the content of free  $CO_2$  in mg. per l. and  $g$  the content of combined  $CO_2$  in mg. per l. Tables are given for values of  $6.517 - \log f$  and for  $\log 2g$ , and a nomogram for obtaining  $p_H$  values directly from those for  $f$  and  $g$ . R. W. Ryan

**Deacidification of water.** H. Haupt. *Gas u. Wasser-fach 76*, 856-9(1933).—Water contg. aggressive  $CO_2$  has a very destructive action on Fe pipes and some deacidifying plants do not completely remove this aggressive  $CO_2$ . Mech. deacidifying plants leave 5-7 mg. of free  $CO_2$  per l., so that soft waters are still aggressive. Some waters are not sufficiently deacidified on passing through marble filters. Hydrated lime is satisfactory for large plants, but the saturator must be carefully designed and operated to secure soln. and proper supply to the Venturi tubes or other proportioning devices. Samples of treated water should be allowed to stand before titration or values for  $CO_2$  may be erroneous. Very small plants should use marble filters of adequate size and aeration. The Tillmans-Lürmann process for deacidifying water with calcined magnesite completely removes aggressive  $CO_2$ , but some industries find Mg much more troublesome than Ca. R. W. Ryan

**Road oils and tars and their effect on water supplies.** Martin E. Flentje. *J. Penna. Water Works Operators Assoc.* 5, 41-2(1933).—In one instance chlorinated water in a distribution reservoir developed a taste after an adjacent highway had been freshly surfaced. Potential tastes and odors may come from either phenol or petroleum products used in surfacing material. G. L. Kelso

**Effects of road oils and tars on public water supplies.** Lewis V. Carpenter and Earl W. Klinger. *J. Penna. Water Works Operators Assoc.* 5, 43-6(1933).—Small test sections of road were prepd. according to the specifications of the W. Va. State Road Commission. The test sections were washed with distd. water equal to one inch of rainfall. Washings were collected and tested for taste and odor. Half-liter samples of the washings were distd. and 300 ml. of distillate collected. The distillate was dild. to 500 ml. and dilns. of 1:20, 1:200, 1:200,000 prepared. The dilns. were chlorinated to a residual of 0.3 p. p. m., free chlorine was removed and the warm odor and cold taste detns. were made according to the Standard Methods of Water Analysis 1933. Results indicated that when roads were surfaced with a "primer" coat there was distinct danger of chlorophenol tastes in water supplies if heavy rains occurred within two hrs. after application. The danger is not as pronounced when "retread" material is used. G. L. Kelso

**(Water)sterilization by the use of chlorine and chlorine compounds resembles a simple oxidation effect.** Ed. Imbeaux. *Rev. hyg. méd. prévent.* 55, 696-9(1933).—After discarding other theories, I. concludes that sterilizing power varies with the oxidation potential, and the same factors influence both. Bacterial reduction parallels oxidation potential (in volts) with  $Cl_2$ , chloramine and azochloramide. Similarly, the addn. of  $NH_3$  reduces both the oxidation potential and the sterilizing power of  $Cl_2$ . Between  $0^\circ$  and  $25^\circ$  there is a gradual increase in sterilizing action and oxidation potential. There is a decrease with increasing turbidity. C. R. Fellers

**Connection between water supply, soil pollution and intestinal disease.** C. P. Mom. Separate. Albrecht & Co., Batavia, Java, 1931, 26 pp.; *U. S. Pub. Health Eng. Abstracts* 13, W, 51(May 13, 1933).—For Java conditions, a colontiter in excess of 100 cc. is necessary to give a fair pollution index. No epidemics of typhoid have been caused by a water supply with a colontiter above 100 cc. The usual ratio of *B. typhi* to *B. coli* is between 1:1000 and 1:100,000 so that a water supply contg. a few colon bacteria is unlikely to be dangerous. The death rate from intestinal diseases in the Dutch East Indies is 65 times that of The Netherlands. C. R. Fellers

**The bacterial efficiency of the excess-lime method of water purification.** H. W. Streeter. *Public Works* 64,

No. 8, 17-19(1933).—Addn. of lime to raw water produced a marked bactericidal effect, which varied directly with the intensity of the treatment. Excess lime diminished the bacterial efficiency of post-chlorination. Considered as a method of disinfection, the excess-lime treatment is more difficult to control and less consistent than ordinary chlorination. C. C. Ruchhoft

**Changes in un-iced bacterial samples during shipment.** Gilbert L. Kelso. *J. Penna. Water Works Operators Assoc.* 5, 27-9(1933).—Water samples for bacterial analysis were exchanged by 3 labs. Samples were shipped by parcel post un-iced. Under these conditions plate counts were rendered unreliable. *Es. coli* tests were reliable 50% of the time while treated samples checked 90% of the time. Max. shipping time was 48 hrs. G. L. Kelso

**Lactose broth fermenters.** Chas. R. Keatley. *J. Penna. Water Works Operators Assoc.* 5, 26-7(1933).—Prechlorination and pretreatment and posttreatment with chloramines did not eliminate organisms fermenting lactose after 24 hrs. incubation. Brilliant green bile medium has eliminated these false presumptive tests. G. L. K.

**Problems involved in providing safe and adequate water supplies for oil-refinery uses.** Sheppard T. Powell. *Water Works and Sewerage* 80, 211-15(1933).—The uses of water in this type of plant may be classified as follows: cooling water for condenser, boiler-feed water, fire protection and sanitary supply. The first 2 classifications require a noncorrosive source which is usually secured by one of the several softening methods. The control of corrosion, scale formation and embrittlement is accomplished by maintaining a  $p_H$  of 9.0 or higher, complete deaeration and the correct ratio of sulfates to the amt. of Na carbonate or NaOH present in the supply. In using a contaminated source for fire protection great care should be exercised to prevent cross connections with the sanitary supply. C. C. Ruchhoft

**Physical chemistry of carbonate separation in water and practical applications.** R. Stumper. *Wärme* 56, 315-18, 340-51(1933); *Wasser u. Abwasser* 31, 265-6(1933).—The article deals principally with the sepn. of  $CaCO_3$  through bicarbonate decompn. as incrustations or silts. The influence of temp. and other phys. factors is described. The clinging capacity of the pptd.  $CaCO_3$  is doubled in the presence of 0.1% NaCl and increased 7-fold by 0.1%  $Na_2SO_4$ . C. R. Fellers

**Iron-removal and zeolite-softening plant at Lancaster, Ohio.** Charles P. Hoover. *Public Works* 64, No. 6, 9-11(1933).—This plant has a present capacity of 2,000,000 gal. daily which can be increased to 3,000,000 gal. daily by equipping the extra filter and zeolite units. The source of supply is two 8-in. wells which discharge into the inlet of an Aero-Mix unit. This is followed by a 30 min. detention period in the reaction basin with the resultant removal of 50% of the  $CO_2$  and the oxidation and pptn. of the 2.4 to 3.4 p. p. m. of Fe present in the raw water. After filtration through sand beds of conventional size and compn. the water is pumped up through beds of Crystalite. Provision is made for the automatic proportioning of hard and soft water. Zeolite runs have averaged 8.4 hrs. with a removal capacity of 12,000 grains per cu. ft. Salt consumption has been  $1\frac{1}{2}$  pound per 1000 grains of hardness removed, while water required for regeneration has averaged 3.9% of the total pumpage. The salt cost for reducing the hardness from 359 to 76 p. p. m. has averaged 2.25 cents per 1000 gals. C. C. R.

**The Budenheim process of water softening with trisodium phosphate.** P. Köppel. *Papier-Fabr.* 31, Tech.-wiss. Teil 109-11(1933).—A correction of the abstract in *C. A.* 27, 4861. Feed water is preheated, mixed with alk. water drawn from the boiler and the phosphate added. Heating removes gases and 30% of the  $Ca(HCO_3)_2$ ; NaOH from the alk. water drawn from the boiler removes the remaining bicarbonate, the resulting  $Na_2CO_3$  and the  $Na_2CO_3$  of the boiler-water removes most of the  $CaSO_4$ ; and the phosphate removes all the substances still present in the water after the pretreatment with the boiler-water, "especially the sol. parts of  $CaCO_3$ . One hr. is required,



when 15 g. phosphate per cu. m. per degree hardness is used. With water harder than 30°, a preliminary soda-lime treatment is recommended." E. J. C.

Role of neutral salts in the treatment of feed waters with trisodium phosphate according to the Budenheim method. P. Köppel and Steinbrunn. *Wärme* 56, 380-2 (1933); *Wasser u. Abwasser* 31, 272 (1933); cf. C. A. 27, 4861, and preceding abstr.—Neutral salts are not coned. in the boiler water but are largely thrown out in the phosphate sludge and removed. C. R. Fellers

The colloidal method of boiler-feed water conditioning. J. S. Merry. *Proc. S. Wales Inst. Engrs.* 49, 367 (1933); cf. C. A. 27, 5127.—Discussion. Alden H. Emery

Boiler scale, its origin and removal. H. Kalb. *Molkerei-Ztg.* 1933, 667-8; *Wasser u. Abwasser* 31, 272 (1933).—The boiling of scaled tanks or boilers with waste starch residues or a mixt. of skim milk and graphite removes scale. If the feedwater is high in Fe or otherwise requires special treatment, coin. prepn. should be used. C. R. Fellers

Filter operating experiences. L. B. Wickersham. *J. Penna. Water Works Operators Assoc.* 5, 64-70 (1933).—Problems arising in the supervision of purification in different plants are reported. G. L. Kelso

When and how to wash a filter. August V. Graf. *Water Works Eng.* 85, 1516-17, 1540 (1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 19 (Feb. 11, 1933). C. R. F.

Obstacles encountered in the flow of water through filter beds. John R. Baylis. *Water Works and Sewerage* 80, 335-6 (1933).—Filter performance is largely influenced by the following factors: size of openings in the filtering material, amt. and characteristics of the suspended material and the extension of the filtering surface by cracks and pulling away from the side walls. The first factor may be expressed mathematically, but as yet this cannot be done with the second factor. The third may be alleviated by some method of surface washing. These suggestions indicate the difficulties encountered in attempting to express filter performance by means of a math. formula. C. C. Ruchhoft

Clay used as artificial turbidity to eliminate short filter runs. Carl Leipold. *Water Works and Sewerage* 80, 304-5 (1933).—Clay secured by crushing "green" bricks was applied to the mixing basin in rates varying from 1.1 to 7.1 grains per gal. It was found that for satisfactory operation with artificial turbidity the mixing period must exceed 15 min. and the coagulation period must be greater than 2 hrs. Periods less than these caused mud balls and cracking of the filters. Too rapid settling of the clay caused difficulties in cleaning the mixing basin. C. C. Ruchhoft

Bleaching clays. John R. Baylis. *Water Works and Sewerage* 80, 287-8 (1933).—Lab. expts. with 2 brands of bleaching clay indicate that this substance had no appreciable power for removing tastes and odors from the samples of water used. When used in connection with Al sulfate the clay aided in the formation of a rapidly settling floe. The odor-removal value of bleaching clay as indicated by this expt. is less than 2% that of activated C. C. C. Ruchhoft

Overhauling filters at the Chain of Rocks plant, St. Louis, Mo. August G. Nolte and Warren A. Kramer. *Southwest Water Works J.* 15, No. 2, 7-9 (1933).—Mud-ball troubles were eliminated by increasing the rate of wash from 12 to 24 in. vertical rise per min. The strainers were clogged by a ZnO coating, obtained from the corrosion of Tobin bronze plates; this increased the water pressure in washing and much trouble resulted from breaking of bolts and strainer plates. Increasing the size of the strainer opening from  $\frac{1}{16}$  to  $\frac{3}{32}$  inches increased the rate of washing from 24 to 36.5 in. vertical rise per min. and eliminated mud balls and broken plates. O. M. Smith

Overhauling rapid sand filters. August G. Nolte and Warren A. Kramer. *Southwest Water Works J.* 15, No. 1, 9-12 (1933).—Unexpected overhauling of filters has been necessary due to blocking of passages by foreign matter, careless handling of cement, improper placement of gravel,

1 nonalignment, faulty design and incrustation on sand grains and strainers. There are discussed method of inspection, cleaning sand bed, partial and complete overhauling and the screening and replacing of gravel and sand. O. M. Smith

Removal of bacteria from a sand filter. F. Meyer. *Gas- u. Wasserfach* 75, 29 (1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 37 (Apr. 1, 1933); cf. C. A. 27, 1425.—At Chemnitz, the water supply from impounding reservoirs is treated by prefiltration and slow sand filtration with chlorination of the raw water or the primary filtrate. *B. coli* appeared in the final effluent of 1 of the filters after chlorination. The Cl disturbed the action of the slow sand filters and it was only by const. backwashing and the addn. of 35 g. of Cl per cu. m. of water that *B. coli* could be eliminated. C. R. Fellers

Bacterial changes in chlorinated filter effluents. H. W. Streeter. *Public Works* 80, No. 7, 19-21 (1933).—Samples of unchlorinated effluent were placed in sterile containers at an av. temp. of 40°F. and various doses of Cl added. Samples were secured after storage up to 9 days. Results showed no secondary increase of bacteria as indicated by the total count and the coli-aerogenes index. The same expt. performed with the av. temp. at 75°F. gave a secondary rise in all cases when the Cl residual was less than 0.10 p. p. m. The data indicate that the rate of bacterial destruction is a function of the time varying with the temp. and that it conforms in general to the laws of disinfection. C. C. Ruchhoft

Pressure pipes of nonmetallic materials. Eugen Weber. *Z. Gesundheitstech. Städtehyg.* 25, 7-18 (1933).—A discussion of the suitability of reinforced-concrete, centrifugally cast concrete or asphalt concrete, and asbestos-cement pipes in piping water from reservoirs. B. C. B.

Metallic materials in water-pipe construction. L. W. Haase and E. Naumann. *Z. Gesundheitstech. Städtehyg.* 25, 18-24 (1933).—A review of the advantages and disadvantages attached to pipes of Fe, Cu, Pb, Sn, Zn, Al, Ni and Cr for water. B. C. Brunstetter

Copper and health. W. M. G. Schneider. *Cuivre et Laiton* 6, 519-26 (1933).—According to recent research Cu and brass are absolutely safe for pipes of drinking water; the admissible amount of Cu in drinking water is 5 mg. per l. A greater content makes the taste disagreeable. Sewer pipes of Cu are safe even for acidic sewer waters if the  $pH$  is about 6.5 and the Cu content about 0.5 mg. per l. The use of copper sulfate in order to prevent development of microorganisms in water reservoirs is not harmful to health. Fifteen references. M. Hartenheim

Algae. Geo. R. Taylor. *J. Penna. Water Works Operators Assoc.* 5, 34-40 (1933).—A thorough, detailed and elementary discussion of examn., enumeration and significance of algae in water supplies. A list of equipment needed and its cost is included. G. L. Kelso

The chemical aspects of the purification of water and sewage. H. B. Taylor. *Chem. Eng. Mining Rev.* 26, 139-42 (1933). W. H. Boynton

New water and sewage-disposal systems of Williams Bay. Ethel L. Gray. *Municipality* 27, 195, 202 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 9 (Feb. 4, 1933).—Water is obtained from an 18-in., 278-ft. well with a 42-in. casing outside of the 18-in. casing to a depth of 170 ft., imbedded in a 30-ft. clay stratum. Sewage disposal is effected at an activated-sludge plant including screen chambers, preliminary tank, 3 aeration tanks, a final settling tank and digester tank. There are 4 levels in the collection system. C. R. Fellers

Research in sewage chemistry and sewage treatment. Critical review of the literature of 1932. J. W. Bugbee. *et al. Sewage Works J.* 5, 567-64 (1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 74 (Dec. 9, 1933).—A very comprehensive critical review covering 97 articles. C. R. Fellers

Modern (sewage) purification involving the latest technical and hygienic developments. A. Horn. *Pumpen- u. Brunnenbau, Bohrtech.* 29, 439 (1933); *Wasser u. Abwasser* 31, 275 (1933).—The Horn digestion tank is modeled after the well-known Imhoff tank. The results

are said to be very satisfactory for disposal of fresh domestic sewage.

C. R. Fellers  
Operation of a small sewage-treatment plant. Floyd G. Browne. *Public Works* 64, No. 7, 39-40(1933).—This 600,000 gal. per day plant includes a hand-raked bar screen, clarifier, covered digester, covered sludge beds and chlorinating equipment. The entire plant is operated by one man who is on duty during the day only, but all operations are under tech. supervision. During the first year the clarifier has removed 98% of the settleable solids and reduced the biochem. O demand of 59%. No trouble has been experienced with the digester which gives a sludge having 39% volatile matter and 84% moisture. Gas production has been 1840 cu. ft. per day from a contributing population of 3000.

C. C. Ruchhoft  
Mechanical equipment in sewage-treatment works. A. Prescott Folwell. *Public Works* 64, No. 6, 21-2(1933); cf. C. A. 27, 5852.—Addenda to previous chapters.

C. C. Ruchhoft  
Sewage at Spartanburg, S. C. Geo. W. White. *Water Works and Sewerage* 80, 327-9(1933).—This plant designed for 3,000,000 gal. daily is equipped with a bar screen, primary sedimentation tanks, covered heated digesters, a sprinkling filter, secondary sedimentation and chlorination facilities. Operating results indicate a reduction of suspended solids from 200 to 20 p. p. m., a reduction of biochem. O demand from 235 to 31 p. p. m. and the production of ripe sludge having a moisture content of 90%. Gas production has averaged 17,500 cu. ft. per day. Chlorinators are located at the screen house, dosing tanks and the final effluent line. Provision is made for by-passing at any stage of treatment.

C. C. Ruchhoft  
The sewage-treatment works of Souderton, Penn. Chas. F. Mebus. *Water Works and Sewerage* 80, 265-6(1933).—This plant designed for a population of 5000 includes a bar screen, detritor, Imhoff tank, sprinkling filter, secondary settling tanks, covered sludge bed and chlorination equipment. The filter which is 110 ft. in diam. contains crushed trap rock to a depth of 6.5 ft. Filter effluent is chlorinated before entering the final settling tanks. The plant handles a dry-weather flow of 220,000 and a storm flow of 500,000 gal. per day.

C. C. Ruchhoft  
Vacuum filtration of sewage at Rockville Center, N. Y. Wm. Gavin Taylor. *Water Works and Sewerage* 80, 283-6(1933).—Originally this activated sludge plant discharged the final effluent on native sand seepage beds. Finely divided suspended solids varying from 5 to 10 p. p. m. were carried over and caused considerable difficulty. Three Wright vacuum filters of 3,000,000 gal. daily capacity each were installed to eliminate the trouble. Two of these are used to filter the final effluent and this reduces the suspended solids to 1.0 p. p. m. The third filter may be used for filtering settled raw sewage or for dewatering waste filter cake before incineration. When filtering settled sewage paper pulp is added to secure greater efficiency of clarification. For ordinary filtering sufficient vacuum is developed by the filter, but in dehydrating a vacuum pump must be used. Plant capacity has been increased and digestion tanks and sludge drying beds have been eliminated.

C. C. Ruchhoft  
Cost analysis of the Ensley sewage treatment plant, Birmingham, Alabama. H. H. Hendon and M. E. Borriss. *Water Works and Sewerage* 80, 275-9(1933).—This is designed to treat 15 million gal. daily and consists of the following units: bar screen, detritor, settling tanks, covered digesters, open drying beds, screenings and scum incinerator and gas holder. About 30% of the 100,000 cu. ft. daily gas production is utilized in the lab. and for heating digesters and buildings. The balance is piped to a waste gas burner. Dried sludge is handled by industrial cars.

C. C. Ruchhoft  
A study of ferric chloride treatment of sewage at Grand Rapids, Mich. E. F. Eldridge and N. G. Damoose. *Water Works and Sewerage* 80, 207-10(1933).—Stream conditions at Grand Rapids demand an addnl. removal of 20-25% suspended solids and biochem. O demand

during an annual crit. period. Plant-scale expts. involving 5 doses of  $\text{FeCl}_3$  (3, 5, 7, 10 p. p. m.) were applied to the influent of the final settling tank. Over a period of 8 days the increase in dry solids removal averaged 17.8%. Increase in biochem. O demand varied considerably and gas production was not materially affected. Effects are more pronounced with sewage of high solids content. The use of  $\text{FeCl}_3$  during short periods is justified if the receiving stream approaches the crit. stage.

C. C. Ruchhoft  
Notes on the ferric chloride coagulation of sewage. E. F. Eldridge. *Water Works and Sewerage* 80, 335-6(1933).—Exptl. plant data have indicated the necessity of a 10-min. mixing and flocculation period when  $\text{FeCl}_3$  is used as a coagulant. Doses of this chemical varying from 10 to 30 p. p. m. gave good flocculation with the max. effect at 20 p. p. m. When using sewage high in colloids the addn. of 5 to 7 p. p. m. of  $\text{KMnO}_4$  assured max. flocculation. In using this form of treatment it is essential to regulate the dose to the varying quality of the sewage and to maintain the optimum  $\text{pH}$ .

C. C. Ruchhoft  
Helpful hints on sewage-works operation. F. M. Veatch. *Public Works* 64, No. 6, 23-4(1933).

C. C. Ruchhoft  
Pre-aeration of sewage by air diffusion. Frank C. Roe. *Public Works* 64, No. 7, 15-16(1933).—The most effective means of removing grease and oil is a small pre-aeration unit. Besides completely removing grease the treatment eliminates odors and results in improved sedimentation. Pre-aeration periods vary from 10 to 30 min. and air quantities from 0.10 to 0.05 cu. ft. per gal. With the ridge-and-furrow type tank a diffuser area of 20 to 30 sq. ft. per m. g. is required. Provision should be made for the effective removal of the liberated grease.

C. C. Ruchhoft  
Biochemical changes and loss of nitrogen during prolonged aeration of sewage. H. Heukelekian and N. S. Chamberlin. N. J. Agr. Expt. Sta., *Bull.* 529, 20-31(1932).—Lab. expts. on aeration of sewage show that the original  $\text{NH}_3$  content of the sewage is not nitrified but undergoes a stabilization stage. The development of a nitrifying flora is a minor factor in this lag. Nitrification proceeds in 2 definite stages, (1) accumulation of nitrites, and (2) oxidation of nitrites to nitrates. Sulfate production is similar to nitrate production. Aeration drives off the  $\text{H}_2\text{S}$  and accelerates sulfate formation from org. S. Aeration also causes a loss of N due largely to the blowing off of  $\text{NH}_3$ . Bases other than  $\text{NH}_3$  are also given off during aeration. Loss of  $\text{NH}_3$  is greatest during the first few days. Loss of N cannot be attributed to interaction of amino acids and  $\text{HNO}_3$ .

C. R. Fellers  
Investigations in the field of sewage colloids. R. Manschke. *Städtereinigung* 25, 155-6(1933); *Wasser u. Abwasser* 31, 279(1933).—Largely a discussion of Harold Wilson's researches (cf. C. A. 27, 2510).

C. R. Fellers  
The regulation of chlorine application in sewage-odor-control work. A. E. Griffin. *Water Works and Sewerage* 80, 218(1933).—Odors in trunk sewers and plants are controlled by the addn. of sufficient Cl to neutralize the  $\text{H}_2\text{S}$  and to kill the sulfate-splitting bacteria. The amt. of this dose can best be detd. by the methylene blue stability test which is as follows: Five-tenths cc. of a 0.10% methylene blue soln. is added to 250 cc. of sewage in a glass-stoppered bottle and incubated at 20°. The time required for the complete disappearance of the color is an indication of the time the sewage will be free from odor, providing that no reseedling has occurred. By this means over-chlorination can be prevented and the max. efficiency and economy secured in the prevention of odors.

C. C. Ruchhoft  
Chlorination at Downers Grove, Ill., helps solve sewage-works odor and stream pollution problems. Harry F. Ferguson and W. Homer Wisely. *Water Works and Sewerage* 80, 200-2(1933).—The old treatment plant consisting of an Imhoff tank, sprinkling filter and secondary settling tank was augmented by the construction of an Imhoff tank equipped for gas collection, sludge beds and a combination screenings incinerator and waste-gas burner. Provision was made for the addn. of 10 p. p. m.

Cl at the screen chamber of the old plant. This dosage provided a tank effluent residual of 0.01–0.2 p. p. m. and permitted heavier loading of the filter. Sewage entering the new plant received 15 p. p. m. Cl at the diversion manhole and 9 p. p. m. after sedimentation. The latter dose was successful in delaying putrefaction until addnl. disin. was made available. Chlorination was practiced only during the crit. months between March and October.

C. C. Ruchhoft

**Sewage disposal.** J. H. Gärner. *Surveyor* 82, 467–9 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 12 (Feb. 4, 1933).—The more common shortcomings of English sewage-treatment plants are noted. Emphasis is placed on proper sludge digestion in lagoons for large plants, or in tanks for smaller ones. Gas recovery is practicable only where the sludge is of sufficient quantity to justify the expense and where there is a use on the works for the gas produced. Sludge tank capacity where digestion is practiced should be about 1½ cu. ft. per person; optimum temp. is 30°; reduction of volatile matter is approx. 50%; the gas yield per capita is 0.827 cu. ft. with a calorific value of 660 B. t. u. per cu. ft.

C. R. F.

**Protozoan fauna of sewage disposal.** I. Comparison of plants. James B. Lackey. N. J. Agr. Expt. Sta., *Bull.* 529, 49–50 (1932).—In general, the types and nos. of organisms in the aeration tanks increased or decreased in relation to the stability of the effluent. Dissolved O<sub>2</sub> present determines the types of protozoa to a large extent. Detailed data are given.

C. R. Fellers

**The utilization of the by-products of sewage disposal.** James R. Rumsey. *Water Works and Sewerage* 80, 241–5 (1933).—Experiences at Grand Rapids, Mich., with the following: sludge and scum as fuel, sludge fertilizer, gas and power, agricultural and horticultural projects and intangible by-products.

C. C. Ruchhoft

**Removal of phenols from sewage by means of compressed air.** A. Schulze-Förster and L. W. Haase. *Gesundh.-Ing.* 56, 608–10 (1933).—From 70 to 80% of the phenols present in normal sewage can be removed by vigorous aeration with compressed air (1–2 hrs.) followed by filtration. Both polymerization to difficultly sol. compds. and oxidation take place, the former being especially favored by higher temps. The higher polymers form a crust on the sides of the aeration basin, but a subsequent retention period of ½ hr. with gentle circulation, followed by filtration is necessary to remove the lower polymers. The best filter material is coke 1–3 cm. in diam. or wood wool. Best results are obtained with a  $pH$  of 8–10. At a  $pH$  as low as 2, the phenols are appreciably removed by aeration, but through volatilization rather than polymerization, thus giving rise to objectionable odors. The presence of suspended matter, especially lime, favors the removal of phenols.

M. G. Moore

**Preliminary results on experimental sprinkling filters.** Willem Rudolfs, H. Heukelekian and N. S. Chamberlin. N. J. Agr. Expt. Sta., *Bull.* 521, 6–32 (1931).—Numerous data on crushed stone, slag, gravel and ½ in. wire-mesh exptl. sprinkling filters are presented. In the building-up process of the filter, the nitrification zone moved downward. Considerable NH<sub>3</sub> was lost into the air. The greatest suspended solids removal occurred in the roughest media, whereas the greatest ease of unloading was exhibited by the smoothest material. Considerable direct, non-biol. oxidation occurred. The reduction in biochem. O<sub>2</sub> demand on the wire-mesh filter was 25%, mainly direct oxidation. The greatest *Es. coli* reduction took place in the gravel, followed by the slag and crushed stone. The upper layers of the filters were most effective as strainers for suspended solids and *Es. coli*. The percentage biochem. O<sub>2</sub> demand removal increased with increased loads (cf. C. A. 25, 1610).

C. R. Fellers

**Performance of experimental trickling filters during winter and summer.** Willem Rudolfs, Noel S. Chamberlin and H. Heukelekian. N. J. Agr. Expt. Sta., *Bull.* 529, 4–16 (1932); cf. C. A. 25, 1610.—Decrease of NH<sub>3</sub>, production of nitrite and nitrate, and decrease in biochem. O<sub>2</sub> demand were in all cases greater in summer than in winter. Slag, crushed-stone and gravel filters gave equal

overall performances. The percentage decrease in NH<sub>3</sub> was greatest at the top levels and more pronounced in the stone filter, followed by the slag, and finally by the gravel. Nitrification proceeded at increased rates with downward movement of the sewage. Most of the decrease in biochem. O<sub>2</sub> demand took place in the upper 1.5-ft. levels. The upper half of the filters removed most of the suspended solids and effected most of the decrease in NH<sub>3</sub> and biochem. O<sub>2</sub> demand, whereas the lower half produced more nitrates. The upper part of the filters removed 90% of the *B. coli* of the influent. The zone of greatest activity in the filters was somewhat deeper in winter than in summer.

C. R. Fellers

**Experiments with Trenton sewage sludge.** Willem Rudolfs and I. O. Lacy. N. J. Agr. Expt. Sta., *Bull.* 521, 38–41 (1931).—Samples of sewage solids from the Trenton sewage plant, contg. large quantities of trade wastes, were limed, and other samples were seeded with ripe sludge. The limed samples yielded higher gas production than the control, but less solids reduction. Adding more lime reduced gas production. The seeded material digested very rapidly but the gas was less in total amt. than is normally formed from domestic sewage. Fe compds. in the sewage are believed to be responsible for the decreased gas production. Although large quantities of sulfates were present, H<sub>2</sub>S production was low. The Fe flocks out the finely suspended solids and thus assists in settling. The digested sludge dries rapidly. About 25 million cu. ft. of gas could be collected yearly.

C. R. Fellers

**Loss of heat in activated sludge aeration channels.** Darwin W. Townsend. *Proc. Am. Soc. Civil Engrs.* 60, 63–71 (1934).

E. H.

**Disposal of activated sludge.** Arnold Kershaw. *Surveyor* 82, 427–8 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 11 (Feb. 4, 1933).—Various schemes were tried at Epsom, England, for disposing of large aunts. of excess activated sludge. Such schemes as ridging, harrowing and trenching were unsatisfactory. Best results were secured by plowing land and planting to coarse water grass. When sludge was discharged on such grassy land, the solids were retained while the inoffensive liquid passed on to the contact beds. Neither flies nor offensive odors were troublesome. The use of sludge-drying beds during fair weather in conjunction with grass lands is practiced and about 1.5% of wet sludge on the beds after decanting the top water was found to be the most practicable dose.

C. R. Fellers

**Sludge disposal by incineration.** M. J. Blew. *Public Works* 64, No. 8, 39–40 (1933).—Sludges vary in heat value from 6000 B. t. u. per lb. for combined sludge to 9500 B. t. u. for domestic sludge. Drying and leaching reduces the heat value, but moisture should be reduced to 75%. Incineration temps. must be above 1400°F. to prevent odors, but not above 2000°F. if much grit is present. Sludge should be stored for a min. time before dewatering and predrying. Forced draft with preheated air is desirable.

C. C. Ruchhoft

**Reaction adjustment of acid sludge.** Willem Rudolfs. N. J. Agr. Expt. Sta., *Bull.* 521, 32–4 (1931); cf. C. A. 22, 2423.— $pH$  detns. on sludge liquor may be made after centrifuging, after filtration through paper or glass wool or after dilg. greatly if the liquid is highly colored. Either milk of lime or dry Ca(OH)<sub>2</sub> is the best neutralizing agent for the treatment of acid sludges. Graphs are given showing the proper aunts. of lime required per cu. ft. of fresh solids at  $pH$  ranges 5.1–6.1. It is best to add the lime to highly acid sludges over a period of several days because of the stimulating action of lime on acid-producing microorganisms.

C. R. Fellers

**Heating top sludge.** II. Henry W. Taylor. *Public Works* 64, No. 2, 7, 10–12 (1933); cf. C. A. 27, 5853.—Expt. at 2 plants in northern New York showed the possibility of controlling gas production by regulating the air temp. above the digesting sludge. This was accomplished by installing a blower so as to force air into the Imhoff tank cover attic at a rate varying from 90 to 120

cu. ft. per min. During winter months the air was heated by passing it through a coil located in an exhaust burner. When top sludge temps. were maintained above 82°F., max. gas production was assured. During summer months cool night air was sufficient to cause a marked reduction in the gas yield. The method suggests an effective means of securing a const. yield of gas regardless of outdoor temps. C. C. Ruchhoft

**Effect of narrowing the carbon-nitrogen ratio on sludge digestion.** Willem Rudolfs and L. R. Setter. *N. J. Agr. Expt. Sta. Bull.* 529, 31-7(1932); cf. *C. A.* 27, 5853.—While the addn. of org. N substances to sewage increased the rate of digestion, the mechanism of decomposition is influenced by many other factors.

C. R. Fellers

**Notes on supernatant liquid and (sludge) digestion.** Willem Rudolfs. *N. J. Agr. Expt. Sta. Bull.* 521, 36-8 (1931).—At solids concns. up to 15%, the digestion of ripe sludge-fresh solids mixts. from which the supernatant liquid is removed is as rapid as that in mixts. from which the supernatant liquid is not removed. The withdrawal of supernatant liquid in digestion tanks has a slightly depressing effect on solids digestion. Fourteen days were required for the supernatant liquid withdrawn immediately after collection of the fresh solids to reach a  $pH$  of 7.8. Material which stood for 1-3 weeks required 20-30 days longer. That is, supernatant liquid after standing in contact with the solids contains substances which are difficult to decompose. C. R. Fellers

**Distribution of solids in a digestion tank.** Willem Rudolfs and C. N. Henderson. *N. J. Agr. Expt. Sta. Bull.* 529, 48-9(1932); cf. *C. A.* 25, 5230.—Stratification became more pronounced in digestion tanks held at 21° or below than at higher temps. Two tanks with scum layers of 1 and 7 ft., resp., were compared. The d. of the sludge near the bottom of the 2 tanks was practically the same. Sepn. of water was more pronounced in the tank with the least scum. The ash contents of the scums were nearly the same, but the ash content of the sludge was considerably higher in the tank without the thick layer of scum. Simultaneously with the increase in solids concn. in the sludge, the ash content increased. The grease content of the scum (deeper layer) was 57% of the total dry solids, decreasing rapidly to 48% at the underside of the scum blanket. The grease content decreased further gradually to about 20% in the liquid layer and remained const. in the sludge. Based on ash content, the sludge with the thick, greasy scum was considerably inferior to the material from the other tank.

C. R. Fellers

**Digestion of activated sludge mixed with fine screenings.** Willem Rudolfs. *N. J. Agr. Expt. Sta. Bull.* 529, 45-8 (1932).—Lab. expts. on properly seeded activated sludge with addns. of 10-20% of fine screenings showed that such sludges could be fully digested. The addn. of 10% of fine screenings did not appreciably retard but the presence of as much as 20% of fine screenings definitely delayed digestion and resulted in poorer quality of digested material. Gas production was higher from sludge to which had been added fine screenings (cf. *C. A.* 24, 1449).

C. R. Fellers

**Effect of trade wastes on thermophilic sludge digestion.** I. Comparison of the digestion of Trenton (containing pickling liquor wastes) and Plainfield solids (domestic). H. Heukelekian. *N. J. Agr. Expt. Sta. Bull.* 529, 37-41 (1932); cf. *C. A.* 25, 5231.—The comparison of the digestion of Trenton solids, which are high in Fe content, with the Plainfield solids shows that the presence of Fe affects the digestion in the same way at 50° as at 28°. At both temps. the digestion of solids with the higher Fe content proceeds at a somewhat faster rate (2-3 days) and produces less gas than the domestic solids.

C. R. Fellers

**Diurnal and seasonal variations in the small ion content of outdoor and indoor air.** C. P. Yaglon and L. Claribel Benjamin. *Heating, Piping, Ventilating* 6, 25-32(1934); cf. *C. A.* 26, 3593.—The variations in the ionization

1 condition of outdoor air are considered, together with the corresponding changes which take place in lightly occupied rooms, heated and ventilated by the usual methods. Drawings and addnl. specifications of the exptl. app. used are included. Evidence supports the belief that the sun is not the direct cause of atm. ionization. For temps. under 21° a rise in temp. appears to be assocd. with an increase in the ion numbers, but this does not hold for higher temps. There is, however, a definite inverse relationship between humidity and ionization. Much more important than either temp. or humidity are the changes in these conditions; a rise in the interdiurnal temp. or humidity is as a rule preceded or accompanied by a falling ion content, but if the temp. continues to rise for 3 days or more the ionization begins to increase. Other influences of less importance are cloudiness, high humidity and light or moderate pptn. of any kind, which have a detrimental effect on the small ion content; it is found that a considerable increase in the small neg. ions is produced by pptn. of a heavy character, while both pos. and neg. ions are increased by pptn. when this is accompanied by thunder and lightning. In winter the concn. of small ions is observed to be much lower in indoor air than in outdoor air; in summer the reverse holds true. A. W. Furbank

**Some causes and effects of stream pollution.** J. K. Hoskins. *Public Works* 64, No. 8, 11-12(1933).—Substances polluting streams may be classified as chem., inert and org. The former are directly detrimental and the latter reduce available O and carry pathogenic bacteria. Inert materials create objectionable conditions. Chemicals produce tastes and odors, damage structures and interfere with treatment. Their removal is best accomplished before being discharged into the stream. Org. pollution is reduced by aerobic and anaerobic decomposition by bacteria whose growth is stimulated by plankton. Natural purification may be encouraged by artificial means such as extensive surface exposure, agitation, addn. of O-bearing chemicals and by delaying biochem. oxidation with the use of a disinfectant. C. C. Ruchhoft

**The problem of waste-water disposal.** L. Aublanc. *Rev. hyg. mbd. prevent.* 55, 684-9(1933).—General.

C. R. Fellers

**Purification of waste water.** H. A. J. Pieters and H. Koopmans. *Chem. Weekblad* 30, 779-80(1933); cf. *C. A.* 25, 4639.—Clay can be sepd. from a suspension with an elec. current by means of Cu electrodes. The purification is due to electrolytic Cu. More economical is the use of Fe electrodes. E. Schotte

**Wastes and pollution vs. recovery for profit.** C. M. Baker. *Water Works and Sewerage* 80, 296-8(1933).—Suggestions are made for the utilization of materials ordinarily wasted. Slight changes in the mfg. process often bring new profits and eliminate pollution. Treatment of trade wastes is recommended only after every effort has been made to salvage the polluting material.

C. C. Ruchhoft

**Spent sulfite liquor, its toxic effect and disposal.** Vogel. *Reichsarbeitsblatt* 1933, III, 265-9; *Gesundh.-Ing.* 56, 180; *Wasser u. Abwasser* 31, 210(1933); cf. *C. A.* 27, 5452.—Because of its toxicity for fish and water plants and animals, spent sulfite liquors should not be returned to rivers. They may be concd. by evapn. and, by the addn. of a cementing substance, may be briquetted. The concd. liquor may also be used to sprinkle streets to lay the dust. It is likewise useful as a tanning material.

C. R. Fellers

**Treatment of butter factory drainage.** R. E. Harris and A. Gordon Gutteridge. *State of Victoria (Australia) Dept. Pub. Health, Bull.* 33 and 34, 1020-3(Jan.-June, 1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 75(Dec. 23, 1933).—The wastes from a butter factory in Gippsland contg. washings from cream cans, buttermilk, churn washings, cleansing and sterilizing solns., floor washings and yard drainage, amounting to 14,000 gal., have been successfully treated for a 12-month period in a plant consisting of grease traps, an equalizing tank and 2 trickling

filters for biol. oxidation under aerobic conditions. A preliminary grease trap of 2 parallel basins with a 1/4-hr. detention period at the max. flow removes 6-8 cu. ft. of grease daily. From the equalizing tank, to which clear water is at times added, the waste water passes through another grease trap to 2 circular trickling filters and finally through a 3rd grease trap to prepd. soil beds. The addn. of garden earthworms to the filter helps to loosen the accumulations of solid matter from the filter material. C. R. Fellers

Disposal of shaft-furnace wastes. W. Steffens. Z. *Kommunalwirtschaft* 23, 409-12(1933); *Wasser u. Abwasser* 31, 209-10(1933).—Wastes may be impounded in sedimentation tanks for the settling out of solids and the effluent used on arable land. Where offensive odors result, further purification by coagulation with lime and  $\text{FeSO}_4$  followed by chlorination is recommended.

Grit and screenings incineration plant at Milwaukee, Wis. Darwin W. Townsend. *Water Works and Sewerage* 80, 317-21(1933).—Preliminary expts. indicated that for large-scale operation grit and screenings could be combined, centrifuged and incinerated. The burning unit consists of 2 furnaces having a capacity of 20 tons per 24 hrs. each. Because of high silica content grates are replaced by 105 sq. ft. of refractory surface area per ton of capacity. The drained and sloped charging floor is unobstructed and 3 charging holes are provided for each unit. Scrubbing action of the flame is exerted at every point except in the ash settling chamber. Calcs. indicate the use of 600 gals. of fuel oil for the 24-hr. run of both units. Total cost ests. for operation are \$1.75 to \$2.00 per ton. C. C. Ruchhoft

Identification and estn. of I in mineral waters and mineral water salts (Prange) 12.

Clay, H. H.: The Sanitary Inspector's Handbook. London: H. K. Lewis & Co., Ltd. 386 pp. 15s. Reviewed in *Indian Med. Gaz.* 68, 597(1933).

Moyer, J. A., and Pittz, R. U.: Air Conditioning. New York: McGraw-Hill Book Co. 390 pp. \$4.

Kalender für das Gas- und Wasserfach. Established by G. F. Schlaar. Edited by the Deutschen Verein von Gas- u. Wasserfachmännern und the Preuss. Landesanstalt für Wasser, Boden- u. Lufthygiene 57 Jahrgang, 1934. Tl. II. Wissenschaftlich-technischer Teil. Munich: R. Oldenbourg. 793 pp. M. 7.50.

Apparatus for purifying water containing oil, etc. Otto Behr. Ger. 589,120, Dec. 2, 1933 (Cl. 85c. 9.05).

Means for removing sand from sand traps of water-purifying plants. Fritz Mieder. Ger. 588,264, Nov. 17, 1933 (Cl. 85c. 6.03).

Water distillation. John A. Silyer (to F. J. Stokes

Machine Co.). U. S. 1,939,418, Dec. 12. Various app. and operative details are described.

Apparatus for dosing liquids as in treating water or sewage. Carl Wilson. U. S. 1,939,938, Dec. 19. Various structural, mech. and operative details are described.

Apparatus for softening water by treatment with base-exchange material. George C. Huppertz. U. S. 1,938,628, Dec. 12. Structural and mech. features.

Apparatus for softening water by use of base-exchange material. Walter N. McConkey. U. S. 1,939,182, Dec. 12. Various details are described of an app. with a piston pump for softening chemicals.

Water-softening apparatus for use with base-exchange material. John H. Nash. U. S. 1,940,966, Dec. 26. Various structural, mech. and operative details are described.

Apparatus (suitable for attachment to a faucet) for softening water by use of base-exchange material. Jens A. W. Madsen. U. S. 1,940,720, Dec. 26. Structural details.

Use of barium ferrite for softening water, etc. Gail J. Fink (to National Aluminate Corp.). U. S. 1,940,409, Dec. 19.

Briquets for treating water for use in locomotive boilers, etc. Julius Alsberg (to Superheater Co.). U. S. 1,938,677, Dec. 12. Briquets are used comprising a porous structure composed of glue and tannin and tannin-bearing ext. in the pores.

Sewage treatment. Guggenheim Bros. Fr. 754,837, Nov. 14, 1933. The putrescible material is removed by pptg. a metal hydroxide in the liquid. The mud formed is sepd. and treated to render it inoffensive and the metal compd. is regenerated. Cf. C. A. 27, 1434.

Sewage treatment apparatus (for bacterial and aeration treatment). Friedrich Schimrigk. U. S. 1,939,924, Dec. 19. Various details are described of an app. and operation in which treatment of the sewage is effected in contact with an aggregate of "settlement bodies" such as rings of wood and earthenware of a sp. gr. about the same as that of the sewage.

Thickener for dewatering materials such as sewage by settling and sedimentation. George M. Darby and Ernest J. Maust (to Dorr Co.). U. S. 1,938,894, Dec. 12. Numerous details are described.

Settling sewage and removing gritty sludge from it. Win. C. Weber (to Dorr Co.). U. S. 1,939,636, Dec. 12. Various details of app. and operation are described.

Aerating device for sewage-disposal plants. Edward H. Hantz. U. S. 1,940,350, Dec. 19. Structural details.

Clarifying tank for sewage. Max Kusch. Ger. 589,011, Dec. 1, 1933 (Cl. 85c. 6.01).

Conical mill for reducing bulky objects contained in garbage, etc. Eisen- & Stahlwerke Oehler & Co. A.-G. Brit. 398,121, Sept. 7, 1933.

Plate heat-exchangers for air-conditioning plants. George G. Bell. Brit. 398,199, Sept. 7, 1933.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

The significance of soil types for agriculture. S. Gericke. *Phosphorsäure* 3, 581-8(1933).—The chem. characteristics of the horizons of different soil types are discussed with particular reference to the distribution of P.

K. D. Jacob

Colloid chemistry in agriculture. S. Gericke. *Phosphorsäure* 3, 723-5(1933).—A brief discussion of the relation of colloids to the structure and properties of soils.

K. D. Jacob

Soil reactions and forest types in the Duke Forest. T. S. Coile. *Ecology* 14, 323-33(1933).—The detn. of H-ion concn. on 500 soil samples from the Duke Forest in N. Car. shows that litter of low H-ion concn., such as red gum, yellow poplar, red maple, river birch, sycamore and dog wood, decomposes more rapidly and the decompn. ducts incorporate more rapidly into the mineral soil

than does litter of high H-ion concn. such as loblolly pine, shortleaf pine and the oaks. The soil reactions under 7 forest types in the Duke Forest, as detd. colorimetrically, do not differ enough to be a limiting factor in the distribution of the forest types. Fourteen references.

John O. Hardesty

Laboratory methods of soil investigation compared with field experiments. W. Wöhlbier and Schulze. Z. *Pflanzenernähr., Düngung Bodenk.* 12B, 460-8(1933).—Comparison of yields of beets, potatoes and small grains grown in field expts. to det. the effect of  $\text{K}_2\text{O}$  with the indications of Dirks' (cf. C. A. 27, 3767) procedure showed agreement in less than 80% of the cases. C. J. S.

Studies in Malayan soils. J. H. Dennett and H. A. Tempny. *Malayan Agr. J.* 21, 345-61(1933).—Malayan soils are discussed and classified as to climate,

parent material and vegetation. These are the granite, quartzite, Raub, coast alluvium, Petang, Dolorite and highland soils. Low org. matter content as well as the lack of a store of plant food characterizes these tropical soils.  $\text{CaO}$  varies from 0.04 to 0.13%;  $\text{K}_2\text{O}$  from 0.05 to 0.80%; and  $\text{P}_2\text{O}_5$  from 0.02 to 1.00%. The available plant food is not more than 0.1 of the above figures. Only occasionally is the soil acidity definitely harmful. In such cases the  $p_{\text{H}}$  is 3.5 or less, caused by free  $\text{H}_2\text{SO}_4$ . The ratio of N to C is about 11.0. The N content of inland soils is 0.1-0.2% and of coastal plain soils 0.15-0.40%.

Irvin C. Brown

The black soils in the vicinity of Sofia. Ivan T. Stranski. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 221-33 (1933).—The origin and characteristics of certain swampy soils are discussed. These badly drained black soils are rich in fertility but have unfavorable phys. properties. They are, in general, responsive to liming and  $\text{P}_2\text{O}_5$  fertilization. Twenty-seven references. C. J. S.

Base-exchange equilibria in clays. C. E. Marshall and R. S. Gupta. *J. Soc. Chem. Ind.* 52, 433-43T (1933).—Analytical and electrometric data are presented from a base-exchange investigation in which Putnam clay (beidellite) and bentonite (montmorillonite) were used. The reactions studied were between Na-clay and  $\text{KCl}$ ,  $\text{CaCl}_2$  and  $\text{AgNO}_3$ , also H-clay with  $\text{AgNO}_3$  and  $\text{Ti}_2\text{SO}_4$ . It was found that when a sufficiently wide range of concn is chosen none of the base-exchange equations which have been proposed is satisfactory. The substitution of activities for concns. in the simple mass-action equations does not suffice to make them valid. A. M. Brant

Evaporation of water from the soil. Max T. Lorey. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 267-78 (1933).—The relative evapns. of  $\text{H}_2\text{O}$  from  $1\frac{1}{2}$  mm. and finer quartz sand and from free  $\text{H}_2\text{O}$  surface were studied. C. J. S.

The relation of hygroscopic water to the exchange capacity. S. N. Alekhin. *Chemisation Socialistic Agr.* 1932, No 11-12, 29-38.—A. points out that there is a definite parallelism between the variation in the values of the hygroscopic moisture, in terms of millicquivalents, of different soils and their variation in values of exchange capacity. By dividing the millicquivalents of moisture by the millicquivalents of exchange capacity a definite figure is obtained which is characteristic for the zonal soil type. After obtaining the characteristic value ( $K$ ) for any soil type it is possible by dividing the millicquivalents of hygroscopic moisture per 100 g. of soil by the const. to obtain the exchange capacity of the soil. A. cites data showing that this method of obtaining the exchange capacity of the soil is in close agreement with actual detns. J. S. Joffe

The validity of Vageler's sorption equation for estimating the relative solubilities of nutrients in the soil. P. Kottgen. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 320-36 (1933).—Vageler's (cf. C. A. 26, 3865) math. treatment of the ease of replacement of absorbed ions is criticized on the ground that however applicable it may be to salt-free permutites, it is not necessarily valid for the soil's absorptive complex. Further, the cation used,  $\text{NH}_4$ , occurs naturally in soils in important amts. On theoretical grounds,  $\text{H}^+$  should be the best replacing cation for soil studies. Application of V's procedure to humid soils indicated no consistency in the amt. of sorbed base, although values for arid soils were in better agreement. It is no more useful than the older leaching methods, and its limitations are such that good indications are not to be expected with poor soils. C. J. Schollenberger

Quantitative laws in the study of the absorption properties of soils. E. N. Gapon. *Chemisation Socialistic Agr.* 1932, No 11-12, 18-28.—G. develops a formula by which he detns. the exchange capacity of soils by getting 2 exptl. points, using definite concns. of electrolytes on 2 samples of soil, on a straight line which represents graphically the isotherm equation. Taking the exptl. data of Gedroiz he shows how the calcns. by the formula correspond to the actual detns. J. S. Joffe

The permeability of the soil. F. Zunker. *Kultur-techniker* 35, 835 (1932); *Fortschr. Landw.* 8, 133.—The

relation between the permeability of a soil and its particle size and hygroscopicity is developed for a clay soil. Particle-size and hygroscopicity detns. may, under certain conditions, lead to different evaluations of the permeability of a given soil. For medium and heavy soils, a more reliable figure for permeability can be obtained from the mean of the results of particle-size, hygroscopicity and heat-of-wetting detns. K. D. Jacob

Cohesion forces in soils with unchanged structure V. G. Buluichev and G. I. Pokrovskii. *J. Tech. Phys.* (U. S. S. R.) 3, 525-31 (1933).—Cohesion forces in soils depend on the way in which the water content and the relative shapes of the soil particles affect the capillary forces. P. H. Rathmann

The effect of raw phosphate on the soils in Ukraine P. F. Tobochko. *Chemisation Socialistic Agr.* 1932, No 11-12, 43-52.—T. presents exptl. data on the effect of raw phosphates on the various subtypes of chernozem as compared with acid phosphate. He shows that outside of the deep chernozem raw phosphates may serve as a favorable substitute for acid phosphate. J. S. Joffe

Bacteriophage and the fatigue of soils planted in alfalfa A. Demolon and A. Dunez. *Compt. rend.* 197, 1344-6 (1933).—Bacteriophage was found in the nodules, roots and stems of alfalfa over 1 yr. old but not in the leaves. It was also found in soil in which alfalfa over 1 yr. old was grown. In the soils planted in young alfalfa no bacteriophage was found. Its presence in the soil is markedly persistent. This causes soil fatigue and by the end of the second year the soil is unfit for the development of legume. This condition persists until the accumulated bacteriophage disappears. Expts. indicate that bacteriophage will pass from the soil into the plants. J. R. Adams

Experimental investigations on the importance of physical soil constants for various forms of natural and newly developed pasture practice. W. Schunemann. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 278-301 (1933). C. J. Schollenberger

Correcting the unproductiveness of acid and alkaline muck soils for the growing of vegetable crops G. M. Tait and J. E. Knott. N. Y. (Cornell) Agr. Exptl. Sta., *Bull.* 572, 3-19 (1933).—Muck soils showing a  $p_{\text{H}}$  reaction of 4.0 may require an addn. of 8 tons to the acre of ground limestone. If the reaction is between  $p_{\text{H}}$  6 and 7, marl from the drainage ditches should not be spread on the surface or the soil will become too alk. In alk. muck soils, if the subsoil is acid, deep plowing or the addn. of  $\frac{1}{2}$ -1 ton of S per acre will correct the alk. Flowers of S were as effective as inoculated S composts. The optimum soil reaction for vegetables on acid and alk. muck soil is not the same. For practical purposes, mucks showing reactions of  $p_{\text{H}}$  5-7 are normally satisfactory for crop production. C. R. Feller

Carbon dioxide from the soil and plant assimilation V. Subrahmanyam and G. S. Siddappa. *Nature* 132, 1001-2 (1933).—Barley was grown on soil contg. org. matter and treated, in sep. pots, with  $\text{Fe}_2\text{O}_3$ ,  $\text{KMnO}_4$  and  $\text{H}_2\text{O}_2$ . There was about 32% more dry matter in the treated than in the untreated pots. The authors' interpretation is that the young plants get most of their  $\text{CO}_2$  from the soil, since the oxidizing agents would increase the available  $\text{CO}_2$ . J. J. Williams

The influence of the lime status of the soil upon the ability of a plant to assimilate phosphoric acid and potash W. Leach. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 20-32 (1933).—The effect of changes in  $p_{\text{H}}$  and content of active  $\text{CaO}$  due to physiologically acid and alk. fertilization and heavy liming upon (I) the citric acid soly. of soil  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$  and (II) indications of the Neubauer rye-seedling method was investigated. The nature of the fertilization, whether acid or basic, had no effect upon  $\text{P}_2\text{O}_5$ . Liming reduced the availability of  $\text{CaH}_2\text{P}_2\text{O}_7$  according to II but not according to I. This throws doubt upon the reliability of II as an index of  $\text{P}_2\text{O}_5$  supply, since field results show that liming does not decrease the action of  $\text{P}_2\text{O}_5$ . Added to soil in the lab. at the rate of 150 kg./ha.,  $\text{P}_2\text{O}_5$  was recovered quantitatively by I, but only 74% by II, still less



when limed. Physiologically basic fertilization increased the availability of  $K_2O$ , an effect furthered by liming, indicated by both I and II. C. J. Schollenberger

The question of magnesia in agriculture. Ch. Brioux. *J. agr. prat.* 97, 339-40, 357-8(1933).—After a brief review of the subject a description is given of some pot tests which indicate that  $MgO$  might be used advantageously as a fertilizer ingredient, particularly in the cultivation of certain flowers. However, the results obtained in field tests are so irregular that it would appear premature to recommend the unrestricted use of  $MgO$  fertilizers.

J. R. Adams

Potassium in calcareous soils. I. Solubility and availability. W. T. McGeorge. *Ariz. Agr. Expt. Sta., Tech. Bull.* 50, 1-19(1933).—Ariz. soils contain large reserves of K but there is a wide variation in the amt. of replaceable or less firmly bound K. Even in the poorest soils there is no evidence of an immediate need for K. The soly. in water is very low in some soils but the adsorbed K responds so readily to the solvent action of  $CO_2$  that the low soly. in water does not handicap the absorption by the crop provided root respiration is normal. The Neubauer test shows that plants will absorb large amts. of K from these soils during the early stages of growth. In fact, the indications are that luxury consumption will take place in many of them. In general, available K in soils decreases with soil depth, as does also the soly. of K in water. The subsoils have a strong fixing power for K and thus, by fixation of K leached from the surface soils, the supply of available K in the subsoil increases with cultivation. II. Some properties of replaceable potassium. *Ibid.* 20-42; cf. C. A. 23, 1980.—Replaceable K is abundantly present in Ariz. calcareous soils. Exchange K is readily replaced from calcareous soils by 0.1 N solns. of  $NH_4$  salts but not by Ca salts, while in non-calcareous soils the 2 salts are equally effective. Ca salts depress the hydrolysis of K zeolite and increase fixation of K in calcareous soils, but not in non-calcareous soils. Calcareous material in soils depresses the soly. of soil K below the theoretical value detd. by Magistad (C. A. 23, 1980) and show high Neubauer values for K. Neubauer values for calcareous and non-calcareous soils contg. equiv. amts. of replaceable K are higher in the former. However, the soly. of replaceable K is higher in the latter. Neutral Ca salts show an active initial liberation of K from calcareous soils. Holding calcareous soils for an extended period in a puddled condition does not change the replaceability of K. Loss of replaceable K by leaching with pure  $H_2O$  is small for calcareous soils. Heating calcareous soils increased replaceable K up to  $760^\circ$  in a sandy loam, while there was little change in a silty-clay loam. Grinding calcareous soils in a ball mill increased the replaceability of K approx. 3-fold. Grinding a peat soil had no effect on replaceability of K. Grinding increases the exchange capacity of the inorg. exchange complex, but does not alter the exchange capacity of org. colloids. Theories are presented which explain the greater availability of K in calcareous soils and support the postulation that they contain a large part of their K adsorbed by non-cryst. colloids, either in the form of synthetic zeolite-like compds. or isoelec. ppts. Twenty-seven references.

C. R. Fellers

Preliminary pot experiments to investigate the symptoms of nutrient deficiency in five varieties of cabbage on three different types of soil. F. Vogel. *Ernähr. Pflanze* 29, 457-52(1933).—Pot expts. with kale, Brussels sprouts, cauliflower, kohlrabi and winter cabbage were carried out on sandy, peat and loamy soil. Treatment consisted of complete fertilizer, without  $K_2O$ , without  $P_2O_5$ , without N, and untreated. On the peat and loamy soils 0.5 g. each of Leumasalpetar, KCl and superphosphate were given per pot. This amt. was reduced by half with sandy soil. N deficiency caused retarded growth and low yield.  $P_2O_5$  deficiency produced a pale-colored leaf, except with kale on the loamy soil.  $K_2O$  deficiency produced a pale color, the absence of the characteristic waxy layer on the surface of leaves, excessive transpiration and the consequent wilting tendency, leaf-roll and marginal discoloration. Complete fertilizer increased yields 10-fold on sandy soil,

3-7-fold on loam, and 5-13-fold on peat soil as compared with the untreated pots. John O. Hardesty

The root systems of cereal plants with uneven distribution of nutrient substances in the soil. M. A. J. Goede-waagen. *Phosphorsäure* 3, 688-711(1933).—Oat plants were grown in rectangular boxes in a soil that was originally very deficient in P. In each box a vertical section of the soil corresponding to  $1/4$  of the total vol. of the box was thoroughly mixed with a phosphate fertilizer, that was comparatively insol. in water, at the rate of 400 kg.  $P_2O_5$  per hectare; adequate amts. of the other fertilizing elements were uniformly distributed throughout the entire vol. of the soil. The position of the oat plants in the boxes was varied with respect to their distance from the portion of the soil receiving the phosphate fertilizer. The total dry wt. of the shoots decreased rapidly with increase in the distance of the plants from the phosphate-fertilized soil, the effect of the phosphate being negligible at a distance of 0.2 m.; the dry wt. of the roots changed in the same direction but to a smaller extent. The results indicate that the max. utilization of water-insol. phosphates is obtained only when the fertilizer is placed in close contact with the plant roots. K. D. Jacob

Corynebacteria as an important group of soil micro-organisms. H. L. Jensen. *Proc. Linnean Soc. N. S. Wales* 58, 181-5(1933).—Bacteria possessing the characteristics of the genus *Corynebacterium* occur as a numerically important group of microorganisms in Australian soils, accounting for 8-65% of the nos. of bacterial colonies developing on plates of dextrose-casein agar. The no. increases somewhat with decreasing soil acidity. They appear to be active in the decompn. of org. matter in soil, particularly in the later stages of the process. They are probably identical with certain organisms previously recorded as rhizobia. K. C. Becson

The bacteriological oxidation of sulfur in an Australian soil. P. M. Rountree. *Australian J. Exptl. Biol. Med. Sci.* 11, 209-18(1933).—The optimum moisture range was 60-90% of satn., and the optimum temp. range  $16-35^\circ$ . A new organism of the *Thiobacillus* group changed the  $pH$  of the soil from 8.4 to 4.5 in 12 days, under lab. conditions. C. G. King

Occurrence of *Azotobacter* in peat soils of New York. J. K. Wilson and B. D. Wilson. N. Y. (Cornell) Agr. Expt. Sta. *Memoir* 148, 3-15(1933).—Fifty-four peat soils from 6 geographical locations in N. Y. state were air-dried, ground and stored for 27 months before examg. for *Azotobacter*. The soils were acid in reaction, except 1, and ranged in reaction from 3.8 to 7.0. Four of the samples showed no *Azotobacter*. There was no close relationship between the soil reaction and the presence of these bacteria. The soil complex seems to be more important in controlling the activity of *Azotobacter* than the soil reaction. Soils that contain carbonates and are not naturally suited to the macroscopic growth of *Azotobacter* can be made suitable in this respect by adjusting the ratio of carbonate to phosphate. This is best accomplished by the addn. of sol. salts contg. P and certain basic substances, or by the addn. of HCl,  $H_2SO_4$  or  $H_3PO_4$ . A practical application of these findings is that soils may be treated with S in order to narrow the ratio of carbonate to phosphate so that the soils will be more productive. C. R. Fellers

Character of the peat deposits of New York. B. D. Wilson and E. V. Staker. N. Y. (Cornell) Agr. Expt. Sta., *Memoir* 149, 3-20(1933).—Characteristic profiles and chem. analyses of the various peat deposits are given. Five different types were encountered. The character of the underlying material detd. largely the amt. of Ca and acidity in the deposits. The layers resting on non-calcareous materials were more acid than when calcareous underlying material was present. The CaO content was 0.92-6.8%;  $MgO$ , 0.18-0.91; N, 1.04-3.37; org. C, 29.8-57.65; and  $pH$ , 4.2-6.0. The N was present largely as lignin-humus complexes. The org. matter of each of the layers contained more hemicellulose than cellulose. The amt. of each of these constituents is smaller in the org. matter of most of the layers than is the amt. of lignin humus. The relative amts. of the org. constituents of the

peat materials are not necessarily an indication of a particular kind of peat.

C. R. Fellers

The decomposition of hydrolytic peat products including ammoniated peat. I. C. Feustel and H. G. Byers. U. S. Dept. Agr., *Tech. Bull.* 389, 1-32(1933).—A study was made of the decompn. of peat when mixed with soil as measured primarily by  $\text{CO}_2$  evolution. The samples of peat were used in the raw condition and as the products of various types of chem. treatments, including extn. by solvents and reactions with water, acids and bases at ordinary and at elevated temps. under pressure. The raw peats decompd. very slowly whereas peat treated at ordinary temp. with 40% HCl or at 150° under pressure with CaO or  $\text{NH}_3$  decompd. quite rapidly, the max. rate being approx. 1/2 of the rate of sweet clover under the same conditions. Peat and other org. materials are capable of reacting with  $\text{NH}_3$  to form nitrogenous compds. of which only a small proportion is ammoniacal in nature. The increase in the combined N when various org. materials were treated with  $\text{NH}_3$  at 150° for 3 hrs. ranged from 2.37% in lignin from corn cobs to 5.78% in sphagnum moss peat. There is no relationship between the N originally present and the addnl. N taken up in the treatment. The immediate availability of the total N in treated samples of saw-grass peat is between 25 and 50% as compared with inorg. N.

W. H. Ross

The connection between the degree of decomposition and some physicochemical properties of high moor peat. Th. Arnd, W. Siemers and W. Hoffmann. *Z. Pflanzenernähr., Düngung Boden.* 32A, 257-66(1933).—Nineteen samples of peat and one of living sphagnum were examd. for extent of decompn. by the methods of (I) Komarevskii (cf. C. A. 23, 3070), (II) Odén (cf. C. A. 15, 2143) and (III) Keppeler (cf. C. A. 14, 2901). I, requiring a detn. of residual cellulose, is too tedious for practical use with many samples; II is subject to minor errors but is satisfactory. Analyses indicated that C increases and H decreases with progress of peat development. Young peat is much lower in N,  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$  than living moss, but N increases with decompn.; CaO changes little but acidity increases.

C. J. Schollenberger

Sampling and testing peat litter. M. Popp. *Z. Pflanzenernähr., Düngung Boden.* 32A, 182-4(1933).—Water content and absorptive capacity for  $\text{H}_2\text{O}$  are the only tests; the latter is detd. under arbitrary conditions described.

C. J. Schollenberger

The influence of magnesium on different potato soil types. B. E. Brown, G. V. C. Houghland, O. Smith and R. L. Carolus. *Am. Potato J.* 10, 55-65(1933); *Rev. Applied Mycol.* 12, 654-5.—When  $\text{MgSO}_4$  was added to Norfolk sandy loam soil in Virginia having a  $p_{\text{H}}$  of 4.2 much less chlorosis (indicative of a well-defined growth disturbance) of potato leaves was observed than when  $\text{MgSO}_4$  was not used. Addn. of  $\text{MgSO}_4$  to soils having  $p_{\text{H}}$  5.5 showed no beneficial results, however. Mg in water of the Atlantic seaboard coastal plains section where this chlorosis is common is low and possibly the chlorosis is an indication of Mg deficiency. In most cases the diseased plants were growing on very acid soils— $p_{\text{H}}$  4.2-5.

Oden E. Sheppard

Nitrogen balance in black cotton soils in the Malwa Plateau. I. Yeshwant D. Wad and V. G. Panse. *Indian J. Agr. Sci.* 3, 820-32(1933).—A study was made of the rate of nitrification of *karanja* cake, safflower cake and  $(\text{NH}_4)_2\text{SO}_4$  in a black cotton soil maintained at the optimum moisture content (25-30%) and incubated under shade in diffused light at relative atm. humidities ranging from 60 to 100%. At the higher humidities ammoniacal N was higher and nitrate N lower than at the lower humidities. In the drier atms. there was greater accumulation of nitrates from *karanja* cake and  $(\text{NH}_4)_2\text{SO}_4$  than from safflower cake. In the wetter atms. the initial accumulation of nitrates was more rapid from *karanja* and safflower cakes than from  $(\text{NH}_4)_2\text{SO}_4$ . With all treatments nitrates decreased rapidly in the 3rd week, the greatest decrease occurring with *karanja* cake. There was no loss of N in any case. The appearance of algal growth occurred simultaneously with the decrease in nitrates; utilization of

nitrates by algae is a factor in decreasing loss of N from soils by leaching during periods of heavy rainfall.

K. D. Jacob

The influence of cropping system and fertilization on the reaction of Sassafras silt loam soil. Henry C. Harris. *J. Am. Soc. Agron.* 26, 29-34(1934).—Long-time treatments with farm manure, N,  $\text{P}_2\text{O}_5$  or  $\text{K}_2\text{O}$  fertilizers of plots located on the Delaware Agr. Expt. Farm have had no appreciable influence on the reaction of the soil. This is probably due to local conditions and the combinations used. It appears that the  $p_{\text{H}}$  value of this soil has been influenced by the cropping system grown on the soil, especially where CaO was applied.

J. R. Adams

The cycle of phosphorus in the soil. Walter Sauerlandt. *Phosphorsäure* 3, 711-22(1933).—When they were grown in sand cultures contg. a very small amt. of black soil, oat plants were unable to utilize efficiently the P of undecompd. phytin; good results were obtained, however, when the phytin was added to the cultures 2 months before the seeds were planted. Samples of soil taken from plots immediately after growth of clover were very low in sol. P, but the amts. of sol. P increased considerably, in some cases, when the samples were kept for 6-8 weeks and the moisture content was maintained at 60% of the water-holding capacity. Tests on acid soils ( $p_{\text{H}}$  4.1-6.3) maintained at a moisture content equiv. to 60% of the water-holding capacity and incubated at 20° for 5-10 weeks indicated that when P was supplied as  $\text{KH}_2\text{PO}_4$  the amt. of available P (Dirks and Scheffer method) decreased to a min. in 5 weeks and then increased slightly. Thirty-two references.

K. D. Jacob

A comparison of estimations of phosphoric acid in soil by the pot method of E. A. Mitscherlich and the rapid procedure of Dirks and Scheffer. W. Meimberg and W. Sauerlandt. *Z. Pflanzenernähr., Düngung Boden.* 12B, 489-99(1933).—A comparison of tests with 234 soils by (I) the Mitscherlich (cf. C. A. 18, 2053) and (II) Dirks-Scheffer (cf. C. A. 24, 3070) tests indicated agreement in only 59% of the cases. All soils testing 8 or over by II were indicated to be supplied adequately with  $\text{P}_2\text{O}_5$  by I. But of all the soils indicated to be stocked sufficiently with  $\text{P}_2\text{O}_5$  by I, only 44% were so indicated by II. If heavy soils alone are considered, the latter figure is 25%. If soils poor in  $\text{P}_2\text{O}_5$  are considered as a group, agreement was 90%. The indications of II are of qual. value only.

C. J. Schollenberger

The estimation of a soil's need for phosphoric acid fertilization by means of *Aspergillus niger*. H. Niklas, G. Vilsmeier and F. Kohl. *Z. Pflanzenernähr., Düngung Boden.* 32A, 50-70(1933); cf. C. A. 25, 3426.—The increase in moisture and ash-free weight of mycelium from the 5-day growth of *A. niger* in 75 ml. flasks contg. 30 ml. nutrient soln. with 1% citric acid and both 2.5 and 7.5 g. soil over growth in check flasks without soil furnishes a reliable index to the soil's supply of available  $\text{P}_2\text{O}_5$ . The weights of mycelium obtained and the soil's need for  $\text{P}_2\text{O}_5$  are related thus:

Weight over 2 controls		Need for $\text{P}_2\text{O}_5$
2.5 g. soil	7.5 g. soil	
0.16-0.40 g.	0.24-0.60 g.	Unconditional
0.40-0.54	0.60-0.86	Conditional
Over 0.54	Over 0.86	None

The indications of the *A. niger* method resemble more closely those of the citric acid extn. of König-Hasenbäumer (C. A. 24, 4574) than the growth of plant seedlings according to Neubauer-Schneider. Fifteen references.

C. J. Schollenberger

The phosphoric acid fertilization of legumes. Arnold Kornfeld. *Phosphorsäure* 3, 594-623(1933).—Thomas meal was as efficient as superphosphate in increasing the yield of legumes, particularly lucerne and soy beans. In field expts. on a neutral soil the plants soon showed the full fertilizing effect of superphosphate, whereas Thomas meal was slower in action; in contrast to Thomas meal, superphosphate showed no secondary fertilizing action. Both fertilizers shortened the vegetation period, particularly of soy beans. The effect of inoculation in retarding

the ripening of soy beans was overcome by the use of phosphate fertilizers. Phosphates had a favorable effect on the root system, and there was a correlation between the setting of root nodules and the digestible protein content of the plants. The use of phosphate fertilizers has made the growth of legumes profitable in certain Roumanian districts. Twenty-five references. K. D. Jacob

Detection of the change in potassium and phosphoric acid contents of soil during a vegetation period by the soil investigation method of Wrangall. Hans Stahl. *J. Landw.* 81, 223-48(1933).—Five soils were carefully sampled to a depth of 15 cm. In addn. a few deeper samples were taken. Exts. by pressing out the soil soln. and repeated extns. in water were made after a fixed amt. of fertilizer was added. Analyses indicated that the  $P_2O_5$  quickly absorbed is tightly held but a portion is sol. by repeated extn. with water. K is more easily extracted than  $P_2O_5$ . Irvin C. Brown

The phosphate question. VI. Estimation of phosphate requirement. O. Arrhenius. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 1-20(1933).—About 6000 soil samples from Swedish fields on which percentage increases in various crops following  $P_2O_5$  fertilization were also detd. were examined for (I) citric acid-sol.  $P_2O_5$  (cf. C. A. 23, 5534), (II) lactate-sol.  $P_2O_5$  (cf. Egner, C. A. 27, 3278) and (III) 0.01% NaCl in  $H_2O$ -sol.  $P_2O_5$ . The data are tabulated and analyzed by statistical methods. Indications from I showed high correlation with field results, II was fairly good, III of practically no value. C. J. S.

Effect of increased applications of phosphates on the yield and quality of tobacco. B. Swietochowski. *Doswiadczalnictwo Rolnicze* 6 (1930); *Phosphorsäure* 3, 767.—P fertilizers increased the yields, improved the quality and hastened the time of ripening of tobacco. N fertilizers had a deleterious effect on the quality.

K. D. Jacob  
The phosphate fertilization of potatoes. Vowinckel. *Phosphorsäure* 3, 735-9(1933).

K. D. Jacob  
The citric acid solubility of phosphates. J. D'Ans, I. Polhe and W. Schuppe. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 70-84(1933).—Soln. of  $P_2O_5$  in 2% citric acid at 18-20°, widely used as an index of availability of phosphates, is shown to be dependent upon size of sample and other factors. Under some conditions it is considerably increased by  $Ca(NO_3)_2$  or  $KNO_3$ , an effect mistakenly attributed to increase in availability from fusion with these salts, and decreased more by  $CaCO_3$  than by  $CaO$ , because of the formation of a difficultly sol. film on the particles of  $CaO$ . Small samples of tech.  $CaHPO_4$  and  $Ca_3(PO_4)_2$  are almost completely dissolved; larger samples approach a limit in soly. asymptotically. Curves for Florida and pebble phosphates are similar; samples less than 5 and 3 g., resp.,/250 ml. are more, and larger samples less, sol. than  $CaHPO_4$ , but exceed  $Ca_3(PO_4)_2$  throughout. With samples less than 4 g., the soly. of apatite exceeds that of  $Ca_3(PO_4)_2$ . Dissolved  $P_2O_5$  from Rhenania phosphate increases rapidly with sample size up to 2.5 g., then decreases sharply, and is less than that from Florida raw phosphate with 10 g. and larger samples. A similar but less pronounced decrease in soly. was shown by basic slag, but both these artificial phosphates are in general more sol. than the other materials. Study of soly. curves over the whole range is a safer basis for judgment of fertilizer value than single detns. C. J. S.

What influence has fineness of basic slag, Kossair and Toria phosphates and Kola apatite upon the fertilizing action of their phosphoric acid? C. Krügel, C. Dreyssing and H. Kurth. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 302-20(1933) cf. following abstr.—Expts. with oats in Mitscherlich pots of humus sandy loam,  $pH$  7.2, indicated basic or Thomas slag at the rate of 40-160 kg./ha. to be by far the best source of  $P_2O_5$  among those tested. Percentages of efficiency with fineness were 22.5% for 75-100-mesh, 28.0% for 100-200-mesh and 33.0% for slag passing a sieve with 200 meshes/in. The raw phosphate rocks of similar fineness and  $P_2O_5$  contents were less than 5% efficient in all tests. The apatite increased slightly in efficiency with fineness, but the other

ground phosphate rocks did not. Conclusion: Raw phosphates are unsuitable for use on nearly neutral mineral soils. Extensive review with data and 37 references.

C. J. Schollenberger  
Is superphosphate used as top dressing as valuable as when worked into the soil? C. Krügel and C. Dreyssing. *Z. Pflanzenernähr., Düngung Bodenk.* 12B, 440-60(1933).—See C. A. 28, 555<sup>4</sup>. C. J. Schollenberger

The effect of different colloidal soil materials on the efficiency of superphosphate. Philip L. Gile. U. S. Dept. Agr., *Tech. Bull.* 371, 1-49(1933).—Detns. are given of the effects of 17 surface soils and 14 subsoils on the efficiency of superphosphate. Addns. of some soils greatly reduce the efficiency of superphosphate as compared with its efficiency in pure quartz sand while other soils increase its efficiency. Thirteen of the 14 subsoils tested impart a lower efficiency than the corresponding surface soils. Soils contg. colloids with a high  $SiO_2$ -sesquioxide ratio may enhance the efficiency of superphosphates while those contg. colloids with low ratios depress efficiency. The same is also true of subsoil materials. Charcoal and peat increase somewhat the efficiency of superphosphate and phosphate rock in pure quartz sand and the efficiency of superphosphate in sand and soil mixts. The effect of a soil colloid on superphosphate seems to depend on the degree to which the colloidal material is satd. with  $P_2O_5$ , the  $SiO_2$ -sesquioxide ratio of the colloid, the effect of the colloid on the H-ion concn. of the medium and the content of org. matter. The availability of rock phosphate on the other hand seems to be governed primarily by the H-ion concn. of the medium. The efficiencies of superphosphate calcd. from the wts. of crop increases are about the same as those calcd. from the quantities of  $P_2O_5$  recovered in the crops. Fifty-four references. W. H. Ross

Causes of the action of Thomas meal. A. Wilhelmj. *Phosphorsäure* 3, 577-80(1933); cf. C. A. 27, 5809; 28, 556<sup>1</sup>.—A summary of recent investigations relating to the soly., action and mobility of the P and the importance of the Ca, Si, Mg and Mn in Thomas meal.

K. D. Jacob  
The "active lime" in Thomas meal. S. Gericke and K. H. Siemens. *Phosphorsäure* 3, 665-87(1933).—The abs. soil-neutralizing value of the lime in Thomas meal cannot be detd. directly, but the activity of the lime can be detd. indirectly by comparison with limestone and other standard liming materials. A study of the changes in  $pH$  values and hydrolytic acidities of 2 acid soils indicated that the neutralizing value of the total lime in Thomas meal is at least as high as that of the same amt. of lime in the form of marl; field expts. and chem. lab. tests gave similar results. The lime of Thomas meal and of marl dissolved more rapidly in 0.025 N HCl than in 0.025 N AcOH; in both acids, the av. initial rate of soln. of Thomas-meal lime was somewhat greater than that of marl lime and somewhat lower than that of fine-marl lime. A 10%  $NH_4Cl$  soln. dissolved approx. 10% more of the total lime from Thomas meal contg. 10-12%  $SiO_2$  than from meal contg. 5.0-6.0%  $SiO_2$ . In field expts., the percentage activity of the lime in Thomas meal and in marl decreased with increase in the total amt. applied to the soil.

K. D. Jacob  
Fertilizer experiments in the service territory of the agricultural station Laufen, Upper Bavaria. Schubeck. *Phosphorsäure* 3, 739-47(1933).

K. D. J.  
Soil analysis as a guide to fertilizer practice. H. Sappok. *Ernähr. Pflanze* 29, 441-3(1933).—The Neubauer values for some Upper Silesian soils are given. The analytical methods of Neubauer, Dirks and Niklas as a guide to individual fertilization of these soils gave good results. The results show a greater need for  $K_2O$  than for N or  $P_2O_5$ . John O. Hardesty

Open questions of the fertilizer consultant. F. Sekera. *Phosphorsäure* 3, 641-64(1933).—The accuracy and practical value of lab. methods for detg. the acidity and fertilizer requirements of soils are discussed. The  $pH$  values of several samples of soils in contact with the roots of living plants ranged from 4.9 to 6.0 as compared with  $pH$

values of 6.0-6.1 for samples of the same soils further removed from the plant roots. K. D. Jacob

An account of pot tests made during the year 1933. G. Demortier. *Bull. inst. agron. sta. recherches Gembloux* 2, 360-73(1933).—Special investigations on the application of N during growth showed that the yield of spring wheat is affected if the reserve of N in the soil is insufficient or if the second applications are made too late.  $MgCl_2$  and  $CaCl_2$  used against dust on roads do not prove very prejudicial to nearby plants. Under operating conditions these chemicals have to be applied at a rate of about 1000 kg. per hectare to begin to affect the yields while 3500-4000 kg. per hectare are highly toxic. J. R. Adams

Effect of individual elements on the growth and the active substances of some medicinal plants. Jan Macku. *Sborník Est. akad. zeměd. Prag A6*, 363(1931); *Phosphorsäure* 3, 767.—P was as effective as N in increasing the formation of sinapisole in *Sinapis alba*, but it had no effect on the wt. of the plants. The phosphate and  $NH_4$  ions had a superior effect in increasing the growth of *Lobelia inflata* and the production of lobeline; the K ion was detrimental. The best growth of *Carduus benedictus* was obtained by fertilizing the plants with Nitrophoska, but the highest yields of snicin were obtained with phosphate and N combinations; K compds. had an unfavorable effect on production of snicin. K. D. Jacob

Comparative investigations on the estimation of fertilizer needs of soils by the cataphoretic method of Reifenberg. B. Haritantis. *Z. Pflanzenernähr., Düngung Boden.* 32A, 348-57(1933).—Ten samples from 4 soil types were examd. for available  $P_2O_5$  and  $K_2O$  by Reifenberg's (cf. C. A. 26, 4068) cataphoretic method: a suspension of the sample in a large U tube was subjected to a current of 1.5-1.8 ma. for 2 hrs. and liquid was withdrawn from the resp. limbs of the tube for analysis. The indications were compared with those of 2 chem. procedures, Lemmermann's (cf. C. A. 14, 995) 1% citric acid extn. and von Sigmond's dil.  $HNO_3$  method for calcareous soils. In most cases, the relative values for samples from the same profile stood in the same order with all methods; this indicates that R.'s method has some value, but caution is necessary in interpreting its indications with soils differing in type. C. J. Schollenberger

Determination of fertilizer needs from root-soluble, citric acid- and water-soluble phosphoric acid. E. Knickmann. *Z. Pflanzenernähr., Düngung Boden.* 32A, 84-95(1933).—Examn. of several thousand soil samples, predominantly sandy, from the Lüneburg district by (I) Neubauer's (C. A. 18, 877) seedling method for root-sol.  $P_2O_5$ , (II) the Dirks-Scheffer (C. A. 24, 3070) procedure for  $H_2O$ -sol.  $P_2O_5$  and (III) an extn. with 1% citric acid designed to measure total available  $P_2O_5$  at min. expense, indicated the best correlation between I and III. In these comparisons, however, the frequency distribution is so wide that the significance of single detns. by III is in doubt. C. J. Schollenberger

American investigations on the placement of fertilizers for different crops. Gustav Rohde. *Ernähr. Pflanze* 29, 462 70(1933).—A review of investigations in the U. S. (cf. C. A. 27, 3769, 5462) which show that cotton, maize, potatoes and beans are better able to utilize fertilizer when it is properly placed in the row or in the hill than when it is broadcast. Thirteen references. J. O. H.

The autumn fertilization of winter crops. J. Kuhn. *Deut. Land. Presse* 59, 427(1932); *Phosphorsäure* 3, 756.—When winter rye, wheat and barley were fertilized in the autumn with complete fertilizers the plants showed good growth and resisted the cold better. Heavy applications of N fertilizers, particularly in the early autumn, may cause the plants to develop so rapidly as to be damaged by heavy snows. Expts. with Thomas slag indicated that a better utilization of the P of water-insol. phosphates can be obtained by autumn applications than by spring applications. K and P fertilizers are not leached from the soil and there is no danger of their loss by autumn application, whereas N may be lost from light soils. K. D. J.

Effect of nitrogen fertilization on the recovery of a York [apple] orchard from drought injury. R. D. An-

thony. *Penn. State Hort. Assoc. News* 10, No. 1, 20, 22-3 (1933).—Fertilization of apple trees, grown in a poorly watered orchard, with  $NaNO_3$  for 7 years at the rate of 5-15 lb. per tree annually did not increase the production of fruit, as compared with the check trees, during the season following the 1930 drought. As indicated by the increased terminal growth of the branches during 1932, N fertilization had a marked effect in promoting recovery of the trees from drought injury, the effect increasing with the amt. of  $NaNO_3$  applied. K. D. Jacob

The effect of nitrogenous fertilizers on the growth and yield of wheat and barley in South Australia. II. The effect of a previous crop on the response of wheat to nitrogenous fertilizers, and the effect of increasing amounts of nitrogen on barley. A. E. V. Richardson and H. C. Gurney. *Empire J. Exptl. Agr.* 1, 325-32 (1933); cf. C. A. 28, 556.—When wheat was grown in rotation with (1) bare-fallow, (2) wheat, (3) barley, (4) oats and (5) peas, without fertilizer or with 2 cwt. superphosphate and 1 cwt.  $(NH_4)_2SO_4$  per acre, the highest yields were obtained after (1) or after (5). A supplementary application of 1 cwt.  $(NH_4)_2SO_4$  per acre gave no significant increase with wheat after (1), but gave a substantial response after (2), (3) or (4). The percentage of N in barley grain was practically unaltered by application of 0-56 lb.  $(NH_4)_2SO_4$  per acre; application of more than 100 lb./acre materially increased the N content and reduced the quality of the grain for malting purposes. N fertilizers increased the no. of ear-bearing tillers per barley plant. K. D. Jacob

The influence of initial fertilization on the yield of winter wheat. H. Schmidt and W. Kleberger. *Das Superphosphat* 9, 74-8(1933).—Initial fertilization with superphosphate, basic slag or Rhenania phosphate and  $(NH_4)_2SO_4$  or  $CaCN_2$  in the fall was superior to early spring fertilization. When  $NaNO_3$  was used, the spring fertilization was more effective, but in general  $NaNO_3$  gave less returns than did the other N carriers. Superphosphate, Rhenania phosphate and basic slag gave yields in the ratio of 100:100:98, resp., when used with  $(NH_4)_2SO_4$ , 99:98:97 with  $CaCN_2$ , and 99:99:98 with  $NaNO_3$ . With a 40% K salt the crop netted a return in the ratio 57:50:44 for fall fertilization and 45:37:26 for spring fertilization. K. C. Beeson

Experiments with commercial fertilizers on cereals Gyula Surányi. *Köztelek* 41, 855, 965(1931); *Phosphorsäure* 3, 639.—Comparative expts. were carried out with superphosphate and Rhenania phosphate, as acid- and alk.-reacting fertilizers, resp. In general, Rhenania phosphate, either alone or in combination with K and N fertilizers, gave better results than superphosphate when the 2 materials were used under the same conditions. Detn. of the P requirements of the soils by the Christensen-Niklas method gave results that agreed with those of field expts. in approx. 67% of the cases. K. D. Jacob

Effect of fertilizing with commercial fertilizers on the development of clover varieties. Ö. Villax. *Köztelek* 42, 94(1932); *Phosphorsäure* 3, 766; cf. C. A. 26, 5373.—Pot expts. were carried out with lucerne, red clover and sainfoin grown in a poor Ca-contg. pit-sand, a rich Ca-contg. loam and a Ca-deficient peat soil. In all soils, P fertilizers, especially in conjunction with K fertilizers, increased the growth of the plants, the increase being very pronounced in many cases. Likewise, P and P-K fertilizers greatly increased the root development of the plants and the growth of root nodules. Addn. of N compds. to the P-K fertilizers slightly increased the growth of the plants, but usually reduced the favorable effects of P and K on the roots. K. D. Jacob

Fertilizer experiments in the flax-producing "sovkhoz" (Soviet State Farm) "Bogatuir." A. M. Sveshnikov, P. A. Korzhagin and V. S. Pavlenkov. *Chemisation Socialistic Agr.* No. 11-12, 53-65(1932).—Expts. are reported on the effects of fertilizers on flax, oats, potatoes, sunflowers and rye in a no. of podzol subtypes. It is pointed out that complete fertilizers are very effective on these crops and as to the flax the effects are also noticed on the quality of the fiber. Simultaneously with the increase

in yield and quality of fiber the fertilizer addn. increased the no. of weeds.

**Problems on the fertilizing of fruit in England.** G. A. Cowie. *Ernähr. Pflanze* 29, 379-81(1933); cf. C. A. 25, 5912.— $K_2O$  deficiency occurs in most all of the fruit-growing districts, especially on light soils, badly weathered soils and heavy damp soils. Soils with a high lime content promote chlorosis in growing fruit. A summary is given of past work on fertilizer problems respecting fruit.

John O. Hardesty

**Method of fertilizer application for canning peas.** F. L. Muslach. *J. Am. Soc. Agron.* 26, 70-4(1934).—Better yields are generally secured on silt loams under normal moisture conditions by drilling as compared with broadcasting fertilizers. On light sandy soils losses due to germination injury are more likely where fertilizers are drilled in the row. Under normal conditions in Wisconsin it is safe to drill with the seed 250-300 lb. of 20% superphosphate and approx. the same amt. of a complete fertilizer relatively low in N, such as 2-12-6 or 2-16-8. This results in increased vigor of plants, better filling of pods and a hastening of maturity.

J. R. Adams

**Experiments with yams in Trinidad, 1931-3.** R. Cecil Wood. *Empire J. Exptl. Agr.* 1, 316-24(1933).—Increased yields of yams were obtained by fertilizing with composts prep'd. from chopped corn stalks, ground limestone,  $(NH_4)_2SO_4$  and superphosphate. Undecomposed org. matter was ineffective.

K. D. Jacob

**Fertilizer and manure for corn.** C. A. Mooers. *Tenn. Agr. Expt. Sta., Bull.* 149, 3-15(1933).—Field trials show the application of  $NaNO_3$  and  $(NH_4)_2SO_4$  is most beneficial when made at the time the corn plant is from a few in. to 1 ft. high. Inorg. sources of N gave much greater crop responses and yields than org. sources of N on soils well supplied with P and K but deficient in N. All the field tests showed K was not required on any of the soils used in the field expts. On soils deficient in P, the addn. of 200 lb. of superphosphate per acre gave uniform and profitable increases in yield.

C. R. Fellers

**The fertilizing of sugar cane.** H. H. Dodds. *Empire J. Exptl. Agr.* 1, 368-80(1933).—A review. Thirty references.

K. D. Jacob

**The fertilizing of tea.** T. Eden. *Empire J. Exptl. Agr.* 1, 297-300(1933).—A review of investigations on the effects of N, P and K fertilizers on the yield and quality of tea. Twenty-one references.

K. D. Jacob

**The effect of fertilizers on the ripening of the embryo of brewing barley.** Ottokar Heinisch. *Z. Pflanzenernähr. Düngung Bodenkd.* 12B, 503-24(1933).—Field expts. in Czechoslovakia with various fertilizer combinations for barley varieties on fine sandy loam,  $pH$  8.1, indicated that varietal and seasonal differences are more important with respect to germ development than fertilization. In all tests, completely fertilized plots matured first; lack of  $P_2O_5$  had the greatest influence in delaying maturity. Extensive review with 64 references.

C. J. S.

**Investigation of a new calcium cyanamide: "Peril-Kalkstickstoff."** Ludwig Schmitt. *Deut. Landw. Presse* 60, 77(1933).—Expts. on an acid sandy soil,  $pH$  4.06, and a loam,  $pH$  6.81, showed that a granulated  $CaCN_2$ , "Peril-Kalkstickstoff," was somewhat superior to powd.  $CaCN_2$  in both cases, although the initial action of the granulated product on the acid soil was slower. This was due to the more rapid neutralization of the soil acidity by the powd.  $CaCN_2$ , although  $pH$  measurements showed that as good final neutralization was obtained with the granulated product as with the powder.

K. C. Beeson

**Comparative experiments with various nitrogen fertilizers (lime ammonium nitrate and ammonium sulfate) for stock beets.** O. Engels. *Z. Pflanzenernähr., Düngung Bodenkd.* 12B, 499-502(1933).—Lime ammonium nitrate produced by I. G. Farbenindustrie contains 20.5% N as  $NH_4NO_3$  and 35%  $CaCO_3$ , formed into small spherules and dyed green. Field expts. with yellow Eckendorfer beets indicated that it is slightly superior to  $(NH_4)_2SO_4$  as a source of N, as measured by yields of beets, tops and dry matter per acre, although the sugar content of beets grown

with this fertilizer was lower than on any other plot.

C. J. Schollenberger

**Vegetation investigation with oats to clear the question of the replaceability of potassium by rubidium.** E. Blanck, F. Giesecke and W. Henkeshoven. *J. Landw.* 81, 205-21(1933).—The utilization of essential  $K_2O$  by the plant is hindered by the poisonous effect of  $Rb_2O$ .

Irvin C. Brown

**Sand and water culture experiments with lithium and rubidium with special reference to the possibility of substituting these elements for potassium in plant nutrition.** K. Scharrer and W. Schropp. *Ernähr. Pflanze* 29, 413-25(1933).—Wheat, rye, barley and oats decrease in sensitivity to the Li ion in the order named. Exptl. results on peas, buckwheat, mustard, red clover, lucern and perennial rye grass showed that the substitution of equiv. quantities of Li for K resulted in decreased yields, and the plants died as soon as the K had been completely replaced by Li. Gradually substitution Rb for  $K_2O$  in fertilizer applied to maize and spring barley resulted in a gradual decrease of yields to zero. Thirty-one references.

John O. Hardesty

**The possibility of the substitution of rubidium and cesium for potassium in plant nutrition.** F. Alten and R. Gottwick. *Ernähr. Pflanze* 29, 393-9(1933).—A gradual substitution of Rb for K in normal complete fertilizers used on oats in pot tests decreased the yield and was harmful to grain formation. Chem. analyses of the grain and straw showed that the use of Rb instead of K caused little difference in the total amt. of cations present. Rb displaces K in the grain and decreases the N, Ca and Mg contents of the straw. The leaf of tobacco plants receiving K showed an increased content of  $K_2O$  and a corresponding decrease in the remaining cations. Plants receiving Rb showed a reduced content of K, Na and Ca and an increase in Mg. Cs and Rb in  $H_2O$  cultures of maize retarded growth and caused premature curling of the roots. The greater toxicity of Cs confirms the lyotropic series of Höber ( $Li < Na < K < Rb < Cs$ ). Twelve references.

John O. Hardesty

**The influence of increasing applications of potash on the potash content of soil and plant.** Werner Wöhlbier and W. Schramm. *Ernähr. Pflanze* 29, 437-41(1933).— $K_2O$  fertilizer, applied to acid soils which were deficient in  $K_2O$  according to Neubauer analysis, resulted in decreased starch content and yield of potatoes. Pot expts. with oats on these  $K_2O$ -deficient soils from Rostock, Mirow and Kotzou showed that all of the  $K_2O$  applied as fertilizer was utilized by the plant except where high applications were made. Analyses of the soils after the removal of the plants with the roots showed that, with the exception of those receiving high application of  $K_2O$ , the total amt. of  $K_2O$  was the same in all soils as was also the degree of soly. of the  $K_2O$ . These soils do not absorb  $K_2O$  readily. Applications of KCl were largely retained by these soils.

John O. Hardesty

**The replaceable potassium content compared with field response to potash fertilization of some Oklahoma soils.** H. F. Murphy. *J. Am. Soc. Agron.* 26, 34-7(1934).—Oklahoma soils contg. less than 60 p. p. m. of replaceable K generally respond to  $K_2O$  fertilization if other factors are favorable for plant growth. Cropped soils contained less replaceable K than virgin soils. The replaceable K content of a fertilized soil was much higher than that of the corresponding soil which had never received any fertilizer applications.

J. R. Adams

**The root system of Coffea arabica. II. The effect of some soil conditions in modifying the "normal" root system.** F. J. Nutman. *Empire J. Exptl. Agr.* 1, 285-96(1933).—A neutral or slightly acid soil is the most favorable to the root growth of coffee. In general, good root growth is not obtained in soils more acid than approx.  $pH$  5.8-6.0.

K. D. Jacob

**Effect of certain cropping systems on the yield and quality of Havana tobacco.** A. B. Beaumont, M. E. Snell and E. B. Holland. *Mass. Agr. Expt. Sta., Bull.* 297, 3-27(1933).—Continuous culture of tobacco increased



soil acidity. The use of a rotation, cover crop or manure with tobacco, stabilized soil reaction. C. R. Fellers

**How much magnesia should be applied to tobacco land?** T. R. Swanback, O. E. Street and P. J. Anderson. Conn. Agr. Expt. Sta., *Bull.* 350, 466-73 (1933).—The optimum content of Mg in tobacco is 1.5-2% of the moisture-free wt. of the cured leaf. When the percentage is less, the combustion is incomplete and a dark ash accompanied by a less desirable taste and aroma results. If the Mg is above 2.5%, the ash is whiter but is undesirable in that it flakes too much. Application of 100 lb. per acre of magnesian limestone (MgO content 30%) was the optimum. Overliming of tobacco soils result in increased black root-rot.

C. R. Fellers

**Relation of calcium to the growth of tobacco.** T. R. Swanback, O. E. Street and P. J. Anderson. Conn. Agr. Expt. Sta., *Bull.* 350, 473-8 (1933); cf. *C. A.* 27, 3740.—Three functions of Ca in the tobacco are: (1) it neutralizes oxalic and other acids produced within the plant or taken from the soil in surplus quantity; (2) as Ca pectate it is an essential constituent of the cell walls; and (3) Ca serves as a vehicle in the translocation of nitrate and probably other anions. Approx. 5% CaO in the air-dry tobacco leaf corresponds to optimal growth of the plant. The higher the Ca content of the leaf, the lower will be the content of K and Mg. Probably Na and  $\text{NH}_4$  have a somewhat depressing effect on the absorption of Ca by the tobacco plant. The availability of Ca compds. for tobacco varied considerably and was in the order of decreasing availability: nitrate, sulfate, oxide, acetate, carbonate, oxalate, monophosphate, tartrate, triphosphate and citrate. In general, approx. 4 times as much Ca as Mg is required for optimal growth. There is a possibility that an insufficient absorption of Ca by the plant may be the ultimate cause of *brown root-rot* of tobacco. Poor absorption may be due, not to low Ca in the soil, but to an improper balance of bases. The addn. of  $\text{CaSO}_4$  at the rate of 300 lb. per acre restored normal growth to tobacco. Other good sources of Ca are cottonhull ashes and  $\text{Ca}(\text{NO}_3)_2$ . Great care is necessary that excessive available Ca is not added to soil or a reaction favorable to black root-rot development occurs.

C. R. Fellers

**Sudan grass as hay, silage and pasture for dairy cattle.** J. R. Dawson, R. R. Graves and A. G. Van Horn. U. S. Dept. Agr., *Tech. Bull.* 352, 1-28 (1933).—Data are presented giving the results of 3 yrs. expts. at the Woodward, Okla., Dairy Expt. Station on the yield, chem. compn., and comparative feeding value for milk production of Sudan-grass hay cut at 4 different stages of maturity. The chem. compn. of the hay, in general, is closely related to maturity of the plants when cut and to a certain extent follows the no. of days of growth. As the no. of days of growth increase, the percentages of crude fiber and of N-free ext. also increase; but the percentages of protein and of fat decrease. The highest yield of protein per acre is obtained when the hay is cut at the first-heads-out stage. The equiv. of 33% more nutrients is secured per acre in the form of Sudan-grass hay cut at the first-heads-out stage than from Sudan grass when grazed.

W. H. Ross

**Chemical composition of herbage from Massachusetts pastures.** J. G. Archibald and Emmett Bennett. Mass. Agr. Expt. Sta., *Bull.* 300, 2-7 (1933).—Analyses on approx. 100 samples of pasture herbage from western Mass. showed that moisture, protein and P decreased from spring to autumn, while fiber and Ca increased. There is a very definite relation between moisture content of the grass and its content of protein and P. In general, the soils were low in available P and had a  $pH$  range from 5.1 to 6. Low-P content of the soil and low-quality herbage seem to be correlated factors. P-deficient soils result in crops contg. low P, and in turn a P deficiency in farm animals.

C. R. Fellers

**Disinfectants and disinfection.** F. B. Hadley and E. C. McCulloch. Wis. Agr. Expt. Sta., *Extension Circ.* 256, 3-12 (1933).—General.

C. R. Fellers

**Tests of soil disinfectants.** C. A. Jørgensen. *Tids. for Plantavl.* 39, 316-28 (1933); *Rev. Applied Mycol.* 12,

709-10.—*Pythium de Baryanum* on cauliflower was completely controlled by Carbololie (oil) 1 and 11, Germisan, Kerol, Koefod-Johnsen's soil sterilizer, phenol, formalin, and heating the soil 2-3 hrs. at 90-5°. Excellent control of *Rhizoctonia (Corticium) solani* on cucumbers was obtained by Uspulun,  $\text{HgCl}_2$  plus salt-peter, and by heating as above. Phenol, formalin, Uspulun and sterilization by heat entirely eliminated *Plasmodiophora brassicae* on swedes. Generally speaking the results show no superiority for the patent preps. as compared with pure chemicals or sterilization by heat.

O. E. S.

**Petroleum products as spray spreaders.** Hubert Martin. *J. Soc. Chem. Ind.* 52, 429-32T (1933); cf. *C. A.* 27, 5464.—Miscellaneous petroleum products were examd. as to their suitability for use as spray spreaders. They have been classified according to the method of Pilat, *et al.* (*C. A.* 27, 2287). Crude Ca  $\gamma$ -sulfonates have excellent spreading properties unaffected by mineral acids or by any insecticidal or fungicidal spray material now in practical use. Both the crude Na  $\beta$ -sulfonates and alkali naphthenates possess excellent spreading properties but are ineffective in the presence of excess CaO or  $\text{CuSO}_4$ . The Na  $\beta$ -sulfonates may be more suitable than fatty acid or resin soaps for the prepn. of miscible oils. Crude naphthenic acids, by reason of the phytocidal properties of the crude oil present, are unsuitable for the prepn. of spray spreaders. Products of the sulfonation of oxidized petroleum oils contain emulsifying agents with promising spreading properties unaffected by the addn. of  $\text{CuSO}_4$  or of insecticides or fungicides contg. CaO. Ichthammol, a pharmaceutical prep., has spreading properties unaffected by sol. Ca or Cu compds.

**Facts concerning the spray-residue problem pertinent to the fruit vegetable industries.** Alvin J. Cox. Calif. Dept. Agr., *Monthly Bull.* 22, 389-96 (1933).—In order to come within the U. S. tolerances for As and Pb, 0.01 and 0.02 grain per lb., resp., of fruit or vegetable, many Calif. crops must be subjected to HCl or other spray-removal treatment. The spray residue remaining from a Pb arsenate-oil spray is much more difficult to remove than plain Pb arsenate. The As:Pb ratio in acid-washed Calif. fruit does not exceed 1:2.5. However, soda ash or alk washes remove less Pb than As, the ratio being as wide as 1:5 or 1:7. The F tolerance is also 0.01 grain per lb. Fluorides are readily removed by washing fruits and vegetables. It is recommended that produce such as celery be examd. and certified as within the As and Pb tolerance at the shipping point.

C. R. Fellers

**The future of spray-residue removal [from apples] in Pennsylvania.** H. G. Ingerson. *Penn. State Hort. Assoc. News* 9, No. 1, 37-44, 46-9 (1932).—Heavy rains in late August and early Sept. cause no significant reduction in the amt. of As adhering to apples sprayed with Pb arsenate. The smooth-skinned varieties of apples retain less As than the rough-skinned varieties. Addn. of lime to Pb arsenate sprays facilitates removal of the As; removal is more difficult when casein spreaders are used, and is still more difficult in Pb arsenate combinations with oils or oil soaps.

K. D. Jacob

**Regulatory control of wetting agents used in agriculture.** J. Vinas. *Ann. fals.* 26, 517-28 (1933).—The value of wetting agents is due to their power to reduce surface tension. Various methods of detg. the surface tension of liquids are outlined and discussed from the standpoint of their value for evaluating wetting agents used in conjunction with agr. sprays.

A. Papineau-Couture

**Fineness and chloride content of dusting kainite and its influence upon the results in combating weeds.** C. Husemann. *Z. Pflanzenernähr., Düngung Bodenb.* 12B, 468-72 (1933).—Three lots of kainite with 63, 32 and 54%, resp., of the material as used passing a sieve with 0.2 mm. square mesh by shaking only were compared as to effectiveness against sheepsorrel and other weeds when dusted at the rate of 400 lb./acre. It was concluded that with increase in fineness according to the above test, there is a decrease in tendency to form aggregates and an increase in Cl content, with increased herbicidal effect. A high



percentage of fine material in kainite indicates low  $H_2O$  and absence of much hygroscopic impurity. C. J. S.

**The control of powdery mildew in snap beans.** H. T. Cook. *Trans. Peninsula Hort. Soc.* 22, 5, 4 pp.(1932); *Rev. Applied Mycol.* 12, 673.—Of 11 fungicides tested for their efficacy against powdery mildew of snap beans Kolodust, lime-sulfur dust and dry lime-sulfur spray gave the most satisfactory results. For practical purposes dry lime-sulfur spray should prove generally effective if applied 3 or 4 times beginning soon after the appearance of the disease. Oden F. Sheppard

**The leaf spot disease of soy beans—a potash-deficiency phenomenon.** Arnold Kornfeld. *Z. Pflanzenernähr., Düngung Bodenk.* 32A, 201-21(1933).—Soy-beans grown in the Siebenbürgen district of Roumania are subject to abnormalities such as irregular yellow to brown spots on the leaves, delayed maturity, tendency to chlorosis and fall of leaves with inferior yields and quality. Analyses of the ash of various parts of the abnormal plants indicated only 70-80% of the usual  $K_2O$  content. Pot expts. with  $K_2O$  fertilizers resulted in normal appearance and growth, and also improved the germination of seed from plants adequately fertilized, as compared with those grown on unfertilized soil and suffering from the above symptoms of  $K_2O$  starvation. C. J. Schollenberger

**Copper seed treatments for the control of damping-off of spinach.** P. P. Pirone, A. G. Newhall, W. W. Stuart, J. G. Horsfall and A. L. Harrison. N. Y. (Cornell) Agr. Expt. Sta., *Bull.* 566, 3-25(1933).—Damping-off disease, caused by *Pythium ultimum*, was effectively controlled in both field and greenhouse by treating the seed with a 1% soln. of  $CuSO_4$ . Equally effective was the method of dusting the seed with  $Cu_2O$  dust, in which 1 lb. of powder was used to 65 lb. of seed. The cost of treating 20 lb. of seed, sufficient to plant 1 acre, does not exceed 25¢. The av. yield increase in field tests of seed-treated plots over controls was approx. 2 tons per acre. C. R. Fellers

**Cottony cushion scale in Puerto Rico.** George N. Wolcott. *J. Puerto Rico Dept. Agr.* 17, 193-221(1933).—Cottony cushion scale caused by *Icerya purchasi* is becoming widely dispersed in P. R. and is very destructive to citrus and other crops. During dry weather almost perfect control is obtained by spraying with a standard emulsion of heavy engine oil, fish oil and soap of which 60 lbs. oil is the stabilizer. C. R. Fellers

**The present status of the potato-scab question.** Floess. *Phosphorsäure* 3, 726-34(1933).—Scab occurs most frequently on potatoes grown in light porous soils; it develops most readily in alk. soils, and physiologically acid fertilizers should be used on such soils. The possibility of the development of scab is not always directly related to the  $pH$  of the soil because of differences in the buffering powers of different soils. The application of a sufficient amt. of Ca-contg. material is necessary to obtain the most efficient utilization of fertilizer (particularly N) and the max. yield of potatoes on acid soils; this does not necessarily favor the incidence of scab. Green manures and stable manure act as scab preventatives, whereas feces and hog manure from fattening establishments favor its development. K. D. Jacob

**Effect of mosaic on the tonnage and the juice of sugar cane in Pusa.** III. W. McRae. *Indian J. Agr. Sci.* 3, 870-80(1933); cf. C. A. 27, 803.—As compared with healthy cane, mosaic-infected cane gave a smaller yield of juice contg. a slightly lower percentage of glucose. The effect on sucrose and juice purity was not statistically significant. K. D. Jacob

**Notes on the biology of *Certostomella ulmi* (Schwarz) Buisman, the agent of the Dutch elm disease.** M. Boudru. *Bull. inst. agron. sta. recherches Gembloux* 2, 310-43(1933).—*C. ulmi* grows with difficulty in liquid media. The most suitable growing conditions seem to correspond to  $pH$  values ranging from 3.2 to 4.4. The influence of  $pH$  values on the growth is scarcely noticeable between  $pH$  4.4 and 7.4. The behavior of *C. ulmi* according to the initial acidity of the medium seems to imply the existence of 2 biol. states, each possessing a particular isometabolic point. *C. ulmi* is plainly acidifying and does not reduce

oxidized dyes. It has, in the whole, very small nutrient needs and possesses a large power of adaptability. Solns. of  $HgCl_2$  and  $NiSO_4$  at concns. of 1/2000 showed relatively poor action as fungicides on *C. ulmi* while Janus green, aniline green and brilliant green at concns. of 1/250,000; quinosol and Et Hg chloride at 1/1,000,000; and Sunoxol and malachite green at 1/2,000,000 were remarkably effective. J. R. Adams

**Life history, bionomics and control of the white fly of cotton (*Bemisia gossypiperda* M. & L.).** M. Afzal Husain and Kidar Nath Trehan. *Indian J. Agr. Sci.* 3, 701-53(1933).—Attack of the insect on cotton seemed to be favored to a slight extent by the use of N fertilizers, the infestation being heaviest on plots receiving farmyard manure and lightest on those receiving  $NaNO_3$ . The condition of the plants and the opening of the bolls were improved by spraying with a mixt. of rosin compd. and fish-oil soap. K. D. Jacob

**Report and investigations on the beet-fly.** R. Mayné and W. van den Bruel. *Bull. inst. agron. sta. recherches Gembloux* 2, 273-307(1933).—Treatment with NaF on the first generation was successful in destroying the flies when weather conditions were favorable. Lab. tests on the efficiency of various poisons showed that the best concn. of poison in the bait with 2% sugar was 0.4% NaF or 0.2-0.3%  $NaSiF_6$ .  $BaSiF_6$  gave some good results but its action was much slower than that of NaF or  $Na_2SiF_6$ . Artificial cryolite acted much too slow and gave poor results. It was found that when solns. were used it was best to spray during the middle of the day. Climatic conditions had an important bearing on the destruction of these flies. J. R. Adams

**Fumigation experiments on Messinian fig trees.** S. Kalogerca. *Praktika (Akad. Athenon)* 7, 72-5(1932).—Comparative results are tabulated to show the varying success of  $SO_2$ ,  $CO_2$ ,  $C_2H_5Cl_2$  +  $CCl_4$  and  $CS_2$  +  $CO_2$  as fumigating agents upon fig trees. Exposures varied from 1 to 24 hrs. at temps. from 21° to 30°. Equal parts of  $CS_2$  +  $CO_2$  for 8 hrs. produced complete sterilization. Lucien Y. Dyrenforth

**Pyrethrum controls cabbage worms.** Ray Hutson. Mich. Agr. Expt. Sta., *Quart. Bull.* 16, 100-1(1933).—Carefully applied pyrethrum spray or dust gives good control of cabbage worms. The pyrethrum should be mixed with an inert carrier such as talc, bentonite or flour in the ratio of 1 to 2, and applied at the rate of 25-30 lb. of the mixt. per acre. C. R. Fellers

**Damage caused by bean worms and some important problems connected with their control.** H. K. Plank. Calif. Dept. Agr., *Monthly Bull.* 22, 365-78(1933).—Since the bean plant is very susceptible to As or S injury great care must be used in spraying this plant. Even moderate rates of application resulted in a concn. of 0.11 grain of  $As_2O_3$  per lb. on the bean straw and moderately severe injury to the growing beans. Arsenic sprays are not recommended for beans. Ba fluosilicate applied at the rate of 8 lb. per acre gave fairly good control of bean insects. C. R. Fellers

**Recent experiments in the control of two Puerto Rican ants.** Geo. N. Wolcott. *J. Puerto Rico Dept. Agr.* 17, 223-39(1933).—Hormiga brava, *Solenopsis geminata*, out-of-doors can be only imperfectly controlled by spraying citrus groves and plantings with a phenol-kerosene emulsion. TI compds. proved ineffective out-of-doors, but indoors a  $Tl_2(SO_4)_2$  sirup gave complete control. Against the hormiguilla, *Myrmelachista ambigua ramulorum*, a bait of ground meat and  $TlCl_3 \cdot H_2O$ , gave very good control. C. R. Fellers

**Inhibition of selenium injury to wheat plants by sulfur.** Annie M. Hurd-Karrer. *Science* 78, 500(1933).—The addn. of 15 p. p. m. of Se to soil causes young wheat plants to become extensively chlorotic, but the simultaneous addn. of large amts. of S or sulfate prevented the effect. With a S:Se ratio of 12 the plants were completely uninjured; with a ratio of 8 chlorosis began to appear, and with a ratio of 2 growth was largely inhibited. The absorbed Se thus probably replaces, or may be replaced by, S in org. compds. in the plants. K. V. Thimann

Detn. of nitrate in soils (Treschow, Gabrielsen) 7. Utilization of the by-products of sewage disposal [as fertilizer] (Rumsey) 14. Phosphoric acid [fertilizers] and baking quality (Lemmerzahn) 12. Colorimetric detn. of K (Alten, *et al.*) 7. Detergents [products used in manuf. of insecticides and fungicides] (Brit. pat. 398,818) 18. Bipyridyls [products useful for destroying pests] (Ger. pat. 588,041) 18.

**Fertilizer.** Willy Bissner (to I. G. Farbenind. A.-G.). U. S. 1,939,165, Dec. 12. A fertilizer suitable for storage and which can be readily scattered comprises a homogeneous salt contg. about 3 and 1 mol. proportions of  $\text{NH}_4\text{NO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$ , resp. Cf. C. A. 28, 562<sup>9</sup>.

**Fertilizer.** Curtis B. Locklin. U. S. 1,939,858, Dec. 19. A satd. brine contg. a K salt is treated with small proportions of sulfates and carbonates of K and Na; the percentage of K present is detd. for the purpose of properly adjusting the proportions in the eventual product and a definite amount of assayed phosphatic material in ground form is added to the soln. and the resulting mixt. is calcined.

**Fertilizer.** Michael Ward (50% to Howard R. Morrison). U. S. 1,941,371, Dec. 26. Earth is passed through smoke to impregnate it with carbon contained in the smoke and is then placed on the ground as an enriching agent. App. is described.

**Fertilizers.** La Soc. d'études pour la fabrication et l'emploi des engrais chim. (Robert Platt, inventor). Ger. 588,140, Nov. 13, 1933 (Cl. 16.5). See Fr. 676,747 (C. A. 24, 3077).

**Fertilizer.** Emil Neufeldt. Ger. 585,725, Oct. 9, 1933. A fertilizer is obtained by pressing defecation slime dried by flue or furnace gases. App. is described.

**Fertilizer composition.** Audrey Hill. U. S. 1,939,850, Dec. 19. A mixt. comprising ground cast iron, steel and Fe ore is maintained at a temp. of about 43° and is moistened with water for 2-4 weeks and the resulting mass is mixed with about 5% of metallic Ca.

**Fertilizers from organic refuse.** Chem. Werke vorm. H. & E. Albert. Ger. 586,743, Oct. 25, 1933 (Cl. 16.14). Addn. to 573,036 (C. A. 27, 3026). The method of Ger. 573,036 is modified by effecting the treatment with  $\text{H}_2\text{PO}_4$  in the presence of a nonpoisonous oxidizing agent, e. g.,  $\text{K}_2\text{O}_2$ ,  $\text{Al}(\text{NO}_3)_3$  or  $\text{KClO}_3$ .

**Treating putrifiable organic wastes.** George H. Earp-Thomas. U. S. 1,938,647, Dec. 12. For rendering inoffensive wastes such as wet garbage, the material is inoculated with thermophile aerobic bacteria such as soil bacteria and aerated and agitated while its bacterial decompn. is effected under controlled temp. and the product is dried and may be mixed with various other fertilizer ingredients.

**Insecticide.** Bruno Rewald (to Hanscatische Mühlenwerke A.-G.). U. S. 1,938,864, Dec. 12. The Cu salt of lecithin is used (suitably together with oil, water, etc.) in insecticides suitable for spraying plants.

**Insecticide.** Henry L. Renard. U. S. 1,941,055, Dec. 26. Finely divided naphthalene and tobacco dust are used together so that the particles of naphthalene are impregnated with a portion of the nicotine content of the tobacco and the tobacco particles are impregnated to some extent with naphthalene. This compn. is suitable for use on the ground around plants.

**Insecticides** I. G. Farbenind. A.-G. Fr. 754,735, Nov. 13, 1933. Esters of carboxylic acids of a cyanohydrin are used along with a solid or liquid dispersing agent as insecticides. The esters are prepd. by causing a cyanide soln. to act on a mixt. of an unsatd. aliphatic aldehyde and an aryl halide or a substitution product thereof. Examples are given of the prepn. of the acetic ester of cyclohexanone- ( $b_{11}$  118°) and crotonaldehydecyanohydrin

( $b_{11}$  85-7°), the benzoic ester of crotonaldehyde- ( $b_{11}$  159-60°), sorbicaldehyde- ( $b_{11}$  158-9°), acrolein- ( $b_{11}$  138-40°) and  $\alpha$ -ethyl- $\beta$ -propylacrolein-cyanohydrin ( $b_{11}$  156-8°), the 2,5-dichlorobenzoyl ester, ( $b_{11}$  145-6°, m. 47°), and the naphthoic ester of crotonaldehyde-cyanohydrin ( $b_{11}$  180-2°).

**Insecticide compositions.** Imperial Chemical Industries Ltd. Fr. 754,477, Nov. 8, 1933. Compns. having properties analogous to soaps are made by causing nicotine or tobacco oil bases or their salts to react with an inorg. ester of a long-chain aliphatic alc. to give a quaternary  $\text{NH}_4$  salt or a mixt. contg. quaternary  $\text{NH}_4$  salts. Thus, a compd. may be obtained by heating nicotine-HCl with dodecyl bromide.

**Insecticidal compositions.** Heinrich Hess. Austrian 135,144, Oct. 25, 1933 (Cl. 45g.). Use is made of a mixt. of an insecticide and a chloroethylene, with or without a solvent. A suitable compn. comprises a 2% soln. of PhOH in  $\text{C}_2\text{H}_5\text{Cl}$ , or a mixt. of aq.  $\text{CH}_2\text{O}_2$ , MeOH 10 and  $\text{C}_2\text{HCl}_3$  100 parts by vol.

**Insecticide or insect repellent.** Dudley H. Grant (to Standard Oil Development Co.). U. S. 1,940,646, Dec. 19. A compn. suitable for use with water as a spray contains an insecticidal oleoresin of pyrethrum or the like and an oil-sol. alkali metal salt of sulfonic acid material derived from petroleum and may also contain soap, derris ext., etc.

**Insecticidal powder suitable for dusting on plants.** Amos E. Badertscher (to McCormick & Co.). U. S. 1,940,899, Dec. 26. A finely divided non-alk. inert material such as talc or bentonite is sprayed with a soln. of the active principle of pyrethrum in a volatile solvent such as a light petroleum distillate and the solvent is evapd. while agitating the material at a suitable evap. temp.

**Insecticide and fungicide.** August Maier. Ger. 581,926, Oct. 27, 1933 (Cl. 45f. 3.03). Use is made of a soln. of naphthalene in  $\text{CS}_2$  and oil soap for irrigating plants.

**Apparatus for mixing mineral oil or other film-forming germicide or fungicide with water and vaporizing the mixture for spraying plants.** Benjamin Clayton, Walter B. Kerrick and Henry M. Stadt. Brit. 397,837, Aug. 23, 1933.

**Fungicides.** Imperial Chemical Industries Ltd. Fr. 754,414, Nov. 7, 1933. Fungicides are made by causing an alkali salt of a salicylic arylamide, their homologs or substitution products to react with a heavy metal compd., e. g.,  $\text{HgCl}_2$ ,  $\text{Pb}(\text{NO}_3)_2$ ,  $\text{CuSO}_4$  or  $\text{ZnCl}_2$ , is caused to react with salicylanilide.

**Disinfectants for seeds.** Guy H. Buchanan and Wm. Moore (to American Cyanamid Co.). U. S. 1,939,951, Dec. 19. An org. dithiophosphate such as Ph, Zn or Pb diethyl dithiophosphate is used with various other active agents and a diluent such as talc.

**Seed disinfectant.** Morris S. Kharasch (to E. I. du Pont de Nemours & Co.). U. S. 1,938,839, Dec. 12. Disinfectants in dust form are prepd. contg. Hg compds. of the general formula  $\text{RHgX}$ , in which R is an org. hydrocarbon radical (such as Me, Et, Pr, Bu or Ph) and X is a cyanide, thiocyanate, phosphate, borate, tetraborate, nitrate, oxalate, benzoate or lactate radical.

**Horticultural spray.** Amos E. Badertscher (to McCormick & Co.). U. S. 1,938,652, Dec. 12. Pine oil and an insecticide such as a kerosene ext. of pyrethrum is used with a sufficient addn. of dipentene substantially to negative the tendency of the pine oil to burn foliage. The compn. may be used in the form of an aq. soap emulsion.

**Treating plants with copper sulfate.** Augustin I. F. R. Joué-Delmas. Fr. 754,965, Nov. 17, 1933. The pressure necessary for the functioning of the app. is obtained by dissolving  $\text{NaHCO}_3$  and K alum in the  $\text{CuSO}_4$  soln so as to obtain a liberation of  $\text{CO}_2$ .

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

Report of the laboratories of the experimental station for grain distilleries and fermentation industries. G. Staiger. *Brennerei-Ztg.* 50, 22(1933).—Analytical results (moisture, alc. yield and diastase) were detd. on 20 kiln-dried distillery malts, 4 green malts and a product sold as malt substitute. Results are tabulated and discussed. S. Józsa

Report from the laboratories of the experimental station for grain distilleries. G. Staiger and M. Glaubitz. *Brennerei-Ztg.* 50, 127(1933).—Twenty mashes of various grains were analyzed (acidity, apparent attenuation, diastase, degree of grinding, starch; alc., alc. after completed fermentation, condition of yeast and bacteria). The results are tabulated. S. Józsa

Absolute alcohol by the new gypsum process of the I. G. Farbenindustrie. Erich Opfermann. *Papier-Fabr.* 31, Tech. wiss.-Teil 533-5(1933).—Operation of a pilot plant producing 60 l./hr. of 99.8% EtOH by the process of Ger. pat. 537,612 (C. A. 26, 1296) and 573,539 (C. 1, 27, 4240) is described. R. H. Doughty

Determination of the higher alcohols (fusel oil determination). B. Bleyer, W. Diehmair and E. Frank. *Z. Untersuch. Lebensm.* 66, 389-95(1933).—Different aldehydes were investigated for their usefulness in the colorimetric detn. of higher alcs. (Komarowsky reaction) and their method of working compared with salicylaldehyde, which is almost exclusively used. The authors believe that *p*-diaminobenzaldehyde gives more exact results than salicylaldehyde. The mechanism of the Komarowsky reaction is discussed, and it is shown that the previously given explanation must be corrected. F. L. Dunlap

The identification of sorbitol in the presence of dulcin and saccharin. G. Reif. *Z. Untersuch. Lebensm.* 66, 408-12(1933).—By the action of BzH and H<sub>2</sub>SO<sub>4</sub> (1:1) on dulcin a red color, benzaldulcin, is produced. Benzaldulcin gives on acetylation a cryst. Ac compd. By the action of aq. H<sub>2</sub>SO<sub>4</sub> and acetone on benzaldulcin a yellow-red color is produced with the setting free of BzH. As dulcin gives the same reactions as sorbitol, it must, when it has been added to a wine, be removed before testing for sorbitol. For the removal of dulcin from wine, no special precautions are necessary, as it is completely adsorbed when present by the C used in the Werder sorbitol detn. Saccharin acts quite differently from dulcin toward H<sub>2</sub>SO<sub>4</sub> (1:1) and BzH in the identification of sorbitol. No benzal compd. is formed. The presence of saccharin does not destroy the sorbitol detn., because it is removed during the analysis by the acetylating process, and it gives no color with H<sub>2</sub>SO<sub>4</sub> and acetone. Saccharin is also completely adsorbed by the C from wine. F. L. D.

A study of the use of wheat in fermentation. Pei-Sung King. *Chem. Ind. (China)* 8, 51-66(1933).—Data are recorded for expts. with *Aspergillus oryzae* and *Rhizopus japonicus*, superior yields of alc. being obtained with the former. Wm. H. Adolph

Fermentation of dextrans. G. Staiger and M. Glaubitz. *Brennerei-Ztg.* 50, 135(1933); cf. *Ibid.* 1925, No. 1667; 1929, No. 1876 and C. A. 20, 61.—Sols. were prepd. from saccharose, dextrin and yeast ext. They were fermented for 3 days at 28-30°. Pombe and Logos yeast were used for the fermentation; culture M and 152 were the checks. Further expts. were carried out on a rye mash and dextrans pptd. from beer by alc. No evidence could be found to support the assumption that Pombe and Logos yeasts should contain dextrinase. Expts. with zymase prepd. according to Buchner's method did not show fermentation in the presence of dextrin. S. J.

The use of spices (drugs) in the spirit industry. C. Luckow. *Brennerei-Ztg.* 50, 65-6(1933).—The use of ginger, limousin wood (*Quercus ilex*), mint and manna is discussed. S. Józsa

Use of rye and potato flakes for the manufacture of spirits. B. Drews. *Brennerei-Ztg.* 50, 93-4(1933).—Rye might be mashed without using malt. The ground

grain is mixed with 3 parts of cold water and let stand overnight. In summer when the temp. is high the mash is held for 2 hrs. at 50°. The mash is held for 1 hr. at 60°. Should the rye contain very little diastase 4-6% green malt must be added to obtain sufficient conversion. Directions for working under pressure are given. Similar directions are given for potato flakes and its combination with rye. S. Józsa

Combined use of rye and potato flakes. F. Wendell. *Brennerei-Ztg.* 50, 2(1933).—The principal idea is to utilize the diastase of rye in mashing potato flakes. By use of 2/3 of rye and 1/3 potato flakes the use of malt can be eliminated entirely. Practical advices are given. 3 The ground rye is doughed in with cold water for overnight. The temp. should not be raised to avoid souring. Rye mashes have the tendency to froth badly during fermentation. Attempts are made to eliminate frothing by special yeast cultures. S. Józsa

Composition of sweet must of grapes and apples and their content in arsenic, copper and zinc. C. v. der Heide and K. Hennig. *Z. Untersuch. Lebensm.* 66, 321-38(1933).—Analytical values are given for sweet musts from grapes and fruit, together with the amts. of Zn, Cu and As. Many references to the literature are given. F. L. Dunlap

Estimation of the alcohol content of liquors and essences. Olli Ant-Wuorinen. *Z. Untersuch. Lebensm.* 66, 444-6(1933).—See C. A. 27, 2755. F. L. Dunlap

Low-alcohol and alcohol-free malt beverages. A. I. Stepanov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate, 1931, 42 pp.—A review of the art of making beer with low EtOH content and with no EtOH. Many literature and patent references are cited. Julian F. Smith

Tables for the determination of alcohol and extract content of wine from the specific gravity of alcohol-water mixtures and from saccharose solutions at 20°, referred to water at 4°. C. v. der Heide and H. Mändlen. *Z. Untersuch. Lebensm.* 66, 338-41(1933). F. L. Dunlap

Ebullioscopes and the alcohol contents of white wines. G. Lhermie. *Ann. fals.* 26, 546-52(1933).—The difference in the alc. content of 50 white wines, as detd. by the Malligand ebullioscope and from the d. of the distillate, resp., varied from -0.2 to +1.5% by vol. No relationship could be worked out between the difference in the results of the 2 methods and the compn. of the wine, and it is concluded that the ebullioscope is of little or no value for detg. the alc. content of such wines. A. P.-C.

Colorimetric determination of iron in red wines. J. Ribereau-Gayon. *Ann. fals.* 26, 552-4(1933).—Polemical with Dubaquié (C. A. 27, 5886). A. P.-C.

Determination of arsenic and of phosphoric acid, copper, zinc, iron and manganese in must and wine. C. v. der Heide and K. Hennig. *Z. Untersuch. Lebensm.* 66, 341-8(1933).—Simple colorimetric methods are given for the detn. of As, Cu, Fe, Mn and P<sub>2</sub>O<sub>5</sub>. The disadvantages of the older methods are pointed out. Zn detns. are made gravimetrically as ZnO. F. L. Dunlap

Acidimetry of wines. James Hossack. *Analyst* 59, 12-13(1934).—Instead of detg. "total acids" and "volatile acids" directly and "fixed acids" by difference it is more logical to det. this last value directly. To det. total acids, add 10 ml. of satd. BaCl<sub>2</sub> to 50 ml. of wine and make alk. with 50 ml. of 0.1 N NaOH free from carbonate. 9 Make up to 250 ml., mix and filter through rapid paper. To 100 ml. of the filtrate add 25 ml. of 0.1 N HCl and titrate with 0.1 N NaOH to a phenolphthalein end point. To det. fixed acids, evap. 50 ml. of the wine to dryness on the water bath and dry at 105°. Dissolve in a convenient vol. of water and proceed as before. Det. volatile acids as recommended in "Methods of Analysis, A. O. A. C." Method I. W. T. H.

When is brandy adulterated? Q. Lieven. *Brennerei-*

*Zig.* 50, 22(1933).—A general discussion referring to official German regulations. S. Józsa

Estimation of brandies with small samples on hand. J. Peltzer. *Brennerei-Zig.* 50, 14(1933).—Methods are described to carry out the fractional distn. with a 60-cc. sample. It is shown that the chem. analysis including total acidity, alc., fusel oil, total aldehyde, aliphatic aldehydes and ester might be carried out on a 60-cc. sample. S. Józsa

Water treatment (for brandies). C. Luckow. *Brennerei-Zig.* 50, 46(1933); cf. *C. A.* 27, 2756.—Various methods (lime-caustic soda, permutoite and electroösmosis) are discussed, particularly with respect to their use in the brandy industry. Electroösmosis has the advantage that the process can be controlled and water of any desired hardness can be obtained by using a larger or smaller no. of cells. S. Józsa

Turbidity in vermouth bitter. C. Luckow. *Brennerei-Zig.* 50, 59(1933).—Various ingredients were tried systematically. L. found that catechu and licorice are mainly responsible for turbidity, particularly when vermouth wine is stored at low temp. It is suggested that these 2 ingredients be extd. with 10% alc. instead of water, let stand until the ppt. is formed and filtered with a suitable filter aid. S. Józsa

Estimation of rum, arrak and cherry brandy by the abundance test. C. Luckow. *Brennerei-Zig.* 50, 86-7 (1933).—The organoleptic test on various dilns. is carried out by detg. the greatest diln. when the characteristic aroma of the brandy is still apparent. The diln. is made with water and not with alc. to overcome the anesthetic effect of the latter. Dilns. are made from 10,000 to 100,000 with rum and arrak, and 1,000-20,000 with cherry brandy. The result gives a fair figure for cutting the brandy. S. Józsa

Examination of foreign yeasts. G. Staiger and M. Glaubitz. *Brennerei-Zig.* 50, 35(1933).—Twenty-seven yeast samples were tested and examd. Outside appearance, smell and taste, fermentation test in dough, keeping test at 35°, moisture, protein and  $P_2O_5$  content were detd. Biol. assay is included in the results, which are tabulated. S. Józsa

Utilization of organic nitrogen by highly aerated yeasts (in the molasses feed method of yeast manufacture). A. G. Khomich and E. V. Doinikova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 85-109(1933).—The proteolytic enzymes of yeast were found to be unable to hydrolyze the protein of lupine seed. Optimum conditions were, therefore, detd. for autolytic dissolving of the N compds. of germinated lupine seed. In the aerobic molasses method of making yeast there is no unfavorable effect on yield or quality when  $(NH_4)_2SO_4$  is replaced by yeast autolyzate, and there is an advantage in that a higher molasses concn. can be used. Julian F. Smith

Resistance of compressed yeast toward sulfuric acid. F. Wagner. *Brennerei-Zig.* 50, 111(1933).—Earlier knowledge on this subject is confirmed. It was found that a protein-rich compressed yeast can be treated with water contg. 40 cc.  $H_2SO_4$  per 100 cc. A small amt. of cells will be destroyed; their no., however, is so small that it is of no importance. S. Józsa

Studies on yeast maceration juice. A. C. van Wijk and F. M. Muller. *Biochem. Z.* 267, 102-18(1933).—Keeping the bottom beer yeast 24-48 hrs. at 1° yields subsequently a juice with generally better fermenting capacity. The duration of maceration is also of great influence upon the fermenting ability of the juice. Destruction of zymase by too prolonged maceration is attributed to proteolytic action. Addn. of boiled juice results in the formation of a juice with great fermentation potency, because of its antiproteolytic action. S. M.

Color test for glycerol [in wine, vinegar] (Täufel, Thaler) 7. Identification of whortleberry juice (Diemair, Lix) 12. Pure coned. grape juices of Algerian origin (Fabre, Bremond) 12. Active allergic substance in hops (Gutmann) 17.

Biological transformation of carbon monoxide to methane. Franz Fischer and Rudolf Lieske. U. S. 1,940,944, Dec. 26. See Brit. 365,544 (*C. A.* 27, 1933).

Azeotropic distillation system for recovering anhydrous methanol and ethanol from crude mixtures obtained by fermentation. Reichsmonopolverwaltung für Branntwein. (Richard Fritzweiler and Karl R. Dietrich, inventors). Ger. 585,065, Dec. 8, 1933 (Cl. 6b. 25).

Apparatus for distilling alcohol. Firma E. Merck. (Otto von Keussler, inventor). Ger. 584,052, Sept. 14, 1933 (Cl. 6b. 25). Addn. to 575,910 (*C. A.* 27, 4874).

Concentrating alcohol from aqueous solutions. Floi Ricard and Henri M. Guinot (to U. S. Industrial Alc. Co.). U. S. 1,940,699, Dec. 26. In effecting concn. by continuous distn. and rectification in exhaustion and concn. zones, combined with distn. in the presence of an entraining liquid in a third zone, vapors from the concn. zone are introduced as a whole and directly into the lower part of the third zone and suffice for the heating of this zone. The reflux necessary for the concn. in the concn. zone is supplied by reflux from the third zone, and, at a region between these zones, alc. of a concn. higher than that of the azeotropic mixt. of water and alc. is continuously withdrawn. App. is described.

Denatured alcohol. Charles Baron and Henri Hennebute. Fr. 42,890, Nov. 15, 1933. Addn. to 742,061 (*C. A.* 27, 3555). The process of Fr. 742,061 applies to crude alcs. of all kinds as well as to rectified EtOH. Cf. *C. A.* 27, 4873.

Continuous production of esters of ethyl alcohol. Otto Fuchs (to Deutsche Gold- und Silber-Scheidanstalt vorm. Roessler). U. S. 1,939,116, Dec. 12. A mash is de-spirited by distn., and the resulting vaporous mixt. is directly esterified without previous condensation by reaction with an aliphatic monocarboxylic acid such as HOAc.

Acetic acid and glucose production by fermentation of mashes of cellulosic material such as corn cobs, sawdust, etc. Philippe A. Tetrault (to Wisconsin Alumni Research Foundation). U. S. 1,939,736, Dec. 19. A sterile culture medium of dil. cellulosic mash contg. nutritive salts and at a temp. of about 90-100° is inoculated with thermophilic microorganisms naturally developed in soil and manure and the culture is incubated at 55-65°; cultures which show less vigorous fermentation are heated to destroy the less resistant microorganisms; sterile cellulosic mash is inoculated with the remaining microorganisms to obtain sub-cultures, which are incubated and heated as before to obtain vigorous cultures which are finally further incubated with agar and used for the main fermentation of cellulosic material.

Vinegar. Ernst Simon. Ger. 589,429, Dec. 7, 1933. (Cl. 6c.). A soln. of glucose or other carbohydrate is fermented with acetic bacteria, e. g., *B. ascendens*, in a nonoxidizing atm., and the product is aerated in known manner to convert it into vinegar.

Malting. Augustinus E. Jonsson. Fr. 755,163, Nov. 21, 1933. An app. is described for removing the heat developed in the germination by an indirect cooling and for removing by air the  $CO_2$  formed.

Apparatus for dispensing measured quantities of spirits, etc. Wm. Mair Rolph. Brit. 398,253, Sept. 14, 1933.

Distillation of wines. Soc. des établissements Barbet. Fr. 42,866, Nov. 15, 1933. Addn. to 702,284 (*C. A.* 25, 4084). Modifications of the app. are given.

Yeast. Otto Hummer. Austrian 135,538, Nov. 25, 1933 (Cl. 6f.). Cultivation is begun in an aerated nutrient sugar soln., and is continued until the nutrient medium is exhausted. The used medium is then replaced completely by fresh medium, and this replacement process is repeated periodically. Mediums of different compn. or concn. may be used in the successive stages, which may also be conducted under different conditions of temp. and aeration. The process is a modification of that of Austrian 119,946 (*C. A.* 25, 1329).

Yeast. I. G. Farbenind. A.-G. (Fritz Lange, inventor). Ger. 585,992, Oct. 14, 1933. The amt. of invertase in

yeast is increased by fermentation in a dil. soln. of saccharose under diminished pressure.

Yeast. Masajiro Mizutani. Ger. 586,805, Oct. 26, 1933 (Cl. 12p. 15). The starting material for prepg.

<sup>1</sup> hypoglucosamine is obtained by treating yeast with picric acid, extg. the resulting picrate with 80% (or weaker) alc., concg. the ext. and finally decomposing the picrate by addn. of  $\text{Na}_3\text{PO}_4$ .

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**Diazo reaction of adrenaline.** Gitaro Nakayama. *Japan J. Med. Sci. II, Biochem.* 2, 285-90 (1933).—In the Ehrlich diazo reaction 3,4-dihydroxyphenylalanine and pyrocatechol behaved like adrenaline with respect to color and sensitivity. Adrenalone gave a nonspecific golden brown color. 2,4-Dihydroxyphenylalanine gave a strong, very stable orange-red color. Rachel Brown 150th birthday of Sertürner. Höll. *Pharm. Post.* 3 64, 577 (1933).—A discussion of the life and personality of Friedrich Wilhelm Sertürner, the discoverer of morphine. H. M. Burlage

**Simple method of designating strengths of solutions and liquid mixtures.** Ludwig Ternaigo. *Pharm. Monatsh.* 14, 229-30 (1933).—Criticizing the present methods of denoting strengths of solns. as indefinite, T. proposes the use of the letters "G" or "V" signifying the wt. or vol. of the soln. or mixt. and "g" or "v" for the quantity of the substance dissolved. The following possibilities in which alc. and water mixts. are used as examples are given: (1) "70Vv%" denotes a mixt. of 70 vol.-units of alc. in 100 vol.-units; (2) "70Vg%", a spirit contg. 70 vol.-units of alc. in 100 wt.-units; (3) "70Gg%", a spirit contg. 70 wt.-units of alc. in 100 wt.-units; and (4) "70Gv%", a mixt. of 70 wt.-units of alc. in 100 vol.-units. It is recommended if this scheme were accepted for universal use that the letters "G" and "g" be replaced by "P" and "p" (from word *Pondus* = weight). For the expression of strengths of standard solns. T. favors writing normalities as  $N/1$ ,  $N/10$ , etc. H. M. Burlage

**Evaluation of ergot with the aid of the nephelometer.** Sandor Tukats. *Pharm. Monatsh.* 14, 246-7 (1933).—The following procedure is described for the detn. of the alkaloids of this drug by the use of Mayer's reagent: (1) **Prepn. of the standard soln.**—Into a 50-cc. graduated flask introduce 1 cc. of a *Secoin* soln. (strong), (Chinoin) or *Gynergen* (Sandoz) corresponding to 1 mg. ergotamine and dil. to 48 cc. with 0.5% tartaric acid soln. Add 20 drops Mayer's reagent and make up to vol. (0.002%). This standard soln. is used in different dilns. for comparison with unknown solns. in the nephelometer. (2) **Detn. of the alkaloidal content.**—Introduce into a centrifugal tube of 30-cc. capacity 0.1 g. of finely powd. ergot and 20 cc. petr. ether, stopper with a cork, shake for  $\frac{1}{4}$  hr. in a shaking app.; then centrifuge and carefully draw off the ether layer with a suction pipet. Repeat the extn. twice with 10 cc. petr. ether. Dry the defatted drug in the tube at 30-40°. Add 20 cc. of a mixt. of 1 part  $\text{MgO}$  and 3 parts  $\text{H}_2\text{O}$ , add 10 cc.  $\text{Et}_2\text{O}$ , allow to stand for 10 min., shake  $\frac{1}{4}$  hr., centrifuge and draw off the  $\text{Et}_2\text{O}$  and introduce into a separatory funnel. Wash the mixt. in the tube with 10 cc.  $\text{Et}_2\text{O}$  and then rinse the pipet. Repeat the extn. process. Shake the  $\text{Et}_2\text{O}$  extns. with 0.5% tartaric acid soln. using portions of 20, 15 and 10 cc. In order to avoid loss of material it is advisable before the 2nd and 3rd extn. to rinse the outlet tube of the separatory funnel with a few drops of the solvent. Collect the extns. in a flask, filter through a hard filter into a 100-cc. graduated flask, wash the filter with the acid soln. and add sufficient acid soln. to the flask to a vol. of 95 cc. Add 20 drops Mayer's reagent and make up the vol. to 100 cc. A light milky turbidity is produced, distribute by shaking and allow to stand for 1-2 min. and compare with the standard soln. in a nephelometer. Results compare well with those obtained by the German Pharm. method. (3) **Detn. of the alkaloid in ergot preps.**—Dilute 1 cc. of the prepn. with 5 cc.  $\text{H}_2\text{O}$ , make alk. with 0.5 cc. heavy  $\text{MgO}$  suspension, ext. 3 times with 10-cc. portions of  $\text{Et}_2\text{O}$  and

shake the combined  $\text{Et}_2\text{O}$  exts. 3 times with 10-cc. portions of 0.5% tartaric acid soln; evap. the solvent from the aq. exts., introduce into a 50-cc. graduated flask and add Mayer's reagent, make up to vol. with 0.5% tartaric acid soln. and compare with the standard soln. (1). Results compare well with those obtained by biol. methods. H. M. Burlage

**Historical names of definite drug groups.** Arthur Krajanski and Bohuslav Lavicka. *Pharm. Monatsh.* 14, 248-53 (1933).—Historical discussion. H. M. Burlage

**Raw materials of cosmetics.** Karl Pfaff. *Riechstoff-Ind.* 8, 193-4 (1933); cf. C. A. 28, 853<sup>a</sup>.—The conclusion of a series of articles dealing with the ingredients of cosmetics including ceresin, paraffin, petrolatum and liquid petrolatum. Formulas are included. H. M. Burlage

**Coriander oil and its utilization. I. Preparation of linalyl acetate.** (A new method for the acetylation of linalool.) Vatsche Isagulyantz and E. Smolyaninova. *Riechstoff-Ind.* 8, 194-7 (1933).—The following method converts almost quantitatively the linalool in coriander oil into the acetate with little side reaction in the cold: Into an Al app. provided with a stirrer and a worm condenser introduce 120 kg. linalool (fraction obtained from the oil with a content of about 70% linalool), 90 kg.  $\text{Ac}_2\text{O}$  (at least 90%) and 0.6 kg. of a catalyzing mixt. (90 pts.  $\text{Ac}_2\text{O}$  + 10 pts. orthophosphoric acid). The temp. gradually rises to 38-40° and should be maintained with the aid of cold water in the worm condenser. After stirring the mixt. for 2 hrs. allow to stand for 12 hrs. at room temp. Neutralize by running the mixt. into a washing app. contg. 20-30 l.  $\text{H}_2\text{O}$  to sep. the major portion of the  $\text{AcOH}$  and a part of the  $\text{Ac}_2\text{O}$  in the form of 20-30 %  $\text{AcOH}$ , which is sepd. and treated with 10% soda soln. (90 pts.  $\text{Ac}_2\text{O}$  + 10 pts. orthophosphoric acid). The temp. gradually rises to 38-40° and should be maintained with the aid of cold water in the worm condenser. After stirring the mixt. for 2 hrs. allow to stand for 12 hrs. at room temp. Neutralize by running the mixt. into a washing app. contg. 20-30 l.  $\text{H}_2\text{O}$  to sep. the major portion of the  $\text{AcOH}$  and a part of the  $\text{Ac}_2\text{O}$  in the form of 20-30 %  $\text{AcOH}$ , which is sepd. and treated with 10% soda soln. Wash the crude linalyl acetate with a satd. soln. of  $\text{NaCl}$  until neutral. Transfer the acetate to a receiver and dry with anhyd.  $\text{Na}_2\text{SO}_4$  and distil in a vacuum app. At 60-90° (15 mm.) terpenes are sepd.; at 90° a fraction contg. 20% linalyl acetate is obtained; at 95-115° a fraction consisting of 85-92% of the compd. and some geranyl acetate is collected. The latter fraction may be distd. to sep. the 2 compds. H. M. Burlage

**The behavior of the principal fluidextracts of medicinal plants under the Wood light.** A. Soldi. *Ann. chim. applicata* 23, 455-62.—Results are tabulated of the examn. of 210 fluid exts. of medicinal plants. No relation between fluorescence and active principles could be noted. A. W. Contieri

**Proteins and nonprotein nitrogenous substances in the extract from medicinal herbs.** G. Barbera. *Ann. chim. applicata* 23, 462-70 (1933).—The upper parts of medicinal herbs contain a high percentage of nonprotein nitrogenous substances, essentially amino acids and amides. These represent about 50% of the total nitrogenous constituents of the herbs. The proteins pptd. by  $\text{EtOH}$  are mostly sol. in  $\text{KOH}$ ; they are conjugated proteins similar to those isolated from the sperm of tuna fish, by Alpani. A. W. Contieri

**Methods for examination of recent drugs, compiled by the group of hospital and commune pharmacists.** Anon. *Pharm. Weekblad* 70, 1330-6 (1933).—Phys. properties and tests for identity and purity are given for Ca acetyl-salicylate,  $\text{BzOCH}_2\text{Ph}$ ,  $\text{NH}_4\text{CO}_2\text{Et}$ , Na citrate,  $\text{HCO}_2\text{Na}$  and diacetylmorphine- $\text{HCl}$ . A. W. Döx

**An international method for determination of the morphine content of opium.** L. van Itallie. *Pharm. Weekblad* 71, 4-9 (1934).—The method of morphine detn. recommended by the Hygienic Commission of the League of

Nations is described in detail. It is based on the British Pharm. method, with slight modifications, and has already been adopted in the new Swiss and Danish Pharms.

A. W. Dox

The action of calomel on alkaloid salts and its value for toxicological investigation. J. J. L. Zwikker. *Pharm. Weekblad* 71, 22-9(1934).—The gray color reaction obtained by adding  $Hg_2Cl_2$  to the concd. soln. of an alkaloid HCl salt is not an actual reduction but a decompn. according to the equation:  $Hg_2Cl_2 \rightleftharpoons Hg + HgCl_2$ . If the alkaloid-HCl is sufficiently sol. it forms a complex with the  $HgCl_2$ , thus removing it from the system and shifting the equil. of the above equation to the right. The complex is decompd. by diln. and the reaction is then reversed. The color reaction is specific only in so far as it distinguishes readily sol. from difficultly sol. HCl salts of alkaloids. Its value in toxicology and analytical chemistry has been greatly overstd.

A. W. Dox

Investigations of tobacco smoke. III. E. Waser and Marta Stähli. *Z. Untersuch. Lebensm.* 66, 354-62(1933); cf. *C. A.* 27, 4025, 4025.—When cigaret tobacco contains 1% or more of nicotine, the nicotine content of the cigaret smoke increases proportionately with the nicotine content of the tobacco. The basic substances accompanying the nicotine have no influence on the detn. of the nicotine in the smoke. In the ordinary concns. in which they are found in the usual smoke investigations, they are pptd. by neither silicotungstic nor picric acids. Various substances are discussed, which have been used for the removal of nicotine from smoke.

F. L. Dunlap

Nicotine determination in tobacco and in nicotine-containing parasitocides. Wilhelm Mohr. *Z. Untersuch. Lebensm.* 66, 362-5(1933).—A method is described for detg. nicotine in tobacco and nicotine-contg. substances, which depends on its pptn. and detn. as nicotine picrate.

F. L. Dunlap

The determination of nicotine in tobacco smoke. II. B. Pfyl. *Z. Untersuch. Lebensm.* 66, 501-10(1933); cf. *C. A.* 22, 1214.—It is shown that smokers of cigarettes and cigars average 2 puffs per min. with an av. smoking time of 2 sec. and a vol. production of 40-50 cc. A method is given for the detn. of the combustibility. An equipment is described for reproducing the natural process of smoking. III. *Ibid.* 510-24.—A crit. discussion of factors concerned with obtaining comparable nicotine values—absorption of nicotine, prepn. of the absorption soln., moisture content of the tobacco, detn. of the amt. of tobacco smoked, statement of analytical values. A new and simplified method is given for the detn. of nicotine in tobacco smoke.

F. L. Dunlap

The standardization of thyroid preparations. Gundis Rotter and Erich Soos. *Arch. exptl. Path. Pharmacol.* 173, 614-21(1933).—The Harrington-Randall method of titrating thyroid prepn. makes possible an accurate differentiation between thyroxine and diiodotyrosine.

Harry Eagle

A new convenient method for the standardization of posterior pituitary extracts. Konrad Schübel and Walter Gehlen. *Arch. exptl. Path. Pharmacol.* 173, 633-41(1933).—The quantity of ext. required to stimulate the puerperal uterus of cats upon intramuscular and intravenous injection is used as the criterion of potency.

Harry Eagle

Chemical examination of commercial liver preparations for circulatory-active substances. Adolf Heinsen. *Klin. Wochschr.* 12, 1722-4(1933).—Campolon and Hepatrat do not contain either adenosine nucleotide or nucleoside; these are demonstrable in Hepatopson and Degewop.

Harry Eagle

A new, water-soluble digitalis preparation. Erich Hesse, Wilhelm Altner and Johanna Becher. *Klin. Wochschr.* 12, 1862-4(1933).—After preliminary extn. with benzene the leaves are extd. with 95% EtOH. The alc. ext. is purified by shaking with benzene, and then concd. with  $CHCl_3$  and pptd. with petr. ether in the usual manner. The glucosides so obtained are believed to correspond to those present in the leaves. Approx. 13% of

the prepn. injected intravenously into cats is bound by the heart.

Harry Eagle

Local anesthetics. Heinrich Münkner. *Apoth. Ztg.* 48, 1493-6, 1512-16(1933).—An address.

W. O. E.

Instability of alkaloids in aqueous solution, especially on sterilization. VII. Cocaine. R. Dietzel and O. Steeger. *Arch. Pharm.* 271, 521-37(1933); cf. *C. A.* 27, 4875.—By means of graphs and other exptl. data it is shown that for all the more common cocaine salts of which the acid dissocn. consts. are known, the decompn. of the cocaine may be detd. by a single quant. light absorption measurement and calcd. from a single corresponding  $pH$  observation. Especially does this apply to each and every  $pH$ , temp. between 0 and 100° and sterilization interval. If, as is commonly the case, the question of only moderate decompn. is involved, the very slight influence of the  $BzOH$  may be disregarded, a single  $pH$  measurement will suffice. Should the process of decompn. involve a question of improperly cleaned glass, accurate results could hardly be expected without previous control expts., since the alkali given off by various kinds of glass show such wide differences that the order of magnitude in changes of the  $pH$  concn. cannot be stated without further data. Not only is the kind of glass an important factor, but especially the  $pH$  of the soln. in question. Based upon a previously executed control, however, the change in sapou. velocity may be calcd. from the change in the  $pH$  concn.

W. O. E.

Volatile alkaloid in the mushroom *Helvella esculenta*. D. Ayc. *Arch. Pharm.* 271, 537-9(1933).—The presence of a volatile, apparently O-free alkaloid, has been established in the mushroom *Helvella esculenta*. While its exact chem. composition is as yet undetd., it appears to be liquid, and is characterized by an unpleasant mouse urine like odor, not unlike that of coniine and otherwise similar to that of nicotine. It yields ppts. with tannin, picric acid, iodized KI, as also with the reagents of Mayer, Dragendorff, Sonnenschein and Scheibler. The amt. present in the dried mushroom is extraordinarily minute.

W. O. E.

Analysis of opium, estimation of the six principal alkaloids. B. A. Klyachkina. *Arch. Pharm.* 271, 558-68(1933). See *C. A.* 28, 575.

W. O. E.

Active allergic substance in drug and useful plants: hops. M. J. Gutmann. *Heil- u. Gewürz-Pflanzen* 15, 89-92(1933).—Of the 9 principal constituents of hops examd. it is shown that lupuloné ( $\beta$ -hop bitter acid) represents the active allergic substance. By means of the biol. test it is possible to select from a series of hops that sample possessing these allergic phenomena in least degree. Furthermore, there is the possibility that addn. of some material to the finished product (beer) may operate completely to inhibit the activity of the allergic substance.

W. O. E.

Brazilian resins as bandage material. Fred W. Freise. *Heil- u. Gewürz-Pflanzen* 15, 95-6(1933).—The resins are obtained by the natives from various species of *Protium*. The prepn. and collection are described. The fresh product m. about 125°; its d. varies between 0.9985 and 1.025, depending on the age of the tree. The resin once hardened cannot again be softened by the native users. Subjected to steam distn. under diminished pressure it yields 11-18.5% of a bright yellow oil smelling of turpentine and having a  $d_{15}$  0.8928 and  $n_D^{20}$  1.4886, which dissolves in 10-14 parts of 90% alc. the initial clear soln. finally acquiring a slight opalescence. The compn. of the oil was not studied.

W. O. E.

Development in the culture of drug and condiment plants, as also of technical plants in Russia during the past few years. A. A. Ravetskii. *Heil- u. Gewürz-Pflanzen* 15, 132-5(1933).—A statistical review.

W. O. E.

Supplement to D. A.-B. VI. Max Sido. *Pharm. Ztg.* 79, 10(1934).—A commentary.

W. O. E.

Viscosity and tinctures. Richard Holdermann. *Pharm. Ztg.* 79, 10-12(1934).—An exptl. study has been made of the viscosity of a series of tinctures; an Ostwald rubbing



tube was employed for the purpose and the data thus obtained were used in evaluating the tinctures. W. O. E.

**Nicotine content of some (Hawaiian) tobaccos.** Leonora N. Bilger, Mark Westgate and Robert Loveland. *Hawaii Agr. Expt. Sta., Rept.* 1932, 12-13(1933).—Analysis was made at different stages of growth on several varieties. In 5 varieties an av. of 2.5% of the nicotine was found in the young leaves, 2.74% in the medium-old leaves and 2.86% in the old leaves. In 4 out of 5 cases the nicotine content was lowest in the young leaves, in 2 cases reached its max. in the medium-old leaves and in 2 cases decreased in the old leaves. Various nicotine compds. were prepd. for exptl. trial as insecticides. These include nicotine, the tartrates, salicylate, sulfate, amide and nicotine mercuric chloride. C. R. Fellers

**Bay-oil investigations.** H. C. Henricksen. Puerto Rico Agr. Expt. Sta., *Annual Rept.* 1932, 20-1(1933); cf. C. A. 27, 565.—The young, tender and immature leaves gave 10-12% more oil than mature leaves. Stack fermentation of the leaves caused a change in the color of the oil from green to yellow and brown. Stack-fermented leaves gave less oil and a product of poorer quality as compared with fresh leaves. Recommendations in still construction are: (1) Baffles should be placed in the still heads to lessen the vol. of solids in the still; (2) distillate receivers of about 20-gal. capacity should be used; (3) pipes should be installed to carry clear water to the receivers; and (4) the oil should be filtered through filter-cel under vacuum. The distn. of ground-up leaves was of no advantage. C. R. Fellers

**Properties of the oil of chenopodium obtained by cross-fertilization of chenopodium ambrosioides with a wild variety from Kansas.** Anthelmintic value of the oil. E. J. LeBlanc and James W. Wilson. S. Dak. Agr. Expt. Sta., *Annual Rept.* 1932, 23-4(1933).—All the oil distd. at a pressure of 25-8 lb. of steam for 20-30 min. Possibly because of the drought, the yield of both oil and ascaridole, the active principle of the oil, was below normal. Exptl. de-worming of swine with the extd. oil was successful. Good results were obtained by the use of 1.5 cc. of oil to 50 lb. live wt. of swine. C. R. Fellers

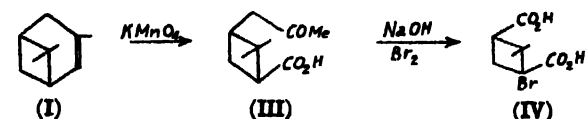
**Newly introduced medicaments and pharmaceutical specialties.** Zernik. *Deut. med. Wochschr.* 59, 96, 291-5, 453, 814, 1006-7, 1364-5, 1675-6(1933).—Summarized description of new preps. introduced in Germany with references to the clinical reports bearing on these products. Arthur Grollman

**Inhepton-Merck—a new liver extract for injection.** L. Lissard. *Deut. med. Wochschr.* 59, 1850-60(1933). Arthur Grollman

**Determination of hexamethylenetetramine in medicinal preparations.** E. Schulek and V. Gervay. *Z. anal. Chem.* 92, 406-17(1933).—After reviewing the literature, a new procedure is described which depends upon liberating HCHO by boiling with  $H_2SO_4$ . If only 4 mg. of sample is taken, heating on the water bath for 10-20 min. with 2 drops of 50%  $H_2SO_4$  and 10 cc. of soln. suffices to accomplish the decompn. without loss of aldehyde by volatilization. In the macrodetn. it is better to start with 0.4 g. of sample, make up to 100 cc. and take 10 cc. of the soln. for analysis. Add 20 cc. more of water and 10 cc. of 50%  $H_2SO_4$ . Distill off the aldehyde until fumes of  $SO_2$  form in the flask; catch the distillate in a little water. Cool, add 25-30 cc. of water to the contents of the distg. flask and again evap. to fumes. Dil. the distillate to 100 cc., mix and take 30 cc. Add 5 cc. of 2 N KCN soln. which causes the aldehyde to form  $CH_2(OK)CN$ . After 15 min., add 5 cc. of 20%  $H_3PO_4$  and introduce satd.  $Br_2$  water until the liquid retains the yellow color due to excess  $Br_2$ . Then add 1-2 cc. of 5% phenol soln. to combine with excess  $Br_2$ , wait 5 min., then add 0.5 g. of KI and after 30 min. titrate the liberated  $I_2$  with 0.1 N  $Na_2S_2O_3$ . Det. the titer of the KCN by a similar titration. From each mol. of  $N_4(CH_2)_6$ , 6 mols. of HCHO is obtained. Each mol. of aldehyde reacts with 1 KCN. By treatment with  $Br_2$ , the excess KCN is converted into HBr and BrCN and by the KI treatment each

mol. of BrCN liberates 1 mol. of  $I_2$ . Numerous results attest the accuracy of the method. W. T. H.

**Essential oil of Orthodon lanceolatum Kudo (Labiateae).** Yasuji Fujita. *J. Chem. Soc., Japan* 54, 1181-7(1933).—Distn. of full grown plants gives 0.8% oil having a characteristic cineole-like aroma and light yellow color. Consts. of the oil are:  $d_4^{20}$  0.8945,  $n_D^{20}$  1.4649,  $[\alpha]_D^{20} +9.76^\circ$ , acid value 0.0, ester value 8.7 (after acetylation 34.2). The oil consists of 57% cineole, 16% *d*-linalool, 12% limonene, 4%  $\alpha$ -caryophyllene, 2% sesquiterpene alc., 1% terpene alc. ester, trace  $\alpha$ -pinene, 7% *orthodene*,  $C_{15}H_{18}$  (I) and 2% *orthodonene* (II). Consts. of I are:  $b_m$  168-70° cor.,  $d_4^{20}$  0.8430,  $n_D^{20}$  1.4670,  $[\alpha]_D^{20} +32.6^\circ$ . The structure of I is based on the following reaction:



III m. 129-30° and IV m. 76-7°. II is a sesquiterpene and has 2 double bonds. Consts. of II are:  $b_m$  254°,  $d_4^{20}$  0.9017,  $n_D^{20}$  1.4947,  $[\alpha]_D^{20} -13.28^\circ$ ; *nitrosite* m. 152-4°. The structure of II belongs to that of eudalene type.

K. Kitsuta  
**Essential oil of Orthodon formosanum Kudo (Labiateae).** Yasuji Fujita. *J. Chem. Soc., Japan* 54, 1188-90(1933).—Steam distn. of the plant gives 0.14% oil having an orange-yellow color. Consts. are:  $d_4^{20}$  1.0309,  $n_D^{20}$  1.5105,  $[\alpha]_D^{20} -5.28^\circ$ , acid value 0.90, ester value 10.6 (after acetylation 26.4). It consists of small amts. of  $\alpha$ - and  $\gamma$ -caryophyllene and 65% dillapiol.

K. Kitsuta  
The coloring of solutions of salicylate and sodium bicarbonate and the inhibiting action of sodium thiosulfate. Oscar A. Rossi. *Rev. farm.* (Buenos Aires) 75, 303-5 (1933).—The addn. to 0.1-0.2% of  $Na_2S_2O_3$  inhibits the formation of a violet color. A. E. Meyer

**Commercial possibilities of Japanese mint in the United States as a source of natural menthol.** A. F. Sievers and M. S. Lowman. U. S. Dept. Agr. *Tech. Bull.* 378, 1-34(1933).—A study with special reference to their value as sources of menthol was made of the oils obtained from Japanese mint grown in various localities and under varying conditions. Oils produced in the North and West contain on the whole a larger percentage of total menthol than those produced in the Southeast. The opportunities for this crop in Calif. appear to be greater than in other sections of the U. S. The total and combined menthol in 8 samples of oil distd. from Japanese mint grown in this state amounted on an av. to 80.94 and 6.56%, resp. Continuous cultivation over a period of yrs. indicates that seasonal conditions cause fluctuations in the menthol content of the oils, but that there is no general tendency for the menthol content to decline gradually as a result of the prevailing conditions in any one locality.

W. H. Ross  
**Chemical investigation of Indian medicinal plants. III. Chemical examination of the leaves of Erythrina indica.** Satyendranath Chakravarti, M. L. Sitaraman and A. Venkatasubban. *J. Annamalai Univ.* 2, 238-42(1933); cf. C. A. 27, 1450.—Preps. from the bark and leaves of *Erythrina indica* have been used as anodynes, febrifuges and vermifuges. The leaves were successively extd. with petr. ether,  $Et_2O$ ,  $CHCl_3$ , abs.  $EtOH$ , 70%  $EtOH$ , cold  $H_2O$ , hot  $H_2O$  and 1% aq. HCl. The petr. ether and  $Et_2O$  exts. contained a neutral, white solid (I) m. 83° after recrystn. from alc. I was not a phytosterol or glucoside.  $Et_2O$  and abs.  $EtOH$  extd. an alkaloid (II) m. 117°. II was best isolated by percolation of the leaves for 48 hrs. with cold 1% HCl, followed by pptn. as the bismuth-iodide salt. No glucosides or tannins were present in the leaves. E. W. Scott

**Indian medicinal plants. I. Withania somnifera.** D. N. Majumdar and P. C. Guha. *J. Indian Inst. Sci.* 16A, 29-33(1933).—The Bengal variety of *Withania somnifera* contains the same constituents as the S. African variety (C. A. 5, 2850), viz.,  $KNO_3$ , tannin, coloring matters, glucose, phytosterol, hentriacontane, stearic,

palmitic, oleic, linoleic, withanic acids, ipuranol, somnirol and an alkaloid,  $C_{15}H_{25}N_2$ . The presence of 3 other alkaloids was noted. II. *Swerelia chirreta*. *Ibid.* 34-9.—The following substances were isolated from an aq. EtOH ext. of the leaves, roots and stems of *Swerelia chirreta*: a phenolic compd. ( $C_{17}H_{14}O_5$ )<sub>2</sub>, m. 179-80°, oleic, palmitic, stearic and probably cerotic acids, a *phytosterol*, m. 128-30°, *acetate*, m. 127-9°, a *hydroxy acid*,  $C_{24}H_{44}(OH)-COOH$ , m. 295°, *Ac deriv.* m. 250-1°, a phenolic compd. m. 250-7°, ophelic acid, tetrabromide, m. 114-15.5°, and a neutral compd. m. 197-8°. A bitter principle, *chiratin*, was resolved into 2 compds. m. 118-19° and 179-80°, resp., and a viscous resin. The drug contains no alkaloids. C. W. Sondern

Arrowroot (Jones) 12. Phenol derivs. [antiseptics] (Brit. pat. 398,218) 10. Barbituric acid derivs. (Ger. pat. 589,146) 10. Heat evolving compds. [for medical or cosmetic purposes] (Austrian pat. 135,336) 18. Treating cacao waste [to ext. alkaloids] (U. S. pat. 1,939,178) 13. Medicinal bread (Ger. pat. 589,184) 12. 3-Carboxy-4-hydroxybiphenyl (U. S. pat. 1,941,207) 10. Phytosterol from raw tall-oil soap (U. S. pat. 1,940,372) 23.

Winter, Fred: *Riechstoffe und Parfümierungstechnik: Genesis, Charakteristik und Chemie der Riechstoffe, unter besonderer Berücksichtigung ihrer praktischen Verwendung zur Herstellung komplexer Riechstoffgemische*. Berlin: J. Springer. 378 pp. M. 32. Reviewed in *Am. Perfumer* 28, 473 (1933).

The Calendar of the Pharmaceutical Society, 1933-1934. Published by The Pharm. Soc. of Gt. Brit. London: Pharm. Press. 4s.

The Pharmaceutical Pocket Book for Practitioners and Students. 12th. ed., revised by C. W. Maplethorpe. London: Pharm. Press. 344 pp. 5s. 6d. Reviewed in *Am. J. Pharmacy* 105, 605; *Pharm. J.* 131, 565 (1933).

Therapeutic preparation. Amanda Grohmann. Austrian 135,514, Nov. 25, 1933 (Cl. 30f.). An aq. ext. of epididymis is mixed with pulped testicles from which the integument has been removed, and an aq. decoction of the testicle integument is added to the mixt. at a temp. not exceeding 60°.

Therapeutic preparation. I. G. Farbenind. A.-G. (Gerhard Domagk and Otto Ripke, inventors). Ger. 589,034, Dec. 1, 1933 (Cl. 30k. 7). A prepn. for conferring immunity against tumors is prepd. by compressing broken tumor cells at a temp. not exceeding 0°, or by extg. them with water or a salt soln. at the same low temp. The product may be purified by standard processes and dried. Details are given.

Therapeutic calcium compounds. Chem. Fab. vorm. Sandoz. Ger. 588,160, Nov. 13, 1933 (Cl. 12o. 11). Nonhygroscopic double compds., useful as sedatives, are prepd. by combining  $CaBr_2$  with an equimol. amt. of the Ca salt of a polyhydroxymonocarboxylic acid obtained by oxidizing a polyaldose, e. g., Ca lactobionate or malto-bionate. Combination may be effected by cooling and crystg. mixed aq. solns. of the salts, or by grinding cryst.  $CaBr_2$  with the other salt, or by oxidizing a polyaldose with  $Ca(OBr)_2$  in the presence of  $Ca(OH)_2$ . Examples are given.

Medicinal agents. I. G. Farbenind. A.-G. (Max Bockmühl and Leonhard Stein, inventors). Ger. 585,532, Oct. 4, 1933. Aq. solns. of 1-phenyl-2,3-dialkyl-4-dialkylaminopyrazolones and 1-phenyl-2,3-dialkylpyrazolone-4-aminomethanesulfonates or their derivs. are prepd. for medicinal purposes by using urethans of lower alcs. as soln. promoters. Examples are given.

Preserving colloidal liquid medicines and foodstuffs. Boris Tsitovich. Ger. 563,011, Dec. 1, 1933 (Cl. 30k. 2). The material is rapidly frozen while in a finely subdivided state. The process may be applied to serums, toxins, pharm. exts., fruit juices, fermented beverages, milk, etc.

Compounds of caffeine, etc. Wilhelm Lohmann. Ger.

585,995, Oct. 14, 1933. See Fr. 748,765 (C. A. 27, 5483). Caffeine compounds. Hans P. Kaufmann. Ger. 586,514, Oct. 21, 1933 (Cl. 12p. 7.10). Compds. of caffeine with CaCNS or SrCNS are obtained by treating caffeine with these in the presence of water. The compds. are stable to air and are used in medicine. Examples are given.

Organic arsenic compounds. Edward Lyons and Oswald M. Gruhitz (to Parke, Davis & Co.). U. S. 1,940,760, Dec. 26. Compds. of increased toxicity toward spirochetes are obtained by causing quinquivalent org. arsenic acids to react with thio acids contg. the sulfhydryl group such as thioglycolic acid. Production of derivs. from 3-amino-4-hydroxyphenylarsonic acid, phenylglycineamide-4-arsonic acid, 3-nitro-4-hydroxyphenylarsonic acid and of the cysteine derivs. of arsanilic acid and of tryparsamide are described.

Organic bismuth compounds. I. G. Farbenind. A.-G. (Max Bockmühl and Walter Persch, inventors). Ger. 585,519, Oct. 7, 1933. The unsatd. acid  $C_8H_7O_3$ , obtained as a by-product in the formation of camphor from oil of turpentine, or crude oils contg. this acid, are treated with Bi compds. The compds. are used in the cure of syphilis.

Quaternary ammonium salts. Kali-Chemie A.-G. (Heinrich Jungmann and Kurt Rülke, inventors). Ger. 589,331, Dec. 6, 1933 (Cl. 12p. 1.01). Thiocyanates of heterocyclic analogs of betaine are prepd. by treating the heterocyclic compds. with HCNS, or by double decompn. between salts of the heterocyclic compds. and thiocyanates. Examples are given of the prepn. of the thiocyanates of pyridinebetaine, quinolinebetaine and acridinebetaine. The products have disinfectant and bactericidal properties.

Salts of bile acids. Carl A. Rojahn. Ger. 585,397, Oct. 3, 1933. Addn. to 579,147 (C. A. 27, 4631). Salts of single or mixed bile acids with  $HOC_2H_4NH_2$  or  $(HOC_2H_4)_2NH$  are prepd. by standard processes. An example is given. The products are of therapeutic value.

Perhydrocarbazole derivatives. I. G. Farbenind. A.-G. (Max Bockmühl, Walter Krohs and Gustav Ehrhart, inventors). Ger. 586,802, Oct. 26, 1933 (Cl. 12p. 2). See Brit. 377,255 (C. A. 27, 4032).

Substituted halo phenols. Emil Klarman and Louis W. Gates (to Lehn & Fink, Inc.). U. S. 1,938,911 Dec. 12. Bactericidal compds. effective against organisms of the type of *Staphylococcus aureus*, such as 3-methyl-6-(diethylmethyl)-4-chlorophenol, 4-ethyl-2-propyl-6-chlorophenol and 3-methyl-6-phenethyl-4-chlorophenol are prepd. by various methods, e. g., by reacting on a suitable halogenated phenol having one substituting hydrocarbon radical with an acyl chloride, treating the resulting ester with  $AlCl_3$  to form a ketone which may be purified and then reduced to form a second hydrocarbon substituting radical. U. S. 1,938,912 relates particularly to the production of compds. such as 2-(diethylmethyl)-3,5-dimethyl-4-chlorophenol, 2-isopropyl-3,5-dimethyl-4-chlorophenol and 2-ethyl-3-methyl-6-isopropyl-4-chlorophenol.

Keratin products. Firma Johann A. Wulfig. Ger. 578,828, Oct. 14, 1933 (Cl. 12p. 16). Compds. of keratin contg. heavy metals and SH groups are obtained by reducing keratins obtained by acid hydrolysis, with Zn, sepg. the ppt. and treating it with  $H_2S$ . The product is then treated with heavy metal salt soln. such as salts of Bi, Pb, Hg, Cu, Au or Ag. Examples are given. The products are used for dermatological treatment.

Extracting vegetable tissues. Continental Can Co., Inc. Fr. 754,608, Nov. 10, 1933. Ligneous and fibrous products are reduced to the form of solid coherent flakes of a uniform thickness so that the sol. ingredients are easily accessible to an extg. liquid. The reduction is effected by breaking the fibers, softening the particles so as to render them supple and submitting them to pressure. The extn. of cinchona bark is described.

Rectal anesthetics and analgesics. Ferdinand W. Nitary (to E. R. Squibb & Sons). U. S. 1,941,220, Dec. 26. Ether and an oil such as olive oil are used to-

gether with an interface-tension depressant such as sulfonated olive oil. Cf. C. A. 27, 4630.

**Hormone preparations.** I. G. Farbenind. A.-G. (Fritz Laquer and Hermann Weyland, inventors). Ger. 585,939, Oct. 13, 1933. Solns. of ovarian hormones in high-boiling fatty acid esters are distd. *in vacuo*, and the hormones obtained from the distillate by usual methods.

**Vitamin preparations.** Wilhelm Lesselberg. Ger. 586,959, Oct. 27, 1933 (Cl. 30h. 2). Stable preps. are obtained by heating a homogenous mixt. of albuminous material and plant sap or ext. and drying in a finely divided condition. Thus, milk, rice ext. and liver contg. vitamin are mixed and sprayed on to drying rollers.

**Hormones.** F. Hoffmann-La Roche & Co. A.-G. Ger. 588,046, Nov. 13, 1933 (Cl. 12p. 17.10). Urine contg. ovarian hormones is heated with an albumin coagulable by heat, and the ppt. is sepd. and extd. with org. solvents to recover the hormones. Examples are given.

**Hormones.** Helmuth Scheibler. Ger. 588,047, Nov. 16, 1933 (Cl. 12p. 17.10). Hormones of the anterior lobe of the pituitary body are pptd. from the urine of pregnant animals by addn. of sufficient 10% phosphomolybdic acid soln. to establish a H-ion concn. of  $pH$  3.5–4. The ppt. is dissolved in aq.  $NI_3$ , treated with  $Ba(OH)_2$  to ppt. Ba phosphomolybdate, and the hormones then recovered from the filtrate.

**Hormones.** Schering-Kahlbaum A.-G. Fr. 754,326, Nov. 6, 1933. Corpora lutea, as soon as possible after removing them from the ovaries, are mixed with substances which prevent fermentation, e. g., NaF, NaCl,  $CHCl_3$  or saltpeter, and afterward they are treated in known manner.

**Hormones.** Schering-Kahlbaum A.-G. Fr. 754,687, Nov. 10, 1933. Crystd. esters of hormones are prepd. by treating the corresponding crude hormone oils with

alkalies, eliminating the neutral fraction and submitting the alkali compds. obtained to acylation in aq. soln., after which the acyl derivs. are crystd.

**Disinfectants.** Wm. L. Estabrooke. U. S. 1,938,585, Dec. 12. Reaction products of urea or thiourea with heavy metal salts such as  $HgCl_2$  or a salt of Pb, Cd, Zn, Ag or Cu are used as disinfectants.

**Bandages.** Surgical Dressings, Inc. Brit. 397,694, Aug. 31, 1933. A surgical bandage consists of a strip of unvulcanized crude rubber which has been depolymerized so that, while nonadherent to hair or skin, it coheres when pressed upon itself and is somewhat porous and extensible. Depolymerization may be effected with "thin pale crepe" by heating to  $100^\circ$  in air 30 min., in  $H_2O$  at  $100^\circ$  1 min. or in steam 5 min.

**Impregnating bandages, etc., with iodine.** Asociacion de Productores de Yodo de Chile. Ger. 585,197, Sept. 29, 1933. See Brit. 364,273 (C. A. 27, 2252).

**Solutions for sterilizing surgical instruments, etc.** Parker, White and Heyl, Inc. Ger. 585,196, Sept. 29, 1933. See Brit. 368,123 (C. A. 27, 2763).

**Cosmetics.** Franz Nöcker. Ger. 587,352, Nov. 2, 1933. Nonaq. liquid or paste compns. for cleansing the skin contain at least 50% of benzyl alc. or an ether or ester thereof.

**Hair-dressing composition.** J. W. Rausch Sohn. Ger. 588,143, Nov. 13, 1933 (Cl. 30h. 13). A colored hair-powder is prepd. by mixing cork meal or like natural product with a soln. of pyrogallol in aq. EtOH, treating the mixt. with an ammoniacal soln. of  $AgNO_3$  and mixing the insol. pigment so obtained with powd. rice and  $H_3BO_3$ .

**Treating tobacco to avoid irritation when smoked.** Werner Pettersson. U. S. 1,941,416, Dec. 26. Tobacco is impregnated with about 0.3% of 3,6-diamino-10-methylacridinium chloride.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

R. M. SYMMES

The calculation of mixtures of acids by a graphic method. S. D. Beskov. *J. Chem. Ind. (Moscow)* 1933, No. 8, 69–74.—Graphs are given for calcg. the diln. of strong acids and the *prepn.* of nitration mixts. H. M. L.

How to start a sulfuric acid tower system. K. A. Polyakov and A. A. Vasil'ev. *Khimstroï* 5, 2496–501 (1933). Chas. Blanc

Selection of packing as a method for intensification of the (sulfuric acid) tower system. K. M. Malin. *Khimstroï* 5, 2501–3 (1933).—The productivity of  $H_2SO_4$  towers can be considerably increased by rational packing, resulting in greater contact surface and greater internal vol. Chas. Blanc

Colloidal problems in nitrogen\* and sulfuric acid industry. Bruno Waeser. *Kolloid-Z.* 65, 378–82 (1933).—Patent review, covering dust problems in  $CaC_2$  manuf., in grinding  $CaCN_2$  and special properties of  $CaCO_3$  produced by hydrolysis of  $CaCN_2$ . Arthur Fleischer

Reworking of the products of alkaline absorption of nitrogen oxide tailings (inversion). V. F. Gogin and M. A. Minovich. *Khimstroï* 5, 2470–3 (1933).—In the conversion of  $NH_3$  to  $HNO_3$ , the absorption of the escaping lower oxides of N with alkalies (26–8° Bé. calcined  $Na_2CO_3$ ) was carried on in Fe scrubbers at 18–20° (gases at 25°). The resulting product, on evapn., gives a mixt. contg. 19%  $NaNO_2$  and 73%  $NaNO_3$ , and as such is not suited for the dye and fertilizer industry, and must be recovered by conversion to  $NaNO_3$ . In the oxidation the best results were obtained by adding  $HNO_3$  to the liquor at 52–5° for 7–10 hrs., constantly maintained at 3–5% acidity, and stirred with rapid current of air. The app. was lined with granite or with acid-resisting tiles set in asphalt. Chas. Blanc

The soda industry of Berezniki and new sources of raw material. G. V. Petrov. *Khimstroï* 5, 2494–6 (1933).—

A discussion is given to future utilization of waste NaCl obtained in the extrn. of KCl from carnallite and sylvinit in the production of  $Na_2CO_3$ . Chas. Blanc

The absorption of carbon monoxide by solutions of copper ammonium salts. N. M. Zhavoronkov and P. M. Reshchikov. *J. Chem. Ind. (Moscow)* 1933, No. 8, 41–9.— $CuNH_4$  formate absorbs CO more readily than the lactate, but the soln. is less stable and cannot be regenerated as well. Both are superior to the chloride and acetate. At least 20 g. per l. of  $Cu^{++}$  should be present in the soln. to prevent sepn. of free Cu. The concn. of  $NH_3$  in the soln. should be 123–150 g. per l. Absorption occurs best at 0–20°, but in com. practice 15–20° is sufficient. Regeneration of the soln. should take place at 70–80° and 1 atm. or less. H. M. Leicester

Fluorine. I. Fusao Ishikawa and Toyosaku Murooka. *Science Repts. Tôhoku Imp. Univ.*, 1st Ser. 22, 1155–62 (1933).—See C. A. 25, 5518. G. G.

A comparison of various methods for purifying argon from nitrogen and hydrogen. I. M. Taraskov. *J. Tech. Phys. (U. S. S. R.)* 2, 425–41 (1932).—Heated layers of Ca dust or arc discharge with Ca electrodes are better than methods using Mg or K. P. H. Rathmann

Researches in the domain of fixed nitrogen. L. M. Fridberg. *Khimstroï* 5, 2467–70 (1933).—Various phases of the production and conversion of synthetic  $NH_3$  are discussed. Chas. Blanc

The preparation of sulfur from sulfur dioxide. VII. The reaction between sulfur dioxide and hydrogen. N. F. Yushkevich, V. A. Karzhavin, A. V. Avdeeva and T. T. Krechemov. *J. Chem. Ind. (Moscow)* 1933, No. 8, 50–8; cf. C. A. 26, 4685.—At 500–800°,  $H_2$  reacts almost completely with  $SO_2$ , but only 40–60% yields of S result. The rest of the S goes into  $H_2S$ , and can be recovered by cooling the gas mixt. to 200–50° and passing it over Fe ore or bauxite, or by passing the  $H_2S$  with  $SO_2$  into  $H_2O$

below 100°. The data of Terres, Schultze and Fortkord (C. A. 26, 2558) for equil. of the reaction between  $H_2$  and  $SO_2$  are incorrect. H. M. Leicester

A study of catalysts for the conversion of methane. V. A. Karzhavin, I. M. Boguslavskii and Z. M. Smirnova. *J. Chem. Ind. (Moscow)* 1933, No. 8, 31-40.—About 1.5-3.0 g. of Ni deposited on 100 g. of porous chamotte is an active catalyst for the conversion of  $CH_4$  by  $H_2O$  and does not lose its activity on long use.  $MgO$  may be used as an activator if the temp. of the reaction does not rise above 1000°. From 0.03 to 0.5% of sulfides in the gas causes a slight preliminary decrease in the activity of the catalyst, but after this has occurred, the activity remains unchanged. H. M. Leicester

Advances in the manufacture of synthetic masses, especially those like linoleum. A. Foulon. *Nitrocellulose* 4, 208-11(1933).—A review of recent literature.

E. M. Symmes  
Litharge-glycerol cement. H. Stäger, H. Zschokke and J. P. Bohnenblust. *Kolloid-Z.* 65, 319-33(1933); cf. C. A. 23, 3311.—The properties of a poured cement,  $P$  (a mixt. of 2 mols.  $PbO$  per mol. of glycerol was used) were compared with those of a troweled cement,  $T$ , in which a mixt. of 3 $PbO$ :1 glycerol was used. The  $PbO$  was a com. grade; the glycerol contained 13%  $H_2O$ . Photomicrographs show a similar structure, contg. unchanged  $PbO$  particles, though  $P$  is somewhat looser. Shear strength,  $S$ , between cement and steel, was independent of cement thickness from 3 to 15 mm., of the height of cement from 30 to 200 mm., and practically independent of the steel pipe diam. from 35 to 195 mm. The strength of the cement is much higher than the above  $S$ , which therefore measures the tenacity of bonding. The temp. of set from 10° to 30° has no effect on  $S$ .  $S$  depends on the nature of the surface, increasing with roughness.  $T$  has a higher tensile strength; tensile strength increases for both  $T$  and  $P$  with temp. Porosity detns. by rate of flow of  $H_2$  and  $N_2$  showed a dense structure.  $T$  shows a linear change with temp., with densest structure at 30°. Detns. of  $S$  after aging in a  $CO_2$  atm. for 8 weeks show an increase for  $T$  and a decrease for  $P$ .  $CO_2$  detns. showed no differentiation of the various cements. Microscopic studies reveal that in  $T$ , the  $CO_2$  penetrates the fine pores, forming a network of  $PbCO_3$ , while in  $P$  a strongly swollen carbonate with no inner strength forms. Aging in mineral oil at 110° had no effect on the properties. Arthur Fleischer

The casein industry at home and abroad. P. F. Brookens. *Natl. Butter and Cheese J.* 24, No. 23, 12-14(1933).

A. H. Johnson  
The determination of mineral matter of industrial casein. Jean Pien and S. Herschdoerfer. *Lait* 13, 1081-9(1933).—It was found that the ash content of com. casein as detd. by simple incineration was too high, because of fixation of org. P and the presence of unoxidized C. Incineration was therefore conducted in the presence of an added alkali (5 cc. of a soln. of  $Ca(NO_3)_2$  or  $Ca(C_2H_3O_2)_2$  with  $CaO$  content of 30 g. per l. per 5 g. sample of casein). This method allows more complete oxidation of org. matter and fixes all the org. P. From the ash thus obtained subtract the  $CaO$  added and the total  $P_2O_5$  of av. pure casein. The results obtained by this method were lower than those obtained by simple incineration and were considered to represent more accurately the true ash content of com. casein. A. H. Johnson

Phosphoric acid esters as substitutes for camphor. Schmidt. *Celluloid u. Plastische Massen* 33, No. 33; *Gummi-Ztg.* 47, 1067-8(1933).—A review of the numerous compds. so far utilized. C. C. Davis

Flotation of heavy spar. J. Hamann. *Metall u. Erz* 30, 455-7(1933).—Methods are given for sepn. by flotation of heavy spar from quartz, mica, carbonates, fluorspar and Fe and Mn oxides. H. Stoertz

Products of thermal refining of graphite and graphitized coal. V. S. Veselovskii and V. S. Levina. *Mineral. Suir'e* 8, Nos. 8-9, 25-9(1933); cf. C. A. 26, 3879.—The dispersion of thermally refined graphites and graphitized anthracite was indirectly detd. by the velocity of combustion and elec. cond. The results obtained in the

use of the products in arts and industry are discussed.

Chas. Blanc

The use of pyrites containing carbon. I. The fundamentals of burning pyrites containing carbon. K. V. Khodakov. *J. Chem. Ind. (Moscow)* 1933, No. 8, 66-7.—A diagram is given to show the relation between the percentage of  $SO_2$ , excess air and compn. of the pyrites when the latter are burned. II. The possibility of using pyrites containing carbon in the contact system. S. Buikhovskii. *Ibid.* 67-9.—If account is taken of the extra  $O_2$  required, such pyrites are suitable for burning in the contact system. H. M. Leicester

The culture of certain silicate gardens. James G. Vail. *Ind. Eng. Chem.* 26, 113-18(1934).—A review of the properties and uses of silicates. P. J. Wilson, Jr.

New flotation agents. W. Hälbich. *Metall u. Erz* 30, 431-3(1933).—In the flotation of heavy spar and dolomite,  $Utinol$  HC was used as a flotation agent. It is a mixed sulfonated alc. and fat, not hydrolyzed by  $H_2O$ , and stable to lime, acid, alkali and salt. H. Stoertz

The complete utilization of *Caesalpinia spinosa* (Mol.) Kuntze. Angelo Castiglioni. *Boll. ufficiale staz. sper. ind. pelli mat. concianti.* 11, 314-19(1933).—The seeds of *Caesalpinia spinosa* (Mol.) Kuntze can be made to furnish a gum, which offers promising possibilities of use in plastic masses, in finishing leather and in textile-finishing operations. J. W. Perry

House ants and their control. Thomas J. Headlee. N. J. Agr. Expt. Sta., *Circ.* 265, 1-4(1933).—A very effective ant poison consists of the following sirup: granulated sugar 4 lb., water 4 pints, cryst. tartaric acid 3 g., and 0.25 oz. of  $Na_2HAsO_4$  dissolved in 3 fl. oz. of water. After cooling, add the  $Na_2HAsO_4$  to the sugar sirup together with  $\frac{1}{2}$  lb. of honey and mix thoroughly. C. R. Fellers

Com. hydrogenation processes [hydrogenation of N to  $NH_3$ ] (Bosch) 13. Heating solids, liquids or gases [manuf. of H and CO] (Ger. pat. 588,213) 13.

Rahm, Louis F.: Plastic Molding: An Introduction to the Materials, Equipment and Methods Used in the Fabrication of Plastic Products. New York: McGraw-Hill Book Co., Inc. 246 pp. \$3.

Hypochlorous acid. Solvay et Cie. Fr. 754,531, Nov. 8, 1933.  $HOCl$  is made by the continuous action on a current of solns. of alkali or alk. earth hypochlorites, of a rapid and regular equiv. amt. of  $Cl$  flowing in the same or opposite direction, while the  $HOCl$  formed is continuously evacuated. Solns. of suspensions of hydroxides may be used instead of hypochlorites.

Hydrocyanic acid. Ges. für Kohlentechnik m. b. H. (Wilhelm Glud and Konrad Keller, inventors). Ger. 576,531, Nov. 18, 1933 (Cl. 12k. 11). See Fr. 752,206 (C. A. 28, 862).

Hydrocyanic acid. Wilhelm Pip. Ger. 586,861, Oct. 27, 1933 (Cl. 12k. 8).  $HCONH_2$ , mixed with steam or steam and indifferent gases, is led over catalysts at high temps. The steam, etc., is pre-heated to a temp. which, with the reaction temp., raises the catalyst to the desired heat.

Nitric acid. Nikodem Caro, Albert R. Frank, Werner Siebert, Rudolph Wendlandt and Thomas Fischer. U. S. 1,939,162, Dec. 12. In producing concd.  $HNO_3$  from gas mixts. contg. N oxides, or from liquid N tetroxide, water or aq.  $HNO_3$  and O or O-contg. gases, a large portion of the primary substance is converted at a temp. of about 100° and the reaction is completed at a diminishing temp. of from 100° to 70° (the pressure remaining between 50 and 200 atm. during the process).

Nitric acid. Hermann Frischer. Fr. 754,426, Nov. 7, 1933. Oxides of N obtained by combustion of  $NH_3$  and from other sources are freed by filtration from acid and water in the form of fog, and treated by  $H_2SO_4$  in 2 stages. In the 1st stage an acid is used of such a concn. that the gases are dried but practically no nitrososulfuric acid is

formed, and the gases are absorbed in the 2nd stage. The acid from the 2nd stage is denitrified by indirect heating so as to obtain an acid of the same concn. as that used for the concn.

**Nitric acid.** Hermann Frischer. Fr. 754,711, Nov. 13, 1933. In making  $\text{HNO}_3$  of high concn. by means of dehydrating agents such as  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ , in columns or like app., the heating is effected from the exterior with the simultaneous introduction of steam into the mixt. of acids. The process may be carried out in the presence of residual  $\text{H}_2\text{SO}_4$  contg. nitrosulfuric acid.

**Nitric acid.** Harry Pauling. Fr. 755,056, Nov. 18, 1933.  $\text{HNO}_3$  is made at a low temp. from oxides of N or a gaseous mixt. contg. them, by passing them and an absorption acid in countercurrent through heat exchangers before and after traversing a cooling basin in which the very low temp. necessary for the process reigns. An app. is described.

**Phosphoric acid.** George F. Moore (to U. S. Phosphoric Products Corp.). U. S. 1,940,689, Dec. 26. In a continuous countercurrent decantation process of mfg.  $\text{H}_3\text{PO}_4$  from phosphatic material by the use of  $\text{H}_2\text{SO}_4$ , the size of the  $\text{CaSO}_4$  crystals formed is increased by decreasing the size of particles of phosphatic material used in the process.

**Sulfuric acid.** I. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauff, inventors). Ger. 585,586, Oct. 23, 1933 (Cl. 12f. 25). Addn. to 573,129 (C. A. 27, 4885).  $\text{H}_2\text{SO}_4$  of any desired concn. is prepd. by immersing in water perforated vessels contg. appropriate reagents other than  $\text{SO}_2$ , e. g., oleum,  $\text{HSO}_3\text{Cl}$ ,  $\text{H}_2\text{S}_2\text{O}_7$  or  $\text{SO}_2\text{Cl}_2$ .

**Mixed acid solutions.** I. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauff, inventors). Ger. 585,473, Oct. 4, 1933. Mixts. of chlorides of P with salts of  $\text{HSO}_3\text{Cl}$  are packed in containers which are perforated at the place of use and thrown into water, this yielding solns. of mixed acids useful, e. g., for preserving green fodder and pickling metals.

**Ammonia synthesis.** Henry S. Loud (to Atmospheric Nitrogen Corp.). U. S. 1,938,598, Dec. 12. A gas mixt. comprising H and N together with inert constituents (such as occur in water gas made from coal) is subjected to catalytic  $\text{NH}_3$  synthesis in a cyclic gas circulatory system under pressure; a portion of the gas circulating in the system is diverted and addnl. fresh gas is supplied in suitable regulated quantity to maintain the inert content of the cyclic system at a predetd. value, and the diverted portion of the gas is subjected to catalytic  $\text{NH}_3$  synthesis and  $\text{NH}_3$  removal in a second cyclic gas circulatory system. Various features of app. arrangement are described. Cf. C. A. 28, 585<sup>2</sup>.

**Ammonia synthesis.** Arthur E. Hecker (to Mathieson Alkali Works). U. S. 1,940,860, Dec. 26. In a process involving circulating a mixt. contg. H and N cyclically over a catalyst, then through an  $\text{NH}_3$  separator, and then again over the catalyst, make-up gases originally contaminated with  $\text{CO}_2$  are supplied to the circulating gas mixt. leaving the  $\text{NH}_3$  separator and  $\text{NH}_3$  carbonate formed solely by reaction of  $\text{CO}_2$  present as an impurity in such make-up gases is sepd. from the resulting gaseous mixt., as a solid, before the remaining gas mixt. is passed over the catalyst. An arrangement of app. is described.

**Hydrated alkali salts.** I. G. Farbenind. A.-G. (Robert Griesbach and Karl Neundlinger, inventors). Ger. 586,506, Oct. 21, 1933 (Cl. 12f. 15). Hydrated alkali salts readily converted to the anhyd. form are brought to globular form by subjection to a dry pre-heated air current in a rotary drum at temps. below the m. p.

**Alkali cyanides.** Grangers Manufacturing Co. Fr. 754,970, Nov. 17, 1933. White alkali cyanides are obtained by heating them to a pt. considerably above the m. p., e. g., to about  $1200^\circ$ , and cooling relatively slowly to the m. p. A small amt. of air or other oxidizing agent may be introduced during the heating. Fr. 754,971. Solns. of alkali cyanides are dried by heating rapidly a thin layer thereof to a pt. about the b. p. of the soln.

<sup>1</sup> The layer of cyanide formed is removed rapidly from the moist air.

**Alkali phosphates from ferrophosphorus.** Victor Chemical Works. Brit. 398,437, Sept. 14, 1933. Duplicate of U. S. 1,926,747 (C. A. 27, 5903). Addnl. information is given.

**Eliminating manganates in the production of tri-alkali phosphates from ferrophosphorus.** George Klein (to Victor Chemical Works). U. S. 1,939,305, Dec. 12.

<sup>2</sup> In a process involving the heating of ferro-P contg. Mn together with an alkali hydroxide or carbonate, formation of alkali manganate is prevented by the use of a 0.5–5.0% excess of the ferro-P.

**Alkali silicates.** Wilhelm Schwarzenauer. Ger. 588,200, Nov. 14, 1933 (Cl. 12f. 38). See Fr. 681,557 (C. A. 24, 4360).

**Cellular solid alkali silicate.** John W. Battersby.

<sup>3</sup> U. S. 1,939,290, Dec. 12. For the prepn. of a cellular product which is moisture resisting and suitable for thermal and elec. insulation, a water-contg., colloidal, readily sol. alkali silicate contg. about 3.5–4.0 parts  $\text{SiO}_2$  to 1 part  $\text{Na}_2\text{O}$  is heated to  $200\text{--}500^\circ$ .

**Alkali metal sulfates.** Oskar Kaselitz. U. S. 1,939,174, Dec. 12. A double sulfate contg. an alkali metal sulfate such as  $\text{K}_2\text{SO}_4$  in combination with another sulfate such as  $\text{MgSO}_4$  which is more readily sol. in water at a temp. between the cryohydric point and the normal b. p. of its soln. is mixed at such a temp. with water in such proportions that the last-mentioned sulfate is completely dissolved and may be sepd. as a substantially satd. soln.

**Cyanides.** Edward J. Franke (to Grangers Manufacturing Co.). Brit. 398,454, Sept. 14, 1933. Alkali metal cyanides are decolorized by heating to considerably above their m. ps. and cooling relatively slowly to near, but above, their f. ps. They may then be cooled to ordinary temp. at any desired rate. During the process the C is oxidized by the cyanates and carbonates present. A small quantity of air or other oxidizing substance may be added to the fused mass.

**Fluosilicates.** Brander Farbwerke, Chemische Fabrik G. m. b. H. and Emil G. Abel. Brit. 398,403, Sept. 14, 1933. See Fr. 741,502 (C. A. 27, 2766).

**Fluosilicates.** Elektrochem. Fab. G. m. b. H. Ger. 588,875, Nov. 29, 1933 (Cl. 12f. 38.04). Addn. to 553,376 (C. A. 26, 5181). Concd.  $\text{SiF}_4$  prepd. by decomp.  $\text{Na}_2\text{SiF}_6$  in *vacuo*, is used in the process of Ger. 553,376.

**Peroxides, etc.** Oesterreichische Chemische Werke G. m. b. H. Brit. 399,040, Sept. 28, 1933. See Fr. 750,125 (C. A. 28, 863<sup>9</sup>).

**Metal carbonyls.** Leo Schlecht and Max Naumann (to I. G. Farbenind. A.-G.). U. S. 1,941,111, Dec. 26. In the production of a metal carbonyl such as that of Fe by acting with CO on a carbonyl-forming material, the supply and withdrawal of fluids take place from a plurality of zones of the reaction space. App. is described.

**Alumina.** Max Buchner. Ger. 535,952, Sept. 21, 1933 (Cl. 12m. 6).  $\text{Al}_2\text{O}_3$  is obtained by treating crude aluminiferous material with  $\text{HNO}_3$ , treating the product with a limited amt. of alkali fluoride, and forming  $\text{Al}_2\text{O}_3$  from the resulting  $\text{AlF}_3$ . Thus, a mineral contg.  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  is treated with  $\text{HNO}_3$  to give  $\text{Al}(\text{NO}_3)_3$  and  $\text{SiO}_2$ . The  $\text{Al}(\text{NO}_3)_3$  is treated with  $\text{NaF}$  to give  $\text{AlF}_3$ . This is treated with water or  $\text{SiO}_2$  to give  $\text{Al}_2\text{O}_3$ . Cf. C. A. 27, 4634.

**Aluminum hydroxide.** The Electric Smelting and Aluminum Co. Ger. 587,294, Nov. 1, 1933. See Brit. 382,366 (C. A. 27, 4355).

**Aluminum nitrate from silicates such as leucite.** Alberto C. Blanc. U. S. 1,940,842, Dec. 26. In order to reduce the quantity of  $\text{HNO}_3$  required for sepg. Al nitrate from the soln. resulting from the action of  $\text{HNO}_3$  on material such as leucite, the acid soln. of nitrates from which the Al nitrate is to be sepd. is concd. by evapg. it down to about 50% its original vol., to eliminate water contained in the soln. as well as a portion of the water normally required for the crystn. of the Al nitrate, and there is then added to the concd. soln. the amt. of concd.  $\text{HNO}_3$  required for the sepn. and crystn. of Al nitrate (a saving

of over half the  $\text{HNO}_3$  otherwise required being effected by reason of the concn.).

**Aluminum sulfate.** Metallges. A.-G. Ger. 589,330, Dec. 6, 1933 (Cl. 12m. 7). An alk. earth aluminate or material contg. it, e. g., alumina cement or a suitable slag, is treated at atm. or slightly raised temp. and at atm. pressure in the presence of water with  $\text{SO}_2$  and O or gases contg. them. Crude alk. earth aluminate prep'd. in known manner from bauxite, clay, etc., may be treated and gases of low  $\text{SO}_2$  content may be used. Numerous details are given, and methods of sepg. the  $\text{Al}_2(\text{SO}_4)_3$  soln. from the alk. earth sulfate also formed are described.

**Aluminum sulfostearate.** Alexander Horwitz. U. S. 1,939,169, Dec. 12. Stearic acid is sulfonated with  $\text{H}_2\text{SO}_4$  and the product is washed and then saponified with an alkali metal comp'd. and the resulting product is further treated with a soln. of  $\text{Al}_2(\text{SO}_4)_3$ .

**Ammonium thiocyanate.** Wilhelm Kraus. Ger. 564,784, Sept. 26, 1933 (Cl. 12o. 17.03).  $\text{NH}_4\text{CNS}$  or  $(\text{NH}_4)_2\text{CS}$  is prep'd. by leading  $\text{NH}_3$  into an alc. soln. of  $\text{CS}_2$  quantitatively, the resulting comp'd. being filtered off, washed with water and heated till no further  $\text{H}_2\text{S}$  is evolved. On evapg. off the water  $\text{NH}_4\text{CNS}$  remains. This is converted to  $(\text{NH}_4)_2\text{CS}$  by heating to above its m. p.

**Ammonium thiocyanate.** Ges. für Kohlentchnik m. b. H. (Wilhelm Gluid, inventor). Ger. 586,587, Oct. 23, 1933 (Cl. 12k. 11). Crude  $\text{NH}_4\text{CNS}$  obtained from coke ovens is purified by forming a sat'd. soln. in cold water, sepg. the solid impurities and evapg. and crystg. the soln. Cf. C. A. 27, 1105.

**Dibarium phosphate.** Kali-Chemie A.-G. Ger. 585,518, Oct. 4, 1933. Addn. to 582,925 (C. A. 28, 864<sup>4</sup>). The  $\text{BaHPO}_4$  pptd. during the prep'n. of  $\text{H}_2\text{O}_2$  from  $\text{BaO}_3$  and  $\text{H}_2\text{PO}_4$  is worked up by first treating with  $\text{H}_2\text{PO}_4$  to convert it to sol.  $\text{Ba}(\text{H}_2\text{PO}_4)_2$ ; insol. impurities are then removed and the soln. treated with  $\text{HCl}$  or  $\text{HNO}_3$  to give  $\text{BaCl}_2$  or  $\text{Ba}(\text{NO}_3)_2$  and  $\text{H}_2\text{PO}_4$ .

**Beryllium fluoride.** Compagnie de produits chim. et électrométallurgiques Alais, Froges et Camargue. Fr. 42,883, Nov. 15, 1933. Addn. to 742,619 (C. A. 27, 3566).  $\text{BeF}_2$  is prep'd. from  $\text{BeF}_2 \cdot \text{NaF}$  or  $\text{BeF}_2 \cdot \text{KF}$  in soln. or aq. suspension by the action of gaseous  $\text{SiF}_4$ . Cf. C. A. 28, 864<sup>7</sup>.

**Nitrogenating calcium carbide.** Bayerische Stickstoffwerke A.-G. Ger. 581,868, Aug. 4, 1933. Addn. to 572,325 (C. A. 27, 2889). App. for charging the carbide holders is described.

**Calcium cyanamide.** Akt.-Ges. für Stickstoffdünger (Ernst Winter and Herbert Polack, inventors). Ger. 585,141, Oct. 3, 1933. See Fr. 741,264 (C. A. 27, 2767).

**Calcium hypochlorite.** Joseph A. M. W. Mitchell and Francis T. Meehan (to Imperial Chemical Industries Ltd.). U. S. 1,940,557, Dec. 19. See Brit. 368,306 (C. A. 27, 2250).

**Apparatus for granulating calcium nitrate and ammonium nitrate mixtures.** Norsk Hydro-Elektrisk Kvaestofaktieselskab. Ger. 580,025, Dec. 1, 1933 (Cl. 16.6). Addn. to 579,118 (C. A. 27, 4621).

**Treating phosphate rock to form calcium nitrate, etc.** Erling Johnson (to Odda Smelteverk A/S). U. S. 1,939,351, Dec. 12. Phosphate rock is dissolved in  $\text{HNO}_3$  and  $\text{Ca}(\text{NO}_3)_2$  thus formed is sepd. by crystn.; one portion of the soln. of  $\text{H}_2\text{PO}_4$  sat'd. with  $\text{Ca}(\text{NO}_3)_2$  which is obtained as mother liquor from a prior crystn. is added in the dissolving operation with  $\text{HNO}_3$ , and a second portion of the mother liquor is supplied to the reaction product of phosphate rock and acid during the crystn. of the  $\text{Ca}(\text{NO}_3)_2$ .

**Lead oxide.** Cecil H. P. Harden. Australia 9364/32, Oct. 5, 1933. An app. is described for oxidizing Pb by air comprising a rotating oxidizing chamber having revolving paddles for pulverizing the molten Pb.

**Dehydrating magnesium chloride, etc.** Joseph Blumenfeld (to Société de produits chimiques des terres rares). U. S. 1,940,620, Dec. 19. For the partial dehydration of chlorides of Mg, of Ce and of earths of the Ce class which are subject to decompn. by heating, the chloride contg. water is subjected to a sudden heating by contact with a

surface heated to about 400–500°, and the product is then further heated in an atm. contg.  $\text{HCl}$  gas. App. is described.

**Magnesium hydroxide.** American Zinc, Lead & Smelting Co. Fr. 755,409, Nov. 24, 1933.  $\text{Mg}(\text{OH})_2$  is made by adding  $\text{NH}_3$  to a soln. of  $\text{MgSO}_4$  in water, approx. in 3 times the theoretical amt. and recovering the  $\text{Mg}(\text{OH})_2$ .

**Utilizing nitrosyl chloride.** Kali-Forschungs-Anstalt G. m. b. H. Brit. 398,187, Sept. 7, 1933. See Fr. 731,230 (C. A. 27, 814).

**Decomposition of nitrosyl chloride.** Kali-Forschungs-Anstalt G. m. b. H. (Oskar F. Kaselitz and Bruno Uebler, inventors). Ger. 526,476, Dec. 7, 1933 (Cl. 12i. 26).  $\text{NO}$  and  $\text{Cl}$  are obtained by heating  $\text{NOCl}$  to its disoccn. temp. (about 700°) and rapidly cooling the products in the presence of air. The disoccn. temp. of the  $\text{NOCl}$  may be reduced to 250–300° if a catalyst is present, e. g.,  $\text{MnO}_2$ ,  $\text{Fe}_2\text{O}_3$  or  $\text{Cr}_2\text{O}_3$ . The  $\text{NO}$  and  $\text{Cl}$  may be sepd. by liquefaction and fractional distn. Cf. C. A. 27, 814.

**Decomposition of nitrosyl chloride.** I. G. Farbenind. A.-G. (Infrid Petersen and Hans Bernhard Seeborn, inventors). Ger. 589,072, Dec. 1, 1933 (Cl. 12i. 3).  $\text{NOCl}$  and gases contg. O are led at a raised temp. not exceeding 600° over a contact mass such as silica gel.  $\text{NO}$  and  $\text{Cl}$  are obtained. The reaction may be effected in stages, and the  $\text{Cl}$  may be sepd. after each stage, e. g., by adsorption. Cf. C. A. 27, 3566.

**Potassium carbonate.** Kali-Chemie A.-G. Ger. 585,421 and 585,422, Oct. 3, 1933, 585,423, Oct. 13, 1933, 585,424, 585,425 and 585,426, Oct. 3, 1933. In the manuf. of  $\text{K}_2\text{CO}_3$  by treating  $\text{KCl}$  and  $\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$  (I) with  $\text{CO}_2$  to form  $\text{MgCl}_2$  and  $\text{MgCO}_3 \cdot \text{KHCO}_3 \cdot 4\text{H}_2\text{O}$  (II), which is then decompd. with water at an elevated temp., the insol. residue (I contg.  $\text{Mg}(\text{OH})_2$ ) from the decompn. of II is treated in water with  $\text{CO}_2$  to produce a soln. of  $\text{Mg}(\text{HCO}_3)_2$  (III), which is heated to regenerate I (585,421). The decompn. of II with water is interrupted at an intermediate stage, and the insol. portion of the mixt. is sepd. and reheated with water or with a soln. of III, if desired at a lower temp. The mother liquor from the second stage may be used as the aq. medium for the first stage, with further addn. of III if desired (585,422). Fresh I, required to replace that lost as  $\text{MgCl}_2$ , is separately converted into II and, if desired, reconverted into I before it is introduced into the process. The accumulation of  $\text{MgO}$  and other impurities in the process is thus checked (585,423). I may be prep'd. in a coarse granular form by incompletely neutralizing a soln. of III with  $\text{MgO}$  or  $\text{Mg}(\text{OH})_2$  (585,424). I obtained in the process, or prep'd. for use in the process, may be purified by sedimentation in water (585,425). The decompn. of II with water is effected under conditions yielding a soln. contg. less than 75 g. per l. of  $\text{KHCO}_3$ , whereby the formation of I in a condition suitable for reuse is promoted (585,426). Cf. C. A. 27, 4887.

**Potassium carbonate.** Alfred Mentzel. Ger. 585,427, Oct. 3, 1933. Addn. to 570,471 (C. A. 27, 2539). The mixt. of  $\text{K}_2\text{SO}_4$ , C and  $\text{CaO}$  used in the process of Ger. 570,471 is finely ground and then briquetted before it is treated with N.

**Potassium nitrate.** Kali-Forschungs-Anstalt G. m. b. H. (O. F. Kaselitz and Bruno Uebler, inventors). Ger. 539,172, Sept. 19, 1933 (Cl. 12i. 26).  $\text{KCl}$  and  $\text{HNO}_3$  are made to react in accordance with the equation:  $3\text{KCl} + 4\text{HNO}_3 = 3\text{KNO}_3 + \text{NOCl} + \text{Cl}_2 + 2\text{H}_2\text{O}$ . The mixt. of  $\text{NOCl}$  and  $\text{Cl}$  is passed over Fe at atm. temp., this yielding  $\text{NO}$  and the double comp'd.  $\text{FeCl}_2 \cdot \text{NOCl}$ . The  $\text{NO}$  is worked up to  $\text{HNO}_3$  in known manner. The double comp'd. is decompd. into  $\text{NOCl}$  and  $\text{FeCl}_2$  by the action of heat or water, the  $\text{NOCl}$  being mixed with fresh  $\text{Cl-NOCl}$  mixt., and the  $\text{FeCl}_2$  being worked up in any convenient way. Cf. C. A. 27, 2539.

**Potassium nitrate.** Kali-Forschungs-Anstalt G. m. b. H. (O. F. Kaselitz and Walter Katz, inventors). Ger. 540,206, Oct. 9, 1933 (Cl. 12i. 26). Addn. to 539,172 (preceding abstr.). The mixt. of  $\text{NOCl}$  and  $\text{Cl}$  obtained in the process of Ger. 539,172 is passed over Fe or Fe-



(NO<sub>2</sub>)<sub>2</sub> at about 300°, whereby all the NOCl is decompd., and NO and FeCl<sub>3</sub> are obtained. The heat of combustion of NH<sub>3</sub> may be used to heat the mixt. to the reaction temp.

**Silica.** I. G. Farbenind. A.-G. (Fritz Stöwener and Josef König, inventors). Ger. 585,938, Oct. 18, 1933. SiO<sub>2</sub> is obtained by treating porous slag with HNO<sub>3</sub>, *e. g.*, at 40–60°.

**Extracting borax from ore.** Thomas M. Cramer (to Pacific Coast Borax Co.). U. S. 1,940,118, Dec. 19. In producing "commercial" borax from an ore contg. prismatic borax and gang material, the ore is heated under super-atm. pressure to a temp. substantially above 100° for effecting the soln. of the borax in its own water of crystn. App. is described.

**Sodium cyanide.** Gesellschaft für Kohlentechnik m. b. H. Brit. 398,732, Sept. 21, 1933. See Fr. 751,191 (C. A. 28, 1150<sup>1</sup>).

**Caustic soda.** Paul Krassa. Ger. 586,972, Oct. 28, 1933 (Cl. 12i. 13). NaOH is prepd. by the action of Fe<sub>2</sub>O<sub>3</sub> on NaNO<sub>2</sub> at high temps. in the presence of air and water vapor and amorphous SiO<sub>2</sub>. Yields of 80–90% are given.

**Trisodium phosphate hydrate-soap crystals.** The Grasselli Chemical Co. Brit. 398,888, Sept. 25, 1933. See U. S. 1,885,905 (C. A. 27, 1108).

**Thorium nitrate.** Chemische Fabrik von Heyden A.-G. (Rudolf Zellmann and Richard Müller, inventors). Ger. 580,980, Oct. 30, 1933 (Cl. 12m. 9). Th(NO<sub>3</sub>)<sub>4</sub> is prepd. by heating Th oxalate to glowing and treating the resulting ThO<sub>2</sub> with concd. HNO<sub>3</sub> at temps. above the b. p. of the latter. The first process is carried out at the lowest possible glowing temp. at which the oxide is formed, *e. g.*, 350–600°.

**Zinc oxide.** Wm. A. Handwerk and Wendel Reiser (to New Jersey Zinc Co.). U. S. 1,940,125, Dec. 19. In the manuf. of ZnO by the zinc retort volatilization process, the formation of "drop-oxide" is inhibited by interposing a layer of air between a stream of the Zn vapor and the side walls of the oxidation chamber. App. is described.

**Zinc oxide.** Metallgesellschaft A.-G. Brit. 398,752, Sept. 21, 1933. See Fr. 753,330 (C. A. 28, 1150<sup>4</sup>).

**Separating ammonia and carbon dioxide.** Nikodem Caro and Albert R. Frank. (Hugo Heimann, inventor). Ger. 588,343, Nov. 15, 1933 (Cl. 12k. 2). Mixts. consisting of or contg. NH<sub>3</sub> and CO<sub>2</sub> are washed at a temp. below 60° with a satd. soln. of CaCl<sub>2</sub>, whereby NH<sub>3</sub> is absorbed without substantial absorption of CO<sub>2</sub>. The CaCl<sub>2</sub> soln. may be used until it contains a high concn. of NH<sub>3</sub>, *e. g.*, 150 g. per l. Details and exptl. results are given.

**Carbon monoxide and hydrogen.** "S. I. R. I." Società italiana ricerche industriali. Fr. 755,493, Nov. 25, 1933. See Swiss 162,458 (C. A. 28, 588<sup>4</sup>).

**Hydrogen peroxide; barium salts.** Kali-Chemie A.-G. Brit. 398,399, Sept. 14, 1933. BaO<sub>2</sub> is caused to react with H<sub>2</sub>PO<sub>4</sub> to produce H<sub>2</sub>O<sub>2</sub> and CaHPO<sub>4</sub> and the CaHPO<sub>4</sub> is treated with volatile acids that form sol. Ba salts, *e. g.*, HCl, HNO<sub>3</sub>, to regenerate the H<sub>2</sub>PO<sub>4</sub>, which may be returned to the process. In a modification the CaHPO<sub>4</sub> is dissolved in H<sub>2</sub>PO<sub>4</sub>, the soln. freed from insol. impurities and treated with the volatile acids. After sepn. of the Ba salts, *e. g.*, by cooling, the H<sub>2</sub>PO<sub>4</sub> may be freed from the volatile acid by distn. HCl is preferably used in excess to ppt. BaCl<sub>2</sub>. After treating the BaHPO<sub>4</sub> with HNO<sub>3</sub> and sepn. the deposited Ba(NO<sub>3</sub>)<sub>2</sub>, the H<sub>2</sub>PO<sub>4</sub> may be treated with Na<sub>2</sub>CO<sub>3</sub> to ppt. the remaining Ba and the soln. may be finally neutralized with further Na<sub>2</sub>CO<sub>3</sub> to form Na<sub>2</sub>HPO<sub>4</sub>, which is sepd. by cooling. Examples are given. Cf. C. A. 28, 268<sup>8</sup>.

**Hydrogen peroxide.** Deberag, Deutsche Beratungsgesellschaft für die chemische und metallurgische Industrie G. m. b. H. Ger. 567,601, Sept. 20, 1933 (Cl. 12i. 16). App. for obtaining H<sub>2</sub>O<sub>2</sub> by direct distn. of aq. solns. of H<sub>2</sub>SO<sub>4</sub> or persulfates is described. Cf. C. A. 27, 4888.

**Hydrogen peroxide.** Deberag, Deutsche Beratungsgesellschaft für die chemische und metallurgische Industrie m. b. H. Ger. 572,112, Oct. 9, 1933, and 572,615,

Oct. 9, 1933 (Cl. 12i. 16). Addns. to 567,601 (preceding abstr.). Further details of the distn. are given.

**Hydrogen peroxide.** J. D. Riedel-E. de Haën A.-G. Ger. 567,602, Nov. 9, 1933 (Cl. 12i. 16). Addn. to 510,064 (C. A. 25, 1043). In distg. H<sub>2</sub>O<sub>2</sub> as described in Ger. 510,064, the soln. is drawn through the app. at a rate above that which gives the max. yield of H<sub>2</sub>O<sub>2</sub>, and the distn. residue is dild. and redistd.

**Sulfur dioxide.** Imperial Chemical Industries Ltd. Fr. 755,255, Nov. 22, 1933. SO<sub>2</sub> is recovered from gases, *e. g.*, gases from the roasting of S ores, by an aq. soln. contg. one or more salts of non-volatile acids, the dissociation consts. of which are between  $1 \times 10^{-3}$  and  $1 \times 10^{-4}$ , measured on a diln. of 40 l. per g. mol. and at 25°. Thus, a soln. of Na citrate, with or without NaH<sub>2</sub>PO<sub>4</sub> or NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> or a salt of lactic or glycolic acid, may be used.

**Sulfur trioxide.** Alling P. Beardsley and Napoleon A. Laury (to Calco Chemical Co.). U. S. 1,941,426, Dec. 26. A mixt. of gases contg. SO<sub>2</sub> and O is passed through a catalytic mass which consists of porous particles of substantially pure silica impregnated with solns. contg. V and Cs. U. S. 1,941,427 relates to the use of a similar catalyst which may contain Rb instead of Cs.

**Hydrogen from methane.** Hans Harter. Ger. 585,419 and 585,420, Oct. 13, 1933 (Cl. 12i. 1). Addns. to 581,986 (C. A. 28, 1150<sup>9</sup>). Further details of the process of 581,986 for producing H by the decompn. of CH<sub>4</sub> by the aid of contact catalysts such as active C steam and O or air are given (585,419). The process may be modified so that the CH<sub>4</sub> is partly oxidized at one stage to give CH<sub>3</sub>O, the waste gases from the process being then allowed to react with CH<sub>4</sub> and steam to give H (585,420). Cf. C. A. 27, 4888.

**Krypton and xenon.** Air liquide, L' (Soc. anon. pour l'étude et l'exploitation des procédés G. Claude). Fr. 755,145, Nov. 20, 1933. The liquid, concd. in Kr and Xe, resulting from an addnl. rectification of liquid O furnished from the principal rectification of air, is partially vaporized and during this vaporization which takes place at the base of the addnl. rectification column, the feeding of liquid O to this column is suppressed. Kr and Xe are thereby extd.

**Burning phosphorus.** Hans Lehrecke (to Metallges. A.-G.). U. S. 1,940,758, Dec. 26. Molten yellow P is fed into contact with a swiftly rotating surface and the resulting spray is mixed with an O-contg. gas and the mixt. is burned. App. is described.

**Sulfur.** Raymond F. Bacon. Ger. 589,084, Dec. 2, 1933 (Cl. 12i. 17). See Brit. 375,798 (C. A. 27, 4039–40).

**Sulfur and sulfates.** I. G. Farbenind. A.-G. (Hans Bähr, inventor). Ger. 588,342, Nov. 15, 1933 (Cl. 12i. 17). Acid solns. contg. sulfites, thiosulfates or polythionates, with or without other salts, are decompd. to yield S and sulfates by forcing them under pressure through an inert liquid medium heated to 150–400°. The liquid medium may be fused S or paraffin wax or an oil. Reaction vessels of Cr-Ni steel or Al are used. Details are given, and app. is described.

**Sulfur from roaster gases.** Raymond F. Bacon. Ger. 585,067, Sept. 28, 1933. See Brit. 364,351 (C. A. 27, 2000).

**Recovering sulfur from gas-purifying compositions.** Vereinigte Stahlwerke A.-G. (Josef A. Bordo, inventor). Ger. 589,073, Dec. 1, 1933 (Cl. 12i. 17). Used gas-purifying compns. contg. S are extd. with a solvent for S, *e. g.*, CS<sub>2</sub>, and the soln. is treated with H<sub>2</sub>SO<sub>4</sub> to decomp. org. impurities. SO<sub>2</sub> formed in the H<sub>2</sub>SO<sub>4</sub> treatment is then eliminated from the soln. by means of gaseous or aq. H<sub>2</sub>S or gases contg. H<sub>2</sub>S, preferably under a slightly raised pressure, and finally the soln. is evapd. to recover S.

**Sulfur recovery from materials such as iron pyrites.** Raymond F. Bacon and Isaac Bencowitz (Bencowitz to Bacon). U. S. 1,939,033, Dec. 12. A charge comprising FeS and a Ca or Mg compd. such as MgO is subjected to the action of a gas contg. free O at an elevated temp. below the fusing point of the charge, while limiting the amt. of free O substantially to that required to form Fe

oxide with the Fe contained in the charge. The liberated S is condensed.

Fine dry sulfur freely miscible with water. Adriaan Nagelvoort (to Delaware Chemical Engineering Co.). U. S. 1,939,403, Dec. 12. Finely ground S is mixed with about 0.05-0.2% of tannin or a sulfite waste liquor prepn.

Active carbon. Holzhydrolyse A.-G. Ger. 589,255, Dec. 4, 1933 (Cl. 89i. 1.02). Lignin suitable for use as raw material for the manuf. of active C is prepd. by subjecting to acid hydrolysis small rods of wood about 5-10 mm. long in the direction of the fiber and of 0.5-3 sq. mm. cross-sectional area.

Apparatus for carbon black manufacture by electrothermal dissociation of organic liquids such as hydrocarbon oils. John J. Jakosky (to Electroblacks Inc.). U. S. 1,941,009, Dec. 26. Structural and operative details.

Lampblack. N. V. de Bataafsche Petroleum Maatschappij. Fr. 754,767, Nov. 14, 1933. The hydrocarbon to be dissocd. is passed through a layer of live flame and near to a radiating surface. An app. is described.

Annaline. Willy Larsson and Gustav Mosebach. Ger. 505,240, Oct. 11, 1933 (Cl. 55c. 2). Neutral annaline for use in the manuf. of paper is prepd. by heating gypsum with C in a blast furnace to 800-1200°, extg. the product several times with hot water and finally neutralizing with hot dil. H<sub>2</sub>SO<sub>4</sub>.

Chloramine. Clark T. Henderson. U. S. 1,940,592, Dec. 19. A soln. formed from Cl and water is brought into contact with CaCO<sub>3</sub> and the resulting product is then combined with NH<sub>3</sub>.

Cryolite. Max Buchner. Ger. 563,873, Sept. 27, 1933 (Cl. 12i. 10). Solns. or suspensions of, or solid, metal fluorides are treated with Al(NO<sub>3</sub>)<sub>3</sub> at low or high temps.

Treating kaolin earths. Emile Soyez and Marcel Cherouvrier. Fr. 42,823, Nov. 4, 1933. Addn. to 736,198 (C. A. 27, 1462). Improved construction of app. is described.

Disintegrating monazite sand. I. G. Farbenind. A.-G. (Rudolf Schulze, inventor). Ger. 585,738, Oct. 7, 1933. Monazite sand is reduced with C, the reduction being carried out with oxides or carbonates as flux, for the rare earth oxides. Three mols. of flux are present for each mol. of earth oxide, and only sufficient C is added to reduce the P<sub>2</sub>O<sub>5</sub>, leaving the rare earth oxides unreduced. The reaction is carried out in a rotary furnace at sintering temp. Preferably an elec. furnace at 1650-1750° is used, the slag being granulated and milled.

Synthetic spinel. I. G. Farbenind. A.-G. Ger. 534,474, Dec. 6, 1933 (Cl. 12m. 6). Yellow synthetic spinel is prepd. by the Verneuil process from a mixt. of Al<sub>2</sub>O<sub>3</sub> about 90% and MgO about 10% to which, as coloring material, both Mn and Fe or compds. thereof have been added in small amt. The mixt. may also contain up to about 2% of ZnO. Cf. C. A. 28, 866<sup>a</sup>.

Apparatus for manufacture of soda ash (and precipitating impurities onto a moving belt). Alexander M. MacDonald. U. S. 1,940,459, Dec. 19. Various details of construction and operation are described, for removing clay, dirt, etc.

Catalysts. N. V. de Bataafsche Petroleum Mij. Fr. 754,604, Nov. 10, 1933. Catalysts for use when treating carbonaceous materials with hydrogenating gases are made by treating a halogen compd. with a sulfurating agent. In examples, WO<sub>3</sub> is heated with an excess of CCl<sub>4</sub> and afterward with H<sub>2</sub>S; molybdenite is heated with HCl to form MoCl<sub>5</sub> and afterward with H<sub>2</sub>S and H.

Metallic catalysts. Owen G. Bennett and Joseph C. W. Frazer (to Catalyst Research Corp.). U. S. 1,940,934, Dec. 26. A supporting material is covered with an amalgam of catalytically active metal and the Hg is removed from the amalgam by vacuum distn. to leave the catalytic metal distributed on the support. Cf. C. A. 27, 2259.

nated porous catalyst. Herrick R. Arnold and (to E. I. du Pont de Nemours & Co.). 19. A porous rigid support such as vacuum to remove absorbed and then is immersed, in a

vacuum, in a soln. of a catalytic compd. such as Al nitrate to prepare a catalyst suitable for use in dehydration reactions. Several examples are given.

Gels. Silica Gel Corp. Brit. 398,517, Sept. 15, 1933. Hard, granular, porous gels, having catalytic or adsorbent properties, are prepd. by peptizing a hydrous oxide "ppt." (as opposed to a true hydrogel) with an org. acid, e. g., HCOOH, AcOH, chloroacetic, and nearly dehydrating the peptized mass, e. g., by subjecting to an air current at 105-150°. The oxide ppts. may be prepd. in an acid or alk. medium, according to the character, and may contain a mixt. of different oxides, e. g., those of Fe, Al, V, Cu, Ni, Ti, Th, Mn, Cr, Zr, Bi, Ga, Be, In, Ce, Sc, Si, Ge, Sn, Ta, Mo and W. An Al gel, thus prepd., may be used to ext. H<sub>2</sub>O vapor from gases contg. carbonaceous matter, since heating to 420-650° to burn out the C does not destroy its efficiency for further adsorption. Cf. C. A. 27, 5906.

Silica gel. Elektrochem. Fab. G. m. b. H. Ger. 587,493, Nov. 4, 1933. SiF<sub>4</sub> is led into aq. H<sub>2</sub>SiF<sub>6</sub> and the ppt. is washed, molded if desired, and dried.

Condensation products from materials such as pectous residues and formaldehyde. Adolf Haverlander (to Albert D. Stewart). U. S. 1,941,349, Dec. 26. An unreacted non-fibrous pectous residue derived from pectocellulose plant material such as wheat straw is caused to react with an aldehyde such as formaldehyde while subjecting the mixt. to agitation and heating, and the reaction is checked before infusible, insol. compds. are formed, to obtain an intermediate fusible, sol. condensation product suitable for satg. fibrous materials and becoming insol. and infusible by further heating under pressure.

Condensation products resembling albumins. Pfeining-Schumacher-Werke G. m. b. H. Ger. 589,236, Dec. 4, 1933 (Cl. 39b. 22). See Brit. 386,065 (C. A. 27, 2002).

Molding compositions. Soc. d'expansion des produits d'art glycero-plastiques (S. E. P. A. G.) (Soc. à r. l.). Fr. 754,568, Nov. 9, 1933. Casein is added to gelatin used for agglomerating molding compns., to prevent the product becoming brittle on drying and reducing shrinkage and deformation on drying.

Moldable compositions. Imperial Chemical Industries Ltd. Fr. 755,280, Nov. 22, 1933. Differently colored layers of moldable PhOH-CH<sub>2</sub>O condensation products are placed in a stratified form in a vessel so that the different layers alternate regularly or irregularly and the whole is heated to 100° or until sufficiently plastic. The plastic mass produced is extruded under pressure and, if desired, broken into fragments.

Moldable materials. Soc. pour l'ind. chim. à Bâle. Fr. 755,146, Nov. 20, 1933. Acid solns. of the condensation products of aromatic amines and aldehydes in the form of gels and contg. fillers, such as sawdust or mica, are pulverized during or after formation, the acid is liberated and the products are washed, dried and compressed to desired shapes.

Mixed polymerization products suitable for making molded articles. Arthur Voss, Ewald Dickhäuser and Werner Starck (to I. G. Farbenind. A.-G.). U. S. 1,939,422, Dec. 12. A product of the mixed polymerization of at least two different esters such as vinyl acetate and vinyl oleate is partially saponified and the saponification mixt. thus formed is reacted upon with an org. compd. such as butyraldehyde so as to form an acetal. Several examples are given.

Plastic compositions. Soc. Nobel française. Fr. 42,857, Nov. 15, 1933. Addn. to 750,350 (C. A. 28, 918<sup>a</sup>). Gramophone disks are made by impressing sheets made from the compns. described in Fr. 750,350, or from a core of inert material covered with sheets made from these compns.

Laminated fibrous material. Roy E. Coleman (to The British Thomson-Houston Co. Ltd.). Brit. 398,618, Sept. 21, 1933. Paper, with a woven cloth or fabric netting imbedded therein, is treated with an aq. soln. or suspension of a resin, dried, stacked in layers and molded under heat and pressure to produce a laminated product. Alk. solns. of (artificial) resins, e. g., shellac, copal,

alkyd resins or aq. solns. obtained in the prepn. of urea- $\text{CH}_2\text{O}$  resins, which may contain some  $\text{PhOH}$  or thiourea, may be used. The aq. colloidal suspensions of alkyd resins described in Brit. 371,627 (C. A. 27, 3639) are also suitable.

**Compositions for manufacturing of molded dust guards for journal boxes or the like.** Harry C. Fisher and Charles L. Keller (to Richardson Co.). U. S. 1,939,492, Dec. 12, 1933.

used with about 5.7 times as much bitumen having substantially no penetration at 32/200/80. A softer compn. contg. a candle-tar substance may be used for parts less subject to wear.

**Putty-like compositions.** I. G. Farbenind. A.-G. (Friedrich Frick, inventor). Ger. 585,353, Oct. 2, 1933. Aq. emulsions of condensations products prepd. from polyhydric alcs., polybasic acids and highly unsatd. higher monobasic fatty acids are mixed with fillers, etc., to form cements or putty-like compns. which may be applied as ground coatings to porous surfaces such as wood.

**Sealing composition.** Jakob Janz. Fr. 754,884, Nov. 16, 1933. A sealing compn. for use cold comprises a dispersion or concd. soln. of a cellulose deriv., particularly the acetate, in very volatile chloroparaffins, e. g.,  $\text{CH}_2\text{Cl}_2$ . Fillers, softening agents giving adhesion, such as phenyl phosphate or acetanilide, fatty substances or resins may also be added.

**Glazing, calking and pointing compositions.** Thomas C. Parr. Brit. 398,057, Sept. 7, 1933. A compn. which retains its plasticity for long periods comprises Al 1-30, oil, e. g., soy-bean, linseed, perilla, cottonseed, olive, rapeseed, corn, etc., about 30, mineral filler, e. g., china clay, Ti white, ground shale or slate, zinc white,  $\text{SiO}_2$ ,  $\text{BaSO}_4$ , etc., 1-50, fibrous material, e. g., asbestos, shredded or ground rope or rags, 1-20% and the remainder a fluid vehicle, e. g., mineral spirits. The preferred compn. is whitening 12, Mg silicate 17, asbestos 5.45, soy-bean oil 30.6, varnish 16.2, mineral spirits 9 and powd. Al 9 parts. Cf. C. A. 27, 1726.

**Casein products.** I. G. Farbenind. A.-G. (Rudolf Bauer and Gustav Manthe, inventors). Ger. 574,841, Oct. 18, 1933 (Cl. 12p. 16). Ester-like high-mol. transformation products of casein which exhibit basic properties are obtained by treating an aq. suspension of casein with  $\text{C}_2\text{H}_5\text{O}$ , its homologs or analogs till an alk. reaction is

The aq. suspension may be made weakly acid by an org. acid, the product being then pptd. by alkali. Examples are given. The products are used in the adhesive and artificial mass industries.

**Artificial horn from casein.** Internationale Galalith-Hoff & Co. (Henri Dumont, inventor). Ger. 588,388, Nov. 14, 1933 (Cl. 39b. 18). The hardening of molded casein compns. by steeping in aq.  $\text{CH}_2\text{O}$  is accelerated by the presence of water-sol. alkali, alk. earth or  $\text{NH}_4$  chlorides or other salts inert to casein. Preferably, the salts are mixed with the casein before molding. Addn. of a little acid or alkali also accelerates the process.

**Coloring artificial horn.** Internationale Galalith-Hoff & Co. (Henri Dumont, inventor). Ger. 589,354, Dec. 6, 1933 (Cl. 39b. 18). See Brit. 380, 826 (C. A. 27, 4042).

**Artificial products.** I. G. Farbenind. A.-G. Fr. 755,048, Nov. 18, 1933. Polyvinyl chloride is submitted to a complementary chlorination by the action of  $\text{Cl}_2$  in a solvent or suspension agent. A depolymerization, during or after the chlorination, may be effected by a suitable elevation of the temp. The products have improved mech. resistance for making varnishes, films, threads, etc.

**Preparing pastes from strong alkali and salt solutions.** I. G. Farbenind. A.-G. (Hans Persiel and Max Kerth, inventors). Ger. 587,365, Nov. 2, 1933. Strong alkali and salt solutions are thickened by treatment with an alkali-sol. cellulose deriv. contg. at least one acid group. Cellulose glycolic acids or hydroxyethylsulfonic acids, prepd. from soda cellulose and  $\text{ClCH}_2\text{COOH}$  or  $\text{ClC}_2\text{H}_4\text{SO}_3\text{H}$ , resp., are suitable. Examples are given.

**Adhesives.** Edward J. J. Knight. Brit. 397,374, Aug. 24, 1933. An adhesive for securing rings of "Gold Seal Cap Compound" (a compn. of rubber latex, gum karaya,

$\text{Na}_2\text{CO}_3$  and bentonite) and other gaskets used in vacuum-sealed canisters comprises soft manila 34, kaolin 33, methylated spirits 28 and castor oil 5 parts. The adhesive may be thinned by aq.  $\text{NH}_3$  and glycerol.

**Adhesive.** Albert Benteli. Fr. 755,147, Nov. 20, 1933. An adhesive contains, e. g., collodion fibers 10, camphor 1, dibutyl phthalate 2, "plastopal" 2, "artificial resin AW 2" 0.5, benzene 5,  $\text{MeOH}$  3, ethylene glycol 4,  $\text{AcOBu}$  2, dioxane 6 and  $\text{AcOEt}$  8 kg.

**Glue product.** Charles H. Campbell. U. S. 1,940,486, Dec. 19. A product which may be used as a cold-water calcimine is prepd. by mixing directly with the soln. of animal glue formed by extn. in the usual way, a finely ground mineral base such as whiting or gypsum, and spray-drying the mixt. in a nebular state in a high-temp. atm. so that the particles of mineral base do not agglomerate and are coated with thin films of glue readily sol. in cold water.

**Variegated composition tiles.** Norman Fredriksen (to Armstrong Cork Co.). U. S. 1,939,045, Dec. 12. A thermoplastic base compn. such as a mixt. of resin and cement is prepd. in a relatively warm, plastic condition, and there are added to it pieces of thermoplastic variegating compn. of relatively cooler and less plastic condition and the mass is formed under pressure while still at a sufficiently high temp. to give the desired plasticity.

**Heat transfer.** Winthrop S. Lawrence (to Kaumagraph Co.). U. S. 1,939,821, Dec. 19. A paper base carries an impressed marking comprising an infusible cellulose deriv. such as nitrocellulose and a plasticizer such as triphenyl phosphate which is fusible at the temp. of transferring and which, when molten, is a solvent of the cellulose deriv. and is stable at the temp. employed. Various formulas are given (cf. C. A. 27, 2543).

**Magnetic articles.** International Standard Electric Corp. Ger. 587,312, Nov. 2, 1933. See U. S. 1,826,711 (C. A. 26, 569).

**Cores for electromagnetic apparatus.** International Standard Electric Corp. Ger. 587,391, Nov. 3, 1933. Particles of magnetic material are united by an insulating binder comprising water glass and a filler such as talc, the water glass used being of such low basicity that the usual addn. of  $\text{CrO}_3$  or other acid to the binder can be omitted. Various details are given.

**Fabrics of artificial fibers.** Kalle & Co. A.-G. (Adolf Dulitz, inventor). Ger. 586,611, Oct. 23, 1933 (Cl. 39a. 170.03). Fabrics suitable for use as windows are formed from a mixture of drawn glass fibers and textile fibers coated with cellulose esters or ethers.

**Removing iron from clay, etc.** I. G. Farbenind. A.-G. (Frederic van Taack-Trakraen, inventor). Ger. 586,588, Oct. 23, 1933 (Cl. 12m. 6). Fe is removed from materials contg.  $\text{Fe}_2\text{O}_3$  by converting the latter into  $\text{FeCl}_3$  by treatment with  $\text{Cl}_2$  under suitable temps., and extg. the  $\text{FeCl}_3$  by water or other solvents. Examples mention the purification of bauxite and kaolin by this method. Cf. C. A. 27, 3052.

**Bipyridyls.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Wilhelm Schulenburg, inventor). Ger. 588,041, Nov. 13, 1933 (Cl. 12p. 1.01). Bipyridyl mixts. are obtained by heating pyridine or its derivs. to 110-160° with an alkali metal compd. having a condensing action and not contg. N, e. g., an alkali hydride or oxide. The reaction is effected in the absence of a solvent or diluent. The products are useful for destroying pests. Examples are given.

**Fixing composition.** Armand Lévy. Fr. 754,446, Nov. 7, 1933. A compn. which does not dry or harden but sticks to any surface contains, e. g., white crepe rubber 32-6, factis 36, elemi resin 4, benzene 13, methylhexalin acid ester of adipic acid 51.6 and chalk 108.1 parts.

**Artificial diamonds.** Hans Karabacek. Ger. 589,144, Dec. 2, 1933 (Cl. 12i. 33). A metal or silicate melt satd. with C is subjected to a fluctuating high pressure in the presence of a compd. from which nascent C seps. During the periods when the pressure is rising, C seps. from the melt as a mixt. of diamond and graphite. Some of this C is redissolved during the periods when the

pressure is falling, but if the duration of these periods is sufficiently restricted, a part of the sepd. diamond remains undissolved and acts as seed for the diamond sepd. during the next period of rising pressure. In one method of procedure, a mixt. of iron shavings, blast-furnace slag, amorphous C and solid  $\text{CO}_2$  or liquid CO is heated to 900–1100° under a hydraulic pressure of 5000 atm. The pressure is then raised to 15,000 atm. in 90 secs., and allowed to fall rapidly after 10–30 secs. The process may then be repeated. App. is described. Diamonds of 5 mm. diam. and 0.25 carat wt. have been obtained.

**Friction material suitable for brake linings, etc.** Mark Shoeld. U. S. 1,941,280, Dec. 26. Felted asbestos is combined with a water-insol. bonding material such as gilsonite or hard pitch and S and the product is molded and dried, the bonding material is rendered infusible (as by heating in air) and the product is then impregnated with an org. compd. such as blown petroleum or asphalt.

**"Mineral wool."** Clarence B. White. U. S. 1,939,329, Dec. 12. A "mineral wool" which is suitable for heat insulation, etc., is made from the waste obtained in the reduction and refining of metal-bearing materials such as blast-furnace slag and has a Cu content of about 0.15–5.0% which serves to prevent brittleness.

**Compound fibrous sheets.** Hendrik J. Prins. Brit. 398,006, Sept. 7, 1933. A combination of rubber, balata, gutta-percha, etc., with mineral and vegetable waxes, e. g., paraffin, montan, is used as the uniting medium in forming compd. sheets of paper, woven fabrics, wood, etc., union being effected by heating to about the softening point and pressing the coated sheets together.

**Cooking utensil of fibrous material impregnated with sodium silicate.** Albert L. Clapp. U. S. 1,941,145, Dec. 26. Receptacles suitable for baking pies are formed of cellulosic fibrous material which is impregnated with a Na silicate soln. of about 5–20°Bé. and then dried out. Asbestos fiber or mica may be added. Cf. C. A. 27, 3077.

**Annular kiln for burning lime with fine coal.** Prager A. Fross-Büssing Werk Komm-Ges. Ger. 585,982, Oct. 14, 1933.

**Heat-evolving compositions.** Paul Tschelnitz. Austrian 135,336, Nov. 10, 1933 (Cl. 12c.). Comps. which evolve heat when moistened with water are prepd. by mixing a powd. metal with a metal sulfide and a suitable electrolyte. A typical compn. contains Fe 92, FeS or  $\text{CuS}$  3 and  $\text{CuSO}_4$  5%. The comps. may contain inert addns., e. g., inorg. colloids or wood meal, and may be used for medical or cosmetic purposes, etc.

**Waterproof compositions.** Carbide & Carbon Chemicals Corp. and Eastman Kodak Co. Fr. 755,175, Nov. 21, 1933. Materials resistant to moisture for making films, sheets, etc., are composed of an org. ester of cellulose, e. g., cellulose acetate united with an impermeabilizing compn. contg. a vinyl resin. The resin may be obtained by simultaneously polymerizing a vinyl halide and a vinyl ester with an aliphatic acid. The impermeabilizing compn. may contain wax 2–45, a gum 5–20, a plasticizing agent 0.25% and vinyl resin the rest, and this compn. is applied in one or more layers or coatings to the sheets of cellulose ester.

**Wetting agents.** Gaïtan P. Lièvre. Fr. 42,888, Nov. 15, 1933. Addn. to 751,422 (C. A. 28, 1213). The alk. neutralization solns. obtained from the residues from petroleum refineries are steam distd. to remove oils, neutralized by hot dil.  $\text{H}_2\text{SO}_4$ , steam distd. to remove volatile impurities and finally dried. The products are used as wetting agents for fibers.

**Wetting, emulsifying and other agents.** Oranienburger Chemische Fabrik A.-G. (Kurt Lindner and Arno Russe, inventors). Ger. 586,066, Oct. 21, 1933 (Cl. 12o. 23.01). Addn. to 582,790 (C. A. 28, 923). Wetting, cleaning and other agents are made by the method of 582,790 under milder conditions. Natural fats, fatty acids, etc., mixed with alcs., ketones or lactones are sulfonated in the presence of water-binding agents.

**Detergents, etc.** Imperial Chemical Industries Ltd., Alfred W. Baldwin and Hugh M. Bunbury. Brit. 398,818, Sept. 11, 1933. Detergent, dispersing, emulsifying and

1 frothing agents are obtained by sulfonating monoalkyl ethers of glycerol in which the alkyl group contains 16–18 C atoms. The starting materials are preferably obtained by the sapon. of the liver oils of elasmobranch fish. The products may be used in *impregnating and tanning* and in the manuf. of *pigments, pastes, insecticides and fungicides*. In examples (1) batyl alc. is sulfonated with pyridine- $\text{SO}_3$  in pyridine or with Na pyrosulfate in pyridine and (2) the mixt. of selachyl, batyl and chimyl alcs. obtained from the liver oil of *Centrophorus granulosus* and *Somniosus microcephalus* is similarly sulfonated. *Cleansing baths for wool*, which foam readily, are prepd. in further examples from the products by soln. in  $\text{H}_2\text{O}$ .

**Cleaning agent.** Soc. pour l'ind. chim. à Bâle. Fr. 42,825, Nov. 4, 1933. Addn. to 743,004 (C. A. 27, 3790). *o*-Dichlorobenzene is used as a cleaning agent for surfaces coated with cellulose ester varnishes.

3 **Cleaning agents.** Adrien Cassmann. Fr. 754,861, Nov. 16, 1933. A soap substitute contains  $\text{CaCO}_3$  60,  $\text{NaCl}$  40 and dehydrated  $\text{Na}_2\text{CO}_3$  40 g.

**Cleaning composition.** Herbert Walter. Fr. 754,521, Nov. 8, 1933. A cleaning compn. for walls, etc., resembling soft rubber is made by dissolving  $\text{K}_2\text{SiO}_3$  in boiling water and mixing rye flour with it. A small amt. of turpentine oil is added to prevent the mass becoming friable. Cf. C. A. 28, 271<sup>1</sup>.

4 **Cleansing compositions.** Anton Riess. Austrian 135,349, Nov. 10, 1933 (Cl. 23b.). A soln. for cleansing, disinfecting and deodorizing butchers' equipment is prepd. from a dry mixt. of an oxidizing agent, a carbonate, and sufficient alum to react with the carbonate. A typical mixt. contains  $\text{NaBO}_3$  15,  $\text{NaHCO}_3$  70 and alum 15%.

**Non-saponaceous hand-cleaning composition.** Charles G. Moore (to Glidden Co.). U. S. 1,940,558, Dec. 19, 1933. A liquid mixt. of toluene, butanol and  $\text{EtOAc}$ , together with 8–16 oz. of lanolin per gal. of the liquid, is suitable for removing lacquer residues or the like from the hands.

**Case for holding silverware to prevent tarnishing.** George E. Herring. U. S. 1,939,497, Dec. 12. Details are described of a case, surfaces of which are treated with a sulfide-neutralizing chemical, such as Pb acetate. Cf. C. A. 27, 4692.

**Metal polish.** I. G. Farbenind. A.-G. (Hermann Hagenest and Frederick W. Stauf, inventors). Ger. 586,823, Oct. 27, 1933 (Cl. 22g. 14). An acid-free liquid or paste-like metal polish contains sol. fluorides. Thus, a polish may consist of kieselguhr, talcum,  $\text{NH}_4\text{F}$ , alc.,  $\text{NH}_4$  oleate and water.

**Paint- and varnish-remover.** Lindley E. Mills and Sherman W. Putnam (to Dow Chemical Co.). U. S. 1,938,714, Dec. 12. Acetone,  $\text{C}_2\text{H}_5$  and  $\text{CCl}_4$  are used with a preponderating proportion of *o*-dichlorobenzene and propylene dichloride.

**Emulsifying agents.** Carl Stürpel. Ger. 589,015, Dec. 1, 1933 (Cl. 12o. 23.02). Mixts. of com. cholesterol with fatty acids or their glycerides are sulfonated with concd.  $\text{H}_2\text{SO}_4$ . Examples are given.

**Composition for use in the manufacture of gaskets, etc.** Harold H. Jordan (to Armstrong Cork Co.). U. S. 1,941,437, Dec. 26. A compn. which may be formed of casein, glycerol, rubber and ethanalamine is milled at an elevated temp. (suitably about 85°), a plasticized glue is added and the milling is continued; comminuted cork is added, and the mixt. is further milled and cured.

**Composition for making dental casts.** Richard Grill. Austrian 135,683, Nov. 25, 1933 (Cl. 80e.). The compn. comprises chamotte about 75, alabaster about 20 and a gypsum cement about 5%.

**Preserving brushes.** Württ. Bürsten- und Pinsel-Fabrik Kullen & Co. (Otto Mecheels, inventor). Ger. 587,362, Nov. 2, 1933. Brushes are impregnated with an aq. glue soln. contg. a softening agent, e. g., glycerol, and then treated with  $\text{CH}_3\text{O}$  and dried.

**Shoe creams, etc.** Carl Gentner chemische Fabrik-Göppingen. Fr. 755,016, Nov. 18, 1933. In shoe creams and polishes composed of waxes, turpentine, water and an emulsifying agent, a suspension in water of insol. earth colors forms the dispersion phase.

**Composition for use on duplicator sheets.** Erik R. Nielsen (to Charles H. Joy, Jr.). U. S. 1,938,927, Dec. 12. Duplicator sheets are formed with a layer of fusible, absorbent, aldehyde-protein compn. having a  $pH$  of 7.0-9.0 and which may be formed from formaldehyde, glue and glycerol.

**Lithographic printing plate.** Thomas E. Richards. U. S. 1,938,667, Dec. 12. There is applied to the bare metal of a grained Al plate, in the form of the work to be printed, an image substance such as a mixt. contg. transfer ink, turpentine, asphalt, oleic acid and "Elbagreen oil" having an affinity for ink and capable of softening when heated; the plate is then etched with acid, then heated sufficiently to develop cavities in it and the image substance is caused to soften and flow into the cavities of the Al. Cf. C. A. 27, 2105.

**Stereotypes.** Ges. E. G. Acheson Ltd. Ger. 585,431, Oct. 4, 1933. Fibrous matrices for casting stereotypes are coated with an aq. graphite dispersion which may also contain  $Na_2SiO_3$ , colloidal clay and glycerol, with or without a thickener such as gum arabic or casein.

**Shoe stiffeners.** The British United Shoe Machinery

Co. Ltd. and David B. Macdonald. Brit. 397,141, Aug. 17, 1933. A shoe-upper end stiffener, charged with a stiffening agent, is provided at a localized portion with a plasticizer or solvent to render this portion temporarily or permanently more flexible. Thus box toes, charged with celluloid and resin and (or) a resin ester, may be treated at the skived portion with tricresyl phosphate, castor oil or stearin for a permanent, or with a low-volatility solvent, e. g., diacetone alc., for a temporary, effect.

**Fire-extinguishing apparatus.** Sparklets Ltd. and George E. Heyl. Brit. 397,380, Aug. 24, 1933. A container for compressed  $CO_2$  is sealed by a wire of a low-melting alloy which is soldered into a bore of a Cu ferrule screwed into an opening in the steel body of the container. Alloys used are (1) Cd 3, Sn 4, Pb 8, Bi 5 (m. 68°); (2) Sn 3, Pb 8, Bi 9 (m. 79°); (3) Sn 3, Pb 5, Bi 8 (m. 94.5°) and (4) Cd 3, Sn 8, Pb 8, Bi 15 parts (m. 70°).

**Apparatus for generating fire-extinguishing foam.** Karl Schmidt and Clemens Wagener (to Pyrene-Minimax Corp.). U. S. 1,940,272, Dec. 19. Various structural and operative details are described. Cf. C. A. 27, 3645, 3791.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

The dependence of the reaction velocity in glass batches on the physical condition and chemical composition of the raw materials. I. The influence of sand grain size on reaction velocity in sand-soda mixtures. M. Linde and F. H. Zschacke. *Glastech. Ber.* 11, 445-54 (1933).—Three similar mixts. of soda and sand of various grain sizes were heated under the same conditions and the effect on the reaction velocity was followed by detg. the undecompd. soda present. The velocity at a certain temp. increases with decreasing grain size. With increasing temp. the differences in velocity become smaller and at sufficiently high temp. differences disappear. As long as the batch is not sintered the insulating effect far outweighs the effect of increased surface. With larger particles the insulating effect is greater. With a sintered batch the differences in velocity are significant. The finer the grain size is, the more rapid the reaction. The last residue of soda is decompd. only slowly. Heating at 1300° for 20 min. still leaves 2% of soda. The large bubbles initially present become smaller and more numerous as the flux becomes more satd. with silica.

J. F. Hyde  
Changing fuel in glass-melting furnaces. H. Maurach. *Glastech. Ber.* 11, 437-44 (1933).—Twenty-seven references.

J. F. Hyde  
Effect of gases upon the properties of glass. VII-VIII. Effect of the heat treatment of glass upon its silver plating. 2 and 3. K. Nakanishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 672-3 (1933); cf. C. A. 28, 869°.—In mirror making it was found to be effective to heat glass at a temp. which is 50-100° below the softening point, for 30-60 min. under reduced pressure. The max. velocity of silver plating was supposed to exist at a condition where gases were removed to a moderate extent from the surface of the glass, but where some  $O_2$  was still present.

Karl Kammermeyer  
Physical and chemical processes in the melting of potassium oxide-lead oxide-silica glasses. M. A. Benbowdov, A. A. Appen, T. F. Korzhukhina, E. P. Chodikel and G. A. Shinke. *J. Soc. Glass Tech.* 17, 305-19 (1933).—A study was made of the processes of conversion into glass of a mixt. of the several oxides to yield a glass of the compn. 48%  $SiO_2$ , 45.5%  $PbO$  and 6.5%  $K_2O$ . The batch was heated at 100° stages up to 1200°. The reaction was followed by detn. of the loss in wt. of the batch, the compn. of the gases evolved, the  $H_2O$ - and the dil.- $HNO_3$ -sol. constituents, the compn. of the molten or sintered mass and by microscopic examn. Studies were made of  $K_2CO_3$  alone and of the binary systems  $K_2CO_3$  and  $SiO_2$ ,  $K_2CO_3$  and  $Pb_2O_3$ ,  $Pb_2O_3$  and  $SiO_2$ , as well as of the ternary system. Up to 300° there was no evidence

of reaction except the liberation of moisture, the  $K_2CO_3$  contg. about 15% originally, and the slight evolution of  $CO_2$  from the  $K_2CO_3$  and  $SiO_2$  reaction. The red lead dissolved initially at 500° at a slow rate and completely below 600°. The  $K_2CO_3$ - $SiO_2$  reaction rate increased at 500° and above, becoming very rapid at 800°. Microscopic examn. showed that even after chem. reaction was complete the product was very inhomogeneous, having varying  $ns$ . Between 1000° and 1200° the homogeneity improved because of the soln. of both the  $SiO_2$  and the  $PbO$ , the mass becoming practically isotropic at 1200°. The  $H_2O$  soly. practically ceased at 800°. The acid soly. was practically const. up to 800° and then decreased progressively with increased temps.

H. F. K.

Manganese dioxide as decolorizer and colorant of glass.

L. Springer. *Céram., verrerie, emailerie* 1933, 251 3.—Studies were made of coloration by oxides of Fe and Mn, decolorization by  $MnO_2$ , and decolorization with pure Mn compds. Results of fusions with varying proportions of coloring and decolorizing agents are described. *Ibid.* 296. —Further tests show the effect of the treatment of glass contg.  $FeO$  with varying amts. of  $MnO_2$ ,  $KMnO_4$  and saltpeper. Variable results are thought due to variations in manner of heating and in temp. *Ibid.* 351.—Coloration of glass by  $MnO_2$  depends on the conditions of reduction or oxidation in the presence of Fe, As or saltpeper. Equal amts. of  $FeO$  and  $MnO_2$  give a smoky-brown color. If the amt. of  $MnO_2$  is double that of  $FeO$  the color is yellowish brown with large amts., green with small amts. Expts. on decolorization by  $MnO_2$  show that it is necessary to use equal amts. of  $MnO_2$  and  $KMnO_4$  or comparatively larger amts. of the latter to decolorize  $FeO$ . Such large amts. do not easily produce over-coloration. Only relatively very large amts. produce an over-coloration of brown or violet. This may be due to the many more or less colorless combinations possible between Fe and Mn. In decolorization by Mn there is danger of reduction effects which may bring back the green color of Fe. Since over-coloration is relatively rare,  $MnO_2$  or better  $KMnO_4$  +  $MnO_2$  + saltpeper are to be considered among the best agents of decolorization.

Alice W. Epperson

Stones in glass and devitrification. Albert Granger. *Céram. verrerie, emailerie* 1933, 389 92.—These phenomena and various causes are discussed, including those caused by the pots and by the compn. of the glass. Compn. and optical properties of the crystals are discussed.

Alice W. Epperson

The temperature of transformation and softening of glasses. Edouard Rencker. *Compt. rend.* 197, 1049-51 (1933).—Differential expansion curves are given for 4

glasses: B<sub>2</sub>O<sub>3</sub>, Pollopos, Pyrex, and one of compn. SiO<sub>2</sub> 87%, Na<sub>2</sub>O 9%, BeO 4%. The results depend on the size of the specimen and the rate of heating. Conclusion: The temperature of transformation coincides with the softening point.

J. B. Austin  
Evolution of gas from solid glass on heating. N. A. Orlova and S. V. Ptitzin. *J. Tech. Phys.* (U. S. S. R.) 3, 596-601 (1933).—Graphs show the rate of desorption from lead and dolomite glass used for lamp bulbs. F. H. R.

Studies on chilled plate glass. Tsuruo Araki, Sōnosuke Takahashi and Shūichi Mori. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 677 (1933).—Polariscopic examn. of the glass showed systematic stress distribution. Phys. properties for chilled and untreated glass are presented.

K. Kammermeyer  
The silvering of automobile headlamp bulbs. Geo. S. Santmyers. *Metal Ind.* (N. Y.) 31, 277-9 (1933).—In most industrial establishments, individual variations in the Rochelle salt and the Brashear formula are prevalent. It has been found that better results in silvering glass are obtained from the use of an excess of NH<sub>4</sub>OH in the prepn. of the Ag soln., the elimination of the necessity for its filtration and the production of a very opaque deposit in a dil. soln. of Ag by the presumably catalytic action of I or of the double cyanide of Hg and K. W. H. Boynton

Effect of drying on the grain-size distribution of clays. Carl W. Correns and Wolfgang Schott. *Kolloid-Z.* 65, 190-203 (1933); cf. *C. A.* 27, 1122.—Drying of a Papendorf diluvial and an Oligocene clay, either at 105° or at various humidities at 30°, caused an increase in coarseness in the fractions below 5 μ. A deep-sea red clay containing 77% <1.1 μ in radius showed 69% after drying at 30° and 61.5% after drying at 105°. Clay dried at 105° and allowed to reabsorb H<sub>2</sub>O showed no further change. The original Oligocene clay, after 200-day treatment in a humid atm., became coarser and absorbed H<sub>2</sub>O, which was not given up at 105°, while the Papendorf clay became finer. The difference is due to chem. compn. Arthur Fleischer

The absorption systems of kaolins and clays with liquids in relation to the occurrence of plasticity. Erhard Gruner. *Z. anorg. allgem. Chem.* 215, 1-18 (1933).—G. has detd. the vapor pressures of systems of kaolin separately with CCl<sub>4</sub>, C<sub>6</sub>H<sub>6</sub>, CS<sub>2</sub>, SO<sub>2</sub> (Group I); H<sub>2</sub>S, Et<sub>3</sub>NH, EtNH<sub>2</sub>, Me<sub>2</sub>NH, MeNH<sub>2</sub>, Et<sub>2</sub>O, Me<sub>2</sub>CO, NH<sub>3</sub>, H<sub>2</sub>O (II). In I, not plastic, the vapor pressure remains practically const., that of the pure liquid, until no liquid remains; in II, plastic, there is a gradual decrease in vapor pressure, indicating an absorptive retention of liquid. In order that a plastic mass result the dispersing liquid must have an asymmetric dipolar mol. which must be so constituted that it can employ a neg. part, equiv. to an O, to regenerate the kaolin anhydride. The magnitude of the dipole, degree of asymmetry and chem. relationship to kaolin det. the degree of plasticity. Liquid NH<sub>3</sub> dehydrates kaolin and clays, by removing H<sub>2</sub>O from the allophane portion only. The results are in agreement with the theory of Ruff and collaborators. Curves are given. E. R. Schierz

Suitability of limes for sand-lime brick manufacture. G. E. Bessey and H. J. Eldridge. *J. Soc. Chem. Ind.* 52, 443-7T (1933).

Artificial drying of fire bricks. M. S. Kazanskii and P. P. Yagupov. *Keram. i Steklo* 9, No. 8, 5-9 (1933); cf. *C. A.* 27, 173.

Silicates of soda in the ceramic industry. Wm. Stericker. *Ceram. Age* 23, 3-4, 28 (1934).—J. G. Vail is given as author but a later note (*Ibid.* 60) explains that this is a typographical error. Herbert S. Willson

Physical-chemical principles of the present-day silicate industry. Wilhelm Fitel. *Angew. Chem.* 46, 803-10 (1933).—A general discussion with special emphasis upon Debye's theory and the application of x-ray absorption spectra.

Karl Kammermeyer  
Classification of florescence. Ellis Lovejoy. *Bull. Am. Ceram. Soc.* 13, 22-3 (1934).—Cryptoflorescence, efflorescence, inflorescence and scum are defined and further subdivided. Corrective procedures are tabulated.

C. H. Kerr

Incrustations on porous pottery—cleaning without loss of

pigment. Colin G. Fink. *Tech. Studies Field of Fine Arts* 2, 59-61 (1933).—Removal of salt incrustations can be effected by electrodesmosis. A. Papineau-Couture  
Semi-porcelain table ware. V. P. Zubchaninov and Z. I. Glushanok. *Keram. i Steklo* 9, No. 8, 9-12 (1933).—A series of expts. in an intermediate field between porcelain and faience is described.

M. V. Kondoidy  
Cracking of cooking utensils. Vielhaber. *Emailwaren-Ind.* 10, 317-20 (1933).—A high-quality enamel resistant to temp. changes must contain a min. amt. of white opacifier. The opacifier should be melted and not added to the mill. The enamel layer should be thin, while the sheet iron should be thick. The 2nd coat is a ground enamel mixed with white enamel to give a lighter color. Up to 50% of white enamel may be added provided it does not contain more than 6% cryolite or Na fluosilicate and is not based on a feldspar opacification. Addns. of kaolin, or opacifiers contg. it, and the addn. of a large amt. of clay as suspending agent should be avoided. It is almost impossible to apply ground enamels contg. opacifiers.

M. V. Kondoidy  
Refractories. D. Dixon. *Steam Engr.* 3, 149-50 (1934).—General. Alden H. Emery  
Vitreous enamels and colors as used for cast iron and steel. A. England. *Foundry Trade J.* 50, 3-4 (1934).

Downs Schaal  
Testing apparatus and investigation methods for enameled ware. Vielhaber. *Emailwaren-Ind.* 10, 362-3 (1933).

M. V. Kondoidy  
Antimony poisoning due to the use of enameled vessels. Anon. Ministry of Health (London) *Memo.* 171 (Med.), 3 pp. (1933); *U. S. Pub. Health Eng. Abstracts* 13, M, 18 (Nov. 11, 1933).

C. R. Fellers  
Funk, Wm.: Die Rohstoffe der Feinkeramik, ihre Aufbereitung und Verarbeitung zu Massen u. Glasuren. Berlin: J. Springer. 334 pp. M. 24.50. Reviewed in *Ceram. Age* 23, 56 (1934).

Höganäs-Billesholms: Feuer fest Mauerwerk für Dampfkesselfeuerungen und andere wichtige industrielle Öfen. Stockholm: A/3 Nordiska Bokhandlen. 127 pp. K. 10.

Glass. Marianne Wellmann. *Ger.* 585,816, Oct. 11, 1933. Addn. to 537,633 (*C. A.* 26, 1408). The method of 537,633 for making Be borate glasses transparent to ultra-violet rays is modified by using alkali carbonate in place of Li<sub>2</sub>CO<sub>3</sub>. Thus, the glass contains 15-25 parts of boric acid, 1-2 parts of BeCO<sub>3</sub> and an amt. of alkalicarbonate equiv. to 3-6 parts of Li<sub>2</sub>CO<sub>3</sub>. The glass is also useful for lenses, prisms and Hg-vapor lamps.

Glass. I. G. Farbenind. A.-G. (Hans G. Grimm and Paul Huppert, inventors). *Ger.* 589,035, Dec. 1, 1933 (*Cl.* 32b. 1). Addn. to 580,295 (*C. A.* 27, 4895). SiO<sub>2</sub> normally used in making glass is replaced wholly or in part by Al<sub>2</sub>O<sub>3</sub> and P<sub>2</sub>O<sub>5</sub> in the proportion of more than 1 mol. of Al<sub>2</sub>O<sub>3</sub> per mol. of P<sub>2</sub>O<sub>5</sub>. The excess of Al<sub>2</sub>O<sub>3</sub> may be up to 18% of the wt. of the glass. The glass obtained has a lower coeff. of expansion and a higher softening temp. than that made by the process of *Ger.* 580,295. Examples are given.

Glass. René Amand. *Fr.* 755,171, Nov. 21, 1933. Construction of refractory pots is described.

Glass. Compagnies réunies des glaces et verres spéciaux du nord de la France. *Fr.* 755,207, Nov. 21, 1933. Construction of flowing table and rollers is described.

Glass-making furnaces. Vetreria Meccanica Toscana. *Fr.* 755,229, Nov. 21, 1933.

Glass-melting furnace. Vergil Mulholland (to Hartford-Empire Co.). *U. S.* 1,941,410, Dec. 26. Various details of construction and operation are described. *U. S.* 1,941,410 also relates to structural and operative details of a regenerative glass-melting furnace.

Forehearth for glass-melting furnace. Hartford-Empire Co. *Ger.* 589,093, Dec. 4, 1933 (*Cl.* 32a. 5). See *Brit.* 368,089 (*C. A.* 27, 3307).

Container for melting glass. Firma Oscar Gossler (Gedeon v. Pazsichky, inventor). *Ger.* 585,761, Oct. 10, 1933. Addn. to 580,502 (*C. A.* 28, 1156<sup>9</sup>).



**Automatic temperature-control apparatus for use in delivery of molten glass.** Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. reissue 19,025, Dec. 12. A reissue of original pat. No. 1,802,789 (C. A. 25, 3794).

**Apparatus for forming glass articles such as bottles or jars.** Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 1,940,634, Dec. 19. Mech. features.

**Glass-blowing apparatus suitable for manufacture of bottles.** Robert Patterson (to Carr-Lowrey Glass Co.). U. S. 1,830,917, Dec. 19. Mech. and operative details.

**Machine for making electric lamp bulbs and similar glassware.** Carl A. Brown, Charles Wm. Craig and Frank B. Vansickle (to The British Thomson-Houston Co. Ltd.). Brit. 397,425, Aug. 24, 1933.

**Apparatus for making glass tubes having a stripe of contrasting color embedded therein.** Wm. H. Said (to Corning Glass Works). Brit. 397,444, Aug. 24, 1933. Addn. to 354,509 (C. A. 27, 2271).

**Device for drawing glass tubes.** Glaswerke Ruhr A.-G. Ger. 585,689, Oct. 6, 1933.

**Continuous apparatus for drawing glass tubes.** Corning Glass Works. Ger. 586,684, Oct. 24, 1933 (Cl. 32a. 23.02). Addn. to 576,341 (C. A. 27, 3794).

**Apparatus for heating glass tubes to form annular constrictions or swellings.** Osram G. m. b. H. Komm.-Ges. (Hans Joachim Spanner and Werner Lukas, inventors). Ger. 585,899, Oct. 12, 1933.

**Tempering glass.** Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cirey. Brit. 397,395, Aug. 24, 1933. Addn. to 361,277 (C. A. 27, 1126). Jets of air for chilling hot sheet glass are produced by apertures in 2 disks, each of which is housed in an air conduit and rotated in its own plane. Cf. C. A. 27, 2270.

**Device for hardening glass plates by blowing air upon them while hot.** Compagnies réunies des glaces et verres spéciaux du nord de la France. Ger. 585,535, Oct. 5, 1933.

**Glass-pressing apparatus.** Eduard Redlhammer & Solme-Glasfabrik. Ger. 585,615, Oct. 5, 1933.

**Apparatus for polishing sheets of glass, marble slabs, etc.** Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cirey. Brit. 398,407, Sept. 14, 1933.

**Glass-rolling apparatus.** John H. Fox and Wm. Owen (to Pittsburgh Plate Glass Co.). U. S. 1,939,967, Dec. 19. Structural and mech. features.

**Roller for use in an apparatus for drawing flat sheet glass.** Joseph Gaskell. Brit. 398,479, Sept. 12, 1933.

**Sheet glass.** Forges et ateliers de constructions électriques de Jeumont. Brit. 397,400, Aug. 24, 1933. In pouring molten glass from a pot into the pass between the rollers of a double-roll machine having its rollers arranged at different levels the pot is tilted about an axis inclined to the axes of the rollers, and at the same time the pot is moved parallel with the rollers to spread the glass.

**Apparatus for drawing sheet glass.** Howard L. Halbach (to N. V. Hollandsche Maatschappij voor de Vervaardiging Van Glas). Brit. 397,820, Aug. 31, 1933.

**Method of making molded articles from white glass cased with colored glass.** Sächsische Glasfabrik August Walther & Söhne A.-G. Ger. 589,094, Dec. 2, 1933 (Cl. 32b. 9). Manipulative features are described.

**Compound glass.** Imperial Chemical Industries Ltd., James S. B. Fleming and Archibald Renfrew. Brit. 398,189, Sept. 7, 1933. In mfg. compd. glass the interlayer, comprising thermoplastic resinous polymers or inter-polymers of unsatd. compds., e. g., polymerized vinyl acetate, Me acrylate, Me  $\alpha$ -methylacrylate, vinylbenzene or the products obtained by polymerizing mixts. of Me acrylate with Me or Et  $\alpha$ -methylacrylate or with vinyl cyanide, is annealed by maintaining the compd. glass for a long time, e. g., 16 hrs., at the temp. of incipient softening of the resin.

**Compound glass.** Imperial Chemical Industries Ltd. and Archibald Renfrew. Brit. 398,855, Sept. 22, 1933. Compd. glass includes a layer of a polymerized or inter-polymerized unsatd. org. compd., e. g., vinyl acetate, Me acrylate, formed from a sheet of a partially polymerized

1 sirup by evapg. the unsatd. compd. by heating below the b. p. The sirup may contain or the component sheets may be assembled under a non-volatile softener, e. g., di-Bu phthalate. The glass sheets may be first coated with an adhesive, e. g., gelatin, polyvinyl acetate.

**Compound glass.** The Triplex Safety Glass Co. Ltd. and John Wilson. Brit. 398,172, Sept. 5, 1933. Addn. to 332,551 (C. A. 25, 391). Cellulose ester plastics, e. g., celluloid, cellulose acetate, are united to sheets of glass 2 coated with gelatin, with or without an enamel or cement, by bringing the sheets together while immersed in or flooded by an inert liquid comprising homologs of cyclohexanol, e. g., methyl- or dimethyl-cyclohexanols, or derivs. thereof, e. g., methyl- or dimethyl-cyclohexanol oxalates, and then subjecting to heat and pressure. The liquid may be used hot and may comprise also cyclohexanol, glycerol, H<sub>2</sub>O, di-Me, di-Bu or di-Am phthalates, ethylene glycol 3 ether, diethylene glycol ether, cyclohexanone or its homologs, triaryl phosphates, *p*-toluenesulfonamide, benzyl alc., triacetin, PhMe, xylene, AmOH, *sec*-hexyl alc. and mineral oil. Cf. C. A. 27, 5920.

**Apparatus for forming compound glass sheets.** Bernhard Engels. U. S. 1,941,392, Dec. 26. A layer of molten glass is delivered onto an upwardly drawn sheet of glass between the molten glass bath and the drawing device.

4 **Laminating sheets of glass and reinforcing material such as celluloid or the like.** Wm. O. Lytle (to Duplate Corp.). U. S. 1,939,998, Dec. 19. Various details of app. and operation are described for uniting the materials under the action of heat and pressure.

**Nonsplintering glass.** Duplate Corp. Ger. 587,457, Nov. 3, 1933. See U. S. 1,781,084 (C. A. 25, 182).

**Molding clay thimbles for holding pottery in kilns.** Harry M. Aynsley (trading as Taylor and Co.) and Henry Shuffelbotham. Brit. 397,737, Aug. 31, 1933.

5 **Ceramic articles.** Max Hauser. Ger. 588,152, Nov. 13, 1933 (Cl. 80b. 8.21). This corresponds to Swiss 128,404 (C. A. 23, 2798), but gives addnl. details.

**Device for partly drying potter's clay, etc.** Georg Fischer. Ger. 585,578, Oct. 5, 1933.

**Rollers for comminuting clay and like plastic masses.** Otto Lefnaer. Ger. 585,496, Oct. 10, 1933.

6 **Counterflow recuperative furnace suitable for firing decalcomania decorations on pottery ware.** Frank T. Cope and Wilbur S. Bowling (to Elec. Furnace Co.). U. S. 1,938,581, Dec. 12.

**Apparatus for drying, maturing and glazing ceramic bodies such as glazed tile in a continuous manner.** Andrew Malinovsky (to Malinite Products, Inc.). U. S. 1,940,554, Dec. 19. Structural and mech. features.

7 **Glazed tile.** Charles B. Lansing and Robert H. Loudon (to National Tile Co.). U. S. 1,941,403, Dec. 26. A mold is at least partially filled with body material; glaze material in sheet form is applied to the body material, the combined materials are compressed, and the tile is then removed from the mold and fired.

**Ceramic insulating compositions.** Deutsche Ton- & Steinzeug-Werke A.-G. Ger. 588,271, Nov. 18, 1933 (Cl. 21c. 2.01). Addn. to 493,001 (C. A. 24, 2816) and 498,149 (C. A. 24, 3843). The products of Ger. 493,001 and 498,149 are improved by adding to the mass before firing a compd. of Mn, Zr, Ce, Cr, P, W or V, as well as a compd. of Ti.

**Electric insulating compositions.** Siemens-Schuckertwerke A.-G. (Willy Zehrowski, inventor). Ger. 588,272, Nov. 15, 1933 (Cl. 21c. 2.03). Use is made of artificial fibers of an inorg. Mg compd. united by a binder comprising a readily fusible glass. Thus, fibers prepd. in known 9 manner from fused hornblende, or from a fused mixt. of hornblende and CaF<sub>2</sub>, may be mixed with powd. fusible glass and molded under heat and pressure.

**Luting.** Siemens & Halske A.-G. Fr. 754,359, Nov. 6, 1933. A luting for the central electrode of spark plugs contains Al<sub>2</sub>O<sub>3</sub> 50-53, Al(OH)<sub>3</sub> 10, quartz powder 15 and glass powder or Pb 5-2 parts.

**Refractory articles.** Deutsche Gold- und Silber-Schmelzanstalt vorm. Roessler (Eugen Rishkevich, in-

ventor). Ger. 588,258, Nov. 17, 1933 (Cl. 80b. 8.13). Refractory articles are manufd. by molding and firing a compn. contg. fresh  $ZrO_2$  and calcined  $ZrO_2$  together with up to 1.5% of  $BeO$  and about the same amt. of  $MgO$ , with or without a little  $Al_2O_3$ . A part of the oxides may be formed *in situ* from hydrolysable compds., e. g.,  $BeCl_2$ ,  $ZrCl_4$ , or  $MgCl_2$ .

**Refractory products.** Gilbert E. Seil. Fr. 755,038, Nov. 18, 1933. A refractory product of chromite, in which the gang of low m. p. has been transformed into a refractory material, is made by intimately mixing the Cr ore and crystd.  $MgO$ , highly calcined, the  $MgO$  being present in amt. above 12.5% (preferably 17-25%) of the total wt. of the mixt., grinding and kneading the mixt., afterward molding and calcining the mass, preferably to about 1850°.

**Refractory material suitable for lining furnaces.** Reed W. Hyde (to Dwight & Lloyd Metallurgical Co.). U. S. 1,939,838, Dec. 12. See Fr. 740,798 (C. A. 27, 2781).

**Refractory brick.** Russell P. Heuer (to General Refractories Co.). U. S. 1,939,211, Dec. 12. Flint clay is calcined until its open pore space is reduced to 5% or less, and a mixt. contg. at least 75% of the product thus obtained is formed into brick under a pressure of over 1000 lb. per sq. in. Cf. C. A. 27, 1472.

**Refractories.** Morningside Fireclay Co. Ltd. and Robert Currans. Brit. 397,977, Sept. 7, 1933. A refractory product for the manuf. of bricks, blocks, tiles, etc., is composed of calcined fireclay without any extraneous ingredients. Raw fireclay is calcined at 1000-1200°, ground dry, reground wet, molded in the plastic condition without a binder and burnt in a kiln. The material may be dried after the wet grinding and then reground wet before molding.

**Polishing, grinding and sharpening material.** Siemens & Halske A.-G. (Reinhold Reichmann, inventor). Ger. 589,374, Dec. 6, 1933 (Cl. 80b. 11). Practically pure  $BeO$  which has been sintered at above 1700° is used for polishing, grinding and sharpening very hard materials such as hard alloys.

**Glazes.** Hans J. Harkort. Fr. 754,412, Nov. 7, 1933. In making Pb glazes for pottery, etc., the Pb is introduced

into the compn. in the form of industrial waste products contg. oxides of Pb, e. g., waste from the storage-battery industry.

**Enamel.** Ignaz Kreidl. Ger. 585,832, Oct. 11, 1933. Fe enamel or the white background of Fe enamel is prepd. by coating the Fe with a soln. or pseudo soln. of salts or compds. of Ni or Co with non-volatile acids in  $H_2PO_4$ . Preferably,  $H_2PO_4$  solns. of phosphates or borates of Ni or Co, or colloidal oxides or hydroxides of Ni or Co are used.

**Enamels.** Ignaz Kreidl. Fr. 754,524, Nov. 8, 1933. Slips, for making enamels, that are stable to storing are made by using opacifying agents, the necessary amt. of which is not above the amt. which can be absorbed by the slip. Suitable agents are org. dyes such as methylene blue and malachite green or highly polymerized hydrocarbons, such as resins, tars and asphalts. The stability can be increased by the addn. of an adsorption agent.

**Enameling iron.** Leichtmetall-Verwertungs-Ges. m. b. H. Ger. 585,409, Oct. 3, 1933. Sheet iron is coated with an aq. sludge of natural lepidolite and then fired at 1000°. Up to 30% of  $SiO_2$ ,  $Al_2O_3$ ,  $CaO$ ,  $MgO$ ,  $K_2CO_3$  or  $Na_2CO_3$  may be mixed with the lepidolite. Preliminary application of a ground enamel is unnecessary.

**Enameled iron articles.** Wm. E. Dougherty (to The O. Hommel Co.). U. S. 1,938,691, Dec. 12. For producing an opaque, white, enameled iron article, there are fired upon the article at least two successively applied coats of glass opacified with Ti oxide, glass being used contg.  $SiO_2$  with flux in sufficient amount to produce a glass m. about 925° or lower, and the Ti oxide being added in a quantity sufficient to afford in a doubly coated article a reflectance of at least 59%.

**Making hollow ware.** Joseph & Jesse Siddons Ltd. and Joseph R. Siddons. Brit. 398,289, Sept. 14, 1933. Cast Fe or steel saucepans, kettles, etc., are enameled over all or part of the exterior surface, allowed to cool, prepd. for tinning and tinned internally. The enamel is fired 15-20 min. at preferably 680-800° for a "wet" process or at 850-1000° for a dry process.

**Apparatus for firing enamel.** Karl Machwirth. Ger. 586,640, Oct. 24, 1933 (Cl. 48c. 7).

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**The mill in the cement industry.** Alfred Müller. *Tonind.-Ztg.* 57, 613-14 (1933).—A general discussion of mill types and construction. Karl Kammermeyer

**Classification of lime-clay-magnesia deposits and their utilization in the production of cements.** V. A. Kind and S. D. Okorokov. *Mineral. Suir'e* 8, Nos. 8-9, 5-14 (1933).—The chem. classification of the U. S. S. R. mixed deposits of  $CaCO_3$ ,  $MgCO_3$  and clay into 24 types is based on the properties of the resulting cements, and is presented by a triangular graph and tabulation. Chas. Blanc

**Cements with addition of bitumen.** Walter Dyckerhoff. *Tonind.-Ztg.* 57, 637-9, 660-2 (1933).—The manuf. of portland cements with bitumen addn. (I) is described. Addns. of 3-4% bitumen present optimum figures. The I cements show a continuous rise in strength when subjected to alternate freezing and heating treatment. They require a greater amt. of mixing water, have longer setting time, and also show a better ratio of tensile to compressive strength than ordinary portland cements. The I cements are also more elastic and have less shrinkage. Exptl. data are presented. Karl Kammermeyer

**Question of swelling and shrinking of cements.** O. Goffin and G. Musznug. *Zement* 22, 549-50 (1933).—Cements from 3 clinkers contg. 1.27-3.27% free  $CaO$  were examd. over a 90-day period of water and air curing. It was found that swelling increased with the free  $CaO$  content and the presence of more than 4% gypsum. Shrinkage increased with the fineness of the cement and with the addns. of  $CaCl_2$ . The  $SiO_2$  content had no apparent effect on either swelling or shrinkage. H. F. Kriege

**Occurrences during the setting of aluminous cements.**

Renato Salmoni with H. E. Schwiete. *Zement* 22, 523-6 (1933).—The heat evolution, swelling, strength and  $pH$  values of 2 setting cements were detd. The swelling of the cement particles, the increase in strength and the heat evolved are controlled by the  $pH$  values of the mass. The Donnan equil. is used to explain the observed occurrences. References are given. H. F. Kriege

**Measuring the heat of the setting of cement.** R. Sandri. *Zement* 22, 593-6 (1933). H. F. Kriege

**Cement problems. The sudden set of portland cement.** Kurt Würzner. *Tonind.-Ztg.* 57, 707-9 (1933).—Expts. are described which were made to det. the relations between setting time and quantity of water bound. These resulted in smooth curves indicating that "sudden set" does not take place instantaneously. The influence of alkali addn. and  $CO_2$  treatment of the cement are also shown. Karl Kammermeyer

**Analysis of portland cement.** Olaf Røer. *Tids. Kjemi Bergesen* 13, 55-6 (1933).—An outline of methods in use. H. C. M. Ingeberg

**Investigations of the clays of portland cement. I. Preparation of portland cement from tuff and limestone.** Yoshiaki Sanada. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 678-80 (1933).—Eleven raw mixts. were prepd. from limestone, tuff, sandy tuff and Cu slag. The chem. compn. of the raw materials and the proportions, hydraulic modulus and fineness of the raw mixts. are presented. Chem. compn., hydraulic modulus,  $SiO_2$  and Fe modulus, activity index and  $Fe_2O_3/Al_2O_3$  ratio are reported for the clinkers. The setting time, soundness and strength tests on these samples showed that portland cement of good

quality could be made from these raw materials. II. The thermal changes of tuff. *Ibid.* 680-1.—Combined water was nearly all lost at 750°, sol. SiO<sub>2</sub> was a max. at 740° and tuff heated at 800° was most easily ground.

Karl Kammermeyer

Average or mean value? R. Feret. *Rev. matériaux construction trav. publics* 1933, 397-400.—A statistical study of compressive-strength data obtained on a variety of cement mortars indicates that the av. value is preferable.

Karl Kammermeyer

Permanent and elastic deformations of cement mortars. S. Uchida and K. Endell. *Zement* 22, 579-82(1933).—A new method of torsion measurements is described which gave satisfactory results with specimens of cement-sand mortars of 1:0 to 1:6 mixes and ages up to 180 days.

H. F. Kriege

Sulfur-impregnated cement mortar. Georg Saenger. *Zement* 22, 537-41, 546 70(1933).—Three cements and 1 sand were made into mortar specimens of 1:3, 1:5 and 1:8 proportions, with 3 consistencies designated as earth moist, plastic and fluid for each mix. After 3 weeks' normal curing the specimens were immersed in molten S at 130-50° or 160-80° for periods of 3, 6 and 24 hrs. The previously reported large increase in compressive strength of the S-impregnated specimens over the untreated was observed. The strength difference due to cement content of the lean and rich mixes was practically overcome by the S treatment of any duration, while the difference due to consistency was materially reduced by the longer soaking periods chiefly. The penetration of the S at 170° was usually less than at 130°. The resistance of the mortars to abrasion and to corrosive solns. was increased by the S treatment. Prolonged H<sub>2</sub>O storage of the impregnated specimens produced notable declines in compressive strength which were not observed in the air-cured mortars. Hence the S treatment is not advised for concrete structures and units which are exposed to moisture and weathering.

H. F. Kriege

Hydraulic mortars. Augustin Maché. *Compt. rend.* 197, 1420-2(1933).—M. has made up mortars which include earthy material to study the effect of org. matter upon the setting and hardening properties of the concrete. A mortar made from a siliceous sand gave relative compressive strengths of 67, 145 and 238 for 2 hrs., 7 and 28 days, resp. By the introduction of 1% humus these values were reduced, resp., to 52, 106 and 155. Two % humus gave 36, 56 and 132 while 5% humus gave 19, 39 and 89, resp. This decrease in strength is attributed to the acid character of the earthy matter and not to its colloidal properties. The addn. of small quantities of free alkali decreases the compressive strength of the mortar. If, however, the mortar contains 5% earthy matter and 5% NaOH, the relative compressive strengths are 56, 120 and 182 for 2 hrs., 7 and 28 days. Similar results are obtained with a calcareous sand in the mortar. H. E. Messmore

The analysis of trass. W. Wittekindt. *Tonind.-Ztg.* 57, 732-4, 758-9, 785(1933).—See C. A. 27, 4052.

Karl Kammermeyer

Slurry drying with the Miag calcinator. Karl Gönigen. *Zement* 22, 582-5(1933).

H. F. Kriege

New phases in concrete technology. J. A. Kirejenko. *Zement* 22, 556-9, 571-2(1933).—A review is given of one Ukrainian work on the crit. age of concrete in connection with low temps., effect of high temp. and moisture on the mech. strength, heat capacities and conductivities of concretes and mortars, protection of fresh concrete against frost action and related subjects.

H. F. Kriege

Newer methods for the investigation of the general and the capillary porosities of concrete structures. Pogány. *Zement* 22, 585-8, 597-8(1933).—Certain microscopic and planimeter methods are discussed. The most practical method is stated to be the measuring of the rise of distd. H<sub>2</sub>O at 20° under 760 mm. Hg pressure in the thoroughly dried specimens.

H. F. Kriege

Changes in compressive strength of concrete with increasing age up to twenty years. Otto Graf. *Zement* 22, 526-31(1933).—Concrete protected from drying out dur-

ing 20 yrs. continued to gain slowly in compressive strength, while that stored dry declined in strength gradually.

H. F. Kriege

Relative viscosities of liquid asphaltic road materials at various test temperatures. J. T. Pauls and R. H. Lewis. *Public Roads* 14, 212-18(1934).—A survey of test methods on asphaltic road materials in connection with the simplification of state specifications indicated a considerable variation of opinion as to the temps. at which viscosity detns. should be made. From a study of this problem the following conclusions were drawn: (1) There is need for tests at a no. of temperatures to cover adequately the wide range in consistency of liquid asphaltic road materials. (2) The use of 140° and 180°F. should prove satisfactory as control temps. in Furol viscosity detns. for the more viscous liquid asphaltic road materials. (3) When practicable, the temp. designated for control should give a Furol viscosity of less than 500 sec. However, the more viscous materials of the rapid curing type should not be tested for viscosity at a temp. higher than 140°F. (4) Many so-called liquid asphaltic road materials, which are used in hot surface-treatment work, and which are designated as hot oils, 90 and 95% road oils, etc., are in fact semi-solid asphaltic materials. These grades of material probably can be controlled best for consistency by either a float test at a low temp. or by a penetration test at 77°F. under a load of 50-100 g. (5) Tests at a temp. of approx. 210°F. can be omitted readily from specifications for liquid asphaltic road materials.

L. B. Miller

Bricks made from schist-ash as the cause of masonry deterioration. Haeckermann. *Tonind.-Ztg.* 57, 604-6, 624-9(1933).—The masonry destruction was caused by the high sulfate content of the schist-ash which gave vol. increases through the formation of double salts from Ca-SO<sub>4</sub> and alkali sulfates. Exptl. data are presented.

Karl Kammermeyer

A scientific and practical study of the principal products used as floor coverings in dwellings. F. Chalamel. *Rev. matériaux construction trav. publics* 1933, 27-9B, 47-50B, 68-71B, 91-4B, 110-13B, 124-6B, 147-50B, 167-70B, 189-91B, 206-9B, 231 3B.—The study includes phys. and chem. characteristics, resistance to microbic invasion, structure, decorative possibilities, uses and upkeep. The materials are classified into those used as individual pieces (tiles, paving bricks, wood, etc.), and products used without joints (granite slabs, concrete, etc.). Burned and unburned products are discussed. Rubber and linoleum products are also mentioned. Considerable exptl. data are presented.

K. Kammermeyer

The blue staining of timber and the molding of wood pulp. Lauri Alanko. *Teknillinen Aikakauslehti* 23, 368-74(1933).—A description is given of the life characteristics of the strains of fungi responsible for the blue staining of timber, and the discoloration and decay of wet mech. and sulfite pulp. A brief account is given of the methods used for the preservation of wood and wood pulp.

S. A. Karjala

New chemical treatments for the control of sap stain and mold in southern pine and hardwood lumber. A. D. Chapman and T. C. Scheffer. *Southern Lumberman* Sep. 4 pp.(May 15, 1933); *Rev. Applied Mycol.* 12, 688-9.—Lignasan (0.25%) and Na tetrachlorophenolate (STCP) (0.3%) gave the best results on a com. scale, reducing incidence of stain to under 1%. LE-3 (an Ht Hg oleate prepn., 0.24%) and a mixt. (known as SCOPP) of STCP and Na 2-chloro-*o*-phenylphenolate (0.3% of each) ranked next in general efficacy. SCOPP gave satisfactory results with all woods except sap gum. SCOPP alone or mixed with STCP was superior in the control of sap stains of pine and mold to lignasan, LE-3 or STCP alone. SCOPP withstood washing out in pine better than LE-3 or lignasan while STCP was best for sap gum. Used at the rate of 1.5-3% as a spray for pine export timbers SCOPP gave very satisfactory results against stain and mold, 90% of the treated pieces reaching London in good condition. The corrosive action of the chem. compds. on equipment can be obviated by adding alkali to the soln., which likewise prevents the Fe tannate

discoloration that is liable to develop in treated oak timber. Oden E. Sheppard

Pressure pipes of nonmetallic materials [concrete and asbestos cement] (Weber) 14. Classifier for sepg. ground cement from gas currents (U. S. pat. 1,939,710) 1. Treatment of calcareous shale (residue used in the manuf. of cement) (Ger. pat. 587,289) 22. Glue product [used as a calcimine] (U. S. pat. 1,940,486) 18.

Bauer, B.: Das Zusammenwirken von Beton und Eisen im Eisenbetonstützenbau. Vienna: Gerold & Co. 64 pp. M. 3.

Cements. I. G. Farbenind. A.-G. Brit. 396,964, Aug. 17, 1933. Addn. to 328,538. See Ger. 573,177 (C. A. 27, 4370).

Cement. Wilhelm Schulze, Jr. Ger. 563,604, Nov. 7, 1933 (Cl. 80b. 3.05). Cement is made from ore slimes and lime with an addn. of oil shale. Oil or coal dust may be used as the fuel for burning. A 40% addn. of oil shale contg. 5% bitumen may be given.

Cement. Soc. des ciments français et des Portland de Boulogne-Sur-Mer et compagnie des Portland de Desvres. Fr. 754,728, Nov. 13, 1933. In making white cement in a rotary furnace, the clinker is removed from the furnace at the moment it has reached its highest temp. and cooled in the absence of air, *e. g.*, by water, and only to such a pt. that it dries by itself.

Cement. Soc. des ciments français et des Portland de Boulogne-Sur-Mer et compagnie des Portland de Desvres. Fr. 754,775, Nov. 14, 1933. A white cement is obtained by intimately mixing the raw materials with either  $\text{CaF}_2$  or  $\text{CaCl}_2$  or both and removing the clinker from the rotary furnace at the pt. where it reaches its max. temp., and cooling the clinker by water or steam in the absence of air.

Pozzolan cement. Società anon. italiana per la produzione calci e cementi di Segni. Brit. 398,028, Sept. 7, 1933. A hydraulic cement for use in sea water is prepd. by mixing  $\text{CaO}$  with (artificial) pozzolana and  $\text{CaSO}_4$  in such proportions that the cement has a hydraulic index of 1-2.5. The  $\text{CaO}$  should not contain more than 5% impurities and the  $\text{CaSO}_4$  should be commercially pure. In an example a cement of hydraulic index 2.1 consists of pozzolana 80,  $\text{CaO}$  15 and  $\text{CaSO}_4$  5%.

Rotary kiln for cement burning. Fellner & Ziegler A.-G. Ger. 585,799, Oct. 10, 1933.

Apparatus for mixing cement and water. Deutsche Werke Kiel A.-G. Fr. 754,443, Nov. 7, 1933.

Apparatus for drying dewatered cement slurry, etc. Albert Weimar. Ger. 589,066, Dec. 1, 1933 (Cl. 80c. 14.10).

Apparatus for evaporating cement slurry, etc. Fried. Krupp Grusonwerk A.-G. Ger. 586,715, Oct. 25, 1933 (Cl. 80c. 14.10).

Rotary drum for treating crude cement mixture with furnace gases. Arno Andreas. Ger. 588,479, Nov. 18, 1933 (Cl. 80c. 14.10).

Mortar. Soc. anon. Brevetti Agostino Pozzi. Austrian 353,692, Nov. 25, 1933 (Cl. 80c.). A substitute for ordinary lime in the prepn. of mortar is prepd. by moistening calcined siliceous lime with dil.  $\text{HCl}$ , and allowing the mixt. to stand in a closed vessel until the reaction is complete. A silicate, *e. g.*,  $\text{Al}$  hydrosilicate, may be added when lime of low  $\text{SiO}_2$  content is used. Mortar prepd. from the product has a cellular structure and hardens quickly.

Bituminous pavement Alfred S. Hirzel. U. S. 1,940,417, Dec. 19. Large particles of stone are used with a smaller proportion of smaller particles of crushed slag as aggregate in a bituminous upper or wearing course of pavements.

Bituminous paving material Robert P. Fletcher, Jr. U. S. 1,940,645, Dec. 19. Mineral aggregate is treated with a volatile temporary fluxing oil, then with an ordinary bituminous paving cement, then with a bituminous tempering material consisting of a hard powd. asphalt or

gilsonite and this mixt. is laid before its constituents have completely coalesced.

Bituminous compositions. Wm. Griffiths and Frank Poulger. Brit. 397,864, Aug. 22, 1933. A mastic asphalt is made by mixing a bituminous binder, *e. g.*, a mixt. of pitch and tar, with an inert filler consisting of spent oxide or cyanide residue having, *e. g.*, the compn.  $\text{Fe}_2\text{O}_3$  11.1,  $\text{H}_2\text{O}$  33.9,  $\text{CaO}$  20,  $\text{SO}_3$  21.3 and  $\text{Fe}(\text{CN})_2$  3.7 and  $\text{CO}_2$ , etc., 10%. A quantity, *e. g.*, 1-5%, of resin or resinous residue from wood pulp manuf. may be added. The mastic, molten or as an aq. emulsion, may be mixed with aggregate, *e. g.*, granite chips, ballast, moist earth, to form a road-making compn.

Bituminous compositions. Eli W. Harvey and Herbert P. Weatherly. Brit. 398,268, Sept. 14, 1933. A paving and roof compn. is made from bitumen, sand and limestone dust by melting the bitumen and adding the heated filling material. Mineral or petroleum bitumen may be used.

Rubber composition for roads, etc. Albert E. Bond (to Rubber Cement Products Ltd.). U. S. 1,940,528, Dec. 19. A plastic compn. which may be used for road or roof surfaces, etc., consists of a concd. aq. dispersion of natural or synthetic rubber and a quantity of Portland cement or the like at least sufficient to cause the dispersion to set or gel irreversibly.

Waterproofing and dust-preventing composition for treating roads, tennis courts, etc. Richard Kraft. Austrian 135,143, Oct. 25, 1933 (Cl. 23c.). The compn., which is heavier than water, comprises crude or waste oil mixed with about 2% of powd. asbestos and about 8% of a soln. of bitumen in solvent naphtha.

Blast-furnace slags. Arthur Killing. Fr. 754,439, Nov. 7, 1933. A compact and homogeneous slag for use in the manuf. of tar macadam, filling materials, concrete, etc., is made by treating the slag with air so as to produce an increase of temp. and fluidity as well as a degassing and adding, if necessary, after reheating, materials contg.  $\text{SiO}_2$  and (or) clay.

Artificial stone. Karl F. Höller and Stefan Schless. Ger. 583,253, Aug. 31, 1933 (Cl. 80b. 1.02). Lime slaked with an excess of water is refined by flotation and sifting and then mixed while wet with a filler, *e. g.*,  $\text{CaCO}_3$ . The mixt. is filtered, molded under pressure and hardened with  $\text{CO}_2$ . Alternatively, the wet mixt. may be finely subdivided before it is molded by rapidly evapg. the water, *e. g.*, by pouring the mixt. onto a heated plate. The mixt. may also be dried, ground, and mixed with a hardening substance, *e. g.*,  $\text{SiC}$  or quartz, before it is molded.

Artificial stone. Edmund P. Schöler. Ger. 588,494, Nov. 24, 1933 (Cl. 80b. 20.01). A mixt. of powd.  $\text{CaO}$  with powd. calcined ash from brown coal is treated with water or steam under pressure, with exclusion of air, until it is uniformly moistened. The mixt. is then pressed into molds and hardened by treatment with steam under pressure.

Light stone, etc. Bruno Neuhof. Ger. 586,795, Oct. 26, 1933 (Cl. 80b. 1.09). Light stone, plaster, heat-insulating material, etc., is prepd. by mixing mineral material such as lime, cement, clay, etc., with the waste sulfite or sulfate lye from cellulose manuf. Alkali carbonates may also be added.

Porous blocks, etc. Richard Handl and Jacobus J. Meuzelaar. Ger. 585,581, Oct. 5, 1933. Light, porous articles are made by molding cellulosic materials and cement mixed with a soln. of  $\text{Fe}_2(\text{SO}_4)_3$  and milk of lime.

Machine for molding concrete blocks, etc. Charles M. Murdoch. Brit. 397,054, Aug. 17, 1933.

Apparatus for the centrifugal molding of blocks, slabs and like constructional elements. Ralph Williams. Brit. 396,931, Aug. 17, 1933.

Endless chain apparatus for molding slabs, blocks, tiles, etc. Donald Craig (legal representative of Frederick T. Walker, deceased). Brit. 398,195, Sept. 1, 1933.

Lining metal tubes with bituminous material. Georg Reichenbecher and Ernst Grube (to Vereinigte Stahlwerke A.-G.). U. S. 1,939,521, Dec. 12. A tube of metal is heated to from 30° to 40° above the working temp. of rust-preventing material to be cast such as

bitumen and then is painted with a thin layer of the material, cooled and rotated while sufficient heated coating material is deposited centrifugally to give a lining of the desired thickness.

**Compound metal sheets.** Egbert Groove. Brit. 398,318, Sept. 14, 1933. Weatherproof building-elements, e. g., roofing, waste-pipes, gutters, are made by rolling a Pb coating onto at least 1 side of a non-perforated Zn sheet. Elements having a Pb coating on 1 side only may have a varnish covering on the opposite side.

**"Acoustic" plaster.** Harry E. Brookby (to U. S. Gypsum Co.). U. S. 1,938,803, Dec. 12, 1933. Com. retarded gypsum stucco is used with oxalic or benzoic acid (adapted to react with a carbonate to release  $\text{CO}_2$ ) and an aggregate of granulated pumice and granulated marble, to form a sound-absorbent plaster. Cf. C. A. 27, 3056.

**Plaster of Paris.** Wilbur S. Randel (to U. S. Gypsum Co.). U. S. 1,941,188, Dec. 26, 1933. For producing  $\text{CaSO}_4$  dihydrate, anhyd.  $\text{CaSO}_4$  is subjected to the combined action of water and attrition to effect hydration and the resulting slurry of dihydrate is heated under pressure to a calcining temp.

**Coloring granular mineral matter such as slate used on roofing.** Horatio L. Small (to Philip Carvey Mfg. Co.). U. S. 1,939,930, Dec. 19, 1933. Na silicate and pigmenting material such as chromic oxide are applied in a plurality of sep. fractional parts which are then dehydrated simultaneously by heating. Cf. C. A. 27, 5170.

**Flooring coverings, etc.** Felix Hoffmann and Franz Hoffmann. Brit. 396,971, Aug. 17, 1933. A floor or wall-covering compn. consists of cork from which the acids have been extd., e. g., by KOH soln., and a binding agent, e. g., cement, gypsum. The cork, which may be colored as desired, may form up to 90% by vol. of the mixt. The compn. may be applied as a continuous surface or as preformed slabs.

**Hygrometric apparatus for determining the moisture content of materials such as wood, textiles, etc.** Paul Rother and Georg Grau. Brit. 398,139, Sept. 7, 1933.

**Impregnating wood for interiors of buildings.** Herman C. Nielsen (to National Wood Products Co.). U. S. 1,939,186, Dec. 12, 1933. Wood such as that for doors or flooring, etc., is impregnated with a mixt. comprising fish oil 22, turpentine 22, mineral lubricating oil 22, mineral turpentine substitute 22, oleic acid 4,  $\text{CaCl}_2$  2 and scenting material such as oil of citronella about 2 parts, and may then be coated with a compn. which dries and hardens to a transparent coating, such as varnish or lacquer.

**Waterproofing composition for wood, etc.** Albert G. Rodwell. Fr. 754,666, Nov. 10, 1933. A gelatinous  $\text{SiO}_2$  is impregnated with a soln. of rubber latex and a soln. of an alkali silicate is added.

**Fireproofing wood.** Jean B. Ambrosini. Fr. 755,121, Nov. 20, 1933. Wood is fireproofed by the hot gas coming from the distn. of coal or by the water condensed from the gas in its passage through the conduits.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Relative efficiencies of domestic fuels in relation to their costs and their advantages.** Ralph A. Sherman. *Am. Inst. Mining Met. Engrs. Contribution* 63, 8 pp. (1933).

**A study of methods for the analysis of mixtures of hydrocarbons and ethyl alcohol.** J. Herbrich. *Ann. combustibles liquides* 8, 1113-33 (1933).—Stability diagrams for gasoline-alc. mixts. for compns. of 90-10 to 84-16 are presented which permit reading temps. of sepn. into 2 phases for various  $\text{H}_2\text{O}$  concns. Numerical examples are carried out, demonstrating the additive character of crit.  $\text{H}_2\text{O}$  concns. at  $0^\circ$ . Karl Kammermeyer

**Effect of water vapor on ignition temperatures of methane-air mixtures.** G. W. Jones and Henry Seaman. *Ind. Eng. Chem.* 26, 71-2 (1934).—The differences between the ignition temps. for the dry and satd. (at room temps.) gases vary somewhat with the compn., reaching a max. of  $11^\circ$  for a mixt. contg. 4%  $\text{CH}_4$ . The effect of amts. of  $\text{H}_2\text{O}$  vapor less than 20% satn. was too slight to be detected.  $\text{H}_2\text{O}$  vapor has no appreciable effect upon the lag on ignition for  $\text{CH}_4$ -air mixts. P. J. W., Jr.

**Influence of fuels on the starting of internal-combustion engines.** Wawrzyniok. *Automobiltech. Z.* 36, 464-70, 496-9 (1933). Tests on various fuels, including gasoline and various blends, showed that the type of fuel has little influence on the starting characteristics of the engines.

A. A. Boetlingk

**Anthracites: peranthracites and true anthracites. II. True anthracites.** P. Lebeau. *Ann. combustibles liquides* 8, 903-1002 (1933); cf. C. A. 27, 5512; 28, 877. The results of the examn. of 11 anthracites of continental origin are reported and include analyses of the anthracites and of the gases produced by pyrogenation. K. K.

**Utilization of anthracite fines by distillation and recovery of the pitch.** Oller S. Martinez. *Bol. oficial minas metal. combust.* 16, 1-93 (Nov., 1932); *Chimie & industrie* 30, 556. The Pieters process, in use at the Esperance et Bonne-Fortune coal mines at Montignat, seems to be the most scientific, simplest and most economical. It uses a continuous, vertical retort, consisting of 2 rectangular chambers; heat is applied to the wider sides, and the gases are removed through ducts in the narrower sides. The material is fed downward by gravity

and requires 15-20 hrs. to reach the level of the burners where it is heated to  $800^\circ$ . Below this level it is cooled by the air used at the burners and is discharged at about  $100^\circ$ . The feeding chamber is closed by means of a hydraulic seal. A. Papineau-Couture

**A laboratory test on coals for predicting the physical properties of the resultant by-product coke.** E. Swartzman, E. J. Burrough and R. A. Strong. *Can. Dept. Mines, Mines Branch, Rept.* No. 737-2, 24 pp. (1933).—Coke buttons are made at  $600^\circ$ , the volatile matter evolved is measured and the swelling index detd. by the formula: percentage of swelling = [(vol. of button in cc. - 2)/2]  $\times$  100; and swelling index = [(percentage of swelling) / (volatile matter)]  $\times$  100. Plotting swelling index (S. I.) vs. volatile matter (V. M.) arranges the coals that produce cokes of similar phys. properties in groups, as follows: (I) S. I., 1000-1400; V. M., 10-15%; contains all high-rank blending coals of Pocahontas type; (II) S. I., 900-1400; V. M., 15-20%; blending coals only; (III) S. I., 900-1500; V. M., 20-25%; natural by-product coking coals; (IV) S. I., 650-1200; V. M., 25-29%; true gas cokes, high density, low reactivity, spongy ends, much breeze, max. swelling and max. contraction; (V) S. I., 650-350; V. M., 29-33%; high-volatile gas coals, giving coke similar to IV, but very friable, must be blended; (VI) S. I., 350-0; V. M., 28-35%; coals similar to V, must be blended; (VII) S. I., 650-350; V. M., 25-29%; medium to good cokes, but friable; (VIII) S. I., 350-0; V. M., 28-25%; gives cokes superior to VI but inferior to VII, must be blended; (IX) S. I., 650-150; V. M., 25-20%; gives fairly good domestic and metallurgical fuels, they differ from III largely in cell structure of thicker walls; phys. properties are greatly influenced by amt. of ash (percentage on 3 inch, apparent sp. gr. and bulk density increase to max. with increasing ash to 10%, then fall); (X) S. I., 150-0; V. M., 25-15%; pebbly coke; (XI) S. I., 350-100; V. M., 20-15%; (XII) S. I., 180-0; V. M., 15-10%; unsuited for by-product use; (XIII) S. I., 0-200; V. M., 5-35%; pebbly cokes or noncoking.

Alden H. Emery

**Studies in the composition of coals. The action of solvents.** J. E. Ashmore and R. V. Wheeler. *J. Chem. Soc.* 1933, 1405-8. In studying the action of solvents on coal attention is called to the possible synthesis of

extractable matter from the solvent itself, due to the powerful catalytic action of the coal. This action is most noticeable in extns. at high temps. and with mixed solvents. The oxidation of  $C_6H_6$  to  $PhOH$  at high temps. accounts for a part of the  $PhOH$  found. The condensation of xylene and  $Am$  alc., with or without simultaneous oxidation, to form a resinic material is readily promoted by coal. The O in coal appears to be highly reactive; e. g.,  $EtOH$  is oxidized to  $AcH$  when it is boiled with finely divided lignite. H. F. Johnstone

New method of sampling coal by a suction drill sampling machine. J. C. Vogel. *J. Chem. Met. Mining Soc. S. Africa* 34, 127-32(1933). Alden H. Emery

An investigation of the accuracy of routine analytical determinations on coal and coke. II. V. A. Briscoe, J. H. Jones and C. B. Marson. *Dept. Sci. Ind. Research Fuel Research, Phys. and Chem. Survey of the Natl. Coal Resources* No. 29, 38 pp.(1933).—Sixty-four detns. of the proximate and ultimate analysis of a coal and coke, of the calorific value of the coal, and of the sp. gr. and porosity of the coke were made. The probable error, and the errors pertaining to duplicates, have been calcd. By comparison with detns. on pure chem. compds. it is concluded that there is no error of lab. sampling. For the same coal analyzed by 12 different labs., the discrepancy of the results is, for all detns. except ash, greater than calcd., and greatest for volatile matter. For non-swelling coals the Dulong calcn. rarely differs from the detd. calorific values by more than 150 B. t. u. The high probable error for the porosity of coke indicates the limited utility of this detn. P. S. Roller

Macro and microscopic study of Donetz basin "reddon" coals. L. M. Mayer and L. B. Zukerman. *Coke and Chem. (U. S. S. R.)* 1932, No. 7, 38-48.—An historic review of the petrographic study of coals. The nomenclature of coals introduced by Potonie and Gotan (?) is adapted: vitrite—coal with luster; durite—opaque coal; fusite—shredded coal. The compn. of a no. of samples from different Donetz basin coals detd. by proximate and ultimate analysis and a series of microscopic photographs accompanied by extensive discussion is given. J. S.

The experimental blending of coals. R. W. Perry. *Gas World* 100, No. 2579, Coking Sect. 5-10(1934).—The 4 methods employed for making blending expts. are: (1) large-scale oven tests, (2) bag tests, (3) box tests and (4) exptl. oven tests. An exptl. oven 3 ft. long, 3 ft. high and 18 in. wide to hold a charge of 500 lb. has proved of value in research problems. Tests to det. the improvements effected in cokes by addn. of small amts. of fusain or coke breeze to the mix in this oven are outlined. The low bulk d. of the charge, a disadvantage of the exptl. oven, which results in a less dense coke than from a large oven, may be overcome by air drying the charge. P. J. Wilson, Jr.

Increasing the coking power of coal. Tadaji Shimamura and Hideo Nomura. *J. Fuel Soc. Japan* 12, 1371-82 (1933) (in English 131-6).—The coking power of coal was increased by treating it with H under pressure and heating. By this process the content of  $\gamma$ -compds. in weakly coking coal increased from less than to more than 10%. The increase of  $\gamma$ -compds. was ascribed to the conversion of some parts of  $\alpha$ - and  $\beta$ -compds. by the action of H in which the O of the original coal was reduced greatly, producing water with H. In regard to the mechanism of the action of H upon coal, the deoxidation occurs first and then the addn. of H follows, until the coal completely liquefies. F. I. Nakamura

The electrical conductivity of coal as a measure of coking properties. Kai-Ying King and Kuo Ping. *J. Chinese Chem. Soc.* 1, 208-18(1933).—60-Mesh coal is placed in a Si tube in a furnace, and the elec. cond. detd. for a column 1 mm. thick for the range 500-800°. Measurements on 4 samples show that good coking coals give a sharply increasing cond. with rise of temp., indicating the ease with which coal is graphitized. The method is proposed for predicting coking properties. W. H. A.

Spontaneous combustion in the western area of the South Wales coalfield. W. M. Thomas, T. David Jones

and J. Ivon Graham. *Proc. S. Wales Inst. Engrs.* 49, 347-58(1933); cf. *C. A.* 27, 5172.—Discussion.

Alden H. Emery

Selection of coal for the industrial boiler house. B. Frisby. *Steam Engr.* 3, 137-9(1934).—F. discusses grading, prox. analysis and purchase of fuel on a calorific basis.

Alden H. Emery

The anthraquinone problem—coal and synthetic anthraquinone production. V. G. Gulinov. *Coke and Chem. (U. S. S. R.)* 1932, No. 8, 24-8.—A description of methods for synthetic anthraquinone production. Raw materials required are phthalic anhydride and anhyd.  $AlCl_3$ . It is believed that the growth of the synthetic anthraquinone industry was due to the temporary abnormally low prices of phthalic anhydride and anhyd.  $AlCl_3$  in the U. S. For this consideration and lack of these 2 raw materials in U. S. S. R. the production of anthraquinone from coal by the Cr method is recommended for the Russian industry as more economical. J. S.

Assessing the value of gas coals. R. A. Mott. *Gas J.* 205, 33-4, 88-90(1934).—M. suggests that comparisons of the gas-making properties of "pure coals" be made in addn. to those for normal com. purity to furnish a clearer picture of the relative gas-making values. A study of the relation between the rank of coals (ash, S and  $H_2O$ -free) and the gas-making power shows that British and American coals in horizontal retorts gave max. yields at 85-86% C, the Canadian coals at a somewhat lower C content. With steaming in vertical retorts or when water gas is added, it would seem that coals of 86-87% C are the best. A comparison of the importance of ash and  $H_2O$  in coal carbonized in horizontal and vertical retorts indicates that except in certain cases freedom from ash is of much greater importance than freedom from  $H_2O$ . P. J. Wilson, Jr.

Vertical retorts and their maintenance. Darrell W. Rees. *Gas World* 99, 625-7; *Gas J.* 204, 889-90(1933).—Each point in the operation of vertical retorts should receive the proper attention at regular intervals. The results of an 8-day test with a typical Welsh washed gas coal are included. P. J. Wilson, Jr.

Two C. O. L. intermittent vertical chamber plants. Anon. *Gas World* 100, 37-9; *Gas J.* 205, 91-3(1934).—The operating results are given from 48 retorts with a capacity of 5,000,000 cu. ft. per day at Brentford, and 24 with a capacity of 3,000,000 cu. ft. at Vancouver. P. J. Wilson, Jr.

Factors influencing maintenance costs of carbonizing plant. T. Campbell Finlayson. *Gas World* 100, 33-6 (1934); *Gas World* 205, 148-51. P. J. Wilson, Jr.

Evaluation of bituminous coal for gas manufacture in coke ovens. N. Hessler. *Gas u. Wasserfach* 76, 881-7, 899-905(1933).—The literature on coal swelling pressure, caking, carbonizing and petrographic tests is reviewed. Test results for proximate analysis, lab. gas yields and heating value, caking index, swelling pressure, shrinkage, coke strength (tumbler test) and petrographic analyses are given for a series of coals from Upper and Lower Silesia, Westphalia and England. Details of the carbonizing test equipment are given. The caking test of Campredon was modified by using a constant amt. of sand and varying the dry coal content by  $1/10$  g. The mixt. is coked in a crucible with an upper diam. of 40 mm. and 46 mm. high, so that the coke button has a height of about 15 mm. On cooling, the button is removed from the crucible and placed on a smooth sand surface. A 16-mm. diam. steel ball is then allowed to fall 100 mm. onto the small end of the button, and that mixt. is selected for which the button is cracked but not disintegrated. The caking index is then taken as 100— (10 times the wt. of coal). The effect of moisture content on the coke swelling power is noted. The most important characteristics of a coal for carbonization in coke ovens are a strong coke and a good gas yield. Some idea of practical oven results may be obtained by detg. the caking tendency, the swelling pressure, shrinkage and making lab. carbonization tests. The petrographic compn. of the coal also has an influence on coke formation but the gas plant is not justified in considering this factor. Coke-



oven plants at mines, however, may use such studies to make good coke blends of poor coals. Rank of coal is of more importance to the gas plant. In general, the heating value of the gas and the yield of 4300 cal. mixed gas increases with increasing volatile content. The coke strength generally decreases with increasing gas yield, but not invariably.

**Reforming oil refinery and natural gas.** J. A. Perry. *Gas Age-Record* 72, 479-83(1933).—One thousand cu. ft. of refinery gas of 1600 B. t. u. is reformed by the United Gas Improvement process to 2000 cu. ft. of 560 B. t. u. gas plus 33 lb. of coke which makes an addnl. 1000 cu. ft. of blue gas. This work is being done with a normal 11 ft. carbureted water-gas set at the rate of 8-10 million cu ft. per day. Overall conversion costs are somewhat less than those for carbureted water gas. H. L. Olin

**Mitigating internal corrosion of natural-gas lines.** A. B. Allyn. *Gas Age-Record* 72, 463-5(1933).—The internal corrosion of high-pressure natural-gas pipe lines caused by the action of  $H_2S$  and  $O_2$  in the presence of condensed moisture is a serious problem in California. Removal of the first 2 by chem. methods seems impracticable and dehumidification to prevent condensation of  $H_2O$  seems to be the only solution. The possibility of applying the common refrigeration methods is discussed. H. L. Olin

**Signs of the times—present-day processes unwieldy—importance of complete gasification—water-gas plant.** C. F. Broadhead. *Gas World* 100, 8-11; *Gas J.* 205, 94-8(1934).—A survey of the gas industry with needed developments in production, purification and distribution. B. considers a combination of a water-gas set and vertical retorts in one plant the most promising means of gas production. P. J. Wilson, Jr.

**Production of high B. t. u. gas in existing water-gas equipment.** Leon J. Willien. *Gas Age-Record* 72, 431-3(1933).—Temporary shut off of the natural gas supply is met by the production of a 945 B. t. u. gas in a standard three-shell water-gas machine. A light distillate of 32° Bc. is gasified in an atm. of steam. H. L. Olin

**Fused cobalt oxide as a water-gas catalyst.** Ernest C. White and J. F. Shultz. *Ind. Eng. Chem.* 26, 95-7(1934).—Catalysts made by the proper fusion and partial reduction with H of Co oxide effectively catalyze the water-gas reaction to equil. at temps. as low as 283° and space velocities of 1800 vols. of water gas per vol. of catalyst per hr. The addn. of suitable promoters, such as Fe up to 3% or Cu oxide, suppressed the simultaneous formation of  $CH_4$ . A Co catalyst contg. 38% Cu was particularly active as a water-gas catalyst without significant synthesis of  $CH_4$ . P. J. Wilson, Jr.

**Coal-gas purification.** New low-temperature method. Berekhoff. *Ice and Cold Storage* 36, 187-8(1933).—By cooling coal gas to 0-5° more complete removal of  $NH_3$  and naphthalene is effected. A. H. Johnson

**Experience with a gas-heating plant.** K. H. Raupp. *Gas-u. Wasserfach* 76, 869-73(1933).—A low, uniform, chimney draft is required for most efficient operation of a gas-heating plant, as indicated by practical test results. R. W. Ryan

**Modern waste heat boilers for gas works.** J. Ipfelkofer. *Gas-u. Wasserfach* 76, 849-56(1933).—Gas plants have 3 sources of waste heat, the hot coke, blow gases from water-gas generators and the flue products from the oven flues. The heat from the coke is rarely used, while the heat in flue products from ovens is used largely for preheating fuel gas and air. This article describes both fire-tube and water-tube boilers, boilers with forced circulation of the water, and boilers with provision for the supplementary use of fuels. R. W. Ryan

**The best design of Venturi tubes.** Wilhelm Beckmann. *Gas-u. Wasserfach* 76, 865-9(1933).—A short, properly designed, downstream portion or diffuser for a Venturi meter has proven to be equally as effective as the usual longer down-stream type, for measuring  $H_2O$ , and saves much room, making Venturi tubes applicable to many situations where the old form is too long. R. W. Ryan

**Practice of (gas) generating process.** G. I. Shakh-

Paroniantz. *Khimstrof* 5, 2477-84(1933).—The designs and performance of various types of generating installations for gasification of coals of varied ash and slag contents are discussed. Chas. Blanc

**The Fuel Research Institute's charcoal gas producer.** Shojiro Uchida. *J. Fuel Soc. Japan* 12, 1391-1402(1933) (in English 138-40).—The charcoal gas producer of the Fuel Research Inst. is characterized by its wall construction, its light weight and cheap price, viz., the producer wall is made of cast iron 3 mm. thick, the inner surface of which is lined with a common fire clay with a thickness of only 5 mm. Outside that wall there is an outer thin iron shell leaving about 10 mm. of air space between them. Air is passed in this space by a natural draft which serves to cool the wall and thus it is protected from high temp. inside the producer. The producer is operated with downward air draft with the addn. of a limited amt. of water. The producer was fitted to a 24 h. p. Hudson 7 seater and a comparative drive totaling about 5000 miles was made with charcoal and gasoline. During the run the inside temp. and wall temp. of the producer were noted and the gases were analyzed. In measuring the reactivity of charcoal, 92.5 cc. of  $CO_2$  per min. was passed to 0.3 g. of powd. sample heated at 900°, and the weight decrease was measured. The app. used was the Oshima-Fukuda precision thermobalance. During this test about 100 g. of charcoal was consumed every min. and the water added for gasification was about 15 cc. per min. As this motor car runs 4.87 km. with 1 l. of gasoline at an av. speed of 32 km. per hr., it may be said that when the distance alone is compared nearly the same run is obtained with 1 kg. of charcoal as with 1 l. of gasoline. F. I. Nakamura

**Influence of sodium carbonate upon the producer-gas reaction.** Clarence B. Weiss and Alfred H. White. *Ind. Eng. Chem.* 26, 83-7(1934).—The reaction  $Na_2CO_3 + 2C = 2Na + 3CO$  which proceeds to the right at temps. above 800° (cf. C. A. 25, 1970) is reversed when the reaction products are cooled slowly in the range 900-750°. The reaction was studied in a miniature gas producer consisting of a Ni tube heated in an elec. furnace. When using untreated Acheson graphite and dry air at 900° and a time of contact of 2 secs., the exit gases contained 6.8% CO; but when the graphite contained 1%  $Na_2CO_3$ , they contained 33% CO. As little as 0.1%  $Na_2CO_3$  would give these results. Similar results were obtained with steam-air mixts. The  $Na_2CO_3$  is decompd. in the lower part of the producer when the temp. is high, and is regenerated in the upper and cooler part of the producer where it deposits on the fresh graphite, and is recycled. If it were not for the loss of part of the soda with the fuel ash, a small amt. would last a long time. Foundry coke required 5%  $Na_2CO_3$  since the ash combined with the soda. The treated coke gave a richer gas at 880° than could be obtained from the untreated coke at 1090°. P. J. Wilson, Jr.

**Gas-absorption apparatus.** Robert T. Dillon. *Ind. Eng. Chem.* 26, 111(1934).—An efficient, glass gas absorber which is adaptable to macro- or microwork, and requires a small vol. of absorbing soln., consists of 2 concentric tubes sealed together near one end. The gas passes down the inner tube, up through the absorbing soln. in the outer tube, and escapes through holes at the junction of the tubes. P. J. Wilson, Jr.

**Experiments with service governors.** N. F. D. Wardle. *Gas J.* 205, 103-4(1934).—A compensated governor has the outlet pressure rising in proportion to the increase in flow. Tests with 2 such governors lead W. to the conclusion that the manufacturers have not hit on the right method of compensation. The results with a better design are shown. P. J. Wilson, Jr.

**Pyrolysis of the lower paraffins. III. Production of olefins in baffled metal tubes.** Adrien Cambron and Colin H. Bayley. *Can. J. Research* 9, 583-90(1933); cf. C. A. 27, 5172.—Results have been obtained which indicate that the conversion of the lower paraffins to olefins by thermal treatment can be satisfactorily carried out in special alloy steel tubes at 800-820°. By using

baffled tubes it has been found possible to obtain high rates of conversion at temps. considerably lower than when using open tubes. Actually the temp. has been brought within the range of usefulness of special alloy steels. Heat-resistant alloys of the 18-8 type have been found unsuitable for this purpose, because Ni appears to catalyze the formation of elementary C, but Ni-free alloys contg. over 20% of Cr have been found satisfactory. IV. The conversion of gaseous paraffins to aromatic hydrocarbons in baffled quartz tubes. *Ibid.* 591-602.—The polymerization of gaseous olefin mixts. such as are obtained by the pyrolysis of the lower paraffins has been studied by passing the gases through heated quartz tubes under conditions of streamline and of turbulent gas flow. It is shown that the observed rate of polymerization of the gaseous olefins to liquid hydrocarbons is appreciably higher at a given wall temp. under conditions of turbulent flow. By subjecting propane to 2 thermal treatments at a max. temp. of 950°, 29% by weight of the gas is converted to liquids of which 70% boils in the gasoline range, and over 30% by weight of the propane is recoverable in the gaseous by-products as olefins, the total conversion into useful products being consequently about 60%. Substantially the same results have been obtained in single-stage recycling expts. J. W. Shipley

**Recovery and treatment of ammonia from coke-oven gas.** P. S. Sokolov. *Coke and Chem.* (U. S. S. R.) 1932, No. 8, 16 20.—An outline of the technology of  $\text{NH}_3$  recovery from coke-oven gas. Computations are made on the basis of coking 1000 tons of dry coal, with 8% moisture, per day for  $\text{NH}_3$  yields, quantity of lime, water, steam consumption, etc. James Sorrel

**Sulfur recovery from hydrogen sulfide of coke-oven gas and other gases by means of activated carbon.** M. D. Kenigstul. *Coke and Chem.* (U. S. S. R.) 1932, No. 7, 32-7.—A discussion of reports of a no. of investigators in the use of activated C for S recovery from gas by absorption ( $2\text{H}_2\text{S} + \text{O}_2 = 2\text{H}_2\text{O} + 2\text{S}$ ). A distinctly different method is described for recovery (where activated C acts as a catalyst only) developed at the Ukrainian Coal Chem. Inst. Essentially it consists in: (1) absorption of  $\text{H}_2\text{S}$ ,  $\text{CO}_2$ , and partly  $\text{CS}_2$  from the gas by  $\text{KNO}_3$  soln. in scrubbers; (2) treating the absorbing liquor by means of Petit's method which results in liberation of gas with 10%  $\text{H}_2\text{S}$ ; (3) passing this gas through an activated C bed acting as a catalyst (according to the scheme proposed by Bezuglov and Kutzakov) where up to 93%  $\text{H}_2\text{S}$  is oxidized and S drops out as liquid outside of the catalyst bed, thus almost eliminating the need for regeneration. James Sorrel

**Chief shortcomings in the Linde installation for separation of coking gas and ways for its perfection.** P. K. Sakmin. *Khimirol* 5, 2485-94(1933); cf. C. A. 28, 6094.—The criticism of the Linde separator is based in part on the lab. expts. in a specially designed app. (illustrated). The tabulated comparative results show that in the Linde system there are large losses of  $\text{N}_2$  in the washing of polluted crude mixts. of  $\text{N}_2$  and  $\text{H}_2$  and of one half of  $\text{C}_2\text{H}_4$  of the purified coking gas in the  $\text{CH}_4$  fraction. The  $\text{C}_2\text{H}_4$  fraction issues as a gas and must be liquefied with considerable consumption of energy before the fractionation into  $\text{CH}_4$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_6$  and  $\text{C}_3\text{H}_8$ . The work is being continued. Chas. Blanc

**Electric purification of coke-oven gas or tar.** Ya. A. Nazarenko and V. S. Savchenko. *Coke and Chem.* (U. S. S. R.) 1932, No. 8, 11 16.—Elec. precipitators are described. James Sorrel

**Examination of the phenols of a low-temperature coal tar.** S. Caplan, J. Ross, M. G. Sevag and T. M. Switz. *Ind. Eng. Chem., Anal. Ed.* 6, 7-12(1934).—The range 220-260° was studied. It is necessary to give close attention to column design, which is described, and to fractionation. Detn. methods are replete in detail showing fractions about 220° and 234° contain mesitol and 3-methyl-5-ethylphenol, resp., also the cryst. derivs., bromides and phenylurethans of these substances. Fractions up to 260° are shown to be phenyl homologs with

alkyl groups in a *m*-position to the hydroxyl group.

Halsey E. Silliman

**Viscosity of pitch.** A. B. Manning. *Dep't. Sci. Ind. Research, Fuel Research, Tech. Paper No. 39*, 20 pp. (1933).—This investigation is designed as part of a program to correlate lab. tests of pitch with its suitability for briquet manuf. Empiric methods such as detn. of twist point, etc., are but in effect rough comparisons. The expts. show that the coeff. of viscosity being const., all coal-tar pitches are true viscous liquids; while petroleum pitches or bitumens are plastics or pseudo plastics, since the coeff. of viscosity varies with the shearing stress. Previous investigations are discussed. This present investigation covers the temp. 30-40° by the disk method, 30-80° by the rotating-cylinder viscometer, and 80-110° by the capillary tube viscometer, all app. being illustrated and described, on low-temp., horizontal-retort, vertical-retort, soft horizontal-retort and coke-oven pitches; also coal-tar pitch as against bitumen. It is noticeable that the temp. coeff. of the viscosity of bitumen is much less than that of coal-tar pitch. Halsey E. Silliman

**Progress in the gas industry: Sulfur and coke problems: Benzene-rectification plant: Working costs.** B. Thorpe. *Gas World* 99, 674-5(1933); *Gas J.* 205, 44-5(1934).—Lower S in the coal to be gasified means lower S in the town gas. An effort was made to trace the S removed from coke on drying with the waste gases from retort settings (cf. H. Singleton, C. A. 28, 8819) by boiling gently in dil., neutral  $\text{H}_2\text{O}_2$  for 12 hrs. and analyzing for S. The operating results of the continuous benzene rectifying plant at Huddersfield are described. P. J. Wilson, Jr.

**How to improve the position of the coking industry.** S. W. Saunders. *Gas World* 100, No. 2579, Coking S. 1 2-4(1934).—The importance of research to the gas industry. Several problems in benzene and tar production are outlined. P. J. Wilson, Jr.

**Heating horizontal retort settings.** H. James Risby. *Gas J.* 204, 781-4, 834 6; *Gas World* 99, 595-8, 612 4 (1933).—In order to obtain the rapid penetration of heat necessary for the production of a smaller, uniform-sized coke, R. has developed the multiple-stage, "tertiary air" combustion system for use on horizontal and inclined retort settings. The secondary air to the heating chamber is so restricted that combustion of the fuel gases entering the heating chamber is incomplete. Sufficient additional air to complete combustion is preheated in overhead recuperators and admitted to the heating flues at the upper retorts. The waste gases continue through the recuperators to the stack. A heat balance indicates that by use of this system a definite saving in fuel is possible. Temps. in the settings will be more uniform and the quality of the coke improved. P. J. Wilson, Jr.

**Bricks of coke-oven walls.** T. Kuroda. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 655-6(1933).—A silica brick taken from a coke-oven battery after 12 yrs of operation was examd. analytically in 3 sections, which were taken from each face and the center of the brick. A slight increase in total Fe was observed on the face of the coking chamber, probably coming from the coal ash. The Fe content of the flue side was reduced somewhat, probably because of the exposure to a reducing flame giving metallic Fe which diffuses into the brick. The analysis of the central section was taken as a basis. K. K.

**Com. hydrogenation processes [hydrogenation of coal and tar benzene] (Bosch) 13. Slow combustion of  $\text{C}_2\text{H}_4$  (Bone, et al.) 2. Utilization of the by-products of sewage disposal [sludge and scum as fuel] (Rumsey) 14. Kinetics of the chem. reaction of the process of combustion shavskii, Eigenzon) 2. A stationary flame and its utilization (Kurokawa) 2. App. for classifying coal (U. S. pat. 1,941,147) 1. App. for sepg. coal mixts. (U. S. pat. 19,021) 1. Heating solids, liquids or gases [gasification of powd. coal] (Ger. pat. 588,213) 13. App. for sepg. mixts. of coal and stone (Brit. pat. 398,210) 1. App. for sepg. dust and small particles from coal (Brit. pat. 396,828) 1. Catalysts [for use when treating carbonaceous**

materials with hydrogenating gases] (Fr. pat. 754,664) 1  
 18 Low-boiling liquid hydrocarbons from coal, tars, etc. (U. S. pat. 1,940,648) 22. Pigment and adsorbent from powd. coal (U. S. pat. 1,940,852) 26.

Callen, Arthur S., and Ulmann, August, Jr.: Principles of Combustion. Scranton, Pa.: Internl. Textbook Co. 71 pp. \$1.05.

British standards for creosote Specifications for Fuel m luminaces. (B. S. S. No. 503-1933). London: Brit. Standards Inst. 2s. 2d. Reviewed in *Chem. Age* 29, 4(1933).

Motor fuel. Compagnie des procédés Gohin Poulenc and Dimitri Costin. Fr. 754,936, Nov. 17, 1933. Gases from mineral or vegetable oils are mixed with a poor gas such as producer gas and used for explosion motors.

Liquid fuels. E. I. du Pont de Nemours & Co. Fred- 3  
 crik B. Downing and Herbert W. Walker. Brit. 398, 790, Sept. 7, 1933. Hydrocarbons are stabilized and rendered resistant to the formation of gums and discoloration by adding a small amt. of an amine salt of a hydroxyaryl compd., other than hydroxydiaryls, in the absence of dyes. Thus gasoline,  $C_6H_6$ , benzine, cracked hydrocarbons or Diesel fuel is mixed with 1 or more of the compds., hydroquinone dianilide, dibutylamine  $\alpha$ -naphthol etc., the monodiethanolamine salt of catechol, the mono- $\alpha$ -toluidine salt of hydroquinone or the  $p$ -phenyl- $\alpha$ -naphthylamine salt of  $m$ -4-xyleneol. Tertiary aliphatic and aromatic amines may also be used in the prepn. of the salts which may have antidetonating properties also.

Liquid fuels. Maurice Chaffette. Fr. 755,445, Nov. 21, 1933. Homogeneous mixts. of hydrocarbons and alcohols such as MeOH or EtOH are obtained at a low temp. or with presence of small amts. of water by the introduction of an acid or a pyridine base. Thus, to a mixt. contg. MeOH 18, ordinary gasoline 54 and benzene 18 vols. is added 0.9% by vol. of "pyridine oleate," and this prevents the presence of 0.5 vol. of water without sepn.

Apparatus for vaporizing liquid fuels to produce a dry vapor Arthur H. Masters. U. S. 1,939,270, Dec. 12. Various structural and operative details are described.

Use of high-frequency oscillations in carburetion of air with liquid fuels. Mark F. Heaney (40% to Edward B. Benjamin). U. S. 1,939,302, Dec. 12. Various details of app. and operation are described by which a pool of suspended droplets of liquid fuel are treated with "ultrasonic" frequency oscillations such as may be induced by the use of an oscillator of the quartz crystal type, the crystal in turn serving in a circuit including an electron discharge tube to establish and fix the rate of the vibrations produced.

Gasifying finely divided solid and liquid fuels. Franz Heitzberg. U. S. 1,939,488, Dec. 12. Finely divided fuel is injected into an externally heated chamber which is the size of a usual coke-oven chamber, and steam is injected into the chamber in a direction opposed to the flow of fuel, the fuel is maintained in suspension and rich gas is withdrawn from the upper part of the chamber, and water gas and ash are withdrawn from the lower part of the chamber. App. is described.

Solid fuel. Alois J. Hanke. Fr. 755,452, Nov. 25, 1933. Solid fuel is improved by submitting it to the action of vapors of hydrocarbons, contg. or not contg. bitumens of mineral wax, at 100-130° according to the nature of the fuel.

Preparing fuel briquets. Ernst Rochming. Ger. 585,507, Oct. 10, 1933.

Apparatus for cooling briquets. Wellpappschalung- 9  
 Vertrieb L. Steiniger. Ger. 585,158, Oct. 3, 1933.

Thermoelectric apparatus for measuring the calorific value of fuels. Siemens & Halske A.-G. (Heinz Gruss, inventor). Ger. 585,215, Sept. 29, 1933.

Destructive hydrogenation. The Gas Light & Coke Co. Fr. 754,676, Nov. 10, 1933. A basic O-contg. salt of Ti or a reduction or transformation product of such a salt is used in the catalytic hydrogenation of carbonaceous

materials. Examples are given of the use of a basic Ti molybdate, chromate, tungstate and vanadate.

Low-temperature carbonization. Hans Magnus. Ger. 588,156, Nov. 13, 1933 (Cl. 10a. 36.01). Low-temperature carbonization products from brown coal, oil shale or like bituminous materials are treated to sep. tar and tarry oils, and the latter are then cracked to yield light liquid hydrocarbons as a sep. product by passage at about 500° through coke produced in the process.

Low-temperature carbonization. Wm. A. Caunt. Fr. 754,642, Nov. 10, 1933. The retort is in the form of a rotating cylinder slightly inclined to the horizontal.

Upright metal retort suitable for low-temperature carbonization of coal, etc. Lewis C. Karick. U. S. 1,938,596, Dec. 12.

Jigging apparatus for screening or classifying coal, ores, etc. Wm. H. Herrisford. Brit. 396,807, Aug. 14, 1933.

Briquetting coal. Wilhelm Klopffleisch. Ger. 588,425, Nov. 17, 1933 (Cl. 10b. 3.01). Coal is mixed with a low percentage of dry peat and ground hard pitch, and the mixt. is briquetted under heat and pressure.

Briquetting coal or brown coal. Wilhelm Bunberger. Ger. 588,403, Nov. 20, 1933 (Cl. 80a. 25.01). Permanent briquetting molds are prepd. by molding and sintering a mixt. contg. WC 50 60,  $Cr_2C_3$  20 30, SiC 10 15, Bc 5 10, and Al 0.5 2%.

Hydrogenating coal or tar. C. Otto & Co. G. m. b. H. Ger. 588,268, Nov. 15, 1933 (Cl. 12a. 1.05). A suspension of coal or tar in an oil of high b. p. is treated in counter-flow with H under pressure in app. comprising a large no. of parallel narrow tubes. The oil should preferably contain unsatd. compds.

Rotary-drum apparatus for the continuous distillation of coal, etc. International Bitumenoil Corp. Ger. 585,274, Oct. 3, 1933. See Brit. 323,523 (C. A. 24, 3103).

Apparatus for charging continuously operated vertical coal-distillation retorts. Heinrich Koppers A.-G. Ger. 585,403, Oct. 10, 1933.

Apparatus for distilling and coking coal. Edmund G. Weeks and Wm. A. Riley (to Babcock & Wilcox Ltd.). U. S. 1,941,130, Dec. 26. Structural and mech. features of an app. having a retort comprising a fuel-bed container with a coke discharge and coke extractor at the bottom of the container and means for automatically changing the speed of operation of the coke extractor as the level of the upper surface of solid fuel in the fuel bed container changes.

Treatment of coal-distillation gases. The Barrett Co. Ger. 588,090, Nov. 11, 1933 (Cl. 26d. 1.40). See Brit. 346,805 (C. A. 27, 1147).

Stable dispersion of coal and fuel oil. Robert A. Adam, Frederick C. V. Holmes and Arthur W. Perrins (to Cunard Steam Ship Co., Ltd.). U. S. 1,939,587, Dec. 12. Coal which is finely (but not colloiddally) pulverized is mixed with a fuel oil contg. at least 6% of fixed carbon.

Hydrocarbons. I. G. Farbenind. A.-G. (Hans G. Grimm and Josef Jannek, inventors). Ger. 585,652, Oct. 6, 1933. App. is described for producing hydrocarbons by the hydrogenation of coal, peat, semi-coke, pitch, etc., at high temp. and pressure.

Apparatus for removing dust and water from lignite. Deutsche Erdöl A.-G. Ger. 585,794, Oct. 14, 1933.

Apparatus for mixing peat with peat dust. Karl Neynaber. Ger. 585,418, Oct. 10, 1933.

Aqueous dispersions of montan wax, etc. Oscar F. Neitzke (to Bennett, Inc.). U. S. 1,940,431, Dec. 19. An alk. aq. dispersion suitable for use in waterproofing paper, etc., comprises a solid content composed largely of montan wax, a normally solid asphalt and the saponification products resulting from reaction of an alkali with a portion of the saponifiable content of the wax (the dispersion being of sufficiently low alkyl. to be free-flowing and substantially free from stabilizing agents other than the saponification products mentioned). U. S. 1,940,432 relates to generally similar products formed from paraffin wax, montan wax, rosin soap and sapon. derivs. of saponifiable matter in the montan wax.

Conversion products of montan wax. I. G. Farbenind.

- A.-G. (Michael Jahrstorfer and Erwin Wals, inventors). Ger. 587,450, Nov. 3, 1933. Crude or derefinised montan wax is saponified, and then extd. with a solvent which dissolves alcs. and soaps from the wax, but does not dissolve the asphaltic constituents of the sapon. product. Suitable solvents are MeOH, EtOH, PrOH or a mixt. of EtOH and acetone. Sapon. may be effected in the presence of the solvent. Details are given.
- Superheating steam.** Andre Huet (to Superheater Co.). U. S. 1,938,099, Dec. 12. Various details of app. and operation are described.
- Apparatus for superheating steam.** Charles W. Gordon (to Superheater Co.). U. S. 1,938,695, Dec. 12. Structural details.
- Steam superheater.** Douglas S. Carter (to Superheater Co.). U. S. 1,941,246, Dec. 26. Structural details.
- Oxidation products produced in internal-combustion engines.** Wm. W. Odell. U. S. 1,939,018, Dec. 12. Oxidizable material and an amount of an oxidizing agent insufficient for complete combustion are admitted into the combustion chambers of an internal-combustion engine, combustion is caused to occur with formation of incompletely oxidized products such as aldehydes, etc., some at least of which are recovered from the cooled exhaust gas.
- Filter for removing soot and moisture from compressed gas tapped from the cylinders of an internal-combustion engine.** Carl Holmbergs Mek. Verkstads-Aktiebolag. Brit. 397,523, Aug. 28, 1933.
- Lighting gas.** Soc. de construction d'appareils pour gaz à l'eau et gaz industriels. Fr. 755,142, Nov. 20, 1933. A part of the CO in blue water gas is replaced by an equal vol. of H and CO<sub>2</sub> by the known Fe-steam reaction, i. e., oxidation of the CO to CO<sub>2</sub> by means of Fe<sub>3</sub>O<sub>4</sub> and production of H by injection of superheated steam on to the FeO formed.
- Fuel gas.** Bamag-Mequin A.-G. Ger. 585,439, Oct. 3, 1933 (Cl. 24e. 2.01). Addn. to 571,666 (C. A. 27, 4381). The production of fuel gas from coke or semi-coke is described.
- Fuel gas of low carbon monoxide content.** Franz Bössner and Carl Marischka. Austrian 135,095, Nov. 25, 1933 (Cl. 26a.). Addn. to 132,040. Details are given of an alternative method of carrying out the process of Austrian 132,040, which corresponds to Fr. 716,088 (C. A. 26, 2040).
- Gas mixtures.** Edmond Voituren. Ger. 584,775, Nov. 14, 1933 (Cl. 12o. 19.01). Addn. to 582,664 (C. A. 28, 883). The method of 582,664 for treating satd. hydrocarbons or gases rich in these, with O in the presence of water at high temps. to give a reactive gas mixt. contg. practically no satd. hydrocarbons, is applied to gas mixts. relatively poor in satd. hydrocarbons, such as coke-oven gas.
- Determining the combustibility content of gas mixtures.** Joseph A. Stein (to Bacharach Industrial Instrument Co.). U. S. 1,940,513, Dec. 19. A device of catalyzing material such as Pt wire is electrically heated in a confined space through which the gas to be tested is passed after admixture with a large excess of dilg. air and changes in elec. resistance are noted. Various details of app. and operation are described.
- Device for cleaning flue gases by water sprays.** Mendel Frey. Ger. 586,674, Oct. 25, 1933 (Cl. 24g. 6.20).
- Purifying gases such as coal gas.** Thyssen'sche Gas- und Wasserwerke G. m. b. H. Ger. 588,310, Nov. 15, 1933 (Cl. 26d. 12.01). Addn. to 457,264 and 482,880 (C. A. 24, 445). The cooling process described in Ger. 457,264 is effected in two stages, cooling being indirect in one stage and direct in the other stage. The same cooling medium, which may be hygroscopic, may be used in both stages, or a hygroscopic medium may be used in the direct stage only. Cf. Ger. 583,417 (C. A. 28, 2937).
- Cracking and carbureting hydrocarbon gases.** Joseph A. Perry (to United Gas Improvement Co.). U. S. 1,939,410, Dec. 12. A hydrocarbon gas such as natural gas or by-product refinery oil gas is passed through an incandescent fuel bed, producing a reformed gas with deposition of C and formation of a stiff pitch; steam is passed through the incandescent fuel bed, generating blue water gas, and the stored heat is utilized for carbureting and fixing the water gas and producing fluid tar, the stiff pitch and fluid tar are mixed for removal from the gas-making app., and the fuel bed is air-blasted to store heat in it and utilize a remaining portion of the previously deposited C. App. is described.
- Carbureted water gas.** Edwin L. Hall (to United Gas Improvement Co.). U. S. 1,939,393, Dec. 12. An agnited column of solid fuel resting on a grate is air-blasted, thereby making producer gas; simultaneously secondary air is introduced to the producer gas adjacent to the top of the fuel bed and in a generally downward direction and at such velocity as to reduce the quantity of fuel blown off at the top of the fuel bed; heat is stored in the upper portion of the fuel bed by burning the producer gas with the secondary air; a steam run is made through the fuel bed, producing blue water gas, and simultaneously oil deposited on the top of the fuel bed is vaporized and serves to carburet the blue water gas. App. is described Cf. C. A. 27, 5174.
- Apparatus for producing water gas.** I. G. Farberman A.-G. (Fritz Winkler, inventor). Ger. 585,531, Oct. 4, 1933.
- Rotary-drum apparatus for making water gas, with or without coal gas, from pulverulent coal.** Bamag-Mequin A.-G. Ger. 589,129, Dec. 2, 1933 (Cl. 24e. 2.01).
- Water-gas plant.** Julius Pintsch A.-G. Ger. 586,672, Oct. 24, 1933 (Cl. 24e. 13.02). Details of valves are given.
- Water-gas generator.** Frank W. Steere (to Squibb Solvay Engineering Corp.). U. S. 1,939,470, Dec. 12. Structural and mech. features. U. S. 1,939,471 also relates to details of gas-generator construction.
- Gas generators.** Wilhelm Voigt. Ger. 586,670, Oct. 25, 1933 (Cl. 24e. 3.05). Gas for driving vehicles or vessels is produced from a mixt. of fuel such as lignite or coal coke contg. S, and fuel such as crude coal, which gives an oil distillate to form a film on the cylinder wall of the engine.
- Gas producer for use with finely granular coke, etc.** Kohlenveredlung und Schwelwerke A.-G. Ger. 586,669, Oct. 24, 1933 (Cl. 24e. 3.03). Addn. to 576,008 (C. A. 27, 3807).
- Rotary-grate gas producer.** Max Orb. Ger. 585,401, Oct. 3, 1933.
- Rotary-grate gas producer.** Bamag-Mequin A.-G. Ger. 589,081, Dec. 2, 1933 (Cl. 24e. 11.03).
- Downward-draft gas producer.** Ernst Mahlkuch. Ger. 585,355, Oct. 2, 1933.
- Operating slagging gas producers.** Louis Chavanne. Ger. 587,721, Nov. 8, 1933 (Cl. 24e. 3.04). Addn. to 567,082 (C. A. 27, 1489). A modified method of regulating the height of the fusion zone is described.
- Feeding device for gas producers.** Demag A.-G. Ger. 589,090, Dec. 2, 1933 (Cl. 24e. 9).
- Stationary grate for gas producer.** Wm. Clime and James E. Dunlop. Ger. 585,291, Sept. 30, 1933. This corresponds to Brit. 343,094.
- High-pressure constant-volume gas holder.** Roland W. Broadhead, Gerald W. Allott and Newton Chambers & Co., Ltd. Brit. 398,439, Sept. 14, 1933.
- Apparatus for drawing off heavy gases from above the sealing piston in waterless gas holders.** Friedrich Limbeck (to the firm of Aug. Klönne). U. S. 1,940,555, Dec. 19. Structural features.
- Desulfurizing gases.** Ges. für Kohlentechnik m. b. H. Ger. 588,528 and 588,529, Nov. 20, 1933 (Cl. 26d. 9.11). Addns. to 578,420 (C. A. 27, 4381). Gases contg. NH<sub>3</sub> and H<sub>2</sub>S are washed with a polysulfide soln. contg. free S, before they are washed as described in Ger. 578,420. The preliminary washing removes CN compds. from the gases (588,528). S is added to the washing liquid described in Ger. 578,420 when the gases contain more than 2 mols. of NH<sub>3</sub> per mol. of H<sub>2</sub>S. The S may be added as crude S contg. Fe compds., e. g., as a spent gas-purifying mass (588,529).

- Desulfurizing gases.** Ges. für Kohlentechnik m. b. H. (Walter Klammt, inventor). Ger. 588,610, Nov. 21, 1933 (Cl. 26d. 9.11). Addn. to 578,420 (C. A. 27, 4381). In applying the process of Ger. 578,420 to gases containing more than 2 mols. of  $\text{NH}_3$  per mol. of  $\text{H}_2\text{S}$ , addnl.  $\text{SO}_2$  is added to the washing liquor in an amt. corresponding to the excess of  $\text{NH}_3$ . The  $\text{SO}_2$  may be obtained by decomp. a part of the thiosulfates produced in the process.
- Removing hydrogen sulfide from coal gas.** Gustaf H. Hultman. Ger. 589,032, Dec. 1, 1933 (Cl. 26d. 9.04). Coal gas is washed with an alkali carbonate soln., which is regenerated after use by subjecting it to a very low pressure, e. g., 30 mm., without applying heat, until all the absorbed  $\text{H}_2\text{S}$  is evolved.
- Device for removing sulfur dioxide, etc., from flue gases by cooling.** Alfred Heilbronn and Bernhard Moll. Ger. 585,558, Oct. 2, 1933.
- Sulfur from gas-purification masses.** Hermann Deneke. Brit. 399,069, Sept. 28, 1933. See Ger. 562,737 (C. A. 27, 1111).
- Distilling tar, etc.** The Barrett Co. Ger. 585,359, Oct. 2, 1933. See Brit. 306,093 (C. A. 23, 5034).
- Low-volatile coke.** Georg Kerkel. U. S. 1,939,457, Dec. 12. Solid carbonizable material such as coal, lignite, peat or wood is passed through a chamber or retort toward the coke outlet, and a stream of inert gas such as coal gas, producer gas, water gas or N is introduced at a temp. of about 750–1000° adjacent the coke outlet; sufficient cold inert gas is introduced into the gas stream after it has traversed the coking part of the chamber to reduce its temp. to about 450° or lower. App. is described.
- Semicoke.** Alfred Beau. Ger. 585,273, Sept. 30, 1933. Preheated coal is mixed rapidly in a rotary furnace with smoke obtained from the same coal in a preceding operation, and the mixt. is warmed to convert the coal into smoke. A part of the furnace charge is then withdrawn and replaced by fresh coal, and the process repeated.
- Discontinuous apparatus for making piece coke or semicoke.** Gustav Hilger. Ger. 585,331, Oct. 2, 1933.
- Coke and gas production in chamber ovens.** Carl Still. U. S. 1,940,567, Dec. 19. Externally heated oven chambers, contg. a charge of coal and provided with a gas-collecting space above the surface of the charge and with interior ducts, are intermittently operated. Volatile distn. products are drawn separately from the interior of the body of coal and from the gas-collecting space; the gas pressure in the collecting space is maintained constantly approx. equal to atm. pressure and the pressure in the ducts of the charge is gradually reduced from the start of the coking process to at least 100 mm. water gage below atm. pressure. App. is described. Cf. C. A. 28, 1172<sup>1</sup>.
- Coke and gas generator.** Wilhelm Voigt. Ger. 586,071, Oct. 24, 1933 (Cl. 24e. 11.02).
- Regenerative gas and coke oven.** Collin & Co. Ger. 586,956, Oct. 27, 1933 (Cl. 10a. 5.03).
- Coke oven.** C. Otto & Co. G. m. b. H. Ger. 584,056, Sept. 14, 1933 (Cl. 10a. 13). Addn. to 581,940 (C. A. 28, 1174<sup>1</sup>).
- Coke oven with horizontal or inclined chambers.** Didier-Weike A.-G. Ger. 588,155, Nov. 14, 1933 (Cl. 10a. 19.01).
- Regenerative coke-oven battery.** Heinrich Koppers A.-G. Ger. 588,154, Nov. 13, 1933 (Cl. 10a. 5.01). Addn. to 527,474 (C. A. 25, 4693).
- Apparatus for charging horizontal coke ovens with a rammed coal charge.** Hermann Petsch (to the firm of Carl Still). U. S. 1,940,562, Dec. 19.
- Coking pitch and coal in a by-product coke-oven battery.** Wm. Tiddy (to Semet-Solvay Engineering Corp.). U. S. 1,940,893, Dec. 26. In operating a coke-oven battery having coking chambers and heating walls for the chambers arranged side by side in a row (the heating walls being constituted of combustion flues, and the walls of some of the coking chambers being lined with a heat-resistant metal such as "Fahrite" while the remaining coking chambers are unlined and are formed of refractory brickwork), coal is coked in the unlined coking chambers, pitch is coked in the lined coking chambers to form pitch coke, the hot gases from the coking of the coal and pitch are withdrawn, admixed, tar is removed from them, the tar is distd. by contact with hot gases from the coking chambers to form a pitch residue, and the latter is coked in the lined coking chambers. An arrangement of app. is described.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. PARAGHER

**Optical density color measurement for petroleum oils.** S. W. Ferris and J. M. McIlvain. *Ind. Eng. Chem., Anal. Ed.* 6, 23 9(1934).—The development of a method for detg. color density of oils by a Duboseq colorimeter is described, and comparative data are given to indicate that this method meets the requirements for a satisfactory color scale. Benzene was found to be the most suitable solvent for the sample. Matches were made with the use of a green light secured by means of a light filter consisting of  $\text{CuCl}_2$  and  $\text{HgCl}_2$  soln. Check detns. by this method by several observers agreed within 2% of the av.

D. F. Brown

**Changes in the physical properties of petroleum products kept in the light.** T. G. Kovalev and V. V. Illarionov. *I. prakt. Chem.* 138, 306 10(1933).—Paraffin Grozny petroleum distillates were examd. previously for the relationship between compn. and dielec. const. (cf. C. A. 27, 4600). The same distillates, kerosene, light and heavy solar oil, spindle oil, engine oil, and cylinder oil, have now been exposed to sunlight for 3 months, with free access of air. The sp. gr. and the  $n$  changed very little. The dielec. const. increased at first, but after 2 months decreased. The presence of mois. with rings closed by O must raise the dielec. const. sharply. The drop in the 3rd month is easily explained by supposing that rearrangement takes place in the O compds. in which the added active O is given off to other unsatd. mois., this forming ketoxy- and oxy-compds. No aldehydes were found.

Emma E. Craudal

**Production of fatty acids by electrolytic oxidation of petroleum hydrocarbons.** I. A. Atanasiu. *Natl. Petroleum News* 25, No. 48, 22, 24, 26 7(1933).—Fatty acid (36.2%) was obtained from paraffinic hydrocarbons, when a 20%  $\text{H}_2\text{SO}_4$  soln. was used as the electrolyte with a Ce catalyst.

R. W. Kelly

**Properties of hydrocarbon mixtures as related to some production engineering problems.** W. K. Lewis. *Oil and Gas J.* 32, No. 22, 14–15, 30(1933). II. Physical laws of perfect solutions applied to properties of mixed petroleum hydrocarbons. *Ibid.* No. 23, 20. III. Illustration of utility of application of data on hydrocarbon mixtures to typical problems. *Ibid.* No. 24, 18, 20.

J. R. S.

**Combination cracking unit may perform wide variety of duties in modern cracking plant.** Geo. Armstrong, Jr. *Oil and Gas J.* 32, No. 24, 11, 22(1933).

J. R. S.

**Components of light distillates may be found mathematically.** Clarke C. Minter. *Natl. Petroleum News* 25, No. 47, 18, 20, 22–4(1933).

R. W. Kelly

**Liberation of gas from solution in oil causes shrinkage and other changes in reservoir.** Ben E. Lindsay. *Oil and Gas J.* 32, No. 28, 19(1933).—(1) Shrinkage, (2) increase in sp. gr., (3) decrease in energy in the oil, (4) increased viscosity and (5) increased surface tension are changes which occur in oil as gas is liberated from soln.

J. R. Strong

**Formation of deposits in internal-combustion engines.** Bandte. *Automobiletech. Z.* 36, 493(1933).—1) Distn. of a lubricating oil is the best method for evaluating the extent

to which deposits will be formed. The fuel contributes, also, to the deposit.

A. A. Boettlingk. **Activation of three common types of refinery bleaching clay, with water and weak acid.** P. G. Nutting. *Oil and Gas J.* 32, No. 20, 17, 18(1933).

J. R. Strong. **Testing gasoline and other motor fuels.** A. W. Schmidt. *Automobiletech. Z.* 36, 403(1933).—A discussion on knock properties and gum formation in gasolines.

A. A. B. **Refinery and natural-gasoline technology.** Geo. A. Burrell and Nelson C. Turner. *Natl. Petroleum News* 25, No. 45, 18-21(1933).—Calc. of refinery vaporization and condensation requirements.

R. W. Kelly. **Synthesis of gasoline from carbon monoxide and hydrogen.** Shigeru Tsutsumi. *J. Fuel Soc. Japan* 12, 1283-40(1933)(in English 137-8).—T. reviews the previous work of Fischer and Tropsch and of Fujimura and presents his own data. With a catalyst specially prep'd., T. obtained liquid hydrocarbons up to 155 cc. per cu. m. of gas mixt. ( $H_2:CO = 2$ ). F. I. N.

The C. F. R. engine and antiknock characteristics of commercial gasoline. Tetsuro Suwa. *J. Fuel Soc. Japan* 12, 1358-70(1933)(in English, 128-31).—The development of tests for antiknock quality of motor fuels is outlined, with a discussion of the present standing of the knock-rating method. A full account of the C. F. R. fuel-research engine and the procedure for knock-testing are included.

F. I. Nakamura. **Modern physicochemical concepts of lubrication.** Eugene Mertens. *Ind. chim. belg.* [2], 4, 373-80(1933).

Albert L. Henne. **Lubricating oil with an admixture of colloidal graphite.** E. Schida. *Automobiletech. Z.* 36, 527-31(1933).—A large no. of bench expts. with a motorcycle engine, in which various lubricating oils with and without the admixt. of colloidal graphite were used, revealed that the thin deposit formed by the graphite on the cylinder walls protects the cylinders from excessive wear for a limited period. It also improves some oils by decreasing the diln. There is a saving of fuel when colloidal graphite is added to some oils.

A. A. Boettlingk. **Results obtained from use of propane during dewaxing and treating lubricating oil.** Ulric B. Bray, Claude E. Swift and Donald E. Carr. *Oil and Gas J.* 32, No. 24, 14-16, 20, 22(1933).—The use of more liquid  $C_3H_8$  than that required for refrigeration provides a better wax-pptg. medium than naphtha or pure hydrocarbons of different boiling ranges.

J. R. Strong. **Reclaiming used lubricating oils.** J. S. Gauder. *Steam Engr.* 3, 162 3(1934). General.

A. H. E. **Analysis of solid lubricants.** Jules Tilmans. *Ind. chim. belg.* [2], 4, 380-90(1933); cf. C. A. 27, 3066.

Albert L. Henne. **Constituents of the volatile oil from the wood of Chamacyparis formosensis Matsum.** Kinzo Kafuku and Nobutoshi Ichikawa. *Bull. Chem. Soc. Japan* 8, 371 91(1933).—See C. A. 28, 624<sup>1</sup>.

G. G. **Oleoresin from individual trees of slash and long-leaf pine.** A. P. Black and S. M. Thomson. *Ind. Eng. Chem.* 26, 66-9(1934).—A summary of analytical data for 416 samples of long-leaf and slash-pine oleoresin is given. The percentage of turpentine obtained was slightly higher in the slash pine, but the sp. gr. was slightly lower. The optical rotation of the turpentine varied considerably with the individual trees. The time of year at which the samples were collected had no apparent effect upon the phys. consts.

W. A. Moore. **The utilization of wood waste.** Hilding Bergström. *Tek. Tid., Uppf. C, Kemi* 63, 81-6(1933).—A review of recent researches on the use of charcoal for motor fuel and the manuf. of liquid fuels (sulfite alc.), lubricating oils, wood pitch, sugar, NaOAc, liquid rosin, turpentine oils and furfural from wood waste.

D. Thuesen. **Com. hydrogenation processes [hydrogenation of petroleum to benzine:] (Bosch) 13. Providing safe and adequate water supplies for oil-refinery uses (Powell) 14. Hydrocarbon analysis (Rosen, Robertson) 7. Heating solids, liquids or gases (distn. of oils) (Ger. pat. 588,213)**

13. **Steel drums for oil cracking (U. S. pat. 1,941,271) 9. Filter for oils (U. S. pat. 1,938,924) 1. Testing oils (U. S. pat. 1,940,373) 27. Ketones from shale-distn. products (Ger. pat. 587,784) 10. Oxidation products of hydrocarbons [gas oil or paraffin] (U. S. pat. 1,940,400) 10. Filtering material [for hydrocarbon liquids] (U. S. pat. 1,939,860) 1. Furnace for drying, carbonizing and [for distg. wood] (Ger. pat. 587,510) 1. A soap for lubricating grease (Brit. pat. 398,402) 27. Oil filter (U. S. pat. 1,941,311) 1.**

American Society for Testing Materials Standards on Petroleum Products and Lubricants, 1933. Philadelphia Am. Soc. for Testing Materials. 202 pp. \$1.25. Reviewed in *J. Inst. Petroleum Tech.* 19, 953(1933).

**Breaking petroleum emulsions.** Melvin De Groot and Louis T. Monson (to Tretolite Co.). U. S. 1,940,390, Dec. 19. An oil-sol. sulfonated deriv. of hydrogenated castor oil is used as a demulsifying agent. Cf. C. A. 28, 1178<sup>4</sup> and the following 3 abstracts.

**Breaking petroleum emulsions.** Melvin De Groot and Arthur F. Wirtel (to Tretolite Co.). U. S. 1,940,391, Dec. 19. A demulsifying agent is used contg. a substantially anhyd. Na salt of a naphthenic acid, produced from naphthenic acids of a mol. wt. of from 200 to 575, a mean mol. wt. of about 225 and a distn. range of from 230° to 310°, mixed with a relatively small amount of an unneutralized naphthenic acid of the same kind. U. S. 1,940,392 relates to the use of a mixt. comprising not over 40% of water, material produced by partial neutralization with  $NH_4OH$  of naphthenic acids as specified in U. S. 1,940,391 and about an equal amt. of a water-sol.  $NH_4$  salt of a butylated naphthalene sulfonic acid. U. S. 1,940,393 relates to the use of a mixt. contg. not more than 40% of water together with a water-sol.  $NH_4$  salt of a butylated naphthalene sulfonic acid, and a product derived by the partial saponification of oleic acid with  $NH_4OH$  dild. with 25% of kerosene. U. S. 1,940,394 relates to the use of a generally similar demulsifying agent in prep. which however an oil-sol., water-insol. petroleum sulfonic acid is used instead of oleic acid.

**Breaking petroleum emulsions.** Melvin De Groot (to Tretolite Co.). U. S. 1,940,395, Dec. 19. An oil and water-sol. demulsifying agent is used contg. not more than 40% of water together with a dialkyl polysulfonate  $NH_4$  salt produced from Blau gas tar by reaction of  $H_2SO_4$  at 40°, and substantially an equal amt. of a naphthenic acid or naphthenate material as specified in U. S. 1,940,392. U. S. 1,940,396 relates to the use of similar naphthenic acids or their salts together with an  $NH_4$  compd. of a petroleum sulfonic acid substantially free from polymers and non-sulfo type hydrocarbons and derived from Gulf Coast naphthene crude oil by multiple acid treatment of the kind in which the first acid draw-off is discarded.

**Breaking petroleum emulsions.** Melvin De Groot and Arthur F. Wirtel (to Tretolite Co.). U. S. 1,940,397, Dec. 19. A demulsifying agent is used such as a mixt. which may comprise a product obtained by hydrolysis of sulfonated castor oil together with a water-sol. salt of a butylated naphthalene sulfonic acid, in specified proportions. U. S. 1,940,398 relates to the use of a demulsifying agent comprising an oil-sol., water-insol. petroleum Na sulfonate, a modified fatty acid product partially saponified with  $NH_4OH$ , dil. alc. and a hydrophobe solvent such as kerosene and neutral compatible salts of inorg. acids in specified proportions. Numerous details and modifications are described.

**Dewaxing petroleum oils.** Robert E. Stanton. U. S. 1,940,654, Dec. 19. For sepg. solid wax particles from a petroleum oil, elec. charges of a definite polarity are impressed upon the solid wax particles by subjecting the wax-bearing oil to the action of a high potential unidirectional current, and the charged particles are collected upon an electrode of opposite polarity with which the wax-bearing oil is brought into contact. App. is described.

**Conversion of high-boiling petroleum fractions.** Wm



Legemann. U. S. 1,936,633, Nov. 28. Material such as a petroleum or shale oil is heated in a chamber to 120-370° with a halogenated O compd. of N such as NOCl and an Al and Fe halide such as  $AlCl_3$  and  $FeCl_3$  in an amt. not over 12% by wt. of the original charge, until a gasoline substitute is obtained. App. and various details of operation are described.

**Cracking heavy petroleum oils.** Walter J. Perelis (to Universal Oil Products Co.). U. S. 1,939,274, Dec. 12. Feed oil is heated in a tubular heater to an effective cracking temp. under a pressure not exceeding 200 lb. and this heating is terminated as soon as an effective cracking temp. is reached. Reflux condensate from a later stage of the process is heated in a tubular heater to an effective cracking temp. and this secondary cracking treatment is prolonged while the temp. is first lowered and then again raised (both within the range of cracking temps.), the pressure at the termination of the secondary cracking treatment being at least 200 lb. Refluxes of both cracking treatments are united, easily coking heavy material is removed from the joint stream by vaporization of the lighter material; the material heavier than pressure distillate is thereafter condensed and this reflux condensate is passed to the secondary cracking treatment. An arrangement of app. is described. Cf. C. A. 28, 888<sup>4</sup>.

**Cracking oils.** Jean Delattre-Seguy (to Universal Oil Products Co.). Brit. 398,506, Sept. 21, 1933. Oil is cracked under pressure in heating and reaction zones, the vapor and liquid products sep'd. and the vapors subjected to reflux condensation with return of the reflux to the cracking zone, the cracking temps. and pressures and the ratio of reflux returned to the raw oil treated being so correlated that an operating index given by the formula  $\frac{[ \text{rav. of heating zone outlet temp. and middle of reaction zone temp. } ^\circ\text{F.} ] \div 30 + [ (\text{pressure on reaction zone (lb. per sq. in.) } \cdot 100) \div \text{reflux ratio} ]}{\text{is maintained between 36 and 38, so that a distillate is produced equal to at least 1.5 times the A. P. I. gravity of the raw oil treated at least equal to the yield given by the formula (min. gasoline yield) : (gravity of charging stock) = 3 - [ (gravity of charging stock) ] \div 32}$ . The app. used is that described in Brit. 380,060 (C. A. 27, 4067). In 398,507, Sept. 21, 1933, the cracking process is conducted so that an operating index given by the formula, the 3 terms of formula  $\frac{[ 2.33 \times [ \text{combined feed (gals. per hr.) } \div \text{vol. of heating and reaction zones (gals.) } ] ]}{\text{is maintained between 3 and 43 so that the yield of distillate is the same as in 398,507}$ . Cf. following 2 abstracts and C. A. 28, 888<sup>4</sup>.

**Cracking hydrocarbon oils.** Jean Delattre-Seguy (to Universal Oil Products Co.). U. S. 1,939,281, Dec. 12. Oil such as gas oil, fuel oil or crude oil is subjected to pressure distn.; vapors and unvaporized liquid are separately removed from the pressure distn. zone; the unvaporized liquid is introduced while hot into a zone of lower pressure in which the heat in the oil effects substantial distn., and before this latter distn., the said unvaporized oil is mixed with a lighter oil of lower temp. Vapors from the lower pressure distn. zone are subjected to vapor phase cracking. App. is described.

**Cracking hydrocarbon oils.** Jean Delattre-Seguy (to Universal Oil Products Co.). U. S. 1,939,282, Dec. 12. Vapors and non-vaporized oil are sep'd. from a pressure cracking zone; the vapors are subjected to reflux condensation, remaining vapors are finally condensed; reflux condensate is withdrawn and subjected to a vaporization under reduced pressure so controlled that the reflux condensate is not completely vaporized; the first-mentioned non-vaporized oil is subjected to partial vaporization under reduced pressure; the two vapor products thus derived are mixed with each other and the mixt. is subjected to vapor-phase cracking by heat exchange with heating gases; the remaining reflux condensate is mixed with the unvaporized oil and reflux from the cracked vapors evolved is subjected to retreatment with fresh charging stock in the primary cracking zone. App. is described. Cf. preceding 2 abstracts.

**Cracking hydrocarbon oils.** Lyman C. Huff (to Universal Oil Products Co.). U. S. 1,937,959, Dec. 5.

Vapors from an oil-cracking process are dephlegmated in a dephlegmating zone, and C is pptd. from the cracked liquid oil in enlarged chambers which are alternately cut in and out of the cracking system for C deposition therein and for cleaning. Prior to being cut into the system, and after cleaning, the chambers are preconditioned by introducing into them charging oil which has been preheated in the dephlegmating zone, and such charging oil is then supplied to the cracking zone. App. is described.

**Cracking hydrocarbon oils.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,938,817, Dec. 12. Vapors from a pressure cracking zone are dephlegmated at a temp. above the b. p. of water in contact with an aq.  $ZnCl_2$  soln.; this treatment evapg. water from the soln. and forming reflux condensate contg. suspended  $ZnCl_2$ ; the reflux condensate is supplied to the cracking zone so that cracking takes place in the presence of  $ZnCl_2$ . App. is described. Cf. C. A. 28, 625<sup>9</sup>.

**Cracking hydrocarbon oils.** Charles H. Angell (to Universal Oil Products Co.). U. S. 1,940,673, Dec. 26. Oil is heated to a conversion temp. in a heating zone such as a pipe coil, and the heated material is passed into a separator in which vapors and non-vaporous residue are sep'd.; the residue is introduced into a coking chamber; vapors from the separator are subjected to further conversion in a sep. heating coil and the heated vapors are introduced into the coking chamber to coke the residue by their direct contact heating action; vaporous products from the coking chamber are subjected to fractionation; overhead vaporous products are removed from the fractionator, subjected to condensation, the resulting distillate and gas are collected; a relatively heavy portion of the reflux condensate condensed in the fractionator is removed and subjected to conversion together with the raw oil charging stock; a relatively light portion of the reflux condensate condensed in the fractionator is removed and subjected to further conversion in a third heating coil and the heated materials are introduced into the separator. App. is described.

**Cracking hydrocarbon oils.** Rene de M. Taveau (to Texas Co.). U. S. 1,936,735, Nov. 28. Products of a vapor phase cracking operation are delivered into a body of oil in an otherwise unheated still to maintain the oil at a cracking temp. and to effect cracking in the liquid phase; evolved vapors from both the vapor phase and liquid phase cracking operations are delivered to a separator, lighter constituents are sep'd., and heavier constituents are subjected to back-trapping to supply oil for the vapor phase cracking operation. App. is described.

**Cracking hydrocarbon oils.** Harry D. Loeb. U. S. 1,941,440, Dec. 26. During cracking of an oil by heating under pressure, the oil is mixed with a small proportion of finely divided lime and fuller's earth, in equal quantities. App. is described.

**Cracking hydrocarbon oils.** Gewerkschaft Kohlenbenzin. Ger. 585,609, Oct. 13, 1933. Hydrocarbon oil vapors and steam are passed over activated fuller's earth at 300-550°, then over pumice stone impregnated with Ni, Co, Cu or similar metallic catalysts at 300-450°, and finally over activated fuller's earth impregnated with oxides of metals such as Ni, Co or Al at 150-300°, to effect a catalytic "cracking." App. is indicated.

**Cracking hydrocarbon oils to produce gasoline.** Eugene C. Herthel (to Sinclair Refining Co.). U. S. 1,939,263, Dec. 12. In producing gasoline by cracking oils of higher b. p. at temps. above 480°, to obtain a product of high antiknock value, a mixt. of vapors and gases from the cracking operation is fractionated to sep. constituents of higher b. p. than suitable for the gasoline product; the remaining mixt. of vapors and gases is subjected to condensation to produce a condensate including the gasoline product; the pressure on this sep'd. condensate is increased and it is fractionated under the increased pressure to sep. constituents of lower b. p. than are suitable for inclusion in the gasoline; remaining condensate is digested with an adsorptive catalyst such as fuller's earth under maintained pressure and at a temp. not substantially lower than that at which it is discharged from the second-

mentioned fractionating operation, and the pressure is thereafter reduced on the digested condensate, constituting the gasoline product. App. is described.

**Apparatus for cracking hydrocarbons.** Milton J. Trumble and Wm. L. Seeley (to Petroleum Hydrogenation Co., Ltd.). U. S. 1,938,877, Dec. 12. A rotary still to which uncracked vapors are supplied such as those of a heavy mineral oil fraction contains a body of catalytic material such as molten Pb and Ni oxide in its bottom portion, and this catalytic material is lifted (by a described device) toward the top of the still and poured downwardly through the vapors.

**Apparatus for cracking hydrocarbon oils.** Sigbert Seelig. Ger. 587,983, Nov. 10, 1933 (Cl. 23b. 1.04). Addn. to 535,277 (C. A. 26, 1111).

**System for cracking hydrocarbon oils.** Standard Oil Development Co. Ger. 587,313, Nov. 2, 1933.

**Apparatus for coking and cracking hydrocarbons.** Trent Process Corp. Ger. 586,971, Oct. 28, 1933 (Cl. 10a. 22.04).

**Removing carbon deposits from oil-cracking tubes.** Adam J. Kulberg. U. S. 1,939,112, Dec. 12. Steam is admitted to the heated tubes and the temp. of the steam blast is raised to about 650° by heating the tubes; subsequently, a stream of gravel-like material is added to the steam blast while its temp. and pressure are maintained.

**Heat-transmission medium suitable for use in oil-cracking systems, etc.** Owen D. Lucas (to Whessoe Foundry and Engineering Co., Ltd.). U. S. 1,941,014, Dec. 26. Diphenyl oxide 60-70% is mixed with about 10% of naphthalene and diphenylamine or aniline in proportions giving a compn. of initial freezing point not higher than about 6°. Cf. C. A. 27, 876.

**Hydrocarbon oil conversion.** Jacob B. Heid (to Universal Oil Products Co.). U. S. 1,936,874, Nov. 28. A closed circuit of liquid hydrocarbon oil and a closed circuit of hydrocarbon vapors are cyclically circulated and during a portion only of their circulation are brought into contact with each other. The liquid circuit is heated to a temp. sufficient to effect substantial vaporization during its sep. circulation; the vapor circuit is heated to a cracking temp. during its sep. circulation; and vapors are removed from the vapor circuit for condensation and collection. App. is described.

**Apparatus for conversion of hydrocarbon oils.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,940,711, Dec. 26. A cracking app. comprises a heating coil in a furnace, a separator, connections for withdrawing vapors from the separator and for reducing the pressure on and flash-distg. the residual oil; vapors from this flash distn. are subjected to more severe cracking conditions in a second cracking coil in a sep. furnace subjected to higher temp. than the first-mentioned coil.

**Hydrocarbon oil conversion.** Lyman C. Huff (to Universal Oil Products Co.). U. S. 1,938,836, Dec. 12. Oil heated to a conversion temp. is discharged into an enlarged chamber where substantial sepn. of lighter fractions in the form of vapors takes place; the vapors are subjected to dephlegmation; uncondensed vapors are removed after dephlegmation; reflux condensate from the dephlegmation zone is returned and mixed with the oil being heated; unvaporized residue is separately withdrawn from the enlarged chamber; a substantial superatm. pressure is maintained on the oil and vapors under treatment, and the vapors are removed from the dephlegmation zone and heated residue is removed from the enlarged chamber without substantially reducing the pressure, and such vapors and residue are mixed and cooled while still under pressure. App. is described.

**Hydrocarbon oils.** Eugene Ayres and Herschel G. Smith (to Gulf Refining Co.). Brit. 398,032, Sept. 7, 1933. The oils are obtained as described in Fr. 748,807 (C. A. 27, 5529). They are then treated with fine clay and Ca(OH)<sub>2</sub>, followed by filtration, or with H<sub>2</sub>SO<sub>4</sub> or by heating to 232-281° to remove suspended sludge.

**Hydrogenating heavy hydrocarbon oils.** Harry H. Semmes (to Standard-I. G. Co.). U. S. 1,940,651, Dec. 10. In a continuous process for the destructive

hydrogenation of S-contg. hydrocarbon oils, the oil, in liquid phase and contg. in suspension a finely divided hydrogenation catalyst subject to S poisoning and comprising Fe, Co or Ni or oxides of these metals, is treated with H under pressure above 20 atm. and at a suitable destructive hydrogenation temp.; vapor and gas and a liquid suspension of the catalyst are continuously withdrawn from the reaction zone; a portion of the catalyst is sep'd. from the suspension, reactivated by roasting, and then reintroduced into the suspension and returned to the reaction zone. App. is described. U. S. 1,940,652 also relates to a generally similar process suitable for producing lubricating oils. U. S. 1,940,653 relates to a similar process in which one reaction zone contg. catalyst may be used while the catalyst is being regenerated in another zone by roasting. App. is described in both these parts.

**Desulfurizing hydrocarbon oils.** Frederick W. Sullivan, Jr., and Arthur B. Brown (to Standard Oil Co. of Ind.). U. S. 1,938,670, Dec. 12. Liquid petroleum distillates are passed, together with molten alkali metal, through a colloid mill to disperse the alkali metal in the form of a colloid suspension; the material is heated to cause the alkali metal to react with the S contained in the distillate, and the alkali metal sulfide formed is sep'd. from the treated oil (suitably by settling). U. S. 1,938,671 relates to desulfurizing pressure distillates, successively higher boiling fractions of which contain increasing S contents. The distillate is redistilled, the redistillate is discontinued when the temp. has risen to a point approx. within the range of 90-165°; bottoms from the redistillate are agitated with alkali metal at a temp. of about 175° under a pressure of over 150 lb. per sq. in. to reduce the S content to an unobjectionable point, and the treated bottoms are then reblended with the overhead from the redistillate.

**Desulfurizing hydrocarbon oils.** Robert F. Ruthruff (to Standard Oil Co. of Ind.). U. S. 1,938,672, Dec. 12. A distillate within the gasoline-kerosene b. p. range is desulfurized by being agitated in the liquid state with a molten alkali metal at a temp. of about 230-330° under a pressure of about 150 lb. per sq. in. or more.

**Desulfurizing overhead products of oil cracking.** Jacques C. Morrill (to Universal Oil Products Co.). U. S. 1,940,726, Dec. 26. The material is treated with an alk. soln. of an alkali or alk. earth metal sulfide.

**Dewaxing hydrocarbon oils.** Earl Petty (to Alco Products, Inc.). U. S. 1,940,014, Dec. 19. Oil to be dewaxed is dild. with an amount of liquefied normally gaseous substance such as liquefied C<sub>2</sub>H<sub>6</sub> to chill the oil to the desired low temp. by the evapn. of the added liquefied gas at atm. pressure; the temp. of the dild. oil is reduced by heat exchange with a cooling medium to a temp. still above the desired low temp., and further reduction in temp. is effected by evapn. of the liquefied gas so that wax is thrown out of soln. in readily filterable form. App. is described. U. S. 1,940,015 also relates to a generally similar process and also describes app.

**Apparatus for refining hydrocarbons.** Eddeleanu G. m. b. H. Fr. 754,836, Nov. 14, 1933. An app. is described for treating hydrocarbons with SO<sub>2</sub> with means for regulating the level and flow of liquid, the heating steam for the evaporators, the pressure and the temp.

**Apparatus for refining hydrocarbon vapors by treatment with fuller's earth, etc.** Arthur G. Connolly (to Universal Oil Products Co.). U. S. 1,938,908, Dec. 12. Structural features.

**Refining products from the heat treatment of hydrocarbon oil.** Richard F. Dazis (to Universal Oil Products Co.). U. S. 1,941,251, Dec. 26. Condensed overhead products from oil heat treatment are subjected in liquid condition to the action of liquid SO<sub>2</sub> contg. a dissolved metal halide such as SnCl<sub>4</sub> or HgCl<sub>2</sub> in order to promote polymerization of unsatd. compds. AlCl<sub>3</sub>, SnBr<sub>4</sub>, FeCl<sub>3</sub>, TiCl<sub>4</sub> and ZnCl<sub>2</sub> also may be used.

**Refining residual hydrocarbon oil.** Joseph Kochan (to Standard Oil Co. of Ind.). U. S. 1,938,629, Dec. 12. Residual oil is treated with H<sub>2</sub>SO<sub>4</sub>; the oil is sep'd. from the

acid sludge. A viscous hydrocarbon-oil distillate having a viscosity of between 80 sec. Saybolt universal at 38° and 95 sec. Saybolt universal at 99° is treated with  $H_2SO_4$ ; acid sludge thus formed is sepd. and heated with water to sep. it into acid oil, sepd. sludge and weak acid; the sepd. sludge from the last mentioned operation is removed and washed with water and the resulting wash water is then further used to wash the first-mentioned acid-treated residual oil.

**Refining "sour" hydrocarbon oils.** Lawrence M. Henderson (to Atlantic Refining Co.). U. S. 1,940,801, Dec. 26. The oil is treated with a soln. of Na plumbite, this forming oil-sol. Pb compds.; the oil is sepd. from the treating soln., and the sepd. oil is treated with an aq. soln. of  $CuCl_2$ , this forming Pb compds. which are insol. in the oil, and the oil is sepd. from the insol. substances formed and from the aq. treating soln.

**Refining impure hydrocarbon distillates.** Robert P. Russell (to Standard-I. G. Co.). U. S. 1,940,649, Dec. 19. Distillates such as heavy lubricating oil stock are treated with H under 20-200 atm. pressure at temps. of about 380-450° in the presence of sulfactive catalytic materials which promote hydrogenation. The hydrocarbon material and H are passed downwardly continuously through a vertical elongated reaction zone packed with lumps of the catalytic material at a rate below about 1.5 volumes of hydrocarbon per vol. of catalyst per hr. U. S. 1,940,650 relates to refining lubricating oils by subjecting the oil to the action of H in a reaction zone packed with a catalyst such as oxides or sulfides of Cr, Mo or W at temps. above 380° and under a pressure of 20 atm. or more while a steady flow of oil is passed in one direction through the catalyst at an absolute velocity above about 0.25 lb. per sec. per sq. ft. of reaction zone cross section. A limited amount of naphtha is formed. App. is described.

**Refining hydrocarbon distillates of low boiling point.** Ernest B. Miller and Gerald C. Connolly (to Silica Gel Corp.). U. S. 1,939,129, Dec. 12. Low-boiling distillates contg. gum-forming constituents are treated with an acidic reagent such as  $H_2SO_4$  of such concn. and quantity, at ordinary temp. and atn. pressure, as to polymerize only the more easily reactive of the gum-forming constituents and form only a small amt. of sludge; the sludge formed is sepd. and the remaining material is heated (in the absence of solid porous adsorbent material) to a temp. and under a pressure to maintain it liquid while polymerizing the more difficultly reactive of the gum-forming constituents; the purified product is then recovered by distn. An arrangement of app. is described.

**Stabilizing hydrocarbon oil pressure distillates.** Joseph K. Roberts (to Standard Oil Co. of Ind.). U. S. 1,939,633, Dec. 12. The distillate is rectified at an elevated p. under a pressure of about 250 lb. per sq. in. to sep. undesired excessively volatile substances, and the remaining material is recovered as a single fraction which is then discharged into a rectifying zone maintained under a lower pressure of about 30 lb. per sq. in., vapors from which are further rectified, and condensate from this rectification is blended with the other desired portion of the distillate. Various details of app. and operation are described.

**Hydrocarbon distillates from solid bituminous material** such as coal, pitch or grahamite and heavy hydrocarbon oil. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 1,940,725, Dec. 26. A portion of a mixt. of the solid material and heavy oil is placed in an enlarged distn. zone. Another portion of the heavy oil, unmixed with solid material, is heated to a vapor phase cracking temp. of about 540° in another zone and the resulting vapor phase cracked vapors are introduced into the distn. zone to supply heat for the distn. of the mixt. App. is described.

**Apparatus for distilling liquids such as hydrocarbon oils.** Gustav A. Beiswenger (to Standard Oil Development Co.). U. S. 1,939,382, Dec. 12. A vaporizing chamber in the form of a vertical pipe of enlarged cross section fitted with baffles spaced at increasing intervals

from the inlet to the discharge end has its inlet end connected with a heating coil and its discharge end connected with a separator. Various other structural and operative details are described.

**Continuously operating apparatus for fractionating hydrocarbon oils, etc.** Floyd L. Kallam. U. S. 1,940,802-3, Dec. 26. Numerous structural and operative details are described.

**Low-boiling liquid hydrocarbons from solid carbonaceous material such as coal, tars, etc.** Robert P. Russell (to Standard-I. G. Co.). U. S. 1,940,648, Dec. 19. A body of a suspension of finely ground carbonaceous material in a heavy oil is maintained at a decompn. temp. under high pressure, and a hot mixt. of the suspension and a gas rich in free H is continuously forced into this body of material; vapor is continuously withdrawn, low-boiling hydrocarbons are condensed from the vapor; a part of the suspension is separately withdrawn from the body of material under treatment, subjected to a reduction of pressure such that substantially all the oil is vaporized, the vapor is condensed and part of the condensate is returned to the body of material undergoing treatment. App. is described.

**Polymerizing olefinic gases.** Wm. B. Plummer (to Standard Oil Co. of Ind.). U. S. 1,940,227, Dec. 19. Gases of concd. olefinic content such as may be obtained by cong. olefins from a cracking system are subjected to polymerization at temps. of about 400-540° under pressures of 500-3000 lb. per sq. in. and the gases and products are cooled without substantial reduction in pressure, introduced into a separator also supplied with unconcd. olefinic gases at a low point of the separator, and undissolved fixed gases are removed from an elevated point of the separator and eliminated from the system. Liquid products and dissolved gases are withdrawn, the pressure on them is reduced to effect their sepn. and the released gases are passed to the heating and polymerizing stage. App. is described, and a liquid product is obtained contg. low-boiling hydrocarbons.

**Mineral oils.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 755,023, Nov. 18, 1933. The formation of mud when certain petroleum or like hydrocarbon residues are dild. with light mineral oil distillates, is prevented by heating the products to be dild. to above 205°.

**Refining mineral oils with alkali metal amalgams.** Evan C. Williams and Herbert P. A. Groll (to Shell Development Co.). U. S. 1,939,839, Dec. 19. For treating oils such as in "sweetening" cracked distillate, an amalgam contg. about 0.7% of an alkali metal such as Na or K is used. App. is described.

**Cracking mineral oils.** Wilbur G. Laird (to Heat Treating Co.). U. S. 1,940,955, Dec. 26. Oil is passed through a heating coil and thence directly into a rotatable unheated reaction drum contg. freely-moving loose abrading elements such as iron or steel balls, and the drum is rotated to cause the loosening and grinding of the oil residuc; vapors produced in the cracking are withdrawn from the drum during its rotation and are conducted into a fractionating zone after an intermediate cooling by contact with a cooling fluid such as charging oil to reduce them below the cracking temp. before the fractionation. App. is described.

**Apparatus for distilling and cracking mineral oils and tars.** Hans Magnus. Ger. 589,018, Dec. 1, 1933 (Cl. 23b. 1.04). Addn. to 568,313 (C. A. 27, 2028).

**Fractional distillation of oils.** Foster Wheeler Corp. Brit. 398,099 Sept. 7, 1933. In the fractional distn. of oils a mixt. of oil and vapor is introduced into a zone from which liquid is withdrawn to a 2nd zone of lower total pressure, the vapor from the 2nd zone passing back to the 1st zone. App. is described.

**Oil-distillate cooler or condenser.** John S. Wallis. U. S. 1,940,338, Dec. 19. Structural details.

**Apparatus for testing the flash point of oils.** Masakichi Mizuta and Teiji Yoshimura (to Nippon Sekiyu Kaishiki Kaisha). U. S. 1,941,182, Dec. 26. Various structural details are described.

**Filtering oils.** Charles W. McKinley (to A C Spark

- Plug Co.). U. S. 1,940,317, Dec. 19. Intermixed cotton waste and curled hair are used as filtering agents.
- Apparatus suitable for filtering automobile engine oil. Charles W. McKinley (to A C Spark Plug Co.). U. S. 1,940,316, Dec. 19.
- Apparatus for purifying oils such as crude oils at wells by separating water, etc. Thomas F. Knoles. U. S. 1,939,988, Dec. 19. Structural features.
- Apparatus with inclined baffles for gravity separation of water, etc., from oil. Harmon F. Fisher (to Petroleum Rectifying Co. of Calif.). U. S. 1,940,794, Dec. 26. Structural details.
- Treatment of calcareous shale, etc. Oskar Tetens. Ger. 587,289, Nov. 1, 1933. Calcareous shale and like bituminous materials contg. flint or other hard minerals are comminuted in a rapidly operated hammer mill or the like with the addn. of dust-evolving material such as ground flint from the treatment of a preceding batch,  $\text{Ca(OH)}_2$ , sand or peat. Oil is distd. from the product in known manner, and the residue is used in the manuf. of cement.
- Fractionating tower suitable for dephlegmating hydrocarbons. George W. Gray and Burt E. Hull (to Texas Co.). U. S. 1,939,392, Dec. 12.
- Fuel for internal-combustion engines. Gellert Alleman (to Sun Oil Co.). U. S. 1,940,439, Dec. 19. A hydrocarbon deriv. of a metal contg. a diethylmethyl group such as Pb, Ti or Ni compds. or a dimethyldiamyl Pb or the like is added (suitably in a proportion of about 0.1%) to a "low compression" fuel such as gasoline. U. S. 1,940,440 also relates to the use of similar fuels for suppressing detonation in internal-combustion engine operation.
- Inhibiting gum formation in gasoline. Wm. S. Calcott and Herbert W. Walker (to E. I. du Pont de Nemours & Co.). U. S. 1,939,659, Dec. 19. A diarylguanidine salt of acetic, butyric, propionic, palmitic, stearic or oleic acid, *e. g.*, about 0.002% of di-*o*-tolylguanidine stearate, is added to gasoline to inhibit gum formation.
- Inhibiting gum formation in cracked gasoline. Wm. S. Calcott and Ira E. Lee (to E. I. du Pont de Nemours & Co.). U. S. 1,940,445, Dec. 19. Cracked gasoline is stabilized by the addn. of about 0.002% or more of a polybutylamine or an amylamine. Di- and tri-ethanolamine 0.05% also may be used.
- Refining overhead gasoline-containing products from oil cracking. Jacques C. Morrell and Gustav Egloff (to Universal Oil Products Co.). U. S. 1,941,266, Dec. 26. The heated vaporous material is treated with  $\text{SO}_2$  and steam in the presence of an Fe oxide under conditions which effect removal of S and gum- and color-forming constituents. Cf. C. A. 28, 889<sup>2</sup>.
- Refining cracked hydrocarbon-oil products of motor-fuel boiling-point range. Jacques C. Morrell (to Universal Oil Products Co.). U. S. 1,941,267, Dec. 26. In order to reduce the S content and to remove color- and gum-forming constituents, the material, in heated vaporous condition, is subjected to the action of a mixt. of  $\text{H}_2\text{SO}_4$  and HOAc. Cf. C. A. 28, 889<sup>2</sup>.
- Gasoline-like hydrocarbons from hydrocarbons of lower molecular weight. Cary R. Wagner (to Pure Oil Co.). U. S. 1,938,945, Dec. 12. Unsatt. hydrocarbon gases obtained from vapor-phase systems of oil conversion are passed over a catalyzing agent such as fuller's earth, activated C, silica gel, bentonite or the like while the gases are at a temp. of about 175-370° and at a pressure of 600-1500 lb. per sq. in., to effect an exothermic reaction. Cf. C. A. 28, 631<sup>1</sup>.
- Gas and liquid separator suitable for separating gasoline from air, etc. Warren H. De Lancey (to Gilbert & Barker Mfg. Co.). U. S. 1,941,390, Dec. 26. Structural features.
- Stable iron carbonyl composition for addition to motor fuels. Martin Müller-Cunradi and Wilhelm Wilke (to I. G. Farbenind. A.-G.). U. S. 1,940,096, Dec. 19. Fe carbonyl is used in admixt. with a benzene-sol. simple amine contg. not more than 12 C atoms such as aniline, monomethylaniline or dimethylaniline as an antiknock agent.
- Refining benzene. Concordia-Bergbau A.-G. (Louis Nettlebusch and Reinhard Schneider, inventors). Ger. 588,048, Nov. 11, 1933 (Cl. 12r. 1). A hydrocarbon oil b. 200-300° is obtained as a by-product from the refining of benzene by proceeding as follows: Crude benzene is washed with  $\text{H}_2\text{SO}_4$ , and the mixt. is dild. with water before the benzene is sepd. The benzene is then sepd. and treated with NaOH soln., and then sepd. from the NaOH soln. and from the intermediate resinous layer. Finally, the benzene is distd., and the still residue is subjected to dry distn. to obtain the hydrocarbon oil.
- Bollers for vaporizing naphtha, heavy mazout, petroleum, etc., for use as fuel in internal-combustion engines with spark ignition. Antonio Olivotti and Elia Olivotti. Brit. 398,357, Sept. 14, 1933.
- "Synthetic oil." Wm. A. Gruse and Karl P. McElroy (to Gulf Refining Co.). U. S. 1,941,169, Dec. 26. A residual oil from a cracking process is atomized into an atm. of natural gas in such proportion that the C content of the mixt. is somewhat less than 85.7% by wt., and the mixt. is passed through a restricted reaction zone such as a pipe coil at a temp. of about 500-550° under 1000-3000 lb. pressure per sq. in.; the resulting "synthetic oil" is condensed at about the same pressure. App. is described.
- Separating crystalline wax, amorphous wax and lubricating oil from wax slop. Walter S. Baylis (to Filtrol Co. of Calif.). U. S. 1,939,946, Dec. 19. A mixt. of adsorbent clay and wax slop contg. a small percentage of an activating substance such as  $\text{Al}_2(\text{SO}_4)_3$  which promotes adsorption is subjected to steam distn. until approx. 50-60% by wt. of the charge has been distd. over; the distd. fraction is slightly chilled and the wax is sepd. from it; the clay is sepd. from the bottoms of the distn., the bottoms are dild. with a light hydrocarbon material, the dild. bottoms are chilled to a low temp. to sep. cryst. wax, the latter is filtered out, the filtrate is chilled to a lower temp. to effect sepn. of amorphous wax, the latter is removed, and the light hydrocarbon diluent is then sepd. from the remaining oil. App. is described.
- Lubricating oil. Alfred Henriksen and Bert H. Lincoln (to Continental Oil Co.). U. S. 1,939,979, Dec. 19. A hydrocarbon lubricating oil is mixed with a small proportion (suitably about 1%) of a halogenated org. acid-diphenylene oxide condensation product such as one formed from chlorinated stearic acid and diphenylene oxide which serves to improve the film strength of the oil. Cf. C. A. 28, 1182<sup>7</sup>.
- Lubricating oil. Bert H. Lincoln and Alfred Henriksen (to Continental Oil Co.). U. S. 1,939,993, Dec. 19. In order to improve their film strength, hydrocarbon lubricating oils are mixed with a small proportion (suitably about 0.1-5%) of condensation products such as may be derived from chlorinated lard oil and naphthalene or the like. U. S. 1,939,994 relates to the similar use of a condensation product derived from 2 halogenated fatty acids or halogenated esters by use of an alkali condensing agent. U. S. 1,939,995 relates to the like use of a halogenated wax-halogenated org. acid condensation product such as that derived from chlorinated paraffin and chlorinated stearic acid.
- Lubricating oils. Edeleanu G. m. b. H. Brit. 398,992, Sept. 28, 1933. Highly viscous mineral lubricating oils are purified by liquid  $\text{SO}_2$  in a countercurrent mixer by first reducing the viscosity of the oil by mixt. with about 10-40% of  $\text{SO}_2$ , introduced as liquid or as gas under pressure. Mixts. of  $\text{SO}_2$  with, *e. g.*,  $\text{C}_6\text{H}_6$  or low-boiling ext. may be used for the extn. and dildn. App. is described. In 399,030, Sept. 28, 1933, lubricating oils of high-viscosity index are obtained by treating crude material, *e. g.*, a Jaolo residual oil, with liquid  $\text{SO}_2$  at above 25°. Cf. C. A. 27, 2800.
- Lubricating oils. Edeleanu G. m. b. H. Ger. 587,393, Nov. 3, 1933. Lubricating oil fractions are refined by treatment with liquid  $\text{SO}_2$  followed by vacuum distn. in the presence of alkali, with or without the aid of steam.

**Lubricating oils.** I. G. Farbenind. A.-G. Fr. 754,456, Nov. 8, 1933. A lubricant comprises a viscous hydrocarbon contg. a condensation product of a carboxylic acid chloride of mol. wt. above 200. Examples are given of the use of condensation products from oleic and stearic acid chloride. Cf. C. A. 28, 1182<sup>1</sup>.

**Lubricating oils.** Red River Refining Co. Inc. Fr. 754,932, Nov. 16, 1933. A lubricating oil is obtained by 1st sepg. rapidly, from an appropriate mineral oil fraction, the desired constituents having lubricating properties by an instantaneous vaporization at an appropriate temp. and under reduced pressure not appreciably above 50 mm. and preferably not above 20, this vaporization taking place in 2 stages. The constituents contg. the lubricating oil are condensed under a corresponding low pressure. The impure oil thus obtained is subjected to a redistn. under a still lower pressure not above 10 mm., and so that the distn. temp. increases progressively and the desired constituents are vaporized successively in the order of their vaporization points. These constituents are afterward condensed while the uncondensed vapors and contaminating substances are removed rapidly. No filtration or acid treatment is required. An app. is described.

**Petroleum lubricating oils.** Robert T. Haslam (to Standard-I. G. Co.). U. S. 1,940,050, Dec. 19. The quality of lubricating oils is improved by subjecting them to the action of H at temps. of about 400–465° under pressures above 50 atm. for a limited time whereby an appreciable but restricted quantity of low-boiling hydrocarbons is formed, the treatment with H being carried out in a series of reactors (of a described app.) and vapors formed being continuously removed from each reactor. Liquid is withdrawn from each reactor when only a portion of it has been improved to a predetd. extent, the portion so improved is removed from the liquid which is withdrawn and the remaining liquid is passed to a succeeding reactor for further treatment. Cf. C. A. 28, 632<sup>2</sup>.

**Apparatus for testing the lubricating quality of oils by opacity (indicating suspended impurities).** Virgil A. Schoenberg (to Light-Sensitive Apparatus Corp.). U. S. 1,940,772, Dec. 26. Various structural and operative details are described.

**Lubricants.** Wm. Helmore and Ernest W. J. Mardles. Brit. 398,222, Sept. 11, 1933. Lubricants formed of mineral oils, castor or olive oil, oleic acid and mixts. thereof are mixed with a small proportion of Sn or a Sn

compd., e. g., oleate, naphthyl, ricinoleate, phenyl, methyl iodide, to minimize the formation of sludge. Pb compds., e. g., tetraethyl, oleate, may also be added to increase the spontaneous ignition temp.

**Lubricants.** Kenneth C. D. Hickman (to Kodak Ltd.). Brit. 398,936, Sept. 28, 1933. Lubricants, suitable for hubs and gear-boxes of automobiles, consist substantially of a cellulose ester or ether, vegetable and (or) fish oils and a heavy mineral lubricating oil. In an example 6 lb. triethyl cellulose is soaked 15–25 hrs. in 64 lb. castor oil, dissolved by heating to 210°, cooled and masticated and then masticated with 30 lb. crank-case oil.

**Base for use in heavy oils and greases.** Alexander Horwitz. U. S. 1,939,170, Dec. 12. An Al stearate base is compounded with about 5% of glycerol, and about 5% of the base is compounded with a mineral oil for the production of a highly viscous and stringy lubricant. Cf. C. A. 27, 836.

**Greases.** I. G. Farbenind. A.-G. Fr. 42,897, Nov. 15, 1933. Addn. to 740,407 (C. A. 27, 2293). Consistent greases are obtained by adding to greases, products of high mol. wt. prepd. by polymerizing aliphatic, aromatic or hydroaromatic hydrocarbons, e. g., polystyrene, hydro-rubber or polymerization products of terpenes, cyclohexene or tetrahydronaphthalene.

**Bituminous emulsions.** Leo Liberthson (to L. Sonneborn Sons Inc.). U. S. 1,940,807, Dec. 26. An emulsifying agent for producing stable emulsions with bituminous material such as tar or asphalt is prepd. from impure green petroleum sulfonic acids produced by the treatment of petroleum oil with H<sub>2</sub>SO<sub>4</sub> and contg. non-acid org. compds. by sepg. the green sulfonic acids from the assocd. non-acid org. compds. by dissolving the acids in an aq. soln. of an alc. contg. not more than 3 C atoms such as EtOH and then producing an aq. soln. of the Na or K salts of the sulfonic acids.

**Dividing asphalt into particles.** Roy A. Curran (to Standard Oil Development Co.). U. S. 1,939,391, Dec. 12. Molten asphalt is directed against a rotating surface (of a described app.) which, as well as the adjacent air, is sufficiently heated that the asphalt remains molten while in contact with the surface.

**Refining sulfate wood turpentine.** Wilbur F. Gillespie and Daniel M. Wadsworth (to Bogalusa Paper Co.). U. S. 1,938,693, Dec. 12. Ethylenediamine is used for removing offensive odors. A bleaching powder also may be used.

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**Viscosity of cellulose solutions.** Mme. A. Dobry and J. Duclaux. *Compt. rend.* 497, 1318 20(1933).—To det. the relation between the nature of the solvent and  $k$  in the Arrhenius equation (C. A. 7, 2714) relating the viscosity and concn. of a cellulose deriv., D. and D. detd. the viscosity of a nitrocellulose (11.4% N, obtained by fractional pptn.) in 11 solvents at concns. of 0.04 and 1%. The lower concn. permitted extrapolation to the origin to calc.  $k$  at infinitesimally small concns. Such values for  $k$  varied little from one solvent to another, in confirmation of Duclaux's previous statement (C. A. 14, 3154) that at large diln.:  $k$  is independent of the nature of the solvent and represents the sp. viscosity of a cellulose deriv. The variation of the viscosity and  $k$  observed at the higher concn. depends largely on the solvent; this confirms McHain's results (C. A. 20, 1714).  $k$  is independent of the solvent at infinite diln. because the micelles are neither swollen nor hydrated. Staudinger's theory (C. A. 24, 1564–5, 3130) that the rapid increase of viscosity with concn. is due to the space occupied by the spheres of action of the macromols. is inadequate since the relative increase is much larger with certain solvents than with others. The best solvent is that one in which a low viscosity results at a relative high concn. F. A. S.

**Fractionation of ethylcellulose.** I. Okamura. *Cellu-*

*lochemie* 14, 135–8(1933).—Com. ethylcellulose with 2.9% moisture and 49.4% EtO was dissolved in glacial AcOH and fractionated by addn. of water. The temp. used in prepn. of fractions had only a slight effect on viscosity, and there was no evidence of acetylation. Viscosity of 1% solns. remained unchanged at 20° for 7 days. Fractionation into 8 parts (5 selected for detns.) was carried out according to the method of Rocha (C. A. 24, 2597). Ethoxy content was approx. the same except for the very small fractions. The I no. by the method of Bergmann and Machmer (C. A. 24, 2877) increased in the later fractions. For pptn. by water in 1% AcOH soln. increasing amts. of pptg. agent are required in passing from the higher to the lower fractions; for pptn. by hexane in 1% C<sub>6</sub>H<sub>6</sub> soln. the reverse is true. Viscosity in the Ostwald viscometer with capillary of 0.067 cm. radius and 11 cm. length at 20° and 50° showed a decrease in lower fractions. The sp. mol. const. (Staudinger) is the same for homologous series. Osmotic pressure in the osmometer, with C<sub>6</sub>H<sub>6</sub> as solvent, and membrane of finest "cellafilter" at 35 ± 0.1° increased in lower fractions, mol. wts. being higher in first fractions. Mol. wts. by the osmotic pressure, I no. and viscosity detns. were approx. the same for each fraction. C. A. Brautlecht

**Hypochlorite-oxycellulose.** Robert Haller and Fritz

- Lorenz. *Helv. Chim. Acta* 16, 1165-80(1933).—Oxy-cellulose, prepd. from purified cotton cloth by treating with alk. NaClO and CO<sub>2</sub>, was extd. with wet steam. The Cu no. (Schwalbe) decreased 60% from 11.3 in 12 hrs. The extn. results in soln. of a part of the reducing degradation products in the oxycellulose as such without hydrolysis and the sol. part is adsorbed on the original oxycellulose. Optical rotation in cupric tetramine hydroxide showed that the extd. oxycellulose still contained oxidation degradation products. The compn. of the oxycellulose ext. was studied. The appearance of a polymer of glucose and a partly oxidized deriv. of it which is built up chiefly of glucose residues indicates that the oxidation of cellulose with hypochlorite causes a hydrolytic splitting of the mol. On the basis of a chain structure of glucose residues for cellulose, hydrolysis means a breaking of acetal bonds between pairs of glucose residues and freeing of aldehyde groups. Oxidation of these chain fragments splits them further and changes the aldehyde groups to COOH groups. The absence of *d*-glucuronic acid in hypochlorite-oxycellulose is shown, contrary to Pringsheim (*C. A.* 15, 2721). M. Heinig
- The Scholler method for the saccharification of wood. Henry Brahmier. *Tek. Tid., Uppl. C, Kemi* 63, 86-7 (1933).—A review with data on the economy of the process. D. Thuesen
- Air oxygen, a factor in wood formation. C. G. Schwalbe and K. E. Hoffmann. *Cellulosechemie* 14, 133-4(1933).—Sections of the bark of pine, beech and spruce trees were covered with paraffin paper during the vegetation period (May-Oct.) and the trees cut in Nov. Sections of bandaged and unbandaged parts of the underlying cambial layer were examd. for OMe content by Fellenberg's method. The bandaged parts of pine and beech showed a slight decrease in OMe when compared to the unbandaged part (1.54-1.41%; 2.17-1.96%), while the spruce showed an increase (1.87-2.00%). Max. variation in OMe detns. was 1.16%. The bark of pine and beech, low in tannins, appears to permit passage of air O to the cambial layer, while spruce bark, rich in tannin, prevents O passage. Lignin was computed from the OMe content. Analytical methods for detn. of pentoses and pectins in spring sap, etc., are not available but S. and H. regard that most of the necessary pentose to form pectin and lignin must first be formed in the spring sap. C. A. B.
- Lignin determination by Halse's method. Sigrid Samuelsen and Erik Stephansen. *Papir-J.* 21, 217-18 (1933); cf. *C. A.* 27, 1505.—Halse's original method (*C. A.* 20, 3082), in which the sample is digested in an open flask for 12 hrs. at 20° with H<sub>2</sub>SO<sub>4</sub> and 39% HCl, is modified by digesting in a closed flask for 2 hrs. at 30° with H<sub>2</sub>SO<sub>4</sub> and 36% HCl. Clinton L. Brooke
- Combined lignosulfonic acid and its liberation. Carl Kullgren. *Svensk Pappers-Tid.* 36, 499-501, 532-8 (1933); cf. *C. A.* 25, 5986; 26, 4948.—K. reviews previous investigations on free and combined lignosulfonic acid and discusses various explanations of the relation involved, with special reference to the role played by Ca and H ions. Wilhelm Segerblom
- Tetraconiferylaldehydesulfonic acid. (Tetralignosulfonic acid.) Peter Klason. *Svensk Pappers-Tid.* 36, 735-6(1933).—Descriptive. K. suggests that the mol. wt. of lignin must be at least 3640. Wilhelm Segerblom
- Utilization of film scrap. Kurt Bratring. *Nitrocellulose* 4, 184-6(1933); cf. *C. A.* 28, 719.—A review. E. M. Symmes
- Consistence control. K. Steinbach. *Wochbl. Papierfabr.* 64, 630-9(1933).—Descriptive of the design and operation of the Haspa regulator. R. H. Doughty
- Latex in pulp and paper manufacture. Emil Richter. *Wochbl. Papierfabr.* 64, 595-6(1933).—Practical expts. are recorded. R. H. Doughty
- Some little-known uses of viscose. Helmut Hoffmann. *Papier-Fabr.* 31, Tech.-wiss. Teil 497-500(1933).—The sizing of paper and cloth, preservation of fruit, and manuf. of sausage casings and sponge-like masses are described, with patent references. R. H. Doughty
- A new apparatus for production of acid in sulfite pulp plants. L. Sæther. *Papir-J.* 21, 227-9(1933).—A suspension of finely ground limestone is circulated through a battery of vertical chambers while SO<sub>2</sub> is forced through in the opposite direction. The content of CaO and free SO<sub>2</sub> in the resulting acid can be regulated at will, with much greater accuracy than in the usual tower method of acid production. Clinton L. Brooke
- Investigations of soda- and sulfate-digesting processes. V. Investigation of the influence of the maximum temperature in the preparation of sulfate pulp. Erik Hägglund and Ingmar Eidem. *Svensk Pappers-Tid.* 36, 632-6(1933); cf. *C. A.* 25, 1992; 26, 1776.—No great advantages seem to be assocd. with lowering the max. temp. below 170° either in quality or yield of pulp. The moisture of the chips does not influence the strength of the pulp. These statements hold only for first-class circulation of liquor and for uniform chips. VI. Investigation of the significance of the concentrations of the liquor in the production of sulfate pulp. Erik Hägglund and Knut Aarsud. *Ibid.* 807-9.—Production of pulp proceeds faster when air-dry rather than moist wood is digested. High concn. of liquor also hastens the action. The tearing and bursting strength increase with a lowering of the concn. of the liquor. Moist and dry woods give pulps of about the same strength. Wilhelm Segerblom
- The chemistry of sulfite pulping. XXVII. The consumption of sulfur in the sulfite-cooking processes. Erik Hägglund and Frank Carrick. *Svensk Pappers-Tid.* 36, 704-8(1933); cf. *C. A.* 27, 1749.—The S consumed in sulfite-digesting processes, *i. e.*, S which cannot be recovered, originates from the H<sub>2</sub>SO<sub>4</sub> formed, the loosely bound H<sub>2</sub>SO<sub>4</sub>, and the tightly bound S. The formation of the H<sub>2</sub>SO<sub>4</sub> occurs early in the digesting and is due to the presence of air. The H<sub>2</sub>SO<sub>4</sub> content rises as the SO<sub>2</sub> content increases. About 20% of the SO<sub>2</sub> produced is used in forming H<sub>2</sub>SO<sub>4</sub>. The loosely bound H<sub>2</sub>SO<sub>4</sub> depends on the amt. of SO<sub>2</sub> in the digesting acid. The loosely bound H<sub>2</sub>SO<sub>4</sub> accounts for about 20-30% of the total S consumed, and the tightly bound S about 50-60%; the latter bears no relation to the SO<sub>2</sub> content. The S consumption rises rapidly toward the end of the digesting. The increasing consumption of S with the increasing Ca content is compensated for by the increased yield of pulp. Wilhelm Segerblom
- What may be expected of liquor circulation in the sulfite process. Karl Ehninger. *Papier-Fabr.* 31, Tech.-wiss. Teil 461-6(1933).—Savings in steam and time seem to be less significant than the improved quality of pulp due to more uniform cooking. R. H. Doughty
- Use and recovery of causticizer sludge [in the alkaline pulping processes]. W. Schmid. *Papier-Fabr.* 31, Tech.-wiss. Teil 509-10(1933).—Descriptive. R. H. Doughty
- The screen analysis of beaten pulp. K. Dittrich and W. Boos. *Papier-Fabr.* 31, Tech.-wiss. Teil 425-31, 439-45(1933).—The previously described method (*C. A.* 26, 6126) was applied to several chem. pulps processed in the lab. beater and Lämpén mill. Sheets of the 4 fractions sepd. were tested for strength, density and air transmission. The difference between the cutting action of the beater and the pounding action of the mill was shown clearly in the amts., appearance and strength properties of the finest fractions. Detailed test data and photomicrographs are given. Simple measurement of the amt. of the fractions is not a safe criterion of pulp quality. However, in connection with other tests, as freeness, it can give valuable information as to the effect of processing variables. It should be of particular value in developing products with special properties. R. H. Doughty
- The beating process in hollander and Jokro mill. K. G. Jonas. *Papier-Fabr.* 31, Tech.-wiss. Teil 473-83 (1933).—The beating actions of the Mallickh expl. beater and Jokro mill (*C. A.* 25, 1074) are fundamentally different, the former having a much greater cutting action. The interrelations of processing time, slowness, fiber length, pulp strength, specific cutting and hydrating effects, operating conditions and efficiency are set forth in 30 curve figures. Analysis of the data by the beater theories of S. Smith shows how operating conditions of the



water should be controlled to give desired combinations of rubbing and cutting action, and also the practical limits of this control. Since the Jokro mill is less sensitive than the heater to small changes in charge, speed and working pressure, it seems a more suitable test instrument.

R. H. Doughty  
**Breaker beaters for old papers.** F. Hoyer. *Wochbl. Papier-Fabr.* 64, 790-1, 809-12(1933).—Twenty com. units are described.

R. H. Doughty  
**Mechanical tests on pulp and paper.** R. Korn. *Z. Ver. deut. Ing.* 77, 1301-7(1933).—K. discusses briefly the principal phys. tests which are applied to pulp and paper, with particular reference to the mechanism of the various testing devices. The following tests on paper are outlined: (1) pop test, (2) tear, (3) impact test, (4) compression and hardness, (5) stretch, (6) air and steam penetration, (7) surface smoothness, (8) size absorption, (9) fastness to rubbing, (10) test for surface grit, (11) embossing and lithographic properties. In addn., K. discusses the strength test as applied to pulps, by prepn. of hand sheets and detn. of bursting strength on the latter. Photographs and schematic diagrams of the instruments discussed are included.

G. H. Young  
**Protection from gases in industry, with special reference to the pulp and paper industry.** Hermann Wenzl. *Tech. Chem. Papier-Zellstoff-Fabr.* 30, 49-61(1933).—Characteristics of common industrial noxious and toxic gases, approved handling and storage procedure, handling of the usual accidents, protective devices and treatment of victims are treated in detail, with brief reference to war gases.

R. H. Doughty  
**Automatic feed regulation in paper and cellulose machines.** Gerhard L'Orange. *Papir-J.* 21, 219-23(1933).—A theoretical discussion of feeding systems in which the vol. of suspended material passing through the feed pipe varies with the consistency.

Clinton L. Brooke  
**The research committee of the Swedish Paper and Cellulose Engineering Association. XVII. Extraction products from sulfite pulp.** Bror Holmlberg. *Svensk Pappers-Tid.* 36, 766-71(1933).—Résumé of recent investigations.

Wilhelm Segerblom  
**The permeability of paper to water vapor.** Wilhelm Staedel. *Papier-Fabr.* 31, Tech.-wiss. Teil 535-40, 545-9(1933). Consideration of previous work (12 citations) led to the following method: A 200 sq. cm. sample is clamped over a shallow Al pan contg. a well-satd. felt; the wt. loss is detd. at intervals and the rate calcd. For consistent results: the felt must carry sufficient water; 0.5-3 hrs. must be allowed, depending on the sheet wt., for the rate to reach a const. value; an air velocity of 3 = 0.25 m./sec., humidity const. to 2% and temp. const. to 0.1° must be maintained over the sample. Rag, straw, chem. and mech. pulp sheets at beating degrees from 20 to 90 Schopper and wts. from 30 to 250 g./sq. m. give water permeability values of 30-70 g./sq. m./hr. at 20° and with an external relative humidity of 65%. Calendering and rosin sizing do not affect the value. Com. papers, including parchment and greaseproof papers, and Cellophane give values of 35-60, waxed paper 5 and moistureproof Cellophane 0.5. There is no relation between water permeability and air transmission. S. agrees with Abrams and Chilson (*C. A.* 24, 6011), that the vapor-pressure difference across the sheet is the driving force in vapor transmission, and further that vapor-phase diffusion is relatively unimportant, most of the transfer being through the fiber substance, at a rate specific for the nature of the fiber.

R. H. Doughty  
**Paper testing with the Schubert puncture-dynamometer.** Max Radligger. *Wochbl. Papierfabr.* 64, 685-7(1933).—The construction and operation of the app. (cf. *C. A.* 27, 5971) are briefly criticized. By making certain (not stated) changes in design and taking proper account of the deflection, the results obtained with either strip or round samples may be calcd. to tensile strength with reasonable accuracy. The sample must have negligible stiffness.

R. H. Doughty  
**Examination of the Elmendorf [tearing test] apparatus, its operation and the significance of the test.** W. Brecht

and O. Imset. *Papier-Fabr.* 31, Fest.-u. Auslandsheft 46-60(1933).—A method of calibration of the Poller-Elmendorf tester based on the operating characteristics and estn. of friction losses is described; results agree closely with those of the Clark method (cf. *C. A.* 26, 1777). When a no. of sheets are torn together: (1) the starting cut is not the same in all, because of poor design of the knife; (2) there is a marked tendency for the outer sheets to split, an abnormally high tearing force being required; (3) the friction between the torn edges increases the tearing resistance abnormally. The errors from these sources are separately evaluated, and shown to reach 15% or more. Also, the relation of tearing resistance to weight of sheet is not linear. To obtain reasonably concordant and useful results the instrument should be calibrated often and enough sheets torn to give a scale reading of at least 20 g.; wt. of sheets should be quite const.; and wt. and no. of sheets torn should be reported. Systematic errors of about 8% may then be expected. Not enough is known as yet about the mechanism of this complex test to permit its use as a measure of fiber shortening in process.

R. H. Doughty  
**Drying felt and its preparation.** W. Schmid. *Pappers-Trövarutid. Finland* 1933, 908-9(in German).—A review of the prepn. and properties of drying felt.

S. A. K.  
**Paper and printing ink.** Julius Beek. *Papier-Fabr.* 31, Tech.-wiss. Teil 485-9(1933).—Printing quality of paper must be evaluated with reference to the ink and process which is to be used; hence tests such as capillarity, air permeability and oil absorption furnish no sure measure of quality. The following tests est. the tendency to offset, hence permissible speed and weight of impression with the ink and paper used. (1) A sheet is printed with a standard ink and plate, the excess ink rapidly removed by blotting and the amt. taken up by the paper detd. by weighing. (2) A sheet is printed, the amt. of ink applied detd. by weighing the plate before and after impression. The printed sheet is covered with a smooth paper to which a detd. pressure is intermittently applied. The interval elapsing before this pressure fails to blur the printing is the desired measure of quality.

R. H. Doughty  
**The fluffing of newsprint.** Håkon Störvik. *Papir-J.* 21, 207-9(1933); cf. *C. A.* 27, 5972.—Projecting fibers are dyed by passing a strip of the paper under an inked roller, the dyed fibers are pressed down with a glass plate, and the sample thus prepd. is photographed.

Clinton L. Brooke  
**Stencils for mimeographing.** Curt Kittler. *Kolloid-Z.* 65, 119-22(1933).—Patent review. Arthur Fleischer

Making bakers' yeast from sulfite liquor (Gurfain, Chastukhin) 12. Blue staining of timber and the molding of wood pulp (Alanko) 20. Elec. cond. of cellulose ethers (Kuvshinski) 2. Spent sulfite liquor (Vogel) 14. Hydraulic press for celluloid (Ger. pat. 588,010) 24. Annalines [for use in the manuf. of paper] (Ger. pat. 505,240) 18. Rubber-covered wooden rolls [for use in paper manuf.] (U. S. pat. 1,939,948) 30. Treating solids or liquids with gases or vapors [saccharification of wood] (Ger. pat. 585,318) 13. App. for making strips of cellulose derivs. (Ger. pat. 589,176) 29. Impregnating or coating porous materials [paper stuff] (Ger. pat. 589,071) 13. Artificial products [for making films, threads] (Fr. pat. 755,048) 18. Waterproof compns. [of cellulose esters] (Fr. pat. 755,175) 18. Pd alloys [used for spinning nozzles for rayon] (Ger. pat. 585,545) 9. App. for coating or impregnating paper with rubber compns. (U. S. pat. 1,939,842) 30.

West, Clarence J.: Bibliography of Paper Making and United States Patents on Paper Making and Related Subjects, 1932. New York: Tech. Assoc. Pulp and Paper Ind. 175 pp. \$2.00.

Cellulose. Francesco C. Palazzo and Fortunato Palazzo. *Brit.* 398,730, Sept. 21, 1933. Wood pulp with a high content of alkali-resisting cellulose is made by treating the material to be refined, e. g., sulfite cellulose, in an autoclave with a liquid contg. 1-1.5% NaOH and

0.2-0.3% colloidal emulsoid Na salt, stable to alkali, at 1-2 atm. 1-2 hrs. Na soaps of higher fatty acids may be used. The treatment removes hemicelluloses, fats and resins. Complete removal of residual lignin components is effected by a mild oxidizing treatment in 2 stages, first in a feebly alk. and then in a feebly acid medium. Thus the pulp, in concn. of 5-6%, may be treated with a hypochlorite soln. contg. a little  $\text{Na}_2\text{CO}_3$  or  $\text{Ca}(\text{OH})_2$ , or with a dil.  $\text{Na}_2\text{O}_2$  soln., and then with a soln. of  $\text{HClO}$  or with dil.  $\text{KMnO}_4$  contg. a little  $\text{H}_2\text{SO}_4$ . The pulp is then treated with dil.  $\text{H}_2\text{SO}_4$  soln., washed and made into boards, sheets or flakes. If desired, the bleached material may be heated with dil.  $\text{Na}_2\text{SO}_3$  and a little colloidal Na salt, washed, treated with  $\text{H}_2\text{SO}_4$  and again washed. The product may be used in the manuf. of cellulose esters and ethers and of artificial fibers and films.

**Cellulose.** Henry Dreyfus. Brit. 398,801, Sept. 18, 1933. Cellulose particularly suitable for esterification is obtained from wood, straw, grass or other lignified cellulose material by sepg. the non-cellulosic constituents therefrom by a liquid comprising a glycol, *e. g.*, ethylene glycol, propylene glycol, trimethylene glycol. An aq. soln. of the glycol, contg. 30-80%  $\text{H}_2\text{O}$ , may be used at, *e. g.*, 120-80°. Increased pressure, if required, may be obtained by use of an autoclave and introduction of an inert gas, *e. g.*,  $\text{CO}_2$ , N, under pressure or a low-boiling liquid, *e. g.*,  $\text{MeOH}$ ,  $\text{EtOH}$ ,  $\text{C}_6\text{H}_6$ , petr. ether. The material may be subjected to a prior or simultaneous treatment, *e. g.*, with dil. alkali or the usual liquors, to remove resins, lignins, etc. In an example mech. spruce pulp is subjected in a closed digester to reduced pressure and an aq. soln. of ethylene glycol is run in. The treatment is carried out 6 hrs at 160°, after which the cellulose is removed and washed. Cf. C. A. 28, 634<sup>9</sup>.

**Continuous apparatus for extracting cellulose from wood, etc.** Lubomir Lemberger. Ger. 589,241, Dec. 6, 1933 (Cl. 55b. 2.10).

**Apparatus for extracting cellulose by the sulfurous acid process.** Aktiebolaget A. Ekströms Maskinaffär. Ger. 585,062, Sept. 28, 1933.

**Making cellulose bands.** Vereinigte Glanzstoff-Fabriken A.-G. Ger. 585,957, Oct. 13, 1933.

**Apparatus for circulating and storing cellulose solutions.** Soc. industrielle de Moy. Ger. 588,275, Nov. 16, 1933 (Cl. 29a. 6.06). See Fr. 692,647 (C. A. 25, 1671).

**Cellulose derivatives.** Henry Dreyfus. Brit. 394,722, July 6, 1933. See Fr. 747,727 (C. A. 27, 5535).

**Colored cellulose derivatives.** Ralph Dinklage. Brit. 398,279, Sept. 14, 1933. Products that are colored throughout are obtained by condensing cellulose or an alkali cellulose with a reactive aromatic compd. and then producing from the condensation product a colored deriv. by introducing into the aromatic radical a chromophoric group and an auxochrome. The colored cellulose compd. may be admixed in soln. with viscose, *e. g.*, for the production of colored threads. Among examples (1) cotton wool dissolved in  $\text{H}_2\text{SO}_4$  is added to  $\text{PhNO}_2$  and the product poured onto ice and dissolved or dispersed in a suitable medium; after reduction by  $\text{NaHSO}_3$  or nascent H the amino deriv. is diazotized and coupled with a naphthol; and (2) alkali cellulose is treated with 1,2-diketo-1-*p*-nitrophenyl-3-chloropropane and the product condensed with dibenzyl ketone in presence of a little sodamide to give a compd. contg. a cyclopentanone group. The nitro compd. is then reduced, diazotized and coupled with Naphthol AS. Cf. C. A. 27, 1166.

**Hot-pressed cellulosic products.** Adriaan Nagelvoort (to Delaware Chemical Engineering Co.). U. S. 1,939,404, Dec. 12. Products such as those of pulp board are formed with an addn. of S in water-repellent form and of a fineness of about 200 mesh, substantially free from peptizing agents for S, the S serving to give improved strength.

**Cellulose esters.** Carl J. Malm and Charles L. Fletcher (to Kodak Ltd.). Brit. 398,626, Sept. 21, 1933. The soly. characteristics of  $\text{Me}_2\text{CO}$ -sol. mixed org. esters of cellulose, *e. g.*, acetate propionate, acetate propionate butyrate, acetate butyrate, acetate stearate, acetate laurate, are changed by treating with a hydrolyzing agent,

*e. g.*, a dil. mineral acid. Among examples a reaction mixt., comprising fully esterified cellulose acetate propionate, propionic acid,  $\text{AcOH}$  and  $\text{H}_2\text{SO}_4$ , is dild. with aq.  $\text{AcOH}$  and heated to 100°F. The products may be used in producing filaments, films, plastics, lacquers, etc.

**Cellulose esters.** I. G. Farbenind. A.-G. (Frich Correns and Rudolf Hofmann, inventors). Ger. 581,954, Aug. 5, 1933. Addn. to 526,479 (C. A. 25, 4401) and 528,821 (C. A. 25, 5030). Mixed cellulose esters are prepd. by treating cellulose with a fatty acid and the anhydride of another fatty acid in the presence of a catalyst, *e. g.*,  $\text{H}_2\text{SO}_4$ , and a chlorinated hydrocarbon having a solvent action, *e. g.*,  $\text{CH}_2\text{Cl}_2$  or  $\text{C}_2\text{H}_4\text{Cl}_2$ . Examples are given.

**Cellulose esters.** C. F. Boehringer & Soehne G. m. b. H. (Richard Müller, Martin Schenck, Wilhelm Wirlatz and Fritz Müller, inventors). Ger. 588,214, Nov. 14, 1933 (Cl. 12a. 6). Haloalkyl sulfonic acids, *e. g.*,  $\text{Cl}_2\text{-CSO}_3\text{H}$ ,  $\text{ClCH}(\text{SO}_3\text{H})_2$  and  $\text{BrCH}(\text{SO}_3\text{H})_2$ , are used as catalysts in the esterification of cellulose.

**Cellulose esters.** Kodak-Pathé. Fr. 754,866, Nov. 16, 1933. Cellulose esters or derivs. thereof contg. a dicarboxylic acid radical are obtained by\* esterifying a cellulose material with a dicarboxylic anhydride, such as phthalic, succinic, dilactic or diglycolic, in the presence of a base such as pyridine or quinoline. The alkali salts of these compds., *e. g.*, of acetoglycolate and acetodilactate, are sol. in water and are therefore of great application in adhesive compns., sizing and vehicles for dyes and pigments.

**Cellulose esters.** Soc. des usines chimiques Rhône-Poulenc. Fr. 754,961, Nov. 17, 1933. Cellulose esters are made by causing a cellulose material, as such or partly etherified or esterified, to react with one or more acylating agents, in the presence of a practically anhyd. hydracid, *e. g.*, HF, in amt. at least equal to and preferably 3 to 6 times the wt. of cellulose. An inert solvent may also be present. Cf. C. A. 27, 189.

**Mixed cellulose ester.** Herbert Kranich. U. S. 1,940,218, Dec. 19. A hydrated sulfonitrocellulose acetate contg.  $\text{H}_2\text{SO}_4$  about 2-3,  $\text{HOAc}$  6-14 and N 7-10%, which is suitable for films, etc., is prepd. by treating cellulose with a specified mixt. contg.  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$  and  $\text{HOAc}$ .

**Cellulose esters of lauric acid.** Max Hagedorn and Georg Hingst (to I. G. Farbenind. A.-G.). U. S. 1,940,589, Dec. 19. Esters sol. in aromatic hydrocarbons and in chlorinated aromatic hydrocarbons are formed by acting on unaltered cellulose, at a temp. below 110° (suitably about 80-100°), with lauryl chloride in the presence of an org. base such as pyridine in an amt. not substantially greater than that equiv. to the lauryl chloride, and of a diluent such as  $\text{PhCl}$  and then heating the ester thus formed to a temp. above 110° (suitably 135-40°). A cellulose distearate is formed in a generally similar manner. Cf. C. A. 28, 636<sup>2</sup>.

**Alkoxyalkacyl esters of cellulose.** Henry Dreyfus. U. S. 1,940,709, Dec. 26. Products such as cellulose ethoxy- or methoxy-acetates are formed by treating cellulose with reagents such as alkoxyacetic anhydrides in the presence of an acylation catalyst and of a liquid solvent for the cellulose deriv. Products suitable for films, etc. are obtained and several examples and numerous details and modifications of procedure are described. U. S. 1,940,710 relates to the production of mixed cellulose esters such as cellulose acetate-methoxy or ethoxy-acetates by treating cellulose separately both with aliphatic acid anhydrides and with alkoxy acid anhydrides, both in the presence of acylation catalysts. Various examples with details and modifications of procedure are given.

**Making cellulose ester capsules.** Chemische Fabrik von Heyden A.-G. (Friedrich Klein, inventor). Ger. 582,796, Oct. 12, 1933 (Cl. 39b. 12.03).

**Solvents for cellulose esters.** Carbide and Carbon Chemicals Corp. Ger. 585,530, Oct. 10, 1933. Dialkyl ethers of  $\text{C}_2\text{H}_4(\text{OH})_2$ , especially the dimethyl ether, are used as solvents for acetylcellulose, etc.

**Cellulose acetate.** Cyril J. Staud and Charles S.

Webber (to Eastman Kodak Co.). U. S. 1,939,235, Dec. 12. Esterification of cellulose fibers is facilitated by pretreatment with a bath contg. a substantial proportion of  $\text{N}_2\text{O}_4$ .

**Cellulose acetates.** British Celanese Ltd. Brit. 398,192, Sept. 4, 1933. Cellulose acetates obtained with the aid of  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$  or other oxy acids or derivs. of such acids are ripened until the Ac content is reduced to only 56.80% (calcd. as  $\text{AcOH}$ ) so that although  $\text{Me}_2\text{CO}$  soly. is reached the process does not proceed to normal  $\text{Me}_2\text{CO}$  soly. Ripening is carried out under conditions such that any acid present is an oxy acid. The resultant cellulose acetates yield non-delustering products, e. g., rayon.

**Cellulose acetate compositions.** Russell L. Jenkins (to Swann Research, Inc.). U. S. 1,941,262, Dec. 26. A chlorinated biphenyl is used as a waterproofer and flame retarder with cellulose acetate compns. suitable for photographic films, etc., and which also may contain various solvents and plasticizers, etc.

**Translucent cellulose nitrate products.** Charles S. Webber and Cyril J. Staud (to Eastman Kodak Co.). U. S. 1,939,244, Dec. 12. Products such as cellulose acetate or nitrate sheets are rendered translucent by treatment with a bath formed of equal proportions of  $\text{MeOH}$  and acetone or the like and then with an  $\text{EtOH}$  or  $\text{C}_2\text{H}_5$  bath.

**Making hollow cellulose bodies.** Wolff & Co., Emil Czapek and Erwin Bauer. Ger. 566,770, Oct. 17, 1933 (Cl. 39b. 12.03).

**Dipping-formers for the manufacture of hollow articles of cellulose.** Ernst Bleibler. Brit. 398,092, Sept. 7, 1933.

**Apparatus for making patterned bands of regenerated cellulose.** Kalle & Co. A.-G. (Maximilian Paul Schmidt and Julius Voss, inventors). Ger. 585,903, Oct. 12, 1933.

**Apparatus for drying seamless tubes of regenerated cellulose.** Kalle & Co. A.-G. (Julius Voss, inventor). Ger. 588,102, Nov. 14, 1933 (Cl. 39a. 19.03). Addn. to 334,241 (C. A. 26, 843).

**Plasticizers for use with nitrocellulose, etc.** Wm. C. Arsen. U. S. 1,938,791, Dec. 12. Esterification compds. are formed from poly- and mono-hydric alcs. such as glycerol, ethylene glycol, ethyl, butyl and benzyl alcs. with "polybasic" acids such as phthalic acid, tartaric acid or citric acid, these products being suitable for use in lacquers or other compns. such as those contg. synthetic resins. In general, these products are viscous liquids. Several examples with details of procedure are given.

**Manufacture of seamless celluloid articles from bars of celluloid.** Lucifer J. Most. U. S. 1,940,223, Dec. 19. In making articles such as fountain pen barrels and caps, a recessed celluloid bar is softened, placed in a form larger than the bar, and a compressed fluid such as compressed air is introduced into the recess of the bar to expand it and fill the form. App. is described.

**Metallizing celluloid surfaces, etc.** Karl Kiefer. U. S. 1,941,438, Dec. 26. The surface of celluloid or the like is treated with a soln. of a Sn salt contg. alc., and the treated surface is then metallized (suitably by use of  $\text{AgNO}_3$ ).

**Compound sheet material.** Ernest Hibbert. Australia 9851/32, Sept. 21, 1933. Alternate layers of paper and rubber latex are vulcanized together to produce a material suitable for wall papers, floor coverings, elec. insulators, cement bags, etc.

**Phytosterol, fatty acids and resin acids from raw tall-oil soap.** Håkan Sandqvist and Torsten O. H. Lindström. U. S. 1,940,372, Dec. 19. Raw tall-oil soap obtained in the manuf. of cellulose by the sulfate method is dried under a pressure of less than 30 mm. Hg, the concd. material is extd. with a solvent such as ether in which phytosterol and non-saponifiable substances are sol., impurities are removed from the ext. by shaking with an alk. material such as  $\text{NaOH}$  soln., and the solvent is distd. off and the residue is crystd. to obtain pure phytosterol. Fatty and resin acids are also recovered.

**Ripening viscose sirup.** George A. Richter (to Brown Co.). U. S. 1,938,722, Dec. 12. A film of unripened viscose sirup is progressively deposited on a heated surface

such as that of a rotating steam-heated drum under atm. pressure, and the heated film is removed from the heated surface in a ripened but unjelled condition. App. is described.

**Rayon from viscose.** Vereinigte Glanzstoff-Fabriken A.-G. (Hugo Elling, inventor). Ger. 589,467, Dec. 9, 1933 (Cl. 29a. 6.08). In the manuf. of rayon from viscose by the reel- or pot-spinning process, the filaments are subjected to tension, and if desired to friction, between the spinning nozzle and the collecting device, but the intermediate drying before the usual after-treatment is effected without tension. Rayon of uniformly high wet strength is obtained.

**Rayon.** Algemeene Kunstzijde Unie N. V. Fr. 755,140, Nov. 20, 1933. A method of winding on bobbins to avoid "mirror" effects is described.

**Rayon.** Soc. pour l'ind. chim. à Bâle. Fr. 755,267, Nov. 22, 1933. Threads made from regenerated cellulose are esterified in the form of spinning cakes while the structure of the threads is maintained.

**Rayon.** Soc. pour la fabrication de la soie artificielle Rhodiaseta. Fr. 755,309, Nov. 23, 1933. Rayon having a normal luster, but easily dulled, is made from a spinning soln. obtained by dissolving several cellulose acetates having different characteristics, e. g., contg. different amts. of  $\text{AcOH}$ .

**Rayon, etc.** Adrianus J. L. Moritz (to American Enka Corp.). U. S. 1,940,602, Dec. 19. Colored filaments, films, etc., of a silk-like luster are obtained from solns. such as those of viscose by incorporating into the soln. when it is made 0.05-0.4% of a pigment (calcd. on the wt. of the cellulose content) and then, prior to spinning, adding less than 1.5% of pine oil (calcd. on the soln.).

**Rayon, etc.** Henry Dreyfus. Fr. 754,683, Nov. 10, 1933. Filaments, etc., made from cellulose acetate or other derivs. are submitted to a sapon. while in movement but without being submitted to any or only to a very low tension. The filaments are afterward washed and dried, also without tension. Before sapon. they are submitted to a drawing. Fr. 754,684. Threads, ribbons, textiles, etc., contg. cellulose derivs. are treated with a sapon. agent in the presence of an oil, e. g., Turkey-red oil, olive oil or a light mineral oil in the form of an emulsion.

**Rayon, etc.** Henry Dreyfus. Fr. 754,685, Nov. 10, 1933. In treating products contg. cellulose derivs. with softening agents for the purpose of drawing them, an oily or fatty substance or a soap and (or) a wetting agent is added to the softening agent. Thus, an aq. soln. of dioxane contg. 1-2% of the Na salt of the sulfuric ester of lauryl alc. may be used. Cf. C. A. 28, 896<sup>4</sup>.

**Producing, delustering and other treatments of rayon, films, etc.** Henry Dreyfus. Brit. 398,258, Sept. 14, 1933. Artificial filaments, threads, yarns, films, fabrics, etc., are delustered, weighted, mordanted, etc., by incorporating therein an inorg. compd. in finely divided form and treating the formed products with a reagent to convert said compd. into its final form. Thus yarn contg. finely divided Zn or Sn hydroxide is treated with a soln. of  $\text{H}_2\text{PO}_4$  or a phosphate. The inorg. compd. is preferably incorporated in the spinning soln. Among examples (1) an  $\text{Me}_2\text{CO}$  soln. of cellulose acetate contg. finely divided  $\text{Na}_2\text{SO}_4$  is spun into an aq. soln. of  $\text{Ba}(\text{CNS})_2$  and  $\text{NH}_4\text{CNS}$ , and (2) cellulose acetate yarn is soaked in a dispersion of  $\text{NaH}_2\text{PO}_4$  in alc., lifted and immersed, without boiling, in a Na zincate soln.

**Apparatus for manufacture of rayon filaments by the stretch-spinning process.** August Hartmann and Gotthard Bauredel (to American Bemberg Corp.). U. S. 1,939,800, Dec. 12. Various structural mech. and operative details are described.

**Device for spinning rayon by the aid of two different precipitating liquids.** Edwin Schurz and Kurt Melkus. Ger. 580,824, Oct. 26, 1933 (Cl. 29a. 6.02). Addn. to 572,705 (C. A. 27, 4398).

**Spinning centrifuge for rayon.** Waldemar zu Löwen (to American Bemberg Corp.). U. S. 1,940,339, Dec. 19. Structural and mech. features.

**Spinning machine for rayon.** Soc. anon. textiles artificiels de Reims. Ger. 585,759, Oct. 13, 1933.

**Spinning nozzles for rayon.** Comptoir général des métaux précieux. Fr. 755,342, Nov. 23, 1933. Construction.

**Artificial threads.** "Sidac," Société industrielle de la cellulose, Soc. anon. Brit. 398,427, Sept. 14, 1933. Bands of cellulose, film, *e. g.*, waste strips produced in the manuf. of cellulose films, preferably from regenerated viscose, are loosely compressed or crushed in the direction of their width. The resulting strands may be loosely twisted or doubled with other yarns and they may be fireproofed, *e. g.*, by treatment with a borax soln.

**Dry-spinning apparatus for producing artificial filaments, ribbons, etc.** British Celanese Ltd. and Edward Kinsella. Brit. 398,478, Sept. 12, 1933.

**Artificial filaments, films, etc.** Henry Dreyfus. Brit. 398,166, Aug. 28, 1933. Artificial films, etc., of org. derivs. of cellulose, of modified properties, *e. g.*, luster, wt., heat resistance, etc., are obtained by incorporating therein an org. B compd., *e. g.*, Me, Et or glycerol borate. The B compd. may be decompd. in the spinning soln. or in the materials to form other B compds., *e. g.*, Et borate, dissolved in alc., may be added to an aq. Me<sub>2</sub>CO cellulose acetate soln., H<sub>2</sub>BO<sub>3</sub> being formed in the spinning soln.

**Artificial filaments from materials such as cellulose acetate.** Camille Dreyfus and Wm. Whitehead (to Celanese Corp. of America). U. S. 1,938,623, Dec. 12, 1933. Filaments of low luster are obtained by extruding a soln. contg. an org. cellulose deriv. such as cellulose acetate and a water-sol. salt of a higher aliphatic acid such as triethanolamine trioleate or K ricinoleate which is sol. in the org. solvent (*e. g.*, acetone) of the cellulose deriv. used, the extrusion being effected through orifices into a setting fluid such as an evaporative atm. which does not alter the soly. of the salt, so that on solidification of the filaments at least some of the water-sol. salt is retained in them.

**Artificial filaments from materials such as cellulose acetate.** Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,938,646, Dec. 12, 1933. A soln. of an org. cellulose deriv. such as cellulose acetate contg. a wetting agent such as Turkey-red oil and a solvent such as acetone is extruded into a setting medium (such as a current of air) which does not remove the wetting agent. The product may be delustered by use of steam, water or alc.

**Filaments of low denier from cellulose acetate.** Henry Dreyfus. U. S. 1,941,204, Dec. 26, 1933. Solns. of cellulose acetate in acetone contg. sufficient water (suitably 10% or more) to yield solns. of substantially lower viscosity than that of solns. of the same concn. in acetone contg. 5% of water are spun and drawn down. The soln. may also contain EtOH.

**Ascertaining and recording the thickness or denier of artificial filaments.** Julius Brenzinger (to Max Arms Chemical Engineering Corp.). U. S. 1,940,072, Dec. 19, 1933. A record is made, with respect to elapsed time, of variations in the relative speeds of the pump that delivers the synthetic material and the spool that winds the thread. App. is described.

**Textile materials.** Henry Dreyfus. Brit. 398,820, Sept. 11, 1933. In the manuf. of spun yarn from org. cellulose derivs. the material is provided, before the opening, carding, drawing and carding operations, to minimize electrification difficulties, with an outer coating contg. a hygroscopic substance, which is cellulose or cellulose deriv. material, (a deriv. of) a degraded cellulose or (a deriv. of) a polyvinyl alc. The coating may contain also other hygroscopic, non-colloidal materials, *e. g.*, glycerol, NH<sub>4</sub> citrate, chlorides and nitrates of Mg, Ca, Zn, Fe, acetamide, methylamine-HCl, etc., and roughening media, *e. g.*, SiO<sub>2</sub>, BaSO<sub>4</sub>, kieselsol, etc., to assist spinning. A cellulose coating may be regenerated from a coating of viscose, NH<sub>4</sub> viscose, nitrocellulose or an ammoniacal Cu or metallic salt soln. of cellulose or may result from the surface sapon. of the filament or fiber. A cellulose deriv. coating may be of esters, *e. g.*, acetate, propionate or ethers, *e. g.*, Me, Et or benzyl ethers, of a cellulose so degraded, previous to, during or subsequent to the intro-

duction of the substituents that the product is hydrophilic, or of a deriv. contg. substituents of a hydrophilic character, *e. g.*, OH, COOH or carboxylic salt groups, as, *e. g.*, esters of oxalic, maleic, glycolic, malic, lactic, tartaric or glyceric acid or hydroxy and carboxy alkyl ethers.

**Separating fibrous and non-fibrous constituents of vegetable materials such as cereal straws.** Adolf Hawerlander (to Albert D. Stewart). U. S. 1,941,350, Dec. 26, 1933. The material is agitated with steam in a solvent such as aq. liquor contg. Ca(OH)<sub>2</sub> to loosen and dissolve non-fibrous material, the soln. formed is sepd. by mech. pressure from fibrous material, and the soln. is then evapd. to recover a non-fibrous residue.

**Reducing the solution viscosity of cellulose fiber.** George A. Richter (to Brown Co.). U. S. 1,941,154, Dec. 26, 1933. Materials such as cotton and preliberated wood pulp are digested at temps. above 150° in a sulfurous acid soln. of a sulfite contg. no more free than combined SO<sub>2</sub>.

**Cellulose digester.** Aktiebolaget Nordiska Armaturfabrikerna. Ger. 584,600, Sept. 22, 1933.

**Sieve for cellulose digesters.** Aktiebolaget Nordiska Armaturfabrikerna. Ger. 586,701, Oct. 25, 1933 (Cl. 55b. 2.40).

**Sulfite cellulose digestion.** Gustaf Haglund (to Patent-aktiebolaget Gröndal-Ramen). U. S. 1,940,136, Dec. 19, 1933. Cellulose-contg. material such as wood chips is first cooked with a soln. of a sulfurous acid salt such as NaHSO<sub>3</sub> and then, after withdrawal (if necessary) of a suitable amt. of the original soln. from the cooking vessel, a soln. of SO<sub>2</sub> is added in waste liquor or wash water from a similar cooking operation, and the cooking is continued for a further period. There is thus obtained a high concn. of by-products in the waste liquor formed. Cf. C. A. 27, 5188.

**Chemical pulping of fibrous materials.** Carl E. Beaman and Alrik H. Lundberg (to Chemipulp Process, Inc.). U. S. 1,938,802, Dec. 12, 1933. Material such as wood chips is fed through a plurality of superposed digesting chambers in each of which the material is treated with a heated chem. liquor under a pressure independent of the pressures existing in the other chambers. Various features of app. are described.

**Apparatus for separating longer fibers from the white water of paper pulp.** Carl B. Thorne. Brit. 398,980, Sept. 28, 1933.

**Apparatus for producing white pulp from resinous wood.** Harald Jensen and Johan K. B. Raeder. Ger. 586,559, Oct. 23, 1933 (Cl. 55a. 1.40).

**Apparatus for bleaching cellulose pulp of high density.** Gebr. Bellmer. Ger. 585,146, Sept. 30, 1933.

**Agitating tank for cellulose pulp, etc.** Olaf Qviller (to A/S Thunes mek. Vaerksted). U. S. 1,939,225, Dec. 12, 1933. Various details of an app. with circulating pumps are described.

**Apparatus for mixing and blending paper pulp.** Randolph V. Bingham. U. S. 1,939,101, Dec. 12, 1933. Various details are described of an app. with a tank and a plurality of material-circulating pumps.

**Tool for taking samples of baled pulp or the like.** Arthur B. Andrews. U. S. 1,939,430, Dec. 12, 1933. Structural details.

**Hammer mills for paper pulp.** William T. Doyle (to Sturtevant Mill Co.). Brit. 398,747, Sept. 21, 1933.

**Centrifugal sieve for paper stuff.** Andreas Biffar. Ger. 588,116, Nov. 13, 1933 (Cl. 55d. 2.10).

**Apparatus for refining and screening fiber stock for paper manufacture.** John A. Wiener. U. S. 1,939,747, Dec. 19, 1933. Mech. features.

**Paper-making apparatus.** Wilhelm Poeschl, Rudolf Poeschl and Wilhelm Roth (to Rohrbacher Lederfabrik Josef Poeschl's Söhne A.-G.). U. S. 1,938,637, Dec. 12, 1933. Portions of suction chests which come into direct contact with strainers are formed with leather facings.

**Paper-making apparatus.** James K. Darby (to Wm. H. Millsbaugh). U. S. 1,939,337, Dec. 12, 1933. Structural and mech. features.

**Round-sieve machine for making paper, etc.** Akt.-Ges. der Maschinenfabrik von Theodor Bell & Cie. Ger. 585,637, Oct. 6, 1933.

- Paper-making machine (fourdrinier type).** Gumal Knopp. Ger. 585,147, Oct. 11, 1933.
- Paper machine with two suction rollers.** Wm. H. Millsbaugh. Ger. 585,729, Oct. 9, 1933.
- Long-sleeve paper machine.** Firma J. M. Voith. Ger. 585,508, Oct. 4, 1933.
- Hollander for paper making.** Anton D. J. Kuhn. Ger. 585,636, Oct. 6, 1933.
- Press rolls for paper manufacture.** Firma Arthur Schutz. Austrian 135,558, Nov. 25, 1933 (Cl. 55b.). Addn. to 132,595 (C. A. 27,8609).
- Method of joining the ends of wire cloth for paper-making machines.** T. J. Marshall & Co. Ltd. and Robert D. Debenham. Brit. 397,629, Aug. 31, 1933.
- Spray-treating web material on paper-making apparatus.** Edmund P. Arpin, Jr. U. S. 1,938,790, Dec. 12. Web material passing through the app. and while in heated condition is sprayed with a liquid treating material such as melted paraffin.
- Weight regulating of paper stock.** Ernest Poirier. U. S. 1,939,411, Dec. 12. Various details of app. and operation are described.
- Paper.** The Mead Corp. Ger. 588,003, Nov. 11, 1933 (Cl. 55c. 3.10). A suspension of any of the usual fillers is supplied to the wire side of a moist paper web during the manuf. of the paper. Pressure may be applied to force the suspension into the web. Paper having the same appearance on both sides is obtained. Various forms of app. are described.
- Waterproof paper.** Kodak-Pathé. Fr. 754,614, Nov. 10, 1933. A waterproof packing paper is obtained by impregnating paper with a dil. soln. of wax and afterward coating it with a soln. of nitrocellulose contg. a relatively high proportion of a plasticizing agent, with or without the addn. of a resin.
- Coated paper.** The Champion Coated Paper Co. Ger. 585,063, Sept. 28, 1933. See Brit. 333,226 (C. A. 25, 343).
- Waxed wrapping paper.** Carroll B. Wilkins (to Nashua Gummed & Coated Paper Co.). U. S. 1,938,949, Dec. 12. A product of substantial opacity and high gloss comprises a body of paper stock assoc. with material of substantially different refractive properties such as "titanox" and treated with colorless wax.
- Heat and adhesive treatment, etc., applied to wax-coated paper as in paper-bag manufacture.** Stuart Moore (to Dixie Wax Paper Co.). U. S. 1,940,559-60-1, Dec. 19. Various details of app. and operation are described.
- Safety paper.** Frank S. Wood (to Inkset Safety Paper Co.). U. S. 1,939,378, Dec. 12. Safety paper is made in one continuous operation comprising at least approx. dehydration and subsequent application and absorption of about 8% water, decolorized iodine, tannic acid and HOAc or equiv. substances, no further drying being required.
- Translucent paper.** Fred O. Reiss (to Aladdin Industries Ltd.). Brit. 397,550, Aug. 28, 1933. Paper with a high  $\alpha$ -cellulose content is impregnated with a glyptal-type artificial resin to form a translucent, heat-resistant paper, e. g., for shades of incandescent mantle lamps. The paper is made from spruce chips digested with  $H_2SO_4$ , blown and washed, sufficient  $\beta$ - and  $\gamma$ -cellulose, e. g., 5%, being left to act as binding medium and no size being used.
- Transparent paper coated with adhesive.** Wm. W. McLaurin. U. S. 1,940,363, Dec. 19. A coating of normally dry and non-tacky character but adapted to adhere to glass and to take various printing inks without causing the inks to run comprises a high proportion of dextrin and a small proportion of a gelatin glue.
- Cigaret paper.** Soc. anon. des anciens établissements Braunstein Frères. Ger. 588,327, Nov. 15, 1933 (Cl. 55f. 16). See Brit. 380,724 (C. A. 27, 5541).
- Apparatus for forming wallboard and like fiber webs from viscous stock.** Henry W. Piquet (to MacAndrews and Forbes Co.). U. S. 1,939,518, Dec. 12. Mech. and operative details.
- Pulpboard.** Hubert L. Becher (to Agasote Millboard Co.). U. S. 1,939,616, Dec. 12. Pulpboard is formed of a compressed mixt. of fiber together with paraffin about 1-4% and montan wax about 0.25-1.0%, a substantial proportion of the latter being in the form of a metallic salt in uniform distribution with the paraffin in a condition such as can be obtained by pptn. from an emulsion including paraffin and saponified montan wax.
- Fiberboard.** Robert G. Quinn (to International Paper Co.). U. S. 1,939,082, Dec. 12. In the manuf. of fiberboard, a fiber pulp stock impregnated with fireproofing salts and having a  $pH$  of about 5.2 is mixed with a colloidal suspension of bituminous material having the property of being pptd. by material of this  $pH$ .

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES R. MUNROE AND C. G. STORM

- The flammability of the mixture  $2H_2 + O_2$  at low pressure.** Pierre Tauzin. *Compt. rend.* 197, 1046 (1933).—The pressure limits between which the mixt. will burn are detd. as a function of temp. between 420° and 560°.
- J. B. Austin
- Calcn. of mixts. of acids [prepn. of nitration mixts.] (Beskov) 18.
- Explosive.** Norman G. Johnson (to E. I. du Pont de Nemours & Co.). U. S. 1,940,255, Dec. 19. A solid metallic nitrate such as  $NaNO_3$  is used in the form of spherical pellets in making explosives such as a non-gelatinous dynamite compn. contg. also nitroglycerin,  $NH_4NO_3$ , sawdust and  $CaCO_3$ . Cf. C. A. 28, 646°.
- Explosives.** Dynamit-A.-G. vorm. Alfred Nobel & Co. (Ph. Naef and K. F. Meyer, inventors). Ger. 583,179, Nov. 13, 1933 (Cl. 78c. 17). In the manuf. of explosives comprising  $NH_4NO_3$  and nitroglycerin or nitroglycol, a liquid or semiliquid hydrocarbon or a mineral or fatty oil is added in an amt. at least 15% of that of the nitroglycerin or nitroglycol. The proportion of the latter in the compns. can then be raised to over 10%, without increasing the sensitiveness of the compns. to handling, friction or shock. The nitroglycerin or nitroglycol may be given a sirupy consistency by addn. of a little nitrocellulose.
- Explosives.** I. G. Farlenund. A.-G. Fr. 755,050, Nov. 18, 1933. Mixed crystals of  $NaNO_3$  and  $NaClO_3$ , either as such or mixed with an excess of these salts are used for the manuf. of explosives.
- Fuses for explosives.** Schaffler & Co. Austrian 135,704, Dec. 11, 1933 (Cl. 78b.). Elec. time fuses charged with a mixt. of powd. Fe and an oxidizing agent, e. g.,  $KMnO_4$ , contain as a retarding agent a powd. inert material of good adherent properties, e. g., chalk. Preferably, the inert material is mixed with the powd. Fe, and the oxidizing agent then added.
- Separating nitroglycerin and residual acid.** Arnold Schmid. U. S. 1,939,634, Dec. 12. Various details of app. and operation are described involving the use of an inclined sepg. vessel with a temp. control jacket, etc. Cf. C. A. 27, 4403.
- p-Phenylenediamine dipicrate.** Jean Piccard (to Hercules Powder Co.). U. S. 1,939,365, Dec. 12. This compd., which is suitable for use in delay elec. blasting caps for igniting time fuses, is formed by reaction of p-phenylenediamine with picric acid in alc. or other solvent.
- Hydraulic press for gunpowder, celluloid and like inflammable materials.** Fried. Krupp Grusonwerk A.-G. Ger. 588,010, Nov. 11, 1933 (Cl. 78c. 2).
- Discharge cap for blasting cartridges.** Frank H. Armstrong (to Safety Mining Co.). U. S. 1,941,196, Dec. 26. Structural details.
- Flashlight cartridges.** Schaffler & Co. Austrian 135,-

707, Dec. 11, 1933 (Cl. 78b.). An elec. actuated igniting device for flashlight cartridges comprises a pill, prep'd. from powd. Zr and an oxidizing agent, in which leads for the current are inserted.

**Ignitable compositions for making matches, candles, torches, etc.** Emil Sokal, Hans Bausch and Johann Bayer. Austrian 135,500, Nov. 25, 1933 (Cl. 78b.). A mixt. of powd. Mg or Al with an alk. earth oxalate is

assocd., with the aid of a binder, with a cheap combustible material such as paper or wood. The compns. so obtained are insensitive to friction or shock. A flame is necessary to ignite them, but once ignited they are not extinguished by wind. Various methods of prepg. and using the compns. are indicated. Thus, ordinary matches may be coated with a mixt. of powd. Mg and  $\text{SrC}_2\text{O}_4$ , or a candle wick may be similarly impregnated.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**The dyestuffs industry in 1933.** R. Brightman. *Ind. Chemist* 10, 18-21 (1934).

**The action of alkaline copper-solution on silk fibroin.** V. Application of the conductometric titration to the system of fibroin-copper-amine. 1 and 2. Yujiro Takamatsu. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 662-8 (1933); cf. C. A. 28, 9014.

Conductometric titration curves were established for solns. of ethylenediamine (I), and  $\text{Cu}(\text{OH})_2 + \text{I}$ . The curve for I has 2 breaks, the first at the point of complete neutralization to the mono-acidic-base and the second where all is neutral salt. If  $\text{Cu}(\text{OH})_2:\text{I} = 1:2$ , the curve shows 2 breaks, the first at the end of a descending branch at the point of complete neutralization of the base ( $\text{CuI}_2(\text{OH})_2$ ), and the second in a rising curve at the point of complete decompn. of the complex salt into simple salts. If  $\text{Cu}(\text{OH})_2:\text{I} = 1: > 2$ , an addnl. break enters the curve, for the point of complete neutralization of the excess I. Similar curves were detd. for the system fibroin Cu I for exact and excess quantities of I. VI. **The mechanism of the solution of fibroin in copper-amine solution.** *Ibid.* 668-72. The soln. of fibroin can be expressed by the equation  $x = kt^n$ , where  $x$  is the dissolved amt. of fibroin at the time  $t$  and  $k$  and  $n$  are consts. which were detd. from exptl. data. The equation was found to give values which agreed well with actual data.

Karl Kammermeyer

**Chemical examination of furs in relation to dermatitis.** IV. **The chemical reactions of dyeing with *p*-phenylenediamine and *p*-aminophenol.** H. E. Cox. *Analyst* 59, 3-11 (1934); cf. C. A. 28, 9021. A quantitative study of the oxidation of the diamine with  $\text{H}_2\text{O}_2$  in the presence of fur, shows that the principal pigment formed is an azine combined with proteins from the fur. Bandrowski's base was found on the surface of the fibers and in the dye-bath there remained considerable of the unoxidized dye-stuff together with B.'s base and traces of quinone and  $\text{NH}_3$ . Similar study with the aminophenol showed the presence of an oxazine on the fur. The azine from the diamine forms a leuco compd., with the addn. of only 0.18%  $\text{H}_2\text{O}_2$ , by the action of  $\text{TiCl}_3$ ; the leuco compd. can also be formed by direct oxidation of B.'s base in soln. and contains at least 9 benzene rings. A preliminary account is given of the reaction of B.'s base with dil.  $\text{HCl}$  whereby free *p*-phenylenediamine is formed. This base is not, as has been assumed, the desired product in fur-dyeing. The properties of other intermediate oxidation products were studied in connection with possible irritation to the skin and the final conclusion was drawn that it is *p*-phenylenediamine itself, and not any intermediate oxidation product, that is the active irritant in dermatitis caused by wearing fur. W. T. H.

**Catechu [use in dyeing]** (Heim de Balsac, et al.) 29. Reaction capacity of the methyl group. 1. Synthesis of 6,8'-dibenzoylindigo (Chardonnens) 10. Pyrrole blacks obtained by reduction (Ilari) 10. Utilization of *Caesalpinia spinosa* [in textile finishing] (Castiglioni) 18. Detergents, etc. [cleansing baths for wool] (Brit. pat. 398,818) 18. Ketones [products used for dye manuf.] (Ger. pat. 575,857) 10. App. for coating or impregnating cloth or cotton batting with rubber compus. (U. S. pat. 1,939,842) 30. Cellulose esters [sizing and vehicles for dyes and pigments] (Fr. pat. 754,866) 23. App. for detg. the moisture content of textiles (Brit. pat. 398,139) 20.

Sulfonating rubber [products used in textile industry] (Ger. pat. 585,622-3) 30.

3 **Barker, S. G.:** Sisal. Bull. 64 of Empire Marketing Board. London: H. M. Stationery Office. 1s. Reviewed in *Malayan Agr. J.* 21, 576 (1933).

**Herzog, E.:** Reaktionstabelle der Küpenfarbstoffe. Tableau analytique des colorants à la cuve. Oberwinterthur: The author, Talwiesenstr. 22. 40 pp. Swiss f. 2 1/2; bound, Swiss f. 3 1/2. Reviewed in *J. Soc. Dyers Colourists* 49, 326 (1933).

**Hetzer, J.:** Textil-Hilfsmittel-Tabellen (Insbesondere Schaum-, Netz-, Wasch-Reinigungs-, Dispergier- usw.-Mittel). Berlin: J. Springer. 211 pp. M. 12. Reviewed in *J. Soc. Dyers Colourists* 50, 20 (1934).

**Preston, J. M.:** Modern Textile Microscopy. Manchester: Emmott & Co., Ltd. 315 pp. 15s. net. Reviewed in *Silk & Rayon* 7, 562; *Textile Weekly* 12, 365 (1933).

5 **Technologie der Textilfasern.** Edited by R. O. Herzog. Bd. IV, Tl. 4: Die Weltwirtschaft der Baumwolle. Edited by Paul Koenig and Arnold Zelle. Berlin: J. Springer. 180 pp. M. 20.50. Cf. C. A. 27, 5547.

**Dyes.** I. G. Farbenind. A.-G. (Georg Kränzlein, Martin Corell and Heinrich Vollmann, inventors). Ger. 583,716, Sept. 8, 1933. Addn. to 577,963 (C. A. 28, 648<sup>9</sup>). The method of 577,963 for obtaining substitution products of monoamino-3,4,8,9- and 4,5,8,9-dibenzopyrenequinone is extended to polyamino derivs., the amino groups being replaced or substituted. Thus, a suspension of diamino-3,4,8,9-dibenzopyrenequinone in  $\text{PhNO}_2$  is treated with  $\text{BzCl}$  to give a fast yellowish red dye. Other examples are given. Cf. C. A. 27, 1193.

**Dyes.** I. G. Farbenind. A.-G. (Fritz Baumaun and Berthold Stein, inventors). Ger. 585,528, Oct. 4, 1933. The dyes 1,4-diamino-2-aryloxyanthraquinone-3-sulfonic acids are prep'd. by treating 1,4-diamino-2-aryloxy-3-haloanthraquinones with neutral sulfites in the presence of water, and, optionally, org. solvents. The reaction takes place under raised temp. and pressure. Examples are given.

**Dyes.** I. G. Farbenind. A.-G. (Walther Benade, inventor). Ger. 585,897, Oct. 12, 1933. Addn. to 582,688 (C. A. 28, 905<sup>9</sup>). The method of 582,688 for forming *o*-hydroxyazo dyes is modified by coupling diazotized 2-amino-1-hydroxybenzenesulfonic acid with 5,6- or 6,7-benzo-2,4-dihydroxyquinoline. Examples are given.

**Dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 751,061, Aug. 26, 1933. Chromatable azo dyes are treated in neutral or acid medium with chroming agents, the chroming being completed without pptn. of the chromed intermediate products in alk. medium. As azo dyes those from 1-diazo-2-naphthol-4-sulfonic acids and naphthols may be used.

**Dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 751,127, Aug. 28, 1933. Dyes for viscose silk are made by coupling 1 mol. of a tetrazotized 4,4'-diaminobiphenyl compd. with 1 mol. of 1-hydroxynaphthalene-4,8-disulfonic acid (I) and 1 mol. of any other coupling component. Thus, the dye obtained from 4,4'-diamino-3,3'-dimethoxybiphenyl, I and 1,3-dihydroxybenzene gives a reddish blue on viscose silk. Other examples are given.



**Dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 751,222, Aug. 29, 1933. Fastness to friction of dyes obtained by impregnating wool in alk. bath with arylides of org. carboxylic acids and developing with diazo compds., is increased by treating the wool with liquids contg. buffer substances capable of lowering the alk. of the prep'd. wool, after impregnation with the arylides. Suitable buffers include  $\text{NaHCO}_3$ ,  $\text{MgSO}_4$ , acid phosphates and weak acids.

**Dyes.** I. G. Farbenind. A.-G. Fr. 754,387, Nov. 6, 1933. 3-Aminophenols (having the 4-position unoccupied) are coupled in alk. soln. with diazo compds. contg. at least one solubilizing group,  $\text{SO}_3\text{H}$  or  $\text{COOH}$ , and not contg. any group capable of giving rise to the formation of a metal complex. The products are treated with oxidizing agents, preferably compds. of Cu.

**Dyes.** I. G. Farbenind. A.-G. Fr. 755,376, Nov. 23, 1933. *p*-Aminodiphenylamine or its homologs or substitution products or its hydrazine or primary aliphatic or aromatic substitution products are condensed with 2- or 4-alkoxy-3,5-dinitrobenzoic acids or their alkyl esters, in the presence of water or an org. solvent and with or without an agent capable of fixing acid. The dyes dye animal fiber in brown-yellow and brown-red shades. Examples are given.

**Azo dyes.** Friedrich Muth (to General Aniline Works). U. S. 1,940,059, Dec. 19. Azo dyes which may be produced on the fiber and which yield fast, usually brown, dyes are formed from components such as 9-methyl-2-hydroxycarbazole-3-carboxylic acid or *p*-chloroaniline and 4-nitroaniline or the like. Cf. C. A. 27, 4405.

**Azo dyes.** Werner Zerweck, Carl Schütz, Alfred Carl and Johann Rosenbach (to General Aniline Works). U. S. 1,940,068, Dec. 19. Dyes, most of which, in the case of examples given, are of various red shades, and which are of good fastness, are obtained by diazotizing an aminodiaryl contg. at least one nitro group in a *m*- or *p*-position (such as 4'-nitro-2-aminobiphenyl) and coupling the diazo compd. with a coupling component of the naphthalene, carbazole or acylacetic acid series (numerous examples being given). The dyes may be produced on the fiber.

**Azo dyes.** Leopold Laska and Bruno Heyn (to General Aniline Works). U. S. 1,941,035, Dec. 26. Dyes (most of which, in examples given, dye green shades) are formed by combining various diazo, tetrazo and diazoazo compds. of the benzene, naphthalene and anthracene series not contg. sulfonic or carboxylic groups with 6-phenylamino-2-naphthol-3-carboxylic acid arylides (numerous examples being given).

**Azo dyes.** Ernst Runne, Karl Moldenke and Werner Kust (to General Aniline Works). U. S. 1,941,057, Dec. 26. Dyes which generally dye red shades are formed from components such as 2-amino-5-chloro-1-methyl-4-isopropylbenzene or the like and an arylamide of 2,3-hydroxynaphthoic acid or a  $\beta$ -ketocarboxylic acid.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 754,639, Nov. 10, 1933. 1-Phenyl-5-pyrazolone-3-carboxamide or its derivs. is combined with diazotized 1-hydroxy-2-aminobenzenes which have a  $\text{SO}_3\text{H}$  group in the 4-position and a halogen or alkyl group in the 6-position or a  $\text{SO}_3\text{H}$  group in the 6-position and a halogen or alkyl group in the 4-position. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 754,674, Nov. 10, 1933. Dyes sol. in water are prep'd. by sulfonating an azo

dye of the formula  $\text{CY}:\text{C}(\text{CO}_2\text{H})\text{C}(\text{OH})\text{CH}:\text{CY}:\text{C}-$

$\text{N}:\text{NC}:\text{CY}:\text{C}(\text{CO}_2\text{H})\text{C}(\text{OH})\text{CX}:\text{CY}$ , where X is H, alkyl or halogen and Y is H, alkyl or halogen. The prep'n. of 5-sulfo-, 5-sulfo-6-methyl-, 5-sulfo-6-chloro- and 5,5'-disulfo-3,3'-dicarboxy-4,4'-dihydroxyazobenzene is given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 754,798, Nov. 14, 1933. The dyes are prep'd. by combining diazo compds. of the formula 2-(HON:N)-5- $\text{XC}_6\text{H}_4\text{SO}_3\text{Y}$  (X is NO<sub>2</sub> or NH-aryl and Y an aromatic ring of the benzene series) with coupling components and transforming, if desired, the NO<sub>2</sub> or NH-aryl to NH<sub>2</sub>.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 755,268, Nov. 22, 1933. New azo dyes are prep'd. by coupling arylides of 2,3-hydroxynaphthoic acid with diazo compds. of aryl or aralkyl ethers of *o*-aminophenols which still contain at least one esterified carboxylic group. Thus, Et ester of 2-amino-1,1'-diphenyl-4-carboxylic acid is diazotized and coupled with 2'-naphthalide of 2,3-hydroxynaphthoic acid, giving a red ppt. A large no. of examples is given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 755,290, Nov. 22, 1933. Azo dyes of the stilbene series are prep'd. by submitting dyes, obtained by condensing dinitrostilbene-disulfonic acid or diinitrobenzylsulfonic acid or transformation products of nitrotoluenesulfonic acid, with aminoazo compds., successively and in any order to the action of alk. reducing and oxidizing agents. The oxidation may be replaced by other purification such as a partial

3 pptn. by ordinary salt.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 755,337, Nov. 23, 1933. 1,3-Dihydroxybenzene or a carboxylic acid thereof is coupled with 1 mol. of 2-nitro-1-amino-4-diazobenzene and 1 mol. of the same or another diazo or diazoazo component. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 755,338, Nov. 23, 1933. Insol. azo dyes, particularly for dyeing cellulose esters, are prep'd. by coupling diazotized 6-bromo- or chloro-2,4-dinitro-1-aminobenzene with  $\text{C}_6\text{H}_5$  or  $\text{C}_6\text{H}_5$  derivs. contg. an  $\text{NH}_2$  group which may be substituted by alkyl or hydroxyethyl. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Ger. 586,638, Oct. 26, 1933 (Cl. 22a.9). Polyazo dyes are prep'd. by coupling further diazotized compds. from optional starting components (except *peri*-aminonaphthols and derivs. of 1-aminonaphthalene substituted by  $\text{NH}_2$  in the *p*-position) or their sulfonic or carboxylic acids which contain etherified OH or SH groups in the *o*-position to the  $\text{NH}_2$  group, with

compds. of the general formula  $\text{XCyRA}$  in which Cy denotes cyanuryl, A *peri*-aminohydroxynaphthalene or a *peri*-(aminobenzoylamino)hydroxynaphthalene, R an aminoazo compd. and X a halogen atom or a residue bound by an O, N or S atom or cyanuric ring. Thus, the aminoazo compd. from diazotized 4-amino-1,3-dimethylbenzene-6-sulfonic acid and 1-amino-2-ethoxynaphthalene-6-sulfonic acid is dissolved in pyridine and treated with the condensation product from 1 mol. of cyanuric chloride or bromide, 1 mol. of amino-8-naphthol-3,6-disulfonic acid, and 1 mol. of 4-amino-4'-hydroxyazobenzene-3'-carboxylic acid. The resulting dye colors cotton from a Glauber salt-soda bath in fast light green shades. Several other examples are given.

**Azo dyes; dyeing.** I. G. Farbenind. A.-G. (Georg Kranzlein and Josef Erber, inventors). Ger. 585,351, Oct. 2, 1933. Diazo or tetrazo compds. not contg. the OH group are coupled in substance or on the fiber or other substrate with barbituric acid, thiobarbituric acid or

other compd. of the formula  $\text{OC}(\text{CH}_2)_2\text{C}(\text{O})\text{N}(\text{R}_1)\text{CX}:\text{NR}$ , where X is O or S, and R and R<sub>1</sub> are H atoms or the same or different aliphatic or cyclic radicals. Greenish yellow or red dyes are generally obtained, according to whether diazo or tetrazo compds. are used. Examples are given.

**Azo dyes; dyeing.** I. G. Farbenind. A.-G. (Wilhelm Neelmeier and Wilhelm Lamberz, inventors). Ger. 587,652, Nov. 7, 1933 (Cl. 22a.1). Addn. to 575,216 (C. A. 27, 3616). This corresponds to Fr. 742,326 (C. A. 27, 3616), but gives addnl. examples.

**Azo dyes; intermediates.** I. G. Farbenind. A.-G. Brit. 398,516, Sept. 15, 1933. H<sub>2</sub>O-insol. azo dyes are made in substance, on a substratum or on the fiber by coupling a 2-hydroxy-5,6- or -7,8-benzocarbazole-3-carboxylic acid arylamide with a diazo compd. In examples cotton is impregnated with the *p*-chloroanilide of the 5,6-deriv. or the *p*-aniside of the 7,8-deriv. and developed with diazotized 4-chloro-2-toluidine or *o*-chloroaniline, resp. The hydroxycarbazoles are made by taking a 5,6- or 7,8-benzocarbazole, substituted in the 2-position by a substituent that can be transformed into

an OH group, and replacing said substituent by known methods. Among examples Na 5,6-benzocarbazole-2-sulfonate (from 2,3-hydroxynaphthoic acid, 3-sulfo-phenylhydrazine and  $\text{NaHSO}_4$ ) is fused with KOH. The hydroxycarbazolecarboxylic acids are made by reacting  $\text{CO}_2$  with an alkali metal salt of the corresponding hydroxy compd. with the hydroxy compd. itself in the presence of an alkali metal carbonate. Examples are given. The arylides are prepd. by customary methods. Among examples 2-hydroxy-5,6-benzocarbazole-3-carboxylic acid is condensed with *p*-chloroaniline or  $\alpha$ -naphthylamine in presence of PhMe and  $\text{PCl}_5$ .

**Azo dyes; intermediates.** I. G. Farbenind. A.-G. Brit. 398,854, Sept. 22, 1933. Insol. azo dyes are made by coupling a 2-hydroxy-5,6-dihydro-7,8-benzocarbazole-3-carboxylic acid arylamide with a diazo compd. in substance, on the fiber or on a substratum. In an example cotton is impregnated with the *p*-aniside and developed with diazotized 2,5-dichloroaniline. The arylamides are made from the corresponding carboxylic acid and amines by customary methods. In an example the acid is condensed with *p*-anisidine by means of  $\text{PCl}_5$  in PhMe. The acid is made by the action of  $\text{CO}_2$  on the alkali metal salt of the corresponding OH compd. or on the OH compd. in the presence of an alkali metal carbonate. An example is given. 2-Hydroxy-5,6-dihydro-7,8-benzocarbazole is made from a 5,6-dihydro-7,8-benzocarbazole contg. a group in the 2-position which can be converted into an OH group by known methods, e. g.,  $\text{NH}_2$ ,  $\text{HSO}_3$  or alkoxo. In examples the 2-sulfonate is fused with KOH and the 2-methoxy compd. is heated with  $\text{AlCl}_3$  in PhMe. The 2-substituted benzocarbazoles are made by condensing the corresponding phenylhydrazine compd. with  $\alpha$ -ketotetrahydronaphthalene by methods similar to that of Bucherer.

**Copper-containing azo dyes.** Richard Stüsser (to General Aniline Works). U. S. 1,940,066, Dec. 19. See Ger. 575,840 (C. A. 27, 5549).

**Disazo dyes.** Henry Jordan (to E. I. du Pont de Nemours & Co.). U. S. 1,940,683, Dec. 20. Dyes generally dyeing bluish red shades are formed by coupling a diazotized aminoazo compd. of the benzene series, contg. not more than one sulfo or carboxy group with benzoylaminobenzoyl-2-amino-5-naphthol-7-sulfonic acid.

**Disazo dyes.** Heinrich Clingstein and Karl Dobmaier (to General Aniline Works). U. S. 1,940,662, Dec. 20. Disazo dyes generally dyeing yellow shades of good fastness to washing, to Cl and to kier-boiling are formed from components such as diacetoacetic- $\alpha$ -tolilide and diazotized *o*-aminobenzophenone or the like.

**Disazo dyes.** J. R. Geigy A.-G. Ger. 587,449, Nov. 4, 1933. See Fr. 739,468 (C. A. 27, 2309).

**Polyazo dyes.** Ralph B. Payne (to National Aniline & Chemical Co.). U. S. 1,938,976, Dec. 12. Dyes producing violet to blue shades on cotton rendered fast by development with  $\beta$ -naphthol are formed from components such as 1,8-aminonaphthol-3,6-disulfonic acid, cresidine, 5,5'-dihydroxy-2,2'-dinaphthylamine-7,7'-disulfonic acid and oxalyl-*p*-phenylenediaminesulfonic acid or the like.

**Vat dyes.** Ernst Honold (to General Aniline Works). U. S. 1,936,716, Nov. 28. New dyes are obtained by treating with an alk. condensing agent *Bs*-1-benzanthronyl-1-aminoanthraquinone compds. contg. in 4-, 5- or 8-position of the anthraquinone nucleus one of the groups NH-alkyl, NH-aryl, NH-cycloalkyl or NH-aralkyl. These starting materials which themselves are scarcely sol. in the vat are obtainable according to the usual methods for instance by condensing *Bs*-1-bromo-benzanthrone with a 1-aminoanthraquinone contg. in 4-, 5- or 8-position an alkylamino, cycloalkylamino, aralkylamino, arylamino, dialkylamino and alkyl-aralkylamino group in presence of an acid-binding agent and advantageously of a Cu compd. acting as catalyst. The new dyes are, when dry, grayish powders sol. in concd.  $\text{H}_2\text{SO}_4$  with a greenish color and dyeing the vegetable fiber from a bluish to violet to black vat gray shades of a good fastness particularly to light and exposure.

<sup>1</sup> By these shades they differ from the dyes of U. S. Pat. 995,936 (C. A. 5, 2728) which do not contain a substituted amino group in the 4-, 5- and 8-position of the anthraquinone nucleus. Several examples with details of procedure are given.

**Vat dyes of the acridone series.** Max A. Kunz, Karl Koeberle and Anton Hensle (to General Aniline Works). U. S. 1,939,011, Dec. 12. Vat dyes which dye cotton brown to orange shades are formed by the action of a halogenating agent, such as Br in the presence of 1, on a compd. contg. a condensed ring system of at least 5 rings comprising the acridone ring system, at least 2 further aromatic carbocyclic rings being connected to the said condensed ring system and at least 2 ketonic groups being contained in the whole ring system in addn. to that in the acridone ring, such as 1,2,5,6-diphthaloylacridone. Numerous examples are given.

<sup>3</sup> **Vat dyes of the anthraquinone series.** Paul Nawiasky, Emil Krauch and Berthold Stein (to General Aniline Works). U. S. 1,936,949, Nov. 28. Vat dyes, generally dyeing yellow and orange shades, are obtained by condensing an anthraquinoneacridone or anthraquinone-thioxanthonecarboxylic acid or substitution product with an aromatic amine which is substituted in the  $\alpha$ -position to the amino group by an OH, SH or  $\text{NO}_2$  group or halogen (numerous examples with details of procedure being given).

<sup>4</sup> **Vat dyes of the dibenzanthrone series.** Edward T. Howell and Otto Stallmann (to E. I. du Pont de Nemours & Co.). U. S. 1,940,419, Dec. 19. Dyes producing various green shades on cotton are produced by reacting with an isopropyl ester such as iso-Pr bromide and an acid-binding agent upon a hydroxydibenzanthrone contg. at least one reactive hydroxy group. Several examples with details of procedure are given.

<sup>5</sup> **Derivatives of vat dyes.** Durand & Huguenin A.-G. Ger. 589,484, Dec. 8, 1933 (Cl. 22b. 2.07). Sulfonic acid esters of leuco compds. of vat dyes are converted into their Li salts, which are more sol. in water than the Na salts ordinarily used.

**Dyes of the anthraquinone series.** Klaus Weinand, Carl Taube and Hans Hertlein (to General Aniline Works). U. S. 1,941,063, Dec. 20. Dyes suitable for dyeing wool or for dyeing cotton or viscose from a neutral or slightly alk. bath, bluish green to green shades, are prepd. by heating, with a Cu catalyst such as  $\text{Cu}_2\text{Cl}_2$  and an acid binding agent, reacting components such as 1-amino-4-bromoanthraquinone-2-sulfonic acid and monoxinamoyl-*p*-phenylenediamine or the like.

**Acid dyes of the anthraquinone series.** Georg Kränzlein and Ernst Diefenbach (to General Aniline Works). U. S. 1,936,944, Nov. 28. Fast blue dyes suitable for dyeing wool and silk are obtained by condensing a 1-amino-4-haloanthraquinone-2-sulfonic acid or a salt of such an acid with a compd. of the general formula  $\text{NH}_2\text{RCH}_2\text{R}'\text{COOH}$  in which R and R' represent radicals of the benzene series and the COOH group is in  $\alpha$ -position to the  $\text{CH}_2$  group in the radical R', by heating the components in the presence of an acid-binding agent and of a small quantity of a Cu compd. such as  $\text{Cu}_2\text{Cl}_2$ . Various examples with details and modifications of procedure are given.

**Anthraquinone dyes.** I. G. Farbenind. A.-G. Fr. 751,283, Aug. 30, 1933. Dyes are prepd. by causing a 1-amino-4-haloanthraquinone sulfamide to react with  $\text{NH}_3$  or a primary or secondary amine, so that the halogen in the 4-position is replaced by the basic radical. The products obtained may be sulfonated. Examples are given of the prepn. of 1-amino-2-sulfocyclohexylamido-4-anilido-, m. 215-6°, 4-(*p*-methoxyanilido)-, m. 244.5°, and 1-amino-2-sulfomethylamido-4-cyclohexylaminoanthraquinone, m. 228-9°, and 1-amino-4-cyclohexylaminoanthraquinone-2-sulfomethylamide. Cf. C. A. 27, 5549.

**Anthraquinone dyes.** I. G. Farbenind. A.-G. (Georg Kränzlein, Martin Corell and Ernst Diefenbach, inventors). Ger. 585,814, Oct. 11, 1933. See U. S. 1,924,44 (C. A. 27, 5548).

**Acid wool dyes.** I. G. Farbenind. A.-G. (Georg

Kränzlein, Martin Corell and Ernst Diefenbach, inventors). Ger. 587,530, Nov. 4, 1933 (Cl. 22b. 3.02). Addn. to 554,324 (C. A. 27, 850). Blue or violet dyes are prep'd. by esterifying on the COOH group 1-aminoanthraquinones substituted with COOH in the 5-, 6-, 7- or 8-position, and further substituted (a) in the 4-position with a sulfonated arylamino residue and in the 2-position with a halogen, or (b) in the 4-position with an unsulfonated alkyl- or aryl-amino residue and in the 2-position with  $\text{SO}_3\text{H}$ . The prep'n. of suitable starting materials is described in Ger. 585,814 (preceding abstr.). Esterification of the starting materials is effected by standard methods. Examples are given.

**Acid wool dyes.** I. G. Farbenind. A.-G. Fr. 755,074, Nov. 18, 1933. A diazo comp'd. of *o*-aminodiphenyl sulfone, which may be substituted in the  $\text{C}_6\text{H}_4$  rings by a halogen, alkyl or alkoxy radical is coupled in an acid soln. with 2-amino-8-hydroxynaphthalene-6-sulfonic acid.

**Dibenzoxacarboquinone dyes.** Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 1,939,201, Dec. 12. Two mol. proportions of a  $\mu$ -methyl-naphthoxazole quaternary salt such as 2-methyl- $\beta$ -naphthoxazole metho-*p*-toluenesulfonate is condensed with one mol. proportion of ethyl orthoformate in the presence of an org. base such as pyridine which is a solvent for the reactants and which serves to bind acid liberated in the reaction. The products may be used as photographic sensitizing dyes.

**Polymethine dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 585,186, Oct. 10, 1933. This corresponds to Brit. 321,155 (C. A. 24, 2609), but gives addnl. examples.

**Fast blue sulfur dyes.** Richard Herz and Wilhelm Hechtenberg (to General Aniline Works). U. S. 1,939,008, Dec. 12. A quinone vat dye such as that described in U. S. pat. 1,588,384 (C. A. 20, 2587) is treated with a sulfurizing agent such as an alkali metal or  $\text{NH}_4$  sulfhydrate, sulfide or polysulfide.

**Green sulfur dyes.** Raymond W. Hess and Maurice H. Fleisher (to National Aniline & Chemical Co.). U. S. 1,938,963, Dec. 12. An indophenol is heated with a polysulfide such as that of Na the S content of which is higher than that represented by the formula  $\text{M}_2\text{S}_x$  in which M represents a metal; the finished polysulfide melt is dissolved in water, and the dye is ppt'd. by satg. the soln. with salt and aerating the resulting soln.

**Dye for cellulose acetate.** Henry R. Lee and Edwin C. Busbaum (to E. I. du Pont de Nemours & Co.). U. S. 1,939,593, Dec. 12. Cellulose acetate is dyed reddish violet of redder shades than the product obtainable by heating 1,4-dimethyldiaminoanthraquinone with  $\text{H}_2\text{SO}_4$  monohydrate for 1 hr. at 180–220° but of bluer shade than 1,4-diaminoanthraquinone, by use of a demethylated 1,1-dimethyldiaminoanthraquinone such as may be prep'd. by heating 1,4-dimethyldiaminoanthraquinone in 93–100%  $\text{H}_2\text{SO}_4$  at 175–200° for 4–8 hrs. in the presence of  $\text{HgSO}_4$  or  $\text{HgCl}_2$ .

**Dyeing liquor.** Charles W. Cameron. Australia 9142/32, Sept. 21, 1933. A dye liquor for silk, etc., contains an org. dye, borax, white bleached shellac and a small amt. of PhOH in water. The dyed fabric may be coated with a fixative or seal composed of cellulose lacquer of low viscosity.

**Intermediates for dyes.** I. G. Farbenind. A.-G. Fr. 42,592, Aug. 23, 1933. Addn. to 704,633. The acenaphth-*peri*-indandione 3,5-diketimidides of Fr. 704,633 are treated with halogenating agents, giving *N,N'*,4,4-tetrahalo derivs. The products are very reactive and may be transformed to dihaloacenaph-*peri*-indandiones, the N.Hg groups being replaced by O atoms by heating them in a dil. acid. The indandiones when heated with alkalis form 5-di(haloacetyl)acenaphthene-6-carboxylic acids, and in a soln. of dil. alkali hypochlorite give acenaphthalic acid, which, on subsequent oxidation gives 1,4,5,8-naphthalenetetracarboxylic acid.

**Arylides of 2,3-hydroxynaphthoic acid.** Ernest F. Grether and Lindley E. Mills (to Dow Chemical Co.). U. S. 1,938,002, Dec. 12. New arylides of 2,3-hydroxynaphthoic acid (useful as dye intermediates) are prep'd. by the reaction of the acid with various substituted anilines

such as methoxydichloroaniline, ethoxydichloroaniline, phenoxydichloroaniline, etc. Various examples with details of procedure are given. Cf. C. A. 28, 654<sup>4</sup>.

**Anthracene derivatives.** I. G. Farbenind. A.-G. (Max A. Kunz, Rudolf Stroh and Hermann Dimroth, inventors). Ger. 588,353 and 588,354, Nov. 15, 1933 (Cl. 12g. 37). The condensation products of anthraquinone (I) or its derivs. with aliphatic amides, described in Ger. 586,068 (C. A. 28, 487<sup>4</sup>), are treated with alk. reagents in the presence or absence of a reducing agent. The products vary in character according to the concn. of alkali. They yield I, or the deriv. used as starting material, when treated with acid. The condensation product from I and  $\text{HCONH}_2$ , boiled for 1–2 hrs. in 15 times its wt. of  $\text{EtOH}$  with nearly 4 times its wt. of  $\text{NaOH}$ , is believed to yield 9,10-diaminoanthracene (II), m. 195°; under similar conditions, the product from 2-chloro-I and  $\text{HCONH}_2$  is believed to yield 2-chloro-II (unstable) (588,353). The products described in Ger. 586,068, heated with aromatic amines or with acid halides or anhydrides, yield new products believed to be 9,10-di-(arylamino)- or 9,10-di-(acylamino)-anthracenes. Examples are given of the prep'n. of compds. believed to be 9,10-di-(phenylamino)-, 9,10-di-(*p*-tolylamino)-, 9,10-di-(benzoylamino)- and 9,10-di-(diacetylamino)-anthracene, m., resp., 315–17°, 195°, 380° and 275° (588,354). The products are useful for coloring lacquers or as intermediates for dyes.

**Anthracene condensation products.** I. G. Farbenind. A.-G. Fr. 754,842, Nov. 14, 1933. Methyleneanthrone or its ring substitution products are caused to react with compds. contg. the grouping  $\text{CH}_2\text{CH}$  one or more times, e. g., toluquinone,  $\alpha$ - and  $\beta$ -naphthoquinone, naphthazarin, maleic anhydride, cinnamic acid or its esters, crotonic acid or aldehyde, benzalacetophenone, stilbene, 2,5,6-trichlorobenzoquinone or 2-chloro- $\alpha$ -naphthoquinone. The prep'n. of several compds. which are dyes are described and of *Bz*-1,*Bz*-2-benzanthronedicarboxylic anhydride, m. above 300°.

**Acylaminoanthraquinones.** Rhys J. Loveluck and John Thomas (to Imperial Chemical Industries Ltd.). U. S. 1,939,218, Dec. 12.  $\alpha$ -Aminoacylaminoanthraquinones are formed by the treatment of  $\alpha$ -arylsulfonamidoacylaminoanthraquinones with a hydrolyzing agent such as 95%  $\text{H}_2\text{SO}_4$  at 20–30° to remove only arylsulfonyl groups. Details are given of the production of 1-amino-5-benzoylaminoanthraquinone, m. about 261°, 1-amino-4-benzoylaminoanthraquinone, etc., and general claim is made to all  $\alpha$ -arylsulfonamidoacylaminoanthraquinones, as being new products, generally suitable for use as dye intermediates.

**Symmetric bis(arylamino)phenols.** I. G. Farbenind. A.-G. (Leopold Laska, Arthur Werdermann and Rudolf Heil, inventors). Ger. 586,647, Oct. 25, 1933 (Cl. 12g. 32.10). Phloroglucinol is heated with about a double mol. amt. of an aromatic amine in the presence of a diluent, so that the resulting water is dist'd. off. Thus, phloroglucinol is heated with *p*-chloroaniline to give a 90% yield of 3,5-bis(*p*-chlorophenylamino)phenol, m. 112°. The prep'n. of 3,5-bis(phenylamino)phenol, m. 95–6°, 3,5-bis( $\beta$ -naphthylamino)phenol, m. 106°, and 3,5-bis(3'-nitrophenylamino)phenol, m. 183°, is also described. The products are used as dye intermediates.

**Symmetric bis(arylamino)phenols.** I. G. Farbenind. A.-G. (Leopold Laska and Oskar Haller, inventors). Ger. 586,806, Oct. 26, 1933 (Cl. 12g. 32.10). The above are prep'd. by treating phloroglucinol with alkali bisulfites and non-nitrated arylamines in the proportions of about 2 mols. of the arylamide to 1 mol. of phloroglucinol in aq. soln. Thus, phloroglucinol is treated with  $\text{PhNH}_2$  and  $\text{NaHSO}_3$  to give an 80% yield of diphenyldiaminohydroxybenzene, m. 110°. The prep'n. of 3,5-bis(*p*-methoxyphenylamino)phenol, m. 155°, 3,5-bis(*m*-tolylamino)phenol, m. 108°, 3,5-bis(4'-methoxy-3'-methylphenylamino)phenol and 3,5-bis(4'-amino-2',5'-dichlorophenylamino)phenol, m. 167°, is also described.

**Arylides of hydroxy aromatic acids (dye intermediates).** Ernest F. Grether (to Dow Chemical Co.). U. S. 1,938,-

901, Dec. 12. The 2,3-hydroxynaphthoic acid arylide of 3,4-dichloroaniline is prepd. by condensing the acid and amine in the presence of  $\text{PCl}_5$  in toluene at refluxing temp. The product, m. 255°, is suitable for forming on cotton fiber or the like an azo dye with another component such as diazotized 2-methyl-4-chloroaniline (forming a scarlet dye). Similarly, bisaniline yields a blue, and 2-nitro-4-ethoxyaniline a dark cardinal dye, and the use of some other components also is mentioned. Cf. C. A. 27, 5340.

**Dyeing.** Imperial Chemical Industries Ltd., Charles H. Barlow and Leslie G. Lawrie. Brit. 398,175, Aug. 31, 1933. Textiles composed of natural or regenerated cellulose, wool and (or) silk are treated before or after the dyeing operation with a dil. aq. soln. of a heterocyclic  $\text{NH}_4$  salt in which the  $\text{NH}_4$  N atom is a member of the heterocyclic ring and carries a long-chain aliphatic residue of at least 12 C atoms, acyl, hydroxyalkyl and hydroxycycloalkyl groups being absent. The fastness of the dyeing is thus increased. Among examples cotton yarn dyed with Chlorazol fast red K or Chlorazol sky blue FF is treated with octadecylpyridinium bromide.

**Dyeing.** Bleachers' Association Ltd., Charles L. Wall and Franklin Farrington. Brit. 398,532, Sept. 14, 1933. Dyeings with direct dyes contg. 1 or more free amino groups are diazotized on the fiber and coupled with an arylide of an arylhydroxycarboxylic acid contg. at least 3 rings or with a binuclear arylide of a  $\beta$ -keto carboxylic acid. Specified coupling components are hydroxycarbazolecarboxylic arylides, hydroxynaphthoic arylides, hydroxydiphenylaminocarboxylic acid arylides, bisacetoacetic- $\alpha$ -tolidide and similar compds. in which the amino and carboxy groups are interchanged between the nuclei. Dyes and developers named are Diazo fast yellow 2G, Diazo sky blue 3GL, Diazo brilliant green 3G, Diazo fast blue 2RW and Diazo indigo blue 4GL; Naphthol AS/G, AS/LT, AS/GR, AS/LH, AS/SG and AS/SW.

**Dyeing.** British Celanese Ltd. and George H. Ellis. Brit. 398,842, Sept. 12, 1933. Materials made of or contg. cellulose esters or ethers are colored by applying, in soln., suspension or dispersion, disazo dyes, free from  $\text{COOH}$  or  $\text{HSO}_3$  groups, of the type  $\text{RN}:\text{NR}'\text{N}:\text{NR}'\text{OH}$ , wherein R, R' and R'' are residues of the  $\text{C}_6\text{H}_5$  series, each contg. a single  $\text{C}_6\text{H}_5$  nucleus, which may be substituted, e. g., by alkyl, alkoxy or halogen groups. The dyes are obtainable by diazotizing suitable aminoazo compds., e. g., those obtained by coupling diazotized  $\text{PhNH}_2$ , chloroanilines, toluidines, xylidines, anisidines or phenetidines with middle components of the  $\text{C}_6\text{H}_5$  series, e. g., *m*-toluidine, *p*-xylidine, cresidine and coupling with phenols, e. g.,  $\text{PhOH}$ , *o*- or *m*-cresol. The dye aminoazobenzene  $\rightarrow$   $\text{PhOH}$ , being resistant to  $\text{HNO}_3$ , is useful for producing compd. shades in conjunction with dyes produced by azoic methods. Among examples a cellulose acetate woven fabric, dyed navy blue with a dispersion of the dye *p*-aminobenzeneazodimethylaniline diazotized on the fiber and developed with  $\beta$ -hydroxynaphthoic acid, is further dyed in a bath, contg. an aq. paste of the dye aminoazo benzene  $\rightarrow$   $\text{PhOH}$  until the color deepens to a fine black and is washed and dried. Cf. C. A. 28, 3404.

**Dyeing.** I. G. Farbenind. A.-G. Brit. 398,846, Sept. 18, 1933. Insol. azo dyes are made on the fiber by applying a mixt. contg. an alkali salt of a hydrazinesulfonic acid of formula 2-Y-4-(acyl-NH)-5- $\text{XC}_6\text{H}_4\text{NHNHSO}_3\text{H}$ , where X and Y are substituents, e. g., alkyl, alkoxy, halogen and an alkali salt of a hydroxylated coupling component which combines in the position adjacent to the OH group, and then steaming. The free coupling component with the equiv. amt. of alkali may be used and dyeing or printing assistants may be added. Among mixts. specified are Na salts of 4-benzoylamino-2,5-dimethoxybenzene-1-hydrazinesulfonic acid with 4,4'-di(acetoacetyl)-3,3'-dimethylbiphenyl, 2'-hydroxyanthracene-3'-carbonyl-1-amino-2-methylbenzene, 3-benzoylamino-2-naphthol or 2',3'-hydroxynaphthyl - 1 - amino - 2 - methoxy - 4 - chlorobenzene and of 4-benzoylamino-2-methoxy-5-methylbenzene-1-hydrazinesulfonic acid with *m*-nitroanilide of 2,3-hydroxynaphthoic acid.

**Dyeing.** I. G. Farbenind. A.-G. (Alfred Bergdolt, A.

Ossenbeck, E. Tietze and F. Gund, inventors). Ger. 585,352, Oct. 2, 1933. Diazo compds. are coupled on the fiber with diketones of the formula  $\text{XCOCH}_2\text{COY}$ , where X and Y are alkyl, aryl or aralkyl radicals. Neither component should contain a group conferring soly. in water. Yellow to orange dyeings dischargeable to pure white are obtained. Examples are given.

**Dyeing.** I. G. Farbenind. A.-G. (Hermann Jäger, inventor). Ger. 588,211, Nov. 14, 1933 (Cl. 8m. 12). In producing azo dyes on the fiber, the material is impregnated with an alk. soln. of an azo dye component and then treated with a diazo soln. in the presence of a neutralizing agent comprising  $\text{NH}_4\text{Cl}$  and  $\text{CH}_3\text{O}$ . The alkali reacts with the  $\text{NH}_4\text{Cl}$  to form  $\text{NH}_3$ , which combines with the  $\text{CH}_3\text{O}$ .

**Dyeing animal fibers.** Hans Bucherer. Ger. 587,361, Nov. 2, 1933. In dyeing animal fibers or mixed textiles contg. animal fibers with mordant dyes, the unmordanted material is treated with the dye in an acid bath and then at atm. temp. with an acidified chromate soln.  $\text{Cr}_2\text{O}_3$  is then produced on the fiber by treating the material with a cold soln. of  $\text{SO}_2$ , and finally the dye is fixed on the fiber by treating the material with hot water.

**Dyeing wool.** Soc. pour l'ind. chim. à Bâle. Brit. 398,878, Sept. 25, 1933. See Fr. 734,189 (C. A. 26, 1205).

**Fast dyeings on wool.** Albert Landolt (to Soc. pour l'ind. chim. à Bâle). U. S. 1,940,551, Dec. 19. In producing fast tints on wool by means of unsulfonated diazo compds. of the benzene series, and unsulfonated arylides of 2,3-hydroxynaphthoic acid derived from such aromatic amines as, besides one or two amino groups, contain no other groups capable of coupling, such arylides are caused to "rush onto" the wool from baths which contain at least 0.1%  $\text{NaOH}$ , followed by development with the diazo compds.

**Dyeing furs, hairs and feathers.** Erich Lehmann and Hans Wassenecker (to General Aniline Works). U. S. 1,910,757, Dec. 26. A dyeing bath is used contg.  $\text{H}_2\text{O}$ , together with a diamine such as 5-amino-2-dihydroxypropylamino-1-chlorophenyl ethyl sulfide or the like. Cr or Cu salts may be used as mordants. Cf. C. A. 27, 852.

**Yarn-dyeing and -twisting apparatus.** Eugene C. Gwaltney. U. S. 1,940,748 9, Dec. 26. Structural and mech. features.

**Printing or dyeing textiles.** Durand & Huguenin S. A. Fr. 755,351, Nov. 23, 1933. In printing or dyeing animal fibers with mordant dyes the duration of steaming may be reduced to 8 mins. while obtaining fast to friction shades, by adding to the printing color or to the "foularding" soln. a high amt. of a nonvolatile org. acid or an easily dissociable salt thereof, e. g., oxalic acid, tartaric acid, citric acid or adipic acid. A urea or thiourea may also be added.

**Printing on wool.** A. Holtmann & Co., G. m. b. H. Brit. 398,944, Sept. 28, 1933. In printing other than vat dyes on wool, improved penetration of the goods by the color is obtained by adding to the printing paste, in proportion forming at least 4% thereof, a  $\text{H}_2\text{O}$ -sol. mono- or di-amido deriv. of carbonic, thiocarbonic or imidocarbonic acid, free from substitution of the primary amino group(s) and still retaining at least 1 of these, said deriv. remaining uncondensed after the printing. Specified derivs. are (thio)urea, (thio)urethans, guanidine and salts thereof. Among examples an aq. paste contg. Crystal ponceau, British gum, oxalic acid and urea is printed on wool and the printed goods are steamed, washed and dried. Cf. C. A. 28, 6569.

**Dyeing apparatus.** Smith, Drüm & Co. Brit. 398,710, Sept. 21, 1933.

**Dyeing machine.** Hans W. Mettler. Ger. 585,155, Sept. 29, 1933 (Cl. 8a. 9.50). Addn. to 528,983 (C. A. 25, 5300).

**Apparatus and method for dyeing fabrics.** George E. Burgess, Burgess, Ledward & Co. Ltd. and Brown & Adam Ltd. Brit. 398,887, Sept. 25, 1933.

**Beam for apparatus for dyeing yarn, etc.** Wm. P.

Hornbuckle and Robert F. Craig. U. S. 1,939,816, Dec. 19. U. S. 1,939,817 also relates to app. for dyeing yarn.

Apparatus for rotating hanks during dyeing, etc. Wm. G. Gass. Ger. 588,035, Nov. 11, 1933 (Cl. 8a. 8.01). This corresponds to Brit. 361,087 (C. A. 27, 1200).

Fibers from plants. Bernard Beddingfield Wood. Australia 8065/32, Oct. 12, 1933. The plants are submitted to a vacuum to remove air, then soaked in water and heated under pressure, with sudden release of the pressure to break up the structure. An app. is described. Cf. C. A. 27, 3833.

Treating textile materials. Harry W. Turner (to The British Thomson-Houston Co. Ltd.). Brit. 398,909, Sept. 25, 1933. See U. S. 1,901,678 (C. A. 27, 3346).

Dressing textiles. Oranienburger Chemische Fabrik A.-G. Ger. 585,724, Oct. 10, 1933. Fabrics are finished, glossed, etc., by using phosphatides such as lecithin, in org. solvents. Waxes, paraffins, mineral oils, etc., and emulsifying agents may also be added. In an example, linseed oil, vegetable lecithin,  $C_6H_6$  and  $C_2H_5Cl$  are used.

Machine for wet-treating textiles. Alfred W. Hennis. Ger. 586,799, Oct. 31, 1933 (Cl. 8b. 13.03).

Loading textiles. Waldemar Zanker. Brit. 398,323, Sept. 14, 1933. Natural silks or rayon, or mixed materials contg. them, are loaded by treatment in a bath contg. 1 or more Sn salts and then in 1 or more baths contg. no Sn but 1 or more salts of another loading metal, at least 1 of the baths contg. a Mg salt. Addnl. loading metals are Pb, Al, Fe, Cr, Mn, Ce and Zr. Among examples silk is treated in a bath at 40–50° contg.  $SnCl_4$ ,  $MgCl_2$  and  $NaH_2PO_4$ , centrifuged, treated, without washing, in a cold bath contg.  $H_2PO_4$ , again centrifuged, treated, without washing, in a bath at 60° contg.  $NaH_2PO_4$ , washed, treated in a water-glass bath at 55°, further treated in a sec. loading bath at 25–30° contg.  $Al(OAc)_3$  or  $Al(HCOO)_3$  and acetates of Pb and Mg and finally treated with water glass and soaped.

Decorating silk fabrics. Herbert Sieben (to Textile Dyeing and Printing Co. of America). U. S. 1,939,322, Dec. 12. There is deposited upon the fabric in a selected design a plastic resist comprising a printing gum and gum acacia in the resp. proportions of about 1:2, the fabric is subjected to a formic acid bath in order to straighten and compact the exposed threads and the action of the acid is finally nullified (suitably by washing in cold water) and the resist is removed. A dye and weighting compn. also may be applied.

Apparatus for the wet treatment of silk textiles. René Clavel. Ger. 585,140, Sept. 29, 1933.

Apparatus for washing and weighting silk fabrics. Conrad Frih. Ger. 569,143, Oct. 19, 1933.

Treating artificial filaments, etc. British Celanese Ltd. and Ernest L. Greenwood. Brit. 398,191, Sept. 7, 1933. Liquid, e. g., dyes, sizes, conditioning and solvent liquids, is applied to traveling artificial filamentary material, e. g., yarns, threads, straws, taps, bristles, continuously with its production by a wick through which the liquid is flowing continuously past the point of contact of the yarn with the wick. App. is described.

After-treating artificial filaments. I. G. Farbenind. A.-G. Brit. 398,738, Sept. 21, 1933. Rayon, which has been washed free from acid and dried, is twisted and wound onto a bobbin of variable diam. and the wound package of threads, after diminishing the diam. of the bobbin, is irrigated with the after-treatment liquids. App. is described.

Washing and other treatments of wrapped cakes of materials such as artificial filaments. Conrad Herrmann (to American Glanzstoff Corp.). U. S. 1,938,830, Dec. 12. Various details of app. and operation are described.

Treatment of materials containing cellulose acetate. Archibald J. Hall (to Celanese Corp. of America). U. S. 1,939,261, Dec. 12. For preventing loss of texture in bleaching, dyeing, printing, steaming and other treatments of materials contg. cellulose acetate at temps. of about 85° or higher, the treatment is effected in the presence of a sol. salt of a multivalent metal such as  $Mg(NO_3)_2$ ,  $CaCl_2$ , alum or  $FeSO_4$  in aq. soln. of a concn. of at least 10%.

1 Delustering knit fabrics such as those of cellulose acetate, etc. Herbert Platt (to Celanese Corp. of America) U. S. 1,940,730, Dec. 26. While loosely hung in loops, the material is treated with a delustering agent such as wet steam, hot water or a soap soln. Cf. C. A. 28, 1203<sup>1</sup>.

2 Delustering artificial threads, etc. British Celanese Ltd. Brit. 398,371, Sept. 14, 1933. Artificial yarns or fabrics, made of cellulose acetate or other org. deriv. of cellulose, are delustered by treating with a higher fatty acid, e. g., oleic, and then with hot aq. liquid or moist steam. The pretreatment with the org. acid obviates uneven delustering. When applied to sized fabrics the size is first removed by padding and the acid may be contained as an emulsion in the desizing liquid.

3 Delustering rayon. Imperial Chemical Industries Ltd. Fr. 754,478, Nov. 8, 1933. Rayon is delustered by treating it with an aq. soln. contg. a sulfonated, alkylated polynuclear hydrocarbon or a sulfonated, alkylated petroleum distn. product, and an Al salt. The Al salt may be the acetate and the hydrocarbon one of those described in Brit. 274,611 (C. A. 22, 2268) or 311,885 (C. A. 24, 932).

4 Relustering materials made of cellulose derivatives. Aceta G. m. b. H. (Wolfgang Stahl and Paul Kraus, inventors). Ger. 585,272, Sept. 30, 1933. Filaments, fabrics, etc., of cellulose derivs., which have become delustered by the action of hot liquids or steam, are relustered by treating the hot wet materials with a hot aq. soln. of an agent which represses swelling, e. g.,  $CaCl_2$ , glycerol or sugar. This treatment may be preceded by treatment with a hot aq. softening bath.

5 Rayon. Algemeene Kunstzijde Unie N. V. Ger. 585,193, Sept. 29, 1933. Regenerated cellulose rayon, while still on the rolls or bobbins on which it was spun, is subjected to the usual wet treatment and dried. It is then steamed, redried, wound (or twisted and wound) on a fresh bobbin, steamed and dried again. Each steaming period may be about 1 hr. Rayon of uniform character as regards shrinkage is obtained.

6 Rayon. La Soie de valenciennes and Maurice A. Starink. Fr. 42,852, Nov. 15, 1933. Addn. to 750,101 (C. A. 28, 639<sup>6</sup>). The torsion of viscose silk is suppressed and replaced by a sufficient aggregation of the fibers of the thread.

7 Rayon. Vereinigte Glanzstoff-Fabriken A.-G. Fr. 755,182, Nov. 21, 1933. The upper and lower layers of viscose or cuprammonium silk wound on bobbins or rollers are divided separately and made into hanks which are allowed to shrink in this form in a moistening treatment and are afterwards finished. The middle part of the layers of thread on the bobbin or roller are divided, separately twisted and finished in known manner without any complementary treatment with liquids in hank form.

Apparatus for after-treating rayon on perforated bobbins. Ernst Berl. Ger. 585,194, Sept. 29, 1933.

8 Dressing rayon. Dubois & Kaufmann G. m. b. H. Ger. 585,512, Oct. 4, 1933. Rayon is dressed by treatment with an emulsion of oil-rubber. Thus, a dressing prepn. is made by grinding oil-rubber with Na alkylphthalene-sulfonate to form a paste with water.

Artificial wool. Gino M. Rossati. Ger. 585,780, Oct. 7, 1933. Jute or other vegetable fiber is treated with 25–30% alkali lye for 30–45 mins. at ordinary temps. The excess of lye is removed by centrifuge and the fiber dried till it commences to curl.

Apparatus for humidifying yarn. Frank J. Hejduk and Harry Sarfert. U. S. 1,941,087, Dec. 26. Structural and mech. features.

9 Apparatus for drying webs of fabric looped over the transverse bars of a traveling chain. Emil Wenzel. Brit. 398,344, Sept. 14, 1933.

Coated fabrics. Benjamin D. Porritt, John R. Scott and The Research Association of British Rubber Manufacturers. Brit. 397,506, Aug. 22, 1933. Waterproofed textile material consists of fabric made wholly or substantially of cellulose ester(s) and (or) ether(s) coated or impregnated with unvulcanized rubber (compn.). The

rubber compn. or soln. may contain fillers, pigments, antioxidants, softeners, etc.

**Coated fabrics.** Deutsche Gasglühlicht-Auer-Ges. m. b. H. (Ferdinand Stern, inventor). Ger. 588,282, Nov. 15, 1933 (Cl. 8/ 4). A coating of rubber or varnish is caused to adhere to the surface of a fabric impregnated with rubber, synthetic resin or glue, e. g., to artificial leather, by dusting the impregnated fabric with comminuted fibers, e. g., cotton fibers, at a stage when the impregnating agent is still tacky, and then applying the rubber or varnish coating in known manner. A roughened fabric may be used instead of the comminuted fibers.

**Coating fabrics with metals.** Siegfried Epstein. Brit. 396,978, Aug. 17, 1933. Socks, stockings, etc., are made from fabric coated with finely distributed metal or are coated, after manuf., with such metal. Zn, Ag, Cu, Al, etc., may be applied to the fabric or article by the Schoop metal-splatter process.

**Airplane fabric.** Guy C. Given, Harold W. Letts and Norman W. Thomson (to E. I. du Pont de Nemours & Co.). U. S. 1,940,212, Dec. 19. A taut fabric such as one of cotton or linen is provided with an undercoat film contg. cellulose nitrate and cellulose acetate, and with an overcoat film formed by coating over the undercoat film with a compn. comprising cellulose nitrate and a mixed solvent such as BuOAc, EtOH, EtOAc and toluene of such character as to have substantially no solvent action on the cellulose acetate in the undercoat film.

**Ornamented felts and felted materials.** Ferdinand R. Stirn (to F. & A. Stirn Corp.). U. S. 1,941,281, Dec. 26. A material suitable for hats, upholstery, etc., is prepd. by forming an embossed pattern on a felt, abrading the elevated portions of the embossed pattern, and then steaming.

**Bleaching threads.** Louis Penfaillit. Fr. 755,458, Nov. 25, 1933. Threads are creamed and bleached by treatment in a bath contg.  $Al_2(SO_4)_3$  and  $NaHSO_3$ , or an alkali sulfite, hyposulfite or metabisulfite and then submitting them to an ordinary bleaching such as treatment with  $Cl_2$ .

**Bleaching fur skins such as those of rabbits.** Wm. E. Popkin. U. S. 1,940,768, Dec. 26. The skins are impregnated with a colorless sol. cyclic oxidizing catalyst such as acetone bisulfite or formaldehyde and then subjected to an oxidizing bleaching action, as by  $H_2O_2$  or a persalt soln.

**Mercerizing.** I. G. Farbenind. A.-G. (Richard May, Karl Brodersen and Alois Waldmüller, inventors). Ger. 588,351, Nov. 15, 1933 (Cl. 8/ 2). The wetting properties of mercerizing lyes are improved by addn. of sulfonates obtained in purifying low-boiling mineral oil fractions with  $H_2SO_4$ . Cf. C. A. 27, 855, 3833, 4422.

**Bucking and mercerizing baths.** Moritz Freiberger. Brit. 398,958, Sept. 28, 1933. See U. S. 1,927,363 (C. A. 27, 5691).

**Paraffin derivatives containing nitrogen.** I. G. Farbenind. A.-G. and Arthur Carpmael. Brit. 398,510, Sept. 14, 1933. Addn. to 339,962 (C. A. 25, 2734). Those bases (or their neutral or basic salts) obtained according to 339,962 which still contain halogen are heated, with or without a Cu catalyst or an acid-binding agent and (or) a suitable diluent, at about 200–300° under ordinary or

1 elevated pressure to give bases having a lower halogen content, which are more unsatd. in character and may be used, as such or as salts of org. or inorg. acids, as auxiliary agents for the textile industry. Aq. solns. of the salts, particularly, have wetting, dispersing and softening properties and improve the fastness of substantive dyes to boiling  $H_2O$  and acid. The bases may be sulfonated according to Brit. 383,736 or by condensation with Na chloroethanolsulfonate to give other useful products for the textile industry. Among examples (1) the product of heating a tetrachlorinated hard paraffin with alc.  $NH_3$  at 100–200° in a closed vessel is heated at 200–215° a few hrs.; on adding alkali a pyro-base, almost free from  $Cl$ , is obtained; the base may also be heated in presence of dimethylamine to give a similar pyro-base, and (2) the base obtained by heating a hexachlorinated hard paraffin with alc.  $NH_3$  at 140–150° for some hrs. is heated with 3 addn. of powd. Cu, at 210–220° 2–3 hrs.

**Lubricating and sizing textile materials.** British Celanese Ltd., Harold M. Hibbert and Robert P. Roberts. Brit. 398,243, Sept. 11, 1933. Textile materials are lubricated or sized with an oil or fat obtained by completely or partly hydrogenating an oil or fat of the coconut oil group, e. g., coconut or palm-kernel oil. The oil may be applied as such or in soln. or emulsion and with or without other agents, e. g., plasticizers, swelling agents, 4 hygroscopic solids.

**Apparatus for scrubbing, sizing, starching, impregnating or otherwise treating fabrics.** James H. Bayliss, Derek G. Bayliss and Kenneth Bayliss. Brit. 399,006, Sept. 28, 1933.

**Waterproof fabrics.** Firma Ewald Dörken. Ger. 580,012, Dec. 1, 1933 (Cl. 8/ 1). Textile fabrics are impregnated with a compn. prepd. by heating pitch from the refining of fats with a metal oxide and an oxidizing agent, e. g., with  $PbO$ ,  $ZnO$ ,  $MnO$ ,  $Fe_2O_3$  or  $Al_2O_3$  and  $MnO_2$  or  $Pb_2O_4$ . Other pitches and other water-repelling agents may be added to the compn. The products may be used for covering railway trucks.

**Fibrous compositions containing rubber, etc.** Dunlop Rubber Co. Ltd., The Anode Rubber Co. Ltd. and Edward A. Murphy. Brit. 398,319, Sept. 14, 1933. Relatively long fibers, e. g., horsehair, pig's hair, jute, coconut fiber, kapok, cotton, rayon residues, are coated with flocculent or granular rubber, gutta-percha, balata, and other ppts., prepd. from aq. dispersions, and the treated fibers are interlocked into sheet or web, e. g., by felting or carding. The sheets may be vulcanized after compressing if desired. The ppts. are prepd. by coagulating in the presence of a relatively large quantity of  $H_2O$ , with or without coagulation retardants, e. g., KOH, casein, Na aluminate, glue, gum acacia.

7 **Rendering fibrous materials (such as cotton insulation on wire) noninflammable.** Rudolf Engelhardt (to I. G. Farbenind. A.-G.). U. S. 1,938,746, Dec. 12. The material is impregnated with an inorg. salt such as  $NH_4$  biphosphate in aq. soln., then dried and further treated with dichlorinated naphthalene.

8 **Fluid suitable for dry-cleaning clothes, etc.** Arnold Mohn (to Rhodes-Perry-Martin, Inc.). U. S. 1,910,688, Dec. 26.  $C_2H_2Cl_2$  and  $CCl_4$  are used together in relative quantities substantially in inverse proportion to their latent heats of vaporization.

## 26 PAINTS, VARNISHES AND RESINS —

A. H. SABIN

**Paint and varnish industry during 1933.** S. Marks and R. S. Morrell. *Ind. Chemist* 10, 24–6 (1934). E. H.

**A plan for a model paint factory.** Ching-Hsu Tsai. *Chem. Ind. (China)* 8, 153–89 (1933). Wm. H. Adolph

**Microextraction apparatus for use with small particles of paint film.** Rutherford J. Gettens. *Tech. Studies Field of Fine Arts* 2, 107–10 (1933).—A modification of the Hettlerich app. (C. A. 26, 2088), designed so that the paint particles are maintained in a fixed position during

9 extn. (thus facilitating transfer of the extd. pigment to a microscope slide), and so that the extd. vehicle may be recovered by transferring the liquid to a hollow-ground object slide and allowing evapn. of the solvent.

A. Papineau-Couture

**The problem of building protection. A new method of stone conservation with silicic acid-ester paints.** W. Graulich. *Tonind.-Ztg.* 57, 677 (1933).— $Si(OC_2H_5)_4$  prepd. from  $C_2H_5OH$  and  $SiCl_4$  is used in alc. soln. as a



paint drier, resulting in the formation of a  $\text{SiO}_2$  film through the hydrolyzing action of the moisture content of the air. It is also possible to produce heat-resistant coatings which withstand temps. up to  $1200^\circ$ . K. K.

**The problem of lining adhesives for paintings.** Geo. L. Stout and Rutherford J. Gettens. *Tech. Studies Field of Fine Arts* 2, 81-104 (1933).—A report of results obtained to date (but not considered conclusive in themselves) of empirical test on adhesives used for "lining" old paintings (a new canvas is attached to the back of the old). The most safe and effective adhesives developed up to date are those which are insol. in water and which do not require the application of org. solvents to reverse the soln.; these are the adhesives of the wax and wax-resin type. If they could be applied without any use of glue (or similar water-permeable and mold-growing substances) on the new canvas, and if the old canvas with its paint film could be rid of its latent infection, it seems likely that such adhesives would serve well in the conservation of oil paintings on cloth. A. Papineau-Couture

**Iron oxide mineral pigments of the United States.** Hewitt Wilson. *Bur. Mines Bull.* 370, 198 pp. (1933).—W. reviews the occurrence of mineral pigments and the nomenclature and common methods of classifying and testing many commercial mineral pigments. Results are given of tests for color, tinting strength, fineness of grain, oil absorption and content of Fe oxide on 274 samples of used and unknown minerals having possible pigment value; 46 samples from new deposits have possible value. Alden H. Emery

**The permanence of artists' pigments.** E. J. Hartung. *Chem. Eng. Mining Rev.* 26, 135 8 (1933).—Oxidation causes many changes in shade. Nonpermanent and permanent pigments are listed and briefly discussed. W. H. Boynton

**The relation between acid concentration and stability in writing inks.** Ming-Shan Hsieh. *Chem. Ind. (China)* 8, 22 50 (1933).—Data are recorded for ink prepd. from nut galls. The amt. of ppt. formed on standing is proportional to  $\text{pH}$ . Wm. H. Adolph

**Tung seed and oil from Empire sources.** II. Anon. *Bull. Imp. Inst.* 31, 327-34 (1933); cf. C. A. 27, 432. A sample of *Aleurites fordii* fruits from Bihar and Orissa, India, were of satisfactory compn., and contained a normal percentage of oil, which was apparently of good quality. A sample of *A. fordii* oil from Bihar and Orissa had the following characteristics:  $d_{4}^{20}$  0.9391, acid no. 0.2-0.3,apon. no. 192.3,  $n_D^{20}$  1.514, I no. (Wjs) 175.5, heat test (A. S. T. M.) 10.25 min., color pale yellow. Oil extd. in a lab. press from *A. fordii* grown in Nairobi, Kenya, in 1931 and 1932, resp., had the following characteristics: color (Lovibond, 1-cm. cell) red 0.30, 0.36; yellow 1.0, 1.4;  $n_D^{20}$  1.5181, 1.5181;  $d_{4}^{20}$  0.9361, 0.9358; heat test 12.25, 12.25 min.; acid value 0.6, 0.4; I value 167.7, 168.0; apon. value 192.6, 194.4. Oil cold-pressed in the lab. from *A. fordii* grown at Misiones, Argentina, had the following characteristics: color (Lovibond, 1-cm. cell) red 0.24, yellow 1.2, acid value 0.37, I value 167.0, heat test 11.5 min.,  $n_D^{20}$  1.5178,  $d_{4}^{20}$  0.9334. Comparative tests on the natural and artificial weathering of varnishes prepd. with oils of *A. montana* and *A. fordii* showed little difference between the 2 varnishes, but reliable conclusions can be drawn only from experience of some hundreds of preps. A. Papineau-Couture

**The aging of oil varnishes.** Pascal Snitter. *Bull. inst. pte* 1933, 223 36 (+9 tables).—Results are given of an extensive investigation into the aging of oil varnishes, more particularly from the standpoint of ascertaining, if possible, if there are any practical methods permitting of detg. quickly and scientifically the quality of a given varnish. Varnishes were prepd. according to a no. of different formulas, from the following materials: Benguela copal, raw and polymerized linseed oil, polymerized tung oil, Bordeaux spirit of turpentine (90% b. 155-70°, acidity less than 0.15%), white spirit (distg. 100-90°,  $d_{4}^{20}$  0.781), Co drier, Albertol 111L, Albertol 209L and rosin. Test panels were prepd. on wood (oak, beech) and metal (Al, duralumin, Zn and steel) and subjected to natural aging

(exposure to the weather) and artificial aging (action of distd.  $\text{H}_2\text{O}$ , natural  $\text{H}_2\text{O}$ , 3.3% NaCl, 0.1%  $\text{H}_2\text{O}_2$ , alternate immersion and emersion at 30-min. intervals in 3.3% NaCl at 55°, ultra-violet rays,  $\text{O}_2$  and heat (70°)). The changes in, or deterioration of, the varnish films were observed by means of Dixmier's app. (Dutron and Dixmier, C. A. 24, 3121; Fr. pat. 705,690, C. A. 26, 323), by detg. the rate of attack by elec. cond., and by means of the flexometer. In the latter instrument the test panel is gradually bent, the line at which bending is effected is observed under a magnifying glass, and the angle at which fissuring of the varnish film occurs is noted. Conclusions.

—The natural gum varnishes were superior to the Albertol varnishes as regards resistance to weather, but inferior as regards resistance to chem. agents; Albertols confer greater elasticity and resistance to attack than copal and rosin. Boiled oil (linseed or tung) is the ingredient which confers most elasticity and resistance to attack. Spirit of turpentine is a decidedly better solvent than white spirit. It improves resistance to weather and to chem. agents in proportion to its oil content; but the latter has autocatalyzing properties and acts as a drier, so that if present in excess it is injurious to the elasticity of the film. Cold immersion in 3.3% NaCl or alternate immersion and emersion in 3.3% NaCl at 55° is recommended for comparing the resistance to attack of varnishes of the same type. The elec. cond. method indicates the resistance of the film and also its impermeability to salt water or to weakly acid solns. Artificial aging methods are not satisfactory for evaluating the changes in elasticity of varnishes, because the results are not comparable to the effects of exposure to the weather. Use of the flexometer is recommended for following variations in elasticity. A. Papineau-Couture

**Weathering tests of nitrocellulose lacquers on wood, with various ground coats.** Fr. Kolke. *Nitrocellulose* 4, 206 8 (1933). By using suitable ground coats, the durability of nitrocellulose lacquers on wood can be improved. Lacquer coats are also improved by incorporating therein glyptal resins. E. M. Symmes

**Polished-wood imitations based on cellulose lacquers.** Adolf Rudolf. *Deut. Lackierzeitung* 13, 5 (1933); *Nitrocellulose* 4, 187 (1933). E. M. Symmes

**Formaldehyde condensations with phenol and its homologs.** II. Gilbert T. Morgan and N. J. L. Megson. *J. Soc. Chem. Ind.* 52, 418 20T (1933); cf. C. A. 24, 4286. —One g. mol. *m*-5-xyleneol was warmed with 1 g. mol.  $\text{CH}_2\text{O}$  and 0.5 cc. concd. HCl in 200 cc. alc. and extd. with  $\text{H}_2\text{O}$  and steam. Crystals deposited on cooling and extd. with benzene left *A* (m. 274-6°, soly. in boiling alc. 3.9 g./100 g.) and yielded *B* (m. 169.5°) and *C* (m. 168°) which were sepd. with hot petroleum. *A* was synthesized by refluxing 3.0 g. *p*-hydroxyhemimellityl alc. and 2.4 g. *m*-5-xyleneol 15 min. in 10 cc. alc. with 1 drop concd. HCl in 8 cc. alc., cooling, and crystn. from MeOH. *A* is thus identified as 4,4'-dihydroxy-2,2',6,6'-tetramethyldiphenylmethane (I). The dibenzoate of I (m. 148°) was prepd. from BzCl in pyridine and the tetrabromo deriv. (m. 246°) by bromination in cold AcOH. Both *B* and *C* are isomerides of I but definite formulas cannot be assigned. The bromo deriv. of *B* m. 230° and dibenzoate of *C* m. 130°. The resin residue of original condensation had a high volatile portion (25%). Ten g. *o*-4-xyleneol left standing with 32 cc. 40%  $\text{CH}_2\text{O}$  and 20 cc. concd. HCl in cold acetone, and extd. with hot  $\text{H}_2\text{O}$ , yielded 2.18 g. of *D* (m. 163°) and *E* (m. 164.5-6°). Benzene ext. of washed resin yielded *F* (m. 212-3°). *D* and *F* were synthesized by refluxing 0.5 g. *o*-4-xyleneol monoalc.

(CH:CMc:CMc:CH.C(OH):CCH<sub>2</sub>OH) and 0.5 g. *o*-4-xyleneol 15 min. with 2 drops 2 N HCl in 10 cc. alc., and extg. with hot water. *E* should be represented by 6,6'-dihydroxy-2,2',3,3'-tetramethyldiphenylmethane; *D* is probably the dissymmetric and *F* the symmetric isomeride. III. N. J. L. Megson. *Ibid.* 420-4T (1933).—Nqvolaks, produced by acidic condensations, are straight-chain polynuclear compds. with  $\text{CH}_2$  linkage. Their formation is easier the greater the possible no. of straight-chain isomer-

ides based on ortho-para directive influence of the hydroxyl. Resoles are straight- or branched-chain compds. which are produced in all condensations. Resites, obtained by heating, are irreversible structures made up of branched-chain macromols. Resoles or B-stage resins are only partly united macromols. P. S. Roller

**Catalysts in phenol-formaldehyde condensations.** E. Leighton Holmes and N. J. L. Megson. *J. Soc. Chem. Ind.* 52, 415-18T (1933).—The time of resinification with 40% formalin was measured for phenol, *m*-*s*-xlenol, *o*-, *m*-, and *p*-cresol and a low-temp. tar (b. 180-200°) in the presence of a no. of substituted amines and inorg. bases. The hyperbolic relation  $w(t - a) = b$  was found to hold where  $w$  = wt. of catalyst,  $t$  = time and  $a$  and  $b$  are consts. *m*-*s*-Xlenol reacts faster than *m*-cresol which in turn is faster than the other phenols. The order of reactivity for different tar fractions between 170° and 230° is that to be anticipated from the phenols which they contain. The time of heat hardening at 100° was exceptionally low for *o*-cresol, and decreased for *m*-cresol over 5-fold between 110° and 160°. P. S. Roller

**Theoretical aspects of urea-formaldehyde resins.** C. A. Redfarn. *Brit. Plastics* 5, 238 40 (1933).—The importance of  $p_H$  is emphasized. This is kept at 4.5 by the buffer action of HCOOH present in or formed from the CH<sub>2</sub>O. The following steps are formulated:  $\text{CO}(\text{NH}_2)_2 + 2\text{CH}_2\text{O} \rightarrow \text{CO}(\text{NHCH}_2\text{OH})_2 \rightarrow \text{CO}(\text{N}:\text{CH}_2)_2 \rightarrow (\text{CH}_2\text{NCO}\cdot\text{N}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{N}\cdot\text{CONCH}_2)_x$ . Arnold M. Collins

**Paper and printing ink (Bekk) 23.** Rubber in paints (Stevens, Icaton) 30. Sapic acid, a constituent of American pine resin (Voeke) 10. Manuf. of synthetic masses, esp. those like linoleum (Foulon) 18. Brazilian resins as bandage material (Freise) 17. Detergents [products used in the manuf. of pigments] (Brit. pat. 398,818) 18. Artificial products [for making varnishes] (Fr. pat. 755,048) 18. Resin acids from raw tall-oil soap (U. S. pat. 1,940,372) 23. Anthracene derivs. [for coloring lacquers] (Ger. pat. 588,353 4) 25.

**Die Harze: Die botanischen und chemischen Grundlagen unserer Kenntnisse über die Bildung, die Entwicklung und die Zusammensetzung der pflanzlichen Exkrete.** Edited by A. Tschirch and Erich Stock. 3rd ed. revised by A. Tschirch. Die Harze und die Harzbehälter. Bd. I. Berlin: Gebr. Borntraeger. 418 pp. M. 47.25. Reviewed in *Ind. Chemist* 10, 32 (1934).

**Paints, etc.** Albin Winterling. Austrian 135,688, Nov. 25, 1933 (Cl. 45g.). A known substance for repelling flies and other insects is added to paints or dis-tempers. Specific compns. are described.

**Paints, etc.** Établissements Weeks (Soc. anon.). Fr. 750,668, Aug. 16, 1933. Pigments used in paints, etc., having a basis of nitrocellulose, synthetic resin, etc., are surrounded by a monomol. film of a fatty acid or an ester of a fatty acid, before incorporation in the base.

**Luminous paint.** I. G. Farbenind. A.-G. (Georg Meder and Konrad Schad, inventors). Ger. 585,541, Oct. 5, 1933. An embedding medium for the paint consists of polystyrene or its homologs or pure hydrocarbon derivs.

**Grinding mills for paints, lakes, inks, etc.** Anciens établissements le Clezio (S. à r. l.). Fr. 42,820, Nov. 4, 1933. Addn. to 743,656 (C. A. 27, 3835).

**Pigments.** Titanium Pigment Co., Inc. Ger. 588,230, Nov. 15, 1933 (Cl. 22f. 7). See Brit. 364,112 (C. A. 27, 1773).

**Pigments.** Titanium Pigment Co., Inc. Ger. 588,446, Nov. 23, 1933 (Cl. 22f. 7). See Brit. 364,562 (C. A. 27, 2050).

**Pigment and adsorbent from powdered coal, etc.** Carl A. Jacobson. U. S. 1,940,352, Dec. 19. Finely divided carbonaceous material such as coal, charcoal or wood is mixed with about an equal wt. of silicious material such as

1 diatomaceous earth and the mixt. is subjected to destructive distn. in a retort excluding air at temps. above the carbonizing point but not substantially exceeding 1100°; the resulting black product is classified by air flotation into at least 2 portions, a lighter portion having the properties of a black pigment and a heavier portion which can be used as an adsorbent for gases or as a filtering medium.

**Lead fluoride.** Léon Paindavoine. Fr. 754,721, Nov. 13, 1933. PbF<sub>2</sub>, for use in under-water paints, is obtained by pptn. from a soln. of a Pb salt (nitrate) by HF or an alkali fluoride. The HF may be obtained by the action of H<sub>2</sub>SO<sub>4</sub> on natural CaF<sub>2</sub> (previously bleached at above 500°) in the presence of a Na or K salt as catalyst.

**Lithopone.** Firma W. Sander. Ger. 589,128, Dec. 2, 1933 (Cl. 22f. 5). Lithopone is made fast to light by adding a compd. of Be during or after its manuf.

**Drying oils, paints, varnishes, etc.** Herman A. Bruson (to Röhm & Haas Co.). U. S. 1,939,622, Dec. 12. Siccatives are used such as the Al, Ba, Cd, Ca, Ce, Cr, Co, Cu, Au, Fe, Pb, Mg, Mn, Hg, Ni, Pt, Sr, Ti, Th, Sn, U, V and Zn salts of butylbenzoyl-*o*-benzoic acid, amylbenzoyl-*o*-benzoic acid, sec-amylbenzoyl-*o*-benzoic acid, di-sec-amylbenzoyl-*o*-benzoic acid, sec-hexylbenzoyl-*o*-benzoic acid, sec-octylbenzoyl-*o*-benzoic acid, sec-amyltoluyl-*o*-benzoic acid, sec-octyltoluyl-*o*-benzoic acid, sec-amyloxyloyl-*o*-benzoic acid, sec-octyloxyloyl-*o*-benzoic acid, sec-amylnaphthoyl-*o*-benzoic acid, sec-amylnaphthoyl-*o*-benzoic acid, sec-octylnaphthoyl-*o*-benzoic acid, etc.

**Oil-soluble basic salts of aroyl benzoic acids.** Herman A. Bruson (to Resinous Products & Chemical Co.). U. S. 1,939,621, Dec. 12. Salts, various of which are suitable for use as siccatives with oils, paints and varnishes, are formed from acids such as *p*-toluyl-*o*-benzoic acid, *p*-cymoyl-*o*-benzoic acid, sec-amylbenzoyl-*o*-benzoic acid, caprylbenzoyl-*o*-benzoic acid, etc., by reaction with Co-SO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, ZnCl<sub>2</sub>, Pb nitrate, MnCl<sub>2</sub>, Ni chloride or salts of Cu, U, Ba, Cd, Ca, Cr, Cu, Hg, Sr, Ti, Th, Sn, V, Au or Pt.

**Drier composition for use with oil-resin coating materials.** Charles A. Thomas (to Dayton Synthetic Chemicals, Inc.). U. S. 1,940,613, Dec. 19. A metallic drier such as Co resinate is used with a phenolic inhibitor of crystn. such as  $\beta$ -naphthol in proportions such as to prevent crystn. during drying of the coating film without retarding the rate of drying of the film.

**Flexible apron-loop drier for paints, pigments, "chemicals," etc.** Joseph Roberts (to Proctor & Schwartz, Inc.). U. S. 1,939,523, Dec. 12. Structural and mech. features.

**Printing inks.** I. G. Farbenind. A.-G. (Walther Lutkendorf, inventor). Ger. 585,167, Sept. 29, 1933. Aq. printing inks, which give waterproof print, are prepd. with a vehicle comprising an aq. dispersion of an oily or resinous condensation product which forms a water-insol. resin when exposed to air. Suitable condensation products are obtainable from polyhydric alcs., polybasic acids, and unsatd. higher fatty acids, or from phenol or urea, CH<sub>2</sub>O and drying oils.

**Apparatus for testing the properties of printing inks in films applied to different papers.** Fred W. Hoch. U. S. 1,939,814, Dec. 19. Various mech. and operative details are described.

**Apparatus and method for drying freshly printed webs.** Frank J. Tone (to Carborundum Co.). U. S. 1,941,328, Dec. 26. The freshly printed surfaces are carried by carrier webs having on their surfaces gritty material such as sand.

**Apparatus for drying freshly printed webs.** Edward R. Newcomb (to Carborundum Co.). U. S. 1,941,362, Dec. 26. Freshly printed webs such as those of Cellophane or the like are dried in contact with a layer such as woven fabric having grains of material such as feldspar upon its opposite sides and provided with depressed portions communicating with the longitudinal edges of the layer so as to provide air passageways when the material is wound into a roll.

**Coating composition.** Walter E. Lawson. (to E. I. du

Pont de Nemours & Co.). U. S. 1,938,662, Dec. 12. A coating compn. suitable for use on wood, etc., contains a polymerized vinyl ester such as polymerized vinyl chloride together with Chinawood oil, linseed oil, perilla oil or hempseed oil, etc.

**Coating compositions.** John W. Iliff and Paul Robinson (to E. I. du Pont de Nemours & Co.). U. S. 1,941,398, Dec. 26. See Brit. 396,081 (C. A. 28, 663<sup>4</sup>).

**Coating compositions.** The International Latex Processes Ltd. Fr. 754,577, Nov. 9, 1933. Granular or floccular ppts. of rubber, obtained from aq. dispersions, are mixed with powders of good covering power, such as kaolin, Spanish white, chalk or talc to form water paints, distempers, etc. Pigments, such as ZnO, lithopone, TiO<sub>2</sub> and ultramarine may be added.

**Coating compositions containing cellulose nitrate.** George R. Enslinger (to E. I. du Pont de Nemours & Co.). U. S. 1,939,076, Dec. 19. A compn. adapted to give non-opaque films comprises cellulose nitrate, pearl essence and an Fe, Cu, Co, Ni or Mn salt of a compatible character derived from a half ester of phthalic, sebacic, succinic, maleic, tartaric or malic acid.

**Composition for coating and insulating various materials.** Mortimer T. Harvey (to Harvel Corp.). U. S. 1,939,773, Dec. 19. A compn. which is suitable for coating metals, etc., is prepd. by heating the oil of the nut of *Sterculia foetida* at 38° or higher and discontinuing the heating before the polymerized oil reaches the rubbery state.

**Coating processes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 398,070, Sept. 7, 1933. Coatings of artificial resin are prepd. by spraying or squirting an amine-aldehyde resin of low softening temp., with or without the addn. of filling or softening material, e. g., powd. quartz, kaolin.

**Coating compositions for floor coverings.** R. I. du Pont de Nemours & Co., Wilmer F. Whitescarver and Horace H. Hopkins. Brit. 398,209, Sept. 11, 1933. Print paints for floor coverings comprise polyhydric alc.-polybasic acid resins modified with a resin acid such as rosin and pontianac gum. Examples describe the prepn. of resins with acid nos. of 5-20 by heating the components at 250-70°. CO<sub>2</sub> may be blown through the mixt. during heating. The resins preferably contain 50-95% rosin glyceride. Part of the resin acids may be replaced by drying or semidrying oils or their acids.

**Colored spirit varnishes.** Hermann Schladebach and Herbert Hähle (to General Aniline Works). U. S. 1,941,958, Dec. 26. Spirit varnishes are colored fast to light with a basic dye such as Victoria blue B or Crystal violet 6B and a spirit-sol. metal nitrate such as uranyl or Th nitrate. Cf. C. A. 27, 5560.

**Apparatus for ascertaining the drying time of varnish,** etc. Alfred M. Parks. U. S. 1,938,975, Dec. 12. The material under test is applied as a layer to a strip such as sheet metal, glass, wood or paper onto which while stationary a band of material such as corrugated rubber is applied at a known and regular rate per unit of time by a roller actuated by clockwork, thus producing markings on the layer under test until it dries.

**Synthetic lacquers.** Soc. des laques et matières plastiques. Fr. 755,422, Nov. 24, 1933. Comps. which are transformable by oxypolymerization into lacquers are made by the union of a polyphenolic compd. with an ethylenic compd., preferably of high mol. wt., and contg. one or more COOH functions (or their immediate derivs.). Thus, comps. are prepd. by condensing pyrocatechol with ricinoleic acid, Et ricinoleate, oleic acid, linoleic acid and olostearic acid, pyrogallol with ricinoleic acid and hydroquinone with oleic acid, in the presence of condensing agents. The comps. are converted to lacquers by heating.

**Coloring lacquers, waxes, fats, oils and natural or synthetic resins.** I. G. Farbenind. A.-G. (Hermann Schladebach and Herbert Hähle, inventors). Ger. 588,308, Nov. 15, 1933 (C. A. 22<sup>h</sup>, 4). An *o,o'*-dihydroxy azo dye, not contg. a free COOH or SO<sub>3</sub>H group, is dissolved in the liquid or fused material, and a heavy metal

1 salt of a soap-forming acid is then added, with or without an org. deriv. of NH<sub>2</sub>. Examples are given.

**Printing with half tones.** John P. Young (to Armstrong Cork Co.). U. S. 1,940,931, Dec. 26. In reproducing designs by printing on materials such as linoleum floor covering, a base color corresponding to the underlying tone of the design is printed; the design is photographed through filters of color complementary to the primary colors in the design; the photographs thus made are superposed, a half tone is made from the superposed photographs, and the half tone is used for printing over the base color.

**Resinous products.** Willard H. Woodstock (to Victor Chemical Works). U. S. 1,940,383, Dec. 19. Products which are of resinous character and suitable for rust-proofing coatings on metals are obtained by reaction between an aldehyde such as paraformaldehyde and a phosphorus amide (or a P chloride and NH<sub>3</sub>).

**Resinous products.** Imperial Chemical Industries Ltd. and Archibald Renfrew. Brit. 398,194, Aug. 29, 1933. Thermoplastic resinous material, e. g., polymerized methacrylate, is deacrated by subjecting to heat and pressure while covered by an inert liquid, e. g., H<sub>2</sub>O, alc., castor and hydrocarbon oils. The temp. used is sufficient to soften the mass without effecting curing. Among examples a block of polymerized vinyl acetate in a Sn vessel is covered with hydrocarbon oil and heated in an autoclave to 60° under 400 lb. per sq. in., the temp. then being allowed to fall in 12 hrs. to 20° before release of the pressure. The bubbles, which are all at the surface of the block, may be removed with the surface layers.

**Complex polymerization products.** I. G. Farbenind. A.-G. (Otto Jordan, Heinrich Hopff and Erich Kühn, inventors). Ger. 588,306, Nov. 18, 1933 (C. A. 22<sup>h</sup>, 2). Addn. to 580,234 (C. A. 27, 4943). The halovinyl or cyanovinyl compd. used in the process of Ger. 580,234 is replaced by a monomeric or not highly polymerized aliphatic, hydroaromatic or polycyclic aromatic vinyl compd. not contg. O, e. g., by a butadiene hydrocarbon, vinylacetylene or vinylnaphthalene.

**Complex polymerization products.** I. G. Farbenind. A.-G. (Leo Kollek and Hanns Ufer, inventors). Ger. 588,307, Nov. 18, 1933 (C. A. 22<sup>h</sup>, 2). Addn. to 580,234 (C. A. 27, 4943). The halovinyl or cyanovinyl compd. used in the process of Ger. 580,234 is replaced by a monomeric or not highly polymerized oxygenated vinyl compd. other than an ester, e. g., by a vinylalkyl ether or ketone.

**Plastic mass.** László d'Antal. Ger. 585,766, Oct. 9, 1933. Addn. to 538,800 (C. A. 26, 2333). The method of 538,800 for producing plastic linoleum-like masses by heating mineral oil-acid resins with vegetable oils is improved by using 20-60 parts by wt. of the former with 80-40 parts of the latter and heating till a homogeneous mass results. In an example, a mixt. of rape-seed and sunflower-seed oils is heated with acid resin.

**Condensation products.** I. G. Farbenind. A.-G. (Josef Binapfl, inventor). Ger. 584,967, Sept. 27, 1933. Products substituted in the *o*-position are produced by condensing natural resins or their derivs. substituted in the COOH group, with PhOH and introducing an alkyl-, aralkyl- or acyl-residue in the phenolic OH group by treatment with a suitable substance such as *n*-BuCl, benzyl chloride, etc. Examples are given. The products are resins with good mech. properties.

**Condensation products.** I. G. Farbenind. A.-G. (Josef Binapfl, inventor). Ger. 584,968, Sept. 27, 1933. Addn. to 582,847 (C. A. 28, 919<sup>1</sup>). The method of 582,847 for condensing phenols, natural resins and aldehydes is modified by using esters of acid natural resins instead of the resins. Examples are given.

**Condensation products of resinic acids.** Hans Krzikalla and Werner Wolff (to I. G. Farbenind. A.-G.). U. S. 1,940,092, Dec. 19. An aliphatic non-drying hydroxycarboxylic acid such as ricinoleic acid (or castor oil) is heated to above 200° (suitably about 260°) with a resinic acid such as abietic acid (or colophony). Products thus formed may be used as softening agents for celluloid, phenol condensation products, etc.

**Colophony.** Newport Industries, Inc. Ger. 585,529, Oct. 4, 1933. Colorless colophony crystg. with difficulty is prepd. by heating bleached purified resin from 10 min. to 8 hrs. to 260-325°.

**Hard light amber resin.** Charles A. Thomas (to Dayton Synthetic Chemicals, Inc.). U. S. 1,939,932, Dec. 19. A mixt. of hydrocarbons essentially comprising a terpene such as pinene and an alkyl benzene such as toluene or xylene is caused to react in the presence of a metallic halide catalyst, such as  $AlCl_3$ , by adding the latter (suitably while the materials are at a temp. of about 25-35°) until a resin having a predetd. I value is obtained (the I value varying inversely with the proportion of metallic halide catalyst used). Numerous examples are given.

**Resin solutions.** Andre Thiriet and Pierre Delcroix (to Produits Navarre). U. S. reissue 19,036, Dec. 26. A reissue of original pat. No. 1,759,526 (C. A. 24, 3002).

**Pectose resins.** Adolf Hawerlander (to Albert I. Stewart). U. S. 1,941,351, Dec. 26. Pectose, an aldehyde such as formaldehyde and a ketone such as dimethyl ketone are caused to react in the presence of an alkali such as KOH to obtain a product which yields an amber-like resin with  $HNO_3$  soln. and warm water treatment. U. S. 1,941,352 relates to the reaction of generally similar materials by heating at about the b. p. to form a sol. reaction product, then adding a hardening agent such as  $(CH_3)_2N_2$  and further heating to produce an infusible and insol. material.

**Transparent resins.** Thelma Muller née Benari. Fr. 755,331, Nov. 23, 1933. Transparent glass-like materials made by condensing  $CH_2O$  or its polymers with ureas, thioureas or mixts. thereof are molded in closed molds made of non-metallic materials, such as acid rocks, glass or plywood and the molded articles are dried in a moist medium until the sp. gr. no longer diminishes. Before completion of the drying the molded piece is submitted to a compression.

**Molding compositions including artificial resins.** Alfred R. Steele and Alexander Stewart (to Imperial Chemical Industries Ltd.). U. S. 1,941,059, Dec. 26. In prepg. a molding compn. of high bulk d. and low-moisture content a filling material is prepd. by subjecting material such as wood meal to treatment with a caustic soln. and kneading at an elevated temp., then removing the caustic soln. and reducing the moisture content, and the material thus prepd. is mixed with an artificial resin.

**Synthetic resins.** Arthur Runyan (to Sinclair Refining Co.). U. S. 1,938,642, Dec. 12. A mixt. comprising an ester such as triphenyl phosphate or tritolyl phosphate and an oxide of Ba, Ca, Zn or Mg is resinated by heating to

about 260-315°. The products thus obtained may be used in varnishes, for molding, etc.

**Synthetic resins.** Paul Haller and Hans Kappeler (to Ciba Products Corp.). U. S. 1,939,691, Dec. 19. For the manuf. of infusible synthetic resins, one mol. proportion of aniline is caused to react, in the presence of at least an approx. equiv. proportion of a strong inorg. acid such as  $HCl$ , with more than one mol. proportion of formaldehyde until a solid jelly is formed, followed by treatment of the latter with an agent such as  $NaOH$  soln. which substantially eliminates the effect of the inorg. acid, with subsequent washing and drying.

**Synthetic resin.** Wm. H. Moss and George W. Seymour (to Celanese Corp. of America). U. S. 1,940,727, Dec. 26. Allyl alc. is caused to react with cresol in the presence of  $ZnCl_2$  as a catalyst (suitably at a temp. of about 130°). The resulting product may be blended with cellulose acetate, etc. (various formulas being given).

**Synthetic resins.** Presswerk Königstein G. m. b. H. Ger. 585,657, Oct. 6, 1933.  $PhOH \cdot CH_2O$  resins contain about twice their own wt. of wood C and  $1/4$  of their own wt. of coke as filling material.

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Ger. 585,061, Oct. 13, 1933.  $PhOH \cdot CH_2O$  resins are colored by indigoid or anthraquinoid vat dyes.

**Synthetic resins.** I. G. Farbenind. A.-G. (Karl Eisenmann, Erich Scholz and Karl Wolf, inventors). Ger. 588,426, Nov. 18, 1933 (Cl. 12o. 17.05). Urea (or thiourea) and  $CH_2O$  are condensed in the presence of an org. solvent contg. the OH group with the addn. of at least 50%, calcd. on the urea and  $CH_2O$ , of an ester which contains a free OH group in the alc. residue and is derived from a higher fatty acid and a di- or poly-hydric alc. The ester may be added before the condensation or later. When the condensation is completed, the solvent is distilled off and the product is heated until it becomes sol. in solvents not contg. the OH group, e. g., in hydrocarbons, esters and ketones. Preferably, the product is stirred or kneaded while it is heated. The final products form solid solutions with fatty oils, and are useful as components of lacquers. Dimethylol-urea and -thiourea, or the products obtainable therefrom by dehydration, may also be used as starting materials. Examples and numerous details are given.

**Synthetic resins.** I. G. Farbenind. A.-G. Fr. 755,316, Nov. 23, 1933. A polymeric vinyl alc. is condensed with an aldehyde in an anhyd. or practically anhyd. medium, the water formed during the reaction being removed by  $CaCl_2$  or other dehydrating agent, or by distn. along with an inert diluent insol. in water, during the reaction.

## 27 - FATS, FATTY OILS, WAXES AND SOAPS

L. SCHLUBERL

**Oils, fats and soaps in 1933.** Rex Furness. *Ind. Chemist* 10, 21-3(1934).

**Studies on Twitchell reagents. IX. The fat-splitting power of three kinds of Twitchell reagents and the darkening of fatty acids hydrolyzed by them.** Kyo-suke Nishizawa and Arihiro Tominaga. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 681-4(1933); cf. C. A. 26, 1145; 27, 200.

**A new unsaturated acid in the kernel fat of "akarittom," *Parinarium laurinum*.** II. Mitsumaru Tsujimoto and Hanji Koyanagi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 673-5(1933); cf. C. A. 27, 3099. The chem. constitution of the new acid was investigated by the ozone method. As the chief products of decompn. azelaic acid and probably azelaic semialdehyde were obtained. The provisional formula given in the previous paper should be withdrawn as erroneous. No definite constitution is given for the acid, but it may be identical with coucopic acid.

Karl Kammermeyer

**Micro method for the determination of iodine numbers.** J. O. Ralls. *J. Am. Chem. Soc.* 56, 121-3(1934).—A method is described which is applicable to samples of from

0.75 to 25 mg. and which permits the detn. of total halogen consumed and the halogen acid produced, on a single sample. Results are given for 30 compds. IBr is used as the reagent and  $CCl_4$  as the solvent.

**The glass electrode and sulfonated oils.** I. D. Burton and G. F. Robertshaw. *J. Intern. Soc. Leather Trades Chem.* 18, 19-22(1934).— $pH$  values of several sulfonated oils at different dilns. were measured with the glass electrode, with the quinhydrone electrode, colorimetrically, and with the H electrode. The last gave much lower results because of poisoning; results by the other 3 methods were in substantial agreement. Best checks were obtained with the glass electrode. The  $pH$  values of the oils employed decreased on increasing diln. and increased on addn. of mineral oil.

H. B. Merrill

**The oil of "karasumi."** Mitsumaru Tsujimoto. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 676(1933). Karasumi is the salted and dried ovary of gray mullet, *Mugil japonicus*. The oil was found to be a liquid wax and resembled sperm oil and inguandaram oil, but differed from them in the higher unsatn. of the acids and the large content of cholesterol. Cetyl alc. and octadecenol were

also present. The properties of the oil are  $d_4^{20} = 0.8818$ ,  $n_D^{20} = 1.4695$ , acid value = 16.0, sapon. no. = 120.1, I no. = 130.6, unsaponifiable matter = 40.64%.

Karl Kammermeyer

**Characteristics and composition of Wisconsin-grown tobacco-seed oil.** Willard L. Roberts and H. A. Schuette. *J. Am. Chem. Soc.* 56, 207-9 (1934).—That it forms a film on exposure to air is perhaps the earliest characterization which tobacco-seed oil has received. As a result, practically all investigators since that time have classified it as a drying oil. If this classification is a valid one, then this oil is unusual in that it contains none of those highly unsatd. acids usually associated with products of this type. Its predominating unsatd. acid is linoleic acid, which apparently is present here in 2 isomeric forms. In much smaller amt. is found oleic acid. The av. compn. of these oils is: palmitic acid 3.1, stearic acid 4.8, oleic acid 16.2, linoleic acid 70.4, unsaponifiable matter 1.25%. Insofar as comparable data are available, it appears that the phys. and chem. const. of Wisconsin-grown oils fall within the limits of those reported by others but not so the chem. compn. This is perhaps explainable on the ground that the compn. reported by several others represent mere approximations. Chem. and phys. characteristics are given for the extd. and expressed oil. C. J. West

**Shea kernels from Nigeria.** Anon. *Bull. Imp. Inst.* 31, 334-41 (1933); cf. *C. A.* 27, 437.—Seven samples of shea kernels were picked from each of 2 individual trees at different stages of maturity and analyzed. **Conclusions.**—The oil content of the kernels increases and the unsaponifiable content of the oil decreases as the kernel ripens. The unsaponifiable content of the fresh kernels remains more or less const. throughout the period of ripening. The unsaponifiable content of the oil remains practically const. once the kernels have reached maturity. The lower the oil content of the kernels, the higher the unsaponifiable content of the oil. It is suggested that the unsaponifiable constituent is present in the nuts at an early stage of their development, before the formation of the oil begins; that it remains more or less const. in amt. during the secretion of the oil, and that consequently as the seed ripens the percentage of unsaponifiable constituents in the oil falls proportionately as the oil content increases. A. P.-C.

**Effect of carbon dioxide on the growth of molds which attack oil seeds in storage.** N. I. Kayukova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (S. S. R.) 3, 193-218 (1933).—The  $CO_2$  accumulating from respiration of moist oil seeds inhibits mold growth. Higher  $CO_2$  concns. are more effective; at 80%  $CO_2$  growth is very slow and at 90% it is practically stopped for molds, with only slight growth of yeasts and bacteria persisting. Decreasing the  $O_2$  concn. to 4% had no effect. Flavored is more susceptible than soy beans to preservation by  $CO_2$ . Julian F. Smith

**Studies on Chinese wax. I. The composition of fatty acids.** I. Ryosei Koyama. *J. Chem. Soc., Japan* 54, 1233-7 (1933). The wax-producing insect, *Erytherus pela* Chevannel, grown on the plant *Ligustrum ovalifolium* is extd. with ether and  $C_6H_6$ . The yield is 87%. It consists mainly of ceryl cerotate with less melissyl cerotate. The acids identified are chiefly stearic and oleic acids with less myristic, palmitic and arachidic acids. The presence of dihydrolaganic acid is also confirmed. K. Kitsuta

**New source of sucrose [de-oiled peanut cake]** (Lamy-lorillon) 28. Treating cacao waste [to ext. cacao butter] (U. S. pat. 1,939,178) 13. Filter for oils (U. S. pat. 1,938,934) 1. Oil filter (U. S. pat. 1,941,311) 1. Fatty acids from raw tall-oil soap (U. S. pat. 1,940,372) 23. Coloring waxes, fats, oils (Ger. pat. 588,308) 26.

**Stearin and paraffin.** A. Motard & Co. A.-G. Ger. 585,756, Oct. 7, 1933. A method of obtaining the above in small globules by dropping is described.

**Utilization of fatty acid distillation residues.** Henkel & Cie G. m. b. H. (Hans Leue, inventor). Ger. 588,376, Nov. 17, 1933 (Cl. 23c. 2). The unsaponifiable residue

from the vacuum distn. of fatty acids is used as an emulsifying agent or as an addn. to soaps, cosmetics, ointments, disinfectants, polishes, sizes, adhesives, etc.

**Modified fatty oils.** Firma Louis Blumer. Ger. 585,187, Sept. 29, 1933. Products of the stand-oil type are prepd. by heating fatty oils to about 250° in the presence of a halogenated org. compd. as a catalyst, e. g., *p*-toluene-sulfonyl chloride or a chlorinated fatty oil.

**Purifying oils.** Camille Deguide. Fr. 754,856, Nov. 10, 1933. A Ba soap, obtained by sapon. a fatty substance with crystd.  $Ba(OH)_2$ , is used for purifying oils.

**Refining animal and vegetable oils, fats and waxes.** Ludwig Rosenstein and Walter Jacob Hund. Ger. 589,284, Dec. 8, 1933 (Cl. 23a. 3). See Can. 328,300 (C. A. 27, 1225).

**Continuous apparatus for extracting fatty oils, etc.** Hanscatische Mühlenwerke A.-G. Ger. 589,233, Dec. 4, 1933 (Cl. 23a. 2).

**Continuous extraction and filtration apparatus suitable for extracting oils from seeds.** Philipp L. Fauth. U. S. 1,940,585, Dec. 19. Various structural and operative details of a rotary-drum app. are described.

**Apparatus for extracting oils, fats and waxes by means of solvents.** Lothar Martinus. Ger. 585,435, Oct. 10, 1933.

**Continuous apparatus for distilling solvents from extracted fatty oils and for deodorizing the oils.** Philipp L. Fauth G. m. b. H. Ger. 588,084, Nov. 13, 1933 (Cl. 23a. 2).

**Testing oils by measuring the light passing through an oil film of definite thickness on a transparent slide.** Virgil A. Schoenberg. U. S. 1,940,373, Dec. 19. Various details of app. and operation are described.

**Tubercle waxes.** Carl L. Lautenschlager (to Winthrop Chemical Co.). U. S. 1,940,174, Dec. 19. For making tubercle waxes free from any tubercle bacilli and tuberculin, the waxes, after being freed from the greater part of the tubercle bacilli and fatty matter, are treated with a dil. acid and are then further purified by repeated solution by means of org. solvents insol. in water such as ether and pptn. by means of water-sol. org. solvents such as alc.

**Substantially anhydrous per-salt soap.** Adolf Welter. U. S. 1,940,570, Dec. 19. A product readily sol. in water is prepd. by mixing about 100 parts of highly split, saponifiable and satd. acids of nondrying oils such as coconut and tallow oils with 44 parts of calcined soda, permitting saponification by the spontaneous heat of reaction, stirring the mass until it becomes stiff, adding 15 parts Na perborate and shaping the material as desired before it becomes cold and brittle.

**Shaving soap mixture.** Robert F. Smith. U. S. 1,940,026, Dec. 19. A major proportion of a lathering soap is mixed with minor proportions of a salt of alginic acid such as Na alginate, a slippery inert inorg. filler such as talc and water.

**Soap-cooling machine.** Weber & Seeländer, Maschinenfabrik. Ger. 589,222, Dec. 4, 1933 (Cl. 23f. 1).

**Soap powder.** Adolf Welter. Ger. 588,488, Nov. 20, 1933 (Cl. 23e. 2). Curd soap heated to above 100° is sprayed with the aid of a compressed gas which is introduced into the vessel contg. the soap before the latter is heated to the required temp.

**Barium soap for lubricating grease.** Camille Deguide. Brit. 398,402, Sept. 14, 1933. See Fr. 746,309 (C. A. 27, 4707).

**Cleansing agent.** Inspro Products Ltd. Fr. 755,264, Nov. 22, 1935. A cleansing agent is composed of a mixt. of gelatinous  $SiO_2$  and a soln. of soap and water.

**Wetting and other agents.** I. G. Farbenind. A.-G. Fr. 755,143, Nov. 20, 1933. Monomeric aliphatic aldehydes or ketones contg. more than 6 C atoms are caused to react with org. substances which will form products sol. in water, or which allow of the introduction of groups causing soly. in water, these groups being introduced if necessary. Examples of aldehydes are lauric, stearic, oleic, ricinoleic, capric, myristic and palmitic aldehyde, of ketones, heptadecyl methyl, diheptadecyl, undecyl methyl, penta-

decenyl methyl ketone or laurone. Products with which they are caused to react include glycerol, sorbitol, Grignard reagents, HCN, aldehydes or ketones contg. up to 9 C atoms, mono-, di- or tri-alkylamines and sulfonic acids of alcs. Several examples are given.

**Wetting, emulsifying and washing agents.** I. G. Farbenind. A.-G. (Hans Beller and Hermann Schütte, inventors). Ger. 588,130, Nov. 13, 1933 (Cl. 12o. 23.-02). Liquid or solid paraffin or naphthene hydrocarbons are subjected to partial oxidation in known manner until practically no unoxidized hydrocarbon remains, and the products are sulfonated.

**Urethans.** I. G. Farbenind. A.-G. (Heinrich Ulrich and Karl Saurwein, inventors). Ger. 585,161, Oct. 6, 1933. Aliphatic or cycloaliphatic aminocarboxylic or

aminosulfonic acids, or their substitution products not contg. a hydroxyalkyl group, are condensed with chlorocarbonic esters of alcs. or substituted alcs. contg. 4 or more C atoms. Thus, octadecyl chlorocarbonate may be added to an aq. NaOH soln. of *N*-methylaurine and the mixt. warmed to 80°, this yielding the urethan  $C_{18}H_{37}OCON(CH_2)_{17}CH_2CH_2SO_3Na$ . Examples are given also of the prepn. of  $C_{18}H_{37}OCONHCH_2COONa$ ,  $C_6H_{11}OCON(C_4H_9)_2$ ,  $CH_3CH_2SO_3Na$ ,  $CH_3(CH_2)_7CHOH(CH_2)_8OCON(CH_2)_7CH_2CH_2SO_3Na$ ,  $CH_3(CH_2)_8CHOH(CH_2)_8OCON(C_2H_5)_2$ ,  $CH_3COONa$ , and a urethan from glycine and 1,3-butylene glycol monochlorocarbonate. The products are useful as *wetting, dispersing and cleansing agents*. They may be sulfonated, if necessary, to confer soly. in water. Cf. C. A. 28, 594<sup>4</sup>.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

**Key for the determination of the varieties of sugar cane grown in Tucumán.** G. L. Fawcett. *Rev. ind. agr. Tucumán* 23, 87-99 (1933).—Over 90 varieties of sugar cane grown in Tucumán are classified by a key described in detail in which the following features are used in descending order of importance: color of stalk, presence of mosaic disease, thickness of barrel, shape and size of bud, node and groove, no. and size of auricles, hairiness of sheath, other features. Nelson McKaig, Jr.

**Which is the better cane, P. O. J. 36 or P. O. J. 213?** Wm. E. Cross. *Rev. ind. agr. Tucumán* 23, 109-11 (1933); *Circ. estac. expl. agr. Tucumán* 1933, No. 37.—Review of the relative agronomic and mfg. merits of the 2 varieties. Nelson McKaig, Jr.

**Another mutation of P. O. J. 36 of greater productivity. The sugar cane "Paz Posse."** Wm. E. Cross. *Rev. ind. agr. Tucumán* 23, 104-8 (1933); *Circ. estac. expl. agr. Tucumán* 1933, No. 35; cf. C. A. 28, 671<sup>7</sup>.—The sugar canes are similar in appearance although "Paz Posse" (I) is somewhat darker purple, is more vigorous, sprouts earlier, is less mature throughout the harvest season and is more resistant to injury by freezing than P. O. J. 36 (II). Expts. since 1928 indicate I produces more cane and somewhat more sugar per hectare than II and the juice of I is about 1% lower in Brix solids and purity. Nelson McKaig, Jr.

**New source of sucrose.** Lamy-Tortillon. *Circ. heb. fabr. sucre, Suppl.*, No. 2336, (Dec. 31, 1933).—Deoiled peanut cake often contains as much as 10% sucrose, which can be recovered by extg. with 66% EtOH.

O. W. Willcox  
**Control of sugar boiling by electric conductivity.** Courrière. *Circ. heb. fabr. sucre, Suppl.*, No. 2333, (Dec. 10, 1933); cf. C. A. 27, 4948.—Historical, showing priority of C. O. W. Willcox

**Thermophil bacteria in sugar, especially sugars of Dutch origin.** L. N. S. Homans. *Tijdschr. algem. tech. Ver. Bietwortsuikerfabr. Raffin* 29, 29-49 (1933).—All 3 classes of organisms noted by American investigators as causes of spoilage of canned foods were found in various European sugars; Dutch sugars contained sulfate-spoilage bacteria in numbers greatly exceeding those reported from America. To det. these bacteria it is best to make the yeast-water by heating a 20% suspension of yeast in water in an autoclave for 20 min. at 120°; this water is used with 1% of  $Na_2SO_4$ , iron being supplied as Fe wire instead of  $FeCl_3$ . O. W. Willcox

**Yeasts found in fermented maple sirup.** F. W. Fabian and Harlow H. Hall. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 31-47 (1933).—The ant. of alc. in samples of fermented maple sirup from which yeasts were isolated ranged from 0.83 to 2.66% by wt. Sterile maple sirup inoculated with yeasts isolated from fermented maple sirup, in a moist atm., required 21-29 days to show visible fermentation. The moisture content of fresh sirup ranged from 26.3 to 36.5%. All samples showing visible

fermentation had moisture contents between 32.7 and 34.6%.

John T. Myers  
**Volume of sugar-beet marc and its adsorptive effect.** S. J. Osborn. *Ind. Eng. Chem., Anal. Ed.* 6, 37-40 (1934).—Detns. of marc vol., including the Pb ppt., by the method of Osborn and Brown (C. A. 26, 6173) gave values from 0.84 to 1.10 ml., av. 1.0 ml. No significant difference was found when 6, 7 or 8 ml. of Pb soln. was used per normal wt. The effect of  $H_2O$  adsorbed by the marc on the vol. of the latter is difficult to det. polarimetrically; tests made indicated that the effect is small in the hot-water digestion method, although perhaps justifying a slightly higher marc allowance than 1.0 ml.

F. W. Zetban  
**Consistency of potato-starch size.** Walter T. Schreiner, M. N. V. Geib, and O. C. Moore. *Bur. Standards J. Research* 11, 705-73 (1933) (Research Paper No. 623). Lab. expts. show that the decrease in consistency of size is dependent upon the temp. of cooking, speed of agitation, and length of the cooking period. The addn. of a soln. contg. small quantities of dispersed lecithin and lanum to the sweet potato-starch size materially retarded the decrease in consistency—a fact as yet not fully explained. The treatment of sweet potato size with solns. of sol starch and certain salts resulted in a great consistency of size but the rate of breakdown was not materially affected. Changes in consistency seem to be less in sweet potato starch than in Irish potato starch. W. H. Boynton

**Fertilizing of sugar cane (Dodds) 15.** Effect of manure on the tonnage and the juice of sugar cane (McRae) 15. Various N fertilizers for stock beets (Engels) 15. Effect of various treatments of sugar-cane cuttings on the rate and extent of germination and the yield of cane (McIntosh) 11D.

**Recovery Nomograms [for sugar manufacture]** Port Louis, Mauritius: The General Printing & Stationery Co. Ltd. 5 rupees.

**Apparatus for automatic control of processes such as sugar refining.** Jacob J. Neuman. U. S. 1,939,143, Dec. 12. Various structural, mech. and elec. details att. described.

**Apparatus for concentrating-sugar solutions.** Wilhelm Schildener. Ger. 585,973, Oct. 14, 1933.

**Extrinsizing starch in cereals.** Hans F. Bauer (to Stah, Hall Mfg. Co.). U. S. 1,938,574, Dec. 12. A product which is suitable for use in foods, adhesives, etc., is prepd. by treating corn kernels or other cereal material with a non-starchy liquefying agent such as  $NaHSO_4$  and with a starch-conversion agent such as HCl and heating the mixt. (suitably at a temp. of about 250°).

**Gelatinized corn-starch product suitable for use in adhesives, sizes, core binders, etc.** Fred O. Giesecke (to International Patents Development Co.). U. S.



1,939,978, Dec. 19. A product which may contain starch 82, protein 6, sol. substances 9-10, dextrin 9 and oil 0.7 % and may have a capacity for water absorption of about 16 to 8 is prepd. from "mill starch" by partial dewatering to a water content of about 40% and passing between rolls heated by steam under pressure.

## 29—LEATHER AND GLUE

ALLEN ROGERS

**Theory of tannage.** Edmund Stiasny. *Cuir tech.* 22, 352 3 (1933).—A brief summary of Stiasny's views.

H. B. Merrill

**Characteristics of vegetable tanning materials.** III. The influence of aging of vegetable-tanned leather on its content of combined tannin. Fritz Stather. *Collegium* 1933, 612-17; cf. *C. A.* 27, 4951.—Hide powder was shaken 4 hrs. with 3°Bé. tannin ext., then washed until tannin free, either at once or after aging. The increase in wt. after drying was considered combined tannin. Combined tannin increased with time (3 to 30 days) and temp. up to 40°, but did not increase from 40° to 60°. Influence of atm. was slight or irregular; the 4 conditions tried were: storage over water; H<sub>2</sub>SO<sub>4</sub>; dry O; or dry N.

Ira D. Clarke

**Sulfiting and decolorizing quebracho extract.** A. Dohogue. *J. Intern. Soc. Leather Trades Chem.* 18, 6 4 (1934).—Color is diminished by replacing part of the Na<sub>2</sub>SO<sub>3</sub> by NaHSO<sub>3</sub>, but duration of sulfiting is thereby increased. Adding HCOOH after sulfiting decreases the color. The decrease is related to reduction in *p<sub>H</sub>* value.

H. B. Merrill

**Catechu and present-day interest in its production.** J. Heim de Balsac, A. Wahl and H. Heim de Balsac. *Halle aux cuirs* 1933, 259-62, et seq.—A review of the history, sources, compn., and uses of catechu, especially in dyeing.

H. B. Merrill

**Determination of chromium and iron in liquors and leathers.** Max Bergmann and Ferdinand Mecke. *Collegium* 1933, 609 12; cf. *C. A.* 24, 1313.—The perchloric acid method can be applied to Cr liquors or leather by digesting very slowly in Kjeldahl flasks to prevent loss of Cl by spattering or as chromyl chloride.

I. D. C.

**An interesting damage to dry goatskins.** Eugen Belavsky. *Collegium* 1933, 551 5.—Stains were of 2 kinds: lesser stains caused by fat and more serious stains caused by the curing salt (Indian "Kharri" salt).

I. D. Clarke

**The variable action of acids on animal hide and the latest methods for detecting harmful acids in leather.** Gerhard Otto. *Collegium* 1933, 586-602; cf. *C. A.* 27, 5573. From hide substance said. with the acid, HCl could be washed out easily, H<sub>2</sub>SO<sub>4</sub> slightly less easily, an acid dye with difficulty and a substantive dye and a tanning sulfo acid I (condensation product of β-naphthalene-sulfonic acid and HCHO) practically not at all. For irreversible fixation mol. size has a decisive role. Irreversibly fixed acid will replace a hydrolyzable acid (as HCl, H<sub>2</sub>SO<sub>4</sub>); it will change the isoelec. point of hide powder from *p<sub>H</sub>* 4.9 toward the acid side. Hide substance completely satd. with I is no longer amphoteric and has a *p<sub>H</sub>* of 3.0; this value of 3 is important in connection with the deterioration of leather by acid on aging (cf. *C. A.* 23, 4367, 25, 3868; 27, 2334). Hide substance tanned with I will absorb less mineral acid from a given soln. than if vegetable tanned, and after the acid treatment it will deteriorate less on heat-aging. The presence of destructive acid in vegetable-tanned leather can be detd. by electrometric titration of an aq. ext. of the leather. If tan *φ* is greater than 0.75 harmful acid is absent; *φ* is the angle between the titration curve and *p<sub>H</sub>* 4.0 to 5.5 and the ordinate axis.

Ira D. Clarke

**Experimental study of animal intestine products.** L. M. Horovitz-Vlasova. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkhosovoi Prom.* Separate, 1931, 5 38.—The literature of red staining of salted intestine products, fish, hides, etc., is reviewed. The organism responsible for reddening is named *Tetracoccus carneus halobius*; it is widespread and requires strict general

antiseptic control, with the added precaution of storage below 5°. Blue staining is caused by reaction between tannins in wood tubs and Fe salts; the tubs should be treated to ext. tannins before use, and Fe salts should be excluded. "Rust" is well named, for it is actually caused by Fe oxides deposited in the intestine walls; the intestine should be kept away from Fe and salted with Fe-free salt. *Dermestes lardarius*, the chief pest of dried intestine, can be destroyed (insects, larvae and pupae) by fumigation with CCl<sub>4</sub>, which is better than gasoline or SO<sub>2</sub>, because it has no fire hazard. The salt commonly used is superior to the substitutes sometimes proposed, but should be Fe-free and protected from halophilic bacteria. Linden or aspen tubs are better than oak or beech, having less tannin. "Folliculosis" in intestine products comes from worm (*Strongylois nodularis intestinalis*)-infested animals; the best prevention is veterinary inspection before slaughter. So-called artificial brines have little superiority over the natural brines. Manuf. of intestine products should be subject to strict lab. control for dependable, profitable results.

Julian F. Smith

**Microbiological studies of salt in relation to the reddening of salted hides.** L. S. Stuart, R. W. Frey and Lawrence H. James. U. S. Dept. Agr., *Tech. Bull.* 383, 1-23 (1933).—An examn. of 165 samples of com. salts for the presence of microorganisms that cause reddening of hides and skins showed that 34 out of 35 samples of crude solar-evapd. salts and 25 out of 39 open-pan-evapd. grainer salts were contaminated with red chromogens. All kiln-dried solar-evapd., vacuum-pan evapd. and mined salts were found to be free from these organisms. A modification of Clayton and Gibbs (*C. A.* 21, 3922) fish-salt-rice medium in which fish broth was replaced by hide broth was found to be reliable for culturing salts to det. the presence of these red chromogenic microorganisms. No correlation was found between the *p<sub>H</sub>* of the salts and the presence of the organisms. Relatively high humidities and slightly alk. conditions are favorable to reddening. Cultural studies of red chromogenic growths on media of high concns. of salt showed them to consist usually of a highly mixed microbial flora. When the mixed cultures were subcultured in dextrose broth and then on dextrose agar, a group of organisms capable of causing reddening was isolated in apparently pure cultures. Studies of the salt tolerance of these organisms showed that their ability to withstand high concns. of salt is markedly enhanced by repeated propagation on media of high salt content.

W. H. Ross

**Report on practical salting experiments in 1932.** M. Bergmann and W. Hausam. *Ledertech. Rundschau* 25, 100-4, 114-16 (1933); cf. *C. A.* 27, 1779.—Calfskins cured 6-8 weeks with soda salt and 1-3% naphthalene had few salt, red or violet stains as compared to skins cured with salt alone. Naphthalene was distinctly advantageous. NaF was poorer than soda-salt-naphthalene. 3700 skins were used.

I. D. Clarke

**Quality of vegetable-tanned sole leather.** I. Robert H. Marriott. *J. Intern. Soc. Leather Trades Chem.* 18, 22-34 (1934).—In general the total wt. of material assoc. with 100 g. hide substance is lower for the higher-priced leathers.

H. B. Merrill

**Study of grease stains on leather.** I. Cause of grease stains on vegetable-tanned heavy leather. John H. Highberger and E. K. Moore. *J. Am. Leather Chem. Assoc.* 29, 16-37 (1934).—Most stains are due to excessive natural skin fat, laid down in the corium during the life of the animal; some stains appear to be due to uneven absorption of oil during oiling. Absorption of oil de-

creases with increase of natural fat. No relation is found between grease stains and degree of tannage. Skins of excessive natural fat content can be detected in the cured state by a simple sp. gr. test ( $< 1.225$  by flotation method in sugar soln. with fleshed, hair-clipped sample). About 80% of stained leather can be predicted by this test.

H. B. Merrill

The physical testing of artificial leather. Walter M. Münzinger. *Nitrocellulose* 4, 219(1933); cf. C. A. 27, 625.—The necessity of control tests during manuf. is emphasized.

E. M. Symmes

The glass electrode and sulfonated oils (Burton, Robertshaw) 27. Utilization of *Caesalpinia spinosa* [in finishing leather] (Castiglioni) 18. Spent sulfite liquor [use as tanning material] (Vogel) 14. Detergents [products used in tanning] (Brit. pat. 398,818) 18. Glue product (U. S. pat. 1,940,486) 18. Coated fabrics [artificial leather] (Ger. pat. 588,282) 25. Sulfonating rubber [products used as tanning agents] (Ger. pat. 585,622-3) 30.

Treatment of hides. Chem. Fab. Schwalbach A.-G. Ger. 585,080, Sept. 28, 1933. Delimed and bated hides are treated with a mixt. contg. an ester of a lower mono-basic aliphatic acid and subordinate amts. of MeOH and an aliphatic ketone. A suitable mixt. is obtained in the distn. of wood. The hides are dried after the treatment, and are then ready for tanning.

Treatment of hides or leather. I. G. Farbenind. A.-G. (Richard Alles, inventor). Ger. 589,175, Dec. 4, 1933 (Cl. 28a. 3). Hides are treated before, during or after tanning with complex compds. formed from chromic salts and urea. The complex compds. may be used alone or mixed with other compds. which do not form a ppt. with the complex compds. or which form a ppt. which redissolves in an excess of the added compd. Suitable addns. to the complex compds. are  $Al_2(SO_4)_3$ ,  $MgSO_4$ ,  $(COOH)_2$ , *p*-toluenesulfonic acid and wetting agents contg. a sulfo group. The complex compds. or the mixts. contg. them form insol. ppts. in the hides or leather with compds. of high mol. wt. which would otherwise be removed by washing, e. g., with natural or synthetic tanning agents, fats and higher fatty acids. Examples are given.

Sheets for separating hides while subjected to tanning solutions. Robert M. Allard (to Armstrong Cork Co.). U. S. 1,940,480, Dec. 19. A double-faced sheet comprises a satd. felt web having on each side a plurality of paint coatings and an overlying lacquer coating to provide smooth, impervious surfaces.

Drenching skins. Wilhelm Neugebauer (to Kalle & Co. A.-G.). U. S. 1,940,265, Dec. 19. See Brit. 373,567 (C. A. 27, 3635).

Unhairing and bating hides. Robert Biedermann (to J. R. Geigy A.-G.). Brit. 398,524, Sept. 15, 1933. See Fr. 731,445 (C. A. 27, 439).

Depilatory. Oonah Ltd. Fr. 754,841, Nov. 14, 1933. A depilatory contains  $Na_2S$ , soap, neat's foot oil and  $C_{10}H_{18}$ .

Tanning agents. Anna I. Gruner. Austrian 135,337, Nov. 10, 1933 (Cl. 28b.). Insol. residues from the extn. or use of vegetable tanning agents are subjected to the action of fungi, e. g., *Aspergillus niger*, whereby sol. products useful as tanning agents are obtained. Nutrient materials for the fungi may be added to the insol. residues to be treated. Various details are given.

Tanning agents. Progil Soc. anon. Ger. 587,496, Nov. 4, 1933. See Fr. 720,712 (C. A. 26, 4204).

Tanning agents (condensation products of carbohydrates with sulfuric acid and phthalic anhydride). Alphons O. Jaeger (to Selden Co.). U. S. 1,938,966, Dec. 12. Carbohydrates such as cellulosic material and pure or crude phthalic anhydride are caused to react in the presence of concd.  $H_2SO_4$  or oleum and the product is further caused to react with materials such as the residue from the purification of crude anthracene.

"Mineral tanning." Ian C. Somerville (to Röhm & Haas Co.). U. S. 1,940,810, Dec. 19. Water-sol. salts of Zr such as the sulfate, chloride or nitrate are used as tanning agents.

Titanium sulfate preparations. Ludwig Teichmann and Hermann Noerr (to I. G. Farbenind. A.-G.). U. S. 1,941,285, Dec. 26. Preps. easily sol. in water and suitable for use as tanning and weighting agents contain an alkali metal sulfate together with 0.3-0.5 mol.  $H_2SO_4$ , combined with each mol. of  $TiO_2$ .

Dyeing leather and skins. I. G. Farbenind. A.-G. Fr. 754,388, Nov. 6, 1933. In dyeing leather or skins by means of S dyes, the formation in the dyeing or brushing bath of NaOH, from the alkali sulfides used for dissolving the dyes, is prevented by adding to the bath a certain amt. of equally ionized substances, such as Glauber salt. An alkali bicarbonate may be added at the same time or an addn. of NaSH may be made immediately.

Leather, skins, etc. Soc. d'exploitation des procédés Escaich. Fr. 755,434, Nov. 24, 1933. Skins, leather, furs, hair, etc., are tanned, partly decolorized and have their natural qualities protected by treatment in an aq. bath contg. metal salts (except alkali or alk. earth salts) and alkali nitrite in a medium allowing the liberation of nascent  $HNO_2$ . Phenols or aromatic amines are generally added.

Furs. Paul Kestenbaum and Israel Kestenbaum. Brit. 397,800, Aug. 31, 1933. Horse pelts, etc., having a thick skin are prepd. by splitting the skin and then dressing the part carrying the hair. The treatment may consist of soaking in a soln. contg. ground barley, alum,  $HCOOH$  and NaCl, greasing with fish oil and tallow, drumming with sawdust to remove external grease, washing, shaving and drumming again with dry sawdust (and sand).

Artificial leather. Paul Meyersberg and Georg Wolf. Brit. 397,676, Aug. 31, 1933. See Fr. 742,295 (C. A. 27, 3636).

"Artificial leather" (coated fabric). Edgar H. Nollan and Donald A. Rankin (to E. I. du Pont de Nemours & Co.). U. S. 1,940,402, Dec. 19. A washable, oil- and grease-resistant "artificial leather" comprises a relatively heavy fabric base such as a drill or sheeting to which is cemented on one face a lighter fabric on which is superposed a film comprising cellulose nitrate, a softener and a pigment, and a surface film comprising cellulose nitrate, a wax such as ceresin wax and a softener such as di-Bu phthalate which is a non-solvent for the wax (the character of the surface film being such that it is discontinuous with respect to the cellulose nitrate).

Artificial leather. E. I. du Pont de Nemours & Co. Ger. 586,582, Oct. 23, 1933 (Cl. 8. 2). Fabric is treated with rubber, coated with asphalt varnish and heated to vulcanize the rubber and dry the varnish. An intermediate layer of oil lacquer may also be added. Cf. C. A. 28, 928.

Artificial leather. The Mechanical Rubber Co. Ger. 588,344, Nov. 15, 1933 (Cl. 39a. 10.04). See Brit. 295,387 (C. A. 23, 2320).

Artificial leathers. Rafael Müller. Fr. 755,243, Nov. 21, 1933. Sheets of cellulose or paper pulp are impregnated with aq. dispersions of rubber, etc., on a metallic support, excess liquid is expelled and the product is dried on the same support, then grained and vulcanized.

Composition for coating leather or rubber. Luzie Loewenthal née Walter. Ger. 589,248, Dec. 4, 1933 (Cl. 71a. 19.10). Leather dust, sugar, powd. S and rubber soln. are mixed together, and the mixt. is allowed to ripen in a closed vessel. Sufficient subdivided leather is then added to yield a mass which can be applied by spreading.

Apparatus for making strips of gelatin, cellulose derivatives, etc. Folien- und Flitterfabrik A.-G. Ger. 589,176, Dec. 6, 1933 (Cl. 39a. 16).

## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

**Review of progress and developments in the chemistry and technology of latex and of rubber from 1927 to July, 1932.** St. Reiner. *Caoutchouc and gutta-percha* 30, 10612-14(1933); cf. C. A. 28, 365<sup>2</sup>.—Numerous patents are cited.

**Iodine value of rubber and gutta-percha hydrocarbons.** A. R. Kemp and G. S. Mueller. *Ind. Eng. Chem., Anal. Ed.* 6, 52-6(1934).—The reactivities of various halogens toward rubber and gutta-percha hydrocarbons (I and II, resp.) were measured quantitatively. The behavior of I and of II is similar in that each combines with halogens (either free or in combination with I) with reactivities which are the greatest with Cl, and are progressively less so with Br, ICl, IBr and I, in the order given. II has a greater initial reactivity toward I than does I, but a longer time is required to complete the reaction with II than with I. The ICl method for detg. the unsatn. of hydrocarbons of the I and II types was improved for use with I and II over the method in its earlier developed form (cf. K., C. A. 21, 1901). Methods for the prepn. of pure I and II are described. After purification in this way, the I values of I and II were found to be very close to the theoretical values. Polyvinyl chloride (Duprene) adds only 30% of the theoretical proportion of I.

**Fluorescence of rubber and of compounding ingredients.** V. N. Morris. *Ind. Eng. Chem.* 26, 107-11(1934).—Various important materials used in com. rubber mixts. were exposed to ultra-violet light and the colors of the fluorescent light, when emitted, were observed. Many accelerators, antioxidants and softening agents are fluorescent, whereas among all the inorg. ingredients (examd. only ZnO) show characteristic colors. The fluorescent colors of different com. brands of ZnO are distinctive enough to make it possible to distinguish the various types, and the ash of a vulcanizate will reveal the particular type of ZnO used in the mixt. Well-vulcanized rubber shows a fairly intense yellow fluorescence, whereas the same mixt. in an undercured condition is only slightly fluorescent. In general, however, no well-defined relation between the optimum phys. properties and the intensity of the fluorescence is evident. Exposure to direct sunlight almost completely destroys the fluorescence of vulcanized rubber mixts. which are normally fluorescent.

**General comparison of antioxygens.** F. Jacobs. *Caoutchouc and gutta-percha* 30, 16573-5, 16008-11(1933); cf. C. A. 28, 307<sup>2</sup>.—Three mixts.: (1) a white mixt. with a high proportion of powder, (2) a black mixt. of the tread type, and (3) a "pure gum" mixt. were used to det. the effects of 34 com. protective agents in the mixts. when the latter were exposed to sunlight, to air at 70° (Geer oven), in an air oven at 120° and in an O-bomb under 21 kg. pressure at 60°. On exposure to sunlight, every substance caused discoloration, some much more severely than others. The 70° oven gave misleading results, and it is concluded that it is not a reliable test either for the comparative effects of protective agents or even to judge the aging properties in general of rubber products. In the O-bomb, unexpected results were obtained, in that numerous of the well-known com. agents were without appreciable protective action.

**The synthetic-rubber problem.** Wallace H. Carothers. *Ind. Eng. Chem.* 26, 30-3(1934).

**Testing reclaimed rubber.** Henry F. Palmer. *Ind. Eng. Chem., Anal. Ed.* 6, 56-9(1934).—The object of the paper is to discuss and evaluate methods for testing reclaimed rubber, both from the manufacturers' and the consumers' points of view, and to suggest a simple, rational and practical series of tests for the consumer to apply to reclaimed rubber. The discussion, which is based on both exptl. lab. data and practical considerations, leads to the recommendation of a definite procedure for the consumer to follow in his examn. of the quality of a reclaimed rubber. This procedure includes a method of

sampling, chem. tests for various ingredients, d. (on a reclaim-S mixt.), optional lab. processing tests of the raw reclaimed rubber and of mixts. contg. it, and mech. tests of vulcanizates contg. the reclaimed rubber. Large-scale tests of tech. mixts. contg. the reclaimed rubber, both for the effect of the reclaimed rubber on processing and on the quality of the finished products, are essential.

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**Rubber in paints.** The incorporation of rubber in oil paints and corresponding investigations with rubber latex in water paints. H. P. Stevens and Noel Heaton. *Bull. Rubber Growers' Assoc.* 15, (XXX) 15(1933).—Systematic expts. were carried out to ascertain the practicability of using raw rubber in paints. To utilize rubber it is essential to reduce the viscosity of its solns. or to use it in a form other than a soln. Various factors were studied, including the effect of masticating the rubber, the effect of various agents on the viscosity (before and after soln.), the soly. of rubber in various solvents, the dispersion of rubber in linseed oil with and without pigments, the initial mixing of rubber and pigments, evapd. oil emulsions of rubber latex, the addn. of latex to water paints, and hypochlorinated and nitrated rubbers. The use of "white spirit" solns. of masticated rubber with ordinary paint driers sol. in the solvent was found to be the best technic. Metal salts of fatty acids were the most effective viscosity reducers, of which the linoleates were the best of all. The most powerful single compd. was Co linoleate. Pure fatty acids and metal oxides were only slightly effective. The drier should be added to the rubber during mastication or to the solvent. Various formulas for the prepn. of flat paints, gloss paints and enamels are given. The presence of rubber in these paints greatly improves the ease of flow and diminishes the tendency to settle. Preliminary expts. on the use of "molten rubber" (heated at 300° to liquefaction) and on the use of latex in washable distempers are described.

C. C. Davis

**Latex in pulp and paper manuf. (Richter) 23.** Fibrous compns. contg. rubber (Brit. pat. 398,319) 25. [Rubber] coated fabrics (Brit. pat. 397,506 and Ger. pat. 588,282) 25. Bandages [of unvulcanized crude rubber] (Brit. pat. 397,604) 17. Compn. for coating rubber (Ger. pat. 589,248) 29. Compound sheet material [of paper and rubber latex] (Australian pat. 9851/32) 23.

**Rubber.** Rubber Growers' Association, Inc. and George Martin. Brit. 396,880, Aug. 17, 1933. Coagulum in crumb or powder form is produced by adding substances to latex which render the wet coagulum short and weak, coagulating, creping by passing several times through rolls the spacing of which decreases as the operation proceeds and disintegrating the shredded crepe. The addns. may be substantial amts. of mineral compounding ingredients, e. g., china clay, C black, ZnO or substances that dissolve in the rubber, e. g., oleic and stearic acids, NH<sub>4</sub> stearate, linseed and palm oils, lecithin and other higher fatty acid compds. Disintegration is preferably by rubbing the crepe through a sieve, a dusting powder, e. g., talc, Zn stearate, powd. antioxidants, S, accelerators such as lecithin, being used to prevent subsequent coherence of the particles.

**Rubber.** Thomas J. Drakeley, Frank H. Cotton and David Bridge & Co., Ltd. Brit. 398,306, Sept. 14, 1933. Rubber is masticated or worked in an atm. of N, flue gas, CO<sub>2</sub> or other inert gas. This reduces softening and loss of nerve and is specially applicable to heavily loaded mixes. Cf. C. A. 27, 3863.

**Rubber compositions.** Dunlop Rubber Co., Ltd. and Anode Rubber Co. (England) Ltd. Ger. 587,397, Nov. 3, 1933. Addn. to 582,982 (C. A. 27, 6019). See Brit. 351,938 (C. A. 27, 443).

**Rubber compositions.** Soc. anon. des pneumatiques

**Dunlop.** Fr. 751,093, Aug. 26, 1933. Compns. having a basis of vulcanized rubber are protected by incorporating therewith a product obtained by condensing an aliphatic amino compd. contg. several OH group, such as di- or tri-hydroxyethanolamine, with a compd. contg. an imino group, i. e., a secondary amine, such as phenyl- $\alpha$ -naphthylamine or phenylene- $p$ -di- $\beta$ -naphthylamine. The compds. are treated with an isocyanate or isothiocyanate of an org. radical (Ph or naphthyl) before incorporation in the compns.

**Rubber compositions.** International Latex Processes Ltd. Fr. 751,307, Aug. 31, 1933. Compns. are made by mixing asbestos fiber with flocculent or granular ppts. obtained from aq. emulsions or dispersions of rubber. The ppts. are obtained by coagulating rubber latex in the presence of a relatively large amt. of water and in the presence or not of substances retarding coagulation.

**Preserving rubber.** Waldo L. Semon (to B. F. Goodrich Co.). U. S. 1,940,815, Dec. 26. Substances such as phenyl- $\alpha$ - or - $\beta$ -naphthyl- $p$ -phenylenediamine, di- $\alpha$ - or - $\beta$ -naphthyl- $p$ -phenylenediamine in which the aryl groups are attached to different N atoms are used as preservatives in rubber compns. U. S. 1,940,816 relates to preserving rubber by treatment with the reaction product of a non-accelerating secondary aromatic diamine such as diphenyl- $p$ -phenylenediamine with S or S chloride. U. S. 1,940,817 relates to preserving rubber with the addn. product of  $\beta$ -naphthol and ditolylamine. U. S. 1,940,818 relates to preserving rubber by use of a secondary monamine in which one of the groups attached to the amino N consists of 2 distinct, but directly connected, aromatic ring structures, such as  $\beta$ -naphthyl-biphenylamine. U. S. 1,940,819 relates to the similar use of a secondary amino biaryl compd. such as dibiphenyl- $p$ -phenylenediamine. Cf. C. A. 27, 5217.

**Preserving rubber.** Arthur W. Sloan (to B. F. Goodrich Co.). U. S. 1,940,824, Dec. 26. A secondary amino deriv. of a poly-aryl methane, such as diphenyldiaminodiphenylmethane, is used as a preservative agent.

**Preserving rubber.** Webster N. Jones (to B. F. Goodrich Co.). U. S. 1,941,012, Dec. 26. Deterioration is retarded by adding to rubber compns. about 0.5% of the condensation product of di- $p$ -tolylethylenediamine with alkol.

**Preserving rubber.** Röbel & Fiedler G. m. b. H. Ger. 585,448, Oct. 4, 1933. Deterioration of rubber after vulcanization is retarded by impregnating the crude rubber with three reagents, viz. (1) a nitrile, amine, aminophenol or aminonaphthol or a deriv. thereof other than a nitro deriv., (2)  $H_2S$ , HCN or a cyanide or sulfide, e. g.,  $NH_4HS$ , and (3) an aliphatic or aromatic aldehyde or ketone or a deriv. thereof. The crude rubber may be purified and dissolved in  $CH_2Cl_2$  and the soln. mixed with solns. of the impregnating substances.

**Rubber solutions.** Immalin-Werke chem. Fab. Eisend-rath G. m. b. H. Ger. 585,405, Oct. 3, 1933. See U. S. 1,909,219 (C. A. 27, 3854).

**Concentrating aqueous rubber dispersions.** Henry B. Townsend (to Vultex Corp. of America). U. S. 1,939,635, Dec. 12. In purifying vulcanized rubber latex, most of the vulcanized rubber particles are sepd. from associated serum and from a large proportion of non-rubber substances; proteins and water-sol. components, excess vulcanizing agents and by-products are removed by washing with water and  $NH_3$ , without adding other extraneous non-rubber components.

**Rubber goods from aqueous dispersions.** Wilfred H. Chapman and Donald W. Pounder (to Dunlop Rubber Co., Ltd.). U. S. 1,941,200, Dec. 26. An emulsion or dispersion of rubber or the like is rendered heat-sensitive and shaped while still in the fluid state and then gelled by the action of a heating medium such as steam.

**Multicellular rubber.** Soc. anon. des établissements Hutchinson. Fr. 754,302, Nov. 6, 1933. Rubber objects during vulcanization are submitted to a vacuum to accelerate the formation of cells by an appropriate difference of pressure.

**Chlorinated rubber and other compounds.** I. G. Far-

benind. A.-G. Fr. 755,486, Nov. 25, 1933. Compds. obtained by chlorinating rubber, paraffins, waxes, fats, oils, colophony, higher fatty acids, resinous acids and naphthenic acids are rendered stable by the addn. of derivs. of ethylene oxide, e. g., epichlorohydrin, phenoxypropene oxide, dimethylglycidol or phenylmethylglycidol. Cf. C. A. 27, 4439.

**Sulfonating rubber.** I. G. Farbenind. A.-G. (Erich Konrad and Helmut Kleiner, inventors). Ger. 585,622 and 585,623, Oct. 6, 1933 (Cl. 39b. 3). Addns. to 582,505 (C. A. 28, 686<sup>3</sup>). The sulfonation process described in Ger. 582,565 is applied to synthetic rubber prep'd. from butadiene hydrocarbons or from mixts. of these with other polymerizable substances (585,622). The ester or ether used in the process of Ger. 582,565 may be replaced by an aliphatic alc. of more than 8 C atoms with or without a diluent. \* The products are useful in the textile industry or as tanning agents (585,623).

**Apparatus for handling and cutting rubber.** Henry H. McGregor and Knut E. Eck (to Firestone Tire & Rubber Co.). U. S. 1,941,099, Dec. 26. Mech. features.

**Expanding and sponging molded products such as rubber compositions.** Clarence B. Siegfried (to Construction Materials Patents, Inc.). U. S. 1,941,420, Dec. 26. A plastic mixt. contg. a gas-forming material is fed to a vulcanizer in which a vacuum is formed concomitantly with vulcanization. App. is described.

**Compound rubber sheet materials.** Marcel Dupret Brit. 398,780, Sept. 21, 1933. Addn. to 396,503 (C. A. 28, 686<sup>9</sup>). An aq. rubber suspension other than latex is used instead of latex in at least 1 stage of the process of 396,503.

**Rubber articles.** Soc. anon. Septa. Fr. 754,839, Nov. 14, 1933. Liquid latex or other aq. dispersion of rubber is spread on a plate to produce a dry rubber sheet which is combined with a reinforcing product, with latex as adhesive.

**Cellular rubber articles.** Soc. belge du caoutchouc-Mousse. Ger. 584,891, Sept. 26, 1933 (Cl. 39b. 9). Addn. to 575,440 (C. A. 27, 3638). The process of Ger. 575,440 is modified by uniting the partly vulcanized and expanded rubber with other materials, e. g., metals, fabrics or non porous hard rubber. Vulcanization is then completed as described in Ger. 575,440.

**Spongy rubber articles.** Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 587,664, Nov. 7, 1933 (Cl. 39b. 9). Addn. to 551,467 (C. A. 26, 4505). See Brit. 365,546 (C. A. 27, 2340).

**Porous rubber diaphragms, filters, etc.** Julius Neuhaus Brit. 398,349, Sept. 14, 1933. See Fr. 743,485 (C. A. 27, 3855).

**Luster finish on rubber articles.** Edward E. McKay (to Revere Rubber Co.). U. S. 1,940,315, Dec. 19. The surface of a rubber article such as a water bottle or bathing cap is sprayed with a mixt. of low-viscosity colored rubber ink and uncolored Al powder and is treated with S chloride.

**Rubber threads.** Ernest J. Joss (to International Latex Processes, Ltd.). Brit. 397,419, Aug. 24, 1933. Rubber thread of reduced cross-sectional dimension is made from thread of greater cross section by stretching the unvulcanized or partly vulcanized thread and then partially or wholly relieving the stresses while in the extended condition, preferably by the action of heat.

**Rubber threads, filaments or tubes from rubber dispersions.** The Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 585,447, Oct. 4, 1933. See Brit. 393,057 (C. A. 28, 374<sup>3</sup>).

**Rubber coverings.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 398,477, Sept. 11, 1933.  $C_6H_6$ -rubber solns. are rendered sprayable by dilg. to the approximate d. of  $H_2O$  with  $C_6H_6$ , etc., and adding protective colloids or emulsifying agents, e. g., soaps, mineral or vegetable oils, fats. In an example a mix of rubber 55,  $ZnO$  35, S 3, an accelerator 1.5 and an oil 5.5 parts is dissolved in 4.5 times its wt. of solvent.

**Coating fabrics.** Dunlop Rubber Co. Ltd., The Anode

Rubber Co. Ltd., Edward A. Murphy and David N. Simmons. Brit. 397,907, Sept. 7, 1933. Fabrics are coated by spreading, brushing or spraying with flocculent ppts. of rubber, obtained by coagulating largely dild. rubber dispersions with acids, *e. g.*, AcOH, salts, *e. g.*, ZnSO<sub>4</sub>, MgSO<sub>4</sub>, and metallic salts produced *in situ*, in presence or absence of substances having a restraining effect on the coagulation, *e. g.*, KOH, casein, Na aluminate, glue, gum acacia. The ppt. may be filtered, *e. g.*, by ceramic material, cotton fabric, wire gauze. Vulcanizing and compounding agents may be added to the dispersion or ppt. Cf. C. A. 28, 1223<sup>7</sup>.

Apparatus for coating or impregnating sheet materials such as paper, cloth or cotton batting with rubber compositions, etc. Carlton W. Crumb and Frank M. Saunders (Crumb to Oliver United Filters Inc., and Saunders to St. Clair Rubber Co.). U. S. 1,939,842, Dec. 19. Structural and mech. details.

Rubber-covered wooden rolls. Charles Berlow (to American Wringer Co.). U. S. 1,939,948, Dec. 19. Rolls such as those for use in paper manuf. have a natural wooden body portion with a rubber covering vulcanized to the wood at a temp. below its charring point.

Treating shoe socks with rubber dispersions. Douglas F. Twiss and Edward A. Murphy (to Dunlop Rubber Co. Ltd.). U. S. 1,941,120, Dec. 26. A fibrous structure which may be formed of and which is substantially of the size and shape of a shoe sock to be made is dipped into a foamed aq. dispersion of rubber material to enclose the surface and edges, and is then caused to set and dry.

Pressed rubber footwear. Henry C. L. Dunker. U. S. 1,939,440, Dec. 12. Various details of manuf. are described.

Insulating splices in rubber-insulated wire. Edward H. Darby (to American Anode, Inc.). U. S. 1,939,843, Dec. 19. The cut surfaces of the rubber insulation are coated with cement, the exposed metal of the wire is coated with Zn; rubber is deposited on the material by electro-deposition from an aq. dispersion, and is dried and vulcanized.

Inserts for shoes, etc. Magyar Ruggyantáru gyár Rt. (to The Anode Rubber Co. Ltd.). Brit. 397,700, Aug. 31, 1933. Shoe insertions and heel cushions, arch supports, etc., for treatment and care of the feet are made of sponge or cellular unmanipulated rubber having a porous superficial skin. Latex is mixed with other known ingredients, whipped into a cream 5 times the original vol., ZnO and Na<sub>2</sub>SiF<sub>6</sub> are added and the foam is poured into molds and vulcanized at 100°.

Balls. St. Mungo Manufacturing Co. Ltd., Reginald C. Swabey and Geo. Bottomley. Brit. 397,944, Sept. 7, 1933. Golf balls and the like are provided with a mobile central core comprising a soln. of approx. 14.5% concd. size powder in approx. 85.5% H<sub>2</sub>O. ZnO or other powder may be added to the soln. to vary the sp. gr.

Balls. Dunlop Rubber Co. Ltd. and Leo V. Kenward. Brit. 398,580, Sept. 21, 1933. A covering for tennis, etc., balls is provided by assembling on an adhesive surface substances in suitably divided form, *e. g.*, powd. metal, cork dust, wood flour, comminuted cotton or flock, the adhesive surface being formed by an adhesive, *e. g.*, rubber (soln. or latex), gutta-percha, balata, celluloid, cellulose, varnish, resins, linseed oil, glue, gelatin, which sets or otherwise changes in state by suitable treatment, *e. g.*, by heating or vulcanization. The adhesive may be applied to the surface of the ball or to textile material to be applied thereto.

Golf ball. Alexander Munro (to St. Mungo Mfg. Co. of America). U. S. 1,940,009, Dec. 19. A cover of vulcanizable material is molded upon a ball core under controlled heat and pressure conditions preclusive of vulcanization; the ball is removed from the mold, and accelerating fluid is applied to the cover and the latter is then vulcanized.

Cellular rubber balls and similar articles containing closed gas cells. Maurice P. H. L. Rupeaet (to Société belge du caoutchouc-Mousse). U. S. 1,941,053, Dec. 26.

Various details of manuf. are described. Cf. C. A. 27, 3638.

Adhesive from rubber latex. Imperial Chemical Industries Ltd. Ger. 585,446, Oct. 4, 1933. See Brit. 357,238 (C. A. 27, 441).

Rubber tubing. Paul A. Raiche (to Davol Rubber Co.). U. S. 1,940,145, Dec. 19. Raw rubber is wound in spiral form and the seam formed by the contiguous ribbon edges is subjected to rapid hammer impacts to produce a weld. App. is described.

Device for producing rubber tubes, etc. New York Belting and Packing Co. Ger. 585,540, Oct. 11, 1933.

Utilizing waste rubber. Maximo L. Gomez. Brit. 397,669, Aug. 31, 1933. Boot and other soles are made by cutting rough blanks from tire covers, enclosing them in a patterned mold, subjecting the mold to 2.7 atm. steam pressure in an autoclave 20 min., removing from the autoclave and maintaining the pressure another 20 min. A sheet of rubber cut from an inner tube may be placed in the mold with the blank so as to cover the unornamented side and overlap the edges.

Floor-covering material comprising fiber and rubber. Gerald F. Cavanagh and Albert B. Schultz (to Ohio Rubber Co.). U. S. 1,939,293, Dec. 12. Various details of vulcanization and molding are described.

"Artificial turf" from rubber and fiber. Frank Fenton (to B. F. Goodrich Co.). U. S. 1,939,846, Dec. 19. A product which resembles turf in appearance is made by pressing unwoven fibrous material such as rubberized threads against the surface of an unvulcanized rubber compn., and then vulcanizing.

Artificial rubber. Victor Kaufmann. Brit. 399,009, Sept. 28, 1933. Artificial rubber is freed from unstable Cl compds. by treatment with H<sub>2</sub>O or steam at ordinary or raised pressure in presence of hydroxides, carbonates or other substances neutralizing HCl. Mixts. of the product with natural rubber are readily vulcanized in presence of accelerators. *E. g.*, 1000 kg. of artificial rubber (sulfurized oil) is damped with H<sub>2</sub>O, 30 kg. chalk added and the whole steamed at 3 atm. for 2.5 hrs., the H<sub>2</sub>O is drained off and the rubber dried. Seventy kg. of the product, mixed with rubber 100, lithopone 50, zinc white 30, S 4 and accelerator 0.5 kg., vulcanizes well at 145° in 15-20 min.

Rubber-like products containing styrene polymerizates. Eduard Tschunker and Walter Bock (to I. G. Farbenind. A.-G.). U. S. 1,938,730, Dec. 12. A polymerizate derived from a compd. such as butadiene is uniformly interpenetrated with a polymerizate derived from a polymerizable styrene compd. such as  $\alpha$ -methylstyrene (suitably so that the polymerizate mixt. contains about 45% of the styrene polymerizate); the mixt. is treated with a vulcanizing agent such as S and ZnO, etc., and with a finely divided soot 20-70% and the mixt. is vulcanized. The product thus formed is of good strength and elasticity.

Rubber-like products containing styrene polymerizates. Eduard Tschunker and Walter Bock (to I. G. Farbenind. A.-G.). U. S. 1,938,731, Dec. 12. A heat or emulsion polymerizate derived from a compd. such as butadiene is combined with a heat or emulsion polymerizate derived from a vinyl benzene hydrocarbon in a proportion of the latter of less than 45%. This mixt. may be vulcanized in the presence of lampblack, etc.

Rubber-like products containing olefin naphthalene polymerizates. Kurt Meisenburg and Walter Bock (to I. G. Farbenind. A.-G.). U. S. 1,938,751, Dec. 12. A heat or emulsion polymerizate derived from a compd. such as 1,3-butadiene is mixed with a somewhat smaller proportion of a heat or emulsion polymerizate derived from a vinyl naphthalene hydrocarbon such as  $\alpha$ -vinyl-naphthalene to obtain a product which has good strength when vulcanized.

Rubber vulcanization accelerators. Albert F. Hsman (to Kelly-Springfield Tire Co.). U. S. 1,939,600, Dec. 19. Ultra-accelerators which may be used without premature vulcanization are prepd. by bringing together

in soln. an alkali metal salt of a monobasic dithiocarboxylic acid such as  $\text{NH}_4$  dithiofuroate and an alkali metal salt of a halogen-substituted aliphatic acid such as  $\text{NH}_4$  chloroacetate and treating with an acid such as  $\text{HCl}$ . Several examples of the prepn. and use of these accelerators are given.

**Vulcanization accelerators.** Schering-Kahlbaum A.-G. Brit. 398,118, Sept. 7, 1933. The vulcanization of rubber is accelerated by adding to the mix mixed dithiocarbamates of the formula  $\text{RR}'\text{NCSSHR}''\text{R}'''\text{NH}$ , in which R and R' are the same or different C-contg. residues which are closed to form a ring and R'' and R''' are the same or different C-contg. residues which are also closed to form a ring, R and R' always being different from R'' and R'''. Both rings may carry further substituents. Compds. mentioned are cyclohexylaminepentamethylene dithiocarbamate (I) and cyclohexylethylaminepentamethylene dithiocarbamate. They are prepd. by the reaction of  $\text{CS}_2$  with or without solvents, with an equimol. mixt. of piperidine (II), or homologs thereof, and other primary or secondary bases or by reaction of free dithiocarbamic acids with a base different from the corresponding starting base. Thus  $\text{CS}_2$  and an equimol. mixt. of II and cyclohexylamine give I together with a little piperidine cyclohexyldithiocarbamate. Pure I may be obtained by recrystn. from alc. or  $\text{Me}_2\text{CO}$ .

**Vulcanizing rubber.** I. G. Farbenind. A.-G. (Walter Huhn, inventor). Ger. 585,696, Oct. 23, 1933. In vulcanizing natural or synthetic rubber, thiuram sulfides are used as accelerators. Thus, rubber is vulcanized by S,  $\text{ZnO}$  and tetramethylthiuram disulfide. Cf. C. A. 28, 932<sup>6,7</sup>

**Rubber vulcanization.** Ira Williams (to E. I. du Pont de Nemours & Co.). U. S. 1,938,651, Dec. 12. Accelerators are used of the general formula  $\text{R}'\text{R}''\text{NCSSA}$ , in which R' and R'' each represent an alkyl group at least one of which contains a straight chain of at least

4 C atoms and Arep resents an alkali metal, e. g., K, butyl- or Na diheptyl dithiocarbamate.

**Rubber vulcanization.** Ira Williams and Arthur M. Neal (to E. I. du Pont de Nemours & Co.). U. S. 1,940,280, Dec. 19. A small proportion of butyl-substituted  $\text{NH}_4$  acetate together with tetramethylthiuram monosulfide or mercaptobenzothiazole is used for accelerating vulcanization.

**Rubber vulcanization.** Marion W. Harman (to Rubber Service Laboratories Co.). U. S. 1,941,146, Dec. 26. An accelerator is used comprising a reaction product of a ketone amine and a mercaptoaryltriazole, e. g., the reaction product derived from diacetoneamine and a mercaptobenzothiazole. Cf. C. A. 28, 376<sup>8,9</sup>.

**Vulcanizing tires.** The Goodyear Tire & Rubber Co. Brit. 397,508, Aug. 23, 1933. The use of air-bags in vulcanizing tires is obviated by applying a layer of a gas-impermeable compn. to the surface to be subjected to gas pressure. A suitable compn. is gelatin 22.9,  $\text{H}_2\text{O}$  35.1, PhOH 7.8, alc. 18.0 and glycerol 15.3 parts; this is spread as a thin film and allowed to dry before vulcanizing.

**Apparatus for vulcanizing rubber hose.** George K. Bedur (to B. F. Goodrich Co.). U. S. 1,939,871, Dec. 19. Mech. features.

**Apparatus for vulcanizing rubber tires.** Fred J. Beighey (to Morgan & Wright). U. S. 1,938,794, Dec. 12. Mech. features. Cf. C. A. 27, 632.

**Press for vulcanizing rubber tires and tubes.** Peter De Mattia (to National Rubber Machinery Co.). U. S. 1,939,670, Dec. 19. Mech. features.

**Securing tread or intermediate soles of macroporous or microporous rubber to the uppers by vulcanization.** Hans Rollmann. Brit. 397,579, Aug. 31, 1933.

**Yellow- and orange-colored vulcanized rubber.** Winfrid Hentrich, Max Hardtmann and Peter Backes (to General Aniline Works). U. S. 1,940,053, Dec. 19. See Ger. 566,725 (C. A. 27, 2601).



# CHEMICAL ABSTRACTS

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## I—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Aluminum in the construction of apparatus for chemical industry. P. Urech. *Tech.-Ind. Schweiz. Chem.-Ztg.* 16, 191 7, 214-17(1933).

The graduation of glassware. Eric F. Hersant. *Pharm. J.* 131, 553(1933).—Distinction is made between the regular l. measure (= 1000.000 ml. = 1000.028 cc.) and the now rarely used "Mohr l." (= 1002.02 ml. = 1000 "G. W. A." units). A Mohr l. is the vol. occupied by 1 kg. H<sub>2</sub>O at 17.5°.

Comparison of constancy of gold- and chromium-plated analytical weights. Harvey V. Moyer and Paul K. Winter. *Ind. Eng. Chem.* 26, 238(1934).—After a year's use in the student lab. Cr-plated gold wts. were close to their adjusted values, whereas most reconditioned Au-plated wts. were seriously in error.

A new drier for granular or pulverized materials. *Revue. universelle mines* 9, 612-13(1933).—App. described for drying slimes and other watery residues in a chamber in which heated blades or other metallic parts rotate and dry the material by bringing it into intimate contact with the heated parts.

Description of a simple extractor using solvents heavier than water. W. L. Dulière. *Compt. rend. soc. biol.* 115, 257-6(1934).—One cut.

A gas buret. John Hume. *Chemistry & Industry* 1934, 47.—A double-tube app. is described, the smaller tube being graduated for accurate readings.

Gas analysis with a modified Orsat apparatus. A. C. Egerton and F. L. Smith. *J. Sci. Instruments* 11, 28 (1934).—Egerton and Pidgeon (*C. A.* 26, 2897) have described a gas pipet in which the absorption of each gas is hastened by introducing the absorbant in the form of spray from a fountain. In ordinary gas analysis less accuracy is required than that obtainable with this pipet, and an app. like that of Orsat has been devised in which CO<sub>2</sub>, O and CO can be detd. in a mixt. during about 10 min. In the Orsat app., the usual absorption bulb has been replaced by a pipet and the absorbant enters the pipet as from a fountain. The measuring pipet is jacketed with water, and ammonia is recommended as confining liquid. Its vapor tension is negligible at room temp., the meniscus is shallow and easy to read and there is less tendency for drops of liquid to adhere to the sides of the vessel. Probably it would not work as well if hydrocarbons are present in the analyzed.

A vessel for acid-alkali titrations. J. Jackson. *Chemistry & Industry* 1934, 36.—The app. is for making titrations with exclusion of air.

Apparatus for the separation of liquid or solid suspensions from gases and their determination. A. Blackie. *J. Soc. Chem. Ind.* 53, 11-12T(1934).—The gas impinges as a jet on the inner surface of a glass bulb. With dust suspensions it is necessary to moisten either the dust or the surface of deposition.

An apparatus for the determination of density. Noel Deerr. *Intern. Sugar J.* 35, 476-7(1934).—The app. consists of a hydrometer jar provided with a rectangular slot in its upper portion which acts as a weir, over which the liquid is allowed to flow. At a distance of 1 cm. above the level of the overflow a fine horizontal line is engraved round the cylinder, while the foot of the cylinder is ground parallel to this line. By means of a tubulure and an

attached funnel the cylinder can be overflowed at will, and the reading taken. The readings, can be made with an accuracy of 0.01%.

Procedure for the preparation of uniform nephelometric suspensions. Arthur F. Scott and Frank H. Hurley. *J. Am. Chem. Soc.* 56, 333-5(1934).—A device is shown and described by which the reagent can be added in exactly the same way in every analysis so that no error will be introduced in the measurement of the optical properties of AgCl as a result of a varying rate of adding the AgNO<sub>3</sub>.

A combined vacuum and pressure gage. Noel Deerr. *Intern. Sugar J.* 36, 23(1934).—The device consists of 2 connected glass tubes with Hg reservoirs, so arranged that either pressure or vacuum can be detd. at will.

New types of dust collectors. N. P. Okulov. *Tsvetnaya Metall.* 1933, No. 1, 69 86.—Descriptive.

A study of a sensitive manometer due to Albert Griffiths. P. C. Vincent. *Proc. Phys. Soc. (London)* 45, 808-32 (1933).—The difference in the ds. of H<sub>2</sub>O and a dil. aq. soln. of uranin is utilized in a manometer capable of measuring pressure differences of 2 dynes per sq. cm.

Official introduction of a new hundred point for the Ventzke-scale saccharimeters and its significance for analysis and scientific measurements. K. Šandera. *Chem. Obzor* 8, 244-5(1933).—By the recognition of a long-established error of 0.1° in the hundred point of saccharimeters the 8th international commission for uniform methods of sugar analysis was successful in removing the uncertainties in using this app. not only for sugar-house control, but also in general analytical and scientific work.

Universal camera and self-indicating rotating crystal camera. Erwin Sauter. *Z. physik. Chem.* B23, 370-8 (1933).—The construction and operation of the x-ray camera previously described (*C. A.* 27, 3643) is given in detail.

Design of town gas-fired furnaces. F. L. Atkin. *Gas J.* 205, 104 7, 152-3(1934).—See *C. A.* 28, 286°.

Powdered-coal furnaces for unground dust. O. Haller. *Arch. Warmewirt.* 15, 43-6(1934).—By the use of a perforated refractory hearth through which air is admitted, and by firing downward, it has been found possible to burn coal fines up to 0.3 cm. without grinding. Results are given for inclined and vertical water-tube boilers, and for fire-tube boilers with dutch oven.

A thermostat for higher temperatures. Břetislav G. Šimek and Jevgenij Zamrzla. *Mitt. Kohlenforschungsinst. Prag.* 1933, 485-9.—The thermostat is based on the principle that if the pressure on a boiling liquid is held const. to within 1 mm. Hg, the temp. of the thermostat, which is heated by satd. vapor, can be held const. to within 1/10°. A vacuum regulator is used to regulate the pressure. A diagram shows the satn. pressures of several liquids suitable for thermostat material. By using a suitable construction material, liquid and condensation temp. this principle can be applied to the regulation of very low or relatively high temps.

Marion E. Headington

The pneumodynamometer (Borasio, De Rege) 12.

Handbuch der chemisch-technischen Apparate. Edited by A. J. Kleser. Tl. III. Destillierapparate—Druckregler. Leipzig: Otto Spamer. 90 pp. M. 8.50. Cf. C. A. 27, 1240.

Air filter. Stig G. Sylvan (to American Air Filter Co.). U. S. 1,941,450, Jan. 2.

Air filter. Hans Wittemeier and Willy Neumann (Wittemeier to Midwest Mfg. Co.). U. S. 1,941,524, Jan. 2.

Cells for rotary suction filters. Maschinenfabrik Buckau R. Wolf A.-G. Ger. 587,642, Nov. 6, 1933 (Cl. 12d. 16.02).

Textile filter tube for liquids. Société des établissements Daubron. Ger. 587,887, Nov. 13, 1933 (Cl. 12d. 19).

Filtering material. Jesus de la Torre (to J. de La Torre e Hijo). U. S. 1,943,165, Jan. 9. A material suitable for filtering liquids comprises a thoroughly degreased woven fabric body of readily permeable vegetable fibers such as cotton duck or canvas. Cf. C. A. 27, 5221.

Funnel (with a central "breather tube"). Louis Green. U. S. 1,942,282, Jan. 2.

Centrifugal steam separator. Alan Urquhart. Brit. 398,363, Sept. 14, 1933.

Process and apparatus for separating granular materials of different specific gravities. Hans Heidenreich. Brit. 399,294, Oct. 5, 1933.

Apparatus for classifying particles of different specific gravities, comprising a bowl classifier superposed on a secondary compartment which is preferably a rake classifier. The Dorr Co., Inc. Brit. 398,579, Sept. 21, 1933.

Apparatus for separating particles such as fibers from liquids by suction and flotation. Adolf M. R. Karlström. U. S. 1,943,180, Jan. 9. Numerous structural and operative details are described.

Blower-type separator suitable for cleaning air, etc. Stig G. Sylvan (to American Air Filter Co.). U. S. 1,941,449, Jan. 2. Structural and mech. details.

Sifting or bolting machine. Frank Pascall. Brit. 399,300, Oct. 5, 1933.

Three-way mixing cock, e. g., for air and combustible gas. Walter Jönsson and Selas A.-G. Brit. 399,396, Oct. 5, 1933.

Self-regulating siphon overflow. James P. Wells. Brit. 399,080, Sept. 28, 1933.

Apparatus suitable for distillation in a high vacuum. Kenneth C. D. Hickman (to Eastman Kodak Co.). U. S. 1,942,858, Jan. 9. Liquid to be distd. is dropped onto an internally heated corrugated cascade dome surrounded by a chamber which can be evacuated and is provided with outlets for the distn. products.

Weighing apparatus arranged for testing the moisture content of sand, etc. Edward G. Thomas (to Toledo Scale Mfg. Co.). U. S. 1,941,818, Jan. 2. Various mech. and operative details are described.

Surface condenser suitable for condensing steam, etc. Karl Baumann (to Westinghouse Elec. & Mfg. Co.). U. S. 1,941,650, Jan. 2.

Steam boiler and mercury condenser. Charles E. Lucke (to Babcock & Wilcox Co.). U. S. 1,941,480, Jan. 2.

Remote temperature indicator. Clarence A. de Giers (to Richard C. Murphy). U. S. 1,943,267, Jan. 9. Structural and operative details.

Thermocouple pyrometer. Horace N. Packard (to Cambridge Instrument Co.). U. S. 1,942,519, Jan. 9.

Thermometer. Harry D. Bolton (to Taylor Instrument Cos.). U. S. 1,942,006, Jan. 9. Structural details.

Thermometer for measuring the temperature of the skin. Bradford Noyes, Jr., (to Taylor Instrument Cos.). U. S. 1,942,516, Jan. 9. Structural features of thermocouples, etc. U. S. 1,942,517 also relates to structural details of thermometers.

Turbidimeters (smoke detectors). Walter Kidde & Co., Inc. Brit. 399,449, Oct. 5, 1933.

Viscosimeters. John G. A. Rhodin. Brit. 399,802, Oct. 11, 1933.

Evaporator suitable for use as a salt crystallizer. Martin J. Kermer (to Buffalo Foundry & Machine Co.). U. S. 1,941,693, Jan. 2.

Spray evaporators. Norsk Hydro-Elektrisk Kvælstof-Aktieselskab. Brit. 399,764, Oct. 12, 1933.

Tubular heaters such as Mantius-type evaporator tubes. Thomas Griswold, Jr. (to Dow Chemical Co.). U. S. 1,942,094, Jan. 9. Structural features.

Pneumatic drier. Paul Rosin and E. Rammler. Ger. 587,874, Nov. 9, 1933 (Cl. 82a. 1.02).

Apparatus for drying grain or like granular materials. John Murphy and The Bandon Milling & Electric Lighting Co. Ltd. Brit. 398,628, Sept. 21, 1933.

Open-hearth furnace operation. Arthur J. Boynton (to Open Hearth Combustion Co.). U. S. 1,942,682, Jan. 9.

Various details of furnace construction and draft control are described.

Hot-blast stove construction and operation. Frank R. McGee. U. S. 1,942,702, Jan. 9. Various structural and operative details.

Furnace operation with pulverized fuel. Fred H. Daniels (to Riley Stoker Corp.). U. S. 1,942,687, Jan. 9.

Fusion of ash is avoided in a main furnace combustion chamber, but sufficient addnl. fuel is burned in suspension in the furnace ash pit to melt the ash and the latter is removed in liquid form. Various structural and operative details are described.

Gas-fired retort and other furnaces. Charles C. Carpenter, Arthur H. Andrews and South Metropolitan Gas Co. Brit. 399,948, Oct. 19, 1933.

Gaseous, liquid- and powdered-fuel annealing and other furnaces. Ernest E. Lucas. Brit. 398,391, Sept. 14, 1933.

Gas, oil and pulverulent-fuel furnaces in which primary air is supplied to the burner and secondary air to the furnace, provided with means for controlling the air supplies simultaneously in opposite senses so as to leave the total supply constant. Soc. anon. des fours spéciaux. Brit. 399,720, Oct. 12, 1933.

Apparatus for indicating and recording the temperature of the charge within a furnace. Edward P. Jones. Brit. 399,541, Oct. 5, 1933.

Arrangement for measuring deviations of temperature in a thermostatically controlled furnace. Lionel F. Prosser. Brit. 399,641, Oct. 12, 1933.

Apparatus for controlling furnaces by variations of the gas pressure within the furnace chamber. Geo W. Smith. Brit. 398,198, Sept. 7, 1933.

Rotary grates for furnaces, gas producers, etc. Charles Groll. Brit. 399,083, Sept. 28, 1933.

Open-top tilting boiling pan or digester. Francis B. Kern and Thomas E. French (to Aluminium Plant & Vessel Co. Ltd.). U. S. 1,942,818, Jan. 9, Brit. 398,879, Sept. 25, 1933. Structural and mech. details.

Thermally actuated valve device for use with gas burners. Radiation Ltd. and Robert Poole. Brit. 398,964, Sept. 28, 1933.

Thermally operated regulating device for controlling the supply of gas to cookers, etc. Radiation Ltd. and Harry J. Yates. Brit. 399,266, Oct. 5, 1933.

Heat regenerator for use with furnaces. Harold Etherington (to A. O. Smith Corp.). U. S. 1,941,970, Jan. 2.

Heat exchangers such as recuperative air heaters. The Underfeed Stoker Co. Ltd., Walter F. Harlow and Arthur E. Bingham. Brit. 399,862, Oct. 16, 1933.

Indirect heat-exchange apparatus suitable for heating air with steam or hot water. R. Harry Stone and Edwin F. Tilley (to Titeflex Metal Hose Co.). U. S. 1,941,587, Jan. 2. Structural and mech. features.

Plate heat exchangers. Owen D. Lucas and The Whessoe Foundry & Engineering Co. Ltd. Brit. 399,186, Sept. 25, 1933.

Casings and headers for heat exchangers. Fred Hepworth. Brit. 399,690, Oct. 12, 1933.

Concentric tubular heat exchangers. Compagnie des

- Surchauffeurs (to The Superheater Co. Ltd.). Brit. 399,735, Oct. 12, 1933.
- Gilled tubes for heat exchangers. Wm. Mills Ltd. and John F. Paige. Brit. 399,995, Oct. 19, 1933.
- Heat-storing apparatus. Archibald A. H. Douglas. Brit. 398,927, Sept. 28, 1933. The app. comprises an assembly of sealed tubes contg. a substance, e. g., paraffin, stearin, stearic acid,  $C_{10}H_8$ , beeswax,  $FeSO_4$ ,  $MgSO_4$ , with a high latent heat of fusion which is melted by passing a hot liquid through the spaces between the tubes, and the absorbed latent heat is thereafter transmitted to a colder liquid.
- Heat-transmitting media. Owen D. Lucas and The Whessoe Foundry & Engineering Co. Ltd. Brit. 398,492, Sept. 11, 1933. A compn. for use in transmitting heat in systems such as described in Brit. 336,209 (C. A. 25, 2279) and 360,816 (C. A. 27, 876) is made by melting diphenyl oxide (I) with 2  $C_6H_5$  derivs., 1 of which has an amine group. I 60, diphenylamine 30 and  $C_{10}H_8$  10 and I 70,  $PhNH_2$  20 and  $C_{10}H_8$  10% are given as examples which yield products melting at 4° and 6° and boiling at 246° and 212°, resp.
- Cathode-ray tubes for television, picture-telegraph or like receivers. John C. Batchelor (to Marconi's Wireless Telegraph Co. Ltd.). Brit. 399,961, Oct. 19, 1933.
- X-ray tube. Louis F. Ehrke (to Westinghouse Lamp Co.). U. S. 1,941,975, Jan. 2.
- X-ray tube and associated apparatus. Charles Fayer (to Wappler Elec. Co.). U. S. 1,941,978, Jan. 2.
- Soft x-ray tube. Charles M. Slack (to Westinghouse Lamp Co.). U. S. 1,942,007, Jan. 2.
- Light-sensitive cell. Arthur W. Carpenter (to United Research Corp.). U. S. 1,942,958, Jan. 9. Structural details.
- Light-sensitive device. Samuel Ruben. U. S. 1,941,194, Jan. 2. A photosensitive electrode has a Cu base and a thermally integrally formed etched cryst.  $Cu_2O$  surface and may be used with a cooperating electrode of Cu and an electrolyte such as lactic acid. Various modifications also are described.
- Photoelectric cell. George R. Stilwell (to Bell Telephone Laboratories, Inc.). U. S. 1,942,501, Jan. 9. Structural features.
- Thermionic valves. The M-O Valve Co. Ltd., David A. Rankin and Colin J. Smithells. Brit. 399,535, Oct. 2, 1933. Those parts of interior electrodes, other than cathodes, which, if made of Ni, could not be adequately heated by eddy currents from a coil outside the bulb without overheating other parts, are made of Fe or mild steel.
- Process for the exhaustion of a thermionic valve having a plurality of metallic electrodes one of which wholly or partly surrounds another and is of higher resistance material than the inner electrode or consists of a foraminous metal body. Harold A. Snow (to Marconi's Wireless Telegraph Co. Ltd.). Brit. 399,797, Oct. 4, 1933.
- Electron-emitting element. Hector Rabezzana and Ora S. Duffendack (to A C Spark Plug Co.). U. S. 1,943,027, Jan. 9. An electron emitter such as a spark plug electrode is made of a ductile alloy contg. Ni together with Ca 0.04-0.1% and Mn about 2%.
- Gaseous-discharge tubes for use in direction finding on aircraft. Willem F. Westendorp (to The British Thomson-Houston Co. Ltd.). Brit. 399,787, Sept. 29, 1933.
- Apparatus for treating gases or vapors with solids such as purifying agents or catalysts. Gewerkschaft Kohlenbenzin. Ger. 578,484-5, June 14, 1933. Addns. to 573,505 (C. A. 27, 4378).
- Apparatus for effecting catalytic exothermic gas reactions such as synthesis of ammonia or methanol. Roger Du Chaffaut (to E. I. du Pont de Nemours & Co.). U. S. 1,942,021, Jan. 2. A catalyst container provided at one end with a gas outlet and having a helically grooved exterior is closely and removably fitted within a shell so as to form a helical gas passage communicating at the end of the catalyst container first named with a gas inlet and at the other end with the interior of the catalyst container.
- Apparatus for estimating the dust in air, etc. Davidson & Co. Ltd. Ger. 587,852, Nov. 9, 1933 (Cl. 421. 4.15).
- Mixing device for gases carrying solid particles such as pulverized coal. Ralph M. Hardgrove (to Fuller Lehigh Co.). U. S. 1,941,471, Jan. 2. Structural details.
- Gas-detecting apparatus, e. g., for fire-damp. Wm. M. Thornton. Brit. 399,978, Oct. 19, 1933.
- Water-cooled gas condensers. Humphreys & Glasgow Ltd. and George H. Morgan. Brit. 399,746, Oct. 12, 1933.
- Water-flow gas calorimeters. Wm. Masterton. Brit. 399,323, Oct. 5, 1933, and 399,326, Oct. 5, 1933.
- Service governor for regulating the pressure of gas. Albert G. Ford. U. S. 1,941,831, Jan. 2. Structural and mech. features.
- Volumetric displacement meter for gases or liquids, particularly applicable for quantitatively adding gas to water, etc. Charles B. Bramwell. Brit. 399,803, Oct. 16, 1933.
- Apparatus for dispensing gases from containers of liquefied gas. Lee C. Updegraff (to Linde Air Products Co.). U. S. 1,943,047, Jan. 9. Structural and operative details.
- Apparatus for dispensing gases from containers of liquefied gas. Leo I. Dana (to Linde Air Products Co.). U. S. 1,943,059, Jan. 9. Structural and operative details.
- Apparatus for dispensing gases such as oxygen, nitrogen or methane from storage containers of liquefied gas. Hallam C. Smith (to Linde Air Products Co.). U. S. 1,942,944, Jan. 9. Structural and operative details.
- Apparatus for discharging gases into liquids as in treating water with chlorine. Wm. J. Orchard (to Wallace & Tiernan Co.). U. S. 1,942,659, Jan. 9. See Brit. 383,896 (C. A. 27, 2746).
- Apparatus for aerating liquids. Bell Brothers (Manchester 1927) Ltd. and Charles G. Benson. Brit. 398,521, Sept. 7, 1933.
- Process and apparatus for aerating liquids. Nikolaus Meurer. Brit. 399,352, Oct. 5, 1933.
- Control valves for apparatus for elevating liquids, particularly acids. Wm. H. Exley and Walter Haddon. Brit. 399,918, Oct. 19, 1933.
- Flow meter for liquids. Bell Brothers (Manchester 1927) Ltd. and Charles G. Benson. Brit. 398,490, Sept. 7, 1933.
- Liquid flow meter, with means for completing an electric circuit for operating an alarm or closing a valve when a predetermined quantity has passed therethrough. The Leeds Meter Co. Ltd. and Leslie Watson. Brit. 399,966, Oct. 19, 1933.
- Mixing valve suitable for use with hot and cold water. Edward F. Niedecken. U. S. 1,943,140, Jan. 9.
- Pressure- and temperature-controlled device for mixing fluids such as hot and cold water. Lloyd L. Davies, Jules V. Resek and Wm. W. Carson, Jr. (to Fulton Syphon Co.). U. S. 1,942,269, Jan. 2. Various structural, mech. and operative details are described. U. S. 1,942,270 also relates to a thermostatically controlled mixing app.
- Doors for resisting fluid pressure. Joseph C. Robinson and James Slater & Co. (Engineers) Ltd. Brit. 399,748, Oct. 12, 1933.
- Covers and doors for resisting fluid pressure. Carl Wiemann. Brit. 399,433, Oct. 5, 1933.
- Electric control apparatus for proportioning the flow of gas and air through tubes to burners, etc. Wm. H. Bailey (to Colo. Fuel and Iron Co.). U. S. 1,942,793, Jan. 9. Numerous structural and operative details are described.
- Foam-generating apparatus. Jan A. S. van Deurs and Binar Schröder. Brit. 398,405, Sept. 14, 1933.
- Critical-pressure boilers. Siemens-Schuckertwerke A.-G. Brit. 398,413, Sept. 14, 1933.
- Disk mill in which the material is dried by hot air. Hans Barthelmess. Brit. 398,914, Sept. 28, 1933.
- Conical and disk mills. Walter G. Hamblin. Brit. 399,928, Oct. 19, 1933.
- Pneumatic conveyors for pulverulent materials. International Cement-Gun Co., G. m. b. H. and Claudius Peters. Brit. 399,730, Oct. 12, 1933.

- Jigging conveyors.** Alfred Bickhoff (trading as Gebr. Bickhoff Maschinenfabrik und Eisengiesserei). Brit. 398,134, Sept. 7, 1933.
- Jigging conveyors.** Robert P. Finlay and The Finlay Conveyor Co. Ltd. Brit. 399,344, Oct. 5, 1933.
- Tubular headers for steam superheaters, reheaters, feedwater heaters and other heat exchangers.** The Superheater Co. Brit. 398,414, Sept. 14, 1933.
- Apparatus for cooling, moistening and conveying hot dusty materials such as ore calcines.** Oscar Lee. U. S. 1,942,897, Jan. 9. Various details are described of an app. with spraying and dust-collecting chambers.
- Apparatus for cleansing and degreasing metal, glass, horn, celluloid, etc., articles by exposure to heavy solvent vapors, e. g., of tri- or per-ethylene or carbon tetrachloride.** Alexander Wacker Gesellschaft für elektrochemische Industrie G. m. b. H. Brit. 399,717, Oct. 12, 1933.
- Apparatus for spraying the interior of a building with a fire-extinguishing or disinfecting liquid.** Charles Orr. Brit. 398,943, Sept. 28, 1933.
- Centrifugal air cleaner.** Federico Lüdke. Brit. 399,365, Oct. 5, 1933.
- Combined isolating and safety cut-off valve for use in pipe lines where inflammable liquid is handled by a pump.** Rosser & Russell Ltd. and Ernest J. Naylor. Brit. 399,809, Oct. 2, 1933.
- Metal pots provided with electrically operated devices for indicating the fall of the metal below or above a pre-determined level.** Wm. Young. Brit. 398,865, Sept. 21, 1933.
- Apparatus of the rotary-drum and scraper type for cooling fatty emulsions, e. g., margarine.** Aage Gerstenberg. Brit. 399,253, Oct. 5, 1933.
- Arrangement for ensuring the discharge of accumulated sediment, etc., from a tank.** Josefa Borch. Brit. 399,109, Sept. 28, 1933.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWN

- Hungarian iatrochemists.** László Szathmáry. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 297-320(1933). 4
- Historical. S. S. de Finály
- Dmitri Ivanovich Mendeleeff, 1834-1907.** P. C. L. Thorne. *Chemistry & Industry* 1934, 92-3. E. H.
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- Safety in the chemical laboratory.** Edwin C. Buxbaum. *J. Chem. Education* 11, 73 6(1934). E. H.
- Class exercises in the industrial chemistry course.** IV. Advertisements and manufacturers' bulletins. V. Specifications. VI. Transportation of a chemical. Kenneth A. Kobe. *J. Chem. Education* 11, 41-2, 108, 109(1934); cf. C. A. 28, 939'. E. H.
- Evaluating unknowns in qualitative analysis.** II. W. Marlow. *J. Chem. Education* 11, 109-10(1934).—A basis for scoring a student's efforts in qual. analysis is suggested. This gives the student credit for proving ions, and also groups, absent as well as present. E. H.
- Recent advances in science: general and organic chemistry.** O. L. Brady. *Science Progress* 28, 476-81 (1934).—A review of recent work on (a) the at. wt. of C, (b) an optically active inorg. salt of Rh, (c) ascorbic acid (vitamin C), (d) addn. of OH groups at double bonds and (e) org. compds. of Li. Joseph S. Hepburn
- Recent advances in science: Physics.** L. F. Bates. *Science Progress* 28, 469-76(1934).—A review of recent work on the magnetic rotation of gases and vapors, and the magnetic behavior of cryst. compds. J. S. Hepburn
- Factors in the presentation and comparison of particle-size data.** E. J. Dunn, Jr., and John Shaw. *Proc. Am. Soc. Testing Materials* 3, Part II, 692-703(1934); cf. C. A. 27, 4462. G. G.
- The construction of nomographs for the solution of formulas.** A. Alison. *Ind. Chemist* 9, 429-30(1934) E. H.
- The measurement of humidity in closed spaces.** E. R. Griffiths, J. H. Awbery, et al. *Dept. Sci. Ind. Research, Food Investigation, Special Rept. No. 8* (Revised Ed.), 70 pp.(1933). E. J. C.
- The story of zinc.** IV. H. R. Hanley. *J. Chem. Education* 11, 111-13(1934); cf. C. A. 28, 939'. E. H.
- Calcium sulfate in sea water. II. Solubilities of calcium sulfate hemihydrate in sea waters of various concentrations at 65-150°.** T. Tomumi, T. Kuwahara and K. Hara. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 689 90(1933); cf. C. A. 26, 1485.—Solubilities of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  are reported for sea waters of Cl content 0-10% and temps. of 60-160°. Karl Kammermeyer
- The history of calcium phosphate, monophosphate (superphosphate), pyrophosphate and orthophosphate of bone earth, plants, etc.** Max Spetel. *Superphosphat* 6, 217-26(1933); cf. C. A. 26, 1373; 27, 4450. K. D. J.
- Periodic unequal potential minima and torsion oscillation of molecules.** Ta-You Wu. *Phys. Rev.* 45, 60 7 (1934).—A math. discussion of the torsion oscillation of *cis*- and *trans*- $\text{ClHC:CHCl}$ . Gerald M. Petty
- Autoxidation and ionization potentials of molecules.** Nicholas A. Milas. *J. Am. Chem. Soc.* 56, 486-7(1934).—In passing down each group of the hydrides, from the lightest to the heaviest central element, there is a regular decrease in the ionization potentials, which means an increasing looseness of the reactive unshared electrons with an increase of looseness of these electrons there is a relative increase in the tendency toward autoxidation. C. J. West
- Thermal analysis of picrates. I. Dehydration, melting points and initial and pre-explosive temperatures of lithium, sodium, potassium, rubidium, cesium, copper and silver picrates.** T. Tucholski. *Roczniki Chem.* 13, 435 47(1933); cf. C. A. 27, 8.—The picrates used were prepd from trinitrophenol (Merek), m. 122.5°, and the appropriate hydroxides or carbonates (Li, Na, K, Cu and Ag picrates) or Ag picrate and inorg. chlorides (Rb, Cs and Cu picrates). An attempt to prep. the Au compd. was unsuccessful. Li picrate ( $4\text{H}_2\text{O}$ ) begins to lose 3 mol.  $\text{H}_2\text{O}$  at 13.3°, the 4th at 106.2°. Its m. p., initial temp. (4) and pre-explosive temp. ( $t_{ps}$ ), resp., are 301.5°, 321° and 342°. Na picrate ( $1\text{H}_2\text{O}$ ) is dehydrated at 154.3°, m. 270.4°,  $t_i$  313°,  $t_{ps}$  302°. K picrate m. 250.1°,  $t_i$  331°,  $t_{ps}$  333°. Rb picrate m. 233.1°,  $t_i$  335°,  $t_{ps}$  336°. Cs picrate m. 276.3°,  $t_i$  301°,  $t_{ps}$  302°. Cu picrate ( $11\text{H}_2\text{O}$ ) loses 3  $\text{H}_2\text{O}$  at 29.6°, 3 at 35.2°, 2 at 71.9° and is dehydrated at 120.5°; m. 305°,  $t_i$  290°,  $t_{ps}$  290°. Ag picrate m. 296°,  $t_i$  332°,  $t_{ps}$  339°. C. T. Ichniowski
- Carbamide-containing media.** VI. Alb. J. J. Vande

Velde. *Natuurw. Tijdschr.* 15, 192-8(1933); cf. C. A. 27, 2706.—The influence of neutral salts on the aqueous hydrolysis of  $\text{CO}(\text{NH}_2)_2$  at elevated temp. was studied, 100 cc. soln. with 10 g.  $\text{CO}(\text{NH}_2)_2$  with or without 5 or 10 g. K, Na,  $\text{NH}_4$  chlorides or nitrates were heated in 150-cc. Kjeldahl flasks with air-cooled reflux cooler to 100°, liquid samples were rapidly cooled and analyzed with 0.1 N acid and methyl orange. The hydrolysis as shown from tables and curves is accelerated by Na and K salts to a decreasing degree; it is retarded by  $\text{NH}_4$  salts; chlorides act more strongly in 5% soln., nitrates in 10% soln. The effect of phosphates in the same soln. (15 cc. of  $1/10$  mol. solns. of  $\text{H}_3\text{PO}_4$ ,  $\text{NaH}_2\text{PO}_4$ ,  $\text{Na}_2\text{HPO}_4$ , and  $\text{Na}_3\text{PO}_4$ ) was an increase of hydrolysis rate by  $\text{PO}_4$  ions. The effect of the cations in these solns. was the same as before.

\* B. J. C. v. d. H.

The magnetic and gyromagnetic properties of pyrrhotite. D. R. Inglis. *Phys. Rev.* 45, 118-19(1934).—A model is constructed which accounts for the  $g$ -value and other magnetic properties of pyrrhotite ( $\text{Fe}_7\text{S}_{10}$ ). G. M. P.

Magnetic properties of Rochelle salt. C. T. Lane. *Phys. Rev.* 45, 66(1934).—The magnetic susceptibility of 2 rectangular crystals of Rochelle salt, about  $12 \times 3 \times 3$  mm., was detd. at 8000 gauss. The mass susceptibility was  $\chi = -0.54 \times 10^{-6}$  if  $\chi_{\text{Au}} = 0.145 \times 10^{-6}$ . The susceptibility did not vary in the 3 principal directions from 10° to 30°. Apparently the Weiss elec. field postulated by Müller (C. A. 28, 698) to account for the anomalous elec. behavior of Rochelle salt has no effect on its magnetic properties. Gerald M. Petty

The magnetic susceptibility of manganous oxide as a function of the temperature. Rayen W. Tyler. *Phys. Rev.* 44, 776-7(1933).—The magnetic susceptibility of  $\text{MnO}$  was studied from 26° to -202°. There is a sharp discontinuity in the susceptibility-temp. curve at the same point,  $t = -156^\circ$ , as in the sp. heat-temp. curve and a 2nd one at a lower temp., -188°. The mass susceptibilities are 68.6, 73.6, 85.8, 78.1, and  $91.4 \times 10^{-6}$  c. g. s. units at 26°, -38.4°, -154.7°, -188°, and -202°, resp. The susceptibility-temp. curve follows Weiss' modification of Curie's law down to  $t = -156^\circ$ . The consts. of this law are  $C = 0.0575$  and  $\theta = -548^\circ \text{K}$ . The no. of Bohr magnetons in the compd. calcd. from exptl. data is 5.7.

Bernard Lewis

Determination of dielectric constant and electric moment by the electrical-resonance method (a preliminary test). Kiang-Shu Chang and Ya-Teh Cha. *J. Chinese Chem. Soc.* 1, 107-15(1933).—The elec. resonance method based on the heterodyne principle is used to det. dielec. consts. for a series of dil. solns. of  $\text{PhNO}_2$  in  $\text{C}_6\text{H}_6$  at 25°, from which  $P_0$  (molar polarization) and  $\mu$  (elec. moment) for  $\text{PhNO}_2$  are calcd. as 32.77 cc. and  $3.82 \times 10^{-18}$  e. s. u., resp.

Wm. H. Adolph

Some electrostatic factors which can operate in polar reactions. Wm. A. Waters. *J. Chem. Soc.* 1933, 1551-7.—Equations were derived (a) for the field effect of ionic charges and of permanent dipoles, and (b) for the induced and inductively transmitted effects of ionic charges and permanent dipoles. These support the empirical equation of Nathan and Watson (C. A. 27, 4787; 28, 24) for reactivity, viz.,  $E = E_0 + C(\mu + a\mu^2)$ . The term  $C\mu$  is suggested as that to be correlated with the direct, or field, effect, and the term  $C\mu^2$  to be correlated with the induced polarization effect. Bond polarizabilities are computed from bond refractivity data, and indicate that the transmission of chem. reactivity by induction in any org. mol. should be much smaller than by direct action across space. This is in accord both with qual. experience and with the small value (0.032) for the factor  $\alpha$  of N. and W. Secondary effects, due to the disturbances set up in the arrangements of intermediate atoms in a polarized chain, are limited to second-order magnitude. This applies also to effects between mols. in any reaction mixt., and hence local electrostatic fields due to mols. do not appreciably change the frequency of intermol. collisions from that calculable for electrically neutral mols. G. Calingaert

The dipole moments of some long-chain molecules. John W. Smith. *J. Chem. Soc.* 1933, 1567-70.—From

measurements of the dielec. consts. and ds. of dil. solns. of palmitic acid, myristic acid and Me myristate in benzene, and on the assumption that the at. polarization of these mols. is approx. 15% of the electronic polarization, their elec. dipole moments ( $\times 10^{18}$ ) were evaluated as 0.72, 0.76 and 1.61, resp. The results are discussed with reference to the variation of the elec. moment of a mol. with the length of the C chain, and also with reference to the assocn. of fatty acid mols. in benzene soln. G. Calingaert

Viscosity, thermal conductivity and diffusion in gas mixtures. XXIV. Determination of the mean viscosity  $\eta_{12}$ ; use, verification and differences in interpretation of the viscosity law for binary mixtures. Max Trautz. *Ann. Physik* 18, 816-32, 833-66(1933); cf. C. A. 27, 4145.—A viscosity law for binary mixts. is developed in detail. While its form is that of the Maxwell viscosity law, it contains 3 adjustable consts.: the ratio of the collision diams. of the 2 kinds of mols., a mean collision diam. and a mean viscosity  $\eta_{12}$ . The development is compared to the Chapman-Enskog modification of the Maxwell theory. The dependence of the consts. on temp. and molar ratio is discussed. Details of the calcn. of consts. from exptl. data are given. Values for a large no. of binary mixts. of the common gases are tabulated.

E. J. Rosenbaum

Formula for specific volumes of saturated vapors. Cyril H. Meyers. *Bur. Standards J. Research* 11, 691-701(1933)(Research Paper No. 616).—The formula  $\log_{10}[1 - (\pi u/R\theta)][1 - (\pi u'/R\theta)] = A \log_{10}(\pi/2.718\pi_c)$  expresses the sp. vol. of the vapor ( $u$ ) in terms of the vapor pressure ( $\pi$ ), the sp. vol. of the liquid ( $u'$ ) and two empirical consts. ( $A$  and  $1/2.718$ , the latter being the same for all substances tested).  $R$  is the gas const.,  $\theta$  the abs. temp. and  $\pi_c$  the crit. pressure. For pressures up to  $1/4$  of the crit. pressure the formula represents the data for 23 substances within the exptl. error. H. A. Smith

Azeotropic mixtures in the system hydrochloric acid-water-chlorobenzene-phenol. W. Prah and W. Mathes. *Angew. Chem.* 47, 11-13(1934).—The binary mixt. 71.6% chlorobenzene-28.4%  $\text{H}_2\text{O}$  boiling at 90.2° as found by Young was confirmed. According to Roscoe the mixt. 20.24%  $\text{HCl}$ -79.76%  $\text{HCl}$  b. 110°. The mixt. 9.21% phenol-90.79%  $\text{H}_2\text{O}$  b. 99.57°. The mixt. 5.3%  $\text{HCl}$ -20.2%  $\text{H}_2\text{O}$ -74.5% chlorobenzene b. 96.9° and the mixt. 15.8%  $\text{HCl}$ -64.8%  $\text{H}_2\text{O}$ -19.4% phenol b. 107.33°. Six references.

Karl Kammermeyer

A study of the degree of purity of benzene and its dehydration by heteroazeotropic distillation. W. Świątowski and J. Usakiewicz. *Roczniki Chem.* 13, 495-9 (in French 499-500)(1933).—Dehydration was accomplished within 0.001%. Heteroazeotropic distn. was performed by using a differential ebullioscope with a dephlegmator. Relative purities of  $\text{C}_6\text{H}_6$  as shown by  $b_{760}$  are: Merck's (pro analysis) 80.089°; triply purified 80.110°; differences between b. p. and condensing points are 0.008° and 0.004°, resp.,  $\text{C}_6\text{H}_6$  forms zeotropic solns. with thiophene.

C. T. Ichniowski

The plasticity of rock salt and its dependence upon water. R. Bowling Barnes. *Phys. Rev.* 44, 898-902 (1933); cf. C. A. 27, 2858.—Measurements are reported which show that if a piece of rock salt is placed in  $\text{H}_2\text{O}$  the latter actually penetrates into the interior of the crystal. A discussion is given of the role played by  $\text{H}_2\text{O}$  in causing the high degree of plasticity and tensile strength (Joffé effect), characteristic of salt crystals that have been so treated.

Bernard Lewis

The conductivity of  $\alpha$ -silver sulfide. II. Carl Wagner. *Z. physik. Chem.* B23, 469-72(1933); cf. C. A. 27, 3372.—Further expts. substantiate the conclusions of the earlier work.

G. M. Murphy

Energy content, particle dimension and lattice formation of active beryllium oxide. R. Fricke and J. Lücke. *Z. physik. Chem.* B23, 319-29(1933); cf. C. A. 27, 4980.— $\text{BeO}$  was prepd. from cryst.  $\text{Be}(\text{OH})_2$  by heating for 1 hr. at 400°, 500°, 600°, 800°, 1000° and 1300°. Measurements of heats of soln. show that the products prepd. at the lower temps. have higher energy contents by as much as 1 kg.-cal. per mol. X-ray photographs also show considerable

differences. Intensity measurements indicate that the lattice formation of the energy-rich preps. is not complete.

G. M. Murphy

**Determination of the space-lattice of a triclinic mineral by means of the Weissenberg x-ray goniometer.** Geo. Tunell. *Am. Mineral.* 18, 181-6(1933).—With one setting of the crystal the data obtainable with certainty and ease are: the coordinates of the points of the space lattice; the indexes of the plane producing each diffraction spot; and the approx. intensity of diffraction from each plane, estd. from the d. of the spot on the film. Further crystallographic interpretation can be readily made on the basis of these data.

A. M. Brant

**The space lattice and optical orientation of chalcantite ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ): an illustration of the use of the Weissenberg x-ray goniometer in the triclinic system.** Tom F. W. Barth and George Tunell. *Am. Mineral.* 18, 187-94 (1933).—The procedure and calcs. necessary to det. the space lattice of chalcantite by means of the Weissenberg x-ray goniometer are given. The dimensions of the unit cell are  $a_0 = 6.110$ ,  $b_0 = 10.673$ ,  $c_0 = 5.95$  A.;  $\alpha = 82^\circ 16'$ ,  $\beta = 107^\circ 26'$ ,  $\gamma = 102^\circ 40'$ . The optical orientation is discussed also.

A. M. Brant

**X-ray examination of konjak mannan. III. Orientation of the micelle in stretching, thawing and drying.** Ichiro Sakurada and Keiroku Futino. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 662(1933); cf. *C. A.* 27, 3130, 28, 947.—X-ray examn. showed that the micelle of  $\beta$ -konjak mannan is oriented in dried films and thawed out disks and when stretched it is oriented parallel to the direction of stretching.

Karl Kammermeyer

**Freezing points of mixtures of  $\text{H}_2\text{O}$  and  $\text{H}_2\text{O}$ .** Victor K. La Mer, W. C. Bichelberger and H. C. Urey. *J. Am. Chem. Soc.* 56, 248 9(1934).— $\text{H}_2\text{O}$  contg. 14.7, 19.1, 39.9%  $\text{H}_2\text{O}$  freezes at 0.632, 0.824 and 1.679, resp., and has  $d_{4^\circ}$  1.01644, 1.02135, 1.04456, resp.; these observations indicate that the solid phase is a solid soln. of the 2 components and that on freezing the mixts. behave as though they were pure substances. The f. p. is a linear function of the d. to 20%  $\text{H}_2\text{O}$ , but a deviation outside the exptl. error is perceptible at 40%.

C. J. West

**Vapor pressure of liquid and solid deuterochloric acid [deuterium chloride].** Gilbert N. Lewis, Ronald T. Macdonald and Philip W. Schutz. *J. Am. Chem. Soc.* 56, 494-5(1934).— $\text{H}^2\text{Cl}$  was obtained from  $\text{H}_2\text{O}$  with anhyd.  $\text{MgCl}_2$  at  $600^\circ$ . The vapor pressure in mm. is given from 152.6° (54.5) to 200.9°K. (1474.5);  $\log_{10}(p_1/p_2) = (15.4/T) - 0.075$  for the liquid and  $-(57.7/T) + 0.387$  for the solid, where  $p_1$  and  $p_2$  are the vapor pressures of  $\text{HCl}$  and  $\text{H}^2\text{Cl}$ , resp. The ratio of the 2 vapor pressures reaches a max. of 1.05 at the triple point. The heat of vaporization of liquid  $\text{H}^2\text{Cl}$  is greater than that of  $\text{HCl}$  by  $70 \pm 1$  cal. per mol., while with the solid there is a difference of  $265 \pm 20$  in the other direction; the heat of fusion of  $\text{H}^2\text{Cl}$  is 141.

C. J. West

**The refractive indexes of ethylene chloride, 1,1,2,2-tetrachloroethane, and of their mixture and the molar refractions of these substances.** Senzo Hamai. *Bull. Chem. Soc., Japan* 8, 297-306(1933).—The  $n_D$  of  $\text{C}_2\text{H}_2\text{Cl}_4$  and  $\text{C}_2\text{H}_2\text{Cl}_2$  are linearly dependent on the reciprocal of the abs. temp.  $n_D$  for  $\text{C}_2\text{H}_2\text{Cl}_4$ :  $14^\circ$  1.44561,  $15^\circ$  1.44510,  $15.7^\circ$  1.44470,  $16.2^\circ$  1.44440,  $17^\circ$  1.44400,  $17.5^\circ$  1.44380,  $18.5^\circ$  1.44341,  $19.1^\circ$  1.44290,  $20.0^\circ$  1.44240,  $21.1^\circ$  1.44189,  $22.0^\circ$  1.44138,  $23.6^\circ$  1.44088,  $24.1^\circ$  1.44038,  $25.0^\circ$  1.43987,  $26.8^\circ$  1.43927,  $27.0^\circ$  1.43927,  $27.4^\circ$  1.43866. Molar refraction 20.82, elec. moment (liquid)  $1.375 \times 10^{-18}$ .  $n_D$  for  $\text{C}_2\text{H}_2\text{Cl}_2$ :  $13.0^\circ$  1.49486,  $15.7^\circ$  1.49354,  $16.5^\circ$  1.49345,  $17.5^\circ$  1.49298,  $18.5^\circ$  1.49260,  $19.3^\circ$  1.49222,  $20.0^\circ$  1.49196,  $21.1^\circ$  1.49146,  $21.4^\circ$  1.49136,  $22.0^\circ$  1.49108,  $25.0^\circ$  1.49004; molar refraction, 31.23.  $n_D^m$  of mixts. (mol. fractions of  $\text{C}_2\text{H}_2\text{Cl}_4$ ) 0.129, 1.44903; 0.156, 1.45074; 0.198, 1.45324; 0.270, 1.45664, 0.425, 1.46617; 0.470, 1.46884; 0.525, 1.47109; 0.687; 1.47861; 0.748, 1.48035; 0.782, 1.48171.

J. E. A.

**The reversible sorption of gases and vapors by potassium benzene sulfonate.** Willy Lange and Gerda v. Krueger. *Z. anorg. allgem. Chem.* 216, 49-65(1933). Lange and

Lewin (*C. A.* 25, 21, 864) found that the sorption of  $\text{H}_2\text{O}$  by  $\text{C}_6\text{H}_5\text{SO}_3\text{K}$  depends on the pressure until a  $1/4$ -hydrate is formed, when, at a certain pressure, this suddenly goes over to a  $1/2$ -hydrate. The sorption of  $\text{H}_2\text{S}$  depends on the pressure and  $1/4$  mol. is taken up at satn. The authors tested the reversible sorption of various gases. That of the following depended on the pressure (the fraction indicates the part of a mol. of gas sorbed at satn. at 0°):  $\text{C}_2\text{H}_6$ ,  $1/5$ ;  $\text{CH}_3\text{Cl}$ ,  $1/5$ ;  $\text{CO}_2$ ,  $1/4$ ;  $\text{N}_2\text{O}$ ,  $1/4$ . The isotherm and isobar of  $\text{NH}_3$  were irregular. The 0 isotherm of  $\text{SO}_2$  approached  $1/5$  mol., then at 242 mm. it suddenly jumped to  $1/2$  mol. in the same manner as that of  $\text{H}_2\text{O}$ . That of  $(\text{CH}_3)_2\text{O}$  approached  $1/7$  mol. until the pressure reached 46.6 mm.; then there was a kink in the curve and it approached  $1/6$  mol. The sorptions of various gases at 0° and 760 mm. were:  $\text{NO}$ , 0.004 mol.;  $\text{CO}$ , 0.014;  $\text{C}_2\text{H}_6$ , 0.100;  $\text{CO}_2$ , 0.139;  $\text{PH}_3$ , 0.143;  $\text{N}_2\text{O}$ , 0.146;  $(\text{CH}_3)_2\text{O}$ , 0.167;  $(\text{CN})_2$ , 0.168;  $\text{CH}_3\text{Cl}$ , 0.197;  $\text{H}_2\text{S}$ , 0.234;  $\text{CH}_3\text{NH}_2$ , 0.250;  $\text{NH}_3$ , 0.288;  $\text{C}_2\text{H}_4$ , 0.280,  $\text{SO}_2$ , 0.503 and  $\text{HCl}$ , 0.89. This sorption of gases is independent of the previous history of the  $\text{C}_6\text{H}_5\text{SO}_3\text{K}$  and in most cases cannot be compared to hydration.

John E. Milbery

**Two types of activated adsorption of hydrogen on the surface of a promoted iron synthetic ammonia catalyst.** R. W. Harkness and P. H. Emmett. *J. Am. Chem. Soc.* 56, 490-1(1934).—There are 3 types of adsorption of  $\text{H}_2$  on a promoted Fe catalyst (1.3%  $\text{Al}_2\text{O}_3$  and 1.59%  $\text{K}_2\text{O}$ ) phys., at  $-196^\circ$ ,  $-183^\circ$  and  $-144^\circ$ ; at which temp. 10 cc. of catalyst adsorbs 5, 2.8 and 0.25 cc.  $\text{H}_2$ , resp. type A activated, between  $-78^\circ$  and  $0^\circ$ , the isobar at 700 mm. showing a gradual decrease from an adsorption of 7 to 5-6 cc.; type B activated, at  $100^\circ$  or higher, an addnl. but much slower adsorption, the total adsorption of both types reaching 8-9 cc. at  $100^\circ$  in 2 hrs.; at  $212^\circ$  and 450 the adsorption reached an apparent equil. in less than 1 hr., the adsorption being 5.6 and 3.5 cc., resp.

C. J. West

**The heat of adsorption of noble gases and carbon dioxide on ionic crystals.** Fritz Victor Lenel. *Z. physik. Chem.* B23, 379-98(1933). The energy of mol. attraction of A, Kr and  $\text{CO}_2$  on ionic crystals was calcd. The total energy is due to dispersive forces, as calcd. by London (*C. A.* 24, 5597) and to an effect due to the fact that the electrically charged ions of the crystal lattice induce an elec. moment in the adsorbed noble-gas atom. For a polar gas like  $\text{CO}_2$  dipole and quadrupole attraction must also be considered. The adsorption isotherms of A, Kr and  $\text{CO}_2$  were detd. on finely pulverized  $\text{KCl}$ ,  $\text{KI}$ ,  $\text{LiF}$ ,  $\text{CsCl}$  and  $\text{CaF}_2$  by means of a hot-wire manometer at low pressures. From the temp. dependence of the adsorption isotherms the heat of adsorption was calcd. Expt. and theory agree well in view of the simple assumptions.

G. M. M

**Absorption of hydrogen by palladium black at high pressure.** V. V. Ipat'ev, Jr. and V. G. Tronev. *J. Gen. Chem.* (U. S. S. R.) 3, 78-86(1933).—The soln. of  $\text{H}_2$  by Pd black was studied in a specially designed app. (illustrated) at  $15^\circ$ ,  $25^\circ$ ,  $100^\circ$  and  $300^\circ$  and 1-25 atm. pressure. Twelve references.

Chas. Blanc

**Monomolecular films of fatty acids on glass.** Katherine B. Blodgett. *J. Am. Chem. Soc.* 56, 495(1934).

C. J. West

**Factors in sedimentation analysis.** E. Wayne Gallihir. *Am. J. Sci.* 26, 564-8(1933).—Proper dispersion is most important in sedimentation analysis. Either  $\text{Na}_2\text{C}_2\text{O}_4$  or Na citrate is a more efficient dispersing agent than  $\text{NH}_4\text{OH}$ . Danger of flocculation by chemicals from micro organisms is discussed. Sterilization with toluene may be necessary.

Alden H. Emery

**Measurement of concentration and dispersity of suspensions by the photoelectric cell. III.** M. Matsui, T. Noda and S. Iwai. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 691-2(1933); cf. *C. A.* 27, 1798.—Measurements of suspensions of  $\text{CaCO}_3$ ,  $\text{ZnO}$ ,  $\text{PbO}$ ,  $\text{Fe}_2\text{O}_3$ , and C black are given as functions of concns. in cc./l. vs.  $\log I_0/I$  and  $(I' - I_0)/I$ , where  $I_0$ ,  $I$ ,  $I'$  and  $I_0'$  are the resp. intensities of light that is incident, transmitted, scattered by suspensions and scattered by suspension medium only.

K. Kammermeyer



Recent advances and applications of colloid chemistry. Giuseppe Bruni. *Giorn. chim. ind. applicata* 15, 481-94 (1933).—A summary. A. W. Contieri

The electrical double layer in colloids. II. Double layer and stability of undialyzed silver iodide sols. E. J. W. Verwey and H. R. Kruyt. *Z. physik. Chem.* A167, 137-48 (1933); cf. *C. A.* 23, 1035.—In freshly pptd. AgI particles changes of structure take place. These differ from the usual aging phenomena. A decrease in the degree of dispersion takes place which is due to the formation of particles with a more perfect lattice formed from the incomplete particles of the sol. The double layer does not cover the particles regularly but collects upon a few points of the surface. III. Double layer and stability of dialyzed silver iodide sols. *Ibid.* 149-63.—Very stable neg AgI sols are prepd. in a high state of purity and in a highly concd. form by dialysis and electrodecantation. Adsorption measurements of the I ion show that the charge of the double layer varies linearly with the logarithm of the concn. of free I ion in the sol. The double layer is centered in a few active places on the surface and its magnitude depends on the degree of aging. The zero point of charge is at  $e_{Ag^+} = -10^{-4}$ . A systematic absorption due to this fact arises in the electrometric AgI titration of the order of 0.1%. G. M. Murphy

Factors that determine the formation of red gold sols. Raúl Wernicke. *Anales soc. cient. Argentina* 116, 196-224 (1933).—Minute traces of impurities are necessary to stabilize colloidal Au preps. If the water used is purified by distn. out of contact with air it becomes unsuitable for use but may be made usable by adding a few g. of Na<sub>2</sub>S or exposing to the air for a few weeks. The essential impurities are evidently of a reducing nature. F. Saunders

Highly polymerized compounds. LXXXV. The molecular weight of methylcellulose. H. Staudinger and H. Scholz. *Ber.* 67B, 84-91 (1934); cf. *C. A.* 28, 1015'.—The authors present the results of a viscosity study of methylated cellulose, in comparison with acetylated cellulose in various solvents. The theory of polymeric homologs and analogs is developed and its relation to viscosity measurements is discussed. Di- and tri-acetylated cellulose failed to give concordant results with methylcellulose when the sp. viscosities were compared. This discrepancy is attributed to the formation of oxonium complexes with solvent mols. on the part of the methylcellulose. Attempts to find a solvent that does not give this solvation effect failed. If the solvation effect is taken into consideration, recalcd. results for the mol. wt. of methylcellulose are in fair agreement with that predicted on the basis of no chain cleavage during the deacetylating and methylating process. This agreement, and the paralleling agreement with the mol. wts. reported by Harworth and Machamer obtained by another method, are cited as evidence to prove the existence of polymeric homologs and analogs, in the cellulose series. Solvents used include *m*-cresol, water, AcOH and pyridine. LXXXVI. The validity of the viscosity-molecular weight relationship. H. Staudinger. *Ibid.* 92-101; cf. *C. A.* 27, 4790. Viscosity measurements are compared with other standard methods for detg. mol. wts. of highly polymerized compds. The viscosity-mol. wt. relationship is defended, and shown to be in very fair agreement with results obtained by other methods when all complicating factors are taken into consideration. The work of Büchner and Santwell (*C. A.* 27, 2031), Kraemer and van Natta (*C. A.* 27, 1800), Carothers, and others in this field is critically reviewed. G. H. Young

The swelling of casein. W. Mohr and J. Moos. *Milchwirtschaft. Forsch.* 15, 384-9 (1933).—Freshly prepd. casein was dried and ground. The finely ground material was sifted to give a uniform size. The casein placed in solns. of a no. of acids with  $p_H$  values up to 4.5 was allowed to stand and the increase in diam. noted. Max. swelling was observed between  $p_H$  2 and 2.3. G. R. Greenbank

The solubility of potassium ferrocyanide and of sodium ferrocyanide in aqueous solutions of ammonia. A. Tettamanzi. *Gass. chim. ital.* 63, 575-9 (1933).—The latter to unpublished fact that the addn. of aq. NH<sub>3</sub> to aq.

K<sub>4</sub>Fe(CN)<sub>6</sub> ppts. K<sub>4</sub>Fe(CN)<sub>6</sub>·3H<sub>2</sub>O led to a systematic study of the systems: K<sub>4</sub>Fe(CN)<sub>6</sub>·NH<sub>3</sub>·H<sub>2</sub>O, Na<sub>4</sub>Fe(CN)<sub>6</sub>·NH<sub>3</sub>·H<sub>2</sub>O and Li<sub>4</sub>Fe(CN)<sub>6</sub>·NH<sub>3</sub>·H<sub>2</sub>O, at 18°. The solubilities of K<sub>4</sub>Fe(CN)<sub>6</sub> and of Na<sub>4</sub>Fe(CN)<sub>6</sub> diminish progressively with increase in the concn. of NH<sub>3</sub> until the salts become practically insol. On the other hand, the soly. of Li<sub>4</sub>Fe(CN)<sub>6</sub> is not affected by NH<sub>3</sub>. Contrary to Briggs (*C. A.* 5, 3018), there was no evidence of isomers or of different states of hydration of K<sub>4</sub>Fe(CN)<sub>6</sub>·3H<sub>2</sub>O and of Na<sub>4</sub>Fe(CN)<sub>6</sub>·10H<sub>2</sub>O. Electrolytic laws do not apply to the phenomenon in view of the absence of common ions and in view of the high concns. C. C. Davis

Polyiodides. I. The solubility of iodine in potassium iodide solution and hydration of the iodide ion. S. I. Raikhshtein, L. Eventov and I. A. Kazarnovskii. *Z. anorg. allgem. Chem.* 216, 1-9 (1933).—The soly. of I<sub>2</sub> in KI solns. from 0.05 to 6.250 *N* was accurately detd. at 25° and found to agree with the best detns. in the literature. The d. of the solns. was also detd. and the mol. vols. were calcd. In the concd. solns. these approached that of I<sub>2</sub> in solid polyiodides. Thus the mol. vol. of I<sub>2</sub> in satd. KI soln. was 59.96 as compared with 57.3 in solid CsI<sub>2</sub>. To explain the fact that the ratio I/KI increases with the concn. of KI, the following equil. was assumed: I<sup>-</sup>(H<sub>2</sub>O)<sub>n</sub> + I<sub>2</sub> ⇌ I<sub>3</sub><sup>-</sup>(H<sub>2</sub>O)<sub>m</sub> + nH<sub>2</sub>O. Thus, anything that decreased the activity of the H<sub>2</sub>O should increase the soly. of the I<sub>2</sub>. To test this the soly. of I<sub>2</sub> was detd. in solns. of KI satd. with sucrose. It was found that sucrose actually did increase the soly. of I<sub>2</sub> in solns. up to 2.659 *N*, but lowered it in more concd. solns. Tests showed that sucrose had no effect on the soly. of I<sub>2</sub> in H<sub>2</sub>O. The action of sucrose is explained by assuming 2 opposing tendencies: reduction of the activity of the H<sub>2</sub>O, and formation of complex ions with I<sup>-</sup>. I/KI is a linear function of the concn. of sucrose when the concn. of KI is const. in both dl. and concd. KI solns. John E. Milbery

The solubility of potassium acid tartrate. I. In tartaric acid and dipotassium tartrate solutions. D. C. Carpenter and G. L. Mack. *J. Am. Chem. Soc.* 56, 311-13 (1934).—The soly. of K acid tartrate (I) in solns. of tartaric acid (II) and dipotassium tartrate (III) was detd. at 0°, 10°, 25° and 0°, 5°, 10°, 15°, 20° and 25°, resp., in a concn. range of 0-1% and found to decrease with increasing concns. of I and II, II having the greater effect. The soly. of I in H<sub>2</sub>O follows the equation  $C_1 = k + at + bt^2$ , where  $k = 0.2305$ ,  $a = 0.010018$ ,  $b = 0.0002564$  at  $t$  temp. The soly. of I in solns. of II and III follows  $C_1 = kC_{II}^{-n}$  and  $C_1 = a + b \log C_{III}$ , resp., where  $k$ ,  $n$ ,  $a$  and  $b$  are consts. at a given temp. II. In various sugar solutions. D. C. Carpenter and J. J. Kučera. *Ibid.* 324-7. The soly. of K acid tartrate (I) in solns. *d*-fructose, invert sugar, *d*-glucose and sucrose in various concns. was detd. at 0°, 5°, 10°, 15° and 20° and found to follow the equation  $C_1 = K - kC_{sugar}^a$ , where  $C_1$  and  $C_{sugar}$  represent the concn. in mg. per 100 g. of soln. of I and sugar,  $K$  is the soly. of I in H<sub>2</sub>O and  $k$  and  $a$  are consts. depending on the temp. and the kind of sugar. The soly. of I decreases with increasing sugar concn. in the order given above. Calcd. on the basis of a fixed amt. of H<sub>2</sub>O as a solvent the soly. of I increases with increasing concn. of sugar, except with sucrose, by which it is practically unchanged. J. Kučera

Kinetic demonstration of the law of Berthelot and Jungfleisch on the distribution of a substance between two immiscible solvents. A. Sconzo. *Gass. chim. ital.* 63, 525-6 (1933).—A further study of the kinetic demonstration of the law of distribution already published (cf. *C. A.* 27, 3870) leads to certain corrections, which are given in detail mathematically. C. C. Davis

Stationary, checked and other states of osmotic systems. II. F. A. H. Schreinemakers. *Proc. Acad. Sci. Amsterdam* 36, 717-23 (1933).—S. extends the work previously reported (cf. *C. A.* 27, 4463) to systems in which the membranes are permeable to more than one substance. He concludes that when a stationary liquid is (1) "enclosed," const. vol., its quantity, pressure and compn. are defined; (2) "open," const. pressure, ( $a$ ) with one or

more non-diffusing substances, its quantity and compn. are defined, (b) with diffusing substances only, its compn. is defined but its quantity will increase or decrease continuously and only accidentally remain const. III. *Ibid.* 779-85.—A continuation of the above with an application to the biol. process, the functioning of a gland.

E. R. Schierz

**Selectivity as exhibited by certain osmotic diaphragms.** Laurie L. Burgess. *J. Am. Chem. Soc.* 56, 414-19 (1934).—Diaphragms are described that exhibit selective osmotic action with respect to the various ions or mols. in the soln. When either Na alginate or soap was used in constructing the diaphragm, the selective action favored K and retarded Na ions, or their corresponding salt mols. The alginate diaphragms also favored bromide at the expense of chloride ions and to a much smaller extent favored sulfate over chloride ions and Ca over Mg and Na ions. When casein was used as the diaphragm material, the selective action was reversed with respect to Na and K compds. Ca also appeared to be greatly retarded. All materials that were found to exhibit a selective osmotic action were colloidal in their behavior and properties. This phenomenon may be attributed to adsorption of the various ions or mols. at the surface of the diaphragm.

C. J. West

**Index of refraction and refractivity of dilute solutions of electrolytes. II. Improvement of the interferometric method and measurements with thallium chloride and thallium nitrate.** A. I. Brodskii and N. S. Filippova. *Z. physik. Chem.* B23, 399-411(1933); cf. *C. A.* 26, 11.—The earlier calibration method for the Haber-Loewe interferometer was improved. Monochromatic light (He 5875 and Hg 4358 Å.) was used. Error in the detn. of the zero point was obviated. Results are given for the difference in  $n$  between  $H_2O$  and  $TlCl$  and  $TlNO_3$  solns., between 0.001 and 0.01 and 0.001 and 0.1  $M$ , resp., as well as dispersion and temp. coeff. The ratio  $\Delta n/c$  is linear in  $c$ , the concn. in this region. III. Index of refraction and refractivity of potassium chloride, potassium bromide, potassium nitrate and sodium chloride. A. I. Brodskii and I. M. Shershever. *Ibid.* 412-27.—The difference in  $n$  between  $H_2O$  and solns. of  $KCl$ ,  $KNO_3$ ,  $NaCl$  and  $KBr$  between 0.001 and 0.1  $M$  at various temp. was measured. The ratio  $\Delta n/c$  increases linearly with concn. except for  $NaCl$ . Molar refraction was calcd. between 0 and 0.1  $M$  for  $KCl$ ,  $KBr$  and  $NaCl$ . Results are discussed from the standpoint of the Debye-Hückel theory. G. M. Murphy

**Concentration dependence of the molar refraction of electrolytes. Remarks on the preceding work of A. I. Brodskii and I. M. Shershever.** K. Fajans and W. Gefick. *Z. physik. Chem.* B23, 428-30(1933).—Discrepancies between the results of Brodskii and Shershever and Gefick and Kruis (*C. A.* 28, 953<sup>a</sup>) on the concn. dependence of the  $n$  of  $NaCl$  must be due to systematic errors in the work of B. and S. G. and K. used other methods to remove such errors. G. M. Murphy

**The dispersion formula for an ionized medium.** D. R. Hartree. *Nature* 132, 929-30(1933).—The disagreement of Tonks [cf. *Nature* 132, 101, 710(1933)] with the use of the Lorentz dispersion formula relating the ionization density  $N$  and refractive index  $\mu$  of an ionized medium for waves of frequency  $p/2\pi$  is discussed by H. who presents arguments equally to justify the Lorentz formula.

Calvin Brous

**Electrochemical and cryoscopic investigation of triple systems: aluminum bromide-bromides of lithium, copper, and silver and solvents benzene, toluene and xylene.** V. A. Plotnikov, I. A. Sheka and V. A. Yankelevich. *J. Gen. Chem.* (U. S. S. R.) 3, 481-99(1933).— $C_6H_6$  and  $PhMe$  solns. of  $LiBr-AlBr_3$ ,  $CuBr-AlBr_3$ , and  $AgBr-AlBr_3$  conduct current. The max. cond. of  $LiBr$  in  $C_6H_6$  soln. of  $AlBr_3$  is  $K = 5.72 \times 10^{-3}$ . The cond. of  $AgBr$  in the same soln.:  $K = 5.80 \times 10^{-3}$ ; the cond. of  $CuBr$ :  $K = 4.96 \times 10^{-3}$ . In  $PhMe$  solns. for  $LiBr-AlBr_3$ ,  $K = 5.28 \times 10^{-3}$ ; for  $AgBr-AlBr_3$ ,  $K = 5.50 \times 10^{-3}$ ; and for  $CuBr-AlBr_3$ ,  $K = 4.86 \times 10^{-3}$ . With increase in concn. of bromides of Li, Cu and Ag, the cond. increases and changes abruptly when the molar ratio corresponds to complexes of

the compn.:  $LiBr \cdot 2AlBr_3$ ,  $CuBr \cdot 2AlBr_3$ , and  $AgBr \cdot 2AlBr_3$ . The cond. in  $C_6H_6$  and  $PhMe$  solns. is:  $AgBr > LiBr > CuBr$ . During electrolysis in  $C_6H_6$ ,  $PhMe$  and  $C_6H_5Me_3$ , Cu and Ag sep. on the cathode from the systems  $CuBr-AlBr_3$  and  $AgBr-AlBr_3$ , and Al from the system  $LiBr-AlBr_3$ . The best ppts. are obtained from  $C_6H_5Me_3$ . The decompn. potential in  $C_6H_6$  soln. of  $AlBr_3$  for  $CuBr$  is 1.13 v., for  $AgBr$  1.35 v., for  $LiBr$  1.60 v.; in  $PhMe$  soln. of  $AlBr_3$ , the decompn. potential for  $CuBr$  is 1.40 v., for  $AgBr$  1.14 v. and for  $LiBr$  2.00 v. Cryoscopic investigation of  $LiBr \cdot 2AlBr_3$ ,  $AgBr \cdot 2AlBr_3$ , and  $CuBr \cdot AlBr_3$  in  $C_6H_6$  showed that the complexes are very much assocd. and the degree of assocn. increases with concn. Addn. of  $CuBr$ ,  $LiBr$  or  $AgBr$  to the  $C_6H_6$  soln. of  $AlBr_3$  raises the f. p.; this indicates a further assocn. of  $AlBr_3$  during the formation of complex compds. W. P. Ericks

**The dissociation constants of organic acids. VII. Acetic acid: a correction. The solvent correction for salts of weak monobasic acids.** George H. Jeffery, Arthur I. Vogel and Hugh V. Lowry. *J. Chem. Soc.* 1933, 1637-43; cf. *C. A.* 27, 1563.—Full details are given of the water correction for solns. of salts of weak monobasic acids, valid above a concn. of about 0.0005  $N$ , made with equil. water, and the method was applied to previous measurements with  $NaOAc$  and  $KOAc$  (*C. A.* 27, 1563). A new method is described for accurate measurement of the cond. of salts of weak acids. It involves the addn. of 20-40% excess over the calcd. quantity of  $Ba(OH)_2$  required to react with all the  $H_2CO_3$  (assumed to be the only impurity) in the water used. When applied to  $NaOAc$  and  $KOAc$  at 25°, this method gives 40.62 for the limiting mobility of the acetate ion at 25°. Corrected values for the classical and the thermodynamic dissoc. consts. of  $HIOAc$  are  $1.824 \times 10^{-8}$  and  $1.764 \times 10^{-8}$ , resp.

Geo. Calingaert

**Relation between complex formation, solvation and formation of an electrically conducting system. II. Ebullioscopic investigation of the system: dimethylpyrone-halides of the elements of the 5th group-benzene.** V. S. Finkelshtein and P. V. Kurnosova. *J. Gen. Chem.* (U. S. S. R.) 3, 121-33(1933); cf. *C. A.* 24, 5587; 27, 2616.—Dimethylpyrone (I) in  $C_6H_6$  showed normal mol. wt. In all 4 systems the formation of an electrically conductive complex was demonstrated.  $SbCl_3$  and  $SbBr_3$  showed auto-solvation with subsequent dissocn. on addn. of I to the soln. Interpretation: The unionized mols. become ionized in a medium with a low dielec. const. ( $C_6H_6$ ) on addn. of I, the mols. of which evidently possess, in common with  $R_3O$ , a dipolar moment sufficient to penetrate within the mols. of the halides of As and Sb and create an ionic complex, which in the case of Sb is capable of being solvated by mols. of the same halides as long as the soln. contains an insufficient no. of I mols. Such a complex, even in a medium of low dielec. const., is ionized and has the properties of an electrolyte. Thus the basic cause of the formation of an electrically conducting medium in this and other cases is the formation of a complex produced by the chem. affinity of the separate parts of a mol. of a halide for the dipolar mol. of I. It is possible that the halides investigated have both homeopolar and heteropolar mols. with a resulting state of equil.:  $AsCl_3 \rightleftharpoons As^{+++}(Cl^-)$ ,  $\rightleftharpoons As^{+++} + 3Cl^-$ , or, if a complete dissocn. is accepted, the center stage drops out. According to the hypothesis of isomeric forms, it is possible that the action of the solvating agent proceeds with I binding first the existing ions of  $As^{+++}$  (or  $Sb^{+++}$ ) and the resulting shifting of the equil. in the above formulation to the right, etc. Such a scheme is not in conflict with the theory proposed. Chas. Blanc

**Electrochemistry of ether solutions. XI. Viscosity of the system: sulfuric acid-ethyl ether.** L. Sabinina. *J. Gen. Chem.* (U. S. S. R.) 3, 87-90(1933); cf. *C. A.* 27, 2365.—By analogy with  $H_2O$  the mixts. of  $Et_2O$  and  $H_2SO_4$  show high elec. cond. (Plotnikov) and form the compds.  $H_2SO_4 \cdot Et_2O$  and  $H_2SO_4 \cdot 2Et_2O$ , whereby the thermal effect of the formation of the monoetherate is equal to that of monohydrate (Chelintzev and Kozlov, *C. A.* 9, 1749). The viscosities of mixts. of different proportions of abs.  $Et_2O$  and 100%  $H_2SO_4$  were detd. at 0°, 10°, 20° and 30° in

the Ostwald viscometer. The tabulated results show that with the increasing addn. of  $\text{Et}_2\text{O}$  to  $\text{H}_2\text{SO}_4$  the viscosity at first sharply drops, then gradually rises, reaching at 63% the value obtained at 92%  $\text{H}_2\text{SO}_4$  and finally drops again, while the d. continuously decreases. Thus also in relation to viscosity the systems  $\text{H}_2\text{SO}_4$ - $\text{Et}_2\text{O}$  and  $\text{H}_2\text{SO}_4$ - $\text{H}_2\text{O}$  act analogously. Chas. Blanc

Thermodynamics of solid solutions. I. Perfect solutions. Harry Seltz. *J. Am. Chem. Soc.* 56, 307-11 (1934).—A graphic method is developed for detg., from the fugacities or activities of the components in the 2 phases, the liquidus and solidus curves for binary systems which solidify with the formation of solid solns. Equations are derived for calcg. the liquidus and solidus curves from the temps. and heats of fusion of the 2 pure solids and the assumption that both solns. are perfect. F. D. R.

Chemistry of calcium cyanamide. IV. Azotization equilibrium of the alkaline earth carbonates with ammonia and alkaline earth oxides with hydrocyanic acid. H. Heinrich Franck and Helene Bank. *Z. anorg. allgem. Chem.* 215, 415-26 (1933); cf. *C. A.* 27, 4991.—The equil.  $\text{Me}^{II}\text{CN}_2 + 3\text{H}_2\text{O} = \text{Me}^{II}\text{CO}_3 + 2\text{NH}_3$  was measured for Ca, Sr and Ba. The equil.  $\text{Me}^{II}\text{O} + 2\text{HCN} = \text{Me}^{II}\text{CN}_2 + \text{CO} + \text{H}_2$  was measured for Ca and Mg from both sides and good agreement obtained. From this equil. the conventional chem. const. for HCN was found to be  $i = 3.5$ . H. Stoertz

The equilibrium  $\text{H}_2\text{SO}_4 + \text{HF} \rightleftharpoons \text{HSO}_3\text{F} + \text{H}_2\text{O}$  and the effect of strong acids upon it. Willy Lange. *Z. anorg. allgem. Chem.* 215, 321-32 (1933); cf. *C. A.* 27, 5624.—With increasing HF,  $[\text{HSO}_3\text{F}]$  at first increases and then falls rapidly to 0. If the  $\text{H}_2\text{O}$  concn. is continuously increased,  $[\text{HSO}_3\text{F}]$  decreases more rapidly than the mass-action law would indicate. Addn. of strong acids favors  $\text{HSO}_3\text{F}$  formation, probably because of hydrate formation with equil.  $\text{H}_2\text{O}$ , displacing the equil. to the right. This is independent of the strength of the acid. H. Stoertz

Sulfonation reaction. I. S. Ioffe. *J. Gen. Chem.* (U. S. S. R.) 3, 437-47 (1933).—Sulfonation is a reversible reaction. The strength of the spent  $\text{H}_2\text{SO}_4$  depends upon the ratio between the substance that sulfonates and the substance being sulfonated and therefore is not const. Sulfonation with fuming  $\text{H}_2\text{SO}_4$  takes place with the free  $\text{SO}_3$  at a considerably higher rate than with  $\text{H}_2\text{SO}_4$  and proceeds according to a second-order reaction. II. Equilibrium between  $\alpha$ - and  $\beta$ -naphthalenesulfonic acids. *Ibid.* 505-12.—The const. ratio between  $\alpha$ - and  $\beta$ -isomers is reached only during a long duration of the reaction at  $100^\circ$  or  $110^\circ$ . Thus it is seen that in sulfonating naphthalene at  $100^\circ$  or  $110^\circ$  for several days, an unchanging ratio between the isomers, i. e. equil. of the system, is not attained. W. P. Bricks

Reaction velocity of halogen-substituted benzene compounds with sodium methylate. E. A. Kryuger and M. S. Bednova. *J. Gen. Chem.* (U. S. S. R.) 3, 67-77 (1933).—The relative activities of halogens in cyclic compds. were studied by the interaction of equimol. mixts. of  $\text{MeONa}$  and the following compds.:  $\text{PhCl}$ ,  $\text{PhBr}$ ,  $\text{PhI}$ ,  $o$ - and  $p$ - $\text{C}_6\text{H}_4\text{Cl}$ ,  $p$ - $\text{C}_6\text{H}_4\text{Br}$ ,  $\text{C}_6\text{Cl}_6$ ,  $\text{C}_6\text{H}_5\text{Cl}$ ,  $o$ - and  $p$ - $\text{MeC}_6\text{H}_4\text{Cl}$ ,  $o$ - and  $p$ - $\text{MeC}_6\text{H}_4\text{Br}$ ,  $m$ - and  $p$ - $\text{ClC}_6\text{H}_4\text{OH}$ ,  $o$ -,  $m$ - and  $p$ - $\text{ClC}_6\text{H}_4\text{NO}_2$ ,  $m$ - and  $p$ - $\text{BrC}_6\text{H}_4\text{NO}_2$ ,  $o$ -,  $m$ - and  $p$ - $\text{ClC}_6\text{H}_4\text{NH}_2$ ,  $o$ - and  $m$ - $\text{BrC}_6\text{H}_4\text{OMe}$ ,  $p$ - $\text{BrC}_6\text{H}_4\text{NH}_2$ ,  $\alpha$ - $\text{C}_{10}\text{H}_7\text{Br}$ , dibromoanthracene, bromocamphor and  $\text{ClCH:CHCl}$ . The reaction mixts. were sealed in glass tubes and heated a definite time at  $150^\circ$ ; the reaction products were then washed with 30 cc. alc. and 100 cc. hot  $\text{H}_2\text{O}$ , and the unchanged  $\text{MeONa}$  was directly titrated with  $\text{HNO}_3$  and methyl orange, and Na halides were detd. in the filtrate with  $\text{AgNO}_3$ . With compds. reacting 70-80% at  $150^\circ$ , the expts. were repeated at  $100^\circ$ . The compds. with  $\text{NO}_2$  group in  $o$ - and  $p$ -position and with 2-6 halogen atoms produced the best results at  $18$ - $20^\circ$ . The tabulated results show: the activity is  $\text{I} > \text{Br} > \text{Cl}$  and increases with the no. of halogens in the ring; the presence of  $\text{NO}_2$  group increases the mobility of halogen in  $o$ - and  $p$ - and less in  $m$ -position;  $\text{MeO}$  group does not always increase the reactivity of halogen and only to a small degree, while  $\text{Me}$ ,  $\text{OH}$  and  $\text{NH}_2$  decrease it; the activity of halogen in

cyclic satd. compds. is greater than in the  $\text{C}_6\text{H}_5$  ring, and increases with addn. rings ( $\text{C}_{10}\text{H}_7$  and  $\text{C}_{14}\text{H}_{13}$ ). Of interest is the greater activity of halogen in  $\text{ClCH:CHCl}$  than in  $\text{C}_6\text{H}_5$  compds. Eleven references. C. Blanc

Kinetics of certain reactions of the alkyl halides in hydroxylic solvents. E. A. Moelwyn-Hughes. *J. Chem. Soc.* 1933, 1576-80.—The velocity of the reaction between  $\text{C}_2\text{H}_5\text{I}$  and  $\text{Na}_2\text{S}_2\text{O}_8$  in water was studied. Although a complicated side reaction between  $\text{C}_2\text{H}_5\text{I}$  and water interferes, the main reaction is bimol. The energy of activation is 21,430 cal. Since this value is very close to the energy of activation of a no. of reactions between  $\text{C}_2\text{H}_5\text{I}$  and various anions in hydroxylic solvents, it is suggested that the process of activation involves chiefly the bond between the alkyl group and the halogen. E. J. Rosenbaum

Oxidation of phosphorus with water at elevated pressures and temperatures. V. N. Ipat'ev and Carl Freitag. *Z. anorg. allgem. Chem.* 215, 388-414 (1933).—At elevated temps. and pressures P reacts with  $\text{H}_2\text{O}$  as follows:  $\text{P}_4 + (3 + n)\text{H}_2\text{O} = \text{P}_2\text{O}_5 \cdot n\text{H}_2\text{O} + 2\text{PH}_3$ ;  $\text{P}_2\text{O}_5 \cdot n\text{H}_2\text{O} + 2\text{H}_2\text{O} = \text{P}_2\text{O}_5 \cdot (n+1)\text{H}_2\text{O} + 2\text{H}_2$ ;  $2\text{PH}_3 + (5 + n)\text{H}_2\text{O} = \text{P}_2\text{O}_5 \cdot n\text{H}_2\text{O} + 8\text{H}_2$ . With considerable time only  $\text{H}_3\text{PO}_4$  and H are formed as follows— $\text{P}_4 + (10 + 2n)\text{H}_2\text{O} = 2\text{P}_2\text{O}_5 \cdot n\text{H}_2\text{O} + 10\text{H}_2$ . The dependence of the reaction upon various variables was studied between  $175^\circ$  and  $420^\circ$  and between 20 and 530 atm. The velocity of all the reactions increases with rise in temp. In the absence of catalysts, temps. above  $280^\circ$  are essential for the oxidation of  $\text{P}_2\text{O}_5$ , the first reaction being the fastest. Metallic compds., especially those of Ni and Co, but also Ag, Cu and Fe compds., show marked catalytic action. Small quantities of  $\text{Ni}(\text{NO}_3)_2$  will take the reaction to completion in a short time at  $200^\circ$ . H. Stoertz

A method of determining the rate of gas reactions of atomic hydrogen. E. Cremer, J. Curry and M. Polanyi. *Z. physik. Chem.* B23, 445-68 (1933).—A stream of  $\text{H}_2\text{O}$  vapor contg. a small amt. of atomic H flows through a nozzle into a space contg. a gas that reacts readily with H. The following measurements were made:  $N$ , the no. of H atoms in the reaction zone, which was detd. by measuring the rate of conversion of para H;  $n$ , the no. of H atoms introduced into the reaction chamber per sec. and  $c$ , the concn. of the reacting compd. The rate const. is given by  $k = n/Nc$ . The method is capable of detg. the upper and lower limits of the heat of activation but is applicable only between 2800 and 7200 cal. at present, although modifications may extend the range.  $\text{MeCl}$  reacts too slowly to follow by this method.  $\text{CH}_3\text{Cl}$ ,  $\text{CHCl}_3$  and  $\text{CCl}_4$  react more rapidly with upper limits for the heat of activation,  $Q$  of 5800, 4300 and 3200 cal., resp.  $\text{MeBr}$  reacts more rapidly than  $\text{MeCl}$  with  $Q$  less than 3200 cal. The mechanism of this reaction is not clear. For  $\text{EtI}$  and  $\text{HBr}$ , the upper limit for  $Q$  is 4500 and 3000 cal., resp. Comparison of similar reactions with Na vapor shows agreement within 1000 cal. G. M. Murphy

The crystallization of eutectic melts. G. Tammann. *Z. Metallkunde* 25, 236-8 (1933).—The ends of the 2 kinds of crystal fibers crystg. from a eutectic melt advance in a front perpendicular to the direction of heat flow. The more rapid the cooling the thinner are these fibers. The decrease in fiber thickness results from the necessity for sepn. of the 2 components under the condition of more rapid cooling but const. diffusion velocity. Since one component envelops the other, the diffusion conditions remain uniform. The necessity for sepn., requiring diffusion, greatly decreases the apparent crystn. velocity for binary eutectics and more greatly for ternary eutectics. These observations, made primarily on nonmetallic systems, are valid also for metallic systems. R. F. M.

Vapor-liquid equilibria in the system nitrogen-water. Arthur W. Saddington and Norman W. Krase. *J. Am. Chem. Soc.* 56, 353-61 (1934).—The system  $\text{N}_2$ - $\text{H}_2\text{O}$  was studied up to temps. of  $250^\circ$  and 300 atm. The soly. of  $\text{N}_2$  in  $\text{H}_2\text{O}$  passes through a min. at  $70$ - $80^\circ$ . The increase in soly. with pressure deviates widely from that calcd. by Henry's law. The concns. of  $\text{H}_2\text{O}$  in the vapor phase are much higher than those calcd. by Poynting's equation, the

deviations increasing with temp. and pressure. A method is given for detg. the vapor phase  $d$ . and compressibility. Calcn. of the latter by an additive rule holds up to 150°.

Michael Fleischer

A study of solutions of methanol in cyclohexane, in water and in cyclohexane and water. E. Roger Washburn and Howard C. Spencer. *J. Am. Chem. Soc.* 56, 361-4(1934); cf. *C. A.* 25, 5822; 27, 651.—Soly. curves and the lines were detd. for the ternary system at 24.8°. The f. ps. of cyclohexane—MeOH solns. indicate that MeOH is highly assocd. in cyclohexane. M. Fleischer

Phase equilibria in the systems titania, titania-silica and titania-alumina. E. N. Bunting. *Bur. Standards J. Research* 11, 719-25(1933)(Research Paper No. 619).—The stable form of  $TiO_2$  above 400° is rutile, m. 1825°. It forms no compds. with  $SiO_2$  but gives a eutectic with 89.5 wt. %  $SiO_2$  at 1540°. With  $Al_2O_3$  a compd.,  $TiO_2 \cdot Al_2O_3$ , is formed, m. 1860°. This compd. forms a eutectic with  $Al_2O_3$  at 62%  $Al_2O_3$  and 1850°. H. A. Smith

The mechanism of heterogeneous catalysis. Étienne Audibert. *Ann. combustibles liquides* 8, 1003-82(1933); cf. *C. A.* 28, 960.—A comprehensive treatise which reviews the structure of solids, the adsorption of gases by solids, the activation of chem. reactions, the various tentative theories for the mechanism of heterogeneous catalysis and the interpretation of exptl. observations. Experience shows that many solids can present local irregularities in crystn. that exist essentially in a crystal lattice which apparently exhibits a vol. greater than normal. All exptl. observations can be interpreted if the following assumptions are made: (1) solid catalysts are substances that present local irregularities in crystn.; (2) in the neighborhood of these irregularities, which are superficial, adsorbed gaseous mols. are subjected to more intense forces than at other points of the field of absorption; and (3) when the irregularity in the lattice is sufficiently pronounced, these forces can become strong enough to activate certain mols. upon which they act.

Karl Kammermeyer

The physical state of solid catalysts. Étienne Audibert and André Raineau. *Ann. combustibles liquides* 8, 1147-9(1933); cf. preceding abstr. and *C. A.* 28, 29.—From observations of x-ray diffraction patterns the authors conclude that, in order to show catalytic activity, a solid substance must have local irregularities in its crystal structure that are essentially characterized by a dilation of the lattice.

Karl Kammermeyer

The effect of ignition temperature on the catalytic activity of zinc oxide. P. Ya. Ivannikov, A. V. Frost and M. I. Shapiro. *Compt. rend. acad. sci. U. R. S. S.* 1933, 124-6(in German 126).—The activity of  $ZnO$  as catalyst for the decompn. of MeOH vapor decreased sharply with rise in ignition temp. of the hydrate from which the  $ZnO$  was formed. The hexagonal lattice remained unchanged between 110° and 1300° and had the following parameters:  $a = 3.248 \pm 0.002$  A. U.;  $c/a = 1.602 \pm 0.002$ . The size of the crystallites remained unchanged from 110° to 500°; a rapid increase began at 770°. A comparison of the changes in activity and crystal size showed that the decrease in activity began sooner and proceeded more rapidly than the decrease in surface caused by sintering.

Louise Kelley

The hydrogenation of naphthalene. A. Maillard. *Compt. rend.* 197, 1422-4(1933).—If  $C_{10}H_8$  is hydrogenated above 180° in the presence of Ni, C is deposited and  $CH_4$  is formed up to 90% by vol. The proportion of  $CH_4$  increases as the initial pressure of H is lowered. At 20°, only the reaction  $C_{10}H_8 + 5H_2 \rightarrow C_{10}H_{18}$  occurs. Above 60° successive reactions take place:  $C_{10}H_8 + 2H_2 \rightarrow C_{10}H_{12}$  and  $C_{10}H_{12} + 3H_2 \rightarrow C_{10}H_{18}$ .

Rachel Brown

Heat-capacity curves of the simpler gases. IV. Extension of the "free energy" formula of Giauque and Overstreet to yield reliable approximation formulas for the calculation of entropy and of heat capacity from spectroscopic data. Entropy and heat capacity of carbon monoxide and of nitrogen from nearly zero absolute to 5000°K. Herriek Johnston and Clyde O. Davis. *J. Am.*

*Chem. Soc.* 56, 271-6(1934); cf. *C. A.* 27, 4158.—Values of  $E^\circ$ ,  $E^\circ$ ,  $C_p^\circ$ , and  $S^\circ$  are calcd. for the range 50-5000°K. Rotational heat capacity curves for CO and  $N_2$  show maxima at about 2° and 5°K., resp. The existence of ortho and para rotational states in  $N_2$  produce heat-capacity curves similar to those for the ortho, para, equi. and nonequil. forms of  $H_2$ . The distribution of CO and  $N_2$  mols. among their resp. vibrational levels is tabulated as a function of the temp. from 300° to 5000°K. F. D. R.

The heat capacities at low temperatures of the alkaline earth carbonates. C. Travis Anderson. *J. Am. Chem. Soc.* 56, 340-2(1934); cf. *C. A.* 27, 4997.—From measurements of the heat capacities from 55° to 300°K., the following values of the entropy at 298.1°K., in cal. per mol. per degree were calcd.:  $CaCO_3$  (calcite, coarse),  $22.24 \pm 0.4$ ;  $CaCO_3$  (calcite, fine, 0.5 micron),  $22.40 \pm 0.4$ ;  $CaCO_3$  (aragonite),  $21.18 \pm 0.3$ ;  $SrCO_3$  (strontianite),  $23.21 \pm 0.4$ ;  $BaCO_3$  (withelite),  $26.75 \pm 0.5$ . F. D. Rossini

The specific heats of  $CaO$ ,  $Al_2O_3$ ,  $CaO \cdot Al_2O_3$ ,  $3CaO \cdot Al_2O_3$ ,  $2CaO \cdot SiO_2$ ,  $3CaO \cdot SiO_2$ , and  $2CaO \cdot Al_2O_3 \cdot SiO_2$  from 20° to 1500°. H. Elsner v. Gronow and H. E. Schwiete. *Z. anorg. allgem. Chem.* 216, 185-95(1933).—Results are discussed with relation to Kopp's law. F. D. Rossini

Estimation of the heat of dehydration of kaolin at 450° H. Elsner v. Gronow and H. E. Schwiete. *Z. anorg. allgem. Chem.* 216, 109-12(1933).—If a salt dehydrates at a relatively high temp., the difference between the heats of soln. of the hydrate and anhyd. salt at room temp. is not the true heat of dehydration because of the difference in the sp. heats of the hydrate and anhyd. salt +  $H_2O$ . Thus the value, 135 cal./g., detd. by Klever and Kordes (*C. A.* 24, 3618) for the heat of dehydration of kaolin is much in error. One of the authors detd. the av. sp. heat of kaolin between 20° and 450° to be 0.280 and that of anhyd. kaolin to be 0.238. By means of these values K. and K.'s value was corrected and the true heat of dehydration of kaolin found to be 213 cal./g.

John E. Milbery

Comments upon the third law of thermodynamics. V. Njegovan. *Collection Czechoslov. Chem. Communications* 5, 415-23(1933).—In heating a body from zero abs. to a higher temp., N. recognizes, in addn. to the heat content, an "internal" effect of the form  $\int_0^C T dC$ , whose relation to the third law is examd.

F. D. Rossini

An attempt to express the chemical constant thermodynamically. V. Njegovan. *Collection Czechoslov. Chem. Communications* 5, 424-6(1933).—Theoretical. Cf. preceding abstr.

F. D. Rossini

Coagulation of the soil fraction smaller than 0.002 mm. in diameter as effected by H ions of HCl and AcOH (Musierowicz, Smolik) 15. Reactions between  $Cl_2$  and solid carbonates (Ishikawa, et al.) 6. The refraction const. of the CN group (Bruylants, Merckx) 10.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

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Hydrogen-like atoms in the old quantum theory. P. Copel. *J. phys. radium* [7], 4, 638–45(1933).—Two-body quantization in the classical and relativistic quantum mechanics is simplified. P. S. Roller

Electron interference experiments on active beryllium oxide. R. Fricke and J. Lüke. *Z. physik. Chem.* B23, 330–37(1933).—Electron interference expts. on the BeO samples prepd. as previously described (cf. C. A. 28, 1586) show that the intensity first increases and then decreases with increasing temp. of prepn. The products prepd. at low temp. show a very poor lattice formation, but those at high temp. possess particle thickness too great for electron interference. G. M. Murphy

Prediction of the photoelectric power of certain compounds from a structural number connected with the formula of the compound. H. Spindler and R. Coustal. *Compt. rend.* 197, 982–4(1933). Howard A. Smith

The thermoelectric effects of the alkalis. A. Sommerfeld. *Phys. Rev.* 45, 65–6(1934).—An extension of one phase of the treatment of the electron theory of metals given in *Handb. d. Physik* 24, 2. Math. A formula gives the correct order as well as the order of magnitude of the Thomson coeff.  $\mu$  for the alkali metals.

Secondary and tertiary particles produced by cosmic rays. J. H. Sawyer, Jr. *Phys. Rev.* 44, 241–5(1933).—Three Geiger counters are used to study the ionizing cosmic-ray particles. The first ionization is due to secondaries, which when produced in air have an absorption coeff. of 0.5 in Pb; the Pb tertiaries have a coeff. of 2.58. L. S. Kassel

Atomic disintegration by cosmic radiation. W. Messerschmidt. *Physik. Z.* 34, 896(1933); cf. C. A. 27, 3394; 28, 381.—The effect of cosmic radiation was observed on Pb, Fe, Al and C. The max. of the frequency-intensity curve of the showers is displaced toward smaller quantities of ions with decreasing at. wt. With an absorber consisting of approx. equal thicknesses of Al and Fe, the observed max. was halfway between the max. for Al and that for Fe. A long-range process produces the showers

in the lower absorbing layers. The size of the at. nucleus det. the magnitude of the shower. Very large showers can be understood if the energy of the primary radiation particle is sufficiently large so that under the influence of at. nuclei it is split into a sufficient no. of pos. and neg. electrons. E. J. Rosenbaum

Radiation appearing on disintegration of lithium. A. Eckardt, R. Gebauer and H. Rausch von Traubenber. *Naturwissenschaften* 21, 694(1933).—Disintegration of Li by protons gives rise to  $\gamma$ -rays. By alternate irradiation of Fe (inert) and Li with H canal rays the differential effect was measured. The principal component of the secondary Li radiation is soft (intensity halved by 0.3 mm. Pb). For a canal ray tube potential of 58 kv., current 1 ma., Pb absorber 1 mm. thick and a distance of 48 mm., 3 quanta were observed per min. in a Geiger-Müller tube. Complications arise from possible neutron emission of the Li. The no. of quanta measured increases again for increasing Pb layer (several cm.). B. J. C. van der Hoeven

Long-range fragments of boron from bombardment with protons. F. Kirchner and H. Neuert. *Physik. Z.* 34, 897–8(1933); cf. C. A. 27, 4729.—Cloud chamber tracks of B fragments were photographed. A slit was used which permitted only those fragments to enter the cloud chamber which were moving approx. parallel to the photographic plate, so that the length of track could be obtained directly from the photograph. Track lengths between 28 and 48 mm. were obtained. A broad max. in the frequency-length curve was observed at 45 mm. It had a width of 6 mm. This max. is consistent with the assumption of a homogeneous group of B fragments. R. J. Rosenbaum

$\gamma$ -Rays from lithium bombarded with protons. C. C. Lauritsen and H. R. Crane. *Phys. Rev.* 45, 63–4(1934); cf. *Ibid.* 44, 783.—Measurements of neutrons made in an ionization chamber with and without a paraffin lining indicated that when LiCl was bombarded with H ions, a considerable part of the ionization was due to  $\gamma$ -rays. Energy calcs. for  $\alpha$ -particles from Li bombarded by protons also suggest accompanying  $\gamma$ -rays. The intensity of  $\gamma$ -rays from Ra Th, LiF and Ra is plotted against the thickness of Pb. The  $\gamma$ -radiation and the short-range  $\alpha$ -particles of Li are apparently assoc. G. M. P.

The use of liquid air in the purification of radon. Nella Mortara. *Atti. accad. Lincei* 17, 1069–72(1933).—The temp. of liquid air may vary from that of liquid N<sub>2</sub> (77.5° K.) to that of liquid O<sub>2</sub> (90.96° K.), this difference being enough to cause the amt. of Rn condensed to vary from 90% in N<sub>2</sub> to 58.2% in O<sub>2</sub>. A. W. Conter

Radioactivity of soil gases. Lynn G. Howell. *Bull. Am. Assoc. Petroleum Geol.* 18, 63–8(1934).—A typical line survey over 9 miles in the Gulf Coast region is given. It shows large variations in radioactivity of the gases in the soil. Alden H. Emery

The relative abundance of the lithium isotopes. G. P.

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- Possibility of interchange between deuterium gas and hydrogen in compounds. Austin J. Gould and Walker Bleakney. *J. Am. Chem. Soc.* 56, 247-8 (1934).—The concn. of deuterium-H mixts. in contact with  $\text{H}_2\text{O}$  in clean vessels remains const. if precautions are taken to avoid preferential soly., diffusion and the presence of metallic surfaces. C. J. West
- Designation of heavy hydrogen. Harold C. Urey, F. G. Brickwedde and G. M. Murphy. *Nature* 133, 173 (1934). E. H.
- The  $M$ -series of the elements bromine (35) and rubidium (37). Manne Siegbahn and T. Magnusson. *Arkiv Mat. Astron. Fysik* 24B, No. 4, 5 pp. (1933).—The  $M$ -series of Br and Rb have been photographed with a concave grating spectrograph. All the lines except one, resulting from permitted transitions between the  $N$  levels and the  $5 M$  levels, have been observed. Their wave lengths, lying between 57 Å. and 193 Å., and values for  $\nu/R$  for the  $M$  and  $N$  levels are given. C. C. Kiess
- Apparatus for x-ray fine-structure analysis. W. E. Schmid. *Z. physik. Chem.* B23, 347-57 (1933).—A very compact and easily adjustable app. for obtaining Debye-Scherrer x-ray photographs is described. The exposure time has been shortened by a special arrangement of the x-ray tube. Four exposures can be made simultaneously. G. M. Murphy
- The colored centers of alkali halide crystals. Erich Mollwo. *Z. Physik* 85, 56-67 (1933).—Absorption measurements of colored KCl, NaCl, KI, KBr, KF, RbCl, RbI and NaBr between  $-53^\circ$  and the m. p. of the crystal lead to the following conclusions: The min. concn. of color centers depends solely on temp. and is detd. by the vapor pressure of the cation metal at the temp. considered. The course of the absorption curve agrees with the classical theory of dispersion. Egon Bretscher
- Connection between chemical constitution and x-ray  $K$  absorption spectra. XII. Investigation of x-ray  $K$  absorption spectra of stereoisomeric compounds. I. Otto Stelling. *Z. physik. Chem.* B23, 338-46 (1933); cf. *C. A.* 26, 3435.—X-ray study of compds. of the type  $\text{MA}_4\text{VCIX}$ , where  $M = \text{Co}$  or  $\text{Cr}$  shows that if  $Y = \text{Cl}$  or  $\text{Br}$  the spectra for trans and cis forms are different, but if  $Y$  is a group coordinated with  $N$  the spectra are the same. G. M. Murphy
- Multiple Laue spots. Carleton C. Murdock. *Phys. Rev.* 45, 117-18 (1934).—Double and triple Laue spots may occur when thick crystals composed of atoms of low at. no. are used. Triple spots are explained by assuming that the crystal is ideally perfect except near the 2 surfaces; double spots by assuming that the crystal is made up of small mosaic blocks. Such perfect blocks within a crystal may be located and surveyed. G. M. P.
- The hyperfine structure of spectral lines. W. E. Curtis. *Science Progress* 28, 420-38 (1934).—A review, with a description of the methods of research. J. S. H.
- The measurement of spectral intensities applied to problems of atomic and molecular physics. L. S. Ornstein. *J. phys. radium* [7], 4, 613-24 (1933).—The probability of emission, activation and excitation of an atom colliding with an electron is discussed. The laws of spectral intensity for complicated line and band spectra are indicated. Recent results based on intensity measurement are given for the accommodation coeff. of gases, the proportion of isotopes, the Raman effect and the phenomena of the elec. arc. P. S. Roller
- The nature of the "forbidden" lines in the Pb I spectrum. J. Blaton and H. Niewodniczański. *Phys. Rev.* 45, 64-5 (1934); cf. *C. A.* 28, 707<sup>9</sup>.—The line 4618.0 Å. is explained by magnetic dipole radiation, rather than by electrically perturbed dipole radiation. If this is correct, the lines 4659.4 and 5312.7 Å. are pure quadrupole lines and the line 7330 Å. is due to mixed magnetic dipole and quadrupole radiation. G. M. P.
- Infra-red grating spectra and spectral laws (Al II, Al I, He I and II, Zn II, Zn I). F. Paschen and R. Ritschl. *Ann. Physik* 18, 867-92 (1933).—Infra-red spectra were photographed to 11,000 Å. with a Rowland grating and sensitized plates. Spectral terms were detd. and used to correct wave lengths in the visible and ultra-violet region. The fine structure of the Al spectrum was studied. It results from a nuclear spin of  $1/2$ . The theory of Goudsmit and Bacher (*C. A.* 27, 4166) is in agreement with the data. E. J. Rosenbaum
- The identification of europium and three lines of extreme sensibility. G. Piccardi. *Atti accad. Lincei* 17, 1092-4 (1933).—Among the lines present in both the arc and spark spectra of Eu are the lines  $\lambda$  4205.03 and 4129.72, the latter being the most persistent in the spectrum. These lines are very close to 2 lines in the spectrum of Ga, i. e., 4150.39, and 4204.84, so that this element interferes unless a spectroscope of high resolving power is used. However, in studying spectra of mixts. of Nd-Sm-Gd-Eu, 3 equidistant lines of notable intensity were found, 4661, 4627, 4594. All 3 lines belong to the spectrum of Eu, and no other lines of this element appear. These 3 lines appeared even when Sm with only a trace of Eu was examd. Thus these 3 exactly equidistant ( $\Delta = 33.0$  Å.) lines are characteristic for Eu, at low excitation. They were also noted by King (*C. A.* 25, 639). A. W. C.
- The interstellar cloud of gas. Otto Struve. *Scientia* 55, 1-10 (1934).—Evidence for the existence of a highly attenuated cloud of ionized Ca in interstellar space is discussed. L. E. Gilson
- Polarization of fluorescence radiation. Irving S. Lowen and G. Breit. *Phys. Rev.* 45, 120 (1934).—The Dirac theory of light quanta is used to investigate the case where light from a radiator raises a scattering atom from the ground state  $\alpha_0$  to the state  $\gamma$ ; it falls to another level through the intermediate state  $\beta$ , emitting the light quanta  $\rho$  and  $\delta$ . The intensity of the fluorescence radiation  $\rho$  polarized in a given direction was examd. G. M. P.
- The emission and fluorescence spectra of sulfur dioxide. H. D. Smyth. *Phys. Rev.* 44, 690 (1933).—The emission and absorption spectra of  $\text{SO}_2$ , discussed by Chow (*C. A.* 28, 709<sup>9</sup>) are compared with the fluorescence spectrum reported by Lotmar (*C. A.* 27, 4734); the results obtained are in agreement. A. B. F. Duncan
- The transparency of the atmosphere and the absorption by oxygen. J. Duclaux. *J. phys. radium* [7], 4, 625-37 (1933).—Near the surface of the earth, and especially in winter, the atm. may be very transparent and the visibility extend to several hundred km. The coeff. of absorption is then at least equal to that deduced from Rayleigh's law of scattering. Ordinary air shows a scattering caused by suspended ultramicroscopic particles. These particles consist in part of  $\text{NH}_4$  nitrate and nitrite and Na chloride and perchlorate. The air near the earth's surface may be purer than that at higher altitudes because of the cleansing effect of rain. Based on these considerations, there is no proof that the disappearance of the solar spectrum beyond the ozone bands is due to continuous absorption by  $\text{O}_3$ . Between 1850 and 1865 Å. the absorption spectrum of  $\text{O}_3$  is found to consist of a complicated series of primary and secondary bands. In order to establish continuous absorption of the solar



spectrum by  $O_2$ , it will be necessary to make absorption measurements on air of the highest transparency. P. S. R.

**Internal temperatures of stars.** G. Gamov and L. Landau. *Nature* 132, 567(1933).—Expressions for the rate of the reaction  $Li^+ + H^+ = 2He^+$  and the diffusion coeff. from interior to exterior of a star are given. The mean free path decreases from  $10^{11}$  cm. at  $10^8$  to 1 cm. at  $10^6$ . Either Li is present on the star surfaces in very small amount or star temps. are not higher than a few million degrees. Gregg M. Evans

**Atomic transmutation and the temperature of stars.** A. S. Eddington. *Nature* 132, 639(1933); cf. preceding abstract.—Circulating currents in meridian planes due to rotation could account for a sufficiently rapid movement of Li (about 60 m./year) to enable astronomically derived temps. to be accepted. Gregg M. Evans

**Simultaneous presence of the bands of carbon and of titanium oxide in sun spots.** P. Swings. *Bull. sci. acad. roy. Belg.* 19, 1071-3(1933).—It is shown, from the theory of dissociative equil., that there are approx. equal nos. of  $C_2$  and TiO mols. in the atms. of sun spots; this accounts for the appearance of both the  $C_2$  and TiO bands in the spot spectrum. C. C. Kiess

**Some stellar spectra presenting simultaneously the emission lines of H, He I, He II, C III (O III), the nebular lines and the absorption bands of TiO.** P. Swings. *Bull. sci. acad. roy. Belg.* 19, 1074-7(1933).—The simultaneous appearance in the spectra of the variable stars AX Persei, RW Hydrae and CI Cygni of emission lines of H, He, C, O and N, which are characteristic of very hot stars, and of the absorption bands of TiO, characteristic of relatively cool stars, suggests that the observed spectra are due, in each case, to the close assocn. of 2 stars, one very hot, of class O, and the other a cooler one of Class K, with a high concn. of Ti. C. C. Kiess

**The bands of scandium oxide observed in the spectra of cool stars.** P. Swings. *Bull. sci. acad. roy. Belg.* 19, 1078-95(1933).—The development of the ScO bands in stars belonging to the F-G-K-M sequence, as described by Bobrovnikoff (*C. A.* 27, 3667), is here accounted for by the theory of dissociative equil. C. C. Kiess

**The band spectrum of barium oxide.** P. C. Mahanti. *Proc. Phys. Soc. (London)* 46, 51-61(1934); cf. *C. A.* 27, 2879.—New wave-length measurements have been made for the BaO band heads between 4268 and 7905 Å. These have been arranged into a single system representing a  $^3\Sigma \rightarrow ^1\Sigma$  transition and given by the formula:  $\nu = 16,815.89 + [495.36 (\nu' + \frac{1}{2}) - 1.12 (\nu' + \frac{1}{2})^2] - [671.48 (\nu'' + \frac{1}{2}) - 2.20 (\nu'' + \frac{1}{2})^2]$ . Several of the individual bands have been measured in detail to secure data for a rotational analysis from which values for the mol. consts. are derived. C. C. Kiess

**Polyatomic molecules—structure and activation of the benzaldehyde.** I. Absorption of ultra-violet rays by gaseous benzaldehyde. F. Almasy. *J. chim. phys.* 30, 528-47(1933).—The different methods for detg. the structure of polyatomic mols. such as x-ray patterns, electronic patterns, elec. moments, optical properties, moments of inertia, infra-red absorption, Raman spectra and ultra-violet absorption are discussed briefly. The present work is concerned with the analysis of the structure of the diverse properties of the carbonyl group. The absorption spectrum of BzH is studied between 2340 and 3747 Å. The absorption spectrum was divided into 3 regions, the first between 3747 and 3163 Å., the second between 2963 and 2509 Å., the third from 2428 to 2340 Å. In the first group are 159 measurable bands, in the second 51 and in the third 6. The magnitude of the shifts, their intensities and the change in quantum nos. corresponding to the shifts are indicated. James H. Hibben

**Spectral differentiation of pure hydrocarbons—a near infra-red absorption study.** Urner Liddel and Charles Kasper. *Bur. Standards J. Research* 11, 599-618(1933) (Research Paper No. 610).—Absorption spectra in the region 5500-9000  $cm^{-1}$  obtained with an automatic recording infra-red glass spectrograph are given for the following compds. (sp. absorptive indexes plotted against wave nos.):  $C_6H_6$ , PhMe, EtPh, *o*-, *m*-, *p*-Me $_3$ C $_6$ H $_5$ ,

1,2,3-, 1,2,4-, 1,3,5-Me $_3$ C $_6$ H $_3$ ; cyclohexane, methylcyclohexane, methylcyclopentane, 2 isomers of 1,2-dimethylcyclopentane; normal pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane; isopentane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,3-dimethylpentane, 2,4-dimethylpentane, 3,3-dimethylpentane, 2,2-dimethylpentane, 2,2,3-trimethylbutane, 3-ethylpentane, 3-methylhexane, 2-methylhexane, 2,2,4-trimethylpentane. Correlations of the spectra are made in 3 regions. In the high-frequency region the absorptions of the aromatic and aliphatic linkages are widely sepd. and variations in type of absorption indicate the manner of binding. The other 2 regions confirm this but are more complex. The positions of certain max. seem to show the presence of primary, secondary and tertiary hydrocarbon linkages. Janet E. Austin

**An infra-red band of arsine.** Will V. Norris and Hilbert J. Unger. *Phys. Rev.* 45, 68(1934).—A weak band of AsH $_3$  at 1.63  $\mu$  is analyzed. Gerald M. Petty

**Depolarization of Raman radiation by liquids.** L. S. Ornstein and P. Stoutenbeck. *Z. Physik* 85, 754-60(1933).—A beam of parallel light from a Hg arc passes an absorption tube contg. the liquid. The scattered light illuminates a horizontal slit, which is placed in the focus of an achromatic lens, followed by a Wollaston prism and a spectrograph with the slit perpendicular. The direction of observation is exactly at a right angle to the primary ray. The degree of depolarization  $\rho = I_{\perp}/I_{\parallel}$ , in which  $I_{\perp}$  and  $I_{\parallel}$  are, resp., the intensities parallel and perpendicular to the plane of the incident light. The following  $\rho$  values were found for Raman lines CCl $_4$ : frequency shift  $\Delta\nu = 211, \rho = 1.0$ ; 314, 1.0; 400, 0.0; 770 790, 1.0; 211, 1.0; 314, 1.0; 400, 0.0. The last three lines are anti-Stokes. The results with CCl $_4$  have been used to calibrate Wood's device and the degree of depolarization of  $C_2H_2Cl_2$  is detd. with this app.  $\Delta\nu = 277, \rho = 0.45$ ; 653, 0.55; 752, 0.66; 957, 0.44; 3000, 0.85. The method of Daure (*C. A.* 24, 1292) was used for purification of the liquids and no continuous background was found. Egon Bretschner

**Raman spectra in inorganic chemistry.** James H. Hibben. *Chem. Rev.* 13, 345-478(1933).—A review of the interpretation, development and application of Raman spectra in the field of inorg. chemistry, with some analysis of the data upon which the interpretations and applications are predicated. Numerous references are given. Louise Kelley

**Raman spectrum of heavy water.** R. W. Wood. *Science* 79, 35(1934).—The Raman spectra of 80 and 18% heavy water are contrasted. A water mol. with 2 atoms of heavy H gives one band with a frequency difference of 2517, while one with one atom each of heavy and of light H gives 2 bands with frequency differences of 2623 and 3500. Ordinary water gives a band with the frequency difference of 3445. Howard A. Smith

**Raman spectra of some cyclanones.** L. Piaux. *Compt. rend.* 197, 1647-8(1933).—Spectra have been obtained with Schott's GG $_2$  and UG $_2$  filters for cyclopentanone, and its  $\alpha$ - and  $\beta$ -Me derivs., cyclohexanone and its *o*-, *m*- and *p*-Me derivs. The absence of lines between 1600 and 1700  $cm^{-1}$  is attributed to the presence of enolic forms in the ketones studied, except with cyclopentanone, in which there is no initial enolization. W. J. Peterson

**Photochemical reaction of ammonia with oxygen.** H. E. Bacon and A. B. F. Duncan. *J. Am. Chem. Soc.* 56, 336-40(1934).—The reaction of NH $_3$  and O, when these gases are irradiated by Zn spark radiation in the region near 2080 Å., was studied. N, H, H $_2$ O and NH $_4$ NO $_3$ , with small amts. of NH $_4$ NO $_3$ , were found as products. The following equation fits the data best:  $8NH_3 + 7O_2 \rightarrow 2N_2 + 2NH_4NO_3 + 8H_2O$ . Probable side reactions and the reaction mechanism are discussed. The values of the quantum yield detd. are unreliable because of the formation of a mist of nitrate soln. which absorbs and scatters radiation. The absorption of NH $_3$  in the region 2080 Å. is represented by  $\log I/I_0 = \alpha p^2$ , in which  $\alpha = 0.010098$ ,

$\kappa = 0.76$ ,  $p$  is the pressure in mm. and  $t$  is the thickness in cm. E. J. Rosenbaum

**Mechanism of the photopolymerization of acetylene.** W. Kamula and St. Mrazek. *Z. physik. Chem.* B23, 358-60 (1933).— $C_2H_2$  was illuminated with quartz Hg lamps and a continuous H tube used to obtain the absorption spectra from time to time to follow the course of the reaction. After short exposure the gas pressure falls and a solid substance forms. The reaction rate drops because of the strong absorption of this solid. From the absorption spectra the presence of  $C_2H_4$ ,  $C_2H_2$  deriva. and other reaction products is evident. Analysis of the gas phase indicates small amts. of  $C_2H_4$  and  $C_2H_2$  (less than 0.25%). The presence of H was not proved. Hg vapor has no effect on the reaction. A reaction mechanism is proposed. G. M. Murphy

**Photochemical reaction of the combination of hydrogen with chlorine at great light intensities.** V. Kokochashvili. *Z. physik. Chem.* B23, 431-44 (1933).—The photochem. reaction between H and Cl was studied with a Mg flash of great intensity and of about 0.08 sec. duration. A glass membrane manometer was used as a recording instrument to follow the reaction. The results are discussed from the standpoint of chain reactions. G. M. M.

**Photochemistry of phosgene.** Louis S. Kassel. *J. Am. Chem. Soc.* 56, 243 (1934). Comments on the work of Montgomery and Rollefson (*C. A.* 28, 45<sup>9</sup>). C. J. W.

**Photodecomposition of chlorine dioxide.** J. W. T. Spinks and J. M. Porter. *J. Am. Chem. Soc.* 56, 264-70 (1934); cf. *C. A.* 27, 905.—The photodecompn. of moist and dry  $ClO_2$  was studied with light of wave lengths 3650 and 4360 Å. The reaction of moist gas is more regular than that of dry gas because of the removal of active groups by the water present. One mole disappears from the gas phase for each mole of  $ClO_2$  decompd. and no Cl is formed. Quantum efficiencies for the decompn. of moist  $ClO_2$  are 3.7 at 3650 Å. and 3.1 at 4360 Å. The rate of decompn. is proportional to the light intensity for  $ClO_2$  concn. below 8%. In the aq. soln. were found  $ClO^-$ ,  $ClO_2^-$  and  $ClO_3^-$ . When Br is added to  $ClO_2$ , a sensitized reaction takes place at 5460 Å. with a quantum efficiency the same as that for 3650 Å. With dry  $ClO_2$  at 17°  $Cl_2O_4$  is formed and condenses on the walls, undergoing subsequent photodecompn. At 31° the thermal decompn. of  $Cl_2O_4$  is rapid, forming Cl and O. Mechanisms for all these reactions are discussed. E. J. R.

**Primary photochemical processes. III. Absorption spectrum and photochemical decomposition of ketene.** Ronald G. W. Norrish, H. Gordon Crone and Olive Saltmarsh. *J. Chem. Soc.* 1933, 1533-9; cf. *C. A.* 27, 2383.—When ketene vapor is irradiated by the light of a Hg lamp, decompn. occurs with the formation of 2 vol. of CO and 1 vol. of  $C_2H_4$ . The absorption spectrum of ketene vapor consists of a series of regularly spaced diffuse bands in the range 3700-2600 Å. with max. absorption at 3100 Å. This indicates that light is first absorbed by the carbonyl group and that this energy can be transferred to the olefin group with consequent rupture. The addnl. energy required for rupture may come from a change in the at. state of C from a quadrivalent to a bivalent form. The potential-energy diagrams involved are discussed. E. J. Rosenbaum

**Photochemical reaction between bromine vapor and platinum.** Joseph Urmston and Richard M. Badger. *J. Am. Chem. Soc.* 56, 343-7 (1934).—The photochem. reaction of Br with finely divided Pt was studied with light of wave length shorter than 5000 Å. and light of wave length longer than 5300 Å. The thermal reaction at 0° and 25° was also studied. The data for both thermal and combined reactions can be fitted by an expression of the form:  $dp/dt = k_1p/(k_2 - p)$ . The Br atom

each. is too small to account for the thermal reaction. From the similarity of the photochem. reaction when blue light is used with that when yellow light is used, it appears that in both cases the initial step is the production of Br atoms and that a considerable fraction of Br mols. excited by yellow light dissociate without a collision.

E. J. Rosenbaum  
**Piperidine metavanadate, a new light-sensitive compound.** Oskar Baudisch and F. L. Gates. *J. Am. Chem. Soc.* 56, 373-4 (1934).—Piperidine reacts with vanadic acid to form piperidine metavanadate  $C_4H_{11}N \cdot HVO_3$ , a white solid, stable in the dark, sol. in alc., insol. in acetone, ether, benzene,  $CHCl_3$  and  $CCl_4$ . When this compd. is irradiated with ultra-violet light, it turns black and piperidine is liberated. When the black product stands in the dark in the presence of piperidine and oxidizing agents, piperidine metavanadate is formed again. Absorption coeffs. were detd. E. J. Rosenbaum

**Liberation of ions from glass and quartz vessels under the influence of radium rays.** A. Fernau. *Physik. Z.* 34, 899-900 (1933).—When cond. water in glass or quartz vessels is exposed to the  $\beta$ - and  $\gamma$ -rays of Ra for lengths of time in the range 18-82 days, the sp. cond. of the water increases. The quantity of  $H_2O_2$  produced in the water by the Ra was detd. and was found to be too small to account for all of the increased cond. of the water.

E. J. Rosenbaum

Prepn. of 3-aminophthalhydrazine for use in the demonstration of chemiluminescence (Huntress, *et al.*) 10.

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**Quantenmechanik der Materie und Strahlung.** Edited by E. Marx. Tl. 2. Moleküle, by R. de L. Kronig, *et al.* Leipzig: Akad. Verlagsges. About 612 pp. About M. 53. Cf. *C. A.* 27, 3143.

**Langseth, A.: Spektroskopiske Studier: en Undersøgelse for Mulighederne for spektrografiens Anvendelse til Konstitutionsbestemmelse af organiske Forbindelser.** Thesis, Copenhagen. 1930. (B. Lunos Bogtrykkeri a/s.) 116 pp.

**Quellet, Cyrias. Désensibilisation de la photolyse du formiate d'uranyle.** Thesis, Zurich. 1931. 31 pp.

#### 4-ELECTROCHEMISTRY

COLIN G. FINE

**Furnaces for high temperatures, especially for ceramic purposes, melting and forging.** H. Masukowitz. *Elektro-*

*technische* 4, 15-18 (1934).—Construction details and operating data are given for furnaces which are equipped with a

new design of heating unit as described by Junker. *Elektrowärme*, July 1933, 218; cf. C. A. 27, 3170. This unit is like a ribbon with a reinforcing rib in the middle and permits of an almost uniform surface heating of the walls and roof. A brass-melting furnace for a 100-kg. crucible, with 8-9 castings every 8 hrs., consumed only 300 kw. hrs. per ton of brass when in continuous operation. M. H.

Recent developments in electric bright-annealing furnaces. Tamele. *Elektrowärme* 4, 3-8(1934).—Box-type and continuous furnaces with and without protective atm. for the material are described, and construction details are illustrated. M. Hartenheim

Electric heat and fused-salt electrolysis. H. Kirchth. *Elektrowärme* 3, 368-71(1933).—Electrolytic production of Na, Al and Mg from their molten salts is discussed and calcn. of required heat explained; phys. and chem. data are given. M. Hartenheim

Decomposition voltages of fused salts. I. Method of its determination and the decomposition voltage of zinc chloride. Yoshio Konishi. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 677(1933).—The voltage was measured by means of 3 graphite electrodes, consisting of anode, cathode and neutral electrode. The sum of the voltages for anode-neutral and neutral-cathode checked well with the voltage for anode-cathode. Decompn. voltages for fused  $ZnCl_2$  were 1.94, 1.89 and 1.83 v. for 408°, 450° and 489° (±2), resp. The calcd. figures were 1.902, 1.880 and 1.843 v. for a heat of formation of 97.21 kg. cal. and a sp. heat of 0.1362. Karl Kammermeyer

Purification of electrolytes in copper refining. E. S. Bardwell and R. J. Lapee. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 512, 12 pp.(1933).—Purification of electrolytes at the Cu refinery of the Anaconda Copper Mining Co., at Great Falls, Mont., is described. Daily a certain vol. of electrolyte is sent to the purification plant. It is boiled down to 46°Bé. and most of the Cu crystd. out as  $CuSO_4$ . The last of the Cu and most of the As and Sb are removed by passing through insol. anode cells. Next it may be returned to the cell room, or boiled to 55°Bé. and the Fe and Ni salts crystd. out before returning to the circuit. The av. analysis of electrolyte for 1932 was, in g. per l.: acid 213, Cu 34.5, As 8.7, Sb 0.60, Fe 2.5, Ni 8.0 and Cl 0.028. The sludge from the anode tanks analyzed Cu 29.9, Zn 0.03, Pb 2.7, As 31.2, Sb 1.93,  $SeO_4$  0.004, Te 1.8, Ni 1.7, Fe 0.2, S 4.1, insol. matter 0.5%, Bi traces and Ag 14.1 oz. and Au 0.13 oz. per ton. The sludge from the last purification step contained Ni 12.8 and Fe 3.9%. Roasting this at 650° for 2 hrs. rendered 99% of the Ni and 14% of the Fe  $H_2O$ -sol. After leaching with boiling  $H_2O$  and pptn. of the Fe with milk of lime, the  $NiSO_4$  soln. could be filtered off and evapd. The compn. of anodes for various periods is given, and the effect of the varying compn. on the purification problem is discussed.

Alden H. Emery  
The rate of displacement of copper from solutions of its sulfate by cadmium and zinc. Cecil V. King and Martin M. Burger. *Trans. Electrochem. Soc.* 65, 8 pp. (preprint)(1934).—The rate of displacement of Cu from dil.  $CuSO_4$  soln. by Cd and Zn has been measured and compared with previous expts. and with the rate of soln. of Zn in acids. The rate is controlled, up to peripheral speeds of the metal surface of at least 44,000 cm./min., by diffusion and electrolytic transport of the  $Cu^{++}$  ion to the surface of the more active metal and the Cu already deposited. There is no indication that the chem. reaction rate is slow enough to be a controlling factor at any stirring speed studied. C. G. F.

Electric conductivity of electrolyte mixtures. V. K. Semenenchenko and V. V. Serpinski. *J. Gen. Chem.* (U. S. S. R.) 3, 470-7(1933).—The elec. conductivities were studied of KCl in the concn. interval 0.000125-2.0 N, of  $NaNO_3$  0.001-1.0 N, of  $NaBr$  0.000125-0.005 N, of  $MgSO_4$  0.000166-2.0 N; of mixts. KCl +  $NaNO_3$  at total concns. of 0.1 and 0.001 N with ratios of components 3:1, 1:1 and 1:3; KCl +  $MgSO_4$  at total concns. of 0.001, 0.01, 0.1 and 2.0 N in the same ratios of components; KCl +  $NaBr$  +  $MgSO_4$  at total concns. of 0.005

and 0.0005 with ratios of components 1:1:1 and 1:1:2. Data on the double and triple mixts. in small concns. are in good agreement with the elec. cond. values calcd. on the basis of additivity of sp. cond. W. P. Bricks

Rhodium plating. Osvaldo Macchia. *Ind. meccanica* 15, 621-2(1933).—A brief review of Rh in electroplating, covering the published researches and the proposed baths. F. D. Rossini

Industrial chromium plating. D. A. Nemes. *Iron Age* 133, No. 5, 14-15, 76, No. 6, 18-20(1934).—A review. E. H.

Chromium plating in the cold. O. Macchia and D. Raffaelli. *Ind. meccanica* 15, 793-5(1933).—A discussion of the problem of plating chromium at 30-50° as contrasted with that at 16-20°. Conclusion: Plating in the cold is entirely practicable and possesses the following advantages over the heated-bath method: The heating app. and its expense of operation are eliminated; a smaller c. d. may be used, in consequence of which a smaller investment in the generating plant and its operation is required; the app. required for ventilation on account of harmful vapors is reduced to a min. F. D. Rossini

Chromium-plating literature. XXI. L. H. Decke. *Platers' Guide* 30, Jan. 13-15(1934); cf. C. A. 28, 976<sup>1</sup>. W. H. Boynton

Platinum plating. Alan E. W. Smith. *Metal Ind.* (London) 43, 201-2(1933).—Corrosion tests on electroplated Pt were made as follows: Brass metal strips were Ag-plated and then plated with Pt. These strips were used as lab. spatulas for 5 months. The spatulas were then dipped into an  $(NH_4)_2S$  soln. to test for broken coatings; none was found. Pt plate is appreciably harder than Ni plate. Other test specimens were exposed to acid fumes,  $H_2S$ , steam and gas-furnace fumes, 10% HCl, a dil. Lysol soln., and out-of-doors atm. After 1 month all these specimens showed some pitting; the one exposed to  $H_2S$  was the worst. In all cases the Pt itself was not attacked. The base metals were corroded because of pinholes in the deposit. Ni, Pt and Cr were plated on steel specimens and subjected to the action of a 2% soln. of  $I_2$  in alc. The Ni was eaten through in 1 day. The Pt showed signs of pinholing, the Cr signs of cracking at the edges in 2 days. Ag- and Pt-coated reflectors were tested for resistance to temp. The Ag reflector failed below 300° and the Pt reflector failed between 400° and 500°. Pt reflects only 65% while Ag reflects 92% of visible light rays. H. E. Messmore

Plating on aluminum. W. Krause. *Mitt. Forschungsinst. Probieramt Edelmetalle* 7, 87-9(1933).—The best method for obtaining a deposit on Al that adheres well is to roughen the surface first with a sand blast and then nickel-plate it. Any other metal deposit can then be made on the Ni (cf. Work, C. A. 27, 1829). M. H.

Theory of metallic overvoltage. N. Thon. *Compt. rend.* 197, 1312-14(1933).—The extension of the theory of activation to highly cryst. metals such as Pb, Zn, Cd, Bi, Cu and Ag seems unreasonable. Ions probably enter special locations in the lattice without the necessity of activation. In the Fe-Ni group, however, the activation energy is utilized in discharging either a hydrated or a colloidal preliminary state. In the case of gaseous cathodes the absence of any especially active centers imposes the necessity for that increase of discharge potential called overvoltage. Gregg M. Evans

The relation between oxygen overvoltage and catalysis. Allen D. Garrison and Johnny Fay Lilly. *Trans. Electrochem. Soc.* 65, 15 pp. (preprint)(1934).—O overvoltages on polished electrodes of Ni, Co, Fe, Ir, Pt and Au have been measured by a refinement of the direct method, and, almost simultaneously, the rates of depolarization of O gas have been measured at the same electrodes. The overvoltages have been found to increase in the order in which the metals have been named, while the rates of depolarization of O have been found to decrease in the order named. The statistical method has been applied to the data, and the following general equation was found to apply for the relation between the O ionization rate ( $\sqrt{}$ ) and the overvoltage (O. V.):  $\ln \sqrt{ } = A (O. V.) + B$ ,

where  $A$  and  $B$  are constants. This quant. relation is discussed in its bearing on the general catalytic theory of overvoltage, on the problem of electrolytic corrosion in  $O$  and on  $O$  electrodes in general. C. G. F.

**Electrolysis of acetates in absolute methanol.** Fr. Fichter and Robert E. Meyer. *Helv. Chim. Acta* 16, 1408-12 (1933).—The electrolysis of a soln. of  $NaOAc$  in abs.  $MeOH$  and  $HOAc$  produces 3% more  $C_2H_4$  and 1.4% more  $CO_2$  than that of a similar soln. in  $H_2O$  and  $HOAc$  under identical conditions. This is evidence that the Kolbe hydrocarbon synthesis takes place through the formation of the diacyl peroxide. Even in abs. alc.,  $O$  is evolved at the anode and true electrochem. oxidations may take place. In the electrolysis of aq. solns. of  $KOAc$  the max. yield (91.3%) of  $C_2H_4$  is obtained when the salt concn. is 1.44  $N$ . At lower concns. the yield of  $O$  and  $C_2H_4$  increases. H. F. Johnstone

**Standard quinhydrone electrode.** Frank Hovorka and Wm. C. Dearing. *J. Am. Chem. Soc.* 56, 243-4 (1934).—The potential difference between the H and quinhydrone electrodes in standard acid mixt. (0.01  $N$   $HCl$  + 0.09  $N$   $KCl$  with 2 series of acid mixts.) was 0.69903 and 0.69-898 = 0.00002 v. at 25 = 0.01°; because of its reproducibility and constancy the standard quinhydrone electrode excels either the 0.1  $N$  or satd. calomel electrode. C. J. West

**Metallized-glass quinhydrone electrodes.** E. Newberry. *Trans. Electrochem. Soc.* 65, 7 pp. (preprint) (1934).—The following electrodes have been examined with regard to their suitability for use as quinhydrone electrodes in various solns. of  $HCl$ ,  $AcOH$ , soil ext. and  $CuSO_4$ : bright wires of (1) Pt; and (2) Au; bright deposits on glass of (3) Pt; (4) Au; (5) Au-Pt alloy; (6) Ag; (7) Pd; and (8) Pt black; and (9) gray Pt on glass. Of these electrodes, 6 and 7 were found to be quite unsuitable; 5 is doubtful, sometimes working well but at other times appearing too slow; 2 is troublesome to prepare and too sensitive to impurities; 8 and 9 are quite satisfactory, especially 9, but are not better than 3 and require more prep.; 1 is good but is expensive and must be flamed before use, and this involves risk of cracking the glass holder, such cracks being sources of serious error; 3 and 4 are the best all-round electrodes for the purpose, being remarkably low in cost, rapid in action, easily prep'd., easily flamed or recoated with little danger of cracks, and less sensitive to impurities than any of the others. C. G. F.

**Some general properties of liquid organic dielectrics.** Vladimir Karapetoff. *Trans. Electrochem. Soc.* 65, 12 pp. (preprint) (1934).—The following properties of and phenomena in liquid dielectrics are briefly discussed: range of resistivities, dielec. const., mol. structure, miscibility, capillarity, surface tension, viscosity, soly., gas absorption, colloidal structure, oxidation, d. c. cond., behavior with a. c., motions in an intense elec. field, chem. changes in a strong field, ionization, and elec. breakdown. C. G. F.

**Luminous discharge lamps, improvements in construction and characteristics.** Clifford C. Paterson. *Electrician* 112, 104-5 (1934).—A review (Na and Hg vapor). C. G. F.

**Coating iron and steel [electrically]** (Brit. pat. 398,685) 9. Making rubber objects by electrophoretic deposition (Ger. pat. 587,700) 30. Silvering glass surfaces (U. S. pat. 1,942,686) 19. Coking of coal residue for electrode manuf. (Nikolskij, Stepanenko) 21. Kolbe hydrocarbon synthesis in liquid  $NH_3$  (Fulton, Bergstrom) 10.

**Handbuch der Experimentalphysik.** Edited by W. Wien and F. Harms. Bd. XII. Elektrochemie Tl. 2. Edited by K. Fajans and E. Schwartz. Leipzig: Akad. Verlagsges. 483 pp. M. 40. Cf. C. A. 27, 1282.

**Primary cells.** Charles H. Vince, Jr. Brit. 399,561, Oct. 9, 1933. A cell consists of strips of Al (alloy) and another metal, e. g., Cu, wound together in spiral form with intervening absorbent material, e. g., paper, cotton-

Wool, capable of being impregnated with electrolyte, which may consist of  $NaOH$  soln. or granular  $NaOH$  sprinkled on the absorbent material.

**Dry cells.** Otto K. Reinhardt (to Bend Electric Corp.). Brit. 398,701, Sept. 21, 1933.

**Dry-cell electrolytes.** Jaroslav J. Pála. Brit. 398,638, Sept. 21, 1933. An electrolyte which becomes gelatinous on addn. of  $H_2O$  without application of heat is made by mixing the exciting salts with (substances contg.) starch, adding  $H_2O$ , kneading the mixt. and drying at a temp. below which starch dextrinizes. In an example flour is mixed with  $NH_4Cl$  and made into dough which is divided into small pieces which are dried below 60°.

**Dry-cell batteries.** The Ever Ready Co. (Great Britain) Ltd. Brit. 397,068, Aug. 17, 1933. Correction of C. A. 28, 715<sup>a</sup> in which the patent no. was incorrectly given as Brit. 39,068.

**Method and apparatus for closing the seams of and insulating the bottom of shell cups of dry batteries.** Alfred Schulz. Brit. 398,662, Sept. 21, 1933.

**Storage batteries.** George C. Appel, Robert W. Vicarey and John D. Wanvig, Jr. (to Globe-Union Mfg. Co.). U. S. 1,942,350-1, Jan. 2. Structural features.

**Storage batteries.** Robert Bosch, A.-G. Brit. 398,630, Sept. 21, 1933 and 398,772, Sept. 21, 1933, addn. to 398,630.

**Storage batteries.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 398,814, Sept. 19, 1933. The frames, lugs, etc., of the pos. plates which are made of Pb-Sb alloy and are not covered with active material are provided with an insulating-coating of rubber, applied from an aq. rubber dispersion by spraying, immersion, etc., and solidified by drying, coagulating and vulcanizing, to avoid gassing after the charge.

**Storage batteries.** Robert J. Plummer and Ceag Ltd. Brit. 398,957, Sept. 28, 1933.

**Storage batteries.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 399,061, Sept. 28, 1933. A battery in which air is drawn over the surface of the electrolyte to remove gases is provided with a check valve to close the air entrance when the suction fan stops and prevent gases escaping into the battery room.

**Storage batteries.** Frederick Temple. Brit. 399,882, Oct. 16, 1933. Structural features.

**Storage-battery electrodes.** Karl Ackermann (to I. G. Farbenind. A.-G.). U. S. 1,942,791, Jan. 9. In a porous, ferrous electrode body such as a porous iron sinter plate the walls of the pores are coated with Ni or Co and the pores are provided with an active material such as Ni hydroxide. Ni or Co alloys contg. Cu or Cr also may be used. Cf. C. A. 28, 1281<sup>a</sup>.

**Storage-battery separator.** Edward W. Smith (to Elec. Storage Battery Co.). U. S. 1,942,667, Jan. 9. Separators are formed comprising a sheet of material such as perforated hard rubber on the surface of which is provided a layer formed from Na silicate and a siliceous powder for contact with the active pos. plate material. U. S. 1,942,668 relates to the use of a similar layer on separator sheets such as those formed of glass wool. Cf. C. A. 27, 234.

**Storage-battery vent plug.** Joseph L. Woodbridge (to Elec. Storage Battery Co.). U. S. 1,942,630, Jan. 9.

**Vent plug for storage batteries.** Ernest Graf (to Elec. Storage Battery Co.). U. S. 1,942,643, Jan. 9. U. S. 1,942,645 also relates to a vent plug.

**Depolarizing electrodes for electric batteries.** Martin L. Martus and Edmund H. Becker. U. S. 1,941,869, Jan. 2. A body of Cu oxide is molded about a metallic conductor to make an electrode article, which is then baked, sprayed with a molten metal such as Cu or Zn on its outer surface and joints, and then heated at an annealing temp.

**Machine for pasting storage battery and other grids.** Monark Battery Co., Inc. Brit. 398,450, Sept. 14, 1933. Divided on 398,328 (C. A. 28, 1281<sup>a</sup>).

**Machine for wrapping yarn, twine, etc., around the dollies of the carbon electrodes of primary batteries.** Wilhelm Hasse. Brit. 399,824, Oct. 5, 1933.

**Electrolytic condenser.** Howard J. Tyndall (to Electro Formation, Inc.). U. S. 1,941,726, Jan. 2, 1933. Structural details.

**Electrolytic condensers.** N. V. Philips' Gloeilampenfabrieken. Brit. 399,400, Oct. 5, 1933. See Fr. 782,023 (C. A. 28, 716<sup>9</sup>).

**Electrolytic condensers.** N. V. Philips' Gloeilampenfabrieken. Brit. 399,762, Oct. 12, 1933. Addn. to 382,916 (C. A. 27, 5008). The electrolyte of a condenser according to 382,916 has an acid, *e. g.*, citric, added thereto to render it acid within defined limits. An example gives glycerol 1 l.,  $\text{KH}_2\text{PO}_4$  40 g., citric acid 40 g.

**Electrolytic cells usable particularly as condensers.** Richard Jahre (trading as Richard Jahre, Spezialfabrik für Kondensatoren). Brit. 399,037, Sept. 28, 1933.

**Electrodeposition of metals.** Charles E. Yates (to Anaconda Copper Mining Co.). Brit. 398,759, Sept. 21, 1933. Sheet Cu, etc., is produced continuously by deposition on a partially immersed cathode drum. Between stripping and reimmersion the cathode surface is subjected to the action of a pad comprising graded abrasive particles, *e. g.*, of SiC, embedded in a soft rubber compd., the rubber being in amt. sufficient to exert a smoothing action, *e. g.*, abrasive 20, rubber 80 parts before vulcanization.

**Electrodeposition of chromium.** Colin G. Fink and Charles H. Eldridge (to United Chromium, Inc.). U. S. 1,942,356, Jan. 2. The object to be plated is heated to the temp. of the bath before beginning the electrodeposition. Thus preheating serves to promote good adherence of the deposited Cr.

**Chromium plating.** George E. Barber (to Timken-Detroit Axle Co.). U. S. 1,942,469, Jan. 9. A ratio of  $\text{CrO}_3$  to  $\text{H}_2\text{SO}_4$  of less than 40:1 is maintained in a bath contg. trivalent Cr and hexavalent Cr in the proportion of not less than 1 to 10.

**Dies.** Alexander G. Russell (to Electrical Research Products, Inc.). Brit. 399,451, Oct. 5, 1933. The working surface of a die for pressing and stamping phonograph records, etc., is coated with Pd. The sound impression is taken in a layer of recording wax located in a recess in a metal disk, which is then inverted and clamped to the  $\text{H}_2\text{O}$ -cooled cover of a sputtering chamber. Insulated within the chamber are an annular anode and disk-shaped cathode, the latter formed by covering a glass sheet with a Pd sheet. The surface of the wax becomes evenly coated with Pd on applying a suitable potential to cause a glow discharge and evacuating the chamber. The coated wax is then Cu-plated by electrodeposition and the product used as the working surface after the wax has been melted away and the plate trimmed and cleaned.

**Electrolytic cells.** Karl Kaisser. Brit. 398,751, Sept. 21, 1933. A screen having a no. of apertures adapted to be (partially) closed by deformation of elastic members is used instead of a diaphragm. Electrolysis may be interrupted by complete closure.

**Diaphragm for electrolytic cells.** Helmuth Müller (to A. Wacker Ges. für Elektrochemische Industrie, G. m. b. H.). U. S. 1,942,183, Jan. 2. A diaphragm suitable for use in cells such as those for producing Cl and alkali contains finely divided  $\text{BaSO}_4$  together with a binder of org. glutinous character such as rubber, and may also contain asbestos, glass powder, etc.

**Diaphragms for pressure electrolyzers.** Alfred Mentzel. Brit. 398,673, Sept. 21, 1933. The diaphragms are of asbestos board or paper or material having a similar degree of uniform fine porosity as distinguished from asbestos fabrics having larger-scale apertures. A porosity of 30% is suitable. Binding agents not attacked by the electrolyte and generated gases are used in their manuf.; solns. of Et or benzyl cellulose in  $\text{C}_2\text{H}_5$  are suitable.

**Electrolytic apparatus for producing sponge lead.** Paul Gamichon. U. S. 1,942,208, Jan. 2. Structural details.

**Electrolysis of water.** Alexander T. Stuart. U. S. 1,941,816, Jan. 2. In electrolyzing water, the gases are taken off and the electrolyte in the cell is subjected to a cyclic circulation by returning anolyte and catholyte,  $\text{H}_2\text{O}$  of O and H, from the top to the bottom of the cell,

they being intermixed for restoring the electrolyte to and maintaining it at substantially uniform strength throughout the cell (the speed of the circulation being regulated for ensuring the offtake of pure gases). App. is described.

**Electrolytic production of refined aluminum.** Julius Weber, Alfred von Zeerleder and Wm D. Treadwell. U. S. 1,942,522, Jan. 9. With anodes of impure material to be refined, solid cathodes are used such as Al, with an electrolyte bath composed of halides of Al and other metals such as alkalis or alk. earths having a lower point of fusion than that of the electrodes, and there is supplied to the electrolyte, besides the Al compds., small quantities of heavy metals more electropos. than Al such as Fe, Mn, Pb, Cd or Ni which serve to prevent "growing out" of the cathode deposit.

**Aluminum.** Metallgesellschaft A.-G. Ger. 587,802, Nov. 9, 1933 (Cl. 40c. 6.04). Al or Al alloys are prepd. by the electrolysis of alumina which has been atomized in a gas while fused and chilled by contact with water, the particles being of about 3 mm. size.

**Recovery of metals such as gold and platinum from ores, etc., by electrochemical treatment.** Richard Rodrian (one-half to Herman H. Buttermann). U. S. 1,941,914, Jan. 2. The material is subjected to an "unlocking" treatment as by electrolysis with  $\text{Na}_2\text{CO}_3$  soln., the "unlocked" material is then treated with  $\text{HNO}_3$ , the residue is treated with aqua regia to dissolve metals such as Au and Pt,  $\text{H}_2\text{SO}_4$  is added to the clear aqua regia metal soln. and this soln. is electrolyzed for pptn. of the metals with an iron electrode as anode, this leaving the Fe in the soln.

**Palladium.** W. C. Heraeus G. m. b. H. Ger. 587,737, Nov. 7, 1933 (Cl. 40c. 7). Pd is deposited as a durable plating by the electrolysis of a neutral or weakly acid soln. contg. an excess of Cl ions over Pd at 20° and with a current of 1 amp. per sq. dm. Crude Pd may be used as the anode and NaCl soln. as the anolyte if a diaphragm is used. The electrolyte may consist of a soln. of  $\text{Na-PdCl}_4$  and NaCl.

**Copper wire.** Pierre Fustier and Soc. anon. J. Bocuze & Cie. Brit. 399,685, Oct. 12, 1933. See Fr. 745,667 (C. A. 27, 4178).

**Melting metal scrap.** Detroit Electric Furnace Co. Brit. 399,569, Oct. 12, 1933. Metal is produced continuously from turnings, borings, etc., by subjecting them to radiant heat from an elec. arc in a furnace oscillated 2-4 times per min., periodically pouring a portion of the charge and periodically charging fresh scrap to maintain a const. vol. of bath.

**Coating metals.** Philip R. Coursey, Clifford H. Marcus and Dubilier Condenser Co. (1925) Ltd. Brit. 398,825, Sept. 18, 1933. Insulating-coatings are produced on Al, etc., by electrolytic treatment in 2 stages, the 1st. at low voltage, *e. g.*, 20-30 v. and the 2nd at high voltage, *e. g.*, 750-1000 v. in a different electrolyte. Dil.  $\text{H}_2\text{SO}_4$  may be used in the 1st stage and a soln. of  $\text{NH}_4$  borate in the 2nd. App. is described.

**Electric resistance furnaces.** Soc. anon. des manufactures des glaces et produits chimiques de St.-Gobain, Chauny et Cirey. Brit. 399,708, Oct. 12, 1933.

**Electric resistance furnace with two superposed heating chambers suitable for various purposes.** Rudolf Schmitz. U. S. 1,942,981, Jan. 9. Structural features.

**Induction furnaces with acid or basic linings of fireproof materials.** Deutsche Edelstahlwerke A.-G. Ger. 586,791, Oct. 26, 1933 (Cl. 31a. 6.01).

**Apparatus for electrical precipitation of suspended particles from gases.** Georg Grave (to International Precipitation Co.). U. S. 1,943,070, Jan. 9. Structural and elec. details.

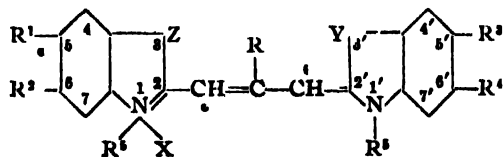
**Electrical precipitation of dust from gases.** Richard Heinrich (to International Precipitation Co.). U. S. 1,941,861, Jan. 2. For pptg. poorly conducting dust from gases, the gas contg. such dust in suspension is passed between discharge and collecting electrodes at a velocity in excess of 10 m. per sec. so as to cause the deposited dust to form a dense uniform layer on the

- collecting electrode and suppress the tendency for elec. discharge to occur from the dust.
- Electrically driven rotary viscometer.** Charles E. Fawkes (to De Vilbiss Co.). U. S. 1,942,920, Jan. 9. Mech. features of an app. suitable for testing the viscosity of paints, lacquers, etc.
- Electric feed-control system for centrifugal separators.** Gustav M. Meer (to Albert T. Otto & Sons). U. S. 1,943,098, Jan. 9. A float and assocd. counterweight serve to control an elec. system which in turn controls an inlet valve.
- Mercury-vapor rectifiers.** Allmanna Svenska Elektriska Aktiebolaget. Brit. 399,973, Oct. 19, 1933.
- Cooling system for mercury-vapor rectifiers.** The General Electric Co. Ltd. and Enrico Gallizia. Brit. 399,582, Oct. 12, 1933.
- Method for igniting the arc in a metal-vapor rectifier.** Aktiengesellschaft Brown, Boveri & Cie. Brit. 399,275, Oct. 5, 1933.
- Polyphase mercury-arc rectifier.** Felix Baron von Kleist (to Westinghouse Elec. & Mfg. Co.). U. S. 1,942,317, Jan. 2. Structural features.
- Anode shields and grids of metallic-vapor electric discharge devices.** Camil Alek Sabbah (to The British Thomson-Houston Co. Ltd.). Brit. 399,498, Sept. 27, 1933.
- Acetylene by electric arc treatment of gases comprising methane.** Paul Baumann, Helmut Tanneberger and Heinrich Schilling (to I. G. Farbenind. A.-G.). U. S. 1,942,131, Jan. 2. The gaseous mixt. from the arc treatment is contacted with a solvent for  $C_2H_2$  such as EtOH or acetone, which has a temp. below the triple point of  $C_2H_2$  and the solvent is then slowly heated.
- Electrically heated apparatus suitable for use with**
- cone bottom stills, etc.** Edgar C. Britton (to Dow Chemical Co.). U. S. 1,942,382, Jan. 2. Structural features.
- High-tension electrical conductor.** George A. Burnham (to Condit Electrical Mfg. Corp.). U. S. 1,941,463, Jan. 2. A conductor such as a high-tension bus is covered with insulating material such as oil in a casing and with solid-discrete non-combustible insulating particles such as sand.
- Electric incandescent lamps.** Egysült Izzólámpa és Villamosági R. T. Brit. 399,715, Oct. 12, 1933. A gas-filled lamp with a spiral shaped incandescent element contains a proportion of dry solid or vaporous I to prevent arc discharges therein. Dry I may be produced within the lamp itself, e. g., by coating the leading-in wires with a compd., e. g.,  $PI_3$ , from which the vapor is liberated upon operation of the lamp.
- Electric incandescent lamps.** The General Electric Co. Ltd., Bernard P. Dudding and Albert E. Woolgar. Brit. 398,994, Sept. 28, 1933. To prevent portions of the glass filament supports nearest to the filament from becoming unduly heated they are protected by screens made of a refractory metal, e. g., Mo.
- Incandescent vapor lamps.** Ehrich & Graetz A.-G. Brit. 399,115, Sept. 28, 1933.
- Flash-light lamps.** I. G. Farbenind. A.-G. Brit. 398,734, Sept. 21, 1933. The lamp comprises a bulb of glass, cellulose acetate, regenerated cellulose or other noncombustible material which contains loose Mg foil of not exceeding 0.01 mm. thickness or Mg wire of not exceeding 0.1 mm. diam. and communicates with the atm. through an opening covered with a wire net or tissue through which an elec. or mech. ignition device projects into the bulb.

## 5- PHOTOGRAPHY

R. P. WIGHTMAN

- Color photography.** A. H. Johnson & Co. (Paper), Ltd., and Michele Martinez. Brit. 399,151, Sept. 21, 1933. In processes of color photography in which a colored colloid, e. g., gelatin, film is differentially hardened in proportion to the Ag content of an image in, under, over or brought into contact with the film by treating the film in the presence of the image with a bath such as used in the ozobrome process, the general hardening action of the dye on the colloid, which occurs mainly when the dye is in aq. soln., is avoided by forming the film from colloid that has been colored in aq. soln. with a dye which has been sepd. in a finely divided state from an alc. soln. and remains undissolved in the  $H_2O$  of the colloid film. In an example, an aq. soln. of indigo carmine is mixed with an aq. soln. of auramine and the resulting suspension added to a soln. of gelatin. If a colloid film thus colored is coated on a photographic sensitive emulsion on a paper base a print may be made from a black and white negative, the light affecting the emulsion being mainly that passing through the interspaces between the dyed particles; development, fixing and treatment with the ozobrome bath yield a pos. print in colored gelatin.
- Color photography and cinematography.** Ernest D. Cooper and John Davies. Brit. 399,786, Oct. 10, 1933. A group of component color record images prepd. from negatives taken through 2 or more complementary color filters is projected in superimposition onto a screen, all the images or part of them being projected through a filter colored by treatment in a soln. of esculin (I) or of  $\beta$ -naphtholdisulfonic acid (II) and part through a different filter. The filter may comprise rose bengal and patent blue addnl. to I or II.
- Float-controlled apparatus for regulating the concentration of photographic fixing solutions or the like.** Kenneth C. D. Hickman (to Eastman Kodak Co.). U. S. 1,942,859, Jan. 9. Various structural and operative details are described.
- Photographic emulsion.** Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 1,942,854, Jan. 9. A cyanine dye contg. a thiazoline nucleus is used in a photographic gelatino-Ag halide emulsion as a sensitizer. Numerous examples are given.
- Photographic emulsions.** I. G. Farbenind. A.-G. Fr. 754,746, Nov. 13, 1933. Ag halide emulsions are sensitized by carbocyanines which contain the same or different substituents in the 5- and 6-positions of one or both  $C_6H_4$  rings. Several compds. and their sensitizing properties are mentioned, of the formula



where Z and Y represent O, S, Se,  $-CH_2CH_2-$  and

- $R'' - C - R'''$  ( $R''$  and  $R'''$  are alkyl or aryl);  $R^1, R^2, R^3$  and  $R^4$  are alkyl, alkoxy, thioalkyl, selenoalkyl, aryl or aryl-oxo;  $R^5$  is alkyl;  $R^6$  is H, alkyl, alkoxy, aryl, thienyl; and X is Cl, Br, I,  $SO_3CH_3$ ,  $ClO_4$  or other acid radical.

**Photographic reliefs.** Michele Martinez. Brit. 399,269, Oct. 5, 1933. Addn. to 390,881 (C. A. 27, 5285). The method of 390,881 is modified by using 2 supports, 1 of which may be a film or paper bearing a layer contg. a reducible light-sensitive compd., e. g.,  $FeCl_3$ ,  $Fe_2(SO_4)_3$ , ferric  $NH_4$  citrate or oxalate,  $K_2Fe(CN)_6$ ,  $HgCl_2$ ,  $HgCl$ , etc., and the other a film, paper, glass, linoleum, metal, etc., bearing a layer contg. the colloid and an org. acid, or salt thereof, e. g., oxalic, citric, tartaric, formic, malic, lactic, exposing the 1st layer to light to produce a latent image, bringing it into damp contact with the 2nd layer to produce by chem. contact action a latent image therein and heating the 2nd layer, e. g., to 90-130°, before



or after removal of the 1st layer, to develop in the colloid a relief corresponding to the image. Alternatively, the 1st layer may contain also an org. acid or salt thereof and the 2nd layer may contain also a light-sensitive metal compd., in which case both layers are exposed to light to produce a latent image, whereafter they are placed in contact so that the image in the 1st may reinforce that in the 2nd. The 2nd layer may contain  $\text{NaH}_2\text{PO}_4$  also.

Developing gelatin reliefs and making metal casts from them. Alexander Murray (to Eastman Kodak Co.). U. S. 1,942,872, Jan. 9. A light-sensitive element adapted to be developed into a relief by heat alone and to have a metal cast made from it comprises a support such as paper, a sensitive layer contg. gelatin, and a ferric salt such as ferric- $\text{NH}_4$  oxalate with a thin overlying coating of a lacquer such as one contg. cellulose nitrate.

Photographic gelatin film. Johannes Brunken (to Agfa Ansco Corp.). U. S. 1,941,852, Jan. 2. Hardened films of good stability are formed contg. gelatin together with a condensation product of gelatin with a dialdehyde such as glyoxal and also a deriv. of the dialdehyde such as glyoxal- $\text{NaHSO}_3$  or glyoxal-tetraacetate.

Anti-halation layers. I. G. Farbenind. A.-G. Brit. 399,713, Oct. 12, 1933. See Fr. 751,692 (C. A. 28, 722<sup>2</sup>).

Anti-halation and filter layers for photographic plates and films. I. G. Farbenind. A.-G. Brit. 399,387, Oct. 5, 1933. Addn. to 399,721 (C. A. 27, 2160). The layers are formed by condensing a substituted aromatic aldehyde with a quaternary  $\text{NH}_4$  compd. of a heterocyclic base having a reactive  $\text{CH}_2$  group, the aldehyde and (or) the base contg. an atom grouping known to impart substantivity toward cotton. Such groupings are, e. g., biphenyl, 3,3'-dimethoxybiphenyl, carbazole, azoxybenzene and diphenylurea. Examples are given of condensing (1) quinaldinemethyl sulfate and 4,4'-diphenyldialdehyde in pyridine (1), (2) quinaldinemethyl sulfate and azoxybenzalaniline in 1, (3) bisbenzoxazoledimethyl sulfate and

dimethylaminobenzaldehyde (II) in  $\text{Ac}_2\text{O}$  and (4) *p*-phenylquinaldinedimethyl sulfate and II in alc. and piperidine.

Nonhalation backing for photographic films. Albert A. Young (to Eastman Kodak Co.). U. S. 1,942,852, Jan. 9. See Brit. 379,984 (C. A. 27, 3414).

Coloring photographs. Harold Fillery. Brit. 399,841, Oct. 13, 1933. Photographs in monochrome are colored by first bringing to a cold brown tone and then applying transparent dye solns. in a particular sequence. A swelling agent, e. g., a mixt. of saliva and alc. or an alc. soln. of Na glyco-oleate, with or without a small quantity of glycerol, may be applied prior to applying the dye solns. A Ag gaslight or bromide print is first bleached in a  $\text{K}_2\text{Fe}(\text{CN})_6$  bath, washed and toned brown in a  $\text{Na}_2\text{S}$  bath, the final cold brown tone being obtained in a bath of  $\text{CuSO}_4$ ,  $\text{NH}_3$ ,  $\text{AcOH}$  and  $\text{H}_2\text{O}$ . For sepia or red-toned photographs the  $\text{Na}_2\text{S}$  bath is omitted. After washing and drying, the swelling bath is applied and the photograph is tinted with aniline dye solns. ordinarily used for tinting photographs in particular strengths and in the order, crimson, yellow, green, orange, grey (a mixt. of blue and violet), blue, brown, crimson, scarlet, violet, indigo (a mixt. of blue, scarlet and crimson) and black (a mixt. of crimson, scarlet, yellow, blue and brown). The earlier colors may overlap but the darker colors should be restricted to the areas concerned.

Leaching coloring substances from dyed cellulose acetate or nitrate film scrap, etc. Ernest R. Taylor and Charles E. Allen (to Eastman Kodak Co.). U. S. 1,942,848, Jan. 9. The scrap is agitated in a leaching bath such as hot alkali, and the bath is intermittently and rapidly drained from the scrap; the bath is distd., and condensed distillate is returned to an intermediate storage container whence it is supplied for further treatment of the scrap after drainage of the previous bath from it. App. is described.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Progress in inorganic chemistry 1930 to 1933. I. Preparative results. Wilhelm Klemm. *Angew. Chem.* 47, 17-26(1934).—A comprehensive treatise including the following subjects: (1) rare elements: Re, Ge, Ga, In and rare earths, (2) halogen, S and N compds., and (3) carbonyl compds. and organo-Cr compds. Ninety-eight references.

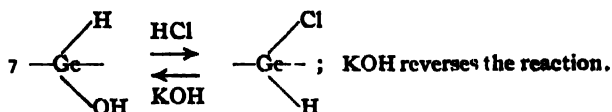
Water in inorganic compounds. III. Relation between water content of Odo acid clay and its decolorizing power for rhodamine solution. Minoru Nakamoto. *J. Chem. Soc. Japan* 54, 772-93(1933); cf. C. A. 27, 5267.—The clay was heated at various temps. It showed the strongest decolorizing action when it was heated at 150°. T. K.

Chemistry of germanium. XIV. Properties of polygermenes ( $\text{GeH}_2$ )<sub>x</sub>. Paul Royen and Robert Schwarz. *Z. anorg. allgem. Chem.* 215, 295-309(1933); cf. C. A. 27, 3415.—The polygermenes possess a chain-like structure, similar to that of the polyoxymethylenes. Low volatility and insoly. in org. solvents point to a relatively high degree of polymerization. The properties of these compds. point to the union of the  $\text{GeH}_2$  groups through normal valence forces rather than to the presence of ring structures like the cycloparaffins. The end groups are possibly combined with  $\text{H}_2\text{O}$  or  $\text{HCl}$  as follows:  $\text{H}-\text{GeH}_2-\text{GeH}_2-$

$\text{GeH}_2$  (OH) (Cl). In the action of  $\text{NaOH}$  on

$\text{GeH}_2$  the main reaction is  $\text{GeH}_2 + 2\text{NaOH} = \text{Na}_2\text{GeO}_3 + 2\text{H}_2$ , but as intermediate products red oxypolygermenes are formed which show a color deepening with increasing no. of OH groups. It is possible to obtain an alkali-free, red oxygermene if the polygermene is heated with  $\text{H}_2\text{O}$  for a few hrs. upon a boiling water bath in a sealed tube. The existence of definite oxidation steps between polygermene and  $\text{Ge}(\text{OH})_4$  is not to be expected. The oxida-

tion equiv. (as detd. by titration with Br in  $\text{HCl}$  soln.) falls with increasing depth of color from 6 to nearly 2. Polygermenes can reduce Cu, Ag, Au and Pd salts to metal, but the reduction effect is less than that obtained with similar, unsatd. Si compds. On treatment with  $\text{HCl}$ , oxygermenes yield corresponding halogen products:



Treatment with I in  $\text{C}_6\text{H}_6$  produces  $\text{GeI}_4$ , orange-yellow crystals, m. 144°. Continued action of  $\text{HCl}$  leads finally to the formation of  $\text{GeCl}_4$ , but the H liberated acts upon  $\text{GeH}_2$  groups to break the chain compd. and form  $\text{GeH}_4$ ; in an analogous manner  $\text{Ge}_2\text{H}_6$ ,  $\text{Ge}_3\text{H}_8$ , etc., are formed:  $(\text{GeH}_2)_x + \text{HCl} \rightarrow \text{GeCl}_4 + \text{GeH}_4 + \text{Ge}_2\text{H}_6 + \text{Ge}_3\text{H}_8 + \dots \text{H}_2$ . About 16.2% of the Ge is found as normal hydrides and 69.5% as  $\text{GeCl}_4$ . Destructive distn. of polygermene from 120-190° leads to the decompn.:  $(\text{GeH}_2)_x \rightarrow \text{Ge} + \text{GeH}_4 + \text{Ge}_2\text{H}_6 + \text{Ge}_3\text{H}_8 + \dots \text{H}_2$ . Unstable  $(\text{GeH})_x$  may also be formed. H. Stoertz

The appearance of lower valences among the halides of the rare earths. G. Jantsch and W. Klemm. *Z. anorg. allgem. Chem.* 216, 80-4(1933); cf. C. A. 24, 1810; 27, 1289.—A theoretical discussion. J. E. M.

Halides of the rare earths. VIII. Comparative investigation of the action of hydrogen upon the chlorides of the rare earths. G. Jantsch, N. Skalla and H. Grubitsch. *Z. anorg. allgem. Chem.* 216, 75-9(1933); cf. C. A. 27, 4184.—Comparative reduction expts. are made with  $\text{YCl}_3$ ,  $\text{LaCl}_3$ ,  $\text{NdCl}_3$ ,  $\text{GdCl}_3$ ,  $\text{TmCl}_3$ ,  $\text{LuCl}_3$ . The lowest temps. at which effective reduction occurs are: 880°, 880°, 840°, 820°, 650° and 750°, resp. In each case

the metal is formed, because of decompn. of the dichloride at the high temp. With Y, La and Nd, only slight reduction occurs because of the great volatility of their trichlorides above 950°. Where reduction occurs below 650°, the dichloride is obtained, as in the case of Sm, Eu and Yb.

H. Stoertz

**Reactions between chlorine and solid carbonates.** I. Reaction between chlorine and sodium carbonate. Fusao Ishikawa, Toyosaku Murooka and Hiroshi Hagisawa. *Science Reps. Tohoku Imp. Univ.*, Series 1, 22, 1179-96 (1933).—The reaction between  $\text{Cl}_2$  and  $\text{Na}_2\text{CO}_3$  was studied over the temp. range 150° to 600°. The  $\text{Na}_2\text{CO}_3$  prepd. by heating  $\text{NaHCO}_3$  at 350° reacted at a lower temp. than that prepd. at 500°. The main reaction was  $2\text{Na}_2\text{CO}_3 + 2\text{Cl}_2 = 4\text{NaCl} + 2\text{CO}_2 + \text{O}_2$ . A small amt. of  $\text{NaClO}_4$  was formed. II. Reaction between chlorine and carbonates of potassium, lithium and magnesium. Fusao Ishikawa and Hiroshi Hagisawa. *Ibid.* 1197-206.—The reaction between  $\text{Cl}_2$  and  $\text{K}_2\text{CO}_3$  was studied over the temp. range 200° to 600°. The main reaction was  $2\text{K}_2\text{CO}_3 + 2\text{Cl}_2 = 4\text{KCl} + 2\text{CO}_2 + \text{O}_2$ . The  $\text{K}_2\text{CO}_3$  prepd. by heating  $\text{KHCO}_3$  at 350° was much more reactive below 450° than that prepd. at 500°. This difference is explained by assuming 2 different modifications of the carbonate.  $\text{Cl}_2$  reacted less readily with  $\text{Li}_2\text{CO}_3$  and  $\text{MgCO}_3$  than with  $\text{K}_2\text{CO}_3$ . III. The velocity of decomposition of sodium and potassium perchlorates. *Ibid.* 1207-28.—Measurements were made of the thermal decompn. of  $\text{NaClO}_4$  and  $\text{KClO}_4$  in the pure state and when mixed with the resp. carbonates. The presence of the carbonate accelerates the decompn. of the perchlorates. P. T. N.

**Formation of basic alkaline earth halides by means of ethylene oxide.** W. Ziese. *Z. anorg. allgem. Chem.* 216, 196-202 (1933); cf. Maass and Boomer, *C. A.* 16, 3423.—Alk. earth hydroxides are pptd. by excess  $\text{C}_2\text{H}_4\text{O}$ . By control of the amt. of  $\text{C}_2\text{H}_4\text{O}$  the following definite basic halides are obtained:  $\text{Ca}[\text{3Ca}(\text{OH})_2]\text{Cl}_2 \cdot 11\text{H}_2\text{O}$ ;  $\text{Ca}(\text{OH})\text{Cl}$ ;  $\text{Ca}[\text{3Ca}(\text{OH})_2]\text{Br}_2 \cdot 11\text{H}_2\text{O}$ ;  $\text{Ca}[\text{3Ca}(\text{OH})_2]\text{I}_2 \cdot n\text{H}_2\text{O}$ ;  $\text{Sr}(\text{OH})\text{Cl} \cdot 4\text{H}_2\text{O}$ ;  $5\text{Sr}(\text{OH})_2 \cdot \text{SrCl}_2$ ;  $\text{Sr}(\text{OH})\text{Br} \cdot 4\text{H}_2\text{O}$ ;  $\text{Ba}(\text{OH})\text{Br} \cdot 2\text{H}_2\text{O}$ ;  $\text{Ba}(\text{OH})\text{I} \cdot 4\text{H}_2\text{O}$ , as well as  $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$  and  $\text{Ba}(\text{OH})_2$ . Foster Dee Snell

**The mutual action of the chlorides and bromides of phosphorus.** I. A. Renc. *Kocsniki Chem.* 13, 454-63 (1933); cf. *C. A.* 28, 1293°.—Varying proportions of  $\text{PCl}_4$  and  $\text{PBr}_3$  were heated to 135° in sealed tubes constricted at one end. Mixts. obtained after the reaction was over fell into 3 classes: (a) From the starting mixts. corresponding to  $\text{PCl}_{4.5}\text{Br}_{1.5}$  to  $\text{PCl}_{2.5}\text{Br}_{2.5}$  were obtained red crystals analyzing from  $\text{PCl}_{2.5}\text{Br}_{1.5}$  to  $\text{PCl}_{2.5}\text{Br}_{1.7}$  and a clear red liquid; (b) starting mixts.  $\text{PCl}_{2.5}\text{Br}_{2.5}$  and  $\text{PCl}_2\text{Br}_3$  yielded a dark red liquid corresponding to  $\text{PCl}_{2.5}\text{Br}_3$  and  $\text{PCl}_{2.5}\text{Br}_{2.7}$  and a clear red liquid; (c) starting from  $\text{PCl}_{2.5}\text{Br}_{1.5}$  to  $\text{PCl}_{4.5}\text{Br}_{0.5}$  gave yellow crystals of from  $\text{PCl}_{4.5}\text{Br}_{0.5}$  to  $\text{PCl}_{4.5}\text{Br}_{0.25}$ , a deep red liquid from  $\text{PCl}_{4.5}\text{Br}_{0.25}$  to  $\text{PCl}_{4.5}\text{Br}_{0.1}$ , and a clear red liquid. The crystals were best sepd. by centrifuging (560 r. p. m.). C. T. Ichniowski

**Polythionates.** II. Polythionate formation from thiosulfates and acid in the presence and absence of arsenic compounds. Christian J. Hansen. *Ber.* 66B, 1000-8 (1933); cf. *C. A.* 27, 5268.—The explanation of this reaction offered by Foerster and Stühmer (cf. *C. A.* 26, 4267) based on hydrolysis of the complex  $\text{As}(\text{S}_2\text{O}_3)_2^{---}$  primarily formed and interaction of the products is untenable, since conditions which favor the formation of polythionates are those which retard hydrolysis, as a very large excess of thiosulfate. The above primarily formed complex ion decomposes to give  $\text{AsS}^+$ , sulfite ion, and 2 mols. of "thio-monothionate,"  $\text{S}_2\text{SO}_3\text{O}^-$ . Two of the last then combine to form the tetrathionate ion. Part of the  $\text{AsS}^+$  formed decomposes to yield  $\text{H}_2\text{S}$  and  $\text{As}$  ion, which again forms a thiosulfate complex. If the acid is sulfurous, 4 bisulfite ions will react with 1  $\text{H}_2\text{S}$  to form thiosulfate, water, and trithionate. All the reactions which explain the formation of the tetra- and trithionates are summed up in the equation:  $2\text{S}_2\text{O}_3^{---} + 3\text{SO}_3 = \text{S}_4\text{O}_6^{---} + \text{S}_2\text{O}_3^{---}$ . The ratio here of 2 mols. of polythionate to 5 mols. of thiosulfate (the  $\text{SO}_3$  is from its decompn.)

1 holds almost quantitatively, regardless of the no. of S atoms per mol. of the polythionates. Formation of higher polythionates is explained by the addn. of 1 or more S atoms to the "thio-monothionate," forming  $\text{S}_2\text{SO}_3\text{O}^-$ , etc. This latter ion combines with a "thio-monothionate" to form a pentathionate, with another like itself to form a hexathionate. If an acid stronger than  $\text{H}_2\text{SO}_3$  is present, the concn. of  $\text{HSO}_3^-$  will be far lower and the yield in trithionates decreased. Also some of the  $\text{SO}_3$  formed by  $\text{HSO}_3^-$  decompn. will react with  $\text{H}_2\text{S}$  (whose concn. is increased by acid) to make more free S available for formation of higher thionates. Results presented in tables verify the conclusion that a higher ratio of acid to thiosulfate favors the production of polythionates contg. more S. No evidence is obtained for the formation of  $\text{SO}_3$ , as claimed by Foerster and Stühmer. In the absence of As, the reaction takes place in the same mol. ratio but at a much slower rate. H. offers an entirely different mechanism, based on the fact that the coördination no. of S is 4. In the acid soln. some of the bisulfite decomposes to yield  $\text{SO}_3$ , and addn. products of the two then react:  $\text{O.SO}_2\text{S.SO}_3^{---} + \text{SO}_3 \rightarrow \text{O.SO}_2\text{S.SO}_3^{---}$  and  $\text{O.SO}_2\text{S.SO}_3^{---}$



4  $\text{SO}_3$   
polythionates in alkaline and acid solutions. *Ibid.* 1009-11.—The decompn. of all polythionates is explained on the basis of an initial splitting off of  $\text{SO}_3^{---}$  and formation of  $\text{S}(\text{OH})_2$ . Trithionate in acid soln. is an exception, splitting off sulfate rather than sulfite. The tetra- and higher thionates are distinguished from the lower by their stability toward acids and their great instability toward alkalis. Thus traces of alkali decompose the pentathionate thus:  $\text{S}_5\text{O}_6^{---} + 2\text{OH}^- = 2\text{SO}_3^{---} + 2\text{S} + \text{S}(\text{OH})_2$ . The  $\text{S}(\text{OH})_2$  reacts with 2 more  $\text{OH}^-$  to form thiosulfate ion and water. If all the mol. S reacts with sulfite, then the total equation becomes:  $2\text{S}_5\text{O}_6^{---} + 6\text{OH}^- = 5\text{S}_2\text{O}_3^{---} + 3\text{H}_2\text{O}$ . The formation also of tetrathionate according to the equation:  $\text{S}_5\text{O}_6^{---} + \text{SO}_3^{---} = \text{S}_6\text{O}_{11}^{---} + \text{S}_2\text{O}_3^{---}$  is evidence of the sulfite decompn. The tetra compd. thus formed decomposes in the same manner to yield trithionate, and if the soln. is not too alk. sulfate will be formed by the decompn. of the latter. Polythionic acids are classified as (a) dithionic acid, which always gives sulfate (along with sulfite) on decompn., (b) trithionic acid, which gives sulfate in acid and weakly alk. soln. and sulfite in solns. more alk. than 1 N, and (c) the higher or true polythionates, which always decompose to give sulfite. M. G. Moore

**Transformation of thiosulfuric acid into polythionic acids with the aid of catalysts.** III. Conditions governing the precipitation of arsenic or antimony sulfide. A. Kurtzacker and Elizabeth Fürstendau. *Z. anorg. allgem. Chem.* 215, 257-70 (1933); cf. *C. A.* 24, 2368.—As or Sb solns. are treated with  $\text{Na}_2\text{S}_2\text{O}_3$  soln. in the presence of varying quantities of acid, and the pptd. sulfides are detd. by direct weighing or by conversion into  $\text{Mg}_3\text{As}_2\text{O}_7$  in the case of As. Pptn. of  $\text{As}_2\text{S}_3$  is quantitative only with 8-10.5 N  $\text{H}_2\text{SO}_4$ , hot, but from 13-16 N  $\text{H}_2\text{SO}_4$  98-99% of the As is pptd.  $\text{Sb}_2\text{S}_3$  is more completely pptd. from weak acid solns. than is  $\text{As}_2\text{S}_3$ , quantitative yields of  $\text{Sb}_2\text{S}_3$  being obtained in AcOH concns. of 0.17 to 1.0 N. H. Stoertz

**Active oxides.** LXX. Addition compounds between zinc oxalate and organic materials. Anton Zörner and Gustav F. Hüttig. *Z. anorg. allgem. Chem.* 216, 145-58 (1933); cf. *C. A.* 28, 396°.—Addn. of  $\text{ZnC}_2\text{O}_4$  to concd. aq.  $\text{NH}_3$  soln. nearly to satn. and evapn. to dryness gives  $\text{ZnC}_2\text{O}_4 \cdot 2\text{NH}_3 \cdot 2\text{H}_2\text{O}$  (I). In contact with  $\text{H}_2\text{O}$  it decomposes to give  $\text{ZnC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ .  $\text{ZnC}_2\text{O}_4$  and excess  $\text{EtNH}_3$  on evapn. of  $\text{EtNH}_3$  give  $\text{ZnC}_2\text{O}_4 \cdot 2\text{EtNH}_3$ , which is unstable in moist air, forming  $\text{ZnC}_2\text{O}_4 \cdot \text{EtNH}_3 \cdot \text{H}_2\text{O}$ . The same hydrate is obtained by evapn. or pptn. by alc. of a satd. soln. of  $\text{ZnC}_2\text{O}_4$  in a 1:1 mixt. of  $\text{H}_2\text{O}$  and  $\text{EtNH}_3$ .  $\text{ZnC}_2\text{O}_4$  combines with  $\text{PrNH}_3$  to form  $\text{ZnC}_2\text{O}_4 \cdot 2\text{PrNH}_3$ , which (nearly pure) is also formed from  $\text{ZnC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ , in both cases after evapn. of excess  $\text{PrNH}_3$ . Alc. pptn. of  $\text{ZnC}_2\text{O}_4$  in a 1:1 mixt. of  $\text{H}_2\text{O}$  and  $\text{PrNH}_3$  or evapn.

of the soln. gives  $\text{ZnC}_2\text{O}_4 \cdot \text{PrNH}_2 \cdot \text{H}_2\text{O}$ .  $\text{ZnC}_2\text{O}_4 \cdot 3\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2$  is recovered unchanged from aq. soln., but by alc. pptn.  $\text{ZnC}_2\text{O}_4 \cdot 3\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2$ ,  $\text{ZnC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  is obtained.  $\text{ZnC}_2\text{O}_4$  and  $\text{C}_2\text{H}_5\text{(OH)}_2$  or  $\text{ZnCl}_2$  in  $\text{C}_2\text{H}_5\text{(OH)}$ , mixed with  $\text{H}_2\text{C}_2\text{O}_4$  in  $\text{C}_2\text{H}_5\text{(OH)}$ , give  $\text{ZnC}_2\text{O}_4 \cdot \text{C}_2\text{H}_5\text{(OH)}_2$ . Pptn. of an aq. soln. of  $\text{ZnC}_2\text{O}_4 \cdot 3\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot 2\text{H}_2\text{O}$  by alc. gives  $\text{ZnC}_2\text{O}_4 \cdot \text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot \text{H}_2\text{O}$ . Addn. of alc.  $\text{H}_2\text{C}_2\text{O}_4$  instead of plain alc. gives  $\text{ZnC}_2\text{O}_4 \cdot 3[\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot \text{H}_2\text{C}_2\text{O}_4] \cdot 2\text{H}_2\text{O}$ ;  $\text{Zn(OAc)}_2 \cdot 3\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot 2\text{H}_2\text{O}$ ;  $\text{ZnCl}_2 \cdot 3\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot 2\text{H}_2\text{O}$ ;  $\text{ZnSO}_4 \cdot 2\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2$ ;  $\text{C}_2\text{H}_5\text{(NH}_2\text{)}_2 \cdot \text{H}_2\text{C}_2\text{O}_4$ .  $\text{ZnC}_2\text{O}_4$  and  $\text{PhNH}_2$  give I. Pptn. of hot alc.  $\text{ZnCl}_2 \cdot 2\text{PhNH}_2$  with hot alc.  $\text{H}_2\text{C}_2\text{O}_4$  or of hot alc. ( $\text{PhNH}_2$ )<sub>2</sub>  $\cdot \text{H}_2\text{C}_2\text{O}_4$  with hot alc.  $\text{ZnCl}_2$  gives  $2\text{ZnC}_2\text{O}_4 \cdot (\text{C}_2\text{H}_5\text{NH}_2)_2 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ . Others obtained by pptn. are  $2\text{ZnC}_2\text{O}_4 \cdot (\text{C}_2\text{H}_5\text{NH}_2)_2 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ ;  $2\text{ZnC}_2\text{O}_4 \cdot (\text{C}_2\text{H}_5\text{N})_2 \cdot \text{H}_2\text{C}_2\text{O}_4$ ;  $2\text{ZnC}_2\text{O}_4 \cdot (\text{C}_2\text{H}_5\text{N})_2 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ ; and  $2\text{ZnC}_2\text{O}_4 \cdot (\text{C}_2\text{H}_5\text{N})_2 \cdot \text{H}_2\text{C}_2\text{O}_4$ . Pptn. of  $\text{ZnCl}_2$  in  $\text{Me}_2\text{CO}$  with  $\text{H}_2\text{C}_2\text{O}_4$  in  $\text{Me}_2\text{CO}$  gives  $\text{ZnC}_2\text{O}_4$  with only 0.4 mole of  $\text{H}_2\text{O}$ , either at room temp. or when combined at  $-60^\circ$ . Debye diagrams of several compds. are given. Thus in addn. to types  $\text{ZnC}_2\text{O}_4 \cdot 2\text{X}$  and  $\text{ZnC}_2\text{O}_4 \cdot 5\text{X}$ , a new type  $\text{ZnC}_2\text{O}_4 \cdot 3\text{X}$  is formed.

Foster Dee Snell

The oxidation of ferrous hydroxide. A. Quartaroli. *Gass. chim. ital.* 63, 669-78(1933).—By the incomplete oxidation of  $\text{Fe(OH)}_2$  under certain definite conditions, there is obtained a voluminous black hydroxide (I), which is only slightly magnetic, and which is transformed by  $\text{H}_2\text{O}_2$  into  $\text{Fe(OH)}_3$ . After an incubation period of more than 0.5 hr., I is transformed rapidly by an autocatalytic reaction into another black hydroxide, which has a small vol., is strongly magnetic, and is not oxidized to  $\text{Fe(OH)}_3$ . This transformation is inhibited or at least retarded by small proportions of Ni or Mg compds., which prolong the period of incubation. The simultaneous pptn. of  $\text{Fe(OH)}_2$  and  $\text{Fe(OH)}_3$  from an equimol. mixt. of ferrous and ferric salts yields much more rapidly, though not instantaneously, unoxidizable magnetic hydroxide. In this case too, Mg and Ni compds. act as inhibitors. When oxidized with  $\text{H}_2\text{O}_2$ ,  $\text{Fe(OH)}_2$  gives a form of  $\text{Fe(OH)}_3$  which is less voluminous and more strongly magnetic than that formed by direct pptn. from a ferric salt. Addn. of  $\text{H}_2\text{O}_2$  several hrs. later yields a  $\text{Fe(OH)}_3$  of small vol. and enormous susceptibility (cf. Q., C. A. 11, 3167). This phenomenon is analogous to the difference in the behavior of  $\text{Fe(OH)}_2$  when freshly pptd. and after standing, and is also related to the concepts of Kohlschütter on the influence of the structure of a solid substance upon another substance formed from it without passage of the former into soln.

C. C. Davis

The amphoteric behavior of metallic hydroxides. II. Zincates. R. Scholder and H. Weber. *Z. anorg. allgem. Chem.* 215, 355-66(1933); cf. C. A. 27, 2645.—In the system  $\text{ZnO} \cdot \text{NaOH} \cdot \text{H}_2\text{O}$ , low NaOH concns. favor the formation of mixed crystals of  $[\text{Zn(OH)}_2] \cdot \text{H}_3\text{BO}_3$  and  $[\text{Zn(OH)}_2] \cdot \text{Na}_2\text{CO}_3$ , while with higher NaOH concns. mixed crystals of  $[\text{Zn(OH)}_2] \cdot \text{Na}_2\text{CO}_3$  and  $\text{NaOH} \cdot \text{H}_2\text{O}$  are formed. Tetra- and hexahydrozincates of Ba and Sr are prepd.

H. Stoertz

Hydration of tricalcium aluminate. W. D. Foster. *Cement and Cement Manuf.* 6, 97-104(1933).—In presence of  $\text{H}_2\text{O}$ ,  $3\text{CaO} \cdot \text{Al}_2\text{O}_3$  partly dissociates, re-forming  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ , which ppts. in amorphous form and later crystallizes. Sol. Ca salts tend to retard hydration and also to inhibit crystn., though with a mixt. of  $\text{CaCl}_2$  and gypsum the effect is not additive, but more nearly is an av. of the effect of the sep. salts. This retarding action disappears before the complete hydration of  $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ , possibly by reason of the formation of complex compds. The problem is considered in relation to the setting of portland cement.

B. C. A.

Reaction of calcium oxide and silicic acid in the solid state. K. Hild and G. Trömel. *Z. anorg. allgem. Chem.* 215, 333-44(1933).—The reaction  $\text{CaO} + \text{SiO}_2$  was studied at  $1000^\circ$  in the mol. ratio of 1:1, x-ray and microscopic examn. being made. The orthosilicate  $2\text{CaO} \cdot \text{SiO}_2$  ( $\beta$ -form) always forms first. This reacts with free  $\text{SiO}_2$  still present to form wollastonite,  $\beta\text{-CaO} \cdot \text{SiO}_2$ . An unstable intermediate product,  $3\text{CaO} \cdot 2\text{SiO}_2$ , is also

formed. With a short reaction time (5 min.) it is possible that the unstable  $\alpha$ -form of  $\text{CaO} \cdot \text{SiO}_2$  is formed.

H. Stoertz

Trivalent manganese. VIII. Determination of true  $\text{MnO}_2$  content in pyrolusite by thermal decomposition to  $\text{Mn}_2\text{O}_3$ . Walter Franke and Alfred Freitag. *Z. anorg. allgem. Chem.* 215, 105-10(1933); cf. C. A. 24, 1591.—All types of pyrolusite are converted into anhyd.  $\text{Mn}_2\text{O}_3$  by heating at  $1100^\circ$ . No generally suitable temp. can be given for converting  $\text{MnO}_2$  to  $\text{Mn}_2\text{O}_3$ . Thus is lost the possibility of giving a universally suitable method for detn. of  $\text{MnO}_2$  in pyrolusite. Total Mn should be detd., as well as active O, to calc. the content of  $\text{Mn}^{II}$  and have a true picture of the value of the sample for tech. use.

H. Stoertz

The non-existence of a higher nickel carbide. Jürgen Schmidt. *Z. anorg. allgem. Chem.* 216, 85-98(1933).—Since Fe forms a higher carbide and since H. Tutiyu (*Bull. Inst. Phys.-Chem. Research (Tokyo)* 10, 951(1930)) had reported detecting a higher Ni carbide, by x-ray analysis, S. attempted to prep. it. CO was passed over Ni (reduced by  $\text{H}_2$ ) for 240-465 hrs. at  $240-250^\circ$ . All samples of carbide thus obtained contained 0.4-1.3% free C and 6.8-7.8% combined C. Although the latter was higher than the theoretical (6.37%) for  $\text{Ni}_3\text{C}$ , this was the only compd. detected by x-ray studies. As all the possible places for C in the space lattice of  $\text{Ni}_3\text{C}$  are not filled, S. assumes that the excess C takes some of these places without distorting the crystal. The d. of  $\text{Ni}_3\text{C}$ , computed from crystal data, is 7.880 g./cc.; the exptl. value ( $d_x^{22}$ ) was found to be 7.957 g./cc. The excess C in the crystal may help account for the difference. The products of decompn. with acids were  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$  and  $\text{H}_2$ , all being evolved in varying proportions. The results of decompn. were not reproducible. When  $\text{CH}_4$  was passed over Ni, C was formed but no carbide.  $\text{C}_2\text{H}_2$  gave  $\text{Ni}_3\text{C}$  and much C. Bibliography.

John E. Milbery

Rhenium tribromide. Harro Hagen and Adolf Sieverts. *Z. anorg. allgem. Chem.* 215, 111-12(1933).— $\text{ReBr}_3$  is prepd. by action of Br vapor upon Re at  $500^\circ$ . O must be excluded.  $\text{ReBr}_3$  sublimes slowly at  $450^\circ$  to give a dark sublimate of greenish black crystals. In the presence of O it is converted into a dark blue compd., probably an oxybromide, at  $400^\circ$ .

H. Stoertz

Preparation and autoxidation of the blue bivalent ruthenium solution. W. Manchot and Hans Schmid. *Z. anorg. allgem. Chem.* 216, 104-8(1933); cf. C. A. 22, 1113.—This soln. is needed in the prepn. of univalent Ru. 0.5 g. of  $\text{RuCl}_3$  in 40 cc. of 4 N HCl was reduced electrolytically with a smooth Pt cathode, a C anode, and a c. d. of 0.133 amp./sq. cm. The electrolysis was carried out at  $2^\circ$  and was complete in about  $1\frac{1}{4}$  hrs. Prolonged electrolysis pptd. the metal. The soln. is fairly stable in the air and has much weaker reducing powers than univalent Ru. CO has no action on the blue soln. NO slowly oxidizes it, but unlike  $\text{FeCl}_2$ ,  $\text{RuCl}_2$  does not form  $\text{RuCl}_2 \cdot \text{NO}$  in soln.  $\text{RuCl}_2$  gives a dark brown ppt. of  $\text{Ru(OH)}_2$  with NaOH. This can absorb  $\frac{1}{4}$  mol. of  $\text{O}_2$  to form black  $\text{Ru(OH)}_2$ , but does not oxidize to  $\text{RuO}_2$ .

J. E. M.

The similarity of ruthenium to iron: Nitric oxide compounds of bivalent ruthenium. W. Manchot and Hans Schmid. *Z. anorg. allgem. Chem.* 216, 99-103(1933).—Bivalent Ru compds., unlike ferrous compds., are not acted on directly by NO. However, by using the carbonyl compds. described by Manchot and König (C. A. 19, 1544) the nitrosyl derivs. were obtained thus:  $\text{RuX}_2(\text{CO})_2 + \text{NO} \rightleftharpoons \text{RuX}_2\text{NO} + 2\text{CO}$ . The orange-red  $\text{RuI}_2(\text{CO})_2$  begins to darken at  $180^\circ$  in a stream of NO and becomes black at  $230^\circ$ . By continuing the treatment for 40 hrs. at  $230^\circ$  and pulverizing the solid every 8 hrs., analytically pure  $\text{RuI}_2\text{NO}$  was obtained. It was a velvet black powder, insol. in  $\text{H}_2\text{O}$ , MeOH, EtOH, and  $\text{Me}_2\text{CO}$  and sol. in  $\text{CHCl}_3$  only in traces. It is stable in warm dil.  $\text{H}_2\text{SO}_4$ , but the concd. acid evolves NO. The above equil. was shown to be entirely reversible by passing CO over  $\text{RuI}_2\text{NO}$  at  $230^\circ$ .  $\text{RuBr}_2\text{NO}$ , prepd. in the same way, is a dark brown powder with similar properties.  $\text{RuCl}_2\text{NO}$  was not prepd. pure because of difficulty in prepd.  $\text{RuCl}_2$ .

(CO)<sub>2</sub>. However, a small sample of the latter darkened when NO was passed over it. The NO is probably not ionically linked in the mol., since it always causes a deepening in color when it enters, as contrasted with the colorless hyponitrite ion.

John E. Milbery

The formation of green manganous sulfide. III. Influence of salts on the transition of the red sulfide to the green. Georg Landesen and Maria Reistal. *Z. anorg. allgem. Chem.* 216, 113-26(1933); cf. *C. A.* 25, 2656.—The effects of NH<sub>4</sub> oxalate, arsenite, chloride, perchlorate and thiosulfate on the rate of transformation of red to green MnS were studied. The effects depend on the order in which the reagents are added and on the nature of the pptg. agent. The oxalate definitely accelerates the transition; the arsenite decreases the rate when NH<sub>4</sub>HS is the precipitant; the chloride accelerates when (NH<sub>4</sub>)<sub>2</sub>S is used, and the perchlorate retards when NH<sub>4</sub>HS is used but accelerates when the yellow polysulfide is the source of the S ion.

H. F. Johnstone

A selenium compound of high thermoelectric strength. M. A. Levitakaya and V. Ya. Dlugach. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 106-8 (in German 109-10).—Cu<sub>2</sub>Se (I), obtained by fusing Se with Cu, is dark gray, without the luster of Se, and resembles graphite. It appears to be porous and absorbs non-colloidal liquids. Its sp. gr. is 6.2. It does not permit the usual soldering; it does not adhere to Sn and adheres only slightly to other metals. Its sp. heat is 0.105. Its heat cond. was compared with that of Pb and found to be of the order of 10<sup>-3</sup>. It does not soften at 900-1000°. On continued heating it seems to give off Se. Its sp. resistance,  $\rho$ , at room temp. =  $1.5 \times 10^{-3}$  cm., that is, it is  $< 1/100$  of the value found by Bellati and Lussana (*Atti. ist. Veneto* 6, 189(1888)). It is pos. in a thermocouple with Cu. The authors recommend its use in thermocouples where the temp. of the junction is not too high and no appreciable c. d. is required, e. g., for measurements of radiation and static tension.

Louise Kelley

Preparation and constitution of the thioannates. I. Sodium ortho- and meta-thioannates. Edwin E. Jelley. *J. Chem. Soc.* 1933, 1580-1.—The apparent difference between the covalency of Sn in the 2 classes of thioannates, meta, M<sub>2</sub>SnS<sub>3</sub>·xH<sub>2</sub>O, and ortho, M<sub>2</sub>SnS<sub>4</sub>·yH<sub>2</sub>O, was investigated. Results uphold the 6-covalency of Sn.

M. McMahon

The molecular combinations of titanium tetrachloride. F. Evard. *Bull. soc. chim.* 53, 1206-10(1933).—See *C. A.* 27, 4186.

G. G.

Zirconium sulfides. M. Picon. *Bull. soc. chim.* 53, 1269-77(1933).—See *C. A.* 27, 4184, 5669.

E. H.

The existence of some ammoniates of double salts. G. Spacu and P. Spacu. *Z. anorg. allgem. Chem.* 214, 113-42(1933).—See *C. A.* 27, 5671.

H. G.

Reaction mechanism of silane formation. III. Robert Schwarz and Paul Royen. *Z. anorg. allgem. Chem.* 215, 288-94(1933).—Silane formation proceeds according to the following reactions:  $Mg_2Si + 2H_2O = (MgOH)_2SiH_2$ ;  $(MgOH)_2SiH_2 + 4HCl = 2MgCl_2 + SiH_4 + 2H_2O$ ;  $2(SiH_4) + H_2O = SiH_4 + SiH_2O$ ;  $3(SiH_4) + H_2O = Si_2H_6 + SiH_2O$ . This explains the formation of higher silanes in the decompn. of a single silicide. In the hydrolysis of the polymeric  $(SiH_3)_x$  1 mol. of *prosiloxane* is formed and the H liberated acts upon the SiH<sub>3</sub> groups to form a homologous series of silanes. With increasing no. of Si atoms, instability of the silane rapidly increases, lower members of the series and H being formed. Decompn. of Si<sub>4</sub>H<sub>10</sub> gives SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>, Si<sub>3</sub>H<sub>8</sub>, and H.

Equilibrium in the system NH<sub>4</sub>NO<sub>3</sub>-NaNO<sub>2</sub>-H<sub>2</sub>O. E. A. Nikitina. *J. Gen. Chem. (U. S. S. R.)* 3, 513-18 (1933).—A systematic study of the systems: NH<sub>4</sub>NO<sub>3</sub>-NaNO<sub>2</sub>-H<sub>2</sub>O, NH<sub>4</sub>NO<sub>3</sub>-H<sub>2</sub>O and NaNO<sub>2</sub>-H<sub>2</sub>O, in the temp. interval 0-98°. The results are compared with those of other investigators.

S. L. Madorsky

The ternary systems KIO<sub>3</sub>-KBr-H<sub>2</sub>O and NaIO<sub>3</sub>-NaBr-H<sub>2</sub>O. John E. Ricci. *J. Am. Chem. Soc.* 56, 290-5(1934).—Soly. and d. detns. were made at temps. varying between 5° and 50° of the ternary systems: KIO<sub>3</sub>-KBr-H<sub>2</sub>O and NaIO<sub>3</sub>-NaBr-H<sub>2</sub>O, involving salts found

1 in the caliche of Chile. The first system studied at 5°, 25° and 50° showed no double-salt formation. The second system was examd. at 5°, 15°, 25°, 35°, 45° and 50° and showed the presence of 2 double salts: 2NaIO<sub>3</sub>·3NaBr·15H<sub>2</sub>O existing up to about 40° and 2NaIO<sub>3</sub>·3NaBr·10H<sub>2</sub>O existing at higher temps. from a little below 40°.

H. S. v. K.

Compound formation between sodium iodate and sodium iodide. John E. Ricci. *J. Am. Chem. Soc.* 56, 295-9 (1934); cf. preceding abstr. and *C. A.* 27, 1565.—The ternary system NaIO<sub>3</sub>-NaI-H<sub>2</sub>O was reexamd. and the existence (between 20° and 55°) established of 3 double salts: 2NaIO<sub>3</sub>·3NaI·20H<sub>2</sub>O, 2NaIO<sub>3</sub>·3NaI·15H<sub>2</sub>O and 2NaIO<sub>3</sub>·3NaI·10H<sub>2</sub>O. The results are compared with those obtained for aq. solns. of NaIO<sub>3</sub> with NaNO<sub>3</sub>, NaCl, NaBr and NaI, resp. The possibility of finding other series of similarly constituted double salts is pointed out.

H. S. v. K.

Ternary systems involving alkali bromates. John E. Ricci. *J. Am. Chem. Soc.* 56, 299-308(1934).—Soly. and d. detns. were made for aq. solns. of NaBrO<sub>3</sub> and KBrO<sub>3</sub> between 5° and 50° and for the Na-salt pairs: NaBrO<sub>3</sub>-NaCl (at 10° and 25°), NaBrO<sub>3</sub>-NaBr (at 10°, 25° and 45°), NaBrO<sub>3</sub>-NaI (at 25°) and NaBrO<sub>3</sub>-Na<sub>2</sub>SO<sub>4</sub> (at 25°). The following K-salt pairs were studied at 25° only: KBrO<sub>3</sub>-KBr, KBrO<sub>3</sub>-KI, KBrO<sub>3</sub>-KNO<sub>3</sub> and KBrO<sub>3</sub>-K<sub>2</sub>SO<sub>4</sub>. In none of these systems was any evidence found of double-salt formation. A comparison is made with systems involving NaIO<sub>3</sub> and KIO<sub>3</sub> studied previously (cf. preceding abstr.).

H. S. v. K.

Changes in sulfur in the air at low temperatures. R. Dubrisay. *Chimie & industrie* 30, 767-9(1933); cf. *C. A.* 26, 379; 27, 5705.

A. Papineau-Couture

The use of phosphoric oxide as a drying agent for hydrochloric acid. Fred Fairbrother. *J. Chem. Soc.* 1933, 1539-41.—Expts. show clearly that no reaction occurs when dry HCl is passed over pure P<sub>2</sub>O<sub>5</sub> at ordinary temps., but the presence of appreciable amts. of moisture or of metaphosphoric acid causes a reaction. P<sub>2</sub>O<sub>5</sub> is not a suitable drying agent for HCl unless followed by condensation and fractionation.

M. McMahon

New salts of perhenic acid. E. Wilke-Dörfurt and Th. Gunzert. *Z. anorg. allgem. Chem.* 215, 369-87 (1933).—Various new *perhenates* were prepd. to show the analogy between perhenic acid and the O acids of the other elements in group VII of the Periodic Table, particularly HClO<sub>4</sub> and HMnO<sub>4</sub>.

6 Hexammine *perhenates* of Co<sup>III</sup> and Cr<sup>III</sup> were prepd. by treatment of solns. of the hexamminochlorides or nitrates with an excess of warm concd. soln. of HReO<sub>4</sub>. [Co(NH<sub>3</sub>)<sub>6</sub>](ReO<sub>4</sub>)<sub>3</sub>·2H<sub>2</sub>O is obtained as orange-yellow, doubly refracting prisms, poorly sol. in H<sub>2</sub>O (0.469 g./l.), d<sub>25</sub><sup>20</sup> = 3.329, mol. vol. = 285. The anhyd. salt has a d. of 3.506, mol. vol. 260. The Cr salt is obtained as citron-yellow prisms, d. of dihydrate = 3.280, mol. vol. = 287.5; of anhyd. salt d. = 3.408, mol. vol. = 265.5. *Chromic hexaurea perhenate* [Cr(CO(NH<sub>3</sub>)<sub>5</sub>)<sub>3</sub>](ReO<sub>4</sub>)<sub>3</sub>, prepd. in a similar manner, is obtained as green needles, much more sol. in H<sub>2</sub>O (17.86 g./l.), sol. in alc. (6.67 g./l.), d<sub>25</sub><sup>20</sup> = 2.652, mol. vol. = 438.5. This salt more closely resembles the permanganates, perchlorates, borofluorides and fluosulfonates, except for soly. in alc. The *tetrammine perhenates* of Zn, Cd, Co<sup>II</sup> were prepd. by action of concd. NH<sub>4</sub>OH on the *perhenates* of these metals, and are described as follows: [Zn(NH<sub>3</sub>)<sub>4</sub>](ReO<sub>4</sub>)<sub>3</sub>, white, cubic crystals, sol. in concd. NH<sub>4</sub>OH (1.852 g./l.), d<sub>25</sub><sup>20</sup> = 3.608, mol. vol. = 175.75; [Cd(NH<sub>3</sub>)<sub>4</sub>](ReO<sub>4</sub>)<sub>3</sub>, colorless, well formed, regular cubes, sol. in concd. NH<sub>4</sub>OH (0.37 g./l.), d<sub>25</sub><sup>20</sup> = 3.714, mol. vol. = 183.5; [Co(NH<sub>3</sub>)<sub>4</sub>](ReO<sub>4</sub>)<sub>3</sub>, beautiful, purple-red crystals, decompd. by H<sub>2</sub>O into a green basic *perhenate*. To prep. [Ni(NH<sub>3</sub>)<sub>4</sub>](ReO<sub>4</sub>)<sub>3</sub>, the hexammine was first obtained, but it quickly loses H<sub>2</sub>O to form the bright blue tetrammine. AgReO<sub>4</sub> dissolves in NH<sub>4</sub>OH to form [Ag(NH<sub>3</sub>)<sub>2</sub>](ReO<sub>4</sub>)<sub>3</sub>, colorless, monoclinic prisms, sol. in concd. NH<sub>4</sub>OH (16.18 g./l.), d. = 3.901, mol. vol. = 100.5. The *tetrapyridine perhenates* of Cu<sup>II</sup>, Ag, were prepd.: [Cu(C<sub>4</sub>H<sub>9</sub>N)<sub>4</sub>](ReO<sub>4</sub>)<sub>3</sub>, blue, monoclinic crystals, sol. in H<sub>2</sub>O (5.555 g./l.), d. = 2.338, mol. vol. = 376.5

[Ag(C<sub>2</sub>H<sub>3</sub>N)<sub>2</sub>]ReO<sub>4</sub> easily loses C<sub>2</sub>H<sub>3</sub>N to form the tripyridine perchlorate, which is likewise very unstable. If a stream of dry NO is passed into a concd. soln. of HReO<sub>4</sub>, (NO)ReO<sub>4</sub> is obtained as a colorless cryst. powder, very hygroscopic and instantly decompd. by H<sub>2</sub>O. Efforts to prep. tetra-, penta- and hexahydrates of these salts met with little success, as the perchlorates tend to form lower hydrates.

H. Stoertz  
Combinations of lime and titanate acid. I. Pargapondal and K. Bergt. *Tonind.-Ztg.* 57, 976-7, 1000-1 (1933).—See C. A. 28, 61<sup>4</sup>. Karl Kammermeyer

The decomposition of permanganic acid in the presence of other acids. Jaroslav Chloupek. *Chem. Listy* 27, 217-22, 246-51, 270-5 (1933).—The decompn. rate of permanganic acid studied by means of a König-Martens spectrophotometer, gasometrically and titrimetrically at room temps. in concd. acids diminished in the order H<sub>2</sub>SO<sub>4</sub> > AcOH > H<sub>3</sub>PO<sub>4</sub> > H<sub>3</sub>AsO<sub>4</sub>; in the last acid the rate of decompn. was equal to zero. The end products are quadrivalent Mn compds. or compds. corresponding to Mn<sub>2</sub>O<sub>3</sub>; the solns. are completely stable after its appearance providing that the original solns. were made from pure substances. In higher concns. of H<sub>2</sub>SO<sub>4</sub> the anhydride of HMnO<sub>4</sub> formed; the change becomes manifest in the spectrophotometer. The solns. of permanganates can be detd. directly in acids of high concns. by a potentiometric titration of Fe<sup>++</sup> salts with a normal electrode of HgSO<sub>4</sub> as the indicating electrode; the results agreed with the visual titration.

Frank Maresh

Physicochemical studies of complex formation involving weak acids. VII. Hydroferrocyanic acid, and the precipitation of ferrocyanides of silver, lead, copper, zinc, cadmium, cobalt, nickel and manganese. H. T. S. Britton and Eric N. Dodd. *J. Chem. Soc.* 1933, 1543-6; cf. C. A. 27, 1587.—H<sub>2</sub>Fe(CN)<sub>6</sub> is slightly weaker than H<sub>2</sub>SO<sub>4</sub>, 33.7% ionized in 0.00936 M soln. (cf. Malaprade, C. A. 24, 287). Metal salt solns. were titrated conductimetrically with K<sub>4</sub>Fe(CN)<sub>6</sub> by means of the glass electrode, and curves are given. Ag gives a normal salt, which further precipitant converts into KAg<sub>2</sub>Fe(CN)<sub>6</sub>. Cu, Zn, Cd, Co, Ni and Mn form normal salts, which are converted by further precipitant into M<sub>2</sub>Fe(CN)<sub>6</sub>.xK<sub>4</sub>Fe(CN)<sub>6</sub>, in which the values of x are fractions less than 1. The combination may be either chemical or physical.

Foster Dee Snell

Dipyridyl- and phenanthroline-containing complex salts of bivalent metals. P. Pfeiffer and Fr. Tappermann. *Z. anorg. allgem. Chem.* 215, 273-87 (1933).—Complex compds. of α-dipyridyl (dip) and o-phenanthroline (phen) with salts of bivalent metals differ from similar compds. contg. amines in combining with large quantities of H<sub>2</sub>O. Among metal salt hydrates of the 2 types [Me dip]<sub>2</sub>.xH<sub>2</sub>O and [Me phen]<sub>2</sub>.xH<sub>2</sub>O, only one individual contains less than 6H<sub>2</sub>O. This is [Ni dip]<sub>2</sub>(SCN)<sub>2</sub>.3H<sub>2</sub>O. The following β-naphthalenesulfonates were prepd.: [Ni phen]<sub>2</sub>(O.SO<sub>2</sub>.C<sub>10</sub>H<sub>7</sub>)<sub>2</sub>.6H<sub>2</sub>O, and corresponding salts with Co, Fe, Zn and Cd, and the following higher hydrates: [Ni phen]<sub>2</sub>Cl<sub>2</sub>.10H<sub>2</sub>O, [Ni phen]<sub>2</sub>Br<sub>2</sub>.10H<sub>2</sub>O, [Ni phen]<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub>.9H<sub>2</sub>O, [Ni phen]<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub>.14H<sub>2</sub>O and [Ni dip]<sub>2</sub>(O.SO<sub>2</sub>.C<sub>10</sub>H<sub>7</sub>)<sub>2</sub>.6 (or 7)H<sub>2</sub>O. It is concluded that the H<sub>2</sub>O mols. belong to a complex pos. radical, as follows: [Me-phen<sub>2</sub>(OH)<sub>2</sub>]<sub>2</sub>.x. Thus about the central metallic atom there is a shell of 6 N atoms and about this a 2nd shell of 6 O atoms. With an excess of H<sub>2</sub>O mols., these are perhaps bound to the neg. radical. With Cu and Mn only 2 mols. of the base are combined as follows: [Cu phen]<sub>2</sub>(O.SO<sub>2</sub>.C<sub>10</sub>H<sub>7</sub>)<sub>2</sub>.H<sub>2</sub>O, Mn phen<sub>2</sub>Cl<sub>2</sub>, Mn phen<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub>.6H<sub>2</sub>O, Mn phen<sub>2</sub>(O.SO<sub>2</sub>.C<sub>10</sub>H<sub>7</sub>)<sub>2</sub>.2H<sub>2</sub>O, except in case of the compd. with bromocamphorsulfonic acid, which has the compn. Mn phen<sub>2</sub>(O.SO<sub>2</sub>.C<sub>10</sub>H<sub>7</sub>OB<sub>2</sub>)<sub>2</sub>.6 (or 8)H<sub>2</sub>O. Ni dip<sub>2</sub>Cl<sub>2</sub> is obtained by heating rose-red [Ni dip]<sub>2</sub>Cl<sub>2</sub>.6H<sub>2</sub>O. It is grass-green in color and is stable in air, but cannot be recrystd. from H<sub>2</sub>O. Ni phen<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub> and Ni phen<sub>2</sub>Cl<sub>2</sub> were also prepd. The anhyd. Ni salts are green, but the hydrates are blue; this is thought to indicate that the blue salts are diaqua salts [Ni phen<sub>2</sub>(OH)<sub>2</sub>]<sub>2</sub>.x, and the green compds. diacid bodies [Ni phen<sub>2</sub>X<sub>2</sub>], similar to

the relationship between chromates and dichromates.

H. Stoertz

New color reactions of cuprous salts. G. Tartarini. *Gazz. chim. ital.* 63, 597-600 (1933).—A preliminary note. Treatment of the complex compds. of Blau (*Monatsh.* 19, 683 (1898)), formed by the reaction of cupric salts with α,α-dipyridyl (I) and o-phenanthroline (II), with reducing agents such as NaHSO<sub>3</sub>, H<sub>2</sub>NOH and NH<sub>2</sub>NH<sub>2</sub> (III) gives intense color reactions varying from orange-yellow to red to blue to violet. This is attributed to the formation of complex compds. contg. univalent Cu united to the I or II mol. They can be prepd. easily either by treating a cupric salt in NH<sub>4</sub>OH with III and adding I or II, or by grinding together moist CuCl, CuBr, CuI or CuSCN with I or II. Since all complex cuprous compds. contg. NH<sub>2</sub> or an org. base which are so far known are either colorless, pale yellow or pale green, it was of interest to study the reaction mentioned above to det. whether the cuprous ion can be detected in the presence of the cupric ion and other metal ions. Addn. of I to ammoniacal CuSO<sub>4</sub> and III gives a brown-red soln. which does not change when heated. Addn. of cold KI ppts. an amorphous yellow compd., while when hot the ppt. is a cryst. orange compd. Similar compds. are obtained with KSCN. Under the same conditions, II gives a brown-red soln., which with excess II turns violet. Addn. of KI or KSCN to the brown-red soln. gives yellow ppts., while addn. to the violet soln. gives violet-blue ppts. A similar blue ppt. is formed by addn. to the violet soln. of excess NaClO<sub>4</sub>. This reaction is a much more sensitive one for Cu than is that with NH<sub>3</sub>, e. g., addn. of 1 drop of NH<sub>4</sub>OH, 1 drop H<sub>2</sub>NNH<sub>2</sub>, a little II and a few drops of NaClO<sub>4</sub> soln. to 1 cc. of 0.001 N CuSO<sub>4</sub> gives a blue ppt. It also makes possible the distinguishing of I and II, which is not possible by other color reactions. The blue compd. pptd. by NaClO<sub>4</sub> could not be isolated pure because of oxidation in air. Better results were had with the compds. pptd. with KI and KSCN. To obtain pure cryst. compds. it is convenient to start with the complex cupric compd. and reduce hot with NaHSO<sub>3</sub> in slightly acid medium, rather than with ammoniacal H<sub>2</sub>NNH<sub>2</sub>.HCl. Thus aq. CuSO<sub>4</sub>, KSCN and I form a ppt. which with NaHSO<sub>3</sub> in boiling water ppts. on cooling the complex compd. CuSCN.C<sub>10</sub>H<sub>7</sub>N<sub>2</sub>, orange; its solns. in alc. I are dark red (a compd. of CuSCN with more than 1 mol. of I is probably present). Prepd. similarly, except for II in place of I, the complex compd. CuSCN.C<sub>10</sub>H<sub>7</sub>N<sub>2</sub> is orange-yellow, turning blue on treatment with excess aq. II. Aq. NH<sub>3</sub>-CuSO<sub>4</sub> reduced with H<sub>2</sub>NNH<sub>2</sub>.HCl, boiled with excess I, and treated with KI yields the complex compd. CuI.C<sub>10</sub>H<sub>7</sub>N<sub>2</sub>, red; its solns. in alc. I are dark red. II (2 mols.) and KI added to aq. CuSO<sub>4</sub> give a yellow ppt., which in boiling NaHSO<sub>3</sub> ppts. the complex compd. CuI.2C<sub>10</sub>H<sub>7</sub>N<sub>2</sub>, violet-blue; its alc. solns. are brown-red.

C. C. Davis

Complex bromo compounds of antimony. Walter Petzold. *Z. anorg. allgem. Chem.* 215, 92-102 (1933).—Cryst. complex Br compds. of Sb are prepd. in which Sb has a valence of more than 3. These are derived from the hypothetical parent compds. SbBr<sub>3</sub>, SbBr<sub>4</sub>, Sb<sub>2</sub>Br<sub>7</sub>, SbBr<sub>5</sub> and SbBr<sub>6</sub>, and they are all easily obtained by treating strong HBr solns. of SbBr<sub>3</sub> and an org. substituted NH<sub>4</sub>Br with Br. The following compds. were prepd.: [(CH<sub>3</sub>)<sub>2</sub>N]Sb<sub>2</sub>Br<sub>11</sub>, (C<sub>2</sub>H<sub>5</sub>NH)<sub>2</sub>Sb<sub>2</sub>Br<sub>11</sub>, [(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>Sb<sub>2</sub>Br<sub>11</sub>, [H<sub>2</sub>N-C(C<sub>2</sub>H<sub>5</sub>)NH]<sub>2</sub>Sb<sub>2</sub>Br<sub>11</sub>, [(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>NH]<sub>2</sub>Sb<sub>2</sub>Br<sub>11</sub>, [(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>N]<sub>2</sub>SbBr<sub>5</sub>, [C<sub>2</sub>H<sub>5</sub>(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>SbBr<sub>5</sub>, [(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>SbBr<sub>5</sub>, [C<sub>2</sub>H<sub>5</sub>(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>SbBr<sub>5</sub>, [C<sub>2</sub>H<sub>5</sub>(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>SbBr<sub>5</sub>, [C<sub>2</sub>H<sub>5</sub>(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>SbBr<sub>5</sub>, and (C<sub>2</sub>H<sub>5</sub>CH<sub>2</sub>NH)<sub>2</sub>SbBr<sub>5</sub>. The structure of these compds. is discussed. In no case is pure Sb<sup>V</sup> believed to be present. They are partly pure *perbromides* and partly transitional stages between "bromo salts" and perbromides.

H. Stoertz

Complex bromo compounds of quadrivalent arsenic. Walter Petzold. *Z. anorg. allgem. Chem.* 214, 365-8 (1933).—If strong HBr solns. of (CH<sub>3</sub>)<sub>4</sub>NBr and AsBr<sub>3</sub> are treated with free Br, a finely cryst., dark red powder is obtained with the compn. [(CH<sub>3</sub>)<sub>4</sub>N]<sub>2</sub>As<sub>2</sub>Br<sub>11</sub> (I). Recrystn. from hot soln. gives deep, carmine-red, hexagonal plates, short hexagonal bipyramids and very long hexagonal prisms. In a similar manner [(CH<sub>3</sub>)<sub>2</sub>NH]<sub>2</sub>As<sub>2</sub>Br<sub>11</sub>



(II) and  $(C_6H_5NH)_2As_2Br_{11}$  (III) are prepd. These are obtained as brick-red crystals. II and III slowly give up Br on standing in air, but I is quite stable, even on heating up to  $210^\circ$ . Aq. solns. of these substances are gradually decolorized, the clear colorless solns. contg.  $As^{III}$  and  $As^V$  in the ratio 1:1. The hypothetical basis of these substances is  $As_2Br_7$  and they probably represent a transitional stage between "bromo salts" and "perbromides". H. Stoertz

Complex chloro and bromo compounds of trivalent arsenic. Walter Petzold. *Z. anorg. allgem. Chem.* 214, 355-64 (1933).—Complex As compds. of the following types were prepd.:  $R_2AsCl_3$ ,  $R_2As_2Cl_3$ ,  $RA_2Cl_3$ ,  $R_2As_2Cl_{11}$ ,  $R_2As_2Br_3$ ,  $RA_2Br_3$ ,  $RA_2Br_7$  and  $RA_2Br_{11}$  (?), in which R represents such as  $(C_2H_5NH_2)$ ,  $(CH_3NH_2)$ ,  $[H_2NC(NH)NH_2]$ ,  $[(C_2H_5)_2NH_2]$ ,  $(C_6H_5NH_2)$ ,  $[(CH_3)_2NH]$ ,  $(C_2H_5NH)$ ,  $[(CH_3)_2N]$ . The chlorides were easily obtained pure and well crystd. from strong HCl solns. of their components. They are colorless, immediately decompd. in  $H_2O$ , in alc., and on heating. The bromides are yellow but similar otherwise. The following individual compds. were prepd.:  $(C_2H_5NH_2)_2As_2Cl_3$ ,  $(CH_3NH_2)_2As_2Cl_3$ ,  $[H_2NC(NH)NH_2]_2As_2Cl_3$ ,  $[(CH_3)_2N-H]_2As_2Cl_3$ ,  $[(C_2H_5)_2NH_2]_2As_2Cl_3$ ,  $(C_2H_5NH)_2As_2Cl_3$ ,  $[(CH_3)_2N-H]_2As_2Cl_{11}$ ,  $(C_2H_5NH)_2As_2Cl_{11}$ ,  $H_2O$ ,  $(NH_4)_2As_2Br_3$ ,  $(C_2H_5NH_2)_2As_2Br_3$ ,  $[(C_2H_5)_2NH_2]_2As_2Br_3$ ,  $[(CH_3)_2NH]_2As_2Br_3$ ,  $(C_2H_5NH)_2As_2Br_3$ ,  $[(CH_3)_2N]_2As_2Br_7$  (I) and perhaps  $[(CH_3)_2N]_2As_2Br_{11}$  (II). I was prepd. only once; efforts to prep. it a 2nd time led to the formation of a compd. with higher As and Br contents, with the possible formula as represented by II. The structure of these compds. is discussed. H. Stoertz

Complex platinum compounds with trivalent and quinquavealent platinum. VI. Prafulla Chandra Ray and Nripendra Nath Ghosh. *Z. anorg. allgem. Chem.* 215, 201-4 (1933); cf. C. A. 27, 2899.—By the action of various org. bases upon  $PtBr(C_2H_5)_3$  the following compds. were obtained:  $Pt_2Br_3(C_2H_5)_3S_2 \cdot 2C_2H_5N$  (I),  $Pt_2Br_3(C_2H_5)_3S_2 \cdot 2C_2H_5N$  (II),  $Pt_2Br_3 \cdot 3(C_2H_5)_3S_2 \cdot (C_2H_5)_2NH_2$  (III),  $Pt_2Br_3 \cdot 5(C_2H_5)_3S_2 \cdot 2C_2H_5NH_2$  (IV),  $Pt_{10}Br_3 \cdot 9(C_2H_5)_3S_2 \cdot 2C_2H_5NHNH_2$  (V),  $Pt_{10}Br_3 \cdot 9(C_2H_5)_3S_2 \cdot N(C_2H_5)_3$  (VI). In I and II Pt is trivalent, in III the 2 addnl. atoms are trivalent and quinquavealent, in IV 2 of the Pt atoms are quinquavealent and 4 trivalent. I and II show sharp m. ps. and well-defined cryst. structure, but like the others are insol. in all ordinary solvents. H. Stoertz

Pyridine complex salts of copper, cobalt, nickel, zinc and cadmium fluosilicates. Kimio Mochizuki. *J. Chem. Soc. Japan* 54, 894-7 (1933); cf. Ten Broeck and van der Meulen, C. A. 25, 5862.—There were obtained 3 new pyridine complex salts,  $Ni(C_5H_5N)SiF_6 \cdot 5H_2O$ ,  $Ni(C_5H_5N)SiF_6 \cdot 2H_2O$  and  $Co(C_5H_5N)SiF_6 \cdot 3H_2O$ . The detns. of Ten Broeck of the crystal system and  $n$  of  $Cu(C_5H_5N)SiF_6 \cdot H_2O$  are corrected. T. Katsurai

Silver halide complexes of the carboxylic acids. Charles Prevost. *Compt. rend.* 197, 1661-3 (1933).—The complex  $(RCO_2)_2AgI$  reacts with  $R'CH:CHR'$  in  $C_6H_6$  to give  $RCO_2CHR' \cdot CHR'CO_2R$ . The complex  $(AcO)_2AgI$  reacts less readily than the dibenzoate because of the formation of iodoacetates and of the relative insolv. of  $AcOAg$  in  $C_6H_6$ . With ethylenic compds. capable of cis-trans isomerism the trans addn. predominates. Fixation of 2 benzyloxy groups seems general. W. J. Peterson

Decomposition of thiosulfato-pentacyano-cobaltic acid and the isomerism of thiosulfuric acid. Priyadarajan Ray. *J. Indian Chem. Soc.* 10, 631-5 (1933).—A quant. study of the hydrolytic decompn. of Ray's postulated  $\alpha$ - and  $\beta$ -thiosulfuric acids was made. The results were interpreted as confirming their existence. F. U.

Dithiosulfato-diethylenediamine cobaltates. Priyadarajan Ray and Sailendra Nath Maulik. *J. Indian Chem. Soc.* 10, 655-8 (1933).—Na, K and Tl dithiosulfato-diethylenediamine cobaltates were prepd. F. U.

Thiosulfato-tetrammine-cobaltic series. II. Constitution of Duff's salt. Bhabesh Chandra Ray and Pulin Bihari Sarker. *J. Indian Chem. Soc.* 10, 625-30 (1933); cf. C. A. 25, 1754.—*cis*- and *trans*-Dithiosulfato-diethylenediamine sodium cobaltate, and thiosulfato-aquo-diethylenediamine cobaltic nitrate, sulfate, iodide and

thiocyanate were prepd. The brottide (Duff's salt) was prepd. from *trans*-thiosulfato-aquo-tetrammine cobaltic bromide. Frank Urban

Isomeric palladium diammines. A. A. Grinberg and V. M. Shulman. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 215-20.—The following isomers of Pd diammines were prepd. by the action of  $NH_4OAc$  or pyridinium acetate on aq. solns. of  $K_2PdCl_4$  or  $K_2PdBr_4$ :  $Pd(NH_3)_2Cl_2$ ,  $Pd(NH_3)_2Br_2$ ,  $PdPy_2Cl_2$  and  $PdPy_2Br_2$ . These isomers differ from the ones obtained previously in color, cryst. structure, soly. and elec. cond., as well as in their behavior with KI and HCl. Their color has a more brownish shade, and their solns. gradually ppt.  $AgCl(AgBr)$  when treated with  $AgNO_3$ . Their behavior is quite similar to that of the corresponding Pt compds., and hence they should be considered *cis* forms. They have the structure I as compared with the known compds. of the structure II.



The *trans* isomer is more sol. in  $CHCl_3$  than the *cis* isomer. The new isomers are more active with HCl than the old ones, and they acquire a red coloring upon the addn. of a few drops of KI to their soln. in acetone. *cis*- $Pd(NH_3)_2Cl_2$ , like the bromide, reacts with KI but to a smaller extent. The same reaction is characteristic for *cis*- $PdPy_2Cl_2$  and *cis*- $PdPy_2Br_2$  in  $CHCl_3$ , in which case the upper (aq. layer) acquires a red color. The numerical data for the soly. and elec. cond. of various *cis* and *trans* isomers are tabulated. A. A. Boettingk

The apparent stereoisomerism of the ferrous tetrapyridine-dithiocyanates. G. Spacu. *Z. anorg. allgem. Chem.* 216, 165-72 (1933); cf. Rosenheim, et al., C. A. 26, 5025.—S. presents a review of his papers (C. A. 9, 180; 10, 2175) to show that he had the compd. claimed and that Rosenheim's compd. is an incompletely reduced mixt. Reply. Arthur Rosenheim. *Ibid.* 173-5 (1933).

Salts of iron carbonyl hydrogen. F. Feigl and P. Krumholz. *Z. anorg. allgem. Chem.* 215, 242-8 (1933).—The following salts of the acid  $Fe(CO)_4H_2$  were prepd.:  $[Fe(CO)_4][Cd(NH_3)_4]$  (I), by treating  $Cd(C_2H_5O)_2$  with concd.  $NH_4OH$  and  $Fe(CO)_5$  in an atm. of N, filtering, washing with dil.  $NH_3$ , with  $Et_2O$ , and drying in a vacuum. It is obtained as colorless prisms which slowly turn brown in the air, are sol. in  $AcOH$ , and are decompd. by mineral acids to give  $Fe(CO)_4H_2$ . Heating converts it into yellow  $[Fe(CO)_4]Cd$ .  $[Fe(CO)_4][Cd(Py)_4]$ , prepd. in a similar manner, is obtained as yellowish prisms, more stable than I, which react in a similar manner with acids.  $[Fe(CO)_4][Ni(NH_3)_4]$ , yellowish brown, is obtained by treating  $NiCl_2$  with  $NH_3$  and  $Fe(CO)_5$  for 6 hrs. It is decompd. by  $H_2O$ ,  $AcOH$  and mineral acids to form  $Fe(CO)_4H_2$  and  $[Fe(CO)_4]_2$ .  $[Fe(CO)_4]_2H_2$ ,  $[Fe(CO)_4]_2[Fe(phen)_3]$  is prepd. by dissolving *aa'*-phenanthroline and  $FeSO_4$  in  $H_2O$  and adding  $NH_3$  and  $Fe(CO)_5$ . After 1 hr., bright red crystals are obtained, stable in air, sol. in  $MeOH$  and acetone, decompd. by acids to give  $Fe(CO)_4H_2$  and red sol. *ferrous phenanthroline*.  $[Fe(CO)_4]Cd$  is only decompd. in air after many days, is much more stable to acids than the other salts, and heated in the absence of air gives  $Fe$ ,  $CO$  and  $Cd$ . I in  $Et_2O$  reacts as follows— $Fe(CO)_4Cd + 2I_2 \rightarrow Fe(CO)_4I_2 + CdI_2$ , and  $Py$  reacts with this to form  $Fe(CO)_4Py_2I_2$ . The structure of these salts is discussed. H. Stoertz

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## 7—ANALYTICAL CHEMISTRY

W. T. HALL

**Quinaldic acid as an analytical reagent. Determination and separation of copper, zinc, cadmium and uranium. Colorimetric determination of iron.** Priyadarajan Ray and Mukul Kumar Bose. *Z. anal. Chem.* 95, 400-14 (1933).—Just as 8-hydroxyquinoline has been used for detg. Mg, Al, Cu, Cd, Zn, etc., the Na salt of  $\alpha$ -quinaldic acid can be used for the quant. pptn. of Cu, Cd, Zn and UO<sub>2</sub>, and for the sepn. of Cu from Cd, P, As, Pb, Ni, Co, Mn, etc. In the absence of Fe and Zn, it is sp. toward Cu and can be used for detecting Cu in the presence of all cations except Fe. Important seprns. of Zn from other elements can also be accomplished with this reagent. With Fe<sup>++</sup> a dark red fairly sol. ppt. is formed in the cold but it changes over, particularly with rising temp., to a less sol. bluish violet modification. Possibly this is a case of cis-trans isomerism. To det. Cu, add 2-5 ml. of 2 N H<sub>2</sub>SO<sub>4</sub> to the soln. contg. 10-50 mg. of Cu in a vol. of about 150 ml. Heat to boiling and add dropwise the 3.5% soln. of the reagent in water. Filter through a Gooch crucible, dry at 125° and weigh as Cu(C<sub>10</sub>H<sub>6</sub>NO<sub>2</sub>)<sub>2</sub>·H<sub>2</sub>O. The ppt. is green and cryst. Cd can be detd. similarly except that the soln. must be neutralized with NH<sub>4</sub>OH or NaOH after the addn. of the reagent. Zn gives a similar ppt. The excess acid should be neutralized with NH<sub>4</sub>OH and 2-5 ml. of dil. AcOH added. UO<sub>2</sub> can be detd. in the same way after 5-7 g. of NH<sub>4</sub>Cl has been added to the neutral soln. Filter-paper pulp may be necessary in filtering. Cu can be sepd. from Cd, Pb, Mn, Ni and Co by adding dil. AcOH or H<sub>2</sub>SO<sub>4</sub> before adding the reagent. Zn can be sepd. from Mn, Ca and Ba by adding AcOH before pptg. Fe<sup>++</sup> can be detd. colorimetrically by adding in succession 1 ml. of 5% NH<sub>4</sub>OH·HCl soln. (to reduce Fe<sup>+++</sup>), 1 ml. of 1% soln. of the reagent and 1 ml. of 10% KCN (to intensify the color). The reagent can be recovered from solns. by forming the Cu salt, satg. with H<sub>2</sub>S, filtering off the CuS, expel the filtrate to dryness and recrystg. from glacial AcOH.

**Electrocapillary method of qualitative analysis.** S. I. D'yachkovskii, V. Ustinakova and Mitropolskii. *J. Gen. Chem. (U. S. S. R.)* 3, 478-80(1933).—A method for detg. ion mobility in filter paper which has been impregnated with gelatin or agar-agar is being developed. If crystals of KI and K<sub>2</sub>CrO<sub>4</sub> are placed in the path of Pb<sup>++</sup>, Ag<sup>+</sup> and Hg<sup>+</sup> ions which are being absorbed by the capillarity of the paper, PbI<sub>2</sub> forms first, then Ag<sub>2</sub>CrO<sub>4</sub> and finally Hg<sub>2</sub>CrO<sub>4</sub>; this indicates that the ion mobility of Pb<sup>++</sup> > Ag<sup>+</sup> > Hg<sup>+</sup>.

W. P. Ericks

**Industrial application of chemical emission spectral analysis to the examination of commercial products.** H. Moritz. *Z. Ver. deut. Ing.* 77, 1321-6(1933).—A brief summary is given of the theory of spectral analysis and of the practical application to the detection of small quantities of impurities in metal products.

W. T. II.

**Spectroanalytical examination of commercial and very pure metals. III. Aluminum.** Walther Gerlach and Hans Riedl. *Sitzber. math. naturw. Abt. bayer. Akad. Wiss. München* No. 2, 227-36(1933); cf. *C. A.* 27, 5271.—Spectrograms in the region 3000-4300 Å. are given for Al from several sources. All the impurities can be detected. Chem. analyses for Fe and Si in the purer sorts agree well with the spectral detn. but not for the impure samples. Ga was found in considerable quantities in nearly all samples. Se but no Ca was found in Al from the Am. Aluminum Co. The relative amts. of Ag, Cr, Cu, Fe, Ga, Mn, Ni, Pb, Se, Si, Sn, Ti, V and Zn are estd. in each sample.

Janet E. Austin

**Determination of admixtures of crystalline odoriferous**

substances with the quartz lamp. E. Ekmann and A. Samyschayewa. *Riechstoff-Ind.* 8, 221-2(1933).—The fluorescent effects of the following pure substances and combinations are reported: (1) c. p. piperonal, com. piperonal alone and in combination with 10% terpinol hydrate, (2) vanillin and each of its combinations with 10% acetanilide, 1% salicylic acid, 10% BzOH, 10% coumarin, 10% terpinol hydrate, 20% MgSO<sub>4</sub> and 10% sucrose, (3) coumarin and coumarin combined with 10% terpinol hydrate, 20% MgSO<sub>4</sub> and 10% acetanilide, (4) menthol and menthol with acetanilide.

H. M. Burlage

**Conditions for the potentiometric titration of copper with sodium sulfide and a platinum electrode.** Jang Bahadur Jha. *J. Indian Chem. Soc.* 10, 643-7(1933).—In the potentiometric titration of Cu with Na<sub>2</sub>S soln. Hg has been used as reference electrode, but Pt can be used instead. Good results are obtained in the presence of the proper quantity of AcOH. In the analysis of a soln. of Cu dissolved in HNO<sub>3</sub> the excess HNO<sub>3</sub> is removed by evapn., the soln. is neutralized with NaOH until a slight ppt. is produced, the ppt. is dissolved in AcOH and 1 cc. of 0.4 N AcOH is added in excess for 25 ml. of soln. If considerable Cu is present more AcOH should be added.

W. T. H.

**Determination of the copper content of commercial minium.** H. Blumenthal. *Mitt. deut. Materialprüfungsanstalt., Sonderheft* 22, 41(1933).—Make a paste in a 1. flask of 100 g. sample and 100 ml. water. To the paste add 170 ml. of 6 N HNO<sub>3</sub>. Dissolve all the Pb<sub>3</sub>O<sub>4</sub> by cautious addn. of 20% KNO<sub>3</sub> soln., carefully avoiding an excess. About 60-70 ml. is usually required. Expel any HNO<sub>3</sub> by boiling 10 min., add 3-4 drops of 15% H<sub>2</sub>O<sub>2</sub> and boil 10 min. more. Neutralize with 20% Na<sub>2</sub>CO<sub>3</sub> until a slight permanent ppt. of PbCO<sub>3</sub> is formed and dissolve this in 6 N HNO<sub>3</sub>, adding about 0.5 ml. in excess. Boil again to expel CO<sub>2</sub> and add 10-20 ml. of cold satd. H<sub>2</sub>S water. Shake well and heat to boiling. Filter, wash with hot water and wash the ppt. into a 200-ml. Erlenmeyer flask. Add 5 ml. of concd. H<sub>2</sub>SO<sub>4</sub> and boil until dense fumes of SO<sub>2</sub> are evolved. Cool, add 50 ml. of water, heat to boiling, cool again and filter off the PbSO<sub>4</sub> ppt. Wash the ppt. with dil. H<sub>2</sub>SO<sub>4</sub>. To the filtrate add H<sub>2</sub>S water, heat until sulfides settle, filter and wash with hot water. Burn the filter in a porcelain crucible and dissolve the ash in hot 6 N HNO<sub>3</sub>. Make ammoniacal and filter off any ppt. that may form. In the filtrate det. the Cu colorimetrically. If the Cu content is below 0.001% take a larger sample. No results are given.

W. T. II.

**A new method for the volumetric estimation of lead.** Mia-Nan Lu. *J. Chinese Chem. Soc.* 1, 139-42(1933).—PbO<sub>2</sub> is formed by the action of NaOCl in alk. soln., and the ppt. is titrated iodometrically.

Wm. H. Adolph

**Determination of the lead content of tinned containers.** E. Wohnlich. *Z. Untersuch. Lebensm.* 66, 453-60(1933). A discussion of methods.

F. L. Dunlap

**Determination of magnesium in aluminum-magnesium alloys containing manganese.** H. Blumenthal. *Mitt. deut. Materialprüfungsanstalt., Sonderheft* 22, 42-3(1933).—Take enough of the alloy to furnish about 2 milli-equiv. of Mg. Dissolve the Al in hot NaOH soln. using 3 g. NaOH for each g. of alloy. Filter off the residue and wash it with hot water. Dissolve it in HCl with a little HNO<sub>3</sub>. Add 20 ml. of 50% tartaric acid soln., a sufficient quantity of (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> soln. and 5 g. of NH<sub>4</sub>Cl. Dil. to about 160 ml. and add NH<sub>3</sub> soln. until most of the free acid is neutralized. Heat the clear soln. to 70° and pour it

quickly into 50 ml. of 10%  $\text{NH}_3$  soln., washing out the beaker with hot water. After a cryst. ppt. of  $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$  has formed, add 30 ml. of 25%  $\text{NH}_3$  soln. and allow to stand some hrs. Filter, wash with dil.  $\text{NH}_3$  and ignite to pyrophosphate. Det. the Mn content of the weighed pyrophosphate by dissolving it in  $\text{HCl}$ , neutralizing with  $\text{ZnO}$  and titrating with  $\text{KMnO}_4$  by the Volhard method. The Mn content will be lower than the total Mn in the alloy. W. T. H.

**Microanalytical determination of palladium by means of dimethylglyoxime, methylbenzoylglyoxime and salicylaldioxime.** II. Holzer. *Z. anal. Chem.* 95, 392-400 (1933).—A hot aq. soln. of dimethylglyoxime added in slight excess to a  $\text{Pd}^{++}$  soln. gives a ppt. which yields Pd upon ignition in  $\text{H}_2$ . If Pt is present, a few drops of perhydrol should be added before introduction of the precipitant. Good results were obtained in detg. 1-4 mg. of Pd in the presence of 3-6 mg. of Pt. Methylbenzoylglyoxime can be substituted for the dimethylglyoxime and is somewhat better. Similarly, if a slightly acid soln. of  $\text{Pd}^{++}$  is treated with a hot, satd., filtered soln. of salicylaldioxime in water an egg-yellow ppt. is obtained which can be washed with water and cold 30% alc., dried at  $110^\circ$  and weighed. It contains 28.17% Pd. W. T. H.

**A titrimetric micro method for the determination of potassium.** L. Jendrasik and J. Szél. *Biochem. Z.* 267, 124-7 (1933).—The  $\text{K}_2\text{Na}[\text{Co}(\text{NO}_2)_6]$  ppt. is collected on asbestos and dissolved in  $\text{H}_2\text{SO}_4$ , the liberated  $\text{HNO}_3$  is oxidized with  $\text{KMnO}_4$  and its excess is detd. iodimetrically. S. Morgulis

**Volumetric determination of uranium in highly ferriferous ores.** Wallis R. Bennett. *J. Am. Chem. Soc.* 56, 277-80 (1934).—Large quantities of Fe can be deposited electrolytically upon a Hg cathode and thus sepd. from small quantities of U, Ti and V. U cannot be detd. accurately when Ti is present by reduction with Zn and titration with  $\text{KMnO}_4$ . The method recommended consists in decomg. the ore with  $\text{H}_2\text{SO}_4$  and HF, taking up the residue in dil.  $\text{H}_2\text{SO}_4$ , fusing any unattacked mineral with  $\text{KHSO}_4$ , pptg. the Fe, Ti, Al,  $\text{UO}_2$ , etc., with  $\text{NH}_4\text{OH}$ , dissolving the ppt. in  $\text{H}_2\text{SO}_4$ , pptg. the Fe electrolytically and the Ti with cupferron, evapg. to  $\text{H}_2\text{SO}_4$  fumes and decomg. excess cupferron with the aid of  $\text{HNO}_3$ , removing excess  $\text{HNO}_3$  by strong fuming, dilg., reducing with a Jones' reductor and titrating with  $\text{KMnO}_4$ . W. T. H.

**Spectral method for control in the preparation of malleable iron.** G. S. Landsberg, S. L. Mandelstam, S. M. Raikil. *J. Tech. Phys. (U. S. S. R.)* 3, 771-9 (1933).—This is a rapid visual method for detg. the quantity of Si in malleable iron, varying from 0.75 to 1.5%. The red Fe line  $\lambda = 6400 \text{ \AA}$ , and the red Si line  $\lambda = 6346.7 \text{ \AA}$  are employed. Variation in the self-induction of the arc circuit causes unequal variation in the intensity of the 2 lines. Their intensities are visually equalized by varying the self induction. From the analysis of a no. of known samples a curve is constructed, in which self-induction at equal intensity is plotted against Si content, and the content of an unknown may be directly read off the curve. Rino Hanninen

**Determination of mercury content of the air.** Alfred Stock and Friedrich Cuenel. *Ber.* 67B, 122-7 (1934). S. believes that it is injurious to health to breathe continuously air contg. a few thousandths of 1 mg. of Hg per cu. m., as is likely to be the case in the offices of dentists or in labs. where gases are confined over Hg. Three methods of detg. such small quantities of Hg are described and shown to give good results: (1) The air can be passed through a tube chilled by liquid air, the deposited Hg dissolved in  $\text{Cl}$  water and deposited electrolytically on Cu wire, the deposit volatilized and the vol. of the condensed Hg measured under the microscope. (2) Instead of using liquid air, liquid N can be used. Instead of cooling and using  $\text{Cl}$  water Moldavski's method (C. A. 25, 1179) of mixing  $\text{Br}_2$  with the vapor and absorbing the  $\text{HgBr}_2$  in water can be used. W. T. H.

**Microdetermination of phosphorus by means of the Winkler photometer.** M. Glani. *Giorn. chim. ind.*

1 *applicata* 15, 432-5 (1933).—The color reaction of Fiske and Subbarow (C. A. 20, 1092-3) is used in detg. P by means of the Pulfrich photometer. To 5 cc. of phosphate soln. contg. 0.002-0.064 mg. P add 1 cc. of 2.5%  $(\text{NH}_4)_2\text{MoO}_4$  in 3 N  $\text{H}_2\text{SO}_4$ , then 0.4 cc. of a 0.25% soln. of 1,2,4-aminonaphtholsulfonic acid. Dil. to 10 cc., shake, let stand 10 min., and compare the blue color. A. W. C.

**Application of potentiometric analysis in the steel plant laboratory.** VI. Determination of sulfur in iron, steel, ferrous alloys, slags and ores. G. Thanheiser and J. Dickens. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch., Düsseldorf* 15, 255-62 (1933); cf. C. A. 27, 242.—The difficulties encountered in the combustion method (burning in an O current) by Holthaus are eliminated in a potentiometric method in which  $\text{H}_2\text{SO}_4$  is titrated with  $\text{NaOH}$  immediately on formation; smaller samples and more dil. solns. can be used. S in steel and pig iron could be easily detd. by burning the samples in a current of O. Slags and ores can be treated in the same way when a small amt. of electrolytic Fe or an Fe with very little S is added to the sample. In the presence of P this test cannot be made, but the titration of the  $\text{H}_2\text{SO}_4$  must be made with an iodide solution instead of  $\text{NaOH}$ . Otherwise the presence of any other usual element (Cr, V, Al, etc.) had no influence on the efficacy of the method, which can be carried out in 5 minutes. Nine references. M. Hartenhein

**Analysis of copper-nickel-plated steel materials.** F. Deiss and H. Blumenthal. *Mitt. deut. Materialprüfungsanstalt, Sonderheft* 22, 32-7 (1933).—Methods depending upon dissolving the plated metal away from the steel are usually defective, as the coating penetrates into the steel. The following procedure is recommended. Take 1/1.5 g. of sample and dissolve most of the plate by treatment with a mixt. of 3 parts  $\text{HNO}_3$  (d. 1.4) and 1 part  $\text{HCl}$  (d. 1.52). As soon as the evolution of nitrous fumes stops, the solvent action is over. Pour off the acid into a porcelain evapg. dish and wash the metal several times with water. Evap. on the water bath, moisten the residue with 6 N  $\text{HNO}_3$ , dil. with hot water and det. Cu electrolytically after neutralizing with  $\text{NH}_3$ , adding 7 ml. of concd.  $\text{HNO}_3$ , 5 ml. of concd.  $\text{H}_2\text{SO}_4$  and water to make 150 ml. After the Cu is all deposited, evap. the soln. on the sand bath till  $\text{H}_2\text{SO}_4$  fumes are evolved. Cool, dil. with water and sat. with  $\text{H}_2\text{S}$  to ppt. any residual Cu, filter and det. the Cu colorimetrically. Expel  $\text{H}_2\text{S}$  from the filtrate, oxidize with  $\text{Br}_2$ , make ammoniacal and filter off hydrated  $\text{Fe}(\text{OH})_3$ . Det. Ni electrolytically in the strongly ammoniacal soln. Now take the undissolved steel from the first treatment, cover it with 60 ml. of a cold soln. of 13 ml.  $\text{Br}_2$  in 1 l. of 6 N  $\text{HCl}$ . After about 10 min. with frequent shaking, pour off the acid and wash the metal with water. Boil off the excess  $\text{Br}_2$  and sat. with  $\text{H}_2\text{S}$  to ppt. Cu and det. the Cu colorimetrically after dissolving the  $\text{CuS}$  by itself. Det. the Ni in the filtrate by the dimethylglyoxime method, after boiling off  $\text{H}_2\text{S}$ , oxidizing with  $\text{HNO}_3$  and adding tartaric acid. Digest the undissolved steel for another 5 min. with  $\text{HCl} + \text{Br}_2$  in order to make sure that all Cu and Ni have been removed. W. T. H.

**Antimony trichloride method for determining the lead dioxide content of minium.** H. Blumenthal. *Mitt. deut. Materialprüfungsanstalt, Sonderheft* 22, 40 1 (1933). Weigh out 0.7 g. of  $\text{PbO}_2$  or 2 g. of  $\text{Pb}_3\text{O}_4$  in a 300-ml. Erlenmeyer flask contg. 8 g. of  $\text{NaCl}$  and 50 ml. of a standardized soln. contg. about 15 g.  $\text{SbCl}_3$  dissolved in 300 ml. of concd.  $\text{HCl}$  and dilid. with water to make 1 l. (This soln. is standardized by taking 25 ml. of it, adding 15 ml. of concd.  $\text{HCl}$  and 25 ml. of water, heating to boiling and titrating with 0.1 N  $\text{KBrO}_3$  to an end point with methyl orange.) Heat the soln. to boiling while rotating the contents of the flask, and when all the  $\text{Pb}_3\text{O}_4$  has been dissolved, titrate the excess  $\text{SbCl}_3$  with  $\text{KBrO}_3$  soln. Standardize the  $\text{KBrO}_3$  soln. against metallic Sb. No analytical results are given. W. T. H.

**Reactions for distinguishing red and yellow mercuric oxide.** I. C. Ritsema. *Pharm. Weekblad* 71, 58-63 (1934).—Fifteen tests are described for distinguishing between red and yellow  $\text{HgO}$ . The following are recommended: (1) Shake 0.25 g. of the sample with 10 cc. of

10%  $(\text{NH}_4)_2\text{SO}_4$ , allow to settle for 2 min., decant about 5 cc., add 5 cc.  $\text{H}_2\text{O}$  and boil. With yellow  $\text{HgO}$  the soln. becomes turbid on cooling, with red  $\text{HgO}$  the soln. remains clear. (2) Shake 0.05 g. of the sample with 25 cc. of freshly prepd. 0.02%  $\text{K}_4\text{Fe}(\text{CN})_6$  and 5 cc. of 5%  $\text{NaHCO}_3$ , place in the dark for 15 min., decant 10 cc. and acidify this with  $\text{HCl}$ . The soln. becomes blue with yellow  $\text{HgO}$ , but remains colorless with red  $\text{HgO}$ . (3) Shake 0.05 g. sample with 5 cc. of 10%  $\text{NH}_4\text{OH}$  and allow to settle. The supernatant liquid is turbid (Millon's base) with yellow, clear with red  $\text{HgO}$ . (4) To 0.2 g. sample add 1 drop of phenolphthalein soln. and 5 cc. of 0.2%  $\text{MgCl}_2$  and shake. Yellow  $\text{HgO}$  gives a rose or red color to the soln., red  $\text{HgO}$  gives no color. (5) Shake 0.1 g. of the sample with 5 cc. of 2%  $\text{NH}_4\text{SCN}$ . Yellow  $\text{HgO}$  gives a microcryst. ppt. of basic  $\text{Hg NH}_4$  thiocyanate, red  $\text{HgO}$  gives no ppt. (6) To 10 cc. of a hot soln. of 20%  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  and 10 drops of formalin add 0.1 g. of the sample and heat to boiling. Yellow  $\text{HgO}$  imparts a brownish green or black color (reduction to  $\text{Hg}$ ). (7) Shake 0.05 g. sample with 0.05 g. acetylsalicylic acid in 5 cc. of 5%  $\text{NH}_4\text{OH}$ . Yellow  $\text{HgO}$  gives a turbidity, red  $\text{HgO}$  none. (8) Shake 0.05 g. sample with 0.15 g. acetylsalicylic acid in 5 cc. of 1%  $\text{NH}_4\text{OH}$ . Allow to settle, decant  $\frac{1}{2}$  of the soln., dil. with 5 cc.  $\text{H}_2\text{O}$  and boil. Yellow  $\text{HgO}$  gives a cloudy soln. on cooling, red  $\text{HgO}$  a clear soln. A. W. Dox

**Volumetric determination of chlorate by induced reduction in the presence of osmium tetroxide as a catalyst.** Karl Gleu. *Z. anal. Chem.* 95, 385-92(1933).—To the equiv. of 10 ml. of 0.1  $N$   $\text{KClO}_3$  in 100-150 ml. of  $N$   $\text{H}_2\text{SO}_4$  add an excess of 0.1  $N$   $\text{As}_2\text{O}_3$  soln. Add 4 small portions of  $\text{NaHCO}_3$  (2.3 g. in all) from a spatula in order to replace  $\text{CO}_2$  with  $\text{CO}$ . Add 3 drops of 0.01  $M$   $\text{OsO}_4$  soln. and 3 drops of ferroin indicator soln. (*o*-phenantroline- $\text{Fe}^{++}$  complex) and titrate with 0.1  $N$   $\text{Ce}(\text{SO}_4)_2$  soln. till the color of the soln. changes from red to colorless. Then, to make sure that sufficient arsenite was used, add 5 ml. of  $\text{As}_2\text{O}_3$  soln. and see whether the end point is obtained again with 5 ml. of  $\text{As}_2\text{O}_3$  soln. Values obtained are about 0.2% too high. The procedure succeeds in the presence of any quantity of perchlorate, but if much  $\text{Cl}^-$  is present, enough  $\text{Hg}(\text{ClO}_4)_2$  soln. must be added before expelling air to make sure that all  $\text{Cl}^-$  is present as undissocd.  $\text{HgCl}_2$ . W. T. H.

**Iodometric microchemical determination of iodate and dichromate in small concentrations. Use of silver catalysts** S. Kuhnelt. *Z. anal. Chem.* 95, 414-18(1933).—As reagents use 0.01  $N$   $\text{Na}_2\text{S}_2\text{O}_3$  prepd. from an aged 0.1  $N$  soln. by diln. with  $\text{CO}_2$ -free and redistd. water. Keep under  $N$  gas. Prep. 0.005  $N$   $\text{KIO}_3$  from 0.1  $N$  soln. by diln. with redistd. water. To standardize  $\text{Na}_2\text{S}_2\text{O}_3$ , take 10 ml. of standard  $\text{KIO}_3$  soln., add 10 ml. of 4  $N$   $\text{H}_2\text{SO}_4$  and 10 ml. of 0.001  $N$   $\text{As}_2\text{NO}_3$  prepd. with redistd. water. To the mixt. add 70 ml. of redistd. water and pass a stream of  $\text{CO}_2$  through the soln. for 30 min. to remove  $\text{O}$ . *Work in orange or red light*, add 1 g. of pure  $\text{KI}$ , rotate the liquid till the solid has all dissolved and allow the reaction to take place for 5 min. in the dark. Then add 3 ml. of starch soln. and titrate with  $\text{Na}_2\text{S}_2\text{O}_3$ . For comparison of the end point use the same vol. of another soln. contg. the same quantity of  $\text{AgI}$ . To analyze for chromate or iodate proceed exactly as just described, or treat with  $\text{KI}$  and acid, distil off the  $\text{I}_2$  into  $\text{KI}$  soln. which has been freed from  $\text{O}$ , and to the  $\text{KI}$  soln. add  $\text{AgNO}_3$ ,  $\text{H}_2\text{SO}_4$  and starch and titrate with  $\text{Na}_2\text{S}_2\text{O}_3$ . The results indicate that the method is reliable. W. T. H.

**Comparative investigations on methods for nitrate determination.** F. Alten and H. Weiland. *Z. Pflanzenernähr., Düngung Boden.* 32A, 337-48(1933).—The phenolsulfonic acid methods (I) were not investigated, as their characteristics are well known. The  $\text{Ph}_2\text{NH}$  method of Fillmans and Suthoff (cf. *C. A.* 5, 3211) was fairly accurate for 1-2.5 p. p. m. nitrate and is not affected by chloride. The brucine method of Autenrieth and Funk (cf. *C. A.* 7, 3027) gave variable results at different times; the use of a reagent preserved with  $\text{CHCl}_3$  was especially unfavorable. The 2,4-xyleneol method of Blom and

Treschow (cf. *C. A.* 23, 4994) has the theoretical advantage over I that but one nitration product is likely to be formed. The tests indicated that it is capable of good results under favorable conditions, which include absence of org. matter as from plant exts., Pb, Mn or halide salts, although small amts. of  $\text{AcOH}$ ,  $(\text{COOH})_2$ ,  $\text{H}_3\text{PO}_4$ , and  $\text{EtOH}$  were harmless. The following modification of the original method is recommended: Evap. the alk. sample soln. to dryness in a flask, add 0.2 ml. 2,4-xyleneol and 50 ml. cold dil.  $\text{H}_2\text{SO}_4$  (5 vol. concd. acid with 3 vol.  $\text{H}_2\text{O}$ ); or, omit the evapn., adding concd.  $\text{H}_2\text{SO}_4$  in proper ratio with cooling during the addn.; if  $\text{N}_2\text{O}_5$  exceeds 10 mg., use more acid mixt. in proportion. Stopper and shake until the evapn. residue is detached from the flask. Keep on the sand bath at  $50^\circ$  with frequent shaking for 4 hrs. or overnight. Cool before opening the flask, pour into a 500-750-ml. distg. flask and rinse the nitrating flask with dil.  $\text{NaOH}$  and  $\text{H}_2\text{O}$  to 400 ml. vol. Distil with a low flame into a 250-ml. volumetric flask contg. 25 ml.  $N$   $\text{NaOH}$  kept cold. When the receiver is nearly filled, arrange the app. and allow the condenser to heat, to drive over any nitro compd. adhering. Make up to vol. at  $20^\circ$  and compare in a colorimeter with about the same quantity of nitrate standard carried through the process. The use of the 5-nitro-2,4-xyleneol standard of B. and T. gave inconst. results, only 70-80% of theory. C. J. Schollenberger

**Speedy methods of determining the moisture in a substance.** S. Stanworth. *Trans. Ceram. Soc.* 32, 443-52 (1933).—A weighed sample is mixed with  $\text{CaCl}_2$  in a closed container fitted with a pressure gage. The  $\text{H}_2\text{O}$  content is measured by the pressure produced by  $\text{C}_2\text{H}_6$ . H. F. K.

**A general analytical procedure for the toxicological detection of the metallic elements, including thallium, uranium and vanadium.** L. Sánchez Guisande. *Arch. med. legal* 3, 205-18(1930). The tissues are treated with  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$ . The fat is sepd. out and the  $\text{HNO}_3$  removed by evapn. The insol. residue is examd. for  $\text{AgCl}$  and sulfates of Ba, Sr and Pb. Groups I and II are pptd. by  $\text{H}_2\text{S}$ , the filtrate is tested for TI with  $\text{KI}$ , then  $\text{Na}_2\text{S}$  is added to ppt. Ni, Co, Fe, Mn, U, Zn, Al, Cr and V. The remainder of the procedure is according to the usual methods of qual. analysis. L. E. Gilson

**The determination of organic halogen by the method of O. Gasparini.** Kurt Heller and G. Patzelt. *Ann. chim. applicata* 23, 391-6(1933).—Polemical with Illari (cf. *C. A.* 27, 3420). A. W. Contieri

**Convenient micro method for estimating sulfur in organic compounds—modification of ter Meulen's method.** Harish Chandra Goswami and Pulin Bihari Sarkar. *J. Indian Chem. Soc.* 10, 611-15(1933).—The ter Meulen method (*C. A.* 16, 2094), which depends upon heating the substance in a stream of  $\text{H}$  in the presence of a catalyst, whereby all S is converted into  $\text{H}_2\text{S}$ , absorption of the  $\text{H}_2\text{S}$  in  $\text{NaOH}$  and titration of the sulfide iodometrically in the usual way, has been adapted to the detn. of small quantities of S. W. T. H.

**New method for the microchemical determination of methanol in the presence of important quantities of its homologs.** Michel Manry. *Compt. rend.* 198, 94-7 (1934).—Contrary to the prevailing opinion,  $\text{MeOH}$  to some extent is present in all fermented materials. The method here proposed is capable of detecting  $\text{MeOH}$  when only about 0.1%  $\text{MeOH}$  is present in a sample of alc. It is not a colorimetric method but is based upon the transference of the primary alc. into an iodide, the regeneration of the  $\text{MeOH}$  by treatment with aq.  $\text{AgOAc}$  and the measurement of the reducing power of the alc. All primary alcs. have the  $\text{OH}$  group replaced by one atom of  $\text{I}$ , and fractional distn. of the regenerated alc. results in volatilization of all  $\text{MeOH}$  and some  $\text{EtOH}$  with practically none of the higher homologs. Then  $\text{MeOH}$  is oxidized to  $\text{CO}_2$  and the other alcs. to  $\text{RCO}_2\text{H}$ , 1.5 times as much  $\text{O}_2$  being required to form the  $\text{CO}_2$  from  $\text{MeOH}$  as to form the carboxylic acids from the homologs. The iodization takes place advantageously in the app. of Zeisel-Fanto at  $105^\circ$  with  $\text{CaCO}_3$  in the wash bottle. The iodides are collected in aq.  $\text{AgOAc}$  soln. at  $43-50^\circ$  and a current of  $\text{CO}_2$  at 30 bubbles per min. is passed through the app. for

95 min. Then, after 2 hrs., there will be complete regeneration of MeOH and EtOH, and the soln. is then distilled into a 50-ml. measuring flask. For the detn. of the reducing power, 5 ml. of distillate is poured into 10 ml. of a mixt. of 20 mg.  $K_2Cr_2O_7$  and 5 ml. of concd.  $H_2SO_4$ . After 15 hrs. at room temp. the excess oxidant is detd. iodometrically. This gives the reducing power of the alc. mixt. The residue of salts remaining in the distg. flask is treated with dil.  $HNO_3$  and the residual AgI weighed. This gives a measure of the quantity of I required to form MeI and some EtI. From the AgI formed and the reducing power of the alc. it is easy to compute how much MeOH is present, because 2 mols. MeOH require 3 mols. of O, and 2 mols. of EtOH require 2 O<sub>2</sub>. W. T. H.

The determination of lactic acid. B. J. Krijgsman. *Arch. néerland. physiol.* 18, 503-13(1933).—A comparison of the colorimetric method of Mendel and Goldscheider (*C. A.* 20, 1252) for the detn. of lactic acid with the method of Dische and Laszlo (*C. A.* 21, 3641). The veratrole method is somewhat more exact than the hydroquinone method. F. L. Dunlap

Acid titration of betaine in acetone. K. Linderström-Lang. *Biochem. Z.* 267, 45-6(1933).—Contrary to Rodor's claim that betaine in acetone takes up no HCl (*C. A.* 27, 2702), this can be titrated (97.3-100%) with naphthyl red as indicator. S. Morgulis

Iodometric determination of mono- and disaccharides. K. Szálkender. *Pharm. Monatsh.* 14, 281-3(1933).—The method proposed depends upon the fact that these substances are quantitatively oxidized to  $H_2C_4O_4$  by NaOBr under the influence of a beam of light. Into a 250-cc.

glass-stoppered Erlenmeyer flask introduce 50 cc. 0.1 N  $KBrO_3$  and add 1 g. KBr; after it has dissolved, add 5 cc. of 25% HCl to liberate  $Br_2$  and follow this immediately with 10 g. of NaOH. Stopper the flask at once and dissolve by shaking and cooling under running water. Add this soln. to the sugar (10-35 mg. in water, max. amt. 30 cc.), mix and subject to a beam of light (15 min. for monosaccharides, 20 min. for disaccharides), keeping at a temp. of 16-17°. Add KI and HCl and titrate with  $Na_2S_2O_3$  soln. The results appear to be accurate. H. M. Burlage

Preparation of solutions of invertase for the determination of sucrose. J. Lehoucq. *J. pharm. chim.* 18, 292-3(1933).—If thymol water is used in the prepn. of invertase soln. (Bourquelot, *C. A.* 2, 1463), only 97% of sucrose is hydrolyzable. With a 0.1% soln. of *o*-hydroxyquinoline *K II* sulfate ("sulfoquinol") as a preservative, a 100% inversion is obtained, and invertase solns. so treated remained active and limpid at the end of 3 months. S. Waldbott

New color reactions of cuprous salts (Tartarini) 6.

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## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIKREK

A note on the minerals cooperite and braggite occurring in platiniferous concentrates from the Transvaal. H. R. Adam. *J. Chem. Met. Mining Soc. S. Africa* 34, 132-6(1933).—The history of the discovery and final identification of cooperite and braggite is given, with the compn. of each. Alden H. Emery

Crystal habit of uraninite from Cardiff Township, Ontario. A. L. Parsons. Univ. Toronto Studies, *Geol. Series No. 32*, 17-18(1932).—A combination of cube and octahedron is most frequent; other forms and twins (fluorite law) are rare. Alden H. Emery

Twinned beryl from Lyndoch Township, Renfrew County, Ontario. A. L. Parsons. Univ. Toronto Studies, *Geol. Series No. 32*, 23-4(1932).—The twin-plane is (112). Alden H. Emery

A topaz deposit in Topsham, Maine. Charles Palache. *Am. J. Sci.* 27, 37-48(1933).—Solns. rich in Na and Li built up layered albite and lepidolite in the bottom of a cavity. Microcline and albite were coated with a dense layer of sericite. Beneath this layer the feldspar was dissolved or kaolinized and lithia tourmaline grew into the spaces so formed. Beryl and topaz were attacked by a soln. indifferent to quartz and albite; the Be and F combined to produce hercynite, although the source of Ca and  $H_2PO_4$  is unknown. Alden H. Emery

Two new types of interpenetration twins on gypsum. A. L. Parsons. Univ. Toronto Studies, *Geol. Series No. 32*, 25-6(1932).—(101) and (500) are the twin-planes. Alden H. Emery

Mineral industry of Alaska in 1932. Philip S. Smith. U. S. Geol. Survey *Bull.* 857-A, 1-91(1934). E. H.

Iron ores at Itabira, Brazil. Bernard H. Sanders. *Bull. Inst. Mining Met.* No. 351, 20-32(1933); cf. *C. A.* 27, 4756; 28, 769.—Discussion. Alden H. Emery

The geology of the iron deposits of the Sierra de Imataca, Venezuela. Guillermo Zulouga. *Am. Inst. Mining Met. Engrs. Tech. Pub.* No. 516, 36 pp.(1933).—A highly ferruginous sandstone was first formed. A granitic intrusion caused migration of the Fe, and a norite caused replacement of metamorphosed quartzite and some granite by magnetite and hematite. The Fe was not derived

from the norite, but Fe in the itabirite was concd. by solns. accompanying the intrusion. The ore is exceptionally pure, 64-69% Fe. Plotted analyses of 21 Fe ores shows that the Brazilian ores are similar and that with the Venezuelan ores are in a class by themselves, contg. <1% SiO<sub>2</sub> and not participating in the const. SiO<sub>2</sub>-Mn ratio of the other ores. Alden H. Emery

Overhanging salt on domes of Texas and Louisiana. Sidney A. Judson and R. A. Stamey. *Bull. Am. Assoc. Petroleum Geol.* 17, 1492-520(1933).—Various theories for salt overhangs are reviewed, including the action of soln. processes. Alden H. Emery

Conversion of fatty and waxy substances into petroleum hydrocarbons. W. P. Seyer. *Bull. Am. Assoc. Petroleum Geol.* 18, 143-8(1934); cf. *C. A.* 28, 3001; Barton, *C. A.* 25, 1305.—Naphthene-base oils are young, paraffin-base oils are old. The gravity and cloud points for many analyses are plotted against geologic age. If the A. P. I. gravity of the 250-75° key cut is 40° or more, the base is paraffinic, 30-70° for intermediate base, and <30° if the base is hybrid or naphthenic. The A. P. I. gravity increases at approx. 2.25° per geologic period for the Tertiary and Cretaceous crudes, but shows no change or very slight increase for crudes of Cretaceous to Ordovician. Wax is present and the base is hybrid if the cloud test of the 200-25° cut is 5°F. or above. The cloud test shows an increase through the Tertiary and Cretaceous and only slight irregularity from the Cretaceous to the Ordovician. The same gravity and cloud points were plotted against depth. The correlation coeff. is  $0.75 \pm 0.06$  for an increase of the A. P. I. gravity from 26.4° at 500 ft., at the rate of 2.15° per 1000 ft. to a gravity of 38.4° at 6000 ft. and (theoretically) 40° at 6800 ft. All samples from <3250 ft. had a cloud test <5°F.; all from >3350 ft. had a cloud test of >20°F. Conclusion: Protoperoleum is naphthenic, and the evolution is toward the paraffin series. Alden H. Emery

Origin of the white quartz sands of northern Puerto Rico. James Thorp and Leslie R. Smith. *J. Puerto Rico Dept. Agr.* 17, 157-70(1933).—The largest areas lie near the seacoast in assocn. with Tertiary limestones, but

unconformable with them. The soln. of limestones in the San Juan formation has left these deposits, podsol leaching probably accounting for the whiteness of the sands.

C. R. Fellers

West Bohemian kaolin and clay deposits (Zartner) 19. Detn. of the space lattice of a triclinic mineral (Tunell) 2. Space lattice and optical orientation of chalcantite (Barth, Tunell) 2. Petrographic and mineralogical nature of the Fe ore of Staro-Oskol'sk District in Kursk Magnetic Anomaly (KMA) Region (Tanatar) 9. Reducibility of KMA ores (Rostovtzev, et al.) 9.

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## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Influence of pulp classification upon flotation. V. I. Trushlevich and I. M. Akxev. *Tsvetnue Metal.* 1933, No. 1, 26-43.—The authors investigated the influence of dry and wet classification of pulp on flotation, and studied the economic factors and schemes of the most profitable grinding with classification, both in lab. and com. ore-dressing plants. Flotation of classified pulp ground to 65 mesh and coarser gave results superior to flotation of material through 200 mesh.

B. N. Daniloff

Kursk Magnetic Anomaly (KMA) ores and their chemical composition. P. P. Demchuk and B. A. Spevakov. *Domes* 1933, No. 9, 4 20.—About 500 KMA ore samples, taken from various borings, were analyzed with the following av. results: S 0.2-0.5, P 0.080-0.096, As 0.033-0.035, Fe 52-58.5, SiO<sub>2</sub> 6.5-9.4, CaO + MgO 1.95-3.3, K<sub>2</sub>O + Na<sub>2</sub>O 0.45-0.7, Al<sub>2</sub>O<sub>3</sub> 1.47-4.5 and loss ignition 6.6-10.34%. Numerous tables and diagrams, also a map, are given.

S. L. Madorsky

Petrographic and mineralogical nature of the iron ore of Staro-Oskol'sk District in Kursk Magnetic Anomaly (KMA) region. I. I. Tanatar. *Domes* 1933, No. 9, 20 9.—The Staro-Oskol'sk deposit is situated in the southeastern part of KMA region. Samples taken from 42 borings were subjected to petrographic and mineralogical analysis. T. agrees with previous investigators that the deposit is of hydrothermal nature, but disagrees on other points. He states (1) that it was the Turingian Schist and not the ferruginous quartzite which first underwent a metasomatic replacement; (2) that the process of pyritization precedes the process of sideritization instead of being simultaneous with it; (3) that the process of converting martite into limonite proceeded not only from the periphery of the grain but also from the nucleus; (4) that the analogy of the process of deposition should be drawn between the Staro-Oskol'sk District and KMA region in general, on one hand, and the northern part of Krivorog, instead of the central and southern, on the other.

S. L. Madorsky

Nature of KMA ores as to their physical properties. S. M. Meerov. *Domes* 1933, No. 9, 20-36.—Porosity, gas permeability, resistance to mech. breaking up and to cracking at ordinary and elevated temps., and to crushing under pressure, were investigated. A screen analysis of the fine ore is given.

S. L. Madorsky

Reducibility of KMA ores. S. T. Rostovtzev, F. S. Taranov and J. E. Ponyukhno. *Domes* 1933, No. 9, 36-57.—The method for testing reducibility of Kursk magnetite consisted in first heating the ore for 1/2-1 hr. at 850° to remove volatile matter, then crushing to a size 0.27 mm. and passing H<sub>2</sub> over 2 g. of the granular ore at a rate of 8 l./hr. at 850° for 30 min. The outflowing gas was tested every 10 min. for H<sub>2</sub>O. Loss of wt.

of sample was detd. at the end of the expt. Altogether 500 samples, representing various localities and depths of the deposit, were tested. The av. reducibility varied between 86.3 and 94.0%.

S. L. Madorsky

An investigation of KMA (Kursk Magnetic Anomaly) ores in regard to Bell's reaction. S. K. Trekalo. *Domes* 1933, No. 9, 57-65.—The reaction  $2CO \rightarrow C + CO_2$ , as catalyzed by the KMA ore, was studied. About 3-g. samples, 3-5 mm. in size, were placed in a boat and kept in an elec. furnace at 500°, while a mixt. of CO + CO<sub>2</sub>, in the ratio of 4:1, was passed through the furnace at a rate of 5 l./hr. Results were calcd. as the wt. of C deposited on the ore, expressed in percentage of the wt. of the ore. This deposit varied with various samples of ore between 1.47 and 15.41%. Thus in regard to Bell's reaction the KMA ores resemble those of Krivorog and Ural dense brown and magnetic ores. Because of its great density, small porosity and large sideritization, it causes a much smaller deposition of C than the Ural red or the ordinary brown ores. Deposition of C takes place more in the pores of the ore particles than on the surface.

S. L. Madorsky

Blast-furnace-charge calculations for the smelting of iron from the ore of Korobkovsk sector of Staro-Oskol'sk District in KMA. A. N. Pokhvisnev, P. P. Demchuk and S. M. Meerov. *Domes* 1933, No. 9, 66-71.—Calculations are given on the basis of 53-55% Fe and 8-13% volatile substances in the ore. On account of the high P content only cast and open-hearth iron can be prepd. from this ore. While the ore is characterized by low porosity and gas permeability at low temps., the reverse is true at high temps. Per 100 kg. of iron produced, the requirements are 74-76 kg. slag and 90-100 kg. coke. This rather large consumption of slag and coke is due mainly to the high S content (0.3-0.5%). Conclusion: The KMA ore can be melted more easily than Krivorog ore.

S. L. M.

Kursk Magnetic Anomaly (KMA). A. N. Pokhvisnev. *Domes* 1933, No. 9, 2-4.—The KMA deposits are estd. at about 200 billion tons of magnetite iron ore carrying an av. of 30-40% Fe. As a potential source it is of extreme importance, being almost equal to the known world deposits (243 billion tons). Most of the ore is too poor to be used without preliminary magnetic sepn., although in some cases the ore carried 50-60% Fe which is high enough to be used directly. A map showing location of deposits is given.

S. L. Madorsky

Grinding ores by explosion. W. Luyken. *Metal u. Erz* 31, 8-11 (1934).—Ores are disintegrated by heating with steam at a pressure of 15 atms. This is particularly suited to dense ores such as sedimentary Fe ores.

H. S.

Decomposition of iron ores such as oölitic, oölitic and pea ore. W. Luyken and L. Kraeber. *Mitt. Kaiser-*

**Wilhelm Inst. Eisenforsch. Düsseldorf 15, 197-203 (1933).**—The difficulties in prep. and dressing oolitic iron ores are discussed; they consist mostly in the fact that the Fe-rich oolites are crushed also when the rocky mass is crushed, which is not desirable. Three different processes were tried of which crushing in mills with rubber-covered bars did not give satisfactory results, while reducing to small pieces by dropping seems only a lab. solution. Blasting offered the most promising results as the ore was neatly sepd. from the other mass. Seven references. M. H.

**Physical and thermal basis of sinter roasting.** Helmut B. Wendeborn. *Metall u. Erz* 31, 1-8 (1934).—A prerequisite for the suction blast process is gas permeability of the charge, as the air which is sucked through the ore bed must not only maintain combustion but also serve to carry heat to the inner part of the ore layer. The high heat efficiency of the process leads to low fuel consumption in the sintering of oxidic ores, but requires the addn. of combustible material in the roasting of sulfidic ores such as pyrites, blendes and galena. H. Stoertz

**The presence of platinum in sulfur ores.** O. E. Zvyagintzev, V. V. Lebedinskii and A. N. Filippov. *Compt. rend. acad. sci. (U. R. S. S.) [N. S.]*, 1933, 165-9.—Pt was detected in various ores and final products by spectroscopic means. Up to 50 mg. per kg. was found in ores from Ridder, Allaverdui, Buron and Karabash contg. Cu, Pb, Zn, Fe, SiO<sub>2</sub>, Se, As, S, Al<sub>2</sub>O<sub>3</sub>, CaO, MgO, Au and Ag. Electrolytic mud, waste from concentrates, etc., contained Pt. A. A. Boehlingk

**Dissolving velocities of graphite in liquid iron.** E. Piwowsky. *Arch. Eisenhüttenw.* 7, 431-2 (1934).—When taking time-temp. curves with different types of cast iron it could be observed that graphite dissolves in the melt in a comparatively small temp. range even at very high heating velocities. Cast iron rods which were dipped with one end in a melting bath of Ni or Cu for only a few seconds showed clearly that eutectic graphite crystallizes directly from the melt, and not from decomp. cementite on account of lack of time. M. Hartenheim

**Symposium on cast iron.** H. Bornstein, et al. *Proc. Am. Soc. Testing Materials* 33, Part II, 115-273 (1934). G. G.

**Special processes for making cast iron of high mechanical qualities.** Le Bruly. *Rev. fonderie moderne* 27, 337-8 (1933).—Some modern processes of producing a high-quality cast iron by retarding and diminishing graphitic sepn. during and immediately after solidification (i. e., in a state of still sufficient plasticity for formation of coarse graphite crystals) are briefly described. They are: (1) The pearlitic process of Lanz in which the metal is cooled very slowly by as small a temp. difference between metal and mold as practically possible; C + Si vary from 4.80 to 3.50%; molds are heated to about 500°; tensile strength is about 26-30 kg./sq. mm. (2) The Emmel process which is based on low C content of the charge, small percentage of coke for fusion and consequently rapid melting with strong blast; C + Si is about 5%; tensile strength is about 30-40 kg./sq. mm. (3) The Krupp process which is essentially the same as 2. (4) The Corsalli process which retards and limits recarburation of the metal in the cupola by reducing the reaction of the coke by immersing the latter in milk of lime. The C content is 2.6-3.0%; tensile strength is 34-40 kg./sq. mm. (5) Some other processes are briefly mentioned based on quality of pig iron rather than on compn. of the charge.

**The study of pourability of cast iron.** R. Berger. *Bull. assoc. tech. fonderie* 7, 489-506 (1933).—Pourability or castability of a metal is defined as the facility with which it completely fills the mold; the principal factors are: temp. of metal in pouring, viscosity of the liquid metal at the pouring temp. and condition and shape of the mold. Cast irons with less than 0.5% Si improve their casting quality with increasing Si content; between 0.75 and 0.95% Si a sudden drop in castability occurs and from this point on castability improves gradually again until the Si content for the eutectic C concn. is reached; for higher Si contents castability again diminishes. The sudden drop

is explained by an endothermal reaction which is due to the initial Si content from the pig iron, a "hereditary" phenomenon. The tests are described in detail by diagrams taken from different C and different Si contents. The formula of Portevin considering all influences  $A = \alpha [cd (\theta - F) / (F - \theta_1) + \beta Ld / (F - \theta_1)]$ , where  $A$  = castability,  $\alpha$  and  $\beta$  = coeffs. depending on the nature of mold and viscosity of metal,  $d$  = density of metal,  $F$  = freezing temp. of metal,  $c$  = sp. heat of liquid metal,  $\theta$  = pouring temp.,  $\theta_1$  = temp. of the mold,  $L$  = latent heat of freezing of the metal, represents fairly well the results obtained in the expts. M. Hartenheim

**The copper refinery at Prescott.** D. W. Aldridge. *Metal Ind. (London)* 43, 605-8, 631-3; 44, 9-12, 87-90 (1933-34). E. H.

**The action of brines on Mansfeld copper schist and sulfide copper ores.** F. Krüll. *Chem. Erde* 8, 490-503 (1933).—Mixed concd. solns. of K, Na, Mg and Ca chlorides and Mg sulfate at temps. of 30° and 60° were allowed to act on Cu schist, bornite, chalcocite and chalcocyanite for 14-90 days, and at boiling for 1 hr. The concn. of Cu in the brine varied from 0.009 to 0.11%, averaging only 0.05%. Conclusions: The penetration of brines into Cu schist is not responsible for the secondary metal displacement, and a reaction of the type  $\text{CuS} + \text{MgCl}_2 = \text{MgS} + \text{CuCl}_2$  is not to be assumed. P. S. Roller

**Separation of copper from complex copper-lead-tin-antimony alloys.** N. N. Murach. *Tsvetnue Metal.* 1933, No. 1, 99-100.—Lab. expts. showed that Cu can be removed almost completely from complex Cu-Pb-Sn alloys by melting with large amts. of PbO. B. N. D.

**Production of pure chromium.** P. P. Alexander. *Metals & Alloys* 5, 37-8 (1934).—Cr<sub>2</sub>O<sub>3</sub> prepd. from distd. CrO<sub>3</sub> was reduced to metallic Cr having a purity of the order of 99.95% by means of the hydrides of both Ta and Ca. Downs Schaaf

**Manufacture of magnesium.** A. Dumas. *Rev. met.* 30, 511-19 (1933).—A brief description of processes for prepn. of anhyd. MgCl<sub>2</sub> and for production of metallic Mg. J. D. G.

**Impurities in commercial zinc.** Werner Frölich. *Metal Ind. (London)* 43, 559-60, 589-90 (1933). E. H.

**Sedimentometric analysis of slimes.** N. Lubman. *Tsvetnue Metal.* 1933, No. 1, 44-61.—Expts. conducted by L. indicated that the dispersion analysis, as developed by G. Wiegner and Sven-Oden for soil investigations, can be utilized also for quant. control of highly dispersed phases in ore flotation. The investigation showed, however, that to obtain a true picture of the state of dispersion as the result of grinding, it is necessary to stabilize the suspension. It was proved that with complete stabilization the distribution of slime particles is independent of viscosity and other mol. properties of the liquid medium. The process of stabilization of hydrophilic and hydrophobic minerals in water and hydrocarbon media of varying viscosities was investigated. The most suitable stabilizers were found to be alizarin red in aq. alkali media, and oleic acid in hydrocarbon media. The sedimentometric methods and technic, however, are not sufficiently developed to be adopted for practical use. B. N. Daniloff

**Some practical applications of sand tests.** G. Henon. *Bull. assoc. tech. fonderie* 7, 506-13; *Usine* 42, No. 51, 31 (1933).—The advantage of testing foundry sands is discussed, and it is shown by a no. of examples that great practical advantages can be derived in molding and obtaining good castings. Measurements to be made should extend to tests of elementary properties, i. e., fineness and regularity of grains and amt. of dust, and of properties of application, i. e., permeability, cohesion and thermal qualities. Instruments for testing these properties are briefly described and diagrams developed which show in a convenient way the characteristics of a sand. American and French practice is compared. Five references. M. Hartenheim

**Developments in foundry refractories.** E. J. Crowley. *Foundry Trade J.* 50, 71-2, 77 (1934). D. S.

**Oxidation and reduction of chromium in the open-**



hearth furnace. N. Inshakov. *Stal* 3, No. 6, 24-33 (1933).—Analyses made during heats contg. 0.25-1% Cr show that the behavior of Cr parallels that of Mn, the Cr being oxidized at the beginning and reduced at the end of the heat.

H. W. Rathmann.  
Open-hearth operations in retrospect. L. F. Reinartz. *Blast Furnace Steel Plant* 22, 29-30, 45(1934). E. H.

A review of blast-furnace practice. Owen R. Rice. *Blast Furnace Steel Plant* 22, 34-6, 46(1934). E. H.

Blast-furnace developments in 1933. Wm. A. Havcn. *Blast Furnace Steel Plant* 22, 27-8(1934). E. H.

Centralized control of blast furnace. Oliver P. Van Steewen. *Blast Furnace Steel Plant* 21, 523-6, 579-80, 530-2(1933). E. H.

Pins and bolts for high-temperature roasting furnaces. A. G. Arend. *Chemistry & Industry* 1934, 94-5. E. H.

Theoretical considerations in the use of oxygen-enriched air in the blast furnace. N. A. Kostuilev. *Domes* 1933, No. 8, 1-19.—The advantages resulting from the addn. of 18-22.5% O<sub>2</sub> to the air in the blast furnace are: the use of the cold blast, a colder hopper, a smaller vol. of dust in the flue gas, due to reduced velocity of gas through the furnace, and a saving of 10-12% in the coke consumption. However, the last advantage is offset by the necessity of burning the limestone to lime before feeding it into the furnace, because of the blast being cold.

S. L. Madorsky.  
The Balz furnace and its suitability for roasting ore for zinc electrolysis. Otto Kühle. *Metallwirtschaft* 12, 683-8(1933).—The construction and operation of the Balz furnace are described in detail and its advantages over other types of furnaces for roasting zinc blende enumerated. Its features are compact construction with low muffles, location of the driving mechanism on the outside removed from the heat and chem. attack, and temp. regulation of the air used to burn the sulfides. Part of the air entering the furnace is cold to prevent fusing of the charge at the start of the roasting, while preheated air is introduced near the end to obtain a completely roasted product. The operating costs are lower than for other types of furnaces. At 840° the ore is roasted in 8 hrs. with a resulting sulfide S content of 0.4% or less and high Zn soly. with the formation of very little ferrite and silicate compds. Samples from 8 lots of Zn blende from various sources which had been roasted in a Balz furnace were leached in H<sub>2</sub>SO<sub>4</sub> according to the Anaconda and Linton processes, and the Zn soly. and the ferrous Fe content were detd. The Zn soly. was 92-9% and 96-9%, resp., and the ferrous Fe content averaged 0.05% and 0.16%.

C. E. Macfarlane.  
Furnaces for heat treatment. W. A. Thain. *Aircraft Eng* 6, 13-19(1934).—A review is made of the requirements of all types of furnace for aircraft factories, and some of the general principles governing their development. Descriptions are given with illustrations of a modern gas-fired furnace with automatic-proportioning burning equipment; of a nitriding furnace of the semi-continuous type utilizing the exhaust NH<sub>3</sub> from a container undergoing treatment; of some elec. furnaces for Al alloys, and of some self-regulating induction furnaces. Illustrated descriptions are given of some modern furnaces.

A. W. Furbank.  
Heat treatment of metallurgical products. A. Portevin. *Aciers spéciaux* 7, 242-56, 282-97, 318 28, 393 412(1932); 8, 2-18, 203-22, 231(1933).—The essential laws and notions of the problem of heat-treating the metallurgical products are given. The following are discussed: (1) methods of qualitative and quantitative study of the transformation points of steel, transformation points of carbon steel; (2) ordinary steels, preliminary treatment, homogeneity, overheating; (3) special steels, phenomena and characteristics of tempering; (4) characteristic curves of tempered steel; (5) classification of steel in four groups according to their heat treatment; (6) annealing; (7) malleable iron.

G. T. Motok.  
Further investigations into the metallurgical course of the Thomas process. P. Bardenheuer and G. Thanheiser.

*Mitt. Kaiser-Wilhelm-Inst. Eisenforsch. Düsseldorf* 15, 311-14(1933); cf. *C. A.* 27, 4504.—To get an insight into the metallurgical principles of steel production by the Thomas process the changes of concn. in melt and slag during the time of blasting were detd. in 9 Thomas melts. The degree of basicity was measured by analysis of the slag of reaction which was freed from free lime, and the transition of the original acid into the basic slag was followed up by detg. the equil. const. for the Mn reaction  $K_{Mn}$  which was found to be between 685 and 1055. The general course of the Thomas process can be represented as follows: the O blown into the melt with the air oxidizes at first a part of the Fe to FeO; other elements as Si, P, Mn, C, etc., are oxidized essentially over FeO. Si, Ti and V and a great part of Mn burn at the beginning of the melting process with very great velocity. The silicic acid formed thereby can form very liquid compds. with simultaneously formed FeO and MnO which sep. quickly from the steel melt. V and Ti are accumulated at the beginning of the reaction in the slag. The burning of C does not begin until after all these elements have been burnt. During the whole time of burning of C the O content of the melt is low in spite of the great amt. of air supplied. Dephosphorization takes place when the slag has become basic.

M. Hartenhein.  
New (permissible) limits of deviation in rolled steel. B. I. Panchenko. *Domes* 1933, No. 8, 32-36.—In view of the enormous demand for rolled steel in Russian industries, the limits of deviation set for profiles are changed so as to effect economy of material.

S. L. Madorsky.  
An investigation of cast iron rolls with hardened surfaces. V. N. Gridnev and E. V. Panchenko. *Domes* 1933, No. 8, 19-27.—Chem. analysis, phys. tests and macro- and micrographic investigations were made of 2 rolls and 14 disks cast from a cupola furnace.

S. L. M.  
A metallographic method for determining furnace-temperature uniformity. E. H. Dix, Jr., and A. C. Heath, Jr. *Metals & Alloys* 5, 10(1934).—Just as the softening of a conglomerate of certain substances such as Al<sub>2</sub>O<sub>3</sub> and feldspar, etc., in a Seger cone denotes a certain temp. in a ceramic kiln, so the authors use the m. p. of a binary eutectic of Al and a 2nd phase, either an intermetallic compd. or a pure element, for detg. furnace-temp. uniformity.

Downs Schaaf.  
The magnetic method for the discovery of flaws in metal products. K. V. Grigorov and M. N. Mikhcev. *J. Tech. Phys.* (U. S. S. R.) 2, 190 9(1932). F. H. R.

The behavior of metallic materials with static and dynamic loading. P. Ludwik. *Z. Metallkunde* 25, 221-8 (1933).—A review, chiefly of L.'s work. R. F. Mehl.  
Tantalum as a construction material. S. Ganswindt and K. Mathies. *Chem. Fabrik* 1933, 521-3.—Data are given on its chem. and phys. properties and resistance to corrosion by acid and alk. solns., and several cuts of app. are shown.

J. H. Moore.  
Status of pressure die casting. W. Brunckow. *Z. Metallkunde* 25, 190-4(1933).—A review of methods, mech. properties, and structure of die castings, limitations, and economics.

R. F. Mehl.  
Influence of silver on the softening of cold-worked copper. H. C. Kenny and G. L. Craig. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 525, 8 pp. (1934).—A small fraction of 1% of Ag in high-cond. tough-pitch Cu increases the softening temp. of the cold-worked material. The Ag is effective in raising the softening temp. both for very short anneals and for heating times of months. The softening temp. increases rapidly until the Ag content reaches 10 oz./ton (0.034%), and then slowly with further increase in Ag content. Cold-worked Cu contg. almost no Ag is completely softened on heating for a few days at 150°, while Cu of the same hardness contg. over 10 oz./ton (0.034%) of Ag is not greatly softened when maintained at this temp. for a year. As much as 40 oz./ton (0.14%) of Ag has no adverse effect on the mech. properties, nor does it lower the elec. cond. appreciably.

C. L. Mantell.  
Hardening processes in silver-copper single crystals. P. Wiest. *Z. Metallkunde* 25, 238-41(1933).—The age-

hardening of single crystals of a 5% Ag Cu-Ag alloy was studied by measurements of hardness on a given crystal face and by x-ray detns. of  $a_0$ , the side of the unit face-centered cell. Aging curves were taken (after quenching) at 350°, 375°, 400°, 420°, 425°, 445° and 470°. These hardness measurements showed the aging to take place in 3 stages, the aging curves at the higher temps. showing 3 maximums. The aging times at which these maximums obtain shorten greatly with increasing temp. No change in  $a_0$  was found during aging until the second max. was encountered. At 350° aging for 36 hrs. sufficed to pass the first max., during which period no change in  $a_0$  was found, nor any noticeable broadening of the x-ray diffraction lines. Polycryst. alloys of the same compn. showed a more rapid aging at all temps. and showed the occurrence of but one max. in hardness. R. F. Mehl

The behavior of graphitic silicon in aluminum at elevated temperatures. C. Schaarwächter. *Z. Metallkunde* 25, 250-1(1933).—It is shown by microscopic observations (that the Si pptd. from the solid soln. of Si in Al (graphitic Si) redissolves in Al on reheating with extreme slowness and that only at temps. in the neighborhood of the eutectic temp., 577°, is the soln. process rapid enough to be observed. R. F. Mehl

Work of data committee on aluminum conductors. H. Schmitt. *Z. Metallkunde* 25, 170-2(1933).—A report on the behavior of Al conductors installed on the island Sylt over a period of 5 yrs. The conditions of construction and of exposure are described. These conductors consisted of Cu; Aldrey; Al, 99.8; Al, 99.2, annealed at 350°; Al, 99.2, annealed at 500°; "test alloy No. II." Photographs show the progressive change in surface appearance of the cables, and graphs show the change in breaking load, corrected breaking load, and elec. resistance over the 5-yr. period. The Al conductors showed good behavior in comparison with Cu. R. F. Mehl

Studies on the deep-drawing of sheet as measured by the Erichsen method. Fr. Dorge. *Z. Metallkunde* 25, 165-8, 210-14(1933).—The interpretation of the Erichsen test for deep-drawing capacity of sheet metal is discussed. Penetration-load curves for Al, Cu, brass, and bronze sheets are given and discussed mathematically. Conclusion: The drawing test is essentially similar to a simple tensile test. R. F. Mehl

Inception and development of hard metal carbides. Karl Schroeter. *Iron Age* 133, No. 5, 27-9(1934).

Light metal rivets. K. Guler. *Z. Metallkunde* 25, 214-17(1933).—A discussion of the behavior of high-strength Al alloy rivets: duralumin, Avional (Al 94.4, Si 0.3-0.6, Fe 0.3, Mn 0.5, Mg 0.55, Cu 3.8%) and Anticorodal (Al 97.25, Si 1.0, Fe 0.3, Mn 0.75, Mg 0.65, Cu 0.1%). Duralumin of German specification 681a and Avional had high resistance to sea-water corrosion, whereas duralumin 681n corroded rapidly (shown by photographs). The tensile properties of Avional and Anticorodal are given in tables and graphs; also the hardening curves as measured by Brinell hardness, shearing strength and tensile strength. Avional hardens on room-temp. aging, whereas Anticorodal must be artificially aged. R. F. M.

Repeated hardening of duralumin rivets and the influences of the hardening temperature. Martin Abraham. *Z. Metallkunde* 25, 203-6(1933).—The claim that the interruption of the hardening process with immediate re-hardening leads to more rapid hardening is shown to be unimportant, the effect small and of no practical significance. The course of hardening with repeated hardening remains the same if the rivets are not treated for 5 days between the soln. heat treatments. The influence of temp. of aging upon the rapidity of aging is much greater; a temp. difference of 20° can produce a difference of 4 kg./sq. mm. shearing strength after a two-hour aging. The limit of working for rivets of duralumin wire of the German specification 681 ZB is around 25 kg./sq. mm. shearing strength. This strength is reached on a ten-hour aging at 8°. The data are given largely in the form of graphs, drawn from tests on duralumin alloys 681 A and 681 ZB. R. F. Mehl

Report of subcommittee XV on impact testing. J. T. MacKenzie, et al. *Proc. Am. Soc. Testing Materials* 33, Part I, 87-129(1934). G. G.

The torsion impact test. G. V. Luerssen and O. V. Greene. *Proc. Am. Soc. Testing Materials* 3, Part II, 315-27(1934). G. G.

An "overnight" test for determining endurance limit H. F. Moore and H. B. Wishart. *Proc. Am. Soc. Testing Materials* 3, Part II, 334-40(1934). G. G.

The determination of the initial ball impression hardness. E. Franke. *Z. Metallkunde* 25, 217-19(1933).—The initial ball impression hardness,  $H_A$ , is detd. by taking a series of Brinell impressions at different applied loads, (giving Brinell hardness no.,  $H$ ), then detg. the Shore scleroscopic hardness pos. of the work-hardened layer ( $S$ ) at the bottom of the impression and also of the unstrained sample ( $S_0$ ), and applying the relationship  $H_A = H \cdot S_0 / S$ . A similar treatment may be applied if pendulum hardness is used instead of scleroscopic hardness. The values of initial hardness obtained in this way are thus independent of work-hardening effects and are more representative of the original material. The method is simple enough to be used in practice. R. F. Mehl

Crystalline structure in relation to failure of metals, especially by fatigue. Herbert J. Gough. *Proc. Am. Soc. Testing Materials* 33, Part II, 3 114(1934); cf. C. A. 27, 5285.—A lecture. G. G.

Fatigue tests of galvanized wire under pulsating tensile stress. S. M. Shelton and W. H. Swanger. *Proc. Am. Soc. Testing Materials* 33, Part II, 348-60(1934). G. G.

The fatigue properties of light metals and alloys. R. L. Templin. *Proc. Am. Soc. Testing Materials* 33, Part II, 364-80(1934). G. G.

The annealing of duralumin wire. S. D. Tzipurdeev. *Metallurg* 8, No. 6, 50-2(1933).—The best results are obtained by heating to 370-400° for 2-3 hrs., cooling in the furnace to 250-70° and then cooling in air. This gives a tensile strength of 22-3 kg. per sq. mm. and an elongation of 17-8%. H. W. Rathmann

Studies upon the Widmanstätten structure. V. The gamma-alpha transformation in pure iron. Robert F. Mehl and Dana W. Smith. *Am. Inst. Mining & Met. Engrs., Tech. Pub.* No. 521, 7 pp.(1934); cf. C. A. 27, 3180.—The Widmanstätten figure in drastically quenched pure Fe delineates the [111] octahedral, planes in  $\gamma$ -Fe. The orientations of the  $\alpha$ -phase with respect to the parent  $\gamma$ -phase shows a satisfactory agreement with the relationships previously found in martensite and slowly cooled hypoeutectoid steels. Alden H. Emery

The linear thermal expansion and  $\alpha$ - $\gamma$ -transformation temperature of pure iron. J. B. Austin and R. H. H. Pierce, Jr. *Physics* 4, 409-10(1933); cf. C. A. 27, 4201.—With a rise in temp. the expansion coeff. increases, passes through a max. at about 450° and falls to a min. at or near the Curie point, then increases to the  $\alpha$ - $\gamma$  transformation. Between 600° and 900° the thermal expansion is sensitive to small differences in compn. or previous treatment. The temp. of the transformation from  $\alpha$  to  $\gamma$  structure appears to be very sensitive to even small amts. of impurity; 928° is thought to be near the true value. The expansion cannot be calcd. for temps. near the Curie point. A. M. Brant

Some investigations and observations principally on the strength properties of cast iron. J. E. Hurst. *Metalurgia* 8, 179-80, 9, 17-19, 43-5(1933).—Data are cited to show that both the compn. and properties of cupola iron vary markedly from cast to cast. The modulus of elasticity, or more properly the  $E/N$  value, varies from 5 to 30 million lb./sq. in. in cast irons. It is influenced by structure, white irons having the higher value. Properties of some centrifugally cast piston rings are given. Superheating iron for these did not improve the properties. J. L. Gregg

An x-ray study of the diffusion of chromium into iron. Lawrence C. Hicks. *Am. Inst. Mining Met. Engrs., Contribution* No. 58, 10 pp.(1933).—The concn. of Cr falls off gradually for a considerable distance, then drops

very abruptly. The percentage of Cr at the break (14-15 atomic %) is somewhat greater than that indicated by Adcock's diagram as the limit of the  $\gamma$ -solid soln. range at 1200°. The mechanism of the diffusion process is that proposed by Bannister and Jones. A. H. E.

The passivity of iron and aluminum. W. H. Cone and H. V. Tartar. *J. Am. Chem. Soc.* 56, 48-52(1934).—With these metals in  $\text{HNO}_3$  no abrupt change was noted between the active and passive states. Phosphates and sulfates accelerate soln. of Fe and Al in  $\text{HNO}_3$  and make them more electroneg. with respect to the soln. This action is attributed to adsorption of these anions at the O film-soln. interface. The passivity of an air-exposed Fe to concd. chromic acid soln. may be destroyed by reduced pressure, a H atm., or wetting with solns. of electrolytes. A. M. Brant

The application of metallography to the study of boiler failures. Robert Stumper. *Chaleur & ind.* 14, 511-14(1933).—A discussion of the principles of ferrous metallography with photomicrographs of various types of steel used in boiler construction. K. K.

Residual austenite in hardened steels. S. S. Shteinberg and V. I. Zyuslin. *J. Tech. Phys.* (U. S. S. R.) 2, 35-46 (1932).—Residual austenite increases with the C content, with slowness of cooling (with the exception of 1.8 % C steel) and with increase of hardening temp. up to 1000°; above that it decreases. Gray pearlite is found with a low residual austenite content. F. H. R.

Upper critical temperature ( $A_c$ ) of steel as affected by various elements. Robert R. Abbott. *Iron Age* 132, No. 26, 7-11(1933).—Quant. relations have been detd. between the amts. of the usual elements in steel and the elevation or depression of the crit. point. This point can be calcd. from the chem. analysis of the steel by the equation: temp. of  $A_c = 908 - 2.237 \text{ C} + 0.4385 \text{ P} + 0.3049 \text{ Si} + 0.3792 \text{ V} - 0.3443 \text{ Mn} - 0.23 \text{ Ni} + 2(\text{C} - 54 + 0.06 \text{ Ni})$ , where all the elements are expressed in hundredths of a % except P, which is in thousandths. If the quantity in the last bracket is neg. it is omitted. Tables are given for the rapid detn. of the upper crit. point from the chem. analysis. A. M. Brant

The effect of time and temperature on the embrittlement of steels. A. M. McKay and R. N. Arnold. *Engineering* 136, 623-5, 647-9(1933).—Ten alloy steels of representative character were tested after soaking for periods at temps. from 300° to 650°. The tabulated results indicate that the ultimate degree of embrittlement is independent of the temp. but the rate of change is more rapid as temp. is increased. Working stresses seem to play no part in the embrittlement. The steels showed a considerable decrease in impact resistance. The hardness and ultimate tensile strength varied within small limits during embrittlement, and the structures did not change appreciably. It is thought that the change in the embrittled steel is of a submicroscopic nature, the material striving to attain a condition of equil. by the pptn. of unstable constituents. A. M. Brant

Effects of columbium in chromium-nickel steels. Frederick M. Becket and Russell Franks. *Am. Inst. Mining and Met. Engrs., Tech. Pub.* No. 519, 14 pp.(1934).—Presence of approx. 4 times as much Cb as C in austenitic Cr-Ni steels diminished the range of temp. through which these steels were attacked at the grain boundaries. When the ratio was increased to 7, a marked improvement resulted; 10 times as much Cb as C yielded steel that failed to disintegrate between 300° and 850°. This probably is related to the normal expansion and contraction during heating and cooling of the Cb-bearing steels, while the ordinary Cr-Ni steels show breaks in the curves. Fully softened steels contg. up to about 2% Cb possess good phys. characteristics, exhibit excellent resistance in the salt-spray test during exposure of 750 hrs. and give satisfactory results in boiling 65%  $\text{HNO}_3$ . A. H. E.

Shearing properties and Poisson's ratio of structural and alloy steels. Inge Lyse and H. J. Godfrey. *Proc. Am. Soc. Testing Materials* 3, Part II, 274-85(1934). G. G.

Chemically resistant iron and steel alloys. W. Ackermann. *Chem.-Ztg.* 57, 901-3(1933).—Alloying elements

forming a series of solid solns. are important for obtaining acid-resisting material, as chances for local elements and potential differences are reduced. Study of space lattice conditions and the formation of protective films are also important factors. Low-C steels contg. 8% Cr show corrosion resistance, but for complete resistance 12% Cr must be exceeded; addn. of 2% Ni improves the mech. properties. For protection against the nonoxidizing acids higher alloying percentages must be used; the 18-8 Cr-Ni alloys are most important. Addn. of 2-3% Mo gives increased resistance. Rust-free Cr steels are martensitic and have heterogeneous structure after heat treatment; a change of hardness can be produced by quenching and tempering. The more resistant Cr-Ni steels are austenitic, a homogeneous solid soln. of  $\gamma$ -iron-Fe<sub>3</sub>C-Cr-Ni. The austenitic steels are occasionally attacked by an intercryst. corrosion. Investigation has shown that pptn. of small amts. of carbide at the grain boundaries causes this condition. Long annealing at the crit. temp., 800-700°, and increasing C content favor this condition. Heating above 1100°, where carbide particles dissolve, and addn. of Si, Mo or V prevent intercryst. corrosion of austenitic steels. Rust-free Cr steels (about 14%) are resistant to air,  $\text{H}_2\text{O}$ , HCl and sufficiently resistant to a few fruit acids such as acetic, malic, citric and tartaric acids. Acid-resistant Cr-Ni (18-8) steels are resistant to the same agents, especially against cold  $\text{H}_2\text{SO}_4$  and  $\text{H}_3\text{SO}_4$ , phosphoric acid, lactic acid, cold formic acid, milk, oxalic acid, ammonia, NaOH, KOH, soda and salt solns., light metal chlorides and sulfates. These alloys show little or no resistance to hot  $\text{H}_2\text{SO}_4$ , heavy metal chlorides, Br, I, Cl, liquid Al, Zn and Sn. The usual Cr steels are made more weather resistant by the addn. of a few tenths of a % of Cu. Addn. of Ni, Cr and Cu to cast iron increases the resistance, especially if an austenitic structure is secured. An alloy cast iron of the following compn.: Ni 12-15, Cu 5-7, Cr 1.5-4, Mn 1-1.5, total C 2.75-3.1, Si 1.25-2, S 0.04-0.13 and P 0.04-0.30% has numerous applications in the chem. and mech. industries. Si is an important alloy element for cast irons; 12% gives good acid resistance and 18% gives complete acid resistance. Rust-free Cr alloys are scale resistant up to 800°; the austenitic Cr-Ni steels, up to 1000°. Addn. of Al greatly increases the scale resistance, but decreases the corrosion resistance and the workability of the alloy. C. B. J.

Structure of an alloy steel. Owen W. Ellis. *Iron Age* 132, No. 18, 21-4(1933); cf. *C. A.* 27, 5288.—Each of a series of 10 samples was heated to 1035°, allowed to cool to a predetd. temp. and quenched. The quenching temp. ranged from 700° to 475°. Cooling curves were made and structural changes were studied. Transformation of face-centered solid soln. commences at 675-650°, and transformation of those parts of the face-centered solid soln. in close proximity to the body-centered soln. which has already formed occurs within 625-600°. The latter phenomenon results in the formation of a conglomerate structure. C. B. Jenni

Alloys and alloy steel in 1934. Charles Longenecker. *Blast Furnace Steel Plant* 22, 61-2(1934). E. H.

The study of constitution (of alloys) by magnetic methods. I. Dia- and paramagnetic measurements. A. Kussmann. *Z. Metallkunde* 25, 259-66(1933).—A review, under the following headings: fundamental quantities, general behavior (of metals), methods of measurement, relationship with constitution (of alloys), kinetics of transformation, lattice distortion, tests for the presence of Fe, soly. relationships, aging, influence of cold deformation. R. F. Mehl

Effect of sulfur dioxide gas on alloys. G. H. McGregor and J. W. Stevens. *Paper Trade J.* 97, No. 18, 40-1 (1933).—Results are given and discussed of the exposure of 50 samples of ferrous and nonferrous alloys at 200-20° in  $\text{SO}_2$  of 17-18% concn. for 30-day periods up to 10 months. The 16-18% Cr, low-Mn alloys showed considerable pitting and general disintegration. In the 18%-Cr 8%-Ni alloys, high C tends toward rapid corrosion. The 23-11, 20-10 and 28-10 Cr-Ni alloys are about as resistant as the low-C 18-8 alloys. The 20-20 alloys and

high-Cr very high-Ni alloys are quite resistant; the low-Cr high-Ni alloys are readily attacked. The resistance of the non-Cr high-Ni alloys varies considerably according to the presence and amts. of other metals, highest resistance having been observed with: Ni 85, Cu 5, Si 10. All the cast irons and steel controls were readily and extensively attacked. The 18-8 Cr-Ni alloys are somewhat more resistant than bronze, which is more or less the standard metal for sulfite digester fittings, and which in turn is more resistant than brass. A. P.-C.

**Influence of heavy metals upon aluminum alloys.** P. Röntgen and W. Koch. *Z. Metallkunde* 25, 182-5(1933).—A micrographic study of the solid soly. of Ni, Cr and Mo in Al at 560°, and of the effect of these elements on the solid soly. of Cu in Al. The solid solubilities are: Ni, 0.01-0.02; Cr, 0.02; Mo, 0.02; the solid soly. of Cu in Al is not increased by addns. of Ni, Cr and Mo.

R. F. Mehl

**The so-called incubation in the hardening of duralumin.** W. Fraenkel and R. Hahn. *Z. Metallkunde* 25, 185-9 (1933).—Tensile tests and measurements of elec. cond. and Brinell hardness were performed on a series of alloys of the duralumin type during aging at room temp. It was found that the incubation period, i. e., that period at the beginning of aging during which little or no change occurs, is dependent chiefly upon grain size, increasing in degree as the grain size increases. Very pure materials are in general less inclined to incubation than com. materials; impurity of Fe seems to favor the occurrence of an incubation period.

R. F. Mehl

**The alloying of gallium with aluminum.** N. A. Pushin and V. Stajić. *Z. anorg. allgem. Chem.* 216, 26-8(1933); cf. C. A. 27, 934.—The complete phase diagram of the system Ga-Al was investigated by thermal analysis. Three compds. were found: AlGa<sub>3</sub>, m. 281°; AlGa, m. 374°; Al<sub>3</sub>Ga, m. 467°. The last compd. showed 2 modifications:  $\beta$ , stable at 467-447° and  $\alpha$ , stable below 447°.

H. H. Rowley

**Beryllium heavy-metal alloys.** W. Hessenbruch. *Z. Metallkunde* 25, 245-9(1933).—Cu-Be alloys can best be melted under a fused chloride flux but Be alloys with Ni, Co, Cr are best melted (and cast) in a vacuum; this provides an alloy with excellent forging qualities. Binary Be alloys are too expensive for wide use and attempts have been made to prepare ternary alloys requiring less Be but with pronounced age-hardening properties. This is possible because most metals (not Ni) lower the solid soly. of Be in Cu, and age-hardening thus obtains at lower Be contents. Cu with 1% Be shows very little hardening after quenching from 850° and aging at 350°, whereas the addns. 3% Ti, 5% Ag, 5% Si, 5% Mn, 10% Fe, resp., cause marked hardening, roughly up to 260 Brinell hardness no. (BHN). These elements without Be give little hardening, and the effect is to be ascribed chiefly to Be. Cold-working after quenching but before aging increases the rate of aging and the max. hardness. The Cu-Ag-Be alloy shows good elec. cond., 22.10 reciprocal ohms. Ni with 1% Be and 4, 6 and 8% Mo, resp., gives similar results, both on normal aging and aging after cold work (aging at 500°), with BHN up to 450. Ni with Be and Cr shows similar behavior, though Cr appears to form a compd. with Be; results are given for an alloy with 80% Ni, 20% Cr, with 1.2% added Be, quenched from 1000° and aged at 400-500°; BHN approaches 460. The acid- and heat-resisting alloy "Contracid" (60% Ni, 15% Cr, 7% Mo, residue Fe with small amts. of Mn and Si) may be made susceptible to age hardening with 0.6% Be. In the quenched state this alloy may be worked (BHN 200); aging at 500-550° develops a hardness no. of 300; cold working followed by aging gives a hardness no. of 500. This hardness is permanent over a wide temp. range; at 600° no loss of hardness obtains during 60 hrs. This high-temp. stability is greater than that in pure Ni-Be alloys. The resistance to creep (Rohn test) is high. Fe is added to Co to suppress the  $\alpha$ - $\beta$  transformation; 2% Be gives an age-hardening alloy; further addns. of Cr, W, Mo and Fe lead to higher hardness values. A Co-Be-Cr-Fe alloy which has a BHN of 200

in the quenched state develops hardness of 650-700 on aging followed by cold-rolling; this alloy must be cold-rolled after aging whereas the previously described alloys are cold-rolled before aging. The effect of cold-rolling before aging on alloys of Cu + 2.5% Be, Ni + 1.7% Be, Contracid + Be, is shown in a series of graphs (as are the other data in this paper). A table shows values for yield point, breaking strength, elongation, Young's modulus, BHN, notch impact for these 3 alloys after (1) quenching, (2) quenching and aging, (3) cold-rolling and (4) cold-rolling and aging. Special uses for these alloys are discussed.

R. F. Mehl

**Copper-lead anti-friction alloys.** M. P. Slavinskii, A. E. Vol, I. V. Gutman, G. T. Fomin and L. R. Edelson. *Metallurg* 8, No. 4-5, 91-109; No. 6, 3-21(1933).—Cu-Pb alloys with small addns. of Ni, Sn, Zn and P are homogeneous above the m. p., but sep. into 2 layers below the m. p. of Cu with pure Cu freezing out separately. With larger addns. layers of Cu contg. Pb and of Pb contg. Cu are formed. If considerable Ni is present, Pb is evenly distributed in the solid state. Addns. of 1-15% Ni and 1-18% Zn to a 10% Sn bronze contg. 10, 20 and 30% Pb show that Ni raises the m. p. and causes equal distribution and fineness of the Pb particles and decreases the  $\delta$ -constituent. Up to 10% Ni increases the hardness but larger amts. decrease the hardness. Zn causes unequal distribution, decreases hardness and increases plasticity. P also causes unequal distribution of the Pb. A list is given of 18 Cu-Sn-Pb-Ni-Zn alloys probably suitable for bearings.

H. W. Ratlimann

**The elastic properties of the solid solution series Au-Cu and Au-Pd and the alloys of Cu<sub>3</sub>Pt, Cu<sub>3</sub>Pd and CuPd.** H. Röhl. *Ann. Physik* 18, 155-68(1933); cf. C. A. 27, 4457.—The elastic moduli of several alloys and solid solution series were detd. to form conclusions concerning the elastic behavior in superlattice formation. For control of the degree or rearrangement of the atoms in the crystal lattice of the alloys exhibiting the superlattice, measurements of sp. resistance were made. Reflectivity of the Au-Pd series in the region of the visible wave lengths was also detd. The alloys Cu<sub>3</sub>Pt and Cu<sub>3</sub>Pd show the same superlattice effect as Cu<sub>3</sub>Au. CuPd has elastic properties similar to those of CuAu, i. e., smaller modulus in the superlattice, greater in statistical atom distribution. From resistance measurements, the system Au-Pd may be interpreted as a ternary alloy above 35 atomic % Pd consisting of Au, and Pd in the <sup>1</sup>S<sub>2</sub> and <sup>3</sup>F states. Absorption of H by Au-Pd alloys decreases the elastic modulus. The reflectivity of Au-Pd alloys as a function of the compn. is similar to that of Au-Ag alloys.

A. S. S.

**Alloys for malleable iron.** Rebecca Hall. *Iron Age* 132, No. 25, 8-9, 60(1933).—Collected information concerning the effect of Al, Sb, B, Ce, Cr, Co, Cu, Mo, Ni, Ti, V, La, Se, Te, U, Bi, V and Zr in malleable Fe.

Downs Schaaf

**An x-ray study of the gold-iron alloys.** Bric-R. Jette, Willard L. Bruner and Frank Foote. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 526, 6 pp. (1934).—The Au-Fe system has been studied by x-ray methods, particularly at temps. below the  $\alpha$ - $\gamma$  transformation of Fe. It has been established that in this range of temps. only the 2 limiting solid soln. phases occur. The limits of these solid solns. have been detd. at several temps. The ferromagnetic character of the solid solns. contg. 10-15% by wt. of Fe has been noted. A series of expts. is reported, which shows that pptn.-hardening of the alloys high in Au is possible.

C. L. Mantell

**Iron-nickel alloys.** O. Dahl and J. Pfaffenberger. *Z. Metallkunde* 25, 241-5(1933).—Permalloy and related alloys develop high permeability when quenched from above 600°, but low when reheated to lower temps. or slowly cooled; these changes can be very conveniently followed by changes in elec. resistance. This behavior may be explained by (1) pptn. of impurities from solid soln. in the neighborhood of 500°; (2) redistribution of the Fe and Ni atoms from a random state at a high temp. to a regular distribution at the lower temp.; (3)-(2) inducing (1). Widely varying O contents were found not

to influence the effect, though widely varying C contents changed the effect in degree. The effect was markedly present in an essentially C-free sample. Data are given for elec. cond., coercive force, permeability and hardness for a series of alloys: 75% Ni, 25% Fe, with addns. of Si up to 5%; 73% Ni, 27% Fe; 73% Ni, 27% Fe with addn. of 5% Si; 60% Ni, 40% Fe, with addn. of 15% Cu; these properties are given for alloys first annealed at 900° or 1000° for 1 hr., air cooled (or quenched), and reheated to increasing temps. for 1-hr. periods. Two % Si eliminates the resistance decrease at 500°, but more than this causes a resistance increase at the same temp., suggesting that Si initiates a process opposite in effect to that occurring in Si-free alloys. Although the evidence seems in favor of a pptn. of phase change, occasionally no change in hardness obtains (alloy with 15% Cu). R. F. Mehl

**Production of ferrovanadium from calcium vanadate.** V. K. Sokovnin. *Metallurg* 8, No. 6, 35-6(1933); cf. C. A. 28, 731<sup>1</sup>.—Expts. show that the simplest and cheapest method of producing ferrovanadium involves pptn. of Ca vanadate and subsequent reduction by Si. Ca vanadate can be substituted for V<sub>2</sub>O<sub>5</sub> in refining. H. W. R.

**Alloys of lithium. II. X-ray analysis of the system lithium-cadmium.** A. Baroni. *Atti accad. Lincei* 18, 41-4(1933); cf. C. A. 27, 1601.—The system Li-Cd has been studied by means of the x-ray with the powder method with a Cu anticathode. The compd. LiCd has thus been shown to have a monometric structure of the type CsCl, the unit cell having a side  $a$  3.32 Å, and coordinates Cd(0, 0, 0) Li( $\frac{1}{2}$ ,  $\frac{1}{2}$ ,  $\frac{1}{2}$ ). LiCd<sub>2</sub> is also monometric (probably) with unit cell  $a$  8.62 Å. The compd. Li<sub>2</sub>Cd found by the thermal analysis could not be identified. A. W. Contieri

**Manganese nickel its properties and technology.** P. I. Gradusov. *Metallurg* 8, No. 6, 46-9(1933).—The addn. of 2.5% Mn to Ni increases the tensile strength, decreases the ductility, and gives a finer microstructure. The alloy shows no noticeable grain growth when heated to 1100° for 5 hr.

**The diagram of state manganese-silicon.** Rudolf Vogel and H. Bedarff. *Arch. Eisenhüttenw.* 7, 423-5(1934).—Thermal and structural investigations showed that, as stated by Doerrnickel, there is no compd. Mn<sub>2</sub>Si but there is a compd. Mn<sub>3</sub>Si<sub>2</sub> with about 3% more Si as well as an inconspicuously melting compd. Mn<sub>2</sub>Si, which dissolves Mn in excess to a limited extent (about 1%). Both transformations of Mn at 1100° and 770° are displaced toward higher temps. with increasing Si content of the Mn-Si solid solns. The transformation equil.  $\beta$ -solid soln.  $\epsilon$  + Mn<sub>2</sub>Si-solid soln.  $k$  =  $\alpha$ -solid soln.  $u$  was detd. It was most pronounced at 900° with 10% Si. M. H.

**Crystal orientations developed by progressive cold-rolling of an alloyed zinc.** M. L. Fuller and Gerald Edmonds. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 524, 8 pp.(1934).—The crystal orientations developed by the progressive cold-rolling of a Zn alloy have been investigated. Cold-rolling yields 3 types of preferred orientation, one of which has not previously been reported in the literature. These structures have been rationalized with the fundamental mechanisms of the deformation of Zn crystals and the changes of form undergone by the metal during rolling. C. L. Mantell

**Modulus of elasticity of annealed  $\alpha$ -bronzes.** Leon Guillet. *Compt. rend.* 197, 1320-1(1933).—Tension, being homogeneous, offers a better medium for tests than either torsion or bending. Excessive precautions were taken to eliminate errors. Av. results were as follows for the ratios of Sn to Cu resp.: 1.92:97.97-12,600; 3.81:96.10 12,300; 6.05:93.85-11,970; 8.02:91.92-11,650; 9.90 90.05-11,260. Gregg M. Evans

**The critical interval in the deformation of melchior and aluminum bronze.** V. A. Bugakov. *J. Tech. Phys.* (U. S. S. R.) 2, 173-89(1933).—Twenty-one photomicrographs and 15 tables are given. The phys. properties and soly. show marked changes in the 20-30% deformation interval. Crystal size and axis ratio  $a/b$  increase rapidly above 20%. Results are similar to those for  $\alpha$ -brass. F. H. Rathmann

**Strength and aging characteristics of the nickel bronzes.** E. M. Wise and J. T. Eash. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 523, 25 pp.(1934).—The authors consider the alloys from 0-12.5% Sn and 0-15% Ni, outlining the methods for the production of test castings and the tensile properties of these castings. Ni leads to improved properties and decreased alloy cost. Max. properties in sand castings are obtained with 5% Sn and 8% Ni at const. cost. The aging characteristics of the sand-cast Ni-bronzes are studied in detail. Tensile strengths in excess of 90,000 lb./sq. in. with elongation of 15% are developed. The effects of various addns. to the 7.5% Ni-8% Sn alloy are reported. The fatigue strength of the sand-cast heat-treated alloy was 18,000 lb./sq. in. at 16,000 cycles. The production and aging characteristics of the wrought Ni bronzes are given. These have tensile strengths of 135,000 lb./sq. in. for annealed and aged alloys and 170,000 lb./sq. in. for the hard rolled and aged alloys. The phys. properties of several Ni bronzes and their interrelation are discussed. C. L. M.

**Superconductivity of alloys from the viewpoint of phase theory.** C. Benedicts. *Z. Metallkunde* 25, 197-202 (1933).—A discussion built largely upon the work of Meissner, Franz and Westermhoff (C. A. 26, 4221). The crit. temp. at which supercond. obtains in alloys on cooling is plotted theoretically against compn. for Roozeboom's 5 types of  $t$ - $x$  diagrams. The effect of heterogeneity upon the crit. temp. is derived from the extreme concns. which may occur on quickly freezing a solid-soln. alloy; this effect gives a range of temps. at which the crit. temp. may occur. Within a range of solid solns. the crit. temp. varies with compn. on a smooth curve; across heterogeneous fields it is stepped, the position of the step depending upon the mode of distribution of the constituents in the alloy. Data on the crit. temps. in the systems In-Pb, Hg-Pb, Bi-Pb, Sn-Tl, In-Tl and Pb-Tl (in which the 5 types  $t$ - $x$  diagrams are represented) are given and found to conform to the general rules laid down. Thus solid solns. can show supercond. Both solid solns. and intermetallic compds. can show a higher crit.-temp. (more easily superconducting) than pure metals. These observations indicate that electrons may readily pass from one atom to an atom of a different kind. R. F. M.

**Equilibrium diagram of iron-aluminum system.** Atomi Ōsawa. *Science Repts. Tōhoku Imp. Univ., First Ser.* 22, 803-23(1933).—The equil. diagram of the Fe-Al system was investigated by means of microscopic examn. and x-ray analysis. A new diagram was constructed from the results. Four compds., (FeAl)<sub>3</sub>, FeAl<sub>2</sub>, Fe<sub>2</sub>Al<sub>3</sub> and FeAl<sub>4</sub>, exist. The first 3 are formed by peritectic reactions, while FeAl<sub>4</sub> solidifies directly from the melt showing a max. m. p. on the liquidus curve. The crystal structure of each phase was detd. by x-ray analysis. C. B. Jenni

**The system copper-beryllium.** H. Tanimura and G. Wassermann. *Z. Metallkunde* 25, 179-81(1933).—The solid soly. of Be in Cu was detd. by precision x-ray measurements of  $a_0$ , the side of the unit face-centered cubic cell. This soly. amounts to 2.1 wt. % Be at the max. (800°), decreasing to less than 1% Be at temps. below 200°. The  $\gamma$ -phase was recognizable on the photograms at temps. as low as 150°.  $a_0$  varies approx. linearly from 3.608 Å. in pure Cu to 3.566 Å. in an alloy with 2.1 wt. % Be. R. F. Mehl

**X-ray studies on the nickel-chromium system.** Eric R. Jette, V. H. Nordstrom, Bernard Queneau and Frank Foote. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 522, 11 pp.(1934).—The equil. diagram of Ni-Cr alloys of a high degree of purity has been studied by x-ray methods of investigating crystal structure. It has been shown that at temps. below 1150° this system consists of 2 terminal solid solns. with an intervening 2-phase area. On the Cr side of the system the soly. of Ni in Cr is low but increases rapidly at temps. above 900°. The soly. of Cr in Ni increases at a rapid but fairly uniform rate as the temp. increases. The soly. found at 1113° is nearly 53 wt. % Cr, which is beyond the eutectic point as detd. by thermal analysis. Reasons for this discrepancy are discussed. No structures were found other than



the body-centered Cr lattice, the face-centered Ni lattice and occasionally the rhombohedral structure of  $\text{Cr}_2\text{O}_3$ . The latter substance has been isolated as inclusions from high-Cr alloys.

C. L. Mantell  
The theories of corrosion. O. A. Knight. *Mineral Ind.*, Penna. State Coll. 3, No. 2, 2, 4; No. 3, 2, 4 (1933); No. 4, 3-4 (1934); cf. C. A. 28, 861.—K reviews the following theories of corrosion: the acid, film, peroxide, direct O attack, colloidal, biol. and electrochem. Soil corrosion and methods for combating atm. corrosion are discussed.

Alden H. Emery  
Report of subcommittee V on total-immersion [corrosion] tests. F. B. Olcott, et al. *Proc. Am. Soc. Testing Materials* 33, Part I, 144-6 (1934); cf. Speller, et al., C. A. 27, 3427.

G. G.  
Resistance (to corrosion) of black metals in solutions of barium chloride. M. V. Borodulin. *Khimstrof* 5, 2500-7 (1933).—The weighed metal plates were suspended in the autoclave and heated with stirring (200 r. p. m.) in the solns. in 4 intervals of 10-12 hrs. each (total submersion of 95 hrs.) at 150° and 3 atm. pressure. The losses of wt. were computed in g. per sq. m. per hr. for the 1st and each succeeding interval. With the mixt. of 20%  $\text{BaCl}_2$  and 5%  $\text{CaCl}_2$ , boiler plate showed 0.53, 0.26, 0.19, 0.15; steel, 0.46, 0.23, 0.17, 0.13; cast iron, 0.18, 0.15, 0.11, 0.09; welded iron, 0.35, 0.20, 0.17, 0.14. With the mixt. of 30%  $\text{BaCl}_2$  and 7.5%  $\text{CaCl}_2$ , boiler plate showed 0.32, 0.21, 0.17, 0.15; steel, 0.95, 0.55, 0.37, 0.26; cast iron, 0.22, 0.15, 0.10, 0.08; welded iron, 0.40, 0.22, 0.20, 0.23. Thus with each succeeding interval the corrosion is decreased.

Chas. Blanc  
Corrosion studies on Hydronalium. P. Brenner. *Z. Metallkunde* 25, 252-8 (1933).—The behavior of Hydronalium (Al + 7-8% Mg) in a 3% aq. soln. of NaCl and in sea water was studied in comparison with duralumin and pure Al (99.5% Al), by inspection on the surface and by measurement of tensile strength and elongation upon progressive corrosion. The tensile strength and elongation of Hydronalium in both the hard and soft states are only very slightly affected by corrosive attack by the 3% NaCl soln. in a period of 6 months, whereas both decrease markedly for duralumin and pure Al; similar results were found for corrosion in sea water. Although the present price of Hydronalium is high, the superior corrosion resistance and the ease of welding promise wide application. Addnl. data are given in a discussion.

R. F. Mehl  
Corrosion-resistant ferrous material in chemical engineering. S. Wernick. *Ind. Chemist* 9, 378-80, 445-7 (1933).

E. H.  
The corrosion of iron. E. Toporescu. *Compt. rend.* 197, 1040-1 (1933).—From expts. on the rusting of Fe in  $\text{H}_2\text{O}$  and in NaCl solns., T. concludes that oxidation is not due to differential aeration but is assocd. with surface-tension effects.

J. B. Austin  
Corrosion of steel by gases containing traces of hydrogen sulfide: effect of pressure and moisture conditions. John M. Devine, C. J. Wilhelm and Ludwig Schmidt. *Bur. Mines, Tech. Paper* 560, 20 pp. (1933).—Results are given of a study of corrosion of steel by natural gas contg. 12 g. or less of  $\text{H}_2\text{S}$  per 100 cu. ft. of gas. A method for estg.  $\text{H}_2\text{S}$  content of gases and a testing app. for detg. in the field the comparative corrosiveness of a gas at various pressures are described. Traces of  $\text{H}_2\text{S}$  may cause severe corrosion if  $\text{O}_2$  and  $\text{H}_2\text{O}$  are present. Two forms of corrosion have been identified: (a) a less serious form in which no pptd.  $\text{H}_2\text{O}$  is present on the surface of the metal, although the gas may be satd. with  $\text{H}_2\text{O}$  vapor; (b) a severe form in which pptd.  $\text{H}_2\text{O}$  is present on the surface of the metal. Pressure accelerates the reaction, especially in b; also, it may ppt.  $\text{H}_2\text{O}$  on the metal and change a to b. The corrosion threshold concn. of  $\text{H}_2\text{S}$  is lower for b than a. a has the characteristics of chem. attack; b appears to be the result of an electrochem. reaction. The corrosion rate with b increases with a decrease in the thickness of the moisture film on the metal, but with continued reduction the reaction finally loses its electrochem. character and becomes a; b can occur in the absence of  $\text{H}_2\text{S}$  if  $\text{O}_2$  is present. In natural gas pipe lines b is more im-

portant than a. Corrosion losses can be reduced by: (1) removal of  $\text{H}_2\text{S}$  (for pressures up to 300 lb. per sq. in.  $\text{H}_2\text{S}$  should be 0.10 grain or less per 100 cu. ft.), (2) reduction of  $\text{O}_2$  content, (3) control of humidity. A. H. E.

Comparative results on the measurement of corrosion. Jean Cournot and Henri Fournier. *Compt. rend.* 197, 1409-11 (1933).—Several metals after having been exposed to the corrosive action of salt water mist for 2 months were tested by stamping to det. the changes in properties due to the corrosion. Armco iron lost 10% in wt., while the alloys suffered no appreciable loss. By the method of Siebel and Pomp, the Armco iron after corrosion ruptured at a decrease in tensile strength of 9.9%, had an elongation of 26% and sagged 15%. The austenitic steel which contained 18% Cr and 8% Ni, ruptured at its original load and exhibited very little elongation and sag. The ferro-Ni ruptured at a tensile strength 6% less, and exhibited a slight neg. elongation and sag. The duralumin ruptured at a diminution of 53% in tensile strength and gave an elongation of 55 and 33% sag. The Monel metal and brass exhibited quite similar properties, the change in tensile strength and elongation, being quite similar to these properties before corrosion. All metals were tested in the form of sheets, the brass being 2 mm. and the others 1 mm. in thickness. H. E. Messmore

Corrosion tests on weld deposits. F. R. Hensel and C. S. Williams. *Metals & Alloys* 5, 11-16 (1934).—Relative performance of weld metal produced by 4 different types of electrode rods was measured by the ability of the deposited weld metal, obtained from each rod, to resist the action of HCl and NaCl solns. in an alternate-immersion type of corrosion test app.

Downs Schaff

Paint as a metal preservative (Jordan, et al.) 26. Dust collectors (Okulov) 1. Artificial stone from furnace slags (Bazhenov, Aleksandrovskii) 20. Field expts. with blast-furnace slag (Kappen) 15. Corrosion of Pb in  $\text{H}_2\text{SO}_4$  plants (Schünemann) 18. [Alloy for] electron-emitting element (U. S. pat. 1,943,027) 1.

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Mineral-flotation apparatus. Arthur C. Daman. U. S. 1,942,803, Jan. 9. Structural and mech. features. Impact pulverizing apparatus for ores. Alvah D. Hadael. Brit. 399,475, Oct. 2, 1933.

Sintering ores, etc. Fried. Krupp Grusonwerk A.-G.



Brit. 399,383, Oct. 5, 1933. In sintering fine ores or metallurgical products, e. g., flue dust, particularly in blast app., Fe sponge, mixed with the raw ore, etc., is used wholly or in part as the fuel. In sintering poor Fe ores a portion thereof may be worked into sponge by reduction and magnetic sepn. and the remainder sintered with the sponge.

**Roasting pyrites fines.** Raymond F. Bacon and Wilber Judson. U. S. 1,941,592, Jan. 2. In a process for treating pyrites-bearing material in which the material is heated to distil the volatile S of the pyrites and produce a gaseous product contg. elemental S vapor and to convert the pyrites substantially to the monosulfide of Fe which is then roasted to produce a gaseous product contg. SO<sub>2</sub>, the distn. and roasting are carried out while the material is in a gaseous suspension. App. is described.

**Chloridizing ore.** Ralph F. Meyer (to The Meyer Mineral Separation Co.). Can. 337,841, Dec. 12, 1933. Oxidized Fe ore is heated with a carbonaceous reducing agent to form FeO, cooled with the exclusion of O, treated with a Cl-contg. gas at 175–300° to form Fe chlorides, oxidized with a restricted amt. of air, and then the accompanying metals are chloridized. The rate of addn. of the Cl-contg. gas is regulated to maintain the ore at the desired temp. by the heat of the reaction.

**Decomposing ores such as those of aluminum or other metals.** George A. Macready. U. S. 1,941,609, Jan. 2. A charge of ore is blown in mech. suspension in a current of hot CS<sub>2</sub> vapor through a heated passage from which air is excluded to promote chem. reaction between the ore and vapor, and resulting products such as Al sulfide, etc., are sepd. by gravity and temp. control. U. S. 1,941,610 relates to a process in which a charge of ore and C is agitated by a current of hot CS<sub>2</sub> vapor and the products formed are recovered.

**Preparation of iron ore.** Ralph F. Meyer (to The Meyer Mineral Separation Co.). Can. 337,843, Dec. 12, 1933. Oxidized ore contg. Fe is heated at 300–750° with a combustible reducing agent in an atm. contg. SO<sub>2</sub> up to about 1%. The treated ore is cooled to normal temp. with exclusion of free O, to convert the Fe into a lower oxide that is stable toward moisture and highly active toward acidic gases. The ore is subsequently treated with acidic gases.

**Reducing iron ore.** Austin Gudmundsen (to A. O. Smith Corp.). U. S. 1,941,983, Jan. 2. A mixt. of ore and flux is heated to temps. below the sintering temp. of the ore; soft coal is added to the heated mixt. and the mixt. is heated to nearly the sintering temp. of the ore, unheated ore is added in an amt. substantially equal to the amt. of ore in the initial mixt., the heated and unheated ores are mixed, and the resulting mixt. is smelted. App. is described.

**Obtaining metals from siliceous rocks.** Ernst Wydler. U. S. 1,942,015, Jan. 2. See Swiss 159,661 (C. A. 27, 4639).

**Recovering nonferrous metals from melts containing oxides.** Wilhelm Witter (to Firma M. Lissauer & Cie.). U. S. 1,941,506, Jan. 2. Material contg. oxides such as those of Cu, Ni, Sn, Pb, Bi and Sb is melted, and reducing gases are passed through the molten material while it is heated in a furnace in which the heating gases are introduced from above the melt; the interaction between the reducing gases and the combustion gases is so regulated that a neutral to slightly reducing atm. obtains at the surface of the melt, to effect recovery of Cu and Ni present wholly, and Sn, Pb, Bi and Sb at least partly, in reguline form.

**Testing the character of metals such as coins by polarization.** Turner D. Bottomo. U. S. 1,942,040, Jan. 2. Various details of elec. app. and operation are described.

**Extraction of copper.** Edward Eisenhauer, Jr. (1/2 interest to Charles A. Palmer). Can. 337,202, Nov. 14, 1933. A crushed carbonate silicate ore is agitated with H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O for a time sufficient to dissolve the carbonates. HCl is then added and the pulp is agitated for a time sufficient to dissolve the silicates. The leached Cu is recovered.

**Treating copper and its alloys to prevent tarnishing.** Clarence E. Irion (to Battelle Memorial Institute). U. S. 1,942,923, Jan. 9. The metal is treated with a soln. contg. a sol. salt of hydroferrocyanic acid, such as K<sub>4</sub>FeC<sub>6</sub>Na. HOAc or hypophosphorus acid also may be used.

**Mixing molten lead with lighter metallic materials such as calcium, sodium or magnesium.** Ralph F. Cohn. U. S. 1,942,202, Jan. 2. Various details of app. and operation are described.

**Apparatus for producing slag sand or foam free from water and iron.** Bernhard Busch. Ger. 587,690, Nov. 7, 1933 (Cl. 80b. 5.05).

**Molds for casting metals.** Wm. H. Walter. U. S. 1,942,583, Jan. 9. Molds are faced with mold sand treated with a soln. of celluloid in a solvent such as acetone.

**Crucible furnace for smelting metals.** Allgemeine Elektrizitäts-Ges. Ger. 587,729, Nov. 8, 1933 (Cl. 31a. 3.01).

**Metallurgical apparatus suitable for use as a copper converter.** Charles R. Kuzell (to United Verde Copper Co.). U. S. 1,941,606, Jan. 2. A molten bath receptacle is formed with a monolithic lining made from a mixt. comprising magnesite and a binder in which about 13–20 % of the bonded particles are minus 80-mesh, the remaining particles are plus 80-mesh, and the major proportion of the minus 80-mesh particles are minus 200-mesh (the binder, such as molasses being used in the mixt. to about 0.5–10% of its wt.). Cf. C. A. 27, 2274.

**Copper converters.** Zinnwerke Wilhelmsburg G. m. b. H. Ger. 587,735, Nov. 7, 1933 (Cl. 40a. 29). In operating converters for Cu stone, etc., a small amt. of oil is blown in with the air.

**Reducing dust losses from shaft furnaces.** Georg Eichenberg and Nikolaus Wark. U. S. 1,941,545, Jan. 2. See Brit. 349,092 (C. A. 27, 938).

**Rotary furnaces and procedures for the distillation of readily volatile metals, e. g., zinc, cadmium.** Fried. Krupp Grusonwerk A.-G. Brit. 398,573, Sept. 21, 1933, and 398,770, Sept. 21, 1933, divided on 398,573.

**Oil-fired forging furnace suitable for heating metal bars.** Arnold J. Nordenson (to Mahr Mfg. Co.). U. S. 1,942,515, Jan. 9.

**Device for centrifuging metals and alloys.** Emile Vroonen. Ger. 587,849, Nov. 9, 1933 (Cl. 40a. 15.20).

**Annealing.** The Mond Nickel Co., Ltd. Brit. 399,040, Sept. 28, 1933. Steels and alloys contg. Ni are treated by imparting a bright surface thereto, rendering said surface passive and then annealing several hrs. at 1650–2000°F. in a reducing atm., e. g., dry H<sub>2</sub>. The alloys may be washed before annealing. The surface of the steel is rendered passive by heating in HNO<sub>3</sub> soln. at 160–200°F. 15–60 min. Stainless steel contg. Cr 18 and Ni 14% or a Ni-Cr alloy contg. 88% Ni may be treated.

**Annealing and zinc-coating ferrous metals.** Wm. H. Potter. U. S. 1,942,121, Jan. 2. Before being coated with Zn, ferrous metal articles such as coiled wire and strip are introduced into a bath contg. Ca cyanamide which serves to facilitate the subsequent coating. App. is described.

**Heat treatment of metal plates, sheet bars or flat pieces.** Thomas J. Costello. U. S. 1,941,599, Jan. 2. Flat metal pieces or the like are passed through a heating chamber on edge, and their positions are reversed one or more times during their progress through the chamber. App. is described.

**Heat-treating multi-strand flexible cable shafting.** Ralph O. Helgeby (to A C Spark Plug Co.). U. S. 1,942,550, Jan. 9. For removing stiffness and internal friction from multi-strand wire flexible shafting for driving speedometers or the like, the material is passed through a heated furnace having a temp. of about 560° at its entrance, 510° at its middle and 570° at its end. App. is described.

**Heat-treating ferrous metals as in carbonizing iron or soft steels.** James A. Robertson and David Robertson (one-half to George F. McCandless). U. S. 1,942,937, Jan. 9. A mixt. of finely ground slow-burning carbon-producing material, such as sawdust, with charcoal,

Mn, Cr and borax is used as a packing for the articles treated; the temp. of the materials is raised to about 1000-1065° and successive combustion of the charcoal and the slow-burning carbon material is effected, to liberate gases which reduce the Si content and open the grain, and the temp. is maintained for a time sufficient to effect desired penetration of C, Mn and Cr into the grain of the metal.

**Cementation mixtures for ferrous metals.** Alexandre Folliet and Nicolas Sainderichin. U. S. 1,943,171, Jan. 9. An oxide of Ti, Mn, Ni, Cr or W is used with a chloride of the same metal and finely divided Al.

**Forming thin-walled seamless metal tubing.** Jerry J. Dunn and Peter C. Patterson (to National Tube Co.). U. S. 1,942,541, Jan. 9. Features of heat treatment and mech. operation are described.

**Woven wire cloth.** Elmer D. Reynolds (to Reynolds Wire Co.). U. S. 1,942,451, Jan. 9. Ferrous wire of a diam. less than 0.02 in. is woven into cloth of less than 12 mesh, and the cloth is heated to a temp. within the bluing range of steel for a sufficient time to relieve materially the strains in the wire.

**Articles such as manhole covers of ductile cast iron.** Frank A. Fahrenwald (to American Brake Shoe and Foundry Co.). U. S. 1,941,671, Jan. 2. Articles of integral section are produced by casting an unstable mixt. contg. C 2.5-3.5, Si 1.3-0.6% and Fe under chilling and nonchilling conditions, heating the article to about 870-1000° to produce in the chilled part of the article a brittle compn. contg. nodular graphite, quickly quenching the article through the crit. temp. to retain the graphite structure in the brittle compn., heating the article to a temp. below the crit. temp. to reduce the brittleness of the chilled part of the article and render this part tough, then cooling the article to atm. temp. (heating, quenching and cooling not materially affecting the unchilled part of the article).

**Cast iron brake shoes.** Frank A. Fahrenwald (to American Brake Shoe and Foundry Co.). U. S. 1,941,672, Jan. 2. For making a brake shoe suitable for railway service, a casting is first made in white iron contg. C 2.2-3.5 and Si 1.25-0.70%, and the portions of the shoe other than the wearing portion are then chilled, the shoe is subsequently maintained at a temp. of about 870-980° for a sufficient time to decompose the cementite in such portions, at least in part, with liberation of secondary graphite in nodular form, and the shoe is finally cooled through the crit. range.

**Brake drum.** John MacLennan (to Kelsey-Hayes Wheel Corp.). U. S. 1,943,224, Jan. 9. Various details of sheet-metal treatment by cupping, rolling, etc., are described to form a drum of stabilized metal within which a lining is then cast.

**Forming brake drums.** John W. White (to Kelsey-Hayes Wheel Corp.). U. S. 1,943,198, Jan. 9. An annular brake-engaging member is centrifugally cast from metal such as steel within a mold, to a back plate which may be formed of sheet metal, and the surface of the cast material is subjected to rolling while hot.

**Projectiles.** Aktiebolaget Bofors. Brit. 398,045, Sept. 7, 1933. Driving-bands for projectiles are made from Fe derived from Fe(CO)<sub>5</sub>, the powd. Fe thus obtained being converted into coherent form by sintering. C, O, Mn and other impurities should be as low as possible.

**Steel.** Wm. H. Lewis. U. S. 1,941,562, Jan. 2. Steel scrap is melted in a regenerative furnace, pig iron is added to the furnace, the entire charge is superheated to about 1600°, then transferred to a Bessemer converter and Bessemerized. App. is described.

**Steel.** Clarence I. Justheim. U. S. 1,942,173, Jan. 2. A steel-producing charge is melted in the presence of a siliceous slag, the slag is removed, and there is placed upon the metal a carbonaceous shale contg. 40-70% silica and the materials are heated to form a second clearing slag and to ppt. nascent Si into the steel; the melt is then deoxidized.

**Steel.** Canio Boichichio. Brit. 399,796, Oct. 4, 1933. See Fr. 738,517 (C. A. 27, 944).

**Steel for telephone transmission lines.** Frederick M. Crapo (to Indiana Steel & Wire Co.). U. S. 1,942,411, Jan. 9. Overhead telephone transmission lines are formed of a series of many spans of wire of hypo-eutectoid carbon steel contg. not less than 0.25% of C.

**High-silicon manganese steel.** Abner C. Jones (to Lebanon Steel Foundry). U. S. 1,941,556, Jan. 2. Steel scrap is melted under oxidizing conditions, ore is added to reduce the C content, silica sand is afterward supplied on the surface of the bath; C is permitted to react with oxide in the steel and the slag, more C is added, silico-Mn is added after the boiling has subsided, the temp is increased, and ferro-Si and more silico-Mn are added.

**Free-scaling and free-machining nickel alloy steel.** Herbert J. French and John W. Sands (to International Nickel Co.). U. S. 1,941,547, Jan. 2. An alloy steel is made contg. Ni about 1% to about 7%, the remainder being formed from "commercial" iron with incorporation of Zr sulfide in such amt. as to give a S content of about 0.05-0.15%, by which a free-scaling steel is produced which has easily detachable scale with a friable intermediate layer, which forms a greater amt. of scale when heated and requires a substantially lesser amt. of power to machine than an untreated low-Ni alloy steel.

**Alloy steel.** Hermann J. Schiffer. U. S. 1,942,779, Jan. 9. An alloy suitable for rolled, punched or forged products which are scale proof up to 800° comprises a low alloyed soft steel contg. Al about 2.8, Cr about 0.8, Mo about 0.1 and W about 0.1%, the balance being Fe except for usual nonmetallic constituents.

**Alloy steels.** Paul Kühn (to Vereinigte Stahlwerke A.-G.). Brit. 399,401, Oct. 5, 1933. Addn. to 369,258 (C. A. 27, 2127). In the process of 369,258 alloying metals, e. g., Cr, Mo, V, Ti, W, Cu, Ni, unless already present in the charge, are added to the slag in combined form, e. g., as ores, and are reduced from the slag in addn to the Mn present, passing into the steel bath.

**Steel alloys.** Hermann J. Schiffer. Brit. 398,680, Sept. 21, 1933. Heat-resistant steel alloys contg. Cr and Al contain also 0.06-1% P and less than 0.05% S. The alloys may contain Cr 2-24 and Al 0.2-4%, with or without Ni 0.2-10 and Si 0.2-4%. Up to 2% of any 1 of the metals Mn, Mo, V, Co, Ti, Cu, Be and Zr and up to 3% of a no. of them may also be present.

**Steel alloys.** Augustus B. Kinzel (to Electro Metalurgical Co.). Brit. 399,643, Oct. 12, 1933. Corresponds to Fr. 741,679 (C. A. 27, 2667), but gives addnl. information.

**Alloy.** Harry J. Lingal (to Westinghouse Electric & Manufacturing Co.). Brit. 399,695, Oct. 12, 1933. The alloy consisting of Ag 40 and W 60%, is used for the contacts of an elec. switch.

**Alloys.** Albert W. Jackson and Willoughby Baker. Brit. 398,663, Sept. 21, 1933. A phone consists of an alloy comprising Pb 95 and Sn 5%.

**Alloys.** Deutsche Edelstahlwerke A.-G. Brit. 399,318, Oct. 5, 1933. The bodies and (or) pole-pieces of permanent or electro-magnets are made by heating compressed powd. metal inductively to a sintering temp. by current in a coil of Cu tubing. A suitable compn. contains Co 5-50, W 1-20, Cr 0-5, Mo 0-15, C 0.5-7% and the remainder Fe.

**Sintered hard alloys.** Tool Metal Manufacturing Co. Ltd. Brit. 398,661, Sept. 21, 1933. The alloys contain at least 1 refractory nitride and at least 1 refractory boride or silicide, the total amt. of nitride, boride and silicide being at least 55%. The nitride and the sum of the boride and silicide should each exceed 10%. Up to 25% of lower-melting metals, e. g., Ni, Co, Cr and up to about 20% of refractory carbides may be contained. Cf. C. A. 27, 5301.

**Sintered hard alloys.** Fried. Krupp A.-G. Brit. 398,932, Sept. 28, 1933. Alloys applicable, e. g., for valves, cutting tools, rayon spinning nozzles, surgical instruments, etc., comprise about 30-97% of the double carbide 3Cr<sub>2</sub>C<sub>3</sub>W<sub>2</sub>C together with 1 or more metals of the Fe, Cr, V and Ti groups and with or without 1 or more carbides or carbonitrides of these metals.

**Electrode alloy.** Erwin F. Lowry (to Canadian Westinghouse Co. Ltd.). Can. 837,987, Dec. 19, 1933. An alloy for use as cathode material in a television tube consists of Ni 70, Co 20, Fe 8 and Ti 2%. These proportions may be varied and Zr or Th may be substituted for the Ti. Cf. C. A. 27, 3697.

**Refractory alloy.** John A. Heany (to The Sirian Lamp Co.). Can. 336,645, Oct. 24, 1933. An alloy of W and Y having the property of selective radiation at luminous temp. is specified.

**Alloy for surgical needles.** Wilhelm Rohn. U. S. 1,942,150, Jan. 2. An alloy is used comprising Ni together with Fe up to 25, Be 0.3-3.0, Cr 10-20, Mo 2-5, W 3-8 and Co 1-5%.

**Aluminum-base alloy.** Theodore W. Bossert (to The Aluminum Ltd.). Can. 227,970, Dec. 19, 1933. An Al alloy contains Mn 0.75-3.0, Mg 0.2-0.5%. The addn. of the Mg inhibits grain growth.

**Aluminum-silicon alloy.** Louis W. Kempf and Ivan R. Dawson (to The Aluminium Ltd.). Can. 337,971, Dec. 19, 1933. A comminuted mixt. of Al 10-80% and Si 20-90% is subjected to pressure to form a dense, homogeneous mass which is heat-treated above 300° and below the temp. at which the most fusible constituent of the alloy will melt. The addn. of Mg and Be decreases the sp. gr. without impairing the low thermal expansivity of the high compressive strength of the original mixt. Addns. of Fe, Mn and the like modify the properties of the compressed product for a variety of uses.

**Copper alloys.** Naraina Das-Chopra. Brit. 399,219, Oct. 2, 1933. See Fr. 753,562 (C. A. 28, 1013°).

**Hardening copper-zinc alloys.** Henry W. Brownson, Maurice Cook, Herbert J. Miller and Imperial Chemical Industries Ltd. Brit. 399,177, Sept. 25, 1933. Cu-Zn alloys, contg. Zn up to 37, Ni at least 2 and Al at least 0.5%, are heated to about 900°, rapidly cooled and reheated to about 300-500°. Cold-working may be interposed between the cooling and the reheating. The alloys preferably contain 1-3% Al and at least 3 times as much Ni.

**Iron alloys.** Maschinenfabrik Meier A.-G. Brit. 399,502, Oct. 10, 1933. A mold for casting steel ingots is formed of pig Fe contg. 0.1-0.5% Mo. The Fe may contain 3-4% C and the usual Mn, Si, P and S. The Mo is added as Fe-Mo to the fused Fe in the ladle.

**Low-thermal-expansion iron-base alloys.** Howard Scott (to Westinghouse Elec. & Mfg. Co.). U. S. 1,942,260, Jan. 2. Alloys which may be sealed into glass contain Fe together with Ni and Co to total of 43-55% to obtain inflection temps. above approx. 300° (the Co being at least about 12% to obtain low expansivity and the Ni at least 15%). U. S. 1,942,261 relates to low-expansion Fe-base alloys contg. a total of Ni and Co of 33-38% and small amts. up to the order of 1% of C and Mn, the amt. of Co being 2-8%, and the alloy being of reversible, low expansivity below about  $8 \times 10^{-6}$  expansivity.

**Ferrous alloys containing chromium, nickel and aluminum, etc.** Percy A. E. Armstrong. U. S. 1,941,648, Jan. 2. Alloys of malleable and machinable character and which are resistant to hot oxidation contain Fe together with Si present as a result of melting operations but not exceeding about 1% (the sum of the Si and any Mn present being below 3%), Cr 5-25, C not over 1.5, Ni 10 or less and Al about 0.3-4.5% (but in excess of the C).

**Nitriding ferrous alloys.** Soc. anon. Commentry, Fourchambault et Decazeville. Brit. 398,834, Sept. 14, 1933. Ferrous austenitic alloys contg. Ni (and Cr), in which the Fe is in the  $\gamma$  state and which contain C 0-1, Al 0-7, Cu 0-20, Si 0-5, W 0-10, Mo 0-10, V 0-2, Ti 0-2, Zr 0-2 and (or) B 0-4%, are nitrided at 550-950°, preferably at over 600°. They may be annealed in a vacuum and subjected to the treatments of Brit. 371,334 (C. A. 27, 2667). In an example an alloy contg. C 0.33, Si 0.88, Mn 1.28, Ni 30.52, Cr 15.22, Al 2.40 and Mo 0.45% is heated to 1000°, cooled 0.5 hr. in air and nitrided 48 hrs. at 650°.

**Alloys of lead with alkaline earth metals and magnesium.** Jesse O. Betterton (to American Smelting and Refining Co.). U. S. 1,941,534, Jan. 2. Particles of carbides of

the alloying metals are added to molten Pb, and the bath is covered with a protecting slag, which serves to dissolve undesired coatings and impurities from the surface of the carbide particles. U. S. 1,941,535 relates to a similar process and describes app. for vigorously agitating the molten bath and assocd. material.

**Magnesium alloys.** The Dow Chemical Co. Brit. 398,760, Sept. 21, 1933. See U. S. 1,918,260 (C. A. 27, 4769).

**Magnesium alloys containing tin, aluminum and manganese.** Robert T. Wood (to Magnesium Development Corp.). U. S. 1,942,041, Jan. 2. Alloys which have good strength, yield point and elongation contain Mg together with Sn 0.1-12.0, Al 0.5-6.0 and Mn 0.1-1.0%. Zn 0.1-5.0% also may be added for extrusion purposes.

**Ductile rolled products from magnesium-base alloys.** Robert D. Lowry and Fred L. Reynolds (to Dow Chemical Co.). U. S. 1,941,608, Jan. 2. In producing a ductile rolled product from a Mg-base alloy which has been previously rolled to about the final thickness at a temp. above about 315°, the metal is repeatedly passed between the rolls of a mill at a temp. between 5° and about 175° so as to produce a relatively small cumulative reduction in thickness, and the rolled metal is annealed.

**Silver alloys.** Hedley A. Sloman. Brit. 399,261, Oct. 5, 1933. Ag alloys contg. 90% or more Ag contain also 1.5% Be. An example consists of Ag 92.5, Cu 7 and Be 0.5%.

**Silver alloys.** Daniel Gray, Richard O. Bailey and William S. Murray (to Oneida Community Ltd.). Can. 338,197, Dec. 26, 1933. Tarnishing of articles formed of Ag or of alloys contg. Ag is retarded or inhibited by electrodepositing In on the article and thereafter diffusing the In through the Ag by the application of heat.

**Zinc alloy.** Leland E. Wemple and Floyd A. Warren. Can. 337,224, Nov. 21, 1933. Alloys are prepd. by adding Zn 100, Cu  $\frac{1}{4}$  to 2 parts and a small proportion of a metal or metals of the seventh horizontal series of the periodic system such as Ag. The alloys should be free from Al, Pb or Mg. The alloy has a higher tensile strength than Zn or known Zn-base alloys.

**Apparatus for use of solvent vapors such as gasoline or carbon tetrachloride for removing grease from metal articles.** Clarence F. Dinley (to Rex Products & Mfg. Co.). U. S. 1,942,355, Jan. 2. Various structural and operative details are described.

**Coating aluminum.** Frank M. Clark (to The Canadian General Electric Co. Ltd.). Can. 337,120, Nov. 14, 1933. Al to be coated is immersed, without the application of externally applied elec. energy, in a soln. contg. sodium silicate 2.5 to 12.0%, NaOH 2.0 to 6.0% and  $\text{NH}_3$  1.5 to 2.5% by wt. An adherent insulating coating is produced.

**Plating ferrous articles with aluminum or its alloys.** Erik H. E. Johansson. U. S. 1,941,750, Jan. 2. See Brit. 363,158 (C. A. 27, 1316).

**Coating iron and steel.** Curtin-Howe Corp. Brit. 398,685, Sept. 21, 1933. See U. S. 1,895,568 (C. A. 27, 2418) and Can. 334,903 (C. A. 27, 5267).

**Coating for iron and steel.** Leo P. Curtin and Bernard L. Kline (to The Curtin-Howe Corp.). Can. 338,010, Dec. 19, 1933. Iron or steel articles to be coated are immersed in a bath of ferric oxalate 50 and oxalic acid 25 parts per l. at a suitable temp., allowed to remain until a fine-grained, satiny coating is obtained, then withdrawn, washed and dried. The coating forms a bond for painting, etc.

**Improving aluminogenetic iron joints such as welded rail joints formed by the aluminothermic welding process.** Wilhelm Sander (to Th. Goldschmidt A.-G.). U. S. 1,942,004, Jan. 2. Tenacity and chem. resistance are improved by incorporating with the aluminogenetic iron a total of not more than 4% of Cr and either Co or Ni (the Co or Ni being used in 1 to 4 times the quantity of the Cr); the tensile strength, resistance to impact, tenacity and d. are improved by adding 3% or less of Ti and a total of not more than 2% W, Mo and V.

**Electric welding.** Willy Kreutz (to Felix Schull). U.

S. 1,943,123, Jan. 9. Contacting faces of material are subjected to the action of an elec. current at welding temp. without pressing the faces together, and, simultaneously, there is passed over the surface a flame contg. an excess of carbon for depositing carbon on the surfaces to be welded; the passage of the elec. current is continued after the m. p. of the material is reduced by the deposition of carbon, so that a weld is produced without ridges or slugs.

**Welding electrodes.** Arnold C. Rood (to Una Welding & Bonding Co.). U. S. 1,942,364, Jan. 2. An electrode for building up surfaces or joining metals contg. C comprises a steel rod carrying a coating contg. C in sufficient amt. to provide weld metal of about the same hardness as the metal to be built up or welded, deoxidizing agents such as Ti, V or Zr or their ferrous alloys also being used in only about sufficient amt. substantially to

1 prevent the gasification of C in the molten weld metal, so that a weld of desired C content is formed.

**Welding electrode and flux.** Louis G. Anastasiadis. Can. 837,746, Dec. 12, 1933. A welding electrode has a base rod of Al and a flux coating 0.025-0.045 in. thick. The flux consists of KCl, 55-65%, LiF 22-26%, Na Al fluoride 10-14%, NaF 2-5% and an alkali metal dichromate 0.1-1%. The m. p. of the flux is substantially the same as, or slightly higher than that of the base rod.

2 **Soldering irons.** The General Electric Co. Ltd. and John R. Hunt. Brit. 399,987, Oct. 19, 1933. A soldering iron, comprising a Cu bit slidable through a tube heated by an elec. heating element, has the surface of the bit in contact with the tube coated with a layer of less easily oxidizable material, Cu being a main constituent thereof. This may be effected by heating the bit to about 350° in Zn dust or 900° in Al dust.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

**Elementary organic reactions.** F. O. Rice. *J. Am. Chem. Soc.* 56, 488-90 (1934).—The following activation energies have been assigned to the reactions listed and the reason for such value is stated.  $H + CH_4 \rightarrow H_2 + Me > 20$ ;  $H + C_2H_4 \rightarrow H_2 + MeCH_3$  17;  $Me + H_2 \rightarrow CH_4 + H$  23;  $MeCH_3 + H_2 \rightarrow C_2H_6 + H$  25;  $Me + C_2H_4 \rightarrow CH_4 + MeCH_3$  20;  $Me + Me_2CO \rightarrow CH_4 + AcCH_3$  15;  $Me + Me_2O \rightarrow CH_4 + MeOCH_3$  15;  $Me + AcH \rightarrow CH_4 + MeCO$  15;  $CH_4 \rightarrow Me + H$  100;  $CH_4 \rightarrow CH_3 + H$  100;  $Me \rightarrow CH_3 + H$  100;  $C_2H_6 \rightarrow 2Me$  79.5;  $MeCH_3 \rightarrow C_2H_4 + H$  49;  $AcCH_3 \rightarrow CH_3CO + Me$  48;  $MeOCH_3 \rightarrow HCHO + Me$  38;  $MeCO \rightarrow CO + Me$  10.

C. J. West

**Thermal decomposition of organic compounds from the standpoint of free radicals.** V. The strength of bonds in organic molecules. F. O. Rice and Wm. R. Johnston. *J. Am. Chem. Soc.* 56, 214-19 (1934); cf. *C. A.* 27, 5713.—The activation energy of the decompn. of  $C_2H_6$ ,  $Me_2CO$ ,  $C_2H_6$ ,  $C_4H_{10}$ ,  $C_4H_{12}$ ,  $C_7H_{16}$ ,  $Me_2CO$ ,  $AcH$ ,  $EtOH$ ,  $Et_2O$ ,  $Me_2O$ ,  $(C_2H_5)_2O$ ,  $Me_2N$  and  $Me_2NH$  into free radicals has been measured by passing the compds. rapidly, at low pressures, through a furnace heated to different temps.; the extent of the decompn. into free radicals was detd. by means of the Paneth effect on metallic mirrors. The ether C—O bond is stronger than the C—C bond as shown by the activation energies for  $Me_2O$ ,  $C_2H_6$  and  $C_4H_{10}$  which are, resp., 81.1, 79.5 and 71.5 cal. The C—N bond is relatively weak, since the activation energy of  $Me_2N$  is only 50.8; the 3-membered ring compd.  $(C_2H_5)_2O$  is the least stable compd. examd., decompn. with an activation energy of only 44.0 cal. There seems to be a definite diminution in stability in passing from the lower to the higher members of a homologous series. VI. The mechanism of some chain reactions. F. O. Rice and K. F. Herzfeld. *Ibid.* 284-9.—A discussion of the reaction mechanism postulated by the theory of free radicals shows that the decompn. of  $C_2H_6$ ,  $Me_2CO$  and  $Me_2O$  must be of the 1st order, the disson. of  $AcH$  of the 1.5th order, while the formation of  $C_2H_6$  from  $C_2H_4$  and  $H_2$  of the 2nd order. The essential condition in the 1st order equation is that the chain shall be terminated by a reaction between the 2 different carriers of the chain. In  $AcH$  the 1.5th order results from the fact that the chain is terminated by the reaction of 2 Me groups. This difference is due to a difference in the heats of activation. The heats of activation can be detd. from the measured reaction rates with considerable certainty and it is seen that they fit the observed orders of the reaction, whereas assigning different values to the heats of activation might be expected to lead to a different order. Although there is as yet no exptl. evidence for the presence of reaction chains in these decompns. and, further, there has been no direct exptl. demonstration even of the presence of free radicals below 700°C. and above a few mm. pressure, nevertheless it is pointed out that the only way to avoid chain reactions as the

explanation of the measured rates would be to increase the heats of activation involved to quite improbable values.

C. J. West

4 **Number of structural isomers of the more important types of aliphatic compounds.** Henry R. Henze and Charles M. Blair. *J. Am. Chem. Soc.* 56, 157 (1934).—The structural isomerism of the more important types of aliphatic compds. has been considered and for each of these types (esters,  $NH_2$  compds., glycols and disubstituted paraffins ( $C_nH_{2n}XY$  and  $C_nH_{2n}X_2$ )) the no. of structural isomers, for certain C atom contents, have been calcd.

C. J. West

5 **Vapor-phase oxidation of hydrocarbons. I.** The amount and rate of oxidation of heptane as a function of temperature. Harold A. Beatty and Graham Edgar. *J. Am. Chem. Soc.* 56, 102-6 (1934).—The effect of temp. on the amt. and rate of autoxidation of a theoretically equiv. mixt. (2%) of heptane vapor in air has been studied by the flow method at atm. pressure in a clean Pyrex tube. As the max. temp. in the gas is increased, the oxidation proceeds in a series of well-defined stages, as follows: 150-250°, a very small amt. of reaction, possibly heterogeneous; 250-350°, with rapidly increasing velocity, a primary reaction, with 3 mols. of O per mol. of fuel input takes place and is terminated within the furnace; 350-470°, a subsequent reaction raises the O used to 4.70 mols. (42.7% of the theory), which remains const.; the velocity of both the primary and subsequent reactions decreases rapidly with increasing temps., the 10° temp. coeff. being about 0.85 from 380° to 470°; 470-510°, the velocity of the primary reaction continues to decrease, but the subsequent reaction now becomes accelerated and above 490° the final amt. of O used is increased; about 510° inflammation occurs. II. The relative oxidizabilities of heptane, 1-heptene, 3-heptene and heptane-2,2,4-trimethylpentane mixtures. *Ibid.* 107-11.—By means of a Pyrex furnace and the flow method, a comparative study has been made of the oxidation, at different temps., of theoretically equiv. (2%) mixts. in air of heptane (I), 1-heptene (II), 3-heptene (III), isooctane (2,2,4-trimethylpentane) (IV) and isooctane mixed with 1 or 3 vols. of I. The temp. of initial oxidation of the 2 olefins is the same for each and is 56° higher than that of I. The general course of the reaction and the max. O consumption (about 40% of the theory) are alike for these 3 hydrocarbons but the relative reaction velocities are distinctly different, increasing in the order: III, II, I. It appears that, under the conditions used, the oxidation of II and III does not begin at the double bond. IV, itself very inert toward O, when mixed with I exercises a slight inhibitory effect on the oxidation of the latter fuel and undergoes induced oxidation. There is evidence that this effect is much more pronounced at higher relative concns. of IV, resulting in a very low rate of reaction and in an induced oxidation of over 3 mols. of IV per mol. of I

oxidized, a behavior parallel to the antiknock characteristics of such mixts. From about 400° to 500° a marked neg. temp. coeff. of reaction velocity is observed for each fuel, with the exception of pure IV which undergoes only a trace of oxidation in this range. III. Chemiluminescence of heptane. *Ibid.* 112-14.—The autoxidation of a theoretically equiv. (2%) mixt. of heptane in air from the temp. of initial reaction (250°) to the point of inflammation (525°) emits a visible chemiluminescence, which appears as a steady, diffuse glow except at the "lower ignition point" (270-300°) where moving "cold flames" sweep along the furnace walls. By directing the fuel charge into the center of the furnace, the glow may be observed there, entirely removed from the walls. The autoxidation of 3-heptene emits a luminescence differing from that of heptane in a manner corresponding to the relative rates of reaction of the 2 fuels. C. J. West

Hydration of unsaturated compounds. I. The hydration rate of isobutene in dilute nitric acid. Howard J. Lucas and W. Ferdinand Eberz. *J. Am. Chem. Soc.* 56, 460-4 (1934).—The hydration of isobutene (I) is catalyzed by HNO<sub>3</sub> and at const. ionic strength the rate is 1st order with respect to both the I concn. and the HNO<sub>3</sub> concn. The rate at a given acid concn. is increased on the addn. of KNO<sub>3</sub>. This increase in rate is greater than the increase in the activity of I when detd. by means of distribution expts. in CCl<sub>4</sub>. In the presence of certain metallic ions, some of which have been stated to be catalysts for the hydration of alkenes in more concd. acids, the sp. reaction rate for the hydration of I in 0.20 N HNO<sub>3</sub> is substantially unchanged. Mixts. of the normal butenes are not hydrated at 25° in N HNO<sub>3</sub>. C. J. W.

The isolation of free methyl and ethyl by the reaction between sodium vapor and methyl and ethyl bromides. J. Horn, M. Polanyi and D. W. G. Style. *Trans. Faraday Soc.* 30, 189-99 (1934).—See C. A. 28, 1013<sup>a</sup>.

E. H.

Addition of hydrogen bromide to 4,4-dimethyl-1-pentene. M. S. Kharasch, Chester Hannum and M. Gladstone. *J. Am. Chem. Soc.* 56, 244 (1934).—The direction of addn. of HBr to 4,4-dimethyl-1-pentene is governed by the peroxide content of the material or reagent. If the reaction is carried out *in vacuo* 50% of 2-bromo-4,4-dimethylpentane, *b*<sub>24</sub> 59.4°, *n*<sub>D</sub><sup>20</sup> 1.4463, is obtained; in air or in the presence of peroxides the 2-Br deriv. is formed. C. J. West

Ozonolysis of purely aliphatic olefins. The behavior of the five simplest normal alkyl radicals in the dehydration of tertiary alcohols. James M. Church, F. C. Whitmore and R. V. McGrew. *J. Am. Chem. Soc.* 56, 176-84 (1934).—This study of ozonolysis was undertaken to make available methods for the detn. of mixts. of isomeric olefins as obtained by the dehydration of tert. alcs. The ozonides were prepd. from solns. of the olefins in a mixt. of paraffin hydrocarbons of boiling range 0-30°; usually the solvent was removed and the ozonides were decompd. by H<sub>2</sub>O and Zn in the presence of traces of Ag and hydroquinone. The olefins were prepd. from the tert. alcs. or by direct heating of the Grignard complexes; the products of the 2 methods were the same; heating the Grignard complex was shorter but the yields were lower. The dehydration of the alcs. by I was dependent on the temp. used, thus, *tert*-AmOH is not dehydrated by I at 102° but is readily dehydrated at 2 atm. and 128°; triamylcarbinol and I at 170° (reduced pressure) give 95% of 6-amy-5-undecene. From all of the dehydration results the conclusion is reached that the decreasing order of ease of supplying the H to go with the HO is as follows: Et, Bu, Am, Me; slight exceptions occur only with the carbinols R'R<sub>2</sub>COH and only when the alkyls involved are adjacent in the list. In some cases in which R contained 1 more C than R' the amt. of dehydration from the R groups was slightly more than twice that from the R' group. Full details are given of the technique of ozonolysis. Data are given for 24 carbinols (*b. p.* and *n*) and for the olefins produced (*b. p.* and *n*), also for the products isolated by the action of O<sub>3</sub> on the olefins, and from these data the results of dehydration of 22 of these alcs. Et-

COH, Pr<sub>2</sub>COH, Bu<sub>2</sub>COH and Am<sub>2</sub>COH give 100%, resp., of 3-ethyl-2-pentene, 4-propyl-3-heptene, 5-butyl-4-nonene and 6-amy-5-undecene; Me<sub>2</sub>EtCOH gives 22 and 78% of 2-methyl-1- and 2-butene; Me<sub>2</sub>BuCOH gives 55 and 45% of 2-methyl-1- and 2-hexene; Me<sub>2</sub>-AmCOH, 40 and 60% of 2-methyl-1- and 2-heptene; Et<sub>2</sub>MeCOH, mainly 3-methyl-2-pentene with a trace of 2-ethyl-1-butene; Et<sub>2</sub>PrCOH, 80 and 20% of 3-ethyl-2- and 3-hexene; Et<sub>2</sub>BuCOH, 90 and 10% of 3-ethyl-2- and 3-heptene; Et<sub>2</sub>AmCOH, 85 and 15% of 3-ethyl-2- and 3-octene; Pr<sub>2</sub>EtCOH, 50% of 3-propyl-2-hexene and 50% of 4-ethyl-3-heptene; Pr<sub>2</sub>AmCOH, 60 and 40% of 4-propyl-3- and 4-nonene; Bu<sub>2</sub>EtCOH, 40% 3-butyl-2-heptene and 60% 5-ethyl-4-nonene; Bu<sub>2</sub>PrCOH, 25% 4-butyl-3-octene and 75% of 5-propyl-4-nonene; Bu<sub>2</sub>-AmCOH, 60 and 40% of 5-butyl-4- and 5-decene; Am<sub>2</sub>MeCOH, 90% 6-methyl-5-undecene and 10% 2-amy-1-heptene; Am<sub>2</sub>PrCOH, 67% 6-propyl-3-undecene and 33% 4-amy-3-nonene; MeEtBuCOH, 15% 2-ethyl-1-hexene, 55 and 30% of 3-methyl-2- and 3-heptene; MeEtAmCOH, 20% 2-ethyl-1-heptene and 50 and 30% of 3-methyl-2- and 3-octene; MePrAmCOH, 20% 2-propyl-1-heptene and 50 and 30% of 4-methyl-3- and 4-nonene; MeBuAmCOH, 15% 2-butyl-1-heptene and 45 and 40% of 5-methyl-4- and 5-decene. C. J. West

Relative mobilities of organic radicals in the chlorosulfites. P. Carré. *Bull. soc. chim.* 53, 1075-84 (1933); cf. C. A. 27, 4211.—Alkyl chlorosulfites on heating decomp. to give SO<sub>2</sub> and alkyl chlorides. Aryl chlorosulfites also decomp. when heated, giving SO<sub>2</sub> with but little or no aryl chloride. Since the temp. of decompn. in the presence of a mol. of C<sub>6</sub>H<sub>5</sub>N varies with the alkyl or aryl group, it has been used as a basis to compare the relative mobilities of the various org. radicals. A series of 35 alkyl and 11 aryl chlorosulfites were thus studied. The relative electropositivities of the radicals found by this method show a few variations from those found by other methods. E. W. Scott

Chlorides of the alkyl- and arylsulfurous acids (alkyl and aryl chlorosulfites) and mixed sulfurous esters. P. Carré and D. Libermann. *Bull. soc. chim.* 53, 1050-75 (1933); cf. C. A. 27, 711, 3912.—The following alkyl chlorosulfites (ROSOCl) were prepd. by adding the alc. to a 10-20% excess of SOCl<sub>2</sub> at room temp., followed by 48 hrs. standing: Bu *b*<sub>11</sub> 88°, β-ClC<sub>2</sub>H<sub>4</sub> *b*<sub>20</sub> 100-1°, C<sub>7</sub>H<sub>15</sub> and C<sub>10</sub>H<sub>21</sub>, which decompd. on distn. Alkyl alc., PhCH<sub>2</sub>OH and substituted benzyl alcs. gave only the chloride when so treated. Sec. and tert. alcohols were dehydrated or converted to chlorides by the SOCl<sub>2</sub> unless first mixed with C<sub>6</sub>H<sub>5</sub>N, in which case some gave small yields of chlorosulfites. The following chlorosulfites were prepd. in good yields by treating a neutral sym. or mixed sulfite with SOCl<sub>2</sub>; allyl *b*<sub>20</sub> 32°, *iso*-Pr *b*<sub>11</sub> 71-3°, *sec*-Bu *b*<sub>20</sub> 75°, cyclohexyl, benzyl and *tert*-Bu, the last 3 being too unstable to distil. PhOH reacted with SOCl<sub>2</sub> to give nuclear-substituted products. The aryl chlorosulfites were prepd. by treating the neutral sulfites, formed from PhOH, C<sub>6</sub>H<sub>5</sub>N and SOCl<sub>2</sub> in CS<sub>2</sub>, with an excess of SOCl<sub>2</sub>. Mixed esters of H<sub>2</sub>SO<sub>3</sub> were prepd. by the reaction of a chlorosulfite with an alc. mixed with C<sub>6</sub>H<sub>5</sub>N. These mixed sulfites were Me Et *b*. 140-3°, Me Bu *b*<sub>11</sub> 86-8°, Pr Bu *b*<sub>11</sub> 102-4°, β-C<sub>2</sub>H<sub>4</sub>Cl Bu *b*<sub>20</sub> 149-52°, allyl Bu *b*<sub>11</sub> 92-4°, allyl β-C<sub>2</sub>H<sub>4</sub>Cl *b*<sub>21</sub> 103-5°, Pr C<sub>7</sub>H<sub>15</sub> *b*<sub>11</sub> 148-50°, Et C<sub>10</sub>H<sub>21</sub> *b*<sub>20</sub> 188-90°, Me PhCH<sub>2</sub> *b*<sub>11</sub> 137-8°, Et PhCH<sub>2</sub> *b*<sub>20</sub> 100-1°, *iso*-Pr Bu *b*<sub>11</sub> 99-101°, Pr cyclohexyl *b*<sub>20</sub> 175-8°, Pr *tert*-Bu *b*<sub>20</sub> 99-100°, Me Ph *b*<sub>20</sub> 128-30°, Et Ph *b*<sub>20</sub> 142-4°, Bu Ph *b*<sub>20</sub> 170-3°, Et *o*-tolyl *b*<sub>20</sub> 145-7°, Bu *o*-tolyl *b*<sub>11</sub> 170-3°, Me *o*-tolyl *b*<sub>11</sub> 137-40°, Et *o*-tolyl *b*<sub>20</sub> 147-50°, Bu *m*-tolyl *b*<sub>20</sub> 178-80°, Me *p*-tolyl *b*<sub>20</sub> 134-6°, Et *p*-tolyl *b*<sub>20</sub> 146-9°, Bu *p*-tolyl *b*<sub>20</sub> 175-7°, Et *p*-chlorophenyl *b*<sub>20</sub> 155-8°, Ph β-C<sub>2</sub>H<sub>4</sub>Cl *b*<sub>11</sub> 195-8°. Me *o*-tolyl sulfite and the alkyl α- and β-naphthyl sulfites decompd. when distd. E. W. Scott

The refraction constant of the CN group. P. Bruylants and R. Merckx. *Bull. sci. acad. roy. Belg.* 19, 1003-16 (1933).—The mol. refractions of the straight-chain hydrocarbons (C<sub>2</sub> to C<sub>12</sub>) are calcd. for H<sub>2</sub>, D and H<sub>2</sub> at 20° and 25° from the refractive indices (Shepard, Henne

and Midgley, *C. A.* 25, 2967; also those of the straight-chain nitriles ( $C_1$  to  $C_{12}$ ) at 15° and 30° (*C. A.* 27, 5056). From these values the following refraction consts. at 20° are calcd.:  $H_n$ , 1.026,  $CH_2$ , 4.617,  $CN$  5.434;  $D$ , 1.037,  $CH_2$ , 4.036,  $CN$  5.459. Janet E. Austin

Reduction of aliphatic cyanides and oximes with sodium and butyl alcohol. C. M. Suter and Eugene W. Moffett. *J. Am. Chem. Soc.* 56, 487 (1934).—A soln. of 1 mol. of aliphatic cyanide or oxime in 2300 cc. BuOH is treated with 161 g. (7 mols.) during 10–15 min. and refluxed until all the Na has dissolved; the yields of amines from a series of Me alkyl ketoximes varied from 69 to 86%; heptaldoxime gives 89%; BuCN and AmCN give 86 and 78%, resp., of the corresponding amines. C. J. West

Use of ethyl sulfonylbisacetate in the identification of aliphatic amines. John P. Alden and Bruce Houston. *J. Am. Chem. Soc.* 56, 413–14 (1934).—Details are given of the prepn. of sulfonylbisacetic acid and its Et ester. With the appropriate amine the following *N*-substituted amides of the acid,  $SO_2(CH_2CONHR)_2$ , were prepd., where R is: Me, m. 186°, 85% yield; Et, m. 178°, 78%; Pr, m. 184°, 85%; iso-Pr, m. 148°, 50%; Bu, m. 192°, 80%; iso-Bu, m. 155°, 65%; Am, m. 174°, 80%. No reaction could be obtained under similar or more drastic conditions with 2-aminobutane,  $Me_2NH$ ,  $Et_2NH$  or  $Pr_2NH$ . C. J. West

Hydrogenation of amides to amines. Homer Adkins and Bruno Wojcik. *J. Am. Chem. Soc.* 56, 247 (1934).—Amides are reduced to amines over Cu-Cr oxide under 100–300 atm. of  $H_2$  at 175–250°; dioxane is a good reaction medium. Lauramide, heptamide,  $\alpha$ -phenylbutyramide, furoamide and tetrahydrofuroamide give 40–70% of the corresponding primary amines and 25–50% of sec. amines. Various substituted amides, as *N*-laurylpiperidine, *N*-cyclohexyllauramide, etc., give 70–95% of sec. or tert. amines. C. J. West

Acyl peroxides and secondary amines. S. Gambarian and L. Kazarian. *J. Gen. Chem.* (U. S. S. R.) 3, 222–8 (1933).—Acyl peroxides react with secondary amines to give 1 mol. of a hydroxylamine deriv. of the type  $R_2NO-COR'$  and 1 mol. of acid.  $Ph_2NOBz$  and  $Ph_2NOAc$  are unstable and readily undergo isomerization (*C. A.* 4, 317) whereas the corresponding products from  $Et_2NH$ , iso-Bu $_2NH$ ,  $(PhCH_2)_2NH$  and piperidine (I) could be isolated (*C. A.* 20, 372; 21, 1638). G. and K. now report a study of the interaction of  $Bz_2O_2$ ,  $Ac_2O_2$  and  $Bz_2O_2Ac$  with  $Et_2NH$ ,  $Pr_2NH$  and I.  $Ac_2O_2$  gave 80% yields of the expected  $NH_2OH$  derivs. If cooling was not used and the action of  $Ac_2O_2$  was too much prolonged dialkylacetamides were formed.  $Bz_2O_2Ac$  gave  $BzOH$  and the *N*-Ac deriv. of  $NH_2OH$ . I reacted more rapidly than the other amines.  $PhNMe_2$ ,  $PhNEt_2$ , and  $Et_2NH$ , but not  $(PhCH_2)_2NH$ , also react with acyl peroxides, indicating that the unsatd. character of the N and not an active H is responsible for the reactivity of the amines.  $Et_2NH$  and  $Bz_2O_2$  gave  $Et_2NH$ . Addn. of 5.19 g.  $Et_2NH$  to 7.26 g.  $Bz_2O_2$  suspended in dry  $Et_2O$ , extrn. of the  $BzOH$  formed after 0.5 hr. with NaOH, drying of the reaction mixt. with  $CaCl_2$  after removal of the excess  $Et_2NH$  with HCl, and addn. of 2.7 g.  $H_2SO_4$  in  $Et_2O$  to the dry soln., gave a disulfate which was decompd. with  $Na_2CO_3$  and the resulting oil extrd. with  $Et_2O$ . Drying of the ext. with  $CaCl_2$ , removal of the  $Et_2O$  and fractional distn. at 0.12 mm. gave *O*-benzoyl-*N,N*-diethylhydroxylamine,  $b_{10-11}$  92°, yield 68.45%. Dropwise addn. of 10 g.  $Et_2NH$  to 11.8 g.  $Ac_2O_2$  in dry  $Et_2O$ , well-cooled, followed in 2 hrs. by addn. of HCl in  $Et_2O$  gave a colorless cryst. ppt. of HCl salts. These were washed with cold dry  $Et_2O$ , decompd. with  $Na_2CO_3$  soln., and the oil liberated from the resulting soln. by salting out with NaCl was extrd. with  $Et_2O$ . Removal of the  $Et_2O$  gave an oil from which *O*-acetyl-*N,N*-diethylhydroxylamine (II) was sepd. by fractional distn.,  $b_{10-11}$  32°; yield 64.88%. When the cooling was omitted the same quantities of  $Ac_2O_2$  and  $Et_2NH$  gave 5.1 g. of  $AcNEt_2$ ,  $Ac_2O_2Bz$  (13 g.) in 100 cc. of dry  $Et_2O$  was treated with 5.3 g.  $Et_2NH$  with cooling. Pptn. of the reaction mixt. with gaseous HCl, decompn. of the pptd. HCl salts with 0.1 *N*  $Na_2CO_3$ , salting out of the

resulting soln. with NaCl, extrn. of the liberated oil with  $Et_2O$ , removal of the  $Et_2O$  and fractionation of the residue gave 50.7% of II. 99.68% of the theoretical quantity of  $BzOH$  was recovered from the filtrate from the HCl salts. By similar procedures the following were prepd.: *O*-benzoyl-*N,N*-dipropylhydroxylamine,  $b_{10-11}$  95°, in 72.2% yield from 12.1 g.  $Bz_2O_2$  and 10.1 g.  $Pr_2NH$ ; *O*-acetyl-*N,N*-dipropylhydroxylamine (III),  $b_{10-11}$  40–1°, in 79.24% yield, from 12 g.  $Ac_2O_2$  and 10.1 g.  $Pr_2NH$ ; III in 59.75% yield from 18 g.  $Ac_2O_2Bz$  and 15.1 g.  $Pr_2NH$ ; *N*-benzoxypiperidine, in 65% yield, from 7.26 g.  $Bz_2O_2$  and 5.1 g. I, 6.66 g. *N*-acetylpiperidine from 11.8 g.  $Ac_2O_2$  and 10 g. I without cooling of the reaction mixt.; *N*-acetylpiperidine (IV),  $b_{10-11}$  50–1° in 81.47% yield, from 16 g.  $Ac_2O_2$  and 8.5 g. I, with cooling; 18 g.  $Ac_2O_2Bz$  and 17 g. I gave, in addn. to IV, 97.51% of  $BzOH$  either as the free acid or as piperidonium benzoate pptd. during the reaction.  $Et_2NH$  (5.8 g.) in 200 cc.  $Et_2O$  with 3.6 g.  $Bz_2O_2$  with cooling gave after 4 days upon the addn. of  $(CO_2H)_2$  in  $Et_2O$  2.75 g. diethylammonium oxalate (V), m. 212°, from MeOH. The free base  $b_{10-11}$  44°. The m. p. of the oxalate given in the literature is 220°. G. and K. found that the oxalate formed by neutralization of  $Et_2NH$  with  $(CO_2H)_2$ , as well as a mixt. of this with V, m. 212°

Lewis W. Butz

Chemistry of the triethylsilyl group. Charles A. Kraus and Walter K. Nelson. *J. Am. Chem. Soc.* 56, 195–202 (1934).— $Et_3SiH$  and  $KNH_2$  in liquid  $NH_3$  give the compd.  $(Et_3Si)_2NK$ ;  $H_2O$  gives  $(Et_3Si)_2O$ ;  $NH_4Br$  in liquid  $NH_3$  gives bis(triethylsilyl)amine,  $b_1$  100°; hydrolysis gives the oxide.  $Et_3SiH$  or  $Et_3SiBr$  and  $EtNH_2$  with Li give triethylsilyl ethylamine, with a very penetrating camphor-like odor; it hydrolyzes readily with the formation of triethylsilol.  $Et_3SiBr$  and  $Ph_3GeNa$  in  $C_6H_6$  give triphenylgermanyl triethylsilane, m. 93.5°, in 70–80% yields; Br gives  $Ph_3GeBr$  and  $Et_3SiBr$ . Li in  $EtNH_2$  gives  $Et_3SiLi$  and  $Ph_3GeLi$ , which could not be sepd. and identified as such but their existence was demonstrated by reaction of the mixt. with suitable reagents. Benzyltriethylsilane,  $b_1$  267–9° (cor.), does not freeze at –33°; it reacts with Li in  $EtNH_2$  but no definite products have been isolated. An improved method for the prepn. of  $Et_3Si_2$  is described. C. J. W.

$\delta$ -Hydroxyvaleraldehyde. R. Paul. *Compt. rend.* 197, 1652–4 (1933).—Dihydropyran (I), hydrolyzed with boiling  $N/70$  HCl, gives 1,5-epoxy-5-pentanol (II),  $b_{10-11}$  80–1°,  $d_{15}^{20}$  1.055,  $n_D^{20}$  1.45342. I in boiling MeOH gives the Me ether of II,  $b_1$  128–9°,  $d_{15}^{20}$  0.969,  $n_D^{20}$  1.42625. AgOH in  $H_2O$  oxidizes II to the Ag salt of  $\delta$ -hydroxyvaleric acid.

W. J. Peterson

Reactions of 2-halogen ethers. I. The action of magnesium on alkyl 2-bromoethyl ethers. Ralph C. Tallman. *J. Am. Chem. Soc.* 56, 126–9 (1934).—Phys. properties are reported for Me, Et, Pr, iso-Pr, Bu, iso-Bu, sec-Bu and Am 2-hydroxyethyl ethers (the sec-Bu deriv.  $b_{10-11}$  158.4–9.0°,  $d_{15}^{20}$  0.8966,  $n_D^{20}$  1.41606), and also for the 2-bromoethyl ethers: iso-Pr,  $b_{10-11}$  139.9–40.2°,  $d_4$  1.2609,  $n_D^{20}$  1.43922; iso-Bu,  $b_{10-11}$  56.5–7.0°,  $d_4$  1.1945,  $n_D^{20}$  1.43352; sec-Bu,  $b_{10-11}$  47–7.5°,  $d_4$  1.2216,  $n_D^{20}$  1.44384; Am,  $b_{10-11}$  75–6°,  $d_4$  1.1719,  $n_D^{20}$  1.44574. Mg and the 2-Br derivs. give  $C_{12}H_{26}$ , the alc. corresponding to the alkyl group of the Br ether and a small amt. of the dialkyl ether of butane-1,4-diol, the following percentage yields are given: Me 33, –, 17.9 (unchanged ether); Et 50.1, 46.3, 18; Pr 49.7, 47, 22.5; iso-Pr 47, 36.7, 17.2; Bu 40, 41.2, 24.8; iso-Bu 37.7, 36.8, 28.7; sec-Bu 35.9, 34, 29.9; Am 30.2, 28.5, 30.4. Butane-1,4-diol dialkyl ethers: Et,  $b_{10-11}$  59–60°,  $d_{15}^{20}$  0.8455,  $n_D^{20}$  1.40610; Pr,  $b_{10-11}$  94–5°,  $d_4$  0.8049,  $n_D^{20}$  1.41368; iso-Pr,  $b_{10-11}$  77–8°,  $d_4$  0.8310,  $n_D^{20}$  1.40954; Bu,  $b_{10-11}$  117–8°,  $d_4$  0.8392,  $n_D^{20}$  1.42064; iso-Bu,  $b_{10-11}$  107–8°,  $d_4$  0.8269,  $n_D^{20}$  1.41398; sec-Bu,  $b_{10-11}$  102–3°,  $d_4$  0.8238,  $n_D^{20}$  1.41370; Am,  $b_{10-11}$  134–5°,  $d_4$  0.8402,  $n_D^{20}$  1.42682. A mechanism for the reaction has been offered, based on the intermediate formation of chelate rings. C. J. W.

New general methods for condensation of ketones. V. Grignard and J. Colonge. *Roczniki Chem.* 13, 475–81 (1933) (in French).—See *C. A.* 28, 101<sup>1</sup>. C. T. I.

Introduction of deuterium atoms into acetone. J. O



Halford, Leigh C. Anderson and John R. Bates. *J. Am. Chem. Soc.* 56, 491-2 (1934).—When a soln. of  $\text{Me}_2\text{CO}$  in  $\text{H}_2\text{O}$  contg.  $\text{H}_2\text{O}$  and a little  $\text{K}_2\text{CO}_3$  is warmed, an exchange of H atoms occurs, with the introduction of  $\text{H}^1$  in the  $\text{Me}_2\text{CO}$ ; 1 sample showed an increase of 1.4° in the temp. of equal density.  $\text{H}_2\text{O}$  removes 54% of the  $\text{H}^1$ . The equil. const. for the formation of monodeuterioacetone and  $\text{H}_2\text{O}$  from  $\text{Me}_2\text{CO}$  and  $\text{HD}_2\text{O}$  is approx. 2, with equil. approached in both directions. The effectiveness of an alk. catalyst argues for a mechanism involving the postulated enol form of  $\text{Me}_2\text{CO}$ . C. J. West

Some properties of pite deutacetic acid [acetodeuterio acid]. Gilbert N. Lewis and Philip W. Schutz. *J. Am. Chem. Soc.* 56, 493-4 (1934).— $\text{CH}_3\text{CO}_2\text{H}^1$ , m. 13.3°, results from  $\text{H}^1\text{Cl}$  and  $\text{AcOAg}$  in the dark for 24 hrs. The vapor pressure in mm. was: 52.2° 66.1, 65.3° 117.8, 74.4° 172.7, 86.9° 272.9; the difference between this and  $\text{AcOH}$  is 7.5% at 50° and 3% at 90°. In the reaction there was no exchange of H in the Me group. C. J. West

Acid iodides. III. Addition of acetyl iodide to unsaturated hydrocarbons. Philip G. Stevens. *J. Am. Chem. Soc.* 56, 450-2 (1934); cf. C. A. 27, 956.— $\text{Me}_2\text{C}=\text{CHMe}$  and  $\text{AcI}$  after 26 days at 25° in the dark give a dark red oil contg. 40.4% I; after treating with  $\text{PhNMe}_2$  a small quantity of dimethylpentenone (I) was isolated. Cyclohexene gives cyclohexyl iodide and tetrahydroacetophenone. Thiophene gives some acetothienone. Unsaturated ketones were not obtained from 2-butene, isobutene, stilbene,  $\text{C}_6\text{H}_4$ , divinyl ether, furan and  $\text{C}(\text{ClH})_2$ ; cyclohexene is unchanged by  $\text{AcI}$  after 290 days at 25°.  $\text{Me}_2\text{CO}$  and butanone condense in the presence of  $\text{HCl}$  to form a mixt. of isomeric unsatd. ketones, one of which is I; I was also prepd. from  $\text{Me}_2\text{C}=\text{CHMe}$ ,  $\text{AcCl}$  and  $\text{SnCl}_4$ . C. J. West

Rule of shift (Verschiebungsgesetz). P. A. Levene and G. M. Meyer. *J. Am. Chem. Soc.* 56, 244-5 (1934).—The following rotations (max. mol.  $[\text{M}]_D^{25}$ ) are reported for the free acid, its Et and  $p\text{-O}_2\text{NC}_6\text{H}_4$  esters:  $\text{EtCH}(\text{MeCO}_2\text{H})$ , -18.0°, -22.9°, -52.5°;  $\text{BuCH}(\text{MeCO}_2\text{H})$ , 21.3°, -30.7°, -65.7°;  $\text{EtCH}(\text{MeCH}_2\text{CO}_2\text{H})$ , -10.4°, 11.5°, -20.0°;  $\text{PrCH}(\text{MeCH}_2\text{CO}_2\text{H})$ , 3.6°, 0.7°, 5°;  $\text{AmCH}(\text{MeCH}_2\text{CO}_2\text{H})$ , 8.1°, 4.2°, 11.2°. The 4th and 5th compds. behave differently from the 3rd on identical substitution; this is another case where the "rule of shift" fails. C. J. West

Mixed sulfonic anhydrides. I. Preparation of mixed acetosulfonic anhydrides. A. Baroni. *Atti accad. Lincei* 17, 1081 8 (1933); cf. C. A. 27, 3447.—The prepn. of mixed anhydrides of  $\text{AcOH}$  with sulfonyl chlorides, by using  $\text{AgOAc}$  and  $\text{NaOAc}$ , has been studied. With  $\text{AgOAc}$ , the reaction is highly exothermic starts at 120-50°, and gives the corresponding mixed anhydride with yields which increase on prolonged heating up to 40%, with 3 hrs. heating. With  $\text{NaOAc}$ , however, 200° and 8-10 hrs. heating is required, while lower yields result. Alky sulfonic acids give higher yields than aromatic sulfonic acids. Mixed anhydrides cannot be prepd. with  $\text{AcCl}$ , because of the volatility of this compd. at the high temp. required. Acetylbenzenesulfonic acid (I), acetyl- $p$ -toluenesulfonic acid (II), acetylmetanesulfonic acid (III) and acetyletanesulfonic acid anhydrides (IV) were prepd. I, prepd. with  $\text{AgOAc}$  (yield 40%),  $b_p$  160-1°; the others prepd. with  $\text{NaOAc}$  with 16, 25, 22% yields, resp.,  $b_m$  180 8° (II), 100-2° (III), 115-17° (IV). A. W. Contieri

Odor and constitution of several esters of heptanoic (enanthic) and isoeptanoic (5-methylhexanoic) acids. B. Rothstein. *Bull. soc. chim.* 53, 1106-7 (1933).—These esters were prepd. by action of the acid chlorides on the alcs. in  $\text{C}_6\text{H}_5\text{N}=\text{CHCl}$ . The b. ps., ns, and  $d_4$  of the heptanoates and the isoeptanoates, resp., are given with the name of the alc.:  $\text{PhCH}_2$ ,  $b_{16}$  157°, 1.4841<sup>30</sup>, 0.9719<sup>30</sup>;  $b_{18}$  160°, 1.4815<sup>30</sup>, 0.9602<sup>30</sup>;  $\text{PhCH}_2\text{CH}_2$ ,  $b_{16}$  167°, 1.4788<sup>30</sup>, 0.9570<sup>30</sup>;  $b_{17}$  167°, 1.4833<sup>30</sup>, 0.9622<sup>30</sup>;  $\text{Ph}(\text{CH}_2)_2$ ,  $b_{18}$  180°, 1.4840<sup>31</sup>, 0.95876<sup>31</sup>;  $b_{19}$  180°, 1.4835<sup>30</sup>, 0.9554<sup>30</sup>; hydriatropyl  $b_{17}$  172°, 1.4830<sup>30</sup>, 0.95556<sup>30</sup>;  $b_{18}$  172°, 1.4825<sup>30</sup>, 0.9534<sup>30</sup>; geraniol  $b_{18}$  171°, 1.4801<sup>30</sup>, 0.9522<sup>30</sup>;  $b_{17}$  172°, 1.4585<sup>30</sup>, 0.8891<sup>30</sup>; terpineol  $b_{18}$  170°, 1.4647<sup>30</sup>,

0.9244<sup>30</sup>;  $b_{18}$  170°, 1.4632<sup>31</sup>, 0.9223<sup>31</sup>. Their odors are faint, resembling those of the alcs. but having a faint fatty smell. The isoeptanoates possess slightly finer and more pleasing odors than the heptanoates.

E. W. Scott

Kolbe hydrocarbon synthesis in liquid ammonia. R. A. Fulton and F. W. Bergstrom. *J. Am. Chem. Soc.* 56, 167-8 (1934).—The K salts of the fatty acids of the  $\text{NH}_2$  system (acid amidines) all give satd. hydrocarbons when electrolyzed in concd. liquid  $\text{NH}_3$  solns. with high c. d. Only in the electrolysis of K acetamidine was any of the hydrocarbon obtained that might be expected from the equation representing the Kolbe synthesis,  $2\text{MeC}(\text{:NH})\text{-NHK} + 2\text{F} = \text{C}_2\text{H}_6 + \text{NH}_4\text{CN}$  (at anode) + 2K (at cathode). In all other cases, a mixt. of  $\text{CH}_4$  and  $\text{C}_2\text{H}_6$  resulted, probably because of thermal conditions at the anode which caused a rather deep-seated decompn. of the amidines. Resinous substances usually appeared at the anode in the electrolysis of K alkylamidines contg. more than 2 C atoms, this perhaps intensifying the over-heating of the electrode surface. A significant portion of the anode product was a blackish tar of high C content (93.7-94.9%), this possibly indicating the formation of C itself at the electrode. C. J. West

Methylene ether esters. Frederick Walker. *Plastic Products* 9, 187-8 (1933).—The following new alkoxy-methyl esters, which may be useful as solvents and plasticizers, have been prepd. in good yield by the interaction, first at 25°, then at 100°, of equiv. amts. of the appropriate Na salt and alkoxy-methyl chloride, made from the alc.,  $\text{CH}_3\text{O}$  and  $\text{HCl}$ . Butoxymethyl formate b. 154°, butoxymethyl acetate b. 169°, isobutoxymethyl acetate b. 161°, butoxymethyl butyrate b. 183°, isobutoxymethyl butyrate b. 178°, methoxymethyl benzoate b. 238°, isobutoxymethyl benzoate b. 256°, sym-ethylenedioxy-methyl acetate (ethylene glycol bis(acetoxymethyl) ether) (I) b. 230°, propoxypropyl acetate (II) b. 160°, methoxymethyl salicylate, propoxymethyl salicylate, bis(methoxymethyl) phthalate, bis(propoxymethyl) phthalate, bis(isobutoxymethyl) phthalate. The last 5 decomp. 180-200°. Ethylene glycol bis(chloromethyl) ether,  $b_p$  97-9°, required for I was made from glycol,  $\text{CH}_3\text{O}$  and  $\text{HCl}$ . Propoxypropyl chloride required for II was made from  $\text{PrOH}$ ,  $\text{EtCHO}$  and  $\text{HCl}$ . Approx. rates of hydrolysis (to alc., acid and  $\text{CH}_3\text{O}$ ) are given for the above and for other members of the series already prepd. (cf. C. A. 11, 1830; 19, 2930). Except for the aromatic esters, stability to hydrolysis increases with mol. wt. Arnold M. Collins

Duality of the dipropenyl glycol of Charon. Isolation of one of the crystalline constituents. Wiemann. *Compt. rend.* 197, 1654-6 (1933).— $\text{PhNCO}$  (25 g.) and dipropenyl glycol (15 g.), heated with ether in a sealed tube at 60° for 40 hrs., give 12 g. of a phenylurethan,  $\text{C}_{10}\text{H}_{11}\text{O}_2\text{N}$  (I), m. 190°. Sapon. of I with  $\text{BaO}$  in a sealed tube at 150° gives  $[\text{MeCH}:\text{CHCH}(\text{OH})]_2$ , m. 48°. W. J. P.

Preparation of the diaminobutanes. II. *dl*-1,3-Diamino-2-methylpropane; *dl*-1,3-diaminobutane; 1,4-diaminobutane. Erich Strack and Herbert Schwaneberg. *Ber.* 67B, 39-45 (1934); cf. C. A. 27, 5720.—The study of the prepn. of diaminobutanes by catalytic hydrogenation of nitriles has been continued. The yield of  $(\text{CH}_3)_2\text{CH}(\text{NH}_2)_2$  from 0.125, 0.5 and 1 vol.-% solns. of  $(\text{CH}_3)_2\text{CH}(\text{CN})_2$  hydrogenated 8 hrs. in 80% alc. with 4-8 parts of Pd catalyst was 76, 67 and 59%, resp.; in 96% alc. the yields are the same but the hydrogenation requires longer time. The  $\text{MeCH}(\text{CN})_2$  required for the prepn. of *dl*- $\text{MeCH}(\text{CH}_2\text{NH}_2)_2$  (I) is obtained pure only through a series of intermediate products but this is largely compensated by the smoothness of its catalytic hydrogenation. The best procedure is the following:  $\text{MeCHBrCO}_2\text{Et} + \text{KCN}$  in alc.  $\rightarrow \text{MeCH}(\text{CN})\text{CO}_2\text{Et}$  + concd.  $\text{NH}_4\text{OH} \rightarrow \text{MeCH}(\text{CN})\text{CONH}_2$  (yield, 41%) +  $\text{P}_2\text{O}_5 \rightarrow \text{MeCH}(\text{CN})_2$  (yield, 78%) + H and Pd in 98-99%  $\text{MeOH}$  contg. alc.  $\text{HCl} \rightarrow$  I. The yield of I in 0.125, 0.25 and 1 vol.-% soln. of the dinitrile is 92, 85 and 80%, resp.;  $\text{EtOH}$  slows up the hydrogenation and water decreases the yield (to 20, 30 and 50% in 0.125% soln. in 80%, 96% and abs. alc., resp.). Salts and *derivs.* of I: *dl*- $\text{HCl}$ ,

m. 201°; sulfate, does not m. 300°; chloroplatinate, orange, decomposes 237°; chloroaurate, yellow prisms or leaflets with 2 H<sub>2</sub>O, m. about 200° (in evacuated tubes it sinters 130°, runs together 138°, liquefies 142°); HgCl<sub>2</sub> compd., deliquesces 196-8°; picrate, bright yellow, sinters 249°, foams 252°, dissolves to the extent of 0.09% in water at 20° and 2.0% at the b. p.; picrolonate, bright yellow, foams 269-71°; di-Bz deriv., m. 145°; bis(m-nitrobenzoyl) deriv., m. 187°. *dl*-1,3-Diaminobutane (II) was prep'd. from MeC(:NH)CH<sub>2</sub>CN which was obtained in 50% yield from MeCN and pulverized Na in ether. The nitrile readily gives II (90%) with Na and abs. alc. For the catalytic hydrogenation, 98% MeOH is the best solvent, a 0.125 vol.-% soln. giving 93% II; water decreases the yield which in 80% MeOH is reduced to a few %. EtOH is an even poorer solvent; the max. yield with abs. alc. was 65%. *Salts and derivs. of II*: di-HCl, m. 177°; sulfate, very hygroscopic, does not m. 300°; chloroplatinate, orange-yellow, foams 250°; chloroaurate, yellow tables with 1 H<sub>2</sub>O, m. 208-10° (in sealed tubes it runs together 168°, m. 171°; the dried salt sinters 200°, m. 210-12°); HgCl<sub>2</sub> compd., runs together 200°; picrate, yellow, sinters 248°, decomposes 251°, sol. to the extent of 0.05% in water at 20° and 2.0% at 100°; picrolonate, bright yellow, darkens 245°, foams 260°, sol. to the extent of 0.02% in water at 20° and 0.3% at 100°; di-Bz deriv., m. 170°; bis(m-nitrobenzoyl) deriv., m. 201°.

*Synthesis of dl-mannitol, allodulcitol and dl-mannose.* R. Lespicaud and J. Wiemann. *Bull. soc. chim.* 53, 1107-10 (1933).—In 6 l. H<sub>2</sub>O are dissolved 100 g. divinyl glycol (of Griner), 118 g. AgClO<sub>4</sub> and 1 g. osmic acid; the soln. stands 3 months at room temp. AgCl is filtered off, the filtrate extd. with C<sub>6</sub>H<sub>6</sub> and concd. to a sirup below 50°; addn. of 4 vols. 95% alc. causes the sepn. of 11 g. cryst. *dl*-mannitol (I), m. 168° (from alc.), forming a *tribenzaldehyde acetal*, m. 192°. The mother liquor treated with much Et<sub>2</sub>O, ppts. a brown sirup, which, on being mixed with alc., deposits 15 g. allodulcitol (II), not previously described (39.49% C and 7.66% H), m. 149-50° and forming a *dibenzaldehyde acetal* (66.47% C and 6.01% H), m. 245-50° (from alc.). If the reaction is allowed to go more rapidly, less of the hexitols is obtained, and *dl*-mannose is sepd. from the mother liquor as its phenylhydrazone. The formation of these 2 hexitols is believed to result from the presence of 2 stereoisomers in Griner's glycol, a *dl*-form yielding I, and a *meso* form giving II.

*M. P. Benoy*  
**Polymerization and ring formation.** XXIII. *ε*-Caprolactone and its polymers. Frank J. Van Natta, Julian W. Hill and Wallace H. Carothers. *J. Am. Chem. Soc.* 56, 455-7 (1934); cf. C. A. 28, 743<sup>2</sup>.—A sample contg. 80% of *ε*-hydroxycaproic acid (I) on heating at 150-210° gives 63% of the monomeric *ε*-caprolactone (II), b<sub>2</sub> 98-9°, m. -5°, d<sub>4</sub><sup>20</sup> 1.0698, n<sub>D</sub><sup>20</sup> 1.4608, and about 1% of a dimer, m. 112-3°. On heating, II is converted to a polymer of high mol. wt.; the process is not easily reversible. The lactones and N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O give the *hydrazide* of I, m. 114-5°. *ε*-Bromocaproic acid and EtONa in EtOH, refluxed 8 hrs., give 37% of the *Et ester* of I, b<sub>4</sub> 104-6°, d<sub>4</sub><sup>20</sup> 0.9944, n<sub>D</sub><sup>20</sup> 1.4381, and some of the dimer of II; the residue (41%) is a polyester of mol. wt. 1660-1980.

*C. J. West*  
**Electrometric titration curves of certain imino dibasic acids.** Anne Litzinger and Lucy W. Pickett. *J. Am. Chem. Soc.* 56, 124-6 (1934).—The electrometric titration curves of NH(CH<sub>2</sub>CO<sub>2</sub>H)<sub>2</sub>, NH(CHPhCO<sub>2</sub>H)CH(CH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>OH)CO<sub>2</sub>H, NH(CH<sub>2</sub>CO<sub>2</sub>H)CH(CH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OH)CO<sub>2</sub>H, NH(CHPhCO<sub>2</sub>H)CH(CH<sub>2</sub>Ph)CO<sub>2</sub>H and NH(CH<sub>2</sub>CO<sub>2</sub>H)CH(CH<sub>2</sub>Ph)CO<sub>2</sub>H have been detd. and found to be in close agreement, all showing the greatest change of p<sub>H</sub> at the point corresponding to the addn. of 1 equiv. of base. A comparison of these curves shows that while the introduction of a Ph group in the β-position is of minor importance, a Ph group in the α-position corresponds to a relatively greater acidity of the mono-K salts and a distinct break in the curve at the 2nd end point. The disocn. const. as calcd. agree closely and indicate that

all 5 substances are weak acids. A comparison of their diln. curves shows characteristic variations for each acid.

*C. J. West*  
**Intermediate oxidation product of cystine.** T. F. Lavine, G. Toennies and E. C. Wagner. *J. Am. Chem. Soc.* 56, 242-3 (1934).—An intermediate oxidation product of cystine is the disulfide.

*C. J. West*  
**Isomerization of hydroxy aldehydes.** V. Oxidative-reductive transformations of α-hydroxy-sobutyraldehyde. S. Danilov and E. Venus-Danilova. *Ber.* 67B, 24-35 (1934); *J. Gen. Chem.* (U. S. S. R.) 3, 559-72 (1933); cf. C. A. 25, 1819.—Mono- or polymeric Me<sub>3</sub>C(OH)CHO (I) in alk. soln. (180 hrs. in 3% NaOH at 20°, long standing at room temp. or 3 hrs. at 100° in 3-4% KOH) gives only a mixt. of Me<sub>3</sub>C(OH)CO<sub>2</sub>H and Me<sub>3</sub>C(OH)CH<sub>2</sub>OH with or without unchanged I, i. e., it undergoes almost solely the Cannizzaro reaction. In the presence of Cu(OH)<sub>2</sub> or Pb(OH)<sub>2</sub> at 100°, however, there is obtained, in addn. to unchanged I and the rearrangement product, MeCH(OH)COME (II), 40-5% Me<sub>3</sub>CHCO<sub>2</sub>H (with the Cu salts a little (7-8%) Me<sub>3</sub>C(OH)CO<sub>2</sub>H is also formed). The metal oxide transports the O from the OH to the CHO group but is itself not reduced. The oxidative-reductive transformation of I into II is best effected (with almost quant. yield) by heating 6-8 hrs. with very dil. acid at 135°. In alk. soln. II is formed only in very small amt. and in the presence of oxides of heavy metals. No Ar<sub>2</sub> could be detected, showing that HO ketones with alkyl radicals are oxidized to diketones with considerably greater difficulty than those which contain Ph or cyclohexyl residues. I was prep'd. from polymeric Me<sub>3</sub>CBBr-CHO made directly from Br and polymerized Me<sub>3</sub>CH-CHO. After several careful distns. it b<sub>60</sub> 62-4° and on standing gradually thickened, finally solidifying after some months to crystals m. 73-4°, the mol. wt. in freezing C<sub>6</sub>H<sub>6</sub> increasing from 95:1 immediately after distn. to 226 in 48 hrs., when I showed d<sub>4</sub><sup>20</sup> 1.1014, d<sub>20</sub><sup>20</sup> 1.0830, n<sub>D</sub><sup>20</sup> 1.44181, n<sub>D</sub> 1.43070; semicarbazone, m. 164-5°; p-nitrophenylhydrazone, m. 153-9° (decompn.). C. A. R.

*Synthesis of the hexuronic acids.* III. The synthesis of *dl*-alluronic acid from allomucic acid. Carl Niemann, Sulo Karjala and Karl P. Link. *J. Biol. Chem.* 104, 189-94 (1934); cf. C. A. 27, 3451.—Cryst. *dl*-alluronic acid has been prep'd. by the reduction of allomucic acid with Na-Hg, m. 145-6°, decomp. 148-9°; *Ba salt p*-bromophenylsazone, m. 209-11°; *brucine salt*, m. 180-1, (hydrate, m. 172-3°), [α]<sub>D</sub><sup>20</sup> -25° in H<sub>2</sub>O (after 8 recrystns. from 80% EtOH). All m. ps. are uncor. IV. The synthesis of *d*-galacturonic acid from *d*-galactose. Carl Niemann and Karl P. Link. *Ibid.* 195-204.—Cryst. *d*-galacturonic acid has been prep'd. in 30% yield from *d*-galactose through the oxidation of diacetone-*d*-galactose with RMnO<sub>4</sub> and subsequent hydrolysis of the diacetone-*d*-galacturonic acid to the free hexuronic acid. The diacetone deriv. prep'd. by direct acetonation of the hexuronic acid was found to be identical with the acid prep'd. by the oxidation of diacetone-*d*-galactose. *α*-Me-*d*-galacturonide has also been obtained in 3% yield by the oxidation of *α*-Me-*d*-galactoside by the method of Isbell and Frush and this reaction offers evidence supporting the pyranoside structure of *α*-Me-*d*-galacturonide previously prep'd. by the methylation of *d*-galacturonic acid. Forty-five references. A. P. Lothrop

*The methyl glucosides of the naturally occurring hexuronic acids.* II. The kinetics of the hydrolysis of *α*-methyl *d*-galacturonide.—Sam Morell and Karl P. Link. *J. Biol. Chem.* 104, 188-8 (1934); cf. C. A. 27, 3450.—The velocity const. for the hydrolysis of both *α*-Me-*d*-galacturonide and *α*-Me-*d*-galactoside in N HCl at 3 different temps. are practically identical. It may be concluded that the former substance contains a 6-membered ring and the results lend support to the contention that the stable forms of the hexuronic acids are pyranoside derivs. A. P. Lothrop

**Ethylene glutarate.** Yojiro Tsuzuki. *Bull. Chem. Soc. Japan* 8, 313-16 (1933).—Glutaric acid heated with ethylene glycol (10% excess) at 135-40° for 45 min. with 0.5 mol. ZnCl<sub>2</sub> as catalyst yields a polymeric ester—

mol. wt. (800–80), titration value and analysis agree with the formula  $\text{HO}[\text{CO}(\text{CH}_2)_2\text{COO}(\text{CH}_2)_2\text{O}]_n\text{OH}$ .

Janet E. Austin

**Nature of racemic compounds.** V. N. Belov. *J. Gen. Chem.* (U. S. S. R.) 3, 7–12 (1933).—The ability of mols. of optical antipodes to form mol. (dl) compds. is explained as a "homochem. combination" (Veimarn, *C. A.* 15, 1838; Wittig, *C. A.* 24, 4789). The formation of homo-union is considered as a result of the approach to each other of similar at. groups. (1) *Homochem. compds. formed by 2 mols. of the d- or 2 mols. of the l-isomer.*—In the simplest case of mols. with 1 asym. C atom the homo-union between 2 mols. of the same optical antipode is effected by 2 pairs of similar at. groups. In such a homo-union there can take part any 2 pairs of similar at. groups of the 4 pairs of the 2 mols., whereby the most stable homochem. compd. will be formed by the approach to each other of similar at. groups possessing the greatest mutual extension. (2) *Homochem. compd. formed by 1 mol. of the d- and 1 mol. of the l-isomer (racemic compd.).*—The homo-union is effected by 3 pairs of similar at. groups in proximity to each other. An assumption must be made of the possibility of approach to each other of any 3 pairs of similar at. groups out of the 4 groups of the 2 mols., but, depending on the chem. nature of these at. groups, one of these possible homochem. compds. is most stable. From the comparison of the 2 homochem. compds. formed by 2 mols. of an optically active substance it must be concluded that: (1) a homochem. compd. formed by 2 mols. of one of the optical antipodes must be less stable than the corresponding homochem. compd. formed by 1 mol. of the l- and 1 mol. of the d-isomer, because in the former case out of 4 pairs of similar at. groups tending to approach each other this is realized by only 2 pairs, and in the latter case by 3 pairs; (2) the racemic compd. represents the most stable form of homochem. combination that can be formed by 2 mols. of the type  $\text{C}(\text{R}_1\text{R}_2\text{R}_3\text{R}_4)$ , because the tendency to approach to each other of similar at. groups is here realized to a max. degree. From a soln. of a mixt. of the 2 antipodes of Na  $\text{NH}_4$  tartrate there sep. crystals of the d- and l-isomers at temps. below 27°, and crystals of the dl-compd. at the temps. above 27° (crystals are considered homochem. compds.). Van't Hoff showed that such phenomena occur also in the solid state. The temp. of about 27° represents for Na  $\text{NH}_4$  tartrate the "temp. of conversion" of the dl-compd. B. considers such a temp. as the point of conversion for a homochem. compd. formed from 1 mol. of the d- and 1 mol. of the l-isomer, and for a homochem. compd. formed by 2 mols. of the d-isomer and correspondingly by 2 mols. of the l-isomer. Thus in the mixt. of both antipodes, it can be presumed, there is a state of equil. between the 2 possible homochem. compds., the equil. being shifted to one or the other side according to the conditions. Chas. Blanc

**Some citrate derivatives and their properties.** W. E. Donaldson, R. F. McCleary and Ed. F. Degering. *J. Am. Chem. Soc.* 56, 459–60 (1934).—Tri-Me citrate with  $\text{PrOH}$ ,  $\text{BuOH}$  or  $\text{AmOH}$  with a trace of  $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{H}$  as catalyst gives the *Pr di-Me deriv.*,  $b_{\text{D}}^{20}$  1.06°,  $d_4^{20}$  1.1774,  $n_D^{20}$  1.4470; the *Bu di-Me deriv.*,  $b_{\text{D}}^{20}$  1.11°,  $d_4^{20}$  1.1303,  $n_D^{20}$  1.4477; and the *Am di-Me deriv.*,  $b_{\text{D}}^{20}$  1.21°,  $d_4^{20}$  1.1447,  $n_D^{20}$  1.4484. C. J. West

**Action of amines on the esters of carboxy-substituted ureas, thioureas and guanidines.** III. J. Alden Murray and F. B. Dains. *J. Am. Chem. Soc.* 56, 144–6 (1934); cf. *C. A.* 15, 531.— $\text{H}_2\text{NCONHCO}_2\text{Et}$  (I) and 33%  $\text{MeNH}_2$  or  $\text{EtNH}_2$  give 60% of 1-methylbiuret (II) and 1-ethylbiuret (III), m. 159°. I and  $\text{PhCH}_2\text{NH}_2$ , heated at 135° for 3 hrs., give  $\gamma$ -benzylallophanic ester (IV), m. 9 103°; at 150° for 5 hrs.  $\text{HN}(\text{CONHCH}_2\text{Ph})_2$  resulted, while at 200° the biuret disoc. to give cyanuric acid and  $\text{CO}(\text{NHCH}_2\text{Ph})_2$ . I and  $\text{PhNCO}$ , heated 5 hrs. at 125°, give carbamiliide and 1-phenyl-5-carbethoxybiuret.  $\text{PhNHNH}_2$  and  $\gamma$ -phenylallophanic ester 5 hrs. at 130° give  $\text{PhNH}_2$  and 1-phenylurazole. Carbonyldiurethan (V) and  $\text{EtNH}_2$  give I; on standing 2 weeks, III and Et thylcarbamate were formed;  $\text{MeNH}_2$  gives II in 36 hrs.;

$\text{PhCH}_2\text{NH}_2$  at 115° gives I and Et benzylcarbamate; at 135°,  $\text{NH}_3$ , I, IV and 1,5-dibenzylbiuret, m. 169°; at 200°  $\text{CO}(\text{NHCH}_2\text{Ph})_2$  was formed. V and  $\text{N}_2\text{H}_4$  give only I;  $\text{PhNHNH}_2$  gives 1-phenylurazole at 115° or 140° but at 160° there results iminodicarboxylic acid diphenylhydrazide, m. 291°.  $\text{H}_2\text{NCSNHCO}_2\text{Et}$  is hydrolyzed by aq.  $\text{NH}_3$  and alkyl amines to  $\text{CS}(\text{NH}_2)_2$ ; heated with  $\text{PhNH}_2$  or  $o\text{-MeC}_6\text{H}_4\text{NH}_2$  it yields the s-diaryllurcas.  $\text{MeSC}(\text{NCO}_2\text{Et})\text{NHCO}_2\text{Et}$  (VI) and  $\text{MeNH}_2$  in EtOH give  $\gamma$ -methyl- $\beta$ -dicarbethoxyguanidine, m. 71° (70% yield); Et deriv., oil (75%);  $\beta$ -hydroxyethyl deriv., m. 98° (85%); benzyl deriv., oil (85%); Ph deriv., m. 71° (70%); o-tolyl deriv., m. 75° (90%); anilino deriv., m. 192° (85%); o-hydroxyphenyl deriv., m. 135° (50%); p-carboxyphenyl deriv., m. 198° (60%); o-isomer (VII), m. 174° (45%); o-carbomethoxyphenyl deriv. (VIII), m. 67° (40%). VI and glycine give 40% of dicarbethoxyguanidineacetic acid, m. 210° (Et ester, m. 56°); 5% EtOH-KOH gives monocarbethoxyguanidineacetic acid, chars 250–75°. VI and  $\text{NH}_4\text{OH}$  in EtOH give 45% of tetrahydro-3-carbethoxyimino-5-keto-1,2,3,4-oxadiazole, m. 228°;  $\text{N}_2\text{H}_4$  gives 60% of the same deriv. of 1,2,4-triazole, m. above 335°;  $o\text{-C}_6\text{H}_4(\text{NH}_2)_2$  gives 97% of 2-carbethoxyimino-2,3-dihydrobenzimidazole, m. 320° (decompn.). 2-Carbethoxyimino-4-keto-1,2,3,4-tetrahydroquinazoline, m. 103°, results in small yield when VIII is heated carefully and in good yield when VII or VIII is boiled with EtOH-KOH. VI and  $o\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Me}$ , heated 3 hrs. at 140°, give 30% of o,o'-dicarbomethoxycarbamiliide, m. 144°. Dicarbethoxyguanidine (IX) and  $\text{PhNH}_2$  at 140° give 30% of hexahydro-1-phenyl-2,6-diketo-4-imino-s-triazine, m. above 335°. The K salt of IX and  $\text{Me}_2\text{SO}$  give 97% of  $\alpha$ -methyl- $\alpha,\gamma$ -dicarbethoxyguanidine, m. 85°. Carbethoxyguanidine and  $\text{PhNCO}$  give 40% of carbethoxydicarboxanilidoguanidine, m. 151° (decompn.);  $\text{PhNCS}$  gives 90% of hexahydro-1-phenyl-2-thio-4-imino-6-keto-s-triazine, m. 180° (decompn.), which gives with  $\text{Me}_2\text{SO}$  a Me thio ether, m. 247°. C. J. West

The structure of arginine in aqueous solution. Giovanni Devoto. *Z. physiol. Chem.* 222, 227–8 (1933).—Detn. of the dielec. coeff. gave a value of 62, in agreement with the calcd. value for the  $\delta$ -polar form represented by the formula  $\text{H}_2\text{N}(\text{HN}:\text{CNH}_2)^+\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{COO}^-$ . A. W. Dox

**Unsaturated reduction products of the sugars. XIX.** Isoglucal, isolactal and protoglucal. M. Bergmann, L. Zervas and J. Engler. *Ann.* 508, 25–38 (1933); cf. *C. A.* 25, 5895; 27, 4778; 28, 7451.—Isolactal (I), for which a unmodified method of prepn. is given (68% yield), m. 218° (all m. ps. cor.),  $[\alpha]_D^{25}$  88.9° ( $\text{H}_2\text{O}$ ); benzylphenylhydrazone, m. 145–7°. Enzymic hydrolysis of I gives isoglucal and galactose, showing that I is a 4-galactosidoisoglucal. I and  $\text{Ac}_2\text{O}\text{-C}_6\text{H}_5\text{N}$  yield a penta-Ac deriv. (II), m. 166–7°, and not a hexa-Ac deriv. as previously reported. II, boiled 1 hr. with 20 parts  $\text{H}_2\text{O}$ , gives 77% of the tetra-Ac deriv. (III), m. 138–9°,  $[\alpha]_D^{25}$  72.6° ( $\text{C}_6\text{H}_5\text{Cl}_4$ ). III and  $\text{PCl}_5$  in  $\text{CHCl}_3$  at  $-15^\circ$  give tetraacetylisolactal chlorohydrin, a white powder yielding with  $\text{Ag}_2\text{CO}_3$  in EtOH lactolide and with  $\text{C}_6\text{H}_5\text{N}$  at 100° 83% of the tetra-Ac deriv., m. 184–5°,  $[\alpha]_D^{25}$  141.3° ( $\text{C}_6\text{H}_5\text{Cl}_4$ ), of anhydrosolactal (IV, Gl = glucose residue), m. 243–4°, which is oxidized by  $\text{BzO}_2\text{H}$  to galactosidoanhydrofructose, whose



(IV)



(V)

osazone m. 184–6°. Protoglucal,  $\text{C}_6\text{H}_5\text{O}_2$  (V), results in a small yield (in addn. to isoglucal) in the hydrolysis of  $\psi$ -glucal diacetate with  $\text{Ba}(\text{OH})_2$ ,  $b_{\text{D}}^{20}$  104–6°,  $[\alpha]_D^{25}$  35° (EtOH), very hygroscopic; p-nitrophenylhydrazone, m.

153°; on catalytic reduction it takes up 2 atoms H<sub>2</sub>, the dihydro product b<sub>0.1</sub> 89-90°; O<sub>3</sub> gives glyoxal; oxidation with BzO<sub>2</sub>H shows the presence of the group CCOCH<sub>2</sub>.

C. J. West

The stability of levulose in aqueous solutions of varying  $\mu_H$  values. Joseph A. Mathews and Richard F. Jackson. *Bur. Standards J. Research* 11, 619-33 (1933) (Research Paper No. 611).—The rates of decompn. of levulose (I) have been detd. within the ranges 4° to 100°, and -2.6 to 14.2  $\mu_H$ . The rate is independent of the concn. of I, and in the early stages the curves are those of a monomol. reaction. A method for calcg. the equil. polarization, when the latter cannot be reached in practice, is described. In acid soln. the primary decompn. results in the formation of heterolevulosan and its dimer, while in alk. soln. the Lobry de Bruyn-van Ekenstein transformation predominates. I is most stable at  $\mu_H$  3.3. The temp. coeffs. of decompn. are unusually high and vary with the  $\mu_H$  being greatest in strong acid soln. A table shows the times required for the decompn. of 1% of I at integral  $\mu_H$ 's and 10° intervals.

M. P. Benoy

Tetrabenzoylfructofuranose (preliminary communication). Percy Brigi and Richard Schinle. *Ber.* 67B, 127-30 (1934); cf. *C. A.* 27, 2676.—By benzoylation of fructose had been obtained  $\beta$ -1,3,4,5-tetrabenzoylfructopyranose, a pentabenzoylate with open chain, and a small amt. of a tetrabenzoylate (I) which, because of its mutarotation, was assumed to be a furanose deriv. with the ring between C atoms 2 and 5. If this assumption is correct, further benzoylation of the 1,6-dibenzoate (II) of Zervas and Sessler (*C. A.* 28, 745<sup>1</sup>) should give I if II is not an open-chain deriv. Further benzoylation of II did, in fact, give I; none of the pentabenzoylate was formed even when the benzoylation was effected with the greatest caution.

C. A. R.

Preparation and properties of aldonic acids and their lactones and basic calcium salts. Horace S. Isbell and Harriet L. Frush. *Bur. Standards J. Research* 11, 649-64 (1933) (Research Paper No. 613).—Directions are given for the prepn. of a no. of aldonic acids and their lactones in cryst. form; in general, the aq. soln. of the acid (from the Ca salt) is distd. with dioxane, seeded with the desired compd., and distn. with dioxane continued until the flask is full of crystals. The acids are: *d*-gluconic (I), *d*-galactonic (II), *d*-mannonic (III), *l*-rhammonic (IV), *d*-xyloonic (V), *l*-arabonic (VI); the properties listed are, resp., m. p.,  $[\alpha]_D^{25}$  after 2, 5, 10 min., and 24 hrs. I: (C<sub>6</sub>H<sub>12</sub>O<sub>7</sub>), 120-31°, -6.9°, -5.2°, -4.2°, +7.3°. I  $\gamma$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 133-5°, 68.0°, 68.0°, 68.0°, 62.7°. I  $\delta$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 150-2°, 66.2°, 65.6°, 63.9°, 8.8°. II (C<sub>6</sub>H<sub>12</sub>O<sub>7</sub>), 148°, -13.6°, -13.2°, -13.0°, -17.0°. II  $\gamma$ -lactone hydrate (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>·H<sub>2</sub>O), 65-6°, -71.0°, -71.0°, -71.0°, -70.6°. II  $\gamma$ -lactone, anhyd. (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 110-2°, -77.4°, -77.4°, -77.4°, -76.4°. III  $\gamma$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 151-2°, 51.5°, 51.5°, 51.5°, 51.5°. III  $\delta$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 158-60°, 114.8°, 114.5°, 114.2°, 30.3°. IV  $\gamma$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 149-51°, -39.2°, -39.2°, -39.2°, -39.1°. IV  $\delta$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 172-82°, -100.4°, -100.1°, -99.6°, -35.1°. V  $\gamma$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 98-101°, 91.8°, 91.8°, 91.8°, 86.7°. VI (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 111-6°, -9.8°, -9.5°, -9.3°, -11.8°. VI  $\gamma$ -lactone (C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>), 95-8°, -71.0°, -71.6°, -71.6°, -71.6°. These acids have the general formula CaX<sub>2</sub>·3CaO; for their basic Ca salts; maltobionic and lactobionic acids have Ca(C<sub>6</sub>H<sub>10</sub>O<sub>6</sub>)<sub>2</sub>·4CaO.

M. P. Benoy

The composition of an aldobionic acid from flaxseed mucilage. Carl Niemann and Karl P. Link. *J. Biol. Chem.* 104, 205-6 (1934).—The aldobionic acid in flaxseed mucilage has been definitely shown to yield *d*-galacturonic acid on hydrolysis as inferred from oxidation studies by Anderson and Crowder (*C. A.* 24, 5041). The occurrence of *l*-rhamnose was also confirmed. A. P. L.

Preparation of calcium lactobionate and lactobionic  $\delta$ -lactone. Horace S. Isbell. *Bur. Standards J. Research* 11, 713-47 (1933) (Research Paper No. 618).—Crude Ca lactobionate (I) is obtained as a jelly-like mass of fine crystals from the electrolytic oxidation of the sugar. Concn. of an aq. soln. with CaCl<sub>2</sub> yields Ca(C<sub>6</sub>H<sub>11</sub>O<sub>7</sub>)<sub>2</sub>·

CaCl<sub>2</sub>·6H<sub>2</sub>O,  $[\alpha]_D^{25}$  20.0° (H<sub>2</sub>O). From this the basic salt is prepd., decompd. with CO<sub>2</sub> and the filtrate concd. to a thick sirup from which after several weeks cryst. I seps., Ca(C<sub>6</sub>H<sub>11</sub>O<sub>7</sub>)<sub>2</sub>·5 H<sub>2</sub>O,  $[\alpha]_D^{25}$  23.7° (H<sub>2</sub>O). A soln. of the free acid prepd. from the Ca salt, dehydrated with dioxane, gives cryst. lactobionic  $\delta$ -lactone (II), m. 195-6° (decompn.) (from glacial AcOH),  $[\alpha]_D^{25}$  54° initially, becoming 22° after several hours (5% aq. soln.). Agreement between these values and those of the products of Br oxidation of the lactose in the presence of BaCO<sub>3</sub>, shows that the initial product in the 2nd case is II, changing into an equil. mixt. of 84% acid and 16% II. M. P. B.

Constitution of inulin. Synthesis of 3,4,6- and 1,4,6-trimethyl- $\gamma$ -fructose. T. N. Montgomery. *J. Am. Chem. Soc.* 56, 419-23 (1934).—Pos. and unquestionable evidence has been obtained proving that inulin on methylation and subsequent hydrolysis yields only 1 trimethylfructose, it being the 3,4,6-isomer (I).  $\beta$ -Diacetonefructose gives a 1-Bz deriv., m. 82°, which is hydrolyzed to 1-benzoylfructose; treatment with 1% MeOH-HCl and methylation with MeI and Ag<sub>2</sub>O give 1-benzoyl-3,4,6-trimethyl- $\gamma$ -methylfructose; debenzoylation and hydrolysis gives I,  $n_D$  1.4658,  $[\alpha]_D^{25}$  20.4° (CHCl<sub>3</sub>,  $c$  2.88); condensation with Me<sub>2</sub>CO gives a monoacetone deriv., b<sub>0.1</sub> 110°,  $n_D$  1.4450,  $[\alpha]_D^{25}$  70.3° (Me<sub>2</sub>CO,  $c$  3.03), expts. in which the condensation was arrested at various stages showed that equil. was reached when approx. 85% of I had reacted but the recovered uncondensed I is identical with the initial I. The condensation product of I with Me<sub>2</sub>CO is a mixt. of isomers; specimens isolated at various intermediate stages as the reaction proceeds range in sp. rotation from 80° to 58° and when hydrolysis of the compd. is arrested when about 80% complete the recovered unhydrolyzed monoacetone compd. shows a  $\alpha$  rotation of 32°.  $\alpha$ -Diacetonefructose and N<sub>2</sub>O<sub>5</sub> in CHCl<sub>3</sub> give the 3-nitrate, m. 61-2°; refluxed with Me<sub>2</sub>CO contg 20% 0.1 N HCl it gives 1,2-acetonefructose 3-nitrate, in 151-2°; this was hydrolyzed to fructose 3-nitrate, which was treated with 1% MeOH-HCl and then methylated, reduction and hydrolysis gives 1,4,6-trimethylfructose,  $n_D$  1.4639,  $[\alpha]_D^{25}$  29.7° (Me<sub>2</sub>CO,  $c$  2.13); the monoacetone deriv. b<sub>0.1</sub> 100°,  $n_D$  1.4464,  $[\alpha]_D^{25}$  1.85° (Me<sub>2</sub>CO,  $c$  1.85).

C. J. West

Action of metallic sodium on 1,4-dibromocyclohexane N. D. Pryanishnikov and S. I. Shuikina. *Ber.* 67B, 64-7 (1934).—Zelinskii and Kozeshkov (*C. A.* 21, 2464) describe the synthesis of a bicyclo[0.2.2] hexane from *cis*-1,4-dibromocyclohexane and Na. P. and S., using the same method, obtained a product C<sub>6</sub>H<sub>10</sub> (I), b. 77-82°,  $d_4^{25}$  0.8108,  $n_D^{25}$  1.4450, I no. 300.44, mol. refr. 26.94. I reacts extremely vigorously with Br; the amt. of added halogen depends on the concn. of the Br soln. In detns. of the I no. (Wijss) the soln. darkens as the result of the sepn. of I. With excess of KMnO<sub>4</sub>, I reacts vigorously and in the aq. soln. of the reaction products can be detected succinic and adipic acids. When I is passed over Pd-asbestos, some benzene is formed. The phys. consts. and chem. behavior of I show that it is not homogeneous. The chem. reactions can be explained by assuming that it is a mixt. of cyclohexadiene, cyclohexene and cyclohexane; this is corroborated by the increment of the parachor (-15.84), the calcd. value, according to Sippel, for a 6-membered ring being -17.1 and for a bicyclic hydrocarbon -23.2. The complete sepn. of such a mixt. by fractionation seems impossible, not only because the b. ps. of the constituents are so close together but on account of their tendency to form azeotropic mixts. P. and S. feel, therefore, that they have obtained no proof whatever of the presence of a bicyclic hydrocarbon. C. A. R.

The possible existence of three  $\alpha,\alpha'$ -dibenzylcyclohexanones. R. Cornubert and M. de Demo. *Compt. rend.* 197, 1656-8 (1933).—Catalytic hydrogenation of dibenzylidenecyclohexanone with either Pt or Ni gives 3  $\alpha,\alpha'$ -dibenzylcyclohexanones m. 55°, 103° and 122°, resp.

W. J. Peterson

Styrene and metastyrene. Samuel Natelson. *Ind. Eng. Chem.* 25, 1391-5 (1933).—An improved method for prepn. of styrene (I) from PhH and C<sub>2</sub>H<sub>4</sub> through PhEt

(II) and PhCHClMe (III) is given. II is best prepd. by first satg. the PhH-AlCl<sub>3</sub> suspension with HCl, then introducing C<sub>2</sub>H<sub>4</sub> with good stirring at 1 atm. and keeping the temp. below 75°. An 85% yield of III was obtained from II in ultra-violet light by the use of 60% of the theoretical Cl. I was obtained from the crude III by distn. with a Ag-Hg couple or HgCl<sub>2</sub>. Cu-Hg, H<sub>3</sub>PO<sub>4</sub>, HgO, HgSO<sub>4</sub>, Hg(OAc)<sub>2</sub>, and ZnCl<sub>2</sub> may also be used. The crude I was polymerized by heating with BzO<sub>2</sub>H formed *in situ* by first dissolving 0.6% O<sub>2</sub> in I, then adding 2% BzH. 1000 g. PhH gave 430 g. of II with 420 g. of PhH recovered. 1000 g. of II gave 340-379 g. of metastyrene.

Arnold M. Collins

**Allyltoluenes.** Charles D. Hurd and Harry T. Bollman. *J. Am. Chem. Soc.* 56, 447-9 (1934).—o-MeC<sub>6</sub>H<sub>4</sub>MgBr and allyl bromide give 70% of o-allyltoluene, b<sub>100</sub> 88-90°, b<sub>100</sub> 181-1.6°, d<sub>4</sub><sup>20</sup> 0.9110, d<sub>4</sub><sup>25</sup> 0.8970, n<sub>D</sub><sup>20</sup> 1.5255, n<sub>D</sub><sup>25</sup> 1.5171; on standing 1 month it had a yellow-green tint; the dibromide b<sub>100</sub> 166-8°, d<sub>4</sub><sup>20</sup> 1.6087, n<sub>D</sub><sup>20</sup> 1.5850. p-Allyltoluene, b<sub>100</sub> 58-60°, b<sub>100</sub> 180-1°, d<sub>4</sub><sup>20</sup> 1.5082, d<sub>4</sub><sup>25</sup> 0.9157, n<sub>D</sub><sup>20</sup> 1.5082, n<sub>D</sub><sup>25</sup> 1.5210; the dibromide b<sub>100</sub> 180°, d<sub>4</sub><sup>20</sup> 1.595, n<sub>D</sub><sup>20</sup> 1.5855. The o-isomer at 650° for 78 min. gave gaseous products contg. 7.8% (by vol.) of C<sub>2</sub>H<sub>4</sub>, 14.8% C<sub>2</sub>H<sub>2</sub>, 30.2% H<sub>2</sub>, 47.2% C<sub>n</sub>H<sub>2n+2</sub> (n = 1.06); the figures at 700° were not very different; the liquid products contained PhMe, o-C<sub>6</sub>H<sub>4</sub>Me<sub>2</sub>, C<sub>10</sub>H<sub>8</sub>, and unchanged o-allyltoluene and allylbenzene. p-Allyltoluene yielded p-C<sub>6</sub>H<sub>4</sub>Me<sub>2</sub> and PhMe; at 650° the gases contained 7.9% C<sub>2</sub>H<sub>4</sub>, 11.4% C<sub>2</sub>H<sub>2</sub>, 28.7% H<sub>2</sub> and 51.9% C<sub>n</sub>H<sub>2n+2</sub> (n = 1.04); at 575° the relations were 16.2% C<sub>2</sub>H<sub>4</sub>, 17.4% C<sub>2</sub>H<sub>2</sub>, 16.4% H<sub>2</sub> and 49.9% C<sub>n</sub>H<sub>2n+2</sub> (n = 1.89). These compds. were somewhat more stable than 1-phenyl-1-butene. Prolonged heating of the latter failed to effect any rearrangement into o-allyltoluene. C. J. W.

**Addition of hydrogen to acetylene derivatives.** XIX. Relation between the direction and progress of catalytic hydrogenation and the nature of catalyst. Yu. S. Zalkind, M. N. Vishnyakov and L. N. Morev. *J. Gen. Chem.* (U. S. S. R.) 3, 91-113 (1933); cf. C. A. 25, 2710.—While the hydrogenation of acetylene γ-glycols (I) in the presence of Pt black progresses uniformly with the formation of satd. glycols, the reaction with colloidal Pd proceeds in 2 stages: I rapidly adds 2 H atoms and then very slowly 2 more with the formation of satd. glycols. Such a sharp break in the process of hydrogenation is displayed only by γ-glycols. Acetylene alcs. combine with 4 H atoms without retardation in the reaction, while acetylene hydrocarbons (II), such as PhC≡CH, add the 2nd pair of H atoms even faster than the 1st (C. A. 8, 1419; 10, 1455, 17, 1453). The hydrogenation of diphenylbutynediol acetate (III) also proceeds in 2 stages with retardation of the reaction after addn. of 4 H atoms followed by highly increasing acceleration of the reduction with the addn. of 4 more H atoms and the formation of diphenylbutane. These facts indicate that the course of hydrogenation is detd. not only by the speed, but that the reaction can proceed selectively, viz., until the mols. of II (PhC≡CH) or those of an unsatd. glycol ester are present in the reaction system they will react with H<sub>2</sub> prior to other mols. (styrene or satd. glycol ester) available in the mixt., though separately the latter could combine with H<sub>2</sub> with a greater speed. Such a selective action of Pd was also demonstrated by Bourguet (C. A. 22, 2099; 27, 2372), who concluded that the selective action of colloidal Pd suspended in starch always leads to hydrogenation of all available mols. of acetylene derivs. first to ethylene derivs. and thereafter to the satd. compds. Thus sp. action of Pd suspended in starch is not characteristic of other catalysts, such as Pt, or of Pd suspended in other protective colloids (Z. and Vilenkins, C. A. 18, 1466). Thus if the selective action of a catalyst is more definitely pronounced in some cases, it was of interest to inquire whether all acetylene derivs. act similarly, regardless of their structure, and to what extent this selective action is related to the chem. nature of the catalyst and is conditioned by the phys. form of the catalyst or the kind of protective colloid used for its suspension. By catalytic hydrogenation of acetylene derivs. there

are formed *cis*- and *trans*-isomers of ethylene compds. While commonly the chief products are malenoid isomers, the tetramethylbutynediol (IV) and tetraphenylbutynediol produced also fumaroid isomers in various proportions, depending on the conditions of the reaction (Z., *J. Russ. phys.-chem. Soc.* 48, 1830 (1916); Z. and Teterin, C. A. 24, 78; Z., C. A. 21, 2459). Bourguet (C. A. 19, 2651; 24, 2451) ascribed the formation of the 2nd isomer of ethylene glycol to some stereoisomerizing agents, such as protective colloids (protalbinic acid). IV, Me<sub>2</sub>C<sub>2</sub>H<sub>2</sub>-C≡C≡COH and PhC≡CH were hydrogenated in the presence of Pd and Pt in the form of colloidal suspensions in protective colloids, powd. blacks and with various carriers. As protective colloids were used starch, gum arabic, gum tragacanth, agar, Na protalbinic acid and casein for Pd, and starch and gum arabic for Pt. The tabulated results of the exptl. work led to the following conclusions. The general course of hydrogenation of acetylene derivs. is conditioned by the chem. nature of the catalyst and the structure of the hydrogenated compd., and while different protective colloids and catalyst carriers may be unlike in their activity, they exert but little influence on the general progress of hydrogenation. The results substantiate the chem. character of the mechanism of catalysis. The catalyst displays selective affinity for hydrogenated mols., showing in general a preference for mols. with a triple bond. The character of catalytic distribution between acetylene and ethylene mols. is conditioned by the nature of the catalyst and the structure of the compd. Thus Pd acts with more definite selectiveness than Pt, while PhC≡CH and styrene differ in their relation to a catalyst considerably more than acetylene alcs. from the corresponding ethylene alcs. All catalysts produced some α-tetramethylbutenediol by hydrogenation of IV in AcOEt or alc. soln. The yields of the α-isomer are independent of the presence of an amino acid (protalbinic acid), and become greater with an increased quantity of a catalyst and a reduced time of addn. of H<sub>2</sub>.

Chas. Blanc

**Chlorine derivatives of p-xylene.** Henri Wahl. *Compt. rend.* 196, 1900-2 (1933).—Chlorination of p-xylene, with Fe as a catalyst, gave 2-chloro-1,4-dimethylbenzene (I), m. 1.6°, b. 184°, d<sub>4</sub><sup>20</sup> 1.0589. I was nitrated with HNO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub> at 0°, warmed to 50°, and poured on ice to give cryst. 2-chloro-5-nitro-1,4-dimethylbenzene (II), m. 97°, b<sub>10</sub> 135-6°, and an oil consisting of II and an isomer which could not be isolated. Reduction of II gave 2-chloro-5-amino-1,4-dimethylbenzene, m. 92.3°, b<sub>10</sub> 135-6°. *Ac deriv.* m. 176°; *Bs deriv.* m. 163°; *picrate*, orange, m. 195° (decompn.). Reduction of the oil gave also 2-chloro-1-amino-1,4-dimethylbenzene, m. 40°, b<sub>10</sub> 132-3°; *Ac deriv.* m. 171°; *Bs deriv.* m. 177°; *picrate*, yellow, m. 171-2° (decompn.). The isomeric amines from the reduction of the oil were sepd. by fractional crystn. of the HCl salts.

John E. Milbery

**Chloro derivatives of p-xylene.** Henri Wahl. *Compt. rend.* 197, 1330-2 (1933).—Nitration and hydrolysis of 2,5-acetoxylide yields 60% 4-NO<sub>2</sub> and 35% 6-NO<sub>2</sub> derivs.; the latter, by the Sandmeyer reaction, gives 75% 2-chloro-3-nitro-p-xylene, m. 56°, b<sub>10</sub> 135°. Reduction of this with Fe and HCl gives 6-chloro-2,5-xylidine (I), m. 41°, b<sub>10</sub> 120-7°; *Ac deriv.* m. 179°; *Bs deriv.* m. 144°; *picrate* m. 120°. I is not the unidentified isomer previously obtained (preceding abstr.); the latter, therefore, is 3-chloro-2,5-xylidine.

H. A. Beatty

**Catalytic reduction of nitro compounds.** A. M. Popov. *Anilinokrasochaya Prom.* 3, 391-402 (1933).—The investigation of the catalytic reduction of nitro compds. to amino derivs. with mol. H<sub>2</sub> by working in a liquid phase at low temps. and pressures was begun with the use of a Ni catalyst. The latter was obtained from freshly prepd. (HCO)<sub>2</sub>Ni by reduction with H<sub>2</sub> and by thermal decompn. The expts. were carried out in steel autoclaves provided with mech. stirring or rocking and elec. heating, and charged with 0.5 g. Ni and 14-17 H atm. at room temp. In the recorded expts. yields of over 90% of amino compds. were obtained with PhNO<sub>2</sub> (from C<sub>6</sub>H<sub>5</sub> contg. thiophene) (10 g.) and 100 cc. H<sub>2</sub>O, absorption of H<sub>2</sub> begins at 115°



and the temp. is raised to 134° in 2 hrs., giving 97% PhNH<sub>2</sub> (I). Complete conversions to I were obtained by using recovered Ni from previous expts., and by varying the quantities of H<sub>2</sub>O, the time of heating from 1.5–3.5 hrs. and the temp. from 120° to 180°. In the 10 expts. the washing of the recovered Ni with alc. and Et<sub>2</sub>O, long exposure to air and the loss in wt. showed no effect on its catalytic activity. A complete reduction of PhNO<sub>2</sub> was obtained at 180° in 2.5 hrs. without H<sub>2</sub>O. *p*-MeC<sub>6</sub>H<sub>4</sub>NO<sub>2</sub> (6 g.) and 20 cc. H<sub>2</sub>O in 25 min. at 95–105° gave 100% *p*-MeC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, m. 44.5–5°. *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H (4.6 g.) and 2.3 g. NaHCO<sub>3</sub> in 20 cc. H<sub>2</sub>O in 20 min. at 92–125° gave *p*-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>Na, the free acid m. 187°. *m*-NH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H, m. 140–1°, was obtained in 25 min. at 100–10°. Tech. *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OH (from *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>Cl) (5.8 g.) and 20 cc. EtOH or 20 cc. H<sub>2</sub>O in 20 min. at 100–10° gave *p*-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OH, m. 185–6° (187.5–8.5° in a sealed capillary). *p*-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>Cl was prepd. from 6 g. *p*-NO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>Cl and 40 cc. H<sub>2</sub>O in 40 min. at 100–10°. Aminosalicilic acid was prepd. from (1) 5 g. 2,6-HO(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H, m. 152–4°, and 2.3 g. NaHCO<sub>3</sub> in 20 cc. H<sub>2</sub>O in 2 hrs. at 97°; (2) 5 g. 2,4-HO(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H, m. 228°, and NaHCO<sub>3</sub> in 1 hr.; (3) 5 g. of the mixed isomers and NaHCO<sub>3</sub> in 40 min. at 90°; (4) 5 g. of the mixed isomers and 20 cc. H<sub>2</sub>O in 1 hr. at 90°; (5) 8 g. Na benzencarbazosalicilate and 40 cc. H<sub>2</sub>O in 1.5 hrs. at 64° or in 40 min. at 75–90°. 4,3-HO(H<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>SO<sub>2</sub>H, m. 155–6°, from 10 g. nitro compd. and 20 cc. H<sub>2</sub>O in 1.5 hrs. at 70–100°. 4,3,5-HO(H<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>SO<sub>2</sub>H from 5 g. of the 5-NO<sub>2</sub> acid and 25 g. H<sub>2</sub>O in 1.5 hrs. at 85–105°. 4,2-Cl(H<sub>2</sub>N)-C<sub>6</sub>H<sub>3</sub>OH, m. 137–8°, from 8 g. nitro compd. (prepd. by nitrating *p*-C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub> and decompg. with NaOH under pressure) and 20 cc. H<sub>2</sub>O in 50 min. at 60–82°. 2,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>, from 4.9 g. nitro deriv. and 20 cc. H<sub>2</sub>O in 4 hrs. at 65–170° or with 20 cc. EtOH in 3 hrs. at 67–116°. 1,2,4-C<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)<sub>2</sub>Cl, m. 70.5–0.7°, from 3.75 g. 4,2-Cl(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub> (prepd. by amidation of 2,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NO<sub>2</sub> in an autoclave) and 20 cc. H<sub>2</sub>O in 15 min. at 90–96°. *p*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>, m. 139–40°, from 5.7 g. *p*-NH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>NO<sub>2</sub> and 20 cc. H<sub>2</sub>O in 1 hr. at 60–95°.  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NO<sub>2</sub> (recrystd. from tech. xylene) (10 g.) and 50 cc. H<sub>2</sub>O in 3 hrs. at 160–70° with rocking gave  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub>, m. 47–9°.  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NO<sub>2</sub> (50 g.) was purified by energetically stirring twice with 500 cc. hot H<sub>2</sub>O for 20 min., decanting from the H<sub>2</sub>O, pouring into cold H<sub>2</sub>O and drying. When 6 g. of purified  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NO<sub>2</sub> with 20 cc. H<sub>2</sub>O at 100–5° was heated 25 min. there was obtained  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub>, m. 49.3–9.8°. Chas. Blanc

**2,4,6-Trinitrobenzalanilines.** Stephan Secareanu. *Bull. soc. chim.* 53, 1016–24, 1024–32 (1933); cf. C. A. 26, 5081.—The action of excess PhNH<sub>2</sub> on 2,4,6-(NO<sub>2</sub>)<sub>3</sub>-C<sub>6</sub>H<sub>2</sub>CHO (I) in boiling AcOH gave a solid (II, m. 224°), probably 4,6-dinitro-2-hydroxy-1,3-diphenyldihydrobenzotriazole. II was also obtained from 2,4,6-(NO<sub>2</sub>)<sub>3</sub>-C<sub>6</sub>H<sub>2</sub>-CH:NPh (III) along with a substance m. 257–8°. When III, PhNH<sub>2</sub> and KI are caused to react, II is formed and I<sub>2</sub> is liberated showing the presence of free HNO<sub>3</sub>. Like III,  $\beta$ -C<sub>10</sub>H<sub>7</sub>N:CHC<sub>6</sub>H<sub>4</sub>(NO<sub>2</sub>)<sub>2</sub> gave the  $\beta$ -naphthyl analog of II, m. 262°; *p*-C<sub>6</sub>H<sub>4</sub>N:CHC<sub>6</sub>H<sub>4</sub>(NO<sub>2</sub>)<sub>2</sub>, the *p*-tolyl analog (IV), m. 272°. IV was also formed from III and *p*-C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>. S. explains the formation of II through the replacement of an *o*-NO<sub>2</sub> group with PhNH and the reaction of this *o*-phenylenediamine with HNO<sub>3</sub> to form a triazole. *p*-BrC<sub>6</sub>H<sub>4</sub>N:CHC<sub>6</sub>H<sub>4</sub>(NO<sub>2</sub>)<sub>2</sub>, m. 184°, in boiling AcOH formed 4,6-dinitro-2-hydroxy-1,3-bis(*p*-bromophenyl)-dihydrobenzotriazole (V), m. 281°. Likewise 3,4-BrMe-C<sub>6</sub>H<sub>3</sub>N:CHC<sub>6</sub>H<sub>4</sub>(NO<sub>2</sub>)<sub>2</sub>, m. 209°, gave the corresponding benzotriazole (VI), m. 298°. Br and mol.-wt. detns. (Rast) sustain the triazole formulas. The reduction of II with Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> and benzoylation gave a tri-Bz deriv., m. 236°. Since 2,4,6-(O<sub>2</sub>N)<sub>3</sub>-C<sub>6</sub>H<sub>2</sub>NHPh on reduction and benzoylation gave a tri-Bz deriv. m. 262°, the possibility that II and its analogs might have a nitrosoamine structure is definitely eliminated. E. W. Scott

Compounds from salicylidene- and hydrocyanosalicylideneaniline as well as analogs and related substances. I. G. Rohde. *J. prakt. Chem.* 139, 17–26 (1934); cf. C. A. 4, 3217.—A discussion of the constitution of Schwab's

compd., prepd. from KCN and salicylideneaniline. II. Experimental and supplement. *Ibid.* 27–43.—Details are given of the prepn. of Schwab's compd., CaH<sub>10</sub>O<sub>2</sub>N<sub>2</sub>, from hydrocyanosalicylideneaniline (I) or from salicylaldehyde, aniline and KCN; salicylideneaniline (II) and KCN give an isomer, m. 146°; I and KCN in CCl<sub>4</sub> give an isomer, m. 136–7° or, in another expt., 147–8°, which is oxidized by O<sub>2</sub> to the unsatd. amide, HOC<sub>6</sub>H<sub>4</sub>C(=CONH<sub>2</sub>):NPh, m. 175–6°. The condensation of the isomers with BzH and HOC<sub>6</sub>H<sub>4</sub>CHO, also with II, is described. Details are given of the prepn. of the *p*-toluidine analog, m. 175.5–6°, of Schwab's compd., and of its splitting by concd. HCl. The condensation of salicylaldehyde, PhNHMe and HCN or KCN is also discussed. Most of the details are given in dissertations to which reference is made. C. J. West

**Cleavage of phenyl-R-anilinoethanes by reduction.** I. Gazopoulos. *Praktika (Akad. Athenon)* 7, 47 (5) (1932).—Based on the behavior of a free bond between the C and N atoms in secondary amines of the type PhNHCHPhR, G. formulates the reduction of such amines thus: PhNHCHPhR + H<sub>2</sub> → PhNH<sub>2</sub> + CH<sub>2</sub>PhR. If R is alkyl the cleavage product will be a combination of PhCH<sub>2</sub> with R, as PhCH<sub>2</sub>Me. If R is aryl or aralkyl, compds. such as CH<sub>2</sub>Ph<sub>2</sub>, MeC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Ph, C<sub>10</sub>H<sub>7</sub>CH<sub>2</sub>Ph or PhCH<sub>2</sub>CH<sub>2</sub>Ph are formed. Prepn. of the secondary amines is effected from org. Mg compds. and PhN:CHPh according to the reactions (1) PhN:CHPh + RMgX = PhN(MgX)CHPhR, and (2) PhN(MgX)CHPhR + H<sub>2</sub>O = PhNHCHPhR + Mg(OH)X. *Prepn. of diphenylmethane.* To 40 cc. abs. Et<sub>2</sub>O are added gradually 3.6 g. powd. Mg and a small crystal of I<sub>2</sub>. Then 12 cc. of PhBr is added gradually and when the soln. of Mg is nearly complete the prepn. is heated on a water bath 45 min. To this soln. is added 25 g. dry PhN:CHPh prepd. by mixing 1 part aniline and BzH (freshly distd.) and washing with alc. After addn. of the PhN:CHPh the mixt. is heated to boiling and the heating continued 1 hr. after expulsion of the ether. The product is dissolved in dil. HCl, sep'd. and washed well with water. It is purified by shaking with concd. NH<sub>4</sub>OH and NH<sub>4</sub>Cl soln., again dissolving in ether and washing with water until neutral. The HCl deriv. is ppt'd. from the ether soln. by addn. of 12 g. HCl in 40 cc. EtOH. The salt is filtered and dried on a porous plate. To 17 g. of the salt in 50 cc. alc. under a reflux condenser are added 100 cc. concd. HCl and 50 g. Zn-Hg. The latter is prepd. by adding 50 g. of Zn in small pieces to aq. HgCl<sub>2</sub>. After reduction for about 1 hr. the prepn. is washed well with water. The contents of the flask are then heated on a gauze to produce vigorous evolution of H<sub>2</sub>, and the solid salt changes to an oily liquid. Water is added and the oily prepn. is decanted into a little ether, after which the ether is evap'd. and the oily liquid returned to the reflux and heated about 45 min. with 20% NaOH. The product is again taken up with ether, washed with water and shaken with dil. HCl, causing the sepn. of the HCl salt of the base. The ether soln., after more washing with water and drying over CaCl<sub>2</sub>, is distd. at 255–65°, yielding about 3.5 g. A second distn. at 260–2° yields pure CH<sub>2</sub>Ph<sub>2</sub>. *Phenyl- $\alpha$ -naphthylmethane* was similarly prepd. from  $\alpha$ -C<sub>10</sub>H<sub>7</sub>CHPhNHPh. An oily product is obtained which crystallizes after 1–2 days. This is distd. at 340–50° producing an oil which crystallizes when dried over H<sub>2</sub>SO<sub>4</sub> yielding a solid product. Recrystn. from alc. yields pure  $\alpha$ -C<sub>10</sub>H<sub>7</sub>CH<sub>2</sub>Ph, m. 59°. L. Y. D.

**Inhibition of oxidation of phenylhydrazine.** R. H. Hamilton, Jr. *J. Am. Chem. Soc.* 56, 487 (1934).—In the formation of osazones the oxidation of PhNHNH<sub>2</sub> is inhibited by the presence of NaHSO<sub>3</sub>; no tar forms in tubes in which all air has been evacuated. C. J. West

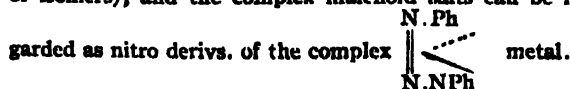
**Diazoamino compounds.** A. Mangini and I. Dejudicibus. *Gazz. chim. ital.* 63, 601–12 (1933).—Various metal salts of diazoamino compds. were prepd. with a view toward throwing further light on the constitution of the latter. Alc. PhNHPh (I) and alc. KOH give an intense violet color but no further reaction, and with H<sub>2</sub>SO<sub>4</sub> I is recovered. However, I in anhyd. Et<sub>2</sub>O and K



directly the *K* salt,  $\text{PhN}_2\text{KPh}$ , dark violet-red, decomps. in air to I; when heated it decomps. violently. Its constitution is the *malenoid form*. Though the *Hg* salt,  $(\text{C}_6\text{H}_5\text{N}_2)_2\text{Hg}$  (II), has been prepd. by Ciusa (*Atti. Accad. Lincei* [5], 18, II, 92(1932)) and otherwise by Vecchiotti and Capodacqua (*C. A.* 20, 591) it can be prepd. more simply in 100% yield by addn. of I in MeOH to  $\text{Hg}(\text{OAc})_2$  in MeOH (contg. AcOH). Its solns. in  $\text{PhNO}_2$  and  $\text{PhNH}_2$  are an intense orange and yield yellow crystals, whereas from  $\text{C}_6\text{H}_5\text{N}$  the crystals are dark orange and explosive. II therefore exists in 2 chromoisomeric forms, a non-explosive yellow ( $\text{PhN}:\text{NNPh}$ )<sub>2</sub>Hg, and the explosive dark orange malenoid form  $\text{Ph}-\text{N}:\text{NPh}:\text{Hg}:\text{NPh}:\text{N}:\text{NPh}$ . Though the *Cu* salt (III)

of I was prepd. otherwise by Meunier and Desparmet (*Compt. rend.* 131, 52), it can be prepd. like II, in which case it has the compn.  $(\text{C}_6\text{H}_5\text{N}_2)_2\text{Cu}:\text{MeOH}$ , is lustrous gray-black and explodes when heated. It has the malenoid form. Like I, alc. *m*- $\text{PhN}_2\text{HC}_6\text{H}_4\text{NO}_2$  (IV) gives an intense violet color with alc. KOH but no product, while III in anhyd. xylene and alc. KOH ppt. a substance contg. approx. 22% K, which may be a *K* salt of a decompn. product of IV. The *Cu* salt,  $(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\text{Cu}$ , prepd. like III (the ppt. forms after 7-8 days), is intense green, and explodes when heated. It has the malenoid form. The *Hg* salt,  $(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\text{Hg}$ , from I and  $\text{Hg}(\text{OAc})_2$  in boiling MeOH (let stand 15 days), exists in 2 forms, a non-explosive yellow salt from MeOH, and an explosive bright red salt from  $\text{C}_6\text{H}_5\text{N}$  or  $\text{PhNH}_2$ . From a  $\text{C}_6\text{H}_5\text{N}:\text{MeOH}$  mixt. an orange mixt. is obtained. IV and  $\text{AgNO}_3$  in MeOH ppt. the *Ag* salt,  $\text{C}_{12}\text{H}_9\text{O}_4\text{N}_4\text{Ag}$  (V), which probably exists in 2 forms, an explosive dark red malenoid form (VI) by pptn. from  $\text{C}_6\text{H}_5\text{N}$  with MeOH, and a non-explosive yellow form (VII). Addn. of MeOH to V in  $\text{C}_6\text{H}_5\text{N}$  ppts. VI, while addn. of  $\text{Et}_2\text{O}$  gives an orange ppt., probably a mixt. of VI and VII. Pure VII could not be isolated. Alc. *p*- $\text{PhN}_2\text{HC}_6\text{H}_4\text{NO}_2$  (VIII) and KOH give a slight ppt., but 100% of the *K* salt,  $\text{C}_6\text{H}_5\text{O}_2\text{N}_2\text{K}$  (IX), is obtained by addn. of alc. KOH to VIII in anhyd. xylene. It is steel-blue and decomps. rapidly in air to VIII. It does not explode when heated. Prepd. like IX (the yield is lower), the *Na* salt,  $\text{C}_6\text{H}_5\text{O}_2\text{N}_2\text{Na}$ , violet-blue, does not explode when heated. Prepd. like V, the *Ag* salt,  $\text{C}_{12}\text{H}_9\text{O}_4\text{N}_4\text{Ag}$ , of VIII has 2 chromoisomeric forms, orange-yellow from xylene, and intense pomegranate-red from  $\text{C}_6\text{H}_5\text{N}$  by  $\text{EtOH}$ . Each can be converted into the other by the proper solvent. The red form explodes when heated, therefore is probably the malenoid type. Prepd. like II, the *Hg* salt,  $(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\text{Hg}$  (X), of VIII is obtained in an orange form (XI) from xylene or by addn. of water to its  $\text{C}_6\text{H}_5\text{N}$  soln., a bright red form (XII) by addn. of  $\text{EtOH}$  to its  $\text{C}_6\text{H}_5\text{N}$  soln., and a canary-yellow form (XIII) by addn. of  $\text{Me}_2\text{CO}$  and water to its  $\text{C}_6\text{H}_5\text{N}$  soln. XIII passes to XI by crystn. from xylene, and to XII by pptn. from  $\text{C}_6\text{H}_5\text{N}$  with  $\text{EtOH}$ . X therefore exists in 2 chromoisomeric forms, (1) XIII, which has the constitution  $(\text{PhN}:\text{NNPh})_2\text{Hg}$  and is not explosive, and (2) XII, the malenoid form, which explodes on heating. XI is probably a mixt. of XII and XIII. On standing 10 days, VIII and  $\text{Cu}(\text{OAc})_2$  in MeOH ppt. a small yield of the *Cu* salt,  $(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\text{Cu}$ , dark green. The various colors of the products described indicate that those which are different from the parent diazoamino compd. are internal complex derivs. This complex structure does not involve the  $\text{NO}_2$  group, because (1) it is found not only in nitrodiazamino compds. but also in all triazenes, whether substituted or not; (2) the *Cu* salts and *K* salts of I, IV and VIII have the same increased intensity of colors over I, IV and VIII; and (3) II and III each exist in 2 chromoisomeric forms. The theory of Hantzsch explains the ease of formation and chromoisomerism of the internal complexes, i. e., the less intensely colored forms are the *anti*-forms, and the more intensely colored ones the *syn*-forms. This is analogous to nitrohydrazones, where the lighter colored compds. have the fumaroid form and the darker compds.

the malenoid form. Sulfication of IV and VIII must fix the mobile H atom (otherwise there would be a greater no. of isomers), and the complex malenoid salts can be re-



All of the salts described are very stable toward light and cannot be converted from I form to another by this agency.

C. C. Davis  
Bisarsyls. VI. 3,3',3'',3'''-Tetraamino-, 3,3',3'',3'''-tetraamino- and 3,3',3'',3'''-tetra(acetylamino)tetraphenylbiarsyl. F. F. Blicke, U. O. Oakdale and J. F. Oneto. *J. Am. Chem. Soc.* 56, 141 4(1934); cf. *C. A.* 27, 1871 — ( $m\text{-O}_2\text{NC}_6\text{H}_4$ )<sub>2</sub>AsOH (I) (6 g.) in 120 cc. hot AcOH and 22 cc. 50%  $\text{H}_3\text{PO}_2$  contg. 2 drops HI give 3.3 g. 3,3',3'',3'''-tetranitrotetraphenylbiarsyl, pale yellow, m. 203-4°; I gives 3,3'-dimutrodiphenyliodoarsine, m. 94-5°, also prepd. from I and AcOH-HI.  $\text{SO}_2$  passed into ( $m\text{-H}_2\text{NC}_6\text{H}_4$ )<sub>2</sub>AsOH (II) in concd. HCl contg. a little HI gives 3,3',3'',3'''-tetraaminotetraphenylarsyl oxide (III), a gum, whose tetra-Ac deriv. m. 236-7°. 3,3',3'',3'''-Tetraaminotetraphenylbiarsyl (IV), m. 168-9° (N atm.), was prepd. from III ( $3\text{-H}_2\text{NC}_6\text{H}_4$ )<sub>2</sub>AsH or  $\text{PhAsH}$ , from ( $\text{PhAs}$ )<sub>2</sub>O and ( $3\text{-H}_2\text{NC}_6\text{H}_4$ )<sub>2</sub>AsH or by reduction of II with  $\text{H}_3\text{PO}_2$ . The tetra-HCl salt of IV m. 283° (decompn.); the tetra-Ac deriv. m. above 300° and absorbed  $\text{O}_2$  very slowly.

C. J. West  
Hydrolysis of substituted benzenesulfonamides. R. S. Schreiber and R. L. Shriner. *J. Am. Chem. Soc.* 56, 114 7(1934).—Substituted benzenesulfonamides contg.  $\text{NO}_2$  groups ortho or para to the sulfone group may be decompd. by concd. alkali to the amine,  $\text{O}_2\text{NC}_6\text{H}_4\text{OH}$  and  $\text{Na}_2\text{SO}_3$ . This cleavage between the C of the ring and the S atom offers a different mode of decompn. from previous hydrolyses which attempted cleavage between the S and N. An *o*- $\text{NO}_2$  group is more effective than a *p*- $\text{NO}_2$  group and a *m*-group has little effect. The 2,4-di- $\text{NO}_2$  derivs. were very readily cleaved by alkali. A mixt. of primary, secondary and tertiary amines may be sepd. satisfactorily by means of *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{SO}_2\text{Cl}$  and the amines recovered from the sulfonamides in good yields. The anilides were prepd. from the amine and chloride with cooling, adding HCl after 15 mins. stirring. 2-Nitrobenzenesulfonamide, m. 114-5° (74% yield); 4- $\text{NO}_2$  isomer, m. 135-6° (74%); 3- $\text{NO}_2$  isomer, m. 122 3° (81%); 2,4-di- $\text{NO}_2$  deriv., m. 112 13° (83%); 2-nitrobenzenesulfonmethylanilide, m. 71-2° (73%); 4- $\text{NO}_2$  isomer, m. 117-8° (65%); 2,4-di- $\text{NO}_2$  deriv., m. 148-49° (92%). A table gives the percentage yield of amine with 20, 30, 40 and 80% NaOH.

C. J. West  
Iodo derivatives of diphenyl ether. I. The mono- and certain diiodo derivatives of diphenyl ether and of 2- and 4-carboxydiphenyl ethers. R. Q. Brewster and Franklin Strain. *J. Am. Chem. Soc.* 56, 117-20(1934).—Most of the following compds. were prepd. by standard methods. 2- $\text{IC}_6\text{H}_4\text{OPh}$ , m. 58°; 3-*I* isomer, b<sub>2</sub> 155°, b<sub>3</sub> 194-6°, d<sub>25</sub> 1.616, n<sub>D</sub> 1.643; 4-*I* isomer, m. 47°; 2-iodo-4'-nitro deriv., m. 104°; 4-*I* isomer, m. 70°; 2-iodo-4'-amino deriv., m. 69° (Ac deriv., m. 150°); 2- $\text{IC}_6\text{H}_4\text{OC}_6\text{H}_4\text{I}$ -4, m. 48°; 2-nitro-4'-iododiphenyl ether, m. 86° (constitution proved for 1st time); 3,4'-dinutrodiphenyl ether, m. 123°; 3,4'-diamino deriv., m. 72° (di-Ac deriv., m. 192°); 3,4'-diiododiphenyl ether, b<sub>2</sub> 200°, d<sub>25</sub> 2.051, n<sub>D</sub> 1.696; 4-phenoxyphenylurethane, m. 63°; 4-iodophenoxy deriv., m. 126°; 4-(4-iodophenoxy)phenylurea, m. 201°; (4- $\text{IC}_6\text{H}_4$ )<sub>2</sub>O, m. 139°; 2-amino-4-nitrodiphenyl ether, m. 107°; 2-*I* deriv., m. 61°; 2-iodo-4-amino deriv., b<sub>2</sub> 203°, d<sub>25</sub> 1.667, n<sub>D</sub> 1.677 (Ac deriv., m. 120°); 2,4-diiododiphenyl ether, b<sub>2</sub> 198°, d<sub>25</sub> 2.056, n<sub>D</sub> 1.700; 3-nitro-4-aminodiphenyl ether, m. 82°; 3,4'-diamino deriv., m. 69° (di-Ac deriv., m. 188°); 3-nitro-4-iodo deriv., b<sub>2</sub> 195°, d<sub>25</sub> 1.722, n<sub>D</sub> 1.657; 3-amino deriv., b<sub>2</sub> 188°, d<sub>25</sub> 1.664, n<sub>D</sub> 1.676 (Ac deriv., m. 144°); 3,4'-di-*I* deriv., b<sub>2</sub> 208°, d<sub>25</sub> 2.055, n<sub>D</sub> 1.700; *o*- $\text{ClC}_6\text{H}_4\text{CO}_2\text{H}$ ,  $\text{PhOH}$ , NaOH and a little Cu, heated at 190° for 15 min. give 2- $\text{PhOC}_6\text{H}_4\text{CO}_2\text{H}$ ; *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  and *o*- $\text{KOC}_6\text{H}_4\text{CHO}$ , heated 6 hrs. at 190-200°, give 2-(4-nitrophenoxy)benz-

aldehyde, m. 112°; oxidation of the aldehyde or nitration of 2-PhOC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H gives the corresponding acid, m. 187°; 4-amino deriv., m. 180° (Ac deriv., m. 185°); 4-I deriv., m. 143°; heating the latter with concd. H<sub>2</sub>SO<sub>4</sub> at 100° for 10 min. gives 2-iodoxanthone, m. 150°. 2-Phenoxy-5-aminobenzoic acid, m. 164° (Ac deriv., m. 165°); 5-I deriv., m. 148°. 2-(2-Nitrophenoxy)benzaldehyde, m. 77°; the acid m. 153°; 4-nitroxanthone, m. 190°; 2-(2-aminophenoxy)benzoic acid, m. 153° (Ac deriv., m. 179°); the lactam m. 211°. 2-(2-Iodophenoxy)benzoic acid, m. 133°; the 4-(4-iodophenoxy) deriv. m. 217°; 2-(4-iodophenoxy)-5-nitrobenzoic acid, m. 178°; the 5-amino deriv. m. 185°; 2-(4-nitrophenoxy)-5-nitrobenzoic acid, the α-form m. 158° and the β-form m. 170-1°; the α-form is converted into the β-form above its m. p.; 2-(4-iodophenoxy)-5-iodobenzoic acid, m. 176°. These compds., with the possible exception of the iodocarboxy compds., do not possess any marked physiol. activity. C. J. W.

Chlorination with dichlorourea. M. V. Likhoshesterov. *J. Gen. Chem.* (U. S. S. R.) 3, 164-71 (1933).—Chlorination with dichlorourea (I) in alk. or neutral soln. is usually accompanied by oxidative processes leading to the formation of gaseous or tarry products. Urotropin is exceptional and can be chlorinated to give dichloropentamethylenetetramine. Also picric acid in Na<sub>2</sub>CO<sub>3</sub> soln. gives some chloropicrin. In the presence of HCl, which acts catalytically, chlorination with I is rapid, proceeds without formation of gases or tar, and can be used to prep. mono- and poly-Cl compds. in aq. soln. Compds. which already contain substituents facilitating halogenation are very smoothly chlorinated by I. PhH, PhMe and C<sub>6</sub>H<sub>5</sub>Me<sub>2</sub> are difficultly chlorinated with I even with heat and catalysts. Thus PhH when boiled with I in the presence of a trace of I<sub>2</sub> gives PhCl, Cl<sub>2</sub>, HCl and NCl<sub>3</sub>. AcOH can be chlorinated similarly in the presence of S. EtOH with the same treatment gives a colorless substance, insol. in H<sub>2</sub>O and sol. in EtOH, which contains C, H, N and Cl. Aromatic amines are strongly oxidized by I with evolution of heat and sometimes with explosive violence. I with dil. aq. or EtOH solns. of amines gives intense colors suitable for sensitive qual. tests, e. g., PhNMe<sub>2</sub> in EtOH soln. gives a green color detectable at a concn. of 1:100,000. Acylated amines can be chlorinated smoothly. An aq. suspension of PhNHAc with I and concd. HCl gives o- and p-ClC<sub>6</sub>H<sub>4</sub>NHAc. Of the dihydric phenols, resorcinol (II) reacts quantitatively, giving mono-, di- and trichlororesorcinols. 4-Chlororesorcinol (III): II (16.5 g.) in 75 cc. H<sub>2</sub>O with 10.17 g. I and 1 cc. concd. HCl gave a reddish soln. with evolution of heat. Cooling was used to keep the temp. below 35°. Extn. with Et<sub>2</sub>O followed by evapn. of the Et<sub>2</sub>O gave a thick liquid which yielded wart-like crystals on standing. Distn. of these gave A b. 256-9°, m. 81°, and B b. 259-60°, m. 88° with evolution of HCl. A 2nd distn. did not give a product with higher m. p. Crystn. of B from PhH gave III, m. 102.5°, b. 259.5° (uncor.). Recrystn. of A from PhH gave a small quantity of substance, m. 94°, differing from III in cryst. habit. III could also be prepd. by chlorination of II in MeOH soln. 4,6-Dichlororesorcinol (IV): Mol. quantities of I and II gave IV, m. 113°. Hydrated IV m. 70°. II (5.5 g.) in 35 cc. of H<sub>2</sub>O, 0.7 g. I and 2 cc. concd. HCl with cooling gave a reddish yellow soln., which after standing several hrs. was treated with Et<sub>2</sub>O, pptg. a reddish brown oil. This crystallizes on standing under reduced pressure. Sublimation of these crystals under reduced pressure gave long silky needles, m. 110-11°. By fractional crystn. from H<sub>2</sub>O a small quantity of substance differing from IV was obtained, probably 2,4-dichlororesorcinol. IV was also prepd. by chlorinating in MeOH, AcOH or Et<sub>2</sub>O. IV is easily sol. in H<sub>2</sub>O, EtOH and Et<sub>2</sub>O, and can be recrystd. from ligroin. The H<sub>2</sub>O soly. of hydrated IV is less than that of anhyd. IV. 2,4,6-Trichlororesorcinol (V): Addn. of the theoretical quantity of I to a dil. aq. soln. of II gave V, recrystd. from H<sub>2</sub>O, m. 83°. 4-Bromo-6-chlororesorcinol (VI) and 4-bromo-2,6-dichlororesorcinol (VII): 4-bromoresorcinol (VIII) (3.8 g.) in 20 cc. H<sub>2</sub>O, a 10% excess of I, and a few drops of HCl reacted with

the evolution of heat and the production of a yellow soln. which was extd. with Et<sub>2</sub>O, the Et<sub>2</sub>O removed, and the residue allowed to crystallize. This crystd. from warm ligroin as a voluminous flocculent mass, easily sublimed. Recrystn. of the sublimate from ligroin gave VI, m. 108.5°. No isomer of VI was isolated. VI is easily sol. in H<sub>2</sub>O, EtOH, Et<sub>2</sub>O and AcMe, somewhat more difficultly in CHCl<sub>3</sub>, PhH and CS<sub>2</sub>. VIII (3.8 g.) in 75 cc. H<sub>2</sub>O, 2.8 g. I and a few drops of HCl gave a voluminous white substance in theoretical yield, which, recrystd. from H<sub>2</sub>O, formed VII, needles, m. 78.5°, very sol. in Et<sub>2</sub>O, AcMe and EtOH from which solns. it is pptd. by H<sub>2</sub>O. VII is more difficultly sol. in cold PhH or CHCl<sub>3</sub>. L. W. B.

Bromination with dichlorourea and potassium bromide M. V. Likhoshesterov. *J. Gen. Chem.* (U. S. S. R.) 3, 172-6 (1933).—Bromination with dichlorourea (I) and KBr is especially valuable for the prepn. of mono- and di-Br derivs. of phenols and aromatic amines in water. Cl derivs. are not formed because of the relatively slow speed of the chlorination reaction. Bromination is attributed to the action of free HBrO formed by the hydrolysis of unstable CO(NHBr)<sub>2</sub>. When the bromination was carried out in neutral soln. considerable oxidation occurred with the formation of tarry products. In the presence of H<sub>2</sub>SO<sub>4</sub> the amt. of oxidation was greatly reduced. The present paper describes the prepn. of 4-bromo- (II), 4,6-dibromo- (III), 2,4,6-tribromo- (IV), 4-chloro-2,6-dibromo- (V), and 4,6-dichloro-2-bromoresorcinol (VI). In the prepn. of III an acid environment gave the highest yield, since in neutral soln. II and IV were also formed. KBr (23.8 g.) in 50 cc. H<sub>2</sub>O, added in large portions to a mixt. of 22 g. resorcinol (VII) in 80 cc. H<sub>2</sub>O and 13.5 g. I with const. shaking and cooling, gave a reddish brown soln., which was extd. with Et<sub>2</sub>O, the Et<sub>2</sub>O evapd., and the thick dark, oily residue allowed to crystallize by standing for several days in a vacuum desiccator over H<sub>2</sub>SO<sub>4</sub>. The crystals by repeated extn. with hot ligroin gave II, m. 99°, very sol. in H<sub>2</sub>O, EtOH, and Et<sub>2</sub>O, much less sol. in PhH, CHCl<sub>3</sub>, and cold ligroin. Aq. II gave a blue color with FeCl<sub>3</sub>. KBr (23.8 g.) in 40 cc. of H<sub>2</sub>O, added in large portions to a mixt. of 11 g. VII in 40 cc. of H<sub>2</sub>O and 13.4 g. I with cooling, gave an oily substance which was dissolved, except for a small residue of IV, in a small amt. of warm H<sub>2</sub>O. Extn. of the aq. soln. with Et<sub>2</sub>O followed by removal of the Et<sub>2</sub>O gave a crystallizable residue. Extn. of this with cold H<sub>2</sub>O removed II. The remaining III, after recrystn. from H<sub>2</sub>O and drying in a vacuum desiccator, m. 115°. III sublimes, is sol. in EtOH and Et<sub>2</sub>O, and is colored blue by FeCl<sub>3</sub>. The theoretical proportions of KBr and I with VII gave IV, recrystd. from dil. EtOH, m. 110°. V, prepd. by the action of 2 mols. Br upon chlororesorcinol, m. 104°. Dichlororesorcinol (1.8 g.), m. 113°, in 75 cc. H<sub>2</sub>O, with 1.2 g. KBr and 0.8 g. I gave a ppt. which was repeatedly crystd. from hot H<sub>2</sub>O, giving VI, needles, m. 101°, sol. in Et<sub>2</sub>O, EtOH and AcMe, from which solns. it is pptd. by H<sub>2</sub>O. Lewis W. Butz.

Iodination with dichlorourea and potassium iodide M. V. Likhoshesterov and R. I. Trimbali. *J. Gen. Chem.* (U. S. S. R.) 3, 177-82 (1933).—Resorcinol (I) (2.2 g.) and 4 g. KI in 25 cc. H<sub>2</sub>O, acidified with 3 drops of concd. H<sub>2</sub>SO<sub>4</sub> with 1.4 g. of finely powd. dry dichlorourea (II) added with const. shaking gave a nearly colorless soln. free from I<sub>2</sub>. Addn. of Na<sub>2</sub>SO<sub>3</sub>, extn. with Et<sub>2</sub>O and removal of the Et<sub>2</sub>O under reduced pressure gave an oil which crystd. readily. The crystals were filtered with suction and recrystd. by dissolving in a small quantity of H<sub>2</sub>O at 50-60° and allowing the soln. to cool. Fine white needles with 1 H<sub>2</sub>O, m. 83°. Upon standing in the air the H<sub>2</sub>O is gradually lost, giving anhyd. iodoresorcinol (III), m. 100°, easily sol. in hot H<sub>2</sub>O, EtOH, Et<sub>2</sub>O, CHCl<sub>3</sub>, AcMe and CS<sub>2</sub>. In the prepn. of 4,6-diiodoresorcinol (V) there was obtained about 40% of by-products, chiefly III and triiodoresorcinol (IV). II (6.8 g.) was added in portions to a mixt. of 5.5 g. I and 16 g. of finely powd. KI in 75 cc. of glacial AcOH. Cooling, addn. of Na<sub>2</sub>SO<sub>3</sub> followed by H<sub>2</sub>O to 400 cc., removal of the pptd. IV, extn. of the filtrate with Et<sub>2</sub>O and re-

removal of the  $\text{Et}_2\text{O}$  gave a mass which crystd. on standing. III was removed by dissolving in EtOH and adding  $\text{H}_2\text{O}$  until an emulsion formed. On standing V crystd., m.  $84^\circ$ , sol. in EtOH,  $\text{Et}_2\text{O}$ , PhH,  $\text{CHCl}_3$  and  $\text{CS}_2$ . IV was prepd. by treating 1 mol. I in dil. aq. soln. with 3 mols. KI and 1.5 mols. II. 4-Chlororesorcinol (1 mol.), 2 mols. KI and 1 mol. II in neutral aq. soln. gave a dark brown product. From this in EtOH addn. of  $\text{H}_2\text{O}$  gave a purified ppt. which by redissolving in EtOH and reprecip. gave 4-chloro-2,6-diiodoresorcinol, needles, m.  $106^\circ$ . Equiv. quantities of KI and II with 4-chlororesorcinol in water acidified with  $\text{H}_2\text{SO}_4$  gave, after treatment of the 1st brown product with  $\text{NaHSO}_3$  and recrystn. from warm benzene, 4-chloro-6-iodoresorcinol, m.  $71.4^\circ$ . Equiv. quantities of KI and II gave with 4,6-dichlororesorcinol in  $\text{H}_2\text{O}$  acidified with  $\text{H}_2\text{SO}_4$  2-iodo-4,6-dichlororesorcinol, m.  $94^\circ$ . III and II in equiv. quantities in glacial AcOH poured into dil. HCl and then dild. with  $\text{H}_2\text{O}$  gave 4-iodo-2,6-dichlororesorcinol, colorless crystals (from hot benzene), m.  $92.6^\circ$ . By similar procedures were prepd. bromoiodoresorcinol (monohydrate), m.  $65^\circ$ , (anhyd.) m.  $87.6^\circ$ , and 4-iodo-2,6-dibromoresorcinol, m.  $112.2^\circ$ .

Lewis W. Butz

**The preparation of aromatic thiocyanates with the aid of dichlorourea.** M. V. Likhoshervostov and A. A. Petrov. *J. Gen. Chem.* (U. S. S. R.) 3, 183-97 (1933).—Dichlorourea (I) and  $\text{NH}_4\text{SCN}$  react slowly in dil. aq. soln. giving pseudothiocyanogen (II), urea,  $\text{H}_2\text{SO}_4$ , HCN, HSCN and HCl. The formation of these substances may be explained by postulating the intermediate formation and hydrolysis of  $\text{CO}(\text{NHSCN})_2$  (III), the following reactions occurring: (1)  $\text{CO}(\text{NHCl})_2 + 2\text{NH}_4\text{SCN} \rightarrow \text{CO}(\text{NHSCN})_2 + 2\text{NH}_4\text{Cl}$ , (2)  $\text{CO}(\text{NHSCN})_2 + 2\text{HOH} \rightarrow \text{CO}(\text{NH}_2)_2 + 2\text{HOSCN}$ , (3)  $2\text{HOSCN} \rightarrow \text{HSCN} + \text{NCSO}_2\text{H}$ , (4)  $\text{NCSO}_2\text{H} + \text{HOSCN} \rightarrow \text{HSCN} + \text{NC}_2\text{SO}_2\text{H}$ , (5)  $\text{NCSO}_2\text{H} + \text{H}_2\text{O} \rightarrow \text{HCN} + \text{H}_2\text{SO}_4$ . More concd. solns. of I and  $\text{NH}_4\text{SCN}$  react more quickly with evolution of heat, giving considerable quantities of II. In AcMe II is formed together with theoretical yields of urea and  $\text{NH}_4\text{Cl}$ . The reaction in MeOH is similar, yielding II, but in addn. a white substance, sol. in EtOH, insol. in  $\text{H}_2\text{O}$ , contg. much C, and exhibiting reducing properties. This unidentified substance reacts energetically with concd.  $\text{HNO}_3$  with formation of free C. An  $\text{Et}_2\text{O}$  soln. of  $\text{Hg}(\text{SCN})_2$  (made by shaking  $\text{HgCl}_2$  in  $\text{Et}_2\text{O}$  with  $\text{NH}_4\text{SCN}$  and filtering out the  $\text{NH}_4\text{Cl}$ ) with the exactly theoretical quantity of I in  $\text{Et}_2\text{O}$  gave a transparent soln. free from I. This reacted with  $\text{PhNH}_2$  with pptn. of urea, furnishing evidence of III in the  $\text{Et}_2\text{O}$  soln. Likewise the red color of  $\text{Fe}(\text{SCN})_3$  in  $\text{Et}_2\text{O}$  is changed to the yellow of  $\text{FeCl}_3$  by the addn. of I. III could not be isolated from its soln. in  $\text{Et}_2\text{O}$  or EtOH. All aromatic compds. contg. substituents favoring the introduction of halogen can be thiocyanated with I and  $\text{NH}_4\text{SCN}$ . The reaction occurring is  $2\text{RH} + 2\text{NH}_4\text{SCN} + (\text{NHCl})_2\text{CO} \rightarrow 2\text{RSCN} + 2\text{NH}_4\text{Cl} + (\text{NH}_2)_2\text{CO}$ , since the urea and  $\text{NH}_4\text{Cl}$  can be quantitatively recovered. Phenols were best thiocyanated in aq. AcOH, amines in EtOH or AcMe, and diamines and amino acids in AcOH or aq. EtOH. AcMe was especially suitable because most aromatic compds. and  $\text{NH}_4\text{SCN}$  are sol. therein, I acts upon AcMe only very slowly, and, since  $\text{NH}_4\text{Cl}$  is insol., the course of the reaction can be followed. The pptn. of orange II along with  $\text{NH}_4\text{Cl}$  indicates the absence of thiocyanation. A few drops of  $\text{H}_2\text{SO}_4$  improve the quality and yield of product. Cooling and const. shaking during the introduction of I are required.  $\text{PhNMe}_2$  (5.63 g.) and 3.54 g.  $\text{NH}_4\text{SCN}$  in 40 cc. AcMe with 3 g. I in 20 cc. AcMe gave, after filtration of the pptd.  $\text{NH}_4\text{Cl}$ , evapn. of the AcMe, and twice washing with alc., *p*-dimethylaminophenyl thiocyanate, m.  $73.4^\circ$ . Recrystn. from EtOH or  $\text{Et}_2\text{O}$  did not raise the m. p.  $\text{PhNH}_2$  (2.86 g.) and 2.5 g.  $\text{NH}_4\text{SCN}$  in 20 cc. of 60% MeOH, 3-5 drops of concd.  $\text{H}_2\text{SO}_4$ , and 2 g. I in 15 cc. of MeOH gave the sulfate of *p*-aminophenyl thiocyanate (IV) which was filtered and converted on the filter with  $\text{Na}_2\text{CO}_3$  soln. to the free base IV (yield 80%), m.  $56-7^\circ$  after recrystn. 2 mols. of I and  $\text{NH}_4\text{SCN}$  in AcMe,  $\text{PhNH}_2$  gave

80% of 2,4-dithiocyananiline, m.  $108^\circ$  from EtOH or PhH.  $\alpha\text{-C}_6\text{H}_4\text{NH}_2$  (V) (4.4 g.) and 2.4 g.  $\text{NH}_4\text{SCN}$  in 20 cc. MeOH with 2 g. I in 10 cc. MeOH gave a product which was treated with large quantities of  $\text{H}_2\text{O}$ , whereupon 70-80% of readily crystallizable yellow oil formed. Recrystn. from aq. alc. gave 4-thiocyano- $\alpha$ -naphthylamine, m.  $140^\circ$ . V (2.2 g.) and 2.36 g.  $\text{NH}_4\text{SCN}$  in 20 cc. AcMe with 2 g. I in 15 cc. AcMe gave 2,4-dithiocyano- $\alpha$ -naphthylamine, decomp.  $204^\circ$ .  $\text{NH}_4\text{Cl}$  was filtered from the reaction mixt. while still warm and the filtrate on cooling gave needles of the above product which were recrystd. from EtOH. Addn. of  $\text{H}_2\text{O}$  to the mother liquor gave more product. L. and P. prepd. for the 1st time 4-thiocyano- (VI), and 4,6-dithiocyano-*m*-phenylenediamine (VII) and dithiocyanobenzidine (VIII). *p*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$ , because of its ready oxidizability, did not give a thiocyano deriv., and the monothiocyanobenzidine could not be sepd. from the accompanying oxidation products. *m*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$  (1.68 g.) and 1.2 g.  $\text{NH}_4\text{SCN}$  in 20 cc. of 80% AcOH with 1 g. I in 10 cc. AcOH gave, after dildn. of the reaction mixt. with  $\text{H}_2\text{O}$ , VI, m.  $160-1^\circ$  from MeOH, sol. in EtOH,  $\text{Et}_2\text{O}$ , AcMe and AcOH, insol. in  $\text{H}_2\text{O}$  and PhH. *m*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$  with 2 mols. I and  $\text{NH}_4\text{SCN}$  gave VII, recrystd. from EtOH, m.  $170-2^\circ$  (decompn.), rhombic, less sol. than VI. VI (1.28 g.) and 1.84 g. KBr in 25 cc. 80% AcOH with 1 g. I in 15 cc. AcOH gave on cooling silvery crystals with a metallic luster, 4-thiocyano-6-bromo-*m*-phenylenediamine (IX). The  $\text{NH}_2$  groups in IX did not diazotize easily. IX decompd. on warming and was less sol. than VI. Benzidine (1.4 g.) and 1.2 g.  $\text{NH}_4\text{SCN}$  in 30 cc. AcOH with 1 g. I in 15 cc. AcOH gave, by pptn. from the reaction mixt. with  $\text{H}_2\text{O}$  and recrystn. of the ppt. from EtOH, VIII, decomp.  $250^\circ$ , difficultly sol. in EtOH, insol. in  $\text{H}_2\text{O}$ , sol. in AcOH and AcMe. 4-Thiocyananthranilic acid (X) and 4-thiocyano-1-aminobenzene-3-carboxylic acid (XI) were prepd. for the 1st time. Anthranilic acid (2.12 g.) and 1.2 g.  $\text{NH}_4\text{SCN}$  in 30 cc. AcMe with 1 g. I in 10 cc. AcMe gave on dildn. 80% of X, recrystd. from hot  $\text{H}_2\text{O}$ , needles, m.  $168-70^\circ$ . X is insol. in cold  $\text{H}_2\text{O}$ , sol. in hot  $\text{H}_2\text{O}$ , EtOH,  $\text{Et}_2\text{O}$ , AcMe and hot AcOH. *m*- $\text{NH}_2\text{C}_6\text{H}_4\text{CO}_2\text{H}$ , by a similar procedure, gave XI, decomp. on warming, insol. in  $\text{H}_2\text{O}$ , sol. in EtOH,  $\text{Et}_2\text{O}$  and AcMe. PhOH and  $\text{NO}_2\text{C}_6\text{H}_4\text{OH}$  could not be thiocyanated with I and  $\text{NH}_4\text{SCN}$ . Hydroquinone and pyrocatechol were first converted to the corresponding quinones, then to the monothiocyanophenols, and finally to esters of thiocarbamic acid,  $\text{C}_6\text{H}_5(\text{OH})_2\text{SCONH}_2$ . Resorcinol did not give a thiocyano deriv.  $\alpha$ - (XII) and  $\beta$ -Naphthol (XIII) gave thiocyano derivs. with the same exptl. procedure. In the case of XIII there was formed at the same time a dark-red substance yielding on standing colorless needles of unknown compn. but not contg. a thiocyano group. 1-Thiocyano- $\beta$ -naphthol is readily decompd. with  $\text{H}_2\text{O}$ , giving a yellow solid which cannot be diazotized. XII (2.22 g.) in 20 cc. AcOH, 1.2 g.  $\text{NH}_4\text{SCN}$  in 5 cc.  $\text{H}_2\text{O}$ , and 1 g. of dry I, mixed in the order mentioned, gave on dildn. the mixt. with 3 parts of  $\text{H}_2\text{O}$ , 75% of 4-thiocyano- $\alpha$ -naphthol, m.  $112-13^\circ$  from EtOH and  $\text{H}_2\text{O}$ , sol. in EtOH,  $\text{Et}_2\text{O}$ , difficultly sol. in AcMe, and insol. in  $\text{H}_2\text{O}$ . XII with 2 mols.  $\text{NH}_4\text{SCN}$  and I gave 2,4-dithiocyano- $\alpha$ -naphthol, long yellow needles from EtOH and hot  $\text{H}_2\text{O}$ , m.  $118^\circ$  (decompn.), sol. in the common org. solvents. The yields of aromatic thiocyanates obtained by L. and P. are usually about 4-5 times those reported previously.

Lewis W. Butz

**Pseudoquinonoid character of tribromoresorcinol.** Tenney L. Davis and Valentine F. Harrington. *J. Am. Chem. Soc.* 56, 129-32 (1934).—1,3,2,4,6-(HO) $_2\text{C}_6\text{HBr}_3$  (I) evidently exists in the tautomeric pseudoquinonoid form, for the effect of reagents upon it is the effect which the reagents would be expected to have upon the pseudoquinone or upon the 2,6-dibromo-3-hydroxy-4-benzoquinyl, which corresponds to the loss of HBr from that tautomer. I is definitely an oxidizing agent, liberating I from  $\text{HI}$  or from KI in EtOH; it oxidizes  $\text{SnCl}_2$  and  $\text{Na}_2\text{SO}_3$ .  $\text{C}_6\text{H}_5\text{N}$  or alkali, by removing HBr from I, produces dark amorphous polynuclear compds. but dry  $\text{C}_6\text{H}_5\text{N}$  in  $\text{C}_6\text{H}_6$  or aq. alkali in

large excess, by forming salts of I in its phenol form, reverses the equil. and suppress quinuonization and the formation of the quinyl radical. Mild reduction of I with  $\text{Na}_2\text{SO}_3$  or  $\text{SnCl}_2$  successively removes the Br atoms para to the HO groups and ceases with the production of 2-bromo-resorcinol, m. 101.2-2°; the 2,4-di-Br deriv. m. 92.8-3.7°. Oxidation of the Me ether of I gives 2-methoxy-3,5,6-tri-bromobenzoquinone, red, m. 168-8.5°, also prepd. by bromination of 2-methoxyhydroquinone; reduction with  $\text{SO}_2$  gives the hydroquinone, m. 175-6°; with 2 N KOH there results methylbromosulfate, does not m. 350°.

C. J. West

**Preparation and enzymic splitting of basic glucosides.** Burekhardt Heflerich, Erich Günther and Siegfried Winkler. *Ann.* 508, 192-205 (1934).—Tetraacetyl-*o*-cresol- $\beta$ -D-glucoside, m. 142-4° (all m. ps. cor.),  $[\alpha]_D^{25}$  -27.5° ( $\text{CHCl}_3$ ), gives an *o*-bromo-*o*-cresol deriv. (I), m. 158-60°,  $[\alpha]_D^{25}$  35.2°; in  $\text{MeOH-NH}_4\text{OH}$  satd. with  $\text{NH}_3$  9 g. I gives 4 g. *o*-(aminomethyl)phenol  $\beta$ -D-glucoside, m. 182-5°,  $[\alpha]_D^{25}$  -64.2° ( $\text{H}_2\text{O}$  contg. AcOH); *N*-Ac deriv., m. 195-6°,  $[\alpha]_D^{25}$  -33.3°; penta-Ac deriv., m. 140-2°,  $[\alpha]_D^{25}$  -64.5° ( $\text{CHCl}_3$ ). Tetraacetyl-*p*-cresol- $\beta$ -D-glucoside, m. 116-8°,  $[\alpha]_D^{25}$  -17.6°; *o*-bromocresol deriv. (II), m. 155-8°,  $[\alpha]_D^{25}$  -19° ( $\text{CHCl}_3$ ); *p*-(aminomethyl)phenol  $\beta$ -D-glucoside, m. 140°,  $[\alpha]_D^{25}$  -70.1° ( $\text{H}_2\text{O}$  contg. AcOH); the HBr salt m. 197° (decompn.); *N*-Ac deriv., crystals with 1 mol.  $\text{H}_2\text{O}$ , m. 130-2°,  $[\alpha]_D^{25}$  -53.8° ( $\text{H}_2\text{O}$ ); penta-Ac deriv., m. 123-5°,  $[\alpha]_D^{25}$  -14.9° ( $\text{CHCl}_3$ ); with emulsin the *N*-Ac deriv. gives *N*-acetyl-*p*-hydroxybenzylamine, m. 135-7°, and glucose. II and  $\text{Ag}_2\text{CO}_3$  in  $\text{Me}_2\text{CO}$  give the tetra-Ac deriv., m. 107-10°,  $[\alpha]_D^{25}$  -18° ( $\text{CHCl}_3$ ), of *p*-(hydroxymethyl)phenol  $\beta$ -D-glucoside, m. 136-8° and 114-8° (dimorphous),  $[\alpha]_D^{25}$  -65.8° ( $\text{H}_2\text{O}$ ). *o*-(Aminomethyl)phenol  $\beta$ -D-galactoside, m. 218-20°,  $[\alpha]_D^{25}$  -35° ( $\text{H}_2\text{O}$ ); *N*-Ac deriv., m. 211-12°,  $[\alpha]_D^{25}$  -19.7° ( $\text{H}_2\text{O}$ ). Tetraacetyl-*p*-cresol- $\beta$ -D-galactoside, m. 105-7°,  $[\alpha]_D^{25}$  3.9° ( $\text{CHCl}_3$ ); *o*-bromo-*p*-cresol deriv., m. 104-7°,  $[\alpha]_D^{25}$  -1.2° ( $\text{CHCl}_3$ ); *p*-(aminomethyl)phenol  $\beta$ -D-galactoside, m. 206-8°,  $[\alpha]_D^{25}$  -45.7° ( $\text{H}_2\text{O}$  and AcOH); penta-Ac deriv., m. 131-2°; *N*-Ac deriv., m. 166-8°. The comps. of  $\beta$ -D-glucoside in their reaction with emulsin stand in the following order: *o*-acetamido 33, *p*-isomer 4.8, *o*-amino 1.3, *p*-amino 1;  $\beta$ -D-galactoside: *o*-acetamido 60, *p*-isomer 4, *o*-amino 1.8, *p*-amino 1. Splitting by acids was in the following order for the  $\beta$ -D-glucosides: *o*-acetamido 7, *p*-isomer 16, *o*-amino 1, *p*-amino 13;  $\beta$ -D-galactosides: *o*-acetamido 3.5, *p*-isomer 0.2, *o*-amino 1, *p*-amino 0.5.

C. J. West

**The constitution of resorcinol and acetylacetone viewed from the Raman effect.** Taro Hayashi. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 16-21 (1933); cf. *C. A.* 27, 3700. Repetition of earlier work supports the diketone tautomer of  $m\text{-C}_6\text{H}_4(\text{OH})_2$  previously postulated by H. (cf. Kohrausch *C. A.* 27, 3841). Repetition of measurements on  $\text{CH}_3\text{C}=\text{CH}(\text{OH})\text{C}(\text{Me})_2$  leads H. to postulate the equil.  $\text{MeCOCH}_2\text{C}(\text{Me})=\text{MeC}(\text{OH})\text{:CHC}(\text{Me})_2$  for this substance.

W. Gordon Rose

**A new method of synthesis of derivatives of quinoline.** IV. K. Dzewoński, J. Moszew, T. Chechliński and I. Pietrzykowska. *Roczniki Chem.* 13, 530-9 (1933) (in French 539); cf. *C. A.* 27, 5331.—2-*p*-Tolyl-4-phenylaminoquinoline (I) is obtained by heating 21 g. *p*- $\text{MeC}_6\text{H}_4\text{C}(\text{Me})_2$  (II) and 35.7 g.  $\text{CS}(\text{NHPh})_2$  for 6 hrs. at 180-260°. The solidified mass is powd. and treated with small aints. of  $\text{C}_6\text{H}_6$ . The difficultly sol. product sepd. and purified from EtOH m. 139-40°, sol. in glacial HOAc and with violet fluorescence in cold concd.  $\text{H}_2\text{SO}_4$ ; picrate, m. 240°; HCl salt, m. 175-6°; nitroso deriv., m. 185-6° (decompn.); Ac deriv. m. 154-5°. 2-Tolyl-4-hydroxyquinoline, prepd. by adding 5 g. of I to 30 g. melted KOH at 160°, heating to 300° for 15 min., cooling, powdering, dissolving in  $\text{H}_2\text{O}$ , filtering, acidifying with concd. HCl, sepg. and warming in dil.  $\text{Na}_2\text{CO}_3$ , crystals from alc., m. 277-8°. 2-*p*-Tolyl-4-(*p*-tolylamino)-6-methylquinoline (III) is obtained by heating 15 g. II with 28 g. of di-*p*-tolylthiourea for 5-6 hrs. at 180-260°, and purify as for I; yield 40%, sol. in HOAc and  $\text{H}_2\text{SO}_4$  as in I; picrate, m. 267-8°; HCl salt, m. 302-3°; nitroso compd., m. 202°; Ac

deriv., m. 164-5°. 2-*p*-Methoxyphenyl-4-phenylaminoquinoline (IV) was prepd.: (1) by heating 5 g. *p*-acetoanisole (V) and 7.6 g.  $\text{CS}(\text{NHPh})_2$  for 6 hrs. at 160-260°, cooling, dissolving in a small amt. of alc., adding dil.  $\text{H}_2\text{SO}_4$ , heating to boiling for a short time, washing with dil. alc., dissolving in alc., making alk. with  $\text{Na}_2\text{CO}_3$ ; crystals from alc. m. 190°; (2) by heating  $\text{PhNCS}$  with the aml of V. Picrate of IV, m. 257°; nitrate, m. 205° (decompn.); nitroso compd., m. 212° (decompn.); Ac deriv., m. 132°.

C. T. Ichniowski

**Preparation of *p*-nitrosophenol by direct nitrosation of phenol.** Chao-Lun Tseng and Mei Hu. *J. Chinese Chem. Soc.* 1, 183-7 (1933).—The direct nitrosation method of Baeyer and Caro is revised by using a higher concn. of reaction mixt. (50 g. PhOH and 200 g.  $\text{KNO}_2$  in 1 l.  $\text{H}_2\text{O}$ ), and a lower temp. (-10°), making possible a yield of 90%. The crude *p*-nitrosophenol is dissolved in ether and decolorized with active C.  $\text{KNO}_2$  gives a purer product than  $\text{NaNO}_2$ .

Wm. H. Adolph

**1,4-Bis(arylimino)quinone-2,5-dicarboxylic acids and their esters.** Hans Liebermann and Bernhard Schulze. *Ann.* 508, 144-53 (1934).—Di-Et *p*-di-*p*-toluinoterephthalate (I) and  $\text{NaNO}_2$  in cold AcOH give the di-*NO* deriv., pale yellow, m. 146° (decompn.); heating a suspension of the ester in PhMe or  $\text{C}_6\text{H}_5\text{Me}$  gives di-Et 1,4-bis(*p*-tolylimino)quinone-2,5-dicarboxylate, dark red-brown, m. 124°; reduction with Zn and AcOH gives I. Di-Et *p*-bis(nitroso-*p*-anisidino)terephthalate, golden yellow; di-Et 1,4-bis(*p*-methoxyphenylimino)quinone-2,5-dicarboxylate, brown-violet, m. 136°. Et succinylsuccinate and  $\text{p-H}_2\text{NC}_6\text{H}_4\text{Ph}$  in EtOH-AcOH give di-Et *p*-(bis-*p*-biphenylimino)- $\Delta^{4,4}$ -dihydroterephthalate, m. 235°; oxidation with I, in AmOH gives di-Et *p*-(bis-*p*-biphenylimino)terephthalate, carmine-red, m. 234°; di-*NO* deriv., pale yellow, m. 160°; heating in PhMe gives di-Et 1,4-bis(biphenylimino)quinone-2,5-dicarboxylate, dark red-brown, m. 185°. Di-Et *p*-bis(nitrosoanisidino)terephthalate, yellow; di-Et 1,4-bis(phenylimino)quinone-2,5-dicarboxylate, dark red-brown, amorphous, m. 93-5°. Di-Et *p*-bis(nitrosoethylamino)terephthalate, m. 114°; at 180° it loses NO, giving 1,4-bis(ethylimino)quinone-2,5-dicarboxylate, deep red-brown, m. 122-5°. *p*-Bis(nitroso-*p*-toluinoterephthalic acid, light yellow; heating in PhMe gives 1,4-bis(*p*-tolylimino)quinone-2,5-dicarboxylic acid, red-brown, m. above 300°;  $\text{NH}_4$  salt, black; K salt, black, rather unstable; Ba salt, brown-black. *p*-Bis(nitroso-*o*-toluinoterephthalic acid, citron-yellow; 1,4-bis(*o*-tolylimino)quinone-2,5-dicarboxylic acid, Cu-colored needles. Bis(nitrosoanisidino)terephthalic acid, nearly colorless; heating in PhMe 1 hr. gives 1,4-bis(phenylimino)quinone-2,5-dicarboxylic acid, prisms with Cu luster, m. 274° (decompn.); K salt, black, amorphous. *p*-Bis(nitroso-*p*-anisidino)terephthalic acid, Cr-green powder; heating in  $\text{C}_6\text{H}_5\text{Me}$  gives 1,4-bis(*p*-methoxyphenylimino)quinone-2,5-dicarboxylic acid, red-brown; K salt, brown-black. Nitrosoanisidino-*p*-hydroxyterephthalic acid, light yellow; *p*-naphthylimino deriv., yellow (di-Et ester, yellow).

C. J. West

**Molecular rearrangements of optically active radicals.** Everett S. Wallis and P. I. Bowman. *J. Am. Chem. Soc.* 56, 491 (1934).—1-EtMePhCCH<sub>2</sub>OH,  $[\alpha]_D^{25}$  -4.90, yields a *tert*-chloride, which has a *d*-rotation, the rearrangement being accompanied by an inversion in sign of rotation.

C. J. West

**Reaction between duroquinone and sodium malonic esters. II. Synthesis and reactions of 2,5-dimethoxy-3,4,6-trimethylbenzaldehyde.** Lee Irvin Smith. *J. Am. Chem. Soc.* 56, 472-4 (1934); cf. *C. A.* 20, 2320.—3,4,6,2,5-Me<sub>5</sub>(MeO)<sub>2</sub>C<sub>6</sub>CHO (I), previously obtained as a degradation product of the compd. resulting from the reaction between duroquinone and  $\text{CHNa}(\text{CO}_2\text{Et})_2$ , has been synthesized as follows: 3,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>NHAc is nitrated, the di- $\text{NO}_2$  deriv. hydrolyzed and the 1,4,5,2,6-Me<sub>5</sub>C<sub>6</sub>H<sub>2</sub>( $\text{NO}_2$ )<sub>2</sub> reduced to the di- $\text{NH}_2$  deriv.; oxidation gives pseudocumquinone, whose dihydro deriv. yields a dibenzoate, m. 179.5-80.5°, and a *di-MeO* deriv., m. 144°, m. 35.5-6°; by the  $\text{Zn}(\text{CN})_2$  method there results I, m. 83.5-4.5°. Condensation of I with  $\text{CH}_3(\text{CO}_2\text{Me})_2$  and Na

gives 3,4,6,2,5-Me<sub>5</sub>(MeO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>C(CO<sub>2</sub>Me)<sub>2</sub>; the corresponding acid, m. 184–6° (decompn.), is identical with another degradation product obtained in the earlier work.

C. J. West

**2,5-Dimethoxy-3,4,6-trimethylbenzoic acid.** Lee Irvin Smith and Russell O. Denyes. *J. Am. Chem. Soc.* 56, 475–6(1934).—Since all attempts to oxidize 3,4,6,2,5-Me<sub>5</sub>(MeO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>CHO to the corresponding acid were unsuccessful, this acid was synthesized to study its behavior toward oxidizing agents. 3,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>CO<sub>2</sub>H was converted into the 2,5-di-NO<sub>2</sub> deriv. (87% yield) and the di-NH<sub>2</sub> deriv. (96%), which was oxidized to the quinone and reduced by SO<sub>2</sub> to the 2,5-di-HO deriv. (69%); Me<sub>2</sub>SO<sub>4</sub> in MeOH gives 53% of *Me* 2,5-dimethoxy-3,4,6-trimethylbenzoate, m. 39–41°; the free acid m. 100–1°, decomp. slowly at 200° (*Ag salt*). The acid decolorizes KMnO<sub>4</sub>, giving only small amts. of oily products, and gives trimethylnitroquinone with HNO<sub>3</sub>.

C. J. West

**Tetramethyl-o-benzoquinone.** Lee Irvin Smith and Lucile R. Hac. *J. Am. Chem. Soc.* 56, 477–8(1934).—Prehnitene gives 80% of the di-NO<sub>2</sub> deriv., m. 176°; reduction of 22 g. gives 24 g. of the HCl salt of the di-NH<sub>2</sub> deriv. (I); the free base m. 144°; 10 g. of the HCl salt gives 4–5.2 g. of *dihydroxyprehnitene* (II), m. 111°; *diacetate*, m. 175°; *dibenzate*, m. 157°; *di-Me ether*, m. 21°. Oxidation of 2 g. of II with Ag<sub>2</sub>O in Et<sub>2</sub>O gives 1.6 g. of *prehnitenesquinone* (*tetramethyl-o-benzoquinone*), bright red, m. 110–1°, begins to decomp. in about 4 hrs. II and *o*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> gives 1,2,3,4-tetramethylphenazine, bright yellow, m. 217°. I and II give *octamethylphenazine*, bright yellow, m. 279°.

C. J. West

**Action of acetic acid on 3,4-dimethoxyphenyldiazonium borofluoride.** L. E. Smith and H. L. Haller. *J. Am. Chem. Soc.* 56, 237–9(1934).—Veratrylamine gives 76% of 3,4-dimethoxyphenyldiazonium borofluoride, m. 123° (decompn.); refluxing 25 g. with AcOH gives 12 g. 2,4,5-HO(MeO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>Ac (I) (and a small quantity of 3,4-(MeO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>F(?), b<sub>10</sub> 98°); *oxime*, m. 162°. I (6 g.) and Me<sub>2</sub>SO<sub>4</sub> give 4 g. 2,4,5-trimethoxyacetophenone, m. 99° (*semicarbazone*, m. 206°); oxidation with KMnO<sub>4</sub> gives 2,4,5-trimethoxyphenylglyoxylic acid, m. 186°, further oxidized to asaronic acid by H<sub>2</sub>O<sub>2</sub>.

C. J. West

**Palladium catalyst. III. Reduction of ketones.** Walter H. Hartung and Frank S. Crossley. *J. Am. Chem. Soc.* 56, 158–9(1934); cf. *C. A.* 25, 3635.—Pd on charcoal quickly and easily reduces PhCOEt to PhPr; a Pt catalyst similarly prepd. was inactive. The substitution of HO or MeO groups in PhCOEt influences the rate but not the extent of the reduction. Results are given as curves for the reduction of PhCOEt, *o*-, *m*- and *p*-EtCOC<sub>6</sub>H<sub>4</sub>OH, *o*-, *m*- and *p*-EtCOC<sub>6</sub>H<sub>4</sub>OMe and propionylcatechol and -resorcinol.

C. J. West

**Possibilities of obtaining by synthesis valuable aromatic aldehydes from new sources.** A. L. Rushchinskii. *Compt. rend. acad. sci.* (U. R. S. S.) 1933, 118–21 (in English 121–3).—R. suggests the prepn. of such aldehydes as vanillin, burbonal and heliotropin from certain C-contg. raw materials. The CHO group might be introduced into the substituted or non-substituted benzene ring by means of mesoxalic ester (I). Since I is not readily available, this method would not be practicable commercially unless I were obtained from malonic ester, which in turn was made from C<sub>2</sub>O<sub>2</sub>. If elec. current is cheap, C<sub>2</sub>O<sub>2</sub> may become a com. product and a valuable source of org. raw materials. Another possible starting point is C<sub>6</sub>H<sub>5</sub>, which, after conversion into di-HO derivs. of C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>O, might subsequently furnish the aldehydes desired.

L. Kelley

**Synthesis of pseudoephedrine.** Roy G. Bossert and Wallace R. Brode. *J. Am. Chem. Soc.* 56, 165–6(1934).—MeCHBrCH(OEt)Ph and MeNH<sub>2</sub> in dry MeOH, heated in a steel bomb 50 hrs. at 125–30°, give 15% of MeCH(NHMe)CH(OEt)Ph, b<sub>10</sub> 116–22°; hydrolysis with 48% HBr gives MeCH(NHMe)CH(OH)Ph. If the bomb is heated to 150–5° there results a small amt. of a *tertiary amine*, MeN[CHMeCH(OEt)Ph]<sub>3</sub>, m. 134.5–5°.

C. J. West

**Ring-chain tautomerism of the β-p-bromobenzoyl-**

**crotonic esters.** Robert E. Lutz and Arthur W. Winne. *J. Am. Chem. Soc.* 56, 445–7(1934).—*cis*-β-p-Bromobenzoylcrotonic acid (*C. A.* 27, 1875–6) (I) yields with MeI through the Ag salt a *Me ester* (II), m. 69° (cor.), in 94% yield; in CHCl<sub>3</sub> with a crystal of I sunlight converts 96% of II into the *trans*-ester in 6 hrs.; the reverse change occurs in EtOH (90%). I and SOCl<sub>2</sub> give 80% of the chloride (β-methyl-γ-p-bromophenyl-γ-chloro-γ-crotonolactone); refluxing with MeOH for 3 hrs. gives the cyclic *Me β-bromobenzoylcrotonate* (γ-Cl replaced by γ-MeO), m. 64°; this also is formed by refluxing II in MeOH contg. H<sub>2</sub>SO<sub>4</sub> or by esterification of I with MeOH-HCl; hydrolysis of these esters yields I. The *Et ester* m. 42° and the *cyclic ester* b<sub>10</sub> 165–8°. The reduction of the open chain esters gives the *Me ester*, b<sub>10</sub> 193–4°, and the *Et ester*, m. 34.5°, of β-p-bromobenzoylbutyric acid. The cyclic esters with Zn and AcOH give 30–40 and 40–43% of *p*-BrC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H and its esters, resp.; different samples of Zn behaved quite differently and the study is being continued.

C. J. West

**Structure of reactants and extent of acetal formation.**

II. Ralph E. Dunbar and Homer Adkins. *J. Am. Chem. Soc.* 56, 442–4(1934); cf. *C. A.* 27, 954.—In the study of acetal formation, the following % conversion and *K* were detd. (using 5 alc. to 1 aldehyde) as follows: for hexahydrobenzaldehyde (I) with MeOH 93, 6.35; tetrahydrofurfural alc., 92, 5.38; 3-tetrahydrofurfurylpropan-1-ol 91, 4.63; iso-AmOH 88, 3.15; cyclohexylcarbinol (II), 87, 2.75; BuOH 80, 1.44; EtOH 78, 1.22; cyclohexanol (III) 75, 0.96; octan-2-ol (IV) 74, 0.88; cyclopentanol 44, 0.101; iso-PrOH (V) 29, 0.035. BzH with II 35, 0.059; III 23, 0.019. Me<sub>2</sub>CCHO with EtOH (using in this group 11 alc. to 1 aldehyde) 73, 0.25; II 58, 0.095; IV 38, 0.026; III 24, 0.007; V 21, 0.006. Cyclopentylaldehyde (VI) with IV (5 alc. to 1 aldehyde) 50, 0.168; EtOH 45, 0.122; II 41, 0.092; III 35, 0.56; V 13, —. The figures for AcH, Me<sub>2</sub>CHCHO and Me<sub>2</sub>CCHO show a progressive lowering of the extent of conversion to acetals, indicating the marked effect of branching upon lowering affinity for acetal formation. VI is rather similar to Me<sub>2</sub>CCHO and is even more nearly like BzH in acetal formation. The relationship of I to BzH is very much the same as found for tetrahydrofurfural and furfural; the satd. compds. have a much higher affinity for acetal formation than the unsatd. compd. In connection with the alcs. the most striking "abnormality" is the high affinity (actual or relative) which III and IV show with the cyclic aldehydes. The *acetal* of MeOH and I b<sub>10</sub> 63°, b<sub>10</sub> 183°, d<sub>4</sub> 0.9363 n<sub>D</sub> 1.4402; of EtOH and I, b<sub>20</sub> 115–17°, d. 0.9021, n. 1.4399 of BuOH and I, b<sub>20</sub> 149–50°, d. 0.8893, n. 1.4439; of iso-AmOH and I, b<sub>10</sub> 168–9°, d. 0.8781, n. 1.4456; of IV and I, b<sub>10</sub> 215–17°, d. 0.8701, n. 1.4475; of γ-tetrahydrofurfurylpropyl alc. and I, b<sub>10</sub> 236–8°, d. 0.9821, n. 1.4620; of III and I, b<sub>20</sub> 202–3°, d. 0.9589, n. 1.4782; of II and I, b<sub>20</sub> 234–5°, d. 0.9680, n. 1.4887; of EtOH and Me<sub>2</sub>CCHO, b<sub>10</sub> 146–8°, d. 0.8192, n. 1.3942; of II and Me<sub>2</sub>CCHO, b<sub>20</sub> 194–5°, d. 0.9235, n. 1.4635. I b<sub>10</sub> 70.5–2°, d. 0.9235, n. 1.4506; Me<sub>2</sub>CCHO b<sub>10</sub> 74–5°; VI b<sub>20</sub> 62–4°, d. 0.9356, n. 1.4435.

C. J. West

**The dissociation constant of hippuric acid.** Bertil A. Josephson. *Biochem. Z.* 267, 74–6(1933).—The value of *K* for hippuric acid is 15.7 × 10<sup>-5</sup>, and *pK* = 3.81. This value is practically the same as that for glycodesoxycholic acid and about 4–5 times that of glycolic acid.

S. M.

**α,α'-Dimethyl-α-phenylsuccinic acid.** H. Marjorie Crawford. *J. Am. Chem. Soc.* 56, 139–41(1934).—MeCH(CO<sub>2</sub>Et)<sub>2</sub> and PhCHBrCO<sub>2</sub>Et with Na give 45% of *tri-Et 1-phenylpropane-1,2,2-tricarboxylate* (I), b<sub>10</sub> 210–17°, which is hydrolyzed to α-methyl-α-phenylsuccinic acid (II), m. 169–72°. I, MeI and Na give 50% of *tri-Et 2-phenylbutane-2,3,3-tricarboxylate*, b<sub>20</sub> 213–16°; hydrolysis gives II. Condensation of PhCHMeCN (for which a method of prepn. is given, 66% yield) and MeCHBrCO<sub>2</sub>Et with NaNH<sub>2</sub> give 15% of *Et α-methyl-β-phenyl-β-cyanobutyric acid*, b<sub>10</sub> 172–3°, d<sub>18</sub> 1.0591; hydrolysis gives α,α'-dimethyl-α-phenylsuccinic acid, m. 145°, sepd. into 2 racemic forms, m. 170–2° and 159–60°; the higher-melting form is identical with the acid obtained by the



oxidation of 2,3,5,6-tetramethyl-3-phenyl-5-cyclohexene-1,4-dione (C. A. 22, 1838).

**Ester enolates and ketene acetals. XVII. Reactions of ester enolates with halogenoacyl compounds.** Helmuth Scheibler and Hans Stein. *J. prakt. Chem.* 139, 105-12 (1934); cf. C. A. 28, 1022<sup>4</sup>.— $\text{PhCH}_2\text{CO}_2\text{Et}$  and  $\text{K}$  give an ester enolate (I), which reacts with  $\text{BzCl}$  to give 17.2% of phenylketene *Et* benzoylacetate, m. 103-4°, 21.5% of  $\text{PhBzCHCO}_2\text{Et}$ ,  $\text{BzOH}$ ,  $\text{BzOEt}$  and  $\text{PhCH}_2\text{CO}_2\text{H}$ .  $\text{Cl-CO}_2\text{Et}$  and I (from 40.3 g. ester) give 6.7 g. *phenylketene Et carboxyacetate* (II), b<sub>14</sub> 155-60°, 8.5 g.  $\text{PhCH}(\text{CO}_2\text{Et})_2$ , 11 g.  $\text{PhCH}_2\text{CO}_2\text{Et}$  and 4.5 g.  $\text{CO}(\text{OEt})_2$ . The addn. product of II and  $\text{EtOK}$  with  $\text{CO}_2$  gives pure II, b<sub>14</sub> 150-1°, while heating with  $\text{EtOH}$  at 75° gives  $\text{PhCH}(\text{CO}_2\text{Et})_2$ .  $\text{Me}_3\text{CHCO}_2\text{Et}$  and  $\text{NaNH}_2$  give  $\text{Me}_3\text{CHC}(\text{OEt})(\text{NH}_2)_2\text{ONa}$ ; with  $\text{ClCO}_2\text{Et}$  there results  $\text{Me}_3\text{CHCO}_2\text{Et}$ , *isobutyramide*, m. 128-30°, and *di-isobutyramide*, m. 172-4°.  $\text{PhCN}$  and  $\text{Me}_3\text{CHCO}_2\text{Et}$  give an ester enolate which reacts with  $\text{BzCl}$  to give *Et dimethylbenzoylacetate*, b<sub>14</sub> 150-60°.

**Organic compounds of selenium. IV. Confirmation of the structure of dimethyl 5,5'-selenodisalicylate *Se*-dichloride.** R. E. Nelson and R. G. Baker. *J. Am. Chem. Soc.* 56, 467(1934); cf. C. A. 27, 1333.—Morgan and Hurstall's (C. A. 23, 2158) theory of the position of the *Se* in 5,5'-selenodisalicylate has been confirmed by changing di-*Me* 5,5'-selenodisalicylate *Se*-dichloride (I) into 5,5'-selenodisalicylic acid (II) and then back to I, the following reactions being carried out:  $\text{MeO}_2\text{C}(\text{HO})\text{C}_6\text{H}_4\text{Se}(\text{Cl})_2\text{C}_6\text{H}_4(\text{OH})\text{CO}_2\text{Me}$  with  $\text{Zn}$  gives  $\text{Se}[\text{C}_6\text{H}_4(\text{OH})\text{CO}_2\text{Me}]_2$ ; hydrolysis gives II, which is esterified with  $\text{MeOH}$ , transformed into the dibromide, then the dihydroxide and then into I. In an attempt to prep. the *Se*-dibromide from II there resulted 3,5-dibromosalicylic acid, m. 233°, indicating that the *Se* was attached to C atom 5.

**Isomerization of the methyl and ethyl ethers of phenylglycidol.** Darnon. *Compt. rend.* 197, 1049-50(1933).—The *Me* ether of phenylglycidol heated with  $\text{ZnCl}_2$  (anhyd.) gives the corresponding ether of phenylacetylcarbinol,  $\text{PhCH}_2\text{C}(\text{OCH}_3)\text{CH}_2\text{OMe}$ , b<sub>14</sub> 139-40°; *semicarbazone*, m. 127-8°. The *Et* ether, b<sub>14</sub> 116-7° (*semicarbazone*, m. 100°), is obtained similarly together with some *Et* ether of tropaldehyde,  $\text{PhCH}(\text{CH}_2\text{OEt})\text{CHO}$  (*semicarbazone*, m. 129°). It is concluded that the affinity capacities of methoxy- and ethoxymethyl are inferior to that of the *Ph* radical and their migratory tendencies less than that of *H*.

**Approximate ionization constant of pantothenic acid as determined by fractional electrolysis.** Roger J. Williams and Robin Moser. *J. Am. Chem. Soc.* 56, 169-70 (1934).—A new method involving fractional electrolysis has been applied to the approx. detn. of the ionization const. of pantothenic acid (I), the value being approx. that of gallic acid ( $3.9 \times 10^{-4}$ ), although slightly lower. From comparison with the ionization consts. of acids of known structure, it is concluded that I cannot be an  $\alpha$ -HO acid but may possess  $\beta$ - or  $\gamma$ -HO groups.

**Natural coumarins. VIII. Bergaptol, a new constituent of Calabrian bergamot oil.** Ernst Spath and Luis Socias. *Ber.* 67B, 59-61(1934); cf. C. A. 27, 4800.—The study of the coumarin derivs. found in masterwort (*Imperatoria ostruthum*) showed that some of them are closely related to bergaptene, the *MeO* group of the latter being replaced by a complicated ether residue. Bergaptol (I), the phenol corresponding to bergaptene, is the common mother substance of these masterwort constituents and has been obtained by hydrolysis of ostruthol, isomeratorin and hydroxypercedanun. As it seemed possible that I might also be the mother substance of the bergaptene found in *Citrus bergamia* Risso the lactones of bergamot oil were tested for the presence of I, which had hitherto not been found in nature. The oil was treated with  $\text{KOH}$  in  $\text{MeOH}$  at room temp. to convert the coumarins into the corresponding HO acids, whose sol. *K* salts were obtained in aq. soln. by shaking with water and petroleum ether. From this soln. the lactones were recovered by acidification, and fractional distn. in a high vacuum yielded a product (0.58 g. from 600 g. oil), m. 280-

2°, identical with the I obtained from isomeratorin. In this procedure, however, the intermediate hydroxycinnamic acid might be formed from the phenol corresponding to isobergaptene (Wessely and Nadler, C. A. 26, 4803) just as well as from I; the bergamot oil was therefore worked up by a process involving only fractional distn. *in vacuo* and in which the use of alkali was entirely avoided, and again I was obtained (0.01 g. from 80 g. of the oil).

**IX. Heraclin.** Ernst Spath and Sigwin Raschka. *Ibid.* 62-3.—Addn. of petroleum ether to the ether ext. of the seeds of *Heracleum spondylium* L. gives bergaptol,  $\text{C}_{15}\text{H}_{12}\text{O}_4$  (0.15% of the dry seeds), m. 189-90°, identical with the "heraclin" of Gutzeit (*Chem. Zentr.* 1879, 727), to which he assigned the compn.  $\text{C}_{15}\text{H}_{12}\text{O}_{10}$ . The residue from the ether-petroleum ether mother liquors allowed to stand with  $\text{KOH}$  in  $\text{MeOH}$  to convert the coumarins into the salts of the HO acids, then dild. with water, freed of neutral substances with ether, converted back into the coumarins by acidification and freed from acids with bicarbonate, give another 0.05% of bergaptene.

**Synthesis of 2-acylresorcinols by means of the Nidhone process. I. 2-Benzoylresorcinol.** Dattatraya Balkrishna Limaye. *Ber.* 67B, 12-15(1934).—Treatment of 30 g. 4-methylumbelliferone benzoate, m. 159°, instead of the acetate (C. A. 26, 2971) with  $\text{AlCl}_3$  at 160-70° yields 18-20 g. 4-methyl-8-benzoylumbelliferone (I), m. 210°, which gives no color with  $\text{FeCl}_3$ . It is not necessary to start with the preformed benzoate (Fries); the same results are obtained with umbelliferone,  $\text{BzCl}$  and  $\text{AlCl}_3$  (Friedel-Crafts). Refluxed with an equiv. amt. of  $\text{Na}$  and  $\text{BrCH}_2\text{CO}_2\text{Et}$  in alc., 2.8 g. I gives 2 g. 4-methyl-8-benzoyl-7-(carboxymethoxy)coumarin, m. 130°, saponif. by alc.  $\text{KOH}$  to the 7-(carboxymethoxy) compd., m. 203°, 1 g. of which, boiled with  $\text{NaOAc}$  and  $\text{Ac}_2\text{O}$  until the evolution of  $\text{CO}_2$  ceases, yields 0.6 g. 2-phenyl-4'-methyl-7', 8'-furocoumarin, m. 170°; when 20 g. of the latter is gently boiled 1 hr. with 20%  $\text{NaOH}$ , the pyrone ring is opened, the  $\text{AcCH}_2\text{CO}_2\text{H}$  residue is split off partly as acetone and  $\text{CO}_2$ , partly as  $\text{AcOH}$ , and there is obtained 10-12 g. of 2-benzoylresorcinol, m. 135°, which gives a blue-black color with  $\text{FeCl}_3$ , regenerates I with  $\text{AcCH}_2\text{CO}_2\text{Et}$  and  $\text{H}_2\text{SO}_4$ , forms with  $\text{Me}_2\text{SO}_4$  a *di-Me* ether, m. 99°, b. 345°, volatile with steam, and yields a *dibenzoyl*, m. 115°. The name "Nidhone" (from Nidhi, the ending one indicating that a ketone is involved) is suggested for the process resorcinol  $\rightarrow$  4-

methylumbelliferone  $\rightarrow$  { acylation  $\rightarrow$  Fries rearrangement  
or  
Friedel-Crafts reaction  
 $\rightarrow$  sepn. of isomeric acyl-4-methylumbelliferones  $\rightarrow$  treatment with alkali  $\rightarrow$  2-acylresorcinol. C. A. R.

**Preparation of 3-aminophthalhydrazide for use in the demonstration of chemiluminescence.** Ernest H. Huntress, Lester N. Stanley and Almon S. Parker. *J. Am. Chem. Soc.* 56, 241-2(1934).—Details are given for the prepn. of 3-nitrophthalhydrazide from 3-nitrophthalic acid (99.5% yield) and its reduction to the 3- $\text{NH}_2$  deriv (luminol) by  $(\text{NH}_4)_2\text{S}$ .

**Biogenetics in the terpene series.** J. A. Hall. *Chem. Rev.* 13, 479-99(1933).—An attempt is made to refer all known terpene configurations to underlying fully hydroxylated compds., the simple dehydration of which in a single stage should give groups of hydrocarbons of related biogenetic characteristics. The relationships thus found should persist more or less consistently throughout all known volatile oils. A few references to the literature are given.

**Isomeric myrtenols. V.** Paolini. *Gazz. chim. ital.* 63, 666-9(1933).—The differing phys. properties of myrtenol alcs. isolated from different sources by Soden and Elz (Chem.-Zig. 29, 857(1905)) and by Semmler and Bartlet (C. A. 1, 1710) suggest that in 1 case or in both cases the product was impure, perhaps because of the presence of an isomer. The present paper shows that myrtenol does exist in a *l*-gyratory form. Myrtenol oil from Calabria prepd. by steam distn. of the leaves of *Myrtus communis* was saponif. by alc.  $\text{KOH}$ , steam-distd., dried, the fraction which b. 210-30° converted by  $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$  (I) to a mixt. of phthalates, which was sepd. by fractional pptn. from



petr. ether and 95% AcOH into acid myrrilenyl phthalate,  $\alpha$ - $\text{HO}_2\text{CC}_6\text{H}_4\text{CO}_2\text{C}_{10}\text{H}_{11}$  (II), m. 116°,  $[\alpha]_D^{25}$  21.95°. Neutralized in water with  $\text{NH}_4\text{OH}$ , II gives with  $\text{AgNO}_3$  Ag myrrilenyl phthalate,  $\alpha$ - $\text{AgO}_2\text{C}_6\text{H}_4\text{CO}_2\text{C}_{10}\text{H}_{11}$ , m. 102°. On sapon. with hot alc. KOH, II yields  $\alpha$ -myrrilenol (III), clear oil, odor of myrtle, b. 222°,  $[\alpha]_D^{49}$  68°. With I, III reverts to II. The product sepd. from II gave on sapon. 3 liquids all of which b. around 230°, and had  $[\alpha]_D$  values of 24°30', 6°15' and -3°50', resp. The laboratory alc. had  $d_{15}$  0.981. The best results in the prepn. of II were had by letting stand at room temp. a mixt. of crude alc. in benzene with excess Na, and letting the product stand in turn with I, dissolving in very dil. NaOH, and liberating with  $\text{H}_2\text{SO}_4$ . C. C. Davis

**5- and  $\pi$ -Hydroxycamphor and their derivatives.** Yasuhiko Asahina and Meizo Ishidate. *Ber.* 67B, 71-7 (1934); cf. *C. A.* 28, 472<sup>3</sup>, 1034<sup>4</sup>.—Camphorol has been shown to be a complex mixt. of hydroxycamphors, one of which (3-hydroxycamphor) had already been isolated; the remainder, which yielded 5-ketocamphor (I) on oxidation, was assumed to be 5-hydroxycamphor (II), but it could not have been homogeneous, as it had merely been recrystd. from ligroin and the presence of  $\pi$ -hydroxycamphor (III) was not suspected at the time. I with 1 mol  $\text{H}_2\text{NCONHNH}_2 \cdot \text{AcOH}$  in dil. alc. yields the disemicarbazone, m. 290°, and the 5-monomemicarbazone, m. 238-40°, which is reduced by Na in alc. at 170-80° to *d*-borneol. The 5-keto group in I is therefore more reactive than the 2-keto group; treated at 10-15° in water with Na-Hg (while  $\text{CO}_2$  is passed through the soln.), I yields II, m. 210°,  $[\alpha]_D^{15}$  47.4° (abs. alc.) (semicarbazone, m. 222° (decompn.)), isolated through the acetate, b<sub>m</sub> 165-7° (semicarbazone, m. 237-8° (decompn.)). With Na and alc. at 170-80°, the semicarbazone of II or of its acetate gives epiborneol, m. 188°,  $[\alpha]_D^{15}$  -3.4° (abs. alc.), oxidized by  $\text{K}_2\text{Cr}_2\text{O}_7$ -AcOH to *d*-epicamphor (IV), m. 182°,  $[\alpha]_D^{15}$  45.4° (abs. alc.). II, whole soly. in water at 15° is 3.1%, thus affords a far more convenient starting point for the prepn. of IV than the cyanohydrin of I recently described. *trans*-III, a 3rd constituent of camphorol, was prepd. by reducing with Na and alc. on the water bath the semicarbazone, m. 235-6° (decompn.), of the *Me* ester, m. 72-3°, of the *trans*- $\pi$ -apocamphor-7-carboxylic acid which was isolated from the oxidation products of camphorol. III, m. 233°,  $[\alpha]_D^{15}$  12.20° (abs. alc.), soly. in water at 18° 12.5%, semicarbazone, m. 224-5° (decompn.); acetate, b<sub>m</sub> 176° (semicarbazone, m. 234-5° (decompn.)). With  $\text{H}_2\text{SO}_4$ ,  $\text{Na}_2\text{Cr}_2\text{O}_7$  III yields *trans*-7-aldehyde- $\pi$ -apocamphor, m. 195-6°, previously obtained, together with the *cis*-isomer, in the oxidation of camphorol. The semicarbazone of III with Na-EtOH at 170-80° gives *d*-borneol, m. 200.5°,  $[\alpha]_D^{15}$  17.68° (abs. alc.), oxidized by AcOH- $\text{K}_2\text{Cr}_2\text{O}_7$  to  $\pi$ -camphor, m. 172-3°, almost inactive optically (2% soln. in alc.) (semicarbazone, m. 214-15° (decompn.)). *Me cis*- $\pi$ -apocamphor-7-carboxylate, m. 74-5°, semicarbazone, m. 259-60°, is reduced by Na and alc. to *cis*- $\pi$ -hydroxycamphor (V), m. 233-4°,  $[\alpha]_D^{15}$  40.68° (abs. alc.), soly. in water at 15° 8% (semicarbazone, m. 216-17°); acetate, b<sub>m</sub> 160° (semicarbazone, m. 210-11°). *trans*-7-aldehyde- $\pi$ -apocamphor, m. 205°; disemicarbazone, m. 254°. *l*- $\pi$ -Borneol, from the semicarbazone of V with Na-EtOH at 170-80°, m. 200.5°,  $[\alpha]_D^{15}$  -16.77°, oxidized by  $\text{CrO}_3$ -AcOH to  $\pi$ -camphor. C. A. R.

**Fenchene series.** V.  $\alpha$ -Fenchene hydrate (methyl  $\alpha$ -fenchocamphorol),  $\alpha$ - and  $\beta$ -fenchene. Gust. Komppa and Siegfried Beckmann. *Ann.* 508, 205-14 (1934); cf. *C. A.* 27, 4228.—*dl*- $\alpha$ -Fenchocamphorone and MeMgI give *dl*-methyl- $\alpha$ -fenchocamphorol ( $\alpha$ -fenchene hydrate), b<sub>m</sub> 76-7°, b<sub>14</sub> 86.5-7°, m. 46-7° (phenylurethan, m. 117-8°); this also results from  $\alpha$ -fenchene-HCl and KOH; distn. at atm. pressure gives  $\alpha$ -fenchene.  $\alpha$ -Fenchene, by catalytic reduction of  $\alpha$ -fenchene, b<sub>m</sub> 161-3°,  $d_4^{25}$  0.8612,  $n_D^{20}$  1.45921, 1.46152, 1.46741, 1.47640 for  $\alpha$ ,  $D$ ,  $\beta$  and  $\gamma$ . *dl*- $\beta$ -Fenchene, b<sub>m</sub> 168-60°,  $d_4^{25}$  0.8553,  $n_D^{20}$  1.45511, 1.45741, 1.46304, 1.47208 for  $\alpha$ ,  $D$ ,  $\beta$  and  $\gamma$ . C. J. West

**Biphenyl and its derivatives.** XII. Nitration of some halogenated derivatives of biphenyl. L. Mascarelli, D. Gatti and B. Longo. *Gazz. chim. ital.* 63, 684-60 (1933);

cf. *C. A.* 26, 5090.—The paper describes unfinished investigations on the influence of halogens on the nitration of halogenated Ph<sub>2</sub> derivs. The nitrating mixt. was  $\text{HNO}_3$  (d. 1.43) and concd.  $\text{H}_2\text{SO}_4$ . By heating, 2-chlorobiphenyl (I) yields, on steam distn., 25% of 2-chloro-4-nitrobiphenyl (II), yellowish, m. 73-4°; oxidized by refluxing with  $\text{CrO}_3$  in glacial AcOH (with  $\text{V}_2\text{O}_5$ , cf. Schlemann and Roselius, *C. A.* 24, 79), it gives 30% 4- $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ . The steam-distn. residue yields (1) 50% of 2-chloro-3',4'-dinitrobiphenyl (III), pale yellow, m. 158-9°; oxidized like II it gives 80% of 3,4-( $\text{O}_2\text{N}$ )<sub>2</sub> $\text{C}_6\text{H}_3\text{CO}_2\text{H}$ , and (2) on distn. *in vacuo* more II. The yields indicate that the 1st  $\text{NO}_2$  group enters the 4'-position and the 2nd  $\text{NO}_2$  the 3'-position, i. e., the halogen in the 2-position induces the  $\text{NO}_2$  group to enter the position farthest away. Reduction of III with Sn and HCl yields 3-chloro-3',4'-diaminobiphenyl-2-HCl, silky, decomp. 233-305°. Diazotized, decompd. with CuCl, and steam-distd., it yields 2,3',4'-trichlorobiphenyl, silky, m. 65-6°. van Alphen (*C. A.* 26, 3789), oxidized ( $\text{o-ClC}_6\text{H}_4$ )<sub>2</sub> (IV) with concd.  $\text{HNO}_3$  to a dichlorotetrannitro deriv., but when IV was oxidized as was I, a non-steam-distillable 2,2'-dichloro-*x,y*-dinitrobiphenyl (V), light yellow, m. 205°, was obtained. It could not be oxidized with  $\text{CrO}_3$ - $\text{V}_2\text{O}_5$ -AcOH and thus identified. The only  $\text{NO}_2$  derivs. of  $p$ - $\text{BrC}_6\text{H}_4\text{Ph}$  (VI) heretofore described are mono- $\text{NO}_2$  derivs. However, VI nitrated as were I and V yields a 4-bromo-*x,y*-dinitrobiphenyl (VII), yellow, m. 205-6°, and another 4-bromo-*x,y*-dinitrobiphenyl (VIII), silky, pale yellow, m. 147-8°. Neither VII nor VIII could be oxidized and therefore identified. Nitrated like I, V and VI, ( $p$ - $\text{BrC}_6\text{H}_4$ )<sub>2</sub> yields [4,2- $\text{Br}(\text{O}_2\text{N})\text{C}_6\text{H}_4$ ]<sub>2</sub> and 4,4'-dibromo-2,3'-dinitrobiphenyl, which agrees with similar expts. by Shaw and Turner (*C. A.* 26, 2188). Nitration in the same way of *m*- $\text{ClC}_6\text{H}_4\text{Ph}$  yields a 3-chloro-*x,y*-dinitrobiphenyl, m. 202-3°, the position of the  $\text{NO}_2$  groups in which were not detd. XIII. Attempts to obtain *o*-biphenylene. *Ibid.* 661-5.—Though Dobbie, Fox and Gauge (*C. A.* 5, 3048; 7, 1490) reported having obtained *o*-biphenylene (I) from ( $o$ - $\text{BrC}_6\text{H}_4$ )<sub>2</sub> (II), Schwechten (*C. A.* 27, 69) failed to obtain any I, and the present paper describes other futile attempts to prep. I. Previous to the method of S. for prep. II, and subsequent to unsuccessful attempts to form II from 2,2'-bis(diazobiphenyl) by CuBr (cf. Treche, *Andamento anormale della reazione di Sandmeyer nella serie del biphenile*, Thesis, Bologna, July, 1911), it was found that II cannot be prepd. from ( $o$ - $\text{O}_2\text{NC}_6\text{H}_4$ )<sub>2</sub> (III) because partial reduction of III by ( $\text{NH}_4$ )<sub>2</sub>S gives an oil difficult to purify, and if diazotization and decompn. with CuBr or CuCl are carried out, the yield of 2-nitro-2'-bromobiphenyl (IV) is very low. A better yield of IV is had with the method of Ullmann, i. e., by the action of powd. Cu on equimol. mixts. of  $o$ - $\text{BrC}_6\text{H}_4\text{I}$  and  $o$ - $\text{IC}_6\text{H}_4\text{NO}_2$  (or  $o$ - $\text{BrC}_6\text{H}_4\text{NO}_2$ ). The reduction of IV to 2-amino-2'-bromobiphenyl by  $\text{SnCl}_2$  takes place readily, but decompn. of the diazobromodibiphenyl by CuBr gives a very poor yield. Attempts to transform, by the method of D., F. and G. (*loc. cit.*), II into I yielded II unaltered, even after 200 hrs. with a large excess of Na. With ( $o$ - $\text{IC}_6\text{H}_4$ )<sub>2</sub> (V) the product was chiefly unaltered V, with a very small yield of an unidentified compd. contg. I, m. 54°. With ( $o$ - $\text{ClC}_6\text{H}_4$ )<sub>2</sub> (VI) the product was chiefly VI, with a small yield of Ph<sub>2</sub>. By heating V with powd. Cu at 25°, D., F. and G. obtained only resinous products, but in the present work  $o$ - $\text{IC}_6\text{H}_4\text{Br}$  (VII) was heated because it was thought that the greater activity of I would lead to II, which might in turn give Ph<sub>2</sub>. However, VII and excess Cu at 230-40° gave largely resins, from which by steam distn. a small proportion of diphenylene oxide (VIII) was isolated. VIII is probably formed by the secondary action of CuO on II. The unsuccessful attempt of S. and of M. and G. to obtain I suggests that in the expts. of D., F. and G., an impurity was present which had a favorable catalytic action. Cases in the literature are cited to show that under conditions which seem to vary in some insignificant way, pos. and neg. yields of various derivs. are obtained in unexplainable ways. C. C. Davis

4,4'-Dihydrazinodiphenylmethane. W. Borsche and R.

Manteuffel. *Ber.* 67B, 144(1934).—B. and Klenitz (C. A. 4, 3220) describe 4,4'-dihydrazinodiphenylmethane as m. 71–2° while Finger (*J. prakt. Chem.* 74, 155 (1906)) gives 139–40° as the m. p. Repetition of the work has shown that the pure compd. m. 141–3°.

C. A. R.

**Reduction by magnesium and magnesium iodide. XII. The reduction of benzopinacolone.** W. E. Bachmann. *J. Am. Chem. Soc.* 56, 449–50(1934); cf. C. A. 26, 5296.—Benzopinacolone is reduced by Mg +  $MgI_2$  at 80° to tetraphenylethylene; there also results 8–10% of a yellow gum; this gum is the principal product at room temp.

C. J. West

**Uranium tetrachloride, tungsten hexachloride and molybdenum pentachloride in organic syntheses. I.** I. Kashtanov. *J. Gen. Chem.* (U. S. S. R.) 3, 229–33 (1933).—Previous work has shown that the compds. of  $TiCl_4$  with ethers and esters decompose in PhH, one of the 2 radicals of the ether or ester being substituted for H of PhH (C. A. 23, 2170) with the formation of mono- or di-derivs. Similar compds. with  $AlCl_3$  and  $TiCl_4$  decompose even more energetically and both radicals of the ether may enter the PhH nucleus (C. A. 27, 975). However, the Ph group in esters is exceptional since PhBz is not formed. Compds. with  $UCl_4$ ,  $WCl_6$  and  $MoCl_5$  decomp. in a manner analogous to those with  $TiCl_4$ , e. g.,  $PhCH_2OEt$  (I) in PhH gives mono- and disubstituted PhH. iso-AmOAc (II) and iso-AmOBz (III) do not decompose in the presence of  $UCl_4$  although  $AcCl$  and  $BzCl$  do. PhBz could not be prepd. from  $BzOCH_2Ph$  (IV) and  $UCl_4$  although the  $PhCH_2$  radical does react with PhH to give mono- and di-derivs.  $UCl_4$  (25 g.), 200 cc. PhH and 10.5 g.  $AcCl$ , heated on a steam bath till evolution of HCl ceases, give a brown soln. which, shaken with several portions of  $H_2O$ , dried with  $CaCl_2$ , the PhH distd. off, and the fraction b. 199–203° collected and redistd., gave 21.6% of PhAc. Similarly 20 g.  $UCl_4$ , 200 cc. PhH and 13.3 g.  $PhCH_2Cl$  gave 12.3 g.  $Ph_2CH_2$ , 2.7 g. *p*- and *m*- $C_6H_4(CH_2Ph)_2$ , 1.1 g. of a hydrocarbon of higher mol. wt., and 3.2 g. of a liquid tar.  $UCl_4$  (17.5 g.), 200 cc. PhH and 13 g.  $BzCl$  gave 22% of PhBz and 8 g. of  $BzOH$  extd. from the reaction mixt. by washing with 50% NaOH.  $UCl_4$  (20 g.), 200 cc. PhH and 15 g. I gave 12.5 g.  $Ph_2CH_2$ , and 2.5 g. *p*- and *m*- $C_6H_4(CH_2Ph)_2$ .  $UCl_4$  (25 g.), 250 cc. PhH and 28 g. IV gave 15.6 g.  $BzOH$ , 13 g. of crude PhBz, and 2.9 g. of *p*- and *m*- $C_6H_4(CH_2Ph)_2$ .  $UCl_4$  (15 g.), 200 cc. PhH and 15 g. III gave 14 g. of unchanged III. II likewise was unattacked.  $WCl_6$  (20 g.), 250 cc. PhH and 14 g.  $BzCl$  gave 4.8 g. crude PhBz.  $WCl_6$  (19 g.), 200 cc. PhH and 13 g. I gave 10.7 g.  $Ph_2CH_2$  and 3.2 g. of *m*- and *p*- $C_6H_4(CH_2Ph)_2$ .  $MoCl_5$  (9 g.), 200 cc. PhH and 9 g. I gave 8.6 g.  $Ph_2CH_2$  and 2.5 g.  $C_6H_4(CH_2Ph)_2$ . Lewis W. Butz

**Apparent isomerism of  $\alpha,\alpha,\beta,\beta$ -tetraphenylethanol.** Richard Wegler. *Ber.* 67B, 35–9(1934).—It has been reported (Paternò and Chieffi, C. A. 5, 682; Bergmann and Engel, C. A. 24, 4274) that  $\alpha,\alpha,\beta,\beta$ -tetraphenylethanol exists in 2 forms, m. 235° (I) and 216° (II), the latter prepd. by illumination of  $Ph_2CO$  and  $CH_3Ph_2$ . Repetition of the illumination expts. gave a product which after 3 crystns. from acetone m. 215–7°. Attempts to replace the HO group by Cl never gave halogenated derivs. and only after repeated crystn. was a homogeneous product (chiefly  $Ph_3C:CPh_3$ ) obtained from II whereas I readily yielded the same compd. By repeating the crystn. of II 15 times its m. p. was raised to 229° and it no longer depressed the m. p. of I. This was not due to a rearrangement of II into I; the same results were obtained when all heating was avoided. When II was heated several hrs. in pyridine at 135° its m. p. was lowered somewhat but recrystd. of the product yielded I. It was concluded that II is impure I and that heating with pyridine so changes the impurities that they are now readily removed by crystn. The literature on the reactions of  $Ph_2CO$  with aliphatic or aromatic hydrocarbons in the light shows that the products are never homogeneous but always contain, in addn. to the alc., varying amts. of glycol and hydrocarbon, and an artificial mixt. of about 20% ( $HOCPh_2$ ) and ( $Ph_3C:$ ); with I behaved exactly like II. When the

mixt. is heated with pyridine, the glycol decomp. into  $Ph_2CO$  and  $Ph_2CHOH$ . The  $\alpha$ -*p*-tolyl homolog of I, prepd. like I and like II, also seemed to exist in 2 isomeric forms but the lower-melting product was more easily purified than II. I with Na gave  $CH_3Ph_2$ ,  $Ph_2CO$ ,  $Ph_2CHOH$ ,  $BzOH$  and especially ( $Ph_3C:$ ), which is in harmony with the conception of intermediate radicals; II with Na in boiling  $C_6H_6$  soon gave an intense blue-green color due to the glycol present. The following soly. detns. (g. in 50 cc. 96% alc.) are recorded: I 0.0215 at 16.5°, 0.0227 at 19°; ( $HOCPh_2$ ) 0.3493 at 18°, 0.3828 at 19°;  $PhCOCPh_2$  (into which the glycol readily rearranges under the influence of acids) 0.0528 at 17.5°, 0.0552 at 19°; ( $Ph_3C:$ ) 0.0318 at 20°.

C. A. R.

**Reaction of potassium amide in liquid ammonia with chloroethenes.** Geo. H. Coleman and Roy D. Maxwell. *J. Am. Chem. Soc.* 56, 132–4(1934).—The action of  $KNH_2$  in liquid  $NH_3$  on 1,1-diaryl-2-chloroethenes causes the removal of HCl and the rearrangement of the mols. to form tolan or substituted tolan; with dichloroethanes 2 mols. of HCl are removed and a similar rearrangement occurs. The following new 1,1-bis(alkylphenyl)-2-chloroethenes are reported: *p*-Et, b. 165–6°,  $n_D^{20}$  1.5898; *p*-Pr, b. 178–81°,  $n_D^{20}$  1.5782; *p*-Bu, b. 190–2°,  $n_D^{20}$  1.5652; 3,4-dimethyl, b. 166–70°,  $n_D^{20}$  1.6035. 1,1-Dibiphenyl-2,2-dichloroethane, m. 139–40°, *p*, *p*'-Diethyltolan, m. 71.5–2.5° (all m. ps. cor.); *Pr* deriv., m. 69.5–70.5°; *Bu* deriv., m. 41–2°; 3,3',4,4'-tetramethyltolan, m. 143–4°; *p*, *p*'-diphenyltolan, m. 243–4°. The ultra-violet absorption spectra of the compds. were detd.; the chloroethenes show non-selective absorption in the region between 200–280  $m\mu$ . Tolans show characteristic absorption bands; tolan 298, 279; di-Me deriv. 304, 284; di-Et deriv. 305, 287; di-Pr deriv. 305, 288; di-Bu deriv. 306, 287; tetrameth deriv. 306, 286; di-MeO deriv. 314, 294. C. J. W.

**Ammonolysis of fluorenone and fluorenone anil.** Louis A. Pinck and Guido E. Hilbert. *J. Am. Chem. Soc.* 56, 490(1934).—Fluorenone and  $NH_3$  at room temp. for several weeks give quantitatively the imide, m. 124°; the anil and  $NH_4Cl$  in liquid  $NH_3$  give the imide and  $PhNH_2$ .  $Ph_2CO$ , 9,9-dichlorofluorene and 1,2-dichlorodiphenyleneethane do not react with  $NH_3$ .

C. J. West

**The law of periodicity. IX. The constitution of triaryl methyl compounds.** P. Petrenko-Kritchenko. *Ber.* 66B, 1771–4(1933); cf. C. A. 27, 5225.—A reply to Hantzsch and Burawoy (cf. C. A. 27, 5736). B. A. Soule

**Reactivity of atoms and groups in organic compounds. XIII. The influence of structure on the pyrolysis of esters of triphenylacetic acid.** James F. Norris and Arthur Cresswell. *J. Am. Chem. Soc.* 56, 423–6(1934); cf. C. A. 28, 1082.—The following esters of  $Ph_3CCO_2H$  are reported: *Pr*, m. 98–9°; *iso*-*Pr*, m. 83.5–4.5°; *Bu*, m. 99–99.6°; *iso*-*Bu*, m. 88–9°; *sec*-*Bu*, m. 101–2°; *Am*, m. 76–6.5°;  $C_6H_5$ , m. 84–4.5°;  $PhCH_3$ , m. 99–9.5°;  $PhCH_2CH_3$ , m. 92.5–3°. The temps. at which the esters first begin to show signs of decomp. when heated for 1 hr. (the cracking temps.) are given in a curve and compared with the values for the corresponding  $Ph_3C$  ethers; from Me to *sec*-Bu the activating influence of these radicals on the lability toward heat of the bonds broken is similar in the 2 series; when the radicals present were *iso*-Bu,  $PhCH_2$  and  $PhCH_2CH_2$ , the effects on cracking temps. were opposite from those in the cases of the other radicals. The percentages of  $CO_2$  in these cases and of olefin products in the pyrolysis products are given. The cracking temps. of the esters are: Me 190°, Et 188°, *Pr* 160°, *iso*-*Pr* 154°, *Bu* 183°, *sec*-*Bu* 163°, *iso*-*Bu* 149°,  $PhCH_2$  179°,  $PhCH_2CH_3$  157°.

C. J. West

**Heteropolar compounds. XXIII. Tetraphenylcyclopentadienone and its reduction products.** W. Diltz, W. Braun and O. Tröskén. *J. prakt. Chem.* 139, 1–16 (1933); cf. C. A. 27, 4222.—2,3,4,5-Tetraphenylcyclopentenone (I) and  $PCl_5$ , heated 15 min. at 185–70°, give the compd.  $C_{20}H_{12}OCl$ , which m. 165–6° (decompn.) and on being heated at 180–90° loses HCl, yielding 2,3,4,5-tetraphenylcyclopentadienone (II). I gives an *Ac* deriv., m. 183°. Reduction of 2,3,4,5-tetraphenylcyclopentenolone or II with HI and red P gives I; I or II with amal-

garnated Zn in AcOH gives 2,3,4,5-tetraphenyl-1-hydroxy- $\Delta^1$ -cyclopentene (III), m. 176°; 2,3,4,5-tetraphenyl-1-hydroxycyclopentadiene (IV) gives the same product. IV, heated 7 hrs. in AcOH in H, gives I. Tetraphenylcyclopentadiene results from the Zn distn. of I, II, III or IV. Tetraphenyl-3-hydroxy- $\Delta^1$ -cyclopentenone, catalytically reduced with Pd, gives a compd. (V),  $C_{26}H_{20}O$ , m. 163°, which gives a depression of 23° in the m. p. of I. With 4% Pt, there results a compd.,  $C_{26}H_{20}O_2$  or  $C_{26}H_{20}O_3$ , m. 228-9°, which yields V on Zn distn.; with 10% Pt some I and V are also formed.



C. J. West  
Tautomerism of  $\alpha$ -diketones. I. Benzyl phenyl diketone. E. P. Kohler and R. P. Barnes. *J. Am. Chem. Soc.* 56, 211-14 (1934).—O.CPh<sub>2</sub>CHBz is rearranged by

HCl in AcOH, giving 70% of PhCH:C(OH)Bz (I). The enol content of the equil. mixt., detd. by Br titration, was: 100° 28.5%, 125° 25.5%, 145° 23.5%, 165° 21%, distillate 9.1% and in the residue after 1 distn. from soft glass into a Pyrex condenser and receiver 27%. For 0.1 N solus.: MeOH 43%, EtOH 38%, CHCl<sub>3</sub> 53%, C<sub>6</sub>H<sub>6</sub> 39%. On autoxidation I forms a peroxide, which could not be isolated, the end products being BzH and BzCO<sub>2</sub>H. I in EtOH-Et<sub>2</sub>O and EtONa give a yellow Na salt, C<sub>16</sub>H<sub>11</sub>O<sub>2</sub>Na.0.5EtOH, sol. in MeI and Et<sub>2</sub>O, from which a new Na salt ppts., lighter in color and free from EtOH. I and Ac<sub>2</sub>O with a drop of H<sub>2</sub>SO<sub>4</sub> give the *O-Ac deriv.*, PhCH.C(OAc)Bz, pale yellow, b<sub>p</sub> 195-200°; the product never contains enough of a C-acyl deriv. to give a color reaction with FeCl<sub>3</sub>. I forms a mixt. of *O*- and *C*-Me derivs. by every method of alkylation; the Na salt and Me<sub>2</sub>SO<sub>4</sub> in Me<sub>2</sub>CO give 80.9% of the *O*-Me compd. and in Et<sub>2</sub>O 64.2%, the Na salt and MeI in Me<sub>2</sub>CO give 64.6% and in MeOH 50.9% of the MeO deriv. The Na salt and I in Et<sub>2</sub>O give a small yield of BzCOCHPhCHPhCOBz, yellow, m. 198°. I and PhMgBr give 89% of PhCH<sub>2</sub>CO.CPh<sub>2</sub>OH, m. 60°. II. Benzohydryl phenyl diketone. E. P. Kohler and N. Weiner. *Ibid.* 434-8.—O.CPh<sub>2</sub>CHBz,

rearranged with MeONa, gives 73-84% of benzohydryl Ph diketone (I), m. 49-50°. I is rapidly oxidized by alk. H<sub>2</sub>O<sub>2</sub> to H<sub>2</sub>O and Ph<sub>2</sub>CHCO<sub>2</sub>H. Condensation of I with *o*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> gives benzohydrylphenylquinoxaline, m. 108-9°. I does not form a Cu deriv. and gives no color with EtOH-FeCl<sub>3</sub>; it resists bromination under all conditions and is therefore completely ketonic. I in satd. MeOH-KOH passes through the color changes of yellow, orange and deep red, finally giving triphenylacetic acid, m. 243-5° (decompn.), *Me ester*, m. 18°. Alk. Me<sub>2</sub>SO<sub>4</sub> and I in MeOH, shaken until the red color disappears, give 94% of  $\alpha$ -methoxy- $\beta$ -phenylbenzalacetophenone, m. 103-4°. MeI may also be used, but the reaction mixt. must be boiled. Benzoylation of I in C<sub>6</sub>H<sub>5</sub>N or in NaOH gives  $\alpha$ -benzoyloxy- $\beta$ -phenylbenzalacetophenone, m. 161° (93.5% in C<sub>6</sub>H<sub>5</sub>N); it is not hydrolyzed by acids and is not catalytically reduced. Catalytic reduction of I in AcOEt or in Ac<sub>2</sub>O gives 1,3,3-triphenyl-1-hydroxypropanone, m. 128°, previously obtained from O.CPh<sub>2</sub>CHCH(OH)Ph; the oxime, m. 135-

6°, is an  $\alpha$ -oxime, since it forms a Cu deriv. and gives a red color in EtOH-FeCl<sub>3</sub>. Addn. of MeMgI to I in Et<sub>2</sub>O gives 1,3,3-triphenyl-2-methyl-2-hydroxypropan-1-one (II), m. 176° (188° in *Am. Chem. J.* 36, 536 (1906) is an error); addn. of I to MeMgI gives 1,3,3-triphenyl-1-methyl-1-hydroxypropan-2-one (III), m. 72-3°; excess HI gives 1,3-diphenyl-1-methylindan-2-one, m. 185° (decompn.). III, added to PhMgI, gives 1,2,3,3-tetraphenyl-1-methylpropane-1,2-diol, m. 184°. II and PhMgBr give a mixt. of this diol and the isomeric 1,1,3,3-tetraphenyl-2-methylpropane-1,2-diol (IV), m. 173°. Ph<sub>2</sub>CHCO<sub>2</sub>Me, treated with MeMgI, gives 86% of *Me*  $\alpha$ -methyl- $\beta$ -*di*-phenyl-, m. 87-8°; with PhMgBr this yields 76% of IV. I

and PhMgBr give Ph<sub>2</sub>CHCPh(OH)Bz. In an attempt to rearrange O.CPh<sub>2</sub>CHBz with HCl in AcOH there results

1,3-diphenyl-1-chloroindan-2-one, m. 174° (decompn.); EtOH gives the 1-EtO compd., m. 133°. C. J. West  
7-Nitrodesoxybenzoin. Jakob Meisenheimer and Emil Mahler. *Ann.* 508, 185-91 (1934).—7-Nitrostilbene, shaken with 15% MeOH-KOH until soln. results, dild. with H<sub>2</sub>O and treated with Br-H<sub>2</sub>O, gives 1,2-diphenyl-1-methoxy-2-bromo-2-nitroethane; the mixt. of isomers m. 58-68°, from which the  $\alpha$ -form, m. 91°, is obtained by repeated crystn. from AcOH. The mixt. of isomers with MeOH-KOH at 30-50° for 1 hr. gives, on addn. of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, 66% of the *di-Me acetal* (I), m. 117-8°, of nitrodesoxybenzoin (II), BzCH(NO<sub>2</sub>)Ph, m. 73°, prepd. from the acetal by shaking with 75% H<sub>2</sub>SO<sub>4</sub> at 100-10°; continued heating at 100° results in complete splitting to PhCH<sub>2</sub>NO<sub>2</sub> and BzOMe; the Br deriv. of II m. 91-1.5°. If in the prepn. of I, HCl is used in place of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, there results 7-nitro-7'-methoxystilbene, S-yellow, m. 87°. From the mother liquor of I, a small quantity of 7-nitro-7'-aminostilbene, yellow, m. 157°, may be isolated. II does not give an oxime with NH<sub>2</sub>OH.HCl in C<sub>6</sub>H<sub>5</sub>N but under the same conditions there results anthraquinone diosime, pale yellow, m. 245-50° (decompn.). C. J. W.

The oxidoreduction of 1-chloro-1,2-diphenylethanal and the so-called oxide of tolan. Georges Richard. *Compt. rend.* 197, 1432-4 (1933).—Dry powd. KOH acting on PhCOCHClPh in Et<sub>2</sub>O gives BzOH, Ph<sub>2</sub>CHCO<sub>2</sub>H, PhCOCH<sub>2</sub>Ph (I) and Bz<sub>2</sub>. Contrary to Madelung and Oberwagner no tolan was obtained. R. suggests that their product was possibly impure I. Rachel Brown

Indirect hydrolysis of hexaphenylethane. W. E. Bachmann. *J. Am. Chem. Soc.* 56, 230-40 (1934).—Ph<sub>2</sub>C (I) is converted to a mixt. of equiv. amts. of Ph<sub>2</sub>CH and Ph<sub>2</sub>COH by a mixt. of H<sub>2</sub>O and a small amt. of I. I does not react with MgI<sub>2</sub> in Et<sub>2</sub>O and C<sub>6</sub>H<sub>6</sub> to give a Grignard reagent as has been reported. I promotes the oxidation of MgI<sub>2</sub> by O of the air. Ph<sub>2</sub>CMgBr reacts rapidly with I and gives I and Mg halides. C. J. West

Pinacol-pinacolone rearrangement. V. The rearrangement of unsymmetrical aromatic pinacols. W. E. Bachmann and Helen R. Sternberger. *J. Am. Chem. Soc.* 56, 170-3 (1934); cf. *C. A.* 27, 5071.—The pinacols were prepd. by the action of a Grignard reagent on the Me esters of benzoic acid or a substituted acid. *Me anisilate*, m. 110-10.5°; *Me 4,4'-diphenylbenzoic acid*, m. 130.5-1.5°. *Benzopinacols*: 3,3'-dimethyl-4',4''-dimethoxy, m. 153.3-4.5° (49% yield); 4,4'-dimethyl-4',4''-dimethoxy, m. 159.5-61° (69%); 4,4'-diethoxy, m. 162-3° (73%); 4,4'-diphenyl, m. 190.5-1° (86%); 3,3'-dimethyl-4',4''-diphenyl, m. 160-1° (69%); 4,4'-dichloro, m. 143-4.5° (69%); 4,4'-difluoro, m. 166.5-7.5° (67%). These pinacols have been rearranged to pinacolones and the relative migration aptitudes of the groups detd. to be: *p*-biphenyl 1.18, Ph 1, *m*-tolyl 1, *p*-tolyl 0.96, *p*-chlorophenyl 0.75, phenetyl 0.49, anisyl 0.39, *p*-fluorophenyl 0.099. The corresponding series for the sym. pinacols is: anisyl 70, phenetyl 39, *p*-tolyl 15, *p*-biphenyl 11.5, *m*-tolyl 1.95, *p*-fluorophenyl 1.85, Ph 1, *p*-chlorophenyl 0.66. There is no simple relationship between the values for the 2 groups 2,2-Di-*p*-fluorophenyl-1,2-diphenyl-1-ethanone, m. 121.5-2.5°; 4,4'-difluorotriphenylmethane, m. 55-6°.

C. J. West  
Rearrangement of  $\alpha$ -naphthalene derivatives into  $\beta$ -naphthalene derivatives under the influence of catalysts. Fritz Mayer and Rudolf Schiffner. *Ber.* 67B, 67-9 (1934).—Several examples were given (*C. A.* 26, 5934) of the conversion of cycloaromatic ketones, by means of arylmagnesium halides, into unsatd. compds. which were dehydrogenated to diaryl compds. with S. In an attempt to effect the dehydrogenation with catalysts in order to avoid the formation of S-contg. by-products, 1-phenyl- $\Delta^1$ -dialin (prepd. from PhMgCl and  $\alpha$ -tetralone) was passed in a current of air over silica gel in a porcelain tube at 350°. It was hoped thereby to obtain  $\alpha$ -C<sub>16</sub>H<sub>7</sub>Ph in better yield and purer form, but the product proved to be  $\beta$ -C<sub>16</sub>H<sub>7</sub>Ph, m. 102.5°.  $\alpha$ -C<sub>16</sub>H<sub>7</sub>Ph itself yields the same

product;  $\alpha$ -C<sub>10</sub>H<sub>7</sub>Me and  $\alpha$ -C<sub>10</sub>H<sub>7</sub>Et at 420-80° are rearranged into the  $\beta$ -isomers; 1,6-C<sub>10</sub>H<sub>7</sub>Me gives 2,6-C<sub>10</sub>H<sub>7</sub>Me;  $\alpha$ -C<sub>10</sub>H<sub>7</sub>C(CH<sub>3</sub>)Me yields only C<sub>10</sub>H<sub>8</sub>;  $\alpha$ -C<sub>10</sub>H<sub>7</sub>Br gives C<sub>10</sub>H<sub>8</sub> and  $\beta$ -C<sub>10</sub>H<sub>7</sub>Br. C. A. R.

Reactions of *o*-phenylenebis(phenylglyoxal) and the retrobenzile acid rearrangement. Preparation of 2,8-diphenyl-1,4-dihydroxynaphthalene. Richard Weiss and Karl Bloch. *Monatsh.* 63, 39-51(1933); cf. C. A. 26, 2451.—Dibenzalphenanthrene (I), from benzaldehyde and PhCH<sub>2</sub>MgBr, with Br<sub>2</sub> gives *o*-C<sub>6</sub>H<sub>4</sub>(COCBrPh)<sub>2</sub> (II), which reacts with EtOH in a sealed tube 24 hrs. at 100° to give *o*-C<sub>6</sub>H<sub>4</sub>(COCOPh)<sub>2</sub> (III). I and Cl in cold AcOH give *dichlorobis(dichlorobenzyl)phthalon* (IV), m. 242-8°. I with a little I in AcOH rearranges to 2-phenyl-3-benzylindone, m. 130-3°. II with Zn in AcOH, heated 2-3 hrs., gives 2,3-diphenyl-1,4-dihydroxynaphthalene (V), m. 236-43°, which is oxidized by Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub> to 2,3-diphenyl-1,4-naphthoquinone (VI), m. 136-9°. III, Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> with Zn dust give the *de-Ac* deriv. of V, m. 200-2°; hydrolysis with dil. HCl gives V. Distn. of V with Zn gives a red-brown mol. compd. of VI and 2,3,1-Ph<sub>3</sub>C<sub>10</sub>H<sub>8</sub>OH (VII) and some VII. The mol. compd. is also formed from the components and m. 133-6°; EtOH-KOH decomps. the mol. compd. into VI and VII. VII gives a 4-NO compd., yellow, m. 193° (decompn.). A nearly satd. soln. of III in hot EtOH and 10% EtOH-KOH, refluxed 1 hr., give *diphenylphthalancarboxylic acid* (VIII), m. 200-2°; *Me ester*, m. 197°; boiling 3 g. with 100 cc. Ac<sub>2</sub>O for 5 hrs. gives a mixt. of diphenylindone (IX) and *o*-benzoylbensilic acid (X), m. 176° (decompn.). Heating VIII at 18 mm. gives IX. Reduction of VIII with HI and red P gives *diphenylhomophthalide*, m. 166°; this also results by reduction of X. C. J. West

Synthesis of polynuclear hydrocarbons by the cyclodehydration of aromatic alcohols. Marston T. Bogert, David Davidson and Richard O. Roblin, Jr. *J. Am. Chem. Soc.* 56, 248(1934); cf. C. A. 27, 3211.—1-Methyltetralin has been obtained by the action of PhOH on PhCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH(OH)Me, PhCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, PhCH<sub>2</sub>CH<sub>2</sub>CH(OH)CH<sub>2</sub>Me or PhCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>Me; 1-ethyltetralin has been obtained from both Ph(CH<sub>2</sub>)<sub>3</sub>CH(OH)Me and Ph(CH<sub>2</sub>)<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH; from Ph(CH<sub>2</sub>)<sub>3</sub>CMe(OH)CH<sub>2</sub>Me both 1,2-dimethyltetralin and 1-methyl-1-ethylindan are formed. C. J. West

Synthesis of bicyclic compounds. P. C. Guha, K. N. Gaid and D. R. Mehta. *Current Sci.* 2, 53(1933); cf. C. A. 27, 3211.—The di-Na deriv. of di-Et 4,6-diketo-2,2-dimethylcyclohexane-1,3-dicarboxylate in C<sub>6</sub>H<sub>6</sub> reacts with CH<sub>3</sub>I, when heated in a closed vessel at a high temp.,

to give  $\text{CMe}_3\text{C}(\text{CO}_2\text{Et})\text{CO}_2\text{CH}_2\text{CO}_2\text{CCO}_2\text{Et}$ , which on

hydrolysis gives ketonopinone,  $\text{CMe}_3\text{CH}(\text{CO}_2\text{CH}_3)\text{CO}_2\text{CH}_3$ .

Under similar conditions succinosuccinic ester yields the 1,4-bridged compd. Louise Kelley

Chlorine derivatives of 4-hydroxybiphenyl. J. C. Colbert, Wyman Meigs and Brown Mackin. *J. Am. Chem. Soc.* 56, 202-4(1934).—4-HOC<sub>6</sub>H<sub>4</sub>Ph in CHCl<sub>3</sub>, treated with Cl for 1 hr., gives 65% of 3-chloro-4-hydroxybiphenyl (I), m. 76-75° (all m. ps. cor.); in CCl<sub>4</sub> the yield is 73%, in AcOH, 46%; 1 mol. Br gives 44% of the 5-Br deriv., m. 84-6°; 2 mols. Br give 56.4% of the 5,4'-di-Br deriv., m. 143-6°. Chlorination in CHCl<sub>3</sub> for 2 hrs. gives 50% of the 3,5-di-Cl deriv. (II), m. 80.5-2°; CCl<sub>4</sub> gives a 58% yield; CS<sub>2</sub> gives 35%; increasing the time to 2.5 hrs. decreases the yield to about 39%. Chlorination in AcOH for 4 hrs. gives 10% of the 3,5,4'-tri-Cl deriv. (III), m. 133.5-7°. The benzate of I m. 95-7°, of II, 144-6°, of III, 161°. The following 2,4-dimethoxybiphenyl ethers were prepd.: 4'-phenyl-2'-chloro, yellow, m. 109-11°; 4'-phenyl-2',6'-dichloro, light yellow, m. 112-13°; 4'-(*p*-chlorophenyl)-2',6'-dichloro, yellow, m. 174-6°. C. J. West

Biaryls and their derivatives. I. 2,7,2',7'-Tetrahydroxybiphenyl. I. S. Ioffe. *J. Gen. Chem.* (U.S. S. R.) 3, 453-52(1933).—The structure of 2,7-dihydroxy-

naphthalene and 2,7,2',7'-tetrahydroxy-1,1'-biphenyl requires further study. Investigation of other sulfonic acids of  $\beta$ -naphthol and polyhydroxynaphthalenes is being continued. II. Cyclization of 2,7,2',7'-tetrahydroxy-1,1'-biphenyl. I. S. Ioffe and I. V. Grachev. *Ibid* 463-9.—Bromination of 2,7,2',7'-tetrahydroxy-1,1'-biphenyl (I) and the cyclization of the mixt. of its penta- and hexa-Br derivs. was studied. Heating of the latter mixt. with Cu powder at 200° caused a flash and resulted in a product, investigation of which is incomplete. Prepn. of the Pb salt of I is described. W. P. Ericks

Naphthaleneearsonic acids. Application of the Béchamp reaction to  $\alpha$ -naphthylamine. Harold P. Brown and Cliff S. Hamilton. *J. Am. Chem. Soc.* 56, 151-3(1934).—The aminonaphthaleneearsonic acid obtained by the direct arsonation of  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub> by means of the Béchamp reaction has been identified structurally as 1,2-C<sub>10</sub>H<sub>6</sub>(NH<sub>2</sub>)<sub>2</sub>AsO<sub>3</sub>H<sub>2</sub> (I) by a series of mixed m. ps., the prepn. of an Ac deriv. and the prepn. of 1,2-C<sub>10</sub>H<sub>6</sub>(NHAc)<sub>2</sub>Cl from this Ac deriv. The assignment of this instead of the 4,1-structure (II) as reported in the literature involves a correction of the structure of all C<sub>10</sub>H<sub>6</sub> arsenicals dependent on the Béchamp reaction as a part of their method of prepn., including certain substituted naphthaleneearsonic acids, the only known HO deriv. and the product at present assigned the structure of the C<sub>10</sub>H<sub>6</sub> analog of arspenamine. I was obtained from II by heating the latter in  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub>, this demonstrates that in a medium of  $\alpha$ -C<sub>10</sub>H<sub>7</sub>NH<sub>2</sub> at temps. above 175°, the former isomer is more stable than the latter. C. J. West

Synthesis of condensed polynuclear hydrocarbons by the cyclodehydration of aromatic alcohols. I. Indans Marston T. Bogert and David Davidson. *J. Am. Chem. Soc.* 56, 185-90(1934).—Monophenylated alcs. of the

type PhCC(OH)CHMe<sub>2</sub> and PhCCHC(OH)Me<sub>2</sub>, which on dehydration may be expected to yield olefins of the type

PhCC: CMe<sub>2</sub>, are converted into indans by 85%

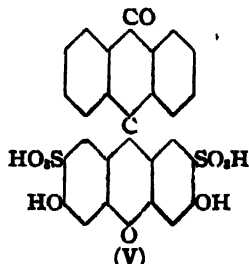
the intermediate olefins are also cyclized to indans by H<sub>2</sub>SO<sub>4</sub>. PhCH<sub>2</sub>CH<sub>2</sub>CM<sub>2</sub>OH gives 65% of 1,2-dimethylindan (I), b. 191°; PhCH<sub>2</sub>CH(OH)CHMe<sub>2</sub> gives 55% of the same product. PhCH<sub>2</sub>CHMeCH(OH)Me, b. 135-6°, gives a polymer only. PhCH<sub>2</sub>CM<sub>2</sub>(OH)CHMe<sub>2</sub>, b. 122-4°, gives 90% of 1,1,2-trimethylindan (II), b. 208°. PhCM<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, b. 137-8°, gives 15% of I. PhCM<sub>2</sub>CH<sub>2</sub>CH(OH)Me, b. 206-8°, gives 35% of 1,1,3-trimethylindan. PhCM<sub>2</sub>CH<sub>2</sub>CM<sub>2</sub>OH, b. 133°, gives 85% of 1,1,3,3-tetramethylindan (III), b. 206-9°. A case of direct cyclodehydration appears to exist in the conversion of Ph(CH<sub>2</sub>)<sub>3</sub>OH into tetralin by the action of hot H<sub>2</sub>PO<sub>4</sub>. These results show that aralkyl alcs. which bear a HO group on the C atom in the 3-position with respect to the Ph group are incapable of undergoing direct cyclodehydration; apparently the steric relationships are such that normal dehydration to olefins takes precedence over cyclodehydration to indans. In those cases in which the polymer was the final product, a trace of cycle was indicated; hence the behavior of the alcs. differs merely in degree and not in kind, except from a practical point of view. The indans with 1-1.5 vol. H<sub>2</sub>SO<sub>4</sub> at 60° give sulfonic acids: I, m. 67°; II, m. 109°; III, m. 107-8°. C. J. West

2-Methyl-1-indone. N. Kizhner. *J. Gen. Chem.* (U.S. S. R.) 3, 201-7(1933).—Elimination of HBr from 2-bromo-2-methyl-1-hydrindone (I) (C. A. 9, 2066) with C<sub>6</sub>H<sub>5</sub>N gives 37% of 2-methyl-1-indone (II). The nature of the by-products was not detd. Boiling 5 g. I in 10 cc. C<sub>6</sub>H<sub>5</sub>N for 1 hr. with a reflux condenser, cooling, acidification with 10% H<sub>2</sub>SO<sub>4</sub>, distn. of the cryst. product with steam, and recrystn. from petrol. ether gave II, yellow platelets, m. 47-75°, b. 99-100°. At ordinary pressures, II begins to b. 240°, but the temp. quickly rises to 350° because of polymerization. II is sol. in H<sub>2</sub>O and org. solvents. Its soln. in concd. H<sub>2</sub>SO<sub>4</sub> is blue. Warming II in alc. with KOH or NaOH produces a blue soln., de-

colored on acidification, and yielding a ppt. of a polymer of II. II and  $\text{KMnO}_4$  gave phthalic acid. The *p*-nitrophenylhydrazones of II, orange, m. 195–7° from hot AcOH. The *p*-bromophenylhydrazones, which can be prepd. from either I or II, HBr being eliminated in the former reaction, orange, m. 122° from AcOH. II when kept in a stoppered tube for 1.5 months polymerizes to an insol. yellow glassy solid. Analysis indicated that polymerization was accompanied by oxidation. Polymerization was more quickly induced by heating with 1% KOH at 50°. The polymer, pptd. from its soln. in PhH by petrol. ether, m. 170–90°; its soln. in  $\text{H}_2\text{SO}_4$  was colorless; evapn. with alc. KOH gave a blue color. II with HBr gives not I or its isomer, *s. e.*, the normal addn. products, but  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{Br}$  (III) by condensation of 2 mols. of II, linking probably between the C<sub>9</sub> atoms. Elimination of HBr from III by alkali gives IV,  $\text{C}_{20}\text{H}_{16}\text{O}_3$ , probably contg. a new 4-C ring. Heating 4.7 g. II with 20 cc. of fuming HBr in a closed tube at 100° for 4 hrs. and diln. of the reaction mixt. with  $\text{H}_2\text{O}$  gave a mixt. of III and II which by extn. with  $\text{Et}_2\text{O}$  followed by pptn. with MeOH gave 56% III. With AcOH satd. with HBr 80% of III was obtained. III m. 170–1° from boiling PhH. III (0.699 g.) boiled 1 hr. with 1 g. NaOH in 15 cc. 70% alc. gave IV, m. 197–8° from boiling PhH, in theoretical yield after removal of the alc. and acidification with  $\text{HNO}_3$ . IV could not be brominated in PhH soln., added HBr only very slowly to give III, and did not form a phenylhydrazone. Lewis W. Butz

4-Cyano-1-hydrindone. Hans Hoyer. *J. prakt. Chem.* 139, 94–6 (1934).—8-(2-Nitrophenyl)propionic acid, treated with  $\text{SOCl}_2$  and then with  $\text{AlCl}_3$ , gives 4-nitro-1-hydrindone, brown, m. 104–5° (oxime, brown, m. 212–13°); reduction with  $\text{NH}_4\text{OH}$  and  $\text{FeSO}_4$  gives the 4-NH<sub>2</sub> deriv., pale yellow, m. 122–8° (*Bs* deriv., yellow, m. 184–5°; oxime, pale yellow, m. 180–1°); through the diazo reaction there results the 4-CN deriv., light yellow, m. 116–17°.

Condensation of *o*-benzoylbenzoic acid with resorcinol. G. Charrier and Elisa Ghigi. *Gazz. chim. ital.* 63, 630–4 (1922).—In view of the fact that *o*- $\text{BzC}_6\text{H}_4\text{CO}_2\text{H}$  (I) is easily transformed into anthraquinone (II) by warm  $\text{H}_2\text{SO}_4$ , it was thought possible that the compd.  $\text{C}_{20}\text{H}_{16}\text{O}_4$  obtained by Pavolini (*C. A.* 26, 5946) by the condensation of I with resorcinol (III) by  $\text{H}_2\text{SO}_4$  was the same compd. as diresorcinolanthraquinone anhydride (IV) obtained by Sharvin and Kuneszoff (*Ber.* 36, 2020 (1903) and *S.*, *C. A.* 6, 316) from III and II. By the condensation method the product was IV, both from III and II as obtained by *S.*, and from I in place of II. By the method of *P.*, there was obtained from II and III a compd. contg. S, from which no Ba salt sufficiently pure for analysis could be isolated. However, with resorcinol-4,6-disulfonic acid and II in concd.  $\text{H}_2\text{SO}_4$  at 250°, there was obtained, not dihydroxyphenanthrone, but a disulfonic acid,  $\text{C}_{20}\text{H}_{14}\text{O}_4(\text{SO}_3\text{H})_2$  (V),



of the diresorcinolanthraquinone anhydride of *S.* Only by arduous purification could V be isolated, and the initial product had to be washed with satd. aq. NaCl and EtOH, and converted to its Ba salt,  $\text{C}_{20}\text{H}_{12}\text{O}_4\text{S}_2\text{Ba}$ , black. The so-called rhodanin of *P.* is only the di- $\text{SO}_3\text{H}$  deriv. of the  $\text{C}_{20}\text{H}_{16}\text{O}_4$  compd. of Deichler (*Ger. pat.* 108,836 (1897); *Chem. Centr.* 1900, I, 1212). V does not m. up to 350°. IV could not be sulfonated under ordinary conditions, and with fuming  $\text{H}_2\text{SO}_4$  (contg. 60%  $\text{SO}_3$ ) the sulfonated product could not be purified. C. C. Davis

Action of sodium on 9-methoxy-10-phenylphenanthrene

and on 1-diphenylene-3-phenylindene. C. Frederick Koelsch. *J. Am. Chem. Soc.* 56, 480–4 (1934).—*o*-Xenylmagnesium bromide (I) and BzH give *o*-phenylbenzohydrol, m. 69–70°; AcOH contg. a little  $\text{H}_2\text{SO}_4$  or  $\text{SOCl}_2$  in  $\text{Et}_2\text{O}$  gives quantitatively 9-phenylfluorene; MeOH contg. 5%  $\text{H}_2\text{SO}_4$  gives the *Me ether*, m. 72–3°; cleavage by Na in  $\text{Et}_2\text{O}$  gives phenyl-*o*-xenylacetic acid (II), m. 171–3°. I and  $\text{BzCO}_2\text{Et}$  give *o*-phenylbenzylidene acid, m. 189–91° (decompn.); reduction with I and red P in AcOH gives II. II and  $\text{PCl}_5$  in  $\text{C}_6\text{H}_6$ , boiled until HCl is no longer evolved, and then treated with  $\text{AlCl}_3$ , form 9-phenyl-10-phenanthrol, m. 142–3°; acetate, m. 153–5°; benzoate, m. 179–80°; picrate, orange-red, m. 135°;  $\text{Me}_2\text{SO}_4$  in MeOH gives quantitatively 9-methoxy-10-phenylphenanthrene (III), m. 189–90°; 40% Na-Hg in  $\text{Et}_2\text{O}$  gives a violet mono-Na compd., hydrolysis of which gives 9-phenylphenanthrene (IV), m. 105–6° (picrate, orange-red, m. 115°; Br gives 9-bromo-10-phenylphenanthrene, m. 108–10°); the Na compd. and  $\text{CO}_2$  give 9-phenylphenanthrene-10-carboxylic acid, m. 185–7°; refluxing the latter with  $\text{SOCl}_2$  in  $\text{CCl}_4$  gives 1,2,3,4-dibenzo-fluorenone, orange-red, m. 186–7°. III and Na-Hg in  $\text{Et}_2\text{O}$ , after 8 hrs., form a di-Na compd., which is decolorized by  $\text{CO}_2$ , the product being IV. IV reacts with Na-Hg to give a mono-Na compd., which reacts with BzH to give 9-( $\alpha$ -hydroxybenzyl)-10-phenylphenanthrene, which could not be crystd.; boiling with AcOH- $\text{H}_2\text{SO}_4$  gives 1,2,3,4-dibenzo-9-phenylfluorene (V), m. 210–11°; this yields a Na compd. which reacts with  $\text{BzCl}$  to give the 9-Bz deriv. of V, m. 228–9°; this also results from 1-diphenylene-3-phenylindene, Na and  $\text{BzCl}$ . Attempts to oxidize V with  $\text{CrO}_3$  give a compd.  $\text{C}_{27}\text{H}_{18}\text{O}_4$ , m. 188–9° which forms with  $\text{NH}_4\text{OH}$  5% of a compd. m. 218–20° (decompn.); HI gives an I-contg. compd., red-brown, m. 185–7°; boiling 5% NaOH gives a compd.  $\text{C}_{27}\text{H}_{18}\text{O}_4$ , m. 184–6°.

Preparation of 2-iodophenanthrenequinone. L. McMaster and R. S. Wobus. *J. Am. Chem. Soc.* 56, 164–5 (1934).—2-Aminophenanthrenequinone, m. 324° (for which a method of prepn. is given), diazotized in  $\text{H}_2\text{SO}_4$  (d. 1.84) at 0–5° and treated with KI, gives 30% of the 2-I deriv., orange, m. 223–4° (cor.), decompd. well above its m. p. with liberation of I; concd.  $\text{H}_2\text{SO}_4$  gives a dark green soln., turning deep red on diln.

Sulfonation of phenanthrene. Preparation of the monosulfonic acid. I. S. Ioffe. *J. Gen. Chem.* (U.S.S.R.) 3, 448–52 (1933).—The decrease in time interval of the sulfonation reaction increases the total yield of monosulfonic acid of phenanthrene. The yield of monosulfonic acids increases with the decrease in quantity and in strength of the  $\text{H}_2\text{SO}_4$ , but in both cases requires a longer sulfonation period. An excessively large sulfonation period with dil. acid decreases the yield of monosulfonic acids due to desulfonation which takes place with dil. acids. The 9-sulfonic acid of phenanthrene is obtained at higher temps. but quickly rearranges into other monosulfonic acids. The yield of phenanthrene-2-sulfonic acid increases with the time interval of the process, reaching 17–37%.

Experimental investigations on the application of the electronic theory in the chemistry of organic compounds. I. A. M. Berkenheim and M. I. Gostev. *J. Gen. Chem.* (U.S.S.R.) 3, 385–410 (1933).—The electronic formula of isomeric nitro compds. of the aromatic series shows the degree of firmness with which the nitro group is attached to the C ion and indicates the possible group rearrangements. During electrostatic rearrangement, formation of more stable compds. takes place due to change in position of the groups in the nucleus; the signs of all charges remain unchanged. As a result of electrodynamic rearrangement of abnormal nitro compds., complex aromatic nitrite ethers are formed, the existence of which was confirmed and methods for their prepn. established, consisting in the interaction of a metallic salt of phenol with NOCl. The formation of by-products during nitration is due to rearrangement of complex nitrite ethers into HO-containing compds. II. A. M. Berkenheim and A. N. Chivikova. *Ibid.* 411–18. —The formation of an amino



oxide from a tertiary amine by the action of  $H_2O_2$ , the N ion being recharged into the N ion, is described. III. A. M. Berkenheim, S. I. Lur'e and M. F. Eliseeva. *Ibid.* 419-31.—The rearrangement of all charges of C ions of Ph group at the time the aromatic amino oxides are formed was experimentally established. W. P. Ericks

Orientation in the furan nucleus. VII. Di- $\alpha$ -substituted furans. Henry Gilman, N. O. Calloway and E. W. Smith. *J. Am. Chem. Soc.* 56, 220-1 (1934); cf. C. A. 27, 2952.—In the sulfonation of 5-bromo-2-furoic acid and in the acetylation of Et 5-methyl-2-furoate the substituent assumes the 4-position and no significant quantity of isomer appears to form. Et 4-acetyl-5-methyl-2-furoate m. 99° (54% yield); the free acid m. 235°; oxidation of the acid gives 5-methyl-2,4-furandicarboxylic acid, m. 270-2°. If in a di- $\alpha$ -substituted furan 1 of the substituents is an *o,p*-director in  $C_6H_5$  and the other a *m*-director, the entering element or group is directed to that  $\beta$ -position contiguous to the *o,p*-director. C. J. West

Hydrogenation and hydrogenolysis of furan derivatives. Harold E. Burdick and Homer Adkins. *J. Am. Chem. Soc.* 56, 438-42 (1934).—Hydrogenation of  $\beta$ -furyl-acrolein (I) at 160° with Ni on kieselguhr (6.5 hrs.) gives 3%  $\alpha$ -ethyltetrahydrofuran, 33% 1,5-dioxoctahydroindene (II), b<sub>10</sub> 49-50°, b<sub>20</sub> 156-7°, n<sub>D</sub> 1.4461, d<sub>4</sub> 1.0314, and 38% of 3-tetrahydrofurylpropanol (III); at 23° with Raney Ni (16 hrs.) there results 46%  $\beta$ -furylpropionaldehyde (IV) and 30% of a mixt. of 3-furylpropanol (V) and I; at 160° Raney Ni gives 3% II and 65% of III; at 120-75° Cu-Cr oxide gives 4% II and 72% IV; twice as much catalyst gives 8% II and 64% V; at 200° Cu-Cr oxide gives 4%  $\alpha$ -heptanol, 22% of III, 29% of heptane-1,4-diol (VI) and 20% heptane-1,7-diol (VII). IV with Ni on kieselguhr at 160° gives 28% II and 29% III. V and Raney Ni at 160° give 80% of III. VII gives 21%  $C_7H_{16}$  and VI gives 66% of hexan-3-ol. III with Raney Ni at 250° gives 1%  $C_7H_{16}$ ,  $H_2O$ , 60% of  $\alpha$ -ethyltetrahydrofuran, 1%  $\alpha$ -propyltetrahydrofuran, b<sub>10</sub> 132-3°, n 1.4230, d. 0.8533 and 9% III. Furfural diacetate with Ni at 160° gives 10%  $\alpha$ -methyltetrahydrofuran, 78% AcOH, 41% tetrahydrofurfuryl acetate and 24% of the diacetate. Furfuryl alc. gives 85% of the tetrahydro deriv. Furfuroin gives 77% of the high-boiling and 16% of the low-boiling isomer of 1,2-dihydroxy-1,2-ditetrahydrofurylthane. Furfural-acetone gives 89% of 1-tetrahydrofurylbutan-3-ol. Furfuralacetophenone gives 31% of 1-tetrahydrofuryl-3-phenylpropane (VIII), b<sub>10</sub> 160°, n 1.5200, d. 0.9795 and 25% of 1-tetrahydrofuryl-3-phenylpropan-3-ol. VIII gives 95-100% of 1-tetrahydrofuryl-3-cyclohexylpropane, b<sub>10</sub> 121-2°, n 1.4675, d. 0.9135. Et  $\beta$ -furylacrylate gives 90% of Et  $\beta$ -tetrahydrofurylpropionate. II with Ni at 200° gives 32% unchanged II and 39% of III. Raney Ni is active at low temps., especially toward C. C and either Raney Ni or Ni on kieselguhr are excellent catalysts for the satn. of C:C in the side chain or in an "aromatic" nucleus as in furan,  $C_6H_4$  or  $C_6H_5N$ . Raney Ni is the best catalyst for the cleavage of C to C in primary alcs. Cu-Cr oxide is rather inactive toward the satn. of an "aromatic" nucleus but is very effective for the cleavage of the ether linkage in furan and at lower temps. for the hydrogenation of multiple linkages in the side chain without affecting an "aromatic" nucleus. C. J. West

Super-aromatic properties of furan. III. Nitration. Henry Gilman and R. V. Young. *J. Am. Chem. Soc.* 56, 464-6 (1934); cf. C. A. 27, 5738.—Nitration of 2-furyl Ph ketone in  $Ac_2O$  at -8° gave 51% of 5-nitro-2-furyl Ph ketone, m. 111°; this also resulted in 63% yield from 5-nitro-2-furyl chloride,  $C_6H_5$  and  $AlCl_3$ . 2-Furyl 2-thienyl ketone (*semicarbazone*, m. 160°) gave 48% of 5-nitro-2-furyl 2-thienyl ketone, m. 161°; in attempts to prep. this from 5-nitro-2-furyl chloride (I) and thiophene, the yield of recovered 5-nitro-2-furoic acid varied from 48% with  $SnCl_4$  to 84% with  $TiCl_4$ ; with  $AlCl_3$   $H_2S$  was evolved on heating; the ketone was not oxidized by acid  $KMnO_4$ ; warming with 10% NaOH and addn. of 5%  $KMnO_4$  to the cooled soln. gave 2-thienoic acid. 2-

Furyl *p*-phenetyl ketone and  $HNO_3$  gave only tars. Furoyl-2,4,6-tribromoacetanilide, m. 164°; nitration gave only resins. I and 2,4,6- $Br_3C_6H_3NH_2$  yielded 98% of 5-nitro-2-furoyl-2,4,6-tribromoacetanilide, m. 191-2°. Furoyl-N-methylanilide, m. 125°; nitration gave no identifiable product. The relative aromaticities are furyl > thienyl > phenyl. C. J. West

Condensations of furan compounds. II. Colored products of the furylidene series and a new method for the determination of small quantities of acetone based on the formation of these products. V. V. Chelutzev and F. K. Nikitin. *Bull. soc. chim.* 53, 1130-9; *J. Gen. Chem.* (U. S. S. R.) 3, 319 28 (1933); cf. C. A. 26, 5948. The known methods of  $Me_2CO$  detn. are reviewed. The reaction of furfural with  $Me_2CO$  in alk. soln. forms difurylideneacetone which combines with  $H_2SO_4$  to give a stable violet color. One cc. of an  $Me_2CO$  soln. conng 0.05-0.005% is mixed with 1 cc. of 0.2% furfural and 1 cc. of 5% NaOH. The mixt is heated 45 min at 50°, dild. to 50 cc. with 80%  $H_2SO_4$  and compared to a standard soln.  $Me_2CO$  was detd. in  $H_2O$ , EtOH, AcOH,  $MeEtCO$  and  $AcCH_3CO_2Et$ . Other ketones and aldehydes do not respond, but aliphatic aldehydes must be removed by oxidation with 0.1%  $KMnO_4$  and  $H_2SO_4$ , since they replace furfural in difurylideneacetone. The lower limit of sensitivity is 0.0001%. E. W. Scott

The compound of the unstable isomer of 2-methylfuran (methylenedihydrofuran) with quinone. N. Kizhaur. *J. Gen. Chem.* (U. S. S. R.) 3, 198 200 (1933).—Attempt to form an addn. product from 2-methylfuran (I) and quinone (II) failed. The unstable isomer (III) of I (C. A. 26, 5299), however, added easily to give a ruby red, cryst. compd. (IV),  $C_8H_8O + 2C_6H_4O_2$ , of unknown structure. With an excess of III, a family colored oil was obtained, probably  $C_8H_8O + C_6H_4O_2$ . This with II gave IV. Mol.-wt. detns. of IV in PhH indicated that the reaction,  $(C_8H_8O + 2C_6H_4O_2) \rightarrow (C_8H_8O + C_6H_4O_2) + C_6H_4O_2$ , had occurred in soln. II (2.2 g.) added to a mixt of 1 cc. III (b 77-9°) and 4 cc. PhH gave in 12 hrs. a cryst. red mass. After washing with petr. ether to remove II, and allowing the residue (2.1 g.) to stand in the air until the odor of II was no longer perceptible, the IV was recrystd from boiling PhH, low, ruby-red platelets, m. 105°, soln. in PhH or EtOH yellow. IV is non-volatile and yielded only trace of II when distd. with steam. Finely powd. II (6.5 g.) and 3.5 cc. III gave in 0.5 hr. a thick brown liquid with evolution of heat, in 4 hrs. a red cryst. mass and in 2 days a solid product which after prolonged evacuation to remove II gave 8.5 g. IV (theoretical 8.97 g.). Addn. of petr. ether to a soln. of 1 g. II in 2 cc. III and 2.5 cc. PhH gave a thick brown oil, which with more II gave IV. IV in EtOH acidified with HCl liberates I, from 1 g. equiv to 1 mol. II. IV is dissolved by  $FeCl_3$  soln. with liberation of II. With  $SO_2$  or by boiling with 5%  $H_2SO_4$ , IV gives hydroquinone. III combines also with toluquinone, but a cryst. substance could not be obtained. Toluquinone (2.4 g.) and 1 cc. III gave after several hrs. an orange soln. which became reddish orange on the 2nd day. Addn. of petr. ether to this soln. gave a reddish orange oil which could not be crystd. Lewis W. Butz

Preparation and reaction of some furyl isocyanates. A. T. Blomquist and H. B. Stevenson. *J. Am. Chem. Soc.* 56, 146-9 (1934).—By heating the appropriate ester with excess  $N_2H_4 \cdot H_2O$  the following furylhydrazides were prepd.: 5-methyl-2-, m. 61-2°; 5-bromo-2-, m. 135.5-6°; 2,4-dimethyl-3-, m. 144-5°; 2-methyl-, m. 149.5-50°; 2,5-dimethyl-3-, m. 136-6.3°. With  $NaN_3$  and AcOH the corresponding azides were prepd. m., resp., 35-6°, 66-7°, oil, 22-3°, 24-5°. Heating the azide in an inert solvent (ligroin, b. 90-100°) gives the isocyanates, b<sub>10</sub> 53-4°, b<sub>10</sub> 75°, b<sub>10</sub> 74-5°, b<sub>10</sub> 42°, b<sub>10</sub> 68°, resp.; the 1st compd. was also obtained from the chloride and  $NaN_3$ . By heating with  $H_2O$  there results *sym bis*(5-methyl-2-furyl)urea, m. 182°; the 2,4-dimethyl-3-furyl deriv., m. 285°; the 2-methyl-3-furyl deriv., m. 227°, and the 2,5-dimethyl-3-furyl deriv., m. 247°. With  $PhMgBr$  there results 5-methyl-2-furylbenzamide, in



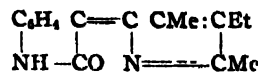
the 2,4-dimethyl-3-deriv., m. 100–70°, and the 2-methyl-3-deriv., m. 137.8–8°. With MeOH there results *Me* 5-methyl-2-furylcarbamate, m. 64–6°; the 2,4-dimethyl-3-deriv., m. 95–6°; the 2-methyl-3-deriv., m. 128°, and the 2,5-dimethyl-3-deriv., b.p. 107°. The substituted  $\beta$ -furyl isocyanates are much more stable toward air, light and heat than are the  $\alpha$ -derivs.; this difference in stability is also found in the derivs. of the isocyanates.

C. J. West  
 Synthesis of  $\alpha$ -substituted pyrroles and pyrrole sulfide. Hans Fischer and Zoltán Csukás. *Ann.* 508, 167–84 (1934).—Opsopyrrolecarboxylic acid aldehyde (3-methylpyrrole-4-propionic acid-2-aldehyde) (I),  $\text{CH}_3(\text{CO}_2\text{H})_2$  and piperidine, warmed 1 hr. on the water bath, give 3-methyl-2-( $\omega,\omega'$ -dicarboxyvinyl)pyrrole-4-propionic acid, yellow, m. 173° (*tri-Me ester*, yellow, m. 80°);  $\text{CH}_3(\text{CN})_2$  gives nearly quant. the  $\omega,\omega'$ -dicyanovinyl deriv., decomp. 251° (piperidine salt, m. 185°); 1 or 2 mols. Br gives the Br deriv., m. 181° (decompn.);  $\text{NCCCH}_2\text{CO}_2\text{Et}$  gives nearly quant. the  $\omega$ -cyano- $\omega$ -carbethoxyvinyl deriv., yellow, m. 176°. I and  $\text{CH}_3\text{N}_3$  in  $\text{Et}_2\text{O}$  give *Me* 3-methyl-2-formylpyrrole-4-propionate (II), m. 77°; I is not esterified by MeOH and HCl and  $\text{Me}_2\text{SO}_4$  gives a poor yield of the ester; with  $\text{CH}_3(\text{CO}_2\text{Et})_2$  II gives *Me* 3-methyl-2-( $\omega,\omega'$ -dicarboxyvinyl)pyrrole-4-propionate, m. 89°. 2,3-Dimethyl-5-carbethoxypyrrrole-4-propionic acid and Br in  $\text{HCO}_2\text{H}$ -AcOH give a Br deriv., decomp. 178°, which is unstable and on 2 crystals from  $\text{C}_2\text{H}_5\text{N}-\text{H}_2\text{O}$  gives 3,3'-dimethyl-4,4'-dipropionic acid-5,5'-dicarboxypyrrolemethane, m. 277°; this also results in attempted condensations with  $\text{CHNa}(\text{CO}_2\text{Et})_2$ . 3-Bromo-5-bromomethyl-2-carbethoxypyrrrole-4-propionic acid and  $\text{HNa}(\text{CO}_2\text{Et})_2$  in  $\text{C}_2\text{H}_5\text{N}$  give *di-Et* 3-bromo-2-carbethoxypyrrrole-4-propionic acid-5-methylmalonate, m. 127°. Opsopyrrolecarboxylic acid (10 g.) and  $\text{NCCCH}_2\text{CO}_2\text{Et}$  in  $\text{CHCl}_3$ - $\text{Et}_2\text{O}$ , treated with HCl gas with cooling, give 3 g. *Et* 3-methylpyrrole-4-propionic acid-2-( $\alpha$ -ketopropionate), m. 164°; the imine m. 189°. 3-Methyl-2-acetylpyrrole-4-propionic acid, from MeCN, m. 178°. Opsopyrrolecarboxylic acid-2-aldoxime (III), pale red, m. 185°; heating with  $\text{Ac}_2\text{O}$  and AcOK gives 3-methyl-5-acetyl-2-cyanopyrrole-4-propionic acid, m. 144°. III and  $\text{SOCl}_2$ , heated 1 hr., give a mixt. of bis(4-methyl-5-cyanopyrrole-3-propionic acid) 2-sulfide, m. 249° (decompn.) (*Et ester*, m. 120°), and 2-chloro-4-methyl-5-cyanopyrrole-3-propionic acid (IV), m. 170°. III and Br in AcOH give the HBr salt, m. 188°, of 2-bromo-4-methylpyrrole-3-aldoxime-3-propionic acid, m. 158°. III and  $\text{SOCl}_2$  in  $\text{Et}_2\text{O}$  give the 2-Cl deriv., m. 175° (decompn.), which gives IV with  $\text{Ac}_2\text{O}$  and AcOK. 2,4-Dimethyl-5-carbethoxypyrrrole (V) and  $\text{S}_2\text{Cl}_2$  in  $\text{Et}_2\text{O}$  give bis(2,4-dimethyl-5-carbethoxypyrrrole) 3-sulfide (VI), m. 252°; the free acid m. 193°. VI and Br give the compd.  $\text{C}_8\text{H}_{10}\text{O}_2\text{N}_2\text{Br}_2$ , m. 152°. Oxidation of VI with  $\text{H}_2\text{O}_2$  in AcOH gives V. Bis(4-methyl-5-carbethoxypyrrrole-3-propionic acid) 2-sulfide, m. 217°; the free acid m. 240° (decompn.). Bis(5-methyl-3-ethyl-4-acetylpyrrole) 2-sulfide, m. 219°. 2,4-Dimethylpyrrole-3-propionic acid-5-aldoxime, m. 187° (Cu complex, m. 215° (decompn.));  $\text{Ac}_2\text{O}$  gives 2,4-dimethyl-5-cyanopyrrole-3-propionic acid, m. 153°. 3-Methyl-5-bromomethyl-4-ethyl-2-cyanopyrrole, light yellow; the intermediate product,  $\text{C}_8\text{H}_{10}\text{N}_2\text{Br}_2$ , light red, m. 139° (decompn.). 3-Methyl-4-ethyl-2-cyanopyrrole-5-carboxylic acid, m. 228° (decompn.); heating at 230–5° gives the compd.  $\text{C}_{10}\text{H}_{10}\text{O}_2\text{N}_2$ , pale yellow. 3-Methyl-4-ethyl-2-cyanopyrrole-5-aldehyde, pale green, m. 143°. C. J. W.

Removal of thiophene from benzene. Harry N. Holmes and Norvil Beeman. *Ind. Eng. Chem.* 26, 172–4 (1934).—Removal of thiophene from  $\text{C}_6\text{H}_6$  by the use of com.  $\text{AlCl}_3$  is far more complete by repeated treatment, instead of a single treatment with large quantities of  $\text{AlCl}_3$ . A temp. of 35° is recommended. E. M. S.

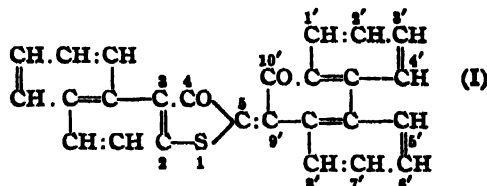
The condensation products of isatin with pyrroles (pyrrole blues). II. P. Pratesi. *Atti accad. Lincei* 18, 53–8 (1933); cf. C. A. 27, 4797; 28, 765°.—Phyllopyrrole (2,4,5-trimethyl-3-ethylpyrrole) does not form a pyrrole blue, showing that the bond with isatin must

be through a C atom in the pyrrole nucleus. The  $\alpha$ -C atoms are the ones involved, for, whereas  $\beta,\beta'$ -dialkylpyrroles form blues readily,  $\alpha,\alpha'$ -dimethylpyrrole does not. Cryptopyrrole ( $\alpha$ -methyl- $\beta$ -methyl- $\beta'$ -ethylpyrrole) also forms a blue, so that 1 free  $\alpha$ -C atom is sufficient for the reaction to take place. It has been shown that the carbonyl O atom eliminated is in the  $\beta$ -position (von Baeyer, *Ber.* 18, 2638 (1885)). Cryptopyrrole blue is formed by the reaction of 1 mol. each of cryptopyrrole and isatin, with elimination of 1 mol. of water. The reaction can only be explained by admitting that the imido H has reacted, i. e., the formula of the blue is



A. W. Contieri

Indigoid dyes. IV. 2,1-Naphthothiophenophenanthrenindigo. Paresch Chandra Dutta. *Ber.* 67B, 5–8 (1934); cf. C. A. 27, 5332.—This work was undertaken to det. the influence of the position of the S in the  $\text{C}_{10}\text{H}_6$  nucleus on the color of naphthothiophenophenanthrenindigo. 2,1-Naphthothiophene-9'-phenanthrenindigo,



and the following derivs. were prepd. by condensation of 2,1-naphthoxythiophene (II) with phenanthraquinones, usually in AcOH with HCl. They give in general a characteristic color with concd.  $\text{H}_2\text{SO}_4$  and dissolve with yellow or yellowish brown color in the hyposulfite vat, from which they are reprecipitated by the air. They have stronger shades than the 1,2-isomers. The colors they impart to  $\text{H}_2\text{SO}_4$  and to cotton, resp., are given in parentheses. I, chocolate-brown, m. 280° (bright red, bright violet). Derivs. of I: 4'-nitro, chocolate-brown, m. above 290° (blue, dark violet); 2'-nitro, chocolate-brown, m. above 290° (blue, brownish violet) (the filtrate from this compd. on treatment with aq. HCl and concn. yields a brick-red cryst. substance, m. 232–3°, possibly a HO compd. formed by aldol condensation, sol. in NaOH and with brown color in concd.  $\text{H}_2\text{SO}_4$ ); 4',5'-dinitro, chocolate-brown, m. above 290° (blue, dark violet); 3'-Br, chocolate-brown, m. 232–3°, sol. in pyridine with brownish red color turning to magenta-red with bluish green fluorescence on diln. (violet, bluish violet); 2'-amino, needles with Cu-red luster, m. above 290° (brown, bright reddish brown); 4'-amino, needles with Cu-red luster, does not m. 290° (—, reddish brown); 2'-HO, dark red-brown, m. above 290° (greenish blue, violet); 4'-HO (greenish blue, dark violet). V. *Ibid.* 9–12.—2,1-Naphthothiophen-3'-indolindigo (III) and 2,1-naphthothiophen-2'-acenaphthyleneindigo (IV) and their derivs., prepd. by condensing II with isatins and acenaphthenequinones, are beautifully colored cryst. compds. which dye cotton powerfully from a hyposulfite vat; as compared with the 1,2-isomers they in general produce colors toward the red and although the shades are strong the tinctorial effect, unlike that produced by the phenanthrene compds. (preceding abstr.), is somewhat lighter than that of the 1,2-isomers. Anhyd.  $\text{Na}_2\text{CO}_3$  in alc. proved to be a useful condensing agent in the prepn. of some of these compds. which could not be obtained with AcOH and concd. HCl. Most of them are readily sol. in a hyposulfite vat with yellow or orange color. The colors imparted to concd.  $\text{H}_2\text{SO}_4$  and to cotton, resp., are given in parentheses. III, dark pink, does not m. 295° (blue, scarlet). Derivs. of III: 5'-Cl, needles with violet-red luster, m. above 290° (—, violet-red); 5'-Br, needles with Cu-red luster, does not m. 295° (—, dark red-brown); 5',7'-di-Br, needles with reddish violet luster, m. 285–7° (—, reddish brown); 5'-nitro, chocolate-red,

m. above 295° (beginning to sublime 280°) (violet, chocolate-brown). IV, scarlet, does not m. 295°, sol. in hot PhNO<sub>2</sub>, pyridine and xylene with red color (blue, red). Derivs. of IV: 5'-nitro, chocolate-brown, m. 290-2° (evolving red-brown vapors at 260°) (blue, green); 5',6'-dinitro, Cu-red, m. above 295° (—, greenish brown). 2,1-Naphthothioaphen-1-aceanthrylenindigo from II and aceanthraquinone, brownish red, m. above 295° (—, reddish brown). Bis-2,1-naphthothioaphenethylenindigo, from II and glyoxal-NaHSO<sub>3</sub>, reddish violet, m. above 290° (green, dark violet). C. A. R.

Optically active aryl sulfoxo fatty acids. Wacław Piechulek and Jerzy Suszko. *Roczniki Chem.* 13, 520-9 (1933) (in German 529). Phenylthiodimethylglycolic acid (I) is obtained by mixing 40 g. Me<sub>2</sub>CBrCO<sub>2</sub>H in 100 cc. alc. (cooled on ice) and 10 g. NaOH (satd. soln.) with 28 g. PhSH in 110 cc. alc. and 12 g. NaOH (50% soln.). It is kept on ice for several hrs., then at room temp. overnight, refluxed 12 hrs., concd. to half, boiled 8 hrs., dild. with H<sub>2</sub>O and acidified with H<sub>2</sub>SO<sub>4</sub>. Extn. with ether and recrystn. from C<sub>6</sub>H<sub>6</sub> gives 36 g. of crystals contg. 0.5 mol. C<sub>6</sub>H<sub>6</sub> and m. 65-6°. Derivs. of I prepd. were: acid chloride (II), a yellow oil, b<sub>p</sub> 108-10°; amide, m. 69-70°. Phenylsulfoxodimethylacetic acid (III) is obtained by keeping below 60° 4.8 g. of I in 10 cc. glacial AcOH and 3 cc. 30% H<sub>2</sub>O<sub>2</sub> (IV). The AcOH is removed, the residue dissolved in CHCl<sub>3</sub> and petr. ether added; the crystals m. 121-2° (3.3 g. yield). II is obtained from SOCl<sub>2</sub> and III. I-III cinchonidine salt, m. 162-3°, [α]<sub>D</sub><sup>20</sup> -136.2°; I-III, m. 122-3°, [α]<sub>D</sub><sup>20</sup> -93.8°; d-III quinine salt, m. 167-9°, [α]<sub>D</sub><sup>20</sup> -40.7°; d-III, m. 122°. Phenylsulfonyldimethylacetic acid (V) is obtained by heating 1 g. I-III in 7 cc. glacial AcOH on a water bath with the addn. of 1.6 cc. IV during the course of 2 hrs. The solvent is expelled and a brown oil, cryst. after moistening with H<sub>2</sub>O and rubbing, is obtained, washed with H<sub>2</sub>O, dried and recrystd. from C<sub>6</sub>H<sub>6</sub>, it m. 146-7° (yield 47%). Et ester of V, from II, abs. alc. and IV, m. 39-40°. l-Phenylsulfoxoacetic acid (VII), m. 119-20°, [α]<sub>D</sub><sup>20</sup> -179.5°; cinchonidine salt, m. 174-6° (decompn.), [α]<sub>D</sub><sup>20</sup> -179.1°; d-VII, m. 119-20°, [α]<sub>D</sub><sup>20</sup> 180.6°, was best obtained from its cinchonine salt, m. 138-40° (decompn.), [α]<sub>D</sub><sup>20</sup> 220.5°. Optical rotations were detd. with c = 1 and the solvent CHCl<sub>3</sub> + EtOH (2 + 1). C. T. Ichniowski

Structure and rearrangement of N-acylpyrazoles. K. v. Auwers and K. Dietrich. *J. prakt. Chem.* 139, 65-68 (1934).—Benzoylacetone yields the following hydrazones: acetyl, m. 117-8°; propionyl, m. 87-8°; butyryl, m. 61-3°; phenylacetyl, m. 94-6°; carboethoxy, m. 104-5°; benzoyl, m. 130-2°; o-toluy, m. 113-4°; m-toluy, m. 111°; p-toluy, m. 148-60°. The hydrazones with 10 parts POCl<sub>3</sub> 1 day at 0° give the acylpyrazoles. 1-Acetyl-3-methyl-5-phenylpyrazole (I), m. 45.5-6.5°; rearrangement by heating 15-20 min. *in vacuo* and distg. gives the 3-phenyl-5-methyl deriv. (II), b<sub>p</sub> 158-60°, m. 36-8°; a mixt. of the 2 is liquid at room temp. 1-Propionyl analog of I, m. 33-4°; of II, m. 77-8.5°, also obtained from the pyrazole and EtCOCl. 1-Butyryl analog of I, m. 34-5.5°; of II, b<sub>p</sub> 150-2°, m. 72-2.5°. 1-Phenylacetyl analog of I, m. 104.5-5.5°; of II, b<sub>p</sub> 178-80°, m. 58-9.5°. 1-Carboethoxy analog (III) of I, m. 65-6° (in 1 prepn. the m. p. was 50.5-1.5°); that (IV) of II, b<sub>p</sub> 198°, m. 73.5-4.5°. 1-Benzoyl analog of I, m. 88-9°, results from the B-Me ether of BzCH<sub>2</sub>Ac (PhC(OMe):CHCOMe) at 40-60° in abs. EtOH; of II (V), m. 83-4°; this results from the hydrazone and POCl<sub>3</sub> in place of the expected I deriv. 1-o-Toluy analog of I, m. 63-5°; of II, m. 36.5-7.5°; 1-m-toluy analog of I, m. 79-80°; of II, m. 56-7°, b<sub>p</sub> 224-6°. 1-p-Toluy analog of I, m. 78-9°; of II, m. 68-70°. Methylphenylpyrazole and KCNO give 3-phenyl-5-methylpyrazole-1-carboxylic amide. The o-nitrobenzoylhydrazones of oxymethyleneacetone m. 187-9°; 1-o-nitrobenzoyl-5-methylpyrazole, m. 130°; 3-methyl isomer, m. 118.5-9.5°; rearrangement expts. gave a mixt. of isomers. 1-o-Nitrobenzoyl-4,5-dimethylpyrazole, m. 118-20°; 3,4-dimethyl isomer, m. 149-60°. Hydroxymethylenacetophenone yields a

1 benzoylhydrazones, m. 148°, an o-nitrobenzoylhydrazones, yellow, m. 151-2°, and a carboethoxyhydrazones, m. 111, 8.5°. 1-o-Nitrobenzoyl-5-phenylpyrazole, m. 181-2°; 3-phenyl isomer, b<sub>p</sub> 208-10°, m. 107.5-8.5°. The 2,1-carboethoxy deriv., m. 58-9° (in 1 expt. 37-9°) and b<sub>p</sub> 192°; the 5-Ph isomer has d<sub>4</sub><sup>20</sup> 1.1165, n<sub>D</sub><sup>20</sup> 1.53359, 1.53880, 1.55232 for α, He and β; the 3-Ph isomer has d<sub>4</sub><sup>20</sup> 1.1694 and d<sub>4</sub><sup>20</sup> 1.1222; n<sub>D</sub><sup>20</sup> 1.57216, 1.57901, 1.59063; n<sub>D</sub><sup>20</sup> 1.54562, 1.55195, 1.56897 for α, He and β. III has d<sub>4</sub><sup>20</sup> 1.1034, n<sub>D</sub><sup>20</sup> 1.53100, 1.53681, 1.55045, IV has d<sub>4</sub><sup>20</sup> 1.0853, n<sub>D</sub><sup>20</sup> 1.53569, 1.54136, 1.55713 V has d<sub>4</sub><sup>20</sup> 1.1043, n<sub>D</sub><sup>20</sup> 1.59080, 1.59908, 1.61900. Et 1-carboethoxy-5-methylpyrazole-3-carboxylate, b<sub>p</sub> 178 9°, d<sub>4</sub><sup>20</sup> 1.1709, n<sub>D</sub><sup>20</sup> 1.48876, 1.49243, 1.50191; 1-o-nitrobenzoyl deriv., m. 107°. Et acetophenoneoxalate gives a benzoylhydrazones, m. 109-12°, which does not yield a pyrazole, the Bz group being split off; the carboethoxyhydrazones, m. 88-90°. Et 1-acetyl-3(5)-phenylpyrazole-5(3)-carboxylate, m. 109-10°; the 1-carboethoxy deriv., m. 80-1°; a 9.709% soln. in α-C<sub>10</sub>H<sub>7</sub>Me has d<sub>4</sub><sup>20</sup> 1.0377, n<sub>D</sub><sup>20</sup> 1.60385, 1.61253, 1.63319. C. J. West

Effect of constitution on the rearrangement of the phenylhydrazones of some unsymmetrically substituted dibenzylacetones. L. Chas. Relford and Edward L. Hill. *J. Am. Chem. Soc.* 56, 174-6 (1934).—Styryl 4-methylstyryl ketone, m. 107-8° (67% yield); 4-tolyl deriv., m. 77-8° (68%); 4-PrO deriv., m. 119-20° (60%), these were prepd. from PhCH:CHAc and the proper aldehyde with NaOH in 50% EtOH. Styryl 4-dimethylaminostyryl ketone yields a phenylhydrazones, yellow, m. 162-3° (52% yield); this could not be reduced by Na-Hg but heating with AcOH for 1 hr. gives the compd. C<sub>8</sub>H<sub>8</sub>N<sub>2</sub>, yellow, m. 133-4°; the product from p-Me. NC<sub>6</sub>H<sub>4</sub>CH:CHAc and PhNHNH<sub>2</sub>, 1-phenyl-3-styryl-5-(4-dimethylaminophenyl)pyrazoline, yellow with greenish fluorescence, m. 166 7°; other compds. with the radical in position 5 are: p-tolyl, yellow, m. 167 8°; 4-methoxyphenyl, yellow, m. 124°; 4-ethoxyphenyl, yellow, m. 126-7°; 4-propoxyphenyl, greenish yellow, m. 118 9°; 3,4-methylenedioxyphenyl, amber, m. 167-8°. Oxidation gives the following 1,5-diphenylpyrazole-3-carboxylic acids: 4-MeO, m. 198-7°; 4-EtO, m. 163-4°; 4-Me<sub>2</sub>N, m. 141-2°. These oxidation products are the acids expected if the closing of the pyrazoline ring takes place in the direction of the Ph radical contg. the "non-acidic" group; this is opposite to that observed when ketones with "acid-forming" substituents were employed. C. J. West

Synthesis of thiazolebarbituric acids. XIII. Florence E. Hooper and Treat B. Johnson. *J. Am. Chem. Soc.* 56, 484-5 (1934).—2-Methyl-4-chloromethylthiazole and CHBr(CO<sub>2</sub>Et)<sub>2</sub> give 59% of di-Et ethyl(2-methylthiazole-4-methyl)malonate, b<sub>p</sub> 168-74°; condensation with CO(NH<sub>2</sub>)<sub>2</sub> gives 63% of 5-ethyl-5-(2-methylthiazole-4-methyl)barbituric acid, m. 261-5°. Di-Et ethyl(2-phenylthiazole-4-methyl)malonate, pale yellow, b<sub>p</sub> 206 11° (50% yield); the free acid, m. 145°; 5-ethyl-5-(2-phenylthiazole-4-methyl)barbituric acid, m. 210-11°. From 2-phenyl-4-chloromethylthiazole there were also prepd the 4-methoxymethyl deriv., b<sub>p</sub> 116°, the phenoxymethyl deriv., m. 67-8°, and the thiophenoxymethyl deriv., m. 42°. The pharmacol. investigation is in progress. C. J. West

Polymerization of 2-methyl-4-chloromethylthiazole Florence E. Hooper and Treat B. Johnson. *J. Am. Chem. Soc.* 56, 470-1 (1934).—(CICH<sub>2</sub>)<sub>2</sub>CO and Me-CSNH<sub>2</sub> in Me<sub>2</sub>O give ClCH<sub>2</sub>COCH<sub>2</sub>SCMe:NH HCl, which yields with ZnCl<sub>2</sub> 2-methyl-4-chloromethylthiazole, b<sub>p</sub> 65-7° (total yield 75-80%); on standing at room temp. or more rapidly by heating at 110-15° it yields a dimer, does not m. 300°; this polymerization is analogous to the transformation of α-haloethylalkylamines into cyclic quaternary salts and the product may be represented structurally as a piperazine deriv. C. J. W.

Dihydro-1,4-pyran. IV. The synthesis of γ-benzoyl-γ-butyrolactone and α-hydroxy-β-benzoylvaleric acid. Reynold C. Fuson, M. E. Davis, B. H. Wojcik and J. A. V. Turck. *J. Am. Chem. Soc.* 56, 285-7 (1934);

cf. C. A. 26, 2435.— $(\text{CH}_3)_2\text{CH:CPh}$  (I) is treated with  $\text{O}_3$  in AcOH and the ozonide decompd. in the presence of  $\text{Zn}$  dust, giving  $\gamma$ -benzoylbutyraldehyde (II), which could not be distd.; the  $\text{NaHSO}_3$  deriv. and aq.  $\text{NaCN}$  give  $\alpha$ -hydroxy- $\gamma$ -benzoylvaleronitrile, m. 151–1.5°; concd.  $\text{HCl}$  gives  $\text{Bz}(\text{CH}_2)_2\text{CH}(\text{OH})\text{CO}_2\text{H}$  (III), m. 117.5–8.5°, identical with the compd. obtained by the degradation of 3-phenyl-3-cyano-6-benzoyl-5,6-dihydro-1,4-pyran.  $\text{Bz}(\text{CH}_2)_2\text{CO}_2\text{H}$ , m. 126°, resulted by the oxidation of I with  $\text{KMnO}_4$  or  $\text{O}_3$  or of II with  $\text{KMnO}_4$ ; the  $\gamma$ -Br deriv. m. 97–8° (80% yield); hydrolysis with  $\text{H}_2\text{O}$  gives  $\gamma$ -benzoyl- $\gamma$ -butyrolactone (IV), m. 78–9°; in attempts to prep. the benzoate of III nearly quant. yields of IV were obtained when the Br deriv. reacted with  $\text{BzOAg}$ .

C. J. West

Synthesis of 5- $\beta$ -D-glucosidokojic acid. Raymond M. Hann. *J. Am. Chem. Soc.* 56, 485–6(1934).—Condensation of the K salt of kojic acid with acetobromoglucose gives 70% of the tetra-Ac deriv., m. 201° (m. ps. cor.),  $[\alpha]_D^{25}$  –88.4° (0.1485 g. in 25 cc.  $\text{CHCl}_3$ ), of 5- $\beta$ -D-glucosidokojic acid (2-hydroxymethyl-5- $\beta$ -D-glucosido-1,4-pyrone), m. 197–8°,  $[\alpha]_D^{25}$  –107.3° (0.1470 g. in 25 cc.  $\text{H}_2\text{O}$ ), the hydrolysis being accomplished with  $\text{MeONa}$ .

C. J. West

Kuromamin, the coloring matter of "kuromame." II Chika Kuroda and Mizu Wada. *Proc. Imp. Acad. (Tokyo)* 9, 517–20(1933); cf. C. A. 27, 2448.—The H<sub>2</sub>O-sol. coloring matter in the seed-coat of kuromame has been shown to be the monoglucoside of cyanidin chloride; the H<sub>2</sub>O-insol. matter is the same anthocyan. The same kryst. compd. is obtained from the coloring matter of kuromame, regardless of differences in the variety and the locality of production.

C. J. West

Action of ultra-violet rays on pyridine. V. Detection of primary aromatic amines; the behavior of pyridine derivatives in ultra-violet light; the nature of photopyridine. Hans Freytag. *J. prakt. Chem.* 139, 44–62(1933); cf. C. A. 28, 768°.—Color reactions are given for photopyridine (I) with 4- $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Et}$ , 4,3- $\text{H}_2\text{N}(\text{HO})\text{C}_6\text{H}_3\text{CO}_2\text{Et}$ , 4- $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2(\text{iso-Bu})$ , 4- $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{CH}_2\text{CH}_2\text{NMe}_2$ ,  $p$ - $\text{C}_6\text{H}_4(\text{NHMe})_2$ , 2- $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ ,  $\alpha$ -aminophthalic acid and its 2-Me ester,  $p$ - $\text{H}_2\text{NC}_6\text{H}_4\text{OME}$ , triaminomesitylene and aminoterephthalic acid; the colors do not seem to be very characteristic. The behavior in ultra-violet light of the 2-, 3- and 4-Me, 2,4- and 2,6-di-Me and 2,4,6-tri-Me derivs. of  $\text{C}_6\text{H}_3\text{N}$  is described and the color reactions with  $\beta$ - $\text{C}_{10}\text{H}_7\text{NH}_2$  recorded, 2- and 3-pyridinecarboxylic acids, 2,3,4,5-pyridinetetracarboxylic acid, a dibromopyridine, m. 111°, 3-nitropyridine and pyridine-3-sulfonic acid were also studied. I is formed only in the presence of  $\text{O}_3$ ;  $\text{O}_3$  and  $\text{H}_2\text{O}_2$  react with  $\text{C}_6\text{H}_5\text{N}$  but not with the formation of I, I is very probably the  $\text{NH}_2$  salt of enolic glutaric aldehyde; the dyestuffs from I are therefore identical with the known pyridine dyestuffs.

C. J. West

Azopyridines. Alfred Kirpal. *Ber.* 67B, 70–1(1934).—The 2,2'-azopyridine (I) prepd. by reduction of 2- $\text{C}_6\text{H}_4\text{NNO}$ , in alk. soln. with  $\text{As}_2\text{O}_3$  (C. A. 26, 3505) was apparently not identical with that (II) obtained by oxidation of 2- $\text{C}_6\text{H}_4\text{NNH}_2$  with  $\text{NaOCl}$ . In further expts. to obtain larger amts. of the substance in absolutely pure form for dipole measurements it was found that the supposedly homogeneous II contained traces of halogen which could not be removed by repeated crystn. from org. solvents; this was finally effected accidentally when a sample crystd. from a very concd. aq. soln. in cold weather. The pure II can now generally be obtained quite readily by rubbing it with ice water. It crystallizes in flat prisms with 8  $\text{H}_2\text{O}$ , m. 80°, which quickly lose their water of crystn. in the air; the mother liquors yield the impurity, 5-chloro-2,2'-azopyridine (III), orange-red, m. 135°. As I is stable toward  $\text{NaOCl}$  or free Cl at room temp., in the formation of III the chlorination must precede the oxidation. The structure of III was established by the synthesis of III from 2- $\text{C}_6\text{H}_4\text{NNEt}_2$  and 2,5- $\text{C}_6\text{H}_3\text{N}(\text{NEt}_2)_2$  with aq.  $\text{KOC}$ ; at the same time there were formed some I and 5,5'-dichloro-2,2'-azopyridine,

reddish, m. 243°, which is obtained almost exclusively from 2,5- $\text{C}_6\text{H}_3\text{N}(\text{NEt}_2)_2$  alone with  $\text{KOC}$ . C. A. R.

Preparation of  $\alpha$ -pyridyl halides from  $\alpha$ -aminopyridine by the diazo reaction. Lyman C. Craig. *J. Am. Chem. Soc.* 56, 231–2(1934).— $\alpha$ -Bromopyridine can be prepd. conveniently and cheaply by diazotization of  $\alpha$ -aminopyridine in  $\text{HBr}$  in the presence of excess Br. The  $\alpha$ -I compd. could not be prepd. The  $\alpha$ -Br deriv. and anhyd.  $\text{CuCN}$  give 74% of  $\alpha$ -pyridyl cyanide, b. 118–20°, b. 222.5–3.5°.

C. J. West

The behavior of the pyridine ring on electrochemical oxidation. IV. Piperidine. Moriaki Yokoyama and Kazuo Yamamoto. *Bull. Chem. Soc. Japan* 8, 306–12(1933).—Piperidine (5.15 g.) in 100 cc. 2  $N$   $\text{H}_2\text{SO}_4$  was electrolyzed for 1.5 hrs. at 22° in a clay cell with Pb foil as anode and Pt foil surrounding the cell as cathode. The c. d. was 0.05 amp. per sq. cm., the quantity 13 amp. hrs.  $\delta$ -Aminovaleric acid, succinic acid,  $\text{NH}_3$ , glutaric acid,  $\text{HCO}_2\text{H}$ ,  $\text{CO}_2$  and CO were isolated. The probable primary product,  $\delta$ -aminovaleraldehyde, could not be isolated but its presence was indicated by a color test with fuchsin. The  $pH$  decreased sharply at first. The current yield was 75.9% after 1 hr. and const. at about 58% after 2 hrs.

Janet E. Austin

Constitution of conhydrine. Ernest Späth and Erich Adler. *Monatsh.* 63, 127–40(1933).—Conhydrine (I), heated with  $\text{P}_2\text{O}_5$  in PhMe at 120–40° for 5 hrs., gives a concine mixt., reduced to a dihydro deriv., identical with (–)-conine. That I is 1-( $\alpha$ -piperidyl)propan-1-ol is substantiated by the following work. I, MeI and MeOH with KOH give methylconhydrine-MeI, m. 221–3°;  $\text{Ag}_2\text{O}$  gives a base which decomp. *in vacuo* to conhydrine-methine (II),  $\text{C}_{10}\text{H}_{17}\text{ON}$ , b. 91°,  $[\alpha]_D^{25}$  30.36°,  $d_4^{25}$  0.8616; picrate, m. 109–10°; II absorbs no  $\text{H}_2$ , contains no HO group and with  $\text{H}_2\text{O}$  and NaI gives the methiodide. II and MeI in  $\text{Me}_2\text{CO}$  give a methiodide (III), m. 134–5°,  $[\alpha]_D^{25}$  16.6° (12.052% soln. in  $\text{H}_2\text{O}$ ). The base from III and  $\text{Ag}_2\text{O}$  on distn. gives a compd.  $\text{C}_8\text{H}_{11}\text{O}$  (IV), b. 157–9°,  $d_4^{25}$  0.858,  $[\alpha]_D^{25}$  28.7°, and the compd.  $\text{C}_8\text{H}_{11}\text{O}_2$  (V), m. 76–6°, which contains 2 active H atoms. Reduction of IV gives the compd.  $\text{C}_8\text{H}_{11}\text{O}_2$ , m. 94–6°, which yields valeric acid on oxidation. Oxidation of V gives EtCHO and succinic acid. IV is transformed into V by heating with  $\text{H}_2\text{O}$  2 hrs. at 170–80°. IV is therefore  $\text{CH}_2\text{:CHCH}_2\text{CH}_2\text{CH CHEt.O}$  and V is  $\text{CH}_2\text{:CHCH}_2\text{:}$

C. J. West

Pseudo bases. IV. Mechanism of formation of dimolecular ethers from pseudo bases. Aromatic nature of heterocyclic compounds. John G. Aston and Percival A. Lascelle. *J. Am. Chem. Soc.* 56, 426–33(1934); cf. C. A. 26, 728.—A method for the calcn. of the instantaneous sp. reaction rate of an ionic reaction from resistance-time plots has been outlined. The rate of formation of dimol. ethers from 1-methyl- (I) and 1,2-dimethylquinolinium hydroxide (II) has been measured by a cond. method at 25°; the measurements indicate a reaction 2nd order with respect to the pos. ion and 2nd order with respect to the OH ion in either case. Measurements at 33.8° on I yield a value of the formal heat of activation of 10,420 cal. 1,2-Dimethylpyrazolinium and -pyridinium hydroxides do not yield ethers at 25°; both bases are strong electrolytes. The sp. reaction rate const. calcd. for a reaction bimol. with respect to the pos. and neg. ions, resp., cor. for the Bronsted salt effect, was 710 for I and 100 for II at 25° (both in moles per l. per hr. in 1  $M$  soln.); in the same units the corresponding rate for 1,2,5-trimethylpyrazinium hydroxide was  $8.9 \times 10^4$ .

C. J. West

Quinoline derivatives. XLII. Derivatives of 2-phenyl-4'-aminoquinoline. Hanns John. *J. prakt. Chem.* 139, 97–104(1934); cf. C. A. 27, 1884.—2-Phenyl-4'-aminoquinoline-4-carboxylic acid (I) results in 205 g. yield from 100 g.  $p$ - $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ , 120 g. isatin and 165 g. KOH in 385 cc.  $\text{H}_2\text{O}$  on heating 20 hrs.; Me ester, light yellow, m. 123°; Et ester, light yellow, m. 145°. Heating 77 g. I above the m. p gives 42 g. 2-phenyl-4'-aminoquinoline (II), light yellow, m. 136°; di-Ac deriv., m. 163.5°; Bz

deriv., m. 224°; formyl deriv., m. 160°; benzylidene deriv., m. 158.5°; *p*-methylbenzylidene deriv., m. 171°; *p*-methoxybenzylidene deriv., m. 190°; benzyl deriv., m. 136°. II with KCN in 2 *N* HCl gives 2-phenylquinolyl-4'-urea, m. above 300°; 4'-thiourea, brick-red, m. 206°; 4'-selenourea, red-brown, m. 217°. II and HCHO in EtOH-KOH give *N,N'*-bis(2-phenyl-4'-quinolyl)methylenediamine, m. 172°. II and CS<sub>2</sub> give *N,N'*-bis(2-phenyl-4'-quinolyl)thiourea, m. 218°. The diazo compd. from II and 8-hydroxyquinoline give the orange compd. C<sub>20</sub>H<sub>18</sub>ON<sub>2</sub>, m. 252°. C. J. West

Synthesis of cinchophens from phenacylideneoxindoles. R. N. DuPuis and H. G. Lindwall. *J. Am. Chem. Soc.* 56, 471-2(1934).—3-Phenacylideneoxindole (2 g.), 20 cc. concd. HCl and 20 cc. 95% EtOH, refluxed 2 hrs. at 120°, give 72% crude cinchophen (2-phenylcinchoninic acid); 4'-Me deriv., 95% yield; 4'-Br deriv., 85% yield; 4'-Cl deriv., m. 243-5° (cor.), 65% yield. H<sub>2</sub>SO<sub>4</sub> may also be used, though the yield is not as large. C. J. W.

Isoquinoline derivatives. III. 3-Isoquinolinecarboxylic acids. H. J. Harwood and T. B. Johnson. *J. Am. Chem. Soc.* 56, 408-9(1934); cf. *C. A.* 27, 5743.—The Me ester, m. 143-4°, and the Et ester, m. 118-19°, of  $\alpha$ -benzamido-3,4-dimethoxycinnamic acid, on catalytic reduction give the Me ester, m. 104-5°, and the Et ester, m. 100-1°, of *N*-benzoyl-3,4-dimethoxyphenylalanine; these esters with P<sub>2</sub>O<sub>5</sub> in boiling xylene give the Me ester, m. 120.5-1.5°, and the Et ester, resp., of 1-phenyl-6,7-dimethoxy-3,4-dihydro-3-isquinolinecarboxylic acid (I). I with SOCl<sub>2</sub> and MeOH gives Me 1-phenyl-6,7-dimethoxy-3-isquinolinecarboxylate, m. 172-3°; the free acid, m. 216-6.5°; I with PCl<sub>5</sub> in C<sub>6</sub>H<sub>6</sub> gives an acid chloride, which regenerates the Me ester of I with MeOH. Heating I in C<sub>6</sub>H<sub>6</sub> causes decarboxylation, giving 1-phenyl-6,7-dimethoxy-3,4-dihydroisoquinoline (II), m. 120.5-1.5°, identical with that obtained by the ring closure of *N*-(3,4-dimethoxyphenyl)ethylbenzamide, m. 90-1°, prepd. from homoveratrylamine and BzCl in 10% NaOH. The chloride from I and SOCl<sub>2</sub> with Et<sub>3</sub>NCH<sub>2</sub>CH<sub>2</sub>OH gives the diethylaminoethyl ester of II, m. 158.5-9°. C. J. West

Pyrimidines. CXL. Pyrimidines derived from carbethoxymalonic aldehyde. Elizabeth Dyer and Treat B. Johnson. *J. Am. Chem. Soc.* 56, 222-5(1934); cf. *C. A.* 28, 154°, 1040°.—(EtO)<sub>2</sub>CHCH<sub>2</sub>CO<sub>2</sub>Et, b<sub>p</sub> 65°, *n*<sub>D</sub><sup>20</sup> 1.4101, and HCO<sub>2</sub>Et with Na in Et<sub>2</sub>O give the Na salt (I) of carbethoxymalonic aldehyde, amorphous; Cu salt, blue-green, m. 205° (decompn.); K salt, m. 264° (decompn.). I and Et pseudothiourea-IIBr in H<sub>2</sub>O give 46% of the compd. NH<sub>2</sub>C(SeEt)NH<sub>2</sub>.OHCC(CO<sub>2</sub>Et):CHOH (II), m. 143.5-4.5°, and a little 2-ethylmercapto-5-carbethoxypyrimidine (III), m. 47-8°; III also results from II by heating with Ac<sub>2</sub>O for 4 hrs. at 100°; II in AcOH and PhNHNH<sub>2</sub> gives 1-phenyl-4-carbethoxypyrazole, m. 99-100°; EtOH-KOH hydrolyzes II to OHCC(CO<sub>2</sub>Et):CHOK. Careful hydrolysis of III gives 2-ethylmercapto-5-carboxypyrimidine (IV), m. 182-3°. Hydrolysis of III or IV with concd. HCl gives 2-keto-5-carboxypyrimidine, turns brown above 220°; it seps. with 1 mol. H<sub>2</sub>O; Et ester, m. 163-4°, crystals with 1 mol. H<sub>2</sub>O. I and CO(NH<sub>2</sub>)<sub>2</sub> give 84% of Et  $\beta$ -urea- $\alpha$ -formylpropionate, m. 175° (decompn.); CS(NH<sub>2</sub>)<sub>2</sub> gives 34% of the  $\beta$ -thiourea deriv., dehydrated to 2-thio-5-carbethoxypyrimidine, bright yellow, m. 214-6° (decompn.); with ClCH<sub>2</sub>CO<sub>2</sub>H this yields 2-methoxycarbonyl-5-carbethoxypyrimidine, m. 175-6.5°, 1 g. of which dissolves in 100 cc. boiling and 500 cc. cold H<sub>2</sub>O. C. J. West

Synthesis of pyrazine by the catalytic dehydrogenation of ethanalamine. J. G. Aston, T. E. Peterson and J. Holowchak. *J. Am. Chem. Soc.* 56, 153-4(1934).—Pyrazine can be prepd. by the catalytic dehydrogenation of ethanalamine, the most favorable conditions being a Cu catalyst at a temp. of 300°; the catalyst loses its activity after a few hrs. of use. The yield was 5.6% of pyrazine isolated as the HgCl<sub>2</sub> salt. Most of the amine disappears by side reactions producing resins, which render the catalyst inactive. C. J. West

Alkylation of pyrimidines. An attempt to prepare 1-glucosidocytosine. Guido E. Hilbert. *J. Am. Chem. Soc.* 56, 190-5(1934).—4-Amino-2-methoxypyrimidine (I) (0.5 g.), heated 5 hrs. at 180°, gives 0.025 g. 1-methylcytosine (II). I and MeI in MeOH give 75% of a 1-methiodide, m. 128° and then 230-5°; the action of Ag<sub>2</sub>SO<sub>4</sub> in H<sub>2</sub>O gives II; decompn. by refluxing in 95% EtOH for 3 hrs. gives 75% of II; concd. HCl gives II nearly quant.; heating at 130-5° causes a loss of 32% of the MeI; at 140°, 42% after 15 min. Heating at 140-5° at 1 mm. gives a trace of 1,3-dimethylcytosine (III), II and an I salt, probably 1-methylcytosine 3-methiodide (IV), converted by Ag<sub>2</sub>SO<sub>4</sub> into III, which is hydrolyzed in acid medium to 1,3-dimethyluracil, characterized by its 5-Br deriv. (V). IV, m. 265-6° (decompn.), results from II, MeI and abs. MeOH on standing in the dark at room temp. for several months; concd. NaOH gives III, m. 147.5°; Br gives V. Attempts to introduce glucose in the 1-position of cytosine by the interaction of acetobromoglucose and I were unsuccessful. C. J. West

Action of alkali and ammonia on 2,4-dialkoxypyrimidines. Guido E. Hilbert and Eugene F. Jansen. *J. Am. Chem. Soc.* 56, 134-9(1934).—2,4-Dichloro-5-bromopyrimidine (60 g.) in 50 cc. abs. MeOH with 21 g. Na in 300 cc. MeOH, cautiously refluxed 2 hrs., give 25 g. Na salt of  $\alpha$ -bromo- $\beta$ -methylisoureidoacrylic acid (I), m. about 250° (decompn.); with concd. HCl it yields 5-bromouracil (II); AcOH gives 4-keto-3,4-dihydro-2-methoxy-5-bromopyrimidine, m. 190° (decompn.), hydrolyzed by concd. HCl to II and gives I with NaHCO<sub>3</sub>. II, in the 1st reaction, the NaCl is filtered and the MeOH removed *in vacuo*, there results 80% of 2,4-dimethoxy-5-bromopyrimidine (III), m. 63-4°; heating III with 60% EtOH contg. NaOH gives I. III and MeOH satd. with NH<sub>3</sub> at 0°, heated at 80° for 96 hrs., give 2-methoxy-5-amino-5-bromopyrimidine, m. 134-6°; with concd. HCl it gives 5-bromocytosine, decomp. at 245-55°, also prepd. by bromination of cytosine; in the latter reaction some 5,5-dibromo-6-hydroxy-5,6-dihydrocytosine-HBr (?), decomp. 175-80°, also results. 2,4-Dimethoxy-5-bromopyrimidine, m. 72-4° (55% yield); 4-keto-3,4-dihydro-2-ethoxy-5-bromopyrimidine, m. 183°. C. J. West

Synthesis with  $\beta,\beta'$ -dichloroethyl ether. Morpholine derivatives. W. Nelson Axe and Charles Freeman. *J. Am. Chem. Soc.* 56, 478-9(1934).—(ClCH<sub>2</sub>CH<sub>2</sub>)<sub>2</sub>O and PhNHNH<sub>2</sub>, refluxed in the presence of sufficient 40% KOH to take care of the HCl formed, give 20-30% of *N*-phenylaminomorpholine, m. 107.5°; *p*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> gives 55-65% of *N,N'*-phenylene-1,4-dimorpholine, m. 196°, which gives interesting color reactions when treated with solns. of salts of heavy metals, halogens and acids. (*p*-H<sub>2</sub>NCH<sub>2</sub>H<sub>2</sub>)<sub>2</sub> gives 35-40% of *N,N'*-bisphenylene-4,4'-dimorpholine, m. 228.5°. *m*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> gave only resinous material. C. J. West

Derivatives of piperazine. I. C. B. Pollard and David E. Adelson. *J. Am. Chem. Soc.* 56, 150(1934).—Piperazine hexahydrate (I) and PhCH<sub>2</sub>COCl give 1,4-bis(phenylacetyl)piperazine, m. 150-1° (65% yield). 1,4-bis(hydrocinnamyl) deriv., m. 122.5-3° (61%). 1,4-diamisoyl deriv., m. 192.5-3.5° (50%). I and PhCH<sub>2</sub>CO<sub>2</sub>H give 1,4-piperazonium 1,4-bis(phenylacetate), m. 146.5-7.5° (80%); bis(hydrocinnamate), m. 150.5-1.5° (85%); diamisoylate, m. 172-4° (90%). I and CH<sub>2</sub>(CO<sub>2</sub>H)<sub>2</sub> give 1-piperazonium acid malonate, m. 180° (decompn.) (90%); acid *C,C*-diethylmalonate, m. 80.1° (85%); 1,4-piperazonium bis(ethylmalonate), m. 144° (78%). These compds. are being studied for physical effects. C. J. West

Constitution of peganine. Ernst Späth and Eduard Nikawitz. *Ber.* 67B, 45-55(1934).—Peganine (I), which is obtained from the mother liquors in the technical prepn. of the alkaloids of *Peganum harmala* and has the compn. C<sub>11</sub>H<sub>17</sub>ON<sub>2</sub>, m. 208-10°, contains no MeO or NMe group, does not react with the usual ketone reagents nor with CH<sub>2</sub>N<sub>2</sub>; with Ac<sub>2</sub>O it gives an oily *Ac* deriv., b<sub>p</sub> 230-40°, in which the *Ac* group is so loosely held that attempts to destroy the excess of Ac<sub>2</sub>O by shaking with water resulted

in the regeneration of I. This points to the absence of a secondary or primary N atom, and the presence of an active H atom (Zerevitinov) indicates that I contains a HO group, which is confirmed by the formation with  $\text{POCl}_3$  of a *desoxychloropogonine*,  $\text{C}_{11}\text{H}_{11}\text{N}_2\text{Cl}$ , somewhat greenish platelets, m.  $136-7^\circ$ . With  $\text{KMnO}_4$  in faintly alk. suspension at room temp. I rapidly uses up the equiv. of approx. 5 atoms O, yielding an acid (II), whose *Me ester*,  $\text{C}_{11}\text{H}_{13}\text{O}_5\text{N}_2$  (prepd. with  $\text{CH}_3\text{N}_3$ ), m.  $152.5^\circ$ , gives anthranilic acid almost quantitatively with boiling 20% KOH. The compn. of the ester and the behavior of the acid toward  $\text{KMnO}_4$  point to a quinazoline. Of the 4 possible quinazoline esters which could give anthranilic acid on alk. cleavage, 3 should also give  $\text{NH}_3$  or  $\text{MeNH}_2$ , neither of which was detected in any appreciable amt. This leaves only the structure *Me 4-keto-3,4-dihydroquinazolinyl-3-acetate* for the ester; on alk. cleavage it should therefore give, along with anthranilic acid, glycol which was actually isolated as hippuric acid. The free acid (II), from the ester and hot concd. HCl, m.  $235-7^\circ$  (slight decompn.); *methylamide*, from the ester and  $\text{MeNH}_2$  in abs. alc., m.  $233-5^\circ$ . Attempts to decarboxylate II by heating it above its m. p. or treating it with fuming HCl in sealed tubes did not give homogeneous cryst. products in sufficient amt. for study; heating with quinoline and Naturkupfer C at  $240^\circ$ , however, yielded 3-methyl-4-keto-3,4-dihydroquinazoline, m.  $103-5^\circ$ . II was unchanged by long hydrogenation with Pd-charcoal at  $50^\circ$ ; treatment at  $95^\circ$  with Sn and concd. HCl, added in the course of 24 hrs., gives a little of an oil of amine-like odor, b.  $70-90^\circ$  (bath temp.) in a high vacuum, having the compn.,  $\text{C}_{11}\text{H}_{13}\text{N}_3$ , of a *desoxyhexahydro-pogonine*. Na and  $\text{ArOH}$  gave *desoxytetrahydro-pogonine* (III), m.  $89.5^\circ$ , yielding an *Ac deriv.*, yellow oil, b.  $190-200^\circ$  (bath temp.) in a high vacuum, and contg. an active H atom (Zerevitinov). Further reduction with Sn and HCl gave the hexahydro compd. In alk. suspension, III is sensitive to  $\text{KMnO}_4$ . Attempts to dehydrate I with concd. HCl or  $\text{P}_2\text{O}_5$  were unsuccessful. Of the various possible structures for I, that of 3-allyl-4-hydroxy-3,4-dihydroquinazoline,  $\text{C}_8\text{H}_9\text{N}$ ,  $\text{CH}(\text{OH})\text{N}(\text{CH}_2\text{CH}:\text{CH}_2)\text{CH}:\text{N}$

is in agreement with the above facts. As the double bond in the allyl group could not be detected by catalytic hydrogenation, I was oxidized with  $\text{KMnO}_4$  in acetone; this smoothly gave II. The similarity in m. ps. of I and Sen's vasicine and of their chlorodesoxy derivs. indicate the 2 bases may be identical, although Späth and Nikawitz have not observed an isomerization of I by NaOH in acetone, and I, unlike vasicine, is difficultly sol in acetone. C. A. R.

Evidence for an asymmetrical arsenic atom. C. F. H. Allen, F. B. Wells and C. V. Wilson. *J. Am. Chem. Soc.* 56, 233-4 (1934); cf. *C. A.* 27, 5078.—The treatment of 7-chloro-7,12-dihydro- $\gamma$ -benzophenarsazine with Ag  $\alpha$ -bromocamphorsulfonate (I) in  $\text{Ac}_2\text{O}$  gives 2 compds. free from halogen (m.  $211-2^\circ$  and  $200^\circ$ ), a yellow compd.,  $\text{C}_{20}\text{H}_{25}\text{O}_4\text{NSBrAs}$ , m.  $188-9^\circ$ ,  $[\alpha]_D^{25}$   $59.5^\circ$ , half-life in the sunlight, 36 min., and an isomer, m.  $182-3^\circ$ ,  $[\alpha]_D^{25}$   $35.1^\circ$ , half-life 70 min. The isomeric 12-chloro-7,12-dihydro- $\alpha$ -benzophenarsazine, from  $\beta$ - $\text{C}_{10}\text{H}_7\text{NHP}$  in 70% yield, yellow, m.  $252-3^\circ$ ; with I it gives 2 compds. which were Br-free and 2 isomers,  $\text{C}_{20}\text{H}_{25}\text{O}_4\text{NSBrAs}$ , yellow, m.  $224-5^\circ$ , and brown, m.  $218-9^\circ$ . *p*-Tolyl- $\alpha$ -naphthylamine gives 47% of 7-chloro-9-methyl-7,12-dihydro- $\gamma$ -benzophenarsazine, greenish yellow, m.  $258-9^\circ$ , with I it gives a small quantity of the compd.  $\text{C}_{27}\text{H}_{33}\text{O}_4\text{NSBrAs}$ , yellow, m.  $250^\circ$ ,  $[\alpha]_D^{25}$   $32.6^\circ$ , half-life 25 min. All rotations were in 95% EtOH, using 0.122 g. per 25 cc. The formation and mutarotation of these diastereoisomers may be considered as evidence in favor of an asym trivalent As atom. C. J. West

Condensation of some toluenesulfonamides with trioxymethylene and with formaldehyde solution. L. McMaster. *J. Am. Chem. Soc.* 56, 204-6 (1934).—*p*- $\text{MeC}_6\text{H}_4\text{SO}_2\text{NH}_2$  and trioxymethylene in  $\text{AcOH}$ ,  $\text{H}_2\text{SO}_4$ , or 40% HCHO in EtOH-HCl give about 40% of tri-*p*-toluenesulfonyltrimethylenetriimide or 1,3,5-tri-*p*-

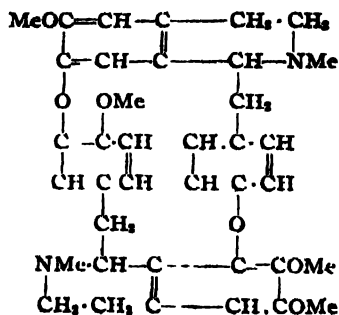
toluenesulfonylhexahydro-sym-triazine, m.  $169.8-70.5^\circ$ ; from  $\text{PhNH}_2$  a compd., m.  $73^\circ$ , seps., which decomps. on warming into  $\text{PhNH}_2$  and the original compd. *p*- $\text{MeC}_6\text{H}_4\text{SO}_2\text{NHMe}$  and  $(\text{CH}_3\text{O})_2$  or 40% HCHO give the compd.  $\text{CH}_3(\text{NMeO})_2\text{SC}_6\text{H}_4\text{Me}$ , m.  $113-4^\circ$ ; EtNH<sub>2</sub> gives a brown viscous liquid. *o*- $\text{MeC}_6\text{H}_4\text{SO}_2\text{NH}_2$  and 40% HCHO gives the triimide, m.  $245.5-6.5^\circ$ ; the  $\text{PhNH}_2$  compd. m.  $259.2-9.4^\circ$ ; with  $(\text{CH}_3\text{O})_2$ , there results a mixt. of the triimine and the diimine, m.  $168.8-9.9^\circ$ . All m. ps. are cor. C. J. West

Cactus alkaloids. X. Constitution of pellotine and anhalonidine. Ernst Späth and Friedrich Boschan. *Monatsh.* 63, 141-53 (1933); cf. *C. A.* 27, 725.—The following facts further confirm the structure for pellotine proposed in part IX. *O*-Benzylpellotine-MeI, m.  $193-5^\circ$ , could not be used in the Hofmann degradation because of the ease with which the  $\text{PhCH}_2$  group was removed. *O*-Ethylpellotine-MeI, m.  $185-6^\circ$ ; 4% Na-Hg reacts with the MeCl deriv. to give a basic oil, partly unsatd., which was catalytically reduced, changed into the methiodide and sepd. into 2 compds., 6,2,3,4-Et(EtO)(MeO) $\text{C}_6\text{H}_4\text{CH}_2\text{CH}_2\text{NMe}_2$  (I), easily sol. in MeOH and  $\text{H}_2\text{O}$ , and 2,3,4,5-Et(EtO)(MeO) $\text{C}_6\text{H}_4\text{CHCHMeNMe}_2$  (II), difficultly sol., m.  $238-9^\circ$ . With alkali II easily splits off  $\text{Me}_2\text{N}$ , giving the compd. 2,3,4,5-Et(EtO)(MeO) $\text{C}_6\text{H}_4\text{CH}:\text{CH}_2$ ; this is oxidized by  $\text{KMnO}_4$  in  $\text{Me}_2\text{CO}$  to 1-ethyl-2-ethoxy-3,4-dimethoxybenzoic acid, m.  $102-3^\circ$ ;  $\text{HNO}_3$  at  $-14^\circ$  gives a small yield of 1-ethyl-2-ethoxy-3,4-dimethoxy-5,6-dinitrobenzene, which was not purified but reduced to the 5,6-di- $\text{NH}_2$  deriv. (III), m.  $80.5-1^\circ$  (di-Bs deriv., m.  $220-30^\circ$ ). III was synthesized by starting with the 3,4-di-Me ether of pyrogallolaldehyde, 2,3,4-HO(MeO) $\text{C}_6\text{H}_3\text{CHO}$ , which reacts with  $\text{MeCHN}_2$  to give 2-ethoxy-3,4-dimethoxybenzaldehyde, b.  $120-30^\circ$ ; oxidation gives the acid, m.  $78-9^\circ$ . Reduction of 2,3,4-HO(MeO) $\text{C}_6\text{H}_3\text{Ac}$  with Zn and HCl gives 1-ethyl-2-hydroxy-3,4-dimethylbenzene, b.  $124^\circ$ , whose 2-EtO deriv. b.  $122-3^\circ$ . Nitration and reduction give III. C. J. West

New method for the preparation of quinoxalones. Hermann Eichler. *J. prakt. Chem.* 139, 113-14 (1934).—*m*- $\text{C}_6\text{H}_4(\text{OH})_2$  (2 parts) in 19 parts concd.  $\text{H}_2\text{SO}_4$ , treated with 0.8-3 parts solid  $\text{NaNO}_2$  or 1-3.7 parts solid  $\text{KNO}_3$ , gives 95-9% of resorufin. C. J. West

Curare alkaloids. II. Constitution of curine (beberine). Ernst Späth and Friedrich Kuffner. *Ber.* 67B, 55-9 (1934); *C. A.* 23, 146.—As stated in the 1st paper, mol.-wt. detns. on curine (I) in camphor gave values about 20% higher than that calcd. from the formula  $(\text{C}_{18}\text{H}_{19}\text{O}_4\text{N})$  assigned to it. When I was digested with 0.5 of the amt. of HCl required for complete neutralization, 0.5 of the I was converted into the HCl salt and the other 0.5 remained as free base; hence I has no tendency to form basic salts, as might have been expected of a diacid base with a doubled mol. wt. To exclude the possible disturbing influence of the phenolic group, an ether soln. of the neutral Me ether was shaken out with 0.01 N HCl; the amt. of base passing into the aq. layer always corresponded to a mol. wt. of 362 (calcd. for the simple empirical formula of the ether 311.18). While the earlier work is thus confirmed, 2 purely chem. methods have been found which indicate definitely that the formula of I should be doubled. The Me ether with a relatively small amt. of MeI gives a cryst. compd.  $(\text{C}_{18}\text{H}_{19}\text{O}_4\text{N})_2\text{MeI}$ , m.  $257-8^\circ$  (foaming) in vacuum tubes. Also, after partial methylation of I with  $\text{CH}_3\text{N}_3$  in ether in the presence of acetone and MeOH and removal of the neutral ether, which is insol. in KOH, there remains a mixt. of phenol bases from which can be isolated I and 2 other compds. One of the latter, m.  $208-8^\circ$ , has a MeO content corresponding to the mono-Me ether of a compd.  $\text{C}_{18}\text{H}_{19}\text{O}_4\text{N}_2$ ; the 2nd is probably a mixt. of the 2 isomeric mono-Me ethers, as it does not melt sharply ( $154-60^\circ$ ); it also has close (14.61%) to the calcd. (15.64%) MeO content. The doubled formula also makes it possible to explain the formation of proto-catechelic acid, along with *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ , in the KOH fusion of I. Oxidation of the N-free compd. resulting

from the 2-fold Hofmann degradation of the Me ether of I gives, among other products,  $p$ -[2,3,5,6-(MeO)<sub>4</sub>(HO<sub>2</sub>C)<sub>2</sub>CH<sub>2</sub>OH]C<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H (Faltis and Fraendorfer, C. A. 24, 3513). The tentative formula



is proposed for the Me ether of I. Exptl. data on the position of the diphenyl ether union and the MeO residues in the left half of the mol. are not yet available.

C. A. R.

**Sophora alkaloids.** IV. Alkaloids of the seeds of *Sophora pachycarpa*. A. P. Orekhov and N. Proskurnina. Ber. 67B, 77-83(1934); cf. C. A. 27, 4234.—The seeds contain about the same amt. of alkaloids as the herb but low-boiling fractions are completely absent from the mixt. of bases obtained from the seeds. The sepn. of these bases proved to be very difficult and was finally effected by tedious fractionation of the HI salts. There were thus obtained 2 well-characterized cryst. bases C<sub>18</sub>H<sub>25</sub>N<sub>3</sub>O, *sophocarpine* (I) and *sophocarpidine* (II). I seps. in crystals, m. 81-2°, with 1 mol. H<sub>2</sub>O, [α]<sub>D</sub><sup>20</sup> -29.44° (alc.), loses its H<sub>2</sub>O *in vacuo* and m. 54-5°, shows a max. in its soly. in water at 70-80°, is not attacked by boiling several hrs. in alc. KOH; the HCl, HBr and HI salts begin to darken 230-40° but do not m. 300°; *chloroaurate*, light yellow, m. 166-70°; *chloroplatinate*, orange-red, m. 209-12° (decompn.); *picrate*, yellow, m. 155-7°; *methiodide*, m. 200-2°. II, m. 73-6°, [α]<sub>D</sub><sup>20</sup> 38.38°, is more sol. in cold than in hot water; HCl, HBr and HI salts; *chloroaurate*, yellow ppt. immediately decomp. with sepn. of Au; *methiodide*, hygroscopic cryst. powder with 2 EtOH rapidly deliquescing in the air. Refluxed in abs. alc. with KOH, II gives the K salt, needles with 4 H<sub>2</sub>O, m. 160-5°, loses 3 H<sub>2</sub>O at 105° and the 4th mol. at 125° and then m. 222-6°, of *sophocarpidine* acid, C<sub>18</sub>H<sub>25</sub>N<sub>3</sub>O<sub>2</sub> 4H<sub>2</sub>O, m. 170-5°, which loses its H<sub>2</sub>O at 105° and then m. 200-2°, [α]<sub>D</sub><sup>20</sup> 19.16°; *chloroaurate*, yellow, m. 194-5°; *chloroplatinate*, orange-red, does not m. 250°. With MeI in boiling MeOH under a reflux the K salt yields an ester *methiodide*, C<sub>18</sub>H<sub>25</sub>N<sub>3</sub>O<sub>2</sub> MeI.H<sub>2</sub>O, m. 212-14°. With Ac<sub>2</sub>O on the water bath, the acid regenerates II. II in many respects resembles the α-form of matrine, from *Sophora angustifolia* (S. *flavescens*), as described by Kondo (C. A. 22, 1212), but there are some appreciable differences, and until they can make a direct comparison of the 2 products, O. and P. assign a distinctive name to II.

C. A. R.

**Strychnos alkaloids.** LXXVIII. An isomer of benzal-dihydrostrychnine. Hermann Leuchs and Hans Beyer. Ber. 67B, 108-12(1937); cf. C. A. 28, 772°.—In a repetition of the work of Kotake and Mitsuwa (C. A. 27, 5334), the yield of benzal-dihydrostrychnine (I) was not as high as reported by them (75-80%), and the greater the amt. of alc. used as solvent the smaller was the yield. It was found that along with I there is formed, especially in the NaOEt condensation in dil. soln., a colorless isomer, *isobenzal-dihydrostrychnine*, C<sub>28</sub>H<sub>33</sub>O<sub>5</sub>N<sub>2</sub> (II), m. 187-9°, [α]<sub>D</sub><sup>20</sup> -324° to -325.1°/d. in abs. alc., [α]<sub>D</sub><sup>20</sup> -665°/d. in CHCl<sub>3</sub> (1.3% soln.), mol. wt. 459 in freezing AcOH; reacts basic to litmus, does not give a color with FeCl<sub>3</sub> and gives a neg. Otto reaction (brownish color at most); *methiodide*, m. 278-80° (decompn.); *Ac deriv.*, m. 157-9°, [α]<sub>D</sub><sup>20</sup> -295°/d. (abs. alc.), gives a neg. Otto reaction. II is quite stable to KMnO<sub>4</sub> in acetone and

absorbs no H with Pt oxide in cold AcOH, while in hot soln., especially HCl, it uses up 12-14 atoms H stepwise but the product has thus far been obtained only in resinous form. The above facts indicate that the acid amide

group, -C<sub>6</sub>H<sub>4</sub>N·CO·CH<sub>2</sub>-, of the strychnine is changed, probably into -C<sub>6</sub>H<sub>4</sub>·N·C·C·CH(OH)·C<sub>6</sub>H<sub>4</sub>-,

in the formation of II. Oxidation of I according to Method I of Kotake and Mitsuwa, with KMnO<sub>4</sub> in Me<sub>2</sub>CO-AcOH, proceeds as they describe but the chief product (III) (70% yield), m. 288° instead of 280°, [α]<sub>D</sub><sup>20</sup> -25.6°/d. (1.8% in 95% HCO<sub>2</sub>H) and has the compn. C<sub>28</sub>H<sub>35</sub>O<sub>4</sub>N<sub>2</sub> (or C<sub>28</sub>H<sub>33</sub>O<sub>4</sub>N<sub>2</sub>), not C<sub>28</sub>H<sub>35</sub>O<sub>4</sub>N<sub>2</sub>; HCl salt, m. 233-6°; *perchlorate*. This corresponds to the addn. of 2 HO residues at the benzal grouping (and possibly further oxidation of 1 of them): PhCH·C(CON)<sub>2</sub>·CHO → PhCH(OH)·C(OH)· → PhCOC(OH)·. With Ac<sub>2</sub>O the product gives a *mono-* or *di-Ac deriv.*, m. 242-5° (found, C 70.51, H 5.99; *perchlorate*, found C 59.78, H 5.45, N 4.68%). In the prepn. of III some BzH is split off and 2 N NH<sub>4</sub>OH exts. from the MnO<sub>2</sub> sludge about 4% of an acid, m. 295-300° (gas evolution) probably identical with that obtained by K. and M. by their Method II (KMnO<sub>4</sub> in Me<sub>2</sub>CO-H<sub>2</sub>O). This method yielded 36% of the acid (33% in the MnO<sub>2</sub> sludge, 3% in the acetone filtrate), [α]<sub>D</sub><sup>20</sup> 91.8°/d. in 1 mol. 0.1 N NaOH. The acetone filtrate yielded in addn. 3% of a neutral substance, m. 263-4°, [α]<sub>D</sub><sup>20</sup> -30.8°/d. (95% HCO<sub>2</sub>H), which is believed to be III, not C<sub>28</sub>H<sub>35</sub>O<sub>4</sub>N<sub>2</sub>.

C. A. R.

**Yohimbe alkaloids.** Hermann Heinemann. Ber. 67B, 15-21(1934); cf. Hahn and Schuch, C. A. 24, 5039.—In the tech. prepn. of yohimbine, H. has isolated 4 addnl. secondary alkaloids, 2 of which were as yet unknown. One, recrystd. from 50% alc., m. 104.5°, [α]<sub>D</sub><sup>20</sup> -73.6° (1% pyridine soln.), has a water content corresponding to C<sub>18</sub>H<sub>25</sub>O<sub>2</sub>N<sub>2</sub>·3H<sub>2</sub>O and after drying, m. 133-40°; it is probably allyoyohimbine. The 2nd alkaloid (I) seps. from MeOH with 1 mol. MeOH, from 95% alc. with 1 mol. EtOH + 1 mol. H<sub>2</sub>O, m. 234-5°, [α]<sub>D</sub><sup>20</sup> for anhyd. base -28.0° (abs. alc., c 2.006), [α]<sub>D</sub><sup>20</sup> for HCl salt 53.8° (water, c 1.045). The yohimboic acid obtained by alk. sapon. of I, hygroscopic crystals with 1 H<sub>2</sub>O, decomposes 276°, [α]<sub>D</sub><sup>20</sup> 50.1° (pyridine, c 1.008). These facts made it seem probable that I is α-yohimbine (II), but Hahn and Schuch state repeatedly that the yohimboic acid obtained from II is very easily sol. in alc. while Heinemann found that his acid is sol. to the extent of only 0.3% by wt. in abs. alc. (contg. 2% PhMe) at 17° and 1 g. in 160 cc. at the b. p.; in MeOH (d<sub>4</sub><sup>20</sup> 0.7973), the soly. is 2% at room temp. and 1 g. in 40 cc. at the b. p. The Et ester, m. 236°, [α]<sub>D</sub><sup>20</sup> -6.7° (pyridine, c 1.037) (HCl salt, 64.0° (water, c 0.492)), while H. and S. give [α]<sub>D</sub><sup>20</sup> 29° for the ester. In view of these discrepancies H. compared his product directly with a sample of Merck α-yohimbine and found the 2 to be identical. The 3rd alkaloid is named β-yohimbine (III). It is characterized by its unusually low soly. in MeOH, from which it seps. in leaflets with 2 MeOH, m. 235.6°, [α]<sub>D</sub><sup>20</sup> -46.8° (pyridine, c 0.998), and, after drying [α]<sub>D</sub><sup>20</sup> -54.0° (pyridine, c 1.047), is pptd. from acids by alkalies as a highly hydrated gel which on the water bath turns into a cryst. *monohydrate*. HCl salt, decomp. 292°, loses 1 H<sub>2</sub>O over P<sub>2</sub>O<sub>5</sub> at 100° and 7 mm, [α]<sub>D</sub><sup>20</sup> 27.7° (water, c 0.542). III depresses the m. p. of allyoyohimbine and II but not that of yohimbine (IV). An equimol. mixt. of III and IV m. 235-6° but the III can be sepd. quite readily by means of MeOH (after 3 re-crystns., [α]<sub>D</sub><sup>20</sup> -47.1°), whereas 3 crystns. from abs. EtOH gives a product still contg. considerable IV and showing [α]<sub>D</sub><sup>20</sup> -12°, and 50% EtOH gives a product with [α]<sub>D</sub><sup>20</sup> 40.5°, although the m. p. remains const. throughout. β-Yohimboic acid, crystals with 1 H<sub>2</sub>O, decomposes 250-1°, 260-1° or 270°, depending on whether it has been pptd. from the aq. soln. of its K salt with AcOH or crystd. from 96% EtOH or from MeOH, [α]<sub>D</sub><sup>20</sup> 15.3°



(pyridine,  $c$  1.009). The 4th alkaloid, *8-yohimbine*, is apparently present in only very small amt. in the bark. It m.  $284^\circ$ ,  $[\alpha]_D^{25} -50.0^\circ$  (pyridine,  $c$  0.992); *HCl salt*, crystals with 1  $H_2O$  from water, anhyd. crystals from alc.  $HCl$ , decomposes  $288^\circ$ ,  $[\alpha]_D^{25} -18.6^\circ$  (MeOH,  $c$  0.994); 0.315 g. dissolves in 100 g. water at  $100^\circ$ . *8-Yohimboic acid* is pptd. from solns. of its salts in highly hydrated form but seps. from MeOH in anhyd. crystals, m.  $258^\circ$ ,  $[\alpha]_D^{25} 1.5^\circ$  (pyridine,  $c$  1.000). C. A. R.

**Amyrins.** III. Constitution of sapotalin and the hydrocarbon  $C_{15}H_{14}$ . Otto Brunner, Hans Hofer and Rosa Stein. *Monatsh.* 63, 79-98(1932); cf. C. A. 27, 501.—Dehydration of amyris with Se gives sapotalin (I),  $C_{15}H_{14}$ , a hydrocarbon  $C_{15}H_{14}$  (II), a hydrocarbon, m.  $304-5^\circ$  and a naphthol  $C_{15}H_{14}O$ . This paper is concerned with the structures of the 1st 2, which have been reached by methods differing from those already published. I is oxidized by  $CrO_3$  in AcOH to a quinone, golden yellow, m.  $113^\circ$ ; the concd.  $H_2SO_4$  soln. is orange-red, further oxidation with  $KMnO_4$  in  $Me_2CO$  gives 3,4-dimethylphthalic acid, isolated and analyzed as the anhydride (III), m.  $124-5^\circ$ , which was synthesized by Franz Grof as follows: 1,2-dimethylbutadiene and maleic anhydride in  $C_6H_6$ , warmed 5 hrs. on the water bath, give 1,4-dimethyl- $\Delta^4$ -tetrahydrophthalic anhydride, m.  $67-8^\circ$ ; this was treated with Br (5 hrs. at  $200^\circ$ ) and the resulting acid reduced with Na-Hg and the anhydride (III) prepd. by the action of  $Ac_2O$ ; the free acid, m.  $149-50^\circ$ ; the methylimide, m.  $98-9^\circ$ . I (1,2,7-trimethylnaphthalene) was prepd. as follows:  $p-MeC_6H_4CHO$  and  $Me_2CO$  give  $p-MeC_6H_4CH:CHAc$ , catalytically reduced to  $p-MeC_6H_4CH_2CH_2CHMeOH$ , which through the bromide and cyanide yields  $p-MeC_6H_4CH_2CH_2CH_2CHMeCO_2H$ ; concd.  $H_2SO_4$  gives 2,7-dimethyl-1-keto-1,2,3,4-tetrahydronaphthalene, transformed by MeMgI and dehydrogenation with Se to I. II (1,2,5,6-tetramethylnaphthalene) on oxidation with  $CrO_3$  does not give a quinone and with  $KMnO_4$  gives only mellophanic acid. In the synthesis of II 2,3- $Me_2C_6H_3CN$  was hydrolyzed to 2,3-dimethylbenzoic acid, m.  $145-6^\circ$  (82% yield); chloride,  $b_m$   $128^\circ$ ; amide, m.  $155-6^\circ$ ; catalytic reduction of the chloride gives 2,3-dimethylbenzaldehyde, whose oxime m.  $80-2^\circ$  and semicarbasone m.  $222^\circ$ ; with  $Me_2CO$  and NaOH there results 81% of 4-(2,3-dimethylphenyl)- $\Delta^4$ -buten-2-one, m.  $37^\circ$  (oxime, m.  $160-2^\circ$ ; semicarbasone, m.  $215^\circ$ ); catalytic reduction with Pd gives the buten-2-one,  $b_m$   $139^\circ$  (semicarbasone, m.  $204^\circ$ ), further reduced by Na and EtOH to the buten-2-ol,  $b_m$   $156^\circ$ ; the bromide  $b_m$   $151-2^\circ$  and the cyanide was immediately hydrolyzed and the crude acid warmed with concd.  $H_2SO_4$ , giving 2,5,6-trimethyl-1-keto-1,2,3,4-tetrahydronaphthalene,  $b_m$   $160-70^\circ$ , which was treated with MeMgI and then heated with Se to give II, m.  $118^\circ$  (picrate, red, m.  $156-7^\circ$ ; styphnate, m.  $166^\circ$ ). 4,5-Dimethyl- $\Delta^4$ -tetrahydrophthalic acid, m.  $189-90^\circ$ ; imide, m.  $126.5-7.5^\circ$ ; 4,5-Dimethylphthalic acid, m.  $196^\circ$ ; anhydride, m.  $208-9^\circ$ ; methylimide, m.  $150-1^\circ$ ; ethylimide, m.  $89^\circ$ . C. J. West

**Santonin series.** XVIII. Constitution of santonin acid E. Wedekind and O. Engel. *J. prakt. Chem.* 139, 115-28(1934); cf. C. A. 26, 1937.—Santonin acid (I)  $b_m$   $285^\circ$  and m.  $170-2^\circ$ ; the Me ester m.  $86^\circ$ . The action of 10% NaOH upon  $\beta$ -metasantonin does not give I but an isomeric acid, m.  $167^\circ$ . I cannot be reduced catalytically but with Na-Hg in 10% NaOH gives dihydrosantonin acid (II), m.  $180-2^\circ$ ; boiled with  $Ac_2O$  5 hrs., there results an acetylactone,  $C_{17}H_{16}O_4$ , m.  $204^\circ$ , and the di-Ac deriv., m.  $232^\circ$  (Me ester, m.  $151^\circ$ ); sapon. of either deriv. gives II.  $\alpha$ -Tetrahydrosantonin (III) and KOH give  $\alpha$ -tetrahydrosantonin acid, m.  $115^\circ$ ; heating the acid in Et<sub>2</sub>O for 2 hrs. gives III.  $\alpha$ -Santonin oxide is unchanged after heating with KOH 1 hr.; the same is true of chloro- and desmotroposantonin and artemonic acid. C. J. West

**Chlorophyll.** XL. New syntheses of desoxyphyloerythrin and several derivatives of phylloporphyrin. Hans Fischer, Martin Speitmann and Hubert Meth. *Ann.* 808, 154-67(1934); cf. C. A. 28, 1041.—Phyllohematin (I) (s.) in 100 cc.  $ClCH_2OMe$ , treated with 8 cc.  $BaCl_2$

at  $40^\circ$  for 5 min., gives nearly quantitatively (crude) hydroxymethylphyllohematin,  $C_{54}H_{52}O_8N_4FeCl$ ; pptd. from AcOH it gives an acetate.  $HBr-AcOH$  and hydrolysis with 10%  $HCl$  give hydroxymethylphylloporphyrin,  $C_{54}H_{52}O_8N_4$ , acid no. 0.25; with 10%  $MeOH-KOH$  the  $HBr$  reaction product gives an ether ester (II),  $C_{54}H_{52}O_8N_4$ , m.  $241^\circ$  (cor.) (*Cu salt*,  $C_{54}H_{52}O_8N_4CuAc$ , red, m.  $205-6^\circ$ ). II and pyrotartaric acid, heated 12-15 min. at  $155^\circ$ , give desoxyphyloerythrin, whose Me ester,  $C_{54}H_{52}O_8N_4$ , m.  $261^\circ$  (*Cu salt*, red, m.  $254^\circ$ ). Heating II with  $HBr-AcOH$  at  $35-40^\circ$  gives the  $HBr$  salt of bromomethylphylloporphyrin,  $C_{54}H_{52}O_8N_4Br$ , very hygroscopic; this reacts with  $CHK(CO_2Et)$ , in  $Me_2CO$  to give a tri-Me ester,  $C_{54}H_{52}O_8N_4$ , m.  $211-12^\circ$ . I and  $Ac_2O$  at  $65-70^\circ$  with  $SaCl_4$  give an Ac deriv., from which was prepd. by heating 12 hrs. with  $HBr-AcOH$  at  $40^\circ$  acetylphylloporphyrin, whose Me ester,  $C_{54}H_{52}O_8N_4$ , m.  $236^\circ$  (*Cu salt*, m.  $318^\circ$ ; the hemin, black, m.  $314^\circ$ ). Phylloporphyrin Me ester (*Fe salt*) and MeMgI give the compd.  $C_{54}H_{52}ON_4$ , m.  $252^\circ$  (the propionic ester group in position 7 is replaced by the corresponding tert. alc. group). The Et ester of phylloporphyrin, m.  $256^\circ$  (cor.), yields a Cu salt, light red needles. Phylloporphyrin yields a mono- $NO_2$  deriv., acid no. 8 (*Fe and Cu salts*; Me ester, m.  $228^\circ$  (cor.)). C. J. West

**Chlorophyll series.** XII. The pheopurpurins. Emma M. Dietz and Wm. F. Ross. *J. Am. Chem. Soc.* 56, 159-64(1934); cf. C. A. 27, 1353.—Pheopurpurin 18 (I) in  $C_6H_5N$  with  $NH_4OH.HCl$  and  $Na_2CO_3$  gives a hydroxylamine deriv. (II),  $C_{54}H_{52}N_4O_8$ , acid no. 18, forms an insol. green K salt; a small quantity of the deriv. (III) of rhodoporphyrin- $\gamma$ -carboxylic anhydride (IV) is also formed. Me pheopurpurin 18 forms a hydroxylamine deriv. (V), acid no. 15-6, giving an insol. green K salt. Either II or V with  $CH_3N_3$  in Et<sub>2</sub>O gives the Me ether of V, acid no. 18, not extd. by alkali; the spectra of these 3 derivs. are identical. III, acid no. 5, was prepd. directly from IV and on methylation gives the Me ester, acid no. 7, and its Me ether, acid no. 9; the 3 spectra are identical. Heating II at  $325^\circ$  gives III. As compared with the oxime of rhodin g tri-Me ether, the  $NH_4OH$  derivs. of the anhydrides were much more acidic. Since I, like chlorin a, has 1 C atom less than the unstable chlorins (VI) or pheopurpurin 7 (VII), somewhere in its prepn. this atom is split off. Fischer concluded that this loss occurred as  $HCO_2H$  in the original phase test hydrolysis. This is not the case. The mixt. of VI formed directly in the phase test hydrolysis still contains the full complement of C atoms, since with  $CH_3N_3$  an excellent yield of di-Me pheopurpurin 7 is obtained. During the standing of the soln. of VI in Et<sub>2</sub>O, oxidation occurs and the C atom is eliminated as  $CO_2$ . The transformation occurs only with the MeO-free VI from the  $a_1$  series and not with the precursor of VII which is derived from chlorophyll  $a_2$ . A more convenient method of prepn. of I is to oxidize an alk. soln. of VI with  $K_2Fe(CN)_6$ ; K molybdicyanide (VIII) may also be used (36% yield). Oxidation of VII with VIII gives  $\beta$ -mono-Me chlorin a (IX), I and  $CO_2$ ; the acid no. of IX is 7 and with  $CH_3N_3$  it gives the tri-Me ester; pyrolysis of IX gives I. Me pheopurpurin 18 with KOH in  $C_6H_5N$  gives  $\alpha$ -mono-Me chlorin a, acid no. 6. Tri-Me chlorin a (X), heated with 25%  $MeOH-KOH$  for 70 min., gives some isorhodoporphyrin and a larger proportion of chlorin f. X gives a Cu deriv., black, m.  $235^\circ$ , and a Zn deriv., greenish black, m.  $242^\circ$ . With 25% KOH in  $MeOH$  X in  $C_6H_5N$  gives a di-Me chlorin a, blue, m.  $241-2^\circ$ ; a di-Me ester also results on refluxing in 1%  $MeOH-KOH$  for 30 min., greenish black, m.  $208^\circ$ . I in  $C_6H_5N-Et_2O$  gives an unstable chlorin a with acid no. 3 and spectrum similar to that of chlorin a;  $CH_3N_3$  gives a tri-Me ester, dark blue, m.  $237-8^\circ$ , giving no depression with known tri-Me chlorin a. C. J. West

**Prodigiosin**, the red pigment of *Bacillus prodigiosus*. V. Fritz Wrede and Alexander Rothhaas. *Z. physiol. Chem.* 222, 203-6(1933); cf. C. A. 27, 5334.—Further proof of the structure recently assigned to prodigiosin, viz., that consisting of a trialkylated pyrrole, a methoxy-

pyrrole and an unsubstituted pyrrole grouped about a central methine C, has now been obtained. Maleimide and methoxymaleimide were isolated by sublimation of the  $\text{CrO}_3$  oxidation products of prodigiosin. Proline was isolated from the  $\text{KMnO}_4$  oxidation products of hydrogenated prodigiosin, and identified as the Reinecke salt and by methylation to stachydrine, which was identified as the chloroaurate. A. W. Dox

The action of ozone on porphyrins. I. Hans Fischer and Mladen Deželić. *Z. physiol. Chem.* 222, 270-8 (1933).—Although  $\text{O}_3$  in high concn. causes a complete breakdown of etioporphyrin into  $\text{H}_2\text{C}_2\text{O}_4$  and  $\text{NH}_3$ , a brief treatment with dil.  $\text{O}_3$  yields *di-* and *triazonides* which are relatively stable and can be obtained cryst. by addn. of  $\text{H}_2\text{O}$  to the  $\text{MeOH}$  soln. The red color of the  $\text{CHCl}_3$  soln. changes to olive-green and at 650  $\mu$  an intense absorption band characteristic of the chlorophyll derivs. is observed. If the treatment is interrupted at this stage an olive-green substance can be isolated which dissolves in  $\text{MeOH}$  and  $\text{Et}_2\text{O}$  with green color and red fluorescence and shows a spectrum very similar to that of pheophorbide *a*. Prolonged treatment with  $\text{O}_3$  decolorizes the etioporphyrin soln., the absorption spectrum disappears, and only a pale yellow, smeary substance can be isolated, probably a tetraozonide. Thus far no mono-ozonide has been obtained. In this oxidation process the  $\text{O}_3$  adds at the double bond of the methine bridge in the porphin nucleus. Although 4 double bonds are present only 3 of them are especially active. The interesting feature of this reaction is the conversion of porphyrins into substances with chlorophyll-like properties. Etiohematin in  $\text{CHCl}_3$  gave with  $\text{O}_3$  a mono-ozonide with absorption band at 670  $\mu$ . This ozonide when heated reverted to the original etiohematin. Similar color changes and spectral behavior were observed when isourpophyrin and 2,3,5,8-tetramethyl-1,4-dipropyl-6,7-dipropionic acid porphyrin and its ester were treated with  $\text{O}_3$ . The stability of the porphyrin ozonides is noteworthy. They do not react with  $\text{KI}$  and are quite resistant to reducing agents such as  $\text{HI}$ ,  $\text{Na-Hg}$  and  $\text{Zn}$  dust. Methylethylmaleimide, an oxidation product of the porphyrins, forms a stable cryst. ozonide, m.  $89^\circ$ , which can be recrystd. from concd.  $\text{H}_2\text{SO}_4$ . A. W. Dox

Dehydrogenation of cholesterol and ergosterol and the nonidentity of the hydrocarbon  $\text{C}_{25}\text{H}_{42}$  with 1,2-cyclopentenophenanthrene. Otto Diels and Hermann Klare. *Ber.* 67B, 113-22(1934); cf. *C. A.* 27, 4810.—In view of the doubt cast by Ruzicka, Goldberg and Thomann (*C. A.* 27, 4808) on the identity of the hydrocarbons  $\text{C}_{25}\text{H}_{42}$  obtained by dehydrogenation of cholesterol and of ergosterol with  $\text{Se}$ , the dehydrogenations have been repeated many times and most carefully, with exactly the same results; the identity of the 2 products has been further confirmed by measurements of their absorption spectra in  $\text{CHCl}_3$  by Windaus. The product obtained by R., G. and T. from ergosterol was probably not free of the impurities which are formed in most dehydrogenations with  $\text{Se}$ , and the exptl. conditions under which they worked were also probably responsible for the formation of such impurities in large amt. A detailed description is therefore given of the method for obtaining the pure hydrocarbon  $\text{C}_{25}\text{H}_{42}$ . For some reason which has not yet been discovered, it is much more difficult to purify the product from ergosterol than that from cholesterol. More important for the chemistry of the sterols is the structure of the hydrocarbon  $\text{C}_{25}\text{H}_{42}$  (I), likewise obtained in the dehydrogenation of cholesterol and ergosterol, which Cook and Hewett (*C. A.* 27, 5335) claim is not  $\text{C}_{25}\text{H}_{42}$  at all but 1,2-cyclopentenophenanthrene (II),  $\text{C}_{27}\text{H}_{44}$ . D. and K. have subjected a sample of C. and H.'s synthetic II to treatment with  $\text{N}_2\text{O}_5$  in ether at  $0^\circ$  (with I this gives a characteristic yellowish cryst. ppt.  $\text{C}_{25}\text{H}_{40}\text{O}_5\text{N}$ ); the soln. remained colorless for 5-10 min., then gradually became greenish and finally, at the end of 0.5 hr., emerald-green (due to dissolved  $\text{N}_2\text{O}_5$ ), but remained perfectly clear. On further standing at  $0^\circ$ , the green soln. gradually evolved  $\text{NO}$  and in 4-5 hrs. had the yellow color of an ether soln.

of  $\text{NO}_2$ . After 2 days longer at  $0^\circ$  a part of the  $\text{NO}_2$  was driven off with dry air and the rest was removed by shaking with water and  $\text{Na}_2\text{CO}_3$ . After drying with  $\text{Na}_2\text{SO}_4$  and slowly evap. in the air, the soln. yielded unchanged II without a trace of the compd.  $\text{C}_{25}\text{H}_{40}\text{O}_5\text{N}$ . Furthermore, spectroscopic measurements by Windaus of II (m.  $137-8^\circ$  after recrystn. from alc.), and of very pure I, m.  $125-6^\circ$ , from cholesterol and from ergosterol gave curves which, although very similar for all 3 samples, showed at certain points differences beyond the limits of exptl. error between that for II on the 1 hand and those for the 2 preps. of I on the other hand. If the statement of Kon (*J. Soc. Chem. Ind.* 52, 950(1933)) that I is  $\gamma$ -methyl-1,2-cyclopentenophenanthrene should be verified, then the synthetic compd. described under the latter name by Bergmann and Hilleman (*C. A.* 27, 5749) must have some other structure. C. A. R

Ag halide complexes of the carboxyl acids (Prevost) 6 Derivs. of 8-aminoquinoline as antimalarial preps (Magidson, Strukov) 11H. Me and Et esters of hemato-prosthelin and of a combination of the compn.,  $\text{C}_{20}\text{H}_{14}\text{N}_4\text{O}_4\text{Fe}$  (Herzog) 11A. Recent advances in org. chemistry (Brady) 2. App. for synthesis of  $\text{MeOH}$  (U. S. pat. 1,942,021) 1.

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Hydrocarbons. Henry Dreyfus Brit. 399,526, Sept. 26, 1933. See Fr. 749,916 (C. A. 28, 480°).

Separation of olefins. Wm. Engs and Richard Z. Moravec (to The Shell Development Co.). Can. 338,207, Dec. 26, 1933; cf. C. A. 27, 5751. Hydrocarbons boiling within the gasoline range are produced from a mixt. of hydrocarbons contg. olefins of the types  $R_1CH_2CHR$  and  $R_1CCHR$ , derived from the pyrolysis of mineral oil, by treating the mixt. with aq. 60–70%  $H_2SO_4$  at 0–25°, thereby selectively forming the monoalkyl sulfates of the  $R_1CCHR$  with the formation of an acid liquor contg. said alkyl sulfates. The acid liquor is removed and heated and the oily polymers produced are sepd.

Addition reactions with unsaturated organic compounds. Richard M. Deaneley (to The Shell Development Co.). Can. 338,211, Dec. 26, 1933. When an unsatd. compd. or compds. or mixts. of one or more unsatd. compds. with satd. compds. are treated with halogen, substitution reactions are inhibited by conducting the reaction in the presence of free O.

Nitrogenous organic compounds. I. G. Farbenind. A.-G. (Alfred Fehle, Karl Streitwolf and Walter Herrmann, inventors). Ger. 582,505, Aug. 22, 1933. Stable aq. solns. of nitrogenous org. compds. are prepd. by treating compds. of the type  $R_1R_2CR_3R_4NR_5R_6$ , where  $R_1$  represents a substituted aryl residue,  $R_2$  and  $R_3$ , O, OH or H,  $R_4$  a C chain and  $R_5$  and  $R_6$ , H or alkyl residues, with  $CO_2$  in the presence of water. Thus,  $\beta$ -3,4-dihydroxyphenyl- $\beta$ -hydroxyethylmethylamine is dissolved in water by the aid of a current of  $CO_2$ . Cf. C. A. 27, 2533.

Catalytic oxidation of organic compounds. Alphons O. Jaeger (to Selden Research & Engineering Corp.). U. S. 1,941,688, Jan. 2. An acid leached permutogenetic material such as one contg. V is used as a catalyst in effecting oxidations such as the production of oxidation de- vs. from aromatic hydrocarbons. Numerous details and examples are given. Cf. C. A. 28, 480°.

Oxygenated organic compounds from hydrogen and carbon oxides. Walter Bader and Edward B. Thomas (to Celanese Corp. of America). U. S. 1,942,530, Jan. 9. For the production of products such as MeOH, gaseous mixts. contg. H and oxides of C are subjected to the action of heat and pressure in the presence of a catalyst contg. a catalytic metal such as Zn, Cu, Pb and Cd solely in the form of its sulfide.

Operating catalytic apparatus such as in oxidizing aromatic hydrocarbons, etc. Alphons O. Jaeger (to Selden Co.). U. S. 1,942,817, Jan. 9. A temp.-regulat-

ing medium is cyclically circulated, first in indirect and then in direct heat-exchange relation with the interior of the catalyst mass and then through an outside heat-exchange system. App. is described.

Organic mercury compounds. I. G. Farbenind. A.-G. Fr. 754,436, Nov. 7, 1933. The compds. are of the

general formula  $XR^1C_2H_5R^2C(SHgR^3)N$ , where  $R^1$  is the radical of an acid group,  $R^2$  is O, S or NH,  $R^3$  is alkyl or cycloalkyl and X is H or an alkali metal. They are sol. in water. Examples are given of the prepn. of compds. in which  $XR^1$ ,  $R^2$  and  $R^3$  are (1) 5-COONa, O and Et, (2) 6-SO<sub>3</sub>Na, NH and Et, (3) 5-AsO<sub>2</sub>HNa, NH and Et, (4) 5-COONa, O and Pr, (5) 5-COONa, S and Et, and (6) 7-COONa, S and cyclohexyl. The prepn. of 2-mercaptobenzoxazole-5-carboxylic acid (decomposed at 283–4°) and 2-mercapto-1-imidazole-6-sulfonic acid, used as starting materials, is also described.

Liquid products by polymerization of olefinic gases. Wm. B. Plummer (to Standard Oil Co. of Ind.). U. S. 1,941,577, Jan. 2. Rich olefinic gases are subjected to polymerization at a relatively low temp. (suitably about 370–510°) and high pressure (suitably about 500–3000 lb.). Lean olefinic gases are subjected to polymerization at high temp. (suitably about 510–675°) and high pressure (suitably about 500–3000 lb.). A lean olefinic gas is sepd. from liquid products of the low-temp. system and a rich olefinic gas from reaction products of the high-temp. system, and the sepd. gases thus obtained are mixed with the corresponding streams of lean and rich gases, resp., supplied to the high- and low-temp. systems. App. is described.

Halogenation. Richard M. Deaneley (to The Shell Development Co.). Can. 338,210, Dec. 26, 1933. Substitution of halogen in a paraffin and addn. of halogen to an olefin are effected simultaneously in a mixt. of paraffin and olefin by the action of free halogen in the absence of O, in the dark, below 100°.

Chlorinating hydrocarbons. Richard M. Deaneley (to N. V. de Bataafsche Petroleum Maatschappij). Brit. 399,991, Oct. 19, 1933. Substantial substitution of paraffin and aromatic hydrocarbons in the dark with Cl is induced by simultaneously carrying out an addn. process in the same reaction zone between Cl and unsatd. hydrocarbons in the absence of substantial amts. of O. The process is not limited to the phys. state of the reactants and is effected at temps. from below 0°, e. g., for  $C_2H_4$ , at its b. p. (–41°) up to 100° or (in the case of hydrocarbons boiling above 100°) over 100°. In an example a mixt. of  $C_2H_6$  and  $C_4H_8$  is chlorinated to form mono- and dichlorobutane.

Alcohol. Benjamin T. Brooks (to The Petroleum Chemical Corp., to The Standard Alcohol Co.). Can. 337,543, Nov. 28, 1933. A secondary or tertiary alc. is obtained from the corresponding alkyl sulfate by dilg. with water and holding at a temp. in excess of 50° and below the b. p. of the corresponding alc. A system is maintained including in countercurrent communication a vertical series of zones contg. liquid and vapor and the alc.  $H_2SO_4$  mixt. is supplied to the upper part of the series and heat is supplied to the lower part of the series. Alc. vapor is continuously removed while the liquid content of the zones is retained by surfaces of a vitreous character and the soln. is held substantially exclusively in contact with surfaces of a vitreous character.

Alcohols. E. I. du Pont de Nemours & Co. Brit. 399,848, Oct. 9, 1933. Higher alcs. are prepd. by treating a fat or fatty oil with excess H at 300–400° and 100–205 atm. in the presence of a mixed Cd-Cu-Zn chromite catalyst. If olefinic linkages are present in the products they may be reduced by further hydrogenation with a Ni catalyst. The catalyst may be prepd. by adding a soln. of  $(NH_4)_2Cr_2O_7$  and  $NH_4OH$  to a soln. of Zn, Cu and Cd nitrates. Examples are given of the hydrogenation of cottonseed, palm, coconut and castor oils, further hydrogenation with Ni being used in the case of cottonseed oil. Palm oil yields mainly cetyl alc. and coconut

oil a mixt. of octanol, decanol, lauryl and myristyl alcs. Cf. C. A. 28, 1049<sup>9</sup>.

**Alkyl alcohols.** I. G. Farbenind. A.-G. Brit. 399,258, Oct. 5, 1933. Addn. to 354,992 (C. A. 26, 5574). See Fr. 752,478 (C. A. 28, 1047<sup>9</sup>).

**Alkylaminocarbinols.** Frederick H. Kranz (to National Aniline & Chemical Co.). U. S. 1,942,820, Jan. 9. An improvement in quality and an increase in yield of alkyl diaminodiaryl carbinols can be obtained by carrying out the oxidation of the corresponding alkyl-diaminodiarylmethanes with a suitable oxidant in the presence of  $\text{HCO}_2\text{H}$ ; thus, for example, tetraethyl-(methyl, propyl, etc.)diaminodiphenylcarbinol may be obtained by oxidizing tetraethyl(methyl, propyl, etc.)-diaminodiphenylmethane with lead peroxide in the presence of  $\text{HCO}_2\text{H}$ . Various details and modifications of procedure are described.

**Hydroxy aldehydes.** F. Hoffmann-La Roche & Co. A.-G. Brit. 399,723, Oct. 12, 1933. Phenols contg. a carbinol group in *o*- or *p*-position are oxidized with nitroaryl sulfonic and carboxylic acids in alk. soln., acids contg. a halogen atom in *o*-position to the  $\text{NO}_2$  group being excluded. Among examples (1) vanillin is prepd. from vanillyl alc., *m*-nitrobenzenesulfonic acid or (I) *p*-nitrobenzoic acid being used, and (2) 4-hydroxyvitine-aldehyde is prepd. from dimethylol-*p*-cresol with the aid of I. Cf. C. A. 27, 5337.

**Ketones from unsaturated fatty acids.** Donald K. Tressler (to Mathieson Alkali Works). U. S. 1,941,640, Jan. 2. Higher unsatd. fatty acids such as oleic acid or "red oil" are heated to a high temp. (suitably about 200° and then to 310-320°) in the presence of a ketone-forming catalyst such as reduced iron or Fe oxide while bringing a non-oxidizing gas such as  $\text{CO}$ , into contact with the reaction mixt. from before the reaction begins until after it has been completed. Products thus obtained are of waxy character.

**Wax-like hydroxy ketones.** Donald K. Tressler and Carlisle Schade (to Mathieson Alkali Works). U. S. 1,941,639, Jan. 2. Unsatd. ketones such as oleone are treated with concd.  $\text{H}_2\text{SO}_4$  to convert them into ethereal sulfates and the latter are hydrolyzed to form hydroxy ketones which may be used as substitutes for Chinese insect wax in polishes, etc.

**Imides of ketones.** Edgar C. Britton and Fred Bryner (to Dow Chemical Co.). U. S. 1,938,800, Dec. 12. An alkali metal or Ca salt of a primary amine is caused to react directly with an aromatic ketone, to form products such as benzophenone anil, m. 114° (from aniline, Na and benzophenone), *p*-chlorobenzophenone anil, m. about 64.5°,  $\alpha$ -naphthylimide of benzophenone, m. about 135-6°,  $\alpha$ -naphthylimide of *p*-chlorobenzophenone, m. 159-60°, acetophenone anil, m. 37°, etc. Various details and modifications of procedure are described.

**Amines.** Werner M. Lauter (to The Goodyear Tire and Rubber Co.). Can. 337,669, Dec. 5, 1933. Secondary aromatic amines are prepd. by the reaction in the presence of an alkali metal bisulfate of naphthols, polyhydroxybenzenes, alkylhydroxybenzenes, hydroxyanthracenes and halogen-substituted hydroxybenzenes with aniline, alkylphenylamines, naphthylamines, cyclohexylamine, furfurylamine, benzylamine, *p*-phenetidine, aminobiphenyls, aminophenols, halogen-substituted naphthylamines and halogen-substituted phenylamines.

**Amines.** Röhm & Haas Co. Brit. 399,201, Oct. 2, 1933. Amines are prepd. by treating an aliphatic alc. with  $\text{NH}_3$  or a primary or secondary amine in the presence of a catalyst contg. P, e. g.,  $\text{P}_2\text{O}_5$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{HPO}_4$ ,  $\text{H}_2\text{P}_2\text{O}_7$ ,  $\text{NH}_4\text{H}_2\text{PO}_4$ ,  $(\text{NH}_4)_2\text{HPO}_4$ ,  $\text{AlPO}_4$ , etc. The reaction is preferably effected in the vapor phase at 250-500°.

**Recovering amines and phenols from their aqueous solutions.** Waldo L. Semon (to B. F. Goodrich Co.). U. S. 1,942,833, Jan. 9. Pptn. of a phenol-amine salt is effected by a suitable proportionate addn. of either a phenol or an amine such as required, e. g., in the sepn. of  $\text{PhOH}$  from aq. soln. by the addn. of  $\text{PhNH}_2$ . Various examples are given.

**Diamines.** Werner M. Lauter (to The Goodyear Tire

and Rubber Co.). Can. 337,668, Dec. 5, 1933. Diamines are prepd. by subjecting a chloride of an aliphatic hydrocarbon to heat and pressure in the presence of an aq. soln. of  $\text{NH}_3$  and an ammo salt of Zn, Cu or equiv. metals, and subsequently splitting off the diamine.

**Sulfuric acid esters of fatty acid compounds of high molecular weight.** Hugo Siebenbürger (to Soc. pour l'ind. chim. à Bâle). U. S. 1,942,577, Jan. 9. Reaction is effected between a fatty acid compd. contg. at least one OH group in the fatty acid radical, such as castor oil, and an addn. product of  $\text{SO}_3$  and an org. tertiary base such as pyridine in the presence of an excess of such tertiary base. Cf. C. A. 27, 4540.

***o*-Aminoaryl alkyl sulfones and *o*-aminoaryl aralkyl sulfones.** Kurt Schimmelschmidt and Hans Thomas (to General Aniline Works). U. S. 1,939,416, Dec. 12.  $\alpha$ -(*o*-Nitroarylsulfonyl) fatty acids, -aryl fatty acids and their substitution products may be transformed, with a good yield, into *o*-nitroaryl alkyl or aralkyl sulfones and their substitution products by heating the alkali metal salts of the acids in an aq. feebly acid soln. (suitably without isolation of the initial materials after their formation by oxidation of the  $\alpha$ -(*o*-nitroarylmercapto) fatty acid or -aryl fatty acid in a soln. of alkali bicarbonate). By reduction of the *o*-nitroaryl alkyl sulfones, *o*-nitroaryl aralkyl sulfones and their substitution products, the *o*-amino derivs., are obtained which are suitable for use as dye intermediates.

4-Chloro-2-nitrophenyl methyl sulfone m. 155-6° and on reduction yields 4-chloro-2-amino-phenyl methyl sulfone, m. 87-8°. 4-Trifluoromethyl-2-nitrophenyl methyl sulfone m. 150-1° and on reduction yields the 2-amino deriv., m. 94-5°. 4-Chloro-2-nitrophenyl benzyl sulfone m. 112-13° and on reduction yields the 2-amino deriv., m. 132-3°. In an analogous manner there may be obtained from *o*-nitrophenylsulfonylactic acid, m. 170-1°, *o*-nitrophenyl methyl sulfone, m. 106-7°, and *o*-aminophenyl methyl sulfone, m. 84-5°; from  $\alpha$ -(*o*-nitrophenylsulfonyl)propionic acid, m. 126-8°, *o*-nitrophenyl ethyl sulfone, m. 44-5°, and *o*-aminophenyl ethyl sulfone, m. 74-5°; and from  $\alpha$ -(4-chloro-2-nitrophenylsulfonyl)butyric acid, m. 88-90°, 4-chloro-2-nitrophenyl propyl sulfone, m. 73-4°, and 4-chloro-2-aminophenyl propyl sulfone m. 54-5°. Other nitro compounds

6 and bases obtainable comprise: *o*-nitrophenyl benzyl sulfone, m. 127-8°; *o*-amino deriv., m. 156°; *o*-aminophenyl butyl sulfone, m. 45-7°; *o*-aminophenyl cyclohexyl sulfone, m. 128-30°; 4-chloro-2-nitrophenyl ethyl sulfone, m. 123-5°; 2-amino deriv., m. 87-9°; 4-chloro-2-aminophenyl butyl sulfone, oil, b<sub>p</sub> 225-6°; 5-chloro-2-aminophenyl methyl sulfone, m. 121-3°; 2-amino-1-naphthyl methyl sulfone, m. 140-1°; 4-methyl-2-nitrophenyl methyl sulfone, m. 122-4°; 2-amino deriv., m. 105-6°; 4-methyl-2-nitrophenyl ethyl sulfone, m. 88-9°; 2-amino deriv., m. 102°; 4-methyl-2-aminophenyl butyl sulfone, m. 87-9°; 4-methyl-2-nitrophenyl benzyl sulfone, m. 134-6°; 2-amino deriv., m. 135-6°; 5-methoxy-2-aminophenyl methyl sulfone, m. 100-2°; 4-nitro-2-aminophenyl methyl sulfone, m. 199-200°; 5-nitro-2-aminophenyl methyl sulfone, m. 203-4°; 4-trifluoromethyl-2-nitrophenyl ethyl sulfone, m. 116-18°; 2-amino deriv., m. 42-3°; 4-trifluoromethyl-2-nitrophenyl benzyl sulfone, m. 134-5°; 2-amino deriv., m. 193-5°; 3-nitro-4-methylsulfonylbenzenesulfondimethylamide, m. 176-7°; 3-amino deriv., m. 187-8°; 4-chloro-2-nitrophenyl 4-methylbenzyl sulfone, m. 133-4°; 2-amino deriv., m. 119-20°; 2-nitrophenyl 4-methylbenzyl sulfone, m. 163-4°; 2-amino deriv., m. 163°; 2-nitrophenyl 3,4-dichlorobenzyl sulfone, m. 148-9°; 2-amino deriv., m. 150°.

9 **Alkylated cycloheptanones and cyclooctanones.** Soc. anon. M. Naef & Cie. Ger. 580,713, July 14, 1933. The above derivs. are prepd. by heating suberic or azelaic acid, alkylated in the  $\alpha$ - or  $\beta$ -position, with salts or hydroxides of metals of the 8rd or 4th groups of the periodic table or of uranyl to temps. of 300-400°. Thus, 2,3-dimethylheptane-2,7-dicarboxylic acid is neutralized with NaOH and heated with  $\text{Th}(\text{NO}_3)_4$ . The pptd. Th salt is filtered off, washed and heated to 300-400°. The

product is *1,1,7-trimethylcycloheptane-3-one*, b. 80–83° at 12 mm. Uranyl nitrate may be used instead of  $\text{Th}(\text{NO}_3)_4$ . Another example describes the prepn. of *1,1,8-trimethylcyclooctane-2-one*, b. 105–7° at 12 mm.

**Tertiary alkyl-substituted *o*-dihydroxybenzenes.** Lindley E. Mills and Bruce L. Fayerweather (to Dow Chemical Co.). U. S. 1,942,827, Jan. 9. 1,2-Dihydroxy-4-*tert*-butyl- and amyl-benzenes m. about 47° and may be used as stabilizers for insecticidal compns. such as those prepd. from pyrethrum and rotenone and as antioxidants with animal or vegetable fats, waxes, soaps, etc., and to prevent gum formation in gasoline or the like. They may be prepd. by the hydrolysis of a 2-halo-4-*tert*-alkyl-1-hydroxybenzene in the presence of  $\text{Cu}_2\text{O}$ , and it is generally stated that the *tert*-hexyl, heptyl, octyl, etc., derivs. may be similarly obtained. Examples with details of procedure are given.

**Halonitroanilines.** I. G. Farbenind. A.-G. Brit. 399,769, Oct. 12, 1933. 6-Bromo- and 6-chloro-2,4-dinitroaniline are obtained by passing Br or Cl into an aq suspension of 2,4-dinitroaniline at moderately raised temp., e. g., 40–60°, with continuous stirring. The product is sepd. by filtration. Examples are given.

**Vinyl polymers of low viscosity.** Harold J. Barrett (to E. I. du Pont de Nemours & Co.). U. S. 1,942,531, Jan. 9. A mixt. comprising a vinyl ester or styrene together with an org. peroxide catalyst such as benzoyl peroxide and rosin or a rosin ester is heated (suitably at a temp. of about 110°) to obtain a product of relatively low viscosity.

**Ether derivatives of 1-benzyl-3-methylisoquinoline.** Otto Wolfes. U. S. 1,941,647, Jan. 2. A 1-benzyl-3-methyl-6,7-dialkoxyisoquinoline, such as the 6,7-dimethoxy deriv., is produced by condensing a phenylacetic acid with 1-(3',4'-dialkoxyphenyl)-2-aminopropane, treating thea mide thus obtained with acid condensing agents at temps. of 60–150°, sepg. the cryst. hydrochlorides of the bases thus formed, liberating the free bases from the hydrochlorides by addn. of alkali, and heating the bases with Pd black to about 160–220° for effecting dehydrogenation. 1-(3',4'-Methylenedioxybenzyl)-3-methyl-6,7-methylenedioxyisoquinoline m. 141°; its hydrochloride m. 254° (decompn.).

**Benzanthrone and derivatives.** The Newport Co. Ger. 580,513, July 13, 1933 (Cl. 12v. 10). See Brit. 305,536 (C. A. 23, 4429).

**Camphane derivatives.** Kenzo Tamura, Gyokuzo Kihara, Yasuhiko Asahina and Morizo Ishidate. Fr. 755,069, Nov. 18, 1933. 2,5-Diketocamphane-3-(or 6)-carboxylic acid and 6-hydroxy-3-ketocamphane-2-carboxylic acid (or 5-hydroxy-2-ketocamphane-3-carboxylic acid) are prepd. by introducing  $\text{CO}_2$  into 2,5-diketocamphane or bromo-2,5-diketocamphane in the presence of a catalyst such as Na, K or Mg. An org. solvent such as xylene, toluene or  $\text{C}_6\text{H}_6$  may be used.

**Anthraquinone derivatives.** Imperial Chemical Industries Ltd. and Frank Lodge. Brit. 399,528, Oct. 4, 1933. *N*-Substituted-1-amino-2-sulfoanthraquinones are prepd. by treating a 1-halo-2-sulfoanthraquinone, free from further  $\text{HSO}_3$  groups, with a suitable amine (in the presence of a Cu catalyst). Basic material, e. g., common alkali or excess amine, and solvents may be present. When further reactive substituents are present, particularly halo-substituents, these may also be replaced by the same or a different (substituted) amino group. In examples Na-1-chloroanthraquinone-2-sulfonate is condensed with  $\text{MeNH}_2$  in presence of Cu bronze or with  $\text{PhNH}_2$  in presence of  $\text{Na}_2\text{CO}_3$  and Na 4-bromo-1-chloroanthraquinone-2-sulfonate is condensed with *p*-toluidine in presence of  $(\text{AcO})_2\text{Cu}$  and  $\text{Na}_2\text{CO}_3$ .

**Pyridinium compound.** Soc. pour l'ind. chim. à Bâle. Swiss 159,926, Apr. 17, 1933. A pyridinium compd. contg. an acylated carbon residue contg. an OH group is prepd. by treating pyridine with the  $\text{CH}_3(\text{OH})\text{CH}_2\text{Cl}$  ester of oleic acid.

**Acylbenzoic acid compounds.** Bernard H. Jacobson (to Calco Chemical Co.). U. S. 1,942,430, Jan. 9. An acylbenzoic acid such as *p*-toluyl- or *o*-benzoyl-

acid is formed by reacting, in the presence of anhyd.  $\text{AlCl}_3$  and at a reaction temp. not substantially exceeding 40°, phthalic anhydride with an excess of a liquid benzenoid compd. such as toluene or  $\text{C}_6\text{H}_6$ , and drowning the reaction mass with sufficient cool water contg. an inorg. acid such as HCl to liberate an acylbenzoic acid and produce a dild. mixt. the temp. of which is sufficiently low to prevent the excess of the benzenoid compd. from holding more than a minor portion of the acylbenzoic acid in soln. (the undissolved acylbenzoic acid being directly sepd. from the mixt.). App. is described. Cl. C. A. 28, 491<sup>2</sup>.

**Continuous production of nitro compounds such as nitropentaerythritol.** Josef Meissner. U. S. 1,943,031, Jan. 9. For the continuous production of nitropentaerythritol, pentaerythritol is dissolved in  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$  is added, the mixt. is passed over an extended ascending path (in a described app.) at the reaction temp. while agitated, and mixed acid and crystals of nitrated pentaerythritol are separately discharged (the crystals floating on the surface of the acid). Methylaniline and resorcinol may be similarly nitrated.

**Reaction products of ketene.** George H. Law (to Carbide and Carbon Chemicals Corp.). U. S. 1,942,110, Jan. 2. See Brit. 397,025 (C. A. 28, 780<sup>1</sup>).

**Ketene reaction product.** Marion K. Young, executrix for Charles O. Young, and George H. Reid (to The Carbide and Carbon Chemicals Corp.). Can. 838,162, Dec. 26, 1933. Ketene is formed by the pyrolysis of acetone and the vapors formed are absorbed in the substance with which it is desired to have the ketene react (e. g.  $\text{PhNH}_2$ ,  $\text{AcOH}$ ,  $\text{HOCH}_2\text{CH}_2\text{OEt}$ ,  $\text{R(OH)}$  or  $\text{H}_2\text{O}$ ). If the absorption takes place at ordinary temp., the resultant liquid will contain the reaction product, excess absorbing medium and condensed unchanged acetone. The liquid may be treated for the sepn. or recovery of its several constituents.

**Disubstituted tetrazoles.** Georg Scheuing and Bruno Walach (to E. Bilhuber, Inc.). U. S. 1,943,148, Jan. 9. The formation of hydrazidines takes place according to the equation: (starting from the oximes)  $\text{R}_1\text{R}_2\text{C:NOH} \rightarrow \text{R}_1\text{R}_2\text{C(OAc):NR}_3 + \text{NH}_2\text{NH}_2 \rightarrow \text{R}_1\text{R}_2\text{C(NR}_3\text{)NHNH}_2$  (I) (or starting from the acid amides)  $\text{R}_1\text{CONHR}_2 \rightarrow \text{R}_1\text{C(OAc):NR}_2 \rightarrow \text{I}$ . The hydrazidines thus obtained may be converted into tetrazoles by further treatment with compds. contg. and yielding the nitrous acid radical under the conditions of the process according to the

equation:  $\text{I} + \text{HNO}_2 \rightarrow \text{R}_1\text{R}_2\text{C:N:N:N.NR}_3$ . The enol esters of the mono-substituted acid amides serving as starting materials need not be employed in a pure isolated form but can be used in the form in which they result in the reaction mixt., for example in the intramol. rearrangement of oxime esters or in the esterification and enolization of mono-substituted acid amides. Since the free hydrazidines are unstable and difficult to handle as well as the enol esters of the monosubstituted acid amides it is in general advisable to avoid isolating them and to carry out the conversion in one step by starting with oximes or oxime esters or from mono-substituted acid amides or their esters. Several examples with details of procedure are given.

**Stabilization of organic nitrates.** James H. Werntz (to The Canadian Industries Ltd.). Can. 336,584, Oct. 24, 1933. Aliphatic nitrates are stabilized by dissolving in a solvent comprising ethylene oxide and acetone and then removing the solvent.

**Organic disulfides.** Howard I. Cramer (to The Good-year Tire and Rubber Co.). Can. 337,670, Dec. 5, 1933. Cyclic disulfides are prepd. by oxidizing the corresponding cyclic dithiocarbamates with a persulfate.

**Water soluble metal carbamates.** Robert B. MacMullin (to Mathieson Alkali Works). U. S. 1,942,610, Jan. 9.  $\text{NH}_3$  carbamate is caused to react with a water-sol. salt such as KCl, NaCl or  $\text{CaCl}_2$  in aq. soln. at a temp. below about 10° to ppt. the carbamate of the metal.

**Aluminum formate and acetate.** Max Schwarz, Fritz Zschimmer, Erich Zschimmer, Rudolf Schwarz and

Werner Schwarz (trading as Zachimmer & Schwarz<sup>1</sup> Chemische Fabrik Dörlau). Brit. 399,737, Oct. 12, 1933. See Ger. 574,452 (C. A. 27, 5085).

**Aliphatic acids.** British Celanese Ltd., Horace F. Oxley and Walter H. Groombridge. Brit. 399,520, Oct. 9, 1933. AcOH and other aliphatic acids are concd. by extg. with a low-boiling solvent, e. g., Et<sub>2</sub>O (partly) removing the solvent from the ext. and then adding an entraining agent, e. g., C<sub>6</sub>H<sub>6</sub>, s-C<sub>4</sub>H<sub>9</sub>Cl<sub>2</sub>, C<sub>6</sub>H<sub>5</sub>Cl<sub>2</sub>, C<sub>6</sub>HCl<sub>5</sub>, AcOEt, AcOBu and distg. to remove the H<sub>2</sub>O as an azeotropic mixt. of lower b. p. than the acid.

**Gluconic acid and its lactones.** Richard Pasternack and Wm. R. Giles (to Chas. Pfizer & Co.). U. S. 1,942,660, Jan. 9. Crystn. from an "over-satd." aq. gluconic acid soln. is effected with temp. ranges so selected as to det. the product of crystn. by excluding transition temps.

**Separating acetic acid from acetic anhydride.** Richard Möller, Hans Hatzig and Erich Rabald (to C. F. Boehringer & Soehne G. m. b. H.). U. S. 1,941,951, Jan. 2. See Ger. 584,571 (C. A. 28, 1055).

**Hydroxybenzoquinolinecarboxylic acids.** Leopold Laska and Oskar Haller (to General Aniline Works). U. S. 1,942,108, Jan. 2. See Ger. 571,832 (C. A. 27, 4414).

**Benzoic acid.** Courtney Conover (to Monsanto Chemical Co.). U. S. 1,942,380, Jan. 2. A mixt. of molten phthalic anhydride and a decarboxylating catalyst such as one contg. Al and Cr compds. is heated in the presence of water (suitably at a temp. of about 280°) to produce benzoic acid. U. S. 1,942,390 also relates to a similar process.

**Separating o- and p-halobenzoic acids.** Lindley E. Mills (to Dow Chemical Co.). U. S. 1,942,826, Jan. 9. Aq. mixts. of these acids or their water-sol. salts have their *p*<sub>H</sub> adjusted to a point (suitably about 4.5) at which *p*-halobenzoic acid is present in free and undissolved form and *o*-halobenzoic acid is present in dissolved form as a water-sol. salt.

**Aliphatic anhydrides.** British Celanese Ltd., Horace F. Oxley, Leonard Fallows and Henry Dreyfus. Brit. 399,793, Oct. 2, 1933. Aliphatic acids are thermally treated at above 550° in presence of catalysts promoted by non-reducible metal oxides other than WO<sub>3</sub>, and the oxides of As and Sb. Suitable mixts. are molten Na<sub>2</sub>P<sub>2</sub>O<sub>7</sub> contg. 2% Na<sub>3</sub>P<sub>2</sub>O<sub>7</sub> and 5% CaO or 4% TiO<sub>2</sub> and solid CaWO<sub>4</sub> with 10% CaO, 5% Al<sub>2</sub>O<sub>3</sub> or 13% V<sub>2</sub>O<sub>5</sub>.

**Aliphatic anhydrides.** Henry Dreyfus. Brit. 399,792, Oct. 2, 1933. The corresponding acids are thermally treated in presence of 5-25% of H<sub>2</sub>O vapor. The vapor may be introduced by evapg. an acid contg. the requisite amt. of H<sub>2</sub>O. The reaction temp. may be 550-900° and the vapor may be preheated to 210-350°. Suitable catalysts may be present, those yielding Me<sub>2</sub>CO as described in Brit. 250,664 (C. A. 21, 2006) being excluded. Cf. C. A. 28, 783<sup>1</sup>.

Straight-tube heat-exchangers, applicable to the con-

densation of acetic anhydride vapor. British Celanese Ltd. Brit. 399,803, Oct. 19, 1933.

**Acetylene from methane.** Thomas S. Wheeler and David Binnie (to Imperial Chemical Industries Ltd.). U. S. 1,942,889, Jan. 9. A mixt. of CH<sub>4</sub>, H and Cl is passed through a reaction tube which may be formed of silica at a min. velocity of about 64,000 cm. per min. and at a high temp. obtained by the exothermic formation of HCl in the mixt.

**Elimination of acetylene from gases.** Marion K. Young, executrix for Charles O. Young (to The Carbide and Carbon Chemicals Corp.). Can. 337,317, Nov. 21, 1933. C<sub>2</sub>H<sub>4</sub> contg. C<sub>2</sub>H<sub>2</sub> is scrubbed with acetone. The residual gas contg. C<sub>2</sub>H<sub>2</sub> is passed through a catalyst at a rate up to 30 cc. of gas per min. per g. of catalyst. The catalyst is prepd. by impregnating pea-size filters with Cu(NO<sub>3</sub>)<sub>2</sub>, roasting and reducing with H at 220-50°. The catalyst is maintained at 195° during the process. The C<sub>2</sub>H<sub>4</sub> after treatment is free from C<sub>2</sub>H<sub>2</sub>. The spent catalyst is revived by passing air or other O-contg. gas through it at 250° and reducing with H.

**Acetaldehyde.** Russell W. Millar and Leo V. Steck (to The Shell Development Co.). Can. 337,706, Dec. 5, 1933. AcH is prepd. from C<sub>2</sub>H<sub>2</sub> by hydrating with a soln. contg. free acid, a Hg compd. (calcd. as HgO) and an acid salt of alkali metal or NH<sub>4</sub> in the proportions of 21:1:100 parts by wt.

**1-Phenyl-2-amino-1-propanol.** I. G. Farbenind. A.-G. (Max Bockmühl, Gustav Ehrhart and Leonhard Stern, inventors). Ger. 587,586, Nov. 6, 1933 (Cl. 12q 32.21). 1-1-Phenyl-2-keto-1-propanol is reduced with H and noble metal catalysts in the presence of NH<sub>3</sub> or primary amines except CH<sub>3</sub>NH<sub>2</sub>. Alternatively, the keto-propanol may be treated with NH<sub>4</sub>OH and the resulting oxime reduced to give the amino compd. This may be alkylated. Examples are given. The HCl salt m 174-5°.

**Dibenzanthrone.** Herbert J. West (to Selden Co.). U. S. 1,941,771, Jan. 2. In the production of dibenzanthrones by the alkali fusion process, oxidizing agents such as NaNO<sub>2</sub> or NaClO<sub>2</sub> are added to the melt before dissolving it in water, in order to facilitate obtaining of a product free from objectionable impurities.

**Polyglycidols.** Georg Frank. Ger. 575,750, Aug. 22, 1933. These are prepd. by polymerizing monomeric glycidols at low temps. by the aid of catalysts. Thus, glycidol is stirred rapidly at -25° and SnCl<sub>4</sub> added drop by drop to produce a polyglycidol.

**Separation of a mixture of alizarin blue and alizarin yellow.** M. A. Il'inskiĭ. Russ. 27,750, July 31, 1931. In the sepn. of blue from yellow alizarin by a treatment with chalk of solns. of their alkali salts, the melt containing mixts. of mono- and di-sulfonates of anthraquinone is neutralized with caustic and transferred into soln. by means of alkali carbonate. This soln. is treated with powdered chalk to ppt. the calcium deriv. of alizarin, while the filtrate from the latter is acidified for the pptn. of flavo- and iso-purpurin.

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Tastes of glutamic acid and related compounds.** II. Tastes of some derivatives of *dl*-glutamic acid. Chao-Lun Tseng and Edith Ju-Hwa Chu. *J. Chinese Chem. Soc.* 1, 189-98(1933); cf. C. A. 26, 484.—The most convenient method for prepg. *dl*-glutamic acid is racemization, by heating the *d*-acid with Ba(OH)<sub>2</sub> and H<sub>2</sub>O in an autoclave under 1.5 atm. for 9 hrs. Derivs. of the *dl*-acid including the Na, K, Li, Ca, Ba, Mg, Sr monobasic salts, the HCl and H<sub>2</sub>SO<sub>4</sub> salts, Me ammonium salts, the Et ester and acyl derivs. were prepd. Of these compds., the Na, K, Li monobasic salts possess intensely meat-

like tastes similar to mono Na *d*-glutamate. The tastes of these *dl*-compds. did not always correspond to those of the corresponding *d*-compds. Wm. H. Adolph

*p<sub>H</sub>* in microbiology. J. Made Castro Marçal. *Rev. bras. med. pharm.* 9, 245-68(1933). E. S. G. B.

A formula and nomogram for the estimation of the osmotic pressure of colloids from the albumin and total protein concentrations of human blood sera. Herbert S. Wells, John B. Youmans and David G. Miller. *J. Clin. Investigation* 12, 1103-17(1933).—From the detn. of the osmotic pressure of colloids and the total protein, albumin and globulin concns. in 53 persons, the following formula is derived:  $P = C(21.4 + 5.9 A)$ , where *P* is the osmotic pressure in mm. water, *C* the total protein



concn. and  $A$  the albumin concn. in g. per 100 cc.

The liquefaction and saccharification of starch by the action of amylases from different sources. G. Orestano. *Arch. farmacol. sper.* 56, 388-406(1933); cf. C. A. 27, 1646.—Inactivation of soy bean (I), malt (II) and pancreatic (III) (dog) amylase by dry heat has given evidence concerning the no. and kinds of enzymes present in these preps. After drying to const. wt. over  $\text{CaCl}_2$ , I, II and III were heated for 0.5 hr. at various temps. Enzymic activity was measured by (1) decrease in viscosity of crude starch suspensions, (2) disappearance of substances giving a color with I when both crude (IV) and sol. (V) starch were digested, and (3) formation of reducing sugars from both IV and V. Complete inactivation of dry I, II and III was brought about by heating at 140-50°. Regardless of what method was used in following changes in enzymic activity no partial specific inactivation by dry heat was observed, i. e., there was no evidence for the presence of 2 component enzymes, one converting starch to achroodextrin and another converting the latter to maltose. With low concns. of II, however, heating at 130° produced inactivation so far as ability to convert V to maltose was concerned, but did not completely destroy the activity as measured by the other methods. This exceptional behavior of II was not observed if the II concn. was sufficiently increased. From these results O. constructs the following hypothesis. III contains only  $\alpha$ -amylase (acting upon  $\alpha$ -glucoside linkages, starch  $\rightarrow$  high-mol. substance  $\rightarrow$  maltose) since the ratio (velocity of liquefaction)/(velocity of saccharification) is relatively high. I contains only one component, probably  $\beta$ -amylase (acting upon  $\beta$ -glucoside linkages, starch  $\rightarrow$  maltose directly) since the above ratio of velocities is relatively small. II contains both  $\beta$ -amylase and  $\alpha$ -amylase (or  $\alpha$ -amylase + kinase), the latter in greater proportion. Heating at 130° inactivates the small amt. of  $\beta$ -amylase without destroying all of the  $\alpha$ -amylase. IV and V differ in the relative no. of  $\alpha$ - and  $\beta$ -glucoside linkages contained.

Lewis W. Butz

The influence of side chains on oxidation processes in the body. II. Model experiments on the biological breakdown of carotene pigments. Richard Kuhn and Kyriako Livada. *Z. physiol. Chem.* 220, 235-46(1933).—The resistance of carotenes to biol. oxidation may be due in part to their insol. in aq. media and their tendency to accumulate in fatty tissue, and in part to the presence of the branched grouping:  $\text{CHCH}:\text{CMeCH}:$  contg. a  $\beta$ -Me. To det. whether this grouping is amenable to the usual  $\beta$ -oxidation, the Ph derivs. of a no. of satd. and unsatd. acids with  $\alpha$ - and  $\beta$ -alkyl substitution were fed to dogs and rabbits and the urines examd. for oxidation products.  $\alpha$ -Methylcinnamic acid undergoes oxidation to  $\text{BzOH}$ , which is excreted as hippuric acid, while the corresponding Et deriv. and its isomeric crotonic acid,  $\text{PhCH}_2\text{C}(\text{CHMe})\text{CO}_2\text{H}$ , are excreted unchanged. Of the  $\beta$ -Me derivs.,  $\text{PhCMe}:\text{CHCO}_2\text{H}$  is paired with glycine and thus excreted, and  $\text{PhCHMeCH}_2\text{CO}_2\text{H}$ ,  $\text{PhCH}:\text{CHCMe}:\text{CHCO}_2\text{H}$  and  $\text{PhCH}_2\text{CH}_2\text{CHMeCH}_2\text{CO}_2\text{H}$  are excreted unchanged. Citral undergoes an  $\omega$ -oxidation to  $\text{HO}_2\text{CMe}:\text{CHCH}_2\text{CH}_2\text{CMe}:\text{CHCO}_2\text{H}$ . It thus appears that alkyl groups on the side chain, instead of undergoing dealkylation, may cause unexpected changes in the behavior of the substance. In general, the biol. breakdown of a substance is impeded by the presence of Me in the  $\beta$ -position. A. W. Dox

The refractive index of protoplasm. A. M. Frederikse. *Protoplasma* 19, 473-84(1933).—The method of Chaunles has been to det. the  $n$  of the protoplasm of *Amoeba vermicosa*.

F. L. Dunlap

The kinetic energy of some cell constituents. A. Kalkanov. *Protoplasma* 20, 20-30(1933).—Twenty-three references.

F. L. Dunlap

Studies on the physiology of ciliary movement. II. Intracellular oxidation-reduction potential limiting the ciliary movement. Shichiroku Nomura. *Protoplasma* 20, 85-9(1933); cf. C. A. 26, 3850.

F. L. Dunlap

Mathematical theory of oxygen consumption at low oxygen pressures. N. Rashevsky. *Protoplasma* 20,

125-30(1933).—"A math. analysis of the diffusion of O into a cell is made, under the assumption that the true rate of O consumption by protoplasm is const. and independent of the O pressure. The results are compared with exptl. data. For unfertilized *Arbacia* eggs and for bacteria the exptl. curves do not conform to the theory. Some addl. assumptions, like those proposed by Gerard, seem unavoidable. For fertilized *Arbacia* eggs a good agreement can be obtained by taking for the diffusion coeff. of O through the protoplasm  $7 \times 10^{-7}$  sq. cm. min.<sup>-1</sup>, and for the permeability of the cell surface to O  $4.25 \times 10^{-4}$  cm. min.<sup>-1</sup>."

F. L. Dunlap

Germ layer origin and mitotic potentiality of regenerating tissues in *Clymenella torquata*. Frederick S. Hammett. *Protoplasma* 20, 181-8(1933).—"Mitotic activity is enhanced by SH and held back by its sub-oxidized deriv. in the 3 chief germ layer derivs. of regenerating *Clymenella torquata*. Growth by increase in cell no. is found to be regulated by the naturally occurring essential chem. equil. comprised of these chem. groups. The degree of enhancement of mitotic activity by SH differed in the 3 types of growing tissue. The inference is drawn that relative proliferation intensity has played an important role in evolution. The mesodermal deriv. exhibited the greatest mitotic potentiality. In this property lies, in significant part, an explanation for the greater diversity of differentiated mesodermal end-products."

F. L. Dunlap

The theoretical physics of the cell as a basis for a general physicochemical theory of organic form. N. Rashevsky. *Protoplasma* 20, 180-8(1933).—"It is shown by thermodynamical considerations that, in general, regardless of the particular nature of a cell, there must be 2 kinds of forces between cells: a force of repulsion, due to metabolism, and a force of attraction, due to irritability. The various geometrical forms, which cellular aggregates may assume under the influence of those forces, correspond in general features to various forms found in nature."

F. L. Dunlap

Hemolysis and the solar spectrum. W. W. Lepeschkin and G. E. Davis. *Protoplasma* 20, 188-94(1933).—"The spectral distribution of radiation efficiency in decreasing the stability of red blood corpuscles corresponds very closely to the spectral distribution of the power of oxy-hemoglobin to absorb radiation. This correspondence clearly indicates that it is a chem. change in the hemoglobin which is responsible for the decrease in resistance of the corpuscles and hemolysis produced by light. In other words, hemolysis is not due to some change in the colorless membrane of the red corpuscle, but to a chem. change in the hemoglobin; i. e., in one of the components of the principal compds. constituting the protoplasm of the erythrocytes."

F. L. Dunlap

Necrobiotic rays. I. W. W. Lepeschkin. *Protoplasma* 20, 232-50(1933); cf. C. A. 27, 316.—The formation of ultra-violet rays in the process of necrobiosis was investigated principally in yeast cells, although this phenomenon was found in other plant cells, such as *Helodea* leaves, *Bacillus subtilis*, petals, etc. The emission of ultra-violet rays can be shown by the use of light-sensitive Ag salts. AgBr suspensions, photographic plates, as well as a compd. of Ag with org. substances of the yeast, were used as detectors of necrobiotic rays. Particularly convincing were the expts. with AgBr suspensions in quartz tubes, shaken in suspensions of dying yeast. The necrobiotic rays of yeast are absorbed to a great degree by glass and the gelatin of photographic plates, but not by air and water. Their wave length lies principally between 1800 and 2300 Å. They contain, however, a small proportion of rays with a wave length greater than 2300 Å. The wave lengths of necrobiotic rays lie very close to those of the mitogenetic rays. It can hardly be doubted that in cases where mitogenetic rays are induced by any necrobiotic process, the rays are in reality necrobiotic rays. It is further possible that in all cases where mitogenetic rays have been observed, these rays arise from a disintegration process of basal substances in living material during energetic physiol. processes, so that they

are in such cases also to be looked on as necrobiotic rays. From the standpoint of modern photochemistry, the production of ultra-violet rays during the process of necrobiosis is in agreement with the fact that ultra-violet rays increase the stability of living matter toward destructive influences, because this increase may be explained by a synthetic action of ultra-violet rays on the products of decompn. of the basal compds. of living matter F. L. D.

**Influence of preservatives on the action of enzymes.** Hans Kluge. *Z. Untersuch. Lebensm.* 66, 412-35 (1933).—A study has been made of the influence of different substances on the enzymes which split starch, fat and proteins. BzOH and its derivs. do not interfere with the activity of enzymes which split starch and fats. The protein-splitting enzyme pancreatin is arrested by the chem. preservatives formalin, salicylic acid,  $\text{Na}_2\text{SO}_3$ , NaF, BzOH and its derivs. Small amts. of BzOH and BzONa showed no harmful effects when fed to healthy guinea pigs. In animals, whose resistance is reduced because of scurvy, BzONa and BzOH are strongly injurious.

F. L. Dunlap

**Influence of preservatives on enzymic processes.** B. Bleyer, W. Diemair and K. Leonhard. *Arch. Pharm.* 271, 539-52 (1933).—The results obtained in a comprehensive study of the behavior of some 15 different preservatives toward both enzymes (pancreatin, pepsin, trypsin, erepsin, lipase, dehydrogenase, peroxidase) and substrate are discussed and tabulated. The question, whether and how chem. preservatives affect enzymic processes, may be answered by the bipartite manner of expt. followed, whether applied directly to the substrate or first to the enzyme. Certain differences in behavior observed afford grounds for a more cautious evaluation of lab. expts. and their application to practical conditions involved in the process of digestion. Noteworthy in this connection is the difference in behavior of the preservative, whether applied as acid or as Na salt, with actual acidity identical in both cases. The reason therefor is as yet unexplained. Of the several substances examd. ( $\text{CH}_3\text{CO}_2\text{Na}$ ,  $\text{H}_2\text{O}_2$ , and (with few exceptions) NaOH) are relatively inert toward enzymes; salicylic acid and saccharin show, on the other hand, marked activity. The behavior of other substances tested renders them somewhat difficult of classification, since some in amylolytic degradation exert a restraining influence, while in peptic degradation on the other hand they function only partially thus or not at all. Furthermore, the "activating" influence of some preservatives toward dehydrogenases and peroxidases are so striking and clear as to be worthy of particular mention. Of the 3 hydroxybenzoic acids the *m*-acid occupies a middle position with respect to their inhibitory and activating properties. The esters of the *p*-acid present a characteristic picture. While the amylolytic activity remains unimpaired, both peptic proteolysis and lipolysis suffer inhibition, and it thus develops that the "nipasol" preps. (Et esters) are more highly active than the "nipagin" preps. (Me esters). Noteworthy too are the cases in which activation is developed by these preservatives up to 100%, as shown in trypsin, dehydrogenase and peroxidase expts. This activation sets in stronger with "nipagin" than with "nipasol," being observable likewise in tryptic degradation, as well as in the peroxidase expts. with free *p*-hydroxybenzoic acid. The "albenal" preps. are in the usual concn. more weakly active, as contrasted in enzymic processes, than BzOH,  $\text{CH}_3\text{CO}_2\text{Na}$ ,  $\text{K}_2\text{S}_2\text{O}_8$  and "mikrobin." An evaluation of the customary preservatives in their higher or lower action on enzymic processes, and hence on the digestion and general compatibility, is naturally possible only by the simultaneous consideration of their varying action on the microorganisms commonly encountered in food and drug spoilage.

W. O. E.

**Osmotic properties of the erythrocytes.** III. The applicability of osmotic laws to the rate of hemolysis in hypotonic solutions of nonelectrolytes. M. H. Jacobs. *Biol. Bull.* 62, 178-94 (1932); *Physiol. Abstracts* 18, 26; cf. C. A. 27, 3979.—Equations are derived for predicting the relation between the time required for osmotic hemoly-

sis and the concn. of a surrounding hypotonic medium. It is shown that when allowance is made for certain known peculiarities of the erythrocyte the rate of hemolysis is, on the whole, in fairly good agreement with osmotic laws. Reasons are given for believing that the increased osmotic resistance of the erythrocyte that develops within a few seconds in solns. of nonelectrolytes is not caused by leakage of salts from the cell, but rather by a changed ionic equil. in which the normal impermeability of the cell to cations need not be lost. Rough ests. are made of the permeability of the erythrocytes of the ox and of man to  $\text{H}_2\text{O}$ . IV. Is the permeability of the erythrocyte to water decreased by narcotics? M. H. Jacobs and A. K. Parpart. *Ibid.* 313-27.—The observation of previous investigators that narcotic substances in proper concns. tend to oppose osmotic hemolysis is confirmed in the case of several urethans. The conclusion frequently drawn from such observations, that the antihemolytic effect of narcotics is due to a decreased permeability of the erythrocyte to water, is unwarranted by the existing exptl. evidence. The necessity for a sepn. of "rate" and "equil." factors in studies on osmotic hemolysis is emphasized. It is shown by expts. in which these factors are properly sepd. that a slight but measurable retardation of osmotic hemolysis may be produced by low concns. of urethans G. G

**The ultrafiltration of serum and plasma.** Chlorine, potassium, sodium, calcium and magnesium contents of the ultrafiltrates from serum and plasma. Jeanne Lévy and Marie M. Pacu. *Bull. soc. chim. biol.* 15, 1317-20 (1933); cf. C. A. 27, 4256.—Methods are described. All the Cl, 95% of the K, about 90% of the Na and (60-70% of the Mg of both serum and plasma are ultrafilterable. Serum Ca is 64% and plasma Ca 72% ultrafilterable. With 27 references. Proteins and cations of blood serum. Jeanne Lévy and F. Gallais. *Ibid.* 1340-5.—The non-ultrafilterable fractions of Na and K of serum are equal to the fractions of these cations fixed in the proteins pptd. from the serum by EtOH. While 32% of the serum Ca is non-ultrafilterable, 61% of it is fixed in the proteins pptd. by EtOH. L. E. Gilson

**Effect of heat on enzyme activity.** S. Trautmann and L. Ambard. *Compt. rend. soc. biol.* 114, 10-11 (1933), cf. C. A. 28, 787<sup>1</sup>.—The increase in activity of an amylase soln. with rise in temp. is affected by NaCl. With but 1 mg. NaCl per l. the activity-increase factor for 10° rise is 1.04; with 1 g. NaCl per l. the factor is 2.14. The influence of NaBr is similar but weaker and that of NaI still weaker L. E. Gilson

**Further study of actions at a distance on rabbit bone marrow.** Eugénie Soru and R. Brauner. *Compt. rend. soc. biol.* 114, 1201-2 (1933); cf. C. A. 28, 502<sup>2</sup>.—Mitogenic rays are given off by the system quinone-hydroquinone-methylene blue and also by fresh lemon juice and tomato juice. L. E. Gilson

**Action of some pure metals on the growth of fibroblasts in vitro.** G. Ménégally, D. Odiette and P. Mover. *Compt. rend. soc. biol.* 114, 1287-90 (1933)—Minute disks of pure metals were placed in drop cultures of chick embryo fibroblasts. Cu, Fe and Mg were very toxic; Zn, Ag, Ta, Sn, Ni and W were somewhat toxic and Au, Al and Pb non-toxic. None of the metals stimulated growth. L. E. Gilson

**The absorption spectrum of visual purple and visual yellow.** The "after fading" of visual yellow in the dark V. Hosoya. *Arch. ges. Physiol. (Pflügers)* 233, 57-66 (1933).—Absorption spectra are given for solns. of visual pigments. The max. absorption for visual purple in different solvents is 510 mμ and is unaffected by fading

Arthur Grollman

**The enzymic hydrolysis of acetylcholine.** R. Ammon. *Arch. ges. Physiol. (Pflügers)* 233, 486-91 (1933).—The enzymic hydrolysis of acetylcholine was followed in a Warburg app. The inhibiting effects of certain drugs (physostigmine, guayacine, etc.) indicate the existence of a specific cholinesterase. Arthur Grollman

**Physiological and thermal investigations on rapid substances.** S. Michael and G. Limmer. *Arch. ges.*

*Physiol. (Pflüger)* 239, 645-51 (1933); cf. *C. A.* 27, 742.—An attempt was made to correlate the sensitivity of the tongue to chem. substances with the heats of soln. of these substances. The tongue is sensitive to temp. differences of 1° to 2° and hence can differentiate a mixt. of 5%  $\text{KNO}_3$  in  $\text{NaBr}$  from pure  $\text{NaBr}$  by their different heats of soln.

The importance of potassium to plant and animal life. F. Honcamp. *Ernähr. Pflanze* 29, 373-7 (1933); cf. *C. A.* 27, 5760.—The previous discussion is concluded.

John O. Hardesty

Differential inactivation of insulin. Burt Davis, Jr., James M. Luck and Albert G. Miller. *Biochem. J.* 27, 1643-7 (1933).—Inactivation of insulin by acid-alc. and by soft x-rays shows that the phosphate-lowering activity of insulin is the most resistant to destruction. Massive doses of insulin inactivated by x-rays produced hyperglucemia. Insulin owes its multiple activity to a no. of "active groups," which vary in stability toward activating agents.

Benjamin Harrow

Effect of deamination on the combination curves of serum albumin and globulin. E. B. R. Prideaux and D. E. Woods. *Proc. Roy. Soc. (London)* B114, 110-23 (1933).—The deamination products of these serum proteins have combination curves of the same type as those of the original proteins. However, displacements may occur, because of loss of  $\text{NH}_2$  groups, principally by lysine. Some introduction of NO groups also takes place.

Joseph S. Hepburn

Crystalline chlorocruorin. Jean Roche and H. Munro Fox. *Proc. Roy. Soc. (London)* B114, 161-7 (1933).—Cryst. oxychlorocruorin was prepd. from the blood of the polychete worm, *Sporoglyphis spallansani*. In the absorption spectrum of oxychlorocruorin, the axes of bands occurred at 6025, 5625, 5150, 4450, 3600 and 2750 Å. On elementary analysis, chlorocruorin yielded C 49.2, H 7.3, N 15.4, S 2.6, Fe 1.2%. The chlorocruorin mol. contained more S, Fe and hematin, and less protein than the hemoglobin mol. The protein of chlorocruorin was not identical with globin. The band axes in the absorption spectrum of CO-chlorocruorin were at 594 and 434 mμ. For further details cf. *C. A.* 28, 181<sup>1</sup>.

Problems of modern enzyme chemistry. Richard Willstätter. *Chem. Rev.* 13, 501-12 (1933).—The Willard Gibbs Medal Address for 1933.

Louise Kelley

Ultracentrifugal study of crystalline pepsin. J. S. I. Philpot and Inga-Britta Eriksson. *Nature* 132, 932-3 (1933).—Cryst. pepsin, prepd. by a method closely resembling that of Northrop (*C. A.* 24, 5318), was examd. in the ultracentrifuge. The velocity method gave a sedimentation const. of  $3.3 \times 10^{-13}$  as a mean of 7 detns.; the equil. method gave a mol. wt. of 35,500 as a mean of 2 detns. The mol. is spherical, and in wt. and shape belongs to the same class of proteins as ovalbumin, Bence-Jones protein and insulin. The ultracentrifuge also yielded information as to the homogeneity of the preps. studied. Some well-crystd. preps., even after thorough washing, contained appreciable quantities of particles, some slightly smaller than the main group and some so small as to be non-centrifugible. Most of these smaller particles were removed in the 1st stage of purification (pptn. with  $\text{MgSO}_4$ ), as shown by the rise in the mean value of the sedimentation const. of the centrifugible part, by the decrease in the non-centrifugible part and by the increase in sharpness of the sedimentation boundary.  $\text{MgSO}_4$  was a more selective precipitant than  $(\text{NH}_4)_2\text{SO}_4$  and its selectivity increased with diln. The next 2 stages (pptn. with  $\text{H}_2\text{SO}_4$  and crystn. by cooling from 45°) raised the sedimentation const. to  $3.0-3.3 \times 10^{-13}$  and further improved the sharpness of the boundary. In all the expts. the  $p_H$  was kept at 4-5 during centrifuging, by dil. acetate buffers; 0.2 N  $\text{NaCl}$  was added to suppress the Donnan effect. A  $p_H$  of a little above 0 apparently had no instantaneous effect on the mol. wt., but only produced slow acid hydrolysis. In this respect the pepsin protein is unique. An exposure of 10 min. to  $p_H$  9, followed by  $p_H$  3.0, caused the formation of about 80% of an aggregate having a sedimentation const. of about 12, while the rest

became very inhomogeneous. This treatment corresponds to the instantaneous alk. inactivation which Northrop and others (*C. A.* 25, 5908) have shown to be partly reversible.

Louise Kelley

Diatase in liver. Eduard H. Majer. *Z. ges. expil. Med.* 90, 865-8 (1933).—The diastatic activity of liver is completely extractable by phosphate buffers. M. L.

The influence of photocatalysts on the action of enzymes. Guido Guerrini. *Boll. soc. ital. biol. sper.* 8, 1357-80 (1933).—The actions of 16 photocatalytic substances were studied on *S. cerevisiae* in the presence of glucose, by taking the amt. of  $\text{CO}_2$  liberated as the index of activity. The results showed that photocatalysts in the presence of light have an inhibiting action on enzymes, but the inhibition is manifested only in high concns. In low concns., with the exception of Nile blue, Magdala red, benzoflavine and trypanflavine, they exert a stimulating action. The mode of action of the photocatalysts is, therefore, a function of the amt. used. There is no relation between photocatalytic action, hemolytic titer and spectroscopic behavior of the substances studied.

Peter Masucci

The decolorization of methylene blue produced by milk or animal tissue. Augustin Boutaric and Tony Jacquinot. *Bull. acad. méd.* 109, 114-18 (1933); cf. *C. A.* 27, 187.—The effect of the addn. of antioxidants, bases, acids or salts on the time of decolorization of methylene blue by  $\text{CH}_3\text{O}$  is the same whether in the presence of milk or animal tissue.

A. E. Meyer

The influence of serum on the decolorization of methylene blue by liver tissue and milk. Augustin Boutaric and Tony Jacquinot. *Bull. acad. méd.* 109, 522-5 (1933).—The decolorization of methylene blue by glycerol-liver ext. in presence of  $\text{NaHCO}_3$  and by milk, both in the presence of  $\text{CH}_3\text{O}$ , is increased by addn. of serum. However, the effect is not much different from that obtained with salts alone in the concn. as present in serum. Sera contg. anti-toxin vary widely in relation to their sp. qualities.

A. E. Meyer

The enzyme-activating (zymosthenic) action in vitro of some mineral waters on the glucolytic enzyme of the blood. M. Loeper, A. Mougeot and V. Aubertot. *Bull. acad. méd.* 109, 256-7 (1933); cf. *C. A.* 27, 741.

A. E. Meyer

Serum proteins prepared by the acetone or salt method. Ch. Achard, Augustin Boutaric and Maurice Piettre. *Bull. acad. méd.* 109, 618-27 (1933).—Serum proteins pptd. either with  $\text{Me}_2\text{CO}$  or  $\text{Na}_2\text{SO}_4$  have been investigated with reference to viscosity of solns., sensibilization of colloidal  $\text{Fe}(\text{OH})_3$ , surface tension, etc. The salt method leads to simple equil. variable by many phys. factors.

A. E. Meyer

The influence of the  $p_H$  and the buffer effect of salts containing solutions of cocaine hydrochloride on the maintenance of the physiological action during sterilization and aging. Jean Régner and Robert David. *Bull. sci. pharmacol.* 40, 650-7 (1933).—Buffer solns. composed of  $\text{Na}_2\text{CO}_3$  and  $\text{NaH}_2\text{PO}_4$  or  $\text{NaH}_2\text{PO}_4$  and  $\text{Na}_2\text{HPO}_4$  do not change when heated, with exception of the first one at high alk. ranges. No change occurs when 1% cocaine is dissolved in these solns. The alk. and neutral solns. lose the anesthetic activity completely by heating; the acid soln. loses most of it; only very weakly buffered acid solns. show no loss. The  $p_H$  shifts to the acid side by heating. Solns. satd. with  $\text{CaCO}_3$  or  $\text{MgCO}_3$ , which are close to neutrality, retain their potency during sterilization but deteriorate afterward and are inferior to solns. of cocaine in  $\text{H}_2\text{O}$ . All solns. which preserved their activity establish an equil. at a  $p_H$  3.8, and the loss during heating is the higher, the more resistance against this acidification is exerted by the salts present.

A. E. Meyer

Comparison of human pancreatic and liver esterases. R. Ammon and E. Tabor. *Biochem. Z.* 247, 26-31 (1933).—The esterase from human pancreas hydrolyzes preferably the l-esters in *dl*- $\text{PhCHOHCO}_2\text{Me}$  and *dl*- $\text{PhCHOHCO}_2\text{Pr}$ . The enzyme is unaffected by the initial substrate concn. or by the addn. of zymokinin. The

pancreatic powder readily synthesizes  $\text{PrCO}_2\text{Bu}$  and  $\text{Bu}$  oleate. Regeneration after inactivation of pancreatic powder by heat is doubtful. In expts. with a combination of the pancreatic and liver enzymes, the hydrolysis of  $\text{PhCHOHCO}_2\text{Me}$  by the pancreatic esterase is independent of that by the liver enzyme. S. Morgulis

Determination of the dry substance of the retina from different animals. Richard W. J. Müller. *Biochem. Z.* 267, 43-4(1933).—Desiccated retina from guinea pigs, sheep, pigs and cows constitutes about 12% of the fresh wt., but that from rabbits and dogs is about 16%. From the study of the dry wt. the av. thickness of the retina from pigs was calcd. as 0.25-0.305 mm. and that of cow retina 0.22-0.31 mm. S. Morgulis

The methyl and ethyl esters of hematoprosthetic and of a combination of the composition,  $\text{C}_{40}\text{H}_{56}\text{N}_4\text{O}_4\text{Fe}$ , and the problem of the number of carbon atoms in the prosthetic group of the blood pigment. Alfred Herzog. *Biochem. Z.* 267, 48-56(1933).—The prepn. of Me and Et esters of hematoprosthetic brings evidence that the nucleus contains 33 C atoms and that when a larger C no. is obtained this is due to the retention of C atoms originally belonging to the globin portion. S. Morgulis

The refraction of light by hemoglobins from different animals. Stefan Schönberger. *Biochem. Z.* 267, 57-63(1933).—For  $\lambda = 656.3 \text{ m}\mu$ , H<sub>a</sub> line, the  $n$  of horse hemoglobin is 194, dog 203 and cow 209. Oxyhemoglobin crystals in  $\text{H}_2\text{O}$ , dil.  $\text{NH}_4\text{OH}$  or  $\text{NaHCO}_3$  has no refraction. The refraction of CO-hemoglobin is the same as that of oxyhemoglobin. S. Morgulis

Adsorption of pepsin by tricalcium phosphate. L. Utkin. *Biochem. Z.* 267, 64-8(1933).—Pepsin is readily adsorbed by freshly pptd.  $\text{Ca}_3(\text{PO}_4)_2$ . S. Morgulis

Kinetics of kidney phosphatase. II. Erik Jacobsen. *Biochem. Z.* 267, 89-101(1933); cf. *C. A.* 26, 4617.—The rate of hydrolysis by kidney phosphatase depends upon concns. of enzyme, substrate and  $\text{H}_2\text{PO}_4$  within the  $p\text{H}$  range of 6.9-9.2. However, at  $p\text{H}$  9 the rate increases markedly with rising substrate concns. The  $\text{H}_2\text{PO}_4$  diminishes the rate of enzymic hydrolysis, the relative inhibition depending upon the substrate/ $\text{H}_2\text{PO}_4$  ratio. While this inhibition decreases as the  $p\text{H}$  rises, the relative inhibition becomes greater. All these kinetic phenomena are incorporated in a formula. S. Morgulis

Light absorption of oxyhemoglobin and of carbonyl-hemoglobin in neutral solution. Vilma Sebesta and Alfred Herzog. *Biochem. Z.* 267, 157-66(1933).—Spectrophotometric studies show for oxyhemoglobin absorption maxima at 575.2 and 541.3  $\text{m}\mu$  and a (false) min. at 557.5  $\text{m}\mu$ ; for carbonylhemoglobin, either natural or synthetic, the maxima are at 566 and 537  $\text{m}\mu$  and the min. at 551  $\text{m}\mu$ . S. Morgulis

Effect of metals on enzymes. III. Martin Jacoby. *Biochem. Z.* 267, 167-8(1933); cf. *C. A.* 27, 4260.—Shaking urease with Se in air does not result in an irreversible, oxidative destruction of the urease, its inactivation being due probably to the formation of inactive complexes. S. Morgulis

Lactic acid formation in the auricle preparation of the rabbit under different conditions. F. Gottdenker and M. Wachstein. *Biochem. Z.* 267, 192-201(1933).—The av. survival time of auricle preps. from rabbits in a  $\text{N}_2$  atm. in unbuffered Ringer soln. is 6 min., in buffered Tyrode soln. without sugar 17 min. and with sugar 37 min. The formation of lactic acid is increased during anaerobiosis independently of the nature of the nutritive soln. and the lactic acid diffuses out from the tissue. In long expts. under aerobic conditions the lactic acid disappears completely. S. Morgulis

Enzymic hydrolysis of gluco-glucosheptonic and of galacto-glucosheptonic acid. Pietro Pratesi. *Biochem. Z.* 267, 238-42(1933).—The enzymic hydrolysis of maltose-carboxylic acid and of lactose-carboxylic acid, both of the compn.  $\text{C}_{12}\text{H}_{20}\text{O}_{11}$ , has been detd. The former is hydrolyzed up to 40% by yeast maltase, and the latter by  $\beta$ -galactosidase from *Saccharomyces fragilis* or by emulsin about 88-90%. S. Morgulis

The elementary chemical composition of living organ-

isms and the periodic system. A. Vinogradov. *Compt. rend.* 197, 1673-5(1933).—A graphical representation of the quant. at. compn. of living matter as a function of the at. nos. of the elements. W. J. Peterson

Specific characteristics of proteins. N. N. Ivanov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchev. Vsesoyuz. Prom.*, Separate 1931, 36 pp.—Properties and characteristics which are useful in the differentiation of various proteins are discussed, with data for proteins from rice, blood serum of various animals, salmon muscle and soy beans. Denaturation expts., thermal and by solvent treatment, are described. Among the properties for which values are given are amino acid content, N distribution, compn. of Ag salts, presence of free  $\text{NH}_2$  groups, and behavior toward aq.  $\text{NaOH}$  or  $\text{NaCl}$ . N distribution and other properties are tabulated for legumelin, glycine A and B, and glutelin of soy-bean protein. J. F. S.

Alcoholic fermentation of *D*-glucose in deuterium water. Eugene Pascu. *J. Am. Chem. Soc.* 56, 245-6(1934), cf. *C. A.* 28, 744<sup>9</sup>.—Alc. fermentation of glucose in 100%  $\text{H}_2\text{O}$  is about 9 times slower than in ordinary distd.  $\text{H}_2\text{O}$ , in 60%  $\text{H}_2\text{O}$  the value was 1.6. The retarding effect of the heavy  $\text{H}_2\text{O}$  may be due to a decreased activity of the zymase complex occasioned by an irreversible, partially destructive action of the heavy  $\text{H}_2\text{O}$  on the enzyme. C. J. West

Some pharmacological experiments with deuterium. David I. Macht and Mary E. Davis. *J. Am. Chem. Soc.* 56, 246(1934).—When  $\text{H}_2\text{O}$  is employed in concns. of 1:2000 or less, no striking physiol. or pharmacol. effect are noted, except possibly a slight inhibitory effect on germination of some seeds. C. J. West

Ultracentrifugal study of the action of papain on ovalbumin. The Svedberg and Inga-Britta Eriksson. *J. Am. Chem. Soc.* 56, 409-12(1934).—A no. of detns. of the sedimentation const. and mol. wt. have been carried out on products obtained by digesting samples of pure crystalline ovalbumin with activated and unactivated papain at 40°. An attempt has been made to sep. the different mol. species out of the mixt. of disintegration products by means of fractional dialysis and fractional pptn. with  $(\text{NH}_4)_2\text{SO}_4$ . The fractions thus obtained have been studied in the ultracentrifuge. The 3 lines of attack have all led to the result that the action of activated papain on native ovalbumin gives rise to 3 kinds of disintegration products: non-centrifugible substance, which probably contains lower polypeptides and  $\text{NH}_2$  acids; a centrifugible substance of a sedimentation const. about  $0.6 \times 10^{-13}$ , which has a mol. wt. of the same order as the protamines and finally a substance of sedimentation const. about  $2.7 \times 10^{-13}$ . This latter product having the same mol. wt. as ovalbumin is probably formed by the loosening of some of the bonds within the ovalbumin mol., thus causing it to assume a highly dissymmetrical shape. It may represent the 1st step toward the breaking up of the mol. into individual parts. Unactivated papain has no influence on the sedimentation const. of ovalbumin, nor are any non-centrifugible products formed. C. J. West

Supposed direct spectroscopic observation of the "O-transporting enzyme." D. Keilin. *Nature* 132, 78<sup>9</sup> (1933).—Bands at 590  $\text{m}\mu$  and 630 or 636  $\text{m}\mu$ , reported by Warburg and Negelein (*C. A.* 27, 4268) for the "O-transporting enzyme" observed in a thick suspension of *Bacterium pasteurianum* (I), have been found by K to vary in different strains of I; to occur in *Bacillus proteus* (II) and *Azotobacter chronococcus* (III); also to be unaffected in III by satn. with  $\text{CO}$  even though III has a much higher respiratory activity than I. A band in II and III at 630  $\text{m}\mu$ , which fades on shaking with  $\text{O}_2$  and reappears upon reduction, is due to  $\text{Fe}^{++}$ , not  $\text{Fe}^{+++}$ , in the pigment. By treating bakers' yeast with acid and  $\text{Na}_2\text{S}_2\text{O}_4$ , K. obtained a cytochrome deriv., probably of its component a, showing bands at 590  $\text{m}\mu$  and 630  $\text{m}\mu$  which consequently are not characteristic for an "O-transporting enzyme." Anne E. White

Isolation of heparoflavins. Kurt G. Stern. *Nature* 132, 784-5(1933); cf. *C. A.* 27, 3231.—The water-sol. yellow-red pigment previously sepd. from catalase preps. has

now been isolated in a cryst. state from horse liver and designated *hepatoflavin* (I). Protein material is pptd. from concd. aq. ext. of fresh horse liver by adding an equal vol. of alc. The  $pH$  is adjusted to 4-5 by AcOH and the flavin adsorbed by fuller's earth, desorbed by a mixt. of pyridine, MeOH and  $H_2O$ . Further elaborate purification procedure yields a brown microscopically cryst. product which is recrystd. from dil. AcOH. In aq. soln. I is lemon-yellow, showing green fluorescence in ultraviolet light; absorption bands are at 2630, 3650 and 4420 Å. I is spectroscopically identical with Warburg's and Christian's yellow oxidation enzyme (C. A. 27, 1846).

Anne E. White

Prepn. and enzymic splitting of basic glucosides (Helferich, *et al.*) 10.

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### THESES

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Melliger, Raymond: Contribution à l'étude des ferments figurés et des fermentations de la datte. Geneva. 1931. 46 pp.

Nadeau, J. Sarto: Dosage des acides monoaminés produits par l'hydrolyse de la gélatine. Geneva. 1931. 28 pp.

Wettley, Paul H.: Spezifität der Liposen und ihre Wirkung auf Kohlenhydratester. Zurich. 1931. 45 pp.

Amylase preparations. Kalle & Co. A.-G. Brit. 399,998, Oct. 19, 1933. A starch-degrading enzyme prepn. especially for desizing is made by adding a salt of a P acid other than  $H_2PO_4$  to the enzyme or its soln. Among examples are (1) pancreas amylase and  $Na_2P_2O_7$ , and (2) bacteria amylase and Na glycerophosphate, the  $pH$  being adjusted to 6.5. Cf. C. A. 27, 4551.

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The glutathione of the tissues after administration of "Tiargirio." Giuseppe Paradiso. *Arch. farmacol. sper.* 56, 487-501(1933).—It is again shown that starch suspension is not a good indicator in the iodometric detn. of glutathione in tissue exts. For best results with Tunncliffe's indicator (Na nitroprusside) P. proceeds thus: Mix in each of a series of test tubes 10 cc. of tissue ext. with 2 cc. of 10% Na nitroprusside. Add increasing vols. of 0.01 N I soln. such that each tube receives 1.5 times as much as the preceding. Finally superpose  $NH_4OH$  and observe the 1st tube in which no purple ring forms immediately. The glutathione content is calcd. from the I added to this tube. Normal values found for dog and rabbit in mg. of reduced glutathione per 100 g. of fresh tissue were: dog, liver 219, heart 64, blood 11.5; rabbit, liver 253, blood 38.7. In animals injected with "Tiargirio" (a Hg dithio-succinate of indefinite chem. compn.) the glutathione content of the tissues was the same. This absence of response is attributed to the stability of the S-S linkage in the compd. administered.

Lewis W. Butz

The extraction of cholesterol from blood. Otto Mühlbock. *Z. physiol. Chem.* 222, 233-4(1933).—Contrary to the assertion of Milbradt (C. A. 27, 2972), cholesterol may be extd. quantitatively from whole blood by Bloor's 3:1 mixt. of EtOH and Et<sub>2</sub>O without preliminary hemolysis.

A. W. Dox

A simple method for determining fructose in the blood. Richard Stöhr. *Z. physiol. Chem.* 222, 261-9(1933).—Two cc. of protein-free blood filtrate, prepd. according to Folin-Wu, is treated with 2 cc. of the phosphomolybdic

acid reagent and the mixt. boiled for 25 min. The mixt. is then titrated with 0.01 N  $KMnO_4$ , the end point being the disappearance of the blue color. A small correction is applied because of other reducing substances present in practically const. amt. Fructose in mg. % is obtained from the formula: (cc. 0.01 N  $KMnO_4$  - 0.05 cc.) 500/2.05 if the Folin-Wu reagent is used, and (cc. 0.01 N  $KMnO_4$  - 0.06 cc.) 500/2.70 if the Folin reagent is used. For detn. of glucose in the presence of fructose, the total sugar is detd. by one of the usual reduction methods and the fructose value subtracted.

A. W. Dox

The determination of cystine. B. J. Krijgsman and E. F. Bouman. *Arch. néerland. physiol.* 18, 458-71 (1933).—The detn. of cystine by the method of Folin and Looney is not satisfactory for blood. By means of the step photometer the Sullivan method for the detn. of cystine-cysteine has been elaborated for use with blood. Only the total cystine values, however, are free from objections. Blood from hungry rats contains only traces of cystine. After feeding, the cystine content may increase to 14 mg %. Twenty-six references. F. L. D.

Some dicarboxylic acids as components of fixing fluids. Conway Zirkle. *Protoplasma* 19, 564-77(1933).—The following dicarboxylic acids were investigated: oxalic, malonic, succinic, glutaric, malic and tartaric. Their fixing properties are unlike those of the fatty acids and resemble those of trichloroacetic, lactic, glycolic, glyceric and gluconic acids. The ability of the acids to influence  $CH_2O$  fixation is conditioned by the rate at which they penetrate the specimen. The rate is correlated with the relative fat sol., the more fat-sol. acids penetrating faster.

F. L. Dunlap

A critical study and review of the method of microincineration. Gordon H. Scott. *Protoplasma* 20, 133-51 (1933).—"A full interpretation of findings in terms of cellular physiology and pathology must await the development of more precise methods for the identification of the elements *in situ*. A procedure for quant. measurements of the ash has been developed and has demonstrated its utility in explt. and morphological studies under way. New methods for the identification of the salts are being investigated. It is of prime importance that the fixation of the tissues used for microincineration be as free from sources of error—both theoretical and practical—as possible. Thus far the technics described in this paper appear to be the best available. While microincineration may supplant some histochem. procedures and add to the efficacy of others it should be applied in conjunction with every sound technic, chem. and phys., at our disposal in order to arrive at a clearer understanding of vital processes." Seventy-four references. F. L. Dunlap

Aldehydes as cytological fixatives. Conway Zirkle. *Protoplasma* 20, 169-79(1933); cf. C. A. 27, 3232.—Root tips of *Zea mays* were fixed with  $CH_2O$ , AcH, EtCHO, PrCHO, HCONH<sub>2</sub>, and  $CCl_3CHO$ . Fixing fluids were then made by combining these compds successively with AcOH,  $HCO_2H$ , Cu propionate, Cu lactate, Müller's fixative, Cu dichromate, Cr sulfate and picric acid, and root tips were fixed in each mixt. In all 54 fixatives were tested. Twenty-five references. F. L. Dunlap

A micro method for the determination of blood iron. Fr. Rappaport and E. Hohenberg. *Klin. Wochschr.* 12, 1810-11(1933).—The blood or tissue is ashed, oxidized with  $H_2O_2$  to the  $Fe^{+++}$  form, the I liberated from KI is distd. into NaOH in the presence of Na sulfite, the NaI so formed is oxidized to  $NaIO_3$  and titrated with thiosulfate.

Harry Eagle

The determination of gastric and intestinal paralytic agents. Erich Heese and Georg Zimmermann. *Klin. Wochschr.* 12, 1986-8(1933).—The retarding effect upon the passage of  $BaSO_4$  through the intestinal canal of mice is used as the criterion of activity. The results parallel those obtained in patients.

Harry Eagle

The determination of morphine in excretions, excretions and tissues. Philipp Ellinger and Heinrich Seeger. *Arch. expit. Path. Pharmacol.* 174, 160-7(1933).—Body fluids or weakly acid tissue exts. are dried on quartz sand, extd. with  $CHCl_3$  and the ext. and the sand washed with

0.025 N HCl. This aq. ext. is made alk. with NaOH, partially neutralized with CO<sub>2</sub> gas, thoroughly shaken with AmOH, and the AmOH ext. in turn shaken with 0.02 N HCl. This final ext. is pptd. in the usual manner with phosphomolybdic acid. The loss during purification is 5-10%, and the error of the method with pure morphine is 3%.

Chromic fixation in alcoholic media. I. Some theoretical considerations and a method for the preparation of a chrome-alcohol stock solution. Henry C. Waterman. *Stain Tech.* 9, 23-8(1934). II. Certain possible substitutes for osmium tetroxide in chromic fixing reagents. Preliminary experiments with iodine in chrome-alcohol reagents. *Ibid.* 26-31.

Staining of neuroglia. Fr. Proeschner. *Stain Tech.* 9, 23-8(1934).—The chemistry of Weigert's glia staining method is critically discussed.

Precipitation of calcium as the oxalate from citrated blood. L. Brull and R. Poverman. *Bull. soc. chim. biol.* 15, 1281-9(1933).—The addn. of 1% of Na citrate to solns. of pure CaCl<sub>2</sub> does not interfere with the complete pptn. of Ca as oxalate, while 3% interferes slightly. For the detn. of Ca in serum not more than 1% of Na citrate should be present. In the case of whole blood 0.5% does not interfere. Allowing citrated blood to stand 4 hrs. before analyzing does not cause any decrease in determinable Ca due to diffusion into the corpuscles. L. E. G.

Detection of nicotine by Roussin's reaction. J. A. Labat. *Bull. soc. chim. biol.* 15, 1339-43(1933).—Methods of detecting small quantities of nicotine by the formation of red crystals of Iodonitine, C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>I<sub>2</sub>.HI, are described.

Histospectrographic detection of antimony in human organs after treatment with antimony compounds. A. Policard and J. Boucomont. *Compt. rend. soc. biol.* 114, 1076-7(1933); cf. C. A. 27, 245.—By the method previously described Sb was readily detected in lung and liver tissue. The spleen contained traces and the blood none.

Microdetermination of sodium in serum or plasma. A. D. Marenzi and Rebecca Gerschmann. *Compt. rend. soc. biol.* 114, 1212-14(1933).—An improved modification of Salit's method (C. A. 26, 5116) is described.

Spectrographic determination of phlorizin in whole blood in vitro. A. Lambrechts and G. Barac. *Compt. rend. soc. biol.* 114, 1862-3(1933); cf. C. A. 27, 5358.—The phlorizin is extd. from the sample by Me<sub>2</sub>CO and detd. by the method previously described.

A source of error in the determination of blood urea by Moog's sodium hypobromite method. Armando Laroze. *Rev. chim. pura applicada* 7, 97-101(1932).—In Moog's method the blood is defecated with CCl<sub>4</sub>CO<sub>2</sub>H and the filtrate neutralized, with phenolphthalein indicator. Later, when the alk. soln. of NaOBr is added, the EtOH of the indicator soln. reacts to form CHBr<sub>3</sub>, which in turn slowly reacts with the excess of NaOH present to form CO and NaBr. Ten drops of EtOH produce about 0.2 cc. of CO, sufficient to cause an error of about 100% in the detn., but 3 drops or less causes no appreciable error.

An arrangement for the direct measure and registration of the [H<sup>+</sup>] of flowing blood. G. Frühling and Hans Winterstein. *Arch. ges. Physiol. (Pflügers)* 233, 479-85(1933).—A description of an app. for recording p<sub>H</sub> with a glass electrode inserted in a blood vessel.

The determination of the basal metabolism by the tatra-nomogram. D. Balázsy. *Deut. med. Wochschr.* 59, 1433(1933).—A mech. nomogram was constructed for calcg. the basal metabolism by Read's formula.

The determination of the acidity (p<sub>H</sub>) of viscid and mucous substances such as sputa. G. Gollnow and J. Koch. *Deut. med. Wochschr.* 59, 1860-1(1933).—The usual colorimetric and electrometric methods for detg. p<sub>H</sub> are described.

Estimation of hematin iron and the oxidation-reduction equivalent of cytochrome c. R. Hill and D. Kellin. *Proc. Roy. Soc. (London)* B114, 104-9(1933).—The hematin

Fe can be detd. colorimetrically by oxidation of org. matter with H<sub>2</sub>O<sub>2</sub>, reduction of the Fe with Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>, and development of the red color with *o*-dipyridyl. This method can also be used for detn. of the Fe content of cytochrome c, since the latter contains only hematin Fe. Study was made of the reduction of oxidized cytochrome c by ferrous salts in the presence of Na tartrate and Na<sub>2</sub>CO<sub>3</sub>, and of the oxidation of partially reduced cytochrome c by ferricyanide, with a Thunberg vacuum tube, and Zeiss microspectroscope to follow the course of the reaction. Both reactions were nearly quant., and involved 1 equiv. per hematin equiv. of the cytochrome

Joseph S. Hepburn  
The usefulness of the colorimetric blood-sugar method of Crecellus-Seifert. Georg Sommerlad. *Munch. med. Wochschr.* 80, 1557-8(1933).

A new simplified method of preparing estrous hormone from urine and a new phenomenon. Masao Ito and Seiji Hayazo. *Munch. med. Wochschr.* 80, 1969(1933).—The method depends on adsorption. On long storage a sudden increase of the activity of the prepns. occurred.

A micro method for the determination of uronic acids. Bernard Burkhart, Lorenz Baur and Karl P. Link. *J. Biol. Chem.* 104, 171-81(1934).—In the method described for the detn. of uronic acids the desirable features of Bustin's method (C. A. 26, 2040) are employed along with certain parts of the app. described by Clark (C. A. 26, 2395) for the microdetn. of OR groups. The decarboxylation with HCl is performed at a bath temp. of 133-6° over a period of not less than 2 hrs. Both titrimetric and gravimetric methods are described but the gravimetric is preferred as it is less tedious and appears to be more accurate. Samples of 9-11 mg. are used. The method is recommended only for pure uronic acids or their derivs.

A new method for the detection and estimation of minute amounts of lead in biological materials. John R. Ross and Colin C. Lucas. *Can. Med. Assoc. J.* 29, 649-50(1933).

—Urine (100 cc.) is treated with 3 cc. strong NH<sub>4</sub>OH and 1 cc. satd. (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>, and the ppt. of mixed phosphates in which the Pb is completely entrained is centrifuged off. The ppt. is dissolved in N HCl by making just acid to Congo red. The Pb is then pptd. by H<sub>2</sub>S and centrifuged with entrainment on a small amt. of filter-paper fiber. After digestion with 0.1-0.2 cc. HClO<sub>4</sub> and a few drops of HNO<sub>3</sub>, 2 cc. H<sub>2</sub>O and 0.5 cc. 10% NH<sub>4</sub>C<sub>2</sub>H<sub>3</sub>O<sub>2</sub> are added. The Pb is again pptd. as the sulfide and removed by centrifuging, after adding a little filter-paper pulp. To the soln. of the PbS in warm N HCl there is added N NH<sub>4</sub>OH until just alk. to bromothymol blue. Then 1 cc. of dithizone soln. in CCl<sub>4</sub> (1 to 2 mg. in 50 cc., according to the amt. of Pb expected to be present) and 5 drops of 20% NaCN are added and the soln. is shaken vigorously in a sepg. funnel. The red salt of the Pb dithizone in the CCl<sub>4</sub> is then drawn off. A second 1-cc. portion of dithizone soln. is then added and extd. as before and the red Pb dithizone drawn off. The extn. is continued until no further red color appears in the lower layer. The red lead dithizone soln. is then washed free of excess dithizone by shaking 2 cc. 0.1 N NH<sub>4</sub>OH. The red dithizone soln. is then converted back to the green by shaking with 1/2 cc. 6 N HCl. The depth of color is proportional to the amt. of Pb present. By comparison in the Duboscq colorimeter with known standards made up in a similar way its strength can be detd. The method as used for tissue requires preliminary ashing in a muffle furnace in which the temp. does not exceed 450°. For spinal fluid CaCl<sub>2</sub> (0.2 cc. of 5% for 10 cc. spinal fluid) is added in the preliminary entrainment. By this procedure satisfactory recovery of Pb was made from normal and pathol. urines and other body fluids and tissues. (The authors have provided the abstractor with certain addnl. details needed for a useful abstr.)

G. H. W. Lucas  
A method for the microdetermination of lipides in the blood and tissues. Gabriele Monasterio. *Boll. soc. ital. biol. sper.* 8, 1299-1304(1933).—Ext. 2 cc. of serum or plasma successively with 40-, 20- and 20-cc. portions of Bleer's solvent (alc.-ether 5:1). Evap. the exts., take



up the residue in  $\text{CHCl}_3$ , filter through a small wad of cotton into a small volumetric flask and make up to 10 cc. with more  $\text{CHCl}_3$ . (a) Evap. the  $\text{CHCl}_3$  from 2 cc. The residue represents the total lipid fraction. (b) Evap. 2 cc. more of the  $\text{CHCl}_3$  soln. to 0.5 cc., add 7 cc. acetone and 3 drops of satd. alc.  $\text{MgCl}_2$ , mix thoroughly, stopper and allow to stand 6 hrs. Centrifuge the ppt., wash twice with acetone and take up in four 2-cc. portions of boiling  $\text{CHCl}_3$ . Filter through cotton and evap. The residue represents the phosphatide fraction. (c) Evap. another 2-cc. portion of the  $\text{CHCl}_3$  soln. to 0.5 cc. Add 1 cc. of 1% alc. digitonin soln., allow to stand at least 6 hrs. and centrifuge; wash the ppt. twice with 95% alc. and dry on the water bath. This is the free cholesterol fraction. (d) To another 2-cc. portion of the  $\text{CHCl}_3$  soln. add 2 cc. of 3%  $\text{NaOEt}$ , heat the mixt. to  $70^\circ$  for 1 hr., neutralize with 1 cc. of 6% alc.  $\text{HCl}$  and evap. Ext. the residue 5 or 6 times with 2-cc. portions of  $\text{CHCl}_3$  and filter into a 30-cc. graduated glass-stoppered cylinder. Evap. to 4 cc. and mix; evap. 2 cc. to 0.5 cc. and add 1 cc. of 1% digitonin soln. The procedure is then the same as that for free cholesterol. This fraction represents the total cholesterol. To the dried residues obtained in (a), (b), (c) and (d) add 5 cc. of Nicloux's  $\text{AgNO}_3\text{-K}_2\text{Cr}_2\text{O}_7$  reagent. Run a 5th tube contg. 5 cc. of the reagent alone as a control. Heat to  $160^\circ$  for 15 min. Transfer the material in the centrifuge tubes (b) and (c) to larger test tubes to facilitate oxidation. Heat all the tubes an addnl. 45 min. to  $160^\circ$ . When oxidation is complete, cool the tubes and titrate the unused chromic acid iodometrically. The no. of cc. of chromic acid used is divided by the various reducing coeffs. of the lipides: for the phosphatides 3.10, for cholesterol 5.93, for digitonin-cholesterol 2.55, for neutral fats 3.54. Thus the values are obtained in mg. which multiplied by 250 (500 for (d)) give the amts. of each fraction in 100 cc. of blood serum. The neutral fats are obtained by subtracting from the total lipides the sum of the values for total cholesterol and phosphatides. For cholesterol it is better to divide the no. of cc. of chromic acid used by 10.48 instead of by 2.55. For detg. lipides in tissues, triturate 1-2 g. of the organ ext. with 3 portions of boiling acetone (about 40 g. of acetone per g. of organ) and evap. the acetone filtrate. Transfer the tissue residue to a micro Soxhlet app. and ext. with ether for 12 hrs. Add the ether ext. to the dried acetone residue and evap. the whole to dryness. Take up in  $\text{CHCl}_3$  and treat as described for blood serum.

Peter Masucci

**Microdetermination of the different lipid fractions in the central nervous system.** Michele Mitolo. *Arch. ital.* 32, 451-59(1933).—The method is based on the sepn. of the lipids by means of successive extrns. The petr. ether ext. contains cholesterol and unsatd. phosphatides (lecithin, myelin, cephalin). Cholesterol is detd. in  $\frac{1}{2}$  of the ext. by evapn. and application of the reaction of Liebermann. Det. the P in another third by incineration of the residue and the use of the colorimetric method of Bell-Doisy-Briggs. Evap. the last third, emulsify in abs.  $\text{EtOH}$ ; scp. the insol. cephalin by centrifugalization, det. the P of lecithin and myelin in the clear liquid and calc. the cephalin by difference. Ext. the residue from the petr. ether extrn. with pyridine, which dissolves sphingomyelin, phrenosin, kersin cerebrosides and sulfatides. Divide the ext. into 3 parts and centrifuge. Ppt. the cerebrosides from the soln. with  $\text{Me}_2\text{CO}$ , keep cold overnight and filter; dissolve the ppt. in cold  $\text{KOH}$ . Det. the galactose, obtained by hydrolysis of the cerebrosides, by the method of Kimmelstiel. Det. the galactose of the sulfatides in the ppt. from 2 centrifuge tubes. Dissolve the ppt. in the third tube in  $\text{EtOH}$  and scp. the sphingomyelin in the soln. as its Cd compd. Incinerate the latter and det. the P colorimetrically. The technic of the method is described. A. E. Meyer

**Iodometric determination of protein decomposition products.** L. Utkin. *Biochem. Z.* 267, 69-73(1933).—Place the soln. to be analyzed in a 50 cc. volumetric flask and neutralize with  $N$   $\text{NaOH}$  to a rose color with phenolphthalein. Add 5 cc. 0.4  $M$   $\text{CuCl}_2$ , 4 cc.  $N$   $\text{NaOH}$  and

10 cc. borate buffer of  $\text{pH}$  8.8 (prepd. from 150 cc. 0.1  $M$  borax and 10 cc.  $N$   $\text{HCl}$  dild. to 200 cc.), and water to the 50 cc. mark. Shake, pour through a dry filter and discard the first 5 cc. of filtrate. The filtrate is blue if amino acids or low peptides are present, but with higher peptides a violet color is obtained. Acidify 10 cc. filtrate with 0.5 cc.  $\text{AcOH}$ , add 2 cc.  $\text{KI}$  and 1 cc. 1% starch and titrate with 0.01 or 0.005  $N$   $\text{Na}_2\text{S}_2\text{O}_8$ . Prep. the  $\text{KI}$  soln. by dissolving 40 g. in 80 cc.  $\text{H}_2\text{O}$ , acidifying with 2 cc.  $N$   $\text{HCl}$  and boiling 1 hr. on a water bath. Add to this 1 g.  $\text{Zn}$  dust and shake until all color disappears, make alk. with 5 cc.  $N$   $\text{NaOH}$ , filter and dil. to 100 cc. with  $\text{H}_2\text{O}$ . In the titration each cc. 0.01  $N$   $\text{Na}_2\text{S}_2\text{O}_8$  = 0.28 mg.  $N$  with most amino acids, or 0.14 mg.  $N$  with peptides or diamino acids. On account of the poor soly. of the  $\text{Cu}$  compds. of some of the amino acids the soln. should not contain more than 1 mg. amino acid per cc. The use of lactate, citrate and tartrate should be avoided because these interfere with the reaction. The method is very suitable for the study of the enzymic hydrolysis of protein but not for the study of the splitting of low peptides or dipeptides. S. Morgulis

**A new reaction for testing and for the colorimetric determination of vitamin A.** Eugen Rosenthal and Johann Erdélyi. *Biochem. Z.* 267, 119-23(1933).—A red-violet color is produced when vitamin A is heated with 0.5% pyrocatechol and cold satd.  $\text{SbCl}_3$  in  $\text{CHCl}_3$  soln. Abs.  $\text{CHCl}_3$ , free from  $\text{H}_2\text{O}$  and alc., is required. The oil is dild. with  $\text{CHCl}_3$  and to 1-2 cc. of the soln. 1 cc. of the pyrocatechol and 2-3 cc. of the  $\text{SbCl}_3$  soln. are added. The tube is at once placed for 1-2 min. in a water bath at  $60^\circ$ . The pyrocatechol soln. must be prepd. fresh. The color which is like that of a dil.  $\text{KMnO}_4$  soln. is more permanent than the blue color developed in the Carr-Price reaction. For detns. since the color is, under proper conditions, proportional to the vitamin concn., the color is matched against a 0.01%  $\text{KMnO}_4$ . The time of heating must be rigorously controlled. S. Morgulis

**A painless histamine skin test: an experimental study.** Samuel Perlow. *Ann. Internal Med.* 7, 561-5(1933).—An intradermal injection of 0.1 cc. of 1:2000 in 0.5% procaine is given. It is best read in 10 min. J. T. M.

**Thermometer for measuring the temp. of the skin** (U. S. pat. 1,942,516-17) 1.

**Handbuch der biologischen Arbeitsmethoden. Bd. XIII.** Edited by Emil Abderhalden. Heft 1. Auswertungsmethoden für Pockenlymphnen und Pockensera, by Stravros Zurukzoglou. Pp. 1141-1190. Heft 2. Das Anaphylatoxin, by E. Friedberger and J. Weisfeller. Pp. 1191-1242. Berlin: Urban & Schwarzenberg. M. 5.80. Reviewed in *Am. J. Pub. Health* 23, 1217(1933); cf. *C. A.* 28, 1375<sup>4</sup>.

## C—BACTERIOLOGY

CHARLES B. MORREY

**The dehydrogenase activity of *Escherichia coli* on the higher fatty acids.** F. P. Mazza and A. Cimmino. *Atti accad. Lincei* 17, 1086-91(1933) See *C. A.* 28, 194<sup>4</sup>.

A. W. Contieri

**The lipoids of tubercle bacilli. XXXVI.** The polysaccharides of *Mycobacterium leprae*. M. S. Newman and R. J. Anderson. *Z. physiol. Chem.* 200, 1-4(1933); cf. *C. A.* 28, 193<sup>4</sup>.—The crude polysaccharides isolated from the  $\text{EtOH-Et}_2\text{O}$  ext. of moist living *Mycobacterium leprae* contain at least 2 different sugars. The acetates obtained by acetylation in pyridine soln. were sepd. into a cryst. and an amorphous fraction. The cryst. portion consisted of trehaloseoctaacetate which after sapon. gave the characteristic rhombic crystals of trehalose. Sapon. of the amorphous portion yielded a non-crystg. polysaccharide which gave the pentose color reaction and a pos. precipitin reaction with immune serum. A. W. Dox

**The applications of fluorescence spectroscopy and spectrography in bacteriology.** C. Dhérif, S. Glücksmann and L. Rapetti. *Compt. rend. soc. Biol.* 124, 1250-3(1933).—Discussion. L. E. Glaser

The lytic action of certain biliary salts on the gonococcus. M. Maino. *Boll. soc. ital. biol. spec.* 8, 1289-91(1933).—The addn. of Na taurocholate (3-4 drops of a 1-5% soln.) to ascites-agar prevented the growth of the gonococcus. Added to blood agar, it prevented the development of streptococcus. Dilns. of 1:20-1:50 of Na taurocholate produced lysis of the gonococcus, while 1:20-1:150 caused lysis of the streptococcus. A 5% soln. of Na taurocholate applied locally to gonorrheal pus gave good results. Peter Masucci

Formation of histamine from *l*-histidine by bacteria. Kinsaburo Hirai. *Biochem. Z.* 267, 1-5(1933).—Histamine was obtained from *l*-histidine under the action of a tyramine-producing strain of *Es. coli*. Practically the same quant. results were obtained with an *Es. coli* strain which produces *p*-hydroxyphenylpropionic acid. S. Morgulis

Formation of hydrogen peroxide by *Lactobacillus bulgaricus*. Claude Fromaget and Jean Roux. *Biochem. Z.* 267, 202-3(1933).—The fermentation of sugar by *L. bulgaricus* is inhibited because of the accumulation of  $H_2O_2$ . The formation of  $H_2O_2$  does not occur in a  $N_2$  atm. where fermentation stops only when the sugar is exhausted. The formation of  $H_2O_2$  increases with the  $O_2$  content. S. Morgulis

The propionic acid bacteria. II. Classification. C. H. Werkman and Russell W. Brown. *J. Bact.* 26, 393-417(1933); cf. *C. A.* 26, 1635.—A key for identification is given. John T. Myers

The classification of dysentery-coli bacteriophages. III. A correlation of the serological classification with certain biochemical tests. F. M. Burnet. *J. Path. Bact.* 37, 179-84(1933).—There are sharp differences between bacteriophages in regard to rate of photodynamic inactivation by methylene blue, ability to lyse in the presence of citrate and rate of inactivation by strong urea solns. Phages falling in a single serological group are approx. uniform in response to these tests. Strong urea solns. inactivate the large particle phages rapidly and with one exception were much less active on small particle phages. Several acidine dyes can be used for the photodynamic inactivation of suitable phages. J. T. M.

The importance of adequate reduction of peptone in the preparation of media for the pneumococcus and other organisms. Hedley D. Wright. *J. Path. Bact.* 37, 257-82(1933).—Difficulty in prep. broth suitable for cultivating pneumococci is largely due to incomplete reduction of peptone. This can be obviated by adding peptone to the broth before applying heat, thus exposing it to the powerful reducing action of meat infusion during steaming. This is the important factor in Hüntoon's hormone broth. The presence of oxidized peptone renders broth relatively unsuitable for many aerobes and for *Cl. tetani*. John T. Myers

Halophilic bacteria. L. M. Horovitz-Vlasova and M. I. Livshitz. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate 1931, pp. 39-46; cf. *C. A.* 26, 4624.—Of 35 halophilic organisms (16 from brines, 4 from pickled hides, 5 from salted intestine, 4 from salt, 4 from air and 2 from caviar) 4 were found to be of the obligate and 30 of the facultative halophilic types, 1 being between obligate and facultative, namely, *Micrococcus citreus agilis*, which will grow without NaCl but only very slowly. The bacteriol. characteristics of the halophilic organisms are described. J. F. Smith

Mechanism of the respiration of pneumococci. M. G. Sevag. *Ann.* 507, 92-110(1933); cf. following abstr.—The  $O_2$  consumption was measured in the Barcroft-Warburg app.; the optimum of enzymic activity lay at  $pH$  8 with  $M/15$  phosphate buffer at  $35.5^\circ$ ; 5 cc. was used, made up of 1 cc.  $M/5$  substrate soln., 2.5 cc. phosphate and 1.5 cc. bacteria suspension. The  $O_2$  consumed by EtOH and PrOH was so small that they were not studied. With glucose (I) and lactic acid (II) contg. virulent pneumococcus type I (III), the  $O_2$  consumed during 10-20 min. is converted almost quantitatively into  $H_2O_2$ ; during 60-120 min. the values are 61.5-77.1%; with non-virulent type I(IV), the corresponding values are all smaller. The  $O_2$

consumptions of I and II with other virulent and non-virulent types and the amts. of  $O_2$  transformed into  $H_2O_2$  during 180 min. are detd. The end products are AcOH and  $CO_2$ ; AcCHO, II,  $AcCO_2H$  or AcH could not be detected in the case of I or  $AcCO_2H$  or MeCHO from II. In the oxidation of II, the intermediate product may be  $MeC(OH)(O_2H)CO_2H$ , which gives AcOH,  $CO_2$  and  $H_2O$ . The ratio  $CO_2$  evolved:  $O_2$  consumed during oxidation of II is 0.52-0.77 for all the pneumococci studied. With III or IV the value is 0.73 for both I and II; this is decreased to about 0.45 by addn. of catalase and increased to about 1.3 by addn. of  $AcCO_2Na$ . The  $O_2$  consumption of I and II with all the types is increased by varying amts. (27-1772%) by addn. of  $AcCO_2Na$  or catalase; the amts. of  $CO_2$  evolved increase also. These oxidations are accelerated by 0.004-0.02 *N* KCN, especially when young cultures are used. Addn. of KCN to I or II with  $AcCO_2Na$  also increases the activity. C. J. West

Mechanism of the respiration of pneumococci. II. M. G. Sevag. *Biochem. Z.* 267, 211-37(1933); cf. preceding abstr.—Expts. with various pneumococcus strains show that at the end of 10 min. practically all the absorbed  $O_2$  is converted to  $H_2O_2$  but with the prolongation of the expt. the quantity of the latter decreases so that the  $H_2O_2$  found corresponds to only 30-60% of the  $O_2$ . This is due to its immediate reaction with pyruvic acid. The duration of the enzymic activity and the extent of the oxidation of glucose or lactic acid correspond to the extent of the reaction between  $H_2O_2$  and pyruvic acid, as does also the virulence or avirulence of the pneumococci. Virulent strains have a higher  $H_2O_2$  content than the avirulent strains. The difference between the theoretical amt. of  $H_2O_2$  and that actually found is practically a measure of the reaction of pyruvic acid with the formation of AcOH and  $CO_2$ . S. Morgulis

Dissociation constant of nitrogen-nitrogenase in Azotobacter. Hans Lineweaver, Dean Burk and W. Edwards Deming. *J. Am. Chem. Soc.* 56, 225-30(1934).—The fixation of N at ordinary temps. and pressures by *Azotobacter*, as a function of N pressure, corresponds to 1 *N*. mol. combining reversibly with 1 enzyme mol. *E* (nitrogenase) to form a compd.  $N_2E$  whose thermodynamic disson. const.,  $K_{N_2} = (E)(N_2)/(N_2E)$ , is  $21.5 \pm 0.2$  vol % (0.215  $\pm$  0.002 atm.). This const. is highly characteristic, being independent of wide variations in the following important factors, the 1st 4 of which are sp. in the fixation process: concn. of Ca, Sr and oxalate;  $pH$ ;  $O$  pressure, concn. of Fe,  $V_{N_2}$  (max. velocity of irreversible decomn. of  $N_2E$  to form protein, at satg. N pressures) and certain physiol. factors (species, *Azotobacter* concn., culture age, and date of expt.). Statistical treatment of the collected data, involving Pearson's "Chi" test, was carried out to substantiate the fixation mechanism and related constns. were obtained. The importance of employing this seldom-used test in analyzing chem. and phys. data is indicated. The molal heat and free energy of the disson. of  $N_2E$  are 0 within exptl. errors of about 1000 and 100 cal., resp. C. J. West

Piorkowski, Suse: Untersuchungen über die Keimtönde (oligodynamische) Wirkung des in der Zahnheilkunde verwandten Wurzelfüllmaterials aus chemisch reinem Silber. Thesis, Breslau. 1931. 26 pp.

## D—BOTANY

THOMAS G. PHILLIPS

The effect of growing corn and soy beans in combination on the percentage of dry matter in the two crops. R. G. Wiggans. *J. Am. Soc. Agron.* 26, 59-65(1934).—The difference in percentage of total dry matter between corn grown alone and in combination with soy beans is insignificant but the percentage of dry shelled grain is greater for the corn grown alone. The percentage of total dry matter in soy beans grown with corn as compared to the percentage when grown alone depended on the season, and very probably on other factors, such as available N,  $P_2O_5$ , etc., and available  $H_2O$ . J. R. Adams

**Investigation of a biological reaction by spectrum analysis.** Walther Gerlach. *Sisber. math. naturw. Abt. Bayer. Akad. Wiss. München* No. 2, 315-16(1933).—A Cu strip inserted in a potato blackens a wide zone if the potato is healthy, a narrow zone otherwise. Spectrum analysis shows that Cu displaces K, the amt. of Cu decreasing and K increasing with distance from the foil. Mg, Ca, B, P, Mn and occasionally Fe and other elements were found in varying amt. Mn increases toward the skin.

Janet E. Austin

**Alcohol resistance of Spirogyra cells of different ages.** Friedel Weber. *Protoplasma* 20, 15-19(1933).—The cells of one and the same *Spirogyra* filament show different resistivities to a 16-20% alc. The old growing cells are more resistant than the younger. The reverse is true toward urea.

F. L. Dunlap

**Effect of x-rays on the protoplasm, nucleus and chondriome of living plant cells after observations on the living.** G. A. Nadson and E. J. Rochlin. *Protoplasma* 20, 31-41(1933).—The expt. was conducted on the living cells of the epidermis of the onion (*Allium cepa*). F. L. D.

**Form of plasmolysis and ion action.** N. Cholodny and F. Sankevich. *Protoplasma* 20, 57-72(1933).—The form and course of plasmolysis were investigated of cells of *Spirogyra*, *Rhodo discolor* and *Allium cepa* which had been previously treated with hypotonic and isotonic solns. of the chlorides of  $\text{NH}_4$ , Na, K, Mg, Ca and Ba and then plasmolyzed with a cane-sugar soln. The cations investigated arrange themselves according to their action on protoplasm in the following series:  $\text{NH}_4 < \text{Na} < \text{K} < \text{Mg} < \text{Ca}$ .

F. L. Dunlap

**Influence of the reproductive gland hormone on the flower and yield of plants.** Hans Goebel. *Arch. Pharm.* 271, 552-8(1933).—The estrogenic principles, which are formed in the reproductive glands of animals, also occur in the plant kingdom, those from this latter source being designated *tokokinins*. The reproductive gland hormones and tokokinins are similar in action, the former acting on plants in the same manner as the tokokinins produced in the plants themselves. Treatment of hyacinths, callas, orchids, corn and tomatoes with the hormone induced a more rapid growth and increase in the quality and no. of the flowers and fruit. W. O. E.

**Effect of variations in the nutrient media upon nitrogen, phosphorus and potassium contents on plants with special reference to the tomato.** R. P. Bartholomew, V. M. Watts and Geo. Janssen. *Ark. Agr. Expt. Sta., Bull.* 288, 42 pp(1933).—Sand culture expts. showed that analysis of variance definitely indicates the factors which cause significant differences in the amt. of dry matter produced. A perfectly physiologically balanced soln. is impossible to obtain under practical conditions. Nutrient solns. varying greatly in chem. compn. produced similar results. A limitation in the amt. of K in a nutrient soln. contg. an abundance of N produces a very leafy type of plant. The amts. of N, P and K absorbed by plants receiving all elements essential for growth in the neutral soln. were controlled to a great extent by the concn. of those elements in the nutrient media. A deficiency of K may result in an increased absorption of N and P by the leaves of the tomato plant and a deficiency of P may increase the absorption of N by stems. Abundant N may increase the amt. of P taken up by leaves of the tomato plant, and an abundant supply of K may increase the absorption of P by the stems. The absorption of Ca and Mg was not appreciably influenced by the amt. of N, P or K absorbed by the plant. It appears likely that antagonistic action of elements may take place in the metabolic centers as well as at the surface of the absorbing membranes. The use of percentage compn. of a plant may lead to erroneous conclusions, because it does not include the growth factor which is represented by the amt. of dry matter produced. Liebig's "law of the min." is not applicable to fertilization with K salts.

Bibliography.

C. R. Fellers

**Changes in composition of Florida avocados in relation to maturity.** Arthur L. Stahl. *Fla. Agr. Expt. Sta., Bull.* 259, 61 pp(1933); cf. C. A. 27, 786.—Phys. and chem. characteristics of avocados were detd. throughout

the life cycle during 3 growing seasons. It was impossible to correlate closely any single characteristic with maturity. The maturity pressure tester was found impracticable. The  $\text{Et}_2\text{O}$  ext. increases rapidly while the fruit is immature, and more slowly as maturity is approached. The changes in the sugar, protein and ash contents are too small and variable to be used as measures of maturity. The moisture content varies with rainfall, and affects the proportions of other ingredients. The sp. gr. of the avocado decreases with the development of the fruit. There is an inverse correlation between oil content and sp. gr. Satisfactory maturity in the Guatemalan, hybrid or late maturing varieties was observed when the sp. gr. of the fruit reached 0.98 or lower, and in the W. Indian or early varieties, at 0.96 or lower. In the Waldin variety the sp. gr. was still above 0.98 when fully mature as to taste. The fat content of the Guatemalan varieties was 2-3 times that of the W. Indian varieties. Fruits held in storage until soft show an increase in oil and hydrolyzable sugars and a decrease in sp. gr., moisture and free and total sugars over those examd. while the fruit was hard. C. R. F.

**Some properties of curly-top virus.** Henry H. P. Severin and Julius H. Freitag. *Hilgardia* 8, 1-48(1933).—This mosaic disease of sugar beets is transmitted by leaf hoppers. The juices extd. from the blades and beet roots contained the virus. Inactivation of the virus occurred after the extd., centrifuged and supercentrifuged diseased beet-root juice was exposed to air at room temp. for 72 hrs. or heated to  $80^\circ$  for 10 min. The virus in beet juice adjusted to  $p_{\text{H}}$  5-6 lived at least 100 days in an anaerobic jar. Freezing the virus at  $-18^\circ$  for over 11 months did not inactivate the virus. The chem. nature of the virus is unknown. C. R. Fellers

**Relation of anther color and the proportions of starch-filled pollen grains in sugar cane.** Thomas Bregger. *J. Puerto Rico Dept. Agr.* 17, 139-43(1933).—There is a pos. relationship between pollen fertility as indicated by the I test and the degree of anther coloration in the sugar cane. Pollen samples taken from dried flowers 9 months after the fresh samples have been taken are similar in their I reaction. C. R. Fellers

**Influence of smoke and ethylene on the fruiting of the pineapple.** Antonio G. Rodríguez. *J. Puerto Rico Dept. Agr.* 16, 5-18(1932).—The practice of using smoke on pineapple plants in the field resulted in a general flowering of all plants and in early fruit production. The quantity of smoke apparently was unimportant. The age of the plants was likewise unimportant. One or more constituents in smoke, and not the slightly increased temp., are responsible for the early bloom. The smoke was not toxic to the plants, and large-sized fruits were obtained as a result of smoking. Treatment with smoke of pineapple plants gave no appreciable response. Slips and suckers treated with ethylene previous to planting flowered 6 months before the control plants, but the fruits were small. The ethylene treatment modified metabolism and induced flower formation. Possibly the use of ethylene for the treatment of pineapple plants in fields may be practical and may replace smoke. C. R. Fellers

**Absorption of ash constituents by citrus trees.** H. C. Henriksen. *Puerto Rico Agr. Expt. Sta., Annual Rept.* 1932, 18-19(1933); cf. C. A. 27, 520.— $\text{LiNO}_3$  was used as a sol. salt in a study of the absorption of salts by the roots, leaves and bark of citrus trees. Conclusions: The ash constituents may be absorbed to some extent by all the roots, even by those which have passed the fibrous stage. The rate of movement of the ash constituents in a citrus tree allows them to reach all parts of the tree within 48-72 hrs. after application is made. The ash constituents move only through the tissue supplied by a definite part of the root system. This emphasizes the need of a uniform distribution of fertilizer salts in the soil. Water was more important than fertilizers in starting new growth in citrus trees. There was less shedding of bloom in the fertilized trees. C. R. Fellers

**Germination of seed corn and its relation to the occurrence of molds during germination.** A. N. Hume and C. J. Franks. *S. Dak. Agr. Expt. Sta., Bull.* 275,

2-18(1933).—Reduction in germination was definitely correlated with increased moldiness over a 5-year study. Moldiness was correlated with high moisture content.

C. R. Fellers

Chemical investigations of the tobacco plant. I. Chemical changes that occur in leaves of Connecticut shade-grown tobacco during early stages of curing. Hubert B. Vickery, George W. Pucher, Alfred J. Wakeman and Charles S. Leavenworth. *Carnegie Inst. Wash., Pub. No. 445*, 1-36(1933).—Rapid dehydration of the leaf tissue occurred; a full yellow color appeared when 66.3% of the H<sub>2</sub>O had evapd., and a full brown color when 87.4% of the H<sub>2</sub>O had evapd. Approx. 21.7% of the org. solids present in the leaf at the start of curing were lost during that process, apparently by conversion into volatile products. Of the total carbohydrate, 67% was lost; total sol. carbohydrate and fermentable carbohydrate first increased slightly, then decreased markedly; unfermentable carbohydrate decreased slowly. The ether ext. decreased, first slowly, then more rapidly, so that approx. 42% of its initial mass had disappeared at the yellow stage; an increase occurred as the brown stage developed. The nitrate content increased by 50% during the green stage, then remained const. A slight synthesis of nicotine, followed by an appreciable loss, occurred. Proteolysis to the amino acid stage took place; 52% of the N insol. in boiling H<sub>2</sub>O was converted into a sol. form; this digestion was most rapid during the green stage, and had practically ceased at the brown stage. The resultant amino acids were, in part, deaminized, and the amide N was thereby increased. This amide N had 2 degrees of stability, part being decompd. by boiling with H<sub>2</sub>O at  $p_H$  3-4, the remainder requiring hydrolysis by dil. acid. NH<sub>3</sub> accumulated in amt. greater than that accounted for by deamination of amino acids. II. Chemical changes that occur in leaves of Connecticut shade-grown tobacco during culture in distilled water. *Ibid.* 37-70.—Mature excised tobacco leaves were subjected to culture in dim light in distd. H<sub>2</sub>O for periods of 0-303 hrs. Rapid imbibition of H<sub>2</sub>O produced an approx. 12% gain in wt. A high degree of turgidity was maintained for over 200 hrs., then a rapid loss of H<sub>2</sub>O and a destruction of chlorophyll occurred. Org. solids evidently were converted into volatile products and lost; the loss was approx. 18% at the beginning of chlorophyll destruction, and 35% at the termination of the expt. Decreases occurred in total H<sub>2</sub>O-sol. carbohydrate, fermentable carbohydrate and unfermentable carbohydrate. A sudden decrease of approx. 30% in ether ext. took place as chlorophyll degeneration began. Nitrates first increased by approx. 65%, then decreased to the level in fresh leaves, apparently to form NH<sub>3</sub>. Nicotine slowly decreased. Approx. 61% of the N compds. insol. in boiling H<sub>2</sub>O underwent proteolysis to amino acids. Both types of amide N (see above) were produced; and NH<sub>3</sub> accumulated (after chlorophyll degeneration began) in amt. greater than that due to deamination of amino acids. In the turgid leaves, carbohydrate was metabolized in preference to protein. Comparison of the curing expts. and the H<sub>2</sub>O-culture expts. showed that dehydration definitely retarded total metabolism (measured by loss of org. solids), increased the rate of proteolysis and of loss of ether ext., apparently decreased the rate of carbohydrate oxidation, and prevented reduction of synthesized nitrate. The early stages of dehydration greatly stimulated amide synthesis. Loss of org. solids was a phenomenon of respiration. Nicotine played a small but definite part in general metabolism. III. Determination of carbohydrates in tobacco leaf extracts. George W. Pucher. *Ibid.* 71-7.—The soln. is prepd. and total reduction is detd. by the method of West, Scharies and Peterson (cf. C. A. 23, 2999) modified by addn. of Na<sub>2</sub>WO<sub>4</sub> and substitution of Ba(OH)<sub>2</sub> for BaCO<sub>3</sub> in the clarification. Unfermentable sugar is detd. after removal of fermentable sugar by means of yeast. Fermentable sugar is obtained by difference.

Joseph S. Hepburn

Formation and decomposition of chlorophyll in the leaves of winter and spring cereals. M. Kh. Challaikhan. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 127-8 (in English

129-30).—Plantlets of winter and spring wheats were grown in moist sawdust at 25° in a thermostat with light (100-w lamp) and dark compartments. The plantlets developed exclusively at the expense of nutritive substances in the endosperm of the seeds. The chlorophyll content was ascertained as early as the stage of the first well-developed leaf, i. e., 7-8 days after sowing. When wheat and barley were raised in continuous elec. light, the leaves of the winter varieties accumulated more chlorophyll than those of the spring. With etiolated sprouts grown for 7 days in the dark and then exposed to light, more chlorophyll formed in the leaves of winter wheats than in those of spring wheats. Green sprouts were tested for chlorophyll content and were then placed in the dark for 5-10 days. After this treatment the amt. of decompd. chlorophyll in the winter wheats was 42-73% and in spring wheats 73-90% of the original amts. of chlorophyll. L. K.

Inducing rubber formation in plants by ultra-violet rays. V. A. Novikov and E. Kh. Herber. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 131-3 (in English 134-6).—Seeds of the tau-sagyz rubber plant were soaked in distd. water for 18 hrs. at 25°, dried and irradiated with a quartz Hg lamp under varying conditions. After irradiation the seeds were allowed to germinate at 25° for 2 days, and then the activity of the catalase was detd. by the method of Jollys. In all irradiated seeds the catalase activity increased abruptly. Irradiation by ultra-violet rays of leaves of the tau-sagyz and *Asclepias*, previously satd. with 3% sucrose soln., caused these plants to continue the formation of rubber in the dark in a 3% sucrose soln. Non-irradiated leaves, both satd. and unsatd. with sugar, not only formed no new rubber in the dark, but even lost the rubber that they had contained. The irradiated leaves not satd. with sugar did not produce any rubber. During the vegetation expts., plants from irradiated seeds were not attacked by aphids; they also shed their leaves later and recovered their foliage earlier, indications of increased life tonus as a result of irradiation. Louise Kelley

Amylopectin as nutritive material for molds. Heinrich Hardtl. *Biochem. Z.* 267, 6-10(1933).—Amylopectin was found to be a good source of C. S. Morgulis

Studies of the chemistry of plant tumors. IV. Peroxidase of plant tumors. G. Klein and W. Zies. *Biochem. Z.* 267, 22-5(1933); cf. C. A. 27, 325.—A considerable increase in the peroxidase activity of tissue, affected by tumor growth is shown in comparison to normal tissue. S. Morgulis

Nutritive value of the mold mycelium. J. T. Skinner, W. H. Peterson and H. Steenbock. *Biochem. Z.* 267, 169-78(1933).—The digestion coeffs. for protein, lipide and crude fiber of molds were 68, 69, 77 and 48, 51, 81 for *A. fischeri* and *A. sydowi*, resp. The N of the different molds cannot support growth or provide for the maintenance of young rats, but addn. of tndol N to small amts. of yeast or casein prolongs life and stimulates initial growth. Replacing half the mold mycelium by an equal amt. of starch retarded the growth of young rats kept on good rations, while addn. of mold mycelium to a ration of low N exerts a demonstrable favorable effect. The dry mycelium contains enough vitamin B to prevent polyneuritis, and to maintain growth provided it supplies 20%, but in an amt. of only 5% it is ineffective. S. Morgulis

Studies on vitamin production in plants. I. Artturi I. Virtanen, Synnöve v. Hausen and Saara Saastamoinen. *Biochem. Z.* 267, 179-91(1933); cf. C. A. 27, 1657.—The total quantity of carotene of a plant increases rapidly up to the time of blooming and then diminishes continuously until the ripening of the fruit. The relative contents of carotene of plants grown at opt.  $p_H$  are much greater than of those grown at higher acidity, and the greatest carotene content is found under conditions where the N supply is sufficient to secure max. growth. In fact it is postulated as a general principle that max. carotene content and max. growth go hand in hand so that the former must be regarded as an essential growth factor in the plant. It is not known what chem. transformation carotene undergoes during the period when its quantity diminishes. The changes in vitamin C content of the plant are more or

less similar to those of the carotene, and it likewise reaches its max. when growth is most active. In the pea, furthermore, the vitamin C content continues to increase during the blooming and begins to decline only in the late stages of ripening.

S. Morgulis

**Carotenoids of red yeast (*Torula rubra*).** E. Lederer. *Compt. rend.* 197, 1694-5(1933).—Four carotenoids were obtained from red yeast. Three hydrocarbons were adsorbed on  $Al_2O_3$ , extd. with petr. ether, then purified from a mixt. of petr. ether and MeOH. Carotenoid I recrystd. from a mixt. of benzene and MeOH appeared identical with  $\beta$ -carotene in m. p., cryst. structure and absorption spectrum bands in  $CS_2$  soln. at 521, 484 and 451  $m\mu$ . Carotenoid II is new and the name *torulene* is proposed for it. It is readily sol. in petr. ether, difficultly sol. in EtOH and shows absorption spectrum bands in  $CS_2$  at 566, 522, 491 and 461  $m\mu$  and in petr. ether and abs. EtOH at 523, 491, 460 and 430  $m\mu$ . Carotenoid III readily decompd. and was not purified. Carotenoid IV appears to be anhydroxylactone, similar to astacin, and resembles it in chem. properties. It dissolves in alc. NaOH and on acidification with AcOH it may be extd. with petr. ether, but not with MeOH. In  $CS_2$  soln. it shows a wide band extending from 600 to 535  $m\mu$ .

James C. Munch

**Conversion of nitrates to ammonia by *Aspergillus*.** D. Bach and D. Desbordes. *Compt. rend.* 197, 1772-4 (1933); cf. C. A. 28, 1378.—The assocn. of  $NH_4OH$  is complete at  $pH$  5.5, which corresponds to the  $pH$  of the contents of many cells. Nonionized  $NH_4OH$  is excreted by the cell. When *Aspergillus* is growing in solns. of  $KNO_3$  or  $NH_4NO_3$ , the nitrate ion penetrates the cell, is reduced to  $NH_4OH$  and reexcreted, making the outside soln. more alk.

James C. Munch

**Yield and protein content of hard red spring wheat under conditions of high temperature and low moisture.** L. R. Waldron. *J. Agr. Research* 47, 129-47(1933).—A study was made of the effects of drought and heat on yield and protein content of wheat grown on a fertile soil under conditions of a light incidence of disease. Of the 9 correlation coeffs. calcd. involving protein content, 7 are minus and significant. Under the conditions of the expt. high-protein content is secured at the expense of other desirable characters such as yield and wt. per bushel. In only one instance which involved the date of heading was the correlation coeff. with protein both pos. and significant.

W. H. Ross

**Biochemical studies on potato wart disease.** W. Szymanski. *Prace Wydz. Chorób Roslin Państw. Inst. Naukow. Gospod. Wiejsk. w Bydgoszczu (Trans. Phytopath. Sect. State Inst. Agr. Bydgoszcz)* 13, 141-62(1933); *Rev. Applied Mycol.* 12, 718.—Dry weight of potato tuber tissue infected with wart disease was less than that of healthy tissue but the ash content was higher. Warted tissue contained much the greater percentage of mineral constituents, especially Fe, Mn, Cu and N. It is suggested that these elements stimulate the proliferation of the warted tissue in infected tubers. Oden E. Sheppard

**Physical and chemical factors influencing the moment of chromosome reduction in the smut fungi.** W. Hütting. *Z. Botan.* 26, 1-26(1933); *Rev. Applied Mycol.* 12, 150-1.—The urethans impeded or suppressed reduction division in the first division of the promycelium while various other alkali salts stimulated the process in a more or less irregular fashion, the Na salts being exceptional in that they exerted a fairly const. inhibitory action at all concns. tested. Changes in vapor pressure, osmotic pressure or H-ion concn. of the medium were without influence.

Oden E. Sheppard

**Examination of starch and hemicellulose extracts from apple wood.** Henry Otterson and W. E. Tottingham. *Plant Physiol.* 8, 561-4(1933).—The starch ext. obtained by salivary digestion (after removal of sugars and fats) of 1-yr. branch growth of apple trees under different cultural treatments gave as av. values: ash 18, crude protein 10, uronic anhydride 23, pentosan 12 and "true" starch 39%. The compensated value for starch was obtained by subtraction of the pentose equiv. of the "true" pentosan from the total reducing power. Similarly the av. values for the

hemicellulose ext. obtained by boiling with 2%  $H_2SO_4$  for 1 hr. were: ash 13, crude protein 3, uronic anhydride 21, pentosan 25 and "true" glucosan 15%. No consistent correlation exists between any or all of the carbohydrate constituents and the cultural history of the tissue. The "true" glucosan content varied independently of the "true" starch content. The hemicellulose fraction seems to be less definitely and directly related to plant performance than in the starch fraction.

Walter Thomas

**Detection and estimation of formaldehyde within the cell of a green plant by the Allison apparatus.** Anna L. Sommer, Edna R. Bishop, and Irene G. Otto. *Plant Physiol.* 8, 564-7(1933).—The unicellular algae *Chlorella* were used in the expts. and the presence of H.CO.H was established by the Allison app. (C. A. 26, 5661). The work is preliminary but suggests great possibilities, not only in further photosynthetic studies, but in detg. various metabolic products of small organisms sufficiently transparent to allow enough light to pass through for work with the Allison app.

Walter Thomas

**Lupine studies. VI. Alkaloids of Lupinus corymbosus.** Heller. I. James F. Couch. *J. Am. Chem. Soc.* 56, 155-6(1934); cf. C. A. 26, 2825.—*Lupinus corymbosus* (air-dried) yields 7.66% moisture at 125°. Extn. with EtOH and of the EtOH-sol. residue with  $H_2O$ , pptn. with basic Pb acetate, removal of the Pb with  $H_2S$  and shaking the alk. filtrate with  $CHCl_3$  gives *hexalupine*,  $C_{15}H_{25}N_2O \cdot 1/3H_2O$ , m. 197-8°,  $\alpha_D^{25}$  126.1° (EtOH, c 4.795 g.); *di-HCl salt*, crystallizes with 8 mols.  $H_2O$ ,  $\alpha_D^{25}$  106.5° ( $H_2O$ , c 3.192 g.); heating at 125° gives a *mono-HCl salt*, m. 136-8°; *aurichloride*,  $C_{15}H_{25}N_2O \cdot 1.5HAuCl_4 \cdot 2.5H_2O$ , golden, m. 204° (decompn.); *picrate*, lemon yellow, m. 245-6°. A new system of naming alkaloids from lupines is proposed, in which a numerical system affixing the Greek numeral prefixed to the generic word lupine is used; monolupine from *L. caudatus*, dilupine and trilupine from *L. barbiger*, tetralupine and pentalupine from *L. palmeri*, instead of possibly caudatine, barbicine and barbiginine, palmerine and palmeridine.

C. J. West

**Sugar metabolism and the ability of molds to accumulate acids.** T. Chrzaszcz and D. Tiukow. *Polish Agr. Forestal Ann.* 26, 71-86[85-6 in German](1931).—Different groups, and even different species of molds, consume varying amts. of sugar. The amt. of acid accumulated by different species is a characteristic property of the species and is independent of the sugar consumption. Max. accumulation of acid takes place within 10-14, usually in 10 days. The ratio of the amt. of acid accumulated and of sugar consumed, termed the "ability to accumulate acid," can be used for identification of the mold species. The sugar consumption and acid accumulation should be expressed in relation to 1 g. of the dry substance of molds.

J. Wiertelak

**Control of "yarovization."** A. Rikhter, V. A. Rantzan, and M. Pekker. *Compt. rend. acad. sci. U. R. S. S.* 1933, 72-4(in English 75-7).—The authors were seeking control indexes for this process. Yarovized seeds of winter wheat, in comparison with controls, showed a gradual increase in amylase and protease activity throughout the days of treatment; peroxidase, however, attained maxima on the 15th and 30th days, and catalase on the 20th and 25th days. Respired  $CO_2$  and  $pH$  reached a peak on the 15th day. Sections of embryos were dyed with toluidine blue at various  $pH$  values. The control seeds gave min. dyeing on the acid side, and the treated seeds on the alk. side.

J. J. Williamson

**Possible chemical nature of tobacco mosaic.** E. Barton-Wright and Alan M. McBain. *Nature* 132, 1008-4 (1933).—A phosphate ext. of diseased leaves of *Nicotiana glauca* was highly infectious. The acetone ppt., at  $pH$  5, of this ext. was also infectious, and could be divided into 2 fractions, a protein and a cryst. material. Although the latter was mostly phosphate, it contained org. matter but no N, and was highly infectious. Sap from healthy leaves did not produce a ppt. with acetone.

J. J. Williamson

**Chemistry of certain beet hybrids.** Eugène Bougy. *Publ. inst. belg. amélioration betterave* No. 5, 147-226(1933).—



Sugar beets (A), fodder beets (B), and their hybrids are similar in content of reducing sugar, ratio of insol. N to dry substance, sol. alky. of ash and ratio of org. and total N to the wt. of fresh substance. They differ in abs. sucrose content and vascularization. In comparison with B, in either fresh or dry substance A contains less mineral and amino N, ash and Cl, less org. and total N, more insol. N, less sol. and more insol. bases in ash, more CaO and MgO in ash per g. of ash, and a lower CaO/MgO ratio. The higher sucrose content of A is relatively dominant in the  $F_1$  hybrids, but this depends largely on the direction of crossing;  $B \times A$  is richer in sucrose than  $A \times B$ ; the same largely applies to crosses of A with *Beta maritima*. The assocn. of the other chem. characters of the  $F_1$  hybrids tends to follow the same rule, that is, the characteristics of  $A \times B$  tend toward those of B, whereas  $B \times A$  tends to resemble A. In the second and following generations the progeny are less homogeneous in their chem. characters. O. W. Willcox

Biol. aspects of the genetics of wheat (Fleurent) 12. Biogenetics in the terpene series (Hall) 10.

Opitz, Franz; Beitrag zur Kenntnis der Holzatzung. Thesis, Dresden. 1931. 46 pp.

## E—NUTRITION

PHILIP B. HAWK

Experimental evidence of an additional substance essential to mammalian nutrition. L. N. Ellis. *Proc. Soc. Exptl. Biol. Med.* 31, 339-40 (1933).—Young rats were fed 3 diets which contained increasing concns. of vitamin G; inferior growth was assocd. with the higher concns. of that vitamin; the growth rate was restored by feeding the Bourquin and Sherman vitamin-G-deficient diet (cf. C. A. 25, 5896). This diet evidently contains an essential growth substance, closely allied to Reader's vitamin B<sub>4</sub> (cf. C. A. 24, 402, 5801) and the factor reported by Halliday (cf. C. A. 26, 4086). The alc. ext. of whole wheat is the most probable carrier of this substance. C. V. Bailey

The mode of action and administration of vitamin D. Cornelius Daly. *Proc. Soc. Exptl. Biol. Med.* 31, 368-9 (1933).—Standard rachitic rats were given subcutaneous injections of histamine (0.005-0.5 mg.) twice daily for 21 days without beneficial effect. The results support the findings of Bauer, *et al.* (cf. C. A. 25, 3039) and Hottinger (cf. C. A. 24, 5806), who were unable to explain the healing action of vitamin D on the basis of an increased formation of acid in the gastrointestinal tract. The oral and subcutaneous administrations of vitamin D were equally satisfactory when continued over a period of 21 days; when the equiv. of the 21 doses was given in 1 dose or in 3 doses in 10 days, the subcutaneous method brought about complete cure whereas the ingested vitamin D caused only moderate or advanced healing. C. V. Bailey

The calcium content of striated muscle and of the liver of normal or starved guinea pigs or animals suffering from acute and chronic scurvy. A. Michaux. *Compt. rend.* 197, 1453-5 (1933).—The Ca content of the muscle of normal guinea pigs was 0.057 and 0.267 g. per 1000 of fresh and dry tissue, resp.; of scorbutic guinea pigs 0.233 and 1.023 g. and of starved animals 0.310 and 1.311 g. On a scorbutic diet rich in Ca the muscle of guinea pigs suffering from acute scurvy contained 0.407 g. Ca per 1000 g. of fresh tissue and 2.114 g. per 1000 g. of dried tissue while that from guinea pigs suffering from chronic scurvy contained 0.353 g. per 1000 g. of fresh tissue and 2.236 g. per 1000 g. of dried tissue. The total Ca found in the liver in scorbutic and thirsting guinea pigs was less than in normal. Rachel Brown

The significance of the thyroid glands for the effect of vitamin D and the genesis of rickets. A. Nitschke. *Klin. Wochschr.* 12, 1793-7 (1933).—A review. H. E.

The mechanism of the action of a salt-free diet. Calcium distribution in the blood. H. Schwartz. *Arch. exptl. Path. Pharmacol.* 173, 558-70 (1933).—A NaCl-free diet does not affect the total serum Ca of rabbits, but does

cause an increase in the protein-bound Ca at the expense of the inorg. Ca. A NaCl-rich diet has the opposite effect. These findings are correlated with the anti-inflammatory effect of salt-free diets. Harry Eagle

Action of irradiated ergosterol on the blood calcium of animals in a state of chronic parathyroid insufficiency. Franz Mathieu. *Compt. rend. soc. biol.* 114, 1375-7 (1933).—Thyroparathyroidectomized male dogs were kept alive by injections of Ca salts. Several months after the operation, large doses of Vigantol caused a small increase in blood Ca, sometimes preceded by a slight decrease. L. E. Gilson

Incidence of dermatitis among rats deprived of vitamin B<sub>2</sub>. Margaret H. Roscoe. *Biochem. J.* 27, 1533-6 (1933).—Dermatitis occurred in 108 out of 191 rats deprived of vitamin B<sub>2</sub>. The av. time taken for symptoms to develop was 10 weeks. Vitamin B<sub>2</sub> content of various materials compared by their power to promote growth and to cure dermatitis, respectively. *Ibid.* 1537-9.—The amts. of yeast ext., egg-white filtrate or meat needed to cure dermatitis are proportional to the daily doses needed to promote a given wt. increase. Benjamin Harrow

The heat-stability of vitamin B<sub>2</sub>. III. The rate of destruction at various reactions of vitamin B<sub>2</sub> contained in different materials. Margaret H. Roscoe. *Biochem. J.* 27, 1540-4 (1933).—No difference is found in the stability to heat and weak alkali of vitamin B<sub>2</sub> as contained in watery yeast ext. (I), marmite soln. (II) or a watery liver ext. (Eli Lilly, No. 343) (III). Heating for 1 hr. at 120° at  $pH$  8.7-7.2 causes a loss in I, II and III of 50% of their original vitamin B<sub>2</sub> potency. Vitamin B<sub>2</sub> is relatively heat-stable in acid soln., and the rate of destruction is rapidly increased with increasing alky. Cf. preceding abstr. Benjamin Harrow

Factors affecting the development and regeneration of visual purple in the mammalian retina. Katharine Tansley. *Proc. Roy. Soc. (London)* B114, 79-103 (1933).—Regeneration of visual purple apparently depends upon normal circulation in the retina and choroid, and healthy outer limbs of the rods. In vitamin A deficiency in the dog and the rat, chem. changes occur in the outer limbs of the rods, and production of visual purple ceases. Joseph S. Hepburn

The threshold for the renal excretion of inorganic phosphates in the sheep. R. H. Watson. *Australian J. Exptl. Biol. Med. Sci.* 11, 197-207 (1933).—The approx. renal threshold was 7.5 mg. P/100 cc. serum, with a pasture or chaff diet. It decreased upon fasting, with a lower  $pH$  value of the urine. C. G. King

Necessary versus optimal intake of vitamin G (B<sub>1</sub>). H. C. Sherman and L. N. Ellis. *J. Biol. Chem.* 104, 91-7 (1934).—“Food mixts. equally rich in other known nutrients and with vitamin G values, adjusted to 4 different levels (0.4, 0.9, 1.3 and 2.2 units per g.) were fed to rats from the end of infancy to the completion of the breeding record. The improvement from the enrichment in vitamin G of an already adequate diet was chiefly apparent in the superior vitality of the young and the extension of the period between the attainment of maturity and the onset of senility. There was increased growth both of the original young animals and of their offspring, though all of the growth rates involved in the expts. were well below the records of very rapid growth which have been observed by other investigators in recent years. The moderate increases in growth rate with increasing intake of vitamin G were evidently related to increases of vitality. This is indicated, on the one hand, by the fact that those receiving more vitamin G and growing more rapidly showed evidence of superior adult vitality as far into middle life as these expts. were continued; and, furthermore, their young showed superior vitality both in their growth rates before and after weaning and in their ability to cope with the emergency of being transferred to a vitamin-G-deficient diet. These findings make clear that the optimal intake of vitamin G is much above the amt. which is easily demonstrable as strictly necessary. It is probable that the true optimum is higher than the highest level here fed.”



Vitamin G was furnished in the form of skim-milk powder. A. P. Lothrop

Dehydrogenation of ergosterol (Diels, Klare) 10. Recent advances in science [ascorbic acid] (Brady) 2.

Hutchinson, Robert, and Mottram, V. H.: Food and the Principles of Dietetics. 7th ed. London: E. Arnold & Co. 630 pp. 21s. Reviewed in *Pharm. J.* 132, 37 (1934).

Petersen, Carl: Über den Calcium- und Phosphorstoffwechsel der Schweine. Thesis, Berlin. 1931. 68 pp.

Theiss, Hans: Die Beeinflussung der experimentellen Meerschweinchentuberkulose durch Vitamin D. Thesis, Freiburg. 1931. 9 pp.

## F—PHYSIOLOGY

HOMER W. SMITH

The hormone content of the corpus luteum and its effect upon the luteal stratum. M. Maino. *Arch. ist. biochim. ital.* 5, 211-24(1933).—From the corpus luteum was extd. a luteinic hormone which gave rise to Bouin and Ancel's reaction in the mucosa of the uterus. Its action on the uterus was quite different from that exerted by the follicular hormone. E. S. G. Barron

The blood in normal pregnancy. I. Blood and plasma volumes. Wm. J. Dieckmann and Carl R. Wegner. *Arch. Internal Med.* 53, 71-86(1934).—During the first third of gestation blood and plasma vols. increase so that by the 13th week the gains are 16 and 18%, resp. At term the increase in vol. is 23% and in plasma 25%, a condition termed "oligocythemic hypervolemia." The increase almost disappears within 8 weeks after parturition. The increase during pregnancy is probably a mechanism to permit fetal respiration. J. B. Brown

Insulin and sugar tolerance in thin people. Harry Blotner. *Arch. Internal Med.* 53, 153-8(1934) J. B. B.

The classification of the body constituents by water content. Harold G. Close. *Brit. Med. J.* 1934, 1, 98-100.—A classification of tissues based on their water and Cl contents is described. Cf. *C. A.* 28, 516<sup>1</sup>. J. B. B.

The hematopoietic response to intramuscular injections of concentrated human gastric juice. Paul J. Fouts, O. M. Helmer and L. G. Zerfas. *Brit. Med. J.* 1934, 1, 141-3.—Human gastric juice, concd. by vacuum distn., is not active in hematopoiesis. J. B. Brown

The diurnal rhythm in water and mineral exchange. Robert C. Manchester. *J. Clin. Investigation* 12, 995-1008(1933).—There is a diurnal rhythm in mineral and water balance; urine vol. and urinary Na, K and Cl are greater during the day, and there is a neg. water balance. A pos. water balance occurs at night. Other urinary constituents show only slight fluctuations. Rise in sp. gr. at night is assocd. with increased concn. of N compds., although actually smaller amts. of these are excreted during that period. The diurnal differences seem to be dependent upon the differences between the waking and sleeping states of consciousness. J. B. Brown

The proteins of blood and subcutaneous lymph in dogs. A. A. Weech, E. Goettsch and E. B. Reeves. *J. Clin. Investigation* 12, 1021-30(1933).—In dogs there is a definite relationship between the albumin to globulin ratios of serum and lymph. Two theories to account for the entrance of serum proteins into the lymphatics are discussed. J. B. Brown

Permeability of capillaries to plasma lipoids. Evelyn B. Man and John P. Peters. *J. Clin. Investigation* 12, 1031-9(1933).—In man the capillary walls are impermeable not only to proteins, but also to cholesterol, phosphatides and compds. of satd. and slightly unsatd. aliphatic acids. J. B. Brown

The oxygenation of concentrated versus normal bloods. G. B. Ray, C. I. Thomas and J. E. Strong. *J. Clin. Investigation* 12, 1051-62(1933).—The tension of O required to produce a given satn. is the same in normal and polycythemic bloods. When these bloods are perfused through the surviving lung the former becomes completely oxygenated while the latter is never fully satd., because

the polycythemic blood (and hence the hemoglobin) passes through the lungs more rapidly and also because there is delayed diffusion because of capillary dilatation. J. B. Brown

A note on the calculation of water exchange. L. H. Newburgh, F. H. Wiley and M. W. Johnston. *J. Clin. Investigation* 12, 1151-2(1933).—A reply to Peters, Kydd and Laviates (cf. *C. A.* 27, 4286). J. B. B.

The rate of excretion of urine in subjects with different amounts of renal tissue. David A. Rytand. *J. Clin. Investigation* 12, 1153-68(1933). J. B. Brown

The blood lipides in the postabsorptive state and after the ingestion of fat in normal human subjects and in a case of disseminated cutaneous xanthomata. I. L. Chaikoff, T. H. McGavack and A. Kaplan. *J. Clin. Investigation* 13, 1-13(1934).—Ingestion of 100 g. olive oil in normal individuals in the postabsorptive state is followed by marked variations in blood fatty acids. In 6 out of 7 cases there was no effect on cholesterol level. The lipemia in a case of cutaneous xanthomata was studied and the effect of olive-oil ingestion shown to be normal. J. B. Brown

Some problems of the origin, circulation and absorption of the cerebrospinal fluid. Louis B. Flever. *Quart. Rev. Biol.* 8, 397-422(1933).—A review with extensive bibliography. J. B. Brown

The changing concept of ovarian rhythms. Olive Swezy. *Quart. Rev. Biol.* 8, 423-33(1933).—A review. J. B. B.

The acid-base equilibrium of inhabitants of the tropics. III. The alveolar carbon dioxide tension and the concentration of hydrogen ions and the carbon dioxide content of the blood in various groups in the tropics. W. Radama, G. M. Streef and J. V. Klerks. *Arch. néerland. physiol.* 18, 536-77(1933); cf. *C. A.* 27, 3981.—It is probable that on an av. the alveolar CO<sub>2</sub> tension in white men in the tropics is lower than in temperate zones. The daily variations of the alveolar CO<sub>2</sub> tension in the tropics and those in temperate zones present a different aspect. In general, the CO<sub>2</sub> tension falls in the course of the tropical day and in many persons it shows a characteristic sudden rise about 4:30 P. M. There is probably some connection between this phenomenon and the radiance of the sun. Exposure to the direct radiance of the sun generally causes the alveolar CO<sub>2</sub> tension to decrease. In this respect there are strongly pronounced individual differences. The decrease of the alveolar CO<sub>2</sub> tension in the course of the tropical day is a consequence of increased lung ventilation. There is a real difference in blood reaction between native servants and Europeans; the blood of the servants is more acid. The values detd. gasometrically for the p<sub>H</sub> agreed well with those found electrometrically in the same blood samples. The figures obtained colorimetrically as well as electrometrically and gasometrically for the blood reaction of Europeans in the tropics are on the whole more on the alk. side than the figures given in the literature for the temperate zones. Fifty-four references. F. L. D.

Outline of a physico-mathematical theory of excitation and inhibition. N. Rashevsky. *Protoplasma* 20, 42-56 (1933).—"The fundamental assumption is made, that every nerve contains 2 antagonistic substances (or groups of substances), one exciting and the other inhibiting. It is assumed that an elec. current passing through a nerve causes a transport of those substances, either to the cathode or to the anode. The excitation at any place of the nerve is supposed to happen whenever the ratio of the concn. of exciting and inhibiting substances exceed at that place a critical value." "The connection of the present theory with the 'chemical' theory of central inhibition is discussed and a suggestion for the explanation of the rebound phenomenon offered." F. L. Dunlap

The effect of the nervous system upon the [kidney] threshold for sugar excretion. M. B. Handelsman and K. Oberdisse. *Arch. expl. Path. Pharmacol.* 174, 80-7 (1933).—Complete denervation of the kidney in dogs has no effect upon the threshold value for the excretion of urinary glucose or the tendency to alimentary glucosuria. Harry Eagle

Catalytic processes in the liver. Franz Delhougne.

*Arch. expul. Path. Pharmacol.* 174, 88-91(1933).—A decrease in the carbohydrate (glycogen) content of the liver (P, tolylenediamine, bile-duct ligation, phlorizin) entails a decrease in the glutathione content as well, presumably a manifestation of decreased catalytic processes.

Harry Eagle

Colloids in the gastric juice and their determination by the [Zsigmondy] gold number method. Franz Delhougne. *Arch. expul. Path. Pharmacol.* 174, 92-5(1933).—The colloid content varies inversely with the acidity.

Harry Eagle

The intermediate carbohydrate-protein-fat metabolism with relation to liver function. Werner Gneiting. *Klin. Wochschr.* 12, 1807-10(1933).—In normal individuals the metabolism of galactose or glycine is not affected by the simultaneous ingestion of the other substance; in hepatic disease, they affect each other significantly. The addition of fat to the mixt. has no further effect.

Harry Eagle

Experiences with the thyrotropic substance of the anterior pituitary lobe in pregnancy, especially in cases with kidney damage. Hans Peter Muller. *Klin. Wochschr.* 12, 1899-901(1933).—Although the hormone normally stimulates the thyroid gland, it cannot be used during pregnancy as a substitute for thyroid medication, as for some unknown reason it fails to exert its normal action.

Harry Eagle

Parathyrotropic action of anterior pituitary extracts. K. J. Anselmino, Fr. Hoffmann and L. Herold. *Klin. Wochschr.* 12, 1944(1933).

Harry Eagle

The adrenaltropic action of anterior pituitary extracts. K. J. Anselmino, Fr. Hoffmann and L. Herold. *Klin. Wochschr.* 12, 1944(1933).

Harry Eagle

The intestinal action of orasthin. Hermann Schroeder and Fritz Kuhlmann. *Klin. Wochschr.* 12, 1961-2(1933).—Orasthin, the uterus-active principle of the posterior pituitary lobe, stimulates contraction of the large intestine of human beings after subcutaneous injection, without affecting the small intestine.

Harry Eagle

Variations in the blood choline level during normal pregnancy and in pregnancy toxemias. H. Rufinger and J. Gottlieb. *Klin. Wochschr.* 12, 1981-3(1933).—The blood choline concn., normally low in pregnancy (1.4-1.9 mg. %), increases within 1-2 hrs. post partum to a little over 3 mg. %. In cases of nephritic toxemia the choline concn. falls to as low as 0.87 mg. %. The blood and urine of an eclamptic patient, injected into cats, caused a prolonged increase in blood pressure (20-40 min. Hg).

Harry Eagle

The adrenotropic hormone of the pituitary. Arthur Jores. *Klin. Wochschr.* 12, 1989-90(1933).—A preliminary report.

Harry Eagle

The detoxicating hormone of the liver (yakriton). XII. Detoxication of chloroform by yakriton. Akira Sato and Shigeo Yanagawa. *Tohoku J. Exptl. Med.* 22, 342-5(1933); cf. Yoshida, C. A. 27, 4571. XLII. Effect of yakriton on excretion of alkaloid; insufficiency and hyper-sufficiency of the liver. Kyumatsu Asakura. *Ibid.* 346-51. XLIII. Prophylactic effect of yakriton against tolylenediamine hemoglobinuria. Matsuichi Yoshida. *Ibid.* 352-4. XLIV-XLV. Effect of yakriton on the blood picture. Morie Chiba and Shigeo Yanagawa. *Ibid.* 355-66. XLVI. Effect of yakriton in counteracting heart dilatation. Akira Sato. *Ibid.* 367-70. XLVII. Effect of yakriton in arsenamine poisoning. Matsuichi Yoshida. *Ibid.* 371-8. XLVIII. Therapeutic effect of yakriton for tolylenediamine icterus. Matsuichi Yoshida. *Ibid.* 379-84.

Harry Eagle

The cholesterol concentration of the blood of rabbits after unilateral and bilateral adrenalectomy. Hyoro Tada. *Tohoku J. Exptl. Med.* 22, 385-94(1933).—The increase in blood cholesterol is more marked after bilateral adrenalectomy, reaching a max. of 25-75% in 5-7 days; it may last for 3-4 weeks.

Harry Eagle

Effect of season on fat test and milk production on dairy cows. F. B. Headley. *Nev. Agr. Expt. Sta., Bull.* 131, 5-11(1933).—The butter fat was highest in milk in winter and lowest in July and Aug. This variation is not due to difference in feed, because cows on unchang-

ing rations show the same changes. Five cows which had an av. fat test of 3.6 at 4 years had an av. test of 3.35 at 10 years of age. After calving 1 month, the herd gave milk with 3.7% fat, 3.44 during the second month and 3.4 the 3rd month; a gradual increase then followed until the fat content was 4.1% during the last month. The time of year at which a cow freshens materially affects the amt. of milk produced during the first 150 days of the milking period. The greatest production was obtained when the cows freshened in Jan. and the smallest when they freshened in Sept.

C. R. Fellers

Biochemistry of creatinephosphoric acid. Effect of section of the nerves on the creatinephosphoric acid content of muscles. Alexandre Palladin and R. Sigalova. *Bull. soc. chim. biol.* 15, 1263-71(1933).—Rabbits and guinea pigs were used. The sciatic nerve of one hind leg was cut, then the same muscles from each hind leg were analyzed 24-48 hrs. later. In all cases the water, total N and total creatine showed no change, but the creatinephosphoric acid was greatly increased, sometimes doubled, in the muscles with sectioned nerves.

L. E. Gilson

Constitution of muscle proteins. I. Effects of total starvation and protein starvation. Andrée Rôche. *Bull. soc. chim. biol.* 15, 1290-1307(1933).—See C. A. 27, 5397.

L. E. Gilson

Protein starvation and the nitrogenous extract of muscles. Andrée Roche. *Compt. rend. soc. biol.* 114, 1185-7(1933).—In rats protein starvation caused a 21% increase, and total starvation a 39% increase, in the water-sol. N of the muscles.

L. E. Gilson

Cholesterol content of horse serum. D. Brocq-Roussau, G. Roussel and G. Gallot. *Compt. rend. soc. biol.* 114, 1075(1933).—The averages found were: horses, 1.112 g per l.; non-pregnant mares, 0.983; mares 4 months pregnant, 1.201; mares 5-10 months pregnant, 1.308.

L. E. Gilson

Expansion of melanophores caused by a mixture of red corpuscles and extract of the anterior hypophysis. G. T. Popa and Una Fielding. *Compt. rend. soc. biol.* 114, 1139-40(1933).—The anterior lobe of a sheep hypophysis was kept in contact with rabbit blood 2-5 days in a refrigerator. An aq. ext. of the mixt. caused melanophore expansion in frogs. Possibly the melanophore-expanding action of ext. of the posterior hypophysis is due to a substance formed from blood in the anterior lobe and subsequently stored in the posterior lobe and adjacent tissues.

L. E. Gilson

Purine metabolism of hypophysectomized dogs. Bernardo Braier. *Compt. rend. soc. biol.* 114, 1209-12(1933); cf. C. A. 27, 3248. —Hypophysectomized dogs on various diets excreted 31-50% less uric acid, 31-55% less purine bases and 32-38% more allantoin than control dogs. The total N excreted in these forms was very slightly greater in the hypophysectomized dogs.

L. E. Gilson

Role of the adrenals in the resynthesis of glycogen after fatigue. R. G. Dambrosi, L. F. Leloir and A. Novelli. *Compt. rend. soc. biol.* 114, 1219-21(1933).—In dogs, 24-48 hrs. after removal of the adrenals the muscles still have a normal glycogen content, but after severe fatigue the glycogen is very slowly regenerated. Injections of glucose do not hasten glycogen regeneration but injections of adrenal cortex hormone restore the glycogen to its normal level. Role of the liver in the resynthesis of muscle glycogen after fatigue. R. G. Dambrosi. *Ibid.* 1222-4. —Removal of the liver decreases the rate of glycogen resynthesis. Injections of glucose speed resynthesis. Role of the pancreas in the resynthesis of muscle glycogen after fatigue. *Ibid.* 1224-6. —Removal of the pancreas greatly retards the resynthesis. Insulin restores the normal condition. Effect of section of the vagus or splanchnic nerves on the resynthesis of muscle glycogen in dogs. *Ibid.* 1228-30. —Cutting the nerves has no effect. Roles of the pancreas and the vagus in the resynthesis of muscle glycogen in cats after fatigue. *Ibid.* 1230-2. —Removal of the pancreas decreases the rate of resynthesis. Cutting both vagi has no effect.

L. E. Gilson

Diagnosis of pregnancy in mares. D. Brocq-Roussau,

G. Roussel and G. Gallot. *Compt. rend. soc. biol.* 114, 1242-3(1933).—The urine of non-pregnant mares causes no change in blood cholesterol when injected into rabbits. Urine from pregnant mares was injected into 24 rabbits. In 6 there was a decrease in blood cholesterol and in 18 an increase.

L. E. Gilson  
Endocrinology of gestation in the rabbit. R. Courrier and R. Kehl. *Compt. rend. soc. biol.* 114, 1317-20(1933); cf. C. A. 26, 3550.—The action of the corpus luteum is discussed.

L. E. Gilson  
Formation of bicarbonates in perfusion liquids containing carbon dioxide. A. Schwartz and F. Schmid. *Compt. rend. soc. biol.* 114, 1326-9(1933).—When the legs of frogs were perfused with Ringer or isotonic glucose soln. bicarbonates were formed in the soln. Apparently bases not ordinarily diffusible are exd. from the tissues.

L. E. Gilson  
Action of the corpus luteum on the blood calcium of female dogs with chronic parathyroid insufficiency. Franz Mathieu. *Compt. rend. soc. biol.* 114, 1373-4(1933); cf. C. A. 28, 515.—The injection of corpus luteum hormone causes a further decrease in blood Ca. This effect is independent of the action on the reproductive app. While most of the properties of corpus luteum hormone are antagonistic to those of the estrogenic hormones its hypocalcemic property is similar to that of the latter.

L. E. Gilson  
Chlorine content of the blood in the afferent and efferent vessels of the principal viscera of the dog. J. Bottin. *Compt. rend. soc. biol.* 114, 1380-9(1933).—Analytical data and discussion. Blood chlorine of dogs during periods of mixed diet and fasting. Its relation to the corpuscle and plasma volumes. *Ibid.* 1389-91. Experimental production of a marked hypochloremia in a dog, with survival of the animal. *Ibid.* 1392-4.—Normal dog blood contains 3.2 g. Cl per l. A dog was kept without food and given 0.9% K<sub>2</sub>CO<sub>3</sub> soln. to drink as desired. After 4 weeks blood Cl was 1.64 g. per l. The change in blood Cl was very similar to that observed in intestinal obstruction, but since the dog survived it is probable that in intestinal obstruction death is not the result of Cl deficiency.

L. E. Gilson  
Nerve ganglion and melanophore reactions. R. Collin and P. Florentin. *Compt. rend. soc. biol.* 115, 162-3(1934).—Exts. of ganglions contg. visceromotor neurons (from normal and pregnant cats and guinea pigs) sometimes caused melanophore expansion when injected into frogs.

L. E. Gilson  
Lactic acid formation of striated muscle induced by galvanic currents. F. Lippay and Charles Rand. *Arch. ges. Physiol.* (Pflügers) 233, 17-34(1933).—Gastrocnemii of frogs, paralyzed by KCl, produce lactic acid when galvanic currents are passed through them. This acid production, in the absence of contraction, is not due to thermal effects.

Arthur Grollman  
The glycogen metabolism of muscle and its nervous influences. I. Glycogen formation in denervated muscles. J. Baum and E. Pichler. *Arch. ges. Physiol.* (Pflügers) 233, 35-42(1933).—Denervated frog muscle forms glycogen in winter. During summer glycogen is formed only in the presence of insulin. Glycogen can still be formed by the denervated muscles of depancreatized or hepatectomized frogs. II. A glycogenolytic reflex. J. Baum, W. Christen and E. Pichler. *Ibid.* 43-50.—When one gastrocnemius is removed, the glycogen content of the opposite muscle is reduced. This reflex is absent after sympathectomy of the 2nd muscle. III. A proprioceptive glycogenolytic reflex. O. Loewi and E. Pichler. *Ibid.* 51-6.—Changes in the glycogen content of muscle produced by strychnine after sympathectomy are due to reflex proprioceptive impulses.

A. G.  
The penetration of glucose into erythrocytes. Walter Fleischmann and H. Kaunitz. *Arch. ges. Physiol.* (Pflügers) 233, 149-58(1933).—Colorimetric detn. of vol. changes indicates the rapid diffusion of glucose into erythrocytes, even at low temps.

Arthur Grollman  
Respiration and carbohydrate metabolism of isolated organs in angiotomized dogs. I. E. S. London, N. P.

Kochneva, A. M. Dubinskii and A. S. Katzva. *Arch. ges. Physiol.* (Pflügers) 233, 160-80(1933). A. G.

The excretion of sugar by the isolated frog kidney. R. Höber. *Arch. ges. Physiol.* (Pflügers) 233, 181-98(1933).—Sugars are reabsorbed by the 2nd segment of the renal tubule in the order: glucose > galactose > mannose > fructose > xylose > arabinose. The last named is scarcely retained by the kidney.

A. G.  
The permeability of the renal tubule of the frog kidney for organic nonelectrolytes. F. E. Schmengler and R. Höber. *Arch. ges. Physiol.* (Pflügers) 233, 199-221(1933).

Arthur Grollman  
The action of the follicular hormone on the ovary and the interrelations of the ovarian sex hormones and the anterior pituitary. M. A. Magath and R. M. Rosenfeld. *Arch. ges. Physiol.* (Pflügers) 233, 311-28(1933); cf. C. A. 28, 1087.

Arthur Grollman  
The innervation of "permeability" in frog lungs. J. Weiser and J. Riemüller. *Arch. ges. Physiol.* (Pflügers) 233, 380-94(1933).—Vagotomy increases the permeability of the frog lung to trypan blue.

Arthur Grollman  
Acid-base equilibrium under diminished atmospheric pressure. R. Wittkower. *Arch. ges. Physiol.* (Pflügers) 233, 607-21(1933).—The CO<sub>2</sub>-combining power of the blood is reduced and the CO<sub>2</sub>-dissocn. curve is markedly altered when animals are transported to high altitudes.

Arthur Grollman  
Further studies on the physiology of high altitudes. A. Loewy and E. Wittkower. *Arch. ges. Physiol.* (Pflügers) 233, 622-44(1933).—Rapid ascent to altitudes of 2450 to 2650 m. resulted in discernible changes in the reaction of the skin to stimuli, reflex activity, position of the diaphragm, etc. These changes occurred despite protection from the abnormal radiations, humidity and cold of high altitudes and are, therefore, attributable solely to the effects of low O<sub>2</sub> tension.

Arthur Grollman  
The occurrence of an acetylcholine-like substance in the blood of the adrenal vein after stimulation of the splanchnic nerve. W. Feldberg and B. Minz. *Arch. ges. Physiol.* (Pflügers) 233, 657-59(1933).

A. G.  
Fermentable sugar in fasting urine. Victor J. Harding and David L. Selby. *Biochem. J.* 27, 1598-608(1933).—Some substance removable by yeast from both glucose and fructose exists in normal human fasting urine.

B. H.  
Mechanical effort in relation to gaseous exchange, heart rate and mechanics of respiration. Francis G. Benedict and Cornelia G. Benedict. Carnegie Inst. Wash., Pub. No. 446, 1-83(1933).—Study was made of the metabolism of 7 university-trained subjects (6 men, 1 woman) during repose, attention (closing an elec. contact at a given signal) and mental effort (usually multiplication of pairs of 2 figure digits for 4 consecutive periods of 15 min. each). Metabolism was the same during repose and attention. Among the results produced by mental effort were increased heart rate, markedly altered respiration, a small increase in CO<sub>2</sub> exhalation, increases of approx. 4% in both O<sub>2</sub> consumption and heat production, a considerable increase in apparent total ventilation of the lungs and a slight increase in the apparent R. Q. The increased O<sub>2</sub> consumption and heat production were due to the increased muscular activity of the respiratory and circulatory app. Mental effort *per se* had no significant influence on energy metabolism.

J. S. H.  
Metabolism and the inorganic elements. Joseph S. Hepburn. *Hakemannian Monthly* 68, 886-67(1933).—A review (with a bibliography of 107 references) of recent work on the occurrence of Al, Sb, As, Ba, Bi, B, Br, Ca, Cl, Cr, Co, Cu, F, Ge, Au, I, Fe, Pb, Li, Mg, Mn, Hg, Ni, P, K, Rb, Se, Si, Ag, Na, Sr, S, Sn, Ti, V and Zn in water and in the food, tissues and excretions of man, and on the function of certain of these elements.

Joseph S. Hepburn  
Solubility of enamel. J. C. Forbes. *J. Dental Research* 13, 849-58(1933).—The soly. of finely ground teeth and enamel in H<sub>2</sub>O, in the presence or the absence of CO<sub>2</sub>, is increased by MgSO<sub>4</sub>. The Mg concn. in saliva normally is so low that it is not an important factor in the etiology of dental caries. In the absence of Ca ions

and phosphate ions,  $\text{CO}_2$ , even in low concns., has a definite solvent action on enamel; but the presence of 3 mg. Ca and 14 mg. P per 100 cc. of soln. prevents decalcification at  $p_H$  values of 6.4 and above; slight decalcification occurs at  $p_H$  5.7, even with an initial Ca concn. of 6.6 mg. per 100 cc. Decalcification occurs in the presence of glucose and acidogenic organisms, slowly at  $p_H$  7.3, readily at  $p_H$  5.7, at intermediate rates at intermediate  $p_H$  values.

Joseph S. Hepburn

Recent advances in science: Agricultural physiology. Arthur Walton. *Science Progress* 28, 510-12(1934).—A review of recent work on (a) milk secretion and (b) lab. diagnosis of pregnancy.

Joseph S. Hepburn

The development of metabolic theory and the Munich school. Friedrich Müller. *Munch. med. Wochschr.* 80, 1656-65(1933).—An historical and biographical lecture on the development of metabolic theory.

M. L.

The internal secretion of the parotid glands. Ladislaus Takács. *Z. ges. exper. Med.* 90, 547-51(1933).—An ext. of the parotid gland lowered the blood sugar of fasting rabbits by 30-40% in a period of 24 hrs. Milton Levy

Cerebroside storage. H. Beumer and H. Fasold. *Z. ges. exper. Med.* 90, 661-4(1933).—Cerebrosides fed to children pass through the intestinal tract unchanged. Cerebrosides injected into rabbits are stored in the organs and may be recovered after long intervals.

M. L.

A hypolipemic hypophyseal substance "Lipotrén." W. Raab and E. Kerschbaum. *Z. ges. exper. Med.* 90, 729-49(1933); cf. *C. A.* 27, 5393.—A substance in the pituitary lowers blood fat. It is not identical with any previously described hormone but is present in many preps. It is not pptd. by  $\text{CCl}_4\text{CO}_2\text{H}$ . It is resistant to heat but sensitive to alkali.

Milton Levy

Hormonal effects on creatine-creatinine metabolism and the simultaneous behavior of urinary total nitrogen, uric acid and allantoin. Severian Buadze. *Z. ges. exper. Med.* 90, 702-804(1933).—Thyroxine, adrenaline, menformone, prehormone, physhormone, insulin and parathormone are examd. Dogs in N equil. were given the hormone and the changes of the urinary constituents followed.

Milton Levy

The physiology of the gall bladder. A. C. Ivy. *Physiol. Rev.* 14, 1-102(1934).—A general review with extensive bibliography, covering the phenomena of absorption, concn. and evacuation of bile in many animal species and man.

E. R. Long

The comparative physiology of the kidney in relation to theories of renal function. E. K. Marshall, Jr. *Physiol. Rev.* 14, 133-59(1934).—A general review with bibliography, covering excretion and absorption in several anatomical portions of the kidney.

E. R. Long

The nature of the sugar of normal urine. II. The behavior of carbohydrates in bromine water and the ketose of normal urine. Mark R. Everett, Beatrice G. Edwards and Fay Sheppard. *J. Biol. Chem.* 104, 11-28(1934); cf. *C. A.* 26, 4089.—Quant. studies were made of the action of Br on the reducing power of sugars and non-sugars. Enough Br was added to 1% aq. solns. in glass-stoppered flasks to insure the presence of a small excess of liquid Br throughout the expt. The mixts. were kept in the dark at const. temp. of 25°. After definite intervals the excess Br was removed by washed air and aliquots were analyzed by both the Sumner and Folin-Wu methods after neutralizing with silicate-free KOH soln. to  $p_H$  7. The Sumner/Folin-Wu ratio of glucose equivs. is of value in the identification of sugars. Amino sugars, methylpentoses and higher oligosaccharides are easily confused with ketoses unless their oxidation curves are studied. The existence of new reducing derivs. of *l*-fucose, inulin, dextrin oligosaccharides and *d*-glucosamine has been demonstrated but they have not yet been isolated. The oligosaccharide impurities of dextrans and sol. starch are aldoses. New glucose equivs. are given for amylotriase, *d*-glucuronic acid, *d*-mannoketoheptose and *d*-mannheptose. The major portion of the so-called sugar of normal urine is resistant to Br and hypolodite oxidation and is properly designated as *uroketose*. A portion of the hydrolyzable urine sugar is more easily

oxidized; it is also easily hydrolyzed by acids and differs from both dextrans and glucuronates, both of which are undoubtedly present in small amts. Ketose color tests are in general unsatisfactory. The major portion of the free sugar of  $\text{H}_2\text{WO}_4$  blood filtrate is oxidized as aldoses are, but a 2nd substance is also present. Forty-five references.

A. P. Lothrop

The metabolism of sulfur. XXI. Comparative studies of the metabolism of *l*-cystine and *dl*-methionine in the rabbit. Robert W. Virtue and Howard B. Lewis. *J. Biol. Chem.* 104, 59-67(1934); cf. *C. A.* 27, 5398.—Rabbits catabolize *dl*-methionine and *l*-cystine readily when they are administered in equiv. amts. orally and subcutaneously. A substance having the reactions of a disulfide and giving a pos. cyanide-nitroprusside reaction but not the Sullivan test for cystine is present in the urine after administration of *dl*-methionine. If the amino group is blocked as in benzoylmethionine, oxidation is checked and it appears (as with cystine) that normal oxidation of the S occurs only if the  $\alpha$ -amino group is free. "It is suggested that a primary reaction in the catabolism of methionine is demethylation and that the pos. cyanide-nitroprusside tests obtained may be due to the presence of small amts. of homocystine, formed by demethylation of methionine and oxidation of the resulting mercapto deriv. to the disulfide."

A. P. L.

The oxidation of the stereoisomers of cystine in the animal body. Vincent du Vigneaud, Harold A. Crafts and Hubert S. Loring. *J. Biol. Chem.* 104, 81-9(1934); cf. *C. A.* 27, 530. —*meso*- and *dl*-Cystine are oxidized by rabbits to a degree midway between that of *l*- and *d* cystine (82 and 45%, resp.). The possible significance of these findings to the theories of the intermediary metabolism of cystine is discussed.

A. P. Lothrop

Creatinuria among adolescent males. Arthur B. Light and Clark R. Warren. *J. Biol. Chem.* 104, 121-8(1934). Urine specimens (24 hr.) were obtained from adolescent boys in a private school under various conditions on an uncontrolled diet. Creatine was found in specimens from 35 of 81 normal boys from 14 to 19 yrs. of age. The percentage showing creatinuria was fairly const. at ages from 14 to 17, dropped perceptibly between 17 and 18 and was present in only 1 out of 6 boys between 18 and 19. The av. creatine excretion for each yearly period declined with increasing age. On a high protein diet 5 subjects showed far less excretion while resting in bed than on the following day on a lower-protein diet while attending classes and engaging in exercise. A marked increase occurred on the 1st day of muscular activity following confinement to bed for illness or injury followed by a progressive decrease on each succeeding day, indicating the fitness of the skeletal muscles to meet the demands of exercise as an addnl. factor in the phenomenon of creatinuria among adolescent males. A certain lethargy and aversion to phys. exercise were observed among the older subjects still excreting creatine.

A. P. Lothrop

Experimental studies in sodium chloride metabolism IV. The metabolism of several diuretics. Hiroshi Sato. *J. Gastroenterol.* 5, 85-90(1933); cf. *C. A.* 27, 5800.—Salyrgan and pituitrin act as diuretics in rabbits and remove NaCl from the body. Blocking the reticulo-endothelial system with lithium carmine inhibits the action of salyrgan.

C. M. McCay

Experimental studies in the absorption of pigment by the intestines. I. Shigekazu Kawawaki. *J. Gastroenterol.* 5, 101-7(1933).—Pigments were introduced into the intestines of dogs and their appearance in the urine, bile and lymph was recorded. Ninety-five % of the numerous dyestuffs tested were absorbed. Absorption depended upon diffusibility. The dye appeared in the thoracic lymph 3-20 mins. after it is injected into the intestine. It attains a max. concn. in 1 hr. II. The behavior of the lymphatic vessels. *Ibid.* 108-10. Pigment absorption is mainly by the blood vessels.

C. M. McCay

The gastric juice of natives of the Japanese South Sea Island. I. The gastric juice of healthy persons. Kyoze Nagasaki. *J. Gastroenterol.* 5, 111-14

(1933).—The usual clin. detns. were made upon samples of gastric juice from 25 men and 20 women, natives of the Japanese South Sea Islands. A rice gruel test meal was used. Gastric contents were 30–60 cc. The free HCl and total acidity were 18.5 and 19.4, resp. Total Cl ranged from 0.3 g. % to 0.44 g. %. Upward flow of bile was found in half the cases. C. M. McCay

The behavior of dyestuffs toward blood and organ pulp. Ryuichi Ohta. *Japan. J. Gastroenterol.* 5, No. 3, *Biol. Untersuch. Farbstoffe* 113–22(1933).—Known amts. of dyestuffs were mixed with blood sera. The diffusion in agar was then measured. Tables of dyes and their affinities for blood fractions are given. Organ pulps combine more readily with basic than with acid dyestuffs. This explains why these are excreted with more difficulty. C. M. McCay

Dye excretion through the liver and kidneys. Yoshio Yano. *Japan. J. Gastroenterol.* 5, No. 3, *Biol. Untersuch. Farbstoffe* 123–7(1933).—Acid dyes are excreted through the kidneys if they diffuse readily in serums. Of dyes excreted with difficulty by the liver and kidneys only the acid ones can be detected for a long period in the blood. The output of basic dyes is related to their affinity for red cells as well as diffusibility in serums. Lipide soly. of basic dyes interferes with a direct relation between diffusibility and excretion. C. M. McCay

Serum differences of various animal species. Hisao Igarashi. *Japan. J. Gastroenterol.* 5, No. 3, *Biol. Untersuch. Farbstoffe* 128–31(1933).—The binding capacity of various serums for dyes was greatest for human beings followed in turn by rabbit. Goat, cow, pig and horse serums were weaker. The weakest serums were pigeon and chicken. The differences were most marked for acid dyes. C. M. McCay

Excretion of dyes through the liver and kidneys. Yoshinori Tada. *Japan. J. Gastroenterol.* 5, No. 3, *Biol. Untersuch. Farbstoffe* 143–86(1933).—Most dyes injected intravenously into dogs appear in the urine or bile. Diamingoldgrün and dianilin black R do not appear. If dyes are excreted in both urine and bile they appear in the urine first. The more diffusible the dye the greater the concn. in the urine and the shorter the time of excretion. Dyes with low diffusibility pass the kidneys poorly but the inverse is not always true. Ligation of the bile duct will not lead to compensatory excretion of such dyes as Congo red 4R by the kidneys unless both the liver and kidneys tend to excrete the dye normally. In the latter case the max. rate of excretion by the kidneys is not exceeded but the time is prolonged. Ligation of the blood supply to the kidneys shows the same relationships develop as those from ligation of the bile duct. The concn. of dye in the blood and that in the urine and bile have a direct relation. For a specific dye the normal kidneys and liver have a fixed excretory power. C. M. McCay

The osmotic pressure of organs after the intravenous injection of distilled water. Italo Simon. *Boll. soc. ital. biol. sper.* 8, 1295–6(1933).—A series of rabbits, previously fasted for 12 hrs., was injected intravenously with 25, 50, 60, 100, 140, 180 and 191 cc. of distd. water per kg. body wt. and at a velocity which did not kill the animals. After the injection, the animals were bled to death and immediately, cryoscopic detns. were made on the heart, brain, kidneys, heart and blood serum. A table giving the value of  $\Delta$  for each organ and for each amt. of water injected is given. Briefly, the kidneys up to 60 cc. of water per kg. was the organ which showed the least lowering of the osmotic pressure, but in doses above 100 cc. the osmotic pressure was the lowest of any organ. The brain showed the least diminution of osmotic pressure in all doses. Peter Masucci

Physicochemical characteristics of retroplacental blood. I. Alkaline reserve, velocity of sedimentation and cell resistance. L. Puccioni, A. De Niederhäusern and P. Roncallo. *Boll. soc. ital. biol. sper.* 8, 1312–14(1933).—The most important characteristics of retroplacental blood were compared to those of peripheral blood from the same

woman while in labor; in a few cases, it was compared to those of funicular blood. The alk. reserve of retroplacental blood in 19 out of 20 cases was lower than the peripheral, ranging from 0.43 to 0.23% with an av. of 0.32%. The values for the peripheral were 0.48–0.20 with an av. of 0.38%. The velocity of sedimentation of retroplacental blood was 0.24 cc. max., 0.05 cc. min., av. 0.08 cc.; the peripheral values were 0.46 max., 0.10 cc. min., av. 0.27 cc. The min. resistance  $R_s$  of peripheral blood was not uniform. The av.  $R_s$  was 0.50. The resistance of retroplacental blood ranged from 0.48 to 0.60, av. 0.50. The resistance  $R_s$  of peripheral blood varied from 0.36 to 0.40, av. 0.38; that of the retroplacental ranged from 0.36 to 0.42, av. 0.40. The resistance  $R$  of the peripheral blood varied from 0.30 to 0.38, av. 0.34; that of the retroplacental varied from 0.30 to 0.40, av. 0.36. II. Index of refraction, viscosity, surface tension, cryoscopy. A. De Niederhäusern, L. Puccioni and P. Roncallo. *Ibid.* 1314–16.—Retroplacental blood, as detd. by the Zeiss refractometer, contained an av. of 7.50% proteins, peripheral an av. of 8.02% and funicular an av. of 6.36%. The av. viscosities were, resp.: 1.66 that of distd. water, 1.60. The av. surface tensions were, resp.: 68.06, 69.09, 69.3 dynes/cm. The av. cryoscopic consts. were, resp.:  $-0.52^\circ$ ,  $-0.53^\circ$ ,  $-0.53^\circ$ . Peter Masucci

The selective activity of certain hystiocyte elements on urea. The function of the so-called reticulo-endothelial or reticulo-hystiocyte system. Giuseppe Vercellana. *Boll. soc. ital. biol. sper.* 8, 1337–9(1933).—Guinea pigs and pigeons were injected intravenously with urea and simultaneously or shortly afterward with India ink. The animals were killed, and small pieces of the brain, lung, liver, spleen, kidney and intestine placed in a soln. of xanthidrol. After 12–24 hrs. they were removed, repeatedly washed in abs. EtOH, then in xylene, imbedded in paraffin, sectioned and stained. In the presence of urea, microscopic examn. showed typical xanthidrolurea crystals. The endothelial cells of the liver (Kupffer cells) and kidneys showed the most abundant presence of urea. Peter Masucci

The basophilic properties of red blood corpuscles. Giuseppe Vercellana. *Boll. soc. ital. biol. sper.* 8, 1339–42(1933).—The tendency of red blood corpuscles to acquire basophilic properties was investigated. Oxidizing agents, O, ozone, have a tendency to render the corpuscles basophilic; reducing agents, H, CO<sub>2</sub>, SO<sub>2</sub> and CH<sub>3</sub>COH, increase the already acidophilic property of the corpuscles. This difference in behavior to stains is ascribed to changes in normal  $p_H$  of hemoglobin; the  $p_H$  is lowered by processes of oxidation, thus increasing the slight acidity of Hb, while the  $p_H$  is increased by reducing processes, thus making Hb distinctly alk. In oxidation, Hb dissociates as an acid into H<sup>+</sup> and a negatively charged protein radical, thereby acquiring an affinity for basic dyes, in reduction processes; Hb dissociates as a base into OH<sup>-</sup> and a positively charged protein radical in which case it acquires an affinity for acid dyes. In the human and animal organism, diseases of the blood or other conditions may increase markedly the oxidative processes of the corpuscles so that some of the corpuscles become completely or partially basophilic. Peter Masucci

The influence of the liver on heart function. Bruno Bassani. *Arch. ital. biol.* 90, 26–32(1933); cf. C. A. 28, 1093<sup>4</sup>.—The favorable action exercised by blood coming from the liver on the heart is not due to glucose or bile substances. The active substance is quickly absorbed by the heart. A. E. Meyer

Kidney function judged by the relation of the urea in the blood to that in the 24-hour urine. Jules Cottet. *Presse méd.* 41, 457–60(1933).—The ratio mg. urea in blood (100 cc.): g. of urea in the urine multiplied by 10 was used as an index. Variations from 1.11 to 18.92 were observed. A. E. Meyer

The sex-stimulating preputiary hormones in the body fluids of pregnant women. A. Brindeau, H. Hinglais and M. Hinglais. *Presse méd.* 41, 705–8(1933).—The biol. detn. of the gonadotropic preputiary hormone gives satisfactory results in the rabbit. Figures obtained dur-

ing pregnancy are given. The test permits diagnosis of mole and of the death of the fetus. A. E. M.

Relation between respiration and gelatinase content of the skin and pigmentation. S. Blaszc. *Biochem. Z.* 267, 11-17(1933).—See C. A. 27, 786. S. Morgulis

Studies on muscle autolysis. III. Changes in the reaction, surface tension, viscosity and refraction. I. A. Smorodintzev, N. Shirokov and N. N. Krylova. *Biochem. Z.* 267, 18-21(1933); cf. C. A. 28, 1094<sup>1</sup>.—The  $p_z$  of preserved muscle decreases, reaching a min. in 24 hrs. The viscosity of the exts. from autolyzed meat decreases and the surface tension increases, attaining min. and max. values, resp., 12-24 hrs. after slaughter. The refraction remains unaltered. These changes are not materially affected by a variation in temp. from 4° to 25°.

S. Morgulis

Effect of carbohydrates on tissue respiration. Bruno Kisch. *Biochem. Z.* 267, 32-42(1933).—Expts. with glucose, xylose, arabinose, rhamnose, levulose, mannose, galactose, lactose, maltose, sucrose and glucosamine show that the respiration of each tissue is affected differently; furthermore, that the effect on different tissues of the same animal or on the same tissue from different animals likewise varies. The respiration was detd. by the Warburg method.

S. Morgulis

Distribution and transformation of ethyl alcohol in the organism of the dog. Erik M. P. Widmark. *Biochem. Z.* 267, 128-34(1933).—The relation between the amt. of consumed alc. and its concn. in the blood which for the human is expressed by the formula  $A = pr(c_1 + \beta t)$  quite generally holds also for the dog. In the above formula  $A = g.$  of alc. consumed;  $p =$  body wt. in kg.;  $c_1 =$  blood alc. concn. at the time  $t$  expressed in mg. per 1000 mg. blood; and  $t =$  time since the consumption of the alc.;  $r$  and  $\beta$  are const., the former to correct for the body mass and is obtained from the relation  $r = A/pc_1$ , i. e., the concn. extrapolated to 0 time, while  $\beta$  is the const. measuring the velocity with which the alc. concn. in the postabsorptive condition decreases in mg. %/min.

S. Morgulis

Effect of composition of the food on the alcohol content of the blood. Erik M. P. Widmark. *Biochem. Z.* 267, 135-42(1933).—Further evidence of the probable combination of alc. with amino acids which accounts for the fact that the simultaneous administration of alc. and glycine or alanine brings about a lower concn. of alc. in the blood than the administration of alc. on an empty stomach.

S. Morgulis

Effect of adrenal cortex on sugar absorption. W. Wilbrandt and L. Lengyel. *Biochem. Z.* 267, 204-10(1933).—Although glucose and xylose are practically equally diffusible, yet in the normal rat the former is more easily absorbed. Absorption is governed not merely by physicochem. conditions but also by another factor which can be inhibited by  $CH_3CO_2H$ . Furthermore, in adrenalectomized rats the absorption of glucose is much decreased but that of xylose is unaffected. Adrenaline has no influence but the adrenal cortex prepn. of Swingle and Pfiffner (C. A. 25, 3045) restores the normal rate of absorption of glucose. The adrenal cortex hormone thus governs the chem. factor of absorption.

S. Morgulis

Corpus luteum hormone. K. Ehrhardt and W. Weigel. *Endokrinologie* 13, 225-33(1933).—Blood and urine from the second half of the menstrual cycle, corpora lutea of pregnancy, placental tissue, urine from early pregnancy, and urine from women with chorion epithelioma were used in this study. The tissue was implanted and from the urines ether exts. were prepd. and injected either intramuscularly, intraperitoneally or subcutaneously, but all of the tests gave neg. results. Further tests for the corpus luteum hormone were carried out with press juice and ether exts. from various plant materials (buds, fruits, seedlings, etc.) also without any result. The hormone was found to be unaffected by radiation (ultra-violet, infra-red or x-ray) but is easily destroyed by trypsin. S. M.

Artificial severing of the seminal ducts and its effect on the testes of sexually mature and senile rats. Ernst R. Welcker. *Endokrinologie* 13, 234-50(1933).—The

1 efferent vessels between the testis and epididymus were tied off in rats, either unilaterally or bilaterally, both in young or senile animals. Most commonly the affected testis showed calcification but never regenerative processes.

S. Morgulis

Studies on the physiology of the thyroid. The iodine substance of the thyroid gland. F. Blum, F. A. Lehmann and W. Leistner. *Endokrinologie* 13, 250-5(1933).

S. Morgulis

2 Growth experiments on tadpoles with cystine and auxin. Bengt Sylvén. *Skand. Arch. Physiol.* 67, 129-36(1933).—Cystine, but not cysteine, increases the rate of growth of tadpoles. The results with auxin are still very indefinite.

S. Morgulis

Standard metabolism of female rats before and after ovariectomy in experiments with and without narcosis Axel M. Hemmingsen. *Skand. Arch. Physiol.* 67, 137-69(1933).—The body temp. of normal rats is subject to  $\infty$  much variation that the standard metabolism must be corrected for temp. In the rat the standard metabolism seems to vary with the previous environmental temp. The influence of age is questionable, but the relation between body wt. and metabolism varies, especially if standard conditions are not fulfilled. It seems probable that in the rat the standard metabolism bears a definite (proportional) relationship to a fractional power either of the body wt. or of the body surface. The influence of the estrous cycle, of ovariectomy and of treatment of spayed animals by ovarian exts. on the standard metabolism has not been satisfactorily solved.

S. M.

Endocrine factors in the causation of the creatinuria of pregnancy. I. Schrire and H. Zwarenstein. *Nature* 133, 27-8(1934).—After castration or in pregnancy the anterior pituitary gland hypertrophies, increasing the formation of creatine. Stimulation of the gonads inhibits the change of creatine to creatinine; excess creatine appears in the urine as such as well as increasing the creatinine content. Residual corpora lutea re-enforce the inhibitory action of the ovaries on this transformation so the excess creatine is excreted as such, and the creatinine excretion is not increased.

James C. Munch

Influence of infusoria on digestion in ruminants. M. I. Dyakov, T. V. Vinogradov, M. P. Vinogradov and A. N. Bereninov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vkusovoi Prom.*, Separate 1931, 24 pp.—In feeding tests with sheep the digestion coeffs. were detd. with and without infusoria, for total dry matter, org. matter, nitrogenous matter, fat, inorg. matter and N-free ext. The differences due to presence of infusoria were too small to indicate any favorable influence on digestion.

Julian F. Smith

7 The metabolism of the retina and of the gray brain substance. Camillo Sellei and Pál Weinstein. *Magyar Orvosi Arch.* 34, 538-41(1934).—The metabolism of the retina and of the gray brain substance are characteristic for their high respiratory heat production and their vitality even under anaerobic conditions. Pasteur's reaction cannot be applied to these tissues; an embryogenetic relationship, however, is suggested.

H. T.

8 The blood-sugar content of healthy Korean adults. Y. C. Lee and C. Y. Choi. *Korean Med. J.* 3, 65-70(1933).—Blood-sugar contents of 34 healthy adult males and 50 adult Korean women were detd. Blood samples were taken before breakfast from the arm vein and the blood sugar was detd. by Hagedorn-Jensen's method. In males, the min. value was 0.09% and the max. 0.109%. Over 82% ranged between 0.09 and 0.11%. In females, the min. was 0.079%, and the max. was 0.128%. Over 68% of all individuals showed values between 0.09 and 0.11%. The av. in each sex was thus 0.107%. According to these results, the Korean, who is known to take more carbohydrates in his daily diet than the occidental, shows a content of blood sugar very little higher than that of the European, American or Chinese.

I. S. Yun

Stationary, checked and other states of osmotic systems. III. [functioning of a gland] (Schreinemaker) 2.

Oneseco Mozo, Francisco: Fisiopatologia del metabo-



Hismo basal. Madrid: Pueyo. 164 pp. Ptas. 15. Reviewed in *J. Am. Med. Assoc.* 102, 318(1934).

### THESES

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## G—PATHOLOGY

H. GIDEON WELLS

A reducing substance in tumors. Leslie J. Harris. *Nature* 132, 605(1933); cf. *C. A.* 27, 4561.—Titration and feeding expts. confirm the previous suggestion of H. that the high reducing capacity of tumor tissue for 2,6-dichlorophenol-indophenol is not due wholly to vitamin C, but to the presence of *reducytin* an unusually powerful reducing substance hitherto unrecognized. P. D. A.

Nitrogen metabolism in white mice in the course of tumor development. I. A. Parfentjev. *Proc. Soc. Exptl. Biol. Med.* 30, 1064-7(1933); cf. *C. A.* 27, 3514.—The urine of the normal mouse contains approx. 1.4 g. percent of a chondromucoid-like protein. In the course of the growth of Sarcoma 180 the protein decreased and tended to disappear from the urine; urea decreased; the excretion of other urinary constituents remained practically unchanged. Possibly the protein is conserved and used in the metabolism of the rapidly growing tumor. C. V. Bailey

Uric acid exchange in pulmonary tuberculosis. M. Pellegrini. *Arch. ist. biochim. ital.* 5, 225-70(1933).—Blood uric acid and urinary uric acid are in general lower than normal in cases of pulmonary tuberculosis. There is a certain relation between the uric acid exchange and the general condition of patients. E. S. G. Barron

Hyperglucemia after lumbar puncture. H. Schönfeld. *Jahrb. Kinderheilk.* 138, 174-8(1933). B. C. A.

Abnormalities of calcium deposition in diabetes mellitus. Howard F. Root, Priscilla White and Alexander Marble. *Arch. Internal Med.* 53, 46-53(1934).—Various types of abnormalities of Ca deposition are found in diabetes. Lack of Ca may be ascribed to its deficiency in the diet and to chronic acidosis causing undue loss. Blood P and Ca are normal. In certain cases arteriosclerosis, cataracts and calculi occur. Adequate Ca in the diet should be supplemented with vitamin D. J. B. Brown

Some observations on achlorhydria and anemia. Stanley J. Hartfall. *Brit. Med. J.* 1934, I, 136-41. J. B. B.

Amino nitrogen changes of the blood in nephritis. Esben Kirk. *J. Clin. Investigation* 12, 1091-1102 (1933).—Elevation of plasma amino N is frequent as renal disease becomes more advanced. The correlation is irregular. The rise is probably not due to renal failure but rather to a breakdown in amino acid metabolism elsewhere. J. B. Brown

Electrolytes in human tissue. III. A comparison of normal hearts with hearts showing congestive heart failure. Walter E. Wilkins and Glenn E. Cullen. *J. Clin. Investigation* 12, 1063-74(1933); cf. *C. A.* 28, 1069.—The right and left ventricles of 17 human hearts, including both normal and diseased, were analyzed. The water content of the right ventricle was slightly higher than the left, and was higher in both ventricles with congestive heart failure. Other differences in P, Na and K were found. J. B. B.

Magnesium metabolism in hyperparathyroidism. Harold A. Bulger and Florence Gausmann. *J. Clin. Investigation* 12, 1135-42(1933).—In hyperparathyroidism there is a neg. Mg balance. The parathyroid hormone does not influence the Mg level in the blood and the effect on Mg metabolism may be secondary to that on Ca metabolism. J. B. Brown

Relationship between the oxygen consumption and nitrogen metabolism. III. In polycythemia vera. Adelaide Barer, W. D. Paul and C. W. Baldridge. *J. Clin. Investigation* 13, 15-28(1934); cf. *C. A.* 27, 2993.—The changes following administration of PhNHNH<sub>2</sub> to 2 subjects with polycythemia vera were as follows: a temporary neg. N balance due to increased urea excretion; a slightly increased proteinuria; retention of the Fe liberated by destruction of red cells; formation of urea and bilirubin more rapidly than they were excreted; intermittent urobilinuria; decrease in blood viscosity. J. B. B.

Calcium and phosphorus metabolism in certain diseases of bone. Walter de M. Scriver and Eleanor M. Venning. *J. Clin. Investigation* 13, 139-53(1934).—In 4 cases of Paget's disease, one of bone cyst and one of bone sarcoma Ca metabolism was within normal limits. There was no evidence of parathyroid dysfunction. J. B. Brown

The diazo reaction of the blood. I. Gitaro Nakayama. *Japan J. Med. Sci. II Biochem.* 2, 215-27(1933).—The blood of men and animals gives the Leimdörfer-Charnass diazo reaction. In those diseases in which Ehrlich's diazo reaction is strongly pos. in the urine, the blood reaction generally falls off or disappears entirely. The reaction depends on the erythrocytes as plasma and serum do not give it. Neither fever nor inanition had any noticeable effect. The blood diazo reaction tends to weaken in acute inflammation in which an increased sedimentation rate and the Costa reaction are observed. The factor responsible for the blood diazo reaction is resistant to acid but is readily destroyed by alkali. It is extd. with dil. HOAc and CCl<sub>3</sub>COOH and is pptd. by phosphotungstic acid. The adrenal capsule and liver and milk expts. give a pos. reaction. II. The carrier of the diazo reaction in serum and urine. *Ibid.* 229-35.—In the blood in kidney deficiency urochromogen was recognized as the cause of the Andrew serum reaction. The indican test was mostly pos. possibly because of an imidazole substance. In the urine of tuberculosis a similar substance was recognized. The amt. of residual N had little relation to the serum diazo reaction. III. The carrier of the diazo reaction in the red blood cells. *Ibid.* 237-44.—The blood and red cells which give a more intensive diazo reaction are rich in residual N. Ergothioneine is a possible cause of the diazo reaction. The intensity of the blood reaction

parallels the concn. of ergothionine. A no. of other substances such as adrenaline, tryptophan and imidazole derivs. and the digestion products of nuclear substances can be substituted.

Rachel Brown

The composition of globin in healthy and anemic human beings. Konrad Lang. *Arch. expil. Path. Pharmacol.* 174, 68-8(1933).—Globin normally varies considerably in its tryptophan content, and to a less extent, in the cystine content. The tyrosine is remarkably const. In secondary (regenerative) anemias, there is a characteristic increase in arginine and decrease in histidine. In aplastic and pernicious anemia, marked changes in compn. were observed, suggesting the formation of a pathologically altered hemoglobin.

Harry Eagle

Kidney function in diabetes insipidus. The effect of Pituit, diurnal and nocturnal filtration. The effect of adrenaline. Poul Iversen, Erik Jacobsen and Jøns Bing. *Arch. expil. Path. Pharmacol.* 174, 69-76(1933).—A case study.

Harry Eagle

The gas metabolism of the [dog] heart during cardiac insufficiency. II. Cardiac insufficiency caused by derivatives of barbituric acid [numal, somnifen, pernocton] and by avertin. A. Rühl. *Arch. expil. Path. Pharmacol.* 174, 96-110(1933); cf. *C. A.* 28, 822<sup>9</sup>.—The O consumption decreases despite cardiac dilatation and the R. Q. increases, the latter a manifestation of partially anoxidative processes as a source of energy. The increased O debt is in part due to edematous changes in the capillary walls preventing O diffusion. As further evidence for anoxidative processes, the insufficient heart consumes less O per unit work than the normal heart. Increased functional performance seems to be assocd. with an increased capacity for O consumption. The max. O consumption is suggested as the best index of the cardiac "sufficiency."

Harry Eagle

Myasthenia gravis. The effect of treatment with glycine and ephedrine. Walter M. Boothby. *Arch. Internal Med.* 53, 39-45(1934).

J. B. Brown

The treatment of hay fever with the specific grass-blossom propeptane or pollen by mouth. Erich Urbach. *Klin. Wochschr.* 12, 1797-801(1933).—The effective constituent in the peroral desensitization of hay fever patients is a protein present in the leaves as well as in the pollen.

Harry Eagle

The common appearance of skin infections caused by yeast and yeast-like fungi in diabetics. W. Engelhardt and W. Haupt. *Klin. Wochschr.* 12, 1805-6(1933).—The optimum glucose concn. for the *in vitro* cultivation of the yeasts and fungi in question is 150-200 mg % approx. that attained in the skin of severe diabetics. This lends credence to the theory that it is the glucose as such which predisposes to skin infections by yeasts and yeast-like fungi in diabetics.

Harry Eagle

The inhibitory action of the urine from cases of cardiac insufficiency upon [the metamorphosis of tadpoles caused by] thyroxine. Andreas Hofmann and Otto Lutterotti. *Klin. Wochschr.* 12, 1941-2(1933).

Harry Eagle

The alkali reserve in Basedow's disease. E. Altenburger and A. Boger. *Klin. Wochschr.* 12, 1983-5(1933).—Although there is a tendency to acidosis in some cases of Basedow's disease, this is not related either to the clinical condition of the patient or to the elevation of basal metabolism.

Harry Eagle

Mineral metabolism in bursitis calcarea. Tsunehiko Aoki. *Tōhoku J. Expil. Med.* 21, 556-92(1933).—A detailed case report with an extensive bibliography.

Harry Eagle

The lactic acid metabolism in ileus. I. The time course of the lactic acid level in ileus. Jiro Izumi. *Tōhoku J. Expil. Med.* 22, 201-16(1933).—After ligation of the intestine in rabbits at the pyloric level, the blood lactic acid concn. begins to rise in 3-6 hrs., reaching a max. value of 50-60 mg % immediately before death (approx. 20 hrs.). The more distal the ligation, the longer is the latent period before the lactic acid begins to increase, the slower and less pronounced the rise, and the longer the animals remain alive. If the obstruction is placed at

the lower portion of the rectum, the lactic acid may not increase at all, and the animals survive for 100-150 hrs. II. The lactic acid metabolism in the liver in ileus. *Ibid.* 217-26.—Normally, the lactic acid concns. of the arterial, portal and hepatic venous blood decrease in the order named. After expil. ileus, and particularly after ligation at the duodenal level, all 3 values increase, but the relative increase in the hepatic vein is greater, the order of decreasing concn. now being hepatic vein, arterial, portal. These results are ascribed to an impaired resynthesis of lactic acid in the liver, an increased formation of lactic acid from hepatic glycogen, and a disturbed lactic acid metabolism in the organs drained by the portal vein.

Harry Eagle

The peculiarity of thyroid extracts in Basedow's disease with respect to the increased oxygen consumption. III. The peculiarity of the oxygen consumption of rabbits injected with a goiter extract from Basedow's disease Kenji Saito. *Tōhoku J. Expil. Med.* 22, 227-51(1933), cf. *C. A.* 28, 817<sup>9</sup>.—The injection of a splenic ext. or irradiation of the splenic area has a relatively slight and transient effect upon the increased O consumption observed in rabbits after the injection of goiter exts. Such rabbits, however, react promptly to KI in doses which have little or no effect in normal rabbits (0.25-0.5 mg./kg.) If the rabbits are rendered hyperthyroid by the injection of thyroxine, "thyroglandol" or exts. of normal thyroid gland, they react promptly either to splenic exts., splenic irradiation or KI. The effect of I in decreasing the O consumption of rabbits, whether normal or hyperthyroid, is temporary; repeated doses may cause an increased O metabolism and toxic manifestations. The increased susceptibility of hyperthyroid animals to I is unexplained.

Harry Eagle

Immunobiological study of fats. I. The formation of antibodies against lipids in tuberculous rabbits. Yasuhide Tokunoyama. *Tōhoku J. Expil. Med.* 22, 252-62(1933).—Repeated intravenous injections of hydnocarpus oil, liver oil, tristearin, tripalmitin and triolein into rabbits caused the appearance of complement-fixing antibodies in very low titer, the antibody response decreasing in the order named. In order to prevent death upon intravenous injection, some of the lipids were emulsified with an elec. homogenizer. The antibody response was greatly increased by mixing the lipid with pig serum prior to injection. Although there was a certain degree of cross-reaction, the antibodies so formed were more or less specific for each lipid. In general, the antibody response seemed to be more pronounced in animals inoculated with human tuberculosis bacilli at about the same time as the first injection. II. The effect of enteral and parenteral lipids upon the serum lipase of normal and tuberculous rabbits. *Ibid.* 263-92.—The intravenous or parenteral injection of liver and hydnocarpus oil caused a significant increase in the serum lipase. Capric acid and tristearin were less effective, and tripalmitin and triolein had no effect. The addn. of pig serum to the lipid prior to injection decreased the effect upon serum lipase; simultaneous inoculation with tuberculosis bacilli greatly increased the lipase response to lipids. Cholesterol caused a decrease and lecithin a slight decrease in serum lipase. Reticuloendothelial blockade (India ink) caused a decrease, and prevented the normal reaction to injections of liver oil. No significant changes in serum lipase were observed after the enteral administration of lipase. There is an extensive bibliography.

Harry Eagle

Silicosis and silicotuberculosis. Louis C. Boislimer. *J. Mo. State Med. Assoc.* 30, 309-16(1933); *U. S. Pub. Health Eng. Abstracts* 13, IHS, 6(Nov. 18, 1933).—Theoretical considerations as to how SiO<sub>2</sub> dust acts in the human lungs.

C. R. Fellers

Blood pH in cancer. G. Benetato and Marie Benetato-Modival. *Compt. rend. soc. biol.* 114, 329-31(1933).—The H electrode of Michaelis was used on oxalated plasma at 38°. The pH ranges were: normal persons 7.32-7.38, incipient cancer cases 7.37-7.48, well-developed cancer 7.27-7.49 (av. of 49 cases 7.35), advanced cases with cachexia 7.21-7.52. In various cases of benign tumors

examd. the plasma  $p_H$  was always within the normal limits.

**Action of sodium oleate on diphtheria toxin.** P. Nélis. *Compt. rend. soc. biol.* 114, 591-4(1933).—Na oleate destroys diphtheria toxin. Some of Vincent's conclusions concerning cryptotoxins are criticized. Reply. H. Vincent. *Ibid.* 594-5; cf. C. A. 27, 5107. L. E. G.

**Action of certain compounds on Staphylococcus toxin.** P. Nélis. *Compt. rend. soc. biol.* 114, 598-601(1933); cf. C. A. 27, 3747.—The effects of quinine salts and various org. and inorg. acids on the toxin were studied.

**Calcium metabolism in chronic rheumatism.** F. Coste, A. Grigaut and P. Charmant. *Compt. rend. soc. biol.* 114, 895-7(1933).—In practically all cases examd. blood Ca and Ca metabolism were normal. L. E. G.

**Influence of syphilitic serums on Kottmann's reaction.** Pierre Simonin and J. R. Helluy. *Compt. rend. soc. biol.* 114, 1025-6(1933).—Serums giving a pos. Bordet-Wassermann reaction frequently react like myxedematous serums when Kottmann's test for thyroid dysfunction is applied.

**Antishock action of sparteine and soluble camphor derivatives.** Fernand Mercier, A. Krijanovsky and J. Andarelli. *Compt. rend. soc. biol.* 114, 1181-2(1933); cf. C. A. 27, 5107.—Sparteine camphosulfonate protects guinea pigs from exptl. anaphylactic shock. Either sparteine sulfate or Na camphosulfonate, used alone, has a similar but much weaker action.

**The chloride content of gall-bladder bile in catarrhal jaundice.** Etienne Chabrol, R. Charonnat, Marcel Cachin and Jean Cottet. *Compt. rend. soc. biol.* 114, 1238-9(1933).—The gall-bladder bile of normal dogs contains little or no Cl. In normal and nephritic human beings bladder bile usually contains much less Cl than liver bile; in cases of catarrhal jaundice the bladder bile usually contains much more Cl than the liver bile.

**Ratio of lipolytic power to antitoxic power of normal and antidiphtheritic horse serum.** Z. Gruzewska and G. Loiseau. *Compt. rend. soc. biol.* 114, 1244-5(1933).—By purification (protein removal) of the serum the antitoxic power can be reduced to almost nothing with little change in the lipolytic power. Lipase seems to play no part in the phenomenon of immunity.

**Colloid goiter produced experimentally by folliculin.** L. Karp and B. Kostkiewicz. *Compt. rend. soc. biol.* 114, 1339-40(1933).—Typical histological pictures of colloid goiter were produced in female rabbits by injecting 50 rat units of folliculin daily for 16-53 days.

**Experiments on the chemotherapy of experimental tuberculosis in guinea pigs by phenol, alone or mixed with alcoholic extracts of various organs.** C. Ninni. *Compt. rend. soc. biol.* 115, 10-13(1934).

**Possibility of obtaining a stable alcoholic antigen for the diagnosis of animal trypanosomiasis by complement deviation.** G. Zottner. *Compt. rend. soc. biol.* 115, 19-20(1934).—A method of prepn. is described.

**Calcium content of the serum of asthmatics during critical seizures.** Andrée Drilhon. *Compt. rend. soc. biol.* 115, 23(1934).—Some asthmatics excrete abnormal quantities of Ca in the urine. The serum Ca of asthmatics during severe paroxysms was 14-28 mg.%; that of normal persons detd. by the same method (Guillaumin's) was 9.4-10.6 mg. %.

**Separation of the agglutinin and the antiseptic power of antistreptococcus serum by dissociation of the bacterial antibody complex.** P. Sédallian and J. Clavel. *Compt. rend. soc. biol.* 115, 60-1(1934).—Technic used for dissociating the specific streptococcus antibody complex.

**Hyperazotemia—pathogenesis, classifications.** Giovanni Ferro-Luzzi. *Minerva med.* 1933, II, 570-82.—Two series of cases, 12 with diminished glomerular filtration and 21 with normal glomerular filtration, were studied by the Rehberg test for renal function. Urea concn. of resorbed liquid was calcd. on the basis of a new formula  $R_u = (F'Ns - U.Nu)/R'$ , where  $R_u$  is urea concn. in

g./100 cc. of liquid resorbed;  $F'$  is glomerular filtrate in cc./min., according to Rehberg formula;  $U$  is the urine eliminated in cc./min.;  $Ns$  is azotemia in g./1000;  $Nu$  is urea concn. in urine in g./1000. From the results, the author adds a new division, "azotemia of tubular origin," to the pathogenic classification which he discusses.

**Uric acid and arthritic diathesis.** G. Usseglio and G. Ceresa. *Minerva med.* 1933, II, 597-607.—Uricemia (colorimetric method) and uricuria (Folin-Shafer) were studied in 1 normal person, 1 case of gout, 4 asthmatics, 2 chronic eczemas, 4 patients with hypertension and 1 with ischialgia, before and after intravenous injection of 0.50 g. uric acid. After the injection uricemia remained within normal limits while uricuria did not vary enough to be considered important pathologically.

**Determination of purpurin by fluorescence and data on the copropurpurin content of urine in normal and pathological conditions.** Enrico Vigliani. *Minerva med.* 1933, II, 674-83.—Copropurpurin was detd. fluorimetrically with the Pulfrich photometer and Hanau quartz lamp. This method was found extremely sensitive and recommended for regular lab. use. Normal copropurpurin, individually const., ranged between 0 and 50-60  $\gamma$  daily while in saturnine intoxications, blood, liver and some febrile diseases and some cases of diabetes it was pathologically increased.

**Glucemic curve in cardiopathy after intravenous injection of glucose.** E. Massobrio and L. Barberis. *Minerva med.* 1933, II, 729-34.—Four normal individuals, 3 cases of compensated and 6 of uncompensated cardiopathy were tested for glucemia (Cruto method) during fasting and 30, 60, 90 and 150 min. after intravenous injection of 20 cc. 50% glucose soln. Normal individuals showed a max. increase (28%) in glucemia 30 min. after injection, then a drop to slightly below the initial figure at 90 min. followed by a rise to slightly above the initial value. In cases of compensated and uncompensated cardiopathy the glucemic curves of the former showed lower values but almost paralleled the latter. In the former the max. rise is 39% while in the latter it is 46% and in both the drop parallels the normal curve up to 60 min., then continues more slowly and gradually, never quite reaching the initial value.

**Comparative investigation of urine and serum proteins in nephritis.** Elsie M. Widdowson. *Biochem. J.* 27, 1321-31(1933).—Studies on the N distribution, racemization, osmotic pressure and specific refraction of urine and serum proteins from nephritic patients indicate that the corresponding urine and serum proteins from any one patient are identical.

**The nature of antigens.** J. G. Fitzgerald. *Trans. Roy. Soc. Can., Sect. 5*, 27, 1-9(1933).—A review.

**The mechanism of the formation of phytobezoars, with special reference to the persimmon call.** Shoichi Izumi, Kichiji Ishida and Masaki Iwamoto. *Japan. J. Med. Sci. II Biochem.* 2, 21-35(1933).—Phytobezoars must be classified into 2 groups: (1) iniobezoar and (2) opobezoar. The first form mechanically by the twining together of fibers. The opobezoar consists of fruits. The persimmon is unique in that it forms concretions in the stomach. This is due to the presence in the fruit of sol. shibuol, to which the astringency of the fruit is ascribed. Sol. shibuol is coagulated by mineral acids, and hence by the HCl of the gastric juice. The mode of the opobezoar formation is accordingly essentially chem. Sol. shibuol is localized around the calyx and under the skin of the ripening fruit, but the seed is free from it, and is not responsible for the formation of opobezoar in the stomach. As the persimmon ripens in the process of curing the sol. shibuol is transformed into coagulated, in which form it loses both its astringency and its property to form opobezoar. With proteins, starches, bile salts, etc., shibuol forms insol. and non-putrescible adsorption complexes. It also adsorbs enzymes and thus impedes enzymic activity.

**Oxyproteic acid in the urine of different pathologic**

conditions. Hikoya Tsutsui. *Japan. J. Med. Sci.* 11 *1* *Biochem.* 2, 185-7(1933).—An extensive table is appended presenting the results obtained with the urine of patients affected with about 23 different pathol. conditions.

B. S. Levine

Hemolytic phenomena. Hector Diacono. *Arch. inst. Pasteur Tunis* 21, 557-641(1932); 22, 47-121, 212-309, 376-442(1933).—A review of phys., chem., biol. and immunological hemolysis with 569 references. M. L.

Theory of diabetes mellitus. E. Grafe. *Münch. med. Wochschr.* 80, 1918-22(1933).—Lecture. M. L.

The existence of antigenic determinants of diverse specificity in a single protein. I. Tyrosine- and histidine-diazoarsanilic acids as haptens. Sanford B. Hooker and Wm. C. Boyd. *J. Immunol.* 25, 61-9(1933).—The results of a quant. study of the inhibition reaction, with dyes of different degrees of resemblance to the haptens concerned, are not incompatible with the conception that the injection of a single "complete" protein coupled with diazotized arsanilic acid leads to the production of 2 different antihaptens, one corresponding more closely to the tyrosinediazoarsanilic acid group, the other to the histidinediazoarsanilic acid group. In the case of the "deficient" protein gelatin, the coupled protein seems to give rise to only one of these antihaptens. E. R. Long

Local organ hypersensitiveness. V. The fate of antigen and the appearance of antibodies during the development of hypersensitiveness in the rabbit eye. Beatrice C. Seegal, David Seegal and Deborah Khorazo. *J. Immunol.* 25, 207-20(1933).—When 0.15 cc. of undild. egg white is injected into the anterior chamber of the rabbit eye traces may be found for as long as 8 days. The egg white can never be demonstrated in the serum or the anterior chamber fluid of the opposite uninjected eye. The injection of 0.15 cc. of undild. egg white into the anterior chamber is followed by the appearance of precipitins against egg white in the serum. Precipitins may also be found in the aq. humor of the injected eye, though they do not always appear there. They never appear in the anterior chamber fluid before they appear in the serum. Precipitins are never found in the anterior chamber fluid of the opposite uninjected eye. When 0.2 cc. of egg white is injected into rabbits in a single dose subcutaneously, intravenously or intracutaneously no precipitins against this antigen appear in the serum. When the same amt. of egg white is dild. and injected in 4 doses subcutaneously or intravenously the serum contains precipitins against egg white to the same titer as that obtained by injecting 0.2 cc. of the antigen into the anterior chamber of the eye. E. R. Long

The volume of precipitate in precipitin reactions. F. S. Jones and Ralph B. Little. *J. Immunol.* 25, 381-96(1933).—In precipitin-antigen titrations the greatest quantity of ppt. was formed at one point. The quantity varies proportionately with change in quantity of either antigen or immune serum. With cow serum and its precipitin it was not possible to show that either antigen or antibody was completely utilized. Where a single antigen, such as egg albumin, was employed with its precipitin, there occurred within a narrow zone complete binding of both antigen and antibody, while in either direction one or the other was still present in active form. E. R. Long

Species specificity of fibrinogens. Harold B. Kenton. *J. Immunol.* 25, 461-70(1933).—Pigeon, sheep, horse and rabbit fibrinogens were tested with homologous and heterologous antisera, and on the basis of specificity of sensitization could not be considered of identical protein structure. "Group" antibody reactions occurred only with sheep and beef fibrinogen. E. R. Long

Effect of the injection of glucose upon green bile. Kelsahun Kanasaki. *Japan. J. Gastroenterol.* 5, 91-100(1933).—The bile of a patient suffering from liver cirrhosis was green. This color changed to yellow 30-45 min. after the injection of a hypertonic glucose soln. C. M. McCoy

The increase in the isoelectrostatic power of serum in relation to the electric charge of the agglutinated red cor-

puscles. Claudio Pulcher and Luigi Biancalana. *Boll. soc. ital. biol. sper.* 8, 1143-4(1933).—Serum from group A agglutinated strongly red corpuscles of group B in a diln. of 1:16 but weakly in a diln. of 1:25. The red corpuscles when suspended in the serum A underwent a diminution of the elec. charge of 16%. The donor of serum A was given a transfusion of 4 cc. of blood from B. The agglutinating titer of A after 8 days increased to 1:60. The elec. charge of the red corpuscles B suspended in A diminished 28.2%. A 2nd transfusion of 4 cc. of blood was made. Eight days later the agglutinating titer of serum A was 1:70 and the elec. charge of the corpuscles B suspended in the serum A decreased 33.8%. These results show that there is a quant. relationship between the agglutinating power of a serum and the diminution of the elec. charge on the red corpuscles. \* Peter Masucci

Glucose, sucrose and formaldehyde as inhibiting agents in isoelectrostatic. Mario Rigoni. *Boll. soc. ital. biol. sper.* 8, 1176-81(1933).—Glucose in a concn. of 11 g. and sucrose in a concn. of 20 g. per 100 cc. of blood inhibit the specific seroreactions of the blood groups (agglutination). The vital properties of the red corpuscles are not destroyed and the reaction is reversible. HCOH in a concn. of 0.35 g. per 100 cc. of blood has a similar action. This property of the sugars may eventually find therapeutic applications in blood transfusion. P. M.

The protective and desensitizing action of colloids in vivo. Luigi Robuschi. *Boll. soc. ital. biol. sper.* 8, 1285-9(1933).—A suspension of India ink introduced into the circulation along with neohirudin remains in the circulation a longer time than a similar suspension introduced without neohirudin. *In vitro*, however, neohirudin lacks this protective action; a mixt. of equal parts of the suspension and 1% neohirudin is flocculated by the same concn. of AlCl<sub>3</sub>. Conversely, the high stability *in vitro* of an India ink suspension contg. gelatin does not appear *in vivo*. The conclusion is that the increased circulation period of the suspension caused by neohirudin which by analogy might be considered a process of colloidal protection *in vivo* is only an apparent one; in reality, the action of neohirudin consists in impeding the sensitization of the labile proteins (fibrinogen) by the suspension. P. M.

The presence of a melanophor-dilator principle in the urine in some diseases. Its use as a pituitary function test. R. Collin and P. L. Drouet. *Bull. acad. méd.* 109, 794-802(1933).—Injection of 3 cc. of the morning urine into the lymphatic sac of the frog (*R. temporaria*) causes the appearance of a dark color of the tegument within 1 to 3 hrs., if the reaction is pos. It was observed during menstruation and in hyperthyroidism. A. E. Meyer

Chlorine disequilibrium in surgical shock. F. Leguen, B. Fey, Palazzoli and Lebret. *Bull. acad. méd.* 109, 879-83(1933).—Cl disequil. is a principal factor in surgical shock. A. E. Meyer

Duodenal ulcer with pylorospasm and increase in blood urea. Hans Kjaergaard. *Acta Med. Scand.* 80, 489-98(1933).—A case is described in which there was a marked rise in blood urea accompanying pylorospasm, which responded favorably to the injection, twice daily for 5 days, of a 1. of salt soln. S. Morgulis

Blood sugar and glucosuria in exophthalmic goiter. Wm. T. Andersen. *Acta Med. Scand.*, Suppl. LIV, 206 pp.(1933).—Spontaneous glucosuria has been demonstrated in practically every exophthalmic goiter patient examd. Although in uncomplicated cases of exophthalmic goiter the fasting blood-sugar level is normal, the av. from a no. of observations is a little above normal. The alimentary glucemia is increased in intensity and in duration, especially in the more severe cases. Thyroidectomy results in a diminution of the markedly increased glucemias, whereas the more moderately increased glucemias are hardly affected at all. The sugar-excretion threshold is somewhat below normal, but without any evidence of renal glucosuria, and is again raised after thyroidectomy. Diabetic patients suffering from exophthalmic goiter show improvement after thyroidectomy while diabetics with myxedema show an aggravation of their

condition under the influence of thyroid medication.

S. Morgulis

**Chemical nature of brain antigen. II. Further studies on the preparation of pure hapten.** Hermann Rudy. *Biochem. Z.* 267, 77-88(1933); cf. *C. A.* 28, 1400\*.—By further purification procedures it has been established that the hapten obtained by alc. extn. of brain is P-free and resistant to alkali, and is neither a sterol, cerebroside nor creatine. The hapten is a lipid-sol. substance scarcely sol. in H<sub>2</sub>O which on removal of its impurities becomes more or less H<sub>2</sub>O-sol. In the crude ext. the hapten is not dialyzable but in the sapond. fraction considerable dialysis takes place. From these results it is concluded that the hapten is adsorbed on lipid material.

S. Morgulis

**Relation between the structure of the antigen and the specificity of the antibodies. VIII. Changes in the specificity of the cholesterol in its transformation into an antigen complex.** E. Burger. *Biochem. Z.* 267, 143-50 (1933); cf. *C. A.* 27, 5414.—Immunization expts. show that the antibodies produced in response to injections of a mixt. of serum + lipid contg. cholesterol are not the same as the antibodies formed to diazotized cholesterol amino benzoate coupled with protein. It is believed that the specificity of the protein, without being destroyed, has been altered by its condensation with the cholesterol-*p*-aminobenzoate.

S. Morgulis

**The minute volume of the heart in experimental acidosis.** Gunnar Norlir. *Skand. Arch. Physiol.* 67, 170-6 (1933).—When the alveolar CO<sub>2</sub> tension is reduced to about 6 mm. Hg by the use of NH<sub>4</sub>Cl the min. vol. of the heart is appreciably increased, even by more than 50%, this increase being primarily due to the poor utilization of the blood O<sub>2</sub>.

S. Morgulis

**Presence of a principle affecting the suprarenal cortex in the urine of cancerous patients.** Max Aron. *Compt. rend.* 197, 1702-4(1933).—The injection of 50 to 60 cc. of urine from patients with cancer into rabbits weighing between 1 and 1.5 kg. produced a marked increase in lipides in the suprarenal cortex, chiefly spongiocytes. By adding 3 or 4 vols. of acetone the active principle was pptd., redissolved in physiol. saline soln. and sterilized with tricresol. Injections of this concd. material in amounts equiv. to 400 to 750 cc. of urine produced positive reactions in 50% of several hundred tests. The injection of quantities corresponding to 750 to 1000 cc. of urine of non-cancerous subjects gave negative results. This is not a specific test but confirmatory results obtained several times on successive samples from each patient increase the accuracy of the test.

James C. Munch

**Renal glucosuria.** A. F. Fowler. *Ann. Internal Med.* 7, 518-29(1933).—A case of renal glucosuria with ketosis was studied in a child 4.5 years old.

John T. Myers

**Xanthoma accompanied by hypercholesterolemia occurring in an otherwise normal individual, and in an individual with acromegaly and diabetes.** Thomas H. McGavack and H. Clare Shephardson. *Ann. Internal Med.* 7, 582-604(1933).—Disturbed carbohydrate utilization is not a necessary antecedent to altered fat metabolism. Insulin has no value in the treatment of non-diabetic xanthoma but is useful in the diabetic type. Thyroid is useful in the non-diabetic type. A low fat and low caloric diet is useful in both types.

John T. Myers

**Factors influencing the pathogenicity of bacteria.** F. H. Teale. *J. Path. Bact.* 37, 185-232(1933).—Washed spores of ordinarily pathogenic bacteria multiply but do not secrete toxins in the animal body, but if highly virulent may prove fatal, because they may create the necessary conditions in tissues for growth. The products of tissue damage can activate infection. Aggressins do not confer immunity. Hypersensitization to bacterial protein may cause severe symptoms even after repeated injections. There is no relation between antitrypsin in blood and tissues, and virulence of an infecting organism. In the tissues of an immunized animal, S forms are not readily changed to R forms.

John T. Myers

**A case of multiple myelosis with generalized amyloid-like deposits and unusual renal changes.** M. L. Rosen-

heim and G. Payling Wright. *J. Path. Bact.* 37, 332-4 (1933).

John T. Myers

**The total calcium content of the blood, and the elimination of calcium in the urine, in cases of chronic and acute scurvy.** A. Michaux. *Compt. rend.* 197, 865-7(1933).—Guinea pigs were fed a diet producing scurvy. The Ca content of the blood increased, Ca excreted in the urine decreased, during the course of the expt.

W. G. R.

**Histologic studies on fat and glycogen metabolism in the liver during experimental diseases.** György Andai. *Magyar Orvosi Arch.* 34, 502-11(1934).—In a no. of pathol. conditions characteristic changes of the liver fat and liver glycogen were found.

Henry Tauber

**The role of the reticulo-endothelial system in the production of fibrinogen.** Antal Leszler and László Pauliczky. *Magyar Orvosi Arch.* 34, 512-16(1934).—The first dose of curmine injected into rabbits caused an increase of fibrin, while subsequent doses diminished it. The effect is suggested to be due to an irritation of the reticulo-endothelial system.

Henry Tauber

**Variations of the different protein fractions in the blood of eczematous children.** Dezső Steiger-Kazal. *Magyar Orvosi Arch.* 34, 517-20(1934).—The serum was fractionated with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, and total N, 2 albumin and 2 globulin values, resp., were obtained. The total N was diminished. The albumin was increased at the expense of the globulin.

Henry Tauber

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**Lohraff, Gerh.:** Der Bilirubinspiegel im Blutserum bei an Blinddarmverstopfung erkrankten Pferden. Berlin. 1931. 56 pp.

**Nicolai, Max:** Die Brugsche Intrakutanreaktion mit 1% Ferricyankali und ihre Bedeutung zur Differenzierung der Ikterusformen. Breslau. 1931. 31 pp.

**Schick, Heinr.:** Über die Beziehungen zwischen Stuttgarter Hundeseuche und Urämie auf Grund pathologisch-anatomischer und histo-chemischer Untersuchungen. Berlin. 1931. 61 pp.

**Traeger, Heinz:** Der Serum-Kalziumspiegel des Blutes staupekranker Hunde und seine Beeinflussung durch Impfung mit Staupe-Immun-Serum Nussag. Berlin. 1931. 34 pp.

## H—PHARMACOLOGY

A. N. RICHARDS

**Pharmacological and clinical studies of a new substance for the treatment of leprosy.** A. Ambrogio. *Arch. ist. biochim. ital.* 5, 321-94(1933).—A new deriv. of chaulmoogra oil "Iodomografa IBI," an I ester of chaulmoogric acid, has been pharmacologically and clinically studied. It can be used with advantage in the treatment of leprosy, is suited to a perfect gradual dosing, and can be given for

periods of weeks. The dose employed was 0.50-1.50 cc. of the ester.

E. S. G. Barron

**Reaction of the organism to the intracutaneous injection of tuberculin.** C. Luchini, M. Belli and C. Gerbi. *Arch. ist. biochim. ital.* 5, 485-536 (1933).—The intradermic reaction of tuberculin produces, at the max. of the dermic reaction, a diminution on the total proteins of the blood serum; an increase in the globulin content and a diminution of the osmotic pressure of the serum.

E. S. G. Barron

**The action of phlorizin on the excretion of glucose, xylose, sucrose, creatinine and urea by man.** Herbert Chasis, Norman Jolliffe and Homer W. Smith. *J. Clin. Investigation* 12, 1083-90 (1933).—The min. requirement of phlorizin by man for complete phlorizinization, i. e., raising of the glucose clearance to xylose clearance, is 10-20 mg. per kg. A dose of 65 mg. did not raise the glucose clearance above that for xylose, and one of 59.4 mg. did not cause deviation between the xylose and sucrose clearances. With the largest dose given there was no significant depressive action on the ratio creatinine:xylose clearance.

J. B. Brown

**Salt and water in the treatment of diabetic acidosis.** David M. Kydd. *J. Clin. Investigation* 12, 1169-83 (1933).—Treatment of diabetics with insulin and carbohydrate alone is unsatisfactory. NaCl gives a rapid recovery with hyperchloremia, retention of Cl until the base level is normal, followed by excretion of chloride with excess base.

J. R. Brown

**The effect of diiodotyrosine on the basal metabolism in myxedema.** Willard O. Thompson, Joseph M. Alper, Phebe K. Thompson and Lois F. N. Dickie. *J. Clin. Investigation* 13, 29-36 (1934).—The intravenous administration of diiodotyrosine was without effect on the basal metabolism of patients with myxedema. This compd. is not the limiting factor in thyroxine formation in individuals with very small amts. of active thyroid tissue nor can it be synthesized to thyroxine outside the thyroid.

J. B. Brown

**The influence of the acid secretion of the stomach on variations in the blood-sugar level after administration of casein and hydrochloric acid.** S. Marino and P. Romeo. *Arch. farmacol. sper.* 56, 407-42 (1933).—No direct relation exists between the blood-sugar level and the degree of gastric acidity during starvation. Therefore it is not possible to diagnose hypo- or hyperacidity from the blood-sugar detn. The administration of casein, HCl and casein + HCl produces changes in the blood sugar which depend on gastric acidity. Casein (35 g.) produced hyperglycemia in all subjects with a max. after 1.5-2 hrs. It was more pronounced in hypoacidity cases. Casein (35 g.) + 150 cc. of 4% HCl produced a slight hyperglycemia in hypoacidity, while in hyperacidity the increase in blood sugar was greater than when casein alone was given. These changes were observed after 1 hr. HCl (150 cc. of 4%) produced hyperglycemia in subjects with hyperacidity with a max. after 1 hr. In hypoacidity there was accentuated hypoglycemia with minima at 0.5-1 hr.

Lewis W. Butz

**The physiological and pharmacological action of sulfur. I. The general effect and the blood picture.** Francesco M. Chiancone. *Arch. farmacol. sper.* 56, 467-76 (1933).—Repeated injections into young dogs of a sol. S prepn. aided growth, raised the hemoglobin content of the blood and increased the resistance of the erythrocytes to hypotonic solns.

Lewis W. Butz

**Eosin and tissue respiration.** Ricciotti Del Zoppo. *Arch. farmacol. sper.* 56, 536-42 (1933).—Intravenous injection of eosin into rabbits produced a diminution in the internal respiration of the tissues. Cell resistance, red cell count and hemoglobin content were not affected.

Lewis W. Butz

**The effect of adrenaline upon [circulation in] the dog liver.** Ernst Rüegg. *Arch. expul. Path. Pharmacol.* 171, 716-32 (1933).—The intraarterial injection of adrenaline into dog livers perfused with beef blood causes an increased arterial pressure and decreased outflow due to arterial contraction. Intraportal injection may have a

similar effect upon the portal pressure and outflow or it may have the reverse effect, during which the liver decreases in size. On isolated strips of beef or cat portal veins adrenaline always causes contraction. H. E.

**The carbohydrate metabolism in dogs after the prolonged administration of carbohydrate.** Leo Falin. *Arch. expul. Path. Pharmacol.* 174, 12-27 (1933).—The prolonged administration of glucose and sucrose to dogs caused a less pronounced hyperglycemic response to glucose and an accentuation of the hypoglycemic phase, variable changes in the hyperglycemic response to adrenaline and a decreased sensitivity to insulin. The hyperglycemic response to the administration of sucrose was, at first decreased (53rd day), but later returned to normal.

Harry Eagle

**The white blood cells. II. The effect of vegetative poisons upon the differential count in human beings.** G. Roessler. *Arch. expul. Path. Pharmacol.* 174, 28-41 (1933).—The effects of atropine, adrenaline, Ca, gynergen, pilocarpine and choline are analyzed. There is an extensive bibliography. III. Central and peripheral regulation of the blood picture. *Ibid.* 45-50. H. E.

**Comparative pharmacological studies on the calcinosis factor and parathyroid hormone. II. Observations on human beings.** F. Holtz, J. Gürsching and H. Kraut. *Arch. expul. Path. Pharmacol.* 174, 51-62 (1933); cf. C. A. 27, 758.—Parathyroid hormone and the calcinosis factor formed during the irradiation of ergosterol were compared for their effect upon calcification, their effect upon the blood Ca and SiO<sub>2</sub> content, toxic symptoms upon overdosage, and their value for substitution therapy in cases of postoperative tetany. In general, the effects were qualitatively similar.

Harry Eagle

**The effect of small doses of arsenic upon the metabolism.** Franz Delhougne. *Arch. expul. Path. Pharmacol.* 174, 77-80 (1933).—Arsenic in therapeutic doses causes an increased formation of glycogen in the liver and muscles of white rats.

Harry Eagle

**Acute somnifen poisoning.** Hans Glatzel and Frida Schmitt. *Arch. expul. Path. Pharmacol.* 174, 111-17 (1933).—A case report with a review of the literature. The symptoms resemble those of barbituric acid poisoning, with motor excitation ascribed to the allyl and amine groups. Coramine was successfully used therapeutically. Based on their barbituric acid contents, somnifen seems to be less toxic than barbital.

Harry Eagle

**Crystalline insulin. IV. The effect of crystalline insulin upon the metabolism of diabetics.** M. Bürger and A. Patzold. *Arch. expul. Path. Pharmacol.* 174, 118-29 (1933); cf. C. A. 28, 1405<sup>6</sup>.—The intravenous injection of cryst. insulin (15γ/kg.) into diabetics increases the oxidative processes. An immediate increase in the O consumption is followed by a 2nd increase in 1-3 hrs. The latter is ascribed to the exhaustion of available carbohydrate, and is assocd. with a significantly lower R. Q. Despite the unreliability of the R. Q. as a quant. measure of the metabolic processes, this decrease seems to be due to the oxidation of fats and unidentified acid org. substances, resulting in slight alkalosis. V. The inactivation of insulin by the blood. M. Bürger and H. Kohl. *Ibid.* 130-42.—Normal human blood and, to a much less degree, cell-free serum, inactivates insulin within several hrs. at 37°. Inactivation of the blood or serum at 50° destroys this property. The blood of leucemic patients is more active than normal blood, and this increased activity decreases in equal proportion to the white blood cell count after therapeutic Röntgen irradiation. The active factor may be the proteolytic enzymes of the white cells.

Harry Eagle

**The absorption of ethereal oils through the skin.** Hans Paffrath. *Arch. expul. Path. Pharmacol.* 174, 143-50 (1933).—After the cutaneous application of "pertussin balsam," ethereal oils can be demonstrated in the expired air and, in smaller quantities, in the urine. H. E.

**Is morphine excreted into the stomach after parenteral administration?** Philipp Ellinger and Heinrich Serger. *Arch. expul. Path. Pharmacol.* 174, 168-72 (1933).—Gastric secretion in dogs begins to decrease immediately after



the subcutaneous injection of morphine (10–50 mg./kg.), stops completely within 2–3 hrs., and slowly resumes thereafter. Morphine does not appear in the gastric juice, either in normal dogs or those habituated to the drug.

Harry Eagle

Changes in the hydrogen-ion concentration of the blood and in the mineral metabolism during anesthesia. III. The effect of acidosis and alkalosis upon the course of the anesthesia. Jan Bečka. *Arch. expl. Path. Pharmacol.* 174, 173–81(1933); cf. C. A. 27, 5815.—Morphine anesthesia causes alkalosis; other anesthetics (EtCl, ether, CHCl<sub>3</sub>, barbituric acid derivs., hypnal, avertin, urethan, amylene hydrate) cause acidosis. Counteracting this acidosis, as by the intramuscular injection of a proprietary colloidal Mg(OH)<sub>2</sub> prepn. 2–3 hrs. before the administration of the narcotic, generally deepens the anesthesia and often reduces the quantity of the drug necessary for anesthesia. In the case of barbital, however, alkalosis counteracts the anesthetic action, possibly because of the formation of the undissociated salt instead of the free diethylbarbituric acid. Increasing the acidosis, as by the administration of glucose, H<sub>3</sub>PO<sub>4</sub> or NH<sub>4</sub>Cl, increases the toxic symptoms and causes death in the expl. animal.

Harry Eagle

The anti-inflammatory action of [colloidally dispersed] camilla oil. Bergljot Krüger-Nilsen. *Arch. expl. Path. Pharmacol.* 174, 197–207(1933).

Harry Eagle

Subdividing the therapeutic dose of antimony. F. Eichholtz and A. Erhardt. *Arch. expl. Path. Pharmacol.* 174, 208–9(1933).—The therapeutic dose of foadin (3.4 mg Sb per kg. in cat opisthorchiasis), dangerously close to the lethal dose, remains effective if distributed over a 4-day period, but loses effectiveness if distributed over 8 days. The same relationship holds for Sb oxalate. H. E.

Factors affecting Röntgen therapy. F. Eichholtz, H. G. Zwerg and L. Kluge. *Arch. expl. Path. Pharmacol.* 174, 210–16(1933).—Insulin accentuates the inhibitory effect of Röntgen rays upon the growth of rat sarcoma; this may be related to the increased lactic acid content of the tumor caused by the insulin. Preliminary treatment of the animals with adrenaline reverses the usual inhibitory effect of irradiation, causing increased growth instead.

Harry Eagle

The dependence of the effect of uterus-stimulating agents (histamine and ergotamine) upon the concentration and the temperature of the reaction. Werner Lipschitz and Fritz Klar. *Arch. expl. Path. Pharmacol.* 174, 223–44(1933).

Harry Eagle

Radiothorium in leucemias and animal experiment. I. Zadek. *Klin. Wochschr.* 12, 1813–16(1933); cf. C. A. 28, 1108<sup>1</sup>.—A review.

Harry Eagle

The use of sodium citrate in hemophilia. W. M. Krüner. *Klin. Wochschr.* 12, 1906–8(1933).—Five case reports in which the subcutaneous injection of isotonic solns of Na citrate (3.5%) seemed to have some effect in stopping hemorrhage. Where feasible, it was injected around the actual site of bleeding. Its use in conjunction with transfusion is recommended.

Harry Eagle

The [therapeutic effect] of cortical adrenal extract upon psoriasis. Preliminary report. Theodor Grüneberg. *Klin. Wochschr.* 12, 1908–9(1933).

Harry Eagle

The increased serum lipase caused by thyroxine, and its inhibition. I. Julius Bauer and Max H. Hoffman. *Klin. Wochschr.* 12, 1933–4(1933).—Lipoid exts. of blood added to the diet of rats inhibit the increase of serum lipase otherwise caused by the injection of thyroxine. Olive oil has a similar but less pronounced inhibitory action.

Harry Eagle

The effect of splenic substances upon the cholesterol content of the blood. Erwin Schliephake. *Klin. Wochschr.* 12, 1936–8(1933).—The injection of splenic ext. (pro-splen) into human beings tends to increase the blood cholesterol if it was previously low, to depress it if it was previously high. Short-wave irradiation of the splenic area generally causes an increase after an initial fall of about an hr.'s duration.

Harry Eagle

The effect of beryllium and its compounds upon the organism. I. Stefano M. Fabroni. *Klin. Wochschr.* 12,

1963–4(1933).—The intravenous injection of Be(OH)<sub>2</sub> into rabbits has no demonstrable toxic or harmful effect, despite storage of the colloid in the reticulo-endothelial system.

Harry Eagle

The effect of reticulo-endothelial blockade with ink upon the purine metabolism of dogs. Friedrich Chrometzka. *Klin. Wochschr.* 12, 1968–9(1933).—The excretion of purine bases is increased, and also that of uric acid and an unidentified precursor of allantoin, while the excretion of allantoin is decreased. The allantoin/uric acid ratio falls from a normal value to 20/1 to as low as 2/1. The results are interpreted on the basis of a delayed purine metabolism, due to the reticulo-endothelial blockade and its effect upon the liver.

Harry Eagle

The decomposition of cocaine and atropine in the animal body. H. A. Oelkers and W. Rartz. *Klin. Wochschr.* 12, 1985–6(1933).—The rate of decompn. of atropine and cocaine injected into mice corresponds to the rate of sapon. *in vitro* in borate buffers at pH 7.4–7.5.

Harry Eagle

The primary cause of death brought about by some preparations of the digitalis group in mice and rats. Chikao Kinukawa. *Tohoku J. Exptl. Med.* 22, 314–25(1933).—With digitoxin and a pharmaceutical digitalis prepn. the primary cause of death is respiratory failure. With strophanthin and a strophanthus prepn., the primary cause of death is also respiratory, but the circulatory system is also somewhat affected. With rhodein and another rhodea prepn., the primary cause of death is probably circulatory, although the respiratory app. is also profoundly affected. In using mice or white rats for testing the circulatory action of various members of the digitalis group, it is therefore important to use artificial respiration.

Harry Eagle

The effect of camphor upon the size of the pupils in rabbits. Chikao Kinukawa. *Tohoku J. Exptl. Med.* 22, 326–34(1933).—Initial mydriasis (sympathetic stimulation) is followed by miosis (parasympathetic stimulation). In the later convulsive stage there is marked mydriasis (sympathetic excitation and parasympathetic atony); and in the paralytic stage there is moderate mydriasis due to paralysis of the parasympathetic center.

Harry Eagle

Derivatives of 8-aminoquinoline as antimalarial preparations. II. Influence of the length of chain in position 8. O. Magidson and I. Th. Strukov. *Arch. Pharm.* 271, 569–80(1933); cf. C. A. 27, 5112.—The compds. 6,8-MeO(Et<sub>2</sub>N(CH<sub>2</sub>)<sub>n</sub>NI)(C<sub>6</sub>H<sub>4</sub>)<sub>2</sub>N (n = 2, 3, 4 and 5) were studied. The max. chemotherapeutic index (I) was found when n = 3. In clinical tests with this compd. 90% of the cases were cured at the tertian and quartan stage of the disease; in malaria tropica cure resulted in half the cases. It is superior to plasmoquin in being less toxic and in causing secondary phenomena less often. It kills chiefly the gametes. Introduction of a —OH group into the side chain decreased I to 14. The introduction of Et on the 8-amino N completely destroyed the therapeutic effect. Substitution of the piperidino group for the Et<sub>2</sub>N group decreased I to 6. 6,8-(Et<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>O)(H<sub>2</sub>N)C<sub>6</sub>H<sub>4</sub>N was inactive. The chemotherapeutic effects of the principal compds. described have been studied in bird malaria (*Plasmodium praecox*) in 2 species of finch. The present investigation involved among other things the prepn. and characterization of the following: Et<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, b<sub>10</sub> 84–5°, yields with CCl<sub>4</sub> in dry C<sub>6</sub>H<sub>6</sub> 1-diethylamino-3-chloropropane-HCl, m. 62–4° (free base, b<sub>10</sub> 82°, b. 169–71°, d<sub>20</sub> 0.980), which, heated 48 hrs. with 6-methoxy-8-aminoquinoline in abs. EtOH, gave among other products 6-methoxy-8-(γ-diethylaminopropylamino)quinoline, bright yellow viscous oil, b<sub>10</sub> 198–201° (meconate, yellow powder, m. 133–4° (decompn.)). The toxic dose is 1:40,000; I = 26.5. 6-Ethoxy-8-(γ-diethylaminopropylamino)quinoline, bright yellow viscous oil, b<sub>10</sub> 238–41°, b<sub>10</sub> 214–18°; toxic dose 1:1500, I = 13.3. Di-Et 8-diethylaminoethylmalonate, b<sub>10</sub> 136–42°, d. 0.9821, n<sub>D</sub><sup>20</sup> 1.4386. Et γ-diethylaminobutyrate, b<sub>10</sub> 103–5°, d<sub>15</sub> 0.9103, n<sub>D</sub><sup>15</sup> 1.4342. 4-Diethylaminobutanol, b<sub>10</sub> 90–2°, d<sub>15</sub> 0.9103, n<sub>D</sub><sup>15</sup> 1.4474. 4-Diethylaminobutyl chloride gave, on warming with 6-methoxy-8-aminoquinoline, 6-methoxy-8-(γ-diethylaminobutylamino)quinoline (HCl salt orange-yellow,

- hygroscopic needles); toxic dose 1:1500,  $I = 10.6$ . *Di- $\gamma$ -diethylaminopropylmalonate*,  $b_p$  149–51°, oil of disagreeable odor,  $d_{20}^{20}$  0.9724,  $n_D^{20}$  1.4416. *Et  $\gamma$ -diethylaminovalerate*,  $b_p$  130–1°,  $d_{20}^{20}$  0.9040,  $n_D^{20}$  1.4354. *5-Diethylaminopentanol*,  $b_p$  131°,  $d_{20}^{20}$  0.8842,  $n_D^{20}$  1.4642. *6-Chloroamyl-diethylamine-HCl*, m. 55–6°. *6-Methoxy-8-( $\gamma$ -diethylaminoethylamino)quinoline*, bright yellow viscous oil,  $b_p$  210–21° (dimeconate, m. 120–2°),  $I = 25$ . *6-Ethoxy-8-( $\gamma$ -diethylamino- $\beta$ -hydroxypropylamino)quinoline*,  $C_{18}H_{27}O_2N_3$ , very thick orange-yellow oil,  $b_p$  240–5°,  $I = 15$ . *6-Ethoxy-8-( $\gamma$ -piperidinopropylamino)quinoline*, bright yellow oil,  $b_p$  227–32°,  $I = 6$ .  *$\gamma$ -N-Piperidinopropylene glycol*, m. 67–8°. *6-Ethoxy-8-ethylaminoquinoline*, m. 53° ( $HCl$  salt m. 200–1°), yields with  $HNO_3$  an intensely green cryst. nitroso compd. *6-Ethoxy-8-[( $\beta$ -diethylaminoethyl)ethylamino]quinoline*, yellow oil,  $b_p$  192–3°,  $I = 0$ . *6-Ethoxy-8-[( $\gamma$ -diethylamino- $\beta$ -hydroxypropyl)ethylamino]quinoline*,  $b_p$  207–12°,  $I = 0$ . *6-( $\beta$ -Diethylaminoethoxy)-8-nitroquinoline*, m. 47.5°. *6-( $\beta$ -Diethylaminoethoxy)-8-aminoquinoline* (*di-HCl salt*, m. 209–12°; *HCl salt of Ac deriv.*, m. 141°; *HCl salt of Bs deriv.*, m. 57°). *6-( $\beta$ -Diethylaminoethoxy)-8-(benzoyl-ethylamino)quinoline-2HCl*, yellow, m. 182–3°. *6-( $\beta$ -Diethylaminoethoxy)-8-(N-diethylaminoethyl-N-benzoylamino)quinoline* (*HCl salt* m. 83°). W. O. E.
- Some amines, derived from phenol ethers, which reverse certain pharmacodynamic actions of adrenaline. Jeanne Lévy and Erwin Ditz. *Compt. rend. soc. biol.* 114, 971–4(1933).—Ten new compds. of the type  $C_6H_5-OCH_2CH_2NRR'$  or  $MeOC_6H_4OCH_2CH_2NRR'$  were prepd. All were found to diminish, suppress or reverse the pharmacodynamic action of adrenaline. Cf. following abstr.
- L. E. Gilson
- Sympathetic action of some amines derived from phenol ethers. D. Bovet and P. Maderni. *Compt. rend. soc. biol.* 114, 980–2(1933).—Three more compds. of the type described in the preceding abstr. were prepd. and found to antagonize the action of adrenaline. L. E. G.
- Experimental production of hypercholesterolemia in rabbits in a state of chronic uranum nephritis. P. Mauriac and L. Servantie. *Compt. rend. soc. biol.* 114, 1105–8(1933).—Normal rabbit blood contains 0.5 g. cholesterol per l. By repeated injections of an oil soln. of cholesterol into normal rabbits a max. blood cholesterol content of 2.5 g. per l. was attained. But when rabbits were kept in a state of chronic nephritis by administration of U salts it was found possible to raise the blood cholesterol to 7.5 g. per l. by the injections. L. E. Gilson
- Experimental hypothermia produced by sparteine ethylphenylbarbiturate. Fernand Mercier and C. Rizzo. *Compt. rend. soc. biol.* 114, 1183–5(1933).—Sparteine sulfate has little or no effect on the temp. of the guinea pig. Na ethylphenylbarbiturate produces hypothermia and sparteine ethylphenylbarbiturate has a similar but more powerful action. L. E. Gilson
- Variations in the mineral elements of the plasma during ether anesthesia. A. D. Marenzi and Rebecca Gerschman. *Compt. rend. soc. biol.* 114, 1226–8(1933); cf. C. A. 27, 3984. Ether anesthesia causes a large decrease in  $CO_2$  and K, a small decrease in Mg and Ca, an increase in P, and little or no change in Na and Cl in the plasma of dogs. L. E. Gilson
- Comparison of the actions of nicotine and sparteine on the secretion of the submaxillary glands. René Hazard and Lise Wumser. *Compt. rend. soc. biol.* 114, 1240–2(1933). L. E. Gilson
- Action of benzene on leucocytes. Experiments with horses. E. Lemétayer. *Compt. rend. soc. biol.* 114, 1282–3(1933).—By subcutaneous injection of 5–10 cc. thiophene-free benzene daily for 5 days the leucocyte count was increased about 70%. The greatest increase was in the polynuclear forms. Action of quinine on the leucocyte count of the horse. *Ibid.* 1284–5.—Quinine-HCl had little or no effect. L. E. Gilson
- Sympathetic effects of "Pao Pereira." Raymond-Hamet. *Compt. rend. soc. biol.* 114, 1309–13(1933).—Pao Pereira is the bark of *Geissospermum laeve* Baillon, a Brazilian species of Apocynaceae. It contains the alkaloids geissospermine and pereirine. An ext. of the bark has a powerful sympathetic action of the quinine rather than the ergotamine-yohimbine type. Inhibiting action of geissospermine on the utero-motor effects of adrenaline. Rothlin and Raymond-Hamet. *Ibid.* 1314–15. L. E. Gilson
- Pharmacodynamic study of the action of lobeline in infants. Effects on the tachycardia of acute anterior poliomyelitis and infantile acrodynia. Raymond Meyer. *Compt. rend. soc. biol.* 114, 1322–6(1933). L. E. G.
- Ammonia excretion of dogs with uranum nephritis. C. Roersch. *Compt. rend. soc. biol.* 114, 1358–7(1933).—Chronic nephritis induced by U salts is accompanied by a 50%, or greater, decrease in urinary  $NH_3$ . L. E. G.
- Phlorizin content of whole blood during phlorizin diabetes in dogs. A. Lambrechts. *Compt. rend. soc. biol.* 114, 1363–5(1933); cf. C. A. 28, 527<sup>1</sup>.—After intravenous injection, about 80% of the phlorizin disappears from the blood in 5 min., and 95% in 30–40 min. L. E. Gilson
- Stimulating action of dinitroresol and dinitrothymol on cell metabolism. C. Heyman and H. Casier. *Compt. rend. soc. biol.* 114, 1384–5(1933).—Dinitrophenol, dinitronaphthol, dinitroresol and dinitronaphthol all produce hyperthermia and a great increase in tissue metabolism. The toxicity decreases in the order given; hence the last 2 are preferable for exptl. work. Numerous references are given. L. E. Gilson
- Comparative action of diiodotyrosine and Lugol's solution in hyperthyroidism. E. Delcourt-Bernard. *Compt. rend. soc. biol.* 114, 1397–1400(1933); cf. C. A. 27, 135. Expts. with 12 cases are discussed. Diiodotyrosine offers no advantages over inorg. I in the treatment of hyperthyroidism. L. E. Gilson
- Action of "Neptal" on the lipid equilibrium and the fats of the kidney tissue of the dog. C. Achard, J. Veran, M. Bariéty and E. Hadjigeorges. *Compt. rend. soc. biol.* 115, 6–7(1934); cf. C. A. 27, 1938. Injections of Neptal caused changes in the staining properties of the kidney-cell lipids similar to those previously reported as produced by theobromine. Neptal is a 9.2% soln. of the hydroxy-mercuripropylamide of *o*-carboxyphenoxyacetic acid. L. E. Gilson
- Action of apocodeine on dog intestine in situ and the resemblance of this action to that of sparteine. Raymond-Hamet. *Compt. rend. soc. biol.* 115, 24–6(1934); cf. C. A. 27, 1948. The antagonism of pilocarpine and apocodeine and its analogy to that of pilocarpine and tropine and that of pilocarpine and sparteine. *Ibid.* 121–4. L. E. Gilson
- Influence of general anesthetics on the urea content of the blood. King-Li-Pin and Woo-Ping-Soung. *Compt. rend. soc. biol.* 115, 55–6(1934).—In rabbits the normal blood urea is 0.35 g. per l. During general anesthesia it rises to an av. of 0.556 in the case of  $Et_2O$ , 0.464 for  $CHCl_3$ , and 0.6 for urethan. L. E. Gilson
- Influence of potassium on the growth of white rats. A. Leulier and G. Vanhems. *Compt. rend. soc. biol.* 115, 57–8(1934); cf. C. A. 28, 201<sup>1</sup>.—Young rats failed to grow and died in 12–24 days when fed a diet const. only 0.13 g. K per kg. but otherwise complete. L. E. G.
- Intoxication by amino acid nitriles. Protection by sodium thiosulfate. A. Desgrez and C. Sanné. *Compt. rend. soc. biol.* 115, 119–21(1934).—The M. L. D. of  $\alpha$ -aminopropionitrile for rabbits is about 0.025 g./kg. intravenously. Rabbits were protected from 0.05 g./kg. by 0.04 g./kg., or a little over 1 equiv., of  $Na_2S_2O_3$ , injected subsequently. Probably the CN group is converted into  $NaSCN$ . L. E. Gilson
- Paralyzing action of diethylaminomethylbenzodioxan on the vasomotor reflexes of the carotid sinus. G. de Vleeschhouwer. *Compt. rend. soc. biol.* 115, 187–9(1934). L. E. Gilson
- The mechanical properties of the arteries of skeletal muscle and their reaction to adrenaline. F. E. v. Tavel. *Arch. ges. Physiol. (Pflügers)* 233, 111–25(1933). A. G.
- The mechanical properties of renal arteries and their

- reaction to adrenaline. V. Kollbrunner. *Arch. ges. Physiol. (Pflügers)* 233, 126-36(1933). A. G.
- Caffeine contracture of striated muscle after inhibition of lactic acid formation. F. David. *Arch. ges. Physiol. (Pflügers)* 233, 222-8(1933).—In the absence of lactic acid, caffeine contracture is more pronounced than normally. Arthur Grollman
- Effect of phlorizin on sugar absorption. E. Wertheimer. *Arch. ges. Physiol. (Pflügers)* 233, 514-28(1933).—Phlorizin strongly inhibits the alimentary absorption of galactose, fructose and dextrose, but not of xylose and arabinose. The absorption of mannose and dihydroxyacetone is only slightly affected. A. G.
- Hypophysis and anaerobic carbohydrate metabolism. The lactic acid of the blood. J. A. Collazo, J. Puyal and Isabel Torres. *Arch. ges. Physiol. (Pflügers)* 233, 503-13(1933).—Small doses of pituitary liquid (pituitrin, pitresin or pitocin) decrease the lactic acid content of the blood. It is only large doses which cause the increase reported by previous observers. Arthur Grollman
- The chemotherapy of cancer. O. Schürch. *Deut. med. Wochschr.* 59, 1494-6(1933).—Thirty-two carcinomatous patients were treated with a 0.5% soln. of Pbl, dissolved in 10% aq. Ca gluconate. Only a temporary improvement (due to the Ca gluconate) was observed. Arthur Grollman
- The mechanism of lead poisoning. An acute case of lead poisoning. A. Schretzenmayr. *Deut. med. Wochschr.* 59, 1601-3(1933). Arthur Grollman
- Experimental studies on colloidal lead poisoning. E. Merlini. *Arch. ist. biochim. ital.* 5, 395-410(1933). E. S. G. B.
- The relation of the clinical picture of lead poisoning to the lead content of the blood and urine. E. Bass. *Deut. med. Wochschr.* 59, 1665-8(1933).—Analysis of the Pb content of the blood and urine has a diagnostic and prognostic value clinically. Arthur Grollman
- The question of injury to the organism by the use of salves containing cholesterol and vitamin D. A. M. Memmesheimer. *Deut. med. Wochschr.* 59, 1681-2(1933). Arthur Grollman
- Effects of amines on oxidations of the brain. Juda H. Quastel and Arnold H. M. Wheatley. *Biochem. J.* 27, 1609-13(1933).— $\beta$ -Phenylethylamine,  $\beta$ -phenyl- $\beta$ -hydroxyethylamine, tyramine, indole, isoamylamine and mescaline strongly inhibit the oxidation of glucose, Na lactate and Na pyruvate by the brain; but do not affect the oxidation of Na succinate. Neurine, cadaverine, putrescine, ethylamine and histamine have little effect on the oxidation by the brain of glucose, Na lactate or Na succinate. Benjamin Harrow
- Further studies on the pharmacological properties of onium salts. H. R. Ing and Winifred M. Wright. *Proc. Roy. Soc. (London)* B114, 48-63(1933).—The curariform properties of sym. onium salts of N, P, As, S and I, and of quaternary ions derived from pyridine, quinoline and strychnine were studied by use of isolated frog nerve sartorius preps. Anomalous curariform properties were not confined to Et-onium ions. Of 32 onium cations tested, only those contg. 3 Me groups produced contraction of the frog rectus abdominis muscle. The size of the cation may influence the pharmacodynamic properties of an onium salt. Joseph S. Hepburn
- Effect of salts on cell permeability as shown by studies of milk secretion. Geoffrey L. Peskett. *Proc. Roy. Soc. (London)* B114, 167-80(1933).—Evidence exists of a correlation between the ratio Na:diffusible Ca in blood and the ratio solids-not-fat:fat in milk, both in a group of cows and in individual animals. "It is suggested that variations in the proportions of these salts in the blood cause changes in the compn. of milk by affecting the relative permeabilities to lipid and non-lipoid of the mammary cell membranes." Joseph S. Hepburn
- The injury to carbohydrate metabolism in chronic lead poisoning. Ludwig Schmidt-Kehl. *Munch. med. Wochschr.* 80, 2003-4(1933).—The retention of fructose is diminished in rabbits poisoned with Pb. Milton Levy
- Pharmacological studies of dyes employed clinically. Toru Kuraya. *Japan. J. Gastroenterol.* 5, 133-42(1933).—Toxicity to frogs and mice is shown by paralysis. Tables of M. L. D. values for a series of dyes are given. C. M. McCay
- Toxicology of dyestuffs. Konan Shi. *Japan. J. Gastroenterol.* 5, 142(1933).—A table is given which divides dyes into 3 classes upon the basis of toxicity. C. M. M.
- Hypoglycemia from trypsin. Gabriele Monasterio. *Boll. soc. ital. biol. sper.* 8, 1297-8(1933).—Small doses of trypsin (5-50 mg.) previously incubated 2-6 hrs. at 37° injected intravenously into rabbits produced a slight but definite hyperglucemia; doses of 100 mg. produced no noticeable effect, while doses of 0.5 g. produced a marked hypoglycemia often resulting in convulsions which were relieved by glucose; still greater doses, 1.0 g., produced a less marked hyperglucemia. Rabbits were injected with 0.5 g. doses intravenously or subcutaneously; the former animals showed a marked hypoglycemia; the latter, a marked hyperglucemia. These results indicate that an *in vivo* neutralization of insulin by trypsin is not possible. Peter Masucci
- Preliminary studies on the distribution of neurotropic drugs between the various lipoids of the encephalo-spinal centers. G. Biancalani. *Boll. soc. ital. biol. sper.* 8, 1325-30(1933).—Dibromostearin and NaBr were administered to adult dogs in increasing doses such that the amt. of Br was the same for the 2 compds. The animals were killed; the brain, spinal cord, liver, muscles and subcutaneous fat were removed, ground, and extd. with ether. Exts. and residue were dried and incinerated. Results of Br detn. by the Engel method showed that for dibromostearin the largest amt. of Br was present in the fat with decreasing amts. in liver, spleen, muscles, brain and spinal cord; for NaBr, there was no Br in fat and only traces in the other tissues. In the brain and cord, regardless of which compd. was administered, the largest amt. of Br was found in the acetone-sol. portion, not assocd. with cholesterol, but in the non-satd. phosphatides and water-sol. fractions. For dibromostearin, the Br content of the phosphatides was about twice that of the protein fraction; for NaBr, the reverse was found. P. M.
- The action of mineral water containing calcium sulfate; pressure variations at the level of the carotid sinus. D. Santenoise, C. Franck, L. Merklen and M. Vidacovitch. *Bull. acad. méd.* 109, 80(1933). A. E. Meyer
- Poisoning produced by apiol adulterated with o-tolyl phosphate. M. Tiffeneau. *Bull. acad. méd.* 109, 121-5(1933). A. E. Meyer
- General disturbances produced by radium. Léon Imbert and Raymond Imbert. *Bull. acad. méd.* 109, 229-36(1933).—Guinea pigs living in a high concn. of Ra irradiation lose wt. and die within 6-7 weeks. Liver damages and gastric ulcers are post-mortem findings. A. E. Meyer
- The influence of tobacco and nicotine on the coronary vessels. Ch. Laubry, J. Walser and L. Deglaude. *Bull. acad. méd.* 109, 595-8(1933).—The coronary vasoconstrictor effect is negligible. The action is entirely on the nervous system. A. E. Meyer
- The effect of carbon dioxide introduced intraperitoneally or rectally on respiration and circulation. M. Loeper, André Lemaire, A. Mougeot and V. Aubertot. *Bull. acad. méd.* 109, 598-602(1933).—The method is more effective than percutaneous application and does not carry the danger of suffocation, as inhalation. A. E. Meyer
- The action of thyroid and pituitary extract on blood composition and diuresis; combined action of thyroid extract and theobromine. L. Langeron, M. Paget and J. Leduc. *Bull. acad. méd.* 109, 843-6(1933).—The ratio plasma vol.:corpuscle vol. is increased by thyroid if it was lower than normal, but it remains unchanged in normal conditions. Diuresis and Cl elimination decrease. The diuretic effect of thyroid and theobromine is much larger than that of theobromine alone. Pituitary decreases the amt. of fluids in blood and the diuresis; it is antagonistic to the thyroid. A. E. Meyer
- The action of some cardiotonics on the isolated ventricle of the snail. A. Beaune and V. Balaceanu. *Bull. sci.*

- pharmacol.* 40, 658-62(1933).—Digitalin has little effect on the muscle; it affects especially the frequency of the rhythm. The systolic stop effected by it is reversible by washing with Ringer's soln. Ouabain has a direct effect on the muscle and its tonus. Caffeine has a neg. chronotropic action. The stimulation of the muscle has a max. at concns. from 1:1000 to 1:5000. A. E. Meyer
- Vagotonin and regulation of arterial pressure. P. Couturat. *Presse méd.* 41, 426(1933).—The action is mediated by the nervous system. A. E. Meyer
- Local cutaneous reactions of histamine. G. Roussy and M. Mosinger. *Presse méd.* 41, 805-8(1933).—Local skin reactions produced by histamine are recommended for the study of peripheral vasomotor function. A. E. M.
- Glycerol and the combination glucose-mercuric chloride in the treatment of varicose veins. Armand Bacharach. *Presse méd.* 41, 709-10(1933). A. E. M.
- The pharmacology of Althea. Henri Leclerc. *Presse méd.* 41, 738(1933). A. E. Meyer
- The combination of amyl nitrite with sodium thiosulfate in the treatment of potassium cyanide poisoning. Alfredo Buzzo and Rogelio E. Carratalá. *Semana méd.* (Buenos Aires) 1933, II, 1772-5; cf. *C. A.* 27, 4305.—Inhalation of  $\text{AmNO}_2$  combined with intravenous injections of  $\text{Na}_2\text{S}_2\text{O}_5$  gives an effective treatment in KCN poisoning. The former causes the formation of methemoglobin, which gives a stable compd. with CN and facilitates the action of the  $\text{Na}_2\text{S}_2\text{O}_5$ . Though  $\text{NaNO}_2$  is still more effective,  $\text{AmNO}_2$  has the advantage of easy application. A. E. Meyer
- Diiodotyrosine in the treatment of hyperthyroidism. Donato Boccia and Antonio E. Torre. *Semana méd.* (Buenos Aires) 1933, II, 1917-19.—Diiodotyrosine is in hyperthyroidism only an assisting remedy, which must be given over a prolonged period. A. E. Meyer
- Sparteine and camphor in the treatment of heart disease. Emile Goujoux. *Semana méd.* (Buenos Aires) 1933, II, 1927-31.—Favorable results obtained with sparteine camphorsulfonate are reported. A. E. Meyer
- Intraspinal bismuth treatment in neurosyphilis. Roque Orlando and Walter Grobli. *Semana méd.* (Buenos Aires) 1933, II, 1992-8. A. E. Meyer
- Avertin narcosis. Adolfo A. Finocchietti. *Semana méd.* (Buenos Aires) 1933, II, 1998-2025. A. E. Meyer
- Results obtained in foreign countries with the treatment of exophthalmic goiter with fluorine. León Goldemberg. *Semana méd.* (Buenos Aires) 1933, II, 2106-11. A. E. Meyer
- Aniline poisoning by cutaneous absorption. Carlos Burdes. *Semana méd.* (Buenos Aires) 1934, I, 104-5.—Description of a case. A. E. Meyer
- Clinical investigations into the effect of intravenous injection of insulin. VI. The hypoglycemic symptoms in diabetes. Kaj Roholm and Th. E. Hess Thaysen. *Acta Med. Scand.* 80, 528-49(1933); cf. *C. A.* 25, 2485.—In 98 out of 101 expts. on persons with normal glucose metabolism the intravenous injection of 12 insulin units brings on insulinism symptoms. In diabetics with injections of 12 or 24 units the incidence of insulinism occurred in 20 and 57%, resp. This difference is attributed to the fact that insulinism symptoms develop only when the glucemia level drops to about 50 mg. % in about 50 min. Otherwise there is no difference in the nature of the response of normal or diabetic persons. S. Morgulis
- The therapeutic action of amino acids on spontaneous rat cancers. F. Vlès and A. de Coulon. *Compt. rend.* 197, 1779-81(1933).—Twenty-four mice in which tumors had spontaneously appeared were fed a mixt. of 15.5 g. of l-cystine, 5.7 g. of dl-alanine, 7.5 g. dl-proline, 8.3 g. each of powd. pig stomach and powd. upper intestine, 12.3 g. of dried pancreas, 28.8 g. of powd. skin, 0.4 g. of thyroid gland, 1.1 g. of whole pituitary gland, 2.9 g. of dried testicle and 0.6 g. of dried suprarenal glands. Ten of the mice showed disappearance of tumors, 3 showed amelioration, while growth was aggravated in 6 mice. James C. Munch
- The action of chemical agents on the skin. Rene Chesneau. *Rev. gen. mat. color* 38, 1-9(1934).—In general there is no well-defined connection between mol. constitution and degree of harmful action on the skin. For diazo solns., cutaneous action is greater the higher the mol. wt.; sulfonation reduces this virulence. Certain substances that are harmless by themselves affect the skin in reducing baths. The characteristic action on the skin and its treatment are described for numerous substances. Halsey E. Silliman
- The toxicity of organic solvents (various esters, acetone and methanol). F. Flury and W. Wirth. *Arch. Gewerbepath. Gewerbehyg.* 5, 1-90(1933).—The toxicities of the vapors of the following org. solvents were studied: MeOAc, EtOAc, PrOAc, BuOAc, i-AmOAc, PhOAc, diethyl ester of phthalic anhydride, Me glycol acetate, MeOH,  $\text{Me}_2\text{CO}$  and ethylene glycol. All caused irritations of the mucosa of the eye and the respiratory tract which sometimes resulted in considerable inflammation. The esters are not as harmless as is generally believed. The Me derivs. are especially toxic because of the formation of MeOH within the animal. Henry Tauber
- The toxicity of acid copper carbonate sprays on the animal organism. I. Brodskii. *Arch. Gewerbepath. Gewerbehyg.* 5, 91-107(1933).—Acid Cu carbonate shows its effect, within a very short time, on the respiratory organs, the gastrointestinal tract, the cardiovascular system and, in rare cases, on the central nervous system. Henry Tauber
- Pharmacological investigation of "Senso," a Chinese drug from the dried skin secretion of the frog. I. Yoshito Kobayashi. *Proc. Imp. Acad.* (Tokyo) 9, 552-5(1933).—The chemistry of this drug has been studied by Kondo and Ikawa (*C. A.* 27, 1887, 3940).  $\psi$ -Bufotalin shows a digitalis-like cardiac action in a diln. of 1:1,000,000,000, while at 1:10,000,000 it has a poisonous action; the fatal dose for cats is 0.25 mg. per kg. body wt. The Ac deriv. acts on the heart in a diln. of 1:30,000,000 but is not poisonous in a diln. of 1:1,000,000.  $\psi$ -Bufotalin bromide is active in a diln. of 1:1,000,000,000,000,000 but is not toxic in a diln. of 1:1,000,000; the fatal dose for cats is over 19 mg. per kg. Acetyl- $\psi$ -bufotalin chloride is active in a diln. of 1:5,000,000,000 but not toxic at 1:1,000,000. Monoacetyl- $\psi$ -bufotalin,  $\text{C}_{28}\text{H}_{45}\text{O}_7$ , is active in 1:10,000,000; monoacetyldesacetyl- $\psi$ -bufotalin chloride is slightly less active than the mother substance but is about equally toxic (1:1,000,000). Anhydro- $\psi$ -bufotalin chloride is active in 1:100,000,000.  $\psi$ -Bufotoxin is active in 1:500,000,000. Desacetyl- $\psi$ -bufotalic acid and -bufotalonic acid are active in dilns. of 1:20,000-40,000; the Me ester has a slightly stronger action. Tetrahydro- $\psi$ -bufotalin is active in a diln. of 1:20,000. C. J. West
- Chemical composition and pharmacological action of buckwheat (*Polygonum hydropiper* L.). W. R. Witanowski and H. P. Kryńska. *Wiadomości Farm.* 60, 563-6(1933).—The dry substance of *P. hydropiper* L. contains an acrid ethereal oil amounting to 0.13-0.07%. It is obtained by steam distn. of the ether ext. of the plant, as distn. of the dry substance causes decompn. of the oil. The ethereal oil contains polygonone, which yields a cryst. thiosemicarbazone m. 194-5°. Its Ag salt is amorphous. The extd. oil lowers the blood pressure of mammals to a higher degree than sabinol, the lowering of the blood pressure being effected rather by widening of the blood vessels of the intestines than weakening of the heart muscle. The oil diminishes the tension of non-striated muscles of the intestines and the uterus. J. W.
- Morphine, codeine and their derivs. (Eddy) 17. Derivs. of piperazine (Pollard, Adelson) 10. Synthesis of thiazole-barbituric acids (Hooper, Johnson) 10.
- Majumder, Akhil R.: Modern Pharmacology and Therapeutic Guide. 3rd ed. Calcutta: The Book, Co., Ltd. 602 pp. Rs. 5. Reviewed in *Indian Med. Gaz.* 68, 598(1933).
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- Berret, Jules: Contribution à l'étude pharmacodynamique d'un nouvel anesthésique local: Le paraminobenzoate du N, N-diéthylleucinol (Panthésine). Geneva. 1931. 63 pp.

**Bohne, Herbert:** Die Ausscheidungsverhältnisse des Jods im Harn des Gesunden bei Darreichung 6 verschiedene Jodpräparate. Kiel. 1930. 16 pp.

**Hemprich, Rudolf:** Narkose und Kohlehydratstoffwechsel. Kiel. 1931. 34 pp.

**Klitzsch, Hellmut:** Über tierexperimentelle Gewebsveränderungen nach intramuskulärer Injektion von Calciumchlorid und Calciumgluconat (Calcium-Sandoz). Erlangen. 1930. 21 pp.

**Krampe, Martin:** Über Orasthin- und Toncephalwirkung am isolierten Uterus des Rindes. Berlin. 1931. 14 pp.

**Kronisch, Franz J.:** Versuche mit Kalziumtherapie bei Adnexitiden. Breslau. 1931. 38 pp.

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**Schlöff, Joachim:** Über das Vanadium und seine antiluetische Wirkung im Kaninchenversuch. Hamburg. 1931. 22 pp.

**Süstrunk, Marcel:** Die akute Intoxikation durch trans- und cis-Dichloräthylen und Äthylenoxyd. (Zusammenfassung eines Beitrags zur Kenntnis der Narkose). Zurich. 1931. 52 pp.

**Trotet, Edmond:** Contribution à l'étude de l'action du dial associé au pyramidon. Geneva. 1931. 45 pp.

**Westendorff, Ernst G.:** Untersuchung über die Erfolge der intravenösen Chemotherapie bei septisch-gynakologischen, insbesondere puerperalen Erkrankungen. Kiel. 1930. 40 pp.

## I—ZOOLOGY

R. A. GORTNER

**Identification and estimation of tryptophan in the hemolymph of the silk worm.** Luigi Mamoli. *Giorn. chim. applicata* 15, 437-8(1933).—By means of the reaction of Vanosene as modified by Purth and Nobel (C. A. 15, 377), the presence of tryptophan is proved in the hemolymph of the silk worm and its content are found to be 0.152%. It is probable that in silk worms and in other insects as well, the digestion of proteins extends to the liberation of the individual amino acids. A. W. Contieri

**The chemistry of marine animals. I. The sponge *Microciona prolifera*.** Werner Bergmann and Treat B. Johnson. *Z. physiol. Chem.* 222, 220-6(1933).—The red sponge, *Microciona prolifera*, found in Long Island Sound, contains a sterol which constitutes 1.25% of the dry wt. and 7.8% of the  $R_2O$  ext. This *microcionasterol*,  $C_{27}H_{46}O$ , m. 126-7°,  $[\alpha]_D^{25}$  -19.76°, is not identical with the spongosterol or chonasterol isolated from other sponges. Its acetate m. 125-6°,  $[\alpha]_D^{25}$  -24.76°; propionate m. 128°, benzoate m. 143°,  $[\alpha]_D^{25}$  -10.72°. Titration with  $BzO_2H$  shows 1 double bond.  $PCl_5$  converts it into a chloride, m. 104-5°, which is reduced by  $AmOH-Na$  to the hydrocarbon *microcionastene*  $C_{27}H_{46}$ , m. 61-2°, analogous to cholesterol. A. W. Dox

**The metabolism of the eggs of the sea urchin. I. The influence on respiration and lactic acid formation through dyestuffs.** A. W. H. van Herk. *Arch. néerland. physiol.* 18, 578-602(1933).—If a soln. of methylene blue, chrysoidin or Janus green is added to a suspension of unfertilized sea-urchin eggs (*Sphaerechinus granularis*) there is an increase in respiration, which at a concn. of 1:100,000 amounts to about 100% of the normal value. This increase is less with the fertilized eggs. Before and after fertilization the cells have the same R. Q. (0.92). Methylene blue and chrysoidin do not change this, but with the unfertilized eggs, it is increased from 0.92 to 1.09, depending on the amt. of dye and the time of the expt. Because of the great utilization of O in fertilized cells, no change is observed. The mean value of the R. Q. after addn. of glucose (end concn. 1.5%) is 0.60; a strong formation of lactic acid is also observed. Janus green increases the lactic acid formation. The changes in the amt. of lactic

acid do not agree with that of the total sum of all the acids. F. L. Dunlap

**Influence of sulfhydryl and its sub-oxidized derivatives on the developmental cycle of hydranths of the genus *Obelia*.** Frederick S. Hammett. *Protoplasma* 19, 510-40(1933).—"These results with the marine hydroid *Obelia geniculata* extend in several directions the application of the postulate that growth by increase in cell no. is regulated by a naturally occurring chem. equil. composed of the sulfhydryl and sub-oxidized derivs. They not only add another species to the roster, but since the form is representative of almost the most primitive type of multicellular animal organization, they broaden considerably the phylogenetic range of action of the principle. The results give clean-cut demonstration that the site of direct action of the chem. equil. is specifically on the proliferation phase as contrasted with the subsequent processes of differentiation and organization. A type of reproduction occurs in this material which is designated as recurrence since it is the repetitive production of a succession of organisms on the distal end of one and the same pedicle. Its property is the maintenance of colony integrity in the face of the functional decline of its constituent members. The expression of recurrence like all other types is accelerated by sulfhydryl and retarded by the sub-oxidized derivs. It underlies and determines the functional duration of the existing hydranths. For the first time demonstration is made of the proliferation-retarding property of a naturally occurring sub-oxidized SH deriv. of a naturally occurring sulfhydryl compd. (cysteine)." Fifteen citations. F. L. Dunlap

**Osmotic behavior of the sea-urchin egg as a criterion of its permeability.** V. A. Dorfman. *Protoplasma* 19, 578-86(1933). F. L. Dunlap

**Procedure of metabolism during the first mitosis of sea-urchin eggs.** John Runnstrom. *Protoplasma* 20, 1-10(1933); cf. C. A. 27, 2500.—After the first period immediately after fertilization, in which acid cleavage products are formed, a period follows in which these products disappear, at least in part. During this period (about 15-45 min.) alkali is set free, which can bind  $CO_2$ . The quotient free  $CO_2/O_2$  is lessened. During the period after the disappearance of the nucleus (45-75 min. after fertilization) the bound  $CO_2$  increases slowly, whereby the quotient free  $CO_2/O_2$  again becomes higher. The O utilization, according to findings with the eggs of *Paracentrotus*, is greater during the second quarter-hour after fertilization than during the first. In the later periods of mitosis the O utilization sinks somewhat but increases again shortly before or by the division. Twenty-six references. F. L. Dunlap

**Studies on the oxidation-reduction potential of protozoan cultures. I. The effect of -SH on *Chilomonas paramecium*.** Theo. L. Jahn. *Protoplasma* 20, 90-104(1933).—Pos. evidence is offered of an acceleration of cell division by -SH in bacteria-free cultures of *Chilomonas paramecium*. When  $H_2O_2$  is added to a standard culture medium no growth is obtained, but relatively rapid growth occurs if both peroxide and a high concn. of -SH are added. The antagonistic action of -SH and peroxide is explained on the basis of the oxidation-reduction potentials involved. This might explain, at least to some extent, the "specific" action of the -SH radical. Methylene blue is less toxic to *Chilomonas paramecium* in tubes sealed with oil than in unsealed tubes. This might be explained as being due to the higher oxidation-reduction potential in the unsealed cultures or to the oxidation accelerative power of methylene blue in the presence of O. Autocatalysis and allelocatalysis might be explained on the basis of adjustments in oxidation-reduction potential. Fifty-seven references. F. L. D.

**Resistance of fish to toxic compounds under various experimental conditions. Sensitizing action of thermol.** Léon Binet and G. Morin. *Compt. rend. soc. biol.* 114, 608-11(1933).—Marine gobies (*Gobius lota*) were made much more sensitive to the action of strychnine, paraldehyde, or tribromoethanol by keeping them for 1 hr. in a 1:75,000 soln. of thermol (2,4-dinitrophenol). L. E. G.

**Composition of *Sipunculus hemerythrin*.** Jean Roche.

*Compt. rend. soc. biol.* 114, 1188-9(1933); cf. *C. A.* 27, 2690.—The crystal. compd. contains C 53.3, H 6.5, N 16.8, S 1.7 and Fe 1.0%.  
L. E. Gilson

Action of adrenaline, ergotamine and tyramine on the isolated median ventricle of the squid, *Loligo pealii*. Z. M. Bacq. *Compt. rend. soc. biol.* 114, 1358-60(1933); cf. *C. A.* 27, 140.—Adrenaline soln. ( $1 \times 10^{-4}$ ) causes an increase in rate and amplitude of beats. The effect lasts about 1 min. Ergotamine ( $1 \times 10^{-4}$ ) produces a similar effect which lasts 20 min. The effect of tyramine is similar but very weak. Reactions of the isolated median ventricle of *Loligo pealii* to acetylcholine, atropine and potassium, calcium and magnesium ions. *Ibid.* 1360-1.—Acetylcholine,  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  inhibit the automatism of the ventricle. The chronotropism and inotropism are increased by  $\text{K}^+$ . Atropine, even in large doses, does not overcome the effects of acetylcholine. L. E. Gilson

Changes produced by sapid substances in the sensory areas of the palate of surviving frogs. A. C. Bruni. *Boll. soc. ital. biol. sper.* 8, 1332-4(1933).—Sapid substances, AcOH, quinine-HCl and sucrose in concns. such that they do not alter the movement of the cilia, produce appreciable morphological changes in the cytoplasm of certain cells of the palate of the surviving frog when examd. under a microscope. The sensory organs of the frog palate and tongue are really organs of taste.  
Peter Masucci

Elementary composition of hemerythrins and their specificities. Jean Roche. *Compt. rend. soc. biol.* 114, 1190-2(1933); cf. *C. A.* 27, 3958.—Analyses of hemocyanins from 7 species of mollusks and 5 species of crustaceans are given.  
L. E. Gilson

Minnesota lakes and their productiveness of fish food (Johnson) 14.

## 12—FOODS

F. C. BLANCK AND H. A. LEPPER

Exchanges of diffusible substances in the preparation of food products. I. Preparation of cacao. R. Whymp. *Chimie & industrie* 30, 507-17(1933).—In the normal fermentation of cacao beans the temp. rises 20-5° during the 1st 72 hrs. and at the same time the  $\text{H}_2\text{O}$  content diminishes; from 72 to 144 hrs., if the mass has been well mixed to avoid overheating, the temp. falls from 50° to 40° and the beans reabsorb  $\text{H}_2\text{O}$ . Slight fluctuations occur in the tendency of the beans either to lose  $\text{H}_2\text{O}$  during the 1st period or to absorb it during the 2nd. These variations apparently are not related to the temp. but seem rather to be due to modifications in the permeability of the teguments. In the course of a 6-day fermentation the  $p_{\text{H}}$  values of the teguments and pulp increase continuously (e. g., from 3.6 to 6.5), while during the same period there is a variable, but general, decrease in the  $p_{\text{H}}$  of the kernels (e. g., 6.3, 5.3, 6.1). The variation in the  $p_{\text{H}}$  of the kernels seems to coincide with their tendency either to absorb or to lose  $\text{H}_2\text{O}$ . By pushing fermentation to its limit the  $p_{\text{H}}$  of the kernels becomes equal to that of the teguments and pulp. The value of the  $p_{\text{H}}$  of the kernels depends also on the formation *in situ* of org. acids, and not solely on the absorbed pulp. The coloring matter of cacao and the modifications which it undergoes during fermentation were studied by means of  $\text{FeCl}_3$  and U acetate papers, on account of their color reactions with tannins. The red color produced by a drop of aq. ext. of fresh Calabacillo kernels on  $\text{FeCl}_3$  paper is always accompanied by a blue tint; the resultant is a purple that is quite distinct from the red obtained with the ext. of true Forastero cacao under the same conditions; Criollo cacao gives a pale rose, and certain varieties of mottled white cacao give no red color. A 6-day fermentation was followed day by day by means of  $\text{FeCl}_3$  paper; the red zone surrounding the dark central spot due to tannins changed, in the case of Calabacillo cacao, from deep purple to very light pink on the 6th day, and at the same time progressive disappearance of tannins from the kernels was observed. U acetate paper gives very irregular results. It may be mentioned, however, that aq. exts. of fresh Calabacillo kernels, prepd. at 90° or 100°, give a blue color, which turns red only at the end of 24 hrs., while exts. of the same cacao prepd. at lower temp., immediately give a pronounced red. It would seem from the absorption spectra that the red color obtained with fresh Calabacillo beans is due largely to an acid phloroglucinol-pentosan deriv. No pyrogallol or gallic tannin could be detected in fresh Calabacillo and Forastero cacaos; but a pos. reaction for pyrocatechol was obtained in each case. By following the exchanges of soln. which take place in the kernel in the course of fermentation as a function of the fermentation of the outer pulp, it was found that the tannins giving a black, blue or green color with  $\text{FeCl}_3$  disappear progressively (but not completely) from the kernels in

the course of a 6-day fermentation and pass into the teguments, where they are fixed. Production of undesirable substances and molds (in fermentations pushed to the limit) was also studied. Evolution of  $\text{NH}_3$  during the mold phase and formation of amines from  $\text{NH}_4\text{OAc}$  apparently explain the disagreeable characteristics of the beans.  
A. Papineau-Couture

Role of nitrates in certain food industries. P. Mazé and P. J. Mazé. *Compt. rend. soc. biol.* 115, 15-16(1934).—The use of nitrates in meat-curing brines is discussed. Nitrates in the human diet. *Ibid.* 16-17.  
L. E. Gilson

The use of bran as a food for man. Eudo Monti. *Atti I° congr. intern. panificazione Roma 1932*, 228-35(1933).—Bread made with specially prepd. bran, added to the extent of as much as 20% to flour, contains 3 times more water-sol. protein than does ordinary bread. Fully 90% of the phosphates is assimilated. Analyses of bread made with variously treated bran and flour mixts. are given. These analyses include  $\text{H}_2\text{O}$ , ash, salt, P, N, sugars, fat, of both sol. and insol. portions.  
J. A. LeClerc

New diabetic foods. Emilio Daho. *Atti I° congr. intern. panificazione Roma 1932*, 174-7(1933).—"Emida" diabetic foods are composed of a mixt. of definite vegetable substances extd. from the green plant and contain vitamins, P compds., inorg. salts, and enzymes capable of acting on carbohydrates. Wheat gluten is not a constituent. "Emida" yields 350 cal. per 100 g.  
J. A. LeClerc

Cereal chemistry. A review of progress. Thomas H. Fairbrother. *Food Manuf.* 9, 5-10(1934). E. H.

Artificial drying of grains is necessary for their storage and their use in panification. Stefano Camilla. *Atti I° congr. intern. panificazione Roma 1932*, 272-80(1933).—The artificial drying of wheat gives practically the same quality of flour as that produced from wheat dried normally for 1 month. The wheat was analyzed for  $\text{H}_2\text{O}$  and 80% sol. and insol. protein. The flour was analyzed for  $\text{H}_2\text{O}$ , gluten, gliadin and glutenin. J. A. LeClerc

Nutritive value of slightly germinated grains. G. Tallarico. *Atti I° congr. intern. panificazione Roma 1932*, 349-57(1933).—A review of some of the important literature bearing upon the differences (chem. and physiol.) between germinated and non-germinated seeds. Feeding expts. with animals were conducted with both germinated and non-germinated grain as basic food, the former producing the greater growth.  
J. A. LeClerc

The Steinmetz process of milling. Stephen Steinmetz. *Atti I° congr. intern. panificazione Roma 1932*, 169-72, 472-6(1933).—A general description of the machine and process used for cleaning and grinding the wheat so as to retain the max. of minerals and vitamins. S. claims that there is no food poorer in minerals and vitamins than the fine, and for the most part, chemically bleached flour



of today. Wheat cleaned by the Steinmetz process contains the aleurone layer intact, only the fibrous part of the bran having been removed. The whole of this wheat, ground into flour, is used in bread making.

J. A. LeClerc  
Necessity for an international standardization of methods of analysis of wheat, flour and bread. Arnaldo Luraschi. *Atti I° congr. intern. panificazioni Roma 1932*, 123-28(1933).—A general discussion of the various methods employed in the different countries and also the standards that have been adopted.

J. A. LeClerc  
Control of wheat, flour, and bread. Arthur Fornet. *Atti I° congr. intern. panificazioni Roma 1932*, 296-303 (1933).—General discussion. About a score of illustrations help to describe the app. used. The oven recommended can bake four 100-150 g. loaves at one time.

J. A. LeClerc  
Unification of methods for the analysis of flour and grain. Pisani-Borg. *Atti I° congr. intern. panificazioni Roma 1932*, 118-23(1933).—The methods used in different labs. vary considerably, e. g., moisture is detd. by different chemists in an ordinary oven or in a vacuum-heated oven from 100° to 110° for 6-15 hrs. The factor for N may be 5.8 or 6.25; sometimes the protein is given without stating the factor used. The methods for ash detns. are described.

J. A. LeClerc  
The characteristics of the grades of Canadian hard red spring wheat and their value for blending purposes. P. J. Birchard. *Atti I° congr. intern. panificazioni Roma 1932*, 477-85(1933).—For the purpose of grading wheat in Canada, there have been established 2 main classes—statutory grades and com. grades. The statutory grades are defined by an Act of Parliament and are not subject to change from year to year as are the com. grades. The statutory grades are Manitoba No. 1 Hard, Manitoba No. 1 Northern, Manitoba No. 2 Northern, Manitoba No. 3 Northern, and Manitoba No. 4 Northern. The best wheat is graded as No. 1 Hard. The requirements for the other grades are successively just a little lower. The com. grades are usually nos. 5 and 6 but occasionally "Special" grades are established. The com. grades include types of wheat contg. various percentages of kernels damaged by adverse weather conditions, such as frosted, immature, shrunk, bleached, sprouted wheat, etc. All grades of wheat are further classified as straight grade, tough or damp according to the amt. of moisture they contain: straight if moisture is less than 14.5%; tough if more than 14.5 and less than 17%; and damp if more than 17%. Protein is also considered in grading of the wheat. The quantity is controlled by regulating the percentage of hard red vitreous kernels in each of the statutory grades and the quality by limiting the varieties which may enter the 2 higher grades. Canadian hard wheat (Manitoba northern) possesses certain characteristics which render it particularly valuable for blending with the softer wheats of other countries. Flours resulting from such blends produce loaves of increased vol., better texture and higher absorption, while, at the same time, the general baking quality is also improved as shown by the outward appearance of the loaf. Tables are given which show the results of baking blends of Canadian flours with flours from Germany, England and France.

L. H. Bailey  
The composition and baking quality of wheat grown in Roumania. G. Andronescu. *Atti I° congr. intern. panificazioni Roma 1932*, 76-9(1933).—In 1930, some 282 samples of wheat grown in various parts of the country were analyzed and the results tabulated according to the type of soil upon which they were grown. These wheats were milled and the flours analyzed and baked and the results tabulated. The wheats averaged 77.2 kg. per hectare; 34.6 g. per 1000 kernels, 31.2% flinty kernels; 3.5% impurities; 91.2% viability; 11.4% H<sub>2</sub>O; 9.6% protein; and yielded from 68.1 to 74.0% flours. The flours had the following compn.: 12.85-13.37% H<sub>2</sub>O; 8.19-8.99% protein; 22.87-26.69% wet gluten; 8.47-9.85% dry gluten; 60.35-64.36% gluten hydration; 0.547-0.612% ash on 13.5% H<sub>2</sub>O basis; the  $p_H$  varied

from 5.4 to 5.9. Water absorption of flour varied from 58.0 to 63.4%; the loaf vol. from 632 to 791 cc.

J. A. LeClerc  
Biological, chemical and economic aspects of the genetics of wheat. E. Fleurent. *Chimie & industrie* 30, 1263-81(1933).—After a historical review, F. discusses the conditions of the application of the genetics of wheat and the evaluation of the products obtained: (1) biol. and tech. conditions which impose a given gluten content, which there is no interest to exaggerate; (2) chem. conditions which show that, the more nearly does the fermentation of bread approach pure alc. fermentation, which corresponds to a min.  $p_H$  of 3, the better the baking qualities. In conclusion, F. shows the beneficial consequences of these conditions on the wheat problem from the double standpoint of food and cultivation.

A. Papineau-Couture  
The application of genetics to wheat and bread production. E. Fleurent. *Compt. rend.* 197, 1695-7 (1933).—From the protein standpoint there is no advantage in exceeding the min. values of 7-7.5% gluten in whole wheat or 9-9.5% in flour, which represent a good baking value. Secondary alc. fermentation produces acids which do not affect gluten if the  $p_H$  does not become more acid than 3.0. If it does, the colloidal dispersion of gliadin is affected. Yeast gave a superior bread to that produced with leaven.

J. C. M.  
The influence of variety and environment upon the quality of wheat. Fritz Schnelle. *Atti I° congr. intern. panificazioni Roma 1932*, 183-4(1933); cf. C. A. 27, 4866.—General discussion.

J. A. LeClerc  
Valuation of the quality of wheat and of flour. Karel Křtinsky. *Atti I° congr. intern. panificazioni Roma 1932*, 114-16(1933).—The criteria best adapted for the detn. of wheat quality are discussed. Among these are (1) H<sub>2</sub>O, (2) purity, (3) wt. per bu., (4) percentage of flint wheat or hardness; (5) yield in flour. The indications of baking quality are (1) the gluten content; (2) the nature of the gluten.

J. A. LeClerc  
The quality of gluten. Karel Křtinsky. *Atti I° congr. intern. panificazioni Roma 1932*, 116-18(1933); cf. C. A. 27, 4314.—The quality of gluten considered as (1) very elastic, (2) elastic, (3) of medium elasticity, (4) slightly elastic and (5) lacking in elasticity, is detd. in a special simple app., the results from which approximate those obtained by the Hankoczy machine.

J. A. LeC.  
The rapid determination of gluten quality in wheat and flour by means of fermentation. P. Pelshenke. *Atti I° congr. intern. panificazioni Roma 1932*, 334-7(in German 433-6)(1933); cf. C. A. 28, 833<sup>1</sup>.—Form 5 g. finely ground wheat and 0.25 g. yeast into a dough-ball with water. Place the dough-ball in a cylinder (approx. 6 cm. in diam. and 7 cm. high) contg. 75 cc. H<sub>2</sub>O and allow to ferment at 31-33°. The time in min. from the beginning of fermentation to the collapse of the dough-ball is the measure of gluten quality. The time may vary, e. g., from 15 min. to nearly 300 min., depending upon the quality of the gluten.

J. A. LeC.  
Food value of gluten. Silvestro Baglioni. *Atti I° congr. intern. panificazioni Roma 1932*, 208-15(1933).—Review of the more important literature. Gluten is a more complete protein than the corresponding protein of corn or rice.

J. A. LeClerc  
The plasticity of gluten. Pierre Barhade. *Atti I° congr. intern. panificazioni Roma 1932*, 247-61(1933).—A description of the aleurograph for the determination of the quality of the gluten of flour.

J. A. LeClerc  
Ergometry, measure of the strength of flours. Giovanni Issoglio. *Atti I° congr. intern. panificazioni Roma 1932*, 308-11(1933).—The app. and prepn. of the dough-disk are described. It is possible by use of the app. to det. the resistance and elasticity of the flour as well as the amt. of work expended during the swelling.

J. A. LeC.  
Refinement of flour. Otto Czadek. *Atti I° congr. intern. panificazioni Roma 1932*, 285-7(1933).—A general discussion of flour bleaching.

J. A. LeClerc  
The production and composition of wheat flour in Argentina. Carlos Girola. *Atti I° congr. intern. pani-*

*fiaciones Roma 1932, 143-5(1933).*—General information regarding acreage, production, yield, exports, milling capacities, etc. Flour contains over 14% protein, 14% H<sub>2</sub>O on the av. The yield in flour is over 70%.

J. A. LeClerc

**Evaluating the quality of flour by means of an automatic machine the farinograph.** C. W. Brabender. *Atti I° congr. intern. panificazione Roma 1932, 98-103(1933); cf. C. A. 28, 833<sup>1</sup>.*—There are 2 important factors in testing flour: (1) the resistance of gluten to the CO<sub>2</sub> formed during fermentation and (2) the production of this same CO<sub>2</sub> in optimum quantity. Both of these factors can be reduced to a simple formula which expresses the baking quality of a flour. A description of the curves obtained with various flours is given. J. A. LeClerc

**Problems of flour bleaching.** E. Bertarelli. *Atti I° congr. intern. panificazione Roma 1932, 80-92(1933).* General discussion of bleaching and flour improvement. B. describes the various gases, liquids and solids used for these purposes—their compns., the amts. used and found in treated flours, their functions and the results of their applications. J. A. LeClerc

**Microcolorimetric examination of flour, dough and bread.** P. Bruère. *Atti I° congr. intern. panificazione Roma 1932, 106-7(1933).*—The successive application of bromocresol green and "fenozafframina" makes it possible to distinguish under the microscope the gluten (blue), the cellulose (red) and the starch (uncolored).

J. A. LeClerc

**Determining the bread-making value of flours. The pneumodynamometer.** L. Borasio and F. De Rege. *Giorn. risicoltura 22, 97-111(1932).*—An app. is described for detg. the mech. characteristics of any material that is impermeable to air but reducible to membranous form. The app. is especially suited to detg. the elasticity and tenacity of dough and gluten. A. R. Merz

**Rice flour in bread making.** Luigi Borasio. *Atti I° congr. intern. panificazione Roma 1932, 262-7(1933).* The rice flours used varied in compn. as follows, depending upon the degree of milling: ash 1.35-0.48, fat 1.80-0.25, fiber 1.10-0.30, P<sub>2</sub>O<sub>5</sub> 0.68-0.20, phytin P<sub>2</sub>O<sub>5</sub> 0.40-0.00, lecithin P<sub>2</sub>O<sub>5</sub> 0.01 trace, catalase value 38.0-1.5, vitamin units 0.40 trace. From 5 to 15% of rice was used with 95-85% wheat flour. J. A. LeClerc

**Modern processes of bread making and flour improvement.** Joseph Chevalier. *Atti I° congr. intern. panificazione Roma 1932, 108-11(1933).* A general discussion regarding the  $pH$  most favorable for the hydrolysis of the starch and the proper examn. of the gluten.

J. A. LeClerc

**The functions of vitamins (B) in flour and bread; chemical control of vitamins.** Raffaele Pajetta. *Atti I° congr. intern. panificazione Roma 1932, 182-3(1933).* The action of vitamin B is identical with that of phytase. A method is suggested for the detn. of phytase in the presence of phosphates. J. A. LeClerc

**Baking in Germany.** M. P. Neumann. *Atti I° congr. intern. panificazione Roma 1932, 73-6(1933).*—The proportion of water to flour is of prime importance for the proper fermentation of the dough. The same consistency of doughs from different flours does not produce the same effect on vol. or grain. Studies were made of absorption and the colloidal changes resulting as detd. by the Hankoczy-Brabender app. Direct fermentation is preferred over leaven for flour of low gluten content. Rye fermentation is discussed. Baking problems of absorption for proper fermentation, role played by ovens, etc., are discussed. J. A. LeClerc

**Compressed yeast and leaven in baking.** Raffaele Pajetta. *Atti I° congr. intern. panificazione Roma 1932, 45-7(1933).*—Bread made from the same flour by the use of leaven and of compressed yeast (1%), resp., had the following compn. on the dry basis: N in crust 2.25, 2.25; N in crumb 2.25, 2.25%; N in flour 2.18%; sugar as maltose in crust 1.97, 2.76; in crumb 2.25, 5.77%; in flour 1.57%; dextrin in crust 0.78, 0.61; in crumb 0.23, 0.77; in flour 1.60%; acid as lactic in crust 0.43,

0.17%; in crumb 0.72, 0.30%; in flour 0.21%.

J. A. LeClerc

**Supplementary leavening in bread making.** Manuel Lopez-Pico. *Atti I° congr. intern. panificazione Roma 1932, 312-15(1933).*—A general discussion of the process of fermentation during bread making, what constitutes good fermentation and the effect of extraneous substances

J. A. LeClerc

**The use of rational fermentation in bread making by means of selected yeast.** Stefano Camilla. *Atti I° congr. intern. panificazione Roma 1932, 281-4(1933).*—General.

J. A. LeClerc

**The use of diastatic products in baking.** Renato Felicetti. *Atti I° congr. intern. panificazione Roma 1932, 40-5(1933).*—The addn. of 1% of malt flour hastened fermentation and increased the vol. of the dough in 5 hrs. by 22%. The temp. of the sponge box was 30-32°, the temp. of the H<sub>2</sub>O used was 20°; the diastatic power of the malt flour was 8500° (Pollack). (Pollack's diastatic power is the amt. of reducing sugars in g., expressed as maltose, produced by the diastase contained in 1 kg. of substance when acting upon arrowroot starch for 30 min. at 40°.) The diastatic power of some 200 samples of flour varied from 2910 to 10,200, av. 6800. J. A. LeC.

**Diastase in bread fermentations.** Andrea Ponte. *Atti I° congr. intern. panificazione Roma 1932, 49-52(1933).*—There are 3 stages in bread making, (a) prepn. of the dough, (b) fermentation, (c) baking. A general discussion of bread and bread making, fermentation, the role of enzymes, etc.

J. A. LeClerc

**Bread from mixed cereals.** V. Ducceschi. *Atti I° congr. intern. panificazione Roma 1932, 291-5(1933).* A general discussion in regard to the various substitutes for flour, their effects on loaf characteristics, the amts. that can be used from a practical standpoint, their physiol. effects and the necessity for proper legislation. Special mention is made of rice, rye, soy beans and dried milk.

J. A. LeClerc

**Chemistry of starch and bread making. XIV. Is the starch in starch pastes crystalline or amorphous?** J. R. Katz and J. C. Derksen. *Z. physik. Chem. A167, 129-36(1933); cf. C. A. 27, 5213.*—Starch paste with 2 or more parts of H<sub>2</sub>O per part of starch has an amorphous x-ray spectrum that is not distinguishable from that of H<sub>2</sub>O at 80°. Upon cooling to room temp. the B-spectrum is obtained. With wheat or rye, but not potato, starch and a small amt. of H<sub>2</sub>O an intermediate stage is found showing the I'-spectrum. Freshly baked bread either at 80° or room temp. shows the same effect. G. M. Murphy

**The increase in yield in the manufacture of macaroni.** Ludwig Adorjan. *Atti I° congr. intern. panificazione Roma 1932, 132(1933).*—An increase in absorption by the semolina may be brought about by refrigeration, by heat, by irradiation, as well as by chem. means. J. A. LeC.

**Oxidative changes of milk and dairy products. The oily tallowy taste.** M. A. Gondos. *Lait 14, 25-30(1934).*—The development of the oily tallowy taste in dairy products was considered to be due to oxidation of the contained fat. The conditions which operated to affect this oxidation were (1) compn. of the fat, a high content of unsatd. acids predisposing to a rapid oxidation, (2) the presence of oleinase in the fat, (3) contamination of dairy products with heavy metals which catalyze the activity of the oleinase and (4) the relative richness of dairy products in certain reducing substances which acted as natural protective agents against oxidation. Control of some of these factors is attained by choice of the proper ration. A high content of unsatd. acids in the fat can be prevented by eliminating press-cake from the ration.

**Use of fresh hay instead of beets, sugar-house or distg. waste increases the content of antioxidizing material.** Proper pasteurization and elimination of contamination with metals may prevent the action of oleinase. Where none of these measures is possible, the addn. of reducing substances is suggested. A special bacterium of high reducing power has been developed for this purpose.

A. H. Johnson

**Influence of change to pasture on the composition of**

milk. Adolf Faltin. *Kisérletügyi Közlemények* 36, 186-91 (1933).—Contents of fat, fat-free dry matter and whey, and refraction of milk decreased on transferring cows to pasture from the stable. The degree of change varied according to the individual cows and was as high as is generally believed. Sometimes even an increase of fat content was observed. S. S. de Finály

The iodine content of milk. I. Effect of desiccation and storage. Z. M. Hanford, G. C. Supplee and Roe E. Remington. *J. Dairy Sci.* 17, 15-18 (1934).—The I content of milk dried by the atm. double-roller process is not less than that of milk slowly evapd. to dryness at 60-80° after the addn. of NaOH. Change of acidity within a range suitable for drying by the roller process does not affect the recovery of added I. No apparent loss of I from dried milk results from storage for as long as 7 months. II. Variations in the mixed milk of herds. Roe E. Remington and G. C. Supplee. *Ibid.* 19-28.—One hundred and seventeen samples from 8 collecting points in South Carolina dried by the roller process varied in I content from 143 to 1872 parts per billion, with a mean value, of  $572 \pm 10$ . Nine similar samples from New York and six from Wisconsin averaged resp. 285  $\pm$  24 and 322  $\pm$  22. The I content of feeds grown in South Carolina is given. Philip D. Adams

Metallic contamination (of milk) in processing. W. L. Davies. *Milk Ind.* 13, 55-7 (1933).—The natural Cu content of milk is 0.30-0.75 p. p. m. The presence of 1.5 p. p. m. Cu in milk kept at 0-5° is sufficient to taint the milk within 24 hrs., a "tallowy" flavor being developed. To det. the sources of contamination in a processing plant, the contents of Cu and Fe have been detd. at the following stages: (a) raw milk, (b) after the pasteurizer, (c) after the holder, (d) after the cooler, (e) the bottled product. The increase in Cu content during the process is generally accompanied by an increase in Fe content, but the amt. of Fe taken up does not appear to affect the flavor of the milk. The Fe content of raw milk varies from 1.18 to 2.52 p. p. m. No contamination is received by hot milk of uniform temp., contg. no dissolved O<sub>2</sub>, if the holder is properly tinned. B. C. A.

A new method for direct count of microorganisms in milk. V. M. Bogdanov. *Lait* 14, 37-48 (1934).

A. H. Johnson

Contribution to the study of the acidity of abnormal milks. R. Vuillaume. *Lait* 14, 12-25 (1934).—Colostrum milks, milks of retention and milks from cows infected with mastitis were examd. for their titratable acidity,  $p_H$ , chloride, lactose and fat contents and for their coagulation times with rennin. A few of these milks exhibited higher acidities than normal, but more often there was a reduced acidity and a higher  $p_H$  value. The milks of reduced acidity coagulated slowly or not at all with rennin. The addn. of CaCl<sub>2</sub> or CO<sub>2</sub> to these milks sometimes reduced their coagulation times.

A. H. Johnson

Critical preheating temperatures for inhibiting rancidity in homogenized milk. F. J. Doan. *Milk Dealer* 22, No. 11, 40-2, 64 (1933); cf. C. A. 27, 5432.—Samples of 3, 6 and 9% milk were heated to temps. between 38° and 71° for periods of 30, 15 and under 1 min., homogenized at 907 kg. pressure, then immediately cooled and held at 1.5-4.5° for 24 hrs. Titratable acidity,  $p_H$  and surface tension were detd. on these and on unheated or unhomogenized check samples. The lipase was inactivated by heating 30 min. at 53-55°, 15 min. at 56-58°, or under 1 min. at 62-64°. The lipase was apparently primarily in the milk plasma rather than in the fat.

F. L. Seymour-Jones

Substances adsorbed on the fat globules in cream and their relation to churning. III. Analysis of the adsorbed protein. Hilda F. Wiese and L. S. Palmer. *J. Dairy Sci.* 17, 29-33 (1934); cf. C. A. 27, 1954.—"Membrane" protein of washed cream is characterized by a high percentage of arginine and low percentage of cystine and histidine. It is not identical with casein, lactalbumin

or globulin, or the alc.-sol. protein of milk, but resembles haptin (cf. Hattori, C. A. 23, 4277). Philip D. Adams

Evaluation of market creams on the basis of their content of albumin. János Trambics and Gyula Szabados. *Kisérletügyi Közlemények* 36, 221-6 (1933).—To 2 g. cream add 3 cc. CaCl<sub>2</sub> soln. (d. 1.14) to prevent foaming and det. N according to Kjeldahl. Calc. albumin as Kjeldahl N  $\times$  6.37. Good creams contained 3.0 to 3.7% albumin calcd. on fat-free matter. Mixed-milk cream contg. more than 4.0% albumin should be considered adulterated. Cream of industrial dairies should contain at least 22% fat. S. S. de Finály

Composition of ice-cream powders. István Szanyi. *Kisérletügyi Közlemények* 36, 235-7 (1933).—Detailed chem. analyses of 12 different ice-cream powders are given. They consisted chiefly of wheat starch or a rubber-like swelling material and org. acids, together with aniline dyes and taste-improving agents. Their use is quite unjustifiable. S. S. de Finály

Variations in the Reichert-Meissl, Polenske and iodine numbers and refractometer values of Hungarian butters according to different seasons and the correlation between these constants of milk fat. Sándor Péter and István Kron. *Kisérletügyi Közlemények* 36, 192-202 (1933).—Reichert-Meissl nos. of butter were slightly lower in summer. The refractometer readings (at 40°) were 40.5-42 in the winter, 42-44.5 in the summer. No connection was found between R.-M. nos. and refractometer values, though usually too low refractometer readings were associated with unusually high R.-M. nos. The I no. = 4 times (refractometer reading at 40° minus 40.4) plus 26. Limits of I no. were 20.6 and 46.0. Green fadders produced higher Polenske and R.-M. nos. When winter fadders were used the correlation found by Polenske could not be confirmed. S. S. de Finály

Two surface defects of butter—"primrose" color and "toppiness." C. R. Barnicoat. *New Zealand J. Sci. Tech.* 15, 199-203 (1933).—"Fat-aldehyde" was detd. on a surface layer of butter 0.5 mm. thick, and values up to 3.04 were obtained. Surface taint is due to oxidation. The porous nature of the wrappings must be largely responsible. "Primrose" color is a surface desiccation which alters the structure and appearance of the butter. P. S. Roller

The detection of the Escherichia-Aerobacter group in butter. M. Grimes. *J. Dairy Sci.* 17, 11-13 (1934).—Litmus-milk inoculations incubated at 21° and 37° are recommended as preferable to lactose broth. Eosin-methylene blue plates are used for confirmation.

Philip D. Adams

The Tausel-Thaler ketone rancidity test. J. Pritzker and Rob. Jungkuntz. *Chem.-Ztg.* 57, 895-6 (1933).—The discovery of Fortner and Rotsch (C. A. 27, 5997) that fresh butter reacts pos. to the Tausel-Thaler rancidity test (C. A. 26, 3394; 27, 479) was confirmed by P. and J., who also found that *biacetyl* was neg. and *acetylmethylcarbinol* pos. to the test. Any butter therefore contg. the latter will react pos. though it contains none of the Me alkyl ketones assocd. with rancidity. To destroy acetylmethylcarbinol without destroying any Me alkyl ketone which may be present, P. and J. distil the sample with 30% FeCl<sub>3</sub> soln. Tests showed that the volatile fatty acids in butter do not give the test. H. K. Salzberg

A study of the relationships between hydrogen-ion concentration, titratable acidity and quality in Cheddar cheese. L. W. Brown and Walter V. Price. *J. Dairy Sci.* 17, 33-45 (1934).—Electrometric measurements of H-ion concn. in the whey during the manuf. of Cheddar cheese do not indicate significant changes in the acidity any more accurately than titration. The quality is closely related to the acid development during the cheese-making process. Philip D. Adams

Further observations on slow development of acidity in cheese manufacture. H. R. Whitehead. *New Zealand J. Agr.* 47, 376-8 (1933); cf. C. A. 27, 8258.—Certain samples of milk contained strains of lactic streptococci which differed from the normal strains only in their power

to produce during their growth in milk some substance which acted as a powerful inhibitory agent on the subsequent growth of normal lactic streptococci in pasteurized milk but not in raw milk; these strains had no inhibitory effect on *Es. coli* and *B. subtilis*. Pasteurized milk contg. these strains developed little or no acidity.

K. D. Jacob  
Preventing gaseous fermentation of process cheeses by biological methods. Ottó Gratz. *Kísérletügyi Közlönyek* 36, 171-9(1933).—Addn. of lactic acid bacteria and lactose did not always protect the cheese from the deteriorating effect of butyric acid bacteria. S. S. de F.

The prevention of gaseous fermentation of process cheeses. I. Examination of the behavior of gas-producing butyric acid bacteria toward heat. József Csizsár. *Kísérletügyi Közlönyek* 36, 180-5(1933).—Germination of *B. sporogenes* did not cease after 72 hrs. at 60°, 24 hrs. at 70° and 2.5 hrs. at 80°. The organism was killed in 50 min. at 90° or in 6 min. at 100°. *B. putrificus* ceased to germinate after 70 min. at 60°, 60 min. at 70°, 50 min. at 80-90° or 6 min. at 100°. Spores of *B. saccharobutyricus* cease to germinate after 90 min. at 60°, 80 min. at 70-80°, 50 min. at 90° or 4 min. at 100°. Since process cheese cannot be treated at such temps. heat treatment cannot be applied to prevent gaseous fermentation. S. S. de Finály

Causes of black spots on the tin wrappers of process cheeses. József Berkó. *Műegazdasági Kutatások* 6, 308-12(1933).—The blackening is slower at lower temps. Citric acid (0.5% soln.) caused black spots in 1-2 days. Application of a very small drop of 10% citric acid caused within a day a black point that increased in 4 days so as to cover the whole Sn sheet. Cheeses made of moldy, second-class material become black more easily. The use of lacquer-covered Sn sheets is proposed.

S. S. de Finály  
Changes in chemical composition of Cantonese eggs in holding. Melecio T. Legaspi. *Philippine Agr.* 22, 509-20(1933).—The hens were fed uniformly for a considerable period and 200 eggs, half fertile and half infertile, weighing 41 g. each, were stored under normal room conditions for 63 days. Analyses were made at the end of each week on 20 eggs. Both fertile and infertile eggs contained practically the same wt. of ash, protein and fats at all ages but the moisture content of the edible portion decreased gradually from 74 to 67%.

A. L. Mehring  
The manufacture of lactic-acid casein of low ash content. Jean Pien and S. Herschdoerfer. *Lait* 14, 30-7(1934).—Casein of minimum ash content was produced when an acidity of more than 65-70° Dornic was developed by fermentation at a low temp. Under such conditions of acid development the heating may be to any temp., preferably to a low temp. to facilitate washing of the curd but not so low as to allow loss of casein.

A. H. Johnson  
Microchemical researches on chalky and colored rice and the localization of the components. L. Borasio. *Giorn. risicoltura* 22, 111-13(1932).—A table gives the values for the moisture, ash, protein, gluten, fat, cellulose and non-nitrogenous ext. of 5 varieties of chalky and colored rice. Chalky rices, erroneously termed glutinous, lack gluten but contain more dextrin, e. g., 3.5%, than normal rices. The fats of rice are localized in the external teguments. Proteins and P-contg. substances are mostly in the external layers but appear in decreasing quantity in the interior of the grain. A. R. Merz

Culinary uses of soy beans. M. P. Dubyanskaya and P. V. Aleksandrov. *Izvestiya Tsentral. Nauch.-Issledovatel. Inst. Pishchevoi Vyssovoi Prom.* Separate, 1931, 79 pp.—Soy beans, if soaked in water 12-16 hrs., cook in 3.75 hrs. at 100°, 2.5-2.75 hrs. at 102-102.5° or about 1 hr. at 111°. The temp. rise must be effected by pressure, not by adding NaCl or NaHCO<sub>3</sub> to the water. Soy-bean flour spoils so easily that it is unsuitable for making macaroni and other alimentary pastes. Instead of the flour it is best to use the boiled beans in biscuit, cake, pastry, etc.; keeping qualities are then good. There are nu-

merous uses for the whole boiled beans, and soy products are useful in many sweetened foods. J. F. S.

Desirable methods of handling and storing potatoes. Ora Smith. *Am. Potato J.* 10, 176-83(1933); cf. C. A. 27, 3992.—Prestorage of potatoes, immediately after harvesting, at 45-46°F. and high humidity for 11-12 days caused greater shrinkage and decay during storage than did prestorage at 65-68°F. and high humidity. At no time during storage did the atm. of potato cellars show a low concn. of O or excessively high concn. of CO<sub>2</sub>. In general, a pos. relation existed between low shrinkage losses of potatoes and high av. relative humidity, low av. temp., and low evapg. power of the air surrounding the bin during storage. K. D. Jacob

Physicochemical changes produced by the cooking of potatoes. Marion D. Sweetman. *Am. Potato J.* 10, 169-73(1933); cf. C. A. 27, 1684.—Cooking of potatoes does not cause the bursting of cell walls but permits ready mech. disintegration of the tuber tissue by sepn. of cells. The process is characterized by partial gelatinization of the starch, soln. of some of the pectic substances, increased digestibility of the cellulose, coagulation of most of the protein, and more or less caramelization of the sugar. Probably constituents present in smaller proportions are also important in their effects on culinary quality. Fourteen references. K. D. J.

The copper test for the differentiation of healthy and decomposed potatoes. H. Bechhold, Walther Gerlach and F. Erbe. *Angew. Chem.* 47, 26-30(1934).—Raw potato mash dissolves 8-20 γ of Cu per g. of mash, in a N atm. On the av. healthy tubers dissolve a little more Cu than decomposed ones, but the difference is not considerable. Therefore, the tubers (healthy and decompd.) must contain an oxidizing agent, which permits the soln. of a limited amt. of Cu. The same mash which dissolved 8 γ of Cu in a N atm. dissolved 20 γ of Cu in air, a considerably greater amt. A mash treated with Cu for 7 hrs. in a N atm. will dissolve addnl. Cu when exposed to air. The Cu is dissolved in the liquid portion of the mash and is not adsorbed at the tissue elements. The Cu dissolved in the Cu test (Cu strip inserted into tuber) occurs only in the blackened tissue and is evenly distributed without a concn. gradient. The Cu concn. in the blackened tissue is the same for healthy and decompd. tubers. After the blackening, which is a chain reaction, has been started in the healthy tuber by cell injuries, caused by introducing the Cu strip, the Cu acts as catalyst in the blackened region. In the decompd. tuber the propagation of the chain reaction does not occur. In the Cu test the penetration of the Cu is not the cause but the consequence of cell changes which are deep-seated in the healthy tuber but not in the decompd. kind. Spectroanalytical tests showed that the K normally present is displaced by the Cu. Seven references. K. K.

Examination of some Hungarian onions. A modified method for the determination of crude fiber. Zoltán Sándor. *Műegazdasági Kutatások* 6, 274-82(1933).—The contents of moisture, matter extractable with cold water, with ether and with petr. ether, total N, crude and pure proteins, sugars, crude fiber, N-free ext., ash and HCl-insol. ash were detd. in several samples of Hungarian *Allium schoenoprasum*, *A. cepa*, *A. sativum* var. vulgare, *Raphanus sativus* var. radicola and *Cochlearia armoracia*. For the detn. of crude fiber, the method of Weender was modified by substituting for filtration centrifuging, for 10 min. at 3000 r. p. m., adding alkali and filtering through a previously dried and weighed paper. The ignited and weighed filter gives the content of crude fiber. The modification cannot be used for flour since the colloidal flour suspension cannot be sepd. by centrifuging at 3000 r. p. m. S. S. de Finály

The use of unfermented grape juice in alimentation. Marcel Labbé. *Bull. acad. méd.* 109, 299-309(1933).—The compn., prepn. and sterilization of grape juice are discussed. A. E. Meyer

Ethylene coloring of citrus fruit. H. Clark Powell and I. Matthews. *Univ. Pretoria Series* 1, No. 25, 20 pp. (1933).—Equipment for the C<sub>2</sub>H<sub>4</sub> coloring of citrus fruit

is described and illustrated. In the absence of continuous heating during the coloring period the  $\text{CO}_2$  content of the rooms contg. fruit increased approx. 0.2%/hr. When continuous heating was required to maintain the necessary temp., the  $\text{CO}_2$  content of the rooms was kept at a low level, owing to leakage from the continual air circulation between the heating units and the rooms. K. D. J.

**Studies in zymasis. IV. The accumulation of zymasic products in apples during senescence.** John C. Fidler. *Biochem. J.* 27, 1814-21(1933); cf. *C. A.* 25, 4945.—Zymasis is the process of zymase cleavage of carbohydrates that leads to the production and accumulation of EtOH (and often AcH) in plant tissues and the simultaneous production of  $\text{CO}_2$ . Little zymasis occurs in Newton Wonder and Bramley's Seedling apples at the beginning of the storage season and up to the beginning of the change from green to yellow-green, when these varieties are stored in air at 1-4°. Senescence is accompanied by a change in the respiratory metabolism of the cells of the fruit, leading to the accumulation in an apple stored in air of considerable amts. of EtOH and smaller amts. of AcH (that is, the alc. no. of the apple rises). Increase of temp., which accelerates the rate of senescence in an apple, leads to an increase in the alc. no. of the apple. V. Seasonal fluctuations in zymasis and in carbon dioxide/alcohol number ratios in apples in the absence of oxygen. *Ibid.* 1822-8.—Zymasis in  $\text{N}_2$  follows the same seasonal curve as  $\text{CO}_2$  output in air. In any one season, the ratio  $\text{CO}_2$ /alc. no., which is about equal to the ratio  $\text{CO}_2$ /EtOH fluctuates widely about a mean value (of the order 100/80-85 for Newton Wonder and Bramley's Seedling apples). VI. Zymasis by apples in relation to oxygen concentration. Meirion Thomas and John C. Fidler. *Ibid.* 1929-42.—Apples were exposed to mixts. of  $\text{N}_2$  and  $\text{O}_2$  at 23° at different times during the developmental and storage life of the fruit. Rising  $\text{O}_2$  concns. progressively retard zymasis. Early in the storage season no EtOH is produced when the  $\text{O}_2$  value is 1-3%. In old apples, EtOH may accumulate even in 100%  $\text{O}_2$ . The rates of  $\text{CO}_2$  production and of  $\text{C}$  loss fall from max. values in  $\text{N}_2$  to min. values in 3-5%  $\text{O}_2$  early in the storage season, but in 8-10%  $\text{O}_2$  for older apples. Benjamin Harrow

**Carbonated apple juice.** D. C. Carpenter. *Natl. Bottler's Gas.* 52, No. 620, 50-4(1933).—Organoleptic tests indicated that carbonated juices were preferred. Observers were inconsistent in reporting scorched tastes in unpasteurized as well as pasteurized juices. Tables are given for the compn. of sediments from the juices. Flash heating (180°F. for 20 sec., cooling immediately to 60-70°F.) followed by filtration through filter cell, then through a Seitz filter, gave a brilliantly clear, sterile juice, which showed no sediment after storage for 2 years. Sediment was pronounced in pectinol-treated juices after 4 months. In clarified-treated juices sediment was slight after 4 months, objectionable after 8 months. Juices treated with gelatin-tannin were entirely clear after 8 months. Ester recovery of over 90% was secured with a Pfaudler fruit juice concentrator and ester impregnator. Several tables are given. J. H. Toulouse

**The use of citrus juices in making carbonated beverages.** W. E. Haier. *Natl. Bottler's Gas.* 52, No. 622, 50-2 (1934).—Citrus fruit juices are used as the base of many carbonated beverages. The process of prep. the juice is described. Directions concerning the proper use of the juices include: storage of ingredients before use, bottle cleaning and rinsing, use of pure materials, and adherence to the manufacturer's formula. J. H. Toulouse

**Some problems in the production of quality beverages.** Max Levine. *Natl. Bottler's Gas.* 52, No. 620, 57-9 (1933).—The presence of substances in sugar which promote the growth of yeast is undesirable for the manuf. of carbonated beverages. Sanitation is extremely important. Cl solns. can be used for general sterilizing purposes and are most effective when used warm rather than cold or hot. Quality beverages must not contain microorganisms or foreign flavors. Air content of the gas should be low. J. H. Toulouse

**Product control methods.** J. H. Toulouse and O. E. Gore. *Natl. Bottler's Gas.* 52, No. 622, 41-5(1934).—Directions are given for the testing and control in carbonated beverage manuf., with discussion of the technic. Special attention is given the control of sugar (*sucrose*) and  $\text{CO}_2$  concns., and the testing of bottle-washing soln. Twelve tests are covered. J. H. T.

**The characters of Sicilian honey.** Felice Sorgès. *Chim. ind. agr. biol.* 9, 398-9(1933).—Sicilian honey (lemon and orange honey) contains ash 0.031-0.179 (alky. of the ash, 0.3-0.7 cc. 0.1 N KOH), albumins coagulated by heat 0.308-0.581, albumins coagulated by tannin 0.305-0.702, acids (calcd. as formic) 0.105-0.294, sucrose 1.56-2.8, glucose 70.9-77.2, volatile matter (with  $\text{H}_2\text{O}$  vapor) 0.02-0.11%. G. A. Bravo

**Walnuts—curing and storage trials.** J. B. Hamond. East Malling Research Sta., *Ann. Rept.* 1931, 28(1932).—When deshucked and washed walnuts were stored at 36°F. for 6 months, the least deterioration occurred in those nuts that had been bleached in  $\text{CaOCl}_2$  and packed in coconut fiber or salt. Kernels high in oil remained considerably more plump than those of av. oil content. K. D. Jacob

**Cold-storage experiments with pecans—a preliminary report.** G. H. Blackmon. National Pecan Assoc., *Rept. Proc. 31st Ann. Convention* 1932, 88-96.—Pecans can be kept in a fresh condition from 1 season to the next when stored at 32°F. or lower, if the nuts are placed in storage as soon as they are thoroughly dry and before the oil begins to break out. Kernels packed in glass jars contg. N or  $\text{CO}_2$  and stored at 42°F. or lower were in fair to good condition after 6 months, while those packed in a vacuum showed some rancidity at 37°F. and higher. Kernels packed in glass jars contg. O and stored at 32°F. for 6 months were more or less rancid and had a very dark reddish color. K. D. Jacob

**Chemical and microscopic examination of anise.** László Benedek. *Kisérletügyi Közlemények* 36, 216-220 (1933).—Twenty samples of anise contained ash 6.1-33.2, sand 0.5-24.2, alc. ext. 7.6-23.1 and ethereal oils 0.4-2.8%. Previous extn. of seeds can only be detd. by microscopic examn. Seeds extd. with alc. are light gray; those treated with steam, dark gray. S. S. de Finály

**Roasted coffee.** Jeno Mótusz. *Kisérletügyi Közlemények* 36, 204-10(1933).—Normal roasted coffee contains 0.5-1.0% surface oil. Beginning 1-2 days after roasting, coffee berries sweat for about 4 weeks. This sweating is not prevented by shellacking. To det. glossing agents the petr. ether method is better than Gur'y's ether method, because the fat const. can be detd. more easily. S. S. de Finály

**A new sampling tube for feeding stuffs and seeds.** F. Mach. *Deut. Landw. Presse* 60, 195(1933).—When the instrument inverted in the material to be sampled is withdrawn, the point seps. from the handle and picks up 50-100 g. of sample. K. C. Beeson

**Sapukaja nut (Freise) 27.** Biol. reaction by spectrum analysis (Gerlach) 11D. Does fertilization influence the baking quality of bread grain? (Neumann, Lemmerzahl) 15. App. for cooling margarine, etc. (Brit. pat. 399,252) 1.

#### THESES

**Matthäi, Heinrich:** Verwendung des Trifruktosangehalts des Roggens zur quantitativen Bestimmung von Roggen- in Weizenmehl. Frankfurt. 1931. 58 pp.

**Prowosnik, Lothar:** Erfahrungen über die Fütterung saugender Stuten in der schlesischen Praxis und ihre Erfolge (zugleich Futtermittel- und Pferdemilch-Analysen). Breslau. 1931. 65 pp.

**Staudt, Erich:** Über den Einfluss von Wärme und Feuchtigkeit auf die chemische Zusammensetzung des Weizenkornes, unter Berücksichtigung enzymatischer Tätigkeit. Zurich. 1931. 60 pp.

Weis, H.: Der Unterschied im histologischen und chemischen Bau zwischen Frisch- und Gefrierfleisch und seine Verwertung bei der Lebensmittel-Kontrolle von Wurst und Hackfleisch. Hannover. 1931. 38 pp.

Preserving food. Ralph E. King (to The British Thomson-Houston Co. Ltd.). Brit. 398,735, Sept. 21, 1933. Air, at 35-45°F. and with a relative humidity of 80-85%, is circulated by a fan over the food at 20-300 ft. per min., the cooling element for the air operating at a temp. sufficiently close to the temp. of the air in the food-preserving cabinet to produce and maintain the required humidity. App. is described.

Preserving food. John Brewis. Brit. 399,648, Oct. 12, 1933. Meat, fish, etc., are preserved by coating with a film of a hydrogenated animal fat and (or) vegetable oil which hardens at ordinary temps. A small amt. of edible paraffin and (or) glycerol may be added. In a modification paper or fabric impregnated with the oil, etc., is applied to the commodity before the oil, etc., has set.

Health biscuits. Alfred Bullard. Brit. 398,360, Sept. 14, 1933. Agar-agar is dissolved in boiling H<sub>2</sub>O and the soln. mixed with coarse ground wheat and other cereals in approx. the proportions wheat 10, barley 2, oats 1 and agar-agar 0.5 parts. The mixt. is dried in an oven, ground into meal, sweetened with sugar, honey, etc., shaped and baked.

Milk preparations. Hansatische Mühlenwerke A.-G. Brit. 398,329, Sept. 14, 1933. In prepg. concd. milk products (0.1% or over of lecithin is added prior to or during concn. The prepus. may be used in the manuf. of margarine and chocolate.

Deodorizing and dehydrating fluids such as cream.

<sup>1</sup> Philip F. Rust (one-half to Industrial Equipment Co.). U. S. 1,943,146, Jan. 9. Live steam in whirling motion is introduced into a vacuum chamber, and a fluid under treatment such as cream is introduced into the top portion of the envelope of expanded steam so that it will descend outwardly and downwardly through the steam. App. is described.

Butter. Paul Feremutsch. Brit. 398,666, Sept. 21, 1933. See Ger. 574,770; Swiss 159,136 (C. A. 27, 4600) App. is described.

Apparatus and method for drying eggs and other liquid food products which are admixed with salt, sugar, casein, gums, glycerol or other material which forms a coating on the dried particles and retains therein a gaseous ingredient such as carbon dioxide which is also added to the product. Samuel Tranin. Brit. 399,492, Oct. 4, 1933.

<sup>3</sup> Roasting coffee. Edward J. Dent (to American Coffee Corp.). U. S. 1,943,211, Jan. 9. During the roasting period coffee in a roaster is subjected to a continually rising temp. beginning at approx. a roasting temp. and continuing until the temp. of the roaster reaches a relatively higher degree such as 150-190°, and roasting is then continued at a more slowly rising temp. until a still higher temp. such as about 200° is attained indicating completion of the roasting. App. is described.

<sup>4</sup> Feed for supplying vitamins, etc. Charles F. Schnabel. U. S. 1,942,943, Jan. 9. Immature grasses grown in rich soil, in the sun, and cut at a stage of growth where joining has not yet occurred, are dried in such a manner as to retain substantially uninjured the original chlorophyll content of the grasses (as by drying in the sun). The product is especially suitable for a poultry feed.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Chemical engineering and its industrial significance. W. B. Gibbs. *Science Progress* 28, 405 19(1934).—A concise survey of the entire field of chem. engineering, with an enumeration of the requisite subjects for a curriculum in chem. engineering. Joseph S. Hepburn

Conditions in the heavy chemical industry. P. Parrish. *Chem. Age* 29, 591 3(1933). E. H.

The chemical industry of Austria in 1933. I. Pollak. *Oesterr. Chem.-Ztg.* 37, 1 2(1934). E. H.

Chemistry in the new Germany. I. Science and industry. A. Binz. *Angew. Chem.* 47, 1 2(1934). II. The problem of Germany's raw material supply. Willy Bauer. *Ibid.* 2 4. III. Chemistry, the problem of raw materials and national economy. L. Ubbelohde. *Ibid.* 4 7. IV. Chemical problems of bast fiber research. Schilling. *Ibid.* 7-11. Thirty-four references. K. K.

Research pays profits—experiences in successful and unsuccessful research. H. W. Gillett. *Metals & Alloys* 5, 23 7(1934). D. Schaaf

Legal pitfalls for the chemical engineer. J. Davidson Pratt and G. S. W. Marlow. *Trans. Inst. Chem. Engrs.* (London) Adv. Copy, Jan. 8, 1934, 28 pp. E. H.

Means of transportation in the chemical industry. R. Hänchen. *Metallborse* 24, 1-2, 33 5, 65-6, 97-8, 131 (1934). E. H.

A survey of the materials commonly used in the chemical industry. F. Cellin. *Metallborse* 23, 1454 5, 1487, 1523, 1554-5, 1586-7, 1619(1933).—Information is assembled in tabular form on the temp. at which they may be used and the construction materials suitable for use with the common inorg. acids, org. acids and alkalies. E. H.

American Society for Testing Materials, Tentative Standards, 1933, 1136 pp.; cf. C. A. 27, 1418.—Tentative specifications, phys. and chem. methods of testing, recommended practices, definitions and (or) rules (together with some tentative revisions of standards) are given for various kinds of steel and steel articles, Zn-coated steel articles, wrought Fe, cast Fe, magnetic testing, ferrous metals and alloys, Al and Al alloys, Mg

and Mg alloys, brass and bronze, Cu wire and cable, die castings, elec.-heating and elec.-resistance alloys, nonferrous metals, cement, lime, gypsum, brick, building stone and tile, clay and concrete pipe, concrete and concrete aggregates, coke, timber, shipping containers, naval stores, oils and thinners, varnish and varnish materials, lacquer and lacquer materials, paints and pigments, petroleum products and lubricants, road materials, waterproofing and roofing materials, elec. insulating materials, rubber products, textile materials, slate, thermometers and coal. G. G.

American Society for Testing Materials, Standards, 1933, two parts, 2300 pp.; cf. C. A. 25, 2210.—Standard specifications, phys. and chem. methods of testing, definitions, charts, and (or) recommended practices are given for various kinds of steel and steel articles, Zn-coated steel articles, ferrous metals and alloys, wrought Fe, pig Fe and Fe castings, Al and Mg alloys, Cu and Cu alloys, Pb, Ni, solder metal, white metal, Zn, deoxidizers, elec.-heating and elec.-resistance alloys, nonferrous metals, cement, lime, gypsum, brick, building tile, fire tests, refractories, pipe and drain tile, concrete and concrete aggregates, coal, coke, timber, timber preservatives, naval stores, pigments, oils and thinners, varnish and varnish materials, lacquer and lacquer materials, preservative coatings, putty, paint, petroleum products and lubricants, road materials, waterproofing and roofing materials, elec. insulating materials, rubber products, textile materials, slate, thermometers and sieves. G. G.

<sup>9</sup> Equations of the diffusion of water in the drying process. A. V. Luikov. *Trans. Thermo-Tech. Inst. Moscow* 1933, No. 7, 49-52.—A math. analysis. A. A. B.

Avoiding the formation of emulsions. G. Fester. *Angew. Chem.* 47, 32-3(1934).—Several manipulative prescriptions for avoiding emulsion in extn. processes are given, with special emphasis upon the use of Ca(OH)<sub>2</sub> powder in aq. emulsions. K. K.

Heat transfer for fluids in turbulent flow in pipes.



R. Chandler. *J. Inst. Petroleum Tech.* 20, 51-72(1934).

E. H.

A new formula for the determination of the heat-transfer coefficient from the liquid to the walls of the tube in a turbulent movement. E. P. Shubin and S. F. Kop'ev. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 8, 35-38.—A crit. discussion is given of the formulas of Kraussold, Merkel, ten Bosch and others. A. A. B.

Danger of carbon monoxide poisoning in industry and mines under normal working conditions. Koelsch. *Arbeitschutz* 1933, 80-1; *Chimie & industrie* 30, 579; cf. C. A. 27, 3541.—Analysis of a large no. of samples of air taken from a wide variety of working places showed the presence of slightly over 0.01% CO (considered as the lowest toxic limit) in only 1/3 of the samples. A. P.-C.

Acute pulmonary edema following exposure to war gases. Andre Kling. *Compt. rend.* 197, 1782-4(1933).—Cl, Br, phosgene, diphosgene and triphosgene react with cholesterol or with lung pulp to furnish a well-crystd. chlorocarbonic ester of cholesterol. During this reaction the hydrophilic character of the fats in the cells of the lungs is destroyed. This explains the acute pulmonary edema which results from the loss of hydrophilic character with the disappearance of the free sterols. J. C. M.

Heat insulators and methods of testing them. F. Kofler and M. Brandt. *Wärme* 56, 230(1933); *Chimie & industrie* 30, 566.—A brief description. A. P.-C.

University patent policies. Archie MacInnes Palmer. *1 Patent Office Soc.* 16, 96-131(1934). E. J. C.

Part played by HF in the noxiousness of the Meuse Valley fog in 1930 (Mage, Batta) 15. Molded artificial resin articles [for elec. insulating purposes] (Brit. pat. 399,738) 26 Cellular rubber [for heat- and sound-insulating panels] (Brit. pat. 399,940) 30. Aq. dispersions of asbestos and rubber [for insulating panels] (Brit. pat. 399,870) 18

Bruère, P.: Organisation biochimique de la défense passive contre le péril chimique aérien. Paris: Vigot Frères. F. 6. Reviewed in *Ann. fals.* 26, 169(1933).

Génin, G.: La filtration industrielle. Paris: Dunod & cie. 448 pp. F. 98. Reviewed in *Chem. Trade J.* 94, No. 2436, iv(1934).

Prandtl, Wilhelm, Gebele, Hubert, and Fessler, Julius: Gaskampfstoffe und Gasvergiftungen. Wie schützen wir uns? 3rd. ed. Munich: Verlag der Ärztliche Rundschau. 117 pp. M. 2.40.

Annuaire de l'Union des Industries Chimiques, 1933. Paris: The Union. 528 pp. Reviewed in *Chem. Trade J.* 94, 84(1934).

Chemical Engineers' Handbook. Edited by John H. Perry, et al. New York: McGraw-Hill Book Co., Inc. 2024 pp. \$9. Reviewed in *Chem. Met. Eng.* 41, 88(1934).

Kempe's Engineer's Year-Book, 1933-34. 40th ed., revised and re-edited. London: Morgan Bros., Ltd. About 2500 pp. 31s. 6d. net.

Purifying gases such as carbon dioxide. Floyd J. Metzger (to Air Reduction Co.). U. S. 1,942,485, Jan. 9

The gas is compressed in stages with removal of impurities, at least a portion of which result from the compression, by treatment after the final compression at the pressure attained in the final stage and at a temp. above the crit. temp. of about 31° and up to about 175° with a soln. of an alkali metal permanganate to remove odor- and taste-imparting substances.

Condensing gases and vapors. Carbo-Norit-Union Verwaltungs-G. m. b. H. (Erwin Reismann, inventor). Ger. 587,511, Nov. 4, 1933 (Cl. 12s. 3.02). App. for obtaining gases and vapors difficult to condense, from mixts. expelled from adsorbents such as active C or SiO<sub>2</sub>, is described.

Separating gaseous mixtures. Carbo-Norit-Union Verwaltungs-G. m. b. H. Brit. 399,680, Oct. 12, 1933. In a process in which several adsorbents in different stages of exhaustion are arranged in parallel, all the adsorbents

are charged for the same length of time, but the rate of flow of gas to each one is controlled in accordance with its capacity. Throttling devices for effecting control are described.

System for separating gases by liquefaction. Mapag Maschinenfabrik Augsburg-Plattling A.-G. and Mathias Frankl. Brit. 399,405, Oct. 5, 1933. O, etc., is evapd. in a rectifier in the sepn. of air, etc., by the heat of an unliquefied part of the gas mixt., cooled in an expansion engine or otherwise.

Apparatus and method for transferring liquefied gas from one container or vessel to another. N. V. Maschinenre-en Apparaten Fabrieken. Brit. 399,112, Sept. 28, 1933.

Drying solutions and emulsions. Johan M. Visser. Brit. 400,000, Oct. 19, 1933. See Fr. 746,203 (C. A. 27, 4321).

Emulgators. Chemische Fabrik R. Baumheier A.-G. (Rudolf Kern, inventor). Ger. 584,949, Sept. 28, 1933 (Cl. 23c. 2). Emulgators are prepd. by swelling casein with alkali or NH<sub>4</sub>OH, mixing the product with resin- or fatty acid soaps, and stirring or kneading the viscous product to a spinnable mass. The mass may be allowed to stand for a time before kneading.

Carbon resistors. Elektrische Glühlampenfabriken Kremenezky A.-G. Brit. 399,907, Oct. 19, 1933. In mfg. elec. resistances of high ohmic value by depositing C on an insulating carrier from a gaseous C compd., deposition of amorphous C at low temps. is prevented by using C compds., such as CH<sub>4</sub>, having a high decompn. temp., e. g., 800-900°. The process may be hastened by admitting more readily dissociable compds. When the temp. has risen sufficiently to prevent formation of amorphous C, excess C on the carrier is removed by admitting CO<sub>2</sub> at a temp. so low that disocn. of the CO formed is prevented.

Ignition plugs. Siemens & Halske A.-G. Brit. 399,752, Oct. 12, 1933. An electrically heated filament, e. g., of Mo or W, is enclosed in a body of pure metal oxide, e. g., Al<sub>2</sub>O<sub>3</sub>, fused at above 1600°, or a mixt. of such oxides.

Heat-transmitting media. N. V. de Bataafsche Petroleum Maatschappij. Brit. 399,441, Oct. 5, 1933.

The media comprise high-boiling alkylated aromatic compds. Suitable compds., obtained by alkylating C<sub>6</sub>H<sub>6</sub> and C<sub>10</sub>H<sub>8</sub>, comprise tri-isopropyl, di-sec. butyl, mono-sec. butyl, di-methylethynaphthalene and di-tertiary amyl benzene. Hydrogenated compds. may be used.

Heat-transferring media. Gesellschaft für Drucktransformatoren (Koenemann-Transformatoren) G. m. b. H. Brit. 399,757, Oct. 12, 1933. The media comprise mixts. of molten metallic chlorides contg. ZnCl<sub>2</sub>, e. g., ZnCl<sub>2</sub> 75, KCl 15 and NaCl 10% or ZnCl<sub>2</sub> 70, KCl 12, NaCl 8, LiCl 5 and FeCl<sub>3</sub> 5%, having m. ps. 180° and 140°, resp.

Respirators. Joseph de Saint-Rapt and Georges Decombe. Brit. 399,390, Oct. 5, 1933.

Gas masks, etc. John A. Sadd. Brit. 399,197, Sept. 25, 1933. Face-pieces for gas masks or respirators are made by coating rubber (compn.) onto a suitably shaped core and vulcanizing while exposed thereon. Brit. 399,496, Sept. 25, 1933, divided on 399,197, relates to a construction of the mask whereby moisture is removed from the inspired air.

Solid carbon dioxide production. Frank R. Zumbro (to Frick Co.). U. S. 1,943,232, Jan. 9. Various details of app. and operation are described.

Use of solid carbon dioxide for refrigeration. Frank Heywood (to Imperial Chemical Industries Ltd.). U. S. 1,941,744, Jan. 2. Various details of app. and air current heat interchange are described.

"Hold-over" solutions for refrigerating apparatus. Joseph Fleischer (to Frigidaire Corp.). U. S. 1,943,268, Jan. 9. A plurality of liquids are used together which are not completely miscible with each other so that although freezing takes place at a const. temp. the freezing

is not complete but leaves liquid interspersed between the crystals formed by freezing. For this purpose there may be used a mixt. contg. water 90 and BuOH 10%, a mixt. contg. water 80 and ethylene glycol mono-Et ether acetate ("cellosolve acetate") 20% or a mixt. of water 95 and diethylene glycol mono-Bu ether ("butyl carbitol") 5%.

**Insulating material.** David Traill and Imperial Chemical Industries Ltd. Brit. 399,888, Oct. 16, 1933. The material consists of a mixt. of a H<sub>2</sub>O-insol. cellulose ether and methylene diaralkyl or diaryl ethers, comprising methylene dibenzyl or diphenyl ethers and their lower alkyl or alkoxy derivs. Other ingredients of high elec. resistance, e. g., glyptal or PhOH-aldehyde resins, gums, resins or oils, rubber, pigments, fillers, e. g., powd. slate, ZnO, etc., may be present. Among examples (1) Et cellulose is mixed with methylene ditolyl ether and ZnO on heated rolls and (2) benzyl cellulose, methylene diphenyl ether and china clay are made up into a dope with xylene, PhMe and methylated spirit.

**Heat-insulating material comprising asbestos or slag fiber having a honey-comb structure.** Louis Weber. U. S. 1,942,013, Jan. 2.

**Heat- and sound-insulating boards and blocks.** Gilbert J. Ward (to Cheesman-Elliott Co.). U. S. 1,941,769, Jan. 2. The surface of a material of compacted, loosely-assocd. fibrous material, such as "Celotex," is uniformly impregnated with a relatively hard asphalt or the like so as not to change substantially the texture of the material and to leave an unimpregnated inner portion.

**Electric insulation suitable for magnetic cores of loading coils, etc.** Wm. C. Ellis (to Bell Telephone Laboratories, Inc.). U. S. 1,943,115, Jan. 9. Magnetic cores, etc., are formed of finely divided particles of magnetic material such as "permalloy" mixed with insulating material formed from colloidal clay, milk of magnesia and Na silicate (mixed in a volatile liquid such as water and evapd. to dryness).

**Impregnating and insulating electric cables.** Thomas N. Riley (to International Standard Elec. Corp.). U. S. 1,941,913, Jan. 2. A conductive core such as one of Cu is surrounded with insulation such as fibrous material, and after subjecting the insulated core to a drying operation under predetd. conditions of temp. and pressure and in which the temp. is raised and the pressure is lowered an impregnating medium such as methylnaphthalene is introduced into the cable, which may finally be varnished.

**Cables.** Greengate & Irwell Rubber Co. Ltd. and Reuben Povey. Brit. 398,811, Sept. 19, 1933. Cables are insulated with layers of unvulcanizable wax compd., contg. at least 50% wax, alternating with layers of varnished fabric or fabric proofed with the wax compd., the innermost layer being of the wax compd. applied directly upon the conductor or upon an interposed layer of asbestos. The outer layer of varnished or proofed fabric is covered by a braided fabric sheath coated with cellulose varnish or wax, over which may be applied a protective metal sheath. The wax compd. comprises a mixt. of paraffin, ozokerite or ceresin with rubber, gutta-percha or balata without vulcanizing agents.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Water supply of greater Dublin.** M. A. Moynihan. *J. Inst. Munic. Co. Eng.* 58, 1716(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 39 40(Apr. 8, 1933).—Slow sand filters of 220,000 sq. ft. of area are used to filter the soft peaty water (hardness 2°) which has caused considerable incrustant trouble in pipes. No pipes under 4 in. are laid. The consumption is 2.5 million gals. a day. Elaborate chem. analyses are given. C. R. Fellers

**Water supply of Sheffield.** J. K. Swales. *Munic. Eng.* 89, 581(1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 39(Apr. 8, 1933).—The history of the Sheffield water supply is given. The softening and filtration plant comprises chem. feed app., reaction and pptn. tanks and gravity sand filters. All the water supplied is filtered and treated with chalk or lime to neutralize its acidity and prevent Pb-solvent or other corrosive action. The supply is used by 850,000 people. C. R. Fellers

**The Stour supply scheme of the South Essex Waterworks Company.** Bernard W. Bryan. *Water & Water Eng.* 35, 334-50(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 89(Sept. 23, 1933).—An area of 153 sq. miles, with a population of 460,000 and a daily consumption of 12.95 million Imp. gal. per day is served. The works consist of intake, siphon, low lift pumping station, sedimentation reservoir, primary and secondary filtration plants, high lift pumping station and distribution works. The unfiltered water is treated with NH<sub>3</sub> and Cl and then passes through a covered baffled contact reservoir of 680,000 Imp. gal. capacity. C. R. Fellers

**The Polchow works of the municipal waterworks at Stettin.** O. Zumbusch. *Gas- u. Wasserfach* 75, 236 (1932); *U. S. Pub. Health Eng. Abstracts* 13, W, 44 (Apr. 15, 1933).—The ground water of the Oder Valley is unsuitable for water supplies, and among the small works are 4 deep wells at Polchow which yield 4.8 million cu. m. a year. Analyses are given. The water passes through an open Fe-removal plant, is aerated and filtered. C. R. Fellers

**Development of underground water supplies in North Dakota.** G. H. Beard. *Trans. N. Dak. Water & Sewage Works Conf.* Nos. 1, 2, 3, 4, 236-49; *U. S. Pub. Health Eng. Abstracts* 13, W, 89(Sept. 23, 1933).—In

N. Dakota 75% of the population use ground water. In general, shallow wells are preferable because of the lower temp. of the water and also because of low cost of construction. Gravel-packed wells deliver more water and have a longer life. C. R. Fellers

**Alkali-alkaline ground water from chalk formation.** O. Luning and K. Brohm. *Z. Untersuch. Lebensm.* 66, 365-8(1933). F. L. Dunlap

**Mineral-water supply of the Mineral Wells Area, Texas.** Samuel F. Turner. *U. S. Geol. Survey Circ.* 6, 9 pp (1934). E. H.

**Kata-numa, a very strong acid-water lake on volcano Katanuma, Niyagi Prefecture, Japan.** S. Yoshimura. *Arch. Hydrobiol.* 26, 197-202(1933).—This lake situated in the crater of a volcano has a *p*<sub>H</sub> of 1.4. The acidity is due to H<sub>2</sub>SO<sub>4</sub>. Milton Levy

**A quarter century of progress in the purification of acid waters.** Edward C. Trax. *Proc. 8th Ann. Conference Water Purification, W. Va. Univ. Tech. Bull.* No. 6, 5-19(1933).—*Bituminous coal-mine drainage* free from acidity is very unusual. Since the prosperity of this area depends upon the mining and industrial enterprises the large streams will become economically most valuable as carriers of city sewage and industrial wastes. A typical acid drainage is highly mineralized, contg. mainly large amts. of sulfates of Fe, Al, Ca, Mg, Mn, as well as free H<sub>2</sub>SO<sub>4</sub>. These compds. are formed by oxidation of the sulfides. Many attempts to treat drainage at the mines by neutralization have failed because of high cost. Disposal by pumping into wells also failed, because of clogging of strata by pptd. Fe hydroxide. The most promising method thus far used has been the sealing of mines in such a manner that the S-bearing strata are submerged and air oxidation is retarded. The simplicity of the neutralization reactions involved has made unnecessary the introduction of any new chemicals during the past 25 years. Much progress has been made in chem. feeding and mixing and in sludge handling. The principal difficulties in control of treatment are the extreme variability in mineral content of raw water and the large amt. of chemicals required. Control measures must not be relaxed because

of the decrease in typhoid fever. Twenty-two references.

G. L. Kelso

The treatment of the Elk river for water supply. F. L. McLaughlin. Proc. 8th Ann. Conference Water Purification, *W. Va. Univ. Tech. Bull.* No. 6, 28-35(1933).—A flocculator of unusual design is employed. Chloramine-activated C treatment successfully prevents taste trouble from industrial phenol wastes. In one plant prechlorination and preammoniation are used without postchlorination. Under certain conditions the entire stream is treated with  $\text{CaSO}_4$  2 miles above the waterworks intake.

G. L. Kelso

A study of total solids, manganese and acidity and their courses downstream of north branch of the Potomac River. J. G. Patrick. Proc. 8th Ann. Conference Water Purification, *W. Va. Univ. Tech. Bull.* No. 6, 52-65(1933).—Detn. of total solids, org. matter, Mn, sulfates,  $\text{pH}$ , total acidity and alkyl. were made at 6 stations for 27 weeks on the Potomac and Savage Rivers and Piney Swamp Run. Results are tabulated and shown diagrammatically.

G. L. Kelso

Colorimetric methods for nitrate determination in water. Walter Lühr. *Z. Untersuch. Lebensm.* 66, 544-56 (1933).—It is shown that the method of Grandval and Lajoux for the colorimetric detn. of nitrate in potable water, wherein the dry residues are treated with phenol-sulfonic acid in an open porcelain dish, results in significant losses. These losses may be avoided by adding 2 drops of a 15%  $\text{NaOH}$  soln. to 10 cc. of the water to be evapd. and through the use of flasks. While this method gives serviceable results, because it is more troublesome to carry out and is less sensitive, it is considered inferior to the methods of Noll and Tillmans-Sutthoff. F. L. D.

Municipal water softening. W. H. Walker. *J. Am. Water Works Assoc.* 26, 77-98(1934).—See C. A. 27, 3270.

E. H.

The suitability of Soviet permutite materials for water softening. Yu. M. Kostrikin and F. E. Prokhorov. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 8, 38-46.

A. A. Boetlingk

The neo-permutite plant in the Luganek power plant. F. E. Prokhorov. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 8, 47-54.

A. A. Boetlingk

Treatment of the feed water for the Löffler boilers installed in the power plant of the Thermo-Technical Institute. Yu. M. Kostrikin. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 6, 28-32.—The Löffler steam boilers receive a feed water composed of a mixt. of condensate and water treated with soda lime. The untreated water has a hardness of 12-14° (German). The org. substances are removed by treatment with  $\text{Al}_2(\text{SO}_4)_3$  (50 g. per ton at 40-50°) and the water is treated in addn. with soda lime.

A. A. Boetlingk

Use of activated carbon without filtration. F. E. Stuart. Proc. 8th Ann. Conference Water Purification, *W. Va. Univ. Tech. Bull.* No. 6, 36-40(1933).—In one instance in the U. S. 3.5 p. p. m. Aqua Nuchar applied to a reservoir as a slurry from a boat removed tastes and odor and settled within 24 hrs. In England 5 p. p. m. of C applied to a lake from a motor boat removed tastes and odors, but required 48 hrs. to settle. In both cases settling was complete enough to prevent passing of C into the distribution system. Water-softening processes have been improved by addn. of activated C. G. L. K.

Loss of head and backwashing velocities for anthracite coal in water filters. Homer G. Turner and G. S. Scott. *Water Works and Sewerage* 80, 66-8(1933).—A series of reduced-scale expts. on several sizes of crushed, screened anthracite show that anthracite filters have a lower head-loss and require lower backwash velocity for equiv. expansion than the same sizes of sand.

G. H. Y.

Clarification of water supplies by filtration through anthracite. Homer G. Turner and G. S. Scott. *Water Works and Sewerage* 80, 135-6(1933).—A series of expts. to det. the efficiency of anthracite filters, as compared with sand, in the reduction of turbidity show a higher efficiency of removal of suspended matter for the anthracite filter. It is proposed that this superiority is

due to the angular shape of crushed anthracite particles.

G. H. Young

Attrition loss of anthracite in rapid filters. Homer G. Turner and G. H. Young. *Water Works and Sewerage* 80, 246(1933).—A lab.-scale test to det. the attrition loss of fine anthracite when subjected to const. rubbing and impact on backwashing indicates that an approx. annual loss of only 0.2% would be encountered under usual operating conditions.

G. H. Young

The action of bacteria in the thermal springs of Aachen and Aachen-Burtscheid. A. Brussoff, F. Reinartz and A. Schloemer. *Z. Untersuch. Lebensm.* 66, 446-53 (1933).—The lime deposits in 2 thermal springs in Aachen-Burtscheid are of bacterial origin.  $\text{SiO}_2$ -depositing and Fe-storing bacteria are also involved in its formation.

F. L. Dunlap

Simple apparatus for detecting sporadic colon bacilli in water. H. Hoek. *Z. Hyg. Infektionskrankh.* 112, 715(1931); *U. S. Pub. Health Eng. Abstracts* 13, W, 42 (Apr. 8, 1933).—A layer of kieselguhr is deposited from a suspension on a filter plate made of the fineness of a Berkefeld filter candle. When a sufficient quantity of the water to be examd. has passed through the filter, the kieselguhr layer is removed. Examn. for *Es. coli* by means of sterile  $\text{NaCl}$  solns. or tap water to which *Es. coli* had been added showed that approx. 67% of the organisms were retained in the kieselguhr. The app. is recommended for simplifying the procedure in water-works and could be used for examg. water or other liquids for other microorganisms as well as for *Es. coli*. C. R. F.

New method for the isolation of *Es. coli* in water. G. Fleury. *Bull. soc. pharm. Bordeaux* 3, 193(1931); *U. S. Pub. Health Eng. Abstracts* 13, W, 42(Apr. 8, 1933).—One cc. of the water under examn. is added to 15 cc. of nutrient agar medium colored with Congo red. After 1-3 days' incubation at 25-30°, colonies of *Es. coli* appear blue and those of *Eberthella typhi* dark red. The bacteria commonly occurring in water can also be detd. by this method.

C. R. Fellers

Symposium on cement-lined water mains—solubility of lining. Robert S. Weston. *J. Am. Water Works Assoc.* 25, 1754-7(1933).—The presence of  $\text{CO}_2$  affects cement linings by dissolving  $\text{CaCO}_3$ , thereby increasing the hardness of the water. With high-Al cements some liberation of Al hydrate is possible. Changing the compn. of the cement or applying a waterproofing coating is considered more effective than treating the water. John R. Baylis. *Ibid.* 1757-61. —As long as  $\text{Ca}(\text{OH})_2$  exists in contact with Fe no corrosion of the pipes can take place. Because of the corrosive effect of most waters on Ca in the cement, painting is strongly favored, especially when the waters are soft. E. L. Chappell. *Ibid.* 1761-9.—Unless the cement is too high in sol. constituents the corrosive action of water will not impair its efficiency. It is felt that, aside from short initial changes, cement-lined pipe under normal conditions has little noticeable effect on the quality of water carried. A low-sol. cement-lined pipe having desirable qualities is referred to. F. E. Hale. *Ibid.* 1770-7.—Tests were made on uncoated and coated pipes, with tar, asphalt and high-alumina cement. Tar coatings while more effective than asphalt coatings were objectionable because of taste and odor. Results on the high-alumina cement are not yet available. Improved results will be obtained through care in application of the cement lining and thoroughness in application of the org. coating. D. K. F.

Minnesota lakes and their productiveness of fish food. Preliminary report. Maynard S. Johnson. *Minn. Agr. Expt. Sta., Tech. Bull.* 90, 3-31(1933).—Chem. and biol. data are given.

C. R. Fellers

Sewage-disposal plant at Southampton. Notes on new works. S. G. Stanton. *Munic. Eng.* 89, 360(1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 25(Apr. 15, 1933).—The Portsmouth sewage-disposal scheme which was recently remodeled comprises a gravitational system and a pumping system. The former consists of storm tanks, settling tanks, sprinkling filters and humus tanks, and the latter of pumps, screens and filters. Sludge from

both systems is conveyed to a tank where supernatant liquor is removed and the sludge is disposed of at sea.

C. R. Fellers

Sewage disposal for large institutions in country districts. A. W. Charity. *J. Inst. Sanit. Eng.* 35, 65 (1931); *U. S. Pub. Health Eng. Abstracts* 13, S, 25(Apr. 15, 1933).—Plan and quant. data are given. C. R. F.

The sewerage works at Colak, Echuca and Mildura, and experience gained during their operation. B. T. M. Garlick. *J. Inst. Engrs. Australia* 5, 330-1(1933); cf. *C. A.* 27, 5852.—Comparison is made with experiences at the Glenclog plant, where trouble occurred during the early stages of operation with considerable growths of *Sphaerotilus* in the activated sludge. Temporary reduction of incoming sewage and an increase in aeration remedied this condition. A. W. Furbank

Analyses on sewage and effluents. Granville Berry. *Munc. Eng. Sanit. Record* 93, 12-13(1934).—Brief notes are given as a guide to the general interpretation of analytical tests, and to indicate the relative efficiency of each stage in the whole process of purification. A. W. F.

Recent "fresh-water" sewage clarification plants for household use. Baumeister and Koschare. *Gesundh.-Ing.* 56, 618-22(1933).—The subject is discussed generally and two recent types of equipment are described. M. G. Moore

$p_H$  determination and the problem of waste waters. M. Deribéré. *Papeterse* 55, 1050-5, 1110-7, 1174-8 (1933); cf. *C. A.* 27, 4991.—After a brief discussion of the value of  $p_H$  detns. in controlling the biol. purification of waste water, the principle of the electrometric detn. of  $p_H$  is explained, and instruments constructed by F. & M. Lautenschlager, Munich, for the continuous electrometric and colorimetric detn. of  $p_H$  are described. A. Papineau-Couture

Pollution of the air by smoke. J. S. Owens. *J. State Med.* 42, 51 8(1934). Philip D. Adams

App. for treating water with Cl (U. S. pat. 1,942,659) 1. Sols for clarifying sewage (U. S. pat. 1,942,507) 18.

Brumbaugh, W. V.: The Significance of Current Trends in Sewage Treatment. Washington: National Lime Assoc. Reviewed in *Rock Products* 36, No. 10, 41(1933).

Hardenbergh, Wm. A.: Municipal Sanitation. Scranton, Penna.: Intern. Textbook Co. \$1.75.

Savell, Walter L.: Hypo-Chlorination of Water. New York: Mathieson Alkali Works. 72 pp. Free.

Standard Methods for the Examination of Drinking Water. Issued by Verein Deutscher Chemiker. Tl. 1. 16 pp. Tl. 2. 18 pp. Berlin: Verlag Chemie. Reviewed in *J. Am. Water Works Assoc.* 26, 161(1934)

Lindemann, Ada: Über Trinkwasserdesinfektion durch Chlorina-Heyden. Thesis, Kiel. 1930. 23 pp.

Lürmann, Herbert: Beiträge zur Wasserschäuerung, insbesondere ein neues Filtrationsverfahren, welches Wasser selbsttätig in das Kalk-Kohlensäure-Gleichgewicht einstellt. Thesis, Frankfurt. 1930. 65 pp.

Prée, Wilhelm: Anwendungsmöglichkeiten des Zeiss'schen Flüssigkeits-Interferometers bei Trinkwasseruntersuchungen. Thesis, Dresden. 1931. 62 pp.

Purifying water. Gustav Rittler. *Brit.* 399,380, Oct. 5, 1933. See *Fr.* 751,543 (*C. A.* 28, 1125<sup>4</sup>).

Purifying water. Jorgen Krüger. *Brit.* 399,403, Oct. 5, 1933. The  $H_2O$  is caused to fall as a drizzle over bodies, having carbonate surfaces, in a closed container and in countercurrent to steam supplied in such quantities that the  $H_2O$  is heated to boiling and all the steam condensed so that only air or gases given off collect at the top of the container. App. is described.

Purifying water. Elisée C. Duhamel and Compagnie générale des industries textiles. *Brit.* 399,826, Oct. 9, 1933. In purifying for re-use  $H_2O$  that has been used for washing wool or other textiles, the  $H_2O$  is subjected to a vacuum to promote the sepn. of suspended impurities. The vacuum treatment may be preceded by treatment with  $Na_2CO_3$  or lime or with acid, sometimes followed by treatment with Ba aluminate. When acid is used, alkali is finally added to neutralize. App. is described.

Apparatus suitable for filtering water. Louis M. Gill (to Darco Sales Corp.). U. S. 1,941,952, Jan. 2. Structural details.

Apparatus suitable for filtering water through a carbon block. Oscar Hennings. U. S. 1,941,895, Jan. 2. Structural features.

Apparatus suitable for filtering water on a large scale. Joseph Weinstein. U. S. 1,942,584, Jan. 9. Structural features.

Apparatus for controlling the supply of gas, e. g., chlorine, to be mixed with liquid, e. g., water. Bull Brothers (Manchester 1927) Ltd., Charles G. Benson and Albert M. Mitchell. *Brit.* 398,491, Sept. 7, 1933

Apparatus for adding proportionate quantities of reagent to a stream of liquid, used for water-softening. United Water Softeners Ltd. and Hubert G. Marigny. *Brit.* 399,633, Oct. 12, 1933.

Softening water. Wm. H. Piper and Clensol Ltd. *Brit.* 398,348, Sept. 14, 1933.  $H_2O$  for domestic use is softened by blocks of  $Na_3PO_4$  with small amts. of a binder, e. g., amyllum, and a substance that retards the action, e. g., gluten, placed in the supply tank.

Base-exchange gels. Permutit A.-G. *Ger.* 580,711, July 14, 1933 (*Cl.* 12<sup>1</sup>. 38.01). See *Brit.* 319,746 (*C. A.* 24, 2528).

Water-softening apparatus for use with base-exchange material. Andrew J. Dotterweich (to Automatic Water Softener Co.). U. S. 1,942,807-8, Jan. 9. Structural and operative details are described.

Base-exchange water-softening apparatus. Leon Ceulmans. *Brit.* 398,756, Sept. 21, 1933.

Small portable base-exchange water softener. Henry L. Tett and Geo. S. Tett. *Brit.* 399,514, Oct. 6, 1933.

Steam generator suitable for making up feed water for boilers. Clifford L. Burnham. U. S. 1,943,106, Jan. 9. Numerous structural details are described.

Sedimentation apparatus. The Dorr Co., Inc. *Brit.* 399,297, Oct. 5, 1933.

Disinfecting-apparatus for water-waste preventers Frederick H. Dobson. *Brit.* 399,603, Oct. 12, 1933.

Distributors for sewage, etc. James Hopwood and George Utley. *Brit.* 398,773, Sept. 21, 1933.

Sewage-sludge digestion tank. The Dorr Co., Inc. *Brit.* 399,298, Oct. 5, 1933.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND E. D. JACOB

Professor A. A. J. de Sigmond and soil science. Róbert Ballenegger. *Mesőgazdasági Kutatások* 6, 403-5(1933). S. S. de Finály

Composition of the forest floor layers under different forest types on the same soil type. F. J. Alway, Joseph Kittredge and W. J. Methley. *Soil Sci.* 36, 387-98 (1933); cf. *C. A.* 27, 3547.—A chem. study is made of the forest floor of jack pine, Norway pine, white pine and maple-basswood. With all 4 types a progressive increase is found in the percentage of ash, lime and N,

together with a decrease in acidity, on passing from the litter to the duff and from the duff to the leaf mold. In chem. character the materials from maple-basswood differs widely from those from the pines, being much higher in lime and in N, P, K and S. The acidity of freshly fallen leaves from the different kinds of trees shows little variation but the duff and leaf mold of the maple-basswood is least acid. Freshly fallen leaves are closely similar in compn. to those of underlying litter. M. S. Anderson

Distribution of volatile matter, lime and nitrogen among

**litter, duff and leaf mold under different forest types.** F. J. Alway, W. J. Methley and O. R. Younge. *Soil Sci.* 36, 399-407(1933); cf. preceding abstr.—Litter, duff, leaf mold and surface soil were studied from 4 forest types, jack pine, Norway pine, white pine and sugar maple-basswood, all growing on Cass Lake fine sand. Detns. were made of the wts. per unit area of volatile matter, lime and N. Maple-basswood had the least litter and duff, but the most leaf mold. It also had the largest amts. of CaO and N. Both of these constituents were much less in each of the pines. The N content of the surface 2.75 in. of mineral soil was only 5-15% of the amt. in the overlying org. layers. The CaO per unit area sol. in aqua regia was greater in this surface layer than in the forest floor in each case. M. S. Anderson

**The course of the weathering processes in the marine clay deposits of Holland.** D. J. Hissink. *Műszaki Kutatások* 6, 467-73(1933) (in English).—Polder soils become slowly poorer in lime and humus. The N content increases somewhat. Av.  $P_2O_5$  content is 0.2%. Lime is slowly removed and replaced by Mg and by alkalis. The  $pH$  value decreases. S. S. de Finály

**A study of some salt-water-flooded soils on the eastern shore of Virginia.** Jackson B. Heister. *Soil Sci.* 36, 427-34(1933).—A study is made of soils of the bayside area of Virginia after a severe storm which flooded the land with salt water. The flooded soils freshly cultivated took up more NaCl than did the soils not cultivated. Considerable replaceable Ca was removed from the soil, whereas Mg was increased by flooding. After the salts were leached out of the flooded soil their  $pH$  values were distinctly higher than those of the corresponding natural soil. Germination studies with a variety of vegetables showed 0.2% NaCl to be injurious in light sandy soils low in org. matter. The addn. of  $Ca(NO_3)_2$  or lime decreased the toxic action. Lime facilitated leaching and stimulated plant growth. The presence of org. matter reduced the toxicity of NaCl to plants. M. S. Anderson

**The effect of additions of certain Colorado soils upon the nitrogen balance of a Tennessee soil.** C. A. Mooers, W. H. MacIntire and J. B. Young. *Soil Sci.* 36, 361-8(1933).—A study is made of the influence of 2 Colorado soils of high nitrifying and fixing capacities upon a Tennessee soil. Admixts. of 1% of Colorado soil with Cumberland clay was made in lysimeters. During the first year the outgo of ammoniacal and nitrite N was considerably increased in the presence of the Colorado soils. After the first year the outgo of N was exclusively in nitrate form and over the longer period of time the unusual properties of the Colorado soils were not maintained nor were they transmitted to the Tennessee soil. M. S. Anderson

**The effect of additions of certain Colorado soils upon the outgo of bases, chlorides and sulfates from a Tennessee soil.** W. H. MacIntire, W. M. Shaw, B. Robinson and K. B. Sanders. *Soil Sci.* 36, 435-46(1933); cf. preceding abstr.—Two calcareous soils from Colorado, the Grand Junction sandy loam and Rocky Ford clay, were mixed with Cumberland clay loam from Tennessee. The soil mixts. were made in lysimeters and the outgo of various ions was detd. Chem. analyses of each of the soils were made by 3 different procedures, by means of digestion with HCl, sp. gr. 1.115, leaching with 0.02 N HCl and extn. with  $H_2O$ . One lb. of Colorado soil was mixed with 100 lb. of the Tennessee soil and in some cases clover hay, limestone and NaCl were added. The addns. of both Colorado soils caused a 0.6% increase in the outgo of Ca, which was much less than the effect produced by clover hay. The outgo of Mg was increased by clover hay, depressed by limestone, and unaffected by NaCl addns. The large amt. of Na in the Grand Junction soil was rapidly leached out. Anion outgo was variable. In general, limestone and clover-hay supplements affected the leachings more than did the addns. of the western soils. M. S. Anderson

**The essential nature of alkali soils and methods for their reclamation.** W. P. Kelley. *Műszaki Kutatások* 6, 439-58(1933) (in English).—The Na content of

1 American alkali soils transforms the adsorption complex of the soil and the qualities of the soil, depending on the concn. and quality of salts. The soils also contain lime carbonates or silicates that have a good effect in reclamation. Reclamation consists of removal of noxious salts and replacing adsorbed Na by Ca. S. S. de F.

**Alkali soils of Spain: Their systematic place according to their chemical composition and vegetation.** Emile Huguet del Villar. *Műszaki Kutatások* 6, 510-21(1933) (in French).—Two types of Spanish alkali soils are (1) black, Mn-contg. and (2) red, poor in lime but not identical with terra rossa. Both contain significant amounts of Na and Mg, but relatively little exchangeable Ca. S. S. de Finály

**Newer results on the reclamation of calcareous alkali soils.** János Di Gléria. *Műszaki Kutatások* 6, 291-8(1933).—Alkali soils of the Great Hungarian Plain contg. both  $CaCO_3$  and  $Na_2CO_3$  can be reclaimed by combined treatment with "Acifer" and nitrogen fertilizers. "Acifer," a material contg. absorbed  $H_2SO_4$  and  $Al_2(SO_4)_3$ , when used alone improved the physical structure of the soil but did not increase the yield of hay. Greatest yields were obtained by using "Acifer N," in which  $HNO_3$  as well as  $H_2SO_4$  is absorbed. S. S. de F.

**A new method for estimating replaceable sodium and potassium in soils.** Amar Nath Puri. *Soil Sci.* 36, 355-9(1933).—Replaceable Na and K are extd. from soil by  $Ba(OH)_2$  soln. From 10 to 20 g. of soil is shaken with 100 cc. of 0.2 N NaOH for 2 hrs., filtered through paper on a Buchner funnel and the soil residue leached with 100-cc. portions of 0.1 N  $Ba(OH)_2$ , until a total of 1000 cc. is obtained. Phenolphthalein is then added to the ext. and  $CO_2$  passed through until the color disappears. After the insol. carbonates have settled the clear filtrate is titrated, with methyl orange as an indicator. This method gives total univalent bases, i. e., both Na and K. If desired, these may be converted to sulfates, ignited, and the K and Na contents calcd. M. S. Anderson

**Lysimeter studies at Aberdeen.** J. Hendrick. *Műszaki Kutatások* 6, 500-9(1933) (in English).—The N of  $NH_4$  fertilizers spread on the soil surface was found in the subsoil water as nitrate, without any material loss. The large amount of superphosphate added was fixed by the soil; the water contained no traces of  $P_2O_5$ . Small amounts of K were found in the water, which also contained much lime and Mg, although the original soil did not contain  $CaCO_3$ . About the same amount of nutrient was washed out by the filtering soil water in unfertilized plots, fertilized plots and plots treated with fertilizer plus lime. S. S. de Finály

**Water content of soil colloids as related to their chemical composition.** L. D. Bayer and Glen M. Horner. *Soil Sci.* 36, 329-53(1933).—The relationship between  $H_2O$  content and various chem. properties of soil colloids is studied. Colloids were treated with 6%  $H_2O_2$  to remove org. matter and were extd. with alternate treatments of 0.1 N HCl and 2%  $Na_2CO_3$  to remove free oxides of Al, Fe and Si. The  $H_2O$  adsorbed over 3.3%  $H_2SO_4$  was not greatly affected by the nature of the colloid but the hygroscopicity over 30%  $H_2SO_4$  increased with the  $SiO_2/R_2O_3$  ratio while the combined  $H_2O$  decreased. Adsorption of  $H_2O$  was also influenced by the cations with which the clays were satd. The order of influence was:  $H > Ca > Li \leq Mg > Na \leq Ba > K$ . Removal of org. matter and extn. with dil. HCl and with  $Na_2CO_3$  had little effect on  $H_2O$  adsorption. Water was removed by heating the colloids at various temps. from 60° to 800°. The temp.- $H_2O$  curves of soils and of bentonite were sigmoidal in shape with distinct points of inflection. These curves suggest that there are at least 2 kinds of  $H_2O$  retained by the colloid. It is suggested that combined  $H_2O$  should represent that which is a part of the crystal lattice of the colloid. Temp.- $H_2O$  loss curves indicate that the colloidal materials of various soils are different. The nature of the exchangeable cations affects  $H_2O$  removed below 250° but has slight effect at higher temps. The theory that the same base-exchange material is responsible for cation exchange in bentonite and in clay is

questioned in the light of the data presented.

M. S. Anderson

**Solubility laws and soil analysis.** Th. Seidel. *Mesőgazdasági Kutatások* 6, 481-48(1933)(in German).—Equations showing the relation of the soil components obtained by a single soil extrn. to those remaining in the soil can be used for the detn. of contents of sol. salts in soils, for the detn. of exchangeable H, for the explanation of hydrolytic and exchange acidity, for the detn. of T values, and for the detn. of K and  $P_2O_5$  in soils significant from the plant-physiological point of view. S. S. de F.

**A method for continuous automatic extraction of soils.** J. C. Russell. *Soil Sci.* 36, 447-50(1933).—An app. is described which is suitable for extg. soils with  $H_2O$  or with various solns. used for base exchange. About 50 cc. of  $H_2O$  is adequate to remove the sol. chlorides from a 40-g. sample of silt loam soil. Extrn. for base-exchange studies requires a vol. of 250 cc. of ext. from 20 g. of soil. Dried samples give much clearer exts. than the same soils in a moist condition. Saline soils often give muddy exts. and also may become impervious when the bulk of the sol. salts is removed. M. S. Anderson

**Modification of the  $pH$  value of agricultural soils by lime.** Maurice Dérivière. *Rev. matériaux construction trav. publics* 1934, 3-8.—A discussion of various methods for measuring the  $pH$  of soils and of the changes in  $pH$  effected by addns. of lime. Exptl. data are presented on 5 soils. Equil. after addn. was established after about 20-5 days. Fifty-four references. Karl Kammermeyer

**The migration of salts in soil.** Hans Erlenmeyer. *Chem. Erde* 8, 317-20(1933).—A filter plate was set on a mixt. of 100 g. of dry sand and 25 g. of  $NaNO_3$ . Water vapor diffusing through the sand from beneath after 61 days caused 1.39 g. of the hygroscopic salt to enter the filter. This result was not found for KCl. Conclusion: Migration of salts in soil may be effected by water vapor in the absence of ground or capillary  $H_2O$ . P. S. R.

**The measurement of temperature near the soil.** C. E. Brazier and L. Ehlé. *Compt. rend. acad. agr. France* 19, 1050-4(1933).—A discussion of the factors entering into the measurement of temps. near the soil (within a few cm.). The factors considered are the mass and nature of the thermometer liquid, shape of the reservoir, condition of the reservoir surface and radiation. The shape of the reservoir, whose surface must be in good condition, has little effect on the readings but it was found that Hg thermometers gave higher readings than alc. thermometers. Radiation has the most important effect on such detns. and causes high readings. In order to correlate these temps. with plant growth they must be better defined. J. R. Adams

**Coagulation of the soil fraction smaller than 0.002 mm. in diameter as effected by hydrogen ions of hydrochloric and acetic acids.** A. Musierowicz and L. Smolik. *Polish Agr. Forestal Ann.* 25, 303-12(1931)(312 in German).—Orthokinetic coagulation of a soil fraction smaller than 0.002 mm. in diam. is enhanced as the concn. of H ions of HCl and AcOH increases in the range:  $pH$  3.87-2.01. At equal  $pH$  values AcOH effects stronger coagulation than HCl. At smaller  $pH$ , a decrease of the degree of coagulation is observed with HCl. It could not be ascertained, whether this decrease is effected by chem. action of the acid, or by a change in the elec. charge of the soil particles. J. Wiertelak

**Neubauer indications for soil nutrients considered with respect to particular crops and fertility levels on an extensive series of East Prussian soils from estates differing in size and soil.** S. Goy. *Z. Pflanzenernähr., Düngung Bodenk.* 12B, 529-44(1933).—It is concluded that the growth of rye seedlings in the Neubauer test (cf. C. A. 18, 877) on soil samples is not an entirely satisfactory basis for fertilizer recommendations, since different crops vary so widely in their requirements. Comparison with yield records indicates that the interpretation of test data must not be too arbitrary; economic factors and cultural practices which cannot be considered in any test are important. C. J. Schollenberger

**Exhaustion of nitrogen and potassium from potato**

**mother tubers as influenced by deficiency of these nutrients in the soil.** Kazimierz Strzemieński. *Polish Agr. Forestal Ann.* 26, 191-204(1931)(203-4 in English).—The N and K store of the mother tuber is essential for the young plant in the first period of vegetation if grown in soil deficient in N or  $K_2O$ . E. g., the mother tuber supplied 84% of the total amt. of N and 97% of  $K_2O$  assimilated by young plants on plots deficient in N or  $K_2O$ , resp. J. Wiertelak

**Influence of soil reaction on the fertilizing effect of calcium cyanamide.** J. Krotowiczówna. *Polish Agr. Forestal Ann.* 25, 235-57(1931)(272 in German).— $CaCN_2$  added to soils of different acidities in pot expts. exhibited a good fertilizing action in the range  $pH$  4-8. The crop increase was slightly higher in acidic as compared with neutral soils. In heavy soils of varying  $pH$  values  $CaCN_2$  gives as good results as  $NaNO_3$ . J. W.

**Microbiology of the soil. VII. Nitrifying organisms.** S. Vinogradskii. *Ann. inst. Pasteur* 50, 350-432(1933); cf. C. A. 27, 1438.—The activity of nitrifying organisms is inhibited by certain org. nutrient-contg. materials, and nitrification does not occur until the microbial mineralization of these is practically complete.  $NH_3$ , even in small concns., retards the development of *Nitrobacter*, which does not become active until  $NH_3$  is almost entirely converted into nitrite. The isolation of a no. of species of nitrifying organisms on  $SiO_2$ -gel media is described. The general  $pH$  range of activity is 6.0-9.2. Certain species of *Nitrosomonas* tolerate  $pH$  < 6.0. The distribution and activity of certain species in soils of different types are recorded. H. C. A.

**Fixation and exchange of certain anions by soil colloids.** A. Demolon. *Mesőgazdasági Kutatások* 6, 474-9(1933)(in French).—In the flocculation of colloidal clay by K salts the limit value (i. e., the min. amt. of salt required) increased with the OH-ion concn. of the medium. The increase was rapid between  $pH$  7 and 8. The limit value at const.  $pH$  varies with the kind of ion. The inactive salts have small mols. and large diffusion capacities: the active salts have higher valencies, often being complexed and large mols. The adsorption of these by the clays increases their negative charge. The solution of assimilable  $P_2O_5$  is in part an exchange process. S. S. de F.

**A rapid method for identifying the bacteria in nodules of legumes.** F. M. Clark and Ray Hansen. *Soil Sci.* 36, 360-74(1933).—A rapid method for identifying the organisms in the nodules of legumes is described with the nodule as antigen. M. S. Anderson

**The relation of phosphorus to biological nitrogen fixation and conformity to the law of decreasing increment.** Robert A. Greene. *Soil Sci.* 36, 383-9(1933).—The P requirements of *Azotobacter* are very small. The relation of available P to N fixed follows the law of decreasing increment. Small addns. of phosphate to a soil deficient in P will produce a greater response than subsequent addns. which may be even larger. M. S. Anderson

**Symbiotic nitrogen fixation in the genus *Casuarina*.** Harold Mowry. *Soil Sci.* 36, 409-25(1933).—Trees of the genus *Casuarina* are among the non-leguminous plants having nodules on their roots. It is shown that such plants fix atn. N in the nodules and that the relation of the host and casual organism of the nodule is one of mutualistic symbiosis. M. S. Anderson

**Nitrogen fixation and nitrification in untreated and reclaimed alkali soils containing lime and soda.** I. Imre Prettenhoffer. *Kisérletügyi Közlemények* 36, 78-108(1933).—The structural changes caused by the reclamation improved the biol. qualities of soils. Alkali soils with a lower content of salts, chiefly of soda, showed after reclaiming a considerable increase of nitrification activity and almost reached the nitrate formation of excellent loamy soils without soda content. The best results were obtained when  $H_2SO_4$  or bauxite with sulfuric acid or  $CaSO_4$  was used for reclamation. Alkali soils which contained much more salts and soda showed less or no nitrification activity at all. The loss of ammonia was due to the essentially smaller basicity in reclaimed soils. S. S. de Finály



Further studies on the relation between the carbon assimilation and nitrogen fixation in leguminous plants. C. E. Georgi, F. S. Orcutt and P. W. Wilson. *Soil Sci.* 36, 375-82(1933).—Growth of red clover plants is more markedly influenced by the partial pressure of  $\text{CO}_2$  than by the total quantity available. Large increases in dry wt. and in N fixed accompany an increase of  $\text{CO}_2$  pressure from 0.03 to 0.1%. Clover plants supplied with glucose and sucrose in the nutrient soln. show an increase in both dry wt. and N fixed even in concns. of carbohydrate as low as 0.1%. However, higher concns. are more effective. The addn. of mannitol to inoculated red clover plants does not cause an increase in N fixed and when the concn. exceeds 0.25-0.50% the influence is detrimental. Red clover and sweet clover plants when inoculated with a non-homologous species of rhizobia die of N starvation even though carbohydrate is furnished the bacteria. This indicates that sol. N compns. capable of being used by the plant are not fixed by free living forms of rhizobia.

M. S. Anderson  
Double superphosphates. L. E. Berlin. *Minérals. Oudobr.* 1, 41-8(1932); *Chimie & industrie* 30, 600; cf. C. A. 28, 284<sup>9</sup>.—A discussion of their prepn. from apatite concentrates and from phosphorites. A. P.-C.

Comparison of the action of ground phosphorite and superphosphate. D. V. Druzhinin and Z. I. Stroganova. *Minérals. Oudobr.* 1, 53-70(1932); *Chimie & industrie* 30, 705.—In soils of low alky. (50-60% bases) application of a double dose of ground phosphorite gives better results with cereals than superphosphates. These soils also require an intense liming (up to 38%), and it is therefore necessary to det. in each case the nature of the fertilizer treatment required (lime or phosphorite) or the best method of combining the 2 so as not to weaken the effects of the phosphorite; e. g., in strongly acid soils (peat, etc.), a phosphorite treatment can be followed by a moderate liming. With soils in which the alky. varies from 60 to 70% bases, and which in addn. lack  $\text{P}_2\text{O}_5$ , a double dose of phosphorite gives at least as good results as a single dose of superphosphate; in such a case liming is of secondary importance. When the soil contains over 70% bases, superphosphate is preferable to phosphorite; but in the event of a pronounced  $\text{P}_2\text{O}_5$  deficiency use of phosphorite is still rational, especially if a cereal crop is followed by a clover crop.

A. Papineau-Couture  
The phosphoric acid requirement of Swiss cultivated soils. E. Truninger. *Phosphorsäure* 3, 420-8(1933).—In 74% of the expts. with phosphate-free-fertilizers, less than half the yield of hay ordinarily obtained by complete fertilization was found. In 48% of the cases where  $\text{K}_2\text{O}$  was omitted less than half the normal yield was obtained. The detn. of  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$  in the ash of the first crop of hay showed that 75-88% of the soils were deficient in  $\text{P}_2\text{O}_5$ . The percentage decreased from 87-90% in 1921 to 74-87% in 1931, which corresponds with the increased use of Thomas slag. The  $\text{K}_2\text{O}$  deficiency was negligible.

K. C. Beeson  
The phosphate requirements of Java sugar-cane soils. G. A. Neeb. *Arch. Suikerind. III Mededeel. Proefsta. Java-Suikerind.* 41, 1031-88(1933).—Previous literature on the detn. of available  $\text{P}_2\text{O}_5$  in soils is reviewed. It was found that extn. with  $\text{H}_2\text{O}$  is the best method, but it is necessary to use varying ratios of soil to  $\text{H}_2\text{O}$ , from 1:100 to 1:0.75. The amts. of  $\text{P}_2\text{O}_5$  found by the ceruleomolybdate procedure were plotted against the ratios, and an approx. figure for the  $\text{P}_2\text{O}_5$  in the soil soln. was detd. by extrapolation. The curve also shows to what extent the soil is able to yield  $\text{P}_2\text{O}_5$  to the soil soln. The power of the soil to bind  $\text{P}_2\text{O}_5$  was detd. by shaking with a soln. of  $\text{Ca}(\text{H}_2\text{PO}_4)_2$ ; in about a month a new equil. between the  $\text{P}_2\text{O}_5$  in the soil and in the soil soln. is established. The increase in the  $\text{P}_2\text{O}_5$  concn. in the soil soln., caused by application of P fertilizer, could thus be measured. The phosphate content of the soil, and its power to bind  $\text{P}_2\text{O}_5$ , do not go parallel. A comparison between the  $\text{P}_2\text{O}_5$  soly. curves and the results of field tests showed good correlation for black, gray and grayish brown soils. In yellow, brown and red soils the power to bind  $\text{P}_2\text{O}_5$  appears to

give a better measure of the  $\text{P}_2\text{O}_5$  requirements than does the soly. curve. No relation was found between the  $\text{SiO}_2$  content of aq. soil exts. and the effect of  $\text{P}_2\text{O}_5$  indicated by field tests. In some cases a high concn. of exchangeable bases in the soil increased the  $\text{P}_2\text{O}_5$  content of the aq. soil exts. In the future the new method, which is tedious, should be applied only to soil types, but not to individual test plots, except in doubtful cases.

F. W. Zerbán  
Plant nutrients of Finnish soils. B. Aarnio. *Mezőgazdasági Kutatószok* 6, 432-8(1933)(in German).—The mechanical compn. and the ratio  $\text{SiO}_2:\text{Al}_2\text{O}_3$  vary in postglacial Finnish soils. They are low in N and in easily sol.  $\text{K}_2\text{O}$  and  $\text{P}_2\text{O}_5$ . Finnish forest soils are somewhat richer, peat soils much poorer.

S. S. de Finály  
Plant nutrients which the farmer supplies in fertilizers unintentionally or not at all. Werner Scholz. *Z. Pflanzenernähr., Düngung Boden.* 13B, 12-22(1934).—A review of knowledge concerning elements essential for plant growth but not generally considered in fertilizer analyses. Several hundred references.

C. J. Schollenberger  
The prolonged action of fertilizers. Henri Blin. *J. agr. prat.* 97, 381-2(1933).—An expt. is cited which shows the delayed or prolonged action of fertilizers on a stand of wheat following a sugar-beet crop. This delayed action is more marked after an abundant crop which will leave in the soil, in addn. to the unused fertilizer already there, a large amt. of unused residue, i. e., leaves, roots, etc.

J. R. Adams  
Fertilizer experiments on sodium-carbonate-containing alkali soils. Sándor Herke. *Mezőgazdasági Kutatószok* 6, 372-95(1933).—*Atropis limosa* grows tolerably well on alkali soils. In the soils studied, poor growth of *Atropis* was caused by N deficiency. Fertilization with N fertilizers caused a 500 to 9000% increase of *Atropis* harvest. Nitrate N and ammonia N were assimilated most easily; cyanamide N had a harmful effect. Ammonia N had in moist soils almost the same effect as nitrate N.

S. S. de Finály  
Influence of fertilizers on the quality of wheat. Erzsébet Rosenblüh. *Mezőgazdasági Kutatószok* 6, 346-51(1933).—Analyses are given of soils and of the wheat produced. K increased the seed wt. P diminished the amt. of gluten; N increased it. The unfavorable effect of P can be explained by the fact that the soils contained much more P than N and addn. of superphosphate made the ratio unfavorable. Plots contg. relatively less P showed the highest gluten contents when treated with complete fertilizers.

S. S. de Finály  
Does fertilization influence the baking quality of bread grain? M. P. Neumann and J. Lemmerz. *Z. Pflanzenernähr., Düngung Boden.* 12B, 544-51(1933); cf. C. A. 18, 2402.—The subject is briefly reviewed with the conclusion that the baking quality of flour from grain grown with com. fertilizers is not significantly different for that reason, and on the av. is certainly not inferior.

C. J. Schollenberger  
Decomposition of farm manure in the soil. M. V. Katabimov. *Minérals. Oudobr.* 1, 81-91(1932); *Chimie & industrie* 30, 705.—In the course of the decompn. in the soil of fresh straw farm manure, there is a certain decrease in the inorg. N content, due probably to its biol. fixation. This occurs during the 1st month; it is most pronounced when the dose of manure is 4%. On the other hand, it is less with fresh peat manure and practically nonexistent with fermented straw or peat manures. Ammonification of org. N increases slightly through decompn. of fresh manure, but is unaffected by fermented manures. Decompn. of fresh manures increases nitrification; the latter increases to a smaller extent by decompn. of fermented peat manure and is unaffected by fermented straw manure. Inorg. N is present in the soil in 2 forms during the decompn. of manures: ammoniacal and nitric; nitrous N is present only during the 1st month.  $\text{H}_2\text{O}$ -sol.  $\text{NH}_3$  is present only during the 1st 3 months, and constitutes only a negligible proportion of the absorbed  $\text{NH}_3$ . After 10-18 months, the amt. of nitrate N present in the soil is much greater

than that present in the original soil and manure. Addn. of  $\text{CaCO}_3$  to the soil considerably increases the inorg. N content by intensifying nitrification. Decompu. of manure also increases the proportion of  $\text{H}_2\text{O}$ -sol.  $\text{CaO}$ ; this is more pronounced with fresh than with fermented manures. The increase in the inorg. N content of the soil is most pronounced with straw manures. The  $\text{pH}$  of the soil varies but little during the decompu. of the manure. A. Papineau-Couture

Controlled manure fermentation. Paul Ehrenberg. *Z. Pflanzenernähr., Düngung Boden.* 12B, 551-4 (1933).—Review. Recent expts. indicate increased loss of N and dry matter with hot fermentation as compared with cold, with some gain in spreading qualities. A greater proportion of the N remains as  $\text{NH}_3$  with cold fermentation, but either treatment is superior to ordinary storage. Destruction of weed seeds is not an important factor, as few survive in manure, however treated. C. J. S.

Results of field experiments with blast-furnace slag. H. Kappen. *Z. Pflanzenernähr., Düngung Boden.* 13B, 22-36 (1934).—Increases in small grain, sugar beet and potato crops from field plots on various acid soils are taken as indexes to the comparative values of ground limestone and (or) burned lime, granulated, coarsely, medium or finely ground blast-furnace slag. These liming materials were applied according to  $\text{CaO}$  contents at light and heavy rates corresponding to each soil's indications for exchange and hydrolytic acidity, resp. Crop increases from liming were not in all cases significant; those from slag were usually equal or superior to those from limestone at equiv. rates. In these expts. with slag,  $\text{CaO}$  content appeared to be more important than fineness. At equiv. rates of application, burned lime was most effective in raising soil  $\text{pH}$ , limestone next and slag least; large applications of the latter had comparatively little effect in this respect. No adverse effects from  $\text{CaS}$  in slag were noted. Slag is considered to be of special value for light soils and peat, both as a source of  $\text{CaO}$  and colloidal  $\text{SiO}_2$ . C. J. Schollenberger

The action of potassium fertilizers upon undesirable nitrogen in the sugar beet. S. I. Lipman. *Nauk. Zapiski Tsukrovoi Prom.* 32, 101-12 (1933).—K fertilizers do not always decrease in beets the percentage of N interfering in sugar manuf. The action of K on the N content is detd. by the ratio of nutritive elements in the soil. In the presence of a large excess of N, small portions of K (with an increase of beet crop) increase the amt. of N in the beets. On the other hand, in the presence of a small amt. of N in the soil, K decreases the percentage of N in the beets. Among K fertilizers sylvinit is the most powerful in decreasing the N content in beets. V. E. B.

Ammoniation of waste sulfite liquor and its possible utilization as a fertilizer material. Max Phillips, M. J. Goss, B. E. Brown and F. R. Reid. *J. Wash. Acad. Sci.* 24, 1-5 (1934).—The authors present a preliminary report of their work on the pressure ammoniation of waste sulfite liquor with a view to its utilization as a fertilizer. A product contg. up to 10%  $\text{N}_2$ , of which only a negligible amt. was present as  $\text{NH}_4$  salts, was obtained. Ammoniation was carried out in 2 steel bombs, which revolved in an oil bath at temps. of 200° and 220° for periods of 4-20 hrs. Highest yields were obtained at 20 hrs. and 220°. The preliminary series of expts. used the ammoniated product as a fertilizer for growing millet under controlled conditions as compared with (1) superphosphate and muriate of potash, (2) dried blood, (3)  $\text{NaNO}_3$ - $(\text{NH}_4)_2\text{SO}_4$ . The product was superior to (1), but slightly inferior to (2) and (3). Further expts. indicated that the N in the ammoniated product was made available over a longer period of time than either the dried blood or inorg. salts. G. H. Young

Effects of hydrogen- and aluminum-ion concentration on conifer damping-off. L. W. R. Jackson. *Phytopathology* 23, 18 (1933). B. C. A.

Effect of sulfuric acid and aluminum sulfate on soil  $\text{pH}$ , when used for the control of damping-off of conifers. L. W. R. Jackson. *Phytopathology* 23, 18 (1933). B. C. A.

Sulfur in agriculture. Eum. Pons-Eacot. *Chimie & Industrie* 30, 533-4 (1933); cf. Bertrand and Silberstein, *C. A.* 27, 1441.—Preliminary field expts. carried out in Peru on cotton and vines confirmed as regards free S B. and S.'s findings as to the value of sulfates. The results are of particular importance as they indicate that the use of free S, either alone or in conjunction with  $\text{CaO}$ , can check cotton wilt and other plant diseases and can permit of continued cultivation of cotton in soil repeatedly fertilized with guano, in spite of the fact that the latter would naturally tend to increase the soil acidity continuously. A. Papineau-Couture

The part played by hydrofluoric acid in the noxiousness of the Meuse Valley fog in 1930. Joseph Mage and Georges Batta. *Chimie & Industrie* 30, 787-8 (1933); cf. *C. A.* 26, 3858.—A further explanation is given of the reasons why HF and other F compds. given off from a  $\text{P}_2\text{O}_5$ -fertilizer factory in the affected district could not be considered as the only or the main factor in the numerous deaths caused by the fog of Dec., 1930. A. P.-C.

The determination of the distribution of particle sizes in lead arsenate sprays. P. J. Clark. *New Zealand J. Sci. Tech.* 15, 183-7 (1933).—The sedimentation method of Calbeck and Harner was used with modifications. The amt. of suspension settling in the scale pan was found to be less than the theoretical amt., and the loss was different for different sizes. This effect was overcome by means of a cylindrical pan 9.1 cm. long suspended in a 2-l. beaker. The analyses of 3 sprays in the range 5 to > 74 microns are tabulated. P. S. Røller

A new method of combating heart and dry rot of beets. K. Meyer-Hermann. *Deut. Landw. Presse* 60, 194, 205 (1933).—Ten plats of sugar beets were treated with varying amts. of borax ranging up to 30 kg. per ha. by dissolving the borax in 10 l. of water and sprinkling it along the newly made drill. The no. of diseased beets was reduced in all cases, but a max. effect was obtained when 20 kg. of borax was used. The yield was doubled over that when no borax was used, and the no. of diseased beets was reduced 90%. The sugar content was increased from 6.46 to 7.05%, and the sugar yield was increased from 43.5 kg./ha. to 61.6 kg./ha. K. C. Beeson

Protection against tobacco diseases. I. Comparative examinations of physiological effects of mercury-containing disinfectants on tobacco seeds and microorganisms spread by means of seeds. György Komlóssy. *Kisérletiügyi Közlemények* 36, 134-61 (1933).—The disinfectant "Higor" did not kill *Alternaria*; "Higosan," Germisan, Tillantin and Uspulun did kill it. S. S. de Finály

Chlorates and the destruction of crowfoots. G. Fron. *J. agr. prat.* 97, 499-501 (1933).— $\text{NaClO}_3$  used for the destruction of plants of the crowfoot family in wheat fields attacks both the wheat and the weed. With the wheat the harmful effect is only temporary and on harvesting there is little difference between the yield from the treated and untreated wheat. While the destructive action on this group of weeds is slower it continues until the weeds, or at least the germinative power of their seeds, is destroyed. When  $\text{NaClO}_3$  is replaced by  $\text{KClO}_3$  the recovery of the wheat from the initial treatment is much more rapid. J. R. Adams

Destruction of the crowfoot in fields planted in cereals. G. Fron. *Compt. rend. acad. agr. France* 19, 892-8 (1933); cf. preceding abstr. J. R. Adams

History of Ca phosphate, münophosphate, pyrophosphate and orthophosphate of bone earth, plants, etc. (Speter) 2. Sampling tube for seeds (Mach) 12. Nitrate detn. (Alten, Weiland) 7. Importance of K to plant life (Honcamp) 11A. Nondyeing metalliferous sulfurized phenol derivs. [insecticides] (U. S. pat. 1,948,179) 25. Tertiary alkyl-substituted o-dihydroxybenzenes [stabilizers for insecticidal compns.] (U. S. pat. 1,942,827) 10.

Peters, Gerhard: Blausäure zur Schädlingsbekämpfung. Stuttgart: F. Enke. 75 pp. M. 6.20,

Handbuch der landwirtschaftlichen Bakteriologie. 2nd ed., revised by F. Löhnis. Bd. II, Tl. 1. Düngerbakteriologie. By G. Ruschmann. Berlin: Gebrüder Borntraeger. 158 pp. M. 15. Cf. C. A. 27, 3735.

#### THESES

Baudy, Eda: Die Anwendung von Eisenvitriol im Pflanzenschutz. Brünn. 1931. 32 pp

Ehrenberg, Paul: Die Bodenbakterien und die Bakterienwelt des Stalldüngers. Breslau. 1930. 16 pp.

Schirle, Wolfg.: Experimentelle Untersuchungen zur Erforschung der Bodenstruktur. Breslau. 1931. 44 pp.

Schubert, Helmut: Einfluss der Vorbehandlung der Boden auf die Ergebnisse der mechanischen Bodenanalyse. Breslau. 1930. 37 pp.

Fertilizer. Kali-Forschungs-Anstalt G. m. b. H. (Oskar F. Kaselitz, Hans Friedrich and Fritz Pohle, inventors). Ger. 587,589, Nov. 6, 1933 (Cl. 18.4).  $MgNH_4PO_4 \cdot 3H_2O$  and  $MgNH_4PO_4 \cdot H_2O$  are pptd. by passing  $NH_3$  into solns. of  $H_3PO_4$  or alkali phosphates and Mg salts at ordinary or raised temps.  $MgO$  or  $MgOH$  may be used instead of Mg salts.

Fertilizer. G. Ober & Sons Co. Ger. 587,890, Nov. 9, 1933 (Cl. 18.1). Crude ground phosphate is made into a paste with aq.  $NH_3$  and treated with strong mineral acid, especially  $H_2SO_4$  or  $H_3PO_4$ , to form a fertilizer. App. for the process is described.

Fertilizer. Chemische Fabrik Kalk G. m. b. H. and Hermann Oehme. Ger. 587,954, Nov. 10, 1933 (Cl. 18.1). A mixed fertilizer is formed in a continuous

operation by treating  $Ca_3(PO_4)_2$  satd. with nonvolatile mineral acid, with a current of  $NH_3$ .

Insecticides. Wm. J. Flaskett. Brit. 399,898, Oct. 19, 1933. A liquid to be sprayed for destroying vermin consists of 1 lb. camphor dissolved in 1 gal turpentine.

Insecticide and insectifuge. Elmer W. Adams and George M. McNulty (to Standard Oil Co. of Ind.). U. S. 1,942,892, Jan. 9. A furoic acid ester such as the butyl or benzyl ester is used with a mineral oil to form a compn. suitable for combating flies, etc.

Bactericide and fungicide. Wm. J. Lipfert. U. S. 1,943,181, Jan. 9. A powder suitable for dusting on plants and trees comprises basic Zn sulfate mixed with  $Ca(OH)_2$ .

Larvicide. John C. Munday. U. S. 1,942,532, Jan. 9. A toxic inorg. salt such as Paris green has an oleaginous material such as Turkey-red oil adsorbed upon it to produce a waterproof and buoyant larvicide. Na amyl-xanthate also may be used.

Spraying liquids. J. D. Riedel-E. de Haen A.-G. (Ludwig Hess, inventors). Ger. 587,747, Nov. 7, 1933 (Cl. 45l. 3.01). In spraying liquids, especially for plant preservation,  $MeCl$  alone or mixed with solvents b. below  $100^\circ$ , such as  $EtCl$ , ether, etc., is used as the propellant.

Rotenone extraction from plant material. Howard A. Jones (dedicated to the free use of the Government and the people). U. S. 1,942,104, Jan. 2. Plant material such as tuba or cubé root is extd. with warm  $CCl_4$  and the extd. material is crystd.

Apparatus for mixing grain or seeds with a pulverulent preservative material. Wm. W. Christie. Brit. 399,821, Oct. 9, 1933.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

Improvements in the production of absolute alcohol. H. Guinot. Intern. Sugar J. 36, 24-8(1934).—Figures are given showing that the cost of producing abs. alc. is no more than for ordinary 96.5% rectified spirits. A process is described, by means of which pure abs. alc. can be obtained from the mash by utilizing the plant and distg. equipment available at any distillery. W. L. O.

Purification of industrial alcohol. Study of the elimination of aldehydes. II. Mircea V. Ionescu and V. N. Georgescu. Bull. soc. chim. 53, 899-909(1933).—The authors investigated a large no. of the methods in use for the removal of aldehydes from rectified alc. Many of the methods were found unsatisfactory, principally because of incomplete retention of aldehydes by the reagents recommended or because of partial oxidation to aldehyde when the alc. is distd. in air at ordinary pressure. Their work shows that oxidation of alc. can be avoided by distn. under reduced pressure. Aldehydes were completely removed by *m*-phenylenediamine-HCl, the hydrochloride of semicarbazide, Na bisulfite, Schiff's reagent; they were removed to a lesser extent by Na sulfite. The first 2 reagents are especially recommended. C. N. F.

Production of pure lactic acid from molasses. A. A. Rozhdstvenskii. Sovet. Sakhar. 1933, No. 3-4, 37.—Best results were obtained by fermentation of molasses by means of *B. delbrückii* with addn. of 10% barley malt ext. The malt was added at  $45^\circ$  and this temp. maintained for 30 min.; the mixt. was then kept at  $52^\circ$  for 30 min., and at  $58^\circ$  for 1 hr., heated to  $62^\circ$ , and filtered.  $CaCO_3$  was used to fix the lactic acid. The product was treated with  $H_2SO_4$  and filtered, and the lactic acid distd. with superheated steam. Lab. tests gave a 25-30% lactic acid that satisfies pharmacopeial requirements. It is estd. that a 50-75% product could be obtained on the industrial scale. Lea Buthoeviden

Antifermentative action of the phenols in presence of substances which decrease the surface tension. Antonio Mossini. Chim. ind. agr. biol. 9, 895-7(1933).—The min. quantities of phenol, *p*-cresol, *m*-xyleneol, *p*-ethylphenol and thymol necessary to stop the fermentation of a fer-

menting soln. (Willstätter and Steibelt soln. with beer yeast) are, resp., 0.8, 0.65, 0.47, 0.28, 0.1%. By adding previously some substances able to diminish the surface tension, these percentages are reduced as follows: with Na stearate 0.67, 0.59, 0.4, 0.26, 0.07; with Na oleate 0.5, 0.36, 0.2, 0.2, 0.06; with Na sulfonate 0.1, 0.05, 0.03, 0.02, 0.01. G. A. Bravo

Clarification (of beer) by means of shavings. K. M. van Laer. Petit J. Brasseur 11, 496-7(1933); Chimie & industrie 30, 932.—The use of shavings had been largely abandoned because of the difficulty of sterilizing them. Introduction of modern types that could be easily sterilized (metallic plates, etc.) is returning them to favor. Their merits are briefly discussed. A. Papineau-Couture

Comparative studies on the nucleic acid in saké press cake and in beer yeast. III. The preparation of nucleic acid by the use of Japanese acid clay. Masaji Kimura. J. Soc. Chem. Ind., Japan 37, Suppl. binding 8-9(1934); cf. C. A. 27, 3028.—Japanese acid clay was used for the following reasons: (1) It sets free mineral acids in contact with neutral salts, (2) it serves as a good filter, and (3) it adsorbs protein and other substances. The nucleic acid was prepd. by one of the usual methods modified by the addn. of the clay. Six preps. were made and their analyses, which show good agreement, are reported.

Karl Kammermeyer

A vegetable extract for the purpose of appreciably increasing the fermentative power of yeast. Torquato De Vita. Atti I<sup>o</sup> Congr. intern. panificazioni Roma 1932, 288-90(1933).—The author used a 20% infusion of bran and compared it with a control composed of glucose 5 g.,  $NH_4NO_3$  10 g.,  $K_2HPO_4$  5 g.,  $MgSO_4$  2.5 g.,  $Ca_3P_2O_8$  0.5 g., 50%  $H_3PO_4$  1.6 cc., and water to 1000 cc.

J. A. LeClerc

The influence of various amino acids on the alcoholic fermentation of brewer's yeast. Yuzo Tozawa and Jiro Horimi. Folia Pharmacol. Japon. 17, No. 1, 87-96 (Breviaria 5-6)(1933).—In the concn. employed, only *d*-arginine and *l*-histidine exerted a depressant action on the sugar fermentation of brewer's yeast. Their combined

action was not synergistic. The addn. of other amino acids did not increase the action of these two, nor were combinations of other amino acids tried effective. Neither the nucleus nor the cell body of the yeast appeared to be influenced by the concn. (0.0%) of the *D*-arginine or *L*-histidine used.

G. H. W. Lucas

A successful method of yeast preservation. Rudolf Bertel. *Atti I° congr. intern. panificazione Roma 1932*, 399-401 (1933).—A description of the principles embodied in B.'s patents (cf. C. A. 27, 2758). J. A. LeClerc

Exchanges of diffusible substances in the prepn. of food products. I. Prepn. of cacao [by fermentation] (Whympster) 12. Materials for making gas, etc., [by fermentation] (Brit. pat. 398,601) 21.

Vinkenborg, Helena: Die Bedeutung des Acetaldehyds bei der alkoholischen Gärung. Thesis, Utrecht. 1931. 70 pp.

Dehydrating alcohol. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Brit. 399,281, Oct. 5, 1933. In obtaining dehydrated alc. by contacting the crude spirit with dehydrating material, e. g., KOAc, capable of increasing the alc. content of the spirit in the

vapor phase to about 95% and distg. off the alc., free from fusel oil, the fusel oil is prevented from accumulating in the system by withdrawal from the distn. column or by removal from the residual liquor. The app. described in Brit. 368,793 (C. A. 27, 5082) may be used.

Dehydrating and distilling alcohol. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Brit. 399,635, Oct. 12, 1933. Abs. alc. is obtained from mashes, worts, spent sulfite lye, etc., by sepg. the alc. and fusel oil from the vinasses in a preliminary concn. and then subjecting to complete dehydration and purification as described in 399,281 (preceding abstr.). App. is described.

Gluconic or citric acid. Konrad Bernhauer. Ger. 587,819, Nov. 30, 1933 (Cl. 12a. 11). The above acid, or their salts are prepd. by fermentation of carbohydrate contg. glucose, the acid being neutralized if desired, e. g., by CaCO<sub>3</sub>. The fermentation is carried out by a bacterium or a fungus, such as *Aspergillus*.

Spirits. Verein der Spiritus-Fabrikanten (Ernst Lubdet and Bruno Lampe, inventors). Ger. 587,781, Nov. 11, 1933 (Cl. 6b. 1.01). Spirits are obtained by mincing, mashing and fermenting potatoes, and finally distg. The potatoes may be pressed and the juice fermented.

Beer. Gottfried Jakob. Ger. 587,782, Nov. 8, 1933 (Cl. 6b. 14). App. for continuously hot-filtering and cooling beer wort is described.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Mexican argemone. O. de Almeida Costa. *Bol. assoc. brasil. pharm.* 14, 489-500 (1933).—This is a Brazilian plant which contains an alkaloid, protopine (C<sub>20</sub>H<sub>19</sub>O<sub>2</sub>N) and an oil m. 15°. This oil is used as purgative.

E. S. G. Barron

Cacao's liver oil (preliminary note). O. de Lazzarini Peckolt. *Rev. brasil. med. pharm.* 9, 278-82 (1933).

E. S. G. Barron

Aminometry of alkaloids. D. Vorländer. *Ber.* 67B, 145 (1933); cf. C. A. 28, 992.—In previous expts. cinchonine and quinine were detd. as diacid amines, strychnine and brucine as monacid amines. No suitable indicator has been found for picric acid. Water-free benzenesulfonic acid and other aromatic sulfonic acids proved to be usable.

A. E. Beillich

Nitrous oxide: history and development. H. E. G. Boyle. *Brit. Med. J.* 1934, 1, 153-5. J. B. Brown

Argentometric determination of theobromine-sodium salicylate. Julius v. Mikó. *Pharm. Monatsh.* 14, 279-81 (1933).—The method of evaluation proposed by the Pharmacopoeial Commission in the Austrian Pharmacopoeia IX is a simple alkalimetric detn. for this substance based upon the principle that the Na held in combination is converted quantitatively into NaOH and titrated with HCl. This method has been found satisfactory in cases where 1 mol. theobromine is so combined as to yield 1 mol. NaOH and is not applicable when more or less than this amt. of NaOH is produced. A method which is said to be independent of the amt. of NaOH is proposed: Accurately weigh 0.5 g. (H<sub>2</sub>O content considered), dissolve in 10 cc. H<sub>2</sub>O contained in a 100-cc. graduated flask, add 1 cc. 5 N HNO<sub>3</sub> and allow to stand for a time. Add 2 cc. 5 N NH<sub>4</sub>OH, shake several times and add 30 cc. 0.1 N AgNO<sub>3</sub>. Rinse the neck of the flask with H<sub>2</sub>O, heat carefully to boiling for 15 min., using a small flame; cool and add H<sub>2</sub>O to mark. After shaking, filter, discard the 1st 25-cc. portion of the filtrate, measure 50 cc. of the remaining filtrate into a glass-stoppered Erlenmeyer flask, and add 10 cc. 5 N HNO<sub>3</sub> and 10 cc. FeNH<sub>4</sub>(SO<sub>4</sub>)<sub>2</sub> as an indicator; in order to prevent the resulting ferric salicylate from interfering with the color change, add 0.1 N NH<sub>4</sub>SCN until the aq. layer remains a pale rose color. Cc. 0.1 N AgNO<sub>3</sub> — cc. 0.1 N NH<sub>4</sub>SCN × 0.01801 = amt. theobromine in 50 cc. soln. This value × 400 = % theobromine in sample.

H. M. Burlage

Ergot. P. N. Schürhoff. *Pharm. Monatsh.* 14, 283-4

(1933).—A historical discussion with comments on the methods of assay.

H. M. Burlage

Preparation of cosmetic emulsions. H. Schonberger. *Riechstoff-Ind.* 8, 213-15 (1933).—A discussion.

H. M. Burlage

The autoxidation of ferrous salts and the permanence of their solutions. Emil Starkenstein and Richard Steiger. *Arch. expl. Path. Pharmacol.* 172, 104-18 (1933).—Acid solns. of the simple ferrous salts keep fairly well, although differences are to be noted. The ease of oxidation of neutral solns. increases in the order FeCl<sub>2</sub>, FeSO<sub>4</sub>, Fe-(AcO)<sub>3</sub>, FeHCO<sub>3</sub>. Ferrous citrate, lactate and gluconate oxidize much more rapidly. In the absence of acid, the Fe<sup>++</sup> is pptd. as Fe(OH)<sub>2</sub>, disturbing the equil. and allowing further oxidation. The complex-forming acids act in a similar sense by combining with the formed Fe<sup>+++</sup>. The more concd. the ferrous salt solns., the less pronounced is the hydrolysis and the less pronounced the tendency to oxidation. Increasing temp. promotes hydrolysis and oxidation. Light has no effect upon the simple ferrous salts, but tends to reduce the ferric salt formed in solns. of the ferrous salt. In the absence of O, or in a CO<sub>2</sub> atm., no oxidation of the ferrous salt solns. is observed. Removal of CO<sub>2</sub> from a soln. of FeHCO<sub>3</sub> causes pptn. of Fe(OH)<sub>2</sub> in the presence of air, and of FeCO<sub>3</sub> in its absence.

Harry Eagle

Microsublimation in drug examinations. Miklós Korányi. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 332-7 (1933).—A general address. S. S. de Finály

Determination of the ethereal-oil content of plants. Miklós Janicssek. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 372-6 (1933); cf. C. A. 27, 3777.—A general address treating in detail the question of cohobation water.

S. S. de Finály

Tinctures. Dezső Wéber. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 387-90 (1933).—Tinctures made by double maceration showed higher contents but were not so perfect as those made by percolation. S. S. de F.

Rapid method for titrimetric determination and separation of metals (aluminum and copper) in drug preparations by means of 8-hydroxyquinoline. Zoltán Csipke. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 437-44 (1933).—Solns. contg. Al and Cu in the presence of tartrate are made alk. with NaOH and the Cu is pptd. with 4% alc. soln. of 8-hydroxyquinoline. The mixt. is heated to 70° for 10 min., cooled, filtered, the ppt. dissolved in HCl

and titrated according to Haen with 0.1 *N* Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. The filtrate is acidified with AcOH, heated to 60–5° and a 4% AcOH soln. of 8-hydroxyquinoline dropped in until the liquor becomes light yellow. Then 5 g. AcONa dissolved in 20 cc. water is added, the ppt. filtered and titrated with 0.1 *N* KBrO<sub>3</sub>.

S. S. de Finály

The analysis of antipyrine and some of its derivatives. Adrienne Dózsa. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 476–506(1933).—Antipyrine was detd. by pptn. as picrate with 0.05 *N* picric acid soln., drying at 120°, weighing, dissolving in boiling water and titrating with 0.1 *N* alkali. For detn. in the presence of pyrimidone picrate the method of S. Erikson is best, but even this is not absolutely correct. Pyrimidone is best detd. by the oxidimetric method of Schulek-Menyhárt. Since the condensation of melubrine and novalgine is reversible, these can be detd. on the basis of the formaldehyde and sulfuric acid developed. CH<sub>2</sub>O was detd. according to Schulek-Gervay, H<sub>2</sub>SO<sub>4</sub> by distn. Total S was gravimetrically detd. after ignition in a specially constructed calorimetric bomb. Melubrine and novalgine solns. undergo oxidation during storage. S. S. de Finály

Dental medicines: modern pharmacological and therapeutic principles applied to their use in general practice. James E. Aiguier. *Dental Cosmos* 75, 1184–97(1933).—A concise summary of the drugs used in dentistry.

Joseph S. Hepburn

Tobacco chemistry and tobacco cultivation in the years 1930–1932. Richard Kissling. *Chem.-Ztg.* 57, 981–2 (1933).

E. H.

The combination of 6-methyl-8-hydroxyquinoline hydrochloride with *o*-hydroxyquinoline hydrochloride as a disinfectant of the bile and urinary tracts. Louis Gaucher. *Bull. acad. méd.* 109, 109–14(1933).—Both substances have a high germicidal power, especially for *Es. coli* and *Eb. typhi*. The first substance is accumulated in the organism and develops a sp. action in coli infections. The sedative action on the mucous membranes, especially of the bladder, is an advantage. The toxicity is low and permits intravenous application. The av. dose is 0.25 g. 3 times daily.

A. E. Meyer

The determination of ecgonine. A. Goris and A. and C. Chalmers. *Bull. sci. pharmacol.* 40, 641–50(1933).—By the detn. of ecgonine preps. originally low in cocaine can be distinguished from products that have deteriorated by heat. Ecgonine can be estd. by the polarimetric method of de Jongh. Observation of the following conditions is of importance: The hydrolysis of the ecgonine esters must be performed by boiling the HCl soln. for at least 3 hrs. For decoloration use the smallest possible quantity of a special charcoal such as norite. De Jongh's formula corresponds to the ecgonine in soln., not to the HCl salt. Racemization or formation of anhydro-ecgonine does not occur during the manipulations.

A. E. Meyer

Analytical constants of authentic Bulgarian essence of rose. Robert Garnier and Sebastian Sabatay. *Compt. rend.* 197, 1748–50(1933).—Analyses of 9 authentic lots gave: EtOH 1.4–12%, d<sub>4</sub><sup>20</sup> 0.8704–0.8834, n<sub>D</sub><sup>20</sup> 1.4511–1.4667, steapoptene 1.2–19.9%; [α]<sub>D</sub><sup>20</sup> (1 dm.) –2.2° to –4.1°, acid no. 4.5–17.5, rhodinol 44.7–60.9%. One l. of EtOH was obtained from 200 kg. of flowers. No relationship was found between optical rotation and rhodinol content. A new azulenogenics sesquiterpene was found in the fraction distg. above geraniol-rhodinol, which is similar to the sesquiterpene from essence of geranium Bourbon. The Sabatay reaction with a CHCl<sub>3</sub> soln. of Br (C. A. 27, 3288) gave a greenish color with pure essence of rose and an intense blue color with the sesquiterpene. J. C. M.

Morphine, codeine and their derivatives. III. Morphine methochloride and codeine methochloride. Nathan R. Eddy. *J. Pharmacol.* 49, 319–28(1933); cf. C. A. 26, 4878.—Morphine methochloride (I), large colorless prisms with 2 H<sub>2</sub>O, loses the water in high vacuum at 100°. The hydrate, m. 287–9° (decompn.), sol. in 10 parts water, [α]<sub>D</sub><sup>20</sup> –84.8° (water). Codeine methochloride (II), fine prisms, very sol. in water, m. 260–5° (decompn.), [α]<sub>D</sub><sup>20</sup> –98.8° (water). Both I and II have less pharmacol.

action than their parent alkaloids, and both exhibit definite curare-like actions. The differences between I and II were similar to the differences between the parent alkaloids.

T. H. Rider

Standardization of dosage of sodium 5-ethyl-5-(α-methylbutyl)barbiturate (nembutal) for anesthesia in cats and dogs. H. C. Bazett and W. H. Erb. *J. Pharmacol.* 49, 352–61(1933).—The anesthetic dosage of nembutal for dogs and cats cannot be adequately expressed in terms of mg. of drugs per kg. of body wt. Fat animals require larger doses than thin. Curves are shown for predicting dosage.

T. H. Rider

A pharmacognostic study of Japanese drug "Nindo." T. Munesada. *J. Pharm. Soc. Japan* 53, 689–90(1933).—The Japanese drug "Nindo" is the dried stems and leaves of *Lonicera japonica* Thumb. Its pharmacognostic study is described in detail and the difference of this plant from other similar ones is pointed out.

Naoy Uyei

Notes on the water of crystallization of quinine sulfate. G. D. Beal and C. R. Szalkowski. *J. Am. Pharm. Assoc.* 22, 1219–25(1933).—Twenty-eight specimens of quinine sulfate, representing market material, were tested for loss in weight at 100°. A specimen contg. 16.78% H<sub>2</sub>O (R) and an anhyd. specimen (A) were prepd. The market material lost 4.39–12.29%, or calcd. as H<sub>2</sub>O 1.9–5.8 mols. None of the specimens conformed to the U. S. P. which requires 7 or 8 mols. of H<sub>2</sub>O (14.43 or 16.16%). Portions of A and R were exposed in desiccators 14 days to conc. H<sub>2</sub>SO<sub>4</sub>, 3:1 H<sub>2</sub>SO<sub>4</sub>, 2:1 H<sub>2</sub>SO<sub>4</sub>, 1:1 H<sub>2</sub>SO<sub>4</sub>, satd. soln. KC<sub>2</sub>H<sub>3</sub>O<sub>2</sub> (20% humidity), satd. soln. of CaCl<sub>2</sub> (30% humidity), satd. soln. K<sub>2</sub>CO<sub>3</sub> (40% humidity) and satd. soln. of NH<sub>4</sub>Cl (80% humidity). No marked changes took place after the ninth day. The dihydrate (4.60% H<sub>2</sub>O) is the most stable form. The heptahydrate (14.43%), the octahydrate (16.16%), and the anhyd. salt tend to form the dihydrate. In changing from the heptahydrate to the dihydrate the salt loses its long, flaky cryst. form and results in short needles which have almost the appearance of fine powder. The salt also loses in bulk.

L. E. Warren

Essential oil in desert plants. III. Examination of the oil of *Artemisia tridentata* typica. Maxwell Adams and Francis S. Oakberg. *J. Am. Chem. Soc.* 56, 457–9 (1934); cf. C. A. 26, 3876.—The dry leaves of *Artemisia tridentata* typica (black sage) yield about 1% of oil, contg. 5% artemisinal (I), 20% α-pinene, 7% cineole, 40% 1-camphor, 12% unidentified sesquiterpenes and 16% resins. I, a new aldehyde, b<sub>100</sub> 61°, has d<sub>4</sub><sup>20</sup> 0.81, is very volatile, a powerful lachrymator and is probably the aromatic substance responsible for the sage brush odor; at 0° it polymerizes to a faintly yellow transparent solid, decomp. at 200°; the semicarbazone m. 184° and the 3,4-dinitrophenylhydrazones, reddish orange, m. 186°. C. J. W.

The so-called Polish surgical cotton prepared from flax. Kazimierz Monikowski. *Wiadomości Farm.* 60, 629–32 (1933).—Surgical "cotton" prepd. from flax shows the following compn.: H<sub>2</sub>O 4.5%, ash 0.14%, SO<sub>2</sub> traces, Cl 0, Ca traces, reducing substances normal, reaction neutral, sorption of H<sub>2</sub>O good. The use of Polish surgical cotton is advocated.

J. Wiertelak

Chemical studies on lymphatin. S. Trawkowska. *Wiadomości Farm.* 60, 661–2, 675–7(677 in French)(1933).—Lymphatin, the dry ext. of lymphatic glands, is of value in treating diseases of bacterial origin. The powd. prepn. has the following compn.: H<sub>2</sub>O 11.7, ash 4.633 (water-insol. part 2.8, sol. part 1.833), NaCl 0.975, alky. 0.5% (calcd. as Na<sub>2</sub>CO<sub>3</sub>), p<sub>H</sub> of aq. ext. 6.2; metals: Na<sub>2</sub>O 1.23, K<sub>2</sub>O 1.45, CaO 0.058, MgO 0.184, Fe<sub>2</sub>O<sub>3</sub> 0.028%, Mn 3.04 mg. in 100 g. dry substance. Of metals exhibiting a pronounced catalytic action the following were found for the first time: Cu 0.004%, Zn 16.9 mg. per 100 g., Ni 0.0025%, Co traces, As traces, TiO<sub>2</sub> 0.011 mg. per 100 g. Of non-metals the following were detd.: S 0.45, total P 1.043, lipoidal P 0.3026, nucleic P 0.2032, mineral P 0.4696%. Lymphatin has the following const.: fatty acids 5.6, unsaponifiable matter 7.36, cholesterol 1.021%, I no. 57, sapon. no. 230, m. p. of the acids 31.2°; acid no. 25.2, pentoses, hexoses, aldoses

and ketoses, neg., proteins pos., total N 9.8, sol. N 2.45, protein N 7.35, NH<sub>3</sub> 1.8, total protein substances 45.92%. In addn. to the above lymphatin contains a great no. of enzymes the role of which is important in metabolism. Arginase, arbutase, lecithase and glycolase were found in lymphatin for the first time. J. Wiertelak

**Preliminary studies on the oil of *Monarda fistulosa*.** S. Badzyński. *Wiadomości Farm.* 60, 689-94 (693 in French) (1933).—*M. fistulosa* contains 0.6% of an essential oil which readily becomes brown on light. The oil contains 17% of alkali-sol. substances, of which 8-9% are phenol-like compds. of the thymol group, the rest belonging to quinones. J. Wiertelak

**Pharmaceutical material from the "Papyrus Rzhherzog Rainer"** (v. Lippmann) 2. Examn. of anise (Benedek) 12. Nondyeing metalliferous sulfurized phenol derivs. [intermediates for pharmaceutical compds.] (U. S. pat. 1,943,179) 25. Negatively charged "aluminum gel" [for purifying viruses] (U. S. pat. 1,942,790) 18.

Cooper, J. W.: *Tutorial Pharmacy*. 2nd ed. London: Sir Isaac Pitman & Sons, Ltd. 442 pp. 10s. 6d. Reviewed in *Pharm. J.* 131, 680 (1933).

Edens, Ernst: *Die Digitalisbehandlung*. 2nd ed. Berlin: Urban & Schwarzenberg. 154 pp. M. 7.

**The Chemists' and Druggists' Year-Book and Directory for Scotland, 1933.** Edited by J. B. M'Vitae. Glasgow: Munro & Co. 320 pp. 2s. 6d.

**The Manchester Royal Infirmary Pharmacopoeia.** 12th ed. Manchester: H. Blacklock & Co., Ltd. 125 pp. Reviewed in *Pharm. J.* 131, 680 (1933).

**Pharmacopoeia of the Hospital for Sick Children.** Revised ed., edited by J. Wicliffe Peck. London: The Hospital. 96 pp. 3s. 6d. Reviewed in *Pharm. J.* 131, 680 (1933).

**Summary of the Principal New or Revised Formulae Recommended by the Pharmacy Sub-Committee for Inclusion in the British Pharmaceutical Codex, 1934.** Report of Codex Revision Committee. London: Pharm. Press. 49 pp. 2s. 6d.

#### THESES

Hilmer, Wilhelm: *Versuche über die Kombination von Novokain und Kaliumphosphat*. Halle, 1931. 15 pp.

Hoeffler, Hella: *Auswertung von Harnextrakten auf Hypophysenvorderlappensubstanz*. Freiburg. 1931 13 pp.

Kaelin, Anton: *Studien zur Prüfung von Pepsin, Pankreatin und getrockneter Schilddrüse*. Zurich. 1931. 137 pp.

Klein, Wolf: *Die gebräuchlichsten Apothekermittel in Süddeutschland um das Jahr 1700*. Würzburg. 1930.

Müller, Erna: *Beiträge zur Kenntnis kolloider Arzneimittel*. Jena. 1931. 55 pp.

Zwahr, Herm. W.: *Über die desinfizierende Kraft einer Mischung von Sagrotan und Eucalyptusöl im Mischungsverhältnis 1:1 und 1:2*. Kiel. 1930. 22 pp.

**Alkaloids from cacao products.** Jules Bebie, John W. Livingston and Max Luthy (to Monsanto Chemical Co.). U. S. 1,942,160, Jan. 2. Alkaloids are liberated and the cacao product is simultaneously rendered more readily filterable by treating the cacao cake at an elevated temp. with an aq. acid soln. such as dil. HCl while maintained near the b. p., neutralizing the acid, extg. the alkaloids with an aq. medium at a temp. near the b. p. and sepg. suspended matter from the aq. medium. Various modifications are described.

**Recovering alkaloids from cacao products.** Max Luthy (to Monsanto Chemical Co.). U. S. 1,942,177, Jan. 2. Cacao waste products such as press cake or the like are treated to obtain an aq. soln. contg. an alk. earth metal salt of theobromine; this salt is converted into an alkali metal salt as by reaction with alkali metal carbonate, the pptd. metal carbonate is filtered out and the

purified theobromine is liberated from the filtrate by use of an acidifying soln. contg. SO<sub>2</sub>.

**N-Substituted derivatives of the pyridone series.** Karl Miescher and Ernest Urech (to Soc. pour l'ind. chim. à Bâle). U. S. 1,941,312, Dec. 26. New products, for use as therapeutic agents or intermediates are formed by converting compds. contg. the pyridone nucleus, the nuclear N of which is linked with H, or compds. contg. a 2- or 4-hydroxypyridine nucleus, or their substitution products, into derivs. amino-alkylated at the nuclear N. Details are given of the production of *N*-diethylaminoethyl-2-pyridone, anhyd. hydrochloride, m. 148°, and monohydrated m. 74°, *N*-diethylaminoethyl-2-pyridone-3-carboxanilide, b<sub>0.5</sub> 205°, and its hydrochloride, m. 195°, *N*-diethylaminoethylpyridone, monohydrochloride, m. 115°, *N*-diethylaminoethyl-2-quinoline-4-carboxanilide, m. 154°, and hydrochloride, m. 258°, *N*-diethylaminoethyl-2-quinolinecarboxydiethylamide, b<sub>0.5</sub> 220°, and forming a hydrochloride, m. 148° (decompn.), 2-diethylaminoethoxy-3-phenyl-4-quinolinecarboxydiethylamide, hydrochloride, m. 154°, *N*-diethylaminoethyl-4-pyridone, b<sub>0.5</sub> 175°, 2-pyridone-*N*-ethylphthalammide, m. 135.7° and the corresponding phthalimide, m. 205°, the hydrobromide of *N*-aminoethyl-2-pyridone, m. 203°, and the corresponding hydrochloride, m. 183°, *N*-aminopropyl-2-pyridone hydrochloride, m. 181-2°, *N*-diethylaminoethylisoquinoline, b<sub>0.5</sub> 175.8°, and it is stated that there may be similarly formed: *N*-dimethylaminoethyl-2-pyridone-3-carboxanilide, monohydrochloride, m. 218°, *N*-dibutylaminoethyl-2-pyridone-3-carboxanilide, monohydrochloride, m. 181°, *N*-piperidinoethyl-2-pyridone-3-carboxanilide, monohydrochloride, m. 215°, *N*-diethylaminoethyl-2-pyridone-3-carboxyphenetide, monohydrochloride, m. 221°, *N*-diethylaminoethyl-2-pyridone-3-carboxy-*N*-ethylanilide, monohydrochloride, m. 102°, *N*-diethylaminoethyl-2-pyridone-3-carboxydiethyl-ethylenediamide, dihydrochloride, m. 86°, *N*-diethylaminoethyl-2-pyridone-5-carboxanilide, m. p. of the base 100-102°, *N*-diethylaminoethyl-2-quinoline, b<sub>2</sub> 168-70°, *N*-diethylaminoethyl-6-ethoxy-2-quinoline, b<sub>2</sub> 198-200°.

**Sodium *p*-phenylphenate.** Edgar C. Britton (to Dow Chemical Co.). U. S. 1,942,800, Jan. 9. Na *p*-phenylphenate, in the form of white needle-like monohydrate crystals, decomp. about 105°, is formed by reaction of free phenol with an excess of aq. NaOH soln. or by other described methods. It is a germicide and insecticide. Cf. C. A. 27, 4543.

**Quinoline azo compounds.** I. G. Farbenind. A.-G. Brit. 399,818, Oct. 11, 1933. Quinoline-8-azo compds. of the quinine series are manufd. by coupling the diazo compd. of 8-aminoquinoline or of a substitution product thereof with hydrocupreine, or a substitution product thereof. The products have pronounced efficacy against malaria. Among examples 6-methoxy-8-aminoquinoline is diazotized and coupled with hydrocupreine-2HBr to produce 6-methoxyquinoline-8-azohydrocupreine.

**Ovarian hormone.** Edward A. Doisy, Sidney A. Thayer and Clement D. Veler (to The President and Board of Trustees of St. Louis University). Can. 338,190, Dec. 26, 1933. An ovarian hormone is obtained by extn. of the urine of pregnant animals with BuOH, evapg., extg. the residue with C<sub>6</sub>H<sub>6</sub>, evapg., extg. the residue with BuOH and petroleum ether, extg. this soln. with an alk. soln., extg. the alk. soln. with Et<sub>2</sub>O, extg. the Et<sub>2</sub>O soln. with an alk. aq. soln., extg. the alk. aq. soln. with Et<sub>2</sub>O, evapg. the Et<sub>2</sub>O soln., and recrystg. the residual product from org. solvents.

**Ovarian hormones.** Edward A. Doisy (to The President and Board of Trustees of St. Louis University). Can. 338,200 Dec. 26, 1933. Ovarian hormones are obtained by extg. urine of pregnant animals with BuOH, removing the butyl alc., extg. the residue with C<sub>6</sub>H<sub>6</sub>, removing this, dissolving the residue in aq. NaOH, treating the NaOH soln. with Et<sub>2</sub>O, thereby fractionally distributing the hormones between the aq. alk. soln. and the ether soln., removing the ether, dissolving the residue in aq. NaOH soln., fractionally distributing



the hormones therein between ether and aq. NaOH soln., evapg. the ether, recrystg. the residue therefrom to obtain the  $\alpha$  hormone and acidifying one or more of the aq. alk. solns. from the fractional distribution to ppt. the  $\beta$  hormone.

**Testicular extract.** Fred C. Koch and Thomas F. Gallagher (to University of Chicago). U. S. 1,941,900, Jan. 2. For concg. and purifying a testicular hormone, the protein constituents are removed from testicular tissue, the testicular hormone is extd. from the residue at least once with a fat solvent such as  $C_6H_6$  and the fat solvent is removed.

**Wound-treating material.** Karl A. Hofmann (to Asociacion de productores de Yodo de Chile). U. S. 1,942,061, Jan. 2. Silk filaments are prepd. carrying 5-12% of I which is titratable with thiosulfate.

**Surgical bandages.** Bernhard Abele. Brit. 399,986, Oct. 19, 1933. A bandage or plaster is made of soft

paper or like material sprayed with I which has been rendered  $H_2O$ -sol. by combination with casein, magnesia, soda or other metallic salts.

**Use of *o*-cyclohexylphenol in antiseptic and germicidal compositions.** Edgar C. Britton (to Dow Chemical Co.). U. S. 1,942,801, Jan. 9.

**Sterilizing catgut, etc.** Alfred Mayr. Brit. 398,459, Sept. 14, 1933. Surgical sewing material is sterilized by aq. or alc. solns. of compds. of the halogens with each other, e. g.,  $ICl$ ,  $IBr$ ,  $ICl_3$ ,  $BrF_3$ ,  $IF_3$ .

**Dentifrices.** Henkel & Cie. G. m. b. H. Brit. 399,917, Oct. 19, 1933. Corresponds to Fr. 737,220 (C. A. 27, 1454) but gives addnl. information.

**Hair tonics.** Jessie M. Stevenson. Brit. 399,007, Sept. 28, 1933. A prepn. for stimulating hair growth comprises castor oil 8, peach kernel oil 2, verbena oil 4 and surgical spirits (industrial spirit contg. small amts. of castor oil and  $H_2BO_3$ ) 2 parts by vol.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

**Extraction of boric acid in Tuscany.** Albert Granger. (*Ceram., verrerie, emaille* 1933, 293-5; cf. C. A. 26, 5718.—Boric acid has been extd. since 1818 from certain vapors (*soffioni*) emitted in the region of Tuscany. Modern operations utilize both the content and energy of the vapors. Boric acid,  $NH_3$ ,  $CO_2$  and rare gases such as A and He are sep'd. and recovered. The streams of vapor are used for supplying turbines, the discharged vapor is washed to remove nearly all boric acid and the washed vapor serves to heat the concn. app. Mother liquor from the crystn. contg. small amts. of boric acid is recirculated.

Alice W. Epperson

**Combined production of sulfuric and hydrochloric acids.** G. V. Prikhodko. *Ukrain. Khem. Zhur.* 8, Wiss.-tech. Teil, 66-7 (in German 67) (1933).— $SO_2Cl_2$  was obtained by passing at room temp. an equimol. mixt. of dried Cl and  $SO_2$  mixed with dry air through a tube charged with various catalysts (Ger. pat. 364,519, 419,521; *Z. angew. Chem.* 40, 1253-4 (1927)). Passing  $SO_2Cl_2$  either into  $H_2O$  to 55° B $\acute{e}$  and heating the mixt. at 200-50° until  $HCl$  is expelled, or into 50° B $\acute{e}$ .  $H_2SO_4$  at 250° to satn. produced pure  $H_2SO_4$  (d. 1.84) and  $HCl$  (d. 1.19). The catalysts were not poisoned in the process. C. B.

**Corrosion of lead of various chemical compositions in sulfuric acid plants.** Adolf Schunemann. *Korrosion u. Metallschutz* 9, 325-31 (1933).—Test plates, prep'd. from 14 different grades of Pb and exposed to operating conditions in various parts of a  $H_2SO_4$  plant, were exam'd. for loss of wt. The influence of impurities in the Pb varied in different locations in the plant. While in the Gay-Lussac tower small addns. of Cu, Ni, Cu and Ag, and Bi had temporarily a passivating effect, complete reversal took place later on. For  $H_2SO_4$  plants the purest Pb is recommended, except where mech. vibrations cause destruction of the Pb by recrystn. Under such conditions a small Cu content is recommended. Leopold Pessel

**Oxidation of  $NH_3$  with  $O_2$  in the presence of water vapor.** G. Margolis and A. M. Dubovitzkiĭ. *Trans. Sci. Inst. fertilizers* (Moscow), No. 92, 59-67 (1932).—By substitution of  $H_2O$  vapor for the N from air, and use of  $O_2$  in mixt. with  $NH_3$ , it was possible to produce efficiently NO by the contact method, with Pt gauze as a catalyzer. In the presence of 30 to 68% vapor it was possible to keep down the temp. to 840°. With a concn. of 19-20%  $NH_3$  in the mixt. at a temp. of 780° the yield of NO was 80-93%. Any increase in  $NH_3$  caused an explosion. With a concn. of 22-23%  $NH_3$  in the presence of  $H_2O$  vapor and with 6.5 gm. of  $NH_3$  per hr. for every sq. cm. of Pt. gauze, the yield was 70-77% at 800°. Without  $H_2O$  vapor a concn. of 10-11%  $NH_3$  fed at the rate of 5.5 g. per hr. for every sq. cm. gave a yield of NO equal to 84-85% at 680-700°. By decreasing the load to 2.9 g. per hour, M. and D. found it possible to increase the concn. of  $NH_3$  to 28% and obtain a yield of NO equal to 82-83% at 640°. J. S. Joffe

**Alumina from Poshan bauxite.** Earl O. Wilson and Yu-Ling Kao. *J. Chinese Chem. Soc.* 1, 120-38 (1933).—The finely ground ore, after being calcined with soda ash and lime for 4 hrs. at 1050°, is extd. with hot  $H_2O$ , and the  $SiO_2$  is removed by boiling with CaO; the  $Al_2O_3$  is ppt'd. with  $CO_2$ . The product is satisfactory for metallurgical purposes and contains 98.81%  $Al_2O_3$  and 0.21%  $SiO_2$ . Wm. H. Adolph

**Production of barium chloride from barium sulfide with chlorine.** M. O. Kharmandar'yan and K. I. Brodovich. *Ukrain. Khem. Zhur.* 8, Wiss.-tech. Teil, 110-15 (1933).—The Grano process (U. S. Pat. 1,167,061, C. A. 10, 670), modified by chlorinating dry BaS at 150° for 3 hrs., produced 93-4%  $BaCl_2$ , free S and no  $H_2S$  and  $S_2Cl_2$ . Production of barium chloride from barium sulfate (barite) with chlorine. *Ibid.* 116-18.—A yield of 99.6%  $BaCl_2$  was obtained by chlorinating barite at 600° for 2 hrs. in the presence of the catalyst  $Al_2O_3$  and C (C and  $BaSO_4$  in equal proportion). Production of barium chloride from barium sulfate (barite) with gaseous hydrochloric acid. *Ibid.* 119-24.—Barite treated with gaseous  $HCl$  for 3 hrs. produced 50%  $BaCl_2$  at 600°, 96% at 800° and 96.7% at 1000°.  $FeCl_3$ ,  $NiCl_2$ ,  $CoCl_2$ ,  $Cu_2Cl_2$ ,  $Fe_2O_3$ ,  $MnO_2$  and  $SiO_2$  (gel) acted as anticalysts, reducing the yield of  $BaCl_2$  in proportion to the amts. used. The conversion of  $BaSO_4$  to  $BaCl_2$  with  $HCl$  increased from 30 to 95.06% at 600° in 2 hrs. on addn. of coke C to  $BaSO_4$  in equal proportion.  $BaCl_2$  was leached out with hot  $H_2O$  with a yield of 94.98%, and the recovered C was used over again. Injecting steam into the systems acted adversely.

Chas. Blanc

**Production of sodium ferrite by the Loewig process.** I. M. O. Kharmandar'yan and G. V. Marchenko. *Ukrain. Khem. Zhur.* 8, Wiss.-tech. Teil, 95-103 (in German 103) (1933).—In the production of Na ferrite, the fusion of calcined  $Na_2CO_3$  and iron ore was effected at lower temps. than usual in the Loewig method (1100-200°) by working with finely comminuted materials. Thus finely divided and easily leachable ferrite was obtained at 850° from powd.  $Na_2CO_3$  and iron ore, and at 900° from powd.  $Na_2CO_3$  and coarse ore in proportions of 1  $Na_2CO_3$  to 2 ore.

Chas. Blanc

**Catalytic production of chlorine from hydrochloric acid.** M. O. Kharmandar'yan and G. V. Prikhodko. *Ukrain. Khem. Zhur.* 8, Wiss.-tech. Teil, 68-71 (in German 71) (1933).—Optimum results of 97.5% Cl were obtained by catalytic decompn. of 18-20%  $HCl$  at 370° and at a speed of 30 l. per hr. with a contact mass prep'd. by pptg. a mixt. of nitrates of Cu, Co, Mn and Bi on fireclay and heating at 600° in an elec. oven. The catalyst is poisoned with  $SO_2$  and  $CO$ .

Chas. Blanc

**Progress in the field of hydrogen production, 1932-1933.** Carl Heinrich. *Chem.-Ztg.* 57, 933-6, 950-2 (1933).

E. H.

**The nitrogen industry in 1933.** E. B. Maxted. *Chem.* 1  
Age 29, 598-9(1933). E. H.

**Dry recovery of sulfur from hydrogen sulfide.** M. O. Kharmandar'yan, E. L. Kopelovich and A. E. Buryak. *Ukrain. Khim. Zhur.* 8, Wiss.-tech. Teil, 72-87 (in German 87-8)(1933).—The problem of desulfurizing com. waste gases with recovery of S from  $H_2S$  was investigated. The dry method was selected as more economical, and was developed with satisfactory results in a semi-com. process. The recovery of S by oxidation of  $H_2S$  is possible only at the b. temp. of S ( $300^\circ +$ ), because below  $250^\circ$  S is condensed on the contact mass, and this reduces its activity and necessitates a complicated regeneration process. The gas mixt. must contain not less than 10%  $H_2S$ , because the liberated heat is not sufficient to maintain the contact mass at  $300^\circ$  without the aid of external heat. At higher concns. it is sufficient to heat initially the catalyst up to  $300^\circ$ , and the temp. rises spontaneously up to  $400-500^\circ$  with 16-18%  $H_2S$ . The use of  $SiO_2$  gel as a catalyst, either alone or treated with salts of Mn, Fe, Mn + Fe or Fe + Cu, is possible only with an initial external heating, and though inadequately active, it possesses a greater heat capacity than activated C and is easily prepd. and regenerated.  $SiO_2$  gels impregnated with metal salts are very brittle and are easily disintegrated in the process. Chamotte proved to be a cheaper and a more stable carrier. A highly active catalyst was obtained by treating chamotte with an aq. paste of  $Mn(AcO)_2$ ,  $Fe(AcO)_3$  and a mixt. of the 2 acetates, and igniting the mass at exactly  $400-500^\circ$  with a free access of air. Equally good results were obtained with French bauxite contg. some Fe. The reaction progresses best in the presence of a small vol. (thin layer) of contact mass, and gives pptn. of S on thick layers. The compn. of escaping gas can be regulated by the concn. of  $O_2$  in the  $H_2S$  mixt.: a deficiency of  $O_2$  produces incomplete decompn. of  $H_2S$  and formation of S, while an excess of  $O_2$  gives complete oxidation of  $H_2S$  with some formation of  $SO_2$ . Equiv. mixts. of  $O_2$  and  $H_2S$  lead to incomplete oxidation of  $H_2S$ . A high velocity of gas flow over the contact mass results in a large escape of unreacted  $H_2S$ . Finely dispersed amorphous oxides of Mn and Fe possess high catalytic activity, considerably accelerating the oxidation of  $H_2S$  at a const. rate without the aid of initial external heating. The oxidation of  $H_2S$  is from 75 to 95%, depending on the concn. of  $H_2S$  in the mixt. C. B.

**Activated charcoal and industrial applications.** L. Friderich. *Chimie et industrie* 30, 1038-9(1933).—Polemical with Godel (C. A. 27, 1718). Reply. A. Godel. *Ibid.* 1039-40. Reply. L. Friderich. *Ibid.* 1040.

**Progress in lime industry in 1932.** R. Barta. *Stavro* 1933, 97; *Chem. Obozr.* 8, Abstract sect. 200. J. K.

**Use of starch for precipitation of sludge in the lime method (of causticizing sodium carbonate).** A. V. Petrov. *Ukrain. Khim. Zhur.* 8, Wiss.-tech. Teil, 89-93 (in German 93)(1933).—The use of  $CaCO_3$  in causticizing soda liquors in combination with com. wheat or potato starch produced tolerably good results in plant operation. The addn. of 0.01% starch based on the liquor vol. is sufficient to reduce the end vol. of the ppt. Peeled potatoes can be used with equal results. The speed of pptn. of chalk sludge with starch is 5 times greater than without the starch and twice greater than with limestone. The addn. of starch is effective up to a concn. of 100 g. NaOH per l. of the liquor. Chas. Blanc

**Asbestos. Its production and treatment.** Hans Diegmann. *Caoutchouc and gutta-percha* 30, 16590-1(1933).—A review and discussion. C. C. Davis

**The uses of gypsum.** Albert Moye. *Tonind.-Ztg.* 57, 942-3, 966-8(1933).—A review. Karl Kammermeyer

**Magnesite in the British Empire.** A. W. Comber. *Mining Mag.* 50, 24-7(1934).—Natural  $MgCO_3$  occurs chiefly in the cryst. form (when it may contain a proportion

$FeCO_3$  and be mineralogically classed as breunnerite) amorphous or compact magnesite. The former is he prepn. by high-temp. calcination ( $1700^\circ$ ) of dead-burned magnesite. Austria and Russia The amorphous type carries less im-

purity than the cryst. variety, and is calcined at a lower temp. ( $1450^\circ$ ) to yield caustic or cementitious material. The difference in calcination temp. of  $250^\circ$  has an important bearing on production costs. The system sometimes adopted in the U. S. A. of mixing Fe ore with a cryst. magnesite to reduce its sintering temp. is regarded as not entirely satisfactory. Light basic  $MgCO_3$  is largely imported from Germany for use as an insulator; this can be made from calcined magnesite not of the highest quality, and its manuf. affords a convenient means of utilizing the  $CO_2$  evolved at the kiln. A. W. Furbank

**The plastics industry, 1933.** H. C. Potter. *Chem.* Age 29, 607-8(1933). E. H.

**Solvents and plasticizers.** Thos. H. Durrans. *Chem.* Age 29, 605-6(1933).—A review. E. H.

**Cold adhesives.** F. Kollmann. *Farben-Ztg.* 38, 1795-7(1933).—In Germany, casein adhesives are usually sold in the form of powder mixed with lime ready for mixing with  $H_2O$ , while in the U. S. for example, the ingredients are sold separately. The general properties, uses and manipulation are briefly reviewed. G. G. Sward

**Chemistry to the rescue: a consideration of a new denture base material.** Norman B. Nesbett. *Dental Cosmos* 75, 1085-8(1933).—The advantages and use of vinyl resin in the manuf. of dentures are described. Joseph S. Hepburn

**Specifications for chemicals used in cleaning metals.** Edward B. Sanigar. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 3, 26-9(Nov. 1933).—The specifications suggested by the Electrodepositors' Tech. Soc. (London) are outlined (cf. C. A. 27, 5487). E. B. S.

**Gas production combined with the regeneration of the waste gas from lime kilns (Mehlig) 21.** App. for synthesis of  $NH_3$  (U. S. pat. 1,942,021) 1.

**Hydrocyanic acid.** Gesellschaft fur Kohlentechnik m. b. H. Brit. 399,718, Oct. 12, 1933. See Fr. 752, 296 (C. A. 28, 862').

**Ammonia.** August Gumbel. Ger. 587,585, Nov. 6, 1933 (Cl. 12k. 7). In utilizing  $NH_3$ , e. g., from coal-distn. gases, to make  $NH_4$  salts, the  $NH_3$  is first treated with Cl under conditions which result in the formation of some  $HCl$  as well as  $NH_4Cl$ . The  $NH_3$  stream may then be carried, with the  $HCl$  and  $NH_4Cl$  into other acids.

**Alkali cyanates.** Nicolaas Rusting (to N. V. Stikstof-binding-industrie "Nederland"). Brit. 399,820, Oct. 9, 1933. See Fr. 731,167 (C. A. 27, 813) and Dutch 29,812 (C. A. 27, 4634).

**Chromates; dichromates.** Bozel-Malétra (Société Industrielle de produits chimiques). Brit. 397,434, Aug. 24, 1933. Addn. to 364,361 (C. A. 27, 1997).—In the process of 364,361 other substances that yield alkali or alk.-earth during the reaction are used in place of or with the alkali or alk.-earth hydroxides, carbonates or bicarbonates. Such substances are alkali or alk.-earth sulfates, chlorides, phosphates, acetates, silicates, aluminates, nitrates, chlorates, per-salts, manganates and permanganates. In 397,435, Aug. 24, 1933, similar substances are used in oxidizing  $Cr_2O_3$ ,  $Cr(OH)_3$  or Cr ores, instead of Cr (alloy), under similar conditions.

**Nitrate production from chlorides.** Bruno Uebler. U. S. 1,942,886, Jan. 9. In producing a nitrate such as  $KNO_3$  from a chloride such as  $KCl$  by reaction with nitrous gases or  $HNO_2$ , nitric oxide is regenerated from the nitrosyl chloride evolved together with Cl by passing this mixt. over  $FeCl_3$  to form an addn. product of  $FeCl_3$  and nitrosyl chloride, heating this addn. product to obtain substantially pure nitrosyl chloride, and passing the latter at ordinary temp. over iron to form nitric oxide and an addn. product of  $FeCl_3$  and nitrosyl chloride (the nitric oxide being re-used in cycle).

**Hyposulfite solution and pure zinc oxide.** I. G. Farbenind. A.-G. (Max Bazlen, Emil Rieger and Fritz Scholtz, inventors). Ger. 587,570, Nov. 4, 1933 (Cl. 12k. 22). An aq. suspension of impure Zn dust (i. e., contg.  $ZnCO_3$ ,  $ZnO$  and foreign materials) is treated with excess of  $SO_2$ :

the  $\text{ZnS}_2\text{O}_4$  soln. is filtered off from the suspended impurities, and the soln. is treated with calcined soda to give a soln. of  $\text{Na}_2\text{S}_2\text{O}_4$  and a ppt. of  $\text{ZnCO}_3$ . Pure  $\text{ZnO}$  is obtained by calcining the latter.

**Removing iron from aluminum salt solutions.** J. R. Geigy A.-G. Brit. 399,772, Oct. 12, 1933. See Ger. 570,376 (C. A. 27, 2540).

**Ammonium molybdate.** Chemische Fabrik Budenheim A.-G. Ger. 587,709, Nov. 7, 1933 (Cl. 12a. 10). Stable solns. of  $(\text{NH}_4)_2\text{MoO}_4$  are obtained by dissolving the substance in dil.  $\text{HNO}_3$  in the presence or absence of  $\text{NH}_4\text{NO}_3$ , boiling for some time and filtering. The boiling may be carried out under pressure at temps. above the normal b. p.

**Ammonium sulfate.** Frederick W. Sperr, Jr. (to The Koppers Co.). Can. 336,146, Oct. 3, 1933. Ammoniacal liquor is treated with  $\text{SO}_2$  to form  $(\text{NH}_4)_2\text{SO}_4$  soln. Finely comminuted oxidizing gas is introduced into the lower portion of a tall narrow column of the  $(\text{NH}_4)_2\text{SO}_4$  soln. to produce  $(\text{NH}_4)_2\text{SO}_4$ . Cf. following abstr.

**Ammonium sulfate.** Robert R. Fulton (to The Koppers Co.). Can. 330,146, Oct. 3, 1933.  $\text{SO}_2$  is introduced into the ammoniacal liquor until the liquor is acid. The oily material is removed and the resulting liquor is treated with air. The  $(\text{NH}_4)_2\text{SO}_4$  in the liquor is converted to  $(\text{NH}_4)_2\text{SO}_4$ .

**Ammonium sulfate.** Frederic M. Pyzel (to The Shell Development Co.). Can. 337,009, Nov. 7, 1933.  $\text{NH}_3$  gas is injected into a stream of acidic soln. of  $(\text{NH}_4)_2\text{SO}_4$  and steam is injected into the stream at the point of injection of the  $\text{NH}_3$  to retard crystn. in the stream. The formation of  $(\text{NH}_4)_2\text{SO}_4$  crystals of uniform size is promoted.

**Ammonium sulfate.** Jan D. Ruys (to The Shell Development Co.). Can. 337,011, Nov. 7, 1933. Acid sludge is neutralized with  $\text{NH}_3$ , and the major part of the oil freed by the neutralization is removed. Finely divided particles of oil remaining in the soln. are agglomerated, and the agglomerated oil is sepd. from the  $(\text{NH}_4)_2\text{SO}_4$  soln., which is thereafter evapd.

**Ammonium sulfate.** Leon R. Westbrook. Can. 337,285, Nov. 21, 1933. The reaction of  $\text{SO}_2$ ,  $\text{NH}_3$ ,  $\text{O}_2$  and  $\text{H}_2\text{O}$  to produce  $(\text{NH}_4)_2\text{SO}_4$  takes place rapidly and substantially completely in the presence of a small amt. of nitrogen oxides ( $\text{NO}_2$  is not included); e. g.,  $(\text{NH}_4)_2\text{SO}_4$  is made by adding a small amt. of an O-transmitting N oxide to a gas phase contg. about 0.5 vol. %  $\text{SO}_2$  and the equiv. amt. of  $\text{NH}_3$  (2 mol.  $\text{NH}_3$ , 1 mol.  $\text{SO}_2$ ), a large excess of O and water vapor, N being the diluent of the gas phase, and maintaining the temp. at 70–125°F.

**Zinc oxide.** Bonner N. McCraven (to New Jersey Zinc Co.). U. S. 1,941,569, Jan. 2. Zinciferous material is reduced to produce Zn vapor from the condensation of which there is maintained a molten bath of Zn metal in full communication by gravity with a second molten bath of Zn metal from which reduction gases are excluded; Zn is volatilized from the second bath and this Zn vapor is oxidized to form  $\text{ZnO}$ . App. is described.

**Zinc oxide.** Metallges. A.-G. (Hans Klencke, inventor). Ger. 587,736, Nov. 7, 1933 (Cl. 40a. 41.01). See Fr. 753,330 (C. A. 28, 1150<sup>6</sup>).

**Decolorizing heavy spar.** Maximilian Schiechel (to American Lurgi Corp.). U. S. 1,941,626, Jan. 2. The heavy spar is heated in admixt. with a relatively small proportion of an oxide or O-contg. salt such as the nitrate or sulfate of K, Na, Al, Mg, Zn or Zr, at a temp. of at least 900° but below the fusion temp.

**Carbon dioxide.** Mark Shoeld (to The Koppers Co.). Can. 337,153, Nov. 14, 1933.  $\text{CO}_2$  is absorbed from gases contg. it by means of alkali carbonate soln. The bicarbonate soln. thus formed is sprayed into a heated chamber into direct contact with steam.  $\text{CO}_2$  is formed and removed from the chamber. The regenerated carbonate soln. is again used for absorption of  $\text{CO}_2$ .

**Hydrogen peroxide.** Kali-Chemie A.-G. (Friedrich Rusberg, Paul Schmid and Ludwig Pellets, inventors). Ger. 587,888, Nov. 9, 1933 (Cl. 12a. 16). App. for the direct prepn. of pure  $\text{H}_2\text{O}_2$  by the fractional distn. of

$\text{H}_2\text{O}_2$  soln. obtained by adding acid to dil.  $\text{BaO}_2$  is described. The mixt. of  $\text{H}_2\text{O}$  and  $\text{H}_2\text{O}_2$  vapor is made into a mist before its entry into the condensing chamber.

**Stabilization of hydrogen peroxide solutions.** Joseph S. Reichert (to The Canadian Industries Ltd.). Can. 337,601, Dec. 5, 1933. A  $\text{H}_2\text{O}_2$  soln. is stabilized by adjusting the acidity to  $p_H$  2–6 and adding an amt. of  $\text{Na}_2\text{SnO}_3$  equiv. to 5–100 mg. of Sn per l. of soln. and 0.01–0.2 g. of  $\text{Na}_4\text{P}_2\text{O}_7$  per l. of soln.

**Anhydrous sulfur dioxide.** Jack E. Elliott. Can. 337,416, Nov. 28, 1933. Liquid anhyd.  $\text{SO}_2$  is manufd. by feeding into a burner substantially pure S, adding air sufficient for vaporization but insufficient for complete oxidation and igniting the S to form S vapor. The vapor is conducted to a combustion chamber and sufficient air added for complete oxidation of the S. The resultant gas is cooled to a low temp., and the  $\text{SO}_2$  is purified by passing all the gases through a water suspension whereby the  $\text{SO}_2$  is dissolved in the water. The resultant aq. soln. is vaporized and the  $\text{SO}_2$  vapor sepd. from the water vapor. The  $\text{SO}_2$  gas is liquefied by compression and then passed to a heat exchanger and the resultant anhyd.  $\text{SO}_2$  is collected as a liquid.

**Hydrogen.** George F. Jaubert. Brit. 399,110, Sept. 28, 1933. See Fr. 42,776 (C. A. 28, 866<sup>1</sup>).

**Elemental sulfur from sulfur dioxide and hydrogen sulfide.** Ludwig Rosenstein (to United Verde Copper Co.). U. S. 1,941,623, Jan. 2. Reaction of  $\text{SO}_2$  with  $\text{H}_2\text{S}$  is effected in the presence of an inorg. gel or adsorbent carbon and of water in the liquid state (suitably at a temp. above 120°).

**Reducing sulfur compounds such as sulfur dioxide to elementary sulfur or hydrogen sulfide.** Charles G. Maier (one-fourth each to Reginald S. Dean and Henry A. Doerner). U. S. 1,941,702, Jan. 2. The compd. to be reduced is heated at an elevated temp. (suitably about 700–900°) with a reducing agent such as a mixt. of H with CO in which the H constitutes over 55% of the mixt.

**Carbon black.** John J. Jakosky and Victor F. Hanson (to The Electrolacks Inc.). Can. 337,132, Nov. 14, 1933. An elec. arc is maintained beneath the surface of a body of oil to cause dissocn. of a portion of the oil and formation of carbon black which is permitted to accumulate in suspension in the oil. A portion of oil remaining undissociated and contg. such carbon black in suspension is withdrawn from the container, the ratio of supply and withdrawal being so regulated as to maintain the concn. of carbon black in suspension in the body of oil within the container and surrounding the elec. arc between 8 and 10%.

**Carbon black.** Gustav A. Frenkel (to The Shell Development Co.). Can. 337,707, Dec. 5, 1933. Natural gas is thermally decomposed in a checker-filled converter and the C produced is collected and admixed with water. The resulting mixt. is subjected to high pressure and sprayed with a stream of hot combustion gases to effect flash evapn. of the water. Air is subsequently added to the resulting humid gas stream, and the carbon black produced is collected.

**Catalysts such as those for sulfuric acid production, etc.** Johannes L. Koetz (to Selden Co.). U. S. 1,941,557, Jan. 2. Raw catalytic material contg. water of hydration, such as a pellet-form V-contg. catalyst, is subjected to the heat given off by a chem. reaction, such as  $\text{SO}_2$  oxidation, that is set up within a moving stream of the material. App. is described.

**Condensation products.** Pfenning-Schumacher-Werke G. m. b. H. Ger. 587,643, Nov. 7, 1933 (Cl. 12a. 7.05). Hardening products are obtained by condensing urea or thiourea with sulfidic compds. and  $\text{CH}_3\text{O}$ . Thus, urea,  $(\text{NH}_4)_2\text{S}$  and  $\text{CH}_3\text{O}$  are condensed in the cold.

**Plastic compositions.** Franz Gassner. Brit. 399,208, Oct. 2, 1933. See Fr. 734,382 (C. A. 27, 1114).

**Plastic compositions.** Eugene V. Hayes-Gratze. Brit. 399,277, Oct. 5, 1933. The residue from a retting or wet-treatment for the extn. of vegetable fibers, e. g., from flax, sisal, cacao beans, etc., is used as a plastic compn. by rolling or pressing to the desired form, with or without

addnl. filling or binding materials. In an example coir waste and pith is dried, ground and mixed to a plastic mass with rubber latex.

**Plastic masses.** Bakelite G. m. b. H. (Fritz Seebach, inventor). Ger. 587,576, Nov. 4, 1933 (Cl. 306. 22). Plastic masses are prepd. by treating a soln. of novolak in fatty oils with a hardening agent. Thus, novolak obtained by condensing cresol and  $\text{CH}_3\text{O}$  in the presence of  $\text{HCl}$  is dissolved in linseed oil.  $(\text{CH}_3)_3\text{N}_4$  is then added at  $130\text{--}50^\circ$  to give a resinous mass.

**Methylene polysulfide plastic.** Joseph C. Patrick. Can. 336,070, Oct. 3, 1933. S-contg. plastics are produced by the reaction of sol. polysulfides on reactive methylene compds., such as methylene dihalides,  $\text{CH}_3\text{O}$ , polymerized  $\text{CH}_3\text{O}$  and  $(\text{CH}_3)_3\text{N}_4$ . Approx. equimol. proportions of the reacting constituents or larger proportion of the methylene compds. are used. The polysulfides are preferably sol. in water and they may be employed in aq. or alc. soln. The products obtained are in general white, yellow or yellowish white, contain more than 65% S, and are readily moldable with a mild application of heat.

**Modifying agents for plastics.** James F. Walsh and Amerigo F. Caprio (to The Celluloid Corporation). Can. 337,319, Nov. 21, 1933. Cellulose acetate and a substantially water-insol. ester of tartaric acid of low volatility are combined by the aid of a solvent. The solvent is then evapd. and the mass formed into the desired shape by heat and pressure. Modifiers include dibutyl dibenzyl, and monobenzyl tartrate. Suitable solvents are acetone, ethyl lactate, ethyl methyl ketone, etc.

**Compound sheets.** Leopold Rado. Brit. 399,304, Oct. 5, 1933. Compd. sheets are formed by drying 2 paper, pasteboard, etc., sheets, coated on one side with metal foil by means of a  $\text{H}_2\text{O}$ -sol. adhesive unaffected by heat, applying to the uncovered sides an adhesive that will soften with heat, e. g., a thermoplastic bitumen compd., and uniting. The compd. may be a mixt. of lignite or soft coal pitch, montan wax, (artificial) asphalt and (or) resin, to which is added turpentine, coal-tar oil, petroleum or linseed oil varnish. In a modification a sheet of pasteboard coated on both sides with the compd. is used to unite the metal-covered sheets.

**Compound sheet material.** Behr-Manning Corp. Brit. 399,856, Oct. 9, 1933. Tough, resilient, flexible sheet material suitable for gaskets, floor coverings, artificial leather, etc., consists of a layer of a mixt. of comminuted cork and fibers and a layer of fibers only or a layer of either material faced on both sides by a layer of the other, the layers being felted together and satd. with a flexible binder. Suitable binders are rubber latex, which may be vulcanized or contain vulcanizing agents, vulcanization accelerators and antioxidants, chlorinated rubber, polymerized isoprene, glyptal, furfural or  $\text{PhOH-CH}_3\text{O}$  resins, etc.

**Dental impression compositions.** I. G. Farbenind. A.-G. Brit. 399,842, Oct. 13, 1933. A plastic mass for dental impressions comprises shellac, copal, stearic acid and a filler, e. g., talc.

**Apparatus and method for molding seamless diaphragms for loud speakers by depositing pulp on porous or perforated formers and drying.** Robert O. Bridger. Brit. 399,165, Sept. 18, 1933.

**Use of fly ash for making molded structural material.** Harry C. Pepper and Paul W. Jones (to Rostone, Inc.). U. S. 1,942,769, Jan. 9. Fly ash produced by burning finely divided bituminous coal is reburned, slaked, mixed with an alk. earth base such as  $\text{Ca(OH)}_2$  and the mixt. is shaped and indurated (suitably by use of steam). U. S. 1,942,770 also relates to mixing fly ash with an alk. earth base and water, shaping and indurating.

**Hard rigid products such as checkers or shuffle boards from vegetable materials of high pentosan content.** Orland R. Sweeney and Charles E. Hartford. U. S. 1,941,817, Jan. 2. Materials such as corncocks, cornstalks, peanut shells, stalks or burrs of cotton are cooked in a liquid such as dil.  $\text{NaOH}$  soln. and comminuted, this

being followed by removal of a portion of the liquid from the mass, and molding into suitable shape.

**Fibrous compositions.** Behr-Manning Corp. Brit. 399,812, Oct. 9, 1933. Sheet material for gaskets and packings, as a backing for artificial leather, etc., consists of comminuted cork and fibers felted in a paper-making machine and satd. with glue or casein which is rendered insol. in  $\text{H}_2\text{O}$  by  $\text{CH}_3\text{O}$ , paraformaldehyde or  $\text{K}_2\text{Cr}_2\text{O}_7$ . Cf. C. A. 27, 1465.

**Rubber-bonded asbestos products.** Dewey & Almy Ltd. Brit. 399,871, Oct. 16, 1933. See U. S. 1,907,617 (C. A. 27, 3571).

**Aqueous dispersions of asbestos and rubber.** Dewey & Almy Ltd. Brit. 399,870, Oct. 16, 1933. An aq. dispersion of latex, the particles of which carry an electropos. charge, is added to an asbestos slurry. The rubber particles remain of colloidal dimensions and attach themselves to the asbestos fibers, which remain dispersed. The charge on the particles may be inverted to electropos. by strong mineral acids, when a protective agent, e. g., hemoglobin is also used, or preferably, by salts with multivalent cations and univalent anions, e. g.,  $\text{AlCl}_3$ ,  $\text{Th(NO}_3)_4$ , when no protective agent is necessary. The material may be used for making asbestos paper, insulating panels, brake linings, etc. Cf. C. A. 27, 3570.

**Adhesive.** Edward F. Christopher (to The Industrial Patents Corp.). Can. 336,140, Oct. 3, 1933. A powd. mixt. of casein, biuret, cyanuric acid and  $\text{CH}_3\text{O}$  forms an adhesive upon the addn. of water.

**Adhesives.** Walter H. Wedger (to Boston Blacking Co. Ltd.). Brit. 399,525, Oct. 9, 1933. Shoe parts are united by use of a cellulose compd. adhesive, e. g., pyroxylin or cellulose acetate cements, the adhesive, which has been applied to the parts and allowed to dry, being softened by a compn. comprising a low-boiling solvent, e. g., mixts. of  $\text{Et}_2\text{O}$ , isopropyl ether or hydrocarbons, e. g., mixed pentanes, with  $\text{Me}_2\text{CO}$  (and  $\text{EtOAc}$ ) or  $\text{EtOH}$ , and a material, e. g., a high-viscosity nitrocellulose or cellulose acetate, which imparts such a character to the compn. that ample time is allowed for assembly of the parts before hardening of the adhesive because of evapn of the solvent, but rapid evapn. of the solvent is permitted after assembly of the parts which are held together under pressure for a much shorter period than usual, e. g., 6 min. at ordinary atm. temps. or less if heat is used. Camphor and (or) resins, e. g., rezyl balsam (I) or santoline resin (II), may be added to the softening compn. I, preferably contg. a (semi-) drying oil, e. g., tung or China wood oil, is made by heating together diethylene glycol, phthalic anhydride and, e. g., China wood oil under a reflux condenser with agitation. II is a product of the condensation of a mixt. of *o*- and *p*-toluenesulfonamide with  $\text{GH}_3\text{O}$ .

**Adhesive and film-forming composition.** Paul C. Lemmerman and Wm. K. Schweitzer (to Grasselli Chemical Co.). U. S. 1,942,299, Jan. 2. A compn. suitable for coating various surfaces comprises a concd. alkali metal silicate soln. contg. less than 2% of a wetting agent such as a substituted naphthalenesulfonic acid, sulfonated oily substance, high mol. wt. carboxylic acid, bile acid, aldehyde, saponin or high-boiling monohydroxy alc. or ester.

**Peanut flour for the manufacture of adhesives.** Irving F. Laucks (to I. F. Laucks Inc.). U. S. 1,942,109, Jan. 2. An oil-free peanut flour is prepd. the protein of which is at least partially coagulated by heat, and this flour is used with an alk. aq. dispersion medium such as one formed with lime and soda to prep. an adhesive of good viscosity, water resistance and strength.

**Synthetic wax preparations from montan wax.** Wilhelm Pungs and Michael Jahrstorfer (to I. G. Farbenind. A.-G.). U. S. 1,942,833, Jan. 9. Products having phys. properties similar to those of carnauba wax or beeswax and which are suitable for use in shoe creams, floor polishing compns., in coating paper, etc., are obtained when crude, deresinified or bleached montan wax, is wholly or partly converted into fatty acids by a treatment with oxidizing agents for example according to U. S. Patent No. 1,777,766 (C. A. 24, 5984) or by steam distn.; the car-

boxylic acids, if desired in the form of their methyl or ethyl esters, are then reduced to alcs. and the latter esterified with one or more non-aromatic monocarboxylic acids contg. up to 25, preferably from 10 to 25 C atoms. As acids for the esterification may be used, *e. g.*, the fatty acids, such as formic, acetic, lactic or butyric acids and especially those of high mol. wt., *e. g.*, vegetal, *i. e.*, vegetable or animal acids, such as stearic acid, palmitic acid, acids from wool fat, linoleic, ricinoleic or resinic acids in the pure or crude state, *e. g.*, colophony, cycloaliphatic naphthenic acids and like non-aromatic mono-carboxylic acids of high mol. wt. as well as mixts. of these acids. Depending on the selection of the acids employed for the esterification, it is possible to prepare wax-like substances having any desired hardness. Various examples, details and modifications of procedure are given.

**Polishing composition.** Grace C. Hipwell. Brit. 399,517, Oct. 6, 1933. A compn. for use on metal, wood, (artificial) leather, etc., is made by adding linseed oil, turpentine and AmOAc to a soln. of shellac in methylated spirit.

**Emulsifying and other agent.** I. G. Farbenind. A.-G. (Karl Brodersen, inventor). Ger. 581,955, Aug. 5, 1933 (Cl. 120. 23.01). An agent for wetting, cleaning, emulsifying, etc., is prepd. by condensing amides of the higher fatty resin and naphthenic acids with aldehydes and aromatic hydrocarbons or their OH, NH<sub>2</sub> or halogen substitution products. The condensates may be sulfonated or have other solv.-inducing groups introduced. In an example, lauryl amide, CH<sub>3</sub>O, KOH, water, PhOH and HCl are stirred together to give a viscous oil suitable for the above uses.

**Softening agents.** I. G. Farbenind. A.-G. Brit. 399,817, Oct. 11, 1933. Softening agents for plastic masses contg. albuminous substances, *e. g.*, albumin, blood, casein, which are free from ash, are prepd. by sulfonating animal or vegetable oils, *e. g.*, castor, neat's foot, to a small extent with H<sub>2</sub>SO<sub>4</sub>, working up the products in the absence of salts of fixed alkalies and adjusting the titer by NH<sub>3</sub> or volatile alkylamines, *e. g.*, MeNH<sub>2</sub>. In an example castor oil is sulfonated and the product, washed with H<sub>2</sub>O, is salted out with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and made slightly alk. with NH<sub>3</sub>.

**Wetting agents.** Imperial Chemical Industries Ltd., Fred Scholefield, Walter F. A. Erinen and Wm. Todd. Brit. 399,537, Oct. 2, 1933. A wetting agent comprises a product prepd. according to Brit. 274,611 (C. 1. 22, 23.8) or 311,885 (C. 1. 24, 932), com. pine oil, terpineol or like terpene alc. and H<sub>2</sub>O in the proportion by wt. of  $x : y : z$ , in which  $x + y + z = 100$  and  $x$  and  $y$  are 40-55 and  $z$  9-18.

**Sols for clarifying liquids such as coal wash waters, sewage, etc.** Curtis Q. M. Campbell. U. S. 1,942,507, Jan. 9. A coagulative sol for the concn. of substances in suspension or emulsion in water comprises a combination of an aq. suspension contg. about .5% of starch with expanded but unruptured cells and a dil. soln. of NaOH.

**Negatively charged "aluminum gel."** Pearl H. Brewer and Henry R. Kraybill (to Purdue Research Foundation). U. S. 1,942,790, Jan. 9. For making a negatively charged "aluminum gel," NH<sub>4</sub>OH is added to Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> until the soln. is alk. to litmus, an addnl. amount of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> substantially equal to the original amt. is added, the white gelatinous ppt. which forms is permitted to settle, supernatant liquid is removed, and the ppt. is repeatedly washed with water, by shaking and then settling, until the NH<sub>4</sub> salts are practically all removed. The product is suitable for use in purifying viruses or other solns. or suspensions.

**Gas-producing compositions.** Imperial Chemical In-

dustries Ltd. and Wilfred R. Cousins. Brit. 399,173, Sept. 25, 1933. A compn., in pelleted form, which evolves gas upon heating, comprises a solid gas-producing substance or mixt., *e. g.*, NH<sub>4</sub>Cl and NH<sub>4</sub>NO<sub>3</sub>, tartaric acid and NaHCO<sub>3</sub> or (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, with a small proportion of a stabilizer which is an anhyd. substance capable of forming a hydrate (or a hydrate that tends to form a higher hydrate) at temps. of storage of the compn., *e. g.*, anhyd. Na<sub>2</sub>CO<sub>3</sub> or Na<sub>2</sub>SO<sub>4</sub>. The pellets may be used for inflating rubber balls, etc., *e. g.*, at 100° or over.

**Stereotype matrices.** Sydney W. H. Long, Miles Graham, The London Express Newspaper Ltd. and Dunlop Rubber Co. Ltd. Brit. 399,936, Oct. 10, 1933. Deformation of the flexible flongs during casting of printing surfaces is prevented by providing them with a heat-resistant flexible backing composed of a vulcanizable material. The backing consists mainly of rubber, gutta-percha, balata, etc., and can be applied either as a plasticized sheet or an artificial or natural aq. dispersion. In an example a compn. contg. rubber, S, ZnO, Zn diethyldithiocarbamate, barytes and limestone dust is used.

**Nonslipping surface suitable for shoe soles, floor coverings, conveyor belts, etc.** Daniel Repony (to Raybestos-Manhattan, Inc.). U. S. 1,941,912, Jan. 2. A nap is formed upon a base fabric such as terry cloth, the nap is coated with a friction surface material such as a rubber compn. and the threads of the nap are subsequently sepd.

**Heat transfer.** Winthrop S. Lawrence (to Kaumagraph Co.). U. S. 1,941,697, Jan. 2. A paper base is printed with a marking comprising molten fusible material such as a wax and oil mixt. and a pigment such as Cd selenide and a relatively volatile fluid such as "butyl carbitol" which does not substantially volatilize when the compn. is melted and the b. p. of which is above 200°, and the relatively volatile fluid is then allowed to escape from the printed marking which is formed upon the paper base. Cf. C. A. 28, 1486<sup>4</sup>.

**Puncture-proofing composition.** Eugen Hirsch. Can. 330,531, Oct. 24, 1933. A puncture-proofing compn. for pneumatic tubes consists of gum tragacanth 8 lb. dissolved in 14 gallons of water, contg. 16 oz. of short threads of cotton and plasticized with sugar 142 lb., salicylic acid 8 oz., carbolic acid 4 oz., oil of tar 4 oz., alc. 7 gallons, MgCO<sub>3</sub> 45 lb., and Mg silicate 27 lb.

**Projection screens.** Karl Zechmanek and D. Weissmann. Brit. 399,507, Oct. 2, 1933. A sound-permeable projection screen comprises a fine porous textile fabric, *e. g.*, crepe georgette, covered with paint in such a way that some of the pores are closed while others remain open. An oil paint made by suspending finely divided ZnO in boiled linseed oil, nitrocellulose paint made by mixing nitrocellulose lacquer with white pigment or white enamel paint may be used. With some fabrics a preliminary coating of paraffin wax in petroleum is necessary.

**Embalming fluid.** Wm. C. Black (one-half to Chauncey G. Wilson). U. S. 1,942,407, Jan. 9. An embalming fluid suitable for use with jaundiced bodies contains benzoyl peroxide in a fluid solvent distributor such as an aq. soln. of EtOH and formaldehyde.

**Vermin destroyer.** Firma Hermann Nier. Ger. 587,853, Nov. 9, 1933 (Cl. 45. 3.01). A prepn. for destroying vermin on fowls, dogs, etc., consists of naphthalene with a 3% addn. of nicotine.

**Fire extinguishers.** Joseph Caffarel. Brit. 397,391, Aug. 24, 1933.

**Fire extinguisher.** Werner Ursum. Ger. 587,932, Nov. 10, 1933 (Cl. 61b). A filling for fire extinguishers contains non-inflammable org. F compds., such as CCl<sub>2</sub>F<sub>2</sub>, or C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>F<sub>2</sub>, as quenching agents.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. R. BARTON, C. H. KERR

Jonah Spode—his times and triumphs. John Thomas. *Trans. Ceram. Soc. (Engl.)* 32, 489-512 (1933).—A biographical sketch. H. F. Kriege

Essentials of glass technology based on American practices. Samuel R. Scholes. *Ceram. Ind.* 22, 102-4 (1934); cf. C. A. 28, 1157<sup>1</sup>. H. Willson

**Progress of the glass industry in 1932.** Oscar Knapp. *Glashütte* 63, 675-6 (1933).—K. briefly reviews the latest investigations dealing with: (1) crystal chemistry of silicates; (2) arrangement of atoms in glass; (3) the state of undercooled liquids and glasses; (4) nature of the glassy state; (5) constitution of glass according to the solvation theory; (6) vols. of tech. glasses; (7) the system K and Na silicates and silica; (8) melting diagrams of the system  $\text{PbO-SiO}_2$ ; (9) reactions between Ca carbonate and  $\text{SiO}_2$ ; (10) rate of disintegration of Ca carbonate; (11) volatilization of soda silica glasses; (12) synthetic Ca silicates. References are given.

M. V. Kondoidy

**New ideas concerning the flow of glass in tanks.** H. Hausner. *Ceram. Ind.* 22, 18-22, 81-6 (1934); cf. C. A. 27, 5913.

Herbert S. Willson

**Effect of zirconium oxide on the resistance of heavy baryta glasses.** W. G. Voinot and A. A. Appen. *Optic. Mech. Ind.* (U. S. S. R.) 12, 8 (1932); *Sprechsaal* 66, 825 (1933).—Heavy baryta glasses have a low resistance to acids; it was attempted to ameliorate resistance by changing the glass compn. without changing the optical properties of glasses. According to Turner ZrO improves the stability of glass. In a glass of the compn.  $\text{SiO}_2$  31.78,  $\text{BaO}$  47.96,  $\text{B}_2\text{O}_3$  12.86,  $\text{Al}_2\text{O}_3$  3.03,  $\text{ZnO}$  2.83,  $\text{As}_2\text{O}_3$  1.54 ( $n_D = 1.6126$ ,  $n_F - n_C = 0.01046$ ), silica was replaced by increasing addn. of  $\text{ZrO}_2$ . Two series of melts were produced, one in grog the other in Pt crucibles. Up to 5%  $\text{ZrO}_2$  was added in the form of Zr mineral. The resistance of glasses obtained was not improved. M. V. Kondoidy

**Melting white arsenic enamel for glass.** M. F. Shur and V. I. Mosheiko. *Glashütte* 63, 524-6, 542-4 (1933).—White glass enamel is used for applying white strips on thermometric capillaries, burets, etc. The enamel must have the same coeff. of expansion as the glass; while the coeff. of elasticity (elasticity modulus), coeff. of Poisson, softening temp. and tensile strength should correspond to those of the glass. The enamel must be easily fusible, and its chem. compn. should be such that with repeated heating the color would not change (color usually changes because of the reduction of Pb or As). White sand, As oxide,  $\text{Pb}_2\text{O}_3$ ,  $\text{KNO}_3$ , boric acid and feldspar or kaolin were used as raw materials.  $\text{SiO}_2$  and PbO are the chief ingredients (they are present as the compd.  $\text{PbSiO}_3$ ). PbO,  $\text{K}_2\text{O}$ ,  $\text{Na}_2\text{O}$  and  $\text{B}_2\text{O}_3$  make the enamel easily fusible.  $\text{B}_2\text{O}_3$  and PbO bestow a special luster; while As oxide makes it opaque. The fusing temp. is 1250-80°. The flame should never be reducing so as not to ppt. metallic Pb or As. Directions for the prepn. of the enamel batch, its fusing and cooling are given. M. V. Kondoidy

**Employing blast-furnace slag in glass manufacture.** Fritz Althof. *Glashütte* 63, 604-6 (1933).—The granulated blast-furnace slag used did not contain alkalis. The batch contg. slag melted easily; hence the soda content of the batch could be lowered considerably (23%). Because of the presence of S (in the form of CaS) and Mn oxide in the slag, graphite and pyrolusite were not used for coloring the glass. It was found that the S coloring is more certain and uniform. Bottles manufactured from batches contg. slag (12%) were found to be very stable. M. V. Kondoidy

**Interpretation of the action of mineralizers.** W. Eitel and W. Weyl. *Chem. Erde* 8, 445-61 (1933).—The action of small amts. of volatile components on the viscosity, crystn. power and inner mol. equil. of glasses is reviewed. A crystn. theory is advanced which takes into account the field action of ions and dipoles and according to which complexes or stable lattice configurations may form. Absorption spectrum measurements on a Na silicate glass colored with NiO were made, and from these the effects on the inner equil. of chilling and of fluoride addn. were studied. P. S. Roller

**Significance of the microscope for judging devitrification.** Hugo Kühn. *Glashütte* 63, 567-71 (1933).—The crystn. phenomena referring to devitrification are due to various causes. The following possibilities are present when batches are melted which do not produce eutectic melts: (1) Undissolved particles remain in the melt.

(2) The glass appears to have streaks and is cloudy. The microscope shows the presence of cristobalite crystals. (3) A part of the melt is clear, while the other is cloudy, forming an inhomogeneous glass. On cooling, such a melt devitrifies. The microscopic study of stones shows the presence of dense crystal needles of prismatic form. They are formed by Ca and silica and are known as wollastonite. Usually, wollastonite crystals appear together with those of cristobalite. In defective alumina glasses, Na aluminate crystals form large colorless prisms. The observations of Tammann, Zsigmondy, Jøbsen-Marwedel and Penner on the formation of crystals are discussed.

M. V. Kondoidy

**Effect of barium oxide on the properties of technical glasses.** F. H. Zschacker, W. Höder and A. Riaz. *Keram. Rundschau* 40, 534-6, 558-61 (1932).—In glasses with 10% RO, substitution of CaO by BaO raises the speed of melting. The clarifying velocity at first increases and then decreases; the glasses are "longer." Pure BaO glass is almost colorless; the workability and the luster are improved by BaO. On substitution of  $\text{Na}_2\text{O}$  by BaO the melting velocity is at first almost unchanged, but larger quantities reduce it; clarification is more difficult and the color darker. BaO glasses poor in  $\text{Na}_2\text{O}$  readily devitrify. Prolonged melting produces a brown color due to sulfide.

B. C. A.

**Chemical glass and optical glass.** P. Gilard. *Rev. universelle mines* 9, 243-8, 268-72 (1933).—See C. A. 27, 4044.

M. Hartenheim

**Testing methods for glass tank blocks.** A. Möser. *Tonind.-Ztg.* 57, 871-2 (1933).—A review of testing methods relating to the vitreous properties. K. K.

**Cooling of the refractory blocks of glass tanks.** O. Bartsch, H. Blank, H. Jersen-Marwedel, W. Koenig and A. Schild. *Fachausschussber. Deut. Glastechn. Ges.* 1932, No. 23, 19-28; *Chemie & Industrie* 30, 1368.—Cooling of the bricks must be considered as a mistake, because it intensifies transverse currents and therefore the erosive action of the glass on the bricks. After the bricks have been in service for some time, it becomes necessary to cool them so as to lengthen their life; in this case cooling should be coned. at the joints; it is necessary to solidify the glass in the cracks, so as to prevent leaks. Refrigeration is effective only if the glass thickens considerably on contact with the brick, which can be effected only with bricks less than 50 mm. thick. Best protection of the joints consists in blowing cold air directly on the glass so as to solidify it.

A. Papineau-Couture

**West Bohemian kaolin and clay deposits.** W. R. Zartner. *Zprávy českoslov. keram. společnosti* 1932, 48-76, *Chem. Obzor* 8, 2(X).

J. Kučera

**Some factors in the weathering of clay shales.** S. R. Hind. *Ceram. Age* 22, 169-70 (1933).

H. S. W.

**Plasticity, shrinkage and other fundamental properties of clay in relation to the form of the clay particles.** Julius Aron. *Trans. Ceram. Soc.* 32, 513-32 (1933).—A translation of the original article appearing in 1873 in *Notizblatt des deutschen Vereins für Fabrication von Ziegeln, Thonwaren, Kalk und Cement* 9, 167. The discussion of tests with numerous German clays is of technical and historical interest.

H. F. Kriege

**Rational analysis of clays.** Albert Granger. *Ceram. vererie, emailerie* 1933, 245-7; cf. C. A. 27, 5914.—Alkalis in clay are believed to result from at least 3 origins: feldspar, mica and alkalis absorbed by argillaceous matter. Rational analysis does not lead to precise results.

Alice W. Epperson

**Practical studies of the relation between burning cracks and clay analysis.** W. Schuen. *Tonind.-Ztg.* 57, 1146-8 (1933).—Burning becomes more difficult as the amt. of chemically bound  $\text{H}_2\text{O}$  increases. Burning cracks, which appear at about 600°, increase as the free  $\text{SiO}_2$  content and the degree of acidity of the acid part increase and the silicate content decreases.

Karl Kammermeyer

**Some notes on the shrinkage of clays during drying.** J. W. Mellor. *Trans. Ceram. Soc.* 32, 455-71 (1933).

H. F. Kriege

**Technical production of tridymite bricks.** H. Salmang



and H. J. Lungen. *Tonind.-Ztg.* 57, 650-1(1933).—Eighteen tests on frits of different compns. show that it is possible to produce tridymite only and have low porosity and high resistance to temp. shock. Flux adds. to the frit ( $\text{Na}_2\text{O}$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{FeO}$ , etc.) are desirable in small amts.

Karl Kammermeyer

**Heat expansion of silica bricks.** Fritz Fromm. *Arch. Eisenhüttenw.* 7, 381-4(1934).—Expansion of 5 kinds (d. 2.38-2.44) was detd. for temps. up to  $1600^\circ$ . Heat expansion from 0 to  $1600^\circ$  and growth above  $1400^\circ$  increased considerably with the d. The growth is less under pressure according to porosity. All samples assumed after heating to  $1600^\circ$  the same d. of 2.32. The quartz begins to change to tridymite in coke ovens at  $800^\circ$ , at first slowly up to  $1410^\circ$ ; at higher temps. and especially in bricks of more than 2.38 d. the conversion is rapid so that the elongation may lead to warping and damage of tie-rods.

M. Hartenheim

**Heat sources for brick drying.** Georg Zehner. *Tonind.-Ztg.* 57, 792-3(1933).

Karl Kammermeyer

**Building materials for tunnel kilns.** Felix Singer. *Tonind.-Ztg.* 57, 618-19(1933).

Karl Kammermeyer

**Rational firing of rotary kilns.** Carl Kjeldsen. *Tonind.-Ztg.* 57, 1077-8(1933).—A discussion of operating practices.

Karl Kammermeyer

**Protective coatings for kiln repair.** W. Schuen. *Tonind.-Ztg.* 57, 676-7(1933).

Karl Kammermeyer

**The slagging action of fuel-oil ash.** L. R. Faulkner. *Bull. Am. Ceram. Soc.* 13, 45-6(1934).—Unfired  $\text{MgO}$  showed the lowest vol. loss, and recrystd.  $\text{SiC}$  the least effect in a series of tests. No direct relation was seen between  $\text{SiO}_2:\text{Al}_2\text{O}_3$  ratio and slag resistance in the fire-clay types of refractories. Absorption was apparently not directly related to slag resistance.

C. H. Kerr

**Manufacture of stoneware for the chemical industries.** P. P. Budnikov and S. A. Shcheparevich. *Chem.-Ztg.* 57, 903-4(1933).—Clays and feldspar of South Russia were found useful for chem. stoneware. The use of artificially plasticized clay gives a thick body structure with normal shrinkage and a proportionately lower firing temp. Higher acid resistance was secured by the casting process than by plastic formation. Ceramic properties of raw materials and finished products are tabulated.

C. B. Jenni

**Decarbonization, reduction and blister formation in the firing of stoneware.** M. Mields. *Tonind.-Ztg.* 57, 908-9, 933-4(1933).—A discussion of the chem. principles involved.

Karl Kammermeyer

**Practical notes on the manufacture of porcelain.** Marc. Larcheveque. *Ceram. verrerie, emailerie* 1933, 341-5; cf. C. A. 25, 1649.—Formulas are given for emulsion for retouching glazes and machines for removing glaze are described.

Alice W. Epperson

**Physical and chemical phenomena in the manufacture of refractories.** Karel Hincis. *Slavsko* 1933, 128; *Chem. Obzor* 8, Abstr. Sect. 198.—The amt. of kaolinite in Czechoslovakian clays is 23.5-86.5%. If it is assumed that all the  $\text{Al}_2\text{O}_3$  is combined in kaolinite, the remainder would be:  $\text{SO}_3$  55.8-68.2, Fe compds. 1.2-11.5,  $\text{CaO}$  0.5-30.0,  $\text{MgO}$  0.6-8.5%.

Jaroslav Kucera

**A new method for testing refractories.** Georg Ising. *Tonind.-Ztg.* 57, 812-13(1933).—In a special furnace test blocks can be exposed to com. conditions and the appearance of the test surface noted.

Karl Kammermeyer

**Notes on the refractory clays of the Andenne basin.** A. Clausset. *Verre et silicates industriels* 5, 2-6(1934).

Herbert S. Willson

**Graphite in refractory materials.** Erich Buchholtz. *Tonind.-Ztg.* 57, 1207-8(1933).—A general discussion.

Karl Kammermeyer

**Action of carbon monoxide on refractory materials.** I. W. Hugill, H. Ellerton and A. T. Green. *Trans. Ceram. Soc.* 32, 533-42(1933).—Sec C. A. 26, 3083. II. Further experiments on the disintegration of fireclay products by carbon monoxide. *Ibid.* 543-50.—See C. A. 26, 3084.

H. F. Kriege

**Improved method for measuring the "after-contraction" of refractory materials.** A. Eric J. Vickers and J. A.

1 Sugden. *J. Soc. Glass Tech.* 17, 320-3(1933).

H. F. Kriege

**The relations between water permeability and the structure of refractories.** Otto Bartsch. *Tonind.-Ztg.* 57, 1158-9, 1182-3(1933).—The influence of burning temp., preliminary burning and grain distribution of grog, and mfg. methods upon water permeability were investigated.

Karl Kammermeyer

2 **Comparison of the rates of flow of water and of air through refractory materials.** F. H. Clews, E. O. Mills and A. T. Green. *Trans. Ceram. Soc.* 32, 472-8(1933).—Ten refractories with apparent porosities of 17.9-70.2% were compared. The comparative order established by the water penetration method was acceptably close to that found by the more laborious water- or air-permeability methods.

H. F. Kriege

**Discoloration of refractories by "iron."** J. W. Mellor.

3 *Trans. Ceram. Soc.* 32, 403-14(1933).—If iron were the only coloring constituent, greens, blues and black would result from ferrous iron and reds from ferric iron. However, the tendency of  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  to form solid solns. at temps. below  $700^\circ$  modifies the reds beyond mere diln. to buff. Lime also bleaches  $\text{Fe}_2\text{O}_3$ . The proper combination of  $\text{FeO}$  and  $\text{Fe}_2\text{O}_3$  in the presence of  $\text{Al}_2\text{O}_3$  may yield white as seen occasionally around black cores in refractories.

H. F. Kriege

4 **The palette of modern colloidal colors.** E. Zschimmer. *Ceram. verrerie, emailerie* 1933, 255-9; cf. C. A. 27, 5014.—A review relating to the yellow of  $\text{CdS}$  and ruby of  $\text{Se}$  and  $\text{CdS}$ .

Alice W. Epperson

**Further development of the underglaze color crayon.** Kenneth E. Smith and Aurelia Arbo. *Bull. Am. Ceram. Soc.* 13, 40-1(1934); cf. C. A. 27, 173.

C. H. Kerr

5 **Leadless glazes in the home pottery industry.** L. I. Sivoplyas. *Ukrain. Khim. Zhur.* 8, Wiss.-tech. Teil, 104-8(in German 108; in Russian 109)(1933).—Leadless glazes were developed equal to glazes contg. Pb. The chief constituents are low-melting clays, soda, quartz, chalk, etc.

Chas. Blanc

**Pastes which work well with stanniferous enamels.** V. Lucas. *Rev. matériaux construction trav. publics* 1933, 228-31B.—The compns. of pastes and their casting properties are discussed.

Karl Kammermeyer

6 **Foundry refractories** (Crawley) 9. **Ceramic ink** (Can. pat. 337,714) 26. **Heat of hydration of kaolin** (v. Gronow, Schwiete) 2.

**Chipman, Frank W.:** Romance of Sandwich Glass. Boston: Sandwich Pub. Co. \$5.

**Eden, F. Sydney:** Ancient Stained and Painted Glass. New York: The Macmillan Co. \$2.50.

7 **Litinsky, L.:** Markenbezeichnungen im Feuerfest-Fach und im Ofenbau. Leipzig: The Author. M. 5.

**Urbach, E. Erwin:** Hermann Seger. The Life and Work of a German Scientist. Berlin: Keram. Rundschau. 67 pp. M. 5.

**Apparatus for feeding batch materials to glass-melting furnaces.** Everett O. Hiller (to Hartford-Empire Co.). U. S. 1,941,897, Jan. 2. Structural and mech. features.

**Uniform feeding of mold charges of molten glass.** Wm. J. Miller and Edward A. Lawrence (to Hartford-Empire Co.). U. S. 1,942,035, Jan. 2. Various details of app. and operation are described.

**Photoelectric control device for automatically feeding mold charges of molten glass.** Everett O. Hiller (to Hartford-Empire Co.). U. S. 1,941,896, Jan. 2. Various structural and operative details are described.

9 **Continuous glass manufacture.** Walter O. Amsler (to Simplex Engineering Co.). U. S. 1,941,778, Jan. 2. In making glass in a tank having a melting chamber and a cooling chamber sepd. by a reduced neck through which a full depth flow of glass is permitted, a max. temp. on the glass is maintained in the melting chamber at a point adjacent to the end of the neck. App. is described. U. S. 1,941,779 relates to details of glass-tank construction.

**Apparatus for automatically controlling the weight of glass articles made by the gob-feed automatic machine process.** Kenneth M. Henry and Burton A. Noble (to Hartford-Empire Co.). U. S. 1,941,552, Jan. 2. A photoelec. cell exposed to light rays emitted by the "gobs" serves to control the outflow of glass. Various elec. and mech. details are described.

**Apparatus for maintaining the thickness of drawn glass tubes, rods or sheets.** Jules Arrault (to Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cirey). U. S. 1,941,924, Jan. 2. Mech. features.

**Apparatus for manufacture of glass bottles, tumblers, etc.** Willard L. Van Ness (to Corning Glass Works). U. S. 1,943,195, Jan. 9. Mech. features.

**Apparatus for uniform heating and softening of a succession of similar glass articles such as in electric light bulb manufacture.** Adolph W. Machlet. U. S. 1,941,807, Jan. 2. An app. is described in which fuel gas is compressed and cooled to sep. moisture from it, air is similarly treated, the dried gas and dried air are mixed with each other under pressure, and a jet of the burning mixt. is projected against the glass articles being treated.

**Composition for coating electric lamp bulbs to render them opalescent.** Albert F. Lindstrom (to Westinghouse Lamp Co.). U. S. 1,941,990, Jan. 2. Na silicate is used in admixt. with a filler such as kaolin, hydrated chromic oxide and boric acid.

**Silvering glass surfaces.** George F. Colbert and Wm. H. Colbert (to Liberty Mirror Works). U. S. 1,942,686, Jan. 9. For partially silvering a glass surface, a coat of Ag is pptd. over the area, a film of Cu is electrodeposited on the Ag, a pattern resistant to the action of a solvent of these metals is superposed on the coatings and the exposed parts are then subjected to the action of a solvent such as an acid soln. Various details and modifications of procedure are described.

**Optical glass.** Edwin Berger (to Jenaer Glaswerk Schott & Gen.). U. S. 1,943,051, Jan. 9. An optical glass in which  $n_D > 1.77 - 0.0037\gamma$  ( $\gamma$  is the relative dispersion), contains 0.5-20% of  $TiO_2$  which serves to reduce the susceptibility of the glass to tarnishing.

**Transfers.** Leonard Allen and Johnson Matthey & Co. Ltd. Brit. 390,922, Oct. 19, 1933. Transfers for the decoration of glass, porcelain, pottery, enameled ware, etc., are prepd. by printing the design in 1 or more colors on paper coated with a film of plastic material that burns away on firing, e. g., collodion, cellulose acetate, resins, varnishes, etc., and contains a vitreous flux.

**Treating clay for transportation and handling.** Wm. S. Wilson (to Merrimac Chemical Co.). U. S. 1,942,196, Jan. 2. While wet, the clay is formed into short cylindrical shapes which are dried without decrepitation and may subsequently be plasticized with water when desired.

**Bricks, etc.** Alfred Wanklin. Brit. 398,237, Sept. 11, 1933. Addn. to 341,594 (C. A. 26, 2839). The method of 341,594 is modified by obtaining the mixt. of hot burnt and unburnt clay for molding by burning only a part of the clay subjected to the initial heat treatment or by mixing alternate batches of burnt and unburnt clay from the same kiln. The mixt. is led to a grinding mill and is then molded and finally burnt as before.

**Firebrick.** Philip H. Jung (one-half to Thomas N. Kurtz). U. S. 1,942,431, Jan. 9. Raw material of high alumina and low silica content is calcined at a high temp., the calcined product is bonded with a mineral material of colloidal character substantially free from, or low in, silica, such as colloidal fire clay and the final mixt. is molded, dried and burned.

**Apparatus for sanding green bricks, tiles, etc.** J. W. Jackman & Co. Ltd., and Stephen Ernest Garratt. Brit. 399,593, Oct. 12, 1933.

**Apparatus for sifting potters' slip, etc.** Arthur C. Harrison, Frank D. Boulton and Fred Beardmore. Brit. 399,293, Oct. 5, 1933.

**Fused-silica articles.** Alvarado LeR. Ellis and Gunnar A. F. Winckler (to The British Thomson-Houston Co. Ltd.). Brit. 399,749, Oct. 12, 1933. Massive articles of fused  $SiO_2$ , e. g., large astronomical mirrors, are made by forming a base of translucent  $SiO_2$  which contains gas bubbles and fusing onto the base a facing of transparent vitreous  $SiO_2$  free from gas bubbles. The base is deposited on a support of refractory material as described in Brit. 296,059 (C. A. 23, 2263).

**Fused silica articles.** Elihu Thomson (to The British Thomson-Houston Co. Ltd.). Brit. 399,750, Oct. 12, 1933. See U. S. 1,930,327 (C. A. 28, 2779).

**Porous ceramic products.** Frederick E. Kern. U. S. 1,941,804, Jan. 2. For producing porous products such as bricks, relatively low-temp. bituminous coal is subjected to distn. whereby volatiles are removed from it, the devolatilized coal is comminuted and mixed with comminuted clay material, the mixt. is plasticized, shaped and subjected to heat treatment by which the coal is burned out of the material.

**Refractory ceramic material suitable for use in furnace and kiln construction.** Frank H. Riddle (to Champion Spark Plug Co.). U. S. 1,942,879, Jan. 9. Andalusite is used together with finely divided sintered alumina.

**Refractory bricks.** Kenneth M. Simpson (to International Chromium Process Corp.). U. S. 1,943,263, Jan. 9. A major portion of fire-clay is formed into bricks which are covered with a small amt. of the clay mixed with chrome ore, and the bricks are dried and burned.

**Refractory masses.** Arthur Sprenger. Ger. 587,827, Nov. 9, 1933 (Cl. 80b. 8.17). Oxides of Mg, Cr and Al are fused in such proportions that the wt. of the  $MgO$  equals, or is greater than, the sum of the wt. of the  $Cr_2O_3$  and  $Al_2O_3$ , the amt. of  $Cr_2O_3$  being greater than the amt. of  $Al_2O_3$ . Other oxides such as  $SiO_2$ ,  $CaO$ ,  $FeO$ , etc., may also be present. Cf. C. A. 28, 873<sup>1</sup>.

**Refractories.** Alterra A.-G. Brit. 399,126, Sept. 28, 1933. Divided on 394,115 (C. A. 28, 278<sup>4</sup>). Refractory sintered  $MgO$  is produced from materials low in Fe by adding black or blackish brown (artificial)  $MgFeO$  thereto. In an example 4%  $MgFe_2O_4$  prepd. by calcining mesitine spat, or native magnesioferite is added to a magnesite low in  $SiO_2$ , Fe and  $CaO$  and the mixt. sintered  $MgFe_2O_4$  may be added to previously sintered  $MgO$  to improve its refractory properties.

**Emery and sand cloth, etc.** Behn-Manning Corp. Brit. 378,014, July 28, 1932. In mfg. abrasive-coated paper, grinding disks, etc., the grains of abrasive, as they fall onto the adhesive-coated sheet, etc., pass through an elec. field whereby they are sep'd. and also turned so that the sharpest points are outwardly directed on the sheet. App. is described. In 398,907, Sept. 25, 1933, the grains of abrasive are stratified according to size. Cf. C. A. 28, 602<sup>1</sup>.

**Manufacture of open space coated abrasive paper by use of paraffin or other hydrophobic materials.** Frank J. Tone (to Carborundum Co.). U. S. 1,941,962, Jan. 2. Certain portions of fabric such as paper are coated with the paraffin or other hydrophobic material; the whole surface is then coated with an adhesive mixed with abrasive grains and the coating is subsequently brushed or scraped from the initially coated areas. App. is described.

**Tunnel kilns.** Keramische Industrie-Bedarfs-A.-G. Ger. 587,767, Nov. 7, 1933 (Cl. 80c).

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**Slurry drying in the cement industry.** Zollikofer. *Tonind.-Ztg.* 57, 879 82, 904 6, 929 31, 953 5(1933). -

A discussion of the various methods of mud drying. Karl Kammermeyr

**Methods for the determination of shrinkage in cement-bound bodies.** G. Frenkel. *Tonind.-Zig.* 57, 1096-7, 1122-4 (1933).—The Amser shrinkage app. was used for the measurements, with a modification when used with porous bodies. The operative technic and exptl. equipment which were evolved in making about 20,000 measurements are discussed.

**Calculation of the results of breaking tests of cement samples.** Henry Le Chatelier. *Rev. matériaux construc-tion trav. publics* 1934, 1-3; cf. Feret, C. A. 28, 1497.—A statistical discussion.

**Status of specifications for hydraulic cements in the United States.** P. H. Bates. *Proc. Am. Soc. Testing Materials* 3, Part II, 462-75 (1934).

**Study of the setting of magnesian cement.** Louis Chassevent. *Chimie & Industrie* 30, 1020-6 (1933).—Anhyd. MgO dissolves in MgCl<sub>2</sub> solns., giving supersatd. solns. The max. amt. of MgO which dissolves before the mixt. begins to thicken depends on the chloride content of the soln.; the degree of supersatn. in MgO increases very rapidly as a function of the MgCl<sub>2</sub> concn. when the latter is above 10%; with a 30% MgCl<sub>2</sub> soln. the max. amt. of MgO dissolved before thickening of the soln. is approx. 1000 times the amt. corresponding to equil. The thickening of the paste and the pptn. of the supersatd. solns. sepd. from the solid correspond to a decrease in the MgO concn. of the soln. Mg(OH)<sub>2</sub> dissolves only very slowly in MgCl<sub>2</sub> solns; this explains the slowness of its setting and its lack of hardness. X-ray examn. revealed that the ppt. formed at the end of 24 hrs. by a supersatd. soln. of MgO in 30% MgCl<sub>2</sub> is the stable oxychloride, in disagreement with Lukens (C. A. 26, 3742). The rate of hydration of MgO in dil. MgCl<sub>2</sub> solns. is greater than in water; as a function of MgCl<sub>2</sub> concn. it passes through a max. The compressive strength after 24 hrs. and after 7 days does not vary with the MgCl<sub>2</sub> concn. of the soln. when the latter is less than 10%; it increases very rapidly with the concn. when the latter is above 20%. The solns. which have the highest MgCl<sub>2</sub> concns. and give the greatest supersatn. also result in highest strength at the end of 24 hrs. and 7 days. MgO burnt at 1085° does not begin to set as rapidly as MgO burnt at 900° and at 720°; but there is little difference in the strength after 24 hrs. and after 7 days.

**Portland cement high in magnesia.** Ernst Ludwig Meyer. *Tonind.-Zig.* 58, 6 8, 27-9, 40 2 (1934). The pptn. of const.-vol. sintered cements high in Mg is feasible.

**The composition of portland cements and the characteristics of regular and hydraulic concretes.** E. Perry. *Paint & Varnish Production Mgr.* 10, No. 1, 14, et seq. (1934).—The manuf. of portland cement from a deposit of oyster shells and silt in San Francisco Bay is described. The forces operating to destroy concrete structures are discussed. The differences between regular and hydraulic cements are discussed.

**Controlling the lime content and the physical properties of portland cements by addition of pulverized minerals and ash.** Rich. Grun and Hugo Beckmann. *Tonind.-Zig.* 57, 822 4, 832-4 (1933).—Mixed cements consisting of cement clinker and coal ash from powd.-coal operations, which have only very weak hydraulic properties, are not superior to undiluted cements in regard to strength and are inferior in their resistance to storage in corrosive solns. Powd. mineral addns. (slate), which represent inert material, are also inferior to undiluted cements in regard to strength and salt-water resistance.

**The properties of high-grade portland cements.** Th. Klehe. *Tonind.-Zig.* 57, 1048-50 (1933).—A discussion of the specifications of 7 European countries. Strength and setting data are presented.

**Clays of portland cement. III. Firing of tuff with coal shale.** Yoshiaki Sanada. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 5 (1934); cf. C. A. 28, 1496.—The tech. analyses of 5 coal shales and their ashes are reported. Firing expts. carried out in a small shaft kiln (40 × 67 cm.) showed that coal shale can be used with good results as fuel for tuff firing.

**from burned tuff and limestone.** *Ibid.* 6-7.—Analyses of limestone, burned and unburned tuff and coal shale ash as raw materials are given. Eight raw mixts. were prepd. from these with addns. of Cu slag, and fired in a small rotary kiln (40 × 55 × 700 cm.). The clinkers were ground with 2.5% of gypsum and the cements tested by the usual methods. Exptl. data on the raw mixes and the cements are presented. Conclusion: Portland cement of best quality can be prepd. from the raw materials which were used.

**"Dolomitizing" of portland cement mortars.** G. Kathrein. *Tonind.-Zig.* 57, 850-60 (1933).—Tests were carried out by storing test pieces of 1:4 mortar in (1) H<sub>2</sub>O-satd. silica sand, (2) same as (1) with 5% MgCO<sub>3</sub> addn. and (3) a suspension of MgCO<sub>3</sub> in H<sub>2</sub>O. Storage was at 16-20° and for 8 months. The compressive strength averaged for 15 samples was for case: (1) 197 kg./sq. cm. (100%), (2) 178 (90%) and (3) 183 (93%). The av. deviation was only 15 kg./sq. cm. The detrimental influence of MgCO<sub>3</sub> is therefore confirmed, even though it is not very clearly recognizable on account of side reactions.

**Calorimeter installation in the engineering materials laboratory of the University of California for studies of heat generation in mass concrete.** S. B. Hiddle, Jr., and J. W. Kelly. *Proc. Am. Soc. Testing Materials* 3, Part II, 571-88 (1934).—See C. A. 27, 3578.

**The testing of protective coatings for concrete.** C. R. Platzmann. *Tonind.-Zig.* 57, 883-4 (1933).—A review.

**Reinforced concrete piling bituminized against deterioration by sea action.** E. Perry. *Paint & Varnish Production Mgr.* 10, No. 2, 14-16 (1934).—Plain or reinforced concrete is subject to deterioration when in contact with sea water. Methods used by the Port of Oakland and the Pacific Piling and Construction Co. in Los Angeles for protecting concrete structures are described. The former consists of painting with refined asphalt. The latter consists of impregnation under 26 in. vacuum at 250°F. with grade D asphalt. A penetration of 1/8 1/2 in. is obtained. The process is expensive but gives durability.

**Refractory concrete.** R. T. Giles. *Metals & Alloys* 5, 28-30 (1934).—The use of high-Al<sub>2</sub>O<sub>3</sub> cement as a binder of refractory materials is discussed.

**Casting Barzas diabases.** A. S. Ginzberg and F. G. Semenov. *Mineral. Surv'e* 8, No. 10, 9-13 (1933). Several samples of diabasic rocks mined in the region of Barzas, Kuznetz basin, produced satisfactory castings in the lab. expts.

**Advances in the field of bituminous binders for road construction.** H. Mallison. *Chem.-Zig.* 58, 93-5 (1934).

**Artificial stone from Martin and cupola furnace slags.** P. I. Bazhenov and V. A. Aleksandrovskii. *Mineral. Surv'e* 8, No. 10, 14-22 (1933).—Lab. expts. with slags from different plants showed that Martin slags, being too rich in CaO and SiO<sub>2</sub>, are not suitable for casting. Cupola furnace slag alone or in equal mixts. with Martin slag produced castings at 1200°, which possess high mech. strength, good resistance to mech. abrasion, but poor dielec. strength and acid resistance.

**Colored surfaces for artificial stones and cement bodies.** Willi Serkin. *Tonind.-Zig.* 57, 1168-71 (1933).—A review.

**Utilization of waste talc-chlorite stone.** N. G. Sergiev. *Mineral. Surv'e* 8, No. 10, 40-8 (1933).—Waste talc-chlorite, a metamorphosed picrite, was pressed into blocks with various cements and subjected to practical tests.

**The drying of wood.** J. M. Helvé. *Rev. ind.* 63, 282-8, 344-9, 404-7, 437-44, 501-8, 561-3 (1933).—A very complete review, including illustrations and descriptions of various types of drying plant, ~~calorim.~~, etc. The drying and aging of wood by treatment with ozone produces very satisfactory results; methods of analysis and control are detailed. Treatments with the vapors of benzene, gas-

line and  $\text{CCl}_4$ , and with  $\text{AcOH}$  (Maurer process) are briefly outlined.

**Weathering of creosote.** H. E. Gillander, C. G. King, E. O. Rhodes and J. N. Roche. *Ind. Eng. Chem.* 26, 175-83 (1934).—A machine is described in which small sapwood blocks evenly impregnated with creosote are exposed to continuous weathering cycles to allow the effects of weathering to be studied either as the results of individual factors or in the aggregate. The course of weathering is followed by removing a certain no. of blocks at stated intervals and detg. (1) their resistance to direct attack by fungi, (2) the percentage loss of oil, (3) toxicity of the extd. oil and (4) the distn. range of the extd. oil. Data are given to show the degree of weathering brought about by the machine and the effect of various cycles. Toxicity-permanence interrelationships are developed, and the probable mechanics of weathering of the oil in treated wood is discussed.

Alfred L. Kammerer

**Hydration of tricalcium aluminate** [setting of portland cement] (Foster) 6. Compound sheet material [for floor coverings] (Brit. pat. 399,856) 18. The sp. heats of  $\text{CaO} \cdot \text{Al}_2\text{O}_3$ ,  $2\text{CaO} \cdot \text{SiO}_2$ ,  $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ , etc. (v. Gronow, Schwiete) 2.

**Modern Road Emulsions.** Edited by F. H. Garner, L. G. Gabriel and H. J. Prentice. London: The Carriers' Pub. Co., Ltd. 206 pp. 12s. 6d. Reviewed in *Chem. Trade J.* 94, 32 (1934).

R. scuola d'ingegneria (R. politecnico) Milan. T. XII. La chimica del cemento. Pt. 1. Il cemento portland. By Querino Sestini. Milan: Ulrico Hoepli. L. 28.

**Schriever, Walter:** Beiträge zur Chemie des Calciums unter besonderen Berücksichtigungen des Portlandzementes. Thesis, Brunswick. 1930. 66 pp.

**Cement.** Hubert K. Woods, Harold H. Steinour and Howard R. Starke (to The Riverside Cement Co.). Can. 336,331, Oct. 10, 1933. Portland cement of low heat of hardening comprises finely ground clinker which contains less than 8%  $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ , substantially no  $2\text{CaO} \cdot \text{Fe}_2\text{O}_3$ , at least 10%  $3\text{CaO} \cdot \text{SiO}_2$ , and in which the sum of the percentage of  $3\text{CaO} \cdot \text{SiO}_2$  and twice the percentage of  $3\text{CaO} \cdot \text{Al}_2\text{O}_3$  is less than 35.

**Cement.** Paul Mecke. Ger. 587,634, Nov. 7, 1933 (Cl. 80b. 1.05). See Fr. 754,113 (C. A. 28, 11637).

**Cements.** Siemens & Halske A.-G. Brit. 398,767, Sept. 21, 1933. See Ger. 583,347 (C. A. 28, 2714).

**Rotary kiln suitable for cement manufacture.** Johan S. Fastang (to F. L. Smidth & Co.). U. S. 1,942,140, Jan. 2. Structural details.

**Cement clinker cooling chambers, etc.** Harry S. Lee. U. S. 1,941,560-1, Jan. 2. Structural and mech. details.

**Apparatus for drying material, e. g., cement, previous to burning in a rotary kiln.** Einar Rønne. Brit. 398,548, Sept. 18, 1933.

**Porous compositions.** Deutsche Gold- und Silber-Scheideanstalt vormals Roessler (to Leichtbaustoff-G. m. b. H.). Brit. 398,367, Oct. 5, 1933. Addn. to 363,058 (C. A. 27, 1724). The process of 363,058 is modified by the use, instead of or in addn. to the catalysts, of substances which effect the release of the O by chem. reaction with the O-contg. substances and are themselves changed in the process, e. g.,  $\text{KMnO}_4$ ,  $\text{Ca}(\text{ClO})_2$ , and alkali hypochlorite. In an example a porous cement compn. is made by adding 20 cc. 30%  $\text{H}_2\text{O}_2$  and 20 g.  $\text{KMnO}_4$  in aq. soln. to 2400 g. portland cement. Cf. C. A. 28, 6047.

**Porous concrete compositions, etc.** François Ernest Marechal. Brit. 398,651, Sept. 21, 1933. Porous building materials are made by agitating in a specially constructed mixer the usual lime and magnesia base mixt. with the addn. of colloidal stabilizing materials, e. g., oleic acid, alkali xanthates and preferably also materials that are readily oxidized to form  $\text{CO}_2$  to promote pore formation. Gelatinous substances, e. g.,  $\text{SiO}_2$ , and  $\text{Al}(\text{OH})_3$ , electrolytes, e. g., halogen compds., S compds.,

e. g., sulfates and sulfonates, fillers, e. g., sand and pumice, and org. silicates, e. g., Et silicate, may be added. App. is described.

**Curing concrete.** Ira S. Reynolds. U. S. 1,942,000, Jan. 2. Freshly laid concrete is provided with a film or coating comprising a volatile liquid and a plasticizer such as a soln. comprising naphtha, rosin and pine oil.

**Centrifugal molding apparatus for manufacturing concrete pipes, etc.** Ralph Williams. Brit. 398,983, Sept. 28, 1933.

**Rotary melting furnace, particularly for producing concrete, etc., from earth or waste materials, e. g., town refuse.** Robert H. King, Allen O. Crocker, Bernardino B. van Domselaar, Louis N. Thomas, Kenneth Henderson, Wm. S. Adams and Wm. A. Westley (trading as Constructora de Caminos "Kingite," Crocker, King & Co.). Brit. 398,872, Sept. 21, 1933.

**Road-making materials.** Lazlo d'Antal. Brit. 399,684, Oct. 12, 1933. A road surface is formed with at least 1 layer consisting of a coarse fibrous vegetable material, e. g., one obtained from leaves, stems or roots of water and bog plants, straw, bamboo, sugar cane, etc., woven or interlaced to form a mat and impregnated with a vegetable oil, fat or resin or with latex (derivs.) or a combination of such substances with bituminous substances.

**Paving and coating materials.** Emanuel J. Propper. Brit. 398,672, Sept. 21, 1933. See Fr. 745,253 (C. A. 27, 4371).

**Bituminous compositions.** John Lightfoot. Brit. 399,147, Sept. 15, 1933. Tennis courts, etc., are made by applying a compn. of bitumen, stearin pitch and shredded, ground or granulated rubber, e. g., shredded old tires, to a foundation surface of concrete, etc. The compn. may also contain coal-tar pitch.

**Bituminous compositions.** Robert H. King, Allen O. Crocker, Bernardino B. van Domselaar, Louis N. Thomas, Kenneth Henderson, Wm. S. Adams and Wm. A. Westley (trading as Constructora de Caminos "Kingite," Crocker, King & Co.). Brit. 399,176, Sept. 25, 1933. A compn. for use as a pavement, road surface, etc., consists of bitumen and a lava with a porous honeycomb structure obtained by melting common earth and cooling.

**Bitumen emulsions.** Société chimique. Ger. 587,829, Nov. 9, 1933 (Cl. 80b. 25.06). Emulsions for road surfacing are prepd. by mixing natural asphalt or petroleum pitch with sufficient petroleum heavy oil to render the mixt. fluid at 15°, and stirring with aq. alkali soln. to form an emulsion.

**Asphalted sheet material for building construction** Thomas Robinson (to Lancaster Asphalt, Inc.). U. S. 1,941,491, Jan. 2. A sheet material suitable for roofing, etc., is produced by forming a sheet of non-aq. plastic material capable of hardening, such as asphalt, and unfelted fiber, and building up the sheet by forming and applying to it a dry layer of plastic material and unfelted fiber in different proportions from those of the sheet, and sealing the materials together. App. is described.

**Building slabs.** Fibroplast G. m. b. H. Brit. 399,000, Sept. 28, 1933. The coarser fibrous material sep'd. by centrifugal or jigger sorters from fine wood pulp for the manuf. of paper and card ("refiner stuff") is mixed with  $\text{H}_2\text{O}$ , binders and, if desired, fillers and is felted and dried to produce slabs, hard slabs being obtained by pressing during or after drying. In an example resin (2%) and water glass (2%) in aq. soln. form the binder which, after felting, is pptd. on the fibers by  $\text{Al}_2(\text{SO}_4)_3$ .

**Composite sheets, building slabs, etc.** Eric R. Harrap and Robert H. Turner. Brit. 398,171, Sept. 4, 1933. A slab for partitions or walls comprises a central asbestos (-cement) sheet, which may be in several plies, with coverings on each side of (ply)wood, linoleum, fabric or paper. The central and covering sheets are each coated with adhesive and then united under pressure, the covering sheets then being sprayed with cellulose or other paint, if desired.

**Coating masonry.** Karl Müller and Eugen Hutzenlaub (to Firma Paul Lechler). U. S. 1,943,085, Jan. 9. Masonry is provided with a coating of asphalt contg. fatty

acid pitch and asbestos into which a layer of sand is pressed, which reduces sun ray absorption.

**Composition tiles.** George P. Heppes (to Tile-Tex Co.). U. S. 1,942,060, Jan. 2. A binder such as gilsonite, a filler such as asbestos and a pigment are mixed under the influence of heat to form a coherent mass, which is calendered and cut into unit slabs for the manuf. of compn. tile, the slabs being fed through a cooling zone (of a described app.) in which opposite faces of the slabs are caused progressively to contact cooling surfaces, and this cooling operation is repeated to reduce the temp. of the slabs to a suitable cutting temp.

**Composition roofing material.** Norman P. Harshberger (to Bakelite Building Products Co.). U. S. 1,943,257, Jan. 9. A sheet of felt is treated with a soln. of starch which when dry will form a smooth coating on the fibers of the felt; a bituminous waterproofing material is then applied to the treated felt sheet, which quickly penetrates the fibers of the sheet.

**Hard sheet material suitable for roofing, etc.** Harry E. Holcomb (to Fiberfraks Inc.). U. S. 1,941,985, Jan. 2. Hard sheets are formed with an outer layer of asbestos-cement compn. contg. about 20% of mineral fiber and 80% of cement, and with an inner layer contg. about equal parts of cement and an org. fibrous material such as wood fiber.

**Marking material such as bitumen-saturated felt.** Wm. R. Mershon (to Barrett Co.). U. S. 1,942,763, Jan. 9. Before satg. a felt base or the like with bituminous material, it is provided with markings formed with a suspension of a metallic powder such as Al in a dil. silicate soln. App. is described.

**Waterproofing solution for treating stuccoed walls.** Wm. B. Houston. U. S. 1,942,601, Jan. 9. In prepg. a waterproofing soln., an aq. soln. of a Na stearate soap is heated to about 50°, a hard fat is then added to the soln., and there is finally added a soft soap soln. of cresols in the proportion of about a half fluid oz. to each 2 gals. of the soap-fat soln.

**Wall and other coverings.** Gaston Desagnat. Brit. 399,358, Oct. 5, 1933. The covering comprises plates of rigid material, e. g., glass, cemented to a substratum, e. g., ribbed tricot, by an adhesive that does not penetrate the substratum, the material of which is extensible and compressible in all directions and sufficiently loose in texture to be completely impregnated by a pasty adhesive, e. g., mastic, which fixes the covering to the wall, etc.

**Wallboard.** Evelyn Hurden, Alfred P. Hurden and Stephen E. Beeson. Brit. 398,649, Sept. 21, 1933. Wallboard comprises a sheet of asbestos cement to which is attached a facing of fibrous material, e. g., paper, cardboard, with an intermediate sheet of fibrous material which is corrugated or indented to form cavities. The sheets are preferably united by waterproof glue.

**Composite hard fibrous panels.** Trudway B. Munroe and Elbert C. Lathrop (to Celotex Co.). U. S. 1,942,723, Jan. 9. A base portion is formed of fibrous material such as bagasse, wood or cornstalk fiber heterogeneously arranged, having a moisture content of about 50%, with a surfacing sheet carrying a design secured to the base portion by use of heat and pressure and an adhesive such as a synthetic resin.

**Fibrous compositions for acoustic plaster.** Joseph J. Bamberger. Brit. 398,547, Sept. 18, 1933. The plaster comprises a plaster base and a binding material composed of fibers of *Ceiba pentandra* or like flusses or silk cottons which do not absorb H<sub>2</sub>O and which each contain an air cell. The base may be gypsum, CaO or cement. H<sub>2</sub>O-absorbing material, e. g., cork, shredded asbestos, may be included. Fillers used are pumice, clay, sand, chalk, coke breeze, diatomaceous earth, chopped hair, etc.

**Use of adhesive particles in suspension in air in plywood manufacture.** Theodore W. Dike (to I. F. Laucks, Inc.). Brit. 399,470, Sept. 27, 1933. See U. S. 1,809,957 (C. A. 26, 5393).

**Fireproofing cellulosic materials.** Ernest E. M. Payne. U. S. 1,942,977, Jan. 9. Material such as wood or fiberboard is treated (in either order successively) with a soln. of a sol. acid phosphate of a metal such as Ca which yields an insol. phosphate and with a soln. of a sol. phosphate such as an NH<sub>4</sub> phosphate which ppts. the insol. phosphate in the cells of the material treated. Various other substances such as H<sub>3</sub>BO<sub>3</sub> and Na aluminate or silicate also may be used.

**Treating felted fibrous products with toxic substances such as insecticides and fungicides.** Fergus A. Irvine. U. S. 1,942,706, Jan. 9. An aq. suspension which may contain about 1% fiber (such as that for insulating-board manuf.) and 90% liquid is admixed with a toxic substance such as As<sub>2</sub>O<sub>3</sub>, which is added in dry, finely divided, solid form so that the particles are incorporated individually, and the suspension may then be felted as by a paper-forming operation or the like.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Report of the Fuel Research Board.** H. Hartley, et al. *Dept. Sci. Ind. Research, Fuel Research Board for the year ended March 31, 1933*, 123 pp.; cf. C. A. 27, 4055.—**Coal survey.**—Committees are working in 9 coal areas covering 96% of the present production in the British Isles. Results will be charted to give a complete picture of the distribution of the various types of coal. **Cleaning and de-ashing of coal and its preparation for market.**—Expts. with the vacuum flotation process are being continued with both lab.- and full-scale operations. The former has dealt mainly with desliming, with differential size oiling and with the relation between the rank of coals and their flotation properties. A new type of air jig with 1½ ton/hr. capacity also is being used. **Carbonisation of coal.**—Studies on the effect of velocity of heating gases in vertical retorts on the throughput are being continued. A new setting of vertical chamber ovens is now in use in expts. on the effect of blending coals on the coke, tars and gas produced. Expts. with a new setting of narrow vertical brick retorts intended primarily for low temps. indicate the possibility of its being suitable for use over a wide temp. range. **Use of pulverised coal, including "colloidal" fuel.**—The "Grid" burner designed at the Fuel Research Station has given promising results and is being developed. The dispersion of 0.5% of Na stearate in a Persian fuel oil made possible a 40% suspension of coal, 85% of which

had passed a 240-mesh B.S. screen. **Hydrogenation of tar and coal.**—Results of studies show that ease of hydrogenation of tar varies with the temp. at which carbonization takes place. A plant handling two tons of tar per day is in project. **Constitution of coal.**—The Board is cooperating with Bone and Scyler in their researches.

H. L. Olin

**Flotation processes for the purification of coal fines.** Ch. Berthelot. *Chimie & Industrie* 30, 770-86(1933).—A review of tendencies followed during the past few yrs. in the chief European collieries, showing that the technic of flotation permits of transformation of low-grade products into com. coals and the means by which the difficulties inherent to the drying of coal fines have been completely overcome. Little-known industrial data on the cost of purification and drying of coal fines are given.

A. Papineau-Couture.

**Progress in coal carbonization, gas making and by-product recovery.** Horace C. Porter. *Ind. Eng. Chem.* 26, 150-4(1934).—Although the by-product coke industry has expanded rapidly practically the same percentage of total coal production is carbonized as was 30 years ago, 16-16.5%. Because of the growth in the use of natural and refinery gases, future expansion in coal carbonization depends on an increase in the steel trade or on building up the demand for domestic coke and coal gas. Progress

in the industry during the past 25 years is reviewed.

P. J. Wilson, Jr.

The hydrogenation of coal. C. C. Wright and A. W. Gauger. *Ind. Eng. Chem.* 26, 164-9(1934).—A review.

P. J. Wilson, Jr.

The separation of coal into fractions of different ash contents. Jaroslav Dolínski. *Gas i Woda* 13, 307-9 (1933).—Pulverized coal is sepd. into fractions of different ash contents by means of a KCNS soln. of known sp. gr. (1.205). The app. consists of a glass tube 1.4 m. in length and 45 mm. in diam. The lower end is closed by a stopper with an inserted glass stopcock. The pulverized coal is shaken in the tube with the soln. and left for 24 hrs. The coal particles settle according to their sp. gr. and their ash content.

J. Wiertelak

Increase in the ash content of fuel dried separately by five gases before its utilization. E. G. Gershtein. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 8, 8-15. A calcn. of the effect of heat on the coal.

A. A. B.

The determination and evaluation of ash melting points. Břetislav G. Šimek, František Coufalík and Zdeněk Beránek. *Feuerungslechn.* 22, 1-6(1934).—The microscopic method of Dölch and Pöschmüller (*C. A.* 24, 5909) gives low results because of conduction away from the thermocouple junction, the sample being heated by radiation. When the app. is more adequately heated, it gives correct results. Other methods of ash m.-p. detn. give concordant results, which agree with those obtained by gasifying the original fuel in CO<sub>2</sub> at controlled temps.

Ernest W. Thiele

Refining of brown coal by heating with water vapor under pressure. Břetislav G. Šimek and Apollo Ruzička. *Mitt. Kohlenforschungsinstit. Prag.* 1933, 355-420.—The physicochem. changes of brown coal resulting from drying and from heating with satd. water vapor under pressure are described. The most favorable conditions for the drying of the coal were considered, and a suitable process was described. A description is given of expts. in a 1-cu. m. lab. autoclave and in an industrial plant having a daily capacity of 400 tons of brown coal. The advantages in the use of a dried coal consist not only in a greater heat efficiency but also a saving in transportation.

M. E. H.

The acids in Bohemian montan wax. August Stadler. *Mitt. Kohlenforschungsinstit. Prag.* 1933, 445-81.—The Me esters of the fatty acids from the wax were fractionated by vacuum distn., and two of the fractions were investigated more closely. The two acids isolated from the fractions were pure white substances, crystg. in shiny plates and m. 86.8 and 89.3, resp. Titration of the acids to det. their equiv. wts. gave results of 410 and 438, which would correspond to the formulas C<sub>27</sub>H<sub>54</sub>O<sub>2</sub> and C<sub>28</sub>H<sub>56</sub>O<sub>2</sub>. Attempts at a further sepn. by recrystn. and fractional pptn. were without result.

M. E. H.

The internally heated retort constructed by V. P. Izhevskii. I. M. Rafalovich. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 7, 39-43.—The retort consists of an inverted cupola-shaped chamber with a vertical partition which does not reach the ceiling of the retort. The fuel, which may be any solid fuel, is passed through the bottom of the retort and moves upwardly, reaches the upper edge of the partition where it is subjected to a partial combustion through the air admitted through the ducts in the partition. The coke then overflows the partition and moves downwardly to be discharged finally at the bottom of the retort. Volatile products are withdrawn through the ceiling and they are subjected to the customary treatment and sepn. A high efficiency, such as high calorific value coke and gases obtainable in this installation, is claimed. Various calcs. are given.

A. A. B.

Controlled cracking in continuous vertical retorts. E. B. Tomlinson. *Gas World* 100, 82-3; *Gas J.* 205, 195-6(1934).—The gases are subjected to further heat treatment in the space above the charge in the retort. In doing this it was necessary to feed small quantities of coal at regular intervals into the retort and to control the coke extn. so as to maintain a fixed free space above the charge. Under the optimum conditions of cracking with the first

coal tried and 14.5% steaming in Woodall-Duckham retorts 84.8 therms of 528 B. t. u. gas were produced per ton with a throughput of 5.2 tons per day. Under normal operation with 12.3% steaming 81.6 therms of 477 B. t. u. gas were produced with a throughput of 6.1 tons per day. A higher bulk d. of coke than normal from that type of retort is obtained. Further work is in progress.

P. J. Wilson, Jr.

The new tables for steam constants. N. A. Kostrov. *Trans. Thermo-Techn. Inst. Moscow* 1933, No. 7, 43-6.—A discussion of Mollier (*C. A.* 22, 1418) and Knoblauch tables.

A. A. Bochtlingk

Simple determination of the losses by free and bound heat in steam boilers. K. Münzer. *Arch. Wärmewirt.* 14, 318(1933).—A slide rule for combustion calcs. is described.

Ernest W. Thiele

Twenty-five years of natural and refinery gases. Geo. A. Burrell. *Ind. Eng. Chem.* 26, 143-50(1934); cf. *C. A.* 27, 4056.—Progress in the industry is reviewed.

P. J. Wilson, Jr.

Recent developments in Germany's gas industry. A. Thau. *Eng. Progress* 14, 230-2(1933).

E. H.

Annual distribution conference of the American Gas Association, Pittsburgh, Pennsylvania, April 3-4, 1933. Report on inspection and tests of specimens removed in 1932. Scott Ewing, et al. *J. Am. Water Works Assoc.* 25, 1618-19(1933).—An abstract of a report dealing with the study of coatings for gas pipe. Coatings varied in thickness from 0.007-0.216 in. (0.18-0.55 mm.) and consisted of various mixts. and combinations of asphalt, coal tar, mineral fillers, and fabric or felt reinforcements. No coating in the test showed enough elec. resistance to rank as a dependable insulator. The condition of a nonmetallic pipe covering is indicated by an electrolytic method that involves deposition of the metallic ions on suitable pattern paper which is immersed in a developing soln. with resultant blue stains recording discontinuities in the coating.

W. H. Boynton

The scientific utilization of gas. Further investigation of burner jets. W. J. G. Davey and A. E. Jones. *Gas World* 100, 84-6(1934).—The discharge coeff. for Amal fixed jets (cf. *C. A.* 27, 399) with channel length 3-5 times the orifice diam. has been detd. as 0.720, whereas American adjustable jets have coeffs. of 0.80-0.85. Corrections for gas discharge from Amal jets to standard conditions are discussed. When Amal jets are installed in preheated burners, jets with a gas discharge of approx. 20% in excess of the required discharge should be used. The Parkinson jet balance for the rapid and accurate calibration of jets against a master jet measures the differential pressure between 2 chambers with a common gas inlet, but from one of which the master jet discharges, and from the other the jet to be calibrated.

P. J. W., Jr.

Protecting gas services from corrosion. K. L. Clark. *Gas World* 100, 87-90(1934).—Corrosion on the inside of services is almost completely prevented by drying the gas, but added security may be obtained with dry gas by painting the inside surface and allowing it to dry before the pipe is laid. Different materials for pipes are discussed. Cu tubing appears to have possibilities by reason of the greater throughput of gas as a result of the smooth surface, and the superior resistance in corrosive soils. Elec. tests on the imperviousness to H<sub>2</sub>O of pipes externally protected by wrapping indicates that double wrapping is better than single, but the test is not decisive in the selection of a pipe covering. Various methods for the external protection of joints are described.

P. J. W., Jr.

Gas production combined with the regeneration of the waste gas from lime kilns. Hans Mehlig. *Tonind.-Zig.* 57, 1120-2, 1148-50(1933).—Lime kiln waste gas can be substituted in part for the steam blown into the gas producer. Equations for the process, which are derived, show that a gas of 900-1100 kg. cal./cu. m. can be produced based upon pure C as fuel. The producer operation can be controlled by the quantity of waste gas blown. The use of the waste gas increases the efficiency of the plant and under certain conditions may make a steam



boiler unnecessary. A numerical example is presented. 1

Kari Kammermeyer  
Production of producer gas from peat. E. Belani. *Wärme* 53, 345(1933); *Chimie & industrie* 30, 807.—Descriptive. Present-day methods of drying peat permit of remunerative production of producer gas from peat, provided 50 kg.  $(\text{NH}_4)_2\text{SO}_4$  and 80 kg. of tar can be obtained per ton of dry peat.

A. Papineau-Couture  
Application of a new gasification process to producers for automotive engines. G. Lauro. 2me Congr. intern. carbone carburant (Milan, Oct., 1932), 149-60; *Chimie & industrie* 30, 1004.—Application of gasification of pulverized coal in small producers for automotive engines presents difficulties on account of the necessity of obtaining a rich gas, sufficiently free from dust, in a small app., while the use of pulverized coal necessitates a fairly large combustion chamber in which the coal dust is kept agitated. Preliminary expts. have shown that a flame blown into the interior of the combustion chamber produces an agitation sufficient to keep the coal particles in motion and thus ensure good contact between the coal and the gases with which it must react.

A. Papineau-Couture  
Chemistry of the Thylox gas-purification process. H. A. Gollmar. *Ind. Eng. Chem.* 26, 130-2(1934).—Na or  $\text{NH}_4$  thioarsenate is the active ingredient used in the Thylox process for removing  $\text{H}_2\text{S}$  from gases. The soln. is regenerated by blowing with air (cf. C. A. 23, 4554). The toxicity of the solns., usually contg. less than 1% equiv.  $\text{As}_2\text{O}_3$ , was studied, but no evidence was found of As poisoning. From his study of the chemistry G. concludes that  $\text{Na}_4\text{As}_2\text{S}_5\text{O}_2 + \text{H}_2\text{S} = \text{Na}_4\text{As}_2\text{S}_6\text{O} + \text{H}_2\text{O}$  represents the principal reaction in the absorber, and  $\text{Na}_4\text{As}_2\text{S}_6\text{O} + \text{O} = \text{Na}_4\text{As}_2\text{S}_5\text{O}_2 + \text{S}$  the principal one of regeneration. Unless the  $\text{pH}$  of the Thylox soln. is maintained at 6.7 or higher, the As tends to revert to its lower valence; and probably a mixt. of  $\text{As}_2\text{S}_3$  and S is pptd.  $\text{Na}_2\text{S}_2\text{O}_3$  slowly forms from a little of the S in suspension. HCN in the gas is converted to NaCNS.  $\text{CO}_2$  has practically no effect because of the low alk. of the soln. ( $\text{pH}$  is 8 or less).

P. J. Wilson, Jr.  
Water-gas generation in coke ovens. S. B. Gorelik. *Coke and Chem.* (U. S. S. R.) 1932, No. 9, 24-8.—A summary of results obtained by admitting steam into the coke ovens as reported by several European gas producers. Admission of steam by means of nozzles and pipes at different points is discussed. Adoption of this practice in the U. S. S. R. gas industry to increase their capacity is urged. No preference is made as to the method of steam admission most suitable for U. S. S. R. gas plants.

James Sorrel  
The large coke plant of the Alma mine in Gelsenkirchen. Otto Krebs. *Feuerungstechnik* 22, 11-12(1934).—A modern by-product plant is described, with some statistics.

Ernest W. Thiele  
A simple laboratory method for the assessment of the combustible nature of coke. H. E. Blayden, W. Noble and H. L. Riley. *Gas J.* 205, 201-5(1934).—The app. by which the crit. air blast necessary to keep fine coke burning (cf. C. A. 28, 291<sup>a</sup>) is detd. has been used to grade cokes. Low-temp. cokes have crit. air blasts in the range 0.015-0.030 cu. ft. per min.; special domestic high temp. oven cokes, 0.042-0.048; gas cokes, 0.045-0.073; and metallurgical cokes, 0.057-0.150. Samples taken from the center of a coke-oven charge were much more reactive than those near the walls. Samples from the pusher end of the charge were decidedly more reactive than an av. sample. Sepn. of the oven charge into reactive and less-reactive fractions is believed to have possibilities.

P. J. Wilson, Jr.  
Free-burning domestic coke from coke ovens. C. H. S. Tupholme. *Ind. Eng. Chem.*, News Ed. 11, No. 23, 342(1933).—A coke oven with a laterally movable wall built by Koppers is used in exptl. coking runs to det. the optimum thickness of coal charge for varying coking temps. For the medium temp. range of 680-720° an oven width of 11.8 in. is most suitable. Coke produced in this middle range is highly reactive and should prove popular for domestic purposes.

H. L. Olin

Utilization of low-temperature carbonization coke in power plants. I. M. Tochilkin. *Trans. Thermo-Tech. Inst. Moscow* 1933, No. 8, 1-7.—The low-temp. coke derived from Zhurinskii and Cheremkhov coals had the following compn.: C 83.9-85.6, H 3.5-3.8, S 0.4-2.1 and O + N 10.2-12.3%. It had a calorific value of 7720-7940 calories. The ash of the Cheremkhov coke contained:  $\text{SiO}_2$  57.9-58,  $\text{Al}_2\text{O}_3$  23.4-24.1,  $\text{Fe}_2\text{O}_3$  7.8-7.9, CaO 3.6-3.7, MgO 2.3-3.2 and  $\text{SO}_2$  2.8-4.7%, and its m. p. was 1080-1310°, while that of Zhurinskii was 1180-1370°. A great variety of data with reference to the behavior of this coke in the boilers is given.

A. A. Bochtlingk  
Coking of coal residue for electrode manufacture. N. A. Nikolskii and M. A. Stepanenko. *Coke and Chem.* (U. S. S. R.) 1932, No. 9, 9-16.—A series of lab. expt., semi-plant and plant tests with prepn. of pitch coke electrodes showed the possibility of producing ash-free coke suitable for use in electrodes at approx. cost of 80-90 rubles (\$40-45) per ton.

James Sorrel  
Circular flow of gases in a coke oven. A. A. Agroskin. *Coke and Chem.* (U. S. S. R.) 1932, No. 9, 16-23.—A review of the important improvements made in the design of coke ovens to insure proper gas circulation and thereby to avoid local overheating, damage to brickwork, excessive loss of heat, etc. The Koppers coke oven is described as an important achievement in respect to rational gas circulation.

James Sorrel

Heat economy in the soap industry (Gäbler) 27. Purification of acid waters [bituminous coal mine drainage] (Trax) 14. Sols for clarifying coal wash waters (U. S. pat. 1,942,507) 18. Mixing device for gases carrying pulverized coal (U. S. pat. 1,941,471) 1. Mineral flotation app. (U. S. pat. 1,942,803) 9. Rotary grates for gas producers (Brit. pat. 399,083) 1.

Callen, Arthur S., and Ulmann, August, Jr.: Fuel Testing and Power Economics. Scranton, Penna.: Intern. Textbook Co. \$1.60.

Sneeden, J. B. O.: Introduction to Internal Combustion Engineering. New York: Longmans, Green & Co. 263 pp. Reviewed in *Commonwealth Engr.* 21, 121(1933).

Liquid fuel. Duilio Annaratone. Ger. 587,775, Nov. 7, 1933 (Cl. 23b. 4.01). Fuel for motors, etc., is obtained by mixing about 25% of components b. 160-205° with about 60% of components b. 35-98° and about 15% of components with a b. p. between those of the two former types. Thus, a fuel may contain 59% of a mixt. of EtOH, abs. alc. and heptane, 15% of a mixt. of toluene, MeOH and *p*-xylene, and 25% of a mixt. of methylcyclohexanol, decahydronaphthalene and tetrahydronaphthalene.

Diesel fuels. I. G. Farbenind. A-G. Brit. 399,150, Sept. 26, 1933. See Fr. 746,116 (C. A. 27, 4378).

Fuel suitable for firelighters. H. K. Maruschek and W. Friedmann. Brit. 359,905, Nov. 2, 1929. A readily combustible liquid such as "petrol" or heavy benzene is absorbed in material such as charcoal, peat dust, sawdust, coke dust, or infusorial earth, or mixts. of such materials, and a mass of the material is coated with paraffin or a suitable oil and then with a mixt. such as may be formed from waste rubber and crude petroleum or like materials. Numerous other ingredients and auxiliary addns. are also mentioned.

Benzene and homologs from gaseous hydrocarbons. Charles C. Towne (to Texas Co.). U. S. 1,943,240, Jan. 9. Normally gaseous hydrocarbon material contg. a large proportion of paraffinic constituents heavier than  $\text{CH}_4$ , such as gases sepd. in "natural gasoline" production, is subjected to a conversion temp. of about 650-950° while in the presence of a clay type catalyst such as bauxite or fuller's earth.

Motor benzene. Clifford Banta (to The Barrett Co.). Can. 336,438, Oct. 17, 1933. Crude benzene is agitated for about 1/4 hr. with about 0.08 lb. of 66°Bé.  $\text{H}_2\text{SO}_4$  per gal. at a temp. below about 40°. The refined benzene is

sepd. from the resulting acid sludge, neutralized and distd. Gum-forming constituents are thus removed.

**Filtering device, particularly for liquid fuel for internal-combustion engines.** Bryce Ltd. and Arthur A. Sidney. Brit. 399,207, Oct. 2, 1933.

**Apparatus for making explosive gaseous mixtures such as those for internal-combustion engines.** Jack A. de Grey. U. S. 1,942,956, Jan. 9. A gaseous mixt. such as air and low-grade hydrocarbon fuel is passed through tubes in which further mixing takes place and thence to a catalytic chamber which may contain various fuel-cracking catalysts. Various structural and operative details are described.

**Decarbonizing devices for internal-combustion engines.** Edward Bagnall-Bull. Brit. 368,513, Mar. 10, 1932. Air is drawn into the induction pipe through a container that has a renewable cartridge comprising an absorbent material satd. with a decarbonizing substance, *e. g.*,  $(\text{NH}_4)_2\text{CO}_3$ ,  $\text{H}_2\text{O}_2$ . In 397,849, Aug. 29, 1933, the air is drawn through a chamber contg.  $\text{H}_2\text{O}$  or other liquid, *e. g.*,  $\text{CCl}_4$ , an aq. soln. of monochloronaphthalene, and then through a 2nd chamber contg. the decarbonizing substance.

**Catalytic device for determining the character of exhaust gases from internal-combustion engines.** George R. Blodgett (to Moto Meter Gauge & Equipment Corp.). U. S. 1,942,323, Jan. 2. Structural details.

**Centrifugal gas cleaners for internal-combustion engines on submarines, etc., wherein liquid oxygen is added to the exhaust products to make the gaseous charge for the succeeding explosion.** Fritz von Opel. Brit. 398,367, Sept. 14, 1933.

**Method for controlling combustion in regenerative furnaces burning gaseous, liquid or pulverulent fuel.** British "Rema" Manufacturing Co. Ltd. and Peter Howden. Brit. 398,200, Sept. 8, 1933.

**Retort furnaces for distilling or coking fuel.** Otto Hellmann. Brit. 399,053, Sept. 28, 1933.

**Destructive hydrogenation.** Ulysses A. R. Dudley. Brit. 399,487, Sept. 25, 1933. Carbonaceous materials, particularly cycloparaffin oils, are hydrogenated with  $\text{H}$  under pressure, preferably in presence of a catalyst, *e. g.*, Mn bronze, the temp. being maintained below  $20^\circ$  by a cooling agent, *e. g.*, brine. App. is described.

**Retorts for the low-temperature carbonization of coal admixed with crude oil or tar.** Thomas H. Parry, Wm. Johnson and Henry A. S. Gothard. Brit. 398,160, Aug. 29, 1933.

**Retort furnaces for the low-temperature carbonization of coal admixed with crude oil or coal tar.** Thomas H. Parry, William Johnson and Henry A. S. Gothard. Brit. 399,495, Sept. 29, 1933. Divided on 398,160 (preceding abstr.).

**Air-pervious table, etc., for separating coal from impurities, etc.** Richard Peale (to Peale-Davis Co.). U. S. 1,941,490, Jan. 2. Various structural and operative details are described.

**Coal and tar distillation.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,375, Jan. 2. Coal is coked in a portion of the ovens of a coke-oven battery, and pitch is coked in another portion of the ovens to form separately pitch-coke. Hot gases from both such coking operations are combined and cooled to sep. a combined tar contg. constituents from both the coal and the pitch. App. is described.

**Plant for high-pressure steam production.** Alfred Huster (to Fried. Krupp Germaniawerft A.-G.). U. S. 1,942,861, Jan. 9. Structural and operative details.

**Apparatus for superheating steam.** Arthur Williams (to Superheater Co.). U. S. 1,942,676, Jan. 9. Structural details.

**Steam superheaters.** Percival R. Boulton. Brit. 399,937, Oct. 19, 1933.

**Steam desuperheaters.** Deutsche Babcock & Wilcox-Dampfkessel-Werke A.-G. Brit. 399,308, Oct. 5, 1933.

**Coal-gas purification.** Frederick W. Sperr, Jr. (to Koppers Co. of Del.). U. S. 1,942,072, Jan. 2. The gas is preliminarily cooled as it issues from the retorts, purified, then finally cooled, and the cooled gas is scrubbed

to remove naphthalene. After the final cooling but before the naphthalene removal the gas is treated with a hygroscopic liquid comprising hygroscopic brines or NaCNS to dehydrate the gas while at its final distribution temp. and so that any entrained salt soln. from this treatment will be removed in the naphthalene scrubbing step. App. is described.

**Purifying gases.** Christian J. Hansen. Ger. 583,938, Sept. 12, 1933 (Cl. 26d. 9.04). See Fr. 750,531 (C. A. 28, 884').

**Purifying fuel gas.** Caleb Davies, Jr. (to Koppers Co. of Del.). U. S. 1,942,050, Jan. 2. The gas is contacted with an aq. liquid contg. suspended S to remove HCN from the gas, then contacted with an Fe salt soln. which absorbs  $\text{NH}_3$  and  $\text{H}_2\text{S}$  to form an  $\text{NH}_4$  salt in soln. with pptn. of Fe sulfide (such as a soln. contg.  $\text{FeSO}_4$ ); the Fe sulfide formed is removed from the soln., treated with acidic material to liberate  $\text{H}_2\text{S}$ ; the liberated  $\text{H}_2\text{S}$  is converted into free S and the latter is added to an aq. liquid in which it forms a suspension which is utilized for further fuel-gas treatment to remove HCN. App. is described.

**Purifying gas from hydrogen sulfide.** Herbert A. Gollmar (to Koppers Co. of Del.). U. S. 1,937,196, Nov. 28. An alk. absorbent liquid is recirculated through a cycle comprising an absorption stage in which the liquid is brought into contact with the gas for removal of  $\text{H}_2\text{S}$  and a regeneration stage in which  $\text{H}_2\text{S}$  removed from the gas by the liquid is liberated. Liberated  $\text{H}_2\text{S}$  from the regeneration stage is removed and oxidized to form  $\text{SO}_2$ ; the resulting  $\text{SO}_2$ -contg. gases are washed with a soln. of Na thio-sulfate, and the resulting soln. is removed and regenerated by subjecting it to contact with the gas contg.  $\text{H}_2\text{S}$  and it is recirculated for further washing of the  $\text{SO}_2$  gas. App. is described. Cf. C. A. 27, 591, 5519.

**Removing sulfur impurities from hydrocarbon gases and oils.** Clarence W. Garrison (to Koppers Co. of Del.). U. S. 1,942,054, Jan. 2. A gas such as coal gas or oil-refinery gas is subjected to countercurrent contact with alkali carbonate soln. to absorb all the  $\text{H}_2\text{S}$  of which it is capable (thereby preliminarily partially fouling the soln. for the following oil-treatment stage) and oil such as a petroleum distillate is then subjected to contact with at least a substantial portion of the soln., to effect further  $\text{H}_2\text{S}$  absorption, and the soln. is then regenerated for further use. App. is described.

**Desulfurizing gases.** I. G. Farbenind. A.-G. (Hans Bähr, inventor). Ger. 587,797, Nov. 9, 1933 (Cl. 26d. 9.11). The  $\text{H}_2\text{S}$  in gases such as coal-distn. gases is catalytically converted to  $\text{SO}_2$  and this, with the  $\text{NH}_3$  present, or with added  $\text{NH}_3$ , is converted to  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{HSO}_4$ ,  $(\text{NH}_4)_2\text{S}_2\text{O}_8$  or polythionate. Cf. C. A. 28, 294'.

**Cooling and purifying burner gases.** Edwin J. Mullen (to General Chemical Co.). U. S. 1,943,137, Jan. 9. Hot burner gas is passed through a tower in contact with a stream of  $\text{H}_2\text{SO}_4$ , and at intervals the flow of acid is stopped and a stream of water is substituted while the flow of burner gas is continued to wash out impurities from the tower. Various details of app. and operation are described.

**Apparatus for controlling the flow of liquids such as solvents used in gas-purification towers, etc.** Herbert A. Gollmar (to Koppers Co. of Del.). U. S. 1,942,094, Jan. 2. Various structural and operative details are described.

**Apparatus for washing flue gases.** Wm. N. C. Clinch. Brit. 399,575, Oct. 12, 1933.

**Gas-washing solutions.** The Koppers Co. Ger. 587,653, Nov. 7, 1933 (Cl. 26d. 9.30). Gas-washing solns. of an element of the Sn group, *e. g.*, As compounds, have the solid impurities removed, are cooled to remove  $\text{Na}_2\text{S}_2\text{O}_3$  and NaCNS by crystn., and are filtered. The liquid is then regenerated by oxygenation.

**Materials for making gas, etc.** Thomas R. Dixon. Brit. 398,601, Sept. 21, 1933. Carbonaceous materials, *e. g.*, powd. coal, are treated with a bacterial org. acid and (or) with fungi or enzymes prior to fractional distn. for the production of spirits, oils, gases. AcOH or an acid

produced by bacteria of the genus *Lactis* may be used. In an example a mixt. of powd. coal and acid is allowed to stand 7 days at 128–132°F., the acidity is reduced by addn. of alkali, the temp. falling to 80°F. and the mixt. left a further 21 days. The liquor is then decanted from the smokeless coal-dust residue and is again fermented by the addn. of yeast and molasses before being fractionally distd. Tar, wood, peat or vegetation may be similarly treated.

**Air-gas generator.** Aldo Curioni. Brit. 399,655, Oct. 12, 1933.

**Oil-gas generation.** Société des procédés Chilowsky and Constantin Chilowsky. Brit. 398,640, Sept. 21, 1933. Heavy oil is atomized directly into an unobstructed zone by an amt. of preheated air insufficient for supporting complete combustion, so as to obtain a free jet of hot products in which partial combustion takes place, and the products are transferred to a 2nd zone sepd. from the 1st by a heat-radiating body to the center of which heat is imparted by substantially the whole of the products before they leave the 2nd zone. App. is described.

**Water-gas generator.** Charles W. Andrews and Wm. B. Chapman. U. S. 1,941,455, Jan. 2.

**Water-gas generators.** Humphreys & Glasgow Ltd. and Arthur R. Griggs. Brit. 399,119, Sept. 28, 1933.

**Portable plant for the production of inert gas from fuel and air for use, e. g., in purging gas holders.** Arthur D. Harrison. Brit. 399,687, Oct. 12, 1933.

**Apparatus for producing gas from liquid hydrocarbon material by electric heating.** Henri Gamard. U. S. 1,941,678, Jan. 2. Various structural and operative details are described.

**Arrangement for discharging ashes from gas producers.** Geo. H. Bentley and Simon-Carves & Co. Ltd. Brit. 398,251, Sept. 14, 1933.

**Device for automatically controlling the calorific value of a gas by varying the output of the gas-making plant.** British Airca Regulators Ltd. and Thomas Lindsay. Brit. 399,798, Oct. 5, 1933.

**Gas holders.** K. & J. Dempster Ltd. and Wm. A. Hulme. Brit. 399,420, Oct. 5, 1933.

**Distilling tar.** John M. Weiss (to Barrett Co.). U. S. 1,942,195, Jan. 2. In distg. tar with the aid of fuel gases, part of a main stream of fuel gases is diverted and passed through hot tar contained in a still to effect its distn., the resulting gases and vapors are cooled to condense oils from them, and the gases and uncondensed tar vapors thus cooled are returned to the main stream of the fuel gases subsequent to the point in the stream whence the gases were diverted. App. is described.

**Distilling tar.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,371, Jan. 2. In distg. liquid material such as tar by the heat of hot coal-distn. gases, the latter, separately collected from a controlled period of the coal-distn. operation such as selected rich or lean gases, are bubbled at a temp. above the dew point of their contained oil vapors, through the material to be distd. to effect distn. and produce a pitch residue of regulated free C content; the resulting gases and vapors are cooled to condense both distillate oils and oils from the coal distn. gases (which may be coke oven gases). App. is described. Cf. C. A. 27, 2790.

**Distilling tar.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,374, Jan. 2. For distg. tar and recovering high-boiling resinous and greasy constituents, the coal tar is brought into direct contact with hot coal-gasification gases, so that the tar is distd. to a pitch of high m. p., and resinous or greasy constituents are volatilized from the tar; gases and vapors from the distn. are brought into direct contact with a regulated quantity of oil to effect only partial cooling of the gases and vapors by which resinous and greasy constituents are condensed and sepd. from the gases and remaining vapors, and the resulting gases and vapors are subsequently cooled to sep. oils from them. App. is described.

**Distilling tar or pitch and coking coal in a by-product coke oven.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,372, Jan. 2. Coal is charged into an incandescent

coke oven and, before coking of the coal is completed, material such as tar or pitch to be distd. is introduced into the upper portion of the coke oven; the liquid material and coal are heated so as to distil the liquid and coke the distn. residue and simultaneously coke the coal in the oven, and mixed vapors and gases thus formed are withdrawn. App. is described.

**Processing tar.** Edmund O. Rhodes and Floyd D. Hager (to The American Tar Products Co. Inc.). Can. 336,568, Oct. 24, 1933. Tar is sepd. by solvents, such as aliphatic ketones and mixts. of aliphatic ketones and alcs., into a pitch-like insol. product that is relatively rich in benzene-insol. constituents and can be readily coked, and a creosote-like sol. product that is relatively rich in high-boiling constituents and is useful for the same general purposes for which creosote is used. The sol. portion may be treated to obtain pitches having a wide range of m. p. by distg. with or without steam. Cf. C. A. 27, 3590.

**Processing tar and pitch.** Charles S. Reeve (to The Barrett Co.). Can. 336,923, Nov. 7, 1933. The free C content of tars or pitches produced in coal gasification processes is increased by distg. off a portion of the volatile constituents and collecting the distillate. The residue from the distn. operation is heated under a pressure between 15 and 120 lb. per sq. in. at between 700° and 820°F. without substantial distn. A portion of the distillate is mixed with the resulting product.

**Indene recovery from tar oils.** Leopold Kahl. U. S. 1,943,078, Jan. 9. The concn. of indene in tar oils is increased up to about 80% by fractional distn., the fraction with this indene concn. is cooled down to about –25° and the indene which crystallizes out is sepd. by centrifuging.

**Apparatus for separating water, etc., from the tar, tar oil or other sealing liquid of a disk gas-holder.** Maschinenfabrik Augsburg-Nürnberg A.-G. Brit. 398,703, Sept. 21, 1933.

**Apparatus and process for the continuous oxidation of tar to pitch.** Société pour l'exploitation des procédés Ab-der-Halden. Brit. 398,112, Sept. 7, 1933.

**Apparatus for coking bituminous liquids such as pitch, oil residuum or asphalt.** Lewis C. Karrick. U. S. 1,942,650, Jan. 9. Various structural and operative details are described.

**Coking processes.** Carl Still (trading as the Firm Carl Still). Brit. 399,859, Oct. 13, 1933. In producing gas and coke in a chamber oven in which vertical ducts are formed in the charge by the insertion of rods that are frequently withdrawn, the ducts communicate with a collecting pipe by tubes extending downwardly from the oven roof and are used for the introduction of steam, coal gas or other gas into the glowing coke during the later stages of the carbonizing period. App. is described.

**Coking bituminous materials such as tar or pitch.** Edmund O. Rhodes (to American Tar Products Co.). U. S. 1,942,978, Jan. 9. In effecting coking in a by-product oven having side walls with heating flues extending substantially through the entire height of the walls, the side walls of the oven are heated to maintain the coking chamber at coking temp., and the material to be coked is sprayed together with a gaseous medium such as superheated steam, substantially free from uncombined O, into the coking chamber so as to produce a liquid spray, which on passing downwardly through the oven, is substantially freed from foaming constituents that cause excessive foaming, the feed of the material being so regulated as to avoid undue chilling of the walls of the oven; the coking of collected residual matter is continued to cause shrinkage to free coke from the side walls of the oven and to form a coke that is removable *en masse* from the oven by a pushing operation. App. is described. Cf. C. A. 27, 2570, and the following abstr.

**Coking bituminous materials such as tar or pitch.** Edmund O. Rhodes (to American Tar Products Co.). U. S. 1,942,980, Jan. 9. By-product coke-oven chambers with side walls having heating flues extending substantially through their entire height are charged with material in a

free-flowing condition, and the oven, above the level of the material deposited in it, is maintained substantially completely filled with vapors from the material, while at the same time excessive foaming is prevented. The charging is conducted at such a rate that emission of vapors from the oven occurs at a greater rate than that at which vapors are superheated and decompd. (this reducing lampblack formation). Accumulated residual coke is pushed out. App. is described.

**Coked fuel agglomerates.** Earl H. Bunce (to New Jersey Zinc Co.). U. S. 1,941,462, Jan. 2. Agglomerates such as those formed from coke breeze and bituminous coal or the like are passed, while in free contact with one another, by gravity, through an upright coking chamber in which they are heated to a coking temp. by direct contact with hot gas passed transversely through the chamber (the hot gas entering the agglomerates at a temp. of at least 800° and leaving them at a temp. not lower than 550°). App. is described.

**Apparatus for charging a coke oven with liquid carbonizable material such as pitch.** Edmund O. Rhodes, Ernest W. Volkmann and James C. Fitzpatrick (to American Tar Products Co.). U. S. 1,942,979, Jan. 9. Various structural and operative details are described.

**Vertically fired coke ovens.** Joseph Van Ackeren (to The Koppers Co. of Delaware). Brit. 398,610, Sept. 21, 1933.

**Vertically fired coke ovens.** Wm. Hesser Pavitt. Brit. 399,975, Oct. 19, 1933.

**Horizontal regenerators, particularly for coke ovens.** Didier-Werke A.-G. Brit. 399,409, Oct. 5, 1933.

**Elements for use in the construction of reversible heat regenerators, e. g., of coke ovens.** C. Otto & Co. G. m. b. H. Brit. 398,320, Sept. 14, 1933.

**Creosoting compositions.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,373, Jan. 2. A large part of the volatile oils present are distd. off from coal tar by spraying it into hot fresh coal-distn. gases from a coke oven or retort plant at the temp. at which such gases normally enter the collector main of the plant, the spray of tar being regulated so as to enrich greatly the gases and effect partial cleaning to produce a gas-vapor mixt. contg. entrained pitch particles in a ratio of pitch to pitch plus oil vapors of about one-fifth of the usual ratio of these in hot fresh coal-distn. gases; the mixt. is cooled to condense oils, and from the condensed oils and entrained pitch particles there is formed a tarry oil suitable for use as a creosoting compn. App. is described. Cf. C. A. 27, 1490.

## 22- PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

**Raccoon Bend oil field, Austin County, Texas.** I. P. Teas and Charis R. Miller. *Bull. Am. Assoc. Petroleum Geol.* 17, 1459-91(1933). Analyses of oil and oil-field waters are given. The variable gravities of Gutoskey oils are explained as due to (1) variation in source material, (2) variation in amt. of accompanying gas and (3) the character of the assocd. waters. Alden H. Emery

**Vapor pressure and vaporization of petroleum fractions.** Geo. G. Brown and Donald L. Katz. *Natl. Petroleum News* 25, No. 50, 28, 30, 32, 34-5; No. 51, 22-4, 26-9; No. 52, 23-4, 26(1933).—A summary of the latest data. R. W. Kelly

**The isolation of mesitylene, pseudocumene and hemimellitene from an Oklahoma petroleum.** Beveridge J. Mair and Sylvester T. Schickelanz. *Bur. Standards J. Research* 11, 665-80(1933)(Research Paper No. 614).—Mesitylene (I), pseudocumene (II) and hemimellitene (III) were isolated in very pure condition from Mid-Continent petroleum, by extg. with liquid SO<sub>2</sub> the fraction b<sub>118</sub> 118-32°, and fractionally distg. and crystg. the ext.; selective sulfonation and crystn. of the sulfonic acids and their hydrolysis were also employed. I has 2 cryst. modifications. The percentage of each in crude petroleum is: I, 0.02 (probably low), II 0.2, III 0.06. The density at 20°, n<sub>D</sub><sup>20</sup>, b. p. and f. p. are, resp.: I: 0.8653, 1.4967, 164.64°, —44.78° (α-form), —51.74° (β-form); II: 0.8762, 1.5025, 169.18°, —44.09°; III: 0.8951, 1.5116, 176.10°, —25.47°. Curves show the transmission of infra-red light. Twenty-two references. M. P. Benoy

**Jamin effect in oil production.** Randall Wright. *Bull. Am. Assoc. Petroleum Geol.* 17, 1521-6(1933).—The Jamin effect does not retard the flow of petroleum toward a well, although it may retard encroachment of edge water. Hydraulic pressure produced more oil under lab. conditions than air pressure. One asphalt-base and one paraffin-base oil exhibited greater adhesion for sand grains than did H<sub>2</sub>O. Alden H. Emery

**Survey of fuel consumption at refineries in 1932.** G. R. Hopkins. *Bur. Mines, Rept. of Investigations* No. 3222, 9 pp.(1933); cf. C. A. 27, 2287.—Av. fuel required per bbl. of crude oil was 692,000 B. t. u. in 1932, as compared with 672,000 B. t. u. in 1931. Use of refinery gas increased 8% and displaced oil as the primary refinery fuel, since the latter declined 11%. Use of coal, natural gas and petroleum coke declined. Acid sludge increased in importance. Alden H. Emery

**The inversion of emulsions of mineral oils and aqueous**

**solutions.** L. Hemmer. *Ann. combustibles liquides* 8, 1135-45(1933).—The formation of different types of emulsions depends upon the volumetric ratio of the 2 phases and upon the method of operation. The change in phase takes place at a certain value of this ratio, called the point of inversion. Expressed in percentage of the dispersed phase of total vol., the point of inversion varies between 74 and 100%. This variation is a function of interfacial tension. At very low tension it approaches 100, and 75% at high tension. In presence of neutral salts the point of inversion decreases inversely to the salt concn. Above a p<sub>H</sub> of about 11 soda produces about the same effect as NaCl. Karl Kammermeyer

**Solubility and liberation of gas from natural oil-gas solutions.** Ben E. Lindsly. *Bur. Mines Tech. Paper* 554, 65 pp.(1933); cf. C. A. 28, 1514°.—Gas may be liberated from solus. in 2 ways. Soly. curves for flash liberation are approx. a straight-line function of pressure. For differential liberation, which is somewhat similar in principle to hatch distn., soly. graphs have pronounced curvature. In the oil sands, reduction in pressure results in differential liberation; flash liberation takes place in the flow string of a well. The method of liberating gas has a pronounced effect upon the gravity of the oil. When gas was liberated differentially in these expts., the A. P. I. gravity of the oil was 1-4° higher than after flash liberation. Gas loss results in oil shrinkage, —11.3% for Ventura crude oil of 34° A. P. I. gravity to 40.5% for Kettleman Hills, 63° A. P. I. gravity. The rate of shrinkage increases greatly below 100 lb. per sq. in. The first 50% shrinkage was caused by liberation of a gas of low sp. gr. contg. approx. 77% CH<sub>4</sub>, whereas the last 50% was caused by a much smaller vol. of heavier gas contg. only 11% CH<sub>4</sub>. Virtually every sample obtained at the well head was undersatd. Alden H. Emery

**Oxidation-reduction reactions between natural hydrocarbons and oil-filled waters.** O. H. Behre, Jr. and R. K. Summerbell. *Science* 79, 39-40(1934).—Previously unpublished work is reported in abstr. form. Expts. show that sulfate-bearing waters, even in the absence of bacteria, suffer reduction to sulfides in contact with paraffin-base oils at temps. of 30-122°. The work is being repeated in more detail, special attention being paid to variations in (a) temps. and pressures, (b) types of paraffins, (c) types of oxidizing agents and (d) naturally occurring catalysts. Howard A. Smith

**Development of the oil-cracking art.** P. C. Keith and W. B. Montgomery. *Ind. Eng. Chem.* 26, 190-4(1934).—

A brief description of the development and of the present state of various cracking processes. V. A. Kalichevsky. *Vapor-phase cracking*. C. R. Wagner. *Ind. Eng. Chem.* 26, 188-9(1934).—A brief survey of the literature on vapor-phase cracking, supplemented by the exptl. data which show that the cracking temp. and the nature of the charging stock affect the characteristics of the reaction products.

V. A. Kalichevsky. *Fundamental variables in mixed-phase cracking*. Harold Sydnor. *Ind. Eng. Chem.* 26, 184-7(1934); cf. *C. A.* 22, 585.—Temp., pressure, reaction time, and conversion per pass (percentage of gasoline multiplied by percentage of fresh feed in total feed) are the only variables which account for the differences between various cracking processes. Results obtained in cracking a Mid-Continent gas oil show the interdependence of these variables and their effect on the yield and knock rating of gasoline. The tube and tank process is described.

V. A. Kalichevsky. *Resinification of gasoline*. Evert Norlin. *Tek. Tid., Uppf. C, Kemi* 63, 89-94(1933).—A discussion of the reasons for the formation of gum in gasoline produced by the cracking process. Recent methods for the estn. of existing and potential gum are described in detail, together with a discussion of various means of inhibiting the gum formation. The use of antioxidants, the effect of the storing of gasoline on the efficiency of these agents and the relation between the activity of antioxidants and their chem. compn. are discussed.

D. Thuesen. *Determination of carbon in graphited cup grease*. F. Heathcoat. *Analyst* 59, 28-9(1934).—The samples examined were supposed to consist of a lime-soap base and 5% of graphite. The graphite was left behind after boiling 3-4 g. with 30 ml. of glacial AcOH, filtering, washing with hot glacial AcOH and finally with hot water. W. T. H.

Conversion of fatty and waxy substances into petroleum hydrocarbons (Seyer) 8. Overhanging salt on domes of Texas and Louisiana (Judson, Stamey) 8. App. for coking oil residuum or asphalt (U. S. pat. 1,942,050) 21. Destructive hydrogenation (Brit. pat. 399,487) 21. Removing S impurities from hydrocarbon gases and oils (U. S. pat. 1,942,054) 21. Tertiary alkyl-substituted *o*-dihydroxybenzenes [for preventing gum formation in gasoline] (U. S. pat. 1,942,827) 10. Hydrogenation of oil (Can. pat. 336,448) 27.

British Standards for Turbine Oils. (B. S. S. No. 489-1933). London: Brit. Standards Inst.

Richtlinien für Einkauf und Prüfung von Schmiermitteln. 6th ed. Issued by Verein deutscher Eisenhüttenleute und dem deutschen Normenausschuss. Berlin: Beuth-Verlag. 128 pp. M. 6.75.

Distillation and utilization of liquid fuels such as heavy petroleum oils. Eastman A. Burrows (one-half to Thomas D. Campbell). U. S. 1,941,968, Jan. 2. A liquid fuel is continuously introduced into a heating zone to effect its partial distn., lighter components from the distn. are removed; heavier components are passed to burners in a furnace assocd. with a primary heat-utilization system for heating material other than the fuel (such as for heating a kiln) maintained at a temp. above 1090°, and intermediate components resulting from the distn. are passed into heat exchange with the flue gases from the furnace at a temp. of below 920° and back to the heating zone. App. is described.

Fractional distillation of materials such as petroleum oils. Albert G. Peterkin, Jr. (to Atlantic Refining Co.). U. S. 1,942,446, Jan. 9. Various details are described of distg. tower operation in which steam is used.

Apparatus for the destructive hydrogenation of petroleum oils. Wm. B. Plummer (to Standard Oil Co. of Ind.). U. S. 1,942,120, Jan. 2. Various structural and operative details of a catalytic app. are described.

Breaking emulsions of petroleum with water. Charles Fischer, Jr. and Warren T. Reddish (to Kontol Co.).

U. S. 1,941,886, Jan. 2. A demulsifying reagent comprises a mineral oil sulfonic product of the type recovered from the refining of medicinal white oils, etc., with strong or fuming H<sub>2</sub>SO<sub>4</sub> with alc. as a viscosity reducer, reagent disperser and coalescence accelerator.

Apparatus for breaking petroleum emulsions by vibratory and electric treatment. Levering Lawrason (to Petroleum Rectifying Co. of Calif.). U. S. 1,942,480, Jan. 9. Various structural and operative details are described.

Cracking petroleum oil. Percy C. Keith, Jr. (to the Gasoline Products Co. Inc.). Can. 336,130, Oct. 3, 1933. Gasoline is produced from petroleum oils by heating in a confined stream to 875-975°F. under a pressure of upward of 500 lb., and passing the heated oil into an enlarged reaction chamber, wherein cracking and sep'n. of vapors from liquid take place. The liquid is withdrawn from the reaction chamber while the vapors therein are maintained at cracking temp. The sep'd. vapors are passed through a heating coil and subjected to vapor-phase cracking, and the heated vapors are passed into a second enlarged reaction chamber, wherein they are maintained at cracking temp. under a pressure of upward of 500 lb. The products of conversion are withdrawn from the latter reaction chamber so rapidly that the accumulation of liquid therein is prevented. The products of conversion are fractionated to sep. the desired high-antiknock gasoline.

Apparatus for cracking hydrocarbon oils. Petroleum Conversion Corp. Ger. 587,899, Nov. 10, 1933 (Cl. 23b. 1.04).

Cracking oil. Walter J. Perelis (to The Shell Development Co., to The Universal Oil Products Co.). Can. 337,552, Nov. 28, 1933. Oil feed is sep'd. into a lighter and a heavier fraction, and the heavier fraction is cracked under flow and under superatm. pressure in the liquid phase while out of contact with the lighter fraction. The lighter fractions from the cracked liquid-phase efflux are sep'd. and passed together with the lighter fraction of the feed to a distg. zone, where lighter and heavier fractions are sep'd. The lighter fractions from the zone are removed and condensed, and the heavier fractions from said zone are cracked in the vapor phase under flow and under a pressure substantially atm. The lighter fractions of the cracked vapor-phase efflux are sep'd. and condensed, and the light condensate from the liquid- and vapor-phase cracking is separately collected.

Distilling and cracking oils. Frank W. Steere (one-half each to Semet-Solvay Engineering Corp. and Air Reduction Co.). U. S. 1,942,191, Jan. 2. The oil is cyclically circulated to form a continuous stream which is subjected to direct contact with the hot gaseous products of a reaction between O, steam and combustible carbonaceous material such as coal, oil or gas and the resultant gas and vapors are passed through a rectifying column to condense heavy hydrocarbons, and the gas and remaining vapors from the column are passed through a condenser to sep. light liquid hydrocarbons and water from the gases. App. is described.

Single-pass heat-exchange apparatus suitable for use with oil-cracking apparatus. Carl S. Reed (to Lummus Co.). U. S. 1,942,878, Jan. 9. Structural details.

Hydrocarbon oil conversion. Hans Engel and Josef Jannek (to I. G. Farbenind. A.-G.). U. S. 1,941,884, Jan. 2. For obtaining products of lower b. p., an oil such as a middle oil or tar or gas oil is subjected to the action of a free halogen such as Cl at a temp. between 0° and 150° (suitably about 100° when using Cl) and the resulting products are then further subjected at a temp. of 100-500° to the action of Al activated by treating it with a soln. of a salt of a less electropos. metal such as HgCl<sub>2</sub>. App. is described.

Conversion of hydrocarbon oils. Robert E. Wilson (to the Standard Oil Co.). Can. 336,184, Oct. 3, 1933. Higher-boiling hydrocarbon oil is heated to about 900° F. under a pressure of about 750 lb. per sq. in., the heated oil is passed to a zone of substantially lower pressure of at least 100 lb. per sq. in. wherein the desired low-boiling

- products together with a portion of the products heavier than the desired products are vaporized and the unvaporized products are maintained at not less than 750°F. The vapors and unvaporized products are separately withdrawn and the unvaporized products are passed to another zone of still lower pressure wherein substantially all of the remaining heavier constituents thereof desirable as cracking stock are vaporized. The vapors and unvaporized portions of the second low-pressure zone are separately withdrawn, the vapors are condensed and the condensate is passed to the oil undergoing cracking. The vapors from the first low-pressure zone are fractionated and the heavier constituents condensed as reflux condensate, which is passed to the oil undergoing cracking. The fractionated vapors are partially condensed and the uncondensed constituents are passed through the unvaporized product in the second low-pressure zone before the latter is withdrawn therefrom. The desired low-boiling oils are recovered.
- Conversion of hydrocarbon oils.** Richard F. Trow (to the Texaco Development Corp.). Can. 336,188, Oct. 3, 1933. A charge of oil, such as an unclean gas oil or a topped crude oil, is brought into contact with hot cracked vapors, by which the more volatile portion of the charge oil is vaporized and the heavier less refractory portion is cracked and partially vaporized, while a portion of the vapors is condensed and deposited along with a remaining unvaporized portion of the charge oils. The combined vapor is scrubbed in the distn. zone and is then dephlegmated to produce a final motor-fuel vapor and a clean gas-oil condensate, which is heated to a temp. well above the usual cracking temp. for such a stock. The residual cooler portion from the distn. zone is combined with the heated products from the heater and the mixt. digested in enlarged zones. The resultant hot vapors are delivered to the distn. zone to distil the charge oil and a residuum, being deposited in the digestion zone, is autogenously distd. to produce an ultimate residue and a vaporous portion which is preferably condensed and delivered to the device for dephlegmating cracked vapor. A motor fuel of high antiknock qualities is recovered.
- Distillation of hydrocarbon oils.** Max G. Paulus (to The Standard Oil Co.). Can. 338,052, Dec. 19, 1933. Hydrocarbon oils are subjected to superatm. pressure and cracking temp. Vapors and unvaporized heavy residual portions comprising pressure tar are separately withdrawn. The hot tarry residues are passed to a chamber at lower pressure, whereby the volatile constituents are flashed into vapors, producing reduced-pressure tar. The vapors and tar are separately withdrawn from the chamber. The tar is agitated, while in the chamber at reduced pressure, to prevent deposition of coke.
- Removing hydrogen sulfide from hydrocarbon oils.** Charles J. Smith (to Koppers Co. of Del.). U. S. 1,942,071, Jan. 2. In purifying a hydrocarbon oil from  $H_2S$  by means of an alk. carbonate soln. recirculated through a cycle comprising an absorption stage in which the oil is treated with the soln. and an actification stage in which the fouled soln. is treated for the removal of  $H_2S$ , the actification stage is so conducted that not more than about half its absorbed  $H_2S$  content is removed. App. is described.
- Refining benzenoid hydrocarbon oils.** Alfons Kemper (to Koppers Co. of Del.). U. S. 1,942,002, Jan. 2. A flow of oil such as benzene is continuously commingled with a flow of 60-65° Bé.  $H_2SO_4$  and this mixt. are agitated and then mixed with water in greater quantity than that of the acid, the dild. mixt. is further agitated, and the flow of mixed oil and acid soln. is then sepd. into different streams of oil and dil. acid soln. App. is described.
- Refining hydrocarbons.** John D. Fields. Can. 337,756, Dec. 12, 1933. A mixt. of petroleum 80, vegetable matter 10 and iron ore 10 parts is heated to 400°F. at normal pressure to drive off distillates. The remaining mixt. is heated to 580°F. under a pressure of approx. 100 lb., and then to 650°F., which temp. is maintained to convert the high-boiling fractions to low-boiling fractions and to drive off the volatile matter until a dry residue is left. The vaporous distillates are condensed and resinous compds. are extd. from the condensates. When a residuum of ferric coke of hard character is desired the iron ore is added, but when a soft dry coke is desired the iron ore is omitted. Suitable vegetable matter is sawdust, kelp, beet pulp, sugar cane and the like.
- Refining liquid hydrocarbons.** Edeleanu G. m. b. H. Ger. 587,900, Nov. 10, 1933 (Cl. 23b. 1.05). App. for refining liquid hydrocarbons by treatment with liquid  $SO_2$  is described. Cf. C. A. 27, 2027.
- Refining oils.** Sigbert Seelig. Ger. 587,984, Nov. 11, 1933 (Cl. 23b. 1.05). Distn. or "cracked" products of mineral, shale or lignite tar oils are refined by treatment with alkali plumbite soln. to which  $Fe_2O_3$ ,  $Fe(OH)_2$ , basic Fe oxide or an Fe salt has been added.
- Refined distillate.** Edward B. Peck (to The International Hydrogenation Patents Co., Ltd.). Can. 338,347, Jan. 2, 1934. Heavier hydrocarbon oil is cracked at above 800° F. An oil boiling above 400° F. and having an aniline point below 100° F. is segregated and passed with H under pressure in excess of 20 atm. through a catalytic reaction zone above 900° F. The product is withdrawn and cooled; it comprises low-boiling hydrocarbon suitable for high-grade motor fuel.
- Treating oil pressure distillates.** Lyle Caldwell and Raymond T. Howes (to Calif. First National Bank of Long Beach). U. S. 1,941,970, Jan. 2. A pressure distillate which has been treated with an inorg. acid such as  $H_2SO_4$  is neutralized and then vaporized with steam; the mixed vapors are passed in contact with material contg. MgO to react and form water-sol. salts; the vapors are condensed, and the condensate is treated with Na plumbite. App. is described.
- Working up crude oils.** Edeleanu G. m. b. H. Ger. 587,774, Nov. 7, 1933 (Cl. 23b. 1.05). Crude oil is heated to 400° to distil off the light oil. The residue is then refined by treatment with liquid  $SO_2$  and further fractionated.
- Viscous oils.** N. V. de Bataafsche Petroleum Maatschappij. Brit. 399,646, Oct. 12, 1933. See Fr. 742,935 (C. A. 27, 3812).
- Hydrogenating and distilling oil shale.** Ralph H. McKee. U. S. 1,941,809, Jan. 2. Oil shale ground to a fineness of at least 20-mesh is preheated to about 300°, then suspended in a rapidly moving stream of steam of about equal wt. and the mixt. is passed through a highly heated metallic tube under a pressure of at least 1000 lb. pressure per sq. in. but not more than 2500 lb. per sq. in. A temp. of about 900° is maintained in the first half of the tube and temps. of 250-450° are maintained through the second half of the tube and the movement of the mixt. through the tube is controlled so that the oil shale is only subjected to the heat for a relatively short time such as a few sec. to produce vapors without deleterious effects upon them. The vapors are withdrawn and products are condensed from them. App. is described.
- Separating wax and oil.** Seymour W. Ferris (to Atlantic Refining Co.). U. S. 1,941,601, Jan. 2. An oil-wax mixt. is extd. with  $PhNO_2$ , and the wax is then sepd. from the oil which remains in the undissolved portion of the mixt. after the extrn.
- Dewaxing mineral oils.** Roy N. Giles (to Standard Oil Co. of Ind.). U. S. 1,943,236, Jan. 9. A wax-bearing oil is heated with liquefied butane or the like to effect complete soln. of the wax and oil; the soln. is then refrigerated to cause crystn. of the wax and the latter is sepd. Numerous details of procedure and app. are described. Cf. C. A. 27, 5960.
- Cracked motor fuel.** Alphonso O. Jaeger (to Selden Co.). U. S. 1,941,689, Jan. 2. Succinimide (suitably in a proportion of about 2-6 lb. per 100 bbl.) is used as a gum-formation inhibitor in cracked hydrocarbon distillates contg. unsatd. compds. in high proportion. Phthalimide, ethyl- or phenyl-phthalimide, naphthalimide, etc., also may be used. Cf. C. A. 27, 3805.
- Concentration of sludge acid.** Laurence V. Phillips (to The Texaco Development Corp.). Can. 336,652, Oct. 24, 1933. The sludge produced by treatment of hydrocarbon oils with  $H_2SO_4$  is extd. with water to produce an acid of 25-30° Bé. contg. 1.0-1.5% carbonaceous ma-



terial. This acid is heated for 6-15 hrs. to a temp. at which substantial pptn. of the carbonaceous materials occurs but at a temp. insufficient to effect substantial vaporization or cause material reduction of the acid to  $\text{SO}_2$  by the carbonaceous material. Air is then passed upward through the acid to conc. the pptd. carbonaceous material on the surface. The ppt. is sepd. and the purified weak acid is concd. to at least 60°Bé.

**Retarding gum formation in gasoline, etc.** Eugene Ayres (to Gulf Refining Co.). Brit. 399,733, Oct. 12, 1933. Divided on and addn. to Brit. 394,511 (C. A. 28, 1814). The products of 394,511 are added to motor fuel, e. g., 0.0005-0.01% *peri*-monoöxynaphthalene to cracked gasoline.

**Lubricating oil.** Harry T. Bennett and Le Roy G. Story (to Mid-Continent Petroleum Corp.). U. S. 1,942,636, Jan. 9. A low-pour-point lubricant for engines comprises a lubricating oil having a viscosity of 100 to 1000 sec. at 38°, together with 5-15% of a low-boiling hydrocarbon oil and not more than 10% of Al stearate. Cf. C. A. 27, 2800.

**Grease.** Gus Kaufman (to The Texaco Development Corp.). Can. 336,653, Oct. 24, 1933. Hydrocarbon or mineral lubricating oil and fatty oil ingredients are mixed in suitable proportions and heated with stirring to 400 (600°)F. The digested mixt. is saponified by the addn. of NaOH, lime or the like, either with or without prior cooling.

**Grease.** Gus Kaufman (to The Texaco Development Corp.). Can. 336,655, Oct. 24, 1933. A mixt. of mineral

and fatty oil is digested for a predetd. time at 400-700°F. to increase the viscosity and hardness. Alk. materials such as NaOH or CaO are added to the digested mixt. to react with its saponifiable constituents. Volatile fractions which may include glycerol, fatty acids and hydrocarbon fractions evolved in vapor form are subjected to controlled dephlegmation for the removal of the valuable constituents to form a reflux condensate which may be returned to the mixt. undergoing treatment.

**Asphalt from blown petroleum residues.** Claude P. McNeil (to Standard Oil Co. of Ind.). U. S. 1,942,656, Jan. 9. Air is continuously mixed with the residue from petroleum distn. and the mixt. is passed continuously through a reaction zone in which heat is liberated by the exothermic reaction of the air with the hot residue. At least part of the liberated heat is absorbed by heat exchange with petroleum passing to the reaction zone. App. is described. Cf. C. A. 27, 1163.

**Apparatus for emulsifying bituminous materials, etc.** Kenneth E. McConaughay (to Pre Cote Corp.). U. S. 1,941,808, Jan. 2. Structural and mech. features.

**Products such as methanol, etc., from vegetable materials by digestion and dry distillation.** Erik L. Rinnan. U. S. 1,941,760, Jan. 2. Raw vegetable material such as wood chips or straw is digested in an aq.  $\text{Ba}(\text{OH})_2$  soln. at an elevated temp. under pressure to effect decomposition and formation of compds. with the  $\text{Ba}(\text{OH})_2$ ;  $\text{BaO}$  is added to the resulting soln. to effect reaction with the water of the soln. and generation of heat, thus driving off water from the soln., and the residue is subjected to dry distn.

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**The iodine number of cellulose.** Brissaud. *Mém. poudres* 25, 222-43 (1932-33); cf. Bergmann and Machermer, C. A. 24, 2877.—By treatment of cotton linters and wood pulp with I in alk. soln., acidulation and titration with hyposulfite, it was found that the I no. varies according to whether the I or caustic is added first, that there is no relation between I no., Cu no. and percentage of  $\alpha$ -cellulose and that bleaching in acid soln. increases the Cu no. with slight increase of the I no., while in alk. soln. the Cu no. is slightly increased and the I no. considerably decreased.

**The copper number of cellulose.** Brissaud. *Mém. poudres* 25, 244-86 (1932-33).—Modifying the usual method by using Erlenmeyer flasks almost completely full, in order to avoid oxidation, filtering on a porous plate, passing the filtrate through a filter paper and washing until 0.2 cc. permanganate was not reduced in 2 min. showed that 3-hr. tests were satisfactory and that longer tests resulted in the deposition of silica upon the fibers. The alk. Cu soln. dissolves slightly polymerized products present and reduces them to glucose, which in turn may be decompd. with loss of reducing power, and reduces cupric to cuprous salts. The Cu no., the resultant of these reactions, measures the reducing groups present, not preexistent but formed during the course of the reaction, as well as their speed of soln., this being proportional to the degree of polymerization and amt. of surface exposed. For similar celluloses the results are proportional to the  $\alpha$ -cellulose present and the results are superior in consistency and reproducibility to the I and Ag nos. Results are not comparable for materials which differ in sp. surface and degree of polymerization such as cotton linters, regenerated cellulose and wood cellulose.

**The reaction of cellulose in acetylation with zinc chloride as catalyst.** C. Trogus and K. Hess. *Angew. Chem.* 47, 30-32 (1934).—The acetylation of the fibers in presence of  $\text{ZnCl}_2$  is a micellar heterogeneous process which results in triacetylcellulose only, as shown by x-ray examus. The authors conclude that the direct formation of weaker acetylated cellulose acetates will only succeed with a fundamental change in the exptl. conditions, such that the

diffusion velocity of the reagent into the crystallite interior is increased greatly, and that the esterification velocity is simultaneously decreased to such an extent that the difference in the reaction const. of the hydroxyl groups becomes effective. Such attempts are in progress. Twelve references.

**Dielectric loss of acetylcellulose and influence of solvents.** D. A. Fedorov and V. N. Malishev. *J. Tech. Phys.* (U. S. S. R.) 3, 749-55 (1933).—The dielec. loss of fully dried acetylcellulose film is independent of, or very slightly dependent upon, field intensity. Addn. of 15% plasticizer causes no variation. Loss of moistened film is considerably greater, being directly detd. by the moisture content. Clean moistened films show higher loss with no apparent parallelism to moisture content. The loss is independent of, or very slightly dependent upon, temp. up to 90° or 100°. For higher temps. the loss increases with various degrees depending upon field strength, and at 120° with high field strength is detd. on the one hand by plasticizing of film, and on the other hand by impurities present, solvents and plasticizers. E. H.

**Swelling capacity and solubility of benzylcellulose in organic liquids.** Ichiro Sakurada and Ichiro Kido. *J. Soc. Chem. Ind. Japan* 36, Suppl. binding 656-9 (1933).—In testing the reaction of 36 liquids upon dibenzylcellulose it was found that the dipole moment, mol. vol. and degree of assocn. of the liquids exert a decided influence. Nonpolar liquids cannot dissolve benzylcellulose completely but are usually good swelling agents. Aliphatic hydrocarbons are poor swelling agents, benzene dissolves the cellulose mostly and tetralin completely. Halogenated hydrocarbons and benzene derivs. usually are good solvents. All aliphatic satd. alcs. are swelling agents only. AcOH is only a partial solvent but  $\text{EtCO}_2\text{H}$  dissolves the cellulose completely. Lactic acid is a poor swelling agent. Esters are nonsolvents except for  $\text{HCO}_2\text{Et}$ ,  $\text{AcOMe}$  and  $\text{AcOEt}$ . Ketones are similar to acids and esters in their action.

**Hygiene in the manufacture of rayon.** Gabriel Bertrand. *Bull. acad. méd.* 109, 221-3 (1933). A. E. M. Composition of some Philippine soft woods. V. Augustus P. West, F. M. Yeuko, Luz Baena and H. M.

Curran. *Philippine J. Sci.* 52, 209-16(1933); cf. C. A. 27, 1733.—Analyses of the following woods were made: anablong (*Trema orientalis*); fire tree (*Delonix regia*); palong-manok (*Alangium chinense*); balsa (*Ochroma lagopus*); ilang-ilang (*Canarium odoratum*); alim (*Melanolepis multiglandulosa*); baguimbang (*Aleurites trisperma*); lumbang (*Aleurites moluccana*), which has the lowest lignin and the highest cellulose and  $\alpha$ -cellulose content; malapapaya (*Polyscias nodosa*); rain tree (*Samanea saman*), which has the lowest ash; basikong (*Ficus conora*), which is highest in lignin; tibig (*Ficus nota*), which has the lowest cellulose and highest ash content; binunga (*Macaranga tanarius*) and gubas (*Endospermum peltatum*). The methods used were those of the U. S. Forest Products Lab. Louis E. Wise

Present status of determining the strength of chemical wood pulps. Société Spiro. *Chimie & industrie Special No.*, 1101-6(June, 1933).—A description of the present standard Swedish, American and German methods for the prepn. of test sheets for the strength-testing of chem. wood pulp. A. Papineau-Couture

Chemical properties of screen fractions of black gum and slash pine groundwood pulps. E. R. Schafer and Matti Santaholma. *Paper Trade J.* 97, No. 10, 46-7 (1933).—The lignin content and the soly. in 1% NaOH varied from fraction to fraction, being higher in the finer fractions than in the coarser. Neither the chem. constituents of the various fractions nor of the whole pulp appear to have any bearing on the paper-making properties of the pulp. A. Papineau-Couture

Effect of different-sized fibers on the physical properties of groundwood pulp. E. R. Schafer and Matti Santaholma. *Paper Trade J.* 97, No. 19, 40-5(1933).—A study of the strength and suspension properties of groundwoods in relation to the dimensions of the fibers, carried out by recombining the screen fractions in various proportions, showed that the av. fiber length is related in a general way to nearly all the usual strength and suspension properties, thus permitting of the employment of screen analysis as an aid in evaluating pulp quality. A. Papineau-Couture

The cooking of wood pulp (with water). Arne Knudsen. *Papir J.* 21, 229-31(1933).—Forty-g. portions of wood pulp suspended in 2.5 l. of  $H_2O$  were autoclaved 15, 30, 45 and 60 min. at pressures from 1 to 6 atm. The temp. of cooking had a marked effect on the phys. properties; little further change occurred after cooking 15 min. Schopper-Riegler wetness decreased about 15% upon cooking at 100° and remained const. until 143° (4 atm.) was reached, above which it fell off rapidly. Absorption measured in mm. capillary rise in 5 min. increased steadily with temp. Breaking length dropped 12.8% upon cooking at 100° and remained const. until 143° was attained, above which it increased rapidly. Yield decreased from 98% at 100° to 92.6% at 155° (6 atm.). Titration with  $KMnO_4$  indicated that the hydrolysis of polysaccharides by water increases with temp. and time. Clinton L. Brooke

The cooking process. VI. Cooking wood with sodium sulfide. S. I. Aronovsky and R. A. Gortner. *Ind. Eng. Chem.* 26, 61-5(1934).— $Na_2S$  is a strong pulping agent which inhibits the destructive action of  $H_2O$  on the  $\alpha$ -cellulose at high temps. VII. Cooking wood with sodium hydroxide and trisodium phosphate. *Ibid.* 220-6.—NaOH hinders the hydrolytic action of  $H_2O$  on  $\alpha$ -cellulose and is a strong pulping agent.  $Na_3PO_4$  yields results similar to those obtained with  $Na_2CO_3$ . P. S. B.

Chemistry of alkaline wood-pulp process. IV. Is there a critical pulping temperature for the sulfate process? J. Stanley Martin, M. W. Bray and C. E. Curran. *Paper Trade J.* 97, No. 20, 38-42(1933); cf. C. A. 25, 5763.—Twenty-two sulfate digestions were made in which all conditions were kept const. excepting temp. (varied from 160° to 180°) and time. An increase in cooking time for any of the temps. employed resulted in a decrease in yield and strength values, with the exception of the resistance to tear for the pulps made at 160°. Pulps cooked for the same length of time at various temps.

showed the higher yields for the lower temps. In the semi-com. digestions increasing the cooking time at 180° and at 170° caused a small decrease in yield and in strength properties; at 160° there was a small (unexplained) increase in pulp yield with increase in cooking time. Increasing cooking time resulted in easier bleaching for pulps in the 160° series; but little change was observed in the bleach requirements for the 170° and 180° digestions. Pulps cooked at 180° showed higher tear and folding resistance and seemed to hydrate easier than those made at the lower temps. The magnitude of the variations observed was small in all instances. Conclusion.—Within the range of 160-180° there is no particular optimum or crit. temp. which is noticeably beneficial or detrimental to the resulting pulps. A. Papineau-Couture

Hydration and beating of cellulose pulps. W. Boyd Campbell. *Ind. Eng. Chem.* 26, 218-19(1934).—Although the effect of beating termed "hydration" is not the result of a solid soln. of water in the cellulose or of the formation of a cryst. hydrate, hydration in the sense of adsorbed water mols. exists but its degree is unchanged by beating. Water causes a soln. of intercrystallite attractions and beating aids this swelling action to increase the external surface, with resulting fibrillation, the essential action of beating. After fibrillation there results the "internal tension effect" of the water, which, during its removal in paper making, forces the cellulose surfaces in sufficient proximity for the crystg. forces to form bonds between them which hold after the water is evapd. F. A. Simmonds

Methods of hydrating pulp for strength testing. Howard W. Morgan. *Paper Trade J.* 97, No. 24, 35-8(1933).—A review of the present status of the use of the expl. beater and porcelain pebble mill for prepg. pulp samples for sheet making and subsequent testing, giving particular attention to a consideration of the variables inherent to the pebble mill method and an outline of the work to be done to establish this method as a tentative pulping testing standard of the Tech. Assoc. of the Pulp & Paper Ind. A. Papineau-Couture

Observations relative to the physical and chemical changes taking place in the cooking of new white rags. Edwin R. Laughlin. *Paper Trade J.* 97, No. 17, 39-52 (1933).—A pressure in excess of 150 lb. is not feasible in com. rag cooking because of the excessive phys. and chem. degradation. Pressures of 100-150 lb. are not excessively degrading when the cook is of short duration (up to 3 hrs.) and at a concn. of up to 3.5% NaOH or 10% lime on the wt. of the rags. The effect of time of treatment on the stability of the cellulose as measured by the viscosity and tearing resistance is small compared to that of pressure and chem. concn. Cooking losses are small for concns. up to 3% NaOH or pressures up to 100 lb., but increase rapidly above these values. The presence of  $MgO$  is favorable to increased phys. strength and viscosity and to lower cooking losses; the cooking residues resulting from lime- $Na_2CO_3$  cooks are not rendered more difficultly removable in the washing operation by the presence of  $MgO$  in the cooking liquor. The presence of  $HCO_2H$ ,  $AcOH$  and small amts. of lactic acid in the waste liquors from rag cooks indicates that the cellulosic degradation process is a mild form of that undergone by cellulose in high concns. of alkali at high pressures and by sugar materials in the presence of strong alkali. At low concns. of alkali and low pressures, non- $\alpha$ -cellulose material is attacked to yield sol. Cr-reducing products faster than  $\alpha$ -cellulose is degraded to non- $\alpha$ -cellulose material insol. in the cooking liquor; at high pressures and high alkali concns., the reverse is true. A. Papineau-Couture

Analysis of alkaline black liquors of varying sulfidity by ammonia distillation method. M. A. Heath, M. W. Bray and C. E. Curran. *Paper Trade J.* 97, No. 20, 33-7 (1933); cf. C. A. 27, 2806.—The previously described method was modified by: (1) elimination of oxidation with  $H_2O_2$ ; (2) use of standard acid and standard I in the first receiver; (3) absorbing the  $CO_2$  in an ascarite bulb instead of in standard alkali; (4) correction for the presence of org. salts by detg. the corresponding amt. of

non-volatile acids remaining in the distg. flask, with methyl red indicator. A comparison was made of the modified method with the standard method used at the U. S. Forest Products Lab., on 2 series of bomb-scale digestions with Douglas fir, in which the  $\text{Na}_2\text{S}:\text{NaOH}$  ratio was varied from 0 to 100%. Results by the standard method for free alkali are low and show regularity; those for  $\text{Na}_2\text{S}$  are high and irregular. The black liquors change in compn. on standing, the NaOH content generally increasing at the expense of the  $\text{Na}_2\text{S}$ . The total consumption of chemicals in sulfate digestions is only slightly affected by the proportion of  $\text{Na}_2\text{S}$  to NaOH when the free alkali is maintained const. This holds throughout in the 30% free alkali series, and up to 60%  $\text{Na}_2\text{S}$  in the 20% free alkali series; with 80–100%  $\text{Na}_2\text{S}$  at 20% free alkali, based on the wt. of wood, the consumption of chemicals is definitely higher, even though the pulping action is less. Digestions by the soda process at alkalinities of 20 and 30% consume less chemical than do the sulfate digestions at the same alkalinities. A. P.-C.

**Murray-Waern system of sulfate and soda waste heat recovery.** C. L. Durkee. *Paper Trade J.* 97, No. 24, 20, 22(1933).—Descriptive. A. Papineau-Couture

**United States patents on paper making. Third quarter, 1933.** Clarence J. West. *Paper Trade J.* 97, No. 22, 35-7(1933); cf. C. A. 27, 4923.—A list in numerical sequence of patents relating to pulp- and paper-making issued at Washington during July, Aug. and Sept., 1933. A. Papineau-Couture

**Ultra-violet rays in the examination of papers.** Gino Testi. *Chim. ind. agr. biol.* 9, 470-1(1933).—Raw kraft cellulose gives brown or red fluorescence; bleached, gray or bluish; raw cotton pulp, grayish; bleached, pink-gray; Manilla pulp (both raw and bleached), reddish gray; raw soda cellulose from conifers, brown; bleached, yellowish gray, raw eucalyptus pulp, deep violet; bleached, gray; raw flax pulp, violet-gray; bleached, clear gray. G. A. Bravo

**The place of pulp color measurements in paper making—present and future.** Lester C. Lewis. *Paper Trade J.* 97, No. 23, 35-9(1933).—Improvements effected during the past few yrs. in methods of measuring reflectance make it possible to substitute this detn. for the more complex and less certain "color" measurement used heretofore. Its field of usefulness in the pulp and paper industry is discussed. A. Papineau-Couture

**Keeping dirt out of paper.** E. K. Becker. *Paper Trade J.* 97, No. 23, 39-41(1933). A. P.-C.

**The most economical way to prepare stock for the paper machine.** M. C. Osborne. *Paper Trade J.* 97, No. 19, 19-20(1933).—A brief discussion. A. P.-C.

**Waterproof papers.** M. Marini. *Papier* 36, 919-27(1933).—An outline of the methods of waterproofing paper and methods of testing waterproofness. A. P.-C.

**Hard-rubber equipment for the paper industry.** C. K. McLeod. *Pulp Paper Can.* 34, 617-19(1933).—Applications in the paper industry, particularly for the handling of corrosive liquids. A. Papineau-Couture

**The electron tube in the paper industry.** Amos J. Gernain. *Paper Trade J.* 97, No. 23, 33-4(1933).—A description of the principal types of electron tubes and their applications in the paper industry. A. P.-C.

**Determination of gelatin in paper.** V. Gruenman. *Papier* 36, 729-37, 821-7(1933).—A review of methods for the detection and detn. of gelatin in paper. A. Papineau-Couture

**The establishment of paper specifications.** C. C. Heritage. *Paper Trade J.* 97, No. 19, 24-6, 29(1933).—An explanation of the essential steps in the establishment and use of paper specifications. A. Papineau-Couture

**New method for determining the moisture content of paper as it leaves the paper-machine driers.** Rene Leonhardt. *Mon. papeterie belge* 13, 675-7(1933).—The "siccometer," constructed by Siemens & Halske, detn. the  $\text{H}_2\text{O}$  content by measuring the dielec. const. of the sheet which passes continuously through a specially designed condenser cell, consisting essentially of a single plate over which the sheet of paper is passed. A. P.-C.

**Comparison of natural aging of paper with accelerated aging by heating.** Royal H. Rasch and B. W. Scribner. *Bur. Standards J. Research* 11, No. 6, 727-32(1933) (Research Paper No. 620).—Addnl. evidence favorable to accelerated aging tests is presented. Thirty-three samples are placed in about the same order of stability by accelerated aging as by normal aging. P. S. B.

**Haug refiner versus attrition and Jordan type refiners.** Anton J. Haug. *Paper Trade J.* 97, No. 22, 33-4(1933).—A brief description of the new Haug refiner, and discussion of its merits. A. Papineau-Couture

**Serviceability and processing effects of oval cast iron and circular steel rods in a rod mill.** C. E. Hrubesky, P. S. Billington and P. K. Baird. *Paper Trade J.* 97, No. 16, 34-8(1933).—Hydration (as measured by the flow rate method) and the rate of development and maxima of bursting, tearing and folding strengths are greater with the circular than with the oval rods at 8% pulp consistence, and the power requirement for processing a given pulp to the desired point would therefore be considerably lower with circular rods. At 4% consistence, the same conclusions can be drawn, except with the tearing strength, where the rate of development and the max. value are lower with the circular rods. A. P.-C.

**Factors governing absorption of dyestuffs by paper fibers.** Frederick A. Soderberg. *Paper Trade J.* 97, No. 21, 39-45(1933).—The av. loss of color in the dyeing of waterleaf paper is 25%; this can be overcome by adding the color to the machine chest by means of a meter and controlling the rate of flow and consistency of the stock. Except for pigment dyestuffs, coloring of sized paper is best carried out at a  $\text{pH}$  of 4.5-5.5; a lower  $\text{pH}$  produces a deadened shade, while above 5.5 the colors are not entirely absorbed. In calender coloring natural sizing in the stock and added sizing necessitate the use of penetration assists; acid colors and some of the more sol. basic dyes are satisfactory for this work; when using basic colors, it is practical to include a small quantity of AcOH to hold the dyestuff in soln. Fillers (clay and talc only were investigated) absorb approx. the same quantity of color as the paper fiber; this may be taken advantage of to prevent granite effects which frequently occur with basic dyes. Fastness to light of certain dyes is improved by using  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , which is best used lb. for lb. following the color and before adding size and alum. The only obvious effect of glue tub-sizing upon dyestuffs is to enhance the apparent color strength due to increased light refraction. In combination with rubber latex, the best results are obtained with direct dyes. When Zn hyposulfite is used for bleaching ground-wood, it should be added to the stock 15-20 min. before addn. of the color. On the whole, addn. of size and alum as mordants is beneficial to the absorption of color; with basic colors it is best to add size first, allowing time thoroughly to mix with the fiber, then color and finally alum. Development of color in the beater to its max. strength varies according to the chem. structure of the dyestuff; as the paper fiber passes a certain point in heating time it develops a translucent appearance which accentuates the color value, and at the same time the shade becomes proportionately duller; the colors are generally fully developed after 90 min. beating. When necessary to use excessive quantities of acid colors, it is advisable to add either  $\text{AlCl}_3$  or  $\text{BaCl}_2$  (preferably the latter) to increase retention. Pptn. of dyestuffs and retardation of fixation by Ca compds. in the water can be prevented by lowering the  $\text{pH}$  before addn. of the dye. Troubles due to Cl residues in the pulp are eliminated by washing the stock thoroughly, carrying it in a trough over as long a distance as possible, and allowing it to circulate in the beater at least 1 hr. before adding color. In order to assist penetration of dyes into paper that is not sized uniformly, alc. and soap chips can be advantageously used with basic colors, and sulfonated oils (of the double-sulfonated type) with acid colors. An app. is described which is suitable for specialty coloring with acid dyes on a board machine (but did not give good results with basic dyes). A. Papineau-Couture

**Colloidal control in starch sizing.** B. W. Rowland. *Paper Trade J.* 97, No. 21, 37-8 (1933).—Cooked starch can be effectively pptd. on pulp fibers in the beater by adding successively cooked starch and alum and then slowly neutralizing with an alkali such as  $\text{NH}_4\text{OH}$ . Similar results can be obtained by reversing the order of addn. of alkali and alum. It does no harm to pass the neutral point into low alk., and likewise it does not reverse the action to pass from neutral or alk. back to acid again. Severe mech. agitation after pptn. of the starch must be avoided. The amt. of alum required for this process is much greater than that employed for setting the rosin, and the quantity of alkali is much greater than usually carried by rosin size. For best results the ratio of alum to starch should be held within certain limits because the pptg. action brings down an adsorption complex of  $\text{Al}_2\text{O}_3$  and starch, and  $\text{Al}_2\text{O}_3$  beyond the pptn. requirements will lower the adhesive strength of the mass. The bursting strength is considerably higher than is obtained by the use of the same amt. of starch in the usual way.

**Reproductions of photomicrographs of paper cross-sections.** Walter E. Rogers. *Paper Ind.* 15, 450-1 (1933).—A series of 11 photomicrographs of various grades of paper.

**Relation of paper properties to printing quality.** C. G. Weber. *Paper Ind.* 15, 452-3 (1933).—A description of the work carried out at the U. S. Bur. of Standards.

**Defects of printing papers.** Harel Vnuk. *Chimie & industrie Special No.*, 1094-1100 (June, 1933).—A discussion of the principal defects of paper as they affect its utilization in the graphic arts, their causes, detection and prevention.

**Ammoniation of waste sulfite liquor** (Phillips, *et al.*) 15. Aq. dispersions of asbestos and rubber [for making asbestos paper] (Brit. pat. 399,870) 18. Treating [paper] (Ger. pat. 587,974) 25.

**Hard, Arnold H.:** The Romance of Rayon. Manchester: Whittaker & Robinson, Ltd. 76 pp. 5s. Reviewed in *Silk & Rayon* 8, 38 (1934).

**Kausch, Oskar:** Handbuch der Azetylzellulosen. Munich: J. F. Lehmann. 274 pp. M. 20. Reviewed in *Silk & Rayon* 7, 562 (1933).

**Directory of the Paper, Pulp and Paper Materials Industry of Germany and Neighboring Countries** (in German). 24th ed. Württemberg: Güntter-Staib Pub. Co. 748 pp. M. 10. (\$2.75). Reviewed in *Pulp & Paper Can.* 34, 604 (1933).

**Risemann, Karl:** Grundlagen, Aufbau und Organisation der deutschen Zellstoffindustrie. Thesis. Heidelberg. 1930. 90 pp.

**Wahlig, Wilhelm:** Beiträge zur Kenntnis der Acetylierung von Cellulose. Thesis. Darmstadt. 1930. 50 pp.

**Scheidegger, Jakob:** Studien über der Acetylierungsverlauf von nativer und mercerisierter Baumwolle. Thesis, Zurich. 1931. 63 pp.

**Treating cellulose.** British Celanese Ltd., John E. Jones and Stanley C. Bate. Brit. 399,508, Oct. 5, 1933. Cellulosic materials are treated with at least 40% of  $\text{SO}_2$  at ordinary temp. for a substantial period of time, *e. g.*, 1 hr., or at increased temps. Inert diluents, *e. g.*,  $\text{C}_6\text{H}_6$ , PhMe, or constituents of a subsequent esterification mixt. may be present, *e. g.*,  $\text{Ac}_2\text{O}$ , or a catalyst, *e. g.*,  $\text{H}_2\text{SO}_4$ . Among examples wood pulp, treated by the process of Brit. 249,173 (*C. A.* 21, 1010), is heated 1-2 hrs. at 50-60° with glacial AcOH and  $\text{SO}_2$  (50% of the wt. of the cellulose). After cooling, AcOH,  $\text{Ac}_2\text{O}$  and Cl are introduced to effect acetylation.

**Cellulose solutions.** Emil Scheller (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,942,346, Jan. 2. For prep. of a soln. of relatively high viscosity, cellulose material such as cotton is treated (as by boiling with water *in vacuo*) to remove substantially all the

uncombined O present in the material, substantially all free O is removed from the interior of the reaction vessel in which the desired soln. is to be prep., a solvent such as  $\text{Cu}_2\text{O}$  and  $\text{NH}_3$  is added to the cellulose, and residual free O is further removed from the cellulose and solvent mixt. so that the entire operation is conducted in substantially complete absence of free O. Pyrogallol and  $\text{Cu}_2\text{Cl}_2$  may be used in O removal. Cf. *C. A.* 27, 412.

**Cellulose solutions.** Charles Gracnacher (to Soc. pour l'ind. chim. à Bâle). U. S. 1,943,176, Jan. 9. Solns. suitable for manuf. of threads, films, etc., are produced by dissolving cellulose in a liquefied quaternary  $\text{NH}_4$  salt obtained by addn. of a hydrohalide ester of an alc. contg. not more than 8 C atoms such as benzyl chloride to a tertiary amine of the pyridine series such as pyridine itself. Numerous examples with details are given. Cf. *C. A.* 27, 5535.

**Molding cellulose derivatives.** Arthur Eichengrün (to Celanese Corp. of America). U. S. 1,942,000, Jan. 2. A cellulose deriv. such as cellulose acetate is subjected to swelling in an excess of swelling agent such as methylene chloride, the excess of swelling agent not absorbed is removed, a plasticizer such as triacetin and alc. is added and the material is molded under heat and pressure.

**Cellulose esters.** Henry Dreyfus. Brit. 399,509, Oct. 5, 1933; Fr. 752,725, Sept. 29, 1933. Cellulose is esterified in the presence of a hydrohalide acid and a hydrohalide of a N-contg. base, particularly with HCl and  $\text{NH}_4\text{Cl}$  or the hydrochloride of an org. base. Org. bases used may be  $\text{MeNH}_2$ ,  $\text{EtNH}_2$ ,  $\text{PrNH}_2$ , ethanalamine or the corresponding dialkylamines,  $\text{PhNH}_2$ , benzylamine, cyclohexylamine or, less advantageously, tertiary bases, *e. g.*,  $\text{Me}_3\text{N}$  or pyridine.

**Cellulose esters.** Kodak A.-G. Ger. 582,068, Aug. 8, 1933 (Cl. 120. 6). Addn. to 577,704 (*C. A.* 28, 894<sup>h</sup>). See Brit. 360,417 (*C. A.* 27, 1167) and 360,058 (*C. A.* 27, 600).

**Purification of cellulose esters.** Jacques Scheidegger (to Camille Dreyfus). Can. 338,069, Dec. 19, 1933. Cellulose acetate is dissolved in a mixt. of benzene and EtOH at elevated temp. and then cooled to below 50° until a substantial portion of the cellulose acetate ppts. or crystallizes. At least some of the impurities or ingredients that lower the clarity, heat test or viscosity characteristics are removed. Suitable solvent mixts. are benzene and EtOH or benzene and MeOH. The mixt. may contain 70-40 parts of benzene and 30-60 parts by vol. of MeOH or 60-35 parts of benzene and 40-65 parts of EtOH, resp. The heat resistance of the cellulose acetate is increased.

**Mixed nitro-aliphatic esters of cellulose.** David R. Wiggam and John S. Tinsley (to Hercules Powder Co.). U. S. 1,943,231, Jan. 9. An ester such as a cellulose nitroacetobutyrate is produced by esterifying cellulose (which may be in the form of cotton, etc.) with a mixt. of an aliphatic acid anhydride such as  $\text{Ac}_2\text{O}$ , an aliphatic acid, such as butyric acid, of different mol. wt. than the acid represented in the anhydride, an inorg. acid catalyst such as  $\text{H}_2\text{SO}_4$  and a nitrate of a weak base such as  $\text{NH}_4\text{NO}_3$ .

**Cellulose ester and ether compositions.** Henry Dreyfus. Brit. 399,191, Sept. 19, 1933. Liquid and solid compns., filaments, films, etc., of improved waterproof properties, comprise (1) cellulose ethers, ether-esters or esters in which the org. ester groups are derived from lower fatty acids and (2) relatively small proportions, *e. g.*, 5-15%, of cellulose derivs. contg. radicals of higher fatty acids as sole substituent groups. In modification films or sheets having a basis of regenerated cellulose or cellulose derivs. of group (1) are coated with compns. comprising cellulose derivs. of group (2). In the production of films from the mixts. a common solvent or mixt. of solvents should be used. High-boiling solvents, plasticizers, resins, fire retardants, fillers, etc., may be added. Among examples (1) a mixt. of cellulose acetate (85-90 parts), cellulose stearate (10-15 parts), tritoyl phosphate and diethyl phthalate is dissolved in a mixt. of  $\text{Me}_2\text{CO}$  and  $\text{C}_6\text{H}_6$  and the soln. cast onto a film wheel, band, etc., and

(2) a cellulose acetate foil is passed through a 5-10% soln. of cellulose stearate in  $\text{Me}_2\text{CO}-\text{C}_6\text{H}_6$ , which may also contain dibutyl phthalate.

**Cellulose ether compositions.** Arlie W. Schorger (to C. F. Burgess Laboratories, Inc.). U. S. 1,941,276, Dec. 26. Solns. or liquid dispersions with caustic alkali are formed of cellulose ethers such as hydroxyalkyl ethers contg. Et or Pr and contg. one alkyl radical to 3 or 4 units of cellulose. These compns. are suitable for use in the manuf. of films or filaments, etc., by pptn. or coagulation. Various examples with details of procedure are given. U. S. 1,941,277 relates to a process in which a reaction product such as that formed from alkali cellulose and ethylene oxide or the like is rendered more sol. in dil. caustic alkali soln. by at least partial freezing of a caustic alkali soln. of 2-10% strength with which the material is mixed. Numerous examples and details are given. U. S. 1,941,278 relates to the production of hydroxyalkyl ethers of carbohydrates such as ethyl- to aryl-cellulose, etc., e. g., cellulose hydroxypropyl ethers contg. one Pr radical to 3 or 4 cellulose units or corresponding starch derivs., by reaction of propylene oxide or the like on an alkali carbohydrate. Various examples are given, with details of procedure, including the production of a hydroxyethyl cellulose ether benzoate. The products may be used for the manuf. of films, filaments, etc.

**Use of an acetylated tribromoaniline as a fire resister with cellulose acetate or other esters or ethers.** Arthur J. Daly (to Celanese Corp. of America). U. S. 1,941,664, Jan. 2.

**Use of dibutyl malate as a plasticizer for cellulose acetate and similar esters.** Henry B. Smith (to Eastman Kodak Co.). U. S. 1,942,843, Jan. 9.

**Use of dialkyl esters such as the diethyl and dipropyl esters of  $\alpha,\alpha'$ -dibromosuccinic acid as plasticizers for cellulose acetate and the like.** Henry B. Smith (to Eastman Kodak Co.). U. S. 1,942,844, Jan. 9.

**Use of a dihydroxybenzophenone as a plasticizer with cellulose acetate compositions for films, lacquers, etc., or other purposes.** Wm. H. Moss (to Celanese Corp. of America). U. S. 1,941,710, Jan. 2.

**Plastic materials.** Hans T. Clarke and Carl J. Malm (to Kodak Ltd.). Brit. 399,814, Oct. 11, 1933. An aryl phosphate, e. g., triphenyl, tritolyl, monotolyl diphenyl or trinaphthyl phosphate, is used as a plasticizer for higher cellulose esters, e. g., stearate, laurate, oleate, palmitate or for cellulose phenylacetate or crotonate. The material may include also other cellulose esters, cellulose ethers, fats, waxes, oils, gums, resins, etc. A soln. for making films contains cellulose stearate 100,  $\text{C}_6\text{H}_5\text{I}_3$  300-500 and triphenyl phosphate (I) 10-50 parts. A soln. for coating or for making filaments contains cellulose oleate 100,  $\text{Me}_2\text{CO}$  300-500 and I 10-50 parts. The compn. may be used in lacquers or varnishes or in a molding powder.

**Films or sheets.** Henry Dreyfus. Fr. 754,108, Nov. 2, 1933. Thin films or sheets made from cellulose derivs. have their mech. resistance increased by a longitudinal and transversal drawing while still in the soft or plastic state.

**Impregnated cellulosic products.** Leo Kollek and Wilhelm Engels (to I. G. Farbenind. A.-G.). U. S. 1,942,146, Jan. 2. A smoothly finished article is formed of a cellulosic material such as wood or paper impregnated with a viscid polymerization product of an alkylene oxide such as ethylene oxide.

**Apparatus for forming films, tubes or the like from viscose solutions by extrusion into a precipitating bath.** Julius Voss (to Visking Corp.). U. S. 1,942,990, Jan. 9. Structural and operative details.

**Nozzle for rayon production by the stretch-spinning process.** Waldemar zur Löwen (to American Bemberg Corp.). U. S. 1,942,632, Jan. 9.

**Device for regulating the feed of spinning-liquid to the spinning-nozzles of rayon spinning-machines.** Fred Nimelt. Brit. 399,920, Oct. 18, 1933.

**Rayon.** British Celanese Ltd., Robert P. Roberts

and Edgar B. Johnson. Brit. 399,795, Oct. 4, 1933. Solns. of cellulose acetate, etc., are extruded into a current of evaporative medium and, in the vicinity of the spinning orifices, there is introduced a current of addnl. evaporative medium from the external atm., the latter current being induced by heat. App. is described. Cf. C. A. 27, 4080.

**Rayon.** Henry Dreyfus. Fr. 752,726, Sept. 29, 1933. Rayon is made by dry-spinning solns. of cellulose derivs. of high viscosity, the fluidity of the material being increased or maintained during the 1st stages of the spinning. The fluidity may be maintained by limiting the amt. of evapg. agent or reducing its temp. in the neighborhood of the spinning nozzles. Improved results are obtained by incorporating in the spinning soln. a solvent of lower volatility than that of the principal solvent, or by using solvents of lower volatility than usual. A higher temp. of the soln. previous to spinning may be used. Thus, a 23% soln. of cellulose acetate in equal parts of acetone and dioxane is spun at 65-70°, the temp. of the evapg. agent being 60-5° at the spinning nozzles. Other examples are given.

**Delustered rayon.** James W. Humphrey and John W. Pedlow (to The Viscose Co.). Can. 337,194, Nov. 14, 1933. Viscose is prepd. in the normal way and into the soln. to be spun is incorporated, in amts. as percentage of the finished yarn from 0.2 to 10% of chlorinated biphenyl and from 0.5 to 15% of oil. A delustered yarn is produced.

**Delustered rayon.** Frank H. Griffin (to The Viscose Co.). Can. 337,195, Nov. 14, 1933. To a soln. to be spun are added 0.1 to 5.0%  $\text{TiO}_2$  and 0.5 to 15% chlorinated biphenyl. A delustered yarn is produced.

**Thread of cellulosic material.** Wm. Whitehead and Camille Dreyfus (to Camille Dreyfus). Can. 337,033, Nov. 7, 1933. Thread or yarn of improved appearance and textile properties is formed by adding a finely divided titanic acid and an oil to a soln. of cellulose acetate and then spinning the soln. Preferably  $\text{Ti}_2\text{O}_3$  is used and the amt. of titanic acid added is 0.1-10% of the wt. of the cellulose compd. present in the finished yarn. The oils used include diethylene glycol, heavy white mineral oil, olive oil and castor oil.

**Artificial threads, etc.** Henry Dreyfus. Brit. 399,171, Sept. 29, 1933. Filaments, threads, yarns, etc., are obtained from compns. contg. 2 or more filament-forming substances of substantially the same chem. nature but of widely differing viscosity characteristics. Said substances must have the same groups within their mols.; they may be mixts. of 2 cellulose acetates, formates, propionates, butyrates, nitrates, nitroacetates or xanthates or 2 Me, Et or benzyl celluloses or 2 modifications of cellulose dissolved in cuprammonium soln. or 2 polymerized vinyl acetates or other polyvinyl esters or ethers or 2 condensation products of the same chem. nature.

**Artificial filaments.** British Celanese Ltd. and Wm. I. Taylor. Brit. 399,822, Oct. 12, 1933. In dry-spinning artificial filaments the means of supply, e. g., pipe, for the spinning soln. passes through a zone of evaporative atm. that is hotter than that into which the filaments are extruded and the cool current into which the filaments are initially extruded is substantially prevented from entering the vicinity of the supply means. App. is described.

**Artificial straws, etc.** British Celanese Ltd. and Wm. I. Taylor. Brit. 399,811, Oct. 9, 1933. Filaments of flattened cross-section are produced by associating a plurality of individual artificial filaments, e. g., of cellulose acetate, etc., or of condensation products of cellulose and glycols or other polyhydric alcs., in the form of a flattened thread and applying a (restricted) solvent or softening agent thereto by means of a surface adapted to maintain the filaments in the desired form so as to cause them to coalesce, pressure being unnecessary. App. is described.

**Extrusion apparatus for the production of artificial filaments by the evaporative method.** Henry Dreyfus, Edward Kinsella, Joshua Bower and Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,942,540, Jan. 9. Various structural and operative details are described.

**Apparatus for preparing or spinning yarns or threads from artificial fibers such as those made from cellulose acetate.** Wm. A. Dickie and Frank C. Hale (to Celanese Corp. of America). U. S. 1,941,880, Jan. 2. Various details are described of an app. having a guide member and calender rolls with surfaces of cellulose acetate.

**Cellulose digester and liquor-circulating system.** Fritz Krüger (to Zellstoffabrik Waldhof). U. S. 1,943,221, Jan. 9. Structural and operative details.

**Sulfite pulp digester with a liquor-pumping system.** Andreas Christensen (to Fibre Making Processes, Inc.). U. S. 1,942,685, Jan. 9. Structural and operative details.

**Sulfite pulp.** Otto Kreissler (to American Lurgi Corp.). U. S. 1,942,760, Jan. 9. Before cooking begins, the digester used is charged with an amt. of liquor which is smaller than the usual amt. by the amt. that would otherwise have to be removed by relieving and blowing-off, without reducing the amt. of wood charged into the digester, and the wood above the level of the liquor is irrigated with cooking liquor (by a described circulating app.) and cooking is otherwise effected in usual manner.

**Paper pulp.** Clinton K. Textor (to The Northwest Paper Co.). Can. 336,325, Oct. 10, 1933. Wood chips are treated at an elevated temp., with a liquor contg.  $\text{Na}_2\text{SO}_3$  as its principal reagent and also contg. a carbonate of Na; the residual liquor is sepd. and concd. and the product is carbonized or melted. The Na compds. thus formed are dissolved in  $\text{H}_2\text{O}$  and the soln. is treated to form a liquor contg.  $\text{Na}_2\text{SO}_3$  as its principal reagent and also contg. a carbonate of Na. Some  $\text{CO}_2$  is preserved in the soln. in a free or loosely combined form. The wood is treated with the resulting liquor.

**Paper pulp.** Clinton K. Textor (to The Northwest Paper Co.). Can. 336,326, Oct. 10, 1933. Wood chips are digested with a liquor of an alky. not less than  $\text{pH}$  7.5, which contains 30 to 40 lb. of  $\text{Na}_2\text{SO}_3$  and 1.3 to 2.6 lb. of  $\text{Na}_2\text{CO}_3$  per 100 lb. of oven-dried wood. From  $\frac{1}{4}$  to  $\frac{3}{4}$  cu. ft. of liquor is used per cu. ft. of wood chips in the digester, at a temp.  $175^\circ$  to  $188^\circ$ , for 3-7 hrs. The base of a soda-contg. waste black liquor from the digestion of the wood is recovered by adding to the liquor a material contg.  $\text{NaOH}$ , evapg. the liquor to a sirupy concd. form, and incinerating, whereby the Na content is converted substantially all into  $\text{Na}_2\text{CO}_3$ . The carbonate is leached from the ash and the leach liquor treated with a predetd. amt. of  $\text{SO}_2$  to form  $\text{Na}_2\text{SO}_3$  from a portion of the  $\text{Na}_2\text{CO}_3$  and to convert the remainder into  $\text{NaHCO}_3$ .

**Apparatus for screening paper pulp, etc.** Orrie J. Mills and Wm. G. Webb. U. S. 1,942,303, Jan. 2. Structural and mech. details.

**Paper-pulp beaters.** Robert J. Marx and Anton D. J. Kuhn. Brit. 399,073, Sept. 28, 1933.

**Fourdrinier paper-making machines.** Walter Voith, Hermann Voith and Hanns Voith (trading as J. M. Voith). Brit. 399,739, Oct. 12, 1933.

**Cleaning felts of paper-making machines.** Robert J. Marx. Brit. 399,113, Sept. 28, 1933.

**Paper.** John Traquair and Francis G. Rawling (to Mead Corp.). U. S. 1,942,622, Jan. 9. In the manuf. of pulp, dewatered fibrous material and a continuously maintained gaseous chlorinating agent are moved relatively to each other through a treating chamber (of a described app.) and the excess of the gaseous chlorinating agent is continuously washed from the treated material

prior to its discharge from the treating chamber. Cf. C. A. 27, 597.

**Paper.** James J. O'Connor and Donald F. Morris (to The Mead Corp.). Can. 338,029, Dec. 19, 1933. A body filler comprising a finely divided, slowly settling, nonfurnaced and uncarbonated lime sludge ppt. obtained in the recovery of pulp-cooking liquor by causticization with high-Ca lime is mixed with a fibrous furnish and the admixed material is used in the manuf. of paper.

**Paper.** Weberei Kbnat A.-G. and Textilwerke Horn A.-G. Brit. 399,077, Oct. 12, 1933. See Swiss 157,962 (C. A. 27, 4674).

**Preparing rags for paper making.** John L. Cooney. U. S. 1,942,855, Jan. 9. Various details of app. and operation are described.

**Coating paper by use of rolls.** Charles A. Dickhaut and Charles C. Willis. U. S. 1,942,383, Jan. 2. Various details of app. and operation are described.

**Sizing paper.** George J. Manson (to Manson Chemical Co.). U. S. 1,942,438, Jan. 9. A wax such as paraffin or a vegetable wax, an org. dispersing agent such as glue or casein and an org. stabilizing agent such as formaldehyde are used together.

**Parchmentized paper or pulp.** Robert B. MacMullin and Wesley K. McCready (to The Mathieson Alkali Works). Brit. 399,725, Oct. 12, 1933. Fibrous cellulose is parchmentized or gelatinized by subjecting to the action of a Na,  $\text{NH}_4$  or K salt, e. g.,  $\text{NaI}$ ,  $\text{KNO}_3$ , dissolved in liquid  $\text{NH}_3$ , in concn. and for a time limited to avoid complete dispersion of the cellulose. In an example paper (pulp) is parchmentized in a liquid  $\text{NH}_3$  soln. of  $\text{NH}_4\text{CNS}$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{NH}_4\text{NO}_3$  or  $\text{NaNO}_3$  at  $-34^\circ$  to  $30^\circ$ . The gelatinized products may be used as moldable cellulose plastics or to produce leather-like paper products. Swollen products may be ground to give material suitable for filter paper or sanitary pads.

**Dyeing paper, etc.** Soc. pour l'ind. chim. à Bâle Fr. 42,623, Aug. 23, 1933. Addn. to 693,172 (C. A. 25, 1674). Water-sol. salts of basic compds. contg. a basic N atom and an aliphatic radical having at least 10 C atoms, other than those of Fr. 693,172, are used to form insol. compds. with sol. dyes in dyeing paper or pulp. Suitable compds. include the  $\text{HCl}$  salt of diethylethylamine, dimethyloctadecylamine and pentadecyldihydroimidazole, the sulfomethylate of octadecyltrimethylammonium, ester of stearic acid and dimethyl (or diethyl)aminoethanol, palmitic ester of *m*-hydroxyphenyltrimethylammonium chloride, etc.

**Apparatus for making paper bottles, where the bottles, after leaving the shaping and other devices, are dried and carried into a heated impregnating bath.** Carl Ristow. Brit. 399,671, Oct. 12, 1933.

**Capsules.** Arthur G. Enock. Brit. 399,722, Oct. 12, 1933. Capsules of the material cellophane are secured on bottles by applying heat and moisture.

**Hard vegetable-fiber products such as fiberboard of high wet and dry strength.** Robert M. Boehm (to Masonite Corp.). U. S. 1,941,536, Jan. 2. A moist mass of vegetable fiber having a sufficiently large non-cellulose content to bond the fibers together is subjected to consolidating pressure and heat until dry. The product, together with a drying oil in a quantity less than half that necessary to saturate the mass after consolidation, is subjected to highly heated air for a sufficient time greatly to increase the modulus of rupture of the material.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES R. MUNROE AND C. O. STORM

**Modern manufacture of lead azide.** Alfred Stettbacher. *Tech.-Ind. Schweiz. Chem.-Ztg.* 1933, 198 200 (1933). Polémique with von Herz (C. A. 27, 4083). B. 11.

**Contiguous commercial manufacture of nitropenterythritol and the future of this explosive.** P. R. de Wilde. *Chimie & industrie* 30, 1034 7 (1933); cf. Desvergues, C. A. 27, 4675. Tetranitropenterythritol can

be considered as a typically synthetic explosive, as it can be manufd. by elec. power from coal (or charcoal),  $\text{H}_2\text{O}$ , air, limestone and (in the continuous nitration process)  $\text{H}_2\text{SO}_4$ , which theoretically can be completely recovered. The procedure followed in a Swiss factory for the continuous nitration of penterythritol (Meissner process, Pat. 702,417, C. A. 25, 4154) and continuous neutraliza-



tion, stabilization and recrystn. of the tetranitrate is described. The possibility and probability of the extensive development of the use of this explosive for military purposes are briefly discussed. A. Papineau-Couture

**Thrimetric determination of the degree of stability of nitrocellulose.** T. Tomonari. *Angew. Chem.* 47, 47-8 (1934).—The method is based upon the observation that unstable nitrocellulose gives up the acid substance which causes instability, only slowly to water, but rapidly to water contg. MeOH or to pure MeOH. The acid no. (cc. of 0.01 N NaOH required to neutralize the acid extd. by boiling 1.0000 g. nitrocellulose 15 min. in 50 cc. MeOH) was correlated with explosion temps., and it was found that acid nos. of 5 or less give a stable nitrocellulose. In the stabilization process by a water boil for many hrs. new acid substances are formed. These side reactions did not occur with stabilization in MeOH. Exptl. data and references are given. K. K.

**Hygroscopicity of nitrocellulose.** Demougin. *Mém. poudres* 25, 287-301 (1932-33).—Hygroscopicity measurements on nitrocellulose of 13.43% N(CP<sub>1</sub>), 11.62% N(CP<sub>2</sub>), 10.49% N(CP<sub>3</sub>), trinitrocellulose prepared with a HNO<sub>3</sub>-AcOH mixt., linters and hydrocellulose in both beaten and unbeaten condition, in humidifiers over H<sub>2</sub>SO<sub>4</sub>-water mixts. showed that equil. is more rapidly attained the lower the vapor pressure. Will's hypothesis that hygroscopic water is fixed on the nonesterified OH groups, making hygroscopicity plus N content equal to 14.6, was found to be untrue for cellulose and trinitrocellulose and true only at low pressures for the others. With approach to satn. there is added to a chem. fixation of water, a phys. absorption and capillary condensation which depends on the amt. of surface and its porosity. These factors vary with the same sample when unbeaten, beaten or gelatinized. Phys. condition is very important at high satn. pressures. A. J. Phillips

**Preparation and properties of the nitric acid ester of starch.** I. J. Hackel and T. Urbanski. *Z. ges. Schiess- Sprengstoffw.* 28, 306-10, 350-4, 378-82 (1933); 29, 14-16 (1934).—See C. A. 27, 2302. II. *Ibid.* 29, 10-17 (1934).—See C. A. 27, 3334. C. G. Storm

**Construction of buildings for the manufacture of poudre B.** Rausch. *Mém. poudres* 25, 205-21 (1932-33).—Mechanical construction. A. J. Phillips

**Inflammability of gaseous mixtures from solvent recovery.** E. Burlot and R. Schwob. *Mém. poudres* 25, 336-420 (1932-33).—A study of the limits of inflammability of gaseous mixts. of alc., ether, O, N and CO<sub>2</sub> with recorded pressure curves, condition of a paper diaphragm closing the explosion chamber and auditory, visual, mech. and olfactory effects. Conclusions: Normal operating conditions are well under the limits of inflammability and the chief danger is in the enrichment of mixts. with O by air leakage. The inflammability limit is affected by the hygroscopic condition of the entering air. A. J. P.

**Conditions favorable to shaft-kiln explosions.** Otto Schott. *Tonind.-Zig.* 57, 979-82 (1933).—A crit. discussion of the causes of a shaft-kiln explosion. K. K.

**Gas explosions in sewers.** V. W. Willits. *Munic. Sanit.* 3, 484-5 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 63 (Sept. 23, 1933).—Explosions in sewers are due to either petroleum, oil or gasoline wastes or leaks, or to fuel gas. Explosions may occur in dry conduits as well as in sewers. The presence of sewer gas is readily detected by a wire-gauze-enclosed alc. flame, or Wolf lamp, in which the flame (1) dies down and goes out in a noncombustible gas, and (2) flares up and blows out in combustible gas. A H-filled aneroid barometer-like box instrument, set with its flexible diaphragm on a gasket over an open hole in the lid, indicates by a needle the d. relative to the atm. For showing the presence and combustibility of gas, a combustible gas indicator is used the action of which depends on the change in resistance of a small metal filament in the presence of the combustible gas. C. R. Fellers

**Thermal analysis of picrates.** I. Dehydration, m. ps. and initial and pre-explosive temps. (Tucholski) 2. Projectiles (Brit. pat. 398,045) 9.

**Explosives.** Henry Wm. Clapham and Imperial Chemical Industries Ltd. Brit. 399,553, Oct. 9, 1933. Peat of a bulk d. not exceeding 0.22 g. per cc. under 25 lb. per sq. in. pressure is used as a carbonaceous ingredient in blasting explosives. It may be slightly charred before use. In an example the explosive contains a fully nitrated mixt. of 4 parts glycerol and 1 part ethylene glycol 14, NH<sub>4</sub>NO<sub>3</sub> 44.5, NaCl 11, NaNO<sub>3</sub> 13, peat contg. 5% moisture 17, resin 0.25 and (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> 0.25%.

**Use of red crystalline basic lead styphnate in ammunition priming mixtures.** Willi Brün (to Remington Arms Co.). U. S. 1,942,274, Jan. 2. This compd. may be used with Pb nitrate, glass, etc.

**"Igniting stick" suitable for repeated use.** Ferdinand Ringer. U. S. 1,941,621, Jan. 2. An igniting stick ignitable by friction is formed of materials such as KClO<sub>4</sub> 35, Ca plumbate 3.7, S 0.9, benzoyl peroxide 3.7, powd. glass 14.2, (CH<sub>3</sub>)<sub>2</sub>N<sub>4</sub> 42.5 parts with glue and CH<sub>2</sub>O as a binder.

**Igniting composition for matches.** Sven H. Ledin. U. S. 1,942,806, Jan. 9. See Brit. 355,901 (C. A. 27, 1177).

**Composition for slow matches.** Aubrey A. Young (to The Atlas Powder Co.). Can. 337,978, Dec. 19, 1933. A match compn. contains an initiating compd. together with a deflagrating compn. consisting of tetryl, NH<sub>4</sub> picrate, trinitrotoluene, tetranitroaniline, hexanitrodiphenylamine, picric acid, or trinitroresorcinol, and a chromate or dichromate. The proportions vary from 90% nitroaromatic compd. and 10% oxidizer to 25% nitroaromatic compd. and 75% oxidizer. Cf. C. A. 28, 646<sup>6</sup>.

**Device for preventing the propagation of flame or explosion in pipe lines conveying explosive gases.** Panstwowa Wytworuina Prochu (formerly known as Panstwowa Wytworuina Prochu i Materjalow Kruszacych). Brit. 391,025, Apr. 20, 1933.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Recent technical developments in dyeing.** A. J. Hall. *Chem. Age* 29, 609-10 (1933). E. H.

**Light sensitivity of aryl- $\beta$ -naphthylamine azo dyes.** F. Krollpfeiffer, C. Mühlhausen and G. Wolf. *Ann.* 508, 39-51 (1933).—This study was undertaken to det. the chem. reactions involved in the bleaching of azo dyes. *p*-(2-Phenylamino-1-naphthyl)azobenzenesulfonic acid (I) (5 g.) in a diln. of 1:1000, on standing 3 days in the sunlight gives 0.45 g. naphthophenazine, m. 141-2°, and 2.17 g. of the *betaine* (II), pale yellow needles, identical with the oxidation product of I with AmNO<sub>2</sub>. Illumination of phenylazophenyl- $\beta$ -naphthylamine (III) on the fiber and addn. of picric acid to the ext. of the fibers give 2,3-diphenyl- $\alpha\beta$ -naphtho-1,2,3-triazolium picrate, m. 243-

4°, also obtained by oxidation with AmNO<sub>2</sub>; the *nitrate* (IV) decomps. 305°; the 2-*p*-chlorophenyl analog, pale brown, decomps. 278-9°; the *betaine* of 2-(*p*-phenyl-sulfonic acid)-3-phenyl- $\alpha\beta$ -naphtho-1,2,3-triazolium hydroxide (II) m. 360° (decompn.); this also results by oxidation with K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> or H<sub>2</sub>O<sub>2</sub>; the 3-*p*-tolyl analog of IV decomps. 270°; the 3-*p*-chlorophenyl analog, pale brown, decomps. 237-8°. Coupling of (*p*-XN<sub>2</sub>C<sub>6</sub>H<sub>4</sub>)<sub>2</sub> with 2 mols.  $\beta$ -C<sub>10</sub>H<sub>7</sub>NHPh gives a green dye, m. 281-2°, which is oxidized to *biphenyl*-3,3'-bis(3-phenyl- $\alpha\beta$ -naphtho-1,2,3-triazolium *nitrate*), brown-yellow, decomps. 245°; excess (NH<sub>4</sub>)<sub>2</sub>S gives the disazo compd.; the *picrate*, golden yellow, m. 320-1° (decompn.); the *nitrate* of the 2,2'-dichlorobiphenyl analog, pale-brown, decomps. 250-60°.

III and  $\text{BzCl}$  in  $\text{C}_6\text{H}_5\text{N}$  give the *N*-Bs deriv. (V), citron-yellow, m. 173–4° (decompn.), of phenylazoxyphenyl- $\beta$ -naphthylamine, red, m. 132–3°. Heating V in  $\text{AcOH-HCl}$  at 150° gives 2,3-diphenyl- $\alpha$ - $\beta$ -naphtho-1,2,3-triazolium chloride and  $\text{BzOH}$ . The above nitrates on fibers regenerate the azo dyes in slightly alk. hyposulfite bath.

C. J. West

**New uses for indigosols [in printing].** A. Wolff. *Melliand. Textilber.* 14, 312(1933).—Indigosols, unlike the vat dyes from which they are prepd., are not discharged by a mixt. of  $\text{Na}_2\text{S}_2\text{O}_4$  and Leucotrope W (I), so that fast multicolored effects are obtained by printing on cotton fabric having a vat ground shade (produced with easily dischargeable vat or indigosol dyes) a discharge paste contg. an indigosol, Hydrosulphite NF conc. and I, steaming, and then developing the indigosol by treatment with  $\text{Na}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$  at 70°.

B. C. A.

**Technological study of hard cordage fibers: sisal and Manila.** F. Heim de Balsac, J. Dantzer and O. Roerich. *Trav. serv. études product. colon.* 1933, 1–16; *Chimie & industrie* 30, 1417.—See C. A. 27, 4679.

A. P.-C.

**Flax.** J. Dantzer and O. Roerich. *Rev. textile* Dec., 1932, Jan.–Feb.–March, 1933, 1–37.—A study of the relation between the abs. strength and the wet strength of flax. The yarn was examd. microscopically from the standpoint of the retting process and pectic matter content. The wet strength of the yarn obtained from a given two depends firstly on the fineness after carding and secondly on the foreign matter content, which consists more of degradation products of the cortical tissues than of waxes and pectin. It is the latter that gives the slipping qualities required in dry spinning. For wet spinning, in which stretching takes place between the elementary fibers, it is advisable to try to remove as much as possible of the pectin binder in the inside of the fiber bundles. Chem. retting, which tends to cottonization and which liberates fibers that are too short, should be avoided in many cases. Pushing degumming too far yields a yarn that is dull and fuzzy after stretching. Luster is due to the parallelism of the slightly twisted fibers held together by the natural gums.

A. Papineau-Couture

**New method for detecting cotton which has been deteriorated by chemical agents.** J. Markert. *Text. Forsch.* 15, 1–11(1933); *Chimie & industrie* 30, 1163.—An old observation of Willows and Alexander on the swelling of cellulose in an alk. liquor can be used to detect and evaluate the degradation of cotton by chem. agents. When cotton fibers which have been cut perpendicularly to their length are treated with 19 Bé.  $\text{NaOH}$ ; it can be seen under the microscope that the ends of undeteriorated fibers swell into a mushroom-like formation. Comparative observations were made with cotton that had been deteriorated with more or less concd.  $\text{H}_2\text{SO}_4$  solns. (hydrocelluloses) or oxidizing solns. contg. 1–3 g. available Cl per l. (oxycelluloses). There can be distinguished 3 types of fibers: (a) well-formed terminal swellings, (b) moderate swelling, (c) no distinct swelling. By means of the percentages of (a), (b) and (c), the amt. of chem. deterioration can be expressed numerically. This can be done with either raw, mercerized, bleached or dyed cotton. Mech. strength tests showed that there is a certain parallelism with the value used to express chem. degradation as indicated above.

A. Papineau-Couture

**Pigments in natural silk.** G. Barbera. *Ann. chim. applicata* 23, 501–8(1933).—The pigments in Italian and Japanese silk are extd. with  $\text{Me}_2\text{CO}$  and  $\text{EtOH}$ , resp., and are shown to consist of carotenoids, in the case of the yellow pigments, and of flavones, for the green (Japanese) pigments, by comparing the reactions of these exts. to reagents such as  $\text{SbCl}_5$  in  $\text{CHCl}_3$  (Carr-Price reagent),  $\text{FeCl}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{CH}_3\text{CHO} + \text{a drop of } \text{H}_2\text{SO}_4$  (Bucher reaction for stearins),  $\text{CCl}_3\text{CO}_2\text{H}$ , and  $\text{CS}_2$ , for the carotenoids; and  $\text{FeCl}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{K}_2\text{CO}_3$ , Fehling soln. and basic Pb acetate, for the flavones. The above reactions were carried out on the exts. above, as well as on exts. known to contain carotenoids and flavones.

A. W. Contieri

**The properties of liquid silk.** Dante Ongaro. *Giorn. chim. ind. applicata* 15, 506–9(1933).—Liquid (non-

coagulated) silk is an irreversible colloid. It is coagulated by the gentlest mechanical rubbing, and on passing through a capillary. It is pptd. by dil., and coagulated by concd. acids. High concns. of electrolytes are needed to bring about coagulation.  $\text{NaOH}$  (0.001 *N*) retards coagulation markedly, a 3% soln. of silk coagulating in 7 days, a 2% soln. in 10 days and a 1% soln. in 15 days. A 1% soln. of the whole silk, fibroin alone and gelatin have the same gold no., 0.02–0.03. The soln. of fibroin shows Brownian movement;  $[\alpha]_D^{25} -39.0^\circ$ . The coagulum is inactive when formed spontaneously, but active when formed by mechanical means.  $\text{NH}_4\text{OH}$  has no action;  $\text{EtOH}$  causes coagulation; tannin causes pptn., while a soln. of  $\text{EtOH-Et}_2\text{O}$  ppts. the silk while extg. all pigments.

A. W. Contieri

**Reactivity of the sulfur linkage in wool.** J. B. Speakman. *Nature* 132, 930(1933); cf. C. A. 25, 1388; H. J. Woods, *Nature* 132, 709(1933).—From the contraction of wool fibers in solns. of  $\text{Na}_2\text{S}$  and  $\text{Ag}_2\text{SO}_4$ , it is apparent that the phenomenon of supercontraction is assocd. with the breakdown of disulfide linkages in wool, so that when strained fibers are exposed to steam, the first reaction is  $\text{RSSR} + \text{H}_2\text{O} \rightleftharpoons \text{RSH} + \text{RSOH}$ . That this reaction is possible is supported by the fact that wool heated with  $\text{H}_2\text{O}$  in the presence of Hg vapor is rapidly contaminated with  $\text{HgS}$  at a temp. as low as 55°. The second step, the rebuilding of new linkages, probably takes place as follows:  $\text{RSOH} + \text{RNH}_2 = \text{RSNHR} + \text{H}_2\text{O}$ . This view is supported by the fact that when fibers are treated with satd.  $\text{Ag}_2\text{SO}_4$  for 17 hrs. in the cold, to convert the disulfide group to  $\text{RSO}_3\text{H}$ , their ability to assume a permanent set is considerably reduced. The reactivity of the S linkage in wool is also shown as follows: prolonged treatment with baryta water removes the S from wool, but an addn. compd. is apparently formed first. Its formation is responsible for the inability of fibers treated with satd.  $\text{Ba(OH)}_2$  for 1.5 hrs. in the cold to contract when boiled 1 hr. with 5%  $\text{NaHSO}_3$  soln. In addn. such fibers have no power of assuming a permanent set.

Louise Kelley

**Treatment of [viscose] rayon crepe fabrics with caustic alkalis.** L. Kollmann. *Melliand. Textilber.* 14, 134–5 (1933).—The shrinkage, handle and appearance of viscose rayon fabric may be modified by treatment, before or after creping in a hot soap bath, with dil. aq.  $\text{NaOH}$ . Full details are given of the behavior of a viscose weft crepe fabric when creped with the assistance of aq.  $\text{NaOH}$  of d. 1.06 and 1.16; the resulting handle is softer and dyeing more even with the dil.  $\text{NaOH}$ , and treatment with the more concd.  $\text{NaOH}$  is not recommended, but the overall shrinkage of the fabric is 30% greater when the creping process includes an alkali treatment (before or after the hot soap bath) than without it. Viscose filaments of 7 denier swell in diam. 28, 36, 45, 76, 118 and 67% when immersed in solns. contg. 0, 5, 20, 60, 115 and 330 g. of  $\text{NaOH}$  per liter, resp. Viscose rayon loses 13% in tensile strength after treatment with  $\text{NaOH}$  (d. 1.16), but is unaffected in strength by  $\text{NaOH}$  (d. 1.06). A viscose filament swelled 69% when immersed in  $\text{NaOH}$  (d. 1.05), but regained its original dimensions when washed and dried. The crepe appearance of fabrics treated with dil. aq.  $\text{NaOH}$  is less coarse than when this treatment is omitted.

H. C. A.

**Preservation of filtering cloth.** M. O. Kharmandar'yan and L. I. Sivoplyas. *Ukrain. Khim. Zhur.* 8, Wiss.-tech. Teil, 125–6(in German 126)(1933).—Good results were obtained in the preservation of filtering cloth in factory operation by cooking the cloth with aq.  $\text{Na}_2\text{CO}_3$  and then impregnating it with an  $\text{NH}_3$  soln. of  $\text{CuSO}_4$ .

C. B.

**Pupa oil emulsion. II. Physical properties of pupa oil emulsion.** Hideo Kaneko and Kenichi Yamamoto. *Bull. Sericult. Silk-Ind. Japan* 6, No. 2, 3–4(1933); cf. C. A. 25, 4712; 28, 331<sup>1</sup>.—Casein, dextrin, Na oleate, gum arabic A and sericin B are good agents for emulsifying pupa oil in  $\text{H}_2\text{O}$ . Many agents have max. emulsifying power between 0.04 and 0.1 g. per 100 cc. In an emulsion contg. 0.93% pupa oil the globules ranged from 1 $\mu$  to 5 $\mu$  in diam. Pupa oil emulsions are very stable.

R. B.

Action of chem. agents [dyes] on the skin (Chesneau) 11H. Indigoid dyes (Dutta) 10. Purifying water [from washing wool, etc.] (Brit. pat. 399,826) 14. Plastic compns. [from residue from extrn. of vegetable fibers] (Brit. pat. 399,277) 18. *o*-Aminoaryl alkyl sulfones and *o*-aminoaryl aralkyl sulfones [dye intermediates] (U. S. pat. 1,939,416) 10. Sepn. of a mixt. of alizarin blue and alizarin yellow (Russ. pat. 27,750) 10.

Deutscher Färberkalender, 1934. Wittenberg: Verlag Deut. Färberkalender. M. 4; leather, M. 7.

Jute, 1933. London; Brit.-Continental Press Ltd. 12s. 6d.

Aurich, Karl: Der Betriebsschutz in der Bleicherei, Färberei und Appretur. Thesis, Leipzig. 1930. 63 pp.

Reinecker, Paul: Über den Einfluss natürlich sauren Wassers auf die tuchwirtschaftliche Betriebsführung in der Oberlausitz. Thesis, Berlin. 1931. 253 pp.

Wiegand, Willy: Über natürliche Polycenfarbstoffe. Thesis, Zurich. 1930. 83 pp.

**Dyes.** I. G. Farbenind. A.-G. Brit. 399,790, Oct. 9, 1933. Acylaminoanthraquinones are prepd. by acylating aminoanthraquinones, or their substitution products, with carboxylic acids of quinoline or naphthoquinoline contg. the COOH group(s) in an isocyclic ring or by condensing haloanthraquinones with the amides of said acids. Among such dyes described are those from (1) 1-amino-5-benzoylaminoanthraquinone (I) and quinoline-5-carboxylic acid (dyes greenish yellow), (2) quinoline-5,8-dicarboxylic acid and 1-aminoanthraquinone (yellow) and (3) 1-naphthoquinoline-3-carboxylic acid and I (yellow).

**Dyes.** I. G. Farbenind. A.-G. Fr. 42,589, Aug. 23, 1933. Addn. to 717,017 (C. A. 26, 2870). The reduction of Fr. 717,017 is effected by the action of anhyd. alkali metal sulfides or polysulfides in the presence of a tertiary base, such as pyridine which may be replaced in part by a diluent such as PhCl. It is advantageous to add a small amt. of a strong primary or secondary base such as piperidine.

**Dyes.** I. G. Farbenind. A.-G. (Fritz Lange and Hans Krzikalla, inventors). Ger. 584,645, Sept. 22, 1933 (Cl. 22a. 2). Addn. to 474,997 (C. A. 23, 3105). The method of 474,997, for producing complex Cr compds. of *o*-hydroxyazo dyes is varied by using Cr<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> instead of (HCO<sub>2</sub>)<sub>2</sub>Cr. Thus, an aq. soln. of the dye from diazotized 4-chloro-2-amino-1-methoxybenzene and 2-hydroxynaphthalene-6,8-disulfonic acid is treated with an aq. soln. of H<sub>2</sub>SO<sub>4</sub> and Cr<sub>2</sub>O<sub>3</sub> to give a dye which imparts fast violet shades to wool. Another example is given. Cf. C. A. 28, 649<sup>1</sup>.

**Dyes.** I. G. Farbenind. A.-G. (Georg Rösch, Josef Haller and Fritz Helwert, inventors). Ger. 584,718, Sept. 23, 1933 (Cl. 22b. 3.06). Dyes are produced by treating the 9,10-disulfuric acid ester of leuco- $\beta$ -sulfaminoanthraquinone or its salts with oxidizing agents, especially PbO<sub>2</sub> or ferricyanides, in aq. neutral or alk. soln. The product may be subjected to the action of dil. mineral acids or acid oxidizing agents in the substance or on the fiber. In an example, a soln. of the K salt of the 2-sulfamic acid of anthrahydroquinone-9,10-disulfuric acid ester is treated with an aq. soln. of K<sub>2</sub>CO<sub>3</sub> and K<sub>2</sub>FeC<sub>6</sub>N<sub>6</sub> to give the K salt of the tetrasulfuric acid ester the leuco compd. of 1,2,2',1'-anthraquinonazine. Treatment of this with dil. H<sub>2</sub>SO<sub>4</sub> and CuSO<sub>4</sub> gives *N*-dihydro-1,2,2',1'-anthraquinonazine. Other examples are given.

**Dyes.** Chemische Fabrik vorm. Sandoz. Ger. 581,161, July 25, 1933 (Cl. 22b. 3.15). Addn. to 578,995 (C. A. 28, 781<sup>9</sup>). Dyes sol. in water are prepd. by introducing one or more SO<sub>2</sub>H groups into substituted arylaminoanthrapyridones. Examples are given.

**Dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 584,577, Sept. 21, 1933 (Cl. 22b. 2.07). Dyes of the anthraquinone series are prepd. by treating unsulfonated vat dyes contg. exchangeable substituents, with alc. solns. of alkali alcoholates at temps. above 100°, in optional presence of catalysts. The products may be alkylated or halogenated.

Thus, nitrodibenzanthrone is heated with KOH and benzyl alc. to give a dye. Other examples are given.

**Dyes (gallocyanine series).** I. G. Farbenind. A.-G. Fr. 754,276, Nov. 3, 1933. New dyes are obtained by condensing gallic acid or one of its derivs., such as gallamide, an arylamide of gallic acid or pyrogallallic acid, with nitroso compds. of a secondary or tertiary aromatic amine of the formula aryl-*N*(R)-alk-SO<sub>2</sub>H (alk. is an alkylene group of at least 2 C atoms, R is H, alkyl or substituted alkyl). The dyes may be sulfonated or reduced to the leuco compds. or condensed with mono- or di-amines or their sulfonic acids or with aldehydes, phenols, naphthols or naphthosulfonic acids. Several examples are given.

**Azo dyes.** Friedrich Felix (to Soc. pour l'ind. chim. à Bâle). U. S. 1,943,170, Jan. 9. Azo dyes which dye various colors are formed by coupling a diazo compd. of the general formula 4,2-X(YO<sub>2</sub>S)C<sub>6</sub>H<sub>4</sub>N:NOH, in which X stands for NO<sub>2</sub> or an NH-acyl group and Y for a nucleus of the benzene series, with an alkyl- $\beta$ -naphthylamine or other suitable coupling component of the naphthalene series which, due to the presence of an NH-R group in the 2-position (R being H, alkyl, aralkyl or aryl), couple in the 1-position.

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 399,916, Oct. 19, 1933. Azo dyes are made by coupling in an acid soln. a diazo compd. of *o*-aminodiphenyl sulfone, or of a nuclear halo-, alkyl- or alkoxy-substitution product thereof, with 2-amino-8-naphthol-6-sulfonic acid. They dye wool from an acid bath red shades.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 749,348, July 22, 1933. Azo dyes, insol. in water, are made by coupling diazo compds. with aminoarylaminanthraquinones of acylacetic acid, of arylenebisacetic acid or of 2,3-hydroxynaphthoic acid. Several examples are given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 754,054, Oct. 31, 1933. Arylides of 2,3-hydroxynaphthoic acids are coupled with diazotized aryl or aralkyl ethers of *o*-aminophenols contg. at least one alkyl or alkoxy group in the *o*-aminophenol radical, e. g., 4-methoxy-2-amino-1,1'-diphenyl ether or 4-methoxy-2-amino-5-acetylamino-1,1'-diphenyl ether. A large no. of examples is given.

**Azo dyes containing a nitroso group.** Leopold Laska, Arthur Zitscher, Wilhelm Christ and Adolf Petzold (to General Aniline Works). U. S. 1,942,865, Jan. 9. Numerous examples are given of the production of azo dyes contg. a nitroso group and corresponding probably to the general formula: 1,2,3-[ $\beta$ -PhN(NO)C<sub>6</sub>H<sub>4</sub>N:N](HO)(R-NHCO)C<sub>10</sub>H<sub>7</sub>, in which the naphthalene nucleus may contain a halogen and the two benzene nuclei halo, alkyl, hydroxyalkyl or hydroxyaryl groups, and R stands for a radical of the benzene or naphthalene series, which dyes are when dry red-like claret to garnet colored powders, sol. in concd. H<sub>2</sub>SO<sub>4</sub> with a reddish violet to violet color, forming color lakes when mixed with the usual substrata and yielding claret to garnet-like reddish to violet dyeings of a good fastness to chlorine and washing when produced on the fiber. Among the initial components which may be used are: nitrosodiazocompds. of 4-aminodiphenylamine itself and of its substitution products, such as 4-amino-2'-(3' and 4')-methyl, 4-amino-2'-(and 4')-methoxy, 4-amino-2'-(and 4')-ethoxy, 4-amino-2'-(3' and 4')-phenoxy, 4-amino-2'-(3' and 4')-chloro, 4-amino-3-methyl-4'-methoxy, 4-amino-3'-methyl-6'-methoxy, 4-amino-2'-methyl-4'-chloro, 4-amino-2'-methyl-5'-chloro, 4-amino-3'-methyl-6'-chloro, 4-amino-4'-methyl-3'-chloro, 4-amino-2'-methoxy-4'-chloro, 4-amino-3',4'-dichloro derivs. and 4-aminophenyl- $\beta$ -naphthylamine. As azo components there may be used, for instance, the 2,3-hydroxynaphthoyl derivs. of aniline, of toluidines, of aminoethylbenzenes, of the alkyl, aralkyl and aryl ethers of aminophenols, of aminophenyl ketones, sulfones and sulfamines, of the halogen-substitution products of the aforesaid compds., of naphthylamines and their derivs., of arylenediamines, diaminodiarlys and their derivs., diamines, in which two aryl radicals are united by a further complex, further such arylamides of 2,3-hydroxynaphthoic acid contg. further substituents with the exception of sulfonic or carboxy group in the hydroxynaphthoyl radical such as arylamides

of 6-bromo-2,3-hydroxynaphthoic acid. Cf. C. A. 27, 1183.

**Azo dyes; intermediates.** Soc. pour l'ind. chim. à Bâle. Brit. 399,097, Sept. 28, 1933. *N,N'*-Diacyl-1,4-diamino-8-hydroxynaphthalene-6-sulfonic acids are prepd. by treating the corresponding diamino compd. with an acylating agent. In an example 1-amino-5-hydroxynaphthalene-7-sulfonic acid is acetylated and diazotized with  $\text{PhNH}_2$  run in. The resulting monoazo dye is reduced by  $\text{SnCl}_2$  to give 1,4-diamino-8-hydroxynaphthalene-6-sulfonic acid. This is acetylated by  $\text{Ac}_2\text{O}$  and 3- and 4-nitrobenzoyl chlorides. In the latter 2 cases reduction of the  $\text{NO}_2$  group to  $\text{NH}_2$  by  $\text{Fe}$  and  $\text{AcOH}$  is also exemplified. Azo dyes are formed in substance or on the fiber by treating the *N,N'*-diacyl compds. with a diazo compd. In the case of aliphatic acyl compds. coupling with simple diazo compds. gives acid dyes; using aromatic acyl compds., the resultant dyes have affinity for vegetable fibers, e. g., cotton, or rayon from regenerated cellulose, e. g., viscose, and such dyes may be further developed on the fiber. The dinitro compds. obtained by using nitroarylacyl compds. may be coupled directly or first reduced and then coupled. Among examples (1) see Swiss 182,465 (C. A. 28, 6509), (2) the dye 1-amino-5-acetoxynaphthalene-7-sulfonic acid  $\leftarrow$  2-naphthylamine-5-sulfonic acid is diazotized and coupled with 3',3''- or 4',4''-diaminodibenzoyl-1,4-diamino-8-hydroxynaphthalene-6-sulfonic acid; on saponification the Ac group blue direct-dyeing dyes are obtained which can be further developed on the fiber, and (3) cotton impregnated with 3',3''- or 4',4''-dinitrodibenzoyl-1,4-diamino-8-hydroxynaphthalene-6-sulfonic acid is developed with diazotized *m*-nitro-*p*-toluidine to give a lilac shade. Cf. C. A. 28, 6554.

**Diazoazo dyes.** I. G. Farbenind. A.-G. Brit. 399,753, Oct. 12, 1933. Solid stable diazoazo salts are made by adding to an aq. soln. of diazotized *o*- or *p*-aminoazotoluene sufficient  $\text{H}_2\text{SO}_4$  to form the acid diazonium sulfate, sepg. the solid diazoazo salt and mixing, if necessary, with a diluent or dyeing assistant. Examples are given.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Brit. 399,241, Oct. 5, 1933. Addn. to 381,920 (C. A. 27, 4407). See Fr. 42,574 (C. A. 28, 11974).

**Vat dyes.** I. G. Farbenind. A.-G. Brit. 399,491, Oct. 4, 1933. See Ger. 582,169 (C. A. 27, 5195).

**Vat dyes (anthraquinoneacridone series).** I. G. Farbenind. A.-G. Brit. 399,182, Sept. 29, 1933. 4-Acylamino-*Bs*-2,3,5-trichloroanthraquinone-2,1(*N*)-benzacrindones are prepd. by acylating the corresponding 4-amino derivs., preferably in an org. diluent. The products give fast even dyeings on mixed fabrics of viscose rayon and cotton. Examples describe acylation with  $\text{BzOH}$  (dye blue), *p*-chlorobenzoic (reddish blue), anthraquinone-2-carboxylic (grey-blue), oxalic (blue), terephthalic, isophthalic, biphenylcarboxylic, naphthoic, naphthalene-1,5-dicarboxylic and anthraquinone-benzacrindone-*Bs*-carboxylic acids, etc.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 753,511, Oct. 18, 1933. Sulfuric esters of leuco derivs. of vat dyes are prepd. by treating a reduction product of a vat dye, stable to air and practically insol. in dil. aq. alkalis, by an agent liberating  $\text{SO}_2$ , in the presence of an org. base, e. g.,  $\text{ClSO}_3\text{H}$  in the presence of pyridine or  $\text{PhNMe}_2$ .

**Vat dyes (anthraquinone series).** I. G. Farbenind. A.-G. Brit. 399,724, Oct. 12, 1933. See Fr. 753,185 (C. A. 28, 9064).

**Vat dyes of the anthraquinone series.** Otto Bayer (to General Aniline Works). U. S. 1,938,993, Dec. 12, 1933. Dyes (examples of which dye yellowish green shades) are prepd. by causing one mol. proportion of a *m*- or *p*-diphenylbenzenedicarboxylic acid or a substitution product thereof, or, more advantageously, of a functional deriv. of these compds. (the halides, for example) to react on two mol. proportions of  $\alpha$ -aminoanthraquinone or substituted  $\alpha$ -aminoanthraquinones, for example, those substituted in the nucleus by halogen ( $\text{Cl}$ ,  $\text{Br}$ , etc.), aryloxy groups (benzoylamino, *m*-methoxybenzoylamino, chlorobenzoylamino, naphthoylamino groups, etc.) or alkoxy groups (methoxy, ethoxy, etc.). The reaction

is advantageously performed while heating the reaction components in the presence of a high-boiling org. solvent inert to the starting materials, such as  $\text{PhCl}$ , *o*- $\text{C}_6\text{H}_4\text{Cl}_2$ ,  $\text{PhNO}_2$ , etc.

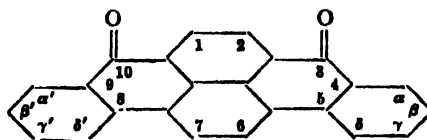
**Anthraquinone dyes.** Imperial Chemical Industries Ltd. Ger. 581,793, Aug. 10, 1933 (Cl. 22b.3.08). See Brit. 387,793 (C. A. 27, 2811).

**Dyes containing sulfur.** I. G. Farbenind. A.-G. Brit. 399,583, Oct. 12, 1933. See Fr. 745,091 (C. A. 27, 4412).

**Dye preparations.** Soc. pour l'ind. chim. à Bâle. Brit. 399,208, Oct. 5, 1933. See Swiss 155,461 (C. A. 27, 1194). In 399,274, Oct. 5, 1933, addn. to 399,268, the org. acid amides are mixed with dyes that are insol. in  $\text{H}_2\text{O}$  and alc. to dil. them. Among examples indanthrone-3,3'-dicarboxylic acid is mixed with *p*-toluenesulfonamide. The preps. of both patents are useful for coloring nitrocellulose lacquers, varnishes and resins.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. Brit. 399,095, Sept. 28, 1933. 1-Aminoanthraquinone-sulfonamides, substituted in the 4-position by an amino group having identical or different *H*, aliphatic, alicyclic, aromatic or aliphatic-aromatic radicals and in which the sulfonic amide group may be similarly substituted, are obtained by treating 1-amino-4-haloanthraquinone-sulfonamides with the required primary or secondary amine or  $\text{NH}_3$  and the products may be sulfonated. Among examples (1) 1-amino-4-bromoanthraquinone-2-sulfonhexylamide is treated with  $\text{PhNH}_2$  or 1-amino-4-methoxybenzene to give dark blue products, and (2) 1-amino-4-anilinoanthraquinone-2-sulfonanilide and 1-amino-4-cyclohexylaminoanthraquinone-2-sulfonmethylamide, obtained, resp., from the 2-sulfonyl chlorides via the 2-sulfonamides and  $\text{PhNH}_2$  or cyclohexylamine, are sulfonated to give blue wool dyes still contg. a sulfonamide group.

**Halogen derivatives of isobenzopyrenequinones.** Max A. Kunz and Karl Koeberle (to General Aniline Works). U. S. 1,942,761, Jan. 9, 1933. New halogenated 4,5,8,9-dibenzopyrene-3,10-quinones probably corresponding to the formula:



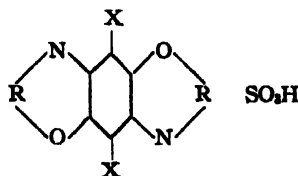
in which the  $\gamma$ - and  $\gamma'$ -positions are unsubstituted by halogen and at least one of the  $\alpha$ -,  $\beta$ -, and  $\alpha'$ -,  $\beta'$ -positions is substituted by halogen, dyeing vegetable fibers essentially more reddish shades than the unhalogenated initial material and with a less bluish tinge than the isomeric 4,5,8,9-dibenzopyrene-3,10-quinones halogenated in chlorosulfonic acid, are obtainable by halogenating 4,5,8,9-dibenzopyrene-3,10-quinones in org. solvents. Several examples with details of procedure are given.

**Hydroxynaphthylbenzoic acid.** Alfred Rieche. Ger. 584,859, Sept. 26, 1933. The compd. 2-(2-hydroxy-1-naphthyl)benzoic acid is prepd. by treating 1,8-phthaloxyl-2-naphthol with alkali hydroxides in alc. soln. The lactone m. 220°. The substance is used as a dye intermediate.

**Nondyeing metalliferous sulfurized phenol derivatives.** Valentin Kartaschoff and Oskar Knecht (to Chemische Fabrik vorm. Sandoz). U. S. 1,943,179, Jan. 9, 1933. Products which have mordanting, tanning, reserving and insecticidal properties and which may be used as intermediates for manuf. of dyes and pharmaceutical compds. can be prepd. by heating phenols with S in presence of metals of the  $\text{H}_2\text{S}$  and  $(\text{NH}_4)_2\text{S}$  groups and their salts and of suitable addn. compds. that act as accelerators for the sulfurizing operation. Such addn. compds. are, for instance, the salts of org. carboxylic acids, like acetates, formates, lactates; salts of weak inorg. acids, like nitrites, hyposulfites, thiosulfates, thionates, sulfohydrates; or compds. like aniline, iodine, etc. Small additions are suitable. As salts of the metals of the  $\text{H}_2\text{S}$  and  $(\text{NH}_4)_2\text{S}$  group it is preferable to use salts of weak inorg. acids like sulfites,

nitrites or salts of org. carboxylic and sulfonic acids such as formates, lactates, benzoates, *p*-toluenesulfonates, etc. Oxides and hydroxides may also advantageously be used, where the use of sulfates and chlorides is inconvenient as the reaction proceeds only slowly and higher temps. must be used. Preparation of Mo, Cr, Sn and Al compds. is described in detail. Cf. C. A. 28, 177<sup>a</sup>.

**Dyes and intermediates.** I. G. Farbenind. A.-G. Fr. 754,987, Nov. 17, 1933. Primary condensation products which may be used for the prepn. of dyes, *e. g.*, oxazine or S dyes, are prepd. by condensing 1,4-quinones with monoamino derivs. of pyrene, fluoranthene, chrysene, or their substitution products, in the presence or not of org. or inorg. oxidants, metal chlorides or acylating agents and sulfonating the products obtained. The dyes correspond probably with the formula—



where X is H, alkyl or halogen, R represents a bivalent radical of the pyrene and other series, and SO<sub>2</sub>H signifies that the dye may be sulfonated. In examples, 4(or 11)-aminofluoranthene is condensed with chloranil, toluquinone or  $\alpha$ -naphthoquinone, 3(or 4)-aminopyrene is condensed with chloranil, benzoquinone and  $\alpha$ -naphthoquinone; aminochrysene is condensed with chloranil.

**Intermediates and dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 750,922, Aug. 22, 1933. Stilbene derivs. which contain in each C<sub>6</sub>H<sub>4</sub> ring substituents capable of giving the anthranilic acid grouping are reduced to the corresponding NH<sub>2</sub> compds., the NH<sub>2</sub> and COOH groups being ortho with respect to one another. The derivs. may also contain other substituents. An example is given of the prepn. of the 4,4'-diamino-3,3'-dicarboxy deriv. and of a large no. of dyes obtained by tetrazotizing it and coupling with components such as 1-amino-8-naphthol-4-sulfonic acid, and of dyes obtained by treating these dyes with metallizing agents. The 4,4'-dinitro-3,3'-dicarboxy deriv. m. above 280°, is obtained by oxidation of 6-nitro-3-methylbenzoic acid with NaOCl in alk. soln.

**Intermediates and dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 751,324, Aug. 31, 1933. Azo dyes are prepd. by coupling diazo compds. with *N,N*-diacyl derivs. of 1,4- or 1,5-diamino-8-hydroxynaphthalene. The acyl compds. are prepd. by treating 1,4(or 1,5)-diamino-8-hydroxynaphthalene or their sulfonic acids with acylating agents. Examples are given of the prepn. of diacetyl-1,4-diamino-, 3',3''(or 4',4'')-diaminodibenzoyl-1,4-diamino-, and 3',3''(or 4',4'')-dinitrodibenzoyl-1,4-diamino-8-hydroxynaphthalene-6-sulfonic acid and 1,5-dibenzoyldiamino-8-hydroxynaphthalene and dyes prepd. therefrom.

**Dyeing.** I. G. Farbenind. A.-G. Fr. 42,476, July 31, 1933. Addn. to 727,605 (C. A. 26, 5765). See Ger. 578,648 (C. A. 28, 910<sup>a</sup>).

**Dyeing fibers.** John L. Hankey. Ger. 587,584, Nov. 6, 1933 (Cl. 8m. 11.01). Vegetable and silk fibers are mordanted by treatment with a mixed soln. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and hyposulfite and steaming.

**Dyeing cellulose esters.** Charles S. Bedford. Brit. 399,533, Sept. 29, 1933. Cellulose esters are dyed or printed with insol. or difficultly sol. dyes in the form of aq. colloidal dispersions obtained with the aid of sulfonated CH<sub>3</sub>O-cresol condensation products, used as free sulfonic acids or as alkali salts.

**Dyeing cellulose esters and ethers.** British Celanese Ltd., George H. Ellis and Henry C. Olpin. Brit. 399,559, Oct. 9, 1933. The production of oxidation colors on materials made of or contg. cellulose esters or ethers is resisted locally by applying a compn. contg. an oxidizable compd. of an inorg. acid, said compd. having mild reducing properties, *e. g.*, sulfites, thiosulfates, stannous and ferrous

salts, and a dye resistant to the oxidizable compd. and having affinity for, or capable of being fixed on, the materials. In an example a cellulose acetate fabric is printed with an aq. paste contg. a dye, *e. g.*, 2,4-dinitro-4'-aminodiphenylamine, 1,4-diamino-2-methoxyanthraquinone, *p*-hydroxybenzenazo-1-phenyl-3-methyl-5-pyrazolone or Duran blue G, methylated spirit, gum arabic, AcONa, ZnO and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> or SnCl<sub>2</sub> and the printed fabric is padded with an aq. liquor contg. PhNH<sub>2</sub>·HCl, AcOH, methylated spirit, tragacanth thickening, NaClO<sub>2</sub>, and CuCl<sub>2</sub> and is dried, aged, chromed and washed to obtain a colored pattern on a black ground.

**Dyeing cotton goods with sulfur black.** Herbert A. Lubs and Herbert W. Walker (to E. I. du Pont de Nemours & Co.). U.S. 1,941,901, Jan. 2. Cotton goods are dyed with a S black produced by thionating a nitrophenol, and from 0.5 to 15% of the Na salt of 1-amino-4-ethoxyphenyl-2-thioglycolic acid is used for a stabilizer and to inhibit tendering.

**Dyeing wool.** Soc. pour l'ind. chim. à Bâle. Brit. 399,228, Sept. 25, 1933. Divided on and addn. to 398,878 (C. A. 28, 1548<sup>a</sup>). Azo dyes are made on wool by grounding with an unsulfonated arylide of 2,3-hydroxynaphthoic acid and developing with a diazotized *p*-aminodiphenylamine or an unsulfonated deriv. thereof, the grounding being conducted in a short bath under the following conditions: (a) the arylide in the bath is not more than 5% of the wt. of the wool, (b) the alkali hydroxide must be 1.5–2.5 times the quantity of arylide and (c) the grounding bath must be exhausted. In an example the dye 4'-ethoxy-4-aminodiphenylamine  $\rightarrow$   $\alpha$ -naphthylamide of 2,3-hydroxynaphthoic acid is produced on wool. Cf. C. A. 27, 4689.

**Printing silk with chrome dyes.** Jean-Jacques Roulet (to Durand & Huguenin S. A.). U. S. 1,942,774, Jan. 9. See Brit. 387,207 (C. A. 27, 4689).

**Obtaining full prints on material of cellulose organic substitution derivatives such as cellulose acetate or the like.** George H. Ellis and Ralph J. Mann (to Celanese Corp. of America). U. S. 1,943,008, Jan. 9. Printing is effected with aq. preps. contg. in undispersed form relatively water-insol. unreduced anthraquinone vat dyes or similar dyes having affinity for the goods, and fixing the coloring compds. by steaming.

**Apparatus (with a liquor-circulating propeller) for yarn dyeing and similar operations.** Harold Gough (to British Cotton & Wool Dyers' Association Ltd.). U. S. 1,943,175, Jan. 9. Structural and operative details.

**Retting materials such as flax.** Jules A. M. Faut (to "Les Fibres Textiles"). U. S. 1,941,793, Jan. 2. About 2% of the wt. of the flax of saponified linseed oil is used as an auxiliary retting bath ingredient to facilitate retting. Cf. C. A. 27, 2826.

**Treating coir fiber to give it a smooth glossy surface.** Ivan Tudor and Owen Tudor-Hart. U. S. 1,941,451, Jan. 2. After treatment with alkali and drying, a mass of the fiber is subjected to a rubbing action.

**Treating cellulose fibers, etc.** Aage C. Thaysen. Brit. 399,952, Oct. 19, 1933. Cellulose, either raw or in the form of threads, fabrics, fishing-nets, etc., is uniformly acetylated so that the increase in wt. thereof is not more than 18% by an acetylating mixt. contg. up to 0.25% HClO<sub>4</sub>, or a salt thereof, 5–10% Ac<sub>2</sub>O and a diluent org. liquid, not more than 1.5 parts Ac<sub>2</sub>O to each part of cellulose being present. The cellulose is thus rendered immune to deterioration by destructive organisms without substantial interference with the normal textile properties.

**Sizing artificial fibers of cellulose esters and ethers.** Carroll F. Chandler (to Du Pont Rayon Co.). U. S. 1,943,000, Jan. 9. The weaving properties of artificial fibers such as those formed of cellulose acetate are improved by combined treatment with a swelling agent such as NH<sub>4</sub>CNS and a sizing material such as gum arabic. Various examples are given.

**Sizing textiles.** I. G. Farbenind. A.-G. Brit. 399,905, Oct. 19, 1933. Addn. to 345,207 (C. A. 26, 320). Textile fabrics, *e. g.*, rayon, are sized with a mixt. of polyvinyl alcs. or their H<sub>2</sub>O-sol. derivs., the viscosity in aq.

solu. of 1 component thereof differing from that of another. Borax,  $\text{Na}_2\text{CO}_3$ , glucose, sucrose, polyglycerol, urea-glycerol condensation products, triethanolamine and  $\text{H}_2\text{O}$ -sol. carbohydrate derivs., e. g., dextrin, Me cellulose, dimethoxytriethoxyhexane (made by catalytic reduction of Me cellulose), may be added to the size. Cf. C. A. 28, 6567.

**Treating textiles, etc.** Luis Neuman. Ger. 587,974, Nov. 11, 1933 (Cl. 8 $\frac{1}{2}$ . 1). Dry pectin material is mixed with the finishing, etc., preps. for textiles, leather, paper, etc.

**Treating yarns.** Owen Tudor-Hart. Brit. 399,800, Oct. 11, 1933. Coir yarn, the fibers of which have been boiled in alkali before or after spinning, is subjected to a rubbing process before or after weaving to impart flexibility, glossiness and greater affinity for dyes.

**Processing yarn.** Frederick J. Williams and Herbert E. Martin (to Camille Dreyfus). Can. 338,070, Dec. 19, 1933. Yarns contg. org. derivs. of cellulose are conditioned by incorporating or applying a fluid contg.  $(\text{CH}_3\text{OH})_2$ , castor oil and BuOH. The yarn has increased flexibility.

**Delustering fabrics.** Charles R. Weiss and Winton R. Bennett. U. S. 1,942,523, Jan. 9. "Shine" is removed from fabrics such as worn garments by use of an alc. soln. contg.  $\text{NH}_4\text{OAc}$ .

**Delustering rayon.** Frederick D. Lewis. Brit. 399,512, Oct. 6, 1933. Artificial threads, etc., of reduced luster are obtained by adding to the spinning soln., e. g., viscose or cuprammonium soln., a halogenated (hydro- or alkyl-) naphthalene, which may be admixed with highly refractive perfumery products, e. g., alkyl and aryl naphthyl ethers, and diluents, e. g.,  $\beta, \beta'$ -dichloroalkyl ethers. Among examples yarn is spun from viscose contg. a dispersion of a soln. of (1) hexachloronaphthalene in  $\alpha$ -monochloronaphthalene, and (2) pentachloronaphthalene in  $\beta, \beta'$ -dichlorodimethyl ether.

**Rayon.** Glanzstoff-Courtaulds G. m. b. H. Fr. 753,951, Oct. 28, 1933. See Brit. 397,253 (C. A. 28, 913<sup>a</sup>).

**Increasing the ironing point of rayon.** Camille Dreyfus and Herbert Platt (to Camille Dreyfus). Can. 337,207, Nov. 14, 1933. The safe ironing point of a textile material contg. filaments of cellulose is raised by treating the material with a soln. contg.  $\text{SnCl}_4$  5% and  $\text{NaCl}$  30% at about 85° for about 2 hrs. and then with a soln. of silicate at elevated temp. Other weighting salts of Zn, Al, Bi, W or Sb may be used, but  $\text{SnCl}_4$  is preferred.

<sup>1</sup>  $\text{KCl}$ ,  $\text{CaCl}_2$  or similarly acting materials which are neither swelling agents nor weighting agents for cellulose acetate material may be used.

**Apparatus for washing, bleaching, desulfurizing or other wet treatments of spooled rayon.** Conrad Herrmann (to American Glanzstoff Corp.). U. S. 1,943,072, Jan. 9. Structural and operative details.

**Crepe threads.** British Celanese Ltd., Wm. A. Dickie and Wm. I. Taylor. Brit. 399,534, Oct. 2, 1933. Highly twisted crepe threads comprise both sapond. and unsapond. cellulose ester filaments.

**Washing wool.** Louis Delfosse. Brit. 399,634, Oct. 12, 1933. See Fr. 741,830 (C. A. 27, 3623).

**Degreasing wool, etc.** Arnold Golwig. Brit. 399,338, Oct. 5, 1933. Animal fibers are degreased by treatment below 0° with org. solvents for fat, e. g., ethylene trichloride, to which may be added 10% of ethane tetrachloride or  $\text{CCl}_4$ . The treatment may be in stages, different solvents and (or) temps. being used at each stage.

**Cleaning wool.** John F. Paterson. Brit. 399,509, Oct. 12, 1933. Raw or manufd. wool is cleaned by dusting with finely divided dry raw gypsum, revolving in 1 or more drums in a machine and discharging onto an endless continuously moving conveyor by which it is taken into a conduit where it is treated by suction before delivery from the machine. App. is described.

<sup>4</sup> **Wool-cleaning process.** Fitzer California Co. Brit. 398,083, Sept. 21, 1933. See U. S. 1,844,154 (C. A. 27, 2587).

**Cleaning felts.** Rudolf F. L. Wille. Brit. 398,695, Sept. 21, 1933. See Fr. 747,708 (C. A. 27, 5207).

**Bleaching vegetable materials with hypochlorites.** Soc. pour l'ind. chim. à Bâle. Brit. 399,319 and 399,320, Oct. 5, 1933. See Fr. 743,925 and 743,926 (C. A. 27, 4102).

<sup>5</sup> **Incandescent mantles.** Deutsche Gasglühlicht-Auer-G. m. b. H. Brit. 399,354, Oct. 5, 1933. Braided hose, consisting of rayon, ramie, and other fibers and with diagonal reinforcing ribs only, is used in the manuf. of the mantles. Cf. C. A. 28, 650<sup>a</sup>.

**Mothproofing agent.** Jules Sibille. Brit. 399,938, Oct. 19, 1933. An agent for preserving textiles, furs, etc., from moths, etc., comprises a  $\text{H}_2\text{O}$ -insol. vegetable alkaloid compd. produced by reaction of crystd. quassin and quinine in the presence of  $\text{HBr}$  and  $\text{H}_2\text{O}_2$ . Oleic or similar fatty acid may be used in place of  $\text{HBr}$ . Cf. C. A. 26, 2027.

## 26—PAINTS, VARNISHES AND RESINS

A. H. SADIN

**Studies in light-proof blue paints.** H. Rasquin. *Farben-Ztg.* 39, 60(1934).—Ultramarine blue excelled in light-proofness indanthrene blue, Pure blue and Fanal blue L. Bex when these pigments were used to tint  $\text{ZnO}$ , white lead carbonate, and lithopone in both glue-vehicle and oil-vehicle paints. G. G. Sward

**Painting "Elektron."** Fr. Kolke. *Farben-Ztg.* 38, 1756(1933).—A bakelite primer containing 30%  $\text{TiO}_2$ , baked on, was the best of several for the Mg alloys, A2M and AM503. Chromatizing pretreatment also favorably affected the durability of the paints. G. G. Sward

**The use of rubber in paints.** H. P. Stevens and Noel Heaton. *J. Oil & Colour Chem. Assoc.* 17, 8-26(1934); cf. C. A. 28, 1570<sup>a</sup>.—The amt. of raw rubber introduced into paints has been limited by the high viscosity of rubber sols. It was found that low-viscosity rubber sols could be prepd. by introduction of small amts. of metallic soaps, linoleates being the most satisfactory. Co, Mn, Cu, Pb, Zn and Fe were the most effective in the order named. The most important effects of the rubber sols on paints were excellent wetting of pigments, good storage properties and good flow of the wet films with the elimination of brush marks. These properties make the use of low-viscosity rubber especially valuable

in flat wall paints and outside house paints. It is not of much value in enamels. No apparent change in durability was noted. G. G. Sward

**Some paint and varnish problems of the rubber industry.** H. J. Stern. *Oil & Colour Trades J.* 85, 322-6(1934). The possible presence of free S and antioxidants in rubber requires consideration in the formulation of coatings for rubber goods. Properties required of coatings for various rubber articles are discussed. G. G. Sward

**The function of paint as a metal preservative.** I. A. Jordan, et al. *J. Oil & Colour Chem. Assoc.* 16, 398-421(1933).—A discussion. G. G. Sward

**Microbicidal paint.** Troussaint. *Bull. acad. med.* 109, 448-52(1933).—The addn. of *o*-hydroxyquinoline sulfate to the paint imparts to the surface the power to destroy most types of germs within 24 hrs. A. E. M.

**Critical oil content of stand oil paints.** H. Wolff. *Farben-Chem.* 4, 445-7(1933); cf. C. A. 23, 5333; 27, 5555.—Regardless of the type of pigment, the crit. viscosity of stand oil paints equals  $3.35\sqrt{V_0}$ , where  $V_0$  is the viscosity of the stand oil. As previously shown, the crit. viscosity of raw linseed oil paints equals  $3.35\sqrt{1/n}$ , where  $n$  is the exponent in the viscosity equation. Hence it is concluded that the  $n$  of the oil det. the crit.  $n$  of



stand oil paints, but the characteristics of both oil and pigment det. the crit. oil content of raw linseed oil paints.

G. G. Sward

**Relationship between color and structure of organic pigments.** Edward J. Zimmer. *Paint, Oil & Chem. Rev.* 96, No. 2, 7-9(1934).—Theories of the relation between color and chem. structure are illustrated by structural formulas of typical dyes and color lakes.

G. G. Sward

**Titanium dioxide, lithopone and leaded zinc.** H. H. Morris. *Official Digest Federation Paint Varnish Production Clubs* No. 131, 356-64(Jan., 1934).—The general properties of Ti pigments for paper, oil paints and enamels are described. A study was made of the possibility of replacing mixts. of extended Ti pigment with  $TiO_2$  and barytes or asbestine, and leaded zinc for ZnO in outside paints formulated on a basis of 45:35:20 titanox-B basic carbonate white lead:ZnO. The results indicated superiority of  $TiO_2$ -asbestine mixts. over titanox-B and also superiority of leaded zinc over pure ZnO pigments.

G. G. Sward

**Lead sulfate in chrome-yellow manufacture.** George Zerr. *Farbe u. Lack* 1934, 4.—The use of by-product  $PbSO_4$  as a source of Pb in the manuf. of chrome yellow is discussed.

G. G. Sward

**Treatment of oils for nonpenetrating paints.** Wilhelm Krumbhaar. *Official Digest Federation Paint Varnish Production Clubs* No. 131, 352-6; *Paint & Varnish Production Mgr.* 10, No. 2, 5-6, 8(1934).—Nonpenetrating properties of paint vehicles are due to the formation of a gel structure as soon as the volatile matter has evapd. They may be obtained by the incorporation of metallic soaps, in which case the effect is often only temporary because of the flocculating action of some pigments. The specific effects of various metals are described. The use of heavy-bodied oils to obtain nonpenetration is limited by their soly. and compatibility with pigments. The production of nonpenetrating oils by sulfurizing processes is difficult to control.

G. G. S.

**Tung oil: chemical studies and specifications.** L. A. Jordan. *J. Soc. Chem. Ind.* 53, 111T(1934).—A lecture covering the detn. of complete and partial satn., gelation by heat and polymerization. The heat test is reviewed and a new method of test which has been in use for some time described. The complete compn. of 11 Empire tung oils is given.

P. S. Roller

**The tung oil phenomenon and the drying of oils by ionized oxygen.** H. Albrecht. *Farben-Ztg.* 39, 15 16(1934).—Using a limed rosin-tung oil varnish, A. was unable to confirm Rossmann's observations (cf. C. A. 27, 5557). The wrinkling of tung oil films is ascribed to the presence of N oxides whose formation in turn may be due to active gases, e. g.,  $O_3$  or other oxidizing gases.

G. G. Sward

**The swelling of cellulose acetate films.** D. Kruger. *Farbe u. Lack* 1934, 3, 15-16, 29-30.—The absorption of  $H_2O$  and various organic liquids by cellulose acetate is reviewed. Twenty-nine references.

G. G. Sward

**Evaporation rates and distillation range [of solvents].** L. Ivanovszky. *Farben-Chem.* 3, 335-6(1932); cf. C. A. 26, 3411.—The distn. range,  $d$ ,  $\eta$ ,  $\gamma$  and comparative rates of evapn. of 21 common nitrocellulose solvents and thinners are tabulated. The filter-paper method does not give the rate of evapn. when the liquid is present in a lacquer; the figures obtained are variously affected by the  $\eta$  and  $\gamma$  of the liquid, the presence of admixed liquids or nitrocellulose and the porosity of the paper. A self-recording app. is recommended.

B. C. A.

**Research on rosin products.** Louis Light. *Paint & Varnish Production Mgr.* 10, No. 2, 24-7(1934).—A review of patents (chiefly German) on esterification, chlorination and other means of modifying rosin for use in varnish and lacquer.

G. G. Sward

**Chemical progress in the synthetic resins industry.** H. L. Bender. *Chimie & industrie* 30, 525-32(1933).—A brief review, with bibliography of 23 references.

A. Papineau-Couture

**Electrometric titration of artificial resins.** S. Gluckmann and N. Riasantzev. *Chimie & industrie* 30, 1290-6(1933).—The method of Bishop, Kittredge and Hildebrand (C. A. 16, 885) was applied (with some modifications) to the electrometric titration of solns. of artificial resins in 95% EtOH, BuOH and in mixts. of these with 20%  $C_6H_6$ . From the titration curves it can be concluded that the resins contain  $CO_2H$  groups and OH groups that react with the alkali, the greater or less quantity of which is characterized by the buffer power expressed by the slope of the curve. The results of electrometric titrations of iditol show that it contains OH groups that react with alkali; in esterified iditol, esterification weakens the buffer power. The sol. portion of ammoniacal bakelite, at all stages of its heat treatment, gives equal curves, indicating identity of the solid, alc.-insol. phase, which also reacts with alkali to a certain extent, leads to the supposition that there is a gradual passing from stage B to stage C, while the passing from stage A to stage B takes place in steps. By means of electrometric titration, abietic acid can be detd. in albertols. The carboxylic values, calcd. from these curves, are lower than the acidity obtained by titration in presence of phenolphthalein which comprises total acidity, viz., carboxylic, which is neutralized by alkali and hydroxylic (phenolic) which is partly neutralized by coned. alkali. The upper portion of the curves gives an idea of the amt. of unesterified phenolic groups. Electrometric titration curves give much more information regarding the properties of albertols than acidimetric titrations in presence of indicators.

A. P.-C.

**Plioform—a new molding resin.** H. R. Thies and A. M. Clifford. *Ind. Eng. Chem.* 26, 123-9(1934).—Various chem. reactions of the rubber hydrocarbon are reviewed. Rubber is converted into Plioform resins by certain adaptations of the reaction between rubber and the chlorotin acids. These resins are tough, odorless and tasteless, resistant to alkalis, most acids and moisture, and are thermoplastic. They are sol. in solvents of the gasoline or benzene type and insol. in solvents of the acetone type. Milled Plioform gives solns. of high concn. and low viscosity. The resins can be produced in a large variety of transparent, translucent, pearlescent and opaque colors. Details of the molding process are discussed.

W. A. La Lande, Jr.

**New sol. pigment B. G. 125 (Bary, Graffe) 30.** Methylene ether esters [solvents and plasticizers] (Walker) 10. Viscometer [for paints, lacquers, etc.] (U. S. pat. 1,942,920) 4. Plastic materials [for use in lacquers or varnishes] (Brit. pat. 399,814) 23. Dye preps. [for coloring nitrocellulose lacquers, varnishes and resins] (Brit. pat. 399,268) 25.

**Chatterjee, A. C.:** Bibliography of Lac. Calcutta: Indian Lac Cess Committee. 129 pp. Rs. 2/8.

**Miskella, Wm. J.:** Practical Automotive Lacquering. Oak Park, Ill.: Finishing Research Labs., Inc. 194 pp. \$3.50.

**Schüller, H. Josef:** Beiträge zur Kenntnis der Kunstharze. (Bakelite, Cyclohexanoncondensate.) Thesis, Bern. 1931. 44 pp.

**Paints and special pigments.** Wendell G. Randolph (to Egyptian Lacquer Mfg. Co.). U. S. 1,942,491, Jan. 9. In prepg. a liquid coating compn. free from tendency to stratify, at least two sep. finely ground differently colored pigments are mixed in the presence of a small amt. of a "cellulose-type lacquer" such as one contg. cellulose nitrate sufficient to bind the particles of the sep. pigments together; the mixt. is dried and ground without substantial sepn. of the differently colored pigments and the product is dispersed in a liquid paint vehicle in which the dried residue of the lacquer used is insol.

**Pigments and paints.** Titanium Pigment Co., Inc. Brit. 399,183, Sept. 29, 1933. See Fr. 734,601 (C. A. 27, 1218).

**Pigments.** Imperial Chemical Industries Ltd., Joseph Edward Clapham and Anthony James Hailwood. Brit. 399,497, Oct. 2, 1933. Inorg. and org. pigments are improved as regards coloring power and miscibility with  $H_2O$ , drying oils, etc., by grinding, wet or dry, with a small proportion of (the Na salt of) a sulfuric ester of an alc. having 10-20 C atoms, e. g., stearyl or dodecyl sulfate, oleyl, stearyl or cetyl Na sulfate.

**Writing ink.** Konstantin Skumburdis. Ger. 587,796, Nov. 7, 1933 (Cl. 22g. 1). Saponin or exts. contg. saponin are added to writing inks.

**Ceramic ink.** Lawrence McLaughlin (to The Western Electric Co. Inc.). Can. 337,714, Dec. 5, 1933. A ceramic ink comprises  $CoO$ ,  $3$ , borax  $1$  part, lead oxide and a sufficient amt. of linseed oil varnish to cause the ink to have the consistency of printer's ink. The compn. of the ink may be widely varied in accordance with the color desired and the nature of the surface to which it is to be applied. Thus vitreous enamel fluxes other than borax may be used, such as glass or lead borate, and any of the following substances, as well as mixts. thereof, are suitable as pigments, manganese oxide, Ni, Fe, Cu, Cr and selenium red.

**Drying oil from castor oil.** Johannes Scheiber. U. S. 1,942,778, Jan. 9. By the treatment of castor oil by vacuum distn. and chem. dehydration and further heating with glycerol, a reaction product is obtained suitable for use in varnishes and paints and which comprises an ester of glycerol with octadecadienic-9,11-acid  $1$ .

**Varnish composition and shellac substitute.** Joseph B. Dietz and Edmund F. Oeffinger (to E. I. du Pont de Nemours & Co.). U. S. 1,942,413, Jan. 9. A mixt. such as Batu gum 18-20, rosin 10-20, lime 1-2 and China-wood oil 20-40 parts which has been heated to over  $200^\circ$  is dissolved in a varnish thinner such as naphtha and benzene.

**Cellulose ester lacquers.** Leo Roon (to Roxalin Flexible Lacquer Co.). U. S. 1,942,902, Jan. 9. Uniformly dispersed finely divided solid particles of carnauba wax are suspended in a lacquer (such as one contg. nitrocellulose) the ingredients of which do not dissolve the wax at ordinary atm. temp., so that the wax serves as an opacifying agent.

**Use of primers and lacquers on surfaces such as wood, brick, stone or concrete.** Wm. H. Moss (to Celanese Corp. of America). U. S. 1,941,709, Jan. 2. Before coating a surface with a cellulose deriv. lacquer such as one contg. cellulose acetate and a synthetic resin the surface is treated with a primer in which the major non-volatile constituent is a non-resinous substance capable of inducing plasticity in the cellulose deriv.

**Coating compositions.** Accumulatoren-Fabrik A.-G. Brit. 399,344, Oct. 5, 1933. A viscous compn. that can be shaped, brushed or sprayed consists of an aq. rubber dispersion,  $NH_3$ , water glass and Zn or Pb salts of 1 or more weak acids, e. g., carbonates or borates. Vulcanizing agents and fillers may be added. In an example S 200,  $ZnCO_3$  10 g., water glass (sp. gr. 1.25) 50 and  $NH_4OH$  (25%) 15 cc. are added to 1 l. latex (60%).

**Coating composition.** Horace H. Hopkins and John Richardson, Jr. (to The Canadian Industries Ltd.). Can. 336,932, Nov. 7, 1933. A coating compn. is manufd. by dissolving in a thinner, an oil-modified glyceryl phthalate resin in the ratio of about 90.3 to 107.2 parts by wt. of thinner to 1 part by wt. of resin and thereby obtain a soln. having a viscosity from about 10 to 20 poises. Drier is incorporated into the soln., which is diluted to a sp. gr. of about 90. Flaked Al is incorporated into the soln. in the ratio of 1.5-2.5 lb. of Al flake to 1 gallon of soln. Cf. C. A. 27, 3836.

**Rust-resisting coating composition.** Herbert O. Albrecht (to The Canadian Industries Ltd.). Can. 336,447, Oct. 17, 1933. Rust-resisting coating compn. is manufd. by mixing  $H_3PO_4$  and BuOH with a coating compn. of the paint or varnish type.

**Coating compositions containing cellulose derivatives and synthetic resins.** Wm. H. Moss and Blanche B. White (to Celanese Corp. of America). U. S. 1,941,708,

Jan. 2. A coating compn. or lacquer comprises an org. cellulose deriv. such as cellulose acetate together with a phenol-furfural resin which bleaches on exposure to light, a phenol-aldehyde resin which darkens on exposure to light and a common solvent (the different synthetic resins being in proportions to give a compn. which as an entirety does not change color on exposure to light). Cf. C. A. 27, 3350; 28, 893.

**Use of chlorinated biphenyl with nitrocellulose in coating compositions.** Russell L. Jenkins (to Swann Research, Inc.). U. S. 1,942,926, Jan. 9. Chlorinated biphenyl is used with nitrocellulose and resins, etc. Various examples are given.

**Resinous coating composition.** John W. Iliff and Harry R. Young (to E. I. du Pont de Nemours & Co.). U. S. 1,942,757, Jan. 9. A solvent such as hydrocarbon material having a b.-p. range of not more than about  $30^\circ$  and lying between  $150^\circ$  and  $250^\circ$  is used with an oxidizable polyhydric alc.-"polybasic" acid resin insol when oxidized in the solvent, together with an oxidation inhibitor for the resin such as cresol, guaiacol, eugenol, catechol or *p*- or *o*-hydroxybiphenyl. Numerous examples are given.

**Resinous coating composition suitable for use on flexible floor-covering materials.** Wilmer F. Whitecarver and Horace H. Hopkins (to E. I. du Pont de Nemours & Co.). U. S. 1,942,736, Jan. 9. A varnish is prepd. by adding a volatile solvent to the product obtained by cooking a drying oil with an oil-sol. resin and a bodied drying oil is blended with this varnish. The resin used may be a condensation product of glycerol and phthalic anhydride.

**Aqueous finishings.** I. G. Farbenind. A.-G. Brit. 399,816, Oct. 11, 1933.  $NH_3$  or mixed  $NH_3$ , alkali metal salts of acid or substantive dyes, with or without the addn. of urea, are added to aq. finishings, e. g., aq. solns. of casein, shellac, tragacanth, carrageen, methylcellulose or like colloidal sol. substances, or body colors, e. g., the said finishings together with a pigment such as  $Fe_2O_3$  or alk. earth metal salts of dyes contg.  $HSO_3$  groups or the like. In an example the dye obtained by coupling tetrazotized diaminostilbenedisulfonic acid with PhOH and alkylating is dissolved in  $H_2O$  and acidified with HCl, the dye which seps. is kneaded with  $NH_4OH$ , urea added if desired, and dissolved in  $H_2O$  and mixed with an aq. soln. of casein.

**Coating metals.** Gerhard H. Averbek. Ger. 587,982, Nov. 16, 1933 (Cl. 22g. 7.02). In rendering metals non-corrosive by coating with org. cellulose ester solns., a water-absorbing agent such as cement or calcined  $CaSO_4$  is added to the soln.

**Plastic compositions, films, lacquers, etc.** Alphonse O. Jaeger (to Selden Co.). U. S. 1,941,474, Jan. 2. Phthalide substances such as phthalide itself or its various hydrogenated products such as tetra- or hexa-hydrophthalide or their alkyl, alkylidene, alicyclyl and aryl derivs. are used as plasticizers and softeners with various condensation products such as those formed from glycerol and phthalic anhydride,  $C_6H_5OH$  and  $CH_2O$ ,  $C_6H_5OH$  and furfural, urea and  $CH_2O$ , from the polymerization of styrene, itaconic acid or the like or with resinous compns. such as those contg. shellac. Various examples with details are given.

**Molded decorative material.** Lester O. Marsteller (to Westinghouse Elec. & Mfg. Co.). U. S. 1,943,131, Jan. 9. A base of plastic compn. such as one contg. a synthetic resin is molded with a colorant such as one comprising anodic Al; it exhibits metallic luster with depth and relative permanence.

**Molded articles containing phenolic resins.** Clarence A. Nash (to Bakelite Corp.). U. S. 1,942,874, Jan. 9. Articles such as water-meter disks and valves are molded from a compn. comprising a phenolic resinoid and a filler of finely divided mica and asbestos fiber.

**Molded artificial resin articles.** Allgemeine Elektrizitäts-Ges. (to International General Electric Co., Inc.). Brit. 399,738, Oct. 12, 1933. The articles, particularly for elec. insulating purposes, comprise a

foundation of artificial resin and filling material and a surface layer consisting (partially) of an artificial resin molding compn. contg. amine-aldehyde resin, the surface being formed during the molding process.

**Treating molten resin to effect its solidification and granulation.** Stuart P. Miller (to Barrett Co.). U. S. 1,942,764, Jan. 9. Various details of app. and operation are described, the molten resin being spread on a belt for cooling.

**Resins.** I. G. Farbenind. A.-G. Brit. 399,232, Oct. 5, 1933. Resins are manufd. by polymerizing mixts. of mono- or polyolefin benzenes or naphthalenes or homologs thereof, e. g., styrene,  $\alpha$ -alkylstyrenes, e. g.,  $\alpha$ -methylstyrene, divinylbenzene (I), vinylnaphthalenes, e. g.,  $\alpha$ -vinylnaphthalene (II) or vinylmethylmethylbenzenes, with unsatd. ketones contg. an olefin linkage in conjugation with the keto group, e. g., vinyl methyl ketone, methylene ethyl methyl diketone (III), benzalacetone. Polymerization accelerants, etc., may be present. Among examples (1) III and styrene are emulsified in  $H_2O$  with the aid of the hydrochloride of diethylaminoethoxyethyl-anilide and the emulsion is shaken 2 days at 60° and (2) a mixt. of vinyl methyl ketone and styrene is polymerized for 8 days at 80°. I is made by treating  $C_6H_6$  with  $C_2H_4$  and dehydrogenating the  $C_6H_4Et_2$  formed with the use of a catalyst, e. g.,  $ZnO$ ,  $Al_2O_3$ . II is made by treating  $\alpha$ -naphthylmagnesium bromide with AcH and dehydrating the naphthylethanol formed with, e. g.,  $KHSO_4$ . III is made by reaction of methyl ethyl ketone with  $CH_2O$  in dil. NaOH and dehydrating with, e. g.,  $K_2CO_3$ .

**Resins from oils containing polymerizable constituents.** Edwin L. Cline (to Barrett Co.). U. S. 1,942,201, Jan. 2. An oil such as crude coal-tar naphtha is heated with PbO and then distd. and treated with a polymerizing agent such as  $H_2SO_4$  to obtain light colored varnish resins.

**Condensation products from resins.** I. G. Farbenind. A.-G. Brit. 399,206, Oct. 2, 1933. Natural resins or the corresponding resin acids or the esters thereof are treated with volatile inorg. halides to give new products.

<sup>1</sup> Inert solvents may be used. The product may be esterified by alcs., e. g., glycerol. Among examples (1) a soln. of colophony in  $CCl_4$  is treated with  $BF_3$  in a current of N, (2) the product of (1) is esterified with glycerol in a current of N, (3) a mixt. of PhMe and the glycerol ester of colophony is treated with  $AlCl_3$  and (4) a soln. of colophony in  $C_6H_6$  is treated with  $SnCl_4$  or  $TiCl_4$ . In Brit. 399,211, Oct. 2, 1933, natural resins, anhydrides or esters thereof are made to react with phenols or substitution products or functional derivs. thereof, e. g., ethers or esters thereof, in the presence of volatile inorg. halides. The products may be further esterified or etherified by means of ethylene oxide or alkyl or aralkyl halides, e. g.,  $BuCl$ , benzyl chloride,  $\alpha$ -chloromethylisopropylmethylbenzene (I) in the presence of alkali, or an alc., e. g., glycerol, acids, e. g.,  $Ac_2O$ , or acid chlorides, e. g.,  $AcCl$ ,  $BzCl$ . Among 26 examples (1) a soln. of American colophony in  $CCl_4$  is treated with a soln. of  $BF_3$  in crude cresol or PhOH, (2) gaseous HCl is passed into a mixt. of the glycerol ester of colophony,  $CCl_4$  and PhOH and (3) the product of (1) is treated with I in the presence of aq. NaOH.

<sup>2</sup> **Distilling column and rectifier operation for distilling resins and resinous materials.** Erik Öman and Sven H. Ledin. U. S. 1,942,767, Jan. 9. In the operation of a column constituted by a still and a superposed communicating rectifier each comprising a plurality of communicating chambers, the resinous material to be distd., in the liquid state, is introduced into the uppermost chamber of the still and a vapor such as superheated steam is introduced into the lowermost chamber of the still; the still is heated to different temps. increasing by stages downwardly through the still, while in the rectifier a temp. is maintained at its bottom substantially identical with the temp. of the top of the still and the temp. decreases by stages upwardly through the rectifier. App. and details of temp. control are described.

<sup>3</sup> **Synthetic resins.** Bakelite Corp. Ger. 582,665, Aug. 19, 1933 (Cl. 12o. 26.02). See Brit. 275,604 (C. A. 22, 2882).

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHRRUBEL

**A test of deteriorated fats by means of the reaction of Stamm.** István Korpáczy. *Kísérletügyi Közlemények* 36, 211-15 (1933).—Dissolve 1 cc. liquefied fat in 1 cc. of a soln. contg. 0.5 g. diphenylcarbazine in 100 cc. acetylene tetrachloride, immerse for exactly 3 min. in boiling water in a test tube, cool and compare with an aq. Bordeaux S soln. Fats showing higher color nos. with this reaction than 5 should be considered deteriorated and unfit for consumption.

**Hungarian castor-oil plant.** Miklós Janicsék. *Mezőgazdasági Kutatások* 6, 316-19 (1933).—Castor beans grown in Hungary had oil contents of 43.75-57.00%. The acid no. varied from 0.59 for freshly pressed seeds to 4.32 for seeds that had been stored in a bottle for 60 days.

**Rye oil. II. Properties as affected by choice of menstruum.** Albert W. Stout, H. A. Schuette and R. G. Fischer. *J. Am. Chem. Soc.* 56, 210-11 (1934); cf. C. A. 26, 4972. The yield of oil that can be recovered by extraction from rye embryo, the degree of pigmentation of the oil, its phys. and chem. consts. and the contents of unsaponifiable matter and P depend on the solvent. The yields for the various solvents increased in the order: petr. ether <  $Et_2O$  <  $CCl_4$  <  $C_6H_6$  <  $CS_2$  <  $C_6H_6$  <  $CHCl_3$  <  $Me_2CO$ . The following minima and maxima were noted:  $d_{20}^{25}$  0.9220 and 0.9482,  $n_D^{20}$  1.4732 and 1.4789, I no. 133.8 and 139.5, percentage of unsaponifiable matter 8.09 and 10.00, percentage of P (tentatively recorded as lecithin equiv.) 1.03 and 7.26.

**Sapukaja nut.** F. W. Freise. *Tropenpflanzer* 36, 199-202 (1933); *Chimie & industrie* 30, 901-2. —Sapukaja nut has a pericarp contg. a toxic compd. and must be

removed. The compn. of the nuts is: protein 16.1, fat 63.6, N-free ext. and crude fiber 8.2,  $H_2O$  8.2, ash 3.85%. The light yellow, almond-odor cold-pressed oil has the following characteristics: d. 0.920, sapon. no. 198, I no. 75.9. Modern plants produce 45-48% yields of first-pressing and 11-13% of second-pressing oil, the former being suitable for edible purposes and the latter for fine soaps.

**Vegetable lecithin of the soy bean.** F. Rothé and F. Nielloux. *J. pharm. chim.* 18, 443-5 (1933).—As lecithin is insol. in acetone, sol. in  $CHCl_3$  or  $Et_2O$ , this permits its quant. sepn. from the fats of com. crude lecithin, and its detn., e. g., in cacao butter. Purified vegetable lecithin contains total P 2.76%; total N 1.37%; ratio P:N 2.015. For egg lecithin, Lebeau and Courtot (C. A. 23, 3307) give P 3.84%, N 1.86%, P:N 2.07.

**Heat economy in the soap industry.** H. Gäbler. *Arch. Warmewirt.* 15, 47-9 (1934). —A general discussion of heat and power requirements.

**Lanolin in toilet soaps.** G. Knigge. *Deut. Parfümerie-Ztg.* 19, 133-4 (1933); *Chimie & industrie* 30, 900. —A study of the methods of detn. of lanolin in toilet soaps. Tests carried out on mixts. of ordinary soaps or Ca soaps, coconut fat and lanolin showed that detn. of the latter, particularly in the presence of unsaponif. fats, by extn. of the Ca soaps by  $EtOAc$  does not give accurate results, the latter being always low. In order to obtain accurate results, the detn. should be based on the difference between the sapon. nos. of lanolin in alc. and in petr. ether solns.

A. Papineau-Couture

Tertiary alkyl-substituted *o*-hydroxybenzenes [anti-oxidants for fats, waxes, soaps, etc.] (U. S. pat. 1,942,827) 10.

Küter, Hans: Blei(4)-Salze von Fettsäuren, Darstellung und Anwendung in der Fettanalyse. Eine neue Methode zur Darstellung von Rhoden-Verbindungen. Thesis, Jena. 1931. 44 pp.

Stabilizing fats and oils. Roy C. Newton and Donald P. Grettie (to Swift & Co.). Brit. 399,639, Oct. 12, 1933. See Fr. 741,417 (C. A. 27, 2833). (Restricted to guaiacum resin.)

Stabilization of oil and fat. Wm. D. Richardson, Donald P. Grettie and Roy C. Newton (to Swift and Co.). Can. 337,546, Nov. 28, 1933. A small amt. of a condensation product of pyrogallol and acetone, which is substantially insol. in water but sol. in the oil or fat, is incorporated into oils or fats for use in food products to stabilize them. Cf. C. A. 27, 1535.

Processing fish oil. Wm. S. Bodaly ( $1/2$  interest to Agnes Bodaly). Can. 337,392, Nov. 21, 1933.  $\text{NaHCO}_3$  3-5 and powd. alum 1-3 oz. are dissolved in hot water. One imperial gallon of oil such as pilchard oil is heated to  $212^\circ\text{F}$ . and the soln. of  $\text{NaHCO}_3$  and alum is added. The mixt. is stirred 15 min. and the temp. maintained until the water content is substantially evapd. When the oil has cooled it is ready for use. The pptd. stearin may be left in with the oil or sepd. as desired but its inclusion does not impair paint produced with the oil then treated.

Hydrogenation of oil. Julius F. T. Berliner (to The Canadian Industries Ltd.). Can. 336,448, Oct. 17, 1933. Various vegetable and animal oils as well as mineral oils contg. unsatd. compds. are hydrogenated by the use of cracked  $\text{NH}_3$  in the presence of a suitable catalyst. E. g., 100 parts of cottonseed oil contg. 2 parts by wt. of a Ni catalyst is charged into a pressure autoclave, heated

to approx.  $115^\circ$  and cracked  $\text{NH}_3$  is passed into the autoclave until a pressure in the neighborhood of 100 lb. per sq. in. is reached.

Toilet soap powder. Wm. H. Alton (to R. T. Vanderbilt Co.). U. S. 1,943,253, Jan. 9. Finely divided high-grade soap is mixed with about 3 times its quantity of finely divided pyrophyllite (both materials being of about 100-mesh fineness).

Wetting, cleansing and dispersing agents from 7,18 stearic glycol, etc. Fritz Guenther and Karl Saftmayer (to I. G. Farbenind. A.-G.). U. S. 1,942,812, Jan. 9. One mol. proportion of water is split off from the 7,18-stearic glycol, obtained by the reduction of ricinoleic acid or its esters, the resulting unsatd. alc. being then converted into water-sol. products by treatment with a strong "polybasic" inorg. acid such as a sulfonating agent or  $\text{H}_3\text{PO}_4$ . Various examples with details of procedure are given.

Wetting and other agents. Soc. pour l'ind. chim. à Bâle. Fr. 754,626, Nov. 10, 1933. Wetting, emulsifying, dispersing and other agents are prepd. by transforming cyclic amidines, substituted in the  $\mu$ -position by an aliphatic or hydroaromatic radical of at least 3 C atoms (derived from *o*- or *peri*-diamines of the  $\text{C}_6\text{H}_4$  or  $\text{C}_{10}\text{H}_6$  series) into compds. sol. in water by alkylation, arylation, or aralkylation up to exhaustion or by sulfonation or by a combination of these 2 processes. Examples are given of products obtained by sulfonating  $\mu$ -heptadecyl-,  $\mu$ -hendecyl-,  $\mu$ -naphthenyl-,  $\mu$ -heptadecyl-*N*-phenyl- and  $\mu$ -heptadecyl-(and hendecyl)-*N*-benzylbenzimidazole,  $\mu$ -heptadecyl-1,2-naphthimidazole (by condensing 1,2-naphthalenediamine with stearic acid),  $\mu$ -heptadecyl-(by heating 1,8-naphthalenediamine with stearic acid) and  $\mu$ -undecylpyrimidine. The prepn. of quaternary  $\text{NH}_4$

salts of the general formula  $\text{C}_n\text{H}_n \text{N}(\text{CH}_2\text{Ph}) \text{CR}'\text{NCl}$ . ( $\text{C}_{12}\text{H}_{12}$ , where  $\text{R}'$  is a heptadecyl or pentadecyl radical, is also described.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

Making muscovado sugar in Jolo. Robert L. Pendleton. *Sugar News* 14, 599-601(1933).—Illustrated description of primitive methods. L. Cusachs

The effect of the working temperature on the polarization of Java raw sugars. K. Douwes Dekker. *Arch. Suikerind.* 41, III; *Mededeel. Proefsta. Java-Suikerind.* 1101-17(1933).—Eleven white sugars and 79 raw sugars were dissolved and polarized at room temp. (approx.  $28^\circ$ ) and also at  $20^\circ$ , and the polarizations of one raw sugar were repeated 25 times under the same conditions. For the white sugars the differences varied from 0.21 to 0.52, av. 0.29; for the raw sugars from 0.12 to 0.46, av. 0.263; for the replicate detns. on one sugar from 0.17 to 0.43, av. 0.258. For pure sucrose the av. differences would have been 0.31, 0.288 and 0.318, resp. The variations found are partly due to differences in the nature of the non-sucrose constituents of the sugars, but errors of observation also play an important part. For molasses the polarization at room temp. was usually higher instead of lower than that at  $20^\circ$ . The results show the advantage of working at  $20^\circ$ ; in doubtful cases sugar samples should be sent to a lab. equipped that way. F. W. Zerban

The necessity of clarification for the determination of reducing sugars in superior head sugar, head sugar and new assortment raw sugar. K. Douwes Dekker and P. J. Klokke. *Arch. Suikerind.* 41, III; *Mededeel. Proefsta. Java-Suikerind.* 1089-99(1933).—In comparisons between no clarification, and clarification with neutral  $\text{Pb}(\text{OAc})_2$ , followed by deleading with  $\text{Na}_2\text{HPO}_4$  and K oxalate, the 1st method gave for 56 samples of superior head sugar results varying from 0.008 higher to 0.011 lower, av. 0.0012 lower than the 2nd. For 48 head sugars the same figures were +0.026, -0.012 and -0.0009, for 51 raw sugars +0.038, -0.015 and +0.0068, resp. In the future the

official method of the Java sugar industry will omit clarification for reducing sugar detn. in these 3 types of sugar and in refined sugar. F. W. Zerban

A study of sugar-distribution methods. Cecilio Alencastre. *Sugár News* 14, 546-9(1933). L. Cusachs

Study of sugar-cane variety P. O. J. 2878. J. O. Carrero. Puerto Rico Agr. Expt. Sta., *Rept.* 1932, 8 11 (1933); cf. C. A. 27, 620.—The inorg. P content of a sugar cane variety is very important in subsequent juice defecation. P. O. J. 2878 is a very heavy P feeder, but lab. examn. of juices of this variety showed variations in inorg.  $\text{P}_2\text{O}_5$  content of 6-62 mg. in 100 cc., with an av. of about 30.5 mg. In 1932, the inorg. P content of this cane was only 50-75% as great as in 1931, and defecation complaints were numerous. The methods for the detn. of inorg. and total P in sugar cane are discussed.

C. R. Fellers

Statistical treatment of ripening data (on sugar cane). Th. J. D. Erlee. *Arch. Suikerind.* 41, 753-61(1933).—A critique of Hommes' article (C. A. 27, 2835).

F. W. Zerban

Occurrence of aconitic acid in cane-sugar products. H. C. Prinsen-Geerligs. *Arch. Suikerind.* 41, 720 1 (1933).—A deposit obtained by centrifuging a 1st molasses in a Cuban factory was found to consist of Ca aconitate, with small quantities of  $\text{CaCO}_3$ ,  $\text{MgCO}_3$ ,  $\text{Fe}_2\text{O}_3$  and  $\text{SiO}_2$ . Cf. Nelson, C. A. 23, 4933.

F. W. Zerban

Sugar beets in the U. S. S. R. from the data of the sugar factories. P. G. Morozov. *Trans. Central Inst. Sugar-Ind.* (U. S. S. R.) No. 4, 3-64(1930).—A review with complete data.

V. E. Baikow

Quality of sugar beets in the U. S. S. R. P. Shemyakin. *Trans. Central Inst. Sugar-Ind.* (U. S. S. R.) No. 4, 65-105(1930).—The max. difference in sugar content

among the factories was 1.97%, purity 3.4 and tech. quality 1.89%. The geographical situation of factories had no direct relation to the richness of the beets. The max. difference of losses was 0.2% on the wt. of beets.

V. E. Baikow

The methods of investigation of silo rotting at a factory storing beets. V. P. Murav'ev. *Trans. Central Inst. Sugar-Ind.* (U. S. S. R.) No. 5, 24-31(1930).—M. outlines the reasons for rotting in silos and gives methods for identification of the microorganisms.

V. E. Baikow

The clarification and characteristics of the last mill juice. R. H. King and Ernesto Villareal. *Sugar News* 14, 533-45(1933).—A gradual elimination of gums takes place above  $p_H$  8.5. Liming to  $p_H$  10.0 more completely removes the suspended matter, non-sugars and gums; the vol. of mud is less and more compact. Because of the high alk. heating to 90° is recommended. The clear juice can be used to temper the mixed juices, or the last mill juice and factory settlings are limed to  $p_H$  10, filtered, and the filtrate is used to temper the factory mill juices. Citations and analytical results are included.

L. Cusachs

Comparative experiments on purification of diffusion juices by the ordinary, V. N. I. S. and Teatini methods. A. M. Pshenichnui and B. P. Shumkov. *Nauk. Zapiski Tsukrovoi Prom.* 32, 59-68(1933).—Juices treated with a small amt. of CaO by the Teatini and V. N. I. S. methods are of the same purity as juices treated by 2% CaO at the 1st and with 0.25% CaO at the 2nd defecation. Ca salts give the same results in all 3 cases. Max. color was decreased by the V. N. I. S. method. Filtration of juices treated by the Teatini and V. N. I. S. methods is good; filtered juices are sparkling and have a slightly greenish coloration which indicates the absence of colloids. The treatment of low-purity diffusion juices (76-80) by these methods also gave very good results. Of great importance in the coagulation of colloids is the maintenance of optimum conditions. From lab. expts. it can be stated that the max. coagulation of colloids under acid conditions is at  $p_H$  4.7-4.9 and in alk. solns. at  $p_H$  11.5-12.0.

V. E. Baikow

Conductometric control of vacuum pan boiling in the refinery. S. Stare. *Intern. Sugar J.* 36, 19-23(1934).—See C. A. 28, 674<sup>2</sup>.

W. L. Owen

Further notes on boiling after-product sugars. Using electrical conductivity control. W. F. Ak-wijn. *Intern. Sugar J.* 35, 465-8(1933); cf. C. A. 27, 6003. A discussion of the comparative merits of high-vacuum and low-vacuum pans with a description of a device for drawing in sirup. Charts are given of elec. cond. during masecuite boiling.

W. L. Owen

Scale formation in evaporators. Its prevention by corrective processes. H. Claassen. *Intern. Sugar J.* 36, 17-18; *Centr. Zuckerrind.* 41(1933).—Scale formation in evaporators differs from that in boilers in that org. salts of Ca and Mg are present. Boiler scale can be prevented by (1) displacement of sulfate and oxalate ions by carbonate and phosphate ions; (2) kinetic reactions on the use of protective colloids; (3) addn. of coarsely dispersed substances; (4) proper operation; (5) elec. means. In the prevention of scale in evaporators (1) and (4) give the best promise of success.

W. L. Owen

Factory results. F. Hommes. *Arch. Suikerind.* 41, 741-52(1933); cf. C. A. 27, 5567. The causes of error in the wt. of mixed juice and imbibition water have been further studied. The juice content may be low because of drying out of the cane after cutting; slight errors may be made unconsciously in calibrating scales and tanks, and in applying foam and other corrections; undetd. losses are often ascribed to errors in the juice wt., and the latter is corrected accordingly; the wt. of the juice may be altered deliberately. Sometimes the reported purity of the mixed juice is suspiciously low; this may be due to souring, but may also be fraudulent, for the purpose of making a better showing. The "concealed" losses may be detected by multiplying the proportional purity ratio (C. A. 27, 2835) with the juice content. A comparison by this method of the results obtained in Java

in 1930 and in 1931 shows that not much progress has been made. It is significant that for some factories the product of juice content and Winter rendiment is const., while in others it fluctuates widely. The undetd. losses are probably mostly mech., and occur principally in the filter station, especially during the night shift. They could be overcome by stricter supervision. It is proposed to use for the over-all control of the factory the formula:  $\text{sugar \% cane} = \text{available sugar in 1st mill juice} \times \text{juice \% cane} \times \text{Brix extn.} \times \text{proportional purity ratio} \times \text{winter rendiment}$ . Detailed directions are given for assembling the necessary data and for supervision of the control.

F. W. Zerban

Electrical power consumption of the sugar factories Goenoengsarie and Soedhono (Java). J. J. W. den Haan. *Arch. Suikerind.* 41, 111; *Mededeel. Proefsta. Java-Suikerind.* 985-1030(1933).

F. W. Zerban

Analyses of Italian molasses of the 1931 campaign. M. Catenacci and Leonetti-Luparini. *Ind. saccar. Ital.* 26, 555-61(1933).—The final molasses from De Vecchis plants is low in purity and high in reducing sugars and color; that from Steffen plants is low in albuminoid N. Analytical tabulations and references are given.

L. C.

Quantitative estimation of sulfurous acid in molasses. G. Staiger. *Brenner's Ztg.* 50, 13-14(1933); cf. *Ibid.* 47, 131(1930).—S. concludes that the simple test with starch KI paper is suitable to replace the volumetric or gravimetric method within certain limits of accuracy. The time of discoloration of the I test is observed and thus the amt. of  $SO_2$  estd. Results comparing the various methods are tabulated.

S. Józsa

Quantitative estimation of sulfurous acid in molasses. B. Drews. *Brenner's Ztg.* 50, 142(1933).—The gravimetric (official) and the volumetric methods are compared. The volumetric method is quicker and dependable. Rothenfusser's method (C. A. 24, 1056) is not sufficiently accurate to be recommended.

S. Józsa

Combating the high yield of final molasses. I. B. Mintz, A. D. Girda, N. I. Zaduikhailo and F. M. Gontar. *Nauk. Zapiski Tsukrovoi Prom.* 32, 77-83(1933).—A high yield of final molasses was caused mainly by the presence in the beets of a large amt. of sol. org. non-sugars, chiefly nitrogenous. Decreasing of the final molasses yield must start with the breeding of the beets. All field and plant operations must be controlled. Treatment of greens with 3% CaO (on the wt. of greens) and carbonation decreases the yield of final molasses by 10-20%.

V. E. Baikow

Prediction of ash percentage in final molasses from conductivity measurements at 35°. J. G. Davies. *Intern. Sugar J.* 35, 472-5(1933).—Formulas designed to predict the chem. ash in final molasses by means of cond. measurements at 20° cannot be used in the tropics owing to the inconvenience of cooling to that temp. The method of Zerban and Sattler gives reliable results when the measurements are carried out at 35°. The higher temp. for measurements introduces an increased error due to the increase in cond., making the variation in the compn. of the ash more apparent. While prediction formulas derived from data obtained from samples from any one country do not yield accurate results even in all cases within that country, a specific prediction formula for any one factory gives results as accurate as the chem. ash analysis in 80% of the cases.

W. L. O.

Benzoylation of starch. A. F. Damansky. *Compt. rend. soc. biol.* 114, 1051-3(1933); cf. C. A. 27, 5572. Three g. of extremely dry starch was added to 100 cc. pyridine and 8 cc.  $BzCl$  and the mixt. slowly heated to 75° during the course of 72 hrs. Amylose prep'd. by Samec's method gave a quant. yield of tribenzoate,  $[\alpha]_D^{25} = 80.1^\circ$ , sol. in pyridine,  $CHCl_3$  or  $Me_2CO$ , insol. in  $Et_2O$ ,  $EtOH$  or water. Amylopectin gave a quant. yield of dibenzoate, insol. in org. solvents. Potato starch formed principally dibenzoate, with a little tribenzoate.

L. E. Gilson

Chemistry of certain beet hybrids (Bougy) 11D. Official introduction of a new hundred point for the

Ventzke-scale saccharimeters (Šandera) 1. Relation of anther color and the proportions of starch-filled pollen grains in sugar cane (Bregger) 11D. Phosphate requirements of Java sugar-cane soils (Neeb) 15. Action of K fertilizers on undesirable N in the sugar beet (Lipman) 15. Combating heart and dry rot of beets (Meyer-Hermann) 15. Production of pure lactic acid from molasses (Rozhdstvenskii) 16.

Gilmore, A. B.: Louisiana Sugar Manual. 24th ed. New Orleans: The Author. 76 pp. \$5.

Kukharevskii, I. A.: Vade-Mecum du cultivateur. Paris: Betterave & les Industries agricoles. 66 pp. F. 30. Reviewed in *Facts about Sugar* 29, 61(1934).

Carbonating sugar juices. Arthur W. Bull and Elmer R. Ramsey (to Dorr Co.). U. S. 1,941,461, Jan. 2. Lime juice and gas are continuously mixed (in a described app.) to carbonate the juice; the degree of alk. is detd from a sample exposed to the atm. and the resulting detn serves as a basis for proportioning the ingredients of the mixt.

Dextrinizing starch. Arthur D. Fuller (to National Adhesives Corp.). U. S. 1,942,544, Jan. 9. Starch is made to react with Cl<sub>2</sub>, the pH is adjusted for the particular product desired (suitably to 7.3 for the production of British gum or 2.0 for the production of thin boiling starch) and the material is then dextrinized. Cf. C. A. 28, 1214<sup>4</sup>.

## 29—LEATHER AND GLUE

ALLEN ROGERS

The use of fluorides in preserving hides. D. Jordan Lloyd. *Collegium* 1933, 698-700.—Edible gelatin prepd. from hides cured with 99% NaCl and 1% NaF did not contain enough F to be harmful to health even though its effect is cumulative. I. D. Clarke

The most important instruments for measuring pH in the leather industry. A. Salmony-Karsten. *Lederlecher Rundschau* 25, 97-100(1933). Com. app. is described. I. D. Clarke

Checking the method for determination of sulfuric acid in leather. I. Kh. Bakhtiyarov. *Ovladanie Tekhniki: Koshevennoe Proizvodstvo* 1931, No. 1, 33-4.—For free H<sub>2</sub>SO<sub>4</sub> added to hide powder, the Balland-Maljean method gives accurate results. For powder treated with sulfates but not free H<sub>2</sub>SO<sub>4</sub> the Balland-Maljean method shows the presence of a considerable amt. of free H<sub>2</sub>SO<sub>4</sub>. The Procter-Sirl method has the same disadvantages, although the data are slightly lower. In both cases of treatment with free H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>SO<sub>4</sub> was found in the filtrate. This acid should be ascribed to the SO<sub>3</sub> from the sulfates. The amt. of Na<sub>2</sub>SO<sub>4</sub> is detd. correctly by the Schroder method. A powder which was treated with Na<sub>2</sub>SO<sub>4</sub> or NaHSO<sub>3</sub> (which contained some SO<sub>2</sub>) gives an excessive amt. of sulfates by the Schroder method. In these cases H<sub>2</sub>SO<sub>4</sub> was not found. The Schroder method gives satisfactory results in case of small quantities of H<sub>2</sub>SO<sub>4</sub> and a simultaneous presence or absence of salts. The Procter-Sirl and Balland-Maljean methods cannot be used for leather tanned with sulfited or sulfite cellulose exts. Atkin-Thomson's "acid number," contrary to the Balland-Maljean and the Procter-Sirl methods, gives lower values with an increase of the acid content. The "acid number" is based on the measurement of the pH of the leather by the Atkin-Thomson method and it gives a good scientific base for the evaluation of the harmful effects exercised by the acid on the leather tissue. A. A. B.

Fat-liquoring process. VII. Train oil spue on vegetable-tanned leather. F. Stather, H. Sluyter and R. Lauffmann. *Collegium* 1933, 617-28; cf. C. A. 27, 5574.—Light, high humidity and low temp. favor spue formation. Mineral salts increase spue moderately. Spue forms more rapidly as either the amt. of grease or sol. solids in the leather increases. The properties of the oil have an unknown influence on spue formation; the I no. is not a reliable guide. VIII. Alteration of liquor fats in chrome leather. F. Stather and R. Lauffmann. *Ibid.* 723-6.—The fat-liquor fats and soaps change considerably during fat-liquoring and after they are in the leather; fatty acids and oxyfatty acids are formed, and the I no. is lowered. Fat extd. from the leather cannot be used to predict the nature of the fat-liquor fat. I. D. Clarke

The use of woolen fabric interwoven with other fibers for identifying tannins by the quartz lamp. Leopold Pollak. *Collegium* 1933, 628-30. Wool interwoven with silk and mercerized cotton in the warp and rayon and ordinary cotton in the weft is used like Mulhouse ribbons (cf. C. A. 26, 4728). I. D. Clarke

Treating [leather] (Ger. pat. 587,974) 25. Compound sheet material [for artificial leather] (Brit. pat. 399,856) 18. Nondyeing metalliferous sulfurized phenol derivs. [tanning materials] (U. S. pat. 1,943,179) 25.

Grasser, Georg: Führer durch die Gerbereipraxis. Leipzig: Friedr. Voigt. About 370 pp. M. 17; leather, M. 20.

Heinrichs, Erich: Über den Einfluss der Äscherung und der Neutralsalzbehandlung auf die Chromaufnahme der Haut und die Eigenschaften der aus der Haut hergestellten Gelatine. Thesis, Darmstadt. 1930. 57 pp.

Leistner, Karl: Die Abhängigkeit der Quellbarkeit getrockneter Gelatineschichten von der Gerbung mit Chromalaun. Thesis, Dresden. 1931. 46 pp.

Würtenberger, Richard: Über elektrometrische Messungen im Gerberei-Laboratorium, insbesondere unter Benutzung eines Röhrengalvanometers als Messinstrument. Thesis, Darmstadt. 1931. 66 pp.

Drying and cleaning hides. Paul Hertzsch. Brit. 399,327, Oct. 5, 1933. Addn. to 340,940 (C. A. 27, 2335). In the process of 340,940 the cleansing agents are allowed to pass out freely with the stream of air to a separator from which they are returned to the drying chamber. App. is described.

Tanning hides. Richard Pasternack and Gordon O. Cragwall (to Charles Pfizer & Co.). U. S. 1,941,485, Jan. 2. For tanning hides, skins or skins, a soln. contg. an Al compd. such as AlCl<sub>3</sub> or Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, together with gluconic acid (or Al gluconate) is used.

Tanning leather. Chemische Werke vorm. H. & E. Albert (Karl Uhl and Hans Menzler, inventors). Ger. 587,724, Nov. 7, 1933 (Cl. 28d. 3). A prepri. for Cl tanning is obtained by bringing org. material such as leaves into soln. by gradual addn. of mineral acid and chromates or bichromates, and heating.

Condensation products (light-colored tanning agents) Alphons O. Jaeger and Heinrich W. Witzel (to Selden Co.) U. S. 1,941,475, Jan. 2. At least one carbohydrate, such as cellulose is condensed with phthalic anhydride, and at least one impure aromatic hydrocarbon such as a crude anthracene or naphthalene residue with H<sub>2</sub>SO<sub>4</sub> and a dispersion of the resulting sol. condensation product is subjected to the action of a bleaching agent such as NaOCl or Cl to lighten its color without destroying its tanning properties.

Agglutinant suitable for use with leather, etc. Wally Stelkens and Richard Müller (to C. F. Boehringer & Soehne G. m. b. H.). U. S. 1,941,958, Jan. 2. Acetyl cellulose, collodion wool and ethyl acetanilide are used together with various solvents, etc.

Electroosmotic fractionation of solutions of glue or gelatin in a four-cell electroosmotic apparatus. Alexander Jenny (to Siemens Elektro-Osmose, G. m. b. H.). U. S. 1,942,478, Jan. 9. Various details of app. and operation are described.



## 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Recent progress in the rubber industry. Georges Thesmar. *Bull. soc. ind. Mulhouse* 99, 559-87(1933).—An address. I. H. Odell

New horizons in the manufacture of rubber. Paul Buère. *J. pharm. chim.* 18, 376-8(1933); cf. *C. A.* 24, 3397; Graffe, *C. A.* 27, 4127; Thiollot, *C. A.* 27, 6015, 6017.—Permanency of rubber goods upon storage is made possible by the judicious use of accelerators in vulcanization and of antioxidants; also by treatment of finished goods with paraffin oil. S. Waldbott

Advances in rubber manufacture since the end of the World War. F. Kirchhoff. *Chem.-Ztg.* 57, 977-80(1933.) E. H.

Review of developments and progress in the chemistry and technology of latex and of rubber from 1927 to July, 1932. St. Reiner. *Caoutchouc and gutta-percha* 31, 16846 8(1934); cf. *C. A.* 28, 1569<sup>1</sup>. Numerous articles and patents on electrophoresis are cited. C. C. D.

Industrial uses of rubber latex. A summary of uses to which rubber latex is being put in many manufacturing processes. D. F. Twiss. *Rubber Age* (N. Y.) 34, 115-17(1933), 172-4, 176(1934); cf. *C. A.* 27, 3636.—A review and discussion. C. C. Davis

The technic of latex dipping processes. H. Barron and G. L. Barron. *India Rubber J.* 86, 767-9, 793, 801 (1933).—A review and discussion of the problems involved in handling latex and of the technic of dipping processes. C. C. Davis

Latex and protective colloids. II. Barron. *India Rubber J.* 86, 743-4(1933).—A review of present developments in the stabilization of latex. C. C. Davis

Colloid chemistry of rubber. II, III and IV. Action of metals on colloidal solutions of rubber. (1), (2) and (3). Keiichi Shimada. *J. Soc. Rubber Ind. Japan* 6, 604-27(1933); cf. *C. A.* 26, 2617.—The viscosity-time relation of rubber sols as affected by oleic acid was studied. Oleic acid caused disaggregation of the rubber, and this effect was similar to the action of the Group-2 vulcanization accelerators in S.'s classification (cf. *C. A.* 27, 629-30). The changes of viscosity during 5 hrs. after the prepn. of sols of Al, Co, Ni, Cr, Ag, Zn, Fe, Cu, Pb, Mn or Mg oleate in  $C_6H_6$  were studied; only Co and Mn oleates showed an increase in viscosity with an increase of time. This effect is attributed to the polymerization of metallic soaps brought about by oxidation in the presence of air. The viscosity-time relation of rubber sols in  $C_6H_6$  as affected by Al, Co, Ni, Cr, Ag, Zn, Fe, Cu, Pb, Mn or Mg oleate was then studied; only Cu, Fe, Mn and Co oleates showed a continued lowering of the viscosity, while the other metallic oleates, as in the case of oleic acid, caused a lowering of viscosity at first, after which the latter remained nearly const. In the former case the rubber was depolymerized and in the latter case it underwent disaggregation. The viscosity-time relation of rubber sols with Cu or Fe oleate can be expressed well by S.'s formula,  $\eta_{10} - \eta_1 = k \log t$ , where  $\eta$  is the viscosity at the time of addn. of the metal soap  $t_0$  and  $t$  hrs. later. The depolymerization of rubber as estd. by the change of viscosity in purified H after the addn. of Cu and Mn soaps indicated that the process was the same as in the presence of air. The mechanism of the change of properties of rubber by the addn. of Cu, Fe, Mn or Co oleate is discussed. K. Kitsuta

pn in the rubber industry. M. Dérivé. *Caoutchouc and gutta-percha* 30, 16575-7(1933).—A review and discussion. C. C. Davis

Chlorinated rubber. An account of research work recently carried out on this controversial subject, in behalf of the Rubber Grower's Association. C. A. Rudfarn. *Rubber Age* (N. Y.) 34, 113-14(1933).—A review and discussion. C. C. Davis

The safe use of carbon tetrachloride in the rubber industry. Leon J. D. Healy. *Rubber Age* (N. Y.) 34, 119 21(1933).—A discussion of the long-standing contro-

versial subject of the toxicity of  $CCl_4$ . The experience of H. indicates that under certain conditions  $CCl_4$  is decidedly hazardous. C. C. Davis

Aging processes of rubber. I. The effect of irradiation by ultra-violet light on the surface tension of rubber solutions. B. Dogadkin and G. Panchenkov. *Kolloid-Z.* 65, 350-5(1933); cf. *C. A.* 26, 2079.—Sols. of rubber of 0-2% concn., prepd. from carefully purified rubber, were irradiated in  $N_2$ ,  $CO_2$  and air. The interfacial tension against water did not change in  $N_2$  but in air and  $CO_2$  it was lowered, and reached a const. value in 120 min. Water extd. a substance of significant cond. The results confirm the previous work in that they indicate the changes to be a result of oxidation. Arthur Fleischer

A water-immersed air oven for accelerated aging tests on rubber. A. G. Milligan and J. E. Shaw. *J. Sci. Instruments* 11, 10-14(1934).—The oven, designed primarily for aging rubber but adaptable to other investigations, consists of a cylindrical brass container with a well-insulated, internally fitting lid, and immersed in an electrically heated and thermostatically controlled water bath. A slow current of air is supplied to the container by a rise of water in a cistern with an automatic siphon. The temp. of all parts of the inside of the oven can be maintained uniform and const. within  $\pm 0.1^\circ$ . C. C. D.

Antioxigens. F. Jacobs. *Caoutchouc and gutta-percha* 30, 16578 80(1933); cf. *C. A.* 28, 1569<sup>1</sup>.—The chem. name and formula, com. name and characteristics of various other substances are tabulated. C. C. Davis

Products of porous rubber. St. Reiner. *Caoutchouc and gutta-percha* 30, 16585-6(1933); *Rubber Age* (London) 14, 292-4(1934); cf. *C. A.* 28, 367<sup>1</sup>.—Cellular rubber, latex sponge, microporous rubber, porous hard rubber and hard foam rubber are discussed. C. C. Davis

A new soluble pigment B. G. 125. P. Bary and L. Graffe. *Rev. gén. caoutchouc* 10, No. 96, 3(1933).—The identity of the product is not revealed, but in rubber it behaves like an "active"  $ZnO$ , and is even more sol. in unvulcanized rubber than the latter. It thickens and stabilizes latex, and on evapn. the films are more nearly transparent than ones contg. the same proportion of  $ZnO$ . C. C. Davis

Incorporation of glue in rubber mixtures. C. G. Rous-selot. *Caoutchouc and gutta-percha* 30, 16616-19(1933); 31, 16644-6(1934).—The paper describes expts. on the incorporation of glue into rubber and its effects on the rate of vulcanization, aging and phys. properties of the vulcanizates. Finely ground glue should be swelled with 15% of water to a gel which is readily dispersed. Coarse glue can be incorporated directly in a master batch. Glue has little or no accelerating action and is not detrimental to aging (judged by Geer oven tests). The higher the proportion of glue in vulcanizates immersed in benzine, gasoline, mineral oil and  $C_6H_6$ , the less was the swelling, and the mixts. regained their original dimensions and quality after evapn. on standing. C. C. Davis

Electric wires insulated with oil-resistant rubber. Minoru Osumi. *J. Soc. Rubber Ind. Japan* 6, 627-31 (1933).—A Cu wire with Sn coating was coated with a layer of ordinary rubber and an outer layer of a mixt. of rubber 40, S 7, Mg carbonate 40. The wire showed no more increase in vol. after soaking 200 hrs. in neutral mineral oil or 60 hrs. in gasoline; in the latter case, there was a slight decrease in vol. after this time, which may have been the result of a partial soln. of the rubber. The wire showed therefore excellent resistance to oil, though it softened slightly, not, however, so that it cracked when bent. K. Kitsuta

Use of rubber in paints (Stevens, Heaton) 26. Paint and varnish problems of the rubber industry (Stern) 26. Plioform: molding resin [from rubber] (Thies, Clifford) 26. Gas-producing compns. [for inflating, rubber balls, etc.] (Brit. pat. 399,173) 18. Puncture-proofing compn.

[for pneumatic tubes] (Can. pat. 336,531) 18. Rubber-bonded asbestos products (Brit. pat. 399,871) 18. Aq. dispersions of asbestos and rubber (Brit. pat. 399,870) 18.

Zinc Oxide in Rubber. New York: New Jersey Zinc Co. 32 pp.

**Latex.** Aage Nyrop and Koefoed, Hauberg, Marstrand & Helweg, Aktieselskabet Titan. Brit. 399,370, Oct. 5, 1933. Latex is coned. by distributing it in finely divided form in a layer of coned. latex, which exts. rubber particles and increases in bulk, while liquid, poor in rubber, passes through and forms a lower layer.

**Compounding rubber.** Robert J. King and Elizabeth C. King (to The Robert J. King Co. Inc.). Can. 337,524, Nov. 28, 1933. A liquid thermoplasticizing compn. for use in the compounding of rubber is made by adding to a liquid hydrocarbon solvent of rubber a large amt. of a sulfonated petroleum oil together with com. secondary hexyl alc., and subsequently diluting the mixt. with a large amt. of hydrocarbon oil.

**Masticating rubber.** The Robert J. King Co., Inc. Brit. 398,702, Sept. 21, 1933. The time required for mastication is reduced by adding to the raw rubber 4-8% of a rubber solvent with a small quantity of solvent activator dissolved therein. The solvent is preferably one non-volatile at the mastication temp., *e. g.*, 300° burning oil, and the activator is a higher alc., *e. g.*, hexyl, or (and) a sulfonated hydrocarbon or fatty oil, *e. g.*, the sulfonated products obtained in purifying medicinal white oil, sulfonated castor oil.

**Apparatus and method for mixing and other treatments of rubber by passage through rolls.** Dunlop Rubber Co. Ltd. and Ernest E. Quinton. Brit. 399,850, Oct. 16, 1933.

**Rubber compositions.** Wm. F. Zimmerli and Waldo L. Semon (to B. F. Goodrich Co.). U. S. 1,942,853, Jan. 9. A softener such as a mineral oil is incorporated into one-third to twice its quantity of rubber, the softener being applied to the surface of substantially unmasticated crude rubber and its absorption by the rubber permitted.

**Rubber compositions.** Harry Morser. Brit. 399,329, Oct. 5, 1933. Kbonite with a small proportion, *e. g.*, 0.5-1%, of powd. metal, *e. g.*, Al, incorporated therein before vulcanization is used for making hard flexible sheets having an embossed pattern on 1 or both faces, to serve as hackings under paper in typewriting or handwriting as a safeguard against fraudulent alterations.

**Cellular rubber.** Dunlop Rubber Co. Ltd., Francis J. Payne, Evelyn W. Madge and Walter G. Gotham. Brit. 399,940, Oct. 19, 1933. Sponge rubber particles having a uniform size of less than 0.5 in. are obtained by subjecting the material to a rapid succession of shearing impacts, *e. g.*, in a disintegrator of the revolving-arm type. The particles may be bonded by an aq. dispersion of raw or vulcanized rubber, synthetic rubber, balata, gutta-percha, etc., and molded in known manner. They may also be sprayed onto a surface coated with adhesive for the production of heat- and sound-insulating panels, etc.

**Preservation of rubber.** Waldo L. Semon (to The B. F. Goodrich Co.). Can. 337,506, Nov. 28, 1933. The deterioration of rubber is retarded by treating the rubber with a substance selected from the class consisting of meso-disubstituted acridans and derivs. thereof having only hydrocarbon groups, hydroxy groups or amino groups substituted on the aromatic rings.

**Ornamenting rubber.** Charles W. Leguillon (to The B. F. Goodrich Co.). Brit. 399,051, Sept. 28, 1933. See Fr. 748,940 (C. A. 28, 374°).

**Rubber goods.** Vernon J. Sprunger (to The Anode Rubber Co. Ltd.). Brit. 399,213, Oct. 2, 1933. See U. S. 1,864,621 (C. A. 26, 4500°).

**Making rubber objects from dispersions by electrophoretic deposition in an alternating current.** Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 587,700, Nov. 7, 1933 (Cl. 39b. 1).

**Synthetic rubber.** I. G. Farbenind. A.-G. (Walter Rock and Eduard Tschunkur, inventors). Ger. 580,540, July 12, 1933 (Cl. 39b. 5). Addn. to 578,965 (C. A. 28,

930°). The method of 578,965 for improving the quality of polymerized butadiene hydrocarbon rubber by addn. of soot prior to vulcanization is modified by replacing the soot by other filling materials of a fineness of under 0.3, examples mention colloidal SiO<sub>2</sub>, ZnO, MgCO<sub>3</sub>, and kaolin. These may be used alone, mixed, or mixed with soot.

**Rubber vulcanization accelerators.** Ewald Zaucker, Max Bögemann and Ludwig Orthner (to I. G. Farbenind. A.-G.). U. S. 1,942,790, Jan. 9. Accelerators having good crit. temps. consist of org. compds. contg. the grouping  $xyC-S-N<$ , where *x* and *y* mean vicinal

carbon atoms of an aromatic nucleus, or *x* means N and *y* S, O or the NH group, such as the reaction products from *p*-nitrophenylsulfur chloride and dibutylamine, piperidine *s*-diphenylguanidine and *o*-tolylbiguanide; *o*-nitrophenylsulfur chloride (I) + diethanolamine; I or *p*-nitrophenylsulfur chloride (II) + methylbenzylamine; I or II + EtNHMe thiocresol + *N*-chloropiperidine (III), 2-mercapto-4-phenyl-1,3,4-thiodiazole-5-thione + III, 2-mercaptobenzothiazole (IV) + III, IV + *N*-chloromorpholine, IV + *N*-chlorodimethylamine (V), IV + *N*-chlorodibutylamine (VI), 2-mercaptothiazoline + III, 2-mercaptoimidazoline + V, 2-mercapto-4-phenyl-1,3,4-thiodiazoline + VI, 2-mercaptobenzoxazole + III, 2-mercaptobenzimidazole + III, 6-nitro-2-mercaptobenzothiazole + III, 6-dimethylamino-2-mercaptobenzothiazole + III, mercaptobenzothiazole + V, or 2-mercapto-4-phenyl-5-methyl-1,3,4-thiodiazoline + III.

**Vulcanization accelerator.** Max H. Zimmermann (to The Firestone Tire and Rubber Co. of Canada Ltd.). Can. 336,611, Oct. 24, 1933. Mercaptobenzothiazole and excess of a CH<sub>2</sub>O soln. are boiled together. There is formed an oily product which upon cooling solidifies into a cryst. mass; this is a mixt. of mercaptobenzothiazole and its reaction product with CH<sub>2</sub>O. The CH<sub>2</sub>O-water soln. of the reaction product, upon cooling, yields a pure cryst. reaction product of mercaptobenzothiazole and CH<sub>2</sub>O. If the reaction takes place in alc. soln. recrystn. is not necessary.

**Vulcanization accelerator.** Lorin B. Sebrell and Albert M. Clifford (to The Goodyear Tire and Rubber Co.). Can. 338,019, Dec. 19, 1933. A basic N compd. such as NH<sub>3</sub>, an amine or a Schiff base, added to a rubber mix either together with the desired dithiazyl sulfide or separately, enhances the accelerator power of the dithiazyl sulfide without detracting from its ability to accelerate vulcanization without scorching the stock.

**Vulcanizing apparatus for sponge rubber.** George H. Wheatley. U. S. 1,943,101, Jan. 9. Mech. details of an app. with heating plates between which conveyor belt passes.

**Presser belts for vulcanizing machines.** Gustav Roese. Brit. 398,429, Sept. 14, 1933.

**Vulcanizing rubber.** I. G. Farbenind. A.-G. (Walter Huhn, inventor). Ger. 587,663, Nov. 7, 1933 (Cl. 39b. 8). Addn. to 585,696 (C. A. 28, 1575°). The application of thiuram sulfides to accelerate the vulcanization of rubber as described in 585,696 is extended to use with other accelerators, except those of an aldehyde-diamine character.

**Vulcanizing rubber.** I. G. Farbenind. A.-G. (Ewald Zaucker, Ludwig Orthner and Max Bögemann, inventors). Ger. 587,608, Nov. 6, 1933 (Cl. 39b. 8). A vulcanization accelerator is obtained by substituting the H of the SH group of an accelerator by the N of a secondary amine. Thus, the new accelerators contain the grouping  $\equiv C-S-N\equiv$ . Such an accelerator is obtained by treating mercaptobenzothiazole with piperidine.

**Vulcanizing rubber, gutta-percha, balata, etc.** Leslie G. Jenness (to St. Mungo Mfg. Co. of America). U. S. 1,941,691, Jan. 2. A vulcanizing agent such as S is incorporated with the material and the mixt. is then subjected to the action of an accelerating soln. which may contain an accelerator and gasoline and which also contains a diluent such as acetone capable of retarding the action of the soln. upon the material being treated. Golf-ball manuf. is described.

# CHEMICAL ABSTRACTS

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## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

The repair of chemical manufacturing plant by scientific welding. C. W. Brett. *Chemistry & Industry* 1934, 123-5.

Filtration of plating solutions. Louis Weisberg and Willard F. Greenwald. *Metal Ind.* (N. Y.) 32, 15-19 (1934).—A discussion of filters, pumps and materials of construction.

Extraction apparatus. Kurt Peters. *Chem. Fabrik* 1934, 21-5.—App. developed especially for the extn. of coal is described and compared with app. of similar construction, with 25 cuts and many references. J. H. M.

A new photoelectric colorimeter. H. B. Lange. *Chem. Fabrik* 1934, 45-7.—Improvements in construction and operation of the app. referred to in C. A. 27, 451, are described.

An improved equilibrium distillation still and equilibrium distillation tests. Masakichi Mizuta. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 11(1934).—By adjusting the elec. current in the heating coil of the upper portion of the still partial condensation was eliminated. Nineteen binary mixts. of pure benzene and toluene were tested, and the expl. data agreed completely with those calculated from vapor pressure data. K. Kammermeyer

A simple safety device for high-vacuum apparatus. Josef Obrist. *Z. tech. Physik* 14, 543-6(1933).—An app. is described which will sound an alarm if the heating current on a vacuum pump is cut off and which shuts off the pump if the cooling H<sub>2</sub>O stops.

An indicating hot-wire vacuum meter. H. Murmann. *Z. tech. Physik* 14, 538-40(1933).—A direct-reading vacuum meter, operated by the thermal expansion of a hot wire, is described. It is useful in the range 10<sup>-1</sup> to 10<sup>-4</sup> mm.

Low-temperature measurement with hydrogen thermometer. Sin-ichi Aoyama and Eizo Kanda. *J. Chem. Soc. Japan* 55, 15-22(1934).—A const.-vol. H thermometer using Jena glass has been constructed. The accuracy of the thermometer was found to be  $\pm 0.036^\circ$  at 0, and  $\pm 0.025^\circ$  at  $-200^\circ$ . By means of this thermometer the following values, b. p. of N— $195.79^\circ$ , b. p. of O— $182.98^\circ$  and the sublimation point of solid CO<sub>2</sub>;  $78.51^\circ$ , were obtained.

Modification of the Stoughton constant-temperature humidity chamber. J. R. G. Sutherland. *Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932*, 87-96(1932); cf. Stoughton, *Ann. Appl. Biol.* 17, 90(1930); C. A. 25, 5598.—The chamber consists of a wooden frame covered with 2 layers of glass spaced 2 in. apart. Humidified air is supplied by passing a stream of air from a pos. blower over a C bulb on which water is dripping at a const. rate. The humidity is controlled by a hair-hygrometer connected in series with the solenoid of a relay in the humidifier-bulb circuit. The chamber can be operated for long periods with max. variations in temp. and humidity seldom reaching 2°F. and 2%, resp.

An inexpensive and economical warm room. G. Grinling. *Analyst* 59, 103-4(1934).—For drying at 78-88°F., a wooden chamber of about 30 cu. ft. is described which is heated with two 250-watt elec. lamps and provided with a temp. regulator.

A nickel vessel for storing standard caustic alkali solutions. Edwin C. Richellato. *Analyst* 59, 104(1934).—Tenth-normal NaOH kept in a Ni bottle remains clear and with unchanged concn.

A valve for regulating the velocity of gas streams. K. Hauschild. *Chem. Fabrik* 1934, 27.

The characteristics of the sodium lamp as influenced by vapor pressure. Gorton R. Pouda and Andrew H. Young. *J. Optical Soc. Am.* 24, 314(1934).

Vapor pressure of solid nitrogen and of solid oxygen. Sin-ichi Aoyama and Eizo Kanda. *J. Chem. Soc. Japan* 55, 23-9(1934).—A thermostat operating on liquid H in the temp. range  $-200$ – $-250^\circ$  was constructed. The vapor pressure of solid N and of solid O has been measured near  $-242^\circ$  by means of the thermostat. Thermodynamic consideration was given to the vapor pressure of N and of O at lower temp.

Operating pointers for users of suspended centrifugals. Wm. T. Powers. *Chem. & Met. Eng.* 41, 84-7(1934).

Some new principles in the design of x-ray apparatus. A. Bouwers. *Radiology* 22, 163-73(1934).—New improvements embodied in Philips x-ray app. are described as follows: reduction of exposure time for x-ray tubes with stationary anode by a new method of loading, which consists simply in automatically lowering a very heavy load, which is initially applied until max. temp. of the anode surface is reached; rotating anode tube with anode cooling; a new high-voltage rectifier; a new x-ray unit of very small dimensions, the entire transformer and enclosed tube weighing only 12 lb.; a new cascade high-voltage generator; and self protected tubes for 400 kv. and more.

A new x-ray goniometer. E. Schiebold. *Z. Krist.* 86, 370-83(1933).—A description of a rotation x-ray goniometer, similar to, but antedating that described by Sauter (C. A. 27, 3643). A characteristic feature is the rotation of the film, either when flat and perpendicular to the x-ray beam, or when on the surface of a cylinder, simultaneous with the rotation of the crystal. The math. relationships are described.

A thermoelectric metal-crystal analyzer. M. F. Hasler. *Physics* 5, 9-14(1934); cf. C. A. 25, 3890; 28, 999.—Detailed description is given of a new app. for detn. and photographic recording of the thermoelec. e. m. f. at room temp. for each increment of length (e. g., 2 mm.) of a metal bar.

Experience with a dry "Union" heating-value recorder. A. Rohr. *Schweis. Ver. Gas- Wasserfach., Monats-Bull.* 13, 301-3(1933).—A short description of the "Union" type recording calorimeter. The gas burning in a no. of quartz nozzles heats up a mechanically balanced suspended circular thermometer, the filling of which can expand on one side. The thermometer thereby rotates and with it an indicator needle. Several compensation devices are used. Its first cost and maintenance are materially less than those of wet calorimeters.

Electric water heater with thermoregulating thermometer for use with refractometer. Franco Lorenzola. *Ann. chim. applicata* 23, 528-9(1933).—An elec. heater with thermoregulator has been designed to heat water in connection with a Zeiss refractometer used for tests on butter. The temp. may be controlled in the range 20-70°.

Low-temperature thermostats. Kurt Peters. *Chem. Fabrik* 1934, 47-9.—The app. is cooled by liquid air and holds any temp. from 0° to  $-185^\circ$  within 0.1-0.5° indefinitely. Cuts and 11 references are given.

- Apparatus and process for forming fine glass needles or pipes.** Pierre H. Du de Roubroune. Brit. 400,109, Oct. 19, 1933. See abstract from *Compt. rend.* (C. A. 27, 863).
- Distilling or rectifying column with a plate-like or annular base.** Carl Eisenach. Ger. 588,941, Dec. 1, 1933 (Cl. 12a. 5).
- Thermally actuated valves for maintaining a constant temperature, e. g., in a gas oven.** Thomas Barnsley. Brit. 400,607, Nov. 2, 1933.
- Temperature- or pressure-control device suitable for use with heating fluids, etc.** Arthur J. Mansure (to Bristol Co.). U. S. 1,943,831, Jan. 16. Structural and mech. details.
- Apparatus for securing zero capacity-temperature coefficient.** Wm. M. Bailey (to General Elec. Co.). U. S. 1,943,713, Jan. 16. A mica capacitor is made with sections having mica and air as a dielectric and other sections having mica and a wax as a dielectric. U. S. 1,943,714-15 also relates to various features of condenser or capacitor construction.
- Rectifying columns.** Gesellschaft für Linde's Eismaschinen A.-G. Brit. 400,798, Nov. 2, 1933.
- Filters.** Louis P. Dolignon. Fr. 755,825, Nov. 30, 1933. Construction of frame.
- Continuous filters.** S. Giertz-Hedström and D. R. E. Werner. Swed. 79,148, Dec. 12, 1933. Hydrostatic and mech. features.
- Rotary-drum filter.** I. G. Farbenind. A.-G. (Siegfried Kiesskalt, inventor). Ger. 590,307, Dec. 30, 1933 (Cl. 12d. 15.03).
- Rotary-drum filtration apparatus.** Charles W. Moore and Carlton W. Cruimb (to Oliver United Filters, Inc.). U. S. 1,943,618, Jan. 16. Various structural and operative details.
- Device on rotary filter for removing the filtered material.** D. R. E. Werner and S. Giertz-Hedstrom. Swed. 77,127, May 2, 1933.
- Drum filter press.** D. W. Berlin. Swed. 77,324, May 23, 1933.
- Air filter.** Verner Dahlman (to Independent Air Filter Co.). U. S. 1,944,407, Jan. 23.
- Air filter for an engine-driven compressor unit.** Fredrick W. Wilson and Tilghman's Patent Sand Blast Co. Ltd. Brit. 401,045, Nov. 9, 1933.
- Filter suitable for oil.** George R. Ericson (to Carter Carburetor Corp.). U. S. 1,944,550, Jan. 23.
- Filter for quick-settling mineral sludges.** Cesag Central-Europäische Schwimm-Aufbereitungs-A.-G. Ger. 588,818, Nov. 27, 1933 (Cl. 1a. 15).
- Centrifugal separator.** Aktiebolaget Separator (H. O. Lindgren, inventor). Swed. 79,266, Dec. 28, 1933.
- Centrifugal separator with automatic intermittent discharge of the separated mud.** Aktiebolaget Separator (E. A. Forsberg, inventor). Swed. 76,977, April 11, 1933.
- Centrifugal separator from which sludge is intermittently discharged through peripheral openings.** Aage Nyrop. Brit. 400,809, Nov. 2, 1933.
- Centrifugal apparatus for purifying gases or vapors.** Franz Heinl. Ger. 590,364, Dec. 30, 1933 (Cl. 12a. 2.01).
- Centrifuge with driving motor mounted upon the frame.** Aktiebolaget Separator (H. O. Lindgren, inventor). Swed. 76,208 and 76,209, Jan. 3, 1933.
- Apparatus for separating solid substances of different specific gravities.** Fried. Krupp Grusonwerk A.-G. Brit. 400,094, Oct. 19, 1933.
- Sifting apparatus.** Samuel D. Robins (to Robins Conveying Belt Co.). Brit. 400,006, Oct. 19, 1933.
- Viscometers.** Glasplakatefabrik Union G. m. b. H. Brit. 400,840, Nov. 2, 1933.
- Piston apparatus for discharging receptacles containing a viscous substance.** Ottomar Voelk. Brit. 401,003, Nov. 6, 1933.
- Apparatus for maintaining a constant concentration or viscosity in a flowing medium.** R. Carlstedt. Swed. 77,661, June 27, 1933. An automatic app. for regulating the addn. of diln. liquid.
- Apparatus for controlling the viscosity of liquids such as wire enamel compositions.** Zoltan J. Kegl and Henry M. Larsen (to Western Elec. Co.). U. S. 1,944,243, Jan. 23. An app. is described in which the height of a column of liquid in a container is varied in accord with the viscosity of the liquid, viscosity-modifying liquids being added in accord with the height of the liquid to produce a liquid of const. desired viscosity.
- Apparatus for the purification of fumes and gases.** Ateliers J. Hanrez. (Soc. anon.). Belg. 396,800, July 31, 1933. Mech. features.
- Gas washers.** Freyn Engineering Co. Brit. 400,360, Oct. 26, 1933.
- Apparatus for continuous gas analysis.** Aktiebolaget Carba (J. G. Tandberg, inventor). Swed. 76,555, Feb. 21, 1933. A vacuum corresponding to the content of a constituent of a gas is obtained in a chamber having a porous closure as a consequence of the diffusion of the constituent through the porous closure and subsequent absorption or diffusion through another porous device. Cf. C. A. 27, 4138.
- Gas pump for gas-analysis apparatus.** Aktiebolaget Carba (J. G. Tandberg, inventor). Swed. 78,721, Oct. 24, 1933.
- Apparatus for detecting the presence of combustible gases such as marsh gas in the atmosphere.** Henry T. Ringrose. U. S. reissue 19,048, Jan. 16. A reissue of original pat. No. 1,645,404 (C. A. 22, 3).
- Apparatus for detecting carbon monoxide in the air.** G. Ljunggren. Swed. 78,160, Aug. 22, 1933. A gas-tight storage box for reagent paper provided with a small testing table with an illuminating device.
- Apparatus for the absorption of carbon dioxide from air or other gas mixture.** P. G. T. Petersen. Swed. 77,624, June 27, 1933.
- Apparatus for indicating the amount of absorbed gas or gases in a liquid.** T. Kalle. Swed. 76,238, Jan. 10, 1933. The liquid is passed through a conduit where it is made to suck in a gas or gas mixt. by means of an injector device, after which it is let out through a friction tube in which it acts upon an indicating device, the effect varying with the velocity of the liquid, which in turn is a function of the amt. of absorbed and unabsorbed gas.
- Apparatus for estimating moisture in the atmosphere.** Alfred Schwartz. Ger. 588,012, Dec. 1, 1933 (Cl. 42. 19.03).
- Adsorbent suitable for removing moisture from air, etc.** Ernest B. Miller (to Chester F. Hockley as receiver for Silica Gel Corp.). U. S. 1,943,617, Jan. 16. U. S. 1,943,616 relates to details of an adsorption refrigerating app.
- Apparatus for humidifying air.** The Textile Illuminating & Engineering Co. Ltd. and Richard Sutchffe. Brit. 400,749, Nov. 2, 1933.
- Device and method for controlling the flow of liquid in air-conditioning or humidifying apparatus.** Rosser & Russell Ltd. and Ernest J. Naylor. Brit. 400,199, Oct. 2, 1933.
- Rotary meter for measuring fluids.** Compagnie française des conduites d'eau and Henry F. Petot. Brit. 400,547, Oct. 26, 1933.
- Rotary liquid meter, provided with means for delivering a predetermined quantity of fluid.** Paul G. Chace and John A. Kienle. Brit. 400,444, Oct. 26, 1933.
- Water-flow calorimeters.** The Gas Light & Coke Co. and Frederick E. Mills. Brit. 400,291, Oct. 26, 1933.
- High-pressure reducing valve suitable for use with water.** Wm. H. Gleeson. U. S. 1,944,424, Jan. 23. Structural and mech. features.
- Apparatus for supplying measured quantities of liquid.** Dieudonne Theophile Tritsch. Brit. 400,615, Oct. 23, 1933.
- Apparatus for delivering measured quantities of liquids from bottles, casks, etc.** Edward T. Slattery. Brit. 400,763, Nov. 2, 1933.
- Apparatus for proportioning the feed of liquid reagents, as in treating liquids in pipe lines.** Edward A. Bailey (to Standard Oil Co. of Kansas). U. S. 1,943,362, Jan. 16. Various structural and operative details are described.

**Level-indicating apparatus.** Telefonaktiebolaget L. M. Ericsson (J. E. Hanson, inventor). Swed. 78,614, Oct. 10, 1933. Elec. features.

**Apparatus for recording the level of an electrically conducting liquid in a tube, e. g., mercury in a thermometer, or recording the difference in levels of the liquid in two tubes.** Wm. Masterton. Brit. 401,100, Nov. 9, 1933.

**Apparatus for emulsifying, atomizing or spraying liquids.** Geo. Harrington. Brit. 401,077, Nov. 9, 1933.

**Apparatus for making and spraying solutions, e. g., disinfectants.** Ernest H. Hill. Brit. 400,242, Oct. 16, 1933.

**Apparatus for drying, cooling or otherwise treating liquids, e. g., liquid fats or fat emulsions.** Hans Kock, Rudolf Knollenberg and Brich Thiel (trading as Schröder & Co.). Brit. 400,849, Nov. 2, 1933.

**Apparatus for emulsifying liquids.** Albert R. Bannister. Fr. 755,666, Nov. 28, 1933.

**Fluid delivery pump for use with a bottle, etc.** The County Chemical Co. Ltd. and Wilfrid Hill. Brit. 400,417, Oct. 26, 1933.

**Apparatus for carbonating liquids.** John E. Treanor. U. S. 1,943,903, Jan. 16. Structural and mech. details.

**Apparatus for carbonating liquids in receptacles such as bottles.** Frank J. Biane and Samuel B. Rowe. U. S. 1,943,753, Jan. 16. Structural and mech. features.

**Apparatus for clarifying liquids.** Aktiebolaget Svenska Maskinverken (F. I. F. Göttner, inventor). Swed. 78,189, Aug. 29, 1933.

**Rotary apparatus for sedimentation of liquid suspensions.** F. Östman. Swed. 78,931, Nov. 14, 1933. The app. is particularly intended for the analysis of blood, urine and similar liquids.

**Timing mechanism for controlling the operation of a valve or similar device such as a sampling device for liquids or granular materials.** Blomfield Engineering Co. Ltd. and Henry Thomas Durant. Brit. 400,084, Oct. 19, 1933.

**Apparatus for mixing solids with liquids in flow in proportionate quantities.** Bell Brothers (Manchester 1927) Ltd. and Charles G. Benson. Brit. 400,917, Oct. 19, 1933.

**Apparatus (with a cylindrical container and circulating pump) for disseminating solids in liquids.** Edwin Cowles (to Cowles Engineering Corp.). U. S. 1,944,836, Jan. 23. An app. is described, suitable for making solns. or suspensions.

**Feeding devices for granular or powdered material such as coal dust or facing or backing sand.** Alfred Baillet & Cie. Brit. 400,617, Oct. 23, 1933, and 400,664, Oct. 30, 1933. Divided on 400,617.

**Continuous apparatus for introducing or withdrawing solids into or from pressure vessels.** I. G. Farbenind. A.-G. (Gerhard Ritter, inventor). Ger. 590,309, Jan. 3, 1934 (Cl. 12g. 2.02).

**Apparatus for granulating crystallized salts, particularly fertilizers.** Preparation industrielle des combustibles. Fr. 755,743, Nov. 29, 1933.

**Crystallization apparatus.** Aktieselskapet Krystal. Norw. 52,690, June 26, 1933. A hot soln. is supersatd. by vacuum evapn., and the supersatd. soln. is passed through a suspension of growing crystals. App. described.

**Evaporating apparatus.** A. Treplin & Co. Nachf. Konin-Ges. Ger. 588,821, Nov. 30, 1933 (Cl. 12a. 2).

**Evaporation apparatus.** Industriemiska Aktiebolaget (H. E. A. Göth, inventor). Swed. 76,860, April 1, 1933.

**Drying apparatus with several drying chambers and a heat-recovery device.** Aktiebolaget Svenska Fläktfabriken (J. G. Olsson and P. I. E. Stenfois, inventors). Swed. 76,354, Jan. 24, 1933.

**Hot-gas drier for moist materials, especially of a vegetable origin.** I. G. Farbenind. A.-G. (Walter Strathmeyer, inventor). Ger. 588,688, Nov. 23, 1933 (Cl. 82a. 1.02).

**Pan for evaporating brine.** Eduard Bodenstein. Ger. 590,470, Jan. 8, 1934 (Cl. 12f. 1).

**Externally heated enameled vessel for evaporation and**

**like processes.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Karl Bromig, inventor). Ger. 590,172, Dec. 27, 1933 (Cl. 12a. 1). Constructional features are described.

**Furnace regenerator operation.** Samuel A. Porter (to H. L. Dixon Co.). U. S. 1,944,074, Jan. 16. In assocn. with a furnace such as may be used for melting glass, a rotatable regenerator is used through which air is supplied to the furnace, and heated gases are withdrawn from the furnace through the regenerator in a const. direction and in opposition to the direction of regenerator rotation. App. is described.

**Regenerative flame furnace.** Eugen Seifried. Ger. 585,188, Jan. 8, 1934 (Cl. 24c. 6).

**Muffle furnace heated by gas.** The Gas Light & Coke Co. Fr. 755,595, Nov. 27, 1933.

**Method of mounting burners for a rotary or semi-rotary melting-furnace.** Wm. F. Wiltshire. Brit. 400,956, Oct. 30, 1933.

**Multiple-track tunnel kilns.** Gibbons Brothers Ltd. and Wm. E. Gibbons. Brit. 400,496, Oct. 26, 1933.

**Apparatus for spraying sludge into rotary-drum furnaces.** Friedrich Uhde. Ger. 588,557, Nov. 23, 1933 (Cl. 80c. 16.10).

**Apparatus for tilting furnaces or other apparatus.** George E. Taylor and Leslie E. Thompson (to Ajax Electrothermic Corp. and Ajax Elec. Furnace Corp.). U. S. 1,943,494, Jan. 16. Mech. details.

**Laboratory gas burner.** Edwin H. Fisher (to Fisher Scientific Co.). U. S. 1,943,859, Jan. 16.

**Apparatus for continuous heat-treating.** J. M. Pehrson and A. H. Pehrson. Swed. 79,265, Dec. 28, 1933. Mech. features of a rotary or oscillatory drum or furnace for continuous heat-treating of materials by means of air or other gases.

**Heat-exchanging apparatus.** C. F. Rosenblad. Swed. 77,682, July 4, 1933.

**Heat-exchange tubes.** Imperial Chemical Industries Ltd. Fr. 756,084, Dec. 4, 1933. Alloys contg. Al 2-8, Ni 1-3% and Cu the rest are used for the tubes.

**Tubular heat-exchanger.** Manufacture générale métallurgique. Ger. 590,313, Dec. 30, 1933 (Cl. 17f. 5.23).

**Incandescent-cathode x-ray tubes.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 756,143, Dec. 5, 1933. Means for mounting and centering the tubes is described.

**Röntgen-ray tubes.** C. H. F. Müller A.-G. Brit. 400,036, Oct. 19, 1933.

**Anodes for Röntgen-ray tubes.** O. H. F. Müller A.-G. Brit. 400,022, Oct. 19, 1933.

**Braun tube.** Radioaktiengesellschaft D. S. Loewe and Kurt Schlesinger. Fr. 755,579, Nov. 27, 1933. Disposition of cathode is described. Fr. 755,580. Means is given for concentrating the cathode rays.

**Electron tube.** Allmänna Svenska Elektriska A.-B. (U. Lamm, inventor). Swed. 79,210 and 79,211, Dec. 19, 1933.

**Kerr cells.** Theodore W. Case. Brit. 401,059, Nov. 9, 1933. See U. S. 1,872,675 (C. A. 26, 5794).

**Photoelectric tubes.** Theodor H. Nakken (to Nakken Patents Corp.). U. S. 1,943,984, Jan. 16. To check the tendency to wander of sensitive photoelec. metals, successive coatings are superposed, such as Mg, K, Rb and Cs in successive superposed films. Various other details also are described.

**Thermionic cathodes.** Radioaktiengesellschaft D. S. Loewe and Bruno Wienecke. Brit. 400,351, Oct. 26, 1933. A pot-like shaped cathode for cathode-ray tubes has a part of its outer surface covered with emissive material arranged in a recess in the body and is indirectly heated.

**Thermionic cathodes.** Jenaer Glaswerk Schott & Gen. Brit. 400,981, Nov. 2, 1933. Addn. to 380,025 (C. A. 27, 4966). Structural features.

**Indirectly heated thermionic cathodes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 400,068, Oct. 19, 1933. Structural features.

- Thermionic valves.** Clarence W. Hansell (to Marconi's Wireless Telegraph Co. Ltd.). Brit. 400,819, Oct. 26, 1933. An ultra-short wave oscillator comprises a discharge device having an anode and cathode, the electrodes being so arranged and dimensioned that the time of flight of an electron to the anode is substantially 0.5 (or an odd multiple thereof) the period of oscillation of the anode and any extension thereof, considered as an electrically oscillating body.
- Thermionic valves.** Ferranti Ltd., Robert W. Sutton and Thomas C. Black. Brit. 400,648, Oct. 27, 1933.
- Thermionic valves.** Standard Telephones & Cables Ltd., Wilfrid E. Benham and Frank D. Goodchild. Brit. 400,999, Nov. 6, 1933.
- Double-receiving thermionic valves with two electrode systems.** Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 400,897, Nov. 2, 1933.
- Discharge apparatus.** Carl Lindström A.-G. Brit. 400,410, Oct. 26, 1933. Amplifying valves, e. g., triodes, pentodes, are filled with gas, e. g., He at 1-5 mm., and operated so that a Crooke's dark space extends between the cathode and the control grid, but not beyond the latter, while the other portions of the discharge, e. g., the neg. glow, fill, and suppress space-discharges in, the space between the control grid and anode. Mg or Ba may be used as a getter.
- Discharge tubes.** The British Thomson-Houston Co. Ltd. and The General Electric Co. Ltd. Brit. 400,806, Nov. 2, 1933. The starting of a discharge tube having a metallic vapor filling and a self-heated cathode, such as described in Brit. 356,234 (C. A. 23, 3150) and 364,578 (C. A. 27, 2348), is facilitated by an interrupted ignition coating which is, by contraction of the electrode chambers, brought to about 2 mm. from the electrode. The coating consists of Ag which forms a reflector and covers  $\frac{1}{2}$ - $\frac{1}{4}$  of the tube surface, or of a conductive network which encloses the tube, the gap being defined by a metallic coating.
- Discharge tubes having an incandescent cathode.** C. H. F. Müller A.-G. Fr. 756,237, Dec. 6, 1933.
- Discharge tubes with rotary anode.** C. H. F. Müller A.-G. Fr. 756,159, Dec. 6, 1933.
- Electric discharge apparatus.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 755,702, and 755,703, Nov. 29, 1933.
- Electric discharge device.** Charles Spaeth. U. S. 1,943,845, Jan. 16. In a device such as a Ne-He lamp, an electrode structure comprises a chamber with an outlet opening into which a tube projects which is sealed to the chamber at the edge of the opening, alkali metal being placed in the chamber and a leading-in wire of W being sealed through the walls of the device with a piece of Ni welded to the end of the wire and supported in such position as to be in contact with the alkali metal bath when the alkali metal is liquefied by heating.
- Electrical discharge device containing mercury.** Charles Spaeth (to Ne-Arga Corp.). U. S. 1,943,847, Jan. 16. A device such as a lamp comprises an envelope which may be formed of glass and which contains a gas filling such as Ne and an anode and cathode, a reservoir of Hg being connected with the envelope near the anode and an auxiliary electrode being immersed in the Hg (various other structural and operative details being described). U. S. 1,943,848 relates to various details of a lamp contg. a rare gas such as Ne and in which Hg and alkali metal also are used.
- Alternating-current electrical discharge device.** Charles Spaeth (to Ne-Arga Corp.). U. S. 1,943,846, Jan. 16. A device suitable for use at high c. d. without destructive sputtering comprises a gas-filled envelope contg. a pair of W electrodes and an assoc. alkali metal electrode, arranged for application of a potential between the W electrodes sufficient to heat them to incandescence and to cause a current to flow between the alkali electrode and the W electrodes.
- Electric discharge device anodes.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 400,768, Nov. 2, 1933. In the construction of a tubular anode which consists of an outer cylinder of material that has a high thermal cond., e. g., Cu, and an inner tube of material of high m. p., e. g., W, Ta, Mo, Zr, Ti, in intimate contact therewith, the formation of the tube takes place within the cylinder. The high-melting material may be cast, preferably *in vacuo*, or applied as a paste which is then sintered.
- Electric discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Fr. 755,834, Nov. 28, 1933. The wires and crosspieces of the grid are coated, at least at the points of fixation, with a material much more easily fused than the material of the wires and crosspieces.
- Electric discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Fr. 756,198, Dec. 6, 1933.
- Electric discharge tube with a gaseous filling and electrodes so spaced that the discharge has the characteristic of an arc discharge without a positive column.** N. V. Philips' Gloeilampenfabrieken. Brit. 400,764, Nov. 2, 1933.
- Method of sealing leading-in wires into vitreous vessels, e. g., the envelopes of electric discharge devices.** The General Electric Co. Ltd., Robert L. Breadner and Christopher G. Eden. Brit. 400,334, Oct. 26, 1933.
- Luminous discharge tubes.** Patent-Treuhand-Gesellschaft für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 400,458, Oct. 26, 1933.
- Gas- or vapor-filled, luminous, positive-column discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Brit. 400,368, Oct. 26, 1933.
- Wire fabric for use as catalytic material.** G. Siebert G. m. b. H. and Heinrich Houben. Ger. 590,468, Jan. 4, 1934 (Cl. 12g. 4.02). Constructional features are described.
- Apparatus for producing sparks for spectrum analysis.** W. C. Heraeus G. m. b. H. Brit. 400,607, Oct. 18, 1933.
- Closure devices, particularly for the gas receptacles of distillation furnaces.** C. Otto & Co. G. m. b. H. Brit. 400,146, Oct. 19, 1933.
- Timing mechanism for controlling the treating period in mixing and other machines.** Ransomes & Rapier Ltd. and Charles E. Brett. Brit. 400,775, Nov. 2, 1933.
- Mixing, kneading and other machines.** F. Aeschbacher A.-G. Brit. 400,149, Oct. 19, 1933.
- Mixing, emulsifying or disintegrating apparatus.** Hermann Hildebrandt. Ger. 590,222, Jan. 4, 1934 (Cl. 50b. 18.20).
- Machine for subjecting materials to a mixing, kneading, shredding or disintegrating process.** Eugen Eppeler and Baker Perkins Ltd. Brit. 400,966, Nov. 3, 1933.
- Hardness tester.** Paul Craemer. Brit. 400,842, Nov. 2, 1933.
- Grinding apparatus.** Soc. anon. d'Ougrée Marillay. Brit. 400,441, Oct. 26, 1933. Addn. to 366,001 (C. A. 27 1553).
- Apparatus (with a testing roller) for testing the hardness of grinding disks.** Herbert Lindner. U. S. 1,944,355, Jan. 23. Structural and mech. details.
- Vibrating-jaw stone crushers.** Fried. Krupp Grusonwerk A.-G. Brit. 400,826, Nov. 2, 1933.
- Ball-and-ring pulverizing mills.** Babcock & Wilcox Ltd. Brit. 401,115, Nov. 9, 1933.
- Apparatus for trapping suspended particles such as dust or cinders from gas currents.** George C. Cook. U. S. 1,943,297, Jan. 16. Structural and operative details.
- Improvement of bag dust removers.** J. Joachim Raven. Belg. 396,984, July 31, 1933. Mech. features.
- Drawing-off arrangement for barrels, drums, etc., for viscous oils, etc.** George F. Beaumont and Cyril G. Beaumont. Brit. 400,936, Oct. 27, 1933.
- Acetylene generator.** Léon Chastan-Bagnis. Fr. 756,736, Nov. 29, 1933.
- Thermostat switch with gas-filled container.** Aktiebolaget Birka Regulator (A. O. Appelberg, inventor). Swed. 77,927, Aug. 1, 1933. The thermostat switch is enclosed in a gas-tight container filled with a dil. gas of low at. wt., e. g., H<sub>2</sub>, with a pressure below the value at which flashing will take place under occurring conditions, the lower limit of the gas pressure being fixed by the condition that the heat cond. of the gas shall be not less than  $\frac{1}{2}$  of its heat cond. at atm. pressure.



## 2-GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Wilhelm Bachmann. H. Braune. *Z. Elektrochem.* 40, 57-9(1934).—Obituary with portrait. G. G.

P. Ehrenfest. H. A. Kramers. *Physica* 13, 278-6 (1933). B. J. C. van der Hoeven

Paul Ehrenfest. W. Pauli. *Naturwissenschaften* 21, 841-3(1933).—Obituary. B. J. C. v. d. H.

The late Professor William Edward Gibbs. M. B. Donald. *Ind. Chemist* 10, 48(1934).—Obituary. E. H.

In memory of K. W. Hauser. C. Ramsauer. *Z. tech. Physik* 15, 4-8(1934). J. B. Austin

William Partridge. Ernest M. Hawkins. *Analyst* 59, 60-70(1934).—Obituary. W. T. H.

Benjamin Sullivan and the beginnings of chemistry at Yale. Philip E. Browning. *J. Chem. Education* 11, 170-4 (1934). E. H.

Chemistry and chemical arts in ancient Egypt. I. L. E. Warren. *J. Chem. Education* 11, 146-53(1934). E. H.

The regulatory chemist of the present and future. James W. Kellogg. *J. Assoc. Official Agr. Chem.* 17, 29-36(1934).—An address. A. Papineau-Couture

Undergraduate organic laboratory chemistry. IIB. Diversification, relative importance and comparative cost of laboratory experiments. E. F. Degering, R. F. McCleary and A. R. Padgett. *J. Chem. Education* 11, 180-4(1934); cf. *C. A.* 28, 939<sup>7</sup>. IIC. Diversification, relative importance and comparative cost of the course. E. H.

b. F. Degering. *Ibid.* 184-5. E. H.

The oxidation of 3-aminophthalhydrazide ("luminol") as a lecture demonstration of chemiluminescence. Ernest H. Huntress, Lester N. Stanley and Almon S. Parker. *J. Chem. Education* 11, 142-5(1934); cf. *C. A.* 28, 1084<sup>6</sup>. E. H.

The preparation of sputtered metal films. E. O. Hulburt. *Rev. Sci. Instruments* 5, 85-8(1934). E. H.

Arsenic in sea water. Norris W. Rakestraw and Frank B. Luts. *Biol. Bull.* 65, 397-401(1933).—Detn. of total As by the Gutzeit method showed 6-28 mg. per cu. m. of sea water, the mean being about 15 mg. Although the As content increases at 10-60 m. below the surface, there is no general increase with depth; hence the distribution is quite unlike that of P. Most of the As is in forms other than arsenate. K. V. Thimann

The buffer capacity of sea water. Philip H. Mitchell and Norris W. Rakestraw. *Biol. Bull.* 65, 437-51 (1933).—By detg. the change in  $p_H$  of  $CO_2$ -free sea water on adding a known quantity of acid, a correction chart is worked out for use with the Thompson and Bonnar method (*C. A.* 25, 5863) of detg. buffer capacity. This correction covers the true noncarbonate buffering and also the effects of chloride on the indicator, etc. While there was found in general an increase in buffer capacity with depth, this was sometimes absent. The ratio of buffer capacity to total chloride, the "specific buffer capacity," increased from Cape Cod southward toward the Caribbean and was somewhat higher in the Pacific than in the Atlantic. Its average was about 0.119. K. V. Thimann

Graphical computation of logarithmic mean temperature difference. A. J. V. Underwood. *Ind. Chemist* 9, 167-70 (1933).—Charts and the mathematics on which they are constructed are given. B. C. A.

Azeotropy and the preparation of pure compounds. I. Rabowicz-Zubkowski. *Roczniki Chem.* 12, 567-75 (1932).—Theoretical. B. C. A.

Cellophane roll films for slide lanterns. Rots Bonar, Floyd Bonar and Earl C. H. Davies. *J. Chem. Education* 10, 92-4(1933).—A Cellophane roll film can be quickly made from thin com. wrapping Cellophane by the use of carbon-paper typing or by pen drawing. A method of fixing the C-paper writing on Cellophane is described. W. H. B.

Correction nomograph for pressure changes supplementary to humidity charts of gases. Sir5al Hatta. *J. Sec. Chem. Ind., Japan* 37, Suppl. binding 38-43(1934); cf. *C. A.* 27, 4602.—The construction of a Z-nomograph for pressure corrections is described. Nomographic charts for a low-temp. and a high-temp. range are presented giving satd. molal humidity as functions of temp. and pressure. Karl Kammermeyer

The concentration of gallium by means of adsorption on hydrated aluminum and iron oxides. Eugene Wainer. *J. Am. Chem. Soc.* 56, 348-50(1934).—Quant. removal of Ga can be accomplished by copptn. of gelatinous  $Ga(OH)_3$  with  $Fe(OH)_3$  or  $Al(OH)_3$ . The method is suitable for the extn. of low-grade ores. In complete neutralization the ratio  $Al_2O_3/Ga_2O_3$  should be at least 20:1 and  $Fe_2O_3/Ga_2O_3$  at least 10:1. H. F. J.

The periodic system of the chemical compounds of type  $A_mB_n$ . H. G. Grimm. *Angew. Chem.* 47, 53-8 (1934).—A periodic system of the chem. compds. of type  $A_mB_n$  is derived from the periodic system of the atoms. This system shows that the electron nos. of both elements have an effect upon the kind and mode of combination. Substances that belong to the same class, because of their type of bond, always have a corresponding place in this system. The compds. are classified into the following groups: (1) salts (ionic binding, at. binding), (2) at. mols. (at. binding), (3) diamond-like compds. (at. binding or free atoms), (4) metals including elements, compds. mixed crystals, eutectics, etc. (free atoms), (5) noble gases (free atoms), (6) substances with 2 kinds of bond characterized by layer lattices and (7) semi-metals. A very extensive diagram is presented with the 92 elements along the coordinate axes giving the classification of the compd. in its resp. field. Another similar diagram gives a subdivision into fields showing the no. of electrons in the nearest inner electron shell. Twenty references. Karl Kammermeyer

A new chemical theory—its origins, content and consequences. Albert Gosselin. *Bull. soc. chim.* 53, 923-45 (1933); cf. *C. A.* 27, 4451.—A modification of Werner's theory is applied to org. compds., in which C has a coordination no. of 6. The mols. are made up of a central atom or kernel with atoms, atom groups or mols. joined to it by electro-, steric or "mixed" valences. Janet E. Austin

The dynamics of liquid crystals. P. J. Bouna. *Arch. neerland. sci.* IIIA, 219-84(1933).—The dielec. loss of liquid crystals of  $p$ -azoxyanisole was measured by means of a resonance-coupled circuit. The curve of loss vs. frequency shows a max. The max. frequencies increased from  $7 \times 10^4$  to  $2 \times 10^6$  Hertz with increase in temp. from  $118^\circ$  to  $124^\circ$ . An increase in max. frequency with temp. was found also for the solid state except that a sharp max. appeared at the m. p.,  $116^\circ$ . To det. the speed with which the swarms of liquid crystals change their orientation, measurements were made of the permeability in a changing magnetic field, of the cond. in changing magnetic and elec. fields, and of the dielec. loss in a const. magnetic field. P. S. Roller

Variation with temperature of the magnetic birefringence and the dispersion of phenyl ethyl succinate. René Lucas, Marcel Schwob and Antoine Goldet. *Compt. rend.* 196, 72-4(1934); cf. *C. A.* 27, 5225.—Data on the Kerr effect in Ph Et succinate are given in the temp. range  $-6$  to  $107.5^\circ$ . To explain the dispersion of the magnetic birefringence at least 3 forms of the substance must be assumed, of which one has neg. birefringence. A. B. F. Duncan

The dielectric polarization of hydrochloric acid in solution. II. Benzene, ethyl bromide and ethylene dichloride as solvents. Fred Fairbrother. *J. Chem. Soc.* 1933, 1541-8; cf. *C. A.* 28, 13<sup>9</sup>.—Previous expts. (cf. *C. A.* 26, 2356) on the dielec. polarization of HCl in soln. were extended to include EtBr and  $C_2H_4Cl_2$  as solvents, and with improved technic a further series of measurements in  $C_2H_6$  was made. Results for solns. in EtBr and

$C_2H_5Cl$ , lead to values of elec. moment almost identical with Zahn's value (C. A. 19, 426) for gaseous  $HCl$ : in  $EtBr$   $1.02 \times 10^{-18}$  and in  $C_2H_5Cl$ ,  $0.97 \times 10^{-18}$  compared with  $1.03 \times 10^{-18}$  e. s. u. M. McMahon

**Molecular polarizations of nitrobenzene in various solvents at 25°.** H. O. Jenkins. *Nature* 133, 106(1934).—Dielec. consts.,  $d_s$ , and  $n_s$  of dil. solns. of  $PhNO_2$  were detd. in some solvents at 25°. The dielec. const. of the solvent, the total polarization of  $PhNO_2$  at infinite diln., the sum of atom and orientation polarization, electron polarization and the apparent elec. moment are given for solns. of  $PhNO_2$  in  $n$ -hexane, cyclohexane, decalin,  $CCl_4$ ,  $C_6H_6$ ,  $CS_2$ , and  $CHCl_3$ . The total polarization of  $PhNO_2$  is proportional to the dielec. const. of the solvent.

Gerald M. Petty

**The dielectric properties of chlorinated biphenyls.** A. H. White and S. O. Morgan. *J. Franklin Inst.* 216, 635-44(1933).—The dielec. const. and loss factor for 4 com. mixts. of chlorinated biphenyls are plotted as functions of temp. for various frequencies in the region of anomalous dispersion. The temp. at which the material should be used for low loss and high dielec. const. depends on the frequency and is just above the range at which anomalous dispersion begins. Louis Goldman

**Variations in the specific heat of gases with pressure.** E. Burlot. *Mem. poudres* 25, 314-35(1932-33).—A math. discussion of the errors and necessary corrections for calcs. that involve high temps. and high pressures simultaneously, as in explosive reactions. A. J. P.

**Effect of pressure on the spontaneous inflammation of hydrocarbons.** M. Neumann and V. Estrovich. *Nature* 133, 105-6(1934).—Inflammation of the mixt.  $C_2H_{12} + 8O_2$  is shown graphically from 5 to 112 cm. pressure, and 200° to 880°. There is a kink in the curve at 55-65 cm. At higher pressures, ignition is probably due to the oxidation of an aldehyde or other intermediate oxygenated product; at lower pressures, conditions favor a decompn. into  $H_2$ ,  $CO$ ,  $CH_4$ , etc.; these require much higher temps. for inflammation. Gerald M. Petty

**The states of aggregation.** K. F. Herzfeld and Maria Goepfert-Mayer. *J. Chem. Physics* 2, 38-45(1934).—Methods of investigating possible states of aggregation are discussed and a simplified one-dimensional model is introduced. It was possible to find the exact equation of state, but in this case a single (gaseous) state exists. No progress could be made in the understanding of the liquid state. Allen S. Smith

**The conductivity of insulating liquids or poor conductors in thin layers. Variations with temperature.** Thérèse Meyer. *Compt. rend.* 198, 160-3(1934).—The sp. conductivities of 18 org. liquids were detd. at ordinary temp. The values ranged from  $8 \times 10^{-11}$  mho for paraffin oil to  $2 \times 10^{-4}$  mho for  $C_2H_5OH$ . Further, the variation of the resistivity of 5 of the substances (aniline, chlorobenzene, glycerol, glycol and paraffin oil) with temp. (−100° to +60°) was studied. The results obtained are briefly discussed. Reuben Roseman

**Liquids of high refractive index.** B. W. Anderson and C. J. Payne. *Nature* 133, 66-7(1934).—The range of the total-reflectometer type of refractometer can be extended to the limit of the  $n$  of the glass by use of: (1) a 22% soln. of tetraiodoethylene in methylene iodide with sulfur,  $n_D = 1.81$ ; (2) phenyldiiodoarsine,  $n_D = 1.843$ ; (3) Se monobromide mixed with methylene iodide contg. S,  $n_D > 1.90$ . Victor Hicks

**An application of a new method, due to Professor Albert Griffiths, of determining a small change in the density of a liquid.** P. C. Vincent. *Proc. Phys. Soc. (London)* 45, 833-5(1933).—Very small changes in the d. of  $H_2O$  due to the dissolving of glass were detected.

H. F. Johnstone

**Measurements of the surface tension of carbon tetrachloride at low temperatures.** T. Alty and G. F. Clark. *Can. J. Research* 10, 129-33(1934).—The variation of the surface tension of  $CCl_4$  with temp. was detd. with considerable accuracy between +12° and −10°.

J. W. Shipley

**The molecular structure of ice and liquid water.** E.

L. Kinsey and O. L. Sponner. *Proc. Phys. Soc. (London)* 45, 768-79(1933); cf. C. A. 27, 4998.—On the basis of x-ray data a new lattice is proposed that accounts for the existence of a polymer and many of the abnormal properties of ice and water. The structure contains the units  $H^+$  and  $H_2-O$ , the latter built so that 3 H ions lie at the corners of an equilateral triangle in the plane midway between them, and perpendicular to the line of centers of the 2 O ions. It consists of neutral chains of  $H_2-O$ , extending parallel to the  $c$ -axis. Polarization effects account for the instability of dihydrol under pressure, and other properties. At the m. p., besides disocn. into monohydrol, clusters of variable size of the 2 types of mol. are the mobile units. The angle between the  $c$ -axis and the line joining an O with the H in the  $H_2-O$  unit is approx. 30°. The effect of the lattice on this angle is small, but the effect on the polarization of the O is large, and is such as to increase it nearly 3-fold over its value for isolated dihydrol (cf. C. A. 22, 895; 24, 765).

H. F. Johnstone

**The crystalline structure of thallium fluosilicate.** M. Tabet. *Gazz. chim. ital.* 63, 679-80(1933).—Pure  $Tl_2(SiF_6)$  was prepd. by addn. of  $Tl_2(CO_3)$  to  $HgSiF_6$ , without continuing to neutralization (to avoid decompn. of the  $SiF_6$  ion), and pptn. with  $EtOH$ . It is anhyd., and does not lose wt. at 100° (in agreement with Werthner (*J. prakt. Chem.* 92, 131(1864)) and contrary to Kuhlmann (*Compt. rend.* 58, 1037), and Nickles (*J. pharm. Chem.* 41, 32(1865)). Röntgenographic examn. (powd. method) showed that it has the same structure as  $K_2PtCl_6$ , with  $a = 8.60$  and a theoretical d. of 5.72. C. C. D.

**The structure of the hypophosphite group as determined from the crystal lattice of ammonium hypophosphite.** W. H. Zachariayen and R. C. L. Mooney. *J. Chem. Physics* 2, 34-7(1934).—The crystal structure of  $NH_4H_2PO_2$  was examd. to det. the size and shape of the  $H_2PO_2$  group. This group has the shape of a distorted tetrahedron in which 2 corners are occupied by O atoms and the other 2 by H atoms. The  $H_2PO_2$  radical may be visualized as consisting of ions  $(H_2P^+O_2^{2-})^-$  with interat. distances of 1.51 Å. for P-O and 1.5 Å. for P-H with angles between the bonds of 120° and 92°, resp.

Allen S. Smith

**Crystal structure of tenorite (cupric oxide).** G. Tunell, E. Povnjak and C. J. Ksanda. *J. Wash. Acad. Sci.* 23, 195-8(1933).—The unit monoclinic cell has  $a_0$  4.66,  $b_0$  3.40,  $c_0$  5.09 Å., all  $\pm 0.02$  Å.;  $\beta$  99°30'  $\pm$  30'. B. C. A.

**The fine structure of the isomeric hydrocarbons quaterphenyl and triphenylbenzene.** Eduard Hertel and Georg H. Römer. *Z. physik. Chem.* B23, 228-34(1933).—Quaterphenyl is monoclinic;  $J_a = 8.14$ ,  $J_b = 5.64$ ,  $J_c = 18.4$  Å.;  $\beta = 97^\circ$ ; the space group is  $C_{2h}^{2h}$ . Two mols. of symmetry  $C_2$  form the elementary cell. sym-Triphenylbenzene forms rhombic bipyramids;  $J_a = 11.2$ ,  $J_b = 19.8$ ,  $J_c = 7.6$  Å.; the space group is  $V_h^{16}$  and there are 4 mols. of symmetry  $C_2$  in the unit cell.

G. M. Murphy

**Crystal structure of 1,3,5-triphenylbenzene.** Kathleen Lonsdale. *Nature* 133, 67(1934).—Piezoelec. measurements show that the structure proposed by Hertel and Römer (preceding abstract) is not correct in that the crystal class is orthorhombic pyramidal instead of orthorhombic bipyramidal, and that (100) is the mol. plane of symmetry instead of (010).

Victor Hicks

**Crystal structure of carotenoids.** G. Mackinney. *J. Am. Chem. Soc.* 56, 488(1934).—Interplanar spacings are given for carotene, xanthophyll, lutein and lycopene; no spacings longer than 7.53 Å. were observed, though the range explored would have recorded up to 15 Å. Absence of significant variation in pattern makes it improbable that carotene takes up  $EtOH$  of crystn. Lutein and leaf xanthophyll do not differ significantly. Certain similar spacings suggest many common structural features in these mols.

C. J. West

**The density and the viscosity of titanium tetrachloride.** Tatsuro Sagawa. *Science Repts. Tôhoku Imp. Univ. First Ser.*, 22, 959-71(1933).—The d. of  $TiCl_4$  was detd

over the temp. range  $-18.10^{\circ}$  to  $109.60^{\circ}$ . The sp. vol.  $\times V_1 = V_2(1 + 9.6457 \times 10^{-4} + 6.026 \times 10^{-7}t + 5.94 \times 10^{-9}t^2)$ , where  $V_1 = 0.56773$ . The coeff. of viscosity is  $0.007921$  c. g. s. units at  $20^{\circ}$  and  $0.007458$  at  $25^{\circ}$ .

P. T. Newsome

The adsorption of carbon tetrachloride on carbon and the activation of carbon. Walter Lemcke and Ulrich Hofmann. *Angew. Chem.* 47, 37-43(1934).—An automatic app. is described for making vapor adsorption isotherms. The adsorption of  $\text{CCl}_4$  by pure C preps., such as activated charcoals, C from reduced  $\text{CO}$ , lampblack and graphites was examd. The capillary condensation of  $\text{CCl}_4$  upon C takes place only near the satn. pressure. The considerable condensation at small pressures, contrary to Kubelka, is not to be explained by capillary condensation, but rather by the Langmuir-Volmer conception, in which the surface forces of the C bind the vapors in a two-dimensional adsorption layer. The adsorptive power of the individual carbons before and after activation parallels that of dissolved substances like methylene blue and phenol. The increased adsorptive power of activated carbons after activation is caused by increased accessible crystal surface. The decrease in adsorptive power of finely ground Ceylon graphite after activation was attributed to smoothing of the surface by the exposed individual crystals and more rapid consumption of the small crystals. The hysteresis of the isotherms for some activated carbons which was observed in the region of intermediate pressures is connected with the vol. increase during adsorption and explained as a dilation of the grain pores of the carbon. Thirty-two references.

Karl Kaunermeyer

Adsorption of hydrogen sulfide by activated alumina. C. H. Hayley. *Can. J. Research* 10, 19-23(1934).—Adsorption of  $\text{H}_2\text{S}$  on a com. sample of "activated  $\text{Al}_2\text{O}_3$ " was measured by the dynamic and the static methods. The adsorption is affected by prior heating of the  $\text{Al}_2\text{O}_3$  to various temps., being a max. when the temp. of prior heating is  $550^{\circ}$ .

J. W. Shipley

Effect of time on alcohol and ether sorption by silica gels. László Putnok and Vilmos Neráth. *Matematik. Természettud. Értesítő* 49, 575-91(1933); cf. *C. A.* 27, 3618. —The velocity of sorption steadily decreases for both  $\text{Et}_2\text{O}$  and  $\text{EtOH}$ . The heat of sorption diminishes the sorption velocity. Gels can be evaluated according to (a) sorption capacity and (b) sorption velocity. The gels examd. were (1) Horig, (2) one made from  $\text{SiCl}_4$ , (3 and 4) 2-3-mm. and 0.5-2-mm. gels, of Deutsche Kolloides, and (5 and 6) S. "A" and S. "E" gels of F. Hermann. (4) showed large sorption velocity and (1) had a low max. sorption capacity. The others showed no great differences.

S. S. de Finály

So-called negative adsorption and vapor-pressure isotherms of permutites and clays. Paul Szigeti. *Kolloid-Beihfte* 38, 99-176(1933).—Neg. adsorption (water-binding) and vapor-pressure isotherms of permutites and clays satd. with H, Li, Na,  $\text{NH}_4$ , K, Mg, Ca, Sr and Ba ions were detd. The isotherms were interpreted in terms of internal structure differences of the substances. Neg. adsorption occurred both from electrolyte and nonelectrolyte solns. At the same vapor tension, the water content of the permutites is always greater than that of the clays.

Frank Urban

Crystal adsorption by substrates. G. I. Finch, A. G. Quarrell and J. S. Roebuck. *Nature* 133, 28(1934).—Twelve successive layers of Zn were condensed on polished Cu. In 11 of these the cryst. electron-diffraction pattern that was evident on first deposition disappeared on standing. Similar layers deposited on cryst. or etched surfaces were permanent. This is considered as expl. proof of the existence of the *Bailly layer*. Gregg M. Evans

Kinetics of reaction and adsorption in the system silver-oxygen. Arthur F. Benton and Leonard C. Drake. *J. Am. Chem. Soc.* 56, 255-63(1934).—The rate of reaction of  $\text{O}_2$  and finely divided Ag to form  $\text{Ag}_2\text{O}$  at temps. of  $160^{\circ}$  and above is equal, in cc. per hr. per mm. pressure, to  $7.2 \times 10^6 - 22,000/RT$ ; the rate of decompn. of the oxide is  $1.9 \times 10^7 - 22,000/RT$ . Both rates are independent

of the extent of oxidation of samples contg. 0.3-10% O. The difference between the energies of activation of oxide formation and decompn. corresponds to the known heat of formation of  $\text{Ag}_2\text{O}$ . Phys. adsorption of  $\text{O}_2$  by Ag occurs at  $-183^{\circ}$ . Activated adsorption occurs in the range  $0-200^{\circ}$ . The limiting satn. value of this latter type of adsorption was approx. const. between  $150^{\circ}$  and  $200^{\circ}$ . The energies of activation for the activated adsorption and desorption processes were found to be 12.7 and 28.4 kg.-cal., resp. No trend in these energies of activation as a function of the amt. of O adsorbed was detectable.

P. H. Emmett

Effect of sorbed water on the physical properties of asbestos and other fibers, with special reference to resilience. L. M. Pidgeon and A. Van Winsen. *Can. J. Research* 10, 1-18(1934); cf. *C. A.* 19, 759; 27, 5230. —Relative humidity exerts a definite effect on the phys. properties of asbestos. An app. was devised in which a mass of fiber could be compressed in such a way that the vol., pressure and relative humidity of the sample were known at any time. The effect of sorbed water on asbestos is to increase the apparent d. and to decrease compressibility and resilience. The major controlling factor is facilitation of slipping of fibers over one another by sorption of water. Since no fiber unit can be obtained with asbestos, the fiber bundle must be considered and the stiffness of such a bundle depends on the ease of slipping of its components and hence on relative humidity. This fact is of prime importance in the testing of asbestos where humidity exerts a direct effect on the screen test. Cotton and wool fibers were examd., and a definite effect of humidity was demonstrated.

J. W. Shipley

The physicochemical phenomenon of the wetting resistance of peat to water. M. V. Chapek. *Kolloid-Z.* 66, 91-5(1934).—Dry peat is not wetted by  $\text{H}_2\text{O}$  but is readily wetted by org. liquids. The heat of wetting in alc.- $\text{H}_2\text{O}$  solns. increases with  $\text{H}_2\text{O}$  content up to  $8\text{H}_2\text{O}$ :  $2\text{EtOH}$ , where it is no longer wetted. The heat of wetting in  $\text{C}_6\text{H}_6$  is small; the results indicate a hydrophilic surface. Extn. with  $\text{C}_6\text{H}_6$ - $\text{EtOH}$  before drying does not change the resistance; hence wax or resin content is not the significant factor (cf. Ramann, *C. A.* 6, 1197, 1337). After evacuation, dried peat is wetted by  $\text{H}_2\text{O}$  and the heat of wetting is 13.7 cal. per g. The wetting resistance is therefore due to a strongly adsorbed air film (cf. Ehrenberg and Schultze, *C. A.* 9, 1142). The film is firmly adsorbed, since the wetting resistance is not changed even after adsorption of  $\text{H}_2\text{O}$  vapor to 32.67%. Peat is termed an "aerophilic" powder. Arthur Fleischer

The problem of wetting and porosity. Adsorption and complete heats of wetting on powders of various grain sizes. Boris V. Il'in and A. Kiselev. *Kolloid-Z.* 66, 28-40(1934).—Expts. were made with a wood charcoal, steam-activated at  $900^{\circ}$ , 2% ash, dried at  $175^{\circ}$ , and carefully screened. Results are given for the fractions, 0.68 mm. (I), and 0.15 mm. (VII) av. particle size. Adsorption of  $\text{I}_2$  and of propionic, valeric and heptylic acids was detd. at  $30^{\circ}$  up to 36 millimol. per l. The time to reach adsorption equil. decreases with grain size. With coarse grains, Traube's rule is reversed at high concns. For the 2 fractions, the ratios of the amts. adsorbed are const. over the whole range and are: VII/I, propionic 1.071,  $\text{I}_2$  1.048, valeric 1.098 and heptylic acid 1.108. The heats of wetting at  $14-17^{\circ}$  in  $\text{H}_2\text{O}$ , isoamyl alc.,  $\text{C}_2\text{H}_5\text{OH}$ , propionic acid, nitrobenzene and heptylic acid were followed accurately over a time period in an adiabatic calorimeter, the heats of wetting increasing in the order named. The time for complete wetting increases with the mol. vol. of the adsorbate and decreases with increased heat of wetting. The ratios of heats of wetting, VII/I, are for propionic acid 1.061 and heptylic 1.110. In considering these results with the adsorption measurements, the heat of wetting per millimol. adsorbed is const. and hence, the activity of the surface is independent of grain size.

Arthur Fleischer

Physical chemistry of wetting phenomena and flotation processes. IX. P. Rebinder, Marie Lipetz, Marie Rimakaya and A. Taubman. *Kolloid-Z.* 65, 268-83

(1933); cf. C. A. 23, 5404; 25, 630; 26, 638; Talmud, C. A. 23, 5383; 24, 4672; 26, 5519.—The degree of wetting or selective wetting,  $B$ , is defined as cosine  $\theta$ , where  $\theta$  is the contact angle. It is easily measured when 2 liquids of max. polarity differences, such as  $H_2O$  and  $C_6H_6$ , are used. To measure  $\theta$ , a drop of liquid is carefully placed on or below a polished mineral surface immersed in the other liquid. The angle is detd. by projection on a screen or from a photograph. The value of  $B$  depends on the order of immersion,  $B_{11}$  representing a drop of nonpolar liquid at a surface wetted by a polar, and  $B_{12}$  the reverse. The difference,  $B_{11} - B_{12}$  is  $h$ , the static wetting hysteresis, which is reproducible and independent of time. For values of  $B$  between 0 and +1, the surface is hydrophilic; for values between 0 and -1, hydrophobic. Various minerals are arranged in a table. The most hydrophobic surface is shown by pure paraffin. Diamond is hydrophilic in contrast to graphite; hard surfaces usually are hydrophilic. On calcination at 1000°, talc increases in hardness and becomes hydrophilic. Easily oxidized surfaces, such as sulfide, are hydrophobic when cleaved under benzene, but hydrophilic when cleaved under water, because of an oxide-film formation. The value of  $B$  depends on the concn. of surface-active compd. in the liquid. In general,  $B$  decreases with increase in concn., tending to reach a max. at max. adsorption and showing an inversion point, e. g., from initially hydrophilic to hydrophobic. Detn. of inversion concns. permits a quant. comparison of the flotation activity of various reagents.  $B$  changes may also be applied to the study of surface reactions caused by (1) electrolytes as in depressing or activating and (2) oriented adsorption. At mineral-water-air surfaces only undissoc. mols. are effective while the ions are the effective agents at the surface mineral-water-benzene. X. The dependence of wettability on the adsorption of flotation reagents. (Wetting isotherms at the interface mineral-water-air.) P. Rehinder, Marie Lipetz and Marie Rimakaya. *Ibid.* 66, 40-50 (1934).—To measure wetting,  $B$ , the polished mineral surface is dipped in an aq. or  $C_6H_6$  soln. for 5 mm., dried with clean filter paper, and then a drop of liquid carefully brought to the surface. The value of  $B_{11}$  changes with the concn. of surface-active reagent and inversion points, change from hydrophilic to hydrophobic surface, are found at concns., 0.01-0.0001%, used in flotation practice. On paraffin isoamyl xanthate is nearly as active as amyl alc., indicating a purely physicochem. orientation. On malachite, the oriented xanthate layer is chemically fixed, causing a greater activity of the xanthate over the alc. The same occurs with soaps on alk. earth or oxidized minerals. Where chem. fixation occurs at a surface  $B_{11}$  changes in the manner indicated, while  $B_{12}$  decreases very slightly in contrast to the behavior at the interface, mineral- $H_2O$ - $C_6H_6$ . From theoretical considerations of wetting forces the necessary condition for flotation is that  $\theta > 0$ . Too fine grinding of particles hinders flotation by a particle hydration. Sulfidized malachite surfaces are made hydrophobic by xanthate adsorption but not by fatty acid adsorption. "Overcoiling" or decreased flotation due to excess reagent is caused by the formation of a second adsorption film with a reverse orientation, making the surface hydrophobic. Arthur Fleischer

The effect of foreign substances on the wettability of chemicals by water. L. J. Weber and A. C. Chatterji. *Kolloid-Beihfte* 38, 412-38 (1933).—The wetting of anthracene by solns. of formic to undecylic acids; naphthalene by solns. of MeOH to hexadecyl alc.; phenanthrene by solns. of Me to Am acetate was detd. The Traube homologous-series rule is valid up to a certain higher member of the series. Various polar and nonpolar substances were added to naphthalene + water. They were oleic acid,  $C_6H_6$ , PhMe, xylene, benzyl alc.,  $PhNO_2$ ,  $PhNH_2$ ,  $m$ -toluidene, 1,3,4-xyldine,  $PhOH$ ,  $o$ -,  $m$ -,  $p$ -cresol, benzonitrile, Me salicylate, resorcinol,  $Me_2O$ ,  $MeEtCO$ , paraffin, pentane,  $CS_2$ ,  $CHCl_3$ ,  $CCl_4$ . The polar substances favored wetting. The addn. of polar and nonpolar substances to melted naphthalene (oleic acid, benzoic acid,  $p$ -nitrobenzoic acid, nitrobenzene, saline,  $p$ -nitroaniline, octyl alc., hexadecyl alc., paraffin) showed that

polar substances increase wetting. Melted naphthalene, anthracene and phenanthrene are not as easily wetted as before. Since impurities increase wetting, if they are polar, the purity of a compd. can be tested in this way. Frank Urban

Surface solutions. Two-dimensional liquids and unimolecular layers. André Marcellin. *Kolloid-Beihfte* 38, 177-336 (1933).—A review. Frank Urban

Structure of surface films. XVIII. Effect of alkalinity in the underlying solution on films of fatty acids. N. K. Adam and J. G. F. Miller. *Proc. Roy. Soc. (London)* A142, 401-15 (1933); cf. C. A. 27, 3652.—Unimol. surface films of 12-22-C fatty acids were studied in detail over the complete range of acidity between strong alkali and dil acid, especially on the alk. side. Electrolytic dissociation progressively increasing from neutral to alk. solns. causes a very marked decrease in lateral adhesion both in condensed and in expanded films. Minor sp. effects of buffer salts on this adhesion are also found. Collapse occurs, in ultramicroscopic aggregates, on the more alk. soln., but this is prevented if strong concns. (2  $N$ ) of salt are present. Bimol. films are not formed. Concns. of salt sufficient to retard collapse on alk. solns. tend to increase the size of the end groups, probably by adsorption of cations. The change in packing of the condensed films from close-packed chains (alk. solns.) to close-packed heads, usually occurs within a small  $pH$  range, the exact value of which depends somewhat on the buffers present. XIX. Effect of alkaline solutions on films with various end groups. *Ibid.* 416-22.—Unimol. films of diacidic acids  $HOOC(CH_2)_nCOOH$  ( $n = 32; 24; 20$ ); octadecylalonic acid  $C_{18}H_{35}O_4$ ;  $CH_3(COOH)_2$ , alkylphenols,  $C_nH_{2n+1}C_6H_4OH$  ( $n = 18; 16; 12$ ); stearylresorcinol,  $C_{17}H_{35}CO_2C_6H_3(OH)_2$  (1:3:4); Me palmitate; and various nitriles show a marked decrease in lateral adhesion, when the alkyl of the soln. is changed so as to ionize the end groups. Substances with nonionizable end groups do not show this effect. Strong soda solns. tend to increase the size of the carboxyl or phenolic groups at the end of the mol. Films of Me palmitate are fairly rapidly hydrolyzed on 2  $N$  NaOH. XX. Surface potential measurements on nitriles. N. K. Adam and J. B. Harding. *Ibid.* A143, 104-11 (1933).—Surface potential measurements of unimol. films of nitriles (contg. 14-22 total C atoms, including the C in the end CN group) indicate a max. value of  $\mu$ , calcd. from the simple Helmholtz equation, only about 1/7 of the dipole moment of the nitrile group as obtained by other methods. The effective dielec. const. of the surrounding of the film mol. is probably of the order of 7. The transition between condensed and expanded films is heterogeneous with the nitriles. Frank Urban

The action of diminished pressure in the formation of liquid drops on the surface of the same liquid. L. D. Mahajan. *Kolloid-Z.* 66, 22-3 (1934); cf. C. A. 25, 14, 26, 896, 3164; 28, 392<sup>14</sup>.—At barometric pressure of 433 mm. and with  $H_2O$  at 0°, primary drops failed to form and secondary drops formed only with great difficulty. Under like conditions at 556 mm. both kinds formed. The expts. confirm the earlier work. Arthur Fleischer

Electrokinetics. XIII. The relation between streaming potential and applied pressure. Henry B. Bull. *Kolloid-Z.* 66, 20-2 (1934); cf. C. A. 26, 2832.—The streaming potential of NaCl solns., 0.00001  $N$ , in  $H_2O$ ,  $H_2O$ - $C_2H_5OH$  and  $H_2O$ -isopropyl alc. were detd. by methods outlined by Ettisich and Zwanig (cf. C. A. 24, 3150; 26, 3714) except for the substitution of Pyrex for Jena glass capillaries. Plotting the streaming potential vs. pressure gave straight lines that pass through the origin. This confirms the Smoluchowsky-Helmholtz equation and contradicts E. and Z.'s results showing a change of electrokinetic potential with pressure. Arthur Fleischer

Determining the concentration gradient in the ultra-centrifuge cell. Ole Lamm. *Nature* 132, 890-1 (1933).—A new refraction method gives a direct measurement of the concn. gradient. Helen S. Hopfield

The preparation of disperse systems by explosion of vapors of a compound into a cold dispersion agent. I

P. P. von Weizsäcker and Naoyasu Sato. *Kolloid-Z.* 66, 1-11(1934).—A tube of material to be dispersed is sealed from the dispersing agent by a seal which loosens when a high pressure develops in the tube. Three conditions are set forth: (1) when all of the compd. in the tube is vaporized prior to explosion, (2) when part is vapor and part liquid and (3) when the tube is filled with liquids so that practically no vapor is present. Condition 1 is similar in principle to the method used in condensing vapors to obtain colloid solns. but provides a great instantaneous supersatn. The latter cases are accompanied by geyser action and sol formation is partly by mech. dispersion. Stable dil. sols of S, Se and Hg were prepd. In no case were gas bubbles observed. The stability is due to the formation of water-sol. compds. In the former  $H_2S$  and  $H_2Se$  were evident. With Hg, the stabilizing sol. factor is probably derived from a small quantity of org. matter from the seal used. In all cases the stable sols were those showing an increase in color on standing.

Arthur Fleischer

The suspension effect. G. Wiegner, H. Pallmann, A. Musierowicz and J. Albareda. *Polish Agr. Forestal Ann.* 28, 323-56(363-6 in German)(1932); cf. *C. A.* 24, 5200.—Explanation of the suspension effect must be based upon the following exptl. results: Addn. of the dispersed phase to a satd. dispersion medium causes a rise in the H-ion activity. The cause of this rise is the dispersed particle. The effect can be detd. by means of a quinhydrone, a H or a glass electrode, and is, therefore, a normal phenomenon of medium or highly dispersed systems. The activity of the satd. dispersion medium is const. and independent of the abs. amt. of the suspended phase. Extn. of the solid phase with fresh solvent does not free the particle from the acidified agent. Hence the suspension effect is caused by H ions adsorbed by the dispersed phase. The latter, consisting of monones or primary particles (micelles), is composed and characterized by 3 components: (1) the ultramicrone, (2) the compact inner layer, and (3) the loosely attached outer layer of ions. The ultramicrone is the carrier of the chem. properties. This center attracts ions of the same elec. charge by secondary valences, these ions forming the inner layer and transferring their charge to the ultramicrone. The inner layer attracts from the medium ions of an opposite elec. charge, forming the outer layer, which is partly mobile and exhibits a partial reactivity. In aq. media H and OH ions take part in the formation of both layers. In case the micelle is electroneg. the H ions present in the outer layer are able to give electromotive and inversomotive effects.

J. Wiertelak

Colloid chemical basis of photo-anisotropy. Fritz Weigert and Josef Matulis. *Kolloid-Beihfte* 38, 884-411(1933).—Review.

Frank Urban

The aging of arsenic sulfide sols under the influence of light. Stability changes of sols with respect to electrolytes. V. Krestinskaya. *Kolloid-Z.* 66, 58-62(1934); cf. *C. A.* 22, 1884; 28, 950<sup>u</sup>.—Three  $As_2S_3$  sols with empirical compns. (1)  $4As_2S_3.9As_2O_3$ , (2)  $5As_2S_3.18As_2O_3$ , (3)  $2As_2S_3.7H_2S$ , and concns. 0.9545, 0.205 and 2.03 g. per l., resp., were exposed to light for 6-13 days. The coagulation concns. by Ba, H, K and Na chlorides were detd. before and after exposure, in the latter case after filtering off the pptd. S. All sols increased in stability to Ba; 1 and 2 showed increased stability to Na and K, while 3 decreased in stability; 1 and 3 decreased in stability to HCl while 2 showed a slight increase. The coagulation concns. of Ba and K chlorides increased with sol concn.; for HCl it remained const. Increase in  $H_2AsO_4$  in the intermicellar liquid acted like diln. because insol.  $Bas(AsO_4)_3$  was formed. The behavior was further complicated by the formation of S sol, which increased the sensitivity to coagulation.

Arthur Fleischer

The thermodynamic equilibrium in the crystal state. D. Balarev. *Kolloid-Z.* 66, 51-7(1934); cf. *C. A.* 20, 2107; 21, 2610; 25, 2614, 4165; 27, 1793, 2372.— $PbI_2$  crystal platelets, grown by slow diffusion of  $Pb(NO_3)_2$  and KI solns., were of 4 colors by incident light, green, blue, rose and violet, and by transmitted light, the resp.

complementary colors. The colors indicate a stepwise growth, each change representing about 300 m $\mu$ . Evapn. of mother liquor in the presence of platelets produced a fog of submicrons which on complete evapn. left a green film on the crystals. The change in particle size of ground pptd.  $BaSO_4$ ,  $BaF_2$ ,  $SrSO_4$ ,  $PbI_2$ , and natural barytes and fluorspar suspended in  $H_2O$ , on standing and on stirring, gave complex curves with max. and min. Particle growth is not simply a mol. soln. process. The results confirm the mosaic theory of real crystals. A. F.

Study of the stability of metallic organo-sols. Wolfgang Ostwald, J. F. Ehlers and H. Erbring. *Kolloid-Beihfte* 38, 387-83(1933).—The method of oscillatory dispersion of Ag in org. dispersion media was further developed for the purpose of obtaining quantitatively reproducible results. The inversion time, i. e., the time in sec. during which oscillatory dispersion may take place before coagulation occurs, is the most reproducible measure of sol formation and stability. It is more characteristic than inversion concn. The inversion time and concn., also the dispersion velocity, were detd. as functions of temp. and voltage. The dispersion media were mixts. of polar and non-polar liquids ( $Et_2O$ ,  $PhNO_2$ ,  $MeOH$ ,  $EtOH$ ,  $PrOH$ ,  $BuOH$  and  $Me_2CO$ , in  $C_6H_6$ ), and mixts. of 2 polar liquids ( $PhNO_2$ ,  $H_2O$ ,  $MeOH$ ,  $EtOH$ ,  $PrOH$ , iso-AmOH and *n*-hexyl alc. in  $Et_2O$ ). Three to four types of curves were obtained (inversion time  $U$  — compn. of mixt.). In the simplest case,  $Et_2O-C_6H_6$ ,  $U = k\sqrt{c}/\epsilon$ , or  $U = k_1\sqrt{c} \mu^2/\epsilon$ , where  $c$  is the percentage compn. of mixt.,  $\epsilon$ , dielec. const.,  $\mu$  dipole moment,  $k$  and  $k_1$  are constns. The case  $PhNO_2-C_6H_6$  may be represented by the function  $U = k\sqrt{cP^2}$ , where  $P^2$  is the orientation polarization. An attempt was made to connect the stability relations theoretically with the dielec. properties of the dispersion medium.

Frank Urban

Density of particles of a "copper" hydrosol. H. H. Paine and H. W. Shearnsmith. *S. African J. Sci.* 30, 127-31(1933).—Samples of colloidal Cu were prepd. by passing an arc discharge between Cu electrodes under cond. water. The water used in the tests had a cond. of about  $0.5 \times 10^{-8}$  ohm $^{-1}$  cm. $^{-1}$ . The sp. gravities of the 4 colloidal solns. were detd. by measuring the loss of wt. of a glass bulb in the solns. and in cond.  $H_2O$ . The detns. were correct within 1 part in 100,000. The colloidal particles could be Cu,  $Cu_2O$ ,  $CuO$  or  $Cu(OH)_2$ . If they are assumed to be Cu, the soln. contained 0.396 g. Cu per l. (by titration with  $HNO_3$ ). The sp. gravity of the soln. was calcd. to be 1.000352. For  $Cu_2O$ , the calcd. sp. gravity of the soln. was 1.000370, for  $CuO$  1.000418 and for  $Cu(OH)_2$  1.000428. The observed value was 1.000420, lying between those for  $CuO$  and  $Cu(OH)_2$ ; the colloidal particles are assumed to be  $CuO$  or  $Cu(OH)_2$ . Since the soln. is brown and does not change upon boiling, the soln. is considered one of  $CuO$  particles. Three other similarly prepd. solns. confirmed this conclusion. H. B. M.

Ionic interchange in sulfur sols. II. Effect of acids. Thomas R. Bolam and Joseph J. Muir. *J. Chem. Soc.* 1933, 1022-8.—Supplementing the investigation of ionic interchange in well-dialyzed S sols (Bolam and Bowden. *C. A.* 27, 649), undialyzed sols of the same kind, contg. a greater amt. of acid were studied. Total coagulation occurred before the whole of the H ion was liberated, and it was established that the actual cation interchange was incomplete. The degree of replacement at the coagulating point decreased with increase in acid concn., but its value proved independent of the nature of the cation of the coagulating salt, in confirmation of previous work. Increase in acid concn. not only decreased the amt. of H ion liberated at the coagulating point, but also increased the concn. of salt necessary to secure this amt. of replacement. The former of these effects appears to be connected with the coagulating action of the acid; the latter, with its so-called "antagonistic" action. Jerome Alexander

Aging of young aluminum hydroxide gels. R. Fricke and K. Meyring. *Z. energ. allgem. Chem.* 214, 269-74(1933).—The aging of freshly pptd.  $Al(OH)_3$  under dil. NaOH was followed by measuring the  $p_H$  of the super-

nant NaOH soln. The aging takes place in two distinct steps during the 1st of which x-ray examn. reveals formation of  $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$  in the ppt. and during the 2nd  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ . The soly. product of  $\text{H}_2\text{AlO}_3$  decreases during aging by nearly  $1\frac{1}{2}$  powers of 10. F. L. Browne

Coagulation of colloids. VI. Viscosity variations during coagulation. Shridhar Sarvottam Joshi and T. Madhab Menon. *J. Indian Chem. Soc.* 10, 599-609(1933); cf. C. A. 28, 9521.—Viscosity changes during slow coagulation of  $\text{As}_2\text{S}_3$  sols by KCl, KBr, KI, KF,  $\text{AlCl}_3$ ,  $\text{ThCl}_4$  and  $\text{Th}(\text{NO}_3)_4$  were detd. Frank Urban

Membrane equilibria. Aug. Boutaric. *Rev. gen. sci.* 44, 633-7(1933).—A review. Frank Urban

Formation of chromatic gels. Mike A. Miller. *J. Chem. Education* 11, 32(1934).—By the addn. of  $\text{CHCl}_3$  to a chromatic emulsion a rigid gel is produced immediately, without the process of creaming. Frank Urban

Swelling peculiarities of gelatin film and the application of the conclusions to the swelling of emulsion colloids. J. Bollhagen. *Kolloid-Z.* 66, 75-83(1934).—Gelatin film squares, 40 mm. on a side, were cut from sheets poured from 10-20% gelatin soln. prepd. by heating at  $55^\circ$  for 4 hrs. All squares were slightly curved; it was not possible to prep. absolutely plane surfaces. Change of curvature on wetting was noted (a) when the square was placed on the surface of  $\text{H}_2\text{O}$  for a period, (b) when one side was breathed upon, and (c) when one side was coated with petrolatum and the square placed in  $\text{H}_2\text{O}$ . Under a, 4 cases are noted: (1) for squares 0.05 mm. thick, the film first curves concave to the dry side, Type I curvature, and then changes to II, concave to the wet side, only to a slight degree; (2) 0.13-0.17 mm., I is very strong, and cylindrical surfaces are formed, II is very small; (3) 0.17-0.43 mm., a small I changing to II but not showing an intermediate plane phase. The time for the change depends on thickness; (4) 1 mm., a spherical curvature develops without any sign of axes. The axis of II is perpendicular to the axis of I. By method b for thicknesses 0.1-0.5 mm., curvature I is produced, changing rapidly to II. By method c for 0.13-0.17 mm., curvature I changes to II, which then changes back to a I. Gelation changes were followed by a polarization microscope. An air-dry foil consists of numerous deformed particles originally spherical. On swelling, 2 stages occur: (1) an increase in 1 dimension and decrease in another in individual particles and (2) change in size of swelling particles. Arthur Fleischer

The measurement of abnormal viscosities by means of the falling-ball method. Fumio Hirata and Kiichiro Kubo. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 11-14(1934).—The viscosity of a very viscous soln. of rubber in xylene and the empirical formula for the ratio of the diam. of ball to the velocity of fall were detd. The abnormal viscosity of very viscous colloidal solns. can be detd. by using balls of the same d. but different diams. The app. is described and exptl. data are presented.

Karl Kammermeyer  
The effect of electric charge on the viscosity of hydrophilic colloids. Ichiro Sakurada and Tadashi Nakashima. *Kolloid-Z.* 66, 62-7(1934); cf. C. A. 23, 4340; 26, 6121; 27, 5230.—Sp. vol.,  $\phi$ , and the shape factor const.,  $a$ , are derived by combining the generalized Einstein and Fikentscher-Mark equations. The combined relation  $c/\eta_{sp} = (100/a\phi) - (c/a)$ , in which  $c$  is concn.,  $\eta_{sp} = \eta_r - 1$ , and  $\eta_r$  the relative viscosity, is a straight line from which values of  $a$  and  $\phi$  are readily calcd. Addn. of NaCl to solns. of the Na salt of celluloseglycolic acid causes  $a$  to drop rapidly until it reaches 2.5, while  $\phi$  remains practically unchanged. The value 2.5 is characteristic of spherical and uncharged particles. In solns. less than 0.17 N in NaCl the increase in  $a$  must be due to particle charge. The change of charge by NaOH is less than by neutral salts. With change in temp., the behavior is complicated and difficult to understand. Starch solns. contain spherical particles with hardly any charge. Gelatin solns show no relation between  $a$ ,  $\phi$  and temp. and their particles may be nonspherical or highly charged.

Arthur Fleischer

The elastic properties of collodion when flowing. A. Pakshver and M. Bunin. *Kolloid-Z.* 66, 68-75(1934).—The rate of fall of steel balls,  $\frac{1}{8}$  to  $\frac{1}{16}$  in. diam. through 6-20% nitrocellulose solns. in  $\text{Et}_2\text{O}$  and  $\text{EtOH}$ , was detd. The min. size of ball at which no fall occurs measures roughly the elastic properties while the slope of the line, rate vs. size, measures the viscosity. The elastic limit, which depends on the load and rate of application, must be passed before the balls sink. With increase in temp. over the range  $15-33.5^\circ$ , viscosity decreases while the elastic limit remains const. With increase in concn., viscosity increases while the elastic limit changes. If the full tube is vigorously shaken, viscosity decreases, indicating a thixotropic effect. On standing the original value is resumed. Quartz sand was added to show flow paths in short tubes under pressure. In 20% soln. flow along the axis of the tube resembles solid flow while at the walls there is liquid flow. In long tubes, the rate-pressure lines are weakly curved. Collodion is not an ideal plastic substance. There is no adequate theory for substances with variable viscosity, elastic limit and elastic modulus.

Arthur Fleischer

Stratification phenomena in pigment-containing celluloid films. Erwin Michnickel. *Kolloid-Z.* 66, 84 (1934).—To prep. homogeneous plates for x-ray analysis,  $\text{Me}_2\text{CO}$  solns. of celluloid to which graphite or metal powder is added are poured on an unglazed clay surface coated with paraffin through which an air current is passed during drying. Good plates can also be obtained by incorporating a small quantity of rosin and pouring on glass. Absence of stratification is detd. by microscopic examn of a vertical section and by elec. cond. measurements of the upper and lower surfaces. The drying time of plates depends not on diln. but on the proportions of celluloid and metallic filler. Air inclusions have no effect.

Arthur Fleischer

Determination of electric charge and isoelectric point of fibers. A. V. Dumanski and O. A. Dumanski. *Kolloid-Z.* 66, 24-8(1934).—If a fiber is suspended in a cuvette contg. distd.  $\text{H}_2\text{O}$  and 2 Pt electrodes to which a const. e. m. f. of about 100 v. is applied, the fiber bends toward one of the electrodes. On reversing the current, the fiber movement is reversed. This movement depends only on the charge of the electrode. For more exact expts. non-polarizable electrodes are used and are placed in half-cells with a salt soln. of the same metal, with a KCl-agar siphon. In  $\text{H}_2\text{O}$  with  $p_H$  4, charges noted were ostrich feather +, human hair +, rayon +, glass —, collodion —, gelatin —, algae + and cotton —. Addn. of HCl or Th soln. changes the charge on glass between  $p_H$  2 and 3. The behavior of gelatin is anomalous and should be + in acid soln. The reversal of direction is due to easy penetration by water causing an electroosmotic effect. "This method is not to be confused with Humphry's (cf. C. A. 21, 1740, 2086). The method is called "cataphoresis of fastened fibers." Arthur Fleischer

Lyophilic colloids. XIX. Effect of several neutral salts and nonelectrolytes on isoelectric gelatin sol. I. W. J. Holleman, H. G. Bungenberg de Jong and R. S. Tjaden Modderman. *Kolloid-Beihfte* 38, 439-43(1933) KI, KCl,  $\text{KNO}_3$ ,  $\text{K}_2\text{SO}_4$ ,  $\text{K}_3\text{Fe}(\text{CN})_6$ ,  $\text{K}_4\text{Fe}(\text{CN})_6$ ,  $\text{Na}_2\text{SO}_4$ , NaI, NaCl, KF, KBr,  $\text{EtOH}$ ,  $\text{PrOH}$  and urethan raise the viscosity of isoelec. gelatin solns. Theoretical discussion. Frank Urban

Fixation of iodine by casein. I. S. Yaichnikov. *J. Gen. Chem.* (U. S. S. R.) 3, 1-4(1933).—The action of I vapor on casein was studied by storing 0.4348 g. casein (obtained by drying 0.4524 g. casein to a const. wt. in a vacuum desiccator) and cryst. I (in sep. containers) in a desiccator for 1660 days. Casein became gradually colored from light yellow to coffee-brown. In all, 180 weighings of casein were made at intervals of 1-125 days with 13 refillings of I. The increase in wt. of casein was relatively greater at the beginning of each addn. of I than at the later stages. At some intervals there was a small loss of wt., which was compensated by the continued increase in wt. of casein to 0.9284 g. iodocasein with 53.17% I or 113.52% I based on casein. From the



failure of the compd. to attain equil. it may be inferred that I is fixed in iodocasein mainly by adsorption, probably with a little I more firmly combined. C. B.

The solubility equation of hydrated salts. J. Perreux. *Compt. rend.* 198, 172-4(1934).—The soly. equation of a hydrate,  $S \cdot xH_2O$ , derived from van der Waals' equation (*Rec. trav. chim.* 1, 125(1889)), is  $[503C/(1-sC)] \cdot (q_c/T^2) - (\delta \log p/\delta C) \cdot (\delta C/\delta T) = 0$ , where  $T$  is the abs. temp.,  $C$  the mol. concn. of the satd. salt soln. (expressed as mols. of salt/mol. of total  $H_2O$ ),  $p$  the vapor pressure of this soln., and  $q_c$  the limiting heat of soln. of the hydrate. This equation and 2 corollaries (relating to *transition* and *cryohydric points*) were experimentally verified for several salts of Mn and Na. Reuben Roseman

The solubilities of certain amino acids in water, the densities of their solutions at twenty-five degrees and the calculated heats of solution and partial molal volumes. John B. Dalton and Carl L. A. Schmidt. *J. Biol. Chem.* 103, 549-78(1933).—The solubilities of the following pure amino acids at various temps. between 0° and 70° were detd.: *D*- and *L*-alanine, *L*- and *D*-aspartic acid, *D*- and *L*-glutamic acid, *L*- and *D*-leucine, diiodo *L*-tyrosine, glycine, *D*-isoleucine, *D*-norleucine, *D*-phenylalanine, *L*-tyrosine and *D*-valine. Solubilities calcd. for the 5° intervals between 0° and 75° and at 100° are tabulated. The equations expressing soly. as a function of temp. are given, and from these the heats of soln. (in the case of those marked \*, corrected for the activity of the amino acid) are, in the same order; 1830\*, 2200\*, 5580\*, 6500\*, 6050\*, 5710\*, 830\*, 2070\*, 7830, 3370\*, 1790, 2540, 2770, 5960 and 1590\* cal., resp. Ds. of aq. solns. at 25° are tabulated. Application of the criteria of Meyerhoffer to the data indicates that *D*-alanine, *D*-leucine and probably also *D*-aspartic acid are racemic compds., while *D*-glutamic acid is a racemic mixt. Seventy-six references. K. V. Thimann

The solubility of the amino acids in water. Max S. Dunn, Frank J. Ross and Lee S. Read. *J. Biol. Chem.* 103, 579-95(1933); cf. preceding abstr.—The solubilities in water of the following pure amino acids at 0°, 25°, 50° and 75° are given: glycine, *D*-alanine, *D*- and *D*-glutamic acid, *D*-valine, *D*-isoleucine, *D*-phenylalanine, *D*-norleucine, *D*-leucine, *L*- and *D*-aspartic acid, and *L*-tyrosine. From the figures are calcd. the heats of soln. for successive 25° intervals and the solubilities at 100°, which, in the same order, are: 75.2, 43.2, 5.34, 19.9, 20.0, 9.04, 6.53, 4.70, 4.83, 4.88, 9.94, 0.492 g. per 100 g. water, resp. On the whole the results in this and the preceding abstr. agree well. When the log of the mole fraction is plotted against  $1/T$ , straight lines are given by glycine, alanine and glutamic and aspartic acids, which are therefore probably less assocd. in soln. than the other amino acids tested. K. V. Thimann

A study of two strong electrolytes with reference to the theory of complete ionization. John B. Robertson. *S. African J. Sci.* 30, 187-95(1933).—If strong electrolytes are completely disscd. in aq. soln. then, when a soln. of such an electrolyte is shaken with an org. solvent in which the electrolyte is sol. but undissocd., there is no common mol. species in the two phases. Consequently the partition law does not apply and all the electrolyte migrates to the ionizing solvent. In water  $AgClO_4 \cdot H_2O$ , and in benzene  $AgClO_4 \cdot C_6H_6$  are stable. Mol. wts. indicate that these solvations are not complete. Mol. wts. of  $AgClO_4$  in dry and moist  $C_6H_6$  are quite different. The difference between the f. ps. of dry and  $H_2O$ -satd.  $C_6H_6$  is 0.097°, corresponding to a  $H_2O$  content of 0.035% at 5.4° if the  $H_2O$  is assumed to be unimol. in the soln. The av. value for the mol. wt. of  $AgClO_4$  in moist  $C_6H_6$  is 670 (max. variation 3.5%), corresponding approx. to  $(AgClO_4 \cdot H_2O)_2$ . Simple mols. apparently do not exist in this soln. The soly. of LiI in  $PhNO_2$  was detd. at 250° to be  $5.27 \pm 0.04\%$ . The soly. of LiI in  $H_2O$  at 250° is  $61.6 \pm 0.1\%$ , dss. of soln.  $1.828 \pm 0.001$ , and g. mols. per l. =  $8.42 \pm 0.01$ . The distribution ratio of LiI between  $H_2O$  and  $PhNO_2$  varied from 3250 to >6830 as the concn. of LiI in the  $H_2O$  layer decreased from 42.2 to 10.1 g. LiI per 100 g. soln. The concn. of LiI per 100 g.  $PhNO_2$  changed little,

0.0156 to <0.0018. The system strongly supports the complete ionization theory. Detns. of the mol. wt. of LiI in  $PhNO_2$  yield reason for divergence from this theory. These mol. wts. vary from 270 to 365. The single mol. wt. = 133.86; hence the 270 value is approx. double, evidence of polymerization. In both cases (LiI and  $AgClO_4$ ) the apparent failure of the distribution law may be ascribed to the polymerization, leaving no species common to both solvents. The evidence here given, while not in direct conflict with the theory of complete ionization in the aq. phase, affords another explanation which would account for the observed phenomena. H. E. M.

Photoelectric measurement of adsorption and color change (of indicators). Rudolf Sewig and Friedrich Muller. *Chem. Fabrik* 1934, 25-7. J. H. Moore

Formation of oxide films on gold and iron. Wm. J. Shutt and Arthur Walton. *Trans. Faraday Soc.* 29, 1209-16(1933); cf. C. A. 27, 888.—Au anodes are rendered passive by alkali, while H is adsorbed. After soln. of the oxide film in dil. HCl, sufficient adsorbed H may remain to prevent further action of the alkali. If the H is removed through oxidation by alk. hypochlorite, formation of a unimol. oxide layer is indicated by the loss of wt. due to subsequent acid treatment. No film formation could be detected in oxidizing agents of low OH-ion concn., such as concd.  $HNO_3$  or acid permanganate. This is ascribed to the slowness of removal of adsorbed H and the slowness of oxide formation due to the low OH-ion concn. Presence of adsorbed H is indicated by a more neg. potential. In acid solns., the potential of electrodes contg. adsorbed H falls more rapidly, with an increase of  $pH$ , than that of electrodes freed from adsorbed H by Cl treatment. In alk. solns., where more adsorbed H is readily produced, the potential of both electrodes is the same. Fe behaves qualitatively like Au. An oxide film, readily formed by treatment with either neutral or alk. solns., causes a lowering of potential, which later rises again to its former value. In this case the dissolved O suffices for the oxidation of the adsorbed H. L. P.

What are the proportions of oxygen and carbon dioxide that extinguish a flame? P. Vinding and E. Banner-Voigt. *Ingeniøren* 42, 65-7(1933); *Chimie & Industrie* 30, 579.—Verification of the hypothesis that an atom which will sustain combustion is not toxic to man was attempted. A Davy lamp (1), bicycle lamp (2), illuminating gas (3) and  $C_2H_2$  (4) were allowed to burn in a closed vessel, and O and  $CO_2$  when the flames went out were, resp., as follows: (1) 17.5-20.1, 2.1-5.6; (2) 17.7-18.6, 2.5-7.5; (3) 10.9, 5.1; (4) 10.1, 8.7%. Intoxication takes place when the O content falls below 15% and would therefore occur in an atm. in which illuminating gas or  $C_2H_2$  does not burn. Intoxication takes place with more than 4%  $CO_2$ , i. e., in an atm. that does not support the combustion of illuminating gas or  $C_2H_2$ , and in 5 of the 12 expts. with the Davy lamp and 4 of the 9 expts. with the bicycle lamp. The values obtained are of the same order as those of Schultzig (C. A. 24, 3561), who worked under rather different conditions; but the O contents at which the flames were extinguished are appreciably higher than those given in some of the textbooks. A. Papineau-Couture

The dissociation pressure of silver carbonate. Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 1229-39(1933).—Over the temp. range 120.1-201.3°, the disscn. pressure of  $Ag_2CO_3$  is  $\log P_{atm} = -(3855.9/T) + 7.9040$ . The following values were calcd. for  $2Ag + C$  (graphite) +  $3/2O_2 = Ag_2CO_3$ :  $\Delta H_{298} = -119,302$  cal.,  $\Delta F_{298} = -103,614$  cal. P. T. Newsome

Equilibrium in the reduction of cobaltous oxide by carbon monoxide. Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 892-901(1933).—The equil. of the reduction of  $CoO$  by  $Co$  was studied by a dynamic method from 563° to 861°. Thermodynamic values for  $CoO$  were calcd. from exptl. results and other data. C. B. Jenni

Equilibrium in the reduction of silver sulfide by hydrogen. Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 902-14(1933).—Results of previous

investigators on the equil. of the reduction of  $\text{Ag}_2\text{S}$  by  $\text{H}$  do not agree. W. used a static method. Results and other data are discussed from the thermodynamic point of view. The standard potential of  $\text{S}$  was also calcd. from these results,  $E_{298} = 0.47$  v. C. B. Jenni

Oxidation-reduction equilibrium of metallic manganese. Shin-ichi Aoyama and Yoshiyaga Oka. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 824-34 (1933).—The oxidation-reduction equil. of metallic  $\text{Mn}$  was measured in  $\text{H}$  atm., which was satd. by  $\text{H}_2\text{O}$  vapor corresponding to several low temps. The linear relation holds between  $\log [\text{H}_2]/[\text{H}_2\text{O}]$  and  $1/T$ . The occurrence of the reaction  $\text{Mn} + \text{H}_2\text{O} = \text{MnO} + \text{H}_2$  was confirmed. For the reaction  $\text{Mn} + \frac{1}{2}\text{O}_2 = \text{MnO}$  at  $298^\circ\text{K}$ :  $\Delta H_{298} = -96,680$  cal.,  $\Delta F_{298} = -96,240$  cal. C. B. Jenni

Stability of sodium hypobromite solutions. John Palmén. *Finska Kemistisamfundets Medd.* 42, 48-63 (1933).—The stability of 0.5, 1.0 and 2.0  $N$   $\text{NaBrO}$  solns. contg. 50, 75 and 100% excess  $\text{NaOH}$  was investigated at  $18^\circ$ ,  $32^\circ$ ,  $62^\circ$  and  $92^\circ$ . More than 50% excess  $\text{NaOH}$  was found unnecessary. The half-life values of the solns. (0.5, 1.0 and 2  $N$ , resp.) are as follows:  $17-18^\circ$  53, 23, 10 days;  $30-5^\circ$  100, 84, 20 hrs.;  $60-6^\circ$  6, 5.5, 0.8 hrs.;  $90-5^\circ$  0.6, 0.5, 0.4 hrs. H. C. Duus

Diffusion film and the rate of solution of particles. Nobuo Moriguchi. *J. Chem. Soc. Japan* 54, 859-61 (1933).—Criticism of the work of Miyamoto (*C. A.* 27, 3873) and of Roller (*C. A.* 26, 3420). Their results are explained by diffusion theory without denying the existence of a diffusion layer. T. Katsurai

The decomposition of complex molecules at high pressures. C. C. Coffin and A. L. Geddes. *J. Chem. Physics* 2, 47 8 (1934).—In an investigation of the homogeneous thermal decompn. of gaseous paraldehyde (*C. A.* 26, 5482) the velocity of the reaction slowly diminished as the initial pressure increased. A possible mechanism is suggested which may apply generally to the 1st-order decompn. of complex mols. Allen S. Smith

Reaction rates of the hydrogen isotopes. M. Polanyi. *Nature* 133, 26-7 (1934).— $\text{H}^1$  does not always react faster than  $\text{H}^2$ . Quantum mech. leakage of energy through the barriers favors  $\text{H}^1$ , but the zero-point energy effect at times suffices to reverse the relation. Gregg M. Evans

The dissolving of aluminum in alkali. Gerhard Schickorr. *Mitt. deut. Materialprüfungsanstalt.*, Sonderheft 22, 16-22 (1933); cf. *C. A.* 26, 361.—The reaction between  $\text{Al}$  and  $\text{NaOH}$  soln. occurs in 3 stages: (1)  $2\text{Al} + 2\text{NaOH} + 4\text{H}_2\text{O} = 2\text{Al}(\text{OH})_3\text{ONa} + 3\text{H}_2$ ; (2) the reaction is practically at a standstill; (3)  $\text{Al}(\text{OH})_3\text{ONa} + \text{H}_2\text{O} = \text{Al}(\text{OH})_3 + \text{NaOH}$ . The  $\text{Al}(\text{OH})_3$  is cryst. In  $\text{Na}_2\text{CO}_3$  soln. only the 1st stage was observed. Small amts. of  $\text{H}_2\text{SiO}_4$  lengthened the 2nd stage; with large amts., the reaction went to completion in the 1st stage. The soln. velocity was higher at higher temps. Stirring raised the soln. velocity only slightly. The soln. velocity was affected considerably by the  $\text{NaOH}$  concn. Com. and 99.5%  $\text{Al}$  dissolved with practically equal velocity in 0.1  $N$   $\text{NaOH}$ . The "difference effect" in the soln. of  $\text{Al}$  in  $\text{NaOH}$  is approx. equal to the current intensity. The progress of the reaction was observed by the evolution of  $\text{H}_2$ . At  $20^\circ$ , in 0.1  $N$   $\text{NaOH}$ , the 3rd period started 29-46 hrs. after the start of the expt. Gerald M. Petty

The thermal reaction between chlorine trioxide and ozone. G. K. Rollefson and A. C. Byrns. *J. Am. Chem. Soc.* 56, 364-7 (1934).—The reaction of  $\text{ClO}_3$  with  $\text{O}_3$  at  $0^\circ$  and  $20^\circ$  was studied kinetically. The rate of decompn. was proportional to the  $\text{O}_3$  pressure at the start, but was gradually inhibited by the  $\text{O}_3$  formed.  $\text{Cl}_2$  and  $\text{N}_2$  had similar effects. From the temp. coeff. of the reaction a heat of activation of 10.9 kJ. was calcd. L. P. Hall

Effect of nonelectrolytes on the velocity of ion reactions. Árpád Kiss, I. Bossányi and P. Vass. *Acta Lit. Sci. Univ. Hung. Francisko-Josephinae, Sect. Chem. Mineral. Phys.* 3, 20-35 (1933) (in German).—The velocity of reaction of monobromoacetate with thiosulfate ion was measured between 0.0025 and 0.010 ion concn. at  $25^\circ$  in nonelectrolytes of various concns. such as  $\text{EtOH}$ ,

$^1$   $\text{PrOH}$ ,  $\text{Me}_2\text{CO}$ , urea. The validity of the equation of Debye-Hückel is discussed and the probable causes of deviations are explained. The role of  $\text{H}^+$ -ion catalysis is detailed. S. S. de Finály

Neutral salt effect in the hydrolysis of acetic anhydride. Á. Kiss and E. A. Kocsis. *Acta Lit. Sci. Univ. Hung. Francisko-Josephinae, Sect. Chem. Mineral. Phys.* 3, 50-65 (1933) (in German text).—The velocity of hydrolysis of  $\text{Ac}_2\text{O}$  was measured at  $25^\circ$  in solns. of  $\text{LiCl}$ ,  $\text{NaCl}$ ,  $\text{KCl}$ ,  $\text{MgCl}_2$ ,  $\text{BaCl}_2$ ,  $\text{LiNO}_3$ ,  $\text{NaNO}_3$ ,  $\text{KNO}_3$ ,  $\text{Mg}(\text{NO}_3)_2$ ,  $\text{KBr}$ ,  $\text{KI}$ ,  $\text{NaClO}_4$ ,  $\text{Li}_2\text{SO}_4$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{K}_2\text{SO}_4$  and  $\text{MgSO}_4$ . The components of neutral salt effect are discussed and explained in detail. The pure-medium effect follows a simple regularity, i. e., the log of velocity const. has a linear connection with the salt concn. S. S. de Finály

The velocity of decomposition of diazo compounds in water. XIII. E. Yamamoto, R. Goshima and J. Hashima. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 29-33 (1934); cf. *C. A.* 28, 702<sup>a</sup>.—The decompn. velocities of 2-sulfonaphthalene-1-diazonium chloride, 1-sulfonaphthalene-2-diazonium chloride and 7-sulfonaphthalene-2-diazonium chloride between  $0^\circ$  and  $60^\circ$  are reported. Karl Kantermeyer

Kinetics of the reaction of the thiosulfate ion with the ions of brominated malonic and succinic acids. M. H. Bedford, R. Burgess Mason and C. E. Morrell. *J. Am. Chem. Soc.* 56, 280-3 (1934).—The velocities of the reactions of the esters and the alkali salts of monobromomalonic acid and of monobromosuccinic acid with thiosulfate ion were measured over a range of concns. Brönsted's theory alone does not account for the results but LaMer and Kammer's theory of oriented ionic collisions (cf. *C. A.* 25, 5075) does. P. H. Emmett

The role of oxygen as an inhibitor for the photosynthesis of hydrogen chloride. K. B. Krauskopf and G. K. Rollefson. *J. Am. Chem. Soc.* 56, 327-33 (1934).—The rate of formation of  $\text{HCl}$  and  $\text{H}_2\text{O}$  in illuminated mixts. of  $\text{H}$ ,  $\text{Cl}$  and  $\text{O}$  was measured for high concns. of  $\text{O}$ . As the ratio  $\text{O}/\text{Cl}$  increases the ratio of the products  $\text{H}_2\text{O}/\text{HCl}$  approaches a limit between 1 and 2. This limit proves that the Nernst chains must be ended by a reaction  $\text{H} + \text{O}_2 = \text{HO}_2$  rather than by  $\text{Cl} + \text{O}_2 = \text{ClO}_2$ . P. H. Emmett

Kinetics of the methane-oxygen reaction. G. L. Frear. *J. Am. Chem. Soc.* 56, 305-7 (1934).—The effect of contact time, pressure and packing upon the oxidation of a 76:22  $\text{CH}_4\text{-O}$  mixt. in  $\text{SiO}_2$  tubes at  $600^\circ$  was studied by a flow method. In the absence of packing a chain mechanism predominates, the apparent reaction order being 3.5 at 450-575 mm. pressure and increasing rapidly with pressure. In the packed tube the reaction is approx. 1st order and apparently heterogeneous; its rate exceeds that of the reaction in the unpacked tubes at pressures of 300 mm. or lower. P. H. Emmett

Unimolecular film in heterogeneous reactions. E. J. Aynsley and P. L. Robinson. *Nature* 132, 894-5 (1933). The combination of  $\text{H}$  with  $\text{S}$  in Pyrex glass was studied at a pressure of 3 mm. of  $\text{H}$  ( $343^\circ$ ). Two reactions occurred simultaneously and independently: (1) the ordinary homogeneous gas reaction and (2) a reaction on the Pyrex surface. The initial velocity of the latter is independent of  $\text{S}$  concn. over a wide range, and proportional to  $\text{H}$  pressure and the area of the glass surface. The latter reaction ceases completely when it has produced an amt. of  $\text{H}_2\text{S}$  sufficient to cover the surface with a unimol layer. The surface reaction is between  $\text{S}$  already present and bombarding  $\text{H}$  mols. The mols. in the film are likely to be specifically oriented. Frank Urban

The effect of traces of oxygen on the thermal decomposition of acetaldehyde vapor. Letort. *Compt. rend.* 197, 1042-4 (1933).—Traces of  $\text{O}$  catalyze strongly the decompn. of  $\text{AcH}$  at  $477^\circ$ . For 6 vols.  $\text{O}$  per 100,000 vol  $\text{AcH}$  the effect stops when 17.8%  $\text{AcH}$  is decomposed.

Compounds of aluminum and silver. F. E. Tishchenko. *J. Gen. Chem. (U. S. S. R.)* 3, 549-57 (1933).—A thermal analysis of the system  $\text{Al-Ag}$  shows that at  $771^\circ$   $\text{AlAg}_2$  is formed. This compd. undergoes a transformation from  $\beta$  to  $\beta_1$  at  $606^\circ$  on cooling, in agreement with the x-ray

investigation of Westgren and Bradley (*C. A.* 22, 4055). The  $\beta$ -modification of  $\text{AlAg}$  forms a solid soln. with Al, reaching a max. satn. of 10.2% Al at 723°. Solv. of Al in  $\text{AlAg}$  decreases with fall in temp.  $\beta_1$ - $\text{AlAg}$  does not dissolve Al. At 723° a eutectic consisting of a combination of  $\text{AlAg}$  and mixed crystals of  $\beta$ - $\text{AlAg}$  with 10.2% Al, seps. The compd.  $\text{Al}_3\text{Ag}$  is stable in the interval 752-711°, while below 711° it can exist only in the metastable state. The stable state below 711° is a mixed crystal of  $\gamma_1$  which is a solid soln. of Al in  $\text{AlAg}$ , reaching satn. at 14.33% Al. A complete transformation of the metastable  $\text{Al}_3\text{Ag}$  into the mixed crystal  $\gamma_1$  occurs only on prolonged heating. In the interval 711-400° crystals of  $\gamma_1$  (solid soln. of Ag in  $\text{AlAg}$ ) and  $\beta$  coexist. Below 400° crystals of  $\text{AlAg}$  and  $\text{Al}_3\text{Ag}$  coexist. Five figures and 24 photomicrographs. S. L. Madorsky

Equilibria in saturated solutions of water-potassium nitrate-potassium chloride-potassium sulfate at 25°. I. Krichewski and E. Goldmann. *Z. anorg. allgem. Chem.* 214, 307-8 (1933).—The compns. of the ppts. are followed by the concns. of  $\text{KNO}_3$ ,  $\text{KCl}$  and  $\text{K}_2\text{SO}_4$ , resp., in g. per 100 g.  $\text{H}_2\text{O}$ :  $\text{KNO}_3 + \text{KCl}$ , 23.84, 35.23, 0.70;  $\text{KNO}_3 + \text{K}_2\text{SO}_4$ , 29.77, 12.57, 2.66;  $\text{KCl} + \text{K}_2\text{SO}_4$ , 12.48, 35.82, 1.45;  $\text{KNO}_3 + \text{KCl} + \text{K}_2\text{SO}_4$ , 21.63, 31.22, 1.38. F. L. Browne

Field of saturation of potassium and sodium chlorides in quinary sea-salt systems. II. D. Langauer. *Roczniki Chem.* 13, 201-12 (1933); cf. *C. A.* 27, 3660.—The solubilities of  $\text{KCl}$  and  $\text{NaCl}$  in solns. of a const. concn. of  $\text{MgCl}_2$  and a variable concn. of  $\text{MgSO}_4$ , and vice versa, were detd. at 83°, 90° and 100°. B. C. A.

The boiling-point curves of the systems  $\text{TiCl}_4$ - $\text{CCl}_4$ ,  $\text{TiCl}_4$ - $\text{SiCl}_4$  and  $\text{TiCl}_4$ - $\text{SnCl}_4$ . Nobuyuki Nasu. *Science Repts. Tôhoku Imp. Univ.*, First Ser. 22, 987-96 (1933); cf. *C. A.* 27, 5236.—The b.-p. curves were detd. at 760 mm. pressure. The liquid and vapor curves showed no max. or min. P. T. Newsome

Melting-point and solidifying-point curve of  $p$ -phenetidine with  $p$ -chloroaniline. S. Aoyama, J. Eguchi and C. Iashiro. *J. Pharm. Soc. Japan* 53, 661-4 (1933).— $p$ - $(\text{O}_2\text{NC}_6\text{H}_4\text{OEt})$  (I) prepd. from  $p$ - $(\text{O}_2\text{NC}_6\text{H}_4\text{Cl})$  contains some of the mother substance as an impurity. Therefore  $p$ - $(\text{OC}_6\text{H}_4\text{NH}_2)$  (II) obtained by reduction of I contains also  $p$ - $\text{H}_2\text{NC}_6\text{H}_4\text{Cl}$  (III). To facilitate the detn. of purity of II, m.-p. and solidifying-p. curves of a mixt. of II and III were constructed. Two kinds of II were used, i. e., one prepd. by reduction of  $p$ - $(\text{O}_2\text{NC}_6\text{H}_4\text{OH})$  with Fe and HCl, and the other obtained by decomn. of  $p$ - $\text{AcHNC}_6\text{H}_4\text{OEt}$ . The products were purified by converting to sulfate and distg. twice. These 2 products m. 4.5°. If the product contained 10%  $\text{H}_2\text{O}$ , the m. p. was 2.55° so that Schneider's product (Beilstein) probably contained 10%  $\text{H}_2\text{O}$ . The m. p. of III was 70.15° and its solidifying p. 69.9°, agreeing with literature. In the mixt. of II and III, if II predominates (70-100%), the m. p. is sharp, while if III predominates the solidifying p. is sharp, but not the m. p. With a mixt. of 65-75% II and 35-25% III, the detn. of these pts. was difficult. The data and curves are given. The eutectic p. occurs when II is 67.5% of the mixt. and its solidifying p. at -19°. Nao Uyei

Acid catalysis in nonaqueous solvents. I. The rearrangement of  $N$ -bromoacetanilide. Ronald P. Bell. *Proc. Roy. Soc. (London)* A143, 377-99 (1934).—The monomol. transformation of  $N$ -bromoacetanilide to  $p$ -bromoacetanilide is catalyzed by acids in several solvents. The catalytic power of 40 acids (picric acid excepted) in chlorobenzene increases in the same order as the disocn. consts. in water, but more slowly. A similar relation exists with benzene as the solvent. Expts. in 6 other solvents show that the medium has little effect upon the catalytic const. The temp. coeffs. for catalysis by 5 acids in chlorobenzene show the reaction velocity to be  $10^{-4}$ - $10^{-5}$  the value detd. from the simple collision formula. Calvin Brous

Atomic heats, heats of fusion and heats of transition for gallium, indium and thallium. W. A. Roth, Ingrid Meyer and Hans Zeumer. *Z. anorg. allgem. Chem.* 214,

209-20 (1933).—The sp. heats of the solids and liquids and the heats of fusion were detd. for Ga, In and Tl and the heat of transition for Tl. The In and Tl were very pure but the Ga contained a slight impurity. The result for Ga, however, agrees with data by previous workers. The change in entropy on melting is not a const. for these 3 metals. Correction. *Ibid.* 216, 303-4. F. L. Browne

Vapor pressure of solid N and of solid O (Aoyama, Kanda) 1. Structure of collagen fibers (Lloyd, Robertson) 29. Magnetochem. investigations (Klemm, Werth) 6. Deoxidation with Mn and Si (Körber, Oelsen) 9.

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## 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

**Address of the president.** Frederick Gowland Hopkins. *Proc. Roy. Soc. (London)* B114, 181-210(1934).—Includes a review of recent work in at. physics, and on H isotopes, vitamin C (ascorbic acid), anthocyanins and the modern application of physical methods in chemistry.

Joseph S. Hepburn

**The symmetric states of atomic configurations.** F. Seitz and Albert Sherman. *J. Chem. Physics* 2, 11-19 (1934).—The expectation that the wave function for the lowest electronic energy-state will be invariant under the group which expresses the symmetry of the at. configuration is fulfilled in all cases considered. A general method for the derivation of such symmetric states is set forth. Several applications of the method are made including the case of 8 identical orbits, centered at the corners of a cube, and 8 orbits possessing tetrahedral symmetry, as in  $\text{CH}_4$ . The vector model is discussed and applied to the cases considered.

Allen S. Smith

**Relativistic treatment of the Fermi atom.** H. Jensen. *Z. Physik* 82, 794-802(1933).

G. G.

**Theory of free radicals of organic chemistry.** Erich Huckel. *Trans. Faraday Soc.* 30, 40-52(1934).—See C. A. 28, 4141.

E. R. Rushton

**The theory of the structure of methane and related molecules.** III. J. H. Van Vleck. *J. Chem. Physics* 2, 20-30(1934); cf. C. A. 27, 3140.—Use of Johnson's (C. A. 26, 1511) formulas for  $sp^3$  levels in conjunction with existing expl. data indicate that the  $^3\text{S}$  state of the C atom is probably 5-8 v. above the ground state although 1.6 v. cannot be definitely excluded. The valence states of C and the relative energies of  $\text{CH}_3$  and  $\text{CH}_4$  are considered. A crit. comparison is given of the Slater-Pauling theory of directed valence and the nondirectional Heitler-Rumer theory based on a  $^3\text{S}$  state of the C atom. The assumption of electron pairing, made in C. A. 27, 3140, is shown to be justified in  $\text{CH}_4$ . The energies of  $\text{CH}_3$  and  $\text{CH}_4$  are compared with theory.

Allen S. Smith

**Potassium superoxide and the three-electron bond.** Edward W. Neuman. *J. Chem. Physics* 2, 31-3(1934).—The highest oxide of K is shown to be paramagnetic, with a susceptibility corresponding to the formula  $\text{KO}_2$ . The crystals are supposed to contain  $\text{O}^-$  ions in a  $^3\text{H}$  state, and the electronic structure  $:\text{O}::\ddot{\text{O}}:-$  is proposed for the superoxide ion. Prepn. of the oxide is described. Since the usual name seems unsatisfactory, it is suggested that the substance be called K superoxide rather than tetroxide.

Allen S. Smith

**Magnetic moment of the proton.** I. Estermann, R. Frisch and O. Stern. *Nature* 132, 109-70(1933).—Since the spin of the proton has the same value as that of the electron, the magnetic moment of the proton is  $1/1840$  Bohr magneton or 1 nuclear magneton. The only available method for the detn. of this moment is the deflection of a beam of H mols. in an inhomogeneous magnetic field. In the H mol., the spins of the 2 electrons are anti-parallel and cancel out. Thus the magnetic moment of the mol. has 2 sources: the rotation of the mol. as a whole and the magnetic moment of the 2 protons. In para-hydrogen, the spins of the 2 protons are anti-parallel, their magnetic moments cancel out, and only the rotational movement remains. At low temp., practically all the mols. are in the zero rotational state, and therefore nonmagnetic. At higher temp., a certain proportion are in a higher quantum state, mainly 2. The deflection expts. with para-hydrogen at room temp. allow, therefore, the detn. of the rotational moment, which has been found to be between 0.8 and 0.9 nuclear magneton per unit quantum no. With ortho-hydrogen, the lowest rotational quantum state possible is 1. Therefore, even at low temp. the rotational magnetic moment is superimposed on that because of the 2 protons with parallel spin. Since the rotational moment is known from the expt. with pure para-hydrogen, the moment of the protons can be detd. from deflection expts.

with ortho-hydrogen or with ordinary H. The value obtained is 5 nuclear magnetons for the 2 protons in the ortho-hydrogen mol., i. e. 2.5 (and not 1) nuclear magnetons for the proton. This is correct within a limit of less than 10%.

Albert L. Henne

**Mass transport in the luminous arc and in flames.** Optical determination of alkali atom radii. L. A. Ginecl. *Arch. neerland. sci.* IIIA, 285-333(1933).—The concn. of electrode metal vapor in the normal and glimmering arc was detd. by measurement of the intensity of the emitted lines. With decrease in concn. the degree of ionization of the metal atoms and the intensity of the  $\text{N}_2$  bands is strongly decreased. In the normal arc between a metal anode and C cathode the influence of the elec. field on the mass transport is negligible in comparison to transport by the air current and by diffusion. Reduction of the oxide layer on the anode by means of H caused a strong decrease in the metal vapor concn. Measurement of the intensities of the resonance lines, and for K and Na also of the continuous background, gave the following values for the diffusion constant in a gas flame: Li 5.50, Na 3.20, K 2.70 Rb 2.40 and Cs 1.90. The corresponding atom radii calcd. from gas-kinetic theory are 2.3, 2.7, 3.0, 3.1 and 3.5, and compare well with the values calcd. by Kramers from quantum theory.

P. S. Roller

**The crystal photoeffect.** Anne Joffé and A. F. Joffé. *Nature* 132, 168-9(1933).—An expt. and a discussion substantiating C. A. 27, 4161.

Albert L. Henne

**Determination of the molecular structure of acetone, methyl ether, formic acid and formaldehyde by diffraction of electrons.** Luis Bru Villaseca. *Rev. acad. cienc. Madrid* 30, 580-620(1933); cf. C. A. 26, 4217; 27, 1260.

L. E. Gilson

**Transformation of metals by secondary electron emission.** Kazuma Hayakawa. *Science Repts. Tôhoku Imp. Univ.*, First Ser., 22, 934-58(1933).—The transformation of metals was studied by detg. (1) the secondary electron emission and (2) the ionization current in H at various temps. Abrupt changes in current occur at the allotropic transformation points of Fe and Co. In the magnetic transformation of Fe, Ni and Fe-Ni alloys, the variation of electron emission or of ionization current with temp. is quite continuous.

P. T. Newsome

**Diffusion of positive ions of salts through copper, silver, and gold at high temperature.** Analysis of the ions emitted with the aid of a mass spectrograph. Jean Chockci. *Ann. Phys.* 20, 478-517(1933); cf. C. A. 27, 894.—Folded sheets of Cu, Ag or Au contg. various salts emit at high temp. simple metal ions of the salt and smaller amts. of complex ions and ions of the sheet metal. The time for max. emission at const. temp. is proportional to the thickness of the sheet, an indication of diffusion through the metal. An energy loss shown by the ion was explained by a hypothesis of large ion emission.

L. Goldman

**Ionization potentials and dissociation energies of non-polar molecules.** Jean Savard. *Arkiv Mat. Astron. Fysik* 24B, No. 3, 5 pp.(1933); cf. C. A. 28, 694<sup>a</sup>.—An energy cycle, based upon the assumption that the binding electrons are not affected by the remaining electrons, shows that the energy of dissocn. of the mol. is:  $D = 2n(I_m - I_a)$ , in which  $2n$  is the no. of binding electrons, and  $I_m$  and  $I_a$  are the ionization potentials of the mol. and atom. The energy of dissocn. of the ion is  $(2n - 1)(I_m - I_a)$ . The method is extended to mols. of the type,  $\text{AB}_n$ . Ionization potentials can be calcd. with precision that exceeds that of the direct expl. detn.

S. Bradford Stone

**The formation of matter from the ether.** V. Poscappel. *Compt. rend.* 198, 59-61(1934).

A. B. F. Duncan

**The effective diameters of the radioactive nuclei.** G. Gamov and S. Rosenblum. *Compt. rend.* 197, 1620-2(1933).—By using wave mechanics a relationship is set up between the decay const., velocity of  $\alpha$ -particle emitted,

at. no. and the radius of the nucleus undergoing disintegration. From this equation it is calcd. that the effective diams. of the radioactive nuclei lie between  $12 \times 10^{-13}$  and  $17 \times 10^{-13}$  cm.

Oden E. Sheppard

A suggested explanation of  $\beta$ -ray activity. M. N. Saha and D. S. Kothari. *Nature* 133, 99(1934); cf. *C. A.* 28, 705<sup>4</sup>.—This interpretation offers a soln. to Bohr's paradox, that, though the nucleus contains only pos. particles, a  $\beta$ -ray can be created within it and expelled at high velocity.  $\alpha$ - or  $\beta$ -Radiation is mainly due to the leakage of  $\alpha$ -particles through the potential barrier. *Electrofusion* of a quantum into an electron and a positron differs from the reverse process of the conversion of radiant energy into mass.

Gerald M. Petty

Atomic transmutation and stellar temperatures. T. E. Sterne. *Nature* 132, 893(1933); cf. *C. A.* 28, 705<sup>4</sup>.—(Simov and Landau (*C. A.* 28, 1601<sup>1</sup>)) suggest either that 1.1 of mass 7 can be present only occasionally on a star's surface, or that no regions with temp. of more than several millions of degrees can exist in the interior of a star. S. points out that, if elements are being made as well as disintegrated, the difficulty of over-stability is avoided. (Or, Li may be assumed to have been present from the beginning in the star's atm.

Frank Urban

Combination of proton and neutron. D. E. Lea. *Nature* 133, 24(1934).—In expts. on neutron scattering,  $\gamma$ -radiation of  $4 \times 10^6$  e. v. reflected at  $120$ – $80^\circ$  was observed. This is explained as being the result of the combination of a neutron and a proton to form  $H^2$ . The no. of short tracks to be expected from such heavy particles is estd. to be as high as  $1/4$ .

Gregg M. Evans

Positive electron tracks. D. Skobel'tzyn. *Nature* 133, 214(1934).—Two pairs of photographs (stereoscopic) are reproduced showing pairs of oppositely curved electron tracks. In 3 of 4 cases in which the energies were calcd., the energy ratio  $e^+/e^-$  lies between 2 and 4; in the 4th case it is about 0.66. Calcs. indicate that the ratio no. pairs/no. of Compton electrons, is proportional to the at. no. In the 2nd pair of photographs is shown a pair of electrons of rather low energy ( $10^6$  e. v.) produced by a  $\beta$ -particle, also showing evidence of the nuclear recoil. An "annihilation radiation" is to be expected from an x-ray-tube anticathode when electron energies of  $10^6$  e. v. are attained.

Gregg M. Evans

Stopping of fast particles with emission of radiation and the birth of positive electrons. W. Heitler and P. Sauter. *Nature* 132, 892(1933).—Dirac's theory of the electron has been used to calc. the probability that a fast electron, passing through matter, emits a quantum of radiation of energy comparable to its own, and also the probability that a quantum of radiation, colliding with a nucleus, gives birth to a pos. electron.

Frank Urban

Experimental proof of the annihilation of positive electrons. F. Joliot. *Compt. rend.* 197, 1622-5(1933).—When 80 millicuries of  $^{210}\text{Po}$  as a source of pos. electrons was placed between 2 magnetic poles in the marginal region of a nonuniform magnetic field (Thibaud, *C. A.* 28, 38<sup>2</sup>) and the pos. electrons were allowed to strike a Pb or Al radiator placed above a Geiger-Muller counter, the radiation emitted was independent of the nature of the radiator, and the photons emitted had an energy of about  $0.5 \times 10^6$  e. v. and were approx. twice as numerous as the incident pos. electrons. These expts. confirm Dirac's theory that a pos. electron may disappear when it meets a free neg. electron and that 2 photons of energy  $0.5 \times 10^6$  e. v. are emitted in opposite directions.

Oden E. Sheppard

The annihilation of positrons on contact with matter and the radiation which results. Jean Thibaud. *Compt. rend.* 197, 1629-32(1933); cf. *C. A.* 28, 960<sup>1</sup>.—A method is developed for distinguishing between the photons of annihilation of pos. electrons by contact with matter and photons arising from neg. electrons. These expts. present for the first time exptl. evidence showing the destruction of matter and its conversion into radiation.

O. E. S.

The transformation of electron pairs. F. Joliot. *Compt. rend.* 198, 81-3(1934).—A positron may disappear with an electron giving two photons, the sum of their energy being  $10^6$  e. v. This will take place after the

positron has been absorbed by dense matter and is moving slowly. Or a positron may disappear with a nuclear electron, giving a single photon of  $10^6$  e. v. The no. of photons per positron was found experimentally to be between 1.6 and 3, but should be known with more precision. Some of the slow positrons may combine with an electron to give a photon and an assocn. of positron and electron (zero mass and energy equal to the photon). In the latter case the ratio photons to positrons should be between one and two. The mean life of the positron cannot be approximated at present. A. B. F. Duncan

Interaction of hard  $\gamma$ -rays with atomic nuclei. C. Y. Chao and T. T. Kung. *Nature* 132, 709(1933).—The ratio of the no. of electrons emitted by Pb to the no. emitted by Al when bombarded by primary  $\gamma$ -rays rises by 16% when the wave length drops from 0.8 to 4.7 X. U. This shows that Pb nuclei are disintegrated by  $\gamma$ -quanta.

Louis Goldman

Disintegration of lithium under proton bombardment. P. I. Dec. *Nature* 132, 818-19(1933).—The short-range particles (of range less than 2 cm.) emitted by Li under proton bombardment were investigated by allowing the proton beam to pass through a mica window into an expansion chamber, where it fell upon a thin target of  $\text{Li}_2\text{O}$ . In the majority of cases particles were emitted in opposite pairs. The ranges of the particles could not be detd. with certainty because of the finite thickness of the target; hence the products of disintegration are not known.

Helen S. Hopfield

The equilibrium among the three hydrogens. D. Rittenberg, Walker Bleakney and Harold C. Urey. *J. Chem. Physics* 2, 489(1934). The equil. consts. for the reaction  $H_2 + H_2 \rightleftharpoons 2H_2^+$  were obtained from a mass-spectrographic analysis of the relative abundances of the 3 mols. The exchange reaction does not take place rapidly, as shown by the fact that the consts. are those characteristic of the temp. of prepn. 21 days before analysis. In each case the observed equil. const. agreed closely with the calcd. values (*C. A.* 27, 1811). The agreement gives reasons for confidence in the mass-spectrographic method of analysis.

Allen S. Smith

Experiments on heavy hydrogen. A. Farkas and L. Farkas. *Nature* 132, 894(1933).—The equil. const.  $K = [H_2][H_2]/[H_2H_2]$  was found to be about  $1/4$  at temps. higher than room temp., and independent of temp. The gas diffusing from a thin Pd tube at  $150^\circ$  has a higher  $H_2:H_2^+$  ratio than the original gas. At higher temps. the diffusing gas becomes heavier. The formation of the equil. mixt. from  $H_2$  and  $H_2^+$  proceeds in the homogeneous phase above  $600^\circ$ . It takes place not only by the mechanism involving the atoms, i. e.,  $H + H_2 = HH + H$  and  $H + H_2 = HHH + H$ , but perhaps also by the mol. exchange reaction  $H_2 + H_2 = 2H_2H$ . The reaction involving the atoms has an activation energy of the same order as that of the thermal ortho-para-H conversion. The formation of  $HH^2$  does not occur at  $-195^\circ$  on charcoal.

Frank Urban

Separation and properties of the isotopes of hydrogen. Harold C. Urey. *Science* 78, 566-71(1933).— $H_2O$  contg. various percentages of deuterium oxide was prepd. by the electrolysis of KOH solns. in cells consisting of glass vessel with Ni tubing electrodes, cooled by running  $H_2O$  to  $20^\circ$  and operated at 25 amp. current. The electrolysis was carried out in 5 stages and yielded  $H_2O$  contg. 1-40% deuterium oxide at a cost of about \$15-20 per g. The refractive index method was used for analysis of the samples of  $H_2O$ . The thermodynamic, phys., kinetic and physiological properties of protium and deuterium oxides are discussed and their properties as observed by previous investigators are tabulated.

M. McMahon

Electrolytic concentration of deuterium. R. P. Bell and J. H. Wolfenden. *Nature* 133, 256(1934).—With 1% NaOH Ni was a better cathode than Pt or Cu; on Ni 1% NaOH was better than 8%. Increase of temp. assisted as did decrease in c. d.

Gregg M. Evans

The activity of materials exposed to a natural electrica field. Hubert Garrigue. *Compt. rend.* 197, 1619-21(1933).—A Zn cylinder  $20 \times 70$  mm. forming part of a

lightning rod struck by lightning showed an activity equal to 934 ions per cc. per sec. in a closed gold-leaf electroscope about an hr. after being struck. A piece of brass, a bunch of grass and a piece of schist exposed on a limestone cliff during a distant elec. storm showed marked activity to a decreasing extent in the order given. The decay curves indicate that the activity is due chiefly to Ra elements.

Oden E. Sheppard

Experiments on evolution of helium from radioactive minerals and rocks. V. Khlopin, E. Herling and E. Ioffé. *Nature* 133, 28(1934).—Loss of He from a mineral is greater in an atm. of H than in a vacuum and is in general proportional to the pressure of H, even above atm. pressure.

Gregg M. Evans

The  $\gamma$ -rays of radium B + C and of thorium C + C'. C. D. Ellis. *Proc. Roy. Soc. (London)* A143, 350-7 (1934); cf. *C. A.* 27, 2874.—A remeasurement of the Ra B + C spectrum and other measurements on the Th C + C' spectrum were made in order that the data would be comparable with those available for the energy of long-range  $\alpha$ -particles, both of which, especially through comparison, contribute information regarding the nuclear level system of radioactive substances. Calvin Brous

Radioactivity and composition of the waters, minerals and rocks in Lurisia. Luigi Francesconi and Renato Bruna. *Ann. chim. applicata* 23, 534-46(1933).—Samples from 10 springs in the Lurisia region were examined. Analyses are given for the spring with highest radioactivity (1000 millimicrocuries or 2700 Mache units per l.). In addn. to *autumite*, *torbernite* is also found in this region. Its compn. is:  $P_2O_5$  13.43,  $As_2O_5$  2.83,  $UO_2$  58.77,  $CuO$  11.39,  $H_2O$  13.55 (99.97). The rocks surrounding these active deposits possess induced radioactivity decreasing in activity to a distance of 20 m. from the active minerals. These rocks can thus, in themselves, be a valuable source of radioactive material.

A. W. Contieri

Quantum mechanics and the benzene problem. I, II. G. Elsen. *Chem. Weekblad* 30, 310-17, 322-8(1933).—A review of recent work.

B. C. A.

Anomalous absorption of  $\gamma$ -rays. Possibility of the quantum jump of the rest mass of an electron. H. Arakatsu. *Mem. Faculty Sci. Agr. Taihoku* 5, 163-8 (1932).—Theoretical.

B. C. A.

Anomalous dispersion and absorption of x-rays. E. J. Williams. *Proc. Roy. Soc. (London)* A143, 358-70 (1934).—The anomalous dispersion of x-rays is calcd. from exptl. data for photoelec. absorption. The results for Fe and Cu are compared with expt. The relation between the oscillator strength calcd. from the exptl. data for absorption and the quantum-mech. oscillator strength for the H-like electrons is discussed. The K continuum of oscillators, whose observed strength is about 1.3, is given particular attention.

Calvin Brous

The N- and O-series and N-absorption edge of x-spectra. V. Dolejšek. *Nature* 132, 443-4(1933).

Albert L. Henne

X-ray K- and L-spectra of aluminum. Manne Siegbahn and Torsten Magnusson. *Nature* 132, 895(1933).—Al metal gives a  $K\beta$  line, corresponding to a transition from the free electron levels to the K-level, with a sharp edge at the side of the short wave lengths. It is not formed by the oxide. The same characteristic differences appear in the L-series. Manne Siegbahn and Harald Karlsson. *Ibid.* 895-6.—In order to verify further a previous interpretation of the L-series of Si, Al and Mg, the structure of the L-line of a nonconducting compd. ( $Al_2O_3$ ) was studied.

Frank Urban

The fine structure of x-ray absorption by molecular gases. H. Petersen. *Arch. neerland sci.* IIIA, 165-218 (1933); cf. *C. A.* 27, 2378.—Equations are derived for the absorption, and the functions tabulated numerically. For  $Cl_2$ , a min. is calcd. at 6.5 v. from the principal limit with a max. variation of 25%; expt. of Lindh gave 7.8 v. The fine structure permits calcn. of the internuclear distance, and applies to light elements where diffraction fails because of the rapid decline in intensity. P. S. Roller

X-ray diffraction by gaseous benzene derivatives. W. C. Pierce. *J. Chem. Physics* 2, 1-5(1934).—Previous

work (*C. A.* 27, 1871) has been extended with results of a more quant. nature. App. is described. The Debye method for the detn. of interat. distances in single mols. is applied to *o*- and *p*-dichlorobenzene. Results with monochlorobenzene are used to correct the scattering curves so as to isolate the Cl-Cl scattering. The resulting Cl-Cl curves agree well with theoretical curves constructed for distances of 3.0 and 6.35 Å., resp. The measurements indicating a plane hexagonal benzene mol. with the Cl atom lying in or near the plane.

Allen S. Smith

Focusing methods in the analysis of crystalline powders. Horia Hulubei. *Compt. rend.* 198, 79-80(1934).—A point source of x-rays irradiates the powder placed on the circumference of a circle, the plane of which is perpendicular to the line joining its center to the source. The diffracted rays will focus on the extension of this line.

Victor Hicks

Focusing of diffuse x-rays by plane crystalline sheets. Y. Cauchois. *Compt. rend.* 198, 76-8(1934); cf. *C. A.* 27, 2022.—Math. expressions are given for the dispersion of a spectrograph consisting of a slit coincident with the circumference of a circle placed adjacent to a plane crystal. The advantages are narrow lines and short exposures.

Victor Hicks

The thermal expansion of bismuth by x-ray measurements. A. H. Jay. *Proc. Roy. Soc. (London)* A143, 465-72(1934); cf. *C. A.* 28, 408<sup>2</sup>.—X-ray powder photographs of Bi were taken over the temp. range 18.5-268° and the lattice dimensions calcd. for each temp. of observation. The lattice expansions are compared with those detd. by optical methods. A small increase in expansion coeff. in the region 70-80° is assocd. with an allotropic transition point around 75°. Immediately below the m. p. the coeff. falls; possible explanations are presented.

Both phenomena are reversible.

Calvin Brous

Series of alkali atoms in an electric field. Edoardo Amaldi and Emilio Segrè. *Nature* 132, 444-5(1933). Preliminary description of photographs of the absorption spectra of K and Na vapor in an elec. field.

A. L. H.

The Zeeman effect in the infra-red krypton I lines. Béla Pogány. *Z. Physik* 86, 729-37(1933).—See *C. A.* 28, 708<sup>2</sup>.

Egon Bretschneider

The mechanical moment of the nucleus of cesium. A. Jackson. *Proc. Roy. Soc. (London)* A143, 455-61 (1934).—The mech. moment of the Cs nucleus is detd. as  $7/2$ . This corresponds to an intensity ratio of the doublet components equal to 1.28; the exptl. value was 1.27  $\pm$  0.02. The doublets studied were  $\lambda$  4555 and  $\lambda$  4593. The effect of self-absorption, for which a small correction was applied, was almost eliminated through the use of very low Cs vapor pressures in the light source.

C. Brous

The resonance excitation of the thallium spectrum in the vapors of its halides. G. G. Neyzhim. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 212-14.—The following Tl lines were observed: 2768, 3519-29 Å. from the level  $3^2D$  (4.4 V.), 2580, 3230 Å. from  $3^2S$  (4.8 V.), 2380, 2915 Å. from  $4^2D$  (5.1 V.), 2316, 2826 Å. from  $4^2S$  (5.2 V.) and 2238, 2709-11 Å. from  $5^2D$  (5.5 V.). The results are discussed.

A. A. Bochtling

A method for the production of the spectrum of atomic nitrogen (N I). D. Seferian. *Compt. rend.* 198, 68-9 (1934).—A low-voltage arc (110 v. 20-50 amp.) was maintained in  $N_2$  between W electrodes. Only arc lines of N and W appear.  $N_2$  bands are absent. A continuum not due to the electrodes was considered due to either at N or W.

A. B. F. Duncan

Continuous absorption of light in cesium vapor. H. J. J. Braddick and R. W. Ditchburn. *Proc. Roy. Soc. (London)* A143, 472-81(1934); cf. *C. A.* 27, 1821.—The absorption of light in Cs vapor, measured from the series limit ( $\lambda$  3184) to  $\lambda$  1935, is directly proportional to the pressure at all wave lengths and decreases from the limit to  $\lambda$  2750, from which it rises monotonically to  $\lambda$  1935. The absorption is concluded to be photoelec., and in the farther ultra-violet was proportional to the vapor pressure of Cs, this makes the rise appear to be of at. origin. Adsorbed films of Cs on the windows are shown to play no appreciable part.

Calvin Brous



The absorption spectra of the sulfides of zinc, cadmium and mercury from  $\lambda 7000$  to  $1900$ , and the heat of dissociation of sulfur. P. K. Sen-Gupta. *Proc. Roy. Soc. (London)* A143, 438-54(1934); cf. *C. A.* 27, 4733.—The absorption spectra of ZnS, CdS and HgS were studied in the region  $\lambda 7000-1900$ . The vapors of all 3 decomp. photochemically. There is absorption corresponding to the formation of: (1) two normal atoms (S in the  $^1P$  state), (2) a normal metal atom and S in the  $^1D_2$  state, and (3) (for HgS only) a normal metal atom and S in the  $^1S_0$  state. The differences  $^1P \rightarrow ^1D_2$  and  $^1D_2 \rightarrow ^1S_0$  for S are, resp., 1.3 and 1.5 v. The sulfides are considered to be ionic in the gaseous state, of the type  $M^+S^{2-}$ . On the passage of light two normal atoms are formed. The possibility that a single electron is transferred causing the formation of  $Zn^+S^-$  is discussed. The heat of dissociation of  $S_8$  into S atoms is indirectly detd. to be 102.9 cal.

The band spectrum of tin oxide. F. C. Connelly. *Proc. Phys. Soc. (London)* 45, 780-91(1933).—The spectrum of SnO was produced in a flame source which offered a considerable no. of advantages over the arc previously used by Mahanti (*C. A.* 25, 4792). The absorption spectrum was also obtained. Exptl. evidence was secured proving that the emitting mol. is SnO. Approx. values of the vibrational consts. were calcd. from the band-head data. The lower electronic level of this system was shown to be the ground state. It is doubtful whether the B and C systems described by M. actually exist as sep. systems.

The carbon-halogen bond energy and the molecular structure as related to halogen alkyls. Y. Fukumoto. *J. Chem. Physics* 2, 46(1934).—Data obtained from an investigation of the continuous absorption spectrum of about 50 halogen alkyls (*C. A.* 27, 4170) reveal the following facts: (1) the energy of the C-halogen bond increases with decrease in at. wt.; (2) it decreases successively as the H atom is substituted by the halogen atom; (3) it is modified more or less as the length of the chain is varied; and (4) no regularity is detected among the energies of the C-halogen bond of normal, iso, secondary and tertiary compds. of one halogen alkyl.

Spectrum of sulfur chloride. H. W. Thompson. *Nature* 132, 896(1933).—The spectrum was studied with pressures of 1-100 mm. with an absorbing column of 50 mm. and over the range 5000-2000 Å., and indicated certain features not unlike those reported in the case of Cr oxychloride. A complete description of the spectrum is given.

Quantized molecules formed of excited mercury atoms and methane molecules. Geo. Glockler and F. W. Martin. *J. Chem. Physics* 2, 46-7(1934).—Diffuse bands similar to those shown by the complex structures formed from excited Hg and rare gases (cf. Oldenberg, *C. A.* 22, 1729) were found in CH<sub>4</sub>-Hg mixts. These bands must be due to quantized states of a Hg complex with CH<sub>4</sub>.

Vibrational energy levels of hydrogen cyanide. A. Adel and E. F. Barker. *Nature* 133, 29(1934).—The following infra-red bands with their positions (in cm.<sup>-1</sup>) and characters were observed in HCN vapor:  $\nu_2 + \nu_3$ , 4005.6, perpendicular;  $\nu_2 + 2\nu_1$ , 4993.9, perpendicular;  $\nu_1 + \nu_3$ , 5405.0, parallel;  $2\nu_1$ , 6523.5, parallel. The band at 5405 is inaccurate, on account of H<sub>2</sub>O-vapor absorption. The complete vibrational energy level diagram of the normal mol. can now be constructed with high precision.

The influence of foreign gases on the intensity of infra-red absorption. Paul C. Cross and Farrington Daniels. *J. Chem. Physics* 2, 6-10(1934); cf. *C. A.* 27, 1824.—To obtain a quant. measure of the effect of nonabsorbing gases on the intensity of the max. absorption of certain unresolved bands in the infra-red, measurements were made on the effect of He, A, O, N, C<sub>2</sub>H<sub>4</sub>, CO<sub>2</sub> and H on the max. absorption by N<sub>2</sub>O, CO and EtBr. Relative "optical" collision diams., calcd. on the postulate that the mean free paths are equal in gas mixts. having the same relative absorption coeffs., show a linear relationship with the gas-

kinetic diams. as detd. by viscosity measurements. The data show that Beer's law is applicable to the infra-red absorption spectra of complex substances of high mol. wt. but that it is applicable to simple diat. and triat. gases only when the total pressure is sufficiently great.

Infra-red absorption spectra of monohalogen derivatives of saturated aliphatic hydrocarbons. Jean Lecomte. *Compt. rend.* 198, 65-7(1934).—Derivs. contg. 2-7 C atoms were studied in the region 490-1450 cm.<sup>-1</sup>. Excellent agreement was found with Raman data when these were available. Data are given for the propyl halides. The halogen vibrations are independent of the chain length.

Study of the absorption spectra of benzene derivatives near 1.0  $\mu$  with the aid of a registering spectrometer. R. Freymann and A. Naheriac. *Compt. rend.* 197, 829-31(1933).—By using 20.3 and 70.0 cm. thicknesses of C<sub>6</sub>H<sub>6</sub> and its derivs. the structure of the complex weak band near 1.0  $\mu$  was detd. The most intense lines are: C<sub>6</sub>H<sub>6</sub>, 1.0220, 1.0593; PhI 1.0189, 1.0542; PhBr 1.0160, 1.0520; PhCl 1.0139, 1.0503; PhNO<sub>2</sub>, 1.0067, 1.0419; PhMe 1.0171, 1.0626  $\mu$ . Thus besides the very intense bands (CH=) at 0.87 and 1.14 (*C. A.* 26, 1188; 28, 970) corresponding to bands at 0.9 and 1.2 of satd. hydrocarbons and bands at 1.09 and 1.11 (C=C as found in Cl<sub>2</sub>C=CCl<sub>2</sub>) there is a weak band at 1.0  $\mu$  analogous to the intense band near 1.0  $\mu$  of the satd. compds.: CHCl<sub>3</sub>, 1.0160, 1.0665; CH<sub>2</sub>Cl<sub>2</sub>, 1.0213, 1.0497; MeOH 1.0073, 1.0697; C<sub>2</sub>H<sub>5</sub>, 1.0347, 1.0966  $\mu$ . This does not appear for Cl<sub>3</sub>CCl<sub>3</sub> or Cl<sub>3</sub>C=CCl<sub>2</sub> and must be attributed to the CH linking. As with the 0.87 and 1.14 bands introduction of electroneg. groups shifts the bands toward the short wave lengths.

Spectral absorption of methylated xanthenes and constitution of the purine nucleosides. J. M. Gulland and E. R. Holiday. *Nature* 132, 782(1933).—The ultra-violet absorption spectra of xanthine (I), 1-(II), 8-(III), 9-(IV) monomethylxanthenes, 3,9-dimethylxanthine and 1,3,9-trimethylxanthine show 2 bands in alk. soln. 3-(V) and 7-monomethylxanthenes, 1,3-(VI), 1,7-, 3,7-dimethylxanthenes and 1,3,7-trimethylxanthine (VII) show one band in acid or alk. soln. Me in position 7 seems to inhibit the appearance of the 2nd band. In V and VI the H of the imino group must be attached at 7, in I, II and III at 9, the reverse of the usual assignment, i. e., the formulas of I and "isoxanthine" would be interchanged. The spectrum of xanthosine (xanthine riboside from guanosine from yeast nucleic acid) has 2 maxima corresponding to those of IV, i. e., the carbohydrate is attached at 9. The spectra of synthetic theophylline *d*-glucoside and *l*-arabinoside show one band identical with VII. The sugar must be at 7. These conclusions are opposed to those of Gulland and Macrae (*C. A.* 27, 4232) but seem to be based on more satisfactory evidence.

Infra-red absorption spectra of some plant pigments. R. Stair and W. W. Coblenz. *Bur. Standards J. Research* 11, 703-11(1933)(Research Paper No. 617).—The infra-red absorption spectra to about 15  $\mu$  of chlorophyll, carotene, xanthophyll, Et chlorophyllide, phytol, pheophytin and Cu pheophytin were obtained with a mirror spectrometer, vacuum thermopile and iron-clad galvanometer. Percentage transmission is plotted against wave length. A table of the wave lengths and nos. for the principal absorption bands is given. Max. at 3.43, 4.3, 6.86, 7.3, 9.6 and 10.4  $\mu$  which were previously obtained for simpler compds. having CH<sub>3</sub> and CH<sub>2</sub> groups, and at 2.95, 5.9 and 8.6  $\mu$  found for compds. contg. COC-, NH- or -OH bonding appear in these spectra, also (cf. Publication 35 Carnegie Inst. of Washington, 1905). The spectrum of carotene changes on oxidation. In general, there is intense absorption in the short wave lengths and many small bands in the infra-red as in the case of some of the aniline dyes.

Absorption of ultra-violet rays by several organic substances. J. Dabrowski and L. Marchlewski. *Bull. soc. chim.* 53, 946-50(1933).—The absorption spectra of isatin (max. 244.5, 299.0, 410.0 m $\mu$ , min. 226.3, 267.5, 340.0

$\mu\mu$ ), *N*-ethylisatin (displaced slightly to red), *O*-Me ether (max. 235.9, 403.0  $\mu\mu$ , min. 305.0  $\mu\mu$ ), and the *O*-Me ether after some time (max. 245.7, 310.0, 458.0  $\mu\mu$ , min. 226.3, 288.6, 378.5  $\mu\mu$ ) are given. The spectra of isatin and its *N*-Et deriv. are similar and differ essentially from that of the pure *O*-ether. These results agree with those of Hartley and Dobbie, not with Morton and Rogers (cf. *C. A.* 20, 418). The *O*-Me ether is very unstable and after a short time gives a spectrum which approaches that of isatin. Janet E. Austin

**The Raman spectrum of water.** J. Cabannes and J. de Riols. *Compt. rend.* 198, 30-2(1934).—The band whose center is at 3450 has 3 maxima, 3224, 3436 and 3625  $\text{cm}^{-1}$ , all polarized. 3625 does not exist in ice. The first 2 maxima are due to polymers of water, the last (which appears also in vapor) to single mols. The band at 1650 represents sym. motion, is polarized and is not displaced by dissolved salts. It exists neither in ice nor in hydrates. A. B. F. Duncan

**Raman spectrum of heavy water.** R. W. Wood. *Science* 78, 578; *Nature* 132, 970(1933).—The Raman spectrum of heavy  $\text{H}_2\text{O}$ , prepd. electrolytically, has been obtained by excitation with 2536 Å. line of Hg. Two Raman bands were obtained with an intensity ratio of 1:4; the new band extended from 2694 to 2721 Å. with max. intensity at 2711 Å. This value is more nearly correct than the value 2713 given previously. M. McMahon

**The Raman OH band of nitric acid.** Louis Medard and Therese Petitpas. *Compt. rend.* 198, 88-9(1934); cf. *C. A.* 28, 1273<sup>9</sup>.—The band at 3100  $\text{cm}^{-1}$  found in solns. of  $\text{NH}_4\text{NO}_3$  in  $\text{HNO}_3$  was found also in pure  $\text{HNO}_3$  extending from 3215 to 3485  $\text{cm}^{-1}$ . The structure is not sym., but more intense on the side of high wave no. Similar bands are found in solns. of  $\text{KNO}_3$  in  $\text{HNO}_3$ , and the shift of other Raman lines in various concns. in these solns. is given. A. B. F. Duncan

**Raman spectra of some acetylenic alcohols.** B. Grédy. *Compt. rend.* 198, 89-91(1934); cf. *C. A.* 27, 5052. —The presence of the radical  $\text{C}\equiv\text{C}\cdot\text{OH}$  attached to the triple bond does not modify essentially the 2 characteristic frequencies found in the hydrocarbons. The secondary group  $-\text{CHOHMe}$  modifies these frequencies. Data are given for 2-octin-1-ol, 2-nonin-1-ol, 4-cyclohexyl-2-buten-1-ol, 3-phenyl-2-propin-1-ol, 3-nonin-2-ol, 3-decin-2-ol, 5-cyclohexyl-3-pentin-2-ol, 4-phenyl-1-buten-2-ol. A. B. F. Duncan

**Raman effect of organic substances. I. Raman effect of a series of esters of benzoic acid and phenyl esters of fatty acids.** Kichimatsu Matsuno and Kwan Han. *Bull. Chem. Soc. Japan* 8, 333-65(1933).—Raman spectra of the following compds. were obtained by means of the Dadiou and Kohlrausch method (*C. A.* 23, 4621): *H*-OMe, *Bz*OMe, *Bz*OPr, *Bz*OBu, isopropyl, isobutyl, isopentyl, cyclohexyl, *o*-tolyl, *n*-octyl benzoates, *Bz*Cl, *Ac*OPh, *Ph* butyrate, *o*-tolyl acetate. The usual line 615  $\text{cm}^{-1}$  for the benzene ring is shifted to 592  $\text{cm}^{-1}$  for *o*-tolyl acetate and seems characteristic of an *o*-compd. Both 616 and 586  $\text{cm}^{-1}$  appear for *o*-tolyl benzoate. Between 2850 and 2980  $\text{cm}^{-1}$  lines attributed to the aliphatic CH linkage appear. The line at 1452  $\text{cm}^{-1}$  (not present for *Bz*Cl) increases in breadth and intensity with the no. of  $\text{CH}_2$  groups and is attributed to the transverse vibration of H in  $\text{CH}_2$ . The frequencies 1720, 1270 and 670  $\text{cm}^{-1}$  possibly arise from the  $-\text{COO}$  group. The following frequencies agree with the shifts calcd. for the bonds C-O 1110, C-C 1110, O Me 1078, C Cl 760, Ph-O 810  $\text{cm}^{-1}$ . Frequencies between 810 and 863  $\text{cm}^{-1}$  are attributed to valency frequencies between the acid residue and the adjacent  $\text{CH}_2$  group and to the free rotation of the alkyl group. The valency and deformation frequencies have been calcd. by assuming that a system of 3 atoms or atom groups gives rise to the Raman lines and that a mol. is made up of these systems. Janet E. Austin

**Raman effect of furan and furfural.** Geo. Glockler and B. Wiener. *J. Chem. Physics* 2, 47(1934).—Lines found for furan and furfural are reported. The results favor the centric formula for furan since no double bond is found.

<sup>1</sup>  $\alpha$ -Substitution causes the appearance of a double bond C=C within the ring. Allen S. Smith

**The photodecomposition of gaseous ammonia.** Richard A. Ogg, Jr., Philip A. Leighton and Francis W. Bergstrom. *J. Am. Chem. Soc.* 56, 318-23(1934); cf. *C. A.* 27, 2881. —The photochem. decompn. of  $\text{NH}_3$  by short ultra-violet light at 20° and pressures of 1-8 atms. occurred with a quantum efficiency of 0.14, which is independent of the pressure of  $\text{NH}_3$  and of the wave length of light. It increased 4-fold between 20° and 400°. Photolysis of  $\text{NH}_3$ - $\text{N}_2\text{H}_4$  mixts. contg. less than 0.3%  $\text{N}_2\text{H}_4$  showed that the decompn. of the latter was photosensitized by the  $\text{NH}_3$ ; the quantum efficiency of the  $\text{N}_2\text{H}_4$  decompn. was 1.28. P. H. Emmett

**[Photochemical] reaction between potassium oxalate and iodine and the relation between intensity and velocity.** W. V. Bhagwat. *J. Indian Chem. Soc.* 10, 649-54(1933). cf. *C. A.* 26, 5848. —White light and light of 5200-6300, 6280-7200, 8500 Å. were used. The relation between intensity and velocity was not const., but steadily increased as the velocity of the reaction decreased.

Frank Urban

**Formaldehyde in the upper atmosphere.** N. R. Dhar and Atrna Ram. *Nature* 132, 819-20(1933). —All samples of rain water contain  $\text{CH}_2\text{O}$ , in amts. varying from 0.00015 to 0.00012 g. per l. The amt. is not increased by lighting, but is greater when the rainfall is preceded by some sunny days.  $\text{CH}_2\text{O}$  in the atm. is probably formed from  $\text{CO}_2$  and  $\text{H}_2\text{O}$  by the action of light of wave length 2550 Å, which has not all been absorbed by the  $\text{O}_3$  layer. De-compn. of  $\text{CH}_2\text{O}$  is produced by 2660 Å., but this reaction is hindered by the presence of H in the upper atm.

Helen S. Hopfield

**Artificial production of the blue fluorescence of fluorite**  
<sup>5</sup> H. Haberlandt, Berta Karlik and K. Przibram. *Nature* 133, 99-100(1934). —The rare-earth lines shown in fluorite under cathodo- and thermo-luminescence and phosphorescence are usually inconspicuous in fluorescence excited by filtered ultra-violet light. The fluorescence usually has 3 bands, in the red, green and blue-violet. The capacity to emit these bands is destroyed by heating and regenerated by Ra rays. Synthetic materials indicate that the blue band is probably due to Eu; it certainly is not due to Cr, Pr, Nd or Sm, and probably not to Tb, Dy or Ho. A synthetic fluorite with 0.1% Eu gave a purple fluorescence after heat and Ra treatment; prolonged exposure to ultra-violet light gave a blue light which duplicated that of the best English fluorite. Gerald M. Petty

**The photoluminescence of sodium and potassium hydroxides.** A. Grumbach and M. Ribailleur. *Compt. rend.* 198, 70-2(1934). —This is shown to be due to small amts. of formate which changes partly to carbonate and oxalate on heating. A. B. F. Duncan

**Thermoluminescence spectra of fluorites. III. Thermoluminescence spectra of fluorites from Wilberforce**  
Enchi Iwase. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 23, 153-61(1934); cf. *C. A.* 28, 1275<sup>8</sup>. —The thermoluminescence of 3 differently appearing specimens from Wilberforce was spectroscopically investigated. The thermoluminescence spectra of the natural specimens and of those exposed to x-rays after previous heat treatment to eliminate natural thermoluminescence are almost the same with respect to the position of the 11 bands observed. Bands above 0.384  $\mu$  are ascribed to Tb, those below to Gd. The intensity ratios of two adjacent bands (0.338  $\mu$  and 0.384  $\mu$ ), due to Tb and Gd, resp., remain in the same sequence for the 3 specimens regardless of heat treatment. The difference in intensity ratio is attributed to a difference in concn. ratio. Bands of long wave length are more intense in restored than in natural thermoluminescence. From the intensity ratios of the 3 specimens it is probable that the specimen with the lowest ratio may arise from the specimen with the 2nd lowest ratio as a result of bleaching due to prolonged insolation. Calvin Brous

**The effect of ultra-violet rays on nicotine.** V. A. Grant. *J. Pharmacol.* 49, 408-27(1933). —Ultra-violet light destroys nicotine (I) and its salts with the formation of

colored oxidation products of nicotinic acid. When irradiation has destroyed all titratable basicity of I, some I still remains as nicotinate or malonate. The acidity first formed is destroyed by further irradiation, giving a colorless product contg. no I. The decompn. of I is an oxidative process probably due to nascent O, the rate of which is increased by H<sub>2</sub>O. The destruction can be avoided by abs. exclusion of ultra-violet rays or O. T. H. Rider

Health aspects of Ra dial painting (Schwartz, *et al.*) 13. Photo-phosphorescence in minerals (Brown) 8. Catalytic oxidations. IV Photochem. oxidation of some ethylenic double bonds (Meyer) 10. Diazo compds. [products used for photochem. applications] (Fr. pat. 755,908) 10. M<sup>5</sup>TH  $\gamma$ -radiation in the genus *Lemna* (Verenskii, *et al.*) 11D.

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Sonnenspektrum von  $\lambda$  10,000 bis  $\lambda$  7600 A. E. Leipzig: J. A. Barth. 56 pp. M. 12.

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## 4—ELECTROCHEMISTRY

COLIN G. FINK

The fundamental formula for the design of electric furnaces. Goro Harada. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 9-10(1933).—A formula for the most favorable electrode diam. is developed on the assumption that  $CV = \text{const.}$ , where  $C = \text{c. d., amp./sq. cm.}$ , and  $V = \text{actual voltage between electrode tip and top.}$  This const. depends upon the kind of material processed and the reaction temp. in the furnace; it is 355 for gray pig iron (1500-1550°). The assumption does not hold for extreme cases. The formula is  $r = \sqrt{KW/1000/355} \times 3\pi$  where  $r = \text{electrode radius in cm.}$  and  $KW = \text{furnace capacity in kw.}$  Karl Kammermeyer

Some points in electric steel making. Victor Stobie. *Foundry Trade J.* 50, 83-4(1931).—A review. D. S.

Temperature regulation in the electric furnace. Nobuo Moriguchi. *J. Chem. Soc. Japan* 54, 882-6(1933). The relation between temp. fluctuation of the thermostat and the sensitivity of the regulator is discussed. The temp. variation in the furnace depends not only on the sensitivity of the regulator but also on the ratio between the continuous current for heating and the intermittent current for regulation. A device for temp. regulation using a lever driven by a time synchronous motor is described. A plate composed of a tightly united metal and insulator is used for contact. When the temp. is too high the lever touches the metallic part and the current is diminished. When the temp. is too low the lever touches the insulated part and the current is increased. The lever touches the contact every 30 sec. T. Katsurai

Decomposition voltages of fused salts. II. Magnesium chloride and magnesium sulfate. Yoshio Konishi. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 11 5(1934); cf. *C. A.* 28, 1605<sup>4</sup>.—Voltages for MgCl<sub>2</sub> between 548° and 908° gave a temp. coeff. of  $-0.000646 \text{ v./}^\circ\text{C.}$ , from which the decompn. voltage at room temp. was calcd. = 3.257 v., agreeing well with 3.275 v. as calcd. from the heat of formation of 151,000 cal. for MgCl<sub>2</sub>. MgSO<sub>4</sub> (856° 968°) gave a temp. coeff. of  $-0.00171$  and a calcd. decompn. voltage of 4.543 v. at room temp. Karl Kammermeyer

Industrial electrolysis of water. Antonino Scornio. *Giorn. chim. ind. applicata* 15, 494 9(1933).—A review of Italian practice. A. W. Contieri

Progress in electroplating. Herbert Kurrein. *Oberflächentechnik* 10, 141-4(1933).—A review. M. II.

Theoretical aspects of the electrolytic formation of metallic coatings. J. Salauze. *Bull. soc. franç. élec.* 3, 836 58(1933); *Chimie & industrie* 30, 1359.—See *C. A.* 27, 2385. A. Papineau-Couture

The use of acids in the preparation of steel for plating. Walter S. Barrows. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 3, 12-18(1933).—B., in attempting to det.

whether any connection exists between the pickling acid used and the breakdown of plated coatings, used H<sub>2</sub>SO<sub>4</sub> and HCl under various exptl. conditions and with various subsequent treatments but was unable to distinguish between the various plated specimens by their failure under atm. corrosion. H<sub>2</sub>SO<sub>4</sub> is advocated for its low cost and reliability, a 25% soln. being suitable for various steels, while a weaker soln. should be used for cast iron. Practical details for the successful pickling of steel, in 25% H<sub>2</sub>SO<sub>4</sub>, prior to plating are dealt with at some length. Edward B. Sanigar

Electrochemistry of chromium. IV. O. S. Fedorova. *J. Gen. Chem. (U. S. S. R.)* 3, 636 40(1933); cf. *C. A.* 27, 667. —Review of lit. on the theory of deposition of Cr from aq. solns. S. L. Madorsky

Chrome-plating at low temperature with low current density. A. Guérillot and J. Pierson. *Bull. soc. franç. élec.* 3, 859-66(1933); *Chimie & industrie* 30, 1359.—The effects of the constituents of the bath were studied. Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> gives slightly dull coatings at 15° and under 3-5 amp. per sq. dm. Org. acids (particularly tartaric) give very bright coatings; their salts are less satisfactory. Cold plating can be carried out with certain sulfates, but the coating is not as bright as with hot plating. A. Papineau-Couture

Impurities in nickel-plating solutions with reference to pitting of electrodeposited nickel. F. J. Liscomb. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 4, 6-15 (Dec., 1933).—A practical discussion of the pitting of electrodeposited Ni and its elimination on the removal of org. and other impurities by Fe(OH)<sub>3</sub> pptn. in the plating soln. The possible sources of impurities causing pitting are reviewed. Edward B. Sanigar

Factors contributing toward quality of (nickel) plated zinc die castings. Carl Hussner. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 4, 15-23(1933).—The standards which should be maintained to obtain satisfactory products, for the material of the Zn die casting, the casting itself and the preliminary finishing and machining as well as the cleaning and plating of the casting, are reviewed. Results are given to show that, other things being equal, the life of a plated casting is in proportion to the thickness of the Ni plate, while other results show that the thickness of the Ni plate is not the only factor to be considered. The discrepancies observable between the life of a plated part under the salt-spray test and in actual service are noted. Edward B. Sanigar

Barrel nickel-plating of fabricated sheet zinc parts. Albert Hirsch. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 5, 31-3(Jan., 1934). See *C. A.* 27, 2385, 4485. Edward B. Sanigar

The influence of the composition and acidity of the electrolyte on the characteristics of nickel deposits.

D. J. Macnaughtan, G. E. Gardam and R. A. F. Hammond. *J. Electrodepositors' Tech. Soc.* 9, 1-26 (1934).—See C. A. 27, 5007.

Edward B. Sanigar

The effect of annealing on the microstructure and mechanical properties of electrodeposited nickel. G. E. Gardam and D. J. Macnaughtan. *J. Electrodepositors' Tech. Soc.* 9, 27-36 (1934).—See C. A. 27, 5038.

Edward B. Sanigar

Cadmium plating on full automatic machines. F. L. Greenwald. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 3, 19-26 (Nov., 1933).—A review dealing with the practical operations, soln. maintenance and prepn. of the work for the mass plating of springs and small parts entirely automatically, or semiautomatically, by means of barrels.

Edward B. Sanigar

Throwing power of zinc-plating solutions. I. Relation between current density and current efficiency of zinc sulfate solutions. Masami Nakajima. *J. Electrochem. Assoc. (Japan)* 2, 19-25 (1934).—The  $p_H$  values of 0.5, 1.5 and 2.5  $N$   $ZnSO_4$  solns. have been detd. and compared with each other. The colorimetric method gave in general higher values than the electrometric method. The effect of  $p_H$  on the cond. becomes greater with decreasing concn. of  $ZnSO_4$ . The estn. of the current efficiency verified the existence of basic salt in the deposit when  $p_H$  was 5.4 and 4.4. In 0.5  $N$  soln., a considerable amt. of basic salt was found at higher  $p_H$  values and lower c. d., and the current efficiency was rapidly lowered with lowering  $p_H$ ; while in 1.5 and 2.5  $N$  solns. the content of basic salt was less and the lowering of  $p_H$  did not greatly affect the current efficiency; an increase in c. d. gave about the same current efficiency, and almost the same values for 2.5  $N$  soln. On the basis of quality of deposit and current efficiency, 1.5-2.5  $N$   $ZnSO_4$  soln. at 3.4  $p_H$  and 1-3.5 amp./sq. dm. is recommended.

K. Konda

Electrodeposition of shellac. Narasimha Murty and M. Sreenivasaya. *Chemistry & Industry* 1934, 35-6.—A preliminary notice. During electrolysis of an alkaline soln. of shellac it was observed that a shellac micelle can carry a neg. charge. Shellac was deposited on a Pt anode from various alk. solns. In the presence of  $Cl^-$  and  $SO_4^{--}$  polymerization took place. J. H. M.

Electrolytic preparation of sodium perborate. II. Fumikazu Kawamura and Hiromu Mohri. *J. Electrochem. Assoc. (Japan)* 2, 10-14 (1934); cf. C. A. 28, 1278.—In the electrolytic prepn. of  $NaBO_3$  from an electrolyte contg. alkali borate and carbonate, the cathodic reduction is diminished by the addn. of  $KCl$ ,  $H_2SiF_6$  and  $Na_2SiO_3$ . A small quantity of  $Na_2CrO_4$  and a few drops of Turkey-red oil lessened the cathodic reduction, but the addn. of Turkey-red oil had no effect when  $KCl$  or  $H_2SiF_6$  was used. The superposition of a. c. upon d. c. did not favor the formation of  $NaBO_3$ . The optimal temp. was 10-12° and the optimal c. d. was 10-15 amp./sq. dm. at 6 v.

K. Konda

Electrochemistry of the system aluminum bromide-cuprous bromide in toluene. V. A. Plotnikov and Z. A. Yankelevich. *J. Gen. Chem. (U. S. S. R.)* 3, 208-13 (1933); *Chimie & industrie* 30, 857.—A study of the conditions of electrodeposition of  $Cu^+$  as a dense coating from solns. which have hitherto been considered unsuitable for this purpose. A complex is formed when  $CuBr$  is dissolved in a  $C_7H_8$  soln. of  $AlBr_3$ . This is confirmed by the following facts:  $CuBr$  is insol. in  $C_7H_8$ , but dissolves to a considerable extent in the presence of  $AlBr_3$ , a satd. soln. contg. 1  $CuBr$  for 1  $AlBr_3$ . Addn. of  $CuBr$  to the  $AlBr_3$  soln. generates a considerable amt. of heat, and the color of the soln. changes from light yellow to deep green. The  $C_7H_8$  soln. of the complex conducts electricity; the max. cond. ( $4.86 \times 10^{-3}$  ohm $^{-1}$ ) corresponds to 36.1%  $AlBr_3$  and 10.3%  $CuBr$ , i. e., to 2  $AlBr_3$  and 1  $CuBr$ . The soln. contains possibly a compd. such as  $Al_2Br_3 \cdot CuBr \cdot nC_7H_8$ . On the other hand, a  $C_7H_8$  soln. of  $AlBr_3$  has a very low elec. cond., while  $CuBr$  itself is insol. in  $C_7H_8$ . When the soln. is electrolyzed with a Pt anode, Cu is deposited on the cathode and Br liberated at the anode. When a Cu anode is used, re-

fining of the Cu takes place; the Cu deposits on the cathode from univalent ions. In order to obtain a dense coating, a Cu cathode must be used. The decompn. potential of the complex corresponds to 1.40 v. A. P.-C.

The role that the chemical nature of electrolytes plays in the surface-energy changes at the interface: metal-mineral oil-aqueous salt solutions. II. Electrochemical oil removal from iron. M. S. Golombik, Dz. S. Lev and N. N. Petin. *J. Gen. Chem. (U. S. S. R.)* 3, 279-90 (1933); cf. C. A. 27, 3377.—The bath consisted of an aq. soln. of  $Na_2PO_4 + NaOH$ . The electrodes were iron articles covered with oil from the stamping press. The temp. coeff. of the rate of removal of oil by the electrochem. method is found to be the same as that obtained by the chem. method. The rate is directly proportional to the concn. of  $PO_4$  ions and to the concn. of  $OH$  ions, but approaches a limiting value. It is also directly proportional to c. d. and becomes sufficiently rapid even at room temp. at a d. of several thousandths of an amp./sq. cm. of electrode surface. It makes little difference whether the oily article is the anode or the cathode. However, best results are obtained when the current alternated every 3, 5, 10 min. A 50-cycle current had slight effect on oil removal at room temp. These facts support the view that the chem. and electrochem. processes of oil removal are identical.

S. L. Madorsky

Liquid-junction potentials. I. J. B. Chloupek, V. Z. Daneš and B. A. Danešova. *Collection Czechoslov. Chem. Communications* 5, 469-78 (1933).—The junction potentials of  $Hg|HgCl, 0.1 N KCl$  (junction soln.)  $0.1 N HCl, HgCl|Hg$  were measured. As junction solns. types of strong electrolytes (e. g.,  $Na, K, NH_4$  chlorides, nitrates and sulfates,  $ZnCl_2, MgCl_2, K_2CrO_4$  and  $K_4Fe(CN)_6$ ) were chosen where the influence of valency and degree of symmetry would show clearly in the results, the chief variable being concn. The free-diffusion type of liquid junction was used (C. A. 26, 5818). The junction tubes (of cylindrical symmetry) were water-jacketed on both sides to allow of the detn. of temp. coeffs. of the junction potentials, these coeffs. forming an important basis for the treatment of the exptl. results. Discussion of results is reserved for a future paper.

Edward B. Sanigar

Polarographic studies with the dropping-mercury cathode. XXXIV. Suppressive effect of certain alkaloids on the maximum of current due to electroreduction of oxygen. Riji Hamamoto. *Collection Czechoslov. Chem. Communications* 5, 427-35 (1933).—H. uses the concept (cf. C. A. 26, 3443) of taking as a measure of the degree of adsorption of a compd. at the dropping-Hg cathode that molar diln. of the compd. (dissolved in  $10^{-3} N KCl$  soln.) which reduces the atm. O max. on polarographic curves to  $1/2$  its original height. H. assumes that adsorption on the Hg drop reaches equil. before the drop falls and forms a unimolecular layer on the drop, this justifying the application of Freundlich's isothermal adsorption equation in the form  $(I - I') = \alpha C^n$ , where  $I'$  and  $I$  are the heights of the max. with and without an adsorbable compd. present. If  $\log (I - I')$  is plotted against  $\log C$ , a straight line is obtained from which the concn. for  $1/2$  max. height can be read. The reciprocal of this value, i. e.,  $1/C_{\alpha} = V_{\alpha}$ , is an electrochem. adsorbability coeff. the diln. being expressed as 1 mole adsorbable compd. in  $n \times 10^4$ ,  $n$  being then taken as the electrochem. adsorbability coeff. As so detd., the following values of  $n$  are given: atropine sulfate 23.98, quinine-HCl 16.98, papaverine-HCl 16.67, strychnine nitrate 13.04 and morphine-HCl 7.92. XXXV. Electrolysis of aqueous solns. of beryllium salts. W. Kemula and M. Michalski. *Ibid.* 436-42.—The normal deposition potential of Be ions at the dropping-Hg cathode is  $-1.70$  v. against the  $N$  calomel electrode, when measured with a galvanometer of sensitivity  $1 \times 10^{-8}$  amp./mm. Because of hydrolysis, the current-voltage curves of Be salt solns. show an increase due to H deposition before the increase due to Be deposition. Owing to the proximity of the Be and Al deposition potentials ( $-1.70$  v. and  $-1.66$  v., resp.), and their similarity of electrochem. behavior, the joint increase in the current-voltage curve due to the presence

of both metals in soln. could not be resolved. **XXVI.** Catalysis of the electrodeposition of hydrogen due to the presence of the platinum metals. P. Herasymenko and I. Stendyk. *Ibid.* 479-96.—The catalytic effect of Pt has been reported previously (cf. *C. A.* 26, 5854; 27, 467). Traces of Ru, Rh, Pd, Ir and Pt at the cathode surface produce a considerable decrease in H overvoltage, and they produce, in general, 3 stages in the catalytic deposition of H: (1) at  $-1.2$  v., (2) at  $-0.9$  to  $-1.05$  v. and (3) at  $-0.5$  to  $-0.7$  v. from the *N* calomel zero. The exact values of these potentials depend on the concn. of the catalyst and of H ions. Pt and Pd show only stage 1. The occurrence of the 3 stages of catalyzed H deposition is explained by the formation of 3 types of catalytic centers having different catalytic activities due to aggregation of atoms of catalyst into polyat. complexes at the Hg surface. The total catalytic effect, measured by the sum of the limiting currents of all catalytic stages, depends on the position of the catalyst in the periodic system: Pt is the weakest catalyst in the series Ru-Rh-Pd, while Pt is less active than Ir. The development of the various catalytic stages depends upon time; by varying the rate of Hg-dropping the catalytic effects of stages 1 or 2 can be either intensified or suppressed. The limiting current of the catalyzed H deposition greatly increases with increasing concn. of H ions up to about  $0.05$  *N*; further increase in H-ion concn. produces a slow increase of the limiting current toward a max. **E. B. S.**

The potentials of the lead oxide electrodes in alkaline solution. Lyle V. Andrews and D. J. Brown. *J. Am. Chem. Soc.* 56, 388-90(1934).—The potentials of the two electrodes  $PbO(s)$ ,  $Pb_2O_4(s)$ ,  $OH^-$  and  $Pb_2O_4(s)$ ,  $PbO_2(s)$ ,  $OH^-$  were found by expt. to be  $+0.2488 \pm 0.0005$  and  $+0.295 \pm 0.001$  v., resp. The Hg,  $HgO(s)$ ,  $OH^-$  electrode was used as a reference electrode. From these values the e. m. f. of the  $PbO_2(s)$ ,  $PbO(s)$ ,  $OH^-$  electrode was calcd. to be  $+0.280 \pm 0.001$  v. **John R. Hill**

The alkaline storage battery. V. The alkali zincate storage battery. 1. Shosaburo Tanaka and Kohei Iwasaki. *J. Electrochem. Assoc. (Japan)* 2, 4-9(1934); cf. *C. A.* 28, 1279f.—When the cathode plate filled with Cd,  $Cd(OH)_2$  or  $CdO$  is used, the charging and discharging voltage in general shows a rapid rise and fall. The Cd-plated cathode also shows a rapid rise of the charging voltage, holds a high discharging voltage for a brief period and then shows a sharp voltage drop. A  $Cd(OH)_2$ -filled cathode which has been subjected to the cathodic treatment in an alk. soln. is easily reduced in 2-3 hrs.; while a  $CdO$ -filled cathode is hardly reducible and results in the slow deposition of Zn. The reduction proceeds slowly, and thereafter the reversible reaction  $Cd \rightleftharpoons Cd(OH)_2$  during charge and discharge proceeds smoothly. The inclusion of  $HgO$  in the filling mixt. is effective, while that of Fe is very harmful for the deposition of Zn. The soln. velocity of Zn in the course of storage (shelf test) is lowest with the cathode filled with flocculent Cd and highest with the Cd-plated cathode. The deposition of Zn on the Cd-plated cathode is similar to that on a Ni-mesh cathode; amalgamation does not affect it as much as the latter; the av. discharging voltage is high, and it is superior to the filled type for a rapid-charging cathode. **K. Konda**

Weston standard cells submitted to the International Bureau of Weights and Measures. A. K. Kolosov, V. V. Muller and Mme. E. S. Churaeva. *Vsesoyuznii Nauch.-Issledovatel. Inst. Metrol. Standartizatsii* No. 127, 31-5 (in French), 107-10 (in Russian) (1933).—In 1930 it was proposed that each national lab. place in the International Bureau of Wts. and Measures a group of standard cells to compose an international standard. The group of cells so deposited by the Inst. of Metrology and Standardization of the U. R. S. S. is described. **E. R. Smith**

Determination of the electromotive force of the international Weston standard cell by the silver coulometer method. A. K. Kolosov. *Vsesoyuznii Nauch.-Issledovatel. Inst. Metrol. Standartizatsii* No. 127, 8-17 (in French), 83-94 (in Russian) (1933).—The mean value of  $E_{20} = 1.018254 \pm 8$  microv. was obtained for standard cells

measured at the Inst. of Metrology and Standardization of the U. R. S. S. between Oct., 1930, and Dec., 1932. **E. R. Smith**

Dry cells from a solid radioactive electrolyte and ionized air. L. Boushet. *Compt. rend.* 197, 1598-9(1933).—Zn and brass were the best electrodes found for dry cells made with solid radioactive materials. Zn and brass washers were sepd. by a mica ring. The hole contains the U nitrate. The entire cell is then sealed in ozocerite. The initial e. m. f. varied from  $0.610$  to  $0.700$  v., usually  $0.65$ - $0.68$  v. and finally steadied at about  $0.54$  v. **Oden E. Sheppard**

Oxidation of nitric oxide to nitrogen pentoxide by means of ozone in the silent electric discharge. N. I. Kobzev, M. Temkin and S. Fraiberg. *J. Gen. Chem. (U. S. S. R.)* 3, 534-9(1933).—With a Berthelot ozonizer connected to a  $10,000$  v. transformer, a study was made of the reaction:  $2NO + 3O_3 = N_2O_5 + 3O_2$ . A rate of  $0.30$ - $0.32$  l./min. of air through the ozonizer resulted in an  $O_3$  content of  $0.5\%$  by vol. The NO was mixed with  $N_2$  in the ratio  $10:90$  and the mixt. passed into the ozonized air at a rate of  $10$  cc./min. In this case the  $O_3$  was in excess of the theoretical amt. required and the reaction was almost instantaneous,  $99\%$  of the NO being oxidized. The ratio between  $O_3$  and the  $HNO_3$  obtained varied between  $1.220$  and  $1.91$  and was, on the av.,  $1.48$ . Hence the rate of decompn. of  $O_3$  in the presence of  $N_2O_5$  was too slow to be effective. By using the same rates of gases, but introducing the NO +  $N_2$  mixt. into the air before it was ozonized,  $NO_2$  was found in the resulting mixt., but not  $O_3$  or  $N_2O_5$ . However, when the ratio  $NO:N_2$  was changed from  $10:90$  to  $1:99$ , and the mixt. was introduced into the air before it passed through the ozonizer (the rates of all gases were the same as above),  $O_3$  and  $N_2O_5$  but not  $NO_2$  were found in the resulting mixt. When the rates of NO +  $N_2$  mixt. and of air were so adjusted that the amt. of  $O_3$  was less than theoretical, and the NO +  $N_2$  mixt. was introduced into the air after it passed through the ozonizer,  $NO_2$  alone or together with  $N_2O_5$ , depending on the amt. of  $O_3$  in the air, was found.  $O_3$  had no effect on  $N_2O_5$ . **S. I. Madorsky**

Gaseous combustion in electric discharges. IX. The cathodic water-gas equilibrium. G. I. Finch, B. W. Bradford and R. J. Greenshields. *Proc. Roy. Soc. (London)* A143, 482-6(1934); cf. *C. A.* 26, 382.—An investigation of the water-gas equil. in the cathode zone of an elec. discharge shows that the equil. position varies with the final gas pressure. The conclusion is that equil. is approached from the CO side in 2 ways, pressure being favorable to the one but unfavorable to the other. **Calvin Brous**

Electric discharges in gases ionization and excitation. 7. Lewi Tonks. *Elec. Eng.* 53, 239-43(1934).—A survey dealing with the nature of the free charges, how they arise from the normally discharged atoms and mols. of a gas, and their relation to light radiation. **W. H. Roynton**

Stopping layer of rectifiers. W. Ch. van Geel. *Nature* 132, 711(1933).—Rectification is possible for a thickness of the stopping layer of  $10^{-4}$ - $10^{-6}$  cm. A volt-ampere characteristic for a rectifier is given. **Louis Goldman**

The mechanism of magnesium-copper sulfide rectifiers. J. Cayrel. *Compt. rend.* 198, 64-5(1934); cf. Anastasiades, *C. A.* 28, 1280<sup>1</sup>.—CuS plays the principal part in the rectification and not  $Cu_2S$ . This latter determines secondary phenomena, such as reversed polarity at low voltages. **A. B. F. Duncan**

Silicon steel with alternating-current and direct-current excitation. R. F. Edgar. *Elec. Eng.* 53, 318-22(1934).

Magnetic tests on Si-steel at 60-cycles with superposed d.-c. excitation are described. Results are shown in a series of curves. A bibliography is appended. **W. H. Boynton**

Elec. condenser process for demulsifying oil (Piercol) 22. Filtration of plating solns. (Weisberg, Greenwald) 1. Electrolytic degreasing (Froehlich) 9. Cr plate (Udy) 9. Sheet Zn for manuf. of batteries (Zalesinski) 9. Treating gases [elec. pptn.] (U. S. pat. 1,944,523) 21. Den-

tal plates and like articles of metal alloys (Brit. pat. 400,089) 9. Electrically heated app. for making drawn or rolled vitreous products (Brit. pat. 400,472) 19. Elec. glass-melting furnace (Norw. 53,287) 19.

Bauer, O., Arndt, H., and Krause, W.: Die Verchromung, unter besonderer Berücksichtigung ihrer Anwendung im Automobilbau. Berlin: M. Krayn. 256 pp. M. 20; bound, M. 22. Reviewed in *Bull. Brit. Non-Ferrous Metals Research Assoc.* No. 62, 24 (1934).

Gaertner, Viktor: Elektrochemie. Ein Lehr- und Hilfsbuch für Studierende, Techniker und Fabrikanten. Leipzig: Deutscher Verlag für Jugend und Volk. 408 pp. M. 20.

Köhler, Walter, and Rompe, Robert: Die elektrischen Leuchtröhren. Brunswick: F. Vieweg & Sohn. 96 pp. M. 6.80.

Moeller, F., and Bolz, G.: Leitfaden der Elektrotechnik. Bd. I. Lign. 1 and 2. Grundlagen des Gleich und Wechselstromes. Leipzig: B. G. Teubner. M. 9.60.

Wagner, Hermann: Untersuchungsmethoden für die Vernicklungs- und Verchromungspraxis. Leipzig: Max Jancke. 61 pp. M. 1.80.

**Primary batteries.** Imperial Chemical Industries Ltd. Fr. 756,083, Dec. 4, 1933. One electrode is made of a homogeneous Zn alloy contg. about 0.2% of Hg.

**High-tension primary-cell batteries.** Alexander R. Pappadakis and Noel J. Sivess. Brit. 400,600, Oct. 25, 1933.

**Dry batteries.** Konrad Bud. Fr. 756,013, Dec. 4, 1933. The depolarizing mass is surrounded by a cloth which is wound more than once round the mass. No fastening string is used.

**Storage batteries.** Soc. de l'accumulateur Fulmen. Fr. 755,572, Nov. 27, 1933. Means for reducing free liquid to a min. is described. Fr. 755,573. Construction of plates is given.

**Storage batteries.** Soc. anon. des piles et accumulateurs Eler. Fr. 755,602, Nov. 28, 1933. A product which absorbs and retains liquids, and is particularly suitable as a separator between storage battery plates, is made by subjecting wooden boards, preferably of long fibers, to high pressure, e. g., by passage between rollers in the general direction of the fibers, and soaking in water. The product is also suitable as a packing between fragile objects.

**Storage battery.** Svenska Ackumulator Aktieföretaget Jungner (E. G. H. Eriksson and G. G. Ljunggren, inventors). Swed. 78,448, Sept. 26, 1933. Structural features of an alk. cell.

**Low-voltage storage battery.** Rufus N. Chamberlain & Gould Storage Battery Corp.). U. S. 1,944,065, n. 16. About 0.9-1.5% of  $\text{NiSO}_4$  is incorporated with the active material used for pasted plate electrodes employed with a  $\text{H}_2\text{SO}_4$  electrolyte. The  $\text{NiSO}_4$  serves to reduce the required charging voltage. U. S. 1,944,066 relates to a similar use of Co sulfate.

**Storage batteries with soluble cathodes.** Kurt Giebel. Brit. 400,424, Oct. 26, 1933. Structural features.

**Storage-battery covers.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 400,561, Oct. 26, 1933.

**Storage-battery plates.** Accumulatoren-Fabrik A.-G. (to Britannia Batteries Ltd.). Brit. 398,397, Sept. 14, 1933. The plate consists of a pasted grid covered with perforated Pb (alloy) or other conductive material which is coated on its outer side with a non-conducting firmly adhering substance, e. g., rubber, which is also perforated. Cf. C. A. 28, 7157.

**Active material for positive electrodes in alkaline storage batteries.** B. S. Groth. Swed. 79,113, Dec. 5, 1933. The material consists of oxygen compds. of Ni and (or) Co and in addn. contains an amt. of an oxide or hydroxide of one or more of the metals Zr, Th, Ce, La, Pr, Nd, Sm, Gd, Er and Y.

**Electrodeposition of iron.** Ernst Kelsen and Edgar

1 Ausnit. Brit. 400,264, Oct. 23, 1933. In refining Fe electrolytically a salt of a metal forming an insol. sulfate is added to the electrolyte as a precipitant for any sulfate ion introduced from Spentg. anodes, e. g., cast Fe scrap, or otherwise. The electrolyte may consist of a soln. of  $\text{FeCl}_2$  and  $\text{NaCl}$  with  $\text{BaCl}_2$ . Salts of addnl. metals may be added for the deposition of alloys.

**Electroplating.** Le Syndicat Jacquemin. Belg. 396,085, June 30, 1933. The article is first cleaned in a bath of suitable salts through which is passed a high current at low voltage. The anode consists of a metal that is insol. in the bath and the article to be treated forms the cathode. Belg. 396,275. The metal required for coating the articles is derived solely from the anode and not from the metal salts contained in the bath.

**Portable electrode for plating by direct application** Alfred E. Newey. Brit. 400,510, Oct. 26, 1933.

**Coating objects with metals.** Le Syndicat Jacquemin Fr. 755,713, Nov. 29, 1933. To protect objects of glass, wood, paper, porcelain, etc., against the atm. of other destructive agents, they are made conductive to electricity by treatment with a varnish, paraffin or wax contg. graphite and are then covered with Zn, Pb, Cu, Sn, Cd, Co, Cr, Ni, Au or Ag electrolytically.

**Electrolytic condensers.** N. V. Philips' Gloeilampen fabrieken. Brit. 400,490, Oct. 26, 1933.

**Supply meters.** Ernst Krämer. Brit. 400,221, Oct. 13, 1933. An electrolytic meter or recording app., wherein the disengaged gases automatically effect operation and are recombined by a catalyst, is provided with a regenerating chamber, situated above the electrolyte and contg. the catalyst, the chamber being filled initially with 1 of the gases generated.

**Electrolytic cells for the deposition of sheet metal,** e. g., sheet iron for magnetic purposes. Ernst Kelsen and Edgar Ausnit. Brit. 400,591, Oct. 23, 1933.

**Electrolytic cells.** Erich Garkisch. Ger. 588,835, Nov. 28, 1933 (Cl. 21b. 14.01). The energy yield of cells is increased by using as electrolyte a fused carbonate.

**Electrolytic cells.** David J. Evans. Brit. 400,247, Oct. 20, 1933. The electrodes consist of rectangular graphite slabs, spaced to form a vertical gap through which the whole of the liquid passing through the cell flows.

**Electrolytic cell for water decomposition with unipolar electrodes.** De Nordiske Fabrikker De. No. Fa. A. S. and C. F. Holmboe. Norw. 52,648, June 12, 1933. Structural features.

**Acetylene.** I. G. Farbenind. A.-G. Brit. 397,987, Sept. 7, 1933. See Fr. 750,521 (C. A. 28, 7174).

**Alkali and alkaline earth metals.** Justin F. Watt. Fr. 755,875, Dec. 1, 1933. A molten compd. of the metals is passed through an electrolyzing zone at a speed beyond that of decompn., to recover a mixt. of free metal and compd. The molten mass may consist of 2 compds. of the metal, having different decompn. potentials so that decompn. of only one takes place. The metal may pass directly to a zone for reaction with a gaseous fluid, e. g., for the production of  $\text{NaOH}$ . An app. is described.

**Alumina.** Gino Gallo. Ger. 588,583, Nov. 20, 1933 (Cl. 12m. 6). Pure  $\text{Al}_2\text{O}_3$  is obtained by the electrolysis of the sol. products obtained by decomposing material such as leucite contg.  $\text{Al}_2\text{O}_3$  and alkali, with  $\text{H}_2\text{SO}_4$ . The electrolysis is continued till the  $\text{Al}_2\text{O}_3$  and alkali form an alkali aluminate, and other substances present, such as Fe, Ca, Mg, are pptd. as hydroxides. The aluminate soln. is sepd. and worked up to pure  $\text{Al}_2\text{O}_3$  and alkali salt by the usual methods. Examples are given.

**Fireproof stone, etc.** Feldmühle, Papier- und Zellstoffwerke A.-G., Friedrich Klein and Karl Bechtel. Ger. 588,805, Nov. 27, 1933 (Cl. 80b. 24.04). Crystl. metal oxides such as  $\text{Al}_2\text{O}_3$  or  $\text{MgO}$  are fused in an elec. furnace and allowed to set. The resulting block is cut to desired shape by high-speed cutting tools.

**Anodic coating of aluminum.** Aluminium Colors Inc. Fr. 755,890, Dec. 1, 1933. The temp. is maintained practically const. at all points of the electrolyte by bubbling air therethrough.



**Electrode for the production of aluminum or other metals or alloys by electrolytic reduction in fused electrolyte.** Det Norske Aktieselskab for Elektrokemisk Industrie. Norw. 53,308, Nov. 20, 1933. The furnace is manipulated through openings in the electrode in order to prevent or eliminate the anode effect.

**Ammonium sulfate by electrolysis.** W. C. Holmes & Co. Ltd. Ger. 590,230, Dec. 28, 1933 (Cl. 12k. 7). See Brit. 356,757 (C. A. 27, 2637).

**Electrolysis with mercury cathode.** K. W. Palmaer. Swed. 76,580, Feb. 28, 1933. Metals less electropositive than alkali or alk. earth metals, particularly one or more of the metals of the eighth group of the periodic system, are pptd. by electrolysis by means of a cathode of flowing Hg which is made to flow over a previously amalgamated metallic body.

**Beryllium.** Beryllium Development Corp. Ger. 581,690, Sept. 22, 1933 (Cl. 40c. 6.03). See Brit. 377,858 (C. A. 27, 3408).

**Direct production of iron and other metals that unite with carbon.** H. G. E. Cornelius (H. G. Flodin and E. G. T. Gustafsson). Swed. 78,447, Sept. 26, 1933. High-C and low-C ore briquets are charged into an elec. furnace together or in succession in such ratio that the desired C content in the resulting product is attained.

**Metallic magnesium.** Alfred C. Jessup and Maurice N. Lucell. U. S. 1,943,916, Jan. 16. In a cyclic process for the production of Mg from fused  $MgCl_2$  by electrolysis, Cl liberated at the anode is brought into contact with a carbonaceous lute at an elevated temp. and water and steam are simultaneously added to obtain HCl gas; the latter is caused to react with an acid-sol. basic compd. of Mg such as partially hydrated  $MgCl_2$  for producing  $MgCl_2$  which, after dehydration, is used in the electrolysis.

**Metallic magnesium.** Maurice N. Lucell. U. S. 1,943,920, Jan. 16. In a cyclic process for Mg production by electrolysis of fused  $MgCl_2$ , Cl from the anode, together with O, is brought into contact with a carbonaceous material such as coal or coke at a sufficiently high temp. to form phosgene, water is added to the phosgene thus formed to produce HCl gas and the HCl is reacted with a Mg compd. such as partially hydrated  $MgCl_2$  to form addnl.  $MgCl_2$ .

**Production of metallic magnesium.** Fritz Hansgurg (to American Magnesium Metals Corp.). U. S. 1,943,601, Jan. 16. Mg in finely divided form is extd. from its compds. such as MgO (suitably by use of C in an elec. furnace) and the Mg thus obtained is then distd. under reduced pressure in contact with an inert gas such as H. An arrangement of app. is described.

**Stainless steel.** Frederick M. Becket (to The Electro Metallurgical Co. of Canada Ltd.). Can. 336,774, Oct. 11, 1933. Chrome ore, Ni mat and a Si-contg. reducing agent are ground to pass an 8-mesh screen. The reducing and reducible materials are well mixed, and lime or other fluxes, as fluorspar, are added. The mixt. is charged into an open-arc elec. furnace and a fluid bath of slag is maintained at all times. A low-C steel bath may be placed in the furnace before smelting or alternatively steel scrap may be incorporated with the smelting charge. A stainless steel is produced.

**Electric furnaces.** Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cuy. Brit. 400,020, Oct. 19, 1933. Fusion of a moving charge having a high m. p. is effected by radiant heat from a fixed C resistance supported independently of and out of contact with the furnace walls. An inert gas is supplied by suction created by a chimney. In mfg. transparent quartz from granulated rock crystal the charge is moved to and fro and is fed from alternate sides. In making  $SiO_2$  plates a 2nd heater is arranged on the underside of the plate, and the plate is molded by suction in a mold moving with the plate. Rotary horizontal containers with fixed axial resistances are used for melting metals and glass and for making glass tubes.

**Electric furnace.** C. E. Cornelius. Swed. 78,205, Aug. 29, 1933. In an electrode furnace the fused bath surrounding the electrodes serves as the resistance, the

material being heated or melted in a crucible placed upon a support above the resistance bath. Structural features.

**Electric salt-bath furnace.** A. G. E. Hultgren. Swed. 76,330, Jan. 24, 1933. In an elec. furnace for the heating of tools, the heat is supplied by elec. current passing through a salt bath between electrodes arranged in couples and placed in the furnace in such a way that a sufficiently large free space is obtained that is free from direct elec. currents.

**Alternating-current furnace for the melting of glass, water glass, cement and similar materials.** Aktiebolaget Surte-Liljedahl (C. E. Cornelius, inventor). Swed. 78,914, Nov. 14, 1933. The fused material serves as elec. resistance between electrodes having a large heat-accumulating capacity. Structural features.

**Coreless electric induction furnace.** Edw. F. Northrup (to Ajax Electrothermic Corp.). U. S. 1,943,802, Jan. 16. Various details of operation are described.

**Electric resistance furnace.** Allmanna Svenska Elektriska A.-B. (L. Hogel, inventor). Swed. 78,521, Oct. 3, 1933.

**Electric resistance furnace for annealing and other heat treatment of metals.** N. G. Elfstrom. Swed. 79,037, Nov. 28, 1933.

**Electric resistance furnaces of the tilting type for melting aluminum.** Emil F. Russ. Brit. 400,521, Oct. 26, 1933.

**Electric-furnace metallurgy.** E. G. T. Gustafsson. Swed. 79,274, Jan. 3, 1934. In a furnace with movable electrodes, during the larger part of the melting or charging period the elec. current is applied with such a high voltage between the electrodes and the metal bath in proportion to the amt. of energy applied per electrode that the elec. resistance is not less than 0.03 ohm per electrode, the depth and compn. of the slag bath being so adjusted that a considerable part of the heat required for the reduction and (or) melting of the charge is developed at the surface of the slag bath by elec. arcs between the electrodes and the slag bath at the same time that a substantial amt. of heat is developed through resistance in the slag.

**Electric-furnace operation as in the reduction of materials.** Paul L. J. Miguet and Marcel P. Perron. U. S. 1,944,521, Jan. 23. A charge is provided consisting of a contiguous mass of a conductive mixt. of raw materials which are regularly interspersed with portions of a relatively non-conductive raw material which serves to stabilize the mean cond. of the charge.

**Furnace for carrying out endothermic reactions.** Buffalo Electric Furnace Corp. Ger. 588,652, Nov. 21, 1933 (Cl. 18a. 19).

**Continuous operation of electric furnaces with hollow electrodes.** Kinar Lund. Norw. 52,356, March 27, 1933. The level of the charge within the hollow electrode is kept nearly const., the electrode being given a rotary or up-and-down motion.

**Resistor units for electric furnaces.** The Electric Furnace Co. Brit. 400,605, Oct. 24, 1933.

**Electric resistance baking and other ovens.** George R. Baker and Baker Perkins Ltd. Brit. 400,219, Oct. 11, 1933.

**Device for tightening of electrodes against the furnace.** Flodinjern A.-B. (H. G. Flodin, inventor). Swed. 79,242, Dec. 28, 1933. Mech. features.

**Suspension device for self-burning electrodes.** Det Norske Aktieselskab for Elektrokemisk Industrie. Norw. 53,200, Oct. 23, 1933.

**Electric gas cleaner.** Aloys Schirp. Ger. 588,707, Nov. 24, 1933 (Cl. 12c. 5).

**Electrical precipitation apparatus.** The English Electric Co. Ltd., The Whessoe Foundry & Engineering Co. Ltd., Wilfrid Donnelly and Alexander G. Grant. Brit. 400,719, Nov. 2, 1933.

**Cooled tubular electrode support for electrofilter.** Siemens-Lurgi-Cottrell Elektrofilter-Ges. m. b. H. fur Forschung und Patentverwertung. (Wilhelm Hoss, inventor). Ger. 590,308, Dec. 29, 1933 (Cl. 12c. 5).

**Electric ozone generator.** John R. Fischer and Joseph

- G. Sola (to Sola Corp.). U. S. 1,943,426, Jan. 16. Various elec. details are described.
- Testing the voltage resistance of protector block assemblies. George H. Brodie (to Western Elec. Co.). U. S. 1,944,211, Jan. 23. Various details of elec. testing are described.
- Inductance coils. Marconi's Wireless Telegraph Co. Ltd. and Francis E. Robinson. Brit. 400,277, Oct. 23, 1933. An inductance coil having a negligible external magnetic field is made by filling a wound coil with a mixt. of latex and dust of magnetic material, e. g., Fe dust 80 and latex 20 parts, and then solidifying the latex, e. g., by vulcanization.
- Loaded electrical conductors. Walter Marion Bishop (to Electrical Research Products, Inc.). Brit. 400,271, Oct. 23, 1933. See U. S. 1,844,114 (C. A. 26, 1806-7).
- Spark-gap apparatus, suitable for converting direct into alternating current, or vice versa, in which the electrodes are enclosed in a chamber filled with gas under pressure. Erwin Marx. Brit. 400,934, Oct. 23, 1933.
- Cooling devices for the anodes of metal-vapor rectifiers. Allmänna Svenska Elektriska Aktiebolaget. Brit. 400,083, Oct. 19, 1933; Swed. 79,118, Dec. 5, 1933. Addn. to 348,367 (C. A. 27, 2889).
- Metallic-vapor rectifiers. Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 400,994, Nov. 6, 1933.
- Mercury-vapor rectifier. Allmänna Svenska Elektriska A.-B. (U. Lamm, inventor). Swed. 79,053, Nov. 28, 1933.
- Flashlight lamp. Johannes A. M. van Liempt (to N. V. Philips' Gloeilampenfabrieken). U. S. 1,944,854, Jan. 23. A lamp arranged for elec. ignition contains material such as Al foil and O which on ignition enters into a reaction with high actinic effect, Na azide being employed on the lamp wires in order to improve the actinic effect for photography.
- Flashlight lamps. Mituyoshi Igari. Brit. 400,476, Oct. 26, 1933. Structural features of a lamp for photographic or signaling purposes, comprising a glass bulb contg. Al, Ce, Ni, Mg, etc., foil and O at less than atm. pressure, are described.
- Lamp for producing and screening ultra-violet rays. Richard A. S. Paget (to Thermal Syndicate Ltd.). U. S. 1,943,877, Jan. 16. Various details are described of a lighting unit suitable for approximating daylight effect.
- Thermionic cathode lamp. Albert W. Hull (to General Elec. Co.). U. S. reissue 19,057, Jan. 23. A reissue of original pat. No. 1,929,143 (C. A. 27, 5658).
- Arc lamps. Reginald H. Cricks, Philip Rigby and Robert Rigby Ltd. Brit. 400,692, Nov. 2, 1933. One electrode is fed by gearing, including means for regulating the rate of feed, and means is also provided for moving both electrodes simultaneously to adjust the position of the arc.
- Discharge lamps. Claude Neon Electrical Products Corp. Ltd. Brit. 400,320, Oct. 26, 1933.
- Discharge lamps. N. V. Philips' Gloeilampenfabrieken. Brit. 400,388, Oct. 26, 1933. The spacing of the electrodes in an arc lamp having a filling of Na and Ne is so small that the pos. column is eliminated.
- Discharge lamps. Patent-Treuhand-Gesellschaft für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 400,756, Nov. 2, 1933. Lamps giving light, including infra-red rays, approximating to daylight are filled with a mixt. of a rare gas, e. g., Ar, Ne, and Cs or Rb vapor and are operated so that the vapor pressure rises above 0.02 mm. corresponding to a temp. of 150°.
- Discharge lamps. N. V. Philips' Gloeilampenfabrieken. Brit. 400,835, Nov. 2, 1933. A lamp is divided into 2 or more channels, contg. gases or vapors giving light of different colors, by a longitudinal partition formed of a material, e. g., black glass, not transparent to the light produced in the channels.
- Gas-filled discharge lamps for electric lighting installations. N. V. Philips' Gloeilampenfabrieken. Brit. 401,086, Nov. 9, 1933.
- Neon-filled glow-discharge lamp, containing sodium, for use in photophones. Marconi's Wireless Telegraph Co. Ltd., George M. Wright and George F. Brett. Brit. 400,275, Oct. 23, 1933.
- Electric incandescent lamp. Theodore Millner (to General Elec. Co.). U. S. 1,944,825, Jan. 23. A gaseous fluoride such as SiF<sub>4</sub>, BF<sub>3</sub>, or PF<sub>5</sub> is used in lamps, in order to prevent blackening of the bulb.

## 5 -PHOTOGRAPHY

E. P. WIGHTMAN

- The Knapp method of development. C. Popineau. *Phot.-Rev.* 45, 276 7(1933). -The Knapp method consists in alternate immersions of the film in developing soln. and in plain water. It is stated that better results are obtained by using 3% Na<sub>2</sub>SO<sub>3</sub> soln. in place of plain water as the second bath. P. W. Vittum
- Rapid fine-grain development. A. Seyewetz. *Bull. soc. franç. phot.* 20, 177-83(1933); cf. C. A. 27, 5261. -Several formulas for rapid fine-grain developers are presented which are claimed to give superior graininess. Good results were obtained with the following formula: elon 5 g., *p*-phenylenediamine 10 g., Na<sub>2</sub>SO<sub>3</sub> (dry) 60 g., Na<sub>2</sub>PO<sub>4</sub> 3.5 g., KBr 1 g.; water to 1 l. Time of developing was 7 min. at 18°. The resultant negatives are thin. S. finds that if such developers are used for fine-grained emulsions (Micro Lumière), there is no diminution in graininess, and he concludes that in all cases the final image is formed after the Ag halide is dissolved by the developer, which then acts as a phys. developer. R. B. Atkinson
- Physicochemical investigation of the role of sodium sulfite in photographic development. K. Madhusudan Pandalai and G. Gopala Rao. *Z. anorg. allgem. Chem.* 215, 23 32(1933). -Na<sub>2</sub>SO<sub>3</sub> appears to play the role of acceptor in an induced reaction such as photographic development, the org. developing agent being the inducer. The Na<sub>2</sub>SO<sub>3</sub> alone does not cause reduction, and the reduction by the org. substance alone is not great. The sulfite speeds up the reduction considerably. The reduction of AgCl in the presence of Na<sub>2</sub>SO<sub>3</sub> appears to be a homogeneous reaction, while in its absence the reaction is heterogeneous. The mechanism of the primary and secondary reactions are discussed. E. P. Wightman
- History of the photographic developer. O. Schlenk. *Phot. Korr.* 69, 171-2(1933).
- History of the pyrocatechol developer. J. M. Eder. *Phot. Korr.* 69, 172 3(1933). -Cf. preceding abstr.
- Metol-hydroquinone developers: the influence of the proportion of mixtures and of the  $p_H$  value. W. Reindt and M. F. C. Beukers. *Phot. J.* 74, 78-82(1934)
- Metol alone works as a powerful developer at a  $p_H$  value at which hydroquinone alone does not cause any reduction. With the former development is possible at  $p_H$  6, whereas with the latter it begins only at a  $p_H$  above 9. However, the velocity of development with the latter increases more rapidly with increasing  $p_H$  than with metol. The velocity is about the same at a  $p_H$  about 10.5-11. The increase of developing power when metol is mixed with hydroquinone is much greater than would be expected, i. e., it is greater than the sum of the two separate effects. This is attributed to the fact that with hydroquinone alone, the first growth of the Ag germ is uncommonly slow, but as soon as these germs are made somewhat larger, as they are with metol, the reduction goes on very rapidly. metol shortens the induction period of hydroquinone. The best mixt. of the 2 developers consists of 1 metol to 3 hydroquinone by wt. Metol and *p*-aminophenol do not work together in the same way. E. P. Wightman

**Theory of the photographic elementary process and of the latent image.** G. Schwarz. *Phot. Korrr. Suppl.* 69, 27-34 (1933).—Expts. bearing on an explanation of sensitivity and the latent image (cf. Schwarz and Urbach, *C. A.* 26, 4545) independent of the Ag nucleus theory have been continued.

**The intermittency effect in photographic exposure.** Julian M. Blair and Malcolm C. Hylan. *J. Optical Soc. Am.* 23, 353-8 (1933).—The intermittency effect is explained by means of the Blair and Leighton equation for the formation of the latent image plus an addnl. hypothesis of a photochem. lag. A few measurements are presented showing intermittency effects of great magnitude. For the most part the explanation is applied to the results obtained by R. Davis (*Bur. Standards Sci. Paper* 21, 95-139 (1926)).

**Photographic properties of silver sulfide. II. The print-out effect—chemical aspect. III. The print-out effect—photographic aspect.** K. C. D. Hickman and W. J. Weyerts. *J. Franklin Inst.* 216, 683-706, 591-627 (1933).—Ag<sub>2</sub>S exhibits a "photographic effect." Pptd. Ag<sub>2</sub>S suspended in solns. contg. the Ag salt of a reducing acid acquires a coating of metallic Ag when strongly illuminated. The action is produced by light of all wave lengths from the ultra-violet to 1.4  $\mu$ ; it is repressed by gelatin, an alkali, an Fe salt, etc., but it can proceed slowly with well-shaded photographic images of Ag<sub>2</sub>S. Images converted to sulfide can be intensified in light under solns. of Ag in NaNO<sub>2</sub> or Ag in Na<sub>2</sub>SO<sub>4</sub>.

**Intensification with mercuric iodide.** R. Namias. *Phot.-Rev.* 45, 342-3 (1933).—Solns. for HgI<sub>2</sub> intensification are usually prepd. by dissolving HgI<sub>2</sub> in aq. KI contg. a trace of Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>. Because the intensified images obtained with this soln. are not stable and turn yellow rapidly, N. prefers formulas in which larger amts. of hypo are used. Good results are claimed to have been obtained with the following formula: HgI<sub>2</sub> 10 g., KI 20 g., hypo 20 g., water to make 1 l.

**The photographic emulsion: sensitization by sodium sulfite.** Burt H. Carroll and Donald Hubbard. *Bur. Standards J. Research* 11, 743-64 (1933) (Research Paper No. 622).—Na<sub>2</sub>SO<sub>3</sub>, in quantities sufficient to reduce a few tenths of 1% of the AgBr of a photographic emulsion, may act as a powerful sensitizer only slightly inferior to the natural sensitizers in gelatin. It acts as such only after digestion with the emulsion; this insures that it has reacted with the AgBr. The sensitivity nuclei thus formed are of metallic Ag, in amts. similar to the Ag<sub>2</sub>S nuclei of normal emulsions. The rate of change of sensitivity increases with increasing alkyl and decreases with increasing bromide-ion concn. Sulfite may be added to the emulsion before washing; it sensitizes only on digestion after washing. There was no indication of panchromatic sensitization (Capstaff effect).

**New procedure for reducing negatives.** G. Schweitzer and M. Rancurel. *Phot.-Rev.* 45, 305-7, 323-5 (1933).—A method is described for effecting local reduction in the highlights of overdeveloped negatives. The process involves the following steps: treatment of the emulsion side of the negative with dichromate soln., drying, exposing the back of the negative to daylight, thus hardening the gelatin in the shadow portions, and finally, brief treatment with hypochlorite soln., which removes part of the gelatin and Ag deposit from the highlights, and does not attack the shadows where the gelatin has been hardened.

**Fine-line etchings.** K. Dulik. *Klmschs Jahrbuch* 1934, 125-8.—A pyro-silver intensifier is used with wet collodion negatives for fine-line work. Exposure must be correct. To transfer any design from existing printing forms to lithography a proof in fatty ink on transfer paper is rolled onto a dry counter-etched Zn plate, the paper is moistened and removed, the plate is washed with water, coated with bichromated albumin and dried. Without exposing to light the ink is removed by scrubbing with benzene. The plate is then rolled up and developed, like a normal albumin print, with water, etc. The result is said to be superior to the transparency method.

**Flashlight lamp** (U. S. pat. 1,944,854) 4.

**Eder, Josef M.:** *Rezepte, Tabellen und Arbeitsvorschriften für Photographie und Reproduktionstechnik.* 14-15 ed. Halle: W. Knapp. 487 pp. M. 8.80; bound, M. 9.60.

**Isert, Gerhard:** *Infrarot-Photographie.* Berlin: Photokino-Verlag. 48 pp. M. 1.50.

**Color photography.** Tru Colour Film Ltd. Brit. 400,251, Oct. 23, 1933. See Fr. 738,190 (*C. A.* 27, 1583).

**Color photography.** Frederick Beckert. Brit. 400,214, Oct. 20, 1933. Two processes are described for obtaining color sepn. negatives from pattern screen negatives by means of a stop-out screen, the processes being contrasted with that of Brit. 380,778 (*C. A.* 27, 2892). In 1 process a stop-out screen is photographically produced on a slow Ag-emulsion plate which is not bichromated; the image is developed (but not fixed), washed and resensitized with bichromate; and the resensitized plate is exposed under the screen-negative, registered therewith and developed, fixed and washed, a reversed sepn. negative of 1 color being obtained. In the 2nd process the slow Ag emulsion is applied to a plate coated with plain gelatin; the stop-out screen image is printed, developed, fixed and washed; the plate is resensitized with bichromate, printed under the registered screen-negative, washed to remove unexposed bichromate and then dyed with a suitable dye, e. g., pinatype black or nigrosine, to obtain a grainless dye negative.

**Color photography.** Dufaycolor Ltd. Fr. 755,675, Nov. 28, 1933. The emulsion lying on the upper face of the colored screen of a photographic film, of the multi-color screen type, is protected against the action of the dyes of the screen by a layer of synthetic resin, between the colored screen and the emulsion. The resin may contain a plastifying agent such as linseed oil and may be applied in the form of a soln. in benzene.

**Color cinematography.** Humphrey D. Murray and Douglas A. Spencer. Brit. 400,264, Oct. 23, 1933. Pos. images corresponding alternately to neg. selection records of 2 primary colors are recorded on 1 side of a double-coated film, and images corresponding to a neg. selection record of the 3rd primary color on the other side. All the images on 1 side are toned in 1 color and all on the other side in another color, and successive frames of the film are projected through 2 filters which are additively complementary and of such color and so appropriated to the frames that each filter will absorb those rays of light that are transmitted by the primary color a record of which is absent from the frame. The coloring of the images may be effected by the process of Brit. 377,706 (*C. A.* 27, 2892).

**Photographic color filter.** Carl L. Gregory (to Kislyn Corp.). U. S. 1,944,230, Jan. 23.

**Photographic materials.** Kalle & Co. A.-G. (Maximilian P. Schmidt, Wilhelm Neugebauer and Robert Franke, inventors). Ger. 590,107, Dec. 23, 1933 (Cl. 57b. 12.05). Sensitive layers for diazotype photography comprise a diazo compd. derived from an amine of any of the formulas XCONHRNH<sub>2</sub>, NH<sub>2</sub>RNHCONHR'NH<sub>2</sub>, and NH<sub>2</sub>RNHCSNHR'NH<sub>2</sub>, where R and R' are aryl radicals and X is an alkyl, aryl or aralkyl radical. Development may be effected in a bath of an azo dye component, or the component may be included in the layer and development effected with NH<sub>3</sub>. Examples are given. Cf. *C. A.* 27, 922.

**Photographic sensitive layers.** Michele Martinez. U. S. 1,944,293, Jan. 23. A support such as paper carries a layer capable, by heat development, of having relief images formed in it and comprising a colloid such as gelatin and substances yielding in aq. soln. carboxyl and ferric ions such as ferric NH<sub>4</sub> citrate and oxalic acid, the ratio of carboxyl content (calcd. as CO) to the ferric content being greater than 1.5.

**Photographic sensitizers.** I. G. Farbenind. A.-G. Brit. 400,401, Oct. 26, 1933. Ag halide emulsions are sensitized by a thiocyanine, thiopseudocyanine or thioisocyanine dye derived from a thiazole compd. having a

system of 3 or 4 condensed rings, particularly anthracene, phenanthrene, acenaphthene, fluorene, chrysene, carbazole and diphenylene oxide ring systems, fused onto the thiazole nucleus. The dyes are sensitive to wave lengths of about 200-620  $\mu$ . The sensitizing properties of 1,1'-diethyl-2,2'- $\alpha$ -anthrathiopseudocyanine iodide, 1-methyl-1'-ethyl-2,4'- $\alpha$ -anthrathiocyanine bromide, 1,1'-diethyl-2,2'-acenaphthenethiopseudocyanine iodide, 1,1'-dimethyl- $\alpha$ -anthrathiocyanine chloride, 1,1'-diethyl-2,4'-(carbazole-6'-methoxy)thioisocyanine iodide, 1,1'-diethyl-2,2'-(diphenyleneoxide-6'-methoxy)thiopseudocyanine iodide, etc., are described. Cf. C. A. 28, 56<sup>9</sup>.

**Photographic sensitizers.** I. G. Farbenind. A.-G. Brit. 400,951, Oct. 30, 1933. Ag halide emulsions are sensitized by the addn. of benzothiocarbocyanine, benzothiocyanine, benzoselenocyanine, benzothiopseudocyanine, benzoselenopseudocyanine, benzothioisocyanine or benzoselenoisocyanine dyes in which the  $C_6H_5$  nucleus attached to the thiazole or selenazole ring contains a substituted or unsubstituted amino group. Suitable substituents are Me, Et, Ac or Pr. The dyes are added to the emulsion as alkyl sulfoalkylates or halides. Among suitable dyes are (1) 1,1'-diethyl-5,5'-bis(diethylamino)benzothiocyanine iodide, (2) 1,1'-diethyl-2,2'-(5-benzamidobenzothioquinol)cyanine iodide, prep'd. by boiling 6-benzamido-2-methylbenzothiazole diethyl sulfate with 2-iodoquinoline-EtI with addn. of alc. KOH, and (3) 1,1'-diethyl-5-diethylamino-6'-methoxybenzoselenopseudocyanine iodide, obtained by boiling 2-methyl-6-diethylaminobenzoselenazole-EtI and 2-iodo-6-methoxyquinoline with addn. of NaOEt.

**Orthochromatic collodion-emulsion photographic dry plates.** Theodor Freundorfer and Roman Freundorfer. U. S. 1,943,380, Jan. 16. Preservatives such as glycerol and protective colloids such as gelatin or albumin are added to a strongly alk. Ag soln., and the treated soln. is applied to a collodion emulsion layer contg. a Ag salt in suspension and also contg. a color-sensitizing dye.

**Polychrome images.** I. G. Farbenind. A.-G. Fr. 755,705, Nov. 29, 1933. In prep. polychrome images in which several partial images are disposed in a single photographic layer, after producing the first partial image the layer for the taking of the other partial image and which

1 still contains unsensitized Ag halide is resensitized by treating it with reducing agents. The layers sensitized to different spectral regions are colored, with a dye capable of being eliminated or destroyed, to a color complementary to its region of sensitivity.

**Softening cinematographic films before application of the lettering.** Filmindustri. Norw. 52,455, April 18, 1933. The film is softened with an aq. soln. of  $Na_2CO_3$  or formaldehyde or a mixt. of both.

**Diazo prints.** Kalle & Co. A.-G. (Maximilian P. Schmidt, Oskar Siis and Robert Franke, inventors). Ger. 588,994, Dec. 1, 1933 (Cl. 57b. 12.05). Prints are obtained by using azo components of the general compn.  $R.CO.CH_2.CO.NXY$ , where R represents aryl, alkyl or aralkyl and X and Y represent H, aryl, alkyl, aralkyl, acyl or hydrogenated cyclic residues, alone or mixed with other azo components, in the light-sensitive layer or in the developing soln. Thus, paper is given a layer contg. tartaric or citric acid,  $H_3BO_3$ ,  $Al_2(SO_4)_3$ , Na naphthalene-trisulfonate, thiourea, the  $ZnCl_2$  salt of the diazo comp'd. of 1-diethylamine-3-ethoxy-4-aminobenzene, cyclohexyl-acetoacetic acid amide, phloroglucine and water. The paper is exposed under an original and developed by gaseous  $NH_3$  or an alk. liquid.

**Photogelatin printing plates.** Jacob A. Fleischmann, Walton W. Sullivan and Frank O. Sullivan (to Gardner Abbott). U. S. 1,944,123, Jan. 16. A plate such as Zn or Al is grained to take a coating, the grained surface is coated with a gelatin and dried; a second coating of gelatin contg. a sensitizer of the  $K_2Cr_2O_7$  type is applied, the coated plate is baked at about 32° for about 3 hrs., exposed without the interposition of a screen to high-intensity actinic rays from a carbon arc projected directly through a transparent image for a period of minutes, and the light-struck plate is developed in flowing water.

**Photogravure printing surfaces.** Niels Ludvigsen. U. S. 1,944,354, Jan. 23. An acid-resisting gram is provided upon the smooth face of a metal plate such as Zn so that the grain has uniform dots regularly disposed, the grained surface is thereafter coated with a light-sensitive material, and a grain is provided on the sensitive surface having uniform dots regularly disposed, this being followed by photographing, developing and etching.

## 6--INORGANIC CHEMISTRY

A. R. MIDDLETON

**Addition reactions of hydrogen and oxygen atoms at low temperatures.** K. H. Geib and P. Harter. *Trans. Faraday Soc.* 30, 131-4 (1934).—See C. A. 28, 983<sup>9</sup>.

E. R. Rushton

**Magnetochemical investigations. IX. The constitution of the higher chromium-oxygen compounds.** Wilhelm Klemm and Hermann Werth. *Z. anorg. allgem. Chem.* 216, 127-31 (1933); cf. C. A. 27, 2073.—The magnetic susceptibility of "red K perchromate" shows that the Cr is not hexavalent as stated by Schwarz and Giese (C. A. 27, 1838) but is probably quinquivalent. In "blue K perchromate" Cr is hexavalent. Robert Schwarz and Hermann Giese. *Ibid.* 132.—The chem. evidence permits Cr in the red salt to have a valence of 5 but not 7. J. B. Austin

**New view of the nature of the covalent linkage and the formation of free radicals.** Morris W. Travers. *Trans. Faraday Soc.* 30, 100-2 (1934).— $B_2H_6$  condenses, a little above 100° to form a mixt. of hydroborons, mainly  $B_3H_9$ . A similarity to the pyrolysis of  $C_2H_6$  is shown. The applicability of ordinary formulas to mols. in free space is questioned.

E. R. Rushton

**The  $(ClO_2)_2$  radical.** M. Gomberg and H. R. Gamrath. *Trans. Faraday Soc.* 30, 24-30 (1934).—When  $AgClO_4$  in 2% soln. in anhyd.  $Et_2O$  is treated with 1 equiv. of 1, 2 concurrent reactions take place: (1) the iodination of the  $Et_2O$ ,  $HClO_4$  being the by-product (Birckenback and Goubeau, C. A. 26, 3198); (2) the liberation of the inorg. radical  $(ClO_2)_2$ , to the extent of 25-50%, as measured by 2 independent methods.

E. R. Rushton

**Lower degrees of oxidation of rhenium.** E. Turkiewicz. *Roczniki Chem.* 12, 589-97 (1932).— $Re^{VII}$  ( $KReO_4$ ) is reduced by  $Cr^{II}$  to  $Re^{IV}$ ; the reaction is catalyzed by 1  $ReO_3 \cdot xH_2O$ , pptd. by alkalis from the reduced solns., yields  $K_2[ReO(CN)_4OH]$  on boiling with concd. aq.  $KCN$ , in acid solns. this salt yields the ion  $[Re(CN)_4(OH)]^{II}$ . B. C. A.

**Bromine fluoride,  $BrF$ .** Otto Ruff and Alfred Braida. *Z. anorg. allgem. Chem.* 214, 81-90 (1933).— $BrF$  results from the interaction of F and Br, but is not stable. It is better to make it from Br and  $BrF_3$  or Br and  $BrF_5$ . It decomposes spontaneously into Br,  $BrF_3$  and  $BrF_5$ . At 50°, the decompn. is so fast and complete that  $BrF$  is no longer detectable. Gaseous  $BrF$  is red-brown, the liquid is red and the crystals have the color of dichromate.  $BrF$  m. about -33°, b. about 20°. The Br fluorides are sol. in each other in all proportions, but only partially sol. in Br. Albert L. Henne

**Bromine trifluoride.** Otto Ruff and Alfred Braida. *Z. anorg. allgem. Chem.* 214, 91-3 (1933); cf. C. A. 26, 3974.— $BrF_3$ , b. 127°, vapor curve  $\log p = 8.41054 - (2220.2/T)$ , heat of evaporation 10 large calories per mol., Trouton constant 25.8, crit. temp. about 327°. The molecules are associated in the liquid. A. L. Henne

**Determination of the total hydration of the ions of calcium chloride.** F. Bourion and E. Rouyer. *Compt. rend.* 198, 175-8 (1934); cf. C. A. 27, 4154, 5623.—From cryoscopic studies it is calcd. that for 0.5 M  $CaCl_2$  and 0.25 M  $CaCl_2$  the corresponding hydrates are  $CaCl_2 \cdot$

$27\text{H}_2\text{O}$  and  $\text{CaCl}_2 \cdot 30.6\text{H}_2\text{O}$ . "It is seen that the Ca ions are hydrated more than the K, Na and, above all,  $\text{NH}_4$  ions studied previously."

**Chloride of lime.** V. Macri. *Boll. chim.-farm.* 72, 327-8 (1933).—Possible sources of error in Tarugi's (C. A. 27, 1586) and Neumann and Hauck's (C. A. 20, 880) detns. of the formula for bleaching powder are discussed.

B. C. A.

**Compounds of calcium oxide and phosphoric acid.** II. 1. Structural chemistry of apatite groups. 2. Characteristic sensitiveness of  $\alpha$  and  $\beta$  compounds of tricalcium phosphate with calcium oxide and water vapor. M. A. Bredig, H. H. Franck and H. Fuldner. *Z. Elektrochem.* 39, 959-69 (1933); cf. C. A. 26, 2666.—In apatites such as  $\text{Ca}_{10}(\text{PO}_4)_6\text{X}_2$ , by substituting a bivalent radical,  $\text{Ca}_{10}(\text{PO}_4)_m\text{X}_{2m}\text{O}_n$  ( $m \geq 0.3-0.5$ ;  $n = 1 - m$ ) can be obtained. That apatites with such radicals as carbonate can be prepd. is shown by the Röntgen diagram. Cyanamide, aluminate and ferrite apatites are synthesized by substituting the univalent radical. The conversion of tricalcium phosphates is very sensitive to the  $\text{CaO}$  and  $\text{H}_2\text{O}$  present. The  $\alpha$ -comps. are converted to the  $\beta$  at  $1000^\circ$  only in vacuum. The stability of hydroxyl- or of hydroxyl-oxy-apatites is explained.

L. Marsh

**Magnesium thiosulfate.** R. Portillo. *Rev. acad. cienc. Madrid* 30, 577-85 (1933).— $\text{SrSO}_4$  and  $\text{MgSO}_4$  solns. were allowed to react, and the filtrate was evapd. at low temp. Rhombic crystals of  $\text{MgSO}_4 \cdot 6\text{H}_2\text{O}$  (I) were obtained. They were stable when exposed to the air. When heated to  $60^\circ$   $\text{MgSO}_4 \cdot 3\text{H}_2\text{O}$  (II) was formed, and at higher temps. decompn. occurred. When II was exposed to the air it absorbed water and was reconverted to I. The mol. heat of soln. for I is  $-3400$  cal.; for II  $+6870$  cal.; I,  $d_4^{25} = 1.741$ ; II,  $d_4^{25} = 2.054$ . A soln. satd. at  $0^\circ$  contains 56.19% of I; at  $40.5^\circ$ , 65.11%.

L. E. Gilson

**The thermal dissociation of normal manganese carbonate and cobalt carbonate.** J. Krustinsons. *Z. Elektrochem.* 39, 936-9 (1933).—Repeated heatings of normal  $\text{MnCO}_3$  result in a min. dissoen. temp. of  $400^\circ$  at 760 mm.  $\text{CO}_2$  pressure. For  $\text{CoCO}_3$  the dissoen. temp. is  $341^\circ$ . The decompn. of  $\text{MnCO}_3$  appears to form a solid soln., while that of  $\text{CoCO}_3$  occurs in steps. The method of prep. the compn. affects the dissoen. temp. Dissoen. curves are given for each compn.

L. Marsh

**The decomposition of mercurous iodide into mercury and mercuric iodide.** Maurice Francois. *Ann. chim.* 20, 285-303 (1933).—Contrary to the statements usually found,  $\text{Hg}_2\text{I}_2$  (I) is pure yellow and is well crystd. It can be prepd. in the pure state as follows: Dissolve 125 g.  $\text{Hg}_2(\text{NO}_3)_2$  in 2 l. of cold  $\text{H}_2\text{O}$  contg. 20 cc.  $\text{HNO}_3$ . Slowly add with stirring a soln. of 50 g.  $\text{KI}$  in 100 cc.  $\text{H}_2\text{O}$ . Let stand 24 hrs. in the dark. Wash, filter and dry at  $50^\circ$ . Keep dark at all times. The greenish tint of the com. salt is due to the presence of dispersed  $\text{Hg}$ , which can be removed by treatment with  $\text{N KI}$  satd. with  $\text{HgI}_2$  (II) or by  $\text{HNO}_3$  ( $36^\circ\text{Be.}$ ).  $\text{C}_6\text{H}_5\text{NH}_2$  (III) acts on I to give  $\text{Hg}$  and II in soln. A cryst. pale-yellow compd.  $2(\text{C}_6\text{H}_5\text{NH}_2) \cdot \text{HgI}_2$  (IV) is also formed. IV can be prepd. in a pure state as follows: Heat 500 g. III and 250 g. II to boiling on a sand bath. After slow cooling add 20 g. I and boil the soln. 5 min. more. Decant the liquid into a filter heated to  $170^\circ$ . Let cool to  $50^\circ$  but not below, whereupon IV seps. out. Avoid sunlight throughout. Filter off the crystals rapidly and wash when cold with a mixt. of alc. and  $\text{Et}_2\text{O}$ . The yield is about 6 g. I is decompd. by  $\text{C}_6\text{H}_5\text{NH}_2$ , phenols, 95% alc., abs. alc., satd. solns. of  $\text{KI}$  and  $\text{HI}$  to give  $\text{Hg}$  and II. All the reactions are reversible. Heat also decomp. I. With  $\text{NH}_3$  it forms a black compd. which is white  $\text{HgI}_2 \cdot 2\text{NH}_3$  and  $\text{Hg}$ . The soly. of II in 100 g. 95% alc. is 0.867 g. at  $15^\circ$  and 4.32 g. at  $79.9^\circ$ . In abs. alc. it is 1.780 g. at  $12^\circ$  and 5.750 g. at  $78.4^\circ$ . J. B. A.

**Sulfur monoxide.** Heinrich Cordes and Peter W. Schenk. *Trans. Faraday Soc.* 30, 31-3 (1934); cf. C. A. 27, 5670.—The prep. and properties of  $\text{SO}$  are described. It may be kept for some days in dry vessels. At  $180^\circ$  it decomposes completely in 1 min. It reacts vigorously with metals, forming sulfides. At room temp., it does not react with  $\text{O}_2$ ; it reacts with water,  $\text{S}$  sepg., and, with aq.

alkalies it forms a soln. of sulfoxylate or hyposulfite which decolorizes indigo. In the short ultra-violet, a photochem. decompn. sets in.  $\text{SiO}_2$  gel also causes decompn. The ready spectroscopic detection of  $\text{SO}$  permits the investigation of a no. of reactions with regard to its formation.

R. R. Rushton

**The behavior of ferrous salt solutions when oxidized with bromine.** V. Rodt and K. Charisius. *Mitt. deut. Materialprüfungsanstalt.*, Sonderheft 22, 43-5 (1933).—The oxidation of  $\text{Fe}^{++}$  to  $\text{Fe}^{+++}$  by  $\text{Br}$  was studied. By oxidizing a warm  $\text{HCl}$  soln. of  $\text{FeCl}_2$  with  $\text{Br}$  water, and evapg. the excess  $\text{Br}$  the  $\text{Fe}$  is made trivalent. The I titration gives the correct value. The oxidized  $\text{Fe}$  is a mixt. of  $\text{FeCl}_2$  and  $\text{FeBr}_3$ . By drying the salts in the air the  $\text{Br}$  content approaches an amt. indicated by  $\text{FeBr}_3$ , and the  $\text{FeCl}_2$  changes to a basic salt; about 75% of the mixt. remains trivalent. When a ferrous salt is oxidized in warm  $\text{HBr}$  soln., on evapn. of the excess  $\text{Br}$  there is a partial decompn. of  $\text{FeBr}_3$  to  $\text{FeBr}_2$ , with a sepn. of free  $\text{Br}$ . If the  $\text{FeBr}_3$  is dried at  $100^\circ$  in air, it is rapidly converted into  $\text{FeBr}_2$ . There was no evidence that on evapn. of its soln.  $\text{FeBr}_3$  is converted to  $\text{Fe}_2\text{Br}_4$ . G. M. Petty

**The action of brown hydrated ferric oxide ( $\text{Fe}_2\text{O}_3 \cdot x\text{aq.}$ ) and of yellow hydrated ferric oxide ( $\text{O}=\text{Fe}-\text{OH}$ ) on a metallic hydroxide in alkaline solution.** V. Rodt. *Mitt. deut. Materialprüfungsanstalt.*, Sonderheft 22, 49-56 (1933).—Brown hydrated ferric oxide ( $\text{Fe}_2\text{O}_3 \cdot x\text{aq.}$ ) in alk. soln. does not form any compds. with  $\text{Na}_2\text{O}$  or  $\text{Ag}_2\text{O}$ ; it combines with  $\text{MgO}$  in  $\text{NH}_3$  soln. The  $\text{MgO}$  content of the compd. increases with the  $\text{MgO}$  and the  $\text{NH}_3$  concn. of the soln. Yellow hydrated ferric oxide ( $\text{O}=\text{Fe}-\text{OH}$ ) does not form a compd. with  $\text{Na}_2\text{O}$ ; with an excess of  $\text{Ag}_2\text{O}$  in  $\text{NaOH}$  soln. it forms  $\text{O}=\text{Fe}-\text{OH} \cdot \text{AgOH}$ . The structural formula of the compd. is  $\text{O}=\text{Fe}-\text{O}-\text{Ag}$ . With  $\text{MgO}$  in  $\text{NH}_3$  soln.,  $\text{O}=\text{Fe}-\text{OH}$  forms a ppt. The  $\text{MgO}$  content of the ppt. increases with the  $\text{MgO}$  and the  $\text{NH}_3$  concn. of the soln.; there were 0.084-8.0 mols. of  $\text{MgO}$  per mol. of  $\text{Fe}_2\text{O}_3$ . The structural formula is probably  $\text{O}=\text{Fe}-\text{O}-\text{Mg}-\text{O}-\text{Fe}-\text{O}$ .

Gerald M. Petty

**The synthesis of yellow hydrated ferric oxide ( $\text{O}=\text{Fe}-\text{OH}$ ) from iron sulfides.** V. Rodt. *Mitt. deut. Materialprüfungsanstalt.*, Sonderheft 22, 56-9 (1933).— $\gamma$ -Hydrated ferric oxide ( $\text{O}=\text{Fe}-\text{OH}$ ) was prepd. by drying hydrated  $\text{FeS}$  and  $\text{FeS}_2$  in air at temps. up to  $220^\circ$ .  $\text{S}$  and  $\text{FeS}_2$  were also present in the residual mixt. The hydrated oxide absorbs  $\text{H}_2\text{O}$  rapidly; it acts as a carrier in the combustion process. There are kinks in the temp.- $\text{H}_2\text{O}$  content curve at  $180^\circ$  and  $210^\circ$ . These kinks are probably caused by the strong  $\text{H}_2\text{O}$  absorption of the  $\gamma$ -ferric oxide.

Gerald M. Petty

**The origin of ferroso-ferric oxide ( $\text{Fe}_3\text{O}_4 \cdot x\text{aq.}$ ) in aqueous solution.** V. Rodt. *Mitt. deut. Materialprüfungsanstalt.*, Sonderheft 22, 45-4 (1933).—Ferroso-ferric oxide ( $\text{FeO} \cdot \text{Fe}_2\text{O}_3 \cdot \text{aq.}$  or  $\text{Fe}_3\text{O}_4 \cdot \text{aq.}$ ) was synthesized by the action of an excess of a soln. contg.  $\text{FeO}$ ,  $\text{NH}_3$  and  $\text{NH}_4\text{Cl}$ , on brown hydrated  $\text{Fe}_2\text{O}_3$ . Under the same conditions, yellow hydrated  $\text{Fe}_2\text{O}_3$  gave  $3\text{FeO} \cdot 2\text{Fe}_2\text{O}_3 \cdot \text{aq.}$ ; however, it is unstable, and  $\text{FeO} \cdot \text{Fe}_2\text{O}_3$  is formed by the removal of the excess  $\text{FeO}$ . The ferroso-ferric oxide is readily and thoroughly oxidized by air.

Gerald M. Petty

**Ferrous ferrites. II. Constitution and ferromagnetism of the ferrous ferrites and the autoxidation of ferrous hydroxide.** Alfons Krause and J. Tulecki. *Z. anorg. allgem. Chem.* 213, 292-300 (1933).—For the prep. of  $\text{Fe}^{II}$  ferrite from  $\gamma\text{-Fe}(\text{OH})_2$  an excess of  $\text{Fe}(\text{OH})_2$  is required, since part of the latter is oxidized with the simultaneous formation of  $\text{H}_2\text{O}_2$ . The constitutional formula of the ferrite is similar to that of spinel, but not all the cation positions are occupied. The ferromagnetism of the compd. is explained by the presence of  $\text{Fe}(\text{O}_2) \cdot \text{Fe}$  groups. The ferrites produced from  $\alpha\text{-Fe}_2\text{O}_3$  are formed by the substitution of  $\text{FeO}$  for the coordinately combined  $\text{H}_2\text{O}$ .  $\text{Fe}_3\text{O}_4$  prepd. by gentle ignition of  $\gamma\text{-Fe}(\text{OH})_2$  or by strong ignition of  $\alpha\text{-Fe}_2\text{O}_3$  adsorbs up to 0.5 mol.  $\text{FeO}$  per mol. of  $\text{Fe}_3\text{O}_4$ .  $\text{BaSO}_4$  accelerates oxidation of  $\text{Fe}(\text{OH})_2$  in air, probably because of the formation of a  $\text{Ba}$  salt of ferrisulfuric acid.

B. C. A.

A note on the reducing action of anhydrous hydrogen iodide. R. Q. Brewster. *Trans. Kansas Acad. Sci.* **36**, 111-12(1933).—Thirty g. iodide, 40 g. rosin and 60 g. sand were heated. The gas evolved was passed over red P, then  $P_2O_5$  and liquefied in a bath of  $CHCl_3$ ,  $CCl_4$  and solid  $CO_2$ .  $PhNHNH_2$  was reduced by adding 5 g. dropwise to 23 g. of the liquid  $HI$ , while the mixt. was kept cold in a bath of solid  $CO_2$ . The excess  $HI$  was allowed to evaporate and the solid residue steam distilled. The distillate was made alk. and steam distilled. The yield was 3 g.  $PhNH_2$ . Reduction of  $PhNHIOH$  by this method was practically quantitative. The method is limited to those compounds easily reducible. W. A. Moore

Hydroxo compounds. H. Brintzinger and J. Wallach. *Angew. Chem.* **47**, 613(1934).—Compounds in solutions of amphoteric hydroxides in strong bases were examined by determination of the ionic weights. The dialysis method of Brintzinger was used, as it permits the presence of large excesses of strong bases.  $CrO_4^{2-}$  was used as standard, and it was found that the antimonite ion was equal to  $[Sb(OH)_3]^-$ . Based upon both  $CrO_4^{2-}$  and  $[Sb(OH)_3]^-$  the following ionic formulas were determined: antimonite ion =  $[Sb(OH)_3]^-$ , germanate ion =  $[Ge(OH)_4]^-$ , aluminate ion =  $[Al_2(OH)_5]^-$ , gallate ion =  $[Ga_2(OH)_5]^-$ , zincate ion =  $[Zn_2(OH)_5]^{2-}$  and the beryllate ion = about  $[Be_3(OH)_6]^{2-}$ . Exptl. data and 6 references are given. Karl Kammermeyer

Structure of silicates. L. H. Borgström. *Finska Kemistumsfundets Medd.* **42**, 69-72(1933).—A résumé. H. C. Duus

System: nickel oxide-oxygen-water. M. Le Blanc and R. Müller. *Z. Elektrochem.* **39**, 204-9(1933).—By the action of aq.  $K_2CO_3$  and  $Br$  in aq.  $KBr$  on aq.  $NiCl_2$ , an unstable black ppt. of variable composition,  $NiO \cdot xO_2 \cdot yH_2O$ , where  $x$  may be as high as 0.9, is obtained. The extra  $O$  liberates  $I$  from  $HI$  and is evolved on treatment with acid or heating in vacuum at  $360^\circ$ . The peroxide has no definite dissociation pressure of  $O_2$  or  $H_2O$ , and no crystal structure can be detected by the x-ray method. B. C. A.

Complex compounds. A. A. Grinberg. *Ann. inst. platine* No. 10, 47-64(1932).—The results of physicochemical research on the coordination compounds of the Pt group are discussed. B. C. A.

Complex platinum compounds. I. I. Chernyaev. *Ann. inst. platine* No. 10, 33-46(1932).—The work of the Institute since 1918 is reviewed. B. C. A.

Complex compounds formed by certain amino acids in the presence of mercuric chloride and alkali. Hubert B. Vickery and Wm. G. Gordon. *J. Biol. Chem.* **103**, 543-7(1933).—Addition of 1.5-2 mols.  $HgCl_2$  to a solution of amino acid at  $pH$  9.8 gave precipitates in which the ratio  $Hg:N$  was 3:2, and which also contained  $Cl$  and alkali metal. The latter is not present simply as contaminant, since in many of the compounds it was also present in simple integral ratio. An exception is made by lysine, whose precipitate has a  $Hg:N:Cl$  ratio of 4:4:3, and contains no alkali metal. K. V. T.

Structure of ultramarines. I. Technical ultramarines as basic materials for research. M. Dominikiewicz. *Roczniki Chem.* **12**, 913-24(1932).—Common ultramarines are solid solutions of ultramarine ( $Na_{41}Al_3Si_{138}O_{384}S_4$ ,  $Na_7Al_4Si_{138}O_{384}$  and isomorphous

$Na_{41}Al_3Si_{138}O_{384}S_4$ , or  $Na_7Al_4Si_{138}O_{384}$ ) and isomorphous Na kaolinite,  $Na_2Al_2Si_2O_{10}$  (0-40%). B. C. A.

Structural and stereochemical relationships among the disulfines and diammines of platinum and palladium. H. D. K. Drew and G. H. Wyatt. *J. Chem. Soc.* **1934**, 56-62.—The previous view of Angell, Drew and Wardlaw on the relationship between the  $\alpha$ - and  $\beta$ -disulfines of Pt is revised (*C. A.* **24**, 2000), it being now evident that migratory change occurs in the transformation  $\beta \rightarrow \alpha$ -disulfine.

The  $\alpha$ -disulfines of Pt are trans planar forms and correspond stereochemically and structurally with the  $\alpha$ -diammines and not with the  $\beta$ -diammines as was supposed by Werner. The  $\beta$ -disulfines of Pt are cis compounds, corresponding with the  $\beta$ -diammines of Pt; 2 structural types appear possible. The disulfines and diammines of Pd, which occur in only 1 form, correspond with the  $\alpha$ -forms of their Pt analogs, unless a chelate group is present, in which case they correspond with the  $\beta$ -forms. In the following en =  $(CH_3NH_2)_2$  (I), es =  $(CH_3SEt)_2$  (II). Pt es  $Cl_2$  in aq. I at room temp. (1 day) or on the water bath, or Pt en  $Cl_2$  in aq. II on the water bath (2 hrs.) give (ethylenediamino)-ethylenediethyldisulfineplatinous chloride, which becomes yellow at  $150^\circ$ ; it usually separates as the monohydrate; with dil.  $HCl$  there results I.  $HCl$  and Pt es  $Cl_2$ ; platy salt,  $[Pt(en)_2PtCl_4]$ , salmon-pink needles, decomposed by warm aq. solvents or in the dry state about  $130^\circ$ ; with aq. tetramminoplatinous chloride it gives Magnus's green salt on warming; boiling  $H_2O$  or dil.  $HCl$  gives about equimolar proportions of Pt es  $Cl_2$  and Pt en  $Cl_2$ . Pallado salt,  $[Pt(en)_2PtCl_4]$ , orange-brown; in hot  $H_2O$  there result about equimolar proportions of Pd es  $Cl_2$  and Pt en  $Cl_2$ ; aq.  $HCl$  gives Pt es  $Cl_2$  and  $(en)_2PdCl_4$ , deep red prisms with blue reflex, which gives Pd en  $Cl_2$  with boiling  $H_2O$ .  $\beta$ -Pt- $(Et_2S)_2Cl_2$  in aq. I gives  $[Pt(Et_2S)_2en]Cl_2$ ; evapn. at room temp. over  $P_2O_5$  gives ethylenediaminomono(diethylsulfine)platinous chloride, which also results from Pt en  $Cl_2$  in aq.  $Et_2S$ ; platy salt,  $[Pt(Et_2S)enCl]_2PtCl_4$ , sepg. as the monohydrate; it decomposes on keeping or more rapidly on boiling with  $H_2O$ , giving a red soln. from which a yellow solid separates, contg.  $Pt(Et_2S)_2Cl_2$ ,  $Pt(Et_2S)Cl_2$  and Pt en  $Cl_2$ . Ethylenediaminobis(diethylsulfine)platinous chloroplatinate,  $[Pt(Et_2S)_2en]PtCl_4$ , brick-red prisms;  $[Pt(NH_3)_4]Cl_2$  gives Magnus's green salt; the aq. soln. deposits a yellow solid, contg. Pt en  $Cl_2$ ,  $Pt(Et_2S)Cl_2$  and  $Pt(Et_2S)_2Cl_2$ ; the mother liquor contains  $[Pt(Et_2S)enCl]Cl_2$ . A preliminary study shows that  $Et_2S$  and Pd en  $Cl_2$  give  $[Pd(en)_2]Cl_2$  and  $Pd(Et_2S)_2Cl_2$ ; es and Pd en  $Cl_2$  give Pd es  $Cl_2$  and Pd en  $Cl_2$ ; es and  $Pd(NH_3)_2Cl_2$  give Pd es  $Cl_2$  and  $[Pd(NH_3)_4]Cl_2$ ; es and Pd  $(Et_2S)_2Cl_2$  give Pd es  $Cl_2$  and  $Pd(Et_2S)_2Cl_2$ ; en and Pd es  $Cl_2$  give  $[Pd(en)_2]Cl_2$  and Pd es  $Cl_2$ . C. J. West

Acid catalysis in non-aq. solvents (Bell) 2.

Bjerrum, Niels: Kurzes Lehrbuch der anorganischen Chemie. Translated from Danish and edited by Ludwig Ebert. Berlin: J. Springer. 356 pp. M. 7.50; cloth, M. 8.30.

Riesefeld, E. H.: Lehrbuch der anorganischen Chemie 11th ed. Leipzig: S. Hirzel. About 700 pp. About, M. 15.

## 7—ANALYTICAL CHEMISTRY

W. T. HALL

Standardization of volumetric solutions. Julius Grant. *Chemistry & Industry* **1934**, 767.—A practical solution is offered of the problem of properly standardizing all solutions used in the analytical lab. with the use of a single ultimate standard. Cf. Hinks, *C. A.* **24**, 2687. W. T. H.

Standardization of thiosulfate solution with potassium dichromate as a standard. Zinziro Nakai. *Bull. Fishery Expt. Sta. Gov. Gen. Chosen*, Ser. D, No. 3, 1-24(1933) (abstracts in English).—A study of the errors involved in the standardization of  $Na_2S_2O_3$  solutions against  $K_2Cr_2O_7$

leads to the following conclusions: The wt. of  $KI$  used should be less than  $11 \times$  the wt. of  $K_2Cr_2O_7$  taken, and the wt. of  $HCl$  less than  $51 \times$  the wt. of  $K_2Cr_2O_7$ . The  $KI$  content should be at least 0.09%; the  $HCl$  greater than 3% and the liberated  $I_2$  about 0.08%. The titration should take place below  $30^\circ$  and in diffused sunlight. Nao Uyei

Use of complex formers and of buffer substances in iodometric determinations. J. d'Ans. *Z. anal. Chem.* **96**, 1-6(1934).—Chromate, permanganate or bromate



can be titrated iodometrically in the presence of  $\text{Fe}^{+++}$  if  $\text{H}_2\text{PO}_4$  or  $\text{H}_2\text{P}_2\text{O}_7$  is added to convert the  $\text{Fe}^{+++}$  into an undissoc. complex. The quant. oxidation of  $\text{Br}^-$  to  $\text{BrO}_3^-$  by  $\text{ClO}^-$  is dependent upon a low concn. of  $\text{H}^+$ , and  $\text{NaH}_2\text{PO}_4$  suitably buffers the soln. except when considerable  $\text{Ca}^{++}$  is present, in which case  $\text{Na}_2\text{HPO}_4$  is better. To accomplish the iodometric titration of  $\text{Ti}^{+++}$   $\text{NaOAc}$  has been found a suitable buffer; it presents the reduction of  $\text{Ti}^{++++}$  which takes place with  $\text{HI}$  in acid solns. The iodometric titration of phenols depends upon keeping the concn. of  $\text{H}^+$  low. Dissolve 2-4 g. of  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$  in 100-150 cc. of water, add a measured vol. of 0.1  $N$   $\text{I}_2$  soln. and then the phenol soln. which has been made as nearly neutral as possible. Cover, allow to stand 15-30 min., make acid and titrate the excess  $\text{I}_2$  (which should correspond to about 5 cc. of 0.1  $N$  soln.) with  $\text{Na}_2\text{S}_2\text{O}_3$ . Salicylic acid can be titrated similarly.

W. T. H.

**The detection of cations with resorufin.** Hermann Eichler. *Z. anal. Chem.* 96, 22(1934).—To the neutral or slightly acid soln. add a few drops of a soln. contg. 0.2 g. resorufin in 5 cc. of  $\text{NH}_4\text{OH}$  and 100 cc. of water. Ppts. are obtained with  $\text{Cu}^{++}$ ,  $\text{Cd}^{++}$ ,  $\text{Fe}^{+++}$ ,  $\text{Al}^{+++}$ ,  $\text{Cr}^{+++}$ ,  $\text{Ni}^{++}$ ,  $\text{Zn}^{++}$ ,  $\text{Ba}^{++}$  and  $\text{Sr}^{++}$ , and a soln. free from  $\text{NH}_4$  salt gives characteristic violet ppts. with  $\text{Mg}^{++}$ ,  $\text{Ag}^+$  and  $\text{Pb}^{++}$ . Ferrous salts and hyposulfites reduce resorufin and must be removed.

W. T. H.

**Universal comparison solutions and best lines for the determination of traces of elements in ore and rock minerals by emission spectral analysis.** H. Moritz. *Chem. Erde* 8, 321-38(1933).—The following mixed solns. in concns. between 1% and 0.01 to 0.0001% are recommended: (1)  $\text{Ag} + \text{Bi} + \text{Hg} + \text{Pb}$ , (2)  $\text{As} + \text{Sb} + \text{Sn}$ , (3)  $\text{Au} + \text{Bi} + \text{Ga} + \text{Ge}$ , (4)  $\text{Ba} + \text{Ca} + \text{K} + \text{Li} + \text{Mg} + \text{Na} + \text{Sr}$ , (5)  $\text{Ce} + \text{La} + \text{Nd} + \text{Pr}$ , (6) yttria, (7)  $\text{Cr} + \text{Mo} + \text{W}$ , (8)  $\text{Mn} + \text{V} + \text{Ti}$ , (9)  $\text{Ni} + \text{Co} + \text{Cu}$ , (10)  $\text{Pb} + \text{Zn} + \text{Cd} + \text{Cu}$ , (11)  $\text{Pt} + \text{Pd} + \text{Ir} + \text{Rh} + \text{Ru} + \text{Os} + \text{Au}$ . For each of the elements the best wave lengths, their sensitivities, and possible interferences are tabulated. Spectrally pure carbons are preferable to the unpurified.

P. S. Roller

**Confining liquids for gas analysis.** Alfonz Nahoczky. *Bunyász. Kohász. Lapok* 66, 332-5(1933).—The data of Passauer (*C. A.* 26, 2934) were tested and confirmed for paraffin oil and concd.  $\text{Na}_2\text{S}_2\text{O}_3$  solns.  $\text{MgCl}_2$  soln. absorbed 20.2 cc.  $\text{CO}_2$  per 100 cc. soln.

S. S. de Finály

**Micro gas analysis and its application to biological purposes in particular.** H. Schwarz and R. Rappaport. *Mikrochemie* 13, 235-73(1934).—A carefully prepd. outline with abundant bibliography.

W. T. H.

**Qualitative analysis of insoluble residues.** Arnaldo Foschini. *Ann. chim. applicata* 23, 522-7(1933).—The usual scheme of qual. analysis is outlined. The sepn. and identification of  $\text{AgBr}$  and  $\text{AgI}$  are simplified by oxidizing the  $\text{Na}_2\text{S}_2\text{O}_3$  soln. of the halides with strong  $\text{H}_2\text{O}_2$  before acidifying. In this way pptn. of S is prevented.

A. W. Contieri

**Eupitnone, as indicator.** K. Brund and Eduard Peruche. *Pharm. Zentralhalle* 75, 8-13(1934).—This condensation product of 4-hydroxy-3,5-dimethoxy-1-methylbenzene (1 mol.) with pyrogallol dimethyl ether (2 mols.) may be used in the estn. of mineral and org. acids, of picric acid, of alkali and alk. earth hydroxides as well as alkali carbonates and bicarbonates, of  $\text{NH}_3$  and certain amines. The alkali salts of eupitnone are sensitive to  $\text{CO}_2$ , unaffected, however, by its combinations with mineral acids. Eupitnone possesses no marked advantage over other indicators now in common use.

W. O. E.

**Selenium as a reduction-oxidation indicator in the determination of arsenite ions by means of potassium bromate.** László Szabellédy and Károly Schick. *Magyar Gyógyszerészud. Társaság Értesítője* 9, 449-54(1933).—The  $\text{KBrO}_3$  titration of  $\text{As}^{III}$  can be made without indicators in bright sunlight, but an indicator is necessary for working by artificial light. A colloidal red modification of Se as a reversible reduction-oxidation indicator can show the end of the reaction instead of the irreversible methyl orange. Add 5 g.  $\text{NaBr}$  to the arsenite-contg. soln.,

1 dil. to 35 cc., add 25 cc. concd.  $\text{HCl}$ , heat to 55-60° and add 1 cc.  $M$   $\text{H}_2\text{SeO}_3$ . A dark-red colloidal Se is formed in the soln., which serves as an indicator. Results obtained by this method agree well with those obtained by potentiometric titration.

S. S. de Finály

**The system mercuric cyanide-chromic thiocyanate as an indicator (by turbidity, in acid-alkali titrations).** R. Uzel. *Collection Czechoslov. Chem. Communications* 5, 457-65(1933)(in French).—The chromithiocyanate ion,  $\text{Cr}(\text{CNS})_3$  (from the system mercuric cyanide-chromic thiocyanate) is a sensitive indicator of  $\text{H}^+$ -ion concn.: at  $p_H$  lower than 4.0 a turbidity due to  $\text{Hg}_2[\text{Cr}(\text{CNS})_3]_2$  results, which disappears at greater  $p_H$ .  $\text{K}_2\text{Cr}(\text{CNS})_6$  is prepd. according to Mahr's method (*C. A.* 27, 40) from  $\text{CrCl}_3$  and  $\text{KCNS}$ , and recrystd. twice from  $\text{EtOH}$ . It must be kept dry, since it slowly decomp. in aq. and alc. solns. For the indicator to be sensitive, the  $\text{K}_2\text{Cr}(\text{CNS})_6$  should contain no excess  $\text{CNS}$ . A stock soln. is made by dissolving 6 g. pure  $\text{Hg}(\text{CN})_2$  and 1 g.  $\text{NH}_4\text{NO}_3$  (add to prevent decompn. of  $\text{Cr}(\text{CNS})_3$  by sudden rise in alkyl. during titration) in water and making to 100 g. Before titration, about 0.02 g.  $\text{K}_2\text{Cr}(\text{CNS})_6$  is dissolved in 10 cc. of stock soln. to make the indicator, 1 cc. of which is taken per 25 cc. titration soln. The violet indicator soln. can be kept about 3 days without deterioration. The new indicator may be used for the titration of strong acids and strong bases. It can be used in colored solns. and those which include compds. destructive to colored indicators, not being affected by  $\text{HNO}_3$  or small amts. of free  $\text{Cl}$  or  $\text{Br}$ . It cannot be used in the presence of iodides, thiosulfates or other than small amts. of bromides and thiocyanates, or for the detn. of cyanides, since the turbidity does not result until after the equivalence point has been reached. It can be used for the titration of chromic and phosphoric acids (as strong monobasic acids) and for the detection and detn. of small amts. of free chromic acid in bichromate solns.

Edward B. Sanigar

**Elimination of the effect of the phosphate radical in qualitative analysis.** IV. Saburo Ishimaru. *J. Chem. Soc. Japan* 54, 887-93(1933); cf. *C. A.* 27, 5679.—A review of the work of Remy (*C. A.* 14, 1795), Charmandarjan (*C. A.* 24, 1052) and T. B. Smith (*C. A.* 27, 5023). The methods are ranked in the order Smith, 6 Charmandarjan, Remy.

T. Katsurai

**Errors in determining aluminum.** Rudolf Rinne. *Chem.-Ztg.* 57, 992(1934).—In pptg.  $\text{Al}(\text{OH})_3$  with  $\text{NH}_4\text{OH}$  there should not be more than 3 g. of  $\text{NH}_4\text{Cl}$  in 100 cc. of soln. The addn. of 5 cc. of concd.  $\text{HCl}$  to the soln will furnish sufficient  $\text{NH}_3$  salt on neutralization. The soly. of the ppt. in excess  $\text{NH}_3$  is not as serious a cause for error as has been assumed. Boiling 30 sec. is sufficient to remove unnecessary excess. The ppt. dissolves with difficulty in dil.  $\text{HCl}$  and the filter is likely to clog, so that when a double pptn. is made, it is best to wash the ppt. back into the beaker before attempting to dissolve it in hot, dil. acid.

W. T. H.

**Use of photoelectric comparator in the determination of minute quantities of arsenic.** A. Sevaux. *Compt. rend. soc. biol.* 115, 377-80(1934).

L. E. Gilson

**Sensitive spot test for copper.** A. S. Komarovskil and N. S. Poluektov. *Z. anal. Chem.* 96, 23-5(1934).—Place a drop of a satd. soln. of 8-hydroxyquinoline in 80%  $\text{AcOH}$  upon filter paper. In the middle of the resulting damp spot, place a drop of the soln. to be tested. After the latter has been well absorbed by the paper, and  $\text{Cu}$  hydroxyquinolate has been pptd. in its pores, add another drop of the reagent to the middle of the spot and follow this with a drop of 25%  $\text{KCN}$  soln. If  $\text{Cu}$  is present, a raspberry-red color is produced. The test is caused by the  $\text{Cu}$  ppt. dissolving in the  $\text{KCN}$  soln. whereby  $[\text{Cu}(\text{CN})_4]^{--}$  and  $(\text{CN})_2$  are formed. The latter reacts with the reagent to form a red compd. The test is very sensitive and will detect 0.0004 mg. of  $\text{Cu}$ . If  $\text{UO}_2^{++}$  or  $\text{Fe}^{+++}$  is present, it is necessary to add an excess of  $\text{NH}_3$  to the original soln. and filter off the resulting ppt. as  $\text{UO}_2^{++}$  gives a brown spot in the test and  $\text{Fe}^{+++}$  a black one; 0.002 mg. of  $\text{Cu}$  can be detected in the presence of 400 times as much  $\text{Fe}$ .

W. T. H.

**Magneto-optic Nicol rotation method for the quantitative analysis of copper.** Edna R. Bishop, Irene G. Otto and Louis Baisden. *J. Am. Chem. Soc.* **56**, 408(1934).—The possibility of using the magneto-optic Nicol rotation method for detg. Cu is shown. No preliminary sepn. is necessary and good results are to be expected in detg. small quantities of Cu. A calibration curve must be made by the observer. W. T. H.

**Detection of copper by means of *p*-phenylenediamine.** R. J. McIlroy. *Analyst* **59**, 103(1934).—Take a few drops of the ammoniacal soln. obtained after the removal of Bi in the conventional scheme of qual. analysis, add 5 ml. of satd. KCNS soln. and 2-3 drops of a soln. of *p*-phenylenediamine in water. A black ppt. of Cu thiocyanate-phenylenediamine compd. is formed when 1 part of Cu is present in 100,000 of soln. The black compd. contains 25.08% Cu. W. T. H.

**Rapid determination of copper in bearing metals by direct precipitation in the presence of tin, antimony, lead, etc.** E. Azzarello and A. Accardo. *Ann. chim. applicata* **23**, 483-90(1933).—Weighing the Cu as Cu salicylaldehyde is advocated. A. W. Contieri

**Electrolytic determination of lead as peroxide.** M. Bertaux. *Documentation sci.* **2**, No. 13, 72-5(March, 1933); *Chimie & industrie* **30**, 1041.—The anodic deposition of PbO<sub>2</sub> from HNO<sub>3</sub> solns. is described. A. P.-C.

**Microdetermination of magnesium as the triple ferrocyanide of magnesium, calcium and hexamethylenetetramine.** L. Dehucquet and L. Velluz. *Bull. soc. chim.* **53**, 1291-2(1933). See C. A. **27**, 4189. G. G.

**Loss of magnesium in systematic qualitative analysis.** L. J. Curtin and N. Mermelstein. *Rec. trav. chim.* **53**, 34 G(1934).—In the ordinary qual. procedure, there are appreciable losses of Mg in the pptn. of the Fe-Al group and of the alk. earths. W. T. H.

**Potentiometric determination of manganese in iron castings.** A. M. Zanko and V. F. Stefanovskii. *Domes* **1933**, No. 8, 27-31.—The best conditions for detg. Mn by reduction of MnO<sub>4</sub><sup>-</sup> with Fe<sup>++</sup> in the presence of K<sub>2</sub>F<sub>2</sub> are described (cf. Miller and Wahle, C. A. **17**, 3306; **18**, 363). S. L. Madorsky

**The quantitative separation of metals by hydrogen sulfide. I. Quantitative separation of nickel and zinc by hydrogen sulfide.** Hisaji Katô. *J. Chem. Soc. Japan* **54**, 867-86(1933).—Within *p*<sub>H</sub> 2.0-3.0 ZnS can be pptd. by H<sub>2</sub>S without pptg. NiS. T. K.

**Colorimetric determination of potassium.** S. N. Rozanov and Valentina Alexandrovna Kazarinova. *Z. anal. Chem.* **96**, 26-9(1934).—The following test depends upon the formation of a ppt. of K<sub>2</sub>NaCo(NO<sub>2</sub>)<sub>6</sub> from the nitrite content of which a yellow azo dye, tropoeolin, can be formed. Take exactly 1 cc. of soln. contg. 0.025-0.1 mg. of K<sub>2</sub>O, acidulate with 1-2 drops of 3 N AcOH and treat with 1 cc. of Na<sub>2</sub>Co(NO<sub>2</sub>)<sub>6</sub> reagent in a centrifuge tube. Shake, allow to stand 4 hrs. or longer, and centrifuge 15-20 min. at 2000-3000 r. p. m. With the aid of a capillary, remove the supernatant soln. and wash the ppt. with 2-cc. portions of water and 5-6 min. rotation in the centrifuge until a perfectly clear wash liquid is obtained. Dissolve the ppt. in 5 cc. of 0.1 N NaOH, heating on the water bath, and disregard any Co(OH)<sub>2</sub> ppt. that may result. Transfer the alk. soln. to a 100-cc. measuring flask and dil. with 50-60 cc. of water. Now add 2 cc. of a mixt. of equal parts 10% HCl and sulfanilic acid + phenol reagent (1 g. sulfanilic acid dissolved in 100 cc. of hot, satd. NH<sub>4</sub>Cl soln., and mixed with 1.5 g. of phenol and 100 cc. of water), mix and allow to stand 15 min. Then make alk. with 10% NH<sub>3</sub> soln. and fill with water to the 100-cc. mark. Compare the color of 15-30 cc. of the soln. with colors produced similarly with known quantities of standard nitrite soln. Since the compn. of the ppt. does not correspond exactly to the compn. K<sub>2</sub>NaCo(NO<sub>2</sub>)<sub>6</sub>, it is important to make sure that the conditions are absolutely the same in the standardization and analysis. W. T. H.

**Detection of tungsten in minerals.** J. Versluys and H. L. J. Zermatten. *Proc. Acad. Sci. Amsterdam* **36**, 868-70(1933).—Fuse the powd. mineral in a bead of

<sup>1</sup> NaPO<sub>3</sub> in the reducing flame. Dip the hot bead in a few drops of 5 N HCl. The presence of W is indicated by a violet film over the bead and in the cracks. With Zn powder the liquid turns a deep violet. The HCl soln. of a bead with Ti turns pale violet when treated with Zn, with Mo brownish yellow, with Ch grayish blue.

A. M. Brant  
**Application of the polarographic method to the analysis of synthetic phosphorescents and a note on the estimation of palladium.** Shinichirô Hakomori and Takashi Tashiro. *J. Electrochem. Assoc. (Japan)* **2**, 15-18(1934).—A discussion showing the practical application of the polarographic method. A polarogram of [P<sub>2</sub>-(NH<sub>4</sub>)<sub>4</sub>]Cl<sub>2</sub> is given. K. Konda

**New method for the gravimetric and volumetric determination of mercury.** G. Spacu and P. Spacu. *Z. anal. Chem.* **96**, 30-4(1934).—The method depends upon the formation of HgIO<sub>3</sub>. The ppt. can be weighed as such or the excess of KIO<sub>3</sub> detd. by titration. *Gravimetric procedure.*—To the hot neutral or faintly acid soln. of HgNO<sub>3</sub> (about 50 mg. Hg in 60-80 cc.) add 0.21-28 g. of KIO<sub>3</sub>. Filter after 60-90 min., wash with water, then with 90% alc. and finally with ether, dry in a vacuum and weigh. *Volumetric procedure.*—To the filtrate from the well-washed HgIO<sub>3</sub> ppt. add 0.5-1 g. of KI, 0.5 cc. of 2 N HCl or H<sub>2</sub>SO<sub>4</sub> and some starch indicator soln. <sup>4</sup> Titrate the liberated I<sub>2</sub> with 0.1 N Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. The results were accurate to within 0.1 mg. The soly. product of HgIO<sub>3</sub> was found to be about 3.4 × 10<sup>-13</sup> at 15.5°.

W. T. H.  
**Determination of chloride in potassium iodide.** V. M. Peshkova and E. S. Przhivalskii. *J. Gen. Chem. (U. S. S. R.)* **3**, 519-23(1933).—Berg's method for detg. small amts. of Cl in KI soln. is inaccurate. The following modification gives better results: Dissolve 1 g. of KI in 50 cc. of H<sub>2</sub>O and 5 cc. of H<sub>2</sub>SO<sub>4</sub> (d. 1.1), add 4 cc. of 5% KMnO<sub>4</sub> soln. and shake vigorously. Add 5-6 drops of 30% H<sub>2</sub>O<sub>2</sub> and again shake well. Make up to 60 cc., filter and use half of the filtrate. Ext. the free I<sub>2</sub> in a sepg. funnel with benzene. Transfer the colorless aq. soln. to a 150 cc. Erlenmeyer flask, dil. to 100 cc. and titrate with 0.1 N AgNO<sub>3</sub> soln. S. L. Madorsky

**Determination of molybdenum and lead by Fajans' method.** Tz. Raikhiinshteyn and N. N. Korobov. *J. Gen. Chem. (U. S. S. R.)* **3**, 531-3(1933); cf. C. A. **27**, 2396.—A comparison between the methods of Fajans, Wiley, Sacher, Chindler and Alexander and Wiley, Ambrose and Bowers, for the detn. of Mo and Pb, showed that Fajans' method is the most rapid and accurate.

S. L. Madorsky  
**Use of aqueous ammonia as a reagent for chlorine and bromine in the presence of iodine.** M. P. Babkin. *J. Gen. Chem. (U. S. S. R.)* **3**, 134-6(1933); *Chimie & industrie* **30**, 1046.—The old method of distinguishing between AgCl, AgBr and AgI by their varying soly. is explained. A. Papineau-Couture

**New colorimetric method for determining nitrogen.** Richard v. der Heid, Jr. *Z. anal. Chem.* **96**, 7-16(1934).—The method is based upon the well-known procedure of Kjeldahl with Hg as a catalyst. The Hg, however, is not introduced as such but in the form of HgSO<sub>4</sub> soln. After the digestion, Nessler soln. is produced in the soln. by careful neutralization and addn. of KI soln. equiv. to the Hg present. The necessary solns. are: (1) A clear filtered soln. of 14.8 g. HgSO<sub>4</sub> in warm 10% H<sub>2</sub>SO<sub>4</sub> diluted with water to 100 cc. (2) A filtered soln. of 33.2 g. KI in 100 cc. (3) Conc'd. HCl. (4) 0.2 g. of diamond fuchsin in 100 cc. of distd. water. (5) NaOH free from NH<sub>3</sub> of d. 1.35. (6) Gum arabic soln. prep'd. by heating 250 g. of the gum with 750 cc. of water on the water bath, with frequent shaking, until all the gum has dissolved; to the soln. add bone char and filter through a Seitz pressure filter. If this filter is not available, prep. a 12.5% soln. of gum arabic and filter through fritted glass. (7) Dissolve 4.177 g. of pure (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> in 1 l. of water to which a little dil. H<sub>2</sub>SO<sub>4</sub> has been added to prevent the formation of mold. *Procedure.*—Take sufficient material to yield 2-7 mg. of N. Weigh into a dry Kjeldahl flask which is

marked in the neck to indicate 250 cc., add 2 cc. of the 1%  $\text{H}_2\text{SO}_4$  soln. followed by 10 cc. of pure, concd.  $\text{H}_2\text{SO}_4$ . Digest with a small flame till the liquid is clear and then 10-15 min. longer. Cool, carefully add 100 cc. of distd. water, cool again, add 5 cc. of concd.  $\text{HCl}$ , shake well and add 0.2 cc. of the fuchsin soln. To accomplish the neutralization, place a funnel in the neck of the flask with its stem reaching to the bottom of the flask, add the  $\text{NaOH}$  so that it reaches the bottom of the liquid. About 10 cc. of the base will be required. First add about 30 cc., shake carefully, cool and complete the neutralization at  $15^\circ$ . To the cold, neutralized soln. add 10 cc. of 25% gum arabic soln. and mix well. In a small flask, mix 2 cc. of the  $\text{KI}$  soln. with about 15 cc. of  $\text{NaOH}$  and introduce this mixt. all at once into the Kjeldahl flask, rotating the contents well. Fill to the mark, mix and measure the color after 30 min. Each day prep. a soln. contg. 5 mg. of N in the same vol. for the colorimetric comparison.

W. T. H.

**Investigation of semimicro Kjeldahl methods.** J. A. Scarrow and C. F. H. Allen. *Can. J. Research* 10, 73-6 (1934).—Several methods of preliminary reduction, recommended for certain types of compds., were found difficult to adapt to semimicro work. A method of reduction, involving the use of  $\text{HI}$  and  $\text{P}$ , was developed for many such compds.

J. W. Shipley

**Nephelometry. II. Determination of phosphorus in steels and arsenic in arsenical copper.** Luigi Belladen, Ugo Scazzola and Renato Scazzola. *Ann. chim. applicata* 23, 517-21 (1933); cf. *C. A.* 28, 2083<sup>2</sup>.— $\text{P}$  in steel is detd. according to Kober and Egerer (*C. A.* 9, 2855) with a strychnine-molybdic acid precipitant, best prepd. as follows: Dissolve 6 g. of  $\text{Na}_2\text{CO}_3$  in 140 cc. of  $\text{H}_2\text{O}$ , gradually add 19 g. of  $\text{MoO}_3$  and heat till dissolved. Then add 50 cc. of concd.  $\text{HCl}$  and 20 cc. of 2% strychnine sulfate soln. This reagent remains stable for a long time. Det. As in alloys by the method of Kleiman and Pangritz (*C. A.* 22, 1743), but use the strychnine-molybdic acid reagent instead of the cocaine deriv.

A. W. Contieri

**Improvements on Winkler's method for determining oxygen in sea water.** Zinziro Nakai. *Bull. Fishery Expt. Sta. Gov.-Gen. Chosen.*, Ser. D, No. 3, 25-42 (1933).

The chief improvements are the use of 100-cc. samples obtained by dissolving  $\text{Mn}(\text{OH})_2$  ppt. by  $\text{HCl}$ , the use of reagents of standard strength and vol. for standardizing  $\text{Na}_2\text{S}_2\text{O}_3$  soln. and the use of a table for conversion of titrated values to O values. A comparison of different methods of standardizing  $\text{Na}_2\text{S}_2\text{O}_3$  soln., showed that Volhard's method gave a variation of 4-7%, while those of Winkler-Bjerrum, Krogh or of N. gave only 0.4% variation. Some experiments on Winkler's method for determining oxygen in sea water. *Ibid.* 43-8.—A few helpful suggestions are given. Method of determining oxygen in sea water adopted in our station. *Ibid.* 49-62. A detailed description of the method.

Nao Uyey

**Phenanthroline-ferrous ion. III. A silver reductor.** The direct determination of iron in the presence of vanadium. Geo. H. Walden, Jr., Louis P. Hammett and Sylvan M. Edmonds. *J. Am. Chem. Soc.* 56, 350 3 (1934); cf. *C. A.* 28, 1302<sup>8</sup>.— $\text{Ag}$  in  $M$   $\text{HCl}$  produces  $\text{Fe}^{++}$  and  $\text{V}^{++}$  without reducing  $\text{Ti}^{+++}$ . The  $\text{Fe}^{++}$  can then be titrated in 5  $M$   $\text{H}_2\text{SO}_4$  with  $\text{Ce}(\text{SO}_4)_2$  soln., phenanthroline-ferrous ion being used as indicator.

L. P. H.

**Titration of 30% hydrogen peroxide.** M. Travers. *Mém. comm. corrosion aéro.* 1930-31, 225 6; *Chimie & industrie* 30, 791-2.—A detailed description of the technique of its titration by the  $\text{KMnO}_4$  method.

A. P.-C.

**Properties of the chlorides of sulfur. VI. Chemical analysis.** A. Herbert Spong. *J. Chem. Soc.* 1933, 1547 51; cf. *C. A.* 25, 2615.—An iodometric method for total Cl in mixts. contg.  $\text{S}_2\text{Cl}_2$  is described which is fairly accurate. Free Cl is removed by  $\beta$ -naphthyl ethyl ether. The following disoccn. occurs:  $2\text{SCl}_2 \rightleftharpoons \text{S}_2\text{Cl}_2 + \text{Cl}_2$ . However,  $\text{S}_2\text{Cl}_2$  is itself disoccd. possibly as follows:  $3\text{S}_2\text{Cl}_2 \rightleftharpoons \text{S}_3\text{Cl}_2 + \text{S}_2\text{Cl}_2$ .

M. McMahon

**Detection of nitrate, nitrite and nitrosylsulfuric acid by the formation of resorufin, orcinol and indophenols.** Hermann Richler. *Z. anal. Chem.* 96, 17-21 (1934).—

By treating a nitrate or nitrite with concd.  $\text{H}_2\text{SO}_4$ , nitrosylsulfuric acid is formed which gives strongly colored compds. with phenols such as resorcinol, phenol or thymol. To a small quantity of the nitrate or nitrite, add 1-2 cc. of a soln. of 0.5-0.6 g. resorcinol in 100 g. of  $\text{H}_2\text{SO}_4$  which is free from nitrosylsulfuric acid, and then, when any effervescence is over, heat till a violet coloration results or  $\text{SO}_2$  vapors are involved. Cool, dil. with 5-10 cc. of water and neutralize with  $\text{Na}_2\text{CO}_3$ . Instead of the resorcinol, 0.4-0.5 g. of orcinol can be used and a red coloration will result.  $\text{Fe}^{+++}$ , sulfides and oxidizing agents interfere with the test. In such cases it is best first to heat for some time with concd.  $\text{H}_2\text{SO}_4$ , add solid resorcinol to the cold acid until a blue coloration is produced and then heat until the violet color results. In some cases, the oxidizer can be removed by pptg. with  $\text{Pb}(\text{OAc})_2$  soln. To detect nitrate in the presence of nitrite, make the  $\text{pH}$  about 3, evap. to dryness (with  $\text{NH}_4\text{Cl}$  if necessary) and test the residue as above. The test may also be used to detect nitrosylsulfuric acid in com.  $\text{H}_2\text{SO}_4$ . 0.02 mg. of  $\text{NaNO}_2$  gives the test.

W. T. H.

**Rapid method for the accurate determination of minute quantities of nitrite.** G. Gopala Rao and K. Madhusudan Pandalai. *Analyst* 59, 99 100 (1934). Place 20 ml. of the nitrite soln. in a 250-ml. flask contg. about 4 g. of  $\text{NaHCO}_3$ , 5 ml. of 10%  $\text{KI}$  soln. and a little starch soln. Pass pure  $\text{CO}_2$  through the reaction mixt. to remove all dissolved O and to free the flask from O. Then, after about 10 min., add 10 ml. of 5 N O-free  $\text{H}_2\text{SO}_4$  and titrate the liberated I with freshly prepd. 0.002 N  $\text{Na}_2\text{S}_2\text{O}_3$  soln.

W. T. H.

**A simple microincineration method and determination of calcium in organs.** József Erdős. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 391-6 (1933).—The use of fuming  $\text{HNO}_3$ , satd.  $\text{NH}_4\text{NO}_3$  and 30%  $\text{H}_2\text{O}_2$  is advocated for destroying the org. matter in 0.2-0.3 g. of organ pulp or 40-80 mg. of dry material. The indirect detn. of Ca as oxalate by titration with  $\text{KMnO}_4$  or by adding an excess of the latter and detg. the excess iodometrically is explained.

S. S. de Finály

**Determination of antimony in viscera and excreta.** Frank Bamford. *Analyst* 59, 101-2 (1934).—To the finely cut material in a  $\text{SiO}_2$  dish, add sufficient  $\text{MgO}$  to make the reaction basic. Cover with a satd. soln. of  $\text{Mg}(\text{NO}_3)_2$  (35-40 ml. for 100 g. of sample). Heat on the sand bath until the stirred mass is well charred and has begun to whiten. Crush with a pestle and heat until perfectly white. If necessary mix the ash with  $\text{NH}_4\text{NO}_3$  and heat again. Moisten the cold ash with water and add sufficient  $\text{HCl}$  to dissolve the  $\text{MgO}$  and give a distinctly acid reaction. Dil. with water and sat. with  $\text{H}_2\text{S}$ . Filter, wash as usual and dissolve the  $\text{Sb}_2\text{S}_3$  ppt. in concd.  $\text{HCl}$ . Dil. with water and filter again if necessary. Add 1 ml. of 5% gum arabic soln. to each 100 ml. of soln. and make up to a definite vol. Pass  $\text{H}_2\text{S}$  through the soln. and compare the orange color in a Duboscq colorimeter with that of a standard  $\text{Sb}$  soln. of approx. the same concn.

W. T. H.

**General method for determining sulfur in organic materials.** Ernest Kahane and Marcelle Kahane. *Compt. rend.* 198, 372-5 (1934).—The method depends upon oxidizing the S to sulfate by means of  $\text{HClO}_4$ ,  $\text{HNO}_3$  and a little  $\text{HIO}_3$ . Thus for 0.1-0.2 g. of material 2 cc. of a mixt. of 2 parts  $\text{HClO}_4$  (d. 1.61) and 1 part  $\text{HNO}_3$  (d. 1.35) was used. A long-necked Kjeldahl flask is recommended for the digestion. In the top of the flask there is provided a ground-glass connection with a bubble tube contg.  $\text{HIO}_3$ . During the digestion, the bubble tube rests in a bath of cold water. The  $\text{HIO}_3$  serves to absorb and oxidize any volatile S compd. such as  $\text{H}_2\text{S}$  that might otherwise be lost. After the oxidation has been accomplished, the bubble tube is rotated  $180^\circ$  and its contents is thereby caused to flow into the flask. The mixt. in the flask is then heated until fumes of  $\text{HClO}_4$  are evolved,  $\text{HIO}_3$  is then reduced by  $\text{NaI}$ , hydrazine or formalin, most of the acid is neutralized with soda and the sulfate is pptd. by adding  $\text{Ba}^{++}$ . The method is said to give good results with such diverse substances as  $\text{ZnS}$ , free S,  $\text{Na}_2\text{S}_2\text{O}_3$ ,

$\text{NH}_4\text{CNS}$ , sulfanilic acid, camphorsulfonic acid, saccharin, thiourea, allylthiourea, *p*-tolyl sulfide, triphenylphosphine sulfide, cysteine, sulfonal, triethylthionium chlorides, tritylthionium chloride and rubber. W. T. H.

**Modified micro method of determining methoxyl and ethoxyl groups.** Homi Ruttonji Nanji. *Analyst* 59, 96-8 (1934).—The method, for which a specially designed app. is shown, depends in the first place upon the formation of alkyl iodide by heating the allyloxyl compd. with HI. The alkyl iodide is then treated with Br water, whereby  $\text{HIO}_3$  is formed. The excess Br is removed by means of phenol, the iodate is caused to react with KI soln. and the liberated I is titrated with 0.01 N  $\text{Na}_2\text{S}_2\text{O}_3$  soln. The procedure was tested with vanillin, grape fruit pectin, com. citrus pectin and hydrated quinine and found to give good results. W. T. H.

**Determination of the methoxy groups in pectin.** Giovanni Romeo. *Ann. chim. applicata* 23, 530-4 (1933).—The MeO content of pectin may be detd. rapidly as follows: Dissolve 1.0 g. of pectin in 250 cc. water; heat to hasten soln. Replace  $\text{H}_2\text{O}$  lost by evapn., cool to  $20^\circ$ , neutralize with 0.5 N NaOH with phenolphthalein as indicator. Add 20 cc. 0.5 N NaOH, stir, let stand 15 min. Then add 20 cc. 0.5 N  $\text{H}_2\text{SO}_4$  and titrate excess acid with NaOH. 1 cc. 0.5 N NaOH corresponds to 0.0155 g. MeO. The results agree very well with those obtained by the Zeisel method. A. W. Contieri

**Detection of nitrobenzene and of phenol by the formation of resorufin.** Hermann Eichler. *Z. anal. Chem.* 96, 21-2 (1934).—Heat a little of the substance with resorcinol and  $\text{H}_2\text{SO}_4$  to a violet coloration or until  $\text{SO}_2$  fumes are evolved. Cool, dil. with water and neutralize with  $\text{Na}_2\text{CO}_3$ . Phenol, when heated with nitrobenzene in concd.  $\text{H}_2\text{SO}_4$ , also yields resorufin. W. T. H.

**Reactions of certain phenols with antimony pentachloride.** Lad. Ekkert. *Pharm. Zentralhalle* 75, 49-50 (1934).—The essential colors developing on the addn. of a  $\text{CHCl}_3$  soln. of  $\text{SbCl}_5$  are: with PhOH, orange red; *o*-cresol, rusty brown; *m*-cresol, orange red; *p*-cresol, red brown; thymol, brownish yellow to rusty brown; carvacrol, brown red to garnet red; guaiacol, light brown to olive brown, deep green, blue green and finally deep blue; creosote, garnet to deep wine red; creosotal-Heyden, yellowish to brownish flesh color; guaiacol carbonate, lemon to S-yellow; K sulfoguaiacolate, no color; pyrocatechol, deep blue; resorcinol, orange to yellow brown; hydroquinone, faint yellow; orcinol, brownish yellow to rusty brown; pyrogallol, carmine red to deep garnet; phloroglucinol, no color;  $\alpha$ -naphthol, carmine red to deep red, reddish brown and almost black;  $\beta$ -naphthol, brownish red; morphine, brownish red; apomorphine, wine to ruby red. W. O. E.

**Reactions of certain phenols with alkali arsenate in concentrated sulfuric acid.** Lad. Ekkert. *Pharm. Zentralhalle* 75, 50-1 (1934).—The reagent K or Na arsenate in concd.  $\text{H}_2\text{SO}_4$  gives with PhOH no change but on heating, brown; *o*-cresol, bright rose to flesh color and gray, on heating liver red to brown; *m*-cresol and *p*-cresol same as *o*-cresol; thymol, scarlet to deep rose red and violet; carvacrol, red to rusty brown; guaiacol, greenish blue to blue, on warming deep green; creosote, deep olive green, on warming garnet brown; pyrocatechol, deep blue; resorcinol, bright yellow to brown; hydroquinone, rose to flesh color, olive brown and deep green on heating; orcinol, pale yellow, on warming yellow to bright brown; pyrogallol, golden yellow; phloroglucinol, lemon yellow to deep green;  $\alpha$ -naphthol, grass green fading with heat, deep green on cooling;  $\beta$ -naphthol, saffron to dichromate yellow, after 10-15 min. liver color; morphine, blue to violet or green; apomorphine, codeine and Et morphine, dark blue. W. O. E.

**Detection and estimation of methyl mercaptan and carbon disulfide in air containing hydrogen sulfide.** J. F. Reith. *Rec. trav. chim.* 53, 18-23 (1934) (in English).—In studying the gas drawn from the spinning rooms of a rayon factory, a study was made of methods for detg.

1  $\text{CH}_3\text{SH}$  and  $\text{CS}_2$  in air contg.  $\text{H}_2\text{S}$ . It was found necessary first to carry out a sepn. by means of solid  $\text{Pb}(\text{OAc})_2$ . The gas is drawn through a series of 4 wash bottles. The first 2 are Jena wash bottles with glass filter No. 83 G. 1 and contain 20 cc. of 0.5 N NaOH. The next 2 are very small with gas dispersers and each contains 2 cc. of NaOH in EtOH. After the absorption, unite the contents of the first 2 wash bottles, add 4 cc. of 25% HCl and connect to the app. for detecting mercaptan. This consists of 2 tubes (20 X 9 cm.) connected with a ground joint. The first contains  $\text{CaCl}_2$  and the second contains fine  $\text{Pb}(\text{OAc})_2$  (about 20 g.). This second tube is connected with a small wash bottle contg. 1 cc. of isatin- $\text{H}_2\text{SO}_4$  (10 mg. in 100 cc.  $\text{H}_2\text{SO}_4$  prepd. fresh every day). Draw air slowly through the app. for 30 min. The  $\text{H}_2\text{S}$  is absorbed by the Pb salt and the mercaptan colors the isatin reagent a grass green. If desired the quantity of mercaptan can be estd. colorimetrically (0.005-0.1 mg. with an accuracy of about 0.01 mg.). Pour the contents of wash bottles 3 and 4 of the first app. into a beaker and rinse them out with 2.5 cc. of 4 N AcOH, then with 10 cc. of  $\text{Cu}(\text{OAc})_2$  soln. (0.92 mg. in 250 cc. of soln.). After at least 2 hrs. filter off the cuprous xanthogenate ppt. in a 3 G 4 glass filtering crucible and wash with not over 25 cc. of water. The formation of the yellow ppt. is proof of the presence of  $\text{CS}_2$ . The quantity present can be calcd. by detg. its Cu content iodometrically as follows: Place the crucible contg. the ppt. on a 25-cc. fractionating flask, add 0.5 cc. of 4 N AcOH and 4 drops of fresh satd. aq.  $\text{Br}_2$  to the ppt. and cover with a watch glass. After 5 min. connect with suction, add 4 drops more of aq.  $\text{Br}_2$  and filter after 5 min. This serves to dissolve the yellow ppt. Wash the filter till the total vol. of filtrate is 10 cc. and mix with 0.5 cc. of 5% phenol soln. to remove excess  $\text{Br}_2$ . After 5 min. add 2.5 cc. of N KI and titrate the liberated  $\text{I}_2$  with 0.01 N  $\text{Na}_2\text{S}_2\text{O}_3$ , of which 1 cc. = 1.52 mg. of  $\text{CS}_2$ . W. T. H.

**Determination of tyrosine by bromination.** Michele Bonicatti. *Boll. ufficiale staz. sper. seta* 3, 66-9 (1933).—The method of Millar (cf. Brown and M., *J. Chem. Soc.* 89, 145 (1906)) is modified as follows: To the acidified (HCl) soln. contg. tyrosine add 5 cc. of 20% NaBr soln. and 0.1 N  $\text{NaBrO}_3$  soln. until a distinct yellow color is reached. Let stand 2 hrs., add an excess of KI, and titrate the liberated  $\text{I}_2$  with  $\text{Na}_2\text{S}_2\text{O}_3$ . The reaction is disturbed by the presence of tryptophan and phenylglycine. G. A. Bravo

**Titrimetric determination of hydroxylamine salts.** László Urbanek. *Mezőgazdasági Kutatások* 6, 334-7 (1933).—Dissolve 0.1-2 g. salt in water, add 1-2 cc. neutral acetone and titrate with 0.05 N NaOH with methyl red as indicator. S. S. de Finály

**Detection of Pb (Harwood, Brophy) 11B. Reaction for Be in minerals and rocks (Zermatten) 8. Rotatory dispersion of sparteine in aq. soln. [detn. of sparteine] (Lapp, Zalc) 10.**

**Andant, A.:** Application de l'effet Raman et de l'absorption ultraviolette à l'identification des carbures d'hydrogène. Paris: Gauthier-Villars & Blondel la Rougery. 76 pp. F. 25.

**Jander, G., and Pfundt, O.:** Leitfähigkeitstiteration und Leitfähigkeitsmessung. Visuelle und akustische Methoden. 2nd ed., revised. Stuttgart: F. Enke. About 100 pp. About, M. 7.80; bound, about, M. 9.30.

**Jungmichel, Gottfried:** Alkoholbestimmung im Blut. Methodik und forensische Bedeutung. Berlin: C. Heymann. 124 pp. M. 6.

**Mourice, A.:** Cours d'analyse quantitative des produits des industries chimiques. Paris: Dunod & Cie. 804 pp. F. 85.

**Wijk, W. E. van:** Inleiding tot de Beoefening der anorganische kwalitatieve Analyse. 2nd ed. The Hague: J. B. Wolters. 36 pp. Fl. 0.75.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIKER

**Photophosphorescence in minerals.** W. L. Brown. *Univ. Toronto Studies, Geol. Ser. No. 35*, 19-35 (1933).—Luminescent properties were tested by exposure to sunlight, ultra-violet and infra-red (heat) radiations. Fluorescence under ultra-violet and photophosphorescence from sunlight proved to be sep. phenomena. Photophosphorescence reached a max. at definite exposure times, and the greater the percentage of longer wave lengths the shorter the time. The relative intensity of phosphorescence in fluorite is dependent on distribution of spectral energy but is modified by selective absorption. The wide range of wave lengths producing photophosphorescent activity and the continuity of photophosphorescence and thermoluminescence are indicated. The fluorescent colors of a no. of minerals are listed. A. M. Brant

**A reaction for beryllium in minerals and rocks.** H. L. J. Zermatten. *Proc. Acad. Sci. Amsterdam* 36, 899-900 (1933).—The powd. mineral is fused in a bead of NaKCO<sub>3</sub> which is then powdered in a black drop-plate. It is dissolved in 3 drops 5 N HCl, and 1 drop of satd. MeOH soln. of morin (C<sub>18</sub>H<sub>10</sub>O<sub>7</sub>·2H<sub>2</sub>O) is added. Four drops of 5 N NaOH produce a clear yellow-green fluorescence if Be is present. On a white background the color is chromate yellow. The color disappears when the soln. is slightly acidified with 5 N HCl or 30% AcOH, or changes to a blue-green fluorescence indicating Al, Mg, Li, Ca, Sr, Ba, Ti, Zr, La, Dy, Ce, Y and Th react neg. to the above test for Be. A. M. Brant

**Structure of hessite.** László Tokody. *Matematik. Természettud. Értesítő* 49, 325-34 (1932).—A hessite from Transylvania contained: Ag 59.41, Au 4.73, Te 35.97, Fe trace, sum 100.11%. Two modifications were observed, the monoclinic stable state becoming cubic at 150°. Its structure shows the monoclinic symmetry. S. S. de Finály

**Colusite, a new mineral of the sphalerite group.** Robert E. Landon and A. H. Mogilnor. *Am. Mineral.* 18, 328-33 (1933).—Colusite occurs in Cu veins at Butte, Montana, assocd. with pyrite, tetrahedrite, bornite, chalcocite and quartz. It is a sulfide in which Cu, Fe, Sn, Mo and Zn are isomorphous, and As, Te and Sb are isomorphous with S. Colusite has a bronzy color; hardness = 3 to 4; sp. gr. = 4.2. Av. compn. is: Sn 6.64, Cu 35.82, Sb 0.58, As 2.50, Zn 0.90, Te 2.97, Mo 8.80, Fe 18.37, S 24.20, Cr and W trace, Mn none, sum 100.78%. The closely assocd. tetrahedrite and colusite have a texture which is the result of unmixing. A. M. Brant

**X-ray examination of colusite (Cu,Fe,Mo,Sn)<sub>4</sub>(S,As,Te)<sub>3</sub>.** W. H. Zachariassen. *Am. Mineral.* 18, 534-7 (1933).—X-ray examn. shows that colusite is cubic with the edge of the unit cube 5.304 ± 0.001 Å. The at. arrangement is essentially that of sphalerite with about a fourth of the S atoms removed at random. A. M. Brant

**Vein-like masses of pyrrhotite in chalcopyrite from the Waite-Ackerman-Montgomery mine, Quebec.** John S. Stevenson. *Am. Mineral.* 18, 445-9 (1933); cf. *C. A.* 26, 5879. —Narrow hair-like areas of pyrrhotite have the appearance of veins, but are simple crystals and occur only between chalcopyrite crystals, so they must have formed by unmixing. A. M. Brant

**Opal deposits in the southern part of Hargita.** János Rúnyai. *Matematik. Természettud. Értesítő* 49, 196-201 (German 202-3) (1932).—These deposits are explained by rhythmical diffusion deposition. S. S. de Finály

**Coronadite "redivivus."** Waldemar Lindgren. *Am. Mineral.* 18, 548-50 (1933); cf. *C. A.* 26, 5878. —New data on this mineral from a find in Morocco indicate the formula 2MnO<sub>2</sub>·PbO. In polished section it is galena-white in color and shows a granular to fibrous structure. The reflectivity is high. It is strongly anisotropic with dark brown to gray colors. Comparative analyses of Arizona and Morocco material are given. A. M. Brant

**Tilleyite, a new mineral from the contact zone at Crestmore, California.** Esper S. Larsen and Kingsley C.

Dunham. *Am. Mineral.* 18, 460-73 (1933).—Tilleyite is closely assocd. with wollastonite in metamorphosed limestone. Its compn. is: SiO<sub>2</sub> 24.09, Al<sub>2</sub>O<sub>3</sub> 0.61, Fe<sub>2</sub>O<sub>3</sub> 0.12, MgO 0.43, CaO 57.75, H<sub>2</sub>O 1.09, CO<sub>2</sub> 15.82, sum 99.91%. The suggested formula is 3CaO·SiO<sub>2</sub>·CO<sub>2</sub>. Tilleyite is biaxial + with α = 1.617, β = 1.635, γ = 1.652; 2V large; monoclinic with Y = b and XAc = 18°; cleavage (100); sp. gr. = 2.838. A. M. Brant

**A chemical and optical study of piedmontite from Shadow Lake, Madera County, California.** Allan M. Short. *Am. Mineral.* 18, 493-500 (1933).—The compn., recalcd. to allow for quartz impurity, is: SiO<sub>2</sub> 35.26, Al<sub>2</sub>O<sub>3</sub> 23.50, Fe<sub>2</sub>O<sub>3</sub> 4.65, MgO 0.21, CaO 22.73, H<sub>2</sub>O 1.37, TiO<sub>2</sub> 0.12, Mn<sub>2</sub>O<sub>3</sub> 12.13, sum 99.97%. A graph of published analyses indicates that the sesquioxides of Al, Fe and Mn mutually replace each other and that MnO and MgO probably replace CaO, the formula H(Ca,Mn,Mg)<sub>2</sub>(Al,Mn,Fe)<sub>2</sub>·Si<sub>2</sub>O<sub>3</sub> best representing these relations. The Madera County piedmontite has the pleochroism X = lemon yellow to orange, Y = amethystine red, Z = carmine. α = 1.7385, β = 1.7649, γ = 1.7985; 2V 64° to 75°. Recorded optical data in relation to Mn<sub>2</sub>O<sub>3</sub> content are shown graphically. A. M. Brant

**Paulopost stilbite in the Camas Land sill, Chelan County, Washington.** Walter M. Chappell. *Am. Mineral.* 18, 440-4 (1933).—The stilbite occurs in quartz-bearing gabbro and diabase, interstitially and also penetrating plagioclase. Residual liquids are thought to have caused a re-soln. of the plagioclase, with crystn. of stilbite and quartz. It is optically — with α = 1.487, β = 1.498, γ = 1.500; 2V = 48°; XAc = 7°. A. M. Brant

**A large monazite crystal from North Carolina.** Waldemar T. Schaller. *Am. Mineral.* 18, 435-9 (1933).—The crystal measures 0.5 × 9.5 × 11 in. and weighs 58.75 lb. Crystallographic features are described. Monazite from this locality contains 5-7% ThO<sub>2</sub>. A. M. Brant

**A study of some Canadian apatites.** A. S. Dadson. *Univ. Toronto Studies, Geol. Ser. No. 35*, 51-9 (1933).—Chem. analyses are given for 5 specimens from various localities, 2 terminated with pyramid and base, 3 with pyramid only. These agree fairly well with the usual formula and show no reason for the difference in crystal habit. Numerous inclusions are present. ε = 1.628-1.637, ω = 1.634-1.642, the highest values in a crystal with high Cl content. A. M. Brant

**Ammonioborite, a new mineral.** Waldemar T. Schaller. *Am. Mineral.* 18, 480-92 (1933).—The mineral is from Larderello, Italy. It is granular, white and lustrous, and is closely assocd. with sassolite. Optical and x-ray data indicate differences from larderellite, but the chem. compn. is similar, so that they seem to be dimorphous forms of (NH<sub>4</sub>)<sub>2</sub>O·5B<sub>2</sub>O<sub>3</sub>·5H<sub>2</sub>O. Ammonioborite crystals are platy, with α = 1.470, β = 1.487, γ = 1.540. A. M. Brant

**Stability relations of a Colorado planite (cuprian melanterite).** Edwin B. Eckel. *Am. Mineral.* 18, 449-54 (1933).—The mineral showed α = 1.473, β = 1.478, γ = 1.483. Its compn. is approx. 2[FeSO<sub>4</sub>·7H<sub>2</sub>O]·[(Cu,Zn)SO<sub>4</sub>·7H<sub>2</sub>O]. Over H<sub>2</sub>SO<sub>4</sub> solns. of known humidity at 22°, the 7H<sub>2</sub>O compd. was found to be stable in relative humidities from about 80 to 44%. 2H<sub>2</sub>O mols. were lost at 30%, and the 5H<sub>2</sub>O compd. was stable down to about 5% relative humidity. Near zero humidity 4H<sub>2</sub>O were lost to form the monohydrate. A. M. Brant

**Artificial jarosites—the separation of potassium from cesium.** J. G. Fairchild. *Am. Mineral.* 18, 543-7 (1933).—Artificial jarosites of K, Rb, Ag and Pb were prepd. by heating the resp. sulfate solns. with a soln. of Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> in sealed glass tubes at 110-80°. At steam-bath temp. it was found that Rb and Cs were taken up by the K jarosite mol. in but small amt. Chem. and optical data are given for the artificial jarosites. A. M. Brant

**Sulfosalite and other minerals from the Otjwalundo Salt Pan, South West Africa.** Wm. F. Foshag. *Am.*

- Mineral.* 18, 431-4 (1933).—Sulfohalite, pirssonite, trona and thenardite are described. Chem. analysis of sulfohalite checked the theoretical values for the formula  $2\text{Na}_2\text{SO}_4 \cdot \text{NaCl} \cdot \text{NaF}$ . The mineral is isotropic and has dodecahedral habit;  $n = 1.455$ . A. M. Brant
- Tungstite.** T. L. Walker. *Univ. Toronto Studies, Geol. Ser.* No. 35, 13 11 (1933).—Microscopic examn. indicated one good cleavage with  $Bx_a$  normal to it and  $2E$  about  $26^\circ$ . The mineral appears to be orthorhombic. W. suggests making the cleavage (001) with  $Y = a$  and  $X = c$ . A. M. Brant
- Manganese deposit, Bombay.** H. E. Pyfe. *New Zealand J. Sci. Tech.* 15, 203-7 (1933).—The ore is a dense amorphous psilomelane ( $\text{H}_2\text{MnO}_4$ ) in which there are bands suggesting hausmannite ( $\text{Mn}_3\text{O}_4$ ). Analysis gave 78.72%  $\text{MnO}_2$  and 5.17%  $\text{MnO}$ . P. S. Roller
- The manganese minerals of the Sunnyside veins, Eureka Gulch, Colorado.** W. S. Burbank. *Am. Mineral.* 18, 513-27 (1933).—The Mn minerals were deposited during the third stage of a mineralization which is tentatively classed as mesothermal. Rhodonite predominates and has assocd. alabandite, alleghanyite, friedelite, helvite, rhodochrosite and tephroite in varied amt. The optical properties are included in the descriptions of the minerals. A. M. Brant
- The genesis of the Sanntal bauxites (Jugo-Slavia).** Emil Dittler and Othmar Kühn. *Chem. Erde* 8, 462-95 (1933).—The geology and mineralogy of the rock formations are described. The origin of the bauxite is in the weathering of andesite which had previously been altered by postvolcanic action. Unaltered, much younger Miocene andesite remained intact. A secondary mode of formation is in the deposition from solns. of Triassic limestone in contact with Al and Fe-bearing solns. derived from the andesite. The  $\text{Al}_2\text{O}_3$  is present mainly as the monohydrate, and its content varies from 59.34 to 74.43% dry basis. P. S. Roller
- The bauxite occurrence at Sümeg.** Tihamér Gedeon. *Földtani Közlöny* 63, 96 7 (1933).—Twenty-two analyses are published with a theoretical discussion. S. S. de Finály
- Microscopical examinations of Hungarian ores.** Ferenc Papp. *Földtani Közlöny* 63, 8 11 (1933).—Data for sedimentary and sulfidic ores are published. S. S. de F.
- Eruptive rocks of Mount Börzsöny.** Ferenc Papp. *Matematik. Természettud. Értesítő* 49, 431-62 (1932).—Data on 25 rock analyses and a detailed petrographic discussion of the area are given. S. S. de Finály
- Petrographic and geologic structure of Márianosztra and its environment.** Ferenc Papp. *Földtani Közlöny* 63, 62-95 (1933).—Detailed description with 10 chem. and numerous petrographical analyses. S. S. de Finály
- Importance of the mineral facies analysis in the interpretation of metamorphic rocks.** K. H. Scheumann. *Ber. Verhandl. sächs. Akad. Wiss. Leipzig, Math.-phys. Klasse* 84, 63-90 (1932).—A discussion of the article by Eskola (C. A. 15, 2605). Albert L. Henne
- The electrolyte content of two clays.** F. K. Schlinz. *Chem. Erde* 8, 504-6 (1933); cf. C. A. 27, 5689.—Treatment of 150 g. with 150 cc. 0.01 N  $\text{NH}_3$  and ultrafiltration gave for the electrolyte content, referred to dry wt. at  $105^\circ$ , 0.84% for a marine concretion-bearing clay and 0.21% for a glacial diluvial clay. The former possessed a higher content of particles less than 1 micron. The content of Ca, Mg, K, Na, Cl and sulfate is given for both. P. S. Roller
- Acid-resisting properties of some nonmetallic minerals of the northwest region.** A. I. Tzvetkov. *Mineral. Suir'e* 8, No. 10, 49-61 (1933).—The acid-resisting properties of quartzite, granite and diabase in this part of European Russia decrease in the order given. C. H.
- Chemical weathering and soil formation in Chile.** E. Blanck, A. Rieser and E. v. Oldershausen. *Chem. Erde* 8, 339-439 (1933).—The chem. compns. of the rocks, weathered rocks, and of the soil are given, and, in addn., for many samples the ext. with 10% HCl, the mech. analysis after Atterberg, and the hygroscopicity. The chem. weathering effects are different in the north from those in the south and middle Chile. For the desert region of north Chile, weathering is explained by the combination of high temp., atm. moisture and concd. alkali salt solns. The exceptions of desert weathering are ascribed to the high temp. P. S. Roller
- Radioactivity and compn. of the minerals and rocks Lurisia (Francesconi, Bruna)** 3.
- Asmanow, Assen:** Die bulgarischen Uranerze. Chemische Untersuchungen. Sofia: C. G. Danow. 76 pp. 40 lei.
- Frey, Robert:** Les analyses d'eaux et leur interprétation géologique. Rabat: Impr. officielle. 68 pp.
- Ore Deposits of the Western United States.** Edited by John W. Finch, et al. Dedicated to Waldemar Lindgren. New York: Am. Inst. Mining & Met. Engineers. 930 pp. \$6.50. Reviewed in *Eng. Mining J.* 135, 90 (1934).

## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

- Gold, silver, copper and lead in South Dakota and Wyoming.** Chas. W. Henderson. Statistical Appendix to Minerals Yearbook, 1932-33, *Bur. Mines* 31-7 (1933). Gold, silver, copper, lead and zinc in Montana. T. H. Miller. *Ibid.* 30-54. Gold, silver, copper, lead and zinc in New Mexico and Texas. Chas. W. Henderson. *Ibid.* 77 90 (1931). Gold, silver, copper, lead and zinc in Utah. C. N. Gerry and Paul Luff. *Ibid.* 91-102. Gold, silver, copper, lead and zinc in Idaho and Washington. C. N. Gerry and T. H. Miller. *Ibid.* 117-39. Gold, silver, copper, lead and zinc in Colorado. Chas. W. Henderson. *Ibid.* 141-62. Gold, silver, copper, lead, and zinc in Arizona. C. N. Gerry and T. H. Miller. *Ibid.* 187-97. Gold, silver, copper, lead and zinc in California and Oregon. V. C. Heikes and Charles W. Merrill. *Ibid.* 199-224. Ore concentration. Metallurgical results and flotation reagents. T. H. Miller and R. L. Kidd. *Ibid.* 225-38. Gold, silver, copper, lead and zinc in Nevada. V. C. Heikes and Charles W. Merrill. *Ibid.* 239 50. Alden H. Emery
- The aluminum industry in Scotland.** Geo. Boex. *Proc. Inst. Mech. Engrs.* (London) 125, 13-66 (1933). E. H.
- The mining industry in Roumania.** Ch. Berthelot. *Mém. compt. rend. soc. ing. civils France* 86, 458-519 (1933). A. Papineau-Couture
- Some methods of gold mining.** James Whitehouse. *Proc. Inst. Civil Engrs.* (London) 232, 1-46 (1931). A description of methods used at Witwatersrand, Africa. Ann Nicholson Hird
- Development of the industry of gold mining in Roumania.** Ch. Berthelot. *Génie civil* 103, 373-7 (1933). The limit of max. Au content is 8 g. of Au per ton. Amalgamation, cyanidation and flotation methods are used, but 65.4% of the Au is produced by amalgamation. Ann Nicholson Hird
- Oxidation of iron pyrites in a sand residue dump.** Jas. Gray. *S. African J. Sci.* 30, 196 7 (1933).—The Witwatersrand Au ore contains about 3% pyrites. Upon oxidation, various products were formed within old dumps. Analyses were made upon the following materials originating from 30-year old dump: (1) liquid draining from the base of the dump, (2) deposit of crystals on a river beach close by, (3) greenish deposit and (4) white deposit at the base of the dump. Sample (1) contained  $\text{SO}_2$  1412,  $\text{Al}_2\text{O}_3$  254,  $\text{Fe}_2\text{O}_3$  122,  $\text{FeO}$  568 parts 100,000. Sample (2) contained  $\text{SiO}_2$  and insol. 6.6%,  $\text{FeO}$  20.6,  $\text{SO}_2$  27.7 and 34% moisture. Sample (3) contained moisture 20.7.



SiO<sub>2</sub> and insol. 32.6, FeO 11.1 and SO<sub>2</sub> 21.7%. The whitish deposit contained moisture 11.8, SiO<sub>2</sub> and insol. 40.0, Fe<sub>2</sub>O<sub>3</sub> 7.5, FeO 5.6 and SO<sub>2</sub> 22.1%. H. E. M.

**Arsenic production of the Boliden Works.** A. G. Paul Palen. *Industriidningen Norden* 62, 2-5 and 15-17 (1934).—An illustrated review. At the present working rate the smelting and refining works of the Boliden mines in the North of Sweden produce 40-50,000 metric tons of As<sub>2</sub>O<sub>3</sub> a year. The only problem is to find new uses for this product. The ore has an av. analysis of 20 g. Au and 60 g. Ag per ton, and 1.8% Cu, 29% S, and 9.1% As; about 1000 tons of this ore are worked per day.

C. A. Robak

**Chemical investigation of the ancient metallic implements in the Orient. IV. The ancient Chinese copper implements. 3. The ancient Chinese bronze implements. 3. Supplementary note on the transition period between the copper and the bronze ages in China.** Tsurumatsu Dōno. *J. Chem. Soc. Japan* 55, 66-9 (1934).—Cf. C. A. 27, 3176, 3366. Continuation of previous works. From the results of chem. analysis of ancient implements the existence of copper and bronze ages has almost been confirmed.

T. Katsurai

**Modern cupola practice.** H. H. Shepherd. *Foundry Trade J.* 50, 99-101 (1934).

D. Schaaf

**Cupola linings.** J. C. Green. *Foundry Trade J.* 50, 102 (1934).

D. Schaaf

**Preventing porosity in nonferrous castings.** J. H. Cheetham. *Iron Age* 133, No. 6, 21-4; No. 7, 28-30, 72 (1934). The following agents are discussed in their relation to d., hardness and fluidity in nonferrous castings: P, B, Zn, Mn, Si, Al, Ni, Mg, Cu, Fe, Na<sub>2</sub>CO<sub>3</sub>, NaCl, Ca(OH)<sub>2</sub>, CaSO<sub>4</sub>, glass, borax, charcoal, NH<sub>4</sub>Cl, ZnCl<sub>2</sub>, NaHCO<sub>3</sub> and BaSO<sub>4</sub>.

Downs Schaaf

**Ferro-alloys in steel making.** C. H. Herty, Jr. *Blast Furnace Steel Plant* 22, 68-70 (1934).—Ferro-alloys are added to liquid steel for 1 or more of 5 purposes: (1) to make an alloying addn. to the steel, (2) to deoxidize the bath, (3) to ensure correct chem. analysis, (4) to "shape up" the slag and (5) to obtain hardenability, grain size, freedom from aging and the like.

Downs Schaaf

**Present-day problems of metallurgy.** Georg Masing. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div.* 104, 13-47 (1933). In the last 2 decades metallurgical research has drifted from the thermodynamic point of view, involving the study of constitutional diagrams, to the kinetic and crystallographic points of view. As illustrations, M. discusses the present status of 3 important fields of research: parting (or corrosion resistance) limits, aging and transformations in the solid state. The theories of Masing and of Borelius on continuous paths of reactive atoms in solid solns. from which parting limits may be calculated are discussed and the artificialities of the theory pointed out; recent observations by Graf on the orientation of Au films left on Au-Cu alloys after partial soln. are considered important. The formation of nuclei or "knots" upon age hardening is discussed. It is shown that aging at a higher temp. following partial aging at a lower temp. results in an initial softening; this is theoretically permissible on the basis of resoln. of small nuclei at the higher temp. M. takes up transformations in the solid state from the thermodynamic, kinetic and crystallographic points of view, and a rational classification is proposed. Some transformations may be regarded as homogeneous, as the formation of martensite, and some as heterogeneous, as the pptn. of CuAl<sub>2</sub> in duralumin.

C. L. Mantell

**Analysis of hard metal carbide theory.** Karl Schroeter. *Iron Age* 133, No. 8, 21-3, 61 (1934); cf. C. A. 28, 1639<sup>a</sup>.

E. H.

**Comparative studies on creep of metals using a modified Rohn test.** C. R. Austin and J. R. Gier. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* 544, 21 pp. (1934).—Data have been presented on elementary metals and com. alloys to illustrate how the temp.-time curves, obtained by means of a modified form of the Rohn test and resulting from plastic deformation, serve as a ready means of making comparisons of the creep charac-

teristics of metals at elevated temps. A convenient means of classification has been discussed whereby an approx. relationship is expressed between load-carrying capacity and temp. for any given metal. A series of curves for Fe, Ni and Co illustrates this method of sorting metals. The relationship between rate of creep and temp. with the 4 loads studied for Fe, Ni and Co indicates that the rate of creep increases much faster than temp. The effects of minute amts. of plastic deformation on resistance to further creep have been studied. In order to express the deformation-time data on the com. alloys in terms readily understood by those assoc. with results obtained by the conventional const.-temp. method, the data have been expressed in a series of curves illustrating the relationship between creep rate and temp. of test for const. load. Variation in load is represented in the different curves. In discussing the evaluation of the high-temp. strengths of the alloys, the importance of initial amt. of deformation on creep rate has been realized and taken into account. The information and analysis of data presented in the paper appear to substantiate the contention that this modified Rohn method of testing provides a valuable means of studying the high-temp. properties of materials.

C. L. Mantell

**Regeneration of exhausted sodium carbonate cementation mixture.** Kh. M. Akhazarian. *Vestnik Metallo-prom.* 13, 55-7 (1933); *Chimie & industrie* 30, 833.—The chemistry of the cementation reaction can be expressed by the equations:  $3Fe + 2CO = Fe_3C + CO_2$ ;  $CO_2 + C = 2CO$ . The latter reaction takes place only in the absence of H<sub>2</sub>O, which reacts with CO to give CO<sub>2</sub> and H<sub>2</sub>. The activity of cementation increases with the CO content of the gas. To produce CO<sub>2</sub>, 15-30% Na<sub>2</sub>CO<sub>3</sub> is added to the cementation mixt., its decompn. at high temp. liberating CO<sub>2</sub>. The regeneration of the exhausted mixt. is based on carbonation of Na<sub>2</sub>O in the air; to this end it is slightly moistened and allowed to stand in the air until the mass is covered with a white coating of Na<sub>2</sub>CO<sub>3</sub> crystals. Before use, the regenerated mixt. is dried and mixed with 10-15% sawdust or charcoal. Cementation mixts. contg. K<sub>2</sub>CO<sub>3</sub> or BaCO<sub>3</sub> instead of Na<sub>2</sub>CO<sub>3</sub> can be regenerated in the same way.

A. Papineau-Couture

**The technic of Parkerization and Bonderization.** O. Macchia, F. Moreno and G. Oddone. *Ind. Meccanica* 15, 866-8 (1933).—A detailed discussion of the technic, methods of operation and precautions which must be followed in securing optimum results in Parkerizing and Bonderizing.

F. D. Rossini

**Fatigue breaks.** A. Thum and H. Oschatz. *Metall-wirtschaft* 13, 1-8 (1934).—From the appearance of a fatigue fracture it is usually possible to det. what part of the fracture is due to fatigue and what part due to sudden breaking. In steel parts the fatigue fracture is smoother and finer grained than the sudden fracture, while in bronze parts it is usually the opposite. The fatigue fracture is often smooth because the 2 parts rub against each other after the fracture has started. Recent investigations indicate that when fatigue breaks start, slip-planes form in the crystals in the overstressed zone. In normal fatigue breaks the fracture takes place through the crystals, while in the presence of alkalies and some other corrosive media the fracture is intercryst. Fatigue fractures usually, but not necessarily, show the characteristic progressive lines which indicate the path along which the fracture proceeds. The typical forms of fractures due to tensile and compressive, single bending, double bending, circular and torsional stressing, with and without notches, are described. From the appearance of the fracture it is possible to draw conclusions as to type of stressing, the amt. of overstressing, the start of the fracture and how it progresses. Regardless of the type of stress the path of the fracture is always at right angles to the lines of force and is often not the shortest distance through the piece, but curved. The shape of the fracture can be used to det. the direction of forces and stresses in complicated shapes.

Six references.

C. E. Macfarlane

**Investigation of the causes of axle failures due to brittleness.** P. Yalovoi. *Stal* 3, No. 6, 89-90 (1933).—

The principal cause at the Dzerzhinskii plant was found to be variation of the Si and Mn content in the converter charge, this causing great heat which results in high O and N contents in the steel. H. W. Rathmann

**Can cracking be predicted?** Jean Chanzy. *Rev. mét.* 30, 543-51 (1933).—Improper cooling of steel during manuf. produces seams. Their removal by chipping leaves weakened zones which open into cracks and seams in subsequent hot working or heat treatment. The conclusions were reached by exptl. and statistical work. More seamy billets in a shipment correspond to a greater number of seamy forgings or cracked tools when the heat used is the same. In a lot of 15% W, 4.5% Cr steel, the no. of seamy billets and of cracked tools is a function of the variation in hardness of the lot. J. D. Gat

**Occurrence of irregularities in lead cable sheathing and their relation to failures.** W. H. Bassett, Jr., and C. J. Snyder. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div.* 104, 254-75 (1933).—A microscopic study was made of cable-sheath failures in service. Their causes can be classed, aside from corrosion, as mech. or structural. Photographs show various examples of service failures and the structure of the adjacent sheath. The method of study involved the microexamination of the failed sheath and the exptl. reproduction of similar defects and structures. Standard mill equipment was used. Photomicrographs show the type of weld responsible for split sheath, and how it was reproduced by dropping the Pb kettle temp. to 650°F. or by the excessive use of lubricants in the Pb container. Frequent examns. of cross sections throughout the pipe extruded by complete extrusion cycles were made for general structural irregularities. Variations in handling of the Pb and operation of the presses caused great differences in the structures noted. A series of 9 macrographs shows dross streaks obtained under normal operation of a press when care is not taken to prevent and exclude oxides. The majority of the dross was found in the 1st quarter and last 8th of the pipe. For contrast, the clean regular structure obtained when extreme care was taken to prevent and exclude oxides is shown. It is concluded that defective welds can be avoided by maintaining proper Pb temps., and avoiding excessive lubrication, and that most of the suboxide and all defects caused by inclusions of yellow oxide, dirt, etc., can be avoided by using good foundry practice in handling the Pb. C. L. Mantell

**Heat treatment with oxy-acetylene flame.** J. H. Critchett. *Metal Progress* 24, No. 6, 28-31 (1933).—Rail ends and massive parts are hardened by heating the surface to just above the crit. point and allowing the cold metal underneath to withdraw the heat and so quench. W. A. Mudge

**Tough, strong, permanent die castings.** D. L. Colwell. *Metal Progress* 24, No. 6, 19-23 (1933).—Zn-base die castings in automotive construction have the strength, toughness and permanency of brass castings. W. A. M.

**New process for forming metallic coatings on aluminum or aluminum alloys.** Ch. Boulanger. *Mém. comm. corrosion aéron.* 1930 31, 80-1; *Chimie & industrie* 30, 833.—Al can be electroplated with Cu or Ni under definite conditions, but the use of the elec. current is not indispensable for plating with metals below Al in the e. m. f. series. Coating is effected by the use of solns. of double or complex cyanides obtained by dissolving oxides, carbonates, phosphates, oxalates, etc., of the resp. metals, or their simple or complex cyanides, in Na, K or NH<sub>4</sub> cyanide or in a mixt. of these. Soln. can be facilitated by addn. of NaOH, KOH, NH<sub>4</sub>OH or alkali carbonates. The coating is obtained by simple immersion of the objects at a variable temp. and at various concns. The coating, which generally requires 15-20 min., ceases with the evolution of gas; its thickness depends on the time of reaction. The coatings are adherent and can be superposed by successive action of solns. of simple cyanides, or can be obtained simultaneously in a single reaction by the use of a complex cyanide. The whole or any part of a given surface can be coated. Only a rather thin coating can be produced. A. Papineau-Couture

**Information for the user about chromium plate.** Marvin J. Udy. *Metal Progress* 24, No. 6, 24-7 (1933).—Hard coatings require hard steel backing and a fine polish to give a low coeff. of friction. Elec. cond., heat cond., reflecting power, oxidation and corrosion properties are given. W. A. Mudge

**Chlorate stains.** H. Krause. *Oberflächenstech.* 11, 1-4 (1934); cf. *C. A.* 26, 4571.—Solns. contg. KClO<sub>3</sub> or NaClO<sub>3</sub> for coloring Cu and its alloys are reviewed, their chem. action is explained and application and tints obtained are described. M. Hartenheim

**Electrolytic degreasing and the limits of its applicability.** K. W. Froehlich. *Mitt. Forschungsinst. Probieramt Edelmetalle* 7, 111-20 (1934).—Certain irregularities and defects which were met in the plating of material which was formerly degreased by electrolytic process are investigated. Especially Cu and Ag surfaces were subject to failures, and certain impurities were found to be the reason. Local development of spongy metal by H in the electrolytic process, impurities of O and P in Cu and Ag (Cu<sub>2</sub>O and Cu<sub>3</sub>P) are responsible. These conditions are discussed. If alloys (contg. such impurities) are first immersed in a 10% boiling soln. of KCN, Cu<sub>2</sub>O and Cu<sub>3</sub>P are dissolved and a silver film is formed and electrolytic degreasing can be applied. The same trouble was, however, not observed with Ni or Cu plating even if the same impurities were present. A no. of etchings illustrate the conditions. M. Hartenheim

**Materials for modern cutting tools.** J. V. Emmons. *Metal Progress* 24, No. 6, 35-40 (1933).—Plain C tool steel is still preëminent for cutting non-abrasive material where the service does not heat the tools. Deeper and faster cutting requires high-speed steels. Abrasive objects require diamonds or cemented carbides. Certain alloys of Fe, Co, W and Mo, in which C is non-essential, are useful for special cases. It is improbable that any single tool material will dominate the field in the future. W. A. Mudge

**Notes on the aging of metals and alloys.** Albert Sauveur. *Trans. Am. Soc. Steel Treating* 22, 97-113 (1934).—The Brinell ball hardness test is used as a means of producing cold-work deformation, and aging is detd. at the bottom of the depression by the Rockwell test. Pure metals, duralumin, Fe-C alloys and steels are included. Aging may take place in the quenching bath and also during cold working when less subsequent aging is to be expected. In com. steel, C is chiefly responsible for aging of ferrite; N, when present in unusually large proportion, greatly intensifies aging; the part played by O<sub>2</sub> is in doubt. W. A. Mudge

**Several measures toward eliminating local elements in the working of aluminum.** H. Röhrig. *Korrosion u. Metallschutz* 9, 332-4 (1933).—The importance of removing heterogeneous constituents from the surface by pickling or tooling is emphasized. Leopold Pessel

**The M. B. V. surface treatment for aluminum and its alloys.** Gustav Eckert. *Foundry Trade J.* 49, 281-2 (1933).—The corrosion resistance of Al and its alloys is improved for certain conditions by treatment in a dil. soln. of Na<sub>2</sub>CO<sub>3</sub> and Na<sub>2</sub>CrO<sub>4</sub>. Downs Schaaf

**Internal stresses in quenched aluminum and some aluminum alloys.** L. W. Kempf, H. L. Hopkins and L. V. Ivanso. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* 535, 23 pp. (1934).—The conditions utilized commercially in the heat treatment of Al alloy castings and forgings are such as to produce in simple shapes stresses of the same order of magnitude as the errors of the methods used in this investigation. Under extreme conditions, involving the quenching in ice water of heavy sections from temps. considerably above those used in ordinary practice, stresses of the same order of magnitude as the yield strength of the alloy may be induced in the heat-treated product. The magnitude of stresses induced by heat treatment is influenced by the mech. and phys. properties of the alloy, the rate of cooling and the vol. and geometry of the specimen. Stresses in simple shapes are compressive in the surface and tensile at the center of the specimen. In cylindrical specimens the

longitudinal stresses are of a higher order of magnitude than the tangential and radial stresses which are about equal at the center of the specimen. To bring about in relatively short periods of time a substantial reduction in internal stress, reheating to temps. in excess of about 500°F. is necessary.

**The velocity of solution, the solvent and the lattice forces in copper single crystals.** R. Glauner. *Oberflächentechn.* 19, 282(1933).—To find the laws according to which metallic single crystals are dissolved (as function of velocity in crystallographic directions and chem. nature of solvent) is of great importance for elucidation of corrosion phenomena. Single crystals of metals baser than H do not show a great difference of soln. velocity in the different crystal directions, but in metals nobler than H this is different. The mechanism of soln. was investigated on single crystals of Cu. The temp. coeff. of velocity of soln. is much greater than that of diffusion velocity; this is explained as due to surface forces emanating from the crystal lattice.

**Method to determine copper and nickel plate thickness on steel, brass and zinc die castings.** Fred Carl. *Metals & Alloys* 5, 39-42(1934).—See C. A. 27, 5702. D. S.

**Some causes of variation in hardness of gold-copper castings.** Harry H. Asher and John A. Comstock. *J. Dental Research* 13, 407-13(1933).—Variations in hardness may be due to formation of cavities (blowholes and shrinkage pipes), differences in compn. of Au-Cu solid solns. and pptn. of definite Au-Cu compds. In Au-Cu alloys contg. 0-83% Au by wt., the center of the crystallite is richer in Cu than the periphery; in alloys contg. 82-100% Au, the distribution is reversed. The hardest compd. has the compn. CuAu. Pptn. hardness is a very small factor in Au-Cu alloys contg. 0-35% and 70-100% at. Au and is negligible in dental alloys which belong to the latter group.

**The relation of phosphorus to copper and silver.** II, III. K. W. Froehlich. *Mitt. Forschungsinst. Probieramt Edelmetalle* 7, 75-80, 91-7(1933); cf. C. A. 27, 256. Contrary to general belief, presence of P is not necessarily harmful to mechanical properties of Ag-Cu alloys; even an improvement can be brought about if complete deoxidation by copper phosphide has been effected; in pouring the metal the contact with air should be as short as possible to avoid absorption of O. For this reason a slight excess of P is desirable, but the melt should always stand under cover of charcoal for about 1-2 min. to insure complete deoxidation. Tensile strength, elongation, deep-drawability, corrosion resistance and refinability are all improved if P is not more than 1%; usually 0.2-0.5% gives the max. effect. Tests with several alloys under different heat treatments are described.

**The principles of deoxidation with manganese and silicon.** A. Reactions between carbon-free liquid iron and iron-manganese oxide-silicates saturated with silicic acid. B. Equilibria of deoxidation of liquid iron with manganese and silicon. F. Köfher and W. Oelsen. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch., Düsseldorf* 15, 271-309(1933).—In order to be able to det. equilibrium const. directly from the melt (which has not been possible for acid steel processes because the material used for crucibles always reacted with the silica melts) crucibles were made of pure sand which permitted observing directly the equilibria between liquid Fe and Fe-MnO-silicates satd. with SiO<sub>2</sub> for reaction temps. of 1550°, 1600° and 1650°. It was found that the equilibria of the individual reactions  $[Mn] + (FeO) \rightleftharpoons (MnO) + [Fe]$ ,  $[Si] + 2(FeO) \rightleftharpoons (SiO_2) + 2[Fe]$  and  $[Si] + 2(MnO) \rightleftharpoons (SiO_2) + 2[Mn]$  and their relations can be represented by the ideal mass law within the limits of error of the expts. The distribution of FeO between metal and slag can be given by Nernst's law. The O content of the Fe melt is, for const. temp., proportional to the content of FeO of the slag; the division coeff.  $[O]/(FeO)$  increases considerably with increasing temp. The formulas of van't Hoff represent very satisfactorily the heat of reaction as the difference of the heats of formation of the solid slag-forming components. Pure liquid Fe is able to reduce Si from SiO<sub>2</sub> if the content

of FeO in the slag is sufficiently low. The results point to the fact that Fe Mn silicates are dissoed. electrolytically to a great extent in "free" lower oxides and "free" silica which causes a dislocation of Mn equil. by the addn. of silica to pure FeO slags. On the basis of the reaction equilibria, the deoxidation equilibria and the quant. relations of Si alone for different O contents are detd. Space models are developed which are to illustrate the equilibria between liquid Fe and different deoxidation products which are sepd. from the melt with varying contents of Mn, Si and O. Practical suggestions are derived for the most favorable ratios of quantities of Mn and Si for common deoxidation.

**Requirements and testing of sheet zinc for the manufacture of batteries.** E. Zalesinski. *Metallwirtschaft* 12, 699-704(1933).—The corrosion of sheet Zn which is used for the container and the neg. electrode of dry cells is affected by the purity of the metal. Pb and Cd are not harmful, but Cu, Fe, Sb and As increase the corrodibility of Zn in the order given. The influence of the impurities is less if the Zn has been quenched so that the impurities are in solid soln. If the impurities are segregated, such as at the top of an ingot, they are more harmful. Cast Zn is attacked more than annealed rolled Zn and still more than hard rolled Zn. The corrosion is also affected by the surface condition of the metal. Most of the methods for testing the suitability of Zn for dry cells consist of detg. the temp. rise of acid in which it is dissolved or the loss in weight of the Zn. A more accurate method proposed consists of measuring the vol. of H liberated after 20 or 30 min. when a sheet Zn sample of 25 sq. cm. surface is immersed in 100 cc. 10% H<sub>2</sub>SO<sub>4</sub>. The app. for this test is described. This and the temp.-rise test were made on several grades of Zn, and it was found that Zn suitable for dry cells should not liberate more than 80 cc. H in 20 min. or more than 200 cc. in 30 min. These tests indicate the behavior of Zn while the battery is not in use, but while the current is flowing the amt. of corrosion depends on different factors. Formerly most battery cups were made from a cylindrical shell with a soldered seam and a bottom soldered on with Sn-Pb solder. Because of the local cells set up the soldered seams corrode first. Sweated cups corrode much less at the seams. Seamless cups made by cold drawing or cold extruding are much superior from the standpoint of corrosion. Thirty-eight references.

**Composition of zinc for polygraphic type plates.** M. D. Zudin. *Zvezdnie Metal* 1933, No. 1, 100-3.—Compns. of domestic and imported Zn for type plates are given. Hardness and fine grain are obtained by adding small amts. of Cd (up to 0.5%). Melting in induction furnace is recommended.

**The inner friction of liquid pig iron.** H. Esser, F. Greis and W. Bungardt. *Arch. Eisenhüttenw.* 7, 385-8 (1934).—Methods and instruments for detg. fluidity and inner friction of alloys with very high m. ps. are reviewed, and a measurement is described whereby the inner friction is detd. by the damping factor of vibrations which are transmitted from the container to the liquid metal in it. Diagrams giving the friction coeff. of melts with different C contents are given; they are calcd. from  $\lambda = \sqrt{\rho\eta}$ , where  $\lambda$  is the decrement in natural logarithms as caused by the damping effect of the melt,  $\rho$  the density of the melt and  $\eta$  the friction coeff. How to measure  $\lambda$  is described. Thirteen references.

**Hardness of cast iron.** R. Chavy. *Bull. assoc. tech. sonderie* 7, 528-36(1933).—Means to obtain castings with any hardness between 120 and 300 Brinell is discussed. Martensitic cast irons with Ni between 2 and 5% and Cr between 0 and 1.5% (according to thickness) are simply cooled in the mold or taken from the mold at a high temp. (hardness > 340); these castings are made machinable with a hardness of 280-300 by annealing at about 500° and also softened to 240-200 Brinell by annealing at 650-700°. Sorbitic cast irons with 2-3% Ni can be easily machined without any treatment, but are susceptible to quenching by quiet or blown air; hardness can be controlled between 280 and 350 by annealing. Over-tempered castings with

4-6% Ni and 3-5% Mn and a hardness of 120-160 can be hardened by annealing at 600-650° after machining. Measurements of hardness and different hardness scales are described.

M. Hartenheim

**Cast iron suitable for nitrogen hardening Nitricastiron (Centrad).** J. E. Hurst. *Foundry Trade J.* 49, 243-4, 247, 259-60(1933); cf. *C. A.* 27, 3690.—Phys. properties such as modulus of elasticity, tensile strength, hardness figures, sp. heat, sp. gr., coeff. of expansion and machinability are given for N-hardened cast Fe together with methods of prepn. for and rectification after treatment and ways and means of protecting surfaces which are not to be hardened.

Downs Schaaf

**Some principles upon which resistance and solidity of cast iron depend.** W. West. *Bull. assoc. tech. fonderie* 7, 514-27(1933).—The properties of fine-grained cast iron with particular respect to P content were investigated in a series of expts. of which the first results, obtained on a large ingot, an ordinary piece of casting with cores and another plain casting of av. dimensions, show that the P content must be below 0.3% if good, dense, resistant castings are to be obtained. It was also conclusively shown that consideration of the C-Si equil. alone does not suffice for a good casting of desired qualities; the content of P must likewise be considered; the greater the P content the more closely the equil. total C-Si must be controlled on account of the very small range within which these 2 elements can vary to avoid hardness in a thin section and porosity in a large section. Reduction of P to less than 0.3% permits of a great variation in Si content which can go to 0.5% without producing hardness or porosity with the highest content. The influence of P is still more accentuated if the C content is higher than 3%. The narrower the solidification interval of a cast iron, the greater is the internal solidity, and no matter what the C content is, it is necessary to find a proper balance between P and Si content. No conclusive evidence was found as to the binary and ternary phosphides in the casting from which, eventually, explanations could be derived for the conditions under which a healthy, resistant cast iron is produced.

M. Hartenheim

**The addition of nonferrous metals to cast iron.** J. E. Hurst. *Foundry Trade J.* 50, 21 2, 28, 73 5(1934).—Present-day production of alloy cast Fe, particularly by addns. of Ni, Cr, Cu, Mo, Al, V and Ti, is discussed.

Downs Schaaf

**Desulfurizing iron with beryllium.** W. Kroll. *Metallwirtschaft* 13, 21 3(1934).—When Be is added to Fe or steel contg. high percentages of S it combines with all of the S. If the S content is high enough, BeS seps. as a layer on top of the metal, but not at the grain boundaries. Steel contg. as high as 0.4% S when treated with sufficient Be can be rolled into sheet and is not red short. In high-C steels an excess of Be over that required to combine with the S has a slight influence on its ability to be hardened. Be is also useful as a desulfurizer for Ni, which can be rolled without the addn. of Mg. Be is a more powerful deoxidizer than Al and Mn.

C. E. Macfarlane

**Relations between primary structure, degree of rolling and quality values of two structural steels.** II. Voss. *Arch. Eisenhüttenw.* 7, 403-6(1934).—The influence exerted by forging (rolling) from 1 to 70 times on tensile strength, elongation, reduction of area and notch-toughness was investigated for steels with 0.15% C, 0.9% Cr and 3.7% Ni, and 0.35% C, 1.25% Cr and 0.20% Mn, resp., which had been melted, cast and worked in the same manner. Tensile strength changed very little; elongation, reduction of area and notch-toughness increased in longitudinal direction; in transverse direction, they partly increased then partly decreased; the ratio of transverse to longitudinal notch-toughness dropped irregularly from 100% in the ingot with the no. of forgings; it was noticeable only up to the eleventh deformation; after that the values remained fairly const. An ingot with better qualities remained also better to the end of working; the ingot which showed the best refinement in cryst. structure in the individual steps of deformation showed the best all-round values. The refinement went on beyond the eleventh

deformation while properties were not changed any more.

M. Hartenheim

**The utility of the spark test as applied to commercial steels.** R. W. Buzzard. *Bur. Standards J. Research* 11, 527-40(1933)(Research Paper No. 605).—Photographs illustrated typical spark streams of plain C steel, a variety of alloy steels, S. A. E. steels, nitrided steel and cast Fe. A study was also made of the appearance of the metal pellets collected from the spark streams of the various types of steel. A sorting chart is included based on the data given by the combined spark and pellet test.

2

Downs Schaaf

**The effect of rate of cooling in quenching on the mechanical properties of special steels.** B. Livshitz. *Stal* 3, No. 6, 51-63(1933).—Cr and Ni-Cr steels were quenched in air, air blast, water, oil and Pb bath. With the same final hardness rapid quenching followed by drawing gives greater ductility than slow quenching, the difference increasing as the free ferrite in the annealed specimen increases. The drastically quenched specimens showed an amorphous-fibrous fracture, whereas those slowly quenched had a fine cryst. fracture.

H. W. Rathmann

**Steel is embrittled if quenched in critical range.** James J. Curran. *Metal Progress* 25, No. 2, 27-30(1934).—Several steels, if quenched from just above  $A_{c1}$ , lack both the ductility and hardness they possess after a higher quench. This may be a property of all steels. Operating difficulties which may be due to this are cited.

4

W. A. Mudge

**Some problems of quenching steel cylinders.** Howard Scott. *Trans. Am. Soc. Steel Treating* 24, 68-84(1934).—Math. and exptl. data are given to support the following conclusions: (1) Cooling rate distribution can be detd. by S.'s method under conditions not amenable to exptl. attack. (2) The cooling rate at the center of a long cylinder is indicative of the max. size that can be fully hardened and can be estd. for water, oil or air quenching from its diam. with fair assurance. (3) The cooling rates at the center of cylinders quenched in water, or oil, do not vary much from the max. value over a considerable temp. range within which the rate of the  $A_{r1}$  reaction in the steel reaches a max. (4) During the quenching of large cylinders in air, or of very small ones in oil or water, the max. cooling rate is reached shortly after the beginning of the quench; cooling thereafter is expressed by very simple relations. (5) As the diam. is increased the advantage of water over oil quenching in producing faster cooling at the center tends to diminish provided other factors do not change excessively. (6) A well-agitated water quench approaches close to the fastest physically attainable as judged by the cooling rate at the center. (7) The chief advantage of exceptional quenching power is to insure uniform shallow hardening in fine-grained steels.

7

W. A. Mudge

**Investigations on steel bars under changing tensile stress.** A. Pomp and M. Hempel. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 15, 247-54(1933). A machine is described in which static and dynamic tests, in particular alternating endurance tensile tests, were made. The results of tests with structural steels St 52 and St 37 are shown in curves, tables and micrographs. They show that the first sign or fine cracks of an endurance fracture depend, besides the amplitude of vibration stress and frequency of vibrations, on small inhomogeneities and defects of the material or on surface injuries which cause a local increase of tension due to their notch action. Eighteen references.

• M. Hartenheim

**Better steel castings reflected in specifications.** David Zuege. *Metal Progress* 25, No. 2, 22-6(1934).—Adequate heat treatment has resulted in better properties which have been adopted by A. S. T. M. specifications. W. A. M.

**Aging of fine sheets of ingot steel.** A. Pomp and Ottokar Klein. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 15, 205-45(1933).—The effects of material, manner of annealing, slight cold-deformation, different heat treatment and final rolling temps. on the tendency of fine sheets to aging were investigated. Killed material ages less than non-killed. Armco iron ages most; next is

Thomas steel; open-hearth steel aged least. Box-annealing showed the most unfavorable action; normalized sheets also age somewhat. Slow cooling of the sheets is advantageous; twice-annealed sheets (normalized and box-annealed) show the least aging. Sensitivity to aging reduces with reducing thickness of sheets. Straightening of the sheets acts like a cold deformation with respect to aging. Subsequent cold-rolling causes aging corresponding to the degree of deformation. Artificial aging and heat treatments, as they occur, for instance, in galvanizing, bring about changes of property depending on kind of material, annealing and deformation. To reach the max. of aging a certain temp. and time are required; if these are exceeded or not reached values of aging are obtained which lie on the rising or falling branch of the aging curve. Heating of the sheets for galvanizing also changes the properties more or less. Higher final rolling temp. favors aging. Numerous tables and charts represent all tests in detail; Rockwell hardness, tensile strength, elastic limit, elongation, deep-drawing capacity and notch-toughness have been measured. Nine references. M. Hartenheim

A study of the effect of water vapor on the surface decarburization of steel by hydrogen with certain developments in gas purification. C. R. Austin. *Trans. Am. Soc. Steel Treating* 24, 81-88(1934).—Pure  $H_2$  has a definite but extremely limited decarburizing power at 800° on eutectoid steels. As the water vapor content of moist  $H_2$  is increased, except in very low concns., the decarburizing power of the gas is greatly increased. In low concns. of about 10 mg.  $H_2O$  per cu. ft. of  $H_2$ , the presence of water vapor appears to reduce the limited decarburizing power of dry  $H_2$ . The results should be com. for bright annealing of high-C steels. W. A. Mudge

The structure and constitution of an alloy steel. Owen W. Ellis. *Trans. Am. Soc. Steel Treating* 22, 139-83 (1934); cf. C. A. 28, 1642\*.—A description is given of methods employed to det. the conditions under which a Widmanstätten structure appears in steel contg. C 0.33, Mn 0.69, Ni 1.30 and Cr 0.73%. Under suitable conditions of cooling the steel can exhibit 4 crit. points,  $Ar'_1$ ,  $Ar'_2$ ,  $Ar'_3$ , and  $Ar'_4$ . At  $Ar'_1$ , part of the face-centered solid soln. (1) transforms into body-centered solid soln. (2). At  $Ar'_1$ , the satd. (1) in the vicinity of (2) already formed, transforms into a "conglomerate" of (2) and carbide of Fe. At  $Ar'_2$ , such (1) as remains unaltered changes into (2), pptg. in the form of needles. At  $Ar'_3$ , the satd. (1) lying between the needles changes into "conglomerate." The alternating needles of (2) and interstitial "conglomerate" form the Widmanstätten structure. Conditions are given showing how the steel may show  $Ar'_1$  and  $Ar'_2$  only;  $Ar'_2$  and  $Ar'_3$  only; all four points; or, when the crit. rate of cooling is exceeded, only  $Ar'_1$ , which corresponds to the hitherto designated  $Ar'$ . Data are given in graphs and photomicrographs. W. A. Mudge

Some factors affecting the physical properties and corrosion resistance of 18-8 chromium-nickel steel wire. W. H. Wills and J. K. Findley. *Trans. Am. Soc. Steel Treating* 24, 1-18(1934).—From 0.06 to 0.40% C alloys were used after cold drawing to tensile strengths up to 270,000 lb./sq. in. The alloy is unworkable from a cold-drawing standpoint if Cr is less than 16%. The higher-C alloys are more subject to carbide pptn. and subsequent decreased resistance to corrosion. The addn. of Ti is the best method for stabilization. Attempts to develop a corrosion-resistant structure by heating at 1500°F. for long periods were unsuccessful. W. A. Mudge

Kinetics of transformation of austenite. IV. Magnetic investigations of carbon steels. Heinrich Lange. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 15, 263 9(1933); cf. C. A. 27, 5040.—An arrangement is described by which the austenite transformation of C steels below 500° can be magnetically observed under high magnetic fields. The disappearance of the Curie point as a function of temp. of the isothermal transformation permits the conclusion that at temps. below 400° Fe carbide is formed in a series of different forms of carbide with different contents of C. Five references. M. H.

The composition and critical temperature of pearlite

containing one per cent silicon. A. E. Schowalter and W. W. Delamater with H. A. Schwartz. *Trans. Am. Soc. Steel Treating* 22, 120-32(1934).—The investigation was made to det. the location of the metastable eutectoid point in hypoeutectoid Fe-C-Si alloys contg. 1% Si. Steels contg. 0.14 to 0.76% C were cooled through a range of rates including 5° and 100° per min. The 100% pearlitic alloy has approx. 0.92% C. Si does not lower the C content of the eutectoid. In the presence of 1% Si, the C content of the eutectoid and the temp. at which the eutectoid transformation occurs are functions of the percentage of C in the alloy. W. A. Mudge

Low-temperature impact tests of medium-manganese steel plate. H. W. Hiemke and W. C. Schulte. *Metals & Alloys* 5, 31-6(1934).—Notch-toughness test results are given for plain C steel and low alloy steels of the silico-Mn and Cromansil types in heavy sections over the range from +100° to -50°. Twelve photomicrographs and a bibliography of 39 references are included. D. Schaaf

The chemical resistance of nonrusting steels. Paul Schafmeister. *Metallwirtschaft* 12, 751-5, 767-8(1933).—The resistance to chem. attack of the various grades of stainless steel is due to the formation of a very thin oxide film which passivates the steel. They are not attacked by oxidizing acids such as  $HNO_3$  and aqua regia but are attacked by reagents which destroy the oxide film such as  $H_2SO_4$  and Cl. The oxide film is improved by a smooth, polished surface and by heating the steel to 200°. The resistance of 18-8 steel to  $H_2SO_4$  is increased by the addn. of 2% Mo which raises its passivity and is decreased by cold working, probably because of lower stability of the passivated surface. In the galvanic potential series 18-8 steel stands slightly above Ag. Its loss in weight due to electrolytic action when in contact with Cu and other metals in various electrolytes is very small. When the C content of Cr steels is raised, part of the Cr forms carbides and the Cr content of the steel must be raised to compensate for this if equal corrosion resistance is desired. The addn. of Ni, Mo or Cu to Cr steels increases their chem. resistance. Heat treatment also affects the chem. resistance as illustrated by the hardening of Cr knife steel and by heating 18-8 steel to 500° to 900°. The carbide pptn. at the grain boundaries of 18-8 steel due to heating can be overcome by lowering the C content to less than 0.07%, by the addn. of Ti or V which combine with C, or by reannealing after heating. Twenty-three references. C. E. Macfarlane

The temper hardening of alloys. IV. Change of hardness of copper-aluminum alloys rich in aluminum during tempering. 2. Hiroshi Kawai. *J. Chem. Soc. Japan* 54, 835-42(1933); cf. C. A. 27, 5291.—The 4% Cu alloy which was tempered for 2 hrs. and then quenched was again tempered. At various temps. during tempering the hardness was measured. It showed max. at 100° and 300°. V. Change of hardness of copper-aluminum alloys rich in aluminum during tempering. 3. *Ibid.* 1191 7.—Tempering at 150° gives the greatest hardness for the alloy with 4-6% Cu. T. Katsurai

Equilibrium relations in aluminum-chromium alloys of high purity. W. L. Fink and H. R. Freche. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div.* 104, 325 34 (1933).—The extreme Al end of the Al-Cr system was studied with alloys which contained less than 0.04% total impurities. It was found that there is a peritectic reaction at 661° between  $CrAl_3$  and a melt contg. 0.41% Cr, to form a solid soln. contg. 0.77% Cr. The solid soln., which was detd. microscopically, decreases with temp.; and at 530° the satd. solid soln. contained only 0.25% Cr. The liquidus was detd. from 685° to 790° by chem. analysis of the supernatant melt. C. L. Mantell

Equilibrium relations in aluminum-manganese alloys of high purity. II. E. H. Dix, Jr., W. L. Fink and L. A. Willey. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div.* 104, 335-52(1933); cf. C. A. 23, 2685.—A previous paper from the labs. of the Aluminum Co. of America reported an equil. study on Al-Mn alloys of the highest purity attainable at that time. The present paper deals with a like investigation on alloys of a still higher



purity, as well as a study of the intermetallic compds. that are inequil. with the Al phases in alloys contg. up to 10% Mn. The solid soly. of Mn in Al contg. not more than 0.008% Fe is 1.82% at the eutectic temp. (658.5°) and decreases to 0.36% at 500°. Small amts. of impurities, particularly Fe, have a marked effect in reducing the solid soly. of Mn in Al. A discussion of the pptn. of the Mn phase from supersatd. solid soln. is given. In alloys contg. more than 4.06% and at least up to 10% Mn, the first intermetallic compd. pptg. from the liquid is MnAl<sub>4</sub>. This compd. reacts with the melt contg. 4.06% Mn in soln. at 710° to form the compd. MnAl<sub>4</sub>. The eutectic between MnAl<sub>4</sub> and the Al solid soln. occurs at 658.5° and 1.95% Mn. The identification of the compds. and their etching characteristics are described. C. L. M.

**Very light magnesium-aluminum alloys.** Paul Bastien. *Rev. mét.* 30, 478-501, 528-42(1933).—A comprehensive thermal and microscopical study of equil. of Mg-Al-Cu alloys. Its liquidus contains 4 primary zones corresponding to the pptn. of Mg, Mg<sub>2</sub>Al<sub>3</sub>, Mg<sub>2</sub>Cu and Mg<sub>2</sub>Cu<sub>2</sub>Al<sub>3</sub> phases. The system has 2 ternary eutectics m. 412° and 484° and 2 ternary solid solns., rich in Mg and rich in Mg<sub>2</sub>Al<sub>3</sub>. Solid soly. limits were definitely established. Alloys contg. 12% Cu max. can be forged, this improving their mech. properties without affecting lightness and cond. phys. properties of machinable alloys are given. Cu addn. to alloys with the same Al content slowly increases their corrodibility in acid solns. and very rapidly in saline. Al in Mg-Cu alloys rapidly reduces their corrodibility in sea water. J. D. Gat

**The lithium-magnesium equilibrium diagram.** Otto H. Henry and Hugo V. Cordiano. *Am. Inst. Mining Met. Eng., Inst. Metals Div., Tech. Pub.* 536, 14 pp.(1934).—The equil. diagram for the Li-Mg system of alloys has been detd. The liquidus was obtained from a series of cooling curves, the solidus from a series of heating curves, and the limits of solid soly. from a series of heat-treating and quenching expts. While it is probable that the time of annealing was not sufficiently long to obtain equil., it is felt that the solid soly. limits as indicated are substantially correct. The diagram shows that Li and Mg are completely sol. in the liquid state, that they are partially sol. in the solid state and that there is a transition where a peritectic reaction takes place. C. L. Mantell

**Electric properties of iron-nickel alloys over a large temperature interval.** P. Chevenard. *Rev. gén. élec.* 33, 759-60(1933).—See C. A. 27, 5293. M. H.

**Chemical investigation of an alleged ancient Greek bronze statuette.** Earle R. Caley. *Tech. Studies Field Fine Arts* 2, 144-8(1934).—The alleged Greek statuette had the following compn.: Cu 83.25, Sn 7.36, Zn 4.87, Pb 4.40, Fe 0.15%; no other elements were present in determinable amts. The absence of semi-metallic or non-metallic impurities such as As or S and the presence of appreciable amts. of Zn indicates that the bronze was not of ancient Greek origin. Furthermore, the analysis does not agree with those of ancient statuary bronzes from other localities, but corresponds closely to that of a favorite modern compn. for making delicate bronze castings.

A. Papineau-Couture

**Ternary system: aluminum-antimony-magnesium.** W. Guertler and A. Bergmann. *Z. Metallkunde* 25, 81-4, 111-16, 132(1933).—In the binary Al-Sb system the solidus rises slowly to a max. at 82% Sb corresponding with the formation of AlSb, which, however, appears to dissociate at the m. p., since free Al occurs as minute particles in air-cooled alloys contg. more than 82% Sb. AlSb is rapidly decompd. by moisture, becoming first brown and then falling to a gray powder; it forms an ill-defined eutectic with Al at 657° and less than 2% Sb and a well-defined eutectic with Sb at 623° and less than 1% Al. In the ternary system Al-Mg-Sb no ternary compd. is formed and the following quasibinary systems exist: (A) Al<sub>2</sub>Mg<sub>3</sub>-Mg<sub>2</sub>Sb<sub>3</sub>, (B) Al<sub>2</sub>Mg<sub>3</sub>-Mg<sub>2</sub>Sb<sub>3</sub>, (C) Mg<sub>2</sub>Sb<sub>3</sub>-AlSb, (D) Al<sub>2</sub>Mg<sub>3</sub>Sb<sub>3</sub>. In D there is a miscibility gap extending from 9 to 98% Mg<sub>2</sub>Sb<sub>3</sub>, and in the ternary system this extends to 41% Mg in the Mg corner and to 73% Sb in the Sb corner. Binary eutectics occur in all the quasibinary

systems and ternary eutectics in the quasiternary systems: Al<sub>2</sub>Mg<sub>3</sub>-Mg<sub>2</sub>Sb<sub>3</sub>-Mg, Al<sub>2</sub>Mg<sub>3</sub>-Al<sub>2</sub>Mg<sub>3</sub>-Mg<sub>2</sub>Sb<sub>3</sub>, Al-AlSb-Mg<sub>2</sub>Sb<sub>3</sub> and AlSb-Sb-Mg<sub>2</sub>Sb<sub>3</sub>, but not in Al<sub>2</sub>Mg<sub>3</sub>-Al-Mg<sub>2</sub>Sb<sub>3</sub>. B. C. A.

**Theory and systematization of the corrosion of metals.** Gerhard Schikorr. *Mitt. deut. Materialprüfungsanstalt. Sonderheft* 22, 3-9(1933).—Comprehensive discussion of the different types of corrosion, particularly of irregularities unexplainable by prevailing theories. A division of corrosion types according to whether the rate of corrosion is detd. by the anodic or the cathodic reaction is outlined. Leopold Pessel

**Resisting hydrochloric acid corrosion with metals.** F. A. Rohrman. *Chem. & Met. Eng.* 40, 646-8(1933).—A discussion of the alloys found acceptable for contact with HCl. Leopold Pessel

**Suitability of the torsion test in observing corrosion phenomena.** B. Garre and H. Brose. *Korrosion u. Metallschutz* 9, 334-6(1933).—Expts. with Cu and Al wires show the dependence of the torque characteristics upon the corrosive medium, polishing material and total loss of wt. Especially with Al, this test offers a sensitive method of detecting pit attack. Leopold Pessel

**Corrosion and coordination.** H. L. Riley. *Proc. Roy. Soc. (London)* A143, 399-410(1934).—Corrosion of Cu and Ni in the presence of solns. of Na salts of org. acids which form sparingly sol. Cu and Ni salts is a function of the coordinating tendency of the anion. The effect of anion concn., acidity and surface area of the metal are discussed. Calvin Brouss

**Corrosion of aluminum by sodium chloride solution, with hydrogen development.** G. Schikorr. *Mitt. deut. Materialprüfungsanstalt., Sonderheft* 22, 22-5(1933).—Severe corrosion, combined with H development, may occur on Al when conditions favor formation of AlCl<sub>3</sub> and NaOH, on sections of the surface sufficiently remote from each other to prevent interaction, and of sufficient concn. to attack the Al under H development. Such corrosion is favored by small amts. of the NaCl soln., by irregular access of the soln. to the various parts of the Al surface, by the presence of O. In the course of the reaction cryst. Al(OH)<sub>3</sub> (Bayerite) is deposited on the Al surface which, being insol. in AlCl<sub>3</sub> and NaOH, gradually forms a protective layer and stops the attack. This type of corrosion could not be observed in tap water or in K<sub>2</sub>SO<sub>4</sub> soln. Leopold Pessel

**Theory of the corrosion of iron.** Gerhard Schikorr. *Mitt. deut. Materialprüfungsanstalt. Sonderheft* 22, 9-16(1933).—The corrosion phenomena of Fe in non-oxidizing acids, in contact with insufficient O and in contact with excess of O are discussed. A classification of corrosion is based upon these 3 types. Leopold Pessel

**Corrosive action on constantly stressed boiler steels.** A. Thum and Cl. Holzhauser. *Arch. Wärmewirt.* 14, 319-21(1933).—The effect of general corrosion in leading to failure of stressed material is described and illustrated. Solns. with passifying action may actually raise the resistance to repeated stress. Intercryst. corrosion is likewise treated. It is important only in very weak solns. Ernest W. Thiele

**Corrosion investigations of tin-silver amalgams.** N. Brecht-Bergen. *Z. Elektrochem.* 39, 927-35(1933).—Alloys of the three-phase region between the points Sn-Hg solid soln., Ag<sub>2</sub>Sn and (approx.) Ag<sub>2</sub>Hg<sub>2</sub>, exposed to the attack by 0.1 N perchloric acid, 0.1 N citric acid, 0.1 N NaOH, 0.1 N NaCl soln., showed a loss of wt. independent from the compn. of the Sn-Ag constituent. Samples contg. less Hg, being more porous, show greater loss of wt. than those richer in Hg. Corrosion of these alloys is essentially caused not by local cells, but by the direct attack by the soln. used. The potential of all amalgams in this region is that of the Sn-Hg solid soln., and is identical with that of Sn. This constituent is being attacked. The three-phase region adjoining, toward Hg, has a potential nobler by 40 mv. This is the potential of a liquid phase completely surrounding the solid crystals. Through this p. d., the boundary between these 2 three-phase regions could be clearly defined at 30°. When the



amalgams are subjected to anodic polarization, the Sn is dissolved as  $\text{Sn}^{++}$  in 0.1 N perchloric acid up to a c. d. of 15 ma./sq. cm. Sn dissolves in the same manner in the other 3 solns. up to 3 ma./sq. cm. With increasing c. d. passivity occurs in the 3 last solns., leading to  $\text{O}_2$  or  $\text{Cl}_2$  development. By means of anodic corrosion the depth of attack could be measured, which increases with the porosity of the amalgam and parallels the loss of wt. This offers a new method for structural investigations of amalgams.

**Corrosion resistance of bronzes.** O. Dahl. *Oberflächentechn.* 10, 282 (1933).—Behavior of Sn, Al, Ni and Si bronzes against corrosion is reviewed. The quantity of Cu present det. the behavior; O corrodes Cu, most strongly in HCl,  $\text{H}_2\text{SO}_4$  and  $\text{CH}_3\text{COOH}$ . Anodic corrosion is not very pronounced. Cu is most resistant when O is excluded. In bronzes (Sn-Cu, Al-Cu, Ni-Cu and Si-Cu) the combination of good mechanical-technological properties with chem. permanency det. the behavior. The alloying constituents exert great influences on the susceptibility of Cu to be made passive as the d. of the surface layers is increased. The properties of the individual bronzes are discussed in detail and explained in the light of the general discussion.

**Experimental welding and subsequent heat treatment of drills made of high-speed tool steel.** V. I. Skotnikov and I. N. Spiridonov. *Vestnik. Metalloprod.* 13, 42-53 (1933); *Chimie & industrie* 30, 839-40. In order to avoid internal stresses which eventually lead to cracking, before being welded the pieces must be annealed at 400-500°, which can be carried out in sand baths constructed in the walls of the Pb baths. The welded pieces should be subjected, immediately after welding, to an intermediate heating at 400-800° in a Pb or sand bath; the pieces are then air-cooled and annealed in a Pb bath at 850-900° for 30 min., and cooled to 700° in 1-2 hrs. at the rate of 2-3° per min., the end of the cooling taking place in sand. This method allows a considerable reduction in the time of annealing.

**Silver solders.** W. Stein. *Mitt. Forschungsinst. Probieramt Edelmetalle* 7, 80-7, 97-103 (1933).—The field of Ag solders and the demands made on them in the rare metal and jewelry industry are reviewed. Comps. of solders of Ag-Cu-Zn-Cd-Sn, Ag-Cu-Sn-Zn-Al, Ag-Sn-Zn, Ag-Cu-Sn-Zn-Sb-Al, Ag-Cu-Zn, their m. and f. ps., range of applications, and phys. and mech. properties are given in tables.

**Portland cement pipe coatings (Speller)** 20. Pitting and corrosion of locomotive boiler tubes and sheets (Davidson, et al.) 14. Corrosion inhibition by lime treatment (Powell) 14. External protection of metal pipes by cement mixts. (Rocca) 20. Corrosion of steel—tests carried out on "Dalmine" covering (Scarpa) 20. Internal attack of water mains (Adloff) 14. App. for washing ores, etc. (Ger. pat. 590,429) 21.

**Aubert, Jean:** Contribution à l'étude de la corrosion du fer. Potentials du fer et des constituants de l'acier dans les divers milieux. Paris: Gauthier-Villars & Blondel la Rougery. 68 pp. F. 20.

**Bacon, John L.:** Forging; a Practical Treatise on Hand Forging of Wrought Iron, Machine Steel and Tool Steel, Drop Forging and Heat Treatment of Steel, Including Annealing, Hardening, and Tempering. Revised by C. G. Johnson. Chicago: Am. Technical Soc. 110 pp. \$1.25.

**Behrens, Otto:** Der Einfluss der Korrosion auf die Biegeschwingsfestigkeit von Stählen und Reinnickel. Berlin: N. E. M.-Verlag. 73 pp. M. 3.60.

**Dusold, Theodor:** Der Einfluss der Korrosion auf die Drehschwingungsfestigkeit von Stählen und Nichteisenmetallen. Berlin: N. E. M.-Verlag. 89 pp. M. 4.50.

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**Hardouin, Maurice:** Étude des flux d'épuration et de

projection du magnésium et de ses alliages pendant leur fusion dans les creusets et leur coulée dans les moules. Paris: Gauthier-Villars & Blondel la Rougery. 50 pp. F. 20.

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**Panseri, Carlo:** La fonderia d'alluminio. Metallografia e tecnologia. Milan: U. Hoepli. 584 pp. L. 65.

**Ronniger, Rudi:** Die Lebensbedingungen der schmalkalder Kleisenindustrie. Coburg: A. Rossteutcher. 67 pp. M. 2.

**Velten, Andreas:** Spanlose Formung der Metalle in Maschinenfabriken durch Giesserei, Schmieden, Schweissen und Härten. Bd. 1. Formerei und Giesserei. 10th ed. revised. Leipzig: Max Jänecke. 148 pp. M. 3.20.

**Comité technique international du carbure et de la soudure.** Recueil de la soudure autogène. T. IV. Soudure des métaux non ferreux. Paris: Ch. Béranger. 95 pp. F. 30.

**Forschungsarbeiten auf dem Gebiete des Schweissens und Schneidens mittels Sauerstoff und Acetylen.** Folge 8. Edited by Walter Rimarski. Halle: Marhold in Komm. 119 pp. M. 4.80. Cf. C. A. 27, 1309.

**Hütte.** Des Ingenieurs Taschenbuch. Bd. III. Lfg. 1. Issued by Akad. Verein Hütte. 26th ed., revised. Berlin: Ernst & Sohn. 676 pp. Cf. C. A. 26, 1561.

**Molybdenum, 1933.** New York: Climax Molybdenum Co. Free.

**Sammlerwerk der Autogen-Schweissung.** Bd. IV. Schweissen der Nichteisenmetalle. Issued by Internat. Beratsstelle für Karbid und Schweisstechnik, Geneva. Halle: Marhold in Komm. 80 leaves. M. 6. Cf. C. A. 26, 5897.

**Ore flotation.** H. Th. Böhme A.-G. Fr. 755,895, Dec. 1, 1933. Sulfonation products, particularly esters of  $\text{H}_2\text{SO}_4$  and fatty acs. of more than 9 C atoms, as well as esters of  $\text{H}_2\text{SO}_4$  and alkyl esters of fatty acids are used as addn. substances to flotation liquids.

**Mineral flotation.** Bolidens Gruvaktiebolag (S. G. Mörtzell, inventor). Swed. 78,304, Sept. 12, 1933. The flotation is carried out with application of one or more org. As compds.

**Flotation with assistance of electric current.** Bolidens Gruvaktiebolag (S. G. Mörtzell, inventor). Swed. 78,111, Aug. 22, 1933. For facilitating the selective flotation, for instance sepn. of pyrite from arsenopyrite, elec. current is applied under such conditions that the floatability of the mineral or minerals (for instance arsenopyrite) that are not intended to float is reduced, chiefly by oxidation of the surface of the particles effected by the action of the elec. current, while the floatability of the rest of the mixt. (for instance pyrite) remains practically unchanged.

**Ore and mineral concentration by flotation.** Wm. A. Douglass (to E. I. du Pont de Nemours & Co.). U. S. 1,943,758, Jan. 16. Ethyl ethylxanthate or other substance of the general formula  $\text{ROC}(\text{S})\text{SX}$ , in which R is a hydrocarbon radical and X is a radical contg. at least one C atom, is used as a flotation reagent with ores such as those of Cu.

**Magnetic separator.** E. O. E. Tydén. Swed. 79,021, Nov. 28, 1933.

**Leaching ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,330, Jan. 16. Various details of operation and app. are described.

**Reduction of ore.** I. Rennerfelt. Swed. 76,699, March 14, 1933. Ore mixed with a reducing agent is charged into a container open at one end, and the charged container is placed in a larger surrounding container, the open end facing toward the bottom of the latter container, after which the space between the containers is filled with a reducing agent so that air cannot enter the charge without passing through the layer of reducing agent. The charge is heated externally until the ore is

reduced to metal powder, which may be pressed together before discharging.

**Device for mixing ore slime with coal or charcoal during the transport of the materials on a belt conveyor.** Sandvikens Jernverks A.-B. (A. B. Ralson and E. J. Larsson, inventors). Swed. 76,865, April 4, 1933.

**Extraction of cobalt from sulfidic copper ore.** F. A. A. Grönwall. Swed. 76,502, Feb. 14, 1933. An addn. to Swed. 74,511. The sulfides together with which the slag is remelted consist of alkali or earth alkali sulfides, or such sulfides formed from sulfites or sulfates during the melting by means of an addn. of a carbonaceous reducing agent or sulfides formed during the melting by means of free S added to the slag. Cf. C. A. 27, 5297.

**Treating ores.** Peter Jung. Brit. 400,933, Oct. 30, 1933. Fine ores, blast-furnace dust, etc., are briquetted with very fine gas coal, with or without binding agents and other materials, e. g., chalk, and the briquets are coked.

**Treatment of sulfidic or arsenical ores.** Carl Goetz. Ger. 590,388, Dec. 30, 1933 (Cl. 40a. 11.70). Addn. to 589,448 (C. A. 28, 1315'). The process of Ger. 589,448 is effected in the presence of sufficient finely divided Fe or Fe<sub>2</sub>O<sub>3</sub> to combine with the bulk of the S and (or) As in the ore.

**Treating tin-bearing ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,338, Jan. 16. Various details are described of a process in which SnCl<sub>4</sub> is obtained and then treated with ZnO to form Sn oxide, which is sepd. from the ZnCl<sub>2</sub> formed.

**Treating materials such as roasted ore containing zinc oxide, etc.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,333, Jan. 16. Material contg. ZnO and which also may contain various other Zn, Fe, Pb and Ca compds. is leached (suitably with HCl soln.) to remove a considerable proportion of the ZnO; the residue is treated with a gaseous chloridizing agent to convert remaining Zn into ZnCl<sub>2</sub>, and the material may then be further treated for recovery of values. Numerous details are described.

**Treating ores such as those containing zinc and iron sulfides, etc.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,334, Jan. 16. An alk. earth metal compd. such as CaO or CaCO<sub>3</sub> is added and the mixt. is roasted in the presence of a reactive S compd. with the materials initially so proportioned that sufficient alk. earth compd. is present to react with substantially all the reactive sulfate radical present and with the other reactive ingredients of the ore. Such furnace conditions are maintained as to produce a considerable amount of alk. earth metal sulfate and alk. earth metal compds. with various reactive ingredients of the ore. After the furnace treatment, the material may be leached. Numerous details are described.

**Treating ores containing metal values such as complex sulfide ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,331, Jan. 16. The ground ore is roasted with a considerable amt. of an alk. earth metal compd. such as CaO and a S-bearing material such as added sulfide, if required, which are capable of and are proportioned for reacting during the roasting operation to form an insol. alk. earth metal sulfate; low-temp. conditions are maintained, and the material is agitated to minimize sintering together of the ore particles; the resulting permeable non-sintered product is treated with a reagent for converting an ore metal value such as Zn to a sol. compd. which is readily recovered from assocd. insol. gang and alk. earth metal sulfate.

**Treating complex ores containing sulfides of silver and other metals.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,339, Jan. 16. The finely divided ore is coated with an alk. earth metal oxide such as CaO, and the coated material is roasted under conditions required to remove the S from the Ag sulfide and produce alk. earth metal sulfate intimately assocd. with the Ag-bearing portions of the ore particles, thus minimizing any tendency for the ore particles to become globulized or to contact with other portions of the ore and combine with

them; the roasted ore is then treated to convert the Ag to a sol. compd. and the Ag is recovered.

**Treating complex ores containing sulfides of zinc and iron.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,340, Jan. 16. The ore is roasted to produce Fe<sub>2</sub>O<sub>3</sub> and ZnO, the roasted material is leached with dil. H<sub>2</sub>SO<sub>4</sub> to remove most of the ZnO as ZnSO<sub>4</sub>, and reduce the ZnO content of the material to such an extent that, with reference to the capability of the residue to absorb the water of reaction during the chloridizing step, the amount of ZnCl<sub>2</sub> and water thus formed will be insufficient to hinder materially the penetration of the reagent gas, but leaving sufficient ZnO to prevent the Fe from going into soln. as a sulfate; the remaining ZnO content of the ore is then chloridized with HCl, forming FeCl<sub>3</sub>, and the chloridized material is heated with air to a temp. at which FeCl<sub>3</sub> is not stable to form nascent Cl for further chloridizing of the ore and to leave the Fe as an insol. ferric oxide, so that the ZnCl<sub>2</sub> may be dissolved and obtained substantially free from Fe.

**Producing metal chlorides from ores such as complex lead zinc sulfide ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,341, Jan. 16. The ore is roasted in the presence of a S-bearing material and an added compd. of an alk. earth metal such as lime capable of, and proportioned for, reacting to form an alk. earth metal sulfate and produce a non-sintered product contg. the sulfate interspersed with an ore metal oxide which is permeable to chem. reagents, and the roasted material is chloridized. Numerous details are given.

**Chloridizing ores by use of ferric chloride.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,332, Jan. 16. An ore material contg. a chloridizable metal sulfide such as ZnS is mixed with FeCl<sub>3</sub>, and the mixt. is heated with O at a temp. at which the chloride is unstable, in the presence of sufficient material such as CaO or CaCl<sub>2</sub> for reacting with the available sulfate radical formed by the oxidation of the sulfide S to prevent the ore metal from being converted into sulfate. The resulting material may then be leached.

**Chloridizing sulfide ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,336, Jan. 16. Ore material contg. a large quantity of unroasted chloridizable ore metal sulfide such as that of Zn is treated with a current of Cl gas while the ore is in substantially dry condition and maintained at a low temp., and the reaction is carried on in the presence of an alk. earth metal compd. such as lime proportioned for fixing the available sulfate radical formed in the process as an insol. alk. earth metal sulfate and thus preventing the transposition of ore metal chloride to sulfate. App. is described, and the treated material may be leached. Various details of procedure are described.

**Chloridizing sulfide ores.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,337, Jan. 16. A sulfide ore which may contain ZnS and FeS<sub>2</sub> is roasted and digested in an aq. soln. of a metal chloride such as FeCl<sub>3</sub>, capable of reducing from a higher to a lower valency and chloridizing the ore, and the material is then removed from the aq. soln. and heated to a temp. at which the metal chloride is not stable, for effecting further chloridizing of ore materials. Numerous details are given.

**Chloridizing sulfide ores such as those of zinc, lead and iron.** Thomas A. Mitchell (to Lafayette M. Hughes). U. S. 1,943,335, Jan. 16. A sulfide ore is roasted under oxidizing conditions to a low sulfide-S content and in the absence of a sulfate-fixing reagent; there is added to the ore a quantity of CaCl<sub>2</sub> proportioned to react with all available sulfate radical during the chloridizing operation and chloridizing of ore metal sulfate is effected; subsequently the material is treated with Cl under conditions to produce an ore metal chloride and form CaSO<sub>4</sub>.

**Rotary device for taking samples of iron ore in maritime transit, etc.** Samuel E. Atkins and Theodore Carlson. U. S. 1,944,392, Jan. 23. Mech. details.

**Reduction of, and removal of sulfur from, iron ore.** Leif Lindemann. Norw. 53,252, Nov. 6, 1933. Iron ores are desulfurized and reduced to FeO at higher temps.

(630-800°) by the gases from the final reduction or by another  $H_2$  gas contg. 11-30% of  $H_2O$  and are then reduced completely at lower temps. (450-650°) by technical  $H_2$  contg. up to 18% of  $H_2O$ .

**Refining copper.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 755,592, Nov. 27, 1933. Cu is refined by heating it violently to a sort of emulsion with a fused slag having a compn. such that the impurities are decomposed and enter the compds. in sol. in the Cu. The slag may contain a salt of Cu (oxide, silicate, sulfide, chloride, etc.) and a flux. Fr. 755,593. The slag used has a high solvent power toward  $Cu_2O$  and may be formed by one or more of the following:  $SiO_2$ ,  $TiO_2$ ,  $Al_2O_3$ ,  $CaO$ ,  $MgO$ , alkali or alk. earth salts, oxides of Fe or of other metals not reduced by Cu.

**Apparatus for condensing zinc-reduction vapors.** The New Jersey Zinc Co. Ger. 588,072, Nov. 28, 1933 (Cl. 40a. 30).

**Melting metals.** David L. Summey. Brit. 400,259, Oct. 23, 1933. In casting ingots, etc., from refined metal, e. g., Cu, Al, Ni, Zn, Mg and their alloys, the metal is charged in continuous increments into a vessel, without contamination of fuel gases and while fully protected from air, and, if necessary, reduced by a medium incapable of leaving a harmful residue, the vessel being substantially air-tight and filled with nonoxidizing gas under pressure. App. is described.

**Reduction without melting.** A. Johnson & Co. (B. M. S. Kalling and C. von Delwig, inventors). Swed. 70,914, April 11, 1933. Powd. ore mixed with C is heated without melting in a S-free reducing gas in a rotary furnace. The gas serves as the main reducing agent, the properties of the C and the gas and the temp. of the furnace being so adjusted that most of the solid carbonaceous material passes unconsumed through the furnace, thus not transferring its S content to the metal. Cf. C. A. 27, 5259.

**Apparatus suitable for filtering smelter fumes, etc.** Ross B. Rathbun (to American Smelting and Refining Co.). U. S. 1,944,267-8, Jan. 23. Structural and mech. details.

**Porous metal castings.** Electro Metallurgical Co. Ger. 590,444, Jan. 4, 1934 (Cl. 31c. 15.04). See Brit. 390,533 (C. A. 27, 4761).

**Crucible for fusing metals.** Pose & Marré. Ger. 588,770, Nov. 27, 1933 (Cl. 18c. 5.40).

**Operating converters for steel manufacture.** Kurt Thomas. Ger. 590,056, Dec. 21, 1933 (Cl. 18b. 19). Addn. to 569,350 (C. A. 27, 2126). Further details of the method of Ger. 569,350 are given.

**Blast-furnace tuyères.** Martin Künckle. Brit. 400,793, Nov. 2, 1933.

**Blast-furnace operation.** Österreichisch-Alpine-Montanges. (Ludwig Richter, inventor). Ger. 590,055, Dec. 21, 1933 (Cl. 18a. 3). See Austrian 128,326 (C. A. 26, 4295).

**Explosion or bleeder valve for blast furnaces.** Michael Svorcina. U. S. 1,944,770, Jan. 23.

**Furnace and method for the heat treatment of metals, e. g., brass or copper strip.** Henry W. Brownson and Imperial Chemical Industries Ltd. Brit. 400,586, Oct. 13, 1933.

**Metallurgical furnace suitable for heat treatments.** James R. Munro (to Caterpillar Tractor Co.). U. S. 1,944,449, Jan. 23.

**Continuous heating furnace suitable for heating billets, ingots, etc.** Samuel Charlesworth (to Surface Combustion Co.). U. S. 1,944,729, Jan. 23. Various structural and operative details are described.

**Furnace for heating metal plates, sheets, etc., having a conveyor device for imparting step-by-step forward movement to the articles.** Alfred Smallwood and John Fallon. Brit. 400,185, Oct. 18, 1933.

**Muffle furnace for heat treatment of metals.** Soc. Allmänna Svenska Elektriska Aktiebolaget. Fr. 755,847, Nov. 30, 1933.

**Furnace for hardening metals by cementation.** The Singer Manufacturing Co. Ger. 590,057, Dec. 27, 1933 (Cl. 18c. 3.50). See U. S. 1,792,456 (C. A. 25, 1791).

**Furnace for annealing brass.** Siemens-Schuckertwerke A.-G. (Rudolf Grundmann, inventor). Ger. 588,616, Nov. 28, 1933 (Cl. 40d. 2.30).

**Thermal treatment of metals.** The Electric Furnace Co. Fr. 756,070, Dec. 4, 1933. A protecting gas for the thermal treatment of metals, which has an oxidizing, reducing, carbonating or decarbonating action, is obtained by mixing a hydrocarbon with air in proportions governed by the required character of the gas, and causing them to react in an exteriorly heated chamber, preferably in the presence of a catalyst.

**Heat-treating magnetic material.** Willoughby S. Smith, Henry J. Garnett and Walter F. Randall. Brit. 400,238, Oct. 18, 1933. The material is heated in coil form in an annealing box, within which the material is cooled in air, the charge being arranged in the box so that the inner coils are cooled more rapidly than the outer coils.

**Hardening metals.** Ewald Hanus. Ger. 590,243, Dec. 28, 1933 (Cl. 18c. 3.15). The article or the part thereof to be hardened is heated in a refractory mold of corresponding shape contg. the appropriate amt. of a gasifiable hardening agent.

**Apparatus for determining Brinell hardness.** S. L. E. Falk. Swed. 78,600, Oct. 10, 1933. The app. has the shape of a pair of tongs.

**Dies suitable for use in drawing wire or the like.** Adrian P. Roux (to General Cable Corp.). U. S. 1,944,758, Jan. 23. Various details of operation are described for making dies comprising W carbide and a metal such as W, Fe and Ni by sintering under pressure and subjection to an elec. current. U. S. 1,944,759 relates to details of similar dies.

**Film-making apparatus.** Peter Ostendorf and Otto Graf. Brit. 400,823, Nov. 2, 1933. The metal band or belt, upon which film-forming soln. is deposited, is made of hard metal, e. g., Fe, steel, plated with a metal, e. g., Ni or Ni alloy, which is not attacked by the fluids used in film manuf., and the plating is rolled to convert the coarse cryst. into a fine cryst. structure which takes on a fine glassy smoothness when polished.

**Degreasing metal articles.** Joseph Savage and Imperial Chemical Industries Ltd. Brit. 400,097, Nov. 6, 1933. In degreasing with volatile solvents, the solvent vapors being condensed by  $H_2O$ -cooled surfaces, the cooling- $H_2O$  is warmed to above the dew point of the atm., whereby the condensed solvent is free from  $H_2O$ . App. is described.

**Lubricant suitable for use in wire drawing.** George S. Rutherford (to Western Elec. Co.). U. S. 1,944,273, Jan. 23. A sol. alginate 1, tallow 4, soap 2 and water 195 parts are used together.

**Siphoning molten metals such as aluminum.** Victor C. Doerschuk and Erwin G. Schoeffel (to Aluminum Co. of America). U. S. 1,944,733, Jan. 23. In siphoning a metal such as Al, a molten material such as artificial cryolite of higher m. p. than the metal is drawn through a siphon and cooled to form a protective coating on the inner surface of the siphon, and the molten metal is then passed through the siphon. App. is described.

**Beryllium.** Heraeus-Vacuumschmelze A.-G. and Wilhelm Rolin. Ger. 588,081, Nov. 30, 1933 (Cl. 40a. 48.20). Addn. to 563,652 (C. A. 27, 941). The method of 563,652 for the prepn. of Be by reducing  $BeO$  is modified by adding metals of the Cr group or their oxides to the reaction mixt.

**Copper.** The Roessler & Hasslacher Chemical Co. Brit. 401,008, Nov. 9, 1933. Cu of high cond. is obtained by melting Cu contg. Ca, Ba, Sr or Mg which has been added as a deoxidizer and passing a substantially inert gas, e. g.,  $H_2$ , N,  $NH_3$ , through the melt to remove (partially) the excess of the deoxidizer.

**Hardening copper.** Charles E. Moyer. U. S. 1,943,738, Jan. 16. Cu is heated to its m. p. and treated with  $CuSO_4$ , salt and borax.

**Purifying crude light metals such as crude electrolytic sodium.** Harvey N. Gilbert (to E. I. du Pont de Nemours & Co.). U. S. 1,943,307, Jan. 16. The light metal is maintained in liquid condition in an inert atm. and at a temp. (suitably about 110° in the case of Na) at which

impurities solidify; the purified light metal is filtered off and sludge is collected from a level below that of filtration (in a described app.).

**Composite metal plates including tantalum suitable for jewelry.** Miner M. Austin (to Fansteel Products Co.). U. S. 1,943,853, Jan. 16. A Ta plate is protected from the atm. by an autogenously attached film of a base metal such as Cu alloy contg. Al or Ni and by a base metal plate autogenously attached to the film.

**Metals and alloys.** Heraeus-Vacuumschmelze A.-G. Brit. 401,094, Nov. 9, 1933. See Fr. 731,243 (C. A. 27, 699).

**Refining metals and alloys.** Isaiah Hall. Brit. 400,258, Oct. 23, 1933. A powder for refining Pb, Sn or Pb-Sn alloys, which may contain Sb, comprises finely powd.  $\text{NH}_4\text{Cl}$  37,  $\text{NaCl}$  14,  $\text{CaCl}_2$  11, C 25 and  $\text{C}_{10}\text{H}_8$  14 parts by vol. The powder is mixed with the metal at 300-750°F., being used particularly for alloys used in type-casting machines and stereotyping foundries and comprising approx. Sn 4-6, Sb 12-13 and Pb 80-85%.

**Sponge metal.** E. G. T. Gustafsson. Swed. 78,704, Oct. 31, 1933. Sponge Fe, Co, Ni or ferrochrome is produced by reduction of the oxidic ores by a reducing gas in a furnace where the charge is in continuous motion in opposite direction to the gas. Powd. coal or other carbonaceous material is added to the gas before it is introduced into the reduction zone of the furnace in such amts. that during the last critical stage the ore is reduced in the presence of such carbonaceous materials. Cf. C. A. 27, 5300.

**Iron sponge.** O. Bergqvist. Swed. 77,083, July 4, 1933. Iron ore is reduced in a shaft furnace by means of gases, e. g., CO,  $\text{H}_2$  and  $\text{CH}_4$ , in the presence of a solid reducing agent (coal or coke). The reducing gas is introduced into the furnace at two different levels, the chief part heated to a high temp. (1200-1300°) so far above the furnace bottom that a cooling zone is formed below the level of introduction, in which zone the reduced Fe sponge can give off its heat to a gas that is taken out at the top of the furnace and introduced cold into the reduction furnace at the lower level of the cooling zone.

**Iron sponge.** S. C. G. Ekelund. Swed. 79,159, Dec. 12, 1933. Iron ore mixed with a solid reducing agent with stirring and in a relatively thin layer is conveyed over one or more hearth surfaces in a reduction furnace by means of scrapers with rotary or oscillatory motion and at the same time is heated by means of a combustible gas that is burned partly with successive application of air during its passage through the furnace.

**Iron.** Eugen Piwowarsky. Ger. 590,059, Dec. 21, 1933 (Cl. 18d. 2.30). Cast iron contg. 0.1-3% of Sb and preferably at least 2% of Ni is used for making articles required to resist wear.

**Grey cast iron.** Heinrich Hanemann. Ger. 588,946, Nov. 30, 1933 (Cl. 18b. 1.02). Addn. to 499,712 (C. A. 24, 4501). In forming grey cast Fe by adding graphite, the method of 499,712 is modified by mechanically stirring the fused Fe during the addn. of the graphite.

**Plant for producing weld iron or steel.** A. M. Byers Co. Ger. 588,769, Nov. 28, 1933 (Cl. 18b. 4).

**Refining iron and steel.** Edith V. Davies. Brit. 400,593, Oct. 16, 1933. A compn. for refining Fe or steel comprises a mixt. of alkali metal chlorate, preferably  $\text{KClO}_3$ ,  $\text{MnO}_2$  and a concd. scavenging agent which comprises alkali metal fluoride, borax or  $\text{Na}_2\text{CO}_3$  or a mixt. of any 2 of these. In an example  $\text{KClO}_3$  12-20, borax and (or)  $\text{H}_3\text{BO}_3$  2-16, NaF and (or) soda ash 2-8 and  $\text{MnO}_2$  1-4 parts.

**Apparatus (employing vibration) for pickling iron and steel sheets, etc.** Edward N. Millan and Edwin B. Hudson (to American Rolling Mill Co.). U. S. 1,944,607, Jan. 23. Structural, mech. and operative details.

**Steels.** Mannesmannröhren-Werke. Brit. 400,102, Oct. 19, 1933. Pressure-welded containers for withstanding high internal and external pressures are made from ingot steel contg. W 0.1-0.7 and C 0.01-0.2%, with or without small amts. of Cu, Mo, V, Cr and (or) Ni, etc.

**Steel for nitriding.** Joseph K. Smith (to Beryllium

Corp.). U. S. 1,943,348, Jan. 16. A steel suitable for nitriding contains Fe (with its common contaminants) together with C 0.15-0.5, Cr 1.5-3.0, Mn about 0.5, Mo 0.5-5.0 and Be 0.35-5.0%.

**Steel for making drawplates and other tools.** Gebr. Böhler & Co. A.-G. Ger. 590,213, Dec. 28, 1933 (Cl. 18d. 2.30). See Austrian 127,769 (C. A. 26, 4297).

**Apparatus for quenching steel to maintain the austenitic structure after hot working.** Wm. Mellor (to Henry Disston & Sons, Inc.). U. S. 1,944,798, Jan. 23.

**Annealing steel.** Floyd C. Kelley (to General Elec. Co.). U. S. 1,944,743, Jan. 23. Various details of app. and operation are described adapted for heating steel strips in a nonoxidizing gas.

**Finishing steel sheets.** Harry H. Holloway (to Apollo Steel Co.). U. S. 1,943,764, Jan. 16. An oxidizing blue finish is applied to the opposite sides of thin previously densified steel sheets by reheating, passing between polished rolls each supplied with a water film, and effecting instantaneous oxidation and compression of the resulting oxide upon and into opposite sides of the sheets throughout their surface areas.

**Spring steel.** Joseph K. Smith (to Beryllium Corp.). U. S. 1,943,347, Jan. 16. A spring steel which has high fatigue resistance contains Fe together with Be 0.3-5.0, Mo 0.35-1.5, Cr 1.0-1.5, C 0.35-0.50 and Mn 1.0-1.5%.

**Steel rails.** Samuel Whyte. U. S. 1,943,944, Jan. 16. In producing rails from steel contg. C 0.5, Mn 1.0 and Cr 0.5%, the rolling heat of the rail is used for maintaining a slow cooling through the crit. range of temp. from about 900° to about 600°, and the rail is air-cooled below such temps. Cf. C. A. 27, 4766.

**Rustless steel.** Vereinigte Stahlwerke A.-G. Fr. 755,817, Nov. 30, 1933. The tendency of Fe and steel to rust is reduced by alloying therewith at least one element, the electrolytic potential of which is below the const. oxidation potential of the corrosion agent ( $E_h = +0.5$  v.) but above that of Fe or steel (Cu up to 1, As, Sb or Sn 0.05-5%) and besides at least one of the elements Ti (0.1-1%) and V (0.1-5%).

**Hardening alloy steel.** Francis B. Foley. U. S. 1,943,595, Jan. 16. Alloy steel contg. substantial but minor proportions of Ni and Al (together not more than 30%) is heated to such a temp. below its  $A_{c1}$  point as will cause the soln. of the Ni and Al in ferrite, followed by cooling at such a rate as will retain the Ni and Al in solid soln., and by reheating to a temp. at least about 166° below the  $A_{c1}$  point and cooling, the time and temp. of reheating and rate of cooling being such as will cause Ni and Al to form and retain a new cryst. phase imparting greatly increased hardness.

**Chromium steels.** Charles E. Macquigg (to Electro Metallurgical Co.). Brit. 401,123, Nov. 9, 1933. See Fr. 747,962 (C. A. 27, 5040).

**Steel and alloys.** Ralph Halkett, Henry A. Fells and James Brown. Fr. 755,927, Dec. 1, 1933. In treating metals with combustion products, the condensable vapor which they contain is removed by cooling.

**Alloy coating on steel.** Pinspongs Metallverks A.-B. (G. H. Clamer, inventor). Swed. 70,729, March 14, 1933. Two or more layers of different metals are applied in succession on the steel surface in proportions corresponding to the compn. of the desired alloy. The metal coatings are then melted.

**Alloys.** Th. Goldschmidt A.-G. Ger. 590,038, Dec. 21, 1933 (Cl. 40b. 12). Bearing alloys contg. Sn 70-90 and Sb 5-20, with or without Cu 0.5-10%, are improved by addn. of Ni and (or) Co 0.5-5 and Cd 0.2-5%. A further addn. of 0.2-2% of As improves the hardness of the alloys, and 0.3-3% of W, Cr, and (or) Mn may also be added, to improve the resistance to corrosion. Cu in the alloys may be replaced in part by Cu-P. Specific alloys are described.

**Alloys.** G. Trione & Co. Fr. 755,918, Dec. 1, 1933. An anti-friction alloy for bearings contains Cu 70 and Pb 30% to obtain perfect miscibility of the 2 metals and an absolute cohesion of their mols.

**Hard alloys.** Fried. Krupp A.-G. (Kurt Moers, Karl

Schröter and Hans Wolf, inventors). Ger. 598,911, Nov. 29, 1933 (Cl. 40b. 17). See Brit. 378,484 (C. A. 27, 3189).

**Nonoxidizing alloy.** Henri Durand. Fr. 755,603, Nov. 28, 1933. A hard white alloy which does not oxidize and is called "nickron" contains Cu (contg. phosphide) 46, Ni (contg. phosphide) 34 and Zn 20%. A small amt. of  $\text{CuSO}_4$  and  $\text{BiSO}_4$  is stirred into the molten alloy.

**Dental alloy.** Établissements Grimar. Fr. 755,827, Nov. 30, 1933. An alloy for metal bases of dental plates contains Sn 24, Sb 4, Cu 1 and Pb 20 parts. Its m. p. is 330°.

**Dental alloys.** Robert R. Bayes. Fr. 755,880, Dec. 1, 1933. See U. S. 1,930,119 (C. A. 28, 914).

**Dental plates and like articles of metal alloys.** Stefan Loos. Brit. 400,089, Oct. 19, 1933. Articles, made of alloys, which are required to fit closely an uneven surface are made by depositing on a mold, e. g., by electrolysis or spraying, a large no. of thin layers of the constituent metals. Diffusion of the metals takes place that may be completed by heating. Dental plates and plates for replacing portions of skull bones may be so made.

**Alloy for oil-cracking tubes.** Frederick M. Becket (to Electro Metallurgical Co.). U. S. 1,943,782, Jan. 16, 1934. An alloy is used contg. Fe together with Cr 16-22, Mn 6-16 and C not more than about 0.3%.

**Heating alloys.** The General Electric Co. Ltd. Fr. 756,288, Dec. 7, 1933. Alloys contg. a volatile constituent such as Zn are heated in a closed chamber contg. H as opposed to a stream of H.

**Aluminum alloys.** Edwin H. Moore. Brit. 400,121, Oct. 19, 1933. Al alloys contg. Si with or without smaller amts. of other elements and impurities are modified by stirring alkali metal nitrate(s) into the molten alloy.

**Aluminum and aluminum alloy castings.** Aluminium Ltd. Brit. 400,026, Oct. 19, 1933. See Fr. 749,182 (C. A. 27, 5707).

**Alloys of aluminum and silicon.** Louis W. Kempf and Ivan R. Dawson (to Aluminum Co. of America). U. S. 1,944,183, Jan. 23, 1934. See Can. 337,971 (C. A. 28, 1053).

**Aluminum-silicon alloys.** Compagnie de produits chimiques et électrometallurgiques Alais, Froges et Camargue. Fr. 756,255, Dec. 7, 1933. An alloy contg. Al 10-80 and Si 90-20% is obtained by reducing the constituents to powder, mixing them and subjecting the mixt. to pressure to form a dense homogeneous mass and heating to above 300° but not to fusion.

**Iron alloys.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 755,939, Dec. 1, 1933. Fe alloys (particularly Fe-Cr and Fe-Mn) of very low C content are treated to remove as completely as possible the reducing metal, e. g., Si used for making the alloys, by an energetic beating of the molten metal with an oxidizing slag, fused at the start or fused in contact with the metal. The slag may be an ore contg.  $\text{Cr}_2\text{O}_3$  29.83,  $\text{Al}_2\text{O}_3$  6.86,  $\text{SiO}_2$  3.21,  $\text{CaO}$  45.73;  $\text{FeO}$  6.96 and  $\text{MgO}$  7.25%.

**Cast iron alloy.** The International Nickel Co. Inc. Ger. 580,832, July 17, 1933 (Cl. 18d. 1.20). An alloy contains C 2-4, Ni 5-25, Cr 2-8, Cu 2.2-16%, and the rest Fe. Al up to 3% and Mn between 3-10% may also be present.

**Purification of iron alloys.** Porter H. Brace (to The Canadian Westinghouse Co. Ltd.). Can. 338,679, Jan. 16, 1934. An Fe alloy is placed in an induction furnace in solid form and subjected to the action of a H-bearing gas free from oxidizing ingredients, while sufficient elec. energy is being supplied to the furnace to melt the alloy. The passage of the gas is continued through the metal and a reducing atm. is maintained over the surface of the metal while it is in a molten condition.

**Ferrous alloys suitable for surface hardening by nitriding.** Victor O. Homerberg (to Nitromal Corp.). U. S. 1,944,178, Jan. 23, 1934. Articles are formed of malleable cast iron having nitride-hardened surface portions, contg. 0.15-5.0% Al and 0.1-8.0% of B, Cr, Mo, Ni, Ti, W, V or Zr. U. S. 1,944,179 relates also to articles with

1 nitride-hardened surfaces formed of malleable cast iron contg. Al 0.15-5.0%.

**Ferromagnetic alloys.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 400,395, Oct. 26, 1933. Ferromagnetic alloys which have been treated by repeated rolling or stretching, preferably with intermediate heating between the initial stretching steps, are subjected after the final rolling or stretching step to a prolonged heating at 100-250°. The treatment of Fe-Ni alloy rods is described in an example.

**Palladium alloys.** G. Siebert G. m. b. H. Fr. 755,701, Nov. 29, 1933. Alloys suitable for making spinning nozzles, thread-guides, etc., for rayon, contain Pd 20-60% and Ag the rest. The Ag may be replaced in part or wholly by Cu and up to 5% of the Cu may be replaced by Al. Ni, Co, Mn, Sn, Ta or P in amt. up to 10% of the total alloy may also be present. The alloys are improved by heating to 850°, quenching and reheating. Cf. C. A. 27, 2668.

**Alloy for use in the manufacture of tetraethyl lead.** Wm. S. Calcott, Alfred E. Parmelee and Homer F. Meschter (to E. I. du Pont de Nemours & Co.). U. S. 1,944,167, Jan. 23, 1934. Pb 90 and Na 10 parts are melted together with about 0.01 part of  $\text{AlCl}_3$  or  $\text{FeCl}_3$ , which serves as an activator in Et<sub>4</sub>Pb production.

**Hard bodies from tungsten-cobalt alloy.** E. A. A. Grönwall. Swed. 77,227 May 9, 1933. Pulverized WC and/or  $\text{W}_2\text{C}$  and/or pulverized metallic W with or without C is mixed well with not less than one fourth of its wt. of a finely ground W alloy having a lower m. p. than the W carbide or W metal and contg. not less than 50 and not more than 85% W, the remainder being chiefly Co or Co plus Cr and/or Ni. The powder mixt. is given the desired shape, e. g., by pressing, and finally sintered.

**Stable surfaces on sheets of ferrous metal.** Percy A. E. Armstrong. U. S. reissue 19,058, Jan. 23, 1934. A reissue of original pat. No. 1,813,654 (C. A. 25, 5137).

**Coating with metals.** Metallisation Ltd. and Robert A. Parkes. Brit. 400,752, Nov. 2, 1933. Articles of oxidizable metal or alloy, e. g., Fe, steel, Cu, Ni (alloys), are protected either by spraying thereon a coating of Cd, Sb, Bi, Pb, Mg, Sn or Zn and then a coating of Al or by spraying thereon a coating of an alloy of Al with a small proportion of 1 of the specified metals, the coated article in either case being heated to 650-1200°. A coating of bitumastic paint or other substance forming a carbonaceous deposit when heated may be applied before heating.

**Apparatus for hot galvanization of sheet materials.** Stockholms Galvaniseringsfabrik Aug. Pettersson (S. E. F. Björkman, inventor). Swed. 76,293, Jan. 17, 1933.

**Galvanizing malleable iron castings.** Votaw S. Durbin. U. S. 1,944,227, Jan. 23, 1934. For galvanizing, without embrittlement, iron castings which have been annealed so as to malleabilize them, the castings are dipped into molten Zn, cooled, and then reheated to about 650°.

**Rust-proofing oil.** Lawrence G. Benton, Howard R. Tate and Edward R. Lewtas (to Standard Oil Development Co.). U. S. 1,943,808, Jan. 16, 1934. About 2% of naphthalene is mixed with mineral white oil.

**Nickel composition for welding.** Norman B. Pilling and Theodore E. Kihlgren (to The International Nickel Co. Inc.). Can. 338,586, Jan. 9, 1934. An alloy contg. Mg 0.02-0.2, Si 0.05-4.0, Ti 0.05-2.0 and Ni more than 90% is well adapted for fusion welding. Cf. C. A. 27, 4770.

**Electric welding of cold-worked austenitic stainless steel.** Earl J. W. Ragsdale (to Edward G. Budd Mfg. Co.). U. S. 1,944,100, Jan. 10, 1934. Various details of operation are described.

**Welding electrode.** David L. Mathias (to Westinghouse Elec. & Mfg. Co.). U. S. 1,944,753, Jan. 23, 1934. A metallic core which may be formed of ferrous metal carries a surface coating of flux material such as kaolin,  $\text{CaCO}_3$ , ferro-Mn, Na resinates and Na silicate anchored to the core by a combination of first- and second-class conductors such as wire and asbestos yarn helically wound. Cf. C. A. 28, 1014.

**Reclaiming scrap pieces of welding electrodes.** Russell

H. McCarroll and Gosta Vennerholm (to Ford Motor Co.). U. S. 1,943,541, Jan. 16. Pieces from electrodes comprising sintered masses of W particles impregnated with Cu are powdered, forming particles of W coated with Cu and Cu oxide, the Cu oxide is reduced to Cu, the material is pressed in dies to the shape of an electrode and is then sintered.

**Flux-coated welding rod.** Walter R. Hume. U. S. 1,943,807, Jan. 16. A rod is rotated simultaneously with the extrusion upon it of an annular body of flux, and the flux coating is wound with a combustible cord. App. is described.

**Fluxes.** Hubert Sutton and John W. W. Willstop. Brit. 400,609, Oct. 23, 1933. A flux for soft-soldering stainless steels, Zn, Cu, brass, bronzes, etc., comprises a mixt. of  $H_2PO_4$  and a basic substance vaporizable without

decompn., e. g.,  $NH_3$ ,  $PhNH_3$ , pyridine, toluidine, an excess of acid or base being present after formation of the resultant phosphate.

**Solders.** Haus Kanz. Brit. 400,817, Nov. 2, 1933. A Cu-contg. hard solder or welding material in rod or wire form is composed of 2 or more different alloys, 1 at least of which is produced in such form by mech. shaping so as to form at the joint an alloy of m. p. materially lower than that of Cu and which cannot itself be made by mech. shaping. Thus for soldering brass a low-melting solder contg. Zn with 42% Cu, which cannot be obtained in wire form by pressing, rolling or drawing, is produced at the joint by forming by mech. shaping a wire of a Cu-Zn alloy contg. more than 58% Cu and thus of high m. p. and filling or coating it with Zn. Coating may be effected by electrolysis, dipping, sherardizing, etc.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

The question of free rotation around a single carbon bond. Adolph Partz. *Sitzber. Naturforsch.-Ges. Univ. Tartu* 39, 214-23 (1932).—From heat capacity data and potential energy curves of ethane it is necessary to conclude that free rotation of Me groups take place. It is not possible to explain the excess sp. heat of ethane over  $C_2H_4$  by a torsional vibration instead of free rotation.

A. B. F. Duncan

**Methane and methane homologs as raw materials for chemical synthesis.** A. D. Petrov. *Coke and Chem.* (U. S. S. R.) 1932, No. 9, 28-35.—The process of cracking of  $CH_4$  (for production of gas black +  $H_2$  and  $C_2H_2$  +  $H_2$ ) and other paraffin hydrocarbons of low mol. wt. to form  $C_2H_4$ ,  $C_2H_6$ ,  $C_3H_8$ , etc., is outlined. Also the recently developed methods of production of synthetic rubber,  $Ac_2O$ ,  $AcOH$ , synthetic liquid fuel and other ultimate products of natural and coke-oven gases. Expts. by Krovatzkii on the oxidation of gas (compn.:  $CH_4$  52-56%,  $C_2H_6$  10-12%,  $C_3H_8$  7-20%, higher hydrocarbons 10-12%) led to the following observations: 1. Absence of catalytic action of N oxides on the process of oxidation by pure  $O_2$ . 2. Yields of alcs., aldehydes and acids of 32% were obtained by oxidation without a catalyst. 3. The highest yields were obtained at 400-500° with a sufficient amt. of  $O_2$ . 4. At 600-700° a partial decomn. of the products of oxidation takes place with formation of CO,  $CO_2$  and  $H_2O$ .

James Sorrel

**Influence of poles and polar linkings on the course pursued by elimination reactions. XXI. Dynamics of the elimination of the *tert*-butyl group from sulfonium compounds.** E. D. Hughes and C. K. Ingold. *J. Chem. Soc.* 1933, 1571 G; cf. *C. A.* 27, 5304.—*tert*-BuI and  $Me_3S$  in  $MeNO_2$  give *dimethyl-tert-butylsulfonium iodide*, decomp. 160°; *picrate*, decomp. 132°. The hydroxide decomposes in 2 directions, giving  $Me_2C:CH_3$ ,  $SMe_2$  and  $H_2O$  (A) and  $Me_3COH$  and  $Me_3$  (B), reaction B predominating in aq. soln. When it is allowed to decomp. completely at const. vol., the results are interrelated in precisely the way which is required by the hypothesis that reaction A is bimol., whereas reaction B is unimol.; reaction A is of the 1st order with respect to each ion, while B depends on the cation only. Extraneous  $HO$  ions produce a relative increase in the rate of reaction A. Reaction A is suppressed relatively to reaction B when the strongly basic  $HO$  ion is replaced by the less basic  $CO_3$  ion or the much less basic  $I$  ion. The course of the decomn. can be represented by the unimol. equation  $k_1 = (2/3t) \log_{10} a/(a-x)$  to the degree of accuracy expected. One effect of replacing  $H_2O$  by  $EtOH$  is to cause a great increase in the speed of both decomns.; the other main effect is to cause a selective facilitation of reaction A; a true solvent influence operates selectively on the simultaneous reactions. The data are given in 5 tables.

C. J. West

**Production of organo-metalloidal compounds by microorganisms. II. Dimethyl selenide.** Frederick Challen-

ger and Harry E. North. *J. Chem. Soc.* 1934, 68-71; cf. *C. A.* 27, 1612.—The volatile product from cultures of 2 strains of *P. brevicaulis* (*Scopulariopsis brevicaulis*) or sterile bread crumbs contg.  $NaSeO_4$  and  $NaSeO_3$  is  $Me_2Se$ , this is also produced when the mold is grown on Czapek-Dox soln. contg.  $NaSeO_4$  with glucose (2%) as the sole source of C; with selenite and bread cultures, considerable reduction to red Se occurs; this does not occur with selenate in bread or glucose cultures and better yields of  $Me_2Se$  are obtained. Attempts were made to obtain  $Me_2Se$  by addn. of S or certain of its compds. to bread cultures of strains A and C of *P. brevicaulis*; neg. results were obtained with S,  $Na_2SO_3$ ,  $Na_2S_2O_4$ ,  $CS(NH_2)_2$ ,  $EtSO_3Na$ , "rongalite" and thiodiglycolic acid and its Na salt.  $Et_2S$  is produced when  $Et_2SO$  but not  $Et_2SO_2$  is added to bread cultures of the mold. *Di-Me selenide mercuribromide*, m. 99-100°; *di-Et selenide mercurichloride*, m. 92.5°

C. J. West

**The preparation of aliphatic mercaptans and sulfonic acids of high molecular weight.** G. Collin, T. P. Hilditch, P. Marsh, and A. F. McLeod. *J. Soc. Chem. Ind.* 52, 272-5T (1933).—Practical directions are given to obtain excellent yields of alkyl mercaptans of high mol. wt. from the corresponding iodide or bromide and NaS in alc. in an autoclave. Heating the mercaptans with I in alc. yields the corresponding disulfides. The oxidation of the mercaptans or disulfides to the corresponding sulfonic acid is efficiently obtained by oxidation with  $K_2Cr_2O_7$  or  $KMnO_4$  in acetone. After completion of the oxidation a large excess of concd. aq.  $HCl$  is added, and this "salts out" the sulfonic acid. The yields of all these operations are very good.

A. L. Henne

**Production of chloropicrin from by-products of the acetone industry.** G. Sanna. *Rend. seminario facoltu sci. univ. Cagliari* 2, 87-9 (1932); *Chimie & industrie* 30, 1387.—By-products from the distn. of  $Me_2CO$  are allowed to fall in a mixt. of concd.  $HCl$  and  $HNO_3$ . The reaction is carried out in presence of a catalyst (not disclosed) without which the reaction is too violent, oxidation passes the desired stage and yields oxalic acid, thus reducing the yield of chloropicrin. This process gives a 70% yield with the tail fractions of either the 1st or 2nd rectification of  $Me_2CO$ , and a 20% yield with mixed acetone oils or distn. residues.

A. Papineau-Couture

**Mode of addition to conjugated unsaturated systems. VI. Addition of halogens and hydrogen halides to conjugated unsaturated carboxylic acids and esters.** C. K. Ingold, G. J. Pritchard and H. G. Smith. *J. Chem. Soc.* 1934, 79-86; cf. *C. A.* 27, 4775.— $\delta$ -Vinylacrylic acid (I) and Cl in  $H_2O$  give 60% of  $\delta$ -chloro- $\gamma$ -hydroxy- $\Delta^a$ -pentenoic acid (II), m. 73-4°; its structure was established by the action of  $O_3$ , giving  $AcCHO$ , identified as the 2,4-dinitrophenylhydrazone, m. 299-300° (decomn.). I in  $Et_2O$ , treated with aq.  $HClO_4$ , gives a dichlorodihydroxyvaleric acid, m. 160°. I and Cl in  $H_2O$  or I in  $Et_2O$  and aq.  $HBrO$  give the  $\delta$ -Br deriv. corresponding to II,



m. 92-3°. The addn. of Br to sorbic acid in CS<sub>2</sub> gives as the main product the cryst.  $\gamma,\delta$ -dibromide (III), together with a liquid by-product, the quantity of which was considerable in CS<sub>2</sub>, CHCl<sub>3</sub> and hexane but was much less in AcOH or with quinolinium tribromide in AcOH, all expts. at room temp. III with O<sub>3</sub> gives MeCH:CHBrCHO and CHOCO<sub>2</sub>H. The liquid dibromide contains III and some  $\alpha,\beta$ -isomer. ICl and sorbic acid give  $\gamma$ -chloro- $\delta$ -iodo- $\beta$ -ethylacrylic acid (IV), m. 88°, and a liquid by-product not examd. IV with EtOH-AcOK or C<sub>6</sub>H<sub>5</sub>N, followed by esterification, gives Et sorbate and Et  $\gamma$ -chlorosorbate, b<sub>16</sub> 105-10°, m. 31-2°. The action of Cl on sorbic acid in H<sub>2</sub>O or of aq. HClO in Et<sub>2</sub>O gives 70% of  $\delta$ -chloro- $\gamma$ -hydroxy- $\Delta^{\alpha}$ -hexenoic acid (V), m. 97°; oxidation with O<sub>3</sub> gives ethylglyoxal, identified as the 2,4-dinitrophenylhydrazone, m. 247°; in neutral soln. KMnO<sub>4</sub> gives MeCHClCO<sub>2</sub>H; reduction of V with Pt oxide and H<sub>2</sub> gives  $\delta$ -chloro- $\gamma$ -hexolactone, b<sub>16</sub> 130-2°, b<sub>16</sub> 243°, m. about 10°. The main product of the action of Br was the  $\delta$ -Br deriv. corresponding to V, m. 110°; the oily by-product, esterified with MeOH, gave a fraction analyzing for Me bromohydroxyhexenoate, b<sub>16</sub> 118°, and a fraction, C<sub>7</sub>H<sub>11</sub>O<sub>4</sub>Br, b<sub>16</sub> 148-50°, m. 154-5°. Me sorbate with Br in H<sub>2</sub>O gives Me  $\gamma,\delta$ -dibromo- $\Delta^{\alpha}$ -hexenoate, since O<sub>3</sub> yields  $\alpha$ -bromocrotonaldehyde, whose 2,4-dinitrophenylhydrazone, deep red, m. 220° (decompn.). Br and sorbic acid in EtOH give the  $\gamma$ -Br deriv., also obtained by the action of EtOH-KOH on the di-Br acid. The 2,4-dinitrophenylhydrazone of AcH exists in 2 forms, the less stable modification, orange-red, m. 146°, changing to the more stable, yellow, m. 162°, on crystn. from EtOH. Liquid HCl and sorbic acid at room temp. for several days give an oil, which decomp. on distn. and consists largely of  $\delta$ -chloro- $\Delta^{\beta}$ -hexenoic acid, since O<sub>3</sub> gives AcCHO. Br and Et muconate give a dibromide, m. 81°, yielding with O<sub>3</sub> Et  $\beta$ -bromo- $\beta$ -aldehydoacrylate, the 2,4-dinitrophenylhydrazone of which, yellow, m. 193-4°, (CO<sub>2</sub>H)<sub>2</sub> and (CHBrCO<sub>2</sub>H)<sub>2</sub>; ICl gives a compd., m. 68°, believed to be Et  $\beta$ -chloro- $\alpha$ -iodo- $\Delta^{\gamma}$ -dihydromuconate. VII. Addition of hydrogen cyanide and methyl malonate to methyl cinnamylidenemalonate. Dora A. Duff and C. K. Ingold. *Ibid.* 87-93.—The addn. of 2 mols. HCN to PhCH:CHCH:CH(CO<sub>2</sub>Me)<sub>2</sub> and hydrolysis gives  $\delta$ -phenylbutane- $\alpha,\beta,\gamma$ -tricarboxylic acid (I), m. 187-90° (decompn.) (cf. Thiele and Meisenheimer, *Ann.* 306, 247(1899)); tri-Me ester, m. 60°; di-Me ester, m. 112°. PhC(CO<sub>2</sub>Et):CH<sub>2</sub> and (EtO<sub>2</sub>C)<sub>2</sub>CHCH<sub>2</sub>CO<sub>2</sub>Et with EtONa give Et-phenylbutane- $\alpha,\beta,\gamma$ -tricarboxylate, b<sub>16</sub> 165°; boiling with 1 vol. H<sub>2</sub>SO<sub>4</sub>, 1 vol. H<sub>2</sub>O and 3 vols. HCO<sub>2</sub>H for 16 hrs. gives  $\delta$ -phenylbutane- $\alpha,\beta,\gamma$ -tricarboxylic acid, m. 210-2°. PhCH<sub>2</sub>CH(CO<sub>2</sub>Et)<sub>2</sub> and Et lunarite with EtONa give Et-phenylbutane- $\alpha,\beta,\gamma,\gamma$ -tetracarboxylate (II), b<sub>16</sub> 204-8°, hydrolyzed to a stereoisomeric form of I, m. 168°; with Et  $\alpha$ -bromosuccinate there results an isomeric II, b<sub>16</sub> 184-6°, which yields I on hydrolysis. The original nitrile thus has the structure PhCH<sub>2</sub>CH(CN)CH(CN)CH(CO<sub>2</sub>Me)<sub>2</sub>; the intermediate in the reaction is the  $\alpha,\beta$ -adduct, which theory requires to possess greater thermodynamic stability than its  $\alpha,\delta$ -isomer. The addn. product of 2 mols. CH<sub>2</sub>(CO<sub>2</sub>Me)<sub>2</sub> to PhCH:CHCH:CH(CO<sub>2</sub>Me)<sub>2</sub> (Meerwein, *Ann.* 360, 323-47(1908); *C. A.* 2, 1005), m. 81°, has the structure suggested by M. The hydrolysis product,  $\beta$ -phenylisohexane- $\alpha,\alpha,\epsilon$ -tricarboxylic acid, m. 140°, subjected to the Dieckmann reaction, gives 2 isomers, m. 139° and 144°, which may be either Me 6- or 2-carboxy-3-phenylcyclohexanone-5-acetate; the lower-melting isomer changes into the higher-melting on standing several months or with a little HCl in cold MeOH; hydrolysis with HCl-HCO<sub>2</sub>H gives 3-phenylcyclohexanone-5-acetic acid, m. 118-9°, which is reduced to 3-phenylcyclohexane-1-acetic acid (III), m. 52-4°. Because of the possibility that the reduction product might be 2-benzylcyclopentane-1-acetic acid (IV), this acid was prepd. as follows: Et cyclopentanone-2-carboxylate, from Et adipate, with PhCH<sub>2</sub>Cl and EtONa gives the Et ester, b<sub>16</sub> 208°, n<sub>D</sub><sup>20</sup> 1.5050, of  $\alpha$ -benzylglypic acid, m. 116-8°; Ac<sub>2</sub>O gives 2-benzylcyclopentanone (V), b<sub>16</sub> 144-6° (semicarbazone, m. 198-200°); in the 1st

attempt to introduce the AcOH side chain, V was reacted with NCCH<sub>2</sub>CO<sub>2</sub>Et and piperidine, giving Et  $\alpha$ -cyan-2-benzylcyclopentylidene-1-acetate, m. 81-3°; satisfactory conditions for hydrolysis could not be detd; cold concd. H<sub>2</sub>SO<sub>4</sub> gives Et 2-sulfolbenzylcyclopentylidene-1-malonamate, m. 120°. Reduction of V with Na gives 2-benzylcyclopentanol, b<sub>16</sub> 154°; HBr in AcOH gives 2-bromo-1-benzylcyclopentane, b<sub>16</sub> 150-5°; CH<sub>2</sub>(CO<sub>2</sub>Et)<sub>2</sub> and EtONa give Et 2-benzylcyclopentane-1-malonate, b<sub>1</sub> 142-50°; the free acid m. 137° and on heating at 150° gives IV. III was prepd. as follows: 3-Phenylcyclohexanol was converted into the bromide and condensed with CH<sub>2</sub>(CO<sub>2</sub>Et)<sub>2</sub>, giving the Et ester, b<sub>16</sub> 160-5°, of 3-phenylcyclohexane-1-malonamic acid, m. 160°; decarboxylation gives III. This proves that the suggested Wagner change has nothing to do with the malonic ester addn. and, probably, with the HCN addn. C. J. West

4 Addition of hydrogen bromide to olefins. J. C. Smith. *Nature* 132, 447(1933). HBr passed through a 0.1% soln. of undecylenic acid in ligroin gives 70-80% yields of almost pure  $\alpha$ -bromoundecic acid. If O is removed either by passage of H or by addn. of Ph<sub>2</sub>NH or by both methods a mixt. is obtained in which the  $\alpha$ -Br isomer predominates. This substantiates Karasch's views.

A. L. Henne

4 Halogenation. V. Bromination and iodination of some fatty acids. Phuldeo Sahay Varma and V. T. Shridhara Menon. *J. Indian Chem. Soc.* 10, 591-2 (1933); cf. *C. A.* 24, 5740. The fatty acid or anhydride (20 cc.) was refluxed with KBr or KI (5 g.) and concd. H<sub>2</sub>SO<sub>4</sub> or nitrosulfonic acid (10 cc.) was gradually added. After 5 hrs. the mixt. was cooled, treated with H<sub>2</sub>SO<sub>4</sub> and extd. with Et<sub>2</sub>O. The dried ext. was evapd. and the residue recrystd. from H<sub>2</sub>O or alc. The lower fatty acids gave poor yields but with the higher acids the method gave satisfactory yields of  $\alpha$ -Br and  $\alpha$ -I derivs., both of which have been obtained in this manner from AcOH, Ac<sub>2</sub>O, EtCO<sub>2</sub>H, butyric anhydride, isobutyric acid, palmitic and stearic acids, in addn. to  $\alpha$ -Br derivs. of lauric and myristic acid. The results are tabulated.

5 VI. Bromination and iodination of benzonitrile. Phuldeo Sahay Varma and Nirode Baran Sen-Gupta. *Ibid.* 593-4.—Br and I derivs. have been obtained directly by the action of KBr and KI with concd. H<sub>2</sub>SO<sub>4</sub> on PhCN. A layer of PhCN (10 cc.) was poured over concd. H<sub>2</sub>SO<sub>4</sub> (5 cc.) in a test tube and KBr (4 g.) was carefully added. After 3 hrs. the solid upper layer was removed, shaken with cold H<sub>2</sub>O and filtered. On evapn. the filtrate gave 2.5 g. of *p*-BrC<sub>6</sub>H<sub>4</sub>CN. The residue was digested with H<sub>2</sub>O at 50° and yielded 0.6 g. of *o*-BrC<sub>6</sub>H<sub>4</sub>CN. The remaining solid was extd. with boiling H<sub>2</sub>O and sepd. into 0.8 g. BzOH and 0.4 g. BzNH<sub>2</sub>. When similarly treated with KI and concd. H<sub>2</sub>SO<sub>4</sub>, 10 cc. PhCN gave 2 g. *p*- and 0.7 g. of *o*-IC<sub>6</sub>H<sub>4</sub>CN, together with 0.7 g. of BzOH and 1.1 g. of BzNH<sub>2</sub>. VII. Iodination and bromination of naphthalene and  $\beta$ -naphthol. Phuldeo Sahay Varma, D. N. Mozumdar and K. Kunjan Rajah. *Ibid.* 595-8.—By refluxing a mixt. of 10 g. C<sub>10</sub>H<sub>8</sub>, 10 cc. glacial AcOH, 10 g. of I and 15 cc. of a mixt. of equal parts of nitrosulfonic acid and fuming HNO<sub>3</sub>, 6.2 g. of  $\alpha$ -iodonaphthalene (I), b. 302-5° (picrate, m. 127°), was formed. Other variations of the iodination with K<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, CrO<sub>3</sub>, a mixt. of concd. H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>, etc., varying amts. of I, and different reaction periods are tabulated together with yields of I. The iodination of  $\beta$ -HOC<sub>10</sub>H<sub>7</sub> (5 g.) in 10 cc. concd. NH<sub>4</sub>OH by the dropwise addn. of 4.5 g. of I in KI soln. gave 9.2 g. of iodo- $\beta$ -naphthol, m. 93-4°. The nascent NI<sub>2</sub> formed by the action of I on NH<sub>4</sub>OH seems to be the active iodination agent. The bromination of 10 g. of C<sub>10</sub>H<sub>8</sub> in the presence of a nitrosulfonic-nitric acid mixt. yielded 10.1 g. (62%) of C<sub>10</sub>H<sub>7</sub>Br, b. 283-5°, and 3 g. of C<sub>10</sub>H<sub>7</sub>NO<sub>2</sub>. Bromination of  $\beta$ -HOC<sub>10</sub>H<sub>7</sub> (5 g.) at 10° in the presence of concd. H<sub>2</sub>SO<sub>4</sub> (1 cc.) yielded 5.8 g. of 1-bromo- $\beta$ -naphthol, m. 83-4°. With fuming H<sub>2</sub>SO<sub>4</sub> and 3.6 cc. Br, 3.5 g. of 1,6-dibromo- $\beta$ -naphthol, m. 105-6°, was produced.

C. R. Addinall

Iodine compounds in seaweed. Etsuo Masuda. *Proc. Imp. Acad.* (Tokyo) 9, 599-601(1933).—The org. I

compd. from *Ecklonia cava*, oxidized with  $H_2O_2$ , gives the following compds.:  $CH_2IClO_2H$ ,  $(CH_2I)_2CO$ ,  $CHI_2CO_2H$ ,  $I_2C:CHCO_2H$  and a compd.,  $I_2CCHO$ , yellow, m. 126-7° (decompn.); the yields, based on the dry powder, were: 0.02, 0.08, 0.02, 0.009 and 0.007%, resp. C. J. West

**Catalytic hydrogenation of trifluoroacetic anhydride. Trifluoroethyl alcohol.** Fred. Swarts. *Compt. rend.* 197, 1261-4 (1933).  $-(CF_3CO)_2O$ , pure or in  $Bu_2O$ , hydrogenated over Pt black at 20-40° and 45-50 atm., yields principally  $CF_3CO_2CH_2CF_3$  (I), m. -65.5°,  $b_{760}$  55.0°,  $d_4^{20}$  1.5179,  $d_4^{15}$  1.4725,  $n_D^{20}$  1.2799,  $n_D^{15}$  1.2812,  $n_{H_2O}^{15}$  1.2823, viscosity  $\eta^{20}$  0.006719,  $\eta^{40}$  0.005067, and also  $CF_3CH_2OH$  (II), m. -43.5°, b. 74.05°,  $d_4^{20}$  1.4106,  $d_4^{15}$  1.3739,  $n_D^{20}$  1.2806,  $n_D^{15}$  1.2907,  $n_D^{10}$  1.2934,  $\eta^{20}$  0.01096,  $\eta^{40}$  0.00796,  $CF_3C(=O)H$  (III) (sepd. from II by its formation with  $Bu_2O$  of an azeotropic mixt. b. 144°) and  $CF_3Me$  (IV), m. -107°, b. -46.8°, crit. temp. 71-2°, wt. of normal I. 3.784 g. No aldehyde is formed. II is also formed by hydrogenation of  $CF_3CONH_2$  in  $Et_2O$ , and is readily obtained by sapon. of I in cold  $H_2O$ . With  $K_2CO_3$  or  $CaO$ , II yields the alcoholates; with  $H_2CrO_4$  it gives III but no aldehyde;  $HBr$  is inert, but  $PBr_5$  yields  $CF_3CH_2Br$ , b. 26.5°,  $d_4^{20}$  1.8383. With  $H_2SO_4$ , esterification of II is difficult, and  $Ba(CF_3CH_2SO_4)_2 \cdot H_2O$  is obtained. II and  $AcCl$  give  $CF_3CH_2OAc$ , b. 77.85°,  $d_4^{20}$  1.2887,  $d_4^{15}$  1.32058,  $n_D^{20}$  1.32191,  $n_D^{15}$  1.32517,  $n_D^{10}$  1.3273,  $\eta^{20}$  0.006987,  $\eta^{40}$  0.004676. In sunlight, IV and Cl form  $CF_3CCl_3$ , m. 13°, b. 46°. H. A. Beatty

**Preparation of isobutylenediamine.** H. D. K. Drew and F. S. H. Head. *J. Chem. Soc.* 1934, 49-50.  $Me_2C:CH_2$  is converted into  $Me_2CClCH:NOH$ , m. 104°; in satd.  $EtOH-NH_3$  this yields the *HCl* salt, m. 210° (decompn.), of  $\alpha$ -aminoisobutyraldoxime (I), m. 89° (benzylidene deriv., m. 110°); reduction of the oxime with  $Na-Hg$  in  $AcOH$  gives a mixt. of 15-20% of  $Me_2C(NH_2)CH_2NH_2$  and a tetramethylpiperazine, probably  $Me_2C \cdot CH_2 \cdot NH \cdot CMe_2 \cdot CH_2 \cdot NH$ . I and  $Ac_2O$  give  $\alpha$ -

acetamidoisobutyronitrile and *N*-acetyl- $\alpha$ -aminoisobutyraldoxime, m. 198-9°. C. J. West

**Serinephosphoric acid obtained on hydrolysis of vitellinic acid.** P. A. Levene and A. Schormüller. *J. Biol. Chem.* 103, 537-42 (1933).—Hydrolysis of vitellinic acid by the method of Lippmann and Levene (*C. A.* 27, 743) followed by treatment with brucine, yielded *serinephosphoric acid*,  $C_6H_8O_6NP$  (I), isolated as the *brucine* salt, m. 98°. Hydrolysis of the *Ba* salt of I gave serine in 50% yield. The failure to obtain a peptide of I with glutamic acid, although in the hydrolysis of casein by more vigorous methods such a peptide appears, indicates that in vitellinic acid I is not combined with glutamic acid. K. V. T.

**Enol content in the acetylacetone series.** Charley Gustafsson. *Finska Kemistamsfundels Medd.* 42, 64-8 (1933).—The enol contents of valeryl- and caproyl-acetone determined by their optical exaltation are 77% and 68% which are, respectively, 7.4% and 14.5% higher than the values given by titration. A German summary is included. H. C. Duus

**Optical rotatory dispersion in the carbohydrate group. II. Ascorbic acid.** R. W. Herbert, E. L. Hirst and C. E. Wood. *J. Chem. Soc.* 1933, 1564-7; cf. *C. A.* 28, 1071.—The rotatory dispersion of aq. solns. of ascorbic acid may be represented by the equation  $\alpha_\lambda = 2.518/(\lambda^2 - 0.195) - 1.340/(\lambda^2 - 0.063)$ . The equation representing the dispersion of *Na* ascorbate is  $\alpha_\lambda = 1.916/(\lambda^2 - 0.060)$ . W. Gordon Rose

**The preparation of glucuronic acid from borneol-glucuronic acid.** K. T. Swartz and C. O. Miller. *J. Biol. Chem.* 103, 651-5 (1933).—The hydrolysis of borneol-glucuronic acid by the method of Quick (*C. A.* 21, 3373), is only 50% complete, but if the borneol is steam-distd. at the same time the yield is 69%. During the hydrolysis there is formed *bornyl borneolglucuronate*, which seps. as an oil  $(C_{16}H_{17})_2 \cdot C_6H_5O_7$ , m. (after purification) 96-7°. K. V. Thimann

**Ascorbic acid and synthetic analogs.** D. K. Baird, W. N. Haworth, R. W. Herbert, E. L. Hirst, F. Smith

and M. Stacey. *J. Chem. Soc.* 1934, 62-7; cf. *C. A.* 28, 1071.—Improved directions are given for the prepn. of *d*-glucoascorbic acid (3-keto-*d*-glucoheptonofuranolactone) (I); the hydrate m. 138°,  $[\alpha]_D^{20} -14^\circ$  ( $H_2O$ , c 1 as hydrate),  $-22^\circ$  ( $MeOH$ , c 1 as hydrate); the *Na* salt has  $[\alpha]_D^{20} -80^\circ$  (neutral aq. soln., c 0.75); the anhyd. compd. m. 191° (decompn.); the oxidation compd. with acid I gives with  $PhNHNH_2$  a compd.,  $C_{19}H_{20}O_6N_4$ , yellow, m. 222°. Details are given of the prepn. *l*-arabinosazone and arabinosone, which reacts with  $NH_3$ ,  $KCN$  and  $CaCl_2$  to give  $\psi$ -araboascorbic acid, converted by 8% aq.  $HCl$  to the *l*-acid (3-keto-*l*-glucofuranolactone), m. 168° (decompn.),  $[\alpha]_D^{20} 19^\circ$  ( $H_2O$ , c 0.6); the *Na* salt shows  $[\alpha]_D^{20} -94^\circ$  (neutral aq. soln., c 0.7); the primary oxidation product showed  $[\alpha]_D^{20} -100^\circ$  (in presence of III immediately after oxidation with I), changing to 12° in 90 hrs.;  $[\alpha]_D^{20}$  of *Na* salt 70° (approx.) in aq. soln. immediately after neutralization. In the same way *d*-galactosone yields *d*-galactascorbic acid (3-keto-*d*-galactofuranolactone), whose monohydrate m. 100° (decompn.); *Na* salt,  $[\alpha]_D^{20} -77^\circ$  (neutral aq. soln., c 0.7). Lactosone yields  $\psi$ -lactascorbic acid, which gives I with 8%  $HCl$ . The absorption spectra of ascorbic acid and its analogs are given; all the substances, excluding the  $\psi$ -compds., show in dil. aq. soln. (2 g. per 100 cc.) an intense band at  $\lambda 265 m\mu$ ; in more concd. aq. soln. the band is at  $\lambda 240-5 m\mu$  and the neutral *Na* salts of the acids have a band at  $\lambda 265 m\mu$ ; in all cases  $\log \epsilon$  is very close to 4. C. J. West

**Influence of solvents and of other factors on the rotation of optically active compounds. XXXII. Rotation dispersion of esters of dibenzoyl-*d*-tartaric acid in various solvents.** T. S. Patterson and David McCreath. *J. Chem. Soc.* 1934, 100-3; cf. *C. A.* 27, 4779.—Data are given for the *Me*, *Et*, *Pr* (I) and *Bu* (II) esters of dibenzoyl-*d*-tartaric acid. I b. 234°, m. 45.5°,  $[\alpha]_D^{20} -78.16^\circ$  ( $C_6H_5N$ , c 2.162); II b. 250°, m. 43°,  $[\alpha]_D^{20} -57.62^\circ$  ( $C_6H_5N$ , c 3.64). Values for *d* and  $[\alpha]$  are given for the *Me* ester in  $MeNO_2$ ,  $C_2H_5Br$ ,  $C_3H_7N$  and quinoline; for the other 3 esters in  $C_2H_5Br$ ,  $C_3H_7N$  and quinoline. While the results confirm in general those previously published for the *o*-nitrobenzyl ester, in no case was there found an equally definite region of anomalous dispersion. For the *Me* ester a distinct min. occurs in the *T-R* curve for green light in  $C_2H_5Br$  at a temp. of about 50°, whereas in quinoline the graph appears to be approaching a min. at a considerably lower temp., in agreement with which the actual rotation is lower; much the same thing applies to the solns. in  $C_3H_7N$  and  $MeNO_2$ . For the *Et* ester a min. appears in all 3 solns. but at a higher temp. in quinoline than in the other 2. The *Pr* ester shows a very similar behavior but with a tendency for the min. to move to a higher temp. and this tendency is more pronounced in the *Bu* ester. The rotation of the *Bu* ester in quinoline rises as the temp. falls, in such a way as to cross the 0 axis and become pos., in the sequences red, yellow, green and blue; and the temp. rotation curves just begin to intersect one another at a temp. of 0°, below which the region of visibly anomalous dispersion would doubtless develop. C. J. West

**Condensation of chloral and bromal with diamides.** F. D. Chattaway and E. J. F. James. *J. Chem. Soc.* 1934, 109-13.—Methylurea and chloral hydrate (2 mols.) in  $H_2O$  give *N*-methyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)urea (I), m. 140° (decompn.); *di-Ac* deriv., m. 90-1° (decompn.);  $Ac_2O$  in *N*  $NaOH$  gives *bis*( $\beta,\beta,\beta$ -trichloro- $\alpha$ -*N'*-methylcarbamidoethyl) ether, m. 230° (decompn.); *di-Ac* deriv., m. 131° (decompn.); *Na* in  $EtOH$  gives the  $\alpha$ -*EtO* deriv. of I, m. 145° (decompn.). Ethylurea gives *N*-ethyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)urea (II), m. 138° (decompn.); *di-Ac* deriv., m. 80° (decompn.); *bis*( $\beta,\beta,\beta$ -trichloro- $\alpha$ -*N'*-ethylcarbamidoethyl) ether, m. 226° (decompn.); *di-Ac* deriv., m. 145° (decompn.);  $\alpha$ -*MeO* deriv. of II, m. 180° (decompn.);  $\alpha$ -*EtO* deriv., m. 135° (decompn.);  $\alpha$ -*PrO* deriv., m. 140° (decompn.);  $\alpha$ -*BuO* deriv., m. 95° (decompn.). Diphenylurea gives *N,N*-diphenyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)urea, m. 170° (decompn.); *mono-Ac* deriv.,

m. 108° (decompn.). Bromal and methylurea give *N*-methyl-*N'*-( $\beta,\beta,\beta$ -tribromo- $\alpha$ -hydroxyethyl)urea (III), m. 180° (decompn.); *di*-Ac deriv., m. 119° (decompn.); *bis*( $\beta,\beta,\beta$ -tribromo- $\alpha$ -*N'*-methylcarbamidoethyl)urea, m. 162° (decompn.); *di*-Ac deriv., m. 180° (decompn.);  $\alpha$ -EtO deriv. of III, m. 162° (decompn.). The *Ph* analog (IV) of III m. 167° (decompn.); its *di*-Ac deriv. m. 142° (decompn.); the ether m. 185° (decompn.), and its *di*-Ac deriv. m. 163° (decompn.); the  $\alpha$ -MeO deriv. of IV m. 158° (decompn.), and the  $\alpha$ -EtO deriv. m. 145° (decompn.). The *N,N*-*di*-Me analog of III m. 165° (decompn.) and forms an unstable hydrate, m. 96° (decompn.). The *N,N*-*di*-Ph analog of III m. 168° (decompn.). Oxamide and chloral give *N,N'*-*bis*( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)oxamide (V), decomp. gradually above 190° into its constituents; *di*-Ac deriv., m. 192°. Et *N*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)oxamide and PhNH<sub>2</sub> in EtOH give *N*-phenyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)oxamide, decomp. above 180° into chloral and *N*-phenyloxamide; *mono*-Ac deriv., m. 185°. V and PCl<sub>5</sub>, heated on the water bath for 30 min., give *N,N'*-*bis*( $\alpha,\beta,\beta,\beta$ -tetrachloroethyl)oxamide, m. 170°; crystn. from boiling EtOH gives the  $\beta,\beta,\beta$ -trichloro- $\alpha$ -ethoxyethyl deriv., m. 176°; EtOH-NH<sub>2</sub> gives the corresponding *di*-NH<sub>2</sub> deriv., m. 213°; PhNH<sub>2</sub> gives the *dianilino* deriv., m. 193° (decompn.). Malonamide gives *C,N,N'*-*tris*( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)malonamide, prisms or plates, m. 180°; *tri*-Ac deriv., m. 165° (decompn.). *N,N'*-*Diphenyl* ( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)malonamide, m. 187° (decompn.); Ac deriv., m. 210° (decompn.). *N*-Phenyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)malonamide, m. 170° (decompn.); *di*-Ac deriv., m. 175° (decompn.). *N,N'*-*Bis*( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)ethylmalonamide, m. 163° (decompn.); *di*-Ac deriv., m. 132°. *N*-Phenyl-*N'*-( $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethyl)ethylmalonamide, m. 164° (decompn.); Ac deriv., m. 185° (decompn.). Chloral and malonanilic acid give  $\gamma,\gamma,\gamma$ -trichloro- $\beta$ -hydroxybutyranilide, m. 146° (decompn.); Ac deriv., m. 149° (decompn.). NCCH<sub>2</sub>CONH<sub>2</sub> gives cyanoacet- $\beta,\beta,\beta$ -trichloro- $\alpha$ -hydroxyethylamide, m. 155° (decompn.); Ac deriv., m. 108° (decompn.). C. J. West

**Mercury derivatives of the purine group.** Mario Covello. *Rend. accad. sci. Napoli* [4], 3, 65-70(1933).—The Hg derivs. of purines should have pharmacol. properties (cf. C. A. 18, 880; 23, 1622). Nineteen g. of a purine base contg. Me or CH<sub>2</sub>Cl at position 8 was dissolved in 1 l. of 5% AcOH, treated with 30 g. of Hg(OAc)<sub>2</sub> in 10 cc. AcOH and 20 cc. H<sub>2</sub>O, heated 2 days under a reflux condenser and finally evapd. to 300 cc. The Hg acetate deriv. (—HgOAc substituted for a H of the 8-Me group) ppts. Ten g. of this acetate heated with 20 g. KI in 50 cc. H<sub>2</sub>O, filtered and evapd. to 15 cc. gives the *mercuripurine*, (purine)<sub>2</sub>Hg. 8-Methylcaffeinemericuric acetate decomposes 250°; *mercuri-8-methylcaffeine* decomposes 300°; *tetrachlorotetramethylxanthinemericuric acetate* does not decompose 300°; *mercuritetrachlorotetramethylxanthine* decomposes 200°; *trichloro-8-methylcaffeinemericuric acetate* decomposes above 300°; *mercuritrichloro-8-methylcaffeine* browns at 200° without melting. All are sol. in weakly alk. solns. The Hg is not ionizable in these compds.: solns. treated with NH<sub>4</sub> polysulfide do not blacken appreciably, and HgO is not formed on treatment with potash. Janet E. Austin

**Phytochemical notes. II. The carbohydrates of several plant downs.** E. Votoček and J. Zvoníček. *Collection Czechoslov. Chem. Communications* 5, 448-451(1933); cf. C. A. 26, 5306.—The materials were extd.

with Et<sub>2</sub>O, boiled with water to give an aq. ext., boiled with 3% H<sub>2</sub>SO<sub>4</sub> for 8 hrs. to dissolve hemicelluloses, and the residue dissolved in 80% H<sub>2</sub>SO<sub>4</sub>, dild., boiled, and tested for glucose to identify true cellulose. J. J. W.

**Carbon rings. XXVI. Many-membered cycloalkylamines.** L. Ruzicka, M. W. Goldberg and M. Hürbin. *Helv. Chim. Acta* 16, 1330-42(1933); cf. C. A. 27, 5062.—Cyclooctylamine (I), m. 179-80°, cyclopentadecylamine (II), m. 137.5-38° and 1,16-diaminocyclotriacotane (III), m. 178-9° (decompn.), were prepd. by reduction of the corresponding oximes with Na and alc. I and III showed no noteworthy physiol. effect. II (1:100,000) stopped the heat of an isolated frog heart in diastole while substances like digitalis do so in systole. Oxime of I, m. 33°, d<sub>4</sub><sup>20</sup> 1.025, d<sub>4</sub><sup>25</sup> 0.979, n<sub>D</sub><sup>20</sup> 1.508, n<sub>D</sub><sup>25</sup> 1.4834, M<sub>D</sub><sup>20</sup> 41.05, and M<sub>D</sub><sup>25</sup> 41.22; oxime of II, m. 75-6°, d<sub>4</sub><sup>20</sup> 0.9273, n<sub>D</sub><sup>20</sup> 1.4830, M<sub>D</sub> 73.06; oxime of III, m. 141-2°. A. W. D.

**The trans- $\alpha,\alpha'$ -dimethylcyclohexanone of Skita should be a cis isomer.** R. Cornubert and M. de Demo. *Compt. rend.* 197, 843 5(1933).—The prepn. of  $\alpha,\alpha'$ -dimethylcyclohexanone (I) from the hexanol by Skita's method (C. A. 18, 979) has been repeated. It does not combine with NaHSO<sub>3</sub> but gives 2 oximes m. 79° (Skita 86°) and 119°; 2 semicarbazones m. 183° and 197°; and 2 tetrahydropyrene compds. m. 175° and 216°. These compds. are identical with those prepd. from I made by methylation of  $\alpha$ -methylcyclohexanone (C. A. 22, 1900) since the oxime m. 65° after further purification m. 79°. Skita's ketone is identical with that of C. and D. and must be the cis form. Janet E. Austin

**p-Cymene. I. The preparation of p-cymene from white camphor oil by the action of sulfur.** Seizō Kimura. *J. Soc. Chem. Ind., Japan*, 37, Suppl. binding 4(1934).—Addns. of vulcanization accelerators, activated C or Japanese acid clay to the reacting substances resulted in increased yields. When ZnCl<sub>2</sub> was used for dehydrating cineole in white camphor oil a high yield of very pure p-cymene was obtained. The combined use of vulcanization accelerators or activated C with ZnCl<sub>2</sub> was ineffectual and heating under reduced pressure was unfavorable for the completion of the reaction. Similar results were obtained when prepg. p-cymene from dipentene in camphor oil with S. II. **The preparation of an azo dye and 5-amino-p-cymene.** *Ibid.* 4.—p-Cymene was nitrated to 2-nitro-cymene (yield 46%), then reduced to 2-aminocymene (yield 60-77%). Coupling with diazotized sulfanilic acid gave a red azo dye found to be p-sulfolbenzeneamino-azo-p-cymene. Diazotization of this compd. resulted in the formation of 5-amino-p-cymene. K. K.

**The shifting of the allyl group.** Jakob Meisenheimer and Georg Beutter. *Ann.* 508, 58-80(1933).—PhCH:—CHCH<sub>2</sub>Cl reacts with metallic acetates to give PhCH:—CHCH<sub>2</sub>OAc (I) (normal substitution) or PhCH(OAc)—CH:CH<sub>2</sub> (II) (abnormal substitution); a rearrangement of II into I also occurs. The % of II and I formed with various acetates in 1 hr. on warming on the water bath were: Li, 9, 55; Na, 20, 35; K, 22, 38; Mg, 0, 44; Ca, 6, —; Ba, 21, 36; Pb, 30, 46; at this temp. there was considerable polymerization; at 50° there was much less polymerization; the % of II formed at 50° was: Li, 48 hrs., 12; K, 24 hrs., 35; Mg, 120 hrs., 0; Ca, 72 hrs., 5; Ba, 63 hrs., 24. The effect of solvent upon the reaction (using AcOK) is shown by the following values: pure AcOH, 27% II, 32% I; AcOH with 3.6% H<sub>2</sub>O, 22, 38; with 7.2% H<sub>2</sub>O, 19, 43; with 12.6% H<sub>2</sub>O, 14, 50. Thus H<sub>2</sub>O favors the normal substitution. Using PhCH:—CHCH<sub>2</sub>Cl and AcOK in the concns. given, the % yields of II were: N, 1.5 N, 22%; N, 2.5 N, 28%; 2 N, 3 N,

	<i>Eriophorum angustifolium</i>	<i>Carduus acanthoides</i>	<i>Taraxacum officinalis</i>	<i>Asclepias syriaca</i>	<i>Populus nigra</i>
J <sub>2</sub>   H <sub>2</sub> SO <sub>4</sub>	blue	green	green	green	blue-green
Aq. ext.	galactose	fructose	pentose	fructose	mannose
	xylose	xylose		xylose	xylose
Hemicellulose	galactose	galactose	xylose	xylose	xylose
	xylose	xylose	(hexose)		mannose
True cellulose	+	+	+	+	
Pentosan in original fiber	36.5%	25.8%	28.8%	31.0%	28.8%



1°; its alc. solns. give a green color with alc. KOH. It is also formed from I,  $\text{PhHNH}_2 \cdot \text{HCl}$  and  $\text{NaOAc}$ , but in lower yield. In accordance with the behavior of compds. of the XII type, the products obtained give with alc. KOH more or less intense colors as a result of the formation of quinonoid salts of the XIII type.

C. C. Davis

**The monochlorination of *m*-nitrotoluene.** W. E. Evison. *J. Soc. Chem. Ind.* 52, 275-6T (1933). The chlorination of *m*-nitrotoluene gives a product 30% of which is the 6-Cl, 21% the 2-Cl, and 10-15% the 4-Cl isomer, together with about 10% of di-Cl compds. A. L. H.

**Nitration of alkylbenzenes.** I. Nitration of *p*-ethyltoluene. O. L. Brady and J. N. E. Day. *J. Chem. Soc.* 1934, 114-21.—This work was undertaken with the idea of studying the view that the electron-donating power of alkyl groups increases with the length of the C chain and that branched chains are more effective than isomeric normal chains. On mononitration of *p*- $\text{EtC}_6\text{H}_4\text{Me}$  (I) with  $\text{HNO}_3$ - $\text{H}_2\text{SO}_4$  under conditions which ensure complete mononitration of PhEt, I is only partly nitrated, some 14% being recovered unchanged; oxidation also occurs with the production of *p*- $\text{MeC}_6\text{H}_4\text{Ac}$  and *p*- $\text{MeC}_6\text{H}_4\text{CO}_2\text{H}$ ; the highest-boiling fraction,  $b_{700}$  247-9°, consists essentially of the 2- $\text{NO}_2$  deriv. of I; oxidation gives 2-nitro-*p*-toluic acid; the intermediate fractions were mixts., probably contg. the 3- $\text{NO}_2$  deriv. of I, although it could not be isolated; 3-benzamido-*p*-ethyltoluene(?), m. 131°. Less drastic nitration conditions (sufficient for the mononitration of PhMe) gave a larger proportion of unchanged I and, although *p*- $\text{MeC}_6\text{H}_4\text{CO}_2\text{H}$  was not found, more *p*- $\text{MeC}_6\text{H}_4\text{Ac}$  was produced, together with what was probably *p*- $\text{MeC}_6\text{H}_4\text{CH}_2\text{CHO}$ , whose dinitrophenylhydrazone, yellow, m. 206°; the 2- $\text{NO}_2$  deriv. of I was the main product of the nitration. Dinitration of I gives about 25% of the 2,3-di- $\text{NO}_2$  deriv., m. 51.5°. Trinitration of I gives 40-50% of the 2,3,6-tri- $\text{NO}_2$  deriv. (II), m. 93°; no ketones or aldehydes were present. II and  $\text{N}_2\text{H}_4$  (III) in EtOH give 2,6-dinitro-3-hydrazino-*p*-ethyltoluene (III), yellow, m. 171° (decompn.); warming with  $\text{NH}_4\text{OH}$  (d. 0.88) gives the 3- $\text{NH}_2$  deriv. (IV), yellow, m. 143°. III in AcOH, heated with  $\text{Cu}(\text{OAc})_2$  at 100° for 30 min., or IV in abs. EtOH contg. 20% oleum, treated with drv  $\text{NaNO}_2$ , gives 2,6-dinitro-*p*-ethyltoluene (V), m. 60°; oxidation gives 2,6-dinitro-*p*-toluic acid, whose Me ester m. 87-8°. III and  $\text{MeNH}_2$  in EtOH give the 3-methylamino deriv., yellow, m. 168°. Boiling III with  $\text{N}_2\text{H}_4$  -  $\text{H}_2\text{O}$  for 1.5 hrs. gives 6-nitro-1-hydroxy-7-methyl-4-ethyl-1,2,3-benzotriazole, m. 224° (decompn.). Reduction of V with  $(\text{NH}_4)_2\text{S}$  gives 2-nitro-6-amino-*p*-ethylbenzene, yellow, m. 96° (Ac deriv., m. 166°). 3-Nitro-4-methylacetophenone (VI) gives an oxime, m. 133°; a semicarbazone, m. 262° (decompn.); and a 2,4-dinitrophenylhydrazone, orange-yellow, m. 232°. Oxidation of VI gives 2-nitro-*p*-toluic acid. Reduction of VI with Fe and HCl in EtOH gives the 3- $\text{NH}_2$  deriv., m. 80° (2,4-dinitrophenylhydrazone, red, m. 265° (decompn.)); the Ac deriv., m. 142°, gives a semicarbazone, m. 252° (decompn.), and a 2,4-dinitrophenylhydrazone, orange-red, m. 280° (decompn.). VI (25 g.), Zn and HCl give 3 g. 2-amino-*p*-ethyltoluene,  $b_{700}$  220-8°; Ac deriv. (VII), m. 137°; Bz deriv., m. 119°. VII and  $\text{HNO}_3$  (d. 1.5) at -5° to -10° give the 3,5-dinitro deriv., m. 176°; the free base, yellow, m. 183°. 2  $\text{MeC}_6\text{H}_4\text{Ac}$  gives a 2,4-dinitrophenylhydrazone, yellow, m. 159°; that of the 3-isomer, orange-red, m. 207°. II. Nitro derivatives of propylbenzene. O. L. Brady and R. Neil Cunningham. *Ibid.* 121 4. PhPr (12 g.) in  $\text{H}_2\text{SO}_4$ - $\text{HNO}_3$  gives 14 g. crude 2,4-di- $\text{NO}_2$  deriv. (I), reduced by EtOH- $(\text{NH}_4)_2\text{S}$  to 2-nitro-4-aminopropylbenzene, orange, m. 59° (Ac deriv. (II), pale yellow, m. 90°); deamination gives *o*-nitropropylbenzene, pale yellow,  $b_{700}$  133-6°. Reduction of I with  $\text{SnCl}_2$  and HCl in EtOH gives 4-nitro-2-aminopropylbenzene, yellow, m. 73°. Nitration of II in  $\text{H}_2\text{SO}_4$  gives 2,3-dinitro-4-acetamidopropylbenzene, yellow, m. 130°; the free base, orange, m. 124°; deamination gives 2,3-dinitropropylbenzene, m. 64°. The 3,5-di- $\text{NO}_2$  isomer, pale yellow, m. 51°, was prepd. by reduction of the mixt. of *o*- and *p*- $\text{NO}_2$  derivs. ob-

tained by nitration, dinitration of the AcNH deriv. and subsequent removal of the  $\text{NH}_2$  group. Mononitration and removal of the  $\text{NH}_2$  group gives *m*-nitropropylbenzene, yellow,  $b_{700}$  136°. Although neither compd. could be isolated pure, evidence is given that the 2,4-di- $\text{NO}_2$  compd. is the main product of the dinitration of PhPr and that the 2,4,6-tri- $\text{NO}_2$  compd. also is formed to some extent on vigorous nitration. 2,6-Dinitro-4-aminopropylbenzene(?), brown, m. 162°.

C. J. West

**Halogenation of the condensation products of alkyl-*o*-toluidines with chloral hydrate and the nitration of the resulting compounds.** A. H. Advani. *J. Indian Chem. Soc.* 10, 621 4 (1933). To study the nature of the reactions involved in the nitration of chloral derivs. of phenylalkylamines in which both *o*-positions to the amino group are occupied, bromination and chlorination of the chloral derivs. of alkyl-*o*-toluidines,  $\text{RHNC}_6\text{H}_4\text{MeCH}(\text{OH})\text{CCl}_3$  (R = Me and Et) was carried out. Br at ordinary or increased temps., with or without I as carrier, yielded only mono-Br compds. forming di-Ac derivs., showing that neither the  $\text{CH}(\text{OH})\text{CCl}_3$  nor the RHN groups had been affected by the action of Br. The formation of a ketonic acid contg. Br on alk.  $\text{KMnO}_4$  oxidation of the di-Ac derivs. proved that the Me group attached to the nucleus had not been attacked by Br. These reactions, together with the work of Fries (*Ann.* 346, 128 (1906)), indicate that, as in nitration, the Br atom enters the nucleus in the *o*-position to the amino group. The corresponding Cl compds. were best prepd. from the HCl salts of the chloral compds. Bromination in  $\text{CCl}_4$  of  $\text{MeHNC}_6\text{H}_4\text{MeCH}(\text{OH})\text{CCl}_3$  gave 2-methyl-4-( $\alpha$ -hydroxy- $\beta$ -trichloroethyl)-6-bromo-*N*-methylaniline (I), m. 150°; di-Ac deriv., m. 130°, converted by alk.  $\text{KMnO}_4$  oxidation to 3-methyl-4-(*N*-acetyl-methylamino)-5-bromophenylglyoxylic acid, m. 201°. The corresponding *N*-ethyl deriv. (II), m. 115°, gave a di-Ac deriv., m. 150-2°. The corresponding 6-chloro-*N*-methyl deriv. (III), m. 132-3° (di-Ac deriv., m. 112°) and 6-chloro-*N*-ethyl deriv. (IV), m. 116-7° (di-Ac deriv., m. 155-6°), were similarly prepd. On treatment with coned.  $\text{HNO}_3$  I yielded 2-methyl-4-( $\alpha$ -hydroxy- $\beta$ -trichloroethyl-6-bromophenyl)-*N*-methylnitroamine, m. 230° (decompn.); Ac deriv., m. 107°. Similarly from II, III and IV were formed the corresponding nitroamines,  $\text{C}_{10}\text{H}_{12}\text{BrCl}_2\text{N}_2\text{O}_3$ , m. 198° (Ac deriv., m. 127°);  $\text{C}_{10}\text{H}_{10}\text{Cl}_4\text{N}_2\text{O}_3$ , m. 230° (decompn.) (Ac deriv., m. 113°); and  $\text{C}_{10}\text{H}_{12}\text{Cl}_4\text{N}_2\text{O}_3$ , m. 181° (Ac deriv., m. 132°). Treatment of 2,6,4-Me( $\text{O}_2\text{N}$ )[ $\text{CCl}_3$ CH(OH)] $\text{C}_6\text{H}_4\text{NMeCO}_2\text{N}$  with  $\text{SOCl}_2$  replaces the OH group of the chloral side chain with Cl and forms 2-methyl-4-( $\alpha$ -chloro- $\beta$ -trichloroethyl)-6-nitrophenyl-*N*-methylnitroamine, m. 199°. It is found that the nitration of the chloral derivs. of alkylamines, alkyl-*o*-toluidines (C. A. 27, 2941) and of the halogenation products of the latter at ordinary temp. without use of diluents yields chloral derivs. of dinitrophenylalkylnitroamines, mononitrophenylalkylnitroamines and halophenylalkylnitroamines, the no. of the entering  $\text{NO}_2$  groups depending upon the presence of replaceable H atoms in the *o*-position to the amino group.

C. R. Addinall

**Optical activity in relation to tautomeric change.** II. Comparison between the rate of racemization of a tautomeric substance and the rate of its tautomeric interconversion. C. K. Ingold and C. L. Wilson. *J. Chem. Soc.* 1934, 93 7; cf. C. A. 28, 746°. Dynamical investigation of the isomerization of optically inactive *p*-chlorobenzohydrylidene- $\alpha$ -phenylethylamine (I) in 1.33 *N* EtOH-EtONa gives  $K = 1.00$ ,  $k = 0.0145 \text{ hr.}^{-1}$  and  $k_1 = k_2 = 0.00725 \text{ hr.}^{-1}$ ; the equil. proportion of the original isomer was almost exactly 50%; the speed of racemization during the isomerization of optically active I is also reported. The values agree with the theoretical equation for racemization by tautomerization but not by ionization. The velocity of racemization is quant. equiv. to its rate of isomeric change. III. Constitutional and catalytic influences on the rates of racemization of prototropic compounds. Christopher L. Wilson. *Ibid.* 98-9.—A no. of examples are cited from the literature.

C. J. West

**Action of nitrous acid and nitrosyl chloride on  $\beta$ -phenylpropylamine.** A method of separating primary, secondary and tertiary phenyl chlorides and phenylcarbinols. P. A. Levene and R. B. Marker. *J. Biol. Chem.* 103, 373-82 (1933).—1-2-Methylphenylethylamine (I), prepd. by reduction of the corresponding carbinol, gave, on treatment with  $\text{HNO}_2$ , a mixt. of carbinols. Treatment of this mixt. with cold aq. HCl led to chlorination of the secondary and tertiary carbinols, which could thus be detd. from the Cl content. In this case 33% of the product was secondary and tertiary. Isolation of the primary carbinol through the phthalic ester gave 1-2-methyl-2-phenylethanol, i. e., a carbinol having the same rotation as the one obtained by direct reduction of the acid (cf. C. A. 24, 5741). From the mixt. obtained on treating I with NOCl the secondary and tertiary chlorides were detd. by shaking a sample with  $\text{AgNO}_3$ , and the remainder treated with  $\text{AgOAc}$ , hydrolyzed with KOH and treated with  $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$ . The unesterified primary chloride and hydrocarbon were then extd. with ether and detd. The carbinol phthalates were hydrolyzed and the amt. of secondary alc. was detd. by treatment with cold aq. HCl as above. The primary, secondary and tertiary halides are thus all detd. in the mixt., and the method is of general application. In this case the proportions were 90, 2 and 8%, resp. K. V. Thimann

**Organic mercury compounds. VI. The synthesis of organic mercury compounds with a negative substituent by means of the diazo method.** A. N. Nesmeyanov, N. Th. Glushnev, P. Th. Epiwanski and A. I. Flegontov. *Ber.* 67B, 130-4 (1934); cf. C. A. 27, 1872.—Two undesirable side reactions (formation of salts of the type  $(\text{RN}_2)_2\text{HgCl}_2$  instead of  $\text{RN}_2\text{Cl} \cdot \text{HgCl}_2$ , and substitution of the diazo group by Cl or H) could be prevented or decreased by lowering the temp., using the proper solvent, stirring carefully, adding the reagents in proper order. *o*-Nitroaniline (69 g.), dissolved at 90° in 150 cc. concd. HCl and 75 cc.  $\text{H}_2\text{O}$ , cooled to 25° and diazotized with 250 g. ice and 35 g.  $\text{NaNO}_2$  in 72 cc.  $\text{H}_2\text{O}$ , gives with 136 g.  $\text{HgCl}_2$  in 80 cc. HCl 190 g. *o*-nitrophenyldiazonium chloride-mercuric chloride,  $\text{NO}_2\text{C}_6\text{H}_4\text{N}_2\text{Cl} \cdot \text{HgCl}_2$ , m. 116-7°. The *p*-compd. (144 g.) is prepd. analogously. With more  $\text{H}_2\text{O}$  (1200 g. including ice) ( $\text{NO}_2\text{C}_6\text{H}_4\text{N}_2\text{Cl}_2 \cdot \text{HgCl}_2$  results. The *m*-compd. (210 g. from 60 g. *m*-nitroaniline in 150 g. concd. HCl and 150 cc.  $\text{H}_2\text{O}$  of 90°, poured into 500 cc.  $\text{H}_2\text{O}$  and 500 g. ice, diazotized with a concd. soln. of 35 g.  $\text{NaNO}_2$  and 136 g.  $\text{HgCl}_2$  in 136 cc. HCl), m. 138°. A soln. of 52 g. diazobenzenesulfonic acid and 150 g.  $\text{HgCl}_2$  in 150 g. concd. HCl yields on cooling to -15° 28 g.  $(\text{HO}_2\text{SC}_6\text{H}_4\text{N}_2\text{Cl})_2 \cdot \text{HgCl}_2$ , m. 152-3°. The reactions were carried out in 3 ways: (a) diazonium chloride-mercuric chloride (or a mixt. of the diazonium compd. and  $\text{HgCl}_2$ ) acted slowly upon Cu powder suspended in the solvent, keeping the temp. as const. as possible, (b) Cu powder was added slowly to a soln. of the diazo compd. or (c) both reagents were added simultaneously to the solvent. There were prepd.:  $\text{ClHgC}_6\text{H}_4\text{CO}_2\text{H}$ ;  $\text{HSO}_4\text{Hg} \cdot \text{C}_6\text{H}_4\text{SO}_3\text{H}$ , which does not melt; *o*-nitrophenylmercuric chloride,  $\text{NO}_2\text{C}_6\text{H}_4\text{HgCl}$ , m. 185°; *m*-compd., m. 235°; *p*-compd., m. 265°; and  $\text{Cl}_2\text{C}_6\text{H}_4\text{HgCl}$ , m. 208°.

A. E. Beilich  
**Substitution in the methyl-4'-nitro- and 4'-acetamidodiphenyl ethers.** Harold A. Scarborough and John L. Sweeten. *J. Chem. Soc.* 1934, 52-6.—*o*- $\text{Me} \cdot \text{C}_6\text{H}_4\text{OH}$ , *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  and KOH at 160° for 6 hrs. give 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2 (I),  $b_{11}$  225-30°, m. 35°; reduction and acetylation gives the 4'-acetamido deriv., m. 110°. I and  $\text{SO}_2\text{Cl}_2$  give 4-chloro-4'-nitro-2-methyldiphenyl ether,  $b_{11}$  235-40°, m. 65°; 4'-acetamido deriv., m. 122°. 4-Chloro-3'-nitro-4'-acetamido-2-methyldiphenyl ether, pale brown, m. 128°, or yellow, m. 133° (the lower-melting form changes into the higher-melting at 124°), results from the nitration of 4,2- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{OC}_6\text{H}_4\text{NHAc}$ -4 in AcOH at 80° or by chlorination of 3,4- $\text{O}_2\text{N}(\text{AcNH})\text{C}_6\text{H}_3\text{OC}_6\text{H}_4\text{Me}$ -2; the 4'-*NH* deriv., bright red, m. 104°. Removal of the  $\text{NH}_2$  group or condensation of *m*- $\text{IC}_6\text{H}_4\text{NO}_2$  with 5,2- $\text{Cl}(\text{KO})\text{C}_6\text{H}_3\text{Me}$  at 220° with Cu powder gives 4-chloro-3'-nitro-2-methyldiphenyl ether, pale orange, m.

52°; the corresponding 4-*Br* analog, m. 73°; reduction and acetylation or bromination of 4- $\text{AcNH} \cdot \text{C}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2 gives 4-bromo-4'-acetamido-2-methyldiphenyl ether, m. 144°; nitration in AcOH at 80° or bromination of 3,4- $\text{O}_2\text{N}(\text{AcNH})\text{C}_6\text{H}_3\text{OC}_6\text{H}_4\text{Me}$ -2 gives the 3'- $\text{NO}_2$  deriv., lemon-yellow, m. 147°; the free base, red, m. 92°; deamination of the base or bromination of 3- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2 gives 4-bromo-3'-nitro-2-methyldiphenyl ether, pale orange, m. 50°. Nitration of 4- $\text{AcNH} \cdot \text{C}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2 gives 3'-nitro-4'-acetamido-2-methyldiphenyl ether, yellow, m. 83°; the free base, deep red, m. 94°; deamination gives 3- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2, also prepd. from *m*- $\text{IC}_6\text{H}_4\text{NO}_2$  and *o*- $\text{MeC}_6\text{H}_4\text{OK}$  at 200°. 4- $\text{AcNH} \cdot \text{C}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -2, slowly added to  $\text{HNO}_3$  (d. 1.4) and poured onto ice after 10 min., gives the 3',4-di- $\text{NO}_2$  deriv., dull yellow, m. 137°; the base, golden brown, m. 170°; deamination or condensation of *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{OK}$  with 2,5- $\text{Br}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$  at 220° gives 3',4-dinitro-2-methyldiphenyl ether, light brown, m. 110°. 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -3, added to a large excess of  $\text{HNO}_3$  (d. 1.4) and carefully warmed, gives 4,4'-dinitro-2-methyldiphenyl ether, m. 132°, also prepd. from *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  and 5,2- $\text{O}_2\text{N}(\text{Me})\text{C}_6\text{H}_3\text{OK}$ . Oxidation of 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -3 with  $\text{CrO}_3$  in AcOH gives a poor yield of 3-carboxy-4'-nitro-diphenyl ether, m. 183°. 4'-Amino-3-methyldiphenyl ether, m. 82° (nitrate, m. 158° (decompn.)); *Ac* deriv., m. 140°. Chlorination of 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -3 or condensation of *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  with 6,3- $\text{ClMeC}_6\text{H}_3\text{OK}$  at 180° gives 4-chloro-4'-nitro-3-methyldiphenyl ether, m. 114°. 4-Chloro-4'-acetamido-3-methyldiphenyl ether, m. 115°; 3'-nitro deriv., lemon-yellow, m. 101°; the free base, bright red, m. 95°. 4-Chloro-3'-nitro-3-methyldiphenyl ether, pale orange, m. 57°. 4-Bromo-4'-nitro-3-methyldiphenyl ether, m. 96°; oxidation gives the 3-carboxy deriv., m. 157°, whose *Et* ester m. 76°. 4-Bromo-4'-acetamido-3-methyldiphenyl ether, m. 130°; 3'- $\text{NO}_2$  deriv., lemon-yellow, m. 102°; the free base, deep red, m. 111°. 4-Bromo-3'-nitro-3-methyldiphenyl ether, yellow, m. 59°. 3'-Nitro-4'-acetamido-3-methyldiphenyl ether, golden, m. 81°; the base, red, m. 52°; deamination of the base or condensation of *m*- $\text{IC}_6\text{H}_4\text{NO}_2$  with *m*- $\text{MeC}_6\text{H}_4\text{OK}$  at 200° gives 3'-nitro-3-methyldiphenyl ether, pale yellow, m. 47°. 4- $\text{AcNH} \cdot \text{C}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -3 or its mono- $\text{NO}_2$  deriv. in  $\text{HNO}_3$  (d. 1.4) at 15° for 15 min. gives the 3',4-dinitro deriv., olive-yellow, m. 144°; the base, orange, m. 140°; deamination or condensation of *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{OK}$  with 5,2- $\text{Br}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$  gives 3',4-dinitro-3-methyldiphenyl ether, orange, m. 87°; the 4,4'-di- $\text{NO}_2$  isomer, yellow, m. 120°, results from the 4- $\text{NO}_2$  deriv. or from *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  and 3,4- $\text{Me}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{OK}$  at 180°; oxidation gives 4,4'-dinitro-3-carboxy-diphenyl ether, m. 185°. 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -3 and  $\text{AcCl}$  with  $\text{AlCl}_3$  in  $\text{CS}_2$  give 4'-nitro-4'-acetyl-3-methyldiphenyl ether, m. 88°, which is oxidized to the 4-carboxy deriv., m. 204°. 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ -4 is oxidized to the 4'-carboxy deriv., m. 245° (*Et* ester, m. 78°). 4'-Acetamido-4-methyldiphenyl ether, m. 135°. 2-Bromo-4'-nitro-4-methyldiphenyl ether, m. 82° is formed by bromination of the  $\text{NO}_2$  compd. or by condensation of *p*- $\text{ClC}_6\text{H}_4\text{NO}_2$  with 3,4- $\text{BrMeC}_6\text{H}_3\text{OK}$  at 220°; oxidation gives the 4-carboxy deriv., m. 108° (*Et* ester, m. 119°). 2-Bromo-4'-acetamido-4-methyldiphenyl ether, m. 142°; 3'- $\text{NO}_2$  deriv., yellow, m. 98°; the base, red, m. 101°; deamination gives 2-bromo-3'-nitro-4-methyldiphenyl ether, pale orange, m. 47°, also formed from *m*- $\text{ClC}_6\text{H}_4\text{NO}_2$  and 3,4- $\text{BrMeC}_6\text{H}_3\text{OK}$ . 3-Bromo-3'-nitro-4-methyldiphenyl ether, pale yellow, m. 68°, results from *m*- $\text{IC}_6\text{H}_4\text{NO}_2$  and 2,4- $\text{BrMeC}_6\text{H}_3\text{OK}$  at 200°. 3'-Nitro-4'-acetamido-4-methyldiphenyl ether, golden, m. 95°; the base, red, m. 91°. 2,3'-Dinitro-4'-acetamido-4-methyldiphenyl ether, pale brown, m. 134°; the base, red-brown, m. 119°; deamination gives 2,3'-dinitro-4-methyldiphenyl ether, m. 87°; the 2,4'-di- $\text{NO}_2$  isomer, pale brown, m. 104°; this also results from 4,3- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$  and 4- $\text{O}_2\text{NC}_6\text{H}_4\text{OK}$  at 220°. These results show that the etheral O atom exercises complete control of the orientation of the substituents, except for the introduction of a  $\text{NO}_2$  group when 1 nucleus contains an  $\text{AcNH}$  group; by comparison with



$O_2NC_6H_4OPh$ , the only effect which can be ascribed to the Me group is a more controlled nitration. C. J. West

**Action of bromine on 2- and 6-chloro- and 2- and 6-iodo-3-bromophenols.** Herbert H. Hodgson and Joseph Nixon. *J. Chem. Soc.* 1934, 137-8.—3,2-Br( $H_2N$ )- $C_6H_4OH$  gives 2-chloro-3-bromophenol, m. 60°, which reacts in  $CHCl_3$  with Br to give the 3,4,6-Br<sub>3</sub> deriv., m. 90°. 2-Chloro-5-bromophenol, m. 60°, gives 6-chloro-2,3,4-tribromophenol, m. 98°; this also results on chlorination of the dibromination product of *m*-Br $C_6H_4OH$ . 3-Bromo-2-iodophenol, m. 85°, gives with Br in AcOH the 3,4,6-Br<sub>3</sub> deriv., m. 125°, and some 2,3,4,6-Br<sub>4</sub> $C_6H_2OH$ ; if the reaction product stands 18 hrs., only the latter compd. is obtained; it was the only product of the bromination of 5-bromo-2-iodophenol, m. 55°. C. J. West

**Mobility of groups containing a sulfur atom. III.** Douglas W. Cowie and David T. Gibson. *J. Chem. Soc.* 1934, 46-8; cf. C. A. 27, 2420.—Bromination of thioanisole gives *p*-Br $C_6H_4SMe$ , identified as the sulfone. Cyclohexylsulfonolactone (I), Me *d*-camphorylthiol-sulfonate (II) and  $Na_2CO_3$  give anhydrocamphorsulfonolactone (III) and an oil which, after hydrolysis and oxidation, yields cyclohexylsulfonolactone (IV), m. 119°. Ethylsulfonolactone and II give *d*-camphorsulfonic acid, III and an oil, yielding camphorsulfonolactone (V), m. 123°. I, Et ethanethiol-sulfonate (VI) and  $Na_2CO_3$  give a sulfide, which yields  $MeSO_2Et$  on oxidation and an alk. ext., from the oil of which were isolated  $\alpha$ -ethylsulfonolactone (VII), m. 165-6° (lowest fraction), and  $\alpha$ -cyclohexylsulfonolactone (VIII), m. 132°, hydrolyzed to cyclohexylsulfonolactone (IX), m. 38°. Cyclohexyl cyclohexanethiol-sulfonate, m. 38°, with methylsulfonolactone (VII) and EtONa gives, by hydrolysis and oxidation of the alkali-sol. product, IV. The alkali-sol. product from camphor disulfide, VII and  $Na_2CO_3$  gives V; ethylsulfonolactone gives the corresponding Et deriv., m. 85°. Methylsulfonolactone (IX), m. 54°, VI and  $Na_2CO_3$  give, after hydrolysis and oxidation of the alkali-sol. product, bisethylsulfonolactone; when equimol. proportions of the reagents were used, the sulfone,  $C_6H_{10}O_2S_2$ , m. 95°, was obtained. Benzyl benzylthiol-sulfonate, IX and  $Na_2CO_3$  give a compd.,  $C_6H_{12}O_2S_2$ , m. 54°. The alkali-sol. product from IX and *p*-tolyl *p*-toluenethiol-sulfonate with EtONa give methylsulfonolactone, m. 50°.  $BzCH_2CN$  and Me *p*-toluenethiol-sulfonate in EtOH-NaOH give 30% of  $\omega$ -cyano- $\omega$ -methylthioacetophenone, m. 50°; 4-chlorophenyl-sulfonolactone gives a mixt. of  $RSO_2CH(SMe)Ac$ , in which the ratio of *p*-Me $C_6H_4:4-ClC_6H_4$  is 53:47.  $PhSO_2F$  and  $MeMgI$  or  $EtMgI$  give bisphenylsulfonolactone and -ethane, resp. C. J. West

**Synthesis of several phenols with unsaturated side chains.** Riko Majima and Kunisaburo Tamura. *Proc. Imp. Acad. (Tokyo)* 9, 606 8(1933).—PhONa and dichlorohexadiene in PhMe (Claisen reaction) give a good yield of 3'-chlorohexa-2',4'-dienylphenol, *b*<sub>1</sub> 120-40°, turning brown in the air but stable in dil. Et<sub>2</sub>O soln.; Me ether, *b*<sub>1</sub> 108-17°, is a mixt. of 2 compds., probably *o*- and *p*-derivs. There also results a chlorohexadienyl Ph ether, reduced by Na and EtOH to hexyl Ph ether, *b*<sub>1</sub> 75-7°. 3'-Chlorohexa-2',4'-dienylpyrocatechol, polymerizes readily on heating; di-Me ether; a by-product is pyrocatechol chlorohexadienyl ether; methylation and reduction gives pyrocatechol Me hexyl ether, *b*<sub>0.8</sub> 93-6°. C. J. West

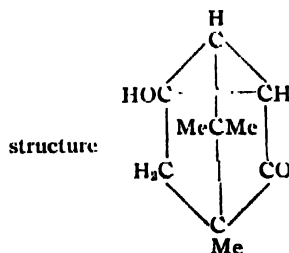
**4,6- and 2,4-Diacetylresorcinol.** Wilson Baker. *J. Chem. Soc.* 1934, 71 3.—4,6-Diacetylresorcinol (I) is obtained in 32% yield by the action of  $FeCl_3$  on resorcinol diacetate; a  $FeCl_3$  complex of I is an intermediate product and is decompd. by heating with HCl; all methods for prep. I give the same product, m. 182°. The constitution of I follows from its oxidation by alk.  $H_2O_2$  and methylation of the product to 2,4,5-(MeO)<sub>3</sub> $C_6H_2Ac$ , identical with the methylation of 2,4,5-(HO)<sub>3</sub> $C_6H_2Ac$ ; the Me ether of I gives the same product. Resacetophenone,  $Ac_2O$  and AcONa give 7-acetoxy-3-acetyl-2-methylchromone, m. 126.5°; with  $AlCl_3$  in  $PhNO_2$  this gives 7-hydroxy-8-acetyl-2-methylchromone, m. 185-0.5°. C. J. West

**The oxidation of isosafrole.** Minoru Imoto. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding, 20-9(1934).—The oxidation of isosafrole to piperonylic acid by  $KMnO_4$  and  $HNO_3$ , and the action of some oxidizing catalysts, were studied. Activated C is an active catalyst in the case of  $KMnO_4$ .  $HNO_3$  gave piperonylic acid, heliotropin and oxalic acid. Karl Kammermeyer

**Beryllium benzoylacetate.** R. W. Bailey, F. M. Brewer and H. M. Powell. *J. Chem. Soc.* 1933, 1546-7.—Be benzoylacetate was prepd. from basic carbonate of Be suspended in alc. plus alc. benzoylacetone refluxed on the  $H_2O$  bath and recrystd. from PhMe. Be benzoylacetate m. 210°, is insol. in  $H_2O$ , dil. acids and alkalis, almost insol. in alc. but moderately sol. in benzene and more sol. in PhMe; its crystals are monoclinic with no distinct cleavage. Very strong double refraction and high dispersion are outstanding optical properties. M. McMahon

**$\omega$ -Nitrophenylglyoxal arylhydrazones.** G. D. Parkes and E. H. Williams. *J. Chem. Soc.* 1934, 67-8.— $BzCH_2NO_2$  (for which a method of prep. is given) and  $PhN_2Cl$  in a mixt. of HCl, AcOH and AcONa at 0° give 60% of  $\omega$ -nitrophenylglyoxal phenylhydrazone (I), orange-yellow with blue reflex, m. 101°; *p*-chlorophenylhydrazone, yellow, m. 134°; 2,4-dichlorophenylhydrazone, pale yellow, m. 135.5°; 2,5-isomer, pale yellow, m. 137°; *p*-bromophenylhydrazone (II), yellow, m. 137°; 2,4-dibromophenylhydrazone (III), yellow, m. 139°; 2,4,6-tribromophenylhydrazone (IV), yellow, m. 111°; 3,4,5-isomer, yellow, m. 169°; *o*-nitrophenylhydrazone, yellow, m. 118°; *p*-isomer, m. 147°. I and I mol. Br in AcOH give II. II and Br in AcOH contg. a little AcONa, on standing 24 hrs., give  $\omega$ -bromophenylglyoxal *p*-bromophenylhydrazone, while refluxing II and Br in  $CHCl_3$  for 1 hr. gives  $\omega$ -bromophenylglyoxal 2,4-dibromophenylhydrazone. IV and Br give the  $\omega$ -Br deriv. III and EtOH-NH<sub>3</sub>, heated 30 min. under the reflux, give the  $\omega$ -amino deriv., yellow, m. 131°, and  $PhNH_2$  gives the  $\omega$ -anilino deriv., yellow, m. 137°. C. J. West

**The physiologically active isomer of Bredt's 5-ketocamphor.** Kunijiro Takeuchi and Yoshikazu Sahashi. *Sci. Papers. Inst. Phys. Chem. Research.* 22, 59-68 (1933).—Bornyl acetate, *b*<sub>4</sub> 80-1°, oxidized with  $CrO_3$  in glacial acetic acid gave 5-ketobornyl acetate (I), *b*<sub>4-1</sub> 125-7°. Sapon. of I with alc. KOH, evapn., acidification with  $CO_2$  and extn. with Et<sub>2</sub>O gave 5-ketoborneol (II), m. 232-5° (from alc.),  $[\alpha]_D^{25}$  82.1° (alc.). II, oxidized with  $CrO_3$  gave 5-ketocamphor (III), m. 207° (ligroin),  $[\alpha]_D^{25}$  103.5 (ligroin). The prismatic crystals of III, on heating in hexane, were converted into irregular plates of the enol isomer (IV), m. 209 10° (from ligroin),  $[\alpha]_D^{25}$  144.6 7.3°; semicarbazone, m. 230-1°. Reduction of IV gives 5-hydroxycamphor (V), m. 220 2°  $[\alpha]_D^{25}$  47.5° (alc.); semicarbazone, m. 220°. Ac deriv. of V, *b*<sub>2</sub> 137-40°; semicarbazone, m. 197-200°. Identical samples of V were isolated from dog urine. V, oxidized with  $H_2SO_4$  and  $K_2Cr_2O_7$  at 50-60°, gave a mixt. of III and IV, m. 197-200°,  $[\alpha]_D^{25}$  70.8 (alc.), which on boiling with hexane was all converted into IV. IV is believed to have the



and has been shown to be

an active heart stimulant, whereas III is without such action. T. H. Rider

**Identity of swertic acid and oleanolic acid.** S. Kuwada and T. Matsukawa. *J. Pharm. Soc. Japan* 53, 680-6 (1933).—Kariyone and Matsushima isolated a cryst. acid from the root of *Swertia japonica* and named it

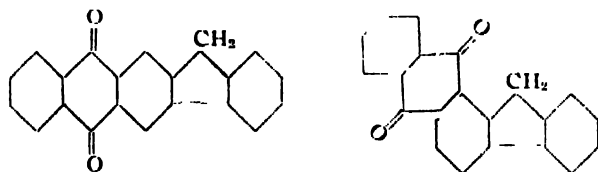
swertic acid (*J. Pharm. Soc. Japan* No. 540, 133(1927)). According to them, the empirical formula is  $C_{27}H_{42}O_8$  and it contains 3 OH groups, one of which is of an acid character while the other 2 are of alc. nature. The present authors show that the acid is identical with oleanolic acid and has the formula  $C_{30}H_{48}O_8$  as detd. by the prepn. of various derivs. Nao Uyei

**Oxidation of hydroxymethylenecamphor esters with ozone.** John Palmén. *Finska Kemistsamfundets Medd.* 42, 85-98(1933).—Ozonization of hydroxymethylenecamphor in glacial AcOH indicates that the tendency to enlarge the ring structure exceeds the ketone-splitting tendency. P. concludes that the rate of hydrolysis is greater for the formyl than for the camphor radical. The Me and Et esters show no ketone splitting. The diperoxide from hydroxymethylenecamphor has two OH groups on the methylene C, but the esters seem to give the group  $-O.O.CH(OH)OMe$ . Investigations are in progress to det. the influence of different radicals on the relative rates of the ketone-splitting and ring-enlarging tendencies. A German summary is given. H. C. D.

**Preparation of camphorquinone.** W. C. Evans, J. M. Ridgion and J. L. Simonsen. *J. Chem. Soc.* 1934, 137.—Camphor (5 g.), 6 g.  $SeO_2$  and 5 cc.  $Ac_2O$ , heated 3-4 hrs. at  $140-50^\circ$ , give 5.22 g. camphorquinone; dioxane may be used as solvent but the yield is lower and the product more difficult to purify. C. J. West

**Instance of the action of air in determining the course of bromination.** John Hannon and J. Kenner. *J. Chem. Soc.* 1934, 138.—When dry air is allowed through the condenser during the interval (13.5 hrs.) between the bromination of 2,2'-bitolyl for 2 working days, there results 60% of the tetra-Br deriv. *o*-Iodocyanobenzene, m.  $54-5^\circ$ , and Cu at  $275^\circ$  give 2,2'-dicyanobiphenyl, m.  $170-7^\circ$ ; this could not be converted to the dialdehyde by Stephen's method (dioxime, m.  $186-7^\circ$ ). C. J. West

**The condensation of *o*-fluorenylbenzoic acid.** A. Dansi and A. Semproni. *Gazz. chim. ital.* 63, (681-4 (1933)).—A preliminary paper. Efforts to obtain better yields of *o*-fluorenylbenzoic acid (I) than previously reported (cf. *Ber.* 36, 4035(1903); *Monatsh.* 25, 1164 (1904)) gave with the Friedel-Crafts reaction a max. of 65% of I from fluorene (6 g.),  $C_6H_5(CO)_2O$  (12 g.),  $AlCl_3$  (20 g.) and  $CS_2$  (75 cc.) at  $100^\circ$  for 9 hrs. I heated at  $300-20^\circ$  until solid yields 100% of phthalylfluorene (II), red vitreous mass, which when pulverized is intense orange. It may have either of the following 2 constitutions:



which by oxidation should yield anthraquinone-2,3-fluorenone and anthraquinone-1,2-fluorenone, resp. However, with  $CrO_3$  oxidation proceeds further, i. e., II and  $CrO_3$  in  $Ac_2O$  kept at room temp. (until a sample gives a yellow ppt. in water), and heated in excess water, yield the compd.  $C_{24}H_{12}O_4$  (III), pale yellow, m.  $259-60^\circ$ , sol. in aq. alk. hydroxides, carbonates and bicarbonates (reppd. by acids), gives a reddish color in hot alk. hydroxides, and also in boiling aq. NaOH and powd. Zn. From its  $NH_4OH$  solns.,  $AgNO_3$  ppts. a stable yellow *Ag* salt and cupric solns. a green flocculent *Cu* salt, while  $Ba(NO_3)_2$  gives no ppt. Because of its acidic character and its anthraquinone reactions, III has 3 possible constitutions: 3,2- $Ph(HO_2C)C_6H_2(CO)_2C_6H_4$  (IIIa), 2-( $o$ - $HO_2CC_6H_4$ ) $C_6H_2(CO)_2C_6H_4$  (IIIb) or 2,1- $Ph(HO_2C)C_6H_2(CO)_2C_6H_4$  (IIIc), i. e., it is either a 2-(*o*-carboxyphenyl)anthraquinone or an *o*-phenylanthraquinone-carboxylic acid. During purification of the oxidation product of II, there was also obtained in a few cases an acid, m.  $236-8^\circ$ , which may have been the 1-(*o*-carboxyphenyl)anthraquinone, m.  $236^\circ$ , of Kränzlein and Voll-

mann (Ger. pat. 506,439, C. A. 25, 304); this would indicate that I may exist in isomeric forms. C. C. Davis

**Stereochemical structure. VI. The isomeric (-)-menthyl  $\alpha$ -naphthylglycolates.** Robert Roger and Evelyn R. L. Gow. *J. Chem. Soc.* 1934, 130-7; cf. C. A. 27, 971.—Values are given for the rotation of (-)- $\alpha$ -naphthylglycolic acid (I) in  $Me_2CO$ ,  $CHCl_3$ , EtOH and  $H_2O$ , of the (+) acid in EtOH (II), of the (-)-menthyl ester (III) of I, of II(IV) and of the *dl*-acid(V) in  $Me_2CO$ ,  $C_6H_6$ ,  $CHCl_3$ ,  $CS_2$  and EtOH. I is much more *l*-rotatory than (-)-mandelic acid(VI) in  $Me_2CO$ ; it exhibits a greater variance with solvent and a similar temp. effect to VI, the Rupe criteria for the 2 acids were very similar and the dispersion is very like that of I, i. e., normal and slightly complex. The rotatory power of solns. of III varied somewhat with the solvent but not with the temp. Concn. had a slight effect in  $CS_2$  and in  $C_6H_6$ ; the Rupe criteria were similar to those of the corresponding ester of VI, except that the value for the EtOH solns. did not depart markedly from those for the other solns.; 1-term Drude equations expressed the dispersion between  $\lambda$  6663-4358; the dispersion is normal but slightly complex. The rotatory powers of IV(always +) varied markedly with solvent and were also affected by temp. and concn.; 1-term Drude equations did not express the dispersions and the Rupe criteria showed a certain regularity that was entirely lacking in the corresponding mandelate. The dispersion is definitely complex but normal. While the rotatory powers of V in  $Me_2CO$ ,  $CHCl_3$  and EtOH did not vary greatly, that in  $CS_2$  showed a depression; the dispersion may be regarded as normal and almost simple. The rotatory power of V can be calcd. from the values of III and IV and agrees with that detd. experimentally for the ester itself. The values from an equimol. soln. of III and IV also agreed, as did those resulting when sep. equimol. solns. were superimposed in the polarimeter, e. g., in  $CS_2$ . C. J. West

**Synthesis of nine chloriodonaphthalenes.** Robert W. Beattie and Frank C. Whitmore. *J. Chem. Soc.* 1934, 50-2.—The following  $C_{10}H_7$  derivs. were prepd. by the action of EtOH solns. of I and NaI on the corresponding Hg derivs. Thus refluxing 7.95 g. 4,1- $C_{10}H_7(HgCl)_2$  in 100 cc. EtOH with 5.05 g. I and 10 g. NaI in 200 cc. EtOH for 1 hr. gives 90% of 1-chloro-4-iodonaphthalene, m.  $54.5^\circ$ . 5-*I* deriv., m.  $80^\circ$  (73%); 6-*I* deriv., m.  $57^\circ$  (70%); 7-*I* deriv., m.  $39^\circ$  (63%); 8-*I* deriv., pale yellow, m.  $80.5^\circ$  (84%); 2-chloro-1-iodo deriv., m.  $83^\circ$  (64%); 6-*I* deriv., m.  $141^\circ$  (70%); 7-*I* deriv., pale yellow, m.  $129^\circ$  (70%); 8-*I* deriv., m.  $55.5^\circ$  (71%). C. J. West

**Constitution of the coloring matter of Lawsonia alba (Lam.) or Indian mehedhi.** Jagaraj B. Lal and Sikhishushan Dutt. *J. Indian Chem. Soc.* 10, 577-82(1933).

Henna, the coloring matter of *Lawsonia alba*, was prepd. from the fresh leaves by maceration in a stone mortar, extrn. with 5%  $NaHCO_3$  and acidification with 50%  $H_2SO_4$ . Recrystn. of the pptd. material from benzene and  $AcMe$  solns. yielded lawsonone (I),  $C_{10}H_6O_3$ , m.  $190^\circ$  (decompn.), sol. in alkalis and forming  $Ag$ ,  $Na$ ,  $NH_4$  and  $Ph$  salts. I contains a phenolic OH group and 2 ketonic groupings and yields the following compds.: *Ac* deriv.,  $C_{12}H_8O_4$ , m.  $128-9^\circ$ ; *anilino* deriv.,  $C_{10}H_7NO_3$ , m.  $190^\circ$ ; *oxime*,  $C_{10}H_7N_2O_3$ , m.  $180^\circ$ ; *dioxime*,  $C_{10}H_7N_2O_4$ , m.  $200^\circ$  (decompn.); *phenylhydrazone*,  $C_{10}H_7N_3O_2$ , m.  $229^\circ$  (decompn.); *mono-Br* deriv.,  $C_{10}H_6BrO_3$ , m.  $198^\circ$ . Heating a mixt. of the *Ag* salt of I with EtBr in a pressure flask on the steam bath for 4 hrs. gave the *Et* ether, m.  $126-7^\circ$ . I was boiled with  $Ac_2O$  under reflux and Zn dust was gradually added until the soln. was decolorized, with the formation of triacetyldehydrolawsonone,  $C_{10}H_4O_6$ , m.  $134.5^\circ$ . The distn. of I with Zn dust in a current of H gave an almost quant. yield of  $C_{10}H_6$  and oxidation of I with alk.  $KMnO_4$  produced only phthalic acid. I was coupled with diazotized  $PhNH_2$  to give a small quantity of benzene-azolawsonone in scarlet needles m. above  $305^\circ$ . By comparison with the work of Tommasi (C. A. 14, 3654) it is probable that the Indian and European varieties of *Lawsonia* contain the same coloring matter I. The identity of I with 2-hydroxy- $\alpha$ -naphthoquinone (II) has

been demonstrated by a direct comparison of I and its derivs. with the synthetically prepd. II and its corresponding derivs.

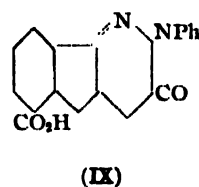
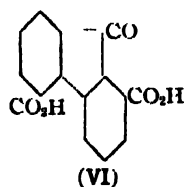
C. R. Addinall  
Preparation of naphthostyryl from 8-bromo-1-naphthoic acid. H. Gordon Rule and Robert R. H. Brown. *J. Chem. Soc.* 1934, 137.—8-Bromo-1-naphthoic acid (20 g.) in 300 cc. concd.  $\text{NH}_4\text{OH}$  contg. 0.4 g. Cu bronze, 5 g.  $\text{NH}_4\text{NO}_3$  and 0.4 g.  $\text{KClO}_3$ , heated at  $130-50^\circ$  for 1 hr., gives 82% of naphthostyryl, m.  $181^\circ$ ; in open vessels the yields were 52-67%; without  $\text{NH}_4\text{NO}_3$  and  $\text{KClO}_3$  the yield was 15% less.

C. J. West  
Aryl selenohalides. IV. 1-Anthraquinonyl selenohalides and the 1-anthraquinoneselenenic acid. Otto Behaghel and Wilhelm Müller. *Ber.* 67B, 105-8 (1934); cf. *C. A.* 27, 4785.—The intensive colors observed in reactions of caustic alkali with nitrophenyl selenohalides are caused by alkali salts of nitrated arylselenenic acids. The arylselenenic acids could not be prepd. However selenenic acids of the anthraquinone series were isolated from anthraquinonyl selenohalides. Di-1-anthraquinonyl diselenide (I) was prepd. with good yield from 1-chloro-anthraquinone and  $\text{Na}_2\text{Se}_2$ . Five g. I and 0.5 cc. Br in 50 cc.  $\text{CHCl}_3$  yield 1-anthraquinonyl selenobromide (II), m.  $217^\circ$ . The corresponding tribromide could not be prepd. 1-Anthraquinonyl selenotrichloride (III), prepd. from I and Cl or  $\text{SO}_2\text{Cl}_2$  in  $\text{AcOH}$ , m.  $203^\circ$ , decomps. in air. 1-Anthraquinonyl selenochloride (IV), prepd. (a) from I and the theoretical amt. Cl, or (b) by heating III in  $\text{CHCl}_3$  and acetone, m.  $220^\circ$ . Addn. of Cl or  $\text{SO}_2\text{Cl}_2$  yields III again. III sapon. with  $\text{H}_2\text{O}$  or caustic alkali yields 1-anthraquinoneselenenic acid (V),  $\text{C}_{14}\text{H}_7\text{O}_5\text{SeOOH}$ . Halides and Zn dust in indifferent solvents form I.  $\text{PhNMe}_2$ , boiled in  $\text{Et}_2\text{O}$  with the calcd. amt. of II, yields 1-anthraquinonyl 4-dimethylamidophenyl selenide, recrystd. from  $\text{AcOH}$ , does not m. below  $270^\circ$ . One g. II, boiled in abs.  $\text{Et}_2\text{O}$  with the calcd. amt.  $\text{PhMgBr}$ , gives 1-anthraquinonyl Ph selenide, m.  $178^\circ$ . II or IV, boiled with an excess of  $\text{AgOAc}$  in  $\text{MeOH}$ , gives 1-anthraquinoneselenenic acid (VI),  $\text{C}_{14}\text{H}_7\text{O}_5\text{SeOH}$ , which does not m. below  $250^\circ$ . Oxidizing agents change VI into V.

A. E. Beitlich  
Oxidative destruction of 1,9-benzanthrone. G. Charner and Elisa Ghigi. *Gazz. chim. ital.* 63, 685-97 (1933).—Because of the importance of knowing the position of substituents in the benzene group of benzanthrone, attempts were made to develop a method which would open the anthraquinone residue and yet leave intact the benzene nucleus. It was at first hoped to weaken the benzene nucleus by introducing a  $\text{NO}_2$  group, reducing it to an  $\text{NH}_2$  group, and then by mild oxidizing agents to open and preserve the chain from the benzene group, which should end with a CO group. However, the results obtained with *bs*-1-aminobenzanthrone (I) were not encouraging, for prolonged heating of I in alk.  $\text{KMnO}_4$  and purification by acidification with HCl ppts. anthraquinone-1-carboxylic acid (II); *Ba salt*,  $\text{C}_{20}\text{H}_{11}\text{O}_5\text{Ba}$ . The acid liquor from the prepn. of II yields, on extn. with  $\text{Et}_2\text{O}$ , a very small quantity of an acid, m.  $180-5^\circ$  (decompn.), which does not contain N and does not give with Zn and NaOH a reaction for anthraquinone derivs. Probably in alk. medium there is hydrolysis of the  $\text{NH}_2$  to OH and oxidation to a hydroxydiphenylketotetracarboxylic acid, because the product is similar to an acid formed by the oxidation of trimethyleneoxyphenanthrene (III). In view of the fact that the hydrogenation of  $\text{C}_{14}\text{H}_8$  to tetralin renders it far more sensitive to oxidation by  $\text{KMnO}_4$ , an attempt was made to break down III by gradual oxidation, since its resistance should be correspondingly less than that of benzanthrone. III in alk.  $\text{KMnO}_4$ , heated at  $85-90^\circ$  (in a tin-lined vessel) and acidified, yields a small quantity of II and 2',3'-dicarboxy-biphenyl-2-glyoxylic acid (*o*-carboxyphenylphthalonic acid),  $\text{HO}_2\text{CC}_6\text{H}_4\text{C}_6\text{H}_3(\text{COCO}_2\text{H})\text{CO}_2\text{H}$  (IV), m.  $230^\circ$  (decompn.), turns blue litmus a strong red, decomps. carbonates; *tri-Na salt*,  $\text{C}_{16}\text{H}_7\text{O}_7\text{Na}_3$ ; *Ba salt*,  $(\text{C}_{16}\text{H}_7\text{O}_7)_2\text{Ba}_3 \cdot 6\text{H}_2\text{O}$ . IV is oxidized by acidic  $\text{KMnO}_4$  by the method of Henriques (*Ber.* 21, 1607 (1888)), with evolution of  $\text{CO}_2$  to biphenyl-2,3,2'-tricarboxylic acid,  $(\text{HO}_2\text{C})_2\text{C}_6\text{H}_3\text{C}_6\text{H}_4\text{CO}_2\text{H}$ , m.  $195-6^\circ$  (decompn.). Prolonged heating of ben-

zanthrone (V) in alk.  $\text{KMnO}_4$  in a glass vessel gives no reaction, but in a Sn-lined Cu vessel at  $80-90^\circ$  there are obtained, after 36 hrs., 30% of IV, 3-5% of II, and 15% of unaltered V. With alc.  $\text{PhHNH}_2$ , IV gives a phenylhydrazone,  $\text{HO}_2\text{CC}_6\text{H}_4\text{C}_6\text{H}_3(\text{CO}_2\text{H})\text{C}(\text{C}(\text{NNHPh})\text{CO}_2\text{H})_2$ , yellow, m.  $180^\circ$  (decompn.). With  $\text{HONH}_2\text{HCl}$  in aq.

$\text{Na}_2\text{CO}_3$ , IV gives an oxime anhydride,  $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{CO}_2\text{H})_2\text{N}=\text{N}=\text{O} \cdot \text{CO}$ , straw-colored, m.  $250^\circ$  (decompn.); *mono-Na salt*,  $\text{C}_{16}\text{H}_{10}\text{O}_7\text{NNa}$ , m.  $270^\circ$  (decompn.). With semicarbazide-HCl and KOAc in dil.  $\text{MeOH}$ , IV gives a semicarbazone,  $\text{HO}_2\text{CC}_6\text{H}_4\text{C}_6\text{H}_3(\text{CO}_2\text{H})\text{C}(\text{C}(\text{NNHCO}_2\text{NH}_2)\text{CO}_2\text{H})_2$ , straw-colored, m.  $220^\circ$  (decompn.). Distn. of a mixt. of IV and  $\text{Ca}(\text{OH})_2$  and steam distn. of the oil yields  $\text{Ph}_2$ , while distn. of IV with powd. Zn and steam distn. of the oil yields fluorene. At  $230-40^\circ$ , IV evolves  $\text{CO}_2$  and leaves a residue which yields an  $\text{Et}_2\text{O}$ -sol. dicarboxylic acid (6.2 g. from 8 g. of IV), decomps. carbonates. The  $\text{Et}_2\text{O}$ -insol. residue extd. with  $\text{C}_6\text{H}_6$  yields a substance which is sol. in boiling alk. carbonates and m. approx.  $240^\circ$ . The  $\text{Et}_2\text{O}$ -insol. residue m. around  $300^\circ$  (decompn.) and is sol. in cold alk. carbonates. All these decompn. products are to be studied further. IV and excess concd.  $\text{H}_2\text{SO}_4$ , heated at  $150-60^\circ$ , evolve  $\text{CO}_2$  and  $\text{SO}_2$  and yield 1,5-fluorenedicarboxylic acid (VI), formed by rotation through  $180^\circ$  of its axis of union of one of the  $\text{C}_6\text{H}_4$  nuclei and elimination of water. It is red and m.  $295-9^\circ$  (decompn.). VI on distn. yields fluorenone and an unidentified acidic substance, pale yellow, m.  $185^\circ$ , probably a mixt. of 2 isomers formed from VI by elimination of CO, *vis.*, 1- and 5-fluorenonecarboxylic acids (VII and VIII), with VII predominating, since the oxime of the mixt. m.  $215^\circ$  (the oxime of VII m.  $230^\circ$ , that of VIII m.  $263^\circ$ ). On distn. with powd. Zn, VI yields fluorene. Alc. VI,  $\text{HONH}_2\text{HCl}$  and  $\text{Na}_2\text{CO}_3$ , refluxed, yields on purification by HCl and  $\text{Na}_2\text{CO}_3$  an oxime,  $\text{C}_{16}\text{H}_9\text{O}_4\text{N}$ , yellowish, m.  $295-300^\circ$  (to a black liquid). VI and alc.  $\text{PhHNH}_2$ , refluxed, form the phenylhydrazone,  $\text{C}_{21}\text{H}_{14}\text{O}_4\text{N}_2$ , red, decomp. at  $240^\circ$  to the pyridazinone (IX), m.  $204-5^\circ$ .



It is also formed by refluxing VI in a mixt. of  $\text{AcOH}$  and  $\text{Ac}_2\text{O}$ . The new method of oxidative destruction leaves intact the benzene nucleus of V, and thus explains the structure not only of derivs. of V in the benzene nucleus (important from the tech. point of view), the constitution of which has been uncertain, but also of condensation compds. of V derivs. of the dibenzanthrone and isodibenzanthrone types. The method also makes possible the prepn. of important new derivs. of  $\text{Ph}_2$  and of fluorene.

C. C. Davis

Nuclear hydrogenation of furan with osmium catalyst. N. D. Zelinskii and N. I. Shufkin. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1933, 60-3 (in German 64-5).—Hydrogenation of furan and its derivs. in the vapor phase with Ni catalysts opens the ring and forms alcs. and satd. hydrocarbons. At high pressures the ring is reduced with difficulty. Cu is not a suitable catalyst for nuclear reduction. With  $\text{PtO}_2$  alc. furfural has been previously reduced to tetrahydrofurfuryl alc. accompanied by pentane-1,2-diol, pentane-1,5-diol and pentan-1-ol. With the aid of Pd-charcoal  $\text{C}_4\text{H}_7\text{OCH}_2\text{OH}$  has been reduced to  $\text{C}_4\text{H}_9\text{OCH}_2\text{OH}$ . Below  $100^\circ$  20% Pt-activated charcoal or 19% Pt-asbestos have very little effect on sylvan (I) in the vapor phase. A 4-fold repetition at  $160^\circ$  over 20% Pt-charcoal gave a mixt. of tetrahydrofuran, tetrahydroxyvan, butan-2-ol and pentan-2-ol. Furfural was converted according to the method of Wolf (*C. A.* 7, 790) into I, which after distn. gave  $\text{C}_4\text{H}_8\text{O}$ , *b<sub>700</sub>* 63-4°, *d<sub>4</sub>*°

0.9130,  $n_D^{20}$  1.4341, M. R. 23.80 (calcd. 23.41). I was vaporized at 80–2° and carried at the rate of 4–5 drops per min. in a stream of H over a 25-cm. layer of loosely packed 25% Os-asbestos in an 8-mm. glass tube. The reduced material was collected in a chilled receiver. It showed little change of  $n$  on a repetition of the reduction process. The product after distn. over Na gave tetrahydrosilylvan,  $C_8H_{10}O$ ,  $b_{76}$  78.5–80°,  $d_4^{20}$  0.8552,  $n_D^{20}$  1.4072, M. R. 24.73 (calcd. 24.78). Thus Os is a unique catalyst for the smooth hydrogenation of furan derivs. in the vapor phase without ring cleavage. C. R. Addinall

Red dyes from indolenine alkyl iodides. Elisa Ghigi. *Gazz. chim. ital.* 63, 694–701 (1933).—A further contribution to the work of Plancher and G. (*Rend. accad. sci. ist. Bologna*, May 20, 1928), who showed that König (C. A. 18, 2163) was wrong in concluding that 2-methyl-1-ethylindole is formed by the action of MeI on 2-methylindole.  $Et_3CHAC$ ,  $PhHNNH_2$  and anhyd.  $Et_2O$  condense directly to 3,3-diethyl-2-methylindolenine (I). The MeI deriv. of I,  $HC(OEt)_2$  (II) and  $Ac_2O$ , refluxed, yield the

corresponding indocyanine,  $MeN \cdot C_6H_4 \cdot CEt_2 \cdot C : CHCH : -$

$CHC : NMeI \cdot C_6H_4 \cdot CEt_2$ , violet reflection, m. 271°. Likewise the  $EtI$  deriv. of I, II and  $Ac_2O$ , refluxed, yield the

corresponding indocyanine,  $EtN \cdot C_6H_4 \cdot CEt_2 \cdot C : CHCH : -$

$CHC : NEtI \cdot C_6H_4 \cdot CEt_2$ , intense red with steel reflection, m. 293–4°. The MeI deriv. of 3-ethyl-3-methyl-2-methylindolenine, II and  $Ac_2O$ , refluxed, yield the corre-

sponding indocyanine,  $MeN \cdot C_6H_4 \cdot CMeEt \cdot C : CHCH : CH-$

$C : NMeI \cdot C_6H_4 \cdot CMeEt$ , violet reflection, m. 254°. Likewise the MeI deriv. of 3-phenyl-3-methyl-2-methylindolenine, II and  $Ac_2O$ , refluxed, yield the correspond-

ing indocyanine,  $MeN \cdot C_6H_4 \cdot CPhMe \cdot C : CHCH : CH-$

$C : NMeI \cdot C_6H_4 \cdot CPhMe$ , violet, m. 272°. As found in the earlier expts., alkyl and aryl groups in the 3-position of indolenine have a bathochromic effect, and the higher the mol. wt. of the group the more pronounced is the effect. Among these new compds., the color depends upon the presence in the indolenine of a Me group in the 2-position, since attempts to prep. a dye from the MeI deriv. of 3,3-dimethyl-2-ethylindolenine were unsuccessful, and gave an intense violet substance which dyed wool a light violet, but which could not be obtained in cryst. form, as with the dye prepd. from the HI derivs. of 9,11-dimethylcarbazolene. C. C. Davis

Condensation of isatin with phenyl esters of fatty acids. Shigenobu Inagaki and Taro Nakato. *J. Pharm. Soc. Japan* 53, 719–27 (1933).—The best condition for the condensation of isatin and Ph esters of fatty acids is the simultaneous use of  $P_2O_5$  and concd.  $H_2SO_4$  and heating the reaction mixt. at 85–90° for 8 hrs. By this method besides bis(acetoxyphenyl)isatin, the following new compds. were obtained: bis(propionyloxyphenyl)isatin, m. 192–3°, and dibutylbis(butyroxyphenyl)isatin, m. 148–9°. The yield decreases as the no. of C atoms of the fatty acid increases. Nao Uyei

Diphenylisatin. I. Synthesis and oxidation of diphenylisatin. Shigenobu Inagaki. *J. Pharm. Soc. Japan* 53, 686–78 (1933).—Bayer (*Ber.* 12, 1310 (1879); 18, 2637 (1885)) has shown that isatin (I) combines with 2 mols. each of  $PhOH$ ,  $PhMe$  or  $PhNMe_2$ ; he did not give conclusive evidence of the point of linkage but assumed it was position 3 of the indole ring, since reduction of I gives hydroxyindole. Sen (C. A. 19, 2196) stated that  $PhOH$  combines with I at position 2 when  $ZnCl_2$  is used as the condensing agent. I. has cleared up this point as follows: Hantzsch's 3,3-dichloroisatin (II) was condensed with  $PhOH$ ,  $PhOMe$ ,  $o-HOC_6H_4Me$  or  $PhOAc$  and the resulting products were compared with already known compds. It was found that these products were identical with products obtained by the use of  $H_2SO_4$  as condensing

agents showing Bayer's assumption was correct. II,  $PhH$  and  $AlCl_3$  gave diphenylisatin (III), needles, m. 230–1°. Ac deriv., platelets, m. 176–7°. Oxidation of III with  $CrO_3$  in  $AcOH$  gave diphenylisatoic anhydride, needles, m. 239–40° (IV). IV dissolves in concd.  $H_2SO_4$  with orange color and evolution of  $CO_2$ . On pouring into a large amt. of  $H_2O$ , it gives a colorless soln. from which *o*-amino-triphenylcarbinol (V), m. 121°, was obtained. Reduction of V with  $Zn$  dust gave acetylaminotriphenylmethane. II. Study of dianisoleisatin and the constitution of diphenol-isatin. *Ibid.* 698–718.—Bayer obtained dianisoleisatin (I), m. 65°, from isatin (II) and  $PhOMe$  in concd.  $H_2SO_4$ . Ger. pat. 462,527 makes I, m. 117–18°, from diphenol-isatin (III) and  $Me_2SO_4$ . But no one has established the exact position of  $MeO$  groups in I. There is a possibility of forming 3 different isomers. In order to det. the exact structure, this work was carried out. II and  $PhOMe$  in  $AcOH$  and  $H_2SO_4$  gave 4 products, (a) m. 157°, (b) 322–4°, (c) m. 98–117° and (d) m. 165°. The main product (IV), m. 157° and had tendency to crystallize with the solvent. Elementary analysis showed this compd. to be identical with I. Ac deriv., m. 153°. III and MeI gave a mono-Me deriv. m. 149–50°, which was identical with trimethylidiphenolisin (V) obtained from III and  $Me_2SO_4$ . Therefore, the OH groups of III and the  $MeO$  groups of I are in the same positions. In order to det. the exact structure, I was oxidized with  $CrO_3$  in  $AcOH$ . A compd. m. 202° (V) was obtained which gave a red soln. with concd.  $H_2SO_4$  with evolution of  $CO_2$ . On pouring the latter soln. into  $H_2O$ , a colorless soln. resulted, which on addn. of  $NaOH$  gave diphenylisatoic anhydride (VI), m. 103°. Ac deriv. m. 174°. From this it is assumed that VI must be one of the following: 2-amino-4',4''- (VII); 2-amino-2',2''- (VIII); or 2-amino-2',4''-dimethoxytriphenylcarbinol (IX). These new compds. have been synthesized by the method of Bayer and Hassel (*Ber.* 37, 3192). *p*- $IC_6H_4OMe$  and *o*- $H_2NC_6H_4CO_2Me$  in presence of  $Mg$  in ether gave VII, m. 103°, which was also obtained from *p*- $IC_6H_4OMe$  and 2-amino-4'-methoxybenzophenone (X). *o*- $IC_6H_4OMe$  and *o*- $H_2NC_6H_4CO_2Me$  gave VIII, m. 181–2°, which gives a greenish blue soln. with concd.  $H_2SO_4$ . Ac deriv. m. 229°. X and *o*- $IC_6H_4OMe$  gave IX, m. 170–1°, which gave a red soln. with concd.  $H_2SO_4$ . Ac deriv., m. 195–6°. Thus it is shown VI and VII are identical; the mixed m. p. was also 103°. This shows that IV is 3-(4',4''-dimethoxydiphenyl)isatin, and III, m. 269°, is the 4',4''-di-*HO* compd. III and  $H_2O$  gave 2-amino-4'-hydroxybenzophenone, m. 165°, and *o*- $H_2NC_6H_4CO_2H$ . Nao Uyei

Tautomerism of pyrazoles. K. v. Auwers. *Ann.* 508, 51–8 (1933).—3-Phenylpyrazole,  $d_4^{18.9}$  1.1037 (14.203% in quinoline),  $n_D^{18.9}$  1.61947, 1.62789, 1.65010 for  $\alpha$ ,  $\beta$ , and  $\gamma$ ; 5-Me deriv.,  $d_4^{20.7}$  1.0966 (11.133%),  $n_D^{20.7}$  1.61672, 1.62540, 1.64732; Me 3-phenylpyrazole-5-carboxylate,  $d_4^{18.1}$  1.1085 (10.315%),  $n_D^{18.1}$  1.61721, 1.62576, 1.64774; 1-Me deriv.,  $d_4^{17.6}$  1.1090 (16.19%),  $n_D^{17.6}$  1.61294, 1.62139, 1.64307; Me 1-ethyl-5-phenylpyrazole-3-carboxylate,  $d_4^{18.1}$  1.1038 (13.202%),  $n_D^{18.1}$  1.61093, 1.61925, 1.64036. The structure of the pyrazole derivs. is discussed from the spectrochem. view; the idea of the equivalence of the 3- and 5-positions is no longer tenable; like other substances capable of tautomerism, the parent pyrazoles are mixts. of isomers, though in some cases they may be practically homogeneous. Other phys. methods must be applied to the problem for the final soln. C. J. W.

Reduction of 2-methylimidazole-4,5-dicarboxylic acid. (Synthesis of 2-methyl-5-hydroxymethylimidazole-4-carboxylic acid.) Y. Tamamushi. *J. Pharm. Soc. Japan* 53, 664–8 (1933).—T. tried to reduce 2-methylimidazole-4,5-dicarboxylic acid by various methods. The reduction was not successful with the acid or its ester. With the 5-monochloride, the reduction with  $Sn$  and  $HCl$  gave 2-methyl-5-hydroxymethylimidazole-4-carboxylic acid. Nao Uyei

Spontaneous resolution of a racemic compound (histidine monohydrochloride). R. Duschinsky. *Chemistry & Industry* 1934, 10; cf. C. A. 22, 2360.—By fractional

crystn. of a mixt. of pure *l*- and *dl*-histidine-HCl from 1.5 parts of H<sub>2</sub>O, the *d*-isomer was produced as follows: (a) On rapidly cooling the hot soln. to 20°, then rapidly filtering, crystals of more or less optically pure *l*-histidine-HCl (I) were sepd. (b) By adding EtOH and Et<sub>2</sub>O to the filtrate and further cooling to 0°, almost pure *dl*-salt (II) was obtained. (c) On concg. the mother liquor and treating as in (a) almost optically pure *d*-histidine-HCl (III) was deposited. (d) The filtrate when treated as in (b) gave II. A mixt. of 660 g. of II and 340 g. of I gave 400 g. of II,  $[\alpha]_D^{25} -38-9.5^\circ$ , 540 g. of II,  $[\alpha]_D^{25} 0^\circ$ , and 46 g. of III,  $[\alpha]_D^{25} 38-9.5^\circ$ . II corresponds to the formula C<sub>6</sub>H<sub>7</sub>N<sub>3</sub>O<sub>2</sub>·HCl·2H<sub>2</sub>O, while the optically active salts fix only 1 mol. of H<sub>2</sub>O. Accordingly II seems to be a racemate and not an externally compensated mixt. It is now possible to prep. large quantities of III previously only available by biol. methods or by combination with optically active substances.

C. R. Addinall

**Naphthothiazole series. II. The methylation of 1-anilino- $\alpha$ -naphthothiazole and of 1-*p*-bromoanilino- $\alpha$ -naphthothiazole. The aromatic character of the heterocyclic nucleus in  $\alpha$ -naphthothiazoles. Mahmudur Rahman Chowdhury, Ranchhodji Dajibhai Desai and Robert F. Hunter. *J. Indian Chem. Soc.* 10, 637-42 (1933); cf. *C. A.* 24, 4036.—On methylation, 1-amino- $\alpha$ -naphthothiazole reacts exclusively in the amino phase (cf. *C. A.* 23, 835, for mechanism), yielding 1-imino-2-methyl-1,2-dihydro- $\alpha$ -naphthothiazole, unaccompanied by any detectable quantity of the isomeric methylamino- $\alpha$ -naphthothiazole. In the benzothiazole series, the reactivity of the amidine system is also almost entirely in favor of the aminothiazole phase. The introduction of a conjugated substituent as in 1-anilinobenzothiazole forms a system which, on methylation, yields a mixt. of both isomers (*C. A.* 25, 103). To exam. the effect of substitution in the NH<sub>2</sub> group on the reactivity of the semicyclic amidine the methylation of 1-anilino- $\alpha$ -naphthothiazole (I), m. 211-12°, prepd. by the condensation of 1-chloro- $\alpha$ -naphthothiazole (II) and PhNH<sub>2</sub>, was investigated. I reacted completely in the amino phase, yielding 1-phenylimino-2-methyl-1,2-dihydro- $\alpha$ -naphthothiazole, m. 182° (picrate, m. 218°), and no trace of the isomeric 1-phenylmethylamino- $\alpha$ -naphthothiazole (picrate, m. 184°), synthesized from II and PhNHMe. Since the attraction of the Ph nucleus for the  $\alpha,\beta$ -double bond in I is evidently insufficient to overcome the effect of internal aromatic conjugation of the heterocyclic ring 1-*p*-bromoanilino- $\alpha$ -naphthothiazole, m. 256°, was methylated. The amino form gave exclusively 1-*p*-bromophenylimino-2-methyl-1,2-dihydro- $\alpha$ -naphthothiazole, m. 182°. No trace of the isomeric 1-*p*-bromophenylmethylamino- $\alpha$ -naphthothiazole, m. 245°, prepd. from *p*-BrC<sub>6</sub>H<sub>4</sub>NHMe and II, was found. The behavior of the 1-amino- $\alpha$ -naphthothiazoles resembles that of the simple aminothiazoles much more closely than that of the 1-anilinobenzothiazoles and the heterocyclic nucleus in  $\alpha$ -naphthothiazole is evidently more aromatic than in benzothiazole. The loss of aromatic character by the thiazole nucleus on combination with the benzene ring as in benzothiazole may be compensated for by the presence of a 2nd fused aromatic nucleus as in  $\alpha$ -naphthothiazole.**

C. R. A.

**Comparison of the directive powers of elements having consecutive atomic numbers. VI. Examination of further possible comparative cases and conclusions. Catharine C. Le Fèvre, Raymond J. W. Le Fèvre and John Pearson. *J. Chem. Soc.* 1934, 37-43; cf. *C. A.* 27, 3475.—A satisfactory exptl. comparison of an oxonium salt with an NH<sub>2</sub> salt is impracticable. The *m*-directive influence of O in the onium condition has been demonstrated most clearly in the cases of 2-phenyl-, 2-phenyl-3-methyl- and 2-*p*-tolyl-benzopyrylium perchlorates and 2,4,6-triphenylpyrylium perchlorate. The contrast between the activating effect of bivalent O and the deactivating effect of "quadrivalent" O was demonstrated by the observations that (a) xanthylum salts were not nitrated under conditions which adequately sufficed to dinitrate xanthone and (b) *o*-phenylxanthylum salts underwent mono-*p*-nitration in the *p*-Ph group only.**

Qual. indications were that oxonium O forms a stronger deactivating pos. pole than does ammonium N (when this element is covalently bound to a Me group, as in all the expts.). Dry HCl passed through a soln. of propiophenone (I), salicylaldehyde (II) and HClO<sub>4</sub> gives 2-phenyl-3-methylbenzopyrylium perchlorate, orange, m. 174-7°; nitration gives the *m*-nitrophenyl deriv., yellow, m. 248-9°, also obtained from *m*-nitropropiophenone. I, isatin and 30% NaOH, heated 8 hrs., give 2-phenyl-3-methylquinoline, m. 50°; methiodide, m. 215°; methopicate, yellow, m. 169-70°; its nitration was not studied. PhCH<sub>2</sub>Ac, I and piperidine give 2-hydroxy- $\alpha$ -phenylstyryl Me ketone, m. 180-1°, ring closure of which could not be effected; 3-phenyl-2-methylbenzopyrylium perchlorate, m. 189-91°, was prepd. from PhCH<sub>2</sub>Ac, II, HClO<sub>4</sub> and HCl in Et<sub>2</sub>O; attempted nitration gave only black masses. 2,1-C<sub>10</sub>H<sub>8</sub>(OH)CHO (III), PhAc and HClO<sub>4</sub> in Et<sub>2</sub>O, with HCl, give 2-phenyl- $\alpha$ -naphthopyrylium perchlorate, yellow, m. 216-20°; II appears to be inferior to III in reactivity, as judged from the reaction with PhAc. PhCH<sub>2</sub>Ac and isatin give 3-phenyl-2-methylquinoline-4-carboxylic acid, m. above 250°; distn. with lime gives 3-phenyl-2-methylquinoline, whose picrate, yellow, m. 170-5°. II and *p*-MeC<sub>6</sub>H<sub>4</sub>Ac give salicylidene-4-methylacetophenone, yellow, m. 158-9°; HCl in AcOH gives 2-*p*-tolylbenzopyrylium perchlorate, yellow, m. 148-50°; nitration gives 3'-nitro-2-phenyl-4'-methylbenzopyrylium perchlorate, m. 200-5°, also synthesized from 4,3-Me(O<sub>2</sub>N)-C<sub>6</sub>H<sub>4</sub>Ac. *p*-MeC<sub>6</sub>H<sub>4</sub>Ac and isatin, after distn. with lime, give 2-*p*-tolylquinoline, pale yellow, m. 82-3°; the methosulfate m. 158-9°; the methopicate m. 157-8°; the *m*-NO<sub>2</sub> deriv. m. 192-4°. 2'-Hydroxy-2-styrylbenzopyrylium perchlorate gives a *di*-NO<sub>2</sub> compd., chocolate-brown, which could not be crystd. without apparent decompn. Quinaldine methopicate gives about 75% of a 5-NO<sub>2</sub> compd., m. 148-50°; the synthetic product m. 149-51°. 2-*o*-Hydroxystyryl-3-methylbenzopyrylium perchlorate gives a *di*-NO<sub>2</sub> compd., decomps. above 150°. Considerable oxidation always occurs when the nitration of benzopyrylium ferrichloride is attempted, small yields only of nitrosalicylic acid being isolated. 5-Nitrosalicylaldehyde and PhAc give 6-nitro-2-phenylbenzopyrylium perchlorate, red, which cannot be recrystd.; the 3-nitrosalicylaldehyde appears to give 3-nitro-2-hydroxychalcone, yellow, m. 163-4°.

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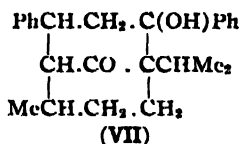
**Cyclic compounds containing a carbonyl group. A mechanism for the formation of pyrylium salts from 1,5-diketones. C. F. H. Allen and H. R. Sallans. *Can. J. Research* 9, 574-82 (1933); cf. *C. A.* 27, 5071.—An EtOH**

soln. of NaOH, CH<sub>2</sub>(CH<sub>2</sub>)<sub>4</sub>CO and BzCH:CHPh (I) on standing gives 2-phenylbenzylcyclohexanone (II), white, m. 149° (dioxime, white, m. 180°). A trimol. compd. C<sub>16</sub>H<sub>14</sub>O<sub>3</sub>, m. 167-8°, forms in the absence of solvent with NaOEt. Similarly there is produced 2-(4-chlorophenacylbenzyl)cyclohexanone, white, m. 125-6°, and 3-Me homolog, white, m. 155-6°. II refluxed with H<sub>2</sub>NOH.HCl in EtOH or the dioxime of II in C<sub>6</sub>H<sub>6</sub> with HCl gives 5,6,7,8-tetrahydro-2,4-diphenylquinoline as a gum (picrate, yellow, m. 196°). Excess of H<sub>2</sub>NOH with phenacylbenzylanthrone (III) (the addn. product of I and anthrone) gives only a monoxime, m. 144-5°, but III in the Grignard machine consumes 2 mols. of reagent without evolution of gas, indicating a diketone. II in EtOH and concd. H<sub>2</sub>SO<sub>4</sub> is dehydrated to 2 stereoisomeric forms of bicyclo[3.1.3]-2,4-diphenyl-9-keto-4-nonene (IV), m. 143° and 151°. The lower-melting isomer gives the oxime, m. 156°, and in the Grignard machine consumes 1 mol. of reagent to give bicyclo[3.1.3]-2,4-diphenyl-9-methyl-9-hydroxy-4-nonene (V), m. 147°. IV does not lose the CO bridge on heating in contrast to the behavior of other compds. of a similar ring system. II in CHCl<sub>3</sub> and abs. MeOH with HBr gives 2,4-diphenyl-2-methoxyhexahydrobenzopyran (VI), m. 171°. II with H<sub>2</sub>SO<sub>4</sub>, or any mineral acid or anhyd. CuSO<sub>4</sub>, also gives VI. None of the other addn. products nor several other previously known 1,5-diketones give a Me ether similar to VI. The addn. product of I and menthone prepd. by Stobbe (cf. *C. A.* 7, 3130) is represented best

by VII since it gives only a monoxime, consumes 2 mols. of Grignard reagent, and evolves 1 mol. of gas. The 1,5-diketones studied undergo ring closure to produce pyrylium salts of which those containing a metal are made from the ketone and the metal chloride in  $\text{Ac}_2\text{O}$ , and the perchlorates are made by the addn. of 50%  $\text{HClO}_4$  to a suspension of the diketone in  $\text{Ac}_2\text{O}$  and abs.  $\text{Et}_2\text{O}$ .  $\text{SnCl}_4$  and  $\text{SbCl}_5$  can replace  $\text{FeCl}_3$  in the ferrichlorides. The Sn compd. is an addn. product of an acetate, but the Fe and Sb compds. are addns. of 1 mol. of the metal chloride to the chloride of the

cyclic deriv. II,  $\text{BzCH}_2\text{CHPhCH}(\text{CHMe})_2\text{CO}$

(VIII) and  $\text{BzCH}_2\text{CHPhCH}(\text{CH}_2)_2\text{CO}$  (IX), give, resp., the ferrichlorides:  $\text{C}_{22}\text{H}_{19}\text{OFeCl}_4$ , yellow, m.  $161^\circ$ ;  $\text{C}_{22}\text{H}_{19}\text{OFeCl}_4$ , yellow, m.  $133^\circ$ ; and  $\text{C}_{20}\text{H}_{17}\text{OFeCl}_4$ , brown, m.  $126^\circ$ . II, VIII, IX, and  $p\text{-PhC}_6\text{H}_4\text{CO}(\text{CH}_2)_2\text{CHPhBz}$  (XI) give, resp., the perchlorates:  $\text{C}_{21}\text{H}_{19}\text{O}_3\text{Cl}$ , yellow, m.  $214^\circ$ ;  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{Cl}$ , orange-yellow, m.  $231^\circ$ ;  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{Cl}$ , yellow, m.  $240^\circ$  (decompn.);  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{Cl}$ , yellow, m.  $258^\circ$ . II, VIII, IX,  $\text{BzCH}_2\text{CHPhCH}_2\text{Bz}$  (X), and XI give, resp., the Sn salts:  $\text{C}_{22}\text{H}_{22}\text{O}_4\text{SnCl}_4$ , yellow-orange, m.  $143^\circ$ ;  $\text{C}_{21}\text{H}_{21}\text{O}_4\text{SnCl}_4$ , yellow, m.  $135^\circ$ ;  $\text{C}_{21}\text{H}_{21}\text{O}_4\text{SnCl}_4$ , brown, m.  $161^\circ$ ;  $\text{C}_{20}\text{H}_{19}\text{O}_4\text{SnCl}_4$ , yellow, m.  $205^\circ$ ;  $\text{C}_{21}\text{H}_{21}\text{O}_4\text{SnCl}_4$ , orange, m.  $206^\circ$ . X and XI give, resp., the Sb salts:  $\text{C}_{22}\text{H}_{21}\text{OSbCl}_4$ , brown, m.  $320^\circ$  (decompn.);  $\text{C}_{20}\text{H}_{19}\text{OSbCl}_4$ , brown, m.  $233^\circ$  (decompn.). II and VI with  $\text{FeCl}_3$  and  $\text{Ac}_2\text{O}$  give the same ferrichloride. A plausible mechanism for the formation of pyrylium salts from 1,5-diketones is given.



R. B. Sandin

**Synthesis of brazilinic acid.** Juanendra N. Ray, Santokh S. Sillooja and Prem R. Wadha. *J. Indian Chem. Soc.* 10, 617-20 (1933).—The condensation of Et methoxyphenoxypropionate with veratroyl chloride in the presence of  $\text{AlCl}_3$  takes place with extrusion of the side chain carrying the ester grouping and the consequent formation of 2-hydroxy-4,4',5'-trimethoxybenzophenone (I),  $\text{C}_{18}\text{H}_{16}\text{O}_6$ , m.  $141^\circ$ , together with a small amt. of the isomeric 4-hydroxy-2,4',5'-trimethoxybenzophenone (II), m.  $175^\circ$ . Treatment of  $m\text{-MeOC}_6\text{H}_4\text{OH}$  and veratroyl chloride in  $\text{PhNO}_2$  with  $\text{AlCl}_3$  also gave I and II in almost equal quantities. The resp. structures were assigned after consideration of the  $\text{FeCl}_3$  color reactions of the 2 ketones. I was converted by nitration, reduction, replacement of the  $\text{NH}_2$  group by CN and hydrolysis of the nitrile to 2-hydroxy-4,4',5'-trimethoxybenzoic acid (III), m.  $203^\circ$ , previously prep'd. by Perkin and Robinson (*C. A.* 2, 1908) by condensing hemipinic anhydride with  $m\text{-C}_6\text{H}_4(\text{OMe})_2$ . A soln. of 1 g. of I in 15 cc.  $\text{AcOH}$  on treatment with a mixt. of concd.  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$  at  $48-52^\circ$  for 2 hrs. gave 2-hydroxy-4,4',5'-trimethoxy-2-nitrobenzophenone, m.  $211^\circ$ , reduced by  $\text{SnCl}_2$  and  $\text{HCl}$  to the 2-amino deriv.  $\text{HCl}$ , m.  $240^\circ$ , converted by treatment with 1%  $\text{NaNO}_2$  and potassium cuprocyanide to the corresponding cyano compd. m.  $152-4^\circ$ , hydrolyzed by alc.  $\text{KOH}$  to III. The condensation of III with  $\text{ClCH}_2\text{CO}_2\text{H}$  in alk. soln. yielded brazilinic acid (IV)  $\text{C}_{18}\text{H}_{16}\text{O}_8$ , m.  $209^\circ$ , developing the characteristic red color with concd.  $\text{H}_2\text{SO}_4$ . IV is identical with the natural brazilinic acid and with the synthetic acid prep'd. by refluxing a mixt. of the above cyano compd. and  $\text{ClCH}_2\text{CO}_2\text{H}$  in alk. soln. for 7 hrs., acidifying and crystg. from hot dil.  $\text{AcOH}$ . C. R. A.

**Cyanine dyes.** VI. Thia-, thiazolo-, oxa- and imidocyanines. Terutaro Ogata. *Proc. Imp. Acad.* (Tokyo) 9, 602-5 (1933); cf. *C. A.* 27, 1631.— $\mu, N, N'$ -Trimethylbenzimidazole iodide,  $\text{Cl}_2\text{CCHO}$  and  $\text{EtONa}$  give 13% of 1,1',3,3'-tetramethyltrimethinimidocyanine iodide, orange-red, m.  $303^\circ$ , sensitizing max 530  $\mu$ . 1-Methylbenzothiazole-R11 (I) and propenedianil (II) with piperidine give 61% of 1,1'-diethylpentamethinethiocyanine iodide,

green with metallic luster, m.  $253^\circ$  (decompn.), 700  $\mu$ .  $\mu$ -Methylthiazole-Mel (III) and II give 5% of 1,1'-dimethylpentamethinethiazolocyanine iodide, steel-blue, m.  $215^\circ$  (decompn.), 690  $\mu$ .  $\alpha, \mu$ -Dimethylthiazole-Mel (IV) and II give 24% of 1,1',5,5'-tetramethylpentamethinethiazolocyanine iodide, steel-blue, m.  $226^\circ$ , 690  $\mu$ . I and pentadienedianil give 15% of 1,1'-dimethylheptamethinethiocyanine iodide, green, m.  $240^\circ$ , 800  $\mu$ . III gives 10% of 1,1'-dimethylheptamethinethiazolocyanine iodide, green, m.  $152^\circ$  (decompn.), 780  $\mu$ . IV gives 27% of the 1,1'-5,5'-tetra-Me deriv., green, m.  $174^\circ$  (decompn.), 780  $\mu$ . I, heated with  $\text{HC}(\text{CO}_2\text{Et})_2$  and  $(\text{CH}_3\text{CO}_2\text{H})_2$  3 min. at  $170^\circ$ , gives 2% of 1,1',1'-triethyl-9-benzothiazolyl-11-methinethiocyanine 1,1'-diiodide, golden, m.  $256^\circ$  (decompn.), 640  $\mu$ . III gives 40% of 1,1',1'-trimethyl-7-thiazolyltrimethinethiazolocyanine 1,1'-diiodide, green, m.  $250^\circ$  (decompn.), 640  $\mu$ . IV gives 42% of 1,1',1',5,5',5'-hexa-Me deriv., greenish blue, m.  $283^\circ$  (decompn.), 640  $\mu$ . 1,1',1',3,3',3'-Hexamethyl-9-benzimidazolyl-trimethinimidocyanine 1,1'-diiodide, dark red, m.  $230^\circ$ , 570  $\mu$ , in 5% yield from trimethylbenzimidazole iodide. Most of these dyes are unstable toward acids. C. J. W.

**Preliminary synthetic experiments in the cytosine group.** I. Attempted synthesis of Ewins' structure for cytosine. Salyendranath Chakravarti and A. Venkatasubban. *J. Annamalai Univ.* 2, 227-37 (1933).—A preliminary description of unsuccessful attempts to synthesize a compd. of the structure assigned by Ewins to cytosine. Further work is in progress. Condensation of the mixt. of nitrotolualdehydes resulting from nitration of  $m\text{-MeC}_6\text{H}_4\text{CHO}$  with  $\text{CH}_2(\text{CO}_2\text{H})_2$  in the presence of  $\text{C}_6\text{H}_5\text{N}$  and piperidine gave 2-nitro-3-methylcinnamic acid (I), m.  $244^\circ$  (Me ester, m.  $83^\circ$ ), and the 6-nitro isomer (II), m.  $224^\circ$  ( $p$ -toluide, m.  $89^\circ$ ). Nitration of  $m\text{-MeC}_6\text{H}_4\text{CH}_2\text{CHCO}_2\text{H}$  gave 4-nitro-3-methylcinnamic acid, m.  $251^\circ$  (Me ester, m.  $124^\circ$ ), together with I and II. Hydroxyuvitic aldehyde with  $p\text{-NH}_2\text{C}_6\text{H}_4\text{Me}$  gave a mono-Schiff's base, m.  $161^\circ$ , which on condensation with  $\text{CH}_2(\text{CO}_2\text{H})_2$  and hydrolysis with  $\text{HCl}$  gave 2-hydroxy-3-formyl-5-methylcinnamic acid, m.  $212^\circ$  (Me ester, m.  $129^\circ$ ). 3-Cyano-4-nitrotoluene by the Skraup reaction in the presence of  $\text{As}_2\text{O}_3$  gave 70% of 6-methyl-8-carboxyquinoline, m.  $169^\circ$ , which on reduction with Sn and  $\text{HCl}$  gave 6-methyl-1,2,3,4-tetrahydro-8-carboxy, uinaline, m.  $190-1^\circ$  (N-nitroso compd., m.  $138^\circ$ ). R. C. Elderfield

**Phenanthridine series.** III. meso-Substituted derivatives. Leslie P. Walls. *J. Chem. Soc.* 1934, 104-9; cf. *C. A.* 26, 5956.—Phenanthridone,  $\text{POBr}_2$  and  $\text{PBr}_3$ , heated 5 hrs. at  $200^\circ$ , give 9-bromophenanthridine (I), m.  $123-4^\circ$ .  $\text{C}_6\text{H}_4(\text{CO})_2\text{NK}$  and  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{Cl}$ , heated 2 hrs. at  $130^\circ$ , give  $\beta$ -phthal- $\beta$ -diethylaminoethylimide, m.  $46-7^\circ$ .  $\text{C}_6\text{H}_4(\text{CO})_2\text{NCH}_2\text{CH}_2\text{Br}$  and  $(\text{iso-Bu})_2\text{NH}$ , heated 4 hrs. at  $130-40^\circ$ , give  $\beta$ -phthal- $\beta$ -diisobutylaminoethylimide, m.  $52^\circ$ ; hydrolysis with 20%  $\text{HCl}$  gives  $\beta$ -diisobutylaminoethylamine, whose  $\text{dipicrate}$ , yellow, m.  $190-2^\circ$  (decompn.). I and  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{NH}_2$  in  $\text{PhOH}$  at  $100^\circ$  give  $N$ -phenylphenanthridone, m.  $118-19^\circ$ ; excess  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{NH}_2$  at  $120^\circ$  gives 9- $\beta$ -diethylaminoethylamino phenanthridine, whose  $\text{di-HCl}$  salt m.  $238-43^\circ$ ; it seps with 1 mol.  $\text{EtOH}$  or 3 mols.  $\text{H}_2\text{O}$ ; the  $\text{dipicrate}$ , yellow, m.  $208-11^\circ$ . I and  $\beta$ -piperidinoethylamine give the 9- $\beta$ -piperidinoethylamino deriv., whose  $\text{di-HCl}$  salt m. about  $265-70^\circ$  and seps. with 2 mols.  $\text{H}_2\text{O}$ ; the  $\text{dinitrate}$  m.  $130-5^\circ$  (decompn.). The 9- $\beta$ -diisobutylaminoethylamino deriv. gives a  $\text{di-HCl}$  salt, crystals with 4 mols.  $\text{H}_2\text{O}$ , m.  $142-4^\circ$ . These compds. have a taste less bitter than quinine, but have no curative properties in malaria and are of no value in trypanosomiasis. 9-Methylphenanthridine, 40% aq.  $\text{HCHO}$  and  $\text{EtOH}$ , refluxed for 5 hrs., give 9- $\beta, \beta'$ -di-hydroxyisopropylphenanthridine, m.  $129.5^\circ$  ( $\text{di-Ac}$  deriv., m.  $93^\circ$ ); oxidation gives phenanthridine-9-carboxylic acid, which forms a complex with 1 mol.  $\text{HCl}$  and 1 mol.  $\text{H}_2\text{O}$ , yellow; the  $\text{Na}$  salt seps. with 3 mols.  $\text{H}_2\text{O}$ ;  $\text{Et}$  ester (III), m.  $57-8^\circ$ ; the acid frequently causes fatty degeneration of the liver and its pharmacology was not studied.  $\alpha$ -Xenylamine and  $(\text{CO}_2\text{Et})_2$ , heated at  $140^\circ$  for 4.5 hrs., yield a mixt. of  $\text{sym-di-o-xenylloxamide}$  (III), m.  $233-5^\circ$ , and  $\text{Et o-xenylloxamate}$ , m.  $112-13^\circ$ ; refluxing the Et





destruction of double bonds occurs under these conditions; if anything the no. of double bonds is somewhat increased. V. The oxidation of ergosterol. *Ibid.* 607-16.—Ergosterol takes up  $O_2$  in the dark, the max. rate being at  $pH$  8. The uptake of  $O_2$  is inhibited, though not completely, by HCN or pyrophosphate and accelerated by Fe, i. e., is a typical heavy metal catalysis. The oxidation is accelerated by phosphate or arsenate. The oxidation is greater in visible light than in the dark, and in light is increased by eosin or chlorophyll. The light reaction varies with the solvent, but is not affected by HCN. It consists of an uptake of 1 mol. of  $O_2$  with eosin, or 0.5 mol. with chlorophyll; in the latter case, vitamin D may be produced. Cholesterol is only very slightly oxidized under the same conditions.

K. V. Thimann

The constitution of laccol. Gabriel Bertrand and Georges Brooks. *Chimie & industrie* 30, 759-66(1933); cf. C. A. 26, 5558.—A more detailed account of the investigation.

A. Papineau-Couture

Syntheses of polycyclic compounds related to the sterols. II. Diel's hydrocarbon  $C_{15}H_{16}$ . S. H. Harper, G. A. R. Kon and F. C. J. Ruzicka. *J. Chem. Soc.* 1934, 124-8; cf. C. A. 27, 5336.—It has been shown that 1,2-cyclopentenophenanthrene (I) is not identical with Diel's hydrocarbon  $C_{15}H_{16}$  (II); II is not the 4'- or the 5'-Me deriv. of I (cf. Ruzicka, C. A. 27, 4800), but is the 3'-Me deriv. (cf. Bergmann and Hillemann, C. A. 27, 5749). 2-Methylcyclopentanone (43 g.) and the Grignard reagent from 90 g.  $\alpha$ - $C_{10}H_7CH_2CH_2Br$  give 24.4 g. 2-methyl-1-( $\beta$ - $\alpha$ -naphthylethyl)cyclopentanol (III),  $b_p$  190°; there also results some  $\alpha,\beta$ -di( $\alpha$ -naphthyl)butane (?),  $b_p$  240°, m. 102° (picrate, m. 174°; bis(*s*-trinitrobenzene) compd., m. 187°; bis(trinitrotoluene) compd., m. 131°). Heating 24 g. III with 40 g.  $P_2O_5$  at 140° under reduced pressure gives 1-methyl-1,2-cyclopentano-1,2,3,4-tetrahydrophenanthrene,  $b_p$  155°,  $d_4^{25}$  1.04542,  $n_D$  1.61363; dehydrogenation gives I, the trinitrotoluene compd. of which, yellow, m. 102°. 2-( $\beta$ - $\alpha$ -Naphthylethyl)cyclopentanol and Me-MgI give 1-methyl-2-( $\beta$ - $\alpha$ -naphthylethyl)cyclopentanol,  $b_p$  154°,  $d_4^{25}$  1.06338,  $n_D$  1.61991; dehydrogenation gives I. 2,5-Dimethylcyclopentanone and  $\alpha$ - $C_{10}H_7CH_2CH_2MgBr$  give 2,5-dimethyl-1-( $\beta$ - $\alpha$ -naphthylethyl)cyclopentanol,  $b_p$  190-5°;  $P_2O_5$  gives 1,3'-dimethyl-1,2-cyclopentano-1,2,3,4-tetrahydrophenanthrene,  $b_p$  160°,  $d_4^{25}$  1.04203,  $n_D$  1.60681; dehydrogenation gives the 3'-Me deriv. of I, m. 125-6° (picrate, brownish orange, m. 118-19°; trinitrobenzene deriv., m. 145-6°; trinitrotoluene compd., pale yellow, m. 93°); a 2nd hydrocarbon is also formed, m. 230° (picrate, scarlet, m. 134-5°). Mixed m. ps., absorption spectra and crystallographic data show that this is identical with II. The compd. prepd. by B. and H. shows several points of distinction from the 3'-Me deriv. prepd. as above, such as crystal form and m. p. of its derivs.; judgment is reserved until a larger quantity is available for study.

C. J. West

Cerevisterol: new notes on composition, properties and relation to other sterols. Edna M. Honeywell and Charles E. Bills. *J. Biol. Chem.* 103, 515-20(1933); cf. C. A. 27, 1355.—Five analyses of cerevisteryl diacetate confirm the formula  $C_{28}H_{46}O_6$ , so that cerevisterol is  $C_{26}H_{44}O_6$ . The mol. has 2 double bonds, 2 and possibly 3 OH groups, of which one is tertiary and not readily acetylated. Its reactions with  $CCl_3CO_2H$  and  $CCl_3CHO.H_2O$  are similar to, but more intense than, those of ergosterol. The digitonide, unlike those of other sterols, is not insol.

K. V. Thimann

Gadoleic acid in cod-liver oil (Toyama, Tsuchiya) 27. Identification of gadoleic acid in Japanese sardine oil, herring oil and liver oil of "Sukeso-Dara" (Toyama, Tsuchiya) 27. Theory of free radicals of org. chemistry (Hückel) 3. Enzymic amylolysis. III. Cryst. hexanose from starch (Waldschmidt-Leitz, Reichel) 11A. Reducing action of anhyd. HI (Brewster) 6. Quantum mechanics and the benzene problem (Elsen) 3. Spectral absorption of methylated xanthines (Gulland, Holiday) 3. Velocity of decompn. of diazo compds. in water (Yamamoto, et al.) 2. Kinetics of the  $CH_4-O$  reaction (Frear) 2.

1 Raman effect of furan and furfural (Glockler, Wiener) 3. Raman effect of org. substances (Matsuno, Han) 3. New chem. theory [of org. compds.] (Gosselin) 2. Raman spectra of acetylenic alcs. (Gredy) 3. Mechanism of the oxidation processes. XXXVI. Enzymic dehydrogenation of lactic acid, pyruvic acid and methylglyoxal (Wieland, et al.) 11A. Esters of sulfonated aromatic carboxylic acids (U. S. pat. 1,935,264) 18.

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3 Beilstein's Handbuch der organischen Chemie. 4th ed. Issued by "Der Deutschen Chemischen Gesellschaft." Edited by Bernhard Prager, Paul Jacobson and Friedrich Richter. Bd. XVII. Heterocyclische Reihe, Verbindungen mit 1 cyclisch gebundenem Sauerstoffatom, Stammkerne, Oxyverbindungen, Mono- und Poly-Oxo-Verbindungen. Berlin: J. Springer. 617 pp. M. 128. Cl. C. A. 27, 1889.

4 Partially oxidizing unsaturated hydrocarbons. E. I. du Pont de Nemours & Co. Brit. 400,297, Oct. 26, 1933. In the oxidation by O of gaseous unsatd. hydrocarbons for the production of olefin oxides, glycols, etc., the process is effected at 250-600° in a reaction vessel having a ratio of surface to vol. not exceeding about 4 (in sq. in.)/l (in cu. in.). Examples describe the oxidation of  $C_2H_4$  to  $C_2H_4O$ ,  $CH_2O$  and  $HCOOH$  and of  $C_3H_4$  to  $C_3H_4O$ ,  $C_3H_5(OH)_2$ , propionaldehyde, propionic acid,  $AcOH$ ,  $HCOOH$ ,  $AcH$  and  $CH_2O$ . The interior surface of the vessel is preferably of a siliceous material, e. g., glass, porcelain, clay.

5 Addition compounds of unsaturated hydrocarbons with hydrogen halides and alkyl halides. John P. Baxter (to Imperial Chemical Industries Ltd.). U. S. 1,944,161, Jan. 23. In producing compds. of this class (such as vinyl chloride from  $C_2H_2$  and  $HCl$ ) in the presence of active carbon as a catalyst, the partially spent catalyst is reactivated by temporarily interrupting the flow of the reaction gas mixt. and substituting a stream of the halide of the character employed in the reaction (the temp. during this stage being 200-600° and being higher than the reaction temp.).

6 Olefins from paraffin hydrocarbons. Per K. Frolich and Benjamin C. Boeckeler (Frolich to Standard Oil Development Co.). U. S. 1,944,419, Jan. 23. In treating hydrocarbons such as  $C_2H_6$ ,  $C_3H_8$ ,  $C_4H_{10}$  or  $C_5H_{12}$  for the production of olefins mainly having the same number of C atoms as the initial material, the material is passed through a reaction zone at 450-700° in contact with a catalyst, formed of Zn and Cr oxides, which has been subjected to reducing conditions before use in the reaction.

7 Absorbing olefins in sulfuric acid. Adrianus J. van Peski (to Shell Development Co.). U. S. 1,944,622, Jan. 23. Compds. such as  $C_2H_4$ ,  $C_3H_4$  or  $C_4H_6$  contg. at least one double bond in the mol. are absorbed in  $H_2SO_4$  in the presence of complex metallic-cyano compds. (numerous examples being given) which serve to facilitate the absorption.

8 Reactions of alkylene oxides with hydrogen halide. Paul L. Salzberg (to E. I. du Pont de Nemours & Co.). U. S. 1,944,274, Jan. 23. An olefin oxide such as ethylene oxide is added to an alkyl ester such as Et silicate contg. free H halide such as  $HCl$  and reaction is effected between the alkylene oxide and the H halide to form a product such as ethylene chlorohydrin.

9 Diolefin production. Martin Mueller-Cunradi (to I. G. Farbenind. A.-G.). U. S. 1,944,153, Jan. 23. For the production of a diolefin such as butadiene, a butylene glycol such as 1,3-butylene glycol, together with an addn. of water vapor is passed over a solid oxide dehydration

catalyst at a temp. of 160–500°.  $\text{CuSO}_4$  or red P may be used as an activator. Cf. C. A. 27, 5082.

**Secondary alcohols from olefin-sulfuric acid reaction liquors.** Benjamin T. Brooks (to Standard Alc. Co.). U. S. 1,944,400, Jan. 23. For obtaining secondary alcs. contg. 3 to 6 C atoms per mol. from acid reaction products formed by treating olefins with aq.  $\text{H}_2\text{SO}_4$ , an acid reaction product is dild. with water, the dild. material is permitted to stratify, forming an aq. layer and a layer consisting largely of hydrocarbons which is then sepd. from the aq. layer, directly and separately partially distd. to obtain a condensate of secondary alcs. with minor proportions of hydrocarbon material and the components of the condensate are sepd. Cf. C. A. 28, 17147.

**Aromatic alcohols.** Ludwig Valik and Irene Valik née Fleischacker. Fr. 756,229, Dec. 6, 1933. See Brit. 398,136 (C. A. 28, 10477).

**Carbohydrates.** Lucien H. Roman. Ger. 590,236, Jan. 4, 1934 (Cl. 12a. 6). Hexoses and higher carbohydrates are prepd. by polymerizing aldehydes, particularly  $\text{CH}_2\text{O}$ , under the influence of light, preferably orange-red light. The reaction is best effected in the presence of a compd. capable of combining with the carbohydrate formed, e. g., an alk. earth hydroxide. App. is described. Cf. C. A. 27, 4123.

**Primary and secondary amines.** Compagnie de produits chimiques et électrometallurgiques Alais, Proges et Camargue. Ger. 588,648, Nov. 21, 1933 (Cl. 12q. 5). Primary or secondary aliphatic or aromatic alcs. (except hydrogenated phenols) are heated with  $\text{NH}_3$  or primary amines in the presence of Ni or other metallic H-attaching catalysts, excluding metals of the 8th periodic group. Thus, a mixt. of  $\text{EtOH}$  vapor and  $\text{NH}_3$  is led over a Ni catalyst at atm. pressure and at 180–200° to give a 90% yield of amine consisting of 40%  $\text{EtNH}_2$  and 60%  $\text{Et}_2\text{NH}$ . The Ni catalyst is obtained by reducing  $\text{Ni}_2\text{O}_3$  at 200°. Other examples are given.

**Acyated cyclohexylphenylamines.** Georg Kalischer and Richard Fleischhauer (to General Aniline Works). U. S. 1,944,514, Jan. 23. Acyated cyclohexylphenylamines (which may be diazotized and used for making azo dyes) are prepd. by replacing, in a *N*-cyclohexylnitroaryl of the general formula cyclohexyl-NH-R- $\text{NO}_2$  (in which R stands for a benzene radical, the H atoms of which may be substituted by the nitro or sulfo group, and "cyclohexyl" stands for a cyclohexyl radical, the H atoms of which may be substituted by the methyl group), the H atom of the NH group by treating the compd. with an acylating agent, and subsequently reducing the  $\text{NO}_2$  group to  $\text{NH}_2$ . Details are given of the production of: 1-*N*-acetylcyclohexylamino-4-nitrobenzene, m. 114°; 1-*N*-acetylcyclohexylamino-4-aminobenzene, m. 143°; 1-*N*-benzoylcyclohexylamino-4-aminobenzene, m. 185°; *N*-2',5'-dichlorobenzoylcyclohexylamino-4-nitrobenzene, m. about 206°; *N*-2',5'-dichlorobenzoylcyclohexylamino-4-aminobenzene, m. 196°; *N*-3'-nitrobenzoylcyclohexylamino-4-nitrobenzene, m. about 147°; *N*-3'-aminobenzoylcyclohexylamino-4-aminobenzene, m. 180°; 1-*N*-acetyl-*o*- and *p*-methylecyclohexylamino-4-nitrobenzenes, m. 112° and 135°, resp.; and similar compds. including some sulfonic acids.

**Aromatic sulfodichloroamides.** Hans Mirau (to Chemische Fabrik von Heyden A.-G.). U. S. 1,944,508, Jan. 23. An aromatic sulfodichloroamide of the benzene series such as *p*-toluenesulfodichloroamide is formed by reacting upon an aromatic sulfoamide such as *p*-toluenesulfoamide with an alkali metal hypochlorite and introducing  $\text{CO}_2$  into the mixt.

**Ketones.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Brit. 400,384, Oct. 26, 1933. Higher aliphatic ketones are prepd. by subjecting a mixt. of a lower aliphatic ketone with a lower aliphatic primary alc. together with H or N to 150–400° in the presence of a catalyst consisting of  $\text{Al}_2\text{O}_3$ , with or without  $\text{MgO}$  or other alk. earth metal oxide, as main constituent with small amts. of Cu and (or) Ag, or an oxide thereof, to which  $\text{MoO}_3$  may be added. Small amts. of higher primary alcs. are also formed when H is used. Among examples (1)

1 MeOH and  $\text{Me}_2\text{CO}$  in equimol. quantities are passed with at least an equal quantity of N over a catalyst prepd. by impregnating  $\text{Al}_2\text{O}_3$  with  $\text{Cu}(\text{HCOO})_2$  and  $\text{MoO}_3$  or  $\text{BaO}$  and treating with steam and air at 450°; the product contains  $\text{MeEtCO}$ ,  $\text{Et}_2\text{CO}$  and high-boiling polysubstituted ketones, and (2)  $\text{MgO}$  is mixed with  $\text{Al}(\text{OH})_3$  and  $\text{CuO}$  and treated with air and steam at 400–500° and a mixt. of  $\text{Me}_2\text{CO}$  (2.5 mols.),  $\text{BuOH}$  (2 mols.) and H (3 mols.) is passed under pressure thereover to give  $\text{MeAmCO}$  as main product, heptyl alc., octyl alc. and higher ketones and alcs. being also formed. Cf. C. A. 27, 2692.

**Ketones and acid anhydrides.** I. G. Farbenind. A.-G. (Otto Nicodemus and Walter Weibezahn, inventors). Ger. 590,237, Jan. 4, 1934 (Cl. 12a. 10). An aliphatic carboxylic acid is treated with a compd. of the type  $\text{RC}:\text{CH}$  at atm. or moderately raised temp. and pressure in the presence of a catalyst, e. g., a mixt. of a salt of Hg, Zn or Cd with  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ . The anhydride of the acid and a ketone corresponding to the acetylenic compd. used are obtained. Thus,  $\text{AcOH}$  and  $\text{MeC}:\text{CH}$  yield  $\text{Ac}_2\text{O}$  and acetone. Other acetylenic compds. which may be used are  $\text{EtC}:\text{CH}$ ,  $\text{PhC}:\text{CH}$ ,  $\text{PhCH}_2\text{C}:\text{CH}$  and  $\text{CH}_2\text{CHC}:\text{CH}$ . Cf. C. A. 27, 4814.

**Esters of formic acid.** Ges. für Kohlentechnik m. b. H. (Wilhelm Glud, Walter Klempt and Fritz Brodkorb, inventors). Ger. 588,763, Nov. 28, 1933 (Cl. 12a. 11). CO is united with alc. under raised pressure in the presence of alcoholates, the temp. being first high and finally allowed to drop to room temp. Thus,  $\text{MeOH}$  with Na in soln. is heated in an autoclave to 60–65° and treated with CO at 50 atm. After 2 hrs. the temp. is allowed to fall. A 60.5% yield of  $\text{HCOOCH}_3$  is obtained. Other examples are given.

**Phosphoric acid esters.** Curt Schönburg (to I. G. Farbenind. A.-G.). U. S. 1,944,530, Jan. 23. Phosphorus oxychloride together with a large excess of glycol mono-alkyl or -aryl ethers are brought into reaction, producing new tertiary neutral phosphoric acid esters of glycol mono-alkyl (or -aryl) ethers, stable colorless substances of high b. p., difficultly inflammable and suitable for use as plasticizers and softeners with cellulose esters and ethers. The following phosphates are formed by the procedure various details of which are given: tris(ethoxyethyl),  $b_{10}$  225°; tris(butoxyethyl),  $b_{10}$  255°; tris(phenoxyethyl), m. 142°; tris(butoxypropyl),  $b_{10}$  248°; bis(methoxyethyl) butoxyethyl,  $b_{20}$  215–20°; bis(ethoxyethyl) butyl,  $b_{20}$  200° or higher; bis(chloroethyl) ethoxyethyl, chloroethyl methoxyethyl butyl,  $b_{15}$  about 200° and bromoethyl methoxyethyl butoxyethyl,  $b_7$  about 205°.

**Alkyl ethers of  $\omega$ -hydroxyaliphatic acids.** Henry Dreyfus. U. S. 1,943,375, Jan. 16. An ether such as methoxyacetic acid is formed by reaction upon an alkyl ether such as dimethyl ether with  $\text{CO}_2$  at an elevated temp. (suitably about 300–400°).

**Thio ethers and organic alkali thio compounds.** Adolf Stephenson. Ger. 588,584, Nov. 20, 1933 (Cl. 12a. 23.03). Sym. and asym. thio ethers and org. alkali thio compds. are obtained by the action of univalent alkali metal org. compds., in which the metal is directly bound to a C atom, on org. sulfur chlorides or on aliphatic and aromatic 1,2-disulfides, in indifferent solvents. Thus,  $\text{C}_6\text{H}_5\text{SCl}$  is treated with  $\text{LiC}_2\text{H}_5$  in ether to give  $\text{C}_6\text{H}_5\text{SC}_2\text{H}_5$  and  $\text{LiCl}$ . Also, the treatment of  $\text{C}_2\text{H}_5\text{SSC}_2\text{H}_5$  with  $\text{Li-C}_6\text{H}_5$  gives  $\text{C}_2\text{H}_5\text{SC}_6\text{H}_5$  and  $\text{C}_6\text{H}_5\text{SLi}$ .

**Halohydrins.** N. V. de Bataafsche Petroleum Maatschappij. Ger. 590,432, Jan. 5, 1934 (Cl. 12a. 5.04). Addn. products of olefinic compds. and  $\text{HOCl}$  or  $\text{HOBr}$  are prepd. by treating the olefinic compds. in the presence of water with a tertiary alc. ester of  $\text{HOCl}$  or  $\text{HOBr}$ . Thus, a mixt. of *tert*-butyl hypochlorite and water, treated with  $\text{C}_3\text{H}_8$  at 18–22°, yields  $\text{C}_3\text{H}_7\text{OH}$  and  $\text{Me}_2\text{COH}$ . Examples are given also of the prepn. of  $\text{HOCl}$  or  $\text{HOBr}$  addn. products of  $\text{C}_3\text{H}_8$ , isobutylene, isoprene, cyclohexene, oleic acid and cinnamic acid. In certain cases, the olefinic compd. may be formed *in situ*; thus, when aq.  $\text{Me}_2\text{COH}$  is heated with its  $\text{HOCl}$  ester, isobutylene is first formed from the alc. and is then converted into isobutylene chlorohydrin. The esters of  $\text{HOCl}$  and  $\text{HOBr}$  with

tertiary alcs. may be prepd. by leading Cl or Br into the aq. alc. in the presence of alkali hydroxide.

**Halogenated butadiene.** E. I. du Pont de Nemours & Co. Ger. 588,708, Nov. 24, 1933 (Cl. 12a. 19.02). Monovinylacetylene is treated with H halide. Thus, monovinylacetylene is treated with a concd. aq. soln. of HCl to give 2-chloro-1,3-butadiene. If CuCl is present as a catalyst, dichlorobutadiene is also formed, and is transformed to 2-chloro-1,3-butadiene by addn. of HCl. Other examples are given. Cf. C. A. 28, 375<sup>a</sup>.

**Derivatives of di- or tri-methoxybenzoic acids.** Produits Roche (Soc. anon). Belg. 397,131, July 31, 1933. These acids are converted by known methods into their di-Me or di-Et amides.

**Derivatives of 2,3-hydroxynaphthoic acid arylides.** Arthur Zitscher, Heinrich Morschel and Wilhelm Luce (to General Aniline Works). U. S. 1,935,930, Nov. 21. By condensing with a primary or secondary arylamine an alkoxy or alkylthio deriv. of 2,3-hydroxynaphthoic acid which contains the alkoxy or alkylthio group in the non-carboxylated portion of the nucleus, products are obtained, suitable for tinctorial purposes. The following derivs. of 2,3-hydroxynaphthanilide are mentioned: 8-methoxy-, m. 230°, 7-methoxy-, m. 248°, 6-methoxy-, m. 226°, 6-methoxy-2'-methyl-, m. 205°, 7-methoxymethyl-, m. 210°, 6-methoxy-3'-methyl-, m. 201°, 6-methoxy-4'-methyl-, m. 238°, 7-methoxy-4'-methyl-, m. 250°, 8-methoxy-4'-methyl-, m. 235°, 6-methoxy-2',5'-dimethyl-, m. 209°, 6-methoxy-2',6'-dimethyl-, m. 218°, 6-methoxy-2'-chloro-, m. 228°, 6-methoxy-3'-chloro-, m. 230°, 6-methoxy-4'-chloro-, m. 255°, 7-methoxy-4'-chloro-, m. 273°, 6-methoxy-4'-chloro-2'-methyl-, m. 237°, 7-methoxy-4'-chloro-2'-methyl-, m. 253°, 6-methoxy-2',5'-dichloro-, m. 215°, 6-methoxy-2'-methoxy-, m. 195°, 7-methoxy-2'-methoxy-, m. 190°, 6-methoxy-3'-methoxy-, m. 192°, 6-methoxy-4'-methoxy-, m. 254°, 7-methoxy-4'-methoxy-, m. 253°, 6-methoxy-2'-methyl-4'-methoxy-, m. 208°, 6-methoxy-2'-methyl-5'-methoxy-, m. 198°, 6-methoxy-4'-chloro-2'-methoxy-, m. 206°, 6-methoxy-2',5'-dimethoxy-, m. 198°, 7-methoxy-2',5'-dimethoxy-, m. 187°, 7-methylthio-2'-methoxy-, m. 164°, and 7-methylthio-2'-methyl-4'-methoxy-, m. 214°. The following derivs. of 2,3-hydroxynaphthamide are mentioned: 6-methoxy-N-1-naphthyl-, m. 205°, 6-methoxy-N-(4-methoxy-1-naphthyl)-, m. 262°, 7-methoxy-N-1-naphthyl-, m. 228°, 6-methoxy-N-2-naphthyl-, m. 244°, 7-methoxy-N-2-naphthyl-, m. 263°.

**Cyclopentenylmalonic acid derivatives.** Emil Rath (trading as Vial & Uhlmann Inh. Apoth. E. Rath). Brit. 400,452, Oct. 26, 1933. See Fr. 747,207 (C. A. 27, 4880).

**Acenaphthalic acid derivatives.** I. G. Farbenind. A.-G. Brit. 400,069, Oct. 19, 1933. Acenaphthalic acid (I) is sulfonated or halogenated or simultaneously nitrated and oxidized. The products may be subjected to further known reactions. Among examples (1) I is monosulfonated with oleum and the K salt of the product or its anhydride isolated by adding KCl; by oxidation with KMnO<sub>4</sub> and acidification monosulfo-1,4,5,8-naphthalenetetracarboxylic acid or its anhydride is obtained and (2) monochloroacenaphthalic acid is obtained by chlorinating I with a mixt. of POCl<sub>3</sub>, PCl<sub>5</sub> and SO<sub>2</sub>Cl<sub>2</sub>, a little CHCl<sub>3</sub> being added to facilitate stirring; by oxidation with CrO<sub>3</sub> in glacial AcOH the anhydride of monochloro-1,4,5,8-naphthalenetetracarboxylic acid is obtained.

**Acetophenone derivatives.** Helmut Legerlotz. Ger. 520,079, Jan. 8, 1934 (Cl. 12g. 32.20). Hydroxy- or alkoxy- $\omega$ -alkylaminoacetophenones are prepd. by sapon. the condensation products from alkoxy- or acyloxy- $\omega$ -haloacetophenones and salts of *N*-monoalkyl acid amides. Thus, *m*-hydroxy- $\omega$ -methylaminoacetophenone, m. 135° (HCl salt m. 234°), is prepd. by shaking *m*-acetyloxy- $\omega$ -bromoacetophenone with *p*-MeC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NKMe in acetone, filtering off KBr and boiling the concd. filtrate with aq. HI. Examples are given also of the prepn. of *p*-hydroxy- $\omega$ -methylaminoacetophenone, m. 148° (HCl salt m. 238-40°), and *m*-methoxy- $\omega$ -methylaminoacetophenone-HCl, m. 186-7°.

**Anthracene derivatives.** I. G. Farbenind. A.-G. (Max A. Kunz, Rudolf Siroh and Hermann Dimroth, inventors). Ger. 590,366, Dec. 30, 1933 (Cl. 12g. 37). 9,10-Diaminoanthracene and derivs. thereof are prepd. by reducing anthraquinone-9,10-diimide or -9,10-dianils. Thus, the dianil obtainable from anthraquinone, PhNH and AlCl<sub>3</sub>, when treated with Zn and NaOH, yields 9,10-dianilinoanthracene (I) (cf. Ger. 588,353, C. A. 28, 1546<sup>b</sup>). 9,10-Di-*p*-toluinoanthracene, m. 295°, 1- $\beta$ -sulphonic acid and a reduction product, m. 231°, of the dianil from 1-chloroanthraquinone and *o*-chloroaniline, have also been obtained.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. (Paul Nawiasky and Berthold Stein, inventors). Ger. 590,053, Dec. 22, 1933 (Cl. 12g. 37). Haloaminoanthraquinones are prepd. by reducing haloazidoanthraquinones in acid, neutral or alk. soln. Thus, 1-azido-2-chloroanthraquinone, treated at 70-80° in pyridine soln. with N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O, yields 1-amino-2-chloroanthraquinone. Other examples are given. The prepn. of the starting material is described in Ger. 580,647 (C. A. 28, 1050<sup>a</sup>).

**Barbituric acid derivatives.** Chem. Fab. von Heyden A.-G. (Rudolf Gebauer, inventor). Ger. 590,174, Dec. 27, 1933 (Cl. 12p. 7.01). Addn. to 589,146 (C. A. 28, 1359<sup>a</sup>). 5,5-Disubstituted barbituric acids, substituted on one or both N atoms with a pyrazolone residue, are prepd. by condensing alkali salts of 5,5-disubstituted barbituric acids with nitroaralkyl halides, and converting the products into pyrazolone derivs. by the reactions described in Ger. 589,146. In the examples, (1) *N*-*p*-nitrobenzyl-5,5-diethylbarbituric acid  $\rightarrow$  the corresponding amino compd., m. 165°,  $\rightarrow$  the pyrazolone deriv., m. 190-3°, the *N*-methyl deriv. of which m. 198°; (2) *N,N'*-di-*p*-nitrobenzyl-5,5-diethylbarbituric acid  $\rightarrow$  the corresponding diamino compd., m. 172°,  $\rightarrow$  the dipyrazolone deriv., m. 220°.

**Barbituric acid derivatives.** I. G. Farbenind. A.-G. (Ludwig Taub and Walter Kropp, inventors). Ger. 590,175, Dec. 27, 1933 (Cl. 12p. 7.01). See Fr. 753,178 (C. A. 28, 781<sup>b</sup>).

**Organic compounds having hydrogenated ring systems.** Otto Diels and Kurt Alder (to I. G. Farbenind. A.-G.) U. S. 1,944,731, Jan. 23. Org. compds. with a system of "conjugated double bonds" such as butadiene, cyclopentadiene, phellandrene, myrcene, etc., easily form condensation products with quinones, maleic anhydride, maleic acid, itaconic anhydride, citraconic anhydride, acrylic acid, acrolein and other unsatd. org. compds. contg. the atomic grouping O=C-C=C in such a

manner that the last named compds. are firmly linked to the systems with conjugated double bonds, the double bond in 1,4-position being opened up. By such reactions, various compds. such as terpenes, sesquiterpenes, alkaloids, camphors and hydrogenated cyclic compds. can be synthesized. Details are given of the production of the following compds.: (1) 3,6-endomethylene- $\Delta^4$ -*cis*-tetrahydrophthalic acid, m. 177-9° (the anhydride m. 164-5°) and being reduced by use of colloidal Pd to 3,6-endomethylene-*cis*-hexahydrophthalic acid; (2) *cis*- $\Delta^4$ -tetrahydrophthalic acid, m. 166° (the anhydride m. 103-4°); (3) 3,6-endomethylene- $\Delta^4$ -tetrahydrophthalic anhydride, m. 147°; (4) 3,6-endomethylene- $\Delta^4$ -tetrahydrobenzaldehyde, a colorless refractive oil  $b_D^{20}$  70-2°, forming a bisulfite compd., a semicarbazone, m. 160°, and a condensation product with cyclohexanone, m. 104-5°; (5) 3,6-endomethylene- $\Delta^4$ -tetrahydrobenzoic acid,  $b_D^{20}$  128-30°; (6) 3,6-endo-*N*-methylimino- $\Delta^4$ -tetrahydrophthalic anhydride, m. 98-9°; (7) 3,6-endo-*oxo*- $\Delta^4$ -tetrahydrophthalic anhydride, m. 125°; (8) 4-isohexenyl-*cis*- $\Delta^4$ -tetrahydrophthalic anhydride, m. 34-5°, and the acid itself; (9) a transparent oil  $b_D^{20}$  143-4° obtained from crotonaldehyde and myrcene; (10) a product  $b_D^{20}$  143-4° from crotonaldehyde and  $\alpha$ -phellandrene; (11) a product from acrolein and  $\alpha$ -phellandrene,  $b_D^{20}$  128-30°; (12) 6-methyl- $\Delta^2$ -tetrahydrobenzaldehyde,  $b_D^{20}$  about 75°; (13) a product from crotonaldehyde and 2,4-dimethylbutadiene,  $b_D^{20}$  81-2°; (14) 3,6-dimethyl- $\Delta^4$ -tetrahydrobenzaldehyde,  $b_D^{20}$

92-3°; (15) 3,4,6-trimethyl- $\Delta^3$ -tetrahydrobenzaldehyde,  $b_{10}$  89°; (16) 3,4-dimethyl- $\Delta^3$ -tetrahydrobenzaldehyde,  $b_{10}$  79°; (17) 3(or 4(?))-methyl- $\Delta^3$ -tetrahydrobenzaldehyde,  $b_{10}$  63-4°; (18) 3(or 4(?))-isohexyl- $\Delta^3$ -tetrahydrobenzaldehyde,  $b_{10}$  140-2°; (19) a reaction product of acrolein and 2,4-dimethylbutadiene,  $b_{10}$  86-8°; (20) a reaction product of maleic anhydride and 1-phenylbutadiene, m. 120°; (21) 3-phenyl-6-methyl- $\Delta^4$ -cis-tetrahydrophthalic anhydride, m. 158-9°; (22) a reaction product of maleic anhydride and 1,4-diphenylbutadiene, m. 207°; (23) 3,6-endomethylene-1,2-dimethyl- $\Delta^4$ -tetrahydrophthalic anhydride, m. 155°; (24) a reaction product of cyclopentadiene and crotonaldehyde (isomers  $b_{10}$  60-85°); (25) a reaction product of ethylideneacetone and cyclopentadiene,  $b_{10}$  76-80°; (26) endoethylenhexahydrobenzenetetracarboxylic anhydride, m. 300.5°.

U. S. 1,944,732 relates to certain of the same products.

**Diazo compounds.** Kalle & Co. A.-G. Fr. 755,908, Dec. 1, 1933. Aromatic diazo compds. are condensed with compds. having a reactive carbonyl group, e. g.,  $\text{CH}_3\text{O}$ ,  $\text{AcH}$ ,  $\text{BzH}$ , anthraquinone, isatin, phenanthrenequinone and aceanthrenequinone. The carbonyl compds. may contain  $\text{NO}_2$ ,  $\text{NH}_2$ ,  $\text{OH}$ ,  $\text{CH}_3\text{O}$  or  $\text{SO}_3\text{H}$  groups and may be used as monomers or polymers. The diazo compds. preferably contain groups which facilitate the condensation such as  $\text{OH}$  or  $\text{NH}_2$ , substituted or not. The products are utilizable for *photochem. applications* and in the *dye industry*.

**Diazoazo salts.** I. G. Farbenind. A.-G. Fr. 755,816, Nov. 30, 1933. See Ger. 586,354 (C. A. 28, 780°) and 587,644 (C. A. 28, 1359°).

**Diazo compounds.** I. G. Farbenind. A.-G. Fr. 755,880, Dec. 1, 1933. See Ger. 586,355 (C. A. 28, 780°).

**Organic antimony salts.** I. G. Farbenind. A.-G. Fr. 755,758, Nov. 30, 1933. Complex trivalent Sb compds. sol. in water are made by causing an org. stibinic compd. to react with a  $\text{C}_6\text{H}_5$  deriv. contg. at least 2 OH groups ortho to one another and at least one acid group capable of forming salts, in the presence of a solvent and a basic substance in amt. such that the final reaction is neutral. Examples are given.

**Organic arsenic compounds.** I. G. Farbenind. A.-G. Fr. 755,583, Nov. 27, 1933. Sol. aminoaryl compds. contg. As are prep'd. by the action of an alkylene oxide or its homologs or analogs, if desired along with  $\text{CH}_3\text{O}$ -bisulfite or  $\text{CH}_3\text{O}$ -sulfoxylate, on compds. of the formula  $(\text{NH}_2\text{Ar.As})_m\text{X}_n$  (X is As, Sb or Bi and  $m$  and  $n$  are whole nos.). Examples are given.

**Aromatic dithiocarbamates.** Albert M. Clifford (to The Goodyear Tire and Rubber Co.). Can. 338,697, Jan. 16, 1934. Compds. of the formula  $\text{R}'\text{NC(S)R}$ , in which  $\text{R}'$  is aryl, are prep'd. by the reaction of an aq. soln. of an aryl diazonium chloride with an aq. soln. of a salt of a disubstituted dithiocarbamate.

**Organic acids from oxidation products such as those derived from paraffin.** Hans Frapzen, Hans Beller and Martin Luther (to I. G. Farbenind. A.-G.). U. S. 1,943,427, Jan. 16. Oxidation products such as those produced from paraffin are treated with an aq. soln. of a saponifying agent such as  $\text{NaOH}$  and there is added to the aq. soln. of crude soaps thus formed a water-insol. non-aromatic org. solvent such as benzene whereby 2 layers of liquid are formed, the lower consisting entirely of soap soln. and the upper contg. also solvent and unsaponifiable substances; the lower layer free from unsaponifiable matter is withdrawn and the remaining emulsion is broken by adding an alc. such as  $\text{MeOH}$  to effect a further sepn. into layers of similar type.

**Aliphatic acids.** British Celanese Ltd., Joseph Billing and Henry Dreyfus. Brit. 400,169, Oct. 17, 1933. Aliphatic acids, e. g.,  $\text{AcOH}$ , are conc'd. by adding a conc'd. soln. of a salt or substance having high affinity for  $\text{H}_2\text{O}$ , e. g.,  $\text{CaCl}_2$ ,  $\text{ZnCl}_2$ ,  $\text{MgCl}_2$  and extg. with a solvent for the acid, e. g.,  $\text{AcOEt}$ ,  $\text{Et}_2\text{O}$ , methylene chloride,  $\text{CHCl}_3$ , ethylene dichloride, benzyl acetate,  $\text{C}_6\text{H}_6$  and mixts. thereof.

**Aliphatic acids and their esters.** E. I. du Pont de Nemours & Co. Brit. 400,189, Oct. 18, 1933. The acids

and esters are produced by passing a mixt. of the vapor of an alc., ether or ester and  $\text{CO}$  over a catalyst comprising free  $\text{H}_2\text{CrO}_4$ ,  $\text{H}_2\text{MoO}_4$ ,  $\text{H}_2\text{WO}_4$  or  $\text{H}_2\text{UO}_4$  (not the corresponding oxides). The acids may be mixed with an adsorbent oxide, e. g.,  $\text{SiO}_2$ -gel, alumina gel or active charcoal. Substances that form alcs. may be used instead of the alc. The catalytic app. may be made of or lined with glass or made of steels contg. a high proportion of Mo, Co, W, Cr, Mn or Ni, or may be internally coated with Cr or Ag.

**Concentrating aliphatic acids.** Julius A. Brachfeld and Albert Smola. Fr. 753,462, Oct. 17, 1933. See Austrian 135,002 (C. A. 28, 782°).

**Acetic acid and acetaldehyde from acetylene.** Wilhelm Heckel and Paul Nashan (to Gutehoffnungshütte Obershausen A.-G.). U. S. 1,943,385, Jan. 16.  $\text{C}_2\text{H}_2$  is mixed with gases contg. free O, small quantities of nitric oxides are also added, and the mixt. is heated to a reaction temp. (suitably about 300°) to form  $\text{HOAc}$  and  $\text{AcH}$ .

**Lactic acid.** Standard Brands, Inc. Brit. 400,413, Oct. 26, 1933. Carbohydrates, e. g., sucrose, are converted into lactic acid by heating to at least 200° under pressure, e. g., 20-35 atm., with an alkali or alk. earth hydroxide. Insol. matter is removed from the product and the lactic acid recovered as such by addn. of  $\text{H}_2\text{SO}_4$  or as Zn lactate by addn. of  $\text{ZnSO}_4$ .

**Oxalic acid.** Consortium für elektrochemische Industrie G. m. b. H. Fr. 756,240, Dec. 6, 1933. See Ger. 588,159 (C. A. 28, 1363°).

**Carboxylic acids.** Consortium für elektrochemische Industrie G. m. b. H. (Wolfram Haeckel and Willy O. Herrmann, inventors). Ger. 588,762, Nov. 27, 1933. (Cl. 12o. 11). High-mol. polymerization or condensation products of aldehydes or similar substances such as  $\text{CH}_2=\text{CHOH}$  or its derivs. are treated with a large excess of alkali, and heated to such temps. that the greatest possible amt. of H is split off. In an example, a powd.  $\text{AcH}$  resin is mixed with powd.  $\text{NaOH}$  and heated for some time. The product is ext'd. with water and treated with  $\text{HCl}$  to ppt. the carboxylic acid. Other examples are given, using polyvinyl alc. as the starting material.

**Carboxylic acids of hydroxydiphenyl ether.** Chemische Fabrik von Heyden A.-G. (Karl W. Rittler, inventor). Ger. 588,650, Nov. 23, 1933 (Cl. 12q. 29.01). Alkali salts of hydroxydiphenyl ethers are treated with  $\text{CO}_2$  under raised temp. and pressure. Thus, 4,4'-dihydroxydiphenyl ether is dissolved in  $\text{NaOH}$  and the product, obtained by evapn., is treated with  $\text{CO}_2$  at 160° and 20 atm. to give 4,4'-dihydroxydiphenyl ether-3,3'-dicarboxylic acid, m. 255-7°. The prep'n. of 4- and 2-hydroxydiphenyl ether-3-carboxylic acid, m. 134° and 142°, resp., is also described.

**Naphthalenecarboxylic acids.** I. G. Farbenind. A.-G. Fr. 756,156, Dec. 6, 1933. Naphthalene-1,4,5,8-tetracarboxylic acid and its derivs. are prep'd. by heating with conc'd.  $\text{H}_2\text{SO}_4$  a pyrene compd. which contains at least one atom of Cl or Br in the 8- or 10-position and at least one other halogen atom of the same kind in the 3- or 5-position and subjecting the pyrenequinone compd. thus obtained to an oxidizing action. Acids which probably contain halogen in the 2-position and the same halogen in the 6- or 7-position are obtained. Cl. C. A. 27, 2457.

**Arylamino-1-hydroxynaphthalene-2-carboxylic acids.** Leopold Laska and Oskar Haller (to General Aniline Works). U. S. 1,943,872, Jan. 16. By heating an alkali metal salt of 1-hydroxynaphthalene, contg. in the 5-, 6-, 7- or 8-position an arylamino group, with  $\text{CO}_2$  under pressure (suitably heating at 200° under 80-100 atm. pressure), products are obtained such as 7-anilino-, m. 199°; 7-p-tolylamino-, m. 203°; 6-anilino-, m. 185°; 6-p-tolylamino-, m. 199°; 5-anilino-, m. 198°; 5-p-tolylamino-, m. 188°, and 8-anilino-1-hydroxynaphthalene-2-carboxylic acid, m. 185°.

**6-Arylamino-2-hydroxynaphthalene-3-carboxylic acids.** I. G. Farbenind. A.-G. Fr. 756,157, Dec. 6, 1933. 2,6-Dihydroxynaphthalene-3,7-dicarboxylic acid is heated with arylamines which contain no  $\text{SO}_3\text{H}$  or  $\text{COOH}$  groups. The products are the same as those made by the process of Fr. 670,462 (C. A. 24, 1868°).

**Purifying crude benzoic acid, naphthalic acid, phthalic acid or their anhydrides or the like.** Alphons O. Jaeger and Lloyd C. Daniels (to Selden Co.). U. S. 1,943,892, Jan. 16. Products such as those formed by catalytic oxidation reactions and which contain impurities more readily oxidized than the salts of the acids or anhydrides desired (such salts not being attacked by hypohalites) are converted into alkali metal salts and an aq. dispersion of the salts is treated with a hypohalite or a peroxide, after which the treated materials are subjected to a further usual sepn. treatment, as by esterification and distn. of the resulting esters. Various examples with details of procedure are given. Cf. C. A. 28, 179<sup>a</sup>.

**Sulfonic acids of phenols and others.** Hermann Friese. Ger. 588,709, Nov. 24, 1933 (Cl. 12o. 23.01). Sulfonic acids of hydrogenated or non-hydrogenated mono- or polyhydric phenols or their ethers are obtained by sulfonation with H<sub>2</sub>SO<sub>4</sub> in the presence of glacial AcOH with subsequent addn. of Ac<sub>2</sub>O. The H<sub>2</sub>SO<sub>4</sub> is added in stoichiometric proportions. Thus, anisole is dissolved in glacial AcOH and treated with the calcd. amt. of H<sub>2</sub>SO<sub>4</sub>. Ac<sub>2</sub>O is added. On pptn. with Ba, the salt Ba(O<sub>2</sub>SC<sub>6</sub>H<sub>4</sub>OCH<sub>3</sub>)<sub>2</sub> is given.

**1,1,2-Trichloroethane.** Julius Söll (to I. G. Farbenind. A.-G.). U. S. 1,944,306, Jan. 23. C<sub>2</sub>H<sub>2</sub> is first caused to react with HCl and the resulting gaseous mixt. contg. vinyl chloride is then caused to react with Cl.

**Formaldehyde.** Lucien H. Roman. Ger. 590,433, Jan. 4, 1934 (Cl. 12o. 7.01). See Fr. 734,065 (C. A. 27, 992).

**Acetaldehyde and acetic acid.** Stefan Goldschmidt. Ger. 590,099, Dec. 22, 1933 (Cl. 12o. 7.02). A mixt. of EtOH and air is passed over Ag maintained at a temp. between 380° and 440°. The Ag is preferably deposited on a support such as asbestos.

**Acetone from acetaldehyde.** Koloman Roka (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,944,109, Jan. 16. AcH is caused to react with

1 water vapor at 250–660° in the presence of a catalyst consisting of a mixt. of O compds. of metals which can replace one another isomorphously in carbonates, such as compds. of Fe and Mg, Mn or Zn.

**Furfural.** Kemiska Kontrollbyrån A.-B. (G. H. Blomqvist and B. S. Groth, inventors). Swed. 78,502, Oct. 3, 1933. A soln. of furfural is first produced directly by leaching the raw material at a suitable temp. and pressure with H<sub>2</sub>O or an acid aq. soln. and sepd. from the raw material, after which the furfural is sepd. from the soln. in a subsequent operation.

**Dimethylol urea.** I. G. Farbenind. A.-G. (Matthias Schmieling, inventor). Ger. 588,945, Nov. 30, 1933 (Cl. 12o. 17.05). See Fr. 721,828 (C. A. 26, 4007).

**Absorption of isobutylene in strong acids.** N. V. de Bataafsche Petroleum Maatschappij. Ger. 590,483, Jan. 2, 1934 (Cl. 12o. 5.04). See Fr. 716,040 (C. A. 26, 1946).

**Hydrogenated methyl abietate.** Irvin W. Humphrey (to Hercules Powder Co.). U. S. 1,944,241, Jan. 23. Methyl abietate (with or without preliminary isomerization by heating to 225–300° with a small proportion of HCl or H<sub>2</sub>SO<sub>4</sub>) is subjected to catalytic hydrogenation at 140–250° and under a pressure of 10–500 atm. to form products such as methyl tetrahydroabietate which are suitable for use in coating compns. such as those contg. nitrocellulose, gum damar, etc. Various details and modifications of procedure are described.

**Phenol.** F. Raschig G. m. b. H. Ger. 588,649, Nov. 21, 1933 (Cl. 12q. 14.02); Fr. 756,863, Dec. 16, 1933. C<sub>6</sub>H<sub>6</sub> is treated with HCl and O and the resulting C<sub>6</sub>H<sub>5</sub>Cl, in the gaseous phase, is treated with steam with regeneration of HCl. The latter is used to treat more C<sub>6</sub>H<sub>6</sub>. App. is indicated. Cf. C. A. 27, 313.

**Trinitrotoluene.** Imperial Chemical Industries Ltd. Ger. 590,234, Jan. 5, 1934 (Cl. 12o. 3.01). See Brit. 382,322 (C. A. 27, 4253).

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Destruction of *l*-, *d*- and *dl*-hyoscine by egg white and rabbit serum.** W. F. v. Oettingen and I. H. Marshall. *Proc. Soc. Exptl. Biol. Med.* 31, 224–5 (1933).—Scopolamine (*l*-hyoscine) and its isomers and atropine (*dl*-hyoscyamine) and its isomers were all destroyed at the same rate when 20 mg. of the alkaloid was dissolved in 2 cc. of water, mixed with 8 cc. of fresh egg white and incubated for 0, 3 and 6 hrs. at 38°; the ratios of destruction for the various incubation periods were ≈5, 21.5–21.9 and 37–37.5%, resp. In similar expts. with rabbit serum the destruction of the various isomers took place at different rates; after 3 hrs. of incubation the destruction of *d*-, *l*- and *dl*-hyoscine was 50, 100 and 79%, resp.; the loss of *d*-, *l*- and *dl*-hyoscyamine was 18, 67 and 37%, resp. After 6 hrs. of incubation the destruction was similar for corresponding compds. and was approx. 100, 57 and 81 %, resp., for the *d*-, *l*- and *dl*-alkaloids. According to Gadamer (*Arch. Pharm.* 239, 300, 663 (1901)), the optical isomerism of these compds. resides in the tropic acid radical; evidently this radical is also responsible for the different resistances of the optical isomers of the same rotation toward decompn. by serum. C. V. B.

**The enzymic splitting of polysaccharides. III. The splitting of chitin by emulsin preparations.** W. Grassmann, L. Zechmeister, R. Bender and G. Tóth. *Ber.* 67B, 1–5 (1934); cf. C. A. 27, 5757–8.—Chitin and its decompn. products are split by mold exts. and emulsin preps. The effect of emulsin preps. of different origins was tested on these chitin derivs. The enzyme which splits chitodextrin tends to disappear with purification. An oil-free enzyme, "Almond powder," acts on both N-

contg. oligosaccharides, the rate of splitting in cellobiose (1) being about the same as in chitodextrin (2). The enzyme also splits cellobiose (3), chitotriose (4) and chitobiose (5). When the enzyme is purified by tannin pptn., the cleavage rate of (1) is considerably increased, although there is still great activity toward (2) and less toward (3), (4) and (5). When the enzyme is purified by fractionation with AgOAc, the activity toward (1) is considerably enhanced, whereas there is little activity toward the others. With Merck's emulsin chitodextrin I (high mol.) is split at a higher rate than chitodextrin II (low mol.); chitotriose and chitobiose are scarcely attacked. A comparison of the different emulsin. preps. in relation to their powers to act as  $\beta$ -glucosidase shows that only the cellobiase activity runs parallel with their action as  $\beta$ -glucosidase (salicin used as substrate). "Almond powder," which shows a greater cleavage of chitodextrin, has lowest  $\beta$ -glucosidase value. When it is treated with alumina cy there is obtained a prepn. active in chitodextrin-splitting enzymes, but almost inactive toward  $\beta$ -glucosidase. The chitin-splitting enzyme is, therefore, often not identical with  $\beta$ -glucosidase.

E. S. G. Barron

**The chemical possibilities of extra-terrestrial life.** E. J. Hartung. *Chem. Eng. Mining Rev.* 26, 173–7 (1934).—An address.

W. H. Boynton

**Changes in the electric potentials and rates of oxidation of the skin subsequent to Röntgen irradiation.** Marvin N. DeWilliams and Charles Sheard. *Radiology* 22, 41–8 (1934).—Measurements on the p. ds. of cross sections of frog skin and on rates of O consumption of skin before and after irradiation with x-rays indicated a seasonal variation in both which paralleled the degree of metabolic activity. The changes in both were more rapid and of greater



magnitude in the dorsal than in the ventral skin. After irradiation by 9000 röntgens both the consumption of O and the p. ds. were increased for 16–18 days. Following this the values decreased until they were below those exhibited normally and remained so on the 30th day. With the lethal dose of 160,000 röntgens, the period of increased activity was less than 3 days for ventral skin and less than 1 day for dorsal skin.

G. L. Clark

The influence of the antiquity of the cell upon cell resistance to radium and x-rays. Robert H. Millwec. *Radiology* 22, 74–6(1934).—Evidence is presented which indicates that those cells which have existed on the earth in an unchanged condition for a long period of time have probably acquired a resistance to short-wave radiation by reason of continued exposure to the radiation of the earth's crust and to cosmic rays. Such cells are to be found in a family of ferns, algae, molds and various other plants and seeds which may have great age from the standpoint of paleontology.

G. L. Clark

Oxalate-containing plants and oxaluria. Arie Goudswaard. *Pharm. Weekblad* 71, 114–19(1934).—The sol. oxalate content is reported for some 50 vegetables and greens. These are classified into 2 lists, one recommended for and the other to be avoided by persons suffering from oxaluria. The Ca oxalate crystals commonly found in plant tissues are insol. in gastric juice and therefore harmless.

A. W. Dox

Cell-bound enzymes of tissues and glands. IV. Pancreatic lyo- and desmo-lipases. Eugen Bamann and Paul Laeverenz. *Z. physiol. Chem.* 223, 1–20(1934); cf. *C. A.* 28, 185<sup>4</sup>.—When fresh or dried pancreas is extd. with 100% glycerol under precautions to avoid autolysis, only 0.1–3.0% of the lipase goes into soln. After autolysis, however, the yield of sol. lipase is 70–80%. Autolysis is thus accompanied by a conversion of desmo- into lyo-enzyme. Different lipase fractions may be distinguished by the degree of activation obtainable by addn. of "compensating activators" such as albumin, Na oleate and CaCl<sub>2</sub>. For example, the lyo-lipase obtained by a single extn. of an unautolyzed dried prepn. undergoes 5000–9000% activation while the residual desmo-lipase is activated only 100%. Successive extns. of lyo-lipase by 100% glycerol give diminishing activation values. The evidence points to the existence of many gradations rather than 2 or more sharply defined lyo-enzymes. While the amylases are distinguished by differences in the mol. carrier of the active grouping, the lipases are differentiated mainly by alterations of the colloidal carrier. Extn. by 100% glycerol gives different percentage yields of the 3 pancreatic enzymes, *e. g.*, nearly 100% amylase, 70–80% trypsin and only 3% lipase. It is probable that the solvent used, especially glycerol of low H<sub>2</sub>O content, causes alterations in the sensitive lipase systems.

A. W. Dox

Lipase and esterase action of the pancreatic juice. H. P. Wolvekamp and K. Griffioen. *Z. physiol. Chem.* 223, 36–42(1934).—The pancreas contains 2 ester-splitting enzymes, one of which hydrolyzes tributyrin and the other EtOAc. They may be demonstrated as sep. entities by their difference in sensitivity toward elevated temp. and unfavorable pH. Exposure of the enzyme mixt. to a temp. of 67° for 45 min. diminishes its activity toward EtOAc to a much greater extent than toward tributyrin. Both enzymes are inactivated about equally by pH 9.92 during 60 min. An acidity of pH 3.3 for 1 hr., however, followed by restoration of the optimum pH of 5.95, destroys the activity toward EtOAc completely and that toward tributyrin only partially. The difference between the 2 enzymes is probably in the colloidal carrier rather than in the active grouping. It is possible that a larger no. of esterases occur in the pancreas, each one sp. for a definite group of esters.

A. W. Dox

Comparison of plant and animal chitin. L. Zechmeister and G. Tóth. *Z. physiol. Chem.* 223, 53–6(1934).—Cellulose occurs in higher plants and lower animals, while chitin occurs in many animals but only in lower plants such as fungi and bacteria which have not advanced in the evolutionary scale. Further evidence of the identity of chitin from plant and animal sources is now presented.

1 Chitin prep'd. from *Boletus edulis* was acetylated by treatment in the cold with Ac<sub>2</sub>O and H<sub>2</sub>SO<sub>4</sub> and a cryst. product obtained which was identical with octaacetylchitobiose obtained from crab shells by similar treatment. Hydrolysis of the crude chitin at 20° by 40% HCl and subsequent neutralization by Ag<sub>2</sub>CO<sub>3</sub> and pptn. by EtOH yielded undecaacetylchitotriose identical with a known prep'n. of animal origin.

A. W. Dox

2 Extractive substances of muscles. XXXVIII. The extractive substances of the muscles of *Dromaeus* sp. N. Tolkachevskaya. *Z. physiol. Chem.* 223, 57–60(1934); cf. *C. A.* 24, 406. —Isolation and identification of the bases present in the flesh of the ratite bird *Dromaeus* affords confirmatory evidence that carnosine and its Me deriv. anserine do not occur simultaneously in the same species of animal. Creatine, xanthine, methylguanidine, anserine, and probably carnitine and choline, were identified but no carnosine could be obtained, although 30 kg. of material was extd.

A. W. Dox

3 Metal complex salts of hematoporphyrin. Fritz Bandow. *Z. physiol. Chem.* 223, 71–3(1934). —The formation of metal complex salts by dil. solns. (1:20,000) of hematoporphyrin in H<sub>2</sub>CO<sub>3</sub>, AcOH, EtCO<sub>2</sub>H and PrCO<sub>2</sub>H was studied spectroscopically. Pb(OAc)<sub>2</sub> did not react, even on heating. Zn(OAc)<sub>2</sub> and Cu(OAc)<sub>2</sub> yielded complexes with the AcOH, EtCO<sub>2</sub>H and PrCO<sub>2</sub>H solns. at room temp. 4 With the H<sub>2</sub>CO<sub>3</sub> soln. Cu(OAc)<sub>2</sub> gave a complex on heating, while Zn(OAc)<sub>2</sub> failed to react. Differences in intensity of the α- and β-absorption bands of the complexes show that the attachment of metal occurs at different places in the porphyrin mol.

A. W. Dox

5 The chemical composition of Herzog's "hematoprostheticin." Felix Haurowitz. *Z. physiol. Chem.* 223, 74–5(1934); cf. *C. A.* 28, 787<sup>1</sup>. —The so-called hematoprostheticin has again been prep'd. in cryst. form and found to have the percentage compn. stated by Herzog. Its reversion to chlorohemin under conditions which exclude the addn. of a C atom refutes H.'s contention that it contains 33 and not 34 C atoms. The analysis corresponds approx. to an equimol. mixt. of hydroxyhemin and its anhydride. The substance is probably identical with Hamsik's cryst. hemi-anhydride of hydroxyhemin (*C. A.* 21, 3628).

A. W. Dox

6 Enzymic amylolysis. III. Crystalline hexaose from starch. Ernst Waldschmidt-Leitz and Max Reichel. *Z. physiol. Chem.* 223, 76–80(1934); cf. *C. A.* 26, 1002. —Pancreatic digestion of erythroamylose, one of the components of starch, comes to a standstill when 65–70% saccharification has occurred. The products then consist of dextrin and maltose and 7–11% of amylohexaose. After removal of dextrin by pptn. with EtOH, the hexaose may be obtained as a viscous oil by addn. of MeAc to the concd. aq. soln., and solidified by repeated washings with Et<sub>2</sub>O. The hexaose has the formula C<sub>36</sub>H<sub>64</sub>O<sub>31</sub>, (α)<sub>D</sub> 183°, m. 258–63° (decompn.) and gives no color with I. It is hydrolyzed by amylase but not by maltase. Amylase splits it into 3 mols. of maltose which are then hydrolyzed by maltase into 6 mols. of glucose. Mutarotation of the maltose formed is in opposite directions according to whether the cleavage is effected by α- or β-amylase, showing that the hexaose contains both α- and β-linkages. The identification of hexaose among the products of partial enzymic hydrolysis is an important argument for the chain structure of starch.

A. W. Dox

7 Influence of electrolytes on the physicochemical properties of colloidal systems as compared to cytoplasm. I. Influence of electrolytes on the viscosity of diluted egg yolk. Br. Zawadzki. *Protoplasma* 19, 485–509(1933). —Na, K, Ca and Mg chlorides, as well as HCl and NaOH, at every concn. used increased the viscosity of dild. egg yolk. HCl and NaOH act many times more strongly than their salts. Of the salts, CaCl<sub>2</sub> exerts the strongest action and KCl the feeblest. The viscosity increases irregularly with increase in salt concn. At about 0.2 M NaCl and KCl and 0.08 M CaCl<sub>2</sub>, the local viscosity max. appears, after which there is for all salts a local min. at 0.4–0.5 M higher than the natural egg yolk viscosity.

F. L. Dunlap

- Measurement of the diffusion of proteins.** Arne Tiselius and David Gross. *Kolloid-Z.* 66, 11-20 (1934).—Application of the Svedberg method (cf. *C. A.* 19, 2768; 20, 1754) at 20° = 0.002° gave the following values for the diffusion const.  $D \times 10^7$ : phycoerythrin 4.00, phycocyan 4.05, CO-hemoglobin 6.93, hemocyanin 1.05, and egg albumin 7.07. The values are corrected to water solns. Salt content of the buffer and protein concn. had little effect on the value for phycoerythrin. At 30°, the value of  $D$  detd. was in good agreement with that calcd. by the Einstein equation. The friction coeffs. calcd. from these consts. are higher than those calcd. from ultracentrifuge expts. except for hemoglobin. Arthur Fleischer
- The hemerythrin of *Sipunculus nudus*.** Jean Roche. *Bull. soc. chim. biol.* 15, 1415-35 (1933).—See *C. A.* 27, 2099. L. E. Gilson
- Hematin content of horseradish peroxidase.** K. A. C. Elliott and D. Keilin. *Proc. Roy. Soc. (London)* B114, 210-22 (1934).—In horseradish preps. a simple relation between hematin content and peroxidase activity does not exist; all the hematin is present in the free state as acid hematin. The N compds. present in the preps. and the free hematin do not combine below  $p_H$  9, and complete combination occurs only above  $p_H$  10.5, at which alky. the peroxidase is nearly inactive. J. S. H.
- Chemistry of the vegetable phosphatides.** E. Bureš and J. Schidlöf. *Časopis Českoslov. Lékárnictva* 13, 229-35 (1933).—"Phosphogramin" has a compn. similar to inositolhexaphosphoric acid; it contains 20.03% of ionizable P and on hydrolysis yields  $H_2PO_4$  and an optically inactive, nonhydrolyzable compd. which seems identical with mesoinositol. William J. Husa
- Experiments on the relationship between bacteria and fungi as regards nutrition and metabolism.** Herbert Bucherer. *Zentr. Bakt. Parasitenk.*, 2 Abt. 89, 273-83 (1933). Carbohydrates which are ordinarily not assimilated by *Asotobacter chroococcum*, such as arabinose, xylose and cellulose, may be utilized in the presence of living or dead cultures of *Penicillium glaucum* or *Aspergillus niger*. John T. Myers
- Directive influences in biological systems. III. The effect of proteases on lipase actions.** K. George Falk. *J. Biol. Chem.* 103, 363-72 (1933); cf. *C. A.* 26, 3270. The addn. of com. papain to exts. of beef kidney, lung or liver decreased the ester-hydrolyzing power of the ext. for all substrates except glyceryl triacetate, which showed increased hydrolysis. Papain alone has some hydrolyzing action on triacetin, and this is increased by adding proteins. Similar results were obtained with exts. of uterine fibroids. Trypsin, however, decreased the ester-hydrolyzing power of all exts. for all substrates. It is suggested that papain acts physiologically as a lipase in the presence of proteins. K. V. Thimann
- The basic amino acids of casein.** Hubert B. Vickery and Abraham White. *J. Biol. Chem.* 103, 413-15 (1933).—Application of the Ag pptn. method of Vickery and Leavenworth (*C. A.* 22, 1606) to purified Hammarsten casein gave histidine, 1.83%, arginine, 3.85% and lysine, 6.25%. K. V. Thimann
- The fractionation of the amino acids of livetin.** Thomas H. Jukes. *J. Biol. Chem.* 103, 425-37 (1933); cf. *C. A.* 27, 740. Existing methods are combined as follows: the bases are removed from the hydrolyzate by the method of Vickery and Leavenworth (*C. A.* 22, 1606), tyrosine is then crystd., and the dicarboxylic acids are pptd. with  $Ba(OH)_2$  and alc., and sepd. as glutamic acid hydrochloride and cupric aspartate. The monoaminomonocarboxylic acids are converted to the Cu salts and sepd. by the methods of Brazier (*C. A.* 25, 309), Kingston and Schryver (*C. A.* 19, 304), Buston and Schryver (*C. A.* 20, 2683, 3703) and Town (*C. A.* 23, 162). With 36 g. livetin, 56% of the N was allocated, i. e., the method is suitable for rather small quantities of protein. Of the total N, 87% was recovered in the various fractions. K. V. Thimann
- The gasometric determination of cysteine and cystine.** W. C. Hess. *J. Biol. Chem.* 103, 449-53 (1933).—In the method of Baernstein (*C. A.* 26, 5977), the cystine contents for a no. of proteins agree with the cystine content detd. by the method of Sullivan (*C. A.* 25, 2449, 3738), but the cysteine content is in all cases addnl. The cystine and cysteine together account for more than the total S of the protein. The apparent cysteine is therefore due to some other compd. On heating a mixt. of amino acids, free from S, with sugar, cysteine was found in small amt. by the Baernstein method, but not by other methods. It is suggested that the apparent cysteine may arise from reaction between amino acids and the small amt. of carbohydrate in protein. K. V. Thimann
- Studies on the phosphatase content of the whole rat and of the vasoligated kidney.** Fredrick W. Kinard and Alfred Chanutin. *J. Biol. Chem.* 103, 461-70 (1933). The phosphatase activity of the whole rat increases from birth to a max. between the 13th and 20th days. Administration of irradiated ergosterol increases the activity at this period but not in adults. In the vasoligated kidney the phosphatase activity falls steadily, reaching zero in about 16 days. K. V. Thimann
- The catalysis of the hydration of carbon dioxide and dehydration of carbonic acid by an enzyme isolated from red blood cells.** Wm. C. Stadie and Helen O'Brien. *J. Biol. Chem.* 103, 521-9 (1933); cf. Meldrum and Roughton, *C. A.* 26, 5584, 5659. The enzyme catalyzing the reaction:  $CO_2 + H_2O \rightleftharpoons H_2CO_3$  is rapidly inactivated at 70° and inhibited by KCN; it is not identical with hemoglobin, hematin or globin. Its effect on the dehydration velocity is only about 38% of that on the hydration velocity. The Michaelis-Menten const. for combination between the enzyme and its substrate is about 90. The velocity consts. are detd. by making one soln. heavier than the other with dissolved sugar, then layering cautiously, and finally detg. the  $p_H$  after rapid mixing, by means of a short-period galvanometer. K. V. T.
- Mechanism of the oxidation processes. XXXVI. Enzymic dehydrogenation of lactic acid, pyruvic acid and methylglyoxal.** Heinrich Wieland, Otto B. Claren and B. N. Pramanik. *Ann.* 507, 203-12 (1933); cf. *C. A.* 27, 4872. Aerobic dehydrogenation of lactic acid (I) proceeds similarly to that of EtOH when impoverished yeast is used. AcOH, EtOH and (mainly)  $CO_2$  are produced; in 2 cases small quantities of succinic acid were isolated. The carbohydrate content and wt. of II do not increase during these expts. Dehydrogenation of I depends more on substrate concn. than does dehydrogenation of EtOH and AcOH.  $O_2$  consumption occurs much more rapidly at the higher concns. studied ( $M/32 - M/4$ ).  $AcCO_2Na$  is first decarboxylated to AcH, which then reacts to give AcOH. A smaller quantity of  $AcCO_2H$ , compared with I, is oxidized completely. The reaction,  $2AcH + H_2O \rightarrow AcOH + EtOH$ , appears to be inhibited by  $AcCO_2H$ . The  $O_2$  consumption is much greater at higher concns.  $AcCHO$  (III) is also dehydrogenated to AcH, principally. Resynthesis of III to carbohydrates does not occur. The course of the dehydrogenation of III appears to differ from that of EtOH,  $AcOH$  or I. C. J. West
- Structure and enzymic reactions. X. Influence of viscosity on the state of aggregation of the dispersed phase.** S. Frajbergerówna. *Acta Biol. Exptl. (Warsaw)* 6, 143-72 (1931) (143 in French).—Gelatin diminishes the amt. of glucose and maltose detd. by Bertrand's method. This amt. is independent of the temp. and the time of contact, and is proportional to the quantity of sugar and gelatin present. The viscosity influences the degradation of starch to a slight degree, with a 4.5% soln. (37°) as starting material. The decompn. of urca starts as late as at 8% gelatin. Starch and amylase do not diffuse through the gel, while urea diffuses with only 10% of the normal rate. Occlusion of starch or amylase in the gel induces a slowing of the reaction, while by a simultaneous occlusion of both ingredients it is not retarded markedly. Shaking accelerates the reaction in the system amylase-starch-gelatin, while EtOH hinders the reaction of amylase-starch, and enhances it in the system amylase-starch-gelatin. The action of EtOH depends on the temp.; at 16° the reaction is accelerated; at 30° it is not. J. W.

**Spreading of insulin and of zein.** E. Gorter and J. van Ormondt. *Proc. Acad. Sci. Amsterdam* 36, 922-6 (1933); cf. *C. A.* 27, 518.—The  $p_H$ -spreading curves of the two proteins were very similar. The min. for insulin was at  $p_H$  3, for zein  $p_H$  3.7. Maxima were at about  $p_H$  2 and 5 for both. The amount of spreading at the isoelec. point may be a function, not of the mol. wt., but of the no. of free COOH and NH<sub>2</sub> groups. J. J. W.

**Calmette, A., Boquet, A., and Nègre, L.:** Manuel technique de microbiologie et sérologie. 3rd ed. Paris: Masson & Cie. 760 pp. F. 50; bound, F. 60.

**Hernandez Guerra, J., and Ochoa de Albornoz, S.:** Elementos de bioquímica. 3rd ed. Madrid: Edit. España. 271 pp. Ptas. 18.

**Kopaczewski, W.:** Traité de biocolloïdologie. T. IV. Fasc. 2. Paris: Gauthier-Villars & Blondel la Rougery. 130 pp. F. 30. Cf. *C. A.* 27, 4261.

**Krebs, H. A.:** Atmung und Gärung in lebenden Zellen. Berlin: Junk. 22 pp. M. 3.

**Reuter, Fritz:** Lehrbuch der gerichtlichen Medizin. Mit gleichmässiger Berücksichtigungen der deutschen und österreichischen Gesetzgebungen und des gemeinsamen Entwurfes 1927. Berlin: Urban & Schwarzenberg. 609 pp. M. 18; cloth, M. 20.

**Schadendorff, Erwin:** Praktikum der organischen und physiologischen Chemie für Mediziner. Vienna: Hain & Co. 111 pp. M. 3.

**Thomas, E. W. Caryl:** A Synopsis of Forensic Medicine and Toxicology. London: Wright; Simpkin. 160 pp. 7s. 6d.

**Medizinische Kolloidlehre.** Edited by L. Lichtwitz, Raph. Ed. Liesegang, and Karl Spiro. Lfg. 9. Dresden: Th. Steinkopff. Pp. 609-688. M. 5. Cf. *C. A.* 27, 1901.

**Enzymes from cereal plants.** George Sperti (to General Development Laboratories, Inc.). U. S. 1,943,633, Jan. 16. For producing a sterile enzymic prepn., growing enzyme-producing cereal plants are subjected to irradiation with ultra-violet light to kill bacteria, etc., while excluding from the light wave lengths short enough to cause injury to the plants, and the enzyme is then extd. from the plant material.

**Amylase preparations.** Kalle & Co. A.-G. Brit. 400,784, Nov. 2, 1933. See Fr. 746,391 (*C. A.* 27, 4551).

## B -METHODS AND APPARATUS

STANLEY R. BENEDICT

**Enzymic histochemistry. VI. A micro method for the estimation of ammonia.** K. Linderstrøm-Lang and Heinz Holter. *Compt.-rend. trav. lab. Carlsberg* 19, No. 20, Spp. (1933); cf. *C. A.* 27, 5356; 28, 5024. L. W. E.

**Estimation of minute traces of bismuth in animal tissues.** G. F. Hall and A. D. Powell. *Quart. J. Pharmacol.* 6, 628-33 (1933).—A no. of the available color reactions for the detection of min. traces of Bi are discussed and criticized. The iodobismuthous acid method is recommended for use for the estn. in animal tissues. This method depends on the characteristic color reaction given by iodobismuthous acid in EtOAc, in which solvent it yields a characteristic pink color. The conditions necessary for the estn. of amts. of the order of 5  $\gamma$  are given, with particular reference to special treatment of certain animal tissues. W. O. E.

**Method for determining calcium in urine.** Harold Gerritz and J. C. Knop. Wash. Agr. Expt. Sta., 42nd Ann. Rept. (*Bull.* 275) 28-9 (1932).—The standard volumetric oxalate method is modified by the addn. of oxidizing agents to facilitate the rapid evapn. to dryness. The oxidation is then completed by heat, the ash taken up with 1:4 HCl and hot water. The soln. is filtered, and the Ca pptd. and detd. according to the standard oxalate method. C. R. Fellers

**Application of the nitric-sulfuric-perchloric acid method of tissue destruction to the toxicological determination of gold.** Ernest Kahane and Victor Stefanescu. *Bull. soc. chim. biol.* 15, 1239-46 (1933).—In the detn. of Au in animal tissues some Au is entrained in the vapors dur-

ing the treatment with HNO<sub>3</sub>-H<sub>2</sub>SO<sub>4</sub>-HClO<sub>4</sub> mixt.; hence the vapors should be passed through a condenser and the condensed liquid examd. for Au. L. E. Gilson

**A colorimetric method for the microdetermination of gold. Its biological application to study of aurotherapy.** B. K. Merejkovsky. *Bull. soc. chim. biol.* 15, 1336-8 (1933).—The HNO<sub>3</sub>-H<sub>2</sub>SO<sub>4</sub> method of destroying org. matter is preferred. A colorimetric method based on the development of a red color by the reaction between Au salts and dimethylaminobenzylidenerhodanine is described. Quantities corresponding to about 0.005 mg. of Au can be detd. L. E. Gilson

**A new "sensitization" reaction for adrenaline.** A. Velicogna. *Compt. rend. soc. biol.* 115, 140-2 (1934). If 3 cc. of a 1% soln. of PhOH in 50% EtOH, 0.6 cc. satd. KIO<sub>3</sub> and 0.3 cc. satd. sulfanilic acid soln. are mixed and heated on a water bath a cardinal-red color develops in 5-10 min. If a trace of adrenaline is added the color develops more rapidly. One part adrenaline in 12,000,000 can be detected. The effects of phenols and related compds. on the reaction are discussed. L. E. Gilson

**Test for iron pigments (hemosiderin) in liver.** J. Guilhaon. *Compt. rend. soc. biol.* 115, 376-7 (1934).—A drop of fresh liver pulp is stirred with 0.5 cc. of HCl (d. 1.19), then a few drops of K<sub>4</sub>Fe(CN)<sub>6</sub> added. If the liver contains hemosiderin a Prussian blue color develops immediately. The reaction is neg. in most animal diseases but is pos. in infectious anemia of horses. L. E. G.

**Extraction method for determination of bilirubin in different body fluids.** Wm. Kerppola. *Acta Med. Scand., Suppl. L.* 277-80 (1932).—Free bilirubin is extd. by CHCl<sub>3</sub> directly; the water-sol. alk. bilirubin is first converted to bilirubin by acid, then extd. by CHCl<sub>3</sub>. Ext. 1 cc. serum or unfiltered urine with 2 cc. CHCl<sub>3</sub>, shake vigorously and centrifuge; bile should be used in 1:1000 diln., while for feces 10 vols. of CHCl<sub>3</sub> should be taken. To ext. the entire bilirubin add to 3 cc. urine or bile 3 cc. 10% AcOH, 1.5 cc. CHCl<sub>3</sub>, shake vigorously and centrifuge. Pptd. bilirubin is dissolved in 0.5 cc. glacial acetic acid extd. with 1.5 cc. CHCl<sub>3</sub> and the acid driven off with an excess of H<sub>2</sub>O. For feces, dissolve 0.5 g. in 3 cc. glacial acetic acid and add 5 cc. CHCl<sub>3</sub> and about 20 cc. H<sub>2</sub>O. For serum, deproteinize 1 cc. by shaking with 2 cc. 96% alc., centrifuge and add to the alc. soln. 2 cc. CHCl<sub>3</sub>, 2 cc. CCl<sub>3</sub>CO<sub>2</sub>H and about 10 cc. H<sub>2</sub>O. Half a cc. of the CHCl<sub>3</sub> ext. is always taken for the colorimetric detn. by the Ehrlich diazo reagent. An aq. 0.05 % K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> soln., which gives the same color as a soln. of 0.0075 mg. bilirubin in 3 cc., is used as a standard. However, the color of the ext. is even a more reliable basis for detn. of bilirubin as the body fluids contain substances interfering with the diazo reaction. S. Morgulis

**Colorimetric determination of phosphoric acid in the presence of arsenate ions.** A. E. Braunstein. *Biochem. Z.* 267, 400-2 (1933).—Polemical against Barronscheen, Banga and Braun (*C. A.* 28, 1929). S. Morgulis

**Titrimetric microdetermination of cholesterol by Gabriel Monasterio.** T. Meuwissen and E. Noyons. *Biochem. Z.* 267, 405 (1933); cf. Monasterio, *C. A.* 28, 7974.—Monasterio's method is not original. S. Morgulis

**Determination of the phenol coefficient by the cover-slip method.** Vilh. Jensen and Elsa Jensen. *J. Hyg.* 33, 485-94 (1933).—See *C. A.* 27, 5367. John T. Myers

**A micro method for the determination of fatty acids from small amounts of whole blood.** Margaret Elizabeth Smith and M. C. Kik. *J. Biol. Chem.* 103, 391-8 (1933).—The methods of Bloor, Pelkan and Allen (*C. A.* 16, 2341) and Stoddard and Drury (*C. A.* 24, 875) are combined and modified for use with 0.5 cc. of blood. The pptd. fatty acids are finally extd. with hot benzene, washed with water, and titrated with 0.02 N KOEt. K. V. T.

**The determination of the bases of serum and whole blood.** Pauline M. Hald. *J. Biol. Chem.* 103, 471-94 (1933).—For total bases the material is ashed in a muffle furnace with H<sub>2</sub>SO<sub>4</sub> and Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and the sulfate then detd. by the benzidine method. For detg. the sep. bases the Fe is omitted from the ashing, the Ca is pptd. as the oxalate and the Mg as phosphate. The soln. is then freed

from phosphate with Fe, the K pptd. as chloroplatinate and the Na as the Zn uranyl acetate,  $(\text{UO}_2)_2\text{ZnNa}(\text{AcO})_6 \cdot 6\text{H}_2\text{O}$ . By using sintered glass filters the whole soln., and not aliquots, may be used throughout, this greatly facilitating the procedure. Extensive details and a no. of analyses of serum are given. The sum of the acids of serum in nearly every case significantly exceeded the total base.

K. V. Thimann

**Studies on cerebrospinal fluid. I. Chemical and spectrographic detection of lead.** I. M. Rabinowitch, Andrew Dingwall and R. H. Mackay. *J. Biol. Chem.* 103, 707-23(1933); cf. Fairhall, C. A. 17, 3885. Details for the prepn. of Pb-free reagents and procedure for the detection of  $10^{-4}$  mg. of Pb by the  $\text{K}_2\text{CuPb}(\text{NO}_3)_6$  method are given. With 6 cc. of cerebrospinal fluid, the spectrographic method was found to detect 1 part of Pb in  $10^6$ , and can therefore be used as a control for the chem. method.

K. V. Thimann

**Microchemical detection of lead: modifications of the Fairhall method.** Robert U. Harwood and Doris Brophy. *J. Ind. Hyg.* 16, 25-8(1934).—Modifications of the hexanitrite test (C. A. 17, 3885) are described, including the substitution of wet for dry ashing. With the modified procedure, 0.5  $\gamma$  of Pb can be estd. in 5 cc. of cerebrospinal fluid. Cf. preceding abstr.

L. W. Elder

**Micro-gas analysis and its application to biol. purposes (Schwarz, Rappaport) 7.** Rotary app. for sedimentation of liquid suspensions [analysis of blood, urine] (Swed. pat. 78,931) 1.

**Christophe, Geneviève:** Dosage de l'urobilin urinaire. Paris: Éditions véga. 78 pp.

**Gallo, C.:** Prontuario di analisi d'urina, in tavole sinottiche con preparati microscopici per medici pratici. Naples: P. Pelosi.

**Glomaud, Georges:** Le liquide duodénal. Détermination des éléments minéraux. Microdosage du magnésium par l'oxquinoléine. Paris: Éditions véga. 91 pp.

**Lombardi, Anselmo:** L'analisi chimica delle urine. Guida teorico-pratica con breve cenno sull'analisi dei calcoli urinari. Catanzaro: Moderno. 102 pp.

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**Sachse, M.:** Praktische Harnuntersuchungen und ihre diagnostische Verwertung. 2nd ed., revised. Radebeul: Madaus. 51 pp. M. 2.50.

**Schilling, Victor:** Das Blutbild und seine klinische Verwertung. Kurzgefahren technische, theoretische und praktische Anleitung zur mikroskopische Blutuntersuchung. 9th and 10th ed., revised. Jena: G. Fischer. 468 pp. M. 22; cloth, M. 23.50.

## C BACTERIOLOGY

CHARLES B. MORREY

**Further studies on the specific carbohydrates of *Vibrio cholerae* and related organisms.** Richard W. Linton and D. L. Shrivastava. *Proc. Soc. Exptl. Biol. Med.* 31, 406-9(1933); cf. C. A. 27, 769, 5400. The method of Furth and Landsteiner (cf. C. A. 22, 986) was used in extg. the sp. carbohydrates of cholera-like vibrios from Bengal. In the majority of vibrios from cholera galactose was the characteristic sugar; others contained arabinose; the groups were similar in agglutinability and in virulence. A 3rd group derived from water was nonagglutinable and contained arabinose. Polysaccharides contg. both arabinose and galactose were isolated from "rice water" stools of cholera patients. Both types of carbohydrate were antibacteriolytic.

C. V. Bailey

**Use of peptone as nutrient substrate for aerobic bacteria. Utilization of peptone by *Staphylococcus aureus*.** Julius Hirsch and Adolph W. Müller. *Z. Hyg. Infektionskrankh.* 115, 443-94(1933).—Peptone is not only a source of N but a source of energy for microorganisms. The production of  $\text{NH}_3$  from peptone by *Staph. aureus* depends on active utilization of the peptone and is inhibited by dextrose. This production of  $\text{NH}_3$  occurs through the deamination of free amino groups. With

ordinary O supply the amt. of growth and  $\text{NH}_3$  production are proportional to the concn. of peptone. The latter is not only a source of energy and food but also a stimulus to reproduction.

Rachel Brown

**The nature of the bactericidal and hemolytic constituents of pyocyanus lipoids.** I. H. O. Hettche. *Klin. Wochschr.* 12, 1804-5(1933).—Of the "lipoids" in a petroleum ether ext. of *Ps. aeruginosa*, 90% is a neutral fat yielding both liquid and solid fatty acids on hydrolysis. The remainder is a fatty acid possessing hemolytic bacteriostatic and weakly bactericidal properties, unlike the neutral fat. The bactericidal action of unsatd. higher aliphatic acids on staphylococci is proportional to the no. of double bonds.

Harry Eagle

**The effect of age of stock cultures on losses of Kjeldahl nitrogen from bacterial cultures.** M. Lemoigne and R. Desveaux. *Compt. rend.* 197, 1697-9(1933).—Irregular losses in N detd. by the Kjeldahl method were observed in following the growth of a no. of strains of bacteria in liquid peptone media. One of the most important causes was the age of the stock culture used. Older cultures showed less variability in N loss.

James C. Munch

**The influence of cations on aerobic sporogenesis in a liquid medium.** F. W. Fabian and C. S. Bryan. *J. Bact.* 26, 543-58(1933).—Cations of the univalent chloride salts, NaCl, LiCl, NH<sub>4</sub>Cl, KCl, and also Na lactate stimulated aerobic spore formation in a liquid medium. Cations of the bivalent chloride salts,  $\text{MgCl}_2$ ,  $\text{MnCl}_2$ ,  $\text{BaCl}_2$ ,  $\text{CoCl}_2$ ,  $\text{PbCl}_2$  and  $\text{NiCl}_2$ ; of the trivalent salts,  $\text{AlCl}_3$ ,  $\text{CeCl}_3$  and  $\text{FeCl}_3$ ; and of a quadrivalent salt  $\text{SnCl}_4$  had no effect on such sporulation. Spore formation was most abundant at the point of max. stimulation of viability. This would indicate that sporulation is not due to a deficiency of nutrient materials or to an accumulation of metabolic products, but that it is a physiol. process occurring when certain conditions are present. The pH of the medium did not materially affect sporulation within a favorable growing range of 5.0-7.5, but an acid reaction was slightly more favorable.

John T. Myers

**The bacteriostatic action of gentian violet and its dependence on the oxidation-reduction potential.** Mary A. Ingraham. *J. Bact.* 26, 573-98(1933); cf. C. A. 27, 1906. —The bacteriostatic concns. of gentian violet affect growth only during the lag phase. The dye must affect the cells indirectly through a mechanism which is adjusted during the lag phase. Bacteriostatic concns. of gentian violet poise the oxidation-reduction potential of the medium within rather wide limits. Bacteriostatic action is related to the initial oxidation-reduction potential and the poisoning action of the dye. Other poisoning agents used also differentiate between bacterial species.

John T. Myers

**A simple method for the preparation of the specific soluble substance of type I pneumococcus.** Harold W. Dudley and Wilson Smith. *J. Path. Bact.* 37, 341-4(1933).—Heating a soln. of the crude carbohydrate in 0.5 N NaOH lowered the precipitating activity. The following is a better method of purification: Dissolve 0.5 g. of the carbohydrate in 40 cc. of 0.05 N  $\text{Na}_2\text{CO}_3$  contg. 10 mg. of trypsin. Add a few drops of toluene and incubate 24 hrs. at 37°. Centrifuge and make acid to Congo red with AcOH. Add 60 cc. of 96% alc. Collect, wash and dry the ppt. The dried product weighed 0.243 g., contained 5.35% N and retained the total activity of the original 0.5 g.

John T. Myers

**The serological grouping of the starch-fermenting strains of *C. diphtheriae*.** Jean. O. Ewing. *J. Path. Bact.* 37, 345-51(1933).

John T. Myers

**Further observations on the specificity of the bactericidal properties of normal serum.** M. H. Finkelstein. *J. Path. Bact.* 37, 359-65(1933).—A sol. substance readily liberated from bacterial growths may annul in a non-sp. manner the bactericidal activity of normal guinea-pig serum.

John T. Myers

**A note on the influence of sodium lactate in the production of green discoloration (hydrogen peroxide formation) by streptococci.** J. Gordon. *J. Path. Bact.* 37, 501-2(1933).—Certain strains of non-green-producing

streptococci grown on blood agar contg. 0.2-0.5% Na lactate become green formers. This is assoc. with the production of  $H_2O_2$ .

John T. Myers

**Transmissible lysis as a function of bacterial respiration. II. Does transmissible lysis influence bacterial respiration?** C. Hallauer. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 194-206(1933); cf. C. A. 27, 5366.—During lysis neither the respiratory quotient nor aerobic glycolysis is markedly influenced. Anaerobic glycolysis is affected even less. **III. Lysin formation during oxidation of definite chemical substances.** *Ibid.* 206-13.—In the presence of C sources as dextrose, levulose, maltose and mannitol, lysin regeneration occurs during oxidation but not during glycolytic splitting of these substances.

John T. Myers

**The influence of reduced iron on the aerobic bacterial flora of the intestine.** Gottfried Handke. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 240-7(1933).—Large doses of reduced Fe markedly reduce the no. of bacteria in the intestine.

John T. Myers

**The influence of anaerobiosis and of several gases on the growth and virulence of diphtheria bacilli.** Adolf Beck. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 287-300(1933).—Growth *in vacuo*, in an atm. of  $O_2$  or of  $CO_2$  had no effect on the rate of growth or virulence, but it produced the morphology of pseudo-diphtheria bacilli. Growth in an atm. of  $H_2S$  increased the rate of growth and the formation of granules, but did not influence virulence.

John T. Myers

**Variants of paratyphosus-B (type Schottmüller) which form no gas from dextrose. III.** A. W. Pot and A. Tasman. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 357-66(1933).—See C. A. 27, 5771.

John T. Myers

**The polysaccharide-forming mouth streptococci and the "frog egg" streptococci of sugar factories.** Friedrich Bl. Koch. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 381-90(1933).

John T. Myers

**The nutrition physiology of diphtheria bacilli.** Hans Schmidt. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 391-418(1933).—Five strains could use salts of acetic, lactic and succinic acids, and glycerol as a source of C. Na asparaginate was a good source of N, but asparagine and glutamic acid would also serve. The following were not utilizable as sources of N: glycocoll, sarcosine, alanine, serine, valine, leucine, proline, phenylalanine, tyrosine, tryptophan, histidine, arginine and glycylglycine. Cystine would not serve as a source of C or N. Virulence was maintained in synthetic media.

John T. Myers

**A method for the quantitative recovery of bacterial dry material in a liquid culture medium.** Ernst Grundmann. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 318-23(1933).—For bacteria of the size range of coli and mycoides, the membrane filter of Zsigmondy with a maximal porosity of  $0.75 \mu$  will remove the bacteria quantitatively and they can be dried for analysis.

John T. Myers

**The chemistry of the lipides of tubercle bacilli. XXXVII. The synthesis of phthiocol, the pigment of the human tubercle bacillus.** R. J. Anderson and M. S. Newman. *J. Biol. Chem.* 103, 405 12(1933); cf. C. A. 28, 1941.

By oxidizing 2-methylnaphthalene with chromic acid there was obtained 2-methyl-1,4-naphthoquinone, I, m. 104-6°; oxime, m. 166-8°. Since I could not readily be acetylated, it was converted in 90% yield to the diacetate, II, m. 114°, by refluxing with NaOAc,  $Ac_2O$ , AcOH and Zn dust. By then treating II with alc. KOH or NaOEt and distg. in steam, 12% of 2-methyl-3-hydroxy-1,4-naphthoquinone, III, was obtained. The substance III, m. 173-4°, is identical with phthiocol, the yellow pigment of the human tubercle bacillus (cf. C. A. 28, 1941). Its oxime m. 199-200°; monoacetate m. 106°; triacetate m. 148° in an opaque liquid which clears at 158-9°. On oxidation of III phthalic acid was obtained.

K. V. Thimann

**Specific inhibition of bacteriophage action by bacterial extracts.** Philip Levine and A. W. Frisch. *J. Exptl. Med.* 59, 213-28(1934).—Expts. are presented demonstrating sp. inhibition of phage by sol. products of bacteria; the inhibition proceeds more rapidly when the phage and bacterial exts. are incubated at 37° than at 0°. The

specificity of the reaction in the instances studied is probably connected with the presence of sp. sol. carbohydrates. A reaction is available for the study of the chemistry of bacillary antigens in terms of bacteriophage. C. J. W.

## D—BOTANY

THOMAS G. PHILLIPS

**Nutrition of Euglena. I. Euglena gracilis.** H. Dusi. *Ann. inst. Pasteur* 50, 550-97(1933).—Cultures can be grown in a synthetic medium in which the source of N is a nitrate or an  $NH_4$  salt, the initial  $pH$  being 6.5-7.5. With  $(NH_4)_2SO_4$  and an initial  $pH$  of 7.0, acid is produced, and the final  $pH$  after 17 weeks is 4.2.  $Ca(NO_3)_2$  cannot be utilized, and Ca ions appear to be unnecessary for development. Of a large no. of  $NH_4$  acids utilized as a source of N, only the simple aliphatic acids, asparagine, histidine and phenylalanine yielded good cultures. Peptone produces the best results. In the dark, media contg. peptones or polypeptides as the source of N are rendered more effective by the addn. of NaOAc. Only those fatty acids having more than 7 C atoms were able to replace AcOH. Strains grown in the light do not require the addn. of a fatty acid to the medium. B. C. A.

**The influence of magnesium on the growth and the activity of Saccharomyces cerevisiae.** Hansen. D. Rabinovitz-Sereni. *Boll. staz. patol. vegetale* [N.S.], 13, 309-23(1933); cf. C. A. 27, 5774.—In the absence of Mg or in the presence of small quantities, the growth of *S. cerevisiae* (on a modified Leberle-Will's soln.) is very poor: the sugar of the medium is not utilized, the acidity is slightly modified and the fermentation is slow in starting and soon ceases. The addn. of small quantities of Mg stimulates the growth, the formation of a superficial layer formed by aerobic enzymes and the respiration. The mycelites grow well in solns. contg. not over 40%  $MgSO_4$ . The growth of some thallophytes in solutions containing a large amt. of magnesium. *Ibid.* 338-45.—Eumycetes, Schyzomycetes, Cyanophyceae and Chlorophyceae were cultivated in solns. contg. increasing doses of Mg. Some of these can live in solns. contg. 20%  $MgSO_4$ , and *Botrytis cinerea*, *Fusarium sp.*, *Coniosporium bambusae* Sacc., and *Rhizodonia solani* Kuhn resist even a medium with 40%

$MgSO_4$ . **Observations on the toxicity of magnesium for the higher plants.** *Ibid.* 346-66. Mg salts exceeding the normal concns. used by the plants and not balanced by Ca produce a strong poisoning of higher plants; the troubles are probably due to altered caryokinetic and respiratory processes. The action of the catalases is counteracted by high concns. of  $MgSO_4$  in the nutrient solns., while the action of the peroxidases is stimulated. **The sensitivity of plants to the action of oxalic acid and of magnesium salts.** *Ibid.* 367-78.—Lower plants (thallophytes) show a good resistance to the action of oxalic acid, but the seeds of higher plants do not grow in solns. contg. >0.05%. The behavior is identical with that of Mg salts. The action of the two substances is explained by supposing that they remove Ca compds. from the living cells. G. A. Bravo

**Amylase of mulberry leaves.** Suemi Matsumura and Takuroh Kasuga. *Bull. Sericult. Silk-Ind. Japan* 6, No. 2, 6(1933).—The optimum  $pH$  for the action of amylase of mulberry leaves is about 5.8 and the optimum temp. for activity 40-50°. Heating at 60° for 60 min. or 70° for 30 min. destroys the enzyme activity, while 50° for 30 min. reduces it markedly. Small amts. of NaCl favor amylase activity. There are species differences. More amylase is found in tender than in mature leaves and in midnight than in mid-day leaves. Leaves sheltered from sunshine for a long time and leaves grown after several gatherings contain less amylase than normal ones. Storage of the leaves decreases enzyme activity. R. B.

**The postmortem color absorption of plant cell walls.** Leo Brauner. *Flora* 27, 190-214(1933).—Living algae cells may remain several hrs. in certain dye solns. as methylene blue and Janus green without absorbing the dye; dead cells, however, are quickly colored. The causes of the difference are probably: (a) the lethal agent changes

the gel structure and permeability of the cell wall; (b) the death of the protoplast may bring about a release of the vacuole contents which impregnate the cell wall. When tannins are thus released they act as mordants and increase the affinity of the cellulose of the cell wall toward the dye. R. C. Burrell

Seasonal variations of the osmotic value of different ecological types in the vicinity of Heidelberg. Robert Thren. *Z. Botan.* 26, 449-520(1933).—According to the type of seasonal variation in the osmotic values of their saps, T. distinguishes 6 ecological groups. Transpiration studies were also made with several species of plants during short cold periods. Winter injury does not seem to be a direct effect of the cold but rather results from water loss in consequence of winter transpiration. R. C. B.

Examination of the pigments of *Capsicum annuum* by adsorption methods. László Cholnoky. *Magyar Gyógyszerésztud. Társaság Értesítője* 9, 400-23(1933).—Crude capsanthin (6.2 g.) extd. with lukewarm  $\text{CS}_2$  gave 0.32 g. of substance A; at  $0^\circ$  5.1 g. substance B was produced. Chromatograms are shown. A consisted of 76% zeaxanthin and 21% capsanthin. B after 3 crystns. gave 3.2 g. of a product consisting of 87% capsanthin and 9% zeaxanthin. Further crystns. from MeOH and  $\text{CS}_2$  gave a product contg. 95% capsanthin and 2.5% zeaxanthin. Artificial mixts. of capsanthin and zeaxanthin could be sepd. by a simple adsorption. Pure zeaxanthin,  $\text{C}_{40}\text{H}_{56}\text{O}_2$ , yellow glittering needles, m. 206,  $[\alpha]_D^{20}$   $-54^\circ$ , gave spectrum lines at 527-508 and 492.5-473  $\text{m}\mu$ . Lutein,  $\text{C}_{40}\text{H}_{56}\text{O}_2$ , glittering carotene-like crystals, m. 192,  $[\alpha]_D^{20}$   $163^\circ$ , gave spectrum lines at 516.5-500 and 485-67  $\text{m}\mu$ . Capsanthin, m. 174.5-176,  $[\alpha]_D^{20}(\text{CHCl}_3)$   $-63$ -68, gave spectrum lines at 552, 554-532, 533, 513 and 514-493  $\text{m}\mu$ . For analysis of paprika pigments, ext. 2.5-5 g. powd. drug with petr. ether, add 10 cc. 10% KOH-MeOH and saponify at  $40$ - $50^\circ$ . Wash in a sepg. funnel with 100 cc. ether, dry and evap. *in vacuo*. Dissolve in  $\text{CS}_2$  and adsorb on  $\text{CaCO}_3$ . The polyene alcs. are adsorbed and carotene is washed out. One kg. dry drug gave 0.5 g. carotene, 1.3 g. capsanthin and 0.6 g. xanthophyll (= lutein + zeaxanthin). S. S. de Finály

The petal pigment of *Calendula officinalis*. László Zechmeister and László Cholnoky. *Matematik. Természettud. Értesítő* 49, 181-8(1932).—Extn. of the petals with alc. and sapon. of the ext. with MeOH-KOH gave xanthophylls, carotene and lycopene; the last was found for the first time in non-fruit material. Carotene has spectrum lines at 530-12 and 495-6  $\text{m}\mu$ ,  $[\alpha]_D^{20}$  (benzene)  $20^\circ$ . Lycopene has spectrum lines at 554-38, 516-497 and 482-67  $\text{m}\mu$ . The xanthophyll showed lines at 510-493 and 481-63  $\text{m}\mu$ ; its ether soln. when underlayered with a 25% HCl soln. gave a beautiful dark blue color. S. S. de Finály

Growth of *Lupinus albus* seedlings in solutions of some amino acids. David I. Macht. *Am. J. Botany* 21, 72-6 (1934); cf. *C. A.* 27, 2175. The growth of *L. albus* seedlings was studied in dil. solns. of stereoisomeric forms of leucine, cystine, alanine, valine and aspartic acid in Shive soln. Such solns. may either inhibit or stimulate growth of plants, depending on the concn. The *l*-forms exhibit the greatest physiol. activity and the *d*-forms the least, with *dl*-forms intermediate, but certain mixts. of isomers may produce a synergistic potentiation in some cases and an antidyamic effect in other cases. L. E. G.

[Report on] biochemistry. W. A. Roach. East Malling Research Sta., *Ann. Rept.* 1931, 34-5(1932).—Causes of resistance to woolly aphids.—When woolly aphids were grown on artificial media contg. exts. from the bark of apple trees, there were indications that in the prepn. of the media, both from susceptible and immune bark, some substance toxic to the nymphs but nontoxic to the adult insects had been produced or liberated. *Chem. examn. of apple bark*.—Alc. exts. of apple-tree bark yielded, by fractional pptn. with Pb salts, red and yellow substances, apparently anthocyanins, which gave green and yellow Pb salts, resp. The distinctive red and yellow colors of the shoot barks of certain apple rootstocks are due to the presence of these substances, and the color of

the Pb ppt. is a fairly const. characteristic of apple, rose and cherry stocks. Similar ppts. from apple and rose roots varied according to the variety from lemon-yellow to reddish brown. K. D. Jacob

The effect of yeast extract on the blooming of plants. Artturi I. Virtanen and Synnöve v. Hausen. *Acta Chem. Fennica* 7B, 75(1934)(in English).—Yeast ext., prepd. by heating an aq. suspension of yeast in an autoclave at  $120^\circ$ , stimulates the blooming of peas to a remarkable extent. The stimulating factor is sol. in  $\text{Et}_2\text{O}$ , since an  $\text{Et}_2\text{O}$  ext. has a marked effect on the development of blossoms. The amt. of ext. necessary is very small; so the factor in question probably belongs to the hormone group. Follicular hormone has no stimulating effect on the development of blossoms. S. A. Karjala

The crystalline glucoside of *Gnidia polyccephala* (Januarie Bossie). M. Rindl. *S. African J. Sci.* 30, 455-7 (1933).—The impure glucoside (ether ext.) on extn. with dry MeOH yielded a thick brown residue, which was extd. with boiling  $\text{H}_2\text{O}$  (yield of cryst. glucoside 0.63%). To sep. traces of daphnin, the product was boiled with rectified spirits and, after removal of the solvent, was repeatedly extd. with abs. alc. On percolating in a Soxhlet app. with  $\text{EtOAc}$  a very small quantity of material m.  $206$ - $8^\circ$  was obtained (suspected of being daphnin). The glucoside is slightly *d*-rotatory in MeOH solns. and *l*-rotatory in  $\text{H}_2\text{O}$ . At  $22.8^\circ$  0.1520 g. dissolves in 61.65 g.  $\text{H}_2\text{O}$ , or 0.246%. The glucoside is hydrolyzed by emulsin and hence belongs to the  $\beta$ -series. Mol. wt. from  $\text{H}_2\text{O}$  solns. gave 461 and 433 (calcd. for  $\text{C}_{15}\text{H}_{11}\text{O}_5 \cdot \text{H}_2\text{O}$  358). H. E. Messmore

Chemical composition of the fruits of two species of *Dialium*. E. Castagne. *Bull. agence gén. colonies* 26, 1315-23(1933).—A study of the compn. of the fruits of *Dialium yambataense* Veru. and of *D. corbisieri* Stamer, both from the Belgian Congo. Results are on the dry basis (except  $\text{H}_2\text{O}$ ). *Pods.*:  $\text{H}_2\text{O}$  7.73, 8.81; N 1.03, 0.72, crude protein 6.44, 4.50; crude fiber 32.62, 33.83; petr. ether ext. 0.35, 0.66; pentosans 17.87, 12.88; sugars after hydrolysis by 3%  $\text{H}_2\text{SO}_4$  40.80, 24.60; ash 3.72, 2.69%. The ash of the pods had the compns.:  $\text{SiO}_2$  61.98, 33.22;  $\text{SO}_3$  1.45, 2.07;  $\text{P}_2\text{O}_5$  5.00, 4.27;  $\text{K}_2\text{O}$  8.94, 31.61;  $\text{Fe}_2\text{O}_3$  +  $\text{Al}_2\text{O}_3$  1.01, 2.04;  $\text{CaO}$  15.44, 11.28;  $\text{MgO}$  1.28, 3.79;  $\text{Na}_2\text{O}$  1.14, 3.01%. *Endocarp.*— $\text{H}_2\text{O}$  28.24, 19.12; N 0.70, 0.60; crude protein 4.38, 3.75; crude fiber 2.80, 4.50; petr. ether ext. 0.20, 0.42; pentosans 3.96, 7.57; reducing sugars (without hydrolysis) 59.10, 59.35; *d*-tartaric acid 10.7, 6.5; ash 2.94, 3.52%. The ash of the endocarp had the compns.:  $\text{SiO}_2$  0.86, 6.45;  $\text{SO}_3$  3.45, 2.29;  $\text{P}_2\text{O}_5$  8.42, 12.30;  $\text{K}_2\text{O}$  53.31, 43.30;  $\text{Fe}_2\text{O}_3$  +  $\text{Al}_2\text{O}_3$  1.75, 2.80;  $\text{CaO}$  5.60, 5.26;  $\text{MgO}$  2.17, 3.30;  $\text{Na}_2\text{O}$  0.85, 1.55%. *Albumen.*— $\text{H}_2\text{O}$  9.29, 14.49; N 1.16, 1.08; crude protein 7.25, 6.85; crude fiber 3.20, 5.81; petr. ether ext. 0.03, 0.05; pentosans 4.32, 5.52; preformed reducing sugars 0.40, 0.14; reducing sugars after hydrolysis with 3%  $\text{H}_2\text{SO}_4$  (consisting of galactose and mannose) 75.18, 64.02; reducing sugars after inversion with invertin 2.25, 1.20; ash 1.32, 1.20%. *Compns. of albumen ash*:  $\text{SiO}_2$  6.62, 4.49;  $\text{SO}_3$  6.68, 7.00;  $\text{P}_2\text{O}_5$  12.12, 11.47;  $\text{K}_2\text{O}$  34.48, 34.78;  $\text{Fe}_2\text{O}_3$  +  $\text{Al}_2\text{O}_3$  2.50, 2.16;  $\text{CaO}$  16.93, 5.33;  $\text{MgO}$  10.00, 12.98;  $\text{Na}_2\text{O}$  4.54, 4.05%. *Embryo.*— $\text{H}_2\text{O}$  5.51, 6.30; N 8.49, 8.22; crude protein 52.79, 51.37; crude fiber 11.72, 12.70; petr. ether ext. 8.75, 13.02; pentosans 6.40, 6.76; preformed reducing sugars 0.23, 0.47; sugars hydrolyzable by 3%  $\text{H}_2\text{SO}_4$  (sucrose) 10.80, 15.80; sugars hydrolyzable by invertin 7.05, 7.89; ash 4.54, 4.90%. *Compns. of embryo ash*:  $\text{SiO}_2$  0.46, 2.92;  $\text{SO}_3$  4.90;  $\text{P}_2\text{O}_5$  30.85, 38.05;  $\text{K}_2\text{O}$  36.17, 19.34;  $\text{Fe}_2\text{O}_3$  +  $\text{Al}_2\text{O}_3$  0.91, 2.01%;  $\text{CaO}$  10.74, 11.90;  $\text{MgO}$  11.39, 15.30;  $\text{Na}_2\text{O}$  1.17, 0.92%. The embryos of each species contain a small quantity of very viscous oil having the following characteristics: acid no. 3.62, 3.7; sapon. no. 186.7, 192.9; I no. 107.33, 104.9; Ac no. 12.22, 25.16;  $d_4^{20}$  0.9284, 0.9201. Total aliphatic acids of the oil of *D. yambataense* had the following consts.: neutralization no. 178.33, sapon. no. 217.1, I no. 108.13, Ac no. 37.59, m. p.  $31.3^\circ$ . The liquid acids of the oils of *D. yambataense* and *D. corbisieri*, resp., had the following consts.: neutralization no. 167.5,



175.5; sapon. no. 205.9, 219.1; I no. 121.44, 126.5; Ac no. 38.87, 98.4. The const. of the solid acids were: neutralization no. 202.1, 208.6; sapon. no. 219.1, 215.9; I no. 5.64, —; m. p. 54.7°, 52.2°. The fruit of neither species contained starch, glucosides or alkaloids.

A. Papineau-Couture

**Occurrence of cyanogenetic glucosides in Nelson pasture plants.** T. Rigg, H. O. Askew and E. B. Kidson. *New Zealand J. Sci. Tech.* 15, 222-7 (1933).—HCN in plants was detd. by grinding, digesting 20-4 hrs. with water, filtering and distg. in the presence of a few cc. 2 N H<sub>2</sub>SO<sub>4</sub> soln. The alk. distillate, not less than 100 cc., was titrated with AgNO<sub>3</sub> soln. For grasses, red clover, alsyke, subterranean clover and *Lotus major* the HCN varied from 0.0001 to 0.0005%; for white clover from 0.0016 to 0.0124%, averaging 0.0045%.

P. S. Roller

**Determination of hydrocyanic acid in white clover.** H. O. Askew. *New Zealand J. Sci. Tech.* 15, 227-33 (1933); cf. preceding abstr.—Digestion in H<sub>2</sub>O for 24 hrs. at ordinary temp. or heating at 45° for 4 hrs. gives the highest titration figures for HCN. Distn. of the digested mash was carried out in the presence of a large amt. of H<sub>2</sub>O (one l. for a 50-g. sample) to avoid formation of undesirable compds. Cool storage of samples up to 6 days did not decrease the yield. The HCN content varies seasonally and is greater for the leaf than for the stem.

P. S. Roller

**Water culture experiments with progynon.** K. Scharer and W. Schropp. *Z. Pflanzenernähr., Düngung Bodenkd.* 13B, 1-9 (1934).—Progynon, prepd. from the urine of pregnant mares, contains the  $\alpha$ -follicular hormone of Butenandt (C. A. 27, 4286) with NaCl and lipoids as impurities. The hormone has been isolated from plants and according to Schoeller and Goebel (C. A. 27, 5882) treatment of seed therewith hastens blooming and increases growth. The authors conducted triplicate tests with cereals and peas in Crone's soln. contg. 0, 100 and 300 mouse units per l. of the hormone, with NaCl and lipoids added to controls, since the latter have an effect upon plant growth. The results indicated that the hormone has a very favorable effect upon the growth of peas and summer wheat, and is beneficial to summer barley and corn, as shown by increases in root growth and plant height, resp. Growth of oats and winter rye was not significantly affected. Twelve references. C. J. S.

**The influence of growth-promoting substances (hormones) upon plant growth.** O. Lemmermann and W. U. Behrens. *Z. Pflanzenernähr., Düngung Bodenkd.* 13B, 9-12 (1934).—Expts. with oats grown to maturity in Mitscherlich pots of sandy loam with uniform addns. of P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O and N as salts, synthetic urea and urine of various animals, pregnant and nonpregnant, in some instances extd. by Et<sub>2</sub>O and CHCl<sub>3</sub> to remove hormones, and graduated addns. of progynon (cf. preceding abstr.) were neg. with respect to possible effects of growth-promoting substances. Similar later expts. with mustard, for comparison of urea and human urine as sources of N, indicated a slight superiority for the latter. C. J. S.

**Mesothorium  $\gamma$  [radiation] in the [genus] *Lemna*.** V. Vernadskii, B. Brunovskii and C. Kunaseva. *Compt. rend.* 197, 1556-7 (1933); cf. C. A. 26, 167.—Burker's (C. A. 25, 3692) report of Th in plants seems unlikely in view of the probable absence of Th in natural waters. V. has shown (C. A. 26, 5007) the absence of Th in deep subterranean waters rich in Ra which contain at the same time MsTh I. Possibly some such condition exists in regard to plants and detn<sup>9</sup>. of Th were made in *Lemna trisulca*, *L. minor* and *L. polyrrhiza* with this end in view. The quant. results show an increase with the age of the specimens in accordance with the increase calcd. if MsTh I existed in the living plant and RaTh was formed from it in the stored samples. Conclusion: No isotope of Th (Th or RaTh) exists in living *Lemna* but only isotopes of Ra (Ra, MsTh I and Th X). Oden E. Sheppard

**A study of three species of Philippine Derris.** Virginia B. Uichanco. *Univ. Philippines Natural and Applied Sci. Bull.* 3, 129-239 (1933).—From the ether ext. of powd. roots of a *Derris* sp. was obtained 2% of pure

rotenone, m. 163°, while from *D. elliptica* and *D. philippinensis* the yields were less than half of this. Extn. with CHCl<sub>3</sub> or EtOH was not successful. A useful review of the botany, chemistry and application of derris, with 103 references, is given.

K. V. Thimann

**Oxidase and dehydrase in phytopathogenic fungi.** Shigekatsu Hirayama. *Proc. Imp. Acad. (Tokyo)* 9, 439-42 (1933).—Twenty-five parasitic fungi were investigated for oxidase and 20 for succinodehydrase. In *Colletotrichum circinans*, *C. spinaciae*, *Gibberella fujikuroi*, *Piricularia oryzae* (I), *Fusarium* sp. No. 13 (watermelon wilt) (II), *Fomes ulmarius* (III) and *Polyporus mikadoi* the oxidase reaction is very strong. Very strong reducing power was proved in I, II, III, and *Polystictus sanguineus*. The two enzymes are not universally distributed in the filamentous fungi which cause the plant diseases or wood decay. The activity of the enzymes varies markedly in each species.

C. J. West

**The influence of temperature on the physiological reaction of ammonium nitrate.** P. Strebeyko. *Polish Agr. Forestal Ann.* 28, 357-70 (1932) (369-70 in English).—The physiol. reaction of NH<sub>4</sub>NO<sub>3</sub> as expressed by the ratio NH<sub>4</sub>:NO<sub>3</sub> taken in simultaneously by corn in H<sub>2</sub>O cultures is very unsteady. It is affected primarily by the pH of the medium and the temp.: the higher the temp. the more NO<sub>3</sub> ions are taken in, while the amt. of NH<sub>4</sub> ions absorbed is const. The physiol. reaction is, therefore, more basic at elevated temps.

J. Wiertelak

**Relative amount of zinc in green and etiolated leaves.** Gabriel Bertrand and M. Andreicheva. *Compt. rend.* 197, 1374-6; *Compt. rend. acad. agr. (France)* 19, 1101-4 (1933); cf. C. A. 23, 1696.—Ten varieties of edible leaves were analyzed for Zn. The green leaves of any one variety had about twice the Zn content of the yellow. The amt. of Zn roughly paralleled the chlorophyll content.

J. J. Willaman

**The dark-colored duramen of ebony.** K. Griffioen. *Proc. Acad. Sci. Amsterdam* 36, 897-8 (1933).—Extn. with NaOH gave a brown substance which was very similar to the ulmic acid isolated from brown coal. In the transition from sapwood to heartwood the lignin is converted to ulmic acid.

J. J. Willaman

**Physiol. spotting of apples (Suit) 12.** Plant physiology section, G. A. R. S., Report (Crowther) 15. Distribution of the P in wheats (Feyte) 12. Effects of Bordeaux mixt. on transpiration (Wilson, Runnels) 15. Internal brown fleck of potatoes (van der Plank) 15. I compds. in seaweed (Masuda) 10. Infra-red absorption spectra of some plant pigments (Stair, Cohlentz) 3. Constitution of the coloring matter of *Lawsonia alba* (Lal, Dutt) 10.

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## E—NUTRITION

PHILIP B. HAWK

**Alcohol-extractable substances from rice and their relation to vitamins.** C. Scaglioni. *Arch. ist. biochem. ital.* 5, 303-20 (1933).—Alc.-extd. substances from polished rice enhance polyneuritic manifestations of beriberi, while exts. from whole rice attenuate and even cure these manifestations. Both exts., when given together, shorten the period of the disease in pigeons. They are inactive, however, when the animals are kept on a vitamin-free diet.

E. S. G. Barron



The 1-cc. group shows only a slightly higher score for the canned juice. There is evidently a slight destruction of vitamin C in the canned juice. Sealing the cans under an addnl. mech. vacuum is not essential. The tooth sections confirm the findings of the Sherman method for the 1932 pack and serve as an addnl. check on the vitamin C content of the canned juice as compared with the fresh.

F. L. Dunlap

**Fat metabolism. III.** P. E. Verkade and J. van der Lee. *Proc. Acad. Sci. Amsterdam* 36, 876-87(1933); cf. C. A. 27, 3974.—A discussion of diafat, intarvin and elm-seed oil. Intarvin feeding produced no dicarboxylic acids in the urine. Sebatic acid resulted from the feeding of the elm-seed oil. It depends on the nature of the fat or oil whether diacidosis or diaciduria is produced. According to the authors, oils and fats which produce moderately strong to strong diacidosis and diaciduria are wholly unfitted for normal use as foods. Intarvin is considered to be composed principally of mixed glycerides. The largest proportion of elm-seed oil is likewise considered to be made up of mixed glycerides, which contain the diacidogenic capric acid together with other non-diacidogenic fatty acids. So far as producing diacidosis or diaciduria, it is immaterial whether the fat or oil is a simple or mixed glyceride. F. L. Dunlap

**The effect of alcohol upon the appearance of B avitaminosis.** August Meyer. *Klin. Wochschr.* 12, 1811-13 (1933).—The addn. of EtOH delays the appearance of the avitaminotic symptoms in rats on a B-deficient diet.

Harry Eagle

**The blood iodine values in human rickets and tetany.** A. Nitschke and H. Doering. *Klin. Wochschr.* 12, 1910 (1933).—The blood I in normal children is approx. 9 γ %, decreased to 3 γ % in extreme rickets, and to 2.8 γ % in latent or manifest tetany. These are av. values, individual cases varying widely. The basal metabolism is also low. Under treatment with vitamin D (vigantol), the blood I returns to normal within 10-20 days. A preliminary report.

Harry Eagle

**Stereochemical structure and the selective absorption of carbohydrates.** Physiology of nutrition. Günther Malyoth. *Klin. Wochschr.* 12, 1930-2(1933).—Malt amylase splits starch with the formation of β-maltose in the early stages of hydrolysis, while pancreatic amylase tends to split off the α-modification first. Necessarily, the 2 dextrans so formed also differ in their stereochem. conformation. Enzymes prep'd. from *Aspergillus* act like pancreatic amylase in that they first split off the α-form, with the added advantage that they contain a phosphatase which decomposes the amylopectin of starch. A dried dextrin-maltose mixt. formed from starch by *Aspergillus* enzymes had a better effect upon the weight curves of infants when added to the milk than the dextrin-maltose mixt. now available produced with malt amylase.

Harry Eagle

**Vitamin A content of ghee.** K. Singh Grewal. *Quart. J. Pharm. Pharmacol.* 6, 650-4(1933).—Ghee prep'd. from centrifuged butter contained a large amt. of vitamin A. Prep'd. by the Indian method ghee showed loss of some of the vitamin A content. Of the 2 samples of ghee, one prep'd. in spring and the other in winter under the same technic, the latter was found to be poorer in vitamin A than the former. The vitamin A content of ghee is not diminished by storage during the summer under conditions.

W. O. E.

**Effect of calcium-deficient roughages upon milk production and welfare of dairy cows.** R. B. Becker, W. M. Neal and A. L. Shealy. *Fla. Agr. Expt. Sta., Bull.* 62, 3-28(1933); *J. Dairy Sci.* 17, 1-10(1934); cf. C. A. 27, 5793.—Grass forages and silages grown on acid sandy soils contain relatively small amts. of Ca. Dairy cows dependent upon these home-grown roughages withdrew mineral matter from the bones to such an extent that they were weakened and easily broken. Under these conditions, less milk was produced, even when the cows received high-protein concentrates in such amts. that the animals were in good flesh. A 2% addn. of bone meal to concentrates and a daily allowance of 5 lb. of alfalfa

hay resulted in substantial increase in milk production without the cows' becoming fat. Minerals were stored in the skeleton to the point that the shaft bones were above av. strength. Reproduction is a far smaller drain on Ca and P than is lactation. With Jersey cows producing approx. 6000 lb. of milk per lactation, a 2% level of bone meal was slightly in excess of the current requirements when used with the type of low-Ca rations commonly used in Fla.

C. R. Fellers

**Vitamin content of Chinese cabbage.** Carey D. Miller and Ruth C. Robbins. *Hawaii Agr. Expt. Sta., Rept.* 1932, 18-19(1933); cf. C. A. 27, 3741.—Chinese cabbage is an excellent source of vitamin A. Approx. 1/3 of this vitamin is lost in the process of pickling in a NaCl-rice-bran paste. The plant is a fair source of vitamin B, about 4.5 g. daily giving a weekly wt. gain in rats of 3.5 g. The vitamin B content was increased about 10 times after pickling in the NaCl-rice-bran paste. The paste acts as an absorbing agent for vitamin B from the bran. The fresh Chinese cabbage had a  $pH$  of 6.38, but after pickling there was a decrease to 4.74.

C. R. Fellers

**Vitamin content of opihī (Australian limpet).** Carey D. Miller and Ruth C. Robbins. *Hawaii Agr. Expt. Sta., Rept.* 1932, 19(1933).—The opihī, *Heliconiscus exerula*, and more particularly the internal organs, are richer in vitamin A than cod-liver oil. The sperm is richer in vitamin A than the eggs. Two 3 g. of opihī or 1 g. of the organs daily cured rachitic rats, indications of good vitamin D values. The percentage compn. of opihī is fat 1.15, protein 2.76, moisture 77.2, Ca 0.28, P 0.17, Fe 0.0134 and Cu 0.00023.

C. R. Fellers

**Vitamin content of mountain apples, *Eugenia malaccensis*.** Carey D. Miller and Ruth C. Robbins. *Hawaii Agr. Expt. Sta., Rept.* 1932, 20(1933).—Mountain apples were fair sources of vitamin C but were deficient in vitamins A, B and G. The min. protective dose for guinea pigs in the vitamin C expts. was approx. 10 g.

C. R. F.

**The assimilations of calcium and phosphorus from different mineral compounds and their effect on range cattle.** J. L. Lantow. *New Mex. Agr. Expt. Sta., Bull.* 214, 5-30(1933); cf. C. A. 27, 3993.—Ca and P were beneficial as supplements and were profitable to feed. On the expt. range, no animal suffered macroscopic mineral deficiency disease. Ca and P were assimilated from compds. other than Ca phosphates. Minerals do not provide the benefit derived from the protein of cottonseed meal or cake in winter. In general,  $CaH_2(PO_4) \cdot H_2O$  was a very satisfactory mineral supplement and its use on the range can be recommended. Fifty-one references.

C. R. F.

**Digestion and mineral balance trials on range cattle with native New Mexico range hay, cottonseed meal, and mineral supplements.** W. E. Watkins. *N. Mex. Agr. Expt. Sta., Tech. Bull.* 212, 3-32(1933).—The range hay had a Ca content of 0.257% and a P content of 0.211%. Cottonseed meal was a very efficient supplemental feed for furnishing both protein and P. The feeding of 14.7 g. of P per steer per day furnished by the feed and by  $Na_2HPO_4$  resulted in uniformly pos. P balances. A ration consisting of range grasses and NaCl did not supply sufficient Ca or P for growing steers 18 months old. This ration furnished only an av. of 11.6 g. of Ca and 8.5 g. of P daily per steer. With growing steers, a pos. N balance is usually accompanied by a daily gain in live wt. of approx. 0.5 lb. The gross energy of the hay was 4227.8 cal. as compared with 5111.4 for cottonseed meal. In spite of deficiencies in protein, P and Ca, range grass, when supplemented with cottonseed meal, bone-meal and some source of Ca, is a valuable feed for range cattle. Cf. C. A. 27, 1659.

C. R. Fellers

**Rickets in calves.** S. I. Bechdel, K. G. Landsburg and O. J. Hill. *Pa. Agr. Expt. Sta., Tech. Bull.* 291, 2-41(1933); cf. C. A. 27, 1660.—Four years' investigation showed that the lack of the antirachitic factor in the rations of calves caused a decreased growth rate, abnormal bone development, swollen joints, slight paralysis of the rear quarters and a bowed back. These conditions were assoc. with a low percentage of ash in the bones. In calves the decrease in bone ash due to rickets was con-

- siderably less than in rats. Direct irradiation of the calves or their feed was equally effective in curing rickets and in increasing ash content of the bones. Cod-liver oil promoted growth and thriftiness slightly better than ultra-violet-light treatments. Feeding expts. with both calves and rats showed that light treatments produced a slightly superior grade of bone to that produced by cod-liver oil. Sun-cured alfalfa hay was appreciably richer in vitamin D than dehydrated hay (cured without exposure to sunlight). This was proved by both calf- and rat-feeding trials. When 1 lb. of dehydrated alfalfa hay was added daily to the basal diet of skim milk and grain mixt., severe rickets resulted in 6 months; under the same conditions with sun-cured alfalfa mild rickets resulted; 2 1/2 lb. of sun-cured alfalfa entirely prevented rickets. Activated ergosterol was highly effective in preventing rickets in calves and in restoring calves in a rachitic state to a normal condition. Calf- and rat-feeding trials showed oat straw to have a considerable antirachitic potency. C. R. Fellers
- Effect of sunlight on vitamin D of cow milk.** T. M. Olson. S. Dak. Agr. Expt. Sta., *Annual Rept.* 1932, 15(1933).—Milk from cows on pasture was richest in vitamin D and gave the greatest wt. gains in rats as compared with milk from "no-sunlight" cows with or without cod-liver oil. Rats receiving milk in addn. to cod-liver oil gave the greatest gain in wt. The results obtained in the blood analysis of the several groups of rats were inconclusive. C. R. Fellers
- Feeding value of artificially dried forage crops.** R. E. Hodgson and J. C. Knott. Wash. Agr. Expt. Sta., *42nd Annual Rept. (Bull. 275)* 29-30(1932); cf. C. A. 27, 527.—Mixed pasture grasses and clovers which were artificially dried at 38-44° gave the following chem. compn. (dry basis): crude protein 24.64, N-free ext. 39.19, Et<sub>2</sub>O ext. 3.5, crude fiber 18.09, ash 11.18, Ca 0.78 and P 0.65%. In a 15-day collection period, heifers made an av. daily wt. gain of 1.32 lb. The digestibility of the protein and N-free ext. was 74-5, of the crude fiber 72.7 and of the Et<sub>2</sub>O ext. 21.9%. Vitamin D was not injured by the drying process. Rats receiving 3, 6 and 9% of green grass (dry basis) in their daily rations gave as high ash content of femurs as the pos. controls. C. R. F.
- Fish oils as a source of vitamin D for growing chicks.** J. S. Carver, J. L. St. John, F. W. Frasier and William Athow. Wash. Agr. Expt. Sta., *Tech. Bull.* 284, 5-32 (1933).—Results are based on feeding tests on 60 lots of chicks totalling 980 individuals. The W. S. C. biol. all-mash ration consisting of ground yellow corn 52 lb., wheat middlings 20 lb., wheat bran 5 lb., skim-milk powder 20 lb., steamed bone meal 2.5 lb. and salt 0.5 lb. was used in all tests; it contained 16.7% protein, 1.6 % crude fiber, 0.94% Ca, 0.68% P and a Ca:P ratio of 1.4:1. This ration produced well-defined rickets in 4-5 weeks. At the 0.25 and 0.5% levels several samples of sardine and pilchard oils did not give chicks protection from rickets; 1% of either oil or 0.125% of a concd. cod-liver oil gave full protection when used with the above ration. The W. S. C. com. poultry ration with its level of 0.8-1.0% P does not require the addn. of supplementary P when the meat scrap used in the ration contains 25-30 % total ash. In order to promote max. growth and calcification in chicks fed the com. ration with added vitamin D, the addn. of 1% oyster-shell flour was necessary. Excellent growth and calcification were secured with a Ca level of 1-1.8% and a P level of 0.8-1.0%. The addn. of 0.5% of sardine oil to the W. S. C. com. ration effectively prevented rickets. C. R. Fellers
- Effect of storage on the vitamin C of potatoes.** Elizabeth J. McKittrick and Emma J. Thiessen. Wyo. Agr. Expt. Sta., *42nd Annual Rept.* 28-6(1932).—Approx. 5 g. is the min. protective amt. of Irish potatoes (raw or cooked) which protected guinea pigs from scurvy. There was some loss after storage 6-8 months. Cooking did not destroy the vitamin C, and in potatoes which had been stored 6 months, less cooked potato than raw was required for protection from scurvy. Potatoes grown under irrigation seemed to hold their vitamin C content during storage better than those grown without irrigation. C. R. Fellers
- The partition of metabolic nitrogen among the urinary constituents and its physiological significance.** V. Metabolism of exogenous protein. Emile F. Terroine and Germaine Boy. *Bull. soc. chim. biol.* 15, 1163-220 (1933).—See C. A. 28, 810<sup>a</sup>. L. E. Gilson
- Influence of unbalanced mineral diet on the growth and chemical composition of the white rat. Variations in potassium and calcium.** Lise Emerique. *Bull. soc. chim. biol.* 15, 1221-34(1933); cf. C. A. 28, 807<sup>a</sup>.—The effects of adding an excess of K or Ca salts to an otherwise balanced diet were detd. Influence of unbalanced mineral diet on the chemical composition of white rats deprived of vitamin A. *Ibid.* 1235 8.—The effects of varying the K and Ca of the diet were detd. L. E. G.
- From irradiated ergosterol to crystallized vitamin D. Progress since the works of Bourdillon and Windaus.** G. Tanret. *Bull. soc. chim. biol.* 15, 1346-64(1933). A review. L. E. Gilson
- Lipides and vitamins B. I. Role of vitamins B in the utilization of lipides.** Raoul Lecoq. *Bull. soc. chim. biol.* 15, 1498-507(1934).—See C. A. 27, 1035. II. Influence of the constitution of lipides on the production of avitaminosis B and the need of vitamin B in the utilization of lipides by pigeons. Raoul Lecoq and Jean Savare. *Ibid.* 1508-16.—See C. A. 27, 4834. III. Are the alcohol- and water-soluble vitamins B also fat soluble? Jean Savare. *Ibid.* 1517-19.—The vitamins B from beer yeast are not appreciably sol. in olive oil. L. E. G.
- Interference with calcium fixation by certain carbonates in the diet of white rats.** Raoul Lecoq and Henri Villette. *Compt. rend. soc. biol.* 114, 1094-6(1933); cf. C. A. 27, 3503, 5792.—When rachitic rats were placed on a curative diet contg. phosphates of Na and Ca, Ca fixation by the tissues was prevented or decreased by the addn. of sufficient carbonate of Ca, Mg, Sr, Fe or Mn to the diet. Influence of the metal on the antirachitic activity of orthophosphates. *Ibid.* 1096 8.—The effects of phosphates of K, Na, Mg, Ca, Sr, Fe, Mn and Bi in the diet were studied. L. E. Gilson
- Excretion of iodine in the bile [of rabbits] during fasting and after feeding.** A. W. Elmer and Z. Luczynski. *Compt. rend. soc. biol.* 114, 1340-2(1933); cf. C. A. 28, 515<sup>a</sup>. Bile secreted during fasting periods contained 4-14  $\gamma$  l in 100 cc. After feeding (normal diet, no added I) the bile contained 27-69  $\gamma$  in 100 cc. L. E. Gilson
- Potassium and sodium of muscles and brain tissue during avitaminosis B and pellagra.** L. Ballif and I. Gherseu vici. *Compt. rend. soc. biol.* 115, 75-6(1934).—The values found, in parts per 1000, were for normal pigeons, muscle K 4.0, brain K 2.4, muscle Na 0.72 and brain Na 1.48. The corresponding values for starved pigeons were 3.18, 2.1, 0.70, 1.5, and for pigeons on a vitamin B-deficient diet 5.9, 3.6, 0.1 and 0.85. In the case of men dying of pellagra the values were 5.0, 3.0, 0.05 and 1.0, while the averages for specimens from men dying of various other diseases were 3.8, 2.4, 0.6 and 1.4. Thus in both pellagra and lack of vitamin B there is a very large increase in the K of the muscles and brain and a large decrease in Na. L. E. Gilson
- Growth experiments with carotenoids.** H. v. Euler, P. Karrer and A. Zubrys. *Helv. Chim. Acta* 17, 24 9 (1934).—Zeaxanthin and xanthophyll have no vitamin A activity. Treated with PBr<sub>3</sub> in PhH, each yielded a resinous product contg. 2-5% Br, sol. in petr. ether, and having a different absorption spectrum from the parent substance. The substance prep'd. from zeaxanthin promoted growth in young rats when 20-40  $\gamma$  per day was fed; 10  $\gamma$  daily of the product from xanthophyll caused a gain in wt. of 0.8 g. per day. Under the same conditions feeding 0.75  $\gamma$  per day of  $\alpha$ -carotene caused a gain of 0.48 g. per day and the same dose of  $\beta$ -carotene a gain of 0.72 g. per day for 5 weeks. These effective doses of carotene are smaller than any heretofore reported. Very pure vitamin A was treated with Ca(OH)<sub>2</sub>. A small fraction ( $\alpha$ -fraction) was adsorbed. This  $\alpha$ -fraction, treated with SbCl<sub>3</sub>, showed an absorption band with a max. at 5

$m\mu$  which soon faded and was replaced by a band at 620  $m\mu$ . The unadsorbed fraction ( $\beta$ -fraction) with  $SbCl_3$  showed a band with a max. at 622  $m\mu$ . This  $\beta$ -fraction had the characteristics of vitamin A and promoted a gain of 0.7 g. per day when 0.3  $\gamma$  was fed daily. The  $\alpha$ -fraction, to which the name *hepaxanthin* is given, has a much weaker growth-promoting power than the  $\beta$ -fraction and it is uncertain whether it is active *per se* or contains some of the  $\beta$ -fraction, to which its activity might be due. L. E. Gilson

**Relations of the vitamin-B-complex (especially vitamin B<sub>1</sub>) to carbohydrate metabolism.** E. Abderhalden and E. Wertheimer. *Arch. ges. Physiol. (Pflügers)* 233, 395-415 (1933).—In the avitaminosis-B<sub>1</sub> of pigeons high liver glycogen values were found even when the diets were free from carbohydrate. This abnormal storage of glycogen is prevented by antineuritic substances. Neuritic symptoms only occurred in animals in which high liver glycogens were also found. Arthur Grollman

**Application of the capillary resistance test as a measure of vitamin C nutrition.** Ruth E. Stocking. *Arch. Pediatrics* 50, 823-31 (1933).—In a group of normal children (41 boys and 38 girls) 2-14 yrs. of age, the capillary strength was within normal limits. However, a slightly reduced capillary resistance apparently existed in the springtime when the supply of foods rich in vitamin C was less plentiful. Joseph S. Hepburn

**Diet in relation to dental problems.** George R. Cowgill. *Dental Cosmos* 76, 223-35 (1934).—An address (with a bibliography of 55 references) devoted to factors detg. adequate nutrition, growth and maintenance, compn. of the teeth, Ca, P and vitamin factors, carbohydrates and bacteria. Joseph S. Hepburn

**Does pasteurized milk cause variation from normal in the crystal structure of enamel formed during the period of use of such milk?** P. C. Kitchin and R. D. McFarland. *J. Dental Research* 13, 359-62 (1933).—"There were no significant optical differences between enamel of control rats and of milk-fed rats nor between enamel of animals fed pasteurized milk and of those on raw milk from the same supply." J. S. Hepburn

**Calcium and phosphorus studies. VIII. The incidence of caries-like lesions in the rat.** David H. Shelling and Dorothy E. Asher. *J. Dental Research* 13, 363-78 (1933); cf. C. A. 27, 4559. Study was made of the occurrence of caries-like lesions in 1150 rats fed various diets. Such lesions were infrequent below the age of 100 days, showed a high incidence in rats whose ration contained a large percentage of coarsely ground corn, and were absent when the ration contained casein and starch or grains with particles finer and softer than those of corn. The occurrence of the lesions had no relationship to either the Ca and P contents of the ration, or the Ca and inorg. P contents of the blood serum, and was attributed to phys. injury by corn particles in the ration. The efficacy of vitamin D in the prevention of dental caries cannot be evaluated by such expts. The production of these lesions in the rat by this procedure is not necessarily related to the etiology of human dental caries. J. S. H.

**Studies, in the rat, of susceptibility to dental caries. III. The experimental production of typical dental fissure-carries and other lesions in rats, and preliminary studies of their etiology.** Theodor Rosebury, Maxwell Karshan and Genevieve Foley. *J. Dental Research* 13, 379-98 (1933); cf. C. A. 27, 748, 2204. In rats fissure caries of 2 types may occur, the one due to forcible impaction on dense food, particles by teeth weakened by rachitic deficiency, the other histologically similar to human fissure caries. Fissure caries occurred in rats on rations deficient in protein, minerals and vitamin D, and in rats on rations with these deficiencies fully corrected; however, the adequate rations delayed the occurrence of the lesions. Joseph S. Hepburn

**Effects of diets containing fluorine on jaws and teeth of swine and rats.** R. M. Bethke, C. H. Kick, T. J. Hill and S. W. Chase. *J. Dental Research* 13, 473-93 (1933).—Addn. of F compds. to the ration of swine and rats produced hypoplasia of the enamel and dentine. The sever-

ity of this hypoplasia was proportional to the amt. of F ingested, and varied according to the F compd. used. With doses of equiv. F content, the deleterious effects upon the teeth were greatest with NaF, intermediate with rock phosphate and phosphatic limestone, and least with CaF<sub>2</sub>. Rations high in F produced no significant departure from normal in the size or proportions of the skull in rats. In swine, rations contg. rock phosphate or NaF produced material increases in the thickness of the mandible and the size of the medullary spaces, and increased the width of the dental arch. J. S. H.

**Effects of diet on salivary phosphate.** Walter H. Eddy, Hattie L. Heft, Samuel Rosenstock and Ruth Ralston. *J. Dental Research* 13, 511-19 (1933).—Samples of saliva were collected from each of 3 human subjects throughout the day at intervals of 30-60 min. The variations in P content were appreciably greater than those in pH. In human subjects, the P concn. of the saliva was decreased by ingestion of sugar (candy), other carbohydrates (farina, bananas), or protein (boiled eggs), unaffected by ingestion of fat (cream) and increased by ingestion of inorg. (Ca) phosphate. In fasting rats, ingestion of sugar decreased P concn., increased pH and produced little change in Ca concn. of the blood. The diet can influence the compn. of the saliva. J. S. H.

**Biochemical studies of soy-bean milk and chicken protein.** Joseph S. Hepburn, Keum S. Solin and Laurence P. Devlin. *J. Franklin Inst.* 217, 213-21 (1934).—Soy-bean milk, prepd. according to the Korean method, had the following percentage compn.: H<sub>2</sub>O 93.08, crude fat 2.35, crude fiber none, crude protein 3.50, ash 0.46, N-free extractives 0.61, Ca 0.034, P<sub>2</sub>O<sub>5</sub> 0.091; it curdled spontaneously at a lower acidity than cow milk. In feeding expts. with young albino rats over a period of 69 days, the ration proper contained corn meal 15, whole wheat flour 15, soy-bean milk 70%; control rats received a ration contg. corn meal 15, whole wheat flour 15, cow milk 70%. The soy-bean milk ration produced gain in body wt. less rapidly and less efficiently. The av. wt. of a rat on the soy-bean-milk ration increased 174.0% of its initial value; and 25.9 g. of ration was consumed for each g. of gain. The av. wt. of a rat on the cow-milk ration increased 359.6% of its initial value; and 13.9 g. of ration was consumed for each g. of gain. In feeding expts. with young albino rats, chicken protein was a less efficient protein than casein. The final ration contained protein (chicken protein or casein) 18, sucrose 15, starch 29.5, powd. agar 5, salt mixt. 2.5, hydrogenated vegetable oil 20, butter fat 10, cod-liver oil 4.3, dried ale yeast 7.5 g. The feeding period was 57 days. On the chicken-protein ration, the av. body wt. increased 141.3% and 4.37 g. of ration was consumed per g. of gain. On the casein ration, the av. body wt. increased 176.2% and 3.97 g. of ration was consumed per g. of gain. J. S. H.

**The digestion and utilization of crude fiber.** Ernst Mangold. *Nutrition Abstracts and Rev.* 3, 647-56 (1934).—A review. E. H.

**Clinical and experimental study on a dietetic therapy for gallstones.** Sanetoshi Saiki. *Japan. J. Gastroenterol.* 5, 79-83 (1933).—A bile sample taken from a Korean girl having rickets showed small stones. Pieces of stone were placed in the gall bladders of 3 dogs. In one case on a complete diet the piece disappeared after 186 days, but in the other two on deficient diets the stones had increased when observed after 10 and 96 days, resp. In 3 addnl. dogs treated similarly, one was fed a vitamin A supplement, another cod-liver oil and the 3rd a vitamin-deficient diet. After 115 days the stones decreased slightly in size in all cases. C. M. McCay

**Some effects of fasting on the composition of the blood and respiratory exchange in fowls.** K. M. Henry, H. E. Magee and E. Reid. *J. Exptl. Biol.* 11, 58-72 (1934).—No relation exists between the 4-day peak for blood glucose in fasting chickens and the changes in cholesterol, lipide P, uric acid and nonprotein N. Liver glycogen may start at a level of 2.6% and drop to 0.13% after 24 hrs. of fasting. It then remains quite const. At the same time the lipide P dropped from 18.7 mg. to 13.4 on

the 3rd day, after which it ranged from 16.1 to 17.9 mg. per 100 cc. of blood during the remaining 7 days of fasting. Glucose ingestion decreased the hyperglucemia during fasting. Adrenaline produced a greater hyperglucemia in fowls that had fasted for 96 hrs. than for shorter periods. Only a quarter of this extra sugar could have come from glycogen stores. During 7 days' fasting the R. Q. dropped below 0.7. It was not altered by protein feeding but increased after fat feeding. During fasting uric acid was 50% of urinary N and after a protein meal 30%. This indicates that the low R. Q. during fasting is due to uric acid synthesis.

C. M. McCay

**Cupremia in anemias.** A. Fieschi and E. Storti. *Boll. soc. ital. biol. sper.* 8, 1363-6(1933).—There is an increase of Cu in the blood of anemic individuals; in pernicious anemia the increase is often 2-3 times the normal amt.

Peter Masucci

**Retention of calcium and phosphorus in rations with a wide CaO:P<sub>2</sub>O<sub>5</sub> ratio.** J. H. W. Th. Reimers. *S. African J. Sci.* 30, 447-51(1933).—Four pigs were fed rations for 4 weeks with a variable CaO:P<sub>2</sub>O<sub>5</sub> ratio to det., if possible, the results of such feeding. In the normal ration the ratio was about 1:2.2, which could be decreased by adding NaHPO<sub>4</sub> with no increase in lime. Records were kept as to the CaO and P<sub>2</sub>O<sub>5</sub> contents of the rations, feces and urine; also the weights of each were recorded to det. the total CaO and P<sub>2</sub>O<sub>5</sub> involved. A ration having a CaO:P<sub>2</sub>O<sub>5</sub> ratio between 1:2 and 1:3 has no harmful effect on the development of young pigs provided the amts. of both materials are sufficient to support normal growth. The retention of a normal amt. of Ca in the body seems to be dependent upon the presence of P. A very large amt. of Ca in proportion to the P has a harmful influence. The reverse does not hold true, in that the animal may retain large amts. of P without increasing the retention of Ca. The excretion of P above a certain level seems to take place through the kidneys, especially when the ration has a low Ca:P content.

H. E. Messmore

**Vitamin B and carbohydrate metabolism.** Marcel Labbé, Floride Nepveux and J. D. Gringoire. *Bull. acad. méd.* 109, 689-702(1933).—Vitamin B favors glycogen formation in the liver. It reduces glucemia and glucosuria, but the action is slow.

A. E. Meyer

**The influence of fats in protein utilization.** F. Maignon. *Presse méd.* 41, 625-7(1933).—See C. A. 27, 2166.

A. E. Meyer

**Diet and the pH of the urine.** P. L. Violle. *Presse méd.* 41, 772-4(1933).—The pH can be influenced by proper selection of the diet, but frequently the addn. of medicinal substances is necessary.

A. E. Meyer

**Lack of copper as cause of sickness among plants and animals.** B. Sjölema. *Biochem. Z.* 267, 151-6(1933).—The occurrence of the sickness "salt lick" among the cattle in the sandy regions of Holland is attributed to the poor Cu content of the hay, and this condition in the cattle is also reflected in the wide-spread disease of various grain crops (oats, rye, wheat) in the same localities which is checked by the addn. of CuSO<sub>4</sub> to the fertilizer. The blood of the affected animals shows a distinct lowering of its dry matter, 13-14% instead of the usual 18-20%; very low hemoglobin and Fe content. The low dry matter of the blood is entirely due to a lessening of the hemoglobin since the plasma protein content is not affected. The disease is thus an anemia. Actually the hay of those regions shows a Cu content of 2-3 mg. (even as low as 1 mg.) per kg. whereas from unaffected regions the Cu content is 7.5 mg. per kg. on the average. Addn. of CuSO<sub>4</sub> alone or in combination with Fe salts brought about remarkable changes in the affected animals, but the primary effect is not on the hemoglobin but on the appetite. The hypothesis that the Cu may produce a favorable alteration in the intestinal flora is discussed and rejected.

S. Morgulis

**Identification of vitamin C in biological fluids.** N. Bezsonov and A. Delire. *Compt. rend.* 197, 1774-5(1933); cf. C. A. 27, 4560. —Titration with 0.0001 N 2,6-chlorophenolindophenol showed that guinea pigs given

20 antiscorbutic doses eliminated 2% in the urine, a man given 0.4 scorbutic doses eliminated 42% and after 1.2 doses, 74%. No vitamin C was found in the urine of patients suffering from vitamin C deficiency. The titration curve of sauerkraut juice differed from that for citrus or tomato juice.

James C. Munch

**Clinical and biochemical observations on hunger osteopathy, juvenile and late rickets (osteomalacia).** A. Muir Crawford and David P. Cuthbertson. *Quart. J. Med.* [N. S.], 3, 87-104(1934).—The essential difference between osteopathy and the rachitic conditions is that the former rapidly stores Ca, P and Mg without the addn. of irradiated ergosterol, increased mineral intake leading to increased retention; while rachitic conditions recover only on the administration of irradiated ergosterol.

John T. Myers

**Dietary requirements for lactation. I. Failure of lactation on an apparently complete synthetic diet.** Waro Nakahara and Fumito Inukai. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 22, 301-7(1933).—Rats fed a diet consisting of 75% polished rice powder, 10% fish protein, 10% butter and 5% McCollum's salt mixt., supplemented with 5 g. brewers' yeast per 100 g. of the above diet, grew normally, but failed to suckle their young. The cause of this failure is not yet known.

W. Gordon Rose

**Growth of transplanted tumors in albino rats maintained on a diet with protein hydrolyzates as substitute for protein.** Umetaro Suzuki, Waro Nakahara, Nabetaro Hashimoto and Ryosuke Ikeda. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 1-8(1933).—No difference was noted in the growth of transplanted tumors in rats fed a diet contg. protein or rats fed a diet in which the protein was replaced by the products of hydrolysis of protein. This supports the conclusion that the protein hydrolyzates are nutritionally equiv. to the proteins.

W. G. R.

**The influence of alcohol on the growth of transplanted tumors in rats.** Umetaro Suzuki, Waro Nakahara, Nabetaro Hashimoto and Ryosuke Ikeda. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 9-15(1933). Growth of tumors in rats fed a carbohydrate-free diet was increased by replacing 10% of the lard in the diet with EtOH. Five % MeOH also caused a slight increase in the growth of the tumor. Replacement of starch by 10% EtOH in a diet contg. carbohydrate was without effect on the growth of transplanted tumors.

W. G. R.

**Effect of the calcium-phosphorus relationship of the ration on growth and bone formation in the pig.** R. M. Bethke, B. H. Edgington and C. H. Kick. *J. Agr. Research* 47, 331-8(1933).—The Ca-P ratio of the ration is a factor in growth and bone formation in the pig. In general, the best results are obtained with a Ca-P ratio between 1.0 and 2.0. When the proportion of Ca to P is greater than 3.0, pigs become more rachitic and the requirements for vitamin D are increased. The concn. of Ca and P in the ration also exerts an effect on growth and bone formation. The P content of the ration should not be less than approx. 0.6% for good growth and bone formation in the absence of added vitamin D. The requirement of the pig for vitamin D can be minimized by properly adjusting the Ca and P contents of the ration.

W. H. Ross

**Changes in quantity and composition of fat in hogs fed a peanut ration followed by a corn ration.** N. R. Ellis. *U. S. Dept. Agr., Tech. Bull.* 368, 1-13(1933).—Two groups of hogs were compared in a study of the quant. relationship of storage of fat to firmness as influenced by the use of peanuts and of corn in successive feeding periods. A higher rate of fat storage prevailed during the period the hogs were on the peanut ration than when they were on the corn ration. Hogs which continued on the hardening ration until the gains reached multiples ranging from 2 to 5 times the amt. stored on the softening ration generally showed increasing firmness. The gain in total fat was generally more closely related to firmness than the gain in live wt. Analyses of fat samples showed marked decreases in satn. as a result of peanut feeding and an increase in satn. or firmness after the feeding of the corn



ration. The addn. of hard fat, formed from the nonfatty constituents of the hardening ration, to the oily fat already formed during the peanut-feeding period produced a gradual hardening of the body fat as a whole. The group of satd. acids replaced linoleic as second to oleic acid when the corn ration was substituted for the peanut ration. W. H. Ross

**Comparative vitamin A content of nut margarines and butter.** Charles F. Poe and Hazel A. Fehlmann. *J. Dairy Sci.* 16, 559-64 (1933); cf. *C. A.* 27, 1955.—Rats depleted of their body store of vitamin A were given varying amts. of uncolored nut margarine of several brands, or pasteurized or unpasteurized butter, as supplements to a vitamin A-free diet in which the total fat was kept const. The highest daily level of margarine given (1 g.) was not sufficient to maintain growth for longer than 30 days and with some margarines wt. decrease began after 7-8 days. On the other hand the feeding of as little as 0.05 g. of butter maintained growth for at least 60 days. The samples of butter used showed 32-40 Sherman units of A and therefore were high in this vitamin. The margarines showed a variation in fat content from 78.12 to 92.54%. H. K. Salzberg

**Inhibition of stimulating effect of red light on testis activity in *Sturnus vulgaris* (starling) by a restricted diet.** Thomas H. Bissonnette. *Biol. Bull.* 65, 452-68 (1933).—Starlings exposed to 1.7 foot-candles of red light for 6 hrs. per night for 23 nights showed a large increase in testis size if on a complete diet. If fed meanwhile on a diet of "middlings mash" the increase was only slight. The effect is apparently related to more general effects of diet on the sexual cycle. K. V. Thimann

**Fat-soluble vitamins. XXXVIII. Microorganisms and the synthesis of carotene and vitamin A.** Carl A. Baumann, H. Steenbock, Mary A. Ingraham and E. B. Fred. *J. Biol. Chem.* 103, 339-51 (1933); cf. *C. A.* 27, 3975.—Synthesis of carotene, together with other pigments, was accomplished by 4 species of bacteria growing on a glucosyeast agar medium. The dried bacteria were active in promoting growth in rats, but only by virtue of their carotene content, vitamin A being absent by the spectrophotometric test in each case. Of a large no. of bacteria, yeasts and molds tried, none was able to convert carotene into vitamin A in culture. K. V. Thimann

**Sparing action of fats on the vitamin B content of animal tissues.** A. R. Kemmerer and H. Steenbock. *J. Biol. Chem.* 103, 353-62 (1933); cf. Evans and Lepkovsky, *C. A.* 26, 3548.—On diets low in vitamin B, rats lost less wt. when the fat content of the diet was high than when it was low. Muscle or liver from rats, chickens or pigs which had been fed diets low in vitamin B contained less of the vitamin than the same tissues from animals fed on diets adequate in the vitamin. However, when a diet low in vitamin B and high in fat was fed, the tissues did not contain any more vitamin than when a diet low in vitamin B and low in fat was fed. This shows that the sparing action of fat on vitamin B is not due to increased conservation by the tissues. K. V. Thimann

**The availability of mesocystine for promotion of growth in connection with cystine-deficient diets.** Hubert S. Loring, Ralph Dorfmann and Vincent du Vigneaud. *J. Biol. Chem.* 103, 399-403 (1933); cf. *C. A.* 27, 5721.—Mesocystine, the internally compensated inactive form of cystine, had the same power of promoting the growth of rats on a cystine-free diet as the externally compensated *d*-form. Under the same conditions *d*-cystine had no growth-promoting effect. It is suggested that the first step in utilization of mesocystine is reduction to *d*- and *l*-cysteine, the *l*-form being then metabolized. K. V. T.

**The influence of fasting on the concentration of blood lipids in the albino rat.** Barnett Sure, M. C. Kik and Anna E. Church. *J. Biol. Chem.* 103, 417-24 (1933).—In the albino rat during fasting the fatty acids of the blood decrease by about 50% and the lecithin by about 20% in 20 days; the blood cholesterol does not change. K. V. Thimann

**Synthesis and destruction of cholesterol in the organism.** Rudolf Schoenheimer and Fritz Breusch. *J. Biol. Chem.*

103, 439-48 (1933).—Mice were grown on a weighed amt. of wool in a wide-necked flask, and after a period on the exptl. diet were killed with ether, and mice, wool, feces and uneaten food dissolved in alc. NaOH. Soln. was almost complete except for the bones. Correction for the amt. of cholesterol, I, contained in the wool thus enabled complete balances of I to be carried out over long periods. In trials, results agreed with those calcd. from the previously detd. av. cholesterol content of mice to within 4%. On a diet of bread alone the synthesis of I averaged 1.8 mg. per mouse per day. The synthesis was less when I was included in the diet in small amts.; when given in large amts. there was considerable destruction. Fat or carotene had no effect on the balance of I, but bile acids increased the destruction. In the tissues I is therefore being continually formed and destroyed. K. V. T.

**The stability of carotene in ethyl esters of fatty acids, and in liver and vegetable oils.** Francis G. McDonald. *J. Biol. Chem.* 103, 455-60 (1933).—Solns. of carotene in various oils decompd. very rapidly both in the dark and in light, but at 5° the decompn. was markedly retarded. Et butyrate and laurate led to the most rapid decompn., maize oil and Wesson oil to the least. K. V. Thimann

**Newly formed hemoglobin and protein catabolism. Conservation of intermediates in the anemic dog on a protein-free diet.** Floyd Shelton Daft, Frieda S. Rohscheit-Robbins and G. H. Whipple. *J. Biol. Chem.* 103, 495-510 (1933).—On a diet free from protein, anemic dogs continued to synthesize hemoglobin, the synthesis being increased by the addn. of Fe to the diet. About 150 g. hemoglobin was synthesized in a 7-week period. The excretion of urea and  $\text{NH}_3$  decreased greatly at the same time, N being presumably retained for hemoglobin synthesis. The total N metabolism appeared to be somewhat higher in anemic than in control dogs. K. V. T.

**Studies on vitamin G ( $\text{B}_2$ ). I. Yeast and liver preparations as a source of vitamin G ( $\text{B}_2$ ).** Richard J. Block and Lucille R. Farquhar. *J. Biol. Chem.* 103, 643-9 (1933).—Rats were fed on a purified diet lacking in vitamin  $\text{B}_2$ , and various com. prepn. were added as source of this vitamin. Gains in wt. of 4.5-6 g. per day were obtained with various yeast and liver prepn. The vitamin is not destroyed by heating dry yeast at 95-100° for 4 weeks or by treatment with alkali in the cold. Unlike the antianemic factor it is not increased in activity by enzymic digestion or autolysis of liver. K. V. T.

**New nutritional factors required by the chick.** J. A. Keenan, O. L. Kline, C. A. Elvehjem, E. B. Hart and J. G. Halpin. *J. Biol. Chem.* 103, 671-85 (1933).—Day-old chicks on a diet of casein, dextrin, salts, yeast and cod-liver oil fail to grow normally and at 3 weeks develop paralysis with degeneration of the brain. The condition was cured by the addn. to the diet of 18% of ether-extd. vacuum-dried hog liver. The action of the liver involves 2 factors: one, a water-sol. substance, preventing paralysis, destroyed on autoclaving, the other, water-insol., heat-stable and necessary for normal growth. The former is probably identical with vitamin  $\text{B}_4$  (cf. Reader, *C. A.* 24, 402, 5801). Both factors are present in the aq. ext. of fat-free blue grass, and to a smaller extent also in the similar ext. of alfalfa. K. V. Thimann

**The distribution of vitamin C in plant and animal tissues, and its determination.** Otto A. Bessey and C. G. King. *J. Biol. Chem.* 103, 687-98 (1933).—Comparison of the 2,6-dichlorophenolindophenol titration (*C. A.* 26, 5324) with the I titration and the animal assay for vitamin C shows excellent agreement. Cysteine, glucic acid and heated sugar solns. interfere with the titration, but interference is minimized if a distinction is made between the rapid reduction of the dye by vitamin C and the slow reduction by sulfhydryl compds., etc. The distribution of the vitamin in various tissues is tabulated, the lowest amts. being in muscle (0.04 mg. per g.), the highest in the adrenals and corpus luteum (1.4-2.3 mg. per g.). A study of the distribution in plant tissues shows peppers and parsley to be the richest sources (1.8-2.3 mg. per g.), lettuce the poorest (0.07 mg. per g.). The distribution in

exptl. animals corresponds with that in human tissue.

K. V. Thimann

**Diet and the blood lipides. II. The effect of occasional overfeeding on the postabsorptive level.** W. R. Bloor. *J. Biol. Chem.* 103, 699-705(1933); cf. *C. A.* 26, 4363.—The plasma lipides of dogs, detd. in the postabsorptive state, were approx. const. over periods of 2 years when the diet was fairly const. A single overfeeding with fat or carbohydrate to the extent of 50% of the normal caloric intake increased the phospholipides by 20-40% and the fat by 20-100% for about 2 days. The cholesterol was not changed. Overfeeding with protein had no such effect.

K. V. Thimann

**Calcium and phosphorus studies in the chick.** C. A. Elvehjem and B. E. Kline. *J. Biol. Chem.* 103, 733-44 (1933).—Day-old chicks have 12 mg. Ca per 100 g. whole blood. If ample vitamin D is given in the diet this increases to 13-14 mg. per 100 g. during the 1st week of life; if vitamin D is not given the Ca falls to 9-10 mg. per 100 g. during the same period. At 4 weeks with vitamin D the value is 10-11 mg.; without vitamin D, 7-8 mg. In chicks on a rachitogenic diet similar relationships hold for P and for the total ash of the bones.

K. V. T.

**The nutritive value of pure fatty acid esters.** Warren M. Cox, Jr., with the technical assistance of Sarah Neale. *J. Biol. Chem.* 103, 777-90(1933).—Mixed Rt esters of fatty acids, incorporated in the diet of rats, gave as good growth as the mixed triglycerides, but individual satd. fatty acid esters were not as effective as mixts. Rt caprate and Et laurate led to sudden death within 2 weeks, without any special pathol. changes being noted. The toxicity varied with the amt. fed. For a different reason Et palmitate and Et stearate also led to death, for the free acids, being solid at body temp., were excreted unchanged. Satd. fatty acids of mol. wt. less than  $C_{10}$  do not appear in the depot fat but give rise to fats of higher mol. wt. When the mol. wt. is greater than  $C_{10}$  then the unchanged acids appear in the depot fat (cf. Powell, *C. A.* 26, 2771, Reckstein, *C. A.* 24, 401).

K. V. Thimann

**Extractability of vitamin G ( $B_2$ ) from yeast by various acetone-water and methanol-water mixtures.** Paul I. Day. *J. Am. Chem. Soc.* 56, 452-4(1934).—Dried bakers' yeast was subjected to extn. with various  $Me_2CO-H_2O$  and  $MeOH-H_2O$  mixts. The vitamin G contents of the untreated yeast, the yeast residues and the yeast exts. were detd. by feeding expts.  $Me_2CO$ , 99.5 and 80% by wt., did not ext. appreciable amts. of vitamin G; 80%  $Me_2CO$  by wt. extd. about 50% of the vitamin G contained in the yeast. Abs.  $MeOH$  did not ext. an appreciable amt. of vitamin G; treatment with 80% (by wt.)  $MeOH$  extd. about 20% of the vitamin, while 60%  $MeOH$  extd. approx. 50% of the vitamin G contained in the yeast. The growth-promoting properties of the various yeast residues and exts. were similar to their cataract-preventive properties. Those yeast preps. that promoted growth in exptl. animals prevented the development of cataract, while cataract appeared in animals receiving preps. that did not promote growth.

C. J. W.

**Ascorbic acid and synthetic analogs (Baird, et al.) 10.** Catalytic oxidations. V. Oxidation of ergosterol (Meyer) 10. Address of the president [ascorbic acid] (Hopkins) 3. Optical rotatory dispersion in the carbohydrate group. II. Ascorbic acid (Herbert, et al.) 10. Fish-liver oils (Brit. pat. 401,095) 27.

**Fernholz, E.:** Vitamin  $B_1$ ,  $B_2$ , C und D. Berlin: Junk. 9 pp. M. 1.

**Friedrichsen, Friedrich:** Die Rolle des Eiweisses im Stoffwechsel und seine Bedeutung für die Behandlung des Diabetikers. Cologne: M. Du Mont Schauberg. 35 pp. M. 2.

**Gringoire, Jean D.:** Les vitamines B. Leur rôle dans le métabolisme hydrocarboné, leur emploi dans le traitement du diabète. Paris: Le François. 97 pp. F. 15.

**Grünigen, F. v.:** Die energetische Beurteilung der Futtermittel auf Grund von Fett- und Fleischumsatz am Tier bei wechselnden Futtermengen. Zurich: Leemann & Co. 174 pp.

**1 Vitamine A de l'huile de foie de morue.** Aubenas (Ardèche): A. Chauvin. 24 pp.

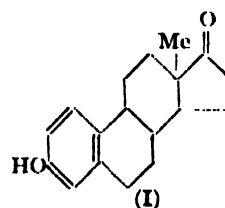
## F—PHYSIOLOGY

HOMER W. SMITH

**Absence of compensatory hypertrophy of Cowper's glands in the albino rat.** H. E. Shih. *Proc. Soc. Exptl. Biol. Med.* 31, 423-4(1934).—Rats aged 250 days were used; 20 days after the removal of 1 gland the remaining Cowper's gland had undergone no compensatory hypertrophy.

C. V. Bailey

**The dehydration of the follicular hormone.** A. Butenandt and W. Thompson. *Ber.* 67B, 140 4(1934).—The formula I was suggested for the follicular hormone; this is analogous to the skeleton of sterols and bile acids. This assumption was supported by the production of a hydrocarbon,  $C_{27}H_{48}$ , by distn. of the hormone over electrolytic Zn dust and successive fractional crystn. This hydrocarbon had the same m. p. and the same spectrum as the hydrocarbon chrysene. The yield was very small: 5 mg. from 5.4 g. of cryst. hormone.



R. S. G. Barron

**Researches on the secretion of Harder's gland.** Aldo Costantini. *Pathologica* 25, 836-40(1933); cf. Belfanti (*C. A.* 20, 447), Derrien and Turchini (*C. A.* 19, 322) and Taddei (*Arch. sci. med.* 29, 319(1900)).—Glands extd. from rabbits are only partially stainable by Sudan III and Nile blue, and are composed of (I) a pink, birefringent part and (II) a white part, which contains only traces of birefringent substances. The av. analyses of I and II, resp., are unsaponifiable matter (cholesterol) 5.35, 3.79; neutral fats 6.28, 1.13; esters of cholesterol 0.52, 2.80; soaps 0.56, 0.60; phosphatides (calcd. as distearolecithin) 0.68, 1.17; loss by drying 64, 76%.

G. A. Bravo

**Experimental investigations on the calcium content of exudates and transudates.** Franz Pagliani and Giorgio Perazzo. *Pathologica* 25, 868-77(1933).—The Ca content in the purulent exudates is greater than the normal blood Ca content, and is less in transudates. Generally there is no relation between Ca content and reaction of the fluids.

G. A. Bravo

**Influence of the (substances of the) endocrine glands on the cholesterol and lecithin contents of the blood.** Experimental investigations. Egle Inglese. *Pathologica* 25, 877-85(1933).—By injection of thyroxine in dogs, the cholesterol (I) and lecithin (II) contents of the blood decrease; by injection of adrenaline, I increases and II decreases; by injection of hypophysis, there is a contrary effect; and insulin injections do not act uniformly.

G. A. Bravo

**Visual purple.** Hans v. Euler and Erich Adler. *Arkiv Kemi, Mineral. Geol.* 11B, No. 20, 6 pp.(1933).—The visual purple from the retina of a pike differs considerably from that of cattle. The former is more stable to glacial acetic acid and less sensitive to light. Colorimetric measurements showed 95  $\gamma$  and 240  $\gamma$  carotene, resp., in 20 beef retinas and 20 pigmented epithelium layers.

A. W. Dexter

**The detection of lyochrome in the pigmented epithelium of the eye.** Hans v. Euler and Erich Adler. *Arkiv Kemi, Mineral. Geol.* 11B, No. 21, 4 pp.(1933).—On extg. the retina of cattle eyes not hardened with alum, the acetone soln. is a greenish yellow. On standing 2 days, it fluoresces a brilliant blue. Lyochrome and carotene are both present in the pigmented epithelium of cattle eyes. Only lyochrome is found in the epithelium

of fish eyes. Large amts. of lyochrome are found in fish eyes but only a little in cattle eyes. The opposite is true for carotene. The lyochrome soln. obtained from shellfish eyes shows an absorption max. at 447 mμ, suggesting lactoflavine. An unstable yellow pigment was found in the iris of pike eyes.

A. W. Dexter

**Cystine requirements of fleece growth.** A. T. King and J. E. Nichols. *Nature* 132, 906(1933).—The inner root sheath material, which is ordinarily lost, gave strongly pos. tests for cystine. This cystine does not appear in the food cystine-wool cystine balance sheet.

A. W. D.

**The glutathione content of normal human blood.** Gilberto G. Villela and J. Gomez Campos. *Compt. rend. soc. biol.* 115, 83-4(1934).—Samples from normal persons 18-50 years old were tested by the method of Woodward and Fry (*C. A.* 27, 5509). In mg. per 100 cc. oxalated blood the values were, for men, reduced glutathione 17-37, av. 27; oxidized, 2-12, av. 6.6; total, 19-41, av. 33.6; and for women, 16-36, av. 28.4; 3-13, av. 7.8; 27-50, av. 36.2.

L. E. Gilson

**Action of corpus luteum hormone on the duration of gestation in rabbits.** Kai Portman. *Compt. rend. soc. biol.* 115, 89-90(1934).—The corpus luteum hormone keeps the uterine muscles in a state of repose. The daily injection of 3 rabbit units (from sow ovaries) into rabbits beginning 2-6 days before the calcd. date of parturition extended the period 3 days (living young produced). By giving 4-6 units daily the period was extended as long as 30 days in some cases (mummified young).

L. E. Gilson

**Action of injections of urine of pregnant women on the blood cholesterol of guinea pigs.** P. Lépine and Mme. Z. Mélas-Joannides. *Compt. rend. soc. biol.* 115, 129-31(1934).—The conclusion of de Potter (*C. A.* 27, 5390) is confirmed.

L. E. Gilson

**Biochemical investigation of the role of the placenta.** E. Lévy-Solal, Jean Dalsace, and C. Gutman. *Compt. rend. soc. biol.* 115, 269-72(1934).—At the time of childbirth the blood plasma of women averages, in g. per l., total solids 85.3, ash 7.97, total lipides 7.9, proteins 62.8. The corresponding values for the plasma of the infants are 64.7, 9.25, 2.6, 49.1. Other analytical data are given. It is evident that the placenta is an impassable barrier for all except very diffusible substances.

L. E. Gilson

**Do the hormones of pregnancy penetrate the placenta?** E. Lévy-Solal, Paul Walther and Jean Dalsace. *Compt. rend. soc. biol.* 115, 272-3(1934).—In 30 of 32 cases the hormone of the anterior hypophysis, so abundant in the blood of the mother, was absent in the blood of the umbilical cord of the infant. In the other 2 cases it was present; these cases differed in that the mother exhibited a marked albuminuria during pregnancy.

L. E. Gilson

**Post-partum azotemia.** B. Estienny and J. Lasserre. *Compt. rend. soc. biol.* 115, 280-3(1934).—During the last 15 days of pregnancy the blood urea of 22 women averaged 0.028%. For the first 15 days post partum the av. was 0.043%. The relation of the increase to resorption of uterine tissue is discussed.

L. E. Gilson

**Experiments on the humoral antagonism of the ovaries using international standard crystallized folliculin.** R. Courrier and R. Raynaud. *Compt. rend. soc. biol.* 115, 299-302(1934).—Many folliculin preps. are impure and produce irregular effects. The effects of graduated doses of very pure crystd. folliculin on female rabbits are described.

L. E. Gilson

**Additional data and discussion on the chalone of the sex glands [of birds].** C. Champy. *Compt. rend. soc. biol.* 115, 358-61(1934); cf. *C. A.* 27, 4572.

L. E. G.

**The antitrypsin of the blood serum after transplantation of endocrine glands.** V. Passek and M. Rubinstein. *Compt. rend. soc. biol.* 115, 361-3(1934).—The resorption of endocrine glands grafted into animals is accompanied by an increase in the antitryptic power of the serum. The increase is proportional to the resorption of the tissue and is due to the introduction into the blood of proteolytic and autolytic enzymes from the tissue.

L. E. Gilson

**Conditions for the determination of the basal metabo-**

**lism of adult rabbits.** Temperature of thermal neutrality. Elimination of movements. Eliane Le Breton. *Compt. rend. soc. biol.* 115, 397-8(1934).—Basal metabolism of adult rabbits. [Absence of] nycthemeral rhythm. Specific dynamic action. *Ibid.* 399-400.

L. E. Gilson

**Spectroscopic determination of fluorine in bones, teeth and other organs in relation to fluorine in drinking water.** C. H. Boissevain and W. F. Drea. *J. Dental Research* 13, 495-500(1933).—The av. F content of the enamel and dentine of persons living in Colorado Springs (F content of drinking water 2 parts per million) was 0.065 and 0.112%, resp., of persons resident in New York City 0.00 and 0.008%, resp. The av. F content of human bones from Colorado Springs was 0.7% by spectroscopy and 0.27% by chem. analysis, of human bones from the region east of the Appalachian Mountains 0.13% by spectroscopy and 0.07% by chem. analysis. The F content of animal bones corresponded with that of the water used. Fossil bones contained as much as 3.5% F. No organ other than bones and teeth was found to contain F. Ingested F was excreted in the urine and feces; F was not found in the milk or saliva.

J. S. H.

**The resorption of calcium sulfate in the digestive tract.** Artturi I. Virtanen and J. Tikka. *Acta Chem. Fennica* 7B, 75(1934)(in English).—CaSO<sub>4</sub> is assumed to pass through the intestinal tract practically unresorbed. However, feeding trials showed that 100-250 g. per day to cows was resorbed for the most part by the intestines. The sulfate was removed mainly in the urine, and the Ca<sup>++</sup> almost quantitatively in the feces, which is attributable to the diffusion of CaSO<sub>4</sub> through the walls of the colon. The above amts. of CaSO<sub>4</sub> had no harmful effects on the health or production of the cows. These data are of importance in the development of the A. I. V. process for fodder preservation.

S. A. Karjala

**Action of thyroxine on the coagulation of blood.** E. Zunz and Gabriel Sanchez de la Cuesta. *Arch. intern. physiol.* 37, 241-73(1933).—See *C. A.* 27, 3525.

C. M. McCay

**Difference between the blood chlorides of the afferent and efferent vessels at the level of the gastric, superior mesentery and renal vessels.** J. Bottin. *Arch. intern. physiol.* 37, 304-9(1933).—At the level of the stomach the difference in chlorides is 5 7% and most marked during gastric secretion. At times it disappears. In the superior mesenterics the difference is the same but here the efferent vessels have higher chlorides showing absorption. In the renal vessels no differences occur.

C. M. McCay

**The mode of formation of cerebrospinal fluid.** Action of methyl violet, uranium nitrate and sodium citrate. Ch. Massaut. *Arch. intern. physiol.* 37, 310-16(1933).—See *C. A.* 28, 528.

C. M. McCay

**Absence of specificity of the secretion of the ray and of swine.** J. Ledrut and G. Alechinsky. *Arch. intern. physiol.* 37, 329-36; *Bull. sci. acad. roy. Belg.* 19, 1188-97(1933).—Secretion from *Raia clavata* stimulates the dog pancreas and produces hypoglycemia in the same degree as that from swine.

C. M. McCay

**The electrical properties of isolated frog skin. II. The relation of the skin potential to oxygen consumption and to the oxygen concentration of the medium.** W. L. Francis. *J. Exptl. Biol.* 11, 35-47(1934).—The O<sub>2</sub> concn. is directly related to the elec. potential across isolated frog skin in Ringer soln.

C. M. McCay

**Changes in the composition of fluids injected into the peritoneal cavity.** Abraham J. Schechter, M. Katherine Cary, Anthony L. Carpentieri and Daniel C. Darrow. *Am. J. Diseases Children* 46, 1015-26(1933).—Solns. contg. various concns. of NaCl, NaHCO<sub>3</sub>, CaCl<sub>2</sub> and Na lactate injected into the peritoneal cavities of dogs and guinea pigs undergo changes in electrolyte concn. which indicate that their compn. tends to approach that of interstitial fluid. Solns. of electrolytes are absorbed at an approx. equal rate. A 5% soln. of dextrose increases in vol. before absorption.

E. R. Main

**Concentration of calcium and phosphorus in the serum**

of children. Ludwig Schoenthal and Dorothy K. Lurie. *Am. J. Diseases Children* 46, 1038-44(1933).—The Ca content of the blood serum of normal children does not vary with age. The P content decreases after the 15th yr., the decrease being more marked in the serum of girls than in that of boys. The Ca and P levels do not appear to be related to growth and are not consistently increased by administration of 1 qt. of milk per day or viosterol in doses of 10-40 drops per day. E. R. Main

Action of folliculin and prolactin on the reproductive organs of the bat during hibernation. Bernhard Zondek. *Lancet* 1933, II, 1256-7.—The administration of folliculin and prolactin to bats during the winter causes the appearance of all of the phases of the generative process. E. R. M.

Studies of reproduction in the rat. I. The effect of changes in the protein upon fertility, pregnancy and lactation. Donald Macomber. *New Engl. J. Med.* 209, 1105-9(1933).—A reduction in the protein intake from 2.9 to 0.83 g. per day had no appreciable effect on pregnancy in rats, but somewhat lowered the fertility. Rats maintained on the low-protein diet during the period of lactation raised a smaller no. of young, the av. wt. at weaning being lower than normal. The percentage of food utilized by growth, which is normally increased during lactation, was markedly decreased by the low-protein intake. II. The effect of changes in energy production upon fertility, pregnancy and lactation. *Ibid.* 1160-2.—A 30% reduction in the total amt. of food consumed induced temporary sterility, the rats appearing to be normal in other respects. Reproduction became normal when a normal food intake was resumed. III. Vitamin E—neutralized when mixed with lard. *Ibid.* 1235-6.—Wheat germ, in quantities of 0.5 g. or more, mixed with diets contg. 20% lard failed to protect against sterility. Lettuce fed separately afforded protection although the diets still contained 20% lard. IV. The occurrence of spontaneous amputation in young growing rats whose mothers were on certain diets. *Ibid.* 1277-9.—The young of approx. 40% of the rats maintained on diets contg. adequate amts. of protein and vitamins with wheat germ as a source of vitamin E developed severe lesions of the tails or toes, frequently leading to spontaneous amputation. Upon substitution of lettuce for the wheat germ, the same mothers reared normal litters. The effect appeared to be due either to a toxic constituent of the wheat germ or to the failure of wheat germ to supply some nutritional substance which is present in lettuce and is essential for normal growth. E. R. M.

The functions of Brunner's glands and the pyloric end of the stomach. H. W. Flörrey and H. E. Harding. *J. Path. Bact.* 37, 431-53(1933).—The secretion of Brunner's glands is alk., about  $pH$  8, rising rapidly to 9 on exposure to the air. It is at least equiv. to 0.1 N NaOH, because of its bicarbonate content. It has the consistency of egg white and is clear or slightly opalescent. Brunner's glands of the cat, rabbit, guinea pig and rat are activated by passing HCl over them. Those of the rabbit respond to mustard oil stimulation. Its function may be to protect the gastric mucosa and its absence may be a factor in the production of peptic ulcer. J. T. M.

Osmotic properties of the erythrocyte. VI. Influence of the escape of salts on hemolysis by hypotonic solutions. M. H. Jacobs and Arthur K. Parpart. *Biol. Bull.* 65, 512-28(1933); cf. *C. A.* 27, 3979.—The degree of hemolysis of ox erythrocytes is not appreciably influenced by short previous exposure to hypotonic solns. Leaking out of electrolytes therefore occurs far too slowly to account for the resistance to hemolysis observed (*C. A.* 24, 5355; 25, 2750). Exposure to sucrose solns., however, increases the resistance to hemolysis, which is in general ascribed to an exchange of anions from the cell for OH ions from the soln., this leading to an increase in the base bound by the hemoglobin and hence a decrease in the total osmotic pressure in the cell. Such an effect would be numerically large enough to explain most of the apparent resistance to hemolysis. K. V. Thimann

The forms of magnesium in serum and milk. Helen Rivkin Benjamin, Alfred F. Hess and Joseph Gross.

*J. Biol. Chem.* 103, 383-90(1933).—The total Mg in the sera of various animals varied from 2.2 to 4.9 mg. per 100 cc. From 50% to all of this was ultrafilterable. The non-filterable form, probably representing Mg combined with protein, was not adsorbed by  $BaSO_4$ , but a part of the filterable form was adsorbed in most cases. The Mg can thus be divided into 3 fractions; filterable, not adsorbed (Mg ions); filterable, adsorbed (Mg combined with weak acids); and non-filterable (Mg-protein compds.). In hypercalcemia the adsorbable fraction was greatly reduced, often to zero. Artificial ultrafiltrates consisting of  $NaHCO_3$ , KCl, NaCl,  $KH_2PO_4$ ,  $MgSO_4$ , and  $CaCl_2$ , brought to  $pH$  7.4 with  $CO_2$ , also contained adsorbable Mg, the amt. of which varied directly with the P:Ca ratio. In the absence of Ca the adsorbed fraction was 53% of the Mg; with a Ca:P ratio of 3 it was 29% and with a Ca:P ratio of 1 it was from 10 to 25%. In milk only minute amts. of Mg are so adsorbable.

K. V. Thimann

The relation of filterable to non-filterable calcium in chicken blood. John T. Correll and J. S. Hughes. *J. Biol. Chem.* 103, 511-14(1933).—Independent of sex and egg-laying activity the filtrate fraction of the serum Ca of the chicken was 6.4 mg. per 100 cc. However, the total serum Ca increases 2-3 times during laying.

K. V. Thimann

The metabolism of azelaic acid. H. Gregg Smith. *J. Biol. Chem.* 103, 531-15(1933); cf. Baer and Blum. *Arch. expl. Path. Pharmacol.* 60, 80(1907).—About 60% of ingested azelaic acid was recovered from the urine of dogs. In a few cases recovery was 90% of the amt. fed. Since most natural fatty acids, if broken at the double bond, would give rise to azelaic acid, it follows that this cannot be the path of breakdown in the animal body.

K. V. Thimann

The hemoglobin content of chicken blood. Arthur D. Holmes, Madeleine G. Pigott and Percy A. Campbell. *J. Biol. Chem.* 103, 657-64(1933).—The hemoglobin content of the blood of well-fed chicks is 9.5-10.5 g. per 100 cc. of blood. It is about 5% lower in pullets than in cockerels, and is unaffected by crate fattening.

K. V. Thimann

The distribution of sugar and rate of glucolysis in the blood of some mammals. Michael Somogyi. *J. Biol. Chem.* 103, 605-70(1933).—The partition of sugar between corpuscles and serum of various animals was redetd. in view of confusion in the past between true or fermentable sugar and merc reducing substances. The methods of *C. A.* 25, 2165, 2180 were used for fermentable sugar. Sugar is absent from the corpuscles of the pig. The ratio of sugar distribution showed no parallelism with the rates of glucolysis in the various species. Discrepancies in the literature are ascribed either to the use of total reducing values or to washing of the corpuscles, which rapidly removes the sugar contained in them. K. V. Thimann

The diffusibility of plasma calcium after parathormone administration. Comparison of the calcium, phosphate and protein concentrations of serum and edema fluids. D. Rourke Gilligan, Marie C. Volk and Mark D. Alt-schule. *J. Biol. Chem.* 103, 745-56(1933).—On administration of parathyroid hormone to human beings the phosphate of the serum and edema fluid decreased 24-48 hrs. before the max. increase in serum Ca. The increase in serum Ca is paralleled by an increase in the Ca of edema fluid, indicating that the increased Ca is principally of the diffusible type. The absence of such parallelism between serum and cerebrospinal fluid indicates that the latter is not a simple dialyzate of blood, confirming the results of Merritt and Bauer (*C. A.* 25, 1568); cf. also Cameron and Moorhouse, *C. A.* 19, 2078. K. V. Thimann

Studies on urinary acidity. II. Sergius Morgulis. With the technical assistance of I. Bercovici. *J. Biol. Chem.* 103, 757-61(1933).—The views of Berg in *Kontrolle des Mineralstoffwechsels* (*C. A.* 25, 990) are shown to be untenable. The primary and secondary phosphates of urine, as detd. by the method of Kugelmass and Rothwell, agree with the values calcd. from the total P and the urinary  $pH$ . Primary and secondary phosphates

added to urine were satisfactorily recovered by the same method. At  $p_H$  less than 6.0, however, the method is unreliable. There is thus no question but that primary phosphates do exist in biol. fluids. K. V. Thimann

**The calcium content of ultrafiltrates of plasma and the influences of changes in hydrogen and bicarbonate ion concentrations upon it.** Lucius M. Dillman and Maurice B. Visscher. *J. Biol. Chem.* 103, 791-9(1933).—The fraction of plasma Ca which passes into the ultrafiltrate varies with  $p_H$ , being 59% at  $p_H$  7.0 and 45% at  $p_H$  7.6 for dog plasma. This result agrees with various earlier observations that bubbling  $CO_2$  through plasma increases the diffusibility and ion activity of Ca. K. V. T.

**Action of bile acids on the metabolism of carbohydrates and fats.** J. V. Supniewski and J. Hano. *Med. Doświadczenia i Społeczna* 16, 310-37(1933).—Na cholate in subcutaneous doses of 0.04-0.06 g. per kg. of rabbit causes hypoglycemia. The max. effect is noticed 2 hrs. after injection. Given intravenously the same dose causes hyperglycemia; 0.1 of the dose produces hypoglycemia. Na desoxycholate and dehydrocholate act similarly. The same effects are observed in pigeons and depancreatized dogs. The blood-sugar level and urinary sugar output were lowered in the dog. The mechanism of hypoglycemia is not concerned with liver cell function. Cholic acid unites with glucose, inactivating the aldehyde group. Parenteral administration of bile acid to pigeons and rabbits caused a decrease in blood fatty acids (kept low for several days by a dose of 0.04-0.06 g. per kg.) accompanied by a fall in ionized P and ester P with an increase in blood phosphatides (the same effects are observed in hyperglycemic and lipemic dogs) and a fall in blood cholesterol, then a rise (when the fatty acid level is low) followed by a return to normal. Perfusion expts. on isolated frog and rabbit livers show cholic acid to be weakly glycogenolytic. Na cholate 1:10,000 does not augment the permeability of rabbit erythrocytes toward glucose. No apparent effects on metabolic rate of the rat could be observed. Normal and curarized frogs could not be used in metabolic studies. C. T. Ichniowski

**Chloropenia and osmotic regulation.** Edmund Kerpel-Fronius. *Z. ges. expil. Med.* 90, 676-83(1933).—Pups fed for 8-10 days on carbohydrate-rich, salt-free diets develop a marked blood and tissue chloropenia. No change of blood N or alkali reserve occurred. The brain was affected as in hydermia. Milton Levy

**Brocq-Rousseu and Roussel, G.: Le sérum normal.** Paris: Masson & Cie. 364 pp. F. 75.

**Palies, A. L. C.: Emotie, Bloedsuiker en Hersenstam.** Een experimenteel Onderzoek naar den Involod van de Emotie op het Bloed suikergehalte. Assen: Van Gorcum & Co. 82 pp. Fl. 2.90.

## G—PATHOLOGY

### II. CIDRON WELLS

**Effect of sodium cyanide on complement hemolysis.** W. H. Randall. *Proc. Soc. Exptl. Biol. Med.* 30, 1412-13(1933).—The addn. of neutralized NaCN soln. to red cells, sp. hemolysin and complement inhibits hemolysis. When red cells were washed after contact with hemolysin and NaCN, the addn. of complement caused hemolysis. The effect of NaCN in inhibiting hemolysis is upon the complement and is independent of the  $p_H$  of the cyanide. The results are contrary to those of Jarno and Suranyi (*et C. A.* 24, 420; 25, 3080). C. V. Bailey

**Creatine content of the heart in experimental cardiac hypertrophy.** D. W. Cowan. *Proc. Soc. Exptl. Biol. Med.* 31, 417-18(1934).—Growing rats were maintained in a state of nutritional anemia for 68-75 days; the av. wt. of the ventricles was 36% higher than in the litter mate controls; the av. body wt. was 47% below normal. The total amt. of creatine in the ventricles was the same for the 2 series; the concn. in the hypertrophied ventricles was 26.6% lower than in the controls. In normal growth hypertrophy, the concn. of creatine in the ventricles was approx. const. C. V. Bailey

An attempt to reactivate mercuric chloride-inactivated

**vaccinia virus.** M. I. Beattie and D. M. Baldwin. *Proc. Soc. Exptl. Biol. Med.* 31, 421-2(1934).—The least amt. of  $HgCl_2$  which would inactivate dermovaccine and neurolapine was detd.; these amts. were added to the suspensions of the viruses and kept at room temp. for 24 hrs. In each instance the addn. of  $H_2S$  to the virus- $HgCl_2$  mixt. did not render the mixt. active when inoculated intradermally in the rabbit. The addn. of  $H_2S$  to virus saline mixts. did not destroy the virus. C. V. Bailey

**A method of obtaining undiluted tissue juice for the study of tissue antibody titer.** Beatrice Carrier Seegal and Devorah Khorazo. *Proc. Soc. Exptl. Biol. Med.* 31, 435-7(1934).—Pieces of tissue are mixed with a large vol. of filter paper and the mass is subjected to a pressure of 10,000 lb. per sq. in. in an hydraulic press. Approx. 15-20% of the tissue wt. is recovered as fluid; this is kept in the ice-box overnight and centrifuged while cold to remove fats. A special compression chamber is used in the press. C. V. Bailey

**Phosphatase activity of the bones and kidneys in thyrotoxicosis.** Merritt B. Low, Robert O. Wilson and Joseph C. Aub. *Proc. Soc. Exptl. Biol. Med.* 31, 447-50(1934).—In the white rat, 0.2-0.4 mg. of cryst. thyroxine was injected intramuscularly daily for 10-18 days; the kidneys were increased in size and the av. phosphatase activity per g. of tissue was slightly diminished; the phosphatase activity of the bones was similar to that of controls. C. V. Bailey

**Antibody to ovalbumin in the blood of allergic subjects.** P. Woring. *Ann. inst. Pasteur* 1933, 270-81.—Two antibodies (A and B) to ovalbumin have been characterized, only one of which (A) is characteristic of congenital allergy. The optimal zones for the fixation of complement by A and B differ widely. An approx. idea of the content of A of a serum is obtained as follows: Egg white is added in proportions varying from 1:500 to 1:5 × 10<sup>6</sup> and the mixts. are injected in a normal subject. The following day an injection of egg white is given and the limits are noted within which an urticarial reaction is produced. There is no fundamental difference between allergy and immunity. B. C. A.

**Some blood chemical findings and their interpretations in diseases of animals.** Jesse L. Bollman and Carl F. Schlotthauer. *J. Am. Vet. Med. Assoc.* 37, 151-60(1934).—Review. Rachel Brown

**The lipolytic activity of normal and tuberculous hog liver.** M. Ghiron. *Ann. chim. applicata* 23, 495-501(1933).—The lipolytic activity of liver from normal and tuberculous hogs was detd. by hydrolysis of tributyrin, Me butyrate, neutral olive oil and fat extd. by acetone from Koch's bacillus. Liver ext. from young hogs has a low activity, hydrolyzing only 1.3%  $PrCO_2Me$ , while from a tuberculous hog of the same age, a much more active lipase is obtained, which splits up to 48% of this ester. Liver exts. from tuberculous hogs also hydrolyze 50-100% tributyrin, attack olive oil, not affected by ext. from normal subjects, and show a particular activity toward fat from Koch's bacillus. Fully grown hogs show marked lipid activity and high resistance to tuberculous infection. There is apparently a direct relation between lipid activity and resistance to tuberculous infection. A. W. Contieri

**Isoelectric points of the blood serum in pulmonary tuberculosis.** Lopo de Carvalho and Herculano de Carvalho. *Compt. rend. soc. biol.* 114, 843-5(1933).

**Acidosis of experimental nephritis and renal excretion of bases and acids.** L. Brull, J. Lambert and C. Roersch. *Compt. rend. soc. biol.* 115, 182-4(1934).—U nephritis is accompanied by a severe acidosis although the ratio of acids to bases excreted in the urine is greatly increased. Complete analyses made daily on the urine of an exptl. dog are given for a 10-day period. L. E. Gilson

**Action of diphtheria toxin on blood plasma. Anticoagulant power of the toxin.** H. Goldie. *Compt. rend. soc. biol.* 115, 287-90(1934). L. E. Gilson

Remarks on the technic of extracting the antigenic

polysaccharide complex from *Aertrycke's bacillus*. André Boivin and Lydia Mesrobianu. *Compt. rend. soc. biol.* 115, 304-6(1934); cf. *C. A.* 28, 1933, 5029.---Extraction of toxic and antigenic polysaccharide complexes from various bacteria other than *Aertrycke's bacillus*. André Boivin, Ion Mesrobianu, Lydia Mesrobianu and Barbu Nestorescu. *Ibid.* 306 8.---Stability of the toxic and antigenic polysaccharide complexes found in bacteria. André Boivin and Lydia Mesrobianu. *Ibid.* 309-10.

L. E. Gilson

Bromine of the cerebrospinal fluid and the blood serum, plasma and corpuscles. C. I. Urechia and Alexandrine Retezcanu. *Compt. rend. soc. biol.* 115, 312-15(1934).---In a series of sane pathol. cases the Br content of spinal fluid taken from the suboccipital region was 0.58-0.89 mg. % or nearly that of the blood; in spinal fluid from the lumbar region it was 0.5-0.76 mg. %. In manic depressive psychosis the corresponding values were often slightly lower. In 20 diversified pathol. cases plasma Br ranged from 0.11 to 0.98 mg. %, serum Br was slightly lower, and corpuscle Br 0.19-0.41, av. 0.27 mg. %.

L. E. Gilson

Comparison of the antigenic properties of whites of hen eggs from different sources. Pierre Woringer. *Compt. rend. soc. biol.* 115, 389-91(1934).---Whites of eggs from different breeds of hens all had the same antigenic property.

L. E. Gilson

Isoelectric points of the blood serum in the successive stages of tuberculosis. N. Bernstein. *Compt. rend. soc. biol.* 115, 401-3(1934).

L. E. Gilson

Action of lecithin on the fractionation of antitoxic sera and the transformation of pseudoglobulin into euglobulin. I. Pirotsky and F. Modern. *Rev. inst. bacteriol. dept. natl. hig.* (Buenos Aires) 6, 51-6(1933); cf. *C. A.* 28, 8189.---Other workers have suggested that euglobulin is a lecithin-pseudoglobulin complex. Lecithin added to antidiphtheritic serum did not affect the fractional pptn. of the proteins by  $\text{Na}_2\text{SO}_4$ . A lecithin-pseudoglobulin complex was prepd. *in vitro*. Injected into guinea pigs it caused shock only in those sensitized to pseudoglobulin and had no effect in those sensitized to euglobulin.

L. E. Gilson

Allergic reactions to foods and their avoidance. M. J. Gutmann. *Deut. med. Wochschr.* 59, 1429-31(1933).---Idiosyncrasy to coffee may result from allergic reactions to its caffeine content or to other constituents. Subjects manifesting allergic reactions to one brand of coffee may be immune to other varieties.

Arthur Grollman

Formation of cavities in molar teeth of rats. Basil G. Bibby and H. Jobe Sedwick. *J. Dental Research* 13, 429-41(1933).---Dental caries developed in 82% of 50 rats fed a ration of ground yellow corn, wheat gluten,  $\text{CaCO}_3$  and  $\text{NaCl}$ ; an adequate supply of cod-liver oil did not decrease the susceptibility. The caries originated as fractures, the development of which was promoted by the presence of coarse hard particles in the ration.

Joseph S. Hepburn

The effect of iodine vapor on the growth of fibroblasts of embryonic chick heart and malignant tumor cells *in vitro*. Albert Strickler and Ona M. Fowler. *Am. J. Cancer* 19, 789-816(1933). Cultures of normal fibroblasts grown in the presence of small amts. of I vapor become partially fixed, but after several transfers to new media show cell proliferation and attain normal growth areas. The growth areas attained by malignant cell cultures become smaller during cultivation for several generations. Exposure to I vapor causes a more rapid decrease in areas of growth and the earlier appearance of evidences of cell degeneration.

E. R. Main

Basal metabolism in asthma and in epilepsy. Anne Topper and Hannal Mulier. *Am. J. Diseases Children* 46, 963-8(1933).---The basal metabolic rate of children tends to be lower than normal in asthma and in epilepsy.

E. R. Main

Choosing a serum test for syphilis. Wm. A. Hinton. *J. Lab. Clin. Med.* 19, 275-80(1933).---The choice of a serum test for syphilis should be based on statistical studies rather than on simple comparisons with the

Wassermann reaction. Flocculation methods appear to fulfil the requirements of high degree of sensitivity, specificity and dependability.

E. R. Main

The catalase content of the blood in cancer. L. Deutsch and J. Frankl. *Z. Krebsforsch.* 40, 98-104(1933). The catalytic index of the blood (the vol. of O in cc. liberated by the catalytic action of the vol. of blood which contains 1 million erythrocytes) detd. after a 15-min. period of reaction is normally 0.68 and after a 30-min. period 1.28. Indexes lower than normal are indicative of malignant growth.

E. R. Main

Photosensitization with special reference to the problem of geeldikkop among small stock in South Africa. J. I. Quin and C. Rimington. *S. African J. Sci.* 30, 461-71(1933).---Geeldikkop, a disease characterized by the sudden onset of edematous swelling of the exposed parts of the head and ears of sheep and angora goats, is caused by eating *Tribulus terrestris*. The swelling of the skin is not present in black-faced sheep. When fresh green or dried *Tribulus* was fed to sheep no symptoms developed. Aq. exts. of powd. *Tribulus*, or expressed green juice, when fed caused death. Alk. solns. of hematoporphyrin when injected into sheep provoked intense irritation as soon as the animals were exposed to sunlight. If these animals were kept stabled or if the head was protected by a dye, as Bismarck brown, or even naturally pigmented, no effects were shown. Ultra-violet rays failed to cause symptoms in sheep injected with hematoporphyrin. Eosin, erythrosin, rose bengal and acriflavine when injected cause well-marked photosensitization but no icterus. Methylene blue, methylene violet or thionine produced photosensitization without icterus. Quinine salts caused hemolysis without photosensitization. After ligation and cutting of the common bile ducts marked photosensitization became evident from the 5th to 14th day. The animals made all possible efforts to get the exposed parts into the shade. In the serum a phylloerythrin was identified; this seemed to be responsible for the photosensitivity. It was obtained also from geeldikkop bile. *Lippia rehmanni* also was capable of giving rise to a syndrome indistinguishable from geeldikkop, except in degree and duration.

H. E. Messmore

Presence of a lethal factor in certain members of the plant genus *Tribulus*. Claude Rimington and J. I. Quin. *S. African J. Sci.* 30, 472-82(1933).---Sheep when fed the juice from *Tribulus* acquired geeldikkop, and death followed in about 8 hrs. The blood contained methemoglobin. Although nitrite is absent from the dry, powd. plant, it is rapidly formed during the soaking of the dried plant in  $\text{H}_2\text{O}$  in a closed vessel. Nitrite in the plant juice, when dried, is oxidized to nitrate. When the dried plant is extd. with  $\text{H}_2\text{O}$  an enzymic reduction yields nitrite. Samples of the dried plant gave 1.20-3.39%  $\text{KNO}_3$ . The nitrate-reducing agent is retained at least to some extent in the plant material and is not washed out by  $\text{H}_2\text{O}$ . The best substances for combating *Tribulus* poisoning are: toluene,  $\text{CHCl}_3$  0.2%,  $\text{Et}_2\text{O}$  0.4% or  $\text{HCHO}$  0.2%. The nitrate content varies widely not only in different species of *Tribulus*, but also in different plants of the same species and growing in the same locality, and even in different parts of the same plant.

H. E. M. Calcification of the Twort mouse carcinoma (in vivo) by means of viosterol. John W. Spies and George P. Lyman. *Arch. Surg.* 27, 588-601(1933).---Toxic doses of viosterol produced calcification in actively growing mouse carcinomas and their metastases. There was also increased calcification in certain viscera.

J. T. M.

Return of gastric acidity after subtotal gastrectomy and double vagotomy. Philip F. Shapiro and Benjamin N. Berg. *Arch. Surg.* 28, 160-79(1934).

J. T. M.

Absorption of urea from the bladder. Frederick A. Fender. *Arch. Surg.* 28, 180-8(1934).---The inflamed bladder mucosa transmits urea in quantities sufficient to raise the nonprotein N of the blood appreciably. This may be a factor in the development of uremia in patients with neurologically incapacitated bladders.

J. T. M.

The selection of noncarcinogenic from carcinogenic oils. C. C. Twort and R. Lyth. *J. Hyg.* 33, 464-73



(1933).—There is a correlation between field of origin and carcinogenic potency, field of origin and refractivity, and carcinogenic potency and refractivity. The third can be deduced when there is a definite knowledge of any 2 of them. Mule spindle lubricating oils should have a refractivity below 5520 when the sp. gr. is above 895 or a refractivity below 5550 when the sp. gr. is below 895.

John T. Myers

A study of the antihemolytic titer of sera of man and animals following staphylococcal infection. J. I. Connor and Margot McKie. *J. Path. Bact.* 37, 353-7(1933).—There is a marked rise in antihemolysins in superficial staphylococcus infections.

John T. Myers

Edema in nephritis. J. Basil Reunie. *Quart. J. Med.* [N. S.], 2, 521-38(1934).—There is reduction in serum albumin in cases of cardiac failure with edema. In nutritional edema, diminution of serum osmotic pressure is directly responsible for the edema. Fall in serum osmotic pressure was a const. finding in the nephrotic syndrome but the development of edema was in certain cases prevented by a salt-free diet. In acute nephritis edema may be due to the rise in blood pressure and fall in serum osmotic pressure jointly. The level of the serum proteins is a valuable prognostic index, for in cases where the serum osmotic pressure is not marked, edema is a very transient feature. The early and gross reduction of serum osmotic pressure in some cases militates against the view that the diminution of serum proteins is entirely due to proteinuria, while the well-nourished condition of such cases rules out malnutrition as an important factor in the production of edema in acute nephritis. Serum proteins may be restored to normal whether the patient is on an adequate protein diet or not. These facts suggest that defective synthesis of serum protein is the important immediate factor in the reduction of serum osmotic pressure.

John T. Myers

Calcification of the kidneys in pyloric stenosis. A. M. Cooke. *Quart. J. Med.* [N. S.], 2, 539-48(1934). The renal changes were attributed to alkalosis. J. T. M.

Pituitary secretion in high blood pressure. Clifford Hoyle. *Quart. J. Med.* [N. S.], 2, 549-60(1934).—It is not possible to detect pituitrin in normal unconed. spinal fluid obtained by lumbar puncture even if sufficient be taken to make it probable that it came from the cerebral cysterns. Patients with essential hypertension or with hypertension assocd. with renal insufficiency do not usually show an increase in pituitrin in such spinal fluid. Pituitrin may be detected occasionally, but only traces are found. This suggests that hyperpituitarism is not a factor in these varieties of hypertension. John T. Myers

The diagnosis of anemia with special reference to cell volume and blood-iron estimation. Harold W. Fullerton, Alexander Lyall and L. S. P. Davidson. *Quart. J. Med.* [N. S.], 2, 561-81(1933).—In all types of anemia, the cell-vol. index, and particularly the Ie index, gave higher readings than the color index. The color index is sufficient for clinical purposes but for research or for difficult cases, the other indexes are useful. J. T. M.

Blood-urea clearance before and after giving urea. Frank S. Powweather. *Quart. J. Med.* [N. S.], 3, 63-77(1934).—The blood-urea clearance test of Van Slyke after the administration of 15 mg. of urea by mouth seems to be a valuable method for the investigation of renal function.

John T. Myers

A further note on the plasma cholesterol in nephritis. James Maxwell. *Quart. J. Med.* [N. S.], 3, 79-86(1934); cf. C. A. 22, 1391.—In acute nephritis plasma cholesterol seems roughly proportional to the degree of edema but it adds little to clinical findings as regards prognosis. In chronic renal disease cholesterol bears no relation to the clinical course.

John T. Myers

The production of specific precipitating sera. Dorothea Hallmann. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 234-9(1933).—Sp. precipitins can be absorbed from immune sera by the homologous alc.-pptd. antigen. Heterologous precipitins can be absorbed by the corresponding alc.-pptd. antigens, leaving the homologous precipitins.

John T. Myers

Electrophoretic investigations on the virus of fowl plague. S. Seidenberg. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 335-8(1933).—The virus migrates toward the anode and hence carries a neg. charge, but there is no demonstrable increase in concn. of the virus at the anode or titratable decrease at the cathode. John T. Myers

The utility of newer disinfectants for sterilizing vaccines, with special reference to their antigenic activity. A. Beck and K. F. Wolff. *Zentr. Bakt. Parasitenk.*, I Abt. 130, 435-9(1933).—Carvasept kills staphylococci at dilns. of 1:3000 and coli at 1:500-750 in from 15 min. to 3 hrs. Hexylresorcinol kills these organisms at 1:200 in 30 min. Bacteria have a greater antigenic activity when killed with these substances than when killed by heat.

John T. Myers

The lead content of the blood and urine, its relation to symptoms and its diagnostic value. St. Litzner and P. Weyrauch. *Arch. Gewerbepath. Gewerbehyg.* 4, 74(1933).—Pb between 0.01 and 0.03 mg. % in the blood shows a normal (0.06 per 1000 cc.) value in urine. These are the clinically neg. cases. Over 0.04-0.06 mg. % of Pb in blood showed 0.05-0.1 mg. urinary Pb. Many of these cases showed definite symptoms. Patients with 0.15 mg. per 1000 cc. of urine showed symptoms of definite Pb poisoning. However, definite symptoms may be observed with only a normal urinary Pb content. There is no relationship between urinary and blood Pb. In all pathol. cases there is an increase in the blood Pb.

H. Tauber

Silicic acid content of lungs of silicon workers in Steir-mark. Hans Lieb and Erwin Schadendorff. *Arch. Gewerbepath. Gewerbehyg.* 4, 576-615(1933).—The SiO<sub>2</sub> content of pathol. lungs was found to be 0.3-1.46% if dried at 120° and 4.6-22.8% of the ashed tissue. Normal lung tissue showed values of 0.08-4.0%. Pathol. findings correspond with the analytical results. A practical method is given for the detn. of SiO<sub>2</sub> in tissue.

H. Tauber

Metabolic studies of children with dental caries. Julian D. Boyd, Charles L. Drain and Genevieve Stearns. *J. Biol. Chem.* 103, 327-37(1933).—In a group of about 100 children there was no correlation between the Ca and P of the serum or of the saliva and the extent of dental caries. On the other hand, the retention of Ca and P was greatest in the group without caries, so that there is pos. correlation between incidence of caries and Ca and P retention. That diet can exert any effect on caries is thus considered to be very doubtful.

K. V. Thimann

The forms of calcium and inorganic phosphorus in human and animal sera. III. A comparison of physiological and experimental hypercalcemia. Helen R. Benjamin and Alfred F. Hess. *J. Biol. Chem.* 103, 629-41(1933); cf. C. A. 27, 2480.—Physiol. hypercalcemia in hens during laying is due principally to an increase in the non-filterable Ca of the serum, the adsorbable and non-adsorbable fractions of this being increased 5-6 times while the ionic Ca is increased less than 50%. The serum P remains unchanged both in amt. and in distribution. In exptl. hypercalcemia of dogs, on the other hand, whether caused by Ca gluconate, parathyroid hormone or irradiated ergosterol, both the filterable and the non-filterable Ca fractions increase, the proportions remaining about const. At the same time the total P increases about 33%, and its filterability decreases 10%.

K. V. Thimann

Chiray, Maurice, and Salmon, Albert R.: Formulaire de pratique médicale courante à l'usage des médecins praticiens. Thérapeutique chimique, physique et biologique, diététique. Paris: Vigot frères. 448 pp. F. 50.

Fleming, Alex., and Petrie, G. F.: Recent Advances in Vaccine and Serum Therapy. Philadelphia: P. Blakiston's Son & Co., Inc. 463 pp. \$4.

## H—PHARMACOLOGY

A. N. RICHARDS

Fate of acacia after acacia-saline injections. Marie Andersch and Robert B. Gibson. *Proc. Soc. Exptl.*

*Biol. Med.* 30, 1848-9(1933).—Rabbits were given intracardial injections of 3-4 cc. of a 30% soln. of acacia every 3rd day until 4.8 g. had been given; 60% of the acacia was retained in the liver, a smaller amt. in the spleen and much smaller amts. in the kidney and muscle. C. V. B.

**Bronchodilator activity of tyramine and its N-methyl derivatives.** Gordon A. Alles. *Proc. Soc. Exptl. Biol. Med.* 31, 385-6(1933).—Tyramine and methyltyramine were equally effective as pressors and bronchodilators when given in intravenous doses as small as 0.001 mm. per kg. of body wt. Similar results were obtained with hordenine when given in 5-10 times this dose; hordenine methiodide is 50 times more active than hordenine; these compds. have an effect similar to that of nicotine and their mode of action is different from that of tyramine or methyltyramine. C. V. Bailey

**Hematopoietic reactions to antimonyl antimony.** S. P. Lucia and J. W. Brown. *Proc. Soc. Exptl. Biol. Med.* 31, 420-8(1934). Normal adult rabbits were injected intravenously with a freshly prepd. 1% soln. of  $K_2SbO_3 \cdot C_4H_4O_6$  (6 mg. per kg. of body wt.). Within 5 min. the leucocyte count was reduced 50%; there was no subsequent leucocytosis in 28 hrs. Normoblasts were moderately increased; the blood platelet count remained unchanged. It is suggested that Sb like As might be used to depress abnormal leucocytoses of myeloid cells. C. V. Bailey

**In vitro leprocidal activity of some non-chaulmoogryl compounds.** G. A. Emerson and A. J. Salle. *Proc. Soc. Exptl. Biol. Med.* 31, 428-33(1934).—In a survey of the *in vitro* leprocidal effects of some 200 dyes, organic metallic compds., fatty acids and miscellaneous compds., high activity was found especially for merthiolate, metaphen, mercurochrome, solganol, triphenylmethane dyes, methylene blue and octyl resorcinol. Trypan blue and the aliphatic alcs. were surprisingly inactive. While some correlation between therapeutic value and leprocidal activity may exist, simple bactericidal tests are by no means a satisfactory excuse for clinical trial but are necessarily preliminary to a comprehensive pharmacol. evaluation of the compds. C. V. Bailey

**Ergotoxine excitement.** Alfred Gilman. *Proc. Soc. Exptl. Biol. Med.* 31, 468-70(1934).—In the unanesthetized cat, the intracardial injection of ergotoxine ethanesulfonate (1 mg. per kg. of body wt.) caused an immediate sympathetic stimulation, wide dilation of the pupil and piloerection; 1 min. after the injection the reflexes were hyperactive and the animal exhibited marked rage and apprehension. The signs persisted for 1 hr. with diminishing intensity and were not followed by any extreme depression. The emotional changes were not diminished by sympathetic paralysis. C. V. Bailey

**Spinal anesthesia in winter frogs.** Raymond N. Bieter and James W. Brown. *Proc. Soc. Exptl. Biol. Med.* 31, 472-4(1934); cf. C. A. 26, 4878.—The anesthetics were injected intraspinaly in winter frogs kept at 10-12°. Based on the min. anesthetic dose the anesthetics are arranged in a decreasing order of sensitivity: pantocaine > nupercaine > panthesine > metycaine > larocaine > tutocaine > procaine. Based on the M. L. D. the drugs are arranged in an increasing order of toxicity: tutocaine < procaine < larocaine < panthesine < metycaine < pantocaine < nupercaine. Larocaine, panthesine and tutocaine gave the highest therapeutic coeffs. C. V. Bailey

**Classification of 24 ions in chemical groups according to their vasomotor action in transcerebral "dielectrolysis."** G. Bourguignon. *Ann. physiol. physicochim. biol.* 9, 817-29(1933).—The changes produced in the body when a continuous current passes through the tissues after the introduction of certain ions is called "dielectrolysis." When one electrode was placed on the eye and the other on the occipital protuberance, there were produced vasomotor effects in the arm, due to elec. stimulation of the cerebral vasomotor centers. These effects were measured by means of an oscillogram. Of the 24 ions tested, the inactive ions were: Li, Na, K, Pb, Cu, Ag, Hg,

B, H and the active ions were: Ca, Sr, Mg, Zn, Al, Mn, Fe, Cr, Pt, Au, Cl, Br, I, C, Si. E. S. G. Barron

**The influence of intravenously injected hypertonic sodium chloride solution upon the movements of the stomach.** L. B. W. Jongkees. *Nederland. Tijdschr. Geneeskunde* 77, IV, 5493-9(1933).—After injection of a 20% NaCl soln. into a cat the stomach showed strong peristalsis, spastic occlusion of the pylorus and of the antrum of the pylorus as shown by radioscopic observations. The evacuation of the stomach was not accelerated by the salt injection. R. Heutner

**A rational digitalis therapy upon a pharmacological basis.** R. A. Hoekstra. *Nederland. Tijdschr. Geneeskunde* 77, IV, 5672-7(1933).—The therapeutic effect following the use of standardized digitalis preps. are due to their saponin content, which prevents cumulation. For this reason exts. from whole digitalis are better for practical use than the pure glucosides. R. B.

**Chemotherapy of mycoses. III. Mucor mycoses. 2 Experiments in vivo.** G. Dessy. *Boll. soc. intern. microbiol. Sez. ital.* 5, 201-6(1933).—The dyes and the salts previously examd. (cf. C. A. 27, 5774) have no therapeutic power in the exptl. infection of rabbits, inoculated by the *Mucor* cited. G. A. Bravo

**Experimental investigations on acute poisoning by lead tetraethyl, by inhalation.** V. Cesaris-Demel, D. Corbi and V. Costanzi. *Pathologica* 25, 685-90(1933). Pb was not detected in the animals kept in an atm. of Et<sub>4</sub>Pb because the Et groups cause the death so early, that there is not time for the establishment of the symptoms and lesions characteristic of saturnism. G. A. Bravo

**Testing and treatment for bilharzia disease.** F. C. Cawston. *J. Trop. Med. Hyg.* 37, 22-4(1934).—Toxic effects from K antimonyl tartrate therapy may be controlled by regulated doses of the K salt in fresh soln. Excessive doses may be toxic. When Na antimonyl tartrate or foudadin is used the toxic effects may be explained by the Na content. Rachel Brown

**Hygiene of carbon monoxide.** K. Supflic, P. Hofmann and J. May. *Z. Hyg. Infektionskrankh.* 115, 623-62(1933).—The CO-hemoglobin content of the blood was detd. by spectrographic means, and small amts. of CO in the air were detd. by the I<sub>2</sub>O<sub>5</sub> method. Conclusion: 6 Const. exposure to CO in small amts. gives rise to changes which follow partial O want. Exposure of dogs for 6 hrs. daily for a month to amts. of CO up to 0.01%, which are encountered in daily life, did not have harmful action. Rachel Brown

**Lead poisoning in infants and children.** E. C. Vogt and C. F. McKhann. *Radiology* 22, 87-92(1934). A brief description is presented of the sources of Pb and symptomatology together with evaluation of certain signs and tests to det. the proper place of roentgenologic findings as aids in diagnosis. Conclusion: Prevention of the ingestion of Pb and diagnosis of the disorder before the development of cerebral involvement are of the utmost significance. G. L. Clark

**The effect of radon implants on the cytology of the liver of the albino rat.** J. C. T. Rogers and G. M. Higgins. *Radiology* 22, 93-8(1934). Au-filtered Rn seeds were implanted in the livers of albino rats and a histological study was made of the irradiated tissue at periods varying from 6 hrs. to 60 days. G. L. Clark

**Acceleration of tissue respiration by a nitrophenol.** E. C. Dodds and G. D. Greville. *Nature* 132, 966-7(1933). 4,6-Dinitro-*o*-cresol causes large increases in the respiration of thin slices of surviving rat tissue when added to the medium in which they are respiring (optimum concn. 10<sup>-5</sup> m.). A. W. Dexter

**The toxicology of chromium.** Keiji Akatsuka and Lawrence T. Fairhall. *J. Ind. Hyg.* 16, 1-24(1934). As much as 1 g. Cr per day was ingested as chromic phosphate, and amts. up to 200 mg. were inhaled as chromic carbonate dust over a period of 17 weeks without causing illness, loss of wt. or tissue damage in cats. The contrast with the toxicology of hexavalent Cr compds. is emphasized (One hundred and sixty-one references. L. W. Elder

*Bryonia cretica*: its action and value in diabetes.

M. A. F. Sherif. *Quart. J. Pharm. Pharmacol.* 6, 634-42 (1933).--The drug is depressant to the heart muscle as well as to plain muscle. The resin given by mouth to dogs produces gastrointestinal irritation. The M. L. D. is 100 mg. per kg. when given intravenously to dogs. There is no effect on blood sugar in human diabetics, but there is a diminution in the amt. of urine. No reduction in blood sugar in normal rabbits was found. The diuresis produced by glucose injection was not affected by the drug. After a const. flow of urine had been induced in dogs by intravenous injections of  $\text{Na}_2\text{SO}_4$ , intravenous injection of the drug was followed by a slight increase in the degree of diuresis. W. O. E.

**Action of 1-phenyl-4-hydroxy-5-methylpyrazole.** J. W. C. Gunn. *Quart. J. Pharm. Pharmacol.* 6, 648 9(1933).--Certain actions of antipyrine and 1-phenyl-4-hydroxy-5-methylpyrazole (I) are compared. The general action and effects on the circulatory system are similar. I is more toxic to mice and has a greater antipyretic action in exptl. pyrexia produced by *Es. coli* toxins in rabbits. W. O. E.

**Action of various salts on red corpuscles.** R. Dujarric de la Rivière and N. Kossovitch. *Compt. rend. soc. biol.* 115, 30 2(1934); cf. *C. A.* 27, 2202. The hemolytic or other effects of very dil. solns. of arsenobenzene and Hg and Bi salts on washed human and animal corpuscles were studied. Corpuscles from syphilitic blood were more resistant than those from normal blood. Bordet-Wassermann reaction of blood previously treated with certain salts [in vitro]. *Ibid.* 32-4.--After treatment with the above salts Bordet-Wassermann neg. serums still tested neg., but many of the serums which gave a pos. test before treatment tested neg. after treatment. The results were too irregular to permit definite conclusions. L. E. Gilson

**Action in vitro of certain gold salts on Koch's bacillus cultivated in Korchner's liquid medium.** Pierre Martin. *Compt. rend. soc. biol.* 115, 45 6(1934). Growth was inhibited by crisalbin (Au Na thiosulfate) in concns. greater than 1:10,000 and by allochrysin (Au Na thiopropanol-sulfonate) only in concns. greater than 1:500. L. E. Gilson

**Experiments in antihelminthic chemotherapy.** J. Rodham and M. T. Van Hoof. *Compt. rend. soc. biol.* 115, 192 4(1934). Frogs infected with the lung-inhabiting trematode, *Distomum cyathraceum* Zinder, were used. Fouadine, K Sb tartrate, Dn 7 (antimonyl-bisoxiquinoline diethylamine sulfate), cinetine and tetrachloroethane in near-toxic doses were all ineffective. L. E. Gilson

**Vagotonic action of essential oil of *Origanum majorana*.** L. Gurrelon and R. Thuilliant. *Compt. rend. soc. biol.* 115, 230 2(1934). L. E. Gilson

**Rhynchophylline.** Raymond-Hamet. *Compt. rend. soc. biol.* 115, 255 7(1934). Rhynchophylline, an alkaloid from *Ouroparia rhynchophylla* Mats., is a methoxy-yohimbine, isomeric with corynanthine. Its physiol. action is similar to that reported for mitraphylline (*C. A.* 28, 830<sup>h</sup>). L. E. Gilson

**Central and peripheral action of amyl nitrite on the vasomotor system.** A. Tournade, J. Malinjac and L. Roelchisani. *Compt. rend. soc. biol.* 115, 297 9(1934).--In chloralosed dogs the central action was vasoconstrictor and the peripheral action vasodilator. L. E. Gilson

**Adrenaline-chloroform syncope.** Victor Papilian, Ion Cosma and Ioan G. Russu. *Compt. rend. soc. biol.* 115, 311 12(1934).--Adrenaline, 0.01-0.02 mg./kg., causes syncope in dogs anesthetized with  $\text{CHCl}_3$  but not in those anesthetized with  $\text{Et}_2\text{O}$ . Removal of the spleen or ligation of the splenic vein does not prevent the syncope. If both spleen and pancreas are removed in the  $\text{CHCl}_3$ -anesthetized dog doses of adrenaline as large as 0.1 mg./kg. cause a prolonged rise in arterial pressure but no syncope. L. E. Gilson

**Estrogenic activity of some condensed ring compounds in relation to their other biological activities.** J. W. Cook, F. C. Dodds, C. L. Hewett and W. Lawson. *Proc. Roy. Soc. (London)* B114, 272 80(1934).--Estrogenic activity was detd. by injection into ovariectomized rats of a soln.

of 100 mg. of a given compd. in 3 cc. of sesame oil, 1 cc. being administered on each of 3 successive days. The most active compds. were 9,10-dihydroxy-9,10-dialkyl-9,10-dihydro-1,2,5,6-dibenzanthracene (in which the alkyl group was either Et, Pr or Bu) and, to a smaller extent, 1-keto-1,2,3,4-tetrahydrophenanthrene. Other compds. possessing this activity were 5,6-cyclopenteno-1,2-benzanthracene, 1,2-benzopyrene, ergosterol, neoergosterol, calciferol, 1,9-dimethylphenanthrene, clupanodonic acid after treatment with Br, and coal ulmins. Apparently a whole group of compds. of rather widely differing structures exists, each member of which produces estrus. Three of these compds. (1-keto-1,2,3,4-tetrahydrophenanthrene, 9,10-dihydroxy-9,10-dibutyl-9,10-dihydro-1,2,5,6-dibenzanthracene and 5,6-cyclopenteno-1,2-benzanthracene) were tested and found to lack antirachitic power.

Joseph S. Hephurn

**Sex change in the plumage of brown Leghorn capons following the injection of certain synthetic estrus-producing compounds.** J. W. Cook, E. C. Dodds and A. W. Greenwood. *Proc. Roy. Soc. (London)* B114, 286 90(1934).--Intramuscular injection of 0.65 g. of 1-keto-1,2,3,4-tetrahydrophenanthrene, dissolved in sesame oil, in divided doses over a period of 9 days, into adult brown Leghorn capons produced feathers of the female type. Similar estrus-producing action was exerted by this compd. on an ovariectomized hen of this variety, and by 9,10-dihydroxy-9,10-dibutyl-9,10-dihydro-1,2,5,6-dibenzanthracene on a capon of this variety. No action was exerted on the combs of the capons. Joseph S. Hephurn

**Importance of the chemical constitution for the pharmacological action of phenoxyethylamine and phenoxyethylpiperidine derivatives, especially on the pharmacological importance of a methoxy group in the *m*- or *p*-position in the side chain.** I. Poisonous action on mice and rabbits. Yoshiaki Fujimoto. *Folia Pharmacol. Japon.* 17, No. 1, Opera Orig. 1 13(1933). The poisonous action of these derivs. was detd. on mice and rabbits by injecting them subcutaneously and intravenously. Marked respiratory depression accompanied by epileptiform convulsions followed. In mice the convulsions were accompanied by a typical tail reaction. The drugs showed a marked affinity for the central nervous system; the cord had nothing to do with the production of convulsions. Death was due to respiratory failure. Introduction of the methoxy group in the *m*- or *p*-position of the side chain increased the action of the phenoxyethylamine derivs., but had the reverse effect on the phenoxyethylpiperidine derivs. The *m*-compd. was about 4 times as active as the *p*-compd. G. H. W. Lucas

**The influence of sinomenine, parasinomenine and quinine on the action which adrenaline, calcium, nicotine, yohimbine and ergotoxine exert on the blood-sugar picture in rabbits.** Yoshizo Arakawa. *Folia Pharmacol. Japon.* 17, No. 1, 1 12(Breviaria 1)(1933); cf. *C. A.* 28, 528<sup>h</sup>. The hyperglucemia which follows the injection of adrenaline 0.0001,  $\text{CaCl}_2$  0.1, nicotine tartrate 0.005, yohimbine-HCl 0.02 or ergotoxine tartrate 0.0015 g. per kg. in rabbits was arrested by the injection of 0.02 g. per kg. of sinomenine, parasinomenine and quinine. Quinine showed the greatest effect and sinomenine the least. Ergotoxine was an exception in that its action was increased by the 3 drugs. The influence of sinomenine, parasinomenine and quinine on the action which diuretin, pilocarpine, glucose and insulin exert on the blood-sugar picture in rabbits. *Ibid.* 13-20(Breviaria 1-2).--The hyperglucemia produced by injecting diuretin 0.5 g. and pilocarpine 0.02 g. per kg. subcutaneously was decreased by 0.02 g. per kg. of sinomenine, parasinomenine and quinine; the action of quinine was strongest and that of sinomenine the weakest. The 3 drugs in relatively small doses increased the hypoglycemia produced by insulin and not only lowered but shortened the hyperglucemia produced by intravenous glucose. G. H. W. Lucas

**The influence of preliminary treatment with colloids which by intravenous injection may cause death.** Makoto Kuse. *Folia Pharmacol. Japon.* 17, No. 1, 21 33(Breviaria 2 3)(1933).--The semicolloidal substances, saviol

Na and collargol, injected into rabbits in certain doses always cause death. This effect may be avoided if, 24 hrs. before the lethal dose is injected,  $1/r^{1/4}$  of the lethal dose of these colloids or other colloids is injected. Similarly, a small dose of gelatin soln. injected before a lethal dose of arspenamine prolongs, and may even save, life; it is not as effective, however, as the other colloids mentioned. Glucose injections about 24 hrs. after injections of lethal doses of the colloids prolong life. G. H. W. L.

The influence of the rapidity of intravenous adrenaline injections on the strength of the action. Makoto Kuse. *Folia Pharmacol. Japon.* 17, No. 1, 34-48 (Breviaria 3) (1933).—The increase in blood pressure varies directly with the rate of injection of adrenaline. The height of pressure remains longer when the adrenaline is more slowly administered. G. H. W. Lucas

The influence of dopa (dihydroxyphenylalanine) on the adrenaline glycogenesis in the surviving toad liver. Jiro Horimi. *Folia Pharmacol. Japon.* 17, No. 1, 90-103 (Breviaria 6) (1933). The toad liver perfused with "Merck" racemic dopa showed in certain concn. an adrenaline-like glycogenesis, but not so pronounced. The effect of dopa and adrenaline together appeared to be a potentiation. G. H. W. Lucas

The influence of amino acids on the vascular action of adrenaline. Hideo Nishiyama and Tokujiro Otsuda. *Folia Pharmacol. Japon.* 17, No. 1, 104-119 (Breviaria 6 7) (1933); cf. C. A. 27, 5423. Glycine, glutamic acid, leucine, alanine, phenylalanine and tryptophan are more or less vasodilators, whereas histidine is a vasoconstrictor. Cystine has no action in weak concn. Each amino acid used in an almost inactive quantity increases the vasoconstrictor action of adrenaline. G. H. W. Lucas

The behavior of fibroblast and staphylococcus in a medium containing tryptaflavine or rivanol. Kenosuki Kawashima. *Folia Pharmacol. Japon.* 17, No. 1, 120-8 (Breviaria 8) (1933). Above a certain concn. these drugs always decrease the growth of fibroblast and staphylococcus. High concn. very rapidly produce degeneration and death. The degenerative changes are described. Tryptaflavine is the stronger of the two. G. H. W. L.

The influence of various synthetic thymol and carvacrol derivatives on sugar metabolism, and the point of attack of these derivatives, with especial reference to the relation between their chemical structure and pharmacological action, together with a comparison of the action of ergotamine with the action of these derivatives. Utaka Asakura. *Folia Pharmacol. Japon.* 17, No. 1, 129-70 (Breviaria 9-10) (1933).—The action of 5 thymol and 4 carvacrol derivs. has been studied on the sugar metabolism of the rabbit. In small doses all produce hypoglycemia. The derivs. in which the H in the ethylamine group of the side chain is replaced by a Me group are the most active; when Et or alkyl groups are introduced in these places, the derivs. are next in activity. The derivs. in which the side chain contains ethylpiperidine in place of ethylalkylamine are the weakest. The thymoxyethylamine deriv. with an alkyl group introduced is the most active, but is somewhat labile in its action. Thymol derivs. are stronger than the corresponding carvacrol ones. The 9 derivs. like ergotamine in a certain concn. decrease adrenaline hyperglycemia, but are weaker in action, although the action mechanism is similar. The derivs. depress the end app. of the sympathetics in smooth muscle. G. H. W. Lucas

The behavior of lead in the animal organism. III. Colloidal lead compounds. Robert A. Kehoe and Frederick Thammann. *J. Lab. Clin. Med.* 19, 178-94 (1933); cf. C. A. 25, 3081.—Within a few min. to a few hrs. after the intravenous injection of  $H_2O$ -sol. Pb salts into rabbits Pb was detected in all tissues, the highest concns. being found in the blood, kidneys, liver and spleen. During the 1st 14 days after the injection gradual changes in distribution of Pb occurred with a gradual loss from the tissues until an eq. lib. was established between the amt. excreted and that absorbed with food. Colloidal Pb reacted in a similar manner and thus appeared to be rapidly

converted into the compds. formed when sol. Pb salts were injected. Pb, injected as suspensions or colloidal preps. of the secondary and tertiary phosphates, showed approx. the same distribution as the sol. Pb salts in the 1st few hrs., but the compds. formed were not sufficiently mobile to be redistributed or excreted in large amts. After 37 days approx. 0.5 of the Pb injected was found in the liver. A large proportion of the Pb, which had been injected as the orthophosphate into a human subject, was found in the liver and very little in the skeleton. Colloidal Pb, injected intravenously into a human subject, was found to be more widely distributed, appreciable amts. being found in the skeleton. E. R. Main

The effect of salyrgan and x-ray on the rate of disappearance of thrombophlebitic edema. L. M. Zimmerman, J. T. Gault, S. S. Halpern and G. de Takats. *J. Lab. Clin. Med.* 19, 243-8 (1933).—Acute thrombophlebitic edema is produced in dogs by the injection of tissue exts. into the femoral vein. The intravenous injection of 1 cc. doses of salyrgan or treatment with x-rays causes a marked increase in the rate of disappearance of the edema. E. R. Main

A comparative study of certain xanthine diuretics. A. Richard Bliss, Jr., and R. W. Morrison. *J. Lab. Clin. Med.* 19, 248-65 (1933). Theobromine, theophylline and their salts appear to be equally satisfactory as diuretic agents for rabbits. They induce increased elimination of solids, chiefly chlorides and uric acid, and maintain the diuretic action for 2-5 days. Large doses of the agents cause gastroenteritis, nephritis and subsequent death. The max. effective and safe doses of theobromine, theophylline, theophylline Na acetate, theobromine Ca salicylate and theophylline Ca salicylate are 40, 50, 30, 50 and 60 mg., resp. Theophylline Ca salicylate in doses of 50-60 mg. appears to be the most efficacious; theophylline in doses of 50 mg. ranks next. E. R. Main

The influence of acid reagents upon the reaction of normal and malignant tissues as determined by means of the glass electrode. Anna Goldfeder, H. M. Partridge and J. A. C. Bowles. *Z. Krebsforsch.* 40, 186-91 (1933). The  $pH$  of the liver tissue of tumor-bearing rats and mice treated with  $CH_3COOH$  and  $NH_4Cl$  (cf. C. A. 28, 5306) is lower than that of untreated tumor-bearing animals. The  $pH$  of tumor and other tissues is not appreciably changed by the treatment. The glass electrode (cf. C. A. 26, 5034) appears to be suitable for  $pH$  measurements in biol. systems. E. R. Main

Bromide psychoses: diagnosis, treatment and prevention. Max Levin. *Ann. Internal Med.* 7, 709-14 (1933). John T. Myers

The effect of pilocarpine on the volume, free and combined acid, total chlorides and pepsin of gastric secretion, and a comparison with the effects of histamine stimulation. Leo J. Meienberg and Charles L. Brown. *Ann. Internal Med.* 7, 702-8 (1933).—Pilocarpine increases all of these factors. Histamine stimulates the secretion of pepsin. Histamine is not a better gastric stimulant than pilocarpine. John T. Myers

An enquiry into the relative toxicities of benzene and toluene. T. Ferguson, W. F. Harvey and T. D. Hamilton. *J. Hyg.* 33, 547-75 (1933). Toluene is a poison of the same type and action as benzene, but acts less readily because of its physicochem. properties. Under certain circumstances it may have a more lasting effect on account of slower elimination. John T. Myers

The action of atropine in complete heart block. A. Rae Gilchrist. *Quart. J. Med.* [N. S.], 2, 483-98 (1934). John T. Myers

The action of adrenaline in complete heart block. A. Rae Gilchrist. *Quart. J. Med.* [N. S.], 2, 499-519 (1934). John T. Myers

Cancer chemotherapy. XI. The effect of carbon monoxide, hydrocyanic acid and pituitrin upon tumor growth. L. C. Maxwell, Fritz Bischoff and Henry Ullman, Jr. *J. Pharmacol.* 49, 270-82 (1933).—Exposure of animals bearing transplantable tumors to CO and to HCN resulted in a decrease in the rate of tumor growth, whereas sublethal doses of pituitrin did not. There was

no significant change of lipid and cholesterol values of the tumors or of lipid and glycogen values of other tissues accompanying such treatment. T. H. Rider

The pharmacology of acetyl- $\beta$ -methylcholine and the ethyl ether of  $\beta$ -methylcholine. J. H. Comroe, Jr., and Isaac Starr, Jr. *J. Pharmacol.* 49, 283-99(1933); cf. Simonart, C. A. 27, 138.—Acetyl- $\beta$ -methylcholine (I) and the Et ether of  $\beta$ -methylcholine (II) are superior to acetylcholine in convenience of administration, duration of action and absence of side effects. I and II produce slowing of the heart rate, and cardiac contraction similar to the effect of vagus stimulation. They also cause vasodilatation, increased peristalsis and intestinal tone, and constriction of bronchi and uterine strips. In equal doses I usually has a stronger effect than II. T. H. Rider

Irritation and toxicity of sodium iodobismuthite (iodobismutol) prepared with propylene glycol and diethylene glycol. P. J. Hanzlik, H. G. Mehrtens and J. B. Spaulding. *J. Pharmacol.* 49, 300-5(1933).—Iodobismutol (I) prep'd. with propylene glycol is at least as irritating but less toxic than I prep'd. with ethylene glycol. I prep'd. with diethylene glycol is more toxic than the latter. The presence of iodide increases the toxicity of I. T. H. Rider

Myocarditis produced experimentally in rabbits by drugs. Charles M. Gruber, Isaac Y. Olch and Brian Blades. *J. Pharmacol.* 49, 306-18(1933).—Myocarditis is produced in rabbits where a methylxanthine or xanthine drug is injected prior to adrenaline, ephedrine or tyramine. T. H. Rider

The anesthetic action of a series of naphthalene derivatives. Merl E. Fisk and Frank P. Underhill. *J. Pharmacol.* 49, 329-36(1933).—Incomplete pharmacol. data are given on diethylaminoethyl- $\alpha$ -naphthoate, diethylaminopropyl- $\alpha$ -naphthoate, diethylaminoethyl- $\beta$ -naphthoate, diethylaminopropyl- $\beta$ -naphthoate, 2-ethoxy-3-diethylaminopropyl (hvl) naphthoate, 2-hydroxy-3-diethylaminopropyl naphthoate, 2-ethoxy-3-diethylaminopropyl naphthoate and diethylaminopropyl- $\alpha$ -naphthoate all as hydrochlorides. All were active on mucous membranes but unstable and irritating. T. H. Rider

Sodium iodobismuthite (iodobismutol): Muscular absorption of bismuth. P. J. Hanzlik and J. B. Spaulding. *J. Pharmacol.* 49, 257-69(1933).—Muscular absorption of Na iodobismuthite (6% voln. with 12% NaI in ethylene glycol) is reported to be prompt and marked. Absorption is retarded after 1 hr. but approaches completion after 24 hrs. After injection the tissue concn. varies considerably but is higher than that of the blood. T. H. Rider

Responses of the cat uterus, in situ, to adrenaline, quinine, morphine and pituitary extract. N. B. Dreyer and R. A. Moreash. *J. Pharmacol.* 49, 337-44(1933).—Quinine and morphine have no stimulating action on pregnant or involuting cat uterus. Pituitrin produces marked effects in pregnancy and immediately after parturition. Adrenaline produces pure inhibition 48 hrs. after birth, but during pregnancy produces motor responses which are abolished by ergotamine, which does not stimulate the pregnant uterus. T. H. Rider

Coronary circulation. II. The effect of ephedrine. O. O. Stoland and A. M. Ginsberg. *J. Pharmacol.* 49, 345-51(1933); cf. C. A. 25, 3396.—Single doses of ephedrine (I) produced increased coronary flow in the dog. Repeated injections of I had a diminishing effect. T. H. Rider

The influence of ephedrine sulfate on the reflexes of spinal monkeys. C. F. Jacobson and Margaret A. Keimard. *J. Pharmacol.* 49, 362-74(1933).—Ephedrine sulfate injected into monkeys after cord transection causes an increase in the excitability of spinal reflexes, believed to be due to direct action on the central nervous system. T. H. Rider

The secretion of the posterior lobe of the hypophysis after the administration of drugs. Alexander Simon. *J. Pharmacol.* 49, 375-86(1933).—The vasopressin content of cerebrospinal fluid of dogs was negligible after the administration of insulin, urea and novasurol. T. H. R.

The reaction of the oviduct of the skate to autonomic poisons. George B. Roth. *J. Pharmacol.* 49, 387-92(1933).—The oviduct of skates is highly reactive to adrenaline but only moderately sensitive to pilocarpine and atropine. T. H. Rider

Elimination of barbituric acid derivatives in the urine with special reference to isoamylethylbarbituric acid (sodium amytal) and (1-methylbutyl)ethylbarbituric acid (pentobarbital sodium). H. A. Shonle, A. K. Keltch, G. F. Kempf and E. E. Swanson. *J. Pharmacol.* 49, 393-407(1933).—Na amytal (I) and pentobarbital sodium (II) are excreted in the urine of men and dogs in traces only while barbital and phenobarbital are excreted as such. I and II are probably rapidly and completely destroyed in the body. T. H. Rider

The bradycardia caused by sympathomimetic drugs. Lawrence Terry and Howard C. Peters. *J. Pharmacol.* 49, 428-31(1933). T. H. Rider

Chronic morphine poisoning in dogs. V. Recovery of morphine from the tissues of tolerant and nontolerant animals. O. H. Plant and I. H. Pierce. *J. Pharmacol.* 49, 432-49(1933); cf. C. A. 22, 4652.—The following method has given 95-110% recovery of morphine (I) from tissues, which are removed immediately after death of the animal and chopped fine. Grind 20-g. samples to a paste with water and glass, and dil. to 100 cc. Add 100 cc. of 4%  $\text{CCl}_3\text{COOH}$  and heat the soln. in boiling water for 5 min., filter hot and conc. a max. sized aliquot on the water bath to 50 cc. Analyze this residue by the method previously described for urine (cf. C. A. 27, 138). Modifications are described for the treatment of blood and contents of the alimentary canal. Detailed results are given for the recovery of I from various organs after administration to normal and tolerant dogs. The av. total recovery was 12.8% greater in nontolerant dogs after 4 hrs., but was 46.2% greater in tolerant dogs after 24 hrs. The percentage of total dose recovered was distinctly less after 24 hrs. than after 4 hrs. in nontolerant animals while the reverse was true in tolerant animals. Increased ability to destroy I is not a factor in tolerance. T. H. Rider

The absorption of insulin from the intestinal tract. David Campbell and Thomas N. Morgan. *J. Pharmacol.* 49, 450-5(1933).—Insulin (I) once in the portal circulation is as active as when introduced into the systemic circulation. The failure of I to act when given orally is due to lack of absorption since it is not destroyed in the intestines. Shaking a  $\text{H}_2\text{O}$  soln. of I with an  $\text{Et}_2\text{O}$  soln. of lecithin (II) led to the formation of a comp'd. of I and II which was not absorbed from the alimentary canal but which was active on subcutaneous injection. T. H. R.

The hyperglucemic action of certain drugs. David Campbell and Thomas N. Morgan. *J. Pharmacol.* 49, 456-65(1933).—The oral administration of  $\text{Et}_2\text{O}$  or the subcutaneous injection of picrotoxin, apomorphine or large doses of ephedrine produces hyperglucemia, but this reaction is prevented by the prior administration of barbiturates. The hyperglucemia produced by adrenaline or by pituitary ext. is not prevented by the barbiturates. The mechanisms of the actions of the various drugs are discussed. T. H. Rider

The influence of caffeine on the effects of acetanilide. J. A. Higgins and H. A. McGuigan. *J. Pharmacol.* 49, 466-78(1933).—Acetanilide (I) has little effect on the heart. Fatal doses of I paralyze the respiratory mechanism. The effects of I,  $\text{EtOH}$  and citric acid are additive. Caffeine (II) does not increase the toxicity of I, and may slightly decrease it. The depression of sympathetic tone by I and II and most analgesics is suggested as having an important relation to therapeutic effect. T. H. R.

Calcium. IX. Acute thrombophlebitic edema. Arnold L. Lieberman and N. R. Cooperman. *J. Pharmacol.* 49, 479-82(1933); cf. C. A. 28, 211<sup>8</sup>.—Ca therapy seems to decrease edema by increasing absorption, but will neither prevent nor reduce the development of the max. amt. of edema produced by the intravenous block of the femoral vein with fibrogen. T. H. Rider

The treatment of toxemia. II. G. Norman Myers.

*J. Pharmacol.* 49, 503-502(1933); cf. *C. A.* 26, 2023. The shock produced by diphtheria toxin is due to the paralysis of the peripheral vascular mechanism preceding paralysis of the medulla and independent of an absence of adrenaline in the suprarenal gland. The circulation is improved and the blood pressure raised by the administration of large quantities of normal gum saline. T. H. R.

The physiological action of the principles isolated from the secretion of the South African toad (*Bufo regularis*). K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 503-13(1933); cf. *C. A.* 28, 214<sup>1,4,7</sup>.—The parotid secretion of *Bufo regularis* yielded cholesterol, *regularo-bufagin* (I), *regularo-bufotoxin* (II), *regularo-bufotenine* (III) and adrenaline. I,  $C_{28}H_{48}O_8$  (?), prisms (from alc.-Et<sub>2</sub>O-petr. ether), m. 234-5° (cor.), has a digitalis-like action, min. emetic dose 0.3 mg. (pigeons) and 0.09 mg. (cats) and fatal dose 0.15 mg. (cats) per kg. II,  $C_{28}H_{48}O_{10}N_2$ , has an indefinite m. p., is also digitalis-like in action; min. emetic doses are 0.35 mg. (pigeons) and 0.275 mg. (cats) and fatal doses 0.48 mg. (cats) per kg. III, an indole deriv. isolated as its flavanate, had slight action on blood pressure and stimulated both isolated rabbit intestines and guinea-pig uteri. I and II both showed pressor action and stimulation of smooth muscle organs. T. H. Rider

The physiological action of the principles isolated from the secretion of the Jamaican toad (*Bufo marinus*). K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 514-25(1933); cf. *C. A.* 28, 214<sup>1,4,7</sup>.—The parotid secretion of *Bufo marinus* yielded cholesterol, adrenaline, *marino-bufagin* I, *marino-bufotoxin* II, and *marino-bufotenine* III. I,  $C_{28}H_{48}O_8$  (?), prisms (from alc.), m. 212-3° (cor.) and II,  $C_{28}H_{48}O_{10}N_2$  (?), spheroids, m. 200° (cor.) both have digitalis-like actions, their min. emetic doses being, resp., 0.375 mg. and 0.2 mg. (pigeons), 0.3 mg. and 0.125 mg. (cats) and fatal doses 0.57 mg. and 0.43 mg. (cats) per kg. III, isolated as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , m. 271-2° (cor.); it gives orange crystals, has no pressor action nor effect on rabbit intestines but stimulates guinea-pig uteri. T. H. Rider

The poisonous secretion of five North American species of toads. K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 526-42(1933).—The compds. isolated from the parotid secretion were, from *B. valliceps*, cholesterol (I), *vallicapo-bufagin*,  $C_{28}H_{48}O_8$ , clusters (from alc.), m. 212 3° (cor.), *vallicapo-bufotoxin* and *vallicapo-bufotenine*, as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , orange-red needles (from H<sub>2</sub>O), m. 261-2° (cor.); from *B. fowleri*, I, *fowlero-bufagin*,  $C_{28}H_{48}O_8$ , m. 153°, *fowlero-bufotoxin*, and *fowlero-bufotenine* as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , orange crystals, m. 198-9° (cor.); from *B. alvarius*, I, *alvaro-bufotoxin* and *alvaro-bufotenine* as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , orange needles, m. 224 5° (cor.); from *B. quercicus*, I, *quercico-bufagin*,  $C_{28}H_{48}O_8$ , m. 258-9° (cor.), *quercico-bufotenine* as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , orange-red needles (from water), m. 204° (cor.); and from *B. americanus*, *americano-bufotenine* as its flavanate,  $C_{28}H_{48}O_{10}N_2 \cdot C_{12}H_{10}O_2N_2S$ , orange needles (from water), m. 197.5-8.5° (cor.). The bufagin and bufotoxin type products had digitalis-like actions. Emetic and fatal doses are given for some. The bufotenine type products stimulated smooth muscle organs. T. H. R.

The parotid secretion of *B. bufo gargarizans* as the source of Ch'an Su. K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 543-7(1933).—A comparison of the compns. and pharmacol. actions of the constituents indicates that the Chinese drug Ch'an Su is prep'd. from the parotid secretion of *Bufo bufo gargarizans*. T. H. Rider

The active groupings in the molecules of cino- and marino-bufagins and cino- and vulguro-bufotoxins. K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 548-60 (1933).—The generic terms bufagin and bufotoxin include two groups of substances isolated from the parotid secretion of toads which have digitalis-like actions but are not glucosides. Investigations of derivs. were made to ascertain the important chem. groupings responsible for the physiol. action. A lactone ring and double bonds present in the bufagins are essential to their sp. action on the heart, and an acid radical (acetic or formic) at-

tached to a hydroxyl group is of almost equal importance. Covering all free hydroxyl groups decreases but does not destroy activity. The chief activity of the bufotoxins depends upon the bufagin content. Suberic acid present in the bufotoxin mols. appears to enhance the emetic action. T. H. Rider

Similarity and dissimilarity of bufagins, bufotoxins and digitaloid glucosides. K. K. Chen and A. Ling Chen. *J. Pharmacol.* 49, 561-79(1933).—A comparison of 20 digitalis-like principles from phys., chem. and pharmacol. points of view. The bufagins and bufotoxins are generally similar but specifically different. They are more closely related to scillaren A than to g-strophanthin, digitoxin or thevetin. Various methods of digitalis standardization are discussed. T. H. Rider

Nickel carbonyl poisoning. K. Kötzing. *Arch. Gewerbepath. Gewerbeky.* 4, 500-7(1933).—The extremely toxic effect of Ni(CO)<sub>4</sub> is due to the substance itself, not the CO which may form within the body. H. Tauher

Hemoglobin production. IV. Evaluation of therapeutic agents in anemia, due to milk diets, based on a study of the blood and bone marrow of rats from birth to maturity. Thomas Fitz-Hugh, Jr., George M. Robson and David I. Drabkin. *J. Biol. Chem.* 103, 617-28 (1933); cf. *C. A.* 25, 2203, 5693.—Rats made anemic by a diet of whole milk were not cured by addn. of 0.3 mg. Fe daily, but were cured by 0.3 mg. Fe + 0.05 mg. Cu, or by 0.2 mg. Fe + 70 mg. Na glutamate daily. The Cu content of the glutamate was far too low to account for its effect. The increase in hemoglobin and in erythrocytes was preceded by a rapid rise and fall of the reticulocyte count. The fall was more complete with the glutamate than with the Cu therapy. Corresponding changes in the bone marrow were followed. That glutamate is effective in anemia treatment thus confirms the results of Drabkin and Miller (*loc. cit.*), but neither with the nor with Cu was a completely permanent cure accomplished. K. V. Thimann

The influence of *l*- and *d*-lactate on oxygen consumption of rabbits. K. W. Buchwald, Carl F. Corn and Robert E. Fisher. *J. Biol. Chem.* 103, 763-76(1933). Injection of Na *l*(+)-lactate into rabbits caused an increase in O consumption equiv. to about 25% of the lactic acid which disappeared, the disappearance being calculated from detns. of blood lactic acid before and after the exp't. Since a small rise in O consumption followed the injection of NaHCO<sub>3</sub>, the increased O consumption is equiv. only to 20% of the lactic acid which disappeared. However, injection of *d*(-)-lactate gave an increase in O consumption equiv. to the whole of the lactate which disappeared. It is therefore probable that with *l*-lactate, 80% is resynthesized to glycogen at the expense of the oxidation of 20%, while with *d*-lactate, all is directly oxidized. K. V. Thimann

Synthesis of new vermifuges and their pharmacol. use (Gluske) 17. Phenanthridine series (Walls) 10. Cinnams XXVI. Cycloalkylamines [physiol. effect] (Ruzicka, et al.) 10. Physiologically active isomer of Brett's 5 ketocamphor (Takeuchi, Sahashi) 10. Hg derivs. of the purine group (Covello) 10.

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## I—ZOOLOGY

R. A. GORTNER

The composition of silks in relation to the food of silk-worms. Guido Colombo. *Boll. ufficiale stat. sper. seta* 3, 65(1933).—No difference was found in the tyrosine and tryptophan contents of the silks obtained from normally fed and from hungry worms. G. A. Bravo

Amino acid composition of the protein of the chrysalis of the domesticated and Tussah silkworm. Ryūgo Inoue, Teitoku Miwa and Kōichi Kitazawa. *Bull. Sericult. Silk Ind. Japan* 6, No. 2, 1-3(1933).—The aq. ext. of freshly ground pupae was heated and the coagulated protein extd. with  $\text{B}_2\text{O}_3$  and dried. The amino acids in 100 g. dry protein from domesticated and Tussah silkworms were, resp.: glycine, 0.146, 0.87; alanine, 3.79, 2.52; leucine, 6.04, 5.68; aspartic acid, 2.60, 0.47; glutamic acid, 1.70, 5.62; serine, —, trace; phenyl-alanine, 7.83, 9.53; hydroxyproline, 0.77, 1.59; proline, 0.65, 0.01; tyrosine, 4.28, 5.73; arginine, —, 2.11; histidine, —, 2.34; lysine, —, 1.00; choline, —, 2.81; betaine, —, 2.77. Rachel Brown

Influence of hypophyseal extract on regeneration by axolotyls. Raphael Belkin. *Compt. rend. soc. biol.* 115, 111-12(1934).—Axolotyls normally regenerated severed limbs in 61 days. When ext. of the posterior lobe of

the hypophysis was added to the water in which they were kept, the regeneration was completed in 46 days.

L. E. Gilson

Fatty acids from the larva fat of the beetle *Pachymerus dactylis* L. Geoffrey Collin. *Biochem. J.* 27, 1874 (1933).—Insects lay down fats similar in type to those produced by mammals; and, like the latter, they can assimilate fats present in their diet and also synthesize fat from other constituents of the food. Benjamin Harrow

Conditions affecting the response of the avicularia of *Bugula*. Alexander Forbes. *Biol. Bull.* 65, 469-79 (1933).—The avicularia or "bird's heads" on a colony of *Bugula* can be made to close by adding to the sea water NaOH, HCl, albumin or the press juice from mussels or clams. Sugar soln. or inorg. salts are without effect. Conc. and diln. of the sea water, or merely introduction of inert solids in suspension, also caused closing, so that the stimulus may be either chem. or mechanical.

K. V. Thimann

A relation between the free and combined carbon dioxide content of the blood and the mean level of habitat in some brachyrrhynch decapods. Maurice Fontaine. *Bull. inst. océanograph.* No. 639, 4 pp.(1933).—The combined  $\text{CO}_2$  contents of the blood of 3 species of crabs of comparable size and activity, but different habitat, were compared. The figures were: *Grapsus marmoratus* living at high tide level, 19.9; *Carcinus maenas*, at intermediate heights, 11.7; *Portunus puber*, at depths down to 30 m., 8.7 cc.  $\text{CO}_2$  per 100 g. blood. Before the detn., the crabs were placed under identical conditions for 24 hrs. Since the  $\text{pH}$  of the blood of all 3 species was the same, 7.75, the total  $\text{CO}_2$  content must vary in the same direction. The alk. reserve and  $\text{CO}_2$  tension thus decrease with increasing duration of submergence.

K. V. Thimann

## 12—FOODS

F. C. BLANCE AND H. A. LEPPER

Agricultural products and their vitamin contents. G. Stenbohl. *Deut. Essigind.* 37, 283-4(1933).—The principal agricultural foodstuffs used by man are enumerated with respect to their vitamin contents. W. O. E.

Preservation of food. Gulbrand Lund. *Teknisk Tidskrift* 80, 574-6(1933).—A review dealing particularly with the influence of the hermetic preservation process upon the vitamin content of vegetable and animal foods. Expts. show that the destructive effect is far less than is generally believed when the foods are boiled in closed tins in the absence of air. Only vitamin C is appreciably affected, however, it is not affected as much as by cooking in open pots. When particular stress is laid upon the keeping of vitamins canning is the ideal form of preservation. C. A. Robak

Movement of diffusible substances in food products. J. Alexander. *Science* 77, 489-90(1933). G. G.

Coloring of foods in former times. E. Merres and R. Linnan. *Deut. Essigind.* 37, 164(1933).—Reference is made to a recent (No. 50) report of the Reichsgesundheitsblatt, in which mention is made of the use of various deleterious substances as food colors, notably during the late 18th and early 19th centuries. W. O. E.

Medicaments as food products. Herbert Patzsch. *Pharm. Ztg.* 79, 20-2, 32, 43-5(1934).—Certain medicaments enumerated in the D. A.-B. VI and the Supplement V. thereto are discussed, as baking powder,  $\text{AcOH}$ , meat ext., gelatin, mutton tallow, yeast, honey, cacao, potato starch, kefir,  $\text{NaCl}$ , malt ext., arrowroot, lactose, whey, fruit juices, oils, lard, starch, albumin, wine and brandy. W. O. E.

Copper in Chinese food materials. Wm. H. Adolph and Lung-Pi Chou. *Chinese J. Physiol.* 7, 185-8(1933).—Among the common cereals sesame seeds were the richest with 16.8 mg./kg. and white corn was the poorest with 2.3 mg. Among legumes cow peas had the lowest with 6.8 mg./kg. while black soy beans were the richest with 10.8.

In most cases only 1-3 samples were analyzed but the table comparing Chinese and American foods shows parallel values except with soy beans, turnips, radishes, spinach and celery. C. M. McCay

Methods for determination of lead in foods. H. J. Wichmann, C. W. Murray, M. Harris, P. A. Clifford, J. H. Loughrey and F. A. Vorhes, Jr. *J. Assoc. Official Agr. Chem.* 17, 108-35(1934).—Six methods for the detn. of small quantities of Pb, particularly in spray residues on fruit or vegetables, are described; they are presented in the order in which they were developed, and their practicability increases in about the same order. Harris method

The sample is prepd. by the digestion procedure used in the official A. O. A. C. method for As detn.; after preliminary sepn. as sulfate, Pb is converted into  $\text{PbCrO}_4$  and the  $\text{CrO}_4$  ion is detd. iodometrically. The method is applicable to all food samples that may be digested in a quantity sufficient to yield 1 mg. or more of Pb. Alc. ppts. very impure  $\text{PbSO}_4$  in the presence of Fe (over 75 mg.), Ca and alkali sulfates, or  $\text{SiO}_2$ ; under these conditions interfering elements may not be entirely removed in the sulfate sepn., and if they are carried through to the  $\text{PbCrO}_4$  pptn. they cause serious interference and erratic results. Otherwise the method gives satisfactory results in the hands of analysts experienced in the procedure. Recoveries of Pb added to Pb-free apple peelings, together with a liberal dose of such contaminants as might be found on sprayed fruits or vegetables, were 95% or better. The method is time-consuming (about 3 days). *Wichmann-Murray method.*—After detg. As on the sample by the bromate method (modified to substitute hydrazine as the reducing agent), the residue is used for the estn. of Pb by Fairhall's method (C. A. 16, 2160), modified by controlling the  $\text{pH}$  of the sulfide and chromate isolations to (1) avoid co-ppts. of elements that commonly interfere, (2) eliminate the necessity for more than 1 sulfide pptn., and (3) reduce the difficulty of obtaining a satisfactory

**PbCrO<sub>4</sub> ppt.** Two alternative methods are given for prepn. of the sample. *A*—suitable for dry pectin, dried apples, tea and probably for similar substances and biol. materials: ash, taking care that the temp. does not exceed 550° to avoid volatilization of Pb. *B*—suitable for Na and Ca phosphates: dissolve 50 g. of sample in the smallest practicable vol. of soln. by warming and alternately adding small quantities of H<sub>2</sub>O and HCl, filter, rinse the beaker and wash the filter successively with 20 cc. hot HCl-citric acid reagent (200 g. citric acid per l. of 1 + 4 HCl), hot water and 20 cc. of 40% NH<sub>4</sub>OAc. *Loughrey's method.*—This method utilizes the remarkable affinity of diphenylthiocarbazone ("dithizone") in CHCl<sub>3</sub> soln. for Pb in sepg. the Pb from common interferences according to Fischer (*C. A.* 27, 3418); the org. Pb compd. is decompd., the Pb is pptd. as PbCrO<sub>4</sub> and detd. indirectly by iodometric titration of the chromate ion. Presence of BaSO<sub>4</sub> or of a large quantity of CaSO<sub>4</sub> causes low results because of occlusion of Pb in these substances and consequent interference in the dithizone extn.; Sn and Bi are extd. by dithizone along with the Pb and interfere in the PbCrO<sub>4</sub> pptn.; other elements that commonly interfere in the chromatng are eliminated by the dithizone extn. Electrolytic sepn. of PbO<sub>2</sub> after partial destruction of the dithizone compd. with HNO<sub>3</sub> may be practiced to advantage, especially in cases where there is less than 1 mg. Pb. The method (with PbCrO<sub>4</sub> pptn.) has been successfully applied to samples that could be digested in sufficient amts. to give a quantity of Pb greater than 1 mg., and that did not introduce interferences of Sn, Ba and CaSO<sub>4</sub>. *Colorimetric sulfide method (Wickmann-Vorhes).*—The method is primarily designed for rapid approx. detn. of Pb on fresh apples and pears. It is essentially as follows: spray residue is removed from the fruit by means of solvents (an alk. immersion is combined with an acid rinse and a detergent is introduced in the alkali; this results in a 95% or better extn. of the Pb or As on the fruit); the soln. is freed from org. coloring matter and common interferences (the most important of which is Fe); and Pb is estd. colorimetrically as the sulfide. The method was applied to control on an extended scale during the 1933 season. Its accuracy was checked by adding known quantities of Pb (unknown to the analyst) to the "strip" solns. of Pb-free apples, and the difference between theoretical and detd. amts. varied from -0.001 to +0.002 grain per lb. (with amts. varying from 0.008 to 0.028 grain per lb.). *Electrolytic method (Wickmann-Clifford).*—This method is based on electrolytic anodic deposition of Pb as PbO<sub>2</sub> from a dil. HNO<sub>3</sub> soln., reaction of the PbO<sub>2</sub> with acidified KI soln., and titration of the liberated I. Interferences noted by Hillebrand and Lundell (*Applied Inorg. Analysis*, *C. A.* 24, 316) are Bi, Sb, Sn, Mn, halogens, As, Se, Te and P. Moderate quantities of elements of the latter series expected in spray residues do not prevent complete deposition of Pb by the procedure described; Bi, Sb and Sn are not found at present in com. spray residues; Mn is found and provision is made to remove it before electrolysis by dithizone extn. From 0.05 to 10 mg., or more, of Pb may be very satisfactorily sepd. on the anode and titrated with 0.001 or 0.005 *N* Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>. A so-called "mush" method of prepn. of the sample is described, which permits use of a very large sample and reduces sampling error to a very low figure. It consists essentially in weighing 40-50 apples (or pears, etc.), peeling (being careful to remove completely the stem and calyx ends), weighing peelings (including stem and calyx ends), running 3 times through a food grinder that shears rather than presses, dilg. 200 g. of the homogeneous mushlike mass to about 300 cc., adding 40 cc. concd. HNO<sub>3</sub>, bringing to a boil and stewing slowly while stirring until initial foaming ceases and a comparatively smooth mixt. is obtained (about 10 min.), making to 500 cc., and carrying out the Pb detn. on a 250-cc. aliquot after a dithizone extn. *Colorimetric dithizone method (Vorhes-Clifford).*—The method was originally devised for rapid approx. detns. on fresh apples and pears, and especially to avoid some of the interferences that were troublesome in previous methods. As described it should be very satisfactory for routine work, giving

results accurate to 0.001 grain per lb. within the range of 0-0.025 grain per lb.; and with certain refinements it can be made very exact even for exceedingly minute quantities of Pb. It is based on the following principle: when a CCl<sub>4</sub> or CHCl<sub>3</sub> soln. of dithizone is shaken with progressively larger amts. of Pb in ammoniacal KCN soln. its normal green color changes, through a series of blues, purples and crimsons, to a cherry red, this gradual change in color is caused by the formation of a red CHCl<sub>3</sub>-sol. org. Pb compd.; the combination in varying proportions (depending on the relative amt. of Pb present) of this red color with the blue-green of the excess dithizone produces the intermediate colors. The colors produced are matched against standards by a process similar to colorimetric *p<sub>H</sub>* detns. This system of color colorimetry has 2 regions of great sensitivity, (1) where dithizone is in great excess and (2) where it is almost satd. with Pb. The use of ammoniacal KCN-citric acid soln. (10 g. KCN, 10 g. citric acid, 500 cc. concd. NH<sub>4</sub>OH per l.) prevents interference from all metals that are liable to be encountered in spray residues. The *p<sub>H</sub>* of the sample and standards must be practically the same; the optimum *p<sub>H</sub>* under varying conditions has not yet been detd., but it is believed to be secondary to the equality factor of the *p<sub>H</sub>*. A. Papineau-Couture

**Distribution of the phosphorus in wheats and flours** A. Feyte. *Compt. rend. acad. agr. France* 19, 925 (1933).—The total P in 53 French wheats varied from 0.80 to 1.41%, in 7 Syrian wheats from 0.50 to 0.69%, and from 0.185 to 0.32% in 7 samples of flour. The P content depends especially on the climate and ripening or scalding and very little on the variety. The P is concentrated in the peripheral parts of the grain. There is no general relation between the P content of a wheat or flour and the extensimeter readings. Except in scalded wheats where it is higher, mineral P reaches a max. of only 0.115% of the dried material. Phytin P composes, on the av., about 73% of the total P. Flours contain very little P in the form of phytin. J. R. Adams

**The most common adulterants in wheat flours** Giovanni Issoglio. *Industria chimica* 8, 1359 (1931). Wheat flour, adulterated with other grain flours, or with flour from grains affected by blight or rust, often shows reduced plasticity, rendering them unfit for bread flour. The loss in plasticity can be detd. by the ergometer (*C. A.* 26, 4106). A. W. Condon

**Shortening requirements for baked products** C. B. Morison. *Oil and Soap* 11, 234 (1934). E. Scherubel

**The nutritive properties of milk in relation to pasteurization.** J. D. Stirling and J. H. Blackwood. *Illness Dairy Research Inst., Bull.* 5, 80 pp. (1933). A review with 188 references. K. D. Jacob

**Factors influencing the rennase coagulation of milk by the action of calf rennase.** Pericle Parisi. *Giorn. chim. ind. applicata* 15, 545-52 (1933).—The enzymic coagulation of milk by rennase is accelerated by increase in concn. of H or Ca ions. Addn. of alkalies; org. acid, H<sub>2</sub>PO<sub>4</sub> and HCl influences the reaction only to the extent that they affect the concn. of H and Ca ions. The temp. coeff. of the reaction changes with different milk, varying from 1.35 to 2.09 within the temps. 30-50°. Outside these temp. limits the variation is much greater. A. W. Condon

**Methods for manufacturing acid-precipitated casein from skim milk.** Charles S. Trimble and R. M. Hill. U. S. Dept. Agr., *Circ.* 279, 1-36 (1933).—Mfg. methods are described for the production of the different types of acid-pptd. casein. By use of these methods a high-grade product may be obtained having a low-ash and free-acid content. Methods are also described for detg. the properties of com. casein such as moisture, ash and fat content, adhesive strength, *p<sub>H</sub>* and free acid value, solv and viscosity. W. H. Ross

**Coloring matter of butter.** A. Loewy and G. Cronheim. *Z. Untersuch. Lebensm.* 63, 450-1 (1933).—After 1st extg. with EtOH to prove that no artificial coloring matter is present, the intensity of natural coloring matter in butter

is detd. by extn. with  $\text{Et}_2\text{O}$  or light petroleum and comparison with fresh soln. of saffron (0.5%). B. C. A.

Relative economies of various types of cheese as determined by analysis. Ruth B. McCammon and W. J. Caulfield. *Trans. Kansas Acad. Sci.* 36, 159-61 (1933); et. C. A. 27, 8535.—By comparing the nutritive value of 100 cal. portions of Neufchatel, cream, rennet and acid types of cottage cheese, and cheddar, it was found that at prevailing prices cheddar was most economical, the 2 types of cottage cheese were next, and Neufchatel and cream least. Cheddar was also found to be higher in Ca and P contents. W. A. Moore

Chemistry of cheddar cheese-making. F. H. McDowall and R. M. Dolby. *Nature* 133, 101 (1934).—During the cheese-making process the concn. of lactate in the whey rises steadily, the titratable acidity remaining const. or even decreasing. The addn. of salt to the curd causes a sharp fall in the lactose content of the whey, at whatever stage of the process it is added; this is ascribed to the liberation of bound water by the salt. From the fact that in the whey, after the curd is cut, lactose may be more concd. than in the original milk, it is calcd. that about 2% of the water in milk is bound, the curd thus containing bound water equal to 80% of its casein content. On the other hand, if 0.1% of sulfate is added to the milk at the start, then the addn. of salt to the curd increases the sulfate in the whey by 50%. No explanation available for this contradiction. K. V. Thimann

Digestibility of cheese. A. Mørn. *Tids. Norske Landbruk* 40, 3-5 (1933).—A fresh half-fat Gauda cheese contained 14.8% water-sol. and 92.0% digestible (HCl and pepsin) N; the ripe (6 months) cheese contained 52.0 and 99.3%, resp. B. C. A.

The quantities of water frozen out in the freezing of foodstuffs. R. Heiss. *Biochem. Z.* 267, 438-51 (1933); et. C. A. 27, 5829.—As detd. by 2 different procedures, the amts. of water frozen out when fresh beef meat was frozen were functions of the temp. No difference was observed in the amt. of cooling required for slow or rapid freezing to the equil. condition. S. Morgulis

Detection of paprika pigment in sausages. W. Pfahl and A. Rotsch. *Z. Untersuch. Lebensm.* 65, 452-4 (1933).—The fat must be extd. and saponified, and the pigment taken up with 95% EtOH before the usual test for paprika pigment can be applied. B. C. A.

Attack of metal containers by so-called canned fish in white wine. Daniel Florentin. *Ann. fals.* 26, 594-7 (1933).—Investigation of complaints relative to digestive disturbances alleged to have been caused by so-called fish in white wine (which are really fish in vinegar) showed that Sn-plated cans were considerably attacked by the high acidity (even when they were not swollen or blown), most of the dissolved Sn being fixed by the fish instead of remaining in soln. in the liquid. With well-varnished containers the amt. of Sn dissolved was negligible. A. Papineau-Couture

The effect of ethyl alcohol on the ripening of tomatoes. S. A. Soldatenkov and M. G. Kubli. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 85-7 (in English 88-90) (1934).—One cc. of 96% alc. per hundred g. of fruit stops growth and causes full ripeness in 11-17 days. Twelve % alc. does not stop growth and ripening requires 20 days. Untreated fruits require over 25 days. Forty-eight % alc. gave a max. acceleration of ripening. Alc. vapors in a concn. of 1 cc. per 10 l. with an exposure of 24 hrs. gave optimum acceleration of ripening. F. H. Rathmann

Studies on a physiological spotting of apples. R. F. Sutt. *Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932*, 119-28 (1932).—The disease, which seems to be distinct from bitter pit, occurs as depressed spots which are slightly darker in color than normal and are surrounded by cork layers. The diseased apples keep well in storage and the diseased areas do not spread within the fruit tissues. A study of the physiology of the diseased and normal Fameuse apples showed that the diseased fruits were less acid, more highly colored and had a higher catalase, oxidase, peroxidase and a lower org. peroxide content than the normal fruits. In con-

trast to the normal apple tissue surrounding the spots, the dead cells in the diseased spots contained an abundance of starch. K. D. Jacob

The keeping quality of frozen orange juice. M. A. Joslyn and G. L. Marsh. *Ind. Eng. Chem.* 26, 2305-9 (1934).—A study has been made of factors that influence the keeping quality of frozen orange juice stored over 2 years at 0°F. A change in flavor was detectable after a storage for 2 months and was quite marked after 6 months. Deaerated juices retained their flavor more completely than untreated juices. Deaerated juice treated with O-free N more nearly retained its original flavor than when  $\text{CO}_2$ , H, etc., were used. 0.005% of orange oil gave a juice that had fairly fresh orange flavor even after storage for 13 months. Among the other phases of this subject that were studied were the effects of amt. and kind of suspended matter, the addn. of acids and sugars, flash pasteurization, precooling the fruit prior to extn. and storage of fruit. F. L. Dunlap

Time and methods for harvesting Royal Ann cherries for barreling. E. H. Wiegand. *Oregon State Hort. Soc., Rept. 47th Ann. Meeting 1932*, 24 7.—Maturity studies indicated that the fruit should be picked when it contains 16-18% of sol. solids and approx. 0.5% acid (calcd. as malic acid) in the juice. Maturity influences to a great extent increased color formation in the fruit; the increased color is partially responsible for the differences in the shade of cherries bleached in  $\text{SO}_2$  solns. K. D. Jacob

Nitrogenous compounds of the white gourd melon and the muskmelon. Kiyohisa Yoshimura and Takeshi Iwata. *J. Agr. Chem. Soc. Japan* 9, 1235-8 (1933).—The analysis of the white gourd melon is:  $\text{H}_2\text{O}$  97.098, crude protein 0.57, protein 0.193, crude fat 0.086, crude fiber 0.513, crude ash 0.375, total N 0.092, protein N 0.031, ammonia N 0.002, N in the ppt. by phosphotungstic acid 0.020 and N in other form 0.039%. Adenine (HCl salt) 0.1, trigonelline (HCl salt) 0.2 g. and histidine trace were isolated from 30 kg. of the fresh white gourd melon. Adenine (HCl salt) 0.1 g. and trigonelline (HCl salt) 0.3 g. were also isolated from 15 kg. of the fresh unripe melon. Y. Kihara

Alkali scorch of Bermuda onions. J. J. Taubenhaus and Walter N. Ezekiel. *Am. J. Botany* 21, 69-71 (1934).—

A shipment of white Bermuda onions turned brown and withered where they came in contact with the jute bags. The bags were found to be impregnated with an alk. salt which caused the damage. L. E. Gilson

Soy bean (*Glycine hispida* Maxim.). M. Wynne Sayer. *Agr. Live-Stock India* 3, 470-4 (1933).—The compns. of 3 varieties of soy-bean seeds grown in the Punjab were:

	Yellow variety	Chocolate variety	Black variety
Moisture	10.50	10.50	10.47
$\text{Et}_2\text{O}$ ext.	16.43	17.38	14.36
Crude protein	38.31	37.31	41.38
Sol. carbohydrates	24.18	24.39	23.42
Woody fiber	6.20	6.14	5.66
Sol. mineral matter	4.35	4.25	4.67
Sand and $\text{SiO}_2$	0.03	0.03	0.04
Total N	6.13	5.97	6.62
Albuminoid N	5.80	5.77	6.23
Albuminoids	36.81	36.06	38.94
Albuminoid ratio	1.68	1.79	1.45

K. D. Jacob

Analytical constants of peanut butter. Helen L. Wikoff, Maribodine Busey and A. M. Kaplan. *Ind. Eng. Chem.* 26, 291-2 (1934).—The exptl. procedure is described. Analytical data are given, based on examn. of 10 samples purchased on the market. The moisture varied from 0.87 to 3.7%, with an av. of 1.74. Ash varied from 1.91 to 3.18%, av. 2.37 (dry basis); chlorides from 1.08 to 3.45%, av. 1.60 (dry meal basis); oil from 39.45 to 52.34%, av. 46.70 (dry basis);  $\alpha$  from 1.4540 to 1.4749, av. 1.4676; crude fiber from 2.67 to 4.31%, av. 3.34 (meals); protein from 54.64 to 62.45%, av. 58.65 (dry meals), which is equiv. to 30.66% on the basis of the whole butter; reducing sugars are absent before

hydrolysis. Starch, cellulose and pentosans were the polysaccharides found in the fat-free meal. F. L. D.

Report of the biochemist for 1932. D. I. Evans. Tea Research Inst. Ceylon, *Bull.* 10, 48-60 (1933).—Slow withering of tea improves the color and strength of the aq. infusions but decreases the pungency, quality and flavor. In general characteristics, teas withered in 4.5 hrs. compare favorably with those withered in 15 hrs., whereas withering in 40 hrs. is detrimental. The degree of wither, as measured by the moisture content of the leaves, has little effect on the pungency of the made teas; harder wither gives more color, strength, quality and flavor. K. D. Jacob

Fermentation of hay for dairy farms. Tiemann and Rehm. *Deut. Landw. Presse* 60, 319 (1933).—Freshly cut hay was covered with 30 cm. of soil and allowed to ferment at 55-65°. Samples of the top layer, a layer 25-30 cm. deep and the bottom layer, were analyzed for AcOH, butyric acid, acetates, butyrates, lactic acid,  $p_n$ ,  $NH_3$ , dry wt., ash, org. matter and crude protein. After 4 months, the top layer had rotted and was unfit for cows. The top and bottom layers had the highest content of butyric acid, 0.27 and 0.30%, while the middle layer had the highest content of lactic acid, 0.60%. Similar results were obtained after 6 and 14 months. The total wt. of the fermented material was about 46% of the original wt. K. C. Beeson

Effect of maturity on the nutritive value of Markton oat hay. J. Sotola. Wash. Agr. Expt. Sta., *42nd Annual Rept.* (*Bull.* 275) 22 (1932).—On a 10% moisture basis the protein percentages of 9.3, 9.2 and 9.18 were obtained for the milk, dough and ripe stages, resp. Similarly the fiber percentages were 28.32, 24.41 and 24.12. The decrease is attributed to the increasing amts. of carbohydrates accumulating in the heads. Ca:P ratios of 1.13:1, 1.48:1 and 1.72:1 were detd. for the milk, medium dough and ripe stages, resp. In the milk stage Markton oat hay contained 5.88% digestible protein and 50.15% total digestible nutrients. At the dough stage the hay contained 5.8% digestible protein and 47.69% total digestible nutrients. The hay from the ripe plants exceeded all others with a content of 6.4% protein and 54.56% total digestible nutrients. C. R. Fellers

Cattle poisoning by the feeding of rape cake. C. Kučera. *Intern. landw. Rundsch.* 37, 915 (1931).—In samples of rape cake having toxic action on cattle the mustard-oil content was low, but probably there was a deficiency of myrosin. Data are given showing the amts. of mustard oil developed by rations contg. rape cake and various myrosin-contg. feeds. B. C. A.

Removing Bordeaux spray from oranges (Benton, Powell) 15. Elec. water heater for use with refractometer [for tests on butter] (Lorenzola) 1. Allergic reactions to foods and their avoidance (Gutmann) 11G. Influence of the nutrition of the plants on the sensitiveness of potato tubers to storage parasites (Fehmi) 15. Occurrence of cyanogenetic glucosides in Nelson pasture plants (Rigg, et al.) 11D. Resorption of  $CaSO_4$  in the digestive tract [fodder preservation] (Virtanen, Tikka) 11F. Liver exts. (Brit. pat. 400,979) 17.

Herzberg, Gustav: Der Nahrungsmittelchemiker und seine Tätigkeit. 5th ed. Stuttgart: Dieck-Verlag Franckh. 76 pp. M. 1.60; cloth, M. 2.25.

Tilgner, Damazy J.: Die Praxis des Trocknens. Obst, Nüsse, Gemüse, Pilze, Eier. Nach neuesten Erfahrungen. Brunswick: Serger & Hempel. 120 pp. M. 5.60.

Valde, Albert van de: Vade mecum voor chemisch en bacteriologisch Onderzoek van Lebensmiddelen. Antwerp: De Nederlandsche Boekhandel. 168 pp. F. 30.

Use of relatively water-resistant cellulose derivatives in foods. Camille Dreyfus. U. S. 1,943,374, Jan. 16. In forming foods intended to promote peristaltic action, cellulose derivs. such as cellulose acetate, etc., are incorporated with foods such as oatmeal, farina or other cereal foods.

1 Drying the gluten mass obtained by the washing of flour. K. Möller and B. Fischer. Swed. 77,355, May 23, 1933. An addn. to Swed. 76,070 (C. A. 27, 5442)

Bread. Georg Purucker. Ger. 590,345, Dec. 29, 1933 (Cl. 2c. 2.02). Comps. to be added to dough comprise liquid malt ext., sol. starch, sugar sirup and malt meal. Specific comps. are described. The comps. can be marketed in cast pieces.

2 Granular calcium phosphate. Wm. H. Knox, Jr. (to Victor Chemical Works). U. S. 1,943,919, Jan. 16. A product which is suitable for use in baking powder comprises mono-Ca phosphate together with less than 0.1% Fe phosphate, less than 0.2% MgO and 1-2% alkali metal oxide, and may be prep. by use of  $H_3PO_4$  obtained by the volatilization process.

Apparatus for determining the fat content of milk (products). Aktiebolaget Separator. Brit. 400,170, Oct. 9, 1933.

3 Milk concentrate. Pomosin-Werke G. m. b. H. Ger. 590,476, Jan. 2, 1934 (Cl. 53c. 5). Addn. to 555,275 (C. A. 26, 5155). Skim milk is treated with a liquid pectin ext. and the mixt. is allowed to stand.

Milk and cream. Bengt A. Clemmedson and Helge V. Abrahamson. Fr. 756,135, Dec. 5, 1933. Milk and cream are improved by heating them slowly from 10° or lower to 40-42° during 20-30 min., and cooling slowly to 2-3°, repeating the process and then maintaining at 2-3° for some time.

Increasing the viscosity of cream. Ture V. Bergman and Hilding A. Svedberg. U. S. 1,944,541, Jan. 23. Cream of relatively high fat content such as that used for making whipped cream is subjected to repeated cooling (suitably to about 5°) and alternate heating to above room temp. but without again fluidizing the fat solidified by the cooling.

5 Preserving fish, etc. Frank Heywood and Imperial Chemical Industries Ltd. Brit. 400,658, Oct. 30, 1933. Fish, etc., are preserved in a mixed atm. of air and  $CO_2$  in a heat-insulated chamber cooled by the evapn. of solid  $CO_2$ . App. is described.

Preserving meat, etc. Jack Brooks, Thomas Moran, Edgar C. Smith and Ronald G. Tomkins. Brit. 400,197, Oct. 19, 1933. Meat (products) and other animal materials are preserved in an atm. contg. a proportion of O to N as great as or greater than that of air and a proportion of  $CO_2$ , generally within 4-40% and never greater than the O present. App. is described.

6 Preservative for roots and fruit. I. E. O. Larsson and E. A. Grönlund. (C. G. Pettersson, inventor). Swed. 76,298, Jan. 17, 1933. An addn. to Swed. 70,515. To a mixt. of 75-90% of slaked lime and 10-25% of carbon is added sublimed S, suitably in an amt. of 1-2.5% of the total mixt.

7 Transporting perishable products. Imperial Chemical Industries Ltd. Fr. 756,085, Dec. 4, 1933. The gas liberated by evapn. from solid  $CO_2$  is led into the refrigerating chamber (contg. fish, fruit, etc.) by an injector which thus causes a simultaneous entry of air. The proportion of  $CO_2$  to air is regulated by a valve to the mixt. best calculated to preserve the products.

8 Apparatus for quick freezing of foods such as fruits, vegetables and meats. Harold V. Atwell (to Standard Oil Co. of Ind.). U. S. 1,944,857, Jan. 23. Various structural and operative details are described suitable for use with refrigerant such as propane under such pressure that it boils at -20° to -35°.

9 Wax emulsion suitable for coating food products such as fruits and vegetables. Walter A. Bridgeman and John A. Schade (to Wilbur White Chemical Co.). U. S. 1,943,468, Jan. 16. A lustrous waxy coating is formed by passing a natural food product through an emulsified compn. consisting essentially of carnauba wax 5-15%, an emulsifying agent such as triethanolamine soap 1-4%, resinous material such as Pontianak gum or rosin 2-6% and water (constituting the remainder of the compn.), the bath, at a temp. of 20° having a surface tension of from about 45 dynes to about 38 dynes per cm., the coated material being then drained and dried.

- Coffee and tea. Theodor Grethe. Ger. 588,844, Nov. 21, 1932 (Cl. 53d. 5). See Brit. 366,805 (C. A. 27, 1904).  
 Food product from pineapple waste. Bruno Pilorz (to Calif. Packing Corp.). U. S. 1,944,265, Jan. 23. A shredded waste from the cores and outer cuttings of pineapples is mixed with an impure sugar soln. while the moisture content of the pineapple waste is above 60%, and the mixt. is then dried to a moisture content of 5-15%. The product is suitable for use as a stock or chicken feed.  
 Fodder. Ulrich Luebkens. Ger. 590,087, Dec. 22, 1933 (Cl. 53g. 4.04). Animal organs including essentially organs communicating with the liver or the gall bladder, or secretions or excretions of such organs, are dried, preferably *in vacuo* at atm. temp., and added to fodder for milk-yielding animals. Appropriate substances may be added to improve the taste.  
 Preserving green fodder. I. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauff, inventors). Ger. 588,992, Nov. 30, 1933 (Cl. 53g. 5.01). Green fodder is preserved without the aid of O by the employment of solid substances giving off CO<sub>2</sub>, e. g., CaCO<sub>3</sub>.

## 13—GENERAL INDUSTRIAL CHEMISTRY

EARLAN S. MINER

- Upturn in 1933 foreign trade in chemicals. Otto Wilson. *Ind. Eng. Chem.* 26, 351-6 (1934). G. G.  
 Accurate methods of determining the number and size frequency of particles in dusts. H. L. Green. *J. Ind. Hyg.* 16, 29-39 (1934).—Constructional details of a sedimentation cell are given for sampling dust-laden air. The dust is allowed to settle on microscope slides from which the particle counts are made. The no. count, which is most suitable for concns. not less than 1000 particles/cc., was checked by an ultramicroscope. Size frequencies are estd. by means of a special ocular graticule, covering the range down to 0.2  $\mu$  diam. Errors and limitations of the methods are discussed and typical data from an actual dust analysis are cited. L. W. Elder  
 The employment of commercial filtration and decantation methods. H. Tiedemann. *Chem. Fabrik* 1934, 114.—A general discussion of vacuum and pressure filtration, percolation and decantation. J. H. Moore  
 Rectification of liquid air. C. Boe. *Teknisk Ukeblad* 80, 284-8 (1933).—A review, chiefly theoretical, with graphs, equations and 1 illustration. C. A. Robak  
 The fractional degassing of hot and cold waters in the Claude-Boucherot process. P. Chambadal. *Compt. rend.* 197, 825-7 (1933); cf. C. A. 26, 4111.—It is suggested that the gas be extd. in several fractions.  
 J. B. Austin  
 The temperature distribution of a gas flowing through a furnace. K. F. Herzfeld. *Physics* 4, 362-5 (1933).—The temp. coeff. of a chem. reaction in a gas flowing through a tubular furnace at low pressure is studied theoretically. If the flow is stream-line, and the pressure drop through the tube is less than 0.008 mm. of Hg per cm. length, temp. equil. is reached throughout the gas. If the pressure drop is about 10 times as great, only a thin layer close to the wall reaches temp. equil. Even under these conditions the measured temp. coeff. of reaction velocity is not affected by the thickness of this hot layer.  
 Channing Wilson  
 Iodized carbon as protector against mercury-vapor poisoning. Alfred Stock. *Angew. Chem.* 47, 64 (1934).—Iodized C is an activated C impregnated with I. The most favorable amt. of I is about 5%. The C either can be used in gas masks or can be sprinkled directly upon open areas or in cracks contaminated with Hg. Expts. are reported which demonstrate the great effectiveness of this prepn. Karl Kammermeyer  
 Carbon tetrachloride poisoning in connection with dry shampooing and dry cleaning, with a survey of the use and action of the substance. Knud O. Møller. *J. Ind. Hyg.* 15, 418-32 (1933); cf. C. A. 27, 2740.—Six cases are described, and 43 references are reviewed. W. D. L.  
 Health aspects of radium dial painting. I. Scope and findings. Louis Schwartz, Fred L. Knowles, Rollo H. Britten and Lewis R. Thompson. *J. Ind. Hyg.* 15, 362-7 (1933).—The study was conducted in 7 factories and included the examn. of 14 men and 228 women. The dust in the general air of the workroom was radioactive (an av. of  $9.8 \times 10^{-10}$  g. per 10 cu. m. of air), while in the vicinity of dial painters the radioactive content of the aerial dust was 2-3 times greater and near dusters it was many times as high. Workers were exposed to  $\gamma$ - and  $\beta$ -radiations. The av.  $\gamma$ -ray exposure was equiv. to that produced by about 1 mg. of Ra 50 cm. from the worker. There was no evidence of harmful effects such as skin necrosis from radiations from sources outside the body. Ra accumulation in the body was assocd. with the length of Ra exposure, the greatest amt. found being 11.3  $\gamma$ . X-rays of the alveolar regions showed bone changes in some workers, notably focal atrophy (osteoporosis or bone rarefaction). The relation of these bone changes to increasing deposits of Ra in the body is unmistakable. With the abolition of the practice of pointing the brush in the mouth, prevention of Ra poisoning depends primarily on extreme cleanliness in the factory, thorough cleanliness of the workers and adequate ventilation, both general and local. Twenty-eight specific suggestions are included for minimizing the hazard of Ra dial painting. II. Occupational environment. J. J. Bloomfield and Fred L. Knowles. *Ibid.* 369-82.—The occupational environment of Ra dial painters is discussed under the headings: history of Ra painting processes, occupational analysis, sanitary survey, the detn. of the amt. of atm. and settled radioactive dust in the air of workrooms, the degree of exposure to  $\gamma$ - and  $\beta$ -rays at the working places, together with the amt. of Rn in the air of these places. Fifty-six air samples (60-200 cu. ft. in vol.) were collected with the paper thimble (C. A. 17, 1331) as the collecting medium, at positions which made them representative of the air breathed by the workers or of the general workroom conditions. The thimbles were ignited and the resulting ash analyzed by fusion with KHSO<sub>4</sub> (C. A. 12, 1942). The av. exposure for Ra dial and hand painters was  $26.1 \times 10^{-10}$  g. of Ra per 10 cu. m. of air. The general air of the rooms contained  $9.8 \times 10^{-10}$  g. For Ra dusting 5 samples gave an av. of  $169.3 \times 10^{-10}$  g. per 10 cu. m. of air, the lowest being  $45.3 \times 10^{-10}$  g. The av. exposure for Ra transfer press operators was  $34.9 \times 10^{-10}$  g. In general the lower levels of Ra dust concn. were assocd. with better ventilation, less crowding, stricter supervision, the use of small amts. of paint and the avoidance of handling of dry paint. Electroscopic detn. of the amt. of  $\gamma$ - and  $\beta$ -radiations and of Rn at the working places showed the av. for all  $\gamma$ -ray readings in the dial painting rooms was equiv. to the discharge produced by about 1200  $\gamma$  of Ra 50 cm. from the instrument. For  $\beta$ -ray readings the av. was equiv. to about 2100  $\gamma$  of Ra. The Rn readings gave an av. of 51 curies  $\times 10^{-8}$  per 10 cu. m. of air, about 2000 times the content of normal outdoor air. E. G. Meiter  
 Health aspects of radium dial painting. III. Measurements of radioactivity in workers. James E. Ives, Fred L. Knowles and Rollo H. Britten. *J. Ind. Hyg.* 15, 433-46 (1933); cf. preceding abstr.—To measure  $\gamma$ -rays, the rate of discharge of a Wulf bifilar electroscope was measured, the probable error being 0.3  $\gamma$ . For Rn and Tn, expired air in a Douglas bag was placed near an electroscope, and the movements were measured. Standardization curves were made, the half-life period of thoron being 54.5 sec. Results of detns. made upon Ra workers are given. W. D. Langley  
 The behavior of gases and smokes in buildings several stories high. D. Dassel. *Gasmask* 6, 10-12 (1934).—

In consequence of chronic gas poisoning which occurred in a 4-story lab. building in rooms far distant from the source of the gas an investigation was made of the distribution of gases in this building. Currents were followed by means of P smoke produced by burning white P. Results showed unexpectedly wide distribution. For example, when 2 ventilating shafts serving different sections of the building emptied into a single discharge shaft with an exhaust fan at its exit end and when the rooms served by one of the ventilating shafts were closed, smoke discharging from the other shaft backed down into the closed rooms. The temp. gradient in a room greatly affected the distribution of smoke in it. The article is of interest in connection with the designing of buildings in which toxic gases will be used.

A. L. Kibler

A new filter and ventilator for closed gas-protected rooms. E. Smolczyk. *Gasmaskes* 6, 16-17(1934).—The ventilator is hand-operated and is intended to protect small, closed rooms from poison gases, primarily chemical warfare gases.

A. L. Kibler

Carbon monoxide and gas protection. Fritz Bangert. *Draeger-Hefte* No. 169, 2415-18(1933).—The reasons that CO is not suitable as a war gas are stated. The question of protection against CO is also discussed and the proper Dräger gas mask is indicated.

A. L. K.

The gas mask in the service of the worker. (The gas mask in industry.) Erich Neitzel. *Gasmaskes* 6, 19(1934).—Accidents are described which occurred in industrial plants in Germany during the year 1932 and which could have been prevented by the use of gas masks. There were only 60 fatalities as compared to 249 for the year 1931 (cf. C. A. 28, 1118\*). Among the causes of the accidents described were Ph, P, Hg, As, Mn, aromatic compounds, CS<sub>2</sub>, H<sub>2</sub>S, CO, dusts, nitrous gases, halogens, chlorinated hydrocarbons, chromic acid, NH<sub>3</sub>.

A. L. Kibler

Comparative life, fire and explosion hazards of common refrigerants. A. H. Nuckolls, et al. Underwriter's Labs., *Miscellaneous Hazards* No. 2375, 118 pp.(1933). Materials investigated were NH<sub>3</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>10</sub>, MeCl, MeBr, C<sub>2</sub>H<sub>5</sub>O<sub>2</sub>, EtCl, EtBr, CHCl<sub>3</sub>, CCl<sub>4</sub>, C<sub>2</sub>H<sub>5</sub>Cl<sub>2</sub>, COCl<sub>2</sub>, CCl<sub>2</sub>F<sub>2</sub>, CCl<sub>2</sub>F<sub>3</sub>, C<sub>2</sub>Cl<sub>2</sub>F<sub>4</sub> and, for comparison, gasoline and illuminating gas. Toxicity was detd. with concns. of 0.5-1.0% and 2-2.5% by vol. (with higher concns. in some cases), by exposing guinea pigs for periods of 5 min. to 2 hrs. Addnl. toxicity tests were made to det. the effect of decompn. of the gas mixts. by heat from gas and oil flames and elec. heating units, and analyses were made of the products of decompn. Investigation of fire and explosion hazards included detns. of ignition temp., limits of flammability or explosibility, explosion pressure-time tests, and speed of flame propagation tests. CCl<sub>2</sub>F<sub>2</sub> and C<sub>2</sub>Cl<sub>2</sub>F<sub>4</sub> are practically nontoxic but yield toxic and irritating decompn. products in the presence of flame or very hot surfaces. Both of these compds. are noncombustible and nonexplosive. The app. used and results of tests are described in detail and the data obtained are tabulated.

C. G. Storm

The effect of oil pressure on insulation strength. John A. Scott. *Elec. Eng.* 53, 308-9(1934).—At power frequencies and under long-time application of voltage there is a considerable increase in endurance strength of oil-treated insulation at pressures of several atms. Under impulse stresses, however, practically no benefit results from increased pressures. The effect of pressure on dielec. strength is greater the longer the time of voltage application, being negligible for the impulse voltage tests of only a few microseconds' duration and a max. for the long-time endurance test.

W. H. Boynton

The life of impregnated paper. J. B. Whitehead. *Elec. Eng.* 53, 244-51(1934); cf. C. A. 27, 1577.—A series of accelerated life tests on 14 different oils as used for the impregnation of one grade of cable insulating paper is described. Complete absence of gaseous ionization was definite relationship shown between the under stress and the capillary rise of a definite type the life of the power, while with oils

of different types differences may be evident in the relation of penetrative power to life. The influence of dielec. loss on life is negligible and the values of power factor during life tests appear to have no relation to life. Numerous curves are shown.

W. H. Boynton

Some mechanical and thermal properties of electrical insulators. Rubberoid, fiber and chemically prepared insulators. Ulrich Retzow. *Z. tech. Physik* 14, 551-5(1933).—Existing values for the sp. gr., tensile strength, bending strength, impact strength, hardness, thermal expansion, sp. heat and thermal cond. of a no. of insulators are collected and reviewed.

J. B. Austin

Utilization of sewage-sludge gas for refrigeration (Griffin) 14. Elec. insulating material (Swed. 77,564) 20

Bustinza Lachiondo, Florencio: Industrias de la quimica organica, cuyas materias primas son de origen vegetal e industrias biologicas. Madrid: J. Sanchez de Ocana 115 pp.

Filippi, Ulysse: Ce que serait la guerre de demain. Aérienne, chimique, bactériologique. Paris: La jeune république. 56 pp. F. 2.

Gibria, and Simon, Louis: Album national l'anti-gaz 3rd ed. Paris: Charles-Lavauzelle & Cie. 85 pp.

Gurgo, Maria: Chimica merceologica. Turin: A. Viretto. 68 pp.

Hampel, Josef: Über vergleichende Schwefeldioxidbestimmungen in der Atmosphäre und in den atmosphärischen Niederschlägen und ihre Verwertung zur Beurteilung von Vegetations-Schaden. Munich: Schiller-Akademie 72 pp. M. 2.80; bound, M. 4.

Kiesewetter, Robert: Gaskrieg und Luftschutz. Bd. VIII. Erläuterungen und Anweisungen für jedermann Leipzig: Reinhold Verlag. 196 pp. M. 2.10.

Maass, A. Th.: Biologie und Toxikologie der chemischen Kampfmittel. Gase, Dämpfe und Zerstäubungen Berlin: Junk. 66 pp. M. 8.

Ruff, Otto, and Fessler, Julius: Gasschutz-Gasbilde gegen Giftgase. Merkbuchlein für Nothelfer bis zum Eingreifen des Arztes. 2nd ed. Leipzig: Frohlich 61 pp. M. 0.80.

Schiller, Herman: Leitfaden der technischen Hygiene (Unfall- und Krankheitsverhütung) im medizinischen Betrieb. Leipzig: G. Thieme. 212 pp. M. 4.20

Smolczyk, Eduard: Lehrtafeln für Gasschutz (Gas, Rauch und Nebel, Staub). Berlin: Eggebrecht. 41 pp. M. 4.

Les établissements industriels et les fumées poussées et gaz. Paris: L'usine. 68 pp. F. 5.

Regeln für die Durchflussmessung mit genormten Düsen und Blenden. Issued by "Strömungsmesserausschuss des Vereines Deutscher Ingenieure." 2nd ed. Berlin: D. I.-Verlag. 20 pp.

Les toxiques de guerre. Brussels: J. de Vrogh 41 pp.

Separating gases or vapors. Edoardo Mazza. *Fr* 750, 239, Dec. 6, 1933. An app. is described for sep'g gas or vapors by the concomitant actions of centrifugal force and gravity and expansion force.

Acid gases from gaseous mixtures. Julius A. Brachfeld and Albert Smola. *Fr* 751,541, Sept. 5, 1933. See Austrian 135,047 (C. A. 28, 841<sup>3</sup>).

Wet purification of gases. J. Debricr. Belg. 391,501, April 29, 1933. Mech. features.

Gas scrubbing. Harvey R. Pife (to Carbide and Carbon Chemicals Corp.). U. S., 1,944,122, Jan. 16. Aq. solns. used in treating gas such as those contg. an amine and which tend to foam, are brought into contact with activated C, to remove foam-forming substances.

Controlling the hydrogen-ion concentration of flowing solutions. Harold S. Martin and Thomas A. Jauncey. U. S. 1,943,684, Jan. 16. There is continually introduced and mixed with the soln. a pH-controlling agent, and a portion of the soln. is subsequently removed and continuously mixed with an indicating agent giving by color an



indication of the  $pH$ . A photoelectric cell and elec. circuit serve to control the addn. of the  $pH$ -controlling agent in accord with the color of the test portion treated with the indicator.

**Treating gases with liquids, etc.** Industrikemiska Aktiebolaget. Brit. 400,592, Oct. 16, 1933. In processes of evapn., satn., gas-washing, etc., in which a gas is forced through a perforated plate immersed in a liquid to form a layer of foam on the liquid, the conditions are such that the foam layer is composed of uniform-sized bubbles of polyhedral form uniformly distributed throughout the layer. Such layer is formed by adjusting the velocity,  $v$ , of the gas through the plate, the smallest dimension,  $D$ , of the plate apertures and the kinematic viscosity,  $\nu$ , of the gas so that  $vD/\nu < 3500$ .

**Treating solids with gases.** F. M. Wiberg. Swed. 76,093, Feb. 28, 1933. The gases are conducted through a number of vessels contg. the material, which are connected in series and preferably mounted upon a string of cars, 2 on each car. The containers of each couple are connected beneath with each other and at the top with the containers of the neighboring couples, the gas passing through the material in downward direction in one container and upward direction in the next one.

**Drying granular materials.** Aktiebolaget Svenska Läkfabriken. (H. Edholm, inventor). Swed. 77,841, July 18, 1933. Granular materials, particularly grain, are treated with drying air during the passage downward through a silo, the passage being divided into a number of drying and resting stages. Mech. features.

**Separating solids from solutions by vacuum cooling in stages.** Karl Ebner (to American Lurgi Corp.). U. S. 1,911,548, Jan. 23. Various details are described of an evaporator and condenser system, suitable for treating solids such as those of mixed salts.

**Increasing the efficiency of centrifugal separation.** Aktiebolaget Separator (E. A. Forsberg, inventor). Swed. 76,944, April 19, 1933. By heat treatment and (or) by addn. of suitable substances the particles in suspension are made to agglomerate into coarser particles and (or) to join with small particles of a sp. gr. differing from that of the liquid in the same direction as the suspension.

**Crystallization.** Louis Prime. Fr. 756,006, Dec. 4, 1933. Larger crystals, e. g., of  $(NH_4)_2SO_4$ , are obtained in saturators by taking up the crystals from the lower part of the app. and causing them to redescend with a gyratory movement imparted to the liquid.

**Aqueous emulsions.** Th. Goldschmidt A.-G. Ger. 590,165, Dec. 27, 1933 (Cl. 23c. 2). Addn. to 551,403 (C. A. 26, 4392), and 582,106 (C. A. 27, 5124). The esters used as emulsifying agents in the processes of Ger. 551,403 and 582,106 are replaced by corresponding esters of hydroxy or unsatd. higher aliphatic acids or their substitution products, mixed with 5-12%, calcd. on the ester, of a saponaceous substance. Examples are given.

**Atmospheric mercury vapor.** Deutsche Gasglühlicht-Auer-G. m. b. H. Ger. 588,531, Nov. 20, 1933 (Cl. 30r. 501). A mass for removing Hg vapor in the atm. of com. laboratories, etc., to prevent poisoning the attendants, consists of active C,  $SiO_2$  or metal gels, impregnated with halogen.

**Apparatus and method of operation for producing compressed gas such as oxygen, nitrogen or methane from liquefied gas.** Christian W. P. Heylandt (to Fluga A.-G.) U. S. reissue 19,054, Jan. 16. A reissue of original pat. No. 1,812,954 (C. A. 25, 5058).

**Absorption refrigerating apparatus.** Platen-Munters Refrigerating System A.-B. (A. H. Fredholm, inventor). Swed. 77,509, June 13, 1933. The cooling medium is  $NH_3$  and the absorption medium is water-free  $LiNO_3$ .

**Apparatus for liquefaction and use of solid carbon dioxide.** Justus C. Goosmann (to American Dryice Corp.). U. S. 1,943,820, Jan. 16. Structural and operative details.

**Dielectric material.** Frank M. Clark (to General Elec. Co.). U. S. 1,944,730, Jan. 23. A material suitable for use alone or with paper, cloth, etc., comprises mainly chlorinated benzene, has a solidification temp. at least as low as  $5^\circ$ , a sp. gr. of about 1.43-1.48 and contains sufficient Cl to yield only substantially non-inflammable gas when electrically or thermally decompd. Cf. C. A. 28, 521.

**Insulating material.** Theo Uranschek. Fr. 756,220, Dec. 6, 1933. A porous insulating construction and refractory material is made by mixing org. fibrous material 3, asbestos flour,  $Al_2O_3$ , etc., 5-7.5, and  $Na_2SiO_3$  of 36-8° Baumé 5-7.5 parts, pressing and drying.

**Electric insulating material.** Linwood T. Richardson (to Cutler-Hammer Inc.). U. S. 1,944,404, Jan. 23. Various details are described of prepg. a cold-moldable insulating material by mixing a fibrous material such as asbestos with an org. binder such as a pitch or synthetic resin mixt., extruding the mixt. as a continuous strip, dividing the strip into blanks and cold-molding the latter. App. is described.

**Testing electrical insulating material.** Ellery B. Paine, Joseph Tykocinski-Tykociner and Hugh A. Brown (to Board of Trustees, Univ. of Ill.). U. S. 1,943,391, Jan. 16. There is impressed on the insulation a potential below the breakdown potential of the insulation but sufficient to cause insulation inhomogeneities to set up disturbance currents, and such currents are measured. U. S. 1,943,392 relates to various elec. details of testing cable insulation or the like.

**Electrical insulation.** Abraham Kronstein (to Electra-Lackwerke G. m. b. H. System Kronstein). U. S. 1,944,562, Jan. 23. Thin, fiberless, unsaponifiable sheets of viscose-like solid regenerated cellulose are provided with a coating of solidified linseed oil oxidation products.

**Coloring and coating insulated wire.** Neil C. Lamont (to National Electric Products Corp.). U. S. 1,944,823, Jan. 23. Various details of app. and operation are described for applying coloring matter and waxlike material to insulated wire.

**Coating cables with materials such as mica and stearin pitch.** Wm. W. Church and Wm. C. Robinson (to National Elec. Products Corp.). U. S. 1,944,822, Jan. 23. Various details of app. and operation are described.

**Apparatus and method for impregnating electric cables, etc., with resin, etc.** N. V. Machinerieën-en Apparaten Fabrieken. Brit. 400,446, Oct. 26, 1933.

**Cables.** Johnson & Phillips Ltd., Albert P. Pyne and Tom B. Parker. Brit. 400,235, Oct. 17, 1933. A cable is protected against fire and vermin by a layer of fibrous material impregnated with a non-inflammable chlorinated, preferably a polychlorinated,  $C_{10}H_8$ , which on application of heat generates a combustion-resisting gas.

**Preventing corrosion of lead sheathing on electric cables.** Henri Benit (to Compagnie générale d'électricité). U. S. 1,944,778, Jan. 23. S is incorporated in a protective covering such as pitch or tar which is applied over the Pb sheathing to form a protective film of Pb sulfide. Cf. C. A. 28, 736.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Progress in American water supply and purification practices during 1933. H. E. Jordan. *Water Works and Sewerage* 81, 1-6(1934).

Biological examination of water in Leipzig. Conrad Rich. *Pharm. Zentralhalle* 75, 15-16(1934).—An il-

lustrated paper on the occurrence of *Spongilla lacustris* L. and *Hematoecoccus pluvialis* Flotow in the water system of Leipzig. W. O. E.

Hydrobiologic and hydrographic investigations of two pond waters. Weimann Reinhold. *Botan. Centr. Beihefte*

51, 397-476(1938).—A small part of this investigation discusses the periodic analysis of the water samples for nitrates,  $\text{NH}_3$ , phosphates and Fe. R. C. Burrell

Examination of a spring water and applications of thermodynamic theories to real solutions. Giuseppe Bragagnolo and B. Maria Fregiani. *Ann. chim. applicata* 23, 546-56(1933).—The spring water in the Vigarano Mainarda region has been analyzed and its properties have been compared with values calcd. according to thermodynamic theory. The water contains Na, K, Ca, Mg,  $\text{NH}_3$ , Fe, HCl,  $\text{CO}_2$ ,  $\text{SiO}_2$ , org. matter. The f. p. of this water was calcd. as  $-0.162^\circ$  (measured  $-0.16^\circ$ ). A. W. Contieri

Simple water analysis. H. G. Smith. *Can. Mining J.* 55, 14 17(1934).—Simple routine water tests are described that are sufficiently accurate to ensure correct softening of water for all purposes. W. H. Boynton

Nephelometry. I. Analysis of potable waters. Luigi Belladen, Ugo Scazzola and Renato Scazzola. *Ann. chim. applicata* 23, 509-16(1933).—Nephelometric methods have been applied to the detn. of sulfate, Cl, Ca and Mg in potable waters. Cl is readily detd. to 1 part/10 million with proper illumination. Addn. of glycerol does not help any in sulfate detn., the low limit being about 7 parts/million. Ca is detd. according to Rona and Kleiman (C. A. 17, 3351) by using Na sulfocinate as precipitant. The Ca and Mg are then detd. according to Feigl and Pavelka (C. A. 19, 797) with  $\text{K}_4\text{Fe}(\text{CN})_6$  and  $\text{NH}_4\text{Cl}$ , the soln. for comparison contg. the same amt. of Ca as found above. The Mg is then detd. by difference. A. W. Contieri

Flow diagrams for the chemical treatment and filtration of water. John R. Baylis. *Water Works and Sewerage* 81, 65-8(1934).—A general discussion of the theory and practice of chem. treatment of water. Several typical flow diagrams showing points of application of the various chemicals in standard use are included. G. H. Young

Wayside water treatment on the Lehigh Valley Railroad. J. V. Cardillo. *Water Works and Sewerage* 81, 11-14(1934).—The treatment of railroad water supplies by automatic proportioning pumps feeding Na aluminate has resulted in decreased boiler maintenance and operating costs. G. H. Young

Methods and value of water treatment with respect to estimating and summarizing possible savings effected. R. B. Coughlan, et al. *Am. Ry. Eng. Assoc.* 35, Bull. 362, 624-5(1933).—Material reduction has been made in boiler repairs, and periods between boiler washings have been extended. R. C. Bardwell

Records show value of water treatment. E. L. E. Zahm. *Ry. Age* 95, 760(1933).—The Missouri, Kansas and Texas Railroad has 72 water-treating plants, all of continuous type using lime, soda ash and Na aluminate. Water treatment has greatly increased locomotive mileage between shoppings and has practically eliminated engine failures due to water conditions. R. C. Bardwell

Large water-treating plant embodies new features. R. E. Coughlan. *Ry. Eng. Maintenance* 29, 418-20(1933).—The Chicago and Northwestern Railroad recently placed a 2.5 million gal. per day water-treating plant in service at Clinton, Ia. Mississippi River water is used. Incrusting solids vary from 7.14 to 11.99 gr. per gal. and suspended solids from 19.68 to 624.27. Water is treated at a rate of 100,000 gal. per hr. with lime, soda ash and Na aluminate. Compressed air is used for mixing and sludge is recirculated. Operation is automatic. Softened water has a hardness of less than 1.0 gr. per gal. and  $\text{pH}$  of 9.8-10.2. R. C. B.

Chemical precipitation at Freeport, Long Island. Lawrence L. Luther. *Public Works* 65, No. 1, 20-2(1934).—Chem. treatment of sewage results in (1) improved quality of effluent, (2) accelerated speed of settling in sedimentation tanks, and (3) improved condition of tanks. Specifically,  $\text{FeCl}_3$  was found effective as a coagulant, the best results being obtained in conjunction with Cl.  $\text{FeCl}_3$  accelerated de-watering of either fresh or digested sludge. Pre-chlorination required no more Cl than post-chlorination. The re-use of previously coagulated solids appeared to have some merit. G. H. Y.

1 Reducing the cost of chlorinating. C. H. Vivian. *Water Works and Sewerage* 81, 25-6(1934).—By recirculating a portion of the chlorinated effluent through the sewage chlorinators, appreciable saving in tap water normally used for carrying Cl into the sewage may be realized. G. H. Young

Tastes, chlorine and chloramines in water purification. I. Charles H. Capen, Jr. *Water Works and Sewerage* 80, 447-50(1933).—A relation between water temp. and Cl dosage is presented and correlated with seasonal variations in Cl demand. II. *Ibid.* 81, 31-8(1934).—The use of  $\text{NH}_3$  in combination with Cl has proved effective in the control and prevention of many tastes and taste-producing organisms, particularly those resulting from direct chlorination alone. G. H. Young

Ammonia in water treatment. L. H. Enslow. *Water Works and Sewerage* 80, 379(1933).—Combination of  $\text{NH}_3$  with Cl in water treatment results in the following advantages: (1) inhibition of tastes produced by reaction of Cl with foreign substances, (2) reduction of Cl requirements, (3) prevention of free Cl taste and odor, (4) maintenance of long-sustained disinfectant action, and (5) control of slime and algal growth in reservoirs and distributing systems. G. H. Young

Results from the use of activated alum at Batavia, N. Y. Herbert M. Cook. *Water Works and Sewerage* 81, 47-8(1934).—A 20% reduction in alum consumption was obtained by using activated C compounded alum. Improved coagulation and more satisfactory taste and odor control resulted. In addn., less wash water is required for back-washing filters, and the filter beds are in better condition since the change to activated alum. G. H. Y.

Well filters. F. Burghardt. *Gas- u. Wasserfach* 77, 5-7(1934).—Well filters are a necessity in the northern part of Germany. Screened filters have the disadvantages that the pipe must be removed and filters replaced periodically because of action of Fe and Mn compds., or stoppage with fine sand. Various types of ring filters and the so called "pocket" filters, generally surrounded with graded filtering material, give longer service. R. W. Ryan

Experience with anthracite coal as a filter medium for water softening. C. P. Hoover. *Water Works and Sewerage* 80, 394(1933).—Anthracite coal of uniformity coeff. 1.6 and approx. 1 mm. effective size is giving satisfactory operation at the Columbus, O., water-softening and purification plant. After operation for 13 months, examn. showed no lumping or cementing together of the anthracite, though appreciable incrustation was observed. A top sample taken after the 13 months' operating period had an effective size of 0.95 mm. and 1.2 uniformity coeff. G. H. Young

Comparison of the reactions which take place in the softening of water by means of trisodium phosphate and sodium carbonate, respectively. J. Leick. *Warme* 56, 250-3(1933); *Chimie & industrie* 30, 1071; cf. C. A. 27 2084. —A general discussion, chiefly bringing out the advantages of  $\text{Na}_3\text{PO}_4$  over  $\text{Na}_2\text{CO}_3$ . A. P.-C.

Modern purification methods for boiler feed water. R. Klein. *Gluckauf* 69, 1077-85(1933).—An automatic method for control of alk. is illustrated. J. D. Davis

The uses of phosphates in boilers and their practical possibilities. Y. Markovitch. *Publ. assoc. ing. (cole mines Mons)* 1933, 259-450; *Chimie & industrie* 30, 1069. A. Papineau-Couture

Phenomena which take place when liquids come into contact in the feeding of boilers and in the treatment of water. Marcand and Bock. *Warme* 56, 302-6(1933). *Chimie & industrie* 30, 1323-4. A. Papineau-Couture

Cause and extent of pitting and corrosion of locomotive boiler tubes and sheets. J. H. Davidson, et al. *Am. Ry. Eng. Assoc.* 35, Bull. 362, 623-4(1933).—Experience indicates that the most practical method for reducing pitting and corrosion is to provide a caustic alk. in the boiler water equal to 10-15% of the  $\text{Na}_2\text{SO}_4$  and NaCl present. R. C. Bardwell

Corrosion inhibition by lime treatment—effect on industrial water-consumption costs. Sheppard T. Powell. *Ind. Eng. Chem.* 26, 254-6(1934). W. A. Moore

**Internal attack of water mains.** K. Adloff. *Wärme* 56, 265-8(1933); *Chimie & Industrie* 30, 1070-1.—Corrosion of water mains is due chiefly to the thin film of water which adheres strongly to the pipe, and depends on its O content and acidity and on the velocity of the water in the pipe. When the speed is very high, as is the case in main pipes as compared with small branch pipes, corrosion is slight or nil because the adherent film is carried away by the current. Two methods are used to prevent corrosion by dissolved  $\text{CO}_2$ : (1) the water is allowed to flow over marble; this process is not effective for waters having a certain hardness; (2) satd. lime water is added in amts. depending on the total hardness. After this treatment has been applied for a certain time the inside of the mains becomes covered with a protective coating which prevents corrosion and permits of decreasing the amt. of  $\text{CaO}$  added. A. Papineau-Couture.

The disturbing influence of nitrite compounds on the potassium permanganate consumption of water and sewage effluents and their removal. H. Jung and W. Otto. *Gas u. Wasserfach* 77, 56-8(1933).—Some sewage effluents contain excessive amts. of nitrite, which tend to give an excessive permanganate consumption. This may be avoided by destroying the nitrite with Na azide or urea. A large excess of urea may be added without interfering with the titration, and 5 cc. of 10% urea soln is recommended for adding to 100 cc. water or effluent to be tested. R. W. Ryan.

**Sewage-treatment plant, Boulder City, Nevada.** Earl M. Kelly. *Proc. 6th and 7th Ann. Conventions Am. Water Works Assoc., Montana Section* 1932, 35-6; cf. *A. 26*, 5361.—The plant designed by the U. S. Bureau of Reclamation uses the sep. sludge-digestion feature. It was designed to handle an av. sewage flow of 0.6 m. g. d. Dorr equipment is used, the digester having special mechanism to promote digestion. Gas from digestion is collected and used to fire a hot-water boiler to furnish heat to maintain sludge in the digestion tank at 90° F. Lime sludge from a water-softening plant is being discharged into the sewers and its effect upon the sewage-plant operation will be studied. G. L. Kelso.

**An economical sewage-treatment plant.** John Strowbridge. *Water Works and Sewerage* 80, 375-7(1933).—At the Dundee, N. Y., disposal plant the entire flow of chlorinated crude sewage is given sedimentation in one unit during a period of 2-3 months, the second settling tank being shut off. At the end of this period the first tank is shut off and the sewage passes through the second unit for the ensuing 2-3 months. Thus each unit is used alternately for sedimentation and digestion, digestion taking place in the 2-3 months each tank is out of service, and no special chem. treatment or aeration is required. Pre-chlorination eliminates surface scum and seems to aid sludge digestion. G. H. Young.

**Chemical treatment of sewage for Birmingham, Ala.** H. H. Herndon. *Water Works and Sewerage* 80, 427-30(1933). G. H. Young.

**British practice in sewage disposal.** H. C. Whitehead and F. R. O'Shaughnessy. *Trans. Inst. Chem. Engrs.* (London) Adv. copy, Jan. 25, 1933, 21 pp. E. J. C.

**Chlorine for small sewers.** G. S. Robins. *Public Works* 65, No. 1, 38-9(1934).— $\text{NaClO}$  was used successfully for combating odor nuisances in Webster Groves, Mo. The hypochlorite was fed directly into the sewer lines from 5-gal. carboys, 5 p. p. m.  $\text{Cl}_2$  being the av. dose. G. H. Young.

**Methods for the aeration of sewage.** Harold E. Babbitt. *Water Works and Sewerage* 81, 27-30(1934).—The relative advantages and disadvantages are given of mech. agitation and air diffusion for aerating sewage in the activated-sludge process. G. H. Young.

**The Pössneck sewage clarification plant with relation to city gas supply.** Otto Waldmann. *Gas u. Wasserfach* 77, 49-56(1934).—The large proportion of factory sewage in Pössneck causes wide variations in the amt. to be treated. Pössneck has 13,000 inhabitants and the sewage averages 620 l. per capita per day. The sludge is fermented in 100 cu. m. concrete digesters, each stirred by 3 stirrers

and provided with 3 gas domes. The normal compn. of the gas is 73-75%  $\text{CH}_4$ , 21-24%  $\text{CO}_2$ , a small percentage each of H and N and 1.0-1.5%  $\text{H}_2\text{S}$ . The heating value is normally 6600-6700 Cal. and the sp. gr. 0.70 to 0.80, av. 0.75. This gas is mixed with vertical chamber oven and blue gas to give a gas about 0.62 sp. gr. and a heating value of 4530 B. t. u. per cu. m., the proportion of sewage gas being about 20%. A slightly higher distribution pressure than normal is used to compensate for the higher sp. gr. and the mixed gas is entirely satisfactory. The gas works and sewage works are near each other. Operating costs for 1931-32 are given, which show that gas recovery made a substantial contribution toward operating costs. R. W. Ryan.

**Study of coagulation as applied to sewage treatment.** I. E. F. Eldridge and F. R. Theroux. *Mich. Eng. Expt. Bull.* 55, 3-22(1934); cf. *C. A.* 28, 1435<sup>a</sup>, 1436<sup>a</sup>.—There is a definite  $p_H$  zone in which  $\text{FeCl}_3$  coagulation of sewage is most effective. For E. Lansing sewage this zone is at  $p_H$  6.5-8.0. There is a higher optimal range and a lower one, where good removal of turbidity and suspended solids in sewage are obtained. The zone of low removal may be due to a coagulation of sewage colloids at their isoelec. point without the aid of  $\text{FeCl}_3$ . Ions extend the range of coagulation. Neg. ions extend the range toward the lower  $p_H$  values and pos. ions toward the higher. Ions of higher valences have a greater effect on extension of the range.  $\text{KMnO}_4$ , in small amts., allows the flocculation of a water at normal  $p_H$  of 7.8, when otherwise flocculation would occur at  $p_H$  4.5-5.5. Greater amts. of solids may be removed from sewage by the use of  $\text{FeCl}_3$  than by plain sedimentation, and the amts. increase with the dosage up to 1.25 grains per gal. For this dose the removal is about 90%. The biol. O demand was greatly decreased, an indication of the removal of org. colloids as well as suspended solids. Odors in the settled sewage were decreased by the use of  $\text{FeCl}_3$ . Fifteen references. C. R. Fellers.

**Some aspects of chemical precipitation in sewage treatment.** Alexander Potter. *Water Works and Sewerage* 80, 367-8(1933).—Advantages claimed include (1) freedom from odor nuisances, (2) ability to handle industrial waste, (3) lower construction costs, (4) space saving and (5) favorable comparison with other types of secondary treatment with regard to fixed charges, maintenance costs and quality of final effluent. G. H. Young.

**Improving settling-tank efficiencies and lowering operating costs at Aurora, Ill.** Walter A. Sperry. *Water Works and Sewerage* 80, 440 2(1933).—Vertical baffles at right angles to the inlet channel in the settling tanks resulted in increased efficiency of removal of suspended solids. G. H. Young.

**The practice of wasting excess activated sludge.** T. R. Haseltine. *Water Works and Sewerage* 80, 411-14(1933).—Results of operating and lab. expts. conducted at the Salinas, Calif., disposal plant show that wasting the activated sludge by return to the crude sewage (1) increases the suspended and settleable matter and biochem. O demand of the clarifier effluent, (2) results in higher percentage decrease of suspended solids and biochem. O demand, but (3) increases the actual suspended solids and biochem. O demand, the increase varying from 30 to 50% in biochem. O demand values and from 10 to 110% in suspended matter, and (4) increases the load on aerators, with accompanying increased operating cost. G. H. Young.

**Reducing the cost of activated-sludge treatment.** Edmund B. Besselièvre. *Water Works and Sewerage* 80, 364 6(1933).—By combining mech. agitation with diffused air aeration, 4 American cities lower power consumption and procure more flexible operation. G. H. Y.

**Utilization of sewage-sludge gas for refrigeration.** Guy E. Griffin. *Water Works and Sewerage* 80, 426(1933).—At Greenwich, Conn., sludge-digester gas from a sewage-treatment plant is used satisfactorily for operation of an Electrolux refrigerating unit in the plant lab. G. H. Y.

**The hygienic value of the disinfecting of swimming water by means of chlorine, chloramine and copper**

chloride. J. Idzerda and J. H. Wildervanck. *Nederl. Tijdschr. Geneeskunde* 77, IV, 5091-5101 (1933).—Ordinary chlorination is preferable in the continuous system of purification, provided that the passage of the pool water through the filter does not exceed 8 hrs., that the no. of visitors does not exceed the allowed limit and that the water is suitable for this kind of disinfection. The chloramine method is to be used for the "periodical" system. The combined Cu and Cl method is unreliable and requires too much supervision.

R. Beutner  
**Essentials of mosquito control.** H. W. Van Hovenberg. *Am. Ry. Eng. Assoc.* 35, *Bull.* 362, 637-9 (1933).—Methods used include proper drainage, oiling, filling, use of fish which eat mosquito larvae, screening and prophylaxis.

R. C. Bardwell  
**Handling sugar-beet wastes in a municipal water plant.** W. D. Loreaux. *Water Works and Sewerage* 81, 61-3 (1934).—Operating expts. carried out at the Dundee, Mich., municipal water works prove that powd. activated C applied in the first and second mixing chambers is superior to a fixed filter bed of granulated C for the removal of tastes and odors resulting from sugar-beet wastes. The most satisfactory results were obtained by using the powd. C in conjunction with pre-ammoniation and pre-chlorination, the ratio of Cl to  $\text{NH}_3$  being maintained at 7:1.

G. H. Young

**Portland cement pipe coatings (Speller)** 20. Radioactivity and compn. of the waters in Lurisia (Francesconi, Bruna) 3.

**Frickhinger, Hans W.:** Gas in der Schädlingsbekämpfung. Berlin: P. Parey. 87 pp. M. 4.50.

**Pia, Julius:** Kohlensäure und Kalk. Einführung in das Verständnis ihres Verhaltens in die Binnengewässern. Stuttgart: Schweizerbart. 183 pp. M. 22.50.

**The Control of Water Softening and Boiler Water Conditioning.** London: Imperial Chem. Industries, Ltd. 39 pp.

**Sterilizing water.** John C. Baker and Franz C. Schmelkes (to Wallace & Tiernan Products, Inc.). U. S. 1,943,650, Jan. 16. A soln. contg. 0.02-0.3% dichloramine is used for treating the water.

**Purifying water.** Fritz Hahn. Fr. 756,266, Dec. 7, 1933. Water is softened and purified by the action of alkalis (caustic or carbonate) and a small amt. of a salt of Cu, Cr or Ni (preferably  $\text{CuSO}_4$ ).

**Purifying water.** Otto Kammann. Ger. 590,170, Dec. 27, 1933 (Cl. 85b. 1.01). Drinking water is freed from Fe, Mn and free  $\text{CO}_2$  in one operation by passing it slowly through a tank in which it is treated simultaneously with finely divided compressed air introduced tangentially and with a heavy metal hydroxide or peroxide capable of adsorbing the sepd. Fe and Mn compds. For the latter purpose, a sludge contg. coarse  $\text{Fe}(\text{OH})_3$ ,  $\text{MnO}_2$ , and a little  $\text{Cu}(\text{OH})_2$  or  $\text{Ni}(\text{OH})_2$  is suitable.

**Purifying aqueous liquids by treatment with chlorine.** Georg Ornstein. U. S. 1,944,804, Jan. 23. An excess of Cl is added to a flowing stream of liquid such as water or sewage to be treated, and a stream of the liquid contg. the Cl is brought into contact with one electrode of a galvanic element; another stream of the liquid contg. the Cl is

dechlorinated and then brought into contact with the other electrode of a galvanic element, and the further addn. of Cl is regulated according to the difference of potential produced across the electrodes. App. and various details of operation are described.

**Heating and deaerating water.** George H. Gibson and Victor A. Rohlin (to Cochrane Corp.). U. S. 1,943,800, Jan. 16. Various details of app. and operation are described.

**Analysis of water.** Louis Friderich. Fr. 755,916, Dec. 1, 1933. Water which has been purified by oxidizing agents is tested for excess of oxidizing agent by the variation produced in the e. m. f. of a couple immersed in the water. The couple may comprise a pos. electrode of Zn and a neg. of Cu.

**Base-exchange substances.** "Mutosel" (Soc. anon. holding luxembourgeoise). Fr. 755,681, Nov. 28, 1933.

**Ground blast-furnace slag is used as starting material and is given an acid or alk. treatment, e. g., with an aq. soln. of  $\text{NaHSO}_4$ , or with  $\text{NaOH}$  at 400-500°, followed by a thorough washing and drying.**

**Zeolites.** General Zeolite Co. Ger. 588,740, Nov. 25, 1933 (Cl. 12i. 38.01). Jelly-like zeolites are obtained by mixing fine streams of concd. solns. of silicate and Al compds. and allowing the mixed stream to flow into a collecting vessel, where the product eventually appears.

**Treating feed water.** H. A. G. Gunnellus. Swed. 77,617, June 20, 1933. Ammonia is used at least for the final regulation of the alk. of the water.

**Several-way valve for regenerative water-filtering apparatus.** Aktiebolaget Filtrum (K. A. R. Johanson, inventor). Swed. 78,347, Sept. 12, 1933.

**Control system (operated by differences in electrical potential) for indicating and regulating the concentration of water- or sewage-purifying reagents such as chlorine** Georg Ornstein. U. S. 1,944,803, Jan. 23. Various details of app. and operation are described.

**Sterilizing liquids such as water or sewage by successive treatment with ammonia and chlorine.** Edward D. Ruth (to Howard J. Pardee). U. S. 1,943,487, Jan. 16. Liquid (which may be flowing through a pipe) is treated with  $\text{NH}_3$  (supplied in gaseous form) and after a predtd elapsed time is then treated with Cl. App. is described.

**Sewage water clarifying plant.** Rudolf Gessner. Ger. 588,757, Nov. 27, 1933 (Cl. 85c. 6.01).

**Septic tank apparatus for treating sewage.** Georg H. mann. Ger. 590,156, Dec. 27, 1933 (Cl. 85c. 6.05). Means for accelerating the digestion of the sludge is described.

**Apparatus for aerating liquids.** Activated Sludge Ltd., Ernest R. Jones, Arthur B. Denton and James A. Coombs. Brit. 400,940, Oct. 23, 1933. Divided on 397,841 (C. A. 28, 11269).

**Purifying air.** Deutsche Gasglühlicht-Auer-Ges. m. b. H. Ger. 590,072, Dec. 22, 1933 (Cl. 30i. 5.02). Air contaminated with  $\text{NH}_3$  or other volatile base is passed through a filter impregnated with an aliphatic hydroxy monocarboxylic acid, e. g., glycolic or lactic acid.

**Sterilizing air.** J. Doms. Belg. 396,748, July 31, 1933. The air is passed through a filter, the mass of which contains metals such as Ag or  $\text{AgCl}$ , and is brought into a storage tank where it is in contact with the same metals in a form having as large a surface as possible.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

**Report of the agricultural chemist for 1932.** T. Eden. Tea Research Inst. Ceylon, *Bull.* 10, 42-7 (1933).—**Soils** that supported little or no growth of tea had  $p_H$  values of 7.06-7.31; within 7-10 months after application of 1000 lb. flowers of S per acre the  $p_H$  values were reduced to 5.00-6.61 and better growths of tea were obtained. **Fertilizer expts.**—Significant increases in the yields of tea were obtained by the application of N fertilizers at the rate of 20-40 lb. N/acre; the best results were obtained

with blood meal and  $(\text{NH}_4)_2\text{SO}_4$  and the poorest with com.  $\text{CaCN}_2$ ; K fertilizers had little or no effect. K. D. J.

**Gezira chemical section, G. A. R. S. Final report on experimental work in 1931-32.** H. Greene. Sudan Gov., Gezira Agr. Research Service., *Ann. Rept.* 1932, 75-92 (1933).—**Soil improvers.**—Significant increases in the yield of cotton were obtained by the application of  $\text{K}_2\text{SO}_4$  (2 tons/acre), gypsum (2 tons/acre) or  $\text{FeSO}_4$  ( $3\frac{1}{4}$  tons/acre), with and without  $(\text{NH}_4)_2\text{SO}_4$ ; S had little or no

effect. The treatments increased the penetration of water in the soil and also the incidence of leaf curl in the plants. *Phys. properties of soils.*—As compared with fallow soils, air-dry soils from cotton plots contained more moisture when exposed to the same atm. conditions, had greater sediment vols. after treatment with  $\text{Na}_2\text{CO}_3$  soln., were less alk. and gave higher values for Na uptake; no significant differences were found in capillary rise of paraffin, in salt content or in production of nitrate in the moist soils. Data are given on the seasonal variations in the nitrate content of soils in fallow and under cotton.

K. D. Jacob

Results of twenty years' complete soil fertility tests, Brookings, South Dakota. Joseph G. Hutton. S. Dak. Agr. Expt. Sta., *Bull.* 280, 3-19(1933).—Over 20 years' field expts. show that the application of P alone has increased the yield of crops by 32.08%, or 1979 lb. per acre per year over the yield from untreated soil. The P alone, added as superphosphate at the rate of 200 lb. per acre per year, has produced an increase of 74% in the total wt. of the red clover crop, including hay, straw and seed. P must be applied to S. Dak. soils if the fertility is to be maintained. The application of N and K, either singly or in combination, proved not to be economical. The expt. is being continued. Detailed data are presented.

C. R. Fellers

Organic matter and humus. F. Trawinski. *Ergras* 49, 15-17(1934).—A short history is given of the discovery of natural humus, followed by a description of some of the recent work on artificial humus, its prepn. and properties. An attempt is made to differentiate between the terms org. matter and humus by stating that humus is a colloidal dehydration product of certain org. matter. *Ibid.* 49-50.—A rather detailed discussion of the phys. and chem. properties of humus and the application of these properties to its use as a fertilizer. Enumeration of its advantages shows its great utility.

J. R. Adams

Functions of humus in orchard soils. R. E. Stephenson. Oregon State Hort. Soc., *Rept.* 47th Ann. Meeting 1932, 33-42.

K. D. Jacob

The exchangeable cations in the soil and the plant. K. K. Gedroiz. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 113, 3-13(1933).—A chernozem soil was satd. with the following cations: Li,  $\text{NH}_4$ , Na, K, Mg, Ca and H. The chlorides of the resp. cations were used until the soil was completely satd. with cations. The excess of chlorides was washed out with alc. The variously satd. soils were dispersed in a l. of water, decanted, and again dispersed in another l. of water. In the solns. detns. were made for humus, total dry matter, loss on ignition,  $\text{SiO}_2$  and  $\text{R}_2\text{O}_3$ . It was found that sol. humus and  $\text{R}_2\text{O}_3$  are the highest in the soils satd. with Li, Na, K,  $\text{NH}_4$ , Mg, Ca and H, in the order given. As to the  $\text{SiO}_2$ , the order remained the same except for the K soil, which gave a lower  $\text{SiO}_2$  content than with any of the other univalent cations. Addns. of  $\text{CaCO}_3$  to the suspensions decreased the yield of humus and other constituents; especially was this noted with the  $\text{NH}_4$  soil. Soils satd. with Cd and Ni did not produce a crop of flax or oats. Expts. with  $\text{NH}_4$ -satd. soils show that in this particular soil adsorbed  $\text{NH}_4$  may serve as a splendid source of N for oats.

J. S. Joffe

Effect of cover crops on the soil solution at different depths under orchard conditions. E. L. Proebsting. *Hilgardia* 7, 553-84(1933); cf. C. A. 24, 5094.—Analyses of soil solns. displaced from 0-2, 2-4, 4-6 and 6-8 ft. samples in peach, apricot, pear and prune orchards given differential cover crop treatment confirm previously reported results as regards the 0-2 and 2-4 ft. samples. The nitrate concn. of the 4-6 and 6-8 ft. depths under peaches and apricots is higher than that under pears and prunes, in contrast to the opposite situation in the surface 4 ft. The nitrate concn. in the 4-6 and 6-8 ft. samples is greatly reduced under alfalfa and winter cover crops as compared with clean cultivated check plots. Plowing under alfalfa increased the nitrate concn. markedly in the surface 4 ft. but had little effect below that depth. Reseeding caused a reduction of nitrate to about the former level. The sulfate concn. under peaches and apricots is

higher in the 4-6 and 6-8 ft. samples than that under pears and prunes. The max. sulfate concn. is normally in the 4-6 ft. layer. In spite of addns. of sulfate by irrigation water the sulfate concn. of the soil soln. remained practically unchanged during a 5-7 yr. period. The bicarbonate concn. is higher in the 4-6 and 6-8 ft. levels than in the surface samples; it is also higher under alfalfa and winter cover crops than in uncropped controls. Max. Cl concn. is at the 6-8 ft. level, and is higher under peaches and apricots than under pears and prunes. Cl is also lower under alfalfa than under clean cultivation. The phosphate concn. is higher in surface than in deeper samples, with a min. at 4-6 ft. Ca concn. varies in a manner analogous to nitrate. The Mg concn. parallels that of Ca except that it is lower in the 0-2 ft. level, and higher in the 6-8 ft. level. The K concn. decreases with depth.

C. R. Fellers

Effects of soil reaction. F. Munter. *Landw. Wochschr.* 89, 552-4(1931).—The influence of various fertilizers on soils of varying  $\text{pH}$  is recorded. The Ca present in certain N fertilizers and in basic slag and Khenania phosphate is insufficient to have any appreciable effect on soil reaction. In soils of different type but similar  $\text{pH}$  plant injury due to acidity varied considerably in extent. On acid soils cultivated plants were frequently unable to form nutrient-assimilating roots. The starch content of potatoes on acid soils was increased by applications of  $\text{CaO}$ .

B. C. A.

Oxides of manganese and the quinhydrone error in measurements of soil reaction. E. M. Crowther and S. G. Heintze. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 1-6(1933)(in English).—Further studies on the causes of errors in measurement of soil  $\text{pH}$  by the quinhydrone method (cf. C. A. 24, 4571) indicate that reduction of higher oxides of Mn to  $\text{MnO}$  and the activity of the latter as a base are the principal sources of error. The simultaneous change in the ratio quinone:hydroquinone is a partially compensatory error of much less importance, except with alk. soils, in which case autooxidation of hydroquinone to quinone and probably other products is catalyzed by Mn. C. J. Schollnberger

Comparative investigations on various methods for measuring soil  $\text{pH}$ . B. P. Nikolskii. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 7-16(1933)(in German).—Tabulated data with a very brief discussion of results obtained on 8 soils varying in humus content and texture, by means of (I) the Haber glass electrode, (II) the same with streaming  $\text{H}_2$ , (III) the Hildebrand  $\text{H}_2$  electrode, (IV) the quinhydrone electrode with quinhydrone specially synthesized, the first potential reading, (V) the same, with further addn. of quinhydrone until potential was const., (VI) Merck's quinhydrone, the first reading, (VII) the same, with further addn. of quinhydrone to const. potential, (VIII) Sb electrode prepd. by electrodeposition from  $\text{Me}_2\text{CO}$  upon amalgamated Pt wire, and the following colorimetric methods: (IX) Universal indicator "Selkhosgiz," (X) technic of Michaelis and (XI) Clark. The measurements were on both  $\text{H}_2\text{O}$  and N KCl exts. of soil, ratio 1:2.5, prepd. by shaking for 2 hrs., letting stand overnight, again shaking and letting stand  $\frac{1}{2}$  hr. Most of the partly settled suspension was then poured off. A part was tested as "suspension" (a), and another portion centrifuged (b) for application of colorimetric as well as electrometric methods. The remainder of the original suspension was tested as "mud" (c). I furnished closely reproducible indications on suspensions a and c, and is believed to be the most accurate method. With centrifugate b, agreement was better with KCl than with aq. exts., the former being more acid and better buffered. II indicated higher  $\text{pH}$  values except with an acid peat and a chestnut brown soil contg.  $\text{CaCO}_3$ , in consequence of removal of  $\text{CO}_2$  by streaming  $\text{H}_2$ . III was satisfactory in only a few cases, no doubt for the reason mentioned. IV, V, VI and VII furnished good indications with some soils, but were subject to grave errors with others. With the last, the observations of Heintze and Crowther (cf. C. A. 24, 4571 and preceding abstr.) as to the effects of

MnO<sub>2</sub> were confirmed. The data do not indicate much advantage in using specially prepd. rather than com. quinihydrone. With soils permitting good measurements of  $p_H$  by the quinihydrone method, the apparent equilibrium potential is the more accurate. In general, quinihydrone indications with the lighter suspension were better than those with the heavier c, and the use of centrifugate b was best with "bad" soils. With "good" soils, b was inferior because inadequately buffered. Indications of VIII were quite satisfactory, although it appears to be subject to errors from suspended solids and salts, not adequately investigated. With centrifugates from peat soils, it was more satisfactory than methods in which quinihydrone was used. Of the colorimetric methods, IX is insensitive, although in practice almost as good as X and XI. In general, these were unsatisfactory, for the reason that they can be applied only to clear exts., insufficiently buffered to resist change in  $p_H$  from acids of indicators. With any method for detg.  $p_H$  of soil, it is advantageous to operate with as narrow a soil:soln. ratio as possible, to secure max. buffering. Clear exts. are very poorly buffered as compared with soil suspensions.

C. J. Schollenberger

$p_H$  or reaction of soils. F. Trawinski. *Engrais* 48, 753-5(1933).—A detailed description of the chemistry of the  $p_H$  of soils from the practical viewpoint, its terminology and its use in detg. the soils best fitted for various crops. A table is given which lists 16 different plants and the  $p_H$  range of the soil in which they give the best yields.

J. R. Adams

The estimation of  $p_H$  values with the antimony electrode. J. Di Gleria. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 17-19(1933)(in German).—The prepn. of an Sb electrode by electrodeposition from a soln. of tartar emetic and Na<sub>2</sub>S upon a base of Sn-plated Cu is described, and the potentials of the same in buffers,  $p_H$  3.0-10.2 by steps of 0.4, are tabulated. The e. m. f.- $p_H$  relation is not strictly linear nor in exact agreement with the Nernst equation, but indications with 20 soils checked well and agreed with those of the quinihydrone electrode up to  $p_H$  8.5, above which the latter is known to be unreliable. The Sb electrode is recommended for soil  $p_H$  work, especially for alk. soils.

C. J. Schollenberger

Some notes on Kappen's method. D. J. Hissink. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 20-4(1933)(in German).—Kappen's method for unsatn. (cf. C. A. 24, 1093) was modified by substituting leaching with Ca(OAc)<sub>2</sub> soln. for shaking and filtration without improvement. Results from a procedure in which soil and soln. were in contact overnight and the size of the soil sample was so regulated that as nearly as possible 10 ml. 0.1 N NaOH was required in titrating 50 ml. of the filtrate, which conditions were found to correspond to a CaO absorption resulting in a  $p_H$  of about 6.5 in the residual soil, were higher and bore a more const. relation (factor 1.5 ± 0.1) to the CaO absorption necessary to take the soil to  $p_H$  7.0 in an electrometric titration with Ca(OH)<sub>2</sub>. These higher figures are believed to approximate the quantity of CaO necessary for amelioration of phys. condition as well as neutralization of heavy clay soils.

C. J. Schollenberger

Influence of rain on soil reaction. A. Salminen. *Acta Chem. Fennica* 6B, 60(1933).—Rainfall under warm summer conditions increased the  $p_H$  of soil at all depths to 25 cm. Later in the season on well-fertilized soil the effect was reversed.

B. C. A.

The use of indicators for the qualitative determination of soil reaction. Horace J. Harper. *Soil Sci.* 36, 451-63(1933).—Filtrates of indicators passing through different soils do not show the same  $p_H$  values as electrometric measurements of the same soil samples. A variation in the concn. of the indicators also affects the results. A decrease in  $p_H$  value occurs when the concn. of an indicator is increased and vice versa. When soils are mixed with indicator solns. and filtered the  $p_H$  values are more acid than when suspensions are used except in very acid soils. Bromothymol blue and bromocresol green are absorbed to a greater extent by soil than bromocresol purple,

1 chlorophenol red or cresol red. A qual. indicator method for soil reaction is proposed in which 0.04% bromocresol purple soln. is used in 16% alc. The soln. is added to soil on Al foil. From the color of a drop passing through the soil,  $p_H$  values are arranged in 5 groups ranging from 5.4 to 7.5.

M. S. Anderson

Effect of soil reaction on the growth of the potato. O. Smith. *Am. Potato J.* 10, 115-21(1933); cf. C. A. 27, 5881.—Potatoes were grown on soils in which the  $p_H$  values were varied from 4.68 to 7.45 by addn. of H<sub>2</sub>SO<sub>4</sub> or hydrated lime. The total yields were reduced on soil of  $p_H$  4.68-4.90 but there were no significant differences in yields on soils of  $p_H$  6.08-7.45. The best yields of U. S. grade No. 1 tubers were obtained on the most alk. soil. The largest no. of scabby potatoes occurred on soils of  $p_H$  6.08-6.51, the no. decreasing at higher and lower  $p_H$  values. Marketable tubers grown at  $p_H$  5.64-6.05 contained more dry matter than did those grown at higher or lower soil reactions. Preliminary tests indicated that immature tubers and tubers grown at  $p_H$  7.16-7.45 showed sloughing off of the outer layers during boiling than do mature tubers or those grown at  $p_H$  5.64-6.05.

K. D. Jacob

Influence of the reaction of peat and mineral soils on the development of potatoes. B. Swietochowski. *Polish Agr. Forestal Ann.* 27, 385-412(411 12 in German) (1932).—Pot expts. gave the following results: Any change of the soil acidity has only a small effect on the juice of potato leaves, but the vegetation period of the plants is lengthened with rising  $p_H$  of the soil, this effect being more pronounced on peat soils. Max. crops of tubers and dry substance are obtained on mineral soil in the neutral region, on peat in slightly acidic soils (to  $p_H$  4.6). In mineral soil an acidity of  $p_H$  3.6 is already prohibitive, while in peat soils the plants develop normally at  $p_H$  3.6, yielding a lower crop. On the alk. side no limiting  $p_H$  is observed. The acidity of the soil also influences the quality of potatoes. The no. of tubers as well as the amt of starch and dry substance increase with rising  $p_H$  of the soil.

J. Wiertelak

A modification of the barium hydroxide method for determining exchangeable hydrogen. H. Grenc. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 23-7(1933)(in English).—In "Sigmund's and Di Gleria's" conductometric titration of soil with Ba(OH)<sub>2</sub>, based on the original method of Hissink (cf. C. A. 19, 3337) for detg. unsatn., many addns. of reagent and readings are necessary for plotting the curve. G. points out that increase in cond. of the soil mixt. is almost entirely due to unabsorbed Ba(OH)<sub>2</sub>, and over most of their courses the curves are the same as those of a Ba(OH)<sub>2</sub> soln. increasing in concn. If a plot is prepd with g. Ba(OH)<sub>2</sub> in soln with corresponding conductivities at const. vol. on the x axis, and g. Ba(OH)<sub>2</sub> added on the y axis, and sufficient Ba(OH)<sub>2</sub> added to bring the cond. into the region where the slope of the curve is 1, a single reading will furnish a fairly accurate indication for H in the sample. A line with slope 1 is drawn through the point and a value for Ba(OH)<sub>2</sub> in soln. read at the intercept with the x axis. The difference between this value and Ba(OH)<sub>2</sub> added represents the H equiv. For several Gezira soils, satisfactory results were obtained with 5 g. soil and 10 ml. 2.5% Ba(OH)<sub>2</sub>, but the method is not applicable to all soils.

C. J. S.

The acetic acid method for the determination of exchangeable bases in carbonate-free soils. Rice Williams. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 28-33(1933)(in English).—Advantages of the HOAc extn. procedure for detn. of all exchangeable bases, as well as for Ca previously noted (cf. C. A. 23, 2234), are reviewed. The method of extn. consists in stirring 25 g. soil with 200 ml. 0.5 N HOAc occasionally for 2 hrs., then filtering and washing with the same to a total vol. of 1 l. Ca and Mg are detd. in 500 ml. by the usual methods. The remainder is evapd. to dryness and ignited to convert acetates to carbonates, redissolved in 20 ml. 0.5 N HCl and titrated for total exchangeable bases (S-2224); this figure does not include H<sub>2</sub>O-sol. salts, sometimes of significance in



humid soils and necessitating laborious corrections with other methods of detn. K and Na may be detd. also (cf. C. A. 24, 5912). Data on exchangeable bases detd. by this H<sub>2</sub>OAc method and N NaCl and NH<sub>4</sub>Cl extn. were in good agreement.

C. J. Schoellenberger  
Base saturation in soils as measured by the soil-calcium carbonate-air equilibrium. Richard Bradfield and W. H. Allison. Ohio Agr. Expt. Sta., 50th Ann. Rept. Bull. 497, 47-8(1932).—As evidence that a true equilibrium has been reached, the amt. of Ca fixed by a soil is the same whether the Ca is added as CaCO<sub>3</sub> or Ca(OH)<sub>2</sub>, or whether the equil. is approached from the acid side by passing an excess of CO<sub>2</sub> and then removing the excess with air, or from the alk. side by the gradual conversion of the excess Ca(OH)<sub>2</sub> into CaCO<sub>3</sub> by the CO<sub>2</sub> of the air. That true satn. is obtained is shown by the fact that the amt. of Ca fixed by the soil is independent of the amt. of the excess added. The p<sub>H</sub> values of soils brought into equil. with an excess of CaCO<sub>3</sub> and air are fairly const., varying from 8.2 to 8.4. The sp. cond. of a series of acid soils increased from 5 to 10 times as a result of the carbonate treatment. The carbonated soils in a 1:5 suspension had sp. cond. ranging from 2.3 to 5.1 × 10<sup>-4</sup> mho at 25°. An increased Ca concn. brings the colloidal particles to the crit. potential with resultant flocculation.

C. R. Fellers  
The relation of the nitrifying capacity of soils to the availability of ammonia and nitrates. G. S. Fraps and A. J. Sterges. Soil Sci. 36, 465-70(1933); cf. C. A. 27, 1646.—Nitrate N was on an av. 5.4% more available than ammonia N in soils of high nitrifying capacity and 1% more available than ammonia N in soils of low nitrifying capacity. There is no evidence of a regular relation between availability of nitric N or of ammonia N and the nitrifying capacity of soils. The availability of N in cottonseed meal is lower than that of either NaNO<sub>3</sub> or (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. There is no relation between the availability of N in cottonseed and the nitrifying capacity of soils. The nitrifying capacity of soils is somewhat increased by cropping and the addn. of fertilizers.

M. S. A.  
Lysimeter investigations. III. Mineral and water relations and final nitrogen balance in legume and non-legume crop rotations for a period of 16 years. R. C. Collison, H. G. Beattie and J. D. Harlan. N. Y. Agr. Expt. Sta., Tech. Bull. 212, 5-81(1933); cf. C. A. 26, 6047.—A final report of these well-known expts. is given. A detailed discussion is given of the influence of the various crops upon subsequent crops, the effect of the addn. of various fertilizers and the removal of elements in the drainage water. Large quantities of N were lost in drainage water, only a small amt. of K and practically no P. The ratio of Ca removal in drainage to that in crops was nearly 1:1 for alfalfa-grain rotations, but as wide as 8:1 for timothy-grain rotations. The presence of sol. N in the soil increased loss of Ca through drainage. Applications of 2200 lb. of CaCO<sub>3</sub> to the Ca-deficient hill soil every 4 years was ample to maintain the soil Ca. In the hill soils the Ca concn. in the drainage water averaged 47 p. p. m., and in the Ontario loam, 91 p. p. m. The quantity of Mg in the drainage was 1/5-1/3 that of Ca. P removed from the soils was lost entirely through crop removal. Applications of 560 lb. of 16% superphosphate per acre in the odd years for 16 years resulted in just balancing P removal from soils in alfalfa-grain rotations, and increasing P somewhat in soils in timothy-grain rotations. The depth of the soil column has little to do with P removal. From the hill soil the largest amt. of bases lost consisted of sulfates, followed by chlorides and bicarbonates. However, from the Ontario loam, greatest base loss occurred as bicarbonates, followed by sulfates and chlorides. Tanks which maintained a high N level or to which N was applied lost much less S, indications that the bases combined with the nitrate ion and conserved the sulfate ion. Enough S was added as pptn. to make up for the S lost in drainage. The same is largely true of chlorides. In the 8-ft. tanks, it appears that some of the N, K and Ca which was already present in the soil below 2 ft., or which was leached to lower levels, becomes available to shallow-rooted plants, probably through capillary

forces. Such interchange is considered relatively unimportant.

C. R. Fellers  
Effects of acidifying amendments on impermeable soils. C. W. Botkin. New Mex. Agr. Expt. Sta., Tech. Bull. 210, 2-18(1933).—Poor soils of the Gila clay loam type were treated with CaSO<sub>4</sub>, FeSO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, S, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, NaNO<sub>3</sub>, manure and superphosphate annually for 3 years. In the 4th year, the soils were deeply subsoiled and planted to cotton with 16 in. of irrigation water. The soils remained dry under the 20 in. horizon. No increases in yield of cotton were found in any case. Most of the amendments decreased the percentage of sol. alkali salts in the soil in the 0-8-in. horizon, and decidedly improved the soil permeability in this horizon. There was no effect at lower horizons. CaSO<sub>4</sub>, as gypsum, was the cheapest amendment, and was most effective in replacing Na in soil. The low permeability of these soils is caused by the high content of replaceable Na in the upper horizon and by a hardpan formed largely by cementing Ca compds. in the lower levels.

C. R. Fellers  
Influence of method of irrigation on the nutrient status of soil and yield of cotton. F. Celtzer. Arb. allruss Forschingsinst. Baumwollbau (Taschkent) 43, 34 (1931); cf. Pedology (U. S. S. R.) 27, 91-102(1932).—Infiltration methods are preferable to surface flooding, since soil structure is less impaired, permeability of soil is greater, and the enrichment with CO<sub>2</sub> of air immediately above the soil surface is considerable. Poorer nitrate accumulation after flooding is ascribed to the lowered activity of the organisms and to denitrification.

B. C. A.  
The effects of thallium sulfate upon soils. A. S. Crafts. Science 79, 62(1934).—In equimol. concns. Tl<sub>2</sub>SO<sub>4</sub> was many times as toxic as As<sub>2</sub>O<sub>3</sub> and NaClO<sub>3</sub>. It was strongly fixed in all soils and its toxicity remained unchanged through 3 successive croppings. Tl-treated grain, used in rodent control, showed very little effect on adjacent plants. The loss of agriculturally valuable land through sterilization by the Tl compds. used in the proper amt. for rodent control seems remote.

J. R. Adams  
Fatigue of soils planted in alfalfa. A. Demolon and A. Duncz. J. agr. prat. 98, 29-30(1934); cf. C. A. 28, 1444.

J. R. Adams  
Relationship between soil and associated plants in the Czerwone Wierchy and Bielskie Tatry districts (Tatra Mountains). J. Wlodek, K. Strzemiencki and E. Ralski. Bull. intern. acad. polonaise, Classe sci. math. nat. 1931B, 1, 103-22.—*Versicoloretum Tatricum* and *Trifidistichetum* grow in a soil richer in humus than that required by *Disticho-Versicoloretum*; the first-named requires a soil richer in Ca than the 2 last. All the plants examd. grow in soils which have a reaction varying from strongly acid to mildly alk. (p<sub>H</sub> 3.7-7.1). *Festuca versicolor* and *Sesleria bielsii* require a soil with relatively high Ca content, in contrast to *Juncus trifidus* and *Sesleria disticha*.

B. C. A.  
The distillation method for determining the combined water and organic matter in soils. G. J. Bouyoucos. Soil Sci. 36, 471-84(1933); cf. C. A. 27, 547.—Further work is presented on the distn. method for the detn. of combined water and org. matter in soils. The original app. is modified and improved. Water added to soil is accurately recovered by this process. The distn. is carried out at 900°. At this temp. soils lose all of their H<sub>2</sub>O in 30 min. The vol. of H<sub>2</sub>O coming off is measured directly and the org. matter calcd. by deducting the wt. of H<sub>2</sub>O from the ignition loss. Detns. are made on a large no. of soils of widely varying character. A comparison is made of org. matter content by this method and by the combustion method (multiplying the CO<sub>2</sub> evolved by the factor 0.471). There is fair agreement between the 2 methods. Muck and peat show high combined H<sub>2</sub>O contents. Clay soils contain more combined H<sub>2</sub>O than do soils of coarser texture. There is no close consistent relationship between clay content and combined H<sub>2</sub>O in the various soils. It is thought that the H<sub>2</sub>O of org. matter can be regarded as combined H<sub>2</sub>O, just as in the inorg. soil material.

M. S. Anderson

Nitrate nitrogen present in two soil types under various treatments. A. O. Allen, B. G. Sitton Rulon, D. Lewis and J. L. Pelham. Nat. Pecan Assoc., *Rept. Proc. 31st Ann. Convention* 1932, 46-9.—After the application of 1500 lb./acre of a 6-8-6 fertilizer, contg.  $\text{NaNO}_3$ ,  $(\text{NH}_4)_2\text{SO}_4$ , and cottonseed meal, to an alluvial Yahola soil in February, the nitrate N in the 1st 3 in. of soil increased to a max. in approx. 2 months. One month after application of the fertilizer the 18-24 in. horizon contained 3.33 p. p. m. of nitrate N, as compared with 1.5 p. p. m. in the same horizon of the unfertilized soil; after 2 months this horizon contained only traces of nitrate. Similar results were obtained on an Orangeburg fine sandy loam, except that in the unfertilized soil nitrate was present in more than traces only in the top 3-in. layer. Clean cultivation increased the nitrate content of both fertilized and unfertilized soils, whereas green-manure crops caused a temporary reduction in soil nitrates but were highly beneficial after they were turned under and allowed to decompose.

K. D. Jacob  
Polar adsorption or adsorption by interchange in soil. II. O. Bottini. *Ann. chim. applicata* 23, 474-83 (1933); cf. C. A. 27, 4866.—A soil having 1 exchangeable cation (Na) was placed in contact with solns. contg. 2 salts having the same anion ( $\text{Cl}$ ). The cation couples studied were K,  $\text{NH}_4$ , Mg, Ca in all their combinations. The total adsorption of cations, except Ca-Mg, was about the same for all the cations, and the values were very close to the values for the adsorption of a soln. of similar concn. having a single cation. The ratio of the 2 cations adsorbed depends on their nature and concn.

A. W. Conti  
Grades of peat and muck for soil improvement. A. P. Dachnowski-Stokes. U. S. Dept. Agr., *Circ.* 290, 1-30 (1933); cf. C. A. 27, 4616.—The characteristic phys. properties and chem. compn. of the main classes of peat are described and the possibilities of several different kinds of peat for improving sp. conditions of a mineral soil are outlined. A light-colored poorly decompd. fibrous moss, reed or sedge peat is most effective in improving unfavorable structural properties of a soil, in increasing its water-holding capacity and in releasing sol. salts and nutrients during decompn. Peat and muck that have been dried artificially or chaired are relatively less suitable grades of org. material because of their greatly reduced capacity to retain water.

W. H. Ross  
Subterranean clover, with special reference to its value on soils of relatively low fertility. J. N. Whittet. *Agr. Gas. N. S. Wales* 44, 717-23 (1933).—Good growth of subterranean clover (*Trifolium subterraneum*) was obtained on soils of  $\text{pH}$  4.3-7.6 and contg. 0.061-0.174% and 0.0013-0.0051%, resp., of CaO and  $\text{P}_2\text{O}_5$  sol. in 1% citric acid.

K. D. Jacob  
Investigations on lime requirement of soils by laboratory methods and fertilizer trials. O. Lemmermann, et al. *Z. Pflanzenernahr. Dungung Bodenk.*, Beiheft 2, 463 pp. (1933).—Soils not responsive to liming had exchange acidity (Daikuhara, KCl) of 0.1-1.4 ml. and hydrolytic acidity (Kappen,  $\text{Ca}(\text{OAc})_2$ ) of 0.5-12.1 ml. With light to medium soils poor in humus, the methods of Daikuhara, Goy ( $\text{pH}$  5.5), Tacke-Arnd and Gehring (degree of satn. = 40%) are in substantial agreement, and liming according to their indications is sufficient for non-acid-sensitive crops. Similarly, the methods which det. hydrolytic acidity, Goy ( $\text{pH}$  7.7) and Gehring (degree of satn. = 70%), give concordant indications and are best adapted to use with heavy soils, and liming accordingly is required for acid-sensitive crops. None of the methods tested is very reliable for highly acid humus sand and peat soils, although the Tacke-Arnd method is satisfactory for humus loam soils. Detn. of degree of satn. by the Kappen and Gehring procedures is generally unsatisfactory, as shown by frequent lack of concordance and the indications of vegetation tests. Indications for lime requirement obtained in pot expts. are likely to be lower than opt. field applications, because distribution of the latter is inferior. Chem. methods in general do not take into account improvement in phys. condition of heavy soils resulting from adequate liming. Finely ground limestone

and equiv. burned lime had practically equal effects, although in some instances the latter was more effective the first season. Some of the collaborators comment upon variation in apparent opt.  $\text{pH}$  for a particular crop on different soils, while others consider  $\text{pH}$  an unsafe guide for need of liming.

C. J. Schollenberger  
The potassium-lime problem in soils. Hans Jenny and E. R. Shade. *J. Am. Soc. Agron.* 26, 162-70 (1934)  
A study of the K-clay- $\text{CaCO}_3$  interchange with purified soil colloids, permutites and natural and artificial soils, reveals that in all systems investigated  $\text{CaO}$  liberates adsorbed K in large quantities. Pronounced exchange takes place in the presence of such anions as  $\text{Cl}$ ,  $\text{SO}_4$ ,  $\text{CO}_3$ ,  $\text{HCO}_3$ ,  $\text{OH}$  and  $\text{PO}_4$ .  $\text{H}_2\text{CO}_3$  liberates considerable amt. of absorbed K because of the large no. of Ca ions resulting from the formation of  $\text{Ca}(\text{HCO}_3)_2$ . In the presence of absorbed H ions the replacement of K by  $\text{CaCO}_3$  is intensified, provided the resulting partial  $\text{CO}_2$  pressure approaches that of soil air. Microorganisms reduce the leaching of K as compared with sterile systems and this reduction is most pronounced in the presence of  $\text{CaCO}_3$ . Under certain conditions of K level and microbiol. conditions the addn. of  $\text{CaCO}_3$  may actually cause a reduction of the K content of the soil soln. below the value of the unlimed soil. This is attributed to biol. reabsorption of K and ionic exchange impedance.

J. R. Adams  
Influence of the absolute reaction of the soil solution upon the growth and activity of *Azotobacter*. P. L. Gainey. *Kan. Agr. Expt. Sta., 6th Biennial Rept.* 1932, 28-9; cf. C. A. 27, 2749.—A 10. Director Dec., 1932, conditions in wheat fields is summarized. The soil of these spots is supplying much more available N than the surrounding soil, for even though the growing plants remove 4.7 times as much N from the soil from the spot, this soil still contains 3.8 times as much nitrate N. Nitrate N was accumulated 3.6 times as fast in the soil of spots. The soil of spots showed an av. 230 lb. per acre more N than surrounding soils. The spots were produced by adding sol. N fertilizers to wheat soils. These spots are identical with the naturally occurring spots. The role of *Azotobacter* in the formation of these spots is not conclusive. There were no differences in the nitrifying bacteria of spots and of the surrounding soils.

C. R. Fellers  
Chemical composition of pasture grasses in Vermont. J. A. Newlander, C. H. Jones and H. B. Ellenberger. *Vt. Agr. Expt. Sta., Bull.* 362, 2-18 (1933); cf. C. A. 27, 1059.—Eighty-six samples of grass gathered from representative Vt. pastures showed Ca contents of 0.282-1.7 averaging 0.825; P contents 0.155-0.573, averaging 0.36%; and Ca:P ratios which averaged 2.72:1. Oth. av. results were crude protein 18.34, crude fiber 20.5 N-free ext. 45.99 and  $\text{Et}_2\text{O}$  ext. 2.62. The av. digestil. crude protein (calcd.) and total digestible nutrients were resp., 14 and 67.5%, the nutritive ratio being 1:3. Vt. grasses are abundantly supplied with minerals. More frequent the cuttings of pasture grasses, the higher were the percentages of Ca and P which they contain. Frequent cutting or reasonably close grazing is recommended.

C. R. Feller  
The meadow and pasture soils of the Rhine Palatinate relative to their contents of nutrient substances, particularly phosphoric acid. M. Kling and O. Enj. *Phosphorsäure* 4, 43-51 (1934).—In 91 samples of soil the root-sol.  $\text{P}_2\text{O}_5$  (Neubauer method) ranged 1.05 to 10.7 mg. per 100 g. dry soil; 47% of the soil contained less than 4.0 mg.; the content of root-sol. ranged from 14.9 to over 50.0 mg. Approx. 50% of samples were deficient in Ca. In general, the soil was richer in Ca and poorer in root-sol.  $\text{P}_2\text{O}_5$  and than the surface soils.

K. D. Jacob  
Improving clover-grass hays. R. Thun. *Dtsch. L. Presse* 60, 285, 296 (1933).—In hay contg. less than clover, increasing the N in the fertilizer from 0 kg./ha. caused a decrease in the percentage of clover-grass hay from 31.7 to 15.0% and a decrease crude protein from 9.80 to 8.12%. The total yi. dry matter and crude protein was increased. I

contg. more than 50% of clover, the reduction in percentage of clover and crude protein as the N in the fertilizer was increased was greater than in those hays contg. less than 50% of clover, and no increase in yield of dry matter was obtained. For hays contg. less than 50% of clover, an application of 20 kg./ha. of N gave the most economical results. Liming the soil increased the  $pH$  from 4.8 to 5.6 and increased the amt. of clover in the hay from 20 to 48%.

K. C. Beeson

The decomposition of peat under aerobic conditions. I. A. Makrinov. *Zentr. Bakt. Parasitenk.*, 2 Abt., 89, 201-9 (1933).—With a large amt. of moisture and air, peat develops a wide variety of soil bacteria with a high degree of activity. Within 10-15 days at 11-12° there are marked changes in chem. constitution. J. T. M.

Plant physiology section, G. A. R. S. Final report on experimental work 1931-32. F. Crowther. Sudan Gov., Gezira Agr. Research Service, *Ann. Rept.* 1932, 56-74 (1933).—The N content of cotton leaves decreased from 4.8-5.0% at germination to approx. 3.2-3.7% in 90 days after sowing the seed; the decrease was more rapid in leaves from seed sowed early in the season than in those from late-sowed seed. The low N levels of early sowings were assoc. with low growth rates. Optimum date for applying  $(NH_4)_2SO_4$ .—With seed planted in Aug. and Sept. the highest yields of cotton were obtained when the  $(NH_4)_2SO_4$  was applied about 6 weeks after sowing; with July plantings application of the  $(NH_4)_2SO_4$  approx. 15 days before sowing gave the best results. The optimum date for application of  $(NH_4)_2SO_4$  was intimately related to the N supply of the soil. Activity of soil microorganisms.

As measured by the evolution of  $CO_2$ , soils receiving no fertilizers or soil amendments showed the greatest activity of the microorganisms, followed in order by those receiving  $(NH_4)_2SO_4$ , farmyard manure, gypsum, and  $(NH_4)_2SO_4$  and gypsum, resp. The highest concns. of nitrates occurred in soils receiving  $(NH_4)_2SO_4$  and the lowest in those receiving farmyard manure. Denitrifying organisms caused rapid disappearance of nitrates added to Gezira soils; the soils were well supplied with N-fixing bacteria, principally *Azotobacter*. Leguminous crops.—Nodulized dry roots of jack bean, addis and *pis* contained 1.66, 0.77 and 0.62% N, resp.

K. D. Jacob

Phosphorus in soil and the phosphorus content as influenced by phosphorus applications to G. Weidemann. *J. Am. Soc. Agron.* 26, 170-8 (1934).—Various rates of application of  $P_2O_5$  were made in quantities of N and  $K_2O$  on soil which was somewhat readily available  $P_2O_5$ . About 400 lb. of superphosphate per acre was required to produce a 1% increase in the amt. of readily available  $P_2O_5$  in soil. There was no consistent increase in yield of the crops grown as a result of applications of P in N and  $K_2O$ . The increases in  $P_2O_5$  content of any, due to  $P_2O_5$  applications to the soil were usually inconsistent. There were, in some very noticeable but inconsistent increases in  $P_2O_5$  of chaff and straw due to these treatments. It is more advisable to add  $P_2O_5$  directly to the animals, where needed, through the use of bone meal or other carrier rather than to try to increase content of grain through the application of  $P_2O_5$ , since the increases in  $P_2O_5$  obtained in this way are not in the grain but in the portion of the plant normally used as feed.

J. R. Adams

Seasonal variation of lime and phosphoric acid in pastures. A. C. Roy and K. C. Sen. *Ag. India* 3, 437-47 (1933).—A study was made of 10 of the grasses of pastures situated at an av. of 7000 ft. above sea level in the Kurmaun district. With the growth of the plants and in-rainfall, the percentages of Ca and P increased in Sept. or Oct. The amt. of P then decreased with the approach of winter and dry conditions marked decrease in Ca occurred. Drought decreased P content more than the Ca content, but after

the rainy season the mixed herbage contained almost the same amts. of CaO and  $P_2O_5$ .

K. D. Jacob

Further experiments with Nitrophoska. Tobacco Substation Windsor Rept. 1932. T. R. Swaback, O. E. Street and P. J. Anderson. *Conn. Agr. Expt. Sta., Bul.* 350, 478-9 (1933).—The fertilizer contained N 16.3,  $P_2O_5$  16.3 and  $K_2O$  20%. Plots fertilized with Nitrophoska produced tobacco of consistently lower grade than other plots fertilized with standard fertilizer mixes. Approx. 80% of the N for tobacco should be from an org. source. Slightly lower yields were also assoc. with the use of Nitrophoska.

C. R. Fellers

The fixation of phosphates by clay soils. G. D. Scarseth and J. W. Tidmore. *J. Am. Soc. Agron.* 26, 152-62 (1934).—Max. plant response to phosphate fertilization on highly colloidal acid and calcareous soils was not obtained until the applications of the phosphates were equiv. to 1800 and 2000 lb. of superphosphate per 2 million lb. of soil, resp. The efficiency, measured by plant response, of the various phosphates decreased rapidly with the time of contact with the soil. In the acid soil,  $CaH_2(PO_4)_2$  was slightly more available than  $CaH_4(PO_4)_2$ . The relative efficiencies for  $CaH_2(PO_4)_2$ ,  $Ca_4(PO_4)_2$ ,  $NH_4H_2PO_4$ , ferric phosphates, and superphosphate were 100, 57, 110, 25 and 117, resp.  $CaCO_3$  greatly decreased the availability of readily sol. phosphates and the crop yield when applied immediately before planting to the acid clay soil, whereas after equil. was established and  $CaCO_3$  was no longer present in the soil the availability of the phosphates increased, as shown by the yield of sorghum.  $CaCO_3$  decreased the availability of  $Ca_2(PO_4)_2$  as measured by plant growth. In general, the more sol. the phosphate used, the more rapid was the rate of fixation. Relatively insol. phosphates were fixed slowly but were inefficient in supplying available P to the plants.

J. R. Adams

The fixation of phosphates by soil colloids. G. D. Scarseth and J. W. Tidmore. *J. Am. Soc. Agron.* 26, 138-51 (1934).—The amt. of available phosphate in soil colloids varied directly with the  $SiO_2$ -sesquioxide ratio of the colloid. The native phosphate in soil colloids was about as sol. in H-satd. as in Ca-satd. colloids, but it was most sol. in Ca-supersatd. colloids. The phosphate-fixing capacity of soil colloids varied inversely with the  $SiO_2$ -sesquioxide ratio of the colloid. In the least weathered colloid the concn. of  $PO_4$  ions brought into soln. by 0.05 N  $H_2SO_4$  at  $pH$  3.0 was considerably decreased on standing for 16 hrs. The concn. of  $PO_4$  ions was not decreased on standing 16 hrs. in contact with a 0.1 N  $H_2SO_4$  soln. Fixation of the  $PO_4$  from  $H_2PO_4$ ,  $CaH_2PO_4$  and  $Na_2PO_4$  was about equal in the colloids with a high  $SiO_2$ -sesquioxide ratio when the degree of Ca satn. was below 100%.  $CaH_2PO_4$  and  $Na_2PO_4$  were slightly more available than  $H_2PO_4$  in the colloids with low  $SiO_2$ -sesquioxide ratios.  $CaH_2(PO_4)_2$  was fixed slightly more than  $CaHPO_4$  in all the colloids. In the gray colloids  $Ca_2(PO_4)_2$  was about 10% less available and rock phosphate 20% less available than  $CaH_2(PO_4)_2$ , while in the red colloids the  $Ca_2(PO_4)_2$  was about equal to the  $CaH_2(PO_4)_2$  and the rock phosphate was slightly more available. At  $pH$  5.4 about 76% of the phosphate added as  $CaH_2(PO_4)_2$  to the red colloid was insol. in buffered 0.05 N  $H_2SO_4$ ; the phosphate application was equiv. to 1806 lb. of 16% superphosphate per acre to a soil contg. 80% colloids. The lower the  $SiO_2$ -sesquioxide ratio the smaller was the influence of the degree of Ca satn. below 100% on the amt. of phosphate fixed by the colloid. When the colloids contained Ca equiv. to 200% satn. the tendency was for more phosphate to be sol.

J. R. Adams

The decomposition of saw phosphates by the root secretions of lupines. D. Prymishnikov. *Phosphorsäure* 4, 1-23 (1934).—Normal development of lupines in sand cultures was obtained with amorphous phosphoric acid as the sole source of P; good, but somewhat less efficient, growth of peas, white mustard and buckwheat was also obtained under these conditions. Red clover and most cereals utilized the P of raw phosphoric acid only when they were grown on acid soils. As shown by direct  $pH$  measure-

ments, the root secretions of the lupine are acid and increase the acidity of the neighboring soil soln., thereby promoting the soln. of the phosphorite. Because of the solvent action of lupine root secretions on phosphorite, plants, such as oats, which normally cannot utilize this source of P make good growth when planted either with or directly after lupines that have been fertilized with crude phosphate. Twenty-two references. K. D. J.

The behavior of small quantities of phosphate fertilizer in soils of different compositions. L. Meyer and U. von Rennenkampff. *Phosphorsäure* 4, 24-42(1934).—The rates and extents of fixation of small amts. of superphosphate (1-4 mg.  $P_2O_5$  per 100 g. soil) in different types of soil were studied by means of von Wrangell's  $H_2O$ -extn. method (cf. C. A. 21, 2762; 25, 1019). In general, the highest fixation of  $P_2O_5$  occurred in heavy loam soil and the lowest in humus-contg. sandy soil. Numerous data are given. K. D. Jacob

Action of phosphatic fertilizers on the development of the plant and on the distribution of the phosphorus in spring barley. H. Burgevin and G. Guyon. *Compt. rend. acad. agr. France* 19, 929-34(1933).—Pot tests of the action of liberal quantities of  $CaHPO_4$  on spring barley showed a marked action in the first development of the plant and a marked increase in the crop, particularly the grain. This is due to an increased no. of heads.  $P_2O_5$  absorption by the plant is increased by applications of phosphatic fertilizer. The lipid  $P_2O_5$  increases constantly, to about 10% of the total  $P_2O_5$ . The protein  $P_2O_5$  varies similarly but the proportion is much smaller. The mineral  $P_2O_5$  is accumulated by the young plant, reaching a max., in some cases 60% of the total  $P_2O_5$ , at the moment of heading, after which a progressive decrease occurs. The phytin  $P_2O_5$  is low before heading and afterward increases very rapidly. The major portion of the absorbed  $P_2O_5$  is found in the grain (80-85% of the total) and 95% of the phytin  $P_2O_5$  concs. there. The phosphatic fertilizer accentuates and accelerates these phenomena. Similar tests in the field led to the same results with few exceptions but in lessened form. J. R. A.

Fertilizer experiments with phosphates on winter wheat. W. Kärsten. *Phosphorsäure* 3, 624-9(1933).—In general, both superphosphate and Thomas meal had a favorable effect on the yields of grain and straw from plants grown on different types of acid and alk. soils. K. D. Jacob

Valuation of the paper "Fertilizer experiments with phosphates on winter wheat" by W. Kärsten. Floess. *Phosphorsäure* 3, 748-53(1933); cf. preceding abstr.—The data are rearranged and critically discussed. K. D. Jacob

Utilization of phosphate and potash fertilizers on degraded chernozem soils. G. Maslov. *Arb. Landw. Versuchs-Sta. Kiev* No. 64, 81-104(1930).—The beneficial effect of a previous leguminous crop persisted after one growth period. Phosphorite had little action on the immediate crop, but its after-effect on the following sugar-beet crop was considerable. Among artificial P fertilizers, double superphosphate was the most effective on both acid and alk. soils. Its use in conjunction with other alk. fertilizers reduced the efficiency of basic slag. Bone meal gave best results when applied with alk. materials. B. C. A.

Magnesium ammonium phosphate in vegetation tests. Z. G. Ilkoyakaya, M. Z. Podolskaya and K. Z. Dmitriev. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 44-9(1933).—Pot expts. with flax on a podzolic soil and oats on a degraded chernozem show that  $Mg NH_4$  phosphate is a very favorable source of N and P. The Mg apparently improved the quality of the flax.  $MgHPO_4$  proved to be a better fertilizer than ammoniated  $MgHPO_4$ . The flax, as a rule, does not tolerate high quantities of N. The oats responded to the N in the fertilizer.  $Mg NH_4$  phosphate was superior to pptd. phosphate for mustard and peas, but not for buckwheat. It is suggested that for oily plants, such as flax and mustard, the Mg in this new fertilizer is highly effective. J. S. Joffe

Phosphate rock. Bertrand L. Johnson and B. H. Stoddard. *Statistical Appendix to Minerals Yearbook*,

1 *Bur. Mines* 1932-33, 25-30(1933); cf. C. A. 28, 2441.

Alden H. Emery  
Enriching superphosphate with ammonia. K. Zeidenberg. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 74-8(1933).—The use of liquid  $NH_3$  and  $Ca(NO_3)_2$  in soln. gives a higher  $NH_3$  content in the superphosphate than when gaseous  $NH_3$  is used. The higher the N content in the mixt. the better is the phys. condition and the better are the keeping qualities. J. S. Joffe

The ammoniation of double superphosphates. L. E. Berlin and L. Goritskaya. *J. Chem. Ind. (Moscow)* 1933, No. 10, 21-7.—Gaseous  $NH_3$  may be added to double superphosphates in amts. varying from 8.3 to 18%, depending on the source of the superphosphate. If more  $NH_3$  is added, it is lost when the product is allowed to stand. Keeping the substance under pressure decreases its moisture content. The ratio of available to total  $P_2O_5$  does not change when  $NH_3$  is introduced. H. M. L.

The methods of obtaining ammoniated superphosphate. L. E. Berlin. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 64-74(1933).—B. presents data on the production of ammoniated superphosphate by treating rock phosphate with acids and passing gaseous  $NH_3$  into the mixt. He takes up the quant. relationships for the successful operation of this process with a no. of types of rock phosphate. The speed of admitting the  $NH_3$  into the acid-rock phosphate mixts., the temp., the time period and other factors involved are discussed. It is pointed out that such ammoniated superphosphate maintains a good phys. condition, does not take up so much moisture and holds the  $NH_3$ . J. S. Joffe

Experiments on the methods of analyzing fluorine in Khibin apatite and superphosphate. S. N. Rozanov and V. A. Kazarinova. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 96-103(1933).—For the detn. of F in apatite and superphosphate in the presence of Cl and colloidal  $SiO_2$  the Penfield method is suitable providing a trap with 10%  $Ag_2SO_4$  in  $H_2SO_4$  soln. is introduced in the absorption train. For samples contg. also org. matter two traps are introduced: one with  $Ag_2SO_4$ , the other with a satd. soln. of  $Cr_2O_3$  or  $K_2Cr_2O_7$  in  $H_2SO_4$ . In the presence of colloidal  $SiO_2$  the yield of F, according to the Penfield method, is low. For detg. F in superphosphate the sample should be dried in a desiccator over  $CaCl_2$  or  $H_2SO_4$ ; it may also be dried in the oven, but the temp. should not exceed 50°. J. S. Joffe

Total and water-soluble phosphoric acid in Diammophos. V. P. Mikhailov. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 129-31(1933).—M. concludes, after having made a no. of tests, that while very frequently the water-sol.  $P_2O_5$  is identical with the total  $P_2O_5$  in Diammophos, it is not always safe to make only a water-sol.  $P_2O_5$  detn. J. S. Joffe

The preparation of the original extract for the determination of phosphoric acid in phosphate rock and superphosphate with a dilute hydrochloric acid solution. A. I. Senger and N. A. Demidenko. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 125-7(1933).—Tests made with cold 10% HCl exts. show that the method is not adequate for the detn. of  $P_2O_5$  in apatite and superphosphate. Boiling with this dil. acid gives satisfactory results. J. S. Joffe

Verifying the methods of determining the fertilizer requirements of the soil. A. Sokolov. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 57-64(1933).—S. discusses the methods used in detg. the fertilizer requirements of the soil and points out that empirical tests on the various soil zones and on the soil variations within the zone may serve as a reliable guide in obtaining information. J. S. Joffe

The fertilizer requirements of the fundamental soil types in the Soviet Union. A. N. Lebedyantsev and D. N. Borodich. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 107-18(1933).—This is a summary report on the effect of fertilizers on the zonal soil types: podzols, chernozem and their subtypes, chestnut and gray. It covers a series of 1590 expts. conducted by the Inst. for

Fertilizers. The various podzols respond most effectively to a complete fertilizer. These are followed by the degraded chernozem soils. The normal and deep chernozems respond only to high applications, and, what is more striking, these soils respond to large applications of N. The data for barley, hemp, sugar beets, oats, potatoes, flax and spring wheat are presented in tables and graphs.

J. S. Joffe  
The ratio of the fertilizer components in a complete fertilizer. A. Sokolov. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 13-18(1933).—From expts. with potatoes S. attempts to draw conclusions as to the favorable and economical ratios of the N to K to be applied, using  $P_2O_5$  throughout the variations of the N or K. He points out that it is difficult sometimes to establish which of the elements is in the first minimum. The difficulty lies in the fact that the effects of the individual constituents are not an arithmetical sum. Fertilizer ratios have to be adopted for the different soil types, crops, rotation, etc., all of which has to be detd. experimentally. He argues against the prepn. of mixed fertilizers.

J. S. Joffe  
The equivalent physiological acidity or basicity of American fertilizers. Arnon L. Mehring and Avis J. Peterson. *J. Assoc. Official Agr. Chem.* 17, 95-100 (1934).—Calcs. are given showing that from 1880 to 1906 the av. equiv. physiol. effect of mixed fertilizers on soil reaction was basic; from 1907 to 1924 it was slightly acid; and since then the acidity has increased rapidly, until in 1932 it was equiv. to 150 lb.  $CaCO_3$  per ton of fertilizer. At the present time the upward trend appears to have been checked. The present acidity could be more than neutralized, when desirable, by substituting dolomite or limestone for sand in the analysis formula at very little addnl. cost to the consumer.

A. Papineau-Couture  
The equivalent acidity and basicity of fertilizers as determined by a newly proposed method. W. H. Pierre. *J. Assoc. Official Agr. Chem.* 17, 101-7(1934); cf. *C. A.* 27, 4010.—The method was studied collaboratively on 10 samples of fertilizers. The agreement in results obtained by chemists working in 8 different labs. was found to be satisfactory. Limestone added as filler in mixed fertilizers was accurately evaluated, and all labs. which were equipped with furnaces for ignition reported that the method was well adapted to routine work.

A. P.-C.  
Studies on the fertilizing value of Polish kainites. M. Górski. *Polish Agr. Forestal Ann.* 26, 259-96 (295-6 in German)(1931).—Pot expts. with barley and sugar beets show that Polish kainites and a 25%  $K^+$  salt act better than pure K salts, and are at least as good as German coned. (40%) K fertilizers. In field expts. with sugar beets a Polish 25% salt is as effective as the German 40% salt as regards yield of beets.

J. Wiertelak  
Effect of fertilizers on the botanical and chemical composition of the vegetation in permanent pastures. B. A. Brown. *Conn. Agr. Expt. Sta., Bull.* 187, 54 pp.(1933); cf. *C. A.* 27, 364.— $CaCO_3$ , K or carriers of N alone were ineffective in altering the character of the pasture herbage, but where superphosphate was applied, white clover and Ky. blue grass increased greatly, and poverty grass, *Danthonia spicata* L., was almost eliminated. These changes were more marked where  $CaCO_3$  was also added. With superphosphate, N was even more effective than  $CaCO_3$  in increasing blue grass, this species constituting 70% of the herbage on the plots after 8-9 years. White clover was greatly depressed and in some cases almost eliminated by N. Rhode Island bent and sweet vernal grasses were relatively unaffected by fertilizer treatment. Weeds were very prominent on the non-P plots and were least prominent on the plots which received both minerals and N. The percentages of dry matter, fiber and N-free ext. were highest in the herbage from the non-P plots, and lowest where the treatment was superphosphate plus either lime or N. The reverse was true of ash, N, fat and K. The P content of herbage from the non-P-treated plots was only 60% that of the plots receiving P. Ca content was depressed by the addn. of N and by the omission of superphosphate and increased by P, and especially by P plus lime. The K content of the grass was significantly

raised by the addn. of either K or N fertilizers. The Ca:P ratios varied widely but were smallest, 2:1, where complete fertilizer but no lime was applied. Si, Fe, Al, Mg, Ca, Mn, Cl and S were detd. in the several plots. Usually Si was highest in the non-fertilized herbage. Fe and Al showed no changes. Except in the N-fertilized plots, Mg, P, S and Cl varied with Ca, though not as markedly. The herbage from the limed plots contained only about 1/2 as much Mn as that from the unlimed plots. Seasonal variations in chem. compn. of the grasses were great. When moisture was very deficient, dry matter, ash, N-free ext., fiber and Ca increased but N, fat, P and K decreased. The highest percentages of dry matter, N, N-free ext. and fat were found in the first samples of the season, while the max. for fiber occurred in June, and for Ca and P in July or early Aug. The lowest values for ash, fiber and Ca were found at the first sampling date in the spring. The Ca:P ratios were usually highest in July and lowest in early May. Herbage of more uniform N content was obtained by N fertilization, or by N plus minerals. Chem. analyses show, contrary to popular opinion, that the quality of herbage from permanent pastures is poorest during the period of max. growth, e. g., about June 1st in Conn. On the contrary, the moisture content and the relative amt. of herbage is greatest at this time. Thirty-two references.

C. R. Fellers  
Symptoms of fertilizer deficiencies in hops. F. H. Beard. *Ann. Rept. East Malling Res. Sta.* 1932, 156 & (1933); *Rev. Applied Mycol.* 12, 785.—The symptoms of each nutritional deficiency of hop plants were detd. by growing them for 3 seasons in pots contg. pure sand and fed with the following nutrient solns., viz., (1) complete nutrient soln., (2) N omitted, (3) K omitted, (4) P omitted, (5) Ca omitted, (6) Mg omitted and (7) rain water only.

Oden B. Sheppard  
Can the composition of pecan nuts be changed by fertilizer or other cultural treatment? Max B. Hardy and H. I. Crane. *Natl. Pecan Assoc., Rept. Proc. 31st Ann. Convention* 1932, 110-17.—Nuts of the Pabst and Schley varieties contained more oil and less protein than those of the Stuart variety. Two lots of Stuart nuts contained approx. the same percentage of oil, but the protein content of nuts from fairly vigorous trees was 3-6% higher than that of nuts from very weakly growing trees. There was no definite relation between the size and the chem. compn. of otherwise comparable nuts. Regardless of variety, size or cultural treatment, the best-filled nuts were consistently higher in oil and lower in protein than the poorer-filled ones. Pruning and fertilizing the trees had no marked or consistent effect on the chem. compn. of the nuts.

K. D. Jacob  
Chemical reactions in fertilizer mixtures. Wm. H. Ross. *Am. Fertilizer* 80, No. 4, 5, 6, 24, 26(1934).—A review and discussion of various types of reactions that may occur in fertilizer mixts., such as those involved in the ammoniation of superphosphate and double superphosphate, the replacement of water in hydrated salts by urea, the formation of reciprocal salt pairs by double decompn. and the decompn. of liming materials by  $NH_4H_2PO_4$ . A mixt. of equimol. parts of limestone and  $NH_4H_2PO_4$  reacts to set free  $NH_3$  and  $CO_2$ . Dolomite and  $NH_4H_2PO_4$  also react to set free  $CO_2$ , but loss of  $NH_3$  is prevented by the formation of  $MgNH_4PO_4$ . W. H. R.

The quantity of acid used in decomposing fertilizers. V. P. Mikhailov. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 127-9(1933).—Data are given on min. quantities of  $H_2SO_4$  and  $H_2SO_4$ -HNO<sub>3</sub> mixts. that might be used for the extn. of  $P_2O_5$  from phosphates of various kinds. The smallest quantity that could be used for 5 g. of rock phosphate or 10 g. of Thomas slag was 30 cc.  $H_2SO_4$ , sp. gr. 1.84. For pptd. phosphate the use of 30 cc.  $H_2SO_4$  or 10 cc. HNO<sub>3</sub> gives just as good results as higher quantities of acid.

J. S. Joffe  
Treating phosphates with nitric acid. A. N. Loginov. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 132-7 (1933).—L. reviews the various methods used in extg.



crude phosphate with acids and the prepn. of ammoniated phosphate. L. also takes up the methods used in extg. sol. phosphate from low-grade rock. J. S. Joffe

The nomenclature and classification of fertilizers. S. I. Volkovich and N. E. Pestov. *J. Chem. Ind. (Moscow)* 1933, No. 10, 17-21. H. M. Leicester

The technology of organic-mineral fertilizers: humates of ammonia. S. S. Dragunov and E. F. Bakhtina. *Trans. Sci. Inst. Fertilizers (Moscow)*, No. 113, 79-86(1933).—Peat samples varying in moisture content were satd. with  $\text{NH}_4$ , which was introduced at temps. from 125° to 200°. The peat was then treated with HCl and the hydrolyzable  $\text{NH}_4$  detd. as well as the total  $\text{NH}_4$  absorbed. Low-moor peat contained as much as 6-7% N. The peat with a 30-50% moisture content is most efficient for  $\text{NH}_4$  absorption. With an increase in temp. the N absorbed becomes unavailable and it is recommended not to exceed 100°. J. S. Joffe

The role of the mineral nitrogen of manure. I. P. Mamchenkov and I. F. Romashkevich. *Trans. Sci. Inst. Fertilizers (Moscow)*, No. 113, 18-27(1933).—Pot expts. on the utilization of N from manure by crops show that the N utilized does not exceed the content of  $\text{NH}_4$  nitrogen in the manure. In manures made up of straw 75% of the  $\text{NH}_4$  nitrogen and in peat manure 95% of it is utilized. The org. N of the manure is not utilized during the first year. This is especially true for plants with a vegetation period of 3-4 months. Manure contg. a low  $\text{NH}_4$  content sometimes even depresses the yield. This is due to the locking up of the N by the microbes. It is advisable to accumulate some mineral N in manure before applying, if the N is to be utilized immediately upon application. J. S. Joffe

The significance of calcium and magnesium in fertilizing and liming of soils. D. V. Druzhinin and V. G. Shvuidenkov. *Trans. Sci. Inst. Fertilizers (Moscow)*, No. 113, 28-41(1933).—The authors tested the validity of the Luxw theory on the relation of the ratio of Ca to Mg to crop yield. Oats, barley and peas grown in pots give normal yield even when the sol. and mobile Ca is far in excess of Mg as required by Loew. A yield decrease takes place when Mg is in excess of Ca, the point of depressing the yield beginning with a ratio of mobile Ca to Mg 1:2 to 2.9. In neutralizing acidity Mg limestone was found to be superior to Ca limestone without any fertilizer. A complete fertilizer seems to react more efficiently with  $\text{CaCO}_3$ .  $\text{MgO}$  and  $\text{CaO}$  equally stimulate nitrification.  $\text{CaO}$  alone added to an unsatd. soil does not increase the water-sol. Mg. J. S. Joffe

Studies on potassium fertilizers. F. Terlikowski, A. Byczkowski and S. Sozański. *Polish Agr. Forestal Ann.* 28, 45-119(115 19 in German)(1932).—The sorption of K by wheat and barley proceeds in the first period of vegetation (1 month) independently of the form of K salt present ( $\text{KCl}$  or  $\text{K}_2\text{SO}_4$ ). The production of dry substance and the ratio of seeds to straw are equal for both salts, provided the concn. of Cl and  $\text{SO}_4$  ions is not too high. Of K fertilizers contg. K as  $\text{KCl}$ , the best crops and highest yields of seeds of oats, wheat, barley, millet, peas and beans are obtained with kainite of Stebnik (10.25%  $\text{K}_2\text{O}$ ), followed by K salts of Kalusz (25.97%  $\text{K}_2\text{O}$ ) and a German K salt (40%  $\text{K}_2\text{O}$ ). Evidently, the plants use K better from low-percentage kainite in building up to org. substance than from high-percentage salts. Of fertilizers contg. K as  $\text{K}_2\text{SO}_4$ , the best yields are obtained with a K-Mg fertilizer contg. 18.3%  $\text{K}_2\text{O}$ , the so-called half-product, while the finished product (24.77%  $\text{K}_2\text{O}$ ) and a German product (25.25%  $\text{K}_2\text{O}$ ) give lower yields. It follows, therefore, that admixts. of low-percentage fertilizers exert a beneficial effect on the growth of the tested plants. Special expts. performed to det. this effect of admixts. to pure K salts, however, did not give concordant results. In general, addn. of  $\text{NaCl}$ ,  $\text{MgCl}_2$ , and  $\text{MgSO}_4$  to c. r.  $\text{KCl}$  and  $\text{K}_2\text{SO}_4$  did not have a harmful effect, and sometimes even had a beneficial effect; addn. of  $\text{NaCl}$  gave almost always a higher yield, especially with oats. The effect of these salts was

1 disturbed by the simultaneous addn. of Ca ions. Addn. of K fertilizers causes an increased retention of moisture by the soil, especially at a low moisture content (80%) in the order: kainite,  $\text{KCl}$ ,  $\text{K}_2\text{SO}_4$ . Plants with low requirement of moisture (oats, barley) show a better effect from fertilization at a small moisture content of the soil, while plants with large requirements of moisture (peas, beans) exhibit an opposite effect. All expts. were performed in a soil showing  $p_H$  6.7. J. Wiertelak

Effect of different potassium fertilizers in pot experiments. M. Górski and J. Krotowiczówna. *Polish Agr. Forestal Ann.* 28, 121-84(133-4 in German)(1932).—Expts. with barley show that low-percentage K salts (kainites of Stebnik and Kalusz, sylvite) give higher yields of barley seeds and straw than concd. K salts (40% K salt,  $\text{K}_2\text{SO}_4$ , K-Mg salt). With horse beans the K-Mg salt yields as good a crop as low-percentage K fertilizers. J. Wiertelak

Influence of potassium on the development of plants in various stages of growth. M. Korczewski and J. Majewski. *Polish Agr. Forestal Ann.* 28, 1-26(25-6 in German)(1932).—Maize raised in aq. cultures on a nutrient soln. of  $\text{P}_2\text{O}_5$  14.2 mg., N 39.7 mg. and varying amts. of K 2.5-31.8 mg. per liter shows 2 optima of growth, viz., at 4 and 32 mg., and one min. at 12-20 mg. K per l., K being indispensable in all stages. If it is removed at any stage of growth, the development curve shows a rapid fall, except at the min. region, 12-20 mg. K per l., where removal of K in the blooming period causes a rise of the growth rate. Addn. of Na in these conditions increases the growth still more. J. Wiertelak

Action and efficiency of potassium fertilizers. M. Górski, M. Korczewski and F. Terlikowski. *Polish Agr. Forestal Ann.* 28, 263-75(270-5 in English)(1932)

5 Polish crude K salts (of Kalusz, Stebnik and Holy) differ from the analogous German salts. Their content in wt. % of  $\text{KCl}$ ,  $\text{K}_2\text{SO}_4$ ,  $\text{MgCl}_2$ ,  $\text{MgSO}_4$ ,  $\text{NaCl}$ ,  $\text{CaSO}_4$ , insol. residue,  $\text{H}_2\text{O}$  and  $\text{K}_2\text{O}$  are resp.: kainite of Stebnik 9.2-12.9, 2.9-12.0, 0.4-1.3, 18.1-27.0, 31.2-37.7, 2.7-3.8, 11.7-17.4, 7.9-10.3, 8.1-12.3; kainite of Kalusz 8.3-14.8, 3.7-6.9, 2.1-3.4, 17.8-27.7, 28.4-37.0, 2.2-2.7, 5.8-13.7, 10.0-13.1, 8.6-11.8; *Polish 25% K salt*: 39.6, 0.0, —, 1.2, 32.4, 5.8, 19.4, 1.6, 25.0; *Polish K Mg salt(half product)*: 22.7, —, 47.9, 3.4, 5.1, 7.6, 3.5, 17.7; *Polish K Mg salt(finished)*: —, 47.3, —, 36.8, 0.7, 0.3, 0.4, 13.7, 25.6. Conclusions (based on numerous water, sand, soil culture and field expts.): The effects of  $\text{KCl}$  and  $\text{K}_2\text{SO}_4$  on the yield of plants are approx. equal, with a slight tendency in favor of  $\text{K}_2\text{SO}_4$ , especially on soils low in sulfate or showing an excess of Cl ions. Com. fertilizers act better than c. p. salts. The larger their proportion of accompanying salts the better are their fertilizing properties. In most cases best results are obtained on Polish kainite and langbeinite, viz., with sugar and fodder beets, barley, summer wheat and oats. Potatoes and rye, on the other hand, are indifferent to the various types of K fertilizers, giving approx. equal crops. The non-K components of the fertilizers in question consist of (1) chlorides and sulfates of Na, Mg, Ca, etc., abundantly present in crude minerals, (2) loam, (3) compds. of B, Ti, Mn, appearing in insignificant quantities. Na salts enhance the effect of crude K fertilizers. The loam may play some role as a useful component. The presence of B produces a favorable effect on beans, peas, tomatoes, tobacco and potatoes. J. Wiertelak

Report of collaborative work on the determination of potash by the Chemical Control Committee of the National Fertilizer Association. F. B. Carpenter. *Am. Fertilizer* 79, No. 12, 11, 26(1933); cf. C. A. 28, 1130°.—This report gives the results obtained by 10 labs. in the detn. of  $\text{K}_2\text{O}$  in 5 mixed fertilizer samples. The detns. were made (1) by the official method by leaching up to somewhat less than 250 cc.; (2) by the same method by leaching up to 500 cc.; and (3) by boiling in water in a 500 cc. flask, proceeding otherwise by the official method. The 1st procedure gives low results as indicated by the formulas from which the samples were prepd. W. H. Ross



Conditions influencing the action of potash fertilizers on podzols. D. V. Drushinin. *Ergebnisse Vegetationsversuchen Lab.-Arb. Pryanishnikov 13*, 273-340 (1930).—In soils not satd. with bases, application of large quantities of low-grade K salts may cause plant injury. In podzols having no exchange acidity this effect is counteracted by the presence of mobile Ca ion. In the  $pH$  range 5.0-5.5 red clover benefits more by the presence of Ca ion than by the correction of the acidity. Peat effectively regulates the reaction and proportion of mobile Ca in sandy soils.

B. C. A.

Obtaining lime-ammonium nitrate. K. Zeidenberg. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 78-9 (1933).—By adding finely divided lime to fused  $NH_4NO_3$  (at  $135^\circ$ ) the lime-ammonium nitrate is obtained. Z. made such a mixt. by using  $CO_2$  and liquid  $NH_3$  in which  $Ca(NO_3)_2 \cdot 4H_2O$  was dissolved according to the following equation:  $Ca(NO_3)_2 \cdot 4H_2O + CO_2 + 2NH_3 = CaCO_3 + 2NH_4NO_3 + 3H_2O$ . A product is obtained contg. 20% N and 40%  $CaCO_3$ .

J. S. Joffe

Pot tests with quartz meal. Werner Wöhlbier. *Deut. Landw. Presse* 60, 423-4 (1933).—Quartz meal was compared with glass sand in soil mixts. contg. either a humus material deficient in plant food, a peat or a compost. A complete fertilizer, a  $P_2O_5$ -deficient, a  $K_2O$ -deficient or a N-deficient fertilizer was added. No material difference was observed in any case when the complete fertilizer was used. A 30-40% increase in yield was obtained when quartz was used with a K-deficient fertilizer in the peaty soil and the humus material. A 100% increase was obtained with a P-deficient fertilizer in the mixt. of quartz and humus material. Less striking increases were obtained with N-deficient fertilizers. Mixts. of  $1/2$  compost and  $1/2$  quartz gave less satisfactory results than mixts. contg. half of each.

K. C. Beeson

Annual fertilizing of vineyards and the accumulation of the fertilizing effects according to the woody diagnosis of the vine. E. Vinet. *Compt. rend. acad. agr. France* 19, 938-46 (1933).—The use of complete fertilizers over a period of 5 years has caused no increase in the amt. of N in the wood in the sequence of years. It has brought about an increase in the amt. of  $P_2O_5$ , especially when a high- $K_2O$  fertilizer has accompanied the phosphatic fertilizer. This increase of the  $P_2O_5/N$  ratio indicates an increased capacity to bear fruit. There is also a marked increase in the amt. of  $K_2O$  in the wood.  $K_2SO_4$  is superior to KCl in increasing the  $K_2O$  content of the wood and in favoring the production of sugar but inferior in favoring the production of fruit.

J. R. Adams

Fertilization of early potatoes. J. E. Metzger and E. H. Schmidt. Md. Agr. Expt. Sta., *Bull.* 333, 41-62 (1932).—Comparison of various sources of N in 7-6-5 fertilizer on early potatoes showed that no 1 source of inorg. N was entirely satisfactory when used alone. A mixt. of inorg. and org. sources of N was desirable, though the inorg. could predominate. Urea and Leuna saltpeter were acceptable for use in compounding potato fertilizers. When a 7-6-5 fertilizer was used in amts. in excess of 2000 lb. per acre, the results were not profitable. The most favorable method of applying the fertilizer was in the row. No crop injury occurred when fertilizer was used in this way. In a comparison of fertilizer mixts. contg. 5, 8 and 10 units of  $K_2O$ , the best results were obtained with 5 units. KCl was superior to manure salts and  $K_2SO_4$ . Double-strength fertilizer where the sole source of N was urea gave fully as satisfactory results as the usual 7-6-5 formula although applied at only  $1/2$  the rate. C. R. F.

The relative responses of potatoes to different fertilizer elements. T. E. Odland. *Am. Potato J.* 10, 27-31 (1933).—The results of long-time expts. on potatoes in Rhode Island are summarized. Kainite, KCl,  $K_2SO_4$  and sulfate of potash-magnesia were almost equally effective as sources of K. Superphosphate, basic slag and triple superphosphate were about equally effective as sources of P, but bone meal and rock phosphate were less satisfactory. Variations in the amt. of P did not affect the yields as much as did variations in N or K. Mg may become a limiting factor on these soils.

K. D. Jacob

Some significant variations in the chemical composition of the plant associated with a malnutrition trouble of potatoes. R. L. Carolus. *Am. Potato J.* 10, 147-65 (1933).—The malnutrition condition is characterized by (1) a yellowing of the leaves of the plant, the lower leaves and especially the apical leaflets yellowing from the margin toward the midrib, (2) stunted growth of the plant during the earlier stages, (3) new terminal growth consisting of small, half-closed, purplish gray leaves and (4) stems of small cross-section, also purplish gray in color. A detailed study of the chem. compn. of the plants showed that the trouble is caused by a deficiency of available Mg in the soil and that this deficiency is, to a certain extent, correlated with the continued cropping of the soils, the use of large amts. of concd. chem. fertilizers in which the greater portion of the N is present as  $(NH_4)_2SO_4$ , and the depletion of the soil in org. matter. In general, soils that produced healthy plants contained approx. 1.76 times as much org. matter as did soils producing plants suffering from malnutrition. Also, the condition occurs most frequently when the acidity of the soil is lower than about  $pH$  5.0; it is overcome by the use of  $MgSO_4$  on soils that are not excessively acid or by the use of Mg limestone on excessively acid soils. Absorption of Mg by the potato plant is increased by liming the soil. Fifteen references.

K. D. Jacob

Fertilizers for yellow tobacco. A. V. Otruigan'ev. *State Inst. Tobacco Investigations* (Krasnodar), No. 84, 3-29 (English summary 30-32) (1932).—See C. A. 27, 4014.

J. S. Joffe

Fertilizer experiments with tobacco at the Goryache-Klyuchev Station for 1928-31. S. Vladuchenski. *State Inst. Tobacco Investigations* (Krasnodar), No. 100, 3-23 (1933).—Summarizing the results of 3 years of expts. V. draws the following conclusions: The sandy loam soils of the podzolic yellow earths show N in the first minimum,  $P_2O_5$  in the second, and  $K_2O$  in the third. In the first period of its growth tobacco responds most to the  $P_2O_5$  treatment. It also speeds up the following stage, hastens maturity and improves the quality. The addn. of 30 kg. of N per hectare increases the yield without injuring the quality. An increase of N to 80 kg. impairs the quality. Physiologically alk. and neutral fertilizers are better than acid fertilizer. The vegetation period is shortened by fertilizer addns. and acid fertilizers are best in this respect. Physiologically alk. fertilizers do not affect the quality, whereas the acid fertilizers decrease the assortment of the better grades. Addn. of lime may increase the yield, but frequently it gives neg. results. It is most effective with physiologically acid fertilizers. Org. fertilizers seem to be more effective both with regard to the quality and quantity of tobacco. Green manuring has also proved to be beneficial.

J. S. Joffe

Tobacco-plant nutrition. P. Koenig. *Das Superphosphat* 9, 124-5 (1933).—A brief review of the fertilizer requirements of tobacco.

K. D. Jacob

The correlation between cultivated plants, their parasites and distribution. The influence of the nutrition of the plants on the sensitiveness of potato tubers to storage parasites and the alteration of the enzymic metabolism processes during storage. Salahattin Fehmi. *Phytopath. Z.* 6, 543-88 (1933); cf. Volk, *Ibid.* 3, 1 (1932).—Under favorable respiration conditions (low atm. moisture) sound tubers from plants grown under all conditions of nutrition were resistant to attack by *Bacillus phytophthorus* and *B. atrosepticus* during storage. Under unfavorable respiration conditions all tubers were rapidly attacked, but those from plants receiving low-N fertilizers were somewhat more resistant than tubers grown under other conditions of nutrition. The effect of complete fertilizers in increasing the thickness of the skins of potatoes was in the decreasing order: high P, low N, low P, no K, high K, normal N, P and K, and high N. Tubers from plants receiving fertilizers high in N were the most readily attacked by the bacteria, followed in order by those receiving fertilizers high in P, high in K, contg. no K, contg. normal amts. of N, P and K, low in P and low in N, resp. The highest storage losses occurred

in potatoes fertilized with excessive amts. of  $(\text{NH}_4)_2\text{SO}_4$  and the lowest in those receiving fertilizers low in N; likewise, the infection of tubers on the plants with *B. phytophthorus* was highest with high-N and lowest with low-N fertilizers. *Fusarium* rot was highest when K was omitted from the fertilizer and was lowest with complete fertilizers low in N. During storage the greatest total loss of carbohydrates occurred in tubers receiving high-N fertilizers and the smallest in those receiving low-N. The initial enzymic changes during storage were smallest in those tubers receiving an excess of K, particularly in the form of 40% potash salts. There was no definite relation between the yield of potatoes, as affected by the fertilizer treatment, and the enzymic changes during storage.

K. D. Jacob

The value of the sugar-beet crop in relation to its technical processing. V. S. Denisievskii. *Trans. Sci. Inst. Fertilizers* (Moscow), No. 113, 49 55(1933).—D. shows how the fertilizers, the soil and climatic condition have an effect on the sugar content of beets, on the undesirable type of N compds. (non-protein) and on other properties.

J. S. Joffe

Fertilizing experiments with strawberries. M. Górski, J. Szlaskiewiczówna and K. Jezewska. *Polish Agr. Forestal Ann.* 26, 335-56(355-6 in German)(1931).—Since fresh strawberries contain  $\text{K}_2\text{O}$  0.14-0.20,  $\text{P}_2\text{O}_5$  0.03-0.06 and N 0.00-0.12%, it follows that the annual requirement of fertilizers for the crop of 10,000 kg. per ha. and the plants themselves is, contrary to older opinions, very small, viz.,  $\text{K}_2\text{O}$  37,  $\text{P}_2\text{O}_5$  12 and N 32 kg. Field expts. lasting 5 and 2 years verified the above calcns. Artificial fertilization has practically no effect on the yield. Pot expts. show that the plants may be easily damaged by nitrates,  $\text{NH}_4$  and K salts in higher concns. Phosphates, on the other hand, are not detrimental even at high concns.

J. Wiertelak

The boron content of some soils, plants and potassium fertilizers. F. Terlikowski and B. Nowicki. *Polish Agr. Forestal Ann.* 28, 135-44(144 in German)(1932).—Different types of soil contain 0.1-14 mg. B per kg. and 0-6.8% org. C. Similarly cultural plants contain varying amts. of B; the lowest amts. are found in barley, rye and wheat, viz., 0.1-0.3 mg. per kg., and the highest in tomato fruit 1, stalks 14 mg. per kg., tobacco 10, potatoes 14, beans 8, peas 18 mg. per kg. This phenomenon is in agreement with the fact that the growth of the latter group is increased by addn. of minute amts. of B. The fertilizers analyzed contain the following amts. of B: kainite (Stebnik) 0.0032, K salt of Kalusz 0.0035, K-Mg fertilizer (half product) 0.0022, K-Mg fertilizer (Polish) 0.0005, K-Mg fertilizer (German) 0.0066, K salt (German) 0.0012%.

J. Wiertelak

Influence of boron compounds on the development of plants. M. Górski. *Polish Agr. Forestal Ann.* 28, 27-44(44 in German)(1932).—Since crude K salts contain small amts. of B compds., pot expts. were performed to det. the influence of B on the development of certain plants, viz., bean, barley and potatoes. Borax in small amts. (0.05-0.1 g. per 8 kg. sand) has a very beneficial effect on the yield of beans, doubling it. Beans do not develop seeds at all without B. B does not have a beneficial action on barley. Preliminary expts show that B increases the growth of potatoes.

J. Wiertelak

Effect of magnesium addition on the yield and the chemical composition of oats. K. Korczewski and F. Majewski. *Polish Agr. Forestal Ann.* 28, 145-53(1932).—Mg added in excess to pure fertilizers has no inhibiting effect on the yield of oat seed and the total dry substance of the plant up to K/Mg = 1:2.5. The Mg content of the plant increases as that of the soil is raised. The assimilation of K and N is independent of the amts. of Mg added to the soil. The CaO content of the plant is decreased regularly by addn. of Mg to the soil, CaO being replaced by  $\text{MgO}$ . Each gain in  $\text{MgO}$  of 1% corresponds to a loss of 0.87% CaO in the dry substance of the plant. This substitution is harmless to the plant. The expts. prove that the amts. of Mg present in K-Mg

fertilizers are by no means harmful and do not disturb the physiol. equil. of the soil constituents.

J. Wiertelak

Influence of irrigation upon growth, production and quality of small fruits. W. S. Brown. *Oregon State Hort. Soc., Rept. 47th Ann. Meeting 1932*, 103-6.—Irrigation had no significant effect on the total solids and sugars in strawberries, but slightly increased the sugar and acid contents of loganberries.

K. D. Jacob

Report of the entomologist for the year 1932 [control of the nettle grub]. C. B. Redman King. *Tea Research Inst. Ceylon, Bull.* 10, 27-33(1933).— $\text{BaSiF}_6$  and Pb arsenate were ineffective as stomach poisons for the nettle grub. The best control was obtained by spraying the infested plants with a 1:40 aq. soln. of laundry soap.

K. D. Jacob

Relative toxicities of pyrethrins I and II. F. D. Wilson. *Soap (Insecticide and Disinfectant Sect.)* 9, No. 9, 84

(1933).—A statistical study of data presented by Wilcox and Hartzell (*C. A.* 27, 1977) indicates that pyrethrin II has a toxicity of about 7% of that of pyrethrin I.

Henry H. Richardson

The action of pyrethrum on insects. Alfred Weed. *Soap (Insecticide and Disinfectant Sect.)* 9, No. 8, 84 5 (1933).—A review with 10 references.

H. H. R.

Scientific section of the insecticide committee. C. H. Peet. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 1, 85, 87(1934); cf. *C. A.* 27, 4019.—A review of recent publications on *pyrethrum*, *rotenone* and *synthetic insecticides* with 28 references.

Henry H. Richardson

New insecticide, germicide and disinfectant patents R. C. Roark. *Soap (Insecticide and Disinfectant Sect.)* 9, No. 11, 89, 91, 93, 99, 101, 103, 105(1933).—Summaries of recent patents are given.

H. H. R.

Petroleum and products are ideal insecticides: used with success on a large scale. C. K. Francis. *Oil and Gas J.* 32, No. 33, 16, 34(1934).—F. describes various petroleum products which are used as insecticides.

J. R. Strong

Factors in insecticide performance. D. F. Murphy and C. H. Peet. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 1, 95, 97, 99, 101, 103(1934).—The toxicities of several *petroleum distillates* ranging from naphtha to heavy oils in combination with *pyrethrum* or with Lethane 384 varied inversely with their viscosities in tests against house flies. The distillates had little toxicity in themselves.

Henry H. Richardson

Spray materials and the residue problem. O. C. Roberts and A. I. Bourne. *Mass. Fruit Growers' Assoc. Rept. 38th Ann. Meeting 1932*, 154-61.—Addn. of hydrated lime to lime-S and Pb arsenate mixts. checks somewhat but does not entirely prevent foliage burning. Apples sprayed with Pb arsenate within 6 weeks of harvesting are likely to carry arsenical residue in excess of the tolerance in a season of normal rainfall; the use of Ca caseinate in late sprays tends to increase the arsenical residue. Arsenical residue is not increased by the use of S and lime-S dusts following Pb arsenate sprays.

K. D. Jacob

Contact sprays for the Japanese beetle. Walter J. Fleming. *U. S. Dept. Agr., Circ.* 280, 1-4(1933).—A review of methods for the prepn. of contact sprays for the Japanese beetle.

W. H. Ross

Zinc hydroxide, a substitute for calcium hydroxide in arsenical sprays. R. H. Hurt. *Phytopathology* 23, 17 (1933).— $\text{Zn}(\text{OH})_2$  can be used instead of  $\text{Ca}(\text{OH})_2$  to prevent arsenical injury to the foliage of peach trees and snap beans. It may be combined with arsenicals either in the form of dust or liquid sprays. In either case the  $\text{Zn}(\text{OH})_2$  should replace the hydrated lime lb. for lb.

R. C. Burrell

Zinc and copper spray materials for peaches and apples. R. H. Hurt. *Va. State Hort. Soc., Proc. 37th Ann. Meeting, Va. Fruit* 21, No. 1, 55-64(1933).

K. D. Jacob

Some incidental effects of routine scab sprays, with special reference to apple fruit sawfly control. A sidelight on the interpretation of field spraying experiments M. H. Moore. *Ann. Rept. East Malling Research Sta. 1932*,

90-8(1933); *Rev. Applied Mycol.* 12, 766-7; cf. C. A. 27, 1080.—Pink-bud applications of Bordeaux mixt. caused severe cracking and russetting of Cox's Orange Pippin apples, and *Sclerotinia fructigena* (brown rot) penetrated the cracks so that some of the sprayed trees showed more brown rot than the controls. Post-blossom applications of Bordeaux mixt. caused surface russetting but very little cracking, and brown-rot infection was slight. Bordeaux mixt. and lime sulfur with and without Pb arsenate applied against apple scab also gave control of sawfly (*Hoplocampa testudinea*). Oden B. Sheppard

New developments in potato spraying. F. M. Blodgett, E. O. Mader, O. D. Burke and R. B. McCormack. *Am. Potato J.* 10, 79-88(1933).—Yields of potatoes increased to a max. with increase in the total amt. of  $\text{CuSO}_4$  applied to the plants in the form of Bordeaux mixt. sprays. In 1 locality the optimum amt. of  $\text{CuSO}_4$  was 75-80 lb./acre. With a given total application of  $\text{CuSO}_4$ , the yields also increased as the amt. of  $\text{CaO}$  in the Bordeaux mixt. was decreased. A ratio of 5 lb.  $\text{CuSO}_4$  to  $2\frac{1}{2}$  lb. hydrated lime to 50 gal.  $\text{H}_2\text{O}$  is recommended. K. D. Jacob

Total amount of copper applied and ratio of lime to copper in Bordeaux mixture as important factors in potato spraying. F. M. Blodgett, E. O. Mader, O. D. Burke and R. B. McCormack. *Phytopathology* 23, 5(1933).—There is some evidence that the total amt. of Cu applied (as Bordeaux mixt.) is an important factor in increasing the yield of potatoes. In a comparison of Bordeaux mixts. made with different kinds of lime, that made with high-Mg lime gave slightly, but fairly consistently, better results than the mixt. made with high-Ca lime. R. C. Burrell

The use of arsenic compounds in fruit-tree cultivation. J. Blanchard. *Compt. rend. acad. agr. France* 19, 1021-6(1933); cf. C. A. 27, 2624.—The results of this work support the findings of last year that the As found on the fruit is not sufficient to cause poisoning. A broadening of the scope of this work shows that the quantities of As found on legumes cultivated under treated trees cause no trouble in animals consuming them. J. R. Adams

The estimation of the wetting power of the solutions or mixtures used in agriculture. Augustin Boutaric. *Compt. rend. acad. agr. France* 19, 1013-20(1933).—A crit. discussion of 3 methods for detg. the surface tension and its use in comparing the wetting power of solns. and mixts. The surface-tension coeff. can be used to give a rough comparison between the solns. only when they are used to wet similar surfaces. When it is a question of detg. the wetting power on unlike surfaces such as the leaves of spinach and cabbage these coeffs. are of little value. J. R. Adams

Bordeaux mixture. G. E. Sanders. *Phytopathology* 23, 31-2(1933).—The addn. of an excess of lime to Bordeaux mixt. increases its value in the control of early blight of potatoes. Mixing Na arsenite soln. with the  $\text{CuSO}_4$  soln. before the addn. of lime gives a much safer arsenical than can be obtained by adding the Na arsenite to the completed Bordeaux mixt. Also in *Am. Potato J.* 10, 248-50(1933). R. C. Burrell

Some effects of Bordeaux mixture on transpiration. J. D. Wilson and H. A. Runnels. *Ohio Agr. Expt. Sta., Bi-monthly Bull.* 18, 147-51(1933); cf. C. A. 28, 1131<sup>1</sup>.—(a) *Coleus* plants the daily curves of changing stomatal aperture are very similar for sprayed and unsprayed plants, but wide variations occur during a 24-hr. period. The sprayed plants transpired much more during darkness, but fell behind the unsprayed during daylight. Bordeaux mixt. may be a deterrent to stomatal transpiration at all times but it causes a decided acceleration of cuticular transpiration during the night period. The cooling effect of a film of Bordeaux mixt. on the upper side of *Coleus* leaves causes a decrease in transpiration rate equiv. to 5% of that of an untreated plant during the mid-day period. This effect is counterbalanced and even exceeded by a drying action during the rest of the daylight period. Bordeaux mixt. increases transpiration to a greater extent on days of low light intensity and high air humidity than on bright, dry days. C. R. Fellers

Removing Bordeaux spray from oranges. R. J. Benton

and T. N. Powell. *Agr. Gas. N. S. Wales* 44, 683-4(1933).—The deposit on Valencia oranges caused by spraying the trees with Bordeaux mixt.-oil sprays was completely removed by immersing the fruit for 30 sec. in 0.125% HCl or for 7.5 sec. in 2% HCl. Satisfactory removal of the discoloration was obtained also with 1% acetic, lactic, citric and tartaric acids. During storage for 3 weeks, fruit that had been dipped in HCl, rinsed in fresh water and dried showed no sign of injury from the treatment. K. D. Jacob

A homemade colloidal copper spray. W. P. Raleigh. *Phytopathology* 23, 29(1933).—A concentrate was prepd. as follows: 1 lb.  $\text{CuSO}_4$  was dissolved in 2 qt. water, and 1 pint blackstrap molasses was added. The mixt. was stirred well and made slightly alk. by adding 0.4 lb. of lye dissolved in 1 qt. of water. The concentrate was allowed to stand until it turned yellow and was used at the rate equiv. to 4 lb. of  $\text{CuSO}_4$  to 50 gal. of water for the control of late blight of potatoes. R. C. Burrell

The method of action of copper mixtures. Role of the deposits. J. Brauns and J. Dulac. *Compt. rend.* 198, 120-2(1934); cf. C. A. 28, 1131<sup>1</sup>.—To dissolve appreciable amts. of the insol. Cu from the dried deposits of Bordeaux and Burgundy mixts. the  $\text{H}_2\text{O}$  should contain more than 7 mg. of  $\text{NH}_3$  per l. and have a  $\text{pH}$  of 5 or less. Rain water normally averages 1 mg. of  $\text{NH}_3$  per l. and has  $\text{pH}$  values ranging from 5.3 to 7.5. Thus after these mixts. have dried and the sol. Cu has been washed out, the rain water does not have enough solvent action on the insol. Cu to give a toxic soln. J. R. Adams

Fungicidal efficiency of mercuric chloride and potassium iodide. W. P. Raleigh. *Phytopathology* 23, 28(1933).—Preliminary field expts. indicate that the addn. of KI to a soln. of  $\text{HgCl}_2$  greatly increases the fungicidal efficiency of the soln. when used to control *Rhizoctonia* on potatoes. R. C. Burrell

Crown treatments for hop downy mildew control. G. R. Hoerner and Walter Jones. *Phytopath. Z.* 6, 619-26(1933).—Tests were made with numerous dusts and sprays for controlling the hop downy mildew (*Pseudoperonospora humuli*). The best results in controlling the disease and reducing the no. of basal spikes on the plants were obtained with dusts contg.  $\text{CuSO}_4 \cdot \text{H}_2\text{O}$  (1 part) and hydrated lime (6 parts) and applied to the exposed crowns at the rate of approx. 1 oz. per hill after pruning in the spring. The results of dusting in the fall and also before flooding in the spring indicated that some of the material is leached away and the effectiveness of the treatment thereby reduced. K. D. Jacob

Citrus red scale—experiments with liquefied hydrocyanic acid gas fumigation. P. C. Hely. *Agr. Gas. N. S. Wales* 44, 823-6(1933).—Fumigation with liquid HCN was slightly more effective than an equiv. amt. of  $\text{Ca}(\text{HCN})_2$  in controlling red scale (*Chrysomphalus aurantii* Mask.) on Valencia orange trees. Higher kills were obtained under closely-woven light calico tents than under those made of heavy calico. K. D. Jacob

"Purple patch" of wheat and oats, a disease caused by the fungus *Rhizoctonia solani*. H. J. Hynes. *Agr. Gas. N. S. Wales* 44, 879-83(1933).—Treatment of affected soil with  $(\text{NH}_4)_2\text{SO}_4$  (1 cwt./acre) prior to sowing the seed gave good control of "purple patch" in wheat. Applications of lime were inefficient until the 2nd season after treatment, when the control was as good as in the original  $(\text{NH}_4)_2\text{SO}_4$  treatments. K. D. Jacob

The "white ear" disease of oats. W. Sauerlandt. *Ernahr. Pflanze* 30, 21-5(1934); cf. Rademacher, C. A. 27, 1079; *Arch. Pflanzensbau* 8, 436(1932).—"White ear" or "blast" is a term applied to a condition in oats which is characterized by the bleached appearance of the spikes due to the absence of chlorophyll. Pot expts. showed that applications of  $\text{P}_2\text{O}_5$  had no effect on the occurrence of the disease. With pots receiving N and  $\text{K}_2\text{O}$  the occurrence of the disease decreased with increasing applications of  $\text{K}_2\text{O}$ . With a N:K ratio which corresponds to the nutrient requirements of the crop there was little or no trace of the disease. The occurrence of the disease

was also increased by reducing the  $H_2O$  supply of the plants.

John O. Hardesty  
Whiptail disease of cauliflowers can almost be eliminated by liming. C. J. Magee. *Agr. Gas. N. S. Wales* 44, 911-14 (1933).—Excellent control of the disease, which is caused by high soil acidity, was obtained by treating the soil with hydrated lime ( $1\frac{1}{2}$ -2 tons/acre) several weeks before planting the seed.

K. D. Jacob  
Third report of progress of studies on walnut blight and its control in Oregon. Paul W. Miller. *Rept. 18th Ann. Meeting Western Nut Growers Assoc.*; Oregon State Hort. Soc., *Rept. 47th Ann. Meeting* 1932, 140-61.—Spraying walnut trees with Bordeaux mixt. (2:2:50) considerably reduced the losses caused by walnut blight (*Botryosphaeria juglandis*), but in many cases it caused injury to the young leaves. Zn-lime (8:8:50) and Cu-Zn-lime (1:3:6:50) sprays were relatively noninjurious to foliage and seemed to possess germicidal properties. Addn. of skim-milk powder and blood albumin to Bordeaux sprays did not reduce the foliage injury. Bordeaux sprays contg. thrice as much lime as  $CuSO_4$  caused less injury than sprays contg. equal amts. of lime and  $CuSO_4$ .

K. D. Jacob  
Control of the obscure scale [on pecan trees]. Howard Baker. Natl. Pecan Assoc., *Rept. Proc. 31st Ann. Convention* 1932, 53-4.—Dormant spraying with a 5% lubricating-oil emulsion gave satisfactory control of light infestations of *Chrysomphalus obscurus*, but frequently caused injury to trees in poor phys. condition; 4% emulsions should be used on such trees. Six % emulsions gave good control of heavy infestations but frequently caused injury, regardless of the phys. condition of the trees.

K. D. Jacob  
Control of the pecan Phylloxera. Howard Baker. Natl. Pecan Assoc., *Rept. Proc. 31st Ann. Convention* 1932, 49-53.—Almost complete control of *Phylloxera devastatrix* and *P. notabilis* on pecans was obtained by dormant and delayed-dormant spraying of the trees with liquid lime S 12.5 gal. and nicotine sulfate 1 pint per 100 gal. of soln. Also, 3% lubricating-oil emulsion gave good results; when applied at the delayed-dormant period it retarded opening of the buds for 4-5 days but caused no permanent injury.

K. D. Jacob  
Field and laboratory studies on frencching of tobacco. G. M. Shear. Va. Agr. Expt. Sta., *Tech. Bull.* 49, 3-15 (1933).—Frencching occurred in the field regardless of fertilizer treatment. There was the least amt. of frencching on the plots receiving manure and  $(NH_4)_2SO_4$ .  $K_2SO_4$  and superphosphate had no apparent effect. Frencching was assoc. with seasons of heavy rainfall. Under greenhouse conditions, frencching was corrected by the addn. of nitrogenous fertilizers to the soil or by the provision of conditions favorable for soil aeration. The addn. of absorbent cotton to the soil increased the severity of frencching. The disorder could not be corrected by spraying the foliage of diseased plants with nitrate solns. or by supplying nitrate to the roots. In water cultures the disorder could not be produced by a deficiency of nitrate or a lack of aeration, or by a combination of the 2 conditions. Partial sterilization of the soil which produced frencched plants was effective in preventing the disorder where the treatment was severe enough to kill weed seeds. Frencching developed in soil having a range of  $pH$  from 5.8 to 7.9. Development occurred most rapidly at  $pH$  7-7.5, decreasing quickly above this range and more gradually as the acidity increased. Frencching was produced in sand cultures that were watered with the soln. leached from soil that produced frencching. This indicates that the disorder is a toxicity disease as opposed to the usual opinion that it is a deficiency disease. C. R. F.

Potato scab and Rhizoctonia and their control. [Experiments in] New York. C. F. Taylor and L. L. Stirland. *Am. Potato J.* 10, 66-7 (1933).—Addn. of Hg compds. to the soil mixed with the fertilizer markedly increased the percentage of scabbed tubers in the crop.  $HgCl$  at rates up to 20 lb./acre was slightly worse than  $HgO$  at 10 lb./acre. Org. Hg compds. caused more scab than in the checks but were not so stimulative as  $HgCl$  or

$HgO$ .  $Al_2(SO_4)_3$ , while reducing scab, markedly reduced the yields of potatoes. Treatment of the seed pieces with Hg compds. also increased the amt. of scab. The effect of the Hg treatments in increasing the yield of potatoes was approx. in the order of their effectiveness in increasing scab on the crop. Application to the soil of  $(NH_4)_2SO_4$  and various types of S tended to decrease scab in proportion to their effect in increasing soil acidity. Inorg. Hg compds were more effective than org. Hg compds in reducing the percentage of tubers bearing sclerotia of *Rhizoctonia*. [Experiments in] Wisconsin. B. J. Dipensaar and R. E. Vaughan. *Ibid.* 60-73.—Two-yr expts. indicated that application of S at the rate of 300-900 lb./acre will change the soil reaction sufficiently to control scab, the best results being obtained when high soil moisture is maintained. Treatment of the seed pieces with hot formalin soln. gave excellent control of scab and *Rhizoctonia* but greatly reduced germination and crop yields; immersion for 10 min. in the acid Hg dig gave nearly complete control and caused no injury to germination, except where the tubers were sprouted too much at time of treating or were not properly dried after treatment.

K. D. Jacob  
Internal brown fleck of potatoes. J. E. van der Plank. *Farming S. Africa* 8, 383-4 (1933).—The disease, which occurs only in potatoes grown on acid soils, is controlled by liming the soil. Phosphate fertilizers reduce the incidence of the disease, whereas  $(NH_4)_2SO_4$  favors its occurrence; potash fertilizers have no effect. K. D. J.

The potato scab-gnat, *Phyria scabiei* Hop. Harry I. Gul. *Am. Potato J.* 10, 22-7 (1933).—Treating seed potatoes with  $HgCl_2$  or hot formalin soln. was effective in destroying *P. scabiei* which had overwintered on the seed. Attack by the insect was reduced by treating the soil with heavy applications of manure or other forms of org. matter. When the  $pH$  of the soil was varied from 1 to 7.8 by the use of S or ground limestone, a direct correlation existed between scab-gnat attack and the  $pH$  value;  $pH$  values near 5.0 were the most effective but caused a reduction in the crop yield. Also in Ohio Agr. Expt. Sta., *Bull.* 524, 21 pp. (1933).

K. D. Jacob  
Potato flea-beetle control. L. B. Daniels. Colo. Agr. Expt. Sta., *Bull.* 400, 3-34 (1933).—The flea-beetle, *Ephritus cucumeris* Harr., thrives best in moist, heavy soils. Ca arsenate, 1 lb., to 8 lb. of  $Ca(OH)_2$  and Na fluoaluminat (Kalite) dusts applied in 2-3 applications gave very effective control. The first application should take place the 2nd-3rd week in July. The dusts are used at the rate of 20-30 lb. per acre. The most effective spray material used was Zn arsenite, 1 lb. to 50 gal. of water. A pressure of 150 lb. to the sq. in. should be used to obtain good leaf coverage. The beetles feed mainly on the under side of the leaves.

C. R. Fellers  
The destruction of leather jackets by chemical means. P. Kaysing. *Ernähr. Pflanze* 30, 269 (1934).— $CaH_2$  completely destroyed the larvae but proved a failure under field conditions owing to its volatility. Applications of 9.5 cwts. of kainite per acre, when well mixed with the surface soil, completely destroyed the pest within a period of 3 months.

John O. Hardesty  
Ingestion of poison by the boll weevil. H. J. Reinhardt and F. L. Thomas. Tex. Agr. Expt. Sta., *Bull.* 475, 5-33 (1933).—Approx. 65% of the boll weevil mortality on dusted cotton occurred as a result of accumulation of  $Ca_3(AsO_4)_2$  dust on the mouth parts and the accidental ingestion of poison by weevils while crawling on the leaves, stems and fruits of the cotton plant. To be most effective the As dust must uniformly cover all portions of the plant. In general, dusts give better coverage than sprays and are also more readily picked up by weevils. The detd. lethal dose of poison for the weevil approximated the total amt. retained on the surface of a bud as a result of dusting at the usual rate of 5-7 lb. per acre. The presence of dust on cotton retarded the crawling activities of weevils by about 60% and reduced the no. of fruits which were visited by 50%. The presence of dense pubescence on the stems and leaves increases the efficiency of As dusts

by forcing greater contact of the insect with the poison.

**The carpenter worm (*Prionoxystus robiniae* Peck) and its control.** C. E. Petch and J. B. Maltais. Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932, 131-6(1932).—Excellent control of the insect on shade trees was obtained by forcing a thick mixt. of solid  $\text{Ca}(\text{CN})_2$  and linseed oil into the larvae tunnels in the tree trunks.

**Grasshopper control by sodium fluosilicate.** S. Marcovitch. Tenn. Agr. Expt. Sta., 45th Ann. Rept. 1932, 33(1933).—The most effective field bait consisted of 100 lb. bran, 4 lb. Na fluosilicate, 2 gal. molasses, and 3 oz. Am acetate. The bait is less toxic to higher animals than As baits.

**Effect of some physical factors on onion maggot infestations in light and heavy soils.** Alan G. Dustan. Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932, 20-7(1932).—When soils varying in  $\text{pH}$  from very alk. to very acid were prepd. and tested, ovipositing females of the onion maggot exhibited a marked preference for the latter. In tests with artificially prepd. soils in which the amt. of humus and sand was varied, ovipositing flies showed a distinct preference for the 50-50 combination and chose pure humus rather than pure sand. The heavy texture of clay soils inhibits the deposition of eggs, although such soils are usually higher in org. matter than the more highly infested sandy soils.

**The gladiolus thrips and its control.** Alan G. Dustan. Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932, 32 7(1932).—Spraying gladiolus plants with lime S, nicotine sulfate, pyrethrum ext. or derris ext., or dusting with nicotine sulfate, pyrethrum or hydrated lime gave little or no control of the gladiolus thrips (*Taeniothrips gladioli* M. & S.). The best results were obtained by spraying with Paris green. Excellent control of the insect was obtained by fumigating the plants with  $\text{Ca}(\text{CN})_2$  under oilcloth or brown-paper tents.

**The oriental fruit moth.** Philip Garman. Mass. Fruit Growers' Assoc., Rept. 38th Ann. Meeting 1932, 21-9.—In lab. expts., treatment with 0.5, 1.0 and 2.0% con. white-oil emulsions killed 64, 85 and 94%, resp., of the eggs of the oriental fruit moth. There are indications that treatment of fruit-moth eggs with S dusts may adversely affect parasitization of the eggs by *Trichogramma minutum*.

**Control of the green peach aphid on the Murrumbidgee irrigation area.** P. C. Hely. Agr. Gas. N. S. Wales 44, 751-8(1933).—When they were applied to the eggs under controlled lab. conditions, tar distillate washes, at dilns. up to 1:40, gave complete control of the green peach aphid (*Mysus persicae*); similar results were obtained under field conditions. Lime S (winter strength) combined with either nicotine sulfate (1:800) or pyrethrum ext. (1 oz./16 gal.) gave good control of aphids and was effective against the peach leaf curl. When they were used alone, nicotine sulfate and pyrethrum ext. had practically no aphicidal value; lime S seems to activate these materials. Pyrethrum dusts and red- and white-oil sprays were ineffective.

**The pumpkin beetle, *Aulacophora hilaris* Boisd.** W. L. Morgan. Agr. Gas. N. S. Wales 44, 915-22(1933).—Hydrated lime and mixts. of lime and tobacco dust (equal parts) were the best dusts for protecting young plants. On older plants Pb arsenate and Paris green sprays had a slight repellent action but did not give satisfactory kills. Although the beetles do not readily feed on foliage that has been sprayed or dusted with arsenicals, Pb and Ca arsenate dusts may give comparatively high kills because of accidental ingestion of the poison while the insects are cleaning the dust from their bodies. Pyrethrum and its exts. were the most promising of the contact insecticides used. Nicotine dust and arsenical sprays were injurious to young pumpkin plants.

**Investigations on the green vegetable bug (*Nezara viridula* Linn.).** E. H. Zeck. Agr. Gas. N. S. Wales 44, 594, 675-82(1933).—The adult bugs are extremely

difficult to kill with contact insecticides. In lab. expts. under controlled conditions the highest kills (80-71%) were obtained with (1) nicotine sulfate and hard soap, (2) petroleum soap emulsion and (3) resin, soda and fish oil; (2) and (3) caused damage to bean plants and (1) is too expensive for large-scale use. Pyrethrum dust, alone or mixed with an equal amt. of 2.5% nicotine dust, killed 40-50% of the bugs and temporarily acted as a deterrent.

**Notes on the tarnished plant bug in the dry belt of British Columbia.** E. P. Venables. Proc. Entomol. Soc. Brit. Columbia No. 30, 17-20(1933).—The poor results obtained with lime-S sprays (1:8 and 1:20) in controlling the tarnished plant bug (*Lygus pratensis*) on apple trees were improved somewhat by addn. of 3-4% of oil to the sprays. A 5% nicotine dust was ineffective against the adult insects.

**Developments in codling-moth control.** W. S. Hough. Va. State Hort. Soc., Proc. 37th Ann. Meeting; Va. Fruit 21, No. 1, 88-92(1933).—Excellent control of the codling moth on apples was obtained by substituting  $\text{BaSiF}_6$  or  $\text{Na}_2\text{AlF}_6$  for Pb arsenate in the July or later sprays; however, the fruit showed an excessive amt. of arsenical residue at picking time. This indicates that F compds. prevent the normal rate of loss of As from fruit during the interval between the last application of Pb arsenate and the picking time. Summer-oil sprays, following Pb arsenate, had but little effect on arsenical residue and gave poor control of codling moth. Addn. of lime to Pb arsenate sprays decreased both the amt. of As adhering to the fruit and the efficiency of the sprays. Ca arsenate did not give satisfactory control of codling-moth larvae.

**Materials used as canker paints in woolly aphid control.** A. A. Dennys. Proc. Entomol. Soc. Brit. Columbia No. 30, 8-10(1933).—Entrance of woolly aphids into canker and pruning wounds in apple trees was prevented by painting the wounds with a mixt. of 25% Castor machine oil (a heavy grade of mineral oil contg. Al naphthenate) and 2.5% nicotine sulfate, emulsified by boiling in water with 5% of wheat flour. The mixt. caused no injury to the wound margins. There is some evidence that the nicotine sulfate may form an oil-sol. Al nicotine naphthenate compd. with the Castor machine oil, which makes its duration of toxicity considerably greater than that of nicotine sulfate alone.

**Present methods for the control of false blossom [of cranberries].** Charles S. Beckwith. Am. Cranberry Growers' Assoc., Proc. 64th Ann. Convention 1933, 8-9, 12-13.—The disease is caused by leafhoppers and is controlled by spraying the plants with pyrethrum soap mixt. (22.5% soap and 0.2% pyrethrins) dild. 1:160 and used at the rate of 400 gal./acre. Expts. with various dusts indicated that good control is obtained by the use of a mixt. of 10% of finely ground pyrethrum with 90% gypsum or talc applied at the rate of 100 lb./acre.

**Control of the apple leafhoppers in Connecticut.** Philip Garman. Mass. Fruit Growers' Assoc., Rept. 38th Ann. Meeting 1932, 128 32.—Neither lubricating oils nor tar distillate washes nor combinations thereof afforded control of leafhopper eggs. Lime S plus nicotine sulfate, with Fe sulfate added to prevent leaf burn, gave the best kill of mature hoppers in midsummer. Na fish-oil soap plus nicotine sulfate was effective in late summer.

**Insecticide tests against wireworms.** Windsor Tobacco Substation Rept. 1932. Donald S. Lacroix. Conn. Agr. Expt. Sta., Bull. 350, 497-8(1933).—Naphthalene, used at a concn. of 16 teaspoonfuls per gal. of water, repelled the worms but burned the tobacco plants. *p*-Dichlorobenzene broadcast over the field at the rate of 10 lb. per acre had no effect on either wireworms or plants. When drilled in the row or used at the rate of  $\frac{1}{2}$  teaspoonful per plant, it gave partial control without injury.

**Weed eradication with chemical sprays.** W. L. Latschaw, J. F. Zahnley and W. F. Pickett. Kan. Agr. Expt. Sta., Biennial Rept. 42-3(1932).—The use of  $\text{NaClO}_2$

spray on bindweed and Johnson grass effectively controlled these weeds. From 150 to 350 lb. per acre is recommended. The month of Aug. proved the best time to spray the bindweed. Narrow-leaf plantain on lawns was completely destroyed without injury to lawn grass by spraying with  $\text{NaClO}_2$ . The optimum concn. was 0.5 lb. of chemical to 1 gal. of water. This amt. covered 100 sq. ft. of lawn.

C. R. Fellers  
Selective eradication of weeds from cereals with sodium chlorate. Ch. Chabrolin. *Compt. rend. acad. agr. France* 19, 1035-40 (1933).—Preliminary results show the possibility of using  $\text{NaClO}_2$  (12 kg. or 1200 l. of 1% soln. per hectare) for the selective destruction of a no. of weeds in cereal cultivation. The cereal (wheat) is itself affected but only transitorily.

J. R. Adams  
Commercial cattle sprays. Franklin C. Nelson. *Soap* (Insecticide and Disinfectant Sect.) 10, No. 2, 79-81, 97, 99, 101, 103 (1934).—The various cattle pests and the purposes of cattle sprays are discussed. A spray with a volatile petroleum-oil base is irritating to cattle. A medium-viscosity oil was most suitable and it had some repellent (A) and toxic (B) value against cattle insects. The addn. of pyrethrum ext. increased A and B. Methods of testing A are described. Cyclic esters had the greatest A of a series of org. compds. Diethyl phthalate was the most effective of these. Approx. 20 cc. of spray applied both morning and evening was found the most suitable. Larger quantities are liable to cause injury. During the fly season sprayed cattle maintained a higher milk flow of higher butter-fat content than unsprayed cows. The spray is best applied as a fine mist. Twenty-one references.

Henry H. Richardson  
Rotenone in fly sprays—raising the quality of pyrethrum fly sprays by the addition of a constant amount of rotenone. A. Edison Badertscher. *Soap* (Insecticide and Disinfectant Sect.) 9, No. 8, 85, 87 (1933).—The addn. of 0.05 % rotenone dissolved in a kerosene miscible solvent to several samples of common household fly sprays of the pyrethrum type increased the killing efficiency against house flies, especially with the less efficient sprays.

Henry H. Richardson  
The use of liquid insecticides for preventing moth damage. Wallace Thomas. *Soap* (Insecticide and Disinfectant Sect.) 9, No. 8, 89, 91 (1933).—A review.

H. H. R.  
Jetting mixtures for the control of sheep blowfly attack. Experiments carried out during 1932-33. R. N. McCulloch. *Agr. Gaz. N. S. Wales* 44, 706-74 (1933); cf. C. A. 27, 365.—Ca arsenite mixt. (10 lb.  $\text{As}_2\text{O}_3$ , 10 lb. stone lime and 1 lb.  $\text{NaOH}$  per 100 gal.) was more effective than Na arsenite soln., sheep dip or Paris green in protecting sheep against blowfly attack. A Ca arsenite mixt. contg. 25% of its As in the  $\text{H}_2\text{O}$ -sol. condition was unsatisfactory. Ca arsenite renders the wool somewhat harsh and rather difficult to cut with hand shears during the 1st 6-8 weeks after jetting. Injury to the sheep may result if the Ca arsenite mixt. is allowed to strike the animal at pressures exceeding 150 lb./sq. in. K. D. J.

A promising new blowfly dressing. R. N. McCulloch. *Agr. Gaz. N. S. Wales* 44, 711-12 (1933).—A paste prepd. from  $\frac{1}{2}$  oz. Paris green,  $\frac{5}{8}$  oz. kaolin and 18 oz. soft soap soln. (1-2%) and applied directly to the wounds was effective in killing blowfly maggots in sheep. The treatment reduced the no. of fly re-strikes occurring in 6-20 days.

K. D. Jacob  
Experiments in the treatment of stomach worms in sheep. F. H. S. Roberts. Queensland Dept. Agr. & Stock, Div. Entomology & Plant Path., *Pamphlet* 5, 17 pp. (1932); cf. C. A. 27, 1443.— $\text{CCl}_4$ , tetrachloroethylene and  $\text{CuSO}_4$  and mustard, administered orally, had little if any effect on tapeworms, *Moniezia* sp., in lambs. Good control seemed to be obtained by the administration of an aq. soln. of 2.33 grains  $\text{As}_2\text{O}_3$  and 105 grains  $\text{MgSO}_4$ . A mixt. of Na arsenite and  $\text{CuSO}_4$  was only slightly efficient.

K. D. Jacob

et al.) 6. Pptn. of  $\text{H}_2\text{PO}_4$  by chalk (Gurévich) 18. App. for granulating crystd. salts, particularly fertilizers (Fr. pat. 755,743) 1. Vermin-destroying compns. (Ger. pat. 555,115) 18. Sulfonated oleic acids [products used for combating insects] (Brit. pat. 400,587) 25.

Doerell, Ernst G.: Die Düngung des Hopfens in histologischen, pflanzenphysiologischen, pflanzenbaulichen, betriebswirtschaftlichen und brautechnischen Betrachtungen. Hnojni chmele. Hop-fertilizing. Bd. II. Prague: Verlag Wiss. Anstalten für Brauindustrie. 332 pp.

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Jahrbuch der Moorkunde. Bericht über die Fortschritte auf allen Gebieten der Moorkultur und Torfverwertung. Jg. 19, 1931. Edited by Bruno Tacke and Friedrich Brüne. Hannover: Schaper. 177 pp. M. 14.

Fertilizer. Frederick W. Genz (to Virginia-Carolina Chemical Corp.). U. S. 1,944,788, Jan. 23. Tobacco stems are impregnated with plant nutrient salts which are formed by reaction in the material of successively added reagents such as lime and  $\text{H}_2\text{PO}_4$  with such chem. and inech. action that part of the tobacco stem material is disintegrated into a colloidal state.

Fertilizer. Norsk Hydro-Elektrisk Kvaestofaktieselskab. Norw. 52,920, Aug. 14, 1933. A fertilizer contains chiefly  $\text{NH}_4\text{NO}_3$  and finely ground dolomite or magnesite, the latter being mechanically bound to the  $\text{NH}_4\text{NO}_3$ , so that every single grain of the fertilizer contains a certain amt. of the different constituents.

Fertilizer from crude phosphate. Stockholms Superfosfat Fabriks A.-B. (J. Gelhaar, inventor). Swed. 77,858, July 25, 1933. Crude phosphate is mixed with an acid nitrate such as  $\text{NH}_4\text{NO}_3$ ,  $2\text{HNO}_3$ , or  $\text{KNO}_3 \cdot 2\text{HNO}_3$  in the solid state, and the materials are allowed to act upon each other until the  $\text{P}_2\text{O}_5$  is all or largely converted into a sol. form.

Decomposing crude phosphate with alkali trinitrate. Stockholms Superfosfat Fabriks A.-B. (J. Gelhaar, inventor). Swed. 79,035, Nov. 28, 1933. An addn. to Swed. 77,858 (preceding abstr.). The acid nitrate is added in successive portions to the crude phosphate so that the mixt. remains very nearly neutral until practically all of the  $\text{P}_2\text{O}_5$  has gone into soln. Swed. 79,036, Nov. 28, 1933. A further addn. to Swed. 77,858. Part, preferably not more than half, of the trinitrate required for the decomposition is replaced by  $\text{HNO}_3$  or  $\text{H}_2\text{PO}_4$  or both of these acids.

Nitrogenous fertilizer. Wm. H. Waggaman (to Oberphos Co.). U. S. 1,944,046, Jan. 16. Protein-contg. material of animal origin such as leather scrap is subjected to the action of a gaseous nitrating agent such as lower oxides of N and then to a heat and pressure conversion (suitably at a temp. of about  $110^\circ$ ).

Complete fertilizer containing citrate-soluble phosphoric acid. Norsk Hydro-Elektrisk Kvaestofaktieselskab. Norw. 53,320, Nov. 27, 1933. Crude phosphate is decomposed with acid, preferably  $\text{HNO}_3$ , and  $\text{CaHPO}_4$  is pptd. by means of  $\text{CaCO}_3$ ,  $\text{CaO}$  or other base. The Ca phosphate is mixed with salts of K and  $\text{NH}_4$  and its water of crystn. is then driven off by heating.

Insecticides. Schering-Kahlbaum A.-G. Fr. 756,242, Dec. 6, 1933. The efficacy of vegetable disinfectants is improved by melting these with appropriate org. or inorg. materials which are solid when cold, e. g., naphthol,  $\text{C}_{10}\text{H}_8$ ,  $\text{NaOAc}$  or crystd. borax.

Insecticide and germicide. John D. Mulligan. Can. 335,803, Jan. 23, 1934. A compn. consisting of Pb arsenate 3, bluestone 2, Cu carbonate 2, pitch 1, salt 1, and sugar 1 lb. may be used dry or wet for the destruction



of wireworms and other insects, and for prevention of 1 potato scab and of smut and rust of grain.

**Fungicides for seeds.** I. G. Farbenind. A.-G. (Wilhelm Schepas, Wilhelm Bonrath and Carl Tanbe, inventors). Ger. 590,219, Dec. 28, 1933 (Cl. 45. 4.01). Addn. to 515,075 (C. A. 25, 1626). Use is made of compds. in which Hg is linked to a substituted aryl radical, e. g., *o*-ClC<sub>6</sub>H<sub>4</sub>HgOAc, *p*-FC<sub>6</sub>H<sub>4</sub>HgOAc, *p*-MeOC<sub>6</sub>H<sub>4</sub>HgOAc or *o*-MeOC<sub>6</sub>H<sub>4</sub>HgCl.

**Seed disinfectant.** Morris S. Kharaevch (to E. I. du Pont de Nemours & Co.). U. S. 1,943,540, Jan. 16.

An alkyl mercuric acetate is used with a dry diluting agent such as CaCO<sub>3</sub> or tolanite or clay. Cf. C. A. 28, 1460<sup>7</sup>.

**Plant treatment.** Roger P. M. Viguier and Daniel Ranghiano. Fr. 756,021, Dec. 4, 1933. An adhesive for fixing antiseptics, etc., to plants contains gum arabic, gelatin, K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, Na<sub>2</sub>CO<sub>3</sub> satd. with cresyl and dried and Cr alum.

**Foot-rot remedy.** Arthur Edward Newman. Brit. 401,046, Nov. 9, 1933. Foot-rot in sheep is treated with a mixt. of methylated spirit, oil of vitriol, verdigris, blue vitriol, burnt alum and Stockholm tar.

## 16—THE FERMENTATION INDUSTRIES

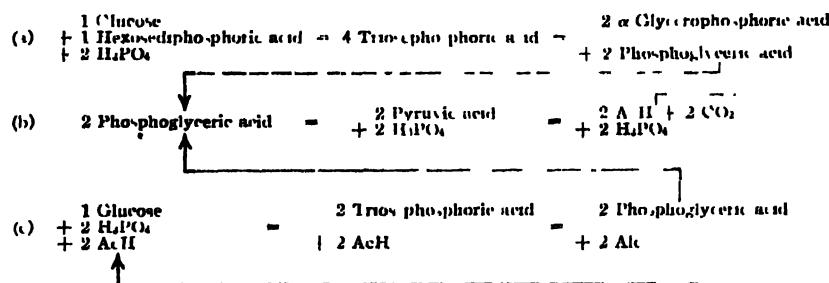
C. N. FREY

**Advances in the fermentation industry.** A. J. C. Cosbie. *Fond* 3, 148-4(1934).

**New light on the chemistry of alcoholic fermentation.** A. P.-C. A. Harden. *J. Inst. Brewing* 39, 644-6(1933); cf. C. A. 27, 3553.

**The phosphorylated intermediate products and the last phases of alcoholic fermentation.** O. Meyerhof and W. Kiessling. *Biochem. Z.* 267, 313-48(1934).—Three reactions in the process of alc. fermentation are described, of which the 1st and 3rd are inhibited by CH<sub>3</sub>ICO<sub>2</sub>H but not by F, while the 2nd is inhibited only by F and that only partially, i. e., the carboxylase phase in which AcH is formed is unaffected either by F or by CH<sub>3</sub>ICO<sub>2</sub>II. Results.

3 Tikka. *Acta Chem. Fennica* 7B, 75(1934) (in German).—Considerable amts. of pyruvic acid are formed in the bacterial fermentation of hexoses. Graessl and Le Fèvre (cf. C. A. 20, 218) have postulated a mechanism in which the acid is fermented by carboxylase to give AcH and CO<sub>2</sub>, and finally AcOH. T. shows that this mechanism is incorrect, since the fermentation of pyruvic acid by coli bacteria gives HCO<sub>2</sub>H and AcOH, comparable to the fermentation of glyceric acid (cf. Virtanen and Peltola, C. A. 24, 2157). It is possible that the fermentation process first forms glyceric acid. Only 54% of the HCO<sub>2</sub>H was obtained, since the organism readily decomposes it into CO<sub>2</sub> and H<sub>2</sub>O. The calcd. amts. of H<sub>2</sub> were not obtained, but it was shown that 19% of unfermented



The nature of the triosephosphoric acids formed is not known. The 3rd reaction is catalyzed by hexosediphosphoric acid. The 1st reaction represents the induction phase in alc. fermentation by yeast maceration juice and can be greatly shortened by the addn. of AcH. According to this scheme methylglyoxal as an intermediate product in alc. fermentation is unnecessary. The appearance of methylglyoxal in Neuberg's expts. with very dil. yeast (MS. poor in coenzyme) is attributed to the easy transformation of 3-glyceraldehydephosphoric acid to methylglyoxal because in the absence of coenzyme the normal dismutation of the intermediate triosephosphoric acid is prevented and it undergoes chem. decompn. S. M.

**Oxidation-reduction potentials of bacterial lactic fermentations.** L. Genevois and T. Nicolaleff. *Compt. rend. soc. biol.* 115, 179-80(1934). Respiration expts. with 5 species are reported. L. E. Gilson

**Dehydration of alcohol by means of an absorbent and recovered vapor.** G. Du Bois. *Chimie & industrie* 30, 535-6(1933).—Anhyd. EtOH can be obtained in a single operation by evap. aq. alc. provided its concn. is above the azeotropic point (97.2%); the method is expensive, however, because the H<sub>2</sub>O in the head fraction carries with it a very considerable quantity of alc. The desired result can be obtained economically by returning to the tower part of the high-strength alc. (e. g., 98% or over) so that the vapors therein are above the azeotropic point, suitable devices being used to obtain max. heat recovery. Application of this modification to the absorbent process of dehydrating alc. will permit it to compete advantageously with the azeotropic processes. A. Papineau-Couture

**The fermentation of pyruvic acid by coli bacteria.** J.

pyruvic acid had been reduced by the nascent H to lactic acid. S. A. Karjala

**Industrial solutions of the brewing industry in the future.** G. M. Vanlaer. *Brasserie & malterie* 23, 310-16, 325-32 (1934).—A discussion of the properly coordinated utilization of heat, cold and mech. power. A. P.-C.

**The nature of metals [used in brewing].** R. Seligman. *J. Inst. Brewing* 39, 415-8(1933). Quick Landis

**The physical properties of metals used in brewing.** J. S. Pritchard. *J. Inst. Brewing* 39, 449(1933).

**The action of cooling tanks (in brewing).** P. Petit. *Brasserie & malterie* 23, 274-9(1933).—A brief discussion of the use of open cooling tanks, showing that, in most cases, their advantages far outweigh their drawbacks. A. Papineau-Couture

**Notes on the barleys of the 1933 crop.** Goethals. *Bull. assoc. (lives inst. sup. fermentations Gand* 34, 246-52 (1933).—A brief discussion of the malting qualities of the 1933 barley crop in various districts of France. A. Papineau-Couture

**Notes on the barleys of the 1933 crop.** J. Raux. *Brasserie & malterie* 23, 249-55(1933); cf. C. A. 28, 251<sup>9</sup>.—A discussion of the compn. of barleys from different districts in France, from the standpoint of their malting quality. A. Papineau-Couture

**Barley problem researches. Prediction of extract.** II. The effect of variety on the relation between nitrogen content and extract. L. R. Bishop and F. R. Day. *J. Inst. Brewing* 39, 545(1933); cf. C. A. 24, 4929. —The ext. in brewers' lb. per 330 lb. of dry malt is given by ( $E = A + 10.5N + 0.20G$ ), where  $A$  is a varietal character-

latic,  $N$  the percentage of  $N$  on dry barley, and  $G$  the thousand corn wt.  $A = 108$  and  $101.5$ , resp., for English and Calif. barleys.

**Quick Landis**  
The Institute of Brewing Research Scheme. I. Investigations on barley Report on the ten years of experiments under the Institute of Brewing Research Scheme 1922-31. E. J. Russell and L. R. Bishop. *J. Inst. Brewing* 39, 287-421(1933).

**Quick Landis**  
California barleys. II. Analytical methods for appreciation of barley and malt. H. Lloyd Hind. *J. Inst. Brewing* 39, 258-72(1933).

**Quick Landis**  
Kiln drying of barley. II. T. S. Miller. *J. Inst. Brewing* 39, 428-45(1933); cf. *C. A.* 26, 5168.—Barley must be dried at  $110-15^{\circ}$  for accurate moisture detn. There is a definite loss of solids on kiln drying,  $CO_2$  being evolved in storage and the content of matter sol. in cold water changing.

**Quick Landis**  
Approximate calculation of the extract of barleys. P. Petit. *Brasserie & malterie* 23, 258-62(1933).—Russell and Bishop have proposed the formula  $M = K - 1.30P + 0.156G$  (in which  $M$  is the ext. of dry malt,  $P$  protein % of dry barley,  $G$  the wt. of 1000 grains of barley and  $K$  a const.). P. studied the possibility of applying such a formula for calcg. the ext. in barley. From the analyses of a large no. of barleys of the 1932 crops, he calcd. the value of  $K$ , obtaining an av. value of 85.4. The values for the ext. calcd. from the above equation varied from those obtained by analysis by up to more than 8%.

**A. Papineau-Couture**  
Report on the preservative principles of hops. XV. The gravimetric estimation of the antiseptic constituents of hops. T. K. Walker and J. J. H. Hastings. *J. Inst. Brewing* 39, 509-12(1933); cf. *C. A.* 27, 2248.—The modified Ford and Tait method (*C. A.* 26, 5169) gives high results for the preservative value because of the slow pptn. of the Pb salt of a non-antiseptic substance. Ten g. finely minced sample is extd. with 100 cc. pure MeOH and filtered. Fifty cc. of the ext. is diluted with 100 cc. of 1% aq. soln. of NaCl and extd. in a separatory funnel with one 50-cc. and three 40-cc. portions of petr. ether. The ext. is diluted to 200 cc. and the total soft resin is detd. on 50 cc. of the ext. The solvent is evapd. from 100 cc. of the ext., the residue taken up with a little warm MeOH and the  $\alpha$ -resin detd. by the Ford and Tait method. Lead salt  $\times 25.45 =$  percentage of  $\alpha$ -resin. **Quick Landis**

Algerian musts in 1933. I. Summary of the investigation of the Central Laboratory for the Prevention of the Adulteration of Food and Drugs. G. Filaudeau and A. Honis. *Ann. fals.* 26, 604-5(1933). II. Report to the Governor General of Algeria. A. Sabatie. *Ibid.* 605-7. — A brief discussion of the compn. of the 1933 vintage.

**A. Papineau-Couture**  
Mash combination and calculation. Heinrich Kreipe. *Deut. Essigind.* 37, 9-11(1933).

**W. O. E.**  
Calculation and adjustment of the alcoholic liquid for the quick vinegar process. A. Steinmetz. *Deut. Essigind.* 37, 105-8, 114-17(1933).

**W. O. E.**  
Mash combination and calculation. A. Patzauer. *Deut. Essigind.* 37, 145-6(1933); cf. two preceding abstrs.

**W. O. E.**  
Some factors affecting the solubility of nitrogenous substances in mashing. II. The effect of various salts in the mashing liquor. Hugh E. Kelly and T. S. Bremner. *J. Inst. Brewing* 39, 622-39(1933).—The  $N$  content of wort as a function of  $pH$  is characteristically parabolic for  $CaSO_4$ ,  $NaCl$ ,  $CaCl_2$  and  $K_2SO_4$ . The "toxic salts"  $MgSO_4$ ,  $CuSO_4$ ,  $FeSO_4$  and  $Al_2(SO_4)_3$  show a marked inhibition at  $pH$  4.6. A comparative method for estn. of malt proteinase activity is described. **Q. Landis**

Formation of mannitol in musts dialyzed at low temperature in the presence of chloroform. G. Barbera. *Ann. chim. applicata* 23, 470-3(1933).—When wine must is dialyzed through animal membrane at  $8-10^{\circ}$  (20-30 days is required for 3 l. of must) a fungus vegetation develops, in spite of the presence of  $CHCl_3$  to prevent fermentation, and large quantities of mannitol are formed. If parchment is used instead of animal membrane, no mannitol is formed. It has not been proved whether the reaction is

due to flora present in the animal tissue or to the proteins contained therein. The dialyzed liquid outside the animal membrane will also form mannitol, but only in the absence of  $CHCl_3$ .

**A. W. Contigri**  
Yields in the quick vinegar process. H. Wustenfeld. *Deut. Essigind.* 37, 202-3(1933).

**W. O. E.**  
Sterilization of spirit vinegar and wine vinegar by the catadyn process. Heinrich Kreipe. *Deut. Essigind.* 37, 257-9(1933); cf. *C. A.* 27, 2827.—Spirit vinegars activated by 250  $\gamma$  or more per l. are still sterile after 6 months' storage and suffer no new infection. Expts. with double wine vinegar show that bacteria are killed by 850  $\gamma$  in 7 days, by 500  $\gamma$  in 18 days. Vinegar eels, on the other hand, succumb in double wine vinegar only to 850  $\gamma$  and upward in about 14 days. The activation of double wine vinegar must be greater, for production of like effects, than with spirit vinegar. Smell and taste of double wine vinegar are unimpaired by the catadyn process. With higher activation (from 850  $\gamma$  up) an opalescent turbidity develops.

**W. O. E.**  
Theory and practice in vinegar production seventy years ago. Heinrich Kreipe. *Deut. Essigind.* 37, 265-8(1933).

**W. O. E.**  
Aromatic vinegars. O. Tille. *Deut. Essigind.* 37, 273(1933).—Directions are outlined for the prepn. of aromatic vinegars, notably those of the tarragon and walnut types.

**W. O. E.**  
Disturbances in the wine vinegar process with especial reference to tropical conditions. Th. Groeger. *Deut. Essigind.* 37, 25-6(1933).

**W. O. E.**  
Vinegar is like honey a biological conception, applicable only to the natural product. Walter Obst. *Deut. Essigind.* 37, 65-6(1933).

**W. O. E.**  
Spirit vinegar and wine vinegar as condiments and their hygienic importance. H. Wustenfeld. *Deut. Essigind.* 37, 97-8(1933).

**W. O. E.**  
Treatment of sterilized vinegars. Heinrich Kreipe. *Deut. Essigind.* 37, 389-91(1933).—The stability of sterilized vinegars is discussed from the standpoint of processes employed therefor, e. g., pasteurization, filtration, sulfuration and catadyn treatment.

**W. O. E.**  
Color reaction with acetone according to Reif in the detection of benzaldehyde. Heinrich Kreipe. *Deut. Essigind.* 37, 397-9(1933).—While mannose may occur as a natural constituent of wine, sorbose is never found in grape wines. The identification of the benzal ppt. is necessary in order to avoid any confusion with mannose. Heretofore resort was had to acetylation followed by a m-p. detn. The basic principles and method of the color reaction with  $Me_2CO$  according to Reif are described. An exact observance of the outlined procedure for the color test leads to unequivocal results, with marked economy of time and effort. The reaction is equally applicable to wines and wine vinegars.

**W. O. E.**  
2,3-Butylene glycol and acetylmetethylcarbinol in wine and vinegar. E. Garino-Canina. *Deut. Essigind.* 37, 316-17(1933).—See *C. A.* 27, 3285.

**W. O. E.**  
Control of plant liquors. Heinrich Kreipe. *Deut. Essigind.* 37, 325-7(1933).—Differences in the estn. of the acidity of vinegars are frequently due to faulty compn. of the liquors employed. In addn. to exactly adjusted liquors reliable app. (pipets and burets) should be used. The subsequent control of plant liquors is best effected with a "test vinegar" or with  $NH_4SO_4$ .

**W. O. E.**  
Chemical sterilization in the winery. Fred E. Adams. *Fruit Products J.* 13, 177, 184(1934).

**E. H.**  
Recognition and evaluation of fruit wines. F. Seiler. *Z. Untersuch. Lebensm.* 63, 466-70(1933).—As a confirmation of the Werder sorbitol test, the content of extractives, ash and lactic acid and the alkali value may be used to detect addn. of sugar to fruit wines. Data are given for pure fruit wines of the Trier district for 1930 and 1931.

**B. C. A.**  
Composition of Moroccan wines. L. Chauveau and Vasseur. *Ann. fals.* 26, 598-603(1933); cf. *C. A.* 25, 3767.—A discussion of the compn. of the musts and wines of the 1931 and 1932 vintages. **A. Papineau-Couture**  
Determination of the residual sugar in red wines. F.

Alexia. *Ann. Jills* 27, 609-10 (1933).—The following simple and accurate method is recommended as suitable for control of wine-cellar operations: to 5 cc. wine add 2.5 cc. NaCl (15 g. NaCl, 100 cc. H<sub>2</sub>O, 20 drops AcOH), place 3 min. in a boiling water bath, cool, neutralize with dil. NaOH in the presence of phenolphthalein powder and make up to 30 cc.; to a 20-cc. aliquot add 1 cc. of 1.5% Na<sub>2</sub>CO<sub>3</sub> and 20 cc. 0.01 N I, let stand 2 hrs., acidify with 5 drops HCl, dil. to 50 cc. and titrate with 0.005 N Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, using starch indicator. A. P.-C.

Different methods of determining total solids in wine. N. Roussopoulos. *Ann. Jills* 26, 582-84 (1933).—From a discussion of the various methods it is concluded that for highly accurate work total solids should be detd. by drying in a vacuum for 48 hrs. over P<sub>2</sub>O<sub>5</sub>. For ordinary routine analysis, total solids should be obtained from the d. of the dealcoholized wine ( $d' = d + 1 - dp$ , in which  $d'$  is the d. of wine after distn. and dln. to its original vol. with H<sub>2</sub>O,  $d$  is the d. of the wine and  $dp$  the d. of the distillate made to the original vol. of the wine) according to  $s = 2663 (d' - 1)$ , based on a d. of 1.8 for invert sugar.

A. Papineau-Couture

Influence of the distilling process on the composition and quality of brandies. H. Wüstenfeld and C. Luckow. *Pharm. Zentralhalle* 75, 36 8, 52-5, 67-72 (1934).—Two high-grade Charente wines were distd. into raw and refined brandy. In refining, fractionation was resorted to, the various fractions obtained being placed in storage. Each fraction was subjected to the customary com. analysis and organoleptically appraised. Fractions 1-3 and for the time being an addnl. fraction were mixed in the lab., the resulting mixts. being analyzed. The quality of the resulting distillates is in large measure dependent on the type of distg. process followed, the analytical values, however, not in like measure. If only the 1st fractions are mixed, e. g., in practice an early switch to 2nd runnings, there result, as in the use of dephlegmators, very pure-toned products which are quite wine-like; they completely satisfy the analytical requirements. Far-reaching use of the later fractions leads to the production of "fatter," more abundant, but less fine distillates. W. O. E.

The stability of beers. R. Morlion. *Bull. assoc. élèves inst. sup. fermentations Gand* 34, 277-82 (1933).—An address discussing the factors on which the stability of beer depends.

A. Papineau-Couture

Notes on the attenuation of beer. G. Kauert. *Bull. assoc. élèves inst. sup. fermentations Gand* 34, 283-7 (1933).—A brief discussion of attenuation on the stability of beer.

A. Papineau-Couture

Notes on the retention of "creaminess" of beer. P. Petit. *Brasserie & malterie* 23, 241-8 (1933).—An address discussing more particularly the part played by the nature and quantity of colloids, and indicating that a study of the optical properties of beer would furnish a valuable method of investigation for improving the behavior of beer on storage.

A. Papineau-Couture

Influence of the rate of agitation in mashing on the composition and quality of beer. P. Petit. *Brasserie & malterie* 23, 321-5 (1934).—A discussion of the results of Jalowetz and Pickholz (*Brau- und Malsindustrie; Wochschr. Brau.* 50, 287 (1933)).

A. Papineau-Couture

New reagents for cleaning (beer) bottles. A. Bossart. *Schweiz. Brauerei Rundschau* 1933, No. 3, 53; *Brasserie & malterie* 23, 284-7.—A mixt. of Na<sub>2</sub>PO<sub>4</sub>, Na silicate, Na<sub>2</sub>CO<sub>3</sub> and NaOH, without addn. of an antiseptic, has no bactericidal power when used at atm. temp. and at a concn. of 0.5-1.5%; but, in a good washing machine, its cleansing power permits of having clean bottles. To ensure sterility of the bottles, a disinfectant should be added. The above mixt. gives perfectly clear bottles, even with a hard water, which cannot be obtained with NaOH alone; it does not remove labels as well as NaOH. As the various ingredients are not utilized to the same extent during cleaning, partial addn. of the original mixt. to the used soln. does not regenerate it.

A. Papineau-Couture

The production of pure yeast. Bernard M. Brown. *J. Inst. Brewing* 42, 9-10 (1934).—Mixed cultures are

preferred to single-cell cultures for brewing purposes. The technic of obtaining them is described. Q. L.

The nitrogenous metabolism of yeast. II. General considerations relating to yeast growth and fermentation in synthetic media. III. The ability of certain pure chemical compounds to function as nitrogen sources for yeast. R. S. W. Thorne. *J. Inst. Brewing* 39, 597-621 (1933); cf. *C. A.* 26, 3869.—Effects of temp., aeration, seeding rate, N concn.,  $pH$  and bios are reported. Nitrite formation retards growth. Yeast races vary in their response to N in different amino acids. Quick Landis

Estimation of nitrogen in yeast and brewing materials. J. S. Ford, A. Tait, L. Fletcher, Jus. Spiers and W. J. Mitchell. *J. Inst. Brewing* 39, 472-86 (1933); cf. *C. A.* 26, 3869, and Case and Price, *C. A.* 27, 2249.—Polemical. A review. Exptl. evidence is also given which indicates that the Kjeldahl modifications are satisfactory. W. A. Davis, J. G. Maltby and F. E. Salt. *Ibid.* 577-81.—A crit. discussion. The Kjeldahl-Gunning method and the Christiansen and Fulmer modification are equally reliable. H<sub>2</sub>O<sub>2</sub> is unnecessary and may cause error by its variable N content. The "absolute" Dumas method is often unreliable. Quick Landis

Yeast troubles (in brewing). J. Raux. *Brasserie & malterie* 23, 279 85, 295-301 (1933).—An address discussing their causes and prevention or remedies.

A. Papineau-Couture

Wild yeasts. P. Petit. *Brasserie & malterie* 23, 337-41 (1934).—A brief discussion of the effects of the presence of wild yeasts in brewing.

A. Papineau-Couture

Fermentation of hay (Tiemann, Rehm) 12.

Chancrin, Ernest: Le vin: procédés modernes de préparation, d'amélioration et de conservation. Paris: Hachette. 248 pp.

Henneberg, Wilhelm, and Bode, Günther: Die Gärungsgewerbe und ihre naturwissenschaftlichen Grundlagen. 2nd ed. Leipzig: Quelle & Meyer. 132 pp. M. 1.80.

Ribèreau-Gayon, Jean: Cassettes ferriques. Etats, réactions, équilibres et précipitations du fer dans les vins. Paris: Delmas. F. 15.

Walter, Erich: Essences for Liquors, Brandies, Liqueurs, and All Alcoholic Drinks. (Supplement to "Manual for the Essence Industry") New York: J. Wiley & Sons, Inc. 429 pp. 75 cents.

Alcohol Tables. 2nd ed. Edited by G. Holzner. New York: Wallerstein Labs. 61 pp. Free.

Alcohol. Firma E. Merck (Eloi Ricard, Paul Savarit and Henri M. Guinot, inventors). Ger. 588,869, Nov. 29, 1933 (Cl. 6b. 25). App. for producing abs. alc. by distg. and dehydrating fermented mash is described. Cf. *C. A.* 27, 4342.

Malt beverage of permissible alcohol content. Thomas Whittam. U. S. 1,943,943, Jan. 16. An HOAc soln. is added to a malt ext. soln. contg. yeast and the mixt. is fermented in a closed container.

Apparatus for separating hop resin from beer. Carl Hurner. Ger. 590,097, Dec. 22, 1933 (Cl. 6d. 3).

Tank and agitator construction suitable for treating mashes for beer. Andreas R. Kellner. U. S. 1,944,742, Jan. 23.

Extrusion press, particularly for extruding yeast. Gerrit Dwaars. Brit. 400,799, Nov. 2, 1933.

Yeast. Pfeifer & Langen A.-G. Ger. 588,738, Nov. 25, 1933 (Cl. 6a. 17.02). Addn. to 536,989 (*C. A.* 26, 1062). In prepg. yeast, the method of 536,989 is improved by fermenting in two sep. stages. In the first, only part of the diluted culture medium is mixed with NH<sub>4</sub> salts. This is given an addn. of yeast and allowed to ferment till the greater part of the inorg. N is assimilated. This is then added to the rest of the culture medium and the whole fermented as usual.

Yeast. Norddeutsche Hefeindustrie A.-G. Ger. 590,-

209, Dec. 29, 1933 (Cl. 6a. 17.02). Molasses for use in the manuf. of compressed yeast is clarified by treatment with  $\text{CaSO}_4$  or by pptg.  $\text{CaSO}_4$  therein. Phosphates of  $\text{NH}_4$  are then added, to serve as nutrient material for the yeast.

Apparatus for yeast fermentation. Svenska Jästfabriks A.-B. (N. R. Nilsson, inventor). Swed. 77,912, Aug. 1, 1933. Air is introduced into the fermenting liquid

in one or more sep. zones of the app. in which the liquid is kept in circulation by action of the ascending air bubbles. Nutrient substances are added successively at one or more places in such a way that they are distributed quickly and evenly.

Centrifuge for the separation and washing of yeast. Aktiebolaget Separator (S. A. B. Dahlgren, inventor) Swed. 79,024, Nov. 28, 1933.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Disinfectants, fumigants and cleaning materials. W. P. Hale, et al. *Am. Ry. Eng. Assoc. 35, Bull. 362, 640-3* (1933).—The majority of disinfectants sold are usually various mixts. of cresol. Formalin is considered more effective.  $\text{HCN}$ ,  $\text{SO}_2$ , and pyrethrum powder are used widely for fumigation but ethylene dichloride, ethylene oxide and  $\text{CO}_2$  are also being tried. R. C. Bardwell

Application quotient and the pharmacological differentiation of similarly acting drugs. P. Pulewka. *Arch. expil. Path. Pharmacol. 169, 482-97* (1933).—The ratio between the doses of a drug necessary to cause death, anesthesia, mydriasis, etc., when administered to the same animal by 2 different routes is termed the "application quotient." Its use in differentiating similarly acting drugs is illustrated by various mydriatics and local anesthetics. B. C. A.

Preparations of cod-liver oil with iron and with ferrous iodide. G. Nobili. *Boll. chim.-farm. 72, 161-7, 201-7, 241-6, 281-93* (1933).—Conn. products are often unsatisfactory. The usual methods of prepn., which may entail loss of vitamin or yield a product of low Fe content, have been critically examd. Ferruginous cod-liver oil is best prepd. by using pure  $\text{Fe}(\text{OBz})_2$  with oleic acid and sweet almond oil or by a modification of Dieterich's method from a complex Fe benzoate.  $\text{FeI}_2$  is incorporated either by formation from Fe and I in the oil or by direct soln. of the pure compd. Standards for content of Fe or  $\text{FeI}_2$  are suggested. B. C. A.

Glycerophosphates and their analysis. C. Gino. *Boll. chim.-farm. 72, 321-6* (1933).—Methods are given for the analysis of pharmaceutical products. B. C. A.

Direct analysis of tobacco. R. Dubrisay and François. *Mem. manuf. état tabacs 6, 264* (1930).—The importance of detns. of resins, waxes and essential oils in the examn. of tobaccos is discussed. Customary methods of analysis do not always give clear differentiation of types. For this purpose the following detns. are made on a  $\text{CaH}_2$  ext.: dry matter, acidity ( $\text{KOH}$  in  $\text{EtOH}$ ), sapon. value, ester value, I value. Characteristic values for oriental, Kentucky and Virginia tobaccos are recorded. B. C. A.

Determination of moisture in tobacco. C. J. Rzymowska. *Roczniki Chem. 12, 943-51* (1932).—Schlapfer's method of distn. with  $\text{PhMe}$  is preferred. B. C. A.

Odorless disinfection with thiocyanic acid solution. Alumina thiocyanogen. B. Dikomeit. *Z. Hyg. Infektionskrankh. 115, 781-91* (1933).—Solns. of alumina thiocyanogen (0.3 and 0.4%) are effective as disinfectant against *Esch. coli*, *B. paratyphosus B* and *Staph. aureus*. One hundred cc. of a 0.35% soln. can be administered orally without harm. Rachel Brown

Green coloration of solutions of quinine salts. M. Bachstsz and G. Cavallini. *Ann. chim. applicata 23, 490-4* (1933).—The green coloration often appearing in solns. of quinine salts on exposure to air or on standing is due to traces of Cu, as all such green solns. give a test with Feigl's reagent (C. A. 23, 4421). A double salt of Cu and quinine has been isolated by adding a soln. of  $\text{CuCl}_2$  in acetone to an acetone-soln. of quinine-HCl. After 48 hrs. at freezing temp., a ppt. of dark green powder,  $[\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 \cdot \text{HCl} \cdot 2\text{H}_2\text{O}]_2 \cdot \text{CuCl}_2$ , forms. To avoid the green coloration, quinine salts must be recrystd. until entirely free from traces of Cu or else  $\text{O}_2$  must be excluded from the soln. A. W. Contieri

Strychnine phosphomolybdate. A. Tettamanzi. *Atti*

*accad. sci. Torino, Classe sci. fis., mat. nat. 68, 147* (1933).—Strychnine phosphomolybdate, as prepd. by Embden (*Z. physiol. Chem. 113, 138*), and that prepd. by Antoniani (cf. C. A. 22, 4715) are found to be identical, and the phosphomolybdate has the same ratio  $\text{P}_2\text{O}_5/\text{MoO}_3$  1.24, as in common  $\text{NH}_4$  phosphomolybdate.

A. W. Contieri  
Supplements to the D. A.-B. VI. Konrad Schulze. *Apoth. Ztg. 49, 23-5* (1934).—A commentary on certain essential changes and addns., including some 20 references. W. O. E.

Relative values of commercial pancreas preparations. H. Dyckerhoff and H. Miehl. *Apoth. Ztg. 49, 161* (1934).—The amylase, lipase and trypsin values of 10 different dry pancreas preps. are recorded. W. O. E.

Specialty events and investigational results during the year 1933. Konrad Schulze. *Apoth. Ztg. 49, 125* (1934).—A review. W. O. E.

Glucosides of *Digitalis lanata*. C. Mannich. *Arch. Pharm. 272, 5-8* (1934).—The "digitanides" of Skoll and Kreis (C. A. 27, 3777) are identical with M.'s *lanata* glucoside II, which, however, he was unable to sep. from the glucosidal mixt. prior to the sepn. effected by S. and K. W. O. E.

Recent investigations in the field of essential oils, especially during the period between 1930 and 1932. Konrad Bournot. *Arch. Pharm. 272, 23-37* (1934). W. O. E.

Microsublimate of radix ononidis. R. Jaretsky and A. Sievers. *Pharm. Zentralhalle 75, 16-17* (1934).—A commentary on the D. A.-B. VI evaluation procedure. W. O. E.

Preservation and sterilization of drug products. H. Eschenbrenner. *Pharm. Zentralhalle 75, 17-20* (1934). A discussion of past and present methods employed in the preservation and sterilization of drug products, in connection with the tabulated amts. of certain preservatives (nipagin, nipazol) required for such purpose. W. O. E.

Colorimetric control of the gradual decrease in the free phosphorus content of phosphorus-containing pills. D. Koszegi. *Pharm. Zentralhalle 75, 34-6* (1934).—A series of 30 pills each contg. 0.5 mg. P was examd. at intervals of 3 days over a period of 16 days, with the result that at the final examn. the pills contained an av. of only 0.05 mg. P, or about  $1/10$  their original content. W. O. E.

Principles for the production of liquid disinfectants. D. Maun. *Pharm. Zentralhalle 75, 65-7* (1934).—Liquid disinfectants should be: nonirritant to the skin and n- tably insensitive to phenolic action after long use; capable of yielding with  $\text{H}_2\text{O}$  quite stable emulsions; noncorrosive to surgical instruments; able in 1-3% soln. to kill *Es. coli* and *Staph. aureus* in a short time, and in 5% soln. to kill *Mycobact. tuberculosis* with certainty; and of pleasant smell. W. O. F.

Adeps suillus. Horkheimer. *Pharm. Ztg. 79, 60* (1934).—A method is suggested for the production in a small way of lard of low acidity and suited to pharmaceutical requirements. The fresh, carefully cleaned and washed fat is drained, steam-heated and sepd. from the cracklings, the resulting fat transferred to flasks, securely corked, then inverted and maintained for a day in an incubator at  $50^\circ$ . On removal and solidification at room temp. the  $\text{H}_2\text{O}$  is withdrawn from the still inverted containers, and the final traces of moisture are removed with filter paper, and

the flasks again closed with fresh stoppers and stored in a refrigerator. The acidity, at first 1.7%, gradually rises to 2.00 after a lapse of 3 weeks. W. O. E.

**Viscosity measurement in the evaluation of fluidextracts.** Hellmuth Schrader. *Pharm. Ztg.* 79, 88-9 (1934); cf. C. A. 28, 855<sup>5</sup> (and Höppler, C. A. 27, 1550).—An exptl. study showing the results obtained by this method with specially prepd. liquid exts. W. O. E.

**Quick method for the estimation of essential oils in drugs and plants.** A. Kuhn. *Pharm. Ztg.* 79, 99-100 (1934).—A specially constructed extn. app. with reflux is shown, which permits the collection and measurement of the oil in one limb of the extractor. The extn. is complete in  $\frac{3}{4}$  of an hr. The results are recorded in the examn. of several series of crude drugs and plants. W. O. E.

**Evaluation of medicinal chars by the antipyrine method.** C. Rohmann and U. Rohmann. *Pharm. Ztg.* 79, 122-4 (1934).—The results obtained in the examn. of several series of medicinal chars are recorded. W. O. E.

**Theory and practice of emulsions.** Wolfgang Brandrup. *Pharm. Ztg.* 79, 137-9 (1934).—An address. W. O. E.

**Detection of small quantities of carbon monoxide in medicinal carbon dioxide.** Jacob E. Schmidt and John C. Krautz, Jr. *Quart. J. Pharm. Pharmacol.* 6, 625-7 (1933).—A simple test (a modification of Martinek and Marti's modification of Teague's  $I_2O_5$  method which involves passage of the questionable sample over this reagent heated to 150°) has been devised, requiring no gas-free CO for scrubbing purposes. The sensitivity of the test is in the order of 1.50,000. Also in *J. Am. Pharm. Assoc.* 22, 1222-5 (1933). W. O. E.

**New medicaments and pharmaceutical specialties during the fourth quarter of 1933.** F. Zernik. *Sudderl. Apoth. Ztg.* 74, 90-2 (1933). W. O. E.

**Observations and criticisms of analytical methods for certain products in the Belgian Pharmacopoeia IV.** J. G. Breugelmanns. *J. pharm. Belg.* 15, 677-81, 697-700, 717-21, 733-6, 749-53, 765-72 (1933).—A crit. review of the phys. and chem. analytical procedures in the Belg. Pharm. A pertaining to Na citrate, Ca glycerophosphate, cinchophen, synthetic camphor, chloral hydrate, argyrol and colloidal Ag. Modified or new procedures are offered. S. W. Goldstein

**The essential oil industries of foreign lands.** C. A. Browne. *J. Chem. Education* 11, 131-41 (1934). E. H.

**The oxygen number and the determination of the fermenting stage in yellow tobacco.** A. I. Smirnov. *State Inst. Tobacco Investigations* (Krasnodar), No. 95, 3-18 (1933).—S. discusses the various contributions on the absorption of O in the fermentation of tobacco and presents step by step the methods used. He also gives his data for different varieties of tobacco. J. S. Joffe

**Toxic principles of *Cucumis africanus* L. f., *Cucumis myriocarpus* (Naud.) emend., and of a new unnamed *Cucumis* species.** C. Rimington. *S. African J. Sci.* 30, 705-14 (1933).—From the mature fruit of *Cucumis africanus*, *Cucumis* species A and species B, the last probably being *C. myriocarpus*, an amorphous bitter toxic principle has been extd. Yields from  $CHCl_3$  extn. from the juice are 0.01, 0.06-0.09, 0.06-0.09%, resp. The bitter principle, cucumin,  $C_{27}H_{46}O_8$ , contains 3OH groups and has  $[\alpha]_D^{25} = +64.35^\circ$ . It decamps. 111-15° with const. loss of wt. Species B contains a 2nd bitter principle,  $\alpha$ -todermin,  $C_{27}H_{46}O_8$  m. 104°,  $[\alpha]_D^{25} = +64.46^\circ$ . This substance also neutralizes 3 equivs. of alkali. One equiv. of acid is volatile. The action of alkali completely destroys their toxic properties. For rabbits and fish the min. lethal dose for intravenous administration was + 2 mg. per kg. H. E. Messmore

**Toxicology and assay of methylene blue.** David I. Macht and Wilton C. Harden. *Ann. Internal Med.* 7, 738-45 (1933).—Chem. and pharmacol. examn. of many samples of medicinal methylene blue reveals many differences in purity. The intravenous lethal dose of methylenium chloride for cats is about 40 mg. per kg. wt. John T. Myers

**The terpenes of Jamb. oil of citronella.** Jean Tabuteau.

*Bull. inst. pin* 1933, 237-46.—The terpene fraction removed in the com. production of terpeneless oil contained methylheptenone, limonene, citronellal, geraniol and citronellol, a complex mixt. of terpene alcs. and acids, and a mixt. of diterpenes contg. an internal ether as impurity. A. Papineau-Couture

**History and value of germicides.** A. R. L. Dohme. *J. Assoc. Official Agr. Chem.* 17, 19-28 (1934).—An address. A. Papineau-Couture

**The structure and synthesis of new anti-malarial substances. The structure of "atebrin."** G. V. Chelintzev, I. L. Knunyantz and Z. V. Benevolenskaya. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, I, 63-5 (in English 65-7) (1934).—Com. "atebrin" was recrystd. from hot water, m. 248-50°. From this dihydrochloride the free base was isolated, dissolved in 120 cc. of 20%  $H_2SO_4$  and 9 g. of  $KMnO_4$  in satd. soln. added. Alkali was added, and then steam distn. gave the base, 5-diethylamino-2-aminopentane. "Atebrin" was shown by synthesis to be 7-methoxy-2-chloro-5-( $\delta$ -diethylamino- $\alpha$ -methylbutyl)-aminoacridine-di-HCl. F. H. Rathmann

**Disinfectant scientific committee.** Emil Klarmann. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 1, 87, 89, 91 (1934).—A review of recent work on disinfectants with 37 references. Henry H. Richardson

**Committee on standardization of disinfectants.** Wm. Dreyfus. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 1, 91, 93 (1934).—Good agreement was obtained by 2 labs. with the Food and Drug Administration (F. D. A.), the Hygienic Lab. (H. L.) and the American Rideal Walker (R. W.) methods for testing phenol coeffs. on 4 samples of different coal-tar disinfectants. On a pine-oil disinfectant H. L. and R. W. agreed but the results with F. D. A. were not uniform. Henry H. Richardson

**Determining the glowing power of tobacco.** Vitez L. Nagy. *Chem.-Ztg.* 57, 971-2 (1933).—Both inorg. and org. constituents affect the glowing power, also the methods of growing and fermenting. A method is described in which powd. tobacco is burned in a fine stream and the time of burning and the length in mm. of the burnt tobacco is measured. E. R. Rushton

**The synthesis of new vermifuges and their pharmacological use. The relationship between chemical constitution and pharmacological effect of compounds of the santonin group.** Alexander Gluske. *Arch. wiss. prakt. Tierheilkunde* 65, 201-43 (1932).—Synthetic 1-tetralol-2-acetic acid lactone (1,2,3,4-tetrahydro-1-hydroxy-2-naphthaleneacetic acid lactone) (syntonin-a) and 1-tetralol-2-propionic acid lactone (1,2,3,4-tetrahydro-1-hydroxy- $\alpha$ -methyl-2-naphthaleneacetic acid lactone) (syntonin-b) (both prepd. from  $\alpha$ -tetralone) are as effective as the expensive santonin of plant origin. A great no. of derivs. have been prepd. of which the above 2 were most effective and practically non-toxic. Henry Tauber

**Medicaments as food products (Patzsch) 12.** App. for making and spraying disinfectants (Brit. pat. 400,242) 1. Depilatories (Brit. pat. 400,980) 29.

**Urdang, Georg:** Zur Geschichte der Metalle in den amtlichen deutschen Arzneibuchern. Mittenwald: Ne-mayer. 138 pp. M. 5; cloth, M. 7.

**Vandenbussche, L.:** Pro pharmacia. Menin: Vandenbussche. 538 pp.

**Codex Revision Committee.** Report of Pharmaceutical Chemistry Sub-Committee. London: Pharm. Press. 51 pp. 2s. 6d. Reviewed in *J. State Med.* 42, 60 (1934).

**Cours de pharmacie galénique.** Mons: G. Delporte. 296 pp. F. 70.

**Medicinal fats.** Gottfried Erhard and Gerhard Schaefer. Fr. 755,532, Nov. 25, 1933. Rd is combined with assimilable edible fats.

**Ointment.** O. S. Foght. Swed. 77,752, July 11, 1933. A mixt. of about 58% of tallow, 28% of beeswax and 14% of rosin.

**Quintments.** Johann Trimmel and Hugo Weil. Fr.

752,419, Sept. 22, 1933. See Ger. 587,142 (C. A. 28, 856').

**Chelidamic acid derivatives.** Max Dohrn and Paul Diederich (to Schering-Kahlbaum A.-G.). U. S. 1,944,412, Jan. 23. Reaction of the Ag salt of 8,5-diiodochelidamic acid dimethyl ester with MeI in dry xylene at its b. p. and sapon. with alc. KOH forms the methyl ether of 3,5-diiodochelidamic acid. The corresponding ethyl, propyl, butyl, allyl and benzyl ethers may be similarly formed. The products may be used for intravenous injection in making x-ray pictures for diagnosis. Various details of procedure are given. Cf. C. A. 27, 4880.

**Cholesterol esters of chaulmoogric and hydnocarpic acids.** Max Bockmuhl and Robert Knoll (to Winthrop Chemical Co.). U. S. 1,944,542, Jan. 23. These esters may be formed by reaction of cholesterol with the acids or acid chlorides. They m. 68-70° and 63-65°, resp., are sol. in acetic acid ester, "moderately sol." in alc. and fatty oils, insol. in water, and are bactericides which can be used in treating leprosy.

**Compounds of chloral and its homologs with quinine.** Chemisch-pharmazeutische A.-G. Bad Homburg. Ger. 590,312, Dec. 29, 1933 (Cl. 12p. 12). Chloral hydrate (or a homolog thereof) and quinine base are heated together in equimol. proportions in a solvent, e. g., EtOH or CHCl<sub>3</sub>. Examples are given of the prepn. of compds. of chloral and butylchloral with quinine. The products are of therapeutic value.

**Organo arsenic compounds.** I. G. Farbenind. A.-G. Brit. 400,776, Nov. 2, 1933. Addn. to 360,957 (C. A. 27, 1094). See Ger. 565,414 (C. A. 27, 2533); Ger. 578,312 (C. A. 28, 859').

**Quaternary salts of heterocyclic compounds.** I. G. Farbenind. A.-G. (Fritz Schonhofer and Hans Heneka, inventors). Ger. 590,239, Dec. 28, 1933 (Cl. 12p. 1.01). This corresponds to a part of Brit. 390,831 (C. A. 27, 4878-9), but includes the following addnl. examples: (1) (a) 6-aminoquinoline (I) and 2-bromo-4-chlorobenzoyl chloride → 6-(2-bromo-4-chlorobenzamido)-quinoline, m. 246-8°, → quaternary methyl sulfate, m. 245-6°; (b) I and 2-phenoxy-4-chlorobenzoyl chloride → 6-(2-phenoxy-4-chlorobenzamido)quinoline, m. 171° → quaternary methyl sulfate, m. 221°; (c) I and 4-butoxybenzoyl chloride → 6-(4-butoxybenzamido)quinoline, m. 154°, → quaternary methyl sulfate, m. 195°; (2) I and phthalic anhydride → 6-(2-carboxybenzamido)quinoline, m. 227°, and 6-quinolylphthalimide, m. 225°, → quaternary methyl sulfates, m., resp., 268-70° and 243°; (3) 3-amino-4-methoxypyridine and 3-nitro-4-toluy chloride → 3-(3-nitro-4-toluy)amino-4-methoxypyridine, m. 184-5°, → quaternary methyl chloride, m. 167° (decompn.). The products are effective against blood parasites.

**Quaternary salts of choline derivatives.** E. Merck Chem. Fab. Ger. 590,311, Jan. 10, 1934 (Cl. 12p. 17.01). Addn. to 539,329 (C. A. 26, 1713). Quaternary salts of therapeutic value are prepd. by addn. of neutral alkyl or aryl sulfuric or sulfonic acid esters to compds. of the formula X(Y)NC(O)OZ, where X is H, alkyl, or CONH<sub>2</sub>, Y is H or alkyl, and Z is a dialkylaminoalkyl group. Examples are given of the prepn. of NH<sub>2</sub>COOCH<sub>2</sub>CH<sub>2</sub>NMe<sub>2</sub>OSO<sub>3</sub>Me, m. 118-20°, NH<sub>2</sub>COOCH<sub>2</sub>CH<sub>2</sub>NMeEtOSO<sub>3</sub>Me, m. 76-7°, MeNHCOOCH<sub>2</sub>CH<sub>2</sub>NMeEtOSO<sub>3</sub>C<sub>6</sub>H<sub>4</sub>Me-p, and NH<sub>2</sub>CONHCOOCH<sub>2</sub>CH<sub>2</sub>NEt<sub>2</sub>OSO<sub>3</sub>C<sub>6</sub>H<sub>4</sub>Me-p.

**Acridinium derivatives.** I. G. Farbenind. A.-G. Fr. 755,631, Nov. 28, 1933. Acridinium compds. of the general formula C<sub>11</sub>H<sub>9</sub>N[OAsO(OH)R']R, in which the acridine ring may be substituted by aminoalkyl or hydroxyalkyl groups (R is alkyl, hydroxyalkyl or aralkyl and R' an aromatic or aromatic-heterocyclic radical) are prepd. by causing a salt sol. in water of an arylarsonic acid (isocyclic or heterocyclic) to react with an acridinium compd. contg. the anion of a mineral acid or lower carboxylic acid joined to the N, in addn. to R. Examples are given of compds. prepd. by the action of p-glycolylaminophenyl-, 3-acetamido-4-hydroxy-5-chlorophenyl-1-, 2,4-dihydroxyphenyl-1-, benzoxazolone-6-, 3-methylben-

zimidazole-6- and 4-acetamido-2-phenylacetic-1-arsonic acid on 3,6-diamino-10-methylacridinium chloride or acetate, 4-phenylglycineamide-1-arsonic acid on 3,6-dimethoxy-10-methylacridinium chloride and 4-glycolylaminophenyl-1-arsonic acid on 2,7-dimethyl-3,6-diamino-10-methylacridinium chloride. The formulas are given. The products have a strong bactericidal action. Cf. C. A. 28, 1361<sup>1</sup>.

**Solutions of chemical compounds.** I. G. Farbenind. A.-G. Fr. 755,635, Nov. 28, 1933. Salts of acridine compds. with org. arsonic acids, such as those described in Fr. 755,631 (preceding abstr.) which are difficultly sol. in water, are brought into soln. by dissolving them in water in the presence of easily sol. salts of bases of the acridine group. In this way very strongly concd. bactericidal solns. may be prepd. The insol. salts need not be isolated, but may be prepd. in the presence of the sol. salts so as to obtain solns. directly. A list of acridine compds. and arsonic acids which may be allowed to react to form new compds. is given.

**Lactones.** Byk-Guldenwerke Chem. Fab. A.-G. Ger. 590,238, Jan. 4, 1934 (Cl. 12p. 25). Cyclohexanone (I) and diethyl mesoxalate (II) are gently boiled together to form diethyl 2-ketocyclohexyltartronate, b<sub>p</sub> 173°, which loses water when heated with AcCl and yields diethyl 2-ketocyclohexylidenemalonate. The latter is reduced with H in the presence of a catalyst to form diethyl 2-hydroxycyclohexylmalonate, which loses EtOH when distd. *in vacuo* and forms a lactone. If the residual ester group in the lactone is sapond. and the acid heated to 150°, CO<sub>2</sub> is split off. Lactones may be prepd. similarly from other cyclic ketones and other keto carboxylic acids or their esters. Other examples given are (1) o-methyl-I and II → a lactone b<sub>p</sub> 143-5°; (2) α-ketotetrahydronaphthalene and glyoxylic acid → 1-hydroxytetrahydronaphthalene-2-acetic acid lactone; (3) menthone and II → a lactone b<sub>p</sub> 160-5°. The products are of therapeutic value.

**Product having the properties of vitamin C.** Nyegaard & Co., A/S. (Invented by O. Rygh). Norw. 53,145, Oct. 9, 1933. The components of narcotine after decompn. of all or part of the methyl or methoxyl groups are brought to combine with each other. Cf. C. A. 27, 1453.

**Solutions containing sulfur and metal.** Paul Mochall. Ger. 588,903, Nov. 29, 1933 (Cl. 30k. 2). Oil or fat solns. contg. S and metals for medicinal or com. uses are prepd. by heating S with sugar, and meal contg. starch, in fats or oils. The C which is pptd. is sepd. and the residue is heated with metal or metal compds. till a colloidal soln. results. In an example, S, starch meal and sugar are heated with fat to 170°. The C is removed and the residue heated to 200° with Fe filings till a reddish brown colloidal soln. results.

**Preparations giving off carbon dioxide.** Firma C. Brady. Ger. 588,718, Nov. 25, 1933 (Cl. 30k. 2). Therapeutic preps. are prepd. by mixing lecithin evolving CO<sub>2</sub> with fat, etc., and enclosing in digestible capsules.

**Cresol preparations.** Carol A. Cofman-Nicoresti. Ger. 588,612, Nov. 21, 1933 (Cl. 30i. 3). Solid preps. contg. cresol in dispersed water-sol. form are obtained by sapon. cresol with fatty acids such as palmitic or stearic in the warm at 10-20 atm. with an excess of NaOH or NH<sub>4</sub>OH only sufficient to convert a small part of the cresol to its alkali salt. The prepn. is used as a disinfectant.

**Keratin compounds.** Firma Johann A. Wilfing. Ger. 588,710, Nov. 24, 1933 (Cl. 12p. 16). Addn. to 578,828 (C. A. 28, 1472'). The method of 578,828 for producing keratin compds. contg. heavy metals and SH groups by treating Zn-SH-keratin compds. with H<sub>2</sub>S and a heavy metal, is modified by titrating sulfhydrylkeratin acid with AgNO<sub>3</sub> soln., with Na nitroprusside as indicator to find the amt. of heavy metal required, and then adding the equiv. amt. of a Bi, As or Sb compd. The resulting keratin compd. is pptd. by addn. of EtOH or MeOH. Examples are given.

**Liver extracts.** Leslie W. Mapson and Cambio Products Ltd. Brit. 400,979, Oct. 30, 1933. The autanemic principle, the physiologically active substance or



- hormone known as physin and meat exts. for flavoring, etc., are extd. from (aq. soln. or suspensions from) liver, or from liver digested by ferments, by treatment with alc. of concn. increasing progressively up to 90% and treating the ext. that is sol. in 90% alc. with  $\text{Me}_2\text{CO}$ . Thus the liver is digested, e. g., with papain, and the liquid product evapd. to a paste to which alc. is added to give a 60% alc. content. The mixt. is allowed to stand and is filtered. The ppt. is a meat ext.-or base for soups, etc. Alc. sufficient to give a 90% alc. content is added to the filtrate which is then filtered, the residue being redissolved in  $\text{H}_2\text{O}$  and again pptd. with 90% alc. This ppt. contains the anti-anemic principle. The combined filtrate is freed from alc. by distn. and taken up in  $\text{H}_2\text{O}$ . It contains all the physin which may be further concd. by adding  $\text{Me}_2\text{CO}$  to 90%. The filtrates from  $\text{Me}_2\text{CO}$  treatment are evapd. to dryness or small bulk and form the final concentrate of physin. The residue from the  $\text{Me}_2\text{CO}$  treatment is a meat-flavoring ext.
- Hormones.** Elektro-Osmose A.-G. (Graf Schwerin Ges.). Ger. 590,159, Dec. 27, 1933 (Cl. 12p. 17.10). The recovery of pure hormone preps. from urine is facilitated by removing electrolytes from the concd. urine by electrobiosis.
- Sexual hormones.** Soc. pour l'ind. chim. à Bâle. Brit. 400,520, Oct. 26, 1933. Crude products extd. from animal or human urine are treated in presence of  $\text{H}_2\text{O}$ , but in absence of org. solvents, with a hydroxide or monoxide of a metal of the 2nd periodic group until an easily disintegrated powder is obtained, this is filtered off, the filtrate and aq. washings are acidified and extd. with a  $\text{H}_2\text{O}$ -immiscible solvent and the ext. is purified in known manner to obtain female sexual hormones in cryst. condition. Examples are given. Cf. C. A. 27, 1718.
- Bandages.** J. Pfrimmer & Co. Ger. 588,532, Nov. 20, 1933 (Cl. 30i. 8.01). Bandages of cotton or cellulose are impregnated with an aq. or alc. soln. of I and I salts, contg. some partly swelled starch.
- Synthetic perfumes.** Soc. anon. M. Naef & Cie. Ger. 588,647, Nov. 21, 1933 (Cl. 12a. 7.03). See Fr. 744,345 (C. A. 27, 4031).
- Lotion.** E. Stockman. Swed. 79,214, Dec. 19, 1933. The mixt. specified consists of 100 parts of formic acid, 10-15 parts of fir-leaf oil (from red fir, *Pinus sylvestris*), eucalyptus oil, bornyl acetate and 4 parts of concd.  $\text{NH}_3$ , diluted with an equal amt. of distd. water.
- Antiseptic mouth wash.** S. A. G. Hasselskog. Swed. 78,459, Sept. 26, 1933. Iodine compds. and I-liberating substances, such as  $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{NHCl}$  or its salts or homologs or derivs., are mixed in the solid state, and dissolved in water.
- Dentifrice.** Roy Cross (to Silica Products Co.). U. S. 1,943,856, Jan. 16. Bentonite 50,  $\text{MgO}$  50,  $\text{NaF}$  1, camphor 1, and tincture of benzoin 5 parts are used together. Soap 5, Na phosphate 5, oil of eucalyptus 1 part and water to form a paste also may be used.
- Antiseptic dentifrice.** Rudolph S. Bley. U. S. 1,943,467, Jan. 16. A dentifrice is prepd. contg. the final reaction products of org. acids with hydroxybenzenes, such as hexylresorcinol or the like and also contg. an enzyme such as diastase in an active state.
- Disinfectant.** I. G. Farbenind. A.-G. (Georg Wesenberg and Friedrich Muth, inventors). Ger. 583,875, Sept. 11, 1933. Addn. to 563,643 (C. A. 27, 1027). The method of 563,643 for producing a disinfecting and conserving agent is modified by using bis(hydroxyaryl) polysulfides contg. no acid residues. Examples mention bis(o-hydroxyphenyl)disulfide, trisulfide and bis(o-hydroxy-5-chlorophenyl)trisulfide. The salts of these sulfides may also be used. Cf. C. A. 28, 860<sup>4</sup>.
- Tobacco.** Neuburg'sche Verwaltungsgesellschaft m. b. H. Ger. 588,958, Nov. 30, 1933 (Cl. 79c. 1). Injurious substances are removed from tobacco to improve its taste and smell by submitting it to an air circulation at temps. not exceeding 65° and with a moisture content not exceeding 10%; the injurious substances are absorbed by active C or  $\text{SiO}_2$ .

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

- Acid making at the Ipswich superphosphate works.** Anon. Ind. Chemist 10, 49-54(1934). E. H.
- Production of phosphoric acid. II. The Dorr process.** A. A. Sokolovskii. J. Chem. Ind. (Moscow) 1933, No. 10, 48-53; cf. C. A. 27, 2535. H. M. Leicester
- Precipitation of phosphoric acid by means of chalk.** L. M. Gurévich. Mineral. Udobr. 1, 38-40(1932); *Chimie & industrie* 30, 800.—Natural White Russian chalk, when treated with water, forms a rather fine suspension, which reacts easily with  $\text{H}_3\text{PO}_4$ . It is impossible to obtain a complete reaction with chalk alone, a certain amt. of milk of lime being also required. The process is carried out in 2 stages: (1) addn. of  $\text{CaCO}_3$ , (2) addn. of milk of lime. The end point of the reaction is detd. in the same way as in pptn. with  $\text{Ca(OH)}_2$  alone, in the presence of methyl red, the only difference being that the sample must be filtered and the indicator added to the filtrate. By this process the  $\text{CaO}$  consumption can be reduced to 6%, and the finished product contains about 36% citric-sol.  $\text{P}_2\text{O}_5$  on the dry basis. The excess of  $\text{CaO}$  is in the form of  $\text{CaCO}_3$  and does not affect the ratio of citric-sol. to total  $\text{P}_2\text{O}_5$ . The time required for pptn. is about 60 min., as compared with 25 min. for  $\text{CaO}$  alone. Combined use of  $\text{CaCO}_3$  and  $\text{CaO}$  improves and facilitates filtration of the ppt. Use of  $\text{CaCO}_3$  does not affect the decrease in the sol.  $\text{P}_2\text{O}_5$  content on drying. A. Papineau-Couture
- Colloid problems of the nitrogen and sulfuric acid industries.** Bruno Waeser. Kolloid-Z. 66, 123-7(1934); cf. C. A. 28, 1473<sup>7</sup>.—Leuna lime and caustic mud properties are reviewed. Patents relating to the recovery of  $\text{H}_2\text{SO}_4$  fog from waste gases are reviewed. A. F.
- The lead chamber process. VI. The relation between pressure and sulfuric acid formation, with nitric oxide as oxygen carrier.** E. Berl and F. W. Althoff. Z. anorg. allgem. Chem. 215, 225-41(1933); cf. C. A. 27, 4351.—In an exptl. chamber process, pressures of 1, 6.6 and 13.3 atm. gave outputs of approx. 150, 600 and 2900, resp. Since the reaction  $2\text{NO} + \text{O}_2 = 2\text{NO}_2$  is the slowest, it defines the overall reaction velocity. Since it is trimol., its velocity should increase as the cube of the pressure. The tests showed that the output of the system increased as the 4th power of the operating pressure in the reaction vessel, so that the above equation is not the only reaction defining velocity. Also, dependence upon the 4th power shows that, in addn. to diffusion velocity or absorption velocity, the limiting surfaces of gas-liquid define the reaction velocity. That oxidation of NO in the gaseous phase does not alone det. velocity is evident from the fact that the outputs of all recent  $\text{H}_2\text{SO}_4$  systems have been increased by incorporating sprays to increase the liquid-gas phase limiting surfaces. E. M. Symmes
- Alkali-containing Hungarian ores from a technological point of view.** József Györki. Vegyi Ipar 32, No. 23-4, 2(1933); *Földtani Közlöny* 63, 189-92(in German).—Phonolites and trachodolerites contain 6.66-2.30%  $\text{Na}_2\text{O}$  and 5.38-0.98%  $\text{K}_2\text{O}$ . No increase of alkali content was obtained by electromagnetic sepn. For the time being such ores cannot be used by the trade. S. S. de Finály
- The production of calcium nitrate.** A. M. Dubovitskii and N. I. Kryuchkov. J. Chem. Ind. (Moscow) 1933, No. 10, 27-32.—Descriptive. H. M. Leicester
- Volatilization of fluorine in manufacture of phosphorus and phosphoric acid by furnace processes.** D. S. Raynolds and K. D. Jacob. Ind. Eng. Chem. 25, 1321-3(1933).—Recovery of the F volatilized does not seem to be worth while. Albert L. Henne

**Isolation of helium and the complete utilization of Larderello gases.** Piero Ginori-Conti. *Giorn. chim. ind. applicata* 15, 500-5(1933).—Summary of recent progress in sepn. and utilization of the gases liberated in the soffioni of the borax-bearing hot springs at Larderello.

A. W. Contieri

**Sulfur in Peru—some deposits of the Andes.** Robert D. Ferron. *Eng. Mining J.* 135, 64-5(1934).—A brief description of some of the comparatively unknown deposits of S in Peru.

W. H. Boynton

**The reactivity of charcoals.** C. Collina and I. Gior-dano. *2me Congr. intern. carbons carburant* (Milan, Oct. 1932), 131-40; *Chimie & industrie* 30, 1117.—Under fixed exptl. conditions (900° and approx. atm. pressure) the reaction const. of  $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$  may be considered as the abs. numerical value of the reactivity. A method and app. are described for carrying out the detn. by passing a measured vol. of  $\text{CO}_2$  over charcoal heated to 900°, analyzing the gases, and calcg. the reactivity of the charcoal from suitable tables or graphs. A. Papineau-Couture

**Mica.** F. W. Horton and B. H. Stoddard. Statistical Appendix to Minerals Yearbook, 1932-33, *Bur. Mines* 7-12(1933).

Alden H. Emery

**Waste gases from the preparation of kieselsguhr (diatomaceous earth).** W. Liesegang. *Angew. Chem.* 47, 48-9(1934).—Kieselsguhr is usually calcined in open sheds, and it was found in lab. expts. that the gases of combustion contained mainly  $\text{SO}_2$  with small amts. of  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ , aldehydes, pyridine and thio acids. However, the quantity of  $\text{SO}_2$  liberated was not sufficient to cause damage to the surrounding vegetation.

Karl Kammermeyer

**Preparation of bleach liquors from liquid chlorine and [quick]lime.** O. Wurz. *Papier-Fabr.* 31, 49-53, 62-5(1933).—Tech. details are given. The quicklime should contain  $>0.2\%$   $\text{Fe}_2\text{O}_3$ ; if Mn is present the liquor is red, but this is harmless. During chlorination a rise of temp. to 42° does not increase the loss of Cl as  $\text{Ca}(\text{ClO})_2$  or  $\text{CaCl}_2$  if the liquor is alk. (as is always necessary). For an escape of Cl<sub>2</sub> the best spray is aq.  $\text{Na}_2\text{CO}_3$ . B. C. A.

**"Italian" powder for polishing marble.** A. G. Eliseev and N. A. Khmelevskaya. *Mineral. Suir'e* 8, No. 10, 37-40(1933).— $\text{Al}_2\text{O}_3$  was used as a substitute for putty powder with good results. The product was prepd. by complete pptn. of a satd. soln. of alum with  $\text{NH}_3$ , d. 0.91, the mixt. was allowed to stand 18 hrs., the ppt. was filtered off, dried, heated, comminuted and sifted to a diam. of 2.3-4.7  $\mu$ . Chas. Blanc

**Liquids for cooling automobile radiators in winter.** E. Hoeg. *Ingenioren (Automobillechnik)* 42, No. 8, 17-19 (Feb. 25, 1933); *Chimie & industrie* 30, 571.—A considerable no. of such liquids at present on the market are highly corrosive. Tests on one of them showed that corrosion is slow at first but proceeds at increasing rate. Even when corrosion is slow, it interferes with cooling, because the sludge formed hinders proper circulation.

A. Papineau-Couture

**Liquids for automobile radiators.** J. Eilersten. *Ingenioren* 42, 73-5(1933); *Chimie & industrie* 30, 571.—The evapn. loss of 30% alc. is equiv. to approx. 0.4 l. of 93% alc. per 1000 km.; alc. of this strength does not attack varnish, while 93% alc. does. Corrosion tests were carried out with aq. 26% glycol, 30% glycerol and 30% EtOH. All 3 attack Pb considerably during the 1st month, after which the rate of attack falls considerably; Sn, Zn and Cu are much less attacked. In every case (except Cu) the metal was least attacked by the EtOH. Fe is attacked more by pure  $\text{H}_2\text{O}$  than by any of the 3 above liquids. A. Papineau-Couture

**Oxidation of NO to  $\text{N}_2\text{O}_5$  by means of  $\text{O}_3$**  (Kobozev, et al.) 4.

**Bachala, A.:** La chaux, facteur de production. Auch: Th. Bouquet. 15 pp.

**Bernard, Edouard:** Le problème de l'azote en France. Paris: J. B. Baillière & fils. 220 pp. F. 25.

**Annuario delle materie plastiche.** Milan: P. A. Pollini. 432 pp. L. 20.

**British Plastics Year Book, 1934.** London: Plastics Press, Ltd. 568 pp. 7s. 6d.

**Boric acid.** Emil Franke (to Chemische Fabrik Grünau Landshoff & Meyer A.-G.). U. S. 1,944,598, Jan. 23. In the manuf. of boric acid from minerals such as kernite and rasorite contg. Mg as an impurity, the material is heated with hot  $\text{H}_2\text{SO}_4$  in the presence of Na borate, so that a soln. of  $\text{H}_2\text{BO}_3$ ,  $\text{MgSO}_4$  and  $\text{Na}_2\text{SO}_4$  is produced, this soln. is cooled to sep. a portion of the  $\text{H}_2\text{BO}_3$ , the resulting liquor is concd. to the point where it is satd. with  $\text{Na}_2\text{SO}_4$  to sep. Na Mg sulfate, and the hot liquor is cooled to crystallize further quantities of  $\text{H}_2\text{BO}_3$  free from sulfate.

**Boric acid.** Andrew Kelly. Ger. 584,702, Sept. 22, 1933 (Cl. 12i. 40). See Brit. 351,810 (C. A. 26, 3337).

**Phosphoric acid from crude phosphates.** George F. Walker, Albert E. Marshall and Holbert E. Dunn (to Southern Mineral Products Corp.). U. S. 1,944,048, Jan. 16. Crude phosphate contg. Fe and Al compds. is leached with a dil. soln. contg. 5-15%  $\text{H}_3\text{PO}_4$  to dissolve Fe and Al compds.; the purified material is then treated with  $\text{H}_2\text{SO}_4$  to produce  $\text{H}_3\text{PO}_4$ ; Fe and Al compds. are pptd. from the leaching soln. and the resulting purified leaching soln. is utilized in the sulfuric acid treatment.

**Phosphoric acid from crude phosphates.** Norsk Hydro-Elektrisk Kvaestofaktieselskab. Norw. 52,397, April 10, 1933.  $\text{H}_3\text{PO}_4$  or a mixt. of acids contg.  $\text{H}_3\text{PO}_4$  is produced by decompn. of crude phosphate with  $\text{HNO}_3$  and pptn. of the lime in the form of  $\text{CaSO}_4$  by passing  $\text{SO}_2$  through the acid soln. under suitable conditions.

**Sulfuric acid.** Metallgesellschaft A.-G. Brit. 400,143, Oct. 19, 1933. In the contact process the removal of solid components from the burner gases and the absorption of the  $\text{SO}_3$  are both performed without any circulation of acid. App. is described.

**Sulfuric acid.** R. A. I. Lundgren. Swed. 76,798, March 28, 1933.  $\text{H}_2\text{SO}_4$  is produced by intimately mixing  $\text{SO}_2$  and nitrous gases with  $\text{H}_2\text{SO}_4$  in an excess of  $\text{H}_2\text{O}$ . The gas mixt. is forced by pressure or suction through a large number of vertical pipes, the lower ends of which dip below the level of liquid in a closed chamber in such a way that the liquid is carried along by means of the gas pressure and is mixed with the gas and introduced into an upper chamber from which the gases are taken out, while the liquid flows back in sep. conduits to the lower chamber and is thus kept in circulation.

**Sulfuric acid concentration.** Wm. C. Mast (to Chemical Construction Corp.). U. S. reissue 19,064, Jan. 23. A reissue of original pat. No. 1,790,507 (C. A. 25, 1340).

**Heat-exchange apparatus suitable for use as an acid cooler in sulfuric acid manufacture.** Bernard M. Carter (to General Chemical Co.). U. S. 1,943,855, Jan. 16. Various structural details are described.

**Vapor-phase catalytic reactions such as ammonia synthesis.** Mortimer J. Brown (to E. I. du Pont de Nemours & Co.). U. S. 1,943,580, Jan. 16. Reactant gases are passed in contact with the inner side of pressure-sustaining walls of a pressure-resisting bomb, and then are passed in heat-exchange relation within the bomb with outgoing gases; the partially heated gases are passed over a preheater and then enter a single catalyst mass at a plurality of adjacent places along the main line of flow. Various structural and operative details are described.

**Apparatus for producing a mixture of water gas and generator gas suitable for the synthesis of ammonia.** The Power Gas Corp. Ltd. and Niels E. Rambush. Ger. 588,715, Nov. 24, 1933 (Cl. 24e. 1.01).

**Alkali cyanates.** Herbert Wittek. Ger. 590,232, Jan. 5, 1934 (Cl. 12k. 9). An alkali carbonate or hydroxide is treated with a mixt. of  $\text{NH}_3$  and  $\text{CO}_2$  at 600-800° in the presence or absence of a catalyst, e. g., Cu or Mg or their alloys or oxides. A little N may be added to the gas mixt. to repress the disson. of the  $\text{NH}_3$ .

**Alkali cyanides.** N. V. Stikstofbindingsindustrie "Nederland." Ger. 588,823, Nov. 27, 1933 (Cl. 12k. 11). Alkali thiocyanates are heated to 400-800° in the presence of oxides of alk. earth or heavy metals and CO or gases

contg. CO. Thus, NaCNS is heated with ZnO and CO to give NaCN, ZnS and CO<sub>2</sub>. Yields of 98–8% cyanide are given.

**Cyanides and cyanamides.** Herbert Wittek. Ger. 588,761, Nov. 25, 1933 (Cl. 12k. 9). A furnace for forming cyanides or cyanamides from NH<sub>3</sub> and uni- or bivalent metals is described. Cf. C. A. 27, 3585.

**Alkaline earth cyanides.** Nikodem Caro and Albert R. Frank (H. Heinrich Franck, inventor). Ger. 588,943, Nov. 30, 1933 (Cl. 12k. 9). Alk. earth carbide is treated with N and the fused or plastic reaction product is rapidly cooled to 400–500° to prevent formation of cyanamides. Thus, CaC<sub>2</sub> is heated and treated with N to give Ca-

**Alkaline earth nitrates.** Harry Pauling. Ger. 588,874, Nov. 29, 1933 (Cl. 12i. 26). The gases obtained by burning NH<sub>3</sub> are absorbed partly in water and partly in dry alk. earth oxides, hydroxides or carbonates. The HNO<sub>3</sub> resulting from the first-mentioned absorption is added to the alk. earth compds. to convert further oxide, etc., to nitrate. The nitrates are sepd. by usual methods.

**Trialkali phosphates.** Chemische Fabrik Budenheim A.-G. (Hans H. Saenger, inventor). Ger. 588,942, Nov. 30, 1933 (Cl. 12i. 31). Aq. concd. solns. of dialkali phosphates are treated with the requisite amt. of alkali carbonate and NH<sub>3</sub>. The soln. is cooled if necessary. In an example, Na<sub>2</sub>HPO<sub>4</sub> is treated with Na<sub>2</sub>CO<sub>3</sub> and NH<sub>3</sub> to give Na<sub>3</sub>PO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>. A 60% yield of Na<sub>3</sub>PO<sub>4</sub> is obtained.

**Alkali polysulfides.** I. G. Farbenind. A.-G. (Erik Reissmann and Hermann Wolff, inventors). Ger. 590,278, Dec. 28, 1933 (Cl. 12i. 18). See Fr. 739,294 (C. A. 27, 1997).

**Molybdates.** I. G. Farbenind. A.-G. (Ernst Pokorny, inventor). Ger. 588,564, Nov. 23, 1933 (Cl. 12n. 10). Molybdates of alk. earth metals or Mg are prepd. by treating roasted molybdenite with boiling alk. solns. or ppts. of these metals. Examples are given.

**Phosphates.** Phosphate Recovery Corp. Fr. 756,037, Dec. 4, 1933. Materials contg. phosphates are concd. by agitation and treatment with air to produce a foam relatively rich in phosphate and sepn. of the foam. The phosphate material is made into a pulp and aerated in the presence of materials contg. naphthenic acid, e. g., those obtained during the refining of petroleum.

**Peroxides.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Fr. 755,562, Nov. 27, 1933. Solns. of peroxides, particularly of H<sub>2</sub>O<sub>2</sub>, are stabilized by the addn. of Sn compds. sol. therein, e. g., Na stannate. To prevent pptn. of Sn a pyrophosphate may be added and the *pH* value of the soln. is kept between 2 and 6.

**Aluminum compounds from material such as bauxite, clay or alunite.** Stephen Hunyady. U. S. 1,944,327, Jan. 23. A salt such as Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, which may be produced by treating bauxite with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, is converted into Al hydroxy carbonate (as by the action of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>), and the latter, with accompanying insol. substances, is treated with SO<sub>2</sub> to form Al sulfite. The last may be calcined to form Al<sub>2</sub>O<sub>3</sub>.

**Manganese compounds.** Joseph Hetterich and Chemisch-technologische Ges. für Metallforschung m. b. H. Ger. 588,787, Nov. 27, 1933 (Cl. 40a. 46.10). Compds. of Mg free from SiO<sub>2</sub> and contg. very little CaO are prepd. by treating an aq. slurry of Mg ores rich in SiO<sub>2</sub> and CaO with SO<sub>2</sub> and O<sub>2</sub> or ozonized air at high temp. and pressure, the Mg compd. being removed from the residue contg. SiO<sub>2</sub> and CaSO<sub>4</sub> by usual methods. An example is given.

**Thiocyanogen compounds.** Emil Hene. Ger. 588,944, Nov. 30, 1933 (Cl. 12k. 11). CaCN<sub>2</sub> is heated with aq. solns. of alkali or alk. earth hydrosulfides with addn. of S to 150° and the temp. increased to 250°. Thus, CaCN<sub>2</sub> is heated with an aq. soln. of KSH and S to give Ca(CNS)<sub>2</sub>. Cf. C. A. 27, 4354.

**Finely divided metal compounds.** Chem. Werke Schuster & Wilhelmy, Patentverwertungs-Ges. m. b. H. (Paul Beyeradorfer, inventor). Ger. 590,481, Jan. 2, 1934 (Cl. 12g. 5.01). Finely divided metal oxides and

other metal compds. are obtained by subjecting to a chem. reaction a mixt. of a fused or fusible metal or metal compd. with a finely divided inert solid, e. g., sand, glass or porcelain. The inert solid may be sepd. from the product if desired. Thus, finely divided Sb<sub>2</sub>O<sub>3</sub> may be prepd. by treating a mixt. of Sb<sub>2</sub>S<sub>3</sub> and sand with air at a temp. above the m. p. of Sb<sub>2</sub>S<sub>3</sub>, e. g., 650°, the product being freed from sand by mech. means. Other examples are given.

**Metal carbonyls.** Leo Schlecht and Max Naumann (to I. G. Farbenind. A.-G.). U. S. 1,944,849, Jan. 23. In forming a carbonyl by the action of CO on a material such as that used for making an Fe or Ni carbonyl in a closed reaction chamber, spent material is continuously withdrawn from and fresh material continuously fed to the reaction chamber in suitably proportioned rate to keep the reaction chamber substantially completely filled with the material. App. is described. Cf. C. A. 28, 1478°.

**Separating aluminum hydroxide from alkali metal aluminate solution.** Alfred H. Cowles (to Elec. Smelting & Aluminum Co.). U. S. 1,943,786, Jan. 16. See Brit. 382,366 (C. A. 27, 4355).

**Aluminum silicosulfides.** Metallgesellschaft A.-G., Oskar Schober and August Schmitzspahn. Brit. 401,038, Nov. 9, 1933. See U. S. 1,921,705 (C. A. 27, 5156–7).

**Ammonium nitrate.** "Montecatini" soc. generale per l'industria mincraia ed agricola. Ger. 590,409, Jan. 8, 1934 (Cl. 12k. 6). See Brit. 367,060 (C. A. 27, 571°).

**Bleaching powder.** Adolf Remele (to I. G. Farbenind. A.-G.). U. S. 1,944,301, Jan. 23. In producing bleaching powder in mech. bleaching chambers, a mixt. consisting substantially of Ca(OH)<sub>2</sub> with an easily volatilizable and inert liquid such as CCl<sub>4</sub> (in such limited quantity as to permit the material to remain in pulverulent condition) is subjected to chlorination. Cf. C. A. 28, 592°.

**Finely divided hydrated calcium sulfate.** Foord von Bichowsky. U. S. 1,943,497, Jan. 16. For producing finely divided hydrated CaSO<sub>4</sub>, acicular hydrated CaSO<sub>4</sub> material is heated with a soln. of H<sub>2</sub>SO<sub>4</sub>-contg. material in which the free H<sub>2</sub>SO<sub>4</sub> does not exceed that of a soln. of 1.3 sp. gr., and the heating with the acid soln. is continued (suitably gradually up to a temp. of about 100° and for a time of about 24 hrs.) until the acicular material disintegrates without being dehydrated.

**Copper sulfate.** Daniel W. Marsh and Benjamin H. Marsh. U. S. 1,944,444, Jan. 23. Metallic Cu (which may be in the form of sheets, wire, etc.) is suspended in dil. H<sub>2</sub>SO<sub>4</sub> and the reaction mixt. is treated with an O-contg. gas such as air while the material is maintained under superatm. pressure and at an elevated temp. App. is described. Cf. C. A. 28, 1134°.

**Magnesium sulfate.** Kali-Forschungs-Anstalt G. m. b. H. (O. F. Kaselitz, Jean d'Ans and Hans Friedrich, inventors). Ger. 590,482, Jan. 2, 1934 (Cl. 12m. 3). MgSO<sub>4</sub>·H<sub>2</sub>O is prepd. by treating a soln. of MgSO<sub>4</sub> or solid MgSO<sub>4</sub>·7H<sub>2</sub>O, with a hot concd. soln. or melt of Mg-Cl<sub>2</sub>. Details are given.

**Potassium carbonate from potassium sulfate.** Chem. Fab. Buckau (Erich Windbrauck, inventor). Ger. 590,158, Dec. 27, 1933 (Cl. 12i. 13). A soln. of K<sub>2</sub>SO<sub>4</sub> is treated with Ca(OH)<sub>2</sub> and CO at about 200° and 15 atm. to produce a soln. of HCOOK, which is filtered, evapd., and finally calcined under oxidizing conditions to convert it into K<sub>2</sub>CO<sub>3</sub>. Calcination may be effected in the presence of KOH, which may be obtained by converting a part of the HCOOK in known manner into (COOK)<sub>2</sub>, and treating the latter with Ca(OH)<sub>2</sub>.

**Potassium cyanide.** Alfred Mentzel. Ger. 590,231, Dec. 29, 1933 (Cl. 12k. 9). A mixt. of coke and KHCO<sub>3</sub> is briquetted, heated to 300–400° in the absence of air, and then treated with N at about 830°.

**Potassium nitrate.** Kali-Forschungs-Anstalt G. m. b. H. (O. F. Kaselitz and Paul Höfer, inventors). Ger. 552,007, Dec. 19, 1933 (Cl. 12i. 6). A mixt. of Al(NO<sub>3</sub>)<sub>3</sub> and KCl is heated to about 200° until gaseous compds. of N or Cl are no longer evolved. The residue is extd. with water or dil. HNO<sub>3</sub> at an elevated temp., and the ext. is cooled to crystallize KNO<sub>3</sub>. The extrn. residue (Al<sub>2</sub>O<sub>3</sub>) is

reconverted into  $\text{Al}(\text{NO}_3)_3$  in known manner. Cf. C. A. 27, 5905.

**Potassium nitrate.** Preussische Bergwerks- und Hütten-A.-G. Zweigniederlassung Salz- und Braunkohlenwerke Abteilung Kaliwerk Bleicherode (Karl Haase and Hellmut Werth, inventors). Ger. 590,051, Dec. 22, 1933 (Cl. 12i. 8). See Fr. 743,239 (C. A. 27, 8786).

**Potassium sulfate.** H. Lawarrée. Belg. 896,870, July 31, 1933.  $\text{KCl}$  (3 parts) is added to  $\text{MgSO}_4$  (1 part); after filtration of the K salts the mother liquor is crystd.; the crystd. salts are removed and treated with alc., and the undissolved salts are sepd. from the alc. soln.

**Sodium aluminate.** Erik I. Rinnan. Brit. 400,984, Nov. 6, 1933. Cf. Fr. 740,621 (C. A. 27, 2766). Only the requisite amt. of oxides or hydroxides need be added and no  $\text{Na}_2\text{CO}_3$  is used.

**Sodium calcium and sodium cyanides.** Edward J. Pranke. Brit. 400,949, Oct. 30, 1933. See Fr. 730,426 (C. A. 27, 878) and U. S. 1,905,304 (C. A. 27, 3587).

**Purifying caustic soda solution.** Harry Bender (to Pennsylvania Salt Mfg. Co.). U. S. 1,944,630, Jan. 23. A salt of the compn.  $\text{NaOH} \cdot \text{NaCl} \cdot \text{Na}_2\text{SO}_4$  is crystd. from a soln. contg.  $\text{NaOH}$  and  $\text{NaCl}$  by adding  $\text{Na}_2\text{SO}_4$ . Cf. C. A. 27, 1460.

**Sodium nitrate.** Norak Hydro-Elektrisk Kvaestofaktieselskab. Norw. 53,363, Dec. 11, 1933. Solns. of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NaCl}$  are passed alternately through a suitable app. contg. base-exchanging substances, for instance permutite. Between the solns. suitable portions of pure water are added to prevent a contamination of the nitrate with  $\text{NaCl}$ . **Potassium nitrate.** Norak Hydro-Elektrisk Kvaestofaktieselskab. Norw. 53,372, Dec. 18, 1933. The process is carried out by means of base-exchanging substances in the manner described above.

**Desensitizing thorium dioxide.** Chemische Fabrik von Heyden A.-G. (Rudolf Zellmann, inventor). Ger. 588,563, Nov. 20, 1933 (Cl. 12m. 9). See Fr. 740,229 (C. A. 27, 2252).

**Basic zinc carbonate.** Martin J. Engberg. U. S. 1,944,415, Jan. 23. A suspension of  $\text{ZnO}$  or  $\text{Zn}(\text{OH})_2$  in a soln. of a Zn salt of a water-sol. org. acid such as the formate, acetate, lactate or citrate is treated with  $\text{CO}_2$ .

**Zinc oxide.** Richard W. French (to Superior Zinc Corp.). U. S. 1,944,158, Jan. 23. By-product Zn residues contg. an alkali metal salt and  $\text{ZnCO}_3$  are boiled with water to render the alkali metal salt content sol., washed to dissolve and remove such alkali salt material, and the residue is calcined.

**Zinc sulfide.** Thomas G. Stephens. U. S. 1,944,281, Jan. 23. An aq. soln. of Ba sulfide at a temp. of  $60^\circ$  or higher is mixed with an aq. slurry of  $\text{ZnO}$  at  $60^\circ$  or a higher temp., forming a ppt. of  $\text{ZnS}$  contg.  $\text{Ba}(\text{OH})_2$ ; the ppt. is sepd. from the soln., formed into an aq. slurry and treated with aq.  $\text{HCl}$  to convert the  $\text{Ba}(\text{OH})_2$  into  $\text{BaCl}_2$  and the latter is washed out.

**Hydrogen peroxide.** Kali-Chemie A.-G. (Friedrich Rusberg, Paul Schmid and Ludwig Pellens, inventors). Ger. 588,822, Nov. 27, 1933 (Cl. 12i. 16). Addn. to 587,888 (C. A. 28, 1821<sup>1</sup>). Mixts. of the vapors of  $\text{H}_2\text{O}_2$  and  $\text{H}_2\text{O}$  obtained from any source are freed from mist- or drop-forming constituents by a device for removing mist, prior to condensation.

**Removal of hydrogen sulfide from air.** E. Auger. Belg. 395,348, April 29, 1933. Air contg.  $\text{H}_2\text{S}$  is mixed with  $\text{SO}_2$  and circulated in an enclosure where it is subjected to the action of water sprays.

**Sulfur dioxide.** Daniel Tyrer and Imperial Chemical Industries Ltd. Brit. 400,998, Nov. 6, 1933. Gases contg.  $\text{SO}_2$  in low concn. are treated with an aq. soln. contg. 1 or more salts of stable non-volatile acids having disocn. consts. between  $10^{-3}$  and  $10^{-4}$ , and the  $\text{SO}_2$  is subsequently expelled by heating and (or) reduction of pressure. Suitable acids are lactic, glycolic, citric or  $\text{H}_3\text{PO}_4$ , and the basic radical may be an alkali or alk. earth metal,  $\text{NH}_4$  or other base that does not lead to undesirable pptn.

**Continuous removal of arsenic from sulfuric acid.** Soc. carbochimique (Spec. anon.). Belg. 394,718, April 29,

1933.  $\text{H}_2\text{S}$  is passed through the  $\text{H}_2\text{SO}_4$ . An app. is specified.

**Bromine from sea water.** John J. Grebe and Ray H. Boundy (to Dow Chemical Co.). U. S. 1,944,738, Jan. 23. Sea water is acidified and the Br is liberated by  $\text{Cl}_2$ , the addn. of  $\text{Cl}_2$  being controlled by an electromotive force varying with the Br concn. in the acidified soln. Cf. C. A. 27, 4636.

**Iodine from brines.** Charles W. Girvin (to General Salt Co.). U. S. 1,944,423, Jan. 23. A brine contg. combined I is treated (as by use of  $\text{H}_2\text{SO}_4$  and  $\text{NaNO}_2$ ) to liberate the I in elemental form, the free I is adsorbed on charcoal, the charcoal and adsorbed I are sepd. from the slightly acid soln. by sedimentation and the I may be recovered from the charcoal by use of an acid to form  $\text{HI}$ .

**Catalytic production of hydrogen from hydrocarbon vapor and steam.** Wm. V. Hanks and George H. Freyer-muth (to Standard Oil Development Co.). U. S. 1,943,821, Jan. 16. A catalyst for the reaction is prepd. by first forming a paste contg. heat-decomposable compds. of a metal or metals of the Fe group, admixed with activators, and then heating this paste to remove uncombined water, and further heating the dried paste to about  $870\text{--}1040^\circ$  while continuously passing over it a flushing gas free from catalyst poisons, the catalytic material being maintained at such temp. for some time (suitably about 12 hrs. to 3 days).

**Molybdenum recovery.** Johann Giesen and Ernst Peukert (to I. G. Farbenind. A.-G.). U. S. 1,944,420, Jan. 23. A mixt. contg. Mo and another metal, such a material used as a destructive hydrogenation catalyst in treated brown-coal tar, is roasted with a gas comprising  $\text{O}$  at  $400\text{--}600^\circ$  and then treated with a soln. of  $(\text{NH}_4)_2\text{CO}_3$  to dissolve the Mo.

**Fixation of nitrogen as oxides of nitrogen or as hydrocyanic acid.** Émile Briner and Charles H. Wakker. Brit. 400,431, Oct. 26, 1933. See Fr. 745,840 (C. A. 27, 4181).

**Catalytic purification of oxygen-containing hydrogenation products of carbon oxides.** I. G. Farbenind. A.-G. Brit. 400,262, Oct. 23, 1933. O-contg. products obtained by the catalytic hydrogenation of oxides of C, particularly the fraction boiling above  $110^\circ$  and consisting largely of higher alcs., are purified by catalytic hydrogenation at  $100\text{--}300^\circ$  and pressures above 50 atm. in presence of sulfides or non-reducible oxides of metals of groups 1, 2, 4, 5, 6 or 8, metals of group 6 being especially suitable. The catalysts may be oxides, hydroxides, carbonates and other salts from which the acid radical can be expelled by heat and complex salts of  $\text{H}_2\text{SiO}_4$  or  $\text{H}_3\text{PO}_4$  with  $\text{H}_2\text{MoO}_4$  or  $\text{H}_2\text{WO}_4$ , e. g.,  $\text{NH}_4$  phosphomolybdate. Among examples an initial fraction boiling at  $120\text{--}180^\circ$  is (1) trickled over a catalyst filling, consisting of pieces of Ni and W sulfides made by treating Ni tungstate with  $\text{H}_2\text{S}$ , at  $200^\circ$  and 200 atm. of H and (2) vaporized in H and passed over Cu chromite at  $180^\circ$  and 200 atm.

**Rock salt.** R. Englert & F. Becker, Chemische Fabrik, Prag-VII and Kurt Seidl. Fr. 756,232, Dec. 6, 1933. Uniformly colored blocks, tablets or grains are made from molten rock salt by adding a finely divided ore contg. Fe, particularly silicates or oxides, alone or with Fe oxide or pure Fe salts, and stirring the mass until it begins to thicken if blocks or tablets are desired, or till it completely solidifies if grains are desired. Bauxite and Fe oxide (2%) may be added to the molten salt.

**Leaching crude phosphate rock.** Markus Larsson (to Kunstdünger-Patent-Verwertungs A.-G.). U. S. reissue 19,045, Jan. 16. A reissue of original pat. No. 1,836,672 (C. A. 26, 1078).

**Treating crude phosphate.** Norsk Hydro-Elektrisk Kvaestofaktieselskab. Norw. 53,328, Nov. 27, 1933. Crude phosphate is decompd. by means of  $\text{HNO}_3$  and the  $\text{CaO}$  is pptd. by means of  $\text{NH}_4$  phosphate, in the form of a double salt of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NH}_4\text{NO}_3$ .

**Treating crude phosphate.** Stockholms Superfosfat Fabriks A.-B. (B. Colbjörnson, inventor). Swed. 78,893, Nov. 14, 1933. Phosphate-contg. materials are decompd.

with  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$  or mixts. of these acids. During or after the decompn. is added one or more alkali sulfates to ppt. Ca and form acid alkali phosphates together with alkali salt of the acid used for the decompn. The pptd.  $\text{CaSO}_4$  is sepd. and the soln. treated with  $\text{NH}_3$  to form tri-alkali phosphates together with alkali salts of the acid or acids used for the decompn. The  $\text{CaSO}_4$  is treated in known ways with  $\text{NH}_3$  and  $\text{CO}_2$  or  $(\text{NH}_4)_2\text{CO}_3$  for the production of  $\text{CaCO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$ , the latter being all or in part returned to the process.

**Dissolving titaniferous materials in acids.** Titan Co., A/S. Norw. 52,774, July 10, 1933. The solution is carried out in the presence of sulfurous reducing agents that can be added before or during the reaction. Cf. C. A. 27, 4761.

**Sulfur from pyrite.** A. R. Lindblad. Swed. 76,748, March 21, 1933. Pyrite is roasted in a rotary furnace in the presence of a reducing agent with an adjusted supply of air so that part of the S is driven off unoxidized and is collected as such while Fe and, if desired, part of the S are oxidized.

**Carbon black.** George C. Lewis (to Columbian Carbon Co.). U. S. 1,944,715, Jan. 23. A hydrocarbon flame is impinged upon a metallic depository carrying a layer of insulating material such as fireclay, a ceramic cement or asbestos on some of its unimpinged portions in order to maintain a desirable high temp. Cf. C. A. 27, 574.

**Activated charcoal.** V. Weerts. Belg. 396,962, July 31, 1933. Crude material, such as peat, is carbonized in a closed vessel and is then mixed with a dehydrating agent such as  $\text{ZnCl}_2$ .

**Lampblack.** Electroblacks Inc. Fr. 756,124, Dec. 5, 1933. See Can. 337,132 (C. A. 28, 1822\*).

**Catalyst for the reduction of sulfur dioxide.** Maitland C. Boswell. Can. 338,000, Jan. 16, 1934. Oxides, hydrated oxides, sulfides, hydrated sulfides or oxysulfides of a metal of the Fe group are treated with  $\text{H}_2\text{S}$  at 200–300°. Cf. C. A. 27, 573.

**Condensation products.** Pfenning-Schumacher-Werke (s. m. b. H. Ger. 588,879, Nov. 29, 1933 (Cl. 12o. 17.05). Addn. to 587,643 (C. A. 28, 1822\*). The method of 587,643 for forming hard albumin-like products by condensing urea and  $\text{CH}_2\text{O}$  by the aid of sulfides is modified by using  $(\text{NH}_4)_2\text{S}$  with 1 mol. of urea, thiourea or their derivs., and 2 mols. of  $\text{CH}_2\text{O}$ . The sirupy product is rendered sol. in water by addn. of  $\text{NH}_4\text{CNS}$  and is cleared by addn. of org. acid anhydrides.

**Artificial masses.** Holzhydrolyse A.-G. (Friedrich Koch and Eduard Farber, inventors). Ger. 588,910, Nov. 29, 1933 (Cl. 39b. 26). Masses with lignin as a filling material are prepd. by swelling lignin obtained as a residue by the acid hydrolysis of vegetable materials, in alk. soln. and mixing the product with synthetic resins or casein as binding agent.

**Casein derivatives.** I. G. Farbenind. A.-G. Fr. 755,876, Nov. 28, 1933. See Ges. 574,841 (C. A. 28, 1485\*).

**Laminated products containing phenol-aldehyde resins.** Howard L. Bender (to Bakelite Corp.). U. S. 1,944,143, Jan. 16. Laminated products comprising sheets of material such as paper have a surface sheet impregnated with a resinoid of the phenol-aldehyde type substantially devoid of free phenol and including residual aldehyde largely in the form of a non-phenolic resin, other sheets being treated with a different resin compn.

**Molding powders.** Paul F. Schlingman and Roy H. Kienle (to The British Thomson-Houston Co. Ltd.). Brit. 400,698, Nov. 2, 1933. A molding powder is prepd. by mixing an aromatic amine-aldehyde condensation product (I) with an alk. soln. of a phenol-aldehyde resin (II) in a  $\text{H}_2\text{O}$ -miscible solvent, neutralizing, washing and drying the ppt. I is prepd. by condensing the amine, e. g.,  $\text{PhNH}_2$ , with aq.  $\text{CH}_2\text{O}$  in the presence of  $\text{H}_2\text{O}$  at room temp. II is used while still in the "A" or sol. phase, having a cure of 30–120 sec. on a 160° hot-plate.

**Adhesive.** Hugo Wilken. Ger. 588,866, Nov. 29, 1933 (Cl. 22a. 2). An adhesive for making ply wood is made by treating casein with KOH and glycerol.

**Adhesives.** Firms Adolf Thöl. Ger. 590,257, Dec. 29, 1933 (Cl. 22a. 2). A vegetable phosphatide, or soy-bean sludge contg. phosphatides, is added to known adhesives comprising blood albumin and  $\text{Ca}(\text{OH})_2$ , dissolved in water, whereby premature setting of the adhesive is prevented.

**Gelatinized corn-starch adhesive.** Fred O. Giesecke (to International Patents Development Co.). U. S. 1,943,382, Jan. 16. By a described treatment of the tailings in corn-starch manuf., there is obtained a product which may be used as a binder in briquets and which comprises starch 78–91, protein 7–9, sol. substances 7–9, dextrin 6–8, oil 0.7–0.9, cellulosic material 1–2%, and which has a water-absorption capacity of about 10. Cf. C. A. 28, 1564\*.

**Adhesive tape or plaster.** Frank I. Bennett, Jr. (to Johnson & Johnson). U. S. 1,944,834, Jan. 23. Structural details of a product with a facing sheet of perforated material such as paper. Cf. C. A. 27, 5908.

**Apparatus for making slag wool.** Soc. des hauts-fourneaux de Saulnes, Jean Raty & Co. Fr. 756,092, Dec. 4, 1933.

**Coating composition.** Percy M. Clark (to The Canadian Industries Ltd.). Can. 338,769, Jan. 23, 1934. A coating compn. comprises nitrocellulose 10, tritoyl phosphate 5–15, a nonvolatile mineral oil 0.2–1.0 parts by wt. The compn. is used for coating flexible elec. cables and similar products.

**Compositions for coating metals.** Vereinigte Stahlwerke A.-G. (Heinrich Klas and Gustav Tichy, inventors). Ger. 590,217, Dec. 28, 1933 (Cl. 22g. 7.02). Compos. for coating iron pipes and other metal articles comprise rubber and a hardenable synthetic resin dissolved together in a tar oil with the addn. of a finely divided filler. S and a vulcanization accelerator may also be included. A specific compn. is described.

**Sulfate furnaces.** Alphonse Zieren. Fr. 756,106, Dec. 5, 1933. Construction of scrapers, exchangeable from the exterior, is described.

**Asbestos substitute.** A. Bako. Swed. 76,425, Feb. 7, 1933. An impregnating and coating compn. for the production of substitutes for asbestos consists of a mixt. of  $(\text{NH}_4)_2\text{SO}_4$ , chalk, glycerol, glue and  $\text{H}_2\text{O}$  in suitable proportions.

**Composition for facilitating the running off of water or other liquids from glass and similar surfaces.** E. B. Stenfors. Swed. 77,873, July 25, 1933. A combination of mucin, as a chem. product or in the form of the slime secreted from the skin of fishes and some other marine animals, in either case in alk. soln., and a colloid insol. in water but sol. in the alk. soln., for instance gum tragacanth or horn substance.

**Pastel receiving surface.** Herman E. Braeg (to St. Mary's College). U. S. reissue 19,060, Jan. 23. A reissue of original pat. No. 1,780,113 (C. A. 25, 178).

**Fluid for use in pressure apparatus such as brake systems.** Charles W. Copeland (to Bendix Aviation Corp.). U. S. 1,943,813, Jan. 16. About an equal amount of ethyl lactate is used with an oil such as castor oil and a small proportion of an org. base such as triethanolamine.

**Washable protecting composition for oil tanks.** T. B. Unger Fabrikker A/S. Norw. 52,517, May 8, 1933. A mixt. of  $\text{BaSO}_4$  and water glass with or without addn. of other substances.

**Antifreeze liquid.** Norsk Sprængstofindustri A/S. Norw. 52,559, May 22, 1933. Aq. mixts. contg. glycerol or glycol together with fat or oil with an admixt. of suitable amts. of soap or similar emulsifying substances.

**Luminous compositions.** I. G. Farbenind. A.-G. Ger. 590,256, Jan. 5, 1934 (Cl. 22f. 15). Weatherproof luminous products are prepd. by sintering or fusing  $\text{Al}_2\text{O}_3$  with an oxide such as  $\text{CaO}$ ,  $\text{BeO}$  or  $\text{MgO}$  after addn. of a small proportion of a metal such as Mn, Ni, Rb or Bi or a zincate, titanate or other nonvolatile compd. of such metal. The reagents must be as pure as possible. Examples are given.

**Printing.** Fritz Tutzschke. Ger. 590,437, Jan. 2, 1934 (Cl. 15f. 7.05). A concd. sugar soln. contg. salts

such as  $\text{Ca}(\text{NO}_3)_2$  and  $\text{KH}_2\text{PO}_4$  is used, instead of gum arabic, for coating lithographic stones or metallic printing plates during pauses in the printing process.

**Printing surfaces.** Hermann G. Zimmermann. Brit. 401,063, Nov. 9, 1933. A printing plate having mercurial nonprinting areas is prepd. by coating a metal amalgamable with Hg, e. g., Cu, brass, with a non-amalgamable metal, e. g., Ni, applying the design in a resist to the coating, etching the unprotected parts to expose the lower metal, amalgamating the exposed parts, treating the amalgamated surfaces with a suitable liquid, e. g., a soln. of  $\text{AgNO}_3$  and  $\text{HNO}_3$ , to produce a layer of Ag amalgam having a mat surface and again amalgamating the treated surfaces with Hg. The resist may be of dichromated fish glue.

**Metal printing blocks.** Kodak-Pathé. Fr. 755,540, Nov. 25, 1933. An image in relief is developed by heat on a colloid for the production of a metal block by exposing to light behind a transparent image a sensitized colloidal layer and pouring on to the printed surface a molten alloy of low m. p. so that the heat of the metal causes development of the relief. The metal is allowed to solidify in contact with the relief and is afterward sepd. Cf. C. A. 28, 1292<sup>o</sup>.

**Engraving printing blocks.** Bekk & Kaulen Chemische Fabrik G. m. b. H. Fr. 755,914, Dec. 1, 1933. Printing blocks, covered with a developed layer of colloidal chromate, are engraved with acid which is mixed with solns., of high concn. and a high degree of viscosity, of hygroscopic salts, e. g.,  $\text{ZnCl}_2$ ,  $\text{CaCl}_2$ ,  $\text{AlCl}_3$  or  $\text{Ca}(\text{NO}_3)_2$ .

**Planographic printing bases.** Ulrich Ostwald (to Kalle & Co. A.-G.). U. S. 1,943,486, Jan. 16. There are used as printing bases sheets of cellulose ester compn. such as those comprising cellulose acetate which are capable of being saponified, the desired printing design being resistant to a saponifying agent used to act upon the places of the printing base which are free from the design.

**Coated metal foil suitable for wrapping chocolate bars, etc.** Karl Kilchling. U. S. 1,944,323, Jan. 23. Metal foil of a thickness of 0.009–0.02 mm. and lacking in substantial strength is coated on one or both sides, without use of an adhesive, with a strengthening layer of material such as a cellulose deriv.

**Shoe polish.** Robert Wood. Brit. 400,286, Oct. 26, 1933. A hard polish for boots, etc., is made by mixing 2 parts beeswax or other wax and 1 part turpentine (substitute), palm or other oil and dye being added.

**Esters of sulfonated aromatic carboxylic acids (wetting, cleansing and emulsifying agents).** Friedrich Felix and Otto Albrecht (to Soc. pour l'ind. chim. à Bâle). U. S.

1,935,264, Nov. 14. Numerous examples are given of the esterification or reaction of a sulfonic acid or a sulfonate of an aromatic dicarboxylic acid of the benzene and naphthalene series or a substitution product thereof, an anhydride or halide thereof, with a compd. such as mono- and polyhydric satd. or unsatd. aliphatic alcs. with normal carbon chains or branched chains and contg. hydroxyl groups, linked to primary, secondary or tertiary C atoms, or derivs. of these. There also may be used natural or synthetic higher fatty alcs. or alcs. derived from waxes; also oxidation products of aliphatic hydrocarbons or alcohol-like compds. or mixts. of such compds. obtainable by catalytic hydrogenation; further, diacetone alcohol, hydrogenated final distillates of acetone or alcs. which are obtained by hydration of the unsatd. hydrocarbons formed by the cracking of acid resin or the residual pitch from the distn. of aliphatic raw materials. The products, in the form of their dried alkali salts, are colorless to light-colored powders which easily dissolve in water, and which, when heated with saponifying agents, are split up into an aromatic sulfo dicarboxylic acid and org. compds. contg. hydroxyl groups. They have a pronounced tendency to assist wetting, cleansing and emulsification. Cf. C. A. 27, 6207–8.

**Product for the cleaning and upkeep of metallic electric contact surfaces.** J. de Pouhon and A. Achkienazi. Belg. 395,206, April 29, 1933. The product consists of a mixt. of  $\text{EtOAc}$ , neat's-foot oil or bone oil and liquid paraffin.

**Silicate detergent material.** Alfred W. Scheidt (to Elec. Smelting & Aluminum Co.). U. S. 1,944,848, Jan. 23. Detergent material in fused condition such as that formed from Al and Na silicates is fed between rolls in such proximity to each other that a thin sheet of the material is formed, which on cooling is readily frangible and highly sol. in water. App. is described.

**Cleaning and disinfecting agent.** Mme. Van Wanzelle, née E. E. Pletain. Belg. 395,849, May 31, 1933. Garlic infusion,  $\text{Et}_2\text{O}$  and  $\text{NH}_3$  are added to white spirit.

**Vermin-destroying compositions.** Ernst Dieckmann. Ger. 555,116, Dec. 22, 1933 (Cl. 45/ 3.01). Use is made of solns. of tribromo- $\beta$ -naphthol in  $\text{CCl}_4$ .

**Insecticide.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 755,822, Nov. 30, 1933. A compn. for keeping flies, etc., from animals comprises a mineral oil and a product repelling insects, boiling between the same temp. limits. Thus a mineral oil, 90% of which distils below 400° and which has a viscosity of 40–75 secs. in the Saybolt scale at 38°, may be used with a pine oil distg. not below 340°.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

**Old English glass; amateur engravings.** Francis Buckley. Glass 11, 66–7(1934). H. S. Willson

**The use of town gas in the British glass industry.** O. W. Roskill. Ind. Chemist 10, 55–9(1934); cf. C. A. 27, 2269.

**Recent studies of the fundamental processes underlying glass melting.** W. E. S. Turner. J. Am. Ceram. Soc. 17, 21–5(1934).—In normal glass melting not one of the alkali carbonates is decompd. by heat alone, but at 800° their reaction with  $\text{SiO}_2$  proceeds rapidly.  $\text{CaCO}_3$  decomposes completely at 610°; hence it is almost entirely thermal and does not rise by interaction with  $\text{SiO}_2$ . There is evidence that in mixts. of  $\text{Na}_2\text{CO}_3$ ,  $\text{CaCO}_3$  and  $\text{SiO}_2$  the shrinking and sintering of the mass at 600° and 750° are due entirely to reaction of the  $\text{Na}_2\text{O}$  and  $\text{SiO}_2$ , the  $\text{CaO}$  acting as it does in the simple  $\text{CaCO}_3$  and  $\text{SiO}_2$  mixts.

C. H. Kerr

**X-ray diffraction and the structure of glasses.** J. T. Randall and H. P. Rooksby. J. Soc. Glass Tech. 17, 287–95(1933).—The examn. included some common glasses and  $\text{Bi}_2\text{O}_3$ ,  $\text{Sb}_2\text{O}_3$ ,  $\text{Cd}_3\text{P}_2\text{O}_7$ ,  $\text{Li}_2\text{B}_2\text{O}_4$ , Se and  $\text{PbSiO}_3$ . The diffraction bands are explained on the basis of minute

crystals or groups of atoms regularly arranged over small vols. It is suggested that the probability of the formation of a glass is high for those substances whose normal cryst forms have forces binding the atoms together in either a strongly directional or in a localized manner. H. P. K

**Methods of determining the constitution of glasses.** Eric Preston and W. E. S. Turner. J. Am. Ceram. Soc. 17, 26–33(1934).—The equil. diagram method involves the destruction of the glassy condition but indicates the compds. that may be formed. The meaning of the change in state at about 40° below the softening point is still obscure. Light-absorption studies indicate solvation. Data on sp. vol., thermal expansion and  $\alpha$  are not decisive. Elec. resistance data indicate the presence of  $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ . Volatilization data indicate the presence of  $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$  and  $\text{K}_2\text{O} \cdot 4\text{SiO}_2$ . C. H. Kerr

**Strength of glass.** J. B. Murgatroyd. J. Soc. Glass Tech. 17, 260–72T(1933).—The strength of glass with reference to surface condition is discussed. Methods of reducing the effect of surface flaws by fusing substances on glass surfaces and the conditions for making "strong" glass are mentioned. The strength of glass is regarded as



dependent on the chance that a surface flaw is correctly oriented to the principle stress, and the theory is applied to the thermal endurance of glass rods. It is deduced that fatigue under repeated alternating stresses should not be shown by glass, and that strong glasses should have weakly defined transition points.

H. F. Kriege

Behavior of glass when slowly heated with special reference to the thermal expansion. Eric Seddon and W. E. S. Turner. *J. Soc. Glass Tech.* 17, 324-47 (1933).—Measurements of the thermal expansion from room temps. to the softening pt. were made on 7 glasses differing widely in compn., viscosity and other properties. The specimens were heated throughout the range at the rates of  $1^\circ$  and  $1/8^\circ$  per min., after a special annealing schedule involving cooling from the softening temp. at  $1^\circ$  and  $1/8^\circ$  per min., resp. In general, the difference in linear thermal expansion coeff. of the glasses heated at the 2 rates did not exceed 4%. Of the 7 glasses, with 5 the transformation pt. was reduced by the slower heating by  $8^\circ$  or less. Transition pts. at temps. below  $500^\circ$  were even more noticeable with the slower heating. Several glasses show heat absorption just below the transformation pt. Four successive heatings of a pure soda-lime-silica glass produced thermal expansion results differing by not more than 4% over the range  $0-400^\circ$ . For practical purposes it is not necessary to heat specimens of 5 mm. thickness slower than  $1^\circ$  per min.

H. F. Kriege

The thermal endurance of glass. Kozō Tabata and Tarō Moriya. *J. Am. Ceram. Soc.* 17, 34-8 (1934); cf. *C. A.* 28, 595<sup>4</sup>.—Perfectly annealed rods of borosilicate glass of 5 different diams. were studied. A new expression was developed:  $\theta_0(R^m - nR) = C$ , in which  $\theta_0$  = min. temp. difference to cause fracture of the rod;  $R$  = radius of the rod; and  $m$ ,  $n$  and  $C$  are consts. Exptl. data agreed well with calcd. data.

C. H. Kerr

Glass. VIII. The coefficient of thermal expansion of boron trioxide. Monroe E. Spaght and Geo. S. Parks. *J. Phys. Chem.* 38, 103-10 (1934); cf. *C. A.* 25, 4757.—By use of a small dilatometer with Hg as the dilatometric fluid, the coeffs. of thermal expansion of 2 samples of  $B_2O_3$  have been measured between  $100^\circ$  and  $325^\circ$  with a probable exptl. error of less than 5%. The coeff. for the viscous liquid was found to be more than 10 times that for the glassy state. The character of the expansion coeff. temp. curves below  $260^\circ$  depends greatly upon the extent of the annealing during the initial formation of the glass. Tables are given.

John M. Ladino

Principles of the testing of hydrolysis of glass at the surface. H. Jebsen-Rothhausen. *Vorre et silic. ind.* 5, 45-7 (1934); *Sprechsaal* 67, 2-3.

H. S. Willson

Results from reconstructing a tank furnace supplying Fourcault machines. S. Berman. *Glass* 11, 52-8 (1934).—The replacement of a Gobbe type furnace by one of a new construction increased the plant efficiency, lowered the fuel consumption, lowered the net cost of the glass and caused a noticeable improvement in glass quality.

Herbert S. Willson

Scientific principles of fuel economy in the glass industry. Combined low-temperature carbonization and total gasification at the Hazel Atlas Glass Works. David Brownlie. *Glass* 11, 14-18 (1934); cf. *C. A.* 28, 1157<sup>9</sup>.

Herbert S. Willson

Application of statistical methods to the quality control of manufactured products. B. P. Dudding and I. M. Baker. *J. Soc. Glass Tech.* 17, 239-59T (1933).—Some of the simpler statistical methods of analysis are illustrated by using the data obtained in different labs. from thermal endurance tests on glass rods of various diams. The adaptability of control charts and the methods of testing the significance of two estimates of a correlation coeff. are discussed.

H. F. Kriege

Proposals for the desirable stability requirements of different kinds of glass. F. Späte and R. Schmidt. *Fachausschussber. Deut. Glastechn. Ges.* No. 26, 55-62 (1933).—Two test methods, recommended in a report of a previous sub-comm., the extn. test of Mylius and the standard grit-test, were selected to classify the stability and resistance of the various glasses. Discussion of the

requirements for service and recommended standards of min. stability are given for window-glass, mirror-glass, crystal or art glass, chem. glassware of the usual type and of the better grades, app. glassware, glass tubing, illumination glass for incandescent lamps, protecting globes, lantern jackets and optical glass. Eighty-four references.

C. B. Jenni

Study of the stresses in flashed glasses. W. M. Hampton. *J. Soc. Glass Tech.* 17, 273-86 (1933).—The stress distribution present in a system consisting of 2 or more glasses fused together is investigated mathematically. The curves drawn are in good agreement with the actual photographs taken by means of a Babinet compensator.

H. F. Kriege

Dilatometric study of some ternary soda-silica-beryllia glasses. Edouard Rencker. *Compt. rend.* 197, 840-3 (1933).—The replacement of  $SiO_2$  or  $Na_2O$  by  $BeO$  raises the transformation temp. Replacing  $Na_2O$  by  $BeO$  lowers the expansion coeff., but replacing  $SiO_2$  by  $BeO$  causes no apparent change.

J. B. Austin

Chilled plate glass. II. Tsuruo Araki, Sōnosuke Takahashi and Shūichi Mori. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 33 (1934); cf. *C. A.* 28, 1491<sup>4</sup>.—Chilled plate glass when broken forms small pieces without sharp edges. The specially treated glasses cannot be cut by a diamond cutter or by the molten lead method.

Thermal endurance tests on ground specimens are reported.

Karl Kammermeyer

Optical glass about one-half hundred years after Joseph Fraunhofer's death (1836-78). Moritz V. Rohr. *Z. Instrumentenk.* 53, 413-23, 456-65, 494-502 (1933).

Ann Nicholson Hird

Safety glass. A review of the present stage of development. J. Wilson. *J. Soc. Glass Tech.* 17, 296-304 (1933).—The industrial development of satisfactory laminated glass and the legislation requiring its use in vehicles are discussed, along with toughened and other forms of "safety" glass.

H. F. Kriege

Clay. R. W. Metcalf. Statistical Appendix to Minerals Yearbook, 1932-33, *Bur. Mines* 1-5 (1933).

Alden H. Emery

Conditioning of clays in the plastic state. F. H. Clews. *Trans. Ceram. Soc.* 33, 1-12 (1934).—Chem. conditioning by changing the  $pH$  of the clay with suitable acids, alkalis or salts is discussed along with the phys. conditioning by evacuating the plastic mass. A bibliography is included.

H. F. Kriege

A study of the mineralogical and physical characteristics of two lithia-zirconia bodies. Helen Blair Barlett and R. R. Thomas, Jr. *J. Am. Ceram. Soc.* 17, 17-20 (1934).—Differences in thermal expansion coeff. and in other phys. properties are attributed to the presence of a  $Li_2O-Al_2O_3-SiO_2$  mineral in one body and its absence from the other. The fact that the lower  $Li_2O$  body gives lower  $T_e$  value (not dielec. strength) demonstrates the difference in behavior of the alkali when present in the glass phase as opposed to cryst. phase.

C. H. Kerr

Development in automatic stoking for brick kilns. M. Steenbrugge. *Trans. Ceram. Soc.* 33, 15-20 (1934).

H. F. Kriege

Cadmium yellow and cadmium red as ceramic pigments. Ludwig Stuckert. *Farben-Ztg.* 39, 9-10, 36-8, 61-3 (1934).—The literature of CdS and CdSe is briefly reviewed. CdS, prepd. by pptn. of sol. Cd salts with  $H_2S$ , while suitable as such in ceramics is unsuitable for the prepn. of CdSe. For this purpose, CdS is best prepd. by reaction of suspended  $CdCO_3$  with  $Na_2S$  or  $NaSH$ . The completeness of this reaction and the effect of conditions upon the particle size of the product were studied. CdS, prepd. by the direct dry method, consists of mixed crystals of  $\alpha$ - and  $\beta$ -CdS in various ratios. Cadmium red can be prepd. by reaction of a suspension of  $CdCO_3$  with a soln. of Se in  $Na_2S$  or  $(NH_4)_2S$ . A thioarsenide is formed, which when heated loses S and rearranges to form a bright red pigment. In the direct prepn. of Cadmium red by heating  $CdCO_3$ , S and Se, a brown mixt. of sulfides and selenides is formed at about  $300^\circ$ . This mixt. decomposes endothermally at  $450-650^\circ$  into a light red pigment. G. G. Sward

The softening temperature and the ordinary silica-alumina refractory products. M. Lepingle. *Verss et silicates ind.* 5, 21-6 (1934).—Examples show that chem. compn. is not the only criterion of the properties of a clay. *Ibid.* 42-3.—L. discusses briefly d., strength and softening of clays and gives tables showing these properties for several European clays. Herbert S. Willson

Permeability of refractory materials to gases. III. Experiments at temperatures up to 850°. F. H. Clews and A. T. Green. *Trans. Ceram. Soc.* 33, 21-32 (1934); cf. *C. A.* 26, 3348.—Thirteen representative refractory materials were examd. for permeability to N at 500-850°. It was found that the permeability decreases with rise in temp. almost independently of the nature of the material. At 850° and 500° the permeabilities are approx. 0.4 and 0.5, resp., of the value at 10°. The increase in viscosity of the gas with temp. rise accounts almost quantitatively for the decrease in permeability noted. H. F. Kriege

Effect of temperature treatment on abrasives and abrasive products. Ross C. Purdy. *J. Am. Ceram. Soc.* 17, 39-42 (1934). C. H. Kerr

Iron oxide as coloring agent in bodies and glazes. E. Berdel. *Keram. Rundschau* 39, 403-4, 423-4 (1931); *Ceram. Abstracts* (in *J. Am. Ceram. Soc.*) 12, 3-4.—Directions are given for obtaining fiery red colors with Fe oxide. Some of these are: (1) For bodies, the  $Fe_2O_3$  content must be high (near 15%), the body lean with high sand content, the fire oxidizing, and the firing temp. low. (2) For glazes, the glaze must be of an aventuring type contg. little else besides alkalis,  $PbO$ ,  $B_2O_3$  and  $SiO_2$ , and the glaze must be of low temp. and oxidizing. J. D. S.

Body and glaze coloration by iron-bearing calcite. E. Berdel. *Keram. Rundschau* 40, 41-2 (1932); *Ceram. Abstracts* (in *J. Am. Ceram. Soc.*) 12, 4.—Small amts. of Fe in calcite, chalk, marble, etc., do not color the raw material perceptibly and are not observable on firing test pieces. Mixing with finely ground  $SiO_2$  and firing in bisque fire in oxidizing atm. brings out the color well, because of the combination of  $CaO$  with  $SiO_2$  freeing  $Fe_2O_3$ . H. G.

Fish scales L. Vielhaber. *Emailwaren-Ind.* 10, 394-5 (1933).—The assumption that fish scale is due to H is discussed on the basis of its diffusion in Fe. As long as H migrates in the form of atoms in Fe, it can be easily removed by heating. However, when it strikes inclusions of slag, etc., it transforms into mol. H and can no longer permeate Fe. It gathers and develops high pressure. This mol. H is changed again into at., probably during calcining of the ware; the included forge scale acts as catalyzer. Because H diffuses inside slowly, it escapes slowly also, partly after enameling, and gathers under the enamel layer diffusing through it and forming fish scale. M. V. Kondoidy

Tin oxide as a white opacifier. H. Gernscheid. *Emailwaren-Ind.* 10, 413-17 (1933).— $SnO_2$  is made by several methods: (1) oxidation of Sn in tank furnaces by hot air; (2) atomizing Sn metal and oxidation of the tin dust; (3) evapn. of Sn and oxidation of the metal vapors.  $SnO_2$  produced by different methods has practically the same opacifying effect. M. V. Kondoidy

Where the enamel industry belongs. L. Vielhaber. *Emailwaren-Ind.* 10, 401-3 (1933).—The relation between the iron, glass, ceramic and enamel industries is discussed. M. V. Kondoidy

Acid-stable enamels. L. Vielhaber. *Emailwaren-Ind.* 10, 311-12 (1933).—The more complete the chem. reactions the more acid-stable the enamel is.  $B_2O_3$  is always detrimental to acid stability. M. V. Kondoidy

Barium nitrate as enamel raw material. L. Vielhaber. *Emailwaren-Ind.* 10, 277 (1933).—Replacing saltpeper by  $Ba(NO_3)_2$  is not advantageous. M. V. Kondoidy

Phenolite as enamel raw material. Krosta and Pfeiffer. *Glashütte* 63, 606 (1933).—Expts. to replace feldspar by phenolite in brown enamels for cooking utensils gave enamels of high quality. M. V. Kondoidy

Adherence of ground enamel free from adhering oxides. K. Meures and A. Dietzel. *Emailwaren-Ind.* 10, 349-55,

390-3 (1933).—(1) During firing, a ground enamel free from adhering oxides passes through 3 stages: (A) immediately after melting, the green enamel covers the bright iron but does not adhere (it can be adjusted to the iron best by cooling); (B) the enamel appears black and shows clearly a black intermediate layer and adheres, (C) with continued firing, the enamel "burns." (2) It is impossible to transform an enamel (free from adhering oxides) into the firing stage (B) without burning it at the edges and in other sensitive places. (3) The term "adherence" should be used only to mean a combining of enamel and iron by means of the known black intermediate layer (adhering layer); when referring to an enamel being fitted to the iron because of favorable phys. properties or suitable cooling (equalization of tensions), the expression should be "adapted" or "adjusted." M. V. Kondoidy

Action of adhesive oxides in ground-coat enamels. K. Beyerlein. *Keram. Rundschau* 40, 205-8, 221-2 (1932); *Ceram. Abstracts* (in *J. Am. Ceram. Soc.*) 12, 8.—B. concludes from expts. with the application of oxides of Ni, Co, As, Sb and P to sheet iron that (1) it is possible under certain conditions to reduce small amts. of the oxides to the metals on sheet iron but that such metallic particles are not the real cause of the adhesiveness of the enamel, and (2) the adhesive oxide acts in part as a protection against resolution of the ground coat and in part as a contact substance to take up O after the "planing" of the enamel. H. G.

Majolica enameling. L. Vielhaber. *Emailwaren-Ind.* 10, 113-14 (1933).—Dry and wet methods and the lowering of the Pb content are discussed. M. V. Kondoidy

Effect of cold weather on enameling. L. Vielhaber. *Emailwaren-Ind.* 10, 407-9 (1933).—The pickling baths, enamel, raw ware, etc. must have a normal temp. to avoid various defects. M. V. Kondoidy

Significance of analysis with regard to the capability of enameling of cast iron. A. Krautle. *Emailwaren-Ind.* 10, 109-13 (1933).—Among the more or less undesirable elements of cast iron (C, Si, Mn, P and S), C may be considered as a const. quantity. The C content is usually 3.2-3.5%. The other components should be considered variable. The P content may vary, 0.6-1.3%; it promotes a good cast iron. The normal Si content is 2.2-2.6%; it promotes the sepn. of graphite in contrast to Mn and S and favors the destruction of Fe and other carbides. From 0.4 to 0.6% Mn is sufficient to combine with S. S is quantitatively combined with Mn and should not exceed 0.8-0.11%. The relation between analysis and coeff. of expansion is almost unexplainable because a series of factors, such as overheating, thickness of walls, casting temp. and rate of cooling, complicate it. Pretreatment of the Fe by calcining and repeated enameling (ground, intermediate and covering enamel) lowers the coeff. of expansion. A white hardened cast iron has a higher coeff. of expansion than a gray hardened one. The nature of the surface to be enameled is most important. The formation of graphite is of less importance with respect to the formation of bubbles. The surface of the Fe consists of a fine layer of carbide Fe which accounts for the formation of bubbles and needle tapings in many cases. A pearlitic structure is difficult to enamel. The same is true of cast iron contg. 1-2% FeO. The Fe is reduced by the free C and the CO or  $CO_2$  formed promotes bubbles. M. V. Kondoidy

Waste in sheet-iron enamel. H. Ebright. *Email* 1, 9-14; *Emailwaren-Ind.* 10, 399 (1933). M. V. Kondoidy

Furnace [for melting glass] regenerator operation (U. S. pat. 1,944,074) 1. Furnace for the melting of glass (Swed. 78,914) 4.

Comblés, Erich: Feuerfester Mörtel zum Flecken von Silica-Koksöfen. Düsseldorf: Verlag Stahlisen. 5 pp. Schwandt, Erich: Keramische Baustoffe für die Hochfrequenztechnik. Leipzig: Hachmeister & Thal. 78 pp.

**Industrielle Keramik.** Edited by O. Krause. Bd. I. Rohstoffbetriebe der keramischen Industrie. By Alfred Laubenheimer. Dresden: Th. Steinkopff. About 150 pp. About M. 9; bound, about M. 10.

**Glass.** Harold A. Wadman (to Hartford-Empire Co.). U. S. 1,944,855, Jan. 23. Glass-making materials are supplied to a bath of molten glass at a rate substantially equal to the rate of withdrawal of finished glass from the bath; heat of combustion is applied to the glass bath surface, and a further heating to a higher temp. is effected by a c. supplied to submerged electrodes with a c. d. sufficiently low as positively to prevent arcing. App. is described. Cf. C. A. 27, 389.

**Glass.** I. G. Farberingd. A.-G. Brit. 400,742, Nov. 2, 1933. In making glasses of the kind described in Brit. 378,012 (C. A. 27, 3307), which comprise an oxidic component and a vitreifying agent which consists wholly or partly of  $Al_2O_3$  and  $P_2O_5$  in equimol. proportions, more  $Al_2O_3$  is used, the amt. being greater than corresponds to the ratio  $Al_2O_3:P_2O_5$  but not greater than 4 parts by wt. for each part by wt. of  $P_2O_5$ . The Al phosphate is used alone or with other vitreifying compds., e. g.,  $SiO_2$ ,  $B_2O_3$ . In 400,743, Nov. 2, 1933 more  $P_2O_5$  is used, the amt. being greater than corresponds to the ratio  $P_2O_5:Al_2O_3$  but less than corresponds to the ratio  $3P_2O_5:2Al_2O_3$ . Examples are given in both patents.

**Glass.** Corning Glass Works. Ger. 588,643, Nov. 21, 1933 (Cl. 32b. 1). A heat-resisting glass is made from  $SiO_2$ ,  $Al_2O_3$ ,  $B_2O_3$  and alkali, the starting materials being mixed in proportions resulting in the presence of  $SiO_2$  76-90,  $Al_2O_3$  up to 5, and  $B_2O_3$  and alkali 6-14%, in the finished glass. The preferred glass contains  $SiO_2$  about 80,  $Na_2O$  4,  $B_2O_3$  13 and  $Al_2O_3$  2%.

**Lead silicates.** Th. Goldschmidt A.-G. Ger. 590,119, Dec. 23, 1933 (Cl. 12i. 38). Lead silicates and lead alkali silicates for use in the manuf. of glass or glasses are manufd. in a hearth furnace from which gases are withdrawn by a mech. suction device, whereby reduction to Pb is avoided. Preferably, the fuel and (or) the air for combustion are supplied under pressure and are thoroughly mixed.

**Furnace suitable for melting glass, etc.** Ray S. Godard U. S. 1,943,957, Jan. 16.

**Electric glass-melting furnace.** Aktieselskapet Ræders Elektroglasovn. Norw. 53,287, Nov. 13, 1933. An electrode furnace is described in which the fusion proper serves as the elec. conductor. The raw material is charged in a heap between the electrodes; the distance between the active electrode surfaces is less on top of the charge than below, in order to concentrate the heat in the unmelted charge. Structural features.

**Glass-feeder of the kind in which a bell is partly submerged in the molten glass above a discharge outlet and suction or compression applied alternately to the interior of the bell to control the discharge of glass at the outlet.** Peter Kucera. Brit. 400,818, Nov. 2, 1933.

**Apparatus and method for pouring molten glass from a pot onto a rolling apparatus.** Forges & Ateliers de constructions électriques de Jeumont. Brit. 401,071, Nov. 9, 1933.

**Apparatus for the feeding of liquid glass mass to molding machines.** Aktieselskapet Moss Glasvaerk. Norw. 53,021, Sept. 4, 1933.

**Apparatus for forming hollow blown glassware such as bottles.** Karl B. Peiler and Algy J. Smith (to Hartford-Empire Co.). U. S. 1,944,844, Jan. 23. Mech. features. Machine for making glass vessels from tubing. Jakob Dichter. Brit. 400,426, Oct. 26, 1933.

**Electrically heated apparatus for making drawn or rolled vitreous products such as rods, tubes or sheets.** Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny & Cirey. Brit. 400,472, Oct. 26, 1933.

**Apparatus for handling sheet glass as it emerges from a vertical drawing apparatus.** N. V. Hollandsche Maatschappij voor de Vervaardiging van Glas. Brit. 400,110, Oct. 19, 1933.

**Apparatus for tempering glass sheets.** Charles Ziegler

(to American Securit Co.). U. S. 1,944,625, Jan. 23. A heating chamber through which the sheet passes has at its exit end a cooling chamber with conveying rollers and chilling surfaces adjacent the path of the glass on the rollers. Cf. C. A. 27, 4646.

**Apparatus for tempering sheets of glass, steel, etc., by jets of air, steam or gas.** Leonardo Mosmieri and Gino Dal Pino. Brit. 401,066, Nov. 9, 1933.

**Continuous polishing apparatus for plate glass, etc.** Forges & Ateliers de constructions électriques de Jeumont. Brit. 400,812, Nov. 2, 1933.

**Decorating glass.** Soc. industrielle de faconnages sur glaces. Fr. 756,045, Dec. 4, 1933. A layer of bakelite varnish is spread on silvered or painted glass, and covered with a soln. of ordinary bitumen not sensitized to light and then, after drying, with a layer of diobromated bitumen. The whole is exposed to light under a negative, the unexposed bitumen is afterward removed by washing with water, then the bitumen and bakelite are removed by appropriate solvents. The Ag thus exposed is converted to chlorite and removed, or the paint is removed by a solvent, leaving a design on the glass.

**Producing silver mirrors on glass.** Max Ermes. Ger. 590,169, Dec. 27, 1933 (Cl. 32b. 10). The known processes, in which a soln. of Ag salt is treated with a reducing agent in the cold, are improved by addn. of a small proportion of cyanides to the Ag salt soln. A mixt. of Hg(CN)<sub>2</sub> and KCN is preferred. Cf. C. A. 27, 387.

**Producing silver mirrors on glass.** Firma Max Ermes. Ger. 587,358, Jan. 5, 1934 (Cl. 32b. 10). Weather-resistant products are made by coating the Ag mirror with an alloy of Ag and a base metal. The alloy may be deposited on the mirror by reducing in the cold a soln. contg. Ag, Cu, Cr, Ni and preferably Zn.

**Apparatus for making wired glass.** Pilkington Brothers Ltd. Ger. 590,134, Dec. 23, 1933 (Cl. 32a. 22). This corresponds to Brit. 381,228 (C. A. 27, 5920).

**Cementing glass sheets.** C. G. Bostrom and G. C. H. Ehrensward. Swed. 78,591, Oct. 10, 1933. The surfaces to be joined are matted and a layer of a suitable cement is applied which fills the depressions of the matted surface and thus restores the transparency. Finally the glass surfaces are pressed together.

**Apparatus for laminated glass manufacture.** Alfred C. Schoepfer. U. S. 1,944,277, Jan. 23. Structural and mech. features.

**Safety glass.** Duplate Corp. Fr. 755,652, Nov. 28, 1933. Means is described for applying a luting agent to the edges.

**Porous materials from clay.** E. I. Lindman. Swed. 78,881, Nov. 7, 1933. Highly porous materials are produced by burning clay, argillaceous materials or rocks in a tunnel furnace with moving bottom at such high temps. that expansion takes place as a result of gas development in the interior of the materials. The raw material is charged in a thin layer on the moving furnace bottom formed by a close succession of cars and heated from above.

**Light-weight porous ceramic material.** Floyd B. Hobart (to Battelle Memorial Institute). U. S. 1,944,007, Jan. 16. A product suitable for use as heat- and sound-insulation is obtained by mixing clay or the like with a sol. silicate soln., foaming the mixt. (as by use of saponin) and introducing a chemical such as  $CO_2$  to cause gelation. U. S. 1,944,008 relates to the production of a heat-insulating material by producing a foam from a sol. silicate soln. (as by use of saponin) and mixing a filler such as slag wool with the foam.

**Apparatus for manufacture of ceramic articles such as tubes.** Willy Langersdorff and Max Langersdorff. U. S. 1,944,790, Jan. 23. Structural and mech. details.

**Molding ceramic articles.** Champion Spark Plug Co. Brit. 400,243, Oct. 16, 1933. Spark-plug cores, etc., are made by prepg. a ceramic material by spraying liquids contg. materials in suspension or soln. from a moving surface, drying or cooling the sprayed drops before they settle so as to form non-adherent pellets which make a

pourable mass, filling the pellets into molds and causing them to adhere to form a self-sustaining article. A spray evaporator and other app. are described. In 400,280, Oct. 16, 1933, divided on 400,243, powd. or granular material is molded by charging the mold through a connection with a storage vessel the material in which is subjected to gas under pressure to cause said material to be permeated therewith so that it flows without clogging and then subjecting the material in the charged mold to high pressure. In 400,281, Oct. 16, 1933, divided on 400,243, an elastic mold is used which is subsequently compressed by pressure applied to the exterior.

**Apparatus for molding tiles with undercut recesses.** Ernest F. Millward and Woods Tileries (Hanley) Ltd. Brit. 400,107, Oct. 19, 1933.

**Electric insulating material.** Gaston Brou. Fr. 755,794, Nov. 30, 1933. The vitrification of a ceramic product having a basis of Mg silicate is obtained by the addn. of a non-alk. borate, the combination of the constituents being regulated automatically and following the law of proportions defined by Proust by the volatilization of the excess of flux which does not enter into reaction. This method of working allows the firing to be carried out at an industrially economic temp., avoiding, in particular, over-firing. Boracite or Mn borate is preferred.

**Refractory masses.** Arthur Sprenger. Ger. 588,860, Nov. 29, 1933 (Cl. 80b. 8.17). Addn. to 587,827 (C. A. 28, 1832\*). The method of 587,827 for producing fireproof masses from  $MgO$ ,  $Cr_2O_3$ , and  $Al_2O_3$  is modified by replacing about  $1/4$  of the  $MgO$  by lime-free  $SiO_2$ .

**Refractory material.** Klinker- und Steinzeugwerke Mertendorf G. m. b. H. Ger. 590,295, Dec. 28, 1933 (Cl. 80b. 8.06). A mixt. of quartz sand with about 10% of metallic Fe is heated in a reducing atm. to 1300-1500°. The mixt. may be heated as such or in the form of balls prepd. with the aid of a binder. The product contains  $SiO_2$  in a modification of low d., and does not increase in vol. when reheated. It may be molded with the aid of a binder and fired at 1280° or above, or it may be added, to the extent of 20% or more, to compns. for making refractory bricks.

**Refractory material resistant to acid and alkali.** Aktiebolaget Amphibolit O. Y. (H. Frauenfelder and H. Avellan, inventors). Swed. 77,783, July 11, 1933. Finely ground amphibole-asbestos rock or waste products obtained by the extn. of asbestos from such rock after moistening with water is pressed and without predrying is burned in known ways until it is through sintering.

**Refractory ceramic products resistant to molten glass.** Paul G. Willetts (to Hartford-Empire Co.). U. S. 1,944,856, Jan. 23. A batch suitable for the manuf. of tank blocks comprises about 65 parts of homogeneous granules of grog of generally similar character to the refractory product to be produced, such as is formed from a mixt. of Georgia Klondike kaolin and Georgia G. clay 92.5% and Bedford feldspar 7.5%, fired to a temp. of about 1560°, and about 35 parts of a binder of the same initial materials in like proportions. Cf. C. A. 27, 2008.

**Refractory articles.** Heinrich Koppers A.-G. Ger. 590,115, Dec. 23, 1933 (Cl. 80b. 8.15). A tube or other hollow article made from sintered finely granular refractory material is coated with relatively coarse refractory material and then fired. Articles impervious to gases and insensitive to temp. variations are obtained.

**Refractory articles cast from highly aluminous materials.** Vladimir Skola (to Corning Glass Works). U. S. 1,944,616, Jan. 23. A melt such as one of bauxite contg. 2%  $Fe_2O_3$  is maintained in a liquid state while the metallic impurities settle to the bottom and imperfectly melted particles rise to the top, and articles such as those for contact with molten glass are then cast from the intermediate layer of the melt.

**Refractory bodies such as blocks or bricks.** Konrad Friederich (to Stollwerk A.-G. vorm. Wilisch & Co.). U. S. 1,944,709, Jan. 23. Various details are described for the manuf. of blocks, bricks or the like from a base material such as chamotte in graded particles of at least

three sizes and pieces of chamotte or other material of larger size.

**Refractory bricks.** Didier-Werke A.-G. Ger. 590,207, Dec. 28, 1933 (Cl. 80b. 12.04). Addn. to 487,110 (C. A. 24, 2264). Binding clay in the form of a slip is mixed with less plastic clay or with clay or bauxite which has been partly dehydrated by heating at a temp. up to 600°. The mixt. is then molded and fired.

**Refractory bricks.** Walter Schroeder. Ger. 590,227, Dec. 28, 1933 (Cl. 80b. 12.04). Binding clay in the form of a slip is mixed with sand, nonplastic clay or other refractory substance to produce a viscous compn. contg. 10-25% of the binder. The mixt. is forced into molds by mech. means and fired.

**Refractory substances.** Siemens & Halske A.-G. Brit. 401,030, Nov. 9, 1933. A support for a heating resistance, e. g., of Ni-Cr, consists of pure  $Al_2O_3$ , free from  $SiO_2$  and binding media, which has been sintered at over 1600° and below the m. p.

**Refractory lining for crucibles such as those used for aluminothermic reactions.** Hermann Schultz. U. S. 1,944,278, Jan. 23. Structural details.

**Production or improvement of calcined magnesite and refractories containing it.** A. G. Alterra. Belg. 395,717, May 31, 1933. Black or blackish brown, strongly ferromagnetic Mg ferrites or Ca ferrites which cause the formation of Mg ferrites are added to magnesite.

**Abrasives.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Fr. 756,117, Dec. 5, 1933. The abrasive grains or powder are fixed to a cloth or paper support by rubber or like gum, having a spongy or porous structure. The rubber is made porous after admixt. with the abrasive and then fixed to the support by heating, vulcanization, etc.

**Abrasive sheet material.** H. I. du Pont de Nemours & Co. Brit. 400,650, Oct. 30, 1933.  $H_2O$ -proof sand paper, emery cloth, etc., consists of a paper, etc., base to which is applied a backsizing impregnation of an emulsion of long oil varnish and asphalt color, a presize of waterproof varnish, a binder coating of an oil-modified polyhydric alc.-polybasic acid resin in which the modifying component is (derived from) a mixt. of drying oils, abrasive material and a sandsize coating of material similar to the binder coating, the paper then being dried at about 160°F. for  $1/2$  hr. The resin may be made from phthalic anhydride, a mixt. of drying oils, e. g., linseed, chinawood, or from the equiv. acids of the oils, and glycerol by heating in a varnish kettle until the desired viscosity is acquired, the hardness and flexibility of the resin depending on the proportion of glyceryl triphthalate to the oil therein. A thinner of naphtha and a drier of Mn linoleate soln. are added to the resin and oxidation-retarding substances, e. g., guaiaccol, hydroquinone, eugenol, may be added.

**Apparatus for making sandpaper and like abrasive materials.** Behr-Manning Corp. Ger. 590,450, Jan. 3, 1934 (Cl. 67c. 3). This corresponds to Brit. 390,385 (C. A. 28, 602\*).

**Polishing or abrading materials.** Fritz Simon. Ger. 580,206, Dec. 18, 1933 (Cl. 39b. 21). A mixt. of emery or like material and powd. resin is applied to a paper or fabric support which has been coated with a drying oil or varnish. Alternatively or in addn., powd. resin is dusted on to the support directly after the emery has been applied. The support is then warmed.

**Polishing, grinding and sharpening material.** Siemens & Halske A.-G. Fr. 755,790, Nov. 30, 1933. See Ger. 589,374 (C. A. 28, 1495\*).

**Grinding wheels, etc.** Theodor Pohl and Josef Schneider. U. S. 1,944,807, Jan. 23. Products comprising a grinding material such as  $SiC$  or emery and matrix material such as a clay or resin are disintegrated to obtain smaller shaped parts, each contg. a plurality of grinding grains and a grinding body such as a wheel is built up from these shaped parts.

**Apparatus for sifting enamel, slip, glaze, etc.** Wm. E. Cotton & Sons (Brassfounders) Ltd. and Wm. E. Cotton. Brit. 401,051, Nov. 9, 1933.

**Enamels.** Philipp Byer. Brit. 401,021, Nov. 9, 1933. Enamelled Fe articles are made by fusing directly onto the Fe base a light-colored glaze, white opacifying agents being used which contain Sb oxide together with ZnO and (or) ZrO<sub>2</sub>. The ZnO or ZrO<sub>2</sub> may be replaced partly or wholly by oxides of the alk. earth or earth metals. The mixt. of Sb oxide and other oxides is calcined and

1 compds. of Al and (or) Ba, together with oxidizing agents, may be added to the mixt. About 1-10 parts of the opacifying agent are added to 100 of the basis glaze, either before fusion or during grinding in the mill. Compns. of suitable basis glazes are given.

Muffle furnace for enamel firing. August Bartelmus. Ger. 588,725, Nov. 25, 1933 (Cl. 48c. 7).

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**New Italian cement standards.** Hans R. Dewidels. *Zement* 22, 717-18(1933).

**Chrome cements.** Maurice Barrett. *Ceram. Age* 23, 58-9(1934).—A review.

**Rapid tests of lime and cements.** Edmond Marcotte. *Genie civil* 103, 430-2(1933).—Tests *in situ* are given for fineness, setting time, expansion, adherence and density.

**Water absorption by cement.** P. Hansel, R. Steinherz and C. L. Wager. *Zement* 20, 1048-52, 1064-9(1931).—The quantity of H<sub>2</sub>O retained by the cement when a mixt. of cement and H<sub>2</sub>O is centrifuged 5 min. after mixing increases with the quantity of H<sub>2</sub>O used to a limiting value which depends on the fineness, but not on the chem. nature of the cement. The centrifuged mass can be stirred and re-centrifuged with sepn. of H<sub>2</sub>O until a min. quantity is retained. The system portland cement-H<sub>2</sub>O behaves exactly like cement-petrolatum, fine sand-H<sub>2</sub>O or fine sand-petrolatum. If the mixed cement is left for 1-3 hrs. before centrifuging, little change takes place in the H<sub>2</sub>O uptake, but in longer periods more, up to 100%, is retained. The solns. obtained are alk. alkali sulfate solns.

**Water absorption by cement.** II. Paul Hansel, Rudolf Steinherz and Carl L. Wagner. *Zement* 22, 625-30, 639-43(1933); cf. preceding abstr.—Examn. of the liquid fractions centrifuged from water-cement pastes after various short periods indicated these steps in the setting process: (a) the soln. of the readily sol. Ca and alk. compds., (b) their interaction to produce less sol. cryst. and colloidal compds., (c) the delayed reaction of the soln. on the remaining cement particles dependent on the thickness of the gel coating them.

**Slag cement for dam construction.** O. Rolfen. *Teknisk Ukeblad* 80, 18-21, 32-6, 288-91(1933).—Cement was produced by grinding a mixt. of 30-40% of portland cement clinker and 60-70% of chilled blast-furnace slag. A good, impermeable concrete was obtained. Leaching tests showed that the slag cement had 3 times more resistivity toward soln. by water than portland cement. As for the heat developed by hardening, the slag cement was tested according to the latest American specifications in comparison with a normal Norw. portland cement, showing 40-50 and 90-100 cal. per g. of cement, resp.

**External protection of metal pipes by cement mixtures.** "Dalmine" covering. A. Rocca. *Mém. compt. rend. soc. ing. civils France* 86, 890-921(1933).—The advantages of cement for external protection of metal pipes against corrosion are brought out, and also the difficulties of its application in practice. The latter are claimed to have been practically overcome by the use of "Dalmine," a coating consisting of asbestos and cement, the proportions and grade of the materials varying according to the conditions of use. The manuf. of the coating and its application to piping are described.

**Corrosion of steel and physicochemical tests carried out on "Dalmine" covering.** O. Scarpa. *Mém. compt. rend. soc. ing. civils France* 86, 922-65(1933); cf. preceding abstr.—The mechanism of the corrosion of iron and steel piping in the ground and factors affecting it are discussed, and various physicochem. tests carried out on "Dalmine," to det. its value as a protection for piping, are described. The tests include electrolytic estn. of the porosity, macro- and micrographic examn. of the structure, detn. of sp. elec.

resistance (as applied to the pipe and after subjection to an appropriate voltage for periods of up to 12 months or more), ability to induce or maintain apparent or real passivity of the iron, resistance to the action of H<sub>2</sub>O and of aq. salt solns., free CaO content, amt. of CaO that can be removed by H<sub>2</sub>O or aq. salt solns. Results of these tests and of the examn. of Dalmine-protected pipe that had been exposed to very severe corrosive conditions showed the product to be highly satisfactory.

**Portland cement pipe coatings.** F. N. Speller. *Water Works and Sewerage* 80, 380(1933).—The use of hydraulic cement pipe coatings inhibits corrosion of metal pipe by (1) preventing water from penetrating to the metal surface or (2) by maintaining a layer of alk. water at the metal surface.

**"Free lime" in portland cement.** C. R. Platzmann. *Zement* 22, 643-4(1933).—Attention is called to the need of distinguishing between the CaO and the Ca(OH)<sub>2</sub> present in cements.

**Determination of the granular composition of portland cement by using a sedimentation apparatus.** Experimental part. I. Effect of the granular composition upon the strength of portland cement. Katsuzo Koyanagi. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 21-3(1934); cf. C. A. 27, 4648.—Two clinkers were ground to various degrees of fineness and the fineness was detd. by sedimentation tests. Samples of concrete and wet mortars of 1:3 mixts. were prepd. with cements of different fineness and tested. The concrete and wet mortar increased in strength with increasing quantities of finest flour in the cement, while dry mortar, in addn. to the finest flour, required a certain amt. of medium-size grains to attain the highest strength. On the basis of these findings K. criticizes the use of 1:3 dry mortar samples as unreliable for specification purposes. II. Concrete of better strength by longer time of mixing. *Ibid.* 24-5.—Expts. showed that prolonged mixing of the cement and aggregate together resulted in addn. grinding of the cement by the pebbles in the aggregate, which produced concrete and mortar of increased strength. III. Comparison of granular composition of two series of cements ground by two different methods. *Ibid.* 25.—Cements ground by short mills with air separator were compared with cements from long compound mills without separator and it was found that the standard sieve test showed both cements to be of nearly the same fineness, while sedimentation exposed a much greater content of finest flour in the cement from the mill without air separator.

**Evaluation of tests on cement kilns.** J. Koch. *Zement* 22, 609-15(1933).—A graphic method is shown of presenting the factors in the heat balance of cement kilns.

**Calculation of the heat balance of cement rotary kilns.** Wilhelm Gumz. *Zement* 22, 677-82, 691-4(1933).

**Preheating the air in rotary kiln operations.** E. Schirm. *Zement* 22, 651-5, 663-6(1933).

**The action of water on concrete.** B. Kellam. *Proc. Am. Soc. Testing Materials* 33, Pt. I, 289-96(1933).—The literature is reviewed and a summary of the present knowledge is presented. The action of water on concrete is fundamentally a solvent action upon the lime set free by the hydrolysis of cement. The degree of solvent action is dependent primarily upon the CO<sub>2</sub> contents of the water and to a lesser extent upon sol. sulfates and other dissolved

substances. A complete chem. analysis of a water is necessary before any significance can be attached to the  $pH$  value. Exptl. data on the variation of lime content with the  $pH$  value of river waters are presented. Seven references.

Karl Kammermeyer

A study of the analysis of fresh concrete with the Dungan buoyancy apparatus. H. R. Nettles and J. M. Holme. *Proc. Am. Soc. Testing Materials* 33, Pt. I, 297-307 (1933).—The sp. gr. detns. of cement and of fine and of coarse aggregates were affected by the length of time of immersion. The analysis of concrete showed variations in the detd.  $H_2O$  content of 1.0 and 1.1 gal. per sack of cement under field and lab. conditions, resp. When the errors in both fineness and sampling had been eliminated the variation in  $H_2O$  content was as great as 0.35 gal. per sack of cement. A study of significant figures showed that alldule computations were sufficiently accurate for the analysis of the mix. Exptl. data are presented.

Karl Kammermeyer

Permeability of concrete under high water pressure. Cornelius C. Vermeule. *Civil Eng.* 3, 611-14 (1933).—A mixt. of 1:2:4 is necessary to secure water tightness in walls 2 ft. thick even under light pressures, but this mixt. is also sufficient up to 200 lb. pressure. Hydrated lime up to 10% gave a tighter more compact mass. Tables are given showing absorption and leakage from 50 to 200 lb.

Ann Nicholson Hird

Deterioration by aging of the concrete in gravity dams. Axel Ekwall. *Water and Water Eng., Suppl.*, Jan., 1934, 17-22.—A review of the reports of 6 authors. E. concludes that the water-tight layer should be composed of concrete contg. 350 kg. cement per cu. m. and where a wide variation in climatic conditions exists this layer should be protected by a special water-tight coating.

W. A. Moore

Destructive occurrences due to freezing (of concrete). A. Steopoe. *Zement* 22, 667-9 (1933).—Addns. of NaCl and  $CaCl_2$  resulted in higher vol. changes of concrete cured at normal temps., while low-temp. curing showed the specimens contg.  $CaCl_2$  had the least and those contg. NaCl the most vol. change with the untreated specimens intermediate. An example of disrupted concrete was explained on this basis.

H. F. Kriege

The story of gypsum in Manitoba. J. P. de Wet. *Can. Mining J.* 55, 20-4 (1934).

W. H. Boynton

Gypsum. C. Galiher and R. W. Metcalf. *Statistical Appendix to Minerals Yearbook, 1932-33, Bur. Mines* 17-23 (1933). Lime (Detailed statistics). A. T. Coons. *Ibid.* 67-75.

Alden H. Emery

Paint and varnish as wood preservatives. L. A. Jordan. *J. Brit. Wood Preserving Assoc.* 3, 46-55 (1933).—A general discussion of paint as a protective coating for wood, particularly as related to wood characteristics and water movement.

Alfred L. Kammerer

The preservation of railway sleepers. J. Bryan. *J. Brit. Wood Preserving Assoc.* 3, 62-71 (1933).—The standard practice of tie treatment on the British railways is described.

Alfred L. Kammerer

Preservative treatment of Douglas fir sleepers in the Sudan. J. Thomson. *J. Brit. Wood Preserving Assoc.* 3, 89-93 (1933).—Douglas fir sleepers are treated with a mixt. of 60% creosote and 40% petroleum by the full-cell process with an av. net retention of 7.7 lb. per cu. ft. All sleepers are adzed, bored and incised before treatment. Because of the extremely low prevailing humidity checking and splitting of the sleepers is the most serious problem. Termites are also active.

Alfred L. Kammerer

Some experiments in the control of dry-rot in floors. Alex. H. Dewar. *J. Brit. Wood Preserving Assoc.* 3, 22-35 (1933).—Hollow wood floors, ventilated and unventilated, treated and untreated, also solid floors treated and untreated were tested for decay resistance to *Merulius lacrymans* and *Coniophora cerebella*. Hollow, ventilated floors made of seasoned wood treated with creosote or preferably with a water-sol. salt of a nitro deriv. of chlorhydroxytoluene gave the best results. A. L. Kammerer

Decomposition of timber under industrial conditions. III. Pitchpine. Ernest A. Rudge. *J. Soc. Chem. Ind.*

53, 22-24T (1934); cf. C. A. 28, 11634.—Three specimens of pitchpine (*P. palustris*) from: (1) pile in alluvial clay subject to sea-water infiltration, (2) gate-post incased in concrete 2 ft. below ground-line, (3) creosoted waling incased in concrete in trestle above ground, pieces in service 35, 2 and 45 yrs., resp. Specimens 1 and 3 were sound; 2 was disintegrated by "wet" rot. Strength detns. and analyses of ash and cellulose-lignin content were made. Symptoms of decay do not seem to be assocd. with salts of strong acids as sulfates or chlorides but with the presence of Ca in the cellulose and  $CaCO_3$  in the surrounding matrix.

Alfred L. Kammerer

Consolidation and waterproofing, by means of water glass, of fissured or disintegrated rocks. M. Stamatiu. *Ann. mines Roumanie* 15, 277-80, 323-6 (1932); 16, 301-4 (1933); *Chimie & industrie* 30, 1337.—Only alkali silicates and silica are suitable for the chem. consolidation and waterproofing of porous, fissured or disintegrated rocks to stop infiltrations of  $H_2O$  or of saline solns. The crushing strength of chemically consolidated rocks depends on the size of grain of the rocks (decreasing with increase in grain size), the sp. gr., petrographic nature, time of air-drying of the solns. (the strength increasing with the time of drying), their nature and concn. Alkali silicate solns. give best results when used at max. concn., but in practice this is limited to 36-38°Bé., above which the viscosity decreases their penetrative power. A. Papineau-Couture

Rubber compds. [for making flooring] (Fr. pat. 755,913) 30. Furnace for melting cement (Swed. 78,914) 4. Enamel paint for stone materials, particularly asbestos-cement articles (Belg. 397,802) 26.

Burchartz, Heinrich, and Gonell, H. W.: Versuche uher das Verhalten von Betonschutzmitteln gegenuber der Einwirkung aggressiver Fluessigkeiten. Berlin: Ernst & Sohn. 85 pp. M. 11.20.

Burre, Otto, and Dienemann, Wilhelm: Vorkommen und Verbreitung technisch verwendbarer Gesteine, Tone und Sande in Deutschland. Berlin: Union Zweigniederl. 28 pp. M. 2.

Girndt, Martin: Baustoffkunde. 11th ed., revised. Berlin: B. G. Teubner. 196 pp. M. 8.

Graf, Otto: Versuche uher das Schwinden von Beton durch Austrocknung bei hoherer Temperatur und uher die Warmedurchlassigkeit von feuchtem und trockenem Beton verschiedener Zusammensetzung. Berlin: Ernst & Sohn. 27 pp. M. 3.60.

Santarella, Luigi: Prontuario del cemento armato. Dati e formula per rendere più spedito lo studio ed il controllo dei progetti di massima nelle strutture più comuni. 4th ed. Milan: U. Hoepli. 302 pp. L. 16.50.

Steopoe, A., and Teodoru, H.: Cercetări chimice și tehnice asupra mortarelor normale de ciment și trass. Bucharest. Copuzeanu. 102 pp.

Beton-Kalender. Taschenbuch für Beton- und Eisenbetonbau sowie den verwandten Fächer. Jg. 27, 1934. Berlin: Ernst & Sohn. 547 pp. M. 4.50.

Handbuch der Eisenbetonbau. Edited by Fritz von Emperger. 4th ed., revised. Bd. IX. Behälter, Mast, Schornsteine, Rohrleitungen. Lfgn. 1-4. By Benno Löser, et al. Berlin: Ernst & Sohn. 320 pp. M. 5.50, each.

Cement. Paul Paget. Ger. 588,808, Dec. 14, 1933 (Cl. 22f. 1). An acidproof cement is made from water glass, quartz meal, etc., and a small amt. of  $NH_4$  salts or salts of org.  $NH_4$  bases. Thus, the cement may contain water glass, quartz meal, heavy spar and  $NH_4CNS$ ,  $(NH_4)_2SiO_3$ ,  $CH_3NH_2HCl$  or  $NH_4F$ .

Cement. F. L. Smidth & Co. A/S. Ger. 590,226, Jan. 3, 1934 (Cl. 80b. 3.14). See Fr. 787,833 (C. A. 27, 1733).

Cement. A. O. Purdon. Belg. 395,866, May 31, 1933. Cement is obtained by adding NaOH or KOH and Na silicate or  $CaF_2$  to crushed slag.



**Cement.** D. R. E. Werner, S. Giertz-Hedström and O. Stålhane. Swed. 77,505, June 6, 1933. A cement chiefly consists of  $\text{CaSiO}_3$  and  $\text{As}_2\text{O}_3$ .

**Cements.** Riverside Cement Co. Brit. 400,813, Nov. 2, 1933. A portland cement of low heat of hardening comprises ground clinker contg. less than 12%  $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ , less than 3%  $3\text{CaO} \cdot \text{Fe}_2\text{O}_3$ , at least 10%  $3\text{CaO} \cdot \text{SiO}_2$ , and having a value less than 45% for the function,  $\frac{3\text{CaO} \cdot \text{SiO}_2 + 2 \times \% 3\text{CaO} \cdot \text{Al}_2\text{O}_3}{100}$ . Cf. C. A. 28, 1835<sup>b</sup>.

**White portland cement.** P. Gërimont. Belg. 396,667, July 31, 1933. The clinker is coated with glass as it emerges from the burning zone of the kiln, and is then allowed to cool. No. 396,668. A reducing agent (either liquid or gaseous) is passed over the clinker in the zone extending from the point where burning is complete to the point where the clinker is cooled sufficiently not to be oxidized by air. No. 396,669. The clinker is mixed with F compds., which are thrown upon it during and after burning. No. 396,777.  $\text{CaCl}_2$  is thrown on the clinker after burning is completed but while it is still incandescent.

**Hydraulic cements.** Julius M. Curschellas. Fr. 755,900, Dec. 1, 1933. The properties of hydraulic cements are improved by the addn. of an org. acid contg. O, e. g.,  $\text{AcOH}$ , citric or saccharic acid, and their salts. The addn. may be made to the caking water. A supplementary addn. of sol. phosphates, compds. of sesquioxides with F or oxalic acids may also be made.

**Cement composition.** Aldo Beghelli. U. S. 1,944,820, Jan. 23. A compn. adapted to be mixed with unkneced portland cement to avoid the aging of molded cement materials or articles after their impregnation with molten S comprises "sol. silica" 80,  $\text{Al}_2\text{O}_3$  10,  $\text{Fe}_2\text{O}_3$  25 and titanic acid 5%.

**Grinding portland cement.** Harold J. Dunton (to Calaveras Cement Co.). U. S. 1,943,817, Jan. 16. Various details of grinding are described, suitable for producing a product which will pass a 400-mesh sieve.

**Mill supplied with air currents, suitable for grinding cement materials, coal, etc.** Niels Nielsen (to F. L. Smidth & Co.). U. S. 1,944,755, Jan. 23. Structural and operative details.

**Machine for making cement tiles.** Svend Flamand. Brit. 400,429, Oct. 26, 1933.

**Apparatus for feeding rotary kilns with cement slurry or like materials.** Gustave Coymans. Ger. 590,094, Dec. 22, 1933 (Cl. 80c. 16.10).

**Firing cement.** D. R. E. Werner and S. Giertz-Hedström. Swed. 76,855, March 28, 1933. The smoke gases are passed through a rotary drum where they are brought into intimate contact with water or raw mix slurry, which by means of a pump is kept in const. circulation through a filtering app. The solid materials recovered are returned to the rotary kiln.

**Firing cement.** S. Giertz-Hedström and D. R. E. Werner. Swed. 78,827, Oct. 31, 1933. The plastic raw mix is charged by being pressed through perforations in the conical top of the firing chamber.

**Utilizing waste heat from cement calcining kilns for drying slurry.** Eric J. Ochs. U. S. 1,944,452, Jan. 23. Various details of app. and operation are described.

**Retarding the reaction in the presence of water between arsenic trioxide and cement or lime.** O. Stålhane, D. R. E. Werner and S. Giertz-Hedström. Swed. 78,492, Sept. 26, 1933. Before the addn. of water the materials all or in part are heated and then cooled before, during, or after mixing. Cf. C. A. 27, 176.

**Light concrete.** Carl Dybberg. Norw. 52,770, July 3, 1933. A light concrete with up to 90% of sawdust, cork waste, peat or loose wood pulp or mixt. of these materials contains 10% or more of a light and fine-grained shelly sand, so-called marl sand.

**Composition for decreasing the permeability of concrete.** C. F. Erikson. Swed. 76,932, April 11, 1933. The mass consists of rubber, fat and wood tar, with rubber as the main substance.

**Coating and sealing the surfaces of cellular particles such as cellular aggregate for concrete.** Arthur S. Dwight (to Dwight & Lloyd Sintering Co.). U. S. 1,943,858, Jan.

16. Particles such as those of artificial light aggregate are coated with a material of lower m. p. than that of the particles, and hot gases are passed through a layer of the coated particles on a pervious support in a furnace chamber to fuse the coating material on the particles and provide them with a thin superficial coating without filling their pores. App. is described.

**Wet production of binders.** V. Trief. Belg. 396,627, June 30, 1933. In the manuf. of mortars, concretes, etc., the binder is prepd. *in situ* by crushing the raw materials under water and adding the other materials in a suitable mixer.

**Glazing stone.** Carl Menz and Gustav Boecker. Ger. 588,934, Nov. 30, 1933 (Cl. 80b. 23.04). Concrete, artificial or natural stone is glazed by spreading a mixt. of glaze and flux over the stone and fusing it by a welding burner.

**Road-surfacing material.** A. B. C. Dahlberg. Swed. 76,684, March 7, 1933. An aggregate such as gravel, sand or slag is coated with a porous material such as kieselguhr or chalk in which is absorbed a material that acts as a flux for the bituminous binder used with the aggregate. This flux may be tar,  $\text{CS}_2$  or  $\text{CCl}_4$ , benzine, etc. Under pressure, for instance, in road-rolling, the flux is liberated by crushing of the grains of the porous material.

**Road-surfacing, building and electric insulating material.** H. V. Grönroos. Swed. 77,564, June 13, 1933. In a modification of the process described in Swed. 72,892 (C. A. 27, 3055), the fused or sintered product obtained by the first heating after cooling and grinding is placed in refractory molds or upon refractory plates and heated to sintering or beginning fusion.

**White "Essen-asphalt."** Norsk Esenasfalt Co. A/S. Norw. 53,219, Oct. 23, 1933. As the basic material white marble, limestone or feldspar is employed and as the binder a mixt. of rosin, a mineral oil such as "P-965" and linseed oil.

**Bituminous emulsions.** Robert J. Lacau. Brit. 400,045, Oct. 19, 1933. Road-surfacing material consists of bitumen, e. g., natural bitumen or petroleum-distn. residues, approx. 50, tars obtained in the manuf. of lighting gas in continuous charging ovens, e. g., of the Glover-West or Woodall-Duckham type, approx. 50 and either Swedish residuary oil 3 or middle phenolic oil 2-5%, the mixt. being emulsified with  $\text{H}_2\text{O}$ , contg. soap, casein or other suitable emulsifying agent. The tars, obtained by the distn. of coal, are evolved at 400-450° and do not contact with surfaces heated above 600° for any appreciable time. Cf. C. A. 28, 1165<sup>1</sup>.

**Synthetic inorganic gel.** Charles S. Howe (to Los Angeles Testing Laboratory). U. S. 1,943,532, Jan. 16. A product capable of forming a viscous gel with water and suitable for use in asphalt or oil emulsions or in suspending mineral matter is prepd. by adding a fusible alkali salt such as Na silicate to an ordinary compn. for making portland cement by calcination, and then subjecting the aggregate mixt. to calcination.

**Blast-furnace slags.** Arthur Killing. Ger. 590,155, Dec. 27, 1933 (Cl. 80b. 22.01). See Fr. 754,439 (C. A. 28, 1500<sup>4</sup>).

**Artificial stone.** Maschinenfabrik Komnick G. m. b. H. Brit. 400,477, Oct. 26, 1933. Road paving, etc., blocks are made by molding granular material contg. lime and  $\text{SiO}_2$ , producing a thin hard skin of Ca hydrosilicate on the blocks by applying steam pressure, drying and impregnating *in vacuo* with bitumen with or without pressure.

**Artificial stone.** Robert H. King, Allen O. Crocker, Bernardino B. van Domselaar, Louis N. Thomas, Kenneth Henderson, Wm. S. Adams and Wm. A. Westley (trading as Constructora de Caminos "Kingite," Crocker, King & Co.). Brit. 400,633, Oct. 23, 1933. Divided on 398,872 (C. A. 28, 1836<sup>3</sup>). An artificial lava for use as an aggregate in bituminous concrete or asphalt is produced by causing earth or waste materials to travel substantially horizontally up to a region of fusion and to pass through this region at a greater speed than that of their approach, the fused material being discharged immediately after their passage through said region.

**Constructional material.** Soc. anon. ciments portland artificiels Belges d'Harmignies. Belg. 397,070, July 31, 1933. A material that is a poor conductor of heat and sound is manufd. from cement, asbestos and porous mineral matter, more particularly slag wool or kieselsguhr.

**Faced building blocks.** Springbank Quarry Co. Ltd., Hugh K. Symington and Wm. W. Gault. Brit. 400,774, Nov. 2, 1933. Faced building blocks are formed face downward in collapsible bottomless molds, the contact surfaces of which are oiled. A moist mixt. of pebbles, Dorset peas, etc., and cement, with or without sand, is spread and pressed down on a pallet in the mold, a filling of concrete, *e. g.*, whinstone chips 4, whinstone sand 3 and portland cement 3 parts by vol., is put in, the whole is allowed partly to set, the surface of the facing material is exposed and cleaned by brushing or washing, the mold is disassembled and the block is removed and cured. The facing material may comprise pit sand 17, Dorset pebbles 42 and portland cement 7 parts by vol. In 400,861, Nov. 2, 1933, divided on 400,774, collapsible molds are described.

**Light-weight, heat-insulating blocks.** Erik Hüttemann. Fr. 755,994, Dec. 2, 1933. See U. S. 1,932,971 (C. A. 28, 548<sup>9</sup>).

**Light bricks with a high sound-insulating power.** Johs. Rykken and Hans Sundbye. Norw. 52,994, Aug. 21, 1933. One part (by vol.) of coke slag, 1 part of grout and 1 part of cork are mixed and added to a mixt. contg. 0.1 part of kieselsguhr and 0.1 part of dry plaster of Paris stirred out in a suitable amt. of thin grout, after which all is mixed intimately, molded, dried and burned. The resulting bricks or blocks have an apparent sp. gr. of 0.75-1.4 kg. per l.

**Porous plaster.** Imperial Chemical Industries Ltd. Fr. 755,813, Nov. 30, 1933. A plaster setting with a cellular structure contains finely divided anhydrite, a small amt. of one or more accelerators ( $K_2SO_4$ ,  $ZnSO_4$  or  $Al_2(SO_4)_3$ ), a small amt. of gas-producing ingredients and a small amt. of portland cement. Cf. C. A. 27, 2012.

**Securing linoleum and other coverings to metal floor surfaces, etc.** Robert M. Allard (to Armstrong Cork Co.). Brit. 400,744, Nov. 2, 1933. The metal is treated with a corrosion-inhibiting asphalt paint which is allowed

to dry and the covering is secured to the painted surface by a Manila gum cement.

**Coloring roofing granules.** Ernest H. Nichols. U. S. 1,944,800, Jan. 23. Granules of raw shales are heated and the hot granules are simultaneously treated with aq. solns. of  $FeSO_4$  and borax to cause evapn. of at least part of the water and are then reheated.

**Colored granules for roofing.** Poole Maynard. U. S. 1,944,294, Jan. 23. Burned clay granules are impregnated with a soln. of an inorg. color intermediate such as Pb acetate and the impregnated granules are treated with a soln. of a color precipitant such as  $Na_2Cr_2O_7$ . Various examples are given.

**Colored mineral granules for roofing.** Henry R. Gundlach (to Central Commercial Co.). U. S. 1,943,525, Jan. 16. Color pigments are attached to the granules with a waterproof cement formed from  $H_3PO_4$ , a filler such as china clay and ZnO.

**Artificial board suitable for use in automobile tops, etc.** Clarence J. Strobel (to St. Clair Rubber Co.). U. S. 1,944,533, Jan. 23. A fibrous material such as "Celotex" or the like is assembled with a paper facing and the fibers of both the underlying material and the facing are impregnated with a rubber compn. which fills the surfate voids in the body material and penetrates part way through the paper, and the rubber is vulcanized.

**Tile board.** Richard Ericson (to U. S. Gypsum Co.). U. S. 1,943,663, Jan. 16. Various details of manuf. are described.

**Artificial wood.** Claude M. J. R. Jeantet. Brit. 400,439, Oct. 26, 1933. Fine dry wood powder, *e. g.*, sawdust, without added agglutinants, is heated to below the decompn. point of the natural binding ingredients contained therein and subjected to heavy pressure, the gums, resins, etc., liberated by the heat being spread thereby evenly through the mass and consolidating the whole.

**Compound paper and fabric.** Julio H. Hughes and Julio R. Hughes. Brit. 400,584, Oct. 23, 1933. Sheets of paper, *e. g.*, newspapers, magazine sheets or fabric or asbestos are coated with glue, starch, dextrin, etc., to make them (partly) nonabsorbent, dried, adhesively coated, *e. g.*, with size or glue, superposed and compressed to form a wood substitute.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Laboratory fractionation of motor fuels.** Horst Brückner. *Gas. u. Wasserfach* 77, 58-60 (1934).—A simple all-glass lab. fractionating column is described which permits quite accurate cuts to be made by the use of a 1-m. air-cooled column. Results are given for a series of motor fuels, and a typical curve is given for a mixt. of hexane with benzene and toluene.

**The use of alcohol in motor fuel in foreign countries.** C. Y. Hopkins. *Can. Chem. Met.* 18, 2-5 (1934).—Economic. Eleven countries are marketing motor fuel contg. EtOH.

**The preparation of synthetic liquid fuel in Siberia (Russia).** N. M. Karavaev and I. Ya. Felberbaum. "Sapromyxites from Barzass," *Goskhimindal-Petrograd* 1933, 4-18.—A general discussion of the deposits, economics and geology of sapromyxites. The following av. yields of low-temp. products are obtained: tar 20-40%, gas 100 cu. m. per ton, semicoke 38-55%, liquid substances and water, including losses in distn., 14-25% and gasoline absorbed from gas 0.5-1.0%. The primary tar on hydrogenation in the presence of catalysts and at 150-200 atm. pressure produced (per ton of sapromyxite): gasoline 6, kerosene 4.5 and oily residue 3%, while the total yield from the sapromyxite was low-temp. carbonization coke 250 kg., gasoline 103, kerosene 45, paraffinic and oily residues 30 kg. and acidic substances 9 kg. Without hydrogenation the corresponding yields were as follows: 250, 30, 30, fuel oil 114, pitch and acidic prod-

ucts 9%. The gas obtained had a high heating value, while the semicoke had to be consumed on the spot because of brittleness.

**Motor fuel from coal and oil shales.** A. A. Boehlingk and J. C. Morrell. *J. Soc. Chem. Ind.* 52: 228-30T (1933).—The results of a study on the cracking of high- and low-temp. tar and shale oil show that high-temp. coal tar and the tar acids obtained therefrom are very refractory toward cracking while the low-temp. coal tar and the tar acids derived therefrom are highly suitable as cracking stocks and for the production of motor fuels. Shale oils are also shown to be desirable sources of motor fuels by cracking. Numerous data are given to substantiate these results.

**Iodometric method for determination of sulfur in fuel.** E. S. Gavrilenko and O. B. Rabinovich. *Nauk. Zapiski Tsukrovoi Prom.* 10, No. 32, 25-36 (1933); cf. C. A. 27, 5171.—The sample is obtained from a residue of fuel after ignition in a calorimetric bomb. Before ignition 12-15 cc. of 10% NaOH or KOH is introduced into the bomb to absorb  $SO_2$ . After ignition the contents of the bomb is washed into a beaker and 7-8 cc. of 3%  $H_2O_2$  is added and boiled for 10 min. The soln. is acidified with HCl to a strong acid reaction; Fe, Al and  $P_2O_5$  are pptd. by  $NH_4OH$ . The filtrate is acidified with HCl (10-12 cc. excess is added). From 8 to 10 cc. of  $BaCrO_4$  mixt. (19.44 g. of  $K_2CrO_4$  and 24.44 g. of  $BaCl_2 \cdot 2H_2O$ ) is added to the soln. which is boiled for 5 min. The soln. is neutralized with  $NH_4OH$ .

The flask is then cooled and made up to the mark with distd.  $H_2O$ . The contents of the flask are thoroughly mixed and filtered through a double filter paper into a beaker. One hundred cc. of the filtrate is transferred into an Erlenmeyer flask with 3-4 g. of KI dissolved in 5-10 cc. of water and 15 cc. of  $HCl$ . After 15 min. the free  $I$  is titrated with 0.05  $N$   $Na_2S_2O_3 \cdot 5H_2O$  with starch as indicator. The end point is the change from blue to green color. One cc. of 0.05  $N$   $Na_2S_2O_3 \cdot 5H_2O$  = 0.000535 g. of  $S$ .

V. E. Baikow

**Carbonization in semi-intermittent vertical retorts.** E. L. Wallis. *Gas World* 100, 139-41 (1934).—Two exptl. West vertical retorts have been operated at Dudley. Each is 90 × 9 in. at the top and 96 × 14 in. at the bottom, of the shape of Glover-West continuous vertical retorts, and is constructed entirely of silica. The retort is superimposed over a cooling chamber divided into 2 compartments, the lower for coke discharging and the upper for continuous steaming. On a 9-hr. coking period the throughput is 91.6% of that from two 40 in. continuous verticals. The coke is less friable than that from continuous vertical retorts, and the bulk  $d$  is greater. Both cokes were burned in a coke boiler with a complete circulating system, and it was found that the semi-intermittent coke is slower in igniting but gives a hotter fire.

P. J. Wilson, Jr.

**The carbonization process at the Jena Municipal Gas Works.** Gülich. *Gas u. Wasserfach* 77, 1-5 (1934).—A layer of coke, 50-60 cm. deep is used at the top of the coal charge in the vertical chamber ovens to absorb and crack the tar. The use of this coke layer gives a higher and more uniform gas yield throughout the carbonizing period. Each of the newer chamber ovens has an adjacent coke chamber in the same setting for water-gas manuf. Expts. in cracking the tar in these coke chambers instead of at the top of the chamber oven gave much poorer results.

R. W. Ryan

**Present technic of semi-carbonization.** Ch. Berthelot. *Genie civil* 103, 513-18, 543-5 (1933).—A comparison of French and English practice in low-temp. carbonization with photographs, drawings and production data.

Ann Nicholson Hird

**The chemical investigation of low-temperature carbonization products obtained from Barzass sapromyxites.** N. M. Karavaev, I. B. Rapoport and A. N. Bashkirov. "Sapromyxites from Barzass," *Goskhimizdat-Petrograd* 1933, 91-130.—The low-temp. tar was sepd. into fractions boiling at (1) 28-100°, (2) 92-107°, (3) 115-30°, (4) 130-45°, (5) 145-60°, (6) 160-85°, (7) 185-200°, (8) 200-50°, (9) 250-300°. The following acids were obtained: (1) oleic, valeric and capronic acids, as well as some  $HCO_2H$  and  $AcOH$ ; (2) oleic, valeric and caprylic acids, with traces of  $HCO_2H$  and  $AcOH$ ; (3) oleic, valeric, caproic and enanthic acids, with traces of  $HCO_2H$  and  $AcOH$ ; (4) caproic and enanthic acids and traces of  $AcOH$ ; (5) valeric, caproic, enanthic and capric acid and traces of  $AcOH$ ; (6) enanthic and capric acids; (7) capric and traces of  $HCO_2H$ ; (8) could not be properly oxidized and the main treated portion had a b. p. of 98-125°; (9) yielded a product b. 120-52°. The following unsatd. hydrocarbons were found:  $C_6H_{12}$ ,  $C_7H_{14}$ ,  $C_8H_{16}$ ,  $C_9H_{18}$ ,  $C_{10}H_{20}$ ,  $C_{11}H_{22}$ ,  $C_{12}H_{24}$ ,  $C_{13}H_{26}$ ,  $C_{14}H_{28}$ ,  $C_{17}H_{34}$  and  $C_{18}H_{38}$ . The double bond was at the 2nd, 3rd or 4th C atom. A small amt. of diolefins was also traced. The aromatic compds. were investigated in the fractions: (1) 30-100°, (2) 100-15°, (3) 115-45°, (4) 150-6°, (5) 156-61°, (6) 161-7°, (7) 167-75°, (8) 175-85° and (9) 185-200°. Fraction (1) (b. 65-85°) contained  $C_6H_6$ ; (2) toluene; (3) *o*- and *p*-xylene; (4) mesitylene and pseudocymene; (5) mesitylene, pseudocymene and small amts. of *p*-ethyltoluene; (6) mesitylene and pseudocymene, (7) pseudocymene and hemimellitene; (8) hemimellitene; and (9) isodurene and prehnitene. The following naphthenes were found: fraction b. below 60° cyclohexene, 95-105° methylcyclohexane, 132-145° 1,4-dimethylcyclohexane. The following paraffins were found in the fraction b. 35-125.5°:  $C_6H_{14}$ ,  $C_8H_{18}$ ,  $C_7H_{16}$  and  $C_9H_{20}$ . The following acids were isolated from 5

fractions b. 48-162°: caproic, enanthic, caprylic, pelargonic, capric, undecylic, lauric, tridecoic and myristic. The 280-350° fraction on being cracked yielded up to 32% of gasoline and 52-4% kerosene at an operating pressure of about 60 atm. and a temp. of 450°. Hydrogenation in the presence of  $Al_2O_3$  at 70-200 atm. for 4 hrs. at 415-25° yielded 22.4% of a fraction b. below 170°, 11% 170-230°, 9.65% 230-80° and 8.57% at 280-350°, and was accompanied by coke formation. Hydrogenation expts. carried out in the presence of  $Al_2O_3$  +  $CuO$  and  $Al_2O_3$  + ( $Al_2O_3$  +  $CuO$ ) at 440-55° and 405-30° are also reported. Heavy bottoms b. above 350° were hydrogenated in the presence and absence of the above catalysts. The gasoline and kerosene fractions obtained are compared with those from petroleum products. In the hydrogenation of the sapromyxite in the presence of  $Co$  oxide and  $NH_4$  molybdate at 430-450° in a rotating Bergius autoclave the yield after about 1 hr. and 40 min. of oily products reached 40-3.5% and that of the solid residue 38-43.2%, while the gaseous part was composed mainly of  $C_2H_4$ ,  $C_3H_6$ , hydrocarbons. A great variety of berginization expts. are reported. Conclusion: The sapromyxite tars are high in unsatd. hydrocarbons (chiefly iso forms), and they also contain aromatic compds. and naphthenes and 40-60% satd. compds.

A. A. Bochtlingk

**Semiproduction investigation of low-temperature carbonization of Barzass sapromyxites.** N. M. Karavaev and D. D. Zuikov. "Sapromyxites from Barzass," *Goskhimizdat-Petrograd* 1933, 71-91.—Barzass sapromyxites were distd. at 500° in rotating retorts (described in detail), the plants having a daily capacity of 5 tons; and semicoke 56.0-75.0, tar 6-13.78 and gas, water and losses 11.83-35.50% were obtained. The semicoke contained  $H_2O$  0.01-5.98,  $S$  0.47-0.90,  $C$  87.34-88.90,  $H$  3.85-5.22 and  $N + O$  2.25-2.40%. The tar had  $d_{15}$  0.9102-0.9535,  $H_2O$  0.6-1.54%,  $E_{20}$  1.26-1.73,  $S$  0.37%, Brenken flash 23-41°, pour point 6°, acidic compds. 4.49-5.70%, acids trace, bases 0.40%, heating value 10,013-10,346 cal. and paraffin 0.55%. The gas was composed of:  $CO_2$  25.2-28.13,  $C_2H_4$  8.91-12.94,  $O$  1.63-3.89,  $CO$  6.02-6.68,  $H + CH_4 + C_2H_6$  43.25-47.25 and  $N$  3.37-12.83%. The steam-distd. tar yielded 19.7% of a fraction boiling below 200° (sp. gr. 0.7870) and 14.3% boiling at 200-273° (sp. gr. 0.8570). The kerosene fraction (steam-distd.) boiling at 185-310° contained 7.5% acidic products and traces of bases. The residue or the fuel oil has  $d$  1.0423,  $H_2O$  1.07%, Brenken flash 179°, mech. admixts. 0.98%, pour point +22°, ash 0.863% and coke 21.1%.

A. A. Bochtlingk

**Results of the technical-chemical investigation of Barzass sapromyxites.** N. M. Karavaev and I. B. Rapoport. "Sapromyxites from Barzass," *Goskhimizdat-Petrograd* 1933, 44-70.—Analysis of a few samples of sapromyxites gave: total water 1.20-3.56, total  $S$  (sulfate  $S$  and org.  $S$  on the dry substance) 0.64-1.01,  $C$  76.04-79.61,  $H$  7.34-9.48,  $O$  9.42-13.67,  $N$  0.28-0.72, volatile matter 60.53-86.17% and heating value 5417-9100 cal. The coke has a low m. p. and is easily broken up into powder. Fractions obtained by extrn. with various solvents were investigated. Low-temp. carbonization yielded a coke having  $H_2O$  0.83-1.85, total  $S$  0.73-1.18,  $O + N$  2.36-4.34,  $C$  84.84-89.96,  $H$  3.60-3.77%, and a calorific value of 3269-8288 cal. The high-temp. carbonization tar has  $d_{15}^4$  0.8910-0.9008,  $C$  84.85-86.01,  $H$  11.60-11.61,  $O + N$  2.05-3.58,  $S$  0.33-0.47% and a heating value of 9641-10,354 cal. The tar was treated with 5%  $H_2SO_4$  for the extrn. of bases, 10%  $Na_2CO_3$  for the removal of acids and 10%  $NaOH$  for the extrn. of phenols (the results are tabulated). It is characterized by a low content of phenols, a considerable amt. of carboxylic acids and a low content of bases. It contained up to 21.9% of a fraction boiling to 200°, having a sp. gr. of 0.7539-0.7545, about 35% aromatics and unsatd. compds. (about 1:2) and it had an I no. of 141.0. The kerosene and heavier cuts were also investigated. The distillates on treatment with  $H_2SO_4$  and fuller's earth and  $NaOH$  yielded bright and stable products (gasoline and kerosene). Thirty-three references.

A. A. Bochtlingk

Modern American coal preparation practice. R. A. Mott. *Colliery Eng.* 10, 378-81, 385(1933). A. N. H.

Physical and chemical investigation of gases contained in coal beds. K. Peters and A. Warnecke. *Glückauf* 69, 1181-90, 1210-12(1933).—One hundred g. samples (particles > 11 mm.) of 18 different coals were ground to  $\mu$  size in a closed mill in a high vacuum. The gases evolved were collected, measured and analyzed. Fossil N, CO<sub>2</sub>, H and C<sub>n</sub>H<sub>2n+2</sub> up to C<sub>7</sub>H<sub>16</sub> were found in varying amts. Helium was also detd. The amt. of gas increased with increasing rank of the coal and, with Silesian coals, it always contained CO<sub>2</sub> and hydrocarbons. In general, the older the coal the more firmly the gas was held. Coal loses its gas rapidly on being taken from the bed, particularly if it is crushed much in removal. From data on different sizes charged in their mill, the authors were able to plot curves from which, by extrapolation, the gas content of the coal in the bed could be estd. The manner in which the gas is held in the coal differs from true adsorption or solid soln. since it is freed by destroying the coal structure (crushing). The amt. of gas recovered varied from 10.5 ml. per 100 g. in the cannel coal to 890 in the anthracite. The gas from the cannel was 100% CO<sub>2</sub>, while the gases from all other samples were mixts.

J. D. Davis

Fusion of coal. C. Arnu. *Rev. ind. minière* 1933, 155; *J. usines gas* 57, 512-19, 541-8(1933).—A review.

B. J. C. van der Hoeven

Tests in Germany on the distillation of coals by the Verté process. L. Verté. *Industria chimica* 8, 446-50 (1933).—Good results were obtained by Otto and Co., Bochum, on application of Verté's process (C. A. 27, 2561) to anthracite, coking coal and mazout, all of German origin.

B. C. A.

A laboratory method for selection of coal charge and determination of its coking properties. L. M. Sapozhnikov and N. A. Bakun. *Coke and Chem.* (U. S. S. R.) 1932, No. 11, 73-8.—The nature of the coking process of Donetz basin coals was studied, and a lab. method for the detn. of coking properties of com. coal mixts. was developed. A simple app. was designed for this purpose, the essential features of which are: a steel cylinder for the coal sample, a perforated plunger connected with hydraulic compensator and a manometer. The coal sample inside the steel cylinder is heated from the outside by an elec. coil (temp. rising 30° per min.); the pressure of the gases generated is transmitted through the plunger and hydraulic compensator to the manometer. The gases liberated inside the coal sample can only escape through the perforations in the plunger and in order to do so have to overcome the resistance of the plastic layer formed around the sample. The speed of the evolution of gas and the degree of the permeability of the plastic layer are the factors detg. the pressure registered by the manometer. The pressures recorded by this app. for different coals were found to correspond very closely to the drum tests for detn. of mech. properties of coke of these coals, especially when single-grade coals were tested. This method is recommended also as means for proper selection and proportioning of the coal mixts. with the desired coking properties.

James Sorrel

The value of plant and semi-plant tests for determination of coking properties of a coal charge. A. S. Bruk. *Coke and Chem.* (U. S. S. R.) 1932, No. 10, 34-8.—To check the reliability of results obtained by semi-plant tests for detn. of mech. properties of coke from different coals parallel runs were made with the same coal. Semi-plant tests were found unreliable for all purposes.

James Sorrel

The behavior of the petrographic constituents of Upper Silesian bituminous coals on carbonization at high and low temperatures and on extraction. B. Neumann and L. Kremser. *Glückauf* 69, 813-20(1933).—Three coals were assayed at high and low temps. and extd. by the method of Cockram and Wheeler. Fusain, durain and vitrain were sepd. in practically pure state. Fusain gave the largest yields of coke and lowest yields of gas and tar. The gas from this coal was rich in CO<sub>2</sub>, particularly with the hard variety which contained calcite.

The yields of gas and tar from the durain and vitrain were practically the same, although the gas from the latter was the richer. Durain showed little coking power. Extn. results showed that the vitrain contained the largest percentage of coking constituents. It appeared that the oily bitumens were responsible for the caking and the solid bitumens for the swelling of the coals during coking.

J. D. Davis

Solution of coal by pressure extraction and hydrogenation of the extracts. H. Pott, H. Broche and W. Scherer. *Glückauf* 69, 903-12(1933).—Yields of approx. 80% ext. from bituminous coals (pea size) are obtained by stage extn. in a shaking autoclave. The method involves keeping the extn. temp. just under the decompn. temp. of the material which rises (400-410° max.) as extn. proceeds. For each succeeding extn. the temp. is therefore raised. Tetralin (C<sub>10</sub>H<sub>12</sub>), C<sub>10</sub>H<sub>12</sub> + PhOH and C<sub>10</sub>H<sub>12</sub> + PhOH + C<sub>10</sub>H<sub>8</sub> are the solvents used, the last 2 being most effective. If the extn. temp. is raised above the decompn. temp. of the material, the yield of ext. falls off. The exts. are easily hydrogenated, yielding a large percentage of C<sub>6</sub>H<sub>6</sub>-sol. oils.

J. D. Davis

Production of activated carbon from coal. A. E. Williams. *Colliery Eng.* 10, 347-8(1933).—The best results are obtained from anthracite. Carbohydrate matter added as a binder often enhances the activity but must be later removed by oxidation. The degree of activation is affected by homogeneity. The process of carbonization and activation is given.

A. N. H.

Oil from coal. W. R. Ormandy and J. Burns. *Trans. Inst. Marine Engrs.* 45, 239-64(1933); cf. C. A. 28, 6204.—A review of hydrogenation, straight distn. and distn. followed by converting coke into water gas and this into oil. The Cunard process of using finely divided coal suspended in oil is discussed, also conflicting economic trends.

Ann Nicholson Hird

Relation of hydrogen and methane to carbon monoxide in exhaust gases from internal-combustion engines. Harold C. Gerrish and Arthur M. Tessmann. *Natl. Advisory Comm. Aeronaut. Rept. No. 476*, 11 pp.(1933).—The results of more than 100 exhaust-gas analyses from engines using hydrocarbon fuels showed that the H and CO were present in definite proportions, the ratio depending on the ratio of H to C in the fuel. The relation found for standard-grade and fighting-grade aviation gasoline, auto Diesel fuel, and lab. Diesel fuel was H = 0.51CO; for hydrogenated safety fuel H = 0.33CO. A small amt. of CH<sub>4</sub> was always present, but was independent of the air-fuel ratio and the H-C ratio of the fuel. O was also found even when the fuel was in excess of that required for complete combustion. The detn. of any 2 components (CO<sub>2</sub>, CO, O, air-fuel ratio), employment of the H-CO relationship, and the use of the Ostwald continuous combustion diagram provide a rapid means for obtaining the quantities of the products of combustion in such exhaust gases. The air-fuel ratio may be detd. from the exhaust gas analysis with a precision of  $\pm 2\%$  without measuring the air taken in by the engine.

P. J. Wilson, Jr.

Further development of the Benson boiler. Heinz Rabe. *Naturwissenschaften* 21, 795-9(1933); cf. C. A. 22, 3974.—A review of recent improvements in Benson boiler installations with special reference to difficulties with salt deposits in the tubes and the use of subcrit. temps.

B. J. C. van der Hoeven

Natural gas. G. R. Hopkins and H. Backus. *Statistical Appendix to Minerals Yearbook 1932-33, Bur. Mines* 103-16(1934).

Alden H. Emery

Foul main pressure regulation. Alan W. Elliott. *Gas World* 100, 114(1934); *Gas J.* 205, 369-71.—Exptl. work showed that a bell type of retort house governor would give results equal to those which can be obtained with a relay type.

P. J. Wilson, Jr.

Deviations from Boyle's law as affecting the measurement of high-pressure gas. Walter Dayhuff. *Petroleum World* 30, No. 11, 40-44(1933). Emma E. Crandal. The purification of gases. E. Ott. *Schweiz. Ver. Gas-*

**Wasserfack. Monats-Bull.** 13, 285-98(1933).—A review on various treatments of gas: cooling and dehydration (also intensive cooling), S ( $H_2S$  and  $CS_2$ ) removal, active-C benzene removal with simultaneous purification, dehydration and naphthalene removal by compression. Tower purifiers are preferred for dry  $H_2S$  removal;  $CS_2$  can be eliminated catalytically but the process is rather expensive. Intensive cooling dehydrates and removes naphthalene effectively but dehydration with  $CaCl_2$  is simpler. The active-C (A. Kohle) process is effective for  $C_6H_6$ ,  $CS_2$  and  $C_8H_{10}$  removal. Compression processes are expensive and do not remove S compds. The latest Petit liquid purification process and the Fischer-Brandt one have not as yet proved their value.

B. J. C. van der Hoeven  
**New gas sulfur purification process.** A. Thau. *Gas-u. Wasserfack* 77, 33-5(1934).—Tower purifiers are filled with porous balls of Fe hydroxide. These have a diam. of 15-20 mm. and a porosity of about 60%. Advantages claimed are much higher gas throughput per cu. m. of purifying material than with dry box purifiers, need of only a small amt. of ground space and easy extn. of the S with solvent so that the material can be reused. A gas velocity of 100 mm. per sec. can be used instead of the 5-7 mm. max. with boxes. The removal of  $H_2S$  from 100,000 cu. m. gas per 24 hrs. requires 2 tower purifiers each 6 m. high and 3.85 m. in diam., having a cross section of only 25 sq. m. as compared with 200 sq. m. for boxes. The tower size is selected so that the purifying material in the lower part of the tower, contg. approx. 45% S, can be removed every 3 days and fresh material added at the top of the tower. This insures good purification. Costs are given. Also in *Colliery Guardian* 148, 151-3 (1934).

R. W. Ryan  
**The theory of small gas governors.** W. E. Benton. *Gas J.* 205, 314-20(1934); *Gas World* 100, 131-6.—Both the const.-pressure and the const.-vol. type are discussed. In contrast to the former, which can be made to offer a negligible resistance at low applied pressures, the const.-vol. type always opposes a considerable resistance to flow.

P. J. Wilson, Jr.  
**Improved hookup method in vent lines permits accurate gas measurement with Pitot tube.** C. M. Rader and R. A. Feemster. *Oil and Gas J.* 32, No. 31, 15-16(1933).—R. and F. describe the type of Pitot tube which gives the most accurate result. Formulas and diagrams are given which are used in the calcs. of the gas flow.

J. R. Strong  
**Liquefied-gas progress and problems.** Charles E. McCartney. *Petroleum World* 31, No. 1, 41-3(1934).

Rmma E. Crandal  
**A charcoal-gas plant.** H. H. Andrews. *Agr. Gas. N. S. Wales* 44, 869-74(1933).—An app. suitable for the manuf. of fuel for tractors is described.

K. D. Jacob  
**Production of vapor-phase gum for pilot tests by continuous addition of nitrous oxide to city gas.** J. A. Perry. *Am. Gas. Assoc. Monthly* 16, 64-6, 70(1934).—An accelerated test for comparing new gas controls or pilots with regular Rutz lighters is secured by the addn. of a small but controlled quantity of NO to the gas stream and the aging of the mixt. for 2 hrs. before it reaches the devices under test. With Philadelphia city gas a concn. of approx. 10 g. NO per million cu. ft. appears sufficient to cause ordinary Rutz lighters to become inoperative in 20-4 hrs. In order to facilitate control of the NO it is dild. with O-free N to a concn. of 1%.

P. J. Wilson, Jr.  
**The washing of gas.** H. Hollings and L. Silver. *Gas J.* 205, 307-11(1934); *Trans. Inst. Chem. Engrs.* (London) Advance copy Jan. 31, 1934, 3-17.—The theory of gas washing in those cases to which Henry's law applies is reviewed. The difficulty in obtaining satisfactory distribution of the liquid limits the effective use of tower scrubbers as countercurrent washers to those operations in which a large quantity of liquid is used in relation to the vol. of gas washed.

P. J. W., Jr.  
**Multi-stage washers.** L. Silver. *Gas J.* 205, 372-9(1934); *Trans. Inst. Chem. Engrs.* (London) Advance

copy Jan. 31, 1934, 18-35.—Equations are developed for the design of the washers. The importance of the different factors is indicated by graphs and tests. Design of washers for  $NH_3$ ,  $C_2H_6$  and  $C_4H_{10}$  recovery is discussed.

P. J. Wilson, Jr.

**The position of gas-works by-products in Australia.** R. S. Andrews. *Gas J.* 205, 206-7, 260-61(1934); *Gas World* 100, 142-5.—The markets and uses for coke and its by-products are discussed. *Tar has been cracked to gas in an exptl. installation of 4 retorts with a throughput of 50 gal. per day. The tar is distd. to coke in the 2 top retorts, and the vapors mixed with steam go on to the lower but hotter ones where cracking to gas and a tar similar to that obtained by cracking tar in a water-gas generator occurs. Per gal. of tar 55 cu. ft. of 1400 B. t. u. gas, 1.6 lb. of pitch coke, 0.1 gal. of crude benzene and 0.26 gal. residual tar are produced. Two methods for distinguishing between good and bad road tars, both complying with specifications, are suggested: (1) A 1-mm. layer of tar is exposed at 150° in a humid atm. to ultra-violet light from a soft C arc at a distance of 12 in. for 20 hrs. A sheet of "Vita" glass is interposed between the sample and the arc. After this treatment the penetration of a standard needle, 100 g. at 5 sec., shall not be less than 50 at the temp. at which the penetration of the original sample was 100. (2) An ultramicroscopic examn. of the no. and state of the C particles per unit vol. is made. The more C particles, the better suited is the tar for road-binding purposes.*

P. J. Wilson, Jr.  
**Condensation of coke-oven gas by cooling to -185° under various pressures.** P. K. Sakmin. *Coke and Chem.* (U. S. S. R.) 1932, No. 10, 48-55.—Linde's process is compared with Claude's process to det. which is more suitable for producing  $N_2-H_2$  gas mixt. from coke-oven gas for  $NH_3$  synthesis. Lab. expts. were performed to det. the purity and yields of  $N_2-H_2$  gas mixt. The coke-oven gas (percentage compn.:  $CO = 0.9$ ; olefins = 1.6;  $O_2 = 0.5$ ;  $CO_2 = 4.8$ ;  $H_2 = 53$ ;  $CH_4 = 21$ ;  $N_2 = 18.2$ ) was cooled to -185° and data were taken for pressures varying from 0-100 atms. The results are given in the form of tables and curves. At a pressure of 28 atms. (condition similar to Claude's process = 25 atms.) the soly. of the  $N_2-H_2$  gas mixt. in the condensate is so great that the yield of the mixt. is only 45%; the product contains 0.9% impurities. Condensation under 10 atms. (pressure used by Linde's process) gives 50%  $N_2-H_2$  contg. 2.4% impurities; by washing the mixt. in liquid  $N_2$  impurities are reduced to 0.4% with a very small loss in  $H_2$  of the mixt. It is concluded that Linde's process has advantages over that of Claude. Besides higher yields in  $N_2-H_2$  gas mixt. free from contact poisons the former does not require expensive high-pressure app. necessary for synthesis of  $N_2-H_2$  produced by the latter.

James Sorrel

**Determination of hydrogen and methane in coke-oven gas from heating value and density.** R. Mulsow. *Glückauf* 69, 1092-4(1933).—Density and heating value vary widely with H and  $CH_4$  content. By assuming 0.97 for the d. of CO, N and O and correcting for  $CO_2$ , equations are derived on the basis of which charts are drawn giving direct readings for H and  $CH_4$ . The probable error for H is 0.7%, that for  $CH_4$  1.2%.

J. D. Davis

**Determination of benzene in crude and purified gas with active carbon.** R. Kattwinkel. *Glückauf* 69, 853-4(1933).—Crude gas is desulfurized by treatment with  $Fe_2O_3$  before adsorption of light oil on active C. For accurate results it is not necessary to remove  $C_6H_6$ . The benzene remaining in industrially purified gas, unlike that in crude gas, contains olefins, which should be removed by washing with  $H_2SO_4$  (sp. gr. 1.84) before adsorption of benzene on active C. The yield so obtained can be applied directly as a correction to that industrially obtained. The purification and absorption train contains units in the following order: tar filter  $\rightarrow H_2S$  remover  $\rightarrow H_2SO_4 \rightarrow H_2O \rightarrow 1:3 KOH \rightarrow H_2O \rightarrow$  active C  $\rightarrow$  gas meter. The gas sample is taken at the rate of 150 l. per hr.

J. D. Davis

**The new benzene plant at Warrington.** A. Cook. *Gas*

*World 100*, 137-8(1934); *Gas J.* 205, 306.—The plant recovers 2-3 gal. of 80% benzene per ton of coal carbonized in Woodall-Duckham vertical retorts (16,870 cu. ft. of 470 B. t. u. gas per ton). Detns. of the heating value of the gas before and after passage through the benzene plant show a loss of 16 B. t. u. P. J. Wilson, Jr.

**Carbonic acid removal—is it worth while?** William Wilson. *Gas World 100*, 105(1934).—By removal of 5% CO<sub>2</sub> from coal gas the heating value is increased approx. 10% and the capacity of the mains 25%. The CO<sub>2</sub> is completely removed by washing the gas with a soln. of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> to form NH<sub>4</sub>HCO<sub>3</sub>. The soln. is regenerated by heating to between 57° and 98° before returning to the absorber. P. J. Wilson, Jr.

**A simple laboratory method for the assessment of the combustible nature of coke.** H. E. Blayden, W. Noble and H. L. Riley. *Gas World 100*, 106-10(1934).—See C. A. 28, 1841'. P. J. Wilson, Jr.

**Determination of the extent of outgassing of cokes.** Ladislaus Sümegi. *Gas u. Wasserfach 76*, 921-2(1933); cf. Ludewig, C. A. 28, 609'.—The gas evolved in the L. test for degree of outgassing of cokes is similar in compn. to a water gas of low heating value, regardless of the coke origin, whereas it would be expected to resemble gas evolved during the latter part of the carbonization period, which is much higher in H. S. attributes the evolution of these gases to the effect of water from coke quenching and to adsorption, and states that this method is not well adapted for detg. the degree of carbonization of coke. Reply. Walter Ludewig. *Ibid.* 922-3.—The purpose of the investigation was not to find out the compn. of the gas given off by coke but to develop a reproducible volumetric method for detg. the degree of carbonization. Any such method will be affected somewhat by the adsorption of gases, but this does not affect its value. The resemblance of the test gases to poor water gas is accidental. The cokes that would adsorb the most gases are the porous, poorly carbonized cokes, which would also give off large vols. of gas, so that the values for various cokes are still relative. R. W. Ryan

**The Mueller under-burner compound coke oven.** W. Mueller. *Gas u. Wasserfach 77*, 7-10(1934).—The various Mueller patents relating to coke-oven construction are reviewed. Advantages of the oven designs claimed in these patents are regenerative heating of the air and gas in parallel currents, mixing in short connecting nozzles discharging directly into the heating flues, convenient and exact regulation of fuel gas and air throughout the whole length of the oven wall, min. use of fuel gas, short coking time, better coke due to uniform heating, highest oven temp. permissible for a given coal, absence of burner stoppages, easy access to and control of flues and regenerators and highest thermal efficiency. R. W. Ryan

**Use of town gas in the Brit. glass industry (Roskill) 19.** Fuel economy in the glass industry (Brownlie) 19. Extn. app. [for coal] (Peters) 1. Paints for gas-works plant (Lawrence) 26. Lead paint for gas works (Williams) 26. Bitumens [and tars] in the paint industry (Hadert) 26. Pössneck sewage clarification plant with relation to city gas supply (Waldmann) 14. Mill for grinding coal (U. S. pat. 1,944,755) 20.

**Meldau, Robert, and Stach, Erich:** Feinbau und Staublagerungen unter besonderer Berücksichtigung des Kohlenstaubs. Berlin: V. D. I.-Verlag. 20 pp. M. 2.25.

**Rosendahl, Fritz:** Steinkohlenteer. Dresden: Th. Steinkopff. About 160 pp. About M. 10.

**Rosin, Paul, Rammier, Erich, and Doerffel, F.:** Die Asche im Braunkohlenrostbetrieb. Berlin: V. D. I.-Verlag. 25 pp. M. 2.20.

**Rosin, Paul, Rammier, Erich, and Sperling, K.:** Korngrößenprobleme des Kohlenstaubes und ihre Bedeutung für die Vermahlung. Berlin: V. D. I.-Verlag. 25 pp. M. 1.50.

**Rother, Josef:** Rauch- und Kohlenoxydgas-Belästigungen. Breslau: Paul Steinke. 23 pp. M. 1.

**Analytische Methoden für die Untersuchung von Kokereigas.** 2nd ed., edited by W. Wunsch and H. Seebaum. Essen: Vulkan-Verlag. 52 pp. M. 8.80.

**The Manufacture of Gas.** Edited by H. Hollings. Vol. I. Water Gas. By R. H. Griffith. London: E. Benn, Ltd. 260 pp. 36s. Reviewed in *Gas World 100*, 185(1934).

**The Story of Coal.** Chicago: Museum of Science & Industry. 103 pp.

**Fuel oil.** A. R. Lindblad. Swed. 77,129, May 2, 1933. Wood, peat, lignite or other materials of similar chem. compn. or products derived from such materials are heated under pressure together with a substance capable of chemically binding or absorbing CO<sub>2</sub> and in the presence of a catalyst. Cf. C. A. 27, 3070.

**Apparatus for filtering and separating water from hydrocarbon motor fuels.** Wm. C. Child and Gustav A. Beiswenger (to Standard Oil Development Co.). U. S. 1,943,811, Jan. 16. Various structural and operative details are described.

**Dust-preventing compositions for solid carbonaceous fuels.** Standard Oil Development Co. Brit. 400,009, Oct. 19, 1933. See Fr. 756,567 (C. A. 27, 4654).

**Vertical-retort for continuous carbonization of fuels.** Heinrich Koppers G. m. b. H. (Josef Daniels, inventor). Ger. 590,348, Jan. 3, 1934 (Cl. 10a. 36.01).

**Destructive hydrogenation of fuels.** I. G. Farbenind. A.-G. (Ernst Hochschwender, inventor). Ger. 590,098, Dec. 22, 1933 (Cl. 12a. 1.05). Solid fuels of high water content are mixed with a heavy oil and treated at a raised temp., e. g., 300-360°, with an inert gas or vapor, e. g., N or steam, until all or most of the water has been removed. The mixt. is then passed directly to the hydrogenation app.

**Destructive hydrogenation.** The Gas Light and Coke Co., Roland H. Griffith, Robert N. B. D. Bruce and Samuel G. Hill. Brit. 400,628, Oct. 27, 1933. The destructive hydrogenation of carbonaceous materials is conducted in the presence of basic oxygenated salts of Ti as catalysts, e. g., basic Ti vanadate, molybdate, chromate or tungstate. Cf. C. A. 27, 3805.

**Distillation of bituminous materials.** S. V. Bergh. Swed. 70,822, March 28, 1933. Bituminous slate, coal and similar materials are heated in vertical retorts under successively increased temp. with introduction of steam or inert gases or both in the lower part of the retort. The distn. residues are taken out from the open bottom end of the retort and passed down into a combustion chamber, the heat developed being used for heating the retorts and for production and heating of the steam, or heating of the inert gases to be introduced into the retorts. Cf. C. A. 27, 3069.

**Washing coal.** Wm. R. Chapman. Brit. 400,644, Oct. 23, 1933. Before treatment to remove adventitious matter and reduce the ash content the coal is given a preliminary washing with H<sub>2</sub>O to remove only the very finely divided argillaceous and like particles, the H<sub>2</sub>O and particles being preferably drained from the coal through a very fine-meshed screen. The coal may first be crushed and screened and then subjected to an air blast to remove some of the clay, etc.

**Apparatus for washing coal, ores, etc.** The Clean Coal Co. Ltd. Ger. 590,429, Jan. 4, 1934 (Cl. 1c. 1.01). See Brit. 341,863 (C. A. 25, 4691) and 361,906 (C. A. 27, 590).

**Flotation separation of fusain, etc., from coal.** Wilhelm Schäfer and Willy Mertens (to Erz- und Kohle-Flotation G. m. b. H.). U. S. 1,944,529, Jan. 23. A froth producing reagent such as a flotation oil is used together with a polyhexose such as starch or dextrin which has been pretreated with HCl and serves to depress the durain, vitrain and clarain but not the fusain.

**Gravity separation apparatus for use in removing fine material from the circulating liquid in the sand-flotation process for cleaning coal, etc.** Thomas Chance. Brit. 400,346, Oct. 26, 1933.



**Apparatus (with a rotatable interiorly-heated hollow drum) for carbonizing coal, etc.** Henry O. Loebell (to Henry L. Doherty). U. S. 1,944,749, Jan. 23. A flexible conveying belt which may be formed of woven wire carries material to be carbonized into contact with the exterior of the drum. Various structural, mech. and operative details are described.

**Low-temperature distillation of coal.** Arthur V. Abbott. U. S. 1,943,291, Jan. 16. Bituminous coal is passed through a distn. chamber in one retort at a comparatively low temp.; the coal is then passed through a distn. chamber of a 2nd retort subjected to a higher temp., thence through the distn. chamber to a 3rd retort at a still higher temp. The liquid and vapors produced from each retort are separately collected from its discharging end, and the hot coke produced is quenched by water within the discharge end of the 3rd retort. The gases produced, commingled with vapors from the quenching operation, are passed to a container, and coke and liquid by-products are separately collected. App. is described.

**Apparatus for low-temperature distillation of coal.** Compagnie internationale de carbonisation. Belg. 397,011, July 31, 1933.

**Tubular apparatus for distilling fine coal.** Kohlenveredlung und Schwelwerke A.-G. Ger. 590,050, Dec. 21, 1933 (Cl. 10a. 33.01).

**Furnace for distilling coal.** Soc. Seedorff-Barfred-George. Fr. 755,521, Nov. 25, 1933.

**Chamber oven for coal distillation.** Carl Still. U. S. 1,943,562, Jan. 16.

**Coal feeding and distillation apparatus for producing coke and gas.** Wm. A. Riddell (to Frederick Iron & Steel Co.). U. S. 1,944,192, Jan. 23. Structural, mech. and operative details.

**By-product recovery from coal-distillation plants.** Stuart P. Miller (to Barrett Co.). U. S. 1,944,130, Jan. 16. Hot fresh coal-carbonization gases are cooled in successive steps, one step being regulated to sep. a heavy tar; the cooler is flushed with tar or pitch during the sepn. of the heavy tar, while there is retained in the gases a substantial quantity of pitch constituents; in a subsequent step a tarry oil contg. such pitch constituents is sepd., this tarry oil is distd. to pitch, and the pitch is blended with the heavy tar. App. is described.

**Treating gases such as those from coal distillation.** Stuart P. Miller (to Barrett Co.). U. S. 1,944,523, Jan. 23. The hot gases are brought into intimate contact with tar or pitch to be distd. and then subjected to elec. pptn. to sep. suspended pitch particles; the surfaces of the app. on which the pitch particles are deposited are flushed with tar or pitch. App. is described.

**Apparatus for cooling and after-drying dried brown coal.** Kurt J. Menning. Ger. 590,467, Jan. 4, 1934 (Cl. 10b. 9.04).

**Apparatus for wet carbonization of peat.** D. W. Berlin. Swed. 78,054, Aug. 15, 1933. An aq. pulp of raw peat is pumped in succession through a heat-exchanging preheater and a wet-carbonization furnace; from this the hot pulp is returned to the heat-exchange app. to preheat the raw peat. Cf. C. A. 24, 2276.

**Improving combustion.** G. Vaudevelde. Belg. 392,158, April 29, 1933. The following products are prepd.: (1) a mixt. of  $\text{KClO}_3$ ,  $\text{NaCl}$ ,  $\text{Fe}$  carbonate,  $\text{Na}_2\text{CO}_3$  and  $\text{NaNO}_3$ ; (2) a mixt. of  $\text{KMnO}_4$ ,  $\text{NH}_4\text{NO}_3$  and  $\text{HC}_2\text{O}_4\text{K}$ ; (3) vegetable charcoal; the 3 products are mixed and sprinkled over the previously moistened fuel.

**Furnace, boiler and steam superheater.** Ralph M. Hardgrove (to Babcock & Wilcox Co.). U. S. 1,944,234, Jan. 23.

**Shell and tube heat-exchange apparatus suitable for use with steam as a superheater.** John A. Potter (to Westinghouse Elec. & Mfg. Co.). U. S. 1,943,456, Jan. 16. Structural features.

**Fuel gas.** Bamag-Mequin A.-G. Ger. 590,378, Dec. 30, 1933 (Cl. 24e. 2.01). Addn. to 479,028 (C. A. 23, 4804). The cooling gas used according to Ger. 479,028 is replaced by a vaporizable liquid introduced with the aid of a compressed gas.

**Gas-purifying compositions.** I. G. Farbenind. A.-G. Brit. 400,387, Oct. 26, 1933. Desulfurization masses comprise a mixt. of hydrated  $\text{Fe}$  oxide with a binding agent in the presence of an alkali metal bicarbonate and  $\text{H}_2\text{O}$ , the mixt. being heated before use. The binding agent may comprise magnesia cement,  $\text{CaO}$  or gypsum, 25 parts binder being mixed with 75  $\text{Fe}$  oxide and 0.5 part  $\text{NH}_4\text{HCO}_3$  added.

**Desulfurizing fuel-distillation gases, etc.** C. Otto & Co. G. m. b. H. Ger. 590,287, Jan. 10, 1934 (Cl. 26d. 9.04). Gases contg. a relatively high proportion of  $\text{H}_2\text{S}$  and relatively little  $\text{NH}_3$  are washed first with a liquid which dissolves a part of the  $\text{H}_2\text{S}$ , and then in known manner with a polythionate soln. contg.  $\text{SO}_3$ , whereby  $\text{NH}_3$  and residual  $\text{H}_2\text{S}$  are removed. The  $\text{SO}_3$  taken up by the gas is then removed by washing the gas with the  $\text{H}_2\text{S}$  soln. obtained in the first washing. App. is described. Cf. C. A. 27, 1144.

**Continuous-diffusion apparatus for testing fine gases, etc.** Aktiebolaget Carba. Ger. 577,485, Dec. 27, 1933 (Cl. 42l. 4.12).

**Apparatus for vaporizing paraffin oil, benzene, etc., for diffusion in gas mains.** Francis C. White. Brit. 400,359, Oct. 26, 1933.

**Gas producers.** Whitfield Gas Producer Patents Ltd. and John N. Williams. Fr. 755,766, Nov. 30, 1933.

**Gas-producer plant.** Babcock & Wilcox Ltd. Brit. 400,881, Nov. 2, 1933.

**Water-gas producer.** C. Otto & Co. G. m. b. H. Fr. 755,677, Nov. 28, 1933.

**Water-gas plant.** The Power-Gas Corp. Ltd., Niels E. Rambush and James MacK. Ballingall. Brit. 400,857, Nov. 2, 1933.

**Apparatus for making carbureted water gas.** Main-Gaswerke A.-G. and Ernst Schumacher. Ger. 590,419, Jan. 3, 1934 (Cl. 24e. 2.07). Addn. to 479,029 (C. A. 23, 4804).

**Means for cooling tuyères and other hot parts of gas producers, etc.** Compagnie générale des Gazogènes Imbert. Ger. 590,068, Dec. 22, 1933 (Cl. 24e. 10.01).

**Apparatus for making gas from liquid fuel and air.** John Whitehart. U. S. 1,944,818, Jan. 23. Various structural and operative details.

**Apparatus for producing compressed gas from liquefied gas.** Alphonse Vergé. Ger. 590,029, Dec. 21, 1933 (Cl. 17g. 5.02).

**Apparatus for producing gas from vegetable waste matter, trash, etc.** Charles R. Hemenway. U. S. 1,943,311, Jan. 16. Structural details.

**Gas generator suitable for producing gas from gasoline, etc.** Wm. H. Cheney. U. S. 1,944,544, Jan. 23. Structural and operative details.

**Gas generators with a fuel-supply shaft and a converter shaft superposed on a grate chamber or producer.** F. C. White. Brit. 400,727, Nov. 2, 1933.

**Gas holders.** Harry H. Hollis. Brit. 401,060, Nov. 9, 1933.

**Piston-type gas holders.** Ashmore, Benson, Pease & Co. Ltd., and Harold E. Bloor. Brit. 400,543, Oct. 26, 1933.

**Piston-type gas holders.** Bamag-Mequin A.-G. Brit. 400,864, Nov. 2, 1933.

**Removing acetylene from gases.** Herbert P. A. Groll and James H. Burgin (to N. V. de Bataafsche Petroleum Maatschappij). Brit. 400,054, Oct. 19, 1933.  $\text{C}_2\text{H}_2$  is removed from gaseous mixts. by absorption in 1 or more polyglycols, their ethers, esters and mixed ether-esters. The  $\text{C}_2\text{H}_2$  may be recovered by heating, and (or) reducing the pressure over the soln.

**Storing acetylene and like explosive substances.** Alfred Burgeni and Reginald O. Herzog. Ger. 590,497, Jan. 4, 1934 (Cl. 26b. 44.20). Porous fillers for vessels for storing  $\text{C}_2\text{H}_2$ , etc., are prepd. by coagulating and granulating a foam produced from a mixt. of a cellulose soln. and a pulverulent or fibrous material, e. g., kieselsoln. or peat.

**Removing phenols from gas liquor.** C. Otto & Co. G. m. b. H. Ger. 590,476, Jan. 2, 1934 (Cl. 85c. 1).

Addn. to 431,244. Phenols are extd. from gas liquor by means of benzene or its homologs, or mixts. thereof with  $\text{C}_2\text{HCl}_3$ , during or directly after the distn. of free  $\text{NH}_3$  from the liquor but before the distn. of fixed  $\text{NH}_3$ . App. is described.

**Removing phenols from ammonia liquors.** Herbert B. Cobb (to Smet-Solvay Co.). U. S. 1,943,653, Jan. 16. In a process in which the liquor is brought into contact with a phenol-extg. medium such as a light oil, a body of the latter is maintained in the extn. vessel (of a described app.) and fresh extg. medium is introduced into the lower portion of the vessel and phenolated medium is withdrawn from the upper portion, the liquor treated being introduced into the vessel above the surface of the extg. medium so that it is distributed over the surface and caused to pass downwardly through the extg. medium. Cf. C. A. 27, 5948.

**Saturator for making ammonium sulfate from coal gas.** Heinrich Koppers A.-G. Ger. 590,028, Dec. 30, 1933 (Cl. 12k. 2).

**Ammonium thiocyanate from fuel-distillation gases.** Ges. für Kohlentchnik m. b. H. (Walter Klempt, inventor). Ger. 590,310, Jan. 2, 1934 (Cl. 12k. 11). Addn. to 565,408 (C. A. 27, 1105). Complex Ni-CN compds. formed in the process of Ger. 565,408 are decompd. by periodic addn. of  $(\text{NH}_4)_2\text{S}$  to the washing liquor. The  $(\text{NH}_4)_2\text{S}$  may be formed *in situ* by periodically reducing the temp. of the liquor. S may be added instead of  $(\text{NH}_4)_2\text{S}$ , and may be produced by withdrawing and aerating a portion of the liquor. Details are given.

**By-product recovery from hot coke-oven gases.** Stuart P. Miller (to Barrett Co.). U. S. 1,944,129, Jan. 16. The gases from a plurality of ovens are collected in a gas collector main while still hot and subjected in this main to regulated cooling to produce a tar with a m. p. between  $32^\circ$  and  $46^\circ$ ; the gases leaving the collector main are cooled to sep. a tarry oil from them, and this tarry oil is distd. App. is described.

**Tar acids from coal-tar distillates.** Wm. C. Cooper (to

Barrett Co.). U. S. 1,944,681, Jan. 23. For obtaining tar acids, the distillates are treated with alkali to convert the tar acids to alkali phenolates, the latter are sep'd. and the tar acids are liberated from them by use of  $\text{CO}_2$ , the liberated tar acids are washed with water to remove phenolates, carbonates and other water-sol. impurities, and the resulting wash water is sep'd. and used in a preceding stage of the process.

**Tar acids.** Stuart P. Miller (to Barrett Co.). U. S. 1,944,131, Jan. 16. See Can. 332,445 (C. A. 27, 4061).

**Agglomerated semicoke and similar products.** Soc. générale de fours à coke système Lecocq. Belg. 396,722, July 31, 1933. The hearth of the oven is heated to a higher temp. than the vertical walls, so as to form, in the immediate neighborhood of the hearth, a cake of overburned semicoke, or even of coke, offering but slight resistance to discharge from the oven. This is effected by providing a heating duct the full length of the hearth.

**Coke oven.** C. Otto & Co. G. m. b. H. Ger. 590,211, Dec. 28, 1933 (Cl. 10a. 13).

**Regenerative coke oven.** Josef Schaefer. U. S. 1,943,558, Jan. 16.

**Heating device for regenerative coke ovens.** Collin & Co. Ger. 588,507, Nov. 23, 1933 (Cl. 10a. 5.20).

**Coke-oven charging apparatus.** Carl Still. U. S. 1,943,034-5, Jan. 16. Structural and mech. features.

**Means for compressing coal in discontinuously operated coke ovens.** Gustav Hilger. Ger. 590,306, Dec. 30, 1933 (Cl. 10a. 15). Addn. to 587,035 (C. A. 28, 883).

**Coking coal.** C. Otto & Co. G. m. b. H. Ger. 588,562, Nov. 29, 1933 (Cl. 10a. 22.01). In coking coal which develops a high pressure during the process, the coal is preheated till the whole of it is at  $300^\circ$ . This prevents excessive local pressures during the coking process.

**Means for withdrawing volatile distillation products from vertical coke-oven chambers.** Carl Still G. m. b. H. Ger. 590,157, Dec. 27, 1933 (Cl. 10a. 19.02).

**Apparatus for dry-cooling coke.** Heinrich Koppers A.-G. Ger. 590,049, Dec. 23, 1933 (Cl. 10a. 17.04).

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

**Chemical investigation of Italian petroleum.** Aldo Campa. *Chim. ind. agr. biol.* 9, 438-41(1933).—Crude petroleum from Montecchino, which contains no asphalt, gives 34% gasoline. Salsomaggiore petroleum contains 27.5% light oils; that from Ozzano 36.8%; and that from Velleja 54.4%. They contain methyl- and dimethylcyclopentane, cyclohexane and  $\text{C}_6\text{H}_6$ . Petroleum from S. Giovanni-Incarico has d. 0.970, contains 1-2% S and traces of cumene; that from Pico has d. 0.840 and contains  $\text{H}_2\text{S}$  and mercaptans; that from Ripi has d. 0.935 and contains 0.7% S and about 18% bitumen.

**G. A. Bravo**  
**Yields from crude petroleum.** L. Codarcea. *Ann. mines Roumanie* 16, 329-37(1933); *Chimie & industrie* 30, 1319.—A discussion of lab. methods for detg. the com. value of crude petroleum through the yields of the products.

A. Papineau-Couture

**Holley-Mott continuous countercurrent washery as applied to petroleum products.** E. Thornton. *J. Inst. Petroleum Tech.* 19, 957-70(1933).—In the Holley-Mott washery, for use in oil-treating plants, a vertical shaft with three blades in a horizontal plane at the bottom serves for mixing the oil and treating agent. Sepn. by settling is preferred, and countercurrent flow is maintained merely by gravity through the series of vessels all set on the same level. This is due to the differences in sp. gr. between the treated oil, the sep'd. treating agent and the mixts. of the two. Maintenance costs are extremely low. E. E. C.

**Petroleum coke.** Břetislav G. Simek. *Mit. Kohlenforschungsinst. Prag* 1933, 482-4.—Results of expts. on coke from Grozny petroleum, showing that coke is a very valuable fuel and not to be underrated as a competitor of other fuels. Marion E. Headington

**Petroleum coke suitable raw material for making activated carbon.** A. L. Nugey. *Refiner Natural Gasoline Mfr.* 13, 49-53(1934).—A general survey of activated carbons is given. Petroleum coke is activated by a preliminary carbonization in a revolving closed retort heated to  $300^\circ\text{F}$ . and contg. the activating chemicals, followed by a secondary carbonization in the same retort at  $800^\circ\text{F}$ ., cooling, washing, acid treatment with 50% acid, washing and drying with exhaust steam. Such a C contains only 1.0% ash and presents a large absorbing surface. It can be produced for about \$0.03 per lb. including labor, reagents, fuel, fixed charges and maintenance. A one-ton plant would cost approx. \$10,000. The yields are 40-60% of the input. The ash content of competitive carbons varies from 3.0 to 30.0% and the wt. in lb. per cu. ft. varies from 12 to 34. Petroleum activated C weighs 20 lb. per cu. ft. J. L. Essex

**Destructive hydrogenation of petroleum hydrocarbons.** W. J. Sweeney and Alexis Voorhies, Jr. *Ind. Eng. Chem.* 26, 195-8(1934).—Based upon the thermodynamic data of pure hydrocarbons, simple hydrogenation without accompanying pyrolysis and destructive hydrogenation with accompanying pyrolysis are discussed. The effects of H pressure and reaction temp. in both types of hydrogenation are shown graphically. Destructive hydrogenation and ordinary cracking of petroleum oils are compared in respect to gasoline yields. The H content of virgin, cracked and hydrogenated petroleum fractions is graphically presented as a function of the b. p. and A. P. I. gr. Highly refractory and H-deficient gas oils have given yields of 115% by vol. of stable gasoline. The prime requisite of a catalyst for hydrogenation is that it shall be S-resistant. Catalysts are available now

for high-temp. and for low-temp. hydrogenations. A new low-temp. catalyst developed by I. G. Farbenindustrie permits hydrogenation at 343–427° and at a high rate, with resultant high volumetric yield of gasoline of high octane value. Such a catalyst must also possess splitting power as well as hydrogenating power. S, O and N in the oils are removed as  $H_2S$ ,  $H_2O$  and  $NH_3$ . J. L. E.

**Decomposition of saturated petroleum hydrocarbons under oxidizing conditions at low temperatures.** A. W. Burrell. *Ind. Eng. Chem.* 26, 204–7 (1934).—A description of the liquid-phase oxidation, mostly by means of air, of hydrocarbons derived from various petroleum sources, under controlled conditions of temp. and pressure; the temp. is always maintained considerably below the thermal decompn. temp. of the hydrocarbon. The oxidation reactions in the hydrocarbons at cracking temp., and those oxidation reactions taking place where ozone or other O-addition compds. have been formed with unsatd. hydrocarbons and subsequent heating, are discussed briefly. The main reaction involves the entrance of the O at the  $\beta$ -carbon atom of the chain. After other O atoms are introduced this  $\beta$ -carbon atom loses H atoms to become a ketone group and later on the whole mol. splits at the ketonic linkage into two acids, formic acid for one and a high mol. weight acid for the other. Ester formation is less marked in oxidation of paraffin wax than in most distillates. J. L. E.

**Pyrolysis of saturated hydrocarbons.** F. E. Frey. *Ind. Eng. Chem.* 26, 198 203 (1934).—A review of the literature on primary decompn. reactions is given. Paraffins decompose chiefly into simpler complementary olefins and paraffins. High decompn. temps. favor the formation of complementary olefins and  $H_2$ . Two mechanisms are proposed to explain the reactions. Surface catalysis causes dehydrogenation paraffins to corresponding olefins or degradation to  $C$ ,  $H_2$  and  $CH_4$ . The cyclohexanes are converted to corresponding aromatic compds., while the other cycloparaffins form various rearrangement products. J. L. E.

**Kinetics and mechanism of decomposition of hydrocarbons.** A. I. Dintzes. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1933, 153–7.—The cracking expts. were carried out in a copper-lined iron tube immersed in a metal bath. The substance was first brought almost to cracking temp. and then passed through the copper-lined tube. Hexane was heated to 525–565° for 6–90 sec., octane to 496–570° for 0–130 sec., and 2,5-dimethylhexane to 492–576° for 3–38 sec. The cracked products were analyzed (data are tabulated). The reactions are (a)  $C_nH_{2n+2} \rightleftharpoons CH_4 + C_{n-1}H_{2n-2}$  and (b)  $C_nH_{2n+2} \rightleftharpoons C_2H_6 + C_{n-2}H_{2n-4}$ , and to some extent (c)  $C_nH_{2n+2} \rightleftharpoons C_3H_8 + C_{n-3}H_{2n-6}$  and (d)  $C_nH_{2n+2} \rightleftharpoons H_2 + C_nH_{2n}$ . Hexane decomposes mainly according to (a) and (b), slightly according to (c) and (d). For octane the reactions are 80–90% according to (a). 2,5-Dimethylhexane decomposes 75–80% according to (a). In each reaction the olefin formed is subjected to a rapid further decompn. according to (e)  $C_{n+m}H_{2n+2m} \rightarrow C_nH_{2n} + C_mH_{2m}$ . For hexane the reaction (e) proceeded to 40–60%, for octane to 60–70% and for 2,5-dimethylhexane to 50–70%. The consts. of the primary decompn. depend upon the temp. and were for hexane at 525–565°  $\log K_1 = 14.58 - (14100/T) \pm 0.06$ , for octane  $\log_{10} K_1 = 14.70 - (14100/T) \pm 0.09$  (495–570°), and for 2,5-dimethylhexane  $\log_{10} K_1 = 6.553 - (7215/T) \pm 0.05$  (490–575°). The activation energies of the primary decompn. of both hexane and octane are accordingly 64,500 and that of 2,5-dimethylhexane is 33,000 calories. The best explanation of the above phenomenon is given by Rice (*C. A.* 25, 2967). A. A. B.

**Sulfonic acids formed in the refining of mineral oils.** R. Fusteig. *Chimie & industrie* 30, 1027–33 (1933).—The work of Holzmann and of von Pilat is reviewed. Tar freed from  $H_2O$  and  $H_2SO_4$  was dissolved in  $C_6H_6$  to remove insol. matter.  $C_6H_6$  was evapd. from the filtrate, the soft, brown residue was taken up in benzene to remove asphaltenes, and the filtrate was treated with milk of lime, which pptd. the Ca salts of the sulfonic acids. The  $Ca$ -sulfonates were insol. in  $H_2O$ ,  $Et_2O$  and benzene.

When they were dissolved in dil. acid and the soln. was treated with benzene, light yellow flakes of a sulfonic acid were pptd. Addn. of  $CH_2O$  to the filtrate from the pptd. black flakes of a sulfonic acid of higher mol. wt.

A. Papineau-Couture  
**Bituminous shales in France.** V. Charrin. *Chimie & industrie* 30, 967–83 (1933).—A description of the method of working bituminous shale deposits and of the principal French deposits, with a discussion of the advantages for France of using them to supply part of her requirements for automotive-engine fuel. A. Papineau-Couture

**Electric condenser process for demulsifying oil.** R. J. Piersol. Ill. State Geol. Survey, *Rept. Investigations* No. 29, 7–38 (1933).—The app. developed consists of 2 concentric electrodes, the outer a metal pipe and the inner a Cu wire enclosed in a glass tube. This glass tube acts as an insulator to prevent the passage of the current through the oil; only the elec. field is set up. A com. unit operates off of a 6 v. storage battery and a Model T Ford spark coil. It has a capacity of 1 bbl. per hr. Tests show that the 3 worst emulsified oils in Illinois can be broken down to less than 0.5% of water by treatment in this app. at 80°F. In districts where elec. power is at hand the app. can be operated by this means. It is fireproof because of sepn. of electrodes. A lengthy discussion of other elec. methods is given. The efficiency of elec. treatment increases at higher temps. but 80°F. was found to be the optimum temp. The essential features of the elec. dehydration consists of coalescence of water globules due to their movement under the influence of an alternating field; hence viscosity has quite an influence upon the speed and travel of these water mols. A very extensive bibliography is included. J. L. E.

**Principles of control of light-oil recovery.** W. Litterscheidt. *Glückauf* 69, 1129–34 (1933).—The law governing absorption of light oil for any given temp. by wash oil is  $P = P_0 (c/78) (u/C)$ , where  $P$  = partial pressure of light oil in the wash oil,  $P_0$  that of light oil in the gas,  $c$  and  $C$  are the percentages of  $C_6H_6$  and wash oil in soln., and  $u$  is the mol. wt. of the wash oil. L. develops charts showing practical washer performance as depending on surface, amt. of wash oil, temp., and relative pressures of  $C_6H_6$  in soln. and in gas. J. D. Davis

**Natural gasoline.** G. R. Hopkins and E. M. Seeley. *Statistical Appendix to Minerals Yearbook, 1932–33, Bur. Mines* 55–65 (1933). Alden H. Emery

**Removal of free sulfur from gasoline by lime and hydrogen sulfide.** Ralph H. Espach, O. C. Blade and H. P. Rue. *Refiner Natural Gasoline Mfr.* 13, 65–9 (1934).—The supernatant liquid removed from a slurry of lime and water through which  $H_2S$  has been bubbled will remove free S from gasolines without forming emulsions. The quantity of S removed appears to be proportional to the percentage of  $H_2S$  added. The sulfides, disulfides and mercaptans are not affected by this soln. Slurries of lime and water alone are not effective; hence  $Ca(SH)_2$  is the active agent. J. L. Esser

**Catalytic hydrogenation of acetylene to gasoline.** A. D. Petrov and L. I. Antzuz. *Refiner Natural Gasoline Mfr.* 13, 79–80 (1934).—Gasoline can be hydrogenated and polymerized easily when in an autoclave under pressure and in the presence of reduced Ni catalyst. The liquid polymer is a gasoline with an end point of 320°F. that contains about 40% of naphthenic hydrocarbons. J. L. Esser

**Application of Raman spectrography to the study of gasoline.** A. Andant. *Chimie & industrie* 30, 1011–19 (1933); cf. *C. A.* 27, 5952.—A detailed account of the Raman spectrographic examn. of 5 different gasolines, which gave the following indications: Sumatra gasoline, b. 111–19°, contained  $C_7H_{14}$ ,  $C_8H_{18}$ ,  $C_9H_{22}$ ; Pennsylvania gasoline, b. 51–143°, contained  $C_6H_{14}$ ,  $C_7H_{18}$ ,  $C_8H_{22}$ , cyclohexane, methylcyclohexane, traces of  $C_6H_6$ ; Borneo gasoline, b. 96.5–227°, contained  $C_6H_{14}$ ,  $C_7H_{18}$ , cyclohexane, cycloheptane, methylcyclohexane, methylcycloheptane; "Esso" gasoline, b. 46.5–188.5°, contained  $C_6H_{14}$ ,  $C_7H_{18}$ ,  $C_8H_{22}$ , cyclohexane, cycloheptane, methylcyclohexane, methylcycloheptane; Mesopotamian gaso-

line, b. 68.5–245°, contained only satd. hydrocarbons, among which  $C_7H_{16}$  and  $C_{10}H_{22}$  were identified.

A. Papineau-Couture

The role of peroxides in the detonation of gasoline engines. Max Serruys. *Compt. rend.* 197, 1592–3 (1933).—By preheating the air to 250° or higher, a one-cylinder engine was caused to knock. With air heated to 310°, a bad, regular knock was produced which continued with a number of explosions after the ignition was turned off. Since peroxides cannot exist above 300°, S. believes that these expts. prove that peroxides are not the sole cause of detonation but only a favorable condition for its appearance. S. believes that this result contradicts Dumanois' conclusions (*C. A.* 27, 5955). *Ibid.* 198, 49–50 (1934).—A correction of the first paragraph of the above paper. Oden E. Sheppard

Combustion in motors. P. Dumanois. *Compt. rend.* 198, 50–1 (1934).—A reply to Serruys' criticism (preceding abstract). D. maintains that Serruys' results are not in contradiction to the peroxide theory of detonation but are explainable on the assumption that at the elevated temps. at which peroxides cannot be formed, the second type of ignition (not due to the spark plugs but ignition of the charge spontaneously) and detonation mentioned by D. (*C. A.* 24, 5498, 5994) take place. O. E. S.

Influence of cracking conditions on the composition and reactivity of cracked benzene. F. Sager. *Petroleum Z.* 29, No. 15, 1–6 (1933).—The gasoline (yield 38%) obtained by cracking Russian mazout in the new type of Dubbs ("full-flashing") plant contained olefins 18.2, aromatic hydrocarbons 48.8, naphthenes 13.5 and paraffins 19.5%, while the corresponding figures for the gasoline (yield 42%) produced in an older type of Dubbs plant were 7.2, 36.1, 16.0 and 40.7%, resp. The main differences in the method of operation responsible for this change in compn. were the rapid and complete removal of the liquid from the reaction chamber, and the increased heat consumption per ton of crude oil. The effects of minor variations in the method of operation are briefly discussed. B. C. A.

Catalytic vapor-phase hydration of ethylene. Frederick J. Sanders and Barnett F. Dodge. *Ind. Eng. Chem.* 26, 208–14 (1934).—The vapor-phase hydration of ethylene has been studied at 360–380° and pressures of 70–135 atms. over  $Al_2O_3$  and  $WO_3$  catalysts with an approx. 1:1 ratio of steam to ethylene. Although yields of ethanol are small, it is produced in significant amts. At 135 atms. pressure considerable polymerization of the ethylene occurs, but at 75 atms. this is prevented. At 400° the conversions of an equimol. mixt. of steam-ethylene are 8.0, 17.0 and 27.5%, resp. for 200, 500 and 1000 atms. For a 10:1 steam-ethylene ratio, the conversions at 400° and 500° atms. would be 29.0%, but the condensate would be quite dil. Lower temps. should give better conversions. No very active catalyst has been developed at present for the vapor-phase hydration of ethylene. To obtain reasonably rapid rates of reactions, temps. must be raised to a point where side reactions become excessive. J. L. E.

Sludge conversion process improves refinery acid recovery. F. J. Bartholomew. *Chem. & Met. Eng.* 40, 642–5 (1933).—This process known as the Hecheubleikner process comprises feeding the refinery acid sludge (light or heavy) into the rear of a rotary kiln where hot gases from burning fuel oil contact it and cause a breaking down of the  $H_2SO_4$  into  $SO_2$ , water and the volatilization and decompn. of the hydrocarbon content of the sludge into lighter gases and coke. The coke is drawn from the front end of the kiln ready for use. It contains 48–50% volatile matter and has a thermal value of 11,000 B. t. u. per lb. The gaseous products of the decompn. pass into scrubbers and condensers where all except the  $SO_2$  are removed. This dry gas is then converted to  $SO_2$  in a catalytic converter and absorbed in 85–93% acid to make 98% acid stock or in 100% acid to make 104% fuming acid stock. The process gives a yield of 90% of the acid charged as sludge. It recovers the acid without any fume nuisance and at a cost of \$4.00 per ton based on 100%  $H_2SO_4$ . Plant requirements are also given. J. L. E.

Design of high-pressure rectifiers. I. N. Beall. *Refiner Natural Gasoline Mfr.* 13, 62–4, 69 (1934).—The necessary changes in columns to take care of the increased pressure are discussed and the calcs. for reboiler heat-transfer surfaces column size, and condenser surfaces, no. and spacing of plates are given. J. L. Essex

The behavior of motor fuels toward sulfuric acid and the determination of the individual hydrocarbon groups. E. Wendehorst and E. Knoche. *Angew. Chem.* 47, 43–7 (1934).—A method was developed which permits the detn. of olefins, aromatic hydrocarbons, naphthenes and paraffins in motor fuels by means of treating with concd.  $H_2SO_4$  in graduated containers. Mixts. of gasoline, benzene, cyclohexane and amylene were prepd. and their reactions with  $H_2SO_4$  studied. Tables and a correction curve are presented which permit the evaluation of the analytical results with consideration of the regularly occurring complications which are designated as "solution mediation." The following combinations are treated: (1) gasoline or benzene, which are analyzed according to the directions given for case (3); (2) mixts. of gasolines and benzene. A mixt. of paraffinic gasoline and benzene is shaken with 100%  $H_2SO_4$  for 1 hr. when all the aromatic constituents are sulfonated and the correction curve will give the aromatic hydrocarbons actually present. If it is desired to obtain a rapid result without correction, then 10% by vol. of pure cyclohexane is added to the mixt. and shaking for 15 min. with 100%  $H_2SO_4$  gives a direct reading. (3) Mixts. of unknown compn. The final b. p. is detd. according to Riesenfeld and Bandtel. Then 100 cc. of the fuel is shaken with 300 cc. of 100% acid for 30 min. If less than 10% naphthenes are present, pure cyclohexane is added to obtain at least that amt. in the mixt. The remaining vol. freed from the acid sludge is redistd. to the same end point and the distillate is measured. The difference with the initial vol. gives the sum (aromatic compds. + olefins). The naphthenes are detd. in the distillate by means of the aniline point. If a residue is obtained in the redistn. which is larger than the previously detd. one, then considerable quantities of olefins are in the fuel, but even without the occurrence of the increased residue olefins may be present. For this purpose another sample is shaken in the graduate with twice its vol. of 85%  $H_2SO_4$ . If a vol. decrease is observed, olefins are present, the amts. of which can be detd. either by vol. decrease or by the vol. of the polymers (redistn.). Alc. addns. do not influence the results of the analysis when 100% acid is used. If olefins are present the alc. must first be removed by extrn. with  $H_2O$ . K. K.

Vacuum distillation applied to lubricating oils. Jules Tilman. *Chimie & Industrie* 30, 518–24 (1933).—A simple, sturdy app. for distg. lubricating oils under high vacuum is described. The table area required is only 50 × 50 cm. Ground-glass joints and rubber connections coated with a celluloid varnish are used. A pump of large capacity compensates for the leakage that may occur through the joints. An oil can be characterized by the trend of its distn. curve and by the mean slope of the curve between 2 arbitrarily selected points; e. g., start of distn. and 80% point. Estimation of the vacuum is made very simple by the use of a Crookes tube. A Pflicker tube reinforces the luminous effects. A. P.-C.

Regeneration of used motor-lubricating oils. T. C. Thomsen, E. Windfeld-Hansen and B. Lévy. *Ingeniøren* 42, No. 32, 29–31 (Aug. 13, 1933); *Chimie & Industrie* 30, 1326.—A discussion of the conditions under which it is economically feasible to reclaim used crankcase oil.

A. Papineau-Couture

A procedure for measuring bleeding of cup greases. Winslow H. Herschel. *Proc. Am. Soc. Testing Materials* 33, Pt. I, 343–7 (1933).—A general description of the app. and the test method is given. Karl Kammermeyer

Contribution to the study of friction in the greasy and semifluid phase. E. Bodart. *Rev. universelle mines* 9, 285–97, 320–9 (1933).—Three kinds of friction are distinguished: dry, without any lubricant, greasy, with an extremely thin film of lubricant—the surfaces feel hardly oily; and fluid or hydrodynamic where a sufficiently thick

layer of lubricant separates the surfaces. The author inserts a semifluid phase between the greasy and fluid phase. The greasy and the semifluid phases were investigated at velocities occurring in practice; i. e., 5–15 m./sec. and at pressures of 2–24 kg./sq. cm. The greasy friction is defined by the value  $V/\sqrt{p} < 0.066$ , where  $V$  is the velocity and  $p$  the pressure. Between 2 and 24 kg./sq. cm. the friction coeff. is independent of the pressure; increasing the temp. up to 100° reduces the friction slightly. The semifluid friction is defined by  $V/\sqrt{p} < 0.066$ . It is more practical to let bearings of machinery operate in the range of the semifluid phase than in the greasy phase in spite of the greater friction coefficient because of the greater reliability of operation and lessened wear. The influence of phys. and chem. factors of the lubricant is not considered in this investigation. Sixteen references.

M. Hartenheim

Some factors involved in the mechanical testing of bituminous mixtures. W. G. Adam and D. G. Murdoch. *Gas J.* 205, 99–102 (1934).—A discussion of the technic for prepg. test specimens from mixts. of mineral aggregates and a bituminous binder and of the tensile, compression and sand-blast attrition tests that shows the conditions necessary for consistent practical results.

P. J. Wilson, Jr.

Proposed method for accelerated weathering tests on bituminous materials. O. G. Strieter, et al. *Proc. Am. Soc. Testing Materials* 33, Pt. I, 381–5 (1933).—The method is intended for detg. the durability of bituminous substances or materials contg. bitumen by producing rapid deterioration of the materials in the lab. under conditions similar to those obtained upon outdoor exposure. The app. required consists of the actual weathering equipment, a trimmer to prep. the bituminous coatings and an instrument to det. the extent of the "weathering" by a cond. test. The app., method of prepg. test panels, test procedure and cond. test are described in detail.

Karl Kammermeyer

Carbonization of "slash." F. Vidron. *2me Congr. intern. carbone carburant* (Milan, Oct., 1932), 180–7; *Chimie & industrie* 30, 1064.—A discussion of the advisability, possibility and advantages of producing charcoal from the "slash" of logging operations.

A. Papineau-Couture

Ailanthus wood charcoal. F. Palazzo. *2me Congr. intern. carbone carburant* (Milan, Oct., 1932), 188–93; *Chimie & industrie* 30, 1064.—Ailanthus wood yields a charcoal that is suitable for various industrial and household uses. Charcoal produced in an old-style vertical retort had the following characteristics: yield approx. 20%,  $H_2O$  3.3–4.4%, ash 2.9–3.2%, volatile matter (including  $H_2O$ ) 8.0, calorific value (Mahler bomb) 7658–7905 cal. Its only drawback is its low d. A. P.-C.

Bitumens and related materials in the paint industry (Hudert) 26. Motor fuel from oil shales (Fisher, Morrell) 21. Petroleum and products are ideal insecticides (Francis) 15. Selection of non-carcinogenic from carcinogenic oils (Twort, Lyth) 11G. Alloy for oil-cracking tubes (U. S. pat. 1,943,782) 9. Filter for oil (U. S. pat. 1,944,550) 1. Denaturant for fats (Can. pat. 338,557) 27.

Anceau: Manuel du graissage. Paris: J. B. Baillière & fils. 336 pp. F. 22.

Bourdiol, Marcel: Contribution à l'étude de la viscosité et de la congélation des huiles. Paris: Gauthier-Villars & Blondel la Rougery. 128 pp. F. 25.

Champaur, N.: Théorie du graissage (Machines, Huiles. Essais). Paris: Delagrave. 196 pp. F. 30.

Falz, Erich: Principes fondamentaux de la technique du graissage. Paris: Ch. Béranger. 478 pp. F. 120.

Breaking petroleum emulsions. Melvin De Groot (to Tretolite Co.). U. S. 1,943,815, Jan. 18. An emulsion of the water-in-oil type is subjected to the action of a demulsifying agent contg. the Na salt of a sulfonic acid derived from tetradecyl alc. Cf. C. A. 28, 1516a, 447.

Breaking water-in-oil type petroleum emulsions. John C. Walker (to Empire Oil & Refining Co.). U. S. 1,944,021, Jan. 16. A demulsifying agent is used contg. an alk. salt such as the  $NH_4$  salt of an alkylated polycyclic sulfonic acid.

Oil- and water-separating apparatus suitable for separating water from petroleum oils by heating and gravity. Wilburn D. Champion. U. S. 1,943,367–S, Jan. 16. Structural and operative details.

Petroleum distillates. John W. Orelup. Fr. 756,088, Dec. 4, 1933. Gasoline or other distillates are stabilized against the action of light and pptn. of antiknock compds. such as  $PbEt_4$ , by the addn. of a small amt. of dinaphthylene oxide or dioxide or perylene. Cf. C. A. 27, 3810.

Extraction of petroleum distillates. David F. Edwards and John V. Starr (to The Standard Oil Development Co.). Can. 338,558, Jan. 9, 1934. Solvents for the extn. of petroleum oils are made more fluid by dild. with a cyclic alc.; e. g., PhOH is dild. with cyclohexanol.

Liquefied petroleum gas. Frederick E. Frey (to Phillips Petroleum Co.). U. S. 1,944,175, Jan. 23. A volatile odorizing agent such as dimethylsulfide is added in an amt. sufficient to odorize the leanest flammable mixt. of the gas with air, and a substance such as kerosene is added to avoid the delivery of an excessive concn. of the odorizer from a substantially empty cylinder from which the gas is delivered.

Ethyl chloride manufacture from petroleum refinery gas. Eric B. Hjerpe and Wm. A. Gruse (to Gulf Refining Co.). U. S. 1,944,839, Jan. 23. After fractionating  $C_2H_4$  and lower-boiling constituents from  $C_2H_6$  and higher-boiling constituents, the lower-boiling fraction, in the presence of a catalyst such as anhyd.  $AlCl_3$ , is contacted with HCl in combining proportion to convert the  $C_2H_4$  to  $EtCl$ ; the product is scrubbed with a relatively non-volatile petroleum absorbent oil and the  $EtCl$  is recovered from the oil by distn.

Hydrocarbons. International Hydrogenation Patents Co. Ltd. Brit. 400,580, Oct. 12, 1933. See Fr. 733,991 (C. A. 27, 1157–8).

Hydrocarbons. I. G. Farbenind. A.-G. Brit. 400,844, Nov. 2, 1933. The heat treatment of carbonaceous materials, contg. or giving rise to asphalt, with hydrogenating gases, preferably under pressure, to obtain hydrocarbons is performed in the presence of a catalyst suspended in an oil which is practically free from asphalt, e. g., contains less than 5% thereof, and does not cause flocculation of the asphalt in the material treated. Thus brown coal small coke is activated with steam at 900°, neutralized with  $H_2SO_4$  and impregnated with an ammoniacal soln. of  $H_2MoO_4$  so that the coke contains 2%  $H_2MoO_4$ . This catalyst is ground to colloidal dimensions and mixed with heavy oil from asphalt to form a suspension contg. 30% of catalyst which is added to an asphaltic German petroleum boiling above 325°. The mixt. is heated with H to 475° under 200 atm., 1650 cu. m. of H being used per metric ton of oil, and the products are led into a sepg. vessel from the bottom of which 6% of the high-boiling products, contg. catalyst, are withdrawn while the remainder is fractionated in a column to give a product 55% of which boils below and 45% above 325°, the latter being free from asphalt and used to mix with the catalyst.

Hydrocarbons. Universal Oil Products Co. Fr. 755,819, Nov. 30, 1933. Cracked and other hydrocarbons are decolorized and their gum and S content are reduced by submitting them to the action of HCl in the presence of a metal, alloy or metal compd. (Zn, Zn-Cu, brass or a Cu and Zn ore) at a pressure sufficient to prevent any appreciable vaporization.

Identification of hydrocarbons. Hermanus F. J. Lorang. Fr. 755,820, Nov. 30, 1933. Gasoline, kerosene, lubricating oils, etc., are identified by the addn. of a small amt. of one or more substances which are sol. in the hydrocarbons and are resistant to the action of light, oxidation and moisture, e. g., Me ester of anthranilic acid, acridine,  $PhNH_2$ ,  $PhNMe_2$ , furfural,  $\alpha$ - and  $\beta$ -naphthol, quinoline,  $PhNO_2$ , biacetyl, glycol nitrate, amyl nitrate or  $C_6H$

**Refining hydrocarbons.** Justin F. Wait. Fr. 756,208, Dec. 6, 1933. Hydrocarbon oils, particularly petroleum, are refined by passing the vapors thereof through a large no. of different zones contg. a continuous current of an anhyd. alkali compd., the temp. being 250-500° and condensing the purified vapors. The vapors may be preliminarily treated with an alkali metal or a mixt. of metal and compd. may be used.

**Refining liquid hydrocarbons.** Gerald C. Connolly and Albert F. Wurzbacher (to Chester F. Hockley, as receiver for Silica Gel Corp.). U. S. 1,943,583, Jan. 16. Hydrocarbon material such as a cracked distillate is treated at a slightly elevated temp. with a reagent such as  $H_2SO_4$  which forms a sludge, the heavy sludge is sepd., and steam is introduced into direct contact with the treated hydrocarbon material at a temp. at which the steam condenses, and condensed steam and remaining sludge are settled out. Silica gel may be used in removing gums.

**Removing mercaptans from hydrocarbons.** Ludwig Rosenstein. U. S. 1,943,744, Jan. 16. Hydrocarbon material such as a petroleum product is treated with an alk. soln. such as  $Na_2CO_3$  and  $NaHCO_3$  capable of removing substantially all the  $H_2S$  but of a strength insufficient to remove a substantial portion of the mercaptans present, and is subsequently treated with a stronger alk. soln. in the absence of extraneous S to remove the mercaptans. Regeneration of the mercaptan-removing soln. is effected by oxidation (suitably with air) in the presence of an oxidation catalyst such as sulfides of Ni or Co.

**Cracking hydrocarbon oils.** Frank H. Edson (to Standard Oil Development Co.). Can. 338,559, Jan. 9, 1934. Oil is cracked at greater than atm. pressure and a portion of the cracked oil vaporized under reduced pressure greater than atm. pressure. The vapors are washed with liquid substantially non-volatile at the temp. and reduced pressure to remove tarry material and the waste liquid contg. tarry material is separately withdrawn. The waste liquid is vaporized and the vapors are condensed, whereby the waste liquid is freed from tarry material. The liquid is reused to wash addnl. vapor. The washed vapor is brought into direct contact with charging oil to preheat the charging oil, which is introduced into the cracking zone, and the washed vapor is condensed.

**Cracking heavy hydrocarbon oils.** Georg Zotos. Ger. 588,666, Nov. 25, 1933 (Cl. 23b. 1.04). Addn. to 552,928 (C. A. 26, 5748). The oils are blown on to the surface of fused metal or salt with a velocity which causes deep penetration, the consequent heat and pressure cracking the oils. App. is indicated.

**Cracking and hydrogenating oils.** Arthur G. L. Try and Murray Stuart. Brit. 400,234, Oct. 23, 1933. The process of Brit. 363,360 (C. A. 27, 1500) is applied to distillates from mixts. of oils and solid carbonaceous materials, e. g., coal, lignite, shale. The voltage of the silent discharge may be 8000-100,000 and the frequency 100-35,000. In Brit. 400,604, Oct. 23, 1933, divided on 400,234 and addn. to 363,360, the process is modified by passing only a part of the distillate through the discharge. The vapors may be first condensed, revaporized, mixed with  $CH_4$ , H, etc., or the gases produced in the process, and then passed through the discharge.

**Cracking and coking hydrocarbon oils.** Albert G. Peterkin, Jr. (to Atlantic Refining Co.). U. S. 1,943,096, Jan. 16. Hydrocarbon material such as a heavy oil is heated to produce a coke residue in a coking chamber; evolved vapors are fractionated to form a vapor fraction and a reflux condensate; the vapor fraction is condensed to form a final light distillate; the reflux condensate is passed through a heated cracking coil; resulting cracked products, at cracking temp., are introduced into the coking chamber; a stream of charging stock comprising a petroleum residuum is separately heated to between 200° and a temp. at which substantial amts. of carbon would be deposited from the residuum as the heating proceeds, by indirect heat exchange with uncooled vapors leaving the coking chamber; the heated stream is directed into

the coking chamber; and an unheated gas-oil charging stock is introduced into the heated stream of petroleum residuum entering the coking chamber. App. is described.

**Apparatus for cracking hydrocarbon oils.** Standard Oil Development Co. Ger. 590,166, Dec. 28, 1933 (Cl. 23b. 1.04).

**Desulfurizing hydrocarbon oils.** Homer T. Darlington (to Oil Corp. of America). U. S. 1,944,170, Jan. 23. A mass of liquid hydrocarbon oil is subjected to cracking conditions within a described app. the walls of which (which may be formed of ferrous metal) are subject to the corrosive effects of S, and finely divided particles of metallic Fe in colloidal form produced *in situ* from Fe oxide by reduction are incorporated in the oil for reaction with the S present.

**Hydrogenating heavy sulfur-containing hydrocarbon oils.** Harold W. Fisher (to Standard-I. G. Co.). U. S. 1,944,639, Jan. 23. In hydrogenating heavy S-contg. hydrocarbon oils under high pressure and at elevated temps.,  $H_2S$  and other volatile sulfurous compds. are sepd. from the hydrogenated products by withdrawing a mixt. of hydrogenating gases and normally liquid hydrogenated oils from a hydrogenation zone, cooling the mixt. under high pressure, followed by sepg. the uncondensed gases, and liquid products at such pressure, reheating the liquid products and reducing the pressure on them to vaporize volatile sulfurous compds. dissolved in the liquid without substantial vaporization of the liquid and sepg. the vapor from the heated liquid. App. is described.

**Destructive hydrogenation of heavy hydrocarbon oils.** Robert T. Haslam (to Standard-I. G. Co.). U. S. 1,944,236, Jan. 23. A body of an oil is maintained in a reaction zone (of a described app.), at a temp. above 370° and under over 50 atm. pressure, and a gas rich in H is forced into the body of oil at a rate so rapid that the vapors of lighter hydrocarbons formed are swept out of the liquid as fast as formed; the vapors are immediately removed from the reaction zone and the remaining liquid is subjected to further hydrogenation. Lubricants and motor fuel may be obtained in the process.

**Apparatus (with a twin still containing molten metal such as lead) for continuous distillation of heavy hydrocarbons and removal of asphaltic residue.** Emile A. Barbet. U. S. 1,944,057, Jan. 16. Structural and operative details.

**Green bloom agents for oils.** Herschel G. Smith (to Gulf Refining Co.). U. S. 1,944,851, Jan. 23; Can. 338,701, Jan. 16, 1934. A green bloom agent comprises a clarified hydrocarbon oil contg. the oil-dispersible, green bloom principle extd. from the decompn. products of an  $AlCl_3$  sludge formed by heating  $AlCl_3$  with petroleum oil (the agent being of brownish green color and imparting a brilliant green bloom to oils when added to them in small proportions).

**Apparatus for distillation of pulverized bituminous schists.** Rene Petit (to Société des schistes et pétroles de Franche-Comté). U. S. 1,944,647, Jan. 23. Numerous structural, mech. and operative details are described suitable for use in connection with employment of superheated steam in the distn.

**Furnace and tube bank, etc., for use in oil conversion.** Audley E. Harnsberger and Clyde L. Smith (to Pure Oil Co.). U. S. 1,944,318, Jan. 23. Numerous structural and operative details are described.

**Device for preventing deposition of carbon in conduits such as those of oil-conversion apparatus.** Edwin W. Beardsley (to Petroleum Conversion Corp.). U. S. 1,944,162, Jan. 23. Agitating devices such as scrapers are mounted on a chain or the like so that they can be moved first in one direction and then in the other in the conduit. Various structural and mech. details are described.

**Revivifying mineral absorbents such as fuller's earth used in treating oils.** George R. Lewers. U. S. 1,943,976, Jan. 16. Various details are described of treatment in a furnace with superposed hearths, to effect partial



distn. and partial combustion of oil from the absorbent material.

**Motor fuel.** Società anon. carburanti Italia. Fr. 755,767, Nov. 30, 1933. An antiknock fuel for motors is made by mixing in the cold 40–60% by wt. of MeOH or EtOH (contg. up to 5% of water) with 60–40% of light oils from asphalt or tar, adding 2% of  $C_{10}H_8$ , distg. the mixt. and submitting the vapors obtained to a "cracking" at 350–500°.

**Benzine products.** The Pure Oil Co. Ger. 588,970, Dec. 1, 1933 (Cl. 28b. 1.05). A process is described for removing the resinous residues of benzine distns. by polymerization at high pressure and fractional distn. under reduced pressure. App. is indicated.

**Tower with a shew and horizontal perforated plates** suitable for countercurrent washing of mixed naphtha or similar operations. Paul J. Harrington (to Standard Oil Development Co.). U. S. 1,943,822, Jan. 16. Structural and operative details.

**Separating paraffin from grease and oil in petrolatum.** John D. Zieley (to Amarel Corp.). U. S. 1,944,483, Jan. 23. The petrolatum is atomized and treated with superheated steam and air in a reaction zone maintained at about 540° (the time of treatment being such as to avoid deleterious cracking). App. is described.

**Dewaxing oils.** Paul J. Carlisle (to The Canadian Industries Ltd.). Can. 338,604, Jan. 16, 1934.  $CH_2Cl_2$ , 1–4 vols., is mixed with 1 vol. of a wax-oil mixt. and the resulting mixt. chilled below 0°F. The pptd. wax is filtered from the mixt. and thereafter the  $CH_2Cl_2$  is sepd. from the oil.

**Lubricating oil.** Ulric B. Bray (to Union Oil Co. of Calif.). U. S. 1,944,491, Jan. 23. An oil contg. asphalt and wax is mixed with a volatile solvent such as an overhead product from casinghead gasoline, under superatm. pressure to dissolve the oil and wax and to sep. asphalt, the latter is removed from the oil-wax soln., the pressure on the soln. is released to evap. the solvent and cool the oil to ppt. the wax, and the wax is sepd. from the cooled oil. An arrangement of app. is described. Cf. C. A. 27, 2800.

**Lubricating oils.** Max. B. Miller & Co. Inc. Fr. 756,248, Dec. 6, 1933. Mineral oils contg. naphthenic and paraffinic constituents are refined for the production of lubricating oil by treating them with a solvent for the naphthenic constituents, such as cresylic acid or its homologs and a solvent for the paraffinic constituents, such as  $C_6H_6$ ,  $C_8H_{18}$ ,  $C_{10}H_{18}$ ,  $C_{12}H_{26}$ , etc., and sepg. the 2 layers formed.

**Chassis lubricating oil.** Joseph Bijur (to Auto Research Corp.). U. S. 1,944,164, Jan. 23. A small proportion (suitably about 6–15%) of blown rape-seed oil is admixed with a base of petroleum oil made from asphaltic crude oils and having a viscosity of about 3000 S. U. V.

**Lubricants.** Robert O. King and Ernest W. J. Mardles. Brit. 400,182, Oct. 10, 1933. Bearing surfaces are coated by feeding thereto a vegetable lubricating oil, e. g., castor, rape, etc., contg. a small amt. of an org. Pb compd., e. g.,

tetraethyl, ricinoleate, tetraphenyl, under temp. conditions which effect oxidation of the oil mixt. Mineral oil may be added and also Sn oleate or tetraphenyl to prevent too large a formation of sludge.

**Lubricants containing oil and soap.** Arman E. Becker and Reginald G. Sloane (to Standard Oil Development Co.). U. S. 1,943,806, Jan. 16. A liquid lubricant contg. mineral oil together with not more than 5% of an alkali soap is prepd. by adding to the oil a soln. of the soap in a volatile solvent such as  $H_2O$  or alc. and then agitating and heating the mixt. until the solvent is removed and rapidly cooling the compn. through the temp. range in which gel formation would otherwise take place. App. is described. The soap also may be formed in the oil. Cf. C. A. 28, 632°.

**Lubricant for wire drawing.** George S. Rutherford (to The Western Electric Co. Inc.). Can. 338,571, Jan. 9, 1934. The lubricant is a mixt. of anhyd. Na alginate 1, lubricant (tallow) 4, soap 2 and water 195 parts. Any other salt of alginic acid sol. in water or oil such as  $NH_4$ , K, Li and Mg alginates may be employed.

**Lubricating grease.** Standard Oil Development Co. Ger. 584,539, Sept. 21, 1933 (Cl. 23e. 1). See Brit. 396,147 (C. A. 28, 632°).

**Composition for retarding sludge formation in insulating oils.** Frank M. Clark (to The Canadian General Electric Co. Ltd.). Can. 338,840, Jan. 23, 1934. Maleic, succinic, citric, tartaric, malonic, malic, mucic or adipic acid or anhydride is kept in contact with, or dissolved in, the oil.

**Resolving oil-water emulsions.** Wm. F. Van Loenen (to L. Blake-Smith). U. S. 1,944,479–80, Jan. 23. Various details of operation are described, of a process in which a granular material is used as a resolving agent in treating emulsions. App. is described. Cf. C. A. 27, 4066.

**Bituminous emulsions.** International Bitumen Emulsions Corp. Brit. 400,409, Oct. 26, 1933. In producing an emulsion by adding a portion of molten asphalt to a hot caustic alkali soln., introducing saponifiable material, e. g., oleic acid, and adding the remainder of the molten asphalt, all with agitation, a small quantity of colloidal clay, e. g., bentonite, is added as a stabilizer at any stage of the process.

**Treating wood tar.** H. O. V. Bergström and K. N. Cederquist. Swed. 77,201, May 9, 1933. Wood tar or other liquid distn. products from wood are sepd. in two or more fractions by distn. The lower fraction or fractions are cracked in order to facilitate the production of valuable substances, for instance, phenols.

**Distilling tar, pitch, liquid rosin, hydrogenation oil, and other wood products.** H. O. V. Bergström and K. N. Cederquist. Swed. 78,693, Oct. 24, 1933. The distn. is carried out periodically or continuously in a rotary furnace or otherwise, the material being spread in thin layers. The solid residues are conveyed by means of a scraping device into a container connected with the distn. furnace.

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**The purification of cellulose by bleaching and chlorination.** J. O. Murto. *Tönnilinen Aikakauslehti* 24, 22–9 (1934).—See C. A. 28, 638°.

**The sorption of water by cellulose.** S. E. Sheppard and P. T. Newcome. *Ind. Eng. Chem.* 26, 285–90 (1934).—Regenerated celluloses adsorb more water than mercerized celluloses. Degrading treatments such as acid tendering and oxidation do not materially change the water adsorption of native cellulose. The mol. wts. of native and regenerated celluloses, as indicated by viscosity measurements, show no correlation with water adsorption. Wood pulp (α-pulp) has a higher sorption than cotton cellulose, approaching that of mercerized cellulose. The sorption of water by the wood pulp is unaffected by beating. Certain

cellulose materials adsorb more water from the liquid phase than from the satd. vapor at the same temp. P. T. N.

**The manufacture of cellulose acetate film by the drying processes.** Max Ullmann. *Kolloid-Z.* 66, 119–23 (1934).—Patent review relating to compn. and pouring procedures.

**Lignin content of cellulose products.** A. G. Norman and S. H. Jenkins. *Nature* 131, 729 (1933); cf. C. A. 28, 315°.—A pentose on treatment with cold 72%  $H_2SO_4$  and then boiling with dil.  $H_2SO_4$  gave a quantity of material as resistant as lignin and detd. as such by accepted methods. About 25% of the apparent lignin content of celluloses from cereal straws is secondarily produced from the cellulose fraction, but there is some true lignin or other

equally acid-resistant material present. The detn. of lignin by the 72%  $\text{H}_2\text{SO}_4$  method should be critically examd. B. C. A.

**Pectin as a source of lignin and humus.** O. Aschan. *Finnish Paper Timber J.* 1932, 386-7.—If humus is dried at higher than  $110^\circ$  volatile constituents are lost. When it is dried at lower temp. the compn. agrees with that of Ehrlich's galacturonic acid obtained by the hydrolysis of pectin. B. C. A.

**Natural substances of high molecular weight.** K. Funke. *Protoplasma* 18, 299-309(1933).—A discussion of the structure of cellulose fibers. B. C. A.

**Controlling atmospheric conditions in rayon production.** James A. Lee. *Chem. & Met. Eng.* 41, 60-3(1934).

**Hygroscopic sizes in paper making.** Hermann Nitz. *Chem.-Ztg.* 57, 957-8(1933).—Wrinkling of sized paper when it becomes very dry is due to a greater shrinkage coeff. in the size than in the paper. To prevent wrinkling the hygroscopicity of the size must be increased by adding enough glycerol to equalize the shrinkage coeffs. or hygroscopic sizes must be used. F. L. Browne

**Paper processing for package purposes.** T. Linsey Crossley. *Oil and Soap* 11, 25-9(1934). E. S.

**Life of impregnated paper (Whitehead) 13.** Alloys [for spinning nozzles, thread guides, etc., for rayon] (Fr. pat. 755,701) 9. Film-making app. (Brit. pat. 400,823) 9.

**Lieferbedingungen und Prüfverfahren für Kunstseide.** 3rd ed., revised. Berlin: Beuth-Verlag. 23 pp. M. 0.60.

**Cellulose from red fir.** Johannes Nielsen. *Norw.* 53,189, Oct. 16, 1933. The raw material after disintegration and sorting is treated with solns. of 3 different reagents in succession, the first consisting of a reducing salt, the sec. of alkali or other base, and the third of an oxidizing salt, with washings between each 2 treatments. The treatments are carried out with relatively dil. solns. and at normal temp.

**Hydrolyzing cellulose.** Henry Dreyfus. *Brit.* 400,168, Oct. 9, 1933. See Fr. 750,495 (C. A. 28, 893\*).

**Alkali cellulose.** Franz Steimmig. *Brit.* 400,489, Oct. 26, 1933. See Fr. 751,617 (C. A. 28, 893\*).

**Cellulose tubes for fountain-pen barrels, etc.** Celluloid Corp. *Brit.* 400,442, Oct. 26, 1933. A tube of cellulose acetate or other cellulose deriv. material is formed by winding helically a strip of the material about a mandrel within a tank contg. boiling  $\text{H}_2\text{O}$ , immersing the wound strip or coil on the mandrel in cold  $\text{H}_2\text{O}$  to cause setting, then removing the coil and immersing it in a bath of  $\text{Me}_2\text{CO}$  or other solvent where it is slightly untwisted to cause sepn. of adjacent helical edges and facilitate application of solvent thereto, and finally giving the coil a slight pos. twist, removing from the bath and allowing to dry.

**Cellulosic materials.** Soc. Alfa-Laval. *Fr.* 756,188, Dec. 6, 1933. Collodions contg. about 20% of cellulosic compds. are purified by heating them rapidly to a temp. at which their fluidity is near that of water, centrifuging in an autoclave centrifuge separator which retains the heavy particles in suspension and cooling them rapidly so that the time they are at the high temp. is as short as possible. An app. is described. *Fr.* 756,189. Viscoscs are clarified by the method of *Fr.* 756,188.

**Regenerated cellulose products.** Waldemar Schwalbe and Otto Schnecko (to Kalle & Co. A.-G.). *U. S.* 1,943,346, Jan. 16. A viscose soln. contg. titanin acid is used for producing opaque or turbid sheets, films, tubes, caps, bands, etc., by molding, without appreciably decreasing the strength of the product.

**Esterifying cellulose.** Henri L. Barthelemy (to Ruth-Aldo Co.). *U. S.* 1,943,507, Jan. 16. An ester such as cellulose acetate is formed by treating cellulose (which may be in the form of cotton) with an esterifying agent such as  $\text{Ac}_2\text{O}$  in the presence of org. acids such as  $\text{HOAc}$  as solvents and of a complex catalyst comprising a strong inorg. acid

such as  $\text{H}_2\text{SO}_4$  and an oxidizing agent for the cellulosic material, such as chromic acid. *Cf. C. A.* 27, 5974.

**Cellulose esters.** British Celanese Ltd. *Brit.* 400,249, Oct. 23, 1933. The Ac content of simple org. esters of cellulose which have undergone partial hydrolysis is increased by further esterification. The esterifying agent may be the corresponding acid anhydride or acyl chloride or, in the case of cellulose formate,  $\text{HCOOH}$ . Esterifying catalysts may be used. Among examples (1) cellulose acetate, after ripening, washing, stabilizing and drying, is treated with a mixt. of  $\text{Ac}_2\text{O}$ ,  $\text{ZnCl}_2$ ,  $\text{HCl}$  and  $\text{C}_6\text{H}_6$  to give a product sol. in  $\text{CH}_2\text{Cl}_2$  and in hot  $\text{CHCl}_3$  but insol. in  $\text{Me}_2\text{CO}$  and (2) hydrolyzed cellulose acetate is treated with  $\text{Ac}_2\text{O}$ ,  $\text{H}_3\text{PO}_4$  and  $\text{C}_6\text{H}_6$  to produce a product sol. in  $\text{Me}_2\text{CO}$  and in  $\text{CH}_2\text{Cl}_2$  but difficulty sol. in hot  $\text{CHCl}_3$ . The products may be used in producing rayon, bristles, straw, lacquers, films, coating compns., plastic compns. and molding powders.

**Cellulose esters.** Eastman Kodak Co. *Ger.* 590,235, Jan. 4, 1934 (Cl. 12a. 6). Addn. to 571,388 (C. A. 27, 3073). See *Brit.* 304,278 (C. A. 23, 4818).

**Reducing the viscosity of cellulose ethers.** David Traill and Alfred S. Levesley (to Imperial Chemical Industries Ltd.). *U. S.* 1,943,461, Jan. 16. A cellulose ether such as cellulose ethyl ether is treated with dil.  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{HOAc}$  or formic or oxalic acid at a pressure of 10-75 lb. per sq. in. and a temp. of  $115-160^\circ$  for not over about an hr.

**Cellulose derivatives.** Soc. pour l'ind. chim. à Bâle. *Fr.* 755,870, Dec. 1, 1933. Cellulose derivs. of heterocyclic compds. contg. N, e. g., as described in *Fr.* 687,301 (C. A. 25, 812), are found to be stable not only toward dil. alkalies but also in operations necessitating a more intense action of the reagents, e. g., hot dyeing with vat dyes of the anthraquinone series, boiling with  $\text{Na}_2\text{CO}_3$  and mercerizing.

**Cellulose derivatives.** Otto Sindl. *Fr.* 755,981, Dec. 2, 1933. Cellulose esters are stabilized by removing them from the reaction mixt. and treating them in the swollen state with liquids such as  $\text{EtOH}$ ,  $\text{AcOEt}$  or  $\text{AcOAm}$  which will dissolve the inorg. acids but not the esters. If necessary a raised temp. and pressure are used. *Fr.* 755,982. Cellulose is moistened before esterification or etherification with an org. liquid which penetrates it entirely and is capable of swelling it, e. g., acids, ethers or alcs. The liquid is removed by pressing to a pt. such that the air has free access to the fibers. The cellulose is allowed to remain in this state until it manifests the desired reaction capacity for esterification or etherification.

**Cellulose derivative compositions suitable for coating compositions, films, etc.** Emmette F. Izard (to E. I. du Pont de Nemours & Co.). *U. S.* 1,943,972, Jan. 16. An ester of an aryloxyethoxyethanol such as phenoxyethoxyethanol or the like is used as a plasticizer with cellulose derivs. such as cellulose nitrate. Numerous examples are given.

**Cellulosic sheets.** La Cellophane. *Fr.* 755,953, Dec. 2, 1933. Thin sheets of regenerated cellulose such as Cellophane have deposited on their surface a cellulosic soln. such as viscose which is spread according to a design in the form of continuous or discontinuous lines and coagulated. The ripples are retained after the action of an aq. bath or a dyeing bath.

**Fireproofing plates of cellulosic material.** Ensoplaten Import-G. m. b. H. *Ger.* 588,786, Nov. 27, 1933 (Cl. 39b. 28). The plates are rendered porous by submission to heat and reduced pressure. They are impregnated with the fireproofing soln. in this condition and, if desired, finally treated with waterproofing material.

**Foils.** Henry Dreyfus. *Brit.* 400,597, Oct. 23, 1933. See *Fr.* 754,108 (C. A. 28, 1861\*).

**Films, foils, etc.** Henry Dreyfus. *Brit.* 400,589, Oct. 23, 1933. Solns. of cellulose derivs. are extruded into coagulating baths contg. softening agents for the derivs., the films, foils or sheets produced are subjected, during or continuously with their production, to transverse tension and at least part of the softening agents are afterward

removed. Longitudinal stretching may also be used. App. is described.

Process and apparatus for making films of gelatin, cellulose derivatives, etc. *Folien- u. Flitterfabrik A.-G.* Brit. 400,178, Oct. 16, 1933. Divided on 395,816 (*C. A.* 28, 6387).

Decolorizing films, fibers, etc., of cellulose esters or ethers. *Deutsche Gold- und Silber-Scheideanstalt vormals Roessler (Karl Werner, inventor)* Ger. 588,539, Nov. 20, 1933 (*Cl.* 39b. 13). Films, fibers, etc., are wetted with a liquid exerting no solvent action and treated with Cl. Thus, nitro- or acetylcellulose films are decolorized by wetting with EtOH of 10-90 vol. % and treated with Cl.

Acylation of carbohydrates. *Henry Dreyfus.* Fr. 756,150, Dec. 5, 1933. Cellulose and other carbohydrates and their derivs. are acylated by aromatic anhydrides, e. g.,  $Bz_2O$ . Acyl groups of lower fatty acids are also introduced, the aromatic radical being present in amt. preferably below 10% of the wt. of the cellulose deriv.

Artificial materials. *Kenneth S. Low.* Fr. 755,835, Nov. 30, 1933. Multicolored sheets, bands or films are obtained by dividing aq. solns. of cellulose, capable of being regenerated or coagulated, into a no. of parts which are dyed or colored separately, then reunited and regenerated or coagulated before the parts have had time to mix or diffuse completely.

Vulcanized fiber. *The Koppers Co.* Ger. 590,320, Jan. 2, 1934 (*Cl.* 39b. 15). Cellulosic material is treated at atm. temp. with a concd. soln. of  $Ca(CNS)_2$ , contg.  $CH_3O$ .

Viscose. *Steckhorn Kunsteide A.-G.* Ger. 588,698, Nov. 23, 1933 (*Cl.* 29b. 3.02). Mat fibers, etc., are obtained by spinning viscose solns. contg. finely divided chemically inactive ethers b. 200-300°, and having about the same sp. gr. as viscose, e. g., benzyl ether.

Rayon. *Kurt Doogs.* Ger. 590,352, Dec. 30, 1933 (*Cl.* 29a. 6.06). The spinning speed is raised during the spinning operation, e. g., from 50 to 70 m. per min., and the speed of the pot, reel or other collecting device is correspondingly raised so that the titer of the filament remains const. or does not vary by more than 10%. The rayon produced toward the end of the spinning operation then has the same dyeing properties as that produced at the beginning. Rayon of uniform dyeing properties may also be obtained by increasing the tension applied to the previously formed filaments during processes such as twisting or winding.

Rayon, etc. *Henry Dreyfus.* Fr. 756,149, Dec. 5, 1933. Threads, films, plastic masses, etc., are made from mixed esters or ether esters of cellulose which contain an aromatic acid radical, e. g.,  $Bz$ . The proportion of this radical is preferably below 10% of the wt. of the cellulose deriv., which also contains a radical of a lower fatty acid, e. g.,  $Ac$ .

Rayon, etc. *Henry Dreyfus.* Fr. 755,621, Nov. 28, 1933. The resistance to traction of filaments, threads, ribbons and thin sheets made of org. derivs. of cellulose is increased by softening and drawing during their travel from one pt. to another, the traction force creating the drawing being entirely or practically entirely limited to the softened portion of the material. Fr. 755,622. The materials are treated with shrinking agents in the absence of a tension sufficient to draw them and afterward submitted to a drawing. The shrinking agent may be, e. g.,  $CH_2Cl_2$ ,  $C_2H_5Cl_2$ ,  $CHCl_3$ ,  $C_2H_5Cl$  or  $AcOEt$ .

Rayon, etc. *Henry Dreyfus.* Fr. 755,811, Nov. 30, 1933. Threads, films, etc., made from cellulose acetate, etc., are softened for drawing purposes by means of diesters and ether esters which may be considered as derivs. of alkylidene glycols (i. e., glycols in which the 2 OH groups are joined to the same C atom) by the substitution of 2 ester groups or of an ester group and an ether group for 2 OH groups. Examples are diacetates of methylene, ethylidene and propylidene glycol.

Rayon, ribbons, etc. *Henry Dreyfus.* Brit. 397,881, Aug. 29, 1933. The stretching of artificial filaments, yarns, etc., made from or contg. cellulose acetate or other film-forming substances that are relatively resistant to

penetration by  $H_2O$ , is facilitated by stretching materials from which an addnl. substance has been removed before or during the application of the stretch-assisting agent. The addnl. substance is 1 of different nature from the base of the materials and from the solvent or other substance which is removed from the spinning soln., or like compn., to form the materials, examples being glycerol, cyclohexanol, cyclohexanvl acetate, cyclohexanone, methylcyclohexanol, methylcyclohexanyl acetate, cyclobutanone, acetylacetone, ethers of olefin and polyolefin glycols, benzyl alc., benzyl acetate, ethyl hydroxybutyrate, diacetin, triacetin, tribenzoylglycerol, triphenyl and tritolyl phosphates, diethyl and dibutyl phthalates, diethyl and dibutyl tartrates, *p*-toluenesulfonamide and sulfonanilide, oils, fats and waxes. They may be dissolved out wholly or in part by suitable liquids which may or may not have a solvent action on the substance of the materials. In examples (1) an aq.  $Me_3CO$  soln. of cellulose acetate, contg. 10% triphenyl phosphate, is spun and the filament stretched by the process of Brit. 277,089 (*C. A.* 22, 2465), 323,790 (*C. A.* 24, 3369) or 370,430 (*C. A.* 27, 3088), the triphenyl phosphate being first removed by a  $C_6H_6$  bath, and (2) an aq.  $Me_3CO$  soln. of cellulose acetate, contg. 8-12% diethylene glycol monobutyl ether, is dry-spun, the filaments passed through an aq. 40%  $Me_3CO$  bath to remove the ether and soften them and then stretched 200-400%.

Artificial straw, ribbons, etc. *British Celanese Ltd.* Brit. 400,631, Oct. 27, 1933. Artificial straw, etc., produced by coalescing a no. of yarns or filaments, e. g., as described in Brit. 328,312 (*C. A.* 24, 5497), 354,233 (*C. A.* 26, 4482), 368,738 (*C. A.* 27, 2300) and 371,428 (*C. A.* 27, 3077), is subjected to severe bending so that it splits lengthwise to form a no. of finer straws assocd. together.

Desulfurizing rayon, fluff, hair, films, transparent paper, etc., obtained from cellulose xanthate solutions. *Soie artificielle de Gand, Soc. anon. "Sarga" and Max G. Luft.* Brit. 400,035, Oct. 19, 1933. See Fr. 749,149 (*C. A.* 27, 5976).

Dry spinning of rayon filaments. *Raymond A. J. Theno* (to Ruth-Aldo Co.). U. S. 1,944,378, Jan. 23. A rotary fan within a spinning cell creates a transverse current of gas adjacent to the spinneret at a velocity sufficient to produce a substantial permanent deformation in the contour of the filaments such as serves to reduce the luster of the product. App. is described.

Spinneret for rayon manufacture. *Ernesto Orioli* (to Ruth-Aldo Co.). U. S. 1,944,298, Jan. 23. Structural details. U. S. 1,944,299 relates to app. for dry spinning of rayon filaments.

Gear-wheel pump for rayon spinning apparatus. *Fritz Sieper* (to Barmer Maschinenfabrik A.-G.). U. S. 1,943,491, Jan. 16. Structural and mech. details.

Artificial filaments formed by the dry-spinning method. *Wm. I. Taylor* (to Celanese Corp. of America). U. S. 1,943,353, Jan. 16. Filaments are formed by extruding org. derivs. of cellulose such as a soln. contg. cellulose acetate into an evaporative atm., a luster-modifying liquid such as water or xylene is applied to the filaments and they are subjected to the further action of the evaporative atm. while they contain a relatively high proportion of solvent, in order either to reduce or to increase their luster. App. is described.

Artificial threads, yarns, etc. *British Celanese Ltd. and William I. Taylor.* Brit. 400,180, Oct. 18, 1933. A relatively non-volatile substance, e. g., malic, citric, mandelic, tartaric, tartaric, tartaric, oxalic, malonic, succinic, glutaric, benzoic or salicylic acids, or salts thereof, alanine, valine, tyrosine, glycine, phenylglycine,  $NH_4Br$ ,  $NH_4NO_3$ ,  $KI$ ,  $KBr$ ,  $Ca(NO_3)_2$ ,  $MgBr_2$ ,  $ZnCl_2$ , is added to the spinning soln. so that it contains at least 25% dissolved solids, and the added substance is removed from the filaments subsequently to their production by the evaporative spinning method. A substance is chosen that is more or less incompatible with the filament-forming material and is preferably sol. in  $H_2O$  or other common solvent so that it may be readily removed. Plasticisers and resins, rub-

ber-like substances and gelatin, themselves spinnable into filaments, are excluded. Anthracene and other hydrocarbons insol. in  $H_2O$  may be used provided they can be removed by a solvent which is a non-solvent for the filament material. The process is applicable to spinning solns. of cellulose esters and ethers, and mixed cellulose esters, ethers and ether esters.

Fibers, films and other artificial substances. W. de Marcken de Merken. Belg. 397,196, July 31, 1933. The fiber or film is formed from a cellulosic mass with which is incorporated flake material that gives off a gas on heating, and the article is heated to a temp. slightly higher than the evapn. temp. of the flake material.

Apparatus for the production of artificial filaments by the evaporative method. Henry Dreyfus. Brit. 400,662, Oct. 30, 1933.

Dry-sorting apparatus for wood chips. J. O. Mårland. Swed. 78,354 and 78,355, Sept. 12, 1933.

Apparatus for recovering fibers from the back water in wood grinding mills. Julius Haug. Norw. 52,854, July 24, 1933.

Digester and liquor circulating system suitable for digesting wood chips with bisulfite solutions. Andreas Christensen (to Fibre Making Processes, Inc.). U. S. 1,943,289, Jan. 16. Various structural and operative details are described.

Sulfite digestion of wood. Henry Dreyfus. Brit. 400,974, Nov. 6, 1933. An aq. soln. or solns. of bisulfite with little or no free  $SO_2$  are used throughout the digestion. The ratios of free to combined  $SO_2$  may be 1:2, 10, or 60, etc., in a 2-8% soln. of Na, K, Ca, Mg, etc., bisulfite. In an example spruce chips are heated at  $140^\circ$  and 10 atm. for 8 hrs. in a soln. of alkali metal bisulfite 6 and free  $SO_2$  0.2%, N being forced into the digester.

Digestion of fibrous material. Otto C. Schoenwerk (to Chemipulp Process, Inc.). U. S. 1,943,489, Jan. 16. In operations such as the cooking of wood chips with acid liquor, a relief fluid is vented from a digester during the cooking period, an acid liquor is circulated by pumping it in an annular path, and the relief fluid is introduced into the circulating liquid at the suction side of the pump. App. is described.

Charging cellulose digesters. Albert E. Nielsen. Norw. 52,144, Feb. 6, 1933. The digester is filled with wood chips by suction applied through the bottom in such a way that the vacuum increases downwards through the vessel; steam, air, or other gases may be introduced at the top of the vessel at the same time as the chips.

Reducing the time required for discharging digesters. Aktiebolaget Nordiska Armaturfabrikerna (T. Samson, inventor). Swed. 77,491, June 6, 1933. In order to decrease the temp. of the charge in the digester part of the liquid is drawn off into one or more sep. containers and replaced all or in part by colder cooking liquid, the liquid in the digester being kept in circulation, after a finished cook, during the introduction of the colder liquid.

Strainer for cellulose digesters. S. E. A. Brobeck. Swed. 78,170, Aug. 22, 1933.

Dewatering apparatus with rotary suction strainer. Aktiebolaget Karlstads Mek. Verkstad (J. D. Ullgren, inventor). Swed. 76,779, March 21, 1933.

Cooking cellulose. K. Y. Kylander. Swed. 77,712, July 4, 1933. The chips are pretreated by cooking under pressure with solns. of acetates or phosphates and are finally cooked with an acid or alk. liquid at a temp. above  $145^\circ$ . Cf. C. A. 27, 4076.

Cooking sulfite cellulose. Mo och Domsjö Aktiebolag. (T. E. Waenerlund, inventor). Swed. 76,200, Jan. 3, 1933. The crude acid coming from the acid-prepn. plant is circulated at normal temp. and pressure through an absorption app. where it is enriched in  $SO_2$  chiefly obtained from the waste gas (part of the  $SO_2$  may come from the digester), the gas being first cooled in a heat-exchanging app. The enriched cold crude acid is made to pass under pressure through the heat-exchanger and in the pre-heated state is stored in a container, from which it is introduced into the digester.

Cooking sulfite cellulose. Patentaktiebolaget Gröndal-

1 Ramén (G. Haglund, inventor). Swed. 77,429, May 30, 1933. See U. S. 1,940,136 (C. A. 28, 1536).

Sulfite cellulose from red fir alone or in mixture with spruce. E. L. Rinman. Swed. 78,733, Oct. 24, 1933. The cooking soln. contains not less than 67 g. of  $NaHSO_3$  per l. besides of an excess of free  $SO_2$ .

Bleaching cellulose. C. A. Geijer. Swed. 76,626, Feb. 28, 1933. The bleaching is carried out in several steps between which the pulp is passed through app. for washing, removal of knots, removal of sand, etc.

Pulp-sorting apparatus. Aktiebolaget Kamyrt (H. D. Wells, inventor). Swed. 78,423, Sept. 19, 1933.

Adjusting the concentration of pulp. K. Y. Sundblad. Swed. 77,173, May 2, 1933. The concn. of wood, cellulose or paper pulp is adjusted by mixing a certain part of the pulp with another part that has first been passed through a dewatering app.

3 Control of the concentration of paper pulp. R. Carlstedt. Swed. 79,139, Dec. 5, 1933. An automatic app. is acted upon by variations in the pressure in the pump conduit caused by variations in the viscosity of the pulp and so regulates the addn. of diln. liquid.

Drying pulp. Aktieselskapet Thunes Mek. Vaegsted. Norw. 52,108, Jan. 30, 1933. The pulp is first passed through a drying chamber, where the drying is effected by circulation and indirect heating of the vapor given off by the pulp, and next through another chamber where it is dried by means of air heated by the vapor from the former chamber.

Wet pressing of pulp. Chr. M. Hanssen. Norw. 52,308, March 13, 1933. Of a pair of rollers, the upper has a plain, the lower a corrugated surface with ridges in the rotation direction in order to facilitate the penetration of the water through the felt.

5 Wire mat for pressing water from sheets of wood pulp or cellulose. Nicolay Paus A/S. Norw. 53,295, Nov. 13, 1933. The mat is woven from wire of oval cross-section in order to attain a gentle action upon the pulp sheets, increase the dewatering power, and reduce the wt. of wire per unit of surface.

Defibration of sulfite pulp. J. H. Wallin. Swed. 76,625, Feb. 28, 1933. The pulp coming from the sulfite digester is defibrated in an app. provided with double walls, the inner wall acting as a strainer for the sepn. of liquor.

Apparatus for removing knots from sulfite pulp. Axel C. Andersen and Arne Schie. Norw. 52,240, Feb. 27, 1933.

Apparatus for separating knots from cellulose pulp. Christian August Johansen. Norw. 52,453, April 18, 1933; Norw. 52,830, July 17, 1933.

7 Sorting apparatus for materials in liquid suspension, particularly paper and cellulose pulp. Wessel Waal and Bror Natanael Segerfelt. Norw. 52,661, June 12, 1933.

Alkaline cooking liquor. B. N. Segerfelt. Swed. 77,894, July 25, 1933. The waste lye is dried and burned and the fused  $Na_2CO_3$  residue is dissolved in a strong  $NaOH$  soln. contg. not less than 50 kg. of  $NaOH$  per cu. m.

Evaporating alkali sulfite liquors. Patentaktiebolaget Gröndal-Ramén (G. Haglund, inventor). Swed. 78,171, Aug. 22, 1933. The acid waste liquor obtained by the cooking of cellulose with alkali bisulfite is made neutral or alk. by addn. of the residue of fused salt obtained by evapn.

8 and burning of the waste liquor from a previous cook, and it is then evapd. and burned, the residue all or in part being used for neutralizing new amts. of waste liquor. Cf. C. A. 28, 1145.

Molded articles from coagulated sulfite cellulose waste liquor. Aktieselskapet Toten Cellulosefabrik. Norw. 53,060, Sept. 18, 1933. The coagulation is brought about by means of chromic acid or other oxidizers which are stirred into the mass immediately before or after the introduction of the mass into the molds.

Causticizing crude lye. T. N. J. Apler. Swed. 77,770, July 11, 1933. Mech. features of app. and procedure.

Recovery of the lime used in causticizing cellulose cooking liquor. Högans-Billesholms Aktiebolag (C. Åberg, inventor). Swed. 78,493, Sept. 26, 1933. The

ppt., chiefly consisting of  $\text{CaCO}_3$ , obtained in causticizing, is brought into a suitable plastic consistency by drying or by addn. of drying materials contg. mainly Ca compds. and (or) combustible materials; the mass is formed into pieces, dried and burned.

Recovery of ammonia from cook liquor in the manufacture of paper by the ammonium bisulfite process. Roger W. Richardson (to E. I. du Pont de Nemours & Co.). U. S. 1,943,345, Jan. 16. The hot cook liquor is made alk. and, while still hot, is brought into intimate contact with air, the resulting gas is cooled, part of the condensable  $\text{NH}_3$  is absorbed in the condensed liquid thus obtained, and the remaining uncondensed  $\text{NH}_3$  is recovered by subsequent scrubbing. An arrangement of app. is described.

Heat-exchange apparatus for heating or cooling of cooking liquor. Aktiebolaget Karlstads Mek. Verktad (R. V. Dahlin and J. A. Magnusson, inventors). Swed. 78,806, Oct. 31, 1933.

Recovering heat in cellulose factories. C. Rosenblad. Swed. 78,735, Oct. 24, 1933. Impure secondary vapors are cooled in a mixing condenser by means of polluted waste water at  $50-60^\circ$ , which is added in such regulated amts. that a liquid of  $90-95^\circ$  is obtained. After sepn. of the permanent gases that accompany the secondary vapors, this hot liquid is passed through a heat-exchanging app. for indirect heating of pure water.

Device for utilizing the heat of the gases from the rotary soda furnaces of the liquor-evaporation plants in sulfate or alkali cellulose factories. L. Glöersen. Swed. 78,663, Oct. 17, 1933.

Doctors for paper machines, etc. Andrew N. Russell. Brit. 401,006, Nov. 9, 1933.

Cylinder paper-making machines. Wm. H. Sutherland and Charles L. Ellis. Brit. 400,624, Oct. 27, 1933.

Means for drying paper in a paper machine of the "Yankee" or M. G. type. Samuel Milne. Brit. 400,013, Oct. 19, 1933.

Drying apparatus for paper-making machines. Rudolf Steinmetz. Ger. 588,546, Nov. 25, 1933 (Cl. 55d. 28.70).

Drying cylinders in paper machines. E. A. Öhlin. Swed. 76,201, Jan. 3, 1933. Structural features.

Drier felts for paper-making machines. Eduard von Asten. Brit. 400,502, Oct. 26, 1933. The felts comprise a textile fabric impregnated with rubber latex, etc., so that part or all of the pores in the fibers and threads are closed while the interstices between the threads remain open.

Paper making. Ernst Strupp. Ger. 588,577, Nov. 24, 1933 (Cl. 55b. 1.20). Half stuff for paper making is obtained by treating straw, grass, etc., with sulfite pulp waste lye made alk. by addn. of  $\text{Ca}(\text{OH})_2$ , and digesting.

Sizing fibrous materials such as paper. Hilbert C. Lathrop and Fergus A. Irvine (to Celotex Co.). U. S.

1,943,975, Jan. 16.  $\text{FeCl}_3$  is used as a size precipitant in varying proportions to give a desired color to the sized product.

Absorbent copying paper. Morland & Impey Ltd. Ger. 588,822, Sept. 9, 1933 (Cl. 55f. 16). See Brit. 359,744 (C. A. 26, 4190).

Filled surface paper. Charles F. Boyers (to Champion Coated Paper Co.). U. S. 1,944,836, Jan. 23. Excess aq. mineral coating compn. such as one contg.  $\text{CaCO}_3$ , etc., is applied to a moving web of paper, and the excess coating material is removed to leave a residual coating in the surface pores of the paper, by a smooth rounded surface having a radius of curvature not exceeding five-thirtieths of an in. at the point where the paper leaves the surface. Other details of app. are described.

Cigaret paper. Louis P. Schweitzer and Wm. P. Schweitzer. Fr. 756,094, Dec. 4, 1933. The paper is made resistant to the action of water by impregnation with a resin, with or without a substance of the nature of wax. The resin and wax are applied in soln. in a volatile solvent such as  $\text{CCl}_4$ , acetone or benzene. Cf. C. A. 27, 4082.

Paper tube for shot shells. Watson H. Woodford (to Remington Arms Co.). U. S. 1,943,501, Jan. 16. A paper shot-shell tube is rendered waterproof and charproof by first immersing it in a soln. having char-preventing and lacquer-plasticizing properties, such as castor oil, and then dipping the tube in a soln. comprising a soln. of a lacquer base such as nitrocellulose in a solvent such as acetone to form a lacquer coating on the tube.

Reclaiming printed waste paper. Industrial Products Corp. Brit. 400,415, Oct. 26, 1933. See Fr. 745,802 (C. A. 27, 4401).

Preheating the drying air in paper machines and cellulose-drying machines. Olaf Gunderson. Norw. 51,480, June 26, 1933. Hot air and steam from the drying machines are utilized for preheating fresh air. The preheating is carried out in 2 steps between which the air is made to pass through the factory rooms as heated ventilation air.

Apparatus for the production of sample sheets of paper or board. Linköpings Armatur- och Metallfabriks A.-B. (B. G. Ullstrand, inventor). Swed. 76,250, Jan. 10, 1933. Structural features.

Manufacture of paperboard. C. W. B. Rasch. Swed. 76,567, Feb. 21, 1933. Mech. features.

Apparatus for drying paperboard. Aktiebolaget Svenska Paktfabriken (J. G. Olsson and F. I. E. Stenfors, inventors). Swed. 77,381, May 23, 1933.

Paperboard. J. R. Wiborg and N. Lund. Norw. 52,528, Dec. 4, 1933. A process and machine are described for the manuf. of board consisting of wood pulp with a coating of cellulose.

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Modern explosives. Guido Guastalla and Giovanni Raccu. *Industria chimica* 8, 1370-7 (1933); cf. C. A. 28, 6451.—The prepn. and properties of trinitroanisole are summarized.

Trotyl oil as a raw material in the manufacture of ammonites and dynamites. I. Kisilew. *Kriegschemie* (Moscow) 4, 3-7 (1933). Nitrocellulose 4, 228.—The use of trotyl oil (liquid trinitrotoluene) in admixt. with trotyl is inadvisable. Addn. of powd. C reduces the detonating power of the explosive. Trotyl oil should be fused with resins or naphthalene, or absorbed in wood meal, peat, cereal meals, etc.

Ignition of some explosive mixtures by modified coil discharges. B. W. Bradford, G. I. Finch and A. M. Prior. *J. Chem. Soc.* 1934, 75-9.—Further expts. with mixts. of  $2\text{CO} + \text{O}_2 + 5\% \text{H}_2$ ,  $2\text{H}_2 + \text{O}_2$  and  $\text{CH}_4 + 2\text{O}_2$  confirmed the previous conclusion (C. A. 27, 2813) that the efficiency of the capacity component, or high-frequency condensed discharge, in the ignition of explosive

gas mixts. is much less than that of the inductance component. The igniting power of the latter is but little, if at all, increased by a preceding capacity component. The results obtained are in direct conflict with the thermal theory of ignition.

The water-gas reaction in low-pressure explosions. B. W. Bradford. *J. Chem. Soc.* 1933, 1557-63.—Observed variations in the position of the water-gas equil. at low pressures may be due to oxidation and reduction of the reactants through the intermediary of the reaction  $\text{CO} + \text{OH} \rightarrow \text{CO}_2 + \text{H}$ , which is governed by the concn. of the OH radicals produced by dissociation of water. The results obtained confirm the opinion that there is no fundamental difference between cathodic combustion and combustion in flames in general.

Experimental determination of the lowering in temperature obtained by adding various substances to B powder. H. Muraour. *Mém. artill. fr.* 12, 125-38 (1933); *Chimie & industrie* 30, 1932.—The substances which, when

added to the charge, decrease the luminosity at the muzzle of the cannon, fall in 2 classes: (1) substances which inhibit re-inflammation (e. g., alkali chlorides); (2) substances which modify the compn. of the gases or lower their temp. The latter were subjected to lab. tests which consisted in firing shots in a bomb and detg. temp., pressure and combustible gas content of the products of explosion. As the existence or non-existence of  $\text{CH}_4$  at the time of explosion affects the results, the latter were calcd. according to both hypotheses. The method used consisted in igniting a given wt. of powder in the bomb, cooling the gases, measuring their vol. and analyzing them. Condensed  $\text{H}_2\text{O}$  is detd. by difference and the wt. of the residue is subtracted from the wt. of the powder. The temp. is calcd. from the formula:

$$T = \frac{273P(V - \alpha p\omega)}{V_0 p\alpha}, \text{ in which } T \text{ is abs. temp., } V \text{ the vol. of the bomb, } \alpha \text{ the covol., } \omega \text{ the wt. of the powder, } V_0 \text{ the vol. of the gases at } 0^\circ \text{ and } 760 \text{ mm.}$$

Because of the effect of the dimensions of the bomb on the cooling, it is evident that all tests must be carried out in the same bomb. The antiluminous compds. tested fall in 2 classes: (1) products which decomp. water vapor (petrolatum, xylitol), (2) compds. or explosive mixts. having a low combustion temp. (nitroguanidine,  $\text{NH}_4\text{NO}_3$ -charcoal mixts.,  $\text{NH}_4\text{NO}_3$ -paraffin mixts., pure  $\text{NH}_4\text{NO}_3$ ). The former are characterized by a high combustible gas content; the latter, by a decrease in the combustible gas content.

A. Papineau-Couture

Fire and explosion hazards of common refrigerants (Nuckolls, *et al.*) 13. Effect of pressure on the spontaneous inflammation of hydrocarbons (Neumann, Estrovich) 2. Paper tube shot shells (U. S. pat. 1,943,501) 23. Trinitrotoluene (Ger. pat. 590,234) 10. Storing  $\text{C}_2\text{H}_2$  and like explosive substances (Ger. pat. 590,497) 21.

Cameron, A. M.: Chemistry in Relation to Fire Risk and Fire Extinction. London: Sir I. Pitman & Sons, Ltd. 292 pp. 7s. 6d.

Jahn, G.: Der Zündvorgang in Gasgemischen. Munich: R. Oldenbourg. About 80 pp. About M. 6.

Propellant explosive. Robert Burns and Oliver W. Stickland (to Imperial Chemical Industries Ltd.). U. S. 1,943,421, Jan. 16. A stable, non-volatile organo-metallic Sn compd. in which the Sn is linked directly to C and which has no destabilizing action on the constituents of the powder, such as  $\text{SnPh}_4$  or  $\text{SnBu}_4$ , is used (suitably in a proportion of about 3-5%) with explosives such as those contg. nitrocellulose and nitroglycerin to prevent metal fouling in guns or rifles.

Use of a lead salt of 3,5-dinitro-*o*-cresol in priming compositions. Willi Brün (to Remington Arms Co.). U. S. 1,943,513, Jan. 16. Pb nitrate is caused to react with the corresponding Na salt and may be used in primers (suitably together with Hg fulminate,  $\text{Ba}(\text{NO}_3)_2$ , abrasive material, etc.). Cf. C. A. 28, 1866<sup>4</sup>.

Percussion fuse of high sensitivity. Edgar W. Brandt. U. S. 1,944,780, Jan. 23. Structural details.

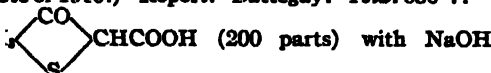
Matches. André Blanc. Fr. 755,941, Dec. 1, 1933. In making matches having a basis of P sesquisulfide, the  $\text{ZnO}$ , which hydrates or facilitates the decompn. of the sesquisulfide in a moist medium, is replaced by  $\text{MgCO}_3$ , which is more stable and more divided because lighter. The  $\text{MgCO}_3$  may be replaced in part or wholly by  $\text{MgO}$ .

Striking composition for matches. L. E. Larsson. Swed. 78,617, Oct. 10, 1933. A compn. to be applied to the side of a match box consists of an inorg. noncombustible binding substance, e. g.,  $\text{SiO}_2$ , to which has been added a substance that liberates O, such as  $\text{KClO}_3$ . It is suitable for striking matches with a primer contg. P.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

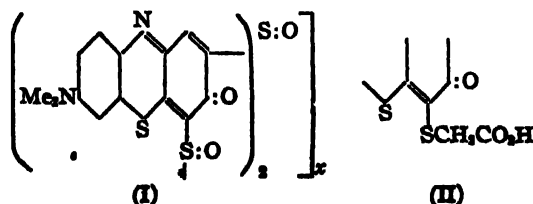
Production of helioidioscarlet S on the fiber. Morand Baumann. *Bull. soc. ind. Mulhouse* 99, 636(1933). (Sealed note of 1910.) Report. Battagay. *Ibid.* 636-7.—



Dyes derived from phenanthraquinone. Phenanthraquinones. N. Ghatak. *Allahabad Univ. Studies* 7, 199-208(1931).—The following are prepd. by interaction of phenanthraquinone or a deriv. with 9,10-diaminophenanthrene: phenanthraphenazine (tetra-benzophenazine), m. 211-12°; 2,7-dinitro-, m. 231-2° (shrinks 210°); 2,7-diamino-, m. 177°; 2,7-dibromo-, m. 239-40°; 2-nitro-, 4,5-dinitro-, m. 197°; and 4,5-diamino-, m. 182°, *derivs.* 4,5-Dinitrophenanthraquinone melts at 227° (lit. 215-17°). All are  $\text{H}_2\text{O}$ -insol. colored substances with poor affinity (from aq. suspension) for silk and wool, which they dye to dull and poorly developed shades.

B. C. A.

Blue sulfur dyes. E. Keller and H. E. Fierz-David. *Helv. Chim. Acta* 16, 585-92(1933).—After purification



blau" (I) (cf. Bernasconi, C. A. 26, 2981) corresponds with  $\text{C}_{24}\text{H}_{20}\text{O}_4\text{N}_4\text{S}_4$ . When heated with  $\text{KBrO}_3$ -HBr-Br I affords tetrabromomethylene violet, spectroscopically identical with a synthetic specimen. When I is heated with glucose and  $\text{KOH}$  (in  $\text{Na}_2\text{S}$ ) the SO groups are reduced to SH, and subsequent treatment with  $\text{CH}_3\text{COCl}$  affords a small yield of the thioglycolic acid (II), whence the structure I is assigned to the original dye, dissoln. in  $\text{Na}_2\text{S}$  arising from reduction of the quinone groups to the leuco compd. and fission of the disulfoxide groups.

B. C. A.

A proposal for the nomenclature of azo dyes. Hermann Eichler. *Chem.-Ztg.* 57, 1011(1933).—Azo dyes are named by setting down the names of the compds. from which they are formed, with letters to denote the no. of azo groups ( $E = 1, Z = 2, T = 3, V = 4$ ), and nos. for coupling positions. The "diaz component" (the compd. diazotized) is placed on the right and the "azo component" (with which the diazo component couples) on the left. Thus, Congo red is 2[1-naphthylamine-4-sulfonic acid] Z benzidine. Where the coupling position is unknown, "s" denotes acid, and "a" alk., coupling. Austin M. Patterson

Azo dyes and intermediates. XII. Preparation of "homologous" azo dyes of higher molecular weight. Paul Ruggli and Oskar Braun. *Helv. Chim. Acta* 16, 858-73(1933); cf. C. A. 27, 1178.—Series of azo dyes of regularly increasing mol. wt. are prepd. by using J acid (6-amino- $\alpha$ -naphthol-3-sulfonic acid) (I) both as a diazo and coupling component, halogenated middle or end components being used in order to obtain by elementary analysis an exact measure of mol. size. Gradual addn. of Br to an aq. soln. of Na naphthionate (II) gives a ppt. of 2-bromonaphthionic acid (III); at higher temp. 2,4-dibromo- $\alpha$ -naphthylamine, m. 115° (*Ac deriv.*, m.



226°), is formed. Similarly bromination of the Ac<sup>1</sup> deriv. of II gives 1,4-C<sub>10</sub>H<sub>6</sub>BrNHAc. Bromination of a cold aq. suspension of 1,7-C<sub>10</sub>H<sub>6</sub>(NH<sub>2</sub>)SO<sub>3</sub>H gives the 2,4-Br<sub>2</sub> deriv. (IV) (K salt). Diazotized IV coupled (alk.) with I gives the monoazo dye (brownish red), which after re-diazotization couples with I to the disazo dye, IV → I → I; repetition of the process gives the trisazo dye, IV → I → I → I, and finally the tetrakisazo dye, IV → I → I → I → I, the shades of which deepen through reddish violet to deep violet. All are isolated as their cryst. Na salts. For comparison the monoazo dyes, III → I, Cleve's acid [1,6- and 1,7-C<sub>10</sub>H<sub>6</sub>(NH<sub>2</sub>)SO<sub>3</sub>H] → I, and IV → β-C<sub>10</sub>H<sub>6</sub>OH, are prepd. Similar series of dyes are prepd. from tetrazotized 3,3'-dichloro- (V) and 2,2'-dichloro-4,4'-diaminobiphenyl (VI), and 2, 4 and 6 equivs. of I, but the tetrakisazo dye from VI and the hexakisazo dye from both V and VI were made from the dyes, I → I and I → I → I and the tetrazotized diamines. In the former series all the dyes were violet, but increasing in blueness with increasing mol. wt., and in the latter the 1st was a clear brownish red, and the remainder violet. They were isolated by salting out with NH<sub>4</sub> carbonate or NaOAc (the former causes partial conversion into NH<sub>4</sub> salt) and removal of the precipitant by heat or with EtOH. XIII. Influence of molecular size on properties of azo dyes. *Ibid.* 873-84.—Detns. of soly., shade, rate of diffusion, dyeing properties and behavior toward electrolytes (and acids) are made in the above series of dyes. In all cases the effect of increasing mol. wt. is bathochromic, but is less marked in the higher members and quantitatively is dependent on constitution. Increase in mol. wt. in the series from IV causes decreased affinity for wool both in neutral and acid baths, but leads to a regular increase in affinity for cuprammonium rayon so that the dyes contg. 3 or 4 equivs. of I form a characteristic test for this fabric. The dyes from V decrease in substantivity as the series is ascended; whereas those from VI behave in exactly the reverse manner. Substantivity is, therefore, purely a constitutional function, and is not necessarily conferred by mol. complexity. Adsorption by the fiber if the result of poor H<sub>2</sub>O soly. is reversible, but if due to constitutional substantivity is no longer truly reversible.

B. C. A.  
Determination of optimum temperature for dyeing with substantive and acid dyes. N. I. Planovskii and E. K. Ruichkova. *Anilinokrasochnaya Prom.* 3, 88-97(1933).—A cotton fabric was dyed at temps. from 30° to the b. p. and a wool fabric at 70° to the b. p. under standard conditions; both the amt. of dye fixed by the fabric and the quality of the color were taken into account. Some substantive dyes (Anil Orange G, Anil Green 2B, etc.) give approx. the same shade at all temps., while others give varying shades (Anil Red F, Anil Violet B, etc.); others again, though giving equal intensity of coloring, give purer shades at higher temps. (Congo Red AT, Anil Fast Scarlet 4BS, etc.) or *vice versa* (Anil Orange R). These differences could not be connected with the purity of the dye. On wool a few dyes (Benzopurpurin AT4B, Anil Orange C and G, Anil Green B) give the best results, at 90°, the rest at the b. p.; the shades obtained with some (Anil Black FF, etc.) vary considerably with the temp. Acid dyes invariably give better results at the b. p. as regards both intensity and purity of color.

B. C. A.  
Skein dyeing of rayon for use in ingrain hosiery. W. H. Hand. *Textile World* 84, 261(1934).

R. K. W.  
Preventing defects in dyeing silk and rayon hosiery. Geo. H. Clifton. *Textile World* 84, 90(1934); cf. C. A. 27, 3825.—The common causes of holes and uneven shades are discussed and suggestions given for preventing them.

Ruby K. Worner  
Detection of iron on fibers. Kōtarō Tanemura and Kōtarō Nishimura. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 43(1934).—Steeping of samples in tannic acid soln. or acidified ferrocyanide soln. results in a violet or blue-black color and a bluish color, resp., when Fe is present.

Karl Kammermeyer  
Adsorption of iron compounds on fibers of cellulose

origin and its prevention. Kōtarō Tanemura and Minazō Yoshida. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 43-4(1934); cf. preceding abstr.—Cellulose acetate silk did not adsorb sufficient Fe from solns. of any pH to be detectable by the tannic acid test. This test gave neg. results on 6 kinds of com. viscose rayon from different makers, but the degree of adsorption of Fe after steeping in a FeSO<sub>4</sub> soln. was different for all 6 samples, showing no relation to the Cu nos. but being proportional to the Ca contents. A summary of the causes of Fe fixation of cellulose fibers is presented and methods are given for preventing Fe adsorption.

Karl Kammermeyer  
A comparative analysis of three hundred fabrics. Rachel Edgar. *Iowa State Coll. J. Sci.* 7, 17-73(1933).—Three hundred fabrics which included all common fibers, kinds of yarn and construction of fabric were tested. Methods used in testing and data for the following characteristics are given for each: fiber, kind and length, construction, yarn, twist, no. per in., yds. per lb. and percentage of fabric; weight oz. per sq. yd.; thickness; width; finish; water ext.; ash; shrinkage; breaking strength, wet and dry; elongation at breaking load, wet and dry. Eighty-nine diagrams and 35 photographs illustrate constructions of fabrics.

F. E. Brown  
Fabric investigations. VII. Weft cracks in rayon crepe. W. Weltzien, W. Coordt and H. Skamkiewicz. *Mitt. Textilforschungsanst. Krefeld* 8, 17-23(1932); cf. C. A. 27, 3081.—Weft cracks occur more frequently in rayon crepe fabrics when bleached yarn has been used, and are then generally due to local oxidation caused by residues of linseed oil size or of spinning oil contg. traces of metals. Over-twisting of yarn causes a small loss of strength, but is not a probable cause of serious weakness; such weakness can be detected by an increased strength of the yarn when untwisted. Spinning faults and too heavy calendering are other possible causes of weft cracks. VIII. Warp stripes in acetate-rayon cloths. *Ibid.* 25-32.—Warp stripes in acetate-rayon fabrics may be due to variations in the quality of the rayon, in the tension or arrangement of the warp ends, in the luster of partly hydrolyzed acetate or of acetate delustered without hydrolysis, or to faulty desizing.

B. C. A.  
Textile processing. Winn W. Chase. *Textile World* 84, 64-5(1934).—The set-up of the various branches of the processing industry and their inter-relationships are outlined.

Ruby K. Worner  
Analysis of cotton-wool textiles. Ralph T. Mease and Daniel A. Jessup. *Bur. Standards J. Research* 12, 75-86(1934) (Research Paper No. 635).—The results of a study of several methods for detg. cotton and wool mixts. are presented. The inadequacy of some of the methods is shown, and a satisfactory procedure is described. In this method, sizing, finishing materials and natural non-fibrous constituents of the textiles are removed by solvent extn., followed by digestion with a starch-hydrolyzing enzyme and washing. Wool is detd. directly by weighing after removal of the cotton by carbonization with AlCl<sub>3</sub>. Cotton is detd. directly by weighing after removal of the wool with KOH. Results accurate to within 1% of the amt. of total dry fiber are readily obtainable.

Milton Harris  
Measurement of hydrogen-ion concentration in the textile industry. K. Schulze. *Mitt. Textilforschungsanst. Krefeld* 8, 12-16(1932).—An account of current methods.

B. C. A.  
The foundations of yarn strength and yarn extension. V. The prediction of the spinning value of a cotton from its fiber properties. A. J. Turner and V. Venkataraman. *J. Textile Inst.* 25, 1-48T(1934); cf. C. A. 25, 3841.

Ruby K. Worner  
Wool crepes. G. L. Atkinson. *Textile World* 84, 83(1934).—A routine is suggested for preventing defects and for producing a firm, lofty handle without glaze.

Ruby K. Worner  
Side lights on aging cotton or rayon vat prints. Francis A. Newton. *Textile World* 84, 255-6(1934). R. K. W.  
Multi-color damoisette. Benjamin D. Blackman. *Textile World* 84, 91-3(1934).—An analysis of this fabric

and a description of the various operations required for its fabrication, including the boil-off, dyeing, printing and carbonizing are presented. Ruby K. Worner

**Determination of oil in acetate rayon.** W. Weltzien and W. Königs. *Mitt. Textilforschungsanst. Krefeld* 8, 40-2 (1932).—Oil cannot be removed completely from acetate rayon by extn. with light petroleum (b. 40-65°). It is detd. by steeping the dried rayon overnight at 45° in a soln. contg. 10 g. of Marseilles soap, 10 g. of Laventin KB and 1 g. of Na<sub>2</sub>CO<sub>3</sub> per l., heating at 50-60° for 1 hr., and washing, drying and reweighing. The oil content is very variable. B. C. A.

**Hosiery finishing.** Milton M. Abrams. *Textile World* 84, 87 (1934). An illustrated description is given of a layout for a hosiery-finishing department. It is designed so that the goods pass in a continuous straightline flow from operation to operation, the whole space is utilized without overcrowding, and each operation is segregated. Ruby K. Worner

**Linseed oil sizes.** I. General methods for the investigation of difficulties and faults. W. Weltzien. *Mitt. Textilforschungsanst. Krefeld* 8, 1-5 (1932).—In removing linseed oil size from rayon it is better to soap at 80° than at 95-100°. Residues of size can often be detected by fluorescence in ultra-violet light, by treatment with aq. Na<sub>2</sub>S, or by dyeing with methyl violet (acetate rayon), but none of these methods is certain and they should be applied to the material both before and after a desizing treatment. The best method is microscopical examn. of the filaments. Damage by linseed oil size most often occurs in bleached material, it is found in places where the size is abnormally acid, and it is often due to traces of metals. Size can be tested by heating sized material at 105° for 2 hrs., when little loss of strength should occur. II. Effect of linseed oil sizes on the extensibility and strength of viscose rayon. W. Coordt. *Ibid.* 7-12.—After 3 hrs. at 105°, the breaking load of unsized rayon was unaffected, while the values for sized rayons were lowered and the pH of the aq. exts. was raised. Generally, the more acid sizes had the greater effect, but acidity was not the only controlling factor. B. C. A.

**Cyanine dyes** (Ogata) 10. Diazo compds. [products used in the dye industry] (Fr. pat. 755,908) 10. Diazoazo salts (Fr. pat. 755,816) 10. Casein derivs. [products used as finishing agents in the textile industry] (Fr. pat. 755,676) 18. Acylated cyclohexylphenylamines (U. S. pat. 1,944,514) 10.

**Bary, P.:** Les fibres textiles et la peinture (les collodes dans l'industrie). Paris: Dunod & cie. 256 pp. F. 49; bound, F. 68.

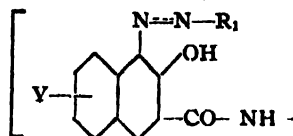
**Schwarz, Edward R.:** Textiles and the Microscope. New York: McGraw-Hill Book Co., Inc. 329 pp. \$4. Reviewed in *Am. Dyestuff Repr.* 23, 102; *Textile Weekly* 13, 40 (1934).

**Dyes.** I. G. Farbenind. A.-G. Brit. 400,870, Nov. 2, 1933. *p*-Aminodiphenylamine or its homologs or substitution products are condensed with 2-alkoxy-3,5-dinitro- or 4-alkoxy-3,5-dinitro-benzoic acids or alkyl esters thereof to give dyes which yield yellow-brown to red-brown fast shades on animal fibers. Among examples 4-aminodiphenylamine-2-sulfonic acid is condensed with 4- and 2-methoxy-3,5-dinitrobenzoic acids (prepd. by nitrating *p*- and *o*-methoxybenzoic acids).

**Dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 588,525, Nov. 24, 1933 (Cl. 22d. 5). S dyes are prepd. by heating leuco compds. of the indophenols from carbazoles and nitrosophenols with finely divided S obtained by the decompn. of polysulfides. Thus, the indophenol from carbazole and nitrosophenol is reduced with a Na polysulfide soln. Urea, *s*-di-*o*-tolylurea and NH<sub>4</sub>Cl are added to the paste, which is then dried *in vacuo*. The product is heated to 200-205°. The resulting dye colors cotton from a clear vat in greenish blue shades. Other examples are given.

**Azo dyes.** Richard Fleischhauer (to General Aniline Works). U. S. 1,943,727, Jan. 16. Dyes of the same general type as those described in U. S. 1,801,390 (C. A. 27, 3342) are formed from components comprising diazo compds. in at least one of which the nitrogenous groups are in *m*-position to one another. Numerous examples, some with details of procedure, are given.

**Azo dyes.** Arthur Zitscher, Heinrich Morschel and Wilhelm Luce (to General Aniline Works). U. S. 1,944,539, Jan. 23. About a hundred different examples are given of dyes of various shades which may be produced on the fiber and which have the general formula



where *x* means the no. 1 or 2, Y stands for an alkoxy or alkylthio group, R<sub>1</sub> for a radical of the benzene, naphthalene, biphenyl or anthraquinone series, and R for a radical of the benzene, naphthalene or biphenyl series. The shades of the dyes obtainable by using a 6-alkoxy-2,3-hydroxynaphthoic acid arylide as the azo-component are considerably nearer to the blue of the spectrum than those of the dyes obtained by means of the known corresponding 2,3-hydroxynaphthoic acid arylides which do not contain an alkoxy group in the 6-position of the naphthalene nucleus. New azo dyes are also made by coupling a suitable diazo compd. with an arylide of a 6-alkylthio-2,3-hydroxynaphthoic acid, or with an arylide of a 5-, 7- or 8-alkoxy-2,3-hydroxynaphthoic acid or of a 5-, 7- or 8-alkylthio-2,3-hydroxynaphthoic acid. By using the 6-alkylthio-2,3-hydroxynaphthoic acid arylides, the shades of the dyes obtained are likewise displaced to the blue side of the spectrum. In the case of the dyes obtainable by using as azo components 2,3-hydroxynaphthoic acid arylides which contain an alkoxy- or alkylthio group in the 5-, 7- or 8-position of the naphthalene nucleus, the shades are not so much altered. The shades of the dyes obtainable from 7-alkoxy-2,3-hydroxynaphthoic acid arylides are not at all, or only somewhat, displaced to the yellow side of the spectrum.

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 400,920, Oct. 16, 1933. H<sub>2</sub>O-sol. azo dyes are made by diazotizing aminoarylides of aliphatic acids contg. at least 10 C atoms and coupling with naphtholdisulfonic acids or derivs. thereof. Acylamino compds. of the C<sub>6</sub>H<sub>5</sub> and C<sub>10</sub>H<sub>7</sub> series are preferred. Coupling components contg. a free amino group may be further diazotized and coupled. Among examples (1) *p*-amino-stearic or -palmitic acid anilide → 2-naphthol-6,8-disulfonic acid and (2) *m*-aminolauric acid toluide → *N*-benzoyl-H acid.

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 400,921, Oct. 16, 1933. H<sub>2</sub>O-sol. azo dyes are made by coupling diazotized aromatic amines substituted by acylamino groups of aliphatic carboxylic acids contg. at least 10 C atoms with ketones capable of forming an enolic isomeric compd. and contg. an aromatic ring to which at least 1 sulfo group is attached. In examples (1) *p*-aminolauranilide → 1-(*m*-sulphophenyl)-3-methyl-5-pyrazolone or 1-(*p*-sulphophenyl)-5-pyrazolone-3-carboxylic acid and (2) *p*-aminostearanilide → sulfoacetoacet-*o*-anilide.

**Azo dyes.** British Dyestuffs Corp. Ltd. and Kenneth H. Saunders. Ger. 580,797, July 17, 1933 (Cl. 22a.). See Brit. 245,865 (C. A. 27, 501).

**Azo dyes.** Ernst Hug and Max Müller (to Durand & Huguenin S. A.). U. S. 1,944,645, Jan. 23. Ger. 588,607, Nov. 25, 1933 (Cl. 22a. 1). See Fr. 748,840 (C. A. 27, 5548).

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 588,523, Nov. 18, 1933 (Cl. 22a. 1). Azo dyes of the general

formula R<sup>1</sup>N:N:C(OH).NR<sup>2</sup>.N:CMe in which R<sup>1</sup> represents an aryl residue which contains a carboxyl group in the *o*-position to the azo bridge and no OH group in the other *o*-position, and R<sup>2</sup> represents H, aryl or

alkyl, one at least of the aryl groups contg. a HSO<sub>3</sub> group, are treated with a Cr-yielding agent. Thus, the dye from diazotized 5-chloro-2-aminobenzoic acid and 1-(2',5'-disulphophenyl)-3-methyl-5-pyrazolone is heated with CrF<sub>3</sub> to give a dye which colors wool from an acid bath in fast golden yellow shades. Other examples are given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 588,524, Nov. 18, 1933 (Cl. 22a. 2). *o*-Hydroxyazo dyes, obtained by coupling diazotized 4-halo- or 4-alkyl- or 4-alkoxy-2-aminophenols with 1-(sulfoaryl)-3-methyl-5-pyrazolone, are treated with a Cr-yielding agent and given an addnl. HSO<sub>3</sub> group. Thus, 4-chloro-2-amino-1-hydroxybenzene-5-sulfonic acid is diazotized and coupled with 1-(3'-sulphophenyl)-3-methyl-5-pyrazolone in soda-alk. soln. The resulting dye is salted out and treated with (Cr<sub>2</sub>O<sub>3</sub>) and Cr<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> soln. The resulting dye colors wool in light- and wash-fast yellowish red shades. Other examples are given. Cf. C. A. 28, 650<sup>1</sup>.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 588,608, Nov. 23, 1933 (Cl. 22a. 2). *o*-Hydroxyazo dyes obtained by coupling, diazotized *o*-hydroxyaminonaphthalenesulfonic acids with naphthols are treated with chroming agents in neutral or acid mediums, the sepn. of chromed intermediates being prevented by making the end reaction alk. Cf. C. A. 28, 649<sup>2</sup>.

**Azo dyes.** I. G. Farbenind. A.-G. (Hans Thomae, August Modersohn, Fritz Müller and Friederich Muth, inventors). Ger. 588,781, Nov. 27, 1933 (Cl. 22a. 1). Diazo compds. of *o*-aminoaryl alkyl sulfones or their substitution products are coupled with 2,3-hydroxynaphthol acid arylides in the substance or on the fiber. Thus, cotton boiled in water is dried and treated with a soln. of 1-(2',3'-hydroxynaphthoylamino)-2-methyl-4-chlorobenzene and Turkey-red oil in NaOH, CH<sub>2</sub>O and water. The product is developed with a soln. contg. diazotized *o*-aminophenyl methyl sulfone, AcONa and NaCl in water, to give light-fast orange shades. Other examples together with an extensive table of diazo and coupling components and colors produced are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Leopold Laska and Arthur Zitscher, inventors). Ger. 588,782, Nov. 28, 1933 (Cl. 22a. 1). Mono azo dyes are produced by coupling diazonium compds. of 4-amino-3-methoxydiphenylamine or the corresponding *N*-nitroso diazonium compds. with 1-(2',3'-hydroxynaphthoylamino)-3-nitrobenzene, in the substance or on the fiber; the nitroso group may be split off if necessary. Thus, cotton goods are treated with a soln. contg. 1-(2',3'-hydroxynaphthoylamino)-3-nitrobenzene, NaOH and sulfonated castor oil; they are dried and developed with a soln. of the diazonium salt of 4-amino-3-methoxydiphenylamine, to give a clear greenish blue effect. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Wilhelm Neelmeier, Heinrich Morschel and Otto Goll, inventors). Ger. 588,897, Nov. 29, 1933 (Cl. 22a. 1). Dyes insol. in water are prepd. in the substance or on the fiber by coupling arylides of 2-hydroxy-5,6-dihydro-7,8-benzocarbazole-3-carboxylic acid with diazo compds., neither component contg. soly.-inducing groups. Thus, cotton is treated with a soln. contg. 1-(2'-hydroxy-5',6'-dihydro-7',8'-benzocarbazole-8'-carbonylamino)-4-methoxybenzene, NaOH and Turkey-red oil. The yarn is dried and developed with a soln. of diazotized 2,5-dichloroaniline to give a fast orange-brown shade. A table of components and colors produced is given.

**Azo dyes.** I. G. Farbenind. A.-G. (Hans Krzikalla and Walter Limbacher, inventors). Ger. 590,190, Dec. 27, 1933 (Cl. 22a. 1). Azo dyes, formed with the use of 8-hydroxyquinoline and its derivs. as coupling components, are converted into complex metal compds. by standard methods. Brown dyes for silk, leather and wool are obtained. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Richard Stüsser, inventor). Ger. 590,321, Dec. 29, 1933 (Cl. 22a. 1). The complex heavy metal compds., particularly Cr compds., obtainable from 4-aminophenol-2-carboxylic acid, are diazotized and coupled with azo dye compo-

nents. Dyes of various colors are obtained. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Hans Krzikalla and Karl Holzach, inventors). Ger. 590,375, Dec. 30, 1933 (Cl. 22a. 2). The diazo compds. from *o*-aminophenol, *o*-aminonaphthols or their derivs. are coupled with 2-hydroxytetrahydronaphthalene or its derivs. The dyes may be converted into complex metal compds. by standard methods. Dyes of various colors, useful for dyeing wool, leather or silk or for coloring lacquers, are obtained. Examples are given.

**Disazo dyes; intermediates.** Soc. pour l'ind. chim. à Bâle. Brit. 400,050, Oct. 19, 1933. *o*-Diaminocarboxystilbenes are made from stilbenes that contain in each C<sub>6</sub>H<sub>5</sub> nucleus a group convertible into the anthranilic grouping by known methods. In an example 4,4'-dinitrostilbene-3,3'-dicarboxylic acid, obtained by oxidation of 6-nitro-3-methylbenzoic acid with alk. hypochlorite, is reduced with Na<sub>2</sub>S. Disazo dyes are made by coupling tetrazotized *o*-diaminocarboxystilbenes with coupling components, e. g., 1-amino-8-naphthol-4-sulfonic acid (I), phenyl-J acid (II), 1-naphthol-4-sulfonic acid and II, I and acetoacetic anilide. The disazo dyes may be converted into metal compds. in substance, on the fiber, in the dyebath or during the coupling process. The metal compds. dye wool, cotton, silk, leather, regenerated cellulose, cellulose esters and ethers and varnishes. Among examples the dye obtained by coupling tetrazotized 4,4'-diaminostilbene-3,3'-dicarboxylic acid with II is treated with ammoniacal CuO. Examples of dyeing processes are given.

**Water-insoluble disazo dyes.** I. G. Farbenind. A.-G. Brit. 400,024, Oct. 19, 1933. See U. S. 1,932,577 (C. A. 28, 652<sup>3</sup>).

**Triazo dyes.** I. G. Farbenind. A.-G. (Carl Taube and Josef Hilger, inventors). Ger. 590,472, Jan. 6, 1934 (Cl. 22a. 10). Benzidine or a substitution product is tetrazotized and coupled first with 1 mol. of an *o*-hydroxycarboxylic acid and then with a 1-amino-2-naphthol ether or a sulfonic acid thereof. The product is diazotized and coupled in the presence of a tertiary base with a 1-amino-8-naphtholsulfonic acid or *N*-substitution product thereof. Green dyes are obtained. Examples are given.

**Vat dyes.** I. G. Farbenind. A.-G. (Franz Wieners, inventor). Ger. 590,103, Dec. 27, 1933 (Cl. 22b. 3.03). Aminoanthraquinones, or their substitution products contg. at least one H atom linked to N, are condensed with chloro-1,3,5-triazines or their substitution products in the presence of an aromatic hydroxy compd. The amt. of the latter may be such that addn. of a further solvent is unnecessary. Dyes of various colors are obtained. Thus, 1-aminoanthraquinone and cyanuric chloride, heated in PhOH for 5 hrs. at 110° and then for 2-3 hrs. at 150°, yield a yellow dye, which is sepd. from the mixt. by addn. of pyridine. Numerous other examples are given.

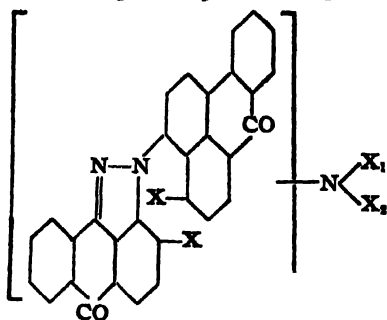
**Vat dyes.** I. G. Farbenind. A.-G. (Richard Herz, Werner Zerweck and Wilhelm Hechtenberg, inventors). Ger. 590,376, Jan. 10, 1934 (Cl. 22a. 7.02). The dyes used in the process of Ger. 525,647 (C. A. 25, 4717) are improved by introducing a SO<sub>2</sub>NH group into the aryl group of the dye, whereby the tendency of the leuco compd. to crystallize from the bath is restrained. It is immaterial whether the SO<sub>2</sub>NH group is linked to the aryl group through the S or the N atom. The dyes may be prepd. by condensing appropriately substituted *o*-aminoaryl mercaptans with aryl quinones, as described in Ger. 445,270 or Brit. 265,641 (C. A. 22, 502<sup>4</sup>).

**Vat dyes.** Felice Benas. Ger. 590,473, Jan. 2, 1934 (Cl. 22b. 2.05). See Austrian 132,374 (C. A. 27, 3617<sup>5</sup>).

**Vat dyes.** Imperial Chemical Industries Ltd. Fr. 755,838, Nov. 30, 1933. Halogen or NO<sub>2</sub> derivs. of 2,2'-dibenzanthronyl (I) are heated either alone or in an inert medium. I may be halogenated in fused phthalic anhydride and the resulting mixt. heated to near its b. p.

**Vat dyes of the benzanthronepyrazoleanthrone series.** Karl Wülke, Josef Stock and Fritz Schubert (to General Aniline Works). U. S. 1,942,710, Jan. 16. Vat dyes

dyeing cotton from the vat blue, gray or green shades are produced by heating a compd. of the general formula:



where X and X<sub>1</sub> stand for H. X<sub>2</sub> represents a polynuclear ring system, or NX<sub>1</sub>X<sub>2</sub> represents a polynuclear heterocyclic ring system, N, X<sub>1</sub> and X<sub>2</sub> being members of the heterocyclic nucleus, with an alk. condensing agent to a temp. of about 90–200°. Numerous examples with details of procedure are given.

**Vat dyes and intermediates.** Scottish Dyes Ltd. Ger. 590,100, Dec. 23, 1933 (Cl. 22b. 3.06). See Brit. 330,217 (C. A. 24, 6031).

**Chromed dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 756,136, Dec. 5, 1933. The *o*-hydroxyazo dyes obtained by the union of 4-halo-, 4-alkyl- or 4-alkoxy-2-diazo-phenols with 1-(sulfo)-aryl-3-methyl-5-pyrazolones and which contain at least one other sulfonic group are treated with chroming agents. The products dye wool red shades. Several examples are given.

**Sulfur dyes.** Herbert A. Lubs and George C. Strouse (to E. I. du Pont de Nemours & Co.). U. S. 1,944,250, Jan. 23. Sulfur dyes are prepd. by thionating indophenols, hydroxyaromatic amines or hydroxyaminophenazines in the monoethyl ether of ethylene glycol. Cf. C. A. 27, 4684.

**Anthraquinone derivatives.** Paul Nawiasky, Berthold Stein and Artur Krause (to General Aniline Works). U. S. 1,943,876, Jan. 16. Products such as 1-methoxyanthraquinone, the corresponding ethoxy and butoxy derivs. (m. about 152° and 116°, resp.), 1,4-diamino-2-methoxyanthraquinone, the corresponding 2-ethoxy and 2-butoxy (m. 186–8°) derivs. (dyeing cellulose acetate clear rose shades), 1,4-diamino-2,3-dimethoxyanthraquinone, m. 183–5°, the corresponding 2,3-diethoxy deriv., m. 151–2°, 2,3-dibutoxy deriv., m. 110°, etc., are produced by treating alkoxyanthraquinones with alkali metal alcoholates. Various examples with details of procedure are given.

**Anthraquinone derivatives.** Imperial Chemical Industries Ltd. Ger. 584,706, Sept. 23, 1933 (Cl. 12g. 37). See Brit. 366,990 (C. A. 27, 2043).

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. (Georg Rösch, inventor). Ger. 590,132, Dec. 23, 1933 (Cl. 22b. 2.06). The leuco compds. of anthraquinone-2,3-arylthioxanthenes are converted into their acid sulfuric esters by standard methods. Examples are given. The products are useful in dyeing.

**Anthraquinone condensation products.** I. G. Farbenind. A.-G. Fr. 756,131, Dec. 5, 1933. 1-Amino-4-haloanthraquinone-2-sulfonic acids or their salts or substitution products are condensed with amides of *p*-aminocinnamic acid to give dyes which may be applied on wool and dye cotton, viscose, etc., directly. The reaction takes place in water with or without the addn. of EtOH or pyridine, at a high temp. and in the presence of an acid-fixing agent and a catalyst such as Cu or its salts. In examples, 1-amino-4-bromoanthraquinone-2-sulfonic acid is condensed with the methylamide, anilide and *p*'-acetylaminosulfonamide of *p*-aminocinnamic acid.

**Carbazole derivatives.** I. G. Farbenind. A.-G. (Heinrich Morschel and Otto Goll, inventors). Ger. 588,042, Nov. 13, 1933 (Cl. 12p. 2). 2-Hydroxy-5,6-dihydro-7,8-benzocarbazole is converted into its 3-carboxylic acid

(I), decomp. above 220°, by heating it, as alkali salt or in the presence of alkali carbonate, to about 260° with CO<sub>2</sub> under about 50 atm. pressure. Arylides of I may be prepd. by standard methods. The *p*-aniside, m. 244°, *o*-methyl-*p*-aniside, m. 234°, *m*-chloroanilide, m. 237°, *p*-chloroanilide, m. 284° and *o*-toluide, m. 247°, of I have been prepd. The products are useful as intermediates for dyes. Cf. Ger. 586,803 (C. A. 28, 1359°).

**Carbazole derivatives.** I. G. Farbenind. A.-G. (Willy Broeg and Heinrich Morschel, inventors). Ger. 588,043, Nov. 16, 1933 (Cl. 12p. 2). 2-Hydroxy-5,6-(or -7,8)-benzocarbazoles are converted into their 3-carboxylic acids (I) and (II), decomp., resp., 245° and 241°, by heating them, as alkali salts or in the presence of alkali carbonate, to about 260° with CO<sub>2</sub> under about 50 atm. pressure. Arylides of I and II may be prepd. by standard methods. The *p*-chloroanilide, m. 292°, *m*-chloroanilide, m. 273°, and *o*-toluide, m. 254°, of I, and the *o*-chloroanilide, m. 237°, *m*-chloroanilide, m. 249°, *p*-chloroanilide, m. 257°, *p*-aniside, m. 246°, 2'-methoxy-4'-chloroanilide, m. 248°, 2'-methoxy-5'-chloroanilide, m. 246°, 2'-methyl-4'-chloroanilide, m. 248°, and 2'-methyl-5'-chloroanilide, m. 243°, of II, have been prepd. The products are useful as intermediates for dyes. Cf. Ger. 586,804 (C. A. 28, 1358°).

**Azo dyes; dyeing.** I. G. Farbenind. A.-G. (Wilhelm Neelmeier and Heinrich Morschel, inventors). Ger. 589,348, Dec. 6, 1933 (Cl. 22a. 1). Arylides of benzo-2-hydroxycarbazole-3-carboxylic acids are coupled in substance or on the fiber with diazo compds. Neither component should contain a group conferring soly. in water. Brown dyes or dyeings are obtained. Numerous examples are given. The prepn. of suitable carbazole derivs. is described in Ger. 588,043 (preceding abstr.).

**Sulfonated oleic acids.** Fettsäure- und Glycerin-Fabrik G. m. b. H. Brit. 400,587, Oct. 16, 1933. Cf. Fr. 734,876 (C. A. 27, 1095). The products or their salts may be used in dyeing, carbonizing, bucking, fulling, sizing and dressing processes, as scrooping agents for rayon and as constituents of spinning oils and compns. for fire-extinguishing, disinfecting and combating insects.

**Color lakes.** Krebs Pigment & Color Corp. Ger. 584,578, Sept. 21, 1933 (Cl. 22f. 12). Color lakes contg. resin soaps and insol. in oil or water are made from insol. monosulfonated monoazo dyes and resin soaps combined with Ba, Ca, Sr, Mg, Cu or Pb. Examples are given.

**Dye intermediates.** Compagnie nationale de matières colorantes et manufactures de produits chimiques de Nord réunies établissements Kuhlmann. Fr. 755,067, Nov. 28, 1933. Acylaminonitroarylsulfonyl chlorides are prepd. by nitrating C<sub>6</sub>H<sub>4</sub> derivs. contg. an alkyl, alkoxy or aralkoxy group in the 1-position, an acylamino group in the 2- or 4-position and a sulfonyl chloride group in the 4- or 2-position. Examples are given of the prepn. of 1-methoxy-2-acetyl-amino-6-nitro-4- (m. 105°), 1-methoxy-4-acetyl-amino-6-nitro-2- (m. 121°), 1-methyl-2-acetyl-amino-6-nitro-4- (m. 148°) and 1-methyl-4-acetyl-amino-6-nitro-2-benzesulfonyl chloride (m. 136°). The acetyl-amino group may be sapond. at the same time as the SO<sub>2</sub>Cl by heating in water, or the compds. may be condensed with Et<sub>3</sub>NH, PhNH<sub>2</sub> or PhNH<sub>2</sub>Et to give the corresponding sulfamide compd. and the acetyl-amino group may then be sapond.

**Dyeing.** David A. W. Fairweather and John Thomas (to Scottish Dyes, Ltd.). U. S. 1,943,787, Jan. 16. Textile materials are treated with sulfuric esters of reduced products of vat dyes, anthraquinones, naphthoquinones or indigos having the ester groups attached to the reduced quinone positions and contg. an azo linkage, and the treated material is then subjected to the action of an oxidizing agent. Various examples are given.

**Dyeing bone objects.** Soc. pour l'ind. chim. à Bâle. Fr. 755,872, Dec. 1, 1933. Bone objects are dyed by treatment with complex metallized dyes, e. g., the chromed dye obtained from 1-diazo-2-naphthol-4-sulfonic acid and *β*-naphthol.

**Dyeing furs.** Soc. pour l'ind. chim. à Bâle. Fr. 755,871, Dec. 1, 1933. Furs are dyed with complex metallized dyes, e. g., the chromed dye obtained from 2-

diazo-1-phenol-4,6-disulfonic acid and 1-phenyl-3-methyl-5-pyrazolone. The furs may be preliminarily treated with agents making them resistant to high temps. and agents increasing their absorptive power. Cf. C. A. 28, 1841.

**Dyeing cellulose derivatives** such as cellulose acetate, etc. George H. Ellis, Henry C. Olpin and Ernest W. Kirk (to Celanese Corp. of America). U. S. 1,944,413, Jan. 23. Dyeing is effected with an aq. dispersion, in unreduced form, of a water-insol. coloring matter comprising a benzo- or naphtho-quinone substituted in the nucleus by at least one NR'R' group in which R' and R represent H and alkyl.

**Dyeing and printing.** I. G. Farbenind. A.-G. (Richard Fischer and Hermann Freund, inventors). Ger. 588,760, Nov. 27, 1933 (Cl. 8s. 1.03). Addn. to 574,355 (C. 4. 28, 3417). In reserve printing with insol. dyes the method of 574,355 is modified by using dye preps. from a diazo-amino compd. and a coupling component after stop-padding with ester salts of leuco vat dyes. A mild reducing agent such as Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> may be added to the dye prep. The stop-padding prep. contains an oxidation accelerator such as NH<sub>4</sub>VO<sub>3</sub> and an oxidizing agent such as alkali chlorate.

**Printing textiles.** British Celanese Ltd., Geo. H. Ellis and Henry C. Olpin. Brit. 400,643, Oct. 23, 1933. Improved penetration of discharging agents into materials made of or contg. cellulose esters or ethers is obtained with the aid of di- or poly-alkylene glycols or ethers, esters or ester-ethers thereof, the processes of Brit. 375,313 (C. A. 27, 4097) and 376,797 (C. A. 27, 4097) being disclaimed. The glycols or their derivs. may be replaced by the corresponding compds. in which an ether (O) atom is replaced by an atom of S. Among examples a cellulose acetate fabric, dyed with benzeneazobenzene-*azophenol*, is printed with aq. prep. contg. gum thickening, SnCl<sub>2</sub>, diethylene glycol, Et lactate, NaCNS and AcOH and the print is dried, aged, washed and dried to obtain a clear white discharge on a yellow ground. In 400,666, Oct. 23, 1933, the fixation by such materials of suspensions or dispersions of coloring matters is effected with the aid of such glycols, etc., the dyed material being then steamed. Processes involving a reduction of the dye on the material are excluded. In an example a cellulose acetate woven fabric is printed with an aq. compn. contg. the dye 1,4-di(methylamino)anthraquinone, gum arabic and diethylene glycol and the print is dried, steamed, washed and dried to obtain a brilliant blue pattern.

**Discharge printing of fabrics.** George Rivat (to Celanese Corp. of America). U. S. 1,944,372, Jan. 23. A dyed fabric contg. cellulose acetate is treated with a printing paste contg. a swelling agent for the fabric, a vat color and a penetrating agent such as dithioglycol which is also a solvent for the vat color.

**Discharge effects on textiles.** British Celanese Ltd., George H. Ellis and Henry C. Olpin. Brit. 400,248, Oct. 23, 1933. Pattern effects are produced on materials made of or contg. cellulose esters or ethers by applying thereto, before or after coloration with a dischargeable ground color, a compn., preferably of acid reaction, contg. a stannous compd., e. g., SnCl<sub>2</sub>, Sn(ClCH<sub>2</sub>COO)<sub>2</sub>, Sn(CNS)<sub>2</sub>, and a leuco deriv. of a vat dye esterified with a di- or poly-basic acid or a salt of such esterified leuco deriv., e. g., "Indigosol," "Soledon." Swelling agents or assistants and also addnl. dyes, e. g., the anthraquinone dyes of Brit. 351,457 (C. A. 26, 5432) may be incorporated. In an example a cellulose acetate fabric, dyed with the azo dye 3,5-dinitro-*o*-anisidine  $\omega$ -hydroxyethyl- $\alpha$ -naphthylamine, is printed with an aq. compn. contg. Indigosol yellow HCG, gum arabic, methylated spirit, NaCNS, citric acid and SnCl<sub>2</sub> and is then aged, treated in an NH<sub>3</sub> atm., steamed, washed, treated in a bath contg. Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> and HCOOH, washed and dried to obtain a yellow pattern on a blue ground.

**Stripping dyed textiles.** Imperial Chemical Industries Ltd., John G. Evans and Leslie G. Lawrie. Brit. 400,239, Oct. 19, 1933. Dyeings produced by combination on the fabric of arylamides of 2,3-hydroxynaphthoic acid with

1 suitable diazo compds. are stripped by treatment of the dyed material with a reducing liquor contg. an amine, amine salt or quaternary NH<sub>4</sub> salt carrying a radical which comprises a straight or branched C chain of not less than 10 C atoms. Among examples (1) cotton, dyed with the dye 4-chloro-2-toluidine  $\rightarrow$  (on the fiber) the 4-bromo-*o*-aniside of 2,3-hydroxynaphthoic acid, is treated 10 min. with a boiling aq. soln. contg. small amts. of Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>, Na<sub>2</sub>CO<sub>3</sub> and  $\beta$ -hydroxyethyl-*N*-octadecylmorpholinium bromide; the dyeing is stripped to a pale yellow which may be cleared by mild Cl treatment, and (2) degummed silk, dyed as in (1), is treated 30 min. with an aq. soln. at 90-95°, slightly acid with AcOH, contg. small amts. of Na formaldehydesulfoxylate and cetyltrimethylammonium bromide; the dyeing is stripped to pale yellow.

**Bleaching vegetable fibers.** I. G. Farbenind. A.-G. Fr. 755,541, Nov. 25, 1933. Vegetable fibers are boiled in a lye which contains, besides alkalis, absorptive inorg. substances (except metal hydroxides) as well as wetting and washing agents. Examples of absorptive substances are SiO<sub>2</sub>-gel, bleaching earth and sol. glass.

**Bleaching vegetable fibers.** H. Th. Röhme A.-G. Fr. 755,637, Nov. 28, 1933. Vegetable fibers are treated with a lye contg. Cl and then directly by a bath contg. active O, without the use of an intermediate bath. The fibers are preferably wetted first with a suitable wetting agent. The treatment with the Cl lye is relatively short.

**Bleaching bast fibers.** I. G. Farbenind. A.-G. (Helmuth Korte, inventor). Ger. 588,872, Dec. 15, 1933 (Cl. 8s. 2). Addn. to 582,239 (C. A. 27, 5991). See Brit. 371,494 (C. A. 27, 3089).

**Apparatus for opening or carding fibers covered with rubber dispersion.** Magyar Ruggyantaarugyar R. T. (to International Latex Process Ltd.). Brit. 400,548, Oct. 26, 1933.

**Apparatus for oiling or moistening cotton, etc., during scutching or opening.** George Hill. Brit. 400,308, Oct. 26, 1933.

**Drying oiled yarn.** Aceta G. m. b. H. Ger. 588,706, Nov. 24, 1933 (Cl. 8s. 1).

**Lubricants for fibers.** John B. Speakman and Norman H. Chamberlain. Brit. 400,681, Nov. 2, 1933. A mixt. of oils contg. more than 10% of hydrocarbon oil is mixed with up to 25% of an aliphatic alc., ether or amine (or a mixt. thereof) that contains more than 8 C atoms in the mol. and preferably has a flash point above 340°F. by the open-cup test and which also reduces the interfacial tension of mineral oil and H<sub>2</sub>O when added in small amt. to the oil and is readily sol. in oil but sparingly sol. in H<sub>2</sub>O or dil. alkali solns. Oleyl alc., the alcs. and ethers derived from wool fat by low-pressure distn. and octadecenylamine are specified.

**Composition for cleansing and degreasing fibrous materials.** Rainer H. Pott (to Chemische Fabrik Pott & Co., Kommandit-Ges.). U. S. 1,944,367, Jan. 23. Hydrogenated naphthalene is rendered miscible with water by use of a small proportion of an emulsifying agent such as a sulfonated fat, alkylated aromatic sulfonic acid or water-sol. salt of such an acid.

**Treating textiles.** Soc. pour l'ind. chim. à Bâle. Brit. 400,031, Oct. 19, 1933. Dyeing and other bath treatments of textile materials made of or contg. animal fibers are effected with an addn. of a sulfonated product obtained by condensing, suitably in presence of H<sub>2</sub>SO<sub>4</sub>, ClSO<sub>3</sub>H, etc., an aromatic compd., contg. nuclear OH, with benzoin and, if necessary, sulfonating the condensation product. The addn. promotes level-dyeing and is useful for producing reserve effects in dyeing mixed fabrics and preventing bleeding of dyes in fulling baths. Among examples (1) half-wool is treated 45 min. at 60° in a bath contg. Chlorantine red 8 BN, Na<sub>2</sub>SO<sub>4</sub> and a neutral product, obtained by condensing Na 2-naphthol-6-sulfonate with benzoin in concd. H<sub>2</sub>SO<sub>4</sub> at 40°, and is then washed, rinsed and dried; the wool is scarcely dyed while the cotton is dyed a strong red, and (2) wool, dyed in an acid bath with the Na monosulfonate of the oxidized condensation product of 4,4'-diethylaminodiphenylcarbonyl

mol with *N*-benzyl- $\alpha$ -naphthylamine, is mixed with an equal wt. of white wool and the mixture is treated for 4 hrs. in a liquor contg.  $H_2SO_4$  and the condensation product of (1); the white wool remains uncolored.

**Fabrics.** British Celanese Ltd. and Robert P. Roberts. Brit. 400,938, Oct. 27, 1933. Fabrics are composed of threads, etc., of cellulose acetate or other org. esters of cellulose, some of the threads being stretched to an extent different from the others. Alternatively the threads may be differentially stretched along their length. On subjection to sapon. and subsequent or simultaneous dyeing color effects are produced. In 400,946, Oct. 27, 1933, fabrics are made from yarns of cellulose esters some of which have been differentially stretched at intervals along their lengths, a streaky or mottled effect being produced on subsequent delustering. The intermittently stretched yarns may be used for the warp and (or) weft and may be assocd. with wool, cotton or silk yarns or with artificial yarns of different character.

**Coated pile fabrics.** Collins & Aikman Corp. Brit. 400,225, Oct. 18, 1933. An impregnating coating compn. comprising a latex (compd.) fortified by the dispersion therein of a previously coagulated rubber provided with a colloid for forming a protective coating for the rubber globules is used for producing pile fabrics as described in Brit. 336,553 (C. A. 25, 2008) and 371,817 (C. A. 27, 3796). Crude or reclaimed rubber may be masticated with 2-10% of casein, saponin, rosin soap or soapy vegetable exts. and dil. latex (compd.) added gradually. Vulcanizers, accelerators and tempering ingredients may be added to the latex, coagulated rubber or mixt. Org. solvents and emulsifying agents may be added to the mixt. In an example a natural latex compd. contg. latex, S, tetramethylthiuram disulfide (I), phenyl- $\beta$ -naphthylamine (II) and ZnO is mixed with a coagulated rubber dispersion contg. pale crepe rubber, I, II and ZnO and applied to a pile fabric, woven from cotton warp, by the coating machine of Brit. 369,910 (C. A. 27, 3090).

**Apparatus for moistening and shrinking fabric webs.** Sanford L. Cluett (to Cluett, Peabody & Co.). U. S. 1,944,001, Jan. 16, 1933. Structural and mech. features.

**Pattern effects on cellulose ester material.** George H. Ellis (to Celanese Corp. of America). U. S. 1,943,377, Jan. 16, 1933. Material which may be in the form of woven fabric and which contains a cellulose ester such as cellulose acetate together with a diazotizable amine such as bisaniline is subjected to diazotization and is exposed to light of varying intensity, and the resulting pattern is fixed by development. Cf. C. A. 27, 5198.

**Treating cellulose acetate threads.** Camille Dreyfus and William Whitehead (to Camille Dreyfus). Can. 338,924, Jan. 23, 1934. Threads and yarns contg. cellulose acetate are treated with a chlorinated aliphatic hydrocarbon, e. g.,  $CH_2Cl_2$ . The pliability, extensibility, strength and luster of the threads and yarns are improved.

**Rayon.** Glanzstoff-Courtaulds G. m. b. H. Brit. 400,760, Nov. 2, 1933. Viscose rayon, wound onto rigid spools as it comes from the pptg. bath and subjected to the entire after-treatment on these spools, is dried after deacidification and before desulfurizing, e. g., with a soln. of  $Na_2S$  or  $Na_2SO_3$ . Differences in shrinkage between the inner and outer windings are thus diminished and the desulfurization is more even. Cf. C. A. 27, 4397.

**Device for supporting rayon cakes during after-treatment.** Arthur Zart. Ger. 590,322, Dec. 30, 1933 (Cl. 29a. 6.08).

**After-treating spools of rayon.** Barmer Maschinenfabrik A.-G. Ger. 588,974, Nov. 30, 1933 (Cl. 29a. 6.08).

**Mercerizing.** Rütgerswerke A.-G. and Leopold Kahl. Brit. 400,135, Oct. 19, 1933. The wetting properties of alk. mercerizing lyes are improved by adding iso-AmOH together with PhOH, cresols and (or) xlenols free from or poor in *o*-cresol.

**Delustering fabric.** Herbert Platt and Camille Dreyfus (to Camille Dreyfus). Can. 338,583, Jan. 9, 1934. Relatively permanent subdued luster is produced on fabric contg. yarns of cellulose acetate by treating the fabric in a bath that acts as a swelling agent for the cellulose acetate, which bath contains a sol. salt of an alk. earth metal and then treating the fabric with a reagent to ppt. the alk. earth metal in the form of an opaque and substantially insol. salt. E. g., a fabric consisting solely of yarns of cellulose acetate is treated for 1 hr. at 70° in a 25° Tw. soln. of  $Ba(CNS)_2$ . It is then treated for 20 min. in the cold in a 1% soln. of  $H_2SO_4$ , after which it is rinsed and dried.

**Delustering rayon.** Imperial Chemical Industries Ltd., Leslie Gordon Lawrie and Harry Donald Mudford. Brit. 400,244, Oct. 18, 1933. Rayon, including regenerated cellulose and cellulose ester and ether products, is delustered by treatment with an aq. medium to which has been added a sulfonated alkylated polynuclear hydrocarbon, or petroleum fraction, and an Al salt. The products of Brit. 274,611 (C. A. 22, 2268) and 311,885 (C. A. 24, 932) may be used as the sulfonated alkylated petroleum fractions.

**Sizing textiles with pectic substances.** Les établissements E. Materné, Soc. anon. Belg. 394,930, April 29, 1933.

**Wetting agents.** I. G. Farbenind. A.-G. Fr. 756,158, Dec. 6, 1933. Wetting agents, particularly for mercerizing lyes, are made by causing  $CS_2$  to react, preferably in the presence of alkali metal hydroxides, with aliphatic secondary amines, one of the alkyl groups of which contains at least 3 C atoms, while the other may contain any no. of C atoms and may be linked with another alkylamine group. Examples are given.

**Fabric-cleaning composition.** Paul S. Denning (one-half each to F. E. Schundler & Co. and Wyodak Chemical Co.). U. S. 1,943,519, Jan. 16, 1933. Bentonite 50-70 is dispersed in water together with  $Na_2CO_3$  30-50 parts for maintaining the bentonite in a "highly fluid" condition beyond the max. gel effect on the bentonite, and a small amount of soap also is used with this compn.

**Composition for "dry cleaning" fabrics, clothing, etc.** Sidney Born. U. S. 1,944,859, Jan. 23, 1934.  $C_2H_5Cl$  1, dichloroethyl ether 3-5,  $CCl_4$  4-6 and "Stoddard solvent" 90% are used together.

**Mothproofing composition.** Elmer W. Adams (to The Standard Oil Co.). Can. 338,896, Jan. 23, 1934. A mothproofing compn. comprises a chlorinated hydrocarbon ext. of cubé incorporated in a mixt. of light hydrocarbon oil 9, and chlorinated hydrocarbon 1 part.

**Mothproofing etc., compositions.** Soc. pour l'ind. chim. à Bâle. Ger. 588,851, Nov. 29, 1933 (Cl. 45f. 3.05). See Fr. 735,959 (C. A. 27, 1824).

## 26—PAINTS, VARNISHES AND RESINS

A. E. SABIN

**Bitumens and related materials in the paint industry.** Hans Hadert. *Farben-Chem.* 5, 12-16 (1934).—The bitumens, tars and pitches are described and classified. Typical formulas using these materials are given. G. G. S.

**The assay of brushable red lead paints.** A. A. Kraff. *Verf. Chronik* 6, 294-6 (1933).—A review of the qualities of ordinary and of "non setting" red lead paints, influence of  $PbO$ ,  $PbO_2$ , of fillers, etc. For detn. of  $PbO_2$  content the

AcOH method of Topf-Diehl is used, rather than the one of Schaeffer (C. A. 10, 1019); the latter gives low results which is probably due to part reduction of  $PbO_2$  during analysis. The D. R. G. (German Railways) heating test is recommended for the non-setting paints.

**The influence of fillers on brush paints and paint pastes.** J. D. Banting. *Verf. Chronik* 6, 293-4 (1933).—A review



(H. Wolff, *Farben. Ztg.* 38, 1188(1933); Klumpp, C. A. 27, 5555).

Paints for aluminum and its alloys. M. Rabaté. *Peintures, pigments, vernis* 10, 64-5, 67-9(1933).—A general account is given of the suitability of coatings made from oils, asphalt, tar, nitrocellulose and synthetic resins and of the prepn. of the metal surfaces. B. C. A.

Lead paint for gas works. F. Williams. *Gas Engr.* 51, 87(1934).

Paints for gas-works plant and buildings. Notes on the formulation of oil paints. J. T. Lawrence. *Gas Engr.* 51, 85, 87(1934); cf. C. A. 27, 1770. P. J. Wilson, Jr.

Aqueous emulsion paints. K. Würth. *Farbe u. Lack* 1934, 5-6, 17-18.—Films of oil emulsion paints are usually porous and of insufficient density for exterior use. However, emulsifying agents of a new type (not named) make satisfactory paints now possible. Suitable pigments are listed. G. G. Sward

Water paints and distempers. H. C. Bryson. *Synthetic and Applied Finishes* 4, 39-43, 50(1933).—The various types of paints based on aq. binding media are summarized, working formulas and precautions necessary in manu. being included. The binders detailed are starch and dextrin, casein, Irish moss, Na silicate, latex, etc., and the relationships between pigment and binder are discussed. B. C. A.

The causes of paint pigment thickening. S. V. Yakubovich and S. V. Kirsanova. *Kolloid-Z.* 65, 333-50 (1933).—Thickening of paints on standing, sealed from air, was followed by noting the consistency to a glass needle every 2 weeks over a period of 44 weeks. Mixts. using lithopone, ZnO and red ochre with 4 samples of blown linseed oil of different degrees of polymerization thickened in the order named but pigment is a minor factor in this rate. Thickening velocity increases with increase in viscosity of the oil but is independent of acid no. Addn. of raw linseed oil lowers the rate. On diln. of a highly polymerized oil with benzine, a ppt. forms which on standing gelatinizes the mass. Addn. of rosin accelerates thickening; ochre and lithopone mixts. thicken faster than ZnO mixts. The principal cause of thickening is not soap formation, except possibly in the case of basic pigments, but is due to colloid reactions causing mol. aggregation leading to gel formation. The velocity of such reactions depends on the degree of polymerization. With oxidized oils, thickening is again a function of viscosity though it occurs faster than with blown oils of like viscosity because of the presence of oxyacids insol. in the benzine thinner. Oils with slight tendency to thicken can be prepd. from sulfurized oils, such as "Novol," in the absence of driers, especially when a long blow period is used after sulfurizing and Cl is removed. Thickening velocity decreases with increase in the percentage of aromatic hydrocarbons in the benzine. Thickening of ready-mixed paints is highly dependent on the oil; slightly polymerized blown linseed oil or an unoxidized sulfurized oil should be used. Arthur Fleischer

The preparation of chrome yellow and chrome green with protective colloids. H. Wagner and J. Gohm. *Farben-Chem.* 5, 5-7(1934).—The addn. of "Gardinol," a sulfonated fatty alc., to the soln. of the Pb salt during the manu. of chrome yellow stabilizes the rhombic form of PbCrO<sub>4</sub>, thereby preventing after-reddening. The influence extends to chrome greens and reduces the flotation of Prussian blue. About 1% based on the Pb salt is required. G. G. Sward

Tung oil from *Aleurites montana* and specification tests. I. A. Jordan. *J. Soc. Chem. Ind.* 53, 21-2T(1934); cf. C. A. 28, 1877<sup>6</sup>.—Examn. of *Aleurites montana* oil shows in comparison with *Aleurites fordii* oil a lower content of eleostearic glyceride, which is the chief polymerizing component of both types of tung oil. As the former will be available as a trade material the following specifications are suggested: I no. 155 (Wijs), no. 1.5130, d<sub>4</sub><sup>20</sup> 0.934; the heat test should not exceed 12 min. and 30% extractive by the Paint Research Sta. method. E. S.

Solvents derived from cyclic alcohols. J. H. Maxwell Wickett. *Oil & Colour Trades J.* 85, 183-8(1934).—

The solvent properties for cellulosic derivs., boiling range, diln. ratio, etc. of cyclohexanone, and some of its derivs. are given. Applications in industrial finishes are discussed. G. G. Sward

The influence of solvents on the viscosity of oil varnishes. Fr. Kolke. *Farben-Chem.* 5, 16-17(1934).—The viscosities of linseed and tung oil, stand. oils thinned with 10-60% of each of "crystal oil 21," solvent naphtha, "crystal oil 30," turpentine oil petroleum and decalin are tabulated. The values for the different thinners increased in the order named. G. G. Sward

Treatment of shellac varnish with sulfur monochloride. M. Venugopalan. Indian Lac Research Inst., *Research Note* No. 12, 1p.(Dec., 1933).—A 0.5-1% varnish with 10% S<sub>2</sub>Cl<sub>2</sub> in CCl<sub>4</sub> showed a water absorption reduction from 30 to 2.4% after one week's immersion. There was no blushing in a month's immersion. The mech. properties were improved. Halsey E. Silliman

Sulfur treatment of shellac. M. Venugopalan. Indian Lac Research Inst., *Research Note* No. 10, 1p.(Nov., 1933).—The best results are obtained by heating shellac at 180° with 3-4% S until a drop of shellac on cooling has a typical green color. Water and abrasion resistance, elasticity, adhesion and molding properties markedly improved. Halsey E. Silliman

Reconditioning shellac. R. W. Aldis. Indian Lac Research Inst., *Research Note* No. 11, 1p.(Nov., 1933); cf. C. A. 27, 3092.—Polymerized shellac is readily sol. in phenols, convenient proportions being 3 parts phenol to 2 parts shellac; it is also sol. in aliphatic acids. Halsey E. Silliman

Tritolyl phosphate and the water resistance of shellac. M. Rangaswami and R. W. Aldis. Indian Lac Research Inst., *Research Note* No. 9, 1p.(Nov., 1933).—Expts. show that tritolyl phosphate does not reduce the amt. of water absorption; hence they do not confirm the results of Paisley (C. A. 26, 1458). Halsey E. Silliman

Analysis of nitrocellulose lacquers. H. Anderson. *J. Intern. Soc. Leather Trades Chem.* 18, 88-90(1934).—Suggested procedures: Ppt. nitrocellulose and pigment with C<sub>6</sub>H<sub>6</sub>, filter, dry, sep. nitrocellulose by soln. in Me<sub>2</sub>CO. Distil the solvent from the filtrate from benzene pptn., dry the residue, remove shellac if present by extn. with dil. alkali, dry the residue and ext. the plasticizer with cold EtOH. Identify the plasticizer by sapon. and identifying acids. Gums remain in the residue insol. in cold EtOH. Solvents are identified by boiling range, odor, sapon. values, etc. H. B. Merrill

Plasticizers for nitrocellulose. Alfred Kraus. *Farbe u. Lack* 1934, 39-40, 53-4; cf. C. A. 26, 5438.—Data for addnl. plasticizers have been obtained and together with those previously obtained are discussed. G. G. Sward

The importance of lac research. A. J. Gibson. *Oil & Colour Trades J.* 85, 247-54(1934).—The early and recent literature on lac and the lac insect is briefly reviewed. Until recently shellac has improved but slightly in quality. While progress has been made in the use of shellac, further development awaits information regarding the structure of this material. G. G. Sward

White nitrocellulose enamels. L. Kern. *Farbe u. Lack* 1934, 31-2, 41.—A few formulas are given for white nitrocellulose enamels suitable for application over baked oil as well as over nitrocellulose lacquer primers. G. G. Sward

Defects in linoleum due to pigments. A. Klemm. *Farbe u. Lack* 1934, 55-6.—Pigments used in linoleum must have reasonable resistance to heat and org. acid fumes developed during the manu. Precautions must be taken not to incorporate pigments with too great a catalytic effect on the oxidation of oils. G. G. Sward

New resin ester. Felix Fritz. *Chem.-Ztg.* 57, 354 (1933).—Stearyl alc., obtained, e. g., during the hydrogenation of technical stearic acid, reacts with coplophony after prolonged heating at 200° to give a liquid resin ester, which suddenly solidifies to a fat-like mass having the viscous properties and odor of coplophony. Possible uses are indicated. B. C. A.

Paint and varnish as wood preservatives (Jordan), 20. Structure of ultramarines (Dominikiewicz), 6. Electrodeposition of shellac (Murty, Sreenivasaya), 4. Azo dyes [for coloring lacquers] (Ger. pat. 590,375) 25. App. for controlling the viscosity of wire enamel compns. (U. S. pat. 1,944,243) 1. Hydrogenated methyl abietate [products used in coating compns.] (U. S. pat. 1,944,241) 10. Rubber-like or resinous masses (Ger. pat. 583,914) 30.

Mehdorn, Walter: *Kunstharzpressstoffe. Eigenschaften, Verarbeitung und Anwendung.* Berlin: V. D. I.-Verlag. 138 pp. M. 8.75.

Scheifele, Bernhard and Kölln, Hermann: *Betriebs-Handbuch der Lacktechnik. Bd. I. Apparate und Maschinen.* Berlin: Union Zweigniederl. 320 pp. M. 21.

Paints. N. V. Philips' Gloeilampenfabrieken. Brit. 401,022, Nov. 9, 1933. A paint for producing an electrically conducting coating on a body, *e. g.*, of glass, ceramic materials, etc., comprises a finely divided metal, *e. g.*, Cu, Zn, mixed with an org. binding agent, *e. g.*, collodion, ester resin and di-Bu phthalate in a solvent such as AmOAc, the metal having been treated to give it a surface free from oxides and other non-conducting compds. Treatment may consist in cleaving, *e. g.*, with  $H_2SO_4$ , and washing with alc. or in pptg. a nobler metal, *e. g.*, Ag, on the metal. The external surface of a thermionic valve may be coated with the paint or an elec. condenser may be made by coating a sheet of mica with layers thereof.

Paint. Soc. anon. John Cockerill. Belg. 397,775, Aug. 31, 1933. Rubber is combined with rosin, pitch or bitumen by means of a nonvolatile solvent acting as condensation agent, such as benzyl alc. The mixt. is heated in an autoclave.

Paints, colors, etc. Karl Gross. Fr. 755,755, Nov. 30, 1933. In making homogeneous mixts. of coloring materials, oily substances and water, more oil is used with respect to the coloring material than when paints are made without the addn. of water. The coloring materials may be made into a paste with water and the oil added. Fr. 755,756. In making colors for printing, contg. coloring material, oil and water, more oil is used than when no water is present.

Decorative paint. Mary B. Parrish. U. S. 1,943,926, Jan. 16. An acid or basic coal-tar dye is used with tincture of hyssop, a thickening material including gelatin, and pancreatin to form a coating compn. suitable for use on leather, celluloid, wood, glass, etc.

Luminous paints, lacquers and molding compositions. I. G. Farbenind. A.-G. Brit. 400,068, Oct. 19, 1933. A luminous substance is mixed with polymerized styrene, vinyl naphthalene, vinyl tetrahydronaphthalene or homologs thereof, *e. g.*, Me or Et styrene, methyl vinyl naphthalene. In examples paints are made by dissolving polymerized styrene in a mixt. of PhMe, xylene and AcOBu, together with tricresyl phosphate as a softener, and adding  $SrS$ ,  $ZnS$ , etc., contg. small amts. of Rb, Mn, Bi, Ag or Cu as excitors. The product obtained by mixing molten  $H_3BO_3$  with phthalic and naphthalic anhydrides may also be used. A molding compn. is made by mixing a luminous paint contg.  $SrS$ ,  $CaS$  or  $ZnS$  with styrene and heating to  $140^\circ$  with a little  $H_2SO_4$ . Cf. C. A. 28, 1557.

Enamel paint for stone materials, particularly asbestocement articles. D. Govaere. Belg. 397,802, Aug. 31, 1933. A mixt. of Na or K silicate with fillers such as  $ZnO$ ,  $Al_2O_3$ ,  $MgO$ ,  $ZnSO_4$  or  $BaSO_4$  is added to an ordinary paint.

Apparatus for coating wire with enamel or the like. Charles B. Fantone and Reuben M. Jameson (to Syncro Machine Co.). U. S. 1,943,818, Jan. 16. Structural and operative details.

Inorganic gel composition from bentonite and calcined dolomite. Roy Cross (to Silica Products Co.). U. S. 1,943,584, Jan. 16. A compn. which may be used in cheap paints, etc., comprises bentonite together with about 0.5-10% calcined dolomite.

Pigments. Frank Rahtjen and Manfred Ragg. Ger.

588,950, Nov. 30, 1933 (Cl. 22f. 10). Finely divided pigments free from oxides are prepd. by heating starting materials contg. Pb oxide compds. with solid, liquid or gaseous reduction agents with exclusion of air. Inactive substances such as ilmenite,  $ZnO$ , silicates, borates, etc., may be added and temps. between the m. p. and vaporizing point of Pb are used.

"Iron red" dry pigments. James B. Castner and Raymond W. Powers (to E. I. du Pont de Nemours & Co.). U. S. 1,943,948, Jan. 16. A raw material for calcining to produce "iron red" dry colors is produced by the reaction of the sludge formed by the reduction of aromatic nitro compds. to amines by Fe with an amount of  $H_2SO_4$  substantially less than the chem. equiv. of the Fe, and setting the resulting mixt.

Printing ink. William H. Laurence. Can. 338,451, Jan. 9, 1934. A quickly drying printing ink consists of a color pigment, a gum such as white or orange shellac crystals or sandrac, a nonhygroscopic agent such as  $TiO_2$ ,  $ZnO$  or lithopone and a highly volatile solvent such as  $Et_2O$ , MeOH or EtOH.

Driers. I. G. Farbenind. A.-G. Brit. 400,797, Nov. 2, 1933. Complex salts of wool grease fatty acids and 1 or more of the acids commonly used in driers, *e. g.*, naphthenic, linoleic or resin acids, or the acids obtained by oxidizing paraffin or petroleum are used as driers for paints, etc. The salts may be prepd. by heating to fusion wool grease, or acids obtained therefrom, and the other acid(s) with oxides, hydroxides, carbonates, acetates, borates, etc., of 1 or more earth, alk. earth or heavy metals, *e. g.*, Co, Mn, Pb, Zn, or by pptn. from a soln. of alkali soaps of the acids by a soln. of 1 or more sol. salts of the metals. About 10% of an amino compd., *e. g.*, triethanolamine, or of 1 or more solid monocarboxylic fatty, olefinic or aromatic acids (or substitution products and derivs. thereof), *e. g.*, palmitic, crotonic, benzoic, anthranilic, cinnamic, hippuric acids, may be added.

Drying oils for use in paints, enamels, etc. Fritz Schmid. U. S. 1,944,813, Jan. 23. See Fr. 730,877 (C. A. 27, 433).

Apparatus for boiling and cooling drying oils. Karl F. Wilhelm. Ger. 590,164, Dec. 27, 1933 (Cl. 22k. 2).

Cleaning iron and steel. Adriaan Nagelvoort (to Delaware Chemical Engineering Co.). U. S. 1,943,875, Jan. 16. Articles of iron or steel are cleaned, as in prep. them for plating or painting by exposing them to air contg. a small proportion of phosgene at a temp. of  $100-200^\circ$ .

Protecting metals. James H. Gravell. Fr. 755,709, Nov. 29, 1933. Metals are protected against corrosion and made ready for painting by the application of a mixt. which contains an acid salt of a tribasic acid, the cation of which is more basic than Fe, *e. g.*,  $Ca(H_2PO_4)_2$  or an arsenate, an absorbent such as wood flour, starch, clay or fuller's earth and an ionizing agent such as water, AcOH, MeOH or EtOH, and preferably also a salt the cation of which is less basic than Fe, *e. g.*,  $Cu(NO_3)_2$ .

Rust-preventing coating. M. Jeanmart and M. Glau-sener. Belg. 397,635, Aug. 31, 1933. The coating contains variable proportions of a double silicate of Al and  $MgO$ , the binder consisting of linseed oil, varnish, etc.

Anti-rust coating. Yves Cornic. Fr. 755,905, Dec. 1, 1933. The coating consists of an aq. dispersion of natural or artificial rubber and cement, in amt. sufficient to cause hardening.

Anti-rust products. Robert Stürzenbinder and Ernest Eppendahl. Fr. 755,805, Nov. 30, 1933. An anti-rust or rust-destroying product is composed of a binder, *e. g.*, a varnish insol. in water and drying in air, and a mixt. sol. in this binder, of an acid attacking the metal, such as  $H_3PO_4$  or  $HCOOH$ , and constituents pptg. from metallic solns., *e. g.*, tannic acid, nucleic acid, benzoic acid or their salts, esters or other compds.

Oil lacquers. I. G. Farbenind. A.-G. (Hanns Bernhard, inventor). Ger. 588,843, Nov. 28, 1933 (Cl. 22k. 3). A lacquer of high gloss is produced by adding aliphatic carboxylic acids with  $\alpha,\beta$ - or  $\beta,\gamma$ -double bonds to the usual constituents. Thus, a lacquer consists of thick oil made from linseed oil and wood oil. Sorbic acid is added

at 100–30°. ZnO is added and subsequently, sanganol, turpentine oil and Co siccativ. Other examples are given.

**Cellulose lacquering.** Herbig-Haarhaus A.-G. Ger. 588,731, Nov. 25, 1933 (Cl. 75c. 5.01). An undercoat for cellulose lacquer consists of oil lacquer contg. at least a 5% addn. of volatile softening agent such as tritolyl phosphate or diethyl phthalate.

**Japanning concrete surfaces.** Sotojiro Asobe. U. S. 1,944,588, Jan. 23. A ground layer is applied comprising a mixt. of raw japan, asphalt, jinoko and tonoko, over which is applied a second layer comprising a mixt. of raw japan and jinoko, and a final finishing layer of japan. Cf. C. A. 28, 351<sup>1</sup>.

**Resin solution suitable for use as a varnish or lacquer.** John H. Schmidt and Rupert S. Daniels (to Bakelite Corp.). U. S. 1,944,867, Jan. 23. A permanently fusible resin, produced from thiourea and formaldehyde, is dissolved, together with an anhyd. CH<sub>2</sub>-contg. hardening agent such as "paraform," in a common solvent such as ethyl lactate, ethylene glycol or ethyl ether of ethylene glycol.

**Fusible and oil-soluble phenol-aldehyde condensation products.** Fritz Seebach (to Bakelite G. m. b. H.). U. S. 1,944,016, Jan. 16. A resinous product of permanently fusible character and which is sol. in vegetable drying oils such as linseed oil and suitable for use in coating compns. is prepd. by heating a phenol-aldehyde condensation product with a phenol contg. more than one OH group, such as a diphenol, dinaphthol or the like until the reaction mass becomes sol. in a vegetable drying oil.

**Resins.** I. G. Farbenind. A.-G. (Eduard Tschunkur and Walter Bock, inventors). Ger. 588,785, Nov. 27, 1933 (Cl. 39b. 4.02). Addn. to 570,980. The method

of 570,980 for producing synthetic resins by mixing butadiene hydrocarbons with olefinic benzenes is extended to include the use of mono- or polyolefin benzenes, their nuclear or side-chain homologs and their semi-polymerizates. In an example, a mixt. of styrene and butadiene is polymerized in the presence of Na stearate to give a resinous product. Other examples are given. Cf. C. A. 28, 1881<sup>2</sup>.

**Synthetic resins.** Imperial Chemical Industries Ltd. and Rowland Hill. Brit. 400,272, Oct. 23, 1933. Oil-sol. resinous compns. are prepd. by condensing the Me or Et ether of 1,3,5-xylenol with CH<sub>2</sub>O, or other compds. contg. a reactive CH<sub>2</sub> group, in an acid medium. The products may be converted into coating compns. by mixing with (semi)drying oils or nitrocellulose. Among examples the condensation product of the Me ether with CH<sub>2</sub>O in presence of HCl is heated with tung oil and mineral spirits, contg. Co linoleate to make a varnish.

**Synthetic resin compositions.** British Celanese Ltd. and Wm. H. Moss. Brit. 400,937, Oct. 27, 1933. Liquid or solid compns., suitable for producing varnishes or molded articles, e. g., gramophone records, comprise animal or vegetable oils together with halogenated synthetic resins of the phenol-aldehyde or -ketone type or synthetic resins of the diphenylolpropane-aldehyde or -ketone type. Cellulose derivs. up to 10% of the synthetic resin, natural resins, other synthetic resins, solvents, diluents, plasticizers, fire-proofing agents and fillers may be added. As examples (1) a varnish is made by mixing diphenylolpropane-CH<sub>2</sub>O resin 10, boiled linseed oil 40, Pb-Co drier 2, turpentine 15 and gasoline 15 parts and (2) a compn. for molding records contains diphenylolpropane-CH<sub>2</sub>O resin 34, diphenylolpropane-Me<sub>2</sub>CO resin 20, castor oil 20, perilla oil 10 and filler 60 parts.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

### E. SCHERUBEL

**Spoilage of fats and oils.** R. Neu. *Allgem. Oel-Fett-Ztg.* 30, 583–8(1933).—W. C. Powick's chain of reactions in explaining the rancidity of fats (C. A. 18, 1580) starts with free oleic acid and finishes with epiphydic aldehyde, the color-producing compd. in the Kreis reaction. N. suggests instead the following chain: olein is oxidized to linolenic acid ester; this by selective oxidation at the 2 outer double bonds becomes an unsatd. diperoxide; by splitting off H<sub>2</sub>O<sub>2</sub> it becomes the corresponding dimonoxide ester and by H<sub>2</sub>O absorption an unsatd. tetrahydroxy acid ester; by splitting again, heptyl and maleic aldehyde result and also the half aldehyde of pimelic acid ester; by losing CO maleic aldehyde forms acrolein and this by oxidation forms epiphydic aldehyde. N. suggests similar reactions for linolin and linolenin, and discusses the work of Pritzker and Jungkuns, Salway, Barnicoat and of Better, who says that autooxidation is not due to the unsatd. condition of the fatty acids, but to the presence or absence of antioxidants. A distinct retardation occurs in ricinolic acid by its introduction of OH which, for further oxidation, must first be dehydrogenated. P. Escher

**Antioxidants for fats and oils.** Geo. R. Greenbank and Geo. E. Holm. *Ind. Eng. Chem.* 26, 243–5(1934).—Of the phenols only the *o*- and *p*-types are active as antioxidants for fats and oils. Some unsatd. polybasic aliphatic acids, notably maleic, are also antioxidants.

E. Scherubel

**Chemical microscopy of fats and waxes.** I. Wilson Greene. *Oil and Soap* 11, 31–2(1934).—This is a review of the methods applied to fats in chem. investigations utilizing the microscope.

E. Scherubel

**Reactions between fatty acid and bicarbonate.** C. Bergell. *Seifensieder Ztg.* 61, 33–4(1934).—A fatty acid of 0° titer will react with concd. bicarbonate soln. in 5% excess at room temp. to complete sapon. in about 1 week. A neutral soap base, on the other hand, showed 1% free fatty acid after exposure for 24 hrs. to air, and when the aq. soap soln. was blown with CO<sub>2</sub>, 7% fatty acids were

liberated. These opposing results are due to unknown changes in the soly. of CO<sub>2</sub> when temp., concn. of salt soln. and surface tension change.

P. Escher

**Heat requirements for fatty acid distillation.** Victor Mills and R. C. Daniels. *Ind. Eng. Chem.* 26, 248–50(1934).—After deducting the heat loss, the preheat required for raising the feed to distn. temp. and the heat absorbed by the agitation steam from the total heat supply, the latent heat of vaporization for recovered grease fatty acids was found to be 108 B. t. u. per lb. and 124 B. t. u. per lb. for red oil.

E. Scherubel

**Twitchell reagents. XII. Properties of principal constituents isolated from Twitchell reagents.** 3. Kyōsuke Nishizawa, Minoru Okuyama and Takahide Inoue. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 34–6(1934); cf. C. A. 27, 200. XIII. Relation between kind of oils and the emulsifying power of Twitchell reagent. Kyōsuke Nishizawa and Takahide Inoue. *Ibid.* 36–8. K. K.

**Regularities in the glyceride structure of some technically important vegetable fatty oils.** T. P. Hilditch and E. C. Jones. *J. Soc. Chem. Ind.* 53, 13–21T(1934).—When an unsatd. fat whose acids belong to the C<sub>18</sub> series is fully hydrogenated it is possible to obtain by systematic fractional crystn. a series of least sol. fractions which contain all the tristearin present mixed only with palmitodistearins. From the sapon. nos. of such fractions it is possible to est. the proportion of tristearin in the hardened fat and, therefore, of the glycerides in the original fatty oil. This procedure is confined to oils in which the unsatd. acids are only oleic, linoleic and linolenic such as olive, cottonseed, linseed and others of the non-drying and drying type. Cottonseed oil appears to consist of nearly 60% of glycerides contg. one palmityl radical and 2 unsatd. C<sub>18</sub> groups with perhaps 15% of dipalmito-olein or dipalmito-linolein; only the remaining 24% consists of unsatd. glycerides. Soy-bean and linseed oils with 86 and 90% of unsatd. C<sub>18</sub> acids in their mixed fatty acids contain 20–25% of mixed satd.-unsatd. acids of glycerides,

mainly palmito-diunsatd. glycerides. The unsatd. acids of soy-bean oil contain 26% oleic, 55% linoleic and 6% of linolenic acids, and those of linseed oil, 8% of oleic, 43% of linoleic and 40% of linolenic acid. In olive and tea-seed oils the proportion of completely unsatd. glycerides is less than 7% of the whole, and since linoleic acid forms nearly 10% of the mixed unsatd. acids it is probable that about 20% of the oils will consist of mixed oleolinoleins, so that the content of triolein in either oil cannot greatly exceed 50%. Peanut oil did not prove amenable to the present method of tristearin estn.

E. Scherubel

Chemical analysis for possible sources of oils of forty-five species of oil-bearing seeds. Salvador P. Padilla and Florencio A. Soliven. *Philippine Agr.* 22, 408-15 (1933).—The results of the principal detns. on the fresh seed are as follows:

Species	Moisture	Ash	Protein	Fat	Carbo- hydrate
<i>Alseodaphne maluccana</i>	2.54	3.27	25.56	63.53	5.10
<i>Alseodaphne trisperma</i>	3.65	3.22	23.31	38.97	30.90
<i>Anacardium occidentale</i>	7.55	2.60	25.41	43.39	21.05
<i>Arachis hypogaea</i>	4.58	2.57	42.77	42.03	8.05
<i>Caesalpinia crista</i>	4.66	3.45	21.19	20.56	50.14
<i>Calophyllum inophyllum</i>	27.73	1.07	6.41	60.72	4.07
<i>Canarium ovatum</i>	4.16	2.99	16.53	72.01	4.31
<i>Cerbera pentandra</i>	8.84	5.40	47.53	34.48	3.75
<i>Chitocheton cumingianus</i>	4.40	2.65	16.38	67.46	9.11
<i>Chitocheton pentandra</i>	12.19	2.41	13.50	13.27	58.63
<i>Chrysobalanus icaco</i>	2.43	1.72	10.74	21.27	63.83
<i>Cinnamomum marcados</i>	16.35	1.71	31.77	43.45	6.72
<i>Cocos nucifera</i>	48.46	0.96	5.39	31.61	13.56
<i>Croton tiglium</i>	4.51	3.18	38.30	37.17	16.84
<i>Delonix regia</i>	6.37	7.42	60.31	9.68	16.22
<i>Diospyros decandrum</i>	46.77	1.87	8.90	1.45	42.01
<i>Entada phaeocoloides</i>	9.09	2.27	22.63	2.07	63.04
<i>Girardinia sepium</i>	13.16	3.53	53.80	26.12	3.39
<i>Gossypium hirsutum</i>	10.48	5.28	38.58	34.09	11.62
<i>Heritiera littoralis</i>	46.27	1.46	4.34	5.34	42.59
<i>Henebra brasiliensis</i>	11.49	2.08	18.53	40.51	26.49
<i>Hydnocarpus alcar</i>	34.34	2.89	13.64	44.27	4.66
<i>Hydnocarpus hutchinsonii</i>	9.74	2.20	17.74	55.39	13.93
<i>Indica bijuga</i>	23.74	2.50	11.12	11.16	51.48
<i>Jatropha curcas</i>	4.65	3.87	31.85	46.40	13.25
<i>Leucaena glauca</i>	13.68	5.41	57.30	13.18	10.43
<i>Malolus philippensis</i>	6.33	2.67	28.27	11.25	51.48
<i>Mornga oleifera</i>	6.52	3.16	46.56	32.60	11.16
<i>Nephelium mutabile</i>	9.07	2.61	15.45	58.18	14.69
<i>Orania palmiana</i>	27.46	1.29	4.57	1.14	65.84
<i>Pachyrrhizus erosus</i>	8.11	4.32	39.50	25.81	22.26
<i>Palaudia rhomboides</i>	18.35	2.47	13.45	8.10	57.68
<i>Pongium edule</i>	21.80	1.62	11.24	38.50	26.84
<i>Parashorea malaenoma</i>	36.37	1.35	4.27	2.91	55.10
<i>Persea japonica</i>	6.56	5.51	39.74	18.89	29.30
<i>Phaeocolobium dulce</i>	21.76	2.26	29.89	17.69	28.40
<i>Pongamia pinnata</i>	12.41	3.05	23.29	28.63	32.62
<i>Psophocarpus tetragonolobus</i>	8.54	6.27	41.86	13.11	31.22
<i>Ricinus communis</i>	5.14	3.85	30.61	53.67	6.73
<i>Samanea saman</i>	11.83	2.93	59.72	11.16	14.36
<i>Sesamum orientale</i>	5.79	6.37	29.50	43.25	15.09
<i>Sesbania grandiflora</i>	10.39	5.48	68.22	7.09	8.82
<i>Sterculia foetida</i>	8.37	3.37	23.44	50.26	14.56
<i>Swietenia mahagoni</i>	4.86	2.77	15.81	60.19	16.87
<i>Tamarindus indica</i>	13.13	2.37	19.60	5.54	59.27

A. L. Mehring

The fatty oil of *Cassia occidentalis*, Linn. seed. A. Steger and J. van Loon. *Rec. trav. chim.* 53, 28-30 (1934).—The oil was extd. in the lab. from the seeds of "wild coffee," *Cassia occidentalis*. The oil yield is 2.3 or 9.2% when based on kernel wt. Consts. are: sapon. no. 178.7, acid no. 10.2, R.-M. no. 0.5, I no. Wijs, 113.9, thiocyanate no. 78.2, n<sub>D</sub><sup>20</sup> 1.4770. Compn. of the oil is: unsaponifiable 7.4, satd. acids 19.7, oleic acid 30.7, linoleic acid 31.4, linolenic acid 6.3, volatile 0.7, glycerol radical 3.8%.

P. Escher

The fatty oil of millet, *Panicum millaceum*. A. Steger and J. van Loon. *Rec. trav. chim.* 53, 41-4 (1934).—Ether extd. 3% of a semi-drying oil: d<sub>4</sub><sup>20</sup> 0.9383, acid no. 12.8, sapon. no. 191.5, n<sub>D</sub><sup>20</sup> 1.4577, I no. Wijs 129.0, thiocyanate no. 80.0, acetyl no. 16.9, R.-M. no. 1.76. Compn. is: unsaponifiable 3.3, satd. acids 10.7, oleic acid 23.9, linoleic acid 46.9, linolenic acid 7.2, volatile 4.0, glycerol radical 4.0%.

P. Escher

The fatty oil of quince seed, *Cydonia vulgaris*. A. Steger and J. van Loon. *Rec. trav. chim.* 53, 24-7 (1934).—The seed yielded 19.2% oil, based on air-dried kernels: d<sub>4</sub><sup>20</sup> 0.9220, acid no. 15.3, sapon. no. 194.2, ester no. 178.9, I no. Wijs 121.6, thiocyanate no. 82.7, acetyl no. 14.7, n<sub>D</sub><sup>20</sup> 1.4738. Compn. is: unsaponifiable 0.36, satd. acids

1 8.6, oleic acid 38.5, linoleic acid 39.3, linolenic acid 8.9, volatile 1.44, glycerol radical 4.0%.

P. Escher

Making cottonseed oil and its products. J. B. Nealey. *Mfrs. Record* 103, No. 2, 18-19 (1934).—The procedure employed by Trinity Cotton Oil Co., Dallas, Texas, is outlined, and a list given of the principal by-products.

A. W. Furbank

Change in the composition of sunflower oil during ripening of the seed. K. H. Bauer. *Fettchem. Umschau* 41, 1-2 (1934).—The I no. of sunflower oil, extd. from fresh seed while ripening between Sept. 26 and Nov. 15, remained almost const., but the satd. acids decreased steadily from 15.14 to 6.70%, the linoleic acid from 74.74 to 64.91%, while oleic acid increased from 9.81 to 28.35%. After Nov. 16, the compn. of the oil remained practically uniform.

P. Escher

The iodine number of Polish linseed oil. Stefan Bazarewski and Witold Zarnowski. *Polish Agr. Forestal Ann.* 27, 315-32 (332 in French) (1932).—The I no. of linseed oil depends on the method of prep. the oil. Oil extd. with Et<sub>2</sub>O shows the smallest I no.; that obtained by pressure with application of heat shows a medium I no.; that pressed in the cold shows the highest I no. Oil from seed obtained on non-fertilized fields has a somewhat higher I no.; that from fertilized fields a smaller I no.; it is 189.7 and 188.1, resp. With dense sowing the I no. is on the av. 189.9, while with thin sowing 187.9.

Meteorological factors in the period of ripening of the seeds exert a pronounced influence on the properties of the oil. The longer this period lasts, the more unsatd. acids the oil contains and the higher is its I no. The I no. depends also on the origin of the seed. The highest no. shows oil from seeds of Nowo-Swieciany (190.7) and Sejny (190.8); the lowest no. shows oil from seeds of Lomza (177.5), Buczacz (177.7) and Chyrów (177.7). A still lower value showed an Argentine linseed oil (La Plata). The av. I no. of Polish linseed oil obtained by hot pressure is 185.0.

J. Wiertelak

Determination of the iodine number of some East-Indian oils by Kaufmann's bromometric method. N. N. God hole, Amarendra and Urba Datt. *Fettchem. Umschau* 41, 2-3 (1934).—Various drying oils, non-drying oils, fats and fatty acids were tested by the Hanus method and H. P. Kaufmann's bromometric method for the detn. of the I no. A good agreement between these 2 methods was found in all cases.

P. Escher

Gadoleic acid in cod-liver oil. Yoshiyuki Toyama and Tomotaro Tsuchiya. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 14 17 (1934).—Gadoleic acid, C<sub>27</sub>H<sub>52</sub>O<sub>2</sub>, has been isolated from cod-liver oil and its constitution detd by ozonolysis. Among the decompn. products of the ozonide, undecanoic acid, undecanal and azelaic acid were identified. The constitutional formula of gadoleic acid is CH<sub>3</sub>(CH<sub>2</sub>)<sub>10</sub>CH=CH(CH<sub>2</sub>)<sub>10</sub>COOH.

K. K.

Identification of gadoleic acid in Japanese sardine oil, herring oil and liver oil of "Sukoso-Dara" (*Theragra chalcogramma*). Yoshiyuki Toyama and Tomotaro Tsuchiya. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 17-20 (1934).—An eicosenoic acid has been isolated in the pure state from Japanese sardine oil, herring oil and "Sukoso-Dara" liver oil. The acid from the first 2 was identified as gadoleic acid by the ozonide method and that from the liver oil as the same acid by the mixed m-p test.

Karl Kammermeyer

White carnauba wax. G. Schneider and R. Folger. *Fettchem. Umschau* 41, 4-6 (1934).—The customary method of bleaching and refining the carnauba-paraffin mixt is replaced by a fractional crystn. of its benzine (80-130°) soln. at 16°, when crystals m. 80.8° are collected, together with a by-product wax m. 60°.

P. F.

The determination of husks in sunflower cakes. R. Heublyum. *Seifensieder-Ztg.* 61, 34-5, 53-4 (1934).—H. modifies the Russian standard method: Moistn 10 g. of the cake of pea-size with H<sub>2</sub>O; add 2 g. pepsin, treated for 1-2 min. with 50 cc. 5% HCl and add to 200 cc. H<sub>2</sub>O, transfer the pepsin soln. together with the treated cake to a 500-cc. flask, fill to the mark and keep for 12-18 hr. at 37-50°. Shake, settle and decant; transfer the residual

husks to a porcelain mortar and wash several times with 400–500 cc.  $H_2O$ ; transfer with 100 cc.  $H_2O$  to a 250-cc. cylinder and stir several times by pouring 25–50 cc. satd. NaCl soln. into it to float off any remaining kernel particles; decant, wash, dry and weigh the residue. The results varied at most by 2.26% with a husk content of 22.43%.

**Changes in the properties of soap by adding lecithin.** E. L. Lederer. *Seifensieder-Ztg.* 60, 919–20 (1933).—Addn. of 5% or more of soy lecithin to soaps effects better cleansing by increasing the emulsifying and lathering power. Rancidity or formation of brown spots does not occur.

**The active constituents of bile in bile soaps.** Welwart. *Seifensieder-Ztg.* 60, 906–7 (1933).—The active constituent of bile in bile soaps is taurocholic acid, present in bile in relatively small amt. The related "Igepon T" of the German I. G. is the Na salt of a high-mol. fatty acid deriv. of taurine.

**The influence of air when drying soap base.** C. Bergell. *Seifensieder-Ztg.* 61, 15–18 (1934).—Atm.  $CO_2$  will decompose finely divided soap at the temp. of the drying chambers, producing free fatty acid, and will cause spoilage by the formation of brown spots; the soap may nevertheless show an alk. reaction because of surface formation of  $Na_2CO_3$ . An ether extn. is required to detect the free acids.

**Determination of the cleansing power of washing agents.** A. van der Werth. *Allgem. Oel- u. Fett-Ztg.* 30, 588–94 (1933).—A general review is given of prevailing ideas on the cleansing power of washing agents. Apparently there are 3 dominant factors which det. cleansing: absorption of dirt particles, emulsifying power and, to a lesser degree, wetting ability. In special cases of comparison measurements of single properties such as lathering power or surface tension may suffice. Washing tests are essential for evaluating washing agents, but present methods of soiling, type of test pieces, temp. and concn. of liquor, mode of judging cleansing power, etc., are too much at variance. Soap solns., when exactly neutralized by buffering, have no cleansing effect. Dirt particles have a pos. charge, soap particles a neg. charge, because of hydrolysis, thus permitting a union of dirt with soap. Adding neg. ions to a soap soln. increases its cleansing power. It is practically impossible to reproduce all com. conditions in single lab. tests, but in all tests it is desirable to measure those properties that produce a cleansing effect, viz., (1) the 3-min. lathering no., (2) the surface tension (drop no.) and (3) the time required for the test piece to sink in the liquor (all 3 detns. to be made in the presence of oil and soot).

Soy bean (Sayer) 12.

**Krings, Robert:** Die Herstellung der Feinseifen und Toilettenseifen. Ein Handbuch und Nachschlagewerk für die Seifenfabrikanten, Praktiker und Chemiker. Berlin: Allgemeine Industrie-Verlag. 146 pp. M. 5.

**Lunde, Gulbrand, and Stiebel, Fritz:** Quantitative Fluoreszenz-Messungen an Olivenölen. Oslo: Dybwad in Komm. 56 pp. Kr. 5.

**Denaturant for fats.** George McIntyre and Edmund J. Higgins (to The Standard Oil Development Co.). Can. 338,557, Jan. 9, 1934. •Acid oils obtained in the refining of petroleum are treated with 5–30 lb. of 60°Bé. or 98%  $H_2SO_4$  for each 50 gallons of oil and the resulting sludge is allowed to settle. The sludge is washed separately with about an equal amt. of water. The sludge and weak acid are settled and drawn off, leaving the acid oil. The acid oil is neutralized with NaOH, washed with water and reduced to meet the required government specifications for denaturing oil. The denaturing oil is incorporated with the fats by mixing with or without an application of heat.

**Stabilizing fats and oils.** Wm. D. Richardson and Donald P. Grettie (to Swift & Co.). Brit. 401,018, Nov. 9, 1933. See Fr. 736,984 (C. A. 27, 1535).

**Sulfonated oils and fats.** Richard Huttenlocher (to Farb- & Gerbstoffwerke Carl Fleisch, Jr.). U. S. 1,943,319, Jan. 16. See Ger. 564,759 (C. A. 27, 1225).

**Plant for the boiling of whole whale bodies.** H. Edman. Swed. 76,659, March 7, 1933.

**Fish-liver oils.** Abbott Laboratories. Brit. 401,095, Nov. 9, 1933. Oils having high vitamin A, and in some cases vitamin D, contents are obtained by steaming fish livers at below 100°, discarding the aq. liquid produced, rapidly cooling the residue, extg. the oil with an org. solvent, e. g., peroxide-free diethyl ether, and removing the solvent from the extd. oil.

**Soap.** Eugen Better and Felix Munk. Ger. 588,951, Nov. 30, 1933 (Cl. 23a. 5). Crude wool fat for soap making is refined and rendered odorless by treatment with hot dil.  $H_2SO_4$ , washing with water and extg. with alc. to remove free fatty acids. The residue is bleached with Cl, hypochlorites or  $HClO$ , washed with hot water and dried.

**Soap.** V. Boulez. Belg. 396,792, July 31, 1933. Glue (0.5%), which may or may not be in soln., is added to the soap paste.

**Soap powder.** Helios Kemisk-Tekniska Fabriker A.-B. (H. Y. Dalström, inventor). Swed. 78,523, Oct. 3, 1933. A compounded soap powder is manufd. by the mixing and reaction of two or more components, at least one of which is powd. and one liquid. The powd. component is strongly agitated by means of a mech. stirring device while the liquid components are added successively without heating in the form of jets. App. is described.

**Cleaning composition.** A. M. Kruse. Swed. 78,917, Nov. 14, 1933. An aq. soln. of 420 g. of  $Na_2CO_3$ , 210 g. of  $NaHCO_3$  and 4.9 kg. of soap cuttings in 22.5 l.  $H_2O$  emulsified with 80 g. of petroleum and 80 g. lubricating oil and contg. in suspension 10.2 kg. of pulverized pumice; there may be added 30 g. of bitter-almond oil and 10 g. of carmine.

**Cleaning composition.** Thorleif Sørensen. Norw. 45,885, June 20, 1933. A mixt. of an absorptive material, solid fatty acids and alkali, liquid fatty acids and an aq. soln. of alkali salts, with or without soap, dyestuffs and perfumes.

**Detergent.** C. van Overstraeten. Belg. 396,321, June 30, 1933. A product having a high detergent power, suitable for the treatment of clothing and fabrics, is obtained by adding spirit of turpentine and olein to a mixt. of Na perborate and  $NH_4OH$  and adding the resultant emulsion to a soap soln.

**Emulsifying, dispersing and cleansing agents.** Deutsche Hydrierwerke A.-G. Brit. 400,980, Nov. 6, 1933. The agents are obtained by esterifying unsatd. aliphatic alcs., having at least 8 but not more than 20 C atoms, with  $H_2SO_4$  and then halogenating the products. The esterification and halogenation may be effected in reverse sequence and salts of sulfuric esters of the alcs. may be treated with  $HClO$ . In examples (1) olein alc. is treated with  $ClHSO_4$  in presence of  $CCl_4$  and gaseous  $HCl$  is introduced toward the end of the reaction; after neutralization the product may be used to disperse olein in  $H_2O$  to obtain a spinning grease, and (2) wool is washed in a liquor contg.  $Na_2CO_3$  and the product obtained by adding  $HClO$  to oleic sulfuric ester; soaps and solvents may advantageously be present.

**Wetting and other agents.** Karl Ott, Winfrid Hentrich and Helmut Keppler (to I. G. Farbenind. A.-G.). U. S. 1,944,300, Jan. 23. Compds. of aliphatic amine sulfonic acids contg. 8 or more C atoms, sol. in water and suitable for use as wetting, softening, frothing or dispersing agents in the textile industry, such as the Na salt of 2-(heptadecylamino)-ethanesulfonic acid, etc., are formed by causing an alkyl, aralkyl or aryl sulfonic acid or a salt thereof contg. a labile halogen atom in the alkyl or aralkyl or aryl group to react with a higher aliphatic amine of the general formula:  $R^1R^2NH$ , in which the satd. or unsatd. aliphatic radical contains at least 8 C atoms or by causing an alkyl, aralkyl or aryl halide to react with a higher aliphatic amine of the kind referred

to and subjecting the resulting reaction products to a treatment with a sulfonating agent. Several examples with details of procedure are given.

**Wetting and other agents.** R. J. du Pont de Nemours & Co. Fr. 755,769, Nov. 30, 1933. Esters of abietic or hydroabietic acid, which are wetting and penetrating agents, are prepd. by causing an abietic acid compd. contg.

an atom or radical which can be substituted in the carbonyl group to react with a compd. of an aliphatic or cycloaliphatic sulfonic acid contg. a supplementary atom or radical which can be substituted attached to one of the C atoms, e. g., ethanol-, pentanol- or cyclohexanol-sulfonic acid. Thus, compds. which are probably Na  $\beta$ -sulfoethyl-abietate and -hydro-abietate may be prepd.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

**Terminology of sugars.** A. P. Bryant. *Ind. Eng. Chem.* 26, 231 (1934).—The sugars formed by inversion of sucrose are known under various names, while totally unlike substances are known under the name of "glucose." This confusion should be ended by using only "dextrose" and "levulose" for the sugars referred to. F. W. Z.

**Advances in beet-sugar manufacture in 1933.** Edmond O. v. Lippmann. *Chem.-Ztg.* 58, 87 8, 107-9 (1934).

E. H.

**Sugar refining with "Suma Carb" in Cuba without revivification.** Mario de la Vega. *Intern. Sugar J.* 36, 70-4 (1934).—While it has been definitely proved that refined sugars of the highest quality can be made economically on the plantation by the use of activated carbons without facilities for their revivification, the present data show that this was also accomplished when very inferior grade raw sugars, polarizing 93-6, which had deteriorated during a long period of storage, were used. These sugars were refined by the use of 0.28% "Suma Carb" on the wt. of refined sugar produced. To obtain the proper filtration of the liquors, which would ordinarily filter very slowly, "Hyflo" filter aid was added at the rate of 0.25-0.35% on solids in the first stage and 0.1% at the third stage of filtration. The amt. of "Suma Carb" employed compares very favorably with other activated carbons, of which 1.75-2.25% is required to perform the same work. A flow sheet of the filtration plan is given.

W. L. Owen

**Different methods of defecation.** K. Smoleński. *Gaz. Cukrownicza* 73, 99-119, 155 78 (1933).—These factory studies were made to explain the tech. value of Teatini's method of defecation. The expts. prove that much smaller amts. of CaO (1.0-1.25% against 1.33% normally) may be used in Teatini's method. A higher amt. of CaO applied in the usual moist defecation increases the rate of filtration and the purity coeff., corrects the quality of the sirup and diminishes the coloration and the content of conductometric ash and Ca salts. Dry defecation under identical conditions gives better results than moist defecation. Preliminary defecation in the cold, as an initial step of moist defecation, gives also an increased rate of filtering and a slight amelioration of the quality of sirup. Addn. of SO<sub>2</sub> in the preliminary defecation gives a negligible improvement of the process. Dry defecation without any preliminary treatment gives a higher rate of filtering, while moist defecation with a preliminary defecation gives a better quality of sirup.

J. Wiertelak

**Regeneration of activated carbons.** N. N. Kudelya. *Nauk. Zapiski Tsukrovoy Prom.* 10, No. 32, 37-45 (1933).—Prolonged boiling of activated C in alk. and acid solns. for regeneration which is the general practice, together with excessive strength of the solns., decreases the decolorizing power of a C. K. suggests the following scheme: boil an exhausted C in water for 1 hr., boil again as a suspension of 15-20° Bé. for 1 hr. in 0.5-1% NaOH soln., wash free from alkali; boil again in 1-1.5% HCl soln. for 1 hr., then further regenerate in a muffle at 600°. V. E. B.

**Design of a modern molasses distillery.** Gustave T. Reich. *Chem. & Met. Eng.* 41, 64-5 (1934). E. H.

**The non-fermentable reducing sugars in molasses wort.** A. Carozzi and M. Montessori. *Ind. saccar. ital.* 26, 627-8 (1933).—The total sugars in cane molasses are expressed as sucrose = double polarization plus (0.95  $\times$  reducing sugars). The residual reducing non-fermentable sugars are assumed to be glucose = 2  $\times$  reducing sugars. The

fermentable sugars are thus, total sugars as sucrose - (0.95  $\times$  glucose  $\times$  1/2). Lab. yields were 0.6145-0.6147 l. anhyd. alc. per kg. sucrose. Distillery yields averaged 0.6085. The corresponding yields with no correction for glucose were 0.6004-0.6019 and 0.5816. Molasses may contain up to 10% glucose, if from Cuba, while that from Java has a value under 5%. L. Cusachs

**Failure of a molasses tank.** Husemann. *Arbeitschutz* 1933, 128-30; *Chimie & industrie* 30, 1171.—Examn. of the molasses contained in the tank showed that, in spite of its alk. reaction, it contained considerable invert sugar; carbonaceous particles were observed on the walls along the fractures, indicating that failure was probably due to an explosion. Spengler has suggested that considerable inversion probably occurred in the course of yrs. of storage, and that, under the influence of certain bacteria, the invert sugar was decompd. with formation of H<sub>2</sub> and CH<sub>4</sub>, which could not escape because of a hard, adherent coating of sugar on the walls of the tank, and thus resulted in accumulation of a high pressure; the immediate cause of the explosion remains unknown. It was observed that the walls of the tank, after removal of the adherent sugar coating, showed considerable corrosion, which H. attributes to attack on the Fe by org. acids produced by fermentation of the molasses, the latter also liberating H<sub>2</sub>. The latter remains in the tank and works its way inwardly and forms an explosive mixt. with the atm. O; the finely divided Fe oxide, whose presence was observed on the walls of the tank, acts as contact mass to catalyze the combustion. From a practical standpoint, accumulation of gases in molasses tanks can be avoided by fairly frequent cleanings. A. Papineau-Couture

**Cyanamide as a source of N for sugar cane (Smith) 15.** Fertilizing values of Polish kainites [for sugar beets] (Górski) 15. Value of the sugar-beet crop in relation to its tech. processing (Denis'evskii) 15. The polysaccharide-forming mouth streptococci and the "frog egg" streptococci of sugar factories (Koch) 11C. Gelatinized corn-starch adhesive (U. S. pat. 1,943,382) 18.

**Extraction of beet sugar.** T. Wintzell, N. R. M. Weibull and G. V. Cederborg. *Swed.* 78,831, Oct. 31, 1933. Beet slices are leached in a battery of diffusers according to the countercurrent principle. Water is applied through a gate which automatically interrupts the discharge of sugar juice from the system when a fixed amt. of water has passed through the gate.

**Diffusion batteries for extracting sugar.** Auguste L. Vasseux. *Brit.* 400,034, Oct. 19, 1933.

**Purifying sugar juices.** Berthold Block. *Ger.* 590,358, Jan. 9, 1934 (Cl. 89c. 10). In the continuous purification of sugar juices with milk of lime, the pumps which feed the juices and the lime are coupled together, so as to avoid fluctuations in the alk. of the juices.

**Purification of sugar juice.** Aktiebolaget Separator (O. E. Fröding, inventor). *Swed.* 76,906, April 4, 1933. Sugar juice not contg. sugar crystals, preferably the concd. thick juice obtained by evapn., is treated in centrifuges provided with devices for excluding air, thus avoiding undesirable changes in the sugar juice due to oxidation.

**Purifying sugar-house and refinery juices.** D. Teatini. *Belg.* 396,674, July 31, 1933. After direct clarification, the juice is treated (after addn. of alkali if need be) with an



acid until the alkyl has been reduced to the point which has been found to be best for the subsequent concn. The juice is then concd. directly. Cf. C. A. 27, 1540.

Apparatus for saturating sugar juices. Fritz Blanke. Ger. 590,024, Dec. 20, 1933 (Cl. 89c. 16). Addn. to 559,048 (C. A. 27, 1228).

Automatic apparatus for the detection of sugar in the condensate of sugar-house boilers. Raffinerie Tirlemontoise, Soc. anon. Belg. 395,843, May 31, 1933.

Oil-burning stoves for industrially heating, e. g., sugar-boiling pans. John McGowan. Brit. 400,352, Oct. 26, 1933.

Gums from carob seeds. Soc. industrielle du Neogum (Soc. anon.). Fr. 755,961, Dec. 2, 1933. The seeds are treated with an acid to attack the film superficially and as soon as this takes place the acid (which would dissolve the gums) is replaced by an org. liquid in which the gums are not sol., but which completely removes the film, e. g., EtOH, BuOH, AmOH or a ketone or ketone derivs.

Treatment of juices in the starch and similar industries. D. Téatini. Belg. 396,227, June 30, 1933. The juice is treated with a reagent (preferably liquid  $\text{SO}_2$ ) capable of retarding flocculation of the colloidal matter so as to prevent its deposition on the sepd. starch.

## 29—LEATHER AND GLUE

ALLEN ROGERS

Boric acid and borax in the preparation of leather from hides. Enrico Vigezzi. *Industria chimica* 8, 1377-84 (1933).—A detailed summary of the use of boric acid and borax in the prepn. of leather from hides. A. W. C.

The fine structure of hide fibers. A. Kuntzel. *Collegium* 1934, 1-18.—The difference in weave between hide and tendon fibers is illustrated. Swelling, contraction and staining phenomena do not indicate a difference, except in structure, between the corium major and corium minor. I. D. Clarke

Structure of collagen fibers and the point of attack by proteolytic enzymes. D. Jordan Lloyd and M. E. Robertson. *Nature* 133, 102-3 (1934).—Bacteria penetrate hide through the cut ends of the collagen fibers and not through the sides of the fibers. Points where the epidermis is injured, such as brand-marks, also allow entry of putrefying bacteria. This is paralleled by the fact that trypsin acts only on the ends of collagen fibers (Bergmann, G. Pojarlieff and H. Thiele, *Collegium* 1933, 582) and fits well with the mol. structure postulated for collagen by the authors (C. A. 27, 2864). K. V. Thimann

Microscopic study of animal hair. II. Effects of beam-house treatment. Fred O'Flaherty and Wm. L. Roddy. *J. Am. Leather Chem. Assoc.* 29, 53-66 (1934).—No change occurs during soaking, with or without NaCl or wetting agents, or in 0.05 N acid or alkali. Hair shafts are attacked and disintegrated by strong NaOH; successive histological changes are described. In satd.  $\text{Ca}(\text{OH})_2$ , no change in the hair shaft occurs but contraction of the hair bulb takes place. In satd.  $\text{Ca}(\text{OH})_2$  + 0.05%  $\text{Na}_2\text{S}$ , the hair bulb first contracts and later expands. Hair is attacked in a manner similar to that induced by strong NaOH, at a rate increasing with  $\text{Na}_2\text{S}$  concn. and temp.  $\text{As}_2\text{S}_3$  acts the same but more slowly. Amines have a slight action on the cuticle of the hair shaft only. Red, black and white hairs are attacked in the order named. "At some concns. of  $\text{Na}_2\text{S}$ , hair shafts break off on mech. unhairing, roots are left in the skin, and pigment from hair roots may discolor the skin." H. B. Merrill

Chrome tanning. E. Barbier. *Cuir tech.* 23, 2-5 (1934).—Time required for tannage diminishes progressively as concn. of t-bath Cr liquor is increased (in presence of excess Cr in all cases). The advantages of time saved are offset by waste of material in used strong liquor. It is not economically profitable to recover Cr from such spent liquors. H. B. Merrill

Some discrepancies in  $p_H$  determination of synthetic tannins. J. A. Gilman. *J. Intern. Soc. Leather Trades Chem.* 18, 90-2 (1934).—One "syntan" (undescribed) gave  $p_H$  values varying from -0.5 to 3.0 by different methods in the hands of different analysts. H. B. M.

Investigations into the quality of vegetable-tanned sole leather. I. Robert H. Marriott. *J. Intern. Soc. Leather Trades Chem.* 18, 68-87 (1934); cf. C. A. 28, 1506.—An attempt is made to correlate compn. with type of microscopic structure. H. B. Merrill

A method for determining acid in chrome leather. C. Riess and A. Papayannis. *Collegium* 1933, 719-22.—Heat 2.5 g. of disintegrated leather and 50 cc. of 0.1 N  $\text{NH}_4\text{OH}$  for 1 hr. at 60° under reflux. Filter into 0.1 N

HCl and wash 4 times with  $\text{H}_2\text{O}$  (final wash boiling). Add 5 cc.  $\text{HCHO}$  to the filtrate and titrate with 0.1 N NaOH and phenolphthalein. The percentage of basicity =  $100(a - b)a$ , where  $a$  = cc. 0.1 N  $\text{Na}_2\text{S}_2\text{O}_8$  for the Cr detn., and  $b$  = cc. 0.1 N NaOH in the above titration.

Ira D. Clarke  
Factors affecting the distribution of fat in fat-liquored chrome leather. W. C. Henry. *J. Am. Leather Chem. Assoc.* 29, 66-84 (1934).—Cr-tanned steer hide pieces, prepd. in the lab., were fat liquored for 1 hr. at 40° with a large excess of fat liquor contg. cod oils of 3 different degrees of sulfonation; in certain expts. paraffin oil was added. The fat-liquored pieces were sectioned horizontally with a microtome, and the sections grouped to make up 12 layers. Each layer was vacuum-dried and extd. successively with petr. ether and acetone. "Bound" fat was detd. by decompg. the residual leather with KOH, acidifying and extg. fatty acids with  $\text{Et}_2\text{O}$ . Unsaponifiable matter was detd. when desired to demonstrate differential penetration of paraffin oil into skin. Results were corrected for extractable matter in non-fat-liquored skin. Total oil take-up was independent of degree of sulfonation of the oil. Sulfonated compds. (acetone ext.) and non-sulfonated (petr. ether ext.) were taken up in proportion to their concns. in the oil used. Penetration was greatest for the oil of lowest degree of sulfonation, and for non-sulfonated as opposed to sulfonated components. Some diffusion of oil into the leather occurred on drying; in general the non-sulfonated components showed greatest penetration on drying. H. B. Merrill

Apparatus for the volumetric determination of water absorption by leather. Arthur Miekeley and Gertrud Schnuck. *Ledertech. Rundschau* 26, 1-6 (1934); cf. C. A. 26, 2344.—Rate of absorption of  $\text{H}_2\text{O}$  by leather was measured in an app. similar to that of Freundlich, Schmidt and Lindau (C. A. 26, 5243). The ratio of absorption for a split surface to the flesh surface varied from 1.22 to 2.26, for split to grain, from 1.11 to 3.01. I. D. Clarke

Effective acidity and the penetration of acid dyestuffs into leather. Robert H. Marriott. *J. Intern. Soc. Leather Trades Chem.* 18, 92-5 (1934).—Pieces of sumac-tanned goat skin were brought to  $p_H$  values from about 1 to 6 with buffers, and dyed in 0.1% solns. of 5 acid dyes. Penetration increased with  $p_H$  value, the effect differing from dye to dye; complete penetration was obtained with Crocine Scarlet at  $p_H$  4.5, while Acid Green showed little penetration even at  $p_H$  6. Increased penetration is accompanied by loss in depth of color, which can be partially remedied by subsequent acid treatment. H. B. Merrill

Filling agents for split and patent leather with a nitro-cellulose base. A. Kraus. *Ledertech. Rundschau* 26, 6-10 (1934).—The use of carbohydrates, albumins, waxes and latex for the filling coat for patent leather is discussed. I. D. Clarke

Old and new materials for patent leather. R. Priester. *Collegium* 1934, 18-22.—Review. Linseed oil for patent leather can be thickened best by preoxidizing at a moderate temp. with an air blast and then heating in a closed vessel. I. D. Clarke

Azo dyes [for leather] (Ger. pat. 590,375) 25.

Kubelka, V.: Kuže jako Surovina Prumyslová (The Hide as an Industrial Raw Material). Brinn: Czechoslovakian Soc. of Leather Trades' Chemists. 253 pp. Reviewed in *J. Intern. Soc. Leather Trades' Chem.* 18, 111 (1934).

Simoncini, E.: Cuoi e pelli industriali (Industrial Hides and Skins). Naples: Stabilimento industrie editoriali meridionali. 430 pp. L. 50. Reviewed in *J. Intern. Soc. Leather Trades' Chem.* 18, 112 (1934).

1. ~~Leather~~ tanning apparatus. James A. Veitch. Brit. 400,678, Nov. 2, 1933.

Depilatories. Halwit Laboratorium, G. m. b. H. Brit. 400,980, Oct. 30, 1933. See Fr. 736,019 (C. A. 27, 1544).

Glue. Akt.-Ges. für chem. Produkte vorm. H. Scheide-mandel. (Julius Kohl, inventor). Ger. 590,087, Dec. 22, 1933 (Cl. 22<sup>a</sup>. 4). Dried bone material is hydrated as described in Ger. 587,476 (C. A. 27, 1544) or 582,691 (C. A. 28, 928<sup>a</sup>), and glue is then recovered by the process of Ger. 554,378 (C. A. 26, 5225).

### 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The rubber industry in 1933. Sidney A. Brazier. *Ind. Chemist* 10, 27-30 (1934).

Recent rubber latex patents. Frederick Marchionna. *Rubber Age* (N. Y.) 34, 19-20, 73-5 (1933).—Abstracts of 154 U. S. pats. on latex and its uses in manufactured products from July 1932 to date. C. C. Davis

The effect of temperature on the plasticity of rubber. R. D. Prestwich. *Trans. Inst. Rubber Ind.* 9, 196-204 (1933).—The aim of the expts. was to ascertain the effect of temp. on the plasticity of raw rubber before and after compounding. A parallel-plate plastometer was used, at temps. up to 90°. The data, which are given in detail in tables and graphs, show that, for the mixts. and temps. examd., the temp. and the plasticity ( $K$  in the Williams equation:  $K = \gamma x^n$ ) of raw rubber, and its mixts. with different proportions of china clay, C black, ZnO and whiting, are related by the equation:  $\log K + b \log t = a$ . In general when  $\log K$  is plotted against  $\log t$ , a series of parallel lines is obtained. For soft mixts.,  $b$  was const. at 0.78, while for harder mixts., e. g., heavily loaded C black mixts.,  $b$  was smaller. According to Williams (C. A. 18, 1763)  $n$  in the  $K = \gamma x^n$  equation is a const. for a given app. and procedure, while according to Griffiths (C. A. 20, 2094)  $n$  varies from 0.16 to 0.18, depending upon the rubber, and according to Cotton (C. A. 26, 872) it varies from 0.06 to 0.3, depending upon the extent of mastication. In the present work,  $n$  varied not only with the rubber mixt. but also with the temp. It was therefore const. for each sample at each temp. The variations in  $n$  followed no well-defined rule, for in some cases  $n$  increased with increase in temp., and in other cases it either diminished or rose to a max. and then diminished. The extreme values were 0.215 (for a soft rubber) and 0.042 (for a hard mixt.). C. C. Davis

Coloring rubber. Joseph Rossman. *India Rubber World* 89, No. 1, 27-8; No. 2, 27-8; 34; No. 3, 35-7 (1933).—A review of 46 U. S. pats. relating to the coloring of raw and vulcanized rubber. C. C. Davis

The coloring of rubber in the mass. R. Boxler. *India Rubber J.* 87, 11-12 (1934).—See C. A. 27, 3357.

The distinction between cured and uncured parts of cold-cured rubber. Hidemaro Endô. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 25-6 (1934).—Cold-cured and uncured rubber strips were dipped in I solns. One % solns. of I in EtOH and 0.1 N I colored the cured part dark chocolate to almost black, while a soln. of ICl did not give any distinctive effects. The uncured part showed a pale yellowish color, like that of the uncured sample. K. K.

Rubber thread. An outline of manufacturing processes used in the production of rubber thread and the performance of different types. Daniel Rhee. *Rubber Age* (N. Y.) 34, 165-6, 176 (1934).—Illustrated with photomicrographs. C. C. Davis

Captax [mercaptobenzothiazole], its history, properties, uses and advantages. Anon. *Vanderbilt News* 3, No. 4, 4-12 (1933).—A large mass of data is given in tables and graphs to show the results obtained in a wide variety of types of rubber products. C. C. Davis

Radox (titanium dioxide), the best white pigment for rubber. Anon. *Vanderbilt News* 3, No. 6, 16-19

(1933).—Data show the results obtainable with TiO<sub>2</sub> in place of lithopone. C. C. Davis

Bondogen. An effective solvent-activator for rubber-gasoline cements. Anon. *Vanderbilt News* 3, No. 0, 22-5 (1933).—Bondogen (patents pending) reduces the viscosity of cements, the time of premastication and churning, and makes possible a higher rubber content for a given viscosity. Graphs show the results obtainable. C. C. Davis

4. Solution properties of dried rubber. T. H. Messenger. *Trans. Inst. Rubber Ind.* 9, 190-5 (1933).—The effects of thorough drying on the soly. of raw rubber in C<sub>6</sub>H<sub>6</sub> were studied. To this end pale crepe, masticated to various degrees, was dried *in vacuo* over P<sub>2</sub>O<sub>5</sub>, and the proportion sol. in C<sub>6</sub>H<sub>6</sub> and the viscosities of solns. of different concns. were then detd. Drying brought about a considerable increase in the soln. viscosity, e. g., a 3-fold increase with lightly milled rubber, which was followed by a slower diminution to a value much below the original one. On progressive drying, an increasing proportion of the rubber became insol. in C<sub>6</sub>H<sub>6</sub>. The more the rubber was masticated, the smaller was the proportion of insol. under given conditions. This increasing insol. explains in part the diminution of the viscosity in the later stages, where solns. of lower concn. were formed. Concn. alone does not explain the phenomenon, because the viscosities of undried rubber solns. of equal concns. to those of the dried rubber solns. are disproportionately low. The increases in viscosity and in insol. components took place at progressively slower rates with increase in the mastication, e. g., with unmasticated rubber the max. viscosity was reached in 5-6 days, with lightly masticated rubber in 70 days and with normally masticated rubber in 700 days. Drying probably leads to some kind of aggregation, assocn. or polymerization of the rubber mols., even in unmasticated rubber. Such phenomenon has been considered responsible for changes in b. p. and other properties of pure liquids on being dried thoroughly (cf. Baker, C. A. 16, 2441). When solns. of undried rubber were dried by P<sub>2</sub>O<sub>5</sub> in a sp. app. which is described and illustrated, there was no increase in viscosity. C. C. Davis

Speeding up the hard rubber reaction with Vandex (selenium). Anon. *Vanderbilt News* 3, No. 6, 4-7 (1933).—Tests show the utility of Se as an accelerator in the vulcanization of hard rubber, where the scorching, gas formation, surface-marking and brittleness encountered with org. accelerators are avoided. C. C. Davis

Adhesion of rubber to brass plate metal. W. J. McCortney. *Vanderbilt News* 3, No. 6, 8-9 (1933).—An illustrated description of the technic used and the results obtained in the automobile industry. C. C. Davis

Notes on the adhesion of rubber to metal. Anon. *Vanderbilt News* 3, No. 6, 26 (1933).—Suggestions based on experience and gathered from various sources are given (cf. preceding abstr.). C. C. Davis

Reclaimed rubber. Max Kath. *India Rubber J.* 87, 103-4 (1934).—A discussion of the technological value of reclaimed rubber and methods of testing (cf. Palmer, C. A. 28, 1569<sup>a</sup>). C. C. Davis

Automobile inner tubes. Anon. *Vanderbilt News* 4, No. 1, 4-22 (1934).—Data are given to show the quality

obtainable by the use of low proportions of S, with suitable accelerators and pigments (cf. Somerville and Russell, *C. A.* 27, 3857).

**Low-sulfur and high acceleration best for heat-resisting compounds.** Anon. *Vanderbilt News* 3, No. 6, 20-1 (1933).—Further data are given on the same subject (cf. Somerville and Russell, *C. A.* 27, 3857 and preceding abstr.).

**Resin-gutta gums.** Applications of balata, gutta-percha and the lower guttas. I. Torrance Gurman. *India Rubber World* 89, No. 3, 31-2, 34 (1933).—A review and discussion.

**Synthetic rubber.** G. S. Whitby and M. Katz. *Ind. Eng. Chem.* 25, 1204-11, 1338-48 (1933); cf. *C. A.* 26, 332.—A comprehensive, crit. and historical review, with bibliography. Theoretical and practical aspects of chloroprene rubber are also discussed. The authors' expts. show that it is much less swollen by paraffin hydrocarbon than is natural rubber, and somewhat less by  $C_6H_6$  and  $CCl_4$  (cf. Hayden and Krisman, *C. A.* 28, 929<sup>4</sup>). It "freezes" at a higher temp. than natural rubber and loses strength to a greater extent on heating, but not nearly so much as does hydrocarbon synthetic rubber.

**The effect of various loading materials in vulcanized rubber.** Anon. *Vanderbilt News* 3, No. 3, 4-26 (1933).—The effects of different proportions of numerous com. fillers and pigments on the tensile strength (stress-strain), resistance to abrasion, resistance to tearing and aging of vulcanizates composed of the base mixt.: rubber 100, S 0.5, Se 0.5, 1-mercaptobenzothiazole 0.5, tetramethylthiouram disulfide 0.5 are described. The materials included channel gas black, clay,  $TiO_2$ , Mg carbonate, ZnO, lithopone, blanc fixe, "mineral rubber," 2 types of soft C black, 2 grades of natural whiting, and 2 grades of pptd.  $CaCO_3$  ("Kalite"). The complete data are recorded in tabular and graphical form.

**The effect of temperature on the tensile properties of vulcanized rubber.** Anon. *Vanderbilt News* 3, No. 5, 4-30 (1933).—An extension of a paper already published (cf. Somerville and Russell, *C. A.* 27, 6018), with numerous tables and graphs.

**Hard rubber as a covering for wood.** Johann Eggert. *Kunststoffe* 23, 276 (1933); *India Rubber J.* 87, 95-6 (1934).

**Thinning and gelation of rubber cements. Practical methods of inhibiting the effects of light and heat.** C. K. Novotny. *Ind. Eng. Chem.* 26, 170-2 (1934).—The aim of the expts. was to devise a practical way of retarding the thinning of crepe rubber cements under ordinary atm. conditions. Exposed to glass in direct sunlight, gasoline cements in most cases became solvent-thin but in a few cases gelled, while  $CCl_4$  cements all formed rigid gels. The varying phenomena in gasoline are not explained; the gelation in  $CCl_4$  is explained by a curing by ultraviolet light radiation and by Cl resulting from decompn. of  $CCl_4$ . Similar results were obtained at a slower rate in diffused light. Protection of the cements by red filters, e. g., red Cellophane wrappers, greatly prolonged the time required for them to become thin. At 50°, the cements became progressively thinner, even in darkness. Exposure in glass to diffused light, to direct sunlight and to heat of a series of gasoline cements contg. increasing proportions of rubber, masticated for correspondingly increasing times so that the viscosities of all the cements were the same, showed that under all conditions the higher the rubber content of a cement the smaller is the change in its viscosity. Varying and generally unfavorable results were obtained with antioxidants.

**Accelerators of vulcanization.** F. Jacobs. *Caoutchouc and gutta-percha* 30, 16605-7 (1933); 31, 16637-40 (1934); cf. *C. A.* 28, 367<sup>9</sup>.—The properties and behavior of Vulcaid 444, Heptene, Vulkacit T. R., Trimene, Trimene base, Vulcaid base, Vulcaid 777 and T. T. T. are described, with tabulated data.

**Studies on the combined use of two different accelerators. IV. Diphenylguanidine and dibenzothiazole disulfide.** Ichiro Aoe and Hiroshi Yokoshima. *J. Soc.*

*Rubber Ind. Japan* 6, 694-702 (1933); cf. *C. A.* 26, 1153.—By plotting the softening and m. ps. of mixts. of diphenylguanidine (I) and dibenzothiazole disulfide (II), it was found that I and II do not form a mol. compd. or a eutectic mixt. Scorching was greatest with rubber contg. a I-II mixt. corresponding to the lowest m. p. of the curve. The vulcanization efficiencies of various proportions of mixts. of I and II are given. I and II form a mol. compd. by the help of  $H_2S$ , and the results obtained with this mol. compd. are given. The formation of the mol. compd. is also possible during vulcanization, since  $H_2S$  is given off.

**Vulcanization-accelerating power of metallic salts of dithio-1-pipecolinedicarboxylic acid.** I. Tokishige Kusama and Tatsuchi Yokoyama. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 12, 853-70 (1933) (Abstracts 10) (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 22, Nos. 457-67; *J. Soc. Rubber Ind. Japan* 6, 668-85 (1933).—Zn dithio-1-pipecolinedicarboxylic acid is an ultra-accelerator of vulcanization which requires more ZnO and S than other ultra-accelerators of the same type; the vulcanization temp., optimal time of vulcanization and the phys. properties of the vulcanized products are equal to those with other accelerators. The position of the Me group has no effect on the acceleration of vulcanization. Ingredients such as C black and  $MgCO_3$  used with the accelerator give superior phys. properties to the products. Vulcanization at less than 15 lb. per sq. in. steam pressure in the presence of  $MgCO_3$  and C black gives excellent transparent products. In the expts. described, where 1% softening agent was added, a mixt. of cyclohexyl oleate and Zn abietate was most effective.

**The manufacture of artificial horn.** Chr. Stark. *Gummi-Ztg.* 47, Nos. 51, 53, *Celluloid u. plastische Massen* 33, 1327-8, 1375-6 (1933).—A review of the chem. and mech. features.

C black (U. S. pat. 1,944,715) 18. Artificial board for use in automobile tops (U. S. pat. 1,944,533) 20. [Rubber] compns. for coating metals (Ger. pat. 590,217) 18. [Rubber] flooring material (Swed. 78,757) 20. Paint [rubber] (Belg. 397,775) 26.

Hübner, Gustavkarl, et al.: Kautschuk. Eine wirtschaftsgeographische Monographie. Berlin-Steglitz: Chem.-tech. Verlag Dr. Bodenbender. 275 pp. M. 15. Reviewed in *Rubber Chem. Tech.* 7, No. 1, vi (1934).

Rubber Compounding Materials. New York: Barrett Co. 36 pp. Free.

**Rubber latex.** The Naugatuck Chemical Co. Fr. 755,776, Nov. 30, 1933. In forming cream from fresh latex, a small amt. of a soap sol. in water is added in addn. to the usual cream-forming agent.

**Coagulating latex.** Franz Homberger. Brit. 400,969, Nov. 3, 1933. Latex is coagulated by moving a deposition surface alternately through a bath of latex and an atm. of coagulating gas in succession in the same path until a coagulated film of the desired thickness has been formed. App. is described.

**Forming rubber thread from latex or the like.** John R. Gammeter (to Revere Rubber Co.). U. S. 1,943,381, Jan. 16. A film of determinate width is formed by deposition of liquid material upon a travelling surface and the film is then withdrawn from the forming surface and twisted into a thread of round cross-section. Cf. *C. A.* 26, 2621.

**Rubber thread.** Ernest Hopkinson (to National India Rubber Co.). U. S. 1,943,436, Jan. 16. A rubber dispersion is deposited in sep. grooves (of a described app.), moisture is withdrawn from the sep. deposits, the latter are removed in the form of filaments, and a thread is formed by superposing and compacting the filaments. U. S. 1,943,437 relates to a process in which a thin, narrow band of rubber dispersion is formed continuously on a moving surface such as a rotating drum and the band is

coagulated by heating and moisture is withdrawn from it, and it is continuously folded into thread shape and covered with fibrous material. App. is described. U. S. 1,943,438 describes an app. and procedure by which a strip is formed from an aq. dispersion of rubber, the strip is folded transversely, and is rolled into a round thread. U. S. 1,943,439 involves a process in which a plurality of strips are continuously formed from liquid rubber compn., assocd. in plied formation and vulcanized, coiled transversely of the length of the material to form a thread, and covered with fibrous material. App. is described.

**Rubber threads.** International Latex Processes Ltd. Fr. 756,199, Dec. 6, 1933. Threads are made by coagulating one latex with another latex having a different  $p_H$  value, no other coagulant being used. Thus, ordinary latex protected by  $NH_3$  may be coagulated by a latex having a  $p_H$  value of 7-4.5 and prepd. by U. S. 1,699,368-9 (C. A. 23, 1308).

**Apparatus and method for making rubber bands, threads, strips and filaments from rubber dispersions.** Magyar Ruggyantaarugyar R. T. (to International Latex Processes Ltd.). Brit. 400,846, Nov. 2, 1933.

**Apparatus and method for making rubber strips from a rubber-containing liquid, e. g., an aqueous dispersion.** John R. Gammeter (to International Latex Processes Ltd.). Brit. 400,147, Oct. 19, 1933.

**Preventing aging of rubber.** I. G. Farbenind. A.-G. Ger. 588,671, Nov. 23, 1933 (Cl. 39b. 8). Addn. to 501,642 (C. A. 24, 4959). The process of 501,642 for adding indanephenols, their substitution products or salts, to natural or synthetic rubber to diminish aging, is applied to cold vulcanization processes.

**Purified rubber.** Willoughby S. Smith, Henry Jay Garnett, John N. Dean, Bernard J. Habgood and Henry C. Channon. Ger. 581,684, Aug. 1, 1933 (Cl. 39b. 2). See Brit. 320,370 (C. A. 24, 2518).

**Porous rubber.** Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 584,890, Sept. 26, 1933 (Cl. 39b. 9). See Brit. 393,022 (C. A. 28, 374) and 393,023 (C. A. 28, 374).

**Chlorinating rubber.** Chemische Fabrik Buckau. Brit. 400,898, Nov. 2, 1933. Cl is introduced into solns. of rubber of low concn. (2% or less) and viscosity and the resulting rubber chloride soln. is gradually poured into hot  $H_2O$ , which may contain substances to raise the b. p., in which is immersed a disintegrating app., whereby the solvent is evapd. and the chloride reduced to granular state. Prior to introduction into the  $H_2O$ , the soln. may be reduced in viscosity by standing, the addn. of alkali or exposure to light. In an example 35 kg. raw rubber is dissolved in 1700 kg. ethylene bromide, allowed to stand to decrease the viscosity, Cl is passed through, the soln. allowed to stand several days or treated with caustic alkali or exposed to light several hrs. and run into a vessel contg. glycerol 8 and  $H_2O$  1 part, heated to 135-140°, in which an immersed propeller runs at high speed.

**Rubber compounds.** Imperial Chemical Industries Ltd. Fr. 755,913, Dec. 1, 1933. Noninflammable rubber compounds, particularly for making flooring, are made by coating or impregnating rubber compds. with a chlorinated  $C_{10}H_8$ , contg. not less than 2 atoms of Cl per mol., e. g., the product known under the trademark "Seckay."

**Tacky rubber composition.** Harry L. Fisher (to The Dominion Rubber Co. Ltd.). Can. 336,768, Oct. 31, 1933. A highly tacky rubber compn. comprises the reaction product of 100 parts rubber and 2-5 parts of a nitroso compd. of an aromatic hydrocarbon or OH or  $NH_2$  deriv.

**Rubber objects.** Ernst Frölich. Brit. 400,001, Oct. 19, 1933. See Fr. 746,472 (C. A. 27, 4716).

**Ornamenting rubber.** Othmar Möser. Brit. 400,815, Nov. 2, 1933. Bathing caps, etc., are made by building up the articles from smooth rubber sheets, drawing over a

core, the surface of which has a pattern, vulcanizing with-out using a rigid outer mold and turning the vulcanized article inside out.

**Rubber articles.** International Latex Processes Ltd. Brit. 400,874, Nov. 2, 1933. Articles are made direct from aq. rubber dispersions by coagulation with anhydrides or halides of the lower aliphatic acids, i. e., having less than 10 C atoms, e. g., anhydrides of AcOH, propionic, butyric, iso-butyric, formylacetic, chloroacetic, acrylic, crotonic and maleic acids and Ac, propionyl, butyryl, acrylyl, crotonyl, chloroacetyl, oxalyl and malonyl chlorides and bromides. The coagulant may be mixed with adhesive materials, e. g., rubber cement, org. solns. of gelatin and glue, alc. solns. of cellulose nitrate, etc.

**Floor coverings.** Linoleum Manufacturing Co. Ltd. and Alfred A. Godfrey. Brit. 400,177, Oct. 16, 1933. Floor coverings simulating tiles are made by positioning tesserae of vulcanized rubber by a grid on a plastic backing of unvulcanized rubber, removing the grid and forcing the tesserae into the bonding material, so that the latter flows into and fills the spaces between the tesserae, and finally vulcanizing. Cf. C. A. 27, 5579.

**Compound sheet material.** Kirchbach'sche Werke Kirchbach & Co. (personally responsible partner: Max K. Kirchbach). Brit. 400,052, Oct. 19, 1933. Material for use in the manuf. of flexible disk couplings consists of fibrous material in the form of a thin fleece, which is impregnated with rubber soln., a no. of layers being then placed upon one another, pressed together and vulcanized.

**Rubber tires.** Adrian O. Abbott, Jr. (to Morgan & Wright). U. S. 1,944,389, Jan. 23. Mech. features.

**Anti-skid preparations.** Walter Josky. U. S. 1,943,917, Jan. 16. See Brit. 384,219 (C. A. 27, 5910).

**Rubber adhesives.** Walter W. Dunfield (to Naugatuck Chemical Co.). U. S. 1,943,423, Jan. 16. Adhesives suitable for uniting rubber to metals are prepd. by heating rubber for 10-20 hrs. at about 300° and mixing the treated rubber with vulcanizing ingredients and rubber cement. U. S. 1,943,424 relates to adhesives formed from "melted rubber" and Newbrough rubber in various relative proportions, together with a minor proportion of unmelted rubber, solvent and vulcanizing ingredients.

**Hardening surfaces of articles coated with rubber or like material.** Wm. C. Geer. Ger. 590,325, Dec. 30, 1933 (Cl. 39b. 3). See Brit. 320,427 (C. A. 24, 2639).

**Rubber vulcanization accelerator.** Harold A. Morton. U. S. 1,944,843, Jan. 23. An accelerator comprises the condensation product of  $\alpha$ -ethyl hexene aldehyde with aniline or other amine.

**Vulcanization accelerators.** The Rubber Service Laboratories Co. Brit. 400,990, Nov. 6, 1933. See U. S. 1,865,265 (C. A. 26, 4506). Brit. 400,991, Nov. 6, 1933. See U. S. 1,865,728 (C. A. 26, 4506).

**Apparatus for vulcanizing splices in rubber tubes.** Andrew B. Mullin (to Firestone Tire & Rubber Co.). U. S. 1,944,754, Jan. 23. Mech. features.

**Rubber vulcanization.** Carl S. Williams (to E. I. du Pont de Nemours & Co.). U. S. 1,943,570, Jan. 16. For removing water from resin type-rubber vulcanization accelerators, they are treated with a material such as CaO capable of reacting with the water present to produce a compd. non-injurious to rubber.

**Rubber vulcanization.** Joseph R. Ingram (to Rubber Service Laboratories Co.). U. S. 1,943,797, Jan. 16. Vulcanization is effected by heating the rubber with S and an accelerator in the presence of a carboxyl-substituted aromatic ketone such as acetophenone, benzophenone or a benzoylbenzoic acid which serves as a controlling agent.

**Vulcanizing tires.** Società italiana Pirelli. Brit. 400,893, Nov. 2, 1933. Addn. to 341,143 (C. A. 25, 4742).

**Rubber-like or resinous masses.** Canadian Electro Products Co. Ltd. Ger. 583,914, Sept. 12, 1933 (Cl. 39b. 4.02). Addn. to 563,792 (C. A. 27, 1236). See Brit. 295,322 (C. A. 23, 2810).

# CHEMICAL ABSTRACTS

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## 1—APPARATUS AND PLANT EQUIPMENT

W. L. RADGER

Porous glass fliteffs and their use. M. A. Lifshitz and B. L. Hershman. *J. Chem. Ind. (Moscow)* 1933, No. 9, 61-3.

A new microburet. M. Malmy. *Bull. soc. chim. biol.* 15, 1575-8(1933); cf. *C. A.* 27, 4959.—When the tip of a microburet is drawn out to a fine capillary to decrease the size of the drops, it is easily plugged by dust or sediment. To avoid this the tip is left larger and to its extremity a short fine glass rod is welded in such a way that the liquid runs down its outside and drops off the end, which is tapered to a diam. of approx. 0.3 mm. About 150 drops per cc. are delivered.

A vacuum distillation apparatus. G. W. Ellis. *Chemistry & Industry* 1934, 77-8.—A vacuum distn. app. is described which is convenient for fractionating small aints. of material without loss of vacuum.

An improved apparatus for receiving various fractions when fractionating liquids under reduced pressure. H. F. J. Loring and J. Kluizenaar. *Chem. Fabrik* 1934, 66-7.—A new cock is described.

Economical rapid evaporation of the most strongly foaming liquids. Ernst Jantzen and Hans Schmalfuss. *Chem. Fabrik* 1934, 61-3.—The app., to be mounted on top of the boiling flask, contains revolving blades to break the foam and a cooling coil to condense the vapor. Cf. *C. A.* 22, 4009; 23, 1186, 5079.

Eddy current cryostats. E. Justi. *Physik. Z.* 35, 3-6 (1934).—A substitute for the metal block thermostats of Henning, Holborn, etc., is described in which Hg, contained in a glass tube without feed-wires, is heated by eddy currents. This cryostat avoids the radial and vertical temp. gradients. Measurements made with this cryostat confirm its given quant. theory.

A reliable safety valve for short MacLeod manometers. W. v. Meyeren. *Z. tech. Physik* 15, 51-2(1934).—The valve prevents the Hg in the gage from entering the rest of the system.

An inexpensive Kipp generator. W. Siebeling. *Z. physik. chem. Unterricht* 46, 168(1933).—A U-tube, with the bend filled with glass beads, is used to support the Zn, marble, etc., in one arm. This arm is closed by means of a stopcock. The other end is closed by a stopper carrying a small bent tube.

Microtherm. R. A. Hanne. *Tech. Gemeindeblatt* 37, 30-2(1934).—A thermocouple having 5 leads which can be placed at different points within an autoclave, etc., is described. Temp. changes within a closed sterilizer can be followed during the course of sterilization from readings on a milliammeter.

Automatic elementary analysis. Hans Reihlen and Erwin Weinbrenner. *Chem. Fabrik* 1934, 63-6.—A detailed description of the construction and operation of a gas-fired app. for the macro- and micro-detn. of C, H, N, S and halogens in org. compds. It is completely automatic for high-boiling compds., and almost so for highly volatile substances; the accuracy is quite good, and an operator can easily make 10 C-H detns. in 8 hrs. with 1 app., or 17 detns. with 2 app.

Semi-micro apparatus for the determination of carbon and hydrogen by the method of Orthner and Reichel. J. Lindner. *Chem. Fabrik* 6, 277(1933); cf. *C. A.* 27, 3116.—Errors introduced by using PbO<sub>2</sub> are described.

Extraction apparatus permitting the simultaneous determination of water. V. Cerchez and C. Panaitescu. *Ann. chim. anal. chim. appl.* 16, 58-60(1934).—The app. described is based on the principle of the Soxhlet extrn. The vapors from the extrn. thimble pass through a vertical tube which at the top has a fairly sharp bend leading to a condenser and to another tube which is provided with a graduated scale and 2 stopcocks. When a solvent lighter than water is used, the vapors pass into the condenser and fall back into the graduated tube and the lighter solvent overflows back into the first tube. At the end, the vol. of water can be read. With a solvent heavier than water, the lower stopcocks must be opened from time to time to drain off the solvent and, at the last, to make the vol. of water extend from the zero reading upward.

The use of the spiral absorber for the determination of carbon dioxide. Harry E. Goresline. *J. Biol.* 27, 65-6 (1934).—The absorber consists of a 4-mm. glass tube approx. 15 ft. in length, wound into a close spiral and sealed to a gas delivery tube incorporating a bubble "pump." The glass spiral is inserted in a large test tube which holds the absorbing liquid, and as each bubble of gas ascends the spiral, a small amt. of the liquid (KOH) is pumped in behind it. The gas and KOH are thus in contact until all CO<sub>2</sub> is absorbed. Pressure developed during fermentation will force the gas through, or a current of CO<sub>2</sub>-free air may be used. The results agree with those of the CO<sub>2</sub>-weighing bulb.

Modern apparatus for determining hydrogen-ion concentration. A. Salmony-Karsten. *Zellstoff u. Papier* 13, 513-16(1933); *Gesundh.-Ing.* 57, 16-19(1934); *Reichstoff-Ind.* 9, 8-10; *Kautschuk* 10, 38-40.—A description of some new elec. and optical instruments for measuring pH.

Continuous transport and measurement of small quantities of gas. E. A. Müller. *Z. tech. Physik* 15, 52-4(1934).—A description is given of an app. of glass and Hg which permits the continuous and regular transport and measurement of quantities of gas between 0.1 and 15 cc./min. with an accuracy of 0.1%.

Apparatus for pyrolysis of hydrocarbon gases. Václav Jelínek. *Zprávy Ústavu pro vědecký výzkum uhlí v Praze* 4, 174-81(1932); *Chem. Obsor* 8, Abstract sect. 163; cf. *C. A.* 27, 399.—Two parallel tubes in the same oven are used alternately for pyrolysis of hydrocarbons. While pyrolysis takes place in one tube the other tube is washed with N<sub>2</sub>, the solid residue burned with O and the products of combustion washed out with N<sub>2</sub>. The alternate introduction of gases into the tubes is effected automatically by a mercury control device.

Simple apparatus for thermal gas reactions, especially for the thermal dissociation of water vapor. Heinrich Rheinboldt. *Z. physik. chem. Unterricht* 46, 58(1933).—An inverted 300-ml. Erlenmeyer flask contg. Cu wire electrodes is used. The app. can be adapted for the decomn. of CO<sub>2</sub> to CO, of org. compds. in general (CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>) to C<sub>2</sub>H<sub>2</sub>, of O<sub>2</sub> to form O<sub>3</sub>, etc.

Apparatus for determining the gas content of steam. H. Claassen. *Chem.-Ztg.* 58, 136-7(1934).—See *C. A.* 27, 5220.

Dräger-Schröter gas-detection equipment and its use in gas attacks. G. Stampe and G. A. Schröter. *Gas-schutz u. Luftschutz* 4, 16-18(1934).—A compact testing

set is described. In principle it cones the gas by drawing a known vol. of air-gas mixt. through silica gel by means of a small hand pump and then identifies the adsorbed gas by means of a permanganate soln. The sensitivity is about 0.015 mg. per l., and a test is made in less than 3 min.

A. L. Kibler

The Razez-Mulder color analyzer and its use for the measurement of pulp and paper color. R. S. Hatch and H. A. Hauff. *Paper Trade J.* 97, No. 26, 34-6(1933).—A discussion of the theory of color and explanation of the principles on which the Razez-Mulder color analyzer is designed, together with photographs of color curves covering a wide range of pulp and paper colors to illustrate the range and sensitivity of the instrument. A. P.-C.

A new thermocouple for the determination of temperatures up to at least 1800°. G. R. Fitterer. *Trans. Am. Inst. Mining Met. Engrs.* 105, 290-301(1933).—See C. A. 27, 2848.

Alden H. Emery

Servicing a noble-metal thermocouple. R. S. Bradley. *Heat Treating and Forging* 19, 80-1, 108-9(1933).—Practical information applicable to thermocouples used for all purposes.

Downs Schaaf

A new instrument designed for the study of combustion. C. F. Taylor, C. S. Draper, E. S. Taylor and G. L. Williams. *S. A. E. Journal* 34, 59-62T(1934).—A simple element for elec. detn. of the rate of change of pressure in a bomb or cylinder is described. H. A. B.

Calculations for furnaces with radiant roof and floor. B. K. Amerik. *Neftyanoe Khozyaistvo* 25, No. 9, 26-31(1933).—Calcs. are given for (1) detn. of the amt. of heat transferred by radiation from the flame surface and the side walls to the roof, wall and floor radiant tubes, (2) comparison of various types of furnaces, (3) detn. of direct heat transfer, and (4) radiation from floor and wall surfaces.

A. A. Boethlingk

App. for rectifying small quantities of liquefied gas (van Dijk, et al.) 2.

Griffiths, Roosevelt: Thermostats and Temperature-Regulating Instruments. London: Chas. Griffin & Co. Ltd. 157 pp. 10s. Reviewed in *Metallurgia* 9, 114(1934).

Grünwald, Alfred: Temperatur-Mess- und Regelgeräte. Berlin: Siemens & Halske.

Pressure distillation apparatus. Firma E. Merck. Ger. 589,608, Dec. 12, 1933 (Cl. 12a. 2).

Apparatus for exothermic vapor-phase catalytic reactions such as production of phthalic anhydride from naphthalene. Alphons O. Jaeger (to Selden Co.). U. S. 1,945,812, Feb. 6. Various details of construction and operation are described, of a converter having vertical catalyst tubes surrounded by a liquid bath such as molten  $\text{NaNO}_3$  and  $\text{NaNO}_2$  in which are immersed vertical heat-exchange elements through which a gaseous cooling medium such as air may be passed.

Carboy container. John J. Bach and James B. Flaws (to Merrimac Chemical Co.). U. S. 1,945,797, Feb. 6. Structural details.

Surface condenser. Bengt E. Meurk and Wm. M. Kennedy, Jr. Ger. 591,215, Jan. 18, 1934 (Cl. 17d. 5.02). This corresponds to Brit. 382,849 (C. A. 27, 5591).

Electric system, etc., suitable for the control of temperatures, etc., in industrial processes. Anker E. Krogh (to Brown Instrument Co.). U. S. 1,947,297, Feb. 13. Various details of app. and operation are described.

Thermometer. Ralph F. Schneider. U. S. 1,947,175, Feb. 13. Structural details.

Viscometer. Walter A. Nivling (to Automatic Appliance Co.). U. S. 1,945,822, Feb. 6. An app. is described in which liquid such as sizing for yarn is forced at a const. rate into an air trap in which accumulation of liquid and air pressure vary with the viscosity of the liquid so that the air pressure in the trap serves as an indication of viscosity.

1 Rotary viscometer suitable for testing liquids. Adolf Kämpf. U. S. 1,944,983, Jan. 30. Mech. details. Filters. Melitta-Werke A.-G. Brit. 400,077, Oct. 19, 1933.

Rotary-drum filter with associated suction filter. Humboldt-Deutzmotoren A.-G. Ger. 591,055, Jan. 15, 1934 (Cl. 12d. 15.02).

Gas filter (bag type). Standard Filterbau-Ges. m. b. H. Ger. 591,026, Jan. 15, 1934 (Cl. 50c. 6).

2 Filter units, comprising pleated screens with means for defining the space occupied by the screen on all sides. Cecil G. Vokes. Brit. 401,287, Oct. 30, 1933.

Apparatus suitable for filtering air. Kenneth D. Jones and Wm. R. Thomas. U. S. 1,946,744, Feb. 13.

Apparatus for filtering air or other gases. Herman A. Brassert, Arthur J. Boynton and John P. Grilli (to H. A. Brassert & Co.). U. S. 1,947,447, Feb. 20.

3 Acidproof filter plate. Toshiyuki Mizuno. Japan. 100,515, Apr. 11, 1933. A filter plate is made by casting a mixt. of acidproof stone or brick of proper grain size with acidproof cement and a liquid for hardening the cement.

Magnetic separators. Herbert Klinger. Brit. 401,301, Nov. 6, 1933.

Steam separators. Holden & Brooke Ltd. and Robert W. Brooke. Brit. 400,859, Nov. 2, 1933.

4 Apparatus for separating gases and liquids. Harry A. Ward. U. S. 1,947,366, Feb. 13. Structural and operative details are described.

Apparatus for separating mixed liquids such as oil and water by gravity. Thomas W. Barber. U. S. 1,945,766, Feb. 6. Numerous structural and operative details are described.

Apparatus for separation of ores, rocks or coal of various specific gravities by means of compressed air. József Finkey. Hung. 107,224, Sept. 1, 1933. Structural details.

Sifting apparatus. Robids Conveying Belt Co. Brit. 401,176, Nov. 9, 1933.

Drying apparatus. Abraham H. Burgess and Wm. H. Bird. Brit. 402,100, Nov. 24, 1933.

Drying apparatus. The Coe Manufacturing Co. Ger. 589,962, Dec. 20, 1933 (Cl. 82a. 1.01).

6 Band for drying apparatus. Benno Schilde Maschinenbau A.-G. Ger. 587,104, Oct. 30, 1933 (Cl. 82a. 25.01). Addn. to 532,034 (C. A. 26, 342).

Tubular drier. Maschinenfabrik Buckau R. Wolf A.-G. Ger. 587,422, Nov. 3, 1933 (Cl. 82a. 23.01). Addn. to 584,939 (C. A. 28, 9367).

Tubular drier. Fried. Krupp Grusonwerk A.-G. (Hans J. Johlige inventor). Ger. 589,543, Dec. 9, 1933 (Cl. 82a. 23.02).

7 Apparatus for drying beet slices and like organic matter with furnace gases. Oesterreichische Bamag-Büttner-Werke A.-G. Austrian 136,027, Dec. 27, 1933 (Cl. 82a).

Centrifugal apparatus for producing dry granular products from liquids. Norsk Hydro-Elektrisk Kvælstof-aktieselskab. Fr. 756,765, Dec. 15, 1933.

Rotary drying and grinding drum. Arno Andreas. Ger. 591,386, Jan. 19, 1934 (Cl. 82a. 19.02).

8 Rotary grinding and mixing apparatus. Johannes Schwarz. Ger. 591,299, Jan. 19, 1934 (Cl. 50c. 15.20).

Apparatus for mixing and rendering powdered materials homogeneous. Mikael Vogel-Jørgensen. Fr. 756,745, Dec. 14, 1933.

Apparatus for analyzing gases by measuring the thermal conductivity. United States Fire Protection Corp. Fr. 757,034, Dec. 19, 1933.

9 Porous diaphragm gas analyzer suitable for use in combustion control. John D. Morgan (to Doherty Research Co.). U. S. 1,947,303, Feb. 13. Various details of structure and automatic operation are described.

Instrument for indicating proximity of dewpoints in gases such as air. Merit Scott. U. S. 1,945,660, Feb. 6. Structural features.

Apparatus for washing, moistening, drying, cooling, heating, etc., air, gases or liquids. Sulzer Gebrüder, Akt.-Ges. Fr. 757,091, Dec. 20, 1933.



**Apparatus for controlling the admixture of gases and liquids as in treating water with chlorine.** Wm. Smalley (to Paterson Engineering Co., Ltd.). U. S. 1,945,757, Feb. 6. Structural and mech. features.

**Rotary apparatus for condensation and other treatment of fluids.** Walter J. Podbielniak. Brit. 401,484, Nov. 16, 1933. Fluids of different ds. are passed in opposite directions through a rotating spiral conduit of progressively increasing radius, the lighter fluid being introduced at the outer end and caused to travel in the direction of the inner end and the heavier fluid in the direction of increasing radius. The process may be used for absorbing the constituents of gases by liquids. App. is described.

**Centrifugal apparatus for purifying liquids.** János Bányay. Hung. 108,831, Aug. 1, 1933. Mech. details are given.

**Rotary furnaces.** Johan S. Fasting. Fr. 756,807, Dec. 15, 1933. An enlarged portion contg. canals is provided in the heating or calcination zone and has a wall permeable to gas spaced from the canals to provide a space into which the mass is introduced and from which it is distributed to the canals.

**Furnace for oxidizing lead to lead oxide.** N. A. Plotnikov. Russ. 1685, Sept. 30, 1925. Construction details.

**Lids or covers for melting-furnaces.** Wm. F. Wiltshire. Brit. 401,629, Nov. 16, 1933. Divided on 400,956 (C. A. 28, 1898<sup>3</sup>).

**Device for mixing air and gas for gas furnaces.** Pharos Feuerstätten G. m. b. H. Ger. 589,812, Dec. 16, 1933 (C. 1. 24c. 2).

**Apparatus for introducing hot air and hot furnace gas into flame furnaces.** Rekuperator G. m. b. H. Ger. 589,619, Dec. 12, 1933 (C. 1. 18b. 3).

**Tuyère for furnaces.** John C. Goss and Harry L. Crispin. U. S. 1,946,850, Feb. 13.

**Tuyère suitable for power-plant furnaces.** Herbert E. Preston (to American Engineering Co.). U. S. 1,944,948, Jan. 30.

**Tuyère plate suitable for multiple retort underfeed stokers.** James A. Drogue (to American Engineering Co.). U. S. 1,944,931, Jan. 30. Structural details.

**Heat-producing apparatus.** Tellur Ipári és Kereskedelmi R. T. Vegyészeti Gyár. Hung. 107,520, Dec. 1. An app. is described in which is effected an exothermic reaction of an active substance with water. The velocity and duration of the reaction can be regulated by the quantity of added water and the surface of the active matter.

**Heat exchangers.** Robert Kobi (to Sulzer Gebrüder, Akt.-Ges.). Brit. 400,853, Nov. 2, 1933.

**Tubes for heat exchangers.** Georg Krause. Brit. 400,513, Oct. 26, 1933.

**Field-tube heat-exchangers for heating air for drying purposes.** Sidney F. Barclay, Herbert Hoyle and Mather & Platt Ltd. Brit. 401,450, Nov. 16, 1933.

**Heat-exchange apparatus.** A. Sandberg née Mohlin (J. T. Sandberg, inventor). Swed. 75,900, Nov. 22, 1932. Mech. details of app. and operation.

**Heat-exchange apparatus of the shell and tube type suitable for use with air and water, etc.** John A. Potter (to Westinghouse Elec. & Mfg. Co.). U. S. 1,947,109, Feb. 13. Structural features.

**Tube and shell heat-exchange apparatus.** Joseph Price (to Griscom-Russell Co.). U. S. 1,946,234, Feb. 6. Structural details.

**Heat-exchange apparatus suitable for use with air, water, brine, etc.** Thomas W. Carraway and Benjamin G. Littlepage (to General Fire Extinguisher Co.). U. S. 1,945,394, Jan. 30. Structural features.

**Tubular heat-exchange apparatus suitable for cooling liquids.** John G. Kaestner (to E. A. Kaestner Co.). U. S. 1,945,402, Jan. 30. Structural details.

**Heat-exchange system for separating gases such as those of air.** Mathias Fränkl (to American Oxythermic Corp.). U. S. 1,945,634, Feb. 6. Various details of app. arrangement and operation are described.

**X-ray apparatus.** Arthur Mutscheller (to Wappler

1 Elec. Co.). U. S. 1,946,176, Feb. 6. Structural and elec. features.

**X-ray apparatus.** Wm. K. Kearsley (to General Elec. Co.). U. S. 1,946,286-7-8, Feb. 6.

**X-ray tube.** Wm. D. Coolidge (to General Elec. Co.). U. S. 1,946,312, Feb. 6.

**Apparatus for the production of x-rays.** Jean Quivy. Fr. 756,800, Dec. 15, 1933.

**Cathode-ray tubes.** Hans E. Hollmann. Fr. 756,917, Dec. 18, 1933.

**Incandescent cathode tube.** Wilhelm Ullmann and Anton Borowiec. Fr. 756,353, Dec. 8, 1933.

**Photoelectric cells.** Siegmund Strauss and Louis Weisglass. Austrian 135,851, Dec. 11, 1933 (C. 1. 21a.).

**Cathodes for vacuum photoelec. cells are made from an alloy of pure Zn with a subordinate amt. of a metal of higher photoelec. work function, e. g., Ni, Cu, Fe or Pb. The alloy may also contain Cd, Sb and Bi. Specific alloys are described.**

**Electron tubes.** Oskar Heil. Fr. 756,969, Dec. 18, 1933, and 757,011, Dec. 19, 1933.

**Electron tubes.** Telefonaktiebolaget L. M. Ericsson. Fr. 757,019, Dec. 19, 1933. Compensation arrangement.

**Electron-discharge tube.** Henry W. Parker (to Rogers Radio Tubes, Ltd.). U. S. 1,945,979, Feb. 6. Various details are described. U. S. 1,945,980 relates to a cathode-ray tube construction.

**Electron-discharge tubes.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 756,340 and 756,341, Dec. 8, 1933.

**Discharge apparatus.** Eugene A. Giard (to Igranic Electric Co. Ltd.). Brit. 401,568, Nov. 16, 1933. The surface of a control electrode is composed of BeO. A control electrode, consisting of an imperforate metal sheet surrounding the filament and having apertures in the end facing the anode, is made of a Ni-Be alloy contg. approx. 2% Be. The surface is oxidized by heating in air and is again heated by a high-frequency field during exhaustion of the tube to evap. the Ni oxide. In a modification the BeO may be produced by deposition and subsequent oxidation of Be on a Ni surface.

**Electric discharge devices with arrangements for automatically controlling the temperature of the gas or vapor therein.** Albert W. Hull (to The British Thomson-Houston Co. Ltd.). Brit. 401,379, Nov. 16, 1933.

**Discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Brit. 401,240, Nov. 9, 1933. Addn. to 392,796 (C. A. 27, 5223).

**Discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Brit. 401,471, Nov. 16, 1933. In a gas-filled discharge tube, such as a rectifier having an incandescent cathode, the main body of each anode consists of C, particularly graphite, the surface of which is (partly) polished to prevent disintegration thereof and blackening of the tube walls.

**Positive-column gas-discharge tube.** Leo L. Beck and Aubrey E. Noble (to Claude Neon Lights, Inc.). U. S. 1,946,477, Feb. 13. A tube which radiates positive column light that appears substantially white to the eye contains a principal filling of He together with just sufficient A (suitably about 0.4%) to bleach the tan He radiation.

**Luminescent electric discharge tube.** Aubrey E. Noble (to Claude Neon Lights, Inc.). U. S. 1,946,498, Feb. 13. A tube emitting yellow light has an envelope of an external diam. of about 11-15 mm. and contg. a filling of He at a pressure of about 3-5 mm. and a cold cathode comprising the decompn. products of an alk. earth oxygenated compd. such as Ba suboxide.

**Electric discharge tubes.** N. V. Philips' Gloeilampenfabrieken. Fr. 756,662, and 756,663, Dec. 13, 1933.

**High-tension discharge tubes.** C. H. F. Müller A.-G. Fr. 756,506, Dec. 11, 1933.

**Cathode for electrical discharge devices.** Carl J. R. H. von Wedel (to Electrons, Inc.). U. S. 1,946,603, Feb. 13. A core at least the outer portion of which is Ni is helically wound with a wire such as Ni to which an electron-emitting material such as Ba nickelate is applied.

Hollow anodes for discharge devices. Elektrische Glühlampenfabriken Joh. Kremenezky A.-G. Brit. 401,542, Nov. 16, 1933. Relates to the shape of the anodes.

Water cooling arrangement for cooling discharge tubes. C. Lorenz A.-G. Brit. 401,348, Nov. 13, 1933.

Cooling structure for metallic vapor apparatus. Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 401,308, Nov. 9, 1933.

Thermionic valves for very short waves. Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 401,182, Nov. 9, 1933.

Apparatus for making filaments such as those of coated metal for radio tubes. Victor Anderson and Donald G. Trutner (to Alfred Hofmann & Co.). U. S. 1,947,449, Feb. 20. Structural and mech. details.

Potentiometric apparatus suitable for recording and control. Thomas R. Harrison (to Brown Instrument Co.). U. S. 1,946,280, Feb. 6. Various structural, elec. and operative details are described.

Apparatus for indicating relative humidity. Roger Lanquetin. U. S. 1,946,702, Feb. 13.

Rotary atomizer for moistening and heating air. Soc. anon. "Imac" installations modernes pour air et chaleur. Brit. 401,902, Nov. 23, 1933.

Apparatus for detection of combustible gas. Ferenc

Lamprecht and János Schreiner. Hung. 107,149, Sep. 1, 1933. Gas escaping from a pipe or mine gas makes a catalyzer glow; this heat burns a thread or melts a metal which closes an elec. circuit leading to a signaling instrument.

Apparatus for generating combustion products under pressure, mixed with steam. Harry Causton. Brit. 401,188, Nov. 9, 1933.

Vacuum-jacketed vessels. Dudley H. Wright. Brit. 401,445, Nov. 16, 1933.

Surface condensers. Akt. Ges. Brown, Boveri & Cie. Brit. 400,437, Oct. 26, 1933.

Apparatus for removing sludge from tanks such as those used for sewage treatment. Darwin W. Townsend and James Brower (to Chain Belt Co.). U. S. 1,947,429, Feb. 13. Various mech. and operative details are described.

Device for preventing damage from fire or explosion due to injury of a receptacle for inflammable liquid. Jean Gut. Brit. 400,396, Oct. 26, 1933.

Gold-saving apparatus with traveling grizzly screen devices. General L. Covington. U. S. 1,947,035, Feb. 13. Mech. features.

Apparatus for coating pipes internally and externally. Vereinigte Stahlwerke A.-G. (Walter Neuhoß, inventor). Ger. 591,149, Jan. 17, 1934 (Cl. 75c. 6).

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Joseph Winters England. Anon. *Am. J. Pharm.* 106, 18-19(1934).—An obituary with portrait. W. G. G.

Leon Iosifovich Kordniah, 1878-1932. L. Shtrum. *Uspekhi Fiz. Nauk* 13, 970-5(1933). F. H. Rathmann

Marko T. Leko (1853-1932). M. Krajčnovic. *Arhiv Hem. Farm.* 7, 33-6(1933).—Biographical with a portrait.

Stjepan Mohorovicic. V. Njegovan. *Arhiv Hem. Farm.* 7, 129-42(1933).—Biography and bibliography with a portrait.

Boris Petrovich Orelkin. G. V. Pigulevskii. *J. Gen. Chem.* (U. S. S. R.) 3, 641-2(1933).—Obituary with portrait.

Samuel Wilson Parr. W. A. Noyes. *Trans. Ill. State Acad. Sci.* 25, No. 2, 41(1932).—A memoir.

Reality in a chemical era. Wm. J. Hale. National Fertilizer Assoc., *Proc. 9th Ann. Convention* 1933, 57-68.—An address dealing with the relation of chemistry to the changes occurring in the world's economic structure.

Apparatus for chemical instruction. H. Rheinboldt. *Z. physik. chem. Unterricht* 46, 97(1933).—Tube and crucible furnaces are cheaply made by drilling out kieselguhr bricks in an appropriate manner. An elec. arc furnace can be made by using two flower pots; the space between them is filled with kieselguhr. A thermoscope for rough measurement of heats of soln., neutralization, reaction, evapn., etc., is described. L. Waldbauer

The spinning of rayon as a school experiment. Hans Römisch. *Z. physik. chem. Unterricht* 46, 27(1933).

The relationship of general and analytical chemistry courses to the teaching of metallurgy. Eric R. Jettc. *J. Eng. Education* 24, 401-13(1934).

The blast-furnace process (lecture experiment). K. Posthumus. *Chem. Weekblad* 31, 112-13(1933).—With the aid of a flower pot a lecture expt. can be carried out to demonstrate the blast-furnace process.

Demonstration of a blast furnace. W. Heldmann. *Z. physik. chem. Unterricht* 46, 71(1933).—Two flower pots are used for the furnace.

Experiments in producing artificial smokes. W. Flörke. *Z. physik. chem. Unterricht* 46, 211(1933).

The making of a fire extinguisher. H. Römisch. *Z.*

*physik. chem. Unterricht* 46, 165(1933).—Two forms are described, one contg. an elaborate device for holding the acid in a sealed ampoule, and the other a simple one with the acid in a tube closed at one end, the other end of the tube being open, but above the  $\text{NaHCO}_3$  soln. L. W.

Silicate weathering. W. Flörke. *Z. physik. chem. Unterricht* 46, 119(1933).—The hydrolysis necessary for the weathering of silicates can easily be demonstrated by heating a pinch of finely powd. orthoclase in a hard-glass test tube on a water bath. After cooling, 2 drops of phenolphthalein soln. are added. Not all types of orthoclase are suitable. Louis Waldbauer

The reform of Russian chemical nomenclature. E. A. Shilov. *Uspekhi Khim.* 2, 760-3(1933).—Reforms in the nomenclature of inorg. compds. making the names more nearly transliterations of those used in western Europe are suggested.

Methane in the atmosphere [stratosphere]. Seitaro Suzuki. *Proc. Phys.-Math. Soc. Japan* [3], 16, 35-8(1934).—It is deduced mathematically that the max.  $\text{CH}_4$  content (0.975% ?) of the stratosphere is reached at a height of 100 km.

Content of dissolved oxygen in water of maritime Seine. P. Chauchard. *Compt. rend.* 198, 594-6(1934); cf. C. A. 27, 212.—The  $\text{O}_2$  content of the water of the estuary of the Seine increases on passing from fresh to brackish to fall slightly in the salt water of the open sea. It is reduced by the bore and incoming tide, which stir up a reducing mud, and is increased by insolation.

A method of measuring radiated energy by a thermophotometer. Maksimilijan Plotnikov. *Arhiv Hem. Farm.* 7, 170-84(184-6 in German)(1933).—The method based on the principle of transformation of the radiated into mol.-kinetic energy of a gas by means of a thin absorbing surface which is enclosed in a well-insulated container closed by a quartz plate and connected with a capillary is described. The principle is explained mathematically.

Some thermal data and the atomic weight of krypton. W. Heuse and J. Otto. *Physik. Z.* 35, 57-9(1934).—D. detns. at 15-20° indicated a value of 3.743 as the weight of a normal l. of Kr and 83.66 as its at. wt. The coeff. of expansion,  $\alpha$ , was detd. as equal to  $0.0036609 + 358 \times 10^{-7} p$ ,  $p = 1.00367 - 0.00367 p$ , when  $p$  is about 1 mm. Hg, and the factor for deviation from an ideal gas  $-0.00124$  at 0° and  $-0.00186$  at 100°.

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The making of a fire extinguisher. H. Römisch. *Z.*

The atomic weights of iodine, carbon and sodium. The ratio of iodine pentoxide to sodium carbonate. Gregory P. Baxter and Arthur H. Hale. *J. Am. Chem. Soc.* 56, 615-17(1934).—The end point for the reaction of  $I_2O_5$  with  $Na_2CO_3$  was detd. with bromothymol blue after  $CO_2$  had been expelled. The ratio of  $I_2O_5:Na_2CO_3$  was 3.14950. Various at. wts. of I, C and Na are calcd. by assuming values for any 2 and computing the third. That of I is probably below 126.92 and C above 12.00.

L. P. Hall

Natural classification of chemical compounds. III. F. M. Shenyakin. *J. Gen. Chem.* (U. S. S. R.) 3, 269-78 (1933); cf. *C. A.* 27, 213.—The mol. system is qualitatively different from the at. system. The natural mol. system can be characterized as a generalized diagram of properties built according to the mol. and structural no. and the mol. symmetry. For the zero group of the Mendeleev system the conceptions of mol. and at. no. are equiv. According to the like or unlike mol. no. and symmetry there are constructed 3 basic kinds of tables, each subdivided into 3 groups. Thus are obtained the tables of 9 kinds genetically connected by "the law of centralized cube." In the normal geometrical series each mol. can be designated by a symbol detg. the interrelation of its nodal points. Comparison of the mols. in the system leads to conclusions and predictions regarding their phys. and chem. properties. The phys. consts. of mols. are basically detd. by the type of the inactive gas to which the given mol. belongs, its symmetry, the no. of atoms, the law of periodicity, the interrelation of the magnitudes of its component parts, and the no. and structure of the nodal points.

Chas. Blanc

Three-dimensional models of the potential energy of triatomic systems. C. F. Goodeve. *Trans. Faraday Soc.* 30, 60-9(1934).—The prepn. of models from laminations of plaster of Paris is described and systems  $3H$  atoms, of  $C + 2O$  and of  $2Na + Cl$  are illustrated and discussed. The distances sepg. the atoms are plotted horizontally and the potential energy is plotted vertically.

E. R. Rushton

Atomic and molecular radii. V. Poscjal. *J. phys. radium* [7], 4, 741-8(1933); cf. *C. A.* 27, 224, 5228.—Upon the basis of the previously derived formula the at. radii of Ne, Ar, Kr and Xe are calcd. as 0.92, 1.61, 3.64 and  $7.32 \times 10^{-8}$  cm., resp. These values agree well with values calcd. by others and lead to the statement of a more general approx. relationship for gases in which  $R = 0.769 + 0.002245Z^2$ .  $R$  is the at. radius and  $Z$  the at. no.

Oden E. Sheppard

Covalency, coordination and chelation. R. C. Menzies and H. Overton. *J. Chem. Soc.* 1933, 1290-4.— $Mg_2PtI$  is polymerized in boiling  $C_6H_6$ , while  $MeHgI$  and  $Et_4PbBr$  in freezing  $C_6H_6$  and  $Et_4PbCl$  in  $C_6H_6$  at room temp. are unimol. Attempts to prep. methylmercury acetylacetonate and triethyllead acetylacetonate were unsuccessful. These expts. confirm the generalization that in the organometallic derivs. of the elements from Pt to Pb, inclusive, the stability of the acetylacetonates (and similar compds.) and polymerization of the corresponding organometallic halides in  $C_6H_6$  are connected. They can be correlated by consideration of the valencies and effective coordination nos. of the metals in question.

Louise Kelley

The electronic structure of hexafluorides. Thomas G. Pearson and Percy L. Robinson. *J. Chem. Soc.* 1933, 1427-9.—The d. and the surface tension of  $SF_6$  were measured over a range of temp., and the parachor calcd. therefrom indicates that the octet valency rule is maintained in this compd., 2F atoms being attached to the S atom by covalent linkages and the remaining 4 by semipolar singlet links. The parachors of  $SeF_6$  and  $TeF_6$  reveal a structure identical with that of  $SF_6$ . A. L. H.

The valency angle of sulfur. G. M. Bennett and S. Glasstone. *J. Chem. Soc.* 1934, 128-9.—The dipole moment of thianthrene (*C. A.* 26, 2902) is confirmed and found not to be caused by effect of the solvent or by atom polarization. It is suggested that the thianthrene mol. lies in 2 planes intersecting in the line joining the 2S atoms in space, and that the mol. is flexible about this line

to some extent. This is taken as an indication of a tendency for the valency bonds of S to adopt an angle of less than  $120^\circ$ . Values of dielec. const., d., n, polarization and dipole moment are given for solns. of thianthrene in  $CCl_4$  at  $24.92^\circ$  and in  $CS_2$  at  $24.20^\circ$  and  $0.0^\circ$ .

W. B. Keighton, Jr.

Thermomagnetic study of certain salts of nickel in the solid state. A. Serres. *Ann. phys.* 20, 441-77(1933).—In addn. to her own results for several Ni salts, S. reviews the data given by other investigators. In soln., Ni salts usually obey the Curie law, with the moment of the Ni ion = 16 magnetons. In the solid states these salts obey the Curie-Weiss law approx. but show definite small deviations from it. The moment of the Ni ion is 15 or 15.5 magnetons in  $NiSO_4$  and in  $NiCl_2$ , regardless of the degree of hydration. In  $NiBr_2$  it is 16 magnetons, while in  $Ni(CN)_2$  it is much less. The results can be explained by assuming a const. paramagnetism superimposed on the paramagnetism that varies with temp. This leads to a more generalized law, expressed by  $(\chi - a)(T - \theta) = C$ . The value of  $a$ , detd. by trial, is  $425 \times 10^{-6}$  in the case of  $NiSO_4$ , both anhyd. and hydrated, and  $NiSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ . For anhyd.  $NiCl_2$  and  $NiCl_2 \cdot 6H_2O$ ,  $a = 284 \times 10^{-6}$ .  $Ni(CN)_2$  seems to obey the simple Curie-Weiss law; hence  $a = 0$ . This const. paramagnetism cannot be attributed to the anion alone for  $a$  does not have the same value for all Ni salts, nor can it be due to the cation alone, since similar salts of Co do not show this effect. It may be due to the deformation of the Ni atom by the cation.

W. W. Stiffler

Magnetic anisotropy of graphite. K. S. Krishnan. *Nature* 133, 174-5(1934).—The magnetic susceptibilities of Ceylon graphite normal and parallel to the principal crystal axis are  $-0.4 \times 10^{-6}$  and  $-22.8 \times 10^{-6}$ , resp.

C. D. West

Experiments on adiabatic cooling of paramagnetic salts in magnetic fields. W. J. de Haas, E. C. Wiersma and H. A. Kramers. *Physica* 1, 1-13(1933); cf. *C. A.* 27, 4452.—Method and results in detail are given of expts. on cold production by demagnetization. The lowest temps. obtained were for  $CeF_3$   $0.13^\circ K.$ ,  $Dy(EtSO_4)_3 \cdot 9H_2O$   $0.12^\circ K.$ ,  $Ce(EtSO_4)_3 \cdot 9H_2O$   $0.085^\circ K.$  and  $KCr(SO_4)_3$   $0.06^\circ K.$  The use of  $KCr(SO_4)_3$ , of fairly high moment, cheap and of regular crystal system, will allow measurement of other phenomena at these low temps.

B. J. C. van der Hoeven

Dielectric-constant studies. III. Aqueous gelatin solutions. A. L. Ferguson, J. Gilbert Malone and L. O. Case. *J. Chem. Physics* 2, 94-8(1934); cf. *C. A.* 28, 9437.—Measurements were made of the dielec. const. of gelatin solns. Results of the effect of  $p_H$  on the dielec. const. agree with Bjerrum's amphoteric ion theory. The application of an equation suggested by Marinova (*C. A.* 25, 3539) indicates that the water bound by the gelatin is still partially free to show its dielec. properties. Calcns. of the mol. wt. of gelatin showed that the mols. are of graded size and of mol. wts. ranging from about 5000 to 100,000. IV. The moments of some inorganic compounds. Mary G. Malone and A. L. Ferguson. *Ibid.* 99-104.—Detn. of the moments of several inorg. compds. yielded:  $SbCl_3$  3.12,  $SbBr_3$  2.47,  $SbI_3$  1.58,  $AsI_3$  0.96,  $AsBr_3$  1.60,  $PI_3$  0.0,  $AsF_3$  2.65 and  $LiClO_4$  7.86 debyes. Solvents were  $C_6H_6$ ,  $CS_2$  or dioxane. The dielec. const. of solid  $AsF_3$  was 5.7. Fair agreement was shown by a comparison of the measured moments with values calcd. from the electronegativity of the elements deduced from measurements of the H compds. or from their periodic relationship.

Allen S. Smith

Dielectric constant of liquid iodine. Alexis Jagielski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 327-35(in French).—The dielec. const. of liquid I was detd. by the resonance method with a condenser in which I is sepd. from the electrodes by two glass layers. The elec. cond. of I is very small and does not disturb the measurements. In the temp. range  $118.1$ – $168^\circ$  a rise of the dielec. const. from 11.08 to 12.98 is observed. Thus liquid I is one of the few liquids with a pos. temp. coeff. of dielec. const., and does not obey the laws of Clausius-Mossotti and of Debye.

J. Wiertelak

Dipole measurements with very small quantities of material. P. Cohen Henriquez. *Physica* 1, 41-52 (1933).—A micro method was devised for detg. the dipole moment of compds. in soln. The condenser used, 2 concentric glass tubes, Pt-plated, 0.5 mm. apart, holding 0.53 cc., had a capacity of 8.7  $\mu\text{F}$ ; a 2nd one of 70  $\mu\text{F}$  was used also. Wildschut transmitters for the a. c. waves were used (C. A. 26, 5803). Great care was taken to exclude all moisture. The solvent used was  $\text{C}_6\text{H}_6$  of  $\text{H}_2\text{O}$  vapor pressure equal to that of the air. With 1.4-10.9 mg. substance (0.0013-0.01 mole fraction) the  $\mu \times 10^{-18}$  (e. s. u.) was detd. of isomer I of naphthodioxan: 0.77-0.80, of isomer II 1.89-1.91. Solns. of less than 2% concn. were used to obviate d. detns. The methods of calcn. are discussed at some length, and the method based on dielec. const. and refraction is rejected, the atomic polarization being unknown and the electron polarization of false frequency. The extrapolation method for  $n$  is condemned likewise. The error in the calcn. of  $\mu$  is less than 0.5% if the equation  $\rho P_2 = (0.1889\delta - 0.567\Delta - 0.044\theta)M_{12}/f_2$  or, simplified,  $\rho P_2 = (0.189\delta - 0.57\Delta)M_{12}/f_2$  is used for  $\rho P_2$ , the mol. polarization of the solute,  $\theta$  being the difference in dielec. consts. of solvent (I) and solute (2):  $\epsilon_{12} = \epsilon_1 + \theta$ ;  $\Delta$  is obtained similarly from  $n_{12} = n_1 + \Delta$ ;  $M_{12}$  is the composite mol. wt.,  $f_2$  the solute mol. fraction. In the above equation benzene is solvent at 20° ( $n_1 = 1.501$ ). The  $\epsilon - n$  method is not sufficiently accurate for small dipoles (moment less than  $0.5 \times 10^{-18}$ ) or for temp.-coeff. detn. B. J. C. van der Hoeven

The electric dipole moments of nitrosomesitylene and of the bimolecular forms of nitrosomesitylene and 2-nitroso-2,5-dimethylhexane. Dalziel L. Hammick, Randal G. A. New and R. Branton Williams. *J. Chem. Soc.* 1934, 20-32.—The elec. dipole moments,  $\mu$ , (and also ds., dielec. consts.,  $n$ s and polarizations, at several concns.) were detd. for: nitrosomesitylene (I) (prepn. described) in  $\text{C}_6\text{H}_6$  soln. at 25°,  $\mu = 3.67 \pm 0.01$  (in e. s. u.  $\times 10^{-18}$ ); nitrosomesitylene (II) in  $\text{C}_6\text{H}_6$  soln. at 8° and 25°; 2-nitroso-2,5-dimethylhexane (III) in  $\text{CCl}_4$  soln. at 0°. By comparing  $\mu$  for I with  $\mu = 3.94$  for  $\text{PhNO}_2$ , polarizations for unimol. II are calcd. From this  $\mu$  for bimol. II is calcd.: at 8°  $\mu = 1.37 \pm 0.13$ ; at 25°,  $\mu = 1.63 \pm 0.09$ . For the dimeric form of III,  $\mu = 0.99 \pm 0.10$ . This is evidence in support of the structure  $\text{R}-\text{N} \rightarrow \text{N}-\text{R}$  for the bimol.



forms of nitroso compds. (cf. C. A. 26, 1261, 2716).

The isotherms of nitrogen between 0° and 150° at pressures up to 400 atmospheres. J. Otto, A. Michels and H. Wouters. *Physik. Z.* 35, 97-100 (1934).—From measurements at 25° intervals from 0° to 150° and with pressures from 45 to 414 atms. formulas were derived for  $p$  with  $p$  or  $d$  as the independent variable. L. P. Hall

Determining the specific gravity of liquids with a new pycnometer. J. M. Aas. *Fetchem. Umschau* 41, 3-4 (1934).—III. A 25-cc. dilatometer with a neck 3.5-4.0 mm. wide graduated in 0.01 cc. is used. After calibration for  $\text{H}_2\text{O}$ , the sp. gr. varies in the 5th decimal at temps. reading to 0.1° and vols. reading to 0.002 cc. P. Escher

Properties of liquids. James R. Pound. *Chemistry & Industry* 1934, 71-6.—The ds., viscosities, optical rotations and  $n$ s of many org. liquids kept at room temp. away from light were detd. from time to time during 11 years. L. W. T. Cummings

The optical properties of ideal solution immersion liquids. M. J. Buerger. *Am. Mineral.* 18, 325-34 (1933).—Mixts. of 2 chemically very similar liquids give rise to a series of ideal solns. whose optical properties are straight-line functions of compn. Refractive index, temp. coeff. and dispersion are discussed, and a method is given for prepg. a correction chart. A. M. Brant

Immersion liquids of intermediate refraction (1.450-1.630). Robert D. Butler. *Am. Mineral.* 18, 386-401 (1933).—A high-boiling kerosene fraction and  $\alpha\text{-C}_{10}\text{H}_7\text{Cl}$  are the end members used, constituting an optically ideal soln. series. The properties are described and presented in graphic form. A. M. Brant

Determination of specific gravity of minerals by use of index liquids. V. B. Meen. *Univ. Toronto Studies Geol. Ser.* No. 35, 47-50 (1933).—Mixts. of Thoulet's soln. and glycerol can be used as immersion media for powd. mineral. By observing whether the small particles sink or float in the layer of liquid on the microscope slide and finally by mixing two members a sp. gr. equal to the mineral is reached. By using a refractometer the  $n$  of this liquid can be obtained and the sp. gr. by referring to a calibration chart. A. M. Brant

Refractive indexes of L-ascorbic acid. Sterling B. Hendricks. *Nature* 133, 178 (1934).—A material isolated from peppers gives the characteristic absorption spectrum of L-ascorbic acid with a max. coeff. at 2650 Å. From  $\text{MeOH}$ , m. 188°,  $\alpha = 1.465$ ,  $\beta = 1.600 \pm 0.006$  and  $\gamma = 1.747$  for  $\lambda 5780$  Å. No evidence was found for structural polymorphism. Results substantiate Cox's deduction of a plane configuration for the mol., which accords with the accepted furanose ring structure. W. J. Peterson

High-frequency losses and molecular structure. P. Debye. *Physik. Z.* 35, 101-6 (1934).—The temp. rises of liquids between condenser plates proved that pure solvents with nonpolar mols. show no losses, that with polar mols. the losses increase with increasing dipole moment ( $\mu$ ) and that with compds. with the same moment they increase with the size of the mol. The "relaxation time" ( $\tau$ ) (about  $10^{-12}$  sec.) is related to the viscosity ( $\eta$ ), which is a const. to be experimentally detd.  $\tau = 4\pi a^2 \eta / kT$ , where  $a$  is a radius,  $k 1.37 \times 10^{-16}$  erg, Boltzmann's const.; and  $w = [(e + 2)/3]^2 \times (\omega^2 \tau / 2V) \times (N \mu^2 / 3kT) \times f E^2$ , where  $w$  is the heat energy (erg/cc./sec.),  $\omega$  the frequency,  $V$  the molar vol.,  $f$  the mol. fraction,  $E$  the elec. field strength,  $e$  the dielec. const.,  $N$  Avagadro's no., etc. This formula may be modified for the calcn. with mixts. L. P. Hall

Heating in the high-frequency condenser field on the ground of anomalous absorption. Heinz Haase. *Physik. Z.* 35, 68-76 (1934); cf. C. A. 26, 1838, 2910.—The temp. rises of hexyl, amyl and butyl alcs. alone and in various solns. of  $\text{C}_6\text{H}_6$  were measured in a high-frequency field, by starting at 20° and using wave lengths between 300 and 600 cm. In a high-frequency condenser field with wave lengths from 300 to 650 cm. the temp. rises at 20° were measured for hexyl, amyl and butyl alcs. and their Br derivs., for  $\text{C}_6\text{H}_6$  and  $\text{C}_6\text{H}_5\text{Me}$ , and for  $\text{C}_6\text{H}_6$  solns. of these alcs. at various concns. Absorption of energy decreased as the solns. became dil., while the resonance band became wider and the maxima shifted to shorter wave lengths. The sign and magnitude of these effects agreed in general with the Debye theory. L. P. Hall

Surface tension of liquid metals. V. The surface tension of the lead-tin alloys. L. L. Bircumshaw. *Phil. Mag.* 17, 181-91 (1934); cf. C. A. 25, 5408.—Surface tensions were detd. by the bubble-pressure method for Pb-Sn alloys over the complete compn. range at temps. from 200° to 800°. Surface tension decreases with temp. rise. The Gibbs adsorption equation was applied to obtain the adsorption of Pb at the interface of Sn-rich alloys. At all temps., the max. adsorption occurs at compns. near the eutectic compn. For an alloy of eutectic compn. the surface layer may consist of a unimol. layer of Pb atoms. E. J. Rosenbaum

Capillary ascent or depression of liquids in cylindrical tubes. II. Wide tubes. Alfred W. Porter. *Trans. Faraday Soc.* 29, 1307-9 (1933); cf. C. A. 25, 3895. By use of the equations both of Rayleigh, and Bashford and of Adams, values of the magnitudes  $k/\beta$  and  $h_0/\beta$  were calcd. for tubes for which  $r/\beta$  varies from 1 to 10 by units and for variations of angle of contact from 0° to 90° at 10° intervals. F. E. Brown

Standards for measurement of the rate of flow of liquids. Duchene. *J. usines gas* 57, 399-403, 439-46 (1933).—A review of the theory of turbulent flow and the methods of measurement of liquid flow with discussion of German and French standards. B. J. C. v. d. H.

Theory of liquid viscosity. Daniel Silverman. *Trans. Faraday Soc.* 29, 1285-94 (1933).—Previous equations for

calc. viscosity of liquids are discussed. A kinetic equation based on the assumptions of Maxwell's equation and the formation and decompn. of clusters of mols. in liquids (cybotaxis) is developed. Calc'd. viscosities are compared with accepted data. The agreement is excellent.

F. E. Brown

Heavy water inert, due to low association. Eugene C. Bingham and W. H. Stevens, Jr. *J. Chem. Physics* 2, 107-8(1934).—From viscosity considerations, it appears that deuterium oxide is less assoc'd. than ordinary  $H_2O$  and the temp. coeff. of assocn. is less.

G. M. Murphy

The relation between constitution and association, especially in reference to aromatic compounds. Eugene C. Bingham and John A. Geddes. *Physics* 5, 42-52(1934).—The fluidities and sp. vols. of  $o$ ,  $m$  and  $p$  isomers of chlorotoluene, bromotoluene, nitrotoluene, phenetidine and bromoaniline were det'd. from  $0^\circ$  to  $100^\circ$ . The degrees of assocn. are compared at equal fluidities, and the effect of chem. groups on the assocn. is discussed. By means of  $CCl_4$ ,  $CFCl_3$ , the atomic-temp. consts. of  $F$  are calc'd. to be 51.4, 54.5, 62.0 and 71.5 at fluidities of 50, 100, 200 and 300 rhes. The  $F$  atom is protective; it is less assocg. than  $H$ , and more than  $Cl$ . Substitution of a halogen atom on a  $C$  atom that also has an electropositive  $H$  atom attached increases the assocn.; substitution of an  $F$  atom on a  $C$  atom that has no  $H$  atom attached decreases the assocn.; substitution of  $F$  atoms for all the  $H$  atoms attached to a  $C$  atom decreases the assocn. G. M. P.

The viscosities of liquids and their vapor pressures. E. W. Madge. *Physics* 5, 39-41(1934).—Equations relating the viscosity and vapor pressures of liquids, and their phys. significance, are discussed. G. M. Petty

The vapor pressure of fluorine. Wm. H. Claussen. *J. Am. Chem. Soc.* 56, 614-15(1934).—The vapor pressure of  $F$  (b.  $85.2 \pm 0.1^\circ K.$ ) between 6.3 and 75.2 cm. is:  $\log P$  (cm.) =  $-462.66/T + 8.7202 - 0.01656T$ . The heat of vaporization is 1560 cal., and the entropy of vaporization is 18.3.  $F$  is a normal liquid. Albert L. Henne

Rate of evaporation of liquids in an air current. M. Tzentsherver, C. Wekerówna and Z. Majewska. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 369-82 (in German).—The rate of evapn. of  $H_2O$ ,  $C_6H_6$  and toluene is proportional to the velocity of the air current, provided the temp. in the surface layer of the liquid is const. The transition of mols. from the liquid to the gaseous phase takes place rapidly, a characteristic of a phys. phenomenon. The rate of evapn. under the conditions studied depends solely on the rate of diffusion of mols. of vapor through the film of air adhering to the surface of the liquid. J. W.

The parachors of some substituted methanes. Dalziel I. Hamrick and Harold F. Wilmut. *J. Chem. Soc.* 1934, 32-4.—For many substances that have an accumulation of neg. atoms or groups in the mol., the calc'd. parachor is greater than the observed parachor. This anomaly is not evident in the  $Cl$ -substituted methanes; it is found in  $CBR_4$  but not in  $HCBR_3$ , in  $C(NO_2)_4$  but not in  $HC(NO_2)_3$ , in  $HCPH_3$  but not in  $H_2CPh_3$ . The existence of these anomalies throws doubt on Sugden's formulation of the structures of sulfonal and trional (*C. A.* 22, 2152) based on parachor values. The following measurements were made:  $H_2CPh_3$ , d. and  $\gamma$  at  $29.9-60.0^\circ$ ,  $P_{obs.} = 419.6$ ,  $P_{calc'd.} = 419.0$ ;  $HC(NO_2)_3$ , d. and  $\gamma$  at  $20.0$  and  $25.0^\circ$ ,  $P_{obs.} = 247.0$ ,  $P_{calc'd.} = 244.2$ ;  $C(NO_2)_4$ , d. and  $\gamma$  at  $20.0-50.0^\circ$ ,  $P_{obs.} = 280.8$ ,  $P_{calc'd.} = 301.2$ ;  $C(NO_2)_4$ , in  $C_6H_6$  solns., d. and  $\gamma$  at  $25.0^\circ$ ,  $P_{soln.} = 280.0$ ,  $P_{calc'd.} = 301.2$ ;  $CBR_4$  in  $CCl_4$  solns., d. and  $\gamma$  at  $25.0^\circ$ ,  $P_{soln.} = 200.1$ ,  $P_{calc'd.} = 276.8$ .  $P_{obs.}$  for  $HCPH_3$  from the measurements of Przyluska (*C. A.* 4, 581) is 578,  $P_{calc'd.} = 591.9$ . W. B. Keighton, Jr.

Fractionation of liquid binary mixtures. II. I. Rabcewicz-Zubkowski. *Roczniki Chem.* 12, 655-61(1932).—When both components of a mixt. are unassoc'd. or are assoc'd. to the same degree, the quotient  $p_A/p_B$ , where  $p_A$  and  $p_B$  are the vapor pressures of the more ( $A$ ) and the less volatile components ( $B$ ), resp., rises with fall in temp.; this increase in  $p_A/p_B$  is usually more marked when  $A$  is unassoc'd. and  $B$  is assoc'd. When  $A$  is assoc'd.

and  $B$  unassoc'd.  $p_A/p_B$  may increase, remain const., or diminish with fall in temp. B. C. A.

Foreign materials that are capable of modifying the crystal habit of a dissolved substance when they are added to the mother liquor of a solution. L. Royer. *Compt. rend.* 198, 185-7(1934); cf. *C. A.* 24, 3686; Gaubert, *C. A.* 19, 1359-60.—It has long been known that the simple forms of crystals that originate from a soln. can vary when the soln. contains certain dissolved foreign materials. R. shows that there exist among the foreign materials, capable of modifying the crystal habit, well-defined structural relations that permit a choice in each case of the appropriate foreign material. Reuben Roseman

Modification of form of crystals grown in solution containing foreign material. L. Royer. *Compt. rend.* 198, 585-87(1934); cf. preceding abstr.—Examples of such modifications are (figures in brackets denote interionic distances in  $A.$  in the (111) plane in which in all cases all the ions in one plane are alternately metal or halogen): the production of octahedral crystals of  $NaCl$  (3.97) by addn. to its soln. of  $CdCl_2$  (3.85),  $ZnCl_2$  (3.77) or  $MnCl_2$  (3.79), while these have no effect on  $KCl$  (4.43); and of octahedral faces on crystals of both salts by addn. of  $NaNO_2$  (5.07) to aq.  $NH_4I$  (5.09), and to a smaller extent if added to aq.  $KI$  (4.97) or  $KBr$  (4.70), but not if added to  $NaCl$  (3.07). C. A. Silberrad

Preparation of crystals of sparingly soluble salts. W. Conrad Fernelius and Kenneth D. Detling. *J. Chem. Education* 11, 176-8(1934).—A method is described of prepg. fair-sized crystals of slightly sol. salts in pure condition by slow mixing (diffusion) of the requisite ions (cf. *C. A.* 8, 1373). W. C. Fernelius

The electrolytic growth of metal crystals. T. Erdey-Gruz. *Naturwissenschaften* 21, 799-800(1933).—The growth of  $Ag$  crystals was studied. A Bridgman monocrystal of 5-6 mm. was used as cathode and 2 concentric half spheres of  $Ag$  were used as anode. The expts. were followed for periods of 3-12 weeks, with  $10^{-3}$  to  $10^{-4}$  amps. No regular development was possible in  $AgNO_3$ ,  $AgClO_4$ ,  $AgF$  or  $KAg(NO_3)_2 + KNO_3$  solns.;  $Ag$  deposited on certain parts of the crystal only, other parts being "passive." In solns. of  $KAg(CN)_2 + KCN$ ,  $AgI + KI$ ,  $Ag_2O + NH_3$ ,  $AgCl + NH_3$ ,  $AgBr + NH_3$ , the electrolysis was such that the originally faceless monocrystal developed the crystal faces, most markedly in  $NH_3$  solns. The explanation is that the complex salts have better anion adsorbability with consequent blocking of the more active parts of the crystal surface; possibly also a dissolving action is exerted on the passive protective layers. The rate of growth of each crystal face is a function of the type of soln., and evidently the adsorption potential on each face depends on the anion. B. J. C. van der Hoeven

Mosaic crystals of zinc. Harold K. Schilling. *Physics* 5, 1-3(1934).—Optically mosaic crystals of 3 types were grown by the Czochralski-Gomperz method from 9 lots of pure  $Zn$ . The growth appears haphazard. H. A. B.

General theory for the pollution of binary systems. D. Balarev. *Z. anal. Chem.* 96, 81-91(1934).—The ppts. produced in the lab. are of a highly dispersed nature and take up impurities because of their "mosaic-like" structure. Classification of the possible ways in which ppts. can take up impurities forms a basis for a general theory. The probability that an "inner absorption" takes place is pointed out (cf. *C. A.* 27, 3372, 4496). W. T. H.

Diffusion of water in a zeolite crystal. Arne Tiselius. *Nature* 133, 212-13(1934).—The rehydration of partially dehydrated crystals of heulandite was observed between crossed Nicol prisms. As many as 7 black bands were observed; their displacement was proportional to the square root of the time. Gerald M. Petty

The diffusion of potassium into glass. Bela v. Lengyel. *Z. physik. Chem.* A167, 295-311(1933).—The diffusion of  $K$  from different molten salts into glass was det'd. directly by measuring the change in weight and indirectly by measuring the change in resistance. The Fick diffusion equation  $dc/dt = D^2c/x^2$  applies, where  $c = \text{conc'n.}$ ,  $t = \text{time}$ ,  $x = \text{distance from surface}$ , and  $D = \text{diffusion const.}$  The amt. of  $K$  diffused and the increase in resistance vary

linearly with  $\sqrt{t}$ . Validity of the diffusion equation is independent of the Na content of the glass. Don Brouse

Crystals and molecules as systems of mixed dimensions. D. Vorländer. *Naturwissenschaften* 21, 781-4(1933).—Cryst. fluids are discussed in relation to the spatial shape of mols. B. J. C. van der Hoeven

Solidification in pressed metal powders. W. Trzebiatowski. *Z. physik. Chem.* B24, 75-86(1934).—Finely divided Cu and Au powders were subjected to pressures as great as  $3 \times 10^4$  atm. The samples were then outgassed *in vacuo* and their d. and hardness followed as a function of pressure applied and temp. of outgassing. X-ray patterns show that the lines are broadened. G. M. Murphy

Electric conductivity of synthetic metallic bodies. W. Trzebiatowski. *Z. physik. Chem.* B24, 87-97(1934).—The elec. conductivities of Cu and Au powders prepd. as described in the preceding abstract were studied between 18° and 600°. The temp. coeffs. are pos. up to 100°, then neg. and become pos. again at 300°. These changes were also followed dilatometrically and are ascribed to adsorbed gases and recrystn. G. M. Murphy

A contribution to disintegration chemistry E. Berl and R. Schmitt. *Kolloid-Z.* 66, 87-91(1934); cf. Chwala, *C. A.* 24, 4685.—Increased reactivity on grinding is due to the formation of fragmentary particles metastable with respect to crystal particles. Difficultly sol. Fe compds. ground with  $\text{NH}_4\text{SCN}$  gave a red substance extractable by ether, indicating reaction. Alkali thiocyanates do not react. Pyrite, chalcopyrite and sphalerite with 12% Fe, gave strong reactions; sphalerite with 2% Fe, hematite, siderite and limonite gave moderately strong reaction, while rouge and fused  $\text{Fe}_2\text{O}_3$  gave none. Grinding sulfidic ores with  $\text{NH}_4$  phosphomolybdate and then digesting in  $\text{H}_2\text{O}$  gives a blue color in a short time, probably due to  $\text{H}_2\text{S}$  inclusions. Grinding sphalerite with NaCN or KCN forms turbid solns. on suspension in  $\text{H}_2\text{O}$ . The effect is not obtained with pptd. ZnS. Other substances that form complex salts, as  $\text{NaNO}_2$ ,  $\text{K}_2\text{Fe}(\text{CN})_6$ ,  $\text{K}_2\text{Fe}(\text{CN})_6$ , produce the same effect, while NaOH,  $(\text{NH}_4)_2\text{SiF}_6$  and  $\text{NH}_4$  tartrate have no effect. PbS is not peptized by KCN, because no complex forms. Arthur Fleischer

Plasticity in single crystals. H. Schlechtweg. *Physik. Z.* 34, 404-7(1933).—The classical method of calcg. plasticity fails for single crystals. The phenomenon of plastic slipping in a single crystal can be explained without assuming a mosaic structure by means of a combination of the Polanyi theory and the Prandtl model of a solid body based on the kinetic theory. B. C. A.

Methods of measuring electrolytic conductivity, without electrodes and with high frequency. E. Denina and Francesco De Paolini. *Gazz. chim. Ital.* 63, 634-54(1933); cf. De Paolini, *Nuovo cimento* 4, No. 9, cxc-cxcv(1927); *C. A.* 21, 2836.—The paper deals with measurements of the elec. cond. without polarizable electrodes, together with a crit. comparative study of the principal methods already known, including capacity, electromagnetic and high-frequency methods. The underlying principles of 3 new methods are also described: (1) a method in which a capacity is introduced into the circuit; with this, abs. measurements of good precision, particularly with liquids unstable with metal electrodes, are possible; (2) a method in which the electrolyte is placed in an electromagnetic field; the app. is termed an *electrolytic electrodynamicometer*; and (3) a *differential thermionic method*, with high frequency, involving app. similar to that of Wien, but with 2 sym. diodes. Method (1) is developed from a qual. demonstration by Scarpa of the cond. of electrolytes by electrostatic induction (cf. *C. A.* 19, 2156). In method (2) a current is induced in the electrolyte (constituting the secondary of a transformer), and measurable in several ways. C. C. Davis

The electrical conductivity of compressed graphite powder. J. Brunner and H. Hammerschmid. *Z. Elektrochem.* 40, 60-7(1934).—The elec. conductivities of powd. graphite from 20 different sources, of 72-100% purity, were detd. at pressures up to 300 kg./sq. cm. The cond. varies greatly but for any given sample under

pressures from 37 to 300 kg./sq. cm. it is roughly proportional to  $\sqrt{p}$ . Gerald M. Petty

Electric conductivity of nickel oxide. H. H. v. Baumbach and C. Wagner. *Z. physik. Chem.* B24, 59-67(1934); cf. *C. A.* 27, 4976.—The elec. cond. of NiO between 800° and 1000° increases with O pressure like that of  $\text{Cu}_2\text{O}$  and is proportional to the 4th root of O pressure between  $2 \times 10^{-4}$  and 1 atm. The thermal e. m. f. of Pt-NiO-Pt was measured between 950° and 1000° in O, air and N. Cond. of NiO is by electron defect. The excess O content is so small that its order of magnitude only can be detd. and that only indirectly from the diffusion coeff. G. M. Murphy

Electrical conductivity and diffusion in solid silver sulfide, selenide and telluride. Mechanism of the formation of these compounds from their elements. C. Tubandt, H. Reinhold and Anne-Lise Neumann. *Z. Elektrochem.* 39, 227-44(1933).—Pure solid  $\alpha\text{-Ag}_2\text{S}$ ,  $\alpha\text{-Ag}_2\text{Se}$  and  $\alpha\text{-Ag}_2\text{Te}$  conduct electrolytically, the cond. being abnormally high, although the diffusion coeffs.,  $D$ , are of the same order as those of other solid electrolytic conductors. If excess Ag is present, some metallic conduction occurs, while if free S or Se is present, the cond. is lowered. The  $\beta$ -forms are metallic conductors.  $D = 18.37e^{-1470/T}$  for  $\alpha\text{-Ag}_2\text{Se}$ ,  $3.33e^{-1500/T}$  for  $\alpha\text{-Ag}_2\text{Te}$ ,  $5.19 \times 10^{-4}$  sq. cm. per day for  $\beta\text{-Ag}_2\text{Se}$  at 107°, and  $6.86 \times 10^{-4}$  sq. cm. per day for  $\beta\text{-Ag}_2\text{Te}$  at 107°. When  $\alpha\text{-Ag}_2\text{X}$  (where X = S, Se or Te) is formed in the solid state from its elements, the Ag becomes covered with a film of  $\text{Ag}_2\text{X}$ . Further formation of  $\text{Ag}_2\text{X}$  occurs by diffusion of Ag through the  $\text{Ag}_2\text{X}$  to X, and not by diffusion of X. It is suggested that  $\text{Ag}^+$  and electrons move through the  $\text{Ag}_2\text{X}$ , and combine with X when they reach the X phase, forming  $\text{Ag}_2\text{X}$ . The excess X left in the  $\text{Ag}_2\text{X}$  layer then combines with Ag at the surface of the metallic Ag phase. B. C. A.

Electric conductivity in solid silver sulfide, selenide and telluride. C. Tubandt and H. Reinhold. *Z. physik. Chem.* B24, 22-34(1934).—Measurements of the rate of formation of  $\alpha\text{-Ag}_2\text{S}$ ,  $\text{Ag}_2\text{Se}$  and  $\text{Ag}_2\text{Te}$  indicate that these compds. are mixed conductors with electronic cond. accounting for more than 99% of the total cond. G. M. Murphy

The conduction of the electrolyte in the determination of the resistance of palladium wires containing hydrogen: notes on a reply by Donald P. Smith. C. A. Knorr and E. Schwartz. *Z. Elektrochem.* 40, 36-8(1934); cf. *C. A.* 27, 5650.—The previous explanation of this phenomenon (*C. A.* 27, 3650) is upheld. John R. Hill

Nonconducting modifications of metals. Johannes Kramer. *Ann. Physik* 19, 37-64(1934); cf. *C. A.* 27, 644.—The nonconducting modification is obtained by condensing the vapor obtained by cathode sputtering. For Sb the resistance is  $10^4$  times its normal value, the characteristic x-ray lines disappear and the resistance is no longer affected by a magnetic field. The temp. coeff. of resistance for the nonconducting modification is neg. At a characteristic temp. the resistance drops sharply and the temp. coeff. increases to its normal value. An empirical relation between normal cond. and transformation temp. is given. Louis Goldmar

Crystalline state of thin sputtered film of platinum. G. P. Thomson, Norman Stuart and C. A. Murisou. *Proc. Phys. Soc. (London)* 45, 381-8(1933).—Films of Pt sputtered in various gases were examd. by electron diffraction. They show patterns indicating that the small crystals are oriented with one face parallel to the surface of the specimen, the crystals being otherwise at random. The width of the rings formed by diffraction shows that in many cases the crystals are very small, of the order of  $5 \times 10^{-7}$  cm. Some films of  $\text{PtO}_2$  showed crystals of the order of  $2 \times 10^{-7}$  cm. B. C. A.

Optical properties of calcium aluminates and ferrites. Kei-ichi Akiyama and Gentaro Sawayama. *Bull. Waseda Applied Chem. Soc.* 21, 17-26(in English 3-4A)(1933).— $3\text{CaO} \cdot \text{Al}_2\text{O}_3$  was obtained by heating the raw mixt. at 1500° for 2 hrs. and cooling slowly. It was well sintered



and showed a greenish white color, isotropic crystals with  $n = 1.710$ . Two forms of  $8\text{CaO} \cdot 3\text{Al}_2\text{O}_3$  (I) were known heretofore, but a new form,  $\beta$ -I, was found which was made by heating the raw mixt. at  $1450-70^\circ$  for 2 hrs. and cooling slowly. It was well fused with reddish yellow color and contained no free  $\text{CaO}$  or  $\text{Al}_2\text{O}_3$ . The double refraction was very weak and the interference color was gray of the 1st order. The crystal showed gridiron twinning, wavy extinction and parallel extinction, and was optically uniaxial and neg.  $n = 1.6152 < n_1 < n_2 < 1.6175$ ,  $d = 2.70$ . Methods of prepn. and optical properties of  $\alpha$ - and  $\alpha'$ -I,  $(\text{CaO} \cdot \text{Al}_2\text{O}_3)_n$ ,  $8\text{CaO} \cdot 5\text{Al}_2\text{O}_3$ ,  $\text{CaO} \cdot \text{Fe}_2\text{O}_3$ ,  $2\text{CaO} \cdot \text{Fe}_2\text{O}_3$ , and  $(\text{CaO} \cdot \text{Al}_2\text{O}_3) \cdot \text{Fe}_2\text{O}_3$  are given. K. Kitaura

Thermal expansion of the crystal lattices of silver, platinum and zinc. R. A. Owen and E. L. Yates. *Phil. Mag.* 17, 113-31(1934); cf. *C. A.* 27, 5604.—X-ray powder photographs were taken of Ag, Pt and Zn in a vacuum camera at  $50^\circ$  intervals in the temp. range  $20-600^\circ$ . Values of the coeffs. of thermal expansion agree with previous data. The expansion of Zn was measured in the direction of, and perpendicular to, the hexagonal axis. The lattice expands to within  $4^\circ$  of the m. p. The thermal expansion of the crystal lattice is the same as that of the material as a whole. E. J. Rosenbaum

Crystal structures and expansion anomalies of  $\text{MnO}$ ,  $\text{MnS}$ ,  $\text{FeO}$ ,  $\text{Fe}_2\text{O}_3$  between  $100^\circ\text{K}$ . and  $200^\circ\text{K}$ . Bennett S. Rilefson and Nelson W. Taylor. *J. Chem. Physics* 2, 58-64(1934).—Discontinuities in the sp.-heat curves of  $\text{MnO}$ ,  $\text{MnS}$ ,  $\text{FeO}$  and  $\text{Fe}_2\text{O}_3$  are accompanied by thermal-expansion anomalies but not by polymorphic transitions.  $\text{Fe}_2\text{O}_3$  and  $\text{MnO}$  contract with increasing temp. in the range  $115-160^\circ\text{K}$ . C. D. West

An approach to an explanation of the surface work functions of pure metals. Joseph F. Chittum. *J. Phys. Chem.* 38, 79-84(1934).—The following hypothesis, with substantiation from exptl. data, is proposed to explain the net-work function: The slope of the force-distance parabola is identified with the lattice energy of the metal crystal and can be assumed equal to a const. times the electrostatic potential energy of the crystal. F. D. R.

The second principle of crystal chemistry. A. Kapustinskii. *Z. Krist.* 86, 359-69(1933).—On the basis of a general formula for the lattice energy of crystals of any structure (*C. A.* 27, 5227), there is proposed a 2nd principle of crystal chemistry which states the relation of the energetics and properties of crystals to their chem. structure by the equation:  $U = 256\eta\eta_1\eta_2\eta_3/(r_K + r_A)\text{kg.-cal.}$ , in which  $U$  = lattice energy,  $\eta$  = no. of atoms or ions,  $r_K$  and  $r_A$  = their dimensions,  $\eta_1\eta_2\eta_3$  = their valencies. This does not hold for  $\text{Ag}^+$ ,  $\text{Cu}^+$  and  $\text{Tl}^+$ , but is valid for a large no. of compds. L. S. Ramsdell

The crystal structure and the swelling of montmorillonite. Ulrich Hofmann, Kurd Rndell and Diederich Wilm. *Z. Krist.* 86, 340-8(1933).—Analysis of montmorillonite gave  $\text{SiO}_2$  49.0,  $\text{Al}_2\text{O}_3$  23.0,  $\text{Fe}_2\text{O}_3$  0.3,  $\text{CaO}$  1.8,  $\text{MgO}$  2.9,  $\text{H}_2\text{O}$  23.0. The unit cell is orthorhombic, with  $a = 5.095$ ,  $b = 8.83$  and  $c = 15.2$  Å. The structure consists of layers of double  $\text{SiO}_4$  sheets, with the free O atom of each  $\text{SiO}_4$  tetrahedron toward the center. The Al ions and OH groups are between the  $\text{SiO}_4$  sheets. The swelling with water is one-dimensional and reversible. The distance between layers varies from 19.6 Å. with over 30%  $\text{H}_2\text{O}$  to 9.8 Å. when heated to  $550^\circ$  (4.6%  $\text{H}_2\text{O}$ ). The structurally similar pyrophyllite does not swell with  $\text{H}_2\text{O}$ . L. S. Ramsdell

The x-ray diffraction of vitreous silica. B. E. Warren. *Z. Krist.* 86, 349-58(1933)(In English).—Vitreous  $\text{SiO}_2$  shows a broad diffraction ring which is attributed to the strongest line (111) of cristobalite crystals about 15 Å. in size. There are 3 objections: (a) the band is slightly displaced; (b)  $\text{SiO}_2$  glass does not show the cristobalite vol change between  $200^\circ$  and  $300^\circ$ ; (c) heat treatment does not increase the sharpness of the band, although crystallites should grow larger and the diffraction effects sharper. It is concluded that  $\text{SiO}_2$  glass consists of a non-cryst. network of  $\text{SiO}_4$  tetrahedra. Each Si is surrounded by 4 O ions, and each O is shared between two tetrahedra. Each tetrahedron has 4 nearest neighbors at 3.1 Å., and

12 next nearest neighbors at 5.0 Å. Beyond this the distances are indefinite. The intensity of scattering from such an arrangement agrees satisfactorily with the exptl. data. L. S. Ramsdell

Softening of vitreous substances. E. Rencker. *Compt. rend.* 198, 571-73(1934).—The rate of penetration of a needle subjected to a fixed pressure is plotted against temp. Penetration begins at a definite "temp. of softening," at which there is a discontinuity in the coeff. of plasticity. This temp. is slightly lower than that of rapid change in the coeff. of dilatation (cf. *C. A.* 28, 2142<sup>2</sup>). The method is illustrated by application to vitreous  $\text{Se}$ ,  $\text{B}_2\text{O}_3$ , xylonite and pollopas. C. A. Silberrad

Structure of the crystals of 12-phosphotungstic acid. J. F. Keggin. *Nature* 132, 351(1933); cf. *C. A.* 27, 5228.—The crystals of 12-phosphotungstic acid which crystallize from aq. solns. at room temp. as colorless octahedra contain 30 mols.  $\text{H}_2\text{O}$  per mol.  $\text{H}_3\text{PW}_{12}\text{O}_{40}$ . The structure is cubic, the edge of the unit cube being  $23.281 \pm 0.002$  Å. There are 8 mols. of acid in the unit cube, the centers of the acidic anions being arranged in positions corresponding to the diamond structure. The anions are  $\text{PW}_{12}\text{O}_{40}$ . The salts of 12-phosphomolybdic and 12-silicomolybdic acids have a similar structure, and their unit cubes measure approx. 23 Å. Albert L. Henne

The crystallographic and optical properties of potassium pentacalcium sulfate, and its density. F. Kröll and O. Vetter. *Z. Krist.* 86, 389-94(1933).— $\text{K}_2\text{SO}_4 \cdot 5\text{CaSO}_4 \cdot \text{H}_2\text{O}$  ("penta salt") is monoclinic. It is biaxial pos., with  $\alpha = 1.550 \pm 0.003$ ,  $\beta$  about 1.565 and  $\gamma = 1.583 \pm 0.003$ .  $2V = 85^\circ$  and  $n_g$  is 0.  $d^{25} = 2.897$ . Analysis of crystals prepd. by van't Hoff's method gave  $\text{K}_2\text{O}$  10.60,  $\text{CaO}$  32.19,  $\text{SO}_3$  55.10,  $\text{H}_2\text{O}$  2.08, sum 99.97%. In contact with  $\text{H}_2\text{O}$  it slowly changes to a porous gypsum pseudomorph. L. S. Ramsdell

Lattice constants, 1933. M. C. Neuburger. *Z. Krist.* 86, 395-422(1933).—A bibliography and tabulation of recent x-ray data for the elements (cf. *C. A.* 26, 13).

Precision measurements of the lattice constants of Carborundum. G. Borrmann and H. Seyfarth. *Z. Krist.* 86, 472-3(1933).—Precision measurements of the 2nd modification of  $\text{SiC}$ , with diamond as standard, give  $a = 3.076 \pm 0.003$  and  $c = 15.07 \pm 0.015$  Å. Calcd.  $d = 3.212$ . L. S. Ramsdell

X-ray investigation of the compounds  $\text{MgZn}$  and  $\text{MgZn}_2$ . L. Tarschisch. *Z. Krist.* 86, 423-38(1933).—The existence of  $\text{MgZn}$  is proved by x-ray data. The structure resembles that of  $\text{MgZn}_2$ . The latter has a hexagonal unit contg. 4 mols. ( $4\text{Mg} + 8\text{Zn}$ ). A similar unit for  $\text{MgZn}$ , with  $a = 5.33$  and  $c = 8.58$  Å. contains 6 mols. ( $6\text{Mg} + 6\text{Zn}$ ), but certain weak reflections indicate that the true unit cell should be doubled. For  $\text{MgZn}_2$ ,  $a = 9.92$ ,  $c = 16.48$  Å., with 16 mols.;  $D_4$ , calcd.  $d = 6.60$ . Both structures consist of alternating layers of Mg and Zn atoms. L. S. Ramsdell

The structure of silver amalgam. A. Weryha. *Z. Krist.* 86, 335-9(1933).—By adding drops of Hg to a dil. soln. of  $\text{AgNO}_3$ , prismatic crystals of  $\text{Ag}_2\text{Hg}$  were obtained. These were six-sided and proved to be cubic. Powder photographs of these crystals, and also of Ag wire dipped in Hg, indicate a unit cube with  $a = 1.09$  Å., contg. 4 mols., space group  $O_h$ . At. positions are suggested. L. S. Ramsdell

The crystalline structure of  $\text{PrMg}$ . A. Rossi and A. Iandelli. *Atti accad. Lincei* 18, 166-61(1933).—The structure of  $\text{PrMg}$  was detd. by the powder method. On the basis of the structure detd., the  $d$  is calcd. as 4.65 (4.67 detd.). The structure should be cubic with 2 atoms each of Mg and Pr at the diagonally opposite corners. The side  $a$  would then be 10.8 Å., whereas the value found for  $a = 2$  is 7.77 Å.; hence this supposed structure cannot be correct. A. W. Conteri

Crystal structure of copper sulfate. C. A. Beavers and H. Lipson. *Nature* 133, 215(1934).—The unit cell of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  contains 2 mols., and has the dimensions  $a_0 = 5.12$ ,  $b_0 = 10.7$ ,  $c_0 = 5.97$  Å.,  $\alpha = 82^\circ 16'$ ,  $\beta = 107^\circ$

26',  $\gamma = 102^\circ 40'$ . The only symmetry of the crystal is a center of inversion. The positions of the atoms are given.

Gerald M. Petty

The structure of thallium and potassium thiocyanates. W. Büsemm, P. Günther and R. Tubin. *Z. physik. Chem.* B24, 1-21(1934).—Contrary to the literature TICNS crystallizes in the rhombic system. The space group is  $V_h^{11}$ ;  $a = 6.80$ ;  $b = 6.78$ ;  $c = 7.52$  Å. The  $d$  is 4.958. There are 4 mols. in the elementary cell. For KCNS the space group is also  $V_h^{11}$ ;  $a = 6.67$ ;  $b = 6.65$ ;  $c = 7.54$  Å., and there are 4 mols. in the elementary cell. Although a linear CNS group is not excluded, it appears to be bent with an angle of  $125-30^\circ$ .

G. M. Murphy

Crystal structure of lanthanum, cerium and praseodymium hydrides. Armando Rossi. *Nature* 133, 174 (1934).—In these hydrides the metal atoms are closely packed in cubes of edges 5.63 Å. (La), 5.61 Å. (Ce).

C. D. West

Alkaline alkylarsonates. Gaston Gilt. *Bull. soc. chim. Belg.* 42, 443-7(1933).—Crystallographical.  $(\text{CsO})_2\text{OAsMe}_2\text{H}_2\text{O}$ , orthorhombic,  $a:b:c = 1.3074:1:1.6643$ ;  $(\text{NaO})_2\text{OAsEt}_2\text{H}_2\text{O}$ , monoclinic,  $\beta = 109^\circ 4'$ ,  $a:b:c = 2.8108:1:2.0309$ ;  $(\text{RbO})_2\text{OAsEt}_2\text{H}_2\text{O}$ , orthorhombic,  $a:b:c = 0.4518:1:0.4848$ .

A. L. H.

The crystal structure of potassium dithionate. Maurice L. Huggins. *Z. Krist.* 86, 384-8; *Am. Mineral.* 18, 455 7 (1933).—There are 2 errors in the paper by Huggins and Frank (*C. A.* 26, 4991). The K parameters for  $\text{K}_2\text{S}_2\text{O}_6$  should be  $u_k = 0.375$  and  $u'_k = 0.690$ . The proper values were used in the calcns., and it is believed that the parameters are more nearly correct than those of Hugg and Helwig (*C. A.* 26, 5468; 27, 2361).

L. S. Ramsdell

The "variable structure" of cadmium bromide. J. M. Bijvoet and W. Nieuwenkamp. *Z. Krist.* 86, 466-70 (1933).—Sublimed  $\text{CdBr}_2$  has a  $\text{CdCl}_2$  type of structure, while powder photographs of  $\text{CdBr}_2$  crystd. from aq. soln. show only a portion of the lines characteristic of the sublimed material. The lines appearing are those common to both the  $\text{CdCl}_2$  and the  $\text{CdI}_2$  types. A structure is proposed in which there is a random distribution of layers of both types. The unit cell has the dimensions  $a = 2.30$  Å. and  $c = 6.23$  Å., and contains  $1/2$  mol. Prolonged grinding of the sublimed material gives the mixed type, while the latter changes slowly at room temp. and rapidly at higher temps. to the  $\text{CdCl}_2$  type.

L. S. Ramsdell

Diamminozinc bromide Crystallographic study. S. Kozik. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 318-23.— $\text{ZnBr}_2 \cdot 2\text{NH}_3$ , like  $\text{ZnCl}_2 \cdot 2\text{NH}_3$ , crystallizes in the rhombic system. It has a rather high  $n$  and strong double refraction ( $n_\gamma - n_\alpha = 0.0608$  approx.), but only very slight dispersion in the visible region. The compds. are deposited in Leclanché cells charged with  $\text{NH}_4\text{Br}$  and  $\text{NH}_4\text{Cl}$ .

B. C. A.

Crystal structure of ferric oxychloride. S. Goldsztaub. *Compt. rend.* 198, 667-9(1934).—Rotation photographs of  $\text{FeOCl}$  show that its unit cell has  $a = 3.75$ ,  $b = 7.95$ ,  $c = 3.3$  Å. and contains 2 mols., space group  $V_h^{11}$ -mm. Coordinates of the atoms are given. The structure consists of layers, each made up of 2 (subordinate) layers of Cl atoms with 2, each of alternate Fe and O atoms, between them, Cl-Cl in the same (principle) layer being 3.3, in different layers 3.75; the perfect cleavage parallel to (010) is thus explained.

C. A. Silberrad

The index of refraction of water for waves 3-3.6 meters long. M. M. Alimova and N. S. Novosilzev. *Ann. Physik* 19, 118-20(1934).—Values of  $n_{17.0}$  correct to 0.2% are recorded as a function of wave length. No change in  $n$  occurs between 2.2 and 3.6 m.;  $n = 9.00$ .

Louis Goldman

The confining layer on lead sulfide. F. Heineck. *Physik. Z.* 35, 113-18(1934).—With inactive, doubly sublimed PbS a weak detector effect is produced by  $\text{H}_2$ ,  $\text{O}_2$ ,  $\text{N}_2$  and  $\text{CO}_2$ .  $\text{H}_2\text{S}$  has no effect, while that of  $\text{H}_2\text{O}$  (gas) is pronounced. The effects disappear on evacuation. The vapors of  $\text{C}_2\text{H}_6$ ,  $\text{Me}_2\text{CO}$  and  $\text{MeOH}$  act like  $\text{H}_2\text{O}$ . No relation was found between contact potential and rectification.

L. P. Hall

The melting point of potassium nitrite. Bela v. Lengyel. *Naturwissenschaften* 21, 848(1933).—A sample contg. 96.5%  $\text{KNO}_2$ ,  $m. 419 = 3^\circ$ . The pure salt certainly melts at a still higher temp. instead of  $297.5^\circ$  as usually reported.

B. J. C. van der Hoeven

Densities of molten inorganic nitrate mixtures. K. Laybourn and W. M. Madgin. *J. Chem. Soc.* 1934, 1-7.—The ds. of  $\text{KNO}_3$ ,  $\text{NaNO}_3$ , of binary mixts. of  $\text{KNO}_3$  with the nitrates of Na, Pb, Ba, Sr and of  $\text{NaNO}_3$  with  $\text{Pb(NO}_3)_2$ , and the ternary mixt.  $\text{KNO}_3$ - $\text{Ba(NO}_3)_2$ - $\text{Sr(NO}_3)_2$  were detd. from the f. p. to about  $150^\circ$  higher with a precision of  $\pm 0.001$  by weighing a known vol. of liquid in a Pyrex bulb. The ds. vary linearly with temp. The isothermal sp. vol.-compn. curves for the 5 binary systems deviate only slightly from straight lines.

W. B. Keighton, Jr.

Change of density of carbon disulfide and nitrobenzene with temperature. Józef Mazur. *Acta Phys. Polonica* 1, 53-62(1932)(in French); cf. *C. A.* 26, 354, 2358.

J. Wiertelak

The freezing temperature of organic substances. II Serwy. *Bull. soc. chim. Belg.* 42, 483-501(1933).—A tabulation of precise measurements of phys. properties of pure substances.  $\text{Cl(CH}_3)_2\text{Cl}$ ,  $m. -99.5^\circ$ ,  $b. 120.4^\circ$ ,  $\text{Cl(CH}_3)_2\text{Cl}$ ,  $m. -72.8^\circ$ ;  $b. 182.3^\circ$ ;  $d_4 1.11622$ ,  $d_4^{25} 1.10158$ ,  $d_4^{20} 1.08692$ ; viscosity 1928 at  $15^\circ$ , 1481 at  $30^\circ$ ;  $\eta$  at  $15^\circ$  1.45858,  $\eta_{25} 1.45903$ ,  $\eta$  He yellow 1.46101,  $\eta$  He green 1.46075,  $\eta$  1.46801,  $\eta$  He blue 1.47180,  $\eta$  1.47681,  $\text{Br(CH}_3)_2\text{Br}$ ,  $m. -34.2^\circ$ ,  $b. 167.34^\circ$ ;  $d_4 2.01618$ , 1.98922 and 1.96238; viscosities 2241 and 1746;  $\eta$  1.52121, 1.52174, 1.52546, 1.53252, 1.53416, 1.53932 and 1.54051,  $\text{Br(CH}_3)_2\text{Br}$ ,  $m. -39.5^\circ$ ,  $b. 222.3^\circ$ ,  $b_{12} 99^\circ$ ;  $d_4 1.72952$ , 1.70876 and 1.68788; viscosities 3888 and 2818,  $\eta$  1.50908, 1.50960, 1.51311, 1.51970, 1.52131, 1.52634 and 1.53072;  $\text{NC(CH}_3)_2\text{CN}$ ,  $m. -29.45^\circ$ ,  $b_{12} 160.4^\circ$ ,  $d_4 1.00293$ , 0.99112 and 0.97930; viscosities 8104 and 5226,  $\eta$  1.43426, 1.43461, 1.43699, 1.44137, 1.44242, 1.44573 and 1.45048;  $\text{NC(CH}_3)_2\text{CN}$ ,  $m. -31.4^\circ$ ,  $b_{12} 177.8^\circ$ ,  $d_4 0.96181$ , 0.95070 and 0.93961; viscosities 9080 and 5791,  $\eta$  1.44010, 1.44044, 1.44278, 1.44721, 1.44816, 1.45167 and 1.45721;  $\text{HO}_2\text{C(CH}_3)_2\text{CO}_2\text{H}$ ,  $m. 134.8^\circ$ ;  $\text{HO}_2\text{C(CH}_3)_2\text{CO}_2\text{H}$ ,  $m. 98.0^\circ$ ;  $\text{HO}_2\text{C(CH}_3)_2\text{CO}_2\text{H}$ ,  $m. 153.0^\circ$ ;  $\text{HO}_2\text{C(CH}_3)_2\text{CO}_2\text{H}$ ,  $m. 105.7^\circ$ ;  $\text{EtO}_2\text{C(CH}_3)_2\text{CO}_2\text{Et}$ ,  $m. -23.80^\circ$ ,  $b. 233.68^\circ$ ,  $b_{12} 117.6^\circ$ ;  $d_4 1.04202$ , 1.02704 and 1.01210; viscosities 3260 and 2311;  $\eta$  1.42294, 1.42333, 1.42570, 1.42982, 1.43080, 1.43382 and 1.43820;  $\text{EtO}_2\text{C(CH}_3)_2\text{CO}_2\text{Et}$ ,  $m. -19.9^\circ$ ,  $b_{12} 131^\circ$ ,  $d_4 1.02589$ , 1.01165 and 0.99744; viscosities 3871 and 2618,  $\eta$  1.42673, 1.42708, 1.42924, 1.43362, 1.43463, 1.4378, and 1.44335;  $\text{PrO}_2\text{CCH}_2\text{CO}_2\text{Pr}$ ,  $m. \text{about } -95^\circ$ ,  $b. 229.2^\circ$ ,  $b_{12} 113^\circ$ ;  $d_4 1.02929$ , 1.01453, 0.99977; viscosities 3161 and 2230;  $\eta$  1.41967, 1.42010, 1.42243, 1.42660, 1.42768, 1.43092 and 1.43569;  $\text{PrO}_2\text{C(CH}_3)_2\text{CO}_2\text{Pr}$ ,  $m. -45.5^\circ$ ,  $b. 264.9^\circ$ ,  $b_{12} 142.4^\circ$ ;  $d_4 1.00766$ , 0.99385, 0.98001; viscosities 4437 and 3033;  $\eta$  1.42723, 1.42760, 1.42990, 1.43420, 1.43521, 1.43848 and 1.44144;  $\text{PrO}_2\text{C(CH}_3)_2\text{CO}_2\text{Pr}$ ,  $m. -34^\circ$ ,  $b_{12} 165.8^\circ$ ;  $d_4 0.98676$ , 0.97371, 0.97074, viscosities 5017 and 4019;  $\eta$  1.43224, 1.43247, 1.43485, 1.43914, 1.44015, 1.44312 and 1.44890;  $\text{BuO}_2\text{CCH}_2\text{CO}_2\text{Bu}$ ,  $m. -83^\circ$ ,  $b. 251.5^\circ$ ,  $b_{12} 137.4^\circ$ ;  $d_4 0.990930$ , 0.98760, and 0.97191; viscosities 3873 and 2682;  $\eta$  1.42520, 1.42664, 1.42792, 1.43218, 1.43324, 1.43658 and 1.44133;  $\text{BuO}_2\text{C(CH}_3)_2\text{CO}_2\text{Bu}$ ,  $m. -60.6^\circ$ ,  $b. 292.8^\circ$ ,  $b_{12} 162.9^\circ$ ,  $d_4 0.98534$ , 0.97227 and 0.95922; viscosities 5424 and 3659;  $\eta$  1.43147, 1.43189, 1.43426, 1.43845, 1.43955, 1.44279 and 1.44443;  $\text{BuO}_2\text{C(CH}_3)_2\text{CO}_2\text{Bu}$ ,  $m. -30.5^\circ$ ,  $b_{12} 188.0^\circ$ ;  $d_4 0.97509$ , 0.96295 and 0.95084; viscosity 8214 and 5262;  $\eta$  1.43460, 1.43673, 1.43910, 1.44344, 1.44445, 1.44771 and 1.45283;  $\text{AmO}_2\text{CCO}_2\text{Am}$ ,  $m. -9^\circ$ ,  $b_{12} 154.1^\circ$ ;  $d_4 0.98404$ , 0.97050 and 0.95718; viscosity 4983 and 3330;  $\eta$  1.42789, 1.42825, 1.43063, 1.43607, 1.43606, 1.43934 and 1.44496;  $\text{AmO}_2\text{CCCH}_2\text{CO}_2\text{Am}$ ,  $m. -60.0^\circ$ ,  $b_{12} 162.4^\circ$ ;  $d_4 0.97853$ , 0.96550 and 0.95234, viscosities 5297 and 3642;  $\eta$  1.43041, 1.43080, 1.43316, 1.43748, 1.43847, 1.44180, 1.44293;  $\text{AmO}_2\text{C(CH}_3)_2\text{CO}_2\text{Am}$ ,  $m. -35.1^\circ$ ,  $b_{12} 180.8^\circ$ ;  $d_4 0.97607$ , 0.96367 and 0.95133; viscosities 8375 and 5308;  $\eta$  1.43597, 1.43631, 1.43868, 1.44513, 1.44411, 1.44740 and 1.45293;  $\text{AmO}_2$

6  $\text{CO}_2\text{Et}$ ,  $m. -23.80^\circ$ ,  $b. 233.68^\circ$ ,  $b_{12} 117.6^\circ$ ;  $d_4 1.04202$ , 1.02704 and 1.01210; viscosities 3260 and 2311;  $\eta$  1.42294, 1.42333, 1.42570, 1.42982, 1.43080, 1.43382 and 1.43820;  $\text{EtO}_2\text{C(CH}_3)_2\text{CO}_2\text{Et}$ ,  $m. -19.9^\circ$ ,  $b_{12} 131^\circ$ ,  $d_4 1.02589$ , 1.01165 and 0.99744; viscosities 3871 and 2618,  $\eta$  1.42673, 1.42708, 1.42924, 1.43362, 1.43463, 1.4378, and 1.44335;  $\text{PrO}_2\text{CCH}_2\text{CO}_2\text{Pr}$ ,  $m. \text{about } -95^\circ$ ,  $b. 229.2^\circ$ ,  $b_{12} 113^\circ$ ;  $d_4 1.02929$ , 1.01453, 0.99977; viscosities 3161 and 2230;  $\eta$  1.41967, 1.42010, 1.42243, 1.42660, 1.42768, 1.43092 and 1.43569;  $\text{PrO}_2\text{C(CH}_3)_2\text{CO}_2\text{Pr}$ ,  $m. -45.5^\circ$ ,  $b. 264.9^\circ$ ,  $b_{12} 142.4^\circ$ ;  $d_4 1.00766$ , 0.99385, 0.98001; viscosities 4437 and 3033;  $\eta$  1.42723, 1.42760, 1.42990, 1.43420, 1.43521, 1.43848 and 1.44144;  $\text{PrO}_2\text{C(CH}_3)_2\text{CO}_2\text{Pr}$ ,  $m. -34^\circ$ ,  $b_{12} 165.8^\circ$ ;  $d_4 0.98676$ , 0.97371, 0.97074, viscosities 5017 and 4019;  $\eta$  1.43224, 1.43247, 1.43485, 1.43914, 1.44015, 1.44312 and 1.44890;  $\text{BuO}_2\text{CCH}_2\text{CO}_2\text{Bu}$ ,  $m. -83^\circ$ ,  $b. 251.5^\circ$ ,  $b_{12} 137.4^\circ$ ;  $d_4 0.990930$ , 0.98760, and 0.97191; viscosities 3873 and 2682;  $\eta$  1.42520, 1.42664, 1.42792, 1.43218, 1.43324, 1.43658 and 1.44133;  $\text{BuO}_2\text{C(CH}_3)_2\text{CO}_2\text{Bu}$ ,  $m. -60.6^\circ$ ,  $b. 292.8^\circ$ ,  $b_{12} 162.9^\circ$ ,  $d_4 0.98534$ , 0.97227 and 0.95922; viscosities 5424 and 3659;  $\eta$  1.43147, 1.43189, 1.43426, 1.43845, 1.43955, 1.44279 and 1.44443;  $\text{BuO}_2\text{C(CH}_3)_2\text{CO}_2\text{Bu}$ ,  $m. -30.5^\circ$ ,  $b_{12} 188.0^\circ$ ;  $d_4 0.97509$ , 0.96295 and 0.95084; viscosity 8214 and 5262;  $\eta$  1.43460, 1.43673, 1.43910, 1.44344, 1.44445, 1.44771 and 1.45283;  $\text{AmO}_2\text{CCO}_2\text{Am}$ ,  $m. -9^\circ$ ,  $b_{12} 154.1^\circ$ ;  $d_4 0.98404$ , 0.97050 and 0.95718; viscosity 4983 and 3330;  $\eta$  1.42789, 1.42825, 1.43063, 1.43607, 1.43606, 1.43934 and 1.44496;  $\text{AmO}_2\text{CCCH}_2\text{CO}_2\text{Am}$ ,  $m. -60.0^\circ$ ,  $b_{12} 162.4^\circ$ ;  $d_4 0.97853$ , 0.96550 and 0.95234, viscosities 5297 and 3642;  $\eta$  1.43041, 1.43080, 1.43316, 1.43748, 1.43847, 1.44180, 1.44293;  $\text{AmO}_2\text{C(CH}_3)_2\text{CO}_2\text{Am}$ ,  $m. -35.1^\circ$ ,  $b_{12} 180.8^\circ$ ;  $d_4 0.97607$ , 0.96367 and 0.95133; viscosities 8375 and 5308;  $\eta$  1.43597, 1.43631, 1.43868, 1.44513, 1.44411, 1.44740 and 1.45293;  $\text{AmO}_2$

$C(CH_3)_3CO_2Am$ , m.  $-28.9^\circ$ ,  $b_{74}$  213.4–3.5°;  $d$  0.95879, 0.94671 and 0.93471; viscosities 9428 and 5911.

Albert L. Henne

The adsorption of carbon dioxide by activated charcoals in the presence of carbon tetrachloride and hydrogen cyanide. R. Chaplin. *Trans. Faraday Soc.* 30, 249 (1934); cf. *C. A.* 23, 1331; 25, 5328.—The low-pressure  $CO_2$  isothermals at  $25^\circ$  were detd. for several different active charcoals in the presence of  $CCl_4$  and of HCN adsorbed singly and together. The vapors adsorbed singly impede but do not change the nature of the adsorption process for  $CO_2$ ; when adsorbed together, however, they suppress the irreversible adsorption of  $CO_2$  completely and allow only superimposed simple adsorption. The theory is advanced that neither  $CCl_4$  nor HCN adsorbed singly can completely occupy all the active points on the charcoal surface because their moles. are too large. This theory is based mainly on considerations of the adsorption and displacement of  $CO_2$  at low pressures but is supported by other facts.

Reuben Roseman

Determination of adsorptive power of activated charcoal for methylene blue and iodine from aqueous solutions. E. Erdheim. *Kocsniki Chem.* 12, 888–95 (1932).—A standard method and app. are described. B. C. A.

Studies in chemisorption on charcoal. II. Experiments on the formation of the acid constituent of charcoal. Alexander King. *J. Chem. Soc.* 1934, 22–6; cf. *C. A.* 27, 1980.—Addnl. expts. on the formation of some org. acid on exposure of moist charcoal to O led to the conclusion that acid formation results from the oxidation of chemically adsorbed water. A thoroughly dried charcoal after exposure to  $O_2$  for 3 days and subsequent evacuation evolved only CO when heated to  $470^\circ$ ; furthermore, placing such an O-satd. and thoroughly dried charcoal sample in water resulted in no acid formation. P. H. Emmett

Adsorption of hydrogen on tungsten. J. K. Roberts. *Proc. Cambridge Phil. Soc.* 30, 74–9 (1934); cf. *C. A.* 28, 1233.—The accommodation coeff. of Ne on W having been detd., a new type of adsorption of H on W can be studied. The characteristics of this are (1) satn. is reached at max. pressures of H of  $4 \times 10^{-4}$  mm.; (2) even at this pressure the time taken for satn. is small. This indicates a chem. nature. The accommodation coeff. for such a H-covered W filament is 0.17 at  $295^\circ K.$  and 0.32 at  $79^\circ K.$

Gregg M. Evans

Adsorption of benzene vapors from air by alkaline, neutral and acid silica gels. M. O. Kharmandar'yan and I. L. Kopeliovich. *Ukrain. Khim. Zhur.* 8, Wiss. Teil 21–31 (1933).— $SiO_2$  gels in acid, neutral and alk. medium were prepd. from a 13°Bé. water glass and a 10% HCl soln. Acid gels are hard, translucent and possess a fine structure, but they are less active (static adsorption of  $C_6H_6$  vapors) than alk. gels, which are soft, turbid and possess a coarse structure. Drying alk. gels before washing decreases their activity approx. 5 times while drying neutral and acid gels is beneficial. Washing with hot water is recommended. Activity of alk. gels is improved by HCl treatment and that of acid gels by  $NH_3$  treatment. The degree of improvement is greater the further the gel is from neutrality. Neutral gels are not improved by such treatment. Dynamic methods of testing gels show that acid gels are more active than alk. gels, which is the reverse of results obtained by static methods.

V. A. Kalichevsky

Effect on the activity of alumina gels of the relative proportions of reagents used in their preparation. V. K. Markov. *Ukrain. Khim. Zhur.* 8, Wiss. Teil 34–5 (1933).— $Al_2O_3$  gels prepd. from  $Al_2(SO_4)_3$  and 25%  $NH_3$  soln. show greatest activity (adsorption of  $C_6H_6$  vapors) for definite  $Al_2(SO_4)_3/NH_3$  ratios. V. A. Kalichevsky

Adsorption and catalysis on alumina. Guichard. *Compt. rend.* 198, 573–5 (1934).— $Al_2O_3$  was prepd. by pptn. of  $NaAlO_2$  with HCl and drying at  $500^\circ$ . The adsorption of  $H_2O$ ,  $EtOH$  and  $Et_2O$  by this  $Al_2O_3$  separately was detd. for various temps. at const. pressure, and at various pressures at const. temp. At  $240^\circ$  (the usual temp. for dehydrating  $EtOH$  by catalysis) adsorption of  $H_2O$  and  $Et_2O$  is practically nil, while that of  $EtOH$  is still

appreciable, its dehydration being thus accelerated. This explains the action on the assumption that adsorption occurs when the 3 vapors are present simultaneously as when they are separate (cf. *C. A.* 20, 2274; Senderens, *C. A.* 6, 1607).

C. A. Silberrad

The adsorption of neon on glass at liquid-hydrogen temperatures. W. H. Keesom and G. Schmidt. *Proc. Acad. Sci. Amsterdam* 36, 825–32 (1933).—Between  $14.45^\circ$  and  $20.28^\circ K.$ , the adsorption of Ne on glass is given by the equation:  $q^s = p/[0.7(p_s - p) + p]$ , in which  $q$  is the fraction of wall covered (for a monomol. layer),  $p$  is the pressure and  $p_s$  the satd. vapor pressure.

L. E. S.

An apparatus for rectifying small quantities of liquefied gas, and the purification of krypton. H. van Dijk, J. Mazur and W. H. Keesom. *Proc. Acad. Sci. Amsterdam* 36, 822–5 (1933).

L. E. Steiner

Isothermals of helium at temperatures of  $0^\circ$ ,  $20^\circ$  and  $100^\circ$  and pressures from 5.5 to 16.5 atmospheres. W. H. Keesom and J. J. M. van Santen. *Proc. Acad. Sci. Amsterdam* 36, 813–21 (1933).—From the isothermals of He, the values of  $B$  in the Onnes equation of state were found at  $0^\circ$ ,  $20^\circ$  and  $100^\circ$  to be  $0.502 \times 10^{-3}$ ,  $0.498 \times 10^{-3}$  and  $0.481 \times 10^{-3}$ , resp.

L. E. Steiner

Measurements on the adsorption of helium on glass at liquid-helium temperatures. W. H. Keesom and G. Schmidt. *Proc. Acad. Sci. Amsterdam* 36, 832–5 (1933).—The adsorption of He on glass between  $1.13^\circ$  and  $3.56^\circ K.$  is given by the equation:  $q^s = p/[0.26(p_s - p) + p]$ , in which  $q$  is the fraction of wall covered (for a monomol. layer),  $p$  is the pressure and  $p_s$  the satd. vapor pressure.

L. E. Steiner

Adsorption of hydrogen atoms and iodine on calcium fluoride. J. H. de Boer and J. J. Lehr. *Z. physik. Chem.* B24, 98–102 (1934); cf. *C. A.* 28, 18.—Adsorption of I atoms, and H atoms on  $CaF_2$  layers sublimed *in vacuo* shows that if the surface of the salt is not too great, twice as much H as I is adsorbed. For large surfaces the H does not penetrate the interior of the  $CaF_2$  and much smaller amts. of I are adsorbed.

G. M. Murphy

The partition of small quantities of substances between liquid and crystalline solid phases. I. The distribution of barium nitrate between a saturated aqueous solution and crystals of lead nitrate. A. Polissitskiĭ. *Z. physik. Chem.* A167, 304–9 (1934).—It is shown that the Nernst law applies to the distribution of small quantities of  $Ba(NO_3)_2$  between satd. solns. and crystals of  $Pb(NO_3)_2$ . A method was developed for detg. small quantities of Ba in satd. solns. of  $Pb(NO_3)_2$  by means of radioactive indicators.

Roy H. Baechler

Relation between ascent of colloidal particles in porous substances and their adsorption by such. A. Boutaric and M. Peyraud. *Compt. rend.* 198, 651–2 (1934).—The velocity of ascension,  $v$ , in vertical strips of filter paper, and the adsorption-concn.,  $\sigma$ , were detd. for a mixt. consisting of a sol of  $As_2S_3$  or  $Fe(OH)_3$  dild. with  $H_2O$  or with aq. NaCl or  $FeCl_3$ , resp. With  $As_2S_3$  and  $H_2O$   $\sigma$  is zero; it increases, while  $v$  decreases, with the concn. of NaCl. With  $Fe(OH)_3$  and  $FeCl_3$   $v$  increases to a max. and then decreases as the concn. of  $FeCl_3$  increases, while  $\sigma$  changes in reverse fashion. Colloidal dyes with neg. granules behave as  $As_2S_3$ , those with pos. as  $Fe(OH)_3$ ,  $v$  always varying oppositely to  $\sigma$  (cf. *C. A.* 28, 1245°).

C. A. Silberrad

Adsorption of mercury vapors by some adsorbents and catalysts, and amalgam of manganese peroxide. E. V. Alekseevskii. *J. Gen. Chem.* (U. S. S. R.) 3, 360–6 (1933).—Weighed samples of the adsorbents and catalysts were placed in containers on a wire gauze resting on a glass crystg. dish  $1/2$  filled with the purified and redistd. Hg, the whole being inserted in a desiccator contg. a thick layer of  $P_2O_5$ . The adsorption of Hg was detd. by chem. analysis once every year. The results of 5 years' exposure are shown by the increase in wt. and the analysis: animal charcoal (Merck) 1.04, 0.06; activated C (Kahlbaum) 0.04, 0.045; American "charcoal" 0.07, 0.04; activated  $Al_2O_3$  0.05, traces; "Adelheim" clay 0.02, none; activated  $MnO_2$  72.5, 41.8;  $CoO$  1.45, 1.05 and Zn dust

(Kahlbaum) 0.09%, 0.017%. The microscopic investigation of  $\text{MnO}_2$  contg. 42% of adsorbed Hg disclosed a uniform mass without any globular agglomeration of Hg. The activated  $\text{MnO}_2$  kept for 105 days in the lab. hood contg. 0.000006 mg. Hg per 1 cu. m. of air adsorbed 0.015% Hg. The high Hg-adsorptive activity of  $\text{MnO}_2$  is made clear by its ability to give amalgam with Hg by grinding. The amalgamation takes place in all proportions after a short time of grinding in an instant without any thermal effect, giving off a peculiar odor strongly irritating to the mucous membrane of the nose. The inactivated (natural)  $\text{MnO}_2$  does not show Hg-adsorptive ability and gives no amalgam with Hg. Chas. Blanc

The vaporous state of myristic acid films on aqueous solutions. S. A. Moss and E. K. Rideal. *J. Chem. Soc.* 1933, 1525-8.—By means of special app. the lowering of the surface tension of water by films of myristic acid was measured at 17°. The following relation was realized:  $FA = \pi RT$ , where  $F$  is the lowering of the surface tension and  $A$  is the reciprocal of the surface concn.  $\pi$  was found to be 0.5, from which it is inferred that long-chain fatty acids below their crit. temp. exist as assoc. complexes of 2 mols., which are extremely stable. J. H. Reedy

Theory of Brownian motion and the operational method. J. Métadier. *Compt. rend.* 197, 29-31(1933); cf. *C. A.* 27, 647.—Math. B. C. A.

Observation of Brownian movement with the unaided eye. N. N. Andreev. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], I, 62(in German)(1934).—A drop of the colloid to be observed is placed on a partially oxidized metal plate showing diffraction coloring. Brownian movement is indicated by the observed color fluctuations. F. H. R.

Representation of Brownian movement. Mizuho Sato. *Science Repts. Tôhoku Imp. Univ., First Ser.* 22, 599-613 (1933); cf. *C. A.* 27, 2363.—A description and theoretical discussion of an app. for representation of Brownian movement. William E. Vaughan

The electric double layer of colloids. IV. The adsorption of ions of coagulating electrolytes by the particles of silver iodide sols. E. J. W. Verwey and H. R. Kruyt. *Z. physik. Chem.* A167, 312-28(1933); cf. *C. A.* 28, 1589<sup>1</sup>.—Freundlich's theory postulates coagulation when the charge on the particles is reduced to a certain min. by adsorption of electrolyte ions of opposite charge and requires that equiv. amts. of adsorbed coagulating ions exert equal effects. The fact is extent of adsorption of ions and change in cataphoretic charge are not directly related. Measurements on AgI sols, whose cataphoretic and total charges were of the same order, showed that the adsorption of the oppositely charged ions by the AgI particles belongs to a type of exchange phenomenon and, therefore, has no significance for a general theory of coagulation. Coagulation occurs in general when an increase of the electrolyte concn. reduces the  $\zeta$  potential through a crowding together of Gouy's (*C. A.* 4, 2231) ionic atm. in the sense of Müller's theory (*C. A.* 22, 2503). Don Brouse

Measurement of permeability of porous media. R. D. Wyckoff, H. G. Botsch, M. Muskat and D. W. Reed. *Bull. Am. Assoc. Petroleum Geol.* 18, 161-90(1934).—A detailed technic is described for measuring the permeability of porous media by the use of either liquids or gases. Formulas for computing the permeability from the lab. measurements are derived. Alden H. Emery

Diffusion in molecularly dispersed solutions. R. O. Herzog, R. Illig and H. Kudar. *Z. physik. Chem.* A167, 329-42(1934).—The Einstein-Sutherland diffusion equation,  $D = kT/4\pi\eta$ , is valid when spherical mols. without dipole moment (such as satd. hydrocarbons) diffuse in a solute free from dipoles. Tables are given showing results with some 33 solutes and 23 solvents. Don Brouse

Diffusion of rod-shaped colloids. R. O. Herzog and H. Kudar. *Z. physik. Chem.* A167, 343-53(1934).—The diffusion formula,  $D = kT[\ln(c/a) + 0.69]/6\pi\eta c$ , in which  $a$  = radius of particle,  $c$  = long axis,  $\eta$  = viscosity coeff. and  $T$  = temp., applies for  $\text{C}_{60}\text{H}_{12}$  and satd. hydrocarbons of lower mol. wt. The equation does not hold for hemi-colloids and must be modified if applied to eu-colloids. Don Brouse

Importance of dialysis in the study of colloids. I. Colloidal ferric hydroxide. B. N. Desai and S. K. Borkar. *Trans. Faraday Soc.* 29, 1269-85(1933).—Freshly prepd samples of  $\text{Fe}(\text{OH})_3$  sol were dialyzed for 25 days. Samples were removed at intervals and tested for cataphoretic speed, stability and viscosity. Cataphoretic speed increased to a max. at 11 days and then decreased. The principal cause is preferential adsorption but hydration and particle size have some effect. Sols begin to coagulate at the same cataphoretic speed. When partially dialyzed sols are dild. their cataphoretic speed changes just as though dialysis had been continued. Comparison of viscosity and cataphoretic speed shows that neither Smoluchowski's theory of a hindering elec. field, nor Dhar's theory of increased hydration and consequent increase of viscosity with decreasing charge is supported. The addn. of a peptizing electrolyte reverses the effects of dialysis except probably an irreversible growth in size. F. E. Brown

Importance of dialysis in the study of colloids. II. Colloidal thorium hydroxide. B. N. Desai and A. K. Desai. *Trans. Faraday Soc.* 30, 265-71(1934).—In a previous paper (Desai and Borkar, preceding abstr.) the results of simultaneous measurements of cataphoretic speed, stability and viscosity of colloidal solns. of  $\text{Fe}(\text{OH})_3$  dialyzed and dild. to different extents were given. In the present paper similar results obtained with colloidal  $\text{Th}(\text{OH})_4$  are presented. The behavior of this sol as regards dialysis, dildn. and crit. potential is similar to that of  $\text{Fe}(\text{OH})_3$ ; the viscosity changes on dialysis and in the presence of electrolytes are, however, different. Reuben Roseman

Gold sol. Hitoaki Tominaga and Bampu Sasaki. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 935-45(1933)

The properties of Au sol were examd. by observing the state of a Au sol prepd. in the presence of KOH to which various electrolytes were added, and the changes in elec. cond. due to the diffusion of a sol prepd. in electrolyte soln. Addn. of 0.001-0.01 N KOH, pure water-0.000001 N or pure water-0.00001 N KCl, KBr, KI,  $\text{K}_2\text{CrO}_4$ , or  $\text{K}_4\text{Fe}(\text{CN})_6$  stabilized the sol ( $\text{KNO}_3$  and  $\text{K}_2\text{SO}_4$  caused complete pptn.); 0.001 N  $\text{Ba}(\text{NO}_3)_2$ ,  $\text{BaCl}_2$  and  $\text{BaBr}_2$  coagulated the sol, and complete pptn. occurred in 0.001 N soln. Pure water-0.000001 N  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{CuCl}_2$ ,  $\text{CuBr}_2$  and  $\text{HgCl}_2$  behave like Ba salts. In higher concns. the behavior was quite different, which is attributed, as verified by the inversion of the direction of endosmosis in 0.0001 N Cu salt soln., to formation of  $\text{Cu}(\text{OH})_2$  from the Cu salt and KOH and the occurrence of positively charged sol particles. From these expts the order of the strength of ions in K, Ba and Cu salts is as follows:  $\text{NO}_3^- < \text{SO}_4^{--} < \text{OH}^- < \text{Cl}^- < \text{Br}^-$ ,  $\text{CrO}_4^{--}$ ,  $\text{Fe}(\text{CN})_6^{--}$ ;  $\text{NO}_3^- < \text{Cl}^- < \text{Br}^-$ ;  $\text{Br}^- < \text{Cl}^- < \text{NO}_3^-$ . Cond. of a Au sol prepd. in pure water or KOH soln. increased; while it decreased when prepd. in KOH soln. When KCl was used, the concn. increased; standing over night or heating at 60-70° for 1 hr. increased the concn. The order of strength of anions toward Au sol particles is  $\text{NO}_3^- < \text{OH}^- < \text{Cl}^-$ . K. Konda

The lyotropic series and the spreading of proteins. Evert Gorter. *Proc. Acad. Sci. Amsterdam* 37, 20-2 (1934).—At  $p_H$  8 the spreading of pure ovalbumin is affected by univalent anions as follows:  $\text{Cl}^- < \text{Br}^- < \text{I}^- < \text{CNS}^-$ . At  $p_H$  6 the spreading of pepsin is affected by univalent cations as follows:  $\text{NH}_4^+ < \text{Li}^+ < \text{K}^+ < \text{Na}^+$ . Equimol. amts. of  $\text{Mg}^{++}$ ,  $\text{Ca}^{++}$ ,  $\text{Sr}^{++}$  and  $\text{Ba}^{++}$  all have the same strong influence on the spreading of proteins. Rachel Brown

Furfural as a lyophilic dispersion medium. Robert Taft and Lloyd E. Malm. *Trans. Kansas Acad. Sci.* 36, 125-30(1933).—Qual. data are given for the dispersion of 122 substances in furfural at -10°, 25° and 95° including carbohydrates, proteins, cellulose nitrates, gums, resins, waxes, rubber, dyes, soaps and miscellaneous substances. W. A. Moore

Notes on a paper by E. Hatachek on "The elastic properties of glycerol gelatin gels hardened with formaldehyde". H. J. Poole. *Trans. Faraday Soc.* 29, 1305-7(1933).—

If the structure of gels is fibrillar, lenticular bubbles should form. They should be perpendicular to the line of stress in reversibly stretched gels, and parallel to the line of stress in irreversibly stretched gels, parallel to the line of compression in reversibly compressed gels and perpendicular to the line of compression in irreversibly compressed gels. H. finds this orientation of bubbles in gelatin. This method may be used to discriminate between gels that have a fibrillar structure and those that do not.

F. E. Brown

Effect of an electric field on the stratified diffusion of alkali carbonates in gelatin. Suzanne Veil. *Compt. rend.* 198, 258-60 (1934).—Rings similar to those of Liesegang are formed when alkali carbonates on gelatin are placed in an elec. field. The phenomenon is conditioned by the peculiar reactions of gelatin in the field.

W. J. Peterson

X-ray interpretation of the molecular structure of gelatin. W. T. Astbury and W. R. Atkin. *Nature* 132, 348 (1933).—The work of Astbury (*C. A.* 27, 2168) is confirmed. The fundamental dimensions in gelatin and in collagen are 2.84, 4.56 and 10.0 Å. Since the d. is 1.346 and the weighed mean residue weight is 96, it follows that the calcd. no. of residues (1.1) assocd. with the chosen x-ray dimensions agrees well with the no. (1) predicted.

Albert L. Henne

The solubility of some organic salts in liquid ammonia at  $-33.9^\circ$ . Warren C. Johnson and Orus F. Krumboltz. *Z. physik. Chem.* A167, 249-59 (1933).—The solubilities, expressed in g. salt per 100 g.  $\text{NH}_3$ , of 10 salts in liquid  $\text{NH}_3$  at  $-33.9^\circ$  are:  $\text{NaCl}$ , 3.325;  $\text{NaBr}$ , 17.62;  $\text{KCl}$ , 0.218;  $\text{KBr}$ , 0.32;  $\text{CH}_3\text{COOK}$ , 1.026;  $\text{KCN}$ , 4.55;  $\text{NH}_4\text{Cl}$ , 14.75;  $\text{NH}_4\text{Br}$ , 90.75;  $\text{LiCl}$ , 0.538;  $\text{AgCl}$ , 0.215.

Don Brouse

Solubility of cupric hydroxide in ammonia. G. Ettisch, F. Hellriegel and D. Krüger. *Ber.* 67B, 22-4 (1934).—The soly. of  $\text{Cu}(\text{OH})_2$  in aq.  $\text{NH}_3$  solns. was detd. (1) by adding weighed quantities of  $\text{Cu}(\text{OH})_2$  to a given  $\text{NH}_3$  soln. until a permanent turbidity was obtained, and (2) by measuring iodometrically the Cu content of  $\text{NH}_3$  solns. satd. with  $\text{Cu}(\text{OH})_2$ . The molar ratio  $\text{NH}_3$ :Cu was plotted against the molarity of the  $\text{NH}_3$ , giving a curve showing a min. between 4 and 6 M  $\text{NH}_3$ . This min. indicates complexes other than  $\text{Cu}(\text{NH}_3)_4^{++}$  at high  $\text{NH}_3$  concns. The insoly. of  $\text{Cu}(\text{OH})_2$  in liquid  $\text{NH}_3$  may be due to existence of the latter as  $\text{NH}_3\text{:NH}_3$  only.

J. H. Reedy

The solubility of lead chromate. Application to the titration of lead. M. Huybrechts and Ch. Degard. *Bull. soc. chim. Belg.* 42, 331-46 (1933).—At  $20^\circ$ , one l. of water dissolves 0.00017 g. = 0.00002  $\text{PbCrO}_4$ . In the presence of a trace of  $\text{CrO}_4$  ion, the soly. decreases to about 0.00001 g. per l., while the presence of  $\text{NH}_4\text{OAc}$  increases the soly. markedly. The soly. in a weak soln. of  $\text{NH}_4\text{OAc}$  and  $\text{HOAc}$  is about the same as in water. Pb should be titrated at room temp. in the presence of  $\text{Ca}(\text{NO}_3)_2$  (about 0.3 g. per l.) by adding a known quantity of alkali chromate and back-titrating the excess.

Albert L. Henne

The solution of magnesium in aqueous salt solutions. III. L. Whitby. *Trans. Faraday Soc.* 29, 1318-31 (1933); cf. *C. A.* 27, 5040, 5044.—Thin sheets of Mg with surface areas of 2, 8, 16 and 24 sq. cm. were hung in a 0.001 N soln. of  $\text{KOH}$  and in solns. of  $\text{K}_2\text{SO}_4$ ,  $\text{KCl}$ ,  $\text{KBr}$ ,  $\text{KI}$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{NaCl}$ ,  $\text{NaBr}$  and  $\text{NaI}$ . The results indicate that OH ion is preferentially discharged. The acid ions are discharged only after local impoverishment of the OH ion has occurred. The soly. of the  $\text{Mg}(\text{OH})_2$  formed is an important factor in the rate of attack. Solubilities  $\times 10^4$  of  $\text{Mg}(\text{OH})_2$  at  $25^\circ$  were found as follows: in  $\text{H}_2\text{O}$ , 4.6; in 0.001 N  $\text{KOH}$ , 2.2; in  $\text{KCl}$ , 3.3; in N  $\text{KBr}$  2.9; in N  $\text{KI}$ , 3.2; in N  $\text{K}_2\text{SO}_4$ , 9.0. This explains the slow corrosion in dil.  $\text{KOH}$  and the rapid corrosion in solns. of  $\text{K}_2\text{SO}_4$ . The rate of corrosion per sq. cm. decreases with increasing area of specimen.

F. E. Brown

Measurement of diffusion rate in the process of dissolving gases in solid phases. H. Dönwald and C. Wagner. *Z. physik. Chem.* B24, 53-8 (1934).—The general

methods for measuring diffusion rate of gases dissolving in solids are outlined and discussed. The cases of plates, cylinders and spheres are treated specifically. G. M. M.

Diffusion of hydrogen through palladium. Victor Lombard and Charles Eichner. *Bull. soc. chim.* 53, 1176-1208 (1933); cf. *C. A.* 27, 2079, 4454.—The diffusion of H through a 0.307-mm. sheet of Pd from a third com. sample was given by the equation  $D = 4.325 \times 10^{-10} \exp \frac{10000}{T}$  for the temp. range  $350-600^\circ$ , and by  $D = 15.85 \times 10^{-10} \exp \frac{10000}{T}$  for the range  $600-850^\circ$  (cf. *C. A.* 27, 4454). However, the whole range is covered by  $D = 20.73 T^{1/2} \times e^{-10000/T}$  ( $T$  in  $^\circ\text{K.}$ ) based on Richardson's formula. (Note error in the exponent of  $e$  in this formula in *C. A.* 27, 4454.)

L. E. Steiner

Diffusion through a membrane. Colin Barnes. *Physics* 5, 4-8 (1934).—An exact soln. is given of the equation for diffusion through a membrane sepp. 2 stirred solns. of different concns. It is shown that the usual soln., which assumes a linear gradient across the membrane throughout the diffusion, involves no appreciable error in the usual type of cell, provided that the gradient is initially linear.

H. A. Beatty

Endosmosis through a spherical expandable semipermeable membrane. Adam Skapski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 347-51 (in English).—A formula was derived for the rate of endosmosis  $dp/dt$  of a substance through a semipermeable spherical expandable membrane. The elastic resistance of the membrane,  $P$ , is opposed to the acting osmotic pressure,  $p$ , so that the process follows the formula  $dp/dt = -kS(p - P)$ , in which  $S$  is the surface permeable to  $\text{H}_2\text{O}$ . If it is assumed that the membrane is a swollen gel with the character of a viscous liquid,  $P$  equals  $4\sigma/r$  or  $\gamma p^{1/2}$  ( $\sigma$  = surface tension,  $\gamma$  = a const.). Thus, the differential equation can be integrated if  $S$  is assumed const. The equation is applied to expts. of S. Skowron (*Acta Biol. Exptl.* 7 (1932)) performed on the osmotic regulation of *Illex pomatia*.

J. Wiertelak

Properties of electrolytic solutions. X. The freezing point of solutions of an electrolyte in a nonpolar solvent. Charles A. Kraus and Raymond A. Vingee. *J. Am. Chem. Soc.* 56, 511-16 (1934); cf. *C. A.* 27, 5618.—Simple app. suitable for use between  $0^\circ$  and  $25^\circ$  at concns. as low as  $10^{-3}$  N and precise to 1% is described. The f.-p. const. is 5.065° for  $\text{C}_6\text{H}_6$  and 4.83° for dioxane. Values of mol. wts. calcd. from f.-p. depressions have a mean deviation of 0.6% from theoretical. The f.-p. curve for iso- $\text{Am}_2\text{NNO}_2$  in dioxane from 0.001 to 0.011 N deviates greatly from the theoretical straight line but approaches it tangentially below  $10^{-3}$  N. The deviation is attributed to assocn. of ion-pairs to more complex aggregates. At 0.011 N nearly 4 ion-pairs are assocd. F. L. Browne

Ethylacetanilide as a solvent in cryoscopy and the molecular weight of several cellulose ethers dissolved in this solvent. F. Garelli and G. Raccui. *Atti accad. Lincei* 18, 150-5 (1933); cf. *C. A.* 27, 2370.—Ethylacetanilide, mannol, was found better suited as a solvent in cryoscopy than triphenyl phosphate, previously suggested (*C. A.* 27, 652), because it crystallizes better. Its cryoscopic const. is  $K = 87$ . It is a good solvent for cellulose deriva. Dil. solns. of nitro-, acetyl- and ethylcellulose in mannol are found to have mols. of  $(\text{C}_6)$ , dimensions. A. W. C.

Methods of measuring electrolytic conductivity. Wilhelm Fink and Philipp Gross. *Monatsh.* 63, 271-84 (1933).—A relatively simple method of high precision, (0.02%), for measuring electrolytic cond. is described. For solns. of equal cond. the capacity of the cond. cell is independent of the nature of the electrolyte. Cells were constructed whose capacities were independent of the sp. cond. of the soln. Cond. data are given for  $\text{Na}_2\text{SO}_4$  in the range: 0.01 - 0.0002 N, and for *o*-nitrobenzoic acid in the range: 0.02 - 0.001 N.

L. E. Steiner

Differences between conductivity coefficients of strong electrolytes in identical solvents. M. Hlasko. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 336-46 (in French).—The cond. coeffs.  $f_\pm = \lambda_0/\lambda_\infty$  of strong electrolytes were detd. in  $\text{H}_2\text{O}$ , acetonitrile,  $\text{MeOH}$ ,  $\text{EtOH}$ ,

PROH, BuOH, pyridine and aniline by Kohlrausch's method. The dielec. const. varies between 80 and 7. For equiv. concns. the cond. coeffs. decrease in the order: HI, HBr, HCl, KOH, NaOH, LiOH. Their differences are:  $-f_{\mu}^{\text{HI}} - f_{\mu}^{\text{HBr}} < f_{\mu}^{\text{HBr}} - f_{\mu}^{\text{HCl}}$ , and  $f_{\mu}^{\text{KOH}} - f_{\mu}^{\text{NaOH}} < f_{\mu}^{\text{NaOH}} - f_{\mu}^{\text{LiOH}}$ . In the case of salts with an identical cation ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$ ,  $\text{NH}_4^+$ ) the value of  $f_{\mu}$  increases in the order F, Cl, Br, I, and the difference is proportional to that of the corresponding acids. In the case of salts with an identical anion ( $\text{Cl}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ )  $f_{\mu}$  increases in the order Li, Na, Rb, Cs. The difference  $f_{\mu}' - f_{\mu}''$  increases but slightly with rising concn.; with a decreasing dielec. const., however, this difference may be enormous. These large differences are probably due to the presence of undissocd. ions. The individual properties of ions play a greater role the smaller the dielec. const.

J. Wiertelak  
Conductivity in the transition range from strong to weak electrolytes. Raymond M. Fuoss. *Physik. Z.* 35, 59 (1934); cf. *C. A.* 27, 5233.—Math. relationships are developed for cond., concn., dielec. const., ionic diams., etc. When the parameter  $b = e^2/aDkT$  is small and when the dielec. const. or the mean diam. of the electrolyte is large, the electrolyte is strong. As  $b$  becomes large, the electrolyte becomes weak.

L. P. Hall  
Absolute measurement of absorption by electrolytes dissolved in glycerol and glycerol-water mixtures in high-frequency electrical fields. J. Hiegemann. *Physik. Z.* 35, 91-3 (1934); cf. *C. A.* 27, 5614; 26, 1176.—The increase in cond. was detd. at 25° for 0.1 to 0.001 M solns. of KCl and  $\text{MgSO}_4$  in glycerol and glycerol-water mixts. contg. 5, 10, 20 and 50% water, by using frequencies of 23, 40 and 92 m. wave lengths. The cond. increases with the longer wave lengths.

L. P. Hall  
Contrasting properties of ions, "zwitterions" and uncharged molecules. Edwin J. Cohn. *Science* 79, 83-4 (1934).—Variation of the apparent molal vol. with concn. is discussed, with particular reference to amino acids; it appears to depend largely on the polarity of the groups in the mol.

H. A. Beatty  
Electrostatic theory of ionic equilibrium. I. Chemical equilibrium in aqueous solution as an electrostatic problem. Ju. W. Chodakow. *Z. physik. Chem.* B24, 35-52 (1934).—The "theory of dominating molecular species" is presented in great detail with application to ionic equil. in aq. soln. of a no. of common acids and bases. The theory is similar to that of Kossel (*C. A.* 10, 2054) except that the point of departure is based on the "monolith postulate," which assumes that certain complex ions are electrostatically equiv. to simple ions of the same radius and charge.

G. M. Murphy  
Equilibrium law for strong electrolytes. Alkali metal bromides and iodides. K. Jablczynski and A. Balczewski. *Roczniki Chem.* 12, 880-7 (1932).—The expression  $n'/n_0 = K$  ( $n_0$  is the concn. of undissocd salt and  $n'$  of one of its ions) is verified cryoscopically for Li, Na, K,  $\text{NH}_4$  and H bromide and iodide, a const. value being obtained for  $K$  if the hydration of the ions is taken into consideration ( $\text{Li}^+ 10.3$ ,  $\text{Na}^+ 3$ ,  $\text{K}^+ 0$ ,  $\text{NH}_4^+ 0$ ,  $\text{H}^+ 9$ ,  $\text{Br}^- 1$  and  $\text{I}^- 2$  mol.  $\text{H}_2\text{O}$ ). The values of  $K$  for LiBr in presence of HBr, and of KI in presence of HI, are the same as for the bromides alone, this indicating that only a part of the salt undergoes ionic dissocn. The degree of hydration of ions can be detd. from cryoscopic measurements of the apparent mol. wt. of mannitol in presence of increasing concn. of salt; the values thus obtained diminish with the concn. and degree of hydration of the ions present.

B. C. A.  
The statistical basis of the theory of electrolytes. Otto Halpern. *J. Chem. Physics* 2, 85-93 (1934); cf. *C. A.* 27, 2865.—The application of various statistical-thermodynamic methods to strong electrolytes is investigated. The statistical and thermodynamic basis of Bjerrum's theory of ionic assocn. is reviewed. Allen S. Smith

A theory of concentrated solutions of strong electrolytes.

1 Possibility of its application to the calculation of osmotic coefficients. G. B. Bonino and G. Centola. *Atti accad. Lincei* 18, 145-9 (1933).—Math. By means of the equation developed by Bonino (*Mem. accad. Italia* 1933) the lowering of the vapor pressure of concd. solns. of NaCl and KCl at 25° was calcd.; satisfactory results were obtained.

A. W. Contieri  
A glass electrode potentiometer system for determining the  $p_{\text{H}}$  values of weakly buffered solutions such as natural and treated waters. John O. Burton, Harry Matheson and S. F. Acree. *Bur. Standards J. Research* 12, 67-72 (1934) (Research Paper No. 634); cf. *C. A.* 28, 1225.—Comparison of the H (A), quinhydrone (B) and glass electrodes (C) shows that A may be used for solns. where concns. are 0.0001 M or more, B for solns. with concns. greater than 0.001 M, with a  $p_{\text{H}}$  less than 8.5 and with absence of oxidizing agents or other compds. acting on quinhydrone, and C for solns. of any concn. from 0.1 M to purest water with an accuracy of at least 0.1  $p_{\text{H}}$  and for solns. that are colored or turbid or contain oxidizing or reducing agents.

L. P. Hall  
The use of the quinhydrone electrode in the determination of the activity of the hydrogen ion in a solution of sucrose that is undergoing catalytic inversion by hydrochloric acid at 25°. Willis W. Floyd. *Trans. Kansas Acad. Sci.* 36, 118 (1933).—The cell: Ag(s), AgCl(s), Cl ion (0.1 M HCl + 0.1 M sucrose) || H ion (0.1 M HCl + 0.1 M sucrose) + quinone(s), hydroquinone(s), Au(s) does not give reproducible potentials in solns. of sucrose undergoing catalytic inversion or in solns. of invert sugar.

W. A. Moore  
Hydrogen-ion concentration and its measurement. A. Lottermoser. *Med. Klin.* 29, 901-4 (1933).—Methods for detg.  $p_{\text{H}}$ , including the electrometric method employing a Pt or quinhydrone electrode and the indicator method are discussed. The disadvantage of the quinhydrone method lies in the fact that  $p_{\text{H}}$  above 7.0 cannot be detd. The indicator method may be used either with or without a buffer. For rapid detn. the colorimetric method of Wulff is mentioned.

Louis J. Soffer  
The structure of the cathode deposit. A. Glazunov. *Z. physik. Chem.* A167, 399-406 (1934).—The process of metallic sepn. by electrolysis is, in a sense, a crystal process in which the no. of crystn. centers ( $KZ$ ) and the velocity of crystn. ( $KG$ ) are affected by more factors than in the usual crystal processes. A method is described for using the microscope to det.  $KG$  and  $KZ$ . Besides crystal in the direction of current flow ( $KG_I$ ), crystal proceeds in a direction at right angles thereto ( $KG_{II}$ ), the velocity of the former being greater than that of the latter. In increasing c. d. increases  $KG_I$ ,  $KG_{II}$ , and  $KZ$ ; increasing concn. lowers  $KZ$  and  $KG_I$  but increases  $KG_{II}$ .

Don Brouse  
Piezochemical studies. XXX. The effect of pressure on the equilibrium in condensed systems. Ernst Cohen and K. Piepenbrock. *Z. physik. Chem.* A167, 365-93 (1934).—Exptl. quant. study shows that Planck's equation, which expresses the effect of external pressure on equil., covers the exptl. errors. Each of the following suitable reactions was employed: the pressure coeff. of the equil. const., and the differential change in vol. accompanying the transformation of 1 g. equiv. An indirect elec. method involving an irreversible galvanic circuit was used to det. the equil. const. at high pressures. In studying the reversal of poles accompanying a change of pressure at a given temp. the e. m. f. became zero at a calcd. pressure which allowed for the exptl. error. The values of the equil. consts. at a fixed pressure and various temps. were controlled by means of van't Hoff's reaction isochore.

Roy H. Baechler  
Hydrazine: The dissociation pressures of hydrazinium dichloride and dibromide. B. E. Christensen and E. C. Gilbert. *J. Am. Chem. Soc.* 56, 393-5 (1934).—The dissocn. pressure of  $\text{N}_2\text{H}_4 \cdot 2\text{HCl}$  is given by  $\log P$  (mm.) =  $13.4779 - 4989.96/T$  ( $^{\circ}\text{K.}$ ); that of  $\text{N}_2\text{H}_4 \cdot 2\text{HBr}$  is about equal, but the latter compd. undergoes rapid decompn. below the m. p.

H. A. Beatty  
Dissociation pressure of strontium carbonate. John



Chipman. *Trans. Faraday Soc.* 29, 1286-9(1933). —  $\text{SrCO}_3 \rightleftharpoons \text{SrO} + \text{CO}_2$ ;  $\Delta C_p = 1.2 - 0.00707T$ . By substituting in the free-energy equation and dividing by  $-RT$ :  $\log p = -\Delta H_0/4.575T + 0.604 \log T - 0.000765T + \text{const.}$  When  $\log p - 0.604T + 0.00765T$  is plotted against  $1/T$  a straight line results. The following values were found by using this graph.  $\Delta F^\circ = 53570 - 1.27 \ln T + 0.00357T^2 - 31.69T$ . The heat of dissocn.,  $H = 53570 + 1.27 - 0.00357T$ . The dissocn. pressures from 650 to 1250 inclusive at 50° intervals are: 0.016, 0.069, 0.25, 0.79, 2.32, 6.08, 14.6, 32.5, 68, 134, 249, 444 and 755.

F. E. Brown

Direct oxidation of saturated hydrocarbons at high pressures. Peter J. Wiezevich and Per K. Frolich. *Ind. Eng. Chem.* 26, 207-26(1934).—Vapor-phase oxidation of  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_8$ ,  $\text{C}_4\text{H}_{10}$ , iso- $\text{C}_4\text{H}_{10}$ , crude  $\text{C}_4\text{H}_{12}$  and  $\text{C}_5\text{H}_{12}$  (liquid phase) and natural gas with air or  $\text{O}_2$  at 33-200 atm. in the absence of catalysts was studied on lab. and plant scales for the recovery of useful products. Data are given showing the effects of temp., pressure, concn., contact time and recirculation. Pyrolysis of  $\text{CH}_4\text{O}$  and  $\text{MeOH}$  at high pressure is noted. Bibliography.

H. A. Beatty

Calculation of the equilibrium constants of the reaction  $\text{C}_2\text{H}_4 + \text{H}_2 \rightleftharpoons \text{C}_2\text{H}_6$  according to spectroscopic data. A. V. Frost. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 158-61 (in English 161-4).—Math. A. A. Boehlingk.

Equilibrium in the reduction of nickelous oxide by carbon monoxide Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ. First Ser.* 22, 436-47(1933).—For  $\text{NiO} + \text{CO} \rightleftharpoons \text{Ni} + \text{CO}_2$  in the temp. range of 663° to 552°,  $\Delta F^\circ = -9771 + 11.77T \log T - 0.003624T^2 + 0.00000031T^3 - 33.59T$ . For  $\text{Ni} + \frac{1}{2}\text{O}_2 = \text{NiO}$ ,  $\Delta F^\circ = -57739 - 5.44T \log T - 0.000824T^2 + 38.05T$ . For  $\text{NiO} + \text{H}_2 \rightleftharpoons \text{Ni} + \text{H}_2\text{O(g)}$ ,  $\Delta F^\circ = 329 + 7.60T \log T + 0.000826T^2 + 0.00000037T^3 - 34.13T$ . W. E. V.

Equilibrium in the reduction of cuprous chloride by hydrogen. Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ. First Ser.* 22, 423-35(1933).—For  $2\text{CuCl(l)} + \text{H}_2 \rightleftharpoons 2\text{Cu} + 2\text{HCl}$  in the temp. range 436° to 726°,  $\log K_p = -(2303/T) + 3.1880$ ; for  $2\text{CuCl(s)} + \text{H}_2 \rightleftharpoons 2\text{Cu} + 2\text{HCl}$  in the temp. range 304° to 401°,  $\log K_p = -(4009/T) + 5.7510$  and  $\Delta F^\circ = 24140 + 24.73T \log T + 0.00306T^2 - 102.39T$ . Also the entropy of  $\text{CuCl(s)}$ ,  $S_{298}^\circ = 20.66$  cal./deg.; and for  $\text{CuCl(s)} \rightarrow \text{CuCl(l)}$ ,  $\Delta H_{\text{fus}} = 3871$  cal.

William E. Vaughan

Equilibrium in the reduction of antimony trioxide by carbon monoxide. Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ. First Ser.* 22, 407-13(1933).—In a static system the equil.  $\text{Sb}_2\text{O}_3(\text{s}) + 3\text{CO} \rightleftharpoons 2\text{Sb(s)} + 3\text{CO}_2$  was studied in the temp. range 502° to 596°.  $\Delta F^\circ = 33461 + 34.286T \log T - 0.01110T^2 + 0.00000093T^3 - 88.65T$ .

William E. Vaughan

Equilibrium in the reduction of silver chloride by hydrogen. Fusao Ishikawa and Motoo Watanabe. *Science Repts. Tôhoku Imp. Univ. First Ser.* 22, 393-406(1933).—In static systems the following equilibria were investigated and these data obtained:  $2\text{AgCl(l)} + \text{H}_2 \rightleftharpoons 2\text{Ag(s)} + 2\text{HCl}$  in the temp. range 450° to 710°,  $\log K_p = -(1104/T) + 3.1012$ ,  $\Delta F^\circ = 20173 + 44.4169T \log T - 0.00207T^2 - 160.10T$ ; and  $2\text{AgCl(s)} + \text{H}_2 \rightleftharpoons 2\text{Ag(s)} + 2\text{HCl}$  in the temp. range 383° to 417°,  $\log K_p = -(3552/T) + 6.3790$ ,  $\Delta F^\circ = 20155 - 3.6170T \log T + 0.01923T^2 - 0.000000250T^3 - 34.80T$ . William E. Vaughan

Thermo-optical dissociation of sulfur dioxide. K. Wieland. *Trans. Faraday Soc.* 30, 260-5(1934); cf. C. A. 27, 664-5.—The absorption spectrum of gaseous  $\text{SO}_2$  was photographed in the Schumann region at temps. up to 450°. At room temp. it shows a well-developed band spectrum between 2400 and 1700 Å. with a predissocn. limit at about 1900 Å., corresponding to a dissocn. into  $\text{SO}$  and  $\text{O}$ . At 450° and at a pressure of 1.5 mm. the bands due to  $\text{SO}_2$  have almost completely vanished, and a new spectrum appears. This consists of very faint bands between 2800 and 2600 Å., due to  $\text{S}_2$ , and a much stronger band system below 1800 Å., which also belongs to  $\text{S}_2$ . After the absorption tube is recooled, the  $\text{SO}_2$  bands reappear with the same intensity as before heating. Thermo-

optical dissocn. of  $\text{SO}_2$  into  $\text{S}_2$  and  $\text{SO}$  seems reasonable (cf. Kornfeld and Weegmann, C. A. 25, 2641-2).

Reuben Roseman

Energy relations in the dissociation of the water vapor molecule into its atoms. Ottilie Riecheneier, Hermann Senftleben and Hans Pastorff. *Ann. Physik* 19, 202-17 (1934).—A new exptl. method is described for measuring the dissocn. into  $\text{H}$  and  $\text{OH}$ . The final products are  $\text{H}_2$  and  $\text{H}_2\text{O}_2$ , and these results are obtained:  $\text{H}_2\text{O} + (5.11 \pm 0.04)\text{v.} = \text{H} + \text{OH}$ ;  $\text{OH} + (5.29 \pm 0.14)\text{v.} = \text{H} + \text{O}$ . These results disagree with a value 6.10 v. or lower for the heat of dissocn. of  $\text{O}_2$  because under the conditions of the expt.  $\text{OH}$  should then be dissocd. at every collision.

A. B. F. Duncan

Equilibrium constants in terms of activities from cryoscopic data. II. The dissociation of pyridine *o*-chlorophenoxide in *p*-dichlorobenzene. H. M. Glass and W. M. Madgin. *J. Chem. Soc.* 1933, 1431-5.—The equil. const.  $K_a$  for the dissocn. of pyridine *o*-chlorophenoxide in melted *p*-dichlorobenzene (m. 52.9°) was detd. from cryoscopic data, from activities instead of concns. Similar measurements were made previously for  $\text{C}_6\text{H}_5$  solns. (C. A. 27, 2368). These two solvents are very similar, since they have practically the same dielec. const., their dipole moments are zero and their internal pressures are about equal. From these data and van't Hoff isochore the heat of formation of pyridine *o*-chlorophenoxide is calcd. to be -8800 cal.

J. H. Reedy

The validity of the law of mass action. II. Determination of the solubility of radium sulfate in sodium sulfate solutions and in water. Boris Nikitin and Paul Tolmachev. *Z. physik. Chem.* A167, 260-72(1933); cf. C. A. 26, 1810. The soly. of  $\text{RaSO}_4$  in water at 20° is  $2.1 \times 10^{-4}$  g. per 100 cc. water. The soly. of  $\text{RaSO}_4$  in solns. contg.  $\text{SO}_4^{--}$  ions follows accurately the law of mass action if the exptl. procedure excluded errors due to absorption. The soly. product remains const. at  $4.25 \times 10^{-11}$  over a wide range of ionic concns.

Don Brouse

Basic salts. VI. Equilibrium relations of the difficultly soluble basic salts. W. Feitknecht. *Helv. Chim. Acta* 16, 1302-15(1933); cf. C. A. 27, 4147.—The soly. product of  $\text{ZnSO}_4 \cdot 3\text{Zn(OH)}_2$  is  $1.12 \times 10^{-17}$  when the concn. of  $\text{ZnSO}_4$  is 0.01 *N* (cf. Kolthoff and Kameda, C. A. 25, 2626); that of  $\text{Bi(OH)}_3\text{Cl}$  is  $1.58 \times 10^{-21}$  when the activity of  $\text{Bi}^{+++}$  is  $2.0 \times 10^{-3}$  (cf. Jellinek and Kuhn, C. A. 17, 3637). An equation is derived for the equil. conditions for coexistence of basic salt and hydroxide in a soln. of a second easily sol. salt having the same anion. From this equation, the soly. product of active  $\text{ZnO}$  is  $1.6 \times 10^{-17}$  (cf. Dietrich and Johnston, C. A. 21, 3010). The relative magnitudes of the soly. products of hydroxide and basic salt det. which is formed when a soln. of metallic salt is treated with alkali. The observed titration curve for  $\text{ZnSO}_4$  differs from the theoretical curve because the basic salt slowly changes in an excess of alkali to a more basic salt contg. a max. of 6-7 mols. of  $\text{Zn(OH)}_2$ . A similar higher basic salt is formed with  $\text{ZnCl}_2$ . X-ray examn. shows that these salts have a layer structure similar to that of the common basic salts. W. C. Fernelius

Double decomposition in the absence of a solvent. XVI. System:  $\text{Ti}_2\text{Br}_2 + \text{Ag}_2\text{SO}_4 \rightarrow \text{Ti}_2\text{SO}_4 + \text{Ag}_2\text{Br}_2$ . N. S. Dombrovskaya. *J. Gen. Chem.* (U. S. S. R.) 3, 291-308(1933); cf. Palkin, C. A. 27, 656.—In conformity with the pos. thermal effect of the reaction and the direction of the reaction in aq. solns., the equil. in the fused system  $\text{Ag}_2\text{SO}_4 + \text{Ti}_2\text{Br}_2 \rightleftharpoons \text{Ag}_2\text{Br}_2 + \text{Ti}_2\text{SO}_4$  is sharply shifted toward the right. A study of the systems  $\text{Ti}_2\text{SO}_4 + \text{Ag}_2\text{Br}_2 + \text{Ti}_2\text{Br}_2$  and  $\text{Ti}_2\text{SO}_4 + \text{Ag}_2\text{Br}_2 + \text{Ag}_2\text{SO}_4$  indicates the existence of the compds.  $\text{AgBr} \cdot 2\text{TiBr}$  and  $\text{Ag}_2\text{SO}_4 \cdot \text{Ti}_2\text{SO}_4$ . The reciprocal soly. in the system  $\text{Ti}_2\text{SO}_4$ -Ag halide is greater than in that of  $\text{TiNO}_3$ -Ag halide.

Chas. Blanc

Rate of absorption of gases by liquids. R. C. Brimley. *Chemistry & Industry* 1933, 472-3.—The rate of soln. of  $\text{CO}_2$  in  $\text{H}_2\text{O}$  or aq.  $\text{NaOH}$  is controlled by the low rate of diffusion of  $\text{CO}_2$  through the surface layer of the liquid and varies with the age of the surface. The same conclusion

can be reached from the data of D<sub>2</sub>N and Mook (C. A. 24, 3157).

**The velocity of solution of electrolytes in acids.** M. Tzentnershner and M. Straumanis. *Z. physik. chem.* A167, 421-9 (1934).—The velocity of soln. of electroc. c. p. Zn in dil. acids is less than that of sublimed Zn about equal to that of the less readily sol. alloy of Zn w 0.2% Cd. Zn plates rubbed with emery cloth dissolve with an initial max. velocity which rapidly decreases and approaches a limit characteristic for the metal and acid. Activation of the Zn plates by rubbing with concd. acids results in a lower limit than does mech. activation. The reactivity of the Zn plates is preserved by keeping in distd. water. Based on its relation to the concn. of HCl (up to 2 N) the velocity of soln. of electrolytic Zn can be expressed by the linear equation:  $dv/dt = K(C - C_0)$ .

**Effect of temperature on the rate of solution of chemically pure thallium in nitric acid.** M. Tzentnershner and S. Lewi. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 362-8 (in German); cf. C. A. 26, 361.—The rate of soln. of pure Tl in HNO<sub>3</sub> is controlled by the rate of the chem. reaction on the interface metal-liquid. HNO<sub>3</sub> shows no pronounced catalytic effect upon the soln. process. This fact, according to Abel (C. A. 24, 5113), is related to the fact that stirring promotes the soln. process.

**Effect of surface-active substances upon the rate of evolution of carbon dioxide from supersaturated solutions.** N. A. Held and A. D. Tkachev. *Compt. rend. acad. sci. U. R. S. S. [N. S.]* 1933, 296-9 (in German 299-302).—The amount of CO<sub>2</sub> liberated in unit time was measured when the HCl equiv. was added to 25 cc. of Na<sub>2</sub>CO<sub>3</sub> to which had been added varying amounts of butyl, isoamyl, heptyl or octyl alc. or *o*-toluidine. For each of the alcs. there was a max. in the curve of ratio of normally evolved CO<sub>2</sub> to that evolved in the presence of the alc. ( $v_0/v_{\infty}$ ) vs. alc. concn. For each alc.  $v_0/v_{\infty}$  is a const., 1.80, except for BuOH, 2.22. This max. corresponds to that concn. for which the adsorption layer is unsatd. *o*-Toluidine curves show two max.

**Unimolecular decomposition at high pressures.** Louis S. Kassel. *J. Chem. Physics* 2, 106 (1934).—K. disagrees with the conclusions of Coffin and Geddes (C. A. 28, 1915).

**Thermal decomposition of deuterium iodide.** D. Rittenberg and H. C. Urey. *J. Chem. Physics* 2, 106-7 (1934); cf. C. A. 27, 1811. The thermal equil. between I and H contg. various amts. of H<sup>2</sup> was detd. The temps. were 398° and 468° and the concns. of H<sup>2</sup> were 13.5% at the lower temp. and 40 and 72.1% at the higher temp. The fraction decomposed agrees well with that calcd.

**The thermal decomposition of tertiary butyl and tertiary amyl alcohols. Homogeneous unimolecular reactions.** Raymond F. Schultz and G. B. Kistiakowsky. *J. Am. Chem. Soc.* 56, 395-8 (1934).—The homogeneous, unimol. decompns. of Me<sub>3</sub>COH and Me<sub>3</sub>EtCOH, studied by the static method in a quartz bulb with "poisoned" walls, have the rate consts.  $4.8 \times 10^{14} e^{-40000/RT}$  and  $3.3 \times 10^{14} e^{-40000/RT}$  per sec., resp. The former begins to fall off at about 2 mm., corresponding to 19 classical oscillators for the activation; the latter is not reproducible at low pressures.

**The temperature coefficient of the decomposition of hydrogen peroxide in the presence of potassium iodide.** Wm. C. K. Hender and Robert A. Robinson. *Trans. Faraday Soc.* 29, 1300-5 (1933).—Reaction velocities for the decompn. of H<sub>2</sub>O<sub>2</sub> in the presence of KI at 15°, 25°, 30°, 35° and 45° were detd. by titration for slow reactions and measuring O<sub>2</sub> evolved for rapid reactions. Supersatn. of O<sub>2</sub> retarded the reaction; so all solns. were stirred. H<sub>2</sub>O, MeOH, EtOH and glycol were the solvents employed. When it is assumed that the reaction is unimol. with respect to H<sub>2</sub>O<sub>2</sub> but occurs only when there is a triple collision between H<sub>2</sub>O<sub>2</sub>, H<sub>2</sub>O and the iodide, satisfactory agreement between calcd. and observed consts. of reaction

is found. Temp. coeffs. and viscosity corrections are applied. A similar hypothesis is successful when MeOH or glycol is the solvent. The reaction seems to involve only H<sub>2</sub>O<sub>2</sub> and the iodide when EtOH is the solvent.

**Kinetic study of the potassium iodide-hydrogen peroxide reaction in acid solution.** Mme. P. Rumpf. *Compt. rend.* 198, 266-8 (1934).—H<sub>2</sub>O<sub>2</sub> and KI react in acid soln. to give I<sub>2</sub>. A spectrographic study of the reaction in stirred solns. indicates that at low concns. of the reactants the reaction is independent of the acidity. In high concns. the reaction is probably  $2I^- + H_2O_2 + 2H^+ \rightleftharpoons I_2 + 2H_2O$ .

**Kinetics of the reaction between iodine and the hydrochlorides of diazine and hydroxylamine.** A. Berthoud and Daniel Porri. *Helv. Chim. Acta* 17, 32-43 (1934).—The exptl. results agree with the following equations, which were derived assuming HIO to be the active oxidizing agent.  $d(I)/dt = k[(N_2H_5^+)(I_2^-)]/[(I^-)^2(H^+)]$  and  $d(I)/dt = k[(NH_2OH \cdot HCl)(I_2^-)]/[(I^-)^2(H^+)]$ . Between 20° and 30° the temp. coeffs. are 3.4 and 4.0 for the N<sub>2</sub>H<sub>5</sub> and H<sub>2</sub>OH reactions, resp. These values do not agree with the detd. by Bhattacharya and Dhar (C. A. 24, 5629). Both reactions are less sensitive to light than reported by Band D.

**The effect of neutral salts on ionic reactions in concentrated salt solutions.** A. v. Kiss. *Z. physik. Chem.* A167, 354-64 (1934).—Velocities in different concns. of several neutral salts, were measured for the following reactions:  $CH_3COOCH_2COO^- + H^+ \rightarrow CH_3(OH)COO^- + CH_3COO^-$  (I),  $COOCHBrCH_2COO^- + OH^- \rightarrow COOCHBr:CHCOO^- + Br^- + H_2O$  (II). Since both are bi-mol., the velocity consts. were calcd. from the equation:  $k = (a - x)/t$ , in which  $a$  = initial concn., and  $x$  = amt. remaining after time,  $t$ . Log  $k$  varied linearly with the concn. of the neutral salt from 1 N to 8 N. The accelerating action of the salts for reaction I is in the order: BaCl<sub>2</sub> > Na<sub>2</sub>SO<sub>4</sub> > NaCl > KCl > NaClO<sub>4</sub> > NaNO<sub>3</sub> > KNO<sub>3</sub>, for reaction II: BaCl<sub>2</sub> > Na<sub>2</sub>SO<sub>4</sub> > NaCl > NaClO<sub>4</sub> > NaNO<sub>3</sub> > KNO<sub>3</sub>.

**Kinetics of the thermal isomerization of cyclopropane.** Thomas Seal Chambers and G. B. Kistiakowsky. *J. Am. Chem. Soc.* 56, 399-405 (1934).—The thermal transformation of cyclopropane to propylene was investigated over the temp. range 470-519°; it is homogeneous and unimol. The rate consts. depend upon pressure, 25 squared terms being required in the energy function to account for this pressure dependence on the basis of classical localized energy theories of unimol. reactions. The high-pressure const. can be calcd. by the equation  $\log K_{\infty} = 15.17 - (65,000/2.3RT)$ .

**Kinetics of ethylene polymerization.** H. H. Storch. *J. Am. Chem. Soc.* 56, 374-8 (1934).—Data are presented concerning the compn. and amounts of products formed by C<sub>2</sub>H<sub>4</sub> polymerization at 377° and 141.5 cm. pressure. Butylene is the primary product, propylene formation being secondary. Minute quantities of Cu<sup>2+</sup> accelerate the reaction. The polymerization seems to be autocatalytic. The energy of activation is about 42,000 cal.

**Reactions of calcium oxide with carbon dioxide and with sulfur dioxide.** J. Zawadzki and S. Bretsznajder. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 271-86.—The initial process in the reaction between CaO and CO<sub>2</sub> is the adsorption of the gas on the surface, in which the mols. move freely and finally combine at active spots. At higher CO<sub>2</sub> pressures nuclei are formed, especially at the active spots, and the velocity of growth of the nuclei governs the velocity of absorption of CO<sub>2</sub>. Similar relations hold for the decompn. of CaO at very low pressures. Abs. rates of absorption depend on the no. of nuclei and the condition of the surface of the CaO. The behavior with SO<sub>2</sub> is rather similar and eventually follows approx. the equation  $4CaO + 6SO_2 = 4CaSO_3 + S_2$ .

**The complexity of arsenic trioxide.** A. Smits and E. Beljaars. *Z. physik. Chem.* A167, 278-9 (1933).—The P-T diagram of As<sub>2</sub>O<sub>3</sub> was accurately detd. between 240° and 380°. Below 240° the vapor pressure was too low to

measure accurately. From soly. detns. in Et benzoate solns., the octahedral modification of  $\text{As}_2\text{O}_3$  is stable below  $221^\circ$  and the monoclinic modification is stable above  $221^\circ$ . The stable triple point,  $S_2 + L + G$ , was found at  $312.3^\circ$  and 66.1 mm. Hg the metastable triple point,  $S_1 + L + G$ , at  $272.1^\circ$  and 26.1 mm. Hg. A change of the  $S_2$  modification to a hitherto unknown  $S_3$  modification was observed in the metastable region at  $258.4^\circ$ . This metastable  $S_3$  modification reached its triple point,  $S_3 + L + G$ , at  $280.6^\circ$  and 40.7 mm. Hg.

Don Brouse

**Phase equilibria in hydrocarbon systems.** II. Methane-propane system. Bruce H. Sage, Wm. N. Lacey and Jan G. Schaafsma. *Ind. Eng. Chem.* 26, 214-17 (1934); cf. C. A. 28, 1254<sup>4</sup>.— $\text{CH}_4$ - $\text{C}_3\text{H}_8$  system was studied over the range of pressures and temps. commonly found in petroleum formations, i. e., 1 to 200 atms. and  $20$ - $90^\circ$ . Ds. and compns. in both the 1- and 2-phase regions were detd., including the region above the crit. pressures.

W. A. Moore

**Thermal equilibrium in binary systems of phenacetin, urea, ethylurethan, antipyrine, menthol, salol and quinine.** Konstanty Hrynakowski and Franciszek Adamanis. *Bull. soc. chim.* 53, 1168-75 (1933).—The soly. diagrams for all possible binary systems among the components, menthol, ethylurethan, antipyrine, salol, phenacetin and quinine were investigated. Salol and quinine form a non-cryst. mass; salol-urea and quinine-urea are immiscible; menthol-urea and phenacetin-urea are partially miscible in the liquid phase; ethyl urethan and urea form a 1:1 compd. with incongruent m. p. All the other systems are of the eutectic type.

L. E. Steiner

**The system: manganese-tin-mercury.** Alan N. Campbell and Herbert D. Carter. *Trans. Faraday Soc.* 29, 1295-1300 (1933).—Tin can be dissolved in Hg easily, and a soln. of Mn in Hg can be made by depositing Mn in a Hg cathode. These solns. were mixed and solubilities were detd. at  $30^\circ$ ,  $55^\circ$  and  $70^\circ$ . The breaks in the soly. curves indicate that the compd. having the formula  $\text{Mn}_2\text{Sn}$  exists at higher temps. and has a transition temp. near room temp. It is believed that systems of metals in Hg can be studied in a manner analogous to that of studying salts in water. By this means exact information can be obtained as to mutual relationships, compd. formation, etc., of metals at, or near, room temp. This pair of metals did not form solid solns., or Hg compds. similar to hydrates.

F. E. B.

**Equilibrium of the system  $\text{Na}_2\text{SiF}_6$ - $\text{NaCl}$ - $\text{H}_2\text{O}$ .** V. Ya. Anosov and S. K. Chirkov. *J. Applied Chem.* (U. S. S. R.) 6, 224-7 (1933).—The soly. isotherms as well as those of the sp. gr. at  $15^\circ$  were studied for the system  $\text{Na}_2\text{SiF}_6$ - $\text{NaCl}$ - $\text{H}_2\text{O}$ . The soly. isotherm consists of 2 branches which cross at a point corresponding to the satn. of both salts. The soly. of  $\text{Na}_2\text{SiF}_6$  in the presence of increasing amts. of NaCl decreases rapidly at first (up to 0.079 g.  $\text{Na}_2\text{SiF}_6$  and 1.18 g. NaCl in 100 g. of the soln.). The decrease is then slower and finally very slow (beyond 0.017 g.  $\text{Na}_2\text{SiF}_6$  and 7.87 g. NaCl in 100 g. of soln.). After the addn. of 2.5 g. of NaCl to 100 g. of the satd. soln. of  $\text{Na}_2\text{SiF}_6$  only small amts. are sepd. upon further addns. The isotherm of the sp. gr. consists of 2 branches which cross at the point of satn. of both salts. The sp. gr. is continuously increasing upon addn. of NaCl. A new method for detg. the soly. properties as functions of the compn. is applied to the construction of the isotherm of the sp. gr. According to this method the point of the given soln. is connected with the beginning of the coordinates and the line obtained is used for the recording of the section indicating the magnitude of the particular properties. The ends of sections obtained in the above manner are connected in a uniform curve.

A. A. Boetlingk

**The diagrams of state of the systems  $\text{HgSO}_4$ - $\text{HgI}_2$ ,  $\text{HgSO}_4$ - $\text{HgBr}_2$ , and  $\text{HgSO}_4$ - $\text{HgCl}_2$ .** M. Paic. *Archiv. Hem. Farm.* 7, 161-9 (169 in French) (1933).—A new app. for detg. the temp. of fusion is described. The system  $\text{HgSO}_4$ - $\text{HgI}_2$  is examd. by thermal and x-ray analysis and the formation of a compd.  $\text{HgSO}_4\cdot\text{HgI}_2$  is found; it m.  $332^\circ$  and decomposes into the single sulfates. Such a

compd. is not formed in the system  $\text{HgSO}_4$ - $\text{HgBr}_2$ .  $\text{HgSO}_4$  is still less sol. in fused  $\text{HgCl}_2$  than in  $\text{HgBr}_2$ . J. K.

**The system  $\text{Na}_2\text{S}_2\text{O}_3$ - $\text{Ag}_2\text{S}_2\text{O}_3$ - $\text{H}_2\text{O}$  at  $25^\circ$ .** Henry Bassett and John T. Lemon. *J. Chem. Soc.* 1933, 1428-7.—The following salts may exist in  $\text{Na}_2\text{S}_2\text{O}_3$ - $\text{Ag}_2\text{S}_2\text{O}_3$  solns. of suitable compn. at  $25^\circ$ : (1)  $\text{NaAg}(\text{S}_2\text{O}_3)\cdot 2\text{H}_2\text{O}$ , rhombic, sol.; (2)  $\text{NaAg}_2(\text{S}_2\text{O}_3)_2\cdot 2\text{H}_2\text{O}$ , microscopic needles, sol.; (3)  $\text{NaAgS}_2\text{O}_3\cdot \text{H}_2\text{O}$ , granular crystals, sparingly sol.; (4)  $\text{NaAg}_2(\text{S}_2\text{O}_3)_2\cdot \text{H}_2\text{O}$ , microscopic rectangular platelets, very slightly sol. The last salt has not previously been reported. Isomerism in the Na Ag thiosulfates reported by Meyer and Eggeling (C. A. 1, 1520) was not confirmed. The formation of complex ions is attributed to the effect of the extra S atom in the  $\text{S}_2\text{O}_3^{--}$  group.

J. H. Reedy

**Equilibrium diagram of the system: aluminum-copper-manganese.** Hachio Sawamoto. *Suuyokwai-shi* 8, 289-44 (1933).—The constitution of Al-rich Al-Cu-Mn alloys contg. up to 40% Cu and 30% Mn was investigated by differential thermal analysis and microscopic examn.; the equil. diagram was detd. Peritectic-eutectic reaction liquid +  $\text{Al}_3\text{Mn} \rightleftharpoons \text{Al}_2\text{Mn} + (\text{Al})$  occurred at  $630^\circ$  and at the compn. 8.3% Cu, 1.75% Mn, 89.95% Al and a ternary eutectic reaction liquid  $\rightleftharpoons \text{CuAl}_2 + \text{Al}_3\text{Mn} + (\text{Al})$  took place at  $544^\circ$ , its compn. being Cu 30.5, Mn 0.65 and Al 68.85%.

Hideo Nishimura

**Kinetic measurements on strong, concentrated acids.** Bruno Flaser. *Z. physik. Chem.* A167, 441-57 (1934).—The hydrolysis of hypophosphoric acid,  $\text{H}_4\text{P}_2\text{O}_6 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{PO}_3 + \text{H}_2\text{PO}_4$ , is a reaction catalyzed by acids and so conveniently measurable that it can be used to det. the strength of concd. acids. Measuring the hydrolysis of fluorosulfonic acid and testing by safranin indicator agreed with the results from the hydrolysis of hypophosphoric acid. The activity of the acids investigated increased very markedly with concn. with the sole exception of  $\text{HNO}_3$ , whose activity did not increase so sharply and even decreased at the higher concns. Addn. of small amts. of water lowered the activity markedly: a 70% soln. of perchloric acid had 3 times the activity of a 60% soln.; a 31% soln. of HCl had double the activity of a 26% soln.

Don Brouse

**Sulfonation reaction. III. Kinetics of the monosulfonation of naphthalene.** I. S. Ioffe. *J. Gen. Chem.* (U. S. S. R.) 3, 963-72 (1933).—See C. A. 28, 957<sup>4</sup>.

E. J. C.

**Homogeneous catalysis of stereoisomeric change in oximes.** Thomas W. J. Taylor and D. C. V. Roberts. *J. Chem. Soc.* 1933, 1439-44.—The rate of change of  $\alpha$ -into  $\beta$ -benzil monooxime in alc. soln. was followed by pptg. the  $\alpha$ -form as an insol. Cu complex. Most of the measurements were made at  $55^\circ$ , with HCl, LiCl,  $\text{NMe}_4\text{Cl}$  and KCl as catalysts. Undissocd. mols. of the catalysts are responsible for the catalytic effect. The mechanism of the reaction is attributed to an interaction between the electronic systems of the catalyst and the C:N group of the oxime.

J. H. Reedy

**The energetics of catalysis. II. The poisoning coefficients and energies of activation in hydrogenation.** Edward B. Maxted and Victor Stone. *J. Chem. Soc.* 1934, 26-9.—The fractional decrease in activity of a Pt catalyst caused by poisoning with a given concn. of  $\text{HgCl}_2$  was the same for the hydrogenation of crotonic, oleic and benzoic acids. The energies of activation were 3100, 4600 and 9700 cal. per mol., resp., for the three acids between  $20^\circ$  and  $60^\circ$ . The sp. rates at  $40^\circ$  were 11.3, 7.25 and 0.65, resp.

P. H. Emmett

**A catalyzed reaction of hydrogen with water.** J. Horiuchi and M. Polanyi. *Nature* 132, 819 (1933); cf. Oliphant, C. A. 28, 1265<sup>4</sup>.—The exchange of atoms between  $\text{H}_2\text{SO}_4$  and heavy H in contact with it was catalyzed by Pt black, so that the deuterium content of the H fell to 0.66% of its original value in 1 hour, at room temp. When no Pt black was used, no perceptible exchange occurred. The suggested explanation is that the exchange of atoms between H and water is due to the ionization of H corresponding to the electromotive process of the H electrode.

H. S. H.

**Decomposition of nitric oxide by platinum catalysts.** 1 Joseph Zawadzki and Georges Perlinski. *Compt. rend.* 198, 260-2(1934).—Studies of the effect of temp. (854-1055°) on the velocity of dissocn. of NO with Pt catalysts lead to the equation for a monomol. reaction retarded by one of the products of decompn. ( $O_2$ ). The retarding action of added  $O_2$  is less than that of the  $O_2$  formed by the decompn. of NO. W. J. Peterson

**The catalytic activity of palladium and the overvoltage of hydrogen.** C. A. Knorr and E. Schwartz. *Z. Elektrochem.* 40, 38-43(1934).—The relation between current  $d$ . and overvoltage is given by the equation,  $\eta = -b \log [(A F + J)/A F]$ , in which  $\eta$  is the overvoltage,  $A$  the catalytic activity of the Pd electrode,  $J$  the current  $d$ .,  $F$  the Faraday and  $b$  is a const. for a given activity  $A$ . The change in the overvoltage with time is attributed to a change in the activity of the electrode surface that depends on the purity of the electrolytic soln. John R. Hill

**The heterogeneous combustion of carbonic oxide on quartz: water as a negative catalyst.** B. W. Bradford. *J. Chem. Soc.* 1934, 73-5.—A series of expts. on the rate of reaction of a  $2CO:O_2$  mixt. in a thoroughly dried quartz tube revealed a unimol. const. whose variation with temp. in the range 333° to 602° indicated an apparent energy of activation,  $E$ , of about 25,000 cal. A similar series of expts. made in the presence of 15 mm. water vapor immediately after the dry expts. indicated an  $E$  of about 40,000 cal. and showed that the rate had decreased to about  $1/10$  the "dry" value. The characteristics of both the moist and the dry reaction were consistent with heterogeneous combustion. P. H. Emmett

**The effect of methyl substitution on the catalytic dehydration of six-membered cyclic hydrocarbons.** A. A. Balandin and A. M. Rubinstein. *Z. physik. Chem.* A167, 431-41(1934).—In the presence of Ni on  $Al_2O_3$  the velocity of dehydration is about 20% greater for methylcyclohexane than for cyclohexane. The energy of activation was nearly the same for both compds. and for a mixt. of them; namely, 13,500 cal./mol. No noticeable amts. of  $CH_4$  were split from methylcyclohexane at a temp. of 300° in the presence of these catalysts. A relation was observed between the energy of activation and the pre-exponential members of Arrhenius' equation. Roy H. Baechler

**"Exergic" and "endergic" reactions.** W. Blum. *Science* 79, 84(1934).—Proposed definitions are: "Exergic reactions are those that occur with a decrease in free energy" and "Endergic reactions are those that occur with an increase in free energy." H. A. Beatty

**Measurement of thermal conductivity of poor and medium heat-conducting materials.** R. W. B. Stephens. *Phil. Mag.* 15, 857-80(1933).—Observation was made of the rate of change in the temp. of a mass of liquid contained in a cylindrical tube of the substance whose thermal cond. is being measured. The tube was in a bath kept at a suitable temp. The data confirm the theoretical treatment of the method. E. J. Rosenbaum

**Experimental detection of transport heats in electrolytic Peltier heats.** E. Lange and T. Hesse. *Z. Elektrochem.* 39, 374-84(1933); cf. *C. A.* 27, 1566.—A method of measuring Peltier heats by means of the  $Ag | AgCl$  electrode is described. The significance of heats of transport is discussed. The values are probably about 100-300 g.-cal. per mol. They depend little on concn. or activity, but are related to transport no. B. C. A.

**Heat conduction in gas mixtures.** Ottilie Riechmeier, Hermann Senfleben and Hans Pastorff. *Ann. physik* 19, 218-24(1934).—It is assumed that heat cond. in a mixt. depends on the total pressure and not on the partial pressures of the individual gases. This is proved by observations in a system contg.  $H_2O$  and its dissocn. products  $H_2$  and  $H_2O_2$ . A. B. F. Duncan

**Internal equilibria and partial vapor pressures of mixtures of primary normal alcohols with normal paraffin hydrocarbons.** Guenther v. Elbe. *J. Chem. Physics* 2, 73-81(1934).—Heats of mixing for mixts. of the first 4 normal alcs. and hexane and heptane were detd. down to practically infinite alc. diln. over a temp. range from 10° to 45°. The heat of mixing is always neg., and the heat

absorption per mol. of alc. increases with increasing diln. of the alcs. to a limit of 5800 cal. per mol.; the curves of the molar heat absorption vs. molar alc. concn. are identical for all systems. The fact that normal hydrocarbons can be mixed without any heat effect was confirmed. The results are discussed theoretically and equations are developed for the partial vapor pressures of alcs. in hydrocarbons and for the calcn. of the degree of dissocn., and therefore the heat of mixing, for any temp. and concn. Allen S. Smith

**Vapor tensions and latent heat of vaporization of some normal nitriles.** G. Heim. *Bull. soc. chim. Belg.* 42, 467-82(1933).—The vapor tensions were measured, and from them latent heats of evapn. and Trouton's const. were computed at many temps. and pressures. Acetonitrile,  $\log p = 3.16338 - (1739.98/T) + 1.75 \log T - 0.00230987$ ; propionitrile,  $\log p = 3.49640 - (1888.77/T) + 1.75 \log T - 0.00272563$ ; butyronitrile,  $\log p = 4.98045 - (2282.80/T) + 1.75 \log T - 0.00459317$ ; valeronitrile,  $\log p = 4.63143 - (2370.569/T) + 1.75 \log T - 0.00386797$ ; capronitrile,  $\log p = 3.63135 - (2319.355/T) + 1.75 \log T - 0.00242357$ ; heptanonitrile,  $\log p = 3.25005 - (2340.32/T) + 1.75 \log T - 0.00199747$ ; octanonitrile,  $\log p = 5.64288 - (3017.288/T) + 1.75 \log T - 0.00446777$ ; *cis*-crotonitrile,  $\log p = 3.88070 - (2008.41/T) + 1.75 \log T - 0.00325373$ ; *trans*-crotonitrile,  $\log p = 4.17674 - (2152.42/T) + 1.75 \log T - 0.00352618$ ; vinylacetonitrile,  $\log p = 4.50080 - (2225.313/T) + 1.75 \log T - 0.00391339$ . A. L. H

**A summary of the entropies of aqueous ions.** Wendell M. Latimer, Philip W. Schutz and J. F. G. Hicks, Jr. *J. Chem. Physics* 2, 82-4(1934).—A crit. survey of the existing data on the heats, free energies and entropies of reactions involving 20 pos. and 12 neg. ions in aq. soln. F. D. Rossini

**Calculation of thermodynamic quantities from spectroscopic data for polyatomic molecules; the free energy, entropy and heat capacity of steam.** A. R. Gordon. *J. Chem. Physics* 2, 65-72(1934).—The methods of calcn. are extended to the case of the triatomic unsymmetrical rotator. Values of  $(F^\circ - E_0^\circ)/T$ ,  $S^\circ$  and  $C_p^\circ$  for  $H_2O$  (gas) are computed for the range 298.1 to 1500° K. Revised values of the equil. const. for the water-gas reaction agree closely with exptl. data. F. D. Rossini

**Thermodynamic properties of real gases as explicit functions of the pressure and temperature.** T. C. Huang and K. C. Su. *Science Repts. Natl. Tsing Hua Univ.* A2, 37-48(1933).—Theoretical. B. C. A.

**Two remarks on the review of H. Zeise: Spectral physics and thermodynamics.** Klaus Clusius. *Z. Elektrochem.* 40, 98-101(1934).—A criticism of those portions of Zeise's review (*C. A.* 28, 404<sup>2</sup>) dealing with the normal potential of  $N_2O$ , and his conclusions to parts 1 (*C. A.* 27, 4970) and 2. Gerald M. Petty

**The thermodynamics of the electrocapillary curve I. The general equations.** F. O. Koenig. *J. Phys. Chem.* 38, 111-28(1934).—The inconsistencies in the existing theory of the electrocapillary curve are removed by starting from only one assumption, that of perfect polarizability, which is defined as meaning impermeability, to electrically charged particles, of the boundary layer between two conducting phases. The Lippmann-Helmholtz equation is found to depend only on the foregoing assumption and holds for all perfectly polarized systems regardless of their compn. F. D. Rossini

**Theory of electrocapillarity II. Thermodynamics of capillarity.** S. R. Craxford, O. Gatty and J. St. I. Philpot. *Phil. Mag.* 17, 54-64(1934), cf. *C. A.* 28, 3924.—The temp. and pressure coeffs. of surface tension are derived. The relationship of surface tension to radius of curvature is examd. The partial molar free energy of a substance in the interphase is derived for interphase thicker than monomol. The Gibbs adsorption equation is generalized to hold for interphases of finite thickness and small radius of curvature. E. J. Rosenbaum

**Supplement to paper on atomic heats and heats of fusion and transition of gallium, indium and thallium.** W. A. Roth, Ingr. Meyer and H. Ziemer. *Z. anorg. allgem.*

*Chem.* 216, 303-4(1934); cf. *C. A.* 28, 1917<sup>9</sup>.—The av. sp. heat of Ga between 0° and 16.2° was redetd.:  $C_p = 5.491 + 0.003147T - 11644/T^2$ . The sp. heat of liquid Ga is const.,  $0.0977 \pm 0.0014$ , from 21 to 100°. The heat of fusion of Ga is  $-10.16 \pm 0.01$  cal./g. or  $-1.336 \pm 0.007$  kg.-cal./g.-atom. The heat of transition  $\beta \rightarrow \alpha$  Tl (erroneously calcd. in the previous paper) is  $0.40 \pm 0.01$  cal./g. or  $0.082 \pm 0.002$  kg.-cal./g.-atom; the heat of fusion of Tl is  $-5.040 \pm 0.01$  cal./g. or  $-1.030 \pm 0.0025$  kg.-cal./g.-atom. F. L. Browne

The heat of ionization of some metals. W. A. Roth and A. Büchner. *Z. Elektrochem.* 40, 87-9(1934).—The heats of soln. of the anhyd. salt, and the heats of ionization of the metals are:  $\text{GaCl}_3$ ,  $+45.1 \pm 0.2$ ,  $+51$ ;  $\text{InCl}_3$ ,  $+23.25 \pm 0.1$ ,  $+32.7$ ;  $\text{AlCl}_3$ ,  $+78.00$ , --;  $\text{ZnCl}_2$ ,  $+16.63 \pm 0.01$ ,  $+37.08$ ;  $\text{CuCl}_2$ ,  $+11.90 \pm 0.02$ ,  $16.6$ . The heat of ionization of  $\text{Cl}_2$  is  $+79.3$ . G. M. Pettit

Correction of heat value calculations in bomb-calorimeter tests. Henrik Edenholm and Torsten Widell. *Isa* 1934, No. 1, 2-7.—In Sweden, heat values from bomb-calorimeter tests are calcd. from the equation  $W' = (100 - x)/100 [W''_{\text{wet}} - 600 \times 9 \times (H_2/100)] - 600 (x/100)$ , where  $W'_{\text{wet}}$  = the value obtained on a water-free sample,  $H_2$  = the total H content in percentage, and  $x$  the percentage of moisture. This value is somewhat low, because no regard is taken of the vol. change, and because the heat of formation of  $\text{H}_2\text{O}$  is taken as 600 instead of 585 cal. per kg. With fuel oil, the error may be 19 cal. per kg. Graphs show the errors with various fuels. E. M. S.

Thermochemistry of aluminum. A. Meichsner and W. A. Roth. *Z. Elektrochem.* 40, 19 26(1934).—Carefully analyzed Al and  $\text{Al}_2\text{Cl}_3$  were ignited in a sintered aluminum dish by means of a cotton thread smeared with petrolatum. The mol. heats of formation of  $\text{Al}_2\text{O}_3$  and  $\text{Al}_2\text{Cl}_3$  are  $393.00 \pm 0.4$  Cal. and  $20 \pm 3$  Cal. at 20° and const. pressure. Curtis L. Wilson

Balta R. de Cela, José: Prontuario de química usual moderna. T. I. Química general. 478 pp. T. II. Química inorgánica. 206 pp. Barcelona: José Bosch. Cf. *C. A.* 26, 5101.

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Müller-Pouillet's Lehrbuch der Physik. 11th ed. Edited by A. Eucken, O. Lummer and E. Waetzmann. Bd. IV. Elektrizität und Magnetismus. Tl. 4. Elektrische Eigenschaften der Metalle und Elektrolyte, magnetische Eigenschaften der Materie. Edited by Arnold Eucken. Brunswick: F. Vieweg & Sohn. 906 pp. M. 62. Cf. *C. A.* 27, 2098.

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Indicator for concentration of hydrogen ion. Shinobu Yamada. Japan. 90,664, Feb. 21, 1933. Thymol blue 0.005 g., methyl red 0.0125 g., bromothymol blue 0.05 g. and phenolphthalein 0.10 g. are dissolved in 100 cc. of pure alc., neutralized with 0.05 N NaOH and the whole is made to 200 cc. with water. The color is red when  $p_H$  is 4.0, orange at 5.0, yellow at 6.0, green at 7.0, blue at 8.0, indigo-blue at 9.0, and violet at 10.0.

## 5 SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W ALBERT NOYES, JR

Some aspects of modern chemistry. Louis D'Or. *Rev universelle sciences* 9, 313-20(1933).—The tendency in modern phys. chemistry to explain valency, affinity and at. and mol. phenomena on the basis of the knowledge of the structure of the atom and of energy levels of the electrons is discussed and illustrated by several examples of mech. models. M. Hartenheim

Note on the paper "On models of the electric field and of the photon." J. J. Thompson. *Phil. Mag.* 17, 197-8 (1934); cf. *C. A.* 28, 81<sup>9</sup>. E. J. Rosenbaum

Influence of condensation nuclei and dust particles on atmospheric ionization. P. J. Nolan. *Proc. Roy. Irish Acad.* A41, 61-69(1933).—Available data on the relation between the rate of disappearance of small ions in a closed vessel and the concn. of nuclei and dust agree with the deduction that small ions combine with dust particles as well as with condensation nuclei. Respective combination coeffs. are deduced. The square-root law of recombination is explained in the expl. indications that at high

concns the disappearance rate is proportional to the square of the concn., and is a coagulation process, and at low concns. is proportional to the concn., and is a diffusion process. B. C. A.

Theory of elementary particles. L. Goldstein. *Compt. rend.* 198, 454 6(1934).—A relativistic wave equation of the Dirac type for a particle of given rest mass will allow only a spin of  $1/2$  in the usual units if other conditions imposed by quantum mechanics are to apply. G. M. M.

The neutron and the positron. W. Bothe. *Naturwissenschaften* 21, 825-31(1933).—A review. B. J. C. van der Hoeven

Electron spin and theory of the neutron. W. Wessell. *Z. Physik* 82, 415-44(1933).—Completion of Dirac's equation by addn. of a spin potential leaves H fine structure unchanged, but gives proper functions of very high energy values, and these may be identified with neutrons. B. C. A.

Probability of electron shifts into the region of negative

energy levels. S. Saczeniwski. *Acta Phys. Polonica* 1, 363-86(1932)(in German).—See C. A. 27, 4159.

J. Wiertelak

Application of the phase-integral method to the hydrogen molecule ion. E. M. van Engers and H. A. Kramers. *Z. Physik* 82, 328-36(1933).—The phase-integral method gives results in agreement with earlier calcns. B. C. A.

The masses of the proton and electron. Arthur Eddington. *Proc. Roy. Soc. (London)* A143, 327-50(1934).—Math.

Calvin Brous

The ultra-violet radiation of the sun. M. Minnaert. *Physica* 13, 277-84(1933).—A lecture with particular reference to the O<sub>3</sub> layer in the upper atm., its concn., altitude, causes, etc. B. J. C. van der Hoeven

The effect of alkali ions on the photoelectric emissivity of tungsten. A. Keith Brewer. *Phys. Rev.* 44, 1016-19(1933). L. S. Kassel

Energy balance, electron temperature and voltage gradient in the positive column in mixtures of sodium vapor with neon, helium and argon. M. J. Druyvesteyn and N. Wurmoltz. *Phil. Mag.* 17, 1-27(1934); cf. C. A. 27, 659.—The energy balance was studied for pos. columns of Na vapor, He, Ne, A and mixts. of Na vapor with He, Ne and A. For a discharge in pure Na vapor the power input is equal to the sum of the rates at which energy is radiated and is transferred to the wall. This is also true for Na vapor plus a rare gas at a few mm. pressure, but at higher gas pressures the power input is considerably larger than the power output. The difference is attributed to energy lost by the electrons in elastic collisions with rare-gas atoms. It is concluded that the electrons have a Maxwell distribution, although the current-voltage characteristic is disturbed by the probe with currents larger than 4 amps. In the Na-Ne column the voltage gradient increases with Ne pressure up to a pressure of 0.5 mm. Ne; at higher Ne pressures the voltage gradient is independent of the pressure. The properties of the Na-rare gas pos. column can be accounted for by the equations for the pos. column. E. J. Rosenbaum

The light emission during gas discharges. II. W. de Groot. *Physica* 1, 28-34(1933); cf. C. A. 27, 1568.—Math.

B. J. C. van der Hoeven

Theory of ionization measurements in gases at high pressures. D. E. Lea. *Proc. Cambridge Phil. Soc.* 30, 80-101(1934).—The columnar theory of Jaffé (cf. C. A. 23, 4134) has been extended to  $\beta$ -rays by taking account of the clusters of secondary ionization. This agrees reasonably well with exptl. results in this case and with proton tracks in H produced by neutrons. With N nuclei in Na, however, the recombination is only about  $1/100$  that of the theory. This is explained by assuming that recoil-nuclear ionization is almost entirely primary. Exptl. results are given graphically as well as tabularly. Gregg M. Evans

Gregg M. Evans

Fatigue phenomena of light receptors. J. H. de Boer. *Physica* 13, 285-8(1933).—A lecture on fatigue of Cs photocells (Cs at. layer adsorbed on Cs<sub>2</sub>O) caused by space charge in the oxide carrier. The cell is revived by rest in the dark, by heating and by red or infra-red irradiation. B. J. C. van der Hoeven

Investigation of electron-counting chambers. Carl Bosch. *Ann. Physik* 19, 65-98(1934).—The counting effect depends on the presence of impurities, as moisture, and disappears when the electrodes are cleaned by baking and glowing and pure gases are used. Such a tube gives the counting effect if a cathode of small dimensions is used. Cathodes of ordinary size behave similarly as a result of points of impurities. The effect is attributed to pos. space charge. Louis Goldman

Quantum yield in "light-counters." K. W. Hauser and K. H. Kreuchen. *Z. tech. Physik* 15, 20-3(1934).—The photoelec. quantum yield in a "light counter" of Al, Zn, Cd, Fe, Cu or brass was studied between 254 and 400 m $\mu$ . The results show agreement with values detd. in a photocell. J. B. Austin

Measurements of ionic mobilities in the positive column. Sidon Harris. *Phil. Mag.* 17, 131-45(1934).—The speed of rotation of the pos. columns of H and air

around a central radial magnetic field was measured with a stroboscope. The transverse Hall effect was measured in the pos. column as a function of current through the discharge and the gas pressure. From these data, ionic mobilities were calcd. which were half as large as those of ions produced by x-rays in H and in air at atm. pressure. The values obtained for the mobilities of the neg. ions agree with the values of Townsend for free electrons. E. J. Rosenbaum

E. J. Rosenbaum

Ionization density and critical frequency. Lewi Tonks. *Nature* 132, 710-11(1933).—The coeff.  $1/2$  in Hartree's expression (*Proc. Cambridge Phil. Soc.* 27, 143(1931)) for the relation between electron concn. and crit. frequency in an ionized gas results from his treatment of the ions as the bound ions of a dielectric. If the elastic binding force is replaced by a Coulomb force, the coeff. becomes unity. Louis Goldman

Louis Goldman

Measurement of the Townsend coefficients for ionization by collision. Frederick H. Sanders. *Phys. Rev.* 44, 1020-4(1933). L. S. Kassel

The production of secondary electrons by argon positive ions and by argon atoms. Charles J. Brasefield. *Phys. Rev.* 44, 1002-5(1933).—Argon pos. ions with energies up to 150 v. are found to be much less efficient in producing secondary electrons than are neutral, possibly metastable, atoms of the same velocity. Conclusion: Pos. ions as such have nothing to do with the maintenance of a cold-cathode discharge. L. S. Kassel

The passage of slow positive ions through highly rarefied gases. Otto Beeck. *Physik. Z.* 35, 36-52(1934).—A review. M. McMahon

M. McMahon

The concentration of excited sodium atoms and of sodium ions in a sodium low-voltage arc. M. J. Druyvesteyn. *Physica* 1, 14-27(1933).—By means of a reversal method the ratio of Na atoms in 2p and in normal state was detd. for a Na low-voltage arc. The electron temp. (17,000°abs.) was detd. by a probe electrode. For increasing c. d. the total no. of atoms per cc. increases from  $19$  to  $96 \times 10^{11}$ , that of normal atoms from  $5.7$  to  $14.7 \times 10^{11}$ . By the Kohn method (C. A. 27, 1271) the ratio of excited to normal atoms was calcd. from measurements of the reversal temp. This ratio, the fraction of atoms in 2p state, is 0.12; the fraction of atoms in higher excited states is probably 0.05; the no. of Na<sup>+</sup> ions (at 4-5 amps.) 216-537 per 100 normal 1 s atoms. B. J. C. van der Hoeven

B. J. C. van der Hoeven

Excitation potentials of light metals. II. Beryllium. H. W. B. Skinner. *Proc. Roy. Soc. (London)* A140, 277-301(1933); cf. C. A. 26, 2112.—Measurements have been made of the "excitation curve" ( $\Delta i/\Delta V$  plotted against  $V$ ) for Be, with both W and dull-emitter filaments, and it is found that the "break potential" (values of  $V$  for which abrupt changes in  $\Delta i/\Delta V$  occur) are displaced correspondingly with the change of filament. When a correction for the work function of the filament is applied, the break potentials are consistent. Excitation starts at 8.5 v., rises continuously up to 92 v., where large and abrupt changes in  $\Delta i/\Delta V$  occur and persist up to 125 v. There is an appreciable difference between the min. K-excitation potentials of Be in the form of metal and of a polar compd. An approx. model for the excited state of the metal, based on the state of the corresponding at. system, is proposed. B. C. A.

B. C. A.

Investigation of copper oxide films by electron diffraction. C. A. Murison. *Phil. Mag.* 17, 96-98(1934).—Oxide films were formed on Cu blocks and were investigated by electron diffraction. The patterns obtained were those due to Cu<sub>2</sub>O, to CuO and a pattern for which the structure has not been detd. The new pattern could be formed by heating Cu to 300-500° and blowing air or O through the furnace. The substance giving the new pattern is another crystal form of CuO. It is sensitive to mech. treatment. E. J. Rosenbaum

E. J. Rosenbaum

Diffraction of electrons by mica. James A. Darbyshire. *Z. Krist.* 86, 313-24(1933)(in English).—Expts. on the passage of high-speed cathode rays through thin slips of muscovite are described, and a table is given showing the variation of the effect with thickness (measured by



means of the Michelson interferometer). Also the nature of the patterns obtained by reflection from freshly cleaved slips is discussed. As the azimuth is changed, pseudosym. effects occur when the incident beam travels along the more important zone axes lying in the cleavage plane.

L. S. Ramadell

**Electron diffraction and the imperfection of crystal surfaces.** L. H. Germer. *Phys. Rev.* 44, 1012-15(1933); cf. *C. A.* 27, 3863.—Electrons of 0.05 Å. wave length were used to det. "rocking curves" for single crystals of Fe, Ni and W. The estd. widths at half max. are 0.8°, 1.5° and 1°, as compared with 14', 24' and 6', resp., for x-ray rocking curves. The crystal surface is thus more imperfect than the interior; even x-rays do not have sufficient penetration to give results certainly characteristic of the whole crystal.

L. S. Kassel

**Electron conductivity in crystals.** R. W. Pohl. *Physik. Z.* 35, 107-11(1934).—Electrons introduced into transparent crystals of KCl, KBr, KI and NaCl give rise to optical phenomena which can be measured. Absorption spectra-frequency curves are bell-shaped, the position of the max. depending on temp. By calcn. it is shown that a cu. cm. holds about  $10^{17}$  electrons. The speed of the electrons through the crystal increases with temp. The free path of electrons varies from about  $10^{-6}$  cm. in NaCl to 1 cm. in AgCl. The behavior of electrons is related to photoelec. effects and formation of photographic latent images.

L. P. Hall

**Atom collisions. I. Production of slow atomic beams by discharge and their measurement with a thermoelement.** Otto Beecck. *Ann. Physik* 19, 121-8(1934).—A new method is described for obtaining slow at. beams of uniform energy and measuring their abs. energy. **II. Ionization of argon by neutral argon.** Otto Beecck and Harold Wayland. *Ibid.* 129-42.—The app. described above is used to study the ionization of A by an A beam having the energy 350-650 ion v. equivs. The no. of collisions producing ions is large. The exptl. work agrees with the theory of Weizel and Beecck (*C. A.* 26, 5829).

A. B. F. Duncan

**Magnetism of free radicals.** Samuel Sugden. *Trans. Faraday Soc.* 30, 18-24(1934).—A discussion of magnetic susceptibility in its relation to the no. of electrons in the mol. and as a test for free radicals. Some data on the ketyls are given. This method makes possible an approx. estimate of a magnetic moment when the concn. of the free radical is 3-5%. It is suitable only for free radicals of long life.

E. R. Rushton

**Nuclear physics.** Theodor Seel. *Physik. Z.* 35, 119-41 (1934).—A discussion and correlation of the work on the scattering of  $\alpha$ -particles in heavy and light nuclei, emission of  $\alpha$ -particles, etc. A short bibliography is given.

L. P. Hall

**General chemical equation.** W. Harrison. *Chemistry & Industry* 1933, 370.—If the elements are represented by formulas of the type  $A_xN_y$ , where  $x$  is the at. wt. and  $y$  the at. no., radioactive changes and the transmutations of light elements may be represented by equations which resemble ordinary chem. equations, e. g.,  $Li + H = 2He$  becomes  $A_7N_3 + A_1N_1 = 2A_4N_2$ .

B. C. A.

**Representation of nuclear transformations.** G. Petiau. *Compt. rend.* 198, 564-6(1934).

C. A. Silberrad

**New applications of radioactivity.** Hans Kading. *Arch. Pharm.* 272, 38-54(1934).—Applications in chemistry, physics and medicine are reviewed. W. O. B.

**Anomalies in the proportions of the elements and the origin of the radioactive elements.** W. M. Elsasser and K. Guggenheimer. *Compt. rend.* 197, 1627-9(1933).—The rare gases are found on earth in very minute quantities compared to their neighboring elements. This may be explained if one postulates that at one time the noble gases were present in similar proportions to the other elements in the earth's atm. and the earth was subject to neutron bombardment. A neutron may be captured by a nucleus and the product emit a  $\beta$ -particle and this process continued repeatedly. By this process A and Kr may have been converted into radioactive K and Rb isotopes 41 and 87. Meteors may have passed through swarms of

neutrons and thus had nuclei built up as large as possible. This would explain formation of the radioactive elements and also why they are found only on the surface of the earth and are not of primary origin. O. E. S.

**Theory of positrons.** V. A. Fok. *Compt. rend. acad. sci. U. R. S. S. [N. S.]* 1933, 265-7(in German 267-71).—Math.

Howard Agnew Smith

**A new type of radioactivity.** Irène Curie and F. Joliot. *Compt. rend.* 198, 254-6(1934).—Certain light elements (Be, B, Al) which have been irradiated with  $\alpha$ -rays of Po will emit pos. electrons for a time after the removal of the source of  $\alpha$ -rays;  $1/3$  hr. in the case of B. W. J. P.

**Chemical separation of new positive electron-emitting radioelements.** Irène Curie and F. Joliot. *Compt. rend.* 198, 559-61(1934); cf. preceding abstr.—The probable formation of radioactive, positron-emitting  $N^{11}$ ,  $Si^{27}$  and  $P^{30}$  (for which the names *radio-nitrogen*, *-silicon* and *-phosphorus* are proposed) with half lives of 14, 2.5 and 3.5 min., by capture of  $\alpha$ -particles from Po by B, Mg and Al, resp., is supported by chem. examn. of irradiated BN and Al. A source of about 100 millicuries of Po was used, producing about  $10^8$  atoms of the radioactive element. That from B behaved like N, that from Al as P.

C. A. Silberrad

**The neutron.** Arthur Bramley. *Science* 79, 160(1934).—Remarks on nuclear stability. G. M. Murphy

**An attempt to detect a neutral particle of small mass.** J. Chadwick and D. E. Lea. *Proc. Cambridge Phil. Soc.* 30, 59-61(1934).—Energy considerations in  $\beta$ -ray emission from certain elements such as Ra E seem to demand a neutral particle of varying energy of mean value about  $6 \times 10^4$  v. Search for such a *neutrino*, however, was fruitless. The expts. were such that a particle of the mass of an electron, with a magnetic moment of 1 Bohr magneton, would have been detected. Gregg M. Evans

**Possibility of the emission of neutral particles of no intrinsic mass during the  $\beta$ -ray radioactive changes.** Francis Perrin. *Compt. rend.* 197, 1625-7(1933).—The apparent energy loss during a  $\beta$ -ray emission has not been explained and in order to explain conformation of these  $\beta$ -ray changes to the law of conservation of energy P. proposes that one assume a neutral particle of no intrinsic mass is produced and has an amount of energy corresponding to this apparent loss. Pauli has already assumed a similar particle but with the same mass as the electron and has called it a *neutrino*. Neutrinos, then, are more nearly related to photons than to electrons. O. E. S.

**Hoffmann Stösse and the origin of cosmic-ray ionization.** W. F. G. Swann. *Phys. Rev.* 44, 1025-7(1933).—It is calcd. that the observed frequency of Hoffmann Stösse is sufficient to give a considerable fraction of the total cosmic-ray ionization.

L. S. Kassel

**Measurement of the ionization per centimeter of path by individual secondary cosmic rays.** W. F. G. Swann. *Phys. Rev.* 44, 961-8(1933); *J. Franklin Inst.* 217, 79-86 (1934).—By a novel statistical method the ionization per cm. path for cosmic-ray secondaries is found to be 89 ions at atm. pressure, equiv. to 61 and 57 for N and O, resp. Higher values found in other ways are due to multiple secondaries, the existence of which is shown.

L. S. Kassel

**The radium-uranium ratio and the number of actinouranium isotopes.** Arthur E. Ruark and Forrest Western. *Phys. Rev.* 45, 69-70(1934).—Data on the Ra-U ratio in pitchblendes, and on the Act branching ratio indicate that there is only a single actinouranium isotope.

L. S. Kassel

**An attempt to decompose the lead atom.** A. Smita, H. S. Vening Meinesz, J. A. A. Kruger and H. G. Roeberson. *Z. Elektrochem.* 40, 71-3(1934).—A Pb plate in air, exposed to x-rays, showed an activity which was not shown by Al, or by either metal in a vacuum. This activity was not shown when Pb was exposed to sunlight. The activity of Pb from a roof is probably due to the pptn. on it of radioactive dust from the air. Gerald M. Petty

**The disintegration of lead by means of penetrating radiation.** B. Rossi. *Nuovo cimento* 10, 349-54(1933).—The secondary radiation generated by penetrating rays

(cf. C. A. 26, 3991) arises in a nuclear process of the type photographed by Blackett and Occhialini (cf. C. A. 27, 2874). Its immediate cause is a radiation, also generated by penetrating rays, which has the property of being absorbed by at. nuclei.

J. B. Austin  
Equations of motion of the neutron. W. M. Elsasser. *Compt. rend.* 198, 441-3(1934).—Math. G. M. M.

Theoretical remarks on the emission of corpuscular radiation ( $\beta$ -rays and positrons) and the symmetry between particles and antiparticles. Jean L. Destouches. *Compt. rend.* 198, 467-9(1934). G. M. Murphy

Radiative collisions of neutrons and protons. H. S. W. Massey and C. H. O. Mohr. *Nature* 133, 211(1934).—The calcd. expectation of combination between a neutron and a proton is 1:1000 under the conditions of Lea's expt. (C. A. 28, 1921<sup>9</sup>); he observed 1:4. G. M. P.

Slow neutrons emitted by beryllium by the action of  $\alpha$ -rays. P. Auger. *J. phys. radium* [7], 4, 719-24(1933); cf. C. A. 26, 5256; 27, 1570.—By use of the app. previously described (C. A. 21, 1591) photographs at right angles of proton trajectories were made. Stereoscopic photographs were also obtained when the automatic compression chamber was in an electromagnetic field. Photographs of proton trajectories were also obtained when a chamber supporting 2.5 atm. pressure of H (instead of 1 atm. as in 2 previous cases) satd. with  $H_2(O)$  vapor was used. The protons ejected by the neutrons obtained from Be by bombardment with  $\alpha$ -particles from Po divide themselves distinctly into 2 classes: the ones corresponding to the action of neutrons of high energy, and the others corresponding to neutrons of low energy—about a tenth that of the first group. Of 418 trajectories photographed under 2.5 atm. pressure 343 showed ranges less than 50 mm., 26 were doubtful and 49 greater. Analysis of the photographs indicates that the slow neutrons are mostly emitted directly (independently of secondary effects, diffusion and inelastic collisions) and form a diffuse group. The slow neutrons are probably emitted from Be when an excitation of a Be nucleus by  $\alpha$ -particles occurs without capture, a part at least of the exciting energy being used to emit the slow electrons. O. E. S.

Calculations on the range-velocity relation for  $\alpha$ -particles and protons. W. R. Duncanson. *Proc. Cambridge Phil. Soc.* 30, 102-13(1934).—Math. G. M. P.

Anomalous heat effects of some radioactive minerals. A. Dorabialska. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 352-6(in French); cf. C. A. 27, 2091. J. Wiertelak

A simple method for determining the diffusion coefficient of radium emanation. Nella Mortara. *Atti accad. Lincei* 17, 949-51(1933).—A 50-cm. tube of Pb, fitted with a hole at one end and a glass needle contg. Ra in the other, is placed in the jaws of a press. After 15 min. the tube is flattened in the press and cut into 3-cm. lengths. The radioactivity of each length is detd. The diffusion coeff. is 0.11, in agreement with previous values. J. B. A.

Method of preparation of sources of radium E. M. Hatssinsky. *Nature* 132, 317(1933); *J. chim. phys.* 31, 43-6(1934); cf. C. A. 27, 5243. G. M. P.

A zero method for the determination of radium by  $\gamma$ -radiation. A. Piccard and L. Meylan. *J. phys. radium* [7], 4, 715-18(1933).—By using 2 identical ionization chambers 20 cm. in diam. contg.  $CO_2$  under 10 atm. pressure connected to the same electrode and leaf system, an app. following the principles of Rutherford and Chadwick's  $\gamma$ -ray method for the detn. of Ra is obtained which enables more accurate measurements to be made more quickly. The unknown sample is moved until its effect exactly balances the known and the scale reading observed. The refinements introduced make the method suitable for rapid measurements of av. precision.

Oden F. Sheppard

Photoelectric absorption of  $\gamma$ -rays by heavy elements. J. McDougall and H. R. Hulme. *Nature* 132, 352-3(1933).—Math. A. I. Henne

Nuclear  $\gamma$ -absorption. Th. Heiting. *Naturwissenschaften* 21, 800(1933).—Previously (C. A. 28, 406<sup>4</sup>) the appearance of secondary radiation with  $\lambda = 24$  =

1 X. U. on irradiation of Al, Fe, Cu or Pb with Th C<sup>+</sup>  $\gamma$ -rays was found. This wave length corresponds to the energy  $h\nu = mc^2$ . Recently (Anderson, C. A. 27, 5241) the formation of positrons from the action of hard Th C<sup>+</sup>  $\gamma$ -rays on heavy metals was observed. If the positron unites with an electron an energy of  $2mc^2$  is liberated in 2 quanta of  $mc^2$  each. This explains the above radiation as one of recombination, hence independent of at. no. The nuclear absorption is interpreted as a splitting up in the field of the nucleus of the primary  $\gamma$  quantum into a pos. and a neg. electron. B. J. C. van der Hoeven

Action of  $\beta$ - and  $\gamma$ -rays on rock-salt crystals. P. W. Burbidge. *Proc. Cambridge Phil. Soc.* 30, 62-9(1934).—Rock salt, on application of an elec. field and illumination with blue light, after small dosages of  $\beta$ - or  $\gamma$ -rays, gave a photoelec. current which decreased exponentially with time. This could be repeated cyclically. The increase of total charge collected is plotted against increase of field. The variation of charge with dosage and light frequency is also shown. A crystal 4 sq. cm. in area was found to collect  $7 \times 10^8$  quanta from  $\gamma$ -rays and  $40 \times 10^8$  from  $\beta$ -rays. The electron efficiency is low, only about 1 electron per  $\beta$ - or  $\gamma$ -ray. Gregg M. Evans

Effects of  $\alpha$ -particles on aqueous solutions. I. The decomposition of water. II. The oxidation of ferrous sulfate. Carl E. Nurnberger. *J. Phys. Chem.* 38, 47-60(1934).—The decompn. of water by  $\alpha$ -rays from dissolved Rn and from Rn contained in a glass bulb was studied by measuring the gas produced. After corrections were applied a yield of 0.371 cc. per millicurie was obtained for dissolved Rn and the percentage transmission for glass bulbs was detd. The percentage of  $FeSO_4$  oxidized rises linearly with the  $\alpha$ -ray dosage, and hence the reaction goes to completion. It is evolved in accordance with Cameroun and Ramsay's law and side reactions take place.

Louis Goldman

Naming hydrogen isotopes. Willis A. Boughton. *Science* 79, 159-60(1934). E. H.

Concentration of the heavy hydrogen isotope by electrolysis. H. Erlennmeyer and Hans Gartner. *Helv. Chim. Acta* 17, 30-1(1934).—Electrolysis of 8 l. of 0.1 N  $H_2SO_4$  on Pb electrodes to a final vol. of 13 cc. yielded 12 cc. of water weighing 5.6 mg. more than the control sample of ordinary water. L. W. Elder

Manufacture of pure heavy hydrogen isotope by diffusion. G. Hertz. *Naturwissenschaften* 21, 884-5(1933). The expts. for isotope sepn. by diffusion were continued, 48 sepn. units being used. The process applied to normal Ne gave Ne<sup>22</sup> spectroscopically free from Ne<sup>20</sup>.  $H_2$  from  $H_2O$  and Mg was treated in the same app. with an added discharge tube to convert  $H^+H^+$  mols. into  $H_2^+ + H_2$ . The  $H_2^+$  made gave a spectrum for almost pure  $H_2^+$ .

B. J. C. van der Hoeven

The diffusion of hydrogen through metals: fractionating the hydrogen isotopes. Colin G. Pink, Harold C. Urey and D. B. Lake. *J. Chem. Physics* 2, 105-6(1934). Two sheets of steel welded together and used as cathode in the electrolysis of an acid soln. eventually bulged bc cause of the pressure of H between the sheets. Similar effects were obtained with tubes of Fe, Ni and Pd. A Pd tube was then used as cathode in a soln. contg. fuming  $H_2SO_4$  and  $H_2O$ , the latter having 0.5%  $H^2$ . At the end of 28 hrs. the H that had diffused through the Pd was analyzed after having been converted to  $H_2O$ . Its d. was 1.00020, showing that some fractionation of  $H^2$  had occurred. The rate of passage of H through the Pd was also detd. but no O passed through when the Pd was made the anode. On the basis of the overvoltages involved, calcn. shows that the pressures of H passing through the metal are of the order of a million atm.

G. M. Murphy

Isotopic fractionation of hydrogen. Herschel Hunt. *J. Chem. Physics* 2, 108(1934).— $H_2O$  contg. 1 part  $H^2$  to 200 parts  $H^1$  was electrolyzed and the H evolved passed over CuO in such a way that half the gas recombined to form  $H_2O$  at 200° and the rest reacted at 600°. The  $H_2O$  obtained at the low temp. had a mass of 6.6 less than the 10 ml. collected at 600°. By use of 2 cells

in series so that the H flow was twice as great the mass difference was 5 mg.

**Chemical separation of deuterium from hydrogen.** A. Parkas and L. Parkas. *Nature* 133, 139(1934).—It is anticipated that reactions for which the energies of activation are small enough to render them sensitive to the difference in zero-point energies will react at different rates. Deuterium and H behave thus, there being a difference in the velocity of liberation of these isotopes when metals are dissolved in water or acid. The rates of production of H and deuterium for Zn, Al, Ca and Na stand in the ratio of 4, 2, 1.5 and 1.2 to 1, resp. Analogous reactions with compounds contg. H are being investigated.

**The weight ratio of the lithium isotopes  $\text{Li}^7$  and  $\text{Li}^6$ .** L. S. Ornstein, J. A. Vreeswijk, Jr. and G. Wolfsohn. *Physica* 1, 53-9(1933).—van Wijk and Koevring (C. A. 25, 5001) detd. the ratio  $\text{Li}^7:\text{Li}^6$  as 7.2 by band-spectrum measurements (cf. Schuler's value of 10.5, C. A. 25, 1734; Nakamura's of 8, C. A. 26, 1187; also van Wijk, C. A. 26, 1510). The work was repeated by study of the Li line of 6708 Å. in a Schuler discharge tube. A Hilger step grating was used. From the intensity ratios in the triplet  $V = i_1/2i_2$  or  $(i_1 - 2i_2)/i_2$  the av. ratio was found to be  $8.1 \pm 0.4$ . The at. wt. calcd. from this value, 6.904  $\pm$  0.005 (cf. Bainbridge, C. A. 27, 4164), is not in agreement with the chemically detd. value of 6.940.

**The measurement of x-ray emission wave lengths in the M-series by means of the ruled grating.** E. G. Purdom and J. M. Cork. *Phys. Rev.* 44, 974-6(1933). Wave lengths are detd. for 13 elements with at. no. greater than 71; the results are consistently 0.32% higher than those found by the crystal method.

**The K absorption discontinuities of the elements zirconium to iodine.** P. A. Ross. *Phys. Rev.* 44, 977-83(1933).—A double-crystal spectrometer was used to study the K absorption edge for Zr, Nb, Mo, Ru, Rh, Pd, Ag, Cd, Sn, Sb, Te and I. The width of the main step increases with at. no. The position of the inflection point of the absorption curve is detd. to  $\pm 0.02 \times \lambda$ .

**The natural widths of the L-series lines in the x-ray spectra of elements 74 to 83.** John H. Williams. *Phys. Rev.* 45, 71-5(1934).

**The relative intensities of certain L-series x-ray satellites in cathode-ray and in fluorescence excitation.** F. R. Hirsh, Jr., and F. K. Richtmyer. *Phys. Rev.* 44, 955-60(1933).—The problem of the origin of x-ray satellites is attacked by a study of their relative intensities when excited by 20-kv. electrons and by Ag L radiation. The elements studied were Zr(40), Mo(42), Ru(44), Rh(45), Pd(46) and Ag(47). The results for fluorescent excitation suggest an origin in LM ionization, but the rapid variation with at. no. of the intensities for electron excitation show that the outer electrons must be involved. Satellite intensities up to that of 72% of the parent line, as for Rh, offer difficulty to any theory of double ionization.

**Some fundamental concepts of the technic of x-ray measurement.** Robert Jaeger. *Z. tech. Physik* 15, 39-42(1934).—Differences are pointed out between the dose detd. for monochromatic and for heterogeneous radiation.

**X-ray diffraction in long-chain liquids.** B. E. Warren. *Phys. Rev.* 44, 969-73(1933).—The theory of Zernicke and Prins (C. A. 21, 1730) is extended and applied to the data of Stewart (C. A. 21, 2206; 22, 1008). Long-chain mols. are straight in liquids, and neighboring mols. are roughly parallel. The main peak, obtained with all hydrocarbon compds., is detd. by the distance to a concn. of scattering matter, and is about 8% larger than the lateral chain sepn. The inner peak for alcs. and fatty acids is detd. by the distance from the end group to the gap at the other end of the chain.

**Wave lengths and spectral laws.** F. Paschen. *Sitzber. preuss. Akad. Wiss. Physik.-math. Klasse* 1933, 876-85.—

It is shown that the errors in wave no. affecting spectrum lines are least for wave lengths measured in the red and infra-red. Therefore, spectral terms derived from measurements of such lines are more accurate than those derived from lines of shorter wave length, and may be used, in consequence of the combination principle, to calc. the wave nos. of lines in the ultra-violet and Schumann region where standard wave lengths are still not available and the precision of measurement is not high. Illustrative examples are chosen from the spectra Al I and Al II.

**The Stark effect of the Lyman series.** Rudolf Frerichs. *Ann. Physik* 19, 1-8(1934).—Theoretical and measured values for the no., sepn. and intensity of the components of the 1st 3 lines of the Lyman series for H are given. Only the intensity values disagree with theory. L. G.

**Relative intensity of atomic spectral lines from a hydrogen discharge tube.** W. W. Jackson. *Phil. Mag.* 17, 33-53(1934).—The at. spectrum of H was obtained free from background. The intensity of the lines was measured with a thermoelement and a sensitive galvanometer for values of the discharge current in the range 200-800 ma. When the intensity of  $H\alpha$  is plotted against the current, the curve is parabolic; for  $H\beta$  and  $P\alpha$  (Paschen series) the variation is linear. The ratio of the intensities of  $H\alpha$  and  $H\beta$  increases linearly with the current, while the ratio of  $H\beta$  to  $P\alpha$  is a const. equal to 2.9. The ratio of the corresponding transition probabilities is 0.7.

**Effect of pressure on high terms of alkaline spectra.** E. Amaldi and E. Segrè. *Nature* 133, 141(1934).—The expectation that the high terms of the Na 3S - nP series would be destroyed by adding a foreign gas was unfounded. Na-N<sub>2</sub> and Na-H<sub>2</sub> mixts. were studied at atm. pressure. A slight broadening of the high terms occurred in Na-N<sub>2</sub> mixts. In the Na-H<sub>2</sub> mixts. a shift to the violet was evident in the high terms. With a concn. of  $4.8 \times 10^{19}$  mols. of H<sub>2</sub>/cc. a displacement of 7.5 cm.<sup>-1</sup> was observed. The shift is proportional to the concn. of the gas.

**Broadening of spectral lines due to an increase in pressure.** Antonio Carrelli. *Rend. accad. sci. Napoli* [4], 3, 39-64(1933).—A math. treatment of the broadening of spectral lines due to the presence of quasi-mols. II. *Ibid.* 101-9.—The distribution of intensity is studied in lines emitted from Na and K vapor of high d. The results point to the presence of quasi-mols. J. B. A.

**The ionization potential of Fe II.** J. C. Dobbie. *Phys. Rev.* 45, 76-8(1934).—Two new terms found in the spark spectrum of Fe permit the principal ionization potential of Fe II to be calcd. as 16.16 v.

**Hyperfine structure absorption in optically excited mercury vapor.** M. L. Pool and S. J. Simmons. *Phys. Rev.* 44, 997-1001(1933); cf. C. A. 28, 1270<sup>a</sup>.—The linear absorption coeffs. for the various components of  $\lambda$  4047 passing through excited Hg vapor were detd.

**Multiplet and hyperfine structure analyses of Bi IV.** Discussion of perturbation effects. A. B. McLav and M. F. Crawford. *Phys. Rev.* 44, 986-96(1933). L. S. K.

**New spectrum of zinc; Zn IV.** L. Bloch and E. Bloch. *Compt. rend.* 198, 645-7(1934).—Vacuum spark spectra are superior as regards intensity and definition to spark spectra in air, resembling, but being more satisfactory than, spectra obtained with the oscillating electrodeless discharge. In this way 133 lines (4039.34 - 2580.9) of Zn IV have been measured. This spectrum contains no lines between 4900 and 4040, or beyond 2580 Å. (cf. C. A. 20, 1952).

**Quenching of atomic thallium fluorescence by foreign gases.** N. A. Prilezhayeva. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1933, 280-1 (in English 282-3); cf. C. A. 27, 3141, 3142.—Expts. were made with Tl I in a quartz tube at 400°, the pressure of the quenching gases N<sub>2</sub>, O<sub>2</sub>, CO, CO<sub>2</sub>, H<sub>2</sub>, H<sub>2</sub>O and A being varied from 0 to 500 mm. The line ( $^2S_{1/2} \rightarrow ^2P_{1/2}$ ) at 5351 Å. emitted by the excited Tl atom was studied. The exciting light was generated by a condensed spark between metallic elec-

trodes, the intensity of the fluorescence being measured photometrically.  $N_2$ ,  $CO$ ,  $H_2O$  and  $A$  are effective in quenching through collisions of the second kind, while  $H_2$  fails to act at all in quenching. Quenching is greatest with  $CO_2$  and  $O_2$  where reaction with the excited  $Tl$  atom is possible.

Howard A. Smith

Weiss constant of paramagnetic ions in the  $S$ -state. Akshayananda Bose. *Nature* 133, 213(1934).—The magnetic susceptibility of  $Mn^{++}$  ions in solns. from room temp. to  $98^\circ$  obeys the simple Curie law; the max. value of the Weiss const. is  $<3$ . The Curie const. for  $Mn^{++}$  is 4.19 in  $MnCl_2$  and 4.11 in  $Mn(NO_3)_2$  solns.; these correspond to 28.8 and 28.5 Weiss magnetons, resp.

Gerald M. Petty

Continuous spectrum of neon. Tsi-Ze Ny and Shueh-Ling Voo. *Compt. rend.* 198, 350-8(1934).—The continuous spectrum of Ne was compared photographically with that of  $H_2$  and was found to increase regularly with increasing wave length from about 2500 Å. in the ultra-violet to a max. at 3400 Å. The intensity of various portions of this spectrum varies proportionately with the current through the discharge tube, thus indicating that it is not due to recombination of electrons with ionized atoms.

C. C. Kiess

The spectrum of atomic nitrogen ( $N I$ ) in ammonia and in mixtures of hydrogen and nitrogen. D. Séférian. *Compt. rend.* 198, 358-40(1934); cf. *C. A.* 28, 19247. — An arc between  $W$  electrodes in atms. of  $NH_3$  and of various mixts. of  $N_2$  and  $H_2$  emits 3 groups of lines of  $N I$  in addn. to the first 4 Balmer lines of  $H$  and the ultimate rays of  $W$ . A continuous spectrum was observed, distinct from that of the incandescent electrodes, which is ascribed to the  $W$  atom.

C. C. Kiess

Predissociation in the upper level of the Ångström bands of carbon monoxide. D. Coster and F. Brons. *Nature* 133, 140(1934).—In the  $P$ ,  $Q$  and  $R$  branches of the  $0 \rightarrow 1$  band ( $1^2\Sigma \rightarrow 1^1\Delta$ ) the lines abruptly decrease in intensity beginning with the same value  $J = 38$  of the upper level. From the observed energy of predissocn. the disson. energy of the normal state is calcd. as  $D = 9.82$  v. The disson. energies of other terms are:  $A^1\Pi$ , 1.82;  $B^1\Sigma$ , 2.28;  $a^1\Pi$ , 3.84;  $a^1\Sigma$ , 3.94; and  $d^1\Pi$ , 3.10 v. The upper zero vibration level of the Herzberg bands lies about  $3100\text{ cm}^{-1}$  higher than the disson. term  $^3P + ^1D$  and are thus more difficult to get than the Ångström bands.

Howard A. Smith

Fluorescence of vapor of iodine excited by circularly polarized light and viewed longitudinally. P. Daure and A. Kastler. *Compt. rend.* 198, 557-9(1934).—Theory requires that the short-wave component of a doublet in the fluorescent spectrum of  $I$  vapor should be purely vibrational ( $\Delta J = 0$ ), while its long-wave satellite is vibration-rotational ( $\Delta J = +2$ ), and therefore should exhibit circular inversion (*C. A.* 12, 1148). By a method similar to that of Hanlé (*C. A.* 26, 3728) this has been verified for the doublet of order 1.

C. A. Silberrad

The fluorescence of diatomic arsenic molecules. P. Swings and M. Migotte. *Compt. rend.* 197, 836-8(1933).

Four resonance series due to  $As_2$  are excited by the Hg arc. The distance between atoms is calcd. to be  $1.94$  Å. and the moment of inertia is  $234 \times 10^{-40}$  g. sq. cm.

J. B. Austin

Existence of oxygen in the atmosphere of Mars. D. I. Bropkin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 100(in English 100-1); cf. *C. A.* 28, 423.—E. suggests a study of the 3200-3400 Å. region for  $O_2$  bands to settle the question of the existence of  $O$  on Mars.

F. H. Rathmann.

The infra-red bands and molecular constants of hydrobromic acid. E. K. Plyler and E. F. Barker. *Phys. Rev.* 44, 984 5(1933).—The fundamental and first harmonic bands were examd. with high resolution. The data give  $\nu_0 = 2649.74\text{ cm}^{-1}$ ,  $r_0 = 1.4096 \times 10^{-8}$  cm. and certain anharmonic const.

L. S. Kassel

Electronic levels of polyatomic molecules. I. Levels of the  $C \equiv C$  double bond. C. P. Snow and C. B. Allsopp. *Trans. Faraday Soc.* 30, 93-9(1934).—Mulliken's

theoretical work on the  $C \equiv C$  double bond in  $C_2H_4$  (*C. A.* 27, 2374) was tested experimentally, and the upper states of trimethylethylene and cyclohexane are shown to be very similar to those of  $C_2H_4$ . The range of transition derivs. permitted by the theory is not observed. Assignment of the principal bands of trimethylethylene and cyclohexane are tentatively made on the same lines as  $C_2H_4$ ,  $(x+x)(x-x)^1B$  upper state,  $(x+x)(s+s)^1A$  ground state, and very weak bands,  $^1A \rightarrow ^1B$ , the multiple analogs of the above transitions.

E. R. Rushton

The infra-red absorption of ozone. G. Hettner, R. Pohlman and H. J. Schumacher. *Naturwissenschaften* 21, 884(1933).—The  $O_3$  spectrum was studied from visible region to  $27\text{ }\mu$ ; no new selective absorption was found beyond that at  $13.8$  and  $14.4\text{ }\mu$  (*C. A.* 27, 4735). The basic vibration at  $7.6$  (or  $7.39\text{ }\mu$ ) (Gerhard, *C.* 1 27, 2094) does not belong to  $O_3$ , nor does the band at  $11.38\text{ }\mu$ . Both bands are due to traces of  $N_2O_5$  present in impure  $O_3$ . A partial pressure of  $1.7\text{ mm. NO}_2$  causes these bands to appear strongly.

B. J. C. v. d H

Infra-red absorption spectra of  $NO_2$  and  $N_2O_4$ . Louis Harris and G. W. King. *J. Chem. Physics* 2, 51 7(1934).—Several new bands of  $NO_2$  and  $N_2O_4$  in the region  $1-4\text{ }\mu$  are reported and analyzed. The spectra are shown to favor angular  $NO_2$  mols. and double mols.  $O_2N-NO_2$ , for the latter possible configurations are discussed.

C. D. West

The ultra-violet absorption of binary liquid mixtures III. The system propionaldehyde-ethyl alcohol. Max Pestemer and Paula Bernstein. *Monatsh.* 63, 236 14(1933); cf. *C. A.* 27, 5248. —Since the reaction between  $EtCHO$  and  $EtOH$  to form the hemiacetal is rapid and reversible, the equil. mixt. cannot be detd. by analysis. In the region  $2300-4000$  Å. only the aldehyde has an absorption band (which is due to the  $CO$  chromophore group). A mixt. of aldehyde and alc. has a band of the same form as the pure aldehyde, and has the max. at the same wave length. For a series of mixts., therefore, the observed extinction at the max., compared with that calcd. from the dilg. effect of the alc. if no reaction occurs, gives the extent of the acetal formation. The data show that the hemiacetal is formed.

L. S. Steiner

Absorption spectra of salts with haloid complex ions Hans Fesefeldt. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse* 1932, 353-5. —The absorption spectra of thin layers of cryst.  $KCN$ ,  $KCNS$  and  $Pb(CNS)_2$  show bands at  $169$ ,  $183$  and  $183\text{ m}\mu$ , resp. For  $KCN$  the Coulomb fraction of the lattice energy is calcd. as  $7.62$  v.  $TICNS$  exhibits deformation.

B. C. A

Adapting a laboratory spectrometer to a study of the Raman effect. Harvey A. Zinszer and Richard H Zinszer. *Trans. Kansas Acad. Sci.* 36, 164 5(1933)

W. A. Moore

The intensity of the Raman effect in water. A. Carrelli and F. Cennamo. *Nuovo cimento* 10, 330-2(1933) —An analysis of the broad band at  $\Delta\nu = 3660\text{ cm}^{-1}$  indicates that it may be composed of 3 components:  $3210$ ,  $3400$  and  $3590$ .

J. B. Austin

The Raman effect in nitric acid alone and in solution L. Médard and H. Volkringer. *Compt. rend.* 197, 833 6(1933).—99.8% acid gives lines at  $612$ ,  $674$ ,  $922$ ,  $1048$ ,  $1103$ ,  $1295$ ,  $1537$ ,  $1679\text{ cm}^{-1}$ . Diln. with  $H_2O$  shifts the lines to higher values. The  $H_2O$  bands appear in solns. contg. less than 52%  $HNO_3$ . Solns. in  $CHCl_3$  show bands due to  $HNO_3$  and  $CHCl_3$  throughout.

J. B. Austin

The Raman effect. XXVIII. The Raman spectra of organic substances (isomeric paraffin derivatives. 4) K. W. F. Kohlrausch and F. Köppl. *Monatsh.* 63, 255-70(1933); cf. *C. A.* 28, 443. —Raman spectra were obtained for *sec*-butylamine, *sec*- and *tert*-butyl mercaptans, *tert*-amyl mercaptan, for the chloro derivs. of hexane, heptane, octane, nonane and decane, and for *sec*- and *tert*-butylcarbinol, methylpropylcarbinol, methylisopropylcarbinol, diethylcarbinol and *tert*-amylcarbinol. The known data for the mercapto-, chloro-, bromo-, iodo- and hydroxy-paraffins are correlated.

L. E. Steiner

Raman spectra of several unsaturated nitriles. Marc de Hemptinne and Joseph Wouters. *Ann. soc. sci. Bruxelles*

B53, 215-18(1933).—The Raman spectra of vinylacetonitrile, crotononitrile and isocrotononitrile were studied by Wood's method, with a Pyrex Hg lamp. For  $\text{—C}\equiv\text{N}$  a Raman line at about  $\Delta\nu = 2250$  was observed, for  $\text{C—H}$  lines about 1400 and 2900, and for  $\text{—C=C—}$  about 1650. The latter value is greater for cis than for trans isomers. L. P. Hall

**Raman spectra of anhydrite and anglesite.** Hisamitsu Nishi. *Proc. Phys.-Math. Soc. Japan* 15, 463-9(1933); *J. C. A.* 27, 5248.—Raman spectra were obtained for anhydrite and anglesite by using a quartz Hg arc for the exciting radiation. For anhydrite the shifted line due to the principal inactive vibration of  $\text{SO}_4^{--}$  is single and the shift is  $10\text{ cm.}^{-1}$  larger than for gypsum. The other lines are double and triple, indications that the  $\text{SO}_4$  group is distorted from a regular tetrahedron but these results do not agree with those obtained from x-ray analysis. For anglesite the shifts are larger than those obtained with other sulfates. There are intensity anomalies in each case but the explt. results are not complete enough to afford any very certain conclusions. G. M. Murphy

**The Zeeman effect of the absorption lines of ruby.** Hans Lohmann. *Ann. Physik* 19, 99-117(1934).—The observed splitting and relative intensities of the components of the absorption lines 6933.7 and 6919.8 Å. of ruby as a function of the orientation of the crystal lattice to the magnetic field and polarization plane at  $-190^\circ$  are given. The optical axis has a 6-fold symmetry. The effect on the lines varies in accordance with the symmetry of the crystal lattice. Louis Goldman

**The para-ortho conversion of hydrogen.** R. Kh. Burshten. *Uspekhi Khim.* 2, 691-9(1933).—A review. F. H. Rathmann

**Determination of the probability of energy transfer during collisions.** N. N. Semenov. *Trans. Faraday Soc.* 30, 227-30(1934).—A method is presented for detg. the probability that a quantum of oscillatory energy will be transmitted, based on a study of the recombination of free radicals. E. R. Rushton

**Free radicals and spectroscopy.** R. Mecke. *Trans. Faraday Soc.* 30, 200-14(1934).—A general discussion of pos.-ray analysis, band spectroscopy, mol. dimensions, mol. vibrations and disson. energies. Radicals were found to retain their dimensions in their stable compds. A purely spectroscopic stereochemistry is predicted. E. R. Rushton

**Free radicals and the photochemistry of solutions.** J. Franck and E. Rabinowitch. *Trans. Faraday Soc.* 30, 120-31(1934).—The majority of photochem. processes in gases take place through the intermediary of free atoms or radicals, and every act of absorption leads to disson. The absorption spectra of liquids or solns. are nearly always continuous, but this cannot be considered as proof for disson. as the primary effect of absorption. When a photochem. reaction in soln. or in a pure liquid shows a primary quantum yield of approx. unity, without a pronounced influence of temp., light intensity or wave length, no atoms or radicals are involved; reactions involving free radicals must exhibit characteristic deviations from the equivalence law, depending on wave length, concn., light intensity and temp. E. R. Rushton

**Free radicals and ions as factors in chemical change.** M. Lowry. *Trans. Faraday Soc.* 30, 3-9(1934).—The majority of photochem. reactions and thermal decomposition appear to depend on the formation and interaction of neutral free radicals. All mols. which possess an odd no. of electrons are regarded as free radicals, although this is not an essential characteristic of free radicals, since unsatisfied valencies may appear at two points in the same mol. E. R. Rushton

**Oxygen molecules as radicals. Interaction of oxygen molecules.** W. Steiner. *Trans. Faraday Soc.* 30, 34-41(1934).—Absorption spectra in O at  $20^\circ$  and 6-30 atm. in columns of 250-750 cm. were investigated and details are to be published soon. At the lowest pressure, the Herzberg spectrum was observed almost exclusively, whereas, at the highest pressure only the bands previously described by S. (*C. A.* 27, 1824) appeared. At

10-16 atm., the 2 spectra are superposed, as shown by the photometer curves given. The absorption is a measure of the stationary concn. of a collision pair, and its calcn. is shown. The  $\text{O}_2$  mol. is not a free radical, because the spin interaction between  $\text{O}_2$  mols., which is a type of valence activity, has a very low energy, not of the order of magnitude of that of a chem. reaction. E. R. R.

**Hydrogen atoms, oxygen atoms and the hydroxyl radical.** Paul Harteck. *Trans. Faraday Soc.* 30, 134-41(1934).—A stream of H, rich in H atoms, was produced at 0.1 to 1 mm., mixed with the gas with which it was to react, and the product studied. H atoms were found to be stable in the presence of  $\text{O}_2$  for at least 0.1 sec. They do not react with  $\text{H}_2\text{O}$  vapor, or with  $\text{N}_2$  or  $\text{NH}_3$ . CO and  $\text{CO}_2$  react very slowly.  $\text{Cl}_2$  and  $\text{Br}_2$  react very rapidly.  $\text{H}_2\text{S}$  is rapidly decompd. and S is deposited. O atoms were produced in a discharge tube, special precautions being necessary to reduce the amt. of  $\text{O}_2$ . O reacts violently with HBr and HCl. With  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ , N and the oxidation products of  $\text{NH}_3$  are formed. The lifetime of the OH radical is much less than those of H and O, and there is little possibility of studying its reactions without the presence of secondary reactions. E. R. Rushton

**Formation of hydroxyl radical from the photolysis of water and the generation of formaldehyde.** N. R. Dhar. *Trans. Faraday Soc.* 30, 142-8(1934).—The water vapor present in the upper atm. appears to be photochemically decompd. by the ultra-violet light of the sun. The H present may reduce  $\text{CO}_2$  to  $\text{CH}_3\text{O}$ , which is washed down by the rain. The decompn. of  $\text{CH}_3\text{O}$  is hindered by the presence of H in the atm. E. R. Rushton

**Intensity measurements on artificial sources of ultra-violet light.** A. van Wijk and E. H. Recink. *Physica* 13, 289-98(1933).—A review. B. J. C. van der Hoeven

**Primary photochemical production of some free radicals.** Ronald G. W. Norrish. *Trans. Faraday Soc.* 30, 103-20(1934).—Light absorbed by one group may cause a reaction in a different part of the mol by processes of resonance. The thermal values of the C links as calcd. from the heat of sublimation of C require adjustment for the  $^1\text{S} - ^3\text{P}$  transition to obtain results in agreement with photochem. data. The photochem. production and stability of free alkyl radicals and the CH and  $\text{CH}_2$  radicals are discussed. There is evidence for the existence of C in the bivalent ( $^1\text{P}$ ) state. A new type of predissociation in acetone is described (*C. A.* 27, 5645). E. R. R.

**Electronic structure and the interaction of some simple radicals.** J. E. Lennard-Jones. *Trans. Faraday Soc.* 30, 70-93(1934); cf. *C. A.* 24, 4220.—The method of non-localized mol. orbitals, as developed by Mulliken (*C. A.* 27, 2374), is applied to a series of simple radicals which have equal nos. of electrons, though different nos. of nuclei. This gives a general, though necessarily qual., picture of the actual processes involved. The electron states and a comparison of the electron structure are given and the energy of rearrangement of radicals and mols. is discussed. E. R. Rushton

**Possible application of molecular ray technic to the study of free radicals.** Ronald G. J. Fraser. *Trans. Faraday Soc.* 30, 182-7(1934).—The method of Estermann and Stern (*C. A.* 28, 34<sup>6</sup>) is suggested for the detection and analysis of mol. rays. The power of the method could be greatly increased by combining it with a magnetic analysis of the mixed beam. It could be used, for example, to analyze the products of the thermal decomposition of  $\text{CH}_4$  and  $\text{C}_2\text{H}_4$ . E. R. Rushton

**Quenching of fluorescence by organic compounds.** K. Weber and M. L. Savic. *Z. physik. Chem.* B24, 68-74(1934); cf. *C. A.* 27, 26.—Quenching of fluorescence was studied in various solvents with org. compds. contg. OH and  $\text{NH}_2$  groups. The solns. were Na naphthionate in  $\text{H}_2\text{O}$ ; quinine sulfate in aq.  $\text{H}_2\text{SO}_4$  soln.; pinakryptol yellow in  $\text{H}_2\text{O}$  and EtOH; fluorenone in  $\text{C}_6\text{H}_6$  and esculin in EtOH. The effect of the solvent is to cause a shift in the extinction curves. G. M. Murphy

**Influence of solvent on law of variation of fluorescent power of dyes as a function of concentration of solution.** J. Bouchard. *Compt. rend.* 198, 649-51(1934).—The

linear relation between  $\log \Phi$  and  $c$  in the equation  $\Phi = \Phi_0 e^{-kc}$ , where  $\Phi$  is the fluorescent power as measured by Perrin's fluorometer,  $\Phi_0$  its limiting value,  $c$  the concn., and  $k$  a const. (cf. C. A. 18, 3145) was verified for a no. of fluorescent dyes in various solvents, provided that the  $p_H$  is const.;  $\Phi_0$  is independent of the solvent,  $k$  dependent on it. With aq. MeOH, EtOH or iso-PrOH of varying concn. but viscosity,  $\eta$ , approx. the same as that of  $H_2O$ , as solvent,  $k$  varies with the sp. inductive capacity,  $\epsilon$ , according to  $k = (A - B\epsilon)^{-1}$ ,  $A$  and  $B$  depending on the fluorescent solute. If  $\eta$  is markedly  $>$  that of  $H_2O$ ,  $k$  decreases more rapidly. The equation giving  $\Phi$  in the presence of an inhibitor (cf. C. A. 27, 2624) is valid only when the inhibitor does not appreciably affect  $\eta$  or  $\epsilon$ ; if it does, the equation becomes  $\Phi = \Phi_0 e^{-(kc + ks - \alpha sc)}$ ,  $s$  being concn. of inhibitor and  $\alpha$  a const. C. A. S.

**Photooxidation of nitrite to nitrate.** N. R. Dhar, S. P. Tandon, N. N. Biswas and A. K. Bhattacharya. *Nature* 133, 213-14 (1934).— $N/525$  solns. of  $NaNO_2$  contg.  $TiO_2$  or  $Fe_2O_3$  as catalyst, and a  $N/112.4$  soln. of  $KNO_3$ , with  $Fe_2O_3$  catalyst, were completely oxidized to the nitrates by exposure for 100 hrs. to sunlight and air. In each case, the vol. of the soln. was 100 cc., and 5 g. of the catalyst was used. Gerald M. Petty

**The chemical action of light on vinyl iodide.** Guy Emschwiller. *Compt. rend.* 198, 464-6 (1934); cf. C. A. 27, 2933.— $CH_2=CHI_2$  irradiated 124 hrs. by a Hg-vapor lamp gave at ordinary temp.  $C_2H_2$ ,  $C_2H_4$  and  $I$ . On the walls of the flask were crystals of  $I$  and droplets of liquid which contained  $HCO_2H$ ,  $CH_2O$  and  $CH_2(OH)CHO$ . A mechanism is suggested for the formation of these products. Julius White

**The action of ultra-violet light on glycine.** V. Henri, Ch. Weizmann and Y. Hirshberg. *Compt. rend.* 198, 168-70 (1934).—A pure aq. soln. of glycine was exposed to ultra-violet light in a quartz flask. The main reaction was:  $CH_2(NH_2)CO_2H + H_2O = CH_2(OH)CO_2H + NH_3$ . The glycolic acid was detected and the  $NH_3$  detd. at intervals. The sp. cond. and  $p_H$  of the soln. were also detd. periodically. By means of control solns. it was found that the  $NH_3$  concn. could be detd. from the sp. cond. At the end of 15 hrs. 13.1% of the  $NH_3$  had been liberated, the sp. cond. was  $71.2 \times 10^{-3}$ , and the  $p_H$  was 7.45 (the sp. cond. of the glycolic soln was  $1.54 \times 10^{-3}$  and its  $p_H$  4.8). That there were side reactions was shown by the fact that a gas rich in CO was evolved during the irradiation. John E. Millery

**Separation of photochemical and thermal action in the photobromination of cinnamic acid.** Walter H. Bauer and Farrington Daniels. *J. Am. Chem. Soc.* 56, 378-85 (1934).—The photobromination at 0-30° of cinnamic acid in  $CCl_4$  soln., by means of the Hg 4360 line, comprises a primary photoreaction of one mol. of Br per quantum, followed by a chain reaction of 0-14 or more mols. which depends on the concn. of Br and the temp. Expts. with light of 540 and 579  $m\mu$  give similar yields. It seems probable that the reaction is an energy chain involving activated Br mols. H. A. Beatty

**A photobromination experiment.** Wayne W. Umbreit. *J. Chem. Education* 11, 175-6 (1934).—The photobromination of cinnamic acid in  $CCl_4$  can be followed colorimetrically and constitutes a good lab. expt. on photochemistry. W. C. Fernelius

**Polarized photoluminescence of adsorbed molecules of dyes.** A. Jablonski. *Nature* 133, 140 (1934).—The variation of the polarization of phosphorescent and fluorescent light excited by natural and polarized light in a dye (euchrysin) adsorbed on cellophane has been measured as a function of the azimuth. An angular periodic variation in polarization is found which differs for ordinary and polarized light. Different dyes have the same form of curves but the amt. of the polarization varies from dye to dye. Howard A. Smith

**An unpublished photochemical experiment by Hauser.** W. Kossel. *Z. tech. Physik* 15, 23-5 (1934).—Passage of current through a photographic emulsion increases the sensitivity at the cathode and decreases it at the anode. The effect appears to be assocd. with Br ions. J. B. A.

**Free radicals in the electric discharge.** E. J. B. Willey. *Trans. Faraday Soc.* 30, 230-48 (1934).—A general discussion of  $CH$ ,  $OH$  and  $NH$  radicals with a large bibliography. Some unfinished work on the effect of a special thyatron-operated circuit, which gives an intermittent discharge of very brief duration and of variable frequency, on a mixt. of  $CH_4$  and a large excess of  $N_2$  is mentioned. The yield of  $C_2H_2$  was much greater than when a. c. or d. c. discharges of the same watt-input were used. E. R. Rushton

**Free radicals in electrical discharges.** Wm. D. Harkins. *Trans. Faraday Soc.* 30, 221-7 (1934); cf. C. A. 27, 2096.—App. for electrodeless and glow discharges are described with diagrams. The principal radicals found were  $CH$ ,  $OH$ ,  $CH$ ,  $NH$  and  $CN$ , all diat. No bands corresponding to  $CH_2$ ,  $CH_3$  or  $NH_2$  were found. The absence of bands of triat. and higher mols. may be due to the small no. of such radicals present, or pos. ions of the type of  $CH_2^+$ , etc., may dissoc. on taking up an electron or may undergo predissocn. The Baldet-Johnson bands of  $CO^+$  are found in the glow discharge but not in the electrodeless discharge. E. R. Rushton

**Decomposition of hexane, cyclohexane and benzene in the positive-ray tube.** R. Conrad. *Trans. Faraday Soc.* 30, 215-20 (1934).—A large no. of radicals is observed on mass spectrograms obtained with hexane,  $C_6H_6$  and cyclohexane. The alternating intensities of the parabolas and the differences in their no. allow of definite conclusions as to the step-by-step decompn. of the initial compn. in the elec. discharge, in which the stability of the intermediate products plays a part. Conclusion: A pos. charge indicates satn. of a C valency, and a C atom with a free valency tends to form a double bond by expelling a H atom. E. R. Rushton

**Decomposition of chloroform by radiations from radon.** G. Harker. *J. Proc. Roy. Soc. N. S. Wales* 67, 96-117 (1933); cf. C. A. 28, 1276°.—The decompn. of  $CHCl_3$  by Ru was detd. with different metal filters. Secondary radiation from metal or glass does not effect the decompn. In  $\gamma$ -radiation the decompn. of  $CHCl_3$  requires 251,300 cal. per mol., while in x-radiation 29,800 cal. is required. A. B. F. Duncan

**Effect of  $\gamma$ -radiations on chloroform.** W. B. S. Bishop. *J. Proc. Sydney Tech. Coll. Chem. Soc.* 5, 66-9 (1933).— $\gamma$ -Rays (and x-rays) liberate Cl from  $CHCl_3$ . After prolonged irradiation HCl and  $C_2Cl_4$  are formed with disappearance of Cl. B. C. A.

**Intermittent stimulation by light. IV. A theoretical interpretation of the quantitative data of flicker.** Sch. Hecht and Cornelis D. Verrijp. *J. Gen. Physiol.* 17, 269-82 (1933); cf. C. A. 26, 3850.—Of photochem. interest. C. H. Richardson

**Five-fold check of uraninite age? (Lane) 8.**  
U-Ra minerals (Lepierre) 8. Isotopic fractionation of water by physiological processes (Washburn, Smith) 11A. Relation between chem. and phys. theories of the source of the stability of the org. free radicals (Ingold) 10. Raman spectra of org. heterocyclic compds (Milne, Muller) 10. Films, plates, etc. [for radiographic work] (Fr. pat. 756,422) 18. Thermo-optical dissocn. of  $SO_2$  (Wicland) 2.

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Quantenmechanik der Materie und Strahlung. Edited by Guido Beck. Tl. 2. Moleküle. 2nd ed. of Bd. VI of Handbuch der Radiologie. Leipzig: Akad. Verlagsges. 604 pp. M. 54; cloth, M. 56. Cf. C. A. 27, 3143.



**Photochemical oxidation reactions.** Franz Nozicka (to Vereinigte Chemische Fabriken Krcidl, "Heller & Co."). U. S. 1,945,067, Jan. 30. A compd. to be oxidized, as in the production of benzoic acid from toluene, is subjected to irradiation in the presence of O and at least 2 different oxidation catalysts, one of which is an "anthraquinone type" catalyst, such as anthraquinone and milk of lime. Various other examples are given. Cf C. A. 27, 2098.

**Ultra-short wave oscillation generation.** Clarence W. Hansell (to Radio Corp. of America). U. S. 1,945,039, Jan. 30. A discharge is passed through a colloidal soln. contg. metallic particles.

#### 4—ELECTROCHEMISTRY

COLIN G. PINK

**The electric melting and heat treatment of iron and steel.** A. G. Robiette. *J. West Scotland Iron & Steel Inst.* 41, 41-52 (1933).

**Electric furnace with controlled atmosphere.** R. F. Benzinger. *Heat Treating and Forging* 19, 105-7 (1933).

**The rare earths. XLI. Electrolytic preparation of rare earth amalgams. 3. Amalgams of lanthanum, neodymium, cerium, samarium and yttrium. Metallic lanthanum, neodymium and cerium by thermal decomposition of their amalgams.** E. E. Jukkola, L. F. Audrieth and B. S. Hopkins. *J. Am. Chem. Soc.* 56, 303-4 (1934); cf. C. A. 27, 3403.—Dil. amalgams are prepd. by electrolysis of satd. solns. of the resp. rare earth metal chlorides in EtOH by means of a Hg cathode. Preliminary vacuum concn. at temps. up to 235° yields solid amalgams contg. 15% rare earth metal. Complete removal of Hg with formation of pure Ce, La and Nd is effected by heating in a vacuum to 1000°.

**The swelling of graphite at the anode and the mechanical disintegration of carbon anodes.** Heinrich Thiele. *Z. Elektrochem.* 40, 26-33 (1934); cf. C. A. 26, 5804.—The mech. disintegration of C anodes is due to a swelling of the graphitic C, which occurs when O is given off at a potential of 1.6 v. in the presence of  $\text{SO}_4^{2-}$ ,  $\text{ClO}_4^-$ ,  $\text{NO}_3^-$  and  $\text{F}^-$  ions, with sufficient c. d. and absence of water. Swollen graphite contains more O than the primary oxide of C. Graphite swells easily and is difficultly oxidizable; amorphous C swells with difficulty and is easily oxidizable.

**The electrical extraction and refining of metals.** G. H. Stanley. *J. S. African Inst. Elec. Engrs.* 24, 301-2 (1933); cf. C. A. 27, 5649.—Discussion. At the Zn plant at Broken Hill slime settlement has been eliminated and all the pulp from the Dorr classifier goes to the Si-Fe-V pptn. V is pptd. separately, removed from the soln., and retreated for the production of fused  $\text{V}_2\text{O}_5$ . Glue and cresylic acid are added in varying amts. to suit the existent conditions.

**Absorption of hydrogen by iron.** Friedrich Korber and Heinrich Ploum. *Z. Elektrochem.* 39, 252-5 (1933).—Absorption of  $\text{H}_2$  by Fe, when the latter serves as cathode in the electrolysis of aq.  $\text{H}_2\text{SO}_4$ , or when it is dissolved in  $\text{H}_2\text{SO}_4$ , occurs only in presence of catalysts, of which the most powerful are S (especially as  $\text{H}_2\text{S}$ ), As, P and other elements which form volatile hydrides. Ni and Hg have a slight catalytic action; Cu and Ag none at all.

**Selection of electroplate coatings for iron and steel components.** E. E. Hall. *Synthetic and Applied Finishes* 4, 45-50 (1933).—Electrodeposited coatings of the "sacrificial protection" and the "blanket" types are discussed with special reference to the electromotive series of the metals. Metals prone to passivity cannot be used as "sacrificial" coverings. The relative behaviors of metals under mild corrosive conditions is often reversed under more rigorous attack. The outstanding features of Zn, Cd, Ni, Cu and Cr electrodeposits are summarized.

**Electrodeposition of alloys. I. Nickel-cobalt alloys.** S. A. Pletenev and V. V. Kuznetsova. *Z. Elektrochem.* 39, 201-4 (1933).—The electrodeposition of Co-Ni alloys from acid solns. of  $\text{NiSO}_4$  and  $\text{CoSO}_4$  in which Ni:Co = 15:1 has been studied. The influence of  $p_{\text{H}}$  (kept const. during electrolysis by addn. of  $\text{H}_2\text{SO}_4$  or  $\text{NH}_3$ ), temp., c. d., ve-

locity of rotation of cathode, and agitation by means of a stream of air on the compn. of the deposit and the percentage of the total Co deposited has been investigated. Under the optimum conditions (Ni 80, Co 5-33 g. per l., c. d. 100 amp. per sq. m.,  $p_{\text{H}}$  3.5, 20°, 2000 r. p. m.) 90% of the Co is deposited as a 41% alloy in 26 hrs.

**Platinum-plating on noble and base metals.** Edmund R. Thews and Ralph W. Harbison. *Chem.-Ztg.* 57, 980-1 (1933).—Pt plating lasts longer than Ag or Au. Relative costs are discussed, and the resistance to corrosion is reported. The methods are described and the present use of  $\text{Pt}(\text{NH}_3)_4(\text{NO}_3)_2$  is endorsed.

**The electrodeposition of rhodium.** G. Grube and E. Kesting. *Z. Elektrochem.* 39, 948-58 (1933).—In a qual. expt., sulfuric fluosilicic, fluoboric, perchloric and oxalic acids give excellent Rh deposits, and the baths can be regenerated through soln. of freshly produced  $\text{Rh}(\text{OH})_3$ . In a quant. expt. for Rh deposition, c. d.-potential curves and the current yield in HCl soln. of  $\text{Na}_3\text{RhCl}_6$  (20°, 40°, 60°) and  $\text{RhCl}_3$  (40°) in oxalic acid soln., in  $\text{NH}_4\text{Rh}$  phosphate soln. (50°), in soln. of Rh perchlorate (20°, 40°, 60°), Rh fluosilicate (20°, 50°) and  $\text{Rh}_2(\text{SO}_4)_3$  (20°) and the effect of excesses of free acid on the deposit are tabulated. The sepn. occurs with high polarization so that at relatively low c. d. the metallic deposit results with H evolution.

**The electrodeposition of columbium.** II. N. Izgaruishev and G. E. Kaplan. *Z. Elektrochem.* 40, 33-6 (1934); cf. C. A. 27, 3671.—Metallic Ch is only partially deposited from solns. contg. KOH or oxalic acid. In the course of the electrolysis, compds. are formed which are not further decomd. With citric acid solns. this action is complicated by the regeneration of the original soln.

**Dispersion of electric current in electrodeposition.** M. A. Rabinovich and S. Ya. Pasechnik. *Ukrain. Khim. Zhur.* 8, Wiss. tech. Teil 127-31 (1933).—A brief literature survey and the exptl. work show that dispersion of elec. currents in electroplating, which results in a non-uniform deposition of metals, is due to local overvoltage because of the differences in smoothness of the surfaces of processed articles.

**Chromium-plating-literature. XXII.** L. H. Decke. *Platers' Guide* 30, Feb. 13-14 (1934); cf. C. A. 28, 18063.

**Anodes for chromium plating in solutions containing hydrofluoric acid.** Erich Müller and Jón E. Vestdal. *Z. Elektrochem.* 40, 14-18 (1934).—Pb is the only anode material which permits the  $\text{Cr}^{+++}$  ions formed at the cathode to be oxidized to  $\text{CrO}_3$ . If F ions are present, the  $\text{PbF}_2$  which is formed during an interruption of the electrolysis increases the cell resistance. This resistance is eliminated by addn. of 10-30% Sb or Bi to the Pb.

**Electrochemical oxidation of trivalent chromium to chromic acid.** N. S. Drozdov. *J. Gen. Chem.* (U. S. S. R.) 3, 345-50 (1933).—The investigation of the influences of various factors on the course of anodic oxidation of trivalent Cr salts confirmed the findings of Muller and Soller (*Z. Elektrochem.* 11, 863 (1905)).

**Platinized glass electrode.** H. Muraoka and K. Hiruma. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 161 (1933).—Platinized glass filter plates form suitable electrodes for electroanalysis expts.

**The theory of passivity phenomena. XX. Passivity**

of nickel. W. J. Müller and E. Löw. *Z. Elektrochem.* 39, 872-9(1933).—Polemic with Georgi (*C. A.* 26, 5853). XXI Film theory. W. J. Müller. *Ibid.* 880-3.—Polemic with E. Müller and Schwabe (*cf. C. A.* 27, 4739). Reply. Erich Müller and Kurt Schwabe. *Ibid.* 884.

Anodic behavior of the iron metals. W. J. Müller. *Korrosion u. Metallschutz* 10, 15(1934).—Polemic with Georgi (*cf. C. A.* 28, 974<sup>3</sup>). Leopold Pessel

Film or layer theory? W. J. Müller. *Z. Elektrochem.* 40, 18(1934).—Mainly polemic with Schwabe (*C. A.* 28, 47<sup>4</sup>). Curtis L. Wilson

Electric oxidation of aluminum. The eloxal method. J. Loewenthal. *Teknisk Ukeblad* 80, 561-4(1933).—An electrolytic method is described for the coating of articles of Al or Al alloys with a 0.02-4 mm. film of  $\gamma$ -oxide. As a rule a.c. is employed, and no counterelectrodes are necessary. Articles of limited size are treated in rubber-lined sheet Fe vats at a temp. of 15-30°. In most cases 3.5-4.5 kw. hrs. per sq. m. surface will be sufficient, the treating being completed in 15-20 min. Wires or ribbons are drawn continuously through the bath. Tube spirals and similar articles that cannot be treated in the bath are treated by a special spraying app., the article being grounded and serving as one electrode, the elec. current playing between the sprayed surface and a counterelectrode on the spraying app. through the jet of electrolyte. The latter is an acid soln. contg. oxidative substances, no further details being stated. The oxide film can be colored by treating with solns. of org. or mineral dyestuffs. The oxide film obtained by the eloxal method is claimed to be far superior to other oxide coatings with respect to elec. resistance, non-porosity, and chem. resistivity.

C. A. Robak

The rate of decay of hydrogen and oxygen overvoltages. G. Armstrong and J. A. V. Butler. *Trans. Faraday Soc.* 29, 1261-6(1933).—When no assumption of at. H or O is made, the rate of decay of overvoltage is expressed by the equation  $dV/dt = i/B$ , where  $dV$  is the change in voltage in the time  $dt$ , and  $i$  is the rate of transfer of ions across the double layer whose capacity is  $B$ . When this equation is integrated and  $\epsilon_H$ , the electrode potential, is plotted against  $\log t$ , a straight line is found from an initial  $\epsilon_H = 1$  to  $\epsilon_H = 0.35$  for Hg electrodes. Electrode potentials above 1 were due to impurities, especially Na. The rates of decay of overvoltages of such contaminated electrodes were slower than those of the uncontaminated. For Pt electrodes the overvoltages are lower and the rate of decay near the reversible H potential is considerably less than theoretical, probably because of adsorbed or dissolved  $H_2$ . The rate of decay of O overvoltages on Pt is slower than theoretical for the first 100 sec. but agrees with theory from 100 to 1000 sec.

F. E. Brown

The anodic passivity of lead. P. Porfiriov. *J. Gen. Chem.* (U. S. S. R.) 3, 590-5(1933).—The bath consisted of  $H_2SO_4$  in concns. of 10, 20 and 96%, satd. with  $PbSO_4$ . A Pb plate served as anode and Pt as cathode. The temp. was kept at 25°. The passivity of the anode was detd. by measuring the change in resistance of the bath to anode with time. Transformation of the Pb into insol. form takes place in 2 stages. In the 1st stage under the influence of the current, a normal soln. of the Pb takes place. The difficultly sol.  $PbSO_4$  deposits on the anode in the form of a fine cryst. layer, covering part of the surface, this increasing the c. d. on the uncovered part. This accelerates crystn. of the sulfate, which causes formation of a colloid and results in an increase in interfacial resistance between liquid and anode and further increase in c. d. When the c. d. reaches a certain point, the 2nd stage sets in. O begins to deposit on the anode and  $PbO_2$  forms, this completing the cycle: Pb sol.  $\rightarrow$  Pb insol. The 1st stage is mech. and the 2nd chem. The process of passivation of Pb in  $H_2O$ -free  $H_2SO_4$  is limited to the mech. stage.

S. L. Madorsky

The development of lead batteries for vehicles. W. Röddiger. *Elektrotech. Z.* 54, 1256-7(1933).—Brief historical review.

F. W. Jung

The electrolytic etching process. III. The side-etching. Masataka Nagano. *J. Electrochem. Assoc.* (Japan) 2, 56-60(1934); *cf. C. A.* 27, 5651-2. The effects of etching conditions have been examd. The side etching may be reduced by an average of 30% by applying electrolytic etching instead of chemical. Thus side etching is decreased when a Cu surface is electrolyzed in 2.5%  $KNO_3$  acidified with 2 N AcOH with c. d. of 2 amp./sq. cm.; similarly for a Zn surface in N  $NH_4Cl$  with c. d. of 3 amp./sq. cm.

K. Konda

Electrolysis of alkali fluophosphates. Juan M. García Marquina. *Anales soc. españ. fis. quim.* 31, 840-51(1933); *cf. C. A.* 27, 4883.—Electrolysis of aq. solns. of Na, K and  $NH_4$  monofluophosphates showed formation of 2 peroxo-acids corresponding to  $O:PF(OH)O.OH$  and  $O:PF(OH)O.OPF(OH):O$ , which have not been isolated but whose compn. has been shown by the variation in the alkyl of the electrolyte.

E. M. Symmes

The electrolysis of sodium sulfide. W. Bohnholtz and Fr. Heinrich. *Z. Elektrochem.* 39, 939-47(1933)

The electrolyses of aq. solns. of pure  $Na_2S$  and polysulfides are conducted with Pt electrodes in a decompn.-voltage flask and calomel cell with a capillary electrometer. C. d.-potential curves are shown for the anode potential and c. d. The periodic phenomena which Kuster assumed to be a single resistance layer formed periodically does not explain the stages of a, b, c, d of these curves summarized as follows: In the first segment (a) the c. d. is low for a low potential at 0° but increases slightly at 50° and only polysulfides are formed. In the b phase the electrode is covered with a current-resistance film thought to be monoclinic S. Since c. d. is almost zero, no electrolytic products are formed. In the c phase the electrode is covered with loose, probably rhombic, S. The S dissolves to polysulfides and no other compd. appears. In d, the electrode is clean and c. d. small, with sulfate and some dithionate produced. In the d<sub>1</sub> the c. d. is high and the electrode covered with S contg. O bubbles. Sulfur, polysulfides, sulfates and dithionates are found. In d<sub>2</sub> the S is generally oxidized to the sulfate and the electrode is practically free from S.

Leona Marsh

Electro-organic oxidations in concentrated aqueous organic salt solutions. Reactions with toluene, oleic acid, benzoin and other substances. Ralph H. McKee and Joe R. Heard, Jr. *Trans. Electrochem. Soc.* 65, 10 pp. (preprint)(1934).—The electrolytic oxidation of several org. compds. dissolved in concd. Na xylene-sulfonate solns. was studied in a cell arranged for measurement of anode gas evolution. Toluene, naphthalene, anthracene and borneol are not oxidized in alk. solns. Oleic acid was oxidized with a higher anode gas absorption efficiency in alk. soln. than under slightly acid conditions, while with the linseed org. acids, the reverse was true. Under strongly acid solns., toluene and the solvents are oxidized to phenolic compds. Naphthalene depolarized a graphite anode in a strongly acid soln. with the formation of quinone and phenol products. Benzoin was oxidized to BzOH under alk. conditions at higher current efficiencies than previously reported. Halogenation of the solvents and toluene took place simultaneously, with halogen preference for substitution in the hydrocarbon ring rather than the side chain. It had been shown (McKee and Brockman, *C. A.* 26, 3734) that BzH and  $PhCH_2OH$  exhibited remarkable solubilities in concd. aq. Na benzenesulfonate solns. Other similar compds. such as Na xylene- and cymene-sulfonates which have a greater percentage solv. by wt. at comparable temp. likewise show a better solvent action for different org. compds. A wide variety of types of water-insol. org. compds. are sol. in these solvents, e.g., toluene, naphthalene, anthracene, hydroquinone, borneol, oleic acid, linseed org. acids and benzoin. The behavior of the compds. mentioned when subjected to electrolytic oxidation in these nonvolatile and conducting sulfonate solvents was detd. The possibility of electrolytic halogenation of toluene in these solvents was likewise investigated.

C. G. F.

Mechanism of the Kolbe reaction. S. Glasstone and A. Hickling. *Nature* 133, 177(1934).—In the electrolysis

of acetate solns. the presence of relatively small amts. of various ions has a profound influence on the course of the Kolbe reaction. Addn. of 0.001 M  $\text{Pb}(\text{OAc})_2$  to a soln. of N AcOK and N AcOH reduces the efficiency for  $\text{C}_2\text{H}_5$  formation at the anode from 70 to 0% (c. d. 0.025 amp. per sq. cm.). The effect of the ions tested is in the order  $\text{Pb}^{++} > \text{Mn}^{++} > \text{Cu}^{++} > \text{Co}^{++} = \text{Fe}$ . It is suggested that possibly  $\text{H}_2\text{O}_2$  is the effective agent in  $\text{C}_2\text{H}_5$  formation by the Kolbe reaction. W. J. Peterson

**Electrochemical research with *p*-fluorotoluene and fluorobenzoic acid; di-*p*-fluorobenzoyl peroxide and its decomposition.** Franz Fichter and Jakob Rosenzweig. *Helv. Chim. Acta* 16, 1154-8 (1933).—The electrochem. oxidation of *p*-fluorotoluene gives immediately *p*-fluorobenzoic acid, and the intermediary aldehyde cannot be detected. The Na salt of the acid does not give the Kolbe electrolysis. Di-*p*-fluorobenzoyl peroxide, obtained from *p*-fluorobenzoyl chloride and  $\text{BaO}_2$ , is decompd. by heat to give *p,p'*-difluorobiphenyl, together with by-products. A. L. Henne

**Electrochemical reduction of pyridine.** N. S. Drodzov. *J. Gen. Chem. (U. S. S. R.)* 3, 351-9 (1933).—Contrary to Emmerl (*C. A.* 7, 2753, and Rülke and Glotofskii, *Ger. pat.* 420,445 (1920)) the course of the electrochem. reduction of  $\text{C}_5\text{H}_5\text{N}$  with a diaphragm is detd. by the amt. of  $\text{H}_2\text{SO}_4$  and not by the concn. of  $\text{C}_5\text{H}_5\text{N}$  in the electrolyte. Thus with the increasing excess of  $\text{H}_2\text{SO}_4$  the yield of  $\text{C}_5\text{H}_5\text{N}$  is increased and that of the di- and polypiperidyls is decreased to 7%. The concn. of  $\text{C}_5\text{H}_5\text{N}$ , the c. d. and the temp. (within 15-35°) do not affect the results of the electrolysis. The electrolysis without the use of a diaphragm is complicated by the anodic oxidation of  $\text{C}_5\text{H}_5\text{N}$  and  $\text{C}_5\text{H}_5\text{N}$  and the cathodic reduction of the oxidation products, which contradicts the findings of Ahrens (*Z. Elektrochem.* 2, 577 (1895-1896) and Merck (*Ger. pat.* 101,308 (1896); 104,664 (1898)). Chas. Blanc

**Electrolysis of silver acetate in acetic acid and pyridine. Silver diacetate and the Kolbe reaction.** C. Schall and B. M. Schall. *Z. Elektrochem.* 40, 5-8 (1934).—The expts. of S. and Melzer (*C. A.* 17, 698) and S. and Wiedmarkter (*C. A.* 23, 4412) were continued. The Ag diacetate occurred combined with pyridine. C. L. Wilson

**A type of silver chloride electrode suitable for use in dilute solutions.** Alfred S. Brown. *J. Am. Chem. Soc.* 56, 646-7 (1934); cf. *C. A.* 23, 5422.—Highly reproducible Ag/AgCl electrodes were prepd. by plating Pt wires with Ag and electrolyzing  $\frac{1}{2}$  hr. at 2.5 milliamp./sq. cm. in 0.1 N HCl. L. P. Hall

**Silvering of mirror surfaces by cathode sputtering.** M. Romanova, A. Rukhtov and G. Pokrovskii. *Compt. rend. acad. sci. U. S. S. R. [N. S.]* 1, 15-16 (in German 17-18) (1934). Silvering was carried out in a  $\text{H}_2$  atm. of 0.05 mm. with a current of 15-20 ma., and a potential of 1400 v. Mirrors obtained had a reflectivity of 98% (normal -93%) only very slowly decreasing. Partially transparent mirrors absorbed less than 1% of incident light. F. H. Rathmann

**The synthesis of ammonia in the electrodeless discharge.** Walter C. Schumb and Louis Goldman. *Proc. Im Acad. Arts Sci.* 69, 160-88 (1934).—The pressure drops observed when a mixt. of  $\text{N}_2$  and  $\text{H}_2$ , 1:3 by vol., is circulated through an electrodeless discharge are plotted as a function of wave length between 200 and 300 m. with 5-8 amp. and initial pressures of 0.5-1.5 mm. The pretreatment of the reaction tube necessary for reproducibility, the pressure rise obtained on baking after  $\text{NH}_3$  formation, colorimetric verification of pressure changes, and the effect of increasing the pressure drop by increasing the surface in the discharge or by decreasing the vol. of the system lead to a hypothesis for the part played by the wall. The reaction is not an equil. reaction. L. G.

**Electrical precipitation of silica dust.** W. R. Franks and F. L. Harrison. *Trans. Roy. Soc. Can., Sect. V*, 27, 141-7 (1933).—The presence of moisture and  $\text{SO}_2$  do not decrease the electrostatic pptn. of silica dust. The use of this method of dust pptn. is suggested for clearing dust from air in mine drifts. W. Gordon Rose

**Synthetic corundum for jewel bearings.** E. G. Sand-

meier. *J. Inst. Elec. Engrs. (London)* 72, 505-14 (1933).—A general description of mfg. processes used in the production of rough synthetic corundum and of jewel bearings for elec. meters and other measuring instruments. W. H. Boynton

**Mfg. glass for elec. bulbs in tank furnaces** (Khovanskii, *et al.*) 19. Modern elec. drive and equipment for a wood pulp factory (Kuhl) 23. Ethyl-, benzyl- and acetyl-cellulose and their iodoec. properties (Speter) 23. Testing Sn coating on soft sheet [Pb detn. by electrolysis] (Bisenkolb) 7. Electroanalysis of Mo (Nemoto, Tanabe) 7. Analyses of inclusions in high-C tool steels (Styri) 7. Diamminozinc bromide (Kozik) 2. AcOH [by electrolysis] (*Fr. pat.* 757,155) 10. Prevention of corrosion of Al and its alloys (*Japan. pat.* 100,100) 9. Films, plates, etc. [for use in electrotechnics] (*Fr. pat.* 756,422) 18. Alkali chlorides [for electrolysis] (*Fr. pat.* 756,413) 18.  $\text{CuS}$  [for neg. electrode] (*Ger. pat.* 591,168) 18.

**Primary battery.** Arthur Cassan. *Ger.* 588,442, Nov. 23, 1933 (*Cl.* 21b. 7.01). Addn. to 510,829 (*C. A.* 25, 882). A Zn-C cell is formed with a concave base of metal or elec. inactive material.

**Dry-cell electrolyte.** Jaroslav Jan Pála. *Ger.* 591,163, Jan. 17, 1934 (*Cl.* 21b. 5.02). See *Brit.* 398,038 (*C. A.* 28, 1608').

**Dry-cell battery.** Henry W. Brownson, Richard Chadwick and Imperial Chemical Industries Ltd. *Brit.* 402,117, Nov. 27, 1933. The container of a dry cell is made of an alloy of Zn with 1% or less of Hg. The alloy may be made by dissolving 25 parts Hg in 75 parts Zn and then adding this alloy to molten Zn in requisite quantity.

**Electric multicell battery.** Carl H. King (to Globe-Union Mfg. Co.). *U. S.* 1,945,694, Feb. 6.

**Storage batteries.** Jeremiah A. Downing and Thomas Blake. *Brit.* 401,281, Nov. 8, 1933. The pos. plates are treated with an oxalic acid soln. after the battery has been discharged and emptied. The soln. may be sprayed over the plates and after a short interval a small quantity of dil  $\text{H}_2\text{SO}_4$  is similarly introduced. After a further short interval the cell is filled with  $\text{H}_2\text{O}$  which may contain a little pyrogallol.

**Storage batteries.** Drumm Battery Co. Ltd., James J. Drumm and Albert G. Burnell. *Brit.* 401,717, Nov. 20, 1933. Addn. to 365,125 (*C. A.* 27, 2631). The grids, envelopes or tubes of the pos. electrodes of the storage battery of 365,125 are made of Ni-plated rustless Fe or of steel or Fe which has been plated with alternate layers of Ni and Cr or Cd. The final outer layer of Ni having been plated thereon, the article is annealed in H. The container is made of Ni-plated rustless steel.

**Storage-battery plates.** Otto E. Huebner (to Mechanical Development Corp. of America). *U. S.* 1,947,473, Feb. 20. Structural features.

**Casting electrolyte-forming material in electric batteries.** Peter R. Aronson (to National Carbon Co.). *U. S.* 1,945,673, Feb. 6. Various details of app. and operation are described suitable for casting caustic alkali electrolyte.

**Electrodeposition of alkaline earth metal carbonates on metals such as cathodes of electric discharge tubes.** Emil Theisz (to Égysült Izzólámpa és Villamosági R. T.). *U. S.* 1,945,623, Feb. 6. Deposition is effected from a soln. such as one contg. Ba formate.

**Electrodeposition of palladium.** The Mond Nickel Co. Ltd. *Ger.* 587,807, Nov. 9, 1933 (*Cl.* 48a. 6.08). See *Fr.* 737,752 (*C. A.* 27, 1879).

**Chromium plating.** Henderik van der Horst. *Brit.* 401,933, Nov. 23, 1933. A hard wearing surface is provided on an internal-combustion engine cylinder bore, after it has been ground smooth, by electrolytically depositing thereon a coating of Cr of uniform thickness, a coaxial cylindrical anode of hard Pb or steel of diam. only slightly less than that of the bore being used and the flow of current being strictly confined to the cylinder bore and the part of the anode within it. With a plating bath

contg. 350 g.  $H_2CrO_4$  per l. and 1%  $H_2SO_4$ , the c. d. and pressure are 30-70 amp. per sq. decimeter and 3-5 v., the current being preferably reversed for the 1st min. to ensure cleaning and degassing of the bore. After deposition, the block is heated to 150-300° for 0.5-2 hrs. to eject occluded H.

**Coating silver to prevent tarnishing.** Blasius Bart (to Precious Metals Developing Co.). U. S. 1,947,180, Feb. 13. Silver articles such as tableware, prize cups, etc., are provided with successive electrodeposited coatings of Ni, Pd and Rh.

**Coating aluminum.** Pierre R. L. Hogner (to Aluminum Colors, Inc.). Brit. 401,579, Nov. 16, 1933. A hard, wear-resistant, adherent oxide coating is produced electrolytically on a printing plate formed of Al (alloy). The plate forms the anode in a cell contg. a 5-10%  $H_2SO_4$  or a 3-5%  $H_2CrO_4$  or oxalic acid soln., a c. d. of 10-20 amp. per sq. ft. being used for 30 min. at 20-30°.

**Protecting metal wires, etc.** Désiré Baudewyns. Fr. 756,505, Dec. 11, 1933. Wires, etc., are protected against oxidation by passing them in a continuous manner into successive electrolytic baths to deposit thereon successive layers of different inoxidizable metals. Washing baths are placed between each electrolytic bath to remove electrolyte.

**Electric condenser.** Samuel Ruben (to Ruben Condenser Co.). U. S. 1,947,112, Feb. 13. A dielectric spacer is used consisting of a homogeneous mixt. of a finely divided inorg. dielectric material such as S, MgO or mica, a water-insol. resinous binder such as a synthetic resin of the Bakelite type and an inorg. binder comprising a B compd. such as  $H_2BO_3$ .

**Electrolytic condenser.** Elektrizitäts-A.-G. Hydraulwerk. Fr. 756,845, Dec. 15, 1933.

**Electrolytic condensers with means, directly responsive to overheating, for releasing excess pressure within the container.** Joseph J. Barrett (to Magnavox (Great Britain) Ltd.). Brit. 401,989, Nov. 23, 1933.

**Electrolytic cells.** I. G. Faibend. A.-G. Fr. 757,119, Dec. 20, 1933. A cell having a Hg cathode is constructed of a material not attacked by Hg, e. g., Fe, and the part not covered by Hg has an insulating layer to protect it from the electrolyte and its decompn. products, while the part not protected and covered with Hg serves for leading in the current.

**Electrolytic recording.** Emil Glas. Austrian 135,822, Dec. 11, 1933 (Cl. 21e). Use is made of a support impregnated with a material which combines directly with metal ions derived from the anode to form an insol. colored substance. Thus, a support impregnated with dithiooxamide may be used with a Cu anode, or a support impregnated with nitrosonaphthol may be used with a Co anode. The cond. of the support may be raised by adding a salt, e. g., NaOAc, to the impregnating soln.

**Per-compounds by electrolysis.** Kali-Chemie A.-G. (Friedrich Nessler, inventor). Ger. 591,263, Jan. 18, 1934 (Cl. 12a. 16). In the manuf. of per-compds. by electrolyzing suitable acid solns. with the use of an anode comprising Pt supported on Al, corrosion of the Al is avoided by first subjecting it in known manner to anodic polarization, e. g., in a satd. soln. of  $NH_4HSO_4$ .

**Electrolytic production of embossing foils of gold or other metals.** Julius Fichtmueller. U. S. 1,945,142, Jan. 30. Electrodeposition is effected on a highly polished metal supporting band, a backing substance such as gelatin or shellac is applied and allowed to dry on the deposited metal, the metal and backing film are stripped from the support, a facing film such as one from "liquid cellulose" is applied and a portion of the backing film is dissolved and removed.

**Ductile electrolytic iron.** John R. Cain (one-half to Frederic A. Eustis). U. S. 1,945,107, Jan. 30. A soln. of a ferrous salt such as  $FeCl_2$  is subjected to electrolysis between a pair of electrodes, while the soln. surrounding the anode is maintained sep. from the soln. surrounding the cathode by a porous wall, and the  $pH$  of the soln. surrounding the cathode is controlled to maintain it at between 1.0 and 3.0. App. is described. Cf. C. A. 27, 4179.

**Metallic salts such as those formed from scrap metal alloys.** Wm. P. Heineken and Meyer L. Freed (to Rufert Chemical Co.). U. S. 1,947,006, Feb. 13. A metallic mass such as a Cu alloy which contains 2 known metals but the exact compn. of which is unknown is employed as anode and electrolyzed with a soln. of sol. salts of the metals (the cathode being segregated from the anode) and a flow of electrolyte is effected from the cathode toward the anode to prevent migration of ions from the anode to the cathode while migration of ions is permitted from the cathode to the anode, the electrolyte adjacent the cathode being maintained in a substantially pure state and in a condition compatible with the deposition of its metal; a supplementary cathode removed from the first-mentioned cathode is provided, adapted for unrestricted interchange of ions and the electrolyte adjacent this supplementary cathode is maintained in a condition permitting deposition

of the other of the known metals. App. is described.

**Low-carbon chromium alloys.** Ture R. Haglund. U. S. 1,946,161, Feb. 6. See Brit. 382,796 (C. A. 27, 4480).

**Manganous chloride.** Goshi Kaisha Sugibayashi Kokuken Mangan Seirenjo (Zyôji Han, inventor). Japan. 99,775, Feb. 24, 1933.  $MnCl_2$  is prepd. by electrolytic reduction of powd.  $MnO_2$  in dil. HCl, with a c. d. of 2 amp. per sq. cm. at 6 v.

**Calcium carbide.** Kenji Tazaki. Japan. 99,201, Jan. 26, 1933. In an elec. furnace for manuf. of  $CaC_2$ , a mixt. of  $CaO$  and C is placed around the electrode, and a mixt. of limestone and coal is placed outside of this first layer.

**Electric removal of arsenic from sulfuric acid.** M. A. Kolontsev. Russ. 1514, July 31, 1926. Crude  $H_2SO_4$  is passed through a number of heated containers charged with porous material where it is exposed to the action of elec. current.

**Treatment of ore slime containing lead sulfate.** Kyôritsu K. K. (Kyoku Nakada, inventor). Japan. 99,582, Feb. 16, 1933. Ore slime contg.  $PbSO_4$  is mixed with satd. NaCl soln., heated and electrolyzed without filtering; Pb is used as the anode. Pb is obtained in a spongy state. By mixing with lime, the soln. gives concd. NaCl soln. which is used in the first process.

**Apparatus for nitriding carbides.** Bayerische Stickstoffwerke A.-G. Ger. 591,194, Jan. 17, 1934 (Cl. 12a. 9). Addn. to 572,113 (C. A. 27, 2889).

**Decomposing liquids to gases.** Alfred Kilgus. Brit. 401,688, Nov. 43, 1933. The production of gases by the chem. or electrolytic decompn. of liquids is carried out in a magnetic field to increase the yield. Thus acidulated  $H_2O$  is decompd. with evolution of  $H_2$  by immersion of permanent magnets or electromagnets therein even when the Fe has been previously rendered passive. By electrolytic decompn. in a magnetic field a yield in excess of that detd. by Faraday's law may be obtained. Detailed examples of the electrolysis of a 30% KOH soln. are given.

**Formaldehyde from methane.** Gutehoffnungshütte Oberhausen A.-G. Ger. 506,516, Aug. 28, 1933 (Cl. 12a. 7.01). See U. S. 1,900,215 (C. A. 27, 3675).

**Hexamethylenetetramine from methane.** Gutehoffnungshütte Oberhausen A.-G. Ger. 508,005, Nov. 25, 1933 (Cl. 12a. 15). Addn. to 506,516 (preceding abstr.). See U. S. 1,930,210 (C. A. 28, 1809).

**Chlorobenzene and hydrogen.** W. Jeunehomme. Belg. 398,222, Sept. 30, 1933.  $C_6H_5Cl$  in MeOH soln. is treated with Cl; HCl is added and the soln. is electrolyzed to give  $H_2$  and PhCl.

**Electric resistance furnace.** Rudolf Schaur and Klemens Schumacher. Austrian 135,901, Dec. 27, 1933 (Cl. 40c). Addn. to 133,875 (C. A. 27, 4745).

**Continuous electric resistance furnace for heating metal strip, wire, etc.** Emil F. Russ. Brit. 401,584, Nov. 16, 1933.

**Electric furnace for dry distillation of hydrocarbons.** Rikagaku Kenkyûjo (Masatoshi Ôkouchi and Taizô Yoshikawa, inventors). Japan. 99,987, March 7, 1933. Diagrammatical.

**Electric salt bath furnace.** Siemens-Schuckertwerke

A.-G. (Ulrich Aschmann, inventor). Ger. 589,824, Dec. 15, 1933 (Cl. 21k. 15.01).

**Crucible for smelting metals electrolytically.** Allgemeine Elektrizitäts-Ges. (Hermann Blomberg, inventor). Ger. 588,437, Nov. 18, 1933 (Cl. 18c. 5.40). Addn. to 589,651 (C. A. 28, 1283\*).

**Heating process suitable for fusing metals.** Irving Langmuir (to General Elec. Co.). U. S. 1,947,267, Feb. 13, 1933. For effecting high-temp. heating, an elec. arc is used to heat mol. H and the H is passed directly from the arc to the body to be heated (the arc being maintained with such voltage and current as to cause substantial quantities of at. H to be formed which recombines in the neighborhood of the body to be heated). App. is described.

**Electrodes for electrolysis.** Asahi Denka Kōgyō K. K. (Masutaro Suzuki and Ryōzō Abe, inventors). Japan. 99,320, Feb. 3, 1933. The strength and durability of electrodes for electrolysis of NaCl soln., etc., are increased by filling small holes in the electrodes with solidified fats or fatty acids in fused state or in soln. in org. solvents.

**Electrodes for electrolysis.** Asahi Denka Kōgyō K. K. (Masutaro Suzuki and Teizō Abe, inventors). Japan. 99,321, Feb. 3, 1933. Small holes in electrodes (such as graphite) for electrolysis of NaCl, etc., are filled with fat or fatty acid, which is then solidified by treating with heat or Cl<sub>2</sub> or mineral acids. The strength and durability of the electrodes are increased.

**Nickel anodes for electrolysis.** The Mond Nickel Co., Ltd. Ger. 591,373, Jan. 20, 1934 (Cl. 48a. 4). Ni contg. up to 0.25% of combined O is mech. treated, e. g., by rolling or hammering, at a raised temp. below its m. p. A homogeneous Ni-NiO eutectic is obtained, which dissolves easily and uniformly in electrolytic baths.

**Electrode for lead cells.** Etsurō Ishii. Japan. 100,473, Apr. 7, 1933. Pure Pb foil perforated and painted with Pb powder or oxide is rolled around a Pb rod and the whole is inserted in a perforated ebonite tube. A series of such tubes is used as the electrode.

**Electrode device suitable for use with oil burners, etc.** Theodore Schmidt (to Winslow Boiler and Engineering Co.) U. S. 1,945,385, Jan. 30. Structural features.

**Binding material suitable for use in making carbon electrodes, etc.** Edmund O. Rhodes and Elmer H. Hyde (to American Tar Products Co.). U. S. 1,946,446, Feb. 6, 1933. A mixt. m. 85–110° is formed from pitch m. 100–150° and pitch oil obtained as a distillate in coking pitch.

**Semi-automatic machine for winding yarn around the dollies of carbon electrodes for dry cells previously wrapped with fabric.** Wilhelm Hasse. Brit. 401,983, Nov. 23, 1933. Addn. to 399,324 (C. A. 28, 1608\*).

**Electrofiltration of gases.** Siemens-Schuckertwerke A.-G. (Richard Heimich, inventor). Ger. 591,193, Jan. 17, 1934 (Cl. 12c. 5). The gases are fed to the electrofilter by a metallic fan coated with enamel, hard rubber, or acetone-sol. cellulose acetate or like material. The particles in the gases become charged with the frictional electricity induced by their contact with the fan.

**Electric gas cleaner.** Aloys Schirp. Ger. 589,609, Dec. 11, 1933 (Cl. 12c. 5).

**Electrical precipitation treatment of fresh hot coal-distillation or carbonization gases.** Stuart P. Miller (to Barrett Co.). U. S. 1,945,061, Jan. 30. The hot gases are sprayed with tar, and residual particles remaining from the resulting distn. of these particles are removed by an elec. pptn. treatment (various details of app. and operation being described).

**Electrical precipitation apparatus.** Alexander N. Crowder (to Research Corp.). Brit. 401,566, Nov. 16, 1933.

**Filtration of liquids by electroosmosis.** The Minister of Communications (Haruo Okuno, inventor). Japan. 100,571, Apr. 13, 1933. Liquids (such as water, glycerol,

acetone, alc.) contg. suspended impurities are purified by means of a special compound porous layer and electroosmosis with an applied e. m. f. of 10–120 v.

**Electric transmission of pictures, etc.** Viktor Bausch, Jr. Ger. 591,455, Jan. 22, 1934 (Cl. 15k. 7.05). Reagents which produce a color under the action of a current, but which can be decompd. or eliminated by a simple after-treatment, are incorporated in paper, fabric or like supports for use in picture telegraphy, etc., whereby darkening of the transmitted picture, etc., can be prevented. Thus, the color may be produced by anodic oxidation in known manner of a volatile amine, e. g., *o*-toluidine, and unchanged amine afterward removed by evapn. Alternatively, the support may contain a light-sensitive diazo compd., e. g., diazotized *p*-aminodiphenylamine, an electrolyte, e. g., NiCl<sub>2</sub>, and a coupling component, e. g., resorcinol. In this case, a dye is formed through the liberation of NH<sub>2</sub> at the cathode, and unused diazo compd. is afterward decompd. by strong illumination.

**Conductors.** Alexander F. Peckete. Brit. 401,368, Nov. 10, 1933. Divided on 396,453 (C. A. 28, 548\*). A conductor, preferably of Cu or Fe, is insulated with alternate coatings of Al and Al<sub>2</sub>O<sub>3</sub> or other insulating chem. compd. of Al. The oxide coatings may be formed by oxidizing the Al coatings and may include fillers, e. g., porcelain, steatite, sol. glass. They may be strengthened by treatment with superheated steam. The Al coatings may be applied electrolytically, an electrolyte of molten Al compds., e. g., cryolite, and auxiliary anodes of Pb being used; alternatively the conductor may be passed through vaporized Al at 1000–1200°.

**Electric system for detecting flaws in electrical conductors such as rails.** Harcourt C. Drake (to Sperry Products, Inc.). U. S. 1,941,930, Jan. 30.

**Electric system for detecting flaws in electrical conductors such as wires, cables or bars.** Elmer A. Sperry (to Sperry Products, Inc.). U. S. 1,944,954, Jan. 30.

**Electrical coils.** Harry W. Turner (to The British Thomson-Houston Co., Ltd.). Brit. 401,084, Nov. 9, 1933. See U. S. 1,874,722 (C. A. 26, 6037\*).

**Incandescent cathode rectifier filled with gas or vapor.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 756,947, Dec. 18, 1933.

**Lamp for emitting both visible and ultra-violet light.** Thomas W. Rolph (to Holophane Co.). U. S. 1,945,567, Feb. 6. Structural features.

**Arc lamps.** Patent-Freihand Gesellschaft für elektrische Glühlampen m. b. H. (to The General Electric Co., Ltd.). Brit. 401,509, Nov. 16, 1933. An enclosed arc lamp electrode consists of a compacted or sintered body of Fe (compds.) and electron-emitting substances, e. g., Fe oxide 50 and BaO 50 parts or Fe dust 90 and CaO 10 parts. A tubular extension removes a quartz window from the neighborhood of the electrodes which may sputter onto the envelope.

**Electron lamps.** Telefunken Ges. für drahtlose Telegraphie m. b. H. Fr. 756,830, Dec. 15, 1933.

**Thermionic lamp.** Compagnie des lampes. Fr. 757,187, Dec. 21, 1933.

**Incandescent lamp.** Egyesült Izzólámpa és Villamos-ágyi R. T. Hung. 107,890, Jan. 2, 1934. To prevent blackening of the glass bulb a water-absorbing substance that is gaseous or that boils below 350° is used. Practically a reaction mixt. or complex compd. is introduced into the bulb from which (e. g., H<sub>2</sub>SnCl<sub>4</sub> or H<sub>2</sub>SiF<sub>6</sub> or their salts) on heating a gaseous or vaporous water-absorbing material is developed. The bulbs are then closed and heated.

**Cut-out for incandescent electric lamps, etc.** Ernst Friedrich and Günther Aschermann (to General Elec. Co.). U. S. 1,946,279, Feb. 6. A shunt resistor contg. a Cu compd. such as the iodide is used with plumbic surfaced terminal members.

## 5—PHOTOGRAPHY

R. P. WIGHTMAN

**Photography.** Ernst Mees. *Apoth. Ztg.* 49, *Deul. Apotheke* 2, 375-80 (1934); cf. *C. A.* 27, 5658.—A concise exposition of the art for beginners and more advanced amateurs. W. O. R.

The photographic summation law and the extent of its validity. A. van Kreveld. *Physica* 1, 60-77 (1933). — The relation between developable  $d$  of the photographic plate and spectral compn. and intensities was studied in connection with the "summation" law of v. K. (*Z. wiss. Phot.* in press). The app. used for longer exposure periods was similar to that of Toy (*C. A.* 16, 4161), essentially a monochromator with double slit; for shorter exposures was used a pair of 16 candle-power lamps with color filters and direct illumination. The  $d$  was detd. to 2-3% accuracy for small or large  $d$  by visual comparison of the illuminated plate with a pyrometer filament, standardized for intensity in an optical system.

The summation law  $\sum_i \frac{E_i}{E_s} = 1$ , in which  $E_s$  is the energy contributed by color ( $i$ ) to a composite developability by mixed ( $m$ ) light, and  $E_i$  the energy of color ( $i$ ) required to produce the same developed  $d$  alone, is independent of the  $d$ -log  $E$  function itself, the measurement of  $d$  and the choice of  $d$ - $E$  or  $d$ -log  $E$  curve. A no. of photographic plates were tested for this law; the deviation of the sum from unity was never more than 3-5%. The influence was investigated of the emulsion type (8 panchromatic ones, several non-sensitized ones), mixing ratio of the light components, wave length, either type of illumination,  $d$ . (from  $D = 0.1$  to  $2.0 = \log$  (incident/transmitted light)), exposure time (0.004-100 sec.), development conditions (1-25 mins., 6 developers),  $d$  measurement by pyrometer or by microphotometer. The law leads to additivity of  $D(E_s)$  from the  $D(E)$  functions of the component colors. If the characteristic curves of the components happen to be parallel,  $E_i/E_s = \text{const.}$ , a special case is obtained with  $E_m$  likewise parallel. This case is realized for non-sensitized Ilford Special Rapid plates and surface development. The general validity of the law is explained by its validity for each individual layer of the plate; for this reason the effect of superficial development (pyrocatechol- $K_2CO_3$  and AcOH arrester) was studied in several expts.; it developed the plates for  $1/4$  of its depth (0.005 mm.). From application of the Svedberg statistical laws (Hay, *Handbuch für Photographie*, Bd. V, 269 (1932)) it is found that the summation law can only be accounted for if the colors of a mixt. act independently of each other on the plate. It is furthermore indirectly proved that the Schwarzschild exponent  $p$  is independent of the color for all ds. This is confirmed from Webb's work (*C. A.* 27, 5659) and present measurements on Ilford Rapid Pan. plates: for red of 650  $m\mu$ , violet of 450  $m\mu$  and their mixt., exposures of 5 to 100 sec.  $p$  is only dependent on  $d$ ,  $D$ , varying from 0.84-0.82 for  $D = 0.3$  to 0.99-0.93 for  $D = 1.0$ . It is impossible to assign a phys. significance to the factor  $p$ .

B. J. C. van der Hoeven

Oxidation products of org. developers (Seyewetz, Symson) 10. Films, plates, etc. (Fr. pat. 756,422) 18.

**Color photography.** Léon J. Dassonville. U. S. 1,945,772, Feb. 6. See Brit. 377,411 (*C. A.* 27, 2892).

**Color photography.** Paul E. F. Lessertisseux. Fr. 756,344, Dec. 8, 1933. Pos. colored films are obtained from 3 selected monochrome negatives, 2 Ag images being obtained on the 2 faces of the film, and they are colored by mordanting. The 3rd image is superposed on one of the first 2 by sensitization by dichromate and dyeing by hydrotype. The process is only applicable if the dyes are carefully chosen to avoid harmful reactions and used in a certain order. The dyes are dissolved in an appropriate thick solvent.

**Light filter system for use in color photography.** Herbert Bertling (to Kurt Dicken). U. S. 1,945,768, Feb. 6.

**Photographic color screen.** Merrill W. Seymour (to The Eastman Kodak Co.). Can. 339,057, Jan. 30, 1934. Colloidal suspensions of certain dyes, especially the indophenols or dyes closely related to them, are particularly useful as filter layers on sensitive photographic elements. These suspensions may be made for example, by mixing a gelatin soln. of a nitroso deriv. of a tertiary aromatic amine with a gelatin soln. of a suitable phenol in which the position para to the hydroxy group is not substituted. The indophenol formed is pptd. in colloidal form in the gelatin.

**Photographic printing process.** Kenneth C. D. Hickman and Ludwig G. Staib, Jr. (to The Eastman Kodak Co.). Can. 339,055, Jan. 30, 1934. Certain brown or black heavy-metal sulfides, e. g., those of Pb, Cu, Bi, Ni, Hg and Ag, are oxidized to a white material, probably the corresponding sulfate, under the action of light, by trivalent Co salts, e. g.,  $Co(NH_3)_4Cl_3$ ,  $Co(NH_3)_5NOCl_2$ , and  $Co(NH_3)_6(NO_2)_3$ . The Co salts are added to, or coated over, layers contg. the sulfides. This is made the basis of a practical printing method; e. g., a photographic positive is made by coating a suitable support with a layer contg. PbS, applying a soln. contg. a light-sensitive trivalent Co salt, printing the layer with a light image, and washing the layer to fix the image.

**Photographic materials.** E. Mayer & Benedik. Ger. 591,443, Jan. 22, 1934 (Cl. 57b. 14.01). Photographic prints are toned with a weak acid soln. contg. phosphates (or arsenates) and molybdates, preferably an acid soln. contg. a phosphomolybdate (or arsenomolybdate) and a thiocyanate. A brown color is obtained if the print is aftertreated with  $NH_3$  or an alk. soln. Aftertreatment with a sol. sulfide or polysulfide colors the print green.

**Photographic emulsion.** Leslie G. S. Brooker (to The Eastman Kodak Co.). Can. 339,059, Jan. 30, 1934. A photographic emulsion contains a cyanine dye in which 2 naphthoxazole nuclei are linked together by a trimethenyl chain, the N atoms of which are each bound to dissimilar alkyl radicals, while one is also bound to a suitable acid radical. Cf. *C. A.* 28, 1611<sup>9</sup>.

**Photographic emulsion.** Syōgyoku Yamabata (Zin zaburō Nabeya, inventor), Japan. 99,058, Jan. 16, 1933. The emulsion is prepd. by mixing gelatin, agar-agar, Rochelle salt,  $NH_4Cl$ ,  $AgNO_3$ , and a citrate.

**Photographic film.** Carl J. Malm (to The Eastman Kodak Co.). Can. 339,060, Jan. 30, 1934. Sol. salts of dicarboxylic acid esters of cellulose are utilized as an antihalation backing for photographic films. Examples of the salts are cellulose Na phthalate and the Na, K and  $NH_4$  salts of cellulose acetate hydrogen phthalate and of cellulose acetate hydrogen succinate.

**Photographic films.** Jaroslav Karafiát and Jirí Černý. Fr. 756,352, Dec. 8, 1933. Photosensitive layers are formed on the surface only of sheets of regenerated cellulose by drying a clear soln. of sol. salts of Ag or Fe, without the use of pptg. agent, e. g., Cl salts for Ag, or developer, e. g., red salt from blood serum for Fe. The sheets are kept in the state of max. dilation in water, before or after sensitization.

**Photographic films.** Voigtländer & Sohn A.-G. Fr. 756,479, Dec. 11, 1933. See Ger. 576,416 (*C. A.* 27, 3677).

**Cockle-proofing photographic film containing cellulose acetate.** Charles Holzwarth (to Du Pont Film Mfg. Corp.). U. S. 1,947,160, Feb. 13. For cockle-proofing photographic film of cellulose acetate contg. moisture-repelling agents such as dibutyl phthalate or triphenyl phosphite so that the combustion-retarding properties of the film will not be materially diminished, the film is thoroughly and carefully dried and both sides are treated with a thin coating formed from a soln. contg. not more than 10% nitrocellulose, about 1% of camphor, about



10% each of acetone, BuOH and the mono-ethyl ether of ethylene glycol and about 80% MeOH, and the film is re-dried.

**Motion picture films.** Lawrence L. Steele (to Essenc Laboratories, Inc.). U. S. 1,946,004, Feb. 6. A polyglycol such as diethylene glycol is incorporated in the gelatin film of motion picture films, in order to prevent brittleness, etc. U. S. 1,946,005 relates to motion picture films with a protective coating including a cellulose ester such as nitrocellulose and a hygroscopic org. material of low volatility such as diethylene glycol.

**Apparatus for developing cinematograph films.** Alexander S. Henderson. Brit. 401,380, Nov. 16, 1933.

**Intensifying photographic images.** Kenneth C. D. Hickman and Walter J. Weyerts (to The Eastman Kodak Co.). Can. 339,050, Jan. 30, 1934. A photographic Ag image is bleached in a soln. contg. an oxidizing agent relatively poor in Ag precipitant. The bleached image is darkened in a soln. contg.  $\text{Na}_2\text{S}$  and a solvent for AgBr. The resulting  $\text{Ag}_2\text{S}$  image is intensified in a soln. contg.  $\text{Na}_2\text{SO}_3$ ,  $\text{NaHSO}_3$ ,  $\text{Na}_2\text{S}_2\text{O}_3$ , and a Ag salt.

**Wash-off relief images.** Merrill W. Seymour (to Eastman Kodak Co.). U. S. 1,946,640, Feb. 13. In making a relief image, a light image is printed from the emulsion side on a layer having sensitivity increasing away from such side, and from this there is produced an image of graded soly. which is least sol. where the sensitivity was greatest, and the more sol. portions of the layer are washed off.

**Photographic and etching process for preparing printing surfaces.** Herman C. Bodicker (to Photo-Cylinder Corp.). U. S. 1,945,676, Feb. 6. Numerous details of procedure are described.

**Photographic printing paper.** Dai Nippon Celluloid K. K. (Kisaburo Takeuchi and Gonnosuke Asai, inventors). Japan. 99,598, Feb. 16, 1933. Paper is coated with a mixt. of NaCl, KBr, KI, a sol. salt of Cu, Ni or Co, gelatin soln. and  $\text{AgNO}_3$ .

**Diazotype paper.** Frans van der Grinten. Dutch 30,636, Sept. 15, 1933. A soln. of a diazo compd. (with tertiary N in the para position) + an azo component + a salt of a strong alkali and weak acid ( $\text{AcONa}$ ) is spread

on paper and dried at a temp. (below  $50^\circ$ ) at which coupling does not take place. The diazo compd. is preferably substituted in the nucleus to retard the coupling tendency. The development takes place on heating the paper with a hot iron or passing it between heated rolls. An example is given of 5% dimethylamino-3,5-xylene-4-diazonium chlorostannate, 0.5% phloroglucinol and 3% NaOAc (or 5% malonate or 5% K succinate).

**Diazotype papers.** Frans van der Grinten. Dutch 30,637, Sept. 15, 1933. Yellowing of diazotype paper is prevented by the addn. of reducing substances such as hydroxylamine or semicarbazide to the mixt.

**Photographic copies.** Kodak-Pathé. Fr. 756,426, Dec. 9, 1933. A photographic product sensitive to light and suitable for making pos. copies comprises a coating contg. a heavy-metal sulfide, e. g., of Pb, Cu, Bi, Ni, Hg or Ag, and a photosensitive oxidizing salt of trivalent Co, e. g., hexamminocobaltic chloride, nitrosopentamminocobaltic chloride or trinitrotetramminocobaltic chloride. The coating may contain a hygroscopic substance such as glycerol. The Co salt may be applied in soln. on a layer of sulfide.

**Colored photographic pictures.** Georg Roessler (to Agfa Ansco Corp.). U. S. 1,945,658, Feb. 6. A photographic Ag picture is acted on with an aq. bleacher soln. contg. a per-compd. such as  $\text{NH}_4$  persulfate and a halide salt such as KBr in the presence of a water-sol. leuco-compd. of a vat dye.

**Coloring photographic pictures.** I. G. Farbenind. A.-G. Brit. 401,340, Nov. 6, 1933. Color pictures are made from Ag pictures by applying to the photographic material an azo dye which is reducible with  $\text{Na}_2\text{S}_2\text{O}_4$  to give reaction products with Ag which are sol. in  $\text{H}_2\text{O}$  or aq. solns. and do not readily regenerate the dye under the influence of O, treating the dyed picture with an acid soln. contg. a reducing agent, e. g.,  $\text{HI}$ ,  $\text{HBr}$ , that does not reduce the dye when used alone and an agent, e. g., thiourea, capable of forming a complex Ag compd., and treating the material in a fixing soln. A bleaching soln. of acidified  $\text{CuCl}_2$  may be used before fixing. A suitable soln. for the process comprises  $\text{I}$ ,  $\text{KI}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{Na}_2\text{SO}_3$  and thiourea. Suitable dyes are Congo sky blue, Sirius red-violet R, Sirius ruby B, Benzo light yellow, etc.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The reactions of arsenic, antimony, tin and lead organic compounds with mercuric chloride in neutral and alkali media. A. N. Nesmeyanov and K. A. Kozeshkov. Ber. 67B, 317-24 (1934).—In EtOH,  $\text{HgCl}_2$  reacts according to these type equations: (1)  $\text{Ar}_3\text{M} + \text{HgCl}_2 = \text{Ar}_3\text{MCl} + \text{ArHgCl}$ ; (2)  $\text{Ar}_3\text{MCl} + \text{HgCl}_2 = \text{Ar}_2\text{MCl}_2 + \text{ArHgCl}$ ; (3)  $\text{Ar}_3\text{MCl}_2 + \text{HgCl}_2 = \text{ArMCl}_3 + \text{ArHgCl}$ ; (4)  $\text{ArMCl}_3 + \text{HgCl}_2 = \text{MCl}_4 + \text{ArHgCl}$ . In (1), (2), (3) and (4) M may be Sn; in (1) and (2) it may also be Pb. In alk. media the type reactions are: (5)  $\text{Ar}_3\text{SnO} + \text{HgO} + 2\text{NaOH} = \text{Ar}_2\text{Hg} + \text{Na}_2\text{SnO}_3 + \text{H}_2\text{O}$ ; (6)  $2\text{ArSbO} + \text{HgO} = \text{Ar}_2\text{Hg} + \text{Sb}_2\text{O}_3$ ; (7)  $2\text{PhAsO} + \text{HgO} = \text{Ph}_2\text{Hg} + \text{As}_2\text{O}_3$ ; (8)  $2\text{Ar}_3\text{PbOH} + \text{HgO} = \text{Ar}_2\text{Hg} + 2\text{Ar}_2\text{PbO} + \text{H}_2\text{O}$ ; (9)  $\text{Ph}_3\text{Hg} + \text{HgO} + \text{H}_2\text{O} = 2\text{PhHgOH}$ ; (10)  $\text{ArSbO} + 2\text{HgO} + 2\text{NaOH} = \text{ArSbO}_2\text{Na}_3 + \text{Hg}_2\text{O} + \text{H}_2\text{O}$ ; (11)  $(\text{ArSb})_2\text{O} + 4\text{HgO} + 2\text{NaOH} = 2\text{Ar}_2\text{SbO}_2\text{Na} + 2\text{Hg}_2\text{O} + \text{H}_2\text{O}$ ; (12)  $\text{PhHgOH} + \text{PhSbO} + \text{NaOH} = \text{Ph}_2\text{Hg} + \text{NaSbO}_3 + \text{H}_2\text{O}$ ; (13)  $\text{PhHgOH} + \text{PhAsO} + 2\text{NaOH} = \text{Ph}_2\text{Hg} + \text{NaAsO}_3 + \text{H}_2\text{O}$ ; (14)  $\text{Ph}_3\text{SnX}_{4-n} + n\text{PhHgX} + 6\text{NaOH} = n\text{Ph}_2\text{Hg} + \text{Na}_3\text{SnO}_3 + 4\text{NaX} + 3\text{H}_2\text{O}$ . Exptl. results are reported on the reaction of  $\text{HgCl}_2$  with  $\text{Ph}_3\text{Sn}$ ,  $\text{Ph}_3\text{Pb}$ ,  $\text{PhAsO}$ ,  $\text{PhSbCl}_2$ ,  $\text{PhSbO}$ ,  $o\text{-MeOC}_6\text{H}_4\text{SbCl}_2$  and  $p\text{-ClC}_6\text{H}_4\text{SbCl}_2$  and of interactions of various substances formed in these reactions.

**Investigations on bromine.** J. d'Ans and P. Höfer. Angew. Chem. 47, 71-4 (1934).—The compn. of Br hydrate was proved to be  $\text{Br}_3 \cdot 8\text{H}_2\text{O}$ . The transition point for  $\text{Br}_3 \cdot 8\text{H}_2\text{O} \rightarrow \text{liquid Br}_3 + \text{soln.}$  was established at  $+5.84^\circ$ . The system  $\text{Br}-\text{H}_2\text{O}$  was further examd. and

the results are presented in graphical form. Vapor pressures for Br were detd. in a soln. of the compn.  $\text{H}_2\text{O}$  100, NaCl 15, KCl 12,  $\text{MgCl}_2$  12 and  $\text{MgSO}_4$  9.2 g. The vapor pressures were measured for 0.1 and 0.27% Br and are reported over the temp. range  $20-80^\circ$ . The iodometric detn. of bromides by van der Meulen's method was also investigated and several improvements are reported. Numerical examples and 16 references are given.

**The composition and the heats of formation of the carbon fluoride mixtures obtained from Norite and from silicon carbide (heats of formation of carbon tetrafluoride and silicon carbide).** Otto Ruff and Otto Bretschneider. Z. anorg. allgem. Chem. 217, 19-21 (1934).

**Preparation and properties of gallium and gallium trichloride.** Wm. M. Craig and G. Wilson Drake. J. Am. Chem. Soc. 56, 584-5 (1934).—Pb dross from the redistn. of Zn is treated with molten  $\text{PbCl}_2$  and the product leached with dil. HCl. The crude Ga obtained by electrolyzing the KOH soln. of the  $\text{Ga}(\text{OH})_3$  from the leachings was heated *in vacuo* and converted to the chloride which was fractionally distd. Ga prepd. from this  $\text{GaCl}_3$  showed no traces of Zn, Cd or In and little tendency to supercool.  $\text{GaCl}_3$  b.  $199.6^\circ$  and m.  $76.65^\circ$ . Ga melts at  $29.755^\circ$ ; has  $d_{20}^{25}$ , 5.903; at. vol., 11.81. W. C. F.

**The reaction products of the various forms of carbon with fluorine. II. Carbon monofluoride.** Otto Ruff, Otto Bretschneider and Fritz Ebert. Z. anorg. allgem. Chem. 217, 1-19 (1934); cf. C. A. 24, 5741.—CF is

formed from Norite (free from O) and F at 280° and 25 mm. pressure, or from graphite and F at 420° and 760 mm. pressure. Its structure has been found from x-ray diagrams. Phys. and chem. properties are listed. At higher temps., Norite, graphite and CF give gaseous fluorides of C, such as  $CF_4$ ,  $C_2F_4$ ,  $C_3F_4$  or even higher homologs.

**The melting point of nitrogen trifluoride.** Otto Ruff and Walter Menzel. *Z. anorg. allgem. Chem.* 217, 93-4 (1934).— $NF_3$  melts at  $-208.5^\circ$ . There is a transformation point at  $-219^\circ$ .

**The oxygen fluorides  $O_2F_2$  and  $OF_2$ .** Otto Ruff and Walter Menzel. *Z. anorg. allgem. Chem.* 217, 85-92 (1934); cf. *C. A.* 27, 3889.—An app. for the production of O fluorides is described.  $O_2F_2$ , b.  $-57^\circ$ ,  $\log p = 7.515 - (1000/T)$  (below  $-100^\circ$ ), m.  $-163.5^\circ$ ,  $d = 2.074 - 0.00291T$ .  $OF_2$ , b.  $-185.4^\circ$ ,  $\log p = 6.897 - (352.7/T)$ , m. about  $-224^\circ$ ,  $d = 1.823 \times 0.0056T$ . The interactions between these compds. and several other compds. are listed.

**A very insoluble phosphate from Orissa monazite.** Chandra Bhusan Roy and Shashanka Bhusan Roy. *Z. anorg. allgem. Chem.* 216, 203-6 (1933).—Monazite from the black sands of Orissa (cf. *C. A.* 27, 5487) was repeatedly fused with the usual reagents, and supposedly every element but Zr, Hf and Ti removed. These latter were found present spectrographically. A preliminary at. wt. detn. gave 100.4 and 99.0, but the chem. properties do not correspond to those for Zr. The freshly pptd. hydroxide is practically completely sol. in  $NaHCO_3$  soln.; the chloride or oxychloride forms yellow crystals, and gives a yellow soln.; the oxide is pale yellow, and on heating becomes deeper yellow. Even if allowance is made for traces of Hf and Ti, these properties differ from those of Zr.

**Alkali iodobismuthates.** D. Motard. *Compt. rend.* 198, 655-7 (1934).—Freshly powd. Bi was added to concd. alc. I to which was added varying amts. of alc. or aq. KI, the mixt. agitated, allowed to stand and the cryst. mass extd. with  $Me_2CO$ , from which the iodobismuthate crystd. out on evapn. The only compds. obtained were: with alc. KI,  $KI \cdot 2BiI_3$  and  $4KI \cdot 2BiI_3$ ; with aq. KI,  $2KI \cdot 2BiI_3$ ,  $2H_2O$  and  $3KI \cdot 2BiI_3$ ,  $2H_2O$ , all well crystd. The methods described by Arrpe and Linau [*Pogg. Ann.* 64, 237 (1845); 111, 243 (1860)] yielded no others; the  $6KI \cdot 2BiI_3$  claimed by Astre [*Compt. rend.* 110, 1137 (1890)] seems to have contained  $BiOI$ . In similar fashion  $NaI \cdot BiI_3 \cdot nH_2O$  ( $n = 0, 1$  and  $2$ ) was prepd.

**The product obtained by the action of ammonia on phosphorus pentachloride.** Henri Moureu and Paul Rocquet. *Compt. rend.* 197, 1643 5 (1933).—On treatment of resublimed  $PCl_5$  with dry  $NH_3$  at  $-50^\circ$  in a special app., a white compd., corresponding to the diiminoamide  $P(NH_2)_2NH_3$ , was isolated. An intermediate compd. could not be isolated. On being heated *in vacuo* the diiminoamide begins to decomp. at  $50^\circ$ , and decompn. is complete after heating 100 hrs. at  $350-400^\circ$  to form the phospham,  $PN_2H$  and  $NH_3$ . This in turn decomp. at  $480^\circ$  to form  $P_2N_5$  and  $NH_3$ , and at  $700^\circ$  P and  $N_2$  result.

**Oxidation of arsenious sulfide with atmospheric oxygen in an alkaline medium, under pressure and high temperature.** G. A. Razuvayev, V. S. Malinovskii and E. P. Lopatina. *J. Applied Chem.* (U. S. S. R.) 6, 206-19 (1933).—Oxidation of  $As_2S_3$  in  $NaOH$  soln. under pressure probably takes place (a) at low temp. ( $100-110^\circ$ ) according to  $As_2S_3 + 4NaOH + 2\frac{1}{2}O_2 \rightarrow 2NaAsO_2 + Na_2S_2O_3 + S + 2H_2O$ ; (b) at  $150-300^\circ$ ,  $As_2S_3 + 10NaOH + 7O_2 \rightarrow 2Na_2HAsO_4 + 3Na_2SO_4 + 4H_2O$ . Insufficient  $O_2$  in the bomb retards the reaction, while an excess has no effect. The contact surface has much influence on the reaction velocities in the liquid and vapor phases. The oxidation in  $Na_2CO_3$  soln. is slower and requires higher temps. than oxidation in  $NaOH$  solns. The exptl. procedure is described in detail.

**Solubility of cupric chloride in water, and the transition points of its hydrates.** Hanna Benrath. *Z. anorg.*

*allgem. Chem.* 216, 207-8 (1933); cf. *C. A.* 26, 4233; Boye, *C. A.* 28, 984<sup>1</sup>.—Polemic. Only a dihydrate of  $CuCl_2$  exists between  $0^\circ$  and  $100^\circ$ . I. J. Patton

**Interaction of aqueous solution of cupric sulfate and cupric hydroxide.** O. Binder. *Compt. rend.* 198, 653-4 (1934).—Mixts. of 5 g. of  $Cu(OH)_2$  and 100 cc. of aq.  $CuSO_4$  of varying concns. were agitated at  $22^\circ$  until equil. was attained. The ratios  $CuO/SO_4$  and  $H_2O/SO_4$  were both invariably 4, and no other basic salt than  $(Cu_2O)_2SO_4 \cdot 4H_2O$  was found. If the amt. of  $Cu(OH)_2$  was relatively too small or too great this compd. was found together with  $CuSO_4 \cdot 5H_2O$  or  $Cu(OH)_2$  as the case might be. The nonexistence of any other basic salt was confirmed by x-ray investigation, which gave the characteristic diagrams of these 3 compds. only (cf. *C. A.* 20, 1184; 26, 1870).

**Basic nickel sulfate.** G. Gire. *Compt. rend.* 197, 1646 (1933).—When powd. Mg is added to  $NiSO_4$  solns. varying from 0.05 to 0.25 mol. per l., soln. occurs and  $H_2$  is liberated. Brilliant green crystals with 18 mols.  $H_2O$  are obtained. The color becomes dull and on drying at 100 the compd.  $NiSO_4 \cdot 4NiO \cdot 10H_2O$  is obtained. This compd. is nonmagnetic, insol. in  $H_2O$  and sol. in hot acids.

**The hydrates of nickel sulfate.** André Chrétien and Raymond Rohmer. *Compt. rend.* 198, 92-4 (1934).—The system  $NiSO_4-H_2O$  was studied at one atm. over the range  $-3.15^\circ$  to  $107.7^\circ$  (b. p. of the satd. soln.). The coexisting solids, temps. and g.  $NiSO_4/100$  g.  $H_2O$  were, resp.: ice- $NiSO_4 \cdot 7H_2O$   $-3.15^\circ$ , 26.2;  $NiSO_4 \cdot 7H_2O$ - $\alpha$ - $NiSO_4 \cdot 6H_2O$   $29.1^\circ$ , 43.7;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $\alpha$ - $NiSO_4 \cdot 6H_2O$   $60.3^\circ$ , 57.0;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $NiSO_4 \cdot 5H_2O$   $98^\circ$ , 79.2;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $NiSO_4 \cdot 4H_2O$   $97.2^\circ$ , 78.5;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $NiSO_4 \cdot 3H_2O$   $96.4^\circ$ , 78.0;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $NiSO_4 \cdot 2H_2O$   $90.3^\circ$ , 73.1;  $\beta$ - $NiSO_4 \cdot 6H_2O$ - $NiSO_4 \cdot H_2O$   $84.8^\circ$ , 69 (\*denotes metastable equil.). Above  $84.8^\circ$  only the monohydrate is stable. The metastable phases are very persistent.

**Decomposing sodium sulfate with hydrogen.** K. I. Losev and Yu. G. Naidis. *J. Applied Chem.* (U. S. S. R.) 6, 220-3 (1933).—At comparatively low temps., up to  $800^\circ$ , there is only a reduction of the sulfate with the  $H_2$ . There is more decompn. when the temp. is above  $800^\circ$  whereby  $H_2S$  and  $NaOH$  are formed in the boat. On further heating, the sepd. alkali as well as the remaining  $Na_2S$  is combined with the material of the boat (porcelain, magnesite, etc.) forming ultramarine of different colorings, such as yellow, green, blue and red. If  $H_2$  is passed in at  $1100^\circ$  for one hr. the alkali and  $Na_2S$  formed to about 80% are completely combined.

**The action of vanadium tetrachloride on some anhydrous chlorides.** André Morette. *Compt. rend.* 197, 1640-3 (1933).—Molten V was treated with a stream of  $Cl_2$  and the product passed over anhyd. Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Zn, Mn, Cr, Ag and Pb chlorides. Of these only K, Rb and Cs chlorides reacted with the vapors of V chlorides, as shown by an increase in wt.  $CsCl$  increased most, while  $KCl$  and  $RbCl$  retained essentially the same wts. of V chlorides and in each case the ratio  $Cl/V$  was about 3, indicating  $VCl_3$ ; for a ratio above 3,  $VCl_4$  seems to enter. The compd. or soln. of V chloride in the alkali chloride loses V when heated in a stream of  $Cl_2$ ; above  $400^\circ$  this loss occurs even in the presence of  $VCl_4$ . The reaction  $VCl_4 = VCl_3 + Cl$  seems to be supported by the alkali chloride. I. J. Patton

**Hydrolysis of carbides.** Norbert G. Schmahl. *Z. Elektrochem.* 40, 68-70 (1934).—S. discusses the hydrolysis products of various metallic carbides, particularly of the rare earth group. He concludes that the nature and amt. of the hydrocarbon products formed can be detd. from the formulas and energy content of the resulting metallic oxide and the original carbide.

**The existence of pyro- and meta-arsenic acids.** V. Auger. *Compt. rend.* 197, 1639-40 (1933).—On repeating Rosenheim and Antelmann's work on meta- and

pyro-arsenic acids (C. A. 24, 5250), and even analyzing a sample of the pyro acid furnished by R., Auger detd. that this acid corresponds to  $3As_2O_5 \cdot 5H_2O$ . The product claimed as  $HAsO_3$  is  $As_2O_5$ . Conclusion: The free ortho-, pyro- and meta-arsenic acids have not been isolated.

I. J. Patton  
**Hydrazoic acid.** Edward C. Franklin. *J. Am. Chem. Soc.* 56, 568-71 (1934).—The reaction  $KNO_3 + 3KNH_2 \rightarrow 3KOH + NH_3 + KN_3$  (75% yield; 80% with  $Pb(NO_3)_2$ ) takes place in liquid  $NH_3$  (90°) and is evidence that  $HN_3$  is ammononitric acid (cf. C. A. 6, 1410; 20, 1185). Aq.  $HN_3$  acts upon Zn, Fe, Mn, Ni and Cu in a fashion similar to  $HNO_3$ :  $Zn + 3HN_3 \rightarrow Zn(N_3)_2 + NH_3 + N_2$  (small amounts of  $H_2N_2$  also). A mixt. of  $HN_3$  and HCl dissolves Au and Pt. Aq.  $HN_3$  oxidizes (augments)  $Fe(N_3)_2$  to  $Fe(N_3)_3$  on warming and  $NaN_3$  oxidizes  $Sn^{++}$  to  $Sn^{4+}$  in molten  $NaNH_2$ . Several simple org. compds. are oxidized (nitridized) when heated with  $HN_3$  in aq. soln. or  $NH_4N_3$  in liquid  $NH_3$ .

W. C. Fernelius  
**A hexosephosphoric acid obtained from the hydrolysis of flour.** Theodore Posternak. *Compt. rend.* 198, 5103-7 (1934).—The biosemonophosphoric acid previously obtained from the hydrolyzate of flour (C. A. 28, 833<sup>9</sup>) was hydrolyzed by boiling with 2%  $H_2SO_4$  and from the soln. was obtained a Ba hexosemonophosphate  $CaH_{11}O_{11}PBa$ ,  $[\alpha]_{D_{20}}^{20}$  (1% soln.) 20.8°; the free acid has  $[\alpha]_{D_{20}}^{20}$  40.9°; the phenylhydrazide of the osazone m. 152-3°. From these properties and from the change of rotation in mixts. of alc. and pyridine the acid is identical with Robison's ester, dextrose-6-phosphoric acid. K. V. Thimann

The amphoteric behavior of metal hydroxides. III. Cuprites. R. Scholder, R. Felsenstein and A. Appl. *Z. anorg. allgem. Chem.* 216, 138-44 (1933); cf. C. A. 27, 5018; 28, 1617<sup>8</sup>. Na tetrahydroxocuprite  $[Cu(OH)_4]Na_2$  is prepd. by gradually adding a warm soln. of 40 g.  $Cu(NO_3)_2 \cdot 3H_2O$  in 25 ml. water to 240 cc. of a soln. of NaOH (sp. gr. 1.535) at 5°, and kept at this temp. in an ice bath. After addn. is complete, the soln. is warmed to 80° on a water bath, filtered by suction, and the filtrate rapidly cooled to room temp. After an hr. a fine, deep-blue ppt. of the Na cuprite forms (sq. plates under a microscope). Analysis led to the above formula. No K salt could be prepd. in this way. Double decompn. reactions for the prepn. of Li, Mg, Ca, Ti and heavy metals from the Na salt failed. Ba and Sr compds. (hydroxides or chlorides) were prepd. Two Sr salts,  $[Cu(OH)_4]Sr \cdot H_2O$ , and  $[Cu(OH)_4]Sr_2$ , were prepd., the former violet, the latter light blue in color.  $[Cu(OH)_4]Ba_2$  was also prepd. Dehydration expts. prove the structure. IV. Cobaltites. R. Scholder and H. Weber. *Ibid.* 159-64. True solns. of  $Co^{II}$  salts in very concd. NaOH solns. give  $[Co(OH)_4]Na_2$ , wine-red;  $[Co(OH)_4]Ba_2$ , violet-red;  $[Co(OH)_4]Sr_2$ , violet red. V. Stannites. R. Scholder and R. Kutsch. *Ibid.* 176-84. From alk. stannite solns., the following cryst. stannites were isolated: (a) white hydroxostannites  $[Sn(OH)_4]Na_2$ ;  $[Sn(OH)_4]Ba_2 \cdot 2H_2O$ ;  $[Sn(OH)_4]Sr \cdot 2H_2O$ ;  $[Sn(OH)_4]Ba$ ; (b) the yellow oxyhydroxostannites:  $[(HO)_2Sn-O-Sn(OH)_4]Ba$ ; and the corresponding Sr salt. At 100-110° the trihydroxo-Ba and Sr compds. change to the yellow oxyhydroxostannites; at 200-400° these go to the pure oxostannites,  $SnO_2 \cdot Ba$  or  $SnO_2 \cdot Sr$ . The Na salt decomposes at room temp. with sepn. of Sn. I. J. P.

Amphoteric oxide hydrates, their higher molecular compounds and solutions thereof. XIX. Hetero- and isopolytungstic acids, particularly the periodotungstic acids. Gerhart Jander and Hans Witzmann. *Z. anorg. allgem. Chem.* 214, 145-57 (1933); cf. C. A. 27, 4187. To investigate the formation and mol. state of heteropoly compds. thoroughly the systems of 1-periodo-6-tungstic acid, 1-telluro-6-tungstic acid, 1 phospho-12-molybdic acid and x-phospho-y-vanadic acids are to be investigated in detail and the systems referred to the theories of Miotati, Copaux and Rosenheim (cf. C. A. 2, 2346; 3, 2008; 12, 1264). These theories are reviewed and the prepn. and properties of periodotungstic acids and their salts are described. XX. Iso- and heteropolytungstic acids,

particularly the optical absorption powers of 1-telluro-1-hexatungstic acid. *Ibid.* 275-80. XXI. Iso- and heteropoly-molybdic acids, particularly the phosphor-molybdic acids. *Ibid.* 215, 310-20.—Diffusion tests were made to investigate the formation, behavior and structure of 1 phosphorus-12-molybdenum acid with solns. of 0.1 M  $Na_2MoO_4 \cdot 2H_2O$ , 0.1 M  $Na_2HPO_4 \cdot 12H_2O$  and 1 M  $NaClO_4$ . To obtain different H-ion concns. the solns. were mixed with various amts. of perchloric acid. Tabulated data show the mol. condition of the Mo-contg. ions for different H-ion concns. Curves are given showing the optical absorption properties of solns. of phosphor-molybdic acids. M. McMahon

The ternary system  $KI-PbI_2-H_2O$  at 0° and 25°. Henry S. van Klooster and Paul A. Balon. *J. Am. Chem. Soc.* 56, 591-2 (1934).—Equilibria conditions in the system  $KI-PbI_2-H_2O$  at 0° and 25° were studied and the existence at both temps. of one double salt,  $KPbI_3 \cdot 2H_2O$ , was established. H. S. v. K.

Ternary systems of urea and acids. I. Urea, nitric acid and water. II. Urea, sulfuric acid and water. III. Urea, oxalic acid and water. Lawrence H. Dalman. *J. Am. Chem. Soc.* 56, 549-53 (1934). The system urea- $HNO_3$ - $H_2O$  was studied at 10°, 25° and 40°. One salt was found:  $CO(NH_2)_2 \cdot HNO_3$ . In the system urea- $H_2SO_4$ - $H_2O$ , studied at 10° and 25° 2 salts exist:  $[CO(NH_2)_2]_2 \cdot H_2SO_4$  and  $CO(NH_2)_2 \cdot H_2SO_4$ . The system urea-oxalic acid- $H_2O$  examd. at 10°, 25° and 40° shows the existence of a mono- and a di-urea oxalate, both anhyd. The mono-urea oxalate is stable only above 21.2°. H. S. v. K.

A class of tartaric compounds. J. P. Mathieu. *Compt. rend.* 198, 251-3 (1934).—Metallic tartrates ( $TM_2$ ) of a unique type have been prepd. by the reaction of equimol. amts. of  $MSO_4$  and  $TNa_2$ . The complex  $TM(OH)_2$  (I), formed in acid soln., undergoes hydrolysis to  $TM(OH)_2H_2$  (II). I and II then react to give  $[TM(OH)_2]M$  (III). I with 1 equiv. of NaOH gives III, but with 2 equivs. gives  $[TM(OH)_2]Na_2$ . W. J. Peterson

New combinations of hexamethylenetetramine. L. Debucquet and L. Velluz. *Bull. soc. chim.* 53, 1288-91 (1933). The feebly basic character of hexamethylenetetramine (I) confers on it the property of giving cryst. compds. with mineral salts and certain complex salts. A soln. of 10 g.  $K_2CrO_4$  and 12.5 g.  $MgSO_4 \cdot 7H_2O$  in 100 cc.  $H_2O$  was mixed with 70 g. I in 150 cc.  $H_2O$ . Crystn. on standing 21 hrs. gave 20 g. of  $(MgCrO_4)_2 \cdot 3I \cdot 15H_2O$ . Similarly were prepd.  $MgCr_2O_7 \cdot 2I \cdot 5H_2O$  and  $CaCr_2O_7 \cdot 2I \cdot 7H_2O$ . Ferro- and ferricyanides were formed by using the Ca compds.  $KCaFe(CN)_6 \cdot 2I \cdot 6H_2O$  and  $K_2CaFe(CN)_6 \cdot I \cdot 6H_2O$  described by Barbieri (C. A. 24, 3724) as starting material. From a mixt. of solns. of I said. with 1 or the other of these compds. and a soln. of  $MgSO_4 \cdot 7H_2O$  were obtained the following new Ca and Mg complexes, insol. in 10-20% aq. I:  $CaMg_2[Fe(CN)_6]_2 \cdot 4I \cdot 24H_2O$  and  $[CaMgFe(CN)_6]_2 \cdot 4I \cdot 40H_2O$ . The above 5 compds. are lemon-yellow, orange-red, brick-red, yellow and almost white, resp. The analysis of the Cr compds. was carried out directly. The ferro- and ferricyanides were calcined and the analyses were made on HCl solns. of the ashes. In all cases classical methods of sepn. were used in the isolation of the metals. C. R. Addinall

Apparent atomic volumes and coordination centers of insoluble internal complexes. G. Gutzzeit. *Arch. sci. phys. nat.* 15, 409-17 (1933).—A simple relationship between the at. vol. of the cation and the centers of coordination of the org. mols. is not applicable to org. monosubstituted compds. I. J. Patton

Trivalent iron combined as alcoholate inner complexes. Bruno Emmert and Eugen Jacob. *Ber.* 67B, 286-9 (1934); cf. C. A. 25, 3580. Reactions were similar to those for ferrous iron except that instead of acetylacetonate ferric butylate the product was acetylacetonate-iron<sup>III</sup>. Acetylacetonate-iron<sup>III</sup> + 2 pyridine in soln. in alc. on oxidation with air gives on evapn. diacetylacetonate ferric ethylate, m. 159.5°; acetylacetonate ferric dimethylate; acetylacetonate-iron<sup>III</sup> +  $2C_2H_5OH$ , m. 109° after 4 crystns.;



## 7—ANALYTICAL CHEMISTRY

W. T. HALL

**Nitrazine yellow, a new indicator.** Henry Wenker. *Ind. Eng. Chem.* 26, 350(1934).—Nitrazine yellow, or 2,4-dinitrobenzeneazo-1-naphthol-3,6-disulfonic acid, shows a yellow color in solns. of  $pH = 6.4$  or lower and a blue color at  $pH = 6.8$  or higher. A test paper can be prepd. by adding a little phenolphthalein to the dye soln. which serves to reduce the porosity of filter paper so that drops do not run out readily. A drop of  $10^{-4} N$  HCl or of NaOH will cause color change with this paper.

**Use of dithizone (diphenylthiocarbazon) in chemical analysis.** W. Fresenius. *Z. anal. Chem.* 96, 128-31 (1934).—A review.

**Analyzing industrial solvents.** VI. F. Hauck. *Chem.-Ztg.* 58, 75-6(1934); cf. *C. A.* 28, 727<sup>7</sup>.—A quant. study of solvent mixts., *turpentine oil* and its substitutes, contg benzene and aromatic compds. The  $n$  is detd. and the mixt. then nitrated according to Marcusson's method. The formulas for calcg. results are given, also data for *pine oil*, *camphor oil* and *hydnorpin*.

**Turbidity and color measurements.** I. A photoelectric cell arrangement for measuring small quantities of certain impurities in reagent chemicals. R. A. Osborn. *J. Assoc. Official Agr. Chem.* 17, 135-41(1934).—A photoelectric cell arrangement for measuring small quantities of certain impurities in reagent chemicals is described. Measurements for Fe, Pb, chloride and sulfate are presented. Satisfactory measurements were obtained for Fe and Pb as sulfides; but difficulties were encountered in the measurement of sulfate and chloride.

**Studies in colorimetry with the photoelectric tube.** I. Kemelchi Yamamoto and Mochiyuki Abe. *Bull. Waseda Applied Chem. Soc.* 21, 1-16(1933)(English abstract 13A). The results of colorimetric studies with solns. of methylene blue, quinoline yellow and eosin red are described.

**Microscope tests on papers.** A. R. Matthis. *Ann. chim. anal. chim. appl.* 16, 1-14, 49-57(1934).—A review of methods used for identifying fibers under the microscope.

**Methods of photoelectric titration.** Friedrich Müller. *Elektrochem.* 40, 40-51(1934). Various methods and types of app. are compared.

**Double-bond titration.** R. Prognier and F. Van Goetsenhoven. *Bull. soc. chim. Belg.* 42, 391-409(1933). Exptl. details are given for the titration of the double bond of an ethylenic compd. in  $CCl_4$  soln., by means of an aq. soln. of Br, a mixt. of KBr and  $KBrO_3$  or a  $CCl_4$  soln. of Br. Accuracy is about 0.5%.

**Volumetric methods for the determination of the metals in the platinum group.** A. A. Grinberg and B. V. Ptitzin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 284-6 (in French 286-90).—A review of the existing potentiometric methods for the titration of these metals in various complexes. The visual titration of 10 Pt complexes with  $KMnO_4$  is also described.

**Drawing off and determination of very small quantities of gas.** R. A. Kolliker. *Chem. Fabrik* 6, 299-302(1933).—A review.

**Kinematic method of quantitative spectral analysis.** A. Betim. *Compt. rend.* 198, 568-9(1934).—A selected spectral line of the substance to be detd. is photographed at fixed intervals (on a plate moved vertically at a fixed rate), while the mineral in which it occurs is heated electrically. The quantity is deduced from the length, and rate of diminution in breadth and intensity of the line, the arrangement having been suitably calibrated.

**Effect of sulfated fatty alcohols in the colorimetric determination of  $pH$ .** J. Edward Smith and Harold L. Jones. *J. Phys. Chem.* 38, 243-4(1934).—Neville and Jeanson (*C. A.* 27, 5986) have used indicators to det. the  $pH$  values of solns. contg. gardinol. Gardinol C. A. is

the Na salt of sulfated oleyl alc. and gardinol W. A. is the corresponding deriv. of lauryl alc. Expts. with buffer solns. show that the  $pH$  detd. colorimetrically may be as much as one whole unit wrong when a salt of a sulfated aliphatic alc. is present. This error is on the acid side and is not caused by the  $pH$  of the sulfated fatty acid itself.

**Qualitative analysis with small quantities of minerals.** IV. 1. Gunther Rieckacker and Werner Schiff. *Centr. Mineral Geol.* 1934A, 56-60; cf. *C. A.* 28, 68<sup>1</sup>.—To test for Ti, take a small fragment of the mineral and digest it with 1 drop of  $HNO_3$ . Remove the clear soln. from the residue by means of a capillary tube, and make it slightly

anioniacal on a watch glass. Evap. nearly to dryness, add 1 drop of 10% KI soln. and 1 drop of satd.  $Na_2S_2O_3$  soln. If 1  $\gamma$  of Ti is present, a yellow ppt. of TiI will be seen. To test for Bi, digest the mineral with a few drops of  $HNO_3$ , evap. the soln. with HCl and to the clear soln. add 1 drop of a soln. contg. 5 g.  $SnCl_4$ , 5 cc. of concd. HCl and water to make 100 cc. Filter and add 1-2 drops of stannite soln. (mixt. of the above  $SnCl_4$  soln. with an equal vol. of 25%  $NaOH$ ). A black ppt. will form if 1-2  $\gamma$  of Bi is present. To test for Mo, fuse a little of the mineral in a small crucible with a pellet of NaOH. Treat the fusion product with a little water and filter. Nearly neutralize with HCl. Add a drop of the soln. to filter paper and add to the border of the spot 1 drop of KCNS and 1 drop of  $SnCl_4$  soln. A red color will result if 1  $\gamma$  of Mo is present. To test for W fuse and treat as just described but use as reagents 1 drop of concd. HCl and 1 drop of  $SnCl_4$  soln.; a blue color results if 10  $\gamma$  of W is present. To test for V, fuse with NaOH as in the last 2 tests and make acid with concd.  $HNO_3$ . If Cr or Mn is present it may be necessary to reduce  $Cr_2O_7^{2-}$  and  $MnO_4^{2-}$  or  $MnO_4^{2-}$  by heating with concd. HCl and then evap. with  $HNO_3$ . As reagent use 1 drop of aniline chloride in concd. HCl. A blue-green color results if 10  $\gamma$  of V is present.

**Tabular method for reading arsenic strips.** Bertrian D. Thomas. *Ind. Eng. Chem.* 26, 356(1934).—In the Gutzzeit test, the lengths of a given standard vary widely from set to set but the relative lengths of the various standards in the set are quite const. Thus with a single set of standards contg. 0.01, 0.02, 0.03 and 0.04 mg. of As, the lengths of the stain may be 8.5, 13.5, 17.0 and 20 mm. with a total length of 59 mm. From these results a graph can be drawn from which the As content can be read. About 25 such graphs suffice to cover a range of 45-70 mm. in length of the stain.

**Correct preparation and use of the Bunsen valve on burets.** Paul Fuchs. *Z. anal. Chem.* 96, 101-3(1934).—Use black rubber tubing of about 3 mm. diam. and at least 1.5 mm. thickness. Use a piece of glass rod with no ridges on the surface. Round one end in the flame of a blast lamp, heating until the end thickens a little. Cut off 8 mm., break it off with the rod held in the head of a cork borer in which the rod fits. Smooth the cut end with a file. In using the valve, make sure that there is no air bubble in the rubber tubing and press from above. Keep the buret filled with liquid to prevent hardening of the rubber.

**Colorimetric determination of aluminum with eriochromocyanin.** F. Alten, H. Weiland and E. Knippenberg. *Z. anal. Chem.* 96, 91-8(1934).—The colorimetric test for Al with eriochromocyanin can be used for the colorimetric detn. of 0.005-0.1 mg. of Al. Reagents.—(1) A 0.1% soln. of eriochromocyanin R conc. G. (G. Grüber & Co. Leipsig), prepd. daily; (2) 2 N NaOH free from Al (*Natrium hydroxidum in rotulis* (Merck) is approx. Al-free but must be preserved in paraffined bottles); (3) 0.2 N AcOH; (4) 7 g. of  $KH_2PO_4$  in a l. of water; (5) 10% LiCl soln.; (6) K or  $NH_4$  alum contg. 0.001, 0.003, 0.005 and 0.080 mg. Al in 5 cc.; (7) buffer soln.

contg. 400 cc. of 5 N  $\text{NH}_4\text{OAc}$ , 200 cc. of 4 N  $\text{NaOAc}$ , 25 cc. of 4 N  $\text{HOAc}$  and water to make 1 l. (by dilg. this buffer mixt. with 9 times as much water, the  $\text{pH}$  = 6.0). *Seprn. of Al from  $\text{P}_2\text{O}_5$  and interfering cations.*—Take 5 cc. of the soln. to be tested and 5 cc. of purest water in a 25 cc. quartz test tube. Add 2 cc. of reagent (4) and 1 g. of pure  $\text{NaOH}$ . Boil 1 min. and add to the hot soln. 2 cc. of reagent (5) and boil 1 min. or until the odor of  $\text{NH}_3$  disappears. Cool, centrifuge and decant off the clear centrifugate into a 100-cc. measuring flask contg. sufficient 10%  $\text{HCl}$  to make the soln. remain acid after the alk. centrifugate has been added. Wash the residue in the centrifuge tube with 2 cc. of water and add the clear washing to the main soln. *Colorimetric test.*—Take 10 cc. of reagent (1), add reagent (2) dropwise until the color is blue-violet and add dropwise, while shaking, sufficient of reagent (3) to make the color change to yellow and then toward a red-violet shade. Then add 10 cc. of reagent (7), make up to the 100-cc. mark, mix and after 30 min. measure the extinction of the test soln. against the blank soln. in the yellow-green (531  $\text{m}\mu$ ). The measured extinction  $\times 50$  gives the approx. Al content in  $\gamma$ . For the accurate detn. follow the same procedure but use instead of 10 cc. of reagent (1) 5 cc. for 0.005–0.015 mg. Al, 10 cc. for 0.015–0.050 mg. Al and 15 cc. 0.05–0.1 mg. of Al. W. T. H.

*The separation of arsenic and antimony from tin.* P. Ed. Winkler. *Bull. soc. chim. Belg.* 42, 503–18 (1933).—The titration of Sn proposed in C. A. 26, 4768 is slightly modified: the oxidation of the S in the thioacetanamide, which was done with  $\text{H}_2\text{O}_2$ , is now performed with  $\text{H}_2\text{O}_2$  first, and then brought to completion with permanganate in acid soln. The pptn. of As and Sb by  $\text{H}_2\text{S}$  from a soln. contg. As, Sb and Sn should be carried out in the presence of 10 g. oxalic acid and 10 cc. of concd.  $\text{HCl}$  per 100 cc. of soln.; adsorption of the Sn salt on the ppt. is thus minimized. A. L. Henne

*Spectrographic determination of some secondary constituents in copper.* Raymond Breckpot. *Ann. soc. sci. Bruxelles* B53, 219–47 (1933).—The behavior, intensities and characteristics of the lines due to 1 to 0.001% of Pb, Bi, Ag, Sb and As in Cu were studied. The most persistent lines were: Pb 2833, Bi 3068, Ag 3383, Sb 2312, 2529 and 2598, and As 2350 and 2288. L. P. Hall

*A rapid and accurate photometric method for determination of lead in small quantities, especially applicable to determination of lead in spray residues and in food products.* Boyd L. Samuel and Howard H. Shockey. *J. Assoc. Official Agr. Chem.* 17, 141–6 (1934).—To det. Pb in apple peelings treat a suitable sample with  $\text{HNO}_3 + \text{H}_2\text{SO}_4$  to destroy org. matter, evap. with  $\text{H}_2\text{O}$  to remove excess  $\text{HNO}_3$  and distil off  $\text{AsCl}_3$  by either the bromate or Gutzeit method. Ext.  $\text{FeCl}_3$  from the residual  $\text{HCl}$  soln. with  $\text{NH}_4\text{CNS}$  and  $\text{Et}_2\text{O}$ , make ammoniacal and add KCN and some  $\text{NH}_4$  citrate. Transfer to the Nessler tube of the photoelec. colorimeter and add  $\text{Na}_2\text{S}$ . Compare the results with those obtained similarly with known quantities of Pb. The original paper should be consulted. A. Papineau-Couture

*Colorimetric determination of lead and copper with dithizone (diphenylthiocarbazon).* Hellmut Fischer and Grete Leopoldi. *Angew. Chem.* 47, 90–2 (1934); cf. C. A. 27, 3418.—The microdetn. of Pb consists of the extn. of Pb with a green soln. of dithizone in  $\text{CCl}_4$  and removal of excess reagent by washing the red lead soln. with a 1% KCN soln. Washing with mineral acid gives a green soln. which is examd. colorimetrically. Details are given for overcoming difficulties due to the presence of other ions. Karl Kammermeyer

*Note on the accuracy of lead analyses.* Lawrence T. Fairhall. *J. Ind. Hyg.* 15, 289 (1933).—Polemical with Kehoe et al. (C. A. 28, 2376). K. has been using the method described in C. A. 16, 2160 and later discarded (cf. C. A. 18, 3400) but some of K.'s criticism is accepted. E. G. Meiter

*Determination of manganese contained in iron and steel or in ores.* Motojiro Sekino. *Bull. Inst. Phys.-Chem.*

Research (Tokyo) 12, 927–34 (Abstracts 61 (in English) published with *Sci. Papers Inst. Phys.-Chem. Research* (Tokyo) 23, Nos. 468–77).—In detg. Mn by the bismuthate method, the soln. must not be above 30° after adding the reagent. K. Konda

*Electroanalysis of molybdenum.* Chujiro Nenoto and Yoshio Tanabe. *J. Electrochem. Assoc. (Japan)* 2, 53 (1934).—Add 0.5 g.  $\text{NH}_4\text{OAc}$  to the aq. soln. contg. 0.1 g.  $\text{MoO}_3$  as  $\text{NH}_4$  molybdate, dil. to 150 cc., heat to about 70° and electrolyze with a current of 0.2 amp. for 5 hrs. and with a cathode of Pt gauze plated with Cu. Add 1 cc. of 50%  $\text{AcOH}$  at the middle of the electrolysis. After complete pptn., wash the deposit with hot water without breaking the circuit, rinse with alc., dry and weigh. K. Konda

*A rapid method for the determination of potassium in the form of potassium bitartrate.* Yu. I. Chernyaeva and R. V. Krasnovskaya. *J. Chem. Ind. (Moscow)* 1933, No. 10, 57–9.—The K sample is mixed with 0.33 N Na bitartrate and stirred for 12 min. The ppt. is filtered and the filtrate titrated with  $\text{NaOH}$ . The method is accurate to 0.6–0.9%, only when large aints. of Na are absent. H. M. Leicester

*A qualitative reaction for radium.* B. A. Nikitin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]* 1, 19–20 (in German 20 1) (1934).—Ra is sepd. from Ba by pptn. with 10%  $\text{K}_2\text{CrO}_4$  in the presence of 1.5% trichloroacetic acid. The method is applicable only in narrow limits. F. H. Rathmann

*Testing tin coating on soft sheet.* Fritz Eisenkolb. *Stahl u. Eisen* 54, 109–10 (1934).—The thickness of the layer is detd. by dissolving a weighed section in  $\text{HCl}$  and titrating with  $\text{FeCl}_3$ . Pb is detd. by electrolysis. Porosity is revealed by allowing pieces to stand in hot water for 21 hrs., and testing for rust spots with  $\text{K}_3\text{Fe}(\text{CN})_6$ . Curtis L. Wilkon

*The detection of fluorine in glass tubes.* K. Baroni. *Giorn. farm. chim.* 82, 277–89 (1933). Lewis W. But

*Determination of the composition of small amounts of a neon-argon mixture.* P. Clausen. *Physica* 13, 320 3. (1933).—A method was worked out for analysis of 1 mg. of a Ne-A mixt. The gas mixt. is measured at room temp. and 100 atm. in a glass reservoir with attached closed capillary (area  $4.8 \cdot 10^{-3}$  sq. cm. and narrowed down 1 cm. from end to  $0.4 \cdot 10^{-3}$  sq. cm.); the latter protrudes from a pressure vessel which surrounds the reservoir. The A is then condensed in the capillary by means of liquid  $\text{O}_2$  (90° abs.) and its vol. read. The various errors, deviation from gas law, increased A vapor pressure (foreign gas), thermal diffusion effects, etc., are discussed and proper corrections given. Tests on known mixts. show the accuracy to be around 5%. B. J. C. van der Hoeven

*The determination of nitrogen in cyanides by the Kjeldahl method.* Angelo Tettamanzi. *Atti accad. sci. Torino, Classe sci. fis., mat. nat.* 68, 153–60 (1933). The Kjeldahl method for N is found to be applicable, without any modifications, to the detn. of N in cyanides. The method is applicable when the more rapid titration methods of Volhard and Liebig fail, as well as for all insol. complex, and nonelectrolyte cyanides. A. W. C.

*Determination of oxygen in alloy steels and its effect upon tube piercing.* Newell Hamilton. *Am. Inst. Mining Met. Engrs. Tech. Pub. No. 540*, 12 pp. (1934).—The app. and procedure used in detg. O, H and N in steel are described. Total O in 2 steels (Cr 18, Ni 8, C 0.07%, Cr 5, Mo 0.50%) showed a direct relationship to the elevated temp. ductility of these steels as detd. by seamless tube piercing. Probably O is combined with the Cr. Inclusions at room temp. are not excessive. Heats of 18–8 alloys deoxidized with Al or Zr have been pierced successfully even though the total O content was above the max. for good piercing quality, probably because the O is fixed to a more stable form with Al or Zr. However, the resulting inclusions interfere with other working of the alloy. Max. O content should be < 0.01%. Alden H. Emery



**The determination of alkali metals as fluosilicates.** W. D. Treadwell and W. König. *Helv. Chim. Acta* 16, 1201-8 (1933).—The alkali metals should be present as chlorides or nitrates, and all other metals (including Mg) should be previously eliminated. Evap. the salt soln. to dryness in a Pt crucible. Add a 200% excess of freshly prepd. hydrated silica, together with some distd. 40% HF soln. (1-2 cc. of acid per 0.1 g. of silica). Evap. on the water bath, dry for 2 hrs. at 120°, and weigh. The alkali metal is present as  $M_2[SiF_6]$ . By subsequent titration it is possible to check the analysis or to det. the ratio of a binary mixt. of alkali metals. A. L. Henne

**Potentiometric determination of arsenates.** W. E. Hanson, S. B. Sweetser and H. B. Feldman. *J. Am. Chem. Soc.* 56, 577-9 (1934).—The method is similar to the one described by Bedford, Lamb and Spicer (*C. A.* 25, 1595) except that 10 times as much NaOAc as required to react with the acid liberated by the pptn. of  $Ag_3AsO_4$  from a soln. of acid arsenate is added to buffer the soln. and the solvent is 50% EtOH. The procedure can be used for detg. As in com. Ca arsenate.

**Microscopic determination of perchlorate.** (1) S. Fedorova. *J. Gen. Chem.* (U. S. S. R.) 3, 377-84 (1933), cf. *C. A.* 22, 1746, 2723; 24, 39.—The method of Kruger and Tschirch (*C. A.* 25, 5642) was studied. The microscopic method for the detn. of pure  $NaClO_4$  is more sensitive and quicker than the colorimetric method, but is inferior to the latter for detg.  $NaClO_4$  contaminated with  $NaNO_3$ ; it is not suited for a mixt. of  $NaClO_4$  and  $NaClO_3$ . Chas. Blanc

**Titration of iodides by the method of Andrews.** L. Michiels and B. Tougarinoff. *J. pharm. Belg.* 15, 845-8 (1933).—The method of Andrews (*J. Am. Chem. Soc.* 25, 756 (1903)) for the titration of iodides has been found to be specific in the presence of bromides, chlorides and other ions. S. W. Goldstein

**Detection of hyposulfites (and sulfoxylates), ferrous salts, hypochlorites and dichromates by means of resorufin.** Hermann Eichler. *Z. anal. Chem.* 96, 98-9 (1934).—An alk. soln. of resorufin (I) shows a yellow-red fluorescence but by reduction hydioresorufin (II) is formed which shows no fluorescence in alk. soln. On the other hand I is easily destroyed by oxidizing agents. To detect  $S_2O_4^{--}$ , add dropwise to the soln. which has been made alk. with  $Na_2CO_3$ , a soln. of 0.2 g. I and 0.2 g.  $Na_2CO_3$  in 100 cc. of air-free water. If  $S_2O_4^{--}$  or  $Fe^{++}$  is present there is no fluorescence until an excess of I has been added but in the absence of these anions an intense fluorescence is apparent on the addn. of the first drop of the reagent. The soln. of II is gradually oxidized by standing in the air. Since  $S_2O_4^{--}$  is hydrolyzed into  $SO_3^{--}$  and  $SO_2^{--}$  and  $SO_2^{--}$  does not give the test, it is apparent that the test is due to the sulfoxylate anion. Dichromates oxidize I in hot dil.  $H_2SO_4$  solns. and hypochlorites do in the cold. After making alk. the soln. shows no fluorescence.  $KMnO_4$  oxidizes I in both acid and alk. solns.  $SO_3^{--}$ ,  $AsO_3^{--}$ ,  $S_2O_3^{--}$  and formaldehyde do not interfere in the above test for  $S_2O_4^{--}$ .  $S^{--}$  does not cause reduction of (I) in the cold. The above tests are useful for detecting  $S_2O_4^{--}$  in vats.  $Cr_2O_7$  in after-chroming liquors,  $ClO^-$  in bleach liquors and for the control of the reducing power of vitriol vats. W. T. H.

**Detection of nitrite with Magdala red** Hermann Eichler. *Z. anal. Chem.* 96, 99-100 (1934); cf. *C. A.* 28, 1949<sup>1</sup>.—Magdala red is yellow in 2 N mineral acid, pink in N mineral acid, red with reddish fluorescence at  $pH = 4$  and lilac at  $pH = 15$ . By treatment with a hot soln. of nitrite it is changed to a non-fluorescent compd. A reagent dissolve 0.1 g. of Magdala red (Durand and Huguenin, Basel) in 100 cc. of water and a little AcOH. Take 5-10 cc. of water, add as little as possible of the dye soln., add HCl in the cold until the fluorescence ceases and a violet color appears. On heating an intense yellow-red fluorescence appears (if not, dil. with water). Add the soln. to be tested which should be neutral or slightly alk. If nitrite is present, the fluorescence will disappear at once and a blue color will result.  $Cu^{++}$  and  $Fe^{++}$

help the test. Nitrates do not cause loss of fluorescence even after long boiling. The method, therefore, is useful for detecting nitrite in the presence of nitrate. Sulfites, thiosulfates, hypochlorites, dichromates and permanganates interfere. W. T. H.

**Determination of inorganic phosphate in the presence of arsenic.** Lionel B. Pett. *Biochem. J.* 27, 1672-76 (1933).—The arsenate is reduced to arsenite, which does not interfere with colorimetric phosphate detns. B. H.

**New method for the potentiometric determination of mercuric salts.** G. Spacu and I. G. Murgulescu. *Z. anal. Chem.* 96, 109-14 (1934).—The method is suitable for detg.  $Hg^{++}$  in its sol. compds. and in  $HgI_2$ . It depends upon the formation of a difficultly sol. complex compd. by the reaction  $[HgI_4]^- + [Cu en_2]^{++} = [HgI_4][Cu en_2]$  in which  $en = H_2N.CH_2.CH_2.NH_2$ . As reagent a 0.1 molal soln. of  $[Cu en_2](NO_3)_2 \cdot 2H_2O$  or the corresponding sulfate is used. To the soln. to be analyzed add sufficient KI soln. to transform all Hg into  $[HgI_4]^-$ . Place a Pt wire coated with Hg in the soln. as indicator electrode and measure the initial potential against the normal calomel electrode. Add sufficient KI soln. to make this p. d. 0.250-0.300 v. Titrate in the usual way with the reagent. At the end point a sharp increase in the p. d. is obtained. It is necessary to wait 2-3 min. after each addn. of reagent. The results of 8 titrations are given and the agreement is satisfactory. W. T. H.

**Methods for determining lead peroxide.** V. A. V. Pamfilov and E. G. Ivancheva. *J. Gen. Chem.* (U. S. S. R.) 3, 262-8 (1933); cf. *C. A.* 26, 3456.—The most convenient and sufficiently accurate method was found to be the following: Digest  $PbO$  or  $Pb_2O_4$  with 25 cc.  $HNO_3$  (d. 1.2), add 75 cc.  $H_2O$  and 5-10 cc. of standard 1-2%  $H_2O_2$  and titrate the excess  $H_2O_2$  with  $KMnO_4$  (cf. Ebell, *Chem.-Ztg.* 10, Repet. No. 10, 70 (1886); Busvold, *C. A.* 26, 2140). Chas. Blanc

**Analyses of inclusions in high-carbon tool steels.** Haakon Styri. *Trans. Am. Inst. Mining Met. Engrs.* 105, 185-97 (1933).—The electrolytic method for sepn. of inclusions in steel has given satisfactory results when there is a membrane around the anode to collect the undissolved particles. Suitable dense filter paper attached to the bottom of a glass tube may serve better for many purposes than collodion bags, because it permits direct filtration. A variety of electrolytes may be used provided (1) the cathode chamber is kept slightly acid (0.1% or less) so that hydroxides are not formed on the membrane and (2) the anode chamber does not get too acid so that pptd. particles will be attacked. When carbides must be kept from the residue, the steel should be quenched from high enough temp. to bring the cementite into solid soln. S is present as sulfide, probably  $(MnFe)S$ . Brief treatment of the residue with weak acids does not affect the sulfides of Mn seriously, but does attack the Fe. Digestion with 25% NaOH for 72 hrs. dissolves all  $SiO_2$ , but attacks the sulfide; with 10 and 20% Na citrate, a large amt. of Fe but smaller amts. of  $SiO_2$ , S or Mn are dissolved, indicating that Mn is present largely as silicate. The amt. of Fe in the residue from heat-treated samples is rather const. and probably largely is bound to slag particles. The total proportion of  $SiO_2$  is very const. Apparently only a small amt. is present as colloidal  $SiO_2$ , as treatment with hot 3%  $Na_2CO_3$  takes some in soln. Alden H. Emery

**The determination of opaque minerals in sands.** E. V. Rozhkova and T. L. Pokrovskaya. *Centr. Mineral. Geol.* 1934A, No. 1, 16-21.—Methods (not new) that have been found most reliable and convenient for field use, including spot tests and microchem. reactions, are described for the identification of hematite, tourmaline, rutile, cassiterite, tantalite, columbite, ilmenite, thorianite and wolframite. Michael Fleischer

**Conductometric determination of ash.** T. Pietrzykowski. *Gaz. Chemiczna* 72, 172-82 (1933).—A critical review with numerous references. J. Wiertelak

**Determination of boron and boric acid.** M. Prommes. *Z. anal. Chem.* 96, 131-5 (1934).—A review. W. T. H.

Determination of sugar. W. Dehio. *Z. anal. Chem.* 196, 51-6, 138-51 (1934).—A review. W. T. H.

Analysis of plant materials. K. Fresenius. *Z. anal. Chem.* 96, 151-5 (1934).—A review. W. T. H.

A critical review of the methods for the detection of the blood in forensic hematology. Amedeo Dalla Volta. *Diagnostica tec. lab. (Napoli) Riv. mensile* 4, 507-18 (1933).—Spectroscopic and spectrographic methods are considered the best. Lewis W. Butz

Lead poisoning as cause of death. Detection in cadaver ash. H. Jesser. *Sudder. Apoth.-Ztg.* 74, 65-6 (1934).—The ash from the cremation of a worker in Pb was examd. in an attempt to det. whether chronic Pb poisoning was the cause of death. The results were indecisive. W. O. E.

Microchemical color reaction of *m*-dinitrobenzene for the forensic detection of benzene. F. Kirchhof. *Chem.-Ztg.* 57, 425-6 (1933). If Peltzer's reaction (*C. A.* 27, 5030; Weber, *C. A.* 25, 2866) is carried out by adding to a mixt. of equal vols. of a soln. of the  $\text{NO}_2$  compd. and 96% EtOH (instead of  $\text{COMe}_2$ ) 1 drop of KOH in EtOH, a color stable for 3-4 hrs. is obtained. The reaction is also obtained with tech.  $\text{PhNO}_2$ , presumably because of the presence of  $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$ . The chemistry of the reaction is discussed. B. C. A.

Modification of a new catalytic method for the determination of carbon and hydrogen in organic compounds. Angelo Contardi and Cesare Ferri. *Atti accad. sci. Torino, classe sci. fis., mat. nat.* 68, 181-9 (1933).—The catalytic method of Ter Meulen and Heslinga (*C. A.* 26, 2144), for detg. C and H by oxidation of the compd. with  $\text{PbO}_2$  and  $\text{MnO}_2$  as catalysts, has been improved by placing these catalysts in different parts of the heating tube. This makes it possible to heat the  $\text{MnO}_2$  sufficiently to cause complete oxidation, while the  $\text{PbO}_2$  is kept below the temp. at which it loses O when its efficiency is lost. In addn., a spiral of Ag is placed in the cool part of the app. beyond the heated part, to condense any Hg present, which has been volatilized, and det. the amt. present. A. W. Contieri

Determination of silver in organic compounds. Carl Stainier and Leon Leclercq. *J. pharm. Belg.* 15, 693-7 (1933).—The error in the detn. of Ag in org. compds. is due mainly to chloride present, which forms  $\text{AgCl}$  and is not taken up in the procedures now used. The use of concd.  $\text{H}_2\text{SO}_4$  and powd.  $\text{KMnO}_4$  in the destruction of the org. part of the mol. is suggested to remove this error. The remainder of the procedure is unchanged. S. W. Goldstein

Determination of formic acid in presence of acetic acid. Carl Stainier and Jean Massart. *J. pharm. Belg.* 15, 869-72, 891-3 (1933).—Ten cc. of soln. contg. about 5% of total acid is titrated with *N* NaOH, with phenolphthalein as indicator. Ten cc. of the same soln. is refluxed with 60 cc.  $\text{H}_2\text{O}$  and 5 g.  $\text{HgO}$  for 2 hrs. with shaking, then titrated with *N* NaOH; in this case only the AcOH is titrated. S. W. Goldstein

Determination of pyruvic acid. G. Carpeniscanu. (*compt. rend.* 198, 272-4 (1934).—A procedure is given for the detg. 1 pt. of  $\text{MeCOCO}_2\text{H}$  in 50,000. The greater sensitivity is obtained by using more dil. solns. and standards covering a wider range. W. J. Peterson

A new procedure for the determination of glycerol. Hiei Kataoka. *J. Biochem. (Japan)* 19, 15-24 (1934).—Principle of method: Acrolein formed in the heating of glycerol with  $\text{KHSO}_4$  is distd. into a mixt. of equal parts of Bertrand's sugar reagents I and II, and the  $\text{Cu}_2\text{O}$  is titrated by the usual Bertrand procedure. To an exactly weighed amt. of glycerol add 20 times the quantity of  $\text{KHSO}_4$  in a test tube, which is connected through a long glass tube to the receiving flask. Pass a current of  $\text{CO}$  through the app. and heat 30 min. with a Bunsen burner under a wire gauze screen. The relation between the amt. of Cu (y) and that of glycerol (x) is given by the formula:  $y = 0.42x - 2.2$ , or once a series of detns. has been made,  $x = 2.380y + 5.238$ . The detn. is also applicable to the study of glycerides. In expts. with  $\beta$ -stearodipalmitin the relation between the values of x and y is given by the formula:  $y = 0.633x + 1$ , and  $x = 1.58y - 1.58$ . S. Morgulis

Detection of the methylenedioxybenzene group. J. A. Lahat. *Bull. soc. chim. biol.* 15, 1344-5 (1933).—To 2 cc. concd.  $\text{H}_2\text{SO}_4$  add 0.1 cc. of an alc. soln. of the substance to be tested and 0.1 cc. of a 5% alc. soln. of gallic acid. Heat on a water bath. A green color changing to deep blue indicates the methylenedioxybenzene group. The reaction is obtained with 0.005 mg. nafcotine. It is also obtained with hydrastine, hydrastinine, berberrine, piperine, heliotropin, apiole, saffrole and isosaffrole. L. E. Gilson

Detection of small quantities of pyridine, particularly in charred wood. A. Brünig and M. Schmetka. *Chem.-Ztg.* 58, 156-7 (1934).—The method of Goris and Larssonneau (*C. A.* 16, 886), which depends upon the formation of a red dye by the action of  $\text{BrCN}$  and aniline, is suitable for detecting traces of pyridine except for the fact that furfuraldehyde gives the same reaction that pyridine does. If, however, benzidine or o-tolidine is substituted for the aniline the test becomes more specific, although nicotine gives the test. In applying the test to the steam distillate from charred wood, it is well to remember that pyridine is often formed by the incomplete combustion of certain org. substance. Details for applying the test are given. W. T. H.

Determination of nicotine. R. Dubrisay. *Mem. manuf. état tabacs* 6, 253 (1930); cf. *C. A.* 21, 2445. Solns. contg. equiv. proportions of nicotine and  $\text{H}_2\text{SO}_4$  have  $p_H$  5.6. Titration methods for detg. nicotine are satisfactory if a bromocresol indicator having a color change at  $p_H$  5.6 is used, and the end-point color is standardized by comparison with suitable buffer solns. B. C. A.

Sensitivity of the Debye-Scherrer method and its application in quant. analysis (Pač) 2. 3,6-Dinitro-2,7-dihydroxyfluoran as a reagent for the detection of reducing sugars (Dominkiewicz) 10. The soly of  $\text{PbCrO}_4$ . Application to titration of Pb (Huybrechts, Degard) 2.

Katow, G.-A. de: *Traité élémentaire d'analyse chimique*. Paris: J. B. Baillière & Fils. 132 pp. F.10

Vazquez-Garriga, J.: *El análisis elemental cuantitativo por medio de los espectros de rayos X*. Madrid: R. Terry. 38 pp.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND I. F. SCHAIRER

Forms in which platinum and allied metals occur in nature. O. E. Zvyagintzev. *Ann. inst. platino* No. 10, 14-33 (1932); cf. *C. A.* 27, 5687.—A discussion. B. C. A.

The crystal form and chemical composition of polybasite. B. Gossner and O. Kraus. *Contr. Mineral. Geol.* 1934A, No. 1, 1-6.—X-ray examn. gave  $a = 7.50$ ,  $b = 12.99$ ,  $c = 11.95$  Å. The unit cell contains 2 mols. of  $8(\text{Ag}, \text{Cu})_2\text{S}_2\text{Sb}_2\text{S}_4$ . It is shown to be pseudohexagonal by lamellar twinning, and may be orthorhombic, in which

case space group  $V_2^2$  fits the reflections observed, or monoclinic with  $\beta$  very nearly  $90^\circ$ , or even possibly triclinic. Michael Fleischer

Realgar and benitoite. H. Buttgenbach. *Bull. sci. acad. roy. Belg.* 19, 1019-33 (1933); cf. Ungemach, *Bull. soc. franç. mineral.* 53, 394-416 (1930).—On the realgar found at Matra, Corsica, 6 new forms have been discovered, bringing the total for the mineral to 80. Crystallographic and optical data are given for benitoite from this district. A. W. Furbank

The chemical composition of matlockite. W. Nieuwenkamp. *Z. Krist.* 86, 470-1 (1933).—Powder photographs of matlockite are identical with those of artificial  $\text{PbFCl}$ . Analysis of matlockite from Matlock, Derbyshire, gave 6.5% F (theoretical 7.3). The true formula is not  $\text{Pb}_2\text{OCl}_2$ , but  $\text{PbFCl}$ . The structure is tetragonal, with  $a = 4.09$  and  $c = 7.21$  Å. L. S. Ramsdell

The behavior of calcite in ultra-violet light. A. Köhler and H. Leitmeier. *Centr. Mineral. Geol.* 1933A, 401-11; cf. Witteborg, *C. A.* 27, 1297.—About 300 specimens were examined. The luminescence phenomena observed are characteristic for each locality, and specimens of different age from the same locality can usually be distinguished. However, no general rule holds, as impurities such as Fe and Mn appear to be an important factor. M. F.

Composition of a robe mineral found in serpentine from Bou Oufroh, Morocco. Robert Frey and Jean Burghelle. *Ann. chim. anal. chim. appl.* 15, 61-2 (1934).—Chem. analysis indicates the compn.  $(\text{Fe}, \text{Cr})_2\text{O}_3 \cdot 9\text{MgO} \cdot 2\text{CO}_2 \cdot 14\text{H}_2\text{O}$ . W. T. H.

Minerals from Topaz Mt., Utah. Charles Palache. *Am. Mineral.* 19, 14-15 (1934); cf. *C. A.* 28, 1631.—Beryl, topaz and pseudobrookite are briefly described. A. M. Brant

Sodalite from Bolivia. Wolfgang Brendler. *Am. Mineral.* 19, 28-31 (1934).—The mineral occurs in a large dike accompanying a small stock of nephelite syenite. The color is dark ultramarine blue; sp. gr. = 2.295 at 14.5°;  $n = 1.4837$ . Chem. analyses of fresh material check the accepted formula closely. Weathered sodalite was found to be lower in alkalis and Cl and to have a greater  $\text{H}_2\text{O}$  content. A. M. Brant

Optical and thermal properties of cancrinite from Dôdô, Korea. Shukusuké Kôzu, Junichi Ueda and Shizuo Isurumi. *Proc. Imp. Acad. (Tokyo)* 9, 13-16 (1933); cf. *C. A.* 27, 3684.—Refractive indexes are  $n = 1.5238$ ,  $n_z = 1.5015$ . The linear thermal expansion is about twice as great along the  $c$  axis as in a direction perpendicular thereto. The expansion curves show irregularities at about 900°, corresponding with the decompn. of the mineral. The heating curve shows only one distinct break at 920°. The curve plotting changes in wt. on heating shows breaks at 300°, 460°, 800° and 910°, corresponding with the loss of  $\text{H}_2\text{O}$  and  $\text{CO}_2$  and the decompn. of the mineral. B. C. A.

Constitution and origin of leverrierite. J. de Laparent. *Compt. rend.* 198, 669-71 (1934); cf. *C. A.* 24, 1919; 25, 2614.—Leverrierite is an assocn. of muscovite and kaolin in varying relative amts., probably resulting from decompn. of biotite under humid conditions. The crystals of the two minerals appear to be in definite orientation (epitaxy). C. A. Silberrad

New microscopic-chemical analyses of phosphorites from the neighborhood of Grodno, Poland. J. Tokarski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 300-17 (in German).—Microscopical, optical and chem. analysis of phosphorites from the Grodno strata reveals that they contain F in amts. sufficient not only to sep. apatite mols. but also to form excess mols. of  $\text{CaF}_2$ . The main constituent of the phosphorites is a mineral similar to francolite of the formula  $2[\text{3Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2] \cdot 3\text{CaCO}_3$ . This mineral is distinctly cryst., optically uniaxial —, with sp. gr. 2.811-855. J. Wiertelak

The tectite from Paucartambo. G. Linck. *Centr. Mineral. Geol.* 1934A, 13-15.—L. reaffirms the tectite nature of the glassy material from Paucartambo, which was doubted by Dittler (*C. A.* 27, 4756), and suggests that the tectites are of extra-terrestrial, possibly of lunar, origin. Michael Fleischer

Clarification of some problems concerning the formation of the Mansfeld copper schist. F. Krull. *Centr. Mineral. Geol.* 1933A, 411-21.—The occurrence of the ores in alternately enriched and impoverished layers is ascribed to a rhythmic pptn. of sulfides due to interdiffusion of sulfide soln. and a soln. contg. metal salts. The lack of bivalent Cu compds. is ascribed to the presence of reducing gases formed by the decompn. of org. matter. M. F.

Barite in the ceded districts of the Madras Presidency;

with notes on its occurrence in other parts of India. A. L. Coulson. *Mem. Geol. Survey India* 64, Pt. 1, 142 pp. (1933).—Theories of barite formation are reviewed. In the ceded districts, Ba-contg. solns. were derived from magma and pptd. by  $\text{H}_2\text{SO}_4$ . Alden H. Emery

The geology of sapromyxite coals in the Barzass River basin. N. M. Karavaev and P. Dorofeev. *Sapromyxites from Barzass* (Goskhimizdat-Petrograd) 1933, 19-35.—A historical review of the geology of sapromyxite coals, with 15 references. A. A. Bochtlingk

Some data on the petrographic character of the Barzass coals. N. M. Karavaev and Z. V. Ergolskaya. *Sapromyxites from Barzass* (Goskhimizdat-Petrograd) 1933, 35-44.—Barzass coals are separable into a platelike variety, a dense massive coal and Kamzhal coal, which is found in thin weathered plates. The geological distribution is discussed and the typical coals are photographically reproduced. A. A. Bochtlingk

Deposits of lignite. Jacques Dumas. *Génie civil* 104, 53-8 (1934).—A description of the mines near Hostens, Gironde, the equipment used to mine and store the lignite, and the power house. Ann Nicholson Hird

The geological position of metaxylite [metallignite]. Hans Bode. *Braunkohle* 32, 793-7 (1933); cf. *C. A.* 27, 5934. F. W. Jung

The problem of the genesis of Central-Asiatic petroleum deposits. V. B. Porfir'ev and V. A. Vasil'ev. *Neftyanoe Khozaystvo* 25, No. 10, 18-22 (1933).—The genesis of the petroleum deposits in the Caspian Valley, Chelekenui, Pitnyak and Gaudak districts is discussed. A. A. Bochtlingk

Some problems concerning oil-bearing deposits in Sakhalin and their connection with its paleogeography. N. Gedroitz. *Neftyanoe Khozaystvo* 25, No. 10, 23-6 (1933). A. A. Bochtlingk

Conclusions derived from the gravitation measurements carried out in the Emba district. V. P. Skvortzov. *Neftyanoe Khozaystvo* 25, No. 10, 14-17 (1933).—Geological formations and their relation to crude-oil deposits in the Emba district are discussed. A. A. Bochtlingk

Source of various salts recovered in the Texas Company's refinery explained by geologist. J. Terry Duce. *Oil and Gas J.* 32, No. 28, 18, 40 (1933). J. R. S.

Volcanic rocks west of Lake Rudolph. Mmc. E. Jérôme. *Compt. rend.* 198, 673-5 (1934).—The volcanic rocks to the west of Lake Rudolph, Kenya, consist of: rhyolites, including comendites and pantellerites (a); phonolites with phenocrysts of sanidine, and much egirite (a); nephelinitic microsyenites contg. solvstergites and some tinguaites; and basaltic rocks often rich in analcite (a), and including ankaramites (a) and doleritic basalts, while some flows contain large (5-6 cm.) phenocrysts of plagioclase (a). An ordanclite-like basanitoid basalt (a) occurs at Lodwar. Holocryst. rocks are found only in dikes or as rounded blocks; they include a herondrite-like essexite, and shonkinite rich in egirite and arfvedsonite (a). Chalcedony, calcite, analcite, stilbite, heulandite and mesolite are found in cavities. Eight complete analyses are given of the rocks marked (a). C. A. S.

Granite from Valle Staffora. (Pavese Apennines). Luigi Peretti. *Atti accad. sci. Torino, Classe sci. fis., mat. nat.* 68, 273-87 (1933).—Petrographic studies of the granite in the shales of the Pavese Apennines have been made. The important constituents are enumerated. The structure is typically intrusive. A. W. Contieri

Nephelite syenite from Solwezi, Northern Rhodesia. Frank D. Adams and F. Fitz Osborne. *Am. J. Sci.* 27, 135-45 (1934); cf. *C. A.* 27, 2115.—The mineralogical compn. of nephelite syenite from Solwezi, N. Rhodesia, is compared with its chem. compn. and calcd. norm, and its origin discussed. Alden H. Emery

Intrusive igneous rocks of the Muswellbrook-Singleton district. H. Savoy Sill. H. G. Ruggatt and H. F. Whitworth. *J. Proc. Roy. Soc. N. S. Wales* 66, 194-233 (1933).—The Savoy intrusion is partly of the simple sill type and partly phacoidal, and is of Tertiary age. Analyses of the constituent dolerite and syenite are given. B. C. A.

**Spillite and the average metabasalt.** H. W. Fairbairn. *Am. J. Sci.* 27, 92-7 (1934).—Spillite is transitional chemically to low-soda metabasalt and the conception of a special spilitic magma is not justified. Comparison of an av. of 135 metabasalt analyses with the av. of 198 analyses of basalt and 43 of plateau basalt shows that the alteration was accompanied by loss of total Fe, gain of Na<sub>2</sub>O and constancy of SiO<sub>2</sub>, MgO and CaO.

**Distribution of the diabase amphibolites in the diamond-bearing region of northern Minas Geraes.** Luciano Jacques de Moraes. *Ann. acad. brasil. sci.* 5, 235-6 (1933).

**The amphibolites of the diamond-bearing region of northern Minas Geraes.** Djalma Guimares. *Ann. acad. brasil. sci.* 5, 237-58 (1933).—Descriptions and chemical constitutions of these rocks are given. John M. Ladino

**Correlation studies of the central and south central Pennsylvania bentonite occurrences.** R. R. Rosenkrans. *Am. J. Sci.* 27, 113-34 (1934).—Chemically the Pa. bentonites resemble one another closely but are distinguished from the younger western material by consistently higher alkali metal content and preponderance of K<sub>2</sub>O over Na<sub>2</sub>O. The alkalis probably exist partly in undecomposed feldspars, partly in clay-like minerals and partly as adsorbed salts. The much lower SiO<sub>2</sub> content is due to age and stage of alteration. Leaching of SiO<sub>2</sub> from the original ash and passage into subjacent strata probably explains the cherty layer underlying bentonite.

**Soil processes in volcanic ash beds.** N. H. Taylor. *New Zealand J. Sci. Tech.* 14, 338-52 (1933); cf. C. A. 27, 2914.—Analyses are given of the secondary alumina minerals occurring throughout the ash beds of northern King country. The results show that kaolin minerals have been deposited in the rhyolitic beds, whereas Al-rich minerals, such as allophane and gibbsite, have formed in the andesitic beds. From observations of profiles it appears that the predominating soil-forming process is podsolization on the rhyolitic beds and laterization on the more basic ones.

**Chemical studies of the orbicular rock from Minedera-yama.** Yoshinori Kawano. *Proc. Imp. Acad. (Tokyo)* 9, 613-16 (1933).—The rock consists of balls of metamorphosed clay-slate in a granite matrix. Chem. analyses are given for the kernel of the balls and its component minerals biotite and oligoclase, the cordierite shell, the matrix and the country rocks. Calcns. from these indicate that the clay-slate furnished material for the component minerals of the balls, and the excess SiO<sub>2</sub> was absorbed by the granite matrix.

**Egriite-augite-bearing riebeckite quartz schist from Kamukotan and some other localities in Hokkaido, Japan.** Jun Suzuki. *Proc. Imp. Acad. (Tokyo)* 9, 617-20 (1933).—Chem. compn. and mode of occurrence indicate that these schists were derived from a highly siliceous sedimentary rock by contact action of ultra-basic magmas intruded in connection with regional metamorphism. The egriite-augite occurs in short prisms, with frequent zonal structure and undulatory extinction. The max. extinction angle is variable, 14° and 32° being observed in that from different localities. It is pleochroic in green and brown.

**Polyhedral concretions of dolomitic composition.** Fritz E. Klingner. *Centr. Mineral. Geol.* 1934A, 6-13; cf. Rodolico, C. A. 25, 5879.—The distorted shapes are ascribed to the action of pressure on the mineral, which was present as a colloidal gel, before crystn.

**Occurrence of indium in Japan.** Yoshio Imaizumi. *J. Chem. Soc. Japan* 54, 771-2 (1933); cf. C. A. 28, 5831.—Arc spectrum analysis shows In in Zn blends from various districts.

**Geochemistry of beryllium.** V. M. Goldschmidt and C. Peters. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse* 1932, 360-76.—Probably the quantities of Li and Be in accessible rocks are not less than the av. values for the whole earth. Spectrographic detns. show that Be is markedly concd. in granites and nephelitic syenites (av. 0.001, 0.01% BeO, resp.). Be was not found in olivine and olivine rocks, but is present in alkali feldspar, nephelite, pyroxene, amphibole and mica. The av. BeO content of rocks is detd. as 0.0005%, and the av. value for meteorites is about the same; hence the Be content is held to be about 0.0002% and in no case more than 0.0004%.

**Geochemistry of noble metals.** V. M. Goldschmidt and C. Peters. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse* 1932, 377-401.—The concn. of Os, Ir, Pt and Rh in rocks is too small to permit the use of a spectrographic method on the original material. The limits with an arc spectrum (admixt. with SiO<sub>2</sub> or Al<sub>2</sub>O<sub>3</sub>) are: Ag 0.0001; Au, Ru, Rh, Pd 0.001; Pt 0.005; Ir, Os 0.01%. A concn. method employing Pb was therefore used; 0.5 g. of original materials could then be employed, and the following quantities ( $\times 10^{-4}$  g.) could be detected: Ag < 0.1; Rh, Pd, Pt, Au 0.1; Ru 0.25; Os 2.5, Ir 0.5. Fe meteorites were examd.; all contained Pt metals and Au. Ni-rich Fe meteorites are frequently particularly rich in noble metals. Basaltic Fe, chromite, Mo and Sn minerals were examd. Pt metals and Au are: siderophile > chalcophile > lithophile; Ag is: chalcophile > siderophile. The distribution of noble metals in arsenides, antimonides and sulfides, and their occurrence in Co and Ni minerals contg. As and Sb, were studied.

**Oceanography and geochemistry.** V. I. Vernadskii. *Mineralog. petrog. Mitt.* 44, 168-92 (1933).—A lecture.

**Portuguese uranium-uranium minerals.** Charles Laperre. *Bull. soc. chim.* 53, 72-80 (1933).—The only U minerals found in Portugal are black mineral, a product of alteration of UO<sub>2</sub> and U<sub>3</sub>O<sub>8</sub> and always accompanied by phosphate, sulfide and sulfate, and the products of alteration of this mineral, autunite and torbernite. Analyses of 2 samples of black mineral from 15 m. and 2 from 95 m. depth are given. All except one of the latter have the normal Ra/U ratio,  $3.2 - 3.3 \times 10^{-7}$ . For the exception it is  $2.80 \times 10^{-7}$ , a fall in the value being characteristic of an altered mineral. There is no const. ratio between Pb and U. The alteration process is discussed and the view advanced that H<sub>2</sub>SO<sub>4</sub> formed by the oxidation of pyrite is an important factor.

**Five-fold check of uraninite age?** Alfred C. Lam. *Am. Mineral.* 19, 1-13 (1934).—Five major lines of attack in the detn. of the age of a disintegrating mineral are discussed: (1) detn. of U<sub>238</sub> content, (2) detn. of Th Pb (Th D + Pb<sup>206</sup>) content, (3) detn. of the change from U<sub>238</sub> to Act D (Pb<sup>206</sup>), (4) O method, (5) detn. of He content; minor methods are based on the proportion of isotopes of Pb and the sp. gr. Wilberforce uraninite is used as an example.

**Goldfield of the Eastern Alps** (Canaval, Imhof) 9. Detn. of sp. gr. of minerals by use of index liquids (Meen) 2. Optical properties of ideal soln. immersion liquids (Buerger) 2. Immersion liquids of intermediate refraction (Butler) 2. Tests and properties of oil and gas sands (Fancher, et al.) 22.

**Munk, Rudolf:** Deposit of Manganese Ore in Kišovec in Slovakia and Its Genesis. Prague: Prometheus. 78 pp.

**Ortiz Mena, Rafael:** Estudio de un mineral mixto de plomo y zinc. Mexico, D. F.: Imp. Universal. 30 pp.

## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR K. HARDER AND RICHARD RIMBACH

Standards and specifications for metals and metal products. G. A. Wardlaw. Bureau of Standards, *Miscellaneous Pub.* No. 120, 1359 pp. (1933). E. J. C.

The flotative separation of a mixture of barite and dolomite—the differential flotation of earth alkali minerals. E. Ringe and E. Bierbrauer. *Berg- und Hüttenmannisches Jahrb.* 81, 139–46 (1933).—A new method was developed in which, by the action of  $\text{ZnSO}_4$ , dolomite in the flotation slime goes into the foam after addn. of  $\text{K}$  amylxanthate. The effects of grain size of barite, amt. of  $\text{ZnSO}_4$ , and of xanthate on the efficiency of the sepn. are studied; increasing the addns. of  $\text{ZnSO}_4$  improves the sepn.; increasing xanthate impairs it; the slime should be kept about neutral. The grain size of the barite should not be too fine as the sepn. is impaired by it. Six references. M. Hartenheim

The flotation of Alabama graphite ores. B. W. Gaudrud, G. D. Coc, C. S. Benefield and I. N. Skelton. *Bur. Mines, Rept. of Investigations* 3225, 20 pp. (1934).—The  $p_H$  value of the flotation pulps is the most important single factor affecting flotation results. Production of com.-grade concentrate is facilitated greatly by adding enough  $\text{H}_2\text{SO}_4$  to give  $p_H$  3.0–5.0. The unoxidized ores are naturally acid and give results much in line with the conditioned oxidized ores. Steam-distd. pine oil was one of the most satisfactory frothing and collecting reagents.  $\text{NaCN}$  depresses the pyrite, and in the unoxidized ores increases recovery and C content. Com.-grade concentrates with reasonably good recoveries were obtained by grinding the primary concentrates and retreating in a second stage flotation. Pneumatic and mech. agitation machines gave comparable results with neutral or alk. pulps; pneumatic machines failed to give a productive froth from an acid pulp. Alden H. Emery

A study of slime coatings in flotation. Guido R. M. del Giudice. *Am. Inst. Mining Met. Engrs. Tech. Pub.* No. 528, 15 pp. (1934).—Calcite slime coatings on galena are due to metathesis between anchored  $\text{Pb}$  ions on the galena and anchored carbonate ions on the calcite. This produces the almost insol.  $\text{PbCO}_3$  which acts as a cement between the galena surface and the slime particle. It is postulated that those reagents which inhibit calcite slime coatings on galena operate by reacting with the sulfide mineral surface, or with the calcite surface, or with both, to form thereon compds. which are less sol. than  $\text{PbCO}_3$ . Na silicate is an excellent reagent for inhibiting slime coatings on galena. It functions by forming relatively insol.  $\text{Pb}$  silicates on the galena surface. A. H. E.

Differential flotation of pyrite copper ores (Solo mine, Java). Gaichi Yamada and Shin-ichi Sato. *Suifokubunshi* 8, 307–23 (1933).—One ore contains Cu 5.89, Fe 20.19, Si 22.37, insol. 47.23% and the other Cu 2.21, Fe 16.93, Si 18.41, insol. 56.05%. The Cu occurs as chalcopyrite and a small amt. of chalcite and bornites. Flotation of finely ground ores (80–85% of the ore, through 200-mesh) gave good results; the recovery was 96–100% Cu and the compn. of the Cu concentrate was 28–30% Cu. The mineralogical compn. of the ore, details of the flotation methods, reagent used, etc., are described. Hideo Nishimura

Measurement of crushing resistance of minerals by the scleroscope. R. S. Dean, John Gross and C. E. Wood. *Progress Repts. Metallurgical Division. I. Mineral Physics Studies. Bur. Mines, Rept. of Investigations* 3223, 33–5 (1934).—Energy absorbed (difference between height of drop and rebound in a scleroscope) was directly proportional to the wt. of material crushed per unit of work. The effect of various variables on the results is described. Alden H. Emery

Progress in explosive shattering of minerals. John Gross. *Progress Repts. Metallurgical Division. I. Mineral Physics Studies. Bur. Mines, Rept. of Investigations* 3223, 19–32 (1934).—Increased pressures cause small increases in shattering. With increasing wt. of

charge, the shattering per g. of  $\text{H}_2\text{O}$  increases. Impact of particles against a solid barrier results in considerable shattering. Material from one explosion is nearly as susceptible to subsequent explosive shattering as the original. Less fines are made by explosive shattering than by ordinary crushing. There is a differential shattering with many ores which concentrates the values more than mech. crushing. A machine for explosion shattering is described. Alden H. Emery

Magnetic separation of minerals. R. S. Dean, V. H. Gottschalk and C. W. Davis. *Progress Repts. Metallurgical Division. I. Mineral Physics Studies. Bur. Mines, Rept. of Investigations* 3223, 3–13 (1934).—After magnetic properties are discussed in general, data are given on the d.-c. susceptibility and a.-c. activity before and after various kinds of heat treatment for many minerals. A separator is described briefly in which magnetized mineral particles on a tilted nonmagnetic belt pass over an a.-c. magnetic field. The slight repulsion of the particles having high coercive force overcomes the friction on the belt and the particles fall off. A. H. E.

A study of the homogeneity limits of wüstite ( $\text{FeO}$ ) by x-ray methods. Eric R. Jette and Frank Foote. *Trans. Am. Inst. Mining Met. Engrs.* 105, 276–89 (1933).—See C. A. 27, 2920. Alden H. Emery

The gold field of the Eastern Alps and its importance for the present. R. Canaval and Karl Imhof. *Berg- und Hüttenmannisches Jahrb.* 81, 146–56 (1933).—Brief historical data are given and the geological conditions discussed. The mineral contains about 8.35 g. Au and 69.3 g. Ag per ton, 3.2% As, 4.8% S and 0.4% Pb. M. H.

Effect of variations in coke ash on pig-iron analyses. H. W. Johnson. *Trans. Am. Inst. Mining Met. Engrs.* 105, 28–6 (1933).—As the amt. of coke ash varies, Si and S in the pig Fe tend to vary correspondingly. Max. blast-furnace efficiency is attained when variations are a min. Alden H. Emery

Metallurgical treatment of brass wastes containing iron. Werner Frölich. *Metallborse* 23, 1406–7 (1933).—Large particles of Fe mechanically attached to the brass turnings, filings, etc., can be sepd. by magnetic methods. Some Fe particles may become coated over with the brass and will not be removed by this means. This Fe and other residual, mechanically attached Fe can be sepd. by cautious melting and removal of the unmelted iron. Fe is especially harmful if it comes in contact with C or carbonaceous compds. to form Fe carbide. In the usual brass the Fe carbide is not decompd.; on casting it collects under the surface as hard inclusions. Control to prevent the C entrance in the metal bath during melting reduces the ill effect of the presence of Fe. Small addn. of Al may be made to destroy the formed Fe carbide. The Fe carbide can be destroyed and the chief part of the alloyed Fe removed by treatment with appropriate slags. An important constituent of the oxidizing slags is  $\text{CaSO}_4$ . Another slag used contains equal parts of sand and calcined soda as fluxing mixt. with about 20% Cu for forging scale for oxidation agent. Other slags are mentioned but they yield poisonous gases and are difficult to use. C. B. J.

Milling methods at the lead-zinc concentrator of the International Smelting Co., Tooele, Utah. W. J. McKenna. *Bur. Mines, Information Circ.* 6758, 13 pp. (1933).—About 1150 tons of  $\text{Pb}$ - $\text{Zn}$  ore is treated daily by flotation. A typical ore assays Pb 8.62, Cu 0.42, Zn 11.23, Fe 9.75%, Au 0.137 and Ag 7.10 oz. per ton. The Pb concentrate assays Pb 64.02, Cu 2.00, Zn 7.67, Fe 3.83, insol. 3.33%, Au 0.539 oz. and Ag 44.65 oz. and accounts for 93.62% of the Pb, 49.71% of the Au and 79.26% of the Ag. The Zn concentrate assays Pb 1.19, Cu 0.05, Zn 58.44, Fe 3.28, insol. 2.50%, Au 0.116 oz. and Ag 3.67 oz. and accounts for 85.44% of the Zn, 13.86% of the Au and 8.49% of the Ag. The Fe concentrate assays Pb 0.80, Cu 0.18, Zn 2.71, Fe 41.50, insol. 5.37%, Au 0.188 oz. and Ag 2.85 oz. and accounts for 67.00% of the

Fe, 21.64% of the Au and 6.31% of the Ag. The tailing assays Pb 0.41, Cu 0.05, Zn 0.44, Fe 3.98%, Au 0.037 oz. and Ag 0.76 oz. The flow sheet is described in detail. The consumption of flotation reagents in Feb. 1931 was soda ash 1.85, Na aerofloat 0.065, NaCN 0.217, ZnSO<sub>4</sub> 0.738, CuSO<sub>4</sub> 1.379, Aerofloat No. 15 0.100, K ethyl-xanthate 0.314 and K amylxanthate 0.115 lb. per ton of ore.

Alden H. Emery  
Recent developments in lead for chemical plant. W. Singleton. *J. Soc. Chem. Ind.* 53, 49-52T (1934). E. H.

Soviet standardizes blast-furnace design. Gordon Fox and Owen R. Rice. *Iron Age* 133, No. 10, 20-4, 58 (1934). E. H.

Heat transfer to the open-hearth bath. Wm. C. Buell, Jr. *Iron Steel Eng.* 11, 52-67 (1934).—A paper presenting a line of reasoning that if brought to a successful conclusion may be instrumental in establishing a more efficient process. Tables and curves and an extensive discussion are included. W. H. Roynton

Operation records of the blast furnaces Nos. 1 and 2 of the Magnitogorsk plant. C. Ilduim and V. Sorokin. *Steel* (U. S. S. R.) 1933, No. 3, 13-25.—Premature burning out of the lining of furnace No. 1 is attributed to the facts that: (1) the level of the charge varied from 0 to 7 m. from the top; (2) the charging bell was designed for fine rather than lumpy ores; (3) ore and coke were charged together. The furnace, of American design, produced 1100 tons pig iron daily contg. 4% Si with a ratio of coke to pig iron of 1.2. The top gases were at a temp. of 400-600° and contained 9% CO<sub>2</sub> by vol. The production of 1% Si pig iron is recommended to give normal life of lining.

H. W. Rathmann  
Remelting aluminum in a reverberatory furnace. E. T. Richards. *Chem.-Ztg.* 58, 135-6 (1934).—Reverberatory furnaces are best used for remelting large amts. of scrap. Al scrap is divided into 3 classes: (1) first quality (pure and purified scrap); (2) av. quality (both coarse and fine pieces); (3) poor quality (old, partly oxidized, thin chips). Classes 2 and 3 are best remelted in the reverberatory furnace. A deep hearth is essential. Basic fireclay contg. little free SiO<sub>2</sub> or bauxite is used for refractories. Furnace control is best with oil or producer gas as a fuel. The temp. should not exceed 750°, as oxidation of Al and absorption of N and hydrocarbons are rapid above this temp. Al oxide layer is not considered sufficient protection to the molten metal against oxidation and harmful gas absorption. Flux may act mechanically by the formation of a slag blanket or may have chem. purification action as well. ZnCl<sub>2</sub> and NH<sub>4</sub>Cl mixt. may be used for flux. NaCl-CaF<sub>2</sub> is also used. A mixt. made up of 10 parts calcined soda, 2 parts calcined CaCO<sub>3</sub>, 1 part borax and 2 parts cryolite has a low m. p. and forms a fluid slag. Oxidizing fluxes used directly before casting remove absorbed gases and purify the Al. Dichromates of Ca, Na and NH<sub>4</sub> nitrates, permanganates and chlorates are used. A final ZnCl<sub>2</sub> treatment is given to decrease the Al<sub>2</sub>O<sub>3</sub> content. C. B. Jenni

Cupola furnaces and casting. G. Itam. *Rev. sonderie moderne* 28, 1-5 (1934).—Previous results of studies of influence of size of tuyères on the melting process (see C. A. 28, 731<sup>a</sup>) are discussed; after more recent tests it has been confirmed that max. temps. can be obtained in a cupola furnace equipped with properly arranged small tuyères without having to resort to recuperating systems as before. M. Hartenheim

Cupola explosions, their causes and prevention. J. Petin. *Giesserei* 21, 3-5 (1934). Curtis L. Wilson

Chromium additions to cast iron for foundry purposes. J. E. Hurst. *Foundry Trade J.* 50, 117-18 (1934); cf. C. A. 28, 1967<sup>a</sup>.—Variations in the yield of Cr in the final metal are shown when Cr addns. are made in various forms. Expts. demonstrate an improved yield when Cr addns. are made in a diluted form. Downs Schaaf

Copper in gray cast iron. C. T. Eddy. *Foundry* 62, No. 2, 15, 57 (1934).—Many advantages are stated for the addn. of Cu to cast Fe as a result of an investigation concerning this subject. Downs Schaaf

The production of iron for electrical apparatus. Y.

<sup>1</sup> Nishiyama and M. Nakashima. *Tetsu to Hagane* (*Iron Steel Inst. Japan*) 20, 1-28 (1934).—Ingots for making dynamo-sheet are made in the basic open-hearth furnace; those for transformer-sheet, in the basic arc furnace. The former contains C 0.036, Si 0.068, P 0.011, S 0.016, Mn 0.14%; the latter, C 0.03-0.04, Si 3.8-4.2, Mn 0.08-0.010, P 0.010-0.015, S 0.010-0.015, Cu 0.06%. Effects of the rolling and annealing on the electrical and magnetic properties were studied, and the procedure in making the sheet is described. M. Kuroda

Steel-making processes. Geo. B. Waterhouse. *Trans. Am. Inst. Mining Met. Engrs.* 105, 13-27 (1933).—The trend in steel-making processes during the past 20 yrs. is reviewed. The future should see the growth of basic open-hearth and elec.-furnace processes. A. H. J.

The manufacture of drill and other high-grade steels at Vereeniging, Transvaal. J. H. Dobson, G. Rolison, I. Burnard Bullock and H. Clarke. *J. Chem. Met. Mining Soc. S. Africa* 34, 106-202 (1933).—The wire works of the Union Steel Corp. and the plant processes are described. Alden H. Emery

Metals in aircraft construction. Robert Jones. *Heat Treating and Forging* 19, 35-7 (1933). D. S.

Metallographic investigation of tungsten wire with addition of thorium. N. M. Zarubin and A. N. Koptzik. *Doklady Akad. Nauk SSSR* 1932, No. 5/6, 59-66; cf. C. A. 27, 3689.—A discussion of microstructure of W wire with addn. of ThO<sub>2</sub>, SiO<sub>2</sub> and K<sub>2</sub>O. More pores were observed in wires prepd. from cheaper grades of W contaminated with Al, Mo, Fe, etc. The no. of pores was found to be greater the finer the grain. B. N. Daniloff

The design of nitrided tools. B. Thomas. *Heat Treating and Forging* 19, 93-5 (1933). D. S.

Heading and heat-treating bolts. J. B. Nealey. *Heat Treating and Forging* 20, 80-1, 84 (1934). D. S.

Heating steel for bolts and propellers. J. B. Jones. *Heat Treating and Forging* 19, 52-3 (1933). D. S.

The time required for heating steel. J. D. Keller. *Heat Treating and Forging* 19, 65-6, 100-1 (1933). D. S.

Steels for automobiles. J. W. Urquhart. *Heat Treating and Forging* 20, 32-4, 73-5, 79 (1934). Downs Schaaf

Crystal structure and ferromagnetism of copper manganese-aluminum alloys. Otto Heusler. *Ann. Physik* 19, 155-201 (1934); cf. C. A. 27, 5638.—The compd. Cu<sub>2</sub>MnAl after prolonged heating at 110° has the ideal structure: cubic, O<sub>h</sub>, *a* = 5.935, *d* = 0.60, 4 formula units per cell; face-centered lattices begin in the points Cu = (1/4, 1/4, 1/4), Mn (000), Al (1/2, 1/2, 1/2), as shown by quant. blackening measurements of Debye photographs. The crystal lattice, elec. cond. and ferromagnetism of the β-phase of the system Cu-Mn-Al vary with compn. and heat treatment. In this phase the compd. Cu<sub>2</sub>MnAl has the max. cube edge, temp. coeff. of cond., intensity of magnetization and Curie point; it is thus responsible for the ferromagnetism of these alloys. C. D. West

Protection from corrosion of aluminum and its alloys. N. D. Pullen. *Metal Ind.* (London) 44, 133-6, 187-9 (1934).—A review. E. H.

Intercrystalline corrosion in rustless steels. Schalmeyer. *Oberflächentechnik* 10, 281-2 (1933).—Intercrystalline attack follows the grain boundaries and can be observed in Pb, Sn, Al, brass, mild steel and rustless steels, dezincing and season-cracking of brasses, lye-brittleness of mild steel and the intercrystalline disintegration of austenitic rustless steel are most frequently observed phenomena. The conditions under which these materials are attacked are studied. Grain boundary corrosion is an electrochem. process. Macrotensile stresses are proper (interior) stresses due to deformation, cooling, temperature differences, microtensile stresses cannot be experimentally demonstrated; they are in equilibrium (dislocation of the lattice). Greater irregular plastic deformation (tensile stress) favors corrosion. Austenitic steels can be improved by preventing segregation of carbide by addn. of Ti in the ratio of about 4:1; 0.14 C and 0.47 Ti gave very good results. Disintegration of grain boundaries can also be prevented or retarded by increasing Cr and



decreasing Ni, or addn. of Ti, Si, etc., which form mixed structures that are more difficultly attacked. M. H.

**A practical method of electrical protection for pipe lines against soil corrosion.** Starr Thayer. *Natural Gas* 14, No. 11, 6-12 (1933).—A line laid in 1927 protected with one coat of coal tar enamel was examined in 1932 and found to have corroded seriously. Methods and results are described of the elec. protection system that was then put into operation. Conclusions: A current of 0.6 volts is sufficient to give complete protection; it would not be economical to attempt the protection of a bare line by this method. Also in *Proc. Am. Petroleum Inst. 14th Ann. Meeting, Sect. IV*, 143 52 (1933).

A. W. Furbank

**Corrosion of central hot-water-heating plants.** K. Dacves and R. Grosschupff. *Gesundh.-Ing.* 57, 40 (1934).—Polemic. Cf. Marx, C. A. 28, 85<sup>o</sup>. Reply. Alex. Marx. *Ibid.* 40-1.

M. G. Moore

Detn. of O in alloy steels and its effect on tube piercing (Hamilton) 7. Equil. diagram of the system: Al-Cu-Mn (Sawamoto) 2. Surface tension of liquid metals (Bircumshaw) 2. Use of stainless steels in the dyeing industry (Michel) 25. Refractory brick for Cowper app. (Leduc) 19. Recovery of gases such as SO<sub>2</sub> from smelter gases (U. S. pat. 1,946,489) 13. Photoelec. cells (Austrian pat. 135,851) 1. Dry concentrator for treating gold sands (U. S. pat. 1,945,526) 12.

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**Jig for ore concentration.** Christopher Livingood. U. S. 1,946,219, Feb. 6. Mech. features.

**Metals from ores.** "Berzelius" Metallhütten-G. m. b. H. (Max G. Freise, inventor). Ger. 587,458, Nov. 3, 1933 (Cl. 40a. 11.40). Addn. to 585,628 (C. A. 28, 1321<sup>o</sup>). The method of 585,628 for obtaining readily reducible low-melting metals such as Sn, Pb, Bi, Sb or their alloys by reducing sulfidic ores or foundry products, is modified by charging the reducing furnace with the ores, etc., and Fe or oxygen compds. of alk. earth metals

or metals of the Fe group, so that the S is driven off or combined with the metals from a slag.

**Metals from bituminous ores.** Carl Goetz. Ger. 587,290, Nov. 1, 1933 (Cl. 1a. 36). Addn. to 551,024 (C. A. 26, 4787). In extg. metal from bituminous ores by heating in exclusion of air to drive off the bitumen by the method of 551,024, temps. of 900° 1000° are used. Cf. C. A. 27, 695.

**Apparatus for pretreating ores, crude cement, etc., with waste gases from rotating furnaces.** Arno Andreas. Ger. 589,715, Dec. 13, 1933 (Cl. 80c. 14.10).

**Treating ores.** Neunkircher Eisenwerk A.-G. vorm. Gebrüder Stumm. Ger. 589,737, Dec. 13, 1933 (Cl. 40a. 2.30). Fine ores are agglomerated or sintered by using smoke dust especially from locomotive fires, as fuel.

**Treating vanadium ores.** Charles Knight and Arden M. Wilson. U. S. 1,945,611, Feb. 6. The crushed and furnace ore is treated with an alk. soln. such as Na<sub>2</sub>CO<sub>3</sub>, and the alk. filtrate is removed, the residue is treated with an acid soln. such as HCl and the acid filtrate is removed. U is removed from the alk. filtrate (suitably by adding HCl and then NaOH) and Ra is removed from the acid filtrate (suitably by use of BaCl<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub>) and the remaining alk. and acid filtrates are then mixed in the presence of iron and in such proportions as to give a neutral soln. to ppt. V. An arrangement of app. is described.

**Reducing iron ore.** Herman A. Brassert (to H. A. Brassert & Co.). U. S. 1,944,874, Jan. 30. In reducing Fe ore by finely divided C, the ore is preheated with waste heat derived from complete combustion of fuel such as oil, gas, coke or coal injected into the melting zone, reduced iron and gang are melted, and the molten metal is refined by an oxidizing flame in the same unit (of a described app.).

**Reducing iron ores.** Trent Process Corp. Ger. 591,485, Jan. 22, 1934 (Cl. 18a. 18.03). See Brit. 378,940 (C. A. 27, 2413).

**Apparatus for mixing iron ore with carbon.** Sandvikens Jernverks Aktiebolag. Ger. 589,927, Dec. 18, 1933 (Cl. 40a. 6.50).

**Smelting iron ores in a shaft furnace.** Herman A. Brassert (to H. A. Brassert & Co.). U. S. 1,945,341, Jan. 30. A metal low in C is produced from Fe ore in a shaft furnace by sepg. the ore into coarser and finer ore portions, charging small fuel mixed with the finer portion of the ore separately into the vertically extending portion of the furnace adjacent the walls, charging the coarser ore substantially free from fuel into the vertically extending central portion of the furnace and smelting the materials in a single furnace operation. App. is described.

**Working up copper and nickel ores.** Edgar Arthur Ashcroft. Ger. 585,697, Oct. 10, 1933 (Cl. 40a. 2.50). See Brit. 338,556 (C. A. 25, 2406).

**Manganese recovery from ores, etc.** Wilson Bradley (to Bradley-Fitch Co.). U. S. 1,947,457, Feb. 20. Material such as ore which has been subjected to partial reduction and contains MnO is treated with a soln. of an NH<sub>4</sub> salt such as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> to form a sol. manganous salt and NH<sub>3</sub>, and a sufficiently low content of NH<sub>3</sub> is maintained in the digestion to permit the digestion to proceed; an O-contg. gas such as air is injected into the digestion liquid to aid in the removal of NH<sub>3</sub> and to oxidize ferrous impurities, and the resulting manganous salt soln. is recovered. Cf. C. A. 27, 486.

**Selenium recovery from copper sulfide ores.** Oliver C. Ralston and Leonard Klein (to United Verde Copper Co.). U. S. 1,945,074, Jan. 30. A Cu sulfide ore contg. Se is smelted to produce a mat, the mat is treated (as by blowing in a converter) to eliminate S, and the resulting product, in the form of a molten bath, is subjected to the action of a slag contg. one or more alkali metal compds. such as a slag formed from "irona" under reducing conditions, in order to form alkali metal selenide which can be leached out with water.

**Chlorinating materials containing tin.** Edgar A. Ashcroft. Ger. 585,769, Oct. 14, 1933 (Cl. 40a. 44.01). See Brit. 302,851 (C. A. 23, 4181).

- Ball mill suitable for treating gold and silver ores, etc.** Elmer L. Van Pelt (to American Ball-Mill Co.). U. S. 1,946,511, Feb. 13.
- Conveyor apparatus for sintering or roasting ores.** Metallgesellschaft A.-G. (Jakob Schwalb, inventor). Ger. 589,984, Dec. 22, 1933 (Cl. 40a. 3.60).
- Preparing hollow ingots such as those of ferrous metal for subsequent working.** Jacob C. Siegle (to Youngstown Sheet and Tube Co.). U. S. 1,945,087, Jan. 30. The ingot is heated to a working temp., and during the heating there is introduced into its interior a gaseous oxidizing fluid such as air or O which forms a scale, and the ingot is subsequently worked to remove the scale from the bore. App. is described.
- Siemens-Martin furnaces.** C. Ott & Co. G. m. b. H. Fr. 756,648, Dec. 13, 1933. Masonry construction.
- Tunnel furnace and method for carrying out the reduction of oxidic zinc ores containing volatilizable detrimental constituents.** e. g., Pb, Cd, Sb, As. Andrew Pearson. Brit. 401,588, Nov. 16, 1933.
- Metallurgical furnace with a hearth and a superposed shaft portion suitable for producing low carbon metal from ores and scrap.** Herman A. Brassert (to H. A. Brassert & Co.). U. S. 1,945,342, Jan. 30. Structural features.
- Metallurgical furnace operation.** Harry O. Breaker (to Industrial Furnace Corp.). U. S. 1,940,270, Feb. 6. In the operation of furnaces such as those used for heat-treating cast iron, interchange of furnace gases with the atm. is prevented by interposing a layer of Fe oxide of av. particle size, 40 mesh or smaller, between the gases and the atm. Various app. features are described.
- Means for gripping and transporting blast-furnace feed buckets.** Demag A.-G. Ger. 591,159, Jan. 17, 1934 (Cl. 18c. 6.05).
- Furnace suitable for heat-treating metal rods, tubes sheets, etc.** Isaac Harter (to Babcock & Wilcox Tube Co.). U. S. 1,946,971, Feb. 13.
- Furnace for annealing metal sheets.** Evelyn E. Griffiths. U. S. 1,944,975, Jan. 30. Structural, mech. and operative details.
- Furnace for annealing metal sheets by a continuous process.** Ernest Griffiths. U. S. 1,941,974, Jan. 30. Various structural, mech. and operative details are described.
- Furnace for annealing blanks.** Akt.-Ges. Brown, Boveri & Cie. Ger. 589,020, Dec. 12, 1933 (Cl. 18c. 8.80).
- Mold materials.** Société l'Avébec. Brit. 401,217, Nov. 9, 1933. A compn. for addn. to molding-sand is made by mixing coal dust with a dry, powd., combustible binder, e. g., sulfite lye, dextrin, farina, linseed.
- Centrifugal apparatus for separating metals of different fusion points.** Louis Renault. Fr. 756,933, Dec. 18, 1933.
- Separation of platinum from solution containing much inorganic salt.** The Minister of War (Tetsuzōrō Matō and Hyōi Watanabe, inventors). Japan. 100,088, March 13, 1933. The soln. is mixed with a glue soln. and reduced with Mg and an acid, by which Pt and other metals are pptd. Pt is sepd. from the ppt. by treating with HCl.
- Metal objects.** Vereinigte Glühlampen und Electricitäts A.-G. Ger. 589,928, Dec. 20, 1933 (Cl. 40d. 1.30). Objects with a large-crystal structure are made by heating to recryst. temp. pressed objects of high-melting metals such as W or Mo, or alloys of these, and substances forming large crystals with them. Thus, H<sub>2</sub>WO<sub>4</sub> hydrate is mixed to a paste with water. A soln. contg. BaCl<sub>2</sub> and NaF is added to the paste. The paste is dehydrated and reduced in a current of H<sub>2</sub>. The resulting metallic powder is then pressed into desired shape and heated to 1100° in a current of H<sub>2</sub>. Cf. C. A. 28, 1011.
- Refining metals.** Karl Schmidt G. m. b. H. (Roland Sterner-Rainer, inventor). Ger. 589,988, Dec. 19, 1933 (Cl. 40b. 1). Metals or alloys, especially Al and its alloys, are refined by fusing and treating with PCl<sub>5</sub>. Cf. C. A. 27, 4764.
- Metal working such as deoxidizing aluminum, etc.** John Schmeller, Sr. (to Schmeller Holding Co.). U. S. 1,947,114, Feb. 13. Various details of app. and operation are described, one feature of operation being the subjection of the molten metal to friction and impact to disrupt oxide coatings on particles of the metal for effecting deoxidation.
- Uniting metals.** Bert Louis Quarnstrom (to Bundy Tubing Co.). Brit. 401,676, Nov. 6, 1933. A strong union between ferrous and cupriferous metals is effected by bringing them into intimate contact and heating so that solid diffusion takes place, the temp. and time being so controlled that the amt. of Cu which diffuses into the ferrous metal does not exceed at any point the soly. of Cu in Fe at the point at which the  $\alpha$ - $\gamma$  transformation begins. The heating is preferably in a neutral or reducing atm., e. g., illuminating gas, H<sub>2</sub>, CO.
- Uniting by fusion.** Michael Zack. Brit. 401,487, Nov. 16, 1933. In elec. arc welding Al (alloys), arcs are struck between the work and at least 2 electrodes of nonmetallic material, e. g., C, the work being covered by a flux, suitably KF 30, cryolite 30 and hydrated Al silicate 40% Cf. C. A. 27, 1856.
- Lining metal articles with metals.** Frederick T. Bersey, Ernest A. Hardy, Sidney C. Newton and The Laystall Motor Engineering Works Ltd. Ger. 591,247, Jan. 18, 1934 (Cl. 49l. 12). See Brit. 372,401 (C. A. 27, 2927).
- Bearing bushings.** Robert D. Pike, Hugo J. Stevenson and Otto M. Eash (to Kalif Corp.). U. S. 1,945,291, Jan. 30. A layer of Cu-Pb bearing metal is cast-welded onto the inside of an iron or steel cylinder, the composite article thus formed is cooled and is rolled between rollers pressing against the exterior iron or steel face to relieve differential stresses. App. is described.
- Finishing ferrous sheet material.** Albert H. Shonkwiler and Donald M. Shanafelt. U. S. 1,946,766, Feb. 13. Material such as strip steel is first hot-rolled, then cold-rolled and then finished by etching the cold-rolled material by treatment with a soln. contg. the HNO<sub>3</sub> radical in active form, such as a soln. formed of H<sub>2</sub>SO<sub>4</sub> and NaNO<sub>2</sub>, and the etched material is annealed. An arrangement of app. is described.
- Case hardening.** Ewald Hanus. Ger. 589,917, Dec. 18, 1933 (Cl. 18c. 3.15). In case-hardening metals, the hardening material is given an addn. of a mixt. of fire-resisting metal filings, asbestos fiber and water glass, to prevent the hardening material from collapsing or falling, in the furnace.
- Nitriding tungsten.** Richard Walter. Ger. 589,906, Dec. 18, 1933 (Cl. 48d. 5). W is nitrided by treatment with substances yielding N, e. g., NH<sub>3</sub>, at high temps. in the presence of C or gases contg. C.
- Heat treatment of metals.** Nobuta Matsunawa, Husatoshi Nozawa and Masuhiro Suzuki. Japan. 100,008, March 9, 1933. As a heat-treating medium, a mixt. of water and mineral oil contg. 0.5-10% petroleum is used.
- Heat treatments such as in tempering steel rolls.** Edwin F. Northrup (to Ajax Electrothermic Co.). U. S. 1,946,876, Feb. 13. For controlling the heat gradient preparatory to tempering a steel roll or the like to give a max. hardness at a surface with max. strength in the adjoining supporting body structure, the surface is heated rapidly with respect to inward conduction of heat, and the charge is quenched when the heat generated at and near the surface has had time to travel by conduction to the desired extent. App. is described for heating by elec. induction.
- Heat-treating duralumin and similar alloys.** Leopold Pessel. U. S. 1,946,545, Feb. 13. For increasing the elongation and resistance against intergranular corrosion embrittlement, alloys of this type, during an aging period of not less than 9 hrs. are subjected to a static pressure which will not effect any essential change in shape but is at least 600 lb. per sq. in. and may be applied by a screw press.
- Annealing and pickling apparatus for metal bands**

Fried. Krupp Grusonwerk A.-G. Fr. 756,762, Dec. 15, 1933.

**Aluminum cooking vessels.** Harry V. Churchill (to Aluminum Co. of America). U. S. 1,946,149, Feb. 6. A coating resistant to long and repeated exposure to the action of corrosive foods such as salted hams comprises an adherent adsorptive oxide coating in which is adsorbed a substantial amt. of a corrosion-inhibiting sol. Na silicate having a ratio of  $\text{SiO}_2$  to  $\text{Na}_2\text{O}$  of at least about 3.25.

**Chromium.** I. G. Farbenind. A.-G. (Ernst Pokorny and Kurt Schneider, inventors). Ger. 589,987, Dec. 19, 1933 (Cl. 40a. 46.01). Powd. metallic Cr is obtained by treating  $\text{CrCl}_3$  with Mg, preferably in the presence of alkali chlorides. The process is carried out at temps. above the m. p. of the chlorides so that the Cr can be filtered from the fused  $\text{MgCl}_2$ . Cf. C. A. 28, 1008<sup>a</sup>.

**Copper.** Keynertstolins Gamla Industri Aktiebolag. Ger. 585,544, Oct. 11, 1933 (Cl. 40a. 13.50). See Brit. 260,294 (C. A. 21, 3428).

**Gold and silver metallurgy.** Baxeres de Alzugaray. Can. 338,900, Jan. 30, 1934. To assist the oxidation of Au and Ag in the extn. of the metals from their ores, salts and compds. of Co, Fe and V or mixts. thereof in an alk. earth and in an alkali cyanide soln. are used. The oxidation is rendered more energetic and is effected with a saving of a considerable amt. of cyanide solvent.

**Lead, antimony and bismuth.** "Berzelius" Metallhitten-G. m. b. H. Ger. 589,738, Dec. 13, 1933 (Cl. 40a. 18.01). Pb, Sb or Bi are smelted by heating their compds. contg. S and O in a furnace directly heated by combustion gas, e. g., in a rotating furnace, till a slag contg. a high percentage of metal and practically no S is obtained. The S-contg. constituent is present as a flotation concentrate. The slag is then reduced in a shaft furnace.

**Centrifuge for separating mercury and heavier metals from amalgamation sludges, etc.** Paul A. Neumann. Ger. 588,280, Jan. 17, 1934 (Cl. 1a. 8).

**Recovery of zinc from zinc dust.** Soc. anon. la nouvelle montagn. Belg. 398,234, Sept. 30, 1933. Excess  $\text{NH}_4\text{Cl}$  is added and the mixt. is heated to slightly above the m. p. of Zn, so that the droplets of Zn liberated from the  $\text{ZnO}$  gather together as liquid Zn.

**Cemented columbium carbide.** Floyd C. Kelley (to General Elec. Co.). U. S. 1,947,206, Feb. 13. A sintered compn. which is suitable for cutting hard rubber or "Mycalex" contains about 3-25% of a metallic binder such as a mixt. of Fe and Mo together with Cb carbide.

**Iron.** Bamaq-Meguín A.-G. (Wilhelm Bannenberg, inventor). Ger. 589,808, Dec. 14, 1933 (Cl. 18b. 20). An acid-resisting Fe alloy contg. at least 12% Si is produced by pouring molten steel into a container filled with Fe-Si.

**Iron.** Adolf Wirtz. Ger. 591,197, Jan. 17, 1934 (Cl. 18b. 1.03). See Fr. 721,975 (C. A. 26, 4025).

**Composition for refining molten metals such as iron and steel.** Alfred H. Davies. U. S. 1,945,260, Jan. 30. An alkali metal chlorate such as  $\text{KClO}_3$ , 3-5, a B compd. such as borax or  $\text{H}_2\text{PO}_4$ , 0.25-1.0,  $\text{Na}_2\text{CO}_3$  or  $\text{NaF}$  0.5-1.0, and  $\text{MnO}_2$  0.25-1.0 parts are used together.

**Hot-rolling steel strips from billets or the like.** Wilhelm Rohm. U. S. 1,946,240, Feb. 6. Various details of operation are described.

**Abrading hardened steel surfaces.** Robert C. Angell (to S. S. White Dental Mfg. Co.). U. S. 1,945,510, Feb. 6. Various details of app. and operation are described suitable for use of a jet of oil and abrasive in grinding articles such as dental burrs.

**Brake drums.** Raymond J. Norton (to Bendix Brake Co.). U. S. 1,946,103, Feb. 6. A brake drum formed of low-C steel has a welded frictional engaging surface of steel of about the same C content but of greater hardness. Cf. C. A. 27, 2927.

**Apparatus for effecting reactions such as steel production from ore dusts, etc.** Sydney T. Wiles (to Buffalo Elec. Furnace Corp.). U. S. 1,946,252, Feb. 6. Various details are described of an app. with an elongated hori-

zontal reaction tube which may be formed of carbonaceous material and is electrically heated.

**Hollow drill steels, etc.** Reginald A. Bedford. Brit. 401,381, Nov. 16, 1933. Hollow bars are made by providing a pre-formed hollow billet with a tubular lining of rustless or stainless steel or other metal or alloy as a close sliding fit in the bore of the billet, rolling, forging or otherwise reducing the compd. blank on a core of a ductile metal or alloy, e. g., Cu (alloy), with a coeff. of expansion higher than that of the blank and then removing the core, the lining remaining as a tight fit in but not welded, soldered or intimately alloyed to the hollow bar.

**Stainless steel.** Heinrich Neuhauss (to Ajax Metal Co.). U. S. 1,946,873, Feb. 13. A blast-furnace iron having a high Cr content is electromagnetically superheated and stirred in vertical planes rapidly, to produce a rapid change of metal at the surface of the bath, and preheated air is coincidentally applied to the surface of the bath while the treated surface is kept free from slag covering, this oxidizing C without excessive loss of Cr. App. is described.

**Manganese nickel steel.** Hurl II. Payne (to Stulz-Sickles Co.). U. S. 1,947,167, Feb. 13. A Mn Ni steel for parent metal in welding operations contains Fe together with C 0.60-0.85, Ni 2.5-3.5, Mn 11-13.5 and Si 0.60-0.95%.

**Steel alloy.** George Charlton (to Wilcox-Rich Corp.). U. S. 1,946,522, Feb. 13. An alloy which is suitable for internal-combustion engine exhaust valves, etc., contains Fe together with Cr about 20, Zr 2, C 1.25, Mn 0.8, Si 0.8%, and a "minimum" of P and S.

**Alloy.** Nippon Tokusyu Kinzoku Kôgyô K. K. (Takeo Kitazawa, inventor). Japan. 100,410, Apr. 4, 1933. An alloy contg. Cu 25-88, Fe 11-50, Cr 0.1-15 and Al 0.1-10% is magnetic, hard and resistant to friction, sea water, etc.

**Alloy.** Nippon Tokusyu Kinzoku Kôgyô K. K. (Takeo Kitazawa, inventor). Japan. 100,411, Apr. 4, 1933. An alloy of Cu 47-89.99, Fe 10-50 and B 0.01-3% is magnetic and resistant to friction, etc.

**Alloys.** Firma Jacob Neuraath. Austrian 135,895, Dec. 11, 1933 (Cl. 40b). Bearing alloys contain Pb 65-77, Sn 3-14, Sb 10-27 and As 0.7-2.5%. Specific alloys are described.

**Alloys.** Heraeus Vacuumschmelze A.-G. Fr. 757,133, Dec. 20, 1933. The hardness of Cr-Ni alloys at high working temps. (500-1200°) is increased by the addn. of alk. earth metals, e. g., Be 0.05-0.8, Mg 0.05-0.5, Ca 0.05-2, Ba 0.05-2 or Sr 0.05-2%, or more than one of these, the total not being above 2%.

**Alloys; annealing.** Henry W. Brownson and Imperial Chemical Industries Ltd. Brit. 401,313, Nov. 3, 1933. Articles the surfaces of which contain designs and (or) lettering, e. g., coins, medals, are stamped from a soft Cu-Ni-Al alloy contg. 0.5-5% Al and about 3-4 times as much Ni, the stamped article being hardened by heating to 300-600°. The initial alloy may be softened by heating to 800-900° and cooling rapidly. The alloy may contain to 37% Zn. In 401,314, Nov. 3, 1933, metal tubes are formed from such alloys.

**Light alloy.** The Head of the Kôkû Kenkyûzyo (Masa-haru Gotô and Shin Nitô, inventors). Japan. 100,469, Apr. 7, 1933. A Mg alloy contg. Cd 3-25, Zn 1-6 and Mn 0.1-2% is resistant to corrosion and has good mechanical properties.

**Hard alloys.** Fried. Krupp A.-G. (Karl Schröter and Hans Wolff, inventor). Ger. 589,597, Dec. 11, 1933 (Cl. 40b. 17). A sintered hard alloy for tools, etc., consists of equal parts of carbide of V and Cb and an addn. of a lower-m. metal, not exceeding 25%, such as Fe, Co or Ni. The Cb carbide may be partly or wholly replaced by Ta carbide.

**Hard alloys.** Compagnie Lorraine de charbons pour l'électricité. Fr. 756,523, Dec. 11, 1933. Alloys of which at least 80% is formed by one or more chem. compds. which are very hard in themselves and the rest by an alloy of 2 or more metals, practically free from metalloids,

are hardened by heating to a high temp. and heating again to a lower temp. Thus, an alloy contains WC 36, TiC 7 and a hardenable alloy (Fe-W, Co-W or Fe-Co-W) 57%.

**Hard alloys.** Gustav Boecker. Fr. 756,992, Dec. 18, 1933. Tools are made from alloys contg. Ti 40-80, Si 10-50 and Co up to 15%, or Ti 15-50, B 40-80 and Co up to 15%. Mg, Al, V or Be may be used up to 15%, and Fe 2% may be present. The starting materials are reduced to easily oxidized metal powders, finely ground and moistened, compressed to the desired shape and heated.

**A hard magnetic alloy.** Nippon Tokusyu Kinzoku Kōgyō K. K. (Takeo Kitazawa, inventor). Japan. 99,549, Feb. 16, 1933. The alloy contains Cu 40-85, Fe 1-50, Ni 0.1-35, Cr 0.1-5 and Al 0.1-7%.

**Magnetic alloys.** Telefonaktiebolaget L. M. Ericsson. Brit. 401,352, Nov. 13, 1933. An Fe-free alloy in powd. form is heat-treated and has substantially the same magnetic properties as powd. Fe used, *e. g.*, in cores for loading coils. For an example cf. Fr. 736,964 (C. A. 27, 1465).

**Magnetic alloys.** Westinghouse Electric and Manufacturing Co. Ger. 591,160, Jan. 17, 1934 (Cl. 18d. 2.10). See U. S. 1,845,493 (C. A. 26, 2164).

**Corrosion-resistant alloys suitable for springs.** Michael G. Corson (to Metal & Thermit Corp.). U. S. 1,945,679, Feb. 6, 1934. An alloy of Ni together with Fe 1-20, at least one metal of the Cr group such as Cr or Mo 10-20, Cu 5-12 and Be 0.5-1.5% is given a desired hardness and elasticity by heating for about 0.5 hr. above 900° but below the m. p. of the alloy, this being followed by quenching and age-hardening at 250-400°.

**Alloy resistant to acids, to alloys and to corrosion.** K. K. Kōbe Seikōzyō (Kōjirō Kochi, inventor). Japan. 100,399, Apr. 4, 1933. The alloy contains Cu 18-60, Ni 21.5-80.3, Cr 0.2-10, Al 0.3-2, Mn 0.5-2, Fe 0.5-2, Co 0.1-1 and Mo 0.1-1.5%.

**Alkaline earth metal alloys.** Calloy Ltd. Fr. 756,766, Dec. 15, 1933. Alloys of alk. earth metals with Pb or Cd or other metals which do not alloy easily with Al are made by reducing a compd. of an alk. earth metal (oxides or silicates) in molten Al and adding fused Pb, Cd, etc., to the Al alloy also molten. The alk. earth metal leaves the Al and alloys with the Pb or other metal.

**Aluminum alloys.** Roland Sterner-Rainer (to American Lurgi Corp.). U. S. 1,945,297, Jan. 30, 1934. Alloys substantially devoid of Cu contain Al together with Mg 0.8-6.0, Si 0.6-6.0% and from 0.2 to 5% of Mn, Ni, Co, Cr or Ti and are given improved strength and resistance to corrosion by heating to near the solidification point, quenching and aging at room temp. for several days.

**Aluminum alloys.** Durener Metallwerke A.-G. and Karl L. Meissner. Brit. 390,121, Mar. 30, 1933. Divided on 392,388 (C. A. 27, 5302). See Fr. 741,667 (C. A. 27, 2666).

**Aluminum alloys.** Karl Schmidt G. m. b. H. Brit. 401,246, Nov. 9, 1933. Alloys for pistons, bearings, cylinders, parts of briquetting presses, etc., consist of Al with Si 5-40 and P 0.001-0.1%, with or without minor addns. of Mg, Ni, Cr, Mn, Co or Cu. In making the alloys P may be added to Al-Si alloy as such or preferably as  $\text{PCl}_3$ , the liberated Cl having a refining effect.

**Aluminum alloys.** Hans Vogt. Ger. 589,857, Dec. 15, 1933 (Cl. 40b. 18). See Fr. 734,920 (C. A. 27, 945).

**Aluminum alloys.** Durener Metallwerke A.-G. Ger. 591,203, Jan. 18, 1934 (Cl. 48b. 9). A corrodible duralumin alloy is plated on one or both sides with another duralumin alloy which is as resistant to corrosion as Al but has better mech. properties.

**Aluminum alloy.** Furukawa Denki Kōgyō K. K. (Tutomu Shiomi and Kenji Ono, inventors). Japan. 99,302, Feb. 1, 1933. An Al alloy contg. Mg 0.3-6 and Cd 0.3-1.3% is strong and is resistant to sea water or acids.

**Aluminum alloy.** Mitsubishi Kōgyō K. K. (Seichi Tamura and Yūzō Mutō, inventors). Japan. 99,821, Feb. 28, 1933. An Al alloy contains Zn 4-15, Mg 1-6, Fe 0.2-2, and Co 0.1-1.5%.

**Hard aluminum alloy.** Kumakichi Koide, Zenzō Sirai, Kyōkichi Taguchi and Eiichi Satomi. Japan. 100,227, March 23, 1933. An Al alloy contg. Si 10-13, Mn 8-10, Sn 5-10 and Cr 2-3% is hard and non-corrosive.

**Aluminum-base alloys.** Walter Bonsack (to National Smelting Co.). U. S. 1,947,121, Feb. 13, 1934. Alloys which have a low thermal coeff. of expansion and good mech. and phys. properties contain Al together with Si 7-20, Mg 0.2-6.0 and Mn 0.1-5.0% (the alloy being comparatively free from other elements having a higher  $\sigma_f$  gr. than Al).

**Aluminum and magnesium alloys.** Georges Chaudron and Eugène Herzog. Fr. 756,714, Dec. 14, 1933. Alloy of high mech. properties and not affected by sea water are made by incorporating with Al, poor in Si and Ni, free from chlorides and dissolved or occluded gases, complex addns. of 2 metals chosen from the Mg family, *e. g.* Mo and Mn, Mo and Ti, or Mo and Ni, the addn. being of the order of 1%. One example contains Al 89.9, Mg 9.5, Mn 0.3, Mo 0.2 and Si 0.1%.

**Heat treatment of aluminum-magnesium alloys.** Edgar H. Dix, Jr. and Louis W. Kempf (to Aluminum Co. of America). U. S. 1,945,737, Feb. 6, 1934. Al alloys contg. Mg 5-20% are improved as to their strength and hardness by heating for about 5-20 hrs. at 250-450° and then cooling rapidly enough to preserve the benefits of the heating. Cf. C. A. 27, 5711.

**Cadmium-nickel alloys.** Carl E. Swartz and Albert J. Phillips. Brit. 401,229, Nov. 9, 1933. See U. S. 1,901,175 (C. A. 27, 3190).

**Alloys of metals such as chromium.** Heraeus-Vacuum-schmelze A.-G. and Wilhelm Rohn. Ger. 589,986, Dec. 20, 1933 (Cl. 40a. 46.01). Addn. to 575,048 (C. A. 27, 3439). The process of Ger. 575,048 is accelerated by adding a compd. of C to the com. II used as reducing agent. Alloys free from C are obtained, provided that the proportion of C compd. does not exceed a certain max., which varies according to the conditions. Addn. of up to 50 g. of  $\text{C}_2\text{H}_2$ ,  $\text{CH}_4$ , benzene or like hydrocarbon to 1 cm. of II is generally suitable. Cf. C. A. 28, 1012<sup>2</sup>.

**Copper alloys.** Siemens & Halske A.-G. (Karl Dorsch, inventor). Ger. 589,985, Dec. 19, 1933 (Cl. 40a. 14). Addn. to 578,675 (C. A. 28, 735<sup>2</sup>). A drum for carrying out the process of 578,675, whereby Cu alloys are stirred with acid solns. of  $\text{CuCl}_2$  or  $\text{CuCl}$ , is described.

**Copper-lead alloy.** Robert D. Pike (to The Kahl Corporation). Can. 339,080, Jan. 30, 1934. To oxidize contg. lead, heated above the m. p. of Cu, is added Cu in amt. equiv. to about 1.5 g. for each lb. of metal in the final product. The molten mass is covered with a protective flux of borax and siliceous earthy material. Cu pig and any previously made Cu-Pb scrap are added, the Cu and scrap melted, and the metal heated to 2100-2200° F. The flux is thickened with sand and most of it removed with a rod and the metal is poured from beneath the remaining thin layer of thickened flux. Cf. C. A. 27, 3906.

**Gold alloys.** Leopold Nowack (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,946,231, Feb. 6, 1934. Alloys which can be annealed or hardened by heat treatment contain Au 70-95, Pt 1-25 and Fe, Ni or Co 0.05-5.0%.

**Ferrous alloys.** Gregory J. Comstock (to Firth-Sterling Steel Co.). U. S. 1,946,130, Feb. 6, 1934. Carbides of metals such as W, Cr, Mo, V, Ti, Ta, Zr, Th, U or Cb are dissolved in a ferrous alloy bath maintained under substantially non-oxidizing conditions (the addn. being made shortly before teeming and without opportunity for thorough dissemination of the carbide, this producing areas locally enriched in carbide which act as nuclei for the reprecipitation of hard carbides on cooling) and the material is cast to reprecipitate a hard carbide. Metal products may be thus obtained which are suitable for cutting tools, dies, punches, etc.

**Ferro-titanium alloy.** George F. Comstock (to Titanium Alloy Mfg. Co.). U. S. 1,946,670, Feb. 13, 1934. Alloys which are suitable for treating gray cast iron contain Fe together with Ti 15-25, Si about 20 and C less than 1%.

**Iron alloy.** Sumitomo Shindō Kōkan K. K. (Muraji Kinukawa, inventor). Japan. 100,516, Apr. 11, 1933. An Fe alloy contg. C 1.7-4, Mo 6-30, Cr 2-8% is very hard and is used for mfg. tools.

**Iron-beryllium alloys.** Ernst Pokorny and Kurt Schneider (to I. G. Farbenind. A.-G.). U. S. 1,945,535, Feb. 6. An alloy of Fe which may contain about 10% Be is produced by causing a Be compd. such as Be oxide to react with an alloy of Mg with about 40-60% Ca in the presence of an Fe compd. such as  $Fe_2O_3$  which effects reduction of the Be and Fe compds. and alloying of the reduced metals.

**Alloys of iron with chromium, nickel and beryllium.** Georg Masing and Wilhelm Kroll (to Metal & Thermit Corp.). U. S. 1,945,653, Feb. 6. Alloys which can be easily rolled and which have good heat resistance contain Fe together with Cr up to 25, Ni 5-10 and Be 0.5-1.5%.

**Lead-tin-cadmium-zinc alloys.** Alvin P. Bixler (to Advance Engineering Corp.). U. S. 1,946,609, Feb. 13. Alloys for wiping joints, fusible plugs, etc., contain Pb 40-75, Sn 15-30, Cd 5-20 and Zn about 1-3%.

**Magnesium alloys.** Leo B. Grant and Otis E. Grant (to Dow Chemical Co.). U. S. 1,946,009, Feb. 6; Brit. 401,244, Nov. 9, 1933. Alloys suitable for die casting contain Mg together with Al 8-15, Mn 0.1-0.5 and Si 0.35-1.0%.

**Silicon alloys.** Soc. électro-métallurgique de Saint-Beron. Fr. 756,537, Dec. 11, 1933. In making Si alloys of low C content, the formation of SiC is prevented by adding Mn, preferably as ore, to the alloy.

**Silver alloy.** Tadashi Tanabe. Japan. 99,246, Jan. 30, 1933. An alloy contg. Cd 4-20, Sn 4-20 and Ag 60-92% is not discolored by air, sulfides, sea water, etc.

**Zinc alloys.** Pascal J. Morell (to American Brass Co.). U. S. 1,945,288, Jan. 30. Alloys which are suitable for die casting contain Zn together with Al 15-35 and Mg 0.01-0.2%. Cf. C. A. 28, 924.

**Zinc alloy.** Leland E. Wemple and Floyd A. Warren. Can. 339,127, Feb. 6, 1934. An alloy consists of Zn 100.0, Cu 0.1-2.25 and Sb 0.01-2.0 parts. Cf. C. A. 28, 1654<sup>2</sup>.

**Zinc-copper alloy.** Compagnie Royale Asturienne des Mines. Brit. 401,147, Nov. 9, 1933. An alloy of Zn 99.5 and Cu 0.5% is described for making ammunition cartridge cases.

**Armor plate.** Fried. Krupp A.-G. Brit. 401,364, Nov. 13, 1933. Armor plate hardened on one side is made from a steel alloy contg. approx. °C 0.2-0.45, Ni 0.5-3.5, Cr 2-4.5 and Mo 0.2-1.5, the Mo being (partly) replaceable by about 1.5-3 times as much W. The plates are toughened by hardening above the  $A_c1$  point and reheating to close below the  $A_c1$  point. They are then heated on 1 side to the hardening temp. and hardened on this side by quick cooling. Cf. C. A. 28, 1323<sup>3</sup>.

**Type metal.** Metallgesellschaft A.-G. (Kurt Paarmann and Ernst Koch, inventors). Ger. 589,679, Dec. 15, 1933 (Cl. 40b. 10). An alloy suitable for type metal contains Pb 50-70, Sb 20-30, Sn 5-12, Zn 0.5-3, Cu 0.5-2, Cd 0.5-3, As 0.1-0.5 and Al 0.01-0.2%. An addn. of 0.01-0.06% of Si may be given and the Cu may be partly replaced by Ni.

**Permanent magnet.** Wm. E. Ruder (to General Elec. Co.). U. S. 1,947,274, Feb. 13. Age-hardened magnets are formed of an alloy of Fe together with Al 6-15 and Ni about 20-30%.

**Bi-metallic thermostat.** Howard Scott (to Westinghouse Elec. & Mfg. Co.). U. S. 1,937,065, Feb. 13. The member of higher temp. coeff. of expansion is an alloy contg. Ni 20-40, Cu 60-25 and Zn 20-35% and the member of lower temp. coeff. of expansion is an Fe alloy contg. Ni 30-39% and Co 2-10% and also traces of Mn and C. Cf. C. A. 28, 1326<sup>4</sup>.

**Decorating metal articles.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Oskar Ehrhart, inventor). Ger. 590,893, Jan. 12, 1934 (Cl. 75c. 5.09). Addn. to 508,395 (C. A. 27, 2008). See Brit. 335,789 (C. A. 25, 1651).

**Galvanizing metal sheets.** Ralph O. Griffis (to American Rolling Mill Co.). U. S. 1,940,936, Feb. 13. While in a substantially continuous travel, sheets are coated with molten galvanizing metal, promptly cooled to about 50° and then roller-leveled.

**Coating metal sheets such as ferrous metals with other metals such as tin.** Willard O. Cook, Oscar O. Miller and Joshua C. Whetzel (to American Sheet and Tin Plate Co.). U. S. 1,945,884, Feb. 6. The coated sheets are discharged into the atm. with the coating metal on the sheets at such a temp. above the solidifying point of the coating metal that the sheets so produced will have no discoloring film visible to the naked eye in ordinary white light and the amount of invisible film is reduced to such a min. that the sheets may be given several 8-10 min. treatments in an oven at a temp. of about 5-40° below the m. p. of the coating metal without causing a growth of the film sufficient to be objectionable from the standpoint of appearance or soldering.

**Coating iron and steel.** Leo P. Curtin and Bernard L. Kline (to Curtin-Howe Corp.). Brit. 401,908, Nov. 23, 1933. See U. S. 1,895,568-9 (C. A. 27, 2418).

**Treatment of surface of iron or its alloys.** Kenzyu Shiota. Japan. 99,675, Feb. 21, 1933. A pasty mixt. of powd. alloy of Cr, Ni, Fe and Al,  $NH_4Cl$ ,  $CoCl_2$  and water is applied to Fe or its alloys. When dried the material is heated at 800-1000° in  $NH_3$  under pressure. The alloy penetrates into the iron and makes it resistant to heat, to acid and to abrasion.

**Metal plating.** Metalligator Berlin A.-G. (Robert Hopfelt, inventor). Ger. 589,535, Dec. 8, 1933 (Cl. 48b. 10). Coatings of atomized liquid metal or condensed vaporized metal such as Zn, on metals such as Fe, are consolidated by treatment with Hg or an amalgam.

**Lead-plating of metallic wires.** Kenjiro Muchida. Japan. 100,079, March 13, 1933. Diagrammatical.

**Tin-plating machine.** Eisenwerke A.-G. Rothau-Neudeck and Fritz Peter. Ger. 589,746, Dec. 13, 1933 (Cl. 48b. 2).

**Apparatus for tinning metal objects.** Josef Janko. Ger. 589,933, Dec. 18, 1933 (Cl. 48b. 8).

**Apparatus for zinc plating.** Saburo Sasaki. Japan. 99,702, Feb. 22, 1933. Diagrammatical.

**Coating aluminum.** Martin Tosterud (to Aluminum Co. of America). U. S. 1,946,148, Feb. 6. An adsorbent amorphous oxide coating is produced on the metal by anodic oxidation, substances such as coloring material are adsorbed on this coating and the permeability of the oxide coating is then reduced by treating in water at a temp. of 80-100°. U. S. 1,946,150 relates to producing white coatings on Al or its alloys by forming on the metal surface an adherent oxide coating and subjecting this coating to a nonelectrolytic treatment with a soln. of an acid such as  $HNO_3$ ,  $H_2SO_4$  or HF. Cf. C. A. 27, 4763; 28, 1328<sup>4</sup>.

**Coating aluminum and its alloys.** Helmer Bengtson (to Aluminum Colors, Inc.). U. S. 1,946,147, Feb. 6. A pervious and adsorbent oxide coating is formed on the surface, composed in substantial part of amorphous Al oxide, and the coated metal is treated in water at a temp. of 80-100° in order to convert the coating into impervious hard cryst. form. Cf. C. A. 28, 1014<sup>4</sup>.

**Producing colored coatings on aluminum (alloys).** Aluminum Colors, Inc. Brit. 401,270, Oct. 30, 1933. See Fr. 750,391 (C. A. 28, 730<sup>5</sup>).

**Protecting or decorating aluminum surfaces.** Émile Apart. Fr. 757,147, Dec. 20, 1933. A deposit is obtained on Al by solns. of halides of Zn and Sn acidulated with HF, the solns. being about 3° Baumé.

**Protecting aluminum from corrosion.** Junius D. Edwards (to Aluminum Co. of America). U. S. 1,946,151-2, Feb. 6. See Can. 335,209 (C. A. 27, 5303). U. S. 1,946,153 relates to a process in which an adsorbent oxide coating is treated with a silicate soln. such as a Na silicate.

**Prevention of corrosion of aluminum and its alloys.** The Minister of Navy (Masahiro Tazaki, inventor).

Japan. 100,100, March 14, 1933. Al or its alloys are made corrosion-proof by passing a. c. or d. c. into a fused alkali nitrate with the metal as the anode (if d. c. is used) or the two poles (if a. c. is used).

**Protecting iron against rust.** Chemieprodukte G. m. b. H. Ger. 591,281, Jan. 19, 1934 (Cl. 22g. 7.02). In the manuf. of rust-proofing compns. comprising subdivided Pb and a metal oxide suspended in an oil, an aq. sludge of PbO and a metallic reducing agent, e. g., Zn or Al, is first treated with a small amt. of an acid or a salt capable of converting the PbO and the reducing agent into sol. salts. Addn. of a little AcOH is suitable. An aq. paste of Pb and ZnO (or  $Al_2O_3$ ) is obtained, which may be kneaded with an oil to displace the water. Alternatively, the paste may be treated with powd. Al, whereby heat is evolved and the water is evapd. In either case, the product is finally worked up with a drying or nondrying oil.

**Welding electrodes.** Michael Zack. Brit. 401,186, Nov. 9, 1933. The metal core of an arc-welding electrode is provided with a helical winding of 1 or more wires of difficultly oxidizable metal or alloy, e. g., Ni, Ni-Mn, Ag, Cu, bronze, Cr-Ni, monel metal, which are sepd. by insulation, e. g., asbestos, from the core throughout or are bared at the inner end where they are connected to the core.

**Welding electrodes.** The Babcock & Wilcox Co. Fr. 756,460, Dec. 11, 1933. Metal electrodes are coated with a compn. which contains substances forming an acid slag (some of these substances liberating O at the temp. of welding and others being reducing agents) in amt. at least equal to the theoretical amt. necessary for combination with the O liberated by the other sub-

stances. An example contains flint 150,  $MnO_2$  75, asbestos 30, Fe-Mn 60 g. and  $Na_2SiO_3$  200 cc.

**Electrode for arc welding.** Loulis G. Anastasiadis (to Una Welding, Inc.). U. S. 1,946,958, Feb. 13. A bare rod consisting predominantly of Al is provided with a flux or coating the same as that of Can. 337,746 (C. A. 28, 1650<sup>1</sup>) except that no dichromate is used.

**Electric arc welding.** James T. Catlett (to General Elec. Co.). U. S. 1,946,305, Feb. 6. An app. is described adapted to produce a curtain of gas spaced from and surrounding portions of the electrodes extending from their holders. U. S. 1,946,306 also relates to a welding-torch construction.

**Soldering and brazing.** Ludwig Meurer. Brit. 401,441, Nov. 16, 1933. In effecting a heat-conductive joint between the tire and rim of a railway vehicle wheel the tire and rim are heated in a reducing atm. and a metal alloyable therewith, e. g., Cu, Ni or alloys thereof, introduced between the surfaces of contact while the reducing atm. is maintained. App. is described.

**Soldering aluminum and its alloys.** Carl Banschier. Fr. 757,200, Dec. 21, 1933. The metal is heated to the same temp. as the solder, the film of oxide which is formed being removed by brushing with the liquefied solder. The solder may contain Sn 160, Al 5 and Zn 35 g., or Zn 120, Sn 75, brass 4 and Pb 1 g., or Zn 192 and Al 8 g.

**Soldering alloys of copper, silicon and zinc.** Aichi Tokai Denki K. K. (Etsuji Takahashi and Akihisa Ida, inventors). Japan. 100,360, Apr. 1, 1933. Alloys of Cu, Si and Zn are soldered to each other or with other metals by using  $Zn(NH_4)_2Cl_2$  as a solvent instead of  $ZnCl_2$  and a solder contg. a few percent of Cu (e. g., a solder composed of 40% Sn, 60% Pb and 3% Cu).

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLIER AND CLARENCE J. WEST

**A new class of free radicals.** A. Schönberg. *Trans. Faraday Soc.* 30, 17 18(1934); cf. C. A. 28, 126<sup>1</sup>.

E. R. Rushton

**Decomposition of organic compounds into free radicals.** F. O. Rice. *Trans. Faraday Soc.* 30, 152 69(1934); cf. C. A. 27, 5713 14.—Org. compds., when heated in the range 700–1100°, decompose into free radicals which can be detected by the Paneth effect on metallic mirrors. The Me group is the chief product of such decompn.; 10–30% of some other fragments are formed which x-ray photographs indicate consist chiefly of the Et radical. Higher radicals probably decompose into unsatd. compds. and smaller free radicals. When the strength of bonds in org. mols. is known, a plausible mechanism can be worked out for a variety of org. decomps., by means of which the products can be predicted, both qualitatively and quantitatively.

E. R. Rushton

**Relation between chemical and physical theories of the source of the stability of the organic free radicals.** C. K. Ingold. *Trans. Faraday Soc.* 30, 52 60(1934); cf. C. A. 27, 5713.—The stability of radicals such as  $Ph_3C$  is due to a special form of wave-mechanic "degeneracy" and a corresponding loss of energy through resonance. This is considered the driving force of all tautomeric changes. Aryl groups permit conductance of electrons in both directions, which is necessary for the degeneracy of the neutral radical. Qual. predictions of the relative stabilizing effect of the different aryl groups in triarylmethyl hydrocarbon radicals were confirmed by the work of Gomberg and Schlenk. This chem. theory is closely related to the phys. theory of Huckel and Pauling, but it is not confined to the hydrocarbons; also, it brings out the relation between radicals and their ions; chiefly, however, it brings the phenomena of the stable free radicals into relationship with the general theory of org. chem. reactivity.

E. R. Rushton

**Free radicals in the thermal decomposition and combustion of hydrocarbons.** Wm. A. Bone. *Trans. Faraday Soc.* 30, 148 52(1934).—The presence of any

free radicals in hydrocarbon flames, as derived from spectroscopic evidence, is probably due to the thermal decompn. of oxygenated mols. such as alcs., aldehydes, etc., as the affinity of hydrocarbons for O is great, and no thermal decompn. is apt to precede oxidation. Spectroscopic evidence does not enable us to distinguish between the main course of events, including primary changes, and mere side reactions and secondary effects in flames. The primary decompn. of  $CH_4$  is probably  $CH_4 \rightarrow \cdot CH_3 + H_2$ .

E. R. Rushton

**Use of free methyl and ethyl in chemical synthesis** F. A. Paneth. *Trans. Faraday Soc.* 30, 179–81(1934).

The method of Paneth (C. A. 26, 1232 3) was used to cause free radicals to produce Me and Et compds. of As, Sb and Bi. Antimony cacodyl,  $[SbMe_2]_2$ , a red solid which m. 17.5° to give a light yellow liquid, and  $[SbEt_2]_2$  were among the compds. formed. The m. ps., vapor pressure and characteristic reactions of the compds. were detd.

E. R. Rushton

**Creation of free radicals in highly diluted gas reactions** Hanns v. Hartel. *Trans. Faraday Soc.* 30, 187 9(1934).

The vapor of an alkali metal in a highly dil. state brought into contact with an org. halogen compd., setting free the org. residue. The products of the reaction are frozen out with liquid air. A 90% yield of  $Ph_2$  can be obtained from  $PhCl$  and Na, and  $Bz_2$  is made from  $BzCl$ . Cyanogen radical is produced by treating  $(CN)_2$  or halogen cyanide with Na.

E. R. Rushton

**Chemistry of radicals with trivalent carbon.** Karl Ziegler. *Trans. Faraday Soc.* 30, 10–17(1934).—A discussion of the stability of hexaphenylethane and analogous substances. The tendency to disoc. depends not only on the unsatd. character of the ethane substituents, but also on their vols. An exact kinetic study of the reaction between radicals and O shows that peroxides of the type R.O.O.R are secondary products. There are primary peroxides of the formula  $R O O \rightarrow$  which are strongly reactive but short-lived. Under suitable conditions



they can give off their O to acceptors and again form radicals, causing reactions.

**Thermal catalytic decomposition of methane.** Leonard Belchetz. *Trans. Faraday Soc.* 30, 170-9(1934).—The method of Paneth (*C. A.* 26, 1232-3) for the detection of Me radicals was used.  $\text{CH}_4$  and not Me proved to be the primary product of the decompn. on Pt.  $\text{CH}_4$  radicals produced compds. with I and Te, and, on a cooled glass surface, 2  $\text{CH}_4$  radicals react to form  $\text{C}_2\text{H}_6$ . At about 1700°,  $\text{CH}_4$  begins to decomp. to form H.

**Synthesis of hexane from propyl bromide by Würtz' method.** E. Erdheim. *Koczniki Chem.* 12, 631-4(1932).—Hexane is obtained in 47.6% yield by the action of Na on PrBr in the presence of MeCN. 2,3-Dimethylbutane cannot be prepd. analogously from iso-PrBr.

**The characterization of double bonds by antimony trichloride.** R. Delaby, S. Sabetay and M. Janot. *Compt. rend.* 198, 276-8(1934).  $\text{SbCl}_3$  (21-22 g.) in  $\text{CHCl}_3$  (100 g.) is a sensitive reagent for the detection of double bonds in unsatd. compds. The sensitivity increases with the no. of double bonds. The reaction is neg. with  $\text{C}_2\text{H}_4$ ,  $\text{C}_2\text{H}_2$ , and coumarin; pos. with phloroglucinol and phenanthrenequinone. A table of colors typical of a no. of unsatd. compds. is included.

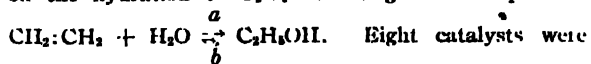
**Interesting by-products in large-scale synthesis of aliphatic compounds from acetylene.** G. Benson and A. F. G. Cadenhead. *J. Soc. Chem. Ind.* 53, 40-31(1934).—In the synthesis of AcOH from  $\text{C}_2\text{H}_2$  through AcH, the following by-products heretofore not described have been identified:  $\text{AcCH(OH)Me}$ ,  $\text{Ac}_2\text{CHCH(OH)Me}$ ,  $\text{AcCH(OH)CH}_2\text{CO}_2\text{Et}$ , 4,2,3- and 5,2,3-

$\text{Me(HO)}_2\text{C}_6\text{H}_5\text{CHO}$ .

**The preparation of butene by the method of Lebeau and Picon.** Tschao Yin Lai. *Bull. soc. chim.* 53, 687-92(1933).— $\text{EtI}$  and  $\text{NaC}\equiv\text{CH}$  in liquid  $\text{NH}_3$  at -45° give 78% of 1-butene.

**Oxidation of iodoform solutions.** René Dubrisay and Guy Emschwiller. *Compt. rend.* 198, 263-5(1931); cf. *C. A.* 27, 700. Oxidation of  $\text{CHI}_3$  in specially purified  $\text{C}_6\text{H}_6$  takes place readily without addn. of  $\text{I}_2$  or acid. The rate of decompn. is independent of the  $\text{CHI}_3$  concn. At 10° and a  $\text{CHI}_3$  concn. of 1% the oxidation is retarded by the addn. of 1:1,000,000 parts of the following: phenol, hydroquinone, aniline and pyrrole.  $\text{H}_2\text{O}$  exercises a light retarding action.

**The question of ethyl alcohol production by hydration of ethylene.** N. I. Burda. *Coke and Chem.* (U. S. S. R.) 1932, No. 12, 50-3.—A report on the lab. research work on the hydration of  $\text{C}_2\text{H}_4$  according to the equation:



Eight catalysts were prepd. and tested by their ability to promote the decompn. of EtOH as indicated by the reverse of the above equation, if it is assumed that the catalytic action of any catalyst in the reaction proceeding in the direction *b* to be proportional to the catalytic action in the direction *a*. A catalyst prepd. from  $\text{Al}_2(\text{SO}_4)_3$  ( $\text{NH}_4$ )<sub>2</sub> $\text{SO}_4$  soln. gave the best results. Decompn. of 99.5% EtOH was obtained with this catalyst. The  $\text{Al}_2\text{O}_3$  was pptd. from alum soln. by  $\text{NH}_3$  and the ppt. washed twice in hot  $\text{H}_2\text{O}$  and dissolved in an alkali; the soln. was filtered and  $\text{Al}_2\text{O}_3$  pptd. by addn. of weak  $\text{H}_2\text{SO}_4$  until neutral; the ppt. was filtered, washed in hot  $\text{H}_2\text{O}$ , and dried for 11 hrs. in an oven at 110°. Some EtOH was obtained by hydration when  $\text{C}_2\text{H}_4$  was pumped into a bomb contg. this catalyst under a pressure of 40 atms. and the temp. was raised to 300°, increasing the pressure to 140 atms.

**Preparation of unsymmetric  $\gamma$ -glycols of the acetylene series.** I. Yu. S. Zalkind and V. K. Teterin. *J. Gen. Chem.* (U. S. S. R.) 3, 369-72(1933).—See *C. A.* 27, 2679.

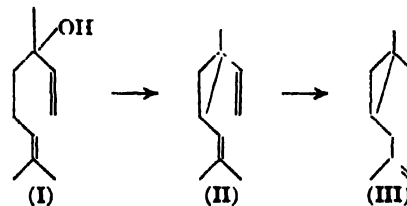
**Addition of hydrogen to acetylene derivatives. XIX.**

Yu. S. Zalkind, V. K. Teterin and A. Ivanova. *J. Gen. Chem.* (U. S. S. R.) 3, 373-9(1933); cf. *C. A.* 27, 2679; 28, 1669<sup>1</sup>.

**Selecting a catalyst for the production of butanol from ethanol.** B. N. Dolgov and Yu. N. Volnov. *J. Gen. Chem.* (U. S. S. R.) 3, 313-18(1933).—Lab. expts. were undertaken for the production of BuOH by thermal decompn. of EtOH in the presence of the catalyst  $\text{Fe}_2\text{O}_3$ .  $\text{Al}_2\text{O}_3$  pptd. on powd. animal C. The results indicate the possibility of the process. The condensation to BuOH is accelerated with an increase in the temp. of the reaction. The excessive formation of gaseous by-products can be checked by activating the catalyst with the addn. of La.

**A convenient method of preparing  $\alpha$ -acetylenic primary alcohols.** Tschao Yin Lai. *Bull. soc. chim.* 53, 682-7(1933).—The following substituted propargyl alcs. were prepd. in 70-95% yield by passing the theoretical amt. of  $\text{CH}_2\text{O}$  gas into a 30% soln. of the proper acetylenic  $\text{RMgX}$  compd. in 20-30 min.: *Et*  $b_{16}$  81 2°,  $d_4^{20}$  0.91,  $n_D^{20}$  1.4535; *nonyl* m. 29.5-30.0°; *decyl* m. 34.5°; *amyl*  $b_{16}$  98 9°,  $n_D^{20}$  1.4585,  $d_4^{20}$  0.884; *hexyl*  $b_{16}$  118 20°,  $n_D^{20}$  1.4558,  $d_4^{20}$  0.875; *Ph*  $b_{16}$  137 8°,  $n_D^{20}$  1.5873,  $d_4^{20}$  1.07.

**Contact isomerization of linalol.** Yasuji Fujita. *J. Chem. Soc. Japan* 55, 6-10(1934).—Linalol (I) and water vapor are passed through a Cu tube contg. active C and heated at 320-40°. A terpene,  $\text{C}_{10}\text{H}_{16}$  (II), is obtained from the dehydration of I during this process. II has 2 double bonds,  $b_{170}$  170°,  $d_4^{20}$  0.7973,  $n_D^{20}$  1.4602,  $[\alpha]_D^{20}$  -1.52°, gives no cryst. tetrahydrate or nitrosate, is not reduced by EtOH and Na, does not condense on heating or with maleic anhydride but it is entirely different from myrcene. The other dehydration product of I is a terpene (III),  $b_{160}$  160°,  $d_4^{20}$  0.7832,  $n_D^{20}$  1.4448,  $[\alpha]_D^{20}$  -5.80°, and a small amt. of a sesquiterpene  $\text{C}_{15}\text{H}_{24}$ ,  $b_{200}$  200°,  $d_4^{20}$  0.9269,  $n_D^{20}$  1.5094,  $[\alpha]_D^{20}$   $\approx$  0.0°. The structures of II and III are unknown, but, since they showed the same optical property as I, there must have been no change in the asym. C in I and since in the dehydration there is no formation of a double bond, there must have been a formation of a ring by the removal of the tertiary OH group thus:



**Decomposition of aliphatic ethers through heterogeneous catalysis.** W. Marx. *Z. physik. Chem.* B23, 33-57(1933).—The kinetics of the decompn. of di-Et, di-Pr and di(iso-Pr) ether vapor on bauxite into olefin and  $\text{H}_2\text{O}$  were studied for different surface concns. At higher concns., the resulting  $\text{H}_2\text{O}$  inhibited the progress of the reaction. This effect could be reduced by passing the gases over BaO. The reaction took place in 3 stages:

(1) short adsorption period; (2) renewal of used ether on the catalyst from the vapor phase (reaction order: 0.35); (3) removal of remaining adsorbed ether (reaction order: 3). At lower surface concns. the entire ether supply was adsorbed at the start, the resulting  $\text{H}_2\text{O}$  remained on the catalyst and the olefin was desorbed. Here, the reaction took place in 4 stages: (1) adsorption period; (2) renewal from gas phase (reaction order: 0); (3) renewal from inactive surface (reaction order: 1 to 2); (4) removal of remaining adsorbed ether (reaction order: 3). The kinetic equations for the various stages were given. The no. of active spots were calcd. to be between  $2 \times 10^{10}$  and  $1 \times 10^{20}$  for 1 g. of catalyst (7-144-289°). The heat of activation was calcd. for Et<sub>2</sub>O 31 kg. cal. per mol., for Pr<sub>2</sub>O 26 kg. cal. per mol. (iso-Pr)<sub>2</sub>O decomposes in 2 steps: (1) C<sub>2</sub>

$C_2H_4$ , heat of activation: 13 kg. cal. per mol.; (2)  $C_2H_5OH \rightarrow C_2H_4 + H_2O$ , heat of activation: 26 kg.-cal. per mol. Inhibited and uninhibited reactions for all 3 ethers gave the same heat of activation. H. H. Rowley

**Hydrolysis of ethyl ether.** A. Vansheldt and M. Lozovakil. *J. Gen. Chem.* (U. S. S. R.) 3, 329-36(1933); cf. Balandin, *et al.*, *C. A.* 27, 223; Ipat'ev, *Ber.* 1904, 2994; Pease and Jung, *C. A.* 18, 1978; 19, 432.—The hydrolysis of c. p.  $Et_2O$  was carried on at atm. pressure in the presence of solid catalysts and by passing  $H_2O$ -moistened  $Et_2O$  vapors over  $H_2SO_4$ , and at high pressure in a rocking autoclave in the presence of dil.  $H_2SO_4$ . The hydrolysis of  $Et_2O$  took place in all 3 cases, the best yield of  $EtOH$  being produced with dil.  $H_2SO_4$  under pressure. Silica gel and  $ThO_2$  showed poor catalytic action, while  $Al_2O_3$ , prep'd. by the method of Willstätter (*C. A.* 17, 3513), gave a good yield of  $EtOH$ , which is ascribed to a high degree of catalytic decompn. of  $Et_2O$  into  $EtOH$  and  $C_2H_4$ . By passing  $Et_2O$  moistened with  $H_2O$  into dil.  $H_2SO_4$  (70% and over) heated to 160° and higher, 5-10%  $Et_2O$  was hydrolyzed with resinification.  $H_2PO_4$  under these conditions failed to hydrolyze  $Et_2O$ . By heating  $Et_2O$  with 5-25%  $H_2SO_4$  at 200° in an autoclave 36%  $Et_2O$  was hydrolyzed without resinification or excessive gas formation. With 1%  $H_2SO_4$  the yield of  $EtOH$  was sharply reduced, while the use of 50%  $H_2SO_4$  and a temp. of 230° and higher caused dark discoloration of the product and excessive formation of gases and oily products. Chas. Blanc

**Successive reactions on the surface of a single catalyst.** II. Hydration of ethyl ether with the subsequent conversion to acetone. M. Yu. Kagan, I. M. Rossinskaya and S. M. Chernizov. *J. Gen. Chem.* (U. S. S. R.) 3, 337-44(1933); cf. K. and Klimenko, *C. A.* 27, 223. —The  $Al_2O_3$  catalyst obtained by pptg.  $Al(OH)_3$  from  $Al_2(SO_4)_3$  with  $NH_3$  (Willstätter, *C. A.* 17, 3513) and from  $Al(ONa)_3$  with  $HNO_3$  proved to be poorly active in hydrolyzing  $Et_2O$ . The  $Al_2O_3$  catalyst was prep'd. by dissolving 100 g. of metallic Al in aq. NaOH, the soln., dild. to 2 l., was filtered and carefully neutralized with dil.  $HNO_3$ , the  $Al(OH)_3$  was washed free from NaOH, by decanting with some addn. of a little weak  $NH_3$  and dissolved in 5%  $HNO_3$  by heating, then it was neutralized with weak  $NH_3$ , washed free from  $NO_3$  ions, filtered and dried at 110°; the  $Al_2O_3$  was activated by passing  $EtOH$  at 325° for 12-48 hrs. until the resulting condensate was colorless. The catalyst produced 22.5%  $EtOH$ , 6%  $C_2H_4$  and unchanged  $Et_2O$  by passing a mixt. of  $Et_2O$  and 2.5 parts of  $H_2O$  at a speed of 16 g.  $Et_2O$  per hr. At the temp. of the formation of  $Me_2CO$  (450-500°) all prepn. of  $Al_2O_3$  led to dehydration of  $Et_2O$  with the formation of  $C_2H_4$ . By addn. of 100 g. of finely powd.  $Fe_2O_3$  and 12 g.  $MgO$  to the above catalyst in the process of prep'n. was obtained a contact mass capable of catalyzing the hydrolysis of  $Et_2O$  with 3 parts of  $H_2O$  to  $EtOH$  at 400-500° and its direct conversion to  $Me_2CO$ . At a speed of 20 cc.  $Et_2O$  per hr. and 495° the reaction mixt. contained 40%  $Me_2CO$ , 7.4%  $EtOH$  and the gases 9%  $C_2H_4$  and 18%  $CO_2$ . The variations in the method of prep'n. of the catalyst or in the proportions of its constituents produced inferior results. Chas. Blanc

**Polymerization of unsaturated mercaptans.** Julius v. Braun and Theodor Plate. *Ber.* 67B, 281 5(1934).—Allyl mercaptan cannot be obtained in pure form from the iodide and KSH because of the ease with which it polymerizes (*C. A.* 20, 2991), and cinnamyl and furfuryl mercaptans behave in the same way.  $MeCH:CH:CH_2SH$  (I),  $Me_2C:CHCH_2SH$  (II),  $CH_2:CHCH_2CH_2SH$  (III),  $CH_2:CHCH_2CH_2CH_2SH$  (IV) and 1-cyclopentenyl mercaptan (V) have been prep'd. to det., if possible, what constitutional factors in an unsat'd. mercaptan condition its tendency to polymerize. Only I and III proved to be similar to the allyl comp'd. in this respect; II, IV and V are much more stable. The mercaptans were prep'd. from the corresponding chloride and bromide and  $H_2NCS_2NH_4$ . Crotyl mercaptan (I), obtained in 37% yield, b. 99-101°,  $d_4^{25}$  0.8830 immediately after distn., increasing

to 0.9285 in 2.5 days at room temp.; if it is now distd., about 80% does not distil over below 101° and there is obtained a fraction b. 101-80° with d. 0.9483.  $\gamma,\gamma$ -Dimethylallyl mercaptan (II), b. 125-7° (*Bs deriv.*, b. 122°),  $d_{15}$  0.8953 immediately after distn., changing to 0.8987 after 3.5 hrs. at 100° and 0.9012 after 45 hrs.; most of it now still b. 125-7°, only about 20% passing over at 127-50°. 1-Butene-4-thiol (III), b. 98-103° (only about 1/3 of the crude product boils at this temp.),  $d_{15}$  0.9087, increasing in 12 hrs. at room temp. to 0.9198, when none of it boils below 104°, about 10% boils up to 115° and most of it up to 250°, leaving a considerable dark viscous residue. 1-Pentene-5-thiol (IV), b. 135-7°,  $d_{15}$  1.0748, changing but slightly at room temp. and only to 1.0812 in 3.5 hrs. at 100° and to 1.0830 in 48 hrs.; on distn., about 80% still b. around 135° and hardly any residue is left at 145°. V, b. 116°,  $d_{15}$  0.8947, increasing to 0.9008 in 3.5 hrs. at 100° and 0.9108 in 48 hrs.; not quite 80% now b. up to 116° and almost all the rest below 130°; the corresponding sulfide, from the chloride in PhMe with  $Na_2S$  in alc., b. 112°, sulfonium iodide, obtained with  $MeI$ , yellow ppt., decomp. 204°. C. A. R

**The mobilities of organic radicals in their promosulfites.** P. Carré. *Compt. rend.* 198, 181 2(1931), cf. *C. A.* 26, 4301; 28, 1658\*. —The decompn. temps. of a no. of bromosulfites,  $ROSOBr$ , in the presence of pyridine, into  $SO_2$  and  $RBr$  (with the alkyl bromosulfites) were det'd. As with the chlorosulfites, the order of decreasing mobility of the radicals, R (or increasing decompn. temp. of  $ROSOBr$ ), is: Et and iso-Pr,  $Pr$ ,  $C_6H_{11}$ , Bu and  $CH_2ClCH_2$ ,  $C_7H_{15}$  and Ph. R. Roseman

**$\beta$ -Chloroethyl esters of sulfurous acid.** Ya. R. Komissarov. *J. Gen. Chem.* (U. S. S. R.) 3, 309-12(1933). —By the interaction of  $SOCl_2$  and an excess of  $HOCH_2CH_2Cl$  (I) at an elevated temp. is formed only  $OS(OCH_2CH_2Cl)_2$  (II) (Levillant, *C. A.* 24, 824). By working in the cold with a small excess of  $SOCl_2$  was obtained  $OS(Cl)OCH_2CH_2Cl$  (III). III, treated with an excess of I, gave II, which, with an excess of  $SOCl_2$ , was reconverted into III. III was also obtained from II with  $PCl_5$ :  $II + PCl_5 = (CH_2Cl)_2 + POCl_3 + III$ .  $O:NOCH_2CH_2Cl$  (IV), treated with  $SOCl_2$  split off 1 or 2 mols. of  $NOCl$ , giving II or III, depending on the conditions of the reaction. One mol. (80.5 g.) I was dropped into 125 g. (5% excess over 1 mol.) of  $SOCl_2$  in the cold, and the product was then refluxed at 50-60° and 100 mm. pressure until  $HCl$  and  $SOCl_2$  were expelled, and then fractionated *in vacuo*, giving 136 g. (83% yield) of III,  $b_{10}$  93-5°,  $b_{20}$  84-5°,  $d_4^{25}$  1.5010. A mixt. of 70 g. III and 60 g. I was refluxed 3 hrs. at 50-60° until the evolution of  $HCl$  had ceased; the product was washed with  $H_2O$ , dried with anhyd.  $Na_2SO_4$  and vacuum-distd., giving 73% (65 g.) II,  $b_{10}$  147-50°,  $b_4$  117.5 18°,  $d_4$  1.4255, mol. refr. 41.25 (found), 41.50 (calcd.). A mixt. of 60 g.  $SOCl_2$  and 50 g. IV was refluxed 1 hr. at 40-50°, and then vacuum-fractionated, giving 54 g. (74%) III and 14 g. II mixed with some III. A mixt. of 60 g.  $SOCl_2$  and 125 g. IV, refluxed 2 hrs. at 70° and treated as above, produced 65 g. of pure II. A mixt. of 30 g. II and 20 g.  $SOCl_2$  was allowed to stand overnight at room temp., the excess of  $SOCl_2$  was expelled, and the product vacuum-distd., giving 65% III and 11 g. of unreacted II. II (30 g.) in 100 cc.  $CCl_4$  mixed with 35 g.  $PCl_5$  was refluxed 1 hr., the  $CCl_4$  was expelled first in the water bath and then *in vacuo* at 50°, and the residue fractionated *in vacuo*, producing 21 g. (90%) III. Chas. Blanc

**The catalytic preparation of nitriles from esters in the presence of Japanese acid clay.** Jiro Abe. *Bull. Waseda Applied Chem. Soc.* 21, 27-31(1933) (English abstract 5A); cf. *C. A.* 27, 3193. —Japanese acid clay is an effective catalytic dehydrating agent for the prep'n. of  $MeCN$  and  $PhCN$  from the corresponding Et ester and  $NH_3$ ; it keeps its activity for several operations at the optimum temp., 350-400°. Yield is 85%. K. K.

**Dynamics and mechanism of aliphatic substitutions.** E. D. Hughes and C. K. Ingold. *Nature* 132, 933-4

(1933).—The authors cite exptl. evidence in support of their views (cf. *C. A.* 27, 3455) regarding the mechanism assumed by them for reactions of certain types, e. g., the hydrolysis of  $\text{NH}_4$  cations. Louise Kelley

**The isolation of chlorodiborane; some additions to the high-vacuum technic of chemical work with volatile substances.** Anton B. Burg. *J. Am. Chem. Soc.* 56, 199 501 (1934).— $\text{B}_2\text{H}_4\text{Cl}$ , m.  $-142^\circ$ ,  $b_{18} -78.6^\circ$ , is extremely unstable. Improved equipment is proposed. A. L. Henne

**Improvement of the method of determination of active hydrogen atoms.** O. Schmitz-Dumont and K. Hamann. *J. prakt. Chem.* 139, 162-6 (1934); cf. *C. A.* 27, 1629. In using  $\text{C}_2\text{H}_5\text{N}$  as solvent in the detn. of active H, gas is produced both by the reaction of the substance contg. active H and by the reaction of the  $\text{C}_2\text{H}_5\text{N}$  with the Grignard reagent. A method is given for correcting the vol. for the gas resulting from the  $\text{C}_2\text{H}_5\text{N}$ . C. J. W.

**Organometallic compounds of group II.** Ferdinand Schulze. *Iowa State Coll. J. Sci.* 8, 225 8 (1933). Reactions between RX and Ca produce organometallic compds. with: EtI, BuI,  $\text{C}_6\text{H}_{17}\text{I}$  and PhI. During the formation of these compds. a voluminous white solid,  $\text{Ca}_2\cdot 2\text{Et}_2\text{O}$ , formed. Mols. contg. twice as many Ca atoms as the original mols. were formed. No organo-strontium or organobarium halides were obtained in sealed tubes under temps. varying from room temp. to  $225^\circ$  and treatments lasting as long as 1 year. Dialkyls and diaryls of Ca, Sr and Ba were not obtained though slight visual evidence of it was observed. Organoberyllium halides form above  $80-90^\circ$ . Catalysts for the reaction in order of effectiveness are  $\text{HgCl}_2$ ,  $\text{BeCl}_2$ ,  $\text{Hg} + \text{I}_2$ ,  $\text{I}_2$  and  $\text{Br}_2$ . The usual solvent was  $\text{Et}_2\text{O}$  but MeBeI was prepd. without a solvent. Ether solns. do not fume in the air. BeMe<sub>2</sub> was prepd. from Be,  $\text{HgMe}_2$  and a trace of MeHgI. BePh<sub>2</sub> and Be di-*p*-tolyl were prepd. by heating Be + Hg aryls with a trace of  $\text{HgCl}_2$  in sealed tubes for 6 hrs. at  $225^\circ$ . Be alkyls are most conveniently prepd. by the reaction of anhyd.  $\text{BeCl}_2$  with the appropriate Grignard reagent. BeMe<sub>2</sub>, BeEt<sub>2</sub> and BeBu<sub>2</sub> were prepd. thus. BeMe<sub>2</sub> sublimes at  $200^\circ$  without melting. BeEt<sub>2</sub>, m.  $-13^\circ$  to  $11^\circ$ ,  $b_4$   $93-5^\circ$ ,  $b_{18}$   $110^\circ$ ,  $b$   $180-240^\circ$ . BeBu<sub>2</sub>,  $b_{18}$   $170^\circ$ . Both BeMe<sub>2</sub> and BeEt<sub>2</sub> react with  $\text{H}_2\text{O}$ ,  $\text{CO}_2$  and  $\text{PhNCO}$ . BeR<sub>2</sub> is at least as reactive as Grignard reagents and more reactive than RBeX. Tri-*p*-isomophenylstibine was prepd. in 90% yield by treating  $\text{SbCl}_4$  in  $\text{Et}_2\text{O}$  with an excess of *p*-Br $\text{C}_6\text{H}_4\text{MgBr}$ . An attempt to prep. (*p*-Me $\text{NC}_6\text{H}_4$ )<sub>3</sub>Sb resulted in tars. F. E. Brown

**Organometallic compounds. II. The reaction between fatty derivatives of tin and tetrahalides of tin.** K. A. Kocheshkov. *Ber.* 66B, 1661-5 (1933); cf. *C. A.* 23, 5172. The interaction of  $\text{R}_4\text{Sn}$  and  $\text{SnX}_4$  or  $\text{RSnX}_3$  or  $\text{R}_2\text{SnX}_2$  (where R = Me, Et, Pr and X = Cl or Br) is a practical method of prep.  $\text{R}_4\text{SnX}$  or  $\text{R}_3\text{SnX}_2$ . Me<sub>4</sub>Sn, m.  $148^\circ$ , is obtained as a by-product in the reaction between  $\text{Me}_3\text{SnCl}_2$  and  $\text{SnCl}_4$  in the presence of  $\text{H}_2\text{SO}_4$ . Pr<sub>4</sub>SnBr<sub>2</sub>, m.  $47-8^\circ$ . A. L. Henne

**Organolead compounds.** Edmund B. Towne. *Iowa State Coll. J. Sci.* 8, 229-30 (1933).—When HCl reacts with an unsym. organolead compd., the more neg. or labile group splits off. By this means a negativity or lability series may be arranged. The position of the double bond is a controlling factor in the lability of unsatd. radicals (cf. *C. A.* 28, 124<sup>3</sup>). The introduction of functional groups into organolead compds. was attempted in 2 ways: coupling of organolead halides with substituted halogen compds., and by rearrangement of some diazonium complexes of bi- and quadrivalent Pb chlorides in the presence of Cu bronze and other metals. Diazonium complexes of  $\text{PbCl}_2$  were prepd. for the first time but no substituted organolead compds. were formed. Et<sub>3</sub>PbBr reacted with Mg to produce EtMgBr and Et<sub>3</sub>Pb. This indicated the formation of an unstable Et<sub>3</sub>PbMgBr. Triphenyl-*p*-anisyllead was prepd. F. E. Brown

**Compounds of bivalent carbon. VII. Action of carbon monoxide on sodium ethylate.** Helmuth Scheibler and Gerhard Frikell. *Ber.* 67B, 312-14 (1934); cf. *C. A.*

27, 3196. Dry CO adds to EtOH-free NaOEt under high pressures at  $20^\circ$ , no  $\text{EtCO}_2\text{Na}$  being formed unless the product is heated to  $100-90^\circ$  (*C. A.* 26, 1805). It was suggested that under these conditions there is formed a bivalent C deriv.,  $\text{C}(\text{OEt})\text{ONa}$ . The product has now been analyzed for total Na (30.93%), Na titratable with 0.1 N HCl (23.42%),  $\text{HCO}_2\text{H}$  in the aq. soln. of the neutral Na salts (13.46%), acid (calcd. as  $\text{HCO}_2\text{H}$ ) volatile with steam after decompn. with dil.  $\text{H}_2\text{SO}_4$  (13.50%), EtO content of reaction mixt. (43.07%). In a vacuum desiccator the EtO content gradually decreased, probably as the result of elimination of  $\text{C}_2\text{H}_4$ :  $\text{C}(\text{OEt})\text{ONa} \rightarrow \text{C}_2\text{H}_4 + \text{C}(\text{OH})\text{ONa} \rightarrow \text{HCO}_2\text{Na}$ , a process which presumably begins as soon as the CO excess pressure is removed when the autoclave is opened. The product therefore consists of a mixt. of unchanged NaOEt,  $\text{HCO}_2\text{Na}$  and  $\text{C}(\text{OEt})\text{ONa}$ . Prepn., which had been kept a long time evolved  $\text{CO}_2$  when treated with  $\text{H}_2\text{SO}_4$  (3% after a few days, increasing on longer standing in dry air and at higher temps.; in an expt. in summer (av. temp.  $25^\circ$ ), the  $\text{CO}_2$  evolved after 3 weeks was 8%). The  $\text{CO}_2$  is probably produced from  $\text{C}(\text{OEt})\text{ONa}$ , resulting from the autoxidation of  $\text{C}(\text{OEt})\text{ONa}$ . VIII. Action of ethyl formate on triphenylmethyl sodium. Helmuth Scheibler and Heinz Cobler. *Ibid.* 314 17. When  $\text{HCO}_2\text{Et}$  is added to  $\text{Ph}_3\text{CNa}$  in ether the dark red soln. is at once decolorized with formation of a cryst. ppt., the filtrate from which yields  $\text{Ph}_3\text{CH}$  on evapn. The water soln. of the ppt. contains NaOH,  $\text{HCO}_2\text{Na}$  and  $\text{NaHCO}_2$ . The NaOH is probably formed from NaOEt, resulting from the decompn. of part of the  $\text{HCO}_2\text{Et}$  into CO and EtOH, the EtOH then giving with  $\text{Ph}_3\text{CNa}$ , NaOEt and  $\text{Ph}_3\text{CH}$ .  $\text{HCO}_2\text{Na}$  is probably formed from  $\text{C}(\text{OEt})\text{ONa}$  resulting from the reaction  $\text{Ph}_3\text{CNa} + \text{HCO}_2\text{Et} \rightarrow \text{C}(\text{OEt})\text{ONa} + \text{Ph}_3\text{CH}$ .  $\text{NaHCO}_2$  is formed by the hydrolysis of  $\text{C}(\text{OEt})\text{ONa}$  produced by autoxidation of  $\text{C}(\text{OEt})\text{ONa}$ . The reaction may also proceed without the intermediate formation of a bivalent C compd.; the  $\text{HCO}_2\text{Et}$  may react directly with  $\text{Ph}_3\text{CNa}$  to form  $\text{C}_2\text{H}_4$  and  $\text{HCO}_2\text{Na}$ . This is to be tested by using  $\text{HCO}_2\text{Ph}$  instead of  $\text{HCO}_2\text{Et}$ ;  $\text{C}(\text{OPh})\text{ONa}$  should be materially more stable than  $\text{C}(\text{OEt})\text{ONa}$ . C. A. R.

**Amide and imide chlorides of nonaromatic acids. VIII. Preparation of  $\alpha,\beta$ -unsaturated aldehydes.** Julius v. Braun, Walter Rudolph, Hugo Kröper and Walter Pinkernelle. *Ber.* 67B, 269-81 (1934); cf. Heymons and Rohland, *C. A.* 26, 2739. The labile imide chlorides,  $\text{RCOCl}:\text{NR}'$ , of nonaromatic acids are not adapted to such reactions as reduction with  $\text{SnCl}_2$  and HCl to the Schiff bases,  $\text{RCH}:\text{NR}'$ , with subsequent conversion into aldehydes,  $\text{RCHO}$ . One reason for this is that they undergo a rapid autodecompn., consisting primarily in an intramol. shifting of the II,  $>\text{CHCCl}:\text{NR}' \rightarrow >\text{C}:\text{CClNHR}'$ , and further condensations of the primary product through the newly formed reactive NH group. Anything that impedes the migration of the H should therefore increase the stability of the imide chloride. One such "stabilizing" factor should be a double bond immediately adjacent to the  $\text{CCl}:\text{NR}'$  group, for in this case the migration,  $>\text{C}:\text{CHCCl}:\text{NR}' \rightarrow >\text{C}:\text{C}:\text{CClNHR}'$ , would produce 2 cumulated double bonds, a grouping which in general is not easily formed. The first attempts to confirm this view, with the imide chlorides of  $\alpha$ -hexenic and  $\alpha$ -nonenic acids, were disappointing, although the imide chlorides were not appreciably decompd., since hydrolysis yielded the corresponding amides. Nor was campholic acid, in whose imide chloride any autodecompn. hindering the reduction is excluded, reduced by  $\text{SnCl}_2$  and HCl. It was concluded that the Dimroth reducing agent is not sufficiently powerful, and after a long series of expts. the desired reduction was effected with  $\text{CrCl}_3$ . Because of the sensitivity of the imide chlorides toward water, the easily prepd. blue aq. soln. of  $\text{CrCl}_3$  could not be employed, and suspensions of dry  $\text{CrCl}_3$  in neutral solvents (in the presence of HCl gas) proved unreactive. Success was finally attained by adding the imide chloride in ether or benzene directly to the ppt. obtained by digesting  $\text{Cr}(\text{OAc})_3$  with HCl

in ether, without removing the ether contg. AcOH and a little water. The reduction in the direction of the aldehyde proceeds rapidly, although not quantitatively, as the moisture in the ether hydrolyzes part of the imide chloride before it is reduced; the yields of aldehyde do not exceed 50% and are generally less, but perhaps better conditions can be discovered by further work. Imide chlorides of aromatic acids, and also of PhCH:CHCO<sub>2</sub>H, which are reduced by SnCl<sub>2</sub>, are of course reduced by CrCl<sub>3</sub> also, but aliphatic imide chlorides with no adjacent double bond are not. A small part of the imide chloride undergoes the intramol. shifting of H during the CrCl<sub>3</sub> reduction; this is impeded by selecting an *o*-substituted Ph radical, such as *o*-MeC<sub>6</sub>H<sub>4</sub>, for R', which increases the yield of aldehyde a few %. In this way were prepd. 2-hexen-1-al (I), 2-nonen-1-al (II), atropaldehyde (III), 3,7-dimethyl-3-octen-1-al (IV), 3-methyl-4-cyclopentenyl-2-buten-1-al (V) and 5,9-dimethyl-2,4,8-decatrien-1-al (VI). These aldehydes show interesting differences in their odors; VI, especially, has an unusually powerful, persistent and pleasing odor with a pronounced similarity to that of lilies of the valley. IV, V and VI are mixts. of *cis* and *trans* isomers. PhCCl:NPh and PhCH:CHCl:NPh smoothly yield more than 80% BzH and PhCH:CHCHO, resp., while BzCl and PhCH<sub>2</sub>CH<sub>2</sub>COCl under the same conditions are unchanged. The *N*-phenyl- or *N*-*o*-tolylimide chloride of PhCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H (hydrocinnamic *o*-toluide, m. 123°) develops the odor of PhCH<sub>2</sub>CH<sub>2</sub>CHO but the aldehyde could not be isolated in detectable amt. (The amidine PhCH<sub>2</sub>CH<sub>2</sub>C(NHPh):NPh, from PhCH<sub>2</sub>CH<sub>2</sub>CNCl:NPh and PhNH<sub>2</sub>, m. 212°). Equally resistant to reduction are campholyl chloride and the *N*-ethyl-, b<sub>12</sub> 125°, and *N*-phenylimide chloride, b<sub>10</sub> 163°. *α*-Hexenyl *o*-toluide, m. 125°; *o*-tolylimide chloride, light yellow, b<sub>0-10</sub> 120°. I (yield, 50%), b<sub>12</sub> 43°, d<sub>4</sub><sup>20</sup> 0.8491, n<sub>D</sub><sup>20</sup> 1.4462; *p*-nitrophenylhydrazones, m. 137°; semicarbazone, m. 173°. *α*-Nonenyl chloride, b<sub>0-1</sub> 70-2°; anilide, light yellow, b<sub>1</sub> 182-4°, m. 50-1°. II (yield, over 50%), b<sub>12</sub> 92°, d<sub>4</sub><sup>20</sup> 0.8439, n<sub>D</sub><sup>20</sup> 1.4542; *p*-nitrophenylhydrazones, m. 109°; semicarbazone, m. 163°. *α*-Nonenic nitrile, obtained in 85% yield from the amide and POCl<sub>3</sub> in benzene at 80°, b<sub>12</sub> 100-2°, is not attacked by SnCl<sub>2</sub> and HCl. Atropyl chloride, b<sub>0-10</sub> 87-8°; anilide, m. 134°. III, b<sub>12</sub> 96°, d<sub>4</sub> 1.0406; semicarbazone, m. 148°. The ester iso-AmCH<sub>2</sub>CMc(OH)CH<sub>2</sub>CO<sub>2</sub>Et, obtained in 80% yield from iso-AmCH<sub>2</sub>COMe, Zn and BrCH<sub>2</sub>CO<sub>2</sub>Et, b<sub>11</sub> 131°; free acid, b<sub>11</sub> 172°, is converted by boiling 6 hrs. with 3 mols. Ac<sub>2</sub>O and 0.5 mol. NaOAc almost quantitatively into dihydrogeranic acid, b<sub>11</sub> 145-7°; the chloride of the latter, b<sub>0-10</sub> 90°; *o*-toluide, b<sub>0-1</sub> 165-6°, m. 60-74°; anilide, b<sub>0-1</sub> 190-2°, m. 36-54°. 5,6-Dihydrocitraol (IV), b<sub>12</sub> 96-8°, d<sub>10</sub> 0.8664, n<sub>D</sub><sup>20</sup> 1.4600; semicarbazone, m. 111-5°; *p*-nitrophenylhydrazones, orange-yellow, m. 104-9°. The ester CH<sub>2</sub>:CH<sub>2</sub>:CH:CH CHCH(CO<sub>2</sub>Et)COMe (65% from

2-chlorocyclopentene and AcCHNaCO<sub>2</sub>Et), b<sub>12</sub> 130°, converted by boiling aq. 10% KOH into cyclopentenylacetone (90% yield), b<sub>12</sub> 67° (semicarbazone, m. 150°); oxime, b<sub>0-10</sub> 86-7°, which gives with Zn and BrCH<sub>2</sub>CO<sub>2</sub>Et 75% of the ester C<sub>6</sub>H<sub>7</sub>CH<sub>2</sub>CMc(OH)CH<sub>2</sub>CO<sub>2</sub>Et, yellowish, b<sub>12</sub> 151°; the corresponding free acid b<sub>0-1</sub> 170° and with boiling Ac<sub>2</sub>O-NaOAc gives 83% β-methyl-γ-cyclopentenylcrotonic acid (VII), b<sub>12</sub> 160-1°, d<sub>4</sub><sup>20</sup> 1.0336, n<sub>D</sub><sup>20</sup> 1.5082, whose chloride b<sub>0-1</sub> 82-5°; Et ester, b<sub>12</sub> 123°; anilide, b<sub>0-1</sub> 157°, m. 34-41°; anilide, b<sub>0-10</sub> 193-5°, m. 72-5°. VII with Pd and H in acetone gives the tetrahydro acid, C<sub>6</sub>H<sub>11</sub>O<sub>2</sub>, b<sub>12</sub> 150°, d<sub>4</sub><sup>20</sup> 0.9740. VII is unchanged by 70% H<sub>2</sub>SO<sub>4</sub>; with concd. H<sub>2</sub>SO<sub>4</sub> it becomes, after 24 hrs. in the cold, deep brown and, when poured into ice water, gives somewhat more than 50% of the lactone C<sub>6</sub>H<sub>7</sub>CH:CHMe.CH<sub>2</sub>.CO.O, which is isomeric with

VII, m. 39°, insol. in Na<sub>2</sub>CO<sub>3</sub>, sol. in hot NaOH and reprecipd. unchanged by acids, and yields with Pd and H in acetone a dihydro deriv., b<sub>12</sub> 144°. V (30% yield), b<sub>12</sub> 108-10°; semicarbazone, m. 139-45°; *p*-nitrophenyl-

hydrazones, red, m. around 140°. Cetylidenecetic acid, from the Et ester and aq. alc. KOH, b<sub>0-1</sub> 158-62°; anilide, b<sub>0-1</sub> 210°. VI was not obtained in sufficient amt. to det. its m. p.; the semicarbazone, a mixt. of isomers, was sepd. by crystn. from 70% MeOH into fractions, sintering 125°, m. around 150° and m. 93-102°.

C. A. R.

The action of hydrogen peroxide on acetone. H. Lecoq. *Bull. soc. chim. Belg.* 42, 531-6(1933).—1) slightly acid media, Me<sub>2</sub>CO treated with H<sub>2</sub>O<sub>2</sub> gives acetone triperoxide, which easily depolymerizes into acetone peroxide.

A. L. Henne

Some tertiary alcohols derived from mesityl oxide. René Jacquemin. *Compt. rend.* 198, 483-4(1934).—Me<sub>2</sub>C:CHCOMe (I) treated with RMgI gave Me<sub>2</sub>C:CHC(OH)MeR where R=Et, b<sub>2-3</sub> 48-50°, d<sub>4</sub> 0.8747, d<sub>15</sub><sup>20</sup> 0.8600, n<sub>D</sub><sup>20</sup> 1.4480; Pr, b<sub>2-3</sub> 60-68°, d<sub>4</sub> 0.8611, d<sub>15</sub><sup>20</sup> 0.8508, n<sub>D</sub><sup>20</sup> 1.4500; Bu, b<sub>2-3</sub> 78.5-80.5°, d<sub>4</sub> 0.8603, d<sub>15</sub><sup>20</sup> 0.8447, n<sub>D</sub><sup>20</sup> 1.4507.

Julius White

Esterification by dilution in inert media performed on new series of substances with anhydrides and also with mineral acids and hydrated organic acids instead of anhydrides. Victor Boulez. *Ind. chim. belg.* [2], 5, 3-5(1934); cf. C. A. 27, 3915. Acetylation of plant products is carried out in xylene. [B. fails to give any useful directions.]

Albert L. Henne

The saponification velocity of the methyl esters of the two crotonic acids. Reaction velocity and configuration. Anton Skrabal and Walther Stockmair. *Monatsh.* 63, 244-54(1933).—Both the acid and the alk. hydrolysis velocities for the Me ester of α-crotonic acid exceed those for the Me ester of β-crotonic acid. A comparison with the sapon. velocities of acrylic acid esters, and the disocn. const. of acrylic acid, indicates the *trans* configuration for the α-ester, and the *cis* configuration for the β-ester. For reaction in aq. solns., the sapon. const. (time in min.) with acid at 25° and 45°, and with alkali at 25°, were for the α-ester 0.000114, 0.000907 and 1.46, resp.; and for the β-ester 0.0000942, 0.000668 and 0.877, resp. Data on the sapon. of esters are used to illustrate the general relation between velocity and configuration.

L. E. Steiner

Butenic nitriles. G. Heim. *Bull. soc. chim. Belg.* 42, 461-6(1933).—This lists the phys. const. of extremely pure *cis*- and *trans*-crotonic nitriles (I and II) and of vinylacetic nitrile (III). I, b<sub>78-8</sub> 107-40°, b<sub>78-8</sub> 107.46°, d<sub>4</sub> 0.84376 at 0°, 0.82890 at 15.00°, 0.81401 at 30.00°, n<sub>D</sub> 1.41021, n<sub>D</sub> 1.41335, n<sub>D</sub> 1.42112, n<sub>D</sub> 1.42852, n<sub>D</sub> red 1.40968, yellow 1.41343, green 1.41982, violet 1.42633 at 30.00°, 1.41736, 1.42065, 1.42887, 1.43590, 1.41683, 1.42072, 1.42718 and 1.43376 at 15.00° for the same rays. II, b<sub>78-8</sub> 122.05°, b<sub>78-8</sub> 122.05°, d<sub>4</sub> 0.84046, 0.82586 and 0.81135; n 1.41438, 1.41775, 1.42617, 1.43349, 1.41400, 1.41791, 1.42460, 1.43146, 1.42140, 1.42480, 1.43337, 1.44074, 1.42097, 1.42190, 1.43180 and 1.43877. III, b<sub>78-8</sub> 118.35°, b<sub>78-8</sub> 118.40°, d<sub>4</sub> 0.85286, 0.83823 and 0.82371; n 1.39897, 1.40115, 1.40761, 1.41286, 1.39862, 1.40154, 1.40644, 1.41135, 1.40572, 1.40818, 1.41452, 1.41981, 1.40521, 1.40825, 1.41323 and 1.41820.

A. L. Henne

Tiglic, angelic and ethylacrylic esters. M. Naster and A. Gavriloff. *Bull. soc. chim. Belg.* 42, 519-30(1933).—Confirming previous work, N. and G. give more correct phys. const. NCCCIMeEt, b<sub>10-1</sub> 33-4°, b<sub>10-1</sub> 64.8-5.7°, d<sub>4</sub><sup>20</sup> 0.98058, n 1.41550, 1.41782, 1.42327 for α, D and β at 20°; NCCMCHCMe, b<sub>10</sub> 62-3°, d<sub>4</sub><sup>20</sup> 1.02892, n 1.43356, 1.43590, 1.44131 at 20°; NCCII-(CH<sub>2</sub>Cl)Et, b<sub>10</sub> 70-1°, d<sub>4</sub><sup>20</sup> 1.02965, n 1.43356, 1.43590, 1.44131 at 20°; MeCHCICHMeCO<sub>2</sub>Me, b<sub>78-8</sub> 164.4-4.8°, b<sub>12</sub> 54-5°, d<sub>4</sub><sup>20</sup> 1.0734, n 1.42761, 1.43006, 1.43523, 1.43949 for α, D, β and γ at 20°. EtCH(CH<sub>2</sub>Cl)CO<sub>2</sub>Me, b<sub>12</sub> 57-8°, d<sub>4</sub><sup>20</sup> 1.0736, n 1.42811, 1.43026, 1.43573, 1.44018 at 20°; CH<sub>2</sub>:CHCO<sub>2</sub>Me, b<sub>12</sub> 122-3°, d<sub>4</sub><sup>20</sup> 0.9310, n 1.42146, 1.42433, 1.43136, 1.43755 at 20°. Me tiglate, b<sub>10</sub> 139.4-9.6°, d<sub>4</sub><sup>20</sup> 0.94980, n 1.43386, 1.43700, 1.44480, 1.45163 at 20°; Me angelate, b<sub>78</sub> 127.6-7.8°, d<sub>4</sub><sup>20</sup> 0.94130, n 1.42901, 1.43207, 1.43971, 1.44620 at 20°. A. L. H.

**Ethylene nitriles.**  $\alpha$ -Methyl- $\alpha,\beta$ -hexenenitriles and  $\alpha$ -butylacrylic nitrile. A. Craen. *Bull. soc. chim. Belg.* 42, 410-18 (1933).— $\text{NCCHMeCHClPr}$ ,  $b_p$  84.0-4.2°, has  $d_4^{20}$  0.99083,  $n$  1.44143, 1.44374, 1.44929, 1.45397 for  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  at 20°;  $\text{NCCH}(\text{CH}_2\text{Cl})\text{Bu}$ ,  $b_p$  94.0-4.6°,  $d_4^{20}$  0.98904,  $n$  1.44146, 1.44319, 1.44724, 1.45385 at 20°;  $\text{NCCCIMeBu}$ ,  $b_p$  62-3°,  $d_4^{20}$  0.95301,  $n$  1.42711, 1.42936, 1.43483, 1.43939 at 20°. Treatment with pyridine yields therefrom: *cis*- $\text{NCCMe:CHPr}$ ,  $b_p$  46-7°,  $d_4^{20}$  0.82218,  $n$  1.43011, 1.43318, 1.44066, 1.44712 at 20°; *trans*-isomer,  $b_p$  59.4-9.6°,  $d_4^{20}$  0.82993,  $n$  1.43793, 1.44111, 1.44885, 1.45557;  $\text{NCCBu:CH}_2$ ,  $b_p$  65.8-6.0°,  $d_4^{20}$  0.820017,  $n$  1.42928, 1.43172, 1.43947, 1.4571 at 20°. The amides of the 3 ethylene nitriles:  $m$  74.2°, 55.7° and 76°, resp.

A. L. Henne  
**Some vinylacetic derivatives** L. Falaise and R. Frogner. *Bull. soc. chim. Belg.* 42, 427-41 (1933).—Exptl. directions to ameliorate the production yield of vinylacetic nitrile, vinylacetic acid and Et vinylacetate.

A. L. Henne  
**Degradation of  $\alpha$ -brominated acids to aldehydes and ketones.** Julius v. Braun, E. Anton, F. Fischer, W. Keller and G. Manz. *Ber.* 67B, 218-25 (1934).— $\alpha$ -Bromo acids can be easily and rapidly degraded to aldehydes or ketones with 1 fewer C atom by the series of reactions:  $\text{R}_2\text{CBrCO}_2\text{H}$  (where 1 of the R's may be H)  $\rightarrow$   $\text{R}_2\text{CBrCOCl}$   $\rightarrow$   $[\text{R}_2\text{CBrCON}] \rightarrow \text{R}_2\text{CBrCON} < \rightarrow [\text{R}_2\text{CBrN}] < \text{O} \rightarrow \text{R}_2\text{CBrNH}_2 \rightarrow \text{R}_2\text{C:O}$ . If it is not desired to isolate the intermediate isocyanate, the acid chloride is gently warmed in a suitable solvent with a slight excess of  $\text{NaN}_3$ , cooled, treated with alc. KOH to hydrolyze the product to the amine, then with dil. acid to effect the degradation to the C:O compd., and extd. with ether or distd. with steam. In 5 of the 6 cases studied, the yield was 60% or better; with  $\alpha$ -bromocyclopentylacetic acid (I), it was only 30% but perhaps it can be improved by varying the solvent (benzene or PhMe can often be advantageously replaced by dry pyridine) or by choosing other temp. conditions for the hydrolysis. Tech.  $\text{NaN}_3$  can hardly ever be used, even when carefully mud, but rubbing with a little  $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$  (cf. *C. A.* 27, 5715) suffices to make it quite reactive.  $\alpha$ -Bromohexahydrobenzoic acid,  $b_p$  120-2°,  $m$  61°, gives through its chloride,  $b_p$  105-7°, in benzene, PhMe or pyridine 52-7% cyclohexanone. *Dibutyl- $\alpha$ -bromosuccinic acid*,  $b_p$  168-71° (chloride,  $b_p$  126-8°), yields 71-7%  $\text{Bu}_2\text{CO}$ ,  $m$  89°.  $\alpha$ -Bromodicyclopentylacetyl bromide (70% from the acid with P and Br),  $b_p$  175°,  $m$  32°, gives 60% dicyclopentyl ketone,  $b_p$  110-12°, purified through the semicarbazone,  $m$  158-62°, which depresses to 126-37° the  $m$ . p. (170°) of the semicarbazone of the ketone  $\text{C}_{11}\text{H}_{18}\text{O}$  obtained from the bicyclic naphthalenic acid  $\text{C}_{12}\text{H}_{16}\text{O}_2$  (*C. A.* 27, 1613); *oxime*  $m$  92°, reduced with Na and alc. to the amine,  $b_p$  120-2°, whose *HCl salt*  $m$  193-4° and *picrate*  $m$  127°. The amine can be obtained from  $(\text{C}_5\text{H}_9)_2\text{CHC(O)H}$  by (1) treating the acid in concd.  $\text{H}_2\text{SO}_4$  with  $\text{HN}_3$  in the usual way (yield 70%), or (2) converting it with  $\text{PCl}_5$  into the chloride,  $b_p$  143-1°, and treating the latter in benzene with activated  $\text{NaN}_3$  and then adding HCl; this gives, along with 36% of the amine, the urea,  $\text{CO}(\text{NHCH}(\text{C}_5\text{H}_9)_2)_2$ ,  $m$  288°, nonvolatile with steam. *Di- $\beta$ -heximalonate*, from  $\text{C}_6\text{H}_{11}\text{Br}$  and  $\text{NaCH}(\text{CO}_2\text{Et})_2$ ,  $b_p$  150-5°, the free acid,  $m$  103-5°, is brominated in ether at 0 to the  $\alpha$ -bromo acid,  $m$  119-21° (evolution of  $\text{CO}_2$ ), which is decarboxylated *in vacuo* at 130° to  $\alpha$ -bromocyclopentylacetic acid,  $b_p$  118-21°, the chloride of the latter,  $b_p$  112-14°, gives with  $\text{NaN}_3$  and then alc. KOH and HCl about 30% each of enanthal,  $b_p$  150-60°, and its product of autocondensation, enanthylideneenanthal,  $b_p$  260-90°. I,  $m$  50°,  $b_p$  121-3°, gives through its chloride,  $b_p$  130-2°, 30% cyclopentylformaldehyde (semicarbazone,  $m$  124°).  $\text{Ph}(\text{CH}_2)_3\text{CHBrCOCl}$ ,  $b_p$  172°, gives 58-9%  $\text{Ph}(\text{CH}_2)_3\text{CHO}$ ,  $b_p$  120-2° (semicarbazone,  $m$  105°).

C. A. R.  
**Splitting of glycol ethers with acetyl bromide.** Conrad Bergsdahl. *Finska Kemistisamfundets. Medd.* 42, 76-84 (1933). By combining unlike radicals with  $(\text{CH}_3\text{OH})_2$  and treating with AcBr, the relative reactivities of Et,

$\text{C}_6\text{H}_5$ , and  $\text{PhCH}_2$  have been found to be 1, 1.05 and 2.6, respectively.

H. C. Duus

**Action of trimethylamine on hexamethyldiaminoisopropanol diiodide.** L. Gorini. *Gazz. chim. ital.* 63, 751-6 (1933).—Equimol. parts of  $(\text{IH}_2\text{C})_2\text{CHOH}$  (I) and  $\text{NMe}_3$  (II) combine directly to  $(\text{Me}_2\text{NH}_2\text{C})_2\text{CHOH}$  (III), as is already known. If, however, either I or III is heated in a hydrolyzing medium (water or EtOH) with excess II in an autoclave at 100° for 18 hrs., a 2nd reaction takes place between III and II, thus:  $2 \text{ II} + \text{III} \rightarrow (\text{Me}_2\text{NH}_2\text{C})_2\text{CHOH}$  (IV) +  $2 \text{ NMe}_3\text{I}$  (V). The yields are smaller with EtOH than water, and the quantity of II has considerable influence. Thus with the theoretical proportion of II in 95% EtOH, i. e., 2 mols. per mol. of III, the yield of V is 10% (based on III). With 3 mols. of II, the yield is 15%, with 7 mols. of II in 80% EtOH it is 25%, and with 7 mols. of II in 50% EtOH it is 35%. In water 3 mols. of II yield 26% of V, and 7 mols. yield 35%. V is obtained directly by pptn. on cooling, IV from the mother liquor by acidification, evapn., alkalization with NaOH, extn. with Et<sub>2</sub>O and further purification of the ext. with HCl, which yields *tetramethyldiaminoisopropanol dichloride* (VI),  $m$  256°, very hygroscopic. Refluxed with  $\text{Ac}_2\text{O}$  (5 parts), VI yields *tetramethyldiaminoisopropyl- $\beta$ -acetate dichloride*,  $\text{C}_8\text{H}_{18}\text{O}_4\text{N}_4\text{Cl}_2$ ,  $m$  247°. VI is also formed by refluxing II (2 mols.) with  $(\text{CH}_2\text{C})_2\text{CHOH}$  in 33% EtOH, and in an analogous way refluxing alc. II (2 mols.) with I yields *tetramethyldiaminoisopropanol diiodide*, lustrous,  $m$  225°. When the reaction between II and I or III is carried out in  $\text{C}_6\text{H}_6$  or anhyd. Et<sub>2</sub>O, no V is formed, and in general the yield of V depends on the hydrolyzing power of the solvent and on the magnitude of the excess of II. The excess II functions as an alkali, and the drop from a hexa- to a tetra-Me compd. is analogous to the removal of an alkyl group from halides of tetrasubstituted amines, with formation of trisubstituted amines. On the other hand, III and  $\text{NH}_4\text{OH}$  in various proportions (up to 25 mols. of III) heated in an autoclave at 100° left the III unaltered. Contrary to data of Berend (*Ber.* 17, 510 (1884)) on IV, it is separable from 30% aq. NaOH; it  $b_p$  46°, without decompn., and its  $d_4^{20}$  is 0.887.

C. C. Davis

**Synthesis of dulcitol and allodulcitol.** Robert Lespiau and Joseph Wiemann. *Compt. rend.* 198, 183-4 (1934); cf. *C. A.* 28, 1663<sup>4</sup>.—When 4 g. of *cis*-ethyleneerythritol (I),  $[\text{CHCH}(\text{OH})\text{CH}_2\text{OH}]_2$ , was oxidized with  $\text{AgClO}_4$  with  $\text{OsO}_4$  as a catalyst, 0.55 g. of crystals was obtained. The major portion of these  $m$  142-9° and were shown to be allodulcitol. A small portion did not melt below 160° but could not be sepd. because of lack of material. I was obtained by reduction of the corresponding acetylene compd. (II), but only crystd. if II was pure. To avoid loss of II, crude II was reduced, giving a sirup rich in I. This was acetylated with  $\text{Ac}_2\text{O}$ , giving a pure *tetra-Ac deriv.* of I,  $b_p$  190-1°,  $d_{20}$  1.186, and  $n_D^{20}$  1.462. This was oxidized with  $\text{AgClO}_4$  and  $\text{OsO}_4$  to give a sirup. This was acetylated and gave *hexaacetyldulcitol*,  $m$  166-6.5° from MeOH. This was checked by analysis and a mixed  $m$ . p.

John E. Milbery

**Autoxidation of amino acid derivatives. III. Dehydrogenation of  $\alpha$ -N-methylaminoisobutyric acid.** F. Bergel, K. Bolz and R. Wagner. *Z. physiol. Chem.* 223, 66-70 (1934); cf. *C. A.* 27, 5343. —In dehydrogenation reactions  $\text{Me}_2\text{C}(\text{NHMe})\text{CO}_2\text{H}$  occupies an intermediate position between  $\text{Me}_2\text{C}(\text{NH}_2)\text{CO}_2\text{H}$  and  $\text{Me}_2\text{C}(\text{NMe}_2)\text{CO}_2\text{H}$ , in that it is slowly oxidized by  $\text{O}_2$  in the presence of charcoal but not by quinone or glucose. The substance was prepd. by heating  $\text{Me}_2\text{CBrCO}_2\text{H}$  with liquid  $\text{MeNH}_2$  and successive treatments of the reaction mixt. with  $\text{Ba}(\text{OH})_2$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{Ag}_2\text{O}$  and  $\text{H}_2\text{S}$ .

A. W. Dox

**The mechanism of sulfur oxidation.** James C. Andrews and Kathleen C. Andrews. *Am. J. Med. Sci.* 187, 146 (1934).—The properties of certain cyclic sulfonic acid derivs. of cystine, such as cysteic acid hydantoin and cysteic acid phenylhydantoin, were studied. These compds. are very unstable, and on neutralization with dil. alkali at ordinary temps. they yield inorg. sulfate

directly. The Ph deriv. yields about 15% of its S as inorg. sulfate, the simple hydantoin about 10%. Other evidence points to 2 simultaneous methods of decompn., one involving loss of  $H_2SO_4$  and the other a split in the hydantoin ring, producing an open-chain compd., the S of which remains stable as a sulfonic acid. R. C. W.

Glucosonic acid (2-ketogluconic acid). III, with a contribution to the constitution of the *o*-phenylenediamine compounds of the sugars. Heinz Ohle. *Ber.* 67B, 155-62 (1934); cf. *C. A.* 24, 3757. It had been reported in the earlier paper that the Na salt of glucosonic acid (I) seps. without water of crystn. when the aq. soln. is concd. Repetition of the work has shown, however, that the substance was the glucosaccharonate; the salt of the true I seps. with 1  $H_2O$  and shows mutarotation ( $[\alpha]_D^{25}$  -83.0° → -75.24° (water, *c* 4.519; equil. in 30 min.), -95.2° → -72.2° (MeOH +  $H_2O$  (1:3), *c* 4.886; equil. in 3 hrs.). The Me ester of I, repeatedly crystd. from 80% MeOH, m. 187°,  $[\alpha]_D^{25}$  -80.39° → -70.03° (MeOH +  $H_2O$  (1:3), *c* 4.250; initial value 30 min. after soln., equil. in 80 min.). Since the mutarotation is in the same direction as that of fructose, the salt and ester are probably the  $\beta$ -forms with pyroid structure. The highly purified salts of I reduce cold Fehling soln. only after a considerable length of time; they neither decolorize I in acid soln. nor react in the cold with hypiodite. The Na or K salt in 5-10 parts water contg. 1 equiv. HCl gives with 1 mol. *o*- $C_6H_4(NH_2)_2$  at 15-20°

80% of a compd.  $C_6H_4 \begin{matrix} \swarrow N:COH \\ \searrow N:C(CHOH)CH_2OH \end{matrix}$ , which,

to designate the configuration of the side chain, is called 3-(*d*-arabotetrahydroxybutyl)-2-hydroxyquinoxaline (II). II m. 199-200° (decompn.),  $[\alpha]_D^{25}$  -87.5° (*N* NaOH, *c* 2.0), easily dissolves in cold 5 *N* HCl with yellow color and is reprecip. by neutralization with  $NH_3$ , is sol. in alkalis and  $Na_2CO_3$  and reprecip. by  $CO_2$ , decomposes when heated in either acid or alk. soln., and turns Fehling soln. green and, after short boiling, ppts.  $Cu_2O$ . With  $Ac_2O$  in pyridine it gives a *tetraacetate*, m. 170.5-1.5°,  $[\alpha]_D^{25}$  -17.38° ( $CHCl_3$ , *c* 2.02). On oxidation with hypiodite by the Willstätter-Schudel-Goebel method, II consumes practically 1 mol. I, and in boiling water with  $KMnO_4$ - $H_2SO_4$  it gives dihydroxyquinoxaline. The reducing power is not due to the quinoxaline nucleus but to the breaking off of the side chain; refluxed in water with  $PhNHNH_2$ , II gives 80% 2-hydroxyquinoxaline-3-aldehyde phenylhydrazone (III), red, m. 278-9°, and glycerol (identified as the tribenzoate (IV)). The structure of III was established by the synthesis of III from 2-hydroxy-3-dibromomethylquinoxaline, m. 103° (prepd. from  $CHBr_2$ ,  $COCO_2H$  and *o*- $C_6H_4(NH_2)_2$  and  $PhNHNH_2$ ). The crude III contained another  $PhNHNH_2$  deriv. which could not be purified, and the IV was also contaminated with an impurity which reduced Fehling soln.; H. believes that the main cleavage into 2-hydroxyquinoxaline-3-aldehyde (V) and glycerol is accompanied by a cleavage, to a small extent, into 2-hydroxy-3-hydroxymethylquinoxaline and glyceraldehyde. The cleavage probably takes place even in boiling water alone, the role of the  $PhNHNH_2$  being merely to remove the V from the field of action and protect it from further reaction with the other cleavage fragments. Fructose with *o*- $C_6H_4(NH_2)_2$  gives 3-(*d*-arabotetrahydroxybutyl)quinoxaline, needles with 1  $H_2O$ , m. 187-8° (decompn.),  $[\alpha]_D^{25}$  -75.2° (5 *N* HCl, *c* 2.006), identical with the product obtained from glucose; *tetraacetate*, m. 120°,  $[\alpha]_D^{25}$  -30.32° ( $CHCl_3$ , *c* 3.258). The compd. obtained by Griess and Harrow from *l*-arabinose and *o*- $C_6H_4(NH_2)_2$  (*Ber.* 20, 2205, 3111 (1893)) is not a quinoxaline but  $\mu$ -(*l*-arabotetrahydroxybutyl)-benzimidazole, m. 234° (decompn.),  $[\alpha]_D^{25}$  51.96° (5 *N* HCl, *c* 1.636); it does not lose in wt. at 100° *in vacuo* over  $P_2O_5$ , reduces neither Fehling soln. nor hypiodite and does not react with  $PhNHNH_2$ ; *tetraacetate*, m. 141-2°. The above facts show clearly that the case with which II is broken down is not due solely to the C:N double bonds but chiefly to the acid HIO group on C atom 2 of the quinoxaline ring. It may therefore be ex-

pected that the introduction of a neg., ionizable group on C atom 1 of fructose will also materially increase the tendency of the latter to break down. C. A. R.

*d*-Glucosaccharosonic acid, an isomer of ascorbic acid. I. Preparation and properties. Heinz Ohle, Hermann Friebach and Herbert Carls. *Ber.* 67B, 324-32 (1934). Systematic investigation of the sapon. of Me glucosonate with  $Na_2CO_3$ , which is accompanied by an anomalous change in rotation (*C. A.* 24, 3794), has shown that along with the normal sapon. there occurs another reaction yielding a new acid, glucosaccharosonic acid,  $C_6H_{11}O_7$  (I), isomeric with and extraordinarily similar to ascorbic acid. I has a linear structure (cf. *Angew. Chem.* 46, 399 (1933)) and therefore the constitutions discussed for ascorbic acid can also be considered for I. With the data at hand, it is not yet possible to decide which of these is correct. In water I is formed in max. yield when the Et glucosonate is sapon. by slow addn. of alkali, so that the reaction of the soln. to neutral red appears to be neutral. In order to secure sufficiently rapid reaction, it is well to work at 60-70°. The best results are obtained by making use of the buffer principle, i. e., by using the alkali in the form of salts of weak acid ( $H_2CO_3$ ,  $H_3PO_4$ ) or weak tertiary bases (pyridine); the most satisfactory is  $NaHCO_3$ . The extent of the formation of I can be detd. by I titration, as I reduces an equiv. amt. of I in acid soln. Neither glucosonic acid nor long standing or boiling in water nor its salts on treatment with alkali yield I, which is formed only from the ester or the lactone of glucosonic acid. The lactone, which as yet unknown, was tested in the form of its triacetate, the yield of I on treatment with  $NaHCO_3$  in aq. alc. is very small, probably because the opening of the lactone ring is considerably more rapid than the splitting off of the Ac groups, and much larger amts. of I are obtained with  $NaOMe$ . Pyridine catalyzes the formation of I only in aq. soln.; the reaction does not take place in abs. pyridine or EtOH- $C_6H_5N$  mixts. Nor is I formed from the glucosonic ester with *o*- $C_6H_4(NH_2)_2$  in water or alc.; this would indicate that I is formed through the keto form of the ester, which, in the presence of  $C_6H_4(NH_2)_2$ , is removed as fast as it is formed.  $NaOMe$  gives no homogeneous product with I; the part sol. in MeOH has a compn. corresponding to the Na salt of the endiol of the ester, although the MeO values are far too low; conversely, the insol. part contains some MeO but much more Na than corresponds to the endiol salt. Both dissolve in water with considerable evolution of heat and an initially alk. reaction which soon becomes neutral, and yield the Na salt of I. The triacetylglucosonic lactone with  $NaOMe$  gives, after catalytic removal of the Ac groups according to Zemplén, at least 50% I, which is identical with the product obtained by Maurer and Schiedt by a modification of this method (*C. A.* 27, 4777), and which, like their product, has an antiscorbutic action (Dalmer and Molt, *C. A.* 28, 1076<sup>3</sup>). Neither I nor its salts give cryst. Ac derivs.; the results of esterification with MeOH or EtOH have thus far been neg. in helping to establish the structure of I; methylation with  $CH_3I$  gives only a sirup; I forms no trityl deriv. or acetone condensation product. It is assumed, therefore, that the 5-HIO group has been replaced by a ring O atom. I is strikingly resistant to very dil. acids; only on boiling with 5 *N* HCl or  $H_2SO_4$  does it slowly split off  $CO_2$  (about 0.8 mol. in 2 hrs.), with formation of furtural. The rotation of the Na salt varies in different preps. from 94° to 100° and is greatly increased by alkali, the max. (150°) being attained in *N* NaOH. The I-reducing power of such solns. gradually diminishes and finally disappears completely on standing at 20°. I forms well crystd. brucine and cinchonine salts and an amorphous Pb salt,  $C_6H_6O_6Pb$ , which is very sensitive to heat. Catalytic hydrogenation with Pd-BaSO<sub>4</sub> of I in water or AcOH or of the Na salt in water could not be effected. Oxidation with  $H_2O_2$  or  $KMnO_4$ , unlike that with I or quinine, is not specific; after 1 atom O has been used up the product still has considerable I-reducing power. Whereas in



acid soln., only 1 mol. I is considered, in alk. soln. (under the conditions of the Willstätter-Schudel-Goebel titration) 2 mols. NaOI react, and the power to reduce Fehling soln. is completely destroyed; in higher concns. considerably less hypiodite is used up and only about 0.4 mol. oxalic acid is formed. Oxidation with  $\text{Ag}_2\text{O}$ , which is quite violent in concd. soln., gives 2 mols.  $\text{CO}_2$ , oxalic, glycolic and acetic acids and small amts. of nonreducing but still optically active substances. I, m.  $106^\circ$ ,  $[\alpha]_D^{25}$   $18.5^\circ$  (water,  $c$  5.897),  $[\alpha]_D^{25}$   $7.66^\circ$  (acetone,  $c$  1.632).

**Brucine salt**, needles with apparently 1  $\text{H}_2\text{O}$ , m.  $220^\circ$  (decompn.),  $[\alpha]_D^{25}$   $6.25^\circ$  (water,  $c$  3.998). **Cinchonine salt**, m.  $221-2^\circ$  (decompn.), is very slightly sol. in water and well adapted to the characterization of I. C. A. R.

**New methods of preparation of diethoxyacetone and  $\beta$ -substituted  $\alpha,\alpha'$ -diethylines  $(\text{RC}(\text{OH})(\text{CH}_2\text{OEt})_2)$ .** G. Darzens and Maxence Meyer. *Compt. rend.* 198, 478-80 (1934).— $\text{EtOCH}_2\text{CO}_2\text{Et}$  (2 mols.) is added to  $\text{NaOEt}$  (1 mol.) covered with PhMe (I) and allowed to stand 24 hrs. The EtOH formed and I are distd. off and the residue is again covered with I. AcOH and  $\text{H}_2\text{O}$  are then added and the PhMe layer is sepd., dried and distd.  $\text{EtCO}_2\text{CH}(\text{OEt})\text{COCH}_2\text{OEt}$  (165 g.) (II) is obtained and on sapon. with aq.  $\text{K}_2\text{CO}_3$  gives  $\text{CO}(\text{CH}_2\text{OEt})_2$  (III). III with  $\text{RMgBr}$  gives  $\text{RC}(\text{CH}_2\text{OEt})_2\text{OH}$  where  $\text{R} = \text{Me}$ ,  $b_p$   $73-4^\circ$ ; iso-Bu,  $b_p$   $110^\circ$ ; PhCH<sub>2</sub>,  $b_p$   $154^\circ$ ; anisyl,  $b_p$   $149^\circ$ ; cyclohexyl,  $b_p$   $100^\circ$ . Julius White

**Addendum concerning the acidity and reducing power of ascorbic acid.** P. Karrer and G. Schwarzenbach. *Helv. Chim. Acta* 17, 58 9(1934); cf. C. A. 27, 5104.

A recalc. of the disson. const. of  $\alpha$ -D-galacturonic acid (I), allowance being made for the mol. of  $\text{H}_2\text{O}$  of crystn., gives  $-\log K = 3.491$  at  $23.6^\circ$  (instead of 3.565). A repetition of the detn. gave  $-\log K = 3.488$  at  $19^\circ$ . In a soln. contg. 0.00406 mol. of I and 0.00200 mol. of NaOH per l., a  $\text{H}_2$  electrode at  $19^\circ$  and 721 mm.  $\text{H}_2$  showed a potential of 0.5440 v. against a 0.1 N calomel electrode. Measurement of the 2nd disson. const. of ascorbic acid (II) (C. A. 27, 4564) gave  $\log K_2 = 11.79$  and 11.80 at  $16^\circ$ . In a soln. contg. 0.00608 mol. MeOH and 0.00406 mol. of II per l., a  $\text{H}_2$  electrode registered a potential of 0.9783 v. against 0.1 N calomel. The more neg. values for the reduction potentials of II found by Green (C. A. 28, 810) are explained as due to polarization effects in alk. solns. The concept of the non-reversibility of the reduction-oxidation system of II is maintained, contrary to the opinions of Georgescu (C. A. 26, 5470) and Wurms (C. A. 27, 4468). C. R. Addinall

**New use of magnesium in organic syntheses. I. Malonic ester syntheses.** Hakon Lund, A. Uch Hansen and A. F. Voigt. *Kgl. Danske Videnskab. Selskab. Math.-fys. Medd.* 12, No. 9, 23 pp. (1933).—Mg, catalyzed with  $\text{I}_2$ , after an induction period reacts rapidly with 1 or 2 mols. of  $\text{CH}_2(\text{CO}_2\text{Et})_2$  (I) in EtOH. In the 1st case, the compd.  $\text{MgC}(\text{CO}_2\text{Et})_2 \cdot 2\text{EtOH}$  (II) crystall. on cooling. II loses EtOH at  $80^\circ$ , forming  $\text{EtOMg}\cdot\text{CH}(\text{CO}_2\text{Et})_2$  (III).  $\text{Me}_3\text{CHCH}(\text{CO}_2\text{Et})_2$  also reacts with Mg, forming  $\text{EtOMgC}(\text{CHMe})(\text{CO}_2\text{Et})_2$  (IV).  $\text{CH}_2(\text{CO}_2\text{Me})_2$  and  $\text{CNCH}_2\text{CO}_2\text{Et}$  react only slightly with Mg. Aluminum-malonic ester was also prepd. but could not be used successfully in syntheses with alkyl halides. III is sol. in most org. solvents and undergoes many of the classic reactions of sodiomalonic ester. The advantages of III over the latter are the ease of introduction of 2 groups simultaneously into I and the readiness with which a 2nd group can be substituted into mono-substituted malonic esters. Alkyl chlorides and bromides react slowly or not at all with III, but iodides give good results. Only 1 sec. or tert. group can be substituted into I through the use of III. With III in ether, acyl halides form acylmalonic esters.  $\text{EtI}$ , allyl bromide,  $\text{PhCH}_2\text{Cl}$ ,  $\text{ClCH}_2\text{CO}_2\text{Et}$  and  $\text{PhCH}_2\text{COCH}_2\text{Cl}$  formed disubstituted malonic esters in good yields. With III in EtOH,  $\text{MeCHBrCO}_2\text{Et}$  and III gave 1,1,2-tricarboethoxypropane. III gave no reaction with  $\text{ClCH}(\text{CO}_2\text{Et})_2$  or  $\text{I}_2$ . III in ether and  $\text{BzCl}$  after decompn. of the product with  $\text{H}_2\text{O}$  formed  $[\text{BzC}(\text{CO}_2\text{Et})_2]_2\text{Mg} \cdot 3\text{H}_2\text{O}$ , m.  $120.5^\circ$ , which produced  $\text{BzCH}(\text{CO}_2\text{Et})_2$  in 70% yield by treat-

ment with dil.  $\text{H}_2\text{SO}_4$ . With III in  $\text{Et}_2\text{O}$ ,  $\text{AcCl}$  (with 88% yield) and  $\text{Ac}_2\text{O}$  gave acetylmalonic ester (Cu compd., m.  $124^\circ$ ; semicarbazone, m.  $104-5^\circ$ ; 2,4-dinitrophenylhydrazone, m.  $147^\circ$ ). In  $\text{Et}_2\text{O}$ , III and  $p$ - $\text{O}_2\text{NC}_6\text{H}_4\text{COCl}$  formed the Mg salt of  $p$ -nitrobenzoylmalonic ester, m.  $238^\circ$ ; III and  $o$ - $\text{C}_6\text{H}_4(\text{COCl})_2$  gave  $\text{C}_6\text{H}_4(\text{CO})_2\text{C}(\text{CO}_2\text{Et})_2$  or  $\text{O} \cdot \text{CO} \cdot \text{C}_6\text{H}_4 \cdot \text{C} \cdot \text{C}(\text{CO}_2\text{Et})_2$  (75%

yield), m.  $74.5^\circ$ ;  $\text{Ph}_2\text{CCl}$  and III formed triphenylmethylmalonic ester, m.  $133^\circ$ , in 86% yield. IV in EtOH reacted with allyl bromide giving 90% allyl-isopropyl malonic ester, and with  $\text{BzCl}$  to form benzoyl-isopropyl malonic ester, m.  $66.5^\circ$  (75% yield). IV and  $\text{Ph}_2\text{CCl}$  did not react. F. W. Scott

**A case of easy rupturing of the carbon chain of a succinic acid derivative.** K. v. Auwers and O. Ungemach. *Ber.* 67B, 249-52 (1934); cf. *Ber.* 29, 1543 (1896); Komppa, *Ibid.* 1548, 1620.—That the compd. m.  $157^\circ$

(I), obtained by heating  $\text{Me}_3\text{C}-\text{CO}-\text{NC}_6\text{H}_4\text{Me}$  (II),  $\text{MeC}(\text{OAc})\cdot\text{CO}$

m.  $131^\circ$ , with alc. alkali is  $\text{MeC}(\text{OH})(\text{CO}_2\text{H})\text{CMc}_2\text{CO}\cdot\text{NHC}_6\text{H}_4\text{Me}$  has been confirmed, for I is also obtained from the Ac-free analog, m.  $187^\circ$  (III), of II and regenerates III on heating. The change I  $\rightarrow$  III already occurs to some extent on mere recrystn. from benzene (b.  $120-30^\circ$ ). The Ac group in II is therefore quite loosely held; in fact, when II is treated in ice with only 1 mol. KOH it yields I and III, together with unchanged II, and with excess of  $p$ -toluidine in dil. benzene soln. at  $15-20^\circ$  it gives I. If, however, equimol. amts. of II and toluidine are cautiously brought together in cold benzene, only the ring is opened and there is obtained the  $\beta$ -acetate, m.  $145-6^\circ$ , of I, which is readily hydrolyzed to I by alkali and regenerates II on heating. When II is boiled with 20% NaOH, there is obtained, along with I, a compd., m.  $108^\circ$ , which has been identified as *isobutyric p*-toluide,  $\text{Me}_2\text{CHCONHC}_6\text{H}_4\text{Me}$ ; it is also obtained from I, II or III with 10% alc. alkali on the water bath. C. A. R.

**Photopyridine reaction.** F. Reigl and V. Anger. *J. prakt. Chem.* 139, 180-2 (1934).—The so-called photopyridine is the  $\text{NH}_4$  salt of glutaric aldehyde,  $\text{OHC}\cdot\text{CH}_2\text{CHCH}:\text{CHONH}_4$ . With  $m$ - $\text{O}_2\text{NC}_6\text{H}_4\text{NH}_2 \cdot \text{H}_2\text{SO}_4$  it yields a condensation product,  $(m$ - $\text{O}_2\text{NC}_6\text{H}_4\text{N}:\text{CHCH}:\text{CHCH}:\text{CHNHC}_6\text{H}_4\text{NO}_2$ )<sub>2</sub>  $\cdot \text{H}_2\text{SO}_4$ , red, m.  $116^\circ$ . The Na salt of the aldehyde is stable and may be used in the test for primary aromatic amines. C. J. West

**Thiocyanic acid.** The chloride of thiourea, M. Battagay and E. Hégazi. *Helv. Chim. Acta* 16, 999 1008 (1933); cf. C. A. 27, 2939.— $\text{NH}_4\text{CSCl}$  (I) is obtained by the interaction of dry HSCN in ether with dry  $\text{HCl}$  gas. I decomps.  $75-80^\circ$  and is split by  $\text{H}_2\text{O}$  and passes into HSCN and  $\text{HCl}$ . It is not an addn. compd. of HSCN and  $\text{HCl}$ , as indicated by its reaction with alics. to form the corresponding alkoxythiourethans,  $\text{ROCSNH}_2$ . I probably exists in equil. with HSCN and  $\text{HCl}$  in MeOH since some  $S$ -methylthiourethan is also formed. An excess of I with EtOH yields Et dithioallophanate. I reacts with phenol to give phenoxythiourethan,  $p$ -hydroxythiobenzamide (II), and some of the  $o$ -isomer of II. II m.  $175^\circ$  (decompn.) to give  $p$ - $\text{HO}\cdot\text{C}_6\text{H}_4\text{CN}$ . L. F. A.

**The action of boric acid as accelerator of the mutarotation of glucose.** G. Aurisicchio. *Industria chimica* 8, 1369-70 (1933).—Addn. of  $\text{H}_3\text{BO}_3$  does not alter the final value of the rotation of a soln. of glucose, but does markedly shorten the time required for attaining this value.  $\text{H}_3\text{BO}_3$  is, therefore, considered to be a catalyst in the mutarotation of glucose solns. A. W. C.

**Constitution of lignin. XVII. Tetraconiferylaldehyde.** Peter Klason. *Ber.* 67B, 302 3 (1934); cf. C. A. 26, 3237.—Freudenberg (*Tannin, Cellulose, Lignin*, C. A. 27, 4924) believes that the no. of  $\text{SO}_3\text{H}$  groups in the formation of "tetralignosulfonic acid,  $4(\text{Cl}_6\text{H}_4\text{O}_6)\cdot\text{H}_2\text{SO}_4$ ," in the sulfite cooking of pine wood under certain conditions has no stoichiometric significance. If this

were true, sulfonic acids with more than 4 coniferylaldehyde groups should be capable of existence. The present work shows that such is not the case. Wood was cooked with  $\text{NaHSO}_3$  at 96–8° until it was completely defibered (1.5 weeks), then treated with dil.  $\text{HCl}$ , the  $\text{HCl}$  completely removed and the lignosulfonic acid extd. hot with pure water; after 12 hrs. the soln. had become yellow and gave with  $\beta\text{-C}_{10}\text{H}_7\text{NH}_2$   $\text{HCl}$  a yellow ppt.,  $4(\text{C}_{10}\text{H}_7\text{O}_2)_2 \cdot \text{H}_2\text{SO}_4 \cdot \text{C}_{10}\text{H}_7\text{N} - \text{H}_2\text{O}$  (found, C 65.6, H 5.6, S 1.6, N 1.5, MeO 12.2%), which did not soften in boiling water. The tetraconiferylaldehydesulfonic acid is therefore the  $\alpha$ -sulfonic acid which is primarily formed in the sulfite cooking. On the other hand, the compn. of the  $\alpha$ -sulfonic acid obtained in practical cooking is  $3(\text{C}_{10}\text{H}_7\text{O}_2)_2 \cdot \text{H}_2\text{SO}_4$ , so the mol. wt. of  $\alpha$ -lignin in wood can hardly be  $4 \text{C}_{10}\text{H}_7\text{O}_2$  but must be at least 3 times as high, or  $12 \text{C}_{10}\text{H}_7\text{O}_2$ . If it is assumed that lignin consists of 1174 parts  $\alpha$ - to 644 parts  $\beta$ -lignin (1 mol. of each), the lowest possible mol. wt. for wood lignin is 3640. Wood (in the form of a wool-like mass) was heated about 20 hrs. at 96–8° with 0.2%  $\text{H}_2\text{SO}_4$  in a sealed vessel; this dissolved only the hemi-cellulose in appreciable amt. (about 15%). The lignin content of the product was 36.1%. Schweizer soln. took up only a very small amt. of cellulose. The mass gave an intense reaction for lignin. Heated a short time with  $\beta\text{-C}_{10}\text{H}_7\text{NH}_2 \cdot \text{HCl}$ , it gave a product which, after washing with hot water and drying at 100°, contained 0.7% N, corresponding to  $3 \text{C}_{10}\text{H}_7\text{O}_2 \cdot \text{C}_{10}\text{H}_7\text{N} - \text{H}_2\text{O}$ . The reaction is therefore the same in principle as that occurring when the wood is first cooked with sulfite and then pptd. with  $\text{C}_{10}\text{H}_7\text{NH}_2$ ; the product then has the compn.  $3 \text{C}_{10}\text{H}_7\text{O}_2 \cdot \text{H}_2\text{SO}_4 \cdot \text{C}_{10}\text{H}_7\text{N} - \text{H}_2\text{O}$ . In both cases the  $\alpha$ -lignin reacts normally in the aldehyde form:  $\text{RCHO} + \text{C}_{10}\text{H}_7\text{N} = \text{RCH}:\text{NC}_{10}\text{H}_7 + \text{H}_2\text{O}$ . Since by the action of  $\text{SO}_2$  on lignin tetra-, tri-, di- and monoconiferylaldehydesulfonic acids are formed, depending on the intensity of the reaction, the coniferylaldehyde complexes must be linked together in the same type of chain as the simple sugars in polysaccharides. C. A. R.

**Tetraconiferylaldehydesulfonic acid.** Peter Klason. *Svensk. Kem. Tid.* 45, 221 (1933).—A discussion of the chem. constitution of compds. derived from lignin.

A. R. Rose

**Cyclobutane-1,2-dicarboxylic acids.** Hans Bode. *Ber.* 67B, 332–5 (1934).—Kuhn and Wassermann report (C. A. 22, 4484) that they were unable to obtain Perkin's *cis*-cyclobutane-1,2-dicarboxylic acid (I), m. 137°; besides the *trans* acid, m. 130°, they obtained a compd. m. 98° which they believed to be the *cis* acid but they could not convert it into an anhydride. A repetition of P.'s work, however, has fully confirmed his results. Decarboxylation of the 1,1',2,2'-tetracarboxylic acid and subsequent treatment of the product with  $\text{AcCl}$  give the anhydride, m. 77–8°, of *cis*-I, which is hydrolyzed by hot water to *cis*-I, m. 138–9°, and this is rearranged by concd.  $\text{HCl}$  into *trans*-I, m. 130–1°. Potentiometric detns. at 20° of the dissociation consts. gave  $-\log K_1 = 4.20$  and  $-\log K_2 = 6.56$  for the *cis*, and 3.77 and 5.63 for the *trans* acid. C. A. R.

**Slow oxidation of some cyclopentane hydrocarbons with one lateral chain at temperatures below their boiling points.** P. Dupont and G. Chavanne. *Bull. soc. chim. Belg.* 42, 537–43 (1933).—The oxidation of ethylcyclopentane with  $\text{O}$  gives  $\text{HCO}_2\text{H}$ ,  $\text{EtCO}_2\text{H}$ ,  $\text{EtCO}(\text{CH}_2)_2\text{CO}_2\text{H}$  and  $\text{EtCOBu}$ ; butylcyclopentane yields  $\text{BuCO}_2\text{H}$ ,  $\text{PrCO}_2\text{H}$ ,  $\text{BuCO}(\text{CH}_2)_2\text{CO}_2\text{H}$  and an unidentified nonanone; phenylcyclopentane oxidizes to  $\text{Bz}(\text{CH}_2)_2\text{CO}_2\text{H}$ ,  $\text{BzOH}$  and  $\text{PhCOBu}$ . The consts. of 1-phenyl-1-cyclopentanol are  $b_D^{20} 1.510$ ,  $d_4^{20} 1.0693$ ,  $d_4^{20} 1.0530$ ,  $n_D^{20} 1.5435$ ,  $n_D 1.5479$ ,  $n_D 1.5590$ ,  $n_D 1.0530$  at 20°; it makes a glass at  $-78^\circ$ . A. L. Henne

**Determination of constitution by melting-point lowering: the configuration of the polymers of cyclopentadiene.** Josef Pirasch. *Ber.* 67B, 101–4 (1934).—M. ps. of acenaphthene,  $\text{PhN}:\text{NPh}$ ,  $\beta\text{-C}_{10}\text{H}_7\text{OMe}$ ,  $\text{NHPh}$  and  $\beta\text{-C}_{10}\text{H}_7\text{OH}$  were taken, with  $\alpha$ -dicyclopentadiene, dihydro- $\alpha$ -dicyclopentadiene and tetrahydro- $\alpha$ -dicyclopentadiene

as solvents. The mol. depressions were high in all cases, averaging 46.2, 45.4 and 35, resp. This is taken to support the Diels-Alder theory of the polymerization of cyclopentadiene, which postulates the formation of polymer of the isocamphane type. J. H. Reedy

**Stereoisomeric 1,2-diethylcyclopentanes.** Gregoire Chiurdoglu. *Bull. soc. chim. Belg.* 42, 347–58, 41. (1933).—Pure 1,2-diethyl-1-cyclopentanol m.  $-23^\circ$ ,  $b_D^{20} 82.0$ – $2.6^\circ$ ,  $b_D^{20} 98.4$ – $0.0^\circ$ ,  $d_4^{20} 0.9237$ ,  $d_4^{20} 0.9059$ , viscosity at 15° 0.12994, at 30° 0.05077,  $n_D^{20} 1.4551$ ,  $n_D^{20} 1.4575$ ,  $n_D^{20} 1.4629$ ,  $n_D^{20} 1.4673$  for  $\alpha$ , D, He yellow,  $\beta$  and  $\gamma$  at 20.00°; it is quantitatively dehydrated by refluxing for 2 hrs. with 90%  $\text{HCO}_2\text{H}$  to 1,2-diethyl-1-cyclopentene, b. 149.20–9.30°,  $d_4^{20} 0.8252$ ,  $d_4^{20} 0.8088$ ,  $n_D^{20} 1.4484$ ,  $n_D^{20} 1.4512$ ,  $n_D^{20} 1.4514$ ,  $n_D^{20} 1.4582$  and  $n_D^{20} 1.4640$  at 20.00°. This is quantitatively hydrogenated at 18° over Pt black in  $\text{AcOH}$ , to a mixt. of *cis*- and *trans*-1,2-diethylcyclopentanes, b. 149.54°,  $d_4^{20} 0.8042$ ,  $d_4^{20} 0.7888$ ,  $n_D^{20} 1.4300$ ,  $n_D^{20} 1.4321$ ,  $n_D^{20} 1.4374$  and  $n_D^{20} 1.4419$  at 20.00°, crit. temp. of soln. in aniline 52.9°. The mixt. is sep'd. by fractional distn. into a *trans* isomer, m.  $-95.6^\circ$ , b. 147.53–7.54°,  $d_4^{20} 0.79858$ ,  $d_4^{20} 0.78318$ ,  $n_D^{20} 1.42738$ ,  $n_D^{20} 1.42960$ ,  $n_D^{20} 1.43487$  and  $n_D^{20} 1.43920$  at 20.00°, viscosities at 15° and 30° 0.00723 and 0.00605, resp., crit. temp. of soln. in aniline 56.6°; and a *cis* isomer, m.  $-118.7^\circ$ , b. 153.55–3.58°,  $d_4^{20} 0.81167$ ,  $d_4^{20} 0.79599$ ,  $n_D^{20} 1.43343$ ,  $n_D^{20} 1.43562$ ,  $n_D^{20} 1.43572$ ,  $n_D^{20} 1.44100$  and  $n_D^{20} 1.44538$  at 20.00°, viscosities at 15° and 30° 0.00815 and 0.00669, crit. temp. of soln. in aniline 50.9°. A. L. Henne

**1-Cyanocyclohexene.** R. Van Conlic. *Bull. soc. chim. Belg.* 42, 419–20 (1933).—Cyclohexanone cyanohydrin, m. 26°,  $b_D^{20} 119.5^\circ$ ,  $b_D^{20} 120.5^\circ$ ,  $b_D^{20} 132^\circ$ ,  $d_4^{20} 1.01723$ ,  $n_D^{20} 1.46057$ ,  $n_D^{20} 1.46285$ ,  $n_D^{20} 1.46847$ ,  $n_D^{20} 1.47313$  for  $\alpha$ , D,  $\beta$  and  $\gamma$  at 30°, treated with  $\text{SOCl}_2$  gives a mixt. of *trans*- and *cis*-1-cyanocyclohexene, m.  $-8^\circ$ ,  $b_D^{20} 110^\circ$ ,  $d_4^{20} 1.08390$ ,  $n_D^{20} 1.47418$ ,  $n_D^{20} 1.47663$ ,  $n_D^{20} 1.48303$ ,  $n_D^{20} 1.48816$  at 30°, and of the *cis* isomer, m.  $-23^\circ$ ,  $b_D^{20} 121^\circ$ ,  $d_4^{20} 1.10195$ ,  $n_D^{20} 1.47721$ ,  $n_D^{20} 1.47967$ ,  $n_D^{20} 1.48577$ ,  $n_D^{20} 1.49089$  at 30°. This mixt. and pyridine or 10%  $\text{NaOH}$  yield 1-cyanocyclohexene,  $b_D^{20} 73.8$ – $4.2^\circ$ ,  $d_4^{20} 0.94725$ ,  $n_D^{20} 1.47769$ ,  $n_D^{20} 1.48231$ ,  $n_D^{20} 1.48967$ ,  $n_D^{20} 1.49712$  at 20°, in only 1 of its 2 possible stereoisomeric forms. A. L. Henne

**(p-Aminocyclohexyl)acetic acid.** Erwin Ferber and Paul Leonhardt. *Ber.* 67B, 245–9 (1934).—Because of the 2 possible positions of the substituents with respect to the plane of the ring (*p*-aminocyclohexyl)acetic acid (I) can exist in a *cis* and a *trans* form. If, in accordance with Aschan (*Ber.* 35, 3389 (1902)), to bring out the complete symmetry of the position of the 2 substituents (1,3 substitution) with respect to the plane of the ring,

$\text{xyly}$  is used to represent the *cis* form and  $\frac{x}{y}$  the *trans* form, it is evident that the *trans* form should be optically inactive and the *cis* form resolvable into 2 active mirror images. All the theoretically possible forms have been prepd. and, with the exception of the *l*-*cis* form, their properties detd.  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CO}_2\text{Et}$  (II), m. 65–6°, was obtained (1) by nitrating  $\text{PhCH}_2\text{CN}$  with  $\text{HNO}_3$  (d. 1.5) to the *p*-nitro deriv., m. 116° (60–72%), and simultaneously hydrolyzing and esterifying the latter by satg. it in 77%  $\text{EtOH}$  with  $\text{HCl}$  and heating on the water bath (yield of II, 91%); or (2) by nitrating  $\text{PhCH}_2\text{CO}_2\text{H}$  (97% yield) and sepg. the resulting isomers through the  $\text{Et}$  esters (yield of II, 82%). II is reduced with  $\text{SnCl}_2$  in alc. and  $\text{HCl}$  gas to the amino ester, m. 49.5° ( $\text{HCl}$  salt, m. 215°), which, because of its high soly., is obtained in only 58% yield. In the subsequent work the reduction of the  $\text{NO}_2$  and hydrogenation of the benzene nucleus were effected simultaneously with  $\text{H}$  and colloidal Pt in 5%  $\text{HCl}$  under 2.5 atm. at 60°. The resulting crude product (70% yield) consisted chiefly of I and its ester (which is hydrolyzed with extreme ease) and on benzoylation yielded an oil (III) which gradually deposited crystals of *Et trans*-(*p*-benzoylamino)cyclohexyl)acetate (IV), m. 142°, mol. wt. in camphor 268; free acid, from IV and 0.5 mol. hot aq.  $\text{Ba}(\text{OH})_2$ , m. 190–1°. On further standing, III yielded another crop of crystals m. around 35°

which could not be recrystd.; when they were heated to 200° the viscosity of the melt increased and on cooling it deposited IV, an indication that a transformation *cis* → *trans* had occurred. The crude I with hot alc. *d*-tartaric acid yielded *cis*-*d*-I acid tartrate,  $C_{12}H_{21}O_6N$ , m. 153–5°,  $[\alpha]_D^{25}$  40° (water, *c* 1), sol. to the extent of 0.144% in acetone, 0.05% in  $CHCl_3$ , 0.55% in abs. alc. and easily sol. in water, and converted by  $Ba(OH)_2$  into *cis*-*d*-I, m. 289.5° (decompn.),  $[\alpha]_D^{25}$  11° (water, *c* 1), react. neutral to litmus. The mother liquors from the tartrate yield crystals whose rotation ranges from 12.5° to 3.5° and which yield a I m. 289.5°,  $[\alpha]_D^{25}$  –2°. *trans*-I, from IV with  $Ba(OH)_2$  in boiling 50% MeOH, m. 308–10°.

C. A. R.

**Preparation of hydrocarbons with a hemicyclic double linking.** N. K. Aleksandrovich. *J. Gen. Chem.* (U. S. S. R.) 3, 48–51 (1933).—Cyclonoxylcarbinol is converted by Na and  $CS_2$  in  $Et_2O$  into *Me cyclohexylmethylcarbinolate*,  $C_{12}H_{21}CH_2OCSSMe$ , m. 165° (amide, m. 75–6°), pyrolyzed above 200° to *methylencyclohexane*. 4-Methylcyclohexylcarbinol similarly affords *Me 4-methylcyclohexylmethylcarbinolate* (amide, m. 104–5°), pyrolyzed to 1-methylene-4-methylcyclohexane.

B. C. A.

**Inositolphosphoric compounds.** Compounds of ferric inositolphosphate with ammonia and amines. S. Otolski. *Rozniki Chem.* 12, 621–30 (1932); cf. C. A. 27, 5763. Amines react in aq. soln. with  $C_6H_5O_3P_2Fe$  to yield compds. with:  $NH_3$ ,  $NH_4Et$ ,  $NH_4Et_2$  (6 mols., 8  $H_2O$ ),  $NMe_3$ , piperidine (6 mols., 12  $H_2O$ ),  $(NH_4CH_3)_2$ , and piperazine (4 mols., 12  $H_2O$ ).  $NH_3Ph$ ,  $C_4H_9N$ , quinoline, 2-aminopyridine and hexamethylenetetramine do not yield compds.

B. C. A.

**Action of hypochlorous acid on active 1-methyl- $\Delta^2$ -cyclohexene.** Marcel Godchot, Max Mousseron and Robert Grauer. *Compt. rend.* 198, 480–2 (1934).—1-Methyl- $\Delta^2$ -cyclohexene treated with  $HOCl$  gave a mixt. of 4 isomers of  $C_7H_{13}OCl$ . These were sep'd. by fractional distn. and gave the following consts., resp.:  $b_D^{25}$  79°, 91°, 93°, 95°;  $d_4^{25}$  1.120, 1.113, 1.107, 1.110;  $n_D^{25}$  1.4852, 1.4839, 1.4861, 1.4848;  $n_D^{20}$  0.0323, 0.2292, 0.5557, 0.5960;  $[\alpha]_D^{25}$  20.14°, –6.32°, 4.21°, 11.15°;  $[\alpha]_{20}^{25}$  33.89°, –10.42°, 6.91°, 18.50°;  $[\alpha]_{400}^{25}/[\alpha]_{540}^{25}$  1.682, 1.647, 1.643, 1.659. It is suggested that these represent the *cis* and *trans* forms of 1-methyl-4-chloro-3-cyclohexanol.

Julius White

**The preparation and investigation of some cyclic unsaturated ketones and hydrocarbons.** Hermann Berge, Curt Wittfeld and E. Wildt. *Ber.* 67B, 238–44 (1934).—In agreement with Cook and Hewett (C. A. 27, 5335), the authors find that phenacetylcyclohexene (I) has no tendency to change over with  $SnCl_4$  or  $AlCl_3$  into a ketophenanthrene, and they have proved that the product of the action of  $PhCH_2COCl$  on cyclohexene in the presence of  $SnCl_4$  is really I by converting it through the unstable dibromide into stilbene. I, m. 47°,  $b_D^{25}$  171–6°, can also be obtained from 3,4,5,6-tetrahydrobenzonitrile and  $PhCH_2MgCl$ ; oxime, m. 124°; semicarbazone, m. 175–6°. Tetrahydropropiophenone (oxime, m. 76°) was likewise obtained from  $C_6H_5CN$  and  $EtMgBr$ . Tetrahydroacetophenone (oxime, m. 60–1°; given in the literature as 99°; probably the 2 forms are stereoisomers) forms a well crystd. dibromide which, however, also decomps. readily on gentle heating. In the conversion of phenethylcyclohexanol through the hexene into octahydrophenanthrene, the authors obtained practically the same results as C. and H.  $PhCH_2CH_2Cl$  (14 g.) with Mg and the 3-methylcyclohexanones gave, resp., 7.0 g. 1-phenethyl-2-methyl-1-cyclohexanol,  $b_D^{25}$  181–3°, 10 g. of the 3-Me isomer,  $b_D^{25}$  171–2°, and 9.0 g. of the 4-Me compd.,  $b_D^{25}$  179°; with  $\alpha$ -tetralone it gave 9.5 g. 1-phenethyl-1-tetralol,  $b_D^{25}$  212–14°.

C. A. R.

**Highly unsaturated compounds containing the  $\beta$ -ionone ring.** H. P. Karrer and R. Morf. *Helv. Chim. Acta* 17, 3–7 (1934); cf. C. A. 26, 5088.—The chloride of the unsatd. acid (I) described in the earlier paper was prep'd. from 135 g. of I and 30 g.  $PCl_5$  and was dissolved in 140 cc. of dry PhMe. To this constantly shaken, cooled soln. was added drop-wise a cold soln. of  $MeZnI$ ,

1 prep'd. by heating a mixt. of 140 g.  $MeI$ , 30 g.  $AcOEt$ , 60 g.  $PhMe$  and 145 g. of Cu-treated Zn for 2 hrs. at 110°. The reaction mixt. was decompd. with ice, washed with  $H_2O$ , aq.  $(NH_4)_2SO_4$ , dil.  $NaOH$  and aq.  $Na_2S_2O_3$ , filtered and dried. The  $PhMe$  was removed under diminished pressure and the residue was distd. in a high vacuum. The Me ester of I remaining in the crude distillate was removed by sapon. and  $Et_2O$  extn. of the unchanged desired product from the alk. aq. soln. The ext. gave 2-methyl-4-[1',1',3'-trimethyl-2'-cyclohexen-2'-yl]-butadienyl Me ketone ( $\beta$ -ionone) (II),  $b_D^{25}$  105–6°,  $d_4^{25}$  0.9456,  $n_D^{25}$  1.54302, M. R. 77.38 (calcd. 72.490), F. 4.89. This extreme exaltation is an expression of the presence of the several conjugated double linkages. By reduction with (iso- $PrO$ ) $_3Al$  in abs. iso- $PrOH$  II was converted into the corresponding alc. with 3 double linkages, 2-methyl-4-[1',1',3'-trimethyl-2'-cyclohexen-2'-yl]-butadienylmethylcarbinol (III),  $b_D^{25}$  105°,  $d_4^{25}$  0.9223,  $n_D^{25}$  1.51956, M. R. 77.15 (calcd. 74.000), E. 3.14. II undergoes the Reformatski synthesis with  $BrCH_2CO_2Et$  and Zn, but the first formed hydroxycarboxylic acid ester is very unstable and splits off  $H_2O$  to yield IV, an ester with 4 double linkages. The synthesis was carried out according to the procedure employed for the lower homolog (C. A. 26, 5088), by using benzene as solvent and treating 30 g. of II with 33 g. of  $BrCH_2CO_2Et$  and 20 g. of Zn. Distn. of the reaction product gave 25 g. of a bright yellow oil, *Et* 2,4-dimethyl-6-[1',1',3'-trimethyl-2'-cyclohexen-2'-yl]-hexa-1,3,5-triene-1-carboxylate (IV),  $b_D^{25}$  142–3°,  $d_4^{25}$  0.97605,  $n_D^{25}$  1.52834, M. R. 95.40 (calcd. 92.143), E. 3.26. The free acid was converted into the chloride and an attempt was made, by the action of  $MeZnI$ , to obtain the corresponding Me ketone. The product was contaminated with cleavage or polymerization products. II, III and IV are mixts. of *cis*-*trans* isomers. They give intensive color reactions (orange-brown, deep red-brown and reddish brown, resp.) with  $SbCl_5$  in  $CHCl_3$ . Part of their mol. structure is related to that of vitamin A but none of them is a substitute for the vitamin in producing growth in exptl. animals. II has an odor similar to that of  $\beta$ -ionone, but finer and of more practical value.

C. R. Addinall

**The purification of aromatic hydrocarbons.** S. N. Popov and S. I. Polonskaya. *Neftyanoe Khozyaistvo* 25, 93–5 (1933).—Expts. which are described in detail indicate that  $ZnCl_2$  when pptd. on a porous mass (bricks) does not yield a standard colorless  $C_6H_6$  and  $PhMe$  from their crude solus.  $ZnCl_2$  may be used for a preliminary treatment whereby the  $H_2SO_4$  treatment requires 40% less acid, provided that the polymers are removed by distn. Up to 20% of reagents can be saved in the  $H_2SO_4$  refining process by using an intermediate steam distn. One-fifth of the acid may be replaced by treatment with benzene-toluene acid sludge and another fifth by using the intermediate steam distn., this producing a refining effect equiv. to a combined  $H_2SO_4$ - $ZnCl_2$  treatment.

A. A. Bochtlingk

**The preparation of *p*-iodophenol and some of its derivatives.** F. B. Dains and Floyd Eberly. *Trans. Kansas Acad. Sci.* 36, 114–17 (1933).—Of various methods tried for the prep'n. of *p*-iodophenol (I), the authors chose a modification of the method of Nolting and Wrzesinsky (cf. *Ber.* 8, 820 (1875)): 70 g.  $NaNO_2$  in 200 cc. of water was added with const. stirring to 110 g. *p*- $NH_2C_6H_4OH$  in 800 g. of water and ice contg. 120 g. concd.  $H_2SO_4$  and maintained at 0°. After 30 min. 20 cc. concd.  $H_2SO_4$  was added and the soln. poured into 200 g.  $KI$  in 200 cc. water. After stirring 20–30 min. the temp. was raised to 75–80° and maintained there until  $N$  ceased to be evolved. The soln. was neutralized with  $Na_2CO_3$  and steam-distd. To decrease the soly. of the product, the distillate was sat'd. with  $NaCl$  and the solid I filtered off. Yield 65–70%. The following ethers were prep'd. by the same general method: *Benzyl p*-iodophenyl ether, m. 62°: To a soln. of 3 g.  $Na$  in 50 cc. alc. was added 22 g. I and then 15 g.  $PhCH_2Cl$ . After refluxing 2 hrs. the mixt. was dild. with water. *p*-Nitrobenzyl *p*-iodophenyl ether,

m. 145°, was obtained from  $\text{NO}_2\text{C}_6\text{H}_4\text{CH}_2\text{Br}$  and  $\text{IC}_6\text{H}_4\text{ONa}$  (II). *Methylene di-p-iododiphenyl ether*, m. 114°, from  $\text{CH}_2\text{Br}_2$  and II. *Ethylene di-p-iododiphenyl ether*, m. 175-7°, from  $\text{CH}_2\text{BrCH}_2\text{Br}$  and II. *Trimethylene di-p-iododiphenyl ether*, m. 149°, from  $\text{Br}(\text{CH}_2)_3\text{Br}$  and II.

W. A. Moore

**Aristole and the production of iodophenols.** C. V. Bordeianu. *Arch. Pharm.* 272, 8-22(1934).—The chief procedure used was the action of I in AcOH soln. on the mercurized phenolic deriv. (substitution of the  $\text{AcOHg}$  complex by I according to Dimroth). Thus, from 6-iodothymol was prepd. 2,6-diiodothymol (I), quite unstable in the presence of alkalis. For the formation of "aristoles," iodophenols in which the positions immediately adjacent to the OH are occupied by alkyl and I, resp., may receive the I in the *p*-position. By virtue of the alkali-insol. of aristole and of the role of oxidizing agents in aristole formation, this substance is believed to possess the constitution of a tetraalkylated diiodo-biphenyl

quinone:  $1,2,4,3,6-(\text{HO})\text{I}_2\text{Me}(\text{iso-Pr})\text{C}_6\text{H} \rightarrow (\text{CH}_3\text{C}(\text{iso-Pr})\text{CO}\cdot\text{Cl}:\text{CMe}\cdot\text{C})_2$ .

The I content of aristole from iodothymol, as also of that made directly from thymol, is in complete agreement with this formula. The same is likewise true of the aristole deriv. from *p*-xylenol and diiodoxylenol, resp., for which in the above biphenylquinone formulation Me takes the place of the iso-Pr groups. The biphenylquinone structure permits the anticipation of polymer formation; indeed the mol. wt. of aristole (as also of xylenol aristole) corresponds to a dimer of the above biphenylquinone. The following substances were prepd.: 2,6-Diiodothymol by the action of iodized KI soln. on 2,6-bis(acetoxymethyl)thymol or on 6-iodo-2-acetoxymethylthymol. Freshly prepd. diiodothymol is yellowish, viscous, easily sol. in org. solvents and sinks in  $\text{H}_2\text{O}$ . It gradually darkens and after long standing becomes permeated with colorless crystals, without, however, becoming completely solid. The cryst. mass after pressing on unglazed pottery m. 45-7°. These crystals may well represent desmotopic modifications, e. g., phenol and pseudophenol form:  $1,2,4,3,6-(\text{HO})\text{I}_2\text{Me}(\text{iso-Pr})\text{C}_6\text{H} \rightleftharpoons$

$\text{CHI}\cdot\text{CH}:\text{C}(\text{iso-Pr})\text{CO}\cdot\text{Cl}:\text{CMe}$ . Both liquid and solid preps. have the same I content and mol. wt. and yield the same acetylation product and with  $\text{CrO}_3$  the same iodothymoquinone. Characteristic for this diiodothymol is its ready transformation in alk. soln. into aristole. 2,6-Diiodothymol acetate, m. 72-3°. 2-Iodo-6-bromothymol, reddish yellow oil splitting off Br with alkali with formation of aristole. 2,6-Diiodo-*p*-xylenol, m. 63° (acetate, prisms, m. 102-3°). 6-Iodothymol, m. 60°, in agreement with that reported by Wilgerodt. Iodothymoquinone, m. 61°. 2,6-Bis(acetoxymethyl)-*p*-xylenol. 2-Acetoxymethyl-6-bromothymol. W. O. E.

**Transpositions of anilides.** II. A. Giacalone. *Gazz. chim. ital.* 63, 761-3(1933); C. A. 27, 80.— $\text{PhN}(\text{CHO})\text{H}$  (I),  $\text{PhNH}_2$ ,  $\text{PhNH}_2\text{Cl}$  and  $\text{ZnCl}_2$ , heated 24 hrs. at 170°, excess NaOH added, steam-distd., and the residue purified by HCl and  $\text{NH}_4\text{OH}$ , yield *p*-leucaniline (II). The mother liquor yields a small quantity of an unidentified yellow compd., m. 261°, which gives a red color with hot alc. chloranil. The reaction probably involves the initial transformation:  $\text{I} \rightarrow \text{p-H}_2\text{NC}_6\text{H}_4\text{CHO}$  (III), which reacts with 2 more  $\text{PhNH}_2$  mols., thus:  $\text{III} + 2\text{PhNH}_2 \rightarrow \text{II} + \text{H}_2\text{O}$ . Under the same conditions,  $\text{PhNHAc}$  yields  $\text{PhN}:\text{CMe}\cdot\text{NHPh}$ , and  $\text{PhNHBz}$  gives a very low yield of  $\text{PhN}:\text{CPh}\cdot\text{NHPh}$ , so that in these last 2 cases there is no initial transposition. C. C. Davis

***p*-Methoxy- and 3,4-dimethoxyphenylurethans.** Otto Brunner and Rolf Wöhr. *Monatsh.* 63, 374-84(1933).—The following figures are the m. ps. of the *p*-methoxy- and 3,4-dimethoxyphenylurethans: Me, 90°, 81°; Et, 65°, 78.5°; Pr, 69°, 62°; iso-Pr, 63°, 88°; Bu, 45°, 58°; iso-Bu, 71°, 68°; Am, 53°, 67°; hexyl, 60°, 67°; heptyl, 78°, 67.5°; octyl, 77.5°, 67°; decyl, 78°, 73°; dodecyl, 80°, 83°; tetradecyl, 83°, 79.5°; hexadecyl, 88.5°, 85°; octadecyl, 92°, 87°; docosyl, 98°, 92.5°; tetracosyl, 102°, 96.5°; allyl, 41°, 68°; Ph, 151°, —; benzyl, 99.5°, 108°; cholesteryl, 152°, 160°. Bis(*p*-methoxyphenyl)urea, m. 237°; bis(3,4-dimethoxyphenyl)urea, m. 215°. The prepn. of the isocyanates from the azides is described. C. J. West

96.5; allyl, 41°, 68°; Ph, 151°, —; benzyl, 99.5°, 108°; cholesteryl, 152°, 160°. Bis(*p*-methoxyphenyl)urea, m. 237°; bis(3,4-dimethoxyphenyl)urea, m. 215°. The prepn. of the isocyanates from the azides is described. C. J. West

***p*-Dimethylamino- and *p*-diethylaminophenylhydrazine.** R. Stollé and K. Th. Gunzert. *J. prakt. Chem.* 139, 141-61(1934).—*p*- $\text{H}_2\text{NC}_6\text{H}_4\text{NMe}_2$  (I) (3.2 g.) through the diazo reaction yields 2.2 g. *p*-dimethylaminobenzene-diazonium borofluoride, light yellow-green, m. 150° (decompn.); it gradually decomp. in the light. The diazonium chloride of I, added to  $\text{NaHSO}_4$  soln. (d. 1.33) or to satd.  $\text{Na}_2\text{SO}_4$ , gives the Na salt of II, orange-yellow leaflets, with 3 mols.  $\text{H}_2\text{O}$ ; from EtOH it sep. as egg-yellow needles; the salt is sol. in 15 parts cold  $\text{H}_2\text{O}$ ; reduction with Na-Hg,  $\text{SO}_2$  or  $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$  gives only I; the  $\text{NH}_4$  salt of II, red, decomp. 200°; HCl gives *p*-dimethylaminodiazobenzenesulfonic acid (II), yellow needles, decomp. 118°, d<sub>4</sub><sup>20</sup> 1.41, if filtered in 0.5 hr., on standing 12 hrs., there result red-violet prisms, decomp. 118°, d<sub>4</sub><sup>20</sup> 1.562; crystallographic data are given for the 2 forms. Passing  $\text{H}_2\text{S}$  through 5 g. of the Na salt of II in 250 cc.  $\text{H}_2\text{O}$  for 5 hrs. gives about 2.5 g. of *p*-dimethylaminodiazobenzenesulfide hydrazine sulfide,  $\text{C}_6\text{H}_4\text{N}_2\text{S}\cdot\text{H}_2\text{S}$ , red with green surface luster, decomp. 78°. Reduction of the Na salt with  $\text{Na}_2\text{S}_2\text{O}_4$  gives *p*-dimethylaminophenylhydrazinesulfonic acid (III), m. 179° (decompn.) (Na salt); heating the acid in  $\text{H}_2\text{O}$  until soln. results gives *p*-aminodimethylaniline *p*-dimethylaminodiazobenzenesulfonate, yellow, m. 149° (decompn.);  $\text{AgNO}_3$  gives the Ag salt of II; the *p*-aminodimethylaniline deriv., yellow-green, m. 158° (decompn.). Benzal-*p*-aminodimethylaniline, light yellow, m. 93°; III in EtOH, satd. with HCl gas, gives *p*-dimethylaminophenylhydrazine di-HCl, m. 161° (decompn.); the free base is very unstable; BzH gives benzal-*p*-dimethylaminophenylhydrazine, light yellow-green, m. 138° (decompn.); salicylidene deriv., yellow, m. 185°; the  $\text{N,N'$ -di-Bz deriv. m. 199° (HCl salt, decomp. 196°); mono-Bz deriv., m. 145°, results from the di-Bz deriv. and  $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$  in EtOH; either deriv. with  $\text{Ca}(\text{OCl})_2$  gives *p*-dimethylaminophenylazobenzoate ( $\text{Me}_2\text{NC}_6\text{H}_4\text{N}:\text{NBz}$ ), red, m. 124°. *p*-Diethylaminobenzene-diazonium borofluoride, yellow, decomp. 113°. Na *p*-diethylaminodiazobenzenesulfonate, crystals with 6 mols.  $\text{H}_2\text{O}$ ; from EtOH, egg-yellow; K salt, yellow;  $\text{NH}_4$  salt, yellow-brown *p*-Diethylaminophenylhydrazinesulfonic acid, m. 132° (decompn.); HCl gives *p*-diethylaminophenylhydrazine di-HCl, decomp. 164°. *p*- $\text{MeC}_6\text{H}_4\text{CHO}$  gives a *p*-diethylaminophenylhydrazine-HCl, decomp. 165°.  $\text{N,N'$ -Di-benzoyl-*p*-diethylaminophenylhydrazine, m. 159°. *p*- $\text{NC}_6\text{H}_4\text{NPh}_2$  and BzCl give a mono-Bz deriv., m. 200°; BzH gives a benzal deriv., yellow-green, m. 145°. *p*-Diphenylaminobenzene-diazonium borofluoride, brick-red, decomp. 162°. Na *p*-diphenylaminodiazobenzenesulfonate, yellow, decomp. 120°; the reduction product could not be purified. C. J. West

**Synthesis of organometallic compounds of titanium.** G. A. Razuvaev and I. F. Bogdanov. *J. Gen. Chem.* (U. S. S. R.) 3, 367-8(1933).—Attempts to synthesize org. compds. of Ti by the action of  $\text{TiCl}_4$  on  $\text{HgPh}_2$ ,  $\text{PhMgCl}$  and a mixt. of Na and  $\text{PhCl}$  produced neg. results. Chas. Blane

**The influence of the phenyl group in the reaction of sulfonyl chloride on primary aliphatic alcohols.** P. Carré and D. Libermann. *Compt. rend.* 198, 274-6(1934).— $\text{PhCH}_2\text{CH}_2\text{OH}$  (1 mol.) and  $\text{PhCH}_2\text{CH}_2\text{CH}_2\text{OH}$  (1 mol.), reacting at room temp. for 24 hrs. with  $\text{SOCl}_2$  (1 mol.), give  $\text{PhCH}_2\text{CH}_2\text{OSOCl}$  (I) and  $\text{PhCH}_2\text{CH}_2\text{CH}_2\text{OSOCl}$  (II), with some  $\text{PhCH}_2\text{CH}_2\text{Cl}$  (III) and  $\text{PhCH}_2\text{CH}_2\text{CH}_2\text{Cl}$  (IV). I decomp. at 87° to III; II at 90° to IV. I with BuOH in  $\text{C}_6\text{H}_6\text{N}$  gives  $\text{SO}(\text{OBu})\text{OCH}_2\text{CH}_2\text{Ph}$ , b<sub>m</sub> 191-3°.  $\text{SOCl}_2$  (0.5 mol.) added slowly to  $\text{PhCH}_2\text{CH}_2\text{CH}_2\text{OH}$  (1 mol.) in  $\text{C}_6\text{H}_6\text{N}$  gives  $\text{SO}(\text{O}-\text{CH}_2\text{CH}_2\text{CH}_2\text{Ph})_2$ , b<sub>m</sub> 248-54°. W. J. Peterson

**Reaction of chlorobenzene with sodium sulfide and sodium hydrosulfide.** N. N. Vorozhtov, Jr. and S. P. Mitzenzengler. *Compt. rend. acad. sci.* (U. S. S. R.)

[N. S.], 1933, 291-4 (in German 294-5).—On heating PhCl with 0.5 mol. of 8% aq.  $\text{Na}_2\text{S}$  at 350-60° and 180 atm. 71.8-2.3% of the theoretical yield of  $\text{Ph}_2\text{S}$  and 15.6-15.8% of a mixt. of PhSH and PhOH is formed. With 6 mols. of  $\text{Na}_2\text{S}$  under the same conditions 2.8-5.5%  $\text{Ph}_2\text{S}$  and 84-92% of a mixt. of PhSH and PhOH is formed. The latter are formed thus:  $\text{Ph}_2\text{S} + \text{Na}_2\text{S} \rightarrow 2 \text{PhSNa}$ ;  $\text{Ph}_2\text{S} + 2 \text{NaOH} \rightarrow \text{PhSNa} + \text{PhONa} + \text{H}_2\text{O}$  from the previously formed  $\text{Ph}_2\text{S}$ . Similar results are had with NaSH.

Howard A. Smith  
Preparation of salts of tris(hydroxyaryl)sulfonium derivatives of *p*- and *o*-substituted phenols and the arylsulfonium bases. D. Libermann. *Compt. rend.* 197, 1425-7 (1933); cf. C. A. 28, 752<sup>1</sup>.— $(\text{BzOC}_6\text{H}_4)_3\text{SOBz}$ , m. 35°,  $[\text{Me}(\text{BzO})\text{C}_6\text{H}_4]_3\text{SOBz}$ , m. 53°,  $[\text{Cl}(\text{BzO})\text{C}_6\text{H}_4]_3\text{SOBz}$ , m. 57-8°, and  $[\text{MeO}(\text{BzO})\text{C}_6\text{H}_4]_3\text{SOBz}$ , m. 51°, have been obtained by heating the corresponding aryl chlorosulfites in pyridine.  $(\text{HOC}_6\text{H}_4)_3\text{SOH}$ , m. 235°, and  $[\text{Me}(\text{HO})\text{C}_6\text{H}_4]_3\text{SOH}$ , m. 264°, were prepd. from the chlorides of the corresponding sulfonium compds. and NaCN in alc. The bases are colorless, insol. in most solvents, but sol. in glycol.

Rachel Brown  
Oxidation products of organic developers. A. Seyewetz and S. Szymson. *Bull. soc. chim.* 53, 1280-8 (1933).—Hydroquinone (I) and pyrocatechol (II) have been oxidized by  $\text{PbO}_2$  and by AgBr in the presence of alk. sulfites and various alkalis or alk. substitutes. Oxidation of aq. I contg.  $\text{Na}_2\text{SO}_3$  in the presence of NaOH or  $\text{Na}_2\text{CO}_3$  gave 50% yields of  $(\text{HO})_2\text{C}_6\text{H}_4(\text{SO}_3\text{Na})_2$  (III), characterized by its beautiful blue fluorescence (C. A. 2, 539) and comparable with the salt made by the direct sulfonation of I. Solns. of I contg.  $\text{K}_2\text{SO}_3$  in the presence of KOH or  $\text{K}_2\text{CO}_3$  gave 75% yields of  $(\text{HO})_2\text{C}_6\text{H}_4(\text{SO}_3\text{K})_2$ . A similar  $\text{NH}_4$  salt was formed. Analogous results were obtained by using AgBr in place of  $\text{PbO}_2$  under the above conditions. Oxidation by AgBr in the presence of alk. sulfite and HCHO or  $\text{Me}_2\text{CO}$  yielded the monosulfonate,  $(\text{HO})_2\text{C}_6\text{H}_4\text{SO}_3\text{Na}$ . The reducing powers of I and its sulfonated derivs. for AgBr were compared and it is shown that III is not a photographic developer. Hypotheses on the oxidation reactions are given and discussed. The oxidation of II was similarly carried out. With  $\text{HgCl}_2$  only the monosulfonate was formed, because of the formation of a cryst. complex which absorbed the alk. sulfite and paralyzed the 2nd stage of the oxidation. The results show that during the use of I and II in the presence of alk. sulfites and alkalis or alk. carbonates to reduce AgBr to Ag, the *p*- or *o*-diphenol is transformed into a monosulfonated deriv. resulting from the action of the alk. sulfite on the quinone, then by an analogous process these are converted into disulfonic derivs. which seem to be the limit of the reaction since these derivs. have no reducing effect on AgBr.

C. R. A.  
Esterification velocity of alcohols in formic acid. III. Anton Kailan and Felix Adler. *Monatsh.* 63, 155-85 (1933); cf. C. A. 26, 5819; 27, 703; 28, 102<sup>1</sup>.—The esterification velocities at 15° of  $\text{BzOH}$ , 2-phenylethan-1-ol, 3-phenylpropan-1-ol, allyl alc., *o*-, *m*- and *p*-nitrobenzyl alcs., 1-phenylethan-1-ol, 1-phenylpropan-1-ol and 1-phenylbutan-1-ol in  $\text{HCO}_2\text{H}$  with varying  $\text{H}_2\text{O}$  content, and with or without HCl, KCl or  $\text{MgCl}_2$  as catalyst, were measured by the increase in f.-p. lowering. Esterification was practically complete. The velocity consts. were calcd. for unimol. reactions. The f.-p. consts. found for the various esters in  $\text{HCO}_2\text{H}$  contg. 0.110 and 1.180 mols.  $\text{H}_2\text{O}/\text{kg}$ .  $\text{HCO}_2\text{H}$  were 2.45 and 2.62, resp. This increase in  $\text{H}_2\text{O}$  content of the  $\text{HCO}_2\text{H}$  decreased the esterification velocity approx. 39% for the primary alcs. and 58% for the secondary alcs. With addn. of HCl, the increase in velocity consts. was approx. proportional to the concn. of HCl, the effect being greater in the water-poor solns. The decrease in consts. due to a Ph or  $\text{NO}_2$  group or to a double bond is greatest when these groups are nearest to the OH group. L. E. Steiner

Nitration of 3,5-dichlorobenzaldehyde and 3,5-dichlorobenzoic acid. Fritz Asinger. *Monatsh.* 63, 385-93 (1933).—3,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{CHO}$  (10 g.) and 100 cc.  $\text{HNO}_3$  (d. 1.48) at room temp. for 3-4 hrs. give 99% (crude

yield) of 2-nitro-3,5-dichlorobenzaldehyde (I), m. 91.5°; oxidation gives 3,5,2- $\text{Cl}_2(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ , m. 194°. I yields an aldoxime, m. 97°, and a phenylhydrazone, blood-red, m. 175°. I and  $\text{PCl}_5$  in  $\text{C}_6\text{H}_6$  give 2-nitro-3,5-dichlorobenzal chloride, m. 45°; this also results by nitration of 3,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{CHCl}_2$ . I, heated with  $\text{Ac}_2\text{O}$  and  $\text{AcONa}$  7 hrs. at 180°, gives 65% of 2-nitro-3,5-dichlorocinnamic acid, pale yellow, m. 227°. I and NaOH in  $\text{Me}_2\text{CO}$  give 97% of 5,7,5',7'-tetrachloroindigo. Reduction of I with  $\text{FeSO}_4$  and  $\text{NH}_4\text{OH}$  gives 84% of the 2- $\text{NH}_2$  deriv., pale yellow, m. 123°; aldoxime, m. 175°; phenylhydrazone, yellow-green, m. 118°. 3,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{CO}_2\text{H}$  and  $\text{HNO}_3$  (d. 1.48) at 70° give 83% of the 2- $\text{NO}_2$  deriv. (II), m. 194°; the Ca salt seps. with 4.6 mols.  $\text{H}_2\text{O}$ ; the Ba salt has 2.5 mols.  $\text{H}_2\text{O}$ ; the Ag salt is anhyd.; acid chloride, m. 94.5°; amide, m. 180°; Me ester, m. 73°; Et ester, m. 69°. Reduction of II gives the 2- $\text{NH}_2$  deriv., m. 230-1° (98% yield).

C. J. West  
Formation of C-phenylanthranils and acridones from o-nitrobenzaldehydes and aromatic hydrocarbons. Kurt Lehmsiedt. *Ber.* 67B, 336 9 (1934).—Reply to Tanasescu (C. A. 27, 4802). In this connection, it has been found that T.'s 3-nitro-6-chloro-9-(*p*-dimethylamino-phenyl)acridine m. 250°, not 235° (the di-Et compd. m. 236°); neither the di-Me nor the di-Et compd. fluoresces in concd.  $\text{H}_2\text{SO}_4$ .

C. A. R.  
Nitration of chalcone. Ioan Tanasescu and Aurel Georgescu. *J. prakt. Chem.* 139, 189-92 (1934).—Chalcone (5 g.) with a nitrating mixt. of 9 g.  $\text{H}_2\text{SO}_4$  (d. 1.48) and 6 g.  $\text{HNO}_3$  (d. 1.42) at 20-35° gives 1.6 g. 2- $\text{NO}_2$  deriv. (I) and 3 g. 4- $\text{NO}_2$  deriv.; the phenylhydrazones m. 163-4° and 148-50°, resp. Boiling 1 g. I with 30 cc. EtOH, 20 cc.  $\text{H}_2\text{O}$  and 5 cc. 30% NaOH for 1-1.5 hrs. gives 0.5 g. pure indigo.

C. J. West  
The condensation of benzylpyruvic acid with benzyl cyanide. Paul Cordier. *Compt. rend.* 197, 1427-9 (1933).—By condensation of benzylpyruvic acid with  $\text{PhCH}_2\text{CN}$  there is formed  $\text{PhCH}_2\text{CH}_2\text{C}(\text{OH})(\text{CO}_2\text{H})\text{CHPhCN}$ . Attempts to hydrolyze this to  $\text{PhCH}_2\text{CH}_2\text{C}(\text{OH})(\text{CO}_2\text{H})\text{CHPhCO}_2\text{H}$  gave an anhydride, m. 74°, either  $\text{PhCH}_2\text{CH}_2\text{C}(\text{O})\text{CPh.CO.O.CO}$  or  $\text{PhCH}_2\text{CH}_2\text{C}(\text{O})\text{CCHPh.CO.O.CO}$ .

C. CHPh.CO.O.CO. By the action of KOH in AmOH

this anhydride is converted to a mixt. of acid and an isomeric anhydride, m. 80°.

Rachel Brown  
Preparation of 3-phenyl-3-(3'-phenyl-3'-hydroxypropionyloxy)propionic acid, 1-phenylpentan-1-ol-3-one and 1-phenylheptan-1-ol-3-one. E. Ditz. *Bull. soc. chim.* 53, 1288-8 (1933); cf. C. A. 25, 4251.—In the course of the prepn. of  $\text{PhCH}(\text{OH})\text{CH}_2\text{CO}_2\text{H}$  (I) by the sapon. of the esters formed in the condensation of BzH with  $\text{BrCH}_2\text{CO}_2\text{R}$  in the presence of Zn (C. A. 3, 1760) the incomplete acidification of the Na salt produced 3-phenyl-3-(3'-phenyl-3'-hydroxypropionyloxy)propionic acid, m. 188°, formed during the acidification by the esterification of I by a 2nd mol. of the same acid. Agitation of  $\text{PhCH}(\text{OH})\text{CH}_2\text{CONH}_2$  with EtMgBr for 1 day and decompn. with ice-cold dil.  $\text{H}_2\text{SO}_4$  gave 1-phenylpentan-1-ol-3-one,  $b_p$  127-30°,  $n_D$  1.528; semicarbazone, m. 168°. Similar treatment with BuMgBr produced 1-phenylheptan-1-ol-3-one,  $b_p$  135° (semicarbazone, m. 133°), in very poor yields.

C. R. Addinall  
*cis*- and *trans*-Cinnamic acids. Steric hindrance. J. Manta. *Bull. soc. chim.* 53, 1277-86 (1933).—The hydrogenation of  $\text{PhC}::\text{CCO}_2\text{H}$  (I) with colloidal Pd on starch gave stable allocinnamic acid (II), m. 68°. The use of Pt black gives a mixt. of *cis* and *trans* forms. Esterification of I in the presence of  $\text{PhSO}_3\text{H}$  with the requisite alc. gave cyclohexyl phenylpropiolates,  $b_p$  190°,  $n_D$  1.5575, and benzyl phenylpropiolates, m. 35°. On hydrogenation with Pd these gave the corresponding allocinnamates,  $\text{C}_{12}\text{H}_{11}\text{O}_2$ ,  $b_p$  180°,  $d_4^{20}$  1.0533,  $n_D^{20}$  1.5410, and  $\text{C}_{10}\text{H}_9\text{O}_2$ , m. 34-5°. The rates of sapon., by 0.025 N NaOH, of the Et, cyclohexyl and benzyl esters of I, II, hydrocinnamic (III) and cinnamic acids were measured in abs. alc. and 96% alc. The ratio  $K_{\text{trans}}/K_{\text{cis}} = 2$  in the 3 different series is the reverse of what would be

expected on the basis of the acid strengths alone and is explained by steric hindrance. The 2 factors, acid strength and the steric factor, are opposed in II (C. A. 3, 2803). The corresponding esters of I and III saponify 100 times and 4 times more quickly than those of II. The rates of all sapon. are increased 6-fold by the use of 96% alc. in place of abs. alc. (C. A. 15, 3017). C. R. A.

The monoamide of salicylacetic acid. E. A. Trofin and K. A. Chkhikvadze. *J. Gen. Chem.* (U. S. S. R.) 3, 17-20 (1933).—Salicylamide (I) and  $\text{CH}_3\text{ClCO}_2\text{Et}$  condense in the presence of  $\text{NaOEt}$  to *Et salicylamidoacetate* (II),  $o\text{-H}_2\text{NCOC}_6\text{H}_4\text{OCH}_2\text{CO}_2\text{Et}$ , m. 130-1°, hydrolyzed with cold alkali to the acid, m. 213-15°, also obtained from I and  $\text{CH}_3\text{ClCO}_2\text{H}$ . II is therefore isomeric with Meriman's compd., m. 304-5° (C. A. 5, 3052; 8, 904), which is shown to be *o*-carbethoxyphenylglycolamide by synthesis from *Et* salicylate and  $\text{CH}_3\text{ClCONH}_2$ . Unlike this compd., II can be allylated to an ester hydrolyzable in the cold to *salicyl-N-allylamidoacetic acid*, m. 120-1°, also obtained from *salicyl-N-allylamide*,  $\text{CH}_3\text{ClCO}_2\text{Et}$  and  $\text{NaOEt}$ . B. C. A.

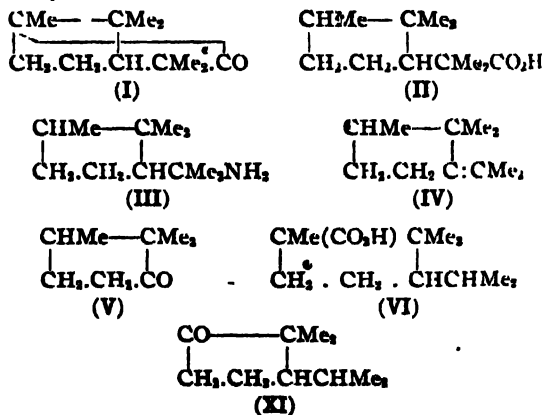
Action of sulfonyl chloride on unsubstituted amides and imides. Chlorosulfonylphthalimide. Aminosulfonamide. M. Battegay and L. Deniville. *Bull. soc. chim.* 53, 1242 9 (1933); cf. C. A. 25, 2082.—The metallic derivs. of unsubstituted amides do not yield chlorosulfonyl derivs. on treatment with  $\text{SO}_2\text{Cl}_2$  (I) but give evidence of reacting in both tautomeric forms, as amides and imino ams. The Na deriv. of  $\text{AcNH}_2$ , acting as a normal amide, yields  $\text{MeNCO}$  through an unstable intermediate *N*-chlorosulfonylacetamide,  $\text{AcNHISO}_2\text{Cl}$ . On the contrary, the Na deriv. of  $\text{BzNH}_2$ , which acts as an imino alcoholate, forms an *O*-chlorosulfonyl deriv. decompg. to  $\text{PhCN}$ . The instability of these intermediates is attributed to the presence of the II atom remaining after the introduction of the  $\text{SO}_2\text{Cl}$  group, which facilitates the formation of  $\text{HCl}$ . By the action of I on the Na deriv. of phthalimide, chlorosulfonylphthalimide (II) (C. A. 26, 1912), m. 160°, contaminated with chlorophthalimide (III), was formed. III was converted into  $\text{C}_6\text{H}_4(\text{CO})_2\text{NH}$  by treatment with dry  $\text{HCl}$  or  $\text{SO}_2$  and sepd. from II by extn. with benzene. Treatment of II in benzene with dry  $\text{NH}_3$  gave a phthalaminosulfonamide (IV), cleaved by heat or solvents to  $\text{C}_6\text{H}_4(\text{CO})_2\text{NH}$  and  $(\text{SO}_2\text{NH})_2$  (V), hydrolyzed in turn to a mixt. of  $\text{H}_2\text{SO}_4$ ,  $\text{H}_2\text{NSO}_3\text{H}$  and  $\text{H}_2\text{NSO}_3\text{NH}_2$ , m. 92° (C. A. 26, 2184) when crystd. from  $\text{AcOEt}$ . From its stability to  $\text{NH}_3$  and its ready cleavage by solvents and heat it is probable that II is an *O*-chlorosulfonyl deriv. The formation of V implies the migration of a H atom in IV. By treating II with  $\text{PhNHMe}$  there was formed a stable *sulfonamide*,

m. 160°, either  $\text{C}_6\text{H}_4\text{CO.N:COSO}_2\text{NMePh}$  or  $\text{C}_6\text{H}_4\text{CO.N(SO}_2\text{NMePh)CO}$ . C. R. Addinall

$\beta$ -Cyclogeraniol and  $\beta$ -cyclogeraniol  $\beta$ -*D*-glucoside. Richard Kuhn and Max Hoffer. *Ber.* 67B, 357-61 (1934).  $\gamma$ -Cyclogeraniol (I) is readily obtained in 60-g. yield from 100 g. crude cyclocitral (fraction  $b_{11}$  87-97°) with  $\text{iso-PrOH}$  and  $(\text{iso-PrO})_2\text{Al}$ ; it is easily sepd. by crystn. from the accompanying  $\alpha$ -form. It  $b_{11}$  101-2°, m. 43-4°, and has a pleasant eucalyptus-like odor. Bromide, from I in benzene and a little pyridine with  $\text{PBr}$  (74% yield),  $b_{11}$  96-9°; attempts to convert it into the Grignard reagent gave  $\text{MgBr}_2$  and a hydrocarbon  $\text{C}_{10}\text{H}_{16}$ , perhaps *bi-β-cyclogeranyl*, m. 116° (cor.), in 40% yield. With  $\text{KI}$  in acetone the bromide gave 70% of a hydrocarbon  $\text{C}_{10}\text{H}_{16}$  (II),  $b_{11}$  48.5-9°,  $d_4^{25}$  0.843,  $n_D^{25}$  1.4772. The expected iodide therefore breaks down with loss of  $\text{HI}$ ; this is probably preceded by an allyl shifting and II is a 1,1,3-trimethyl-2-methylene-3-cyclohexene.  $\beta$ -*D*-Glucoside tetraacetate of I (62% from I and acetobromoglucose with  $\text{Ag}_2\text{O}$  in ether), m. 104°,  $[\alpha]_D^{25}$  -37.7° (96% alc.), hydrolyzed by  $\text{Ba(OH)}_2$  in aq. alc. to the  $\beta$ -*D*-glucoside, m. 74-5°,  $[\alpha]_D^{25}$  -35.5° to -35.9° (96% alc.), has a strongly bitter taste, is easily hydrolyzed by dil. mineral acids but not by alkalis and therefore does not reduce even boiling Fehling soln. C. A. R.

Santenone. Ossian Aschan. *Svensk Kem. Tid.* 45, 209-21 (1933).—The stereoisomers in santenone (I) obtained by chromic oxidation of santenol were 12 parts  $\alpha$  I to 1 part  $\beta$ -I. The sepn. of the isomers was not successful with I, I phenylhydrazones or I oxime but was accomplished with the semicarbazones (II). II:  $\alpha$ , m. 236°;  $\beta$ , m. 222° soly. in 100 parts alc.,  $\alpha$  0.6 parts at 12°, 3.5 at the b. p.,  $\beta$ , 7.1 at 19°, 12.5 at the b. p.; soly. in 100 parts  $\text{H}_2\text{O}$ ,  $\alpha$  2.5 parts at 20°, 3.5 at the b. p.;  $\beta$  1.5 at 20°, 13.5 at the b. p. Much more steam was required to distil  $\beta$ -II than  $\alpha$ -II. I was prepd. from  $\alpha$ -II and  $\beta$ -II by adding  $\text{H}_2\text{C}_2\text{O}_4$ , steam distg. and  $\text{Et}_2\text{O}$  extn.  $\alpha$ -I m. 55°, b. 191°  $\beta$ -I, m. 46°, b. 190°. I oxime:  $\alpha$ , m. 74°;  $\beta$ , m. 51°. The  $\alpha$ -I acid from  $\text{KMnO}_4$  oxidation m. 171°. The  $\beta$  I acid and I phenylhydrazones were not suitable for m.p. detns. The santenones are good solvents for nitrocellulose, again emphasizing their similarity to camphor. Spatial relations are discussed. A. R. Rose

Configuration determinations in the terpene and camphor series. VI. Julius v. Braun and Peter Kurtz. *Ber.* 67B, 225-30 (1934); cf. C. A. 26, 1246.—In the hope of effecting the series of reactions  $\text{I} \rightarrow \text{V}$ , thereby obtaining a deriv. of camphor in which the 4-C atom had become activated while the configuration of the 1-C atom remained unchanged, and then correlating this deriv. with a  $\beta$ -methyladipic (and hence a methylsuccinic) acid of known configuration, I was treated with  $\text{NaNH}_2$  according to Haller and Bauer (*Compt. rend.* 148, 1644) but the (homogeneous) product proved to be the amide of dimethylcampholic acid (VI), for replacement of the  $\text{CO}_2\text{H}$  group in VI either through the isocyanate (VII) or directly by the  $\text{HN}_3$  method yielded *dimethylcamphylamine* (VIII) which, on elimination of the elements of  $\text{NH}_3$ , gave 1,2,2-trimethyl-3-isopropyl-5-cyclopentene (IX), and this on oxidative degradation yielded not a trace of V but 3-isopropyl-4,4-dimethyl-5-hexanon-1-al (X). Thus, while the original object of the expts. was not attained, X is the 1st known open optically active deriv. of camphor in which C atom 1 has become inactivated while the 4-C atom, it may well be assumed, has retained its original configuration. *Dimethylcamphyl isocyanate* (VII), obtained in 80% yield from the amide of VI with 2 atoms Br and 2 mols.  $\text{KOH}$ ,  $b_{11}$  109-12°,  $d_4^{25}$  0.9470,  $[\alpha]_D^{25}$  16.5° (alc.) (there is also formed a little *bi-(dimethylcamphyl) urea*, m. 154°). VIII,  $b_{11}$  90°,  $d_4^{25}$  0.8746,  $[\alpha]_D^{25}$  22.31° (no solvent), 33.06° (alc.); *picrate*, m. 202°. VI with  $\text{NaN}_3$  in  $\text{CHCl}_3$  in the presence of  $\text{H}_2\text{SO}_4$  gives about 75% of VIII with the same b. p. and d. but with considerably lower rotation ( $[\alpha]_D^{25}$  15.37° without solvent, 22.57 in 29.9% alc.). With 1 l mol. aq.  $\text{H}_2\text{PO}_4$  most of the VIII is pptd. as an insol. salt; both the ppt. and the residu. remaining in the filtrate give on dry distn. about 30% of (basic) original VIII (somewhat racemized) and 61% of non-basic IX, b. 168-70°,  $d_4^{25}$  0.8095,  $n_D$  1.4521.



$[\alpha]_D^{25}$  -15.49° (no solvent), X (90% from IX ozonized in  $\text{AcOH}$  and treated with  $\text{Zn}$  dust in the usual way),  $b_{11}$  117-20°,  $d_4^{25}$  0.9575,  $[\alpha]_D^{25}$  43.39° (no solvent), immediately colors fuchsin- $\text{SO}_2$ ; *p*-nitrophenylhydrazones,



m. 179–80°; semicarbazone, m. 208°. There was also obtained a little of a substance, b<sub>12</sub> 70–80°, which hardly colored fuchsin-SO<sub>2</sub> and the compn. of whose semicarbazone, m. 200°, pointed distinctly to a deriv. of XI.

C. A. R.

**Contact isomerization of pinene.** Yasuji Fujita. *J. Chem. Soc. Japan* 55, 1–5(1934).—Isomerization of pinene (I) to camphene (II) proceeds easily when I and water vapor are passed through active C at 300°; the products of the side reaction are *p*-cymene and a satd. compd., C<sub>10</sub>H<sub>18</sub> (III), b. 164°, d<sub>4</sub><sup>20</sup> 0.8072, n<sub>D</sub><sup>20</sup> 1.4399, M. R. 44.02. Phys. consts. of III are close to those of thujane. The main product of reaction at 200° is dipentene and the products of side reaction are I → II → III + C<sub>10</sub>H<sub>18</sub>.

K. Kitsuta

**Contact changes of isoamyl alcohol.** Yasuji Fujita. *J. Chem. Soc. Japan* 55, 11–14(1934).—iso-AmOH and water vapor are passed through a tube contg. active C and heated at 320–40°. The main product is Me<sub>2</sub>CHCH<sub>2</sub>CHO. The products from the side reactions are isovaleric acid, iso-Am isovalerate, di(iso-Am)<sub>2</sub>O, isoamylene, isobutylene, isobutane, CO and H<sub>2</sub>.

K. Kitsuta

**Isomerization of  $\alpha$ -pinene to an aliphatic terpene. I, II. Examination of the aliphatic terpene.** B. A. Arbuzov. *J. Gen. Chem.* (U. S. S. R.) 3, 21–7, 28–34(1933).—When  $\alpha$ -pinene (I) is passed over Cu chromite (Adkins, C. A. 25, 1797, 1808) at 300°, some 80% of I is recovered and 20% of an aliphatic terpene II. At 375°, 23% of I, 42% of dipentene and 31% of II are produced, and at 400–10°, 20% of I, 23% of dipentene, 20% of II and 36% of an unidentified monocyclic terpene C<sub>10</sub>H<sub>18</sub>. Dipentene is not isomerized under these conditions. II may be identical with the product obtained from I with an Al catalyst. A Co–Th catalyst at 380° gives similar products in comparable yield (cf. C. A. 26, 2582). II, b<sub>16</sub> 87–7.5°, d<sub>4</sub><sup>20</sup> 0.8102, n<sub>D</sub><sup>20</sup> 1.5448, [ $\alpha$ ]<sub>D</sub><sup>20</sup> 0, closely resembles allo-oimene; it is readily oxidized in the air to a viscous product with the properties of a peroxide. II is reduced by Na and EtOH to a dihydro compd., b. 168.5–70°, contg. 2 double linkages (titration with AcO<sub>2</sub>H). Reduction of II over a Cu–Cr catalyst gives 2,6-dimethyloctene, b. 165–6°, and H<sub>2</sub> and Ni give *dl*-2,6-dimethyloctane, b. 159.5°. II combines with maleic anhydride to an anhydride, C<sub>14</sub>H<sub>18</sub>O<sub>3</sub> (III), m. 81.2°, hydrated to an acid, C<sub>14</sub>H<sub>20</sub>O<sub>4</sub>, m. 154.5–5.5°, which is isomerized by HBr to an acid, m. 189–90°, dehydrated by Se to a compd., m. 77.5–80° (III?). II and citraconic anhydride give an anhydride, C<sub>18</sub>H<sub>24</sub>O<sub>4</sub>, m. 82°.

B. C. A.

**Bromination of enols and enol ethers.** T. Fjäder. *Acta Chem. Fennica* 6B, 60–1(1933).—Bromination of the appropriate  $\beta$ -diketone by Toivonen's method (in suspension in cold AcOH in the presence of KOAc) affords the Br derivs. of 4-methyl-, m. 103–4°, 4-ethyl-, m. 40–1°, and 4-isopropyl-, m. 80–1°, -menthone, 4-phenyl-1-methylcyclohexene-2,6-dione, m. 55–6°, and CHAc<sub>2</sub>Me, b<sub>11</sub> 63°, the appropriate enol ethers similarly giving 2-bromo-3-methoxy-, m. 103–4°, -3-ethoxy-, m. 112–13°, and -3-isopropoxy-, m. 89–90°, -5,5-dimethyl- $\Delta^2$ -cyclohexenone.

B. C. A.

**Indirect enol titration.** T. Fjäder. *Acta Chem. Fennica* 6B, 61–2(1933).—The different behaviors of various Br ketones titrated by the Meyer method in the presence of (a) HBr +  $\beta$ -C<sub>10</sub>H<sub>17</sub>OH (I), (b) HBr, (c) I, and (d) I<sub>2</sub>O, HBr + I, indicate that the reaction is complex. Thus with bromomethylmenthone the Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> titer falls rapidly in (a) and much more slowly in (c), (b) and (d) in this order.

B. C. A.

**Some derivatives of 2,2'-dinitrobenzidine.** Dino Ponte. *Giorn. farm. chim.* 82, 328–35(1933).—The nitration of benzidine (Ber. 23, 795(1890)) gives, in addn. to 2,2'-dinitrobenzidine (I), small quantities of 2-nitrobenzidine (II), m. 143°, and 2,3'-dinitrobenzidine (III), m. 238°. II is obtained when the nitration mixt. is poured into H<sub>2</sub>O as a yellowish brown ppt. III was obtained on concg. the alc. mother liquor from I as a yellow substance, purified by soln. in HCl, decolorization, addn. of NH<sub>4</sub>OH, and recrystn. from EtOH. Diazotization with 6 g. NaNO<sub>2</sub> in 15 cc. H<sub>2</sub>O of 10 g. I in 25 cc. concd.

HCl and 100 cc. H<sub>2</sub>O at 0° with mech. stirring gave a product which was filtered and poured slowly into a soln. of CuCN, maintained at 60–70°. The mixt. was heated 1 hr., aerated, cooled and the dark yellow product dried and extd. with Et<sub>2</sub>O in a Soxhlet app. The Et<sub>2</sub>O ext. was washed with dil. NaOH and H<sub>2</sub>O, and dried with CaCl<sub>2</sub>. Evapn. of the Et<sub>2</sub>O gave 0.5 g. of a new compd., 2,2'-dinitro-4,4'-dicyanobenzidine, m. 208–9° (decompn.), from EtOH. I (5 g.) on diazotization and reaction with CuCl in HCl at 70–80° in CO<sub>2</sub> gave a solid which by extn. with Et<sub>2</sub>O, neutralization, desiccation, and evapn. of the Et<sub>2</sub>O gave 0.5 g. of 2,2'-dinitro-4,4'-dichlorobiphenyl, m. 139–40°, from EtOH. Similarly 5 g. I with CuBr gave 0.9 g. of 2,2'-dinitro-4,4'-dibromobiphenyl, m. 138°.

Lewis W. Butz

**Di-*p*-substituted derivatives of diphenylmethane and diphenylethane.** T. Reichstein and R. Oppenauer. *Helv. Chim. Acta* 16, 1373–80(1933).—Compds. of the series (*p*-RC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>CH<sub>2</sub> (I) and (*p*-RC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>CHCH<sub>3</sub> (II) (R = CH<sub>2</sub>Cl, CH<sub>2</sub>OAc, CH<sub>2</sub>OH, CHO, CH<sub>2</sub>CN and CH<sub>2</sub>CO<sub>2</sub>H) have been prepd. to serve as intermediates in the formation of compds. contg. 2 benzene nuclei with duplicate linkages in the *p*-position of the type

(CH<sub>2</sub>)<sub>x</sub>.C<sub>6</sub>H<sub>4</sub>.(CH<sub>2</sub>)<sub>y</sub>.C<sub>6</sub>H<sub>4</sub>. With *x* and *y* = 2 and *x*

and *y* = 3 compds. having the formation tendency of the usual 4- and 6-C atom rings should result. For *x* = 1 and 2 and with a relatively large *y* value the free rotation between the 2 nuclei should be annulled with the consequent appearance of optically active forms of derivs. of these systems with a substituent in 1 of the nuclei. By mechanically shaking 200 g. PhCH<sub>2</sub>Cl and 60 g. of polyoxymethylene with 575 g. 84% H<sub>2</sub>SO<sub>4</sub> for 3 hrs. below 20° and extg. with Et<sub>2</sub>O a crude product was obtained which yielded after fractional distn. and distn. in a high vacuum 11.5 g. of 4,4'-dichloromethyldiphenylmethane (III) (I, R = CH<sub>2</sub>Cl), C<sub>18</sub>H<sub>14</sub>Cl<sub>2</sub>, m. 110° (cor.), b<sub>2</sub> 180° (slight decompn.). Reduction of III with Zn dust and AcOH for 6 hrs. under reflux yielded a hydrocarbon, which after vacuum distn., washing in pentane with concd. H<sub>2</sub>SO<sub>4</sub>, distn. over Na and crystn. from MeOH at –40°, proved to be 4,4'-dimethyldiphenylmethane, b<sub>12</sub> 165°, m. 28.5°, identical with a sample prepd. by the reduction of (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>CO. The 2 CH<sub>2</sub>Cl groups in III show reactivity analogous to that known in PhCH<sub>2</sub>Cl. Boiling with AcONa in AcOH gave the glycol acetate (I, R = CH<sub>2</sub>OAc), m. 50°, hydrolyzed to an 82% yield of the glycol (I, R = CH<sub>2</sub>OH), m. 123° (cor.). A soln. of the glycol in CHCl<sub>3</sub> was oxidized at room temp. with NaO<sub>4</sub> (*J. Chem. Soc.* 71, 1056(1897)) to 93% yields of the di-aldehyde, (I, R = CHO), m. 85.5–6° (cor.); in evacuated tube; the aldehyde oxidizes slowly in the air; dioxime, C<sub>18</sub>H<sub>14</sub>N<sub>2</sub>O<sub>2</sub>, m. 184°. The dioxime was transformed by refluxing with a ten-fold excess of Ac<sub>2</sub>O for 2 hrs. into 4,4'-dicyanodiphenylmethane (I, R = CN), m. 167° (cor.) (Schopf, Ber. 27, 2325(1894)). In contrast to Connerade (C. A. 27, 716), R. and O. did not observe any mentionable amt. of polymerization in this transformation. As starting material for series II, bibenzyl (II, R = H), m. 51°, b<sub>10</sub> 158°, was readily prepd. in 82% yields from PhCH<sub>2</sub>Cl and Et<sub>2</sub>O and iodized Mg. By reduction with HClIO or with (ClCH<sub>2</sub>)<sub>2</sub>O according to Stephen (C. A. 14, 2338) 45–50% yields of 4,4'-dichloromethyldiphenylethane (II, R = CH<sub>2</sub>Cl), m. 95–6° (cor.), b<sub>2</sub> 190°, were obtained. This compd. was reduced by excess Zn dust in AcOH with the addn. of a few drops of aq. CuSO<sub>4</sub> soln. to the known (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>CH<sub>2</sub>, m. 82° (Moritz and Wolfenstein, Ber. 32, 2532(1899)). In a manner similar to the prepn. of the corresponding members of series I were prepd. the following derivs. of series II: R = CH<sub>2</sub>OAc, m. 123° (cor.); CH<sub>2</sub>OH, m. 161° (cor.), b<sub>2</sub> 192°; CHO, m. 126° (in evacuated tube); CH<sub>2</sub>CN, m. 130°, was prepd. from the di-Cl deriv. by heating with NaCN in alc. The dinitrile was saponified to the corresponding dicarboxylic acid which, as the Ce salt, was dry-distd. *in vacuo*, at 450°. On working up the product some (*p*-MeC<sub>6</sub>H<sub>4</sub>)<sub>2</sub> and a little (*p*-MeC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>)<sub>2</sub> were recovered but no cyclic ketone. The

cyclization expts. will be repeated with acids contg. the  $\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$  group and also with other derivs.

C. R. Addinall

**3,6-Dinitro-2,7-dihydroxyfluoran as a reagent for the detection of reducing sugars.** M. Dominikiewicz. *Roczniki Chem.* 12, 686-92(1932).—2,7-Dinitro-3,6-dihydroxyfluoran yields with KOH-EtOH an orange K salt, an orange-brown K<sub>2</sub> salt, and a violet K<sub>3</sub> salt; the last 2 dissociate on diln. with H<sub>2</sub>O to yield the K salt. 3,6-Dinitro-2,7-dihydroxyfluoran (I) gives an orange-brown K<sub>2</sub> salt, which readily dissociates, yielding an orange K salt, reduced to 2,7-dihydroxyrhodamine by glucose, fructose, mannose, galactose, arabinose, xylose, lactose, and maltose, but not by sucrose, raffinose, starch and inulin or by sorbitol, dulcitol, mannitol, glycerol, glyoxal, glyceraldehyde,  $\text{CH}_2\text{O}$ ,  $\text{HCO}_2\text{H}$  or  $\text{H}_2\text{C}_2\text{O}_4$ . Reducing sugars are detected by adding I to the alk. soln., when a cerise coloration develops, changing to an intense orange fluorescence on acidification. This method serves for the detection of not less than 0.01275 mg. per cc. of sugar. B. C. A.

**Isomeric transformations of hydrocarbons  $\text{C}_{26}\text{H}_{20}$ , isomers of 1,3,1',3'-tetraphenyl-1,1'-dihydorrubene.** Antoine Willemart. *Compt. rend.* 197, 1420-32(1933); cf. Dufraisse, C. A. 27, 1840—PhC·CCPh<sub>2</sub>Cl (I) by the action of metals yields: a colorless compd., m. 250°, loses solvent and m. again 317-8°, sepd. by alternate recrystns. from acetone and EtOAc from a yellow isomer, m. 249°, which corresponds to the yellow  $\text{C}_{26}\text{H}_{20}$  obtained by heating I. These substances are isomers of 1,3,1',3'-tetraphenyl-1,1'-dihydorrubene. R. B.

**Isomeric transformations of the hydrocarbons,  $\text{C}_{26}\text{H}_{20}$ , isomers of the 1,3,1',3'-tetraphenyl-1,1'-dihydorrubene. Description of a new isomer.** Antoine Willemart. *Compt. rend.* 197, 1659-61(1933).—The colorless hydrocarbon  $\text{C}_{26}\text{H}_{20}$ , m. 179° (cf. Moureu, et al., C. A. 21, 1980), heated in xylene with  $\text{K}_2\text{Fe}(\text{CN})_6$  yields a yellow isomer, m. 225°.  $\text{CrO}_3$  oxidation of the yellow hydrocarbon  $\text{C}_{26}\text{H}_{20}$ , m. 249° (preceding abstract), gives  $\text{BzOH}$ ,  $\text{o-BzC}_6\text{H}_4\text{CO}_2\text{H}$ ,  $\text{Ph}_2\text{CO}$  and traces of an unidentified compd., m. 240°.  $\text{KMnO}_4$  in acid soln. gives a quant. yield of  $\text{C}_{26}\text{H}_{20}\text{O}_2$ , m. 277°. W. J. Peterson

**Synthesis of 2-propionyl- and 2,7-dipropionylfluorene.** K. Dziewotński and J. Schweiger. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1932A, 293 9.—Interaction of fluorene,  $\text{EtCOCl}$  and  $\text{AlCl}_3$  in  $\text{CS}_2$  gives the 2-COEt and 2,7-(COEt)<sub>2</sub> derivs., identified by Beckmann rearrangement of their oximes to 2-propionamido- and 2,7-dipropionamidofluorenes and hydrolysis of these to the known amines. The following are described: 2-fluorenyl Et ketone (I), m. 120-1° (oxime, m. 185 6°); phenylhydrazones, m. 155-6°; 2,7-dipropionylfluorene, m. 216-7° (dioxime, m. 219-20°); 2-propionamidofluorene, m. 202-3°, and 2,7-dipropionamidofluorene, m. 286-7°. By oxidation of I with  $\text{Na}_2\text{Cr}_2\text{O}_7$  and  $\text{AcOH}$  2-fluorenyl Et ketone, m. 169-70° (bisphenylhydrazones, m. 186 7°), and fluorene-2-carboxylic acid, m. 340°, are formed. B. C. A.

**Substances related to rubene.** Charles Dufraisse and Paul Chovin. *Compt. rend.* 197, 1127-9(1933); cf. C. A. 27, 716.—Et benzoylpyruvate was treated with  $\text{PCl}_5$ , but the product was not the chlororubene ester analogous to the deriv. of  $\text{CH}_2\text{Bz}_2$  obtained by this reaction. A red nonchlorinated substance (I) was obtained which was fluorescent and gave a characteristic absorption spectrum. The percentage compn. is that of a rubene. A similar compd. was made by a different method by von Pechmann but its constitution was not established. A comparative study will be reported later. Details of the method of prepn. are not given. Yields vary from 3 to 6%. After recrystn. from benzene the red crystals m. 317° and sublime unaltered. Solns. in org. solvents fluoresce like the rubenes. I has two absorption bands (5050 and 5400 Å.) approaching the characteristic bands of the rubenes. However, irradiation of a soln. in contact with air does not cause oxidation, the very slow decoloration being probably due to a secondary reaction with oxidized solvent; the product is not a thermolabile oxide. The empirical formula is  $(\text{C}_{26}\text{H}_{20})_n$ . In rubenes of similar

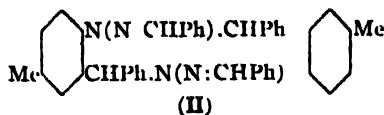
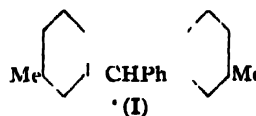
spectrum  $n$  is 4; the volatility of I would preclude higher values. This formula indicates a loss of  $2\text{H}_2\text{O} + \text{O}_2$  in the reaction. Further study of the loss of  $\text{O}_2$  under non reducing conditions is expected to aid in explaining the mechanism of the reaction as well as the constitution of I. Anne E. White

**Dissociable organic oxides. XIV. A violet chloro compound in the 1,1'-phenylenrubene series.** Charles Dufraisse, Raymond Buret and Raymond Girard. *Bull. soc. chim.* 53, 782-8(1933); cf. C. A. 27, 716.—Dichlorodiphenylrubene, heated 2.5 hrs. in *vacuo* at 200°, yields 75% of 3-chloro-3'-phenyl-1,1'-phenylenrubene (I), violet, m. 274°.  $\text{C}_{26}\text{H}_{19}\text{Cl}$ , fused and heated 1 hr. at 230°, yields 40% of I. I gives an absorption spectrum similar to that of diphenylphenylenrubene (II) and undergoes autooxidation in soln.; this is confirmatory evidence of the structure previously advanced for II. A. F. Shepard

**Electrochemical contribution to the problem of the constitution of triarylmethyl salts.** P. Rumpf. *Compt. rend.* 198, 269 72(1934).—The 2 values  $\text{pK}_\text{H}$  and  $\text{pK}_\text{H}$  have been detd. by electrometric titration in dil. alc solns. for the 1st and 2nd basic functions of some sym aromatic diamines. The values show regularly the effect of constitutional differences. W. J. Peterson

**Condensation of aldehydes with hydrazones. VIII. Heterocyclic nuclei with eight atoms.** A. Giacalone. *Gazz. chim. ital.* 63, 764 6(1933); cf. C. A. 27, 3200. In the previous work, the constitution of the compd  $\text{C}_{24}\text{H}_{20}\text{N}_4$  was identified as either I or II (see below)

$\text{PhHC NN} \cdot \text{CHPh} \cdot \text{NN} \cdot \text{CHPh}$



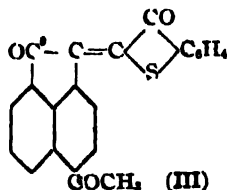
Further expts. to establish which formula is correct led to the prepn. of I by a different method. BzH condensed with  $p\text{-MeC}_6\text{H}_4\text{NH}_2$  to  $[3,6\text{-Me}(\text{H}_2\text{N})\text{C}_6\text{H}_3]\cdot\text{CHPh}$  (III) (cf. *J. prakt. Chem.* 36, 263(1887)). III, diazotized in HCl with  $\text{NaNO}_2$ , heated with  $\text{Na}_2\text{SO}_3$  at 80°, reduced with Zn and  $\text{AcOH}$  and pptd. with HCl, yields the corresponding hydrazine, viz., 2,2'-dihydrazino-5,5'-dimethyltritylphenylmethane-HCl,  $\text{C}_{24}\text{H}_{24}\text{N}_4 \cdot 2\text{HCl}$ , yellow, m. 190°, stable in dry air. With alc. BzH it ppts. 2,2'-bis(benzylidenetriphenyl)-5,5'-dimethyltritylphenylmethane (IV), pale yellow, m. 88°. A mixt. of IV, BzH and concd.  $\text{H}_2\text{SO}_4$  let stand, eliminates water with formation of the condensation compd. I, yellowish, m. 151 2°. It differs from the condensation product of BzH and  $p$ -tolylhydrazine, and therefore the  $\text{C}_{24}\text{H}_{20}\text{N}_4$  compd. of the previous work (loc. cit.) probably has the constitution II. Attempts to synthesize it directly were unsuccessful. Because of its 2 asym. C atoms, it was thought possible to sep. II into optical antipodes, but since it has no acid or basic function attempts were made to prep. an analogous compd. with such a function. Benzylidenetriphenyl- $p$ -benzoic acid,  $p\text{-PhCH NNHC}_6\text{H}_4\text{CO}_2\text{H}$ , prepd. directly from alc.  $p\text{-H}_2\text{NNHC}_6\text{H}_4\text{CO}_2\text{H} \cdot \text{HCl}$  and BzH, m. 221°. No conditions were found under which it would condense with BzH. C. C. Davis

**Behavior of phenylhydrazones with condensing agents III. A. Giacalone. *Gazz. chim. ital.* 63, 757-80(1933) cf. C. A. 27, 70.**—Hot alc.  $\text{PhHNNH}_2 \cdot \text{HCl}$  (I) and all aromatic aldehydes studied (except  $p\text{-Me}_2\text{NC}_6\text{H}_4\text{CHO}$  and nitrobenzaldehydes) form, sometimes with the intermediate formation of the phenylhydrazone, the corresponding derivs. of  $\text{Ph}_2\text{CH}$ , some of which have already

been described. *o*- and *m*-MeC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub>·HCl (II and III) form the corresponding Ph<sub>3</sub>CH derivs. directly, while *p*-MeC<sub>6</sub>H<sub>4</sub>NHNH<sub>2</sub>·HCl forms only the phenylhydrazone, because of the occupation of the *p*-position. The expts. show that HCl, in virtue of its salification of the hydrazine, is sufficient to bring about the condensation. A boiling alc. suspension of I (2 mols.) and BzH (3 mols.) forms transiently PhCH:NNHPh, which is transformed into *di*bensaldihydrazinotriphenylmethane (IV) (cf. C. A. 24, 837). When cold the formation of IV is slower and the yield is lower. Likewise I and anisaldehyde form 4,4'-bis(4-methoxybenzylidenetriphenylmethane) - 4'-methoxytriphenylmethane (cf. C. A. 25, 1507); I and *o*-HOC<sub>6</sub>H<sub>4</sub>CHO form 4,4'-bis(2-hydroxybenzylidenetriphenylmethane) - 2'-hydroxytriphenylmethane (cf. C. A. 25, 1507); I and *p*-MeC<sub>6</sub>H<sub>4</sub>CHO form 4,4'-bis(4-methylbenzylidenetriphenylmethane) - 4'-methyltriphenylmethane (cf. C. A. 27, 70); and I and *p*-HOC<sub>6</sub>H<sub>4</sub>CHO form 4,4'-bis(4-hydroxybenzylidenetriphenylmethane) - 4'-hydroxytriphenylmethane, yellowish, m. 192-3°. II and BzH form an oil which, refluxed with EtOH, yields 4,4'-bis(benzylidenetriphenylmethane) - 3,3'-dimethyltriphenylmethane, reddish yellow, m. 200°. Likewise III and BzH yield an oil which in turn yields 4,4'-bis(benzylidenetriphenylmethane) - 2,2'-dimethyltriphenylmethane, yellow, m. around 180°.

C. C. Davis  
 $\beta$ -Naphthylethyl alcohol and  $\beta$ -vinyl-naphthalene. Denise Sontag. *Compt. rend.* 197, 1130-2 (1933); cf. C. A. 26, 4325. C<sub>10</sub>H<sub>8</sub> is autoclaved with excess PH<sub>2</sub> at 170° to give  $\beta$ -C<sub>10</sub>H<sub>7</sub>Br (I). Mg in ether is added to I, the ether evapd. and enough heat applied to cause formation of  $\beta$ -naphthylethyl alc. (II), b<sub>10</sub> 178-88°, m. 67.5-8°. There is also formed a resinous residue having the properties of the polyvinyl-naphthalene which must be the result of spontaneous dehydration during distn. Three less satisfactory methods of prepn. are recorded. Five g. of II and 7 g. fused KOH are heated together. Much gas is evolved and the solid  $\beta$ -vinyl-naphthalene (III) is obtained, b<sub>10</sub> 135-7°. After recrystn. it m. 66°. III is much more stable than the liquid  $\alpha$ -isomer, and also gives a di-Br deriv. m. 84.5-5°.  $\beta$ -C<sub>10</sub>H<sub>7</sub>Ac was reduced with 2% Na-Hg to a product which might be  $\beta$ -C<sub>10</sub>H<sub>7</sub>CH(OH)Me but it has not been completely identified. A. E. W.

Oxidation products of 5-acetylacenaphthene. K. Dzic-wolski and Sz. Piasecki. *Bull. intern. acad. polonaise, (classe sci. math. nat.)* 1932A, 287-92 (in German). --Oxidation of 5-acetylacenaphthene with Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> in AcOH at 85° gives in addn. to other oxidation derivs. 5-acetyl-acenaphthenequinone (I) (C. A. 25, 1518). Purification of the crude oxidation product by coupling it with NaHSO<sub>3</sub> and decompu. with acids, yields I in chem. pure form, without contamination with 5-acetylacenaphthalic anhydride (II), m. 191-2°. Both compds. obtained simultaneously on oxidation of 5-acetylacenaphthene are very similar in their soly. in H<sub>2</sub>O, alkalis and org. solvents. Differentiation is best effected by formation of the red lake dye (III) from I, or the tris(phenylhydrazone) of I. I, C<sub>14</sub>H<sub>8</sub>O<sub>4</sub>, yellow needles, m. 181-2°,



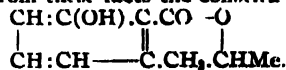
difficultly sol. in hot H<sub>2</sub>O, sol. in EtOH, AcOH and C<sub>6</sub>H<sub>6</sub>. Aq. alk. solns. are dark purple, solns. in concd. H<sub>2</sub>SO<sub>4</sub> dark red. Trioxime, yellowish, m. 242° (decompn.). Tris(phenylhydrazone), brown-yellow needles, m. 222-4°. III, C<sub>14</sub>H<sub>8</sub>O<sub>4</sub>S, by treating I in hot EtOH with  $\beta$ -hydroxythionaphthene and Na<sub>2</sub>CO<sub>3</sub> soln., red needles, m. 260-1°. The alk. hyposulfite lake stains cotton with a reddish tint. Di-Me 5-acetylacenaphthalate, C<sub>16</sub>H<sub>14</sub>O<sub>6</sub>, by heating II in a 10% Na<sub>2</sub>CO<sub>3</sub> with Me<sub>2</sub>SO<sub>4</sub> for 3 hrs., m. 112-14°. Oxime of II, C<sub>16</sub>H<sub>14</sub>O<sub>3</sub>N<sub>2</sub>, m. 275-8°. Bis(phenylhydrazone) of II, red needles, m. 241-2°. 5-Acetyl-

naphthalimide, C<sub>14</sub>H<sub>8</sub>O<sub>3</sub>N<sub>2</sub>, by refluxing II and concd. NH<sub>4</sub>OH for 6 hrs., m. 270-2°. J. Wiertelak

Selective catalytic reduction of ketones. II. N. D. Zelinskii, Kurt Packendorff and L. Leder-Packendorff. *Ber.* 67B, 300-2 (1934); cf. C. A. 27, 3704. --The ease with which ketones having the C=O in the  $\alpha$ -position to a benzene nucleus are reduced is shown by a no. of further examples. The reduction proceeds through the HO group and carbinols with the C(OH) group in the  $\alpha$ -position to a benzene nucleus can likewise be reduced. 1-Indanone yielded indan, b<sub>100</sub> 175°, n<sub>D</sub><sup>20</sup> 1.5352; 1,3-indandione likewise gave indan; from di-Me 1,5-diketophenheptamethylene-2,4-dicarboxylate was obtained an oil, presumably the di-HO ester, which could not be distd. in *vacuo* without decompn.; BzII yielded PhMe; fural yielded silvane, b<sub>100</sub> 63°, n<sub>D</sub><sup>20</sup> 1.4342; PhCH<sub>2</sub>OH gave PhMe; mandelic acid yielded PhCH<sub>2</sub>CO<sub>2</sub>H almost quantitatively and its nitrile gave PhCH<sub>2</sub>CN which on further hydrogenation gave some PhCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>.

C. A. R.

Ochracin, a new metabolic product of *Aspergillus ochraceus*. Teijiro Yabuta and Yusuke Sumiki. *J. Agr. Chem. Soc. Japan* 9, 1284-75 (1933). --The fermentation product of *Aspergillus ochraceus* on extn. with ether yielded ochracin, C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>, prisms m. 58.8-5°. It gives a violet color with FeCl<sub>3</sub>; [ $\alpha$ ]<sub>D</sub> -124.80°. There is no double bond in the side chain. The compd. does not reduce Fehling soln. A mono-Me deriv., m. 88.9°; mono-Ac deriv., m. 126.7°, and mono-Bz deriv., m. 101-2°, were prepd. They give no color with FeCl<sub>3</sub>. A mononitro, m. 184.5°, and dinitro deriv., m. 161.2°, were prepd. They give a red color with FeCl<sub>3</sub>. When ochracin was fused with KOH at 270-80°, 2-methyl-6-hydroxybenzoic acid, m. 170-1°, was isolated. With 90% KOH at 205.10°, a hydroxybenzoic acid, C<sub>8</sub>H<sub>6</sub>O<sub>4</sub>, m. 136.7°, was obtained. Its constitution was not ascertained. Ochracin has no MeO, CH<sub>3</sub>O, or CO group. Methylochracin oxidized with KMnO<sub>4</sub> gave 3-methoxyphthalic acid, m. 172.3°. From these facts the constitution of ochracin is given as



Ochracin is supposed to be identical with mellein which Nishikawa found in the metabolic products of *Aspergillus melleus* Yukawa. Y. Kihara

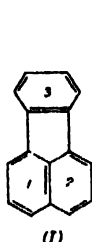
Anthraflavone derivatives. Henri de Diesbach and Salvador Gil Quinza. *Helv. Chim. Acta* 17, 105-13 (1934). --Both *cis*- and *trans*-forms of  $\alpha,\beta$ -di-2-anthraquinonylethylene (I) are theoretically possible. The formation of diphthalylphenanthrene by the fusion of the 2 anthraquinone nuclei of I has never been accomplished and this failure, together with the tinctorial properties of I, suggests the *cis*-formation for the compds. D. and Q. have attempted unsuccessfully the formation of the isomeric form by transforming the double bond into a single linkage by addn. of 2 halogen or 2 H atoms and by replacing the CH: groups by CO, followed by reestablishment of the double linkage. Chlorination of I by passing Cl through solns. of I in concd. H<sub>2</sub>SO<sub>4</sub> or PhNO<sub>2</sub> gave a mono-Cl deriv., C<sub>20</sub>H<sub>17</sub>ClO<sub>4</sub>, m. 284-6°, from which the Cl atom was not eliminated by powd. Cu, PhNEt<sub>3</sub>, nor by a hyposulfite bath. By heating I in PhNO<sub>2</sub> with SO<sub>2</sub>Cl<sub>2</sub> and a trace of I, a crude compd. contg. nuclear Cl was formed. Elimination of the ring Cl by heating with powd. Cu yielded a di-Cl deriv., (RCHCl)<sub>2</sub> (R = 2-anthraquinonyl), C<sub>20</sub>H<sub>16</sub>Cl<sub>2</sub>O<sub>4</sub>, m. above 320°, which regenerated I on heating with PhNEt<sub>3</sub> or in a hyposulfite bath. A suspension of I in glacial AcOH was not reduced on continued exposure to bright sunlight (C. A. 19, 1570) but reduction with Al-bronze powder and a mixt. of AcOH and HCl or with concd. H<sub>2</sub>SO<sub>4</sub> gave  $\alpha,\beta$ -di-2-anthraquinonylethylene, C<sub>20</sub>H<sub>14</sub>O<sub>4</sub>, m. 330-2° (Maquenne block); mono-Br deriv., C<sub>20</sub>H<sub>17</sub>BrO<sub>4</sub>, m. above 315°, which regenerates I on heating with PhNEt<sub>3</sub>. I is not reduced by Cu and AcOH, HCl or concd. H<sub>2</sub>SO<sub>4</sub> or on catalytic hydrogenation. It is remarkable that the Al-bronze-AcOH-HCl reduction affects only the double linkage and

leaves the anthraquinone nuclei intact. The synthesis of the diketone RCOCOR (II) was carried out analogously to that of dianthraquinonyl ketone (C. A. 27, 287), commencing with (*p*-MeC<sub>6</sub>H<sub>4</sub>CO)<sub>2</sub> (III), prep'd. according to Stierlin (*Ber.* 22, 380(1889)) from *p*-MeC<sub>6</sub>H<sub>4</sub>CHO. The gradual addn. of 8.5 g. of KNO<sub>3</sub> to 10 g. III in 120 g. conc'd. H<sub>2</sub>SO<sub>4</sub> maintained below 40°, gave, after trituration with H<sub>2</sub>O, washing with dil. NH<sub>4</sub>OH and H<sub>2</sub>O and recrystn. from glacial AcOH, 53% of pure *bis*(3,3 - dinitro - 4,4 - dimethyldiphenyl)diketethane, C<sub>28</sub>H<sub>18</sub>N<sub>4</sub>O<sub>8</sub> (IV), m. 181-2°, giving a yellow soln. with H<sub>2</sub>SO<sub>4</sub>, changing through carmine-red to violet on addn. of a trace of thiophene. IV was reduced by SnCl<sub>2</sub> in HCl to the corresponding amino comp'd. C<sub>28</sub>H<sub>22</sub>N<sub>2</sub>O<sub>2</sub>, m. 159°, which was converted through the dinitrile, C<sub>28</sub>H<sub>18</sub>N<sub>4</sub>O<sub>2</sub>, m. 207°, to the dicarboxy comp'd. (V), C<sub>28</sub>H<sub>14</sub>O<sub>6</sub>, m. 318-9°. On heating with PCl<sub>5</sub> in a little benzene V was changed to the acid chloride. After removal by vacuum distn. of the benzene and the POCl<sub>3</sub> formed in the reaction the residue was taken up in benzene and heated with AlCl<sub>3</sub> to give *bis*(3,3 - dibenzoyl - 4,4 - dimethyldiphenyl)diketethane, C<sub>40</sub>H<sub>22</sub>O<sub>4</sub>, m. 143°. Cl was passed through a soln. of this ketone in C<sub>6</sub>H<sub>5</sub>Cl at 180-90° for 3 hrs. On addn. of Et<sub>3</sub>O to the cooled soln. *bis*(*ms*-dichloro-2-anthryl)-diketethane, C<sub>20</sub>H<sub>14</sub>Cl<sub>2</sub>O<sub>4</sub>, m. 185°, was formed. This was transformed by heating with conc'd. H<sub>2</sub>SO<sub>4</sub> into *ds*-2-anthraquinonyldiketethane (VI), C<sub>20</sub>H<sub>14</sub>O<sub>6</sub>, m. 280°. When refluxed in alk. soln. VI turns green, then red and forms a ppt. On exposure to air the soln. is immediately decolorized with formation of anthraquinone-2-carboxylic acid. Evidently the -CO.CO- chain is cleaved by oxidation accompanied by reduction of the original product (green coloration) and of the anthraquinone nuclei (red coloration). The hyposulfite bath similarly changes VI into the carboxylic acid. By heating a mixt. of VI and *o*-(H<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>4</sub>·2HCl in alc. for 10 hrs. was formed 3,3-di-2-anthraquinonylquinoxaline, C<sub>26</sub>H<sub>18</sub>N<sub>2</sub>O<sub>4</sub>, m. 326.5°, in yellow crystals with no tinctorial properties. With N<sub>2</sub>H<sub>4</sub>·H<sub>2</sub>O in alc. VI gave, on heating for 8 hrs., *ds*-2-anthraquinonylhydrazonoketethane, C<sub>20</sub>H<sub>14</sub>N<sub>2</sub>O<sub>4</sub>, m. 265° (decompn.). This comp'd. gave, when heated in a sealed tube at 160° for 10 hrs. with EtONa,  $\alpha,\beta$ -di-2-anthraquinonyl- $\alpha$ -hydroxyethane, RCH<sub>2</sub>CH(OH)R, C<sub>20</sub>H<sub>14</sub>O<sub>4</sub>, in red-orange crystals colored green by alkalis and giving a green conc'd. H<sub>2</sub>SO<sub>4</sub> soln. C. R. Addinall

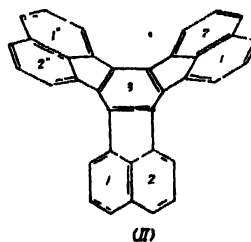
The rotatory dispersion of the acyclic terpene alcohols, C<sub>10</sub>H<sub>18</sub>O, from the essences of citronella, geranium and rose. Charles Lagneau. *Compt. rend.* 198, 166-8(1934). - Since there are conflicting views on the constitution of these alcs., L. has tried to learn something from their powers of rotatory dispersion. Five samples were investigated: com. *d*-citronellol (I) from essence of citronella, com. *l*-citronellol (II) from geranium, com. *l*-rhodinol (III) from geranium, c. p. *l*-rhodinol (IV) prep'd. from essence of rose, and pure essence of rose (V). The sp. rotation of each was det'd. by using the yellow, green and indigo lines of Hg. A preliminary chem. test showed that the samples were not all pure. The sp. rotations also varied, but the ratio of the sp. rotation of the indigo line to that of the yellow line did not. This dispersion for I, IV and V was 2.03, an indication that they are optical isomers. The abs. value of I was less than that of IV. This may have been due to the presence of the racemate. The dispersion of II and III was 2.41 and 2.44, an indication that they are the same comp'd. and different from the others. John E. Milbery

Catalytic pressure hydrogenation of decacyclene and rubicene. Julius v. Braun, with Gottfried Manz and Werner Keller. *Ber.* 67B, 214-18(1934). - The pressure reduction of fluoranthene (I) proceeds in well-defined steps, the aromatic rings 1, 3 and finally 2 being successively hydrogenated with formation of tetra-, deca- and perhydrofluoranthene, resp. (C. A. 25, 1244). It was of interest to det. whether decacyclene (II) and rubicene (III), in which the structural elements of I are, so to speak, repeated 3 and 2 times, resp., would behave in the same way. With a Ni catalyst at high temps. and pressures, II and III can be readily hydrogenated and under the

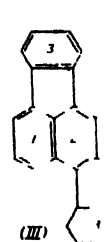
proper conditions it is not difficult to obtain homogeneous products. II in the 1st stage takes up 12 H atoms, i. e., rings 1, 1' and 1'', first add 4 H atoms each, but in the next stage rings 2, 2' and 2'' add 6 atoms H each and the resulting trisdecacyclodecacyclene, C<sub>24</sub>H<sub>24</sub> (IV), resists further hydrogenation. With III the hydrogenation, even when effected cautiously, does not stop with ring 1 and 1'; rings 3 and 3' are also hydrogenated (20 atoms H are taken up) and, in fact, a part of III is even hydrogenated to the perhydro deriv. C<sub>24</sub>H<sub>24</sub> (V). IV, obtained by hydrogenation of II free of all S-contg. impurities, m. 215°, is not attacked in the slightest by conc'd. H<sub>2</sub>SO<sub>4</sub> at 50-60°, gives mellitic acid with HNO<sub>3</sub> in sealed tubes at 160°, b<sub>2</sub> above 360° as a viscous light yellow oil solidifying to a glass which on long standing changes back into the crystals; on distn. from PbO it undergoes deep-seated decompn. Attempts to partially dehydrogenate it with S were not very successful; heated with 7 atoms S at 200° and 20 mm. in N until the evolution of H stopped (about 12 hrs.), it yielded about 20% of a yellow cryst. powder, m. 245° having the compn. C<sub>24</sub>H<sub>18</sub>. By starting with II which still contains about 1% S, the hydrogenation stops with the absorption of 18-20 atoms H and there is obtained 70% of the dodecacyclodecacyclene, C<sub>24</sub>H<sub>20</sub>, golden yellow, m. 303-6°. V, which is also readily obtained from III in boiling AmOH slowly treated with an excess (40 atoms) of Na, m. 55-65°, b<sub>2</sub> 254-6° (apparently with slight dehydrogenation). The dehydrogenation becomes quite distinct when V is heated with O-contg. solvents; e. g., when it is dissolved in hot AcOEt and allowed to cool it gives about 10% of a comp'd. C<sub>24</sub>H<sub>18</sub>, m. 246-8°. With Ni in decalin at 250° under about 200 atm. H pressure, III rapidly absorbs almost 20 atoms H and gives, together with some V, 85% of the comp'd. C<sub>24</sub>H<sub>18</sub>, m. 165-74°, and a little of a comp'd. C<sub>24</sub>H<sub>16</sub>, m. 271-3°.



(I)



(II)



(III)

C. A. R

The production of furfural from concentrated solutions of xylose. Richard Lindley Foster. *Iowa State Coll. J. Sci.* 8, 191-6(1933). - The % of furfural, X, in a soln. in PhMe may be det'd. by the equation,  $S_8 = S_T + [(S_1 - S_T)S_T]/X$ , in which  $S_8$ ,  $S_T$  and  $S_1$  are the sp. grs. resp. of the soln., of PhMe and of furfural. The errors are less than 1%, up to 40% furfural. Benzene and CCl<sub>4</sub> may be substituted for PhMe. Furfural was produced by treating xylose in conc'd. solus. with various acids and salts and removing the furfural as formed, by the use of a solvent for furfural, immiscible with water. Variation of the proportion of PhMe from 20 to 300% of the vol. of the reaction mixt. did not change the yield of furfural. When the concn. of xylose was increased from 1% to 60%, the yield of furfural decreased but the decrease up to 20% was small. Concns. of HCl at 0.25, 0.50, 0.75, 1.00, 1.50 and 2.00 N were used each in the presence of 0, 5, 10, 15, 20, 25, 30, 35, 40 and 45% NaCl for periods of 2 to 10 hrs. The max. yield of xylose was 37 g. from 100 g. of xylose. This yield was produced by the following treatments: 0.50 N HCl, 45% NaCl, 8 hrs.; 0.75 N HCl, 35% NaCl, 6 hrs.; 1.00 N HCl, 35% NaCl, 4 hrs.; 1.50 N HCl, 30% NaCl, 4 hrs. and 2.00 N HCl, 25% NaCl, 2 hrs. The sum of the % increase in activity of the H ion and the % decrease in soly. of furfural due to the presence of the salt is approx. the % increase in yield of furfural during the early part of the run. F. E. B

Furfural and some of its derivatives. George F. Wright. *Iowa State Coll. J. Sci.* 8, 235-6(1933). - This paper is an

abstr. of a thesis and contains no detailed information. It deals with nuclear substitution on the furan ring. Precautions are necessary in working with positively-substituted furans in acid solns. Nitrofurans are especially sensitive to alkalis. All furans are thermally unstable. No attempt at sulfonation was successful. Nitrofurans can be formed by direct addn. of acetyl nitrate.  $\alpha$ -Bromo- or iodofurans could not be nitrated to form  $\beta$ -nitrofurans. The stability of halogenated furans is discussed especially with regard to the Grignard reagent.

F. R. Brown

The Grignard reaction with *l*-proline and *l*-hydroxyproline esters and with diketopiperazines. J. Kapfhammer and A. Matthies. *Z. physiol. Chem.* **223**, 43-52 (1933).—*l*-Proline Et ester (I) loses EtOH spontaneously at room temp., more rapidly when heated under pressure, to form the *anhydride* (II) or diketopiperazine deriv., m. 149°,  $[\alpha]_D^{25}$  -147.2°. I reacts with PhMgBr to form *pyrrolidylidiphenylcarbinol*, m. 83° (HCl salt, no m. p. up to 240°; *Bz* deriv., m. 183°), and with EtMgBr to form *pyrrolidylidethylcarbinol* (HCl salt, m. 158°). On account of its insol. in Et<sub>2</sub>O, II was added in PhOMe to the PhMgBr reagent, and *pyrrolidylidiphenylmethane-N-pyrrolidyl Ph Ketone* obtained, isolated as the *picrate*, m. 174-5°. *l*-Hydroxyproline Et ester HCl salt reacts with PhMgBr to form *hydroxypyrrolidylidiphenylcarbinol*, m. 187.8°. Like I, the hydroxyproline ester readily loses EtOH and goes into the corresponding *anhydride*, m. 245.6° (charring),  $[\alpha]_D^{25}$  -153.44°. Sarcosine anhydride in PhOMe reacts with PhMgBr yielding *methylaminoacetophenone* (*picrate*, m. 145.6°; HCl salt, m. p. not stated), and *sarcosylmethylaminoacetophenone*, analyzed as the *picrate*; and with EtMgBr yielding *2,5-tetraethyl-N,N'-dimethylpiperazine*, analyzed as the *picrate* and HCl salt.

A. W. Dox

Natural coumarins. X. Synthesis of osthole. Ernst Spath and Herbert Holzen. *Ber.* **67B**, 264-5 (1934); cf. *C. A.* **27**, 3712.—From 2,4-HO(MeO)C<sub>6</sub>H<sub>3</sub>CHO, refluxed in benzene with 1 atom Na and then boiled to neutral reaction with 1.1 mols. Me<sub>2</sub>C:CHCH<sub>2</sub>Br, is obtained 19.6% 3-isoamylmethylresorcyllaldehyde 4-Me ether, b<sub>10</sub> 118-22°, 2.5 g. of which, subjected to the Perkin coumarin synthesis, yields 0.165 g. osthole, m. 82-3° when crystd. from petr. ether or ether and not depressing the m. p. of the natural product. When osthole distd. in a high vacuum solidifies, it m. 62-3°, but on long standing, seeding or heating to 50-60°, it changes into the higher-melting dimorphous form.

C. A. R.

Synthesis of dihydroosthole from a degradation product of rotenone. Ernst Späth, Sankichi Takei and Shikuro Miyajima. *Ber.* **67B**, 262-3 (1934).—On the basis of the Späth and Pesta formula for osthole (*C. A.* **27**, 3712), dihydroosthole (I) should be 8-isoamyl-7-methoxycoumarin (II). Attempts to synthesize II from tetrahydrotubanol, 2,6-(HO)C<sub>6</sub>H<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CHMe<sub>2</sub> (III), were unsatisfactory, and tetrahydrotubajic acid 4-Me ether, 2,4,3-HO(MeO)(iso-Am)C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H, was accordingly decarboxylated at 220-30° *in vacuo* to the *Me* ether of III, b<sub>10</sub> 120°, which gave no color with FeCl<sub>3</sub> and which with malic acid and concd. H<sub>2</sub>SO<sub>4</sub> over a free flame yielded II, m. 85-5.5°, identical with I prepd. by partial hydrogenation of natural osthole with Pd-charcoal in AcOH.

C. A. R.

Isatogen and indole. XII. A new oxidation splitting of indoxyl derivatives by atmospheric oxygen in alkaline solution. Paul Ruggli, Arthur Zimmermann and Otto Schmid. *Helv. Chim. Acta* **16**, 1249-56 (1933); cf. *C. A.* **27**, 4782.—Air is sucked through 2-phenyl-6-nitroindoxyl in alc. NaOH. The resulting ppt. is *Et* 4-nitrobenzoylanthranilate (I), m. 179-80°; the *free acid* (II), m. 251° (rapid heating) or 240-6° (slow heating), is obtained from the mother liquor, or by sapon. of I. The constitution is proved by independent synthesis: The Ac deriv. of *p*-nitro-*o*-toluidine is oxidized with KMnO<sub>4</sub> to the corresponding acid; the Ac group is then replaced by a *Bz* group. The oxidation of 2-phenyl-5-styryl-6-nitroindoxyl by air in an alk. solution yields 4-nitro-5-

styrylbenzoylanthranilic acid, m. 279°. XIII. Acetyl derivatives of 2-phenyl-6-nitroindoxyl. *Ibid.* **17**, 9-22 (1934).—If the exptl. conditions are properly adjusted, the acetylation of a compd. contg. an OH and an NH group takes place on the OH or the NH, or on both. By adequate sapon., it is possible to revert from the *O,N*-di-Ac deriv. to either the mono-*O*- or mono-*N*-Ac deriv. The following new *derivs.* have been made of 2-phenyl-6-nitroindoxyl: *O*-Ac m. 191°; *O,N*-di-Ac m. 178°; *N*-Ac, m. 178-80°; *O*-Bz, m. 229°; *O,N*-di-Bz, m. 204°; *N*-acetyl-*O*-benzoyl, m. 184°; *N*-benzoyl-*O*-acetyl, m. 187-8°; *O*-phenylurethan, m. 214°; 3-carbethoxy, m. 170°; 2-phenyl-3-acetyl-6-acetamidindoxyl, m. 210-12° (*picrate*, m. 188°, Ac deriv. m. about 100°); 1-acetyl-2-phenyl-6-acetamidindoxyl, m. 217-19°, blackening about 210°.

Albert L. Henne

Acyl compounds of polymeric indoles. Consideration of the method of determining active hydrogen atoms. O. Schmitz-Dumont and K. Hamann. *J. prakt. Chem.* **139**, 167-79 (1934).—The Ac *derivs.* may be divided into 2 classes,  $\alpha$ - or *N*-Ac *derivs.*, which contain 1 less active H atom than the parent compd., and  $\beta$ -*derivs.*, which contain the same no. of active H atoms as the original compd. The  $\beta$ -*deriv.* does not result by a rearrangement of the  $\alpha$ -*deriv.* If the  $\beta$ -*deriv.* contained the acyl group on the  $\beta$ -C atom, they should behave as ketones; such ketone character could not be demonstrated; other possible structures for the  $\beta$ -*derivs.* are discussed. Diindole and Ac<sub>2</sub>O at room temp. give the  $\alpha$ -Ac *deriv.*, m. 158.5°; ClCO<sub>2</sub>Et gives the  $\alpha$ -carbethoxy *deriv.*, m. 130-1°; BzCl in PhMe gives at -8° the  $\alpha$ -Bz *deriv.*, m. 178-9°; Bz<sub>2</sub>O gives the same compd. but on heating at 160° there results the  $\beta$ -*deriv.*, m. 197.8°, while the former yields diindole on hydrolysis, the latter reacts very slowly with EtOH-KOH and yields no diindole. Tollylsulfonyldiindole, m. 186-7° (90% yield); this is probably an  $\alpha$ -*deriv.*  $\alpha$ -Benzoyldiindole, m. 212°;  $\alpha$ -carbethoxy *deriv.*, m. 155.6°;  $\alpha$ -tolylsulfonyl *deriv.*, m. 188-9°;  $\beta$ -carbethoxytriindole, m. 163.4°. A table gives the results of the active H detns.

C. J. West

Some azo derivatives of methyleneindolines. Elisa Ghigi. *Gazz. chim. ital.* **63**, 701-8 (1933).—The work is an extension of that of Rosenhauer in synthesizing indoline (cf. *C. A.* **18**, 2896; **19**, 61). *o*-MeC<sub>6</sub>H<sub>4</sub>NNH<sub>2</sub> and iso-PrCOMe (I), heated at 100°, yield the *o*-tolylhydrazones of I, iso-PrMeC:NNHC<sub>6</sub>H<sub>4</sub>Me-*o* (II), b<sub>10</sub> 176°. Prolonged heating of II with anhyd. ZnCl<sub>2</sub> in abs. EtOH in a current of N yields *bs-o*-methyl-*pr*-2,3,3-trimethylindoline (III), b<sub>10</sub> 135°. III and MeI, refluxed, yields the *MeI* *deriv.* (IV) of III, m. 245° (cf. 212° of a compd. thought to be this by Alois, *Monatsh.* **26**, 833 (1905)). When heated, IV and PhNIINH<sub>2</sub> react violently with evolution of NH<sub>3</sub>, and formation of PhNH<sub>2</sub> and a red compd., C<sub>19</sub>H<sub>23</sub>N<sub>3</sub>, m. 232° (decompn.). Decompd. with NaOH and treated with picric acid (V), it forms a *picrate*, C<sub>28</sub>H<sub>29</sub>O<sub>7</sub>N<sub>3</sub>, dark red, m. 208°. *bs-o*-Methyl-*pr*-1,3,3-trimethyl-2-methyleneindoline in dil. AcOH and PhN<sub>2</sub>Cl at 0° ppt., by addn. of AcONa, a *basic compd.*, C<sub>19</sub>H<sub>23</sub>N<sub>3</sub>, red-yellow, m. 146°. Refluxed in C<sub>6</sub>H<sub>6</sub> with V, it yields VI. Prepd. in an analogous way to II, the *m*-tolylhydrazones of I is a pale yellow oil, b<sub>10</sub> 190°. Prepd. like III, *bs-m*-methyl-*pr*-2,3,3-trimethylindoline (VII), m. 61-2°, b<sub>10</sub> 140°. *Picrate*, C<sub>19</sub>H<sub>21</sub>O<sub>7</sub>N<sub>3</sub>, yellow, m. 169°; *Bz* *deriv.*, C<sub>19</sub>H<sub>21</sub>ON<sub>3</sub>H<sub>2</sub>O, m. 186°. Refluxed with MeI, VII forms a *MeI* *deriv.*, C<sub>19</sub>H<sub>21</sub>N<sub>3</sub> (VIII), m. 230°. With PhNHNH<sub>2</sub>, the action is violent, as with IV, with formation of NH<sub>3</sub>, PhNH<sub>2</sub>, and a red compd., C<sub>19</sub>H<sub>23</sub>N<sub>3</sub>, m. 250°. Decompd. with NaOH it forms with V a *picrate*, C<sub>28</sub>H<sub>29</sub>O<sub>7</sub>N<sub>3</sub> (IX), dark red, m. 200°. *bs-m*-Methyl-*pr*-1,3,3-trimethyl-2-methyleneindoline and PhN<sub>2</sub>Cl at 0° ppt. the compd. C<sub>19</sub>H<sub>23</sub>N<sub>3</sub>Cl, orange-yellow, m. 240°. Decompd. with NaOH and extd. with Et<sub>2</sub>O, it yields the *free base*, m. approx. 90°, which with V forms IX. 1,3,3-Triethyl-2-methyleneindoline (X) and PhN<sub>2</sub>Cl at 0° give a pitchy product (XI) which, after decompn. with NaOH, yields a *picrate*, C<sub>27</sub>H<sub>29</sub>O<sub>7</sub>N<sub>3</sub>, lustrous red, m. 168°. The syntheses verify

the conclusion reached by Rosenhauer (*loc. cit.*) and by König (C. A. 18, 85, 8055) that elimination of *N*-alkyl groups in indoline bases does not take place, since the products formed by coupling and by the action of  $\text{PhNH-NH}_2$  on Mel derivs. of indolenines are the same. The ready formation of XI by coupling of X is contrary to the assertion of König (*loc. cit.*) that coupling is difficult with derivs. contg. Et groups in the 3-position. C. C. Davis

**Benzoyl derivatives of indigo.** II. Henri de Diesbach, Edouard de Bic and Fritz Rubli. *Helv. Chim. Acta* 17, 113 28(1934); cf. C. A. 27, 2149.—The melt from the alk. fusion of 20 g. of Ciba yellow (I) in 100 g. NaOH at 270–320° in a Cu or Ni crucible was poured onto a metal plate. The cold mass from 5 such operations was powd. and digested with 500 cc. of cold  $\text{H}_2\text{O}$ . The residue was extd. with 2 l. of cold  $\text{H}_2\text{O}$ , centrifuged and washed (voln. II). The insol. portion was digested with dil. HCl, yielding a mother liquor (III) and 52 g. of an acid-insol. residue (IV). On acidification II pptd. 22 g.  $\text{BzOH}$ , 8 g.  $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$ , and 4 g. of a yellow product (V). Neutralization of III with excess  $\text{NH}_4\text{OH}$  gave 11 g. of a substance (VI). There were also present as by-products 0.5 g. of  $\text{o-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$  (VII) and 0.5 g. of an unknown alkali-sol. base. VI,  $\text{C}_{11}\text{H}_{10}\text{N}_2$ , m. 332° (mononstro deriv.,  $\text{C}_{11}\text{H}_9\text{N}_2\text{O}_3$ ), is probably a 3,4-indoloquinoline since on oxidation with  $\text{CrO}_3$  in glacial AcOH it gives 3,4-pyrroloquinoline-2',3'-dicarboxylic acid,  $\text{C}_{11}\text{H}_8\text{N}_2\text{O}_4$ , m. 325° (decompn.), decarboxylated by sublimation *in vacuo* at 325° to 3,4-pyrroloquinoline (VIII),  $\text{C}_{11}\text{H}_8\text{N}_2$ , m. 293–4°. Oxidation of VIII by  $\text{KMnO}_4$  gave a good yield of oxalylanthranilic acid, transformed by alk. sapon. into VII, proving that all the above derivs. have a quinoline nucleus in which the benzene ring is unsubstituted. Oxidation of VIII with  $\text{HNO}_3$  (d. 1.4) yielded 4-hydroxy-3-quinolinecarboxylic acid and thus the junction of the C atoms between the quinolinic and pyrrole nuclei is in position 3. The main product IV, 3,4-(*N*-hydroxyindolo)-2-hydroxyquinoline,  $\text{C}_{11}\text{H}_{10}\text{N}_2\text{O}_3$ , in. above 430°; dinitro deriv.,  $\text{C}_{11}\text{H}_8\text{N}_4\text{O}_6$ , was oxidized by  $\text{KMnO}_4$  to oxalylanthranilic acid and on treatment with  $\text{PCl}_5$  in  $\text{PhNO}_2$  yielded 3,4-(*N*-chloroindolo)-2-chloroquinoline, transformed by heating with a little  $\text{PhNH}_2$  in benzene to 3,4-(*N*-anilinoindolo)-2-chloroquinoline,  $\text{C}_{21}\text{H}_{14}\text{N}_2\text{Cl}$ , m. 195°, and on boiling in  $\text{PhNH}_2$  to 3,4-(*N*-anilinoindolo)-2-anilinoquinoline,  $\text{C}_{21}\text{H}_{16}\text{N}_4$ , m. 284°. The verity of these formulations is based on the well-established structure of VIII. The different results obtained by Hope and Richter (C. A. 27, 506) are attributed to the use of a steel tube in making the fusion, provoking a reduction of I to Höchst yellow which on alk. cleavage gives VII. The results of H. and R. are valuable since they demonstrate the smallness of the differences between the various products of the reaction of  $\text{BzCl}$  on indigo. Höchst yellow R (IX), m. 354°, prepd. by the action of cold  $\text{H}_2\text{SO}_4$  on the Dessoulay compd. was fused at 255° with NaOH. The cold mass was dissolved in  $\text{H}_2\text{O}$ , filtered and acidulated with HCl. The cryst. HCl salt in  $\text{H}_2\text{O}$  was neutralized with  $(\text{NH}_4)_2\text{CO}_3$  and the base on crystn. from alc. gave the 3-hydroxy-2-phenylquinoline-2'-carboxylic acid lactone (X),  $\text{C}_{16}\text{H}_{12}\text{NO}_3$ , m. 248°, which on methylation with  $\text{Me}_2\text{SO}_4$  in NaOH gave Me 3-hydroxy-2-phenylquinoline-2'-carboxylate,  $\text{C}_{17}\text{H}_{14}\text{NO}_3$ , m. 189°. Two varieties of IX are known and the interruption of the alk. fusion at 140° gives a 3rd form in which the OH group has migrated from position 4 to position 3 in the quinoline nucleus. Alk. fusion of Höchst yellow U (XI), m. 288 4°, prepd. by heating IX in concd.  $\text{H}_2\text{SO}_4$  on the steam bath, yields 1 mol. of VII and 1 mol. of X. Thus XI differs entirely from I although they have almost identical reactions. Since on alk. fusion XI gives VII and I yields VI it is possible to det. the proportion of a mixt. of the 2 dyestuffs. The above facts permit the provisional establishment of formulas for the different derivs. obtained by the action of  $\text{BzCl}$  on indigo. The monobenzoylindigo formed rearranges in acid soln. to generate with the indoxylated an C atom a new hexagonal nucleus. The nuclei of the quinoline deriv. thus formed are open and at this stage, according to the conditions of the expt., the II

atom attached to the N atom may be benzoylated, eliminated or may migrate. Structural formulas are given for I, its dihydrate and vat, for IX, XI and its vat and for the Dessoulay compd. The formation of VI and IV by alk. fusion of I is explained by a mechanism consisting of an internal condensation followed by elimination of  $\text{H}_2\text{O}$  or by oxidation, and the relation between I with its characteristic double bond and compds. of the Höchst yellow type is demonstrated. C. R. Addinall

**Raman spectra of organic heterocyclic compounds** M. Milone and G. Müller. *Atti accad. sci. Torino Class. sci. fis., mat., nat.* 68, 337–43(1933).—See C. A. 27, 5000.

A. W. Coniery

**The constitution of certain disubstituted thiazolidones** Walter S. Long and F. B. Daus. *Trans. Kansas Acad. Sci.* 36, 119–24(1933)(reprint).—Digestion of 1 mol. KSCN and 1 mole  $\text{ClCH}_2\text{CONHAr}$  (Ar = aryl group) in boiling alc. gives thiazolidones (I). Soln. of I in 20% NaOH followed by refluxing 10 g. of the resulting Na salts with 5 cc. EtI in 75 cc. alc. yields Et derivs. of I,  $\text{S.C}(\text{NEtAr})\text{N.CO.CH}_3$  (II) and, in some cases,

$\text{S.C}(\text{NAr})\text{NEt.CO.CH}_3$  (III). These structures are shown by hydrolysis and identification of the arylamines formed (cf. Wheeler and Johnson, *Am. Chem. J.* 28, 121 46(1902)). Hence the structure  $\text{S.C}(\text{NEt})\text{NAr.CO.CH}_3$  of Beckurts and Frerich (C. A. 10, 888) is incorrect. Thiazolidones (I) and their type II derivs. were prepd with the following Ar groups: *o*-nitrophenyl (Et deriv.) *m*-nitrophenyl, m. 200° (Et deriv.); *p*-nitrophenyl (IV) (Et deriv., m. 126°;  $\text{PhCH}_2$  deriv., m. 135°); 2-nitro *p*-tolyl (V), m. 182° (Et deriv.); 3-nitro-*p*-tolyl, m. 206° (Et deriv., m. 142°); 4-nitro-*o*-tolyl (VI), m. 172° (Et deriv., m. 129°). IV, V and VI also give Type III Et derivs., m. 131–2°, — and 86°, resp. H. A. Beatty

**Derivatives of tetrahydropyran.** R. Paul. *Compt. rend.* 198, 375–6(1934).— $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{O})\text{CH}_3$  (I) gave with Br at  $-15^\circ$ ,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$  (II); with gaseous HBr, it gave  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$ , b<sub>18</sub> 61°, which rapidly undergoes decompn. and resinifies. II on distn. over a long column gave  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$  (III), b<sub>22</sub> 63° (cor.). I in contact with air gave  $[\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{Br})\text{CH}_3]\text{O}$ , m. 110°. Julius White

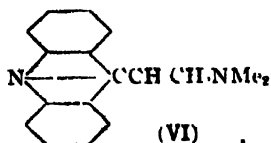
**$\alpha$ - and  $\beta$ -Cinenic acid.** Constitution of  $\beta$ -cinenic acid. H. Rupe and H. Hirschmann. *Helv. Chim. Acta* 17, 98 105(1934); cf. C. A. 27, 3705.—The oxidation of 75 g. freshly distd.  $\beta$ -cinenic acid (I), carefully purified from the Ca salt, with 4%  $\text{KMnO}_4$  gave 4 g. of a mixt. of lower fatty acids,  $\text{HCO}_2\text{H}$ , AcOH and probably some valeric acid, 7 g. of  $\alpha$ -cinenic acid (II) and 4 g. of a mixt. of higher-boiling acids (III). The remainder of the material seems to have been destroyed. MeAc was detected and identified as the phenylsemicarbazone. By conversion into the Ag salt III was shown to be a mixt. of I and cinogenic acid recognized by its characteristic Co salt (*Ber.* 34, 2199(1901)). More conclusive evidence as to the constitution of I was given by ozonization which generated the lactone of  $\alpha$ -methyl- $\alpha$ -hydroxyglutaric acid ( $\alpha$ -methylparaconic acid),  $\text{O.CO.CH}_2\text{CH}_2\text{CMeCO}_2\text{H}$ , m. 68–70°, identical with the synthetic acid (*Ber.* 14, 1780(1881)). The 2 main degradation products resulting from the elimination of  $\text{CO}_2$  from cineolic acid are cinenic acid (2,6,6-trimethyl-tetrahydropyran-2-carboxylic acid), formerly termed  $\alpha$ -cinenic acid, and 1,5-dimethyl-1-hydroxyheptene-4-carboxylic acid. The designation  $\beta$ -cinenic acid should not be retained since the compd. no longer contains the pyran ring of cineolic acid. C. R. Addinall

**Quinoline derivatives.** XLIII.  $\alpha$ -Alkylated 2-phenyl 4-quinolylaminoacetic acids. Hanns John and Ernst



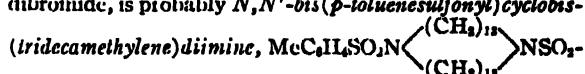
Pietsch. *J. prakt. Chem.* 139, 183-8 (1933); cf. *C. A.* 28, 1702<sup>2</sup>.—2-(4-Aminophenyl)quinoline (I) (2 g.) and 4.5 g. 126-8% NaCN in 20 cc. EtOH, heated 10 hrs. on the water bath, during which 10 cc. 40% HCHO is added, the soln. evapd. to dryness, taken up in 200 cc. H<sub>2</sub>O, made alk. with 2 N NaOH and acidified with (CO<sub>2</sub>), give 2 g. 2-phenylquinolyl-4'-β-aminoacetic acid, C<sub>14</sub>H<sub>11</sub>NC<sub>6</sub>H<sub>4</sub>NHCH<sub>2</sub>CO<sub>2</sub>H (II), red, m. 218°; *Me* ester, m. 152°; *Et* ester, m. 144°. Heating II above its m. p gives 2-(4'-methylaminophenyl)quinoline, yellow, m. 83°; *picrate*, m. 186°. I (3 g.) and 1 g. MeCH<sub>2</sub>BCO<sub>2</sub>II, heated 6 hrs. at 140°, give 1.1 g. of 2-phenylquinolyl-4'-β-(α-methyl)aminoacetic acid, C<sub>15</sub>H<sub>13</sub>NC<sub>6</sub>H<sub>4</sub>NHCH<sub>2</sub>CHMeCO<sub>2</sub>II, light red, m. 215-7°; *Et* ester, m. 86°; heating gives 2-(4'-ethylaminophenyl)quinoline, light yellow, m. 110°. The α-*Et* deriv. of II, orange, m. 187°; the α-*di-Me* deriv. of II, m. 192-5°; the α-*Pr* deriv., m. 163-5° (*Et* ester, m. 108°); α-*iso-Pr* deriv., m. 180-2°; α-pentadecyl deriv., m. 127-8° (*Et* ester, m. 65°). C. J. West

Some derivatives of acridine. Lydia Monti with Mario Procopio. *Gazz. chim. ital.* 63, 724-30 (1933).—The new compds. were prepd. with a view to their utilization in the treatment of malaria (cf. Frankel, *Die Arzneimitel Syntese*, *C. A.* 22, 1216). It was found possible to prep. by 2 different methods compds. with an acridine (I) nucleus and a basic function in a side chain. *Method 1.*—The CH<sub>2</sub>NH<sub>2</sub> group was introduced in the I nucleus by the condensation reaction of methylolamides with aromatic compds. (cf. *Ann.* 343, 207 (1906); *M.*, *C. A.* 27, 508). Condensation is somewhat difficult because there are no groups in I to activate the reaction, but compds. of the (C<sub>13</sub>H<sub>9</sub>N)CH<sub>2</sub>NHCOR type are obtained, which are readily sapond. in acid medium. I and methylolchloroacetamide in concd. H<sub>2</sub>SO<sub>4</sub> yield chloroacetylacridylmethylamine, (C<sub>13</sub>H<sub>9</sub>N)CH<sub>2</sub>NHCOCH<sub>2</sub>Cl (II), yellowish, m. 172-4°; its solns. in AcOH have a green-yellow fluorescence. Likewise I and methylolbenzamide form benzoylacridylmethylamine, (C<sub>13</sub>H<sub>9</sub>N)CH<sub>2</sub>NHIBz (III), ivory color, m. 162-4°. II or III, refluxed with 20% HCl, gives a product which is unstable in air, but the free base dissolved, immediately after pptn., in dil. AcOH, forms with picric acid (IV) acridylmethylamine monopicrate, (C<sub>13</sub>H<sub>9</sub>N)CH<sub>2</sub>NH<sub>2</sub>(C<sub>6</sub>H<sub>3</sub>O<sub>3</sub>N<sub>3</sub>), lemon-yellow, m. 202-4° (decompn.). In alk. medium, the sapon. of II and III proceeds abnormally, with decompn. to NH<sub>3</sub> and HCHO. The general behavior of II and III is therefore similar to that of other acylamines formed by condensation of methylolamides with hydroxyquinolines (cf. *M.*, *loc. cit.*). Attempts were not made to establish at what point in the I nucleus the CH<sub>2</sub>NH chain enters, but it is probable that it takes place at the 9-position, i. e., at the II atom which is activated by the N in *p*-position. *Method 2.* HCHO and primary and secondary amines are condensed with compds. contg. H atoms rendered mobile by the proximity of special groups, thus: =CH<sub>2</sub> + CH<sub>2</sub>(OH)<sub>2</sub> + RR'-NH → =CHCH<sub>2</sub>NRR' + 2H<sub>2</sub>O. 9-Methylacridine (V) in concd. HCl, aq. HCHO and HNMe<sub>2</sub>, refluxed and poured into water, yield a greenish brown secondary product, while the mother liquor made alk. with NH<sub>4</sub>OH yields an Et<sub>2</sub>O-insol. cryst. *N*-dimethyl-9-acridylethylamine (VI), very unstable in air. With dil. HCl, it forms its *HCl* salt, C<sub>17</sub>H<sub>15</sub>N<sub>2</sub>·2HCl·2H<sub>2</sub>O, canary-yellow, m. 185-90° (decompn.), which with aq. IV forms a *monopicrate*, C<sub>17</sub>H<sub>15</sub>N<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(NO<sub>3</sub>)<sub>3</sub>·OH, bright yellow, m. 130-5° (decompn.). Likewise V, HCHO and C<sub>6</sub>H<sub>5</sub>NH form *p*-iperidinoacridyl-9-ethylamine (VII), which is also unstable in air. Its *HCl* salt, C<sub>20</sub>H<sub>23</sub>N<sub>2</sub>·2HCl·H<sub>2</sub>O (VIII), canary-yellow, m. 169-70° (decompn.). Addn. of satd. aq. IV to VIII ppts. a *dicpicrate*, C<sub>20</sub>H<sub>23</sub>N<sub>2</sub>[C<sub>6</sub>H<sub>3</sub>(NO<sub>3</sub>)<sub>3</sub>OH]<sub>2</sub>, of VII, lemon-yellow, m. 138-40°.



(VI) C. C. Davis

Polymembered cyclic compounds. VIII. Cyclobis-(tridecamethylene)diimine, and remarks on the preparation of hexamethylenimine. Adolf Müller, Erich Rölz and Michael Wiener. *Ber.* 67B, 295-300 (1934); cf. *C. A.* 27, 701; Ruzicka *et al.*, *C. A.* 28, 1346<sup>1</sup>; Ziegler and Orth, *C. A.* 28, 1019<sup>2</sup>.—Methods of prep. erucic acid, m. 32°, and di-Me brassylate, b<sub>10</sub> 170-210°, are described. The latter is reduced with Na and alc. to tridecane-1,13-diol, m. 74°, from which is prepd. 1,13-dibromotridecane. This, refluxed with 1 mol. *p*-MeC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NH<sub>2</sub> and 2 mols. KOH in aq. alc., yields 0.8% of a compd. (I) m. 162-3° and 4.7% of a compd. (II) m. 92°. II is *N,N'*-bis(*p*-toluenesulfonyl)-1,13-diaminotridecane and is hydrolyzed by concd. HCl at 160-70° to the bis(*p*-toluenesulfonate), C<sub>17</sub>H<sub>34</sub>O<sub>4</sub>N<sub>2</sub>S<sub>2</sub>, m. 198° (cor.), of 1,13-diaminotridecane, b<sub>10</sub> 172-3°, m. 51° (cor., evacuated capillary), absorbs CO<sub>2</sub> from the air; chloroaurate, yellow, decomp. about 180°; chloroplatinate, light red-yellow, decomp. about 225°; *picrate*, yellow, m. 45-6° (cor.); *N,N'*-di-Bz deriv., m. 124-5° (cor.). Tridecane-1,13-bis(phenylthiourea), m. 118-19°, from the amine and PhNCS in alc. 1,13-Bis(phthalimido)tridecane, from the dibromide and C<sub>6</sub>H<sub>4</sub>(CO)NK, decomp. 321-4°, gives with concd. HCl at 200° the di-HCl salt, decomp. 321-4°, of II. I, which shows a mol. wt. of 654-74 in PhOH, CHCl<sub>3</sub> or pinene dibromide, is probably *N,N'*-bis(*p*-toluenesulfonyl)cyclobis-



C<sub>6</sub>H<sub>4</sub>Me; with HCl at 155° it yields the free diimine, b<sub>0-01</sub> 183-5°, m. about 52°, difficultly sol. in water with strong alk. reaction; the *HCl* salt, chloroaurate and *picrate* crystallize well and have high m. or decompn. points; *N,N'*-di-Bz deriv., m. 95° (cor.), mol. wt. in pinene dibromide 599-608 (like I, it gives a much lower mol. wt. (458) in camphor); *N,N'*-bis(benzenesulfonyl) deriv., is apparently dimorphous, sepg. from aq. acetone in crystals sintering 111°, m. 122-2° (cor.), and m. 111° after rapid cooling. Z. and O. improved the yield of hexamethylenimine by using very dil. solns., but M. had already shown that better yields are obtained in dil. soln. C. A. R.

Alkaloids of Anabasis aphylla. VII. Amination of anabasine and *N*-methylanabasine with sodamide. G. Menshikov, A. Grigorovich and A. Orechov. *Ber.* 67B, 289-92 (1934); cf. *C. A.* 27, 3217. Anabasine in boiling xylene with NaNH<sub>2</sub> gives, together with much resinous material, about 5% aminoanabasine, presumably CH<sub>3</sub>CH<sub>2</sub>C(=O)CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub> (I), m. 111°. Probably

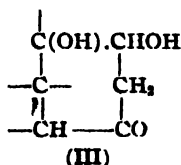
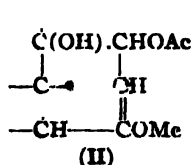
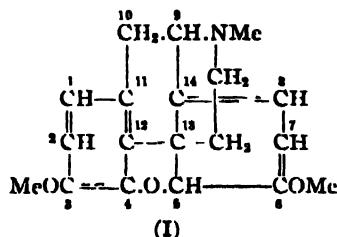
CH<sub>3</sub>NH--CNH<sub>2</sub>NH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub> it is the secondary NH which is responsible for the resinification, for *N*-methylanabasine reacts much more smoothly, giving 45-50% of a mixt. of 2 amino derivs.; II, b<sub>10</sub> 100-2°, m. 95-5.5° (*picrate*, m. 234-5° (decompn.)), and III, b<sub>10</sub> 140-63° (*HCl* salt, rapidly deliquesces in the air; *picrate*, m. 220-1°). That II is the *N*-Me deriv. of I was shown by converting II in HCl with NaNO<sub>2</sub> into α-chloro-*N*-methylanabasine (61% yield), b<sub>10</sub> 145-6°, which with KMnO<sub>4</sub> gave α-chloronicotinic acid, m. 192°. III is probably the α'-amino isomer of II. The amination is accompanied by complete racemization; both the amino derivs. and the parts of the original bases which have not reacted with the NaNH<sub>2</sub> are optically inactive.

C. A. R.  
Cactus alkaloids. XI. A new synthesis of pellotine. Ernst Spath and Friedrich Becke. *Ber.* 67B, 286-8 (1934); cf. *C. A.* 28, 1706<sup>2</sup>.—Gallacetophenone 3,4-di-Me 2-benzyl ether, m. 47-8.5° (all in ps. in evacuated tubes), obtained in 76% yield from 2,3,4-HO(MeO)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>COMe in NaOMe soln. refluxed to neutral reaction with PhCH<sub>2</sub>Cl, gives with a 50% excess of H<sub>2</sub>NCH<sub>2</sub>CH(OR)<sub>2</sub> at 165-73° of the Schiff base, PhCH<sub>2</sub>O(MeO)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>CMc:NCH<sub>2</sub>CH(OR)<sub>2</sub>, b<sub>0-01</sub> 180-200° (bath temp.), 22 g. of which, shaken 2 days at 15-20° with 73% H<sub>2</sub>SO<sub>4</sub>, dild. with water and heated 1 hr. at 50°, yields 1.5 g. 6,7-dimethoxy-8-hydroxy-1-methylisiquinoline, m. 180-2°; the methiodide, m. 188-9.5°, of the latter on reduction with Sn and HCl

gives pellotine, m. 110-12°, identical with the natural product (mixed m. p.). C. A. R.

**Constitution of isochondodendrine.** VI. Franz Faltis and Hermann Dieterich. *Ber.* 67B, 231-8(1934); cf. C. A. 26, 5304.—The various structures of isochondodendrine (I) (doubled mol.) suggested in the earlier paper were all based on the assumption that the  $\text{HO}_2\text{CC}_6\text{H}_4\text{O}(\text{MeO})_2\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$  obtained in about 33% yield by oxidative degradation of the N-free product of the 2-fold Hofmann degradation of I is the only product of the degradation. The correctness of this assumption is proved by the present work. From 8.5 g. of the inactive methine base,  $\alpha$ -isochondodendrimethine, m. 205°, ozonized in dil.  $\text{H}_2\text{SO}_4$ , shaken with Pt sponge to destroy the  $\text{H}_2\text{O}_2$ , treated with H and Pd-BaSO<sub>4</sub> to reduce the aminoxide or peroxide, made alk. and at once extd. with  $\text{CHCl}_3$  and heated with MeI on the water bath, was obtained 11.13 g. of the *methiodide*,  $\text{C}_{21}\text{H}_{35}\text{O}_5\text{NI}$ , of the expected dimethylaminodialdehyde. The corresponding quaternary chloride is smoothly broken down by boiling 5% alkali into NMe<sub>3</sub> and an oily *o*-vinylaldehyde which in AcOH gives the characteristic indigoblue color with concd.  $\text{H}_2\text{SO}_4$  and with Pd-charcoal takes up 2 atoms O, but attempts to oxidize it to the dicarboxylic acid gave unsatisfactory results. However, when the quaternary chloride was treated in water with excess of  $\text{KMnO}_4$  at 20° and boiled with 5% alkali it gave pure *5-vinyl-2,3-dimethoxy-1,1'-diphenyl ether-6,4'-dicarboxylic acid* (66% based on the methine, 75% based on the methiodide), m. 192°. This yield of far more than 50% proves beyond doubt that the mol. of I is composed of 2 identical parts. Decarboxylation of the acid in boiling quinoline with Naturkupfer C gave 55.5% of oily vinyl-dimethoxydiphenyl ether, which, without further purification, was oxidized in cold acetone with  $\text{KMnO}_4$ , giving 61% *2,3-dimethoxy-1,1'-diphenyl ether-5-carboxylic acid*, m. 161°, whose *Me ester* (prepd. with  $\text{CH}_3\text{N}_3$ ), m. 69°; the structure of the latter was proved by synthesis of the ester from 5-bromoprotocatechuic acid condensed with PhOK in the presence of Cu at 180°. C. A. R.

**Oxidation of thebaine with manganic acetate.** F. Vieböck. *Ber.* 67B, 197-202(1934).—When treated with  $\text{Mn}(\text{OAc})_4$ , bixin very rapidly uses up 1 or 2 atoms O depending on the solvent, 1 HO and 1 AcO group per atom O being added at a double bond. In the presence of  $\text{Ac}_2\text{O}$  with 2 atoms O, only a triacetate is formed; hence 1 of the HO groups is not esterifiable, probably because of its tertiary nature. On further degradation by the Criegee glycol cleavage with  $\text{Pb}(\text{OAc})_4$  after complete hydrogenation and sapon. of the Ac groups, the mol. breaks down in the middle, proof that it is the middle double bond which the  $\text{Mn}(\text{OAc})_4$  has attacked. The work with bixin was discontinued because of lack of material, but thebaine (I), which, according to Schöpf, has 2 conjugated double bonds, behaves in the same way, adding HO and AcO at the 8,14-double bond and forming a cryst. *buse* (II), m. 198° (Cu block). II heated a short time with 20% HCl yields a *base* (III), m. 171° (Cu block), together with a little hydroxycodone (IV); on longer heating both II



and III give IV almost exclusively, which is also formed from III with hot alc. KOH. In spite of its close relationship to IV, III is insol. in alkalis, i. e., it is not a phenol. III, as a 1,2-glycol, should undergo ring cleavage with  $\text{Pb}(\text{OAc})_4$ , but in the expts. thus far made only a little unchanged III has been obtained; the N ring seems also to be split off and no aldehyde reaction with fuchsin-SO<sub>2</sub> can be obtained.  $\text{Pb}(\text{OAc})_4$  reacts like  $\text{Mn}(\text{OAc})_4$  with I, but the working up of the products is more difficult and the yields are poorer. The reaction of  $\text{Mn}(\text{OAc})_4$  with codeine and IV is entirely different; apparently only the N ring is ruptured. *Oxime* of III, m. 212-15°, is sol. in alkalis. C. A. R.

**Oxidation of strychnine.** Preliminary note. Alessandro Bernardi. *Atti IV Congr. nas. chim. pura appl. cala* 1933, 389.—The literature is reviewed. The reactions  $2\text{H}_2\text{CrO}_4 + 6\text{AcOH} + \text{C}_{21}\text{H}_{33}\text{N}_2\text{O}_4 = \text{C}_{21}\text{H}_{33}\text{N}_2\text{O}_4 + 2\text{Cr}(\text{OAc})_3 + 6\text{H}_2\text{O}$ , and  $10\text{H}_2\text{CrO}_4 + 30\text{AcOH} + 6\text{C}_{21}\text{H}_{33}\text{N}_2\text{O}_4 = 3\text{C}_{21}\text{H}_{33}\text{N}_2\text{O}_4 + 10\text{Cr}(\text{OAc})_3 + 28\text{H}_2\text{O}$  are possible. Ultimate analyses of the products of oxidation are given, without wholly conclusive results. K. M. S.

**Resins and resinous substances.** IX.  $\beta$ -Amyrin from Manila elemi resin. 6. Alexander Rollett and Rudolf Petter. *Monatsh.* 63, 311-16(1933); cf. C. A. 26, 4910. The action of  $\text{O}_2$  on  $\beta$ -amyrin benzoate (I) at room temp gives a small yield of a *peroxide*,  $\text{C}_{27}\text{H}_{44}\text{O}_4$  (II), m. 333°; the yields decrease with the time of action of  $\text{O}_2$ . II liberates I from acidified KI-I. Hydrolysis of II gives oxy- $\beta$ -amyrin. I appears to take up 14 atoms of Br, while  $\beta$ -amyrin takes up 12 atoms; there probably result mixts of Br derivs. C. J. West

**Convallarin.** Josef Lindner and Alois Torggler. *Monatsh.* 63, 335-46(1933); cf. C. A. 9, 1760.—Convallarin is a mixt., as shown by its behavior with  $\text{CHCl}_3$ ,  $\text{AcOEt}$  and  $\text{H}_2\text{O}$ .  $\text{AcOEt}$  exts. about 45%,  $\text{H}_2\text{O}$  about 60% of the original material. C. J. West

**Lusitanicoside.** H. Herisev. *Compt. rend* 198, 265-6 (1934).—Hydrolysis of *lusitanicoside* with dil.  $\text{H}_2\text{SO}_4$  gives an *aglucone* (I) and a mixt. (equimol.) of glucose and rhamnose. I gives a cryst. *Br deriv.* and a *Me deriv.* identified as *estrangle*. It is concluded that *lusitanicoside* is  $\text{C}_{21}\text{H}_{38}\text{O}_{10}$ . W. J. Peterson

**Two kinds of saponins of soy beans.** Koji Okano and Iwao Ohara. *J. Agr. Chem. Soc. Japan* 9, 1249-58, *Bull. Agr. Chem. Soc. Japan* 9, 177-80(1933).—An ext. of soy bean, from which the bean oil had been sepd., was mixed with NaCl soln. The ppt. resulting was extd. with ether and the residue was repeatedly recrystd. from 80% alc. Crystals, m. 225-7°, were obtained. The compd. was identified with Sumiki's saponin. From the mother liquor, an amorphous saponin, m. 216-18°, was isolated. The formulas  $\text{C}_{48}\text{H}_{77}\text{O}_{19}$  and  $\text{C}_{48}\text{H}_{75}\text{O}_{19}$ , resp., are given to the 2 saponins. The hydrolytic products of the cryst. saponin were a sapogenin  $\text{C}_{26}\text{H}_{42}\text{O}_8$ , glucuronic acid, galactose and rhamnose. A sapogenin  $\text{C}_{21}\text{H}_{32}\text{O}_4$ , glucuronic acid, galactose and rhamnose were isolated from the amorphous saponin by hydrolysis. Five isomers of sapogenin, viz., a yellow amorphous powder, m. 201°, needles, m. 235°, needles, m. 239°, needles, m. 260°, and prisms, m. 248-9°, were isolated according to the length of the time used for the hydrolysis. Methane and ethane were evolved on heating these saponins and sapogenins with CuO or  $\text{PbCrO}_4$ . These saponins have no hemolytic power. Y. Kihara

**Santonin series.** XIX. Behavior of santonin acid on oxidative degradation. Edgar Wedekind and Irmgard Jackh. *J. prakt. Chem.* 139, 129-40(1934); cf. C. A. 28, 1709.—Santonin acid (I) (3 g.) in 50 cc. 2% KOH and 20 cc.  $\text{H}_2\text{O}_2$  in 20 cc.  $\text{H}_2\text{O}$  gave after 24 hrs. 0.86 g. of *apocantonin acid* (II),  $\text{C}_{14}\text{H}_{20}\text{O}_5$ , m. 164-5°,  $[\alpha]_D^{25} + 98.93^\circ$  (0.8592% in MeOH); *oxime*, decomp. 185-6°. Catalytic reduction of II gives a *dihydro deriv.*, decomp. 205-6°; *oxime*, decomp. 188-9°. Oxidation of 5 g. of II with  $\text{CrO}_3$  in AcOH gives 0.7 g. of a diketolactone,  $\text{C}_{14}\text{H}_{18}\text{O}_4$ , m. 159-60° (*oxime*, decomp. 228°); aq. KOH gives the acid,  $\text{C}_{14}\text{H}_{18}\text{O}_5$ , decomp. 200-2°. Oxidation of 25 g. of I with KBr gives 7.2 g. of a *hydroxysantonin acid* (III),  $\text{C}_{14}\text{H}_{18}\text{O}_6$ , decomp. 215°,  $[\alpha]_D^{25} + 15.63^\circ$  (0.906% in MeOH).

*Me ester*, m. 87–90° (decompn.); *di-Ac deriv.*, decompn. 192° (*Me ester*, m. 142°). With KOH III gives an acid,  $C_{15}H_{10}O_6$ , m. 198°. Oxidation of I with  $O_3$  did not give cryst. products. Santonic acid,  $C_{15}H_{10}O_6$ , distd. with  $Ac_2O$ , gives a ring ketone,  $C_{15}H_{10}O_4$ , m. 203–4°, whose oxime decompn. 223°. The oxime of I and  $NaNO_2$  in  $AcOH$  give hydroxamic santolic anhydride, decompn. 245°, which yields with 1:1  $H_2SO_4$  santolic acid, decompn. 178–80°; this also results from the oxime of I and 25%  $H_2SO_4$ . *Dihydrosantolic acid* decompn. 160°. C. J. W.

**Criteria for the purity of crystalline digitalin (digitoxide).** R. Charonnat and L. Deglaude. *Compt. rend.* 198, 470–8 (1934).—C. and D. suggest the use of rotatory power as a criterion for the purity of digitalin. The values obtained at 10° were: in  $CHCl_3$ ,  $[\alpha]_{D10}^{20}$  18.2°,  $[\alpha]_{D10}^{25}$  21.1°,  $[\alpha]_{D10}^{30}$  28.0°; in  $C_6H_5N$ ,  $[\alpha]_{D10}^{25}$  —5.7°; in dil.  $HCl$   $[\alpha]_{D10}^{25}$  22.5°. Julius White

**Chlorophyll a. V. Its phase-positive derivatives and allomerization.** Arthur Stoll and Erwin Wiedemann. *Helv. Chim. Acta* 16, 739–72 (1933); cf. C. A. 27, 4806.—Polymers against H. Fischer. Chlorophyll a and b, m. 130–3° (decompn.) and 183–5° (decompn.), resp., have Willstätter's formulas. Details are given for the prepn. and previously recorded properties of benzoyl- (I), benzoyl-methyl-, benzylphytyl-, and methyl-pheophorbide a (oxime), allomerized pheophorbide a (II) (oxime), proto-pheophorphyrin a (Bz deriv., also prepd. from I; oxime) [by catalytic reduction of II and  $HI-AcOH$  reduction of allomerized I] and its allomerization product (=pheophorphyrin a) (oxime). New spectroscopic data and the method of obtaining them in test tubes are described. B. C. A.

**Constitution of picrocrocin and its relationship to the carotene pigments of saffron.** Richard Kuhn and Alfred Winterstein. *Ber.* 67B, 344–57 (1934).—See C. A. 28, 1612.

**Rubixanthin, a new xanthophyll with the formula  $C_{42}H_{56}O_6$ .** Richard Kuhn and Christoph Grundmann. *Ber.* 67B, 339–44 (1934).—*Rubixanthin* (I) is the 1st xanthophyll which corresponds spectroscopically to  $\gamma$ -carotene (C. A. 27, 2688). It is found, together with considerable amts. of lycopene and carotenes, in the haws; the ripe fruits of *Rosa rubinosa* are especially well adapted to its prepn. Its sepnd. was made possible by chromatographic adsorption analysis; of all epiphasic carotenoids I is the most easily adsorbed on  $Al_2O_3$  and by virtue of this property it can be sepnd. from  $\gamma$ -carotene as easily as from lycopene and the other carotenes. Its adsorption behavior is very similar to that of kryptoxanthin, and artificial mixts. of the 2 substances cannot be sepnd. quantitatively with either  $Al_2O_3$  or  $CaCO_3$ ; I accumulates in the upper, kryptoxanthin in the lower part of the homogeneously brown-red adsorption zone. I seps. from  $C_6H_5MgOH$  in needles with Cu luster (microphotographs are given), m. 160° (Berl.); the absorption maxima ( $m\mu$ ) are 333, 494, 461 in  $CS_2$ , 509, 474, 439 in  $(CHCl_3)$ , 496, 463, 433 in abs. alc., 495.5, 463, 432 in benzene (b. 70–80°), 494, 462, 432 in hexane; it takes up 12 mols.  $H_2$  on catalytic hydrogenation and gives 0.94 mol. acetone on  $O_3$  degradation. I is therefore probably a *hydroxy- $\gamma$ -carotene*, with the  $HO$  on the C ring; daily doses of 20 $\gamma$  have no growth effect on rats on a vitamin A-free diet. Although the suggested formula contains an asym. C atom, I is optically inactive ( $[\alpha]_{D20}^{25} = 10^\circ$  in benzene). Quant. analysis of various haws showed the following amts. (mg.) of various components in 100 g. of the fresh fruits of *R. canina* and *R. rubinosa*, resp.: xanthophyll esters 3.1, 2.35; carotenes 2.55, 2.3; lycopene 1.6, 2.75; I 1.35, 1.25. C. A. R.

**The pigment of the sunflower. II.** L. Zechmeister and P. Lutzon. *Ber.* 67B, 170–3 (1934); cf. C. A. 25, 2433.—A further investigation of this pigment has confirmed the earlier observations as to the chief constituent (I) except that the rotation is about twice as high as had been reported and agrees well with the value for lutein,  $C_{40}H_{56}O_6$ , from egg yolk. By the Twett chromatographic adsorption method there has also been obtained, along with insignificant amts. of various polyenes (possibly including violaxanthin), relatively much taraxanthin,  $C_{40}H_{56}O_6$  (II),

1 which can be very easily isolated; when the proper chromatographic zone of the sapond. crude ext. is merely elutriated, transferred to ether and concd., almost pure II crystallizes out directly. I m. 183° (cor., Berl block),  $[\alpha]_{D20}^{25}$  136° ( $AcOEt$ ), 162° ( $CHCl_3$ ),  $[\alpha]_{D20}^{25}$  145° ( $AcOEt$ ), absorbs in  $CS_2$  at 517.5–500.5 and 484.5–469  $m\mu$ , seps. from hot  $MeOH$  in ochre-yellow crystals which on cooling change into leaflets with metallic luster. II, brownish yellow prisms or plates, m. 184° (Berl block). C. A. R.

**Nucleic acids. III. The ring structure of ribose in yeast nucleic acid.** Hellmut Bredereck. *Z. physiol. Chem.* 223, 61–5 (1934); cf. C. A. 27, 2156.—The furanose structure of cytidine, adenosine and inosine is demonstrated by the prepn. of trityl derivs. The nucleotides in pyridine soln. condense with  $Ph_3CCl$  to yield cryst. products which are not hydrolyzed by alc. KOH, hence the substitution occurs on the primary  $OH$  of the 5-C atom of the ribose and not on the  $NH_2$  of the pyrimidine. The derivs. described are *tritylcytidine* (1  $KtOH$  of crystn.) m. 255–7°,  $[\alpha]_{D20}^{25}$  —0.7° in pyridine; *trityladenosine*, m. 255–8°,  $[\alpha]_{D20}^{25}$  —8.7° in  $CHCl_3$ , and *tritylinosine*, m. 231–2°. A. W. Dux

**Ring system of sterols and bile acids. IV. Nomenclature of the cholane group.** O. Rosenheim and H. King. *Chemistry and Industry* 1934, 91–2; cf. C. A. 27, 3221.—R. and K. propose a new nomenclature for the sterols and bile acids involving the cholane group. J. White

**Constituents of hornbeam bark.** Otto Brunner and Gertrud Wiedemann. *Monatsh.* 63, 368–73 (1933); cf. Zellner, C. A. 21, 590.—The bark of hornbeam (*Carpinus betulus* L.) (25 kg.), extd. with 96%  $EtOH$ , gave 260 g. of dry ext., which was sapond. with 3 l.  $N EtOH-NaOH$  by heating 12 hrs. on the water bath; 1 l. of  $EtOH$  was distd. off and 3 l. hot  $H_2O$  added; extn. with petr. ether removed the unsaponifiable portion, sepnd. into 2 fractions, easily and difficultly sol. in petr. ether; the latter contained a sterol and a resinol. The sterol m. 132°; its acetate,  $C_{27}H_{48}O_4$ , m. 122°; it does not give a cryst. bromide. The resinol is the same as the betulin from birch bark; it is a dihydroxytriterpene,  $C_{60}H_{100}O_4$ , m. 261°, the crystals with 1 mol.  $EtOH$  m. 258°; the acetate  $C_{60}H_{100}O_4$  m. 221.5–2.0°; boiling with  $HCO_2H$  gives the formate, m. 322°, of allo-resinol, m. 279°. C. J. West

**Bisiminocamphor derivatives with exalted optical activity.** P. C. Guha and S. M. Patel. *Current Sci.* 2, 97–8 (1933).—1,4-Naphthylenebisiminobenzylideneminocamphor (I), contg. 17 conjugated double bonds, has a mol. rotation of 22,050° in pyridine for the Hg yellow line 5780. I was obtained by condensing  $p-AcNHCH_2CH_2CHO$  with  $p-(NH_2)_2C_{10}H_6$ , removing the  $Ac$  groups by dil.  $HCl$  in alc. and condensing the resulting bisaminobenzylidenenaphthylenediamine with camphorquinone. The bisiminocamphor derivs. of  $p,p$ -diaminodiphenylcarbamide and  $p,p$ -diaminodiphenyloxamide show mol. rotations of 8911° and 12,094° in  $CHCl_3$ . R. B.

**Hydrolysis of carbides (Schmahl) 6. Primary photochem. production of some free radicals (Norrish) 3. Covalency, coordination and chelation (Menzies, Overton) 2. Freezing temp. of org. substances (Serwy) 2. Kinetics of the thermal isomerization of cyclopropane (Chambers, Kistiakowsky) 2. Possible application of mol. ray technic to the study of free radicals (Fraser) 3. Chem. action of light on vinyl iodide (Emschwiller) 3. Decompn. of hexane, cyclohexane and  $C_6H_6$  in the pos.-ray tube (Conrad) 3. Free radicals in the elec. discharge (Willey) 3. Relation between constitution and assocn., esp. in reference to aromatic compds. (Bingham, Geddes) 2. Reactions of As, Sb, Sn and Pb org. compds. with  $HgCl_2$  (Nesmeyanov, Kozeshkov) 6. The parachors of some substituted methanes (Hammick, Wilmut) 2. Homogeneous catalysis of stereoisomeric change in oximes (Taylor, Roberts) 2. Electronic levels of polyat. mols. 1. Levels of the  $C=C$  double bond (Snow, Allsopp) 3. App. for production of phthalic anhydride from naphthalene (U. S. pat. 1,945,812) 1. Chloroleucene and H (Belg. pat. 398,222) 4.**

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**Liquid hydrocarbons from ethylene.** Franz Eisenstecken. Ger. 589,914, Dec. 20, 1933 (Cl. 12o. 1.03). Addn. to 588,158 (C. A. 28, 1353<sup>3</sup>). The process of Ger. 588,158 is modified by adding H to the  $C_2H_4$  in addn. to  $SO_2$ , whereby the production of unsatd. liquid hydrocarbons is avoided.

**Purifying hydrocarbons.** Leo D. Jones and Edward M. James (to The Sharples Specialty Co.). Brit. 401,298, Nov. 6, 1933. See Fr. 733,156 (C. A. 27, 730).

**Stabilizing chlorinated aliphatic hydrocarbons.** The Dow Chemical Co. Brit. 401,210, Nov. 9, 1933. See U. S. 1,917,073 (C. A. 27, 4539).

**Hydrogenating hydrocarbons.** Imperial Chemical Industries Ltd. Fr. 756,724, Dec. 14, 1933. Aromatic hydrocarbons, e. g.,  $C_{10}H_8$ , are hydrogenated by passing them in the form of vapor under pressure up to 10 atm. and at 170–300° over catalysts composed of or contg. sulfides of heavy metals, particularly of the 6th group, e. g., W.

**Olefins from saturated hydrocarbons.** Fritz Winkler and Hans Haebler. U. S. 1,945,960, Feb. 6. A gas comprising  $C_4H_{10}$ ,  $C_3H_8$ , and  $C_2H_6$  is passed through an internally tinued Mn-Cu tube heated to about 700° to form olefins such as butylenes and propylenes,  $C_2H_4$ ,  $C_3H_6$ , etc.

**Apparatus for regulated vaporization of liquefied hydrocarbon gases such as propane and butane.** Maurice E. Painter. U. S. 1,947,099, Feb. 13.

**Catalytic conversion apparatus suitable for oxidizing aromatic hydrocarbons, etc.** Alphons O. Jaeger (to Selden Co.). U. S. 1,945,353, Jan. 30. Various structural and operative details of a heat-exchange system, etc., are described.

**Aromatic compounds.** I. G. Farbenind. A.-G. Brit. 401,312, Oct. 30, 1933. See Fr. 730,428 (C. A. 27, 1359).

**Effecting organic reactions.** N. V. de Bataafsche Petroleum Maatschappij. Dutch 31,269, Nov. 15, 1933. The reaction takes place in part of a rectifying column with continuous removal of products. Chlorination of butane is described as an example.

**Soluble organic compounds.** Leó Egger és J. Egger Gyógyszervgyártó Gyár (to József Erdős). Hung. 107,982, Jan. 2, 1934. Insol. compds. are treated with diamines, dioxides, diketones, amides or dihydroxy derivs. of compds. contg. carbonyl groups in presence of water or an org. solvent at ordinary or higher temps. If desired, the vapors of the above substances are led into the suspension of the insol. compds.

**Reduction of organic compounds.** H. Th. Bohme A.-G. (Heinrich Bertsch, inventor). Ger. 591,057, Jan. 16, 1934 (Cl. 12o. 27). Addn. to 577,037 (C. A. 27, 3941). See Brit. 359,188 (C. A. 27, 304).

**Alcohols.** I. G. Farbenind. A.-G. (Wilhelm Lommel and Rudolf Schroter, inventors). Ger. 589,946, Dec. 20, 1933 (Cl. 12o. 5.02). Satd. high-mol. secondary alcs. are prep'd. by reducing ketones from soap-forming fatty acids, with H in the presence of catalysts. Thus, stearic acid and  $AcOH$  are led over  $CaO$  or  $ThO_2$  at 440–60° to form a ketone nuxt. This is treated with H at 40 atm and 100° in an autoclave, with a Ni catalyst to give a secondary alc. b. 197–9° and m. 33–6°.

**Receiver for the synthesis of alcohols.** The Head of the Tokyo Kogyō Shikienjo (Gorō Shima and Meikō Yamamoto, inventors). Japan. 100,101, March 14, 1933. The receiver is a vessel having shelves for fractional purification of alcs. manuf'd. from CO and  $H_2$ .

**Purifying synthetic alcohols.** The Head of the Tokyo Kogyō Shikienjo (Gorō Shima and Kan'ichi Hasumi, inventors). Japan 99,067, Jan. 10, 1933. Addn. to 92,839. Alcs. synthesized from CO and  $H_2$  in the presence of catalysts are purified by treating with an acid or a substance which easily gives an acid and an oxidizing material such as  $KMnO_4$ .

**Aromatic alcohols.** Ludwig Valik and Irene Valik.

U. S. 1,944,958–9, Jan. 30. See Brit. 398,186 (C. A. 28, 1047<sup>7</sup>).

**Aldehydes, acids, anhydrides and esters.** Henry Dreyfus. Brit. 401,269, Oct. 30, 1933. See Fr. 753,165 (C. A. 28, 776<sup>7</sup>).

**Aminoaromatic ketones.** Edgar C. Britton and Fred Bryner (to Dow Chemical Co.). U. S. 1,948,058, Feb. 6. A compd. such as *p,p'*-diaminobenzophenone is made by the reaction of a nuclear halogenated aromatic ketone such as *p,p'*-dichlorobenzophenone with aq.  $NH_3$  under superatm. pressure at a temp. of about 170–300° in the presence of a Cu compd. such as  $Cu_2O$ .

**Cyclic cyano ketimides and ketones.** Schering-Kahlbaum A.-G. (Karl Ziegler, Helmut Ohlinger and Hans Eberle, inventors). Ger. 591,269, Jan. 19, 1934 (Cl. 12o. 25). Nitriles of the formula  $NC(CH_2)_nCN$  are treated with condensing agents contg. the group  $RR'NM$ , where R and R' are alkyl, aryl or aralkyl groups or an alicyclic group, and M is a metal such as an alkali or alk. earth metal, Mg or Al. The products are cyano ketimides of

the formula  $NC\overline{CH_2}(CH_2)_{n-1}\overline{C:NH}$  (I) or  $NC\overline{CH_2}$ .

$(CH_2)_{n-1}\overline{C:NH}.CH(CN).(CH_2)_{n-1}\overline{C:NH}$  (II). They yield cyclic cyano ketones when saponified with mineral acid. Thus, adipodinitrile yields  $\alpha$ -cyanocyclopentanone imide, m. 147°, when treated in  $Et_2O$  soln. below 0° with  $BrMgNEt_3$ , prep'd. from  $BrMgEt$  and  $NH_4Et$ . Sebacadinitrile, treated under similar conditions with  $LiN(C_2H_5)_3$ , yields  $\alpha$ -cyanocycloheptanonimide, which on saponification yields  $\alpha$ -cyanocycloheptanone, b<sub>p</sub> 140–1° (schmiedbarzom, m. 102°). In other examples, (1) azelaic dinitrile yields  $\alpha$ -cyanocyclooctanone, b<sub>p</sub> 150–60°, m. 53°, and (2) dicyanocyclohexadecane-1,8-dione; (2) 1,14-dicyanotetradecane yields I and II ( $n = 14$ ), m., resp., 135° and 192°. Relatively dil. solns. should be used, particularly in prep'g. compds. contg. more than 6 C atoms in the ring. The products are useful as intermediates for perfumes.

**Esters.** Henkel & Cie. G. m. b. H. Brit. 401,117, Nov. 9, 1933. This corresponds to Fr. 746,434 (C. A. 27, 4539) but the hydroxy or mercapto fatty acids are saponified with hydroxy or mercapto aliphatic compds. contg. at least 8 C atoms or with naphthenic or resin alcs. In Brit. 401,120, Nov. 9, 1933, addn. to 401,117, such fatty acids contg. at least 6 C atoms are saponified with hydroxy or mercapto aliphatic compds. contg. less than 6 C atoms.

**Vinyl esters.** I. G. Farbenind. A.-G. (Walter Repp, inventor). Ger. 589,970, Dec. 20, 1933 (Cl. 12o. 19.03). Addn. to 588,352 (C. A. 28, 1357<sup>3</sup>). The process of Ger. 588,352 is applied to the prep'n. of vinyl esters of cyclic carboxylic acids. Examples are given of the prep'n. of vinyl benzoate, b<sub>p</sub> 72–4°, phenylacetate, b<sub>p</sub> 88–90°,  $\alpha$ -naphthoate, b<sub>p</sub> 145–55°,  $\beta$ -naphthoate, b<sub>p</sub> 153°, ethyl phthalate, acetylsalicylate, b<sub>p</sub> 145–50°, and abietate, b<sub>p</sub> 200–25°.

**Esters of higher acids and alcohols.** Geo. D. Graves (to E. I. du Pont de Nemours & Co.). U. S. 1,941,887, Jan. 30. By reaction of the alcs. with the acids, esters are formed such as lauryl caproate, b<sub>p</sub> 205–10°, lauryl laurate, m. 31°, stearyl laurate, m. 37°, oleylstearyl laurate (a light brown solid), oleyl laurate (also a light brown solid), myristyl caproate (a brown oil). Coconut oil acids are esterified with mixed alcs. from hydrogenated coconut oil, and, in general, satd. fatty acids contg. 6 to 13 C atoms may be used for reacting with alcs. contg. 12 to 18 C atoms. The esters thus formed may be used in coating compns., etc.

**Persulfuric acid esters.** H. Th. Bohme A.-G. (Heinrich Bertsch, inventor). Ger. 589,778, Dec. 20, 1933 (Cl. 12o. 23.02).  $H_2S_2O_8$  esters of high-mol. aliphatic alcs. with more than 8 C atoms are obtained by the action of the acid on the alc. or the corresponding olefin, in optional presence of a solvent. Thus, hexadecylene is treated with  $H_2S_2O_8$  to give the ester. The products are used for treating textiles.

**Stable solutions of alkylamino esters of aminobenzoic acid.** I. G. Farbenind. A.-G. (Max Bockmuhl and Willy H. Ludwig, inventors). Ger. 589,519, Dec. 8, 1933 (Cl.

12g. 6.02). Alkylamino esters of *N*-monoalkylated or *N*-monoalkoxyalkylated derivs. of *p*- and *o*-aminobenzoic acids in the form of salts are brought into soln. with hydroxy acids of the aliphatic or hydroaromatic series and in the presence of prolamines and wheat mucous. Thus, 4-butylaminobenzoic acid  $\beta$ -dimethylaminoethyl ester is introduced into quinic acid and water. Wheat mucous, alc. and gliadin alc. are added. Distd. water and acetone bisulfite are then added to give a stable soln. Other examples are given.

Continuous production of esters such as methyl salicylate. Thomas S. Carawell, Ernest T. Stehly and Nicolaas J. G. Alozerij (to Monsanto Chemical Co.). U. S. 1,945,177, Jan. 30. A mixt. comprising an org. carboxylic acid such as salicylic acid which is substantially non-volatile below 120°, an aliphatic alc. such as MeOH the b. p. of which is below 100°, water, and the ester of the acid and alc., is boiled, water is added to the boiling mixt. to effect removal from it of the ester produced by the reaction while more ester is formed simultaneously, and acid and alc. are added in equiv. proportions as consumed in the ester-forming reaction. Cf. C. A. 27, 3482.

Saponification of esters of terpene alcohols. Hajime Ueda and Kyôhei Murakami. Japan. 99,856, March 1, 1933. The saponification of esters of terpene alcohols with aq. alkali is improved by adding salts of alkali or alkali earth metals of higher fatty acids, resin, casein, glue, silica gel, active C or kieselguhr.

Ethers. Henkel & Cie. G. m. b. H. Brit. 401,142, Nov. 9, 1933. See Fr. 751,923 (C. A. 28, 777°).

Purification of ether. Yoshio Konishi. Japan. 99,479, Feb. 10, 1933. Crude ether is purified by passing its vapor through a layer of metallic oxides (oxides of Pb, Cu, Fe, Mn, Al, Ca, etc.) heated above the b. p. of ether.

Preventing decomposition of ether in tin cans or the like. Joseph Rosin (to Merck & Co.). U. S. 1,946,502, Feb. 13. A bundle or "sheaf" of bent iron wire or the like is placed in the receptacle contg. the ether.

Nitrophenol ethers. Shinjirô Aoyama. Japan. 99,202, Jan. 26, 1933. Nitrophenol ethers are prepd. by heating a mixt. of halogenated nitrobenzene, alc., water and caustic alkali, with oxide, peroxide or salt of metals except Cu, as catalysts. The formation of dihaloazoxybenzene is prevented.

Phenols. F. Raschig G. m. b. H. Fr. 756,814, Dec. 15, 1933. PhOH and its homologs are made by treating PhCl and its homologs with steam at a high temp., in the presence of compds. of  $H_3PO_4$  with elements of the 2nd group, e. g.,  $Ca_3(PO_4)_2$ , Cu, Ni, Co, Ag, Au and metals of the Pt group or their compds. may be present. Cf. C. A. 28, 2020°.

Alkylolamine derivatives of aliphatic acids. Jean G. Kern and Charles J. Sala (to E. I. du Pont de Nemours & Co.). U. S. 1,946,079, Feb. 6. By reaction of mono-, di- or tri-ethanolamine or aminopropanediol or methyl-diethanolamine or the like with oleic acid, ricinoleic acid, castor oil, stearic acid, sulfonated castor oil or the like, derivs. are obtained which may be used as sol. oils, solvents, detergents and antiseptics. Several examples with details of procedure are given. U. S. 1,946,080 also relates to products of the same character.

Alkoxy derivatives of phosphorus acid chlorides. Erik Clemmensen (to Monsanto Chemical Co.). U. S. 1,945,183, Jan. 30. Smooth, quantitative reaction is effected by adding MeOH to P oxychloride or to P sulfochloride, to produce methoxy P oxydi- or mono-chloride and methoxy P sulfodichloride, resp., and similar reactions are effected with other alcs. such as BuOH, PrOH, iso-PrOH, sec-butyl alc. or AmOH, etc., under reduced pressure.

Purifying fluorinated aliphatic hydrocarbon derivatives. Herbert W. Daudt (to Kinetic Chemicals, Inc.). U. S. 1,946,195, Feb. 6. Products such as  $CF_3Cl$ , which contain acidic impurities are treated with an amine such as aniline and the purified product is sep'd. from the resulting mixt. (suitably by distn.).

Barbituric acid derivative. Compagnie de Béthune. Ger. 589,947, Dec. 19, 1933 (Cl. 12p. 7.01). The compd. 5,5-allyl- $\Delta^2$ -cyclopentenylbarbituric acid is prepd. by

condensing the ethyl ester of allyl- $\Delta^2$ -cyclopentenylmalonic acid with urea in the presence of condensing agents of the alkali or alk. earth groups. The substance m. 139-40°.

Methyleneanthrone derivatives. I. G. Farbenind. A.-G. (Heinz Scheyer, inventor). Ger. 591,496, Jan. 22, 1934 (Cl. 22b. 2.05). Methyleneanthrone (I) or a nuclear substitution product is treated with a quinone contg. one or more groups —CX: CX—, where X is H or halogen. The reaction may be effected by heating the components to a moderate temp. in an inert solvent. Condensation products useful as vat dyes or intermediates are obtained. Examples are given of the prepn. of products from I and  $\alpha$ -naphthoquinone (II), 2-chloro-II, benzoquinone, toluquinone,  $\beta$ -naphthoquinone and naphthazarin; a product from methylene-2-chloroanthrone and II is also described. Quinones contg. 2 —CX: CX— groups may be condensed with 1 or 2 mols. of I. The quinones may be replaced by compds. which yield them under the reaction conditions, e. g., II-dichloride.

Quinoline derivatives. I. G. Farbenind. A.-G. (Heinrich Jensch, inventor). Ger. 591,480, Jan. 22, 1934 (Cl. 12p. 1.10). New derivs. of quinoline (I), having one  $NH_2$  group in the 2- or 4-position and another in the benzene ring, are prepd. (1) by introducing an  $NH_2$  group into the 2- or 4-position of a *BS*-amino-I by standard methods, or (2) by reducing a *BS*-nitro-2- or -4-amino-I. Alkyl, acyl or urea derivs. of the products may be prepd. by standard methods or from correspondingly substituted starting materials. Examples are given of the prepn. of 2,6-diamino-I, m. 219°; 4,6-diamino-I, m. 215°; 4,6-diamino-2-methyl-I, m. 197°; 4-amino-6-acetamido-2-methyl-I, m. 250°; 4-ethylamino-6-amino-2-methyl-I, m. 195°; 4-amino-6-ethylamino-2-methyl-I, m. 232°; 4,8-diamino-2-methyl-I, m. 168°; 4-amino-6-cinnamoylamino-2-methyl-I, m. 253-4°; 4-amino-8-cinnamoylamino-2-methyl-I, m. 202-3°; *s*-bis(4-amino-6-quinaldyl)urea, m. 255°, *s*-bis(4-amino-6-quinaldyl)oxamide, unmelted at 300°, *s*-bis(4-amino-6-quinaldyl)fumaramide, m. 259°, and *s*-bis(4-amino-6-quinaldyl)malonamide, decomp. 216°. The products are useful as internal disinfectants. The prepn. of the following intermediates is described:

4-chloro-6-acetamido-2-methyl-I, m. 208-9°; 4-chloro-6-amino-2-methyl-I, m. 170°; 4-amino-6-*N*-ethylacetamido-2-methyl-I, m. 221-2°; 4-chloro-8-acetamido-2-methyl-I, m. 119-20°, and 4-chloro-8-amino-2-methyl-I, m. 112°.

Amino compounds. Oswald T. Krefft. Brit. 401,302, Oct. 30, 1933. See Fr. 735,020 (C. A. 27, 1118°).

Hydroxybiphenylene compounds. I. G. Farbenind. A.-G. (Friedrich Muth, Bruno Putzer, and Alfred Carl, inventors). Ger. 591,213, Jan. 18, 1934 (Cl. 12g. 14.02). Hydroxy derivs. of biphenylene oxide, sulfide, sulfoxide and sulfone are prepd. by diazotizing the corresponding amino compds., and heating the diazo compds. to about 200° with  $H_3PO_4$ . The amino compd. may be diazotized in  $H_3PO_4$  soln., and the soln. then heated while superheated steam is passed through. Examples are given of the prepn. of 2- and 3-hydroxybiphenylene oxide, m., resp., 139° and 136°, 3-hydroxybiphenylene sulfide, m. 160°, 2-hydroxybiphenylene sulfoxide, m. 147°, and 3-hydroxybiphenylene sulfone, m. 284°. 3-Aminobiphenylene oxide, m. 128°, used as a starting material, is prepd. by heating 3-bromobiphenylene oxide to 200-220° with an excess of aq.  $NH_3$  in the presence of a Cu salt.

Oxidizing mononuclear aromatic compounds as in the production of maleic acid from benzene. Alphonso O. Jaeger (to Selden Co.). U. S. 1,945,354, Jan. 30. Vapor of a starting material such as  $C_6H_6$  together with an O-contg. gas such as air contg. somewhat more O than required for the desired oxidation are passed at reaction temp. through a series of converters contg. a catalyst (such as Al vanadate on quartz) favoring the oxidation of C atoms of the aromatic nucleus. The converted product is condensed out of the gases after leaving each converter, and uncondensed gases, without addn. of further O-contg. gas, are passed in series through the next converter.

Addition products of fatty acids and camphene. I. G. Farbenind. A.-G. Ger. 589,779, Dec. 14, 1933 (Cl. 12a.

25). In forming the addn. products,  $\text{BF}_3$  is used as the catalyst and the fatty acid is added in equiv. proportions or in excess not exceeding 25%. Thus, camphene, glacial  $\text{AcOH}$  and  $\text{BF}_3$  are stirred together to give a 95% yield of isobornyl acetate.

**Cyclic substitution products of acetaldehyde.** I. G. Farbenind. A.-G. (Angelo Knorr, Emil Laage and Albert Weissenborn, inventors). Ger. 591,452, Jan. 23, 1934 (Cl. 12a. 8). A cyclic aldehyde is treated with a halo-acetic ester in the presence of an alk. condensing agent and a liquid hydrocarbon or halo hydrocarbon. The cyclically substituted glycidic esters so obtained are then decompd. in known manner to yield the corresponding aldehydes. Thus,  $\text{BzH}$  and  $\text{ClCH}_2\text{COOEt}$ , added at  $8^\circ$  to  $\text{EtONa}$  in

xylene, yield  $\text{PhCH}_2\text{OCHCOOEt}$  (I),  $b_{\text{D}}^{20}$  128-30°, which is sapond. with  $\text{NaOH}$  and then heated with  $\text{H}_2\text{SO}_4$  and an org. acid while steam is led through the mixt., this yielding  $\text{PhCH}_2\text{CHO}$  (II),  $b_{\text{D}}^{20}$  80-2°. The following compds. have also been obtained: 4-chloro-I,  $b_{\text{D}}^{20}$  155-60°, and -II, m. 39-40°; 4-methyl-I,  $b_{\text{D}}^{20}$  145-7°, and -II,  $b_{\text{D}}^{20}$  80-2°; 4-ethyl-I,  $b_{\text{D}}^{20}$  155-60°, and -II,  $b_{\text{D}}^{20}$  98-100°; 2,4-dimethyl-I,  $b_{\text{D}}^{20}$  150-5°, and -II,  $b_{\text{D}}^{20}$  95-8°; 4-isopropyl-I,  $b_{\text{D}}^{20}$  165-70°, and -II,  $b_{\text{D}}^{20}$  105°; 4-(1-methopropyl)-I,  $b_{\text{D}}^{20}$  170-5°, and -II,  $b_{\text{D}}^{20}$  105°; 2,4-diisopropyl-I,  $b_{\text{D}}^{20}$  175-85°, and -II,  $b_{\text{D}}^{20}$  129-30°; 4-methoxy-I (unstable), and -II,  $b_{\text{D}}^{20}$  120°; 5,6,7,8-tetrahydro-1-naphthylglycidic Et ester,  $b_{\text{D}}^{20}$  185-90°, and 5,6,7,8-tetrahydro-1-naphthyl-acetaldehyde,  $b_{\text{D}}^{20}$  135-40°.

**Water-soluble condensation products from compounds such as phenol and trichlorobenzyl chloride.** Alfred Thaus, Gustav Mauthé and Arnold Dover (to General Aniline Works). U. S. 1,946,430, Feb. 6. An aromatic hydroxy compd. such as  $\text{PhOH}$  is heated with about the same quantity of a halogenated aralkyl halide contg. no hydroxyl group, such as trichlorobenzyl chloride at a temp. of  $100^\circ$  or lower for 3-15 hrs. in the presence of  $\text{ZnCl}_2$  or  $\text{AlCl}_3$  and the condensation product thus obtained is sulfonated at a temp. of 35-80° to obtain a product which may be used as a resist in treating fabrics, etc.

**Polymerization products of esters of ethylenedicarboxylic acids.** Harry B. Dykstra (to E. I. du Pont de Nemours & Co.). U. S. 1,945,307, Jan. 30. Coating compns. which give clear films comprise polymerization products such as those of esters of fumaric, maleic, citraconic and mesaconic acids which may be used with conjointly polymerized vinyl esters or styrene. Numerous examples are given.

**Polymerizing isoolefins.** I. G. Farbenind. A.-G. Brit. 401,297, Nov. 3, 1933. High mol. polymerization products are made by polymerizing isoolefins in the presence of an inorg. halide, preferably volatile, e. g.,  $\text{BF}_3$ , which may be charged with  $\text{HF}$ ,  $\text{PF}_3$ ,  $\text{AlCl}_3$ , while maintaining the temp. below  $-10^\circ$ . Solvents, e. g.,  $\text{C}_6\text{H}_{10}$ , may be present. Among examples (1)  $\text{BF}_3$  is led into liquid isobutylene cooled in a  $\text{CO}_2$  bath to  $-80^\circ$  and (2)  $\text{Al}$  chips and  $\text{HgCl}_2$  (forming  $\text{AlCl}_3$  *in situ*) are added to a soft paraffin wax-cracking product cooled to  $-60^\circ$  by  $\text{Me}_2\text{CO}$  and  $\text{CO}_2$ , the temp. not being allowed to exceed  $-40^\circ$ .

**Polymerizing olefinic gases.** Wm. B. Plummer (to Standard Oil Co. of Ind.). U. S. 1,947,306, Feb. 13. Olefinic gases are polymerized into higher-boiling liquid hydrocarbons at pressure of 500-3000 lb. per sq. in. and temps. of about 400-675° in a system which comprises a preheating zone, a heating zone, a soaking zone and a recovery system for sepp. liquid hydrocarbons, high-olefin-content gases and low-olefin-content gases. Low-olefin-content gases are passed through the preheating zone, heating zone, soaking zone and recovery app. and high-olefin-content gases are introduced into the system prior to the soaking zone but subsequent to the preheating zone. App. is described. Cf. C. A. 28, 1714°.

**Nonbenzenoid acetylene polymers.** E. I. du Pont de Nemours & Co. Ger. 589,561, Dec. 12, 1933 (Cl. 12a. 19.01). Addn. to 588,283 (C. A. 28, 1360°). See Fr. 41,454 (C. A. 27, 2096°).

**Alkali acetate.** The Head of the Tokyo Kōgyō Shikenjo (Saizō Ueno, inventor). Japan. 100,470, Apr. 7, 1933. An alkali acetate is prepd. in good yield by heating a mixt. of  $\text{EtOH}$  and  $\text{NaOH}$ ,  $\text{KOH}$  or mixed caustic alkalies at 200-450° in presence of water. The alkali should be kept in a fluid state with water. When water is absent, more than 50% of the alkali used changes into a carbonate.  $\text{KOH}$  is used under ordinary pressure; with  $\text{NaOH}$  better results are obtained by carrying out the reaction under pressure.

**Carbamates.** The Mathieson Alkali Works. Fr. 756,-421, Dec. 9, 1933. Alkali or alk. earth metal carbamates are made by bringing  $\text{CO}_2$  into contact with a sol. metal salt in the presence of water and  $\text{NH}_3$ , the amt. of water being 10-100% of the wt. of  $\text{NH}_3$ .  $\text{EtOH}$ ,  $\text{MeOH}$  or acetone may be added to the water. Cf. C. A. 28, 863°.

**Carbamates.** The Mathieson Alkali Works. Fr. 750,-653, Dec. 13, 1933. Alkali and alk. earth metal carbamates are made by the action of  $\text{CO}_2$ ,  $\text{NH}_3$  and a salt of the metal, the  $\text{CO}_2$  being used as a solid compd. of  $\text{CO}_2$  and  $\text{NH}_3$ , e. g., carbamate, sesquicarbonate or bicarbonate-carbamate of  $\text{NH}_4$ .

**Ferric oxalate.** Curtin-Howe Corp. Ger. 588,878, Nov. 30, 1933 (Cl. 12a. 11). See Brit. 393,531 (C. A. 27, 5756°).

**Potassium oxalate.** Rudolph Koepf & Co. Chemische Fabrik A. G. Fr. 756,820, Dec. 15, 1933.  $\text{K}_2(\text{COO})_2$  is made by heating  $\text{HCOOK}$ , taking care to assure the presence of an alkali hydroxide at the start of the process, the amt. being greater as the temp. is lower, and the partial pressure of  $\text{H}$  is regulated according to the temp. of reaction so that this partial pressure remains below the equil. pressure of the reaction and maintained below this pressure during the reaction. The partial pressure of  $\text{H}$  is kept below 1 atm. and constantly lowered during the course of the reaction. The temp. is preferably 300-400°.

**Thorium oxalate.** Chem. Fab. von Heyden A.-G. (Rudolf Zellmann and Richard Muller, inventors). Ger. 591,478, Jan. 22, 1934 (Cl. 12m. 9). Th oxalate, prepd. as described in Ger. 580,216 (C. A. 27, 4818°), is freed from  $\text{H}_3\text{PO}_4$  by digestion with dil.  $\text{H}_2\text{SO}_4$  at atm. or raised temp.

**Nitrosamine salts.** Tatsuo Tokunaga Japan. 100,-312, March 29, 1933. By treating diazo compds. of aromatic amines having many negative groups (such as  $\text{Cl}$  or  $\text{NO}_2$ ) with a neutral sulfate before introducing the diazo compds. into a strong alkali soln., nitrosamine salts are produced in good yield and quality. Examples of 2,5-dichloroaniline, 2-nitro-4-chloroaniline and 2,6-dichloro-4-nitroaniline are given.

**Salts of cresols mercurated in the nucleus.** Philipp Honig. Ger. 589,949, Dec. 19, 1933 (Cl. 12g. 15.02). Conc'd. aq. solns. of cresol-alkalies are heated with  $\text{HgO}$  and alkali chloride, and the resulting paste dried. Thus, *p*-cresol and  $\text{NaOH}$  are dissolved in water. The soln. is heated with  $\text{NaCl}$  and  $\text{HgO}$  to form a salt paste sol. in water. This is dried and pressed.

**Sulfonyl chloride of hydroxynaphthalenecarboxylic acid.** I. G. Farbenind. A.-G. (Georg Kranzlein and Hans Schlichenmaier, inventors). Ger. 589,520, Dec. 8, 1933 (Cl. 12g. 30). The compd. 2-hydroxynaphthalene-3-carboxylic acid-6-sulfonic acid chloride is prepd. by treating 2-hydroxynaphthalene-3-carboxylic acid-6-sulfonic acid with  $\text{PCl}_5$  and heating the reaction product with conc'd.  $\text{H}_2\text{SO}_4$ . The substance decomposes at  $190^\circ$ .

**Crystallization of guanidine salts.** Yōgorō Katō (Kiichirō Sugino, Syōei Koizumi and Yōgorō Katō, inventors). Japan. 99,441, Feb. 8, 1933. Guanidine salts are purified by fusing and gradually cooling below their m. ps. to effect crystn.

**Nitroguanidine nitrate.** Yōgorō Katō (Kiichirō Sugino, Syōei Koizumi and Yōgorō Katō, inventors). Japan. 99,975, Feb. 16, 1933. Nitroguanidine nitrate is prepd. by treating guanidine, guanidine nitrate or substances such as dicyanodiamide with  $\text{HNO}_3$  and  $\text{NO}_2$ .

**Stabilization of mixtures of free strong acids and alkanols, alkenes, alkyl or dialkyl compounds or other polymerizing substances.** N. V. de Bataafsche Petroleum



**Maatschappij.** Dutch 31,611, Dec. 15, 1933. Polymerization of alkyl sulfates and similar compds. in the presence of excess acid is inhibited by addn. of metal cyanides or complex cyanides or sol. Pt, Cu, Fe, Co, Ni or Ag salts.

**Separation of solid and liquid fatty acids by crystallization from a cooling solution.** Ernst A. Mauersberger. Dutch 31,378, Nov. 15, 1933. The mixt. is crystd. by cooling a hot mixt. of the fatty acids stirred continuously with an O-free solvent (aliphatic or aromatic hydrocarbon) in which a H<sub>2</sub>O phase is dispersed. The latter is produced by addn. of H<sub>2</sub>O or of dil. aq. solns. of alcohols, ketones, etc. Cf. C. A. 28, 922<sup>a</sup>.

**Fatty acids from hydrocarbons.** I. G. Farbenind. A.-G. (Max Harder, inventor). Ger. 591,121, Jan. 18, 1934 (Cl. 12a. 11). Crude oxidation products of higher paraffin hydrocarbons, or crude fatty acids obtained from such oxidation products, are freed by distn. from constituents of relatively low b. p., e. g., constituents b<sub>4</sub> up to 200°. The residual acids are then refined by hydrogenation in known manner. Details are given.

**Aliphatic acids.** Henry Dreyfus. Brit. 400,944, Nov. 1, 1933. Aliphatic acids, e. g., AcOH, propionic, butyric, are concd. by extg. with a low-boiling solvent together with an O-contg. liquid of b. p. at least 150° in which H<sub>2</sub>O is insol. or by extg. with a low-boiling solvent and pptg. H<sub>2</sub>O from the ext. by adding the high-boiling O-contg. liquid. The low-boiling solvent is at least 50% of the mixed solvents. Low-boiling solvents are ethers, e. g., Et<sub>2</sub>O, esters, e. g., AcOEt, HCOOBu, and MeEt ketone. High-boiling liquids are ketones, e. g., acetophenone and other alkyl aryl ketones, ethers, e. g., anisole, phenetole, benzyl phenyl ether, and esters, e. g., AcOAm, octyl acetate, butyl butyrate, dimethyl phthalate, benzyl benzoate. Any H<sub>2</sub>O in the ext. may be removed by a dehydrating agent, e. g., Na<sub>2</sub>SO<sub>4</sub>, or as an azeotropic mixt. with 1 of the components of the extg. medium, e. g., AcOEt, or with a suitable added substance. Cf. C. A. 27, 310.

**Carboxylic acids such as acetic or propionic acid.** John C. Woodhouse (to E. I. du Pont de Nemours & Co.). U. S. 1,946,254, Feb. 6. A satd. aliphatic alc. such as MeOH or EtOH which remains substantially undecompd. when vaporized or a compd. such as an alkyl ester or ether which gives a satd. aliphatic alc. upon hydrolysis is treated with CO in the presence of a volatile inorg. acid such as may be formed from steam and Cl (suitably at a temp. of about 375° under 700 atm. pressure). U. S. 1,946,255 relates to the generally similar production of carboxylic acids such as HOAc or propionic acid from a hydrolyzable alkoxy compd. or alc. U. S. 1,946,256 relates to production of a carboxylic acid such as HOAc from an aliphatic alc. and CO with employment of a volatile halide such as HCl and Mn chloride assocd. with activated C as a catalyst.

**Organic acids such as acetic acid.** Gilbert B. Carpenter (to E. I. du Pont de Nemours & Co.). U. S. 1,946,257, Feb. 6. Acids such as HOAc are produced by contacting a monohydroxy aliphatic alc. such as MeOH or an alkyl ether or alkyl ester under high pressure with a halide of an element of group 2 of the periodic system or of Mn, such as ZnI<sub>2</sub> or CdI<sub>2</sub>, and with CO at a reacting temp. (which may be about 300°). U. S. 1,946,259 relates to the use of similar catalysts in the prepn. of acids such as HOAc from MeOH or compds. contg. a hydrolyzable alkoxy group and CO in the presence of a H halide.

**Organic acids such as acetic acid.** Wallace H. Carothers and Gilbert B. Carpenter (to E. I. du Pont de Nemours & Co.). U. S. 1,946,258, Feb. 6. Acids such as HOAc are produced by contacting a monohydroxy aliphatic alc. such as MeOH or an alkyl ether or ester with a complex inorg. oxide contg. a metal of group VI-A of the periodic system such as a silico tungstic acid in the presence of CO at a reacting temp. (which may be about 300°). A high pressure is used.

**Organic acids such as acetic acid from their alkali metal salts.** John C. Woodruff, Grover Bloomfield and Ignace J. Krehma (to Commercial Solvents Corp.). U. S. 1,946,419, Feb. 6. A salt such as NaOAc is subjected to

the action of CO<sub>2</sub> gas in the presence of a homogeneous aq. org. liquid medium such as a mixt. of MeOAc, MeOH and water in which the salt is "at least partially sol."

**Acetic acid.** Usines de Melle (Soc. anon.) and Henri M. Guinot. Fr. 757,155, Dec. 21, 1933. AcOH is made by quantitatively oxidizing alc. with an acid aq. soln. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, extg. the AcOH by a solvent, and regenerating the residual aq. soln. by electrolysis, which transforms the chromous to chromic salts.

**Organic dibasic acids such as maleic and tartaric acids by catalytic oxidation.** Heinrich W. Witzel (to Selden Co.). U. S. 1,945,248, Jan. 30. A cyclic org. compd. such as furfural is subjected to vapor-phase oxidation with splitting of the ring, the major portion of the products are removed from the gas stream, the tail gases are treated with water, an alkali is added in sufficient amt. to form a salt of different soly. from the remaining solute, and the product of lowest soly. is sepd.

**Succinic acid and its salts.** Johann A. Bertsch and Arthur H. Krause (to Monsanto Chemical Co.). U. S. 1,945,175, Jan. 30. Maleic or fumaric acid or a maleate or fumarate is hydrogenated and the crude hydrogenation product, in soln. and assocd. with some unreacted raw material, is treated with a water-sol. permanganate or other suitable oxidizing agent which is inert to the hydrogenated product, and the purified product is filtered and crystd.

**Barbituric acids.** F. Hoffmann-La Roche & Co. A.-G. Berlin Chemische Fabrik. Ger. 587,192, Oct. 31, 1933 (Cl. 12p. 7.01). Addn. to 526,854 (C. A. 25, 4893). *N*-allyl- or *N,N'*-diallyl-5,5-disubstituted barbituric acids are obtained by treating 5,5-disubstituted barbituric acids with allyl halides in the presence of a small amt. of Cu. Thus, a soln. of 5,5-diallylbarbituric acid in NaOH is treated with allyl bromide and a small amt. of finely divided metallic Cu to give an 87% yield of *N*-allyl-5,5-diallylbarbituric acid, m. 68-9°. Other examples describe the prepn. of 1,3,5-triallyl-5-isopropylbarbituric acid, b<sub>10</sub> 171-4°, 5,5-phenylethyl-*N*-monoallylbarbituric acid, m. 68-9°, 5,5-benzylethyl-*N*-allylbarbituric acid, m. 77-8°, and 1-allyl-3-phenyl-5,5-diethylbarbituric acid, m. 72-3°.

**Barbituric acids.** Chemische Fabrik von Heyden A.-G. (Rudolf Gehauer, inventor). Ger. 587,428, Nov. 3, 1933 (Cl. 12p. 7.01). Addn. to 573,541 (C. A. 27, 4349). The method of 573,541 for prepg. 5,5-disubstituted barbituric acids from 5-monosubstituted barbituric acids, 1,2,3-substituted pyrazolones and aldehydes in optional presence of a condensing agent, is modified by using *N*-substituted-5-monosubstituted acids. Thus, *N*-methyl-5-ethylbarbituric acid, m. 105° (obtained from ethyl malonate and methyl urea) is condensed with phenyldimethylpyrazolone and paraformaldehyde in the presence of concd. HCl to give a product, m. 221°. Other examples, giving the structural formulas of the products are given.

**Benzoic acid and benzoates.** Jules B. Denant (to Bozel-Malétra (Société industrielle de produits chimiques)). U. S. 1,945,032, Jan. 30. See Ger. 585,429 (C. A. 28, 1304<sup>a</sup>).

**Purifying 2-phenylquinoline-4-carboxylic acid and its salts.** Wm. H. Glahn and Jacob Ehrlich (to Verona Chemical Co.). U. S. 1,945,270, Jan. 30. Crude cinchophen is warmed with an alkali metal hypochlorite or alk. earth metal hypochlorite, and resulting alkali- and water-insol. colored substances are sepd. from the cinchophen.

**Aminoethanesulfonic acids.** I. G. Farbenind. A.-G. (Hans Haussmann, inventor). Ger. 589,948, Dec. 22, 1933 (Cl. 12q. 6.01). Ethane compds. contg. HSO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> ester groups are treated with NH<sub>3</sub> or amines. Thus, abs. alc. is treated with gaseous SO<sub>3</sub> and the product with aq. and gaseous NH<sub>3</sub>. Other examples are given. Cf. C. A. 27, 2965.

**1-Iodo-8-hydroxynaphthalenesulfonic acids.** Arthur Stoll, August Binkert and Walter Kussmaul (to Chemische Fabrik vorm. Sandoz). U. S. 1,946,950, Feb. 13. Diazonium iodides of 1-diazo-8-hydroxynaphthalenesulfonic acids are heated in an aq. medium in the presence of Cu.

**Acetic anhydride.** Rudolf Meingast and Martin Mugdan (to Consortium für elektrochemische Industrie). U. S. 1,946,707, Feb. 13. HOAc vapor contg. a small proportion of a volatile weak inorg. acid such as  $H_3PO_4$  serving as a catalyst is heated to 400-800°. Cf. C. A. 27, 311.

**Acetic anhydride.** Consortium für elektrochem. Ind. G. m. b. H. (Martin Mugdan and Johann Sixt, inventors). Ger. 591,195, Jan. 18, 1934 (Cl. 12o. 12). A liquid mixt. of  $Ac_2O$ ,  $AcOH$  and  $H_2O$ , obtained by thermal decompn. of vaporized  $AcOH$ , is treated at a low temp. with a water-insol. solvent for  $Ac_2O$  and  $AcOH$ , e. g.,  $C_2H_2Cl_2$ . The aq. layer is then removed, and the solvent layer is fractionally distd. at atm. pressure to yield a residue of  $Ac_2O$ . A continuous process is described.

**Acetylene.** Floyd J. Metzger (to Air Reduction Co., Inc.). Brit. 401,531, Nov. 16, 1933. See U. S. 1,900,055 (C. A. 27, 2965).

**Purifying acetylene.** Hannus Bueckert, Robert Stadler and Helmut Tanneberger (to I. G. Farbenind. A.-G.). U. S. 1,945,592, Feb. 6. For increasing the concn. of  $C_2H_2$  in a gas mixt. also contg. biacetylene, allene, allylene and butadiene, obtained by a thermal treatment of a hydrocarbon material (such as by use of an elec. arc) above 1000°, the gas mixt. is cooled to about -70° to condense impurities. App. is described.

**Apparatus for producing acetylene and substantially dry calcium hydroxide from calcium carbide and water.** Karl Weibezahn and Felix Walter (to Akt.-Ges. für Stickstoffdünger). U. S. 1,947,120, Feb. 13. Various structural and operative details are described.

**Tetrachloroethylene.** John H. Reilly (to Dow Chemical Co.). U. S. 1,947,491, Feb. 20. An olefin chloride such as ethylene chloride and  $Cl$  in mixt. are heated to about 300-500° in the presence of a porous surface catalyst such as coke or pumice. An arrangement of app. is described.

**Acetone from ethyl alcohol.** Grover Bloomfield, Lloyd C. Swallen and Francis M. Crawford (to Commercial Solvents Corp.). U. S. 1,945,131, Jan. 30. A gaseous mixt. contg.  $KtOH$  under less than atm. pressure and which also may contain  $N$ ,  $CO_2$  or  $H$  is subjected to the action of catalysts such as  $Cr$ ,  $Mn$ ,  $Cu$  or  $Fe$  compds. and  $Ca$  or  $Mg$  compds. at temps. of 250-650°.

**Diacetone alcohol.** I. G. Farbenind. A.-G. (Richard Leopold and Bernhard Schacke, inventors). Ger. 501,316, Jan. 19, 1934 (Cl. 12o. 5.03). Diacetone alc. is manufd. continuously by passing acetone at atm. temp. over solid caustic alkali and distg. the product.

**Methyl formate and methanol by hydrogenation of carbon monoxide.** Norman D. Scott (to E. I. du Pont de Nemours & Co.). U. S. 1,946,918, Feb. 13.  $CO$  and  $H$  are absorbed in a soln. of an alc. contg. a plurality of alcoholsates such as those of  $Na$  and  $Cd$ .

**Methylamine from methyl ether.** Lloyd C. Swallen (to Commercial Solvents Corp.). U. S. 1,946,245, Feb. 6. A mixt. of gaseous methyl ether and  $NH_3$  contg. 1-2 mols.  $NH_3$  per mol. of  $Me_2O$  is subjected to the action of an  $Al_2O_3$  catalyst at 300-450°. Cf. C. A. 27, 1012.

**Formaldehyde preparation.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler Abteilung Hiag. (Hermann Finkenbeiner, inventor). Ger. 589,776, Dec. 14, 1933 (Cl. 12o. 7.01). A solid  $CH_2O$  prepn. sol. in water is obtained by treating a soln. of  $CH_2O$  in an org. solvent with calcined  $Na_2PO_4$ .

**System for making acetaldehyde by vapor-phase oxidation of ethyl alcohol.** Richard Leiser, Julius Kovačević, and Hugo Bauer. Austrian 135,888, Dec. 11, 1933 (Cl. 12e).

**Furfural.** Georg H. Blomqvist and Bertil S. Groth (to Kemiska Kontrollbyran Aktiebolag and Aktiebolaget A. Heyman). U. S. 1,946,667, Feb. 13. See Ger. 583,324 (C. A. 28, 180<sup>5</sup>).

**Furfural.** Bertil S. Groth and Georg H. Blomqvist (to Kemiska Kontrollbyran Aktiebolag and Aktiebolaget A. Heyman). U. S. 1,946,688, Feb. 13. A raw pentosan-contg. material such as oat or rice husks is lixiviated with an aq. soln. such as a 0.1  $N$  soln. of  $H_2SO_4$  at such a

temp. (suitably about 80-110°) that the pentosans are substantially transformed into pentoses; the pentose soln. thus formed is sepd. and the pentoses in it are converted into furfural by heating to 130-200° and the furfural is recovered by distn. App. is described.

**Racemic phenylaminopropanol.** I. G. Farbenind. A.-G. (Max Bockmühl, Gustav Ehrhart and Leonhard Stein, inventors). Ger. 588,880, Nov. 29, 1933 (Cl. 12q. 32.21). 1-Phenyl-2-amino-1-propanol is obtained in racemic form by the catalytic reduction of 1-1-phenyl-2-keto-1-propanol with metals of the  $Ni$  group in the presence of  $NH_3$  or primary amines. Thus, 1-phenylacetylcarbinol is dissolved in alc.  $MeNH_2$  soln. and hydrogenated by treatment with  $Ni$  and  $H$  to give racemic phenylpropanolmethylamine- $HCl$ , m. 188°. Other examples describe the prepn. of racemic phenylbenzylaminopropanol- $HCl$ , m. 192-3°, and phenylaminopropanol- $HCl$ , m. 193-4°.

**Ethylene glycol phthalate.** Charles L. Gabriel and Lloyd C. Swallen (to Commercial Solvents Corp.). U. S. 1,946,202, Feb. 6. A neutral reaction product is obtained from ethylene glycol and phthalic anhydride, by heating together with  $H_2SO_4$ , and may be used as a plasticizer with nitrocellulose, etc.

**Urea.** Max Hofszász (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,945,314, Jan. 30. An ammonia-carbon dioxide compd. is heated with an inert viscous liquid such as a viscous oil (suitably under a pressure of 100 atm. and to a temp. of 150-200°) to form urea.

**Glycol chloro- or bromo-hydrins.** N. V. de Bataafsche Petroleum Maatschappij. Dutch 31,306, Nov. 15, 1933.  $HClO$  or  $HBrO$  esters of tertiary alcs. react in the presence of  $H_2O$  with org. compds. having 1 or 2 double bonds. The tertiary alc. is regenerated and a di- or bromo-hydrin soln. is obtained.

**Nuclear chlorination of benzene and its derivatives.** Wesley C. Stoesser and Frank B. Smith (to Dow Chemical Co.). U. S. 1,946,040, Feb. 6. Chlorination of compds. such as  $C_6H_6$ ,  $PhCl$ , biphenyl, etc., is effected by treatment with free  $Cl$  in the presence of a chlorination catalyst comprising a mixt. of  $S$ ,  $SbCl_5$  and  $Pb$ .

**2,4-Dimethoxy-1-propenylbenzene.** Zyunzō Arima and Takeo Takahashi. Japan. 100,534, Apr. 12, 1933. *m*-Methoxyphenol is converted by allyl chloride to *m*-methoxyallyloxybenzene, which is converted to 2-hydroxy-4-methoxy-1-allylbenzene by heating with dimethylaniline in an autoclave. This compd. is methylated with  $Me_2SO$ , and then heated with alc.  $KOH$ , to produce 2,4-dimethoxy-1-propenylbenzene.

**Nitrotoluene.** Nippon Sekiyū K. K. (Masakichi Mizuta and Teidi Yoshimura, inventors). Japan. 99,749, Feb. 23, 1933. Toluene is mixed with 10-80% solvent, which is inactive to nitrating reagent, according to its purity. The mixt. is treated with  $H_2SO_4$ , alkali soln. and Japanese acid clay, by which the toluene is purified. Then the mixt. is nitrated as usual and pure nitrotoluene is sepd.

**Chloronaphthalenes.** I. G. Farbenind. A.-G. (Rudolf Engelhardt, inventor). Ger. 548,260, Jan. 23, 1934 (Cl. 12o. 2.01). Naphthalene is chlorinated at a temp. below 140° in the presence of a catalyst, e. g.,  $Sb$ ,  $P$ ,  $S$  or  $I$ . Products of a waxy consistency, contg. less than 60% of  $Cl$ , are obtained.

**4,5-Dimethyl-7-chlorohydroxythionaphthene and its indigoid derivatives.** Norbert Steiger (to General Aniline Works). U. S. 1,945,923, Feb. 6. The sulfate of 4-amino-1,2-dimethylbenzene (formed by nitrating *o*-xylene and reducing the nitro product) is transformed into 1,2-dimethyl-4-aminobenzene-5-sulfonic acid by the "baking process"; the amino group is then replaced by  $Cl$  according to Sandmeyer's method, and the 4-chloro deriv. is transformed, through the sulfonyl chloride and followed by reduction, into the 1,2-dimethyl-4-chlorobenzene-5-mercaptan; this mercaptan, by the action of monochloroacetic acid, yields 1,2-dimethyl-4-chlorobenzene-5-thioglycolic acid which by ring closure is transformed into 4,5-dimethyl-7-chlorohydroxythionaphthene, m. 160°, and which when condensed with cyclic diketones

or their derivs. such as isatins or naphthoisatins, their chlorides or arylides, etc., yields mixed thioindigoid dyes giving pink-red to blue dyeings from the vat of good brightness and fastness to kier boiling. When treated with an oxidizing agent, the 4,5-dimethyl-7-chloro-hydroxythionaphthene yields the sym. thioindigo deriv. which dyes reddish violet. Various examples and alternative procedures are given.

**Camphor.** Nippon Syōnō K. K. (Seiichi Yamada and Hiroshi Ogata, inventors). Japan. 99,469, Feb. 9, 1933. Camphor is prepd. from borneol or isoborneol in an atm. not contg.  $O_2$  by catalytic oxidation at 300–400°. As catalyst reduced Cu or Ni is used. The Cu is prepd. by reducing  $Cu_2O$ , obtained from  $CuOH$  prepd. from  $CuNO_3$  and NaOH.

**Camphane.** Hajime Ueda and Kyōhei Murakami. Japan. 99,167, Jan. 25, 1933. Camphane is manufd. in good yield by agitating a mixt. of pinene-HCl, an acidic org. solvent (such as phenol or cresol), NaOH and a catalyst (such as Japanese acid clay or active C) and distg. the product.

**Indene.** Rütgerswerke-A.-G. and Leopold Kahl. Ger. 589,560, Dec. 9, 1933 (Cl. 12o. 1.04). Indene is obtained by fractionating tar oil till a product contg. 80% indene is obtained. This is cooled to –25° and the crystal. indene sepd. by centrifuging at about this temp.

**Chlorothymene.** The Head of the Tokyo Kōgyō Shikenjo (Harushige Inoue and Hiroshi Horiguchi, inventors). Japan. 100,570, Apr. 13, 1933. Chlorothymene is prepd. in good yield by treating thymene with  $Cl_2$  gas at 40–79°, in the presence of a mixt. of Fe powder and anhyd. halides of Fe, Ni, Al, Zn, P or S.

**Purifying crude coumarin.** Erik Clemmensen (to Monsanto Chemical Co.). U. S. 1,945,182, Jan. 30. See Fr. 722,406 (C. A. 26, 4069).

**Purifying crude coumarin.** Erik Clemmensen (to Monsanto Chemical Co.). U. S. 1,945,184, Jan. 30. In purifying crude coumarin contg. org. impurities, an aq. soln. is formed of a sulfite addn. product of coumarin, impurities are extd. from the soln. by use of an immiscible solvent such as  $C_6H_6$  or  $CCl_4$  and the coumarin is subsequently regenerated.

**3-Menthone.** Walter Schoeller, Erwin Schwenk and Erich Borgwardt (to Schering-Kahlbaum A.-G.). U. S. 1,940,115, Feb. 6. 3-Menthene oxide is heated to about 250° in contact with a surface catalyst such as pumice or silica gel.

**4,8-Dihydroxy-1,2,5,6-dibenzophenazines.** I. G. Farbenind. A.-G. (Arthur Zitscher, inventor). Ger. 589,071, Dec. 22, 1933 (Cl. 12p. 10). 2-Amino-3-hydroxynaphthalene, in which the H of the OH group is substituted, is converted into the phenazine and the substituent in the OH group is split off. Thus, 2-amino-3-[(3'-carboxybenzene-1'-sulfonyl)hydroxy]naphthalene is heated with  $CuO$  and  $C_6H_5Cl$ . The reaction mixt. is treated with water, NaOH and steam to split off the acyl group. The substance 4,8-dihydroxy-1,2,5,6-dibenzophenazine, m. 375–80° (uncor.), is obtained. The prepn. of 4,8-dihydroxy-*Bs*-2',2''-dimethoxy-1,2,5,6-dibenzophenazine, m. 380°, 4,8-dihydroxy-, and 4,8-dimethoxy-*Bs*-2',2''-dibromo-1,2,5,6-dibenzophenazine, m. 385° and 382–5° (uncor.), resp., is also described.

**Anthraquinone.** I. G. Farbenind. A.-G. (Hermann Hagenest, Erich Reiche and Emanuel Blümel, inventors). Ger. 589,777, Dec. 14, 1933 (Cl. 12o. 10). Anthraquinone and  $CrCl_3$  are prepd. by reducing aq. solns. of chromates contg. HCl, with anthracene.

**Benzanthrone-1-aldehyde.** Otto Bayer (to General Aniline Works). U. S. 1,946,829, Feb. 13. See Ger. 581,239 (C. A. 27, 5083).

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Presence in cells of adipose tissues of a dehydrogenase acting on higher fatty acids.** G. Quagliariello. *Atti accad. Lincei* 16, 552–4 (1932).—The adipose tissue of the dog contains a dehydrogenase which acts on higher fatty acids, causing either oxidation of existing double linkings or formation of new double linkings (cf. C. A. 27, 2461).

B. C. A.

**Action of different kinds of light on glucolysis.** E. Keeser. *Arch. expl. Path. Pharmacol.* 170, 500–4 (1933).—Irradiation (red light) for 30 min. of 0.1% glucose soln. (buffered with  $PO_4^{III}$ ) in presence of yeast cells accelerated the decrease in reducing power (I); white, green or blue light has little effect. Similar results were obtained with fructose as well as in the glucolysis of glucose or fructose by guinea-pig serum. Irradiation (5 hrs.) of ox serum with visible light did not alter its I or its content in inorg. P (II), but ultra-violet irradiation increased I but did not change II. Rabbits irradiated with visible light exhibited a reduction in the no. of white blood corpuscles, but apart from a temporary eosinophilia no change in the differential count occurred. B. C. A.

**Cytolysis by fat solvents and the importance of calcium and lecithin in the physicochemical behavior of protoplasm.** B. Hlučovský and B. Sekla. *Protoplasma* 18, 130–40 (1933).—The antagonism of fat solvents with respect to their cytolytic action is discussed. In the structure of the protoplasm there is a Ca-lecithin equil. which is disturbed by the differential action on the components of the various solvents examd. B. C. A.

**Physicochemical properties of proteins separated from serum by the acetone method.** A. Boutaric. *Protoplasma* 18, 286–98 (1933); cf. C. A. 27, 4552.—The viscosity and optical properties of proteins and their influence on the flocculation of  $Fe(OH)_3$  are discussed.

Seprn. of proteins at low temp. by the  $Me_2CO$  method does not involve the disturbance of mol. structure. B. C. A.

**The enzymic cleavage of the lecithins.** A. Contardi. *Boll. chim. farm.* 73, 3–12 (1934); cf. C. A. 27, 4258.—A lecture.

Lewis W. Butz

**Chemical synthesis of hormones.** Max Eitel. *Süddeut. Apoth.-Ztg.* 74, 63–5 (1934).—The synthesis of hormones, as adrenaline, thyroxine hypophysis and reproductive principles, is discussed.

W. O. E.

**Colorless crystals of hemoglobin.** Alfred Teitel-Bernard. *Compt. rend. soc. biol.* 115, 303–4 (1934).—Under certain conditions rhombic crystals of hemoglobin from human blood partly changed to monoclinic crystals exhibiting a marked dichroism. The new crystals appeared either colorless or violet red, depending upon the angle from which they were viewed. Their absorption spectrum was that of reduced hemoglobin.

L. E. Gilson

**Application of capillary analysis to the study of the constitution of alexin.** Otto G. Bier. *Compt. rend. soc. biol.* 115, 349–50 (1934).—Some expts. on the adsorption of alexin from serum by strips of filter paper are described.

L. E. Gilson

**Ovalbumin and conalbumin.** Guy Bruynoghe. *Compt. rend. soc. biol.* 115, 441–4 (1934).—Precipitin reactions with serums of sensitized rabbits showed that ovalbumin from hen eggs is quite distinct from the proteins of hen blood serum. Conalbumin is more complex and reacts to some extent like ovalbumin (perhaps because of incomplete seprn.) and also like hen serum protein; the latter fact suggests that it may be derived from one of the serum proteins.

L. E. Gilson

**Oxidation-reduction potentials of cytochrome c.** David E. Green. *Proc. Roy. Soc. (London)* B114, 423–35 (1934).—Cytochrome c forms a reversible oxidation-reduction system; the change from the reduced to the oxidized form involves a single equiv. During a study of the variation of the potential of cytochrome with change in

H-ion concn. between  $pH$  4.59 and 9.20, it was found that within the physiol.  $pH$  range, cytochrome lies on the oxidation-reduction scale intermediate between methylene blue and the indophenols.

Joseph S. Hepburn

**Osmotic pressures in the hen egg.** Edward J. Baldes. *Proc. Roy. Soc. (London)* B114, 436-40 (1934).—In "fresh" chicken eggs, the white and the yolk differ in vapor pressure and in osmotic pressure. In the yolk, an osmotic pressure gradient exists with a low value near the surface and a high value in the interior. Only a small, if any, difference of osmotic pressure exists across the vitelline membrane. Mixts. of white and yolk react with each other in some as yet not understood manner to produce a ppt.; the deid. osmotic pressure of the mixt. is less than the calcd.

Joseph S. Hepburn

**The mechanism of activation of arginase.** E. Waldschmidt-Leitz and W. Kocholaty. *Naturwissenschaften* 21, 848 (1933).—The activation of arginase by sulfhydryl + heavy metal (Fe, Cu) has been proved (C. A. 27, 1010; Salaskin, C. A. 26, 5110; Edlbacher *et al.*, C. A. 27, 3488). The activation does not take place with either a completely reduced or a completely oxidized system, but only with the labile oxido-reduction system. The activating combination is not required for the splitting of the arginine itself; the presence of arginine blocks the activation of arginase. The activation reaction has only a temporary effect and an optimum at  $pH$  = 5. The Fe-sulfhydryl system can be replaced by Fe-alloxan or oxy-hemoglobin; methemoglobin is inactive. It is probable that the activated enzyme is an oxidized form of arginase.

B. J. C. van der Hoeven

**Natural activation of vegetable tissue protease.** K. Mothes. *Naturwissenschaften* 21, 883 (1933).—The mechanism of  $O_2$  action on papain (tissue protease) was studied further (cf. C. A. 26, 3820; 27, 4271; 28, 504<sup>2</sup>; Ber. Botan. Ges. 51, 31 (1933); *Forsch. u. Fortschr.* 9, 438 (1933)). Sol. sulfhydryl substances are among the natural activators for papain (from yeast, barley, onion or leaves); however, they do not occur as such in higher plants. Only reversibly inactivated enzyme preps. can be activated; quinone oxidation is partly destructive; dil.  $H_2O_2$ ,  $O_2$  in the presence of plant pulp (dehydrogenase) or colloidal noble metal oxidizes reversibly. For air oxidation  $pH$  7 is more favorable than  $pH$  5. Reactivation takes place by plant pulp in the absence of  $O_2$ , by several undefined  $H_2O$ - or  $Me_2CO$ -sol. plant exts. and by  $Pd-H_2$ . All active papain preps. give the SH reaction; inactive ones have disulfide characteristics.

B. J. C. v. d. H.

**Peroxidase activity of hematin.** C. A. Johnson. *Arch. Path.* 16, 667-9 (1933).—Pure hematin was prepd. from blood by Elvehjem's modification (C. A. 25, 5907) of older methods and its peroxidase activity in various dilns. compared with that of blood. In every trial the peroxidase activity of hematin was equal to that of blood; this confirms the conclusions of others that hematin is responsible for the peroxidase activity of blood.

H. F. II.

**Amylosynthase.** XIX. Toyosaku Minagawa. *J. Agr. Chem. Soc. Japan* 9, 1198-201 (1933); cf. C. A. 28, 1062<sup>2</sup>.—Isolichenin was proved in some varieties of the lichens produced in Japan, such as *Alectoria ochroleuca*, *A. sulcata*, *A. japonica*, *Ramalina geniculata* and *Usnea trichodea*. It is not present in *Cladonia bellidiflora*, *Gyrophora vellea*, *Loharia pulmonaria*, *Parmelia tinctorum*, *Ramalina pollinaria*, *Usnea japonica*, *U. montis*, etc. Isolichenin was decompd. into a product without l reaction by malt amylase or heating with glycerol. The product could not be polymerized by amylosynthase. Isolichenin closely resembles amylose. Though glutinous rice starch gives a red color with I-K soln., it was sepd. into glutinous amylose and glutinous amylopectin. XX. *Ibid.* 1202-6.—The action of amylosynthase was retarded by  $Al(NO_3)_3$ ,  $AlCl_3$ ,  $Cd(NO_3)_2$ ,  $Ph(NO_3)_3$ ,  $Fe(NO_3)_3$  and  $FeCl_3$ . It is, however, reactivated by the addn. of  $(NH_4)_2SO_4$ . When amylosynthase was damaged by the salts of Ag, Cu, Hg, Zn and Pt, it could not be reactivated.  $MnCl_2$  and  $BaCl_2$  gave no effect on the action of amylosynthase.

Y. Kihara

**Phosphatase and phosphatase of *Rhizopus tritici*.**

Fumio Hemmi and Norimasa Tsukitani. *J. Agr. Chem. Soc. Japan* 9, 1382-93 (1933).—The mold filament or the ext. of *Rhizopus tritici* was added to glucose soln. contg.  $Na_2HPO_4$ ,  $NaHCO_3$  and  $PhMe$  at 37°. No decrease of free phosphoric acid nor change in the reducing power could be observed. Phosphatase, an enzyme forming phosphoric ester, could not be proved. Na glycerophosphate, K hexosediphosphate and K sucrosephosphate were split by the mold filament or the ext. of *Rhizopus tritici* into  $H_2PO_4$ . Phosphatase may be present. The optimum  $pH$  of phosphatase was at 6.0-6.2.

Y. K.

**Succinic acid from the cadaver.** A. Verdino. *Deut. Z. ges. gericht. Med.* 22, 384-6 (1933).—Succinic acid in large quantities was isolated in 2 cases. The yields were 60 mg. from 807 g. of organs and 190 mg. from 1886 g. of cadaver. The distribution of succinic acid in the individual organs, and even in the stomach and intestinal contents, in the liver, kidneys, lungs and brain was detd. The appearance of such large amts. of succinic acid can only be explained as having resulted from putrefaction of the organs.

Frances Krasnow

**The decomposition of lactic acid by yeast enzyme.** Amandus Hahn, E. Fischbach and H. Niemer. *Z. Biol.* 94, 58-66 (1933).—Lactic acid is quickly decompd. by yeast ext. in the presence of either methylene blue or dinitrobenzene as H-acceptor, yielding pyruvic acid and AcH. In the absence of acceptors this reaction does not occur.

Frances Krasnow

**Mass action and albumin decomposition in the living organism.** Otto Krummacker. *Z. Biol.* 94, 119-34 (1933).—An attempt is made to show that the law of mass action applies to reactions in the organism.

F. K.

**Barley diastase.** R. H. Hopkins, G. J. Cope and J. W. Green. *J. Inst. Brewing* 39, 487-93 (1933); cf. *J. Inst. Brewing* 824 (1933).—Alc.-pptd barley diastase, optimum  $pH$  4.5-4.7, stable over  $pH$  4-8, converts 60.5% starch or 42-44% glycogen over the  $pH$  range 4.3-7.5. This limit is increased by 20% or more by living yeast but not by activators prepd. from yeast (Meyerhof's activator, C. A. 21, 2280; Pringsheim's complement, C. A. 18, 1507). Lintner's sol starch was degraded to 97% by successive treatments.

Quick Landis

**Normal absorption and excretion of lead.** I. Lead absorption and excretion in primitive life. Robert A. Kehoe, Frederick Thamann and Jacob Cholak. *J. Ind. Hyg.* 15, 257-272 (1933).—Exptl. observations made in primitive regions in Mexico demonstrated that Pb is a natural constituent of the soil and the vegetation and that Pb occurs in the blood, the urine and the feces of human beings who live naturally on local agricultural and animal products. Analytical methods are described for detg. Pb in food, tissues, urine and feces. Twenty two references. II. Lead absorption and lead excretion in modern American life. *Ibid.* 273-288.—The Pb intake and output under normal environmental conditions were studied. It is concluded that the normal adult American excretes Pb at a rate of 0.02-0.08 mg. per l. of urine, and at a rate of 0.03-0.1 mg. per g. ash in the feces; that the mean daily Pb output for various groups of normal individuals varies from 0.25 to 0.38 mg.; that the Pb intake in the food of selected subjects was approx. equiv. to the Pb content of their feces; that from direct analytical observations on the food, and from indirect interpretation of the fecal Pb content of a large group of subjects, the daily intake of Pb in the food is of the order of 0.16 mg to 0.28 mg.; that normal persons whose Pb metabolism is followed for prolonged periods show no evidence of Pb accumulation, but appear to have established an equilibrium with their environment in which excretion of Pb keeps pace with absorption. Twenty-seven references.

III. The sources of normal lead absorption. *Ibid.* 290-300.—The amt. of Pb was detd. in certain common foods and beverages. The amt. of each material examd. was equiv. to that consumed by one subject in a week, so that the quantity of Pb found constitutes a definite proportion of the total weekly Pb intake of a normal individual. The investigation demonstrated the general occurrence of small amts. of Pb in these materials. Certain classes of foods

frequently contain more than av. amts. of Pb. Among these in the order of increasing importance are, bread-stuffs, meats, processed meats, ice cream, candy, leafy green vegetables and certain fruits. The comparison of primitive Mexican and American foods indicates that a factor in the higher Pb content of the latter is the general use of Pb-contg. insecticides. Eighty-six references. IV. Lead absorption and excretion in infants and children. *Ibid.* 301-5.—Random samples of the urine and feces of patients from a children's hospital were analyzed. The results showed Pb in the urine in amts. varying from 0.02 to 0.18 mg. per l., with a mean excretion of 0.08 mg. per l. The mean Pb excretion in the feces was 0.08 mg. per g. of ash. The Pb excretion of a group of Mexican children living under essentially primitive conditions varied from nil to 0.03 mg. per l. of urine, with a mean of 0.015 mg.; their mean fecal Pb excretion was 0.04 mg. per g. of ash of feces. Analyses made on large amts. of human milk from normal mothers with neg. histories in respect to occupational Pb exposure yielded Pb in amts. varying from nil to 0.05 mg. per l. Four of 5 premature or still-born human fetuses showed the presence of small amts. of Pb in their tissues, despite the absence of maternal Pb exposure; the Pb was found in the bones of 3, in the liver, brain, and skin of 2, and in the intestinal tract of one. The largest total amt. was 0.41 mg. of Pb in a still-born fetus at term. Eight references. E. G. Meiter

**Morphology and fine structure of collagen fibers.** A. Kuntzel and F. Pranke. *Biochem. Z.* 267, 243-95 (1933).—Collagen fibers from tendon are about 10  $\mu$  wide while those of skin are 2  $\mu$  wide. All collagen fibers consist of fibrillae, which can be mechanically sepd about 0.5  $\mu$  in width. The fine structure can be detd not only by means of the polarizing microscope and x-ray analysis but also by swelling reactions. Swelling in H<sub>2</sub>O of the dried fibers leads not only to their thickening but also lengthening, the absorption of the H<sub>2</sub>O being chiefly intamicellar, but there is also intermicellar absorption as shown by the changes in the form of the fibers. Acid swelling leads to thickening and shortening of the fibers, with a considerable increase in vol. The effect is reversible with tendon fibers, but with the skin fibers it occurs only under stretching. The acid swelling results from osmotic action because of unequal distribution of ions inside and outside the fibers, the osmotic effect being exerted only at definite points of the lattice structure. Shrinkage of water swollen fibers either through heating to 62-70° or through the action of strong electrolyte solns. results from a very rapid shortening of the fibers to 1/5-1/4 of their original length. This consists of a reversible and irreversible process, the latter being eliminated by preliminary treatment of the fibers with HCOH. The contraction can thus be made reversible and is merely a tendency of the mol. lattice to attain a more stable form. Shrinkage of the collagen fibers is assoc. with a loss of water, probably from the lattice structure. The form change of the shrunken fibers is not apparently assoc. either with a buckling in of micelles or of principal valence chains, the original micellar arrangement remaining unaltered. S. Morgulis

**The response to enzymes of glucuronides and glycyrrhizic acid.** F. Bergmann. *Biochem. Z.* 267, 296-308 (1933).—Glycyrrhizic acid or rheticic acid according to Karrer (*C. A.* 16, 2427) has the formula C<sub>42</sub>H<sub>60</sub>O<sub>22</sub>(OH)<sub>8</sub>·COOH, [ $\alpha$ ]<sub>D</sub><sup>20</sup> = 146°, a C:H:O ratio = 23:36:3, but a mol. wt. of only 360 instead of 704 according to Karrer, so that the probable compn. is C<sub>24</sub>H<sub>36</sub>O<sub>12</sub>. It contains only CO<sub>2</sub>H (prepn of the ester) and since the ester is hard to saponify the C to which the COOH is attached is probably combined only with C atoms. The presence of a OH group is also substantiated by the mono Ac deriv., but apparently there are no double bonds. Neither  $\beta$ -naphtholglucuronic nor rhizinic acid were attacked by hydrolyzing enzymes (emulsin, taka-diastase, *Aspergillus niger*, baccalinase, *Saccharomyces fragilis*, maltase). S. M.

**Emulsion of Rosa canina.** Ed. Hofmann. *Biochem. Z.* 267, 309-12 (1933).—The tips of the wild rose, dried, powd., extd. with ether and treated with 0.05 N NH<sub>4</sub>OH,

yield an enzyme prepn. having practically no action on  $\beta$ -glucosides but strongly hydrolyzing  $\beta$ -galactosides. The emulsin of the wild rose thus differs from that obtained from related sources (almonds, apricots, plums) in that not only is the relation between the  $\beta$ -glucosidase and  $\beta$ -galactosidase reversed, but the enzyme consists almost entirely of  $\beta$ -galactosidase. The optimum H-ion concn. for its action with  $\beta$ -phenolgalactoside is at pH 5. S. Morgulis

**Electrophoresis of trypanosomes and spirochetes.** F. P. Fischer and Viktor Fischl. *Biochem. Z.* 267, 403-4 (1933).—Contrary to reports in the literature, both types of microorganism, in the natural medium or in saline solns., whether alive or dead, always move to the cathode in the elec. field. This cathodic migration is especially marked in the presence of erythrocytes which migrate to the anode. The charge is affected by changes in the pH but has nothing to do either with life or virulence of the organisms. S. Morgulis

**Comparative studies on the biochemical formation of optically active phosphoglyceric acid from different sugars.** Tamezi Baba. *Biochem. Z.* 267, 452-5 (1933).—Formation of optically active phosphoglyceric acid from glucose, fructose, sucrose and maltose increases with the concn. of organically bound P, and was shown to diminish in expts. with decreasing amts. of hexosediphosphate. A somewhat greater yield was obtained with maltose than the other sugars. S. Morgulis

**Constitution of ovomucoids.** Toshinori Isaki. *J. Biochem. (Japan)* 19, 1-5 (1934).—Two-hundred g. purified ovomucoid was digested for 250 days at 37° with 40 g. trypsin. The soln. was filtered, pptd. with HgCl<sub>2</sub> and the filtrate freed from Hg with H<sub>2</sub>S. The filtered soln. was aerated, neutralized with dil. NaOH and concd. under diminished pressure. The soln. was now pptd. with Pb(OAc)<sub>2</sub>, and to the filtrate NH<sub>4</sub>OH was added as long as a ppt. was formed. The Pb ppt. was washed several times with H<sub>2</sub>O and decompd. with H<sub>2</sub>S, the soln. aerated, evapd. to a sirupy condition and poured into abs. alc. A white ppt. of a hygroscopic substance (45 g.) was thus obtained which was washed with abs. alc. and ether. The substance contains only traces of ash, no amino acids, and about 49.5% chitosamine. On the basis of tests the presence of an at. grouping =C(—NH<sub>2</sub>)—CHOH— is thought to be established. S. Morgulis

**Electrical phenomena on the cuticle. I. Potential difference between the cuticle and electrolyte solutions.** Katsuzo Hayashi. *J. Biochem. (Japan)* 19, 145-63 (1934).—The expts. were made with enucleated cow's eyeballs. These were placed in one arm of a U-shaped vessel filled with the electrolyte soln., touching the soln. with the outer surface over a diam. of about 1 cm. The interior of the eyeball is connected to a calomel electrode through an agar syphon dipping in a satd. KCl soln. A similar syphon, placed in the other arm of the U vessel, connects the electrolyte soln. to another calomel electrode. The cuticle membrane tends to make the potential of the more dil. soln. more pos. in a diffusion chain of chlorides of the alkalis and earthy alkalis, but in the case of chlorides of bivalent (Cu<sup>++</sup>) or trivalent cations (Al<sup>+++</sup>) the effect of the membrane is practically nil. In the case of the H<sup>+</sup> cation the membrane effect becomes strongly neg. KSCN, KNO<sub>3</sub> or KBr also exerts a pos. effect, which is even stronger for NaOH. In the case of bivalent anions (SO<sub>4</sub><sup>==</sup>) or trivalent anions (Fe(CN)<sub>6</sub><sup>==</sup>) the membrane effect is again nil. Further studies on the potentials of cuticle. *Ibid.* 165-72.—In these expts. instead of the enucleated eyeball, carefully dissected pieces of the cuticle were tied over the free end of a glass tube, with the epidermal layer on the outside. The epithelial layer was sometimes in contact with the more dil. and at other times with the more concd. soln. In all respects the membrane effects on the diffusion potential were similar to those obtained in the preceding series of expts. Expts. were also made with membranes treated with formal. These expts. show the series of the ion effects more strikingly. Swelling has no dominant influence on the electromotive phenomena of the cuticle. S. Morgulis

The isotopic fractionation of water by physiological processes Edward W Washburn and Edgar R. Smith. *Science* 79, 188-9(1934).—A quantity of branches and leaves from a young willow tree (*Salix nigra*) was treated in such a way as to obtain the sap  $H_2O$  and the  $H_2O$  from combined H. Roth showed an increase in  $H^2$  which is apparently due to preferential selection during the process of growing. No isotopic fractionation occurs during the passage of the  $H_2O$  into the tree through the root membranes. G. M. Murphy

Uroflavin, maltoflavin and reduction-oxidation potentials of lyochromes Kurt G. Stern. *Nature* 133, 178-9 (1934).—Uroflavin (I) has been obtained from normal human urine and maltoflavin (II) from malted barley. The procedure is similar to that for the prepn. of heptoflavin. With a quartz monochromator it has been found that visible light of the blue-violet region and not ultra-violet radiation is responsible for the fluorescence of lyochromes. Both lyochromes yield  $CHCl_3$ -sol. "lumiflavins" on strong irradiation in soln. I and II possess sharp absorption bands in the ultra-violet, at 281 and 255  $m\mu$ , resp. W. J. Peterson

Microheterogeneous catalytic decomposition of hydrogen peroxide by cholesterol sols. Igor Remezov. *Ber.* 67B, 134-40(1934); cf. *C. A.* 28, 7937.—The previous report that the decompn. of  $H_2O_2$  is catalyzed by colloidal cholesterol is confirmed. Molecularly dispersed cholesterol, and also cholesteryl esters and lecithin are inactive. With 10%  $H_2O_2$ , the reaction is unimol., though more complicated relations were met when the catalyst: $H_2O_2$  ratio was varied. The action seems to be similar to that of catalases and Pt sols, only weaker. The speed of the reaction is detd. by the rate of adsorption of the  $H_2O_2$  upon the particles of the catalyst. The activity of the catalyst shows a max. for a  $pH$  range of 6.4 to 8.04. The catalyst is not affected by  $CN^-$ , but its action is strongly inhibited by Hg and Hg compds. J. H. Reedy

Absorption of pepsin by crystalline proteins. John H. Northrop. *J. Gen. Physiol.* 17, 165-94(1933).—Cryst. proteins (edestin, melon globulin) remove pepsin from soln. The pepsin protein is taken up as such by the foreign protein, the amt. being equiv. to the peptic activity of the digestive soln. The formation of the protein-pepsin complex depends upon the  $pH$ , reaching a max. at 4.0. An insol. complex is formed which ppts. when pepsin and edestin sols. are mixed, the max. pptn. occurring at  $pH$  4.0. Compn. of the ppt. varies with the relative quantity of pepsin and edestin. As much as 75% of this complex may consist of pepsin; its activity may be equiv. to  $1/4$  of the activity of cryst. pepsin itself. The pepsin may be extd. from the complex with 0.25 N  $H_2SO_4$  soln.; if dissolved in the acid soln. at  $pH$  2.0, the foreign protein is rapidly digested, leaving the pepsin protein which may be isolated and identified by its tyrosine + tryptophan content, basic N content, cryst. form and sp. activity. C. H. R.

The theory of diffusion in cell models. Lewis G. Longworth. *J. Gen. Physiol.* 17, 211-35(1933).—In a cell model, with water and a salt as the only substances whose diffusion requires consideration, Osterhout (*C. A.* 27, 3381) showed that the results are in qual. accord with the kinetics characterizing 2 consecutive unimol. reactions. I. believes, however, that the mechanism more nearly corresponds to that of 2 simultaneous and mutually dependent processes. The differential equations that describe the simultaneous diffusion of water and a salt in a cell model were formulated and solved. These equations are derived from the general laws for diffusion processes. The theoretical time curves of diffusion of the 2 substances agree with those detd. experimentally. C. H. R.

The nature of lysozyme action. Karl Meyer, Richard Thompson, John W. Palmer and Deborah Khorazo. *Science* 79, 61(1934).—The authors believe that lysozyme is an enzyme or enzyme mixt. which splits a reducing sugar from certain mucoids and from the polysaccharides derived from them. "Its occurrence in tears, nasal, bronchial and gastrointestinal mucus, egg white and semen can thus be understood, the bacteriolytic action being incidental." J. J. Willaman

The nature of the osmotic effect of solutions of non-electrolytes on the erythrocyte. M. H. Jacobs. *Am. J. Med. Sci.* 187, 147(1934).—Expts. indicate that while an escape of salts from the erythrocytes of the ox into a surrounding sucrose soln. undoubtedly occurs in expts. of sufficiently long duration, this change is much less striking than an earlier one, which begins almost instantly and is practically complete within a few min. This change, unlike the later one, is readily reversible and is believed to be due to an exchange of anions from the cell for  $OH$  ions from the soln., the resulting increase in the base bound by hemoglobin causing a decrease in the osmotic pressure of the cell contents. Calcns. indicate that the expected osmotic effect of such an ionic shift is of the order of magnitude of that actually observed. R. C. Willson

Some characteristics of intestinal lactase. F. A. Cajori. *Am. J. Med. Sci.* 187, 295(1934).—A lactose-splitting enzyme was invariably found in aq. exts. of the mucosa of the duodenum and jejunum of adult dogs. Juice from a Thiry loop of the colon did not contain the enzyme. Jejunal juice showed feeble lactase activity. Intestinal lactase showed max. activity at  $pH$  5.4-6. Its activity was inhibited by glucose but not by galactose. The Michaelis const. was  $K_m = 0.0056$ . Lactase was adsorbed readily from slightly acid soln. by  $Al(OH)_3$  or  $Fe(OH)_3$ . Aq. exts. of the liver showed lactase activity about  $1/4$  that of intestinal mucosa exts. The lactase activity of intestinal exts. and intestinal juice accounted for less than  $1/2$  of the lactose that disappeared from a jejunal loop during absorption trials with this sugar in the intact animal. R. C. Willson

Biochemistry and manuf. of fine chemicals (Carr) 17  
Ring system of sterols and bile acids (Rosenheim, King)  
10. S oxidation (Andrews, Andrews) 10. Pectate  
(Tserevitinov, Rozanova) 12

Fearon, Wm. R.: An Introduction to Biochemistry. London: Wm. Heinemann, 323 pp. 10s. 6d.

Marinesco, N.: Equilibre de membrane. Paris: Hermann & Cie. 69 pp. F. 15.

Lecithin. I. G. Farbenind. A.-G. Fr. 750,952, Dec. 18, 1933. Pure lecithin is obtained by extg. lecithin from a substance contg. it by means of an org. solvent and adding an inorg. oxide sol to the resulting soln. and sepg. the ppt. Examples are given of the use of EtOH sols of oxides of Si, Al and Fe.

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The determination of glucose and uric acid in alcaptonuric urines. Corrado Cassata. *Diagnostica tec. lab* (Napoli) *Riv. mensile* 4, 394-6(1933).—The homogentisin and trihydroxyphenylpyruvic acids present in alcaptonuric urines are extd. with  $Rt_2O$  before applying the usual quant. procedures for glucose and uric acid. L. W. B.

Studies on the mineral composition of the bones. I. Analytical technic. Mario Coppo. *Diagnostica tec. lab* (Napoli) *Riv. mensile* 4, 465-87(1933).—A procedure is described which permits the detn. of Ca, P, Mg, Na and K; only 1.2-1.5 g. of bone is used.  $^{45}Cl$  is detd. in a sep. 0.5 g. sample. Lewis W. Butz

The microdetermination of phosphorus (inorganic, acid-soluble, lipid and total) in the blood and excretions. F. Ferranti and O. Giannetti. *Diagnostica tec. lab* (Napoli) *Riv. mensile* 4, 664-82(1933).—The Bell and Doisy method is modified to decrease the quantity of acid present in the liquid after destruction of the org. matter. This is accomplished by adding 5 cc. of a 45% aq. soln. of  $AcONa$  for each cc. This modification makes it unnecessary, in the detn. of total and lipid P, to convert the sample into ash by the dry method, thus permitting the use of the Neumann wet method. Blood phosphorus in normal adults. *Ibid.* 845-54.—The P content of the erythrocytes does not vary even under the most diverse physiol. and pathol. conditions. That of the plasma, however, varies considerably; it is influenced, e. g., by slight changes in the erythrocyte



vol. Therefore the plasma P should always be detd. F. and G. found the following values (mg. P per l.) for plasma, serum and erythrocytes, resp., using their modifications of the Bell and Doisy method: inorg. P 34.75, 16.3, 25.12; acid-sol. P 42-53, 425, 240; lipid P 65-70, 170, 119; total P 107-121, 608, 364. L. W. H.

The determination of fibrinogen in the blood. Guido Boehm. *Diagnostica lec. lab. (Napoli) Riv. mensile* 4, 683-8(1933).—A new biol. method is described which requires the use of a table given in the original. It consists essentially in the addn. of  $\text{CaCl}_2$  soln. to a series of dilns. of oxalated and centrifuged blood and subsequent observation of fibrin formation. Lewis W. Butz

Determination of  $^{35}\text{Cl}$  in biological substances. Ernest Kahane and M. R. Dumont. *Bull. soc. chim. biol.* 15, 1247-55(1933).—Several methods are discussed and an improved method is described by which Cl and some other element, such as Na, can be detd. in the same sample of tissue even though  $\text{HClO}_4$  is used for the final destruction of org. matter. L. E. Gilson

The determination of blood glucose. Adolfo Escudero. *Rev. facultad cienc. quim. (Univ. La Plata)* 8, Pt. 2, 37-45(1933).—Methods are discussed. L. E. G.

Technic and methods in the study of climatic factors in connection with biological investigations. J. J. de Gryse. Quebec Soc. Protection Plants, 23rd & 24th Ann. Rept. 1930-1932, 38-86(1932).—A detailed discussion of methods and app. for the measurement of temp., atm. humidity, pptn. and pressure, light and evapn. with special reference to biol. problems. K. D. Jacob

Determination of skin polarization with the tube voltmeter. Hans Schaefer. *Z. Biol.* 94, 11-38(1933).—In the presence of  $\text{AlCl}_3$ ,  $\text{HCl}$  (0.001 N) and  $\text{NaH}_2\text{PO}_4$  the anodic current effects an increase in resistance and polarization. 0.001 N  $\text{NaOH}$  also aids polarization. Inhibition of polarization is obtained under the cathode with 0.1 N  $\text{HCl}$ , under the anode with 0.001 N  $\text{NaOH}$ . Frances Krasnow

Comparison of total nitrogen analyses of urine for one- and four-day periods. Bernice L. Kunerth. *Trans. Kansas Acad. Sci.* 36, 157-8(1933).—Results show that unless it is necessary to know the daily fluctuations in the urinary N, analysis of a composite sample may be used to calc. the daily N excretion. W. A. Moore

Determination of reduced glutathione content in blood. Fumio Murata. *Sei-i-kwai Med. J.* 51, No. 10, 92-5 (English Abstract 4-5)(1932).—The Perlzweig-Detruer method is so modified as to give more accurate results with blood. Three cc. of blood is added slowly and while shaking to 10 cc.  $\text{H}_2\text{O}$ . Then immediately 10 cc. 1%  $\text{CCl}_3\text{COOH}$  is added to prevent decompn. of reduced glutathione. The protein is then pptd. with 10 cc. 30%  $\text{CCl}_3\text{COOH}$  and by shaking the mixt. 3 times. With this modification, F. obtained 0.0201-0.0264, av. 0.023% reduced glutathione in the normal rabbit blood. S. T.

Dixon, Malcolm: Manometric Methods as Applied to the Measurement of Cell Respiration and Other Processes. New York: The Macmillan Co., Ltd. 122 pp \$1.75.

Determination of oxygen consumed and carbon dioxide produced in respiration of men or animals. Géza Mansfeld. *Hung.* 107,112, Sept. 1, 1933. Details of the method and app. are given.

## C—BACTERIOLOGY

CHARLES B. MORREY

Fermentation of glucose by legume bacteria. A. I. Virtanen, M. Nordlund and E. Hollo. *Acta. Chem. Fennica* 6B, 62(1933).—Fermentation is of the  $\text{PrCO}_2\text{H}$  type. B. C. A.

Fermentative properties of the *Zymosarcina* group. J. Smit. *Ann. inst. Pasteur* 50, 675-94(1933).—This group can be regarded as allied to the bacilli of lactic fermentation and is frequently found in the stomach in cases of pyloric ulcer. In the presence of  $\text{HCl}$  the optimum  $p_H$  for growth is 0.9.  $\text{H}_2\text{C}_2\text{O}_4$  will not allow growth below  $p_H$  3.4, nor will  $\text{AcOH}$  below  $p_H$  4.1. *Z. ventriculi* (I) is the only

member of the group which contains catalase; none contains tyrosinase or will liquefy gelatin. From a glucose medium I produces  $\text{CO}_2$  and  $\text{EtOH}$ , and *Z. maxima* yields  $\text{CO}_2$  and  $\text{BuOH}$  with a trace of  $\text{EtOH}$ . All of the group are sensitive to antiseptics and to heating at 55°; they remain viable for long periods in the ground in some unknown form. B. C. A.

Activity of nonpathogenic bacteria utilizing mineral matter in the thermal water of Aix-les-Bains and Aix-Burtscheid. I. A. Schloemer. *Z. Unters. Lebensm.* 65, 470-6(1933). The content of Fe is 1000 times, of Ca and  $\text{SiO}_2$  many times, higher in the slimy sediment of the Kaiserbad spring at Aix than in the  $\text{H}_2\text{O}$ . This is due to the action of Fe-, Ca- and Brucella's  $\text{SiO}_2$ -bacteria. The sediment is also richer in Al, which was not found by Feder (*C. A.* 18, 1886) in the  $\text{H}_2\text{O}$ , but is now shown to be present. B. C. A.

The action of lipolytic bacteria on some simple triglycerides and some natural fats. Mervyn A. Collins. *Iowa State Coll. J. Sci.* 8, 187-9(1933).—The Nile-blue sulfate technic was used. Hydrolysis of simple triglycerides by bacteria becomes more difficult as the mol. wt. increases. Tristearin is unaffected by bacterial action. Any common natural fat or oil is a good material for the detection of lipolytic bacteria. There is a close agreement between lipolytic and proteolytic abilities of the 159 cultures of bacteria studied, but not all of the lipolytic bacteria are proteolytic in litmus milk. There were no lipolytic bacteria in aseptically drawn milk or in salted butter, but they were present in large nos. in ordinary milk, cream and butter. They cause rancidity and decrease in no. as strong rancidity is reached. The organisms which produce the odor of lower fatty acids in butter fat produce tallowiness in corn oil, olive oil, tributyrin and triolein. F. E. Brown

The metabolism of some nitrogen-fixing clostridia. W. Hillman Willis. *Iowa State Coll. J. Sci.* 8, 231-3(1933).—Anaerobic N-fixing clostridia growing in  $\text{N}_2$  on N-free media whose initial  $p_H$  ranged from 6.5 to 9.5, produced 4.0-4.3 mg. of fixed N per 50 cc. of media in 3 weeks. In a similar medium whose initial  $p_H$  was 5.0, 3.2 mg. of N was fixed.  $\text{CaCl}_2$  and especially  $\text{CaCO}_3$  promoted the fixation of N. If peptone  $(\text{NH}_4)_2\text{SO}_4$  or  $\text{NaNO}_3$  was added to the medium glucose was utilized more rapidly but little or no N was fixed. The  $\text{CaCO}_3$  might act as a neutralizer of acid or as an acceptor for H in anaerobic fermentations. F. E. Brown

Bacterial phosphatases. I. The decomposition of phosphoric acid esters by *Clostridium acetobutylicum* Weizmann. Robert D. H. Heard and Arthur M. Wynne. *Biochem. J.* 27, 1655-59(1933).—Na hexosediphosphate (I) in 1.2% concn. is not fermented by living *Clostridium acetobutylicum*. When present in 0.75% concn. the diphosphate completely inhibits the fermentation of glucose in an otherwise favorable medium. A similar concn. of Na  $\beta$ -glycerophosphate (II) inhibits the fermentation of glucose. In active glucose-peptone cultures of the organism, both I and II are appreciably hydrolyzed. The hydrolysis of I proceeds most rapidly during the second phase of the fermentation following the time at which max. acidity is attained. II. The phosphatases of *Clostridium acetobutylicum* Weizmann and *Propionibacterium jensenii* van Niel. Lionel B. Pett and Arthur M. Wynne. *Ibid.* 1860-71.—These phosphatase systems have been investigated in expts. in which Na glycerophosphate, Na hexosediphosphate and Na pyrophosphate were employed as substrates. Mg appears to stand apart from all other ions as an activator of the phosphatase systems investigated. Benjamin Harrow

A chlorophyll-like bacterial pigment. K. Noack and E. Schneider. *Naturwissenschaften* 21, 835(1933).—Bacteriochlorine of S-free purple bacteria was studied by the methods of chlorophyll chemistry. It is violet in the bacteria and in ether, green in  $\text{EtOH}$  or on oxidation by peroxides or quinone; it does not crystallize; it contains Mg removable by acid and the "bacteriopheophytine" is spectroscopically related to pheophytin. The Stoll process for recovery of pheophorbide yielded 2 substances

sol. in 0.01 N KOH; one, the *b* modification,  $C_{48}H_{88}O_{10}N_4 \cdot \frac{1}{2}H_2O$ , has an OMe group and gives a di-Me ester  $C_{48}H_{88}O_{10}N_4$ . The *a* modification present in small amts. has not as yet been obtained in pure state. Further details are given. The principal difference between bacteriochlorophyll and plant chlorophyll lies in its spectrum.

B. J. C. van der Hoeven

**The metabolism of sulfur bacteria.** O. v. Deines. *Naturwissenschaften* 21, 873-8(1933).—The droplets in the interior of the cells of S bacteria consist of H persulfide not of elementary S (C. A. 27, 5017), probably from  $H_2S + SO_2$ , the latter by biol. oxidation (C. A. 27, 2080). The role of S bacteria in the formation of sulfidic ores is discussed; it is shown for Vulcano Island that direct volcanic  $H_2S$  action is responsible for the sulfide formation and that bacterial influences will generally be rare.

B. J. C. van der Hoeven

**Direct spectroscopic detection of the oxygen-transporting enzyme in Azotobacter.** E. Negelein and W. Gerischer. *Naturwissenschaften* 21, 884(1933).—The O-transporting enzyme of respiring *Azotobacter* cells (as well as that of acetic acid bacteria) can be observed spectroscopically. The bands of reduced enzyme (ferrous) lie at 632  $m\mu$ , those of oxidized enzyme (ferric) at 647  $m\mu$ ; CO causes change of the former to 637  $m\mu$ ; HCN causes the bands of the oxidized enzyme to disappear. The cytochrome spectrum also is visible, but is unaffected by the different reagents.

B. J. C. van der Hoeven

**Tryptophan and the growth of bacteria.** P. Fildes and B. C. J. G. Knight. *Brit. J. Exptl. Path.* 14, 343-9 (1933).—Tryptophan is essential for the growth of certain bacteria, but some of these can be trained to grow without it. All organisms which normally grow without added tryptophan or can be trained to do so synthesize tryptophan under these conditions. Tryptophan is a constituent of all bacterial protoplasm. There appears to be a relation between inability to synthesize tryptophan and pathogenicity.

Harriet F. Holmes

**Bacteria associated with the manufacture of soy.** Yoshio Ishimaru. *J. Agr. Chem. Soc. Japan* 9, 859-904, 953-1004, 1143-83(1933).—Sixteen kinds of aerobes and 12 kinds of anaerobes were isolated from the soy mash and investigated morphologically and physiologically. Growth occurred in 10% NaCl soln. Half of them grew even in 20% NaCl soln. Optimum temp. was generally 35-40°. Most of the bacteria produced  $RIOH$ , aldehyde, acetone, furfurole, ammonia, fusel oil and  $MeOAc$ . The production of indole or gas was rare. There were many kinds of bacteria that produced lactic acid. The bacteria come mainly from the soy bean and NaCl, rarely from the wheat or the water. In the manuf. of soy, the bacteria accelerated the hydrolysis of protein and polysaccharides by the mold (*Aspergillus*). The following bacteria were especially good in the manuf. of soy: *Bacillus nondiastaticus* var. soya No. 1 and No. 2, *Bacillus megatherioides* var. soya, *Micrococcus flavus lardigradus* var. soya, *Micrococcus periclitreus* var. soya, *Bacillus soya nonliquefaciens* nov. sp., *Pediococcus acidilactici* var. soya  $\alpha$  and  $\beta$ , *Pediococcus albus* var. soya  $\alpha$ , *Bacillus panis* var. soya, *Bacillus delbrückii* var. soya and *Micrococcus acidilactici* var. soya n. sp.

Y. Kihara

**Respiration and fermentation of lactic acid bacteria.** II. J. G. Davis. *Biochem. Z.* 267, 357-9(1933); cf. C. A. 28, 194.—*Lactobacillus casei* has so slight a respiratory function that it is indifferent to the presence of  $O_2$ . Expts. with acetone preps. of *L. delbrückii*, which oxidize only lactate and pyruvate, show that lactate oxidizes to  $CO_2$  with the formation of  $H_2O_2$ .

S. Morgulis

**Activator of the metabolism of propionic acid bacteria.** Claude Fromageot and Edward L. Tatum. *Biochem. Z.* 267, 360-75(1933).—The org. substance of potato ext. furnishes in addn. to its nutritive content also a special activator indispensable for the utilization of dissolved glucose; it also promotes the utilization of starch but not of lactic acid. This activator transforms the glucose mol. into a labile form, i. e., it is a "hexokinase," which can be dispensed with when the glucose is obtained from starch or maltose. The activation is necessary only for making

the glucose labile but not for the fermentation of the lactic acid.

S. Morgulis

**Transformation of optically active phosphoglyceric acid by Escherichia coli.** Claudio Antoniani. *Biochem. Z.* 267, 376-9(1933).—Fresh *Es. coli* changes phosphoglyceric acid to pyruvic acid, as much as 73% of the latter having been isolated, with the formation of small quantities of acetoin and  $EtOH$ . Similar results were obtained also with dry colon bacilli preps. Destruction of *dl*-glyceric acid by *Es. coli* and *Aerobacter aerogenes*. *Ibid.* 390-2.—With *Es. coli* glyceric acid yields a large amt. of  $AcOH$ , some  $HCO_2H$ , very small amts. of  $EtOH$  and no lactic acid. With *Aerobacter aerogenes* the results are similar except that much more  $AcOH$  is formed and also some acetoin.

S. Morgulis

**The physiological youth of bacteria as evidenced by cell metabolism.** H. H. Walker, C. E. A. Winslow, Evelyn Huntington and M. Grace Mooney. *J. Bact.* 27, 22-3 (1934).—In a peptone or glucose-peptone culture of *Es. coli* through which air is continuously bubbled the yield of  $CO_2$  per cell per hr. rises from 40 mg.  $\times 10^{-11}$  during the first hr. to 120 mg. during the second hr. and then falls to 20 mg. during the fifth hr. In a peptone medium through which N is bubbled, lag is produced and the max. yield is 70 mg. during the third hr. with peptone medium; when glucose is added, there is a peak yield of 210 mg. of  $CO_2$  during the fourth hr. Approx. computations suggest that 1 cu. micron of bacterial substance (colon) during the first 4 hrs. of the culture cycle may consume 20-50 mg.  $\times 10^{-11}$  of O per hr. and may produce 20-70 mg. of  $CO_2$  and 3-7 mg. of ammonia N, liberating in the process 30-90 cal. of heat per hr.

John T. Myers

**Production of peroxidase by streptococci and its possible significance.** Michael A. Farrell. *J. Bact.* 27, 24-5 (1934).—Peroxidase was demonstrated in all of 22 strains examined. It is thermostable, withstanding 120° for at least 15 min.

John T. Myers

**The synthesis of carotene by bacteria.** M. A. Ingraham and C. A. Baumann. *J. Bact.* 27, 25-6(1934).—Carotene is produced by many bacteria as demonstrated by chem., spectroscopical and biological tests. Staphylococci, flavobacteria, corynebacteria and mycobacteria produce appreciable amts. It was not found in any anaerobe tested. Vitamin A was not found. One organism gave a yield of 0.58 mg. per g. of dried cells or twice as much as is present in carrots.

John T. Myers

**The bacteriostatic effect of indole and skatole.** Leslie A. Sandholzer and Ralph P. Tittler. *J. Bact.* 27, 27-9 (1934).—All of 179 strains of bacteria were inhibited by indole at 1:1500 and showed growth at 1:5000. The ratio of the inhibiting dilns. of indole to that of skatole was approx. 1:1.5.

John T. Myers

**The effect of certain triphenylmethane dyes on Staphylococcus aureus and Escherichia coli communior.** Marv V. Reed and Elizabeth Genung. *J. Bact.* 27, 29(1934). *Staph. aureus* did not readily adapt itself to inhibiting concns. of crystal violet and was stable in the presence of all the dyes. *Es. coli* adapted itself to inhibiting concns. of brilliant green, and temporary involution forms were induced. These variants disappeared as the alk. of the dye-agar medium increased.

John T. Myers

**A method for distinguishing living from dead cells of Gram-positive bacteria by stained preparation.** Wm. C. Frazier and A. J. Boyer. *J. Bact.* 27, 31-2(1934). Berkefeld filtrates of 10-day milk cultures of *Streptococcus lacticus* grown at 30°, when applied to dried and fixed films of Gram-positive bacteria, made some of the cells Gram negative. A count of the remaining Gram-positive cells agreed with a colony count. The addn. of the lactic filtrate greatly stimulated the growth of lactic acid bacteria.

John T. Myers

**A new medium for the isolation of intestinal pathogens.** Einar Leifson. *J. Bact.* 27, 32-3(1934).—The medium consists of 1.5% beef infusion agar contg. NaCl 0.5%, Na desoxycholate 0.5%; Na citrate 3.0%; ferric N11, citrate 0.2%;  $Pb(AcO)_2$  1:150000; lactose 1.0% and neutral red 1:50000, and having a  $pH$  of 7.2-7.4

John T. Myers

The problem of favorable culture media for the isolation of *Bacterium granulosis*. Ida A. Bengston. *J. Bact.* 27, 34-5(1934).—In the Noguchi horse blood carbohydrate medium, disaccharides were more favorable than monosaccharides. Of the amino acids tested asparagine and tryptophan were best. Horse serum was better than rabbit serum. John T. Myers

The survival curves exhibited by bacterial spores in chlorine disinfection. David B. Charlton and Max Levine. *J. Bact.* 27, 37-8(1934).—The mechanism of disinfection with hypochlorites is probably different from that of disinfection with chloroamines. J. T. M.

The artificial production of a specific lytic agent which behaves like bacteriophage. John D. LeMar and John T. Myers. *J. Bact.* 27, 49(1934).—When 48-hr. broth cultures of various bacteria were autoclaved, permitted to incubate for 48 hrs. longer at 37°, 15 cc. of 3% H<sub>2</sub>O<sub>2</sub> per 100 cc. added and again incubated for 48 hrs., filtrates were obtained that cause lysis of homologous bacteria, which seemed transmissible in series. John T. Myers

The cultivations of organisms concerned in the oxidation of thiosulfate in mineral media. Robert I. Starkey. *J. Bact.* 27, 52-3(1934). The products of oxidation of thiosulfate by bacteria in mineral media. *Ibid.* 53-4.—*Thiobacillus thioparvus* Beij. produces sulfate and elementary S. Another organism studied formed sulfate only. *Th. trautweinii* Bergey causes less complete oxidation, the chief product being tetrathionate, which later breaks into pentathionate, trithionate, sulfate and S. John T. Myers

Strain variation of *Azotobacter* and the utilization of carbon compounds. Nathan R. Smith. *J. Bact.* 27, 54-5(1934). John T. Myers

A serological study of certain butyric anaerobes of soil. Elizabeth McCoy. *J. Bact.* 27, 56 7(1934). J. T. M.

The influence of concentration of soluble calcium on the precipitation of calcium carbonate by microorganisms. F. T. Williams and E. B. Fred. *J. Bact.* 27, 58 9(1934).—CaCO<sub>3</sub> was pptd. without traces of P and was in the crystal form of calcite. John T. Myers

The decomposition of alginic acid by microorganisms. Melvin C. Allen. *J. Bact.* 27, 59 60(1934).—Certain soil bacteria can hydrolyze this acid. John T. Myers

"Black beets," a problem involving stimulation of bacterial growth by iron. E. J. Cameron. *J. Bact.* 27, 60 1(1934).—An organism was isolated which grew much better in the presence of Fe in beet juice and rendered the product more alkaline, the *p<sub>H</sub>* going from about 5.3 to 6.0. The stimulative effect is not related to the change in *p<sub>H</sub>*. John T. Myers

The lipolytic activities of several bacteria causing bitter cream. James T. McGrath and J. A. Anderson. *J. Bact.* 27, 68-9(1934).—Of the glycerides of the higher acids that occur in butter, palmitin is the only one that is rapidly hydrolyzed. John T. Myers

An agar plate method for the detection and enumeration of lipolytic microorganisms. J. A. Anderson. *J. Bact.* 27, 69(1934).—The medium consists of 1% of tributyrin in nutrient agar. Lipolytic colonies are indicated by clearing of the opalescence due to the tributyrin. John T. Myers

The relation of electrical charge of bacteria to their stability. Harold A. Abrahamson. *J. Bact.* 27, 89 (1934).—The charge on the bacterial cell as well as the potential must be held in any attempt to det. the surface chem. factors in the regulation of stability. J. T. M.

The utilization of carbohydrates and salts of organic acids by *Corynebacterium diphtheriae* in the production of strong toxin. George F. Leonard and August Holm. *J. Bact.* 27, 98-9(1934).—Optimum conditions were produced by the addn. of 0.45% maltose and 0.75% NaOAc. John T. Myers

A systematic study of microorganisms which decompose the specific carbohydrates of the pneumococcus. Grace M. Sickles and Myrtle Shaw. *J. Bact.* 27, 100(1934); cf. C. A. 27, 1907. John T. Myers

The fermentation of glycogen by pneumococci. L. A.

Barnes and Benjamin White. *J. Bact.* 27, 106-7(1934). John T. Myers

The chemistry of the cellular constituents of *Brucella*. R. C. Huston, I. Forrest Huddleson and A. D. Hershey. *J. Bact.* 27, 108(1934).—*Brucella* is characterized by the absence of simple sugars, by the occurrence of non-pptg. polysaccharides only, by a large proportion of water-extractable proteins and by cell lipides analogous to the conventional types found in higher organisms. *Brucella* sp. can be differentiated from one another by the relative proportions of 2 biologically inactive polysaccharides, and 2 lipide constituents. John T. Myers

The growth of *Bacillus megatherium* in relation to the oxidation-reduction potential and the oxygen content of the medium. Georges Knaysi and S. R. Dutky. *J. Bact.* 27, 109-19(1934); cf. C. A. 27, 1907.—Normal meat infusion broth of *p<sub>H</sub>* 7 has a potential nearly equal to that of the satd. calomel electrode. In a vacuum that inhibits the growth of *B. megatherium* ( $\geq 10$  mm. of air pressure) the potential drops to -0.160 or less. If Na<sub>2</sub>SO<sub>4</sub> is added to the broth, growth is inhibited when the concn. reaches 0.27%. The potential of this medium is nearly -0.250 v. in the air and does not change in a vacuum. When 0.5% ferric NH<sub>4</sub> citrate is added to broth, growth takes place readily. The potential of such a medium in air is +0.100 v. and about -0.040 in a vacuum that inhibits growth of *B. megatherium*. Even in this relatively high potential the organism does not grow. The O content of the above media after standing 24 hrs. at 30° was as follows in 20 cc. samples: broth of *p<sub>H</sub>* 7, 0.07 cc.; broth plus 0.27% Na<sub>2</sub>SO<sub>4</sub>, 0.0 cc.; broth plus 0.5% ferric NH<sub>4</sub> citrate, 0.12 cc. The limiting factor for growth was O content not oxidation-reduction potential of the medium. John T. Myers

Studies on dissociation of certain paratyphoid bacilli. The role of variants in the precipitation of calcium sulfate. Mary E. Caldwell. *J. Bact.* 27, 121-60(1934).—During the course of studies on disocn. of paratyphoid bacilli, variant cells capable of giving rise to CaSO<sub>4</sub> crystals were found and called thiosomes. Conditions which promote disocn. seem to be conducive to the development of thiosomes, such as age, salts, rapid transfers in broth, compn. of medium and probably activity of bacteriophage. The possibility that certain variants may ppt. Ca may be of significance in the formation of concretions in the animal body. John T. Myers

The differentiation of living from dead bacteria by staining reactions. Frederick P. Gay and Ada R. Clark. *J. Bact.* 27, 175 89(1934).—Death of bacteria as produced by phys. or chem. agents, by bacteriophage, or by serum results in a shift in the staining reaction to the Proca-Kayser differential stain. Gram-pos., Gram-neg., acid-fast bacteria and yeast show a similar shift. The precise nature of the changes in protoplasm at death is not known. It is not simply a crude change in reaction or reversal of elec. charge. John T. Myers

Interchange of bacteria between the fresh water and the sea. Victor Burke. *J. Bact.* 27, 201-5(1934).—Changes in salt concn. affect the characteristics of some species. Suspected new species of fresh water and marine bacteria should be studied in media simulating both environments. John T. Myers

Pneumococcal hemolysin; its extracellular nature, production and properties. S. T. Cowan. *J. Path. Bact.* 38, 61-71(1934).—Hemolysin is found in filtrates of young broth cultures of pneumococci. Its curve of formation resembles that of viable counts rather than total counts indicating that it is the product of living pneumococci rather than the result of autolysis. The titer falls in old cultures, probably as a result of oxidation, since it can be restored by NaHSO<sub>3</sub>. It is antigenic but not type-sp. and is destroyed at 55°. John T. Myers

A blood agar tellurite arsenite selective medium for *C. diphtheriae*. W. James Wilson. *J. Path. Bact.* 38, 114-15(1934). John T. Myers

The meaning of blood pigments to the parasitic flagellates. André Lwoff. *Zentr. Bakt. Parasitenk.*, 1 Abt. 130, 498-518(1934).—The growth of *Stringomonas fascicu-*

lata is proportional to the amt. of blood in an artificial medium. In the presence of blood and peptone, *Stringomonas fasciculata*, *Stringomonas encopelii* and *Leptomonas clenorephali* can synthesize a catalytic respiration system in which 1 g.-atom of Fe can cause the utilization of 4.83 g.-mol. of O<sub>2</sub> at 28°. The rate of synthesis of this respiration system is const. and, within certain limits, independent of blood concn. Protohemin and protoporphyrin were the only hemins and porphyrins found which could stimulate respiration and growth of these flagellates.

John T. Myers

The metabolism of propionic acid bacteria. I. The degradation of phosphoric acid esters by *Propionibacterium jensenii* (van Niel). L. B. Pett and A. M. Wynne. *Trans. Roy. Soc. Can. V* 27, 119-22(1933).—Methylglyoxal-bis-dinitrophenylhydrazine (I) m. 298° cor. was obtained by addn. of 2,4-dinitrophenylhydrazine to the soln. resulting from the action of the dried propionic acid bacteria on a 1% Mg hexosephosphate soln. Similar treatment of Na  $\beta$ -glycerophosphate soln. yielded a mixt. of dinitrophenylhydrazine derivs. of glycerolytic products. The portion insol. in alc., m. 292°, is believed to be I, contaminated by a small amt. of some impurity. The fraction sol. in alc. m. 150° is similar to the dinitrophenylhydrazine of glyceraldehyde and dihydroxyacetone. The derivs. from Na  $\beta$ -glycerophosphate were not obtained in sufficient amt. for further purification or microanalyses.

W. Gordon Rose

The presence of salicylic and phenylacetic acids in the acetone-soluble fat of the tubercle bacillus. Nils Stendal. *Compt. rend.* 198, 400-1(1934); cf. C. A. 27, 5364.—The acetone-sol. fat obtained from the tubercle bacillus after sapon. gave a yellow oil which was partially sol. in petr. ether. The insol. fraction was identified as salicylic acid while the sol. fraction was phenylacetic acid.

Julius White

Bacteriol. studies of the red discoloration of salted hides (Lochhead) 29. Destruction of carbohydrates and org. acids by bacteria (Levine, Watkins) 14.

## D—BOTANY

THOMAS G. PHILLIPS

The alimentary variations of cultivated plants in the absence of fertilizers under the conditions of practical agriculture. Henri Lagatu and Louis Maume. *Compt. rend.* 197, 1558-60(1933).—Diagrammatic representation of the results of analyses of leaves from grapevines and potato plants grown in unfertilized soil shows that the percentage of the quantity of plant food (N + P<sub>2</sub>O<sub>5</sub> + K<sub>2</sub>O) on the basis of dried material is, in general, inversely proportional to the age of the leaves. The nutrition equilibrium charts of these plants grown under comparable conditions show that N predominates in the leaves of the grapevine and K<sub>2</sub>O in the potato leaves. However, all these relations are greatly affected by exterior factors, particularly meteorological conditions.

J. R. Adams

The biological action of metals at a distance. G. A. Nadson and C. A. Stern. *Compt. rend.* 198, 282-4(1934); cf. C. A. 27, 5366.—Metals placed at a distance of 2-3 mm. from white mustard seeds in a moist chamber retard the germination of the seeds and the growth of the sprouts in the order Pb > Au > Pt > Al.

P. D. A.

Conditions of culture and synthetic power of *Saprolegnia* sp. Carbon, nitrogen and sulfur nutrition. M. Volkonsky. *Ann. inst. Pasteur* 50, 703-30(1933).—A typical basic culture medium contains NaOAc 0.1, K<sub>2</sub>HPO<sub>4</sub> 0.1, MgCl<sub>2</sub> 0.01%, a trace of FeCl<sub>3</sub>, and NaOH to pH 7.0. Muscle peptone supplies complete org. nutriment. AcOH, OHCHMeCO<sub>2</sub>H and AcCO<sub>2</sub>H are poor sources of C; alanine, cysteine and histidine are good sources. Glycine, sarcosine and valine will not support development. In the presence of an unfavorable amino acid a fermentable sugar is essential. Most of the amino acids which are poor sources of C are good sources of N in the presence of glucose. Cysteine is the only source of S which is effective alone; H<sub>2</sub>S and AcSH require the presence of glucose

1 in addn. The synthetic power is greatly modified by the compn. of the nutrient medium.

B. C. A.

Vitamin formation in plants. S. von Hausen. *Acta Chem. Fennica* 68, 62(1933).—The carotene (I) and vitamin C (II) contents of plants are largely dependent on the nature of the N source, high values for both in sand-cultured peas being assocd. with N supplied as KNO<sub>3</sub>, glutamic or aspartic acid. The proportions of N, P and K in the nutrient which produce max. plant growth are also optimal for the formation of I and II. With increasing divergence of N, P and K concns. from the optimum, there was a corresponding decline in I and II in the plants. Changes in the latter were observed where differences in nutrient ratios were too small to produce differences in plant yields. Excessive N supplies did not affect the formation of I and II, but concns. of P and K above the optimum led to reduced production of these.

B. C. A.

Nutrition of higher plants with organic compounds. I. Tanaka. *Japan. J. Botany* 5, 223, 350(1931).—For a no. of plants examd. nitrate proved the best source of N. Urea was assimilated readily, and asparagine, acetamide or glycine to a limited extent. *Sisyrinchium* utilized sucrose, maltose (I), lactose, glucose (II), fructose and galactose (III), but not mannose (IV). I, III and IV had an inhibitory action on *Plantago*. Assimilation of II could not replace the photosynthetic process. Org. acids (butyric, salicylic) were tolerated only in small concn. HCO<sub>2</sub>H and AcOH retarded root development. Lecithin was more easily assimilated than phytin. Among a no. of org. compds. examd. as sources of S only cystine proved at all utilizable.

B. C. A.

Root respiration of young coffee plants. E. Herndlhofer. *Z. Pflanzenernahr. Dungung Bodenk.* 29A, 200(1933).—Respiration increases with light intensity. In darkness respiration is small and tends to maintain a constant rate throughout the day.

B. C. A.

Formation of organic acids in green plants. II. Nitrogen and acid metabolism in *Begonia evansiana* Andr. Mannen Shibata. *Science Repts. Tohoku Imp. Univ.* 4th Ser. 8, 205-48(1933).—Estns. are given of protein, amide, amino and ammonia N, and of acidity in different parts of the plant. The acid content of all parts increases with age. In the flowers and stalks the acidity and amide or ammonia N values run parallel. In the leaves the amide and ammonia N, also the acidity increase at night, and the ammonia N is low compared with the acidity. As the tubers sprout their amino-N content increases at the expense of the amide N.

M. L. C. Berheim

Nature of injury caused by potato leaf-hopper on forage legumes. H. W. Johnson. *Phytopathology* 23, 19(1933).—Symptoms almost identical with the injury caused by *Empoasca fabae* were produced artificially by mechanically severing all but one of the vascular bundles in clover petioles or by girdling with live steam. J. does not believe the leaf-hopper injury results from the injection of a sp. inciting agent but rather from an over accumulation of osmotically active sugars.

R. C. B.

Action of various alkaloids on the metabolism of glucides by *Aspergillus niger*. G. Mezzadrol and A. Amati. *Atti accad. Lincei* 18, 161-5(1933); cf. C. A. 27, 2174.—At 37° in Wehner and Raulin type nutrient solns., strychnine (nitrate), 0.5-2.0%, assists in the consumption of glucose and sucrose, and regulates the metabolism. Quinine (sulfate), 0.5-3%, is even more active. Caffeine, however, retards the action. The compn. and temp. of the nutrient soln. and the kind of carbohydrate do not, in general, affect the action of the alkaloid on the metabolism of the glucide.

A. W. Contieri

Carbohydrate contents of the maple tree. C. H. Jones and Jennie L. Bradlee. *Vt. Agr. Expt. Sta., Bull.* 358, 3-147(1933).—Sucrose is the circulatory medium in the maple tree for elaborated leaf products. Rapid changes to hexoses occur within the living cells from Oct. to Jan. and as rapid decreases from Feb. to May. Enzymes are very active. The earlier change seems stimulated by lowering temp. and the latter by rising temp. The "cut tree temps." need not cover a very wide range above and

below 0° within the tree and are governed by external air conditions. The "periodic bleeding period," occurring at the close of the winter when the surrounding bark is punctured and the wood layers penetrated, represents an outpouring at the point of least resistance. In an untapped tree the internal pressures aid in forcing the water to the extreme upper sections of the tree before transpiration following leaf development begins. The gradual lessening of the starch content in maple wood, beginning at the close of the storage period in Sept. or Oct., is accompanied by accelerated increases in the sucrose and hexose contents of the tree, which are maintained throughout the winter season. These start to decline in Mar. and Apr. when reverse changes occur. Hexoses are present in the fall and winter, and they disappear in the spring. Hexoses appear to be a product of the living cell and serve as a balance wheel in the living medullary ray cells. The hexoses in the living cells can increase within 120 days 12 times in amt. and later, gradually decrease to  $1/18$  of the max. figure in a similar time interval. Extremely small amts. are present in the sap outside of that enclosing living cells. The external air temp. is the one variant of which there is some knowledge and the changes noted (av. of 3 winter and sugar seasons) range from 14° to 7° at the time when the hexoses increase and from 7° to 13.5° at the time when they decrease. This is indicative of a periodic function characteristic of most plant life in temperate zones; but mere chem. data are quite insufficient to explain the complicated action of the agencies which are involved. Forty-four references. C. R. Fellers

**Oxidation zones in plant cell.** Ph. Joyet-Lavergne. *Compt. rend. soc. biol.* 110, 918-20 (1932); *Physiol. Abstracts* 18, 151.—The epithelial cells of the petals of *Crinum powelli* were studied for the observation of oxidation processes. Leuco derivs. of various substances were used. The restoration of color to the reagent is most rapidly effected in the mitochondrial region. This part of the cell possesses the power of restoring the color, the colored reagent afterward diffusing into other regions of the cytoplasm. All the elements of the mitochondria do not have the same oxidizing power. The leuco derivs. employed were those of cresyl blue, methylene blue, methyl green, neutral red, etc. The coloring of neutral red is effected more on the surface than in the mitochondrial mass. Coloration may also appear in the nucleus, especially in the nucleolus when this exists. G. G.

**The deposition of starch in the endosperm cells during the development of the seed [of wheat]** A. Gonçalves da Cunha. *Compt. rend. soc. biol.* 110, 1045-6 (1932); *Physiol. Abstracts* 18, 153.—Sol. sugars have been described in wheat seeds as granules of reserve material which may cause disorganization of the nucleus from compression. The irregularity of outline of these granules is striking. The minute structure of the granules is described. No doubt is entertained of their mitochondrial origin. The sol. sugars are converted into starch by the chondriocotes and remain thus as reserve material until germination begins, when they are hydrolyzed for the benefit of the embryo. G. G.

**Distribution of sugar and nitrogenous substances in wheat grain.** Wacław Kretowitch. *Biochem. J.* 27, 1687-90 (1933).—Sucrose is contained in the germ as well as in the endosperm. The concn. of sugar in the outer layers of the endosperm is about 4.8 times greater than in the inner layers. Wheat bran contains little gliadin. There is no gliadin in the cells of the aleurone layer. Hence flour from the cells of the aleurone layer does not yield gluten. Benjamin Harrow

**Some cell-wall constituents of *Cetraria islandica* ("Iceland moss").** Harold Wm. Buxton and Victor H. Chambers. *Biochem. J.* 27, 1691-1702 (1933).—The cell wall consists mainly of hemicelluloses and cellulose. Pectins, pentosans and lignins are absent. B. H.

**Inhibition of bud development and other functions of growth substance in *Vicia faba*.** Kenneth V. Thimann and Folke Skoog. *Proc. Roy. Soc. (London)* B114, 317-39 (1934).—In *Vicia faba* growth substance is produced in the presence of light by the growing terminal

bud, actively growing lateral buds and leaves; it inhibits the development of lateral buds and causes elongation of the stem; the latter action is greater in the dark than in the light. Joseph S. Hepburn

**The relationship between different physiological aspects of plants and the appearance of pigments in the different parts of the plants. V. The relationship between the presence of anthocyanin pigments and transpiration in some cultivated plants.** Hiroshi Kosaka. *J. Dept. Agr. Kyushu Imp. Univ.* 4, 95-126 (1933); cf. *C. A.* 27, 4535.—Transpiration studies were carried out with *Oryza sativa*, *Perilla nankaiensis* and *Abutilon avicennae*; in each case specimens which had anthocyanin pigments in the leaves, and other specimens which lacked these pigments or contained them only in the stalks and stems were used. Under varied conditions of light intensity the more colored forms show greater transpiration differences than the less highly colored ones. It is believed that the close relationship between the presence of anthocyanins in the leaves and transpiration is, in all probability, connected with heat absorption by the anthocyanin pigments. The exptl. results are given in 19 tables. G. A. Hill.

**Pathology of the fig, *Ficus carica* L. I. The fruit dry-rot problem in Asia Minor.** A. Vassf. *Phytopath. Z.* 6, 589-618 (1933).—On synthetic culture media at 28-32°, the daily rate of growth of the hyphae of *Aspergillus niger*, *A. ochraceus*, *Fusarium moniliforme* and *F. heterosporum*, which are concerned in the dry rot of figs, decreased as the concn. of sugar in the media was increased from 25.23 to 48.13%, no growth being obtained at the latter concn. *Fusarium* species were more sensitive than *Aspergillus* species to sugar concn. At the highest tolerated concn. *Aspergillus* produced numerous normal conidia. At 37.12% sugar *F. heterosporum* produced numerous microconidia, but at 40.3% the hyphae frequently showed signs of disintegration. The limiting sugar concn. for the growth of the 1st 3 varieties was between 45.76 and 48.13%, and for *F. heterosporum* between 43.16 and 45.76%. K. D. Jacob

**Report of the mycologist for the year 1932.** C. H. Gadd. *Tea Research Inst. Ceylon, Bull.* 10, 17-26 (1933).—**Wood rot.** Blocks of wood painted with white lead and exposed to attack by the wood-rot fungus *Irpex destruens* under various conditions suffered no deterioration in 12 months; Carcilin B and Solignum also gave good protection. **Microorganisms and tea manufacturing.** A marked decrease in the no. of fungi on tea leaves occurred during the rolling and fermentation processes; the bacterial count was not decisively affected. Mincing the withered leaves greatly decreased the nos. of fungi and bacteria; this decrease could not be traced to any sp. antiseptic action of the tea-leaf constituents. Enormous increases in the yeasts and bacteria, but not of fungi, occurred within 24-48 hrs. after the fermentation of the leaves. Fermenting tea leaves show 2 temp. maxima, the 1st resulting from enzymic changes and the 2nd from microbial activities; the 2nd max. does not occur in chemically sterilized leaves, and neither max. occurs in boiled leaves. In general, microorganisms deleteriously affect the quality of tea leaves. K. D. Jacob

**A nematode disease of potatoes caused by *Heterodera schachtii* (Schmidt).** D. G. O'Brien and E. G. Prentice. *West Scotland Agr. Coll., Research Bull.* 2, 63 pp.—The disease, which is caused by the attack of *H. schachtii* on the potato roots, is characterized by the slow growth of the potato haulm, the small no. of thin, spindly stems, the unhealthy appearance of the foliage, and the withered areas on the leaves, which appear 1st at the tip of the terminal leaflet. No definite relation existed between the severity of the disease and the reaction of the soil, although there were indications that plants growing on soils having  $pH$  values less than 4.2 and greater than 5.0 tended to suffer more when attacked by *H. schachtii* than those growing on soils of intermediate  $pH$  values. There was no relation between the  $pH$  of the soil and the no. of *H. schachtii* cysts present. Promising results in the control of the disease were obtained by the application of farm-

yard manure (15 tons per acre) in the drill just before planting the tubers. Seventy-seven references.

K. D. Jacob  
**Helminthosporium disease of oats.** Dept. of Plant Husbandry. West Scotland Agr. Coll., *Research Bull.* 3, 74 pp. (1933).—The leaf-stripe disease of oats is caused by *Helminthosporium avenae*. Satisfactory growth of the fungus was obtained on oatmeal agar at  $pH$  values between 5.0 and 6.75. At  $pH$  4.76 there was a preliminary retardation of growth extending over the 1st 3 days and followed by almost complete recovery; no marked recovery in rate of growth occurred at  $pH$  3.6. The fungus was not acclimatized to the more acid media in 2 successive generations. Optimum growth was obtained in the dark at 100% relative humidity and approx. 20° temp. Good control of the disease was obtained by soaking the seed in hot water (preliminary soaking for 5 hrs. at 15°, followed by 15 min. at 54°) or Uspulun ( $1/4$ - $1/2$ % soln. for  $1/2$  hrs.) or Germisan ( $1/2$  1% soln. for  $1/2$  hr.) or formalin (1:240 for 20 min.). Dusting the seed with Tillantin R also gave good results, but I dusts were ineffective. Germination of the seed was reduced 9% by the formalin treatment; the other treatments had a smaller effect. Seventy references.

K. D. Jacob  
**The influence of the reaction of the medium on the growth of tea.** N. B. Kargopol'tzev. *Trans. Sci. Inst. Fertilizers* (Moscow) No. 113, 55-7 (1933).—Const. drip culture expts. with tea bushes has shown that the  $pH$  of 7.5-7.8 is very injurious to tea and that the danger point varies within narrow limits, from 7.0 to 7.5. On the acid side, however, the range to injury is wider. At a  $pH$  4.5-4.0 the tea bushes suffered, but not as severely as with a shift toward more alk. The optimum  $pH$  was found to be 5.5-6.0.

J. S. Joffe  
**Calcium and magnesium absorption of rice plants during growth in water culture.** Yoshiaki Ishizuka. *J. Agr. Chem. Soc. Japan* 9, 1022-35, 1064-76; *Bull. Agr. Chem. Soc. Japan* 9, 110-11 (1933).—The presence of Ca in the nutrient soln. was absolutely necessary till the 13th week after germination. Thereafter lack of Ca had no effects on the growth. Mg is essential till the 17th week. If there is lack of Ca before the 5th week a supply of Ca leads to recovery. Lack of Mg before the 6th week does not affect development. Ca is utilized most rapidly from the 5th to the 7th week and Mg from the 4th to the 8th week. The ratio of CaO to MgO absorbed was about 3:1 at the early period of the growth and gradually approached to 1:1.

Y. Kihara  
**Formation of phosphoglyceric acid from galactose and hydrolysis of phosphoglyceric acid by galactose yeast.** Carlo Cattaneo. *Biochem. Z.* 267, 456-9 (1933).—Yeast trained to ferment galactose produced phosphoglyceric acid apparently identical with that produced in the fermentation of other sugars. Pyruvic acid was a product of the action of *Saccharomyces cerevisiae* on phosphoglyceric acid.

S. Morgulis  
**Studies on the micrometabolism of yeast cells.** Earnest A. Pribram and Louis Kotler. *J. Bact.* 27, 24 (1934).—*Saccharomyces cerevisiae* and *S. lactis* grown on dextrose media absorb more dextrose than galactose or lactose under similar conditions. *S. lactis* absorbs more galactose and lactose than does *S. cerevisiae*. The presence of  $CaCl_2$  decreases, while  $KCl$  and  $FeCl_3$  increase the absorption capacity of yeast cells,  $FeCl_3$  less than  $KCl$ .

John T. Myers  
**The ability of a mold or its metabolic products to inhibit bacterial growth.** Roger D. Reid. *J. Bact.* 27, 28 (1934).—Filtrates of a mold closely related to *Penicillium notatum* could inhibit the growth of certain bacteria. The inhibitory substance is not identical with, but closely related to, the pigment which develops simultaneously. It is relatively thermostable. It is volatile under certain conditions. It contains enzymes, notably amylase and catalase. The  $pH$  increases in parallel with it, but when once formed, alterations in  $pH$  do not affect it. It does not cause a change in the charge on the bacterial cell. It is adsorbed on charcoal. It does not affect the oxidation-reduction potential.

**The effect of the oxidation-reduction character of the medium on initiation of yeast growth.** J. J. Reid and I. L. Baldwin. *J. Bact.* 27, 29-30 (1934).—The character of the medium exerts a decisive influence on the ability of *Saccharomyces cerevisiae* to initiate growth. J. T. M.

**The fixation of nitrogen by germinating seeds of leguminous plants.** F. S. Orcutt, A. M. Shannon and P. W. Wilson. *J. Bact.* 27, 55-6 (1934).—There is no evidence of the fixation of atm. N by peas exposed to such substances as  $MgSO_4$ ,  $K_2SO_4$ ,  $MnSO_4$ , or strychnine nitrate.

John T. Myers  
**The chemistry of mold tissue. III. Composition of certain molds with special reference to the lipid content.** L. M. Pruess, E. C. Eichinger and W. H. Peterson. *Zentr. Bakt. Parasitenk.*, II Abt. 89, 370-7 (1934); cf. *C. A.* 27, 1378.—The lipide, protein, carbohydrate and sterol contents of 24 molds were studied, when grown both on synthetic and org. media. On synthetic medium, the lipid content varied from 1.1 to 19.9%, the av. being 6.0. The protein content ranged from 13.7 to 43.7, the av. being 31.6%. On the org. medium the lipides varied from 1.5 to 24.4, the av. being 8.8%. The protein ranged from 12.5 to 36.3 with an av. of 22.5%. The lipides contained considerable free fatty acid. Calcd. as oleic, the content fluctuated from 8 to 70%. Other constituents, as phosphatides, are indicated by the presence of P and N.

John T. Myers  
**Possible chemical nature of tobacco mosaic virus.** John Caldwell. *Nature* 133, 177 (1934).—If the  $K_2HPO_4$  eluate from healthy tobacco tissue is acidified and 2 vols.  $Me_2CO$  added, a cryst. as well as a colloidal ppt. is obtained. The presence of virus in the crystals has been detd. by the *N. glutinosa* method. N-free virus-contg. crystals have not been sepd.

W. J. Peterson  
**The effect of the length of day upon the chlorophyll apparatus of plants.** M. Kh. Chailakhyan. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], I, 37-9 (in English 40-2) (1934); cf. *C. A.* 28, 1739.—A short-day period of exposure to light decreases the chlorophyll content of plants shortly after sprouting, but after a week the chlorophyll content is increased.

F. H. Rathmann  
**The effect of ultra-violet light on photosynthesis.** Wm. Arnold. *J. Gen. Physiol.* 17, 135-43 (1933).—An unidentified unit in the mechanism of the photosynthesis of the green alga, *Chlorella pyrenoidosa*, is inactivated by the absorption of 1 quantum of ultra-violet light (2537 Å.), the same radiation has no effect on the normal respiration of this plant. The chlorophyll extd. from irradiated cells has undergone no chem. change. The order of the Blackman reaction in photosynthesis. *Ibid.* 145-9; cf. *C. A.* 26, 3822; 27, 1657.—The photosynthesis of *Chlorella pyrenoidosa* involves a photochem. reaction of the 1st order which is not appreciably affected by temp., and a dark reaction (Blackman reaction) dependent on temp. On the assumption that photosynthesis is a cyclic process, and that ultra-violet light does not change the reaction const., it is shown that the Blackman reaction is of the first order. A math. treatment of the theory and exptl. data is given.

C. H. Richardson  
**The conversion of fat to carbohydrate in the germinating castor bean. I. The respiratory metabolism.** John R. Murlin. *J. Gen. Physiol.* 17, 283-302 (1933).—The R. Q. of germinating castor beans varies from 0.30 to 0.58, an indication of the transformation of oil to carbohydrate. It reaches its lowest value when the new growth (hypocotyl) measures 20-35 mm. in length. The R. Q. of the young plant (cotyledons and hypocotyl) varies from 0.78 to 1.00, an indication of considerable combustion of sugar. The R. Q. of the endosperm alone is low but usually somewhat higher than that of the entire germinating tissue. The young plant produces 2.6 times as much  $CO_2$  (moist wt. basis) as the endosperm although it absorbs only 1.3 times as much  $O_2$ . II The combustion respiratory quotient as determined by a modified oxy-calorimeter. Ray G. Daggs and H. S. Halco-Wardlaw. *Ibid.* 303-9 (1934).—After germination of the castor bean is well started, the R. Q. of the combusted seed in-



creased with increase in stage of germination. This indicates a change from an O-poor to an O-rich substance, probably fat to sugar. The O-rich substance is formed in the endosperm. The oxycalorimeter and method are described. Accuracy of the method was checked by org. combustions. III. The chemical analysis, and correlation with respiratory exchange. H. B. Pierce, Dorothy E. Sheldon and John R. Murlin. *Ibid.* 311-25(1933).—Up to a hypocotyl length of 80-140 mm. in the germinating castor bean, there is a continual decrease in fat ( $\text{Et}_2\text{O}$  ext.) and a continual increase in sugar, after which the fat decreases as the crude fiber (cellulose) increases. The most rapid decrease in fat coincides roughly with the most rapid increase in sugar. The C balance between fat loss and carbohydrate (sol. and crude fiber) gain is not close except at the beginning of growth. There is an undetd. residue which increases with the total carbohydrate and accounts for increasing amts. of C. The protein content ( $\text{N} \times 6.25$ ), about 26% in the ungerminated seed, undergoes a primary decrease, then rather steadily increases to nearly 35% (dry wt.). This is explained on the basis of the occurrence of more and more volatile material which is lost in drying. The ash increases irregularly, finally reaching about the same ratio as the protein. The R. Q. (cf. above) can be accounted for by assuming that 2 out of 6 mols. of ricinoleic acid are converted to sucrose and one to cellulose, whereas 3 are oxidized. It is suggested that the undetd. substance is an oxidation product of pentose. C. H. Richardson

Influence of temperature and light intensity on photosynthesis and respiration and an explanation of "solarization" and "compensation point." N. R. Dhar. *J. Indian Chem. Soc.* 10, 541-61(1933). This is a discussion of the reasons why, in plant physiology, the Arrhenius equation for effect of temp. on rate of chem. reaction is more accurate and applicable than the van't Hoff rule. In energy exchange in plants the following reaction obtains:  $n\text{CO}_2 + n\text{H}_2\text{O} \rightleftharpoons \text{C}_n\text{H}_{2n}\text{O}_n + n\text{O}_2$ . The following explanations are offered for the inapplicability of the van't Hoff rule: (1) Photosynthesis is proportional to light intensity, there being no photosynthesis in the dark. (2) Respiration takes place in the dark, but is appreciably accelerated by light. (3) An increase in temp. affects respiration more markedly than photosynthesis. The data used are taken from the literature. J. J. Willaman

Absorption of Mn by wheat seedlings (Davidson) 15.  
Two kinds of saponins of soy beans (Okano, Ohara) 10.  
Rubixanthin (Kuhn, Grundmann) 10.

## E—NUTRITION

PHILIP B. HAWK

Vitamin G potency of purified liver preparations. Erwin Brand, Randolph West and Charles J. Stucky. *Proc. Soc. Exptl. Biol. Med.* 30, 1382-4(1933).—Purified liver exts. (P. A. factor), prepd. from the Lilly ext. No. 343 and of known potency in pernicious anemia, failed to induce growth in rats deficient in vitamin G. C. V. Bailey

Blood regeneration in anemic rats on a vitamin G-deficient ration. Charles J. Stucky and Erwin Brand. *Proc. Soc. Exptl. Biol. Med.* 30, 1404 5(1933).—Young anemic rats were fed a ration contg. Fe and deficient in vitamin G for approx. 1 month; the anemia was cured in 3-4 weeks; growth was not restored. C. V. Bailey

High-carbohydrate and high-fat diets. Esther M. Guttsheimer, Edith Goldsworthy and Gertrude Thomas. *Proc. Soc. Exptl. Biol. Med.* 30, 1420-8(1933).—In a woman, the fasting blood sugar was const. for 7 days on a balanced diet; it was slightly increased after a high-carbohydrate diet and considerably decreased after a high-fat diet. The extent and duration of hyperglucemia after the ingestion of 1 g. of glucose per kg. of body wt. was practically unchanged by the high-carbohydrate diet; after 7 days on a high-fat diet the findings were similar to those in diabetes mellitus. The urea N and total non-

protein N varied markedly with the diet. The findings are of importance in the clinical application of these tests. C. V. Bailey

Pathologic changes in the organs of scorbutic guinea pigs. Otto A. Bessey, Maud L. Menten and C. G. King. *Proc. Soc. Exptl. Biol. Med.* 31, 455-60(1934).—The most characteristic changes in the organs of scorbutic guinea pigs were depletion of fat and cholesterol from the adrenal cortex, fatty degeneration of the myocardium, marked degeneration of testicular germinal epithelium and spermatozoa and swelling of connective tissue. C. V. Bailey

Infection and vitamin A in man. Robert Debré and André Busson. *Bull. mfm. soc. méd. hôp. Paris* 49, 1431-8(1933).—It appears impossible to consider vitamin A as an anti-infectious substance, playing a role in protecting the organism against puerperal infection. F. L. Dunlap

Role of unsaturated acids (linoleic acid) in the nutrition of rats. Jenő Becker. *Méregadasi Kutakok* 6, 363-71(1933).—Rats need small amts. of fats contg. linoleic acid. Ether exts. of walnuts of different degrees of ripeness were fed to rats in doses of 5 mg. The 1 nos. of the samples indicated different contents of linoleic acid. The more acid there was present, the better the growth obtained. As the feeding of only 5 mg. of walnut oil (2-3 mg. of linoleic acid) cured the new deficiency disease reported by Burr, *et al.* (*C. A.* 22, 2395; 23, 4601), it seems that linoleic acid acts as a vitamin. S. S. de F.

Photochemical activation of adenine. B. C. Guha and P. N. Chakravorty. *Nature* 132, 447(1933).—Irradiated adenine failed to cure polyneuritis in pigeons, even in 5 mg. doses, but the same daily dose supported growth in 36 young rats which had ceased to grow on a diet of starob, caseinogen and McCollum's salt mixt. supplemented by cod-liver oil and an aq. ext. of ox kidney. Irradiated solenine gave no response in 31 young rats receiving ox-liver extracts or autoclaved marmite as the source of vitamin B<sub>1</sub>. Irradiated guanine chloride, cytosine chloride and uracil did not resemble in action irradiated adenine in preliminary tests; the latter could not replace vitamin B<sub>1</sub> in the diet. A. L. Henne

Unlocking another door to nature's secrets vitamin C. Wm. A. Waugh. *J. Chem. Education* 11, 69-72(1934). This paper is a review dealing with the recent isolation and identification of vitamin C. The chem. properties of the vitamin are described and the methods of assaying it and its physiol. effects are given. The formulas that have been suggested for the constitution of the vitamin are reported and the natural sources of the antiscorbutic substance described. R. H.

The metabolism of healing in celiac rickets. Findlay J. Ford. *Arch. Disease Childhood* 8, 355-9(1933). The rickets of celiac disease appears to be of the same nature as ordinary infantile rickets. During antirachitic treatment the Ca and P metabolism in the rickets of celiac disease is similar to that of infantile rickets. E. R. Main

The relation of vitamin A and vitamin D to urinary calculus formation. A. Richard Bliss, Jr., Geo. R. Livermore and Ellsworth O. Prather, Jr. *J. Urol.* 30, 639 52(1933).—The development of urinary calculi in albino rats appears to be related to a lack of vitamins A and D. Calculi were formed in 61.8% of the rats maintained on diets deficient in vitamins A and D and in 57.1% of those on diets deficient in vitamin A only. The calculi were composed chiefly of Ca and Mg phosphates. E. R. M.

Nutrition and child-bearing. Edward Mellanby. *Lancet* 1933, II, 1131 7. A discussion of the relation of dietary deficiencies in Ca, P, I, Fe and vitamins A and D to the toxemias of pregnancy. E. R. Main

Nutritive value of boiled and raw milk in infant feeding. Noah Morris and Stanley Graham. *Lancet* 1933, II, 1314-15. The absorption of N, Ca, P and fats does not appear to be diminished when boiled milk is used in place of raw milk in the diets of infants. E. R. Main

Neuromuscular irritability in relation to the biochem-

- istry of mineral matter. III. Mineral composition of blood serum and muscle press juice as well as of their ultrafiltrates in relation to the neuromuscular irritability. Influence of parathyroidectomy on the calcium-magnesium ratio of the blood serum. B. Sjollema and L. Seekles. *Biochem. Z.* 264, 316-33(1933); cf. *C. A.* 27, 5103.—On a diet contg. too little Na and too much K the mineral compn. of the blood serum is very little altered, although as the expt. is prolonged the values for K and Cl tend to increase, and the muscular elec. response changes in the direction of latent tetany. On diets contg. too little Ca and too much P, alone or in combination with a similar alteration in the Na/K ratio, the total Ca content of the serum may diminish 20-30% and the elec. response of the muscles indicates a condition either of latent or of manifest tetany. While the total Ca diminishes the ultrafilterable fraction may actually show a small relative increase. The inorg. P generally increases definitely, but the P remains entirely diffusible. The Mg drops about 40%, but the ultrafilterable fraction is unaffected. Similarly, the K, Na and Cl contents of the serum or of its ultrafiltrate are not appreciably altered. On a diet with abnormal Ca/P or Na/K ratio the Ca/Mg ratio of the blood serum does not vary in any regular manner with the increase in elec. irritability of the muscles but the Ca/P ratio diminishes. During tetany parathyreopriva in the dog the Ca/Mg as well as the Ca/P ratio in the serum decreases, but in grass tetany in cattle the former ratio is greatly increased and the Ca/P variable and only exceptionally lowered. The condition in rabbits resembles more closely that found in the dog. It follows, therefore, that the Ca/Mg ratio does not vary in the same direction in different types of tetany or with the changes in the elec. irritability of the muscles. On diets with abnormal Ca/P and Na/K ratios the total Ca of the muscle press juice increases, 2 to 3 times, with increasing neuromuscular irritability, but the changes in the ultrafilterable fraction were not definite, and the diffusible P decreased. The total Mg showed no relation to the irritability, although the diffusible portion of the Mg was highest on diets with abnormal ion ratios. The K values were unchanged, the Na tended to increase and the Cl increased markedly, except for the ultrafilterable Cl, which remained the same. The Ca/Mg ratio in the muscle press juice is greater where the neuromuscular irritability is higher, but there is no parallelism between the two. The Ca/P ratio, contrary to expectation, increases with the increase in irritability. These results indicate that neuromuscular irritability is associated with a different mineral compn. in the serum or the muscle press juice, but the reason for this difference is not clear. In fasting rabbits the mineral compn. of the serum and muscle juice undergoes changes similar to those obtained on a diet of abnormal compn., except that the serum P is higher. The latter condition is responsible for a rise in irritability. No relation was found between the excess of base and irritability. S. Morgulis.
- Magnesium in animal diets.** I. J. Cunningham. *New Zealand J. Sci. Tech.* 15, 191-8(1933).—The concn. of Mg in the blood serum and in the bones of rats was increased by increasing amts. of Mg in the diet. Mg carbonate produced the greatest effect of the different salts used. The total proportion of Ca in the dried bodies was not greatly affected by the Mg feeding. There was a general tendency to a lower blood Ca. At the higher levels of Mg carbonate and sulfate, the ash content of the bones decreased and moisture increased, but the interpretation was confused by diarrhea in the animals. P. S. R.
- Chem. compn. of tunny liver oil (Tomiya).** 27. Acidity and reducing power of ascorbic acid (Karrer, Schwarzenbach) 10.
- Pl-Suñer Bayo, César:** El complexe vitaminic B. Barcelona: Imp. Elzeviriana. 54 pp.
- F—PHYSIOLOGY**
- HOMER W. SMITH**
- Relation between mouse- and rat-unit of the estrus-**
- 1** producing hormone. H. Kreitmair. *Arch. expul. Path. Pharmacol.* 169, 578-84(1933).—The ratio mouse unit: rat unit for any estrin prepn. depends on the medium in which the prepn. is suspended or dissolved. Thus for aq. sols (with lecithin as protective agent) the ratio is 1:1, while for sols. in oil it is 1:4. B. C. A.
- Theory of muscular contraction.** Philippe Fabre. *Compt. rend. soc. biol.* 106, 951-3(1931).—H and lactate ions diffuse with different velocities into the contractile element, forming an elec. double layer and producing a change in surface tension. Relaxation takes place when the more slowly diffusing ion has neutralized the other. B. C. A.
- Inorganic constituents of nerve tissue.** K. Hayashi. *Japan. J. Med. Sci. II, Biochem.* 2, 1-5(1933).—The spinal cord of the whale is richer in inorg. P than any other nerve tissue examd. and has a higher ash content, but only traces of S are present. The lingual nerve is the richest in Na and Cl, and the brain in K. All nerve tissue in the whale is richer in Na and Cl than that of land mammals. B. C. A.
- Muscle extractives.** Teijiro Yazawa. *Japan. J. Med. Sci. II, Biochem.* 2, 37-41(1933).—The following were obtained from an aq. ext. of finback-whale muscle: lactic acid, xanthine (or adenine), hypoxanthine, histidine, creatine and a substance (m. 259-61°; N 20.05%) similar to lysine. B. C. A.
- Cetacea. XLIII. Nitrogenous substances of the liver** Teijiro Yazawa. *Japan. J. Med. Sci. II, Biochem.* 2, 43-6(1933).—Tyrosine, guanine and xanthine, but not hypoxanthine, were isolated. Autolysis increased the (arginine + histidine) N and the N not pptd. by phosphotungstic acid. Free sugar increased. B. C. A.
- Sugar of amniotic fluid. Observations in chick embryos.** Kichinosuke Yamada. *Japan. J. Med. Sci. II, Biochem.* 2, 47-69(1933).—Fructose was identified. Creatine and creatinine are not present after incubation for 12 days, but lactic acid can be detected. A summary of the general phys. and chem. properties is given. B. C. A.
- Fructose in the amniotic fluid of chick embryos** Kichinosuke Yamada. *Japan. J. Med. Sci. II, Biochem.* 2, 107-13(1933).—With the cryogenin color reaction (cf. *C. A.* 28, 992<sup>a</sup>) fructose was detected. B. C. A.
- Conversion of urinary folliculin into an ether-extractable form.** B. Zondek. *Klin. Wochschr.* 11, 812(1933). A claim for priority. B. C. A.
- The digestibility of milk in vivo as affected by certain physical treatments.** Francis N. Mortenson. *Iowa State Coll. J. Sci.* 8, 211-12(1933).—Calves with gastric fistula were used in one set of expts. Sometimes the milk was introduced through the fistula. Samples were taken at intervals of 1 hr. Boiled and autoclaved milk left the stomach faster than raw milk because their curd offered more surface to the gastric juice. X-ray photographs with or without BaSO<sub>4</sub> do not give satisfactory information of the stomach contents. A calf without a fistula, was fed and autopsied 8 hrs. later. The stomach contents were similar to those of the calves having fistula. Expts. on a human subject by means of a stomach pump produced similar results. The time for digestion is variable because of fatigue, state of health and individuality. F. E. Brown.
- The influence of ultra-violet radiation on the metabolism of muscular work and on the capacity of man for work.** Gunther Lehmann and Alexander Szakáll. *Arbeitsphysiol.* 5, 278-341(1932).—The effect of ultra-violet radiation from 2 quartz Hg lamps on 6 subjects at weekly intervals was to lower the basal metabolism 10 to 15%, increase the capacity for work up to 60% and decrease the O debt. The various effects were similar to those found as the result of training. T. M. Carpenter.
- Further investigations on the influence of ultra-violet radiation on the metabolism of work and on the capacity of man for work.** Gunther Lehmann and Alexander Szakáll. *Arbeitsphysiol.* 6, 84-9(1932).—To det. whether the results in the earlier investigation (cf. preceding abstr.)

were due to psychic influences, the same subject was studied when a screen impervious to ultra-violet rays was placed between him and the rays without his knowledge. The increase in capacity for work did not take place. Another subject treated at the same time showed a fall in wt., a lowering of the basal metabolism, a rise in the daily R. Q. when treated in contrast to a daily fall in the week when not treated, and a slight increase in the alkali reserve.

T. M. Carpenter

**The influence of radiant heat on the human circulation.** Irvin L. Fisher. *Arbeitsphysiol.* 6, 384-410(1933).—The effects of radiant heat from 10 reflecting lamps of 500 w. each were detd. on 4 workers in the Fe industry and P. The subjects stood 130 cm. from the lamps, at which distance the radiation was 2 calories per sq. cm. per min. Exposures of 75-90 min. led to the following changes: +46% in arterial-venous  $O_2$  difference, -21% in the min. vol. of the blood circulation, -44.5% in the stroke vol., +43% in the pulse rate and +16% in  $O_2$  absorption.

T. M. Carpenter

**The energy expenditure of agricultural work.** J. L. Kahn, W. W. Kotschegina and T. A. Zwinogrodskaja. *Arbeitsphysiol.* 6, 585-94(1933); cf. *C. A.* 23, 887; 24, 5352; 25, 1563; 26, 5908.—The output of energy in several kinds of farm work was detd. by the Douglas-Haldane method with 3 men and 2 women during 3 min. of work and the first 3 min. of recovery. The increase in heat production was as follows: with men, heavy plowing, 4.1-6.5 kg. calories per min., light plowing, 2.9-4.7, tending a steam thresher, 2.7-3.9; with women, binding of sheaves of rye or oats, 2.0-4.3 and weeding turnips, 2.1-2.6. The ratio of recovery  $O_2$  per min. to  $O_2$  per min. during work varies from 0.33 to 0.59.

T. M. C.

**A study of the energy expenditure of scrubbing.** End 1 Weatherhead and D. B. Thomson. *Arbeitsphysiol.* 6, 595-606(1933).—The net energy cost of scrubbing in the standing position was about 80 cal. per sq. m. per hr. with 2 untrained subjects and about 95 cal. per sq. m. per hr. with a trained subject. In the kneeling position both averages were 100 calories per sq. m. per hr.

T. M. C.

**Changes in the character of breathing at varying  $O_2$  concentrations.** Rodolfo Margaria and Cesare Talenti. *Atti accad. sci. Torino, Classe sci. fis., mat., nat.* 68, 183-91(1933). Subjects breathing air contg. from 98.6% down to 15%  $O_2$  for  $\frac{1}{2}$ -hr. periods do not show any marked change in rate of respiration. With  $O_2$  down to 12%, the rate increases for a time but soon returns to normal. At 9.6%  $O_2$ ,  $p_H$  detn. of the blood shows a slight change toward alk. of 0.03-0.10%. It does not, therefore, seem probable that change in  $p_H$  and rate of respiration are closely related.

A. W. Contieri

**The preparation and demonstration of the parathyroid hormone in the blood in pregnancy.** F. Hoffmann. *Arch. Gynakol.* 153, 181-200(1933).—A substance sep'd. from the blood of pregnancy increased the blood Ca in the dog. This substance could be detected as early as the third month of pregnancy, rising each month thereafter. It disappeared in the puerperium, and was never found in fetal blood.

L. Eichelberger

**Carbohydrate metabolism during and after pregnancy.** Sugar and diastase in blood. P. Goldschmidt-Fürstner. *Arch. Gynakol.* 153, 417-33(1933).—The diastatic activity of the blood declined during pregnancy but increased after parturition. The blood sugar rose during parturition. Exts. of pituitary injected caused a rise in the diastatic activity and the blood sugar. Glucose or adrenaline injected caused a fall in diastatic activity but later there was a rise as the blood sugar fell.

L. Eichelberger

**The change in liver function during pregnancy.** Minoru Kojima. *Arch. Gynakol.* 154, 119-21(1933).—The urine of two pregnant rats fed on a const. diet was analyzed during the progressive stages of pregnancy for C, N and vacant oxygen, and their ratios were computed. Menthol was given orally at definite intervals. After labor a gradual decline in the quotients was found, thereby indicating a change in liver function.

L. Eichelberger

**Thyroid secretion and blood formation.** S. Thaddeus.

*Arch. expl. Path. Pharmacol.* 166, 276-89(1932); *Physiol. Abstracts* 18, 205.—Repeated injection of 0.5 mg. thyroxine per kg. into rabbits causes an increase in the hemoglobin and the red blood corpuscles, reticulocytes and thrombocytes, accompanied by a relative neutrophilia in a relatively leucopenic blood. The bone marrow shows increased activity. Removal of the thyroid leads to an aplastic type of anemia which can be compensated for by giving thyroxine. This anemia is accompanied by a leucopenia with a relative lymphocytosis and diminution of neutrophile cells; the bone marrow activity is decreased. Phenylhydrazine anemia is more rapidly compensated in the hyperthyroid than in the normal animal, and much more rapidly than in the thyroidectomized animal. The regeneration of the white cells is similarly accelerated.

G. G.

**Nutritive vascular regulation. I.  $CO_2$  and  $O_2$  lack as stimuli.** A. Fleisch, I. Sibul and V. Ponomarev. *Arch. Ges. Physiol. (Pflügers)* 230, 814-34(1932); *Physiol. Abstracts* 18, 182; cf. *C. A.* 27, 3509.—The posterior extremities or intestine of anesthetized cats was perfused with blood (clotting prevented by Liquoid); a perfusion app. which included a lung was used. The ventilation of the lung with 2 to 10%  $CO_2$  in air usually causes a small primary vascular contraction followed by dilatation. Occasionally  $CO_2$  has a pure dilatator effect. In sensitive preps. 0.5 to 1% of  $CO_2$  may cause an increase of 30% in the perfusion rate. The administration of  $CO_2$  causes a mean change in the  $p_H$  (venous blood) of 0.17;  $p_H$  alterations of 0.05 may be effective. The ventilation of the lung with N also causes vasodilatation. The  $p_H$  of the venous blood is shifted toward the alk. side; the effect usually consists of a small contraction followed by dilatation. The neg. findings of other investigators with  $CO_2$  are discussed.

G. G.

**Fat metabolism of the chick embryo under standard conditions of artificial incubation.** A. L. Romanoff. *Biol. Bull.* 62, 54-62(1932); *Physiol. Abstracts* 18, 65-6; cf. *C. A.* 27, 3246.—The amt. of fat in the growing embryo and egg yolk gives a comprehensive idea of the change in fat content occurring in the egg during incubation. The relative increase of fat in the embryo and the decrease of it in the yolk can be well demonstrated by curves plotted from the data on the percentages of fat in dry wt. The curve of consumed fat is quite similar to the curve of the growth of embryo. Iodine value, sapon. no. and % of the fat from the yolk sac of the developing egg are almost const. throughout the incubation period. Iodine value and % of the fat from the developing embryo are increasing and decreasing, resp., during the latter part of incubation.

G. G.

**Histochemical localization of cholesterol in hen egg. Methods and results.** V. D. Marza and E. Marza. *Bull. Histol.* 9, 313-40(1932); *Physiol. Abstracts* 18, 155.—The eggs were studied from the earliest stages up to 1.5 cm. in diam., by either the digitonin method or the saponin method for detecting free cholesterol, and then by converting the cholesterol and lipid ethers into the free substances by first fixing in formal saline and then treating with digitonin. The refractivity of the lipid bodies is unaffected by a temp. of 60°, but that of the cholesterol bodies is destroyed. Treatment with Sudan III or Nile blue gives very inconstant results. The cholesterol of eggs is derived from the blood, and enters the ovoplasm slowly during the initial periods of slow growth, but rapidly during the last rapid growth period. The different layers of the egg are not equally rich in cholesterol, and the ratio between free cholesterol and total cholesterol varies in different parts.

G. G.

**Function of denervated kidney after section of the splanchnic nerve.** P. Demant. *Compt. rend. soc. biol.* 110, 1090-9(1932); *Physiol. Abstracts* 18, 125.—After denervation of a kidney by stripping the arterial outer coat the urine formed was more abundant on the following day than on the other side. The content of chlorides remained the same. The N content was less on the denervated side. The total quantity of Cl on the denervated side was greater for the time of observation. The total

amt. of N was equal on both sides. In other expts. both splanchnic nerves and pneumogastric nerves were cut, and the artery was denervated on one side. In this case more urine was formed by the kidney of which the artery was left intact. The secretion of urine depends in the 1st instance on the parasympathetic system, the influence of which is capital even in presence of intact sympathetic nerves. The secretion of N is regulated by the parasympathetic nerves and is independent of the sympathetic system. G. G.

Internal secretion of the prostate. M. Sergievskii and I. Bakhromeev. *Z. ges. expil. Med.* 81, 6-12(1932); *Physiol. Abstracts* 18, 143.—Stimulation of the hypogastric nerves (secretory nerves of the prostate) leads to a rise in blood K, but no change in Ca content occurs. The blood of the animal (cat or dog) after stimulation of these nerves has an inhibitory influence on the perfused frog heart, diminishing its amplitude and frequency. G. G.

Sugar cerebrospinal fluid after ingestion of carbohydrate. M. Dobrev and Tr. Saprianov. *Z. ges. expil. Med.* 81, 128-32(1932); *Physiol. Abstracts* 18, 131; cf. C. A. 27, 3980.—The administration of 100 g. glucose in 300 cc. water to 28 patients with nervous diseases led in the majority of cases to an increase in sugar of spinal fluid. The sugar in the spinal fluid was nearly always less than that in the blood, but in some cases the rise in the former after the glucose was negligible even when the blood-sugar rise was very marked. The rise is a normal physiol. process. G. G.

Chemical constitution of the follicular ovarian hormones. Armando Novelli. *Anales quim. farm.* (Chile) 3, 8-13 (1934); cf. C. A. 27, 4842.—Discussion. L. E. G.

The pancreas and the formation of muscle glycogen from glucose. V. G. Foglia and R. Fernandez. *Compt. rend. soc. biol.* 115, 330-2(1934).—After intravenous injection of glucose the muscle glycogen shows an increase in 1 hr. in normal, but not in pancreatectomized dogs. Giving insulin to the latter or grafting a pancreas to the blood vessels of the neck permits the normal synthesis of muscle glycogen. Role of the vagus nerves in the formation of muscle glycogen from glucose. *Ibid.* 333-4.—Section of the vagus has no effect on the formation of muscle glycogen. The adrenal cortex and the formation of muscle glycogen from glucose. R. Fernandez, V. G. Foglia, L. F. Leloir and A. Novelli. *Ibid.* 334-7.—The adrenal cortex or its ext. is necessary for the formation of muscle glycogen. L. E. Gilson

Role of the endocrine glands in the resynthesis of muscle glycogen after fatigue. R. G. Dambrosi. *Compt. rend. soc. biol.* 115, 344-5(1934).—Dogs were used. The pancreas, liver and adrenals are necessary for the resynthesis. Removal of the thyroid, parathyroids, hypophysis or gonads has no effect on the rate of resynthesis. Large doses of thyroid ext. cause a slight decrease in the rate. L. E. Gilson

Determination of vaginal mucification in the guinea pig. I. Desclin. *Compt. rend. soc. biol.* 115, 439-41 (1934).—The injection of urine of pregnant women, deprived of folliculin by extn. with  $\text{Et}_2\text{O}$ , caused mucification. Ext. of corpus luteum had the same effect. Corpus luteum ext. injected simultaneously with folliculin inhibited the action of the latter. Mucification during gestation depends upon the specific action of the corpus luteum hormone. L. E. Gilson

Respiratory exchanges of bantam hens and cocks. G. Nichita and G. Iftimesco. *Compt. rend. soc. biol.* 115, 661-3(1934); cf. C. A. 27, 4287. Respiratory exchanges of several breeds of hens during starvation. G. Nichita and I. Mircea. *Ibid.* 664-7. Respiratory exchanges of starving pigeons. G. Nichita and G. Iftimesco. *Ibid.* 667-70. L. E. Gilson

The sulfur metabolism of the dog. XII. The preparation and metabolism of *d*-acetylcysteine. Norman W. Pirie and Thomas S. Hele. *Biochem. J.* 27, 1716-18 (1933); cf. C. A. 27, 3245.—*d*-Acetylcysteine (I) is prepd. by the action of ketene on cystine in alk. soln.

1 The feeding of I to a dog causes an excretion of 48% a. sulfate and 32% as neutral S. Benjamin Harrow

Vapor pressure isotherm of muscle. J. Brooks. *Proc. Roy. Soc. (London)* B114, 258-72(1934).—Change in wt. of the sartorius muscle (in rigor) of the frog was detd. at different vapor pressures of  $\text{H}_2\text{O}$ . The muscle was permitted to come to equil. by suspension in a closed space over  $\text{H}_2\text{SO}_4$  of definite concn. The vapor pressure of the water was designated *a*; this was the quotient obtained by division of the vapor pressure of the  $\text{H}_2\text{SO}_4$  soln. by the vapor pressure of pure  $\text{H}_2\text{O}$  at the same temp. A const. wt. was obtained except at *a* = 0.994. The wt.-vapor pressure curve was reversible within values of *a* between 0 and 0.955. In muscle at rigor at *a* = 0.994, only a small portion of the  $\text{H}_2\text{O}$  was in the bound state (0.3 g.  $\text{H}_2\text{O}$  being assocd. with 1 g. total solids). The amt. of bound  $\text{H}_2\text{O}$  decreased with its activity below *a* = 0.80, the value probably being 0.15 g.  $\text{H}_2\text{O}$  per g. total solids at low activities of  $\text{H}_2\text{O}$ . Joseph S. Hepburn

Gas exchange of "natural" and artificial nerve impulse. R. W. Gerard and H. K. Hartline. *Naturwissenschaften* 21, 882-3(1933).—The conclusions of Winterstein (*Handb. norm. path. Physiol.* 18, 246(1932)) on differences between natural and artificial excitation of nerves, with accompanying respiration or  $\text{NH}_3$  evolution are discussed. Highly accurate expts. (1 mg. tissue) were made on the eye and optic nerve of horseshoe crab (*Limulus polyphemus*) with either type of excitation. On illumination of the eye (outside the respiration chamber), i. e., natural excitation waves, the  $\text{O}$  consumption of the nerves increases occasionally over 50%, av. 41%. Similar increases (44%) are obtained by elec. induction impulses. The increase in both cases lasts 15-40 min.; likewise in both cases  $\text{NH}_3$  seems to be evolved initially. B. J. C. van der Hoeven

Calcium optimum and blood coagulation. I. v. Zárday. *Wien. Arch. inn. Med.* 24, 283-92(1933).—Expts. *in vitro* show that an increase of Ca-ion concn. at first hastens the coagulation of blood, until a certain optimum concn. is reached. Further increases of Ca-ion concn. decrease and finally prevent the coagulation of the blood. Blood rendered incoagulable by high Ca-ion concn. can be made to coagulate by the addn. of Na citrate soln. For the citrate soln., as regards its effectiveness in producing coagulation, there are also min., optimum and max. concns. Harriet F. Holmes

Remarks on the work of O. Meyerhof and D. McEachern. "The anaerobic formation and disappearance of pyruvic acid in muscle." Amandus Hahn. *Z. Biol.* 94, 97-8(1933); cf. C. A. 27, 3513.—Note regarding priority for the discovery of pyruvic acid during the digestion of muscle in vacuum without the addn. of H acceptors. Frances Krasnow

Central blood-sugar regulation. IX. The fasting blood sugar after brain section. F. Hägler and F. Zell. *Z. ges. expil. Med.* 92, 193-210(1933); cf. C. A. 28, 2411. X. The effect of exclusion of the central nervous system on alimentary hyperglucemia. *Ibid.* 211-21. XI. The effects of removal of various parts of the central nervous system on pyramidone acid magnesium hyperglucemias. *Ibid.* 222-33. XII. Reflex blood-pressure control and sugar metabolism. *Ibid.* 234-40. M. L.

Significance of the liver in the metabolism of the lipid bodies. Change in the amounts of lipoids in the blood and the bile in parenteral administration of lecithin to normal rabbits. Y. Osoda. *Japan. J. Gastroenterol.* 5, 115-23(1933).—Purified lecithin was injected subcutaneously or into the ear veins of rabbits by means of 3-5 cc. per kg. of 3% lecithin emulsion. The lipoids of the blood and bile were detd. at intervals of 1 hr. The no. of repetitions of these injections and the no. of rabbits employed are not stated. The total fatty acids, lecithin and cholesterol increase in both the bile and blood after such injections. The metabolism of lipoids in hepatic disturbance in rabbits. *Ibid.* 124-31.—The livers of rabbits were injured either by feeding  $\text{CCl}_4$ , injecting India ink or ligation of the bile duct. After the injection of lecithin intravenously the blood lipoids remain at 4

higher level than normally if the liver has been injured by blocking the parenchymatous cells. The blood lipid changes are normal if only the hepatic stellate cells are blocked. The liver functions in regulating the level of blood lecithin. The lecithin may be excreted in the bile or removed from the blood by the reticulo-endothelial cells.

C. M. McCay  
The relation between the chemical constitution and the excretion of dyes by the liver and kidneys. Y. Tada and K. Hishikawa. *Japan. J. Gastroenterol.* 5, 187-90 (1933).—The rate of excretion after intravenous injection of 7 monoazo dyestuffs in the urine and bile was detd. Dyes with 1 sulfone group are excreted chiefly through the kidneys. With 2 of these groups more is found in the urine and with dyes contg. 3 such as Scharlach 6 R 41.9% was excreted in the urine and only 6.4% in the bile.

C. M. McCay  
The excretion of dyestuffs by the liver. Y. Tada. *Japan. J. Gastroenterol.* 5, 191-200 (1933); cf. *C. A.* 28, 1753. —The removal of dyestuffs from the blood is a function of the parenchymatous cells of the liver. Dyes are secreted by these cells into the bile. C. M. M.

The excretion of dyestuffs after the liver is injured experimentally. R. Wakabayashi. *Japan. J. Gastroenterol.* 5, 201-35 (1933).—The excretion of dyestuffs is influenced by the degeneration of the parenchymatous cells. It seems to matter little whether this degeneration is caused by chem. agents as  $\text{CCl}_4$ ,  $\text{CHCl}_3$ , and P, or such liver parasites as *Schistosomum japonicum* and *Distomum spulatum*.

C. M. McCay  
The influence of bacterial toxins upon the liver function. I. Kizu. *Japan. J. Gastroenterol.* 5, 236-78 (1933). Necrosis of the liver cells follows the injection of bacterial toxins especially diphtheria. The decreased ability to excrete dyes corresponds to this destruction by toxins.

C. M. McCay  
Bicarbonate content of living muscle. N. Brookings. *Biochem. Z.* 267, 349-56 (1933).—Resting muscle at equil. in serum contains about 30% less bicarbonate, and its reaction is about 0.13  $p_{\text{H}}$  more acid. S. Morgulis

Influence of the adrenal cortex hormone on the chemistry of the active muscle. Roberto Indovina. *Biochem. Z.* 267, 383-8 (1933).—Rats can run until complete exhaustion sets in 50% longer (6 hrs. instead of 4) when they are injected with the adrenal cortex hormone. This effect of the hormone is attributed to the fact that under its influence the glycogen content of the muscles does not drop so greatly nor does their nonprotein N content rise nearly as much at the time of exhaustion as without the hormone.

S. Morgulis  
Chemical composition of pig thymus. Eisei Kataoka. *J. Biochem. (Japan)* 19, 21-4 (1934).—A large amt. of pig thymus contained 64.1%  $\text{H}_2\text{O}$ , and the dry substance consists of 26.6% fat free and 9.3% fatty material. Of the latter about  $\frac{1}{10}$  was acetone-insol. The residue of the ether ext. extd. with cold acetone yielded at 0° crystals, which were recrystd. from warm alc. and constituted 11% of the thymus. This cryst. substance, sol. in ether, petr. ether, benzene, toluene,  $\text{CHCl}_3$  and  $\text{CS}_2$ , m. 63.5°, was identified as pure  $\alpha$ -palmitodistearin. In the protein fraction no glycine was demonstrable, but leucine and the diamino acids were in preponderance. S. M.

Comparative studies on the chemical composition of the pancreas. Eisei Kataoka. *J. Biochem. (Japan)* 19, 25-32 (1934).—No difference has been found in the protein compn. of pig and cow pancreas, in either case leucine and the basic diamino acids being predominant quantitatively. But from the cow pancreas pure cryst.  $\beta$ -stearo-dipalmitin was obtained which was not present in the pig pancreas, where another glyceride is present, probably  $\beta$ -laurio- $\alpha$ -distearin. S. Morgulis

Sex differences in the oxidation-reduction capacity of the tissues. V. Influence of the gonads on the oxidation-reduction capacity of the tissues. Sakae Kagiya. *J. Biochem. (Japan)* 19, 45-58 (1934); cf. *C. A.* 27, 2184. —The oxidation capacity was detd. on samples of blood and the reduction capacity on the gastrocnemius muscle by the methylene blue method. The oxidation

capacity is higher and the reduction smaller in male than in female rabbits. In the castrated male the oxidation capacity diminishes and the reduction shows a slight tendency to increase. In the castrated female no change has been observed in the oxidation capacity but the reduction capacity has decreased. In feminized male rabbits there is a fairly strong decrease in the oxidation but only a slight increase in the reduction capacity. In masculinized female rabbits, on the contrary, the oxidation is somewhat increased but the reduction is markedly diminished. These sex differences in oxidation-reduction activity are observable not only in the adult animals, but also in the young or even in the embryo. These functional differences are attributed to the gonads.

S. Morgulis  
Tissue respiration and indophenol-oxidase reaction of serous membranes. K. Kiyohara and S. Kagiya. *J. Biochem. (Japan)* 19, 59-68 (1934).—The  $\text{O}_2$  consumption per mg. of various serous membranes (omentum, mesenterium, mediastinum, pericardium, pleura, peritoneum) from different animals (dog, rabbit) and the distribution of oxidase granules in these membranes have been detd. A parallel relationship has been found between the degree of  $\text{O}_2$  consumption and the no. of granules. S. M.

Change of the oxidation-reduction potential of Ringer solution on passage through an isolated working heart. A. Ju Kharit and I. I. Fedorov. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 68-71 (in German 71-3) (1934). A Ringer or a Ringer-Locke soln. after passage through the heart of *Rana* shows a reduction of potential against a smooth Pt electrode of 26-61 mv. while the  $p_{\text{H}}$  remained const. A 0.0002M KCN soln. addn. reverses the oxidation process and the potential decreases by about 20 mv. Addn. of CO at first increases the potential and then decreases it below normal. F. H. Rathmann

Biological activators and inhibitors. Hans v. Euler. *Arkiv Kemi, Mineral Geol.* 11A, No. 12, 7 pp. (1933). A short review of the catalytic action of metals on biol. systems and the nature of biol. catalysts such as vitamins, hormones and enzymes. The antagonistic behavior of vitamin A and thyroxine in regard to growth was studied and a balance was achieved between the two in feeding expts. E. W. Scott

Action of cardiac hormones on lactic acid and dextrose content in blood. J. A. Collazo, J. Puyal and Isabel Torres. *Arch. med. cirugia espec. (Madrid)* 36, 599; *J. Am. Med. Assoc.* 101, 329-30 (1933). —The action of org. exts. on the circulatory mechanism is due to their content in cardiac hormones. These may be true cardiac hormones which have a cardiac, muscular or visceral origin and the active principle of which is adenylophosphoric acid or they may be arterial hormones which are of pancreatic origin and of unknown compn. To det. the significance of adenylophosphoric acid in muscular metabolism the glucemia and blood lactic acid of 2 groups of normal rabbits were detd. One group of animals was injected with one cc. per kg. of body wt. of a cardiokinetic muscular ext. while the other group received a similar dose of a pancreatic ext. The blood sugar and lactic acid were detd. at 30, 60 and 120 min. Only the hormone in the muscular ext. can be identified with adenylophosphoric acid, since it produced a const. drop in blood lactic acid and a slight elevation of blood sugar. The action of pancreatic hormone, deprived of insulin, on blood sugar and lactic acid is less marked than the hormone contained in muscular ext., either because its active principle is a specific hormone and not adenylophosphoric acid or because its content of the latter is not equal to that of the muscular exts. The action of cardiac hormones is primarily on carbohydrate and phosphorus metabolism of peripheral muscles, cardiac muscles and mostly muscular layers of vessels. Louis J. Soffer

Hippuric acid. IV. Hippuric acid synthesis in the animal body. Isao Kanzaki. *Sei-i-kwai Med. J.* 52, No. 1, 85-90 (English Abstract 4-5 (1933)); cf. *C. A.* 27, 114. —From detns. of hippuric acid (I) in the blood by K.'s

method (C. A. 27, 117), K. concludes that the kidneys cannot be the only organs concerned with the synthesis. Normal rabbits contain no I, nor does the blood of the normal rabbits after 3-9 hrs. after BzONa injection. If the injection is made in nephrectomized animals, I appears. The spleen also cannot play the role, for splenectomy and nephrectomy together give the same results as does nephrectomy alone. When the reticuloendothelial system of nephrectomized rabbits is blocked with India ink and then injected with BzONa, I shows a decrease as compared with that of the non-blocked animal, followed by an increase; this is due probably to the acceleration of the cell activity. The results of P or CHCl<sub>3</sub> poisoning show that the liver must be concerned with the synthesis in the rabbits. S. Tashiro

**Effect of the pituitary body on nitrogen metabolism.** Yo Takeuchi and Yoshio Tokizaki. *Sei-i-kwai Med. J.* 52, No. 3, 25-50 (English Abstract 5-4) (1933).—The daily analysis of urinary non-protein N (I), creatine and creatinine (II), blood N (III), blood non-protein-N (IV), and blood creatine and creatinine (V) was made for 1-4 weeks with dogs (about 7 kg.). Hypophysectomy produces a slight decrease in I, II and III, but increase in IV followed by a decrease. The daily injection of pituitrin (1. cc.) to the normal dog causes a decrease in all except III, while a similar injection of hypophysectomized dogs causes an increase in all. The antuitrin gives the same results as pituitrin. With pituitary and normal dogs, all decrease, while with hypophysectomized dog, I, II and III decrease, but IV and V show no change. S. T.

**Influence of the spleen upon sulfur metabolism.** Kaname Iwabuchi. *Sei-i-kwai Med. J.* 52, No. 4, 59-83 (English Abstract 3) (1933).—The results of estn. of daily urinary excretion of total N, total S, neutral S, total sulfate, inorg. sulfate and ethereal sulfate of the normal and splenectomized bitch for 2 weeks with and without subcutaneous daily injections of 3 com. products show that the spleen plays an important role in S metabolism. Its activity depresses S metabolism and its absence accelerates it. An injection of opostatin reduces the S metabolism accelerated by splenectomy. Both adrenalin and oophormine accelerate S metabolism, especially of splenectomized animals. S. Tashiro

**The nature of the depressor substance of the blood.** Cyrus H. Fiske. *Proc. Natl. Acad. Sci.* 20, 25-7 (1934).—It has been able, by a modification of the method of Fiske and Subbarow (C. A. 24, 389), to sep. from a protein-free blood filtrate, 2 substances, adenosine triphosphate (I) and diphosphoglyceric acid (II). I can be adsorbed on charcoal (norite) and thus be sep. from II. The reactions of I are analogous to the adenosine triphosphate obtained from the muscle. Julius White

**Factors influencing the secretion of tracheal mucus.** Julian Johnson. *Am. J. Med. Sci.* 187, 298 (1934).—Stimulation of the peripheral or central end of the superior laryngeal nerve will cause a secretion of mucus. Also when an irritating substance comes in contact with the tracheal mucosa, mucus is secreted, as a result of both direct irritation and reflex stimulation of the mucous glands. R. C. Willson

**Glutathione in hibernation and in reawakening.** Filippo Dulzetto. *Z. vergleich. Physiol., Abt. C of Z. wiss. Biol.* 16, 218-27 (1932).—The glutathione content of the tortoise increases during hibernation. The increase was greatest in the heart, smaller but very pronounced in the liver and blood and very small in the striped muscle. B. C. B.

**Evans, Herbert M., Meyer, Karl, Simpson, Miriam E., Szarka, Alex. J., Pencharz, Richard I., Cornish, Robert E. and Reichert, Frederick L.: The Growth and Gonad-Stimulating Hormones of the Anterior Hypophysis. Mem. Univ. of California. Vol. 11. Berkeley: Univ. of California Press. 446 pp. \$10. Reviewed in Nature 133, 401 (1934).**

## G—PATHOLOGY

H. GIBSON WELLS

**Distribution of sugar in the blood of diabetic and non-**

**diabetic Indians.** J. P. Bose. *Indian Med. Gaz.* 67, 415-35 (1932).—In normal persons the plasma sugar (I) is slightly less than the whole blood-sugar (II) and slightly greater than the corpuscular sugar (III), whereas in diabetes I is significantly greater than II and III to an extent depending on the severity of the disease. Hence the ratio III:I is a criterion of the gravity of diabetes. Administration of glucose and of insulin gives values for I, II and III which indicate that the hormone increases the permeability of the corpuscles to sugar and facilitates its storage and utilization. B. C. A.

**The application of Ruckert's lipocrite in the study of lipemia.** B. Bisbini and G. Canali. *Diagnostica tec. lab. (Napoli) Riv. mensile* 4, 377-88 (1933).—Ruckert's lipocrite (*Klin. Wochschr.* No. 40 (1931)) is suitable for the study of variations in alimentary lipemia only to follow fat absorption. The lipemic level varies from subject to subject. Since there are many uncontrollable factors, the method is not of diagnostic value. L. W. B.

**The sedimentation of blood.** Andrea Colarusso. *Diagnostica tec. lab. (Napoli) Riv. mensile* 4, 553-627 (1933).—A crit. review of work on blood sedimentation including its clinical value. A bibliography of 449 references is given. Lewis W. Butz

**Clinical and experimental hypoglycemia.** Piero Lavraga. *Diagnostica tec. lab. (Napoli) Riv. mensile* 4, 729-42 (1933).—A review with large bibliography. Lewis W. Butz

**Action of the diabetogenic substance of the anterior hypophysis in various physiological conditions.** B. A. Houssay, A. Biasotti and C. T. Rietti. *Compt. rend. soc. biol.* 115, 323-5 (1934); cf. C. A. 27, 534. —In dog, the alk. ext. of the anterior bovine hypophysis produces a diabetic effect in the absence of pancreas, hypophysis, thyroid, ovaries, testicles or adrenal medulla. The effect is also produced in dogs after injury of the tuber or section of the splanchnic or lumbar sympathetic nerves. After thyroidectomy the action is a little weaker. Diabetogenic properties of extract of the anterior hypophysis in diverse species and with different diets. *Ibid.* 325-7. —The diabetogenic effect is produced in cats, dogs, pigeons, guinea pigs, rats, mice and rabbits but not in toads or snakes. The hyperglucemia, and especially the glucosuria, are more intense in dogs on a carbohydrate diet than in those on a meat diet. The diabetogenic effect is specific for the anterior hypophysis; it is not produced by exts. of muscle, kidney, liver, spleen, thyroid or posterior hypophysis. Properties of the diabetogenic substance of the anterior hypophysis. *Ibid.* 327-9. The diabetogenic substance is stable if heated to 50° for 15 min., but is almost totally inactivated at 80°. It is partially sol. in 50% EtOH. It does not pass through ultrafilters or parchment membranes. It is pptd. by 30% satn. of the soln. with Na<sub>2</sub>SO<sub>4</sub>. It is not adsorbed by blood charcoal or glaucomaceous earth. L. E. G.

**Analytical study of Monilia albicans antigen.** P. Negroni. *Compt. rend. soc. biol.* 115, 342-4 (1934). L. E. Gilson

**Phenyl isocyanate protein compounds and their immunological properties. II. The gelatin compounds** Sydney J. Hopkins and Arthur Wormal. *Biochem. J.* 27, 1706-15 (1933); cf. C. A. 27, 5402. —Phenylureido (I) and p-bromophenylureido-gelatin (II) give marked precipitin and complement-fixation reactions with antisera to phenylureido-horse-serum-globulin. I and II injected into rabbits over a long period fail to produce antibodies which are detectable by precipitin and complement-fixation tests. Benjamin Harrow

**Chemo-immunological studies of pneumococcal infection and immunity.** Oswald T. Avery. *Naturwissenschaften* 21, 777-80 (1933).—A review.

**Ultra-violet absorption spectra studies in malarial sera.** N. D. Kehar. *Rec. Malaria Survey India* 3, 171-3 (1932).—Absorption is greater in malarial than in normal serum of human beings throughout the ultra-violet spectrum; as compared with normal serum, malarial



serum shows no selective absorption in this region.

**Studies in immunity in malaria. I. An intradermal reaction in malarial infections in monkeys.** J. A. Sinton and H. W. Mulligan. *Rec. Malaria Survey India* 3, 323-45 (1932).—A disintegration product of a malarial parasite occurring in the blood, liver, spleen and bone marrow of monkeys was prepd. by digesting the finely divided parasitic material with papain for 4 hrs. at 60° and filtering the digest through paper. When the filtrate was added to a 10-fold quantity of abs. alc. a copious yellowish or whitish ppt. that was almost completely sol. in normal saline soln. was formed. Antigens prepd. from the pptd. material that had been in contact with alc. for 24-48 hrs. remained sterile for long periods and were as active as those prepd. from the original filtrate. The prepn. causes an immediate skin reaction when it is injected intradermally into normal monkeys, and the reaction seems to be of the type assocd. with atopic hypersensitiveness. Intradermal injection into monkeys infected with the same strain of parasite gives rise to a delayed reaction similar to that occurring in hypersensitiveness of infection. As yet, there is no proof that these reactions are sp. for malaria in general or even for infection with the special strain of malarial parasite used.

**Sedimentation reaction in acute cholecystitis and in uncomplicated cholelithiasis.** Nils Liedberg. *Acta Chir. Scand.* 74, 19-40 (1934).—In acute cholecystitis there is generally no increase in the sedimentation rate during the first 24 hrs., but during the next 24 hrs. there is an increase in 90% of the cases studied, the av. rate per hr. being 29 min. During the 3rd, 4th and 5th day the sedimentation rate rises to an av. of 48, 57 and 61 mm. per hr. The presence of icterus has no effect on this sedimentation rate. The sedimentation rate in uncomplicated cholelithiasis is normal.

**Diastasic conditions in cases of jaundice due to malignant tumors.** Erik Millbourn. *Acta Chir. Scand.* 74, 47-87 (1934).—Jaundice due to tumor is accompanied by increased diastase activity of the urine in about 1/4 of the cases studied. The increased diastase is greater when the tumor is located on the duodenal papilla or the extrahepatic bile ducts, but was absent in cases of cancer of the pancreas.

**Diazo urines. III. Chemical composition of diazo urines in scarlatina.** Sadajiro Nakayama. *J. Biochem. (Japan)* 19, 33-8 (1934); cf. C. A. 28, 1758<sup>7</sup>.—Urine from scarlatina patients is acidified, evapd. to a thin syrup and treated with Pb(AcO)<sub>2</sub> until no further ppt. is formed. The filtrate is reduced in vol. at 40° in *vacuo*, treated with dil. H<sub>2</sub>SO<sub>4</sub> and freed from the ppt. The excess H<sub>2</sub>SO<sub>4</sub> is removed with baryta and the excess Ba with CO<sub>2</sub>, and the final filtrate is greatly reduced in vol. On adding abs. alc., drop by drop, a ppt. of antoxy- and oxyproteic acid is obtained. The antoxyproteic acid is sep'd. from the oxyproteic acid by Hg(AcO)<sub>2</sub>. The substance gives a strong S but no biuret or xanthoproteic test, nor does it give a red color with Millon's reagent. It gives a strong pos. reaction with Ehrlich's diazo reagent. The oxyproteic acid gives neither the biuret nor the diazo reaction, but a pos. S test. From about 10 l. scarlatina urine were obtained 7.18 g. antoxyproteic acid, 1.07 g. oxyproteic acid and 0.35 g. of histidine, arginine and lysine. **IV. Chemical composition of diazo urines in measles.** *Ibid.* 39-43.—From about 7 l. of measles urine were obtained 6.5 g. antoxyproteic acid, 4.5 g. oxyproteic acid and 0.95 g. hexone bases (histidine, arginine and lysine).

**Availability of fructose in the bodies of normal and diabetic animals.** Minoru Abe. *J. Biochem. (Japan)* 19, 69-110 (1934).—Fructosuria is caused in the dog with a smaller amt. than is required to produce glucosuria with glucose, and the hyperglucemia with fructose is also lower, indicating a lower renal threshold. Partial pancreatectomy which has not affected the glucose tolerance of the dog was assocd. with fructosuria when 2 g. fructose per kg. was administered. With a more

strongly diabetic tendency and a lowering of the glucose tolerance dogs do not respond with fructosuria to this dose, but 3 g. fructose per kg. produces a slight glucosuric response. Glucose in these animals always causes a high hyperglucemia and glucosuria. In severe diabetic dogs with high hyperglucemia even during the post-absorptive stage, the administration of fructose causes increased hyperglucemia but to a smaller degree than does glucose, and a smaller amt. is lost in the urine. Successive administration of fructose elevates its renal threshold so that the hyperglucemia from fructose also tends to be elevated. Repeated daily administration of fructose or glucose had little effect on the glucose tolerance of mildly diabetic animals, though the glucose excreted is less after fructose than glucose injections. In the Japanese the oral consumption up to 0.5 g. fructose per kg. is tolerated well, but with amts. above 0.8 g. there is fructosuria.

**The influence of liver degeneration and recuperation on the acid-base equilibrium of the blood.** Wm. de B. McNider. *J. Pharmacol.* 50, 108-22 (1934).—Where liver degeneration occurs there is a definitely correlated decrease in alkali reserve.

**Reduced glutathione content in the organ tissue of rabbits immunized with typhoid bacilli.** Fumio Murata. *Sei-i-kwai Med. J.* 51, No. 10, 63-91 (English Abstract 3-4) (1932).—The reduced glutathione contents (I) of liver, spleen, kidney, suprarenal, testicles, lungs, heart, bone marrow and muscle increase when the rabbit is immunized with typhoid bacilli. This increase begins to fall as the titer of agglutination falls, reaching a normal level after about 2 months. If the rabbit, whose reticulo-endothelial cells were previously damaged by pelican, is immunized with the organisms, I increases greatly in suprarenals, but not in any other tissues. The results obtained with splenectomized animals under similar conditions led M. to conclude that the spleen shares in the agglutinin production.

**Landsteiner, Karl:** Die Spezialität der serologischen Reaktionen. Berlin: J. Springer. 123 pp. M. 8.80; cloth, M. 9.80.

## H—PHARMACOLOGY

A. N. RICHARDS

**The effects of sodium hyposulfite on intoxication by potassium cyanide.** Ch. Achard and Leon Binet. *Compt. rend.* 198, 222-4 (1934).—Na hyposulfite prevents and has some curative action on intoxication of carp (*Cyprinus carpio* L.) by KCN. Added to a perfusion soln. it prolongs respiratory movements of the isolated head of the fish (*Gobius lota*) from 27 to 48 min.; KCN arrests them in 2 min.; both together maintain them 32 min. Sodium hyposulfite does not restore the movements after cessation due to perfusion of KCN.

**The neuro-muscular action of amides and ammonium salts.** R. Bonnet. *Compt. rend.* 198, 284-5 (1934).—The amides (acetamide, oxamide, succinamide) and urea are toxic to muscle and without action on nerve excitability. They are to be classed as curarizing poisons. NH<sub>4</sub> salts (acetate, carbonate, oxalate, succinate) are both muscle and nerve toxins. The pharmacodynamic action of urea favors the diamide constitution.

**Variations in blood cholesterol on injection of adrenaline.** E. Benhamou and R. Gille. *Compt. rend. soc. biol.* 107, 1546-7 (1931); cf. C. A. 27, 2214.—Injection of adrenaline increases the blood cholesterol in normal, but not in splenectomized, persons. Blood fat is unaltered.

**Metabolism of alcohol.** H. E. Himwich, L. H. Nahum, N. Rakieten, J. F. Fazikas, D. Du Bois and E. F. Gildea. *J. Am. Med. Assoc.* 100, 651-4 (1933).—Ingestion of 10 cc. of 19% EtOH (I) per kg. body wt. by man and 50 cc. by dogs was followed by a slight rise in blood sugar, a marked rise in blood lactic acid and a decrease in blood CO<sub>2</sub> and p<sub>H</sub>. (I) acts as a glycogenolytic agent on liver and muscle glycogen. The fall in p<sub>H</sub> due to accumulation of lactic acid and lag in CO<sub>2</sub> excretion varied with the

concn. of (I) in the blood. In patients suffering from the effects of excessive ingestion of alc. the lactic acid of the arterial blood was increased. Intraperitoneal injection of 50 cc. of 19% (I) per kg. of rat lowered the R. Q. of the cerebral cortex from 0.98 to less than 0.9, this indicating an oxidation of (I) and lactic acid.

B. C. A.

**Hyperfunction of the thyroid in pregnancy. Effect of adrenaline on blood iodine in pregnancy.** W. Scheringer. *Klin. Wochschr.* 12, 107-8(1933).—During the second half of pregnancy intravenous injection of 0.005 mg. of adrenaline resulted in a marked fall in blood I within 30 sec. After 30 min. the values reached, or even exceeded, the original level.

B. C. A.

**The action of santonin on isolated blood vessels.** Stefano Bertino. *Arch. farmacol. sper.* 56, 579-82 (1933).—See C. A. 27, 2217. **The action of santonin on the uterus.** *Ibid.* 593-600.—See C. A. 27, 2217. **Santonin and alimentary hyperglucemia from glucose.** *Ibid.* 601-6.—Santonin (0.15 g. per kg.) given intramuscularly in  $C_2H_5(OH)_2$  (3 cc. per kg.) to rabbits produced an exaltation of the hyperglucemia (245 to 328 after 1 hr.) because of administration of 8 g. glucose per kg. by mouth. A similar increase was not observed after 0.01 g. per kg. of santonin and 3 g. per kg. of glucose.

Lewis W. Butz

**The antidotal relationship between semicarbazide and mercuric chloride in the rabbit.** Luciano Battistoni. *Arch. farmacol. sper.* 56, 583-92(1933); cf. C. A. 27, 1676.—Administration of semicarbazide hydrochloride (I) by ear vein separately but immediately after  $HgCl_2$  (0.0375 mg. per kg.) by the same route did not prevent intoxication and death in the rabbit. If lethal doses of I were given the intoxication resembled that from I in addn. to the symptoms caused by  $HgCl_2$ .

L. W. B.

**The hemopoietic action of copper.** Giulio Dolfini and Calogero Casuccio. *Rass. clin. terap. sci. affini* 32, 291-318(1933).—Administration of  $KCu(CN)_2$  raised the hemoglobin level in normal guinea pigs and stimulated blood regeneration in those rendered anemic by hemorrhage.  $KCu(CN)_2$  is less toxic than the other Cu salts usually given.

Lewis W. Butz

**Toxicological investigation of the poisonous constituents of *Ryania acuminata*.** S. Nakarai and T. Sano. *Arch. Pharm.* 272, 1-4(1934).—In addn. to an anatomical examn. of the root, a chem. ext. of the finely comminuted product was effected which yielded after repeated extrn. with  $CHCl_3$  a colorless residue m. 100°. This substance on hydrolysis reduces Fehling soln. and is probably identical with the product ryanin already isolated and described by LaCointe. The toxicological examn. shows it to be highly poisonous. Thus in the case of frogs of 10 g. body wt. the M. L. D. is 0.00001 g.; with mice of 10 g. body wt. the M. L. D. is 0.000005 g.; with rabbits of 1 kg. body wt. the M. L. D. is 0.00025 g. The toxicity of ryanin toward cats, dogs and fishes was likewise studied, and showed its high potency. Its effects on mice when injected alone and with chloral and with curare was investigated. Ryanin acts first as excitant and then as a paralyzing poison on the respiration. Death appears to result chiefly from cramp of the respiratory muscles, which precedes paralysis of the respiratory centers. It is highly significant that the convulsive action of strychnine, injected simultaneously with ryanin, is without effect on the action of ryanin.

W. O. E.

**Adrenaline and diastase in phosphorus poisoning.** G. Rosenfeld. *Arch. expil. Path. Pharmacol.* 166, 205-10 (1932); *Physiol. Abstracts* 18, 223.—Sufficiently large doses of adrenaline prevent the fatty infiltration of the liver and the complete disappearance of the liver glycogen found in P poisoning in dogs. The injection of a series of doses of diastase with the final production of anti-diastatic activity in the serum also prevents the fatty infiltration of P poisoning. Since adrenaline antagonizes the effect of diastase on the blood sugar it would seem that the abolition of excessive diastatic activity was synonymous with the restoration of a normal liver carbohydrate metabolism.

G. G.

**Acetylcholine contracture of striated muscle after treatment with moniodoacetic acid.** J. F. von Ledebur. *Arch. ges. Physiol. (Pflügers)* 230, 394-400(1932); *Physiol. Abstracts* 18, 102; cf. C. A. 26, 3581, 4870.—The sartorius, ileo-fibularis and rectus abdominis of the frog still react to acetylcholine (1:100,000 to 1:10,000) after treatment with moniodoacetic acid (in concns. sufficient to inhibit the lactic acid production). The height of contraction in treated muscles is appreciably smaller than in untreated control muscles. Acetylcholine brings about the typical rigor in muscles treated with moniodoacetic acid.

G. G.

**The polarization capacity ["permeability"] of frog muscle in relation to metabolism.** W. Quensel. *Arch. ges. Physiol. (Pflügers)* 230, 423-33(1932); *Physiol. Abstracts* 18, 104.—Creatine and phosphates cause "tightening of the muscle membrane, while lactate ion causes a loosening. Lacarnol (adenylic acid) has a loosening effect in very small concns. Treatment with  $CH_3BrCO_2H$  brings about tightening of the membrane together with contracture. Addn. of lactate inhibits this effect of the drug. KCN or replacement of the ( ) by N has no direct action on permeability.

G. G.

**The effect of adrenaline on the blood pressure of the elasmobranch, *Squalus acanthias*.** L. C. Wyman and B. R. Lutz. *Biol. Bull.* 62, 17-22(1932); *Physiol. Abstracts* 18, 40.—Intravenous injection of adrenaline, in doses as low as 2 cc. of 1:500,000, produced long-sustained pressor effects in *Squalus acanthias*, together with marked increase of pulse pressure and a tendency toward decrease of heart rate. Subsequent doses of adrenaline following doses stronger than 1:500,000 were ineffective. This is interpreted as being due to already existing max. pressor action. Doses subsequent to a dose of 2 cc. of 1:500,000 were effective. The pressor effect is interpreted as being due to extracardiac factors, peripheral to the gill capillaries, but the region of action of the adrenaline was not located.

G. G.

**Antagonistic action of cephalin and calcium salts on the isolated frog heart.** H. Scheiner. *Compt. rend. soc. biol.* 115, 232-5(1934).

L. E. Gilson

**Role of the adrenals in nicotine hyperglucemia.** L. L. Leloir. *Compt. rend. soc. biol.* 115, 319-23(1934).

**The hyperglucemic action of nicotine is due essentially to hypersecretion of adrenaline. The action does not occur in adrenalectomized dogs or in dogs from which the medulla of the adrenals has been removed. It is due to a direct excitation of the adrenals since it occurs after sympathetic innervation.**

L. E. Gilson

**The thyroid and the diuretic action of extract of the anterior hypophysis.** A. Biasotti. *Compt. rend. soc. biol.* 115, 329-30(1934).—The diuretic action of the ext. is indirect and is due to stimulation of the thyroid. The action does not occur in thyroidectomized dogs.

L. E. Gilson

**Action of extract of adrenal cortex on the endocrine glands.** E. B. del Castillo, L. F. Leloir and A. Novelli. *Compt. rend. soc. biol.* 115, 338-40(1934).—The ext. produced no significant effects in normal rats.

L. E. Gilson

**Inhibition of anaphylactic shock by Congo red.** Otto G. Bier. *Compt. rend. soc. biol.* 115, 347-8(1934)

**In guinea pigs the intraperitoneal injection of Congo red did not prevent shock when anaphylotoxin (prepn *in vitro* by Bordet's method) was injected intravenously 30-60 min. later.**

L. E. Gilson

**Action of intravenous injections of hydrochloric acid on the proteins, lipides and alkali reserve of the blood and the lipides of the kidney tissue of dogs.** C. Achard, J. Verne, M. Bariety and E. Hadjigeorges. *Compt. rend. soc. biol.* 115, 355-6(1934); cf. C. A. 27, 1938.

L. E. Gilson

**Experiments with some circulatory and respiratory analeptics.** P. Régniers and G. de Vleeschouwer. *Compt. rend. soc. biol.* 115, 428-9(1934).—The effects of Solu camphre, Camphostyl, Hexetone, Coramine, Cardiazole, Oetine and Icoral on narcotized dogs, cats and rabbits are described.

L. E. Gilson

**Variations in blood composition produced by intra-**

venous injections of sodium chloride or glucose [in dogs]. A. de Moraes Sarmiento and M. J. Bruno da Costa. *Compt. rend. soc. biol.* 115, 454-5(1934) L. E. G.

Action of tricaline on the blood of fish. L. Baudin. *Compt. rend. soc. biol.* 115, 510-12(1934); cf. C. A. 26, 3842. L. E. Gilson

Effects of insulin and adrenaline on the amino acid content of blood. James M. Luck and Stanley W. Morse. *Biochem. J.* 27, 1048-54(1933).—The amino-nitrogen (A-N) content of the blood of normal rabbits is reduced by insulin. The A-N contents of liver and muscle are reduced alike by insulin, adrenaline or balanced injections of insulin and adrenaline together. Hypoglycemia is prevented by the use of balanced injections of insulin and adrenaline, but hypoamino-acidemia is still observed. Adrenaline is as effective as insulin in reducing blood A-N. Benjamin Harrow

Determination of the binding of therapeutic chemicals by spirochetes and trypanosomes. Ernst Singer and Viktor Fischl. *Naturwissenschaften* 21, 787(1933).—By accurate As detn. (Sanger and Black method), 0.5 to 0.9  $\gamma$  As was found in the recurrens spirochetes of from 0.13 to 0.45 g. blood of mice after intramuscular injection of  $1/100$  g. neosarphenamine at the height of the infection. After  $1/100$  g. atoxyl, 3  $\gamma$  As was found in the trypanosomes of nagana Prowazek of 0.33 g. blood. Further studies have included the absorption of the chemicals by the microorganisms and the behavior of resistant species. Results with other metal derivs. confirmed those with As. B. J. C. van der Hoeven

The inactivation of insulin by normal and diabetic blood. P. T. Black. *Brit. J. Exptl. Path.* 14, 318-22 (1933).—Insulin incubated with serum or with laked cells or with cytolized leucocytes loses some part of its power to lower the blood sugar and produce convulsions in fasting rabbits when the mixt. is injected subcutaneously. Insulin incubated with laked cells loses some part of its power to lower the blood sugar when injected intravenously into rabbits. This is probably due to destruction of the insulin by an enzyme other than trypsin. The inactivating substance does not readily pass from the cells to the plasma. Insulin incubated with heparinized whole blood retains its power to lower the blood sugar when injected intravenously into rabbits. This is also true of insulin incubated with intact red cells or leucocytes. Blood from diabetic patients, even from those displaying resistance to insulin, had no more than normal power to destroy insulin in any of these expts. This investigation therefore does not support the view that the symptoms of diabetes are due to destruction of insulin in the circulation. Harriet F. Holmes

The influence of histamine and pilocarpine on the human gastric secretion. A. P. L. Blakely and J. F. Wilkinson. *Brit. J. Exptl. Path.* 14, 349-54(1933).—A study was made of 43 normal individuals, 13 with achlorhydria and 32 with other gastrointestinal disturbances. Histamine is nearly inactive in all cases of achlorhydria, entirely so in the achlorhydria of pernicious anemia. Pilocarpine caused marked increase in secretion in the former group, some action in the latter. Both drugs were effective in all other cases studied; the effect of the two given together is greater than of either alone. In cases in which the effect was noted, HCl and pepsin were increased more by histamine than by pilocarpine. Harriet F. Holmes

Parenteral versus oral administration of quinine. P. V. Karamchandani. *Res. Malaria Survey India* 3, 445-73(1933).—After 17 hrs. 80% of the quinine injected as quinine acid hydrobromide into the gluteal muscles of a rabbit was recovered from an 8.3 g. portion of the injected muscle. Little or no loss of quinine or change in color of the solns. was caused by boiling quinine acid hydrobromide (10 grains in 10 cc. water) for 3-5 min. Quinine administered orally along with alk. mixt., if it be retained, is as efficacious therapeutically as quinine administered by injection. Parenteral injections of quinine are very likely to produce local necrosis and

suppuration of the tissues. Ninety-nine references.

K. D. Jacob

Chronic hydrogen cyanide poisoning. Nuri Refet. *Gasmaskes* 6, 19-20(1934).—Two cases are described of chronic HCN poisoning due to long-continued breathing of HCN. The symptoms were loss in wt. and appetite, headache, nausea, occasional collapse, numbness in the limbs, muscle pains. In one patient a characteristic skin acne appeared on the hands. Both subjects recovered when proper precautions were observed. A. L. K.

Substances that decrease blood pressure. III. Decrease of blood pressure by alcoholamines. Masao Toki, Tokichi Miyoshi and Nagao Ueda. *J. Agr. Chem. Soc. Japan* 9, 1187-92(1933); cf. C. A. 27, 5347.—Ethanolamines were generally nontoxic for the animals; HCl salts of these bases caused marked decrease in blood pressure. Y. Kihara

Evipan, a new general anesthetic applied to dental surgery. John Bunyan. *Brit. Dental J.* 56, 23-4 (1934).—The drug is contraindicated in liver and gall-bladder disorders. Its use may entail respiratory embarrassment which can be overcome by administration of lobeline or CO<sub>2</sub>. The period of recovery varies from one half to one hour, depending upon the individual. Frances Krasnow

Evipan as a general anesthetic for dental operations. F. R. P. Williams. *Brit. Dental J.* 56, 25-6(1934).—Report of two cases showing excellent results. F. K.

Montanin poisoning. M. Flamm. *Deut. Z. ges. gericht. Med.* 22, 21-7(1933).—Montanin is a by-product of the ceramic industry, contg. about 30% of hydrofluosilicic acid, used in breweries to combat vermin and molds. The lack of color and odor often causes mistakes and leads to fatal poisoning. Several case histories are given, as well as exptl. evidence of the effect of F salts on human beings and animals. Immediate irrigation of the stomach, use of O<sub>2</sub> inhalation and heart remedies may arrest the sickness. Autopsy shows a dark purple spotting of the skin, especially of the face, hyperemia of the mucous membrane. Both lungs are enormously edematous. On the stomach membrane, particularly on the back wall and the great curvature are many bright red extravasations and inflammations. The kidneys show the picture of acute, toxic, hemorrhagic nephritis. The brain was edematous and hyperemic. F. K.

The physiology of alcohol oxidation after beer and meals. G. Jungmichel. *Deut. Z. ges. gericht. Med.* 22, 153-66 (1933).—After drinking beer on a fasting stomach the alc. concn. curve in the blood is flatter than after drinking pure alc., which is dissolved in water but is more concd. Essential differences in the combustion power of the body after drinking various alcohol-contg. beverages exist only when pronounced addiction to one particular beverage exists. Even on drinking alc. after meals, the values given by Widmark can be computed; however, they do not then represent comparative values for nutrition expts. Frances Krasnow

Action of thymus extract on isolated frog muscle. Hans U. Rosemann. *Z. Biol.* 94, 74-7(1933).—Stimulation with thymoglandol at the rate of 20-30 times per minute gave increased efficiency. More rapid stimulation did not yield these results. Frances Krasnow

Behavior of cyanamide in the animal organism. Fritz Horn. *Z. Biol.* 94, 159-70(1933).—The data presented show differences between cyanamide and guanidine reactions. The former leads to hyperglucemia and temporary tremors, whereas the latter provokes definite tetanic spasms but no marked increase in blood sugar. Frances Krasnow

Chemotherapy of experimental tuberculosis of guinea pigs with gold compounds and Pregl's solution of iodine. John A. Kolmer and Herman Brown. *J. Chemotherapy* 10, 73-6(1934).—The following Au compds. had no therapeutic value in the treatment of tuberculosis in guinea pigs: moniodide, thiosalicylate, guaiacol, quinine sulfate, thiourea, Na thiosulfate and *p*-thiocresol. Pregl's soln. of I was likewise without value. W. D. Langley

Toxicity of various compounds of bismuth used in the

therapy of syphilis. George W. Raiziss, M. Severac and J. C. Moetach. *J. Chemotherapy* 10, 77-87(1934).—Tested intramuscularly on rabbits, K Bi tartrate and Bi salicylate were among the least toxic of Bi compds. Doses contg. up to 80 mg. of Bi per kg. of body wt. were tolerated. W. D. Langley

Central blood-sugar regulation. VIII. The effects of various drugs on alimentary hyperglucemia after galactose. F. Höglér and F. Zell. *Z. ges. expil. Med.* 92, 181-92(1933); cf. *C. A.* 28, 829<sup>1</sup>.—Ergotamine, atropine, phenobarbital, barbital and chloral hydrate each alone and in combination were used. M. L.

Action of ephedrine on the portal circulation. C. Pak and B. E. Read. *Chinese J. Physiol.* 7, 199-214(1933).—Ephedrine and pseudoephedrine cause a rise in the portal venous pressure of dogs but this effect is less marked than that of adrenaline. Adrenaline always gives a decreased liver vol. while ephedrine is variable. Ephedrine and pseudoephedrine cause a prolonged rise in the venous pressure. C. M. McCay

The mechanism of the mydriatic action of ephedrine. C. Pak and T. K. Tang. *Chinese J. Physiol.* 7, 229-42(1933).—A difference exists between the peripheral actions of adrenaline and ephedrine. The mydriatic action of adrenaline is augmented by denervation and by cocaine while that of ephedrine is altered little. Ephedrine sensitizes the mydriatic effect of adrenaline in rabbits. Ephedrine acts on the sympathetic nerve endings in rats and on the muscle directly in rabbits. C. M. McCay

The effect of adrenaline and acetylcholine on the heart rate of the chick embryo. Fong-Yen Hsu. *Chinese J. Physiol.* 7, 243-52(1933).—Adrenaline and acetylcholine can act on embryonic hearts independently of the nerve elements. Hearts or fragments of hearts of embryo chicks of 37-480 hrs. incubation are accelerated by adrenaline and inhibited by acetylcholine. C. M. McCay

A comparison of the action of the isomers of amyl nitrite. Bernard E. Read, K. Y. Yu and T. M. P'eng. *Chinese J. Physiol.* 7, 253-68(1933).—Pure tertiary  $\text{AmNO}_2$  is the best for therapeutic purposes because of lower toxicity, more const. effects and its greater potency. The path of administration shows phenomenal differences in comparative effects of the isomers of  $\text{AmNO}_2$ . Intravenously the order of potency is iso, normal, secondary and tertiary. By inhalation the order is secondary, tertiary, normal and iso. C. M. McCay

Relation of the metabolic effect of the thyroid secretion to the condition of the central nervous system. Roberto Indovina. *Biochem. Z.* 267, 389-99(1933).—Thyroxine administered together with therapeutic doses of strychnine causes a much greater rise in the metabolic rate than when acting alone, but cocaine does not affect the thyroxine action. Likewise, when the secretion of the thyroid gland is stimulated by the thyrotropic hormone from the anterior lobe of the hypophysis, the effect is greater if the nervous system is at the same time also stimulated by strychnine. S. Morgulis

Relation of different sugars and sugar-forming substances to the blood lactic acid level. Tatsusaburo Kolke. *J. Biochem. (Japan)* 19, 111-43(1934).—Intraperitoneal administration of lactose, arabinose or xylose causes no rise in the blood lactic acid level in rabbits, whereas glucose, fructose, mannose, galactose or maltose produce a great increase. Injections of galactose and maltose produce a more prolonged hyperglucemia than those of glucose, fructose and mannose, but the rise in lactic acid level is practically the same, lasting about 1-2 hrs., and only when the hyperglucemia exceeds 200 mg. %. The peak of the hyperglucemia and of the lactic acid level is practically always coincide. With sorbitol or glycerol, however, the 2 curves no longer follow such a course and the lactic acid level may remain high when the hyperglucemia is below 200 mg. %. Furthermore very high values for lactic acid are thus obtained. After adrenaline injection the condition is still more different in that the peaks of 2 curves no longer coincide, the

hyperglucemia preceding the lactemia, and the lactic acid levels attained are much lower than in the other expts. Injections of lactate bring about marked hyperlactemia with insignificant hyperglucemia. It is pointed out that studies of the alk. reserve of the injected animals leave no doubt that the hyperglucemic responses were not attributable to the mobilization of the liver glycogen through acid action. S. Morgulis

The use of glycine in the treatment of myasthenia gravis. Earl O. G. Schmitt. *Ann. Internal Med.* 7, 948-59(1934).—There was clinical recovery in two cases. There was an increase in elimination of creatinine and preformed creatinine N and a decrease in creatine. The ratio of creatine N to preformed creatinine N in the urine was decreased. John T. Myers

Action of cathartics on isolated dog colon. I. Secretory activity. Lawrence M. Larson and J. Arnold Barger. *Arch. Surg.* 27, 1120 9(1933).—Cathartics given orally or by enema did not effect the amt. or rate of secretion. During defecation from any cause, secretion of mucus was increased. II. Motor activity. *Ibid.* 1130-45. John T. Myers

Experimental obstruction of the jejunum. Effect of administration of water on length of life and changes in chemical composition of the blood. Hjalmar E. Carlson and Thomas G. Orr. *Arch. Surg.* 28, 292-5(1934).—The upper part of the jejunum was obstructed in 12 dogs. Six were deprived of both water and food and six of food only. The animals deprived of water showed relatively little change in the blood chlorides,  $\text{CO}_2$ -combining power and sugar as compared to those which received water freely. Animals showing great blood chem. changes lived longer than those showing little change. The loss of body wt. was less in animals receiving water, an indication of upper gastrointestinal water absorption. John T. Myers

The effect of morphine on obstructed intestine. Alton Ochner, I. M. Gage and R. A. Cutting. *Arch. Surg.* 28, 406-16(1934). John T. Myers

Intoxication by carbon tetrachloride. M. Duvour, Guibert and H. Desoille. *Ann. méd. légale criminol. police sci.* 13, 533 40(1933).—A description of the symptomatology of  $\text{CCl}_4$  poisoning, illustrated by observations of such intoxications which occurred recently in Paris. A. Papineau-Couture

Carbon monoxide poisoning: value of the intoxication coefficient. Balthazard and Méliissinos. *Ann. méd. légale criminol. police sci.* 14, 1-13(1934).—The intoxication coeff. in CO poisoning is defined as the ratio of hemoglobin combined with CO to total hemoglobin in the blood. In 65 fatal cases the coeff. varied from 0.42 to 0.81, of which 43 cases varied from 0.58 to 0.70. The causes of, and deductions that may be drawn from, abnormally high or abnormally low values of the coeffs. are discussed, they do not invalidate the theory that attributes death in CO poisoning to anoxemia. Chem. detn. of the coeff. is a delicate operation and may give too high rather than too low results. CO-hemoglobin is much more resistant to putrefaction than hemoglobin, so that the apparent coeff. increases with the degree of putrefaction, and may in such cases approach 1.0. As the time which elapses between removal of the person from contact with CO and death increases, the coeff. decreases; in such cases death may be due not to anoxemia, but to secondary accidents. The higher the CO content of the atm. the shorter the time required for complete asphyxiation and the higher the intoxication coeff. The toxicity of other gases, which may be present simultaneously with CO, is not likely to have any action, as CO acts much more rapidly than any of the others (except HCN, which is not likely to be found in practice in conjunction with CO in cases of acute intoxication). A decrease in the amt. of O entering the lungs (either by reduction of the O content of the air or by reduction of the atm. pressure) lowers the intoxication coeff. required to produce death; conversely, increase in the amt. of O raises the coeff. The lethal coeff. can vary according to the condition of

the individual or as a result of assocd. intoxication (e. g., alc., atropine, etc.). A. Papineau-Couture

Toxic action of barium carbonate towards gallinaceans. Jean Olbrycht and Jean Robel. *Ann. méd. légale criminol. police sci.* 14, 135-43(1934).—The min. lethal dose for hens was found to be 0.6-0.8 g.  $\text{BaCO}_3$  per kg. body wt. The symptomatology is described. A. P.-C.

The action of certain ethers of  $\beta$ -alkyl choline derivatives. André Simonart. *J. Pharmacol.* 50, 1-14(1934); cf. C. A. 27, 138.— $\beta$ -Methylcholine ethyl ether and  $\beta$ -propylcholine ethyl ether exhibited some muscarine-like action but were inferior in potency. The actions of other  $\beta$ -alkylcholines are discussed, none resembling muscarine

Comparison of the pharmacologic action of atropine and its optical isomers, *l*- and *d*-hyoscyamine. W. F. v. Oettingen and I. H. Marshall. *J. Pharmacol.* 50, 15-20(1934).—The relative activities of atropine, *l*- and *d*-hyoscyamine of 1:2:1/20 detd. by Cushny hold true only for certain species. Rabbit serum destroys the *l*-isomer more rapidly than the *d*-, the racemate being intermediate.

Effect of cyanide on primary muscle types. Carroll J. Bellis. *J. Pharmacol.* 50, 21 7(1934).—After CN administration frog skeletal muscle showed little change in contraction curve other than a slight lengthening of contraction phase; rectal muscle showed less relaxation with shortening of latent and contraction periods; equiv. doses killed the frog heart but stimulated the turtle heart; the rabbit heart was first stimulated, then slowed, temporary revival being produced by glutathione or adrenaline, and finally stopped in extreme rigor.

The action of cinchophen on nitrogen metabolism. G. P. Grabfield and M. G. Gray. *J. Pharmacol.* 50, 28 31(1934).—The administration of cinchophen to dogs on a submaintenance diet was followed by increased urinary excretion of N, S, allantoin and uric acid, the effect on N excretion resembling the effect produced by salicylates.

The absorption of methyl salicylate by the human skin. Ernest W. Brown and W. O. Scott. *J. Pharmacol.* 50, 32 50(1934).—Salicyl recovery from urine up to 96-8% was obtained by the following method. To 100 cc. of urine was added 20 cc. of sirupy  $\text{H}_2\text{PO}_4$ . Distn. was carried out until the liquid temp. reached 122° after which steam distn. was carried out up to 135° until the distillate contained no salicyl. The distillate was tested for freedom from phosphate, then made up to 1 l. and an aliquot acidified with 1 cc. 0.1 N NCl, and treated with ferric alum for colorimetric detn. according to Thoburn and Hanzlik (C. A. 10, 618). Variations in absorption according to different methods of application are discussed. Greatest absorption was obtained from a 11.8% aq. suspension.

The effect of pathologic states on the minimum lethal dose of procaine intracardially. Frank Wang CoTui. *J. Pharmacol.* 50, 51-60(1934).—Pneumonia, marked post-operative infection and hypotensive states produced by hemorrhage,  $\text{AmNO}_2$  and histamine all reduced the lethal dose of procaine. There is probably a relationship between this reduction of lethal dose and anoxemia.

Pharmacologic actions of glycine ethyl ester hydrochloride. J. H. Weatherby and H. R. Hulpieu. *J. Pharmacol.* 50, 61-9(1934).—The action on smooth muscle from different species or on different types of smooth muscles from the same animal showed differences, indicating that all smooth muscles do not show the same qual. results. The action was independent of the autonomic nervous system. There were also demonstrable effects on the central nervous system.

Contributing factors to the pulse changes resulting from injection of adrenaline in rabbits. Wm. F. Allen. *J. Pharmacol.* 50, 70-8(1934).

The reversal effect of chorda tympani stimulation. Geo. W. Stavsky. *J. Pharmacol.* 50, 79-87(1934).—The reversed vascular effect of chorda tympani stimula-

tion under the influence of  $\text{AmNO}_2$  is confirmed. Possible mechanisms are discussed.

Narcotic potency of the aliphatic acyclic acetals. P. K. Knoefel. *J. Pharmacol.* 50, 89-92(1934).—Of a representative series of aliphatic acetals and related compds. none equals paraldehyde as a hypnotic. There is good correlation between resistance to acid hydrolysis and effectiveness by mouth, but high oral activity is obtained only with a reduction in the margin of safety. In this order the b. p., sp. gr., and acid hydrolysis consts. are given for  $\text{CH}_3(\text{OCH}_2)_3$ , 41°, 0.86, 0.00038;  $\text{CH}_3(\text{OC}_2\text{H}_5)_3$ , 85°, 0.85, 0.00234;  $\text{CH}_3(\text{OC}_3\text{H}_7)_3$ , 137°, 0.83, 0.00360;  $\text{CH}_3(\text{OCH}(\text{CH}_3))_3$ , 118°, 0.83, 0.01810;  $\text{CH}_3(\text{OC}_4\text{H}_9)_3$ , 179°, 0.84, 0.00358;  $\text{CH}_3\text{CH}(\text{OCH}_3)_2$ , 63°, 0.86, —;  $\text{CH}_3\text{CH}(\text{OC}_2\text{H}_5)_2$ , 104°, 0.82, 15.0;  $\text{C}_2\text{H}_5\text{CH}(\text{OC}_2\text{H}_5)_2$ , 123°, 0.82, —;  $(\text{CH}_3)_2\text{C}(\text{OC}_2\text{H}_5)_2$ , 114°, 0.87, 33,800.0;  $\text{CH}_3\text{OH}(\text{CH}(\text{OC}_2\text{H}_5)_2)_2$ , 165°, 0.89, —;  $\text{C}_2\text{H}_5\text{OH}(\text{CH}(\text{OC}_2\text{H}_5)_2)_2$ , 167°, 0.89, —;  $(\text{C}_2\text{H}_5)_2\text{CH}(\text{CH}(\text{OC}_2\text{H}_5)_2)_2$ , 180°, 1.10, —;  $\text{CH}(\text{OC}_2\text{H}_5)_4$ , 146°, 0.94, 7800.0;  $(\text{C}_2\text{H}_5)_4\text{C}$ , 128°, 0.99, —.

Toxicity of  $\alpha$ - and  $\beta$ -nicotines and nicotines. Chemopharmacodynamic relationships. David I. Macht and Mary E. Davis. *J. Pharmacol.* 50, 93 9(1934).—Toxicity data in 9 test subjects indicate as the only const. relationship between activity and structure the fact that all beta compds. were more potent than the corresponding alpha compds.

Pharmacologic action of the alkaloids of fumaraceous plants. I. Isocorydine. R. A. Wand. *J. Pharmacol.* 50, 100-7(1934).—Isocorydine is similar in action to bulbocapnine.

The denervated kidney. I. The action of cinchophen on the uric acid and allantoin excretion in dogs and its effect on the nitrogen and sulfur excretion. G. P. Grabfield and Mildred G. Gray. *J. Pharmacol.* 50, 123-30(1934).—Section of renal nerves slightly enhances the effect of cinchophen (I) on allantoin excretion but reverses the effect of I on uric acid excretion for a variable period which may mark regeneration of the nerves. Nerve section does not influence the effect of I on the urinary excretion of N and S.

The relationship between chemical constitution and physiological action. The comparative effects of benzyl- $\beta$ -phenylethyl-, and di-( $\beta$ -phenylethyl) amines and some of their derivatives. Axel M. Hjort. *J. Pharmacol.* 50, 131-50(1934).—Tabulation of pharmacol. data on 26 related compds. The only general conclusions are that the replacement of a benzyl group by a phenylethyl group decreases toxicity and that the substitution of hydroxyl groups for H and methoxy groups decreases toxicity markedly.

The influence of insulin-free pancreatic extract on the gaseous exchange of the white rat. C. Jelleff Carr, Jacob E. Schmidt, Wm. Harve and John C. Krantz, Jr. *J. Pharmacol.* 50, 151-6(1934).—Insulin-free pancreatic ext. increases the R. Q. of the white rat, shows hypoglucemic properties after intravenous injection in the rabbit and does not significantly antagonize the increased O consumption produced by adrenaline.

The action of nucleic acid derivatives on the coronary flow in the dog. Alfred M. Wedd and Alan N. Drury. *J. Pharmacol.* 50, 157-64(1934).—Yeast adenylic acid and yeast cytidylic acid and to a lesser extent adenosine increased coronary flow in dogs regardless of simultaneous fall in mean blood pressure after intravenous injection. Chlorazol served as a suitable anticoagulant for dogs without adverse effect.

The actions of pituitary preparations (posterior lobe) upon the intestines of the dog. K. I. Mcville and R. L. Stehle. *J. Pharmacol.* 50, 165-79(1934); cf. C. A. 28, 1070<sup>3</sup>.—Pressor and oxytocic fractions obtained from the posterior lobe of the pituitary by a method different from that of Kamm, *et al.* still showed that the pressor substance showed the only effect on the intestines indicating that this effect is due to the pressor substance itself, not to a possible third substance.

The combined effects of digitalis and quinidine on the

heart. Nathaniel T. Kurt and Harry Gold. *J. Pharmacol.* 50, 186-97(1934).—Quinidine (I) produces auricular acceleration through vagus depression both in normal and digitalized dog hearts. I relieves the block produced by digitalis. Other combined actions are discussed in detail. T. H. Rider

Mapharsen (3-amino-4-hydroxyphenyl arsine oxide) as an antisyphilitic agent. A. L. Tatum, G. A. Cooper, H. M. Kelly, V. A. Benn and C. C. Pfeiffer. *J. Pharmacol.* 50, 198-215(1934).—3-Amino-4-hydroxyphenyl arsine oxide is a drug which can be prepd. pure, and the purity of which can be tested chemically. It becomes less toxic on oxidation and has a greater therapeutic index than neoarsphenamine in exptl. syphilis. Its clinical trial is recommended. T. H. Rider

The action of drugs on the isolated intestine of certain teleost fish. Fred. Bernheim. *J. Pharmacol.* 50, 216-22(1934); cf. *C. A.* 28, 216<sup>1</sup>.—Acetylcholine, pilocarpine and Ba produce contractions which are relaxed by atropine but further contracted by adrenaline or nicotine. Adrenaline relaxes intestines contracted by mech. stimuli. Histamine and physostigmine are practically without action. Ca is necessary for contraction. T. H. R.

The comparative effects of various diuretics in dogs with special reference to the excretion of urine, chloride and urea. Marshall N. Fulton, Howard A. Van Auker, Robt. J. Parsons and Lowrey F. Davenport. *J. Pharmacol.* 50, 223-39(1934).—Various diuretics were tested with a view to throwing further light on their mode of action. The results are discussed in some detail although no generalized conclusions were reached. T. H. R.

Further reports on the use of tribromoethanol (avertin). Dorothy A. Wood. *Anesthesia and Analgesia* 12, 38-42(1933). Louis J. Soffer

The diffusion of nitrous oxide, ethylene and carbon dioxide through human skin during anesthesia, including a new method for estimating nitrous oxide in low concentrations. Fred S. Orcutt and Ralph M. Waters. *Anesthesia and Analgesia* 12, 45-7(1933).—Samples of gas diffused through the skin of the hand and forearm during anesthesia were obtained by collecting the gas in a plethysmograph attached so as to enclose the hand and forearm. The gas thus obtained was passed through a porcelain tube of unglazed interior, heated to a constant bright red heat and bubbled through a 10% soln. of KOH. The resultant alkaline soln. gave a positive test for nitrites and these were determined by the sulfanilic acid and alpha-naphthylamine acetate method. It was found that a decided loss of nitrous oxide through the skin occurs during anesthesia and that this diffusion is considerably greater than that of CO<sub>2</sub> and about 20 times as much as ethylene. Louis J. Soffer

Short surgical anesthesia with intravenous sodium evipan: a new barbiturate. Walter Sebening. *Anesthesia and Analgesia* 12, 213-15(1933). L. J. S.

The relation between the chemical constitution and vasomotor action of pyrazole derivatives. Kwanichi Horiuchi. *Sei-i-kwai Med. J.* 51, No. 9, 1-20(German Abstract 1)(1932).—The action of pyrazole derivs. on the blood vessel of the toad leg was measured by the Hosaka-Nishimura modification of the Trendelenburg method. Pyrazole and pyrazolone have no action, but pyrazoline causes a vasoconstriction. N-Phenyl derivs. of these 3 compds. are vasoconstricting. 3-Me derivs. of pyrazolone and pyrazole produce a vasodilation. S. Tashiro

Studies in phlorizin. IV. The effect of phlorizin on carbohydrate metabolism. Toranoshin Onodera. *Sei-i-kwai Med. J.* 51, No. 9, 21-47(English Abstract 2-3)(1932); cf. *C. A.* 28, 532<sup>1</sup>.—A repeated subcutaneous injection of phlorizin to the rabbits increases the blood sugar in 2-3 hrs. after the last injection, and the intravenous likewise after 2 hrs. A similar injection lowers the sugar tolerance. In nephrectomized rabbits, a single injection produces no effect, but the second injection raises the blood sugar after 1-2 hrs. In rabbits injected with pelican, a single phlorizination produces no effects,

but if phlorizinized rabbits are blocked with pelican and then injected intravenously with phlorizin, the blood sugar rises after 2 hrs. The pelican blockade gives no change in glycogen contents of liver and muscle, but when phlorizinized, the glycogen decreases somewhat. VI. The effect of phlorizin upon the permeability of the red blood corpuscles. *Ibid.* 52, No. 2, 1-26(English Abstract 1-2)(1933).—Phlorizin accelerates the entrance of H<sub>2</sub>O, urea and chloride to the red corpuscles of rabbits, but inhibits that of the dextrose. This inhibitory action is counteracted by NaCN. The rate of diffusion of dextrose and water through collodion membrane is not altered by phlorizin. S. Tashiro

The effect of pituitary products on basal metabolism. Yuzaburo Ishikawa and Mitsuo Takahashi. *Sei-i-kwai Med. J.* 51, No. 10, 1-22(German Abstract 1-2)(1932).—The basal metabolism of mice was detd. by Ikenuma's app. (*Ibid.* No. 454, 91) after subcutaneous injection of 3 com. products in 0.05 cc. and 0.1 cc. doses. In control animals (0.1 cc. 0.85% NaCl injected), there were no appreciable changes in CO<sub>2</sub> production, and O<sub>2</sub> consumption, but there was an increase in the respiratory quotient, with return to the normal in 2 hrs. Injection of a small quantity of pituitrin reduces CO<sub>2</sub> and O<sub>2</sub>, but increases R. Q. of both sexes, while the larger amt. increases all three. The effect of a small quantity of pituitandol on both sexes, and that of a large quantity in the male is the same as that of pituitrin, but in the female, a large quantity shows no effect on CO<sub>2</sub> but a decrease in O<sub>2</sub> and an increase in R. Q. A still larger injection (0.2 cc.), increases CO<sub>2</sub>, R. Q. but decreases O<sub>2</sub>. The action of hypohorin in small quantity in the male is the same as that of other drugs, but in the female there is not much effect on CO<sub>2</sub> and O<sub>2</sub>, but an increase in R. Q. With a larger quantity, CO<sub>2</sub> and O<sub>2</sub> are decreased in both sexes, but R. Q. is decreased in the male, and increased in the female. S. Tashiro

Cerebrospinal fluid. II. The occurrence of lead in cerebrospinal fluid. I. M. Rabinowitch, Andrew Dugwall and F. H. Mackay. *J. Biol. Chem.* 103, 725-32(1933); cf. *C. A.* 28, 2027<sup>1</sup>.—Chem. and spectrographic methods showed good agreement in 41 analyses. In all cases of Pb poisoning, Pb was found in the cerebrospinal fluid. In 5 out of 20 neurotic cases in which Pb was absent, exptl. acidosis, brought about by NH<sub>4</sub>Cl feeding, led to the appearance of about 10<sup>-4</sup> mg. Pb per 6 cc. cerebrospinal fluid. Pb in amts. greater than this is therefore a definite indication of Pb poisoning. K. V. Thimann

Experiences with divinyl ether. S. Goldschmidt, I. S. Ravdin and B. Lucké. *Am. J. Med. Sci.* 186, 888-9(1933).—The material used had added to it a small amt. of absolute EtOH and an "inhibiting" substance. In the dog the anesthetic concn. in jugular vein blood averaged 28 mg.% and the lethal concn. 68 mg.%. In man the anesthetic concn. in blood drawn from a vein in the antecubital fossa averaged 18 mg.%. The anesthetic was 4 times as potent as Et<sub>2</sub>O. The "margin of safety" is as 1 to 2.1. Administration of the anesthetic for 3 hrs. produced liver necrosis in 8 of 27 well-fed dogs. Even 6 hrs. of consecutive anesthesia did not produce liver necrosis in the *Macacus rhesus* monkey. The effect on blood pressure and respiration of the dog was similar to that produced by Et<sub>2</sub>O. Respiration failed before circulation in both dog and monkey. The anesthetic has been used clinically in 758 cases. Induction and recovery are rapid. Vomiting occurred in 9% of the patients. No liver changes were observed. R. C. Willson

Effect of adrenalectomy on salt metabolism in rats. Mitchell I. Rubin and Elizabeth T. Krick. *Am. J. Med. Sci.* 187, 148(1934).—Balance studies of Ca, Mg, Na, K, P, Cl and N showed that during adrenal insufficiency there was a marked loss of these elements from the body, resulting in most instances in a neg. balance. A salt mixt. contg. the chlorides of Ca, Mg, Na and K caused signs of adrenal insufficiency to disappear when it was substituted for the distd. H<sub>2</sub>O of the control periods.



Some animals died spontaneously of insufficiency after 2-3 months in spite of this salt mixt. R. C. Willson

Derivs. of acridine [in treatment of malaria] (Monti, Procopio) 10.

Moore, Joseph E.: The Modern Treatment of Syphilis. Springfield, Ill.: C. C. Thomas. Over 500 pp. \$5. Reviewed in *J. Chemotherapy* 10, 107(1934).

## I—ZOOLOGY

R. A. GORTNER

Relation of inorganic salts to growth and reproduction in *Amoeba proteus*. D. M. Pace. *Arch. Protistenk.* 79, 133-45(1933).—A stimulatory effect on reproduction is shown by  $\text{FeCl}_3$  in concns. less than 0.0001 *N* and by  $\text{SO}_4^{++}$  less than 0.0007 *N*. Above these limits inhibition occurs. The stimulatory action of  $\text{SiO}_4^{++}$  was very marked. Increasing concns. of chlorides of Na, K, Ca and Mg or of  $\text{Na}_2\text{SO}_4$  and  $\text{Na}_2\text{SiO}_3$  have at first a stimulatory and at higher concns. an inhibitory effect. In still greater concns. a 2nd optimum is reached. Similar effects are produced by solns. of mixed salts. The action of salts is ascribed to electrolytic effects rather than to sp. ionic properties. B. C. A.

Digestion in selachians. H. Beauvalet. *Compt. rend.* 196, 1437-9(1933); cf. *C. A.* 27, 2733.—An ext. of the anterior portion of the stomach of *Scylium canicula* hydrolyzes fibrin (I) in acid medium to albumoses and peptones, while the ext. of the posterior portion hydrolyzes (I), starch (II) and olive oil (III) in alk. media. The pancreatic ext. hydrolyzes (II) and (III), while the liver ext. and bile hydrolyze (I) (to peptones), (II), and (III). B. C. A.

Function and chemical differentiation in the nervous system of *Coeloplana boeckii*. A. R. Moore. *Science Repts. Tôhoku Imp. Univ., 4th Ser.* 8, 201-4(1933).—The nervous system of *Coeloplana* resembles that of the coelenterates in structure, but in its reactions to strychnin, atropine, nicotine and phenol it resembles that of the worms. Chemical differentiation is not, in *Coeloplana*, associated with morphological complexity. M. L. C. B.

The relative values of cations in protecting the membrane-forming capacity of the eggs of the echinoids *Clypeaster japonicus* and *Temnopleurus hardwickii*. A. R. Moore. *Science Repts. Tôhoku Imp. Univ., 4th Ser.* 8, 249-53(1933); cf. *C. A.* 27, 3009.—Bivalent cations are about fifty times more effective than univalent ones in protecting the membrane-forming capacity of echinoderm eggs in urea solns. Univalent cobaltamine chloride having a univalent cation shows no effect, while the cobaltamine chlorides having bivalent, trivalent and quadrivalent cations showed increasing effect with each added valency, though the increments are not regular. M. L. C. Bernheim

An acid lake in an old mountain formation. Lake Lispach in the Vosges. Hydrobiological study. E. Hubault. *Ann. écol. eau. for St. rech. exp. for.* 4, No. 2 (1932); *Current Sci.* 2, 114.—The fauna of an acid lake in France was studied. The  $\text{pH}$ , the O content, temp., total quantity of electrolytes, phosphate and silicate contents of the water are recorded. The fauna studied is largely restricted to the zooplankton. At a depth of 5 m. the  $\text{pH}$  varied from 5.3 to 5.7. Near the surface the  $\text{pH}$  was 5.8 to 6.5. *Ceratium hirundinella* common in other lakes is absent in this acid lake. Rotifers are represented by very few species. Of the insects and fishes, only *Chironomid larvae* and *Salmo fario*, respectively, were found. E. J. C.

Studies in mass physiology: The effect of numbers on the oxygen consumption of fishes. Frank Schuett. *Ecology* 14, 106-22(1933). E. J. C.

Cell metabolism. I. The oxygen consumption of Nereis eggs before and after fertilization. E. S. Guzman Barron. *Biol. Bull.* 62, 42-5(1932); *Physiol. Abstracts* 18, 107.—The total O consumption from the initiation of fertilization to the 2-cell stage is no greater than the O consumption for a similar period of time before fertiliza-

tion. There is a small increase of about 25% during the first 18 min. after fertilization. It is suggested that the enormous increase in O consumption of fertilized sea-urchin eggs may be considered exceptional. G. G.

Physical and chemical constants of the egg of the sea urchin, *Arbacia punctulata*. E. N. Harvey. *Biol. Bull.* 62, 141-54(1932); *Physiol. Abstracts* 18, 21.—The consts. given include dimensions, densities, viscosity, surface tension, osmotic pressure, permeability, elec. resistance and cataphoretic potential,  $\text{pH}$ , metabolism, oxidation-reduction potential, compn., development, anesthetic and lethal concns. of various substances. G. G.

Influence of lecithin on the cytolytic action of saponin. B. S. Levin and I. Magat. *Compt. rend. soc. biol.* 115, 142-7(1934).—The survival period of paramacia placed in dil. solns. of saponin was prolonged by the addn. of small quantities of lecithin to the solns. But paramacia which had been grown in a 0.3% solu. of lecithin were more sensitive to the action of saponin alone than were ordinary cultures. L. E. Gilson

Surcharge of glycogen in the reproductive organs of some invertebrates at the time of spawning. M. Chaigne. *Compt. rend. soc. biol.* 115, 174-6(1934); cf. *C. A.* 28, 1410.—The phenomenon was observed in *Asterias rubens*, *Paracentrotus lividus*, *Maja squinado*, *Sepia fillicoxi* and *Helix pomatia*. L. E. Gilson

Muscle phosphagen of frogs after total destruction of the adrenals. A. Moschini. *Compt. rend. soc. biol.* 115, 215-18(1934); cf. *C. A.* 27, 535.—Frogs lived 2-5 days after total adrenalectomy and remained practically immobile. The muscle phosphagen decreased from a normal of 50-55 mg.% fresh muscle to 4-30 mg.% at the time of death. Action of Eucortone on the phosphagen of normal and adrenalectomized frogs. *Ibid.* 218-21.—Eucortone is a commercial ext. of adrenal cortex prepd. by Swingle and Piffner's method. It had little or no effect on the muscle phosphagen of adrenalectomized frogs, and very little effect on the survival period. L. E. Gilson

Expansion of erythrocytes of *Phoxinus laevis* caused by non-hypophyseal substances. F. Stutinsky. *Compt. rend. soc. biol.* 115, 241-3(1934). In males of *Phoxinus laevis* erythrocyte expansion was produced by injections of exts. of hypophysis, testicles, ovaries, placenta, thyroid, thymus and myocardium. The reaction is not specific for intermedin (contrary to Zondek and Krohn, *C. A.* 26, 4306). The reaction seldom occurs in the female fish. L. E. Gilson

Physicochemical experiments on the amphibian organizer. Joseph Needham, C. H. Waddington and Dorothy M. Needham. *Proc. Roy. Soc. (London)* B114, 393-422 (1934).—A secondary embryonic axis may be induced in amphibian gastrulae by implantation of (a) cell-free exts. of neurula, (b) ether and petr. ether exts. of neurula, (c) adult amphibian tissues and (d) ether ext. of adult amphibian viscera. The evocator (producer of an embryonic axis as such) probably is a definite chem. compd. sol. in  $\text{Et}_2\text{O}$  and petr. ether. A bibliography is appended. Joseph S. Hepburn

Chemical studies on coccids produced in Japan. IV. Inorganic matters, carbohydrates and enzymes of *Cerococcus muratae* Kuw. Michio Kono. *J. Agr. Chem. Soc. Japan* 9, 775-82(1933); cf. *C. A.* 27, 4312.—Ash of the shell of *Cerococcus muratae* Kuw. consists of  $\text{SiO}_2$  87.84,  $\text{Al}_2\text{O}_3$  0.84,  $\text{P}_2\text{O}_5$  2.09,  $\text{Fe}_2\text{O}_3$  4.15,  $\text{MgO}$  0.79,  $\text{CaO}$  4.13 and  $\text{K}_2\text{O}$  4.13%. The insect contains cellulose, lignin, mannann, galactan, dextrin, *d*-mannose and *d*-galactose. Chitin and glucose could not be detected. The insect was treated with the mixt. of ether and alc. and then extd. with  $\text{H}_2\text{O}$ . In the aq. ext. cellulase, mannase, amylase, invertase, maltase and lactase were detected. V. Nitrogenous compounds and wax of *Cerococcus muratae* Kuw. *Ibid.* 1276-83.—The shell of *Cerococcus muratae* Kuw. contained 15% of a scleroprotein insol. in  $\text{H}_2\text{O}$ . The wax was extd. with  $\text{C}_6\text{H}_6$  and  $\text{CHCl}_3$ . The residue, digested by pepsin in 0.1%

HCl soln., was evapd. to a sirup. The N distribution of the sirup was: ammonia N 8.90%, humin N 4.49%, cystine N 8.78%, arginine N 14.11%, lysine N 4.09%, amino N 12.67% and non-amino N 44.87%. Guanidine, cystine, lysine, glutamic acid, arginine, alanine and hydroxyvaline were isolated from the sirup after total hydrolysis. The wax is a dark reddish brown resin; it m. 77-8°, has  $d_4^{20}$  0.906, acid value 25.17, sapon. value 212.79, ester value 187.02, I value 15.65, Ac value 110.40, neutral fat 72.96, unsaponifiable matter 15.79. Cerotic acid, m. 78°, and ceryl alc., m. 78°, were isolated from the hot alc. ext. of the wax. Cerotic acid, isoceryl alc., m. 82° and an unknown hydrocarbon, m. 47.5°, were obtained from the portion insol. in hot alc. An unidentified acid  $C_{15}H_{31}O_4$ , b<sub>p</sub> 145°, m. 12-12.5°, was isolated from the portion sol. in cold alc. Y. K.

Physiological investigations of living salivary glands from ringed snakes. J. V. Hattinberg and W. Hartoch. *Z. Biol.* 94, 99-107 (1933). -Narcotized "snakes" were examined by the method of intravital microscopy with luminescent light. Fluorescein staining revealed a delicate, imperfect network of "cracks" in the intercellular substance. Trypaflavine treatment revealed a coarse granulation of the cell substance but no nuclear demonstration. After pilocarpine administration the splitting of the intercellular substance was shown very clearly by subsequent fluorescein treatment. The cracks were filled with secretion. When trypaflavine was used the cell nucleus and cytoplasm were differentiated.

Frances Krasnow

The fibrin content of the plasma of fish blood. E. Zunz. *Arch. intern. physiol.* 37, 274-81 (1933). -The fibrin in the blood of four teleosts varied from 172 to 431 mg.%. The means for 4 species were 273-355. For 2 species of selachii the means were 109.0 and 263.

C. M. McCay

The coagulation of fish blood. E. Zunz. *Arch. intern. physiol.* 37, 282-7 (1933). -The muscles of *Scylliorhinus stellaris* and *Conger vulgaris* can furnish cytozyme to coagulate oxalated plasma of rabbit blood.

C. M. McCay

The surface tension of the blood plasma and serum of marine animals (fish, crustacea and cephalopods). E. Zunz. *Arch. intern. physiol.* 37, 288-303 (1933). -In the selachii the surface tension of plasma is higher than that of water and in fish it is lower.

C. M. McCay

Relation between the heat evolved and the respiratory exchange of insects during post-embryonic development. N. Balzam. *Arch. intern. physiol.* 37, 317-28 (1933).

C. M. McCay

A cytological study on the hibernating toad. I. Changes in the Golgi apparatus. Chi-Hsiun Chu. *Chinese J. Physiol.* 7, 269-85 (1933). -The Golgi material found in the columnar epithelial cells of the duodenum seems to be formed from absorbed food and not to be a permanent structure. The amt. of this material was influenced by the diet.

C. M. McCay

The control of respiratory movements in Crustacea by oxygen and carbon dioxide. H. M. Fox and M. L. Johnson. *J. Exptl. Biol.* 11, 1-10 (1934). -The respiratory movements of the barnacle *Balanus* and of the phyllopod *Cheirocephalus* are not accelerated by decreased  $O_2$  or increased  $CO_2$ . Crayfish are affected by decreased  $O_2$  and not increased  $CO_2$ . The movement of the pleopods of *Asellus* is accelerated by decreased  $O_2$  but not increased  $CO_2$ . The seashore isopod *Ligia* is affected only by an increase in  $O_2$  tension above that when sea water is in equil. with air. In *G. pulex* the changes that accompany  $O_2$  and  $CO_2$  variations in water are permanent, in the marine form, *G. locusta*, these changes are transitory.

C. M. McCay

The osmotic pressure of the colloids in fish sera. Ancel Keys and R. M. Hill. *J. Exptl. Biol.* 11, 28-33 (1934). -The osmotic pressures in mm. of  $H_2O$  for 4 fish species were 104-128 for *Pleuronectes platessa*, 94-114 for *Tinca vulgaris*, 104-116 for *Gadus morhua* and 87-91 for *Esox lucius*. The serum chlorides were

detd. on 2 species. They were 373-378 mg.% for *Tinca vulgaris* and 558-577 for *Pleuronectes platessa*. No attention was given to the state of nutrition or seasonal variations. Rel blood from *Anguilla vulgaris* had an osmotic pressure of 253-283 after 7 days of fasting and 110-145 after 60 days of fasting. Fasting was more important than the water, since sea water gave only slightly higher values in each case.

C. M. McCay

Kinetics of the oxidation processes in fertilized eggs. I. Rate of oxidation during embryological development of *Trutta iridea* (rainbow trout). W. Schlenk, Jr. *Biochem. Z.* 267, 424-37 (1933). -A complete description of the all-glass app. used in these expts. is given together with the method of its employment. The rate of  $O_2$  consumption of the developing egg seems to be independent of whether or not oxidation is partial or goes to  $CO_2$ . The total utilization increases logarithmically with time although the  $O_2$  for partial oxidation drops from 16.9% in the first stage to 7.9% in the second stage. The oxidation rates are calcd. from the formula  $-dO_2/dt = e^{4.015 + 0.0022t}$ , and  $dCO_2/dt = e^{4.028 + 0.0022t}$ , where  $t$  = no. of days. The doubling of the rate of respiration is 8 days for the  $O_2$  and 7.4 days for the  $CO_2$ .

S. Morgulis

Activation of proteolysis in the regenerative organs. V. N. Orekhovich. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 27-32 (in German 33). -Glutathione present in the thioenolic form in axolotl caudal tissue rises to 46.4 mg.% on the 5th day, then falls to 45.6 on the 10th and to the normal 19.6% on the 20th day. The surrounding tissue also is high in glutathione at this period. The cause is an interference with normal respiration. The result is a favorable condition for proteolysis.

F. H. Rathmann

Investigation of the chromosome morphology of some Pisces and Amphibia. A. A. Prokof'eva. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 80-3 (in English 81) (1934). -The best compn. of fixing soln. to reveal chromosome structure varies with the species. Solns. used were: 41% formic acid and 1% chromic acid for *Trilon* and *Rana*; 7% formic acid and 0.3% chromic acid for axolotl, and 25% formic acid and 2.5% chromic acid for fish.

F. H. Rathmann

Effects of ultra-violet radiations on the bean weevil, *Bruchus obtectus* Say. G. F. MacLeod. *Ann. Entomol. Soc. Am.* 26, 603-15 (1933). -Eggs and 1st instar larvae of *B. obtectus* were killed by light from a quartz-Hg arc of wave length shorter than 3126 Å.; adults exposed to the same light showed no visible effects but their eggs were largely sterile. Sublethal doses of ultra-violet light produced weevils defective in metabolic processes (they consumed excessive amts. of food but failed to build greater body wt.). Irradiation of eggs and adults led to abnormalities which appeared in the larval and adult stages of the progeny.

C. H. Richardson

Electrical responses from the lateral-line nerves of fishes. IV. The repetitive discharge. Hudson Hoagland. *J. Gen. Physiol.* 17, 195-209 (1933); cf. C. A. 27, 3755-6. -Largely physiol. The rise and decline of frequency of impulses from the lateral-line nerve could be accounted for if the frequency were proportional to the concn. of an intermediate compd. (B) produced as the result of the consecutive reactions,  $A \rightarrow B \rightarrow C$ . Another possible alternative: The circulation may act to remove substances normally inhibiting a process which tends to produce continuous excitations.

C. H. R.

Carbohydrate metabolism of parasitic protozoans. II. The sugar metabolism of trypanosomes. Th. v. Brand. *Z. Zellforsch. mikroskop. Anat.* 19, 587-614 (1933); cf. C. A. 27, 3989. -*Trypanosoma brucei* is able to secure necessary sugar from such low concentrations as those characteristic of diseased organs. It utilizes glucose, mannose, fructose and galactose in the proportion of 100:86:50:21:9. Arabinose, xylose, lactose and probably sucrose are not utilized by this organism, and proteins only to a negligible amt.

Henry Tauber

The digestion of wood by insect larvae. K. Mansour

and J. J. Mansour. *Proc. Acad. Sci. Amsterdam* 36, 795-9(1933).—The larvae of 2 wood-feeding Coleoptera were free from associated microorganisms, either intracellularly or in the alimentary canal; nevertheless both digest wood rapidly. Larvae of *Macrotoma palmata* yielded a stomach juice rich in cellulose-splitting enzyme; in 48 hrs., at pH 6.3, 0.5 cc. of juice hydrolyzed 28% of the 6 mg. purified filter paper added. The animal lives on the wood of *Morus alba*, which contains less than 0.5% of total sugar and starch; it is, therefore, dependent for nutrition on the hydrolysis of cellulose. Larvae of *Xystrocerus globosa* yielded no cellulose-splitting enzyme, but only an active amylase. Correspondingly it is found only in the sapwood (6.2% sugar and 3.9% starch), and not the heartwood, of its host (*Albizzia lebbek*). The animal, therefore, depends on these constituents of the wood, and correspondingly the amount of its excreta is very large. Wood-feeding insects thus belong to 3 types: those like the 1st above, which contain a cellulase; those like the 2nd, which do not, and are therefore restricted to woods with a high content of starch or sugar; and finally those like termites, which harbor various microorganisms able to digest cellulose. A no. of the species recorded in the literature are assigned to these 3 groups. K. V. T.

The presence of a phenolic substance in spider blood. J. Millot and R. Jonnart. *Compt. rend.* 197, 1002-3 (1933).—The nonfatty granulations found in the blood of araneids (*Bull. biol. France & Belg. Suppl.* 8, 1-240 (1926)) are studied further.  $K_2Cr_2O_7$  turns them brown. The perchlorate  $KIO_4$  and *p*-aminophenol in oxidizing medium gave positive tests for the presence of a phenol,

though of varying intensity with the granules and the cell plasma. In most cases mono- and dihydric phenols occurred simultaneously in different proportions. No difference in species, in nutritional condition, nor in development of genital organs seemed to be correlated with this occurrence. The phenols disappeared at the time the skin was cast but reappeared within the following week. It seems probable that the occurrence of these usually toxic substances may be one of the causes of casting skins among the Arthropods. Anne E. White

Electrokinetic studies on marine eggs. Katsuma Dan. *Am. J. Med. Sci.* 187, 204(1934).—The method consists in measuring the horizontal displacement from the vertical path of fall of eggs. Charges found on eggs of various species under different circumstances follow: (1) *Arbacia punctulata*: eggs with jelly, -34.1 mv.; without jelly, -30.3 mv. When killed by heat, this egg does not change its charge at all, and when it is fertilized, the absolute magnitude of the charge is decreased. (2) *Cumingia tellinoides*: eggs with jelly, -34.1 mv.; without jelly, -28.8 mv. (3) *Asterias forbesii*: with jelly, -18.95 mv.; without jelly, -19.9 mv.; eggs killed by heat, -19 mv. (4) *Echinarrachnius parma*: with jelly, -31.6 mv.; without jelly, -20 mv. approx. (5) *Nereis limbata*: unfertilized eggs, -10 mv., approx. (6) *Cerebratulus lacteus*: chorions contg. eggs move toward the anode. Egg cells move toward the cathode within the chorions. In sea water these eggs show 0 potential. R. C. Willson

Respiration of mosquito larvae and pupae (Kalandadse) 14.

## 12—FOODS

F. C. BLANCK AND H. A. LEPPEL

Chemical constituents of "miso," a Japanese food. III. Free fatty acids and saponin. Yoshito Sakurai. *J. Agr. Chem. Soc. Japan* 9, 1328-30(1933); cf. C. A. 27, 3756. —Oleic, linoleic, linolenic, stearic and palmitic acids were found in a free state in "miso." The existence of arachidic acid was suspected. Four g. of a Ca salt of saponin, m. 264-6°, was isolated from 9 kg. of "miso." Free saponin, m. 232°, was sepd. by  $H_2SO_4$ . It was identified with soy-bean saponin. Y. Kihara

The manufacture of farinaceous products. Stefano Camilla. *Giorn. farm. chim.* 82, 349-60(1933).

Lewis W. Butz

Maturation of grains of wheat; influence of certain physicochemical phenomena. Maurice Piettre. *Compt. rend.* 198, 608-11(1934).—The maturation of green wheat grains stored at -5° to -7° is characterized by a rapid decrease within 4 days of reducing and nonreducing sugars and within 8 days of globulin and albumin, coincident with a rapid decrease of water. P. D. A.

Poisoning of human beings by weeds contained in cereals (bread poisoning). D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 219-66(1933).—Data are given on the toxicities to animals of the seeds of numerous varieties of plants growing on the wheat lands of S. Africa. The seed of *Vicia sativa* L. contained 64.8 mg. HCN per 100 g.; the cyanogenetic glucoside is vicianin. The seed of *Datura stramonium* L. contained 0.49% total alkaloids, chiefly hyoscyamine. Published data on the chemistry of the toxic constituents of the various seeds are reviewed. Seventy-one references. K. D. Jacob

The economic importance of controlled fermentation [in bread making]. F. E. Thomas. *Atti 1° congr. intern. panificazioni Roma* 1932, 488-91(1933).

L. H. Bailey

Some recent discoveries dealing with the nutritive value of milk. L. A. Maynard. *Cornell Veterinarian* 23, 362-7(1933).—A review. K. D. Jacob

Effect of pasteurization on some of the nutritive properties of milk. W. E. Krauss. *Proc. Intern. Assoc. Milk Dealers, Lab. Sect., 26th Ann. Convention, Sept.,*

1933, 3-9. —The only effect of pasteurization on the nutritive value of milk is a partial destruction of vitamin B (B<sub>1</sub>). The partial destruction of vitamin C depends in its degree on the kind of pasteurization. Milk is a rather poor source of both these vitamins, but this deficiency can be met by proper dietary control. The continued use of pasteurized milk offers no serious problem from the food standpoint. J. C. Jurrjens

Effect of metals on the vitamin C content of milk. F. Schlemmer and H. Cahnmann. *Deut. Nahr.-Rundschau* 1932, 182-3. —The vitamin C is destroyed by Cu, and less markedly by Sn; Ni, Cr and Al are least destructive. B. C. A.

Raw versus pasteurized milk. W. L. Burgess, et al. *Scottish J. Agr.* 17, 1 35(1934). —The effects of pasteurization on the compn. and nutritive value of milk are discussed. K. D. Jacob

Physical and chemical effects of homogenization on milk. G. Malcolm Trout. *Proc. Intern. Assoc. Milk Dealers, Lab. Sect., 26th Ann. Convention, Sept., 1933*, 199-220. —Mixed milk was used contg. approx. 3.7-3.8% fat, and was homogenized before and after pasteurization at various temps. and pressures. A pressure of more than 1500 lb. per sq. in. is unnecessary for elimination of the formation of cream layer. Homogenization has practically no effect on the sp. gr. There was an increase in foaming with raw milk and a decrease with pasteurized milk. Milk pasteurized before homogenization was considerably more stable to alc. than after. A decrease in viscosity was observed after homogenizing pasteurized whole milk. When milk was homogenized at pressures not exceeding 1500 lb. per sq. in., the fat loss in the skim milk during centrifugal sepn. should not exceed 30%. The homogenized cream butter showed no inclination toward defects during the working process, but yielded a firm, waxy body, similar to that from unhomogenized cream. J. C. Jurrjens

The relation among sugar, chlorides and serum refraction in milk. Thure Sundberg. *Svensk Kem. Tids.* 45, 253-75(1933). —The subject matter is presented in

extensive tables. Dilm. of milk is detected by distorted relations.

A. R. Rose  
Report of the laboratory methods committee on accuracy of sampling for fat tests at the weigh can. A. J. Powers. *Proc. Intern. Assoc. Milk Dealers, Lab. Sect., 26th Ann. Convention* Sept., 1933, 95-159; cf. C. A. 27, 1412.—Tabulated results of fat tests and their greatest variations in 58 dairies are given. There was a persistent tendency for the non-agitated samples to test higher than the agitated ones.

J. C. Jurrjens  
Weigh-tank test variations. D. H. Bailey, J. W. Mitten, and F. M. Twining. *Proc. Intern. Assoc. Milk Dealers, Lab. Sect., 26th Ann. Convention* Sept., 1933, 81-95.—The importance of proper mixing of the milk in the weigh tanks is pointed out and good results were obtained by using a slow-speed 4-bladed propeller.

J. C. Jurrjens  
Detection of the addition of skim milk to milk chocolate. H. Jesser. *Chem.-Zig.* 58, 148(1934).—A study has been made of milk chocolates of known compn. For the purpose of detg. skim milk in the presence of full milk, it is necessary to det. also the butyric acid no. and the sapon. no. On the basis of these figures it is possible to calc. the amt. of skim milk present. With these methods of investigation, the compn. of milk chocolate can be detd. more rapidly than by the time-consuming method proposed by Härtel (C. A. 21, 285; 27, 5838) for the detn. of sugar, casein and crude fiber, and the results are just as accurate.

F. L. Dunlap  
The acidoproteolytes in gaseous associative fermentation in milk. Constantino Gorini. *J. Bact.* 27, 69-70 (1934).

John T. Myers  
Trembles (or milk sickness). James Pitton Couch. U. S. Dept. Agr., *Circ.* 306, 1-11(1933); cf. C. A. 22, 440; 24, 372 3.—Milk sickness or trembles is a disease that attacks persons and lower animals alike. It is due to a poisonous substance, *tremetol*, present in certain poisonous plants. In the Eastern portion of the U. S. white snakeroot is the plant that carries tremetol. In the Southwest, jimmivweed and a closely related plant, *Aplopappus fruticosus*, furnish the poison. The poison is secreted in the milk of animals that have grazed on these plants and such milk is capable of causing the disease in persons and suckling animals. The disease can be prevented by keeping livestock away from the plants either by fencing off the areas where the plants grow or better by destroying the plants. W. H. Ross

Report of milk-borne epidemic diseases in the United States and Canada (1924-1931 inclusive). S. J. Crumbine. *Proc. 47th Ann. Meeting Conf. State and Provincial Health Authorities* June, 1932, 33-9; U. S. Pub. Health Eng. Abstracts 13, Mi, 11(Aug. 19, 1933). C. R. F.

Manufacture and sale of ice cream in relation to public health. Thomas Benson. *J. Roy. Sanit. Inst.* 53, 452 7(1933); U. S. Pub. Health Eng. Abstracts 13, Mi, 12(Aug. 19, 1933).—Bacteria and chem. standards are suggested as follows: Not more than 100,000 bacteria per cc., and no coliform bacteria in 0.1 cc. All ice cream mixes shall be pasteurized efficiently. Ice cream must contain not less than 8% butter fat and not less than 18% milk solids. Because of the great variability in market samples of British ice cream, standards should be set up.

C. R. Fellers  
Iodine numbers of Norwegian butter. Kr. Støren. *Meldinger Norges Landbruks.* 13, 857-74(1933).—Results are given of detns. of I nos. in 663 different samples of butter from 102 Norwegian dairies collected during the years 1929-32. The av. I no. was 32; the upper and lower limits were 43.9 and 25.1, resp. The variations were closely connected with the seasons; during autumn and winter, I nos. varied from about 28 to 32, increased during spring to 37-40, and stayed there until October. The connection between the I no. and the consistency of the butter is discussed.

H. C. M. Ingeberg  
Antirachitic factor in preserved eggs. E. Lesné and R. Clément. *Compt. rend. soc. biol.* 107, 1533-4(1932).—The vitamin D content of eggs, which is not high, is not appreciably diminished by hard-boiling or by keeping

the eggs for 8 months in Ca(OH)<sub>2</sub> or Na silicate soln.

B. C. A.  
Watery whites of eggs. Report of preliminary investigations. A. S. Canham. *Onderstepoort J. Vet. Sci.* 1, 539-66(1933).—Candling is not an exact method for detg. whether an egg contains a watery white. In candled normal eggs the percentages of thin albumin ranged from 25.4 to 51.8 and of thick albumin from 48.2 to 74.6. In candled watery-white eggs the thin albumin ranged from 18.1 to 93.7% and of thick albumin from 6.3 to 81.9%. Normal eggs kept for varying periods of time became in many cases definite watery-white eggs although this could not be shown by candling. The  $pH$  values of the whites of normal eggs ranged from 6.8 to 8.5, and those of watery-white eggs from 7.2 to 8.0. The causes of watery-white eggs are probably warmth, vibration or movement, storage or age, excessive porosity of the shells in a few cases, and strain in the hens toward the close of a heavy egg-laying period. K. D. Jacob

The A:B (acid:base) coefficient applied to the estimation of the quality of meat. I. A. Smorodintzev. *Bull. soc. chim. biol.* 15, 1256-62(1933); cf. C. A. 27, 4840.—Adjust the  $pH$  of 200 cc. N AcONa to 8.3, add 50 g. of the chopped beef, shake 15 min., filter and titrate an aliquot part with 0.1 N NaOH, using phenolphthalein. The calcd. no. of cc. of N NaOH required for 100 g. beef = A. Shake another 50 g. of the sample with 200 cc. 0.1 N AcOH and titrate an aliquot part of the filtrate with 0.1 N NaOH. The calcd. no. of cc. N acid neutralized by 100 g. beef = B. The ratio A/B ranges from 0.08 for tendons to 4.3 for pure muscle fiber. For inferior cuts A/B averages 0.73 and for choice cuts 3.2.

L. E. Gilson  
Changes in canned meat. I. Changes in muscle protein in canning. Yuzuru Okuda and Kazuo Yamafuji. *J. Agr. Chem. Soc. Japan* 9, 835-44(1933).—Muscle proteins, prepd. from hen, whale and fish, were heated at 140° for 1 hr. in a sealed tube. About 20% of protein N was hydrolyzed. The higher the  $pH$  value, the more NH<sub>3</sub> and H<sub>2</sub>S were produced. The quantities of cystine, arginine, histidine and lysine decreased. The changes of the quantities of tryptophan and tyrosine were very small; no change could be observed in proline content. Protein S changed into H<sub>2</sub>S, sulfide S, sulfate S and sol. org. S, especially when the reaction was alk. Y. K.

The cool storage, handling and ripening of pears. G. B. Tindale and S. A. Trout. *J. Dept. Agr. Victoria* 32, 38-40(1934).—The optimum ripening temp. for Williams pears is 55-65°F. When the fruit is stored at 32°F., core breakdown and scald do not develop till after approx. 20 weeks, but the fruit must be removed at the end of 12 weeks in order for it to ripen properly; the appearance of the 1st sign of yellow color marks the end of the cool storage life of the fruit. As measured by the CO<sub>2</sub> evolution, the daily rate of respiration of pears stored at 32°F. increases to a max. at the green-yellow stage and then rapidly decreases until the fruit ceases to liberate CO<sub>2</sub>. The optimum storage conditions vary somewhat with different varieties of pears.

K. D. Jacob  
Experiments with California dates in storage. Wm. R. Barger. *Rept. 10th Ann. Date Grower's Inst.* 1933, 3-5.—Storage of dates at 0-10°F. reduced chem. and phys. changes in the fruit to a min. and prevented molding and souring during storage, but did not kill the fruit or the contaminating spores; normal life and the causes of molding and souring revived after storage. Lower temps. were required to prevent deterioration in the dark soft invert-sugar types of fruit than in the lighter-colored cane-sugar types. Absorption of moisture during storage hastened the formation of sugar spots on the fruit. The use of moisture-proof containers or wrappers minimized the deterioration due to absorption of moisture during storage and the loss of moisture after storage. K. D. J.

Study of the changes in composition of tomato juice on standing. Charles F. Poe. *Fruit Products J.* 13, 116-17(1933).—"The results of the exptl. data show the necessity for great care being exercised in the canning of tomato juices. As little time as possible should elapse

from the beginning to the completion of the canning process. The increase in the amt. of volatile acid is significant. This increase began immediately and reached values several times the original amt. in 2 hrs. The analysis of the volatile acids may offer an excellent means of detecting decompn. in juices which have fermented during the canning process. It has been found that the av. value for volatile acids is less than 1.0, this value being expressed as the no. of cc. of 0.1 N NaOH required to neutralize the volatile acids from 100 cc. of the sample."

F. L. Dunlap

**Physicochemical analysis and problems of flocculation.**  
I. Flocculation of grape-juice colloids. S. I. Inozemtzev. *J. Gen. Chem.* (U. S. S. R.) 3, 114-20(1933).—The colloid content (I) of grape juice (II) can be roughly deduced from the stability of emulsions formed by shaking II with  $C_6H_6$ , PhMe or  $Et_2O$ , the best results being obtained with  $CaH_2$ . The observations indicated that I varies greatly with different samples of II, as well as for the same sample during maturation. I is greatly diminished by boiling II. The system II- $EtOH$ - $Et_2O$  exhibits every stage from complete clarity to complete flocculation.

B. C. A.

**Pectase.** S. F. Tserevitinov and O. I. Rozanova. *Schriften zentr. biochem. Forschungsinst. Nahr.-Genussmittelind.* 3, 251-68(1933).—The deleterious effects of light and air on pectase are shown by quant. data on the activity of the enzyme. Pectase content has been detd. for various grasses and plants; potato plants and Swedish clover were found richest in pectase. Activity decreases during storage; in 3-5 months lucerne pectase was 2.0 times weaker at 2°, and 5.5 times weaker at room temp. than its initial activity. Com. use of pectase is favorably indicated in those industries needing to remove pectin from fruit juices and like products. **Influence of temperature and  $pH$  on coagulation of fruit pectin by pectase.** *Ibid.* 269-79.—From trials with apples, grapes, currants, gooseberries, raspberries, strawberries and cranberries it was found that the optimum temp. for coagulation of pectin by pectase is 60-65°. Optimum  $pH$  values for coagulation vary considerably, even in juice of the same fruit. A table of natural juice  $pH$  and optimum coagulation  $pH$  values is given, together with tables and curves showing effects of temp., concn., etc. **Action of pectase on fruit-juice pectins.** *Ibid.* 280-90.—Expts. are cited, with tables and curves, to show that pectin can be removed from fruit juices as required, with pectase under conditions adapted to the juice being treated. **Clarification time varied from 8 days (currants) to 50 days (custard apples).** **Removing pectin from cranberry juice.** *Ibid.* 291-8.—Pectase is effective for removing pectin from cranberry pulp or juice on a com. scale.

Julian F. Smith

**The pectin content of some Philippine fruits.** F. T. Adriano, H. L. Ylizarde and E. Villanueva. *Philippine J. Agr.* 3, 273-9(1932).—Of 14 different Philippine fruits analyzed, the rind of Tahiti lime had the highest pectin content (2.63%). Bignay, native orange, duhat, mabolo, naranjita, santol, hevi and guava follow in descending order, and contain sufficient pectin for jelly-making and many important industrial preps. Eleven references.

John O. Hardesty

**Studies on the quick freezing of Philippine fruits and the utilization of the frozen pack products.** F. T. Adriano, A. Valenzuela and L. G. Miranda. *Philippine J. Agr.* 4, 41-72(1933).—Strawberries, mangoes, avocados, lanzones, ates, guavas, young coconuts, pineapples, nangkas, lemasas, chicos and zapotes made frozen products of better flavor, color and texture when frozen at 0°F. and -40° than those frozen at 18°F. Thirty-two references.

John O. Hardesty

**The value of Philippine fruits and vegetables for the preparation of fermented and unfermented pickles.** F. T. Adriano, A. Valenzuela and D. S. Santos. *Philippine J. Agr.* 4, 13-40(1933).—Fermented pickles from fruits and vegetables, namely, ampalaya, radishes, cucumbers, papaya, onions, beans, seguidillas, balimbing, cauliflower, chayote, etc., were better in texture, flavor and keeping

qualities than the unfermented pickles. Below 40° salometer hevi softens in texture and further softening occurs even when the brine concn. is brought back to 40° and above. Toughness of the fermented pickles of eggplants, paayap and papaya is prevented by steaming prior to bottling. The materials and equipment used in the pickling process are described.

John O. Hardesty

**The chemical composition of Philippine mushrooms.** F. T. Adriano and R. A. Cruz. *Philippine J. Agr.* 4, 1-12(1933).—Analyses of 23 Philippine species and 5 species of mushrooms imported from China, Japan and France showed the former to average higher in fat, protein and mineral contents and lower in crude fiber and carbohydrates. *Psaliota campestris*, *Psaliota merrillii* Copel. B., *Hirneola affinis* (white gelatinous), *Auricularia polytricha* (brown top and white bottom), *Collybia albuminosa* (Berk.) Petch, *Lycoperdon lilacinum* Copel. (puffball) and *Volvaria esculenta* Bres. (kabuteng saguing) were higher in food value than any of the others. Canned mushrooms were exceptionally high in Fe, Na and Cl contents. Six references.

John O. Hardesty

**Experiments in storing of cabbage and other vegetables.** Olav Moen. *Meldinger Norges Landbruks.* 13, 767-86(1933).—Treatment with  $Cl_2$ ,  $CH_3O$ ,  $SO_2$ ,  $O_3$ ,  $CaO$ , powder, S and lime-copper sulfate and drying of the air in the storage rooms with  $CaCl_2$  or  $CaO$  did not prove effective. Ordinary storage methods are far from satisfactory.

H. C. M. Ingeberg

**Emulsification by mustard.** John W. Corran. *Spice Mill* 57, 175-7(1934).—Mixts. of lime water and olive oil contg. various quantities of mustard were shaken. For small amts. of mustard the emulsion was of the greasy (water-in-oil) type, but as the mustard content increased the emulsion inverted to the creamy (oil-in-water) type. Fine mustard flour was more effective than coarse. The factors affecting the stability of mayonnaise are discussed and exptl. data are presented showing the stabilizing effect of mustard.

L. W. E.

**Toxic constituents of the so-called bongkreng poisoning in Java.** A. G. van Veen and W. K. Mertens. *Rec. trav. chim.* 53, 257-60(1934).—The investigation was undertaken to ascertain the toxic principles formed in bongkreng and semaji, 2 auxiliary foodstuffs commonly used in middle Java, but not infrequently of high toxicity. The toxic substances, 2 in no., were isolated only after the most tedious and careful procedures, by the repeated use of immiscible solvents  $Et_2O$ ,  $CHCl_3$ , petr. ether and aq. solns. of varying  $pH$  values. The essential facts developed were: The poisonous principles result from the action of certain bacteria (notably "bacterium hongkreng") on domestic by-products of the coconut (press cake). Soy bean and peanut cake treated in a similar manner do not develop these poisons. Cooking or roasting of bongkreng or semaji has little or no effect on their toxicities. Of the 2 poisonous principles one formed yellow flat needles or leaflets (I), m. 171-2°, the other (II) a colorless fatty (thus far non-cryst.) product. I appears to be a high-mol. protein-like substance in loose combination with a lower mol. yellow protein-like substance, disocn. gradually taking place by the action of heat,  $EtOH$ , certain salts, etc., whereby the toxicity becomes markedly less. The development of I and II is invariably shown by the appearance of a yellow color, and may result by bacterial action not only on bongkreng and semaji, but on glycerol, oleic, stearic and palmitic acids, certain hexoses, pentoses and sugar alcs. in suitable nutrient media. I induces narcotic phenomena; II induces tetanic phenomena. II is N-free, has the character of an acid, is easily oxidized and is extremely sensitive to heat.

W. O. E.

**Improvements in the manufacture of dry fodders.** J. Landis, H. Burekhardt and E. Steiner. *Schweiz. landw. Mh.* 10, 282, 293, 314(1932); *Fortschr. Landw.* 8, 280(1933).—As compared with hay cured on the ground, hay cured on scaffolds showed smaller loss and higher digestibility of its nutrient contents, a better flavor and a smaller water content. Curing on scaffolds was particularly advantageous in rainy weather.

K. D. J.

*Lathyrus sativus* L. (chickling vetch; Khesari; Indian

pea) as a stock food. D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 163-71(1933).—The fresh green plants of *L. sativus* cut at the flowering stage contained ash 6.0,  $P_2O_5$  0.51, CaO 1.08, fat 4.47, cellulose 36.6, protein 17.3 and  $H_2O$  74.5%. Hay made from the flowering and seeding plants contained ash 8.0,  $P_2O_5$  0.34, CaO 0.96, fat 2.4, cellulose 27.0, protein 20.9 and  $H_2O$  8.3%. The ripe seed contained ash 2.9,  $P_2O_5$  0.74, CaO 0.24, fat 0.6, protein 28.0 and  $H_2O$  10.0%. When they were fed without any addnl. ration, the fresh plants in the pre-flowering and flowering stages were poisonous to horses. Cattle, sheep and rabbits consumed relatively large amts. of the plant without any ill effects. The active principle of *L. sativus* is not definitely known. K. D. J.

A hexosephosphoric acid obtained from the hydrolysis of flour (Posternak) 6. Detn. of Pb in small quantities in food products (Samuel, Shockley) 7. Rept. of the mycologist for the year 1932 [microorganisms and tea manuf.] (Cadd) 11D. Normal absorption and excretion of Pb [detn. of Pb in food] (Kehoe, et al.) 11A. Lipolytic activities of several bacteria causing bitter cream (McGrath, Anderson) 11C. Digestibility of milk (Mortenson) 11F. Action of lipolytic bacteria on natural fats (Collins) 11C. Destruction of carbohydrates by bacteria (Levine, Watkins) 14. Treatment of sewage from food industries (Bode) 14. Washing fruit for removing spray residues (U. S. pat. 1,945,922) 15. Spray desiccation of juices or sirups (U. S. pat. 1,946,566) 13. Reducing the oil content of soy-bean meal [for use in bread making] (U. S. pat. 1,947,200) 27.

McCance, R. A., and Shipp, H. L.: The Chemistry of Flesh Foods and Their Losses on Cooking. Special Rept. Series No. 187 of the Med. Research Council. London: H. M. Stationery Office. 146 pp. 2s. 6d.

Analisis químico de forrajes mexicanos y su valor alimenticio. Mexico, D. F.: Secretaria de Agricultura y fomento. 19 pp.

Finely subdivided food products. Bernard J. G. Chicago. U. S. 1,947,520, Feb. 20. Preparatory to drying, various products such as cheese, meats, yeast, cereals, fruits or nuts are finely subdivided by the action of a rotating wire brush (various operative details being described).

Vegetable jelly for use as a food. Arthur W. Thomas and Morris Mattikow. U. S. 1,946,649, Feb. 13. Agar agar 1, gum karaya 0.5-1.0 and an acid such as tartaric acid somewhat less than 1 part are used together to form a compn. which can be dissolved in hot water to form a stiff and elastic jelly upon setting at ordinary room temps.

Heat-sealable opaque wrapping paper for foods. Walter W. Herrick (to Riegel Paper Corp.). U. S. 1,946,141, Feb. 6. Paper is coated on one or both sides with wax contg.  $TiO_2$ .

Preserving foods. I. G. Farbenind. A.-G. (Heinrich Kircher, inventor). Ger. 588,467, Nov. 18, 1933 (Cl. 53c. 6.01). Addn. to 554,512. The method of 554,512 for preserving cut flowers by treatment with aq. methyl-cellulose soln. is applied to the conservation of foods, both fruit and flesh.

Protective lacquer for food containers. Alberto Williams (to Swift & Co.). U. S. 1,945,584, Feb. 6. A lacquer is prepd. by dissolving shellac and rosin in alc. by suspending them in the alc. on a porous tray close to the surface of the alc.

Cereal food. Eugene H. McKay (to Kellogg Co.). U. S. 1,946,803, Feb. 13. For prepg. a "ready to eat" food, whole or broken rice kernels are cooked, partially dried, ground into particles about 0.06-0.12 in. in diam., the ground material is formed into a ribbon, the ribbon is dried until hard and brittle, and then is puffed by heating.

"Ready-to-eat" cereal food. Eugene H. McKay (to Kellogg Co.). U. S. 1,945,946, Feb. 6. Various details are given of a process of prepg. a shredded, puffed and

1 toasted food from a cooked mixt. of rice, bran and water U. S. 1,945,947 relates to details of prepg. a crisp porous food from rice.

Bleaching flour. J. R. Short Milling Co. Ger. 591,304, Jan. 18, 1934 (Cl. 53c. 6.02). See Brit. 846,408 (C. A. 26, 587).

Wheat flour, etc. Kenneth P. Wanklyn. Brit. 401,941, Nov. 23, 1933. The fatty acids in wheat germ treated by heating at reduced pressure or in an artificial atm., e. g., N or other inert gas, is neutralized by adding  $NaHCO_3$  before or during the treatment. The treated germ is then mixed with wheat flour, millers' offal or cattle or poultry food. To make a specially white bread or feeding meal, the treated germ is bleached with  $NO$ ,  $Cl$ ,  $NCl_3$ , etc., before admixt.

Dry concentrator suitable for treating flour, gold sands, etc. James F. Gibson. U. S. 1,945,526, Feb. 6. Structural and mech. features.

Baked flour products such as cakes. Albert K. Epstein and Benjamin R. Harris. U. S. 1,945,346, Jan. 30. Small proportions of diketones such as biacetyl and 2,3-pentadione are added to pastry ingredients in order to give a butter-like aroma and flavor.

Flour mixture for making cake dough. Jacob Finkel U. S. 1,944,880, Jan. 30. A dry powder is prepd. by agitating and heating a mass of grain flour under a vacuum for removing moisture from the flour, then adding a shortening and other perishable ingredients to the dried flour and continuing the heating and agitation of the mixt. at a temp. below  $85^\circ$  to drive off substantially all free moisture, and to effect softening of the flour gluten, and further blending of the ingredients. U. S. 1,944,881 relates to a similar process in which "cocoanut oil" and cocoa are added to the flour, etc.

Bread. Etablissements Vitafor. Fr. 757,111, Dec. 20, 1933. Bread is improved by the addn. during manuf. of a stable emulsion of animal and vegetable fats, Vichy salts, an essence and a coned. sugar sirup in water.

Treating surplus bakery bread for use in other foods. Karl P. Keeney and Harold E. Turley. U. S. 1,945,436, Jan. 30. The material is subjected to the action of a digestant such as pepsin or diastatic malt in the presence of acidified water, and is agitated until the non-crust material is broken down and mixed with the water; the crust material is then removed, and remaining material may be further digested. App. is described.

Filter for milk, etc. Alma J. Clare. Brit. 400,833, Nov. 2, 1933.

Butter substitute. Kametarô Kawai. Japan. 100,020, March 9, 1933. A butter substitute is prepd. by mixing margarine or hardened oil with purified wax sepd. from cod-liver oil by cooling below  $0^\circ$ .

Butter substitute. Asahi Seiraku K. K. (Zyûgorô Sugai, inventor). Japan. 100,257, March 25, 1933. To margarine are added a fermentation product of palm oil, milk sugar and lactic acid bacilli and a fermentation product of natural butter and glucose.

Margarine. Bruno Behrend. U. S. 1,944,962, Jan. 30. A fat mixt. is churned with soured skimmed milk in which lecithin and malt ext. are dispersed. Cf. C. A. 28, 1116.

Margarine. Albert K. Epstein and Benjamin R. Harris. U. S. 1,945,347, Jan. 30. A small proportion of a diketone such as diacetyl and 2,3-pentadione is added to oleomargarine, in order to improve its flavor. Cf. C. A. 27, 4600-1.

Cheese. Albert K. Epstein and Benjamin R. Harris. U. S. 1,945,345, Jan. 30. A small proportion of a diketone such as diacetyl or the like is added to cheese such as Cheddar type cheese in order to improve its flavor and keeping properties.

Sterilizing liquid egg material, milk or other foods with chlorine and by use of violet rays. Samuel Tranin and Rudolph M. Snyder (to Samuel Tranin). U. S. 1,945,102, Jan. 30.  $Cl$  gas is introduced into a stream of the material and it is then passed closely adjacent a violet ray lamp incidental heat from which serves to evap. the gas. App. is described.



**Egg filtering apparatus.** Melville J. True (to Armour & Co.). U. S. 1,946,772, Feb. 13.

**Preserving unfermented fruit juices.** Silvere C. Vandecaveye (to State College of Washington). U. S. 1,947,237, Feb. 13. In treating fruit juices by means of generations of yeasts derived from the yeast naturally present in the fruits, the liquid is kept at a temp. favorable for the yeast development which is allowed to proceed until foam bubbles indicate CO<sub>2</sub> production and beginning of EtOH formation; further development of the yeasts is then checked and they are pptd. by heating to above 45° for 30–40 min., followed by cooling to 25° for the purpose of promoting a new generation of yeast by inoculation with fresh juice material; the ppts. formed are allowed to settle and the clear portion of juice is sepd., and the procedure is repeated for removing substantially all N and P.

**Pectin product.** Willard E. Baier and Robert B. Harris (to Calif. Fruit Growers Exchange). U. S. 1,945,963, Feb. 6. About 5–10% of acetonedicarboxylic acid is added in prep. a dry, finely divided pectin product, in order to produce a stable effervescent compn. A buffer salt such as Na citrate also may be added.

**Treatment of insect-infested fruit such as oranges or grapefruit.** Bronson C. Skinner (to Biogdex Co.). U. S. 1,947,115, Feb. 13. The fruit is provided with a thin film-like coating of waxy material such as paraffin to reduce wilt and shrinkage, and is then steamed for 4–6 hrs. at a temp. of about 43–46°.

**Chocolate sirup.** Wallerstein Co. Brit. 401,333, Nov. 6, 1933. See U. S. 1,854,353–5 (C. A. 26, 3310).

**Seasoning material.** K. K. Suzuki Shōten (Fukutaro Tsunoda and Sekizyūō Ōno, inventors). Japan. 99,003, Feb. 17, 1933. Proteins are hydrolyzed with a strong

acid. The product is concd. with HCl and cooled, to give a mixt. of glutamic acid hydrochloride and NH<sub>4</sub>Cl. The mixt. is suspended in H<sub>2</sub>O, NH<sub>3</sub> is introduced and free glutamic acid is crystd. This is purified and converted to the Na salt for use as a seasoning material.

**Seasoning material.** Dai Nippon Jinzōhiyō K. K. (Kōtarō Shimo and Yutaka Tanimura, inventors). Japan. 99,741, Feb. 23, 1933. Animal or vegetable proteins are hydrolyzed with an acid or alkali, the product is neutralized, mixed with carbohydrates and NaCl, and subjected to saccharification.

**Roasting coffee.** Joseph F. Gilbreath. U. S. 1,946,398, Feb. 6. A mixt. of an org. acid and water (suitably a soln. of HOAc or citric acid) is added to freshly roasted coffee before drawing it from the roasting oven and while it is still hot, the proportion of acid added being varied as the percentage of acid naturally present in the coffee, for the purpose of inhibiting staling or rancidity.

**Apparatus for decomposing materials containing proteins.** K. K. Suzuki Shōten (Genpei Shimizu, inventor). Japan. 99,214, Jan. 26, 1933. The app. is designed for decomp. large amts. of material contg. proteins with mineral acids by applying heat, pressure and agitation.

**Stock feed containing molasses and cereal material, etc.** Albert H. Schmidt. U. S. 1,945,918, Feb. 6. Various details of app. and mfg. operations are described.

**Preserving fodder.** Willy Rojahn and Michel Mercurio. Brit. 401,867, Nov. 23, 1933. A layer of absorbent material, e. g., peat dust, chaff, kieselsuhr, slag, ash, cork meal, is provided on the floor space of a store chamber and sprayed with formalin or dil. aq. solns. of formalin compds. that generate bactericidal gases, e. g., formalin H<sub>2</sub>SO<sub>4</sub>, formalin Al sulfite, before the introduction of the fodder.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Progress in the field of recovery of volatile solvents.** L. Piatti. *Kunststoffe* 24, 6–9 (1934).—A patent review.

**Progress Reports—Metallurgical Division.** I. Mineral Physics Studies. Preliminary report on dust settling. R. S. Dean, John Gross and C. E. Wood. Bur. Mines, *Rept. of Investigations* No. 3223, 37 (1934).—A chem. combination in a dust- or fume-laden atm. forms a rapidly settling cloud of rather large particles that collect the dust or fume particles and sweep them out of the atm. The most promising agent investigated is NH<sub>3</sub> and steam. Steam or NH<sub>3</sub> alone improves the settling, but the 2 together are immensely more efficient.

**The control of the condition of the air in cooled spaces.** Kurt Linde. *Beihfte Z. ges. Kälte-Ind.*, Ser. 2, No. 7, 1 47 (1933).

**Heat transfer in air coolers with ribbed tubes.** Theodor E. Schmidt. *Beihfte Z. ges. Kälte-Ind.*, Ser. 2, No. 6, 1 45 (1933).

**The motion of granular or pulverous materials in a horizontal rotating cylinder.** I. Yoshitoshi Oyama. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 12, 953–75 (1933). (*Abstracts* (in English) published with *Sci. Papers Inst. Phys.-Chem. Research* (Tokyo) 23, Nos. 468–77).—Granular materials in circular motion with the wall of the cylinder are in an area surrounded by 2 curves crossing at a stationary point. Above the crit. velocity, these 2 curves are expressed by an empirical formula:  $\rho = a e^{b\theta}$ , in which  $\rho$  denotes radius of curvature,  $\theta$  is angular displacement,  $a$  and  $b$  are consts. The area in which granular materials are in contact with the inside wall of the cylinder has a min. value relative to the no. of rotations. The max. in flying quantity is independent of the quantity of the charge and it is found at 78 r. p. m. for 200 mm. of the inner diam. of the revolving cylinder. The rotation of grains 0.08 mm. in diam. is discontinuous. K. Konda

Experimental investigation of the efflux of granular

mass. Kōichirō Takahashi. *Bull. Inst. Phys.-Chem. Research* (Tokyo) 12, 984–93 (1933) (*Abstracts* (in English) published with *Sci. Papers Inst. Phys.-Chem. Research* (Tokyo) 23, Nos. 468–77).—The velocity of grains falling through a round hole at the bottom of a cylindrical vessel does not depend on the height of the grain layer unless the layer is very thin. The falling velocity of grains piled above a certain limit of height is expressed by the following empirical formula:  $v = k \sqrt{gd} / (f\mu + a(\bar{D}/d))$ , where  $v$  denotes the velocity of grain;  $d$ , the diam. of hole;  $\bar{D}$ , the mean diam. of grains;  $g$ , the acceleration of gravity;  $f$ , a function depending on  $\mu$  given by  $\mu = \tan \theta$  ( $\theta$  is an angle subtended by the horizontal plane and generating line of the cone of grain formed by the pile of falling grains),  $k$  and  $a$  being consts. independent of materials. Similarly the pressure acting on the hole is expressed as follows:  $P = c_1 g d^2$ , in which  $P$  is the total pressure;  $\mu$  the apparent sp. gr. of the grain;  $c_1$ , a const. K. Konda

**Steam research program. II. Vapor pressure of water.** Leighton B. Smith, Frederick G. Keyes and Harold T. Gerry. *Proc. Am. Acad. Arts Sci.* 69, 137–88 (1934); cf. C. A. 23, 1450.—Details are given of expts. between 150° and 374°, leading to the following equation:  $\log_{10}(p/p_0) = (x/T) (a + bx + cx^2 + dx^3) / (1 + dx)$  in which  $x = T_0 - T$ ,  $p_0 = 218.167$  atm.,  $T_0 = 647.27^\circ\text{K.}$ ,  $a = 3.3463130$ ,  $b = 4.14113 \times 10^{-2}$ ,  $c = 7.515484 \times 10^{-3}$ ,  $d = 1.3794481 \times 10^{-2}$ ,  $e = 6.56444 \times 10^{-4}$ , which reproduces the data and those of Osborne, *et al.* (C. A. 27, 1792) to within 4 parts per 10,000. Tables of vapor pressure and of  $dp/dt$  are given. H. W.

**Safety precautions in chemical manufacture.** T. J. Dixon. *Chemistry & Industry* 1934, 167–71. E. H. Betz, J. H. Holden and J. O. Handy. *Ind. Eng. Chem.* 25, 774–6 (1933).—Between July 1, 1931, and June 30, 1932, 607 detns. of SO<sub>2</sub> in the air of Pittsburgh were made. The sampling station was 75 ft. above the ground and in a typical location with respect to sources of SO<sub>2</sub>.

The yearly av. was 0.3 p. p. m. with a max. of 2.5 p. p. m. The yearly morning av. was 0.38 p. p. m. and the afternoon av. was 0.19 p. p. m. It is to be noted that the tests were made during a period when industrial activity was considerably below its peak, and on the decline.

G. L. Kelso

**Common misconceptions regarding the possibilities of protection against dichlorodithyl sulfide (mustard gas) and first aid to persons poisoned with this substance.** Muntsch. *Gasschutz u. Luftschutz* 4, 20(1934); cf. C. A. 28, 528<sup>a</sup>, 566<sup>a</sup>.—The possible use of salves as a protective coating is discussed and discarded as ineffective and impracticable. The impregnation of clothing with chloride of lime or other Cl preps. which have the power of destroying dichlorodithyl sulfide is also discarded as presenting tech. difficulties, as well as having probable harmful effects upon the wearer. Contaminated portions of the skin may be freed from this poison by repeated washing with fresh portions of kerosene or other petroleum products provided this treatment is started not more than a half hr. after contamination. Thorough bathing with warm water and soap is also effective if undertaken within a half hr. The earlier these treatments can be given the more is the chance of success. It is entirely useless to undertake treatments to remove the poison after the skin shows signs of redness or swelling. It is known that black skin is much less susceptible to the poison than white skin and M. thinks that this fact offers a promising line of investigation.

A. L. Kibler

**Lead absorption and excretion in relation to the diagnosis of lead poisoning.** Robert A. Kehoe, Frederick Thammann and Jacob Cholak. *J. Ind. Hyg.* 15, 320-40 (1933).—Studies were made of the Pb excretion of subjects for a period of months after the cessation of well-known types of Pb exposure, also single or repeated observations were made on patients with actual or suspected Pb poisoning. In addn., examn. was made of the tissues in fatal cases in which Pb was a suspected factor. It is concluded that persons who have absorbed abnormal amts. of Pb excrete Pb at higher than normal rates after the cessation of Pb exposure. The duration of the period of increased Pb excretion depends upon the extent of Pb absorption. The rate of Pb output diminishes rapidly for a period of several weeks, after which there is a prolonged and gradual diminution in excretory rate until the normal level is reached. The relative intensity of the Pb exposure is indicated by the initial height of the excretory level, by the sharpness of the decline in the excretory rate during the early weeks of freedom from exposure, and by the duration of the period of high excretion. Persons abnormally exposed to Pb show the presence of unusual amts. of Pb in their circulating blood during life and in their tissues at necropsy for variable periods of time after the discontinuance of their exposure. The total amt. of Pb in the body varies with the severity of the Pb exposure and the interval between exposure and death. The detection of an abnormally high rate of Pb excretion or an unusual amt. of Pb in the tissues is useful in estg. the severity of the Pb exposure. It does not constitute proof of the existence of Pb intoxication. The recognition of either of these phenomena is greatly facilitated by the study of excreta or tissues soon after the cessation of exposure. Eleven references. E. G. M.

**Lead absorption and excretion in certain lead trades.** Robert A. Kehoe, Frederick Thammann and Jacob Cholak. *J. Ind. Hyg.* 15, 306-19(1933).—Groups of workmen, representing different degrees of Pb exposure, were studied as to their fecal and urinary Pb excretion. The mean Pb excretion of all types of workmen in a white lead plant was found to be  $3.76 \pm 0.26$  mg. per sample of feces,  $0.57 \pm 0.03$  mg. per g. of ash in the feces, and  $0.24 \pm 0.01$  mg. per l. of urine. The corresponding values for workmen in a plant mfg. storage batteries were, resp.,  $2.53 \pm 0.18$ ,  $0.45 \pm 0.03$  and  $0.18 \pm 0.01$  mg. Workmen exposed only to inorg. Pb dusts in a plant mfg. tetraethyl Pb excreted Pb at mean rates of  $0.56 \pm 0.06$  mg. per fecal sample,  $0.20 \pm 0.02$  mg. per g. of fecal ash, and  $0.14 \pm 0.01$  mg. per l. of urine. Clinical

<sup>1</sup> Pb poisoning had occurred in the first 2 plants. The tetraethyl Pb plant had shown none during the 5 years of observation. Evidence is presented for the belief that Pb exposure is safe if it does not give a mean Pb excretion of more than 0.6 mg. per day in the feces and 0.15 mg. per l. in the urine. Conclusion: The occurrence of Pb poisoning may be expected under conditions in which Pb is excreted at a mean rate above 1.1 mg. per day in the feces, and 0.21 mg. per l. in the urine. Twelve references.

E. G. Meiter

**Aerochemical war gases and protection against them.** Walter Meyer. *Pharm. Ztg.* 78, 1280-2(1933).—The more important war gases are arranged in 4 groups, and their physiol. actions, together with their most effective antidotes, are given.

W. O. E.

**Importance of insulation on furnaces.** B. Thomas. *Heat Treating and Forging* 19, 49-51, 78-9(1933).—The application and cost of insulating industrial furnaces are considered.

Downs Schaff

**Drager-Schroter gas detection equipment (Stampr, Schröter).** 1. Analyzing industrial solvents (Hauck) 7 Press mixts. of type 1 [products used as insulators] (Brandenburger) 18. Light construction [insulating] material (Fr. pat. 756,966) 20.

<sup>4</sup> **Delorme, José M.: Aprovechamiento de residuos industriales. Regeneracion de desperdicios.** Barcelona. A. Roch. 288 pp.

**Delorme, José M.: Nociones de química indispensables al industrial.** Barcelona: A. Roch. 233 pp. Ptas. 15

**Izard, L., Cilleuls, J. des, and Kermarrec, R.: La guerre aéro-chimique et les populations civiles. Etude historique, clinique, thérapeutique et préventive.** 3rd ed. Paris: Limoges 312 pp.

<sup>5</sup> **Richter, H.: Rohrhydraulik Allgemeine Grundlagen, Forschung, praktische Berechnung und Ausführung von Rohrleitungen.** Berlin: J. Springer. 256 pp. M 22.50.

**Worden, Edward C., First: Chemical Patents Index (U. S. 1915-1924) Vol. III. F. L. 1004 pp. Vol IV. M.-R. 1132 pp. New York: Chem. Catalog Co., Inc. \$25 each. Reviewed in Ind. Eng. Chem., News Ed. 12, 71(1934). Cf. C. A. 27, 790.**

<sup>6</sup> **Bildwort englisch technische Sprachhefte. Nr. 8 Chemical Engineering.** Berlin: V. D. I.-Verlag. 33 pp

**Catalytic reactions.** I. G. Fairbairn, A.-G. (Walter Simon, Paul Jacob and Wilhelm Kunze, inventors) Ger. 589,968, Dec. 21, 1933 (Cl. 12o. 1.05). Catalytic reactions, especially the pressure hydrogenation of carboniferous materials, are carried out with cryst. W compds. as the catalyst. Cf. C. A. 27, 1112.

**Purifying gases.** Ateliers J. Hanrez (Soc. anon) Fr. 756,702, Dec. 14, 1933. Gases or smokes are brought into contact with a liquid capable of retaining impurities contained therein, the liquid being in a vessel containing clays, tubular systems, etc., conducting or not conducting for a part. An elec. current is caused to pass through the system liquid-container. A substance may be incorporated in the liquid to give insol. substances with the impurities.

**Generation of high-pressure gas.** Yūzaburō Murakami and Miyukichi Kobayashi. Japan. 99,867, March 1, 1933. The gas is generated by adding water (200 parts) to a mixt. of solid CO<sub>2</sub> (400) and CaC<sub>2</sub> (400) in a generating chamber.

<sup>9</sup> **Clarifying aqueous liquids.** René A. Henry. Ger. 591,266, Jan. 18, 1934 (Cl. 85c. 1). This corresponds to Brit. 322,798 (C. A. 24, 2815), but gives addl details.

**Concentration of liquids containing volatile matter.** Artur Vadász. Hung. 107,480, Dec. 1, 1933. The liquid is divided into 2 parts. One is heated to remove the volatile constituents and the other is cooled to absorb substances removed from the first. Thus a double concn. is effected. Details of the app. are given.

**Method of discharging solid, liquid or gaseous materials from high-pressure reaction apparatus.** Friedrich Uhde. Brit. 401,429, Nov. 16, 1933.

**Emulsions.** International Bitumen Emulsions Corp. Brit. 401,131, Nov. 9, 1933. Aq. emulsions of asphalt, pitch, tar, resin, wax or mineral or other oils, stabilized with alkali caseinate, are treated with a soln. of acid, e. g.,  $H_3PO_4$ ,  $H_2BO_3$ , to reduce the alky. of the caseinate and prevent its deterioration.

**Vaporizing mercury.** John J. Grebe (to Dow Chemical Co.). U. S. 1,946,851, Feb. 13. For vaporizing Hg, as in power cycles, a current of Hg vapor is caused to travel through a heating zone such as a pipe system in which it is superheated from an external source of heat, and small portions of liquid Hg are simultaneously injected so that the liquid is vaporized by the superheat of the vapor.

**Separating gaseous products from hydrocarbon vapors or the like by a liquefaction and rectification system.** Leon S. Gregory. U. S. 1,946,580, Feb. 13. App. and various details of operation are described.

**Recovery of gases such as sulfur dioxide from dilute mixtures such as smelter gases.** Fredrik W. de Jahn (to Jacob D. Janssen). U. S. 1,946,489, Feb. 13. The desired component such as  $SO_2$  is absorbed from the mixt. in a first solvent such as water and is then removed from this solvent by a second solvent such as  $AmOAc$  immiscible with the first solvent, and is finally expelled from the second solvent.

**Purifying gases such as carbon dioxide.** Sidney T. Adair and Charles F. Cushing (to Chester F. Hockley, as receiver for Silica Gel Corp.). U. S. 1,945,407, Jan. 30. The gas is compressed and liquefied, some of the liquid is expanded, heat from the gas prior to compression is transferred to the expanded liquid to sep. moisture from the gas, the cooled gas is contacted with a dehydrating agent to remove more moisture, the dehydrated gas is passed through solid, porous, adsorbent material such as silica gel to remove odoriferous compds., and the purified gas is supplied for the compression. An arrangement of app. is described.

**Absorption of carbon monoxide or alkadienes from gases or vapors.** N. V. Bataafsche Petroleum Maatschappij. Dutch 31,454, Dec. 15, 1933. CO is absorbed in a neutral cuprous salt soln. in the presence of a reducing agent ( $HONH_2$ ,  $HCl$ , hydroquinone, sulfite,  $SnCl_2$ , etc.). Alkali or alk. earth chlorides dissolved in  $H_2O$  or  $EtOH$  are used as solvent for  $CuCl$ . By heating to  $40-80^\circ$  the soln. is regenerated and the gas recovered.

**Apparatus for forming solid carbon dioxide from the liquefied gas.** Frederic H. Foster and Walter C. Priestley. Brit. 389,475, Mar. 13, 1933.

**Use of liquid "amo" in refrigerating systems.** Gerald C. Connolly and Ernest B. Miller (to Silica Gel Corp.). U. S. 1,947,381, Feb. 13. "Amo" is used with an absorbent comprising a gel such as silica gel impregnated with a substance such as  $CaCl_2$ ,  $SrCl_2$  or  $LiCl$  with which the "amo" forms a compd.

**Spray desiccation of materials such as juices or sirups.** Wm. S. Bowen. U. S. 1,946,566, Feb. 13. Various details of app. and operation are described.

**Drying viscous material.** The War Minister (Shigeo Mukai, inventor). Japan. 99,065, Jan. 16, 1933. Viscous material is agitated in such a way that many small air bubbles are enclosed; then it is evapd. to dryness *in vacuo*.

**Dispersions and dispersing and precipitating agents.** James F. Mosley. Brit. 401,282, Oct. 23, 1933. See *Ir.* 749,446 (C. A. 28, 546<sup>2</sup>).

**Rendering  $\beta,\beta'$ -dichlorodiethyl sulfide innocuous.** Chem. Fab. von Heyden A.-G. (Curt Philipp, inventor). Ger. 590,796, Jan. 9, 1934 (Cl. 78d. 1.02). Addn. to 557,081 (C. A. 27, 355). The dichloroamides used in the method of Ger. 557,081 are mixed with inert solids, such as kieselguhr or talc, to form compns. which can be strewn. Alkali, alk. earth and Mg carbonates or bicarbonates may be included in the compns. Cf. C. A. 28, 1427<sup>1</sup>.

**Electrical apparatus such as transformers.** Charles F. Hill and James T. Goff (to Westinghouse Elec. & Mfg. Co.). U. S. 1,947,085, Feb. 13. Between parts such as those of transformers there is interposed a heat-conducting and -insulating material comprising a mixt. of quartz sand or the like and an impregnating jelled vegetable oil such as jelled China-wood oil.

**Electrical apparatus for testing insulating materials.** Frank C. Doble (to Doble Engineering Co.). U. S. 1,945,263, Jan. 30.

**Thermal insulator for use in cold storage.** Toshio Kuzuyama. Japan. 99,137, Jan. 24, 1933. A mixt. of kieselguhr, sawdust and clay is molded into bricks, heated at  $1000-1100^\circ$ , cooled to  $250-300^\circ$ , immersed in melted asphalt and cooled quickly.

**Heat- and sound-insulating compositions.** Franz Jaray. Austrian 130,008, Dec. 27, 1933 (Cl. 80d). Fibers of cotton, glass wool, rayon, hemp, jute, etc., of at least 25 cm. length are arranged in parallel, impregnated with 10-35% of a binder such as rubber, glue, water-glass or a synthetic resin, and molded under pressure.

**Insulated electrical conductor.** Beauford H. Reeves (to Rockbestos Products Corp.). U. S. 1,946,331, Feb. 6. A stranded conductor or the like is provided with an insulation which does not evolve an inflammable or explosive gas at elevated temps. and which includes non-brittle fibrous material such as asbestos, in an amt. sufficient to retain at least part of the insulation on the conductor, the insulation including materials such as borax and Na silicate which are capable of forming a vitreous-like tube when highly heated.

**Electrical-insulating material suitable for use at high temperatures.** Leon McCulloch (to Westinghouse Elec. & Mfg. Co.). U. S. 1,947,096, Feb. 13. A plurality of layers of asbestos paper, rolled to crush conducting particles, are used, each layer contg. a partially carbonized org. binder such as may include heat derivs. of China-wood oil, etc.

**Electrical insulation on metal sheets.** George C. Kiefer and Charles A. Scharschu (to Allegheny Steel Co.). U. S. 1,946,146, Feb. 6. Metal sheets are passed through a soln. formed of Na silicate, water and chromic acid in specified proportions, passed through rolls to remove excess soln., dried and baked at a temp. high enough to drive off excess water, form a ppt. and bake the latter onto the sheets.

**Vehicle body with heat-insulated compartments suitable for transporting solid carbon dioxide.** Eugene A. Hults (to Mathieson Alkali Works). U. S. 1,945,689, Feb. 6.

**Apparatus for applying insulating coatings to wire and burning off volatile ingredients.** Frank Martindell (to Western Elec. Co.). U. S. 1,947,478, Feb. 20. U. S. 1,947,479 (Frank Martindell and Ansel D. Miller (to Western Elec. Co.)) also relates to app. for the same general purpose.

**Coating surfaces.** Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co.). Brit. 401,500, Nov. 16, 1933. Articles are impregnated or coated for elec. insulation by applying styrene in a pre-polymerized state or as a soln. of polystyrene in monomeric styrene without a volatile solvent and then hardening by heat treatment, e. g., at  $100-180^\circ$ . The treating liquid may contain catalysts, e. g., Bz peroxide, or non-volatile softening agents, e. g., tritolyl phosphate.

**High-tension submarine cable.** Georg Zapf (to Felten & Guillaume Carlswerk A.-G.). U. S. 1,945,704, Feb. 6. A conductor is provided with an oil-impregnated paper insulation, an overlying layer of non-metallic material such as a cellulose ester or ether impermeable to oil and a rubber sheathing, and is treated with paraffin to close its surface pores.

**Insulation on submarine cables, etc.** Willoughby S. Smith, Henry J. Garnett and John N. Dean. U. S. 1,946,337, Feb. 6. A gutta-percha insulation is used conjointly with a material contg. coal tar such as a mixt. of pitch and anthracene oil which may be used as a coating or impregnating material and which is substantially free

from acid and basic components and from readily volatile substances.

**Composition for impregnating cable insulation.** George F. Kennedy (to Hercules Powder Co.). U. S. 1,946,322, Feb. 6. A hydrocarbon oil is used with rosin substantially free from oxidized components in a proportion of about 5-50%.

**Cables.** W. T. Henley's Telegraph Works Co. Ltd. and Percy Dunsheath. Brit. 400,929, Oct. 27, 1933. The insulation in a cable is impregnated with oil, etc., exposed to the pressure of gas enclosed between the insulation and the cable sheath, the gas space being electrically screened and divided longitudinally into a no. of sep. spaces.

**Cables.** N. V. Hollandsche Draaden Kabelfabriek. Brit. 401,001, Nov. 6, 1933. Bodies comprising coherent insulating and conducting portions like those described in Brit. 396,891 (C. A. 28, 842) are made of insulating material which is liquid or plastic originally and afterward sets solid, portions being rendered con-

ducting by mixing powd. graphite or metal therewith. Suitable materials are shellac, cellulose ester lacquer, and artificial resins. Comps. contg. binding agents, e. g., resins, pitch, hydrocarbons, and asphalt, fibrous materials, e. g., asbestos, paper, cellulose and wood meal, and fillers, e. g., powd. quartz, kaolin and fluorspar, may be used, the filler being replaced (partly) by conducting materials. Or paper may be impregnated with artificial resin portions of which contain powd. graphite.

**Cables.** James H. Young and H. H. Robertson Co. Brit. 401,401, Nov. 16, 1933. A cable comprising a conductor and insulation has a flame-proof outer covering of dry chlorinated biphenyl and (or) chlorinated polyphenyl in admixt. with resins, waxes or asphalts.

**Cables.** C. H. F. Müller A.-G. Brit. 401,560, Nov. 16, 1933. An elec. cable consists of a flexible body of insulating material, e. g., rubber, having an internal passage with smooth walls having a firmly adherent layer of conducting material, e. g., "Aquadag," and contg. a flexible conductor.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**The Sanitary Water Board.** W. L. Stevenson. *Year-book Dept. Health Pennsylvania* 1931, 117-26; U. S. *Pub. Health Eng. Abstracts* 13, S, 73 (Dec. 2, 1933).—A progress report of the many activities of the State Water Board. C. R. Fellers

**The Kingsbridge and Salcombe Water Board's works.** J. M. Linton Bogle. *Water and Water Eng.* 35, 109-14 (1933); U. S. *Pub. Health Eng. Abstracts* 13, W, 55 (May 20, 1933).—Water is taken from Bala Brook, a tributary of the Avon River, piped  $1\frac{1}{4}$  mile to the filter house, thence flows  $8\frac{1}{2}$  miles to a 750,000-gal. reservoir. The chemicals used in filtering include alum before filtration, lime after filtration to neutralize acidity, and  $\text{Na}_2\text{Al}_2\text{O}_4$  to be used when the water is discolored. C. R. Fellers

**Municipal water supplies of Virginia.** F. H. Fish. Va. Polytech. Inst., Eng. Extension Div. Series *Bull.* No. 29, 35; U. S. *Pub. Health Eng. Abstracts* 13, W, 72 (July 1, 1933).—Descriptive. Mineral analyses of all water supplies in the state are being compiled. C. R. F.

**Public water supplies in North Dakota.** A. L. Bayone. *Trans. N. Dak. Water & Sewage Works Conf.* (1st, 2nd, 3rd and 4th Ann. Meetings) 154-62; U. S. *Pub. Health Eng. Abstracts* 13, W, 71 (July 1, 1933).—Sources, descriptions and characteristics of N. Dak. water supplies are given. C. R. Fellers

**Water-purification plant at Ottumwa, Iowa.** Horace A. Brown. *J. Am. Water Works Assoc.* 26, No. 2, 260-70 (1934).—Des Moines River furnishes the supply, which fluctuates widely. Lime is used to remove carbonate hardness. From an Aeromix the water passes a flocculator, a baffle system and a clarifier. Soda ash is then added to reduce noncarbonate hardness to 10-15 p. p. m. and  $\text{Al}_2(\text{SO}_4)_3$  to bring the  $\text{pH}$  to 9.8. Another baffle system flocculator and clarifier bring the water to the filter house. Here it is recarbonated. The water gets a final treatment with  $\text{NH}_3$  and  $\text{Cl}$  in the suction line of the service pumps. D. K. French

**Cheltenham water supply and its chlorination.** J. S. Pickering. *Water and Water Eng.* 36, 11-13 (1934).—A description of the present and the proposed plant. Alumina and  $\text{Cl}$  treatment is used. W. A. Moore

**New waterworks of the town of Potsdam, near Eiche, Germany.** O. Sprung. *Gas u. Wasserfach* 74, 1052-9 (1931); U. S. *Pub. Health Eng. Abstracts* 13, W, 54 (May 20, 1933).—Underground water contg. Fe and Mn has a hardness of 215 p. p. m. and a  $\text{pH}$  value of 7.9. Equipment is described. Fe and Mn removal are by aeration followed by double filtration. C. R. Fellers

**Investigation of the central water supply of the city of Vienna.** Viktor Gegenbauer. *Wasser* 7, 50-73 (1933).—The city supply is obtained from springs or wells in the mountains and led by 2 conduits to the city. It is un-

4 treated. Total bacteria count and no. of organisms producing fermentation on samples taken at the lower end of the conduits and at taps in the city indicated that no pollution occurred within the city mains. However, pollution occurred at times of high water, i. e., after the melting of snow or heavy rainfall. This was due to the fact that at such times natural filtration was deficient, the contaminated surface water reaching the wells without being filtered by penetration of the upper strata of soil. High turbidity also occurred at such times, so that by rejecting water from such wells as were turbid pollution could be avoided. An automatically recording turbidimeter, through which the water flows continuously and in which the light from a const. source traverses the column of water and falls on a photoelec. cell, is described. Remedial measures included reforestation of barren areas and protection of the water-shed against pollution by man. Statistical treatment of the data obtained is discussed. M. G. Moore

**Deep-well water supply system for the town of Weston.** A. G. Peirson. *Can. Engr.* 64, No. 17, 13-16 (1933); U. S. *Pub. Health Eng. Abstracts* 13, W, 96 (Oct. 7, 1933). The supply from the Huron had to be abandoned because of diminishing supply and poor quality in favor of deep gravel-walled wells. The first wells sunk yielded water contg. 584-1360 p. p. m.  $\text{NaCl}$  which could not be decreased sufficiently by pumping to become potable. Other satisfactory wells were located. The water requires no chem. or phys. treatment. C. R. Fellers

**Chemical properties of the water of some lakes of the Kurgan forest steppe.** A. V. Golovin. *Trav. inst. recherches biol. Perm.* 4, No. 3-4, 61-75 (in English 70-8) (1932).—Waters of 41 lakes in the Kurgan forest steppe of the Ural province were all alk. and differed little in the amt. of dissolved  $\text{O}$  near the surface and near the bottom of the lakes. The waters are higher in alkali ions than in  $\text{Ca}$  and  $\text{Mg}$ , and  $\text{Mg}$  is higher than  $\text{Ca}$ , the concn. range of  $\text{Cl}$  is wide and many of the lakes are low in sulfate and carbonate. Most of the lakes analyzed fall into groups I and III of Palmer's classification (cf. C. A. 5, 3869), two lakes belonged to group II, and some lakes of group III showed a tendency to approach group IV. As the lake passes from its "youth" to "maturity," which corresponds to groups I and III of Palmer, it shows an increase in dry residue, increase of general concn. and of concn. of alkali ions and chloride ions. There is also a decrease in concn. of  $\text{Ca}$  and  $\text{CO}_3$  ions. Tables giving complete analyses of the lakes are included. Rea Mairiel

**Standards of purity as specified in the tri-state treaty.** Thomas Parran, Jr. *Proc. 47th Ann. Meeting Conf. State and Provincial Health Authorities N. America* 175-80; U. S. *Pub. Health Eng. Abstracts* 13, S, 73 (Dec. 2,

1933).—Tidal waters are divided into 2 classes. Class A waters are used primarily for recreational purposes, shell-fish culture and the development of fish life. Class B waters are not expected to be used primarily for recreational purposes, etc. Chem. and biol. standards for each class are set up and aim properly to safeguard the public from a health and sanitation aspect without actually requiring sewage purification beyond actual needs.

C. R. Fellers

Studies of the effect of a small impounding reservoir on stream purification. G. M. Ridenour. *Sewage Works J.* 5, 319-32(1933).—Seasonal studies are compared to show the effect of a small impounding reservoir on the purification of a comparatively heavily polluted stream. These studies show that the biochem.-O-demand reduction through the reservoir amounted to 86.5% in the summer time as against 52.5% in the winter time. The av. detention periods of the pond during those seasons were 2.8 and 3.0 days, resp. Av. reduction in *es. coli* amounted to 76% in the summer time as against 40% during the winter. Coeffs. for rate of deoxygenation and reoxygenation of the pond with respect to Streeter's formulae for deoxygenation of sewage-polluted water under conditions of reoxygenation are detd. Of 13.5 p.p.m. O consumed through the pond in summer, 10.4 p.p.m. was furnished by atm. absorption and photosynthetic processes. This amounted to 466 lb. per day. During the winter season 9.8 p.p.m. was furnished by the above processes, equiv. to 407 lb. per day or 87% of that provided in summer.

E. Hurwitz

Modern water purification. S. Johnsen. *Tek. Ukeblad* 80, *Sanktaer- og Varmeteknikk* 15-17(1933).—A review describing filtering app. of the closed type.

C. A. Rohak

Micro forces in water as applied to the practice of water purification. Julius Wigger and H. Bach. *Wasser* 7, 22-49(1933); cf. *C. A.* 18, 560.—A theoretical (math.) discussion of surface tension and surface energy, including capillary rise, pressure in drops, development of Poiseuille's equation, mol. arrangement in unimol. films, corrosion at surfaces, etc.

M. G. Moore

Sterilization of drinking water by silver-coated sand. S. V. Moiseev. *J. Am. Water Works Assoc.* 26, 217-38(1934).—By a special method 145 different Ag-coated sands were prepd., and the one possessing the greatest microbicidal power and stability was selected. Two exptl. lab. plants are described. As long as the sand remained clean and unpolluted its sterilizing properties were efficient. Conclusions: The oligodynamic action of Ag is stronger with pathogenic forms. It increases the longer the Ag is in the water. A concn. of 0.3% Ag by wt. appeared best.

D. K. French

Water and the chemist. H. Bach. *Wasser* 7, 11-21(1933).—A general discussion of the uses to which water is put.

M. G. Moore

The effect of the decomposition of natural organic contaminating matter on the properties of surface waters. H. Haupt. *Wasser* 7, 138-52(1933).—Lab. studies on the decompn. of leaves of various trees under water are reported with tabular data giving total solids, permanganate consumption,  $pH$ , content of the extn. liquid in coloring matter and tannin, etc. In the case of oak leaves about 4% of the leaf material goes into soln. in 4 weeks. Much more tannin and coloring matter (humic acids) are produced by oak leaves than by beech. The high tannin content and acid character of the extn. liquid delay the beginning of the normal  $CH_4$  fermentation. Lab. expts. on the removal of color and tannin from such exts. by alum show that the usual treatment is not always successful unless the  $pH$  is reduced. In view of the cost of such treatment H. advises that when possible reservoirs be protected from leaf contamination and vegetation be removed from new basins before they are used. Pines are best for forests about reservoirs, oaks are especially objectionable.

M. G. Moore

Production of "distilled water" by electrodesmosis. H. R. Dietzel. *Pharm. Ztg.* 79, 71-2(1934); cf. *C. A.* 26, 2896.—An illustrated exptl. study giving the values

(tabulated) obtained with 8 samples of  $H_2O$  over periods of 35, 27 and 25 days, resp.

W. O. E.

Tastes and odors in the Delaware River. J. Wendell Burger and Stanley Thomas. *J. Am. Water Works Assoc.* 26, 120-7(1934).—The taste is described as earthy-musty, and is more pronounced than the odor. It is attributed to general org. disintegration and is corrected and overcome by prechlorination.

D. K. French

Elimination of taste in water passing through creosoted wood-stave pipe. J. F. Harkom and C. Greaves. *Eng. J.* 14, 515(1931); *U. S. Pub. Health Eng. Abstracts* 13, W, 55(May 20, 1933).—Creosoted pipes should be flushed for 1-1½ months before use. Chlorination forms phenols and unpleasant tastes in creosoted waters. Waters contg. 3-5 p.p.m. of creosote oil were rendered palatable by superchlorination and subsequent dechlorination by  $SO_2$ . The higher the concn. of Cl used, the shorter was the required contact period for superchlorination. The best contact period was 24 hrs. when 2-3 p.p.m. of Cl was used for water contg. 0.5 p.p.m. creosote. The contact period with  $SO_2$  was unimportant. Filtration of the water through activated C was effective in removing the creosote taste.

C. R. Fellers

Activated-carbon treatment. Frank E. Turner and Carl Haynes. *Rept. 8th Mo. Ann. Water Sewerage Conf.* 1932, 24-5; *U. S. Pub. Health Eng. Abstracts* 13, W, 64(June 17, 1933).— $H_2S$  odor was successfully removed by activated C fed at the rate of 0.1 grain per gal. and costing \$1.57 per million gal. at Cameron, Mo. Phenol tastes were effectively removed from the water supply at Moberly, Mo., by activated C.

C. R. Fellers

Results from a small, inexpensive iron-removal plant. E. S. Flannery. *Rept. 8th Ann. Mo. Water Sewerage Conf.* 1932, 33; *U. S. Pub. Health Eng. Abstracts* 13, W, 64(June 17, 1933).—A small plant costing \$1650 consisting of aerators, a settling basin, and a rapid sand back-washing filter effectively freed a ground-water supply contg. 5 p.p.m. of Fe. The capacity is approx. 75 gal. per min.

C. R. Fellers

Prechlorination. Cleo Brown. *Rept. 8th Ann. Mo. Water Sewerage Conf.* 1932, 26; *U. S. Pub. Health Eng. Abstracts* 13, W, 64(June 17, 1933).—Prechlorination saved 0.3 grain per gal. of alum and paid for itself. It also produced a safer and more palatable water, with less color, and saved wash water.

C. R. Fellers

Reasons for and difficulties encountered in the use of ammonia-chlorine in Richmond. Marsden C. Smith. *Va. Polytech. Inst., Eng. Extension Div. Series, Bull.* No. 29; *U. S. Pub. Health Eng. Abstracts* 13, W, 72(July 1, 1933); cf. *C. A.* 28, 2389.—In first operating the Richmond plant,  $NH_3$  was added to the raw water about 2 min. ahead of the Cl. A residual Cl content was soon present over the settling basins and on top of the filters. It was several hrs. before the Cl appeared in the filter effluent and it was accompanied by disagreeable odors and tastes due to unloading the filters. When the filters were sufficiently cleaned after several hrs., the quality of the water improved. Cl and  $NH_3$  were applied in a 3 to 1 ratio.

C. R. Fellers

The detection of nitrite in water. M. Montalti. *Diagnostica tec. lab. (Napoli) Riv. mensile* 4, 488-92(1933).—The Zlataroff (*C. A.* 17, 2028), Vergnoux (*C. A.* 23, 3037) and Ravenna (*Analisi Chimica, C. A.* 16, 2095) reactions for the detection of nitrite have been compared. The sensitivities found in g. per l. were, resp.:  $5 \times 10^{-6}$ ,  $5 \times 10^{-4}$  and  $5 \times 10^{-7}$ . The last method is therefore to be preferred. The reagent is prepd. by mixing solns. A and B. Addn. of 5 drops of the reagent to 100 cc. of sample gives a rose coloration in dil. and an orange coloration in more concd. ( $5 \times 10^{-3}$  g. per l.) solns. of nitrite. Soln. A = 0.5 g. sulfanilic acid in 150 cc. 10% AcOH. Soln. B 0.2 g.  $\alpha$ -naphthylamine boiled in 150 cc. 10% AcOH followed by the addn. of 20 cc.  $H_2O$ .

L. W. B.

Water softening for municipalities. C. S. Childs. *Trans. N. Dak. Water & Sewerage Works Conf.* (1st, 2nd, 3rd and 4th Ann. Meetings) 148-53; *U. S. Pub. Health Eng. Abstracts* 13, W, 73(July 1, 1933).—Water softening is economically practicable and justifiable in communities

having hard waters. For every 80 p. p. m. of hardness removed, there is an approx. saving of \$5.00 per capita per year, divided equally between the user and the municipality. C. R. Fellers

**Columbus softens her water supply.** L. F. Warrick. *State Board of Health Bull. Wis.* 5, No. 14, 7(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 67(June 24, 1933).—High mineral and Fe content made softening an economical measure. Fe and Mn in water not only discolor the water, but stain clothes and fixtures, and impair water mains. An off-flavor is also imparted to the water. Flocculation of the Fe adds 1 more safeguard to the safety of the supply. C. R. Fellers

**Water softening at Quincy, Illinois.** W. R. Gelston, Jr. *J. Am. Water Works Assoc.* 26, 70-6(1934).—The hardness averages about 150 p. p. m. subject to seasonal variation. Softening aims to reduce this to 70 p. p. m. total hardness, 40 p. p. m. as carbonate and 30 p. p. m. as noncarbonate hardness. Aluminum or iron sulfate is first added, then after a short settling  $\text{CaO}$ , as the water goes to the first paddle mixers, then Na aluminate and returned sludge. A Dorr clarifier removes about 95% of the turbidity. After this the water is recarbonated and finally chlorinated. The cost averages between \$8.00 and \$9.00 per million gallons. D. K. French

**Softening reactions with barium carbonate or hydroxide.** J. Leick. *Wasser* 7, 197-205(1933).—Tables and graphs report data from a no. of expts. on the treatment of both natural and synthetic waters with  $\text{BaCO}_3$  or  $\text{Ba(OH)}_2$ . This method has the advantage of removing sulfate hardness without increasing the salt content of the water, as the sulfate as well as the Ca or Mg is pptd. The reaction is more complete at higher temps. The presence of  $\text{CO}_2$  favors the reaction, probably by the formation of  $\text{Ba(HCO}_3)_2$  which reacts more readily than the normal salt. Treatment with  $\text{BaCO}_3$  may increase the carbonate hardness, as the sulfate is pptd. because of the formation of  $\text{Ca(HCO}_3)_2$ . When used in conjunction with soda-lime or phosphate treatment, the baryta treatment must be first before the  $\text{CO}_2$  is removed. M. G. Moore

**Softening plant reduces soap usage.** E. S. Cary. *Water Works Eng.* 87, 65 6(1934). W. A. Moore

**The manufacture of artificial zeolites. The control of zeolite water softeners.** Paul G. Bird. *Iowa State Coll. J. Sci.* 8, 183-5(1933).—Optimum proportions for the artificial zeolite were  $\text{SiO}_2:\text{Al}_2\text{O}_3:2.2:1$ . The max. capacity was obtained when a gel was made to contain about 1.25 g. mols of  $\text{Al}_2\text{O}_3$  per l. The gel was filter-pressed, frozen at 21°F. for 48 hrs., dried at room temp. and tested for capacity. Freezing increased the capacity, as did the addn. of small amts. of  $\text{Na}_2\text{CO}_3$ , agar, casein or NaOH. Addn. of small amts. of NaCl,  $\text{Na}_3\text{PO}_4$  or  $\text{Na}_2\text{B}_4\text{O}_7$  or of large amts. of gluc, casein or  $\text{Na}_2\text{CO}_3$  cause a decrease in capacity. Automatic control of the regeneration of zeolite softeners could be effected by making use of the greater cond. of the softened water or of a light-sensitive control activated by the lines which appear in hard water but not in softened waters. F. E. B.

**Analytical problems connected with boiler waters.** G. Ammer and H. Schmitz. *Wasser* 7, 185-96(1933).—Volumetric methods for phosphate detn. are reviewed. A no. of attempts to det. phosphate and sulfate in the presence of each other are reported. Pptn. of phosphate with Ag ion, removal of excess Ag with Cl, and subsequent pptn. of sulfate with  $\text{BaCl}_2$  is not satisfactory, because of the marked adsorption of Ba ion by AgCl. Even after filtration, enough AgCl remains in colloidal condition to adsorb an appreciable quantity of Ba and thus introduce a large error in the back titration with K palmitate. Blacher's method for the detn. of sulfate (*C. A.* 3, 2335-6; 4, 2965) can be simplified for field and control work by omitting the heating to drive off  $\text{CO}_2$  and adding 2 cc. 0.1 N HCl and shaking instead. The results check the original method to within 3%. The following method is recommended as sufficiently accurate for boiler-water control for the detn. of phosphate and sulfate in the same sample (all reagents are 0.1 N): After detg. the alky. of the sample against both phenolphthalein and methyl

orange, add 10 cc.  $\text{CaCl}_2$  soln. and 1 cc. excess HCl, and heat the flask or shake until the  $\text{CO}_2$  is expelled. Just neutralize against phenolphthalein with NaOH, heat 2 min. longer to ppt. all the phosphate, cool and add a drop of HCl to neutralize. Titrate with K palmitate to a faint pink. This pts. the excess Ca. Add  $\text{BaCl}_2$  soln until the color disappears, and 2 cc. in excess. Brief heating ppts. the  $\text{BaSO}_4$  quantitatively. Back-titrate the excess Ba with K palmitate, as in the method of Blacher.

Data given indicate that the error in sulfate does not exceed 4%, that in phosphate sometimes reaching 10-15%. A similar method for the detn. of sulfate alone with soap soln. is given, with a correction curve. M. G. Moore

**The historical development of the treatment of boiler feed waters.** A. Splittgerber. *Wasser* 7, 156 74(1933), cf. *C. A.* 27, 3271.—A historical review, with 45 references, including mention of publications of recently organized societies. M. G. Moore

**The solution of silicic acid by water and its removal.** Hans A. Reimers. *Wasser* 7, 175-84(1933).—Equations show the decompn. of adularia ( $\text{KAlSi}_3\text{O}_8$ ) in nature by  $\text{CO}_2$ -contg. water with the ultimate formation of  $\text{Al}_2\text{O}_3$  and other products. The action of alkali carbonates on these intermediate products yields  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$ , which may remain in water as colloids for varying periods. Phosphate treatment does not remove silicates satisfactorily from boiler waters. Water (170 l.) previously softened with lime and contg. 6 mg./l.  $\text{SiO}_2$  was treated with 23.5 cc. of 20%  $\text{ZnSO}_4$  soln. with stirring. The flocc settled faster than an alum flocc, leaving the water clear and free from  $\text{SiO}_2$ . In a soda-lime treatment plant the Zn salt may be added along with these reagents. CaO or other base must be present. M. G. Moore

**Survey of the flora and fauna of the water supplies of the Madras Presidency.** S. A. Rafay. *Indian J. Med Research* 20, 1083-1100(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 104(Dec. 2, 1933).—The water supplies are subject to dense and rapid algal growths. Exptl work showed the amt. of  $\text{CuSO}_4$  required to destroy the several species. By treating one of the principal lakes with 0.3 p. p. m. of  $\text{CuSO}_4$ , the Cl requirement for purification decreased from 2 to 0.6 p. p. m. Extensive data are tabulated. C. R. Fellers

**Algal growths and water supply.** J. W. Husband. *Water and Water Eng.* 35, 765-80(1933).—By treating the water with 2-5 lb. of  $\text{KMnO}_4$  per million gal. growth of algae was prevented. W. A. Moore

**The removal of bacteria from water by the surface action of crystalline metals.** van der Leeden. *Wasser* 7, 90 103(1933).—The views of various authors regarding the mechanism of the oligodynamic action of pptd. Ag are briefly reviewed. Under the same conditions this material is as effective as catadyn Ag for water sterilization. The action of pptd. Cu ("Zement Cu") on water and sewage was investigated. Contact of dairy sewage with 10 g./l of this material reduced the bacterial count from  $15 \times 10^6$  per cc. to  $7 \times 10^4$  in 5 min. and to  $2.4 \times 10^4$  in 1 hr. Contact with 25 g./l. reduced a count of  $13.6 \times 10^6$  to  $2 \times 10^4$  in 30 min. Larger amts. of Cu gave no better results. Expts. with this type of sewage indicated that the use of a filter of pptd. Cu following chlorination still further reduced the bacterial count and reduced the residual Cl to a negligible amt. Filtration of domestic sewage through pptd. Cu alone indicated that the bactericidal action was not reliable but appeared to vary from day to day. Expts. on a com. scale showed that such a filter reduced a residual Cl content of 6-7 p. p. m. in domestic sewage to 1 or less p. p. m. Contrary data are presented from different plants on the use of pptd. Cu to remove slight amts. of residual Cl from drinking waters. M. G. Moore

**Bacterial removal by means of the electrocatadyn process.** G. A. Krause. *Wasser* 7, 74-89(1933).—The advantages of the electrocatadyn process over the static catadyn sand process include: (1) The cost is lower, as the cost of prepg. the Ag-carrying sand or other material is greater than the cost of the Ag used; (2) the electro process can be satisfactorily used with turbid waters; (3) the concn of Ag in the water can be readily controlled; (4) the process



can be practically automatic, requiring a min. of attention; and (5) but little plant space is required. The voltage used must be below the decompn. potential of water, not above 1.6 v. Aside from the size of the plant, current consumption depends on: (1) the elec. cond. of the particular water, and hence the mineral content, (2) the current efficiency for the particular water (about 50% for drinking waters), (3) the  $pH$ , neutral or alk. waters accelerating the sterilizing action, (4) temp., higher temp. being favorable, and (5) the degree of pollution of the water treated, the degree of bactericidal power desired, and the chances of adsorption of Ag by pipes, etc. The process is well adapted to the treatment of small amts. of water. Examples are given of its use in treating drinking water, bath waters (cf. *C. A.* 27, 4009), water for ice manuf., and its use on ships and in breweries. The sensitivity of organisms used in brewing to catadyn water makes it very satisfactory as a wash water in this industry. Five cuts and 36 references.

M. G. Moore  
Destruction of carbohydrates and organic acids by bacteria from a trickling filter. Max Levine and J. H. Watkins. *La. Eng. Expt. Sta., Bull.* No. 110, 54 pp. (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 39 (June 10, 1933).—The nature and type of bacteria capable of destroying lactic acid are described and discussed. A small building-lath filter, receiving *creamery wastes*, was the source from which 18 species of bacteria, falling into 9 genera, were isolated. Two of the species, *Vibrio carcharias* and *Lactobacillus acidovorans*, are new. Several species were capable of producing org. acids from carbohydrates and oxidizing these acid products. Other species utilized org. acids only without attacking carbohydrates. A reaction of  $pH$  5.0 inhibited the growth of nearly all these organisms. Such inhibiting reactions occur in the upper part of a trickling filter receiving milk wastes contg. 0.5–0.6% lactose. AcOH was readily attacked by 14 species of bacteria, but only 2 attacked chloroacetic acid. Cf. *C. A.* 26, 5482.

C. R. Fellers  
Operation of Brantford filtration plant. F. P. Adams. *Can. Engr.* 64, No. 13, 66–7 (1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 104 (Dec. 2, 1933); cf. *C. A.* 27, 4406.

C. R. Fellers  
A critical survey of the problems of the reconditioning of water mains and its proved economic solution. A. Gossley. *Water and Water Eng.* 36, 24–8 (1934).—The causes of corrosion in water mains and the various methods used in reconditioning them are discussed. The electrodeposition of bitumen from an aq. soln. is recommended. The pure bitumen deposited on the walls of the pipes is tasteless, odorless, and adheres tightly to the pipes. It is not affected by traffic vibrations. The mains can be reconditioned in 6 hrs. by this method. W. A. M.

F. C. Gaiser, *Wasser* 7, 104–16 (1933).—Ten tables present data from a no. of lab. expts. on the changes in concns. of salts,  $CO_2$ , etc., in both standing and circulating water with time, the changes being due to evapn. or contact with Fe, wood, marble, lime, etc. Conc. changes were greater in running water. The original lime content of the natural water rather than the  $CO_2$  content is probably the important factor in salt pptn. and hence the formation of tufas in nature.  $CO_2$  may be removed from many natural waters without the pptn. of lime, while marble sometimes acts as a seeding agent for its pptn.

M. G. Moore  
Economics of corrective treatment for cold-water corrosion—application in public water supplies. Edward S. Hopkins, James W. Armstrong and John R. Baylis. *Ind. Eng. Chem.* 26, 250–4 (1934).—The effects of lime treatment on the cost of steam generation, soap consumption, renewal of pipes, and industrial water softening are discussed. Comparative costs of water softening by means of lime, caustic soda and soda ash are given. W. A. M.

E. A. Anderson, C. E. Reinhard and W. D. Hammel. *J. Am. Water Works Assoc.* 26, 49–60 (1934).—Tests were made with galvanized iron as the source of zinc, in distd. water with and without Cl. The addn. of Cl in amounts up to 5 p. p. m. reduced the rate of corrosion when compared to

that in distd. water. In distd. water in 7 days enough Zn went into soln. to render the water unfit for drinking. The max. safe concn. of Zn in drinking water is 40 mg. per liter. Fifteen references.

D. K. French  
Treatment of flood waters in Bradford field for the removal of corrosive suspended matter. L. J. Clarke. *Oil and Gas J.* 32, No. 34, 16, 18 (1934).—Lime is added to the water to form  $CaCO_3$  which forms a protective coating on the interior of the pipes.

J. R. Strong  
Water-supply system and sewers at Flin Flon. Frank R. Simmons. *Can. Engr.* 64, No. 9, 25–7 (1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 104 (Dec. 2, 1933).—An illustrated description of the unusual conditions which had to be provided for in installing water and sewerage systems in frozen muskeg and rock. Most of the piping was above the surface of the frozen ground and was enclosed in wooden boxing packed with sawdust.

C. R. Fellers  
Construction and operation experiences of the Town Sewerage Board in Duisburg-Hamborn. W. Seeger. *Gesundh.-Ing.* 55, 159, 173 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 36 (May 20, 1933).—A plant consisting of 3 settling-seepage tanks, each with a capacity of 3 l. per sec., and retention period of 35 min., removes the coarse solids. The effluent flows into the Rhine.

C. R. Fellers  
The development of a chemical process for treatment of sewage. Willem Rudolfs. *Sewage Works J.* 5, 207–9 (1933); cf. Gleason and Loonam, *C. A.* 27, 2510.—A discussion of the relative merits of the Guggenheim chem. process for the treatment of sewage, especially with regard to simplicity of operation and cost.

E. Hurwitz  
Functions of the sewage-treatment laboratory. Michael J. Blew. *Sewage Works J.* 5, 312–18 (1933).—B. emphasizes the importance and necessity of an efficient lab. for controlling and correctly operating a modern sewage-treatment plant. Suggestions are given as to the no. and kind of phys., chem., bacteriol. and operating tests necessary, depending on the kind of treatment employed. The value of lab. data and research is also discussed.

E. H.  
Mechanical equipment in sewage-treatment works. IV. Sedimentation tanks. A. Prescott Folwell. *Pub. Works* 63, No. 9, 12–14 (1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 20 (Mar. 11, 1933); cf. *C. A.* 27, 2234; 28, 1435.

C. R. Fellers  
Baltimore sewage-treatment plant and experimental work. Geo. E. Pinck. *American City* 48, No. 3, 55–7 (1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 39 (June 10, 1933).—The Back River plant, located 7 miles from Baltimore, treats daily 60–5 million gals. of sewage. The sewage flows through a bar screen house to a meter house, and from there to 4 settling tanks, each 103 by 420 ft. with a depth of 10–14 ft. The settled sewage continues through 4 revolving screens and thence through conduits contg. butterfly valves to 30 acres of trickling filters, 10–14 ft. deep. On leaving the filters the sewage flows through 2 final settling tanks to an automatically operated hydroelec. plant and into the Back River. The sludge is dried for use as fertilizer.

C. R. Fellers  
Milwaukee sewage-disposal plant. Charles Dick. *Natl. Engr.* 37, 421–4, 426 (1933).—Operating experiences with the conveying and drying of sludge are outlined.

A. W. Furbank  
Sewage disposal at Johannesburg, S. Africa. E. J. Hamlin and H. Wilson. *Surveyor* 83, 203–4 (1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 27 (Apr. 22, 1933).—The plants and equipment are described.

C. R. Fellers  
Results of investigations in the operation of the municipal sewage-disposal plant of north Nürnberg. Eduard Merkel. *Wasser* 7, 206–32 (1933).—The plant, serving a population of 193,000, consists essentially of 4 settling basins, each of 1000 cu. m. capacity and supplied with 2 conical sludge-collecting pits at the outlet end; 2 groups of 4 sludge-digestion units, each of 750 cu. m. capacity; and sludge-drying beds of 8000 sq. m. area. Structural features and operation are given in detail. The plant handles an av. of 720 l. of sewage per sec., of which about 120 l. is surface water from a small stream. Mech.

clarification of 95% or more is obtained. 200 cu. m./day of fresh sludge is collected. The dried sludge (6% of the wt. of the fresh) contains about 18% sand, 12-5% raw fat and 62% other org. matter. Gas collected from the digestion tanks averages 3210 cu. m. daily with a heat value of 54-5500 cal./cu. m. During the winter the digesting sludge is heated. Tables show the character of entering sewage, effluent and sludge, as well as conditions in the small stream (flow of 8-10 cu. m./sec.) receiving the effluent.

M. G. Moore

Approach to city saved by sewage-works design, construction and operation of Saranac Lake Plant. Henry N. Taylor. *Sewage Works J.* 5, 278-88(1933).—The diversion of raw sewage from the Saranac River to the new Saranac Lake plant removed objectionable and unsightly river water conditions. The plant and operation are described.

E. Hurwitz

One-man sewage-plant operation. Lewis D. Suhr. *Munic. Sanit.* 4, No. 3, 80-3(1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 37 (May 20, 1933).—A flow sheet and routine operation of the Woodstock, Ill., plant is described.

C. R. Fullers

Shallow clarification basins (as separate settling units) for sewage treatment considered from the chemical standpoint. W. Husmann. *Wasser* 7, 233-8(1933).—The relative merits of the Imhoff tank (1) and sep. settling basins and digesting units (2) are discussed from the chem. and hygienic standpoints, without regard to factors of economic and engineering importance. The direct connection between digesting sludge and fresh sewage in (1) permits septic sludge at times to be stirred up and to contaminate the clarified effluent, this sometimes producing an effluent of poorer quality than the influent. The sudden entrance of large amts. of solid matter or of cold water of higher d. may produce these conditions by rapidly sinking to the bottom and thus causing the sludge to rise. The argument that in (2) the sewage being clarified is too long in contact with the settled sludge is not valid in the case of modern basins with continuous mechanical removal of settled sludge. In this type of shallow basin aerobic conditions prevail. However, if sludge removal is not quant., anaerobic conditions may develop in the old sludge and thus produce objectionable conditions in the clarified effluent.

M. G. Moore

Experiences with the treatment of sewage from food industries. G. Bode. *Wasser* 7, 259-71(1933).—Sewage from factories using potatoes in the production of alc., etc., can be treated without difficulty at the city disposal plant. Wastes from factories using the molasses by-product from sugar factories as raw material require special treatment. These liquors are often evapd. at the plant, the residue is burned and the K salts are extd. Two cases are considered where evapn. was not possible. The use of trickling units was not advisable because of the sensitiveness of this process to changes in the concn. of the sewage, the presence of disinfectants from wash waters, etc. In order to prevent the wastes from becoming foul in the stream receiving them care was taken to maintain aerobic conditions. The water leaving the plant at 90° was allowed to fall in fine streams 25 cm. into the 1st of 3 basins, and then was allowed to overflow into the 2nd basin while the temp. dropped to 30°. Tables reporting total solids, N, KMnO<sub>4</sub> consumption, etc., both at the plant and along the small stream receiving the effluent indicate satisfactory operation.

M. G. Moore

The treatment of spent gas liquor in admixture with sewage at the sewage purification works at Cheltenham. 4th Report of the Liquor Effluents Subcommittee. F. R. O'Shaughnessy. *Trans. Inst. Gas Engrs.* 79, 422-30 (1929-30).—See *C. A.* 24, 4108. Alden H. Emery

Soundness tests for sewage filter media. H. G. Payrow. *Civil Eng.* 4, 90-2(1934).—Resistance to the strain caused by recrystn. of Na<sub>2</sub>SO<sub>4</sub> repeatedly taken up by limestones and slags is used as a test of resistance to freezing and thawing.

Ann Nicholson Hird

Explosions in sewers. J. J. Jessup. *Munic. Sanit.* 3, 197(1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 43(June 17, 1933).—Stagnant gases from leaky gas mains and gaso-

line vapors are the most common cause of sewer explosions in Los Angeles. Gasoline should not be disposed of in sewers.

C. R. Fullers

Explosion and health hazards in sewage-works operation. G. W. Jones. *Sewage Works J.* 5, 289-301(1933).—The 2 definite hazards involved in the handling, disposal and utilization of sewage gas are (a) explosion hazard, (b) health hazard due to presence of toxic constituents and low O content of gas.

E. Hurwitz

Copper and biological sewage treatment. F. Sierp and F. Fränsemeier. *Wasser* 7, 239-58(1933).—Lab expts. on domestic sewage are reported. The hydrolytic acidity of Cu salts is neutralized in whole or in part by the carbonates or proteins present in sewage. The Cu is pptd. as sulfide if H<sub>2</sub>S is present. Samples of fresh sludge were treated with varying amts. of CuSO<sub>4</sub> and seeded with old sludge to which no Cu had been added. The effect of the Cu varied with the individual type of sludge, but in general the presence of up to 0.5-1% Cu (on the dry wt. of sludge) produced no noticeable decrease in 8-day or 184-day gas production. Larger amts. of Cu decrease gas production markedly and even cause acid fermentation. In such cases a drop occurs in the 8-day curve at 0.5-1.0%, in the 184-day curve at 1.5% Cu. Curves showing O<sub>2</sub> consumed against time for the digestion of domestic sewage—not sludge—showed that Cu in concns. up to 5 mg./l. decreased the values of O<sub>2</sub> consumed slightly but did not alter the general shape of the curve. Amts. greater than 10 mg./l. did alter the curve, the initial rise occurring about 24 hrs. later. When consumed O<sub>2</sub> is plotted against Cu concn. a sharp break occurs in the curve at about 20 mg./l., the curve being practically horizontal to the axis of Cu concn. beyond this point. A curve of total no. of bacteria against Cu shows a sharp break at the same point, but contrary to expectation, the total no. of bacteria increases with Cu concn., although the no. of *Es. coli* decreases. Increased Cu content delays the time at which nitrification begins. In normal sewage the lower the initial pH, the lower is the 5-day biochem. O demand. The effect is more pronounced when Cu ion (5 mg./l.) is present. Lab. expts. on the activated-sludge process indicated that domestic sewage undergoes normal digestion in the presence of 1 mg./l. of Cu ion. Three mg./l. retarded the process appreciably and 20 mg./l. fed intermittently was distinctly detrimental. Of the Cu added 80% was found in the dried sludge, 20% having gone off in the effluent.

M. G. Moore

Regulations on use of sewage for irrigating crops. Anon. Calif. Dept. Pub. Health, *Special Bull.* No. 59, 3 pp.(May 27, 1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 64(Sept. 30, 1933).—The use of raw untreated sewage for fertilizing or irrigating growing crops is prohibited. Effluents from septic, Imhoff or settling tanks may be used for watering or fertilizing only such crops as nursery stock, cotton, hay, rice, alfalfa and fodder corn. Milk cows will not be pastured on land wet with untreated sewage.

C. R. Fullers

Factors affecting the efficiency of sewage sedimentation. G. J. Schroepfer. *Sewage Works J.* 5, 209-32(1933). Sedimentation of sewage is influenced by 4 factors: (a) characteristics of liquid, (b) characteristics of the solids, (c) phys. characteristics of the design and (d) miscellaneous effects. Under (a) it is shown that viscosity changes in the liquid have a more important effect on the hydraulic values of the particles than do changes in sp. gr. of the water due to temp. variations. Under (b) the characteristics of the solids, their size, sp. gr., concn. and shape, influence sedimentation of sewage somewhat in the order named. Flocculation and coagulation exert variable effects. (c) Various factors affecting sedimentation under characteristics of design might be placed in the following order according to importance: detention period, inlet and outlet effects, depth and ratio of length to depth, velocity of flow, shape of tank and bottom surface area. Mechanism effects exert either a negligible or a variable influence, depending on the design and operation. (d) Miscellaneous features such as currents, eddies and biol. effects exert some influence. The influence of elec. effects

and bottom reaction appears to be negligible in sewage sedimentation.

**Additional comments on Fair and Moore's article on "Heat and energy relations in the digestion of sewage solids."** D. Althausen, C. S. Boruff, A. M. Buswell and G. E. Symons. *Sewage Works J.* 5, 233-5(1933); cf. *C. A.* 27, 2510.—Excessive gas yields per g. of volatile matter digested are probably due to error in detg. the total solids and volatile matter content of the raw and digested sludges rather than in measurements of the gases produced. Evidence is also given that all of the data used in Fair and Moore's math. considerations are based on batch expts. which do not represent the true course of digestion of materials as observed in practice. E. H.

**Mechanism of the activated-sludge process.** C. Lumb. *Surveyor* 83, 229-30(1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 27-8(Apr. 22, 1933).—The removal of colloidal matter from sewage by activated-sludge treatment is discussed. The explanation of the mechanism of the clarification stage of the activated-sludge process involves physicochem., enzymic, biol. and biochem. phenomena.

**Chemical treatment of sludge to facilitate disposal.** Charles C. Agar. *Sewage Works J.* 5, 270-7(1933).—A résumé of satisfactory experiences showing the value of chemicals in making possible economical and convenient methods of conditioning sludge for disposal. Among the chemicals most frequently used are lime, chloride of lime, alum, chlorinated copperas and  $\text{FeCl}_3$ . E. H.

**Prefiltration treatment of sewage sludge.** F. W. Mohlman and G. P. Edwards. *Ind. Eng. Chem.* 26, 226-30(1934).—Numerous filter aids, both chem. and phys., were tested. It was found that digested sludge required more  $\text{FeCl}_3$  than activated.  $\text{Na}_2\text{Cr}_2\text{O}_7$  added up to 1% reduced the amt. of  $\text{FeCl}_3$  required and prevented the loss of ferrous Fe in the filtrate. A smaller amt. of  $\text{FeCl}_3$  is required if lime is added after the  $\text{FeCl}_3$  treatment to raise the  $\text{pH}$  to 9 or higher.  $\text{FeCl}_3$ ,  $\text{NaCl}$  and  $\text{FeSO}_4$  plus lime were found to be of no value. Paper pulp when used in amts. equal to 50% of the wt. of dry sludge aided filtration. Preheating of fresh sludge from 22.2 to 32.2 before  $\text{FeCl}_3$  treatment improved filtration. W. A. Moore

**The disposal of surplus activated sludge.** H. D. Bell. *Munic. Eng. Sanit. Record* 92, 745-7(1933); cf. *C. A.* 27, 2234.—An outline is given of experience with a plant at Barnsley based on the discovery that it is possible to sep. up to 65% of the supernatant liquor from activated sludge by mixing it with an inert material with a rough surfaced contour such as sand. A. W. Furbank

**Laboratory experiments on the thermophilic digestion of sewage sludge.** H. Bach. *Wasser* 7, 289-310(1933).—The work of Rudolfs and Heukelejian (cf. *C. A.* 25, 1928) is briefly reviewed and checked. The "thermophilic" sludge used for seeding was prepd. by incubating fresh domestic sludge in a medium favoring the development of  $\text{CH}_4$ -producing bacteria (5 g.  $\text{Ca}(\text{OAc})_2$ , 0.5 g.  $\text{NH}_4\text{Cl}$ , 0.25 g.  $(\text{NH}_4)_2\text{HPO}_4$  and distd. water to 500 g.) at 48° for 3 weeks. Three flasks, each contg. 500 g. of fresh sludge, were incubated at 50°. A was seeded with 25 cc. of thermophilic sludge, B with 25 cc. of Imhoff tank sludge, and 25 cc. of water was added to C. Gas production in A began immediately and reached 10.8 l. after 30 days. In B gas began to be appreciably evolved after 10 days and reached 8.65 l. after 48 days. Gas production did not begin in C until after it had ceased in A and B (55 days) and reached 35.18 l. after 118 days. From the fact that the wt. of sludge decompd. in C lay between the wts. for A and B, B. concludes that the gas produced in C was largely  $\text{H}_2$ . Three flasks, each contg. 800 g. of equal parts of thermophilic and fresh sludge, were incubated at 50°, 25 g. of fresh sludge being added to each daily. An av. of 21.9 l. of gas was produced in 47 days, 595 cc. per g. of org. matter decompd. or about 100 cc. per g. of added org. matter. A similar expt. on continuous digestion indicated that a vol. of less than 500 cc. of the digesting sludge mixt. was sufficient to decompose 1 g. of org. matter (dry wt.) daily, while with mesophilic digestion 1 l. is required. Advantages of the thermophilic process would be speed of

digestion, large amt. of gas produced, and saving in plant space and hence in construction cost. However, the sludge is more alk. and the odor more objectionable than that of sludge produced at lower temps. It does not drain or filter readily, the org. matter seeming to remain in colloidal condition. No satisfactory method of settling this was found. Three cases of the use of thermophilic digestion in plants are briefly reviewed. M. G. Moore

**Treatment of sewage sludge by bacterial digestion.** Herbert C. Whitehead and Francis R. O'Shaughnessy. *Proc. Inst. Civil Engrs.* (London) 233, 38-135(1931). See *C. A.* 27, 1692. Ann Nicholson Hird

**Water-pollution research.** A. Parker. *Munic. Eng. Sanit. Record* 92, 888-9(1933).—The solvent action of many natural waters on lead service pipes, with resulting contamination, is briefly discussed. A. W. Furbank

**Water from coke-chemical plants.** P. I. Kotliarov. *Coke and Chem.* (U. S. S. R.) 1932, No. 12, 13-21.—Treatment of water discharged from coke and coke by-products plants in the European and U. S. practice is described. James Sorrel

**The effect of precipitants on textile waste liquors.** H. P. Chrisco, A. McLaren White and H. G. Baity. *Sewage Works J.* 5, 674-84(1933).—Chem. treatment of the waste liquors is necessary before discharge into the stream and factors affecting exact treatment are: (1) use of stream, (2) diln. factor afforded, (3) biochem. O demand, (4) acidity or alk., (5) color, (6) odor and (7) suspended solids. Tables and details of exptl. work on 29 different textile wastes are given. For each waste coagulation tests were run with varying amts. of different reagents. The  $\text{pH}$  and the color were measured for each waste before and after treatment. Color detn. was made by comparison with Pt-Co standards. Reagents used in this work were alum, lime, copperas,  $\text{CaCl}_2$ ,  $\text{FeCl}_3$ ,  $\text{H}_2\text{SO}_4$  or mixts. of these. The textile wastes were classified under the following types: (1) indigo wastes, (2) S wastes, (3) processing wastes, (4) miscellaneous dye wastes. In general it seemed that copperas and lime together formed the most satisfactory treating material for color removal. E. H. Hurwitz

**Water-borne typhoid fever in Chamberlain, S. D.** W. W. Towne. *J. Am. Water Works Assoc.* 26, 99-110(1934).—Temporary discontinuance of the sedimentation basin due to freezing is considered as a possible cause of the epidemic, permitting infection of the distribution system. Milk and food supplies were not probable sources. D. K. French

**Twelve months' records of mosquito breeding in Telok Anson with special reference to hydrogen-ion concentration.** A. G. Badenoch. *Malayan Med. J.* 7, No. 3, 82-7, 90(1932); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 10(June 24, 1933).—Colorimetric detn. of natural waters of this region show a  $\text{pH}$  of 4-8.5. Common species of *Anopheles* and *Culex* were found breeding throughout this range. Neutral and slightly alk. waters favored *Anopheles* in preference to acid waters. C. R. F.

**Respiration of mosquito larvae and pupae and the effect upon them of petroleum, shade and dirty water.** L. Kalandadse. *Arch. Schiffs-Tropen-Hyg.* 37, 88-103(1933); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 10(June 24, 1933).—Larvae of *Culex*, *Stegomyia* and *Anopheles* can survive submergence for several hrs., the time of survival of *Stegomyia* being greatest. Petroleum is considered to be a contact poison acting through the tracheae. Horse manure pollution discouraged *Anopheles* breeding. C. R. Fellers

**Presence of *Anopheles* larvae in the salt waters of Tunisia Sahel.** Georges Villain. *Riv. malarial.* 11, 346-52(1932); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 23(Oct. 7, 1933).—Fourth stage *Anopheles* *egyptii* reared in fresh water and transferred to  $\text{NaCl}$  soln. at 24° were unaffected by concns. not exceeding 0.9%. A 1.1% soln. was fatal in 4-7 days. Sea water was less lethal than  $\text{NaCl}$ , 1.5% sea water having the same toxic effect as 1.2%  $\text{NaCl}$  soln. *A. multicolor* was reared in salt water which was 20% higher than sea water in salt concn. C. R. Fellers

**Results of biological and chemical investigations on the effect on fish of waste waters containing potash.** G. Ebeling. *Wasser* 7, 272-88(1933).—About 25 individual lab. expts. are reported on the effect of mill tailings and wash waters from kieserite ( $MgSO_4 \cdot H_2O$ ) on fresh-water fish and lower animals which serve as their food. Similar expts. with K, Mg or Na salts alone showed that the poisoning action of these wastes was due first to the specific action of K ion, second to Mg, and not to osmotic effects. The presence of Ca ion tends to annul the poisoning action of K. A study of both biol. and chem. conditions in a stream receiving such wastes is reported. Bibliography is given. M. G. Moore

**Destruction of a house-infesting tick, *Liponyssus nagoyoi*.** Saburo Mitsuohori. *J. Pub. Health Assoc. Japan* 8, No. 11, 14(1932); *U. S. Pub. Health Eng. Abstracts* 13, P, 3(June 3, 1933).—This small tick bites men and animals and is able to transmit plague. Volatile chemicals, except  $C_{10}H_8$  and camphor, were effective in destroying the ticks. The recommended contact chemicals are  $CCl_4$ ,  $CHCl_3$ ,  $C_6H_6$  and chloropicrin. C. R. Fellers

**Chlorinating an open bathing beach.** Leonard M. Board. *Munic. Sanit.* 3, 194(1932); *U. S. Pub. Health Eng. Abstracts* 13, Sw, 6(June 17, 1933).—*Es. coli* at a fresh water bathing beach was effectively controlled by the application daily of HTH powder (a Cl compd.) to the surface of the water. The residual Cl never exceeded 0.1 p. p. m. All gas-forming bacteria were not destroyed. C. R. Fellers

**New public baths in Copenhagen sports ground.** A. Hüttemeier. *Ingeniøren* 40, 252; *U. S. Pub. Health Eng. Abstracts* 13, Sw, 7(June 24, 1933).—The tank holding 220,000 gal. and maintained at a temp. of 22° is filled from the city water supply, and the water is recirculated every 5½ hrs. It is purified by mech. filtration at the rate of 65 gal. per min. and by chlorination at the rate of 0.2 p. p. m. of liquid Cl. Aeration is by compressed air. Sea salt, 1%, is added. C. R. Fellers

**Taste and odor control with activated carbon.** Henry Wiesner, Jr. Proc. 8th Ann. Conference Water Purification, W. Va. Univ. Tech. Bull. No. 6, 42 3(1933).—Better taste and odor removal was obtained with smaller dosages of activated C by introducing it into the water just before filtration than by adding it with the coagulants. G. L. K.

**Activity of nonpathogenic bacteria utilizing mineral matter in the thermal water of Aix-les-Bains and Aix-Burtscheid (Schloemer) 11C.** App. for removing sludge from tanks used for sewage treatment (U. S. pat. 1,947,429) 1. App. for controlling the admixt. of gases and liquids as in treating water with Cl (U. S. pat. 1,945,757) 1.

**Water Softening and its Control.** London: Imperial Chem. Industries, Ltd. Reviewed in *Water & Water Eng.* 36, 30(1934).

**Water purification.** Ralph A. Stevenson (to Great Western Electro-Chemical Co.). U. S. 1,946,818, Feb. 13. Sludge removed from material such as in water or sewage purification is separately chlorinated and the chlorinated sludge is then used to effect pptn. of undesirable suspended matter.

**Apparatus suitable for filtering water.** Marcel Lamort (to Établissements E. & M. Lamort Fils). U. S. 1,945,491, Jan. 30.

**Apparatus suitable for filtering water, etc.** Edmund von Maltitz. U. S. 1,945,839, Feb. 6. Structural and mech. details.

**Apparatus suitable for filtering cistern water.** Gregory T. Hiatt. U. S. 1,946,163, Feb. 6.

**Regeneration of manganese filters during operation.** Dénes Molnár. Hung. 107,175, Sep. 1, 1933. Mn filters can be regenerated in works where excess Cl is added to the water before the Mn filter and excess Cl is removed by active charcoal or thiosulfate after filtration, by increasing the Cl addn. and making the water slightly alk. The Cl-free water is then aerated to remove its aggressivity.

**Apparatus for introducing a chemical into water in proportion to its flow.** Compagnie pour la fabrication des compteurs et matériel d'usines à gaz. Fr. 756,828, Dec. 15, 1933.

**Proportionate feeding of fluids such as water-treating reagents.** Reginald M. Banks, John H. Banks and William W. Burritt. U. S. 1,946,474, Feb. 13. Various details of app. and operation are described.

**Apparatus for carbonating water.** John R. Manley (to Manley Automatic Co.). U. S. 1,945,489, Jan. 30. Structural features.

**Softening water.** Hall Laboratories Inc. Fr. 756,761, Dec. 15, 1933. Water contg. Ca and Mg compds. is softened by adding thereto an alkali metaphosphate, preferably in amt. of at least 4 gram-mols. of  $NaPO_3$  for 1 gram-mol. of Ca compd. in the water. The  $NaPO_3$  is preferably sold mixed with an alk. reagent.

**Softening and degassing boiler water.** Chemische Fabrik Budenheim A.-G. (Guido Hedrich, inventor). Ger. 589,963, Dec. 19, 1933 (Cl. 85b. 1.01). The water is softened and degassed by adding  $Fe(H_2PO_4)_2$  and alkali or alkali phosphate.

**Base-exchange water-softening apparatus.** The Permutit Co. Brit. 400,762, Nov. 2, 1933.

**Base-exchange water-softening apparatus.** Wm. Bobb & Co., Ltd., and Charles Wm. Gidlow-Jackson. Brit. 401,025, Nov. 9, 1933.

**Base-exchanging substances.** Aktiebolaget Filtrum. Brit. 401,235, Nov. 9, 1933. The process of Brit. 395,185 (C. A. 28, 240) is modified by adding the neutral salt, e. g.,  $CaCl_2$ , in a solid powd. or other finely divided state to the mass of base-exchanging clay.

**Gel production from solid reagents.** Wm. Vaughan (to Permutit Co.). U. S. 1,945,838, Feb. 6. In forming a gel such as a water-softening zeolite gel, reagents such as Na silicate and Na aluminate are mixed in dry powd. form, the dry mixt. is moistened with water, the moist mixt. is allowed to stand and is then dried and washed with water.

**Regenerating water-purifying zeolite beds.** Dana Burks, Jr. (to Board of Trustees, Univ. of Ill.). U. S. 1,947,248, Feb. 13. In a process involving water treatment, a regenerating stage in which brine is passed through the bed, and a washing stage in which water is passed through the bed in the same direction but at a more rapid rate than in the water-purification stage, the regenerating brine comprises approx. the last two-thirds of the effluent of a previous regenerating stage and the first part of the effluent of a previous washing stage, mixed and with addn. of regenerating salt (the shift from the washing stage to a following water-purification stage being effected by reducing the rate of flow of water through the zeolite bed).

**Agent for cleaning boilers.** The Minister of Navy (Toyoshirō Miyoshi, inventor). Japan. 99,816, Feb. 27, 1933. The agent is a mixt. of alkali phosphates, aluminates, nitrites (or sulfites) and caustic alkali (or alkali carbonate).

**Preventing boiler incrustation.** Alfred Pfeiffer. Ger. 590,705, Jan. 8, 1934 (Cl. 85b. 1.36). Addn. to 510,299 (C. A. 25, 1016). An alternative method of arranging the coated fabric, used in the method of Ger. 510,299, is described. As a further alternative, appropriate reagents in powd. form may be wrapped in an uncoated fabric. Cl. C. A. 27, 2236.

**Apparatus for sterilizing water or sewage with chlorine** Gerald D. Peet. Brit. 401,589, Nov. 16, 1933.

**Sewage treatment.** Wm. C. Laughlin (to Filtration Holding Corp.). U. S. 1,945,051, Jan. 30. After screening out coarse particles, sewage is treated with a "collecting agent" comprising a finely divided fibrous material such as waste paper or paper pulp in water suspension, capable of absorbing grease particles and forming a semi-solid mass, the materials are then passed through a clarifier app. for removing a portion of the solid-free liquid, and solids and semi-solids are treated in a second clarifier app. for removal of a further portion of the liquid; the liquid is recirculated into the first clarifying app. for further treatment, and resulting solids and semi-solids are subjected

to further liquid and solid sepn. An app. arrangement is described.

**Sedimentation tanks for treating sewage, etc.** Reginald A. Dibdin. Brit. 401,804, Nov. 16, 1933.

**System for purifying sewage with activated sludge.** Franz Leiner. Ger. 591,260, Jan. 18, 1934 (Cl. 85r. 3.02).

**Controlling the humidity and temperature of the air in buildings.** George H. Fisher (to Minneapolis-Honeywell Regulator Co.). U. S. 1,946,903, Feb. 13, 1933. Various details of app. and operation are described.

**Preparations for purifying air and liberating oxygen.** Ewald Herzog (to Deutsche Gold & Silber Scheideanstalt

vorm. Roessler). U. S. 1,946,460, Feb. 6. An alkali metal peroxide 100 is treated with water 6-9 parts in the form of a spray at a temp. of about 0° and in the presence of a catalyst such as  $MnO_2$  which promotes  $O$  liberation in the presence of  $CO_2$  and water.

**Air-conditioning apparatus (including an ozonizer).** Arthur A. Roesch (to Roesch Enamel Range Co.). U. S. 1,945,379, Jan. 30. Structural features.

**Oligodynamic treatment of liquids.** Oligodyn A.-G. Fr. 756,351, Dec. 8, 1933. The metal having oligodynamic action is brought into action by an elec. current, the electrodes being mounted on a common base in the form of a handle.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

**General system of soils.** Eick 'Sigmund. *Math. naturw. Ans. ungar. Akad. Wiss.* 49, 79-101(1932).—See C. A. 27, 1909.

**The dynamic properties of soil.** V. Dynamics of soil on plow moldboard surfaces related to scouring. Ralph D. Doher and M. L. Nichols. *Agr. Eng.* 15, 9 13(1934); cf. C. A. 27, 3277.

**Some properties of the soil solution and the colloids in certain Iowa soils.** Gordon B. Killinger. *Iowa State Coll. J. Sci.* 8, 203-4(1933).—Nine soils from different parts of the state were examd. The difference in colloidal content might be useful in detg. soil types. The org. matter was chiefly colloidal. When N was high, C and P were also high. The water-sol. minerals were not present in soil solns. in the same ratio as in the soils. The equiv. for base exchange was related to the loss on ignition. Colloids from the soils promoted gas production by anaerobic bacteria.

**A review of results of dielectric methods for measuring moisture present in materials.** N. E. Edlefsen. *Agr. Eng.* 14, 243-4(1933).—A given quantity of water when distributed evenly through a soil produces a greater change in the dielec. const. of comparatively dry soil than it does in the same soil when relatively wet; however, the relation is practically linear for percentages of water up to the moisture equiv. of the particular soil under investigation. Eleven references.

**Study of the relation of the organic content of soil to its pH.** J. R. Endsley and W. F. Hall. *J. Tenn. Acad. Sci.* 9, 78-83(1934).—Studies made in western Tenn. showed both soil and subsoil to be acid in correlation with org. matter present and with sandness of soil.

**The nature of the base-exchange material of soils and of the bentonitic clays as revealed by chemical investigations and x-ray analysis.** W. P. Kelley and W. H. Dore. *Trans. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 34-6(1933)(in English); cf. C. A. 25, 1317.—Examn. of soil colloids sepd. by sedimentation and freed from org. matter by  $H_2O_2$  oxidation indicated that replaceable base can often be increased several fold by dry grinding in a ball mill. Similar results were obtained with bentonites. The replaceable element showing the greatest increase is Mg, although with one bentonite and colloids from humid soils, K and H were also increased. Grinding exposes new surfaces with replaceable bases which may differ from those previously at the surface. X-ray diffraction patterns by the powder method of 9 bentonites and 6 soil colloids, examd. in the original state, ground for a long time and also after satn. with various bases, indicated essentially similar cryst. structure with only slight differences attributable to different absorbed bases and impurities. Bentonites showed a simpler structure than soil colloids; there seem to be 5 classes of the former, and lines from the latter sometimes included 2 of these classes. Replaceable bases are indicated to be an integral part of the cryst. structure, not merely adsorbed on surfaces, although in ordinary exchange studies only the latter are replaced. The original base in the bentonites

and California soil colloids was Mg, later more or less replaced by Ca, K, Na, etc. The Cecil colloid is a cryst. acid salt. These inorg. base-exchange materials form a closely related series of secondary products from weathering. The ratio  $SiO_2:Al_2O_3$  varies, without great effect upon crystal structure. The effects of heating as well as these chem. and x-ray studies indicate that the soil colloid is no well-known zeolite, but probably a true clay mineral related to montmorillonite, a Mg aluminosilicate.

**The causes and mechanism of an increased cation exchange in various soils after  $Ca(OH)_2$  treatment.** A. Th. Tyulin and E. M. Bystrova. *Trans. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 85 107(1933)(in English).—A review and extended discussion of lab. expts. with various soils and artificial gels, from which it is concluded that increase in exchange capacity following  $Ca(OH)_2$  treatment is due principally to activation of "coagels" formed by the mutual pptn. of oppositely charged sols, e. g., negatively charged clay and positively charged  $R_2O_3$  aq. This passive gel can again acquire a neg. charge and upon  $Ca(OH)_2$  treatment  $Ca^{++}$  is adsorbed, to be released subsequently by exchange with other cations. Thirty-six references.

**Exchangeable cations of the soil and plant.** K. K. Gedroiz. *Trans. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 71-83(1933)(in German); cf. C. A. 28, 2089.—A general discussion with description of pot expts. in which oats, mustard and buckwheat were grown in heavy chernozem from which all exchangeable bases had been removed and replaced by Ca and K furnished at different rates by complete fertilizer. Yields indicated that the crops secured sufficient K and Mg for max. growth from the soil contg. only exchangeable Ca. In similar expts. with soil satd. with other elements, the crop on the fertilized Ca soil was slightly superior to that on the original soil; that on Sr soil was somewhat inferior, but practically equal when the fertilization was supplemented by  $CaCO_3$ . Small crops were secured from soil satd. with Mg,  $Fe^{++}$ , Al and H. With  $CaCO_3$ , there was a small crop on  $Fe^{++}$  soil, but none on soil satd. with Cd. On H-satd. soil,  $CaSO_4$  was ineffective, indicating the importance of  $CaCO_3$  as a neutralizing agent. It is noted that although soils satd. with Na are unproductive, there is some evidence that Na is important in N nutrition.

**Action of hydrogen peroxide upon the soil.** K. K. Gedroiz. *Trans. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 41-70(1933)(in German); cf. C. A. 26, 2264.—A review and description of exptl. work with chernozem soils. Treatment of 5 g. soil with 60 ml. 30%  $H_2O_2$  without heating changed org. N practically completely to  $NH_3$ ; a trace was oxidized to nitrate. Org. matter was reduced from 9.3 to 1.1% and the reaction made alk., 0.1%  $CO_2$  being found in the residue from the originally  $CaCO_3$ -free soil. Addn. of 1 g.  $CaCO_3$  to the sample prior to treatment hindered the action. Heating the mixt. resulted in considerable loss of N, increased by  $CaCO_3$ . In further expts., 10 g. soil with 25 ml.  $H_2O$  and increments of  $H_2O_2$  added gradually without heating were finally

evapd. to dryness on the water bath. The  $p_H$  value of a sample so treated without  $H_2O_2$  was 6.75; up to 20 ml.  $H_2O_2$  caused a regular decrease in  $p_H$  to 3.75, and up to 100 ml. caused a subsequent rise to 5.92. Water-sol. org. matter, both total and that oxidizable by  $KMnO_4$ , as well as  $CaO$  and  $MgO$  were considerably increased by  $H_2O_2$  treatment. Sol. org. acids were evidently formed. Exchangeable bases in  $H_2O_2$ -treated soil as compared with the original soil were detd. with difficulty; apparently this was due largely to loss of permeability with humus. The efficiency of  $N$  NaCl in exchange was cut in half, of  $N$   $NH_4Cl$  reduced 30%, but that of 0.05  $N$   $HCl$  reduced by only 8%. With 4  $N$   $NH_4Cl$ , but not with 4  $N$  NaCl, the difference almost disappeared. The effect of  $H_2O_2$  upon a no. of soils caused small decreases in exchange capacity, but with a heavy chernozem there was a 50% reduction, an indication of the possible importance of humus in exchange reactions. Similar soils satd. with  $Na$  prior to treatment with  $H_2O_2$ , etc., were more dispersed after the latter treatment, indicating some protective action of humus against alkali damage. The cementing action of humus in the soil is important.

C. J. Schollenberger  
The concentration of carbon dioxide in the soil air under various crops and in fallow soils. F. B. Smith and P. E. Brown. *Iowa State Coll. J. Sci.* 8, 1-16(1933).—The concn. of  $CO_2$  in the soil air in fallow soils and in soils under the crops (corn, alfalfa, red clover, cowpeas, soy beans, oats, wheat and bluegrass) and under various soil treatments was detd. The  $CO_2$  is due to plant growth, microbiological action and decay of org. matter. Rates of diffusion may influence concns. of  $CO_2$ . Bluegrass and corn in early stages of growth depress microbiological action. Legumes seem to stimulate it. Deep-rooted legumes produce more  $CO_2$  than shallow-rooted legumes. Concns. of  $CO_2$  in the soil air as a measure of the rate of  $CO_2$  production in field soils are of limited value. It is not a desirable method for detecting differences due to soil treatment.

F. E. Brown  
Increased yields from the action of small quantities of basic materials on acid soils. H. Kappen. *Deut. landw. Presse* 60, 547(1933).—The exchange acidity of a humus, sandy loam was reduced from 8.4 to 1.4 when 5000 kg. of  $CaCO_3$  per 100 sq. m. of soil was used with an acid fertilizer.  $CaCO_3$  (10,000 kg.) reduced the exchange acidity to 0.4, and the  $p_H$  of the soil was increased from 4.77 to 5.83. A basic fertilizer contg.  $NaNO_3$ , Thomas meal and a potash salt reduced the exchange acidity to 1.8 and increased the  $p_H$  to 5.5. Increased yields corresponded to the reduction in soil acidity.

K. C. H.  
Studies on sugar cane and sugar-cane soils. I. The immediate and residual effects of lime on crop yield. P. E. Turner. *Empire J. Exptl. Agr.* 2, 78-92(1934).—Plant and ratoon canes, grown on unflocculated, acid soils in Trinidad, benefited greatly by liming up to the lime requirement (as detd. by the degree of unsatn. of the soil with exchangeable  $Ca$ ) of the soil. On soils exhausted through continued practice of a type of "shifting" cultivation, the benefit derived from liming was at 1st very small, but it appeared to attain normal proportions in the course of time. In the absence of  $(NH_4)_2SO_4$ , the lime-yield curve followed the law of diminishing returns; in its presence, the curve rose to a max. point which corresponded to an application of lime equal to the calcd. lime requirement. After the max., the curve showed a significant fall which occurred either when an excess of lime was applied in the presence of small applications of  $(NH_4)_2SO_4$  or when an excess of  $(NH_4)_2SO_4$  was applied in the presence of small amts. of lime. Fluctuations in the quality of cane due to liming were unimportant in comparison with the accompanying increment in yield, unless conditions were very unusual.

K. D. Jacob  
Recent developments in the agriculture of sugar cane in Queensland. H. W. Kerr. *Empire J. Exptl. Agr.* 2, 20-8(1934).—In the sugar-cane districts of Queensland, the highly acid alluvial soils of the heavy rainfall areas show marked response to applications of phosphates, but not to potash. The deep, red volcanic loams are con-

spicuously deficient in potash, but phosphates have little effect on cane yields. The red loams vary considerably in their potash and phosphate requirements. Practically all the cane soils are notably deficient in  $N$ .  $KCl$  and  $K_2SO_4$  are of equal value as sources of  $K$  for cane in Queensland. Extn. of the soil phosphates with 0.01  $N$   $H_2SO_4$  (250 parts/part of soil) and of the soil potash with 0.02  $N$   $HCl$  seems to give a good index of the  $P$  and  $K$  requirements of the soils. Soils more acid than  $p_H$  4.3, as detd. in 1.0  $N$   $KCl$  soln., respond to applications of lime, soils less acid than  $p_H$  4.7 seldom show response. Marked increases in cane yields are obtained by the use of molasses as fertilizer. A method for testing the maturity of cane is based on the fact that the expressed juices from 3 equal sections of a mature cane stalk contain approx. the same amts. of reducing sugar; this value tends to a const. min at this period.

K. D. Jacob  
Soil and mineral supplements in the treatment of bush sickness. T. Rigg and H. O. Askew. *Empire J. Exptl. Agr.* 2, 1-8(1934); cf. C. A. 27, 2243.—Sheep depastured on typical bush-sick country at Glenhope, New Zealand, were drenched twice a week with (I) 3-4 g. Onekaka limonite, (II) 7-9 g. of the silt and clay fractions of Nelson soil contg. 0.75-1.0 g.  $Fe_2O_3$  sol. in 0.1  $N$  oxalic acid and (III)  $Fe$   $NH_4$  citrate equiv. to 0.75 g.  $Fe_2O_3$ . Sheep drenched with II gained rapidly and continuously in wt. and remained perfectly free from bush sickness; those receiving I showed no improvement over the controls. In general, sheep receiving III remained free from bush sickness, but did not make as good growth as those receiving II. The failure of I to overcome bush sickness suggests that an adequate supply of  $Fe$  compds. is insufficient in itself to prevent the disease, and that some other factor operates detrimentally to the normal functioning of the animal system.

K. D. Jacob  
Studies on the viability of *Eimeria tenella* in soil. F. D. Patterson. *Cornell Veterinarian* 23, 232-49(1933).—Addn. of 10% of  $CaO$  to soils contaminated with oöcysts of *E. tenella* did not prevent infection of chickens in 12 weeks.

K. D. Jacob  
The fertilizer effect of various mineral phosphates compared with the effect of easily soluble phosphate fertilizers. Paul Solberg. *Meldinger Norges Landbruks* 13, 481-540(1933).—On boggy soil, the effect of mineral phosphates is nearly as great as that of ordinary superphosphate, provided the lime dressing is not too high, and is equal to that of Thomas and Rhenania phosphates, while on mineral soil (morainic) the results are more variable.

H. C. M. Ingeberg  
Statistics of production, consumption, etc., of phosphate rock and superphosphate, 1932. A. N. Gray. *Superphosphate* 7, 1-6, 21-8(1934); cf. C. A. 27, 1430, 1701.—World data are given.

K. D. Jacob  
Fertilizers and the [British] Empire. A. N. Gray. *Empire J. Exptl. Agr.* 2, 65-77(1934).—Detailed data are given on the production, consumption and trade in  $N$ ,  $P$  and  $K$  fertilizers and fertilizer materials in the Brit. Empire.

K. D. Jacob  
Artificial fertilizers registered [in Victoria] for 1934. Analyses and unit values. W. C. Robertson. *J. Dept. Agr. Victoria* 32, 43-52(1934); cf. C. A. 27, 1440.

K. D. Jacob  
Sulfates and chlorides as fertilizers. III. Effects on the viscosity and the surface tension of pastes made from rice starch. Isenosuke Onodera. *J. Agr. Chem. Soc. Japan* 9, 1077-90(1933); *Bull. Agr. Chem. Soc. Japan* 9, 139-40.—Rice paste had a max. viscosity when  $NH_4Cl$ ,  $Na$  phosphate and  $K_2SO_4$  were applied as fertilizers to the rice plant in the pot. The viscosity was generally larger with sulfates than with chlorides. If fertilizers of  $K$  and  $NH_4$  with different anions were used, the viscosity of the rice paste was larger than that with fertilizers having the same anion. The surface tension of the rice paste was greater when the compds. of  $K$  and  $NH_4$  with the same anion were used as fertilizer.

Y. Kihara  
Composts and fertilizers in relation to greenkeeping. II. Nitrogenous fertilizers. T. W. Evans. *J. Board Greenkeeping Research* 3, 34-8(1933); cf. C. A. 25, 5218.—



The use of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{CaCN}_2$ , and Nitro-chalk on golf greens is discussed. K. D. Jacob

A field method for the determination of the fertilizer requirements of soils. I. M. Robertson and A. B. Stewart. *Scottish J. Agr.* 17, 71-9(1934).—Expts. with the Mitscherlich plot method are described. In general, Scottish soils, with the possible exception of newly broken-up lea, are very deficient in N, and show a marked response to N fertilizers. K. D. Jacob

The effect of fertilizer salts on the soil. O. Diehl. *Ernähr. Pflanze* 30, 41-5, 61-4(1934).—Of 14 different salt solns. used,  $\text{KCl}$ ,  $\text{Ba}(\text{OH})_2$ , and  $\text{Ca}(\text{OH})_2$  produced the greatest increase in the speed of sedimentation in a  $\text{CaO}$ -free suspension of loess loam soil. The values were 15, 20 and 20 mm./min., resp. A 6%  $\text{KCl}$  soln. produces the max. effect for that salt.  $\text{CaO}$  in the original soil suspension reduces the effect of the salt concn. Of the salts of uni-, bi- and trivalent metals, the chlorides produced the greatest acceleration of flocculation. Increasing the diln. of the soil suspension caused a decrease in acceleration with the alkali metals and a less marked decrease with the bi- and trivalent metals ( $\text{Ca}$  and  $\text{Fe}$ ), the values tending to become const. This is expl. proof of the need for  $\text{CaO}$  with heavy applications of K salts. Similar tests with silt soil showed the loosening action of  $\text{CaO}$  on the structure of such soils. John O. Hardesty

The economic importance of effective plant protection by the use of potash fertilizers. H. Eisele. *Ernähr. Pflanze* 30, 66-8(1934).—A general review with 21 references is given. John O. Hardesty

The calcium antagonism in soil and oakwood. Arthur C. Magill. *J. Tenn. Acad. Sci.* 8, 273-321(1933).—An extensive survey over much of Tenn. showed that high soil Ca is assocd. with high Ca in oak in 0.90 correlation, but low-Ca soils (Ca below 0.35%) yield oak high in Fe. A. Lloyd Taylor

Absorption of manganese by wheat seedlings. Jehiel Davidson. *Trans. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 84(1933)(in English).—A résumé of conclusions drawn from soln. culture expts. with  $\text{Mn}_2\text{O}_3$ ,  $\text{MnO}_2$ ,  $\text{MnCl}_2$  and  $\text{MnSO}_4$  as sources of Mn,  $\text{NaNO}_3$ ,  $\text{NH}_4\text{Cl}$  and  $(\text{NH}_4)_2\text{SO}_4$  as sources of N,  $\text{K}_2\text{SO}_4$  and  $\text{KCl}$  and K phosphates and  $\text{CaCO}_3$  to regulate  $pH$ . Physiologically alk.  $\text{NaNO}_3$  but not  $\text{NH}_4$  salts decreased Mn absorption from sources other than  $\text{MnCl}_2$ . Mn absorption was but slightly decreased from  $\text{MnCl}_2$  by  $\text{CaCO}_3$ , but phosphates caused decreases when  $pH$  was const. The results indicate that the availability of Mn to plants is detd. by the combined effect of  $pH$  and anions, and the effect is through the soly. of Mn rather than upon the absorptive power of the plant. The results further show the utility of  $\text{H}_2\text{O}$  cultures in solving practical problems, and indicate the necessity of considering the effect of applied fertilizers and amendments upon the availability of soil constituents. C. J. Schollenberger

The relative palatabilities of seeds mixtures, and a study of the influence of fertilizers on natural hill pastures. W. B. J. Milton. *Empire J. Exptl. Agr.* 2, 51-64(1934).—As shown by the degree to which the plots were grazed by sheep and cattle, the palatability of pasture grasses was increased by the application of either Ca, N, P or K fertilizers; in general, the hardest grazed plots were those that had received all 4 elements, Ca being particularly effective in increasing grass palatability. To a certain extent, the increased palatability of the plots was due to the effect of the fertilizers in promoting the growth of naturally palatable plants, such as *Molinia* and clover. The effect of lime, either alone or in combination with fertilizers, was much more marked than that of superphosphate. Twenty-two references. K. D. Jacob

Investigations in pasture production. VI. Studies of effect of ammonium sulfate and frequency of cutting on production of pasture under system of mowing only. A. W. Hudson. *New Zealand J. Agr.* 48, 17-24(1934); cf. C. A. 28, 555<sup>4</sup>.—In general, applications of  $(\text{NH}_4)_2\text{SO}_4$  increased the growth of grass for periods of from a few weeks to a few months after application, depending on the time and amt. of the application. The period of bene-

ficial effect of each application of  $(\text{NH}_4)_2\text{SO}_4$  was usually followed by a period of slumping in grass production which coincided with a reduction in the amt. of clover growth and the more or less unthrifty appearance of the grass. Ground limestone was somewhat more efficient in preventing increased soil acidity, due to  $(\text{NH}_4)_2\text{SO}_4$ , when it was applied in mixt. with  $(\text{NH}_4)_2\text{SO}_4$  than when it was applied separately once a year. K. D. Jacob

Fertilization of meadows in relation to the new ruling on agricultural fats. L. Schmitt. *Deut. landw. Presse* 60, 473, 484, 496(1933).—Governmental restrictions on fat imports in Germany necessitate an increased production of hay for feed. Use of Thomas meal alone on meadows over a period of 15 years did not increase production. K phosphate alone increased yields about 60% and the yield of N in the hay was increased from 85.8 to 131.4 kg./ha. The application of N fertilizers did not appreciably increase yields. K. C. Beeson

Effects of time of planting and of fertilizer mixtures on the curly-top resistant sugar-beet variety U. S. No. 1 in Idaho. A. W. Skuderna, C. E. Cormany and L. A. Hurst. *U. S. Dept. Agr., Circ.* 273, 1-15(1933).—Fertilizer mixts. contg. high percentages of  $\text{P}_2\text{O}_5$  produced larger yields of beets and greater yields of sugar per acre than mixts. in which N or K predominated. A sharp decrease in stand of beets occurred when the percentage of N in the fertilizer mixt. exceeded 8%. The tests indicate that a fertilizer mixt. in which the percentage of  $\text{P}_2\text{O}_5$  predominates is likely to produce consistently good results with sugar beets, especially under cropping and soil conditions that necessitate the use of com. fertilizers. W. H. Ross

Liming conditions for flax. Johannes Görbing. *Deut. landw. Presse* 60, 475(1933).—Optimum root growths were obtained when burned limestone was added to a soil to increase the  $pH$  from 5.6 to 6.2-6.7. Less satisfactory growths of flax roots were obtained at  $pH$  of 7.4. Electro-metric titration of the soil with lime water is the most satisfactory method of detg. lime requirements. K. C. Beeson

Orchard sprays in New Zealand. VII. Combination sprays. G. H. Cunningham. *New Zealand J. Agr.* 48, 1-12(1934); cf. C. A. 28, 248<sup>9</sup>.—The uses and chemistry of various spray mixts. are discussed. Thirty-one references. K. D. Jacob

The composition, application and general effects of the main orchard sprays at present applied to pome fruits. P. H. Thomas and T. D. Raphael. *Tasmanian J. Agr.* 3, 145-53(1932).—A review. K. D. Jacob

Experiments with dormant sprays for control of leaf and nut case-bearers [on pecans]. Fred. W. Walker. Ga.-Fla. Pecan Growers Assoc., *Proc. 37th Ann. Convention 1933*, 31-5.—Dormant spraying of the trees with a 1:15 soln. of tar or creosote emulsion, just before the opening of the buds, gave practically complete control of case-bearers. Bordeaux and Pb arsenate sprays were ineffective. K. D. Jacob

Effects on apple trees of lime sulfur following Bordeaux mixture. G. H. Cunningham. *New Zealand J. Agr.* 48, 15-17(1934).—The ppts. obtained by adding  $\text{CuSO}_4$  or Bordeaux-mixt. solns. to equiv. amts. of 0.1% lime S soln. were not injurious to the fruit or foliage when they were applied to Delicious, Jonathan, Sturmer and Rome Beauty apple trees in early summer; with smaller amts. of Cu or larger amts. of lime S injury is likely to result, because of the formation of sol. Cu compds. Injury is not likely to follow when apple trees are sprayed with either 5-4-50 or 3-4-50 Bordeaux mixt. at the green-tip stage, and followed at the pink or pre-pink stage with 0.2% lime S. K. D. Jacob

The abrasive effect of lime as used in Bordeaux mixture. E. L. Nixon. *Agr. Eng.* 14, 335-6(1933).—When pulverized pebble lime or hydrated lime was used in a 4-4-50 Bordeaux mixt. the abrasion of the spray-nozzle disks (as indicated by the loss in wt.) was approx. 0.5 times as great as when lump lime was used. K. D. J.

Tar distillate emulsions for the control of the rosy aphid and other fruit insects. F. Z. Hartzell and P. J.

Parrott. N. Y. Agr. Expt. Sta., *Bull.* 636, 29 pp. (1933).—The tar distillate emulsions used as insecticides consist of refined creosote oil (the fraction distg. from 200° up being redistd. to remove the light and heavy ends) prepd. with various emulsifiers. Certain foreign and nearly all domestic com. products contain, in addn., various amts. of petroleum oil. Five-year tests indicate that these emulsions are highly effective against the rosy apple aphid (*Anuraphis roseus*), black cherry aphid (*Myzus cerasi*), and the eye-spotted budmoth (*Spilonota ocellana*). For the above insects, 4 gals., 5 gals. and 7½ gals., resp., of the concd. emulsion are mixed with water to make 100 gals. of spray. The sprays are applied in the early spring when the buds are dormant. The importance of proper timing of sprays is emphasized. Methods and costs of prep. a concd. tar distillate emulsion from tar oil 3.25 gal., petroleum lubricating oil 0.75 gal., sulfonated cod oil 0.4 gal. and NaOH 2.50 lb. are given. Com. products contain about 80% of active ingredients. C. H. R.

Are we developing strains of codling moths resistant to arsenic? Leonard Haseman and R. L. Meffert. Mo. Agr. Expt. Sta., *Bull.* 202, 11 pp. (1933).—When 0.00275 mg. Na arsenite is injected into the body cavity of full-grown larvae of *Carpocapsa pomonella*, 85–80% of them die within 4 hrs. 0.00425 mg. Na arsenite injected by mouth into the digestive tract of the full-grown larvae kills 75–80% in 4 hrs. 0.24 mg. PbHAsO<sub>4</sub> introduced by mouth into the digestive tract kills 26–33% of the larvae in 4 hrs., and 63–73% in 8 hrs. Na arsenite is therefore slightly more than 1/3 as toxic when injected into the body cavity than when introduced into the digestive tract, and is about 113 times as toxic as PbHAsO<sub>4</sub> in the digestive tract of full-grown larvae. In the digestive tract, a sublethal dose of Na arsenite (0.00375 mg.) gave approx. the same percentage mortality of Colorado larvae (purported to be difficult to control with arsenicals) as of Missouri and Virginia larvae. Likewise a sublethal dose of 0.24 mg. PbHAsO<sub>4</sub> in the digestive tract gave about equal mortalities of Colorado, Missouri and Virginia larvae. Therefore, Colorado strains of codling-moth larvae are not more difficult to control with As than are Missouri and Virginia strains. Methods are described. C. H. Richardson

Copper in relation to chlorophyll and hemoglobin formation. O. S. Orth, G. C. Wickwire and W. E. Burge. *Science* 79, 33–4 (1934).—The soil in one portion of a chlorotic orange orchard was treated with CuSO<sub>4</sub>. It cured the "frenching" or chlorotic condition. Leaves from the treated area contained 4.6 times as much chlorophyll as those from the untreated area. No Cu was found in either. Cattle pastured on Cu-poor land developed nutritional anemia. Conclusion: Cu is necessary for the formation of both chlorophyll and hemoglobin. J. J. W.

Greenhouse fumigations with naphthalene solutions. Frank Wilcoxon, Albert Hartzell and W. J. Youden. *Contrib. Boyce Thompson Inst.* 5, 461–9 (1933); cf. C. A. 21, 792; 24, 4350. —A method is described for using a soln. of naphthalene in oil and of naphthalene in S in a fumigation process in which a desired concn. of naphthalene is maintained throughout the fumigation period. Control of red spider mite was obtained by using this fumigation process for 14–16 hrs. Plants usually sensitive to naphthalene fumigation were not injured. N. M. N.

[Report on] agriculture. J. A. Verret and A. J. Mangelsdorf. Hawaiian Sugar Planters' Assoc., *Proc. 52nd Ann. Meeting* 1932, 33 pp. (1933).—Dipping the cut ends of cane seed-pieces in 1% Ceresan soln., immediately after cutting the stalks, reduced the rotting and increased the germination of the cuttings. K. D. J.

The germicidal efficiency of hypochlorite solutions in the presence of chicken manure. Ernest C. McCulloch. *J. Bact.* 27, 37 (1934).—The data indicate that a new compd. probably a chloramine is formed by the action of hypochlorite on NH<sub>3</sub> from the manure. J. T. M.

Hoary cress control. A. Morgan. *J. Dept. Agr. Victoria* 32, 1–6, 40 (1934).—When it was applied under dry-farming conditions to a soil having a relatively impervious clay subsoil, NaCl in concns. lethal to hoary cress (*Lepidium draba* L.) penetrated to a depth of only 8–10

1 in., and little or no control of the weed was obtained. Application of 5 tons of NaCl per acre to a typical black Wimmera soil resulted in lethal concns. at a depth of over 4 ft. and gave a high kill. Application of 600 gal of 12.5% NaClO<sub>2</sub> soln. per acre did not give permanent control of the weed. The best results were obtained by spraying the plants with acid Na arsenite soln. (0.4% As<sub>2</sub>O<sub>3</sub> and approx. 5% H<sub>2</sub>SO<sub>4</sub>). The max. rate of movement of As soln. downward through the tissues of the hoary cress plant was 0.5 in./sec., under field conditions, whereas in the morning glory the max. rate was 2.5 in. sec. K. D. Jacob

Influence of regular dipping on the Merino sheep and its fleece. J. E. Duerden, G. S. Mare and V. Bosman. *Onderstepoort J. Vet. Sci.* 1, 567–80 (1933).—Dipping sheep in Na arsenite soln. (2 lb./100 gal. water) at weekly intervals for 1 yr. had no effect on the body and fleece wts., or the fiber thickness, staple lengths, fiber contours, and S content of the wool. The wools of sheep dipped either in arsenite soln. or in pure water deteriorated somewhat in color, handle and appearance; these effects seemed to be due to the hardness of the water used in prep. the dips. K. D. Jacob

Detn. of Pb in small quantities in spray residues (Samuel, Shockey) 7. Action of dil. HCl on phosphorites (Anosov, Ust-Kachintzev) 18. Nematode disease of potatoes caused by *Heterodera schachtii* (O'Brien, Prentice) 11D. Use of sewage for irrigating crops (Anon.) 14. Baltimore sewage-treatment plant [sludge used as fertilizer] (Finck) 14. Disinfectants [for destruction of parasites] (Fr. pat. 757,040) 17. K Mg sulfate [fertilizer] (Ger. pat. 591,097) 18. Double nitrates [fertilizers] (Ger. pat. 591,458) 18. Treating polyhalite [to produce fertilizers] (U. S. pat. 1,946,068) 18. H<sub>3</sub>PO<sub>4</sub> or Ca superphosphate (Japan. pat. 100,142) 18.

Fertilizer. Beverly Ober and Edward H. Wright (to Oberphos Co.). U. S. 1,947,138, Feb. 13. A phosphate fertilizer in the form of porous discrete nodular encrusted and indurated globoid particles, having a crushing strength several times as great as that of fully cured den superphosphate and contg. K- and N-bearing material, is prepd. by a described autoclaving process.

Fertilizers. Oskar Ried and Karl Ruschertner. Austrian 136,025, Dec. 27, 1933 (Cl. 45g.). The activity of natural or artificial fertilizers is modified by irradiation. Details are given.

Fertilizers. Paul Christian. Fr. 756,777, Dec. 15, 1933. Artificially prepd. substances contg. SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are used as fertilizers. They may be made by decomposing sol. glass with a sol. Al salt such as Al(NO<sub>3</sub>)<sub>3</sub>, preferably in the presence of peat, lignite or other substance of large surface. Rare earths in amt. in excess of that found in the natural silicates may be added.

Fertilizer. Camille Malignon and Pierre Kachkaroff. Fr. 756,875, Dec. 16, 1933. Org. fertilizer contg. N and a tar composed of N-contg. substances are obtained by distg. vegetable materials such as wood, peat, straw, lignin and certain coals at a temp. up to 400° in an atm. of NH<sub>3</sub>.

Fertilizer of slow action. Mitsui Kōzan K. K. (Shimizu Oda, inventor). Japan. 100,380, Apr. 4, 1933. The fertilizer is prepd. by mixing a mixt. of a fertilizing material of quick action (such as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, NH<sub>4</sub>NO<sub>3</sub>, etc.) and urea with an aldehyde, especially HCHO.

Carbon fertilizers. I. G. Farbenind. A.-G. Fr. 756,614, Dec. 13, 1933. The unwashed intermediate products obtained during the prepn. of active C and resulting from the treatment of carbonaceous substances by solid or dissolved activating agents are neutralized and used as fertilizers. Thus, peat is treated with H<sub>3</sub>PO<sub>4</sub>, calcined and neutralized with NH<sub>3</sub> or caused to react with P<sub>2</sub>O<sub>5</sub> and ground with CaO.

Fertilizing salts. Hans Grah. Brit. 401,520, Nov. 16, 1933. See Fr. 748,471 (C. A. 27, 5467).

Treatment of tricalcium phosphates for the production of soluble fertilizers. Soc. anon. produits chimiques et

engrais L. Bernard. Belg. 398,256, Sept. 30, 1933. The phosphate is heated at about 1200° with an excess of alkali and SiO<sub>2</sub> such that 1 mol. of alkali oxide combines to form an alkali Ca phosphate and an alkali Ca silicate.

Autoclaves and associated apparatus for producing a fertilizer from nitrogenous material such as feathers, hair, wool or leather by thermal decomposition under pressure. Wm. W. Pagon (to Oberphos Co.). U. S. 1,945,229, Jan. 30. Structural and operative features.

Apparatus and method for drying fish and slaughterhouse refuse. Conrad Schlotterhose and Hermann Brandt (trading as Schlotterhose & Co.). Brit. 365,308, Jan. 21, 1932.

Apparatus for drying fish and slaughterhouse refuse. Conrad Schlotterhose and Hermann Brandt (trading as Schlotterhose & Co.). Brit. 382,085, Oct. 20, 1932. Addn. to 365,308 (preceding abstr.).

Insecticide. Wm. K. Price. U. S. 1,947,169, Feb. 13. A spray suitable for repelling codling moths contains naphthalene together with a less readily vaporizable carrier such as an emulsified oil.

Insecticides. James R. Cattanch. Brit. 401,519, Nov. 16, 1933. An insecticide in jelly form for diln. with H<sub>2</sub>O is prepd. by sapon. a mixt. of a fatty substance, *e. g.*, lard and a vegetable oil, *e. g.*, coconut oil, with alkali, neutralizing the product or rendering slightly acid and then incorporating a mineral oil ext. of pyrethrum. Cf. C. A. 27, 2246.

Insecticides. Imperial Chemical Industries Ltd. and Stephen H. Oakshott. Brit. 401,707, Nov. 20, 1933. Insecticidal compns. are prepd. by incorporating quaternary compds. of nicotine and like bases of tobacco, made by interaction of the base with inorg. acid esters of long-chain aliphatic alcs. contg. more than 6 C atoms, *e. g.*, dodecyl or octadecyl bromide, with a solid liquid diluent, *e. g.*, talc, kieselsguhr, H<sub>2</sub>O, nicotine, solns. of nicotine in oils, tar and petroleum oils.

Insecticides. Ernst B. Nier, Ida E. Adolph, Richard W. Nier, Martha H. Pross and Johannes K. Nier (trading as Hermann Nier). Brit. 401,914, Nov. 23, 1933. A molten mixt. of C<sub>10</sub>H<sub>8</sub> and a small quantity, *e. g.*, 3% of nicotine, is poured into grooves of perches, etc., to destroy parasites on poultry or domestic animals.

Insecticides, etc. Alfred Kirkham and Peter Spence & Sons Ltd. Brit. 401,705, Nov. 16, 1933. See Fr. 754,128 (C. A. 28, 1133').

Insecticides. Anciens établissements Aulagne & Cie. Fr. 757,152, Dec. 21, 1933. Pine oil, turpentine oil, citronella oil, etc., are emulsified in water with sulfonated fatty alcs. or esters, sulforicinate, soaps, for use as insecticides, etc.

Dusting insecticide. Dai Nippon Mokuzai Bôhû K. K. (Kyo Katô, inventor). Japan. 100,320, March 29, 1933. Addn. to 96,607. A fine fibrous substance (such as sawdust) is treated with a mixt. of CCl<sub>4</sub>, HCHO, *o*- or *p*-dichlorobenzene, naphtha and a small amt. of chloropierin.

Colorless household pyrethrum insecticide. Nicholas A. Sankowsky and Dudley H. Grant (to Stanco Inc.). U. S. 1,945,235, Jan. 30. Pyrethrum flowers are extd. with kerosene to obtain a strong kerosene soln. of pyrethrus, the soln. is shaken with anhyd. MeOH to dissolve part of the ext. in the MeOH, the latter is cooled to about 0° and centrifuged to remove impurities, the MeOH is

distd. off *in vacuo* and the remaining purified ext. contg. pyrethrins is dissolved in water-white kerosene.

Preserving the pyrethrum content of chrysanthemum flowers. Wm. A. Hughes (to Harvel Corp.). U. S. 1,945,148, Jan. 30. After picking, the flowers are treated with sufficient kerosene or cymene to protect the pyrethrin from the atm.

Dehydroroteneone. Herbert L. J. Haller and Paul S. Schaffer (to the public for free use). U. S. 1,945,312, Jan. 30. Rotenone is hydrogenated in the presence of a Ni catalyst.

Insecticide and fungicide. Johannes A. L. Bouma. Dutch 30,941, Sept. 15, 1933. An insecticidal or fungicidal plant ext. (*e. g.*, quassia wood, rhatany root, pyrethrum flowers) is added to S-treated fatty or etheral oil (*e. g.*, 6 parts linseed oil plus 1 part S heated to 120°). Gluc, gelatin and similar substances, also powdered materials, talcum powder, may be added to the mixt. Cf. C. A. 27, 2754.

Fungicide and insecticide. Sándor Terényi. Hung. 107,115, Sept. 1, 1933. A compd. of quinquivalent As with a bivalent metal (Ca, Mg, Zn, Cu, etc.) is mixed with a compd. of a trivalent metal (Fe, Al, etc.) with quinquivalent As. *E. g.*, Na<sub>2</sub>AsO<sub>4</sub> soln. is added to a soln. of MgSO<sub>4</sub> and FeCl<sub>3</sub> and the reaction of the soln. is adjusted to very weak acidity.

Fungicides. Lelio Ferri. Brit. 401,603, Nov. 16, 1933. See Fr. 751,277 (C. A. 28, 1134').

Washing fruit such as pears for removing spray residues, etc. Fred Stebler (to Food Machinery Corp.). U. S. 1,945,922, Feb. 6. In washing fruit with a soln. such as HCl for removing Pb arsenate of lower sp. gr. than that of the fruit, the fruit is supported while partially submerged in the soln. and the soln. is sprayed over the fruit. App. is described.

Composition for combating diseases of plants such as those of cryptogamic character. Georges Truffaut and Isaak Pastac (to Soc. anon. établissements et laboratoires Georges Truffaut). U. S. 1,947,320, Feb. 13. A water-sol. org. coloring matter is used with a wetting agent such as a substituted amide of a fatty acid.

Anticryptogamic products. Adolpe Audet. Fr. 756,755, Dec. 15, 1933. A resin dissolved in an emulsifiable heavy oil is added to anticryptogamic solns. to impart wetting and adhering power thereto.

Parasiticide composition. Max L. Tower and Harry W. Dye (to Niagara Sprayer and Chemical Co.). U. S. 1,945,542, Feb. 6. A compn. suitable for use on foliage comprises an insol. powder such as S the particles of which are coated with a substantially insol. colored colloidal substance such as a green-dyed casein and bentonite mixt.

Composition for destroying weeds, etc. Elmer H. Hyde and Floyd D. Hager (to American Tar Products (Co.)). U. S. 1,946,462, Feb. 6. For killing vegetation, a mixt. is used comprising all the distillates of coal tar which are driven off up to a temp. of about 425–540°.

Pest-destroying compositions. Permutit A.-G. Ger. 591,107, Jan. 16, 1934 (Cl. 451. 3.01). Compns. for destroying beet carrion beetles and their larvae comprise an alimentary poison, *e. g.*, Schweinfurt's green, Na<sub>2</sub>SiF<sub>6</sub>, or an arsenate, mixed with fish meal, flesh meal or dried blood, with or without a diluent or nutrient such as bran. The compns. may be made into a paste and then applied by stewing.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

Alcohol fermentation by *Rhizopus*. Fumio Hemmi and Norimasa Tsukitani. *J. Agr. Chem. Soc. Japan* 9, 1371–81 (1933).—*Rhizopus delemar*, *R. tritici*, *R. tonkinensis*, *R. oryzae*, *R. japonicus* and *R. acidus* produce alc. When they are cultivated in koji water, the first 3 varieties produce more alc. The addn. of CaCO<sub>3</sub> to the koji water increases the yield of the mold, but the addn. of K<sub>2</sub>HPO<sub>4</sub> increases the production of alc. When the aq. ext. of the

mold is added to glucose, the action of zymase is too weak to be noticed.

Y. Kihara  
An unknown factor stimulating the formation of butyl alcohol by certain butyric acid bacteria. E. L. Tatum, W. H. Peterson and E. B. Fred. *J. Bact.* 27, 207–17 (1934); cf. C. A. 27, 1906.—An unknown substance which greatly stimulates the fermentation of corn mash by certain butyric acid bacteria was found in potatoes, yams,

oranges, lettuce, cabbage, alfalfa, soy and navy beans, wheat middlings and malt sprouts. It greatly increases the destruction of starch and increases the production of BuOH 10-fold. Yields of acetone and alc. are not affected. The concn. of the substance varies in different plants. Different strains of bacteria differ in their response to it. It can be purified with ammoniacal Pb(OAc)<sub>2</sub>.

John T. Myers

Butanol-acetone fermentation. IV. Minoru Tsuchiya. *J. Agr. Chem. Soc. Japan* 9, 783-97(1933); cf. *C. A.* 27, 5468. —Molasses was fermented by acetone bacteria in mixts. with more than 2 parts of corn. When the molasses was added during the fermentation, 3.6 parts of molasses could be used for 1 part of corn. Molasses treated with charcoal gave a better yield of acetone. The excess of protein in the materials hindered the fermentation. The addn. of CaCO<sub>3</sub> had a bad effect.

Y. Kihara

Amlyo method of fermentation. II. Kunimoto Muta and Shori Tanaka. *J. Agr. Chem. Soc. Japan* 9, 1239-48 (1933); cf. *C. A.* 26, 5167. —Twenty kinds of molds were examd. to det. their saccharifying powers. Y. K.

The fermentation of citron. C. R. Fellers and E. G. Smith. *J. Bact.* 27, 63(1934).

John T. Myers

An extremely economical sugar fermentation. H. J. Conn and Mary A. Darrow. *J. Bact.* 27, 51-2(1934). —*Bacterium globiforme* and some similar organisms ferment glucose with the formation of large proportions of CO<sub>2</sub> and almost no acid.

John T. Myers

Fermentation without yeast cover. H. Niggemeyer. *Wochschr. Brau.* 50, 153-6(1933). —The procedure described by Hallermann (*C. A.* 25, 4656) and Sailer (*C. A.* 25, 4999) was tried extensively by N. Perforated Al trays having slots as advocated by Hallermann were tried on 3 types of beer (export, lager and Pilsen). A very clean yeast crop was obtained; however, the yeast was found to be very weak. It took 11 days to carry out the first fermentation instead of the usual 8 days. It is assumed that the retarding effect is due partly to CO<sub>2</sub> accumulation and partly to elec. currents (Cu attenuators and Al trays). The effect on export and lager beer was a slight improvement in taste—they were milder. The flavor of the Pilsen beer was greatly altered and considerably improved. The removal of krausen in case of strongly hopped beer gives a pleasant, mildly bitter beverage devoid of harsh-bitter taste.

S. Józsa

Constituents of commercial cider and apple product vinegars. S. L. Crawford and J. M. Ward. *Fruit Products J.* 13, 48-51(1933). —A general discussion of the constituents, analytical data and their interpretation. *Ibid.* 83-4. A continuation of the above-mentioned discussion. *Ibid.* 107-8. The max., min. and av. results of analyses are given of 100 pure cider vinegars of known origin, calcd to 4 g. per 100 cc. acidity. These vinegars were produced by various legitimate manufacturers in the ordinary commercial manner during the years 1924 to 1927 in 9 eastern and central states. The analyses are given to show as clearly as possible the extremes to which various constituents sometimes fluctuate as actually encountered in practice. *Ibid.* 169-71, 174, 187(1934). —Analysis is given of vinegar made from second pressing after some fermentation has ensued. In such vinegars, the solids, non-sugar solids and pentosans are abnormally high, and the polarization is right-handed, with no Pb acetate ppt. Where no appreciable fermentation has taken place, vinegar from second pressings is only slightly above the av. in total solids, non-sugar solids and pentosans, the polarization and lead acetate ppt. being normal. Analyses are given of 3 vinegars produced from apple juice which had been preserved with Na benzoate. Such vinegars are abnormally high in total solids and non-sugar solids, and a high percentage of the total solids will be reducing sugars. This type of vinegar may usually be recognized not alone by the high solids and reducing sugars but by the usual high plus polarization, caused by the *d*-rotary sugars, being more difficult of fermentation in the presence of benzoic acid. Max., min. and av. of analyses are given of 25 evapd. apple product vinegars (waste vinegar) and these data discussed.

F. L. Dunlap

Effect of acid spray on germination. Max. Hamburg. *Brau-Malsind.* 33, 75-8, 127-8(1933). —A criticism of Paula's work (*C. A.* 27, 3028). Gottfried Paula. *Brauer-Hopfen-Zig.* "Gambrinus" 60, 154-7(1933). —Addnl. data supplementing previous work (*C. A.* 27, 3028). S. L.

Protein composition of Austrian barleys of the 1933 crop. W. Rokita and H. Löhner. *Brauer-Hopfen-Zig.* "Gambrinus" 60, 170-1(1933); cf. *C. A.* 26, 4907.

Thirteen samples were analyzed. The total protein content, salt-sol. and alc.-sol. protein varied within the following limits, resp.: 9.36-15.20, 2.59-3.75, 3.01-6.90%, in percentage of total protein the salt-sol. part amounted to 23-37%, and the alc.-sol. to 29.8-45.4%. S. L.

Pericarp and testa of barley and wheat. L. Krause. *Wochschr. Brau.* 50, 209-12(1933). —The study of Grun. (*C. A.* 24, 5930) is extended. Microscopic studies of pericarp and testa were made on a 4-rowed barley, huskless barley and wheat. The pericarp showed an outer cork layer which was missing around the embryo on ordinary barley. The cork layer was defective at the upper tip. The lower part of the brown streak along the ventral canal is sepd. from the embryo only by a cellulosic matter which adsorbs water easily. This is the place where water will enter the grain.

S. Józsa

Malts of the 1933-1934 season. S. Pickholz. *Brau-Malsind.* 33, 154-5(1933).

S. Laufer

The balance of protein and extract in some maltings. E. Ehrlich. *Brauer-Hopfen-Zig.* 73, 571-3(1933). —Lab. malting trials were carried out with 20 barleys of various types. The max., min. and av. values were found for yield of malt 94.19, 87.40, 91.47%; losses due to rootlets 5.44, 2.50, 3.93%; losses due to steeping and respiration 8.45, 2.05, 4.60%; distribution of the barley protein in malt 91.67, 83.69, 87.58%, and in rootlets: 13.66, 7.1, 10.87%; increase in ext. from barley to malt 4.71, 2.20, 3.59%; increase in sol. protein from barley to malt 1.91, 1.276, 1.628%, resp.

S. Laufer

New method for estimating the color of malt. H. Krawawnik. *Wochschr. Brau.* 50, 165-6(1933). —Slight variation in color can be detd. by exposing glass-light paper used in photography to a source of light passing through glass capsules contg. the wort. A standard light source and capsules of exact dimensions are essential. A thickness of 5-10 mm. is suggested. The prints are developed and fixed in the usual way. Standards could be prepared by a central brewing institute lab. and a positive glass printed which could be used at the same time when prints are made from samples; this would exclude errors from the light source and developing.

S. Józsa

Organic bases of "dizake," a kind of sake produced in Kagoshima. Kotaro Nishida and Aritomo Yamada. *J. Agr. Chem. Soc. Japan* 9, 830-4(1933). —Agmatine (nitrate) 1.40 g., betaine (hydrochloride) 0.8 g., hypoxanthine (hydrochloride) 0.6 g., choline (hydrochloride) 4.20 g. and NH<sub>3</sub> 4.73 g. were isolated from 20 l. of "dizake." Arginine could not be found.

Y. Kihara

Determination of colloidal form of protein nitrogen in brewery liquids. II. A. Stádník. *Kvas* 1932, No 12 15; *Chem. Obzor* 8, Abstract sect., 162. —By shaking brewery liquids with active C the colloidal part of the protein substances is adsorbed. The pptg. power increases in the series: tannin < phosphotungstic acid < C. Adsorption by C gives colorless filtrates, facilitating the detn. of formal N. The method is described.

J. K

The stirring of mashies. E. Jalowetz and S. Pickholz. *Brau-Malsind.* 33, 88-91, 101-3(1933). —Lab. and brewery mashies were made with continuous and intermittent, fast and slow stirring, to det. the effect which the type of stirring during mashing has on the compn. of worts and of the resulting beers. The analysis revealed a difference in quality and compn., although the values observed in the brewery were not comparable with those obtained in the lab. The authors attribute the differences which are noted between "directly heated beers" and "steam-heated beers" to the variation in stirring of the mash which is brought about by the 2 different methods of heating; the variation in stirring, in turn, is responsible for the large or small differences in temp. between the edge

and middle of the mash, which obviously will have a decided effect on the compn. of the wort and consequently on the quality of the resulting beer. S. Laufer

**Influence of sulfates and chlorides of alkaline earths in the brewing liquor on the composition of wort.** P. Kolbach and G. Haussmann. *Wochschr. Brau.* 50, 201 (1933).—Gypsum in brewing liquor tends to lower the  $p_H$  of the mash. The effect is similar to that obtained by acidification or decarbonation of the mash. Decarbonation, however, increases the phosphate content whereas gypsum lowers the phosphate content considerably by pptn. No salt is introduced by decarbonation in contrast to gypsum treatment. The permissible amt. of gypsum varies in the opinion of authorities from 30 to 175 g. per hl. Various amts. were tried (0, 25, 50, 100 and 200 g. per hl.). Amts. such as might be used in practice showed no effect. The  $p_H$  value was decreased with increasing  $CaSO_4$  dosage, the phosphate content decreased and the non-coagulable N increased. No effect on the color was observed. Other salts as  $CaCl_2$ ,  $MgSO_4$ ,  $MgCl_2$  and  $Ca$  lactate were tried. The effects were similar except that the Mg salts decreased the  $p_H$  value only slightly. S. Józsa

**Sugar estimation in wort and beer by means of Fehling solution.\*** E. Rothenbach. *Wochschr. Brau.* 50, 189-91 (1933).—Incorrect calcn. is responsible for differences in results of detns. at different labs. (cf. Laster, C. A. 27, 4501). Pavlovski's method and calcn. (Die Brautechnischen Untersuchungsmethoden, C. A. 26, 1704) are compared with Laster's (Kjeldahl's). The results are identical. S. Józsa

**Final attenuation determined by composition of wort and not by type of yeast.** G. Isotti. *Wochschr. Brau.* 50, 181-2 (1933).—From various sources 28\* bottom fermentation yeasts, known as high-, medium- and low-attenuating, were tried on 3 worts from 12.6° to 13.1° Balling. The final attenuation (apparent) was practically the same for each sample of yeast. The final attenuation therefore is not detd. by the type of yeast employed but merely by the typical character of the wort. S. J.

**Influence of aluminum on wine.** Josef Schindler. *Vinarski Obsor* 26, 86-8 (1932); *Chem. Obsor* 8, Abstract sect., 166.—Al, especially in combination with other metals, is corroded by contact with alc. beverages; beer and wine cause discoloration of Al and are made turbid by it. Fruit juices contg. more sugar and acids have no effect. J. Kučera

**Removal of beer scale from aluminum, V<sub>2</sub>A steel and other metals.** A. Freymann. *Schweis. Bräu. Rundschau* 44, 13 (1933).—Tests were made with a new prepn. "IST" which is an acid deriv. of  $CaH_2$ , has no  $HNO_3$  and is non-poisonous. This paste yields satisfactory results and eliminates all the difficulties usually encountered with  $HNO_3$ . S. Laufer

**Pitch-coated aluminum chips (for clarification).** Hell. *Wochschr. Brau.* 50, 206-7 (1933).—Eckert's article (C. A. 27, 5886) is criticized on the ground that the comparatively smooth surface of metal foils is likely to be far less effective than wood shavings. The pitch might chafe or splinter from the metal. There are also dangers of infection since the material is not sterile. S. Józsa

**The use of Mammut bio-chips.** W. Rokita. *Brauer-Hopfen-Zig. "Gambrinus"* 60, 124-6 (1933); cf. Fink, C. A. 27, 3773.—Comparative tests with and without bio-chips have demonstrated that the chips, when used in proportion to 10 g. per hl. during primary or secondary fermentation, accelerate fermentation and aging, and generally improve the beer quality. S. Laufer

**Relationship between stability of beer and germ content of the wort; and scheme of systematic sampling of wort for biological investigation.** I. Janensch. *Wochschr. Brau.* 50, 172-5, 177-81 (1933).—The general belief that it is not necessary to have the wort absolutely free from microorganisms when it enters the fermentation vat is criticized. Mere microscopic examn. after fermentation is not sufficient and infection may develop. Sources of infection are described and the most commonly found organisms are listed. J. suggests taking samples at

various parts of the cooler and refrigerator for drop cultures. S. Józsa

**Stabilization of beer and its fermentation.** J. Satava. *Kvas* 1932, No. 28/29; *Chem. Obsor* 8, Abstract sect., 162-3.—Good beers contain less than 1% maltose. J. Kučera

**Determination of oil in compressor air and its influence on head retention (of beer).** H. Siegfried. *Schweis. Bräu. Rundschau* 44, 27-32 (1933).—The air said. with oil is drawn through water from which the oil is extd. with  $Et_2O$  either directly or after coagulation by addn. of Al sulfate. The results obtained by either method differ at the most by 1 mg. per l. from the theoretical value. The main condition for correct detn. lies in obtaining a quant. absorption of the oil from air by water, which is secured by bringing air and water into intimate contact with each other. Compressor, machine and motor oils, and vegetable oils such as olive and peanut oil had practically no effect upon head retention of beer, while animal fats such as butter and lard, and a certain compd. of soap and mineral oil were detrimental to the head of foam. Machine and compressor oils, however, should also be eliminated, since they impart, even when present only in traces, an unpleasant flavor to the beer. S. Laufer

**Growth of yeast and oxygen deficiency.** R. Koch. *Wochschr. Brau.* 50, 169-72 (1933).—According to R. Windisch's investigations the fermentative power of yeast is impaired rather than improved by aeration. The question arises with the introduction of closed wort coolers and closed fermentation vats on the continent. K. finds that moderate aeration at low fermentation temp. is beneficial; however, it becomes injurious when carried to extremes. Aeration is distinctly stimulating at the commencement of fermentation. Yeast was studied in drop cultures in an atm. deprived of  $O_2$ . Reproduction was less than normal for the first 24 hrs. and ceased in 2-3 days. S. Józsa

**Montanin poisoning [in the brewing industry] (Flamm) 11H. Bacterial removal by means of the electrocatadyn process [in the brewing industry] (Krause) 14.**

**Alcohols.** Aktieselskabet Dansk Gaerings-Industri. *Brit.* 401,495, Nov. 16, 1933. See Fr. 745,860 (C. A. 27, 4342).

**Apparatus for obtaining anhydrous alcohol continuously from mashes, worts, spent sulfite liquors, etc., by distillation followed by dehydration.** Adolf Gorhan (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,946,020, Feb. 6. Various details of app. and operation are described.

**Propionic acid fermentation.** Hugh R. Stiles. U. S. 1,948,447, Feb. 6. A fermentable mash contg. sol. carbohydrate material of at least 25% fructose equiv. is subjected to the combined action of mannitol-forming bacteria and propionic acid bacteria, in order to obtain a high proportion of propionic acid. Cf. C. A. 28, 565<sup>5</sup>.

**Butanol-acetone fermentation of carbohydrates.** Miklós Moskovits and Krausz-Moskovits Egyesült Ipartelepék R. T. Hung. 106,787, Aug. 1, 1933. A mash contg. about 7% carbohydrates is fermented; then a mash of twice this concn. ( $1/4$  to  $1/10$  of the vol. of the original mash) is added. Afterward  $1/2$  to  $1/4$  by vol. is added at intervals of 3-6 hrs. until twice the original vol. is reached and this is fermented to a carbohydrate content of about 0.6-1.0%.

**Apparatus for regulating the temperature of fermenting liquids.** Rudolf Horsch. Ger. 589,944, Dec. 18, 1933 (Cl. 6b. 18). Addn. to 540,057 (C. A. 26, 1706).

**Apparatus for utilizing the gases from fermenting liquors.** Ernst Ludwig and Wilhelm Brill. Ger. 589,886, Dec. 12, 1933 (Cl. 6a. 22).

**Fermentation processes.** I. G. Parbenind. A.-G. Brit. 401,284, Nov. 1, 1933. See Fr. 743,530 (C. A. 27, 3775).

**Fermenting distillery mufts.** Gaston Denys. Brit. 401,138, Nov. 9, 1933. Cf. Fr. 730,666 (C. A. 27, 370)

and abstract from *Bull. assoc. chim. suc. dist. (C. A.)* 27, 3773). Derivs. of salicylic acid such as Na,  $\beta$ -naphthol or PhOH salicylates may be used.

Apparatus for cooling and carbonating beer, etc. Fred A. Block. U. S. 1,946,962, Feb. 13. Structural features.

Yeast fermentations. Johannes van Loon. Ger. 581,761, Dec. 13, 1933 (Cl. 65. 16.01). Yeast fermentations are improved by the presence of a small amt. of aromatic acyl peroxide such as benzoyl, toluyl or naphthyl peroxides.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Identification of organic compounds. XIII. L. Rosenthaler. *Pharm. Ztg.* 78, 699-700 (1933); cf. C. A. 27, 5030, 5479.—The properties and reactions of aetbrine (a dialkylaminoacridine), plasmochin (an 8-amino-6-methoxydiethylaminoisoamylquinoline), amatin [1,3,4-C<sub>6</sub>H<sub>3</sub>Me(OAc)CO<sub>2</sub>H], butolan (PhCH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OOCNH<sub>2</sub>), and perabrodil (diethanolamine 3,5-diiodo-4-pyridone-1-acetate) are described. B. C. A.

The alkaloids of white hellebore. I. Isolation of constituent alkaloids. Kojiro Saito, Harusada Suginome and Michio Takaoka. *Bull. Chem. Soc. Japan* 9, 15-23 (1934).—The only cryst. alkaloid obtained from *Veratrum grandiflorum* Loes. fil. is jervine, colorless needles contg. 2 mols. H<sub>2</sub>O from dil. alc., m. 240-1°, [ $\alpha$ ]<sub>D</sub><sup>25</sup> -177.5° (abs. alc.); hydrochloride, crystals from dil. alc. contg. varying amts. of alc. and H<sub>2</sub>O all m. about 308°; unstable acetate, m. 234-8°, [ $\alpha$ ]<sub>D</sub><sup>25</sup> -126.8° (abs. alc.). H. A. Beatty

Sage oils. Victor G. Fourman. *Drug and Cosmetic Ind.* 34, 121, 152 (1934).—A discussion. H. M. B.

Volatile plant constituents. I. Atlanton, the aromatic principle of true cedar-wood oil. Alexander St. Pfau and Pl. Plattner. *Helv. Chim. Acta* 17, 129-57 (1934).—*Atlas cedar oil* with the consts.: d<sub>4</sub> 0.9485, n<sub>D</sub><sup>20</sup> 1.5162, [ $\alpha$ ]<sub>D</sub><sup>20</sup> +51° 04', sol. in 7 vol. 90% EtOH, distd. at ordinary pressure yielded some (Me)<sub>2</sub>CO; 1 kg. fractionated (10 mm.) yielded the fractions: (A) 80-122°, (B) a sesquiterpene fraction, 124-32°, (C) 139-56°, and (D) sesquiterpene alcs. and ketones, 157-9°. (A) after repeated distn. (10 mm.) yielded a ketone (1%) C<sub>15</sub>H<sub>14</sub>O, b. 82-4°, d<sub>20</sub> 0.9495, n<sub>D</sub><sup>20</sup> 1.4831, [ $\alpha$ ]<sub>D</sub><sup>20</sup> -0° 14' (semicarbazone, m. 163°); (B), equal about 50% of the original oil, distd. over Na yielded cadinene (dihydrochloride, m. 116-7°), (C) upon further distn. yielded sesquiterpenes; (D) (30% of the oil) fractionally distd. in an atm. of N yielded middle fractions, b. (1 mm.) 120-1°, d<sub>20</sub> 0.9803, n<sub>D</sub><sup>20</sup> 1.513-23, [ $\alpha$ ]<sub>D</sub><sup>20</sup> +4° to 8°; upon exposure to the air the d. and  $\alpha$  rose rapidly. Analysis: C= 81.02-81.67, H= 10.11-10.81; formylation showed an alc. content of 12.8% (calcd. as C<sub>15</sub>H<sub>22</sub>O); titration with hydroxylamine, a ketone content of 27% (calcd. as C<sub>15</sub>H<sub>22</sub>O). Further examn. showed the alcs. to be a mixt. of bi- and tricyclic sesquiterpene alcs. Ketones sepd. by semicarbazide yielded atlanton (E), C<sub>15</sub>H<sub>22</sub>O, mixed with a ketone, C<sub>15</sub>H<sub>22</sub>O<sub>2</sub>. (E) when subjected to a series of reactions was shown to be a mixt. of 2 ketones which were designated

as  $\alpha$ -atlanton, CH<sub>3</sub>.CH:CMc.CH<sub>2</sub>.CH<sub>2</sub>.CHCMc:CHCO-

CH:CMc<sub>2</sub>, and  $\gamma$ -atlanton, CH<sub>3</sub>.CH:CMc.CH<sub>2</sub>.CH<sub>2</sub>.C:CMcCH<sub>2</sub>COCH:CMc<sub>2</sub>, which is converted upon sapon. with splitting off of 1 mol. Me<sub>2</sub>CO into 9-acetyldipentene and 9-acetylterpinolene which upon further sapon. produces 1-methyl-4-acetylcyclohexene (F) with a loss of 1 mol. Me<sub>2</sub>CO. The latter reaction tends to prove that (F) does not occur as such in plants but is formed by steam distn. of the oil from plant material. Studies on the oils obtained from the wood of Himalaya and Lebanon cedars substantiates the above conclusion that (E) is the aromatic principle in these oils. H. M. B.

The green color of olive oil. L. Nobile. *Boll. chim. farm.* 72, 649-50 (1933).—Decided green color in olive oil is usually due to fermentative processes producing rancidity; adulteration with refined S oils, or to traces of Cu. The Cu is frequently present as stearate.

Lewis W. Butz

The green coloration assumed by camphorated olive oil.

Dino Pontc. *Boll. chim. farm.* 72, 953-5 (1933) Camphorated olive oil made with synthetic camphor becomes green after a time, especially after sterilization. The same product made from natural camphor does not. The green color is due to Cu. Lewis W. Butz

Guaiacol cinnamate. A. Angeletti and U. Gallo. *Giorn. farm. chim.* 82, 361-4 (1933).—Guaiacol cinnamate m. 142°. Guaiacol and cinnamic acid did not form addn. compds. eutectic was observed at 25° corresponding to 94.5% guaiacol. Lewis W. Butz

The detection and determination of guaiacol in the presence of eucalyptole. Dino Pontc. *Giorn. farm. chim.* 82, 365-9 (1933).—In olive oil soln.: Steam-distill a mixt. consisting of 5 cc. of the oil soln., 25 cc. H<sub>2</sub>O and 3-4 drops concd. H<sub>2</sub>SO<sub>4</sub>, collect 250 cc. of distillate, acidify with 2-3 drops concd. H<sub>2</sub>SO<sub>4</sub>, and ext. repeatedly with Et<sub>2</sub>O. Evap. the Et<sub>2</sub>O on a water bath and make alk. with 10% NaOH when the guaiacol dissolves, leaving the eucalyptole. The guaiacol is then isolated by acidification followed by extn. with Et<sub>2</sub>O. In sirups: The sample (15-20 g.) is heated on a water bath to remove EtOH. The remainder of the procedure is as described above. Lewis W. Butz

Carrel-Dakin solution. The solution of sodium hypochlorite—formulas for correction of tables. Carlo Stelfeld. *Tribuna farm.* 2, 59-60 (1934); cf. C. A. 21, 431; 26, 542.—In the prepn. of Dakin's soln. 25% of "available" Cl<sub>2</sub> in the CaOCl<sub>2</sub> has long been regarded as standard. Recent advances have greatly increased this percentage. Instead of using a table to obtain the amt. of the ingredients when the CaOCl<sub>2</sub> varies the following formula is given: (25)(184)/N = X, where N is the actual percentage of "free" Cl<sub>2</sub> and X is the required wt. of CaOCl<sub>2</sub> to prep. a standard soln. From X the relative quantities of NaHCO<sub>3</sub> and Na<sub>2</sub>CO<sub>3</sub> may be easily calcd. Because the French trade calcs. available Cl<sub>2</sub> in 1 pr 1000 g. CaOCl<sub>2</sub>, each 1. a "degree," appropriate conversion formulas are also given. G. H. Conant

The discoloration of a solution of sodium salicylate and sodium bicarbonate in water. M. Beukema-Goudsmut. *Pharm. Weekblad* 71, 196-201 (1934).—The development of color in a soln. contg. Na salicylate + NaHCO<sub>3</sub> occurs only in the presence of free O<sub>2</sub>, and is independent of the pH value. The HCO<sub>3</sub><sup>-</sup> ion is an important factor in the reaction. Very small quantities of Cu can completely suppress the color formation. A. W. Dow

The keeping of and keeping properties of citrus oils. Polaks Fruital Works. *Spice Mill* 57, 169-9 (1934) The effects of light, temp., moisture, and contact with air and metals are briefly reviewed. Sn and Al are not harmful, but the latter is corroded by citrus oils. The common antioxidants are ineffective. Removal of turpenes and diln. with 5 to 10% EtOH are the most effective means of preservation. L. W. Elder

Science and practice in the druggist's shop. H. Wajahn. *Apoth. Ztg.* 49, 181-3 (1934).—An address. W. O. E.

Preparation of a rectal suppository containing digitalis extract. H. Eschenbrenner. *Apoth. Ztg.* 49, 189-92 (1934).—A suitable suppository contg. the active ingredients of digitalis is fully discussed, and a procedure for its prepn. suggested. W. O. E.

Importance of the biological evaluation of drugs. K. W. Merz. *Apoth. Ztg.* 49, 206-10 (1934).—An address. W. O. E.

Propane as fuel in drug laboratories. Walter Meyer. *Apoth. Ztg.* 49, 223 (1934). W. O. E.



**New constants for drugs and galenicals. II. Copper values of drugs in the Supplement to the D. A.-B. V. 1930.** Jul. Aug. Müller. *Pharm. Zentralhalle* 75, 81-6(1934); cf. C. A. 26, 5173.—The Cu values of some 150 drugs and galenicals have been detd. and tabulated.

W. O. E.

**Estimation of animal lipoids and their constituents.** Herbert Patzsch. *Pharm. Zentralhalle* 75, 98 102, 116-20 (1934).—The methods are especially suited to the needs and facilities of the pharmaceutical lab., and based on Abelin's work, *Z. anal. Chem.* 94, 439-64(1933). Twenty-four references.

W. O. E.

**Diacylation of cinchona tincture and extract.** H. Breddin. *Pharm. Ztg.* 79, 148-9(1934).—An illustrated article showing the app. for diacylating the 2 preps. in connection with a pertinent commentary.

W. O. E.

**Diacylation of cinchona fluidextract.** H. Breddin. *Pharm. Ztg.* 79, 163-5(1934).—The previous work (preceding abstr.) is discussed and data are presented on the diacylation of this fluidext.

W. O. E.

**New drugs and pharmaceutical specialties in the 4th quarter of 1933.** F. Zernik. *Süddout. Apoth.-Ztg.* 74, 97-9(1934); cf. C. A. 28, 567<sup>a</sup>.

W. O. E.

**Photochemistry of cod-liver oil.** J. Howard Graham. *Am. J. Pharm.* 106, 44-56(1934).—From the tabulated results there appears to be no conclusive evidence of consistent correlation among the sapon., I, and free acid values. Variations of air, moisture, light and temp. conditions seem to preclude any possibility of close correlation. A realization of the complexity of the chem. nature of cod-liver oil is further emphasized. On considering the 2 generally used tests for rancidity, the Hager-Salkowski would seem to be more preferable to the Kreis in detg. the relative freshness of an ordinarily handled cod-liver oil. Even with the first-mentioned test, the purplish blue obtained with the specimens of fresh oil will continue to appear, for periods up to 35 days, but whereas the color lasts at first for approx. a second, the purple color becomes ever more evanescent as the days increase. A bibliography is appended.

W. G. Gacssler

**Notes on the assay of strychnine alkaloid in strychnine sulfate tablets.** Florin J. Amrhein. *Am. J. Pharm.* 106, 57 8(1934).—By altering the official method, to remove all of the mineral oil, better results were obtained by the following modified method: Weigh 25-100 tablets and transfer directly to a separatory funnel. Add 20 cc. of water to disintegrate the tablets followed by 1-2 cc. of 10%  $H_2SO_4$ . After complete disintegration has been effected ext. twice with two 25-cc. portions of  $CHCl_3$  to remove the fat. Then make alk. with dil.  $NH_4OH$  (1 + 2). Ext. 5 times with  $CHCl_3$ , using 25-, 20-, 15-, 10- and 5-cc. portions, resp., or until the alkaloid is completely removed. Combine the first 2 extns. in a second separatory funnel into the stem of which has been inserted a pledget of absorbent cotton wet with  $CHCl_3$ . Wash with 5 cc. of water contg. a drop of dil.  $NH_4OH$  (1 + 2). When clear, filter the  $CHCl_3$  portion into a small beaker. Wash each successive  $CHCl_3$  ext. with the same wash water and filter in a similar manner into the main portion, finally washing the outer surface of the stem of the separatory funnel with a few cc. of  $CHCl_3$  and adding this also to the main portion. Evap. on a steam bath, removing the beaker from the bath at 3-5 cc. and allow final evapn. to take place in a current of air to prevent decrepitation as the last portions evap. from the beaker. Add 2-3 cc. of neutral alc., cover beaker, and warm on a steam bath to dissolve the residue. Add a few drops of methyl red indicator and titrate with 0.02 N acid to a faint pink color. Add 50 cc. of recently boiled water and continue the titration with 0.02 N acid to a faint red color. (One cc. 0.02 N acid is equiv. to 6.684 mg. of strychnine  $(C_{21}H_{27}O_2N_2)$ , or 8.565 mg. of strychnine sulfate  $(C_{21}H_{27}O_2N_2)_2 \cdot H_2SO_4 \cdot 5H_2O$ , or 7.944 mg. of strychnine nitrate  $(C_{21}H_{27}O_2N_2) \cdot HNO_3$ ). Control analyses were run by means of the regular A. O. A. C. method and it was found that the results obtained varied from  $1/100$  to  $1/10$  of a grain for

the  $1/100$  grain tablet and for the  $1/10$  grain tablet the assay would indicate that it was a  $1/100$  grain tablet.

W. G. G  
**Digitalis purpurea and D. lanata.** A. Pfister. *Anales quim. farm. (Chile)* 3, 1-7(1934).—The chemistry of the active principles is briefly reviewed.

L. E. Gilson  
**International standard for the estrogenic hormone.**

C. Lormand. *Bull. soc. chim. biol.* 15, 1566-8(1933).—The international comm. adopted the hydroxyketone form of the estrogenic hormone from gravid urine as the international standard. The international unit is 0.1  $\gamma$  (approx.  $1/2$  rat unit).

L. E. Gilson  
**Formula and preparation of sirup of terpinol hydrate.** J. R. Machado and J. Sonol. *Rev. facultad cienc. quim. (Univ. La Plata)* 8, Pt. 2, 7-14(1933).—A stable prepn. which does not ppt. when diluted consists of terpinol hydrate 1, EtOH 20, glycerol 20 and simple sirup 60 parts. Other formulas collected from various sources are discussed.

L. E. Gilson  
**The chemical composition of cigarettes and cigaret tobacco leaves of the aromatic and nonaromatic types.** F. T. Adriano, C. G. Ramos and R. A. Isidro. *Philippine J. Agr.* 4, 87-97(1933).—Comparative analyses for moisture, ash, sand, N, nicotine, starch and  $H_2O$ -sol. sugars are given on 5 brands of cigarettes which are imported to the Philippines, 8 Philippine-made aromatic brands, 18 typical brands and 18 varieties of cigaret tobacco leaves.

John O. Hardesty  
**The analysis of aromatic tincture of iron with arsenic.** Miloš Melichar. *Časopis Českoslov. Lékařnictva* 13, 321 7(1933).—To det. EtOH, sucrose, As and Fe on one sample, the EtOH is removed by distn.,  $Fe(OH)_3$  and  $NH_4MgAsO_4 \cdot 6H_2O$  are pptd. together, the mixt. is filtered and sucrose detd. polarimetrically in the filtrate. To the ppt. HCl is added, As is distd. off as  $AsCl_3$  and detd. by titration with  $KBrO_3$ , while Fe remains and is detd. iodometrically.

William J. Husa  
**The testing of sirup of raspberry.** J. Šterba-Böhm. *Časopis Českoslov. Lékařnictva* 14, 14(1934).—To 5 g. of sirup is added about 5 g. of satd. soln. of  $K(SbO) \cdot C_2H_4O_4$ . A strip of filter paper is partially immersed in the liquid for 1-3 hrs., then carefully washed and dried at room temp. With an authentic sirup the paper is colored grayish, sometimes having a barely perceptible pink tinge; a reddish color shows adulteration with other fruits or dyes.

William J. Husa  
**Fowler's solution. I. Chemical composition.** Axel Jernstad & Ottar Østby. *Norg. Apotekerforen. Tids.* 41, 187 90(1933). See C. A. 28, 258<sup>a</sup>.

H. C. M. I.  
**Misbranded livestock and poultry remedies.** H. E. Moskey. *Cornell Veterinarian* 23, 98-109(1933).—An address relating to the work of the U. S. Food and Drug Administration.

K. D. Jacob  
**Body weight and dosage in the assay of digitalis with frogs.** Behrend Behrens and Ernst Reichelt. *Z. ges. expl. Med.* 91, 417 23(1933).—The same dose of strophanthin per g. of body wt. produced wide variations of the mortality rate between different wt. classes of frogs. It is recommended that the same dose be given to all frogs regardless of wt. and that the permissible wt. limits be narrowed for the assay of digitalis.

Milton Levy  
**Practical tests of Dakin solution.** Dulcideo T. de Lacerda. *Tribuna Farm. (Brazil)* 2, 39-40(1933).—In prepg. Dakin soln. it is important that the  $CaCl_2$ , from which the  $NaOCl$  is eventually prepared, have an active Cl content of not less than 20%. A titration method is described for detg. the Cl content of the  $CaCl_2$  and of the prepd. Dakin soln.

M. McMahon  
**Sodium cacodylate. Criticism of some reactions contained in the French Pharmacopea 1908.** François Martin. *Bull. sci. pharmacol.* 41, 21-8(1934).—The reaction of a soln. of  $Me_3AsO_3Na$  against phenolphthalein depends on the concn. of the salt as well as of the indicator. A soln. of the pure salt is alk. Only preps. contg. free acid meet the requirements of the pharmacopea. The test for monomethylarsinate with  $HgCl_2$  is pos. in the neutral salt even in the absence of any impurity, a ppt. of  $Hg_2OCl_2$  being formed. The test with  $AgNO_3$  is

unreliable also, as it reacts with unimportant impurities and also with the absolutely pure salt itself. These tests should be substituted by the detn. of the monomethylarsinate with HI.

A. E. Meyer  
Azochloramide, a new selective chlorine compound. Frans C. Schmelkes, Henry C. Marks, Isabelle B. Romans, Elizabeth S. Horning and Albert F. Guiteras. *J. Bact.* 27, 26-7 (1934).—There was no reaction between azochloramide (*N,N*-dichloroazodicarbonamidine) and a series of amino acids and little with cystine, which is in striking contrast to hypochlorite solns. It is highly bactericidal and highly stable in body fluids. J. T. M.

The pneumococcal powers of sodium oleate and sodium ricinoleate. L. A. Barnes and Charlotte M. Clarke. *J. Bact.* 27, 107-8 (1934).—Na ricinoleate, 0.004% and Na oleate, 0.0004% are approx. the minimal pneumococcal concns. of these soaps. John T. Myers

Ultra-violet absorption and Lovibond unit of vitamin A-containing oils and fats. B. Josephy. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* 3, 133-5 (1933).—The Lovibond values of cod-liver oil, halibut-liver oil, sheep-liver oil and certain other oils and fats contg. vitamin A agree with the ultra-violet absorption at 3280 Å. after sapon., with a mean error less than 5%. Cholesterol must be removed from the unsaponifiable fraction before measuring absorption. J. C. M.

The detection of petroleum in ethereal oils. J. Zimmermann. *Chem. Weekblad* 31, 132-3 (1934).—The oil is distd. *in vacuo* (24-28 mm.) with the Widmer app. (cf. C. A. 18, 1009). The first fraction, b. 10-15°, is treated with concd. H<sub>2</sub>SO<sub>4</sub>. When petroleum is present a clear layer is obtained with  $n_D^{20}$  1.42-1.45, whereas other products from the action of H<sub>2</sub>SO<sub>4</sub> on ethereal oils have a  $n_D$  of at least 1.48. With oils, e. g., turpentine, with fractions distg. below the above temp. the distn. is first carried to 20° and the fraction following this to the end of the distn. is used for the treatment. E. Schotte

The early history of digitalis. A. John Schwarz. *J. Tenn. Acad. Sci.* 8, 358-61 (1933).

A. L. Taylor  
Preparation, toxicity and absorption of bismuth compounds. V. Bismuth compounds of catechol, pyrogallol and gallic acid. W. M. Lauter, A. E. Jurist and W. G. Christiansen. *J. Am. Pharm. Assoc.* 22, 531 4 (1933); cf. C. A. 27, 4026.—Na Bi gallate is a yellow powder; it contains 51.52% Bi and some Na Bi digallate; Na Bi digallate is a yellow powder, has 59.7% Bi and some Na Bi gallate; Na Bi Me gallate is a yellow powder and has Bi 49.56%. Bi pyrogallate is a yellow solid; it has Bi 59.24% (theory 59.7%). Bi catecholate is a yellow powder, insol. in NaOH soln. but sol. in HCl. The compds. in aq. or oil suspension were injected intramuscularly into albino rats. The absorption was detd. by estn. of the unabsorbed Bi remaining at the site of injection. The toxicity was estd. from growth curves. Na Bi digallate is much less toxic than Na Bi gallate. The absorption is not satisfactory as compared with the tartrates and mucates. The absorption and toxicity of Na Bi digallate and Na Bi Me gallate are about the same. The H<sub>2</sub>O solns. are unstable. Although the toxicity of these compounds is low, their slow and incomplete absorption renders them of doubtful utility in therapy. L. E. W.

A new field of investigation in pharmacognosy: the microscopy of glandular products. Heber W. Youngken and Allan W. Reed. *J. Am. Pharm. Assoc.* 22, 1215-18 (1933).—The products studied were fresh and preserved pituitary whole gland and anterior and posterior lobes, whole ovary, corpus luteum, desiccated strips of these and powd., desiccated products specially prepd. from the mentioned materials. Cattle and hogs yielded the products. The descriptions of the reagents and technic as well as the microscopic characteristics of the several products are given. L. E. Warren

Biochemistry and the manufacture of fine chemicals. F. H. Carr. *Chemistry and Industry* 1934, 113-28.—A discussion of the manuf. and applications of some biochem. substances for medical use, including hormones, vitamins, insulin, thyroglobulin, adrenaline, glutathione and sterols. Julius White

1 Test for penetration of petrolatum (Anon.) 22. Cleansing compn. for use as a shampoo (U. S. pat. 1,946,372) 18. Cyclic cyano ketimides and ketones [products as intermediates for perfumes] (Ger. pat. 591,260) 10 Alkylolamine deriva. of aliphatic acids [antiseptics] (U. S. pat. 1,946,079) 10.

Kroeber, Ludwig: Das neuzeitliche Kräuterbuch. Die Arzneipflanzen Deutschlands in alter und neuer Betrachtung. Stuttgart: Hippokrates-Verlag. 448 pp. M. 15.

Jahresbericht der Pharmazie. Jg. 67, 1932. Issued by "Standesgemeinschaft Deutscher Apotheker vorm. Deutscher Apotheker-Verein." Edited by Carl A. Rojahn and S. M. v. Bruchhausen. Göttingen: Vandenhoeck & Ruprecht. 431 pp. M. 24; cloth, M. 26.50.

3 Medical compositions comprising oil and an acidic organo-mercuri compound. Edgar B. Carter and Edmond E. Moore (to Abbott Laboratories). U. S. 1,947,519, Feb. 20. See Brit. 393,102 (C. A. 27, 5895).

Stable injection solutions. Chemisch-Pharmazeutische A.-G. Bad Homburg. Ger. 589,730, Dec. 14, 1933 (Cl. 30k. 2). Addn. to 564,992 (C. A. 27, 1092). The method of 564,992 for producing stable oily solns. of alkaloid salts for injection purposes is modified by using alcs. contg. at least 6 C atoms in the mol., such as octyl, decyl, benzyl alc., etc., to dissolve the salts before adding them to the oil. Thus, quinone-HCl is dissolved in octyl alc. and the soln. then added to olive oil.

Material for lowering blood pressure. Sankyô K. K. (Masao Doki, Tôkichi Miyoshi and Kôkichi Kaluta, inventors). Japan. 99,519, Feb. 14, 1933. Dried and fat-free yeast is decompd. with H<sub>2</sub>SO<sub>4</sub> or HCl under pressure. The product is neutralized with Ba(OH)<sub>2</sub> or lime and impurities are pptd. with AgNO<sub>3</sub> and Pb acetate. The soln. is neutralized with NH<sub>4</sub>OH. The ppt. is dissolved in warm water, treated with H<sub>2</sub>S and the filtrate is concd. to give a material that lowers blood pressure.

Iodine preparations. John C. Harry. Fr. 756,634, Dec. 13, 1933. See U. S. 1,896,171 (C. A. 27, 2533)

Alkaloids. Franz Köck and Franz Messner. Austrian 136,144, Jan. 10, 1934 (Cl. 30f.). Vegetable material contg. alkaloids are fermented, after addn. of sugar or other fermentable substance if necessary. The liquid fermentation products are sepd. and distd., and the alkaloids then recovered from the distn. residue. An example is given in which coffee beans are boiled with dil. HCl and the mixt. is neutralized, treated with sugar, and fermented with yeast under weakly alk. conditions to yield an alk. soln. contg. caffeine.

7 Lobelia alkaloids. Heinrich Wieland (to C. H. Boehringer Sohn). U. S. 1,946,345, Feb. 6. The inactive or but slightly active lobelanidine, which is present in lobeline mother liquors, may be converted into lobeline and lobelanine by oxidation (suitably by use of a permanganate or MnO<sub>2</sub> with dil. H<sub>2</sub>SO<sub>4</sub> soln., by chromic acid in HOAc soln. or by electrolysis). Various examples with details of procedure for the prepn. of the hydrochloride of norlobelidine, etc., are given.

8 Alkaloidal preparations of opium. Paul Casparis and Kurt Siegfried. U. S. 1,947,330, Feb. 13. For producing a prepn. of opium which is almost entirely free from ballast matter and contains a quantity of each of the alkaloids of opium, morphine and narcotine are first sepd. from an opium soln. by use of NH<sub>3</sub> and the other alkaloids are extd. from the mother liquor by use of CHCl<sub>3</sub>.

9 Theobromine and theophylline derivatives. Franz Wratschko. Austrian 135,890, Dec. 11, 1933 (Cl. 12a.). Equimol. amts. of salicylic acid, theobromine or theophylline, and Ca(OH)<sub>2</sub> or Sr(OH)<sub>2</sub> are brought together in water or an org. solvent. Mol. compds. of therapeutic value are obtained. Examples are given.

Berberine salt. Shigeru Mizuno and Kuni'ichi Yoshida. Japan. 99,230, Jan. 23, 1933. Vegetable material contg. berberine extd. with hot furfurole. The

ext., after distn. of the solvent, is mixed with hot water and treated with ether. Berberine-HCl is obtained from the aq. layer.

**Compounds, of aspidinofilicine.** C. F. Boehringer & Soehne G. m. b. H. (Fritz Johannessohn and Hans Hatzig, inventors). Ger. 589,780, Dec. 15, 1933 (Cl. 12p. 12). Aspidinofilicine is treated with cinchonidine or other quinine bases. The products have pharmaceutical uses.

**7-Iodo-8-hydroxy-5-quinolinesulfonates of benzylisoquinoline derivatives.** Chinoin Gyóg- és Vegyszeti Termékek Gyára R. T. Hung. 106,906, Aug. 1, 1933. These salts, obtained directly by action of the acid on derivs. of benzylisoquinoline, have high therapeutic value.

**Isacen.** Sankyó K. K. (Ryûji Takamoto, inventor). Japan. 99,024, Jan. 13, 1933. Isacen, m. 244°, is prepd. by agitating a mixt. of 3,3-bis(*p*-hydroxyphenyl)oxindole and  $\text{Ac}_2\text{O}$  in a current of HCl gas without heating.

**Isacen.** Sankyó K. K. (Ryûji Takamoto, inventor). Japan. 99,025, Jan. 13, 1933. Isacen is prepd. by acetylating 3,3-bis(*p*-hydroxyphenyl)oxindole with  $\text{Ac}_2\text{O}$  or  $\text{AcCl}$  in presence of an unstable metallic chloride which evolves HCl on contact with  $\text{H}_2\text{O}$ .

**Isacen.** Dai Nippon Seiyaku K. K. (Shigenobu Inagaki, inventor). Japan. 100,349, March 30, 1933. By heating 3,3-dichlorooxindole and phenyl acetate at 80–95° for 19 hrs. without catalyst, isacen, m. 242°, is prepd. It is recrystd. from phenyl acetate.

**Styptic.** Meigyô Saitô. Japan. 99,442, Feb. 8, 1933. The fresh marrow and bone tissue of birds and mammals are crushed and treated with org. solvents. The residue is extd. with pure water at 60°. Proteins are pptd. with sulfosalicylic acid, the soln. is neutralized with  $\text{CaCO}_3$  and a styptic is obtained from the filtrate.

**Solid material containing vitamins A and D.** Isamu Hayashi. Japan. 99,171, Jan. 25, 1933. Fish oil (especially cod-liver oil) is decompd. with lipase, and  $\text{CO}_2$  is introduced under pressure; by this means fatty acid contg. vitamins A and D is sepd. The product is neutralized with  $\text{Ca}(\text{OH})_2$  or  $\text{Mg}(\text{OH})_2$  and is dried at a low temp. and a low pressure.

**Vitamin-enriched oil.** The Head of the Tokyo Kôgyô Shikunjo (Yasuyuki Toyama, Tomotarô Tsuchiya and Tokuzô Ishikawa, inventors). Japan. 100,471, Apr. 7, 1933. By heating a mixt. of sliced fish liver and an oil (such as olive oil, colza oil) at below 100°, an oil rich in vitamin A is obtained.

**Vitamins from saponifiable oils.** Walter O. Snelling. U. S. 1,947,315, Feb. 13. A mixt. of an oil such as a fish-liver oil and pentane or the like is heated with an aq. non-alc. soln. of a caustic alkali and the resulting product further treated for vitamin concentrate recovery.

**Preserving vitamin-containing fish-liver oils.** \*Ralph C. Huston and Howard D. Lightbody (to State Board of Agriculture of Mich.). U. S. 1,947,432, Feb. 13. A small proportion of hydroquinone is added as a stabilizing agent. Pyrocatechol, resorcinol, pyrogallol or phloroglucinol also may be used.

**Hormones.** Schering-Kahlbaum A.-G. Brit. 401,205, Nov. 9, 1933. See Ger. 584,143 (C. A. 28, 262°).

**Hormones.** Soc. pour l'ind. chim. à Bâle. Brit. 401,574, Nov. 16, 1933. The hormone of the corpus luteum is concd. by treating a soln. thereof in a solvent

1 immiscible with  $\text{H}_2\text{O}$ , e. g.,  $\text{CS}_2$ , petroleum ether,  $\text{C}_6\text{H}_6$ , PhMe,  $\text{AcOEt}$ , with 1 or more adsorbing agents, e. g., fuller's earth, alumina, kieselsuhr, silica gel,  $\text{CaCO}_3$ , C, kaolin, and extg. the hormone from the adsorbent with an org. solvent, e. g.,  $\text{Et}_2\text{O}$ , MeOH, EtOH,  $\text{Me}_2\text{CO}$ ,  $\text{CHCl}_3$  or a mixt., e. g., of MeOH and petroleum ether, at raised temp. Evapn. of the solvent leaves the product in solid form or as a liquid which solidifies on standing.

2 **Pancreas preparation containing agents which neutralize the toxic influence of the substances of the thyroid gland.** József Baló and Albert Szent-Györgyi. Hung. 107,882, Jan. 2, 1934. Acid or alk. hydrolysis is applied during the process.

**Antiseptics.** Cherg. pharm. Fab. Hubold & Bartsch. Ger. 580,972, Dec. 22, 1933 (Cl. 12q. 12). Addn. to 502,392 (C. A. 27, 4350). The process of Ger. 502,392 is modified by using 2,4-diaminoazobenzene instead of its mono-HCl salt.

3 **Surgical sutures.** Paul Bost. Brit. 401,449, Nov. 16, 1933. Addn. to 274,493 (C. A. 22, 2244). Threads for surgical sutures or fabrics are prepd. from muscle fibers as in 274,493 except that no special precautions as to sterility are observed and the step of tanning in formalin is omitted. The threads so formed are sterilized by boiling in an alc. soln. of  $\text{HgCl}_2$  or by steeping in an aq.  $\text{HgCl}_2$  soln.

4 **Vulnary plasters.** Eugen Sander. Fr. 756,918, Dec. 18, 1933. A polymerizate of an unsatd. org. compd., preferably polyacrylic acid which is transparent, is used for making plasters.

**Medicinal baths.** Prosper Joseph Auguste Georges Demarty. Ger. 591,173, Jan. 17, 1934 (Cl. 30k. 11). Compos. to be immersed in bath water are prepd. by molding a mixt. of Portland cement, powd. Al, and a sludge of radioactive minerals into hollow porous briquets, the hollows of which are then filled with a salt mixt. which evolves  $\text{CO}_2$  when treated with water.

5 **Toilet powder.** Yushichi Nishizawa. Japan. 100,525, Apr. 11, 1933. A toilet powder consists of  $\text{ZnS}$  contg. some  $\text{Mg}(\text{NO}_3)_2$ ,  $\text{KNO}_3$ ,  $\text{NH}_4\text{NO}_3$ , perborates, persulfates and peroxides of Ca or Mg, nitric esters and perboric esters.

**Generating heat for permanent hair waving.** Ralph L. Evans. Brit. 400,943, Oct. 30, 1933. See U. S. 1,894,032 (C. A. 27, 2263) and U. S. 1,919,090 (C. A. 27, 4882).

**Pomades.** Gerhard Kohn. Fr. 757,146, Dec. 20, 1933. Finely divided medicaments which are insol. or nearly insol. in water are incorporated in pomades by dissolving them 1st in org. solvents insol. in water and then emulsifying the solns. in water, using resins as emulsifying agents.

7 **Disinfectants.** Edouard O. Ornfeldt. Fr. 757,040, Dec. 19, 1933. Mineral oils are made semi-solid by treatment with soap powder and a mixt. of beeswax and paraffin, and then mixed with thickeners, such as starch and talc. The products are used for disinfecting and for the destruction of parasites.

**Treating tobacco to prevent irritant action in smoking.** Werner Pettersson. Ger. 509,244, Jan. 27, 1934 (Cl. 79c. 1). In addn. to the substance specified in C. A. 28, 1474, tobacco may be treated with an ethoxydiaminoacridinium chloride, or the K salt of the sulfuric ester of 2-hydroxyquinoline.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The action of dilute hydrochloric acid on phosphorites. V. Ya. Anosov and V. F. Ust-Kachintzev. *J. Applied Chem.* (U. S. S. R.) 6, 228–38 (in German 238–9) (1933).—The action of dil. HCl on apatite from Khibinsk and on phosphorites from Vyatka, Saratov, Ural, Morocco and Aktyubinsk was studied. The degree of decompn. varies with the origin of the phosphorites. It amounts to 92.23–80.1% for a 5% HCl and 89.96–70.3% for 1% HCl.

An increase of the temp. from 18° to 100° raises the soly. by 1.6 to 22.9%. It is recommended to use an amount of HCl that would convert the total Ca present in the phosphorite into  $\text{CaCl}_2$ . The concn. of the  $\text{P}_2\text{O}_5$  in the ext. increases in proportion to the concn. of the applied acid. When HCl of a concn. up to 2–3% is used it can be partially replaced by  $\text{H}_2\text{SO}_4$ . With 50%  $\text{H}_2\text{SO}_4$  replacement of HCl the degree of decompn. is raised. A. A. B.

**Sulfuric acid production by the lead chamber method.** Pietro Guzzeschi. *Industria chimica* 8, 1884-94(1933); cf. C. A. 28, 859.—The math. analysis of the intensive method of prepg. lead chamber acid is completed.

A. W. C.

The salt cake process for the extraction of copper during the roasting of cupripyrates for the manufacture of sulfuric acid. Yagoro Kato and Takeshi Takei. *J. Electrochem. Assoc. (Japan)* 2, 61-4(1934).—When the salt cake in an optimal amt., 1 mol.  $\text{Na}_2\text{SO}_4$  per mol.  $\text{CuO}$ , is added to  $\text{Cu}$  pyrites during roasting to obtain  $\text{SO}_2$  for  $\text{H}_2\text{SO}_4$  manuf.,  $\text{Cu}$  remains mostly in the sol. state, even at the usual max. roasting temp. of  $850^\circ$ . Salt cake accelerates formation of  $\text{CuSO}_4$ ; also it fuses easily with  $\text{CuSO}_4$ , and prevents decompn. of  $\text{CuSO}_4$ , hindering the formation of  $\text{CuO}$  and  $\text{CuO}\cdot\text{Fe}_2\text{O}_3$ . As the natural sequence of this procedure, gases generated during the roasting do not contain any matter harmful to the lead chamber.

K. Konda

**Good and poor catalysts in the preparation of sulfuric acid.** I. E. Adadurov. *J. Applied Chem. (U. S. S. R.)* 6, 193-204(in German 204-5)(1933).—A review and discussion of the literature.

A. A. Bochtlingk

**Purification of the hydrogen used in the synthesis of ammonia by removing hydrogen sulfide with activated carbon.** V. F. Postnikov and I. P. Kirillov. *J. Applied Chem. (U. S. S. R.)* 6, 240-4(1933).—The capacity of the charcoal depends upon the concn. and is expressed by  $K = 5.88 C_0^{0.33}$ , where the coeffs. 5.88 and 0.367 were detd. graphically from the equation  $\log K = \log a + b \log C_0$  in the coordinate system  $\log K = \text{ordinate}$  and  $\log C_0 = \text{abscissa}$ . An increase in the grain of the charcoal lowers its capacity. Expts. carried out on desorption of  $\text{H}_2\text{S}$  by blowing the charcoal with  $\text{H}_2$  and air at  $100^\circ$  and with the use of vacuum restored the activity to 55-65%.

A. A. Bochtlingk

**The volatilization of ammonium bicarbonate.** I. S. Telemov, G. N. Gorshtein and Z. P. Tkachenko. *J. Chem. Ind. (Moscow)* 1933, No. 10, 53-5.—Higher temp. and smaller crystal size increase the volatility of  $\text{NH}_4\text{HCO}_3$ . Mixing it with other solids does not decrease its volatility, but covering the salt with a film of high-boiling liquid does.

H. M. Leicester

**The simultaneous production of calcium carbide and phosphorus.** A. S. Mikulin'ski. *J. Chem. Ind. (Moscow)* 1933, No. 10, 32-7.— $\text{CaC}_2$  prepd. from phosphorite and C usually contains some P. When this  $\text{CaC}_2$  is heated at  $900^\circ$  in  $\text{N}_2$ ,  $\text{CaCN}_2$  free from P is obtained.

H. M. L.

**Potash.** Bertrand L. Johnson. *Bur. Mines Econ. Paper* No. 16, 78 pp.(1933).—Com. statistics are given, followed by a bibliography.

E. J. C.

**Potash and alumina from Georgia shale.** S. L. Madorsky. *Ind. Eng. Chem.* 26, 256-9(1934).—A practically complete sepn. of  $\text{FeCl}_3$  from  $\text{AlCl}_3$  or the chlorides obtained in the  $\text{HCl}$  extn. of Georgia shale can be obtained by heating the mixt. to about  $600^\circ$  in an atm. of  $\text{HCl}$  gas. The  $\text{Al}_2\text{O}_3$  can then be made essentially Fe free by washing with a dil.  $\text{HCl}$  soln. By this method an Fe-free  $\text{Al}_2\text{O}_3$  can be obtained from Georgia shale as well as  $\text{KCl}$  free from Fe and Al.

J. R. Adams

**Artificial dehydration of hydrated salts by means of solar energy.** A. V. Nikolaev, V. M. Vdovenko and P. F. Pokhil. *Compt. rend. acad. sci., U. R. S. S. [N. S.]*, 1, 25-6(in English 26-7)(1934).—Films of kerosene, etc., on water exposed to sunlight cause a decrease in evapn. and a rise in temp. Said. solns. of  $\text{Na}_2\text{SO}_4\cdot 10\text{H}_2\text{O}$ , exposed to summer sunlight at Kulunda, Western Siberia, showed differences of  $10-16^\circ$ . When the  $32.4^\circ$  point was reached conversion of mirabilite to thenardite set in. The method may have com. applications in Kara Buzaz and the Crimea.

F. H. Rathmann

**New sources and methods for producing boron compounds.** S. I. Volkovich. *J. Chem. Ind. (Moscow)* 1933, No. 10, 56-7.—Datolite is ignited at  $800-50^\circ$ , then mixed with  $\text{H}_2\text{SO}_4$  for 30 min. at  $80^\circ$ . The concd. ext., filtered from  $\text{CaSO}_4$ , is boiled with  $\text{CaCO}_3$  to remove heavy metals, and further concd. to yield  $\text{H}_2\text{BO}_3$ .

H. M. Leicester

**Magnetite and hydromagnetite in British Columbia.** A. M. Richmond. *Brit. Columbia Dept. of Mines Non-Metallic Mineral Investigations Rept. No. 3*, 21 pp(1933).

Alden H. Emery

**Floating molybdenite in Morocco.** Anon. *En. Mining J.* 135, 58(1934).—In Morocco, in the district of Azegour, South Marrakesch, 25 tons per month of M. concentrate are produced, contg. 85%  $\text{MoS}_2$ . Flotation is selective, because of the chalcopyrite present. A flow sheet, operating results and power requirements tabulated.

W. H. Boynton

**Special adaptations of mechanical ovens of type G for burning different kinds of pyrites.** N. L. Arkin. *J. Chem. Ind. (Moscow)* 1933, No. 9, 59-60.

H. M. L.

**Platinum catalyst deposited on silica gel.** M. (1) Kharmandar'yan and G. D. Dakhnyuk. *Ukrain. Khim. Zhur.* 8, Wiss. Teil 36-43(1933); cf. Thompson, C. A. 25, 1069.—Efficient catalysts for  $\text{SO}_2$  manufacture can be prepd. with smaller Pt content but the same activity as the catalysts now in use. Simultaneous pptn. of Pt and  $\text{SiO}_2$  gel yields less effective catalysts than deposition of colloidal Pt on the gel. Colloidal Pt solns. were prepd. by reducing  $\text{H}_2\text{PtCl}_6$  with  $\text{HCHO}$ , pyrocatechol or hydrazine hydrate in presence of Na protalbuminate (cf. C. Paal and C. Amberger, *Ber.* 37, 124-39(1904) and H. Henrich, *Ber.* 36, 609-16(1903); for prepg. Na protalbuminate cf. C. Paal, *Ber.* 35, 2195-206(1902)). The best catalysts that were obtained with hydrazine hydrate, showed only a slight loss in activity after 48 hrs. testing and were almost completely regenerated by air blowing.

V. A. Kalichevsky

**A new negative mass for making accurate plastic reproductions.** P. G. Ross. *Arch. Path.* 16, 869-72(1933).—A method of making accurate plastic reproductions is described in which the neg. material is cheap and easily prepd., and consists of agar 100, oil soap 100,  $\text{MgSO}_4$  40, absorbent cellulose 12 and  $\text{H}_2\text{O}$  700-800 parts by wt. The pos. can be cast in plaster of Paris or paraffin, or made of resinous compds. such as sealing wax. The neg. material can be used repeatedly. The salient feature of the method lies in the resiliency of the agar neg. mass.

Harriet F. Holmes

**Parts for (electrical) installations from phenoplastics.** K. Brandenburger. *Kunststoffe* 24, 25-7(1934).—A discussion.

J. W. Perry

(A comparison of) the general, mechanical and electrical properties of artificial masses made by die-casting and pressing. Th. Ruemele. *Kunststoffe* 23, 201-3(1933).—A discussion.

J. W. Perry

**Supplement to a table of trade marks, factory brands, trade designations, etc., of plastic masses and products therefrom.** Kausch. *Kunststoffe* 24, 28-30(1934). Cf. C. A. 27, 2536, 3783.

J. W. Perry

**The technical utilization of blood.** Walter Obst. *Kunststoffe* 23, 278-9(1933).—Suggestions are given for the profitable com. use of blood albumin produced in Germany.

J. W. Perry

**Press mixtures of type I.** Kurt Brandenburger. *Kunststoffe* 24, 2-3(1934).—A new plastic having a high wetting and binding power for mineral fillers can be used to manuf. products which, even after superficial charring, remain excellent high-tension elec. insulators.

J. W. Perry

**Hand fire extinguishers.** Roy Williamson. *Munich Eng. Samt. Record* 92, 760-7(1933).—The 6 varieties, soda-acid, foam,  $\text{CCl}_4$ ,  $\text{MeBr}$ ,  $\text{CO}_2$ , and dry powder are discussed briefly.

A. W. Furbank

**Production, consumption, etc., of phosphate rock and superphosphate (Gray) 15.** App. for producing  $\text{CaH}_2$  and substantially dry  $\text{Ca}(\text{OH})_2$  from  $\text{CaC}_2$  and  $\text{H}_2\text{O}$  (U. S. pat. 1,947,120) 10. Furnace for oxidizing Pb to  $\text{PbO}_2$  (Russ. pat. 1685) 1. Elec. removal of As from  $\text{H}_2\text{SO}_4$ . (Russ. pat. 1514) 4.

**Gaadinger, C. B.: Pyrethrum Flowers.** Minneapolis. McGill Lithograph Co. 269 pp. \$3.50. Reviewed in *Ind. Eng. Chem., News Ed.* 12, 33(1934).

**Sommerfeld, Arthur:** *Plastische Massen. Herstellung, Verarbeitung und Prüfung nicht metallische Werkstoffe für spanlose Formgebung.* Berlin: J. Springer. 346 pp. M. 28.

**Hydrochloric acid, sodium hydroxide and alumina.** Sydchi Matsumoto. Japan. 99,753, Feb. 23, 1933. A mixt. of clay and NaCl is treated with HF.

**Hydrocyanic acid.** The Roessler & Hasslacher Chemical Co. Brit. 401,351, Nov. 13, 1933. In the manuf. of HCN, *e. g.*, by the dehydration of formamide or the decompn. of NaCN by  $\text{H}_2\text{SO}_4$ , stabilizing concns. of  $\text{SO}_2$  are maintained in the reacting system and retained in the HCN formed.

**Hydrocyanic acid.** Alice F. Walker, executrix for Mark Walker, deceased, and Cornelius J. Marvin (to The Canadian Industries Ltd.). Can. 339,124, Jan. 30, 1934. A mixt. of NaCN and a metal sulfite is made to react with acid so that there is 0.05–0.5% by wt. of  $\text{SO}_2$  in the HCN collected therefrom. A stable, water-white HCN is obtained.

**Absorption of hydrocyanic acid.** Ernő Brummer and István Csordás. Hung. 107,582, Dec. 1, 1933. An aq. or alk. soln. is sprayed into the space contg. gaseous HCN. The soln. may contain a substance that binds HCN to form a solid compd. The liquid is collected and the solid compd. contg. the HCN is filtered off.

**Absorption and recovery of hydrocyanic acid.** Béla Bobest. Hung. 107,883, Jan. 2, 1934. HCN is absorbed by a mixt. or suspension of alkali and alkali earth, or heavy metals. The cyanides formed are leached out with water and HCN is regenerated.

**Nitric acid.** Harry Pauling. Fr. 756,821, Dec. 8, 1933. In concg.  $\text{HNO}_3$ , obtained by aq. absorption of nitrous gases, by subsequent absorption of the residual gases in  $\text{H}_2\text{SO}_4$ , the nitrous gases obtained by denitration of the  $\text{H}_2\text{SO}_4$  are led with the necessary addn. of O, without mixt. with the principal gas current, to act in a particular absorption step on the  $\text{HNO}_3$  obtained in the aq. absorption.

**Nitric acid.** Lonza Elektrizitätswerke und chemische Fabriken A.-G. Fr. 756,593, Dec. 12, 1933. Conc'd.  $\text{HNO}_3$  is made in a continuous manner from water or dil.  $\text{HNO}_3$ , oxides of N and O, under pressure and at more or less high temp., in app. in the form of a column, which is traversed in countercurrent by the liquid components of the reaction and by vapors and gases which rise, these being finely distributed. The temp. in the upper and lower part of the column is regulated to provoke a strong fractionated distn. of the down-flowing acid, the result being obtained, *e. g.*, by introducing heat at the lower part of the column and condensing the vapors at the upper part. The distn. and temp. are regulated by heat-exchange means, *e. g.*, by heating the O by the evacuated acid. An app. is described.

**Concentration of phosphoric acid and a mixture of phosphoric and sulfuric acids.** Dai Nippon Jinzôhiryô K. K. (Tazô Shinya and Hatsutarô Yuma, inventors). Japan. 99,453, Feb. 8, 1933.  $\text{H}_3\text{PO}_4$  or a mixt. of  $\text{H}_3\text{PO}_4$  and  $\text{H}_2\text{SO}_4$  is introduced into a rotating furnace (lined with acid-proof material) from one side, while a heated gas is introduced from the other side, by which the acid is conc'd. Diagrams of the app. are shown.

**Phosphoric acid or calcium superphosphate.** Mitui Kôzan K. K. (Kôzô Ikawa, inventor). Japan. 100,142, March 17, 1933.  $\text{H}_3\text{PO}_4$  or Ca superphosphate is made by heating P ore or other materials contg.  $\text{Ca}_3(\text{PO}_4)_2$  with  $\text{SO}_2$ ,  $\text{H}_2\text{O}$  and  $\text{O}_2$  (or air) below  $100^\circ$ , in the presence of catalysts (such as N oxide or sulfate of Fe, Ni, Co, Mn, Cr, Mo, W, Sn or Cu).

**Refining sulfuric acid.** Paul Weinstock. Ger. 591,056, Jan. 16, 1934 (Cl. 12: 25). Addn. to 578,034 (C. A. 27, 4353). The process of Ger. 578,034 is applied to  $\text{H}_2\text{SO}_4$  contg. coloring impurities. Details are given.

**Contact sulfuric acid process.** Franz P. Fiedler and Alphons O. Jaeger (to Selden Co.). U. S. 1,945,267, Jan. 30. A catalyst is used contg. Ti oxide and V in

chem. combination, such as combined oxides of Ti, V and Ag on diatomite brick fragments.

**Oxidation of ammonia.** The Head of the Tokyo Kôgyô Shikensho (Kasuo Sasaki, inventor). Japan. 99,289, Feb. 1, 1933. N oxides are formed by oxidation of  $\text{NH}_3$  in the presence of Co or its oxide, which may contain 0.001–0.3 part of Ta, Si, Sr, Th, Pd, Ni, Rh, Na, K or their oxides.

**Obtaining alkalies from silicates.** Félix Jourdan. Brit. 401,567, Nov. 16, 1933. In the treatment of silicates, *e. g.*, leucite, with wet steam at high temp. to obtain alkali hydroxides, the silicate, which may be mixed with substances facilitating the reaction, *e. g.*,  $\text{Ca}(\text{OH})_2$ , is charged into the upper portion of an autoclave, the lower portion of which contains  $\text{H}_2\text{O}$ , the steam produced being condensed after attacking the silicate and the  $\text{H}_2\text{O}$  then evap'd. and used again, the cycle being repeated until all the alkali has been ex'd. or the condensed liquid sat'd.

**Alkali chlorides.** R. Englert & F. Becker, Chemische Fabrik, Prag-VII and Kurt Seidl. Fr. 756,413, Dec. 9, 1933. Alkali chlorides suitable for electrolysis are prep'd. by fusing the impure chlorides, freed from sol. sulfates, and sepg. the slags formed which contain the impurities. The formation of the slags may be facilitated by the addn. of  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$  or bauxite or by the introduction of air. The process may be applied to alkali chlorides contg. sol. sulfates by adding to the molten mass an amt. of a carbonate or oxide of Ba or Sr equiv. to the sulfates.

**Alkali chromate.** Toragorô Tanabashi. Japan. 99,438, Feb. 8, 1933. Alkali chromate is formed by roasting a mixt. of Cr ore, alkali carbonate and a small amt. of lime. Extn. with water leaves a residue that contains about 10% of Cr. This is mixed with fresh Cr ore for the next batch.

**Alkali cyanide.** Ryûzaburô Hara. Japan. 100,143, March 17, 1933. Alkali cyanamide is prep'd. by heating alkali cyanide and alkali metal in an atm. of  $\text{N}_2$  at  $400\text{--}650^\circ$  with a catalyst (such as powd. Fe). The product is converted to alkali cyanide by heating at  $650\text{--}850^\circ$  with C.

**Alkali sulfates and phosphates.** Metallges. A.-G. (Conway Freiherr von Girsowald and Erich Stahl, inventors). Ger. 580,125, Jan. 16, 1934 (Cl. 12: 5). Addn. to 571,494 (C. A. 27, 3041). Sec U. S. 1,918,355 (C. A. 27, 4885).

**Removing metal carbides from soot.** Gerhard Kröner and Paul Diltthey (to I. G. Farbenind. A.-G.). U. S. 1,945,907, Feb. 6. For removing metal carbides from soot such as that contg. Ni carbide, the soot is heated in an atm. free from CO to a temp. of about  $150\text{--}600^\circ$  and then is heated in a current of gas contg. CO at about  $50\text{--}210^\circ$  until metallic constituents are removed.

**Double nitrates.** I. G. Farbenind. A.-G. (Günther Hamprecht, inventor). Ger. 591,458, Jan. 22, 1934 (Cl. 16: 6). Double salts useful as fertilizers are prep'd. by combining a nitrate of a univalent metal or radical with a basic nitrate of a bivalent metal or with the normal nitrate and the oxide or hydroxide of a bivalent metal. The reaction may be effected by fusing or sintering a mixt. of the components. Examples are given of the prep'n. of  $\text{Ca}(\text{OH})\text{NO}_3\cdot\text{KNO}_3$ ,  $\text{Ca}(\text{OH})\text{NO}_3\cdot\text{NH}_4\text{NO}_3$ ,  $\text{Ca}(\text{OH})\text{NO}_3\cdot\text{CO}(\text{NH}_2)_2\cdot\text{HNO}_3$ ,  $\text{Mg}(\text{OH})\text{NO}_3\cdot\text{KNO}_3$ ,  $\text{Sr}(\text{OH})\text{NO}_3\cdot\text{KNO}_3$ ,  $\text{Ba}(\text{OH})\text{NO}_3\cdot\text{KNO}_3$  and  $\text{Zn}(\text{OH})\text{NO}_3\cdot\text{KNO}_3$ .

**Water-soluble phosphate compounds.** Emil Reubke (to I. G. Farbenind. A.-G.). U. S. 1,945,914, Feb. 6. A water-insol. Ca phosphate material such as natural tri-Ca phosphate is treated, in the absence of free acids, with an aq. soln. of neutral  $\text{NH}_4$  sulfate at temps. of about  $200\text{--}300^\circ$ , the soln. formed is sepd. from residual  $\text{CaSO}_4$ , the latter is converted into  $\text{NH}_4$  sulfate by use of  $\text{NH}_3$  and  $\text{CO}_2$ , and the  $\text{NH}_4$  soln. thus formed is used for continuing the process.

**Metal phosphates.** Chemische Werke vorm. H. & E. Albert. Ger. 589,913, Dec. 20, 1933 (Cl. 12: 31). The above, with the exception of alkali or alk. earth phosphates, are prep'd. by the double decompn. of Ca phosphates and metal salts in the presence of  $\text{SO}_2$ . Thus, Morocco phosphate is treated with a reaction mixt. of

bauxite and  $\text{H}_2\text{SO}_4$ .  $\text{SO}_2$  is led into the suspension. The  $\text{CaSO}_4$  and  $\text{SiO}_2$  residue is filtered off leaving a  $\text{SO}_2$  soln. of Fe and Al phosphate, these being pptd. by removal of the  $\text{SO}_2$ . Other examples are given.

**Thiocyanogen compounds.** Emil Hene. Ger. 589,967, Dec. 28, 1933 (Cl. 12k. 11). Addn. to 588,944 (C. A. 28, 2133<sup>9</sup>). The method of 588,944 for producing the above compds. is modified by heating  $\text{CaCN}_2$  with  $\text{Ca}(\text{SH})_2$  and alkali hydrosulfides or sulfates, the  $\text{Ca}(\text{SH})_2$  being produced by heating  $\text{Ca}(\text{OH})_2$  with S. Examples are given.

**Titanates.** Hisao Yamamoto. Japan. 99,016, Jan. 13, 1933. A mixt. of ores contg. Ti, an acid sulfate and Cl is fused and the product is extd. with water. By treating the soln. with  $\text{SO}_2$  or dil. mineral acid, titanate is obtained.

**Alumina from clay or kaolin.** Hikoichi Takubo. Japan. 100,117, March 15, 1933.  $\text{Al}_2\text{O}_3$  is prepd. by passing F, produced by heating a mixt. of fluorspar and  $\text{MnO}_2$  (or  $\text{CrO}_3$ ) at 1800-2000° over clay or kaolin. Si and other impurities in the material are vaporized after combining with F.

**Aluminum sulfate.** Wm. S. Wilson (to Merrimac Chemical Co.). U. S. 1,945,171, Jan. 30. Reaction is effected between bauxite and sludge acid from petroleum refining. Sufficient water is evapd. to form a solid product at ordinary temps. contg. less than 17.3%  $\text{Al}_2\text{O}_3$ , the evapd. product is flaked and then dehydrated and roasted in a rotary kiln.

**Aluminum-silicon sulfide.** Metallgesellschaft A.-G. Ger. 552,918, Nov. 6, 1933 (Cl. 12m. 7). The above sulfide, suitable for use as a *vulcanization agent*, is prepd. by heating a mixt. or alloy of Al and Si with S, preferably in powd. form.

**Aluminum-silicon sulfide.** Metallgesellschaft A.-G. Ger. 583,322, Nov. 6, 1933 (Cl. 12m. 6). Addn. to 552,918 (preceding abstr.). The method of 552,918, for producing the above sulfide by treating an Al and Si mixt. or alloy with S is modified by carrying out the reaction with the substances in the fused condition.

**Separation of ammonium chloride from potassium or sodium sulfate.** Teru Nakagawa. Japan. 99,553, Feb. 16, 1933. Since  $\text{Na}_2\text{SO}_4$  and  $\text{K}_2\text{SO}_4$  are more sol. in HCl than in water,  $\text{NH}_4\text{Cl}$  is sepd. from a mixt. with  $\text{Na}_2\text{SO}_4$  (or  $\text{K}_2\text{SO}_4$ ) by adding HCl and concg.

**Ammonium chloride; sodium carbamate.** Robert B. MacMullin (to The Mathieson Alkali Works). Brit. 401,554, Nov. 16, 1933. See Fr. 751,700 (C. A. 28, 863<sup>9</sup>).

**Ammonium phosphates.** I. G. Farbenind. A.-G. (Emil Reubke, inventor). Ger. 591,457, Jan. 22, 1934 (Cl. 16.4). Crude  $\text{Ca}_3(\text{PO}_4)_2$  is treated under pressure with a soln. of a hydrolyzable  $\text{NH}_4$  salt at a temp. above the normal b. p. of the soln. and under such conditions that  $\text{NH}_3$  formed by the hydrolysis is removed. A soln. of  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NH}_4\text{H}_2\text{PO}_4$  is suitable, and yields  $\text{CaSO}_4$  and  $\text{NH}_4\text{H}_2\text{PO}_4$ . The latter may be treated with the  $\text{NH}_3$  formed by the hydrolysis. Details are given.

**Ammonium sulfate.** Mitsui Kōzan K. K. (Shinsyō Oda and Toyoji Sugimoto, inventors). Japan. 100,381, Apr. 4, 1933.  $(\text{NH}_4)_2\text{SO}_4$  is manufd. by treating crystd.  $(\text{NH}_4)_2\text{SO}_4$  with a gas contg.  $\text{SO}_2$  alone or together with  $\text{O}_2$  at about 100°.

**Evaporating and crystallizing apparatus for recovery of ammonium sulfate, etc., from solutions.** Heinz Leithäuser (to Koppers Co. of Del.). U. S. 1,945,281, Jan. 30. Various structural and operative details are described.

**Calcium chloride.** Kyūzaburō Tomita. Japan. 100,011, March 9, 1933. In mfg.  $\text{CaCl}_2$  from brine (or  $\text{MgCl}_2$ ) and lime, basic Mg chloride is produced. This basic chloride is decompd. with  $\text{CO}_2$ , pptg.  $\text{MgCO}_3$ . From the filtrate  $\text{CaCl}_2$  is obtained by adding lime.

**Porous and anhydrous calcium chloride.** Gi Ideta. Japan. 100,482, Apr. 10, 1933. Ordinary  $\text{CaCl}_2$  is melted at 180-200°, a small amt. of cane sugar or the like is added and the heating is continued.

**Stable bleaching powder.** Adolf Remele (to I. G. Farbenind. A.-G.). U. S. 1,945,918, Feb. 6. For con-

verting undried bleaching powder into a condition in which it is stable during storage, the undried material, contg. at least about 36% available Cl, is treated with an amt. of unslaked lime which is at least sufficient to combine with the "free" water content of the bleaching powder, the mixt. is exposed to temp. conditions leading to the slaking of the added unslaked lime, and the product is finally dried.

**Calcium cyanamide.** Nikodem Caro and Albert R. Frank (H. Heinrich Franck, inventor). Ger. 591,039, Jan. 16, 1934 (Cl. 12k. 9).  $(\text{NH}_4\text{COO})_2\text{Ca}$  is heated to 600-800° in a stream of  $\text{NH}_3$ , which may contain  $\text{CO}$  or  $\text{CO}_2$ . The used gases, contg.  $\text{NH}_3$  and  $\text{CO}_2$ , are cooled to form  $\text{NH}_4\text{COONH}_2$ , from which fresh  $(\text{NH}_4\text{COO})_2\text{Ca}$  for use as starting material is produced.

**Furnace for nitriding carbide to form calcium cyanamide.** Bayerische Stickstoffwerke A.-G. Ger. 588,409, Nov. 17, 1933 (Cl. 12k. 9). Addn. to 565,784 (C. A. 27, 2389<sup>9</sup>).

**Chromic anhydride.** Toragorō Tanabashi. Japan. 99,439, Feb. 8, 1933.  $\text{CrO}_3$  is manufd. from  $\text{Na}_2\text{Cr}_2\text{O}_7$  and 4-5 times of the equivalent amt. of  $\text{H}_2\text{SO}_4$  of Be 55-58°.  $\text{NaHSO}_4$  goes into soln., while  $\text{CrO}_3$  is pptd. as fine crystals. It can be obtained in large crystals by recrystn. from dil.  $\text{H}_2\text{SO}_4$ . The crystals are purified by washing with a satd. soln. of  $\text{CrO}_3$ .

**Chromic oxide.** Toragorō Tanabashi. Japan. 99,440, Feb. 8, 1933.  $\text{CrO}_3$  is reduced by heating at 300-400° with molasses. Black  $\text{Cr}_2\text{O}_3$  is produced, which on heating at 1000-1100° for about 3 hrs. becomes green.

**Cuprous chloride.** Toshio Watanabe (Saburo Awazu, Shizuo Kojima and Toshio Watanabe, inventors). Japan. 99,952, March 6, 1933. A mixt. of  $\text{Cu}_2\text{Cl}_2$  and powd. Cu is mixed with  $\text{CuCl}_2$  soln. or  $\text{FeCl}_3$  soln. and concd. After filtration the soln. is quickly cooled and  $\text{Cu}_2\text{Cl}_2$  pptd.

**Copper sulfate.** Henri Wismer. Fr. 756,364, Dec. 8, 1933. Pure or impure Cu or Cu ores are transformed to  $\text{CuSO}_4$  by heating with  $\text{H}_2\text{SO}_4$ , water and O, under pressure or not.

**Copper sulfate.** Affinerie française. Fr. 756,376, Dec. 8, 1933.  $\text{CuSO}_4$  is made from waste Cu or Cu ores, by oxidation in very weak  $\text{H}_2\text{SO}_4$ , using  $\text{CuCl}_2$  as catalyst. An app. is described.

**Cupric sulfide.** P. R. Mallory & Co. Inc. Ger. 591,168, Jan. 17, 1934 (Cl. 21g. 11.02). Addn. to 590,285.  $\text{CuS}$  in a hard and dense form is prepd. by heating Cu plates of about 5 mm. thickness to between 150° and 500° in a closed vessel filled with S vapor. The product is suitable for use as neg. electrode in the dry rectifier cell described in Ger. 590,285.

**Lead carbonate.** Melville F. Perkins (to American Smelting & Refining Co.). U. S. 1,946,709, Feb. 13. A suspension of a Cl compd. of Pb such as the hydroxy-chloride is treated with  $\text{Ca}(\text{OH})_2$  in such a quantity that the Ca is slightly less than the theoretical equiv. of the Cl to be removed, and the mixt. is carbonated in the presence of a suitable oxidizing agent such as  $\text{Pb}_2\text{O}_4$  to form Pb carbonate and the product is treated with a small amount of an alkali metal compd. such as the hydroxide or carbonate capable of reacting with the remainder of the Cl to produce a water-sol. chloride.

**Magnesium ammonium phosphate.** Constantiu d'Asceev. Brit. 401,407, Nov. 16, 1933. See Fr. 738,847 (C. A. 27, 1997<sup>9</sup>).

**Anhydrous magnesium chloride.** Seisyo Horio (Masao Kajiwara, inventor). Japan. 100,174, March 20, 1933. Hydrous  $\text{MgCl}_2$  is heated by a flame produced by burning  $\text{H}_2$  and  $\text{Cl}_2$  in equimol. proportions.

**Nickel carbonyl.** I. G. Farbenind. A.-G. Brit. 401,438, Nov. 16, 1933. This corresponds to Fr. 740,406 (C. A. 27, 2257<sup>9</sup>), pressures of 2-1000 atm. and temps. of 100-350° being referred to.

**Potassium magnesium sulfate.** Hubert Kappen. Ger. 591,097, Jan. 16, 1934 (Cl. 12f. 5). Carnallite is treated with superheated steam, and the resulting mixt. of KCl and MgO is treated with an aq. soln. of  $\text{MgSO}_4$ . A basic K-Mg sulfate, useful as a *fertilizer*, is obtained.



**Apparatus for collecting selenium dioxide.** Nippon Kôgyô K. K. (Toyo Terasaki, inventor). Japan. 100,187, March 20, 1933. Diagrammatical.

**Silica.** Silica, Verein chem. Fab. (Georg Alaschewski and Paul Roters, inventors). Ger. 591,477, Jan. 22, 1934 (Cl. 12: 38.03). Hydrated  $\text{SiO}_2$ , obtained in known manner from  $\text{SiF}_4$  evolved in the manuf. of superphosphate, is purified in the usual way, and the sludge obtained after the final washing is treated with a small proportion of a polyhydric alc., e. g., glycerol. The dry product obtained from the sludge is easily wetted by aq. liquids, in contrast to the dry product obtained without addn. of an alc.

**Sodium, potassium and calcium nitrates.** Atmospheric Nitrogen Corp. Brit. 401,121, Nov. 3, 1933. See Fr. 747,384 (C. A. 27, 4880).

**Sodium aluminate.** Harold W. Heiser (to Aluminum Ltd.). Can. 339,193, Feb. 6, 1934. Purified  $\text{Al}(\text{OH})_3$  10 and c. p. soda ash 8 parts are finely ground and intimately mixed; solid Na aluminate is added as a binder, the mixt. is moistened with about 10–15% water and formed into briquets, which are heated to 900–1100°. Solid Na aluminate of high purity and substantially free from insol. material is produced.

**Sodium chloride.** Ryo Saburo Hara. Brit. 401,612, Nov. 10, 1933.  $\text{NaCl}$  is recovered from substances contg. it, e. g., rock or sea salt, by extg. with liquid  $\text{NH}_3$ , sep. insol. substances and evapg. the soln. Extn. is preferably at 0° to –10°, a less sol. compd.,  $\text{NaCl} \cdot x\text{NH}_3$ , being formed below –10°.

**Sodium chloride.** Asahi Garasu K. K. Fr. 757,080, Dec. 20, 1933. Crude  $\text{NaCl}$  is purified by dissolving it under pressure in liquid  $\text{NH}_3$ , preferably at below 0°, removing the insol. impurities by filtration, evapg. the clear soln. to sep. pure  $\text{NaCl}$  and filtering again.

**Sodium ferrocyanide.** The Head of the Tokyo Kôgyô Shikenjo (Heima Shinozaki, inventor). Japan. 99,402, Feb. 6, 1933.  $\text{Na}_2\text{SO}_4$  is converted to  $\text{NaCN}$  by heating with C,  $\text{CaCO}_3$  and  $\text{Fe}_2\text{O}_3$  in  $\text{N}_2$  under pressure. The cyanide is mixed with water (more than the amt. sufficient for making satd. soln. of  $\text{NaCN}$ ) and a sol. ferrous salt and warmed, producing  $\text{Na}_2\text{Fe}(\text{CN})_6$ . By introducing  $\text{CO}$  into the soln., the sulfide is converted to carbonate with liberation of  $\text{H}_2\text{S}$ . On evapn. of the soln. the ferrocyanide is obtained, free from sulfide and chloride.

**Friable caustic soda.** John W. Koenders (to Dow Chemical Co.). U. S. 1,946,863, Feb. 13. Solid  $\text{NaOH}$  having a fibrous cryst. structure, the crystals of which exhibit a preferred orientation and possess a definite fiber axis as shown by an x-ray diffraction pattern, and which is softer and more easily crushed than the ordinary product, is prepd. by filling molten  $\text{NaOH}$  into a container such as a sheet iron drum to which a small amt. of an oil such as paraffin oil or a heavy motor oil is added prior to introducing the molten  $\text{NaOH}$ .

**Purifying waste caustic soda liquors.** Erik L. Rinman. Brit. 393,962, June 12, 1933. Addn. to 381,697 (incorrectly given as 361,697 in C. A. 27, 4081). In obtaining waste liquors free from  $\text{SiO}_2$  as described in 381,697, the hydroxides or oxides of Ca and (or) Mg, with if desired  $\text{Al}(\text{OH})_3$ , are used as precipitants, while the alk. of the digester liquor is reduced by an amt. approx. corresponding to the added Ca and Mg oxide and hydroxide. The process may be used when the  $\text{NaOH}$  lye contains  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{SO}_3$ ,  $\text{Na}_2\text{SO}_4$ , contact substances, phenols, org. oxy acids or the like.

**Sodium phosphate.** Hiroshi Tanaka. Japan. 99,830, Feb. 28, 1933. When  $\text{AlPO}_4$  is heated with  $\text{SiO}_2$  and  $\text{Na}_2\text{CO}_3$  (or  $\text{NaOH}$ ),  $\text{Na}_3\text{PO}_4$ ,  $\text{CO}_2$  and  $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$  are produced. Thus  $\text{Na}_3\text{PO}_4$  is easily sep'd. from alumina; this is the principle adopted in the process.

**Anhydrous sodium sulfide.** Henry H. Mayers (to Rohm & Haas Co.). U. S. 1,946,089, Feb. 6. A granular product contg. over 85%  $\text{Na}_2\text{S}$  is prepd. by heating hydrous  $\text{Na}_2\text{S}$  under reduced pressure and simultaneously stirring the mass by plowing and turning it over.

**Oxides of titanium.** Intermetal Corp. Fr. 756,605, Dec. 13, 1933.  $\text{TiO}_2$  having particles of the order of 0.2–

0.4  $\mu$  is obtained by causing a soln. of  $\text{HCl}$  to react with an amt. of  $\text{TiCl}_4$  in excess of that which normally is sol. in the said soln. The product of the reaction is heated, the size of particle being controlled by the degree of heating.

**Titanium oxide.** I. G. Farbenind. A.-G. (Paul Weise and Friedrich Raspe, inventors). Ger. 591,007, Jan. 15, 1934 (Cl. 22f. 7). See Fr. 738,620 (C. A. 27, 2050).

**Removing iron from chromium salt solutions.** J. R. Geigy A.-G. Ger. 591,098, Jan. 16, 1934 (Cl. 12m. 8). See U. S. 1,909,865 (C. A. 27, 4036).

**Effecting reactions such as those between silica and magnesium carbonate for producing a hydrous silicate.** Ernest W. Rembert (to Johns-Manville Corp.). U. S. 1,945,534, Feb. 6. For promoting reactions between solid finely divided silicious materials and sparingly sol. reactive compds. such as  $\text{MgCO}_3$  in the presence of water, an alkali such as  $\text{Na}_2\text{CO}_3$  is added, the mixt. is heated and the alk. soln. is sep'd. from the silicate product. An arrangement of app. is described.

**Carbon dioxide from gases such as furnace or kiln gases.** Mark Shoeld (to Koppers Co. of Del.). U. S. 1,945,002, Jan. 30. See Can. 337,153 (C. A. 28, 1821<sup>9</sup>).

**Recovery of carbon dioxide from mixtures with other gases.** Rikwagaku Kenkyûjo (Bennosuke Kubota and Kashiwa Akashi, inventors). Japan. 99,767, Feb. 24, 1933. Org. amines dissolved in org. solvents are brought into contact with gases contg.  $\text{CO}_2$ . From the solid condensation products formed  $\text{CO}_2$  is regenerated by heating, with or without the solvent.

**Nitrous oxide.** Leo Schlecht and Alfred von Nagel (to Winthrop Chemical Co.). U. S. 1,946,114, Feb. 6.  $\text{NH}_3$  and O are passed over a catalyst such as Fe oxide and Bi oxide which promotes  $\text{NH}_3$  oxidation, at 200–550°, and at so slow a speed that the formation of NO is substantially suppressed, but sufficiently rapid to prevent the  $\text{NH}_3$  from being substantially converted into N, and the NO and higher oxides of N are removed from the resulting gas.

**Hydrogen sulfide from gases.** Ludwig Rosenstein and Gustav A. Kramer (to Shell Development Co.). U. S. 1,945,163, Jan. 30. See Can. 335,454 (C. A. 27, 5492).

**Drying gases containing sulfur dioxide.** Erzröst-G. m. b. H. Wilhelm Lindheimer and Josef Walmrath. Ger. 589,966, Dec. 19, 1933 (Cl. 12: 24). Wet  $\text{SO}_2$  gases for contact  $\text{H}_2\text{SO}_4$  plant are dried by passage through one or more  $\text{SiO}_2$  gel filters before introduction into the contact chamber.

**Material for producing sulfur dioxide.** Aladár Vajdaffy. Hung. 107,239, Sep. 1, 1933. Powd. S or flowers of S are mixed with inorg. substances that do not give any noxious combustion products at the ignition temp. of the S. Waterglass or a solvent for S is used as binding material.

**Catalytic oxidation of sulfur dioxide to trioxide.** Alphons O. Jaeger (to Selden Co.). U. S. 1,945,811, Feb. 6. A gaseous mixt. contg.  $\text{SO}_2$  and O is passed over successive layers of a V-contg. catalyst having an overload capacity in excess of that of Pt contact masses; the gases are cooled between successive layers, and at least the first layer is of such thickness that the effective contact time of the gases passing through it is not sufficiently in excess of that required for the normal percentage conversion at normal operation to permit excessive heat evolution under overload; the subsequent layers are of sufficient thickness to permit commercially economical outputs per vol. of catalyst. App. is described. Cf. C. A. 27, 3043.

**Krypton and xenon from air.** Wolcott Dennis (to Air Reduction Co.). U. S. 1,945,365, Jan. 30. Various details (app. and operation) of a liquefaction and rectification system are described. U. S. 1,945,366 relates to app. for the same purpose.

**Sulfur recovery from sulfides, etc.** Louis F. W. Leese. U. S. 1,947,529, Feb. 20. See Fr. 746,675 (C. A. 27, 4637).

**Sulfur from iron sulfide ores.** Raymond G. Brown (to Sulphide Corp.). U. S. 1,946,349, Feb. 6. Ore contg. Fe sulfide and other metal values is reduced to a

fineness of less than 60 mesh, the Fe present is chlorinated to  $\text{FeCl}_3$  with dil. chlorinating gases, liberated S is removed as a vapor substantially free from heavy metal chlorides; the  $\text{FeCl}_3$  is then oxidized by a preheated oxidizing gas such as air, the preheat of which supplies such a quantity of heat that the oxidation is effected without permitting fusion of the  $\text{FeCl}_3$  or other heavy metal chlorides present; chlorinating gases formed in the oxidizing reaction are passed to the chlorinating zone to chlorinate addnl. Fe sulfide contg. material. App. is described. Cf. C. A. 28, 2609.

**Recovery of sulfur.** Raymond F. Bacon and Wilber Judson (to Raymond F. Bacon). Can. 339,298, Feb. 6, 1934. Elementary S is recovered from iron pyrites by suspending a finely divided mixt. of pyrites and carbonaceous matter in a stream of hot gas contg.  $\text{SO}_2$ . The labile S is distd. off from the pyrites,  $\text{FeS}$  is formed, and the  $\text{SO}_2$  reduced to elementary S. The  $\text{FeS}$  is passed into a countercurrent stream of oxidizing gas to produce  $\text{SO}_2$ .

**Smelting sulfide ore.** Raymond F. Bacon. U. S. 1,944,873, Jan. 30. A mixt. of ore such as a pyrites-chalcopyrites charge, carbonaceous reducing agent such as coke in amt. sufficient to reduce a substantial part of the  $\text{SO}_2$  formed to elemental S, and slagging materials such as silica and Ca sulfite is smelted and the smelter gases contg. elemental S may be passed in contact with a catalyst such as porous alumina or hauxite capable of accelerating further reduction of the  $\text{SO}_2$  in the gases to produce elemental S; the S is sep'd. from accompanying gases, and the gases are contacted with lime to form Ca sulfite and the latter is returned to the smelting operation as a source of slagging material.

**Treating iron pyrites.** Stanley I. Levy (to Sulphide Corp.). U. S. 1,948,325, Feb. 6. The material is treated with  $\text{FeCl}_3$  vapors in an amt. just sufficient to convert the Fe to  $\text{FeCl}_2$ , while maintaining a temp. (suitably about 800–1000°) sufficient to cause the  $\text{FeCl}_2$  to react, liberating elemental S in vapor form. An arrangement of app. is described.

**Sulfur from gas filters.** Gewerkschaft Mathias Stinnes. Ger. 548,408, Nov. 17, 1933 (Cl. 12a. 17). Addn. to 573,868 (C. A. 27, 4301). In extg. S from gas filters by extn. with  $\text{C}_2\text{H}_6$  by the method of 573,868, the process is accelerated by giving the filter mass a 15% addn. of water.

**Sulfur and metal chlorides.** Stanley I. Levy. Ger. 585,506, Oct. 5, 1933 (Cl. 40a. 2.60). See Brit. 359,568 (C. A. 26, 4922).

**Carbon black.** Jesse A. Guyer (to Phillips Petroleum Co.). U. S. 1,946,739, Feb. 13. Gases (such as those from natural gas or from oil cracking) contg.  $\text{C}_2\text{H}_4$ ,  $\text{H}_2$ , etc., are subjected to a controlled partial cracking in a temp. range of about 675–950° and at about atm. pressure in a time period of about 0.002–0.02 min., by which about 35–50% of olefins are produced, and the resulting gaseous mixt. is subjected to a partial combustion to produce carbon black. An arrangement of app. is described.

**Active carbon.** Carbo-Norit-Union Verwaltungs-Ges. m. b. H. Ger. 591,090, Jan. 16, 1934 (Cl. 12a. 33). The reactivation of used pulverulent active C is effected by briquetting the C, with or without the aid of a binder, and treating the briquets with a mixt. of steam and an oxidizing gas contg. less than 15% by vol. of O, e. g., a mixt. of steam and air contg. 2% of O. The air-steam mixt. is preheated to 80–250°. The briquets may also be preheated with superheated steam. They crumble during the reactivation process.

**Regenerating active carbon.** The Gas Light and Coke Co. Ger. 587,600, Nov. 6, 1933 (Cl. 26d. 13.01). See Brit. 374,597 (C. A. 27, 4041).

**Retort and associated apparatus for revivifying spent activated carbon by air treatment and heating.** Raymond G. Davis (to Darco Corp.). U. S. 1,945,479, Jan. 30. Structural and operative details.

**Adsorbent charcoal.** Louis Friderich. Fr. 757,172, Dec. 21, 1933. An adsorbent charcoal for sterilization and adsorption, is prep'd. by agglomerating active charcoal

in impalpable powder by means of a dil. soln. of nitro-cellulose or salts of cellulose, putting the paste in a thin layer and removing the solvent by known means. For sterilization, the charcoal may be mordanted with salts of Ag.

**Absorbent felt.** Joseph E. Plumstead (to Jessup & Moore Paper Co.). U. S. 1,947,103, Feb. 13. For producing an absorbent felted product suitable for use with waterproofing agents, a finished or prep'd. cellulosic fibrous pulp is employed which has been previously cleaned by neutralizing and dissolving the cementing intercellular substances, and the pulp is treated with a fiber curling or kinking agent such as NaOH and an auxiliary agent such as Na sulfide or a Cu or Zn comp'd. which improves the activity of the curling or kinking agent. U. S. 1,937,104 relates to a process in which artificially curled or kinked fibrous material impregnated with a Cu comp'd. is further treated with an  $\text{NH}_3$  comp'd. to form a mucilaginous coating on the fibers simultaneously with the production of the felted sheet, to obtain a finished product of increased strength. U. S. 1,947,105 relates to a process in which finished or prep'd. cellulosic fibrous pulp is treated with Na sulfide soln., producing kinking, curling or crimping of the pulp fibers (previously cleaned of cementitious intercellular substances). U. S. 1,947,106 relates to a process in which fibrous cellulosic pulp is showered with a treating soln. and shredded and defelted in the presence of the soln., screened to sep. excess soln. and passed between presser rolls for further removal of soln. App. is described. U. S. 1,947,107 relates to a process of accelerating the kinking, curling and crimping of prep'd. cellulosic fibers by bruising the fibers (suitably by the action of a ball mill) at one or more points of their length, and treating the fibers with a soln. such as soap, NaOH,  $\text{Na}_2\text{S}$ ,  $\text{ZnCl}_2$ , etc., to effect selective or pronounced reactivity at the bruised points and consequent accelerated curling of the fibers. U. S. 1,947,108 relates to a process of curling fibers for making absorbing paper by building up a layer of the fiber pulp on the wall of a centrifuge and flushing NaOH soln. of non-mercerizing strength through the fibers. App. is described.

**Catalyst.** The Head of the Tokyo Kōgyō Shikenjo (Gorō Shima, Ichitarō Kitawaki and Tyōkan Matsuda, inventors). Japan. 100,509, Apr. 13, 1933; cf. Japan 94,998 (C. A. 27, 2771). A catalyst is prep'd. by treating Fe, its alloys or iron oxides in the form of scales or fine granules with HCl,  $\text{HNO}_3$ , their salts or mixt. of these reagents.

**Condensation products.** I. G. Farbenind. A.-G. Brit. 401,237, Nov. 9, 1933. Phenols, or derivs. thereof are caused to react with unsatd. aliphatic acids, or derivs. thereof, in the presence of  $\text{BF}_3$ , if desired in the presence of a solvent which does not react under the prevailing conditions, e. g., benzene,  $\text{C}_6\text{H}_6$ , PhMe, xylene,  $\text{CHCl}_3$ ,  $\text{CCl}_4$ . The products are obtained as a viscous liquid or pronouncedly adhesive mass which can be drawn into threads or as a rubber-like mass. Among examples (1)  $\text{BF}_3$  is introduced by a current of N into a mixt. of olive oil and cresol mixt. at room temp., the temp. rising to 45°; after standing overnight the mixt. is dild with  $\text{C}_6\text{H}_6$ , the  $\text{BF}_3$  decompd. with  $\text{Na}_2\text{CO}_3$ , the product filtered and the  $\text{C}_6\text{H}_6$  and undecompd. cresol distd. off, (2) linseed oil for lacquer is similarly condensed with cresol mixt. or anisole; and (3) com. linseed oil acids and cresol are similarly condensed.

**Condensation products.** Wilhelm Kraus. Ger. 589,989, Dec. 21, 1933 (Cl. 12a. 17.05). Products capable of being hardened are obtained by condensing urethan and urea with aq.  $\text{CH}_3\text{O}$  in the presence of an acid contact agent at high temps. Thiourea may also be present.

**Condensation product of formaldehyde and ammonium thiocyanate.** Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.). U. S. 1,945,315, Jan. 30. A product sol. in acetone and which is compatible with nitrocellulose, etc., is obtained from  $\text{NH}_4\text{CNS}$  and formaldehyde by heating.

**Press-mixtures of urea-formaldehyde condensation products.** The British Cyanides Co., Ltd. Ger. 586,543,

Oct. 23, 1933 (Cl. 396. 22). See Brit. 350,498 (C. A. 27, 381).

**Oil-soluble condensation product.** Tadae Syōno. Japan. 99,551, Feb. 16, 1933. PhOH is condensed with HCHO in the presence of hydroxides, carbonates or bicarbonates of K, Na, NH<sub>4</sub> or Ca(OH)<sub>2</sub> as a catalyst, in the amt. of about 1% of PhOH used. After the condensation is completed, the product is heated with pine resin to give an oil-sol. product.

**Surface treatment of Bakelite articles.** A. Stevens and V. Widdowson. Belg. 398,169, Sept. 30, 1933. Greasy or oily substances which appear on the surface of Bakelite articles on molding, are removed by means of a solvent that can penetrate to a certain depth, in order to permit labels, etc., to adhere to the surface. \*

**Artificial masses.** I. G. Farbenind. A.-G. Brit. 401,200, Nov. 9, 1933. The masses are made by the action of Cl on polyvinyl chloride in soln. or suspension in a suitable solvent or swelling agent, e. g., CCl<sub>4</sub>, C<sub>2</sub>H<sub>5</sub>Cl, (I). Highly polymerized products may be chlorinated and simultaneously or subsequently depolymerized by a suitable rise in temp. The products may be used for the *manuf. of films, lacquers, impregnating agents, molded or sprayed masses or wrapping sheets*. Softening agents, e. g., a H<sub>3</sub>PO<sub>4</sub> ester, a phthalic acid ester, castor or linseed oil, coloring agents and filling agents may be added. In examples (1) polyvinyl chloride of low polymerization is suspended in CCl<sub>4</sub> and treated with Cl at (60-70)°, the product being pptd. with MeOH and (2) highly polymerized polyvinyl chloride is dissolved in I at 70-80° and treated with Cl at 100°; the product is sepd. by steam distn. of the solvent.

**Artificial masses.** László Bolgár. Hung. 107,782, Dec. 15, 1933. Tar residues or asphalts are mixed with acids or acid salts contg. fillers (sand, rock powder, clay, sawdust, cork, fibers, graphite, etc.) up to a content of 90%, and the mixt. is pressed into shape. Cf. C. A. 27. 2001.

**Artificial material.** Aladár Vajdaff. Hung. 107,439, Dec. 1, 1933. The cellulose content of plant fibers is nyltrated and the moisture content is maintained above 24%. Disintegrated portions of plants, resins, fatty acids or their salts, latex, pitch, paraffin or cements are added, and the mixt. is pressed into shape.

**Compound sheet material.** Arthur S. Lewenstein. Brit. 401,391, Nov. 16, 1933. Plywood is surfaced with synthetic resin by applying to 1 or both surfaces (fabric and paper) treated with the resin, which may be partially cured, and completing the cure by subjecting the assembly to 75-500 lb. per sq. in. Fabric, if used, is placed between the plywood and paper.

**Adhesive.** Sadakichi Satō. Japan. 99,757, Feb. 24, 1933. A waterproof adhesive is prepd. by treating cellulose materials (especially hemicellulose) and proteins of soy bean in the colloidal state with ZnCl<sub>2</sub> and NaOH, etc.

**Adhesive for wood.** Hōnen Seiyu K. K. (Eijirō Ichikawa, inventor). Japan. 99,595, Feb. 16, 1933. A mixt. of powd. soy bean (100 parts), slaked lime (5), soda ash (5), anhyd. Na silicate (20), water (240-270) and Canada balsam (40) in CS<sub>2</sub> (60) is specified.

**Adhesive suitable for use on glass, metals, wood, etc.** Myron E. Delaney (to Halowax Corp.). U. S. 1,945,803, Feb. 6. About equal parts of a normally solid chlorinated naphthalene and ester gum are used together with about 5% of rubber latex.

**Cement composition suitable for adhering to smooth surfaces such as glass.** Loven Lasher. U. S. 1,945,149, Jan. 30. Na silicate, rosin, gum arabic, PbO, glycerol and water are used in prep. a cement.

**Protein solutions such as those of casein.** Charles Graenacher (to Soc. pour l'ind. chim. à Bâle). U. S. 1,946,159, Feb. 6. See Fr. 730,216 (C. A. 27, 383).

**Hardened or condensed products of sericin.** Kyōsuke Nishizawa and Takashi Kirigakubo. Japan. 100,256, March 25, 1933. Sericin is treated with acids, NH<sub>3</sub>, caustic alkali, salts, phenols, naphthols or methylenic compds. as gelatinization reagents and HClO or compds. liberating HCHO as condensation reagents.

**Composition for phonograph records.** James E. Syn-

onds (to United Research Corp.). U. S. 1,946,597, Feb. 13. Polymerized vinyl acetate 77, amorphous silica 20, dibutyl phthalate 0.25 and coloring matter such as carbon black about 2.75% are used together.

**Diaphragms suitable for use in "loud-speaking" apparatus.** Constantin Chlowsky and Paul Breton. U. S. 1,945,933, Feb. 6. In the manuf. of diaphragms having a backing of material such as silk muslin permeable to fluids, the backing is stretched and placed above a liquid such as Hg at a distance from the surface of the liquid which is less than the desired thickness of the diaphragm, and there is poured upon the backing material, in the form of a fluid adapted to coagulate, the substance (such as a cellulose-acetate varnish) which is to constitute the diaphragm material and coagulation of the material is permitted.

**Clay compositions.** George H. Hadfield and Sand & Shingle Ltd. Brit. 401,304, Nov. 2, 1933. A compn. for surfacing artificial cricket pitches, etc., consists of fibrous material, plastic material of the nature of clay and very finely divided non-plastic, preferably siliceous, material. A typical compn. contains asbestos 16-44, sawdust 0-24, clay 6-12%, with SiO<sub>2</sub> and fine sand as remainder.

**Acid treatment of Japanese acid clay.** Nippon Sekiyū K. K. (Masakichi Mizuta and Teiji Yoshimura, inventors). Japan. 100,247, March 24, 1933. Acid clay is treated with concd. H<sub>2</sub>SO<sub>4</sub> *in vacuo*, by which the utilization of the acid is improved.

**Flotation of alunite.** Tomekichi Ishikawa. Japan. 100,390, Apr. 4, 1933. By mixing finely crushed ore contg. alunite (dia. less than 0.3 mm.) with 5 times its wt. of water, 0.1-0.2% AcOH or acetate and 0.1% palm oil, a mixt. of the oil and alunite is floated on the surface and sepd. from the other rocks.

**Treating polyhalite.** Hans Friedrich. U. S. 1,946,068, Feb. 6. The mineral is heated with water in the presence of an acid N-O compd. such as HNO<sub>3</sub> or nitrous gases and the resulting soln. is sepd. from insol. residue and may be crystd. to produce a fertilizer which may be treated with NH<sub>3</sub>.

**Plant for recovering asbestos from minerals.** Michail P. Brodsky. Ger. 591,402, Jan. 20, 1934 (Cl. 1a. 32).

**Powdered agar-agar.** Dai Nippon Seiyaku K. K. (Suekichi Oki and Kyō Imo'o, inventors). Japan. 99,061, Jan. 16, 1933. Seaweed is extd. with hot water. Agar-agar is sepd. from the concd. ext. by adding Na<sub>2</sub>SO<sub>4</sub>, washed with H<sub>2</sub>O and dried at low temp.

**Powdered agar-agar.** Kwan Kimura and Sakae Nagai. Japan. 99,998, March 9, 1933. Liquid agar-agar and air under pressure and below 0°, are separately introduced into a chamber; moisture in the frozen particles is removed by means of warm air.

**Artificial pumice.** Soc. anon. des hauts-fourneaux et mines de Halanzy and Soc. des hauts-fourneaux de Saulnes Jean Raty & Cie. Fr. 756,445, Dec. 9, 1933. Artificial pumice is made by blowing slag from blast or metallurgical furnaces on to a previously wetted surface where it swells and is cooled. The product is broken up to the desired size.

**Apparatus for making artificial pumice from blast-furnace slag.** Bruck, Kretschel & Co. Ger. 591,153, Jan. 17, 1934 (Cl. 80b. 5.06).

**Apparatus for manufacturing table salt.** Masao Fujiwara and Nagayasu Bandō. Japan. 99,247, Jan. 30, 1933. Diagrammatical.

**Plaster for casts.** Wilhelm Utermann. Ger. 589,961, Dec. 19, 1933 (Cl. 80b. 25.08). A bituminous plaster for making casts is made by dissolving rubber waste in asphalt, mineral oil bitumen, etc., at 200-250° and adding ground chalk, shale, limestone or asbestos, so that the final product contains 5-25% rubber waste and 25-60% chalk, etc.

**Compositions for making dental plates.** Deutsche Celluloid-Fabrik. Ger. 591,282, Jan. 19, 1934 (Cl. 30b. 12.01). Use is made of compns. comprising a water-insol. cellulose ether and a non-saponifiable plasticizer, e. g., PhC<sub>2</sub>H<sub>4</sub>OH, limonene or *p*-cymene.

**Lining for apparatus for oxidizing ammonia.** Dai Nippon Jinzōhiryō K. K. (Takejiro Takahashi, inventor).

Japan. 100,038, March 9, 1933. The lining material is a mixt. of  $\text{BaSO}_4$  (e. g., 50 parts),  $\text{BaO}$  (80), powd. asbestos (10) and Na silicate (50) and water. Cf. C. A. 27, 1457.

**Magnetic core material.** Howard L. Cobb (to Research Corp.). U. S. 1,946,964, Feb. 13. A sintered mixt. is used comprising  $\text{Fe}_2\text{O}_3$  and a monoxide of another metal such as that of Cu, Ni, Pb, Cd, Zn or Ca capable of chemically combining with the  $\text{Fe}_2\text{O}_3$ .

**Clutch and gear materials.** Theodor Sachs. Brit. 400,172, Oct. 11, 1933. Bearings, gears, etc., are made from woven fabrics, paper, etc., embedded in a synthetic resin,  $\text{CH}_2\text{O}$  condensation product or the like, the fabric, etc., being impregnated with a non-drying oil prior to insertion in the binding material. Part of the fabric material may be impregnated with graphite by the wet method instead of with oil. Steaming may precede the impregnation with oil.

**Flexible packing for rods and shafts.** Fletcher H. Field (to Rhodes Metallic Packing Co.). U. S. 1,946,527, Feb. 13. A tubular braided core which may be formed of wire or metal ribbon such as Mg or a Cu-Pb alloy extends through a body of packing and constitutes a lubricant reservoir. U. S. 1,946,528 relates to a packing comprising a core such as may be formed of wire contg. Mg, a surrounding layer of a nonabrasive metal alloy having heat-resisting properties, such as a Mg alloy and a protecting cover of braided Mg alloy wire.

**Fluid suitable for use in pressure apparatus such as hydraulic brake systems or the like.** Arthur G. Weber and Richard B. Schneider (to E. I. du Pont de Nemours & Co.). U. S. 1,945,543, Feb. 6. Castor oil, rape-seed oil or liquid petrolatum is used with a mixt. of higher-boiling oxygenated org. liquid products obtainable as a by-product in the catalytic hydrogenation of oxides of carbon to MeOH, which serves to give a desirable viscosity over a wide temp. range.

**Mixture of colloidal metal and fat.** Shinkichi Horiha, Mizuho Otagiri and Tatu Kiyota. Japan. 100,366, Apr. 1, 1933. A metal oxide in a mixt. of fats (or oils) and fatty acids is reduced with an agent such as hydroquinone or  $\beta$ -phenylenediamine. The products of oxidation of the reducing reagent and free fatty acids are sepd. by the difference of the soly. in a solvent such as MeOH.

**Coating for wood or cardboard articles.** László Dér. Hung. 107,622, Dec. 15, 1933. A mixt. of gypsum 4 parts by wt., flour, wood flour or sawdust 1 part and varnish 1 part is stirred with water to form a pulp. The pulp is spread on the articles to be coated and when dry forms a hard glossy surface.

**Treated paper or the like for preventing tarnishing of silverware.** Arthur E. Thurber and Raymond H. Sholtz (to Oneida Community, Ltd.). U. S. 1,946,508, Feb. 13. See Can. 333,430 (C. A. 27, 4675).

**Heating by chemical action.** Daniel Mangrané. Fr. 756,836, Dec. 15, 1933. In obtaining heat by exothermic reactions based on the substitution of one metal by another in a salt, the reaction is made slower by the production of secondary reactions which are themselves exothermic. Thus, the secondary reactions are produced by introducing a salt of a metal which has several valencies and an oxidizing agent. Thus, if the primary reaction is the conversion of Fe to  $\text{FeCl}_2$  and  $\text{CuCl}_2$  to Cu,  $\text{SnCl}_4$  is introduced and is converted 1st to  $\text{SnCl}_2$  and then reduced to Sn.

**Protecting printed documents, etc.** Joseph Broadman. U. S. 1,947,516, Feb. 20. An addnl. flexible sheet of light-permeable material such as transparent paper is connected to each side of a sheet of printed paper or the like by an intermediate layer of adhesive such as a cold-water wheat-flour paste which is caused to enter and penetrate only the inner part of the addnl. sheet material; the exterior surface of the addnl. sheets is then coated with a layer of light-permeable protective material such as Manila gum varnish which penetrates only the outer portion of the sheet and is of flexible and non-peeling resinous character.

**Films, plates, etc.** I. G. Farberind. A.-G. Fr. 756,422, Dec. 9, 1933. Films, layers, fibers plates and other

plastic substances are made from solns. of colloidal salts obtained by causing polymeric polycarboxylic acids, rich in COOH groups, or their alkali salts to react with salts of elements capable of forming cations (metals) with the exception of alkali metal salts. Alkali salts of polyacrylic acid are particularly suitable. As metal salts, products contg. Ag, Pb or Ur may be used in photography, those contg. Pb or Th may be used for radiographic work and products contg. Fe may be used in electrotechnics.

**Detergents.** Robert H. Marriott. Brit. 401,413, Nov. 16, 1933. Washing-compns. consist of a sulfonated alc. or an alkali salt thereof, and bentonite, "willkinit" or equiv. clay. An alk. substance, e. g., borax,  $\text{Na}_2\text{HPO}_4$ , a medicament, e. g., menthol,  $\text{H}_2\text{O}$ , glycerol, an emollient and coloring substances may be added. Examples include a shampoo prepd. by mixing bentonite 3, Na salt of sulfonated lauryl alc. 1, and  $\text{NaHCO}_3$  1 lb. and dissolving 0.5 oz. of the mixt. in 10 oz.  $\text{H}_2\text{O}$ .

**Cleansing agent.** Wilhelm Lohmann. Ger. 588,205, Nov. 14, 1933 (Cl. 22g. 14). Addn. to 502,816 (C. A. 24, 5446). The method of 502,816 for producing cleansing blocks from factice, sand and substances yielding  $\text{NH}_3$  is modified by replacing the latter by acid salts such as  $\text{KHSO}_4$ .

**Cleansing composition suitable for use as a shampoo or on fine fabrics.** Roy H. Brownlee. U. S. 1,946,272, Feb. 6. A non-alk. cleansing compn. contains a phosphate such as primary Na phosphate or di-Na phosphate and a water-sol. non-drying oil such as sulfonated coconut or castor oil in a quantity not materially greater than is sufficient to neutralize the relatively slight alkalinity of the salt in aq. soln.

**Wetting and other agents.** Henkel & Cie. G. m. b. H. Brit. 401,116, Nov. 9, 1933. This corresponds to Fr. 746,435 (C. A. 27, 4539) but the esters or thio esters of Brit. 401,117 and 401,120 (C. A. 28, 2364\*) are sulfonated.

**Wetting and emulsifying agents.** British Dyestuffs Corp. Ltd. Ger. 588,690, Nov. 23, 1933 (Cl. 12o. 23.01) See Brit. 274,611 (C. A. 22, 2268).

**Waterproofing material.** Rikwagaku Kenkyūjo (To-kishige Kusama and Tatuichi Yokoyama, inventors) Japan. 99,764, Feb. 24, 1933. Powd. rubber is heated with tetralin at  $130-180^\circ$  for 2-6 hrs. and then the solvent is expelled. A mixt. of the product with an org. solvent is used for waterproofing paper, cloth, etc.

**Moisture-proofing compositions.** Fred K. Shankweiler (to Hercules Powder Co.). Brit. 401,534, Nov. 16, 1933. See Fr. 740,013 (C. A. 28, 5639).

**Agent to prevent clouding of spectacles.** The War Minister (Shintarō Kunisawa and Hidejirō Kōda, inventors). Japan. 99,290, Feb. 1, 1933. The agent is a mixt. of polyhydric alcs. (such as ethylene glycol or glycerol), water, resin soap and saponin (or a sulfonate of a hydrogenated ring compd. contg. an alkyl group).

**Stirrer for muffle or flame furnaces for making sodium sulfate.** Alphonse Zieren. Ger. 591,268, Jan. 18, 1934 (Cl. 12f. 5).

**Forming centers of golf balls or the like, which are liquid at normal temperatures.** Douglas F. Twiss and Albert E. T. Neale (to Dunlop Rubber Co., Ltd.) U. S. 1,947,539, Feb. 20. Liquefying centers are formed of parts of different materials such as gelatin gel and  $\text{NH}_4\text{NO}_3$  which are of solid character but when assembled and in contact with each other form a liquid product.

**Wood polishes.** Albert van Rōyen. Fr. 756,536, Dec. 11, 1933. Polishes are colored the same color as the wood to be polished and contain insecticides such as corrosive sublimate or pyrethrum oil.

**Glass polisher.** Tomio Satō. Japan. 100,342, March 29, 1933. The polisher is prepd. by steaming a molded mixt. of powd. silica, Al silicate, acid clay, chalk, flour, K soap and gelatin soln.

**Shoe polish.** Sándor Szalay. Hung. 107,877, Jan. 2, 1934. To a mixt. of carnauba wax 16-18, montan wax 12-14 and ceresin 8 10% is added a turpentine soln. of 4 5% aniline dye.

**Shoe-stiffening material.** David B. Macdonald (to United Shoe Machinery Corp.). U. S. 1,945,850, Feb. 6. The marginal portions only of a blank of porous absorbent material such as a thin fabric are charged with a non-stiffening substance such as rubber or farina gelled in water to reduce the absorptivity of that portion preparatory to treating the blank with a stiffening substance such as celluloid.

**Cleaning tobacco pipes, etc.** Boris Hellmann. Brit. 401,436, Nov. 16, 1933. Pipes, cigar holders, etc., are cleaned and disinfected by filling with a solvent consisting of a mixt. of  $\text{Me}_2\text{CO}$  or the like, a nitrated hydrocarbon, e. g.,  $\text{PhNO}_2$ , and a dil. mineral acid, e. g.,  $\text{HCl}$ , which may be replaced by  $\text{Ac}_2\text{O}$  where the solvent comes into contact with metal.

**Reagent for preventing molding.** Goichi Hirata. Japan. 100,141, March 17, 1933. The reagent is prep'd. by

1 introducing  $\text{Cl}_2$  into an aq. or alc. soln. of urea and then mixing with mustard oil.

**Insecticide for white ants.** Tosane Matsudaira. Japan. 99,524, Feb. 14, 1933. A mixt. of  $\text{As}_2\text{O}_3$ , saccharin, starch, Pb arsenate, gum arabic and powd. rice is specified.

**Deodorizing insecticide.** Kazuhiko Koyama. Japan. 100,477, Apr. 10, 1933. The insecticide is a mixt. of camphor, chloronaphthalene (or *p*-dichlorobenzene) and some essential oils (such as the Japanese pepper oil, 2 cinnamon oil, camphor oil).

**Fireproof antiseptic.** Tatsusaburō Saitō. Japan. 99,918, March 2, 1933. The antiseptic is a mixed soln. of  $\text{Mg}(\text{NH}_4)_2(\text{SO}_4)_2$ ,  $\text{Mg}(\text{NH}_4)_2\text{Cl}_2$  and ethyl oxalate.

**Fluid-pressure-controlled alarm device suitable for use with fire extinguishing systems.** Arthur C. Rowley (to Globe Automatic Sprinkler Co.). U. S. 1,946,412, Feb. 6. Structural and mech. features.

## 19- GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

**Study of the technic of stained glass of the Middle Ages.** G. Chesneau. *Bull. soc. encour. ind. natl.* 132, (109-25(1933)).—Stained glasses of the 12th and 13th century cathedrals were exam'd. The raw materials used for the fundamental white glass were sand, plant ashes to furnish K, common salt and a little  $\text{MnO}$  to neutralize the coloration due to Fe oxides. The glass was worked on a table and varied in thickness. Some glass was blown in cylinders and had uniform thickness. Glass was colored by the addn. of metallic oxides.  $\text{Cu}_2\text{O}$  gave red glass;  $\text{CoO}$  with traces of  $\text{CuO}$  gave blue glass; the blue was often modified by the presence of  $\text{NiO}$  or  $\text{MnO}$ ; yellow was produced by the oxysulfide of Sb with some  $\text{Fe}_2\text{O}_3$ ; violet was produced from pyrolusite which contained some Fe;  $\text{CuO}$  was added to give green. All of these metallic oxides with the exception of Co were found in France. The Pb used to secure the glass in the windows contained some Sb, making it slightly harder.

C. B. Jeuni

**Effect of composition of glass and temperature and strength of alkali solutions on bottle scratching, together with discussion of methods proposed to measure scratchability.** H. A. Trebler and J. H. Shrader. *Proc. Intern. Assoc. Milk Dealers, Plant Sect., 26th Ann. Convention* Sept., 1933, 60 8.—There is no evidence that the cleaning soln. now used in bottle washers (0.3 3% alk. for 8 16 min. at 140 160° F.) materially contributes to a softening of the glass surface, making it more susceptible to scratching. At present no practical lab. test for resistance to scratching is known. Bottles should be bought on the basis of service test both for breakage and scratching.

J. C. Jurgens

**Recent developments in design and operation of industrial furnaces.** G. A. Merkt. *Iron Steel Eng.* 11, 76-84 (1934).—Recirculation of approx. 30% of the waste gases in a glass-melting furnace, fired with natural gas, has given highly satisfactory results. In the cited case the waste gas was returned to the pot without regeneration by tapping the flue to the stack.

W. H. Hoynton

**Flameless furnaces and their use in glass melting.** N. P. Krasnikov. *Keram. i Steklo* 9, No. 10, 11-15 (1933).—The principles of flameless firing, different types of burners, and advantages in applying flameless firing to the Fourcault channel and annealing furnaces are described.

M. V. Kondoidy

**Manufacturing glass for electric bulbs in tank furnaces.** B. V. Khovanskii, A. I. Morozov and A. N. Nagornuil. *Keram. i Steklo* 9, No. 10, 8-11 (1933).—Conditions required for the production of glass for elec. bulbs in a tank furnace of the Simplex type are discussed.

M. V. K.

**The physical processes occurring in the melting and cooling of glass.** J. T. Littleton. *J. Am. Ceram. Soc.* 17, 43-9 (1934).—Fusion of the batch is soon completed; most of the time is used in freeing the glass from gas bubbles and in improving homogeneity. Melting may be

similar to a diffusion process, aided by convection currents. Only elec. cond. data indicate the existence of silicate compds. Dissolved gases probably assist fining by diffusing into the bubbles and increasing their size. Devitrification is avoided by knowing the devitrification temp., staying above that temp. during melting and fining, and cooling rapidly through that zone. Data show that viscosity changes with time, and when instantaneous values of viscosity are used, the rate of release of stress during annealing is proportional to the stress divided by the viscosity. The const. of proportionality has the dimension of the shear modulus of glass and is equal to  $1/4$  the value of the shear modulus in glass at room temp.

C. H. Kerr

**Comparison tests with alumina and feldspar as alumina-containing materials in glass.** Fr. Stang. *Glashutte* 63, 615-16 (1933).— $\text{Al}(\text{OH})_3$  is equal to or superior to feldspar in fusibility in the presence of Na carbonate. Feldspar is superior to  $\text{Al}(\text{OH})_3$  in fusibility in the presence of Na sulfate. In the presence of both Na carbonate and Na sulfate the relative fusibilities depend on the proportion of the mixt.  $\text{Al}(\text{OH})_3$  and feldspar are more fusible than  $\text{Al}_2\text{O}_3$ ;  $\text{Al}(\text{OH})_3$  is better because of a more uniform compn., and it produces a finer tinge in the finished glass.

M. V. Kondoidy

**Light permeability and color tone of building and illuminating glass.** H. Craemer. *Glashutte* 63, 616-17 (1933).—The reason for the greenish coloring of glass employed for illuminating and building purposes is the presence of metallic oxides, especially of  $\text{Fe}_2\text{O}_3$  and  $\text{FeO}$ , in the glass melt. The green coloring means a loss of light, because only the green colors pass through the glass unweakened, while all the other colors of the spectrum are partly absorbed and destroyed. The phys. decolorization of glass, or an addn. of complementary pigments, lowers the total permeability of the glass. The green tinge is removed only by means of chem. decolorization of the glass. Tests showed that Ce and Mn are especially interesting as decolorizers.

M. V. K.

**A study of some frit compositions.** C. W. Parmelee and K. C. Lyon. *J. Am. Ceram. Soc.* 17, 60-6 (1934).—Frits contg.  $\text{Na}_2\text{O}$ ,  $\text{CaO}$ ,  $\text{B}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  were studied. For proper fusibility and fluidity some  $\text{B}_2\text{O}_3$  is necessary.  $\text{SiO}_2$  should not exceed 8.0 equiv.  $\text{Na}_2\text{O}$  and  $\text{CaO}$  may vary from 0.3 to 0.7 equiv.  $\text{Al}_2\text{O}_3$  may be used up to 0.1 equiv. at least.  $\text{B}_2\text{O}_3$  need not exceed 0.5 equiv. To prevent excessive corrosion of the smelter lining, the  $\text{SiO}_2$  content should not exceed 1.0 equiv. The soly. of the frit glass in  $\text{H}_2\text{O}$  is roughly proportional to the mol. ratio  $(\text{Na}_2\text{O} + \text{B}_2\text{O}_3)/(\text{CaO} + \text{SiO}_2)$ . Small addns. of  $\text{Al}_2\text{O}_3$  (about 0.1 equiv.) will reduce the soly. about one-half. A frit of low soly. can be made without using  $\text{Al}_2\text{O}_3$ .

C. H. Kerr

**Artificial resins, etc., as the intermediate layer in safety glass.** A. Bresser. *Kunststoffe* 24, 30-2 (1934).—The

use of various synthetic, artificial plastics in the manu- of  
shatter-proof glass is discussed.

J. W. Perry  
Determination of the cristobalite content of silica bricks.  
J. M. G. Hemmar and J. G. de Voogd. *Hot Gas* 53, 492-6  
(1933).—The detn. of cristobalite in burnt silica brick is of  
some importance, because of the relatively large vol. in-  
crease in the rapid  $\alpha$ - $\beta$  transition at 230° and its relation  
to spalling. The Nieuwenburg dilatometer app. (C. A.  
22, 1265, 2863) for cristobalite detn. based on the expan-  
sion of a small test cylinder is described. The test body of  
90% powd. brick (DIN sieve no. 60) + 10% fat clay,  
kneaded with H<sub>2</sub>O and pressed through a 7-mm. glass  
cylinder, is cut off to 30 mm., dried for 1 hr. in *vacuo* at 50-  
60°, then ground to 30 mm. It is heated in the center of  
an elec. furnace; its expansion is transmitted to a little  
mirror, 0.01 mm. expansion giving 9 mm. displacement of  
a light beam on the scale. Several curves of expansion vs.  
temp. rise are given; from these the cristobalite content is  
derived. The results are reproducible in 1% from tests by  
3 independent labs. The test cylinders are used only once.  
Results so far obtained do not point to high cristobalite  
content as a cause of spalling.

B. J. C. v. d. H.  
Some effects of temperature on commercial heat-  
insulating bricks. A. J. Dale and F. Wheeler. *Trans.*  
*Inst. Gas Engrs.* 79, 224-8, 245-53 (1929-30). A. H. E.  
Use of galena, natural lead sulfide, in ceramic industry.  
Marc Larcheveque. *Céramique* 36, 221-4 (1933).

M. H. Berns  
Effect of fineness of flint on vitrification of a ceramic  
body. C. W. Parmelee and W. R. Morgan. *Ceram.*  
*Ind.* 22, 146-52 (1934). Herbert S. Willson

Technical study and practice of the mixing and prepara-  
tion of ceramic stoneware slips. Felix Chalmel. *Cé-*  
*ramique* 36, 235-46 (1933). M. H. Berns

Report on burned clay. Henri Gilardoni. *Céramique*  
36, 185-91 (1933). M. H. Berns

Some experiments on frothed clays. S. R. Hind.  
*Trans. Inst. Gas Engrs.* 79, 228 (1929-30).—China clay  
and ball clay slips were treated to give a froth (method  
not given), the froth was dried, fired to 1250°, ground for  
grog, bonded with 15% ball clay and refired to 1200°.  
The thermal cond. at 267-500° was 0.00050, at 415-800°,  
0.00064 and at 640-1100°, 0.00077. Alden H. Emery

Thermal insulation of crowns of glass furnaces as a  
means of saving fuel and Dinas bricks. N. P. Krasnikov.  
*Keram. i Steklo* 9, No. 9, 20-1 (1933).—Thermal insulation  
of crowns of glass furnaces permits reduction of gas con-  
sumptions by 10% and decreases the total quantity of  
Dinas bricks by half, because they last twice as long.  
Changes appearing in Dinas brick (connected with the  
formation of tridymite) occur irregularly, and the brick  
becomes inhomogeneous when the crown is not insulated,  
while with thermal insulation the production of tridymite  
proceeds uniformly and the brick becomes much more  
stable and durable.

M. V. Kondoidy  
Kieselguhr and insulation in the ceramic industry.  
Lucien Augé. *Céramique* 36, 217-20 (1933). M. H. B.

Measuring the thermal conductivity of refractory  
materials and insulators. L. Longchambon. *Céramique*  
36, 215-17 (1933).—Isothermal surfaces are detd., and the  
quantity of heat which traverses these surfaces is measured.

M. H. Berns  
Refractory brick for Cowper apparatus (blast-furnace  
stoves). R. Leduc. *Céramique* 36, 260-7 (1933).

M. H. Berns  
The measurement of reaction rates [in refractories] at  
high temperatures. J. H. Chesters and C. W. Parmelee.  
*J. Am. Ceram. Soc.* 17, 50-9 (1934).—Cylindrical test  
pieces, formed under 10,000 lb./sq. in. pressure, were  
heated to 1300-1500°. The rate of inversion of quartz to  
cristobalite and the rate of spinel formation in mixts. of  
electrically fused MgO and Al<sub>2</sub>O<sub>3</sub> were detd. from the slope  
of the expansion curve at const. temp. The amt. of  
cristobalite or spinel formed was calcd. from d. detns.  
before and after firing. The products were identified by  
x-ray and microscopic examn. Unfired SiO<sub>2</sub> brick showed  
almost complete inversion to cristobalite in 2 hrs. at

1300°, the corresponding vertical expansion being about  
6%. Adding 2% CaO to unfired quartzite increased the  
rate of inversion quite appreciably. A further addn. of  
1.5% Na<sub>2</sub>O and 1.5% Fe<sub>2</sub>O<sub>3</sub> so increased the rate of in-  
version at 1400° that after 2 hrs. only cristobalite was  
found. A mixt. of electrically fused MgO (0.15-0.06  
mm. grain size) and Al<sub>2</sub>O<sub>3</sub> (3.59-0.15 mm. grain size)  
contained about 25% spinel after 2 hrs. at 1500°. Adding  
2% B<sub>2</sub>O<sub>3</sub> increased the spinel to 75% under the same  
conditions. Test pieces made from MgO and Al<sub>2</sub>O<sub>3</sub> of one  
grain size only (0.06 mm.) showed complete conversion to  
spinel after only 10 min. at 1450°.

C. H. Kerr  
The influence of oxidizing and reducing atmospheres on  
refractory materials. H. T. S. Swallow. *Trans. Inst.*  
*Gas Engrs.* 79, 238-40 (1929-30).—The influence of atm  
on the ordinary refractory test is negligible for firebricks  
contg. normally low amts. of Fe. Heating for a long  
period under reducing conditions lowered the refractorness  
of a brick contg. about 5% Fe<sub>2</sub>O<sub>3</sub> by about 20°. The  
load-bearing capacity of firebricks is lowered by a change  
from oxidizing to reducing conditions.

A. H. Emery  
The after-expansion and true specific gravity of silica  
refractories for carbonizing plant. A. J. Dale, H. T. S.  
Swallow and F. Wheeler. *Trans. Inst. Gas Engrs.* 79,  
229-37, 245-53 (1929-30); cf. C. A. 24, 2565.

Alden H. Emery  
The most important characteristics of refractory con-  
struction materials for brown coal stoking. W. Michr  
*Braunkohle* 32, 757-65, 778-83 (1933).—Chem. and phys.  
properties are compared.

F. W. Jung  
A note on the surface flaking of vertical retorts. A. J.  
Dale and V. Hackney. *Trans. Inst. Gas Engrs.* 79, 237 8,  
245-53 (1929-30).

Alden H. Emery  
Progress report on hot-patching cements. A. J. Dale  
and V. Hackney. *Trans. Inst. Gas Engrs.* 79, 240 53  
(1929-30).

Alden H. Emery  
Glazes without lead for terra cotta. V. M. Barshtak  
*Keram. i Steklo* 9, No. 7, 26-7 (1933).—See C. A. 28, 871<sup>9</sup>,  
where the author's name was incorrectly given C. C. Ber-  
man.

E. J. C  
The microstructure of some raw lead mat glazes  
C. W. Parmelee and Wm. Horak. *J. Am. Ceram. Soc.*  
17, 67-72 (1934).—Glazes of the following ranges of  
compd. were fired at cones 03, 2, 4 and 6: 0.4-0.6 PbO,  
0.2-0.3 CaO, 0.0-0.3 BaO, 0.0-0.3 ZnO, 0.1-0.35 Al<sub>2</sub>O<sub>3</sub>,  
0.7-1.8 equiv. SiO<sub>2</sub>. The compds. recognized as crystals  
were anorthite, celsian (probably), tridymite and wol-  
lastonite. Willemite was not observed. The good mats  
were due to crystal sepn. A high Al<sub>2</sub>O<sub>3</sub> content was not  
essential. Anorthite was the principal cryst. form  
present in mat glazes contg. CaO. When ZnO is under  
0.3 equiv. no Zn silicate crystallizes out, but the ZnO  
combines with the other constituents to form a more fluid  
glass. BaO tends to form mats by crytg. out as a mineral  
believed to be Ba feldspar.

C. H. Kerr  
Determination of the effect of direct gas firing on  
porcelain glazes. Arthur P. Watts. *Am. Gas Assoc.*  
*Monthly* 16, No. 1, 8-10; *Ceram. Age* 23, 37-8 (1934).  
Tests on a series of elec. and sanitary porcelain glazes,  
both white and colored, indicated that they can be directly  
fired without damage to body or glaze if flashing and direct  
impingement of the flame is prevented. A material  
reduction in firing time was also obtained. Results of the  
tests on 58 glazes are given.

A. M. Brant  
Late developments in the enameling industry. Emer-  
son P. Poste. *Ceram. Ind.* 22, 138-45 (1934).

Herbert S. Willson  
Softening of vitreous substances (Rencker) 2.

Taschenbuch für Keramiker, Jg. 26. 1934. Bd. I  
52 pp. Bd. II. 368 pp. Berlin: Keramische Rund-  
schau. M. 3.30. Reviewed in *J. Soc. Glass Tech.* 17,  
510 (1933).

Tonindustrie-Kalender, 1934. Tl. 1. Notiskalender.  
32 pp. Tl. 2. Textband. 388 pp. Berlin: Chem.  
Lab. für Tonindustrie. M. 3.30.



**Refining glass.** Corning Glass Works. Fr. 756,495, Dec. 11, 1933. Masses of molten glass are refined by adding to the charge to be melted a small amt. of material contg. Br or I, e. g., I, iodates, iodides, iodoform, bromides and bromates.

**Feeding mold charges of molten glass.** Samuel G. Stuckey (to Obeas-Nester Glass Co.). U. S. 1,945,871, Feb. 6. Various details of app. and operation are described. Cf. C. A. 27, 4646.

**Glass tank furnace and associated apparatus.** John L. Drake (to Libbey-Owens-Ford Glass Co.). U. S. 1,945,801, Feb. 6. A displacement plunger is provided to assist in maintaining a desired level of molten glass in the furnace. Various structural and mech. details are described.

**Electric furnace for melting glass.** \*Patent-Treuhand-Ges. für elektrische Glühlampen m. b. H. Fr. 756,498, Dec. 11, 1933.

**Cooling furnace for glass sheets.** Adolf Schild. Ger. 589,678, Dec. 12, 1933 (Cl. 32a. 29).

**Apparatus for drawing sheets of glass.** N. V. Hollandsche Maatschappij Voor de Vervaardiging van Glas. Fr. 756,685, Dec. 13, 1933.

**Apparatus for making glass sheets by vertical drawing.** N. V. Hollandsche Maatschappij Voor de Vervaardiging van Glas. Fr. 756,720, Dec. 14, 1933.

**Sheet wire glass.** Charles B. Kingsley (to Mississippi Glass Co.). U. S. 1,945,995, Feb. 6. Various details of app. and operation are described.

**Sponge-like glass.** Bernard Long (to Soc. anon. des manufactures des glaces & produits chimiques de Saint-Gobain, Chauny & Cirey). U. S. 1,945,052, Jan. 30. Gas-evolving substances such as  $\text{Na}_2\text{CO}_3$ ,  $\text{H}_2\text{BO}_3$ ,  $\text{Al}(\text{OH})_3$ ,  $\text{TiO}_2$ ,  $\text{NH}_4\text{Cl}$  and carbon are incorporated in a glass batch, and the glass material is subsequently maintained close to its softening temp. and sufficiently below the fusion temp. to cause evolution of gas and form a sponge-like product which is suitable for heat and sound insulation.

**Apparatus for manufacture of hollow glass articles such as bottles.** Emile Roirant (to Soc. anon. d'études et de constructions d'appareils mécaniques pour la verrerie). U. S. 1,946,411, Feb. 6. Mech. features.

**Manufacture of hollow glassware such as bottles.** George E. Rowe (to Hartford-Empire Co.). U. S. 1,945,982-3, Feb. 6. Various details of app. and operation are described. U. S. 1,945,985 (Arthur E. Smith, to Hartford-Empire Co.) also relates to the manuf. of bottles, etc.

**Annealing glassware.** Harold L. Eastman (to Hartford-Empire Co.). U. S. 1,947,408, Feb. 13. Various details of app. and operation are described suitable for annealing glassware in an elongated tunnel.

**Apparatus for manufacturing glass cylinders.** Yuzuru Iwasaki. Japan 94,910, March 2, 1933. Diagrammatical.

**Composite vitreous articles.** Società anon. vetreria italiana balzaretto modigliani. Fr. 756,657, Dec. 13, 1933. Glass threads are mounted between sheets of glass to give optical, decorative, thermal or acoustic effects.

**Agatized bodies such as marbles.** Sellers H. Peltier. U. S. 1,946,879, Feb. 13. A pool of molten vitreous material is formed over an orifice (in a described app.), and a stream from the pool is flowed through the orifice, a coloring substance being supplied to the border of the pool to form colored portions in the surface of the stream.

**Compound glass.** British Celanese Ltd. and Wm. H. Moss. Brit. 401,299, Nov. 1, 1933. Laminated glass is made by uniting sheets of glass and a sheet or sheets of a cellulose deriv. by thin films of cellulose derivs., low pressures, e. g., 50 lb. per sq. in. or less, being applied, e. g., in a press or by passing between rubber-faced rollers, while the films are in a softened condition due to the presence of a solvent or swelling agent. Atm. or higher temp., e. g., up to 100°, may be used. The same cellulose deriv. may be used in the films and reinforcing sheets.

**Laminated glass.** Wm. H. Moss (to Celanese Corp. of

America). U. S. 1,947,486, Feb. 20. Glass sheets are pressed together with an intervening layer of a cellulose deriv. compn. such as one contg. cellulose acetate, etc., together with water 1-5% which serves to improve the plasticity of the compn.

**Clay product suitable for light bricks, etc.** Herman Reiser. U. S. 1,945,232, Jan. 30. The residuum obtained by burning rice hulls (suitably in a proportion of about 20-80%) is mixed with brick or potters clay

**Silica-lime brick.** Julius Schöffler (to Koppers Co. of Del.). U. S. 1,945,286, Jan. 30. In prepg. a molding mass for the manuf. of silica brick to be burned, from finely ground silica and lime, only a part of the total content of finely ground silica of the ultimate bricks is mixed with unslaked lime, and the lime in the mixt. is slaked, the product being then mixed with the remaining portion of the silica. App. is described.

**Kiln for making bricks and ceramic articles.** Ferdinand Panta. Ger. 591,086, Jan. 16, 1934 (Cl. 80c. 5). This corresponds to Brit. 346,699 (C. A. 27, 1128).

**Kiln suitable for burning brick or other ceramic products.** John J. Schmidt (to Frederick Iron & Steel Co.). U. S. 1,947,496, Feb. 20.

**Ceramic articles that can be fired at low temperature.** Géza Becker. Hung. 107,181, Sept. 1, 1933. Steatite is added to the raw material in quantities from 20 to 90%. Articles thus obtained can be fired at low temp. and are resistant to rapid variations of temp.

**Ceramic products.** Porzellanfabrik Kahla (Werner Rath, inventor). Ger. 591,090, Jan. 16, 1934 (Cl. 80b. 8.01). Brucite or nemalite is used in the manuf. of ceramic products of high  $\text{MgO}$  content. The powd. mineral alone may be molded and fired, or products of a spinel character may be prepd. from a mixt. of the mineral and  $\text{Al}_2\text{O}_3$ , or a eutectic mixture of the mineral and  $\text{Al}_2\text{O}_3$  may be used as a binder for other refractory materials. Known compns. contg. steatite may be modified by using brucite or nemalite in place of a part of the steatite.

**Oils for ceramic presses, etc.** Karl Jungmann and "Bituma" Bergbau- und chem. Ind. A.-G. Ger. 591,339, Jan. 20, 1934 (Cl. 80b. 24.05). Use is made of mixts. of hydrocarbon oils with (1) liquid resin obtained as a by-product in the cellulose industry, or (2) conversion products of the liquid resin, e. g., tall oil, or (3) a sulfonated fat, fatty oil or fatty acid.

**Foundry and glass-making crucibles.** Edmond Frayssé and Tran van Loi. Fr. 757,216, Dec. 22, 1933. Siliceous sandstone and quartzite are used for making the crucibles which are cut directly from the natural rock.

**Mullite.** Deutsche Ton- & Steinzeug-Werke A.-G. Ger. 589,556, Dec. 9, 1933 (Cl. 80b. 8.07). Ceramic material rich in mullite is prepd. by burning a mixt. of silicates of the sillimanite group and aq. solns. of Al salts, preferably those contg.  $\text{SO}_4$  and Cl ions.

**Apparatus (with a vibrating mold) for making ceramic articles such as refractories.** Elisabeth Lux (to Koppers Co. of Del.). U. S. 1,944,989, Jan. 30. Structural and mech. features.

**Refractory materials.** Jenny Pohl née Hohl. Ger. 591,154, Jan. 17, 1934 (Cl. 80b. 8.16). Refractory substances such as clay, magnesite, dolomite, and  $\text{Al}_2\text{O}_3$  are heated to softening temp. and then passed directly to a system of pressure rolls. The rolled products may be reheated to softening temp. if desired. Dense products suitable for making refractory articles are obtained.

**Abrasive sheets.** Minnesota Mining & Manufacturing Co. Fr. 756,564, Dec. 12, 1933. Polymerization or condensation products of an aldehyde and an amide or imide are used as bonding agent for abrasives on paper, etc.

**Abrasive sheets.** Minnesota Mining & Manufacturing Co. Fr. 756,907, Dec. 18, 1933. Polymerization or condensation products of polyhydric alcs. with polybasic acids or phenols are used as bonding agents for abrasives on paper, etc.

**Abrasive articles such as sheets or disks.** Joseph McKee (to Union Sandpaper Co.). U. S. 1,944,898, Jan. 30. After the article is formed and the adhesive used in its

manuf. has set, particles of material projecting beyond the general level of the majority of particles are broken off, as by the action of rolls.

**Composition for enameling or glazing metals.** Charles J. Kinzie (to Titanium Alloy Mfg. Co.). U. S. 1,944,938, Jan. 30. A coating suitable for use on sheet iron and steel is formed from a batch comprising Na Zr silicate 10-43,  $\text{Al}(\text{OH})_3$  0-3, K feldspar 0-48, quartz 0-24,  $\text{Na}_2\text{CO}_3$  0-11,  $\text{NaNO}_3$  3-5,  $\text{CaCO}_3$  0-8, cryolite 0-7, ZnO 4-14, fluorspar 0-11 and borax 23-47 parts.

**Enameling iron.** Ignaz Kreidl. Austrian 136,003, Dec. 27, 1933 (Cl. 48c). The adhesion of the enamel is

promoted by alloying the Fe with a small proportion of a suitable metal, particularly Ni or Co.

**Enameled gold-alloy or platinum tooth crowns.** Rezső Hejemann. Hung. 106,893, Aug. 1, 1933. A mixt. of  $\text{SiO}_2$  6.5, borax 2.0, cryst. soda 1.65,  $\text{NaNO}_3$  0.30, cryolite 1.20 and SnO 0.50% is heated for 2 hrs. to  $1000^\circ$ , powder and 10 parts of the powder mixed with 0.5 part white clay and an opacifier, the mixt. colored with the usual metal oxides and after addn. of about 0.75 l. water per kg ground in a mill for 24 hrs. An aq. or turpentine pulp, made from the dust is applied to the metal crowns and fired.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**Calcium aluminates and their significance in cement.** Gunnar Assarsson. *Zement* 23, 1-3, 15-20(1934).—A comprehensive study is made of the phase relations in the system  $\text{CaO}-\text{Al}_2\text{O}_3-\text{H}_2\text{O}$ , with the results shown graphically. The chief cryst. products formed are  $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 10.5\text{H}_2\text{O}$ ,  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 12\text{H}_2\text{O}$ ,  $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$ ,  $\text{Al}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$  and  $\text{Ca}(\text{OH})_2$ . The crystn. processes are aided by increase in temp. and retarded by decrease in the amt. of mixing water. The main product of the hydration of  $\text{CaO} \cdot \text{Al}_2\text{O}_3$  is a gel of index 1.53 accompanied by crystals of  $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$ . The hydration products of  $3\text{CaO} \cdot 5\text{Al}_2\text{O}_3$  are similar. Aluminous cements when shaken with 0.4 to 20 parts of water show soln. only for about an hr., with pptn. occurring rapidly after the second hr. The ratio of CaO to  $\text{Al}_2\text{O}_3$  is highest in the more dil. solns.

H. F. Kriege

**Hydration of the lime silicates in portland cement.** K. Koyanagi. *Zement* 22, 705-8(1933).—Coarse cement particles, freed from adhering dust by 24-hr. shaking with abs. alc. and drying, were shaken for 50 days with 20 times their wt. of distd. water or lime water at  $20^\circ$ . The hydration process after a few hrs. resulted in the sepn. of a finely divided amorphous material having approx. the compn. of plumbierite ( $\text{CaO} \cdot \text{SiO}_2 \cdot 2\text{H}_2\text{O}$ ). In addn.  $\text{Ca}(\text{OH})_2$  in hexagonal crystals larger than the original cement grains developed to the extent of 3, 6.75 and 40.6% after shaking for 1, 2 and 4 weeks, resp. The hydration products of  $3\text{CaO} \cdot \text{SiO}_2$  and  $2\text{CaO} \cdot \text{SiO}_2$  are therefore  $\text{CaO} \cdot \text{SiO}_2 \cdot 2\text{H}_2\text{O}$  and  $\text{Ca}(\text{OH})_2$ . H. F. Kriege

**Investigation of the setting properties of mixtures of anhydrite cement and clay.** A. V. Filosofov. *J. Applied Chem.* (U. S. S. R.) 6, 245-7(1933).—According to expts. which are described in detail, anhydrite cement and clay have a mutually detrimental effect on the setting properties and therefore they should not be used together.

A. A. Bochtlingk

**Examination of cement and mortars.** H. Brückner. *Z. anal. Chem.* 96, 151-60(1934).—A review. W. T. H.

**Concrete strength in the light of new physical research.** Adalbert Pogány. *Zement* 23, 48-50, 63-5(1934).—Microscopic examn. showed that to obtain higher ultimate strengths in concrete, it is necessary to control the hardening processes so as to avoid the formation of minute cracks in the mass. H. F. Kriege

**Protective coatings for concrete and their resistant properties against the action of corrosive liquids.** C. R. Platzmann. *Asphalt Teer Strassenbautech.* 33, 943-4(1933); cf. C. A. 28, 1834'.—Discussion. F. W. J.

**Important advances in road building by the use of new types of asphalt emulsions.** A. Caroselli. *Teer u. Bitumen* 31, 398-400(1933).—A brief description and classification of emulsions. F. W. Jung

**The preparation of a new road binder.** C. F. Broadhead. *Trans. Inst. Gas Engrs.* 79, 531-73(1929-30).—See C. A. 24, 4372, 4912; 25, 1054, 1966. A. H. E.

**The preservation of the technically important properties of tar as the binding element in road surfacing.** Hermann Ehligts and Ewald Flister. *Teer u. Bitumen* 31, 405-9, 417-23, 429-32(1933).—App. for detn. of adhesiveness

and strength are described. The effect of time upon adhesiveness and dropping point is shown graphically and in microscopic structure for various tar mixts.

F. W. Jung

**The present state of road-tar testing.** Georges Batta. *Ind. chim. belge* [2], 5, 47-62(1934).—A discussion of the Belgian specifications.

A. L. Henne

**The adhesion of bituminous binders to stone.** Walter Riedel and Hans Weber. *Asphalt Teer Strassenbautech.* 33, 677-80, 693-5, 713-18, 720-32, 749-51, 793-8, 800-12(1933); cf. C. A. 26, 2568'.—A method for detg. adhesiveness based upon the proportionality between adhesion and effect of electrolytes and soaps upon the covering properties of bituminous materials has been developed and is demonstrated in a large no. of applications. Hygroscopic and other properties of the stone used in road construction appear of greater effect than those of the binder. Adhesiveness of hot bitumen varies less than that of emulsions because of effects of emulsifying and stabilizing agents. That of tar mixts. exceeds that of bitumen mixts. after aging, although less when fresh. F. W. Jung

**The "breaking" of bituminous road-building emulsions through the action of stone.** Hans Weber. *Teer u. Bitumen* 31, 333-6, 349-51(1933); cf. C. A. 27, 4649, 4899. F. W. Jung

**The "breaking" of bituminous emulsions upon stone.** G. H. Klinkmann. *Asphalt Teer Strassenbautech.* 33, 842-4, 873-6, 893-6(1933); Weber and Bechler, cf. C. A. 26, 2568'.—In a method employing mech. agitation of sized stone with the emulsion, the "breaking value" is detd. as the percentage of available bitumen deposited upon the stone surfaces. A no. of Italian stones have been studied with emulsions of various stabilities. Other methods are discussed briefly. Breaking and breaking value are considered from practical and theoretical stand points. F. W. Jung

**Colored bitumen fabrications.** C. R. Platzmann. *Teer u. Bitumen* 31, 369-71(1933).—The use of natural asphalts, e. g., gilsonite, asphaltite or Utah asphalt, in combination with stearin pitch and lanolin or lanolif pitch for the impregnation or coating of roofing paper is described. F. W. Jung

**Slags: their uses in road making.** Bernard H. Knight. *Munic. Eng. Sanit. Record* 92, 704 7(1933). The chemistry of blast-furnace slags as produced in Great Britain today is outlined. Conclusions: The presence of Ca orthosilicate or CaS is liable to produce disintegration. A tendency in this direction is governed by 3 factors: (a) the  $\text{CaO}/\text{SiO}_2$  ratio, (b) the MgO content and (c) the S content. A suggested draft of the Brit. Standard Specification for slag to be used as an aggregate in road surfacing is given; the specification used in Austria is discussed. A. W. Fürbank

**Rammed earth for farm building walls.** Ralph L. Patty. *Aggr. Eng.* 15, 14-15, 17(1934).—The optimum moisture content for rammed-earth walls ranged from 7% for soil contg. 70-80% of total sand to 16% for soil contg. 5-10% sand. Addn. of hydrated lime to the soil reduced the strength of the blocks in compression and also reduced the resistance to weathering. The strength of the

blocks was increased 20-25% by admixing the soil with fibrous materials such as grass sod and flax and oat straw. Plaster bonded to the walls satisfactorily without the use of a base. Linseed-oil paints seemed to adhere to rammed-earth walls better than to wood.

K. D. Jacob. The artificial materials "Steinholtz" and "Dermas." E. Belani. *Kunststoffe* 23, 255-8 (1933).—Various formulas used in making these products (artificial sheet rock) are explained and illustrated by means of examples and the advantages of including micro-asbestos as a filler component emphasized.

J. W. Perry. Roofing paper and zinc sheeting. H. Mallison. *Teer u. Bitumen* 31, 345-8 (1933).—Weathering action on Zn surfaces protected by asphalt and tar papers has been studied. Corrosion is caused by the action of condensed moisture and occurs with both types of paper. Provision for evapn. of condensed water prevents corrosion.

F. W. Jung. Aluminized roofing paper. E. Tauber. *Teer u. Bitumen* 31, 387 (1933).

F. W. Jung. New methods and preparations for preserving wood. Heinrich Wiesenthal. *Kunststoffe* 23, 258-9 (1933).—A discussion with formulas.

J. W. Perry. Preservative treatment of post woods. Deane G. Carter. *Agr. Eng.* 14, 252-3 (1933).—See C. A. 28, 603<sup>9</sup>.

K. D. Jacob. Movement of the pit membrane in coniferous woods, with special reference to preservative treatment. E. W. J. Phillips. *Forestry* 7, 104-20 (1933).—Some aspirated pits occur in green conifer wood contg. much free water; the no. slowly increases as the moisture content falls until the fiber-satn. point is approached, when a rapid increase occurs. The results are considered in relation to the penetration of liquids and the difficulties encountered in treating coniferous timber with preservatives.

K. D. J. Studies in the decomposition of timber under industrial conditions. IV. Extensive wet rot. Ernest A. Rudge. *J. Soc. Chem. Ind.* 53, 37-8T (1934); cf. C. A. 28, 2151<sup>8</sup>.—Samples of oak, elm, chestnut and birch in an advanced state of decay due to "wet rot" were analyzed as in previous studies. All specimens were from timbers that had been in contact with soil. V. Dry rot. *Ibid.* 38-40T. —Two samples of interior building timbers, one from wainscot base in contact with lime plaster and the other from floor-joint imbedded in concrete, were analyzed as before. The results from IV and V confirm R.'s previous conclusion that decay of wood is connected with the close assocn. of Ca with cellulose or its degradation products.

Alfred L. Kammerer

Rept. of the mycologist for the year 1932 [wood rot] (Gadd) 11D. Optical properties of Ca aluminates and ferrites (Akiyama, Sawayama) 2. App. for pre-treating crude cement with waste gases from rotating furnaces (Ger. pat. 589,715) 9.

Cement. Carbo-Lime & Cement Co., Ltd. Fr. 756,953, Dec. 18, 1933. A hydraulic cement is made by grinding limestone or other commercial CaCO<sub>3</sub> till it passes a screen of 10 meshes per sq. cm., heating till it contains not more than 0.5% moisture, grinding again and mixing with a more finely ground clinker contg. tri-Ca silicate. The proportion of CaCO<sub>3</sub> to free oxide in the clinker is 8:1.

Cement. Mikael Vogel-Jorgensen. Fr. 757,107, Dec. 20, 1933. Crude material for cement is wetted with a controlled amt. of water and beaten up in an intense fashion until it has become homogeneous and has acquired the consistency of moist earth. A layer permeable to gas can then be formed without further treatment, such as transformation to nodules or briquets.

Cement. Iwaki Cement K. K. (Mangorô Komuro, inventor). Japan. 99,308, Feb. 2, 1933. Clay is primarily heated at a high temp. (500-800° or 900°) to cause decompn. to Al<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>; these are then mixed with other materials for cement manuf. Cf. C. A. 27, 3312.

Magnesia cement. Ryosaku Matsuura (to Minami

1 Manshu Tetsudo K. K.). U. S. 1,946,327, Feb. 6. A cement is prepd. consisting of light burned magnesite contg. 85% MgO and "almost insol." Mg sulfite. Powd. silica, coloring matter, etc., also may be added.

Portland cement composition. Howard R. Starke (to Riverside Cement Co.). U. S. 1,947,504, Feb. 20. A finely ground portland cement is prepd. of which less than 1% comprises particles exceeding 50 microns in diam., interground with about 0.05-1.0% of oleaginous material such as oleic acid which serves to facilitate desired fine grinding.

Acidproof cement. I. G. Farbenind. A.-G. (Karl Frank and Karl Dietz, inventors). Ger. 589,594, Dec. 11, 1933 (Cl. 22i. 1). Addn. to 460,125. An acidproof plastic cement or luting for containers consists of water glass, quartz meal and salts of the type X<sub>2</sub>ZrF<sub>6</sub>, X<sub>2</sub>GeF<sub>6</sub>, X<sub>2</sub>TaF<sub>7</sub> and X<sub>2</sub>SnF<sub>6</sub>, X representing an alkali metal. Cf. C. A. 27, 576.

Basic dolomite clinker. Seisyo Horio (Masaji Kadiwara, inventor). Japan. 99,399, Feb. 6, 1933. A moist mixt. of powd. dolomite, fluor spar and Fe is heated to clinker, which is immersed in a 10% Mg(HCO<sub>3</sub>)<sub>2</sub> soln. and then kept in an atm. of CO<sub>2</sub> and H<sub>2</sub>O at 200°. Cf. C. A. 27, 3797.

Rotary cement kilns. Harry S. Lee. Brit. 401,392, Nov. 16, 1933.

Rotary cement and other kilns. Niels S. Borch. Brit. 401,726, Nov. 20, 1933.

Combined shaft furnace and rotary kiln for cement manufacture. Arno Andreas. Ger. 591,049, Jan. 16, 1934 (Cl. 80c. 14.10).

Concretes. Riverside Cement Co. Brit. 399,101, Sept. 28, 1933. Massive cementitious bodies, e. g., concrete dams, are made from a cement mix or concrete contg. a portland cement of low heat of hardening described in Brit. 400,813 (C. A. 28, 2153<sup>1</sup>).

Concrete bodies. Richard Gruu. Ger. 589,514, Dec. 3, 1933 (Cl. 80b. 21.03). Hard concrete bodies are made by using broken cement clinker or similar clinker as flux.

Glazing concrete objects. Carl Menz and Gustav Boecker. Ger. 589,940, Dec. 18, 1933 (Cl. 80b. 23.04). Concrete objects are glazed by coating them with an Al<sub>2</sub>O<sub>3</sub> cement m. below 1500° and fusing this by a fine pointed flame. Cf. C. A. 28, 2154<sup>2</sup>.

Concrete preparation for building construction. Wm. W. Lillard. U. S. 1,947,345, Feb. 13. Dry cement and dry aggregate are mixed in a central mixing plant distant from the point of use, the mixt. is stored in a dry bin and heat is used to maintain it dry; the mixt. is transported in a dry container to a point near the place of use and is sprinkled with water while agitated and moved into place. App. is described.

Laying concrete roadways. Graham M. Gordon (to Viber Co.). U. S. 1,945,145, Jan. 30. Various details of app. and operation are described for pouring, vibration, air exhaustion and water removal.

Apparatus for lining or coating pipes with fused metals or bituminous compositions. Josef Zavadil. Austrian 135,889, Dec. 11, 1933 (Cl. 48b).

Bituminous compositions for lining pipes. Vereinigte Stahlwerke A.-G. Ger. 591,044, Jan. 16, 1934 (Cl. 22g. 7.02). In coating the inner surfaces of pipes with bituminous compns. applied in the fused state by a centrifugal process, the viscosity of the fused compns. is reduced by adding 1-3% of a drying oil.

Bituminous emulsions for making roads. Ges. fur Teerverwertung m. b. H. (Fritz Kraft, inventor). Ger. 591,340, Jan. 20, 1934 (Cl. 80b. 25.06). As emulsifying agents, use is made of the crude products obtained by heating humous substances, e. g., brown coal or peat, with aq. alkali. Resins, fats or oils, or acids or alcs. obtained therefrom, or naphthenic acids, may be added to the emulsions during or after their prepn. The emulsions may be stabilized by adding to all or a part of the water used a substance capable of swelling, e. g., starch. Cf. C. A. 27, 410.

Sand rock asphalt pavement. Glenn H. Alvey (to Uvalde Rock Asphalt Co.). U. S. 1,946,517, Feb. 13. Limestone rock asphalt is pulverized so that 75% will

pass a 10-mesh screen, sand is added which is poorly graded so as to produce "a max." of voids, the ingredients are mixed and heated to about 150° and an asphaltic flux is added sufficient to coat the sand particles and soften the native bitumen in the rock asphalt. Cf. C. A. 27, 3580.

**Artificial marble.** Kálmán Neuhauser. Hung. 107,705, Dec. 15, 1933. To a pulp of white cement and water coloring material is added, or several pulps of different colors are mixed in such a way as to imitate the layers of natural marbles, and the mixt. is pressed to the desired shape. After setting, the articles are treated with a mixt. of flowers of S, tin ash and oxalic acid, polished and then treated with wax dissolved in turpentine.

**Building material.** I. G. Farbenind. A.-G. (Hans Welsch and Hans Wolf, inventors). Ger. 588,196, Nov. 14, 1933 (Cl. 80b. 1.09). Addn. to 574,793 (C. A. 27, 4650). The method of 574,793 for producing porous building material by treating a hydraulic binding agent with slag and sulfonic acids or sulfonates is modified by adding alkali silicates. Thus, sand, portland cement, Na isopropylsulfonate and water are mixed and water glass added.

**Building material.** Heinrich Peikert. Ger. 589,804, Dec. 14, 1933 (Cl. 80b. 21.04). Material for making light building or insulating masses is formed by treating old paper with soda or lime and water to form a lumpy mass. This is then granulated.

**Cellular building material, etc., from gypsum plaster.** Hans O. Kauffmann (to Buffalo Electro-Chemical Co.). U. S. 1,946,077, Feb. 6. A cementitious material such as  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is mixed with a peroxide such as  $\text{H}_2\text{O}_2$  and with water; a potentially active catalytic peroxide-decomp. agent such as  $\text{CoCl}_2$  is added to the mixt. and this catalytic agent is subsequently rendered active (as by adding  $\text{NaOH}$ ) to decompose the peroxide and liberate O in the mixt.

**Cellular product.** George D. King (to The Canadian Gypsum Co., Ltd.). Can. 339,030, Jan. 30, 1934. A dry mix comprises powd. calcined gypsum, finely powd.  $\text{CaCO}_3$ , ground  $\text{Al}_2(\text{SO}_4)_3$  and powd. benzoic acid. When water is added to the mix an improved plastic and cohesive mixt. is obtained which sets and hardens rapidly, forming a composite cellular structure.

**Light stone, etc.** Bruno Neuhoef. Fr. 756,966, Dec. 18, 1933. See Ger. 586,795 (C. A. 28, 1500<sup>9</sup>).

**Forming structural slabs, blocks, aggregate or the like from molten slag and ground limestone or magnesite.** Ray C. Newhouse. U. S. 1,947,488, Feb. 20. A construction material contg. gas pockets is formed by mixing a molten slag with a finely divided carbonate such as  $\text{CaCO}_3$  or  $\text{MgCO}_3$  and allowing the mixt. to cool. App. is described.

**Apparatus for mixing materials such as molten slag with pulverized limestone or gypsum.** Ray C. Newhouse. U. S. 1,947,487, Feb. 20. Structural and mech. features.

**Forming corrugated asbestos cement sheathing.** John W. Ledebor (to Ambler Asbestos Shingle & Sheathing Co.). U. S. 1,944,895, Jan. 30. Various operative details of manuf. are described.

**Mortar.** Chem. Fab. Grunau Landshoff & Meyer A.-G. Ger. 591,469, Jan. 22, 1934 (Cl. 80b. 1.15). Waterproof mortar is obtained by using an aq. soln. of a hydrated alkali aluminate in making the mortar.

**Fireproof stone.** C. Otto & Co. G. m. b. H. Ger. 589,959, Dec. 22, 1933 (Cl. 80b. 8.03). Highly fireproof

stone is made by mixing corundum dust with 10-30% of substances consisting mainly of  $\text{SiO}_2$ , such as quartzite or silver sand.

**Floor covering.** Hermann Baum. Ger. 591,409, Jan. 20, 1934 (Cl. 8b. 4). See Brit. 390,412 (C. A. 27, 5995).

**Floor- and wall-covering material.** Fritz Ebener. Ger. 591,338, Jan. 19, 1934 (Cl. 80b. 21.06). Powd. Fe contg. up to 20% of Si and small proportions of Al and Ti is mixed with concrete.

**Sound-absorbing wall.** Gustave A. New (to National Gypsum Co.). U. S. 1,946,914, Feb. 13. A wall is formed with a layer of cementitious material such as gypsum stucco together with asbestos and mineral wool, and a second layer including portland cement, mineral fiber and Al stearate.

**Ornamenting the surface of building slabs formed of plaster board, asbestos board or the like.** Lloyd V. Casto (to Oxford Varnish Corp.). U. S. 1,947,450, Feb. 20. Before the material has hardened it is subjected to pressure against a surface bearing an ornamental design which will form in the surface of the material interstices of desired contour and depth, and these are filled with different material (such as may simulate wood graining) of contrasting character to produce a uniformly flat surface. App. is described.

**Impregnating fiber board with materials such as fireproofing salts.** Alexander Winogradow. U. S. 1,945,714, Feb. 6. The board is impregnated with a soln. of a salt such as  $\text{NH}_4\text{H}_2\text{PO}_4$  and a portion of the soln. is then removed from the board, throughout its thickness, by squeezing it up to substantially its elastic limit; the board is then dried. Cf. C. A. 27, 5979.

**Wall papers from peeled wood veneers.** Heinrich A. Hellmers. U. S. 1,945,686, Feb. 6. See Brit. 388,544 (C. A. 27, 5931).

**Laminated material suitable for radio panels, furniture, etc.** Robert P. Courtney (to Bakelite Corp.). U. S. 1,946,932, Feb. 13. A cement obtained in the treatment of rubber with  $\text{H}_2\text{SO}_4$  is applied to a base material such as metal or wood and over this is superimposed a compn. contg. a reactive resinoid which is then set and bonded to the base material by heat and pressure.

**"Synthetic insulating lumber."** Orland R. Sweeney (to Iowa State College of Agriculture and Mechanic Arts). U. S. 1,946,952, Feb. 13. Corn stalks are broken up into comparatively small pieces which are commingled with water and the resulting mass is treated with  $\text{CuSO}_4$  soln., pressed and dried. U. S. 1,948,953 relates to a similar process in which, however, the  $\text{CuSO}_4$  soln. is applied to the material while still warm after pressing and drying by heat. Cf. C. A. 28, 1166<sup>8</sup>.

**Treating wood, etc.** I. G. Farbenind. A.-G. Ger. 589,649, Dec. 13, 1933 (Cl. 38b. 2.02). Addn. to 532,578 (C. A. 26, 569). The method of 532,578 for treating combustible material with solns. or suspensions of fireproofing salts in urea- $\text{CH}_2\text{O}$  condensation products, is modified by adding pigments to the soln. or suspension to produce a decorative effect.

**Impregnating wood.** Alfred Nowak. Austrian 135,829, Dec. 11, 1933 (Cl. 38d). Wood is impregnated in a known manner with a soln. of any of the usual preservatives in a volatile solvent, and the excess soln. is run off. The air in the impregnating vessel is then displaced by admitting vapor of the solvent, which may be superheated, and the vessel is then connected to a suction device, whereby the admitted vapor and residual solvent in the wood are removed together. Cf. C. A. 27, 1134.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

**Performance tests of alcohol-gasoline fuel blends.** R. B. Gray. *Ag. Eng.* 14, 185 (1933).—Octane ratings on 3 gasolines alone averaged 66.6 as compared with 74.0, 79.6 and 84.6 on blends contg. 10, 20 and 30% alc., resp. With light unloaded trucks slightly higher mileages

were obtained from straight gasoline than from the 20% blend, but the reverse was true with very heavily loaded trucks; C accumulation in the cylinder heads was greater with straight gasoline than with the alc. blends. In belt tests on a 4-cylinder tractor fitted with high-altitude

pistons, the max. horsepower increased from 80 with straight gasoline to 44.4 with a 30% alc. blend; with a 20% blend the fuel economy was better than with straight gasoline. A 2-cylinder horizontal tractor engine developed a max. horsepower of 31.7 on straight gasoline and 32.2 with a 10% blend. K. D. Jacob

Annual review of fuel technology in Japan. Fuel Soc. Japan. *J. Fuel Soc. Japan* 13, 4-36(1934)(in English 1-4).—The review includes: the coal-mining industry, the coal-cleaning industry, the coke industry and research, briquets for industrial use, synthetic gasoline, and city gas and the gasification industry. F. I. N.

The physicochemical properties of alcohol-gasoline blends. II. The influence of anhydrous ethyl alcohol concentration upon water absorption. Leo M. Christensen, R. M. Hixon and Ellis I. Fulmer. *Iowa State Coll. J. Sci.* 8, 175-9(1933); cf. *C. A.* 27, 4901.—In series I and II the EtOH content was varied from 0 to 100%. In I, atms. were kept at a relative humidity of either 50 or 100%. The temp. was kept at 0° for 12 hrs. and then at 38° for 12 hrs. Fifty cc. of each blend was put into a 100-cc. Erlenmeyer flask which was fitted with a 2-mm. tube for a vent. In II, 500 cc. of blend in a 1000-cc. Erlenmeyer flask, vented by a 2-mm. tube, was placed outdoors but protected from rainfall. In series III, tests were made on com. storage of 84,000 gal. and of 5500 gal. of 10% EtOH blend. In I, the max. absorption of water for 50% humidity was at 15% EtOH, and for 100% humidity at 8% EtOH. In II, the max. absorption was at 2% EtOH. No measurable absorption occurred within 30 days in any blend above 8% in EtOH. In III, no measurable absorption of water occurred within the time of the expts. (66 days and 13 days). III. The A. S. T. M. distillation curves and Reid vapor pressure. *Ibid.* 237-44(1934).—The data from A. S. T. M. distns. are reported in tables and graphs. The percentages of alc. by vol. are: 0, 0.5, 1.0, 2.0, 4.0, 6.0, 8.0, 10, 15, 20.0, 30.0, 40.0, 50.0, 60.0; 70.0, 80.0, 90.0 and 100. The initial temp. of distn. and the temp. for the first 10% distg. indicate that the easier starting qualities of blends are not due to higher volatility but to the fact that alc.-air mixts. are explosive over a wider range than gasoline-air mixts., and that there would be no greater loss on storage from blends than from gasoline. The lower temp. of volatilization of the first 30% explains the better acceleration, especially in cold weather. The temp. of volatilization of 60% and the last 10% do not indicate that 10% alc. should have much effect on power output of a hot motor or diln. of oil. Vapor lock is not affected by adding alc. IV. Influence of alcohol concentration upon specific volume, fluidity, air to fuel ratio, calorific value, latent heat and fall in temperature on evaporation. *Ibid.* 245-50.—When alc. and gasoline are mixed: there is a slight lowering of temp. with a max. of 2.5° at 10% alc.; the vol. increases a max. of 0.27 cc. per 100 cc. at 10% alc.; and the fluidity decreases 3.5% and the viscosity increases 2% when the mixt. contains 10% alc. The air to fuel ratio for a 10% alc. blend is 4% less than for the original gasoline and the calorific value is 3% less. Evapn. of 10% alc. blends lowers the temp. of the intake manifold approx. 33% more than gasoline. Shop and road tests show that carburetor settings should be the same for straight gasoline and 10% alc. blends. F. E. Brown

Carbonization. IV. Influence of various factors on ignition temperature, reactivities and structure of coke. 22nd Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University. A. Parker, H. Kerr and C. B. Marson. *Trans. Inst. Gas Engrs.* 78, 240-8(1928-29); 79, 50-103, 143-55 (1929-30); cf. *C. A.* 21, 3121; 23, 2015.—Size of coal carbonized had no effect on the ignition temp. of the coke. Ignition temp. decreased as the temp. of carbonization was lowered or as the volatile matter in the coke increased. Addn. of coke breeze to the coal before carbonization had no effect on the ignition temps. of the resulting cokes.  $\text{Na}_2\text{CO}_3$  lowered the ignition temps. of cokes prepd. above 800°; below 800° there was no effect.

Reactivities of cokes were not greatly influenced by size of coal particles carbonized. Cokes produced at 915° were more reactive than those made at 980°; those made at lower temps. did not exhibit any definite relationship. Addn. of coke breeze to coal before carbonization had no marked effect.  $\text{Na}_2\text{CO}_3$ ,  $\text{CaCO}_3$ , or Fe oxide increased reactivities. There seems to be no correlation of the above with coke structure. V. Temperature, size of coal, blending with inorganic compounds. 23rd Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University. H. Kerr and C. B. Marson. *Ibid.* 78, 249-51(1928-29); 79, 104-19, 143-55 (1929-30).—A highly coking Durham gas coal, graded into 3 sizes ( $1\frac{1}{4}$  in.,  $\frac{1}{2}$  in. and 8-30 mesh), was carbonized at 920° and 815°. The size of the coal had no effect on the ultimate yields of gas, coke and therns. At 920° the greatest tar yield was obtained with the largest size. The size of coal when carbonized at 920° affects the rate of gas evolution. At 920°, 8-30-mesh coal gave 12,007 cu. ft. of 597 B. t. u. gas; at 815°, 9959 cu. ft. of 649 B. t. u. gas. Final thermal yields were 71.7 and 64.6 therns at 920° and 815°, resp. The compn. of the gas and its rate of evolution were influenced greatly by the temp. of carbonization. The yields of tar, ammoniacal liquor and coke increased as the carbonization temp. was lowered. Increasing addn. of coke breeze had no marked effect on yields of gaseous therns and  $\text{NH}_3$  per ton of coal, but addn. of 30% of breeze lessened tar production, and increased rate of gas production. Effects of adding 2% of  $\text{CaCO}_3$ , Fe oxide and  $\text{Na}_2\text{CO}_3$  were studied. Only  $\text{Na}_2\text{CO}_3$  increased the amt. of gas made. Fe oxide increased tar yield.  $\text{H}_2\text{S}$  was reduced by inorg. compds.; Fe oxide was the most effective. All 3 inorg. addns. increased  $\text{NH}_3$  yield at 920° but (except  $\text{CaO}$ ) decreased it at 815°. V (continued). Supplement to the 23rd Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University. F. J. Dent, W. H. Blackburn and A. H. Kelly. *Ibid.* 79, 120-55(1929-30).—Variation in the size of Durham coal and addn. of coke breeze to the coal had no influence on the ignition temp. of the coke made therefrom. Cokes prepd. at 815° were ignited more readily (30° lower) than cokes prepd. at 920°. Addn. of 3.3%  $\text{Na}_2\text{CO}_3$  to the coal caused a pronounced lowering of the ignition temp. of the coke prepd. at both temps. Addn. of 2.2% Fe oxide or 3.4%  $\text{CaCO}_3$  lowered the ignition temp. of coal prepd. at 920° but had no influence on the 815° coke. These results are similar to those previously reached for Nottinghamshire coal. Variation in size of coal had no influence on the reactivity of coke toward  $\text{CO}_2$ . Differences between cokes prepd. at 815° and 920° and effect of addn. of coke breeze to the coal were small. Addn. of 3.3%  $\text{Na}_2\text{CO}_3$ , 2.2% Fe oxide or 3.4%  $\text{CaCO}_3$  to the coal before carbonization increased reactivity at both temps. of carbonization. Coke produced from Nottinghamshire coal is much more reactive than coke produced from Durham coal, far more than the differences produced by size of coal, temp. of carbonization or blending. The rate of carbonization of the 2 coals is very different, Nottinghamshire having 15% greater throughput than Durham coal. A. H. E.

Carbonization in semi-intermittent vertical retorts. E. L. Wallis. *Gas J.* 205, 493-6(1934).—See *C. A.* 28, 2157.

Calorific values for calculation. F. J. Matthews. *Steam Engr.* 2, 431-2(1933).—M. discusses various corrections that are applied to heating values. A. H. E.

Thermal treatment of gaseous hydrocarbons. I. Laboratory-scale operation. A. E. Dunstan, E. N. Hague and R. V. Wheeler. *Ind. Eng. Chem.* 26, 307-14 (1934).—A review of lab.-scale work on the pyrolysis and polymerization of gaseous hydrocarbons. By atm. pressure treatment at 700-900° 17-35% of the paraffins ( $\text{CH}_4$  excepted) were converted into liquids, and 30-40% of the olefins. The fraction b. below 200° contains up to 75%  $\text{C}_2\text{H}_4$ , and also PhMe, styrene, xylenes and indene. In the portion b. above 200°  $\text{C}_{10}\text{H}_8$ , anthracene and phen-

anthrene were identified. By the mild pyrolysis of propane and butane it is possible to obtain 90-100% conversion by vol. into gaseous olefins. By the polymerization of olefins at pressures between 200 and 2000 lb. and temps. from 300° to 550° up to 92% conversion to liquids has been attained. From 80 to 86% of the liquids distilled below 200°. They contain olefins and paraffins with 3-8 C atoms per mol. The presence of naphthenes is indicated. In a 30% gasoline blend this fraction was 4%, as good in antiknock value as  $C_6H_6$  on a vol. basis.

II. Semi-industrial production of aromatic hydrocarbons from natural gas in Peralta. W. H. Cadman. *Ibid.* 315-20. —The yields of  $C_6H_6$  obtained by the pyrolysis of the natural gases has been detd. under varying temps. and pressures up to 30 lb. on a semi-com. scale.  $H_2S$  was removed first from the gas by a modified Chance-Claus process. Various furnaces and retort materials, including fireclay, were tested; but certain special steels alone proved satisfactory. A degree of turbulence in the gas flow in the tubes is important. The optimum conversions of several gases to crude  $C_6H_6$  varied from 1.14 to 2.6 gal. per 1000 cu. ft. Surface combustion and submerged flame heating of the gases to be pyrolyzed have proved considerably inferior to metal tube heaters from the standpoint of both  $C_6H_6$  yield and quality. In the reaction products have been identified  $C_6H_6$ , cyclohexene, PhMe, xylenes, styrene, indene,  $C_{10}H_8$ , anthracene, phenanthrene, chrysene, butadiene and isoprene. The vol. of exit gas from the pyrolysis is normally over twice the vol. of inlet gas, and contains 20% olefins, essentially  $C_3H_6$ .

P. I. Wilson, Jr.

The recovery of hydrogen from gaseous hydrocarbons with brown-coal cokes as catalyst. R. Schmidt. *Braunkohle* 32, 889-94 (1933).—Sufficient H can be obtained from the mixt. of  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ ,  $\text{C}_3\text{H}_8$  and  $\text{C}_4\text{H}_{10}$  formed in the hydrogenation of brown-coal tar to supply the needs of the original hydrogenation. CO formed with H in the first conversion at  $1000^\circ$  with steam can be treated at  $500^\circ$  in a 2nd stage to form  $\text{CO}_2$  and more H. Coke from brown coal gives a 90% and 70% conversion for the 1st and 2nd stages, resp., at commercially satisfactory reaction rates. F. W. Jung

**Thermal decomposition of the "coal hydrocarbon."**  
H. H. Lowry. *Ind. Eng. Chem.* 26, 320-4 (1934). - Coal is not a hydrocarbon, but does contain as an essential part of the structure the 6-C ring of the aromatic hydrocarbons. This nuclear structure becomes more and more condensed through the various ranks from peat to anthracite. Condensation of the aromatic nuclei appears to be the main reaction in the solid residue during pyrolysis, and does not end until graphite is formed. The chemical nature of the condensed products depends on the severity of the thermal treatment. It is suggested that solvent extn. is the mildest type of thermal treatment, and the similarity in compn. of a  $C_{12}H_8$  ext. and a vacuum tar is pointed out (cf. *C. A.* 11, 247, 2956; 17, 3019). The simple aromatic compds. appear in low-temp. tar (cf. *C. A.* 26, 3380), and it is suggested that they are first formed between 450° and 800° by the dehydrogenation of the satd. and unsatd. hydrocarbons having the 6-C ring structure, such as were isolated from the  $C_{12}H_8$  ext. and the vacuum tar. P. J. Wilson, Jr.

**The combustion of carbon.** Martin A. Mayers. *Chem. Rev.* 14, 31-53 (1934).—A review of various exptl. letins. of the mechanism and rate of combustion of solid C by gaseous O, a discussion of previous math. analyses of the process, and a description of some exptl. measurements at low pressures. M. concludes that no complete formulation of the rates or mechanism of the combustion of C is yet possible; much more exptl. work is needed. References to the literature are given. Louise Kelley

Some results of the Fuel Research Coal Survey. F. S. Innatt. *Gas World* 100, No. 2587, Coking Sect., 27-30 (1934).—The extent of the survey of the seams of Great Britain, sampling and analytical methods, and the significance of the results are discussed, including volatile matter, carbonates and Cl in the coal, fusion temps. and mpn. of ash, and swelling properties of the coals. High-

1 and low-temp. coking tests are also summarised

**P. J. Wilson, Jr.**

$\mu$ -Coal. IV. Alterations of the carbonizing characteristics of bituminous coals. Kurt Peters and Werner Cramer. *Brennstoff-Chem.* 14, 445-50(1933); cf. C. A. 27, 3799.—Reproducible values for degree of swelling by the method of Lambris (cf. C. A. 25, 4105) were obtained only with  $\mu$ -size coal. With vitrain, greater swelling was obtained generally with  $\mu$ -coal than with larger sizes. The addn. of  $\mu$ -size durain to a high-volatile la. coal decreased the swelling more than did addn. of larger coal, indicating the use of  $\mu$ -grinding for reduction of sizes, not in banded coals. The swelling of mixts. of swelling la. durain was always less than that calcd. for vitrain alone. Similar results were obtained with mixts. of the mixts.; and 10% and non-oxidized coals. Decrease in oxidized (at 1, increasing oxidation is shown graphically. swelling with 10% could not be restored to oxidized. Swelling and cat. thresholds extd. bitumens. Bitumen and coals by adding it a sextns. with  $C_6H_6$  both at 80° and residual coal from the bed identically in carbonization under pressure behaved identically the hydrogenation of a low-Pseudobitumen, prep'd. extd. coal, conferred carbonizing volatile coal, added to it was given by addn. of normal properties identical to the also, hydrogenated, acquired bitumen. Low-volatile coal w/ high-volatile coals. With the carbonizing properties of (anal. the extrn. residue also extensively hydrogenated cogenatraphy. P. W. Jung yielded a caked coke. Bibliog. theory comprising the

Coal and coal bitumens. Auct. D. J. W. Kreulen  
present knowledge on this subject. 79. The product obtained  
*Chem. Weekblad* 31, 104-7 (1934). 1. Consisting of an oily  
from coal by extn. is an organosol. 4. (solvent phase). A very  
phase and a disperse phase (mic. 6. the protective bodies  
intimate connection exists between rad. 8. consists of humic  
of the micelle and its nucleus, which cannot be carried  
substances. It is probable that a certain liket. of the protective  
out quantitatively. The properties base. 10. surface tension. The  
bodies mask those of the nucleus very perim. can be explained  
extn. liquid must possess a high surf. 12. which follows from  
behavior of various types of coal on extn. 14. E. Schotte  
on the basis of the constitution scheme 16. Orlam  
the theory. 18. J. A. J. Pieters

New views in coal chemistry. IV. In the softening and H. Koopmans. *Het Gas* 53, 538 (1933).—A study was made of the process of coal by means of a novel apparatus, measuring the resistance offered by the coal to the horizontal movement of a vertical needle. Ten g. of coal pulverized to 0.1 mm. is pressed (2500 kg. per sq. cm.) in a cylindrical Fe crucible and heated in a stream of CO. The crucible is rotated at 3° per min., the temp. being measured by a thermocouple. A needle attached to a drum, concentric with the crucible and provided with a spiral spring, is inserted into the mass in an opening provided for it near the top of the crucible. The resistance to movement of the needle is plotted; the coal is read from the angle of revolution of the drum required to overcome this resistance; the temp. is read against temp. Softening and solidification are determined as well as softness of the plastic mass is found from the curves. Good coking coals have a long range, softening at low fluidity; increased coalification shortens the range. More rapid heating (from 1° to 3° per min. or more) widens the range. Oxidized coal has a short range. The range of softening mixts. lies between those of the compal softening. The presence of structural plant residues in the coal lowers the fluidity; the range remains the same. The pressure of the coal shifts the curves to the left and decreases the swelling. Furthermore the rate of coal of various volatile contents was determined (under sand) of coal pieces at a heating rate of 1 min. up to 860°; 6 types of coal were studied. High gas content gave strongly porous cokes; low gas content gave less porous cokes; coal gas of low gas content gave dense cokes; the content of volatile matter in the coke was insignificant (from 9.5 to 17.5%). The influence of structural matter on the swelling of the vitrinite was studied during softening. The softening of coal was studied during softening. The softening of coal was studied during softening.



unless this matter exceeds 38% in which case the swelling is decreased; the effect on the coke strength is probably more noticeable. As compared with the important effect of the degree of coalification on the coke quality the difference in coke from "dull" and "bright" coals is inconsiderable. The latter difference does, however, appear in rapid heating tests, e. g., in the volatile-matter detn. dull coal will give a little sintered cake, bright coal a swollen coke button. B. J. C. van der Hoeven

**Classification of coals of the United States according to fixed carbon and B. t. u.** W. A. Selvig, W. H. Ode and A. C. Fieldner. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 527*, 11 pp. (1934).—The following classification is proposed: I anthracite—metaanthracite, 98% or more dry fixed carbon (F. C.); normal anthracite, dry F. C. 92-98%; semianthracite, dry F. C. 86-92%; II bituminous—low volatile, dry F. C. 77-86%; medium volatile 69-77% dry F. C.; high volatile A, dry F. C. <69% and moist B. t. u. 14,000 or more; high volatile B, moist B. t. u. 13,000-14,000; high volatile C, 11,000-13,000 moist B. t. u., either agglutinating or nonweathering; III sub-bituminous—sub-bituminous A, moist B. t. u. 11,000-13,000, weathering and nonagglutinating; sub-bituminous B, moist B. t. u. 9500-11,000; sub-bituminous C, moist B. t. u. 8300-9500; IV lignitic—lignite, moist B. t. u. <8300, consolidated; brown coal, moist B. t. u. <8300, unconsolidated. Supporting data for division points are given. Alden H. Emery

**Anthracite and coke-analysis survey conducted at the Fuel Research Laboratories.** B. F. Haanel and R. E. Gilmore. *Can. Dept. Mines, Mines Branch, Rept. 737-5*, 13 pp. (1933).—Analyses are given of 64 anthracites (Pa., Welsh, Scotch and Westphalian) and 22 cokes. Alden H. Emery

**Effect of oven humidity on accelerated weathering tests of coal.** E. Stansfield and K. C. Gilbert. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 543*, 8 pp. (1934).—An oven for drying coal at controlled humidity (salt solns.) is described. At 30°, K acetate gave 20% humidity, MgCl<sub>2</sub> 32%, Ca(NO<sub>3</sub>)<sub>2</sub> 45%, NH<sub>4</sub>NO<sub>3</sub> 60% and NaCl 75%. Slacking indexes of 7 coals were detd. at these humidities. Humidity control is not essential for high-rank, coking, bituminous coals. For lower-rank slacking coals, reduction of humidity from 40 to 20% on the av. doubles the slacking index, indicating the necessity for humidity control in the detn. of this index. Alden H. Emery

**Gas-value number of coal and gas yield in gas-works practice.** Wilhelm Filtz. *Brennstoff-Chem.* 14, 461-3 (1933).—Use of the formula of Steding (*C. A.* 27, 2016) is demonstrated. Calcd. mixed gas (distn. gas + water gas) yields and total heat values, from coal carbonized and then treated with steam, both plotted against max. heating values of distn. gas for dry coals of different gas values, show increased total heating value of mixed gas so obtained. Necessary admixt. of waste gas or air to obtain gas of desired heating value from a coal of abnormal gas value can also be calcd. F. W. Jung

**The coal-cleaning plant at Michel, B. C.** Paul P. Grundy. *Trans. Can. Inst. Mining Met.* 1934 (in *Can. Mining Met. Bull.* No. 262) 58-77.—G. describes the coal-cleaning plant at Michel, B. C., and gives analyses and float and sink data on coal of various sizes. Alden H. Emery

**Pulverized coal and colloidal fuel.** H. D. Tollemache. *Proc. S. Wales Inst. Engrs.* 49, 345-6, 359-66 (1933); cf. *C. A.* 27, 5171.—Discussion. Alden H. Emery

**Coal hydrogenation.** Calvert C. Wright. *Mineral Industries, Penna. State Coll.* 3, No. 5, 1-2 (1934).—A review. Alden H. Emery

**High-temperature carbonizing properties of coal.** A. C. Fieldner, J. D. Davis, D. A. Reynolds and C. R. Holmes. *Ind. Eng. Chem.* 26, 300-3 (1934).—Representative samples of bright and splint coal and a sample contg. 40% splint and 60% bright coal from the Elkhorn bed were carbonized at 900° in the Bur. of Mines carbonizing app. The yield of coke from the splint coal is slightly higher than from the bright. The former is

more resistant in the shatter and tumbler tests, and the softening temp. of the ash is 450° higher. The yield and quality of the gas from the 2 coals are nearly the same. The bright coal yielded more tar than the splint coal, and it was more phenolic and less benzenoid in character. P. J. Wilson, Jr.

**Oxygen absorption and aging of coals at ordinary temperatures and the chemistry of the sorption of oxygen.** Karl Bunte and Horst Brückner. *Angew. Chem.* 47, 84-6 (1934).—A simple method is presented for detg. the relative O<sub>2</sub>-absorption capacity of coals at ordinary temps. It is based upon measuring the progressive decrease of air pressure in a closed system and the analysis of the remaining gas. In a period of 24 hrs. it was observed that 20 g. of various coals (4900-mesh sieve) absorbed 0.5-21 cc. of O<sub>2</sub>, and in 2 months 17-112 cc. O<sub>2</sub>. The influence of aging of these coals upon softening point, caking index and gas evolution was detd. It was found that the gas yield decreased as the O<sub>2</sub> absorption increased. The O<sub>2</sub> absorption is at least partially a chemisorption, where a C peroxide is formed which, in presence of H<sub>2</sub>O, is split off as oxalic acid. Sixteen references. Karl Kammermeyer

**Rapid method for the determination of the hygroscopic point and the hygroscopic properties of brown coal.** Helmut Krainer. *Braunkohle* 32, 937-41 (1933).—Two graphical methods of detg. the hygroscopic point  $\phi$  from the loss or gain in moisture of a series of coals of different moisture contents placed in a satd. atm. at const. temp. are given with examples. F. W. Jung

**Carbureting test in a retort generator of the Yokohama type.** R. Kada and K. Takahisa. *J. Fuel Soc. Japan* 13, 36-52 (1934) (in English 5-7).—Two tests were carried out: lab. and the full scale with the following conclusions: The gas can be fully carbureted by atomizing oil directly at the gasification zone. It is not necessary to instal a costly carburetor. About 30 l. of heavy oil was supplied per hr. and about 60% of the total heat of oil was gasified; gas increased its calorific value by about 200 cal. per cu. m. Light oil has an advantage as a carbureting oil, but heavy oil may be used since it is far lower in price. F. I. Nakamura

**Heat transmission, with particular reference to modern methods of expressing convection data.** Margaret Fishenden. *Trans. Inst. Gas Engrs.* 79, 578-609 (1929-30).—See *C. A.* 25, 1909. Alden H. Emery

**The determination of volatile sulfur in flue dust.** F. Roll. *Brennstoff-Chem.* 14, 468 (1933).—Ashing should be carried out under conditions similar to actual combustion, i. e., in air and at 950°. Results by a no. of different standard methods are compared. F. W. J.

**Natural gas in Australia and New Guinea.** W. G. Woolnough. *Bull. Am. Assoc. Petroleum Geol.* 18, 226-42 (1934).—About 40 analyses of natural gases in Australia and New Guinea are given. In the Great Artesian basin are 2 types of gas: (1) inflammable hydrocarbon and (2) noninflammable N<sub>2</sub>. CO<sub>2</sub> gases are found in New South Wales and Victoria. Alden H. Emery

**Construction of complete new gas works at Oxford, with costs and working results over eighteen months.** W. Eames Caton. *Trans. Inst. Gas Engrs.* 78, 88-127 (1928-29).—The Oxford gas works are described. The av. coal carbonized per setting per day is 12,056 tons, av. calorific value of gas 485 B. t. u., coke and breeze per ton of coal carbonized 14.00 cwt., tar per ton of coal 11.3 gal., gas per ton of coal 15,396 cu. ft. or 74.66 therms. Costs for different steps are given. Alden H. Emery

**Advances in the technology of natural and refinery gases.** Geo. A. Burrell and Nelson C. Turner. *Penna. State Coll., Min. Ind. Expt. Sta., Bull.* 12, 29-56 (1933).—B. and T. discuss compn. of natural gas, removal of H<sub>2</sub>S (Fe<sub>2</sub>O<sub>3</sub>, lime, Girdler, Seaboard and Koppers hot activation processes), gas transmission, removal of H<sub>2</sub>O, satn. of gas, natural gasoline plants, liquefied gas, efficiency in usc, C black and gas cracking. A. H. E.

**A new recording gas calorimeter.** W. Masterton. *Gas World* 100, 194-6 (1934).—A description of the

Masterton calorimeter, designed on the principles formulated by Boys (C. A. 16, 2772). Also in *Gas J.* 205, 626-8(1934).

Gas dehydration. E. W. Smith. *Trans. Inst. Gas Engrs.* 79, 610-58(1929-30).—See C. A. 24, 4376, 4917; 25, 1970.

Pyrolysis of gas. N. A. Butkov and E. I. Rabinovich. *Nefyanos Khosyaisivo* 25, 88-92(1933).—Gases obtained on vapor-phase cracking of petroleum have the following compn.: butylenes 4.0, propylenes 12.0, ethylene 16,  $H_2$  14, methane and ethane 50%. The calorific values of these gases amount to 11,000-11,500 cal. and since they are high in heavier unsatd. compds. they are unsuitable for city gas because of the formation of condensation products. This gas was re-cracked in a special lab. app. (described in the original paper) consisting of a retort charged with refractory fillers heated to 800-900°, the pressure being maintained at 3-40 mm. Hg. The cracked product was passed through a hydraulic seal charged with white oil, an air and water cooler, 2 wash bottles charged with oil and 2 charcoal adsorbers. The gas obtained had a sp. gr. of 0.367-0.379, calorific value of 5306-5412 cal.; it contained higher olefins 0.0-0.7, ethylene 0.1-0.4,  $CO_2$  0.0-0.2,  $O_2$  0.0-0.2, CO 1.3-1.7,  $H_2$  48.2-62.3 and  $C_2H_{2n+2} + N_2$  36.1-48.8%. The tar obtained as a result of pyrolysis had a sp. gr. of 1.024. In expts. carried out in porcelain tubes of various diams. a gas of 9464-9926 cal. was obtained. A prolonged exposure to high temps. caused a polymerizing effect, while a short exposure produced a lowering of unsatd. compds. such as amylenes, butylenes and propylene and a slight increase in ethylene. The condensate contained up to 8% of crude  $C_6H_6$  and 1%  $C_6H_5CH_3$  in addn. to a light oil with a final b. p. of 175°.

A. A. Bochtlingk

Progress summary on production of substitute gas. Geo. Wehrle, A. C. Rathkey and Alfred Johnson, et al. *Western Gas* 9, No. 12, 14-15, 34(1933).—The conversion of water-gas sets into those for mfg. substitute gas of high calorific value is discussed. Fundamentally the process is similar to carbureted water-gas operation with the coke or coal fuel bed replaced by a refractory screen; oil is sprayed into the top of the generator and is cracked on the latter, where C is deposited as lamp black. Steam is admitted to form blue gas. This and the oil gas together have a calorific power of about 500 B. t. u., and enrichment is carried out to 1000 B. t. u. or more. From 3 to 4 hrs. are required to heat the set to proper operating temps. of 870-980° in the generator and 760-820° in the carburetor and superheater. Practice at Denver, Mason City (Iowa), Chicago, Los Angeles and San Diego is outlined. Conclusions: The problem of making substitute gas has a wide selection of processes available, but the information regarding them is very limited.

A. W. Furbank

Analysis of coke-oven gas. P. K. Sakmin. *Z. anal. Chem.* 96, 104-8(1934); cf. C. A. 28, 809°.—The results of considerable experience are given with respect to suitable app., suitable reagents and manipulation for detg.  $CO_2$ , olefins,  $O_2$ , CO,  $H_2S$ , H,  $CH_4$ ,  $C_2H_6$  and  $N_2$ .

W. T. H.

Nitrogen oxides in coke-oven gas. Literature review. Fritz Schuster. *Brennstoff-Chem.* 14, 469-70(1933).—Occurrence, concn., origin, analytical detn., practical importance and removal are covered briefly. F. W. J.

Memorandum on the use of creosote in the manufacture of carbureted water gas. 24th Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University. F. J. Dent. *Trans. Inst. Gas Engrs.* 79, 197-220(1929-30).—See C. A. 24, 711; 25, 2548; 26, 3901.

Alden H. Emery

Examination of products of combustion from typical gas appliances. IV. 21st Report of the Joint Research Committee of the Institution of Gas Engineers and Leeds University. J. James W. Wood and Gilbert H. Howarth. *Trans. Inst. Gas Engrs.* 78, 230 9(1928-29); 79, 7 49(1929-30); cf. C. A. 26, 3901. —C() production from

No. 1 geyser burners at several gas rates and variable flame lengths was 417 to <1 part per 10,000 of gas burned. CO can be kept low by restricting gas rate, but for a given CO production, the permissible gas rate increases with the length of flue pipe. No. 2 burners gave greatly improved results. Similar data are given for a surface combustion griller, a domestic griller and a boiling burner.

Alden H. Emery

Investigations on a gas producer [equipped] with a steam jacket. Wilhelm Horak. *Z. österr. Ver. Gas-Wasserfack* 73, 170-81, 194-203(1933).—The extent of chem. reaction and the temp. distribution in successive zones above the slag layer in the coke charge of a gas producer were investigated. The temp. reaches its max. in the zone immediately above the slag layer. In this zone the exothermic reactions (reactions of  $O_2$  with C) take place most extensively. In succeeding zones endothermic reactions (water-gas reaction, and reactions of  $H_2O$  with C) become more prominent and the temp. decreases. Chem. equil. (water-gas and  $CO-CO_2$ ) is reached only near the top of the charge (about 80 cm. above the slag layer). The slag layer is effective in pre-heating the blast gas and in distributing it uniformly over the generator area. The heat taken from the generator by the steam jacket is so small that it does not influence the gas making. Its effect is further minimized by the good distribution of blast through the generator.

Channing Wilson

Liquid purification of coal gas by means of ammonia. 2nd Report of the Ammonia Subcommittee. E. W. Smith. *Trans. Inst. Gas Engrs.* 79, 284-90, 305-31(1929-30).—See C. A. 24, 2271.

Alden H. Emery

The Burkholder [gas] purification process. 2nd Report of the Ammonia Subcommittee. Philip G. G. Moon. *Trans. Inst. Gas Engrs.* 79, 294-334(1929-30).—See C. A. 24, 3882.

Alden H. Emery

Notes on purification [of coal gas from hydrogen sulfide]. Geo. C. Pearson. *Trans. Inst. Gas Engrs.* 78, 274-98(1928-29).—See C. A. 24, 2271.

Alden H. Emery

Benzene washing of coal gas from horizontal retorts. H. G. Davison. *Gas World* 100, 197-8(1934).—In the benzene-recovery plant at Chester 2.03 gal. of benzene is recovered per ton of coal carbonized by circulating 200 gal. of gas oil per hr. One hundred and twenty tons of coal is coked per day. Also in *Gas J.* 205, 625-6(1934).

P. J. Wilson, Jr.

Benzene recovery, with particular reference to gas-works practice. W. H. Hoffert and G. Claxton. *Trans. Inst. Gas Engrs.* 79, 726-5b(1929-30).—See C. A. 24, 4375, 4918.

Alden H. Emery

The recovery of benzene by active carbon. H. Hollings and S. Hay. *Gas World* 100, 189-93(1934); *Chemistry and Industry* 1934, 143-55.—A description of the cyclic process developed at Beckton. The  $C_6H_6$  is first adsorbed from the gas by the active C in an adsorber, from which the heat of adsorption is removed by  $H_2O$  in coils. When observation of a flat flame burner shows that  $C_6H_6$  is not all adsorbed, the adsorber is replaced with a freshly steamed one. The spent adsorber is regenerated with both direct and indirect steam for 30-40 min. The regenerated C at 120° is now cooled rapidly by turning fresh gas through. The temp. of the adsorber should be maintained as low as possible, but not below the gas temp. in order to prevent condensation. The  $H_2O$  in the C at the end of the steaming period should be between 15 and 20% in order to ext. sufficient heat to prevent gum formation, the cause of deterioration of the C. Present annual production is 3,000,000 gal. of  $C_6H_6$ , corresponding to 3.1 gal. per ton of coal coked in horizontal retorts and coke ovens. The extn. efficiency is usually over 92%. The av. overall steam consumption has been 36.6 lb. per gal. and the av. rate of C replacement 7.1 lb. per 1000 lb. of  $C_6H_6$ . Practically all the thiophene and  $CS_2$  are removed from the gas, and for a 6 months' period the S in the gas through the plant was reduced from 30.5 to 6.1 g. Only gas free from  $H_2S$  and  $C_2H_2$  and associated unsatd. hydrocarbons is treated. P. J. Wilson, Jr.

The recovery of ammonia in gas manufacture. Indirect, direct and semi-direct processes. 2nd Report of the Ammonia Subcommittee. A. Parker. *Trans. Inst. Gas Engrs.* 79, 260-83, 305-34(1929-30).—See C. A. 24, 2371, 3629.

Economies in the recovery of ammonia by the indirect process. 1st Report of the Ammonia Subcommittee. H. Hollings and S. Pexton. *Trans. Inst. Gas Engrs.* 78, 266-8(1928-29); 79, 254-67, 305-34(1929-30).—See C. A. 24, 1958.

The zinc process for the extraction of ammonia and hydrogen sulfide from gas. 2nd Report of the Ammonia Subcommittee. J. W. Cobb. *Trans. Inst. Gas Engrs.* 79, 291-3, 305-34(1929-30).—See C. A. 24, 3883.

Report on a visit to Germany to inspect the methods adopted for the recovery of phenols from ammonia liquors and kindred subjects. Allan C. Monkhouse. *Trans. Inst. Gas Engrs.* 79, 409-21(1929-30).—Four German plants recovering phenol from  $\text{NH}_3$  liquors by solvents are described. Advantages of the benzene and of the soda method are given. Remarks are made on bacterial purification, recovery of benzene from dephenolated liquor, and electrostatic tar pptn.

Memorandum on processes for the removal of phenol from ammoniacal liquor and effluent spent liquors. A. Parker. *Trans. Inst. Gas Engrs.* 79, 375-408(1929-30).—Phenol recovery is by 4 types of processes: (1) by solvents such as benzene, trichloroethylene, etc., (2) by solid absorbents, e.g., activated C, (3) by volatilization, and (4) extn. from crude coal gas at temps. above the dew point of the gas before liquor condenses. Plants of type (1) in America and Germany are described with operating data and costs, and published data on (2), (3) and (4) are summarized.

The disposal of liquor effluents from gas works. 3rd Report of the Liquor Effluents Subcommittee. A. C. Monkhouse and W. Etheridge. *Trans. Inst. Gas Engrs.* 78, 250-65(1928-29); 79, 335-73, 428-36(1929-30); cf. C. A. 23, 2018; 25, 2547, 4384.—The vol. of tar deposited in the retort house is increased and the higher tar acids in the liquor are decreased by using a restricted gas main in which a finely divided spray of liquor under pressure impinges on the gas stream. Condensation of liquor with the tar was minimized (and hence soln. of higher tar acids from the tar by the liquor) by lagging the extractor and heating the circulating liquor with a closed steam coil. Electrostatic pptn. was highly efficient as a tar extractor, reducing the higher tar acids in the liquor to a comparatively small amt., but total  $\text{O}_2$  absorption and content of monohydric phenol were increased. The precipitators recovered 91.5% of the total tar condensed up to the exhaust (16.1 gal. per ton of coal) and contg. only 14% of liquor.  $\text{C}_6\text{H}_5\text{OH}$  in the liquor increased from 0.403 to 0.721 g. per 100 cc. because of tar previously acting as a partial solvent of the phenol when condensed with the liquor; shaking the liquor with retort house tar reduced  $\text{C}_6\text{H}_5\text{OH}$  to 0.378 g. per 100 cc., while higher tar acids increased from 20 to 137 g. of  $\text{O}_2$  absorbed per 100,000 cc. Cost of electrostatic pptn. was 0.15 d. per 1000 cu. ft. of gas. The lower  $\text{O}_2$  content of the crude gas caused a diminution in the quantities of thiosulfate and thiocyanate in the condensed liquors.

Composition of high-temperature coal tar. V. S. Vasserman. *Coke and Chem.* (U. S. S. R.) 1932, No. 10, 55-8.—Coal tar was analyzed to det. the constituents as present in the original form. To accomplish this no distn. was made as this results in decompn. of the original substances. The coal sample was dissolved in benzene, phenols and acids were sep'd. from the benzene soln. by treatment with 4 N NaOH soln. and the bases by 2 N  $\text{H}_2\text{SO}_4$  soln. Ketones and aldehydes were sep'd. with  $\text{H}_2\text{K}_2(\text{CN})_2$ . The results of the analysis obtained are: (in percentage compn.) insol. sediment 12.1, phenols and acids 0.41; bases sol. in  $\text{HCl}$  3.1; amphoteric bases 0.29; ppt. formed by  $\text{H}_2\text{SO}_4$  treatment (probably insol. salts of bases) 13.3; aldehydes and ketones 5.28; neutral compd.

(hydrocarbons) 65.69. The nature of insol. sediment and that of the ppt. were not definitely det'd. James Sorrel

The heavy fractions of "Donbas" coal tar and study of their purification. N. Narushkin and V. Patz. *Coke and Chem.* (U. S. S. R.) 1932, No. 9, 40-62. J. S.

The analysis of mixtures of bituminous coal tar and asphalt bitumen. H. Mallison. *Asphalt Teer Strassenbautech.* 33, 845(1933).

The law of temperature dependence with tars. W. Eymann. *Asphalt Teer Strassenbautech.* 33, 751-4(1933); cf. C. A. 27, 5926, 5939 and *Verkehrstechnik* No. 16(1932). Time-temp. relationships of the viscosities of tars and fractions are discussed from a theoretical standpoint.

The hydrogenation of brown coal tar by the Klever process (formerly D. R. P. 301,773, 1923). Seidenschneur. *Braunkohle* 32, 853-6, 872-8(1933).—The use of a Mo catalyst yields 70% S-free benzene in the reaction products, without pitch or fuel-oil formation. Pure, hard paraffin may be recovered from the cleared tar. The filtrate, after removal of the soft paraffin, has lubrication value. Practical details are given.

Practical experiences with the micron determination in tars according to the experiments of Nellensteyn. J. Oberbach. *Asphalt Teer Strassenbautech.* 33, 814-16(1933); cf. *Ibid.* 31, 957(1931); C. A. 27, 5939.—A tar is entirely suited for road-building purposes even though contg. <14 million microns per cu. mm. but it must meet the other usual specifications.

Two interesting coke-oven tars of the Urals and Siberia. Karl Frey. *Asphalt Teer Strassenbautech.* 33, 839-41(1933).—Complete analytical data are given for 2 oppositely different tars from similar ovens. Various fractions, particularly the wash oil, are exam'd. as to compn.

The functions of coke ovens. Edward G. Stewart. *Trans. Inst. Gas Engrs.* 79, 660-705(1929-30).—See C. A. 25, 1972.

Factors influencing the reactivity of coke. Gas Research Fellowship Report 1929. F. J. Dent and J. W. Cobb. *Trans. Inst. Gas Engrs.* 78, 252-5(1928-29); 79, 156-96(1929-30).—See C. A. 23, 4048. A. H. E.

Dependence of the properties of coke upon the conditions of preparation. IV. W. J. Müller and E. Jandl. *Brennstoff-Chem.* 14, 441-4(1933); cf. C. A. 28, 881'.—New app. for detg. the "combustibility" (reactivity) of coke by the interferometer measurement of  $\text{CO}_2$  has been developed from older methods. The  $\text{CO}_2$  content of the exhaust air, det'd. at  $\frac{1}{2}$ -min. intervals, is plotted against time; the max. content of  $\text{CO}_2$  is used as an index. An air-passage rate of 20 l./hr., 0.5 cc. finely pulverized coke and a test temp. of 550° showed the greatest differences between the cokes and charcoals tested. With this method, 2 series of cokes, carbonized slowly and rapidly, at temps. of 700-1300°, and degasified for 1-16 hrs., are compared graphically as previously described. The differences caused by slow and rapid heating are small but vary with carbonizing temp.

Colored bitumen fabrications (Platzmann) 20. Relative fuel economics of electricity, gas, oil and solid fuel as heating agents (Barker) 4. Geology of sapromyxite coals in the Barzass River basin (Karavaev, Dorofeev) 8. Petrographic character of the Barzass coals (Karavaev, Ergolskaya) 8. Correction of heat-value calcns. in bomb-calorimeter tests (Edenholm, Widell) 2. Water from coke chem. plants (Kotliarov) 14. Surface flaking of vertical retorts (Dale, Hackney) 19. After-expansion and true sp. gr. of silica refractories for carbonizing plant (Dale, et al.) 19. Filtering out finely divided impurities from tars, etc. (U. S. pat. 1,945,583) 22. Coking heavy petroleum residues (U. S. pat. 1,944,872) 22. Light hydrocarbon oils by distn. of solid materials such as coal (U. S. pat. 1,945,530) 22. Pigments from exhausted gas-purifying masses (Hung. pat. 107,461) 26. Binding material [pitch] for use in making C electrodes (U. S. pat. 1,946,446) 4.

Vermeidung von Gefahren bei Kohlenstaubanlagen. 2nd ed. Issued and edited by Arbeitsausschuss Feuerungstechnik beim Reichskohlenrat. Berlin: Beuth-Verlag. M. 0.25.

Solidified fuel from liquid hydrocarbons. Petro-Sol Corp. Brit. 401,357, Nov. 13, 1933. See U. S. 1,880,211 (C. A. 27, 589-90).

Combustion of pulverized fuel in furnaces. Jay G. Coutant. U. S. 1,947,460, Feb. 20. Various structural and operative details are described.

Distilling oleaginous vegetable materials. Physical Chemistry Research Co. Fr. 756,544, Dec. 11, 1933. Oil-contg. vegetable materials are distd. in the presence of a fatty acid (other than HCOOH), preferably as an alkali or alk. earth metal salt thereof, and a catalyst (metal oxides mixed or not with metals) to obtain hydrocarbons suitable for use as motor fuel.

Motor fuel. Fuel Development Corp. Ger. 591,204, Jan. 19, 1934 (Cl. 23b. 4.01). See U. S. 1,848,063 (C. A. 26, 2585).

Motor benzene. Thomas H. Rogers and Vanderveer Voorhees (to The Standard Oil Co.). Can. 339,267, Feb. 6, 1934. Products derived by the destructive distn. of bituminous materials are prevented from deterioration and developing gums by incorporating therein a small proportion of phenyl- $\alpha$ -naphthylamine.

Motor benzene. Thomas H. Rogers and Vanderveer Voorhees (to The Standard Oil Co.). Can. 339,268, Feb. 6, 1934. Gum formation and deterioration of a benzene distillate are inhibited by incorporating a small proportion of a benzylaminophenol. Cf. C. A. 27, 1159.

Motor benzene. Thomas H. Rogers and Vanderveer Voorhees (to The Standard Oil Co.). Can. 339,269, Feb. 6, 1934. A small proportion of an inhibiting org. reducing agent contg. an aromatic polyamine radical is incorporated in benzene distillates that have been partially refined with H<sub>2</sub>SO<sub>4</sub> to inhibit gum formation, discoloration and bad odors.

Filters for liquid fuel. L'Accessoire de Précision. Brit. 400,443, Oct. 26, 1933.

Filters suitable for the treatment of liquid fuel for internal-combustion engines. Robert Bosch A.-G. Brit. 400,080, Oct. 19, 1933.

Filter used in a liquid-pumping system, e. g., in an internal-combustion engine. Robert Bosch A.-G. Brit. 401,211, Nov. 9, 1933.

Steam superheaters. Percy St. G. Kirke. Brit. 400,252, Oct. 23, 1933.

Steam superheaters. The Superheater Co. Ltd. and Charles Adamson. Brit. 400,703, Nov. 2, 1933.

Fuel briquets. Dezső Fekete. Hung. 106,725, Aug. 1, 1933. Briquets made as usual are treated with sulfite cellulose lye and dried at 250-350° or sprayed with 15% water glass. Solidity increases, and the briquets do not crumble.

Fuel briquets. Ottó Fehér. Hung. 107,171, Sept. 1, 1933. Coke or semicoke powder is mixed with binding material and black or brown coal of grain sizes smaller than 0.5-0.8 mm. but larger than colloidal size. The mixt. is pressed cold or warm.

Coke briquets. János Széki. Hung. 106,935, Aug. 1, 1933. Disintegrated or powd. coke is mixed with tar (ignited or slaked lime also may be added), pressed to briquets and distd. at not over 800° in a current of a washing and hydrogenating gas contg. CO with a partial pressure lower than 1 atm. and steam.

Lignite-coke briquets. Reinhold Ahrendt and Martha Gassel née Wienrich. Ger. 589,896, Dec. 19, 1933 (Cl. 10b. 1).

Coke briquets from brown coal. Konrad Nowak. Ger. 589,895, Dec. 18, 1933 (Cl. 10a. 36.02). Addn. to 488,500 (C. A. 24, 2586). Brown coal contg. less than 8% of water and of a granule size not exceeding 2 mm. is briquetted and coked.

Briquetting brown coal. Fritz Seidenvenhnr and Hermann Pape. Ger. 591,205, Jan. 18, 1934 (Cl. 80a.

25.05). In making egg briquets from moist brown coal, the briquetting molds are coated with powd. clay, chalk or like material.

Briquetting wood charcoal. Clementine Polich. Austrian 135,877, Dec. 11, 1933 (Cl. 10c). Comminuted wood charcoal is mixed with an easily resinifiable tar oil or tar, and the mixt. is briquetted without compression. The briquets are then hardened by heating to 70-200° in a current of air, and may be finally heated to 500-1000° in an inert atm. and cooled in a gas contg. hydrocarbons.

Distillation of lumpy fuels with preservation of their original form. János Széki. Hung. 107,073, Aug. 15, 1933. Mech. details are given.

Retort for distilling bituminous and other fuels. I. G. Farbenind. A.-G. (Ferdinand Lampe, inventor). Ger. 589,818, Dec. 14, 1933 (Cl. 10a. 26.01).

Drying fuels prior to carbonization. Metallges. A.-G. (Otto Hubmann, inventor). Ger. 590,709, Jan. 9, 1934 (Cl. 10a. 36.02). Addn. to 544,192 (C. A. 26, 2579). The fuel is dried until it contains 30-40% of water, and is then briquetted and dried still further. The coarser granules may be sepd. after the first drying step and briquetted separately.

Low-temperature carbonizing plant for solid fuel. British Carbonised Fuels Ltd. and Harold Pearson Hud Fr. 756,961, Dec. 18, 1933.

Catalysts suitable for use in destructive hydrogenation of carbonaceous materials. Mathias Pier and Karl Winkler (to Standard-I. G. Co.). U. S. 1,946,108, Feb. 6. For the production of a catalyst of high mech. stability, a small amt. of Al powder is incorporated with an aq. paste of molybdic acid and ZnO, the mixt. is kneaded (without permitting the temp. to rise above about 50°) and the mixt. is gradually dried. U. S. 1,946,109 relates to the production of S-immune catalysts by mixing Fe, Ni or Co or their alloys or carbides with a paste such as may be formed of molybdic acid, ZnO and MgO and gradually drying the resulting mixt. Cf. C. A. 28, 611<sup>a</sup>.

Destructive hydrogenation of coal, tars, mineral oils, etc. N. V. de Bataafsche Petroleum Maatschappij. Ger. 591,099, Jan. 16, 1934 (Cl. 12a. 1.05). The process is effected in 2 or more stages with the use of Mo or a Mo compd. as the catalyst in the 1st stage, and I or a compd. of I as the catalyst in the 2nd or subsequent stages. Volatile products are sepd. after each stage. Cf. C. A. 28, 292<sup>a</sup>.

Hydrogenation of coal, etc. Mitsui Kōzan K. K. (Kōzō Ikawa and Sōji Kōno, inventors). Japan. 100,484, Apr. 10, 1933. In hydrogenation of coal or the like under high pressure, P compds. or compounds which liberate P compds. not contg. elements of the O and S groups are used as catalysts. Inorg. or org. phosphines or phosphonium compds. are especially recommended. By the use of these compds., the decompn. temp. is lowered. The formation of CH<sub>4</sub> and free C is decreased. The product is rich in the gasoline fraction. The amt. of the catalyst is about 1% of the coal used.

Hydrocarbons from coal. Kyūhei Kobayashi. Japan 99,665, Feb. 21, 1933. A mixt. of coal (fine granules), Japanese acid clay (ordinary or activated) and iron scraps is subjected to dry distn. at below 550°. The amt. of the oil produced from 1 ton of coal is about 20-35 gallons and about 65% of the oil b. 200°. As by-products coke and absorbent clay are obtained.

Hydrocarbons from coal or other carbon compounds. The Head of the Tokyo Kōgyō Sūikenjō (Ichitarō Kitawaki and Tamekichi Suzuki, inventors). Japan. 99,732, Feb. 23, 1933. Before hydrogenation, the carbonaceous material is treated with Cl or Br to decrease the S and ash contents and increase the reactivity toward H.

Apparatus for taking samples of material such as coal or stone from conveyors or the like. Jesse D. Bradford and Wm. S. McAleer (to Koppers Co. of Del.). U. S. 1,944,963, Jan. 30. A system is described for electromagnetic operation of a sampling gate at timed intervals.

Restoring the natural appearance of discolored coal. Nathaniel R. Landon and Ernest V. Collins, Jr. (to D.

L. & W. Coal Co.). U. S. 1,945,371, Jan. 30. Coal discolored by oxidized Fe compds. is treated with a soln. contg. tannin or gallic or pyrogalllic acids and is then exposed to the atm. so that the Fe compds. are converted into other compds. and the natural appearance of the coal is restored.

**Light oils from coal distillation.** Carl Still. U. S. 1,946,721, Feb. 13. Ducts are formed in the interior of a coal charge through which distn. products are withdrawn by suction; light oils are sep'd. from other distn. products, and the sep'd. light oils are stabilized with a polymerizing agent of moderate activity (such as 90% strength  $H_2SO_4$  at ordinary temp.) followed by treatment with a polymerizing agent of greater activity (such as 90% strength  $H_2SO_4$  at 30–35°). An arrangement of app. is described.

**Briquetting coal.** Béla Móry. Hung. 107,977, Jan. 2, 1934. See *Brit.* 372,283 (C. A. 27, 2561).

**Coke briquets.** János Széki. Hung. 108,018, Jan. 2, 1934. A mixt. of distd. powd. fuels (semi-coke) and raw coal with bituminous binder is coked. The gases formed are hydrogenated by means of a current of CO and steam.

**Coking coal.** Gustav Komarek (to Berwind Fuel Co.). U. S. 1,946,628, Feb. 13. For producing dense lumps of coke, coal is continuously fed into a heated rotary retort chamber maintained about half filled with coal and coke, and the retort is rotated at a speed to produce tumbling of the contents and shifting of the mass while at uniform coking temp. App. is described.

**Peat.** Rönstén Chemische G. m. b. H. Brit. 101,227, Nov. 9, 1933. Fr. 756,799, Dec. 15, 1933. Peat is enriched in  $H_2O$ -sol. humins by mixing with substances evolving  $NH_3$ , moistening and storing in a silo. In an example air-dried peat 70,  $(NH_4)_2SO_4$  25 and powd. CaO 5 kg. are moistened with 20 l.  $H_2O$  and stored 6–8 weeks.  $CaCN_2$ , urea,  $(NH_4)_2CO_3$ , etc., may replace the CaO and  $(NH_4)_2SO_4$ .

**Gasification of brown coal.** Gábor Szigeth. Hung. 107,340, Dec. 1, 1933. The gases formed are drawn off from the hottest part of the charge, at about the middle of a gasifying chamber. Thus the steam and  $CO_2$  developing in the first period of heating filter through the ignited charge (at 850–900°) and are transformed partly or totally to permanent gases, the hydrocarbons are partly decomposed and the  $H_2$  formation can well be increased. Steam and  $O_2$  are led into the furnace in sep. pipes. Cf. C. A. 27, 5174.

**Gas.** I. G. Farbenind. A.-G. Fr. 756,778, Dec. 15, 1933. Moist finely granular fuel is introduced into the upper part of a gas generator and caused to pass continually down an inclined plane while being treated by the hot gasifying agents. An app. is described.

**Fuel gases.** Gemeinde Wien-Stadt. Gaswerke (Alfons Klemenc and Johann Rupp, inventors). Austria 136,199, Jan. 10, 1934 (Cl. 23a). Fuel gases contg. CO and  $H_2$  are led at 300–550° over a catalyst such as activated Fe or  $Fe_2O_3$ ; whereby CO is converted into  $CO_2$  and  $CH_4$ .

**Oil gas.** Charles A. Rosier. U. S. 1,945,790, Feb. 6. See Fr. 744,910 (C. A. 27, 4380).

**Gas purification.** Christian J. Hansen (to Koppers Co. of Del.). U. S. 1,944,978, Jan. 30. A soln. of  $NH_4$  thiosulfate is treated with  $H_3PO_4$  to form  $NH_4$  phosphate and  $NH_4$  thionate, and gas such as that from coal distn. is washed with the resulting liquid to remove  $H_2S$  from the gas. App. is described.

**Purifier for generator gas.** Humboldt-Deutzmotoren A.-G. Fr. 757,117, Dec. 20, 1933.

**Regenerating gas-cleaning masses.** Hoersch-Köln Neuenven A.-G. für Berghau und Hüttenbetrieb. Ger. 589,713, Dec. 13, 1933 (Cl. 26d. 8.30). The masses are freed from  $H_2S$  by adding air or  $O$  to gases being cleaned.

**Baffle apparatus for separating dust from fuel gases.** Wilhelm Voigt. Ger. 585,192, Jan. 27, 1934 (Cl. 26d. 1.20).

**Apparatus for determining the amount of "corrected gas" in a stream of raw gas such as producer or water**

**gas.** Maurice B. Zoll (to Western Gas Construction Co.). U. S. 1,947,370, Feb. 13. Various details of an orifice meter system for continuous operation are described.

**Generating combustible gas from air and gasoline, alcohol, pentane, etc.** Walter H. Hermsdorf (to S. H. G. Inc.). U. S. 1,945,550, Feb. 6. Various details of app. and operation are described. Cf. C. A. 28, 884<sup>a</sup>.

**Gas generator.** Elemér Bánki. Hung. 106,762, Aug. 1, 1933. To save costs of compression the pressure formed by the gas development is used for transporting, purification and final compression of gases. Structural details are given.

**Apparatus for producing gas by carbureting air with liquid fuels.** Jesse D. Thomas. U. S. 1,945,464, Jan. 30. Numerous structural and operative details are described.

**Gas producer.** Albert L. Galusha. U. S. 1,947,330, Feb. 13.

**Gas producers.** I. G. Farbenind. A.-G. Brit. 401,463, Nov. 16, 1933.

**Gas producer with a cooling jacket.** Heinrich Koppers A.-G. Ger. 589,785, Dec. 29, 1933 (Cl. 24e. 10.03).

**Coal-gas producer.** Dingler'sche Maschinenfabrik A.-G. Ger. 589,784, Dec. 15, 1933 (Cl. 24e. 9).

**Water-gas producer operated by anthracite waste.** Industries of America, Inc. Ger. 589,728, Dec. 13, 1933 (Cl. 24e. 1.01).

**Low-temperature hydrocarbon gas producer.** Christian Bolz. Ger. 589,766, Dec. 21, 1933 (Cl. 24e. 2.01).

**Ash-discharge device for gas producer.** Metallges. A.-G. (Otto Hubmann, inventor). Ger. 591,008, Jan. 16, 1934 (Cl. 24e. 11.03).

**Device for removing soot, etc., from gas mains of generating plants.** Nikolai I. Ivanovskii. Ger. 591,126, Jan. 17, 1934 (Cl. 24e. 13.01).

**Gas holder of the disk type.** Georg von Hanffstengel. U. S. 1,946,512, Feb. 13.

**Transporting artificial gas containing gum-forming substances through mains.** Walter L. Shively (to Koppers Co. of Del.). U. S. 1,945,001, Jan. 30. In a system in which gas such as coke-oven gas contg. gum-forming constituents is transported through a main at pressures materially higher than the pressure at which the gas is subsequently distributed, and in which gummy substances are deposited in the relatively low-pressure system, the gas is treated, to repress gum formation, by introducing water or steam in the high-pressure line at intervals to maintain a sufficiently high humidity above 80% in the gas in the main, which inhibits gum formation.

**Removing naphthalene and gum-forming constituents from gas.** Alfred R. Powell (to Koppers Co. of Del.). U. S. 1,944,903, Jan. 30. See Brit. 374,975 (C. A. 27, 2565).

**Sulfur recovery in gas purification.** Wilhelm Fitz. U. S. 1,947,467, Feb. 20. Sulfur foam resulting from the removal of  $H_2S$  from gases by wet purification is treated with an oxidizing agent such as  $KNO_3$  soln. in the absence of free inorg. acids at temps. above the m. p. of S and S is recovered as a regulus.

**Removal of organic sulfur compounds from hydrocarbon mixtures.** Deutsches Patent. Hung. 107,609, Dec. 15, 1933. The mixts. are treated at temps. over 300° with nascent H under at least 10 atm. pressure until the av. b. p. decreases less than 50°. E. g., a coal-tar benzene of d. 0.780, av. b. p. 130°, contg. 3.5% org. S was treated in the presence of  $FeS_2$  as a catalyst with H produced from copperized iron and concd.  $FeCl_3$  soln. at 360–410° and 50 atm. until the av. b. p. decreased to 110°. The product contained less than 0.1% S.

**Phenols from tar oils.** John G. Peake (to Timbrol Ltd.). U. S. 1,945,376, Jan. 30. In the recovery of phenols from tar oils by extn. with a soln. of an alkali metal hydroxide, neutral oils and other alkali-insol. compds. are removed from the soln. by distg. under sub-atm. pressure.

**Apparatus for removing tar and water from gas.** Humphreys & Glasgow Ltd. Fr. 756,794, Dec. 15, 1933.

**Purification of primary tars and shale oils.** F. de Ragenrioux, M. De Visscher and E. Van Cuyck. Belg. 395,574, May 31, 1933. The tar or oil is emulsified or mixed with water contg. in soln. or in suspension reagents which make the substances to be eliminated pass into soln. or into suspension; the liquid is decanted and centrifuged.

**Working up tar products and production of phenol derivatives.** Béla Markó. Hung. 107,093, Sept. 1, 1933. Water is distd. from tar products treated with 10-40% NaOH or KOH. There are obtained 2 separable phases, one consisting of alkali phenolates and cresolates and the other of oils free from phenols. The alkalies can be regenerated from the cresolates by electrolysis.

**Tar and other emulsions.** Gustave Labourse. Fr. 756,535, Dec. 11, 1933. Hydrated lime (slaked lime or milk of lime) is used as the emulsifying agent.

**Tar distillation.** Stuart P. Miller, (to Barrett Co.). U. S. 1,947,485, Feb. 20. Tar is sprayed into hot coal-distn. gases and then further distd. and the tar-distn. residue decomposed by direct contact with hot coal-distn. gases, thus producing coke; and the gases and vapors from the distn. are cooled to recover distillates. App. is described.

**Improving tarry acidic substances.** Nenryô Kenkyôjû

Tyô (Yoshikiyo Ôshima and Shingo Aoto, inventors). Japan. 99,830, Feb. 28, 1933. Tarry acidic substances are hydrogenated with or without a catalyst such as  $\text{Fe}_2\text{O}_3$ ,  $\text{FeCl}_3$ , or  $\text{ZnO}$ .

**Liquefaction and rectification system suitable for separation of constituents of coke-oven gas.** Maurice Gobert (to l'Air Liquide (Soc. anon. pour l'étude & l'exploitation des procédés Georges Claude)). U. S. 1,945,367, Jan. 30. Various details of app. and operation are described.

**Coking coal.** Gustav Hilger. Ger. 591,416, Jan. 20, 1934 (Cl. 10a. 22.01). Coal contg. 2-3% of water is packed in a coke-oven chamber with interspersed layers of coke, and then heated first to 300-500° and afterward to a higher temp.

**Coke ovens.** Gustav Hilger. Ger. 589,894, Dec. 15, 1933 (Cl. 10a. 18.02). Coke ovens are charged with a mixt. of good coal and poor-distg. bituminous coal.

**Regenerative coke ovens.** Evence Coppée & Co. Fr. 756,798, Dec. 15, 1933.

**Vertical coking oven.** Didier-Werke A.-G. Ger. 589,509, Dec. 8, 1933 (Cl. 10a. 13).

**Coke-oven battery.** Lloyd F. Schrader and Frederick P. Hart (to Somet-Solvay Engineering Corp.). U. S. 1,947,499-500, Feb. 20.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. PARAGHER

**Research developments in the refining of Pennsylvania petroleum.** M. R. Penske. *Penna. State Coll., Min. Ind. Expt. Sta., Bull.* 12, 9-16(1933).—F. discusses the viscosity index, gravity index, b.-p. index, optical index and solvent extn. Alden H. Emery

**Edleannu refining process may be applied to treat practically all petroleum fractions.** O. P. Cottrell. *Oil and Gas J.* 32, No. 28, 64(1933). J. R. Strong

**The Foster-Wheeler tube still in Grozny.** V. G. Nikolaeva. *Nefyanoe Khozaystvo* 25, No. 9, 31-4 (1933).—A Foster-Wheeler atm. tube still with a daily capacity of 2000 tons was built in Grozny in 1930. Steam superheated in a coil in the furnace is admitted into the bubble tower. The furnace has an efficiency factor of 0.75. The superheated steam (400°) consumes about 6.1% of the fuel, the total consumption of which is 2% when producing 65-70% of distillates. A. A. B.

**Diagrams used to show what goes on in a tower during fractionation of complex oil mixtures.** B. P. Voinov. *Oil and Gas J.* 32, No. 35, 14(1934). J. R. Strong

**Some economic aspects of the bituminous sands of Northern Alberta.** S. C. Ellis. *Can. Dept. Mines, Mines Branch, Rept.* 735, 10-29(1934); cf. *C. A.* 27, 3593.—Cost of producing petroleum products from bituminous sands is estd. Yields of various products are tabulated. Alden H. Emery

**Physical tests and properties of oil and gas sands.** George H. Fancher, James A. Lewis and Kenneth B. Barnes. World Petroleum Congress, Preprint No. 8, 14 pp.(1933); *Penna. State Coll., Mineral Ind. Expt. Sta., Tech. Paper No.* 4(1933).—Petrographic examn., screen analysis, porosity and permeability tests are discussed in the light of recent developments. Four methods for the measurement of porosity are compared. A procedure in testing and an app. which yields accurate and reproducible results in the measurement of permeability are described. The permeabilities of 127 samples of various geol. formations are tabulated. A. H. E.

**Some physical characteristics of oil sands.** G. H. Fancher, J. A. Lewis and K. B. Barnes. *Penna. State Coll., Mineral Ind. Expt. Sta., Bull.* 12, 65-171(1933).—Reliable methods for detn. of porosity are discussed. An app. for measuring permeability of consolidated sands is described. Accurate data on permeability and porosity are given for 130 sands. Various methods for computing permeability are compared and conversion factors calcd.

No consistent relationship is found between porosity, permeability and screen analysis. Alden H. Emery

**Russian crude oils as a raw material for the preparation of aviation oils.** A. S. Velkovskii and B. G. Semendov. *Nefyanoe Khozaystvo* 25, No. 10, 49-53(1933).—The Soviet standards for aviation oils differ from the American by a higher flash point (250°), lower pour point (—10°), higher acidity (0.05%) and higher ash content (0.05%). Attempts to select stocks which would make aviation oils that conform to the American standard failed because of the low viscosity at elevated temps., except with Sags oil. The high pour points of the Soviet oils were improved by adding paraffin. The importance of using distillates instead of bottom oils is emphasized. A. A. B.

**Combating paraffin in the production of crude oil.** I. I. Korganov. *Nefyanoe Khozaystvo* 25, No. 10, 27-35 (1933).—The following methods are discussed: (1) blasting, by lowering the charge to the bottom of the hole; (2) expansion of the hole; (3) use of solvents such as gasoline,  $\text{C}_6\text{H}_6$ , kerosene and crude oil; (4) heating with superheated steam; (5) heating by circulating hot crude oil or by lowering chemicals producing heat on being dissolved, such as Ca carbide or NaOH; (6) burning of a combustible mixt. (Garner-Leyden process). A. A. B.

**The oxidation of paraffin and ceresin by air at higher temperatures.** Typko. *Erdol u. Teer* 9, 451(1933), cf. *C. A.* 27, 5954. F. W. Jung

**The effect of Paraffin on wax crystallization and the pour point of lubricating oils.** J. C. Zimmer, G. H. B. Davis and P. K. Frolich. *Penna. State Coll., Min. Ind. Expt. Sta., Bull.* 12, 57-63(1933).—Small amts. of wax in lubricating oils cause them to congeal at relatively high temps. Interlocking wax crystals prevent the free flow of oil at low temps., and retention or adsorption of oil by the wax causes the mixt. to set to a gel. Paraffin is preferentially adsorbed by the wax, reducing the size of the crystals and preventing the adsorption of large quantities of oil by the wax. This allows the oil to flow freely at low temps. even though solid wax particles are suspended in the oil. Alden H. Emery

**Advances in production, recovery and purification of benzene during the year 1932.** Fritz Rosendahl. *Teer u. Bitumen* 31, 393-6(1933).—Brief bibliographical and patent description. F. W. Jung

**Diethyl peroxide as a proknoek.** A. Egerton and A. R. Ubbelohde. *Nature* 133, 179(1934).— $\text{Et}_2\text{O}_2$  is a violent proknoek, slightly more potent than  $\text{C}_2\text{H}_5\text{NO}_2$  at the same



concn. Its knocking action is inhibited by  $PbEt_4$ .  $BiH_3O_2$  is likewise definitely a proknock. In spite of the ease of thermal decompn.,  $H_2O_2$  has a definite but slight proknock tendency. W. J. Peterson

**Drilling mud.** Percy Meyer. *J. Inst. Petroleum Tech.* 20, No. 123, 10-33(1934).—Drilling mud is a "semi-solid" colloidal suspension and both shear force, or yield point, and viscosity govern its flow. The two properties can be measured at once by detg. the rate of flow through a capillary at various heads. Shear force alone can be measured by a "shearometer." Next to density, shear force is probably the most important quality of a mud. To utilize the Schlumberger elec. coring app. in deep tests, the mud must be of high density but thin enough to allow the plummet to reach the bottom of the hole. The barytes combined with the clay to form the mud must be easily wettable. The mud should not settle out on standing; to prevent settling, a min. of 68-70 lb. of clay per cu. ft. is necessary. *Aqualog* or *bentonite* may be added to the clay to supply the needed colloidal quality. Barytes reduces greatly the penetration of the mud into the formation. Na silicate, phosphate, carbonate and hydroxide are used for thinning mud but the silicate, especially, is incalculable in its effect. Emma R. Crandal

**Mud solution, its preparation and distribution among the large oil fields.** P. I. Rozhen. *Neftyanoe Khosyaistvo* 25, 141-6(1933).—Various methods used in mining and sepg. clay (from mech. admixts.) are discussed. A. A. B.

**The synthesis of lubricating oils from Kogasin.** Preliminary communication. Franz Fischer and Herbert Koch. *Brennstoff-Chem.* 14, 403-8(1933); cf. *C. A.* 24, 4919.—A series of chlorination products has been prep'd. from the olefin-contg. gas-oil fraction, Kogasin II, obtained in the benzene synthesis from CO and H. They were condensed with a no. of aromatic hydrocarbons by using  $AlCl_3$ . Best yields were obtained with the tri- and tetrachloro compds. and xylene. The oils resembled naphthene-base oils in properties. Catalytic hydrogenation gives a water-white oil of low sp. gr., high stability against oxidation, small carbon residue, which retains its lubricating value at low temp. Comparative phys. data are given for the various oils prepared. Bibliography. F. W. Jung

**Friction tests on lubricating oils.** J. W. Donaldson and D. R. Hutchinson. *J. Soc. Chem. Ind.* 52, 424-9T (1933). The app. consists of a pendulum carrying adjustable wts. and supported at the fulcrum by means of a single sphere that rests in a seat or by a single small sphere that rests on four larger moving spheres. The whole app. is provided with a heating device. The time of swing of the pendulum is detd. by numerous tests over long and short periods, and by dividing the time of damping by the time of one complete swing, the no. of swings can be detd. from the no. of swings made, the decay of oscillation per swing is calcd. and whiz this value is used in the Hardy formula a simple expression for coeff. of friction,  $\mu$ , is derived for each type of app. Mineral, fixed and comp'd. oils ranging in sp. gr. at 60°F. from 0.880 to 0.964, in viscosity at 100°F. from 75 sec. to 1490 sec., total acidity from a trace to 7.0% and sapon. no. from 0 to 18.0 were tested on both types of app. Based upon the formula  $\mu = 9.39/T$ , where  $T$  is the damping time, coeffs. of friction of mineral oils were found to increase as the viscosity decreases on heating, which is attributed to increased no. of asperities in the bearing being brought into contact. A decrease in coeff. of friction at high temp. of the fixed oils suggests chem. changes. J. L. Essex

**Artificial aging of lubricating oils.** S. Fachini and F. Sporer. *Giorn. chim. ind. applicata* 15, 553-6(1933).—An artificial aging test for lubricating oils consists in heating for specified times in air. The temp. is fixed at 150°, and the times used are 15, 50, 75, 100 and 150 hrs. Heating was carried out in a porcelain crucible of the Rosenthal type, which is absolutely neutral and unattacked. The oils are classified into 4 groups. I shows the presence of an insol. residue (in ordinary gasoline) after heating 15 hrs.; II and III withstand 75 and 100 hrs. of

heating; while IV give no residue even after 150 hrs. of heating. A. W. Contieri

**Flash-point testing of lubricating oils.** D. Holde. *Erdöl u. Teer* 9, 485-7, 497-8, 506-11, 523(1933).—The various methods, definitions and literature of flash point are discussed. References. F. W. Jung

**Influence of roughness of surface and variation of speed on boundary lubrication.** P. S. Caldwell and A. S. T. Thomson. *J. Roy. Tech. Coll. (Glasgow)* 3, 106-15 (1933); cf. *C. A.* 25, 2842.—Scraping, burnishing and running-in of the surfaces result in a considerable reduction in the value of the coeff. of static friction, by 45% with white metal on Ni-Cr steel, by 25% with P-bronze on Ni-Cr steel, and by 8% with cast Fe on Ni-Cr steel. A further reduction is produced by grinding or lapping the surfaces; of the above combinations the last-named gives the lowest coeff. of static friction (0.130). With increase in rubbing speed under relatively low loads, decreases to a min., then rises; the speed at which this min. occurs varies directly with load and static friction and inversely with the viscosity of the lubricating oil. Friction-rubbing speed curves are given for 6 oils under boundary, film and greasy conditions of lubrication. B. C. A.

**Railroad-car journal oils tested under severe conditions of temperature change and load.** C. M. Larson. *Oil and Gas J.* 32, No. 30, 15-16, 18(1933).—The torque is measured in ft. lb. caused by the resistance of a satd. waste pack against the journal surface. A low rate of change in viscosity with temp. is needed as well as a low rate of change in adhesion with temp. J. R. Strong

**Low-viscosity oils as substitutes for high-viscosity lubricants.** D. S. Velikovskii and P. P. Khrshanovskii. *Neftyanoe Khosyaistvo* 25, 113-15(1933).—The authors tested in the Olsen machine various mixts. of kerosene with (1) cylinder-oil distillate and (2) sulfurized and chlorinated cylinder-oil distillate. They found that (2) has a higher breakdown point than (1). A sulfurized oil of 1.2  $E_{50}$  viscosity is equal to a fuel oil of 4.2  $E_{50}$  viscosity. The theory of lubrication is discussed in detail. A. A. B.

**Comparison of Soviet and foreign greases.** D. S. Velikovskii, L. G. Yartzeva-Pod'yapolskaya and L. S. Shekhoyan. *Neftyanoe Khosyaistvo* 25, No. 6, 55-9; No. 8, 176-9; No. 10, 53-6(1933).—A number of Russian and foreign greases were analyzed and various tests were made with automobile and ball-bearing greases. It is concluded that the Russian greases are inferior to the foreign products and various recommendations for the improvement of the former are made. A. A. B.

**Tentative method of test for penetration of greases and petrolatum.** Am. Soc. Testing Materials A. S. T. M. Designation: D217-33T; Am. Standards Assoc. A. S. A. No.: Z11.3-1933, 6 pp.(1933). Alden H. Emery

**Simple, compact and unusually flexible vacuum asphalt unit completed at Sunray refinery.** W. T. Ziegenhain. *Oil and Gas J.* 32, No. 29, 10(1933). J. R. Strong

**Plasticity of bitumens.** R. N. J. Sual and G. Koens. *Bitumen* 4, 16-19(1934); cf. *C. A.* 27, 2795.—Concentric and high-pressure capillary viscometers are used for measuring the viscosity of bitumens. Both types of app. give reliable data. Bitumens of different penetration and viscosity values fall on a straight line when log viscosity is plotted vs. log penetration. From data on numerous bitumens it is concluded that there is a close relationship between plasticity and ductility. If a bitumen cannot be found with the desired properties for a given use, a mixt. of several bitumens often yields a product with the desired plasticity. Howard A. Smith

**Analysis of mixts. of bituminous coal tar and asphalt bitumen (Mallison) 21.** Hydrogenation of brown coal tar [lubrication value of by-product paraffin] (Seldenschnur) 21. Pyrolysis of gas [from cracking of petroleum] (Butkov, Rabinovich) 21. Thermal treatment of gaseous hydrocarbons (Dunstan, et al.) 21. Genesis of Central-Asiatic petroleum deposits (Porfir'ev, Vasil'ev) 8. Oil-bearing deposits in Sakhalin (Gedroits) 8. Direct oxidation of satd. hydrocarbons at high pressures (Wiezevich, Frolich) 2. Gravitation measurements carried out in the Emba dist.

[crude-oil deposits] (Skvortzov) 8. Source of various salts recovered in the Texas Company's refinery (Duce) 8. Phase equil. in hydrocarbon systems (Sage, *et al.*) 2. Light oils from coal distn. (U. S. pat. 1,946,721) 21. Removal of org. S compds. from hydrocarbon mixts (Hung. pat. 107,609) 21. Destructive hydrogenation of mineral oils (Ger. pat. 591,099) 21. Purification of shale oils (Belg. pat. 395,574) 21. Preventing oxidation of petroleum hydrocarbons (Japan. pat. 99,257) 27. Elec. furnace for dry distn. of hydrocarbons (Japan. pat. 99,987) 4.

Echantillonnage et analyse des huiles de graissage et des graisses lubrifiantes. Brussels: Association belge de standardisation. 75 pp.

**Refining petroleum oils.** Walter L. Savell (to Mathieson Alkali Works). U. S. 1,945,121, Jan. 30. Oil such as a gasoline, naphtha or kerosene is subjected to the action of a substantially dry Ca hypochlorite contg. over 50% available Cl at a sub-cracking temp.

**Dewaxing petroleum oils.** Ernest W. Reid (to Carbide and Carbon Chemicals Corp.). U. S. 1,947,359, Feb. 13. The oil is dissolved in a mixt. of isopropyl ether 60 and acetone 40% and the soln. is cooled to sep. the wax by pptn.

**Apparatus for filtering petroleum vapors through solid adsorptive material.** Malcolm P. Youker (to Grey Process Corp.). U. S. 1,945,249, Jan. 30. Various structural and operative details are described.

**Contact tower with superposed perforated shower and collecting plates suitable for fractionating petroleum vapors.** George B. Coubrough (to Lummus Co.). U. S. 1,945,600, Feb. 6. Structural features of an app. arranged for passing vapors transversely through showers of liquid.

**Coking heavy petroleum residues, etc.** Charles W. Andrews and Reginald D. Rogers (to C. P. T. Development Corp.). U. S. 1,944,872, Jan. 30. The material, in liquid form, together with an O-contg. gas is sprayed into a closed chamber at approx. atm. pressure and at such a temp. as to cause partial combustion of the liquid, thus raising its temp. to such a point as to drive off volatile portions of the liquid and progressively deposit a solid carbonaceous residue upon the floor of the chamber in the form of coke. The floor of the chamber is externally heated to approx. a coking temp., and periodically the introduction of material is interrupted and the layer of coke formed is withdrawn. App. is described.

**Hydrogenating carbonaceous materials such as a petroleum residue or tar oil, etc.** Lajos von Szeszich (to Deutsche Gold- & Silber-Schneideanstalt vorm. Roessler). U. S. 1,946,341, Feb. 6. A carbonaceous material contg. S is mixed with other material which is poorer in S and the mixt. is treated with H<sub>2</sub> at 350-600° under pressures above 100 atm. in a reaction vessel contg. a catalyst comprising Fe, Ni or Co, there being present throughout the entire reaction a quantity of H<sub>2</sub>S such that the activity of the catalyst is increased over the action of the catalyst including the metallic sulfides when employed in the absence of the H<sub>2</sub>S.

**Cracking petroleum oils.** Albert G. Davis (to Gasoline Products Co.). U. S. 1,947,001, Feb. 13. Oil is heated (suitably in a pipe coil) to a cracking temp. under pressure and then passed to a reaction chamber where it is digested under pressure and at a cracking temp.; cracked products are passed to a zone of reduced pressure in which lighter fractions are distd. off, and a hydrocarbon material such as liquid bottoms, substantially none of which will volatilize in the zone of reduced pressure, is also introduced into the latter. App. is described. Cf. C. A. 28, 1850<sup>2</sup>.

**Cracking hydrocarbons.** Henry Dreyfus. Brit. 401,286, Oct. 30, 1933. Gaseous or vaporized hydrocarbons boiling below 150° are converted into hydrocarbons of lower H content, which may be olefinic or acetylenic, by contact at a raised temp. with a liquid or semiliquid compn. contg. free C., *e. g.*, a cracking residue of high b. p., tar or pitch from the destructive distn. of oil, coal

or lignite, a natural tarry product, a suspension of graphite in a heavy oil. In an example a mixt. of C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>6</sub> is passed at 450° and 5 atm. through a cracking residue and olefins are removed from the reaction products by H<sub>2</sub>SO<sub>4</sub>.

**Cracking hydrocarbons.** Deutsche Erdöl A.-G. Brit. 756,922, Dec. 18, 1933. Residues from coking of coals are freed from ash, *e. g.*, by treatment with acid, activated by treatment with steam at 350° and used as catalysts for cracking hydrocarbons.

**Cracking hydrocarbon oils.** Edward W. Isom (to Sinclair Refining Co.). U. S. 1,945,275, Jan. 30. A gas oil is forced successively through primary and secondary stages in a heating zone under superatm. pressure and thence into an expansion chamber. In the primary stage the oil is heated to a high-cracking temp. and as it is discharged from this stage a relatively cool crude oil at a temp. below about 175° is added in such proportion as to reduce the temp. below the point at which substantial cracking occurs. In the secondary stage the oil is heated to a cracking temp. lower than the temp. of the oil discharged from the primary stage, the pressure on the oil passing from the secondary stage to the expansion chamber is reduced, vapors of gasoline character are taken off from the expansion chamber and residue is discharged from it. App. is described.

**Cracking hydrocarbon oils.** Donald F. Gerstenberger (to Universal Oil Products Co.). U. S. 1,945,604, Feb. 6. Various details are described of app. and operation of a cracking system comprising a pressure heating coil and enlarged reaction chambers.

**Hydrocarbon oil cracking.** Lyman C. Huff (to Universal Oil Products Co.). U. S. 1,946,938, Feb. 13. Oil is heated to a cracking temp. under pressure while flowing through a pipe coil and is discharged into the upper portion of an enlarged reaction chamber maintained under cracking conditions of temp. and pressure; vapors and unvaporized oil are both passed downwardly through the reaction chamber for conversion of the vapors and the vapors and unvaporized oil are withdrawn from the lower portion of the reaction chamber. A sep. washing oil such as raw oil alone or mixed with reflux condensate is passed downwardly over the inner surfaces of the reaction chamber at an elevated temp. such as to prevent substantial cooling of the vapors so that conversion of the vapors is not interfered with but the temp. is not sufficiently high to cause substantial coking of the washing oil in the reaction chamber. App. is described.

**Cracking hydrocarbon oils.** Alphonse W. Jurrison, Albert B. Cox and Andrew M. Wood (to Universal Oil Products Co.). U. S. 1,946,939, Feb. 13. Various details of app. and operation are described, involving use of an oil-heating coil and an enlarged chamber.

**Cracking hydrocarbon oils.** Ross C. Powell (to Texas Co.). U. S. 1,947,110, Feb. 13. An app. of the "coil and drum" type comprises a heating coil, a cracking vessel fed from the coil and provided with a pump for independently circulating oil from the vessel through another heating coil and back to the cracking vessel, a second cracking vessel fed by overflow from the first vessel and various other auxiliary app.

**Cracking mineral oils.** Arthur E. Pew, Jr. (to Sun Oil Co.). U. S. 1,946,329, Feb. 6. Oil such as gas oil is vaporized, entrained liquid particles are removed from the vapors and the oil vapors are then dried (in another part of the app.) by mixing with them a relatively small proportion of a dry hydrocarbon gas and, in still another part of the app., the mixt. formed is heated to a cracking temp., followed by cooling and fractionation. An arrangement of app. is described.

**Cracking oils.** Carl Still (trading as Firm Carl Still). Brit. 401,508, Nov. 16, 1933. Oils are fractionated in a distn. column into a benzene distillate, middle oils and pitch, the middle oils being circulated through a cracking coil and the products returned to the distn. column where they are expanded in contact with the pitch and part of the crude oils. App. is described.

**Refining overhead products from oil cracking.** Jacques C. Morrell and Gustav Eglyoff (to Universal Oil Products

(n.). U. S. 1,946,094, Feb. 6. Heated vaporous products are treated with  $\text{SO}_2$  and steam in the presence of a non-metallic solid contact material such as fuller's earth (the quantity of  $\text{SO}_2$  being not substantially in excess of that necessary to remove S and gum-forming substances from the distillate). U. S. 1,946,095 relates to the similar use of an acid of P such as  $\text{H}_3\text{PO}_4$  with a free O-contg. gas and a non-metallic solid contact material such as fuller's earth. U. S. 1,946,096 relates to treatment of the vapors with an aq. soln. of a water-sol. borate such as borax and with steam.

**Hydrocarbon oil conversion.** Carbon P. Dubbs (to Universal Oil Products Co.). U. S. 1,946,463, Feb. 6. Oil is subjected to an initial conversion by passing it through a heating coil, vaporizer and dephlegmator maintained under superatm. pressure; highly heated unvaporized oils from the vaporizer are passed through succeeding app. units in which the pressure is successively reduced, to vaporize substantial portions of the oil, and the vapors are dephlegmated, condensed and collected, distillate being redphlegmated, and reflux condensate being returned to the initial heating coil for retreatment. Various features of app. are described.

**Refining hydrocarbon oils.** Homer T. Darlington (to Oil Corp. of America). U. S. 1,944,877, Jan. 30. Oil such as crude petroleum is heated and vaporized under pressure, the pressure is released to facilitate vaporization, and the vapors are passed through a series of successively cooler bodies of condensate and oil alternately, the bodies of oil contg. a solid treating agent such as fuller's earth or bog iron ore in colloidal dispersion. App. is described.

**Refining hydrocarbon oils.** Johannes A. Buchel and Roytus N. J. Saal (to Shell Development Co.). U. S. 1,945,516, Feb. 6. In the manuf. of refined transformer, spindle and lubricating oils from a mixt. of heavy hydrocarbons contg. aromatic hydrocarbons, by use of liquid  $\text{SO}_2$ , there is added to the liquid  $\text{SO}_2$  a fluid aromatic hydrocarbon such as  $\text{C}_6\text{H}_6$  or the like to increase the content of components sol. in liquid  $\text{SO}_2$ , by means of which the ratio of high-boiling aromatic content in the ext. layer to high-boiling aromatic content in the raffinate layer is increased.

**Distilling hydrocarbon oils.** Ernest W. Thiele (to Standard Oil Co. of Ind.). U. S. 1,947,319, Feb. 13. A stream of heated oil undergoing distn. is passed into an enlarged chamber in which vapors are evolved; vapors from this chamber are passed into a fractionating tower and a portion of the vapors is diverted to a second enlarged chamber for preheating it and the heated oil is then passed into the second chamber. Various features of app. are described.

**Light hydrocarbon oils by distillation of solid materials such as coal.** Lewis C. Karriek. U. S. 1,945,530, Feb. 6. In a continuous process for producing hydrocarbon oil lighter than water from solid carbonizable material such as coal, a mixt. of such material and a highly adsorptive material such as coke contg. adsorbed Cu, Co or Cr is passed under pressure through a cylindrical retort or the like and heated to increasing temps. in progressive stages to effect controlled pyrolysis; vaporized distn. products are withdrawn in a direction counter to the general movement of the mixed material through zones of successively decreasing temps., and incompletely decompd. liquid distn. products are returned to the heating zone with addnl. carbonizable material for further conversion. App. is described.

**Dewaxing of hydrocarbon oil.** Frederick W. Sullivan, Jr. (to The Standard Oil Co.). Can. 339,270, Feb. 6, 1934. Hydrocarbon oil is dewaxed by dilg. with 1 to 4 times its vol. of a mixt. contg. about equal quantities of AcOME and  $\text{C}_6\text{H}_6$ , and cooling the soln. to  $-50^\circ$  to  $-15^\circ\text{F}$ . to ppt. hydrocarbon wax. The wax is sepd. and the diluent is removed from the hydrocarbon oil. Cf. C. A. 27, 4664.

**Filtering out finely divided impurities from liquid hydrocarbon products such as oils, tars, etc.** Rudolf Wietzel and Bruno Engel (to I. G. Farbenind. A.-G.). U. S. 1,945,583, Feb. 6. The liquids are filtered through finely divided semi-solid carbonaceous residues obtained in the

destructive hydrogenation of carbonaceous materials such as coal, tar or oil.

**Furnace setting and tube banks for oil heating and steam generation.** John S. Wallis (to Foster Wheeler Corp.). U. S. 1,945,581, Feb. 6. Numerous structural details are described of an app. suitable for use in oil-fractionating systems.

**Heated tank for separating oil and water from oil-field emulsions.** Wm. G. McMurray (to M. & V. Tank Co.). U. S. 1,946,220, Feb. 6.

**Oils.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 756,640, Dec. 13, 1933. The pour point of oils, particularly crude mineral, lubricating, combustible, tar and schist oils, is lowered by adding to the oils a small amt. of an org. compd. having 5 or (and) 6 atom rings and lateral chain contg. 10 or more C atoms, such that in a mononuclear system there are more than one of these chains and in a polynuclear system there is at least one of these chains. N or O or both may be present in the rings and (or) side chains. Examples of substances are tristearate of pyrogallol, phloroglucinol and trihydroxytriphenylmethane, distearate of 1,5-dihydroxynaphthalene and resorcinol, hexastearate of rufigallic acid and distearylalizarin.

**Mineral oils.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 756,343, Dec. 8, 1933. Oils are refined by treatment with a mineral acid, neutralization with an alkali and then treatment with an aq. soln. of a mineral salt such as NaCl or  $\text{CaCl}_2$ .

**High-pressure hydrogenation of mineral oils.** Minami Maushū Tetsudō K. K. (Yūdō Tanaka, Sei Mizoshita, Nen Maeda and Masaharu Ueno, inventors). Japan. 100,179, March 20, 1933. Mineral oils are hydrogenated under high pressure with Japanese acid clay contg. reduced Ni as a catalyst. The catalyst is prepd. by reducing the acid clay mixed with ammonia soln. of  $\text{Ni}(\text{OH})_2$  or NiO.

**Utilizing sludge acid from oil refining.** Wm. S. Wilson (to Merrimac Chemical Co.). U. S. 1,945,172, Jan. 30. Sludge acid is dild. with water to ppt. a fraction of the dissolved org. matter constituting a fuel oil, and the residual dild. liquor is allowed to act upon calcined clay to form an alum liquor and to cause the residual clay to collect org. matter from the liquor. An arrangement of app. is described.

**Apparatus for purifying waste oils.** Syōjirō Watanabe. Japan. 99,938, March 4, 1933. Diagrammatical.

**Device for supplying fire-extinguishing foam to oil tanks.** Benjamin A. Moeller. Brit. 401,005, Nov. 9, 1933.

**Oil and wax compositions.** I. G. Farbenind. A.-G. Brit. 399,527, Oct. 1, 1933. Liquid or solid hydrocarbons, e. g., benzene, gasoline, kerosene, gas oil, lubricating oil or grease, paraffin wax, are mixed with a high-mol. polymerization product of an iso-olefin such as those described in Brit. 401,297 (C. A. 28, 2367\*). Among examples (1) a lubricating grease is made by mixing lubricating oil with highly polymerized isobutylene, together with oleic acid glyceride,  $\text{Ca}(\text{OH})_2$  and NaOH soln., and (2) a paraffin wax compn. for the manuf. of candles is made by incorporating a small amt. of polymerized isobutylene in the wax. The lubricating oil compns. may be used as insulating oils in elec. transformers or switches.

**Fuel.** Erwin F. Spellmeyer (to The Art Metal Works, Inc.). Can. 339,200, Feb. 6, 1934. A fuel consisting of a mixt. of 20% of a petroleum distillate having a boiling range of  $194-262^\circ\text{F}$ . and 80% of a petroleum distillate having a boiling range of  $288-352^\circ\text{F}$ . has a flash point of about  $55^\circ\text{F}$ ., ignites quickly, evaps. slowly, is substantially nonexplosive, and is ignitable by pyrophoric spark.

**Benzene storage.** Paul Vondiziano and Naim Majdalany. Fr. 756,367, Dec. 8, 1933. The vapors collecting at the top of storage tanks for benzene are liquefied by passage through a series of small tanks partly filled with water and fitted in the upper part of the storage tank.

**Cracked gasoline with good anti-detonating properties.** John C. Black. U. S. 1,945,508, Feb. 6. A petroleum oil is cracked under pressure at temps. of about  $425-480^\circ$  and the hot cracked oil products are passed into a zone of lower pressure and there is vaporized, sepd., condensed and collected only a lower-boiling portion of the gasoline

stock; hot residual cracked oil products from the primary zone of lower pressure are passed into a secondary zone of still lower pressure and the remaining higher-boiling portion of the gasoline stock is vaporized and sepd. and this sepd. portion only is passed through a heated zone at about 480–660° and cool hydrocarbon oil is injected, as the cracked product leaves the heated zone, in quantities sufficient to lower the temp. of the vaporized cracked products below an active cracking temp.; reformed gasoline stock is sepd. contg. a high percentage of hydrocarbons of the carbocyclic series possessing anti-detonating characteristics. An arrangement of app. is described.

**Treating cracked gasoline.** Paul I. Murrill (to R. T. Vanderbilt Co.). U. S. 1,947,219, Feb. 13. Gum formation is inhibited by the addn. of a diaryl aryene diamine suitably about 0.002–0.01 g. per 100 cc. of diphenyl-*p*-phenylenediamine).

**Stabilizing cracked gasoline.** Ralph C. Cook (to Universal Oil Products Co.). U. S. 1,945,599, Feb. 6. Vaporous gasoline-like products of hydrocarbon oil cracking are subjected to condensing in a condensing zone, a portion of the vaporous products is withdrawn from this zone; the distillate obtained is moderately heated by heat exchange with the withdrawn vapor, so as to remove from the distillate gases and vapors lighter than gasoline, the vaporous products are returned to the condensing zone, and the unvaporized stabilized distillate is independently collected. App. is described.

**Treating dephlegmated vapors of gasoline from cracking processes.** Richard F. Davis (to Universal Oil Products Co.). U. S. 1,946,131, Feb. 6. Dephlegmated cracked gasoline vapors are contacted with dry SO<sub>2</sub> and the heavy reaction products thus formed are sepd. App. is described.

**Cracked "hydrocarbon spirits" motor fuel.** Frederick B. Downing and Herbert W. Walker (to E. I. du Pont de Nemours & Co.). U. S. 1,945,521, Feb. 6. Formation of gummy substances is retarded by the addn. of about 0.03% of xylenols such as 4-hydroxy-1,3-dimethylbenzene or an alkyl substitution product. Numerous examples are given.

**Refining gasoline vapors.** Arthur Lachman (to Vapor Treating Processes Inc.). U. S. 1,945,114, Jan. 30. In treating gasoline vapors at elevated temps. with metallic salt solns. such as those of ZnCl<sub>2</sub> of optimum concn., heat economy is effected by utilizing a temp.-reducing soln. of metallic salt initially to treat the gasoline vapors and then treating the vapors with the soln. obtained by the first step. App. is described.

**Addition agent for motor gasoline.** Gyula Lakner. Hung. 107,493, Dec. 1, 1933. To 100 l. gasoline is added 34 g. of an agent consisting of 2.7% naphthol, 8.1% phenol, 8.1% *p*-dichlorobenzene, 27.0% naphthalene and 54.1% stearoptene. The agent prevents deposition of C in the valves.

**Revivifying spent filter clay used for treating oils.** Norman E. Lemmon and Arthur B. Brown (to Standard Oil Co. of Ind.). U. S. 1,946,748, Feb. 13. The clay is washed with an org. solvent such as naphtha to remove adhering oil, residual solvent is swept out of the material with an inert water-free gas such as refinery "high line" gas to leave the clay in a dry water-free condition, and org. matter present in the clay is destroyed by ignition.

**Revivification of spent clays used for decolorizing and clarifying lubricating oils.** Albert E. Buell (to Phillips Petroleum Co.). U. S. 1,945,215, Jan. 30. The clay is agitated with an oil solvent such as naphtha and the oil-free clay is then agitated with a mixt. of naphtha and an alc. soln. of NaOH.

**Lubricating oil.** Bert H. Lincoln and Alfred Henriksen (to Continental Oil Co.). U. S. 1,944,941, Jan. 30. A hydrocarbon lubricating oil is given a lower coeff. of friction by the addn. of a small proportion (suitably about 0.5%) of a halogenated ester of an org. acid with a monohydric alc. or with a dihydric alc., such as chlorinated ethyl oleate or chlorinated methyl stearate, or of ethyl oleate or stearate, butyl oleate, phenyl stearate or the like.

**Lubricating oil.** Bert H. Lincoln (to Continental Oil

Co.). U. S. 1,945,614, Feb. 6. A deflocculating agent (suitably 35–100 g. per gal. of oil) consisting of an oxidation product obtained by oxidizing a stereometrical isomeride of oleic acid with KMnO<sub>4</sub> is used with a lubricant contg. a hydrocarbon oil existing as an iso-colloidal system having an external and an internal phase, to increase the dispersion of the internal phase. The oleic acid isomeride is obtained by treating oleic acid with HN(O).

**Lubricating oil.** Bert H. Lincoln and Alfred Henriksen (to Continental Oil Co.). U. S. 1,945,615, Feb. 6. The film strength of a lubricating oil is improved by adding a small proportion (suitably about 1%) of a condensation product obtained by condensing with an alk. condensing agent such as Na ethoxide a halogenated wax such as a chlorinated wax with itself or a similar compd. so that the condensation product contains a small amt. of halogen in org. combination.

**Lubricating oils.** Garland H. B. Davis (to Standard Oil Development Co.). Brit. 401,841, Nov. 7, 1933. The viscosity index of hydrocarbon lubricating oils is raised with reduction, or without undesirable rise, in the pour point by adding waxy hydrocarbons and up to 10% of a substance depressing the pour point. Compounding materials, *e. g.*, rosin, Pb or Al oleate, may be added. Specified depressants are natural resinous materials, *e. g.*, wax tailings, gums occurring in gasoline, *p*-coumarone resins, gum damar and copals, the partial oxidation products of paraffin wax or waxy hydrocarbons and the acids derived therefrom or the Zn or Mg salts thereof, synthetic oils obtained by condensing waxy hydrocarbons with aromatic compds., *e. g.*, C<sub>6</sub>H<sub>6</sub>, PhMe, C<sub>10</sub>H<sub>8</sub>, anthracene, naphthols, anthrasols, substituted phenols and aromatic gas oils. Cf. C. A. 27, 4665.

**Lubricating oil.** Nippon Sekiyū K. K. (Dokichi Nakamori, inventor). Japan. 99,215, Jan. 26, 1933. Fish oil or another animal or vegetable oil is hydrogenated until its I value becomes 120–150, and is then polymerized by heating in the presence of a catalyst (such as Japanese acid clay, silica gel, active C). The polymerization product is mixed with mineral oil to form a lubricating oil.

**Dewaxing mineral lubricating oils.** Francis X. Govers (to Indian Refining Co.). U. S. 1,945,350, Jan. 30. A wax-bearing mineral oil is mixed with acetone and C<sub>6</sub>H<sub>6</sub> in such proportions that the acetone and C<sub>6</sub>H<sub>6</sub> together, at a temp. of about 38°, have complete solvent action on the wax-bearing oil, and, at temps. of about –20° and below, have substantially complete solvent action on the liquid hydrocarbons present but substantially no solvent action on the solid hydrocarbons present, so that by use of the solvent and by a cooling and filtering system (various details of which are described) a "low cold test" oil can be obtained.

**Refining high-viscosity petroleum lubricating oil stocks with liquid sulfur dioxide.** Wolfgang Grote and Paul Oberfell (to Edelcanu G. m. b. H.). U. S. 1,945,500, Jan. 30. The uncooled unextd. stock is dild. with SO<sub>2</sub> in amt. substantially miscible with the stock at the extrn. mixing temp. and sufficient to cause a decrease in viscosity to permit of efficiency and satisfactory cooling and single zone counter-current extrn.; the dild. stock is cooled to the desired extrn. mixing temp., and extd. in a single counter-current zone with liquid SO<sub>2</sub>. An arrangement of app. is described. Cf. C. A. 28, 1524<sup>a</sup>.

**Heat-exchange device suitable for cooling oils as in lubricating systems.** Leo M. Monroe. U. S. 1,945,287, Jan. 30. Structural details.

**Apparatus for filtering waste lubricating oils.** K. K. Hansin Tekkōzyo. Japan. 100,003, March 9, 1933. Diagrammatical.

**Die lubricant.** Robert T. Wood (to Magnesium Development Corp.). U. S. 1,946,121, Feb. 6. A die lubricant for Mg base alloys comprises a suspension of comminuted graphite in CCl<sub>4</sub>.

**Lubricating with greases.** Frank J. Hall. U. S. 1,947,470, Feb. 20. In lubricating bearings such as those of automobiles, an artificially colored grease is used and after a period of use is displaced by a grease of different color

(the different color facilitating observance of the replacement of the old grease by the new).

**Lubricating greases.** I. G. Farbenind. A.-G. Brit. 401,295, Nov. 6, 1933. See Ger. 574,753 (C. A. 27, 4666).

**Apparatus for melting asphalt, etc.** Eugen May. Ger. 588,526, Nov. 23, 1933 (Cl. 22k. 7) and Ger. 589,567, Dec. 11, 1933, addn. to 588,526.

**Asphalt-like material from hydrocarbon oil residues.** Clifton J. Pratt (to Universal Oil Products Co.). U. S. 1,946,947, Feb. 13. Pressure-cracking residue, while at a temp. above 230°, is passed into the vapor space of a chamber contg. water maintained under substantially atm. pressure; constituents volatilized from the residue are removed in vapor form, unvaporized material accumulates in the chamber contg. water and the residue solidifies to an asphalt-like material which is sep'd. and recovered. App. is described.

**Bitumen jelly.** "Rinulgia" Vertriebsgesellschaft für Asphalt-, Teer- und Strassenbauprodukte Clause & Co.

Komm.-Ges. Ger. 589,960, Dec. 19, 1933 (Cl. 80b. 25.06). An asphalt-tar mixt. contg. 7.5-25% tar is heated to 140° and a quantity of boiling alk. water equal to the wt. of the asphalt-tar mixt. is added; 1.5% of an emulsifying agent is also added.

**Separating borneol from pine oil.** Irvin W. Humphrey (to Hercules Power Co.). U. S. 1,945,501, Jan. 30. Pine oil is subjected to the action of H<sub>2</sub>O and the treated oil is fractionated. Cf. C. A. 28, 634<sup>2</sup>.

**Oleoresinous pine-tree product suitable for use in resin soap manufacture, etc.** McGarvey Cline. U. S. 1,945,421, Jan. 30. A natural oleoresin as obtained from living trees is subjected to a heat treatment at a temp. sufficiently high to distill off the water and water-sol. acid constituents but not substantially higher, and leave a substantially transparent, viscous liquid stable over long periods of time.

**Shaft furnace for continuous carbonization of wood, etc.** Adolf Fehmel. Austrian 135,883, Dec. 11, 1933 (Cl. 10c.).

## 23—CELLULOSE AND PAPER

CARLETON F. CURRAN

**The constitution of cellulose.** II. Staudinger. *Chem.-Ztg.* 58, 145-8(1934).—A review. E. H.

**Critical study of some factors influencing the determination of  $\alpha$ -cellulose.** Harry F. Lewis and B. L. Browning. *Paper Trade J.* 97, No. 24, 39-44(1933).—From a crit. comparison of the methods of the U. S. Forest Products Lab. method, the Tech. Assoc. of the Pulp & Paper Ind. standard (which is essentially the same as the Am. Chem. Soc. method) and the U. S. Bur. of Standards, and an expl't. study of the effects of the chief factors influencing the results, a modification of the Tech. Assoc. of the Pulp & Paper Ind. method is presented and will be used as a basis for future investigations. The modifications in technic comprise: (1) control of temp. (maintained at 20°) of all liquids added throughout the operation at least through the acid wash; (2) allowing the alk. suspension to stand after diln. and prior to filtration in order to furnish the dild. alk. soln. its max. peptizing action; (3) washing with 100 cc. of 7.3% NaOH sol. to water wash to remove a considerable amt. of alkali-sol. org. matter.

**The preparation of cellulose from peat disintegrated while in a frozen condition.** E. Pallas. *Kunststoffe* 24, 5-6(1934).—By grinding or otherwise disintegrating frozen peat, recovery of its cellulose in useful form can be greatly facilitated. Use of chemicals can be either avoided entirely or the amts. required greatly decreased.

**The kinetics of cellulose reactions.** Ichiro Sakurada. *Cellulosechem.* 15, 3-8, 17-20(1934).—See C. A. 26, 3662, 6122; 27, 3814, 4667.

**Process for the preparation and aging of alkali cellulose.** F. Steimmig. *Russa* 8, 829, 831(1933).—Pulp in the form of a thin continuous web is passed through a mercerizing bath, supported on 1 or between 2 conveyors; on leaving the bath it is pressed, transferred to another conveyor and passed through an aging chamber in which aging can be carried out at a higher temp. (and consequently in a shorter time) than usual because the condition of the material permits of rapidly cooling it as soon as the required degree of aging has been reached. A. P.-C.

**Impregnating cellulose with cuprammonium.** G. Durst. *Kunststoffe* 24, 27-8(1934).—A patent review.

**Acetylation of cellulose.** D. Krüger and W. Roman. *Angew. Chem.* 47, 58-61(1934).—A discussion of the catalytic action of acids in the acetylation of cellulose in mixts. of glacial AcOH and Ac<sub>2</sub>O, based upon literature data and addnl. expl't. work. The new results with HI, HCl, HClO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and especially with H<sub>3</sub>PO<sub>4</sub> + NaClO<sub>4</sub>, make it probable that the acetylation of cellulose takes place through a salt-like "critical complex," which is

formed by the basic constituents of the cellulose mols. with the catalyst acid. It is likewise probable that undissoc. acid mols. are actively engaged in the catalytic effect. Expl't. data are reported. Fifty-five references.

**Fractionation of commercial acetylcellulose and ethylcellulose.** L. Ubbelohde. *Cellulosechem.* 14, 169(1934).—The viscosity measurements of Herzog and Deripasko (C. A. 26, 2313) and of Okamura (C. A. 28, 1525<sup>9</sup>) are criticized.

**Cellulose esters and their relation to the structure of cellulose.** Malowan. *Nitrocellulose* 5, 26-8(1934).—A review. E. M. Symmes

**Ethyl-, benzyl- and acetylcelluloses, and their dielectric properties.** Max Speter. *Nitrocellulose* 5, 28-9(1934); cf. C. A. 26, 5426.—Films of ethyl-, benzyl- or acetylcellulose assume pos. or neg. charges, depending upon the conditions during rubbing.

**Spontaneous orientation of the micelle in unstretched acetyl- and nitro-cellulose films.** Ichiro Sakurada and Keiraku Futino. *J. Soc. Chem. Ind., Japan* 36, Suppl. binding 659-61(1933).—X-ray examn. of unstretched films showed orientation, asserted by S. and F. to be due to the anisodiametric properties of the cellulose fibers and also to the influence of surface tension.

**Cellulose, lignin and paper-making studies.** Louis E. Wise. *Paper Ind.* 15, 509-11, 568-71(1933-34); cf. C. A. 27, 4923.—A review with 90 references.

**The preparation of lignin, its nitration and the properties of the products obtained.** W. M. Nyhof. *Chem. Weekblad* 31, 90-6(1934).—The elementary analyses of lignins prepd. according to various methods are compared. The agreement between the results would probably have been greater if the various authors had applied a uniform method of drying. The crystals of nitrolignin obtained by Kürschner (C. A. 26, 3103) could not be duplicated and are probably cryst. impurities. The elementary analyses of various nitration products from different authors compare favorably notwithstanding the variation in the materials and the methods.

**The manufacture of a polychromatic viscose foil.** G. S. Ranshaw. *Kunststoffe* 23, 279-80(1933).—Two or more viscose solns. each contg. a different dyestuff are compounded in such a way as to avoid a homogeneously mixed, uniformly colored soln. before pouring the film.

**New methods for investigating rayon.** R. Flint. *Kunststoffe* 24, 32-4(1934).—A general discussion.

**Chemical researches on the woods of Karafuto.** II. Masuzo Shikata and Shokoku Ba. *Cellulose Ind. (Tokyo)*

9, 305 9; *Abstracts* (in English) 37-9(1933); cf. C. A. 26, 5204.---The air-dried pulp (10 g.) from coarse bark (I) and smooth bark (II) of "Eso" spruces, digested with  $(\text{NH}_4)_2\text{SO}_4$ , and contg. 0.33 and 0.30% ash and 86.73 and 86.72%  $\alpha$ -cellulose and the same kinds of barks (III), (IV), digested with  $\text{Mg}(\text{HSO}_4)_2$ , and contg. 0.47 and 0.40% ash and 86.83 and 83.20%  $\alpha$ -cellulose, were mercerized with 90 g. of 18% NaOH soln. at about 18° for 1 hr., pressed to 28  $\pm$  1 g., and treated with 5.5 g.  $\text{CS}_2$ ; the xanthate thus obtained was dissolved in a dil. NaOH soln. so as to contain 7% cellulose and 6% NaOH, ripened at 23° for 6 or 7 days and spun at a velocity of 28.61 m./min. Strengths/denier (g.) of threads were, resp., 0.86 (I), 0.81 (II), 0.62 (III) and 0.63 (IV) (Kipawa 0.91). The  $\alpha$ -cellulose contents of "Eso" spruces are larger than that of Kipawa spruce in general; the viscose threads from these pulps are inferior to that of the latter. However, it is believed that a good viscose pulp will eventually be made from the Japanese spruce. III. *Ibid.* 309-11.---The results of analysis on "Doroyanagi" (*Populus suaveolens* Fish.) "Onohyanagi" (*Salix Opaca* Anders.) and "Bak-hoyanagi" (*Salix Caprea* L.) are (each in %) ash 0.98, 0.42, 0.57; alc.- $\text{C}_2\text{H}_5$  ext. 2.34, 2.39, 4.03; cold-water-sol. matter 1.23, 0.41, 2.07; hot-water-sol. matter 2.86, 2.58, 4.77; 1%-NaOH-sol. matter 24.56, 22.91, 21.25; mannan —, 1.42, 2.37; galactan 1.07, 0.61, 0.58; pentosan 17.41, 19.91, 14.03; hemicellulose 18.48, 20.52, 14.61; N 0.06, 0.06, 0.07; crude protein 0.37, 0.39, 0.43; lignin 22.47, 19.19, 21.22; total cellulose 56.86, 55.71, 54.96;  $\alpha$ -cellulose 33.82, 35.71, 37.27;  $\beta$ - $\gamma$ -cellulose 22.04, 20.34, 17.68;  $\alpha$ -cellulose in total cellulose 59.48, 64.00, 67.83;  $\beta$ - $\gamma$ -cellulose in total cellulose 40.52, 36.00, 32.17; methoxyl 5.41, 5.57, 5.96; [(methoxyl/lignin)  $\times$  100] 24.11, 29.02, 28.08. These *Salicaceae*, especially *Salix Caprea* L. are almost equal in the content of total cellulose and  $\alpha$ -cellulose to *Todomatsu Abies* Juss and inferior to Karafuto spruce described in Part II but may be used as pulpwood. K. Konda

The value of lauan as pulp material. Nobuhiko Migita. *Cellulose Ind.* (Tokyo) 9, 338-42; *Abstracts* (in English) 41-4(1933).---The chemical compn. of white lauan and its pulping by the soda process are described and chem. compn., bleachableness and phys. properties of lauan pulp are given. Lauan wood is not considered to be suitable for paper, since its fibers are unsuitable and the pulp prepd. from them has many defects. On account of its high price, it is hopeless to use lauan pulp for the loading material for softwood pulp. K. Konda

Physicochemical studies of wood. I Qualitative and quantitative studies of gaseous products by the heat decomposition of different kinds of wood impregnated with different chemicals. Setsuro Tamaru, Yoshiki Imai and Satoshi Momma. *J. Chem. Soc. Japan* 55, 30-42(1934).---About 30 anti-igniting chemicals,  $(\text{NH}_4)_2\text{HPO}_4$ ,  $\text{H}_3\text{PO}_4$ ,  $(\text{NH}_4)_2\text{SO}_4$ , etc., were tried. These chemicals decreased the gaseous formation from the thermal decompn. of wood, especially below red heat. The prevention of gaseous formation by the chem. treatment was greater in wood than in pure cellulose at 500°, but this effect was reversed when they were heated at 700°. Therefore, the lignin, and not cellulose, in wood is attacked at 500°. Different chemicals did not give the same effect, but, with the same chemical, the more the wood was impregnated, the less was the gaseous formation by heat. II. Physicochemical studies on the heat decomposition of different kinds of wood and the properties of the solid products. Setsuro Tamaru and Haruo Sakurai. *Ibid.* 43-52.---The rate of decompn. of wood by heat treatment is estd. There is a discontinuity in gaseous and charcoal formation from wood at 310-20° if heated at high temp. for many hrs. Quick heating of wood in a white hot furnace caused the loss of C as volatile gas and decreased the rate of carbonization. The charcoal showed less d. and hardness, while slow heating gave a product of high d. and hardness. Wood impregnated with  $\text{ZnCl}_2$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ , etc., gave less contraction on heating and gave charcoals of high d. and hardness. Carbonization of wood without any oxidation

process caused the formation of inactive C; active C was not formed by heating the wood below 550° even when it was impregnated with  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ ; impregnation with  $\text{ZnCl}_2$  produced activation at low temp. III. Expansion of small wooden test piece by absorption of moisture; velocity and equilibrium of expansion. *Ibid.* 53-65.---Drying of wood in air at 150° for 90 min. or steaming in an autoclave at 150° (4.7 atm. pressure) for 45 min. gave no change in the expansion of wood with addn. of moisture but heating in air at 200° for 2 hrs. or impregnation in boiling oil caused a change. Heating in air at 200° for 2 hrs. caused a change in wood itself, including discoloration. A method for estg. accurately the rate of increase in length by moisture absorption is described. Change in moisture equil. caused an increase in length  $S$  in time  $t$ . The relation of  $S$  and  $t$  can be expressed by the equation,  $S = a \log t + b$ . Consts.  $a$  and  $b$  are discussed from the standpoint of adsorption formula. The relation between the velocity of increase in length  $dl/dt$  by the change of moisture from  $h_1$  to  $h_2$  can be expressed by the formula  $dl/dt = k(h_2 - h_1)/t$ , where  $t$  is the time measured from the moment of increase in moisture. K. Kitsuta

Further investigation of the penetration of liquids into wood. J. H. Sutherland, H. Wyatt Johnston and O. Maass. *Can. J. Research* 10, 36-72(1934); cf. C. A. 24, 5490.---The rate of penetration of water through heartwood, pressure and temp. remaining const., shows an initial fairly rapid decrease followed by a gradual decrease to a const. rate. With unseasoned sapwood, the rate of penetration increases to a max., after which it slowly decreases. With seasoned sapwood the rate decreases with elapsed time. Pre-soaking for periods up to 7 days does not affect the equil. rate of penetration. The initial rate is lower with pre-soaked than with air-dry wood. Pre-soaking does not hasten the attainment of an equil. rate. Rate of penetration is fairly const. for heartwood specimens of the same kind taken from the same transverse section of a tree. Unseasoned sapwood is more than 200 times as permeable as heartwood from the same tree. White spruce, black spruce and red pine heartwoods show about the same penetrability at low pressures. At higher pressures red pine, cedar, tamarack and balsam become much more permeable than white spruce at the same pressure. Unseasoned sapwoods show increasing penetrability in the order hemlock, balsam, red pine, white spruce. Observed apparent penetration radially and tangentially through heartwood is less than 9% of that in the longitudinal direction. In sapwood the rate of radial and tangential penetration is less than 2% of that in the longitudinal direction. Tangential penetration of white spruce sapwood is probably greater than radial penetration. Rate of longitudinal penetration increases with decrease in thickness of the specimen. A large increase in rate is noted after the thickness becomes less than 1 fiber length. This is suggested as a method of obtaining an approximation to the av. fiber length. Rate is not inversely proportional to thickness, but decreases more rapidly with increasing thickness because of loss of pressure head in passing pit membranes. Rate of penetration increases with increase in pressure differential. The rate of penetration is proportional to pressure in white spruce but increases much more rapidly than proportionately with balsam, tamarack, cedar and red pine. Magnitudes of pressure and back pressure have no effect on rate of penetration, or time to reach an equil. rate, if pressure differential remains const. Penetrability is not altered permanently by the application of pressure. Rate of penetration increases with temp. Temps. above 70° have a permanent effect on the penetrability. Intensive drying of wood increases its penetrability. Sucrose solns. cause a decrease in rate of penetration greater than that expected from viscosity considerations. Molar NaOH increases the permeability of heartwood specimens of greater than 1 fiber length, and decreases that of sapwood and very thin sections of heartwood. Molar HCl decreases the rate of penetration through heartwood, but has little effect on



that through sapwood. Gases penetrate seasoned heartwood and sapwood easily. Pre-soaked heartwood strongly resists penetration by gases. Short lengths of unseasoned or pre-soaked sapwood are fairly easily penetrated by gases. All the evidence points to the absence of any valve action on the part of pit membrane tori. A new theory has been advanced to account for the phenomena ordinarily ascribed to valve action.

J. W. Shipley  
Paper-making qualities of woods from Cameroons. P. Heim de Balsac, A. Parveaud and L. Lefèvre. *Bull. agence gén. colonies* 26, 1432 7(1933).—"Ilomba" (*Pycnanthus Kongo* Warb.) was cooked 7 hrs. at a pressure of 3.5-4 kg. per sq. cm., with 5.5% of NaOH (on the wt. of the wood) at a concn. of 7°Bé. It yielded 42.3% of hard-bleaching pulp suitable for the production of ordinary grades of paper. "Esoula" (*Placodiscus pseudostipularis*, Radlk.) cooked 11 hrs. at a pressure of 3.5-4 kg. per sq. cm., with 3.5% of NaOH (on the wt. of the wood) at a concn. of 6°Bé, yielded 27.1% of hard-bleaching pulp suitable only for low-grade papers. "Naliangavele," cooked 6 hrs. at 3.5-4 kg. per sq. cm. with 6°Bé. NaOH, yielded 42% of hard-bleaching pulp that gives a rather weak paper.

A. P.-C.  
Notes on the purity and permanence of wood fibers. Charles A. Blaisdell and Jessie E. Minor. *Paper Ind.* 15, 512 14(1933).—The aging or permanence properties of a very white facial tissue made of highly bleached sulfite wood fiber and of a cream-colored towelling made of unbleached sulfite wood fiber were investigated by detg. Cu no. and absorbence before and after subjection to oven aging (10 hrs. at 100°) or to light aging (exposure for 1 hr. to a Victor x-ray ultra-violet light at a distance of 10 in. and a temp. of 38°). Conclusions: The original Cu no. of papers of this type gives no clue as to the permanence quality of the paper. A marked change of Cu no. with oven or light aging may be considered as indicative of a marked loss of absorbence quality with normal aging. Changes of absorbence quality with oven aging are due to both drying out of moisture and a chem. degradation of the fibers.

A. Papineau-Couture  
Effects of beating on cellulose fibers. James d'A. Clark. *Paper Trade J.* 97, No. 26, 25-31(1933).—C. gives a review of current theories on beating and "hydration," attempting to bring them together into a simple composite theory which satisfactorily explains the different phenomena. Some expl. data on pulp treatment and results on the adhesion of viscose sheets when pressed together under different moisture conditions indicate that cellulose is probably subject to "partial soly." when wetted with H<sub>2</sub>O to form a kind of mucilage and offers a field for further investigation. The following theory, somewhat similar to that of Campbell (*C. A.* 24, 1976, 26, 5416), is advanced: The structure of cellulose fibers is porous, hygroscopic and elastic; the lateral bonds between the rod-like elements formed by the OH groups are not very strong and have a chem. affinity for water; when immersed in H<sub>2</sub>O the fibers swell and the component parts are loosened, certain of the OH groups combining with H<sub>2</sub>O, this destroying these particular bonds and forming a potentially adhesive layer; beating cuts, bruises and flexes the fiber, opens it up further and softens and fibrillates it; when the sheet is formed the fibrils of all dimensions intertwine and the whole is compacted to a greater or less degree by the effects of surface tension; when the paper is dried the combined H<sub>2</sub>O is driven off and mutual OH linkages form to hold the structure together, aided, perhaps, by any other effective noncellulosic materials present. The strength of the sheet primarily depends on the effectiveness with which the fibers and fibrils are prevented from slipping along and between one another, and not on direct tensile effects, which also explains the important function of fiber length on the strength of the sheet. Reply. W. Boyd Campbell. *Ibid.* 98, No. 3, 33-4(1934). Reply. James d'A. Clark. *Ibid.* 34.

A. Papineau-Couture  
The effect of fibers of different sizes on the physical properties of mechanical wood pulp. E. R. Schafer and

Matti Santaholma. *Zellstoff u. Papier* 14, 53-5(1934); cf. *C. A.* 28, 18554.

S. I. Aronovsky  
Modern electric drive and equipment for a wood-pulp factory. W. Kuhl. *Siemens Z.* 14, 58 62(1934).—Ten illustrations. A detailed account emphasizing the advantages of electrified equipment.

C. G. F.  
Strength evaluation of pulp for paper manufacture. Erich Richter. *Zellstoff u. Papier* 13, 431-4, 476 80(1933); cf. *C. A.* 27, 5069. —A discussion of the bursting, tearing and folding strength, Cu no. and freeness detns. of the pulps in relation to their use in paper mfg.

S. I. Aronovsky  
The exchange of cations in strong sulfite pulp. Carl DuRietz. *Zellstoff u. Papier* 13, 558 60(1933); 14, 17 18(1934); *Svensk Kem. Tids.* 45, No. 8, 185 90(1933).—Sulfite pulp is a typical "acidoid," i. e., although insol. because of its high mol. wt. and fiber structure, it contains "sol." but "anchored" acid groups which can fix cations. The pulp is thus analogous to zeolites, permittes, humus acids and other cation-exchanging colloids. The acid groups which give this pulp its "acidoid" character are: (1) the SO<sub>3</sub>H group, strongly acid and completely ionized; (2) weaker acid groups of the carbonate type; and (3) phenolic or other weakly acidic groups. The displacement of the equil. between 2 unequal ions, with increasing diln., favors the multivalent ion, i. e., a pulp said. with Na<sup>+</sup> will exchange them readily for Cu<sup>++</sup>, but not in the opposite direction. In comparing various cations it is remarkable how little difference there is between the various ions of the same valence group. The ash of the pulp may be changed to any desired compn. with suitable salt solns., or it may be entirely eliminated by means of acids. On drying, the stability of the pulp is low against H<sup>+</sup> and in the presence of those cations whose solns. show a strong degree of hydrolysis. These relations complicate the results of the usual *pH* detn. The *pH* values depend not only on the H<sup>+</sup> content of the pulp but also on the concns. of the various other ions which can displace and "activate" the H<sup>+</sup>. For the detn. of the degree of pulping by the "acid no." of Kullgren the following simplified method is proposed: The sample removed from the digester is quickly treated with a Cu salt soln., washed with distd. water, suspended in a KCNS soln. to which a few grains of KI is then added and the suspension titrated with 0.01 N Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> with starch as the indicator.

S. I. Aronovsky  
Comparison of sheet machines for pulp evaluation. R. H. Doughty and C. E. Curran. *Paper Trade J.* 97, No. 25, 38 44(1933).—A comparison of 5 different machines for making pulp test sheets (British standard, Swedish or Sandberg, Valley, Williams and U. S. Forest Products Lab.) showed that the actual differences between machines, either in true values, reproducibility of results, or duplicability of test sheets, are remarkably small, much more significance attaching to the procedures of pressing and drying the sheets, or to other operations subsequent to formation, than to the operation of sheet making by itself.

A. Papineau-Couture  
Production of half-pulp from straw without pressure. M. Resh, L. Skulskaya and A. Rubenkina-Goer. *Unterlagen Inst. (Moscow) Ausgabe II*(1933); *Zellstoff u. Papier* 14, 56-7(1934).—The effects of chemicals and their quantities, of liquor concn. and of temp. were studied on the production of half-stuff from straw without pressure. Expts. with Ca(OH)<sub>2</sub> (24 hrs. at 15°) and Na<sub>2</sub>CO<sub>3</sub> (3 hrs. at 80°) gave poorer results than those obtained with NaOH. Alk. smelt liquors, from the regeneration of the monosulfite and kraft processes, were also used, the ratio of NaOH to Na<sub>2</sub>S being varied. The optimum results were obtained at 80° for 1-2.5 hrs. with NaOH + Na<sub>2</sub>S equal to 10-17% of the dry straw. Bleaching expts. gave poor results.

S. I. Aronovsky  
Bleaching rag pulp. S. A. Fotiev and S. Bogdanov. *Unterlagen Inst. (Moscow) No. 4/31; Zellstoff u. Papier* 14, 21(1934).—Slow bleaching results in good strong fibers, while fast bleaching weakens the fiber. An increase of 10° in bleaching temp. doubles the speed of bleaching and

increases the consumption of bleaching powder 4-5%.

S. I. Aronovsky

Application of elementary statistical methods in the testing of pulp and paper. F. A. Simmonds and R. H. Doughty. *Paper Trade J.* 97, No. 25, 32-7(1933).—A demonstration of the application of elementary statistical methods to the testing of pulp and paper, showing that, if properly applied, they furnish valuable information as to the accuracy of test values, the significance of differences, and the comparative merits of operations or results.

A. Papineau-Couture

Precision of measurements, with pulp and paper applications. D. S. Davis. *Paper Ind.* 15, 505-8(1933).—A brief discussion of the 3 principal fields to which precision studies may be confined, with illustrations in each type taken from fields familiar to the pulp and paper technicians.

A. Papineau-Couture

Rapid method for the determination of moisture and consistency of insulating board pulp. Lionel K. Arnold. *Paper Trade J.* 98, No. 1, 40(1934).—A description of a technic using the xylene-distn. method, which has been found to give practically the same results as the ordinary drying method but requires only from 20 to 30 min. above the time required for weighing the samples. A. P.-C.

Investigation of various physicochemical factors which influence sulfite cooking. H. H. Saunderson and O. Maass. *Can. J. Research* 10, 24-35(1934); cf. C. A. 27, 3815.—The penetration of aq. sulfite solns. into differently shaped blocks of spruce wood was investigated and the effect of the shape, type of wood, and of the presence of imprisoned air detd. Measurements of the rates of diffusion of the constituents of  $\text{Ca}(\text{HSO}_3)_2$  solns. into pre-soaked blocks of wood showed that "free"  $\text{SO}_2$  diffused more readily than  $\text{Ca}(\text{HSO}_3)_2$ . Adsorption of  $\text{SO}_2$  and  $\text{Ca}(\text{HSO}_3)_2$  solns. by spruce wood was measured at 30° and 50°, and the influence of this factor on penetration was detd. The effect of penetration on delignification indicated the necessity of a satisfactory distribution of the lime salt at a low temp. to avoid localization of the lime during the pulping process. The relation of the findings to current practice in the sulfite mill is discussed.

J. W. Shipley

The sulfite cooking process. N. N. Nepenin and P. V. Khviyuzov. *Unterlagen Inst. (Moscow) Ausgabe II* (1933); *Zellstoff u. Papier* 14, 21-2(1934).—The relief gases consist of  $\text{SO}_2$ ,  $\text{CO}_2$  and N. The N is present in the relief gases until the end of the cook. The vol. of  $\text{CO}_2$  increases with temp. and totals 1.43% of the wood.  $\text{H}_2$ , CO and hydrocarbons are not present in the relief gases. The largest portions of the gases consist of  $\text{SO}_2$ . The free  $\text{SO}_2$  impregnates the wood more quickly than does combined- $\text{SO}_2$ . The absorption of the free  $\text{SO}_2$  takes place mainly in the early part of the cook. The S consumption increases with the increased  $\text{SO}_2$  content of the cooking liquor.

S. I. Aronovsky

New developments in pulp cooking. Erik Hägglund. *Zellstoff u. Papier* 13, 473-6(1933).—A brief review of the theories of sulfite cooking followed by a discussion of the effects of liquor circulation systems for the sulfite and alk. processes. The advantages of forced liquor circulation systems are cited.

S. I. Aronovsky

Stuff quality of sulfite cooks. E. Richter. *Zellstoff u. Papier* 13, 560-3(1933).—A discussion of the effects of the human element, acid fluctuation in the digester relief acid, age and moisture content of the wood, cooking time, etc., on the quality of sulfite pulp and of the paper into which it is made.

S. I. Aronovsky

Thickeners with forced circulation of the stuff. A. A. Chlebnikoff. *Zellstoff u. Papier* 14, 19-20(1934).

S. I. Aronovsky

United States patents on paper making. Fourth quarter, 1933. Clarence J. West. *Paper Trade J.* 98, No. 2, 33-6(1934); cf. C. A. 28, 1857<sup>1</sup>.

A. P.-C.

Coordination of technical control, research and development with practical [paper] mill operation. K. A. Taylor. *Paper Trade J.* 98, No. 4, 33-6(1934).—An address outlining the main types of work done by a well organized technical organization. A recommended practice to be

<sup>1</sup> included in the Manual of Standards of the Tech. Assoc. of the Pulp & Paper Ind. is suggested.

A. P.-C.

Standardization of materials purchasing specifications. A. E. H. Fair. *Paper Trade J.* 98, No. 6, 43-4(1934)

A general outline of the progress made and desired relative to establishing specifications for such materials as wool, pulp, alum, sizes, felts, wires, coal and lubricants.

A. Papineau-Couture

<sup>2</sup> Preliminary notes on continuous refining. D. Manson Sutherland, Jr. *Paper Trade J.* 98, No. 4, 37-9(1934).—A discussion of continuous refining and of the results obtained in some preliminary mill-scale tests, indicating that: (1) Temps. higher than those normally experienced in batch refining are to be expected. (2) The refining actions now produced by the batch system can be obtained in 1 or more continuous machines which must be synchronized in capacity with the paper machine. (3) Continuous sizing, coloring and loading systems must be further developed to work in conjunction with continuous refining. (4) Some progress is being made in the development of continuous refining.

A. P.-C.

Consistency regulator and freeness recorder. E. J. Trimbe. *Pulp Paper Can.* 35, 12-13(1934).—A description of the Trimbe-Witham, Jr., consistency regulator and freeness recorder.

A. P.-C.

<sup>3</sup> The determination of the wool content of paper. Charles A. Blaisdell and Jessie R. Minor. *Paper Ind.* 15, 625-7(1934).—From a comparative study of the Kjeldahl and microscopic methods of detg. wool in paper, it is concluded that: (1) In mill beating more wool than cotton is lost; in the lab. stir method this loss amounts to almost 10 times as much for the wool as for the cotton. Any increase in the extent or intensity of beating is apt to give by analysis a lower percentage of wool in the finished product. (2) When a factor considerably larger than 2.0 is needed to bring agreement between the microscopic and Kjeldahl methods, it is probable that the Kjeldahl value has been increased by the adherence of structureless, N-contg. wool material to the fibers. (3) Where the machine water is recirculated, it is probable that the Kjeldahl value would be built up to approx. the same figure as that of the original furnish. (4) When the outer layer of the wool fiber has been gelatinized the under cortical layer tends to fibrillate, showing clearly under the microscope frayed ends as in cotton; but as they lack the strength to develop any long fibrils, they soon lose their structure, and it is this entire gelatinized mass which accounts for the discrepancy between the Kjeldahl and microscopic methods of analysis. (5) The microscopic method gives better concordance between different samples of the same lot than does the Kjeldahl method. (6) A microscopic dot-count method, with a factor of 2.0 for wool and 1 for cotton, gives results which are probably more nearly correct for the wool content of the finished paper than does the Kjeldahl method.

A. Papineau-Couture

Determination of acid-soluble iron in paper. Anon. *Paper Trade J.* 98, No. 3, 37(1934).—A description of the tentative standard method of the Tech. Assoc. of the Pulp & Paper Ind.

A. Papineau-Couture

<sup>4</sup> Automatic mechanical control and direct water system. Melvin R. Ware. *Paper Trade J.* 97, No. 26, 18, 21(1933).—A brief description of a system which is in successful operation on a machine making rag roofing stock. Complete re-use of white water is effected.

A. Papineau-Couture

Sizing and the paper machine. G. M. Papeterie 55, 222-6, 286 90, 334-42(1933).—A discussion of the retention of different types of size and of the physicochem. changes undergone by sizing agents on the paper machine and of their effects on sizing quality. Data are presented on the m. ps. of sizes pptd. under the same conditions as in mill practice (but in absence of fiber) and on the sizing quality of paper sized with Na resinate and with free-rosin size, resp., and dried under different conditions, they show that the greater uniformity and superiority of the sizing obtained with a 90-5% free-rosin size (contg. less than 3.5% total alkali), as compared with rosin-soap

size, is due at least in part to the fact that the free rosin deposited on the fibers actually melts or sinters on the driers, whereas the Al resinate does not. A. P.-C.

A review of the literature of sizing. E. Sutermeister. *Paper Trade J.* 97, No. 4, 18-25; No. 21, 26-31; No. 22, 20-5(1933); 98, No. 1, 25-31(1934). A. P.-C.

Liquid rosin and its utilization. W. Schmid. *Zellstoff u. Papier* 13, 571-2(1933).—Among other uses, the liquid rosin made from sulfate black liquor may be used in conjunction with bentonite and NaOH, in deinking old newspaper. S. I. Aronovsky

Beater addition of titanium pigments. Wm. R. Willets. *Paper Trade J.* 98, No. 6, 37-9(1934); cf. C. A. 27, 5973. —A discussion of Ti pigments when used as fillers in the beater. A. Papineau-Couture

Beater and jordan control. G. Lamont Bidwell, Jr. *Paper Trade J.* 98, No. 5, 33-5(1934).—Means are outlined whereby instruments may be used to control the freeness, consistency and other properties of pulp by mech. regulation of beater rolls and jordan plugs. A. P.-C.

Significant sheet properties for developing specifications for various papers and paperboards. P. K. Barrd. *Paper Trade J.* 98, No. 2, 40-6(1934).—An analysis of a survey on the use requirements of papers as expressed in sheet properties indicated: (1) the sp. properties considered of importance in setting approx. specifications for each class and grade of paper; (2) the order of importance or rating for each of the selected properties for each grade and class; (3) the grand order of importance or rating for each property as related to papers and paperboards (all classes as a group). A. Papineau-Couture

Bituminous emulsions in the manufacture of paper and boards. Henri Calmels. *Papeterie* 56, 58-60(1934). A crit. review of a few of the chief patents on the production of bituminized paper or board by the use of emulsions instead of by impregnation of the felted sheet. A. P.-C.

Determination of the amount of coating of mineral-coated paper. Anon. *Paper Trade J.* 98, No. 1, 37(1934). —A proposed revision of the official method of the Tech. Assoc. of the Pulp & Paper Ind. is described, suitable for the ordinary types of mineral coatings, and having an accuracy of 0.5 2%. A. Papineau-Couture

The use of latex in coated papers. W. H. Birchard. *Paper Ind.* 15, 561-3(1934). —Com. runs have shown the possibility of using latex in coated papers and thus producing a paper of improved properties for the printer at no increase in cost. The method of using latex in the coating "color" is described, and its advantages are briefly indicated. A. Papineau-Couture

The rate of drying of newsprint. F. W. Adams. *Paper Trade J.* 98, No. 1, 38-40(1934).—Application to the drying of newsprint of Montgomery's (C. A. 27, 3330) equations for drying rates of kraft paper showed that production and evapn. rates in drying newsprint increase with steam temp., and that they are considerably greater than for kraft and board. A. P.-C.

Drying paper and cellulose-containing raw materials in the laboratory. F. A. Simmonds. *Zellstoff u. Papier* 13, 135-6, 480 2, 518 9(1933).—See C. A. 27, 4075. S. I. A.

The analysis of paper ash containing titanium pigments. J. M. Jarmus and W. R. Willets. *Paper Trade J.* 98, No. 1, 41 3(1934).—A detailed description of the technique of the detn. of Ti in paper ash by reducing the soln. of the Ti salt in a Jones reductor and titrating with standard  $\text{Fe}^{+++}$   $\text{NH}_4$  sulfate soln. The technique to be followed in the presence of large amts. of Ba and in its absence (or in the presence of only small amts.), resp., are described. The procedure for a complete analysis of the ash in the absence of  $\text{BaSO}_4$  is also given. A. Papineau-Couture

Paper testing with barrier-film photocells. L. Bloch. *Zellstoff u. Papier* 14, 9-13(1934).—This instrument is useful not only for the optical testing of finished papers but it may also be used in the course of mfg. the paper to obtain uniform results. S. I. Aronovsky

The initial tear and through-tear resistance of papers. W. Brecht and O. Imset. *Zellstoff u. Papier* 13, 564-7(1933); 14, 14-16(1934).—The manual initial tear and

through-tear (ripping) tests are 2 fundamentally different testing procedures. Their results are not identical and they cannot be substituted for each other. The mechanics of the tearing resistances obtained by these 2 methods and a no. of diagrams are given. S. I. Aronovsky

Lacquered wrapping paper (waterproof) in rolls. Walter Sembritzki. *Zellstoff u. Papier* 13, 575(1933).—A brief discussion of waterproof wrapping paper made by coating one side of the paper. S. I. Aronovsky

Razek-Mulder color analyzer and its use for the measurement of pulp and paper color (Hatch, Hauff) 1. Tetraconiferylaldehydehydrosulfonic acid (Klason) 10. Artificial masses [products used for manuf. of films, wrapping sheets] (Brit. pat. 401,200) 18. Ethylene glycol phthalate [used as a plasticizer with nitrocellulose] (U. S. pat. 1,946,202) 10.

Jaffé, Albert: Geschichte der Papiermühlen im ehemaligen Herzogtum Zweibrücken mit besonderen Berücksichtigungen der allgemeinen Papiergeschichte sowie der Entwicklungs-geschichte der rheinpfälzischen Papierindustrie und der Wasserzeichentechnik. Pirmasens: Selbstverlag. 150 pp.

Cellulose. Francesco Carlo Palazzo and Fortunato Palazzo. Austrian 136,005, Dec. 27, 1933 (Cl. 55c). This corresponds to Brit. 388,656 (C. A. 27, 5974) but describes the use of slightly different concns. and conditions.

Cellulose. Jens W. A. Elling. Ger. 589,751, Dec. 13, 1933 (Cl. 55b. 2.01). A double digester in which the fibrous material is heated, circulated and reheated, is described.

Cellulose. Adolf Basler. Ger. 591,115, Jan. 17, 1934 (Cl. 55b. 1.10). Straw or like grass material is boiled for 1 2 hrs. with caustic alkali soln.  $\text{Ca}(\text{OH})_2$  is then added, and boiling continued for a short time.

Cellulose. Philippe J. Planquaert. Fr. 756,553, Dec. 12, 1933. Cellulose is extd. by impregnating wood with NaOH and then dry-heating it.

Cellulose. Umberto Pomilio. Fr. 756,626, Dec. 13, 1933. Vegetable material is treated in a continuous manner with a dil. soln. of NaOH and Cl, the material being caused to descend by gravity in a tower and the reagents being introduced at an intermediate point of the tower and passing in countercurrent to the material.

Bleaching cellulosic fibers. Roland Runkel. Ger. 591,111, Jan. 16, 1934 (Cl. 55c. 1). An aq. suspension of the fibers is treated first with caustic alkali soln. and Cl supplied together, and then with the same reagents supplied in turn. Further treatment with the reagents supplied together may follow. The fibers may be washed between the stages. An example is given.

Felted sheets of artificially crinkled cellulose fiber. Frank H. McCormick and George L. Schwartz (to E. I. du Pont de Nemours & Co.). U. S. 1,944,907, Jan. 30. Sheets suitable for making artificial leather are formed of felted artificially crinkled cellulose fibers impregnated with a mixt. of drying oil and bituminous material, the fibers having a freeness of 15 to 40 sec. and having the substantially circular form in cross section such as characterizes material treated with solns. of NaOH of mercerizing strength.

Manufacture of tubes from sheet cellulose material. Otto W. Dieffenbach. U. S. 1,944,970, Jan. 30. Various details of app. and operation are described.

Waterproofing cellulosic materials. Sylvania Industrial Corp. Fr. 756,477, Dec. 11, 1933. The materials are waterproofed by forming thereon a transparent film of wax, between 0.1 and 0.01 micron. The wax is deposited in the form of fine particles and heated. An intermediate layer contg. nitrocellulose, dibutyl phthalate and colza oil may be applied to make the wax adhere.

Esterifying cellulose. Robert E. Fothergill and Frederick C. Hahn (to E. I. du Pont de Nemours & Co.). U. S. 1,945,310, Jan. 30. Various examples with details of

procedure are given in which anhyd. HF (suitably in a proportion of 4 to 6 times the wt. of the cellulose under treatment and at a temp. of 0°) is used as a reaction medium in esterification of cellulose material such as cotton linters to produce cellulose acetate, acetobutyrate, acetolaurate, caproate-heptate, phthalate, nitrate, acetate-nitrate and ethylcellulose propionate, and the process is stated to be generally applicable for the production of numerous other simple and mixed cellulose esters which are mentioned.

**Cellulose esters.** Henry Dreyfus. U. S. 1,947,463, Feb. 20. In the production of cellulose esters containing hydroxyalkylacyl groups, cellulosic material such as cotton pretreated with formic acid is treated with hydroxyaliphatic acid anhydrides, such as glycolic anhydride (to form cellulose glycolates).

**Cellulose esters.** Eastman Kodak Co. Ger. 587,952, Nov. 13, 1933 (Cl. 120. 6). See Brit. 287,880 (C. A. 23, 512).

**Cellulose esters.** I. G. Farbenind. A.-G. Ger. 591,120, Jan. 17, 1934 (Cl. 120. 6). Addn. to 560,685 (C. A. 27, 1166). The process of Ger. 560,685 is applied to the prepn. of sol. esters of cellulose with satd. or unsatd. heterocyclic monocarboxylic acids, including heterocyclically substituted fatty acids. An example is given of the prepn. of a cellulose isonicotinate. Esters of cellulose with carboxylic acids of furane, coumarone, thiophene, pyrrole, pyrrolidine, indole, piperidine, pyridine, quinoline, isoquinoline, pyridazine, pyrazine and piperazine are stated to be obtainable.

**Cellulose esters.** Eastman Kodak Co. Ger. 588,876 and 588,877, Nov. 30, 1933 (Cl. 120. 6). See U. S. 1,946,620 and Brit. 304,278 (C. A. 23, 512).

**Organic esters of cellulose such as mixed cellulose stearyl, palmityl and acetyl derivatives.** Carl J. Malm (to Eastman Kodak Co.). U. S. 1,946,632, Feb. 13. Cellulose is treated with an acyl halide such as stearic and palmitic chlorides and the resulting product is subsequently acylated with an agent such as  $\text{Ac}_2\text{O}$  containing a lower number of C atoms than the acyl halide preliminarily used. Cf. C. A. 28, 635<sup>2</sup>.

**Use of esters such as the acetic, phthalic or succinic ester of trichloro-*tert*-butyl alcohol as a plasticizer with cellulose organic esters such as cellulose acetate.** Henry H. Smith (to Eastman Kodak Co.). U. S. 1,946,643, Feb. 13.

**Acetyl cellulose.** Michael Melamid. Ger. 589,545, Dec. 12, 1933 (Cl. 120. 6). The acetylation is carried out at 50-100 atm. pressure. In the example, cotton is treated with  $\text{Ac}_2\text{O}$ , glacial  $\text{AcOH}$  and concd.  $\text{H}_2\text{SO}_4$  at 50-100 atm. pressure.

**Treating cellulose esters such as cellulose acetate to reduce their viscosity.** Cyril J. Staud and Thomas F. Murray, Jr. (to Eastman Kodak Co.). U. S. 1,946,645, Feb. 13. The air-dried material is subjected to the action of a gas such as  $\text{SO}_2$  or  $\text{Cl}_2$ .

**Cellulose acetate compositions.** C. F. Boehringer & Soehne G. m. b. H. (Richard Müller and Alfred Lubke, inventors). Ger. 591,305, Jan. 20, 1934 (Cl. 39b. 12.01). Monohydroxybiphenyls are used as gelatinizing and softening agents for primary and secondary cellulose acetates.

**Rapid seasoning of transparent film base containing cellulose acetate.** Martin Marasco (to Dupont Film Mfg. Corp.). U. S. 1,947,419, Feb. 13. The material is bathed in  $\text{MeOH}$  and then dried under only enough tension to prevent wrinkling during the drying.

**Cellulose ester and ether compositions.** Soc. des usines chim. Rhône-Poulenc. Ger. 591,366, Jan. 20, 1934 (Cl. 39b. 12.01). See Brit. 373,704 (C. A. 27, 3818).

**Cellulose ethers.** Alfred S. Levesley and Frederick C. Randall (to Imperial Chemical Industries Ltd.). U. S. 1,944,896, Jan. 30. Cellulose ethers yielding low-viscosity solns. are obtained by digesting cellulose ethers such as cellulose benzyl or ethyl ethers yielding high viscosity solns. with dil. acids such as  $\text{HCl}$  or oxalic acid in the presence of a considerable quantity of a water-sol. salt such as  $\text{NaCl}$  or  $\text{Na citrate}$ .

**Use of  $\beta$ -phenoxy- $\beta'$ -chlorodiethyl ether as a plasticizing agent with cellulose organic esters such as cellulose acetate or acetate-propionate.** Thomas F. Murray, Jr., and Wm. O. Kenyon (to Eastman Kodak Co.). U. S. 1,946,635, Feb. 13.

**Cellulose derivatives.** Henry Dreyfus. U. S. 1,947,464, Feb. 20. Cellulose is treated with amino alkylating agents such as 3-acetamidobenzyl chloride or 2-(chloromethyl)benzylamine in the presence of an alkali such as  $\text{NaOH}$  to form derivs. such as *m*-acetamidobenzyl cellulose or *o*-(aminomethyl)benzyl cellulose.

**Cellulose derivative compositions.** Ennette F. Izard (to E. I. du Pont de Nemours & Co.). U. S. 1,947,008, Feb. 13. A cellulose deriv. such as cellulose nitrate, acetate or butyrate is used with an ester formed from a polyhydric alc. having 2-6 C atoms and a halogenated aliphatic acid having 2-4 C atoms, e. g., glyceryl di- or tri chloroacetate, which serves as a plasticizer.

**Reducing the viscosity of cellulose nitrate.** Roderick K. Eskew (to Dupont Viscoloid Co.). U. S. 1,946,067, Feb. 6. A pyridine base such as pyridine itself is employed as a viscosity-reducing agent, and after the treatment is removed by use of an aldehyde such as formaldehyde.

**Felt-like celluloid.** Ichirō Yoshida. Japan. 160,430, Apr. 5, 1933. An amyl acetate soln. of celluloid is formed into threads by passing through small holes. After partial drying the threads are collected and pressed into felt-like state. The product is used as a filter for acids or oils or as a separator in a primary cell.

**Pyroxylin sheet material.** Guy E. Alling (to Athol Mfg. Co.). U. S. 1,945,250, Jan. 30. A product suitable for use as a leather substitute, etc., is made by spreading a layer of pyroxylin soln. containing a plasticizer upon a substantially air-pervious sheet such as a textile web to which it will not firmly adhere, drying the layer, and stripping it from the sheet. App. is described.

**Covering articles with pyroxylin.** Wm. C. Hampton (to Crawford, McGregor and Canby Co.). U. S. 1,946,208, Feb. 6. Various operative details are described suitable for covering articles such as knobs or golf clubs, or the like with preformed pyroxylin coatings. Cf. C. A. 27, 3075.

**Viscose capsules.** Kalle & Co. A.-G. (Julius Voss, inventor). Ger. 589,575, Dec. 9, 1933 (Cl. 39b. 12.03). Shrunk opaque capsules are prepd. by treating viscose capsules containing insol. alk.-earth salts as pigment with aq. solns. of alkali carbonates. The capsule surfaces are then washed with dil. acid to remove the alk.-earth carbonate formed.

**Viscose spinning solution.** N. V. Hollandsche Kunstzijde Industrie. Dutch 31,214, Nov. 15, 1933. Excess  $\text{CS}_2$  (56 to 63 parts per 100 parts cellulose) is present in viscose of low cellulose content (5.5%); more  $\text{CS}_2$  is added for less cellulose. A thread of good strength is obtained (6 to 1 denier).

**Filaments, films, etc., from viscose.** Feldmühl: A.-G. vorm. Loeb, Schoenfeld & Co. Ger. 591,427, Jan. 22, 1934 (Cl. 29b. 3.02). Filaments, etc., of reduced luster are obtained by emulsifying in the viscose soln. a product obtained by treating an unsatd. fatty acid with a compd. of S and Cl. A product obtained from oleic acid and 1  $\text{C}^{60}$  of  $\text{S}_2\text{Cl}_2$  is suitable.

**Viscose rayon.** Gustav J. Nord. U. S. 1,945,330, Jan. 30. A mass of viscose rayon staple fibers is placed in a vat containing water in which there is placed about 2 lb. of olive oil and palm oil to every 100 lb. of the fibers, together with about 2 lb. salt or  $\text{Na}_2\text{SO}_4$ ; the bath is heated to about 55° and the mass is agitated for about 20 min., subjected to the action of a squeeze roll to set the kinks and squeeze the mass into a mat-like form, and then is dried at a temp. of about 80°.

**Rayon.** Algemeene Kunstzijde Unie N.V. Fr. 757,136, Dec. 20, 1933. The spinning soln. is caused to pass through an envelope of cotton wool or other fibrous material. **Rayon.** Kurashiki Kensyoku K. K. (Yoshio Moriwaki, inventor). Japan. 99,299, Feb. 1, 1933. Viscose

soln. contg. 1-10% of a soln. of solid paraffin in an org. solvent is emulsified with a suitable reagent.

**Rayon.** Kurashiki Kensyoku K. K. (Yoshio Moriwaki, inventor). Japan 99,832, Feb. 28, 1933. Rayon is prep'd. by treating a mixt. of alkali cellulose and 10% of org. compds. (such as benzene or the like, petroleum hydrocarbons, terpenes) with  $CS_2$ .

**Rayon, etc.** Uddelholms Aktiebolag. Skoghalls-Verken. Fr. 757,214, Dec. 22, 1933. Higher alcs., their derivs., sulfonation products or N compds., e. g., borneol or leophene are added to the fibrous materials or necessary agents used in the manuf. of rayon, films, ribbons, etc.

**Rayon, etc.** Henry Dreyfus. Fr. 757,224, Dec. 22, 1933. Threads, films, ribbons, etc., made from org. derivs. of cellulose are subjected during or after formation to the action of a relatively volatile solvent of the cellulose deriv., applied conjointly with a non-solvent of the deriv. and in the presence of a relatively small proportion of a solvent which, under the conditions, has a vapor pressure lower than that of the non-solvent applied. Thus, a soln. of cellulose acetate in acetone is extruded in a coagulating bath contg. dioxane 40.5, diacetone-alc. 5 and water 50-55%, or cellulose acetate threads are immersed in an aq. bath contg. dioxane 44.7 and methylglycol monoacetate 3.5%.

**Rayon from nitrocellulose solutions.** Jacques Delpech and Constantin Heinrich. Ger. 591,066, Jan. 16, 1934 (Cl. 29b. 3.03). See Fr. 698,423 (C. A. 25, 3168) and 39,153 (C. A. 26, 2317).

**Spinning pot for rayon.** Comptoir des textiles artificiels (Soc. anon.). Fr. 757,083, Dec. 20, 1933. Construction is described.

**Cover for rayon spinning.** Comptoir des textiles artificiels (Soc. anon.). Fr. 757,118, Dec. 20, 1933. Construction is given.

**Means for controlling the centrifuges in spinning rayon.** Barmer Maschinenfabrik. A.-G. Fr. 756,324, Dec. 8, 1933.

**Combined pot- and bobbin-spinning machine for rayon.** Kirkles Ltd., Arthur Bennett and Wm. Tong. Ger. 591,129, Jan. 17, 1934 (Cl. 29a. 6.01). This corresponds to Brit. 380,566 (C. A. 27, 4079).

**Cellulose ester and ether threads, ribbons, etc.** Henry Dreyfus. Brit. 401,335, Nov. 13, 1933. The dry spinning of filaments, etc., from cellulose esters and ethers of high viscosity characteristics is facilitated by prolonging the period during which the filaments, etc., extruded from the spinning nozzles, remain in a fluid state, as by retarding the evapn. of solvent therefrom during the early part of their travel or preferably by including in the spinning soln. at least 30% of a (partial) solvent of relatively low volatility or by using such a solvent as the solvent of the spinning soln. Solvents mentioned are the cyclic ether obtained from ethyleneglycol and  $CH_2O$ , dioxane, methyl-dioxanes, diox-tioxan, di-ethers of dioxidioxanes, diacetone alc.,  $MeEtCO$ , butyrene and Et lactate.

**Funnel and outlet tube, etc., for producing artificial threads from solutions.** Hugo Hofmann (to American Benberg Corp.). U. S. 1,917,159, Feb. 13.

**Artificial fiber.** Camille Dreyfus and William Whitehead (to Camille Dreyfus). Can. 339,291, Feb. 6, 1934. An insol. salt or oxide of Bi is incorporated in the dope or spinning soln. contg. an org. deriv. of cellulose. Generally the amt. of Bi comp'd added is 0.1 to 10.0% by wt. of the cellulose comp'd. present in the finished yarn. Fibers and yarns produced have a pleasing appearance and unproved textile properties.

**Bleaching of bamboo sheath.** Masakichi Shirota. Japan 90,783, Feb. 24, 1933. The bamboo sheath, softened with water, is treated with dil. HCl and bleaching powder soln.

**Digester and associated apparatus for cooking fibrous material to produce paper pulp.** Lloyd D. Smiley (to Chemipulp Process, Inc.). U. S. 1,945,205, Jan. 30. Various structural and operative details are described.

**Wood pulp.** Aimwell G. MacIntyre (to A. E. Staley Mfg. Co.). U. S. 1,945,862, Feb. 6. Digestion of wood in a liquor such as an acid or alk. soln. is effected in the

presence of a dispersing colloid other than that contained in the wood, such as a starch conversion gum.

**Apparatus for forming wood pulp with digester liquors such as acid sulfite solution.** Albert D. Merrill. U. S. 1,945,504, Jan. 30. Various structural and operative details are described.

**Cylindrical suction apparatus for dewatering wood pulp, etc.** Sverre Diesen. Ger. 591,468, Jan. 22, 1934 (Cl. 55d. 13.20).

**Nitrocellulose from wood pulp.** Ernest Tschudin. U. S. 1,945,101, Jan. 30. Wood pulp is treated with soda lye and  $CS_2$  to form a slightly gelatinous paste, the paste is formed into pellets, the pellets are immersed in a hardening soln. such as  $SO_2$  or  $NaHSO_3$  soln. and are then nitrated to form a product which may be used for explosives or other purposes.

**Bleached refined cellulose pulp.** George A. Richter (to Brown Co.). U. S. 1,945,202, Jan. 30. A bleached, refined, soft and absorbent cellulose pulp in unmercerized condition is derived from long raw fibers such as hemp, jute, china grass, ramie, manila and sisal, by a described digestion with NaOH soln. and has an  $\alpha$ -cellulose content of at least about 93% and can be converted into stable paper of greater tear resistance than papers prep'd. from the raw fibers. Cf. C. A. 27, 417.

**Paper pulp beating engine or refining engine.** Samuel Milne. U. S. 1,947,440, Feb. 13. Structural and mech. details.

**Hydrating mercerized paper pulp.** George L. Schwartz (to E. I. du Pont de Nemours & Co.). U. S. 1,944,900, Jan. 30. A product suitable for use in making artificial leather is prep'd. by treating mercerized but substantially unpurified paper pulp, of pentosan content above 5%, with water until the pulp is hydrated.

**Paper paste and pulp strainer.** Marcel Lamort (to Établissements E. & M. Lamort Fils). U. S. 1,945,492, Jan. 30. Structural and mech. features.

**Paper.** Charles I. Goessmann. U. S. 1,944,886, Jan. 30. Raw stock paper is impregnated with a nitrogenous colloid, and laminations are immediately formed of the impregnated stock prior to solidification, the laminated stock is chilled, then impregnated with a fixing agent such as alum or a chromate and the product is dried. App. is described.

**Paper.** Hector McVicker and Edwin F. Bearce (to Chillicothe Paper Co.). U. S. 1,945,118, Jan. 30. A marginal strip is severed from a paper sheet while on the wire, the severed strip is conveyed as a trim for an addnl. distance on the wire, then is removed, mixed with "white water" and the mixt. is returned to the system after the Jordan engines. Various app. features are described.

**Paper-making apparatus.** Frederick W. Vickery (to Vickery Inc.). U. S. 1,945,761, Feb. 6. Mech. details.

**Fourdrinier paper-making apparatus.** Frank M. Sanger (to Hagley and Sewall Co.). U. S. 1,946,592, Feb. 13. Mech. features.

**Paper-making machine (Fourdrinier type).** Wm. H. Millsbaugh. Ger. 591,249, Jan. 19, 1934 (Cl. 55d. 8.30). See Brit. 369,907 (C. A. 27, 3078).

**Electrically operated paper-making apparatus.** Akt.-Ges. Brown, Boveri & Cie. Ger. 591,441, Jan. 22, 1934 (Cl. 55d. 25).

**Steam-circulation system for paper-making machines.** V. I. B. Apparatchau-Ges. m. b. H. Ger. 591,302, Jan. 19, 1934 (Cl. 55d. 28.01).

**Suction box for paper-making machine.** Rohrbacher Lederfabrik Jos. Pöschl's Söhne A.-G. Austrian 135,846, Dec. 11, 1933 (Cl. 55b.). Addn. to 133,780 (C. A. 27, 4925).

**Drying felts for paper-making machines.** Thomas Hindle and Sam Lord. Brit. 401,468, Nov. 10, 1933. The felts are impregnated with a soln. or suspension of an alk. carbonate,  $Ca(OH)_2$  or  $CaCO_3$  to neutralize acid carried thereto by the paper web.

**Paper-mill hollander.** Helmut Banning. U. S. 1,946,347, Feb. 6. Structural features.

**Apparatus for regulating the consistency and indicating**

the "freeness" of paper-making stock. Geo. S. Witham, Jr. U. S. 1,945,968, Feb. 6.

Centrifuge for unfelted paper and cellulose. I. W. Erkens Maschinenfabrik und Eisengieserei. Ger. 589,878, Dec. 16, 1933 (Cl. 55d. 2.01).

Artificial fabric. George L. Schwartz (to E. I. du Pont de Nemours & Co.). U. S. 1,945,537, Feb. 6. Material such as may be produced by dispersing paper pulp with 8-35% NaOH soln. at room temp. and promptly washing out the caustic, is used in making sheets of artificially crinkled fibrous cellulosic material in which starch is absorbed and which are flexible exhibit very little paper-break and are strongly resistant to tear and suitable for use in bookbinding and for various other purposes. U. S. 1,945,538 relates to similar sheet material impregnated with rubber latex and coagulated.

Coating paper. The Champion Coated Paper Co. Ger. 591,442, Jan. 22, 1934 (Cl. 55f. 15.20). See Brit. 379,833 (C. A. 27, 3609).

Spraying apparatus for coating paper, etc. Russell S. Bracewell. U. S. 1,946,831, Feb. 13. Mech. features of an app. suitable for coating paper webs or the like with coloring materials, etc.

Carbon papers. Rinco A.-G. Fr. 756,897, Dec. 13, 1933. A fundamental color which does not combine with the support and which is free from fats or waxes is applied to the support and to the fundamental layer is applied a 2nd layer. Thus, the 1st layer may contain an aq. soln. of casein, Turkey-red oil, glycerol, lampblack and Prussian blue and the 2nd, stearic esters of glycol, water and  $\text{TiO}_2$ .

Coated paper. Charles L. Gabriel (to Commercial Solvents Corp.). U. S. 1,946,203, Feb. 6. Paper which may be used as a moistureproof wrapping is prepd. by coating with a compn. contg. a cellulose ester such as cellulose nitrate or acetate together with an ester formed from a "polybasic" acid esterified conjointly with poly-

and mono-hydric alcs. such as glycerol butyl (or benzyl) phthalate. U. S. 1,946,204 relates to paper coated with generally similar compns. such as may contain cellulose nitrate or acetate together with glycol butyl (or benzyl) phthalate. U. S. 1,946,205 relates to coating paper with cellulose nitrate or acetate or the like together with a neutral ester of a "polybasic" acid and a dihydric alc. such as ethylene (or propylene) glycol phthalate.

Copperized paper. Wm. R. Barber, Albert G. Natwick and Maurice W. Phelps (to Crown Willamette Paper Co.). U. S. 1,947,451, Feb. 20. Paper sheets are made of fiber carrying a ppt. of Cu o-phenylphenate which serves to adapt the paper for covering plants or wrapping fruit. U. S. 1,947,452 relates to paper contg. Cu resinate ppt. in its fibers.

Tracing paper. Harold M. Spurlin (to Hercules Powder Co.). U. S. 1,946,338, Feb. 6. A material capable of receiving ink, substantially transparent and waterproof and free from greasiness, comprises a thin sheet of substantially porous paper impregnated with and superficially coated with a compn. contg. nitrocellulose and a plasticizer such as tricresyl phosphate, etc.

Waterproof paper. Masuteru Kaneko (Sin'ichi Takeda, inventor). Japan. 99,125, Jan. 21, 1933. Paper is treated with a viscose soln.,  $(\text{NH}_4)_2\text{SO}_4$  soln. contg.  $\text{ZnSO}_4$  and finally with  $\text{H}_2\text{SO}_4$ . Cf. C. A. 27, 5978.

Plant for working up waste paper, cardboard, cellulose, etc. Fredrik Grewin. Ger. 591,145, Jan. 17, 1934 (Cl. 55a. 5.01). This corresponds to Brit. 393,824 (C. A. 27, 5978).

Waterproof paper or cardboard. The Richardson Co. Ger. 591,112, Jan. 16, 1934 (Cl. 55f. 11.01). See Brit. 341,542 (C. A. 27, 603).

Hot press for making smooth cardboard sheets. Karl Kubik and Edmund Saller. Ger. 591,152, Jan. 17, 1934 (Cl. 55d. 16.20).

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Investigation of dry explosion safety valves for solvent vapor-gas mixtures. A. Knodel and F. Nauck. Z. tech. Physik 15, 54-8(1934). -The effectiveness of gravel and glass balls as obstacles in the propagation of explosions is detd. for mixts. of air and  $\text{Et}_2\text{O}$ ,  $\text{Me}_2\text{CO}$ ,  $\text{C}_2\text{H}_6$ , PhMe and  $\text{CS}_2$ . Comparison is made with Davey and Kito screens.

Explosive (and non-explosive) reactions between nitrogen oxides and combustible gases. M. J. van der Wal. Rec. trav. chim. 53, 97-117(1934). -The explosive limits of various binary, and ternary mixts., as well as of the quaternary mixt. of  $\text{NO}$ ,  $\text{N}_2\text{O}$ ,  $\text{CO}$  and  $\text{H}_2$ , were detd. by means of a special glass app. which is described in detail. Numerous references to the literature are cited.

Solvenit as substitute for dynamite. V. Kachkarin. Neuheiten der Technik 1933, No. 4, 8; Nitrocellulose 5, 29.

The ability of explosives to decompose on ignition in vacuo. E. Burlot. Compt. rend. 197, 1223-5(1933). -B. has shown by a series of over 200 expts. that below a certain limit of pressure the complete decompn. of explosives (by combustion, deflagration or detonation) cannot be initiated by contact with flame or incandescent substance if the contact is of sufficiently short duration. This pressure is greater than 1 mm. for  $\text{Hg}(\text{ONC})_2$  and of the order of 0.02 mm. for  $\text{PbN}_3$ . A phase of combustion precedes the detonation of both of these explosives when ignition is effected by a fusible bridge wire. At a pressure of 0.05 mm.,  $\text{PbN}_3$  only partially decompd., leaving agglomerates of blackened  $\text{PbN}_3$  (cf. C. A. 28, 898).

The influences of electrical and magnetic fields upon "spin" in gaseous detonations. W. A. Bone. Nature 132, 348-9(1933); cf. C. A. 27, 3079. -Photographs were taken of  $2\text{CO} + \text{O}_2$  detonations in a tube of 1.25

cm. internal diam. fitted with a glass section in which a strong elec. field could be maintained between 2 electrodes (one of which was a ring-shaped silver mirror deposited on the inside of the tube) 30 cm. apart. In blank expts. with no field, the detonation flame passed through the glass section with a const. velocity of 1755 m. per sec. showing a normal "spin" with frequency of about 45,000 per sec. The velocity of the same flame entering and crossing a field of 3000 v. per cm. in the + to - direction fell to 1720 m. in crossing but rose again to 1760 m. on leaving the field; the velocity was thus slightly retarded between the electrodes but the "spin" was not appreciably affected. On reversing the polarity of the field so that the flame entered by its - boundary and crossed it from - to +, not only was the "spin" quickly and entirely suppressed, but detonation ceased, the flame speed being rapidly reduced from 1755 to 910 m. per sec. Moreover the magnitude of the effect depended on the strength of the field applied. A longitudinal magnetic field of 40,000 gauss over a length of 1.5 cm. or a 20,000-gauss field over 60 cm. caused a speed decrease of about 60 m. per sec. without, however, materially affecting the "spin."

Combustion of colloidal propellants. A. D. Crow and W. E. Grimshaw. Phil. Mag. 17, 161-72(1934); cf. C. A. 27, 1512. -The results of Muraour and Aunis (C. A. 27, 2302) are rejected. The use of crushers to det. max. explosion pressures is discussed. With suitable calibration, this method is satisfactory for max. pressure but not for indicating the development of pressure with time.

The temperature gradient in flames. Oliver C. de C. Ellis and E. Morgan. Trans. Faraday Soc. 30, 287-98(1934); cf. C. A. 27, 3611. -The characteristic thermochem. equation of the reaction is not completed near the surface of the explosion flame. Unless there is delayed



emission of heat the temp. must fall inward from the flame surface throughout the flame period; actually the temp. rises inward from the flame surface throughout the flame period when the reactions considered lead to equls. that shift exothermically under the condition of rising temp. and pressure, the rise in the gradient becoming more and more marked as the combustion proceeds; for a considerable portion of the flame period the temp. rises inward from the flame surface even when the reactions considered lead to equls. that shift endothermically under the condition of rising temp. and pressure. Thus, there is a lag on the completion of the primary action that is characteristic of the flame surface in the mixt. considered, and the phenomenon of "afterburning" is independently demonstrated in a new way. Math. analysis. R. R.

**The movement of flame in fire-damp explosions.** 11. P. Coward and R. V. Wheeler. *Safety in Mines Research Board (Gt. Brit.) Paper No. 82*, 59 pp. (1933). Flame is propagated at the highest speed (27 cm. per sec.) in mixts. of fire damp and air contg. 10% CH<sub>4</sub>, the speed falling off rapidly as the amt. increases or decreases. The speed of the flame is increased by movement of the mixt. Expansion due to the heat of the flame causes a streaming movement either ahead of, or behind, the flame. If movement is from a closed toward an open end, or in a gallery open at both ends, the movement is ahead of the flame and may increase its speed many fold. Expansion due to the heat of the flame introduces convection effects which enlarge the area of the flame surface and increase the flame speed. These effects increase with increase in vol. of explosive mixt.; hence the flame travels faster in a big space. Turbulence has the same effect; hence obstructions increase flame speed. Resonance of the gas column causes vibrations of the flame. This resonance can be reduced by narrow slits in the container. Variations in temp. and pressure are unimportant. Reduction of O<sub>2</sub> content reduces flame speed. Since small diam. reduce speed of flame, holes small enough will prevent passage of flame. Diam. of these holes depend on the compn. of explosive mixt. and the manner in which flame approaches them.

Alden H. Emery

**The prevention of ignition of fire damp by the heat of impact of coal-cutter picks against hard rocks.** M. J. Burgess and R. V. Wheeler. *Safety in Mines Research Board (Gt. Brit.) Paper No. 81*, 14 pp. (1933). The ignition of fire damp when a coal cutter pick strikes hard rock can be prevented by a continuous discharge into the cut of about 1 1/2 cu. ft. per min. of CO<sub>2</sub>. A. H. E.

**The ignition of fire damp by the filaments of broken electric lamp bulbs.** G. Allsop and T. S. E. Thomas. *Safety in Mines Research Board (Gt. Brit.) Paper No. 80*, 13 pp. (1933).—If the filament current is > 2 amp., the current must be cut off before the glass is broken to prevent ignition of fire damp. For current < 1 amp., the delay period is 0.12–0.02 sec. Vacuum bulbs are less safe than gas-filled bulbs of the same rating. The time of cooling of the filament is proportional to the current flowing through it.

Alden H. Emery

**Explosions in Kentucky coal mines January 1, 1844–June 30, 1933.** J. F. Davis and H. B. Humphrey. *Bur. Mines, Information Circ. 6754*, 21 pp. (1934). A. H. E.

**Mine explosions and fires in the United States during the fiscal year ending June 30, 1933.** D. Harrington and W. J. Fene. *Bur. Mines, Information Circ. 6761*, 19 pp. (1934). Alden H. Emery

**Progress in explosive shattering of minerals (Gross) 9. Explosions in sewers (Jessup) 14. Explosion and health hazards in sewage-works operation (Jones) 14. Zn-Cu alloy [for making ammunition cartridge cases] (Brit. pat. 401,147) 9.**

**Prettre, M.: L'inflammation et la combustion explosive en milieu gazeux.** Pt. 2. Les hydrocarbures. Paris: Hermann & Cie. 56 pp. P. 15. Cf. C. A. 27, 2814.

**Explosives.** I. G. Farbenind. A.-G. Brit. 401,307, Nov. 9, 1933. See Fr. 755,050 (C. A. 28, 1537<sup>a</sup>).

**Explosives.** Edward Whitworth and Imperial Chemical Industries Ltd. Brit. 401,723, Nov. 20, 1933. A mixt. of diethyldiphenylurea and dimethyldiphenylurea is used for gelatinizing and stabilizing solventless nitro-cellulose-nitroglycerin explosives, which may contain addnl. substances, e. g., di- or tri-nitrotoluene for ballistics, nitroguanidine for flashlessness, tetrabutyl stannate for antifouling.

**Explosive.** Nippon Kayaku Seizō K. K. (Syunji Teraï and Heizō Nanbō, inventors). Japan. 100,562, Apr. 13, 1933. The explosive is a mixt. of pure Fe powder (coated or uncoated with a waterproof film), combustible materials (such as C, starch, S), O-carriers (such as nitrates, chlorates) and powerful agents (such as nitroglycerin, nitrolycol, nitrocellulose). Fe powder is used as a heat generator.

**Blasting explosive.** Willard de C. Crater (to Hercules Powder Co.). U. S. 1,945,344, Jan. 30. Cryst. nitro-lactose is used together with an explosive salt such as NH<sub>4</sub>NO<sub>3</sub> and an oxidizing salt such as NaNO<sub>3</sub>. Wood pulp, TNT, DNT, etc., also may be added.

**Priming explosives.** Behn-Karlsruher Industrie-Werke A.-G. Fr. 755,549, Nov. 25, 1933. Trinitroresorcinate of Ba, free from water of crystn., is used along with other priming explosives for fuses and low-power munitions of all sorts.

**Nitrated-sugar explosives.** Harold A. Lewis (to E. I. du Pont de Nemours & Co.). U. S. 1,947,530, Feb. 20. A nitrated ketose such as nitrated levulose free from nitrated aldoses is used in soln. in a liquid nitric ester such as nitroglycerin, in dynamites, etc.

**Primers for explosive charges.** L'Air liquide (Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude). Fr. 756,345, Dec. 8, 1933. The primers are composed of 2 sep. parts, a very small amt. of a chem. substance such as Hg fulminate which is placed in direct contact with the lighting means, and a combustible substance capable of absorbing a liquefied gas and of provoking, in this state, an explosive wave, e. g., cork flour. The amt. of the first component is less than that necessary, if alone, to start the explosive charge.

**Dynamite composition.** Clifford A. Woodbury (to E. I. du Pont de Nemours & Co.). U. S. 1,944,910, Jan. 30.

**A substantially "unbalanced" explosive compn. is prepd. comprising nitroglycerin and less than the normal amt. of nonexplosive or "dope" ingredients required to produce a finished dynamite compn.; a small proportion of nitro-cellulose is then added to increase the viscosity and hold the nitroglycerin from leakage, and addnl. "dope" ingredients are subsequently added.**

**Separating nitroglycerin from residual acids.** Arnold Schmid (to Karl Schmid). U. S. 1,946,414, Feb. 6. Emulsified material is passed horizontally through a vessel provided with inclined plates dividing the body of liquid into a series of longitudinal superposed layers communicating with each other at each end, so that the nitroglycerin as it seps. may pass upward along the under surfaces of the division plates toward the top of the body of liquid, where it is continuously drawn off, while the sepd. acid gravitates downwardly toward the lower portion of the vessel, where it is continuously discharged. U. S. 1,946,415 relates to a process in which a similar emulsion is continuously introduced into the upper portion of a quiescent inclined column of liquid of lower temp. than the introduced emulsion so that the emulsion cools during its descent and continuous sepn. is effected. App. is described. Cf. C. A. 27, 4403; 28, 1538<sup>a</sup>.

**Electric purification of gun cotton or other nitrated cellulose.** Kogorō Murakoshi. Japan. 100,065, March 13, 1933. Gun cotton or other nitrated cellulose immersed in water is treated for about 8 hrs. with alternating current (and sometimes d. c. in addn.) at 50 cycles, 1000–2000 v. and 1 amp. per sq. in.

**Protective coatings on soft metal bullets.** Hermann E. Gustav and Thorismund Gerlich. U. S. 1,944,884, Jan. 30. Bullets such as those formed of Pb or as Pb alloy are provided with an outer coating of a residual solute such as cellulose acetate or cellulose.

- Toy torpedo or "impact salute."** Joseph B. Decker (to Gertrude M. Decker). U. S. 1,945,217, Jan. 30. A container such as a cardboard tube is substantially filled with a mass of granular material such as gravel the particles of which are cemented to each other and to the walls of the container (suitably by S, glue or collodion) with explosive material filling the interstices of the mass.
- Loading shells with pyrotechnical material.** Warren G. Thrasher (to National Fireworks, Inc.). U. S. 1,946,042, Feb. 6. Various details of app. and operation are described.
- Blasting detonators.** Archibald C. Gooden, Godfrey Rotter and Edgar R. Deacon. Brit. 401,843, Nov. 23, 1933. The casing of detonators, in the contents of which Pb azide is present, is made of Cu (alloy) coated externally and internally with Pb, Sn or other metal or alloy resistant to Pb azide.

## 25 DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

- The absorption of dyestuffs by cellulose. II. The influence of temperature.** W. M. Carvie, L. H. Griffiths and S. M. Neale. *Trans. Faraday Soc.* 30, 271-8(1934); cf. *C. A.* 27, 5544.—Measurements were made of the absorption of 2 direct dyestuffs (*Chlorazol Fast Red K* and *Heliotrope 2B*) by viscose sheet and by cotton cloth over a range of temps. from 25° to 100°. The rate of diffusion of dye into viscose sheet is very roughly doubled for 20° temp. rise. The amt. of dye absorbed at equil. is very roughly halved for 30° temp. rise. At any given temp. the addn. of NaCl causes the rate of diffusion into viscose sheet to rise to a max. and then fall, whereas the absorption at equil. steadily increases. Viscose sheet normally takes up more dyestuff than cotton, but the difference decreases and is ultimately reversed when the absorption is reduced, either by raising the temp. or by reducing the amt. of added electrolyte. Reuben Roseman
- Lakes of vegetable dyes.** G. A. Bravo and A. D'Alberto. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 11, 326-53(1933).—A study was made of the effect of the  $p_H$  of the soln., during pptn., on lakes prep'd. by various combinations of soln. contg. one of the following: hematein, ext. of quercitron, cochineal, catechu, alizarin, with a soln. of one of the following salts:  $FeSO_4$ ,  $Cr_2(SO_4)_3$ ,  $CuSO_4$ ,  $KAl(SO_4)_3$ , double oxalate of Ti and K,  $MgCl_2$ ,  $CaCl_2$ ,  $SnCl_2$ . Curves showing the vol. of the ppt. as a function of  $p_H$  of the soln. are given and conditions of optimum pptn. indicated. In general, the lake becomes more gelatinous the higher the  $p_H$  during pptn. and in some cases it may even tend to become colloidal dispersed. Changes in  $p_H$  also greatly affect the color of the lake. Exposure of several of the lakes to the light of a Hg vapor lamp for 16 hrs. had only a very slight effect on their color. The use of such lakes in dyeing various types of fabric is briefly discussed. Also in *Industria chimica* 8, 1537-54(1933). J. W. Perry
- Tinctorial action of substances having a surface activity on naphthols of the AS group.** H. Gerstner. *Tiba* 11, 821-7(1933); cf. *C. A.* 26, 2867.—A further discussion with addnl. evidence of the merits of "Acorit." A. P.-C.
- $p_H$  determination in the dyeing industry.** Maurice Dérilère. *Tiba* 11, 907-17(1933); 12, 27-33(1934).—An explanation of the principle of the electrometric and colorimetric detn. of  $p_H$ , with a brief outline of its applications in the dyeing industry. A. Papineau-Couture
- The use of stainless steels in the dyeing industry.** Andre Michel. *Rev. gén. mat. color.* 38, 67(1934); cf. *C. A.* 28, 6474.—Most stainless steels which are resistant to HCl do not resist  $SnCl_4$ . A Cr-Ni-Mo steel is not attacked by  $SnCl_4$  of 30° Bé. at 20° and 50° for 122 hrs. Polished surfaces of stainless steels, Type 18-8, greatly reduce the decompn. rate of  $H_2O_2$  and in this condition, the latter is not decompd. more rapidly than by Al. Halsey E. Silliman
- Sanitation and vocational diseases: dyeing.** A. Thomas. *Russa* 8, 943-9(1933).—A brief outline of vocational hazards in the dyestuffs and dyeing industry and of sanitation measures by which they can be prevented or overcome. A. Papineau-Couture
- Chloramines and their use in the textile industry.** H. Tatu. *Tiba* 11, 883-7(1933).—A brief description of the prep'n. and prop'ties of activin or chloramine T ( $MeC_6H_4SO_2N(Na)Cl$ ) and peractivin ( $MeC_6H_4SO_2NCl_2$ ), with a brief review of their applications, particularly in the textile industry. A. Papineau-Couture
- Alkali and soap in the degumming of natural silk.** Tatu. *Russa* 8, 839-43(1933).—From a review of recent work on the subject it is concluded that: (1) presence of alkali is absolutely essential to obtain satisfactory degumming; (2) with our present knowledge, soap is the most suitable manner of supplying the required alkali. A. Papineau-Couture
- Delustering of acetate rayon goods. Use of phenol and of pine oils.** Jean Rolland. *Russa* 8, 933(1933).—A brief discussion of the precautions required to obtain good results. A. Papineau-Couture
- Polyvinyl compounds and their applications in the sizing of rayons.** M. Jeanny. *Russa* 8, 1017-21(1933); 9, 11-15(1934).—A review of recent literature and patents. A. Papineau-Couture
- A process for making artificial wool.** E. Pallas. *Kunststoffe* 23, 281-2(1933).—Jute is treated with a 25-30% KOH soln. for 30-45 min. at ordinary temp., then carefully bleached, treated with dil. acid and finally oxidized. J. W. Perry
- Permanent fireproofing of fabrics.** L. P. Michel. *Tiba* 12, 3, 5(1934).—Practical operating directions. A. Papineau-Couture
- Color removal on wool muslin.** R. Haller. *Tiba* 12, 23 7(1934).—A discussion of the use of Neolane dyes (Soc. for Chem. Industry, Basel) and of their merits for this purpose. A. P.-C.
- Combination of collagen with dyes (Bravo, Baldracco, et al.) 14. Textile finishes research (Stevens, Gaunt) 30. Use of rubber, in combination with textiles (Wurm) 30. Benzoyl derivs. of indigo (de Diesbach, et al.) 10. Clean sing compn. for use on fine fabrics (U. S. pat. 1,946,272) 18. 4,5-Dimethyl-7-chlorohydroxythionaphthene and its indigoid derivs. (U. S. pat. 1,945,923) 10. Persulfonic acid esters [products for treating textiles] (Ger. pat. 580,778) 10. Water-sol. condensation products [for treating fabrics] (U. S. pat. 1,946,430) 10. Benzanthrone 1 aldehyde (U. S. pat. 1,946,829) 10. Methylenecanthrone derivs. [products useful as vat dyes or intermediates] (Ger. pat. 591,496) 10.**
- Holsboer, H. B., and Lanzer, J.:** *Practisch Kleurstofonderzoek op de Vezel*. Enschede: Hoogere Textiel school. 72 pp. Reviewed in *J. Soc. Dyers Colourists* 50, 52(1934).
- Forschritte der Teerfarbenfabrikation und verwandter Industriezweige. Verbindungen ohne Farbstoffcharakter der organischen Technologie. Organische Farbstoffe. Verfahren der Faserveredelung.** Begun by Paul Friedlaender. Edited by Hans Ed. Fierz-David. Pharmaceutical part edited by Max Dohrn. Tl. 18, Hülft 1 and 2. (Covering the literature from Jan. to Dec. 1931). Berlin: J. Springer. 1548 pp. M. 392. Cf. *C. A.* 27, 2039.
- Dyes.** Durand & Huguenin A.-G. Brit. 401,137, Nov. 9, 1933. See Fr. 749,461 (*C. A.* 28, 6569).
- Dyes.** I. G. Farbenind. A.-G. Fr. 756,349, Dec. 8, 1933. Complex compds. of *o*-hydroxyazo dyes are prep'd

by diazotizing compds. of the formula  $\text{NH}_2(\text{AO})\text{XSO}_2\text{N}(\text{Z})_2$  (X is a  $\text{C}_6\text{H}_5$  or  $\text{C}_{10}\text{H}_7$  radical, A an alkyl, aryl or acyclic group and each Z is H or an alkyl, cycloalkyl, aralkyl or aryl radical, OA and  $\text{NH}_2$  are in *o*-positions with respect to one another) and combining with compds. contg. at least one  $\text{SO}_3\text{H}$  group, then treating the dyes obtained by chroming agents under such conditions that the A radical is eliminated. Several examples are given.

**Dyes.** I. G. Farbenind. A.-G. (Fritz Baumann, inventor). Ger. 589,638, Dec. 12, 1933 (Cl. 22b. 3.01). The dyes 1,4-diaminoanthraquinone-2,3,5-trisulfonic acid are prepd. by treating 1,4-diamino-2,3-dihaloanthraquinone-*x*-sulfonic acids with salts of  $\text{H}_2\text{SO}_4$ . In an example, 1,4-diamino-2,3-dichloroanthraquinone is sulfonated in the presence of  $\text{H}_2\text{BO}_3$  and a suspension of the product in water is treated with  $\text{Na}_2\text{SO}_4$ . Other examples are given. Cf. C. A. 28, 1540<sup>8</sup>.

**Dyes.** Durand & Huguenin A.-G. Ger. 589,566, Jan. 2, 1934 (Cl. 22e. 7.02). See Fr. 737,081 (C. A. 27, 1516).

**Dyes.** Scottish Dyes Ltd. Ger. 586,906, Oct. 27, 1933 (Cl. 22e. 6). See Brit. 317,428 (C. A. 24, 2306) and Brit. 332,907 (C. A. 25, 604).

**Azo dyes.** Gerald Bonhote (to Soc. pour l'ind. chim. à Bâle). U. S. 1,946,010, Feb. 6. Over a hundred examples (some with details of procedure for manuf.) are given of azo dyes of the general formula  $1,2,3-(\text{R}_1\text{OR}_2-\text{N}(\text{HO})(\text{R}_3\text{HNCO})\text{C}_{10}\text{H}_7)$  where  $\text{R}_1$  stands for an aryl nucleus of the benzene series or an aralkyl radical,  $\text{R}_2$  for an aryl nucleus of the benzene or naphthalene series, where further the O atom and the N atom of the 2 substituents of the benzene nucleus  $\text{R}_1$  stand in *o*-position to each other, and where at least one of the two radicals  $\text{R}_1$  and  $\text{R}_2$  contains a COOX group in which X means alkyl, which products are orange to red and brown powders, dissolve in pyridine to orange-red and blue-red solns., and yield when produced on textiles, orange to red and blue-red tints of good fastness. Among the components which are used are the ethyl ester of 2-amino-4-carboxylic acid-1,1'-diphenyl ether and 2,3-hydroxynaphthoic acid 2'-naphthalide, etc.

**Azo dyes.** Harold E. Woodward (to E. I. du Pont de Nemours & Co.). U. S. 1,947,027, Feb. 13. Disazo dyes suitable for coloring hydrocarbons and their halo-ecated derivs. are formed, e. g., from first components such as *p*-aminodibutylbenzamide, 2-aminoanisole-5-dimethylsulfonamide, *p*-aminodimethylbenzamide, *m*-aminodimethylbenzamide, *p*-aminobenzanilide, *p*-aminobenzovlethylaniline, 2-aminotoluene-4-dimethylsulfonamide, 2-aminoanisole-4-dimethylbenzamide and other dialkylamides of aminobenzoic acids, anisidine-, aniline-, toluidine-, or xylylene-sulfonic acids (in general, the lowest-melting aminodialkylbenzamides are preferred, and especially dibutylbenzamide), second components such as aminohydroquinone dimethyl ether, 1<sup>st</sup>-amino-2-naphthol methyl ether, cresidine,  $\alpha$ -naphthylamine, 1-amino-7-naphthol, 1-ammonaphthyl-6- or -7-dimethyl sulfonamide and other  $\alpha$ -naphthylamine derivs. which can couple in the 4-position and contain no carboxylic or sulfonic groups, and as last components  $\beta$ -naphthol, 2-hydroxy-3-naphthylamide, 1-amino-7-naphthol, 2-hydroxy-3-ethylnaphthamide, 2-hydroxy-3-phenylethylnaphthamide, 2-hydroxy-3-dibutylnaphthamide or the like. Several examples with details of procedure are given. Cf. C. A. 27, 4405. U. S. 1,947,028 relates to the production of monoazo dyes (having brilliant colors from yellow to orange) from a diazotized nitroaniline, having substituted thereon halogen, alkoxy or benzyloxy groups, coupled with a compd. having the general formula  $\text{RCOCH}_2\text{CONHC}_6\text{H}_4\text{Y}$ , in which R represents an alkyl, phenyl or benzyl radical, and Y represents an alkoxy, benzyloxy or benzyl radical. The products are suitable for use in printing inks and paints.

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 400,922, Oct. 16, 1933. Azo dyes are made by coupling diazo or tetrazo compds. with an amino and (or) hydroxy coupling component to which an aliphatic radical of at least 10 C atoms is attached by means of a  $-\text{NH}-$ ,  $-\text{CO}-$ ,  $-\text{NHCO}-$

or  $-\text{NHSO}_2-$  group, where coupling components corresponding to 1 of the formulas  $\text{C}_{10}\text{H}_7(\text{OH})(\text{NHCOX})$  and  $\text{C}_{10}\text{H}_7(\text{OH})(\text{NHSO}_2\text{X})$  (X being a 10 or more C atom aliphatic radical) contg. a sulfonic group are used only for disazo dyes and for such monoazo dyes as contain a further radical of at least 10 C atoms in the diazo component. Any diazo compd. can be used, e. g., those of the  $\text{C}_6\text{H}_5$  and  $\text{C}_{10}\text{H}_7$  series including aralkyl, OH, alkoxy, halo,  $\text{NO}_2$ , carboxy and sulfo derivs. and diamino derivs. of biphenyl, benzophenone, diphenyl sulfone, diphenylurea, diphenylene ketone, carbazole, diphenylmethane, diphenyl ether, stilbene, azobenzene and derivs. thereof. The dyes are sol. in org. solvents and are suitable for coloring lacquers or artificial masses, e. g., celluloid. Among examples: (1) 1-naphthylamine-5, 7-disulfonic acid  $\rightarrow$  *p*-aminostearanilide of acetoacetic acid, (2) bis-anisidine  $\rightarrow$  oleyl-H acid; the dye may be treated in substance or in the dye bath with Cu salts, and (3) metanilic acid dodecylamide  $\rightarrow$  capryl-H acid.

**Azo dyes.** Imperial Chemical Industries Ltd. Fr. 756,741, Dec. 14, 1933. 1,3,5-Xylenol is combined with a diazo compd. of the  $\text{C}_6\text{H}_5$  or  $\text{C}_{10}\text{H}_7$  series, which contains no  $\text{SO}_3\text{H}$ ,  $\text{COOH}$  or OH groups, e. g., 5-nitro-2-anisidine or  $\alpha$ -naphthylamine. Cf. C. A. 27, 3830.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 757,039, Dec. 19, 1933. *o*-Aminophenols and their substitution products are caused to react with org. bases contg. at least one hydroxyalkyl group fixed to the N atom. Thus, 5-nitroaminophenol is diazotized and coupled with 1-( $\beta$ -hydroxyethylamino)-2-methoxy-5-methylbenzene, giving a dye which dyes acetate silk a reddish violet shade. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 757,084, Dec. 20, 1933. Complex azo dyes contg. Cr or Cu are prepd. by treating with Cl or Cu compds. azo dyes of the formula  $1,7,3-(\text{HO})_2(\text{HO}_2\text{S})\text{C}_{10}\text{H}_7\text{N}(\text{ROH})$  where R is the aryl group of a diazotized amine radical, the OH in which is ortho to the N. Examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 757,123, Dec. 20, 1933. The dyes are prepd. by coupling either in substance or on the fiber or in the presence of an appropriate substratum for the prepn. of lakes, 2,6-dihalo-1,4-diaminobenzenes, monodiazoized in the 4-position, with arylamides of 2,3-hydroxynaphthoic acid or their derivs., substituted in the  $\text{C}_{10}\text{H}_7$  radical (the components being free from  $\text{SO}_3\text{H}$  and  $\text{COOH}$  groups). Thus, 2,6-dichloro-1,4-diaminobenzene  $\rightarrow$  2',3'-hydroxynaphthoyl-1-amino-2-ethoxybenzene gives a brown-red. Several examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Arthur Zitscher, inventor). Ger. 589,527, Dec. 8, 1933 (Cl. 22a. 1). Dyes insol. in water are obtained by coupling diazo compds. with 3-hydroxy-1,2-benzofluorenes, neither components contg. soly.-inducing groups. Thus, diazotized 1-amino-4-benzoylamino-5-methoxy-2-chlorobenzene is coupled with 3-hydroxy-1,2-benzofluorenone in dil. NaOH to give a dye useful for coloring pigment pastes. Another example and table of components and colors of dyes produced are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Werner Lange and Ulrich Dreyer, inventors). Ger. 589,636, Dec. 11, 1933 (Cl. 22a. 4). 1,3-Dihydroxybenzene or 1,3-dihydroxybenzenecarboxylic acid is coupled with 1 mol. of 2-nitro-1-amino-4-diazobenzene and 1 mol. of the same or another diazo or diazoazo compd. Thus, 2-nitro-1,4-diaminobenzene is diazotized and coupled with 1,3-dihydroxybenzene-5-carboxylic acid and diazotized 1-amino-4-nitrobenzene-2-sulfonic acid to give a dye which colors leather red-brown. Other examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Erwin Hoffa, Werner Kirst and Wilhelm Schumacher II, inventors). Ger. 589,637, Dec. 11, 1933 (Cl. 22a. 7). Dis- and poly-azo dyes, insol. in water, are prepd. by introducing an OH compd. into a tetrazo compd. in the presence of an acid, and then coupling with other components contg. no soly.-inducing groups, in acid, neutral or alk. mediums. Thus, cotton is treated with a soln. contg. 2,3-hydroxy-

naphthoylaminobenzene. The rinsed cotton is then treated with an acid soln. of benzene-1,4-bisdiazonium borofluoride. The resulting brownish red product is treated with a soln. of 2,3-hydroxynaphthoylaminobenzene. Other examples and a table of components are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Karl Wiedemann, Heinrich Clingstein, Hans Krzikalla and Walter Kühn, inventors). Ger. 589,842, Dec. 15, 1933 (Cl. 22a. 2). Monoazo dyes contg. metal are prep'd. by treating dyes contg. 2,8-dihydroxynaphthalene-6-sulfonic acid as coupling component with a metal-yielding agent. Thus, 2-amino-1-hydroxybenzene-4-sulfonic acid is diazotized and coupled with 2,8-dihydroxynaphthalene-6-sulfonic acid. The resulting dye is dissolved in water and treated with  $\text{CrF}_3$  to give a dye which colors wool from an acid bath in fast reddish gray shades. Other examples are given. Cf. C. A. 27, 5194.

**Azo dyes.** I. G. Farbenind. A.-G. (Wilhelm Neelmeier and August Modersohn, inventors). Ger. 591,125, Jan. 17, 1934 (Cl. 22a. 1). New dyes are prep'd. by sulfonating 4,4'-dihydroxyazobenzene-3,3'-dicarboxylic acid, or its substitution products having alkyl or halogen in the 2-, 2', 6-, and (or) 6'-position, and (or) alkyl, halogen, or  $\text{SO}_3\text{H}$  in the 5- or 5'-position or the complex Cr compds. of any of these substances. Examples are given. The products are more sol. than the starting materials, and give clearer shades, which are sometimes more greenish.

**Azo dyes.** I. G. Farbenind. A.-G. (Hans Schindhelm and Richard Gast, inventors). Ger. 591,495, Jan. 22, 1934 (Cl. 22a. 13). Two mols. of an azo dye from diazotized 4-nitro-4'-aminostilbene (or dibenzyl)-2,2'-disulfonic acid are united by suitably modifying their  $\text{NO}_2$  groups. Thus,  $\text{NO}_2$  may be reduced to  $\text{NH}_2$  and 2 mols. of the product linked through a  $-\text{CO}-$  group, or the  $\text{NO}_2$  groups of 2 mols. may be partly reduced to form an azo or azoxy group. Substantive dyes having a strong affinity for vegetable fibers are obtained. The dyes may be subjected to any of the usual after-treatments for stilbene or azo dyes, e. g., oxidation, reduction, alkylation and conversion into complex metal compds. Examples are given.

**Azo dyes; dyeing.** Soc. pour l'ind. chim. à Bâle. Ger. 591,494, Jan. 22, 1934 (Cl. 22a. 1). Arylides of 2,3-hydroxynaphthoic acid are coupled in substance or on the fiber with diazotized aryl or aralkyl ethers of 2-amino-1-phenol-4- (or 5-) carboxylic acid esters or their substitution products. Red dyes are produced. Numerous examples are given. Cf. C. A. 27, 3830.

**Azo dyes; dyeing.** I. G. Farbenind. A.-G. (Max A. Kunz, Gerd Köchenderfer, Kuno Maurach and Walter Linbacher, inventors). Ger. 591,223, Jan. 19, 1934 (Cl. 22a. 1). Pyridinonaphthols or their substitution products are coupled with aromatic diazo compds., in substance or on the fiber, in the proportion of 1 mol. of diazo compd. for each OH group in the pyridinonaphthol. Dyes of various colors are produced. Numerous examples are given. The pyridinonaphthols may be prep'd. by alk. fusion from the corresponding sulfonic acids, which are obtainable from naphthylaminesulfonic acids by the method of Brit. 394,416 (C. A. 28, 1759).

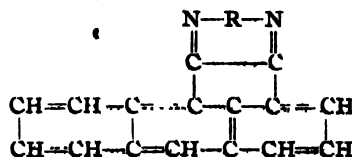
**Azo dyes of the thiazole group containing metals.** Kichiji Takeuchi. Japan. 100,387, Apr. 4, 1933. Azo dyes of the thiazole group are prep'd. by coupling diazotized primuline with compds. obtained by heating a mixt. of aromatic compds. having OH and  $\text{CO}_2\text{H}$  groups in the ortho position and salts of Fe or Cr.

**Azo dyes containing chromium.** Fritz Straub and Hermann Schneider (to Soc. pour l'ind. chim. à Bâle). U. S. 1,946,951, Feb. 13. An azo dye of the general formula  $\text{HO}-\text{R}'-\text{N}=\text{N}-\text{R}''$  in which  $\text{R}'$  stands for a sulfonated naphthalene radical and  $\text{R}''$  a naphthol radical and in which the OH group is in *o*-position to the azo linkage, is caused to react in a medium the  $\text{pH}$  of which is not greater than 7.0 with an agent yielding Cr such as Cr fluoride and the medium is made alk. and the chroming is completed without sepu. of the chromiferous intermediate products formed. The Cr-contg. dyes

thus produced give fast dyeings and are suitable for making lakes.

**Disazo dyes.** I. G. Farbenind. A.-G. Fr. 756,808, Dec. 15, 1933. Diaminodiphenyl sulfones or their nuclear substitution products are tetrazotized and 1 mol. of the tetrazo compd. is coupled with 1 mol. of an *o*-hydroxycarboxylic acid of the  $\text{C}_6\text{H}_4$  series and 1 mol. of a 2-aryl-amino-8-naphthol-6-sulfonic acid.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 756,986, Dec. 18, 1933. Compds. obtained by condensing aceanthrenequinone or its derivs. with aromatic, aliphatic or alicyclic 1,2-diamines, substituted or not, are fused with caustic alkali and the products obtained are halogenated if desired. The condensation products have the general formula.



**Vat dyes.** I. G. Farbenind. A.-G. (Heinz Scheyer and Emil Schwamberger, inventors). Ger. 589,039, Dec. 20, 1933 (Cl. 22b. 3.04). Vat dyes contg. N are prep'd. by treating halogen derivs. of the products obtained by condensing anthrones with glyoxal (as in Ger. 550,712) with N compds. which contain at least 1 exchangeable H atom linked to the N. In an example, the dye obtained by condensing 2-chloroanthrone with glyoxal is treated with  $\alpha$ -aminoanthraquinone, calcined soda, CuCl and  $\text{PhNO}_2$  to give a dye coloring cotton from a yellowish brown vat in red-brown shades. Other examples are given.

**Vat dyes of the anthraquinoneacridone series.** Georg Kränzlein, Heinrich Vollmann, Hermann Boedeker and Hans Becker (to General Aniline Works). U. S. 1,911,086, Jan. 30. See Ger. 574,966 (C. A. 27, 4682) and Ger. 576,404 (C. A. 28, 9057).

**Vat dyes of the dibenzanthrone series.** Edward T. Howell (to E. I. du Pont de Nemours & Co.). U. S. 1,947,047, Feb. 13. Bluish green to yellowish green dyes are formed by reaction of dihydroxydibenzanthrone with alkylating agents such as contain the general grouping  $\text{Y}-\text{CH}_2-\text{CH}_2-\text{X}-\text{CH}_2-\text{CH}_2-\text{Z}$  in which X is an O atom, an imine group or radical or S atom, and wherein Y and Z both stand for the same or different strong acid radicals, for example, chloride, bromide, sulfate or arylsulfonate, which are characterized by their capacity of reacting with aryl hydroxy compds. to give ethers; or where one of the substituents Y and Z stands for a strong acid radical as defined, while the other stands for an ether or ester radical, such as O-alkyl, O-acyl or the like (in other words, alkylating agents characterized by the possession of such end groups that after complete reaction with dihydroxydibenzanthrone, a product will result containing the following grouping  $-\text{OCH}_2\text{CH}_2\text{XCH}_2\text{CH}_2-$  where X stands for O, S or an imine radical, and where one of the end O atoms is linked to a dibenzanthrone radical, while the other is linked to a H atom, an alkyl group, an acyl group or the like, or to the same or to a different dibenzanthrone radical). Several examples with details of procedure are given. Cf. C. A. 28, 1544.

**Dye compositions.** Alfred Hagenböcker and Rudolf Brune (to General Aniline Works). U. S. 1,945,484, Jan. 30. Preps. of thioindigoid dyes are prep'd. contg. 0.05-0.5 mol. proportion of an Fe, Cu, Zn or Sn salt such as  $\text{FeSO}_4$ ,  $\text{ZnSO}_4$  or  $\text{FeCl}_3$  which served to accelerate fixation of the dye.

**Dye preparation.** Imperial Chemical Industries Ltd. Ger. 587,509, Nov. 4, 1933 (Cl. 8m. 13). See Brit. 377,978 (C. A. 27, 4098).

**Dyes for cellulose esters and ethers.** Imperial Chemical Industries Ltd. Fr. 757,090, Dec. 20, 1933. Secondary disazo dyes contg. no  $\text{SO}_3\text{H}$  or  $\text{COOH}$  groups are prep'd. by combining a diazotized amine of the  $\text{C}_6\text{H}_5$  or  $\text{C}_{10}\text{H}_7$  series with a 2,5-dialkoxylaniline, diazotizing again and combining with an amine of the  $\text{C}_6\text{H}_5$  series, having 1 or

$\beta$ -hydroxyethyl groups in the amino group. Several examples are given. Thus, *p*-anisidine  $\rightarrow$  2,5-dimethoxyaniline  $\rightarrow$  *N*-ethyl- $\beta$ -hydroxyethylaniline gives a red on cellulose acetate.

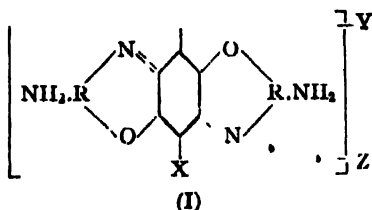
**Anthraquinone dyes.** I. G. Farbenind. A.-G. Brit. 401,132, Nov. 9, 1933. See Fr. 748,571 (C. A. 27, 549-50).

**Blue basic dye.** The Head of the Tokyo Kôgyô Shikenjo (Morizô Yoshino, inventor). Japan. 99,537, Feb. 14, 1933. Addn. to 93,406 (C. A. 27, 1519). The dye is made by the reaction of PhNMe<sub>2</sub>, H<sub>2</sub>O, AcOH, MnO, and PhOH. Cf. C. A. 27, 1519.

**Indigoid dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 756,401, Dec. 9, 1933. Dyes are obtained by oxidizing 3-oxythionaphthene contg. a halogen atom in the 4- or 7-position, an alkyl group in the 7- or 4-position, and an alkyl group in the 5- or 6-position, the 2 alkyl groups being meta to one another, or by condensing these compds. or their derivs. contg. a group capable of reacting in the 2-position, with components suitable for the production of indigoid dyes. The products may be halogenated. (Compds. of the 1st type include 7-chloro-4,6-dimethyl-3-(m. 111°), 4-chloro-5,7-dimethyl-3-(m. 118°), 7-bromo-4,6-dimethyl-3-, 4-bromo-5,7-dimethyl-2-carboxy-3-oxythionaphthene, the 2-(*p*-dimethylamino)anil of 7-chloro-4,6-dimethyl-3-oxythionaphthene, m. 253°, and 4-chloro-5,7-dimethylthionaphthenequinone. Compds. of the 2nd type include isatins, naphthatisatins, indoxyls, thionaphthenequinones, oxythionaphthenes and acenaphthenequinones.

**Oxazine dyes.** I. G. Farbenind. A.-G. Fr. 756,504, Dec. 11, 1933. Deep red, violet, blue and bluish green dyes are prepd. by heating to 150-300° a compd. of the

formula  $\text{CO.CX:C(NHRNH}_2\text{).CO.CX:C(NHRNH}_2\text{)}$  (X is H or halogen, R is an aromatic radical contg. at least 2 C<sub>6</sub>H<sub>4</sub> rings, one of which is joined to the NH group and the other to the NH<sub>2</sub>) in the presence of an acylating agent. Acylating agents may be used AcO, H<sub>2</sub>Cl, benzotrichloride or *p*-toluenesulfonyl chloride. The components may be boiled in a solvent of high b. p. with or without an oxidizing agent. The products may be used directly as pigments or converted by sulfonating to dyes sol. in water having a good affinity for vegetable fiber. The dyes have the formula I (Y signifies that they may contain acyl groups, Z that they may be sulfonated, R contains at least 2 C<sub>6</sub>H<sub>4</sub> rings as before, the O and N being joined to adjacent C atoms of one ring and the NH<sub>2</sub> being in the other ring). Examples are given.



**Pyranthronine dyes.** \* Wilfred M. Murch (to National Aniline and Chemical Co.). U. S. 1,945,405, Jan. 30. Vat dyes giving on cotton from the vat reddish violet to brownish violet shades changing on exposure to the air to reddish brown to yellowish brown are obtained by reacting pyranthronine with sulfuryl chloride in the presence of I and an aromatic nitro compd. such as PhNO<sub>2</sub>, removing the insol. chloropyranthronine which may be present in the reaction mass (suitably by partial cooling and filtering) and recovering the vat dyes from the residual reaction mass (as by concg. and further cooling). Cf. C. A. 27, 1193.

**Triarylmethane dyes.** I. G. Farbenind. A.-G. (Ottmar Wahl, Werner Muller, Adolf Kohn and Ernst Teupel, inventors). Ger. 590,748, Jan. 9, 1934 (Cl. 22b. 10). Addn. to 574,021 (C. A. 27, 3619). The process of Ger. 774,021 is modified by starting from *N*-arylaminoalkyl-sulfonic acids in which the sulfo group is linked to an

alkylene group higher than C<sub>2</sub>H<sub>4</sub>. An example is given of the prepn. of a dye from PhNBuCH<sub>2</sub>CH(SO<sub>3</sub>H)Me and *o*-chlorobenzaldehyde.

**1-Methylamino-4-aminonaphthoquinone.** Soc. pour l'ind. chim. à Bâle. Ger. 591,170, Jan. 17, 1934 (Cl. 22b. 3.02). See Brit. 396,662 (C. A. 28, 654\*).

**Dyeing.** I. G. Farbenind. A.-G. (Arthur Zitscher and Wilhelm Seidenfaden, inventors). Ger. 588,212, Nov. 14, 1933 (Cl. 8m. 12). Addn. to 560,797 (C. A. 27, 1204). In producing insol. azo dyes on the fiber by using antidiazotates, alkali and hydroxy compds., by the method of 560,797, alkali antidiazosulfonates of the general formula *p*-R.NH.C<sub>6</sub>H<sub>4</sub>N=N.SO<sub>3</sub>M are used, R denoting an alkyl, aralkyl or alicyclic residue and M an alkali metal. Thus, cotton is printed with a paste contg. Na 4-benzylamino-2,5-dimethoxybenzene-1-diazosulfonate, 2,3-hydroxynaphthoquinonaminobenzene, NaOH, thiodyglycol, Na<sub>2</sub>CrO<sub>4</sub>, water and starch-tragacanth thickening. The printed ware is dried, steamed, washed and rinsed. Another example is given.

**Dyeing.** Oranienburger Chemische Fabrik A.-G. (Kurt Lindner, inventor). Ger. 589,508, Dec. 8, 1933 (Cl. 8m. 3.01). Solns. of S dyes or vat dyes are made stable by addn. of highly sulfonated condensed sulfonic acids or sulfonates obtained by the action of halosulfonic acid on mixts. of natural fats, fatty acids or fat-like substances and condensable aliphatic or aromatic compds. such as hydrocarbons, alcs., phenols, lactones, ketones, etc. Thus crude oleic acid is mixed with C<sub>6</sub>H<sub>5</sub> and treated with ClSO<sub>3</sub>H. The product is then treated with alkali carbonate to give a dye-stabilizing prepn. Other examples are given.

**Improvement of dyeing with alkaline dyes.** Hikoji Satô. Japan. 100,531, Apr. 11, 1933. Addn. to 89,540 (Cl. 1. 25, 3176). Cloths or threads are treated with a dil. soln. of the astringent juice of the persimmon before dyeing with an alk. dye.

**Dyeing materials comprising cellulose acetate.** George H. Illis and Henry C. Olpin (to Celanese Corp. of America). U. S. 1,947,038, Feb. 13. Compds. such as *p*-tolyl-4-chloro-2-nitroaniline or the like are used for dyeing materials such as cellulose acetate fast yellow to orange shades.

**Dyeing animal fibers.** Hans Bucherer. Ger. 591,212, Jan. 18, 1934 (Cl. 8m. 11.01). Animal fibers are dyed with mordant dyes in baths contg. free NH<sub>3</sub>, with or without (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>. The fibers may first be mordanted and then dyed, or the mordant and the dye may be applied from the same bath. The dyed fibers are preferably after-treated in a weak AcOH bath contg. a little K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. Examples are given.

**Dyeing wool.** Soc. pour l'ind. chim. à Bâle. Ger. 591,315, Jan. 19, 1934 (Cl. 8m. 12). In dyeing wool by treatment in turn with an azo dye component and a diazo compd., improved results are obtained by first subjecting the wool to slight chlorination.

**Dyeing and printing.** Durand & Huguenin A.-G. Ger. 591,410, Jan. 20, 1934 (Cl. 8m. 3.02). In dyeing and printing with dyes of the *N*-dihydro-1,2,2',1'-dianthraquinonazine group, by processes involving the oxidation of an ester salt of the leuco compd. of the dye in an acid medium, no special precautions are taken to avoid over-oxidation, but instead the dyed material is brought to the required color by after-treatment with a reducing agent in a mild alk. bath. Examples are given.

**Compositions for use in dyeing and printing.** Mordecai Mendoza, Arthur G. Murray and Herbert B. Briggs (to Imperial Chemical Industries Ltd.). U. S. 1,947,433, Feb. 13. A compn. which is suitable for use in printing fabrics comprises stoichiometric proportions of the formaldehyde-bisulfite compd. of a primary arylamine free from azo groups such as 5-chloro-*o*-toluidine, aniline or *o*-anisidine and alkali nitrite and an arylamide such as the *o*-aniside of 2,3-hydroxynaphthoic acid.

**Printing with vat dyes.** I. G. Farbenind. A.-G. Fr. 756,817, Dec. 15, 1933. Moist materials printed with vat dyes and on which are found the dye, a thickener, an alkali and a hyposulfite or one of its derivs., are developed

by reducing the dye on the material as quickly as possible, preferably at a temp. below 100°. The dye is fixed on the material at a temp. below that used for the reduction. An app. is described which regulates the moisture.

**Printing cotton.** Sebastian Gassner and Hermann Berthold (to General Aniline Works). U. S. 1,945,221, Jan. 30. A printing paste is used comprising a vat dye and an alkali metal salt of a compd. such as an unsubstituted sulfonic or carboxylic acid of the benzene or naphthalene series, hydrogenation products, or alkyl-, hydroxy- or dialkylamino-substitution products of benzene or naphthalenesulfonic acids. Numerous examples are given.

**Printing cotton.** I. G. Farbenind. A.-G. and A. Carpmal. Brit. 372,828, May 12, 1932. Divided on 373,212 (C. A. 27, 4099) and addn. to 343,102 (C. A. 25, 5575). The process of 343,102 is extended to S dyes, which are converted into pastes suitable for cotton printing by reduction in the presence of H<sub>2</sub>O and glycerol or other H<sub>2</sub>O-sol. alc. and an alkali weaker than an alkali metal hydroxide. Hyposulfites, glucose and titanous salts may be used as reducing agents and hydrotropic agents, e. g., Na benzenesulfonate, benzylanilinesulfonates, may be added before, during or after the reduction. Among examples (1) the dye obtained by S fusion of carbazole-indophenol is reduced by Na hyposulfite in the presence of H<sub>2</sub>O, glycerol and NH<sub>3</sub> and (2) indocarbon CL is similarly reduced.

**Printing wool.** I. G. Farbenind. A.-G. (Max Zabel, Oskar Falek and Hans Seifert, inventors). Ger. 591,476, Jan. 22, 1934 (Cl. 8a. 1.02). Aminoacetic acid or a salt thereof is added to printing or discharge pastes used for coloring wool with vat dyes. Examples are given.

**Rotary machine for dyeing textiles.** Juan Rabassa. Fr. 756,954, Dec. 18, 1933.

**Apparatus for dyeing and other treatments of yarns and fabrics.** Peter W. Custers. Ger. 587,200, Nov. 1, 1933 (Cl. 8a. 9.70). Addn. to 569,612 (C. A. 27, 3833).

**Fibers.** Charles V. Rowell. Ger. 589,844, Dec. 15, 1933 (Cl. 29a. 7). App. for treating hemp, etc., with steam under pressure to produce spinnable fibers is described. Cf. C. A. 27, 5562.

**Treatment of fibers.** Sakumatsu Nishioka. Japan. 100,339, March 29, 1933. By treating fibers with a mixt. of gelatin soln., boric acid, paraformaldehyde, phenol-formaldehyde condensation product, alum and camphor, they are made strong, antiseptic, waterproof and lustrous.

**Vegetable fibers resembling silk.** Kiyoshi Watanabe and Kunji Ina. Japan. 99,070, Jan. 16, 1933. Vegetable fibers are treated with caustic alkali, water and a colloidal soln. of silk.

**Textile fabric.** Henry Dreyfus. U. S. 1,947,465, Feb. 20. A textile filling strand is formed of a plurality of individually twisted ends such as cellulose acetate temporarily maintained in parallel but untwisted relation by a removable bounding agent.

**Treatment of cloth and thread.** Ichitarô Syôji. Japan. 100,072, March 13, 1933. Cloth or thread is treated with a water-sol. condensation product of urea and HClHO heated at about 80° and treated with dil. acid (e. g., 0.3% H<sub>2</sub>SO<sub>4</sub>), washed with H<sub>2</sub>O and dried. The quality of the material is improved.

**Pretreatment of textiles for dyeing.** Sadaichi Imai (Ushinosuke Imai, inventor). Japan. 100,503, Apr. 10, 1933. Before dyeing red, cloth is treated with an aq. soln. of Na silicate and phosphate neutralized or made slightly acidic with dil. H<sub>2</sub>SO<sub>4</sub> contg. a sugar, glycerol or the like.

**Machine for treating textiles with chemicals.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. (Georg Wolff, inventor). Ger. 589,773, Dec. 14, 1933 (Cl. 8a. 5.01).

**Delustering fabrics containing cellulose derivatives such as cellulose acetate.** Camille Dreyfus. U. S. 1,947,002, Feb. 13. The fabric is thoroughly wetted by prolonged treatment with non-saponifying aq. liquids such as a non-saponifying aq. soap soln. and is then subjected

to the action of a delustering agent such as a soap soln. at higher temp.

**Liquid treatments of fabrics such as those comprising cellulose acetate.** George H. Ellis (to Celanese Corp. of America). U. S. 1,947,039, Feb. 13. In the treatment of materials in folded form with liquid such as scouring or dyeing soln., creasing is avoided by a preliminary treatment of the material with a non-saponifying aq. liquid such as hot very dil. soap soln. contg. Turkey-red oil for at least 2 hrs. while in unfolded form.

**Improving the resiliency of cellulosic textile fibers such as those of cotton or rayon.** Frank R. Redman (to Resilient Rayons, Inc.). U. S. 1,945,449, Jan. 30. The fibers are successively immersed in a bath of albuminous material such as gelatin soln. and in an insolubilizing agent such as formaldehyde and then dried while mechanically treated to sep. the fiber from each other.

**Conditioning yarns containing organic cellulose derivatives such as cellulose acetate, etc.** Frederick J. William and Herbert E. Martin (to Celanese Corp. of America). U. S. 1,945,959, Feb. 6. The yarns are rendered more amenable to knitting by treatment with a conditioning liquid contg. a liquid polyhydric alc. such as diethylene glycol and an oil such as castor oil together with a solvent such as BuOH.

**Treating artificial yarns, etc.** British Celanese Ltd. Brit. 400,988, Nov. 6, 1933. The flexibility of yarns, bristles, straws, etc., made of or contg. org. derivs. of cellulose is increased and their stability to storage improved by treatment with an alkyl ester of a hydroxybutyric acid, applied as such or dild. with a non-solvent for the cellulose deriv., e. g., H<sub>2</sub>O, triethylene glycol. In examples cellulose acetate yarn is treated with a mixt. of Et  $\alpha$ -hydroxybutyrate, diethylene glycol and H<sub>2</sub>O.

**Filaments and yarns.** Camille Dreyfus and William Whitehead (to Camille Dreyfus). Can. 339,118, Jan. 30, 1934. Filaments and yarns contg. an org. deriv. of cellulose are treated with a finely divided, insol. salt of a higher aliphatic acid in the presence of a swelling agent for the org. deriv. of cellulose. Suitable salts include stearate, oleate, palmitate, cerotate and claidate of Zn, Al, Mg, Ca, Sr and Ba. Swelling agents are Me<sub>2</sub>CO, HOAc, thiocyanates of Na, K or NH<sub>4</sub>, diacetone alc., etc. The treated filaments or yarns have a pleasing appearance and improved textile properties.

**Saponifying cellulose ester filaments, yarns fabrics, etc.** Henry Dreyfus. Brit. 400,996, Nov. 6, 1933. Loss of strength during sapon. is avoided by using sapon. media contg. oils which may be of mineral, vegetable or animal character or sol. oils such as sulfonated castor oil. In examples the baths consist of (1) aq. NaOH contg. Turkey-red oil, (2) a homogeneous aq. mixt. contg. triethanolamine, oleic acid and olive oil and, (3) an emulsion of light mineral oil in soap soln. contg. NaOH.

**Machine for sizing and finishing cotton and other yarns or threads.** George Hill. Brit. 401,327, Nov. 7, 1933. Divided on 400,808 (C. A. 28, 2198\*).

**Apparatus for the wet treatment of hanks.** Hans Wagner. Ger. 591,473, Jan. 22, 1934 (Cl. 8a. 8.01).

**Apparatus for the wet treatment of fabric webs.** Zittauer Maschinenfabrik A.-G. Ger. 591,474, Jan. 22, 1934 (Cl. 8a. 9.70).

**Apparatus for the wet treatment of rayon cakes.** Feldmühle A.-G. vorm. Loeb, Schoenfeld & Co. Ger. 591,131, Jan. 17, 1934 (Cl. 29a. 6.08).

**Apparatus for washing and after-treating rayon cakes.** Otto Jüntsch. Ger. 591,130, Jan. 17, 1934 (Cl. 29a. 6.08).

**Rayon of animal origin.** Gentô Yamanouchi. Japan. 99,190, Jan. 26, 1933. A soln. for rayon manuf. is prepd by dissolving silk or the like in a soln. of basic salts and hydroxides of alkali or alkali earth metals.

**Rayon.** Soc. pour la fabrication de la soie artificielle "Rhodiaseta." Fr. 756,832, Dec. 15, 1933. Threads which, even after a drawing above 100% still have an appreciable plastic stretch, are obtained by using dichloroethane as drawing liquid.



**Rayon.** The Viscose Co. Fr. 757,008, Dec. 10, 1933. A mat thread is obtained by adding  $\text{TiO}_2$  (0.1-5) and chlorobiphenyl (about 4.5%) to the spinning soln.

**Regeneration of silk thread.** Shigenosuke Tsuda. Japan. 99,164, Jan. 25, 1933. A colloidal soln. is prepd. by dissolving silk with a soln. of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NaSCN}$  or  $\text{Ca}(\text{SCN})_2$  or  $\text{NaI}$ . The fiber is regenerated by passing the colloidal soln. through a soln. of  $\text{Na}_2\text{SO}_4$  and  $\text{ZnSO}_4$  acidified with  $\text{H}_2\text{SO}_4$ .

**Treatment of silk thread.** Ken'ichi Kakeyama and Toyokichi Mukawa (Tamotsu Kanchako, inventor). Japan. 99,693, Feb. 22, 1933. Silk thread is passed through a cold aq. soln. of  $\text{NaOH}$ , milk and  $\text{NH}_4\text{OH}$ , to which an aq. soln. of  $\text{NaOH}$  and sesame oil is gradually added. The thread is then steamed and dried. Thread thus treated is suitable for making knitted goods.

**Degumming silk.** Wallerstein Co. Inc. Fr. 756,911, Dec. 18, 1933. Raw silk is impregnated with a protease prep., preferably in the presence of an impregnating agent, and dried without eliminating an appreciable amt. of its gum. The gum is afterward removed by immersion in hot water.

**Sizing silk.** Joseph Condamin. Fr. 756,510, Dec. 11, 1933. The silk is wound on perforated bobbins which are dipped into a sizing bath until said, and the excess liquid is removed by centrifuging.

**Coating fabrics with rubber or the like.** John McGavack (to Naugatuck Chemical Co.). U. S. 1,946,090, Feb. 6, 1933. Latex material is spread on an inclined upwardly moving band of material under the action of gravity opposed to the movement of the band. App. is described.

**Removing fatty and pitchy substances from animal**

**fibers.** Viktor Fluss. U. S. 1,947,522, Feb. 20. Animal fibers such as hair and wool are cleansed and rendered more readily feltable by treating with a solvent such as trichloroethylene at temps. below  $0^\circ$  at about atm. pressure or less, while preserving the fibers themselves intact.

**Treating woolen fabrics in order to improve them for fume bags, etc.** Edgar A. Slagle (to American Smelting and Refining Co.). U. S. 1,947,024, Feb. 13. The fabric is treated with a colloidal soln. of  $\text{BaSO}_4$ .

**Cleaning wool.** Walter Saare. Brit. 401,525, Nov. 16, 1933. Pitch and similar coloring materials are removed from sheep wool by treating with the vapor of a volatile solvent, e. g., hexalin, tetralin, trichloroethylene, cooling, expressing the condensed solvent by pressure and then washing the degreased wool with an alkali soln., e. g., a soap or soda soln.

**Apparatus for cleaning and sterilizing feathers.** Frank I. Klayman and Frederick R. Lawrence (Klayman to Louis Gordon). U. S. 1,945,290, Jan. 30. Various structural and operative details are described.

**Dry-cleaning preparation.** Dunlop Rubber Co. Ltd. Ger. 585,533, Oct. 4, 1933 (Cl. 30b. 13). See Brit. 358,584 (C. A. 26, 4127).

**Bleaching.** Soc. anon. pour l'ind. chim. à Bâle. Ger. 580,774, Dec. 13, 1933 (Cl. 8i. 2). See Fr. 743,925 (C. A. 27, 4102).

**Waterproof cloth.** Sannojo Ushiyama. Japan. 100,281, March 27, 1933. Addn. to 95,695 (C. A. 27, 3624). Cloth is waterproofed by painting a mixt. of glue and  $\text{NaOH}$  and a mixt. of linseed oil, Fe powder, etc., and powd. hair on both sides.

## 26 PAINTS, VARNISHES AND RESINS

A. H. SABIN

**International standardization in the field of paints.** C. P. A. Kuppelmeier. *Ind. Standardization* 4, 135-7 (1933). Alden H. Emery

**Casein paints.** F. C. Atwood. *Am. Paint J.* 18, No. 19, 48, et seq., No. 21, 17 et seq. (1934). G. G. S.

**The use of metallic zinc paint for the protection of metal surfaces.** H. P. Britsch. *Agr. Eng.* 14, 337 8 (1933).—Owing in part to its chem. compn. and in part to its unusual distensibility, metallic Zn paint affords much better adherence to Zn and Zn-coated surfaces than many other paints commonly used for this purpose. K. D. Jacob

**Standard methods of routine analysis of white pigments.** Am. Soc. Testing Materials A. S. T. M. Designation: D31-33; Am. Standards Assoc. A. S. A. No.: K15-1933, 12 pp. (1933). Alden H. Emery

**Standard methods of routine analysis of dry red lead.** Am. Soc. Testing Materials A. S. T. M. Designation: D39-33; Am. Standards Assoc. A. S. A. No.: K16-1933, 6 pp. (1933). Alden H. Emery

**The darkening of chrome oxide green at high temperature.** J. P. Saché. *Farben-Chem.* 5, 49-50 (1934).—The darkening of chrome oxide green at red heat is ascribed to the formation of a darker cryst. modification. G. G. S.

**Phenols as antioxidants in drying oils.** R. S. Hilpert and Cl. Niehaus. *Angew. Chem.* 47, 86-90 (1934).—Expts were made on the action of some phenols upon the drying of linseed oil and wood oil, with and without addns. of Co, Pb and Mn driers. Uniform conclusions could not be obtained. Exptl. results and twelve references are given. Karl Kammermeyer

**Recent developments in the nitrocellulose-lacquer industry in 1933.** H. Schmidt. *Nitrocellulose* 5, 23-6 (1934).—A review. E. M. Symmes

**Crystal japan finish on metal.** C. F. Scribner. *Ind. Finishing* 10, No. 4, 26-30 (1934).—Crystal japan can be applied directly on metal or wood; it gives hard and attractive finishes which make rough surfaces appear smooth. The crystal size is controlled by the heaviness

of the coat. Special oven conditions and baking schedules are outlined. Crinkle japan is a similar attractive finish which requires somewhat different baking conditions. D. Thuesen

**Baked finishes on die castings.** C. F. Scribner. *Ind. Finishing* 10, No. 4, 30-40 (1934).—Practical suggestions for obtaining better finished products are given. D. T.

**Fundamentals of the production and use of processed fossil gums.** Wilhelm Krumbhaar. *Official Digest Federation Paint Varnish Production Clubs* No. 134, 43 8 (1934).—The running process of fossil gums must be conducted so that the percentage of dibasic acids will not be excessively reduced. Mastication between steam-heated rollers renders copals more sol. and fusible. After running, the processing is completed by neutralization of the acids with  $\text{MgO}$  or  $\text{CaO}$ , or by esterification with glycerol. Copal esters are sol. in petroleum spirits and in oils. Varnishes contg. them give off no odor after baking, have good  $\text{H}_2\text{O}$  resistance and are compatible with all pigments. G. G. Sward

**Tornesit.** R. A. Coolahan. *Official Digest Federation Paint Varnish Production Clubs* No. 133, 39-42 (1934).—"Tornesit" is stable at temps. up to  $100^\circ$ ; decompn. is not serious until  $135^\circ$  and at  $150^\circ$  it begins to char. "Hercolyn," chem. plasticizers, blown linseed oil and bodied tung oil are suitable plasticizers. Amberols, coumarones, alkyds, ester gums and dammar may be used with Tornesit. A wide range of pigments may be used. Tornesit coatings have proved successful in various places about a nitrocellulose factory. G. G. Sward

**Linoleum (not requiring) treatment in the drying house.** Felix Fritz. *Kunststoffe* 23, 234-5 (1933).—Various practical means are described for hastening or eliminating the process of drying linoleum after applying the linoleum mass to the jute background. J. W. Perry

**Determining when printed linoleum is ready for use.** A. I. Kogan and P. A. Sikar. *Farben-Chem.* 5, 50-3 (1934).—Abrasion resistance is considered better than tackiness as a measure of the dryness of printed linoleum. There is described an abrasion-resistance device in which

an abrasive block (a mixt. of molten S and emery) is moved to and fro over the surface under test. G. G. S.

**A new fossil resin—Kiscellite.** L. Zechmeister, G. Tóth and A. Koch. *Centr. Mineral. Geol.* A1934, 60-1; cf. C. A. 22, 47, 4085.—The brownish green resin had hardness of about 2, sp. gr. = 1.186,  $n_D^{20}$  = 1.5418, m. p. indefinite. On heating,  $H_2S$  is evolved. Analysis: C 84.47, H 11.12, S 3.99, ash 0.31, sum = 99.89%. This is the first natural resin found which contains no O.

Michael Fleischer

**Applications of countercurrent mixers in the artificial-resin industry.** Paul Wicssner. *Kunststoffe* 24, 3-5 (1934).—Descriptive with diagrams. J. W. P.

**Rapid determination of the pressure required in molding articles from artificial resins.** K. Brandenburger. *Kunststoffe* 23, 253-4 (1933).—A nomograph to facilitate calcs. is given and its use explained with examples. J. W. P.

**The influence of the material of the apparatus on the condensation of artificial resins.** K. Brandenburger and Ernst L. Marx. *Kunststoffe* 24, 32 (1934).—The material used in making app. for prepg. artificial resins affects not only the color of the product but also the rate of condensation. J. W. Perry

**New fillers for artificial-resin masses.** K. Brandenburger. *Kunststoffe* 23, 204-5 (1933).—Tests with various org. fillers, e. g., ground wood, small bits of paper, etc., revealed that the use of cotton-silver imparted the best mech. properties to articles prepd. from artificial resins. J. W. Perry

**Resins and resinous substances (Rollett, Petter) 10.** Furnace for oxidizing Pb to Pb oxide (Russ. pat. 1085) 1. Azo dyes [products used in printing inks and paints] (U. S. pat. 1,947,027) 25. Esters of higher acids and alcs. [used in coating compus.] (U. S. pat. 1,944,887) 10. Condensation products [for lacquers] (Brit. pat. 401,237) 13. Artificial masses [products used for manuf. of lacquers] (Brit. pat. 401,200) 18.

**Paint.** Torazô Kamata (Kikuzô Kamata, inventor). Japan. 99,138, Jan. 24, 1933. A mixt. of linseed oil (7), Turkey-red oil (3) and white wax (1) is heated at 50-200° and then is mixed with talc (5-10).

**Paint for ship.** Isaburô Toda. Japan. 99,773, Feb. 24, 1933. The paint is prepd. by heating copal gum, tar oil, asphalt, graphite, mica, etc.

**Bituminous paint.** Samuel W. Sparks (one-third each to Robert T. Lytle, Lawrence W. Stoffel and Price S. McPherson). U. S. 1,945,869, Feb. 6. A paint which is suitable for use on various materials comprises the reaction products of bituminous rock,  $HNO_3$ ,  $H_2SO_4$  and collodion.

**Minium paint.** Nippon Kakô Penki K. K. (Nobumasa Nogami, inventor). Japan. 99,858, March 1, 1933. Minium is mixed with a volatile solvent soln. of metallic soap of linoleic acid or other aliphatic acids.

**Water paint.** Herman A. Scholz and Wilbur S. Randel (to U. S. Gypsum Co.). U. S. 1,947,497, Feb. 20. A paint suitable for use on interior walls, etc., after admixture with water and linseed oil comprises a mineral filler such as a tremolite and dolomite mixt. 59.7, casein 6, a Ti pigment 20,  $ZnO$  3, Irish moss 0.1, hydrated lime 9, borax 2 and tribromophenol 0.2 part. U. S. 1,947,498 (Herman A. Scholz (to U. S. Gypsum Co.)) relates to a dry compn., forming a smooth mixt. with water and permanently stable in storage, comprising casein particles coated with oil together with sufficient anhyd. Na borate to serve as a latent solvent for the casein, and which also may contain  $NaF$ , lime or  $K_2Cr_2O_7$ , etc.

**Painting.** Wilhelm Lühl. Ger. 591,084, Jan. 16, 1934 (Cl. 75c. 10). A priming compn., on which water paints or oil paints or both in turn can be applied, comprises an unboiled vegetable oil 40-65, glycerol or like alc. 30-55, and spermaceti about 5%, together with an optional amt. of a mineral filler other than  $CaCO_3$ .

**Surface treatment of magnesium and its alloys to form a coating to which paint, etc., will adhere.** Edward C. Burdick and Wm. H. Gross (to Dow Chemical Co.). U. S. 1,947,122, Feb. 13. The surface is subjected to the

action of a soln. of a di-H phosphate such as that of  $Na_2$  and a compd., such as the Na salt of chromic, tungstic or metavanadic acid.

**Wood filler.** James F. Walsh (to Celluloid Corp.). U. S. 1,947,438, Feb. 13. A cellulose ester such as cellulose nitrate or acetate 100, is used with a substantially nonvolatile liquid modifier such as dibutyl phthalate, 35-60, a comminuted org. filling material such as wood flour 250 and a volatile solvent such as alc. and acetone 600-640 parts.

**Pigment.** Carl J. Harbert (to Harshaw Chemical Co.). U. S. 1,945,809, Feb. 6. See Brit. 393,474 (C. A. 28, 351<sup>1</sup>).

**Pigments.** Julian T. Baldwin (to Sandura Co.). U. S. 1,946,052, Feb. 6. For coating the surface of a pigment such as lithopone comprising a metal compd. adapted to react with fatty acids, it is subjected to hot oxidized fatty acid vapors such as those from soy-bean oil to form a thin film of soap of the metal and the oxidized fatty acid on the surface of the pigment. U. S. 1,946,053 relates to a pigment coated with a film formed of the Zn soap of blown soy-bean oil. U. S. 1,946,054 relates to a process involving dissolving a water-sol. soap of an oxidized acid such as oxidized linoleic acid in an aq. suspension of a pigment and adding a metallic salt such as  $ZnSO_4$  which will react with the water-sol. soap to form a water-insol. soap to coat the individual particles of the pigment. U. S. 1,946,055 relates to a pulverulent pigment such as lithopone the particles of which are coated with a soap (such as the Zn soap) of an oxidized acid (such as oxidized linoleic acid) having more than 7 C atoms in its chain.

**Pigments.** Albert Sander. Fr. 756,415, Dec. 9, 1933. Dyes or pigments are made by reaction of a salt of Zn or Cd or a mixt. thereof on an org. compd. of S, to form a metal sulfide. S compds. include compds. of thiocarbonic acid, xanthates, thiocarbamides, isothiocyanates and thiocarbamilides.

**Pigments.** "Kolloidchemie" Studiengesellschaft m. b. H. Johannes B. Carpozow, Robert Lenzmann, Martin March and Hermann Sanders. Ger. 588,447 Nov. 21, 1933 (Cl. 22f. 10). Addn. to 555,714 (C. A. 26, 6153). The method of 555,714 for making pigments is applied to a mixt. of sea ooze and org. dyes. Thus, crude aniline oil contg.  $PhNH_2$  and toluidine is intimately mixed with sea ooze *in vacuo* and dried. The product is oxidized by exposure to air or treatment with  $H_2O_2$ , to give a brownish red to wine-red pigment. Other examples are given.

**Pigments.** I. G. Farbenind. A.-G. (Erich Korinth and Georg Meder, inventors). Ger. 589,783, Dec. 14, 1933 (Cl. 22f. 10). Inorg. pigment is prepd. by mixing  $ZnO$  with one or more colored oxides of the type  $MO$ ,  $M$  denoting a metal, and heating till a solid soln. or mixed crystals are produced. Thus,  $ZnSO_4 \cdot 7H_2O$  and  $MnSO_4 \cdot 4H_2O$  crystals are ground and intimately mixed. The mixt. is heated to glowing to drive off  $SO_2$  and water and is reduced to the  $MnO$  stage by heating in an atm. of CO or  $CO_2$ . A bright brown pigment results. Other examples are given.

**Pigments.** Pál Zelenka. Hung. 107,940, Jan. 2, 1934. Melted metal or alloy is sprayed under pressure against a heated gas or air current (or, if desired, in the same direction as the current). The heat of the current vaporizes the metals and the vapors are oxidized by some method.

**Pigments from exhausted gas-purifying masses.** Gyula Baranyi. Hung. 107,461, Dec. 1, 1933. The free and org. S and carbonizable org. matter of the mass are evapd. and ignited. Disintegrated iron particles or ignited lime may also be added. Yellow, brown and red pigments are obtained in different parts of the furnace; dark-red material, e. g., is formed in the hottest portion, at 500-650°. Cf. C. A. 27, 4107.

**Lithopone.** Wm. C. Hooey and Edmund J. Flynn (to New Jersey Zinc Co.). U. S. 1,945,551, Feb. 6. Aq. solns. of BaS and  $ZnSO_4$ , at least one of which contains a precipitable Mg compd. in soln., such as  $MgSO_4$ , are brought together, and the main reaction is terminated before an appreciable amt. of Mg compd. is pptd. Cf. C. A. 27, 2830.

**zinc sulfate.** Silesia Verein chem. Fab. (Peter Schüssler and Paul Hegenberg, inventors). Ger. 591,280, Jan. 19, 1934 (Cl. 22f. 7). Roasted ores contg. Fe and Zn are treated with  $H_2SO_4$  of 50–80°Bé. and then calcined in an oxidizing atm. at a temp. below the decompn. temps. of  $ZnSO_4$  and  $Fe_2(SO_4)_3$ , e. g., below 450°. The product is lixiviated and filtered, and the filtrate is treated with ZnO or  $ZnCO_3$  to ppt.  $Fe(OH)_3$ . The soln. of  $ZnSO_4$  is filtered, and the residue of  $Fe(OH)_3$  is calcined at 400–500°.

**Cadmium yellow.** Silesia Verein chemischer Fabriken Fr. 757,225, Dec. 22, 1933. Clear Cd yellow, tending toward the green is made by mixing the  $CdS$ , pptd. and dried, with  $ZnS$  or material contg.  $ZnS$ , e. g., lithopon, and afterward heating the mixt. to 350–450°.

**Iron-containing black pigment.** Béla Moskovits. Hung. 107,553, Dec. 1, 1933. An org. material, e. g., sawdust, is added to Fe oxide or material contg. it. The org. matter forms reducing gases during dry distn. The cooled product is treated by magnetic sepn. and then ground to powder.

**Titanium white.** Hartmut W. Richter. U. S. 1,947,226, Feb. 13. In the hydrolysis of highly acid solns. of  $TiO_2$  in  $H_2SO_4$  to produce a ppt. suitable for conversion into a pigment, the temps. and pressures necessary for hydrolysis are lowered by adding a soln. of more basic Ti sulfate contg.  $H_2SO_4$  and  $TiO_2$  in a ratio by wt. of less than 1.8:1.0.

**Zinc white.** Zinkhütte Neu-Erlaa G. m. b. H. Ger. 589,593, Dec. 11, 1933 (Cl. 22f. 4). App. for producing the above pigment by distg. Zn and burning the resulting Zn vapor is described.

**Ink.** Matahei Shinozaki. Japan. 99,701, Feb. 22, 1933. A mixt. of gallnut ext., dil.  $H_2SO_4$ , dil. oxalic acid, ferric oxalate,  $FeSO_4$  and  $Al_2(SO_4)_3$ , and an aniline dye is kept at 1–2° until impurities are pptd. The time of manuf. is thus very much shortened.

**Printing ink.** I. G. Farbenind. A.-G. (Ernst Knebel, Arthur Hügel and Heinrich Steimeyer, inventors). Ger. 591,456, Jan. 22, 1934 (Cl. 15f. 7.01). Sol. condensation products of polyhydric alcs. with polybasic org. acids are used as components of inks for plain or relief printing.

**Gravure ink.** Kizydō Kawamura. Japan. 99,782, Feb. 27, 1933. The ink is prepd. from metallic alginates, wax, resin, oil, higher fatty acid, pigment, etc.

**Mimeograph ink.** Shinjirō Horii. Japan. 99,266, Feb. 1, 1933. The ink is a mixt. of oils (such as linseed, castor or soy-bean oil), wax, soap of org. bases (such as ethanol-amine oleate or hydroxyethylamine naphthenate), dyes or pigments and water. It does not corrode metals.

**Stamp ink.** Tōyō Seikan K. K. (Iwao Siga, inventor). Japan. 100,572, Apr. 15, 1933. The ink is prepd. by dissolving induline in crude cresol or MeOH.

**Linseed-oil substitute.** Hakodate Seiyū K. K. (Kintarō Hashimoto, inventor). Japan. 100,422, Apr. 6, 1933. A hydrocarbon oil (such as light oil) contg. absorbed  $H_2S$  is heated with animal and soy-bean oils, while air is bubbled into the mixt.

**Promoting the drying of oils and varnishes.** Hōnen Seiyū K. K. (Mitsuo Nakamura, inventor). Japan. 99,478, Feb. 10, 1933. Addn. of about 5% of aromatic ketones, aldehydes or their derivs. promotes the drying of oils or varnishes. Acetophenone, benzophenone, benzaldehyde and salicylaldehyde are examples.

**Accelerator for drying of oils and varnishes.** Hōnen Seiyū K. K. (Mitsuo Nakamura, inventor). Japan. 99,977, March 7, 1933. Addn. of about 5% of a phenol ether (such as isosafrole or anethole) accelerates the drying of oils and varnishes.

**Coating composition.** Herbert A. Endres (to The Goodyear Tire and Rubber Co.). Can. 339,070, Jan. 30, 1934. One hundred lbs. of the chlorostannic acid reaction product of rubber is mixed with 10 lbs. of carbon black on cooled mill rollers until a homogeneous sheet is obtained. This is dispersed in 50 gallons of solvent naphtha and 5 lbs. of tung oil. This coating compn. has unusual resistance to the deleterious action of acid, alk., saline

and other corrosive solns. Other pigments as  $ZnO$ ,  $BaSO_4$ ,  $TiO_2$ , lithopons,  $Al_2O_3$ ,  $Fe_2O_3$ , and org. dyes may be added to the rubber conversion product on the mixing rollers. Solvents such as turpentine,  $CCl_4$ ,  $CS_2$ ,  $CHCl_3$ , petroleum solvents and coal-tar solvents may be used. Cf. C. A. 28, 9177.

**Coating compositions.** Imperial Chemical Co. Ltd., Arthur Hill, Rowland Hill and Eric E. Walker. Brit. 401,309, Nov. 9, 1933. A binuclear dihydric phenol, derived from *o*-cresol and ketones, e. g.,  $Me_2CO$ , cyclohexanone, or aldehydes other than  $CH_3O$ , e. g.,  $AcH$ , butyraldehyde,  $BzH$ , is condensed with  $CH_2O$  or a compd. contg. a reactive  $CH$  group in an acid medium and the product is dissolved in a drying oil, e. g., tung, to yield a coating compn. In examples  $\alpha,\alpha,4,4'$ -dihydroxy-3,3'-dimethyldiphenylcyclohexane,  $\alpha,\alpha,4,4'$ -dihydroxy-3,3'-dimethyldiphenylbutane, or  $\beta,\beta,4,4'$ -dihydroxy-3,3'-dimethyldiphenylpropane is condensed with  $CH_2O$  in the presence of methylated spirits and  $HCl$  and the initial condensation product of *o*-cresol and  $AcH$  in the presence of  $HCl$  is condensed with  $CH_2O$  in the presence of  $HCl$ .

**Coating composition.** Paul Friedrich. Fr. 756,481, Dec. 11, 1933. A compn. for application to metals, wood, stone or paper is made by mixing tar and coal-tar pitch with the addn. of chlorinated aliphatic hydrocarbons and a mixt. of homologs and derivs. of  $C_6H_6$ , the mass being energetically agitated and submitted to pressure. One example contains tar 70, pitch 13, trichloroethylene 3 and homologs and derivs. of  $C_6H_6$ , 11 kg.

**Coating composition from drying oil, phenolic and aldehydic materials.** Adolf Heck (to Cook Paint & Varnish Co.). U. S. 1,947,414, Feb. 13. A compn. suitable for use on elec. app., etc., comprises reaction products of an oxidized drying oil such as oxidized linseed oil with about equal amts. of a phenol and aldehyde in the presence of an alk. catalyst (the mol. ratio of the aldehyde to the phenol being less than 1.0 but greater than 0.25), the products being sol. in toluene, xylene, etc. U. S. 1,947,415. See Can. 329,051 (C. A. 27, 1530).

**Coating compositions suitable for application by spraying.** Erik Rotheim. U. S. 1,945,998, Feb. 6. A coating compn. (which is maintained under pressure) comprises a nonvolatile coating material, such as a cellulose ester in a solvent, and a liquefied gaseous material such as  $MeCl$  or isobutane dissolved in the compn. in a quantity sufficient to produce a sol. said. with the gaseous compd. under a pressure of several atm. at ordinary temp.

**Lacquers.** Theodor Kotthoff. Ger. 588,231, Nov. 15, 1933 (Cl. 22h. 3). Addn. to 575,789 (C. A. 27, 4942). Oil lacquers obtained as in 575,789 by heating oils and resins, are extd. with an org. extn. agent such as alcs., esters or ketones, and the residue is worked up into a lacquer. Thus,  $PhOH \cdot CH_2O$  resin, wood oil and linseed oil are heated to form a lacquer. This is extd. with a mixt. of  $BuOH$  and iso- $PrOH$ . The residue, 80–85%, is worked up into a lacquer. Other examples are given.

**Oil varnish.** Tokyo E. C. Kōgyō K. K. (Yūtarō Inada, inventor). Japan. 100,206, March 22, 1933. Varnish is made by heating a mixt. of drying oil, natural resin (such as amber, copal) or artificial resin and about 0.1% Se. Burning of the mixt. during heating is prevented by addn. of Se.

**Cellulose lacquer.** Asahi Garasu K. K. (Yoshitaka Amenomiya, inventor). Japan. 100,441, Apr. 6, 1933. The lacquer is prepd. from a cellulose ester or ether contg. a metallic hydroxide, which is obtained by treating a cellulose ester or ether soaked in an aq. soln. of a metallic salt with an aq. soln. of an alkali.

**Coating copper with cellulose acetate lacquer.** Benest R. Taylor and Harry I. Davis (to Eastman Kodak Co.). U. S. 1,946,647, Feb. 13. Cu is treated with a hot alk. soln. such as a 2% soln. of  $NaOH$  and then washed, dried and coated with a cellulose acetate lacquer contg.  $H_3PO_4$ .

**Nitrocellulose lacquer.** Theodore F. Bradley (to Ellis-Foster Co.). U. S. 1,946,479, Feb. 13. Nitrocellulose is used with a solvent such as  $BuOAc$  and toluene together with phthalic anhydride and sufficient addn.

crystallizable org. acid such as benzoic acid to exert a plasticizing effect. Cf. C. A. 27, 5560.

**Apparatus for applying enamel to wire and heating it.** Henry M. Larsen (to Western Elec. Co.). U. S. 1,947,476, Feb. 20. Various structural and operative details are described.

**Apparatus for baking enamel on wire.** Emerson Pugh (to Western Elec. Co.). U. S. 1,947,545, Feb. 20. Various structural and operative details are described. U. S. 1,947,546 (Raymond L. Reading (to Western Elec. Co.)) and U. S. 1,947,547 (Hal F. Fruth (to Western Elec. Co.)) also relate to app. of the same general character and purpose.

**Oven for drying lacquered articles.** Carl C. Wilcox (to Studebaker Corp.). U. S. 1,946,923, Feb. 13. Structural and operative details of a drying app. in which there may be maintained an atm. that does not support combustion.

**Ornamenting.** Karel R. van Staal. Brit. 401,507, Nov. 16, 1933. The surface of plates, with a wooden surface (which may be covered with a thin paper layer) and consisting of 1 or more layers, is improved by treating with a soln. of artificial resin(s) to which a plasticizer has been added, drying and hot-pressing between polished metal plates under not more than 25 kg. per cm.

**Airplane wings.** Soc. des vernis perl. Fr. 756,948, Dec. 18, 1933. The wings are impregnated with a soln. of halogenated rubber in toluene which may contain a color or Al bronze. Acetylcellulose or nitrocellulose varnish is then applied and a 2nd application of the 1st soln. may be given.

**Floor finish.** Frank H. Lyons (to E. L. Bruce Co.). Can. 339,024, Jan. 30, 1934. A floor finish comprises as a base, linseed oil 313, tung oil 94, gloss oil 130, naphtha 365 gallons, paraffin wax 724, zinc stearate 50 lb. and 50% by vol. of xylene.

**Polymerized oil.** Velvet Sekken K. K. (Seki Zenda, inventor). Japan. 100,462, Apr. 6, 1933. A polymerized oil is prepd. by heating a mixt. of a fish oil and 0.4-0.5% NaHSO<sub>3</sub> in a closed vessel at about 275°.

**Oil for linoleum.** Suekichi Otaka. Japan. 100,264, March 25, 1933. A trichloroethylene soln. of castor oil as the main constituent is used together with mineral, vegetable or animal oil, wax or resin.

**Linoleum.** Dubois & Kaufmann G. m. b. H. Ger. 591,158, Jan. 17, 1934 (Cl. 8, 1). The linoleum ordinarily used in the manuf. of linoleum is replaced wholly or in part by factice, prepd. by treating a fatty oil with S or S<sub>2</sub>Cl<sub>2</sub>. The resin ordinarily used may be replaced by a synthetic resin prepd. from C<sub>10</sub>H<sub>8</sub> and S<sub>2</sub>Cl<sub>2</sub>. Specific compns. are described.

**Condensation products.** I. G. Farbenind. A.-G. (Eduard Mütch and Georg Kraemer, inventors). Ger. 587,037, Oct. 28, 1933 (Cl. 12, 26.02). Addn. to 547,517 (C. A. 26, 3686). The method of 547,517 for producing oily or resinous products is varied by condensing the esters obtained by treating higher unsatd. acids with alkylene oxides, with polybasic acids or their derivs., polyhydric alcs. being added if desired. Thus, linseed-oil acid is treated with C<sub>2</sub>H<sub>4</sub>O and the product condensed with phthalic anhydride. Other examples are given.

**Resins.** Imperial Chemical Industries Ltd., Arthur Hill, Rowland Hill and Eric E. Walker. Brit. 401,290, Oct. 30, 1933. Oil-sol. resins are prepd. by condensing together in an acid medium CH<sub>2</sub>O, or a polymer thereof, and a substituted phenol, contg., in the *p*-position, an alkyl group of more than 1 C atom and, in 1 *o*-position, H,

alkyl or aralkyl. In examples *p*-isobutylphenol, 2,4-dibenzylphenol, *p*-benzylphenol and *p*-*tert*-amylphenol are condensed with CH<sub>2</sub>O in presence of HCl. The products may be dissolved in oils, e. g., tung, linseed, and solvents, with or without Co linoleate, to give a varnish.

**Resins from phthalic anhydride, glycerol and fatty acids from castor oil.** Adolf Heck (to Cook Paint & Varnish Co.). U. S. 1,947,416, Feb. 13. Castor-oil fatty acids are distd. under a reduced pressure of about 30 mm. at temps. of about 260-70° and 50-100 parts of the distd. acids are mixed with phthalic anhydride 100 and glycerol 50 parts, the mixt. is heated to 180-230° until it becomes clear and, until an elastic, light-colored, substantially nontacky resin is obtained on cooling which is sol. in benzene, toluene, etc., and suitable for use as a coating compn.

**Synthetic resins.** Frank A. Apgar and Arthur Runyan (to Sinclair Refining Co.). U. S. 1,945,719, Feb. 6. Unsatd. components of cracked petroleum distillates about 90% or more of which boil below about 230° are polymerized to produce polymers b. about 300° or higher, oils of lower b. p. are sepd. from the polymers and the latter are resinified with a phenol, an aldehyde and a condensing agent.

**Synthetic resin.** Frederick S. Granger (to Combustion Utilities Corp.). U. S. 1,946,459, Feb. 6. For producing a potentially reactive synthetic resin, a mixt. comprising an alk. phenolate soln. and an aldehyde is permitted to react without heating for 3 hrs. or longer and the material is then heated to above 60°, and neutralized with a dil. acid to ppt. the synthetic resinous product.

**Synthetic resins.** Wilhelm Kraus. Austrian 135,858, Dec. 11, 1933 (Cl. 39a). Resins which can be hardened by heat and pressure are prepd. by condensing phenol, acetone and CH<sub>2</sub>O in an alk. medium, or first in an alk. medium and then in an acid medium. Examples are given.

**Synthetic resins.** Allgemeine Elektrizitäts-Ges. Ger. 591,479, Jan. 22, 1934 (Cl. 12, 26.02). Resins which harden without application of heat are prepd. by heating with aliphatic alcs., contg. more than 2 OH groups, the hardenable condensation products obtained in known manner from a polyhydric aliphatic alc., a polybasic acid, and a fatty oil, with or without a monobasic acid, e. g., a resin or fatty acid. Thus, a condensation product from glycerol and phthalic anhydride may be heated to 200-220° with linseed oil and then to 240-260° with glycerol. Other examples are given. Cf. C. A. 28, 920<sup>1</sup>.

**Synthetic resins.** Adrien Pinel. Fr. 756,896, Dec. 16, 1933. Molding powders are obtained by reducing resins to impalpable powders by dissolving them in an alk. soln., pptg. and washing with water. The resins are mixed with inert materials while moist.

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Fr. 757,038, Dec. 19, 1933. A primary aromatic amine or a salt thereof is caused to react with more than 2 mols. of CH<sub>2</sub>O in the presence of a large amt. of a strong mineral acid, preferably at a relatively high temp. The product is washed, dried and compressed by heating under pressure. Fillers, plasticizing agents, etc., may be added.

**Synthetic resin molding compositions.** Fritz Schmidt. Ger. 591,045, Jan. 16, 1934 (Cl. 39b, 22). Urea or a urea deriv. and CH<sub>2</sub>O (or a reagent which yields CH<sub>2</sub>O), or initial condensation products of the urea-CH<sub>2</sub>O type, are kneaded at a moderate temp. with a material capable of swelling, e. g., casein, cellulose or starch, until a dry homogeneous compn. which can be molded directly is obtained. Softening or gelatinizing agents or solvents may be kneaded into the mixt. Examples are given.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**Transition points of mixtures of cow butter and cacao butter.** David W. Horn and Margaret Alberta Wilson. Am. J. Pharm. 106, 59-61 (1934); cf. C. A. 23, 5052-3.—The transition point of cacao butter is a sensitive charac-

teristic of that substance and is certainly affected by the presence of some foreign fats. The discussion in the present paper relates to the effect of added cow butter upon the transition point of cacao butter. In mixts. of cacao

butter and cow butter at intervals of 20% or less throughout the range of concns. between 100% cacao butter and 100% cow butter, the transition points were well defined until the percentage of cow butter approached 80%. As far as 70% there is a linear relation between transition point and the percentage of cow butter in the mixed fat. This linear relation is expressed by the equation,  $y = -0.165x + 29.2$ .

W. G. Caessler

**The melting points of the fat mixtures of margarine.** M. Sandomirskii and O. Mikhailovskaya. *Masloboino-Zhirovoe Delo* 1933, No. 4, 14-16.—Tables and diagrams show the effect of the addn. of sunflower- and cottonseed oils on the m. p. of hydrogenated oils. E. B.

**Photochemical studies of rancidity.** Mayne R. Coe and J. A. LeClere. *Ind. Eng. Chem.* 26, 245-8 (1934).—Oils properly protected from light do not give reliable color tests for rancidity, and oils remain free therefrom even though they have a peroxide value equal to or higher than that of an unprotected rancid oil if they have been protected with black or green paper transmitting light delimited by 4900 to 5800 Å. Such oils have not shown organoleptic rancidity after 7 months. The results of expts. with cottonseed and corn oils support the view that oxidative rancidity may be due to photochem. action of light on a compd. which probably exists simultaneously in the oil or is produced from compds. which give rise to the formation of peroxides. E. Scherubel

**Production of cottonseed oil.** A. E. Williams. *Crushing & Grinding* 2, 3-5 (1933).—W. reviews the crushing of cottonseed and extn. of the oil. Alden H. Emery

**The adsorption of sunflower oil by the hulls.** J. Kolpakov. *Masloboino-Zhirovoe Delo* 1933, No. 4, 19-22.—The anatomical structure of the sunflower seed hulls is very favorable for adsorption phenomena. Expts. showed that 16.6-18.5% of oil can be adsorbed by the hulls. Elias Bielouss

**Oil from Solanacea seeds.** S. I. Ivanov and A. J. Lutenberg. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* 3, 219-38 (1933).—Henbane and thornapple, common weeds in Russia, yield seed oils similar to tobacco-seed and tomato-seed oils; the alkaloids in the seeds are not oil-sol. and the oils are both non-toxic and edible. The max. oil content of the seeds occurs at a middle stage of ripeness; acid no. and I no. also decrease as ripening progresses. Annual production of oil from 50 tons of thornapple seed and 25 tons of henbane seed is planned in Russia. Julian F. Smith

**Walnut oil in Russia.** S. I. Ivanov and E. E. Berdichevskii. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* 3, 246-50 (1933).—Walnut oils from widely distant parts of the U. S. S. R. vary but little in compn. Climatic temp. is an important factor only during the active growing season. Like soy beans and peanuts, the nuts are rich in protein and poor in cellulose. The acid compn. of a representative sample is: linoleic 62.7, oleic 17.6, linolenic 10.0, satd. acids 9.4%.

Julian F. Smith

**Cedar-nut oil of western Siberia.** S. I. Ivanov and S. B. Resnikova. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* 3, 239-45 (1933).—Oil from nuts of *Pinus cembra* L. (western Siberia) contained oleic acid 32.40-35.82, linoleic acid 31.12-34.23, linolenic acid 16.57-27.75% as its major acid components. Linolenic acid content is highest in the most northern climate. For the best com. utilization of the oil further study of the influences of growing conditions and a better understanding of the biochemistry of the oil are needed. J. F. S.

**Chemical composition of tunny-liver oil.** Tetsuo Tomiyama. *Bull. Agr. Chem. Soc. Japan* 9, 141-7 (1933).—The liver of *Thunnus orientalis* in spring time was ground with anhyd.  $\text{Na}_2\text{SO}_4$  and extd. with petr. ether. The oil obtained from the ext. was analyzed; it had acid value 28.0, sapon. value 177.6, ester value 149.6, I value 175.6, Ac value 31.5, Hehner value 89.8, Reichert-Meisler value 2.2, Polenski value 0.5,  $d_{20}^{20}$  0.924, unsaponifiable matter 1.6%, and m. p. 28-9°. The following acids were isolated: oleic 30, arachidonic 20, stearic 7, clupanodonic 22, palmitic 19, myristic acid 5% and a small amt.

of linoleic acid. The administration of 9 mg. of the oil per day to one albino rat was sufficient to cure vitamin A deficiency. Y. Kihara

**Polysulfonation and purification of oils.** J. Abramovitch. *Tiba* 11, 803-11 (1933).—In order to obtain higher sulfonation products than can be obtained by direct treatment of oils by  $\text{H}_2\text{SO}_4$ , the oil may be chlorinated (oils having a high content of unsatd. acids are treated with  $\text{Cl}_2$  gas, preferably not above 30-40°, to obtain the dichlorinated acids; oils with a low unsatd. acid content are treated with  $\text{SOCl}_2$  to obtain the acid chlorides, which are sepd. by distn. at about 125-30°, the chlorinated deriv. (or acid chloride) is sapond. with aq.  $\text{NaOH}$  to obtain the corresponding di- or tri-hydroxy acid, and the latter is treated with the theoretical amt. of 66° Bé.  $\text{H}_2\text{SO}_4$  at not over 28-30°. A dry trihydroxy acid heated for about 3 hrs. at 125-50° thickened considerably, presumably because of formation of lactones and (or) lactides, and careful sulfonation of the cooled reaction product with  $\text{H}_2\text{SO}_4$  yielded a disulfonated tri- or tetrahydroxy alc. (this reaction was obtained once; but all subsequent attempts to repeat it were unsuccessful). A. P.-C.

**A new type of catalyst for the hydrogenation of oils.** Bug, Volokitin and Igumov. *Masloboino-Zhirovoe Delo* 1933, No. 4, 16-17.—An alloy of Ni and Al treated for a short time with  $\text{NaOH}$  represents a valuable stationary catalyst for the hydrogenation of oils. The  $\text{NaOH}$  (by its action on the Al) roughens the surface of the alloy, and thus increases its active area. The  $\text{NaOH}$ -treated alloy does not require an anodic oxidation with subsequent reduction by  $\text{H}_2$ , and is not sensitive to the usual poisons ( $\text{H}_2\text{S}$ , etc.), whereby the usual frequent regenerations are eliminated. Alloys contg. 27% Ni showed the highest activity. Low hydrogenation temps. (200° and less) can be applied with this alloy. Elias Bielouss

**The effect of electrolytes on rosin soaps.** A. Laptev and E. Arensham. *Masloboino-Zhirovoe Delo* 1933, No. 4, 11-13.—Contrary to the accepted view, the rosin soaps can be readily salted out by moderately concd. (10%)  $\text{NaCl}$  solns. Elias Bielouss

**The value of silicate of soda as a detergent.** III. Siliceous silicate in water containing calcium bicarbonate or carbon dioxide. John D. Carter and Wm. Stericker. *Ind. Eng. Chem.* 26, 277-81 (1934); cf. *C. A.* 26, 806.—Unsoiled cloths and cloths soiled with C black, burnt amber, raw amber or  $\text{Fe}_2\text{O}_3$  were washed simultaneously with 0.2% detergent solns. (detergent =  $\text{Na}$  oleate or  $\text{Na}_2\text{O}$ : 3.25 $\text{SiO}_2$  or a mixt. of the two) at 60° in the laundrometer; the detergent solns. were made up in (1) distd. water, (2) water contg.  $\text{Ca}(\text{HCO}_3)_2$  equiv. to 85.7 parts  $\text{CaCO}_3$  per million or (3) water contg. enough  $\text{CO}_2$  to give a  $pH$  between 4 and 5; after rinsing and drying of the washed cloths, their reflecting power was detd. with a photometer. The  $\text{Ca}(\text{HCO}_3)_2$  caused a greater loss in efficiency of the detergents than the  $\text{CO}_2$ , both in washing the soiled cloths and in preventing deposition on the unsoiled cloths; the silicate and silicated soaps were less affected in this respect than the soap. In general for the 4 pigments, the mixts. of silicate and soap tested were superior to silicate under all conditions tried; these mixts. were equal or superior to the soap in the presence of the  $\text{Ca}(\text{HCO}_3)_2$  or  $\text{CO}_2$ , but the mixts. rich in silicate were inferior to soap in distd. water. Oscar T. Quimby

**Double-bond titration** (Frognier, van Goetsenhoven) 7.  
**Action of lipolytic bacteria on natural fats** (Collins) 11C.  
**Oleoresinous pine tree product for use in resin soap manuf.** (U. S. pat. 1,945,421) 22.

**Distilling fats, etc.** Metallgesellschaft A.-G. and Wilhelm Genescke. *Fr.* 756,397, Dec. 8, 1933. In distg. fats, etc., of high b. p., reflux of condensation products in the upper part of the distn. chamber is prevented by the use of 2 bell-shaped members mounted so as to form a space between them which remains filled with still gas, the upper member serving to collect the condensation products, while the still air between the 2 members insulates the upper member from the heat of the lower part of the

chamber. A suitable opening is made for the upward passage of vapors.

**Sulfonated fats or aliphatic acids.** I. G. Farbenind. A.-G. (Ferdinand Münz, inventor). Ger. 591,196, Jan. 18, 1934 (Cl. 120.23.01). Unsaid. aliphatic acids or their esters are treated with an excess of fuming  $H_2SO_4$ . The reaction may be effected in a solvent, e. g.,  $CCl_4$ , at a low temp. Examples are given. The aq. solns. of the products are stable to hard water and to boiling with mineral acid.

**Preventing oxidation of fats and oils and petroleum hydrocarbons.** Hōnen Seiyu K. K. (Mitsuo Nakamura, inventor). Japan. 99,257, Jan. 30, 1933. Oxidation is prevented by adding to the oils hydrazine, amino or hydroxy compds. of thymol, or a prephenyl or allyl deriv. of phenol contg. an alkyl ether group larger than ethyl.

**Apparatus for separating crystals from fats and oils.** Taiji Ōhashi and Ikki Hachiya. Japan. 99,769, Feb. 24, 1933. Diagrammatical.

**Apparatus for extracting fats, etc., from materials, e. g., wool, cotton fabrics, fish, with volatile solvents.** Shio Hitoshi. Brit. 400,613, Oct. 23, 1933.

**Apparatus for extracting fats, oils and waxes.** Lothar Martinus. Fr. 756,424, Dec. 9, 1933.

**Apparatus for continuous extraction of oils and fats.** Minoru Maki. Japan. 99,064, Jan. 16, 1933. Diagrammatical.

**Apparatus for continuous and automatic extraction of olive oil.** Fermin Martinez-Huarte. Fr. 756,628, Dec. 13, 1933.

**Apparatus for recovering oils and fats from water.** Alfred E. Ridley. Fr. 756,642, Dec. 13, 1933.

**Recovery of oil from Japanese acid clay used for purification of oils.** Sanpei Kurahashi. Japan. 99,667, Feb. 21, 1933. An aq. soln. of a sulfonate of an alkylated aromatic hydrocarbon is used to recover oil contained in the waste acid clay.

**Apparatus and process for the extraction of oil from oil-containing fruits.** Fried. Krupp Grusonwerk A.-G. Brit. 401,550, Nov. 16, 1933.

**Extraction of castor oil.** J. Geysen. Belg. 395,785, May 31, 1933. The seeds are crushed and treated with a solvent, the soln. is filtered, and the solvent distd.

**Hydrogenation of oils and fats.** Nippon Chissohryō K. K. (Aiji Honda, inventor). Japan. 99,101, Jan. 18, 1933. In hydrogenation of highly unsatd. oils, wholly or partly hydrogenated oil is added and the whole is treated with  $H_2$  in the presence of a catalyst. By this means the reaction is completed at a lower temp., and thus the life of the catalyst is prolonged and the quality of the product improved.

**Recovery of waste nickel catalyst.** Hokkai Yushi Kōgyō K. K. (Gorō Kimura, inventor). Japan. 99,594, Feb. 16, 1933. Waste Ni catalyst used for the hardening of oils is dissolved in  $H_2SO_4$  contg.  $HNO_3$ . To the soln.  $NaOH$  or  $Na_2CO_3$  is added in such amt. that Ni is not pptd. but most of the Fe and other impurities are pptd. After sepn. from the ppt., the soln. is heated with a small amt. of an oxidizing agent (such as  $KMnO_4$  or  $Na_2O_2$ ), by which the remaining Fe is pptd. From the filtrate, Ni is recovered as hydroxide with caustic alkali.

**Device for testing the rate of oxidation of oils and fats.** Ivor M. Colbeth (to Baker Castor Oil Co.). U. S. 1,944,926, Jan. 30. Structural details.

**Adsorbent for decolorizing oils and fats.** Daniel S. Belden and Wm. Kelley (to Filtrul Co. of Calif.). U. S.

1,946,124, Feb. 6. An activated clay pulp is mixed with a substantial proportion of finely divided clay in air-dried condition, the mixt. is heated to 100–315° until an exothermic reaction occurs, and the mixt. is then quenched in 3–5 parts by wt. of hot, softened water, agitated to move sol. salts, and then dried. Cf. C. A. 27, 2800.

**Dispersion and stabilization of oils.** M. Ernott. Belg. 395,761, May 31, 1933. Carbonation sludge, such as sugar-house scum, is used as dispersing and stabilizing agent.

**Deodorization of oils.** Shigezō Nunomura. Japan. 100,091, March 13, 1933. Oils are deodorized by agitation with crushed ginger and  $H_2O_2$ .

**Reducing the oil content of soy-bean meal.** Louis W. Haas and Herbert O. Renner (to J. R. Short Milling Co.). U. S. 1,947,200, Feb. 13. Preliminary to pressing the meal, its moisture content is adjusted to about 10% in order to facilitate cold pressing and production of a meal suitable for use in bread making.

**Apparatus for drying olive marc.** Mauricio (Soc. anon.). Fr. 756,554, Dec. 12, 1933.

**Apparatus for the manufacture of Turkey-red oil.** Hiroshi Koide. Japan. 99,338, Feb. 3, 1933. The neutralization of sulfonated oil is effected in steps.

**Luting for metal containers.** Paul Fassbender. Ger. 589,568, Dec. 19, 1933 (Cl. 22i. 1). A luting for metal containers for oil, fats, etc., consists of a mixt. of finely powd. cereal meal and satd. or highly concd. aq. soln. of hygroscopic salts such as  $MgCl_2$  or  $CaCl_2$ .

**Soaps.** Henkel & Cie. G. m. b. H. Fr. 757,012, Dec. 19, 1933. Alcoholic ethers formed from di- or tri-hydric aliphatic alcs. and alkyl radicals of high mol. wt., and contg. at least one free OH, e. g., monododecyl or monooctadecyl ether of glycerol, are added to soaps, creams and cosmetic preps. to obtain superfatted products.

**Soap compositions.** Stanislaw Pilat (Jaroslaw Sereda, inventor). Austrian 135,828, Dec. 11, 1933 (Cl. 23b). Org. solvents are incorporated into soaps with the aid of mineral-oil sulfonic acids or their salts or derivs. Thus, the solvent may be emulsified in water with the aid of the sulfonic acids, and the emulsion mixed with soap, or a solvent contg. the sulfonic acids in soln. may be mixed with soap.

**Soft soap.** Camille Deguide. Fr. 756,883, Dec. 16, 1933. Sapon. is effected in an autoclave which has stirring means and is steam-heated.

**Honey soap.** Kiichiro Yasukawa. Japan. 100,046, March 10, 1933. Addn. to 91,067 (C. A. 26, 1466). A mixt. of honey, egg, salicylic acid and powd. soap is specified.

**Soap.** Victor Scheffer. U. S. 1,946,765, Feb. 13. See Ger. 575,790 (C. A. 27, 4946).

**Apparatus for drying and crusting soap.** John E. Pouton, Baker Perkins Ltd. and Anciens établissements A. Savy, Jeanjean et Cie. Brit. 401,285, Oct. 26, 1933.

**Apparatus for making hollow floating soap.** Grete Sax. Austrian 135,983, Dec. 27, 1933 (Cl. 23b).

**Detergent composition.** R. Thoen. Belg. 398,380, Sept. 30, 1933. Suitable solvents (e. g., benzine) are added to Turkey-red oil or other sulfonated oil.

**Wetting, cleansing and dispersing agents.** I. G. Farbenind. A.-G. Ger. 589,511, Dec. 8, 1933 (Cl. 120.23.02). Addn. to 577,428 (C. A. 27, 4043). The hydrocarbon oxidation products obtained as described in Ger. 524,354 (C. A. 25, 3664) are treated with sulfonating agents other than concd.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

Some of the problems now facing the Research Bureau of the Philippine Sugar Association. George H. Bissinger. *Sugar News* 15, 19–24 (1934).—Entomol., pathol. and botanical problems and suitable packaging of sugar are discussed. Cellophane attracts cockroaches. L. C. The "Tucumán" sugar-cane seedlings. Results of the

1932 and 1933 experiments. Wm. E. Cross. *Rei ind. agr. Tucumán* 23, 135–64 (1933).—The purity analysis, yield of cane and sugar per hectare of the most promising Tucumán seedlings are given for the crop years 1932 and 1933, also average of plant and ratoon crops for certain seedlings up to 1933. Of the series 1–1100, the



varieties Tuc. 407, 454, 472 and 544 compare well with P. O. J. 36. In the series 1101-1424, the best varieties (Tuc. 1376, 1111, 1406 and 1422) seem superior to P. O. J. 36. In addn. to harvest data, the parentage and characteristics of the 1931 and 1932 seedlings (Tuc. 1501-1800 and 1801-2418, resp.) are briefly described.

Nelson McKaig, Jr.  
2878 P. O. J. and 2883 P. O. J. planting and harvesting experiments in the Victorias sugar-cane district. Carlos L. Locsin. *Sugar News* 15, 8-15(1934). L. Cusachs

A new source of industrially marketable sucrose. Marcel Lamy-Torrilhon. *Compt. rend. acad. agr. France* 19, 992-4(1933).—See C. A. 28, 1563. J. R. Adams

The purity of sugar-house juices in relation to the activity of a lactobacillus. V. Bolcato. *Ind. succar. ital.* 27, 8-11(1934).—The amt. of acid formed is an indication of the nonsugar content of the juice and hence is applicable to the study of different methods of defecation. This relation does not hold for molasses. L. Cusachs

Accumulation of color in massecuite during boiling. L. E. Fleishman and G. K. Virskaya. *Nauk. Zapiski Tsukrovoi Prom.* 10, No. 33, 121-7(1933).—The color of sugar depends on the amt. and quality of nonsugars. With a higher nonsugar content in the massecuite the color of the sugar increases. A decrease of one hr. in boiling time decreases color of the sugar by 22%. White and green sirups used for boiling and also as feed liquor increase the color of sugar. V. E. Baikow

The action of oxygen in the decomposition of alkaline solutions of sucrose. M. I. Nakhmanovich, S. L. Berman, M. S. Plakhotnik, I. I. Pletnik. *Nauk. Zapiski Tsukrovoi Prom.* 10, No. 32, 1-24(1933); cf. C. A. 28, 672. —CO<sub>2</sub>-free air, blown through a 15% soln. of refined sugar heated with 0.4% CaO up to 90 during 3 hrs., decomps. 4.57% of sucrose. This was accompanied by formation of 0.77% Ca salts and decrease in alk. to 0.27% CaO. Unpurified air decomps. a smaller amt. of sucrose. The control expt. (with no air blown through the soln.) showed very little decompn. of the sugar. Decompn. is greater when the soln. contains a greater amt. of CaO. Heating of the soln. under the same conditions for 2, 4, 8, 16 and 24 hrs. with periodic addn. of Ca(OH)<sub>2</sub> for reestablishment of initial alk. showed that the process of oxidation is most intensive during the 1st 4 hrs. In the 1st hr. 0.8-0.8% of sucrose was decompd. During 24 hrs. of oxidation 10.6% of the sucrose was decompd., 2.4% of Ca salts were formed and the color of the soln. attained 5 Stammer units. Without reestablishment of the initial alk., only 5.76% of sucrose was decompd. and 1.1% of Ca salts formed during 24 hrs. The color increased only up to 1.1 Stammer unit. The heating of a soln. in absence of air decompd. 2.19% of sucrose after 24 hrs. The greater amt. of CaO in soln. increased the amt. of sucrose decompd. Without reestablishment of initial alk. the decompn. of sucrose is much slower. The effect of the air on more concd. solns. (30-60%) is much weaker. With increase of the temp. from 40° to 100° under the same conditions, decompn. of sucrose increased from 1.44 to 4.1% and the Ca salts increased from 0.075 to 0.445%. The color increased. During manuf. the presence of the air during heating of the alk. solns. of sucrose may be the source of undetd. chem. losses. In order to decrease these losses it is advisable: (1) to control the satn. gas and check the amt. of contained O; (2) to exhaust the gas and to speed up the carbonation process, and also to control the temp. during the defecocarbonation; (3) in a process of microfloatation to replace the air by CO<sub>2</sub>. V. E. Baikow

A preliminary note on the single-pan method of manufacturing "Khandasari" sugar. D. R. Sethi and B. N. Sarkar. *Agr. Live-stock India* 3, 448-58(1933).—The chem. changes occurring during the boiling of cane juice in open pans were studied. The loss of sucrose by inversion was small during the 1st 45 min. of heating when the temp. did not exceed 102°, but thereafter the losses were increasingly large, particularly during the last 15 min. of the final stage of *rab* making when the temp. was 114°. The acidity of the juice showed little or no change

during the 1st 15 min. of boiling but it increased thereafter. The 1st sugar recovered contained an av. of 92.7% sucrose and 2.75% glucose. K. D. Jacob

Drying of granulated sugar. L. I. Roman'yuk. *Nauk. Zapiski Tsukrovoi Prom.* 10, No. 33, 47-9(1933).—A sugar-drying installation at the Veselo-Podolyanskii sugar factory (Russia) is described and illustrated. V. E. Baikow

Errors in the determination of sugar in the beet. E. Parisi. *Ind. succar. ital.* 26, 565-71(1933); cf. Carboni and Borghi, C. A. 27, 5567. L. Cusachs

Results of experiments on manufacturing sugar from dried beets. D. I. Zaretskaya, A. I. Lityago and I. I. Shetzkko. *Trans. Central Sci. Research Inst. Sugar-Ind.* 6, 14-175(1930).—Conclusion: White sugar of good quality can be obtained with losses not exceeding the losses in manuf. from fresh beets. The following technical scheme is suggested: Each cell of a diffusion battery is charged with 75 kg. of dry cosettes per hectoliter. The sugar is extd. by water at 70-5°. The diffusion juice is neutralized by addn. of milk of lime in each cell. The loss in the pulp is 0.4% on the wt. of the pulp and the loss in water 0.2% on the wt. of the water. The amt. of juice is 50-60% on the wt. of raw beets. The diffusion juice heated up to 85° is limed with 1.5-2.5% CaO (on the wt. of raw beets) in the form of milk of lime of 25°Bé.

The length of defecation is 20 min. Defecated juice is carbonated to an alk. of 0.05-0.06%, heated to 95-100° and filtered. The filter-press mud contains 1.0% of sugar and 50% of water on the wt. of mud. The filter-press mud is washed with 150% of water of which 50% is used for prepn. of the milk of lime and 50% for addn. to the juices and 50% is left in the mud. The yellow sugar is melted in carbonated, filtered juice. In case of accumulation of a high amt. of Ca salts soda is added. The juice is treated with 0.2% Kieselsoluh (on the wt. of raw beets) and sulfited to an alk. of 0.01%. Then the juice is reheated to 95-100° and filtered. This juice is boiled for 10 min. at 103°. The boiled juice is filtered and evapd. to 65° Brix. The sirup is filtered through filter bags and boiled in vacuum pans for a first-strike massecuite of 92° Brix. The hot massecuite is centrifuged, washed with water and steamed. The yield of white sugar is 50% on the wt. of the massecuite. The run-off is boiled for a second-strike massecuite of 92° Brix. It is dild. in crystallizers to 91° Brix. After 72 hrs the massecuite is centrifuged and the yellow sugar obtained is washed with water and steamed. The molasses is pumped to the tanks and washings are used as last feed liquor in boiling the massecuite of a second strike. The yellow sugar is melted in carbonated filtered juice. V. E. Baikow

Experiments on regeneration of bone char. I. F. Zelikman and K. K. Iyubitzkii. *Nauk. Zapiski Tsukrovoi Prom.* 10, No. 33, 21-35(1933).—In order to regenerate the max. decolorizing capacity of bone char the following scheme based on lab. and semifactory-scale expts. was proposed: washing of the chars with tap water (free from suspended matter), 800-1000% of water based on the wt. of char, at 75-90°. Dry chars must be heated at 500-600° for 60-90 min. Periodic treatment of chars by HCl in order to remove CaCO<sub>3</sub> is necessary. When CaSO<sub>4</sub> accumulates in the bone char the treatment by soda or NaOH and HCl is required. The chem. regeneration must be followed by thermal regeneration. V. E. Baikow

The specific gravity of dextrin. W. Hönisch. *Chem.-Ztg.* 58, 76(1934).—The sp. gr. of absolutely dry dextrin cannot be found in the literature. The sp. gr. of com. dextrin was detd. by the pycnometric method, with xylene as the liquid. D<sub>20</sub> for very fine white, 1.593; for very fine yellow, 1.527; superior yellow, thick-boiling, 1.561; thin-boiling, 1.542. The sp. gr. changes with the variety and the method of prepn. A mean value of 1.556 may be assumed. The sp. gr. of each variety should be detd. E. R. Rushton

Saccharification of starch. A. Tychowski. *Przemysl Chem.* 17, 65-74(1933).—The saccharification of dextrans by malt or barley diastase is due chiefly to  $\alpha$ -diastase; the

action of a mixt. of purified  $\alpha$ - and  $\beta$ -diastase is considerably less than that of the unpurified malt ext., this pointing to the presence of activators in the latter; such activators are also present in aq. exts. of yeast. The concn. of maltose in the reaction mixt. does not affect the equil. point, the attainment of which depends solely on exhaustion of hydrolyzable dextrins. H. C. A.

**The flow of starch pastes. III. The effect of soaps and other electrolytes on the apparent viscosity of hot starch pastes.** W. A. Richardson and R. Waite. *J. Textile Inst.* 24, T383-410(1933); cf. *C. A.* 22, 4315.—The apparent viscosity of sago, farina and maize starch pastes prep'd. under standardized conditions was measured by observing the flow through a capillary tube under application of the pressure required to maintain a standard driving force for each unit of surface of the inner wall of the tube. The viscosity was found to depend on the rate of stirring and the age of the paste. In general the viscosity decreases with age. The very high initial viscosity of the farina paste fell rapidly as stirring was continued. The comparatively low initial viscosity of the sago paste decreased less rapidly, while that of the maize paste which is intermediate between the sago and the farina decreased least rapidly of the 3. The rate of change of viscosity on storage depends on the  $p_H$  of the paste. The sago pastes were most stable around  $p_H$  7-8; the farina at about  $p_H$  5; and the maize between  $p_H$  4.5 and 6.5. For higher acidities or alkalinities (except when soap was added), the viscosities of the resp. starches decreased at an increasing rate with increasing acidity or alkali. When Cu stirrers were used instead of stainless steel, the pastes had lower viscosities and higher rates of change with time, apparently because of the dissolved Cu acting catalytically. When the pastes in which the acidity was controlled by the addn. of buffer salts, acids or alkalis were compared 60 min. after the start of an expt., the highest viscosity was obtained in the region  $p_H$  4-5. At higher acidities and between this region and neutrality, there is a progressive decrease in viscosity. As the alkali increases, maize and farina pastes continue to exhibit lower viscosities, but the alk. sago pastes are not less viscous, and in certain circumstances may be more viscous than the neutral pastes. Farina pastes are much more sensitive to the addn. of neutral salts than sago, which are only slightly affected. Farina is also sensitive to salts used in buffer mixts. with the result that farina pastes in which the acidity is controlled by buffers have a much lower level of viscosity than those prep'd. from farina and water alone. In low concns., soaps behave toward sago pastes like mild alkalies and lower the viscosity; as the soap concn. is increased, the viscosity reaches a min., and then rises rapidly. The min. occurs in a 5% paste at a soap concn. of about 0.15% of the paste, but the rapidity of the initial fall and subsequent rise depends on the kind of soap. The effect cannot be ascribed to increasing alkali alone but to some specific action between the soap and the starch. Four per cent farina pastes behave similarly to 5% sago pastes, but with 2% farina pastes, the viscosity continues to fall with increasing soap concn. up to the limit of concn. used in the expts. Castor-oil soap lowers the viscosity of sago

1 pastes at all concns. up to 0.6% of the paste. In addn., soaps have a considerable stabilizing effect on starch pastes. Tallow alone has no effect on the viscosity of a sago paste, but if soap is present, the effect of the tallow is to counteract that of the soap. In mixts. of sago and farina of the same total starch content, both unbuffered and buffered at  $p_H$  5, the viscosity increases with increasing farina content. The stability of these mixts. varies with their compn. A mixt. of 3 parts sago to 1 part farina is more stable than either starch alone or a mixt. of any other proportion. Ruby K. Worner

**Agriculture of sugar cane in Queensland (Kerr) 15.** Sugar cane and sugar-cane soils (Turner) 15. Effects of time of planting and of fertilizer mixts. on the curly-top resistant sugar-beet variety U. S. No. 1 in Idaho (Skuderna, et al.) 15. [Rept. on] agriculture [treating cane seed] (Verret, Mangelsdorf) 15. Crystn. [of sugar] (Fr. pat. 756,621) 13. App. for drying beet slices with furnace gases (Austrian pat. 136,027) 1.

**Gueze, P.: Chemical Control for Sugar Factories (In French).** Station agronomique de l'Isle de Réunion. **Parr, W.:** Table for the Determination of the Polarization by the Volumetric Method (100:110 cc.). Berlin Verlag der deutschen Zuckerindustrie. 50 pf.

**Molasses.** N. V. Industriele Maatschappij Voorheen Noury & van der Lande. Fr. 757,125, Dec. 20, 1933. An acid or alkali is added to a molasses soln. to make it neutral or slightly acid and it is then clarified by centrifuging.

**Degrading carbohydrates.** Hans Schlubach. Ger. 587,495, Nov. 4, 1933 (Cl. 12o. 6). Addn. to 554,699 (C. A. 26, 6176). In degrading highly polymerized carbohydrates by treatment with compressed HCl, the method of 554,699 is improved by treating the degradation products with a stream of dry or moist gas, such as air, at ordinary or raised temps., to remove the residual HCl.

**Filtering in cornstarch manufacture.** Eugene Staritzky (to Dorr Co., Inc.). U. S. 1,946,039, Feb. 6. In corn starch manuf., for filtering the various grades of by-products as obtained from wet sepn. steps, a primary layer of the coarser by-products is formed upon a filter element under suction, and the fine by-products are allowed to filter upon the primary layer. App. is described.

**Starch paste.** Stephen Jozsa and Herbert C. Gore (to Standard Brands Inc.). U. S. 1,947,295, Feb. 13. In prep'g. a starch paste of high stability and low viscosity, starch is gelatinized by cooking in water and the hot starch paste is subjected to the action of a high-speed mixer until its viscosity has been lowered to an extent such that the outflow time of a 5% cold soln. from a standard 100-cc. pipet is about 200 sec. or lower.

**Soluble starch or dextrin.** Dengorô Mori. Japan 100,061, March 10, 1933. Dried and powd. starch is treated with Cl<sub>2</sub>, HCl or HNO<sub>3</sub>, etc. When an aq. soln. of these acids is used, the amt. of the water contained should not exceed about 10% of the starch used.

## 29—LEATHER AND GLUE

ALLEN ROGERS

**Principles of pickling [hides].** W. B. Pleass. *Leather World* 25, 134(1933); *J. Am. Leather Chem. Assoc.* 29, 124.—Discussion. H. B. Merrill

**Bacteriological studies of the red discoloration of salted hides.** A. G. Lochhead. *J. Bact.* 27, 61-2(1934).

John T. Myers

**Some practical observations on the molding of pickled sheep skins.** L. S. Stuart and R. W. Frey. *J. Am. Leather Chem. Assoc.* 29, 113-18(1934).—Molding in transit was traced to acid absorption by cask wood which raised the  $p_H$  value above the crit. point for mold growth. In gelatin-dextrose broth a strain of *Penicillium* grew

at  $p_H$  1.8 and NaCl 4%; a strain of *Alternaria* grew at  $p_H$  2.4 and NaCl 12%. Acidity is further reduced by mold growth. Use of 0.025% *p*-nitrophenol or a more acid pickle is recommended. H. B. Merrill

**Hide powder. II. Report of the commission of the international association of tannery chemists.** F. Stather. *Collegium* 1933, 451-3; cf. *C. A.* 26, 2342.—Tannin analyses in 1928, 1930 and 1933 with the same ready-chromed hide powder did not show any change in the powder. I. D. Clarke

**Astringency of tan liquors and tanning processes.** E. W. Merry. *Leather World* 25, 682(1933); *J. Am.*

*Leather Chem. Assoc.* 29, 128-9.—If percentage of tannin is plotted against percentage of nontannin for a series of suspender liquors, the slope of the resulting curve at any point shows the relative tannin-nontannin take-up of the pelt in the corresponding liquor. The curve should be flat (much nontannin absorbed) in the first suspenders and steep in the later suspenders. A flat curve indicates a mellow tannage and a steep curve a harsh or astringent tannage. The tannin-nontannin curve for the yard should be watched carefully. H. B. M.

**Technology of tanning. I. Historical introduction.** Frederick L. Hilbert. *Hide & Leather* 87, No. 10, 15-22, et seq. (1934). H. B. Merrill

**The tanning action of sulfite-cellulose extracts.** Wilhelm Vogel. *Collegium* 1933, 524-31.—Sulfite cellulose has a tanning action, but is commercial of value only in mixts. contg. less than 1/3 of it. Sole leather tanned with sulfite cellulose had a degree of tannage of only 35-40, upper leather of 40-55. I. D. Clarke

**Committee on qualitative tannin analysis.** O. Gerngross and H. Herfeld. *Collegium* 1933, 411-8. A review. I. D. Clarke

**Detection and determination of sulfiting in quebracho tannin extracts.** Otto Gerngross and Hans Herfeld. *Collegium* 1933, 602-9.—The Auerbach (*C. A.* 26, 4501) and Stathur-Lauthmann (*C. A.* 26, 5781) methods both gave reproducible results. Fixed S by the former was about twice that by the latter method, which agrees with the observation of Bergmann and Pajarheff (*C. A.* 25, 5155). Fairly satisfactory results were obtained on mixts. contg. sulfite cellulose by preliminary removal of the latter with aniline-HCl. I. D. Clarke

**A new auxiliary apparatus for tannery use.** Josef Starling. *Collegium* 1933, 538-40.—The app. consists of a 20-cm. tube contg. a stirrer, heating coil and thermostat. It can be put in a corner of a tan vat to stir and heat the liquor, yield is increased and time of tanning is decreased. I. D. Clarke

**Bleaching of vegetable-tanned leather.** H. Phillips. *Leather World* 25, 802 (1933); *J. Am. Leather Chem. Assoc.* 29, 129.—The use of bleaching exts. is upheld on the grounds that (1) they do not introduce  $H_2SO_4$  into the leather; (2) they do not reduce its strength, (3) they permit the fulfillment of the demand for a low-cost leather of limited life, and (4) they ensure a leather of mellow cut and supple grain. H. B. Merrill

**Recent results on the determination of bating value.** K. H. Goeller. *Collegium* 1933, 517-51.—A gravimetric hide-powder method is described, it is not affected by  $NH_4$  salts. I. D. Clarke

**Bating and dyeing. XIV. Theory of mineral tanning.** R. Elöd and Th. Schachowsky. *Collegium* 1933, 701-19, et *C. A.* 27, 2599.—Theories of Cr tanning are reviewed; most of them are not entirely in agreement with exptl. facts. Stasny and Pokala (*C. A.* 26, 6176) found a C which was very similar to hide powder in absorption of Cr salts, but this C has a high ash and after extrn. with acid combines with very little basic Cr sulfate. Development of theory requires a study of distribution of the mineral tannin within the individual hide fiber. The tanning action on gelatin of complex Co salts was studied both by the boiling test on films and the absorption spectra of solns. Stable complexes, as shown by no change in the absorption spectra of water or gelatin solns. after several days, did not tan; easily decompd. complexes all had tanning action.  $Co(OH)_2$ , all tetrammine and one pentammine salt tanned. **XV. Theory of leather dyeing.** 1. R. Elöd and A. Kohnlein. *Ibid.* 751 (63).—In dyeing collagen with acid dyes first acid and then dye is absorbed; as the dye is absorbed the acid anion is forced out as is required by the Donnan equil. The rate of absorption and quantity of acid dye absorbed by isoelec. collagen depend very largely on the  $pH$  of the bath and is a max. at  $pH$  1.3. There is a max. absorption for each  $pH$  and lowering the  $pH$  at once increases this max. The only explanation for this is that the amino groups are only partially in the free condition; the no. of free groups and their activity depend on the  $pH$ . In-

creasing the bath vol. does not increase absorbed dye. Salt decreases the rate of absorption of dye and aids attainment of equil. **XVI. Theory of leather dyeing.** 2. R. Elöd and H. Hünsel. *Ibid.* 763-72.—For dyeing studies, Cr leather must be exhaustively neutralized on the residual acid in the leather will mask the results. Dye absorption and  $pH$  of the bath are closely related as would be expected for a chem. reaction between the dye and the amino groups of collagen. Only dyeing on the acid side of the isoelec. point is "water fast"; on the alk. side there is only absorption or impregnation and the dye can be easily washed out with aq. solns. of the same  $pH$ , but if this leather or collagen is acidified and amino groups are freed, the dye is fixed. Substantive dyes dye only the surface of Cr leather because the dye mol. is large, diffuses slowly and the reactivity is greater than the rate of diffusion. I. D. Clarke

**The combination of collagen with dyes. II.** G. A. Bravo and F. Baldracco. *Collegium* 1933, 772-8; *C. A.* 26, 4501.—The Procter-Wilson formula represents the data for the absorption of acid dyes by hide powder better than the adsorption formula; the action is chem. The combining wt. of collagen for acid dye is about 1104 instead of 739 as found for direct dyes. Basic dyes were only slightly absorbed by hide powder. I. D. Clarke

**Report of the commission on leather analysis concerning the determination of acid in vegetable-tanned leather.** L. Jablonski. *Collegium* 1933, 523-4.—Proposal is made to make the Imies-Kubelka method official. I. D. Clarke

**A new method for determining nitrogen in leather.** C. van der Hoeven. *Collegium* 1933, 532-8.—The hydrogenation method of ter Meulen and Hesslinga ("Nouvelles methodes d'analyses chimiques organiques," *C. A.* 26, 2144) is simpler, more rapid and more accurate than the Kjeldahl method. I. D. Clarke

**Rate of drying chrome leather.** O. A. Ilougen. *Ind. Eng. Chem.* 26, 333-9 (1934).—In practice, rate of drying decreases directly with the decrease in free  $H_2O$  content of the leather and inversely with the thickness. Free  $H_2O$  is the total minus equil.  $H_2O$  for the temp. and relative humidity employed. Values for equil.  $H_2O$  are detd. at 80° and 120°F. for relative humidities of 0-90%. For drying in an air current passed vertically over the surface of the skins, an equation is developed experimentally:  $dW/d\theta = -0.282 \cdot L \cdot G^{0.66} \cdot W \Delta H$ , where  $W$  = free  $H_2O$ ,  $\theta$  = elapsed time,  $G$  = mass velocity of air,  $L$  = av. thickness of skins, and  $\Delta H$  = unsatn. of air. Examples of solution of problems by this equation are given. H. B. Merrill

**Water in leather.** F. H. Humphreys. *Leather World* 25, 358 (1933); *J. Am. Leather Chem. Assoc.* 29, 124-5.—Freshly flayed hide contains about 70%  $H_2O$ , mostly bound. Tanning is interpreted as a replacement of this bound  $H_2O$  by lyophilic colloids, such as vegetable tannins and Cr compds. This must be done without distortion of the fiber. The various steps of vegetable tanning are discussed from this point of view. H. B. Merrill

**Requirements of an ideal filling process for sole leather.** W. Petrie. *Leather World* 25, 360 (1933); *J. Am. Leather Chem. Assoc.* 29, 126-8.—Four commonly used processes are described and discussed; none is wholly satisfactory. In a new process conditioned leather is (1) drummed with a 9 to 1 mixt. of cellulose ext. (soda base) and cod oil for several hrs., (2) piled 1 or more days, (3) drummed briefly with a little cod oil, and (4) hung to dry. This process is claimed to fulfil the 7 listed requirements of (1) cheapness, (2) being self-contained, (3) freedom from detrimental chemicals, (4) ease of regulation, (5) adaptability to any reasonable degree of loading, (6) yielding a leather resistant to oxidation, and (7) to excessive washing out. The thorough drumming with cod oil is responsible for (7) and some other desirable qualities imparted by the process. H. B. Merrill

**The oiling (stuffing) of belting-leather, fat distribution, use of hardened fats.** Leopold Pollak. *Gerber* 59, 80-1, 89-90, 100-2 (1933). A study was made of the

- effect of the compn. and properties of the fat mixt. used in stuffing belting leather on its quality. It appears important to use fat mixts. of high m. p. but with a low viscosity at the stuffing temp. Although belting leather can be advantageously stuffed with mixts. contg. hardened fats, their exclusive use is not recommended. Data on the phys. properties of leather samples stuffed with 4 different fat mixts. and on the distribution of the fat in the leather are given. J. W. Perry
- Bookbinding leathers. L. G. Kitcat. *Leather World* 25, 37(1933); *J. Am. Leather Chem. Assoc.* 19, 124.—A review of causes of decay. Cf. Innes, C. A. 26, 8186; 27, 4436. H. B. Merrill
- Factors affecting the currying properties of oils, fats and waxes. H. Phillips. *Leather World* 25, 256(1933); *J. Am. Leather Chem. Assoc.* 29, 124-5.—Fats that "wet" leather easily are those forming oriented films on the surface of the fibers; this enables the oil to penetrate the interfibrillar spaces. Presence of  $H_2O$  assists penetration of fat, by enlarging channels between fibers, providing the fat forms an orientated film on  $H_2O$ . Drumming assists penetration. Hot drum stuffing permits the use of higher-melting greases and waxes when it is desired to lubricate the fibers as well as fill the spaces. Some animal or vegetable fat should be included to penetrate the smaller capillaries. Vegetable and animal oils especially if unsatd. undergo hydrolysis, oxidation and polymerization in leather. This may cause spew. Presence of vegetable tannin is believed to check oxidation and perhaps polymerization of unsatd. oils. Some cases of cod-oil spews are attributed to adulteration with more highly unsatd. oils, but in many cases the cause is excess of free fatty acid or presence of Fe in the leather. Inert mineral greases and waxes are more suitable than true fats for heavily filled, waterproofed leather. H. B. M.
- The histology of the corium and the grain. G. C. Heringa. *Collegium* 1933, 749-54.—A lecture. I. D. C.
- Recent methods of dealing with insect pests. M. E. Robertson. *Leather World* 25, 582(1933); *J. Am. Leather Chem. Assoc.* 29, 128.—General methods are suggested for trial in the control of hide infestation by beetles. H. B. Merrill
- The action of pancreatin on gelatin and collagen. M. Bergmann, G. Pojarlieff and H. Thiele. *Collegium* 1933, 581-5.—Review. A test for the tannage of leather may be based on the fact that sulfo acids from a tannage with sulfited exts. or syntans increase the action of trypsin on leather. I. D. Clarke
- Introduction of the notion of  $p_H$  in the study of glues and gelatin. Maurice Dérivé. *Tiba* 11, 813-21 (1933).—A general discussion and explanation. A. Papineau-Couture
- Methods of testing animal glue. E. Pallas. *Techn.-Ind. Schweiz. Chem.-Ztg.* 16, 234-6(1933). D. B.
- Morphology and fine structure of collagen fibers (Künzel, Prakte) 11A. Felted sheets of cellulose fiber [for making artificial leather] (U. S. pat. 1,944,907) 23. Hydrating mercerized paper pulp [for making artificial leather] (U. S. pat. 1,944,906) 23. Pyroxylin sheet material [leather substitute] (U. S. pat. 1,946,250) 23. Azo dyes [for leather] (Ger. pat. 589,636) 25.
- Treating hides and skins for unhairing, cleaning and bating. Emil Lenk and Felix Lippner (to American Cyanamid & Chemical Corp.). U. S. 1,946,218, Feb. 6. A substantially pure culture of *Es. coli communis* or *Staphylococcus pyogenes albus* is used.
- Retanning chrome leather. Thomas Blackadder (to Röhm & Haas Co.). U. S. 1,945,461, Jan. 30. Without neutralizing the leather prior to retanning, it is treated with a synthetic tanning material such as condensed aromatic sulfonic acids, aromatic sulfonic acids of high mol. wt. or resins peptized in aromatic sulfonic acids.
- After-treatment of tanned leather. Max Bergmann. U. S. 1,947,513, Feb. 20. Leather tanned or treated with vegetable tanning agents, before being washed-out, is treated with an aq. soln. of a urca-aldehyde condensation product which serves to fix the residual vegetable tanning substances.
- Leather. Abatan (Soc. à r. l.). Fr. 756,550, Dec. 11, 1933. Dehaired skins are treated in a bath contg. quinone or hydroquinone, an acid salt of Al or Mg and an alkali hyposulfite, the mixt. giving rise to a Na alum which seps. the fibers of the skin, and to S which becomes interspersed between the fibers and keeps them apart. The skins are then treated with Cr alum and NaOAc.
- Leather substitute. Johannes Klasi. Brit. 401,140, Nov. 9, 1933. A substitute for leather which may be used as wash leather, packing material, for bookbinding or as wall facing is made by forming vegetable or like fiber into a fleece with fibers as free as possible from parallelism, laying layers thereof in zigzag formation on one another, wetting, compressing, spraying with a colored rubber emulsion, drying and vulcanizing.
- Artificial leather (rubberized sheet material). Frank O. Woodruff (to Beckwith Mfg. Co.). U. S. 1,945,173, Jan. 30. A multi-ply sheet of fiber such as leather fibers and cellulosic fibers is formed contg. rubber latex coagulated not only in the plies but also between the individual plies as a film serving to integrate the plies (the film being substantially continuous with the latex coagulated in the plies). App. is described.
- Preserving glue. Edgar C. Britton and Lindley E. Mills (to Dow Chemical Co.). U. S. 1,946,057, Feb. 6. About 0.05% or more of a polychlorophenol or an alkali or alk. earth metal salt such as a salt of 2,4,5-trichlorophenol is added to a glue to serve as a preservative.

### 30—RUBBER AND ALLIED SUBSTANCES

C C DAVIS

- The process of assimilation and formation of rubber in *tau-sagiz*. V. A. Novikov, A. I. Grechushnikov, Ya. P. Barmenkov and A. K. Nosov. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 78-80 (in English 80-2); *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 1353-81.—Rubber formation in *tau-sagiz* increases with the intensity of light, with a temp. increase from 10° to 28°, and with the moisture content of the leaves up to 77%, giving a daily yield of 4 g. per 100 g. of dry leaf material. Accumulation is partially counteracted, unless coagulation takes place, by enzymic decompn. F. H. Rathmann
- Higher alcohols in rubber compounding. W. B. Wiegand. *Can. Chem. Met.* 18, 24-9(1934).—Exptl. data show varying results in improved rubber compounding. Pretreatment of C black with higher fatty acids indicates no advantages, as judged by the resulting stress-strain curves, tensile values, etc. Higher alcs. are entirely without the activating action of fatty acids. Their softening action is greater than that of stearic acid but less than that of pine tar, and this action is not accompanied by a retardation in curing or by any general degradation of phys. properties after cure which characterize the free use of pine tar. The inclusion up to 2% (on the rubber) of higher fatty alcs., with a proportionate reduction in pine tar, improves the curing and phys. properties, without change of consistency of the raw stock. The present high costs of these higher alcs. make questionable their economical application in rubber. W. H. Boynton
- Determination of the specific gravity [of rubber products]. N. Ban. *Chem.-Ztg.* 57, 415(1933).—In detg. d. by the hydrostatic balance, the difficulty of air bubbles forming on the surface of the material may be obviated by adding 0.1% of a wetting agent (Nekal BX or Igepon T) to the water used for immersion. B. C. A.
- Textile finishes research. H. P. Stevens and R. Gaunt. *Bull. Rubber Growers' Assoc.* 15, 651-66(1933).—The

object of the investigation was to find a means of utilizing latex or rubber dispersions in sizes for calico printing, dyeing and stiffening. Addn. of latex to starch-clay-olein sizes made the finish less easily removed by washing. The technic used by Hauser and Hünemörder in studying the penetration of threads by latex (cf. *C. A.* 27, 2600, 6015) was unsatisfactory, and a new better method is to soak thread in latex, dry, stain with boiling satd. alc. Sudan III, dry, embed in a paraffin wax-stearic acid mixt, cut and mount in glycerol jelly. Without a wetting agent, there was almost no penetration, but with all com. wetting agents tested, there was complete impregnation of the threads (not of each fiber). Neither preliminary swelling of the fibers nor surface xanthation aided penetration.  $C_6H_6$  solns. of rubber penetrated the threads but not into the fibers. Treatment with latex of cloth for shower-proofing gave insufficient protection for practical utility, except with a coating made from chlorinated rubber in  $C_6H_6$ . Data show the water absorption of cloth treated with latex. Various types of substances were ineffective in overcoming the tackiness of latex-treated cloth, as was preliminary dialysis of the latex, but prolonged immersion in hot water was successful, though the product had an increased capacity for water absorption. There is preferential absorption by cloth of the serum, i. e., of the components, so that the dried product contains a disproportionately high quantity of non-rubber substances, which in turn probably account for the tackiness. This may be prevented by squeezing wet. Dyeing expts. led to uncertain results. Addn. of vulcanizing agents to the latex before impregnation and heating of the impregnated fabric overcame tackiness by the formation of a vulcanized impregnation. Expts. aimed at the use of latex in a variety of com. products are described briefly, e. g., the impregnation of stockinette with latex, in which case the product has phys. properties of promise for bandages, etc.

C. C. Davis

The use of rubber in combination with textiles. Erich Wurm. *Chem.-Ztg.* 58, 53 5 (1934).—An illustrated description of the manuf. of various products. C. C. D.

The stability of hard rubber against aggressive liquids. St. Reuter. *Chem. Fabrik* 1933, 375 6. The results of tests at 20° (8 weeks) and at 70° (8 days) of 6 varieties of hard rubber with 23 acid or alk. solns. are tabulated; also tests of 2 varieties of soft rubber with the same solns. In most cases they were considered to be practically stable.

J. H. Moore

The impact resiliometer. Paul Lupke. *Vanderbilt News* 3, No. 6, 10-14 (1933).—The new instrument which is described and illustrated is based on the 3 principles that: (1) the height of fall times the wt. of the falling sample is the energy of impact; (2) the height of rebound times the wt. is the energy recovered; and (3) value (2) divided by (1) is the resilience (fractional). Since the strain is momentary, the result is the *impact resilience*. Tabular and graphical data show the results obtained with different vulcanizates and their relation to the comps. and other phys. properties.

C. C. Davis

Effect of paraffin oil on raw rubber and the gel "poly-prene-sulfur" at different degrees of vulcanization. P. Buère and J. Grigorou. *Rev. gén. caoutchouc* 10, No. 96, 1 6 (1933). A series of samples of rubber, beginning with raw rubber and including undervulcanized, normal vulcanized and overvulcanized rubber, was immersed in paraffin oil at room temp. and the increases in wt. and vol. were measured. Absorption was greater by the raw rubber, and diminished progressively to a state of overvulcanization.

C. C. Davis

Oil-resisting rubber. W. J. S. Naunton, Maldwyn Jones and W. F. Smith. *Trans. Inst. Rubber Ind.* 9, 169-90 (1933).—In studying the effect of varying substances on the oil resistance of vulcanized rubber, the state of cure was taken into account by testing all mixts. in the uncured, optimum and overcured states. Because of the slowness at 20° and the severity and continued vulcanization at 100°, 55° was chosen for the tests. Preliminary tests showed that Diesel fuel oil, transformer oil, spindle oil,

linseed oil and butter diminished in severity in the order given, and the final test adopted was 6 days in Diesel oil at 55°. The sensitivity to oil was judged by the increase in wt. (based on the rubber). Excessive mastication lowered the oil resistance, and the highest resistance was shown by vulcanizates made directly from latex. The latex products were rendered still more resistant by glyptal resin, gelatin, glue, casein and methylcellulose, with increasing effectiveness in the order given. In masticated rubber, glue had no protective effect. With increasing times of vulcanization the oil resistance of a "soft-rubber" contg. S and diphenylguanidine increased to a max. and then diminished slowly, but with enough S to form hard rubber, the resistance increased progressively to the hard rubber state. Tetramethylthiourea disulfide without S gave vulcanizates, the oil resistance of which increased continuously through overvulcanization, whereas with S the resistance diminished at high overcures. However, the resistance with S was greater than without it. Rubber vulcanized with  $C_6H_5(NO_2)_2$  was more oil resistant than that vulcanized with S, and the resistance increased continuously with the time of vulcanization. Rubber vulcanized without accelerator was as oil resistant as an accelerated mixt. of high strength, but its general phys. condition after treatment was worse. There was little difference among various accelerators at the optimum cures. Based on the same vol., Mg carbonate imparted more oil resistance than did gas black, ZnO or  $CaCO_3$ , but in all cases the protective effect was small. Gas black was particularly effective in rubber vulcanized with  $C_6H_5(NO_2)_2$ . Softeners in general reduced the oil resistance, but glue had no deleterious effect. A study of surface treatments showed that varnishes are unsatisfactory because of mech. sepn., whereas immersion in Br water increased the oil resistance until the rubber was stretched or abraded. Coumarone resins,  $PhOH-HClO$  resins, alkyl resins, glyptal resins and chlorinated rubber were all unsatisfactory. In high concns. ethylene polysulfide resin ("Thiokol") was extremely effective, except for the objections of odor and thermoplasticity. Duprene mixts. were far better than rubber mixts. (cf. Hayden and Krishnan, *C. A.* 28, 9294). Since hard rubber is completely oil resistant, mixts. of hard rubber and Duprene give flexible products highly resistant to oil and satisfactory in aging.

C. C. Davis

Use of latex in coated papers (Hirschard) 23. Torne-out (Coolahan) 26. [Rubber] coating compn. (Can. pat. 339,070) 26. C black (U. S. pat. 1,946,739) 18. Coating fabrics with rubber or the like (U. S. pat. 1,946,090) 25. Al-Sa sulfide [vulcanization agent] (Ger. pat. 552,918) 18. [Rubber] waterproofing material (Japan. pat. 99,764) 18.

Grigoriou, Jean: Examen et conservation du caoutchouc manufacturé. Paris: Vigot frères. 128 pp. F. 30.

Treating latex to improve its penetrating properties. Robert L. Sibley (to Rubber Service Laboratories Co.). U. S. 1,946,003, Feb. 6. Latex is treated with a sol. salt of a  $H_2SO_4$  deriv. of the reaction product of an alc. such as  $BuOH$  and a hydroxy-substituted biaryl such as *o*-hydroxybiphenyl.

Deposition of rubber from latex. Robert B. F. F. Clarke (to Imperial Chemical Industries Ltd.). U. S. 1,945,256, Jan. 30. A gas-permeable vessel contg.  $CO_2$  under pressure is immersed in the latex, and coagulation is effected upon the outer surface of the vessel.

Apparatus for making microporous rubber articles from latex, etc. Dunlop Rubber Co. Ltd. and The Anode Rubber Co. Ltd. Ger. 591,422, Jan. 20, 1934 (Cl. 21b. 2.02). See Brit. 349,002 (*C. A.* 27, 445-6).

Rubber objects from aqueous dispersions. The Anode Rubber Co. Ltd. Ger. 585,624, Oct. 5, 1933 (Cl. 39b. 5). See Brit. 364,084 (*C. A.* 27, 2062).

Concentrating rubber dispersions. The International Latex Processes Ltd. Fr. 756,988, Dec. 18, 1933. Aq.

versions of rubber, etc., are com-  
e time by applying in the mid  
ations which engender 2 concomi  
sing a moderate mixing in the dispersi  
er hand, one or more waves at the surfac  
ults a periodic spreading of the dispersion in a th  
the walls of the vessel.  
Rubber compositions. Bruno Rewald (to Hansa  
tühlenwerke A.-G.). U. S. 1,946,333, Feb. 6. Phot  
institute material from soy bean is incorporated in rubber  
mpns. before vulcanizing and serves as a softening agent  
nd vulcanization accelerator. Cf. C. A. 27, 4716.  
"Age-resisting" rubber composition. Robert L. Sibley  
to Rubber Service Laboratories Co.). U. S. 1,946,002,  
Feb. 6. An antioxidant is used which is obtained by  
condensing 2 mol. proportions of an aromatic primary  
amine such as aniline with 1 mol. proportion of a reaction  
product of a naphthol 2 and an aldehyde such as butyr-  
aldehyde 1 mol. proportion.  
Rubber antioxidants. Ludwig Meuser and Percy J.  
Meuser (to The Naugatuck Chemical Co.). Brit. 401-  
353, Nov. 13, 1933. Products obtained by the reaction of  
a ketone, e. g., Me<sub>2</sub>CO, Et<sub>2</sub>CO, MeEtCO, acetophenone,  
benzophenone, phorone, cyclopentanone, benzalacetone,  
furfuralacetone, mesityl oxide, with an amine contg. only  
secondary amino groups, e. g., phenyl-α- or -β-naphthyl-  
amine, diphenylamine, α-α- or -β,β-dinaphthylamine,  
N,N'-diphenylethylenediamine, monomethylaniline, N,  
N'-di-α-α- or -β,β-naphthyl-β-phenylenediamine, at not  
above about 100° in the presence of HI and (or) HBr,  
alone or with known catalysts, are used as antioxidants.  
Cf. C. A. 27, 4441.  
Rubber antioxidant. Howard I. Kramer (to The  
Goodyear Tire and Rubber Co.). Can. 339,235, Feb. 6,  
1934. Secondary naphthylamines when hydrogenated  
yield derivs. which resist the effect of light, heat and O and  
enhance the resistance to deterioration of flexing in the  
vulcanized products in which they are incorporated.  
E. g., in a rubber mix is incorporated a secondary aryl-  
amine in which one of the substituents is a hydrogenated  
conjugated aryl group. The rubber is then vulcanized.  
Treating rubber to retard deterioration. Wm. P. Horst  
(to Naugatuck Chemical Co.). U. S. 1,945,576,  
Feb. 6. Rubber is incorporated with a formic acid deriv  
of the reaction product of an aliphatic ketone such as  
acetone and a secondary aromatic amino compd. such as  
diphenylamine or phenyl-β-naphthylamine. U. S. 1,945,  
577 relates to the similar use of a nitroso deriv. of a reaction  
product of like character. U. S. 1,945,578 relates to the  
similar use of a naphthol such as β-naphthol combined  
with a reaction product such as may be formed from  
acetone and a diarylamine. Cf. C. A. 28, 9314.  
Retarding deterioration of rubber. David Craig (to  
The B. F. Goodrich Co.). Can. 339,068, Jan. 30, 1934.  
Rubber is treated with a diarylamine in which an aliphatic  
hydrocarbon radical contg. at least 2 and preferably 3 or  
more C atoms is substituted on one of the aryl groups.  
Preserving rubber. Wm. S. Calcott and Wm. A.  
Douglass (to E. I. du Pont de Nemours & Co.). U. S.  
1,947,458, Feb. 20. Deterioration of rubber by aging is  
lessened by adding about 1% of an anti-oxidant having the  
general formula HORR'OH in which R represents a phenyl  
naphthyl or phenyl nucleus and R' represents a phenyl  
nucleus, such as β-hydroxybiphenyl. Rikwagaku Kenkyūjo  
(Tokishige Kusama and Tatuichi Yokoyama, inventors).  
Japan. 99,765, Feb. 24, 1933. Condensation products of  
and reduced phenols with aliphatic acids soften rubber and  
improve its physical properties. E. g., methylcyclo-  
hexanol is condensed with oleic acid.  
Coloring rubber. Arnold Wartenberg. Ger. 591,064,  
Jan. 16, 1934 (Cl. 22g. 10.01). A compn. for modifying  
the color of black rubber heel pieces comprises balata, a  
resin, a pigment and a volatile solvent.  
Sulfurized compounds. Henkel & Cie. G. m. b. H.



# CHEMICAL ABSTRACTS

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## 1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Aluminum drums for chemicals. H. V. Churchill. *Chem. Industries* 34, 215-16(1934). E. H.

Equipment in the inorganic chemical industry. Bruno Waeser. *Chem. App.* 20, 139-40, 149-51, 173-6, 182-3 (1933).—Brief summaries of the process and equipment used in the manuf. of  $\text{Na}_2\text{CO}_3$ ,  $\text{NaOH}$ ,  $\text{Cl}_2$ ,  $\text{HCl}$ ,  $\text{Na}_2\text{S}$ ,  $\text{H}_2\text{SO}_4$ , and  $\text{NH}_3$ , are given with references to some patents and manufacturers. Cf. *C. A.* 27, 2005 M. C. Rogers

A rapid and accurate semi-automatic delivery pipet M. W. Jennison. *Am. J. Pub. Health* 24, 59(1934).

Attachment for facilitating the observation of menisci of liquids. A. M. Belousov. *J. Applied Chem.* (U. S. S. R.) 6, 381-2(1933).—Construction details and a drawing of the app. are given. A. A. Bochtlingk

Gas-washing bottle. A. M. Belousov. *J. Applied Chem.* (U. S. S. R.) 6, 383(1933).—The wash bottle is constructed according to the Tishchenko principle and is characterized by the interchangeability of the intake and outlet. A. A. Bochtlingk

Theoretical principles relating to continuous distillation columns. J. Pétiard. *Bull. assoc. chim. sucr. dist.* 50, 62-75(1933).—Formulas are derived expressing the thermal relations for the sepn. of the constituents of a binary liquid mixt. fed to the middle of a single-column plate still. In practice, conditions differ widely in some respects from the ideal assumptions made, and some corrections are suggested to render the formulas more valid. B. C. A.

Distillation and evaporation by means of heat pumps (vapor recompression). Bruno Schulz. *Chem. App.* 20, 151-2(1933).—A short discussion of the use of vapor recompression for evaporators. M. C. Rogers

A calorimeter for burning chlorine and bromine derivatives. M. M. Popov and P. K. Shirokikh. *Z. physik. Chem.* A167, 183-7(1933).—A calorimeter for detg. the heat of combustion of  $\text{Cl}$  and  $\text{Br}$  derivs. was constructed and tested. Roy H. Hächler

A rapid electrolyzer. H. Brintzinger, A. Rothhaar and H. G. Beier. *Kolloid-Z.* 66, 183-8(1934); cf. *C. A.* 21, 2410; 25, 2350.—An app., incorporating a high membrane surface, means for using increased temp., and means for applying an elec. field, is described. Comparison is made with the Pauli electrolyzer, and data on various membranes and current consumption are presented. A. Fleischer

Improved form of Sprengel tube. A. D. Gardiner. *Analyst* 59, 172.—The under surface of the arms of the Sprengel tube is made of white enamel glass. W. T. H.

New accessories for a microscope for microchemical work (capillary holder, microchemical manipulator) and some notes on qualitative micro-electrolysis. Herbert Aller. *Mikrochemie* 14, 219-44(1934).—So much interest has developed in microchem. work that special app. has been devised which is here described. The general technique of such work is discussed because, it is felt, much of the failure to obtain satisfactory results has been due to want of skill on the part of the operator rather than to defects in the methods. W. T. H.

A micro manipulator for pure culture and microchemical work. G. W. Fitz. *Science* 79, 233-4(1934). E. H.

A universal ebullioscope and its applications. W. Swietoslawski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 177-81.—A combination of differential

ebullioscope with fractionating column is described with directions for its use in detg. the purity of a solvent or azeotropic mixt., the purity of a solute, or the compn. of an azeotropic mixt. C. D. West

High-speed centrifuge. W. DeW. Gurnan. *Rev. Sci. Instruments* [N. S.], 4, 450-3(1933).—The shape of air ports, the most effective angle of the jets, the design of rotor grooves, and the proper conditions of max. speed have been investigated. B. C. A.

Copper-to-glass seals. H. de Laszlo. *J. Sci. Instruments* 10, 296-7(1933).—Cu tubing is turned down to a feather edge, coated with  $\text{Na}_2\text{B}_4\text{O}_7$ , and sealed to the inside of a glass tube. B. C. A.

Dependence of the lag of thermometers on the viscosity of the indicator liquids used in them. Walter Grundmann. *Physik. Z.* 34, 75-7(1933); cf. *C. A.* 28, 933<sup>a</sup>.—From tests on thermometers filled with creosote,  $\text{EtOH}$ ,  $\text{C}_6\text{H}_6$ ,  $\text{C}_6\text{H}_{11}\text{OH}$ , and  $\text{Hg}$ , thermometric lag depends on, among other factors, the viscosity of the liquid used. The effect is particularly noticeable with creosote. E. J. Rosenbaum

The pumping speed of diffusion pumps which use an organic substance. Hans Klumb and Heinz O. Glimm. *Physik. Z.* 34, 64-5(1933).—Vacuum-pump oil, dibutylphthalate, and 2 paraffins m.  $42^\circ$  and  $68^\circ$  were compared with  $\text{Hg}$  as pumping liquids. The pump oil and the lower-melting paraffin evolved too much gas to be useful. The dibutylphthalate and the higher-melting paraffin were as efficient as  $\text{Hg}$ , provided the fore-vacuum was  $10^{-4}$ - $10^{-5}$  mm. No decompn. or reaction with  $\text{Hg}$  was observed. E. J. Rosenbaum

Apparatus for detecting poison in the air. N. Muć and D. Kenig. *Bull. soc. chim. roy. Yougoslav.* 4, 121-3(1933). G. S. Stanatoff

Detection of small leaks in high-vacuum apparatus. F. R. Terroux and W. H. Watson. *Can. J. Research* 8, 412-13(1933).—An app. is described for examg. each seal in turn until the faulty one is detected. It is based on the principle that the rate of leak depends on the pressure differential prevailing across the faulty seal. A Pyrex tube capable of evacuation is placed over the seal to be tested. On evacuation any leak will be observed by the change in the pressure differential across the joint. J. W. Shipley

The use of a selenium barrier-film photocell for measurement of very weak intensities. H. C. Hamaker and W. F. Reezhold. *Physica* 1, 119-22(1933).—A Se photocell (18 mm. sensitive surface) illuminated on the front with monochromatic light was for a c. d. of  $2-4 \times 10^{-9}$  amp. very slow to come to a const. value (several mins.), depending on light intensity and color. The return to zero is also influenced. This observation agrees with work of Brown (*C. A.* 6, 20, 827). For weak intensities Se cells are unsuitable. B. J. C. van der Hoeven

Comparison of vacuum and gas-filled [photoelectric] cells. G. A. Boutry and J. Orcl. *Compt. rend.* 198, 808-10(1934); cf. L. Capdecombe, *Compt. rend.* 198, 402-4(1934).—It is pointed out that O. had proposed the use of such cells for mineralogical work long ago (cf. *C. A.* 21, 217). The doubt as to strict proportionality between the current and the light flux in gas-filled cells is due to the difficulty of obtaining 2 strictly comparable fluxes of light, an accuracy of 1% being the practical limit; hence the claim to an accuracy of 0.25% for vacuum cells is

doubtful. The max. potential safely applicable diminishes as the flux of light increases, but should never exceed 80 v.

C. A. Silberrad.

Schöbel's heating oven for determining carbon and hydrogen by the Pregl method. H. Lieb. *Mikrochemie* 14, 268-4(1934).—A heating chamber composed of glass and made by Schott and Gen. of Jena is described which is suitable for keeping the  $PbO_2$  layer of the combustion tube at a temp. above  $170^\circ$  and below  $200^\circ$ . W. T. H.

Rotary furnace. Peters. *Chem.-Ztg.* 57, 643-4(1933).—The heating of materials which must not come in direct contact with fire gases is effected by the use of a cruciform gas flue dividing the furnace drum into segments, designed for pasty materials, or by the use of several inner tubes contg. the material to be heated, if this is granular. High gas velocities and correspondingly small units are possible and dust losses are avoided. B. C. A.

Temperature regulation of furnaces and thermostats. R. Fonteyne. *Natuurw. Tijdschrift* 15, 226-8(1933).—A sparkless triode relay is described. B. J. C. v. d. H.

Mercury-in-glass thermoregulator. C. C. Coffin. *Proc. Nova Scotian Inst. Sci.* 18, 213-14(1934).—A thermoregulator capable of controlling bath temps. within  $0.001^\circ$  consists of a closely wound spiral or helix of flattened, thin-walled glass tubing filled with Hg. Each end of the coil has a vertical extension long enough to rise above the surface of the bath. One of these ends in a capillary contg. a fixed contact. The other has a stopcock below the bath surface. This is for the purpose of regulating the amt. of Hg in the system. The second contact is fused in this tube below the stopcock. The advantage of this regulator lies in the fact that the ratio of surface area to vol. is so high and the speed of vol. change is so great. C. H. Peet

Glass stills for laboratory and other work. Rust Keller. *Brit.* 401,883, Nov. 23, 1933.

Containers for chemicals. I. G. Farbenind. A.-G. *Fr.* 757,719, Dec. 30, 1933. Vessels for containing  $SO_2$  or halogen derivs. of  $H_2SO_4$  are made of or lined with Al or Al alloys.

Filling bodies for washing-towers. Adolf Erganz. *Ger.* 591,820, Jan. 27, 1934 (Cl. 12a. 1.03).

Bubble-tower plate. K. F. Pavlov. *Russ.* 31,415, Oct. 31, 1933. Construction details.

Apparatus for mixing substances in suspension with chemical reagents. Zellstoffabrik Waldhof. *Fr.* 757,634, Dec. 29, 1933.

Mixer for liquids. B. F. Makeev. *Russ.* 31,416, Oct. 31, 1933. Construction details.

Mixing apparatus suitable for use with liquids, solids and gases. Joseph E. Jewett (to National Aniline and Chemical Co.). U. S. 1,947,851, Feb. 20. Various structural and operative details are described.

Apparatus for commingling soap and water, etc. Clifford M. Larson (to Sinclair Refining Co.). U. S. 1,947,994, Feb. 20. Various structural, mech. and operative details are described.

Electric circuit for measuring hydrogen-ion concentration or making electrometric titrations. Alfred Uhl. *Austrian* 136,517, Feb. 10, 1934 (Cl. 42a).

Closures for the discharge openings of mixing machines, edge-runners, etc. Ludwig Eirich and Joseph Eirich. *Brit.* 401,570, Nov. 16, 1933.

Tower suitable for cooling water by air currents. Barton H. Coffey (to Cooling Tower Co.). U. S. 1,948,980, Feb. 27.

Stirring apparatus. Aktiengesellschaft Kühnle, Kopp & Mausch and Karl Foerster. *Brit.* 401,583, Nov. 16, 1933.

Temperature-control device. Francis H. McCormick (to The British Thomson-Houston Co. Ltd.). *Brit.* 402,243, Nov. 30, 1933.

Continuous rotary filter construction and operation. George W. O'Keefe (to Filtration Engineers, Inc.). U. S. 1,948,947, Feb. 27.

Means for coupling flexible tubes for filtering gases. Victor Roeder. *Ger.* 592,474, Feb. 10, 1934 (Cl. 50a. 6).

Gas filter and dust collector suitable for treating air or

other gases. Emmett F. Annis. U. S. 1,949,002, Feb. 27. Various structural, mech. and operative details are described.

Air filter. Richard R. Halstead. U. S. 1,948,791, Feb. 27.

Air filter. James K. Hammond (to American Air Filter Co.). U. S. 1,949,540, March 6.

Oil-containing device for screening and filtering air to remove dust, etc. Wilfred W. Lowther (to Donaldson Co.). U. S. 1,949,212, Feb. 27. Structural details.

Oil filter. Francis F. Emory. U. S. 1,948,654, Feb. 27. Filters for organic liquids. I. G. Farbenind. A.-G. (Martin Müller-Cunradi and Otto Ambros, inventors) *Ger.* 591,757, Jan. 26, 1934 (Cl. 12a. 27). Org. liquid are recovered from foam-like solid masses by pressing the latter against filters. Thus, the product formed by treating  $Fe_2O_3$  and water with Na isopropylsulfonate is dried, reduced and sintered, treated with  $SiO_2$  and further dried, to form a suitable filter mass.

Filtering medium. Victor Benjamin. U. S. 1,949,644, March 6. A medium suitable for filtering oils comprises a coherent and porous unburned solid body capable of retaining its solidity when immersed in water, composed of a solidified mixt. of unaltered "rice ash," a water-setting cement reactive with the rice ash, and water.

Filter cloths for rotary suction filters. Maschinenfab. Buckau R. Wolf A.-G. *Ger.* 592,290, Feb. 5, 1934 (Cl. 12a. 16.02). Constructional features are described.

Filter-bed tiles. John W. E. Norman, Brit. 401,776, Nov. 23, 1933. Tiles of rectangular shape have 1 or 2 openings in the center, recesses in each side and legs of pentagonal cross section at each corner, the openings, recesses and legs being tapered to prevent the filtering medium from becoming jammed.

Apparatus for separating carbon dioxide from smoke and other gases. Jean Mauclet. *Fr.* 757,537, Dec. 28, 1933.

Device for the separation of liquids such as water from air in pipe lines. John D. MacLachlan (to Mac Ad Co.) U. S. 1,948,180, Feb. 20. Structural details.

Magnetic separators of the trough or tray type. Sydney Morris. *Brit.* 401,430, Nov. 16, 1933.

Magnetic ore separator. Percy H. Thomas. U. S. 1,948,080, Feb. 20. Mech. features.

Flotation apparatus for separating solids. Charles Le Chatelier. *Fr.* 757,461, Dec. 27, 1933.

Apparatus for separating solids of different specific gravities (such as coal and refuse) by agitating with liquids. Thomas M. Chance. U. S. 1,949,242, Feb. 27. Various structural and operative details are described.

Centrifugal separating apparatus. Eugene C. Saint-Jacques. *Brit.* 401,630, Nov. 16, 1933. Addn. to 367,194 (Cl. A. 27, 1551).

Continuously working centrifuge. I. M. Abramovich and K. N. Reimer. *Russ.* 31,379, Oct. 31, 1933. Construction details.

Cellular rotary drying drum. Cyrille A. Defemme. *Ger.* 592,112, Feb. 2, 1934 (Cl. 82a. 21.02).

Rotatable elongated drier and associated apparatus for removing oil from thermatomic carbon. Carroll Miller (to Thermatomic Carbon Co.). U. S. 1,947,780, Feb. 20. Various structural and operative details are described.

Apparatus for evaporating salt solutions, etc. Rischer Wyss Maschinenfab. A.-G. *Ger.* 592,289, Feb. 5, 1934 (Cl. 12a. 2).

Pan for evaporating brine. Preussische Bergwerks- und Hütten-A.-G., Zweigniederlassung Salz- und Braunkohlenwerke, Abteilung Saline Schönebeck (Elbe). *Ger.* 591,532, Jan. 24, 1934 (Cl. 12a. 1).

Heating apparatus for evaporators, etc. Ges. für Drucktransformatoren. (Koenemann - Transformatoren) G. m. b. H. *Ger.* 588,582, Feb. 2, 1934 (Cl. 12a. 1).

Apparatus for distilling and rectifying liquids. Messer & Co. G. m. b. H. *Ger.* 592,345, Feb. 6, 1934 (Cl. 12a. 5).

Apparatus for treating liquids with gases. K. P. Likhushin and L. D. Neresov. *Russ.* 31,417, Oct. 31, 1933. Construction details.

Apparatus for cooling and carbonating liquids with solid carbon dioxide. Louis Stark. Austrian 136,291, Jan. 25, 1934 (Cl. 17c).

Apparatus for mixing carbon dioxide and liquids. Mathias J. Kautz. Ger. 583,843, Nov. 27, 1933 (Cl. 6b. 20).

Apparatus for contact treatment of mutually insoluble liquids of different specific gravities such as in dephenolizing ammonia water with benzene. Heinrich Schöneborn (to Koppers Co. of Del.). U. S. 1,949,696, March 6. Various structural, mech. and operative details are described, of an app. comprising a vertical chamber with agitators mounted on a vertical central rotatable shaft.

Apparatus and method for releasing the pressure on viscous liquids. Schofield Labrow and Imperial Chemical Industries Ltd. Brit. 401,722, Nov. 20, 1933. Pressure upon liquids contg. solids in suspension, e. g., the products of the destructive hydrogenation of carbonaceous materials, is released by allowing the liquid to flow from the pressure chamber through a relatively long constricted passage formed by a channel or groove at the interface between a cylinder and a cooperating piston, the cylinder and piston being normally stationary.

Device for measuring the ratio of the ingredients in a mixture of gases or liquids such as "laughing gas" and oxygen. Eugen Schweitzer (to I. G. Farbenind. A.-G.). U. S. 1,947,923, Feb. 20. Two gases or liquids are admitted to opposite ends of an inner horizontal tube connected to an outer surrounding jacket or exit tube by perforations spaced longitudinally of the tube, and the position of a freely movable ball in the inner tube indicates the mixing proportions of the two gases or liquids.

Gas-pressure regulator. George M. Denning (to Air Reduction Co.). U. S. 1,948,027, Feb. 20. Structural and mech. details.

Apparatus for compacting fibrous materials (such as those mixed with latex) under pressure. Ernest Hopkinson (to Naugatuck Chemical Co.). U. S. 1,949,472, March 6. Structural and mech. features.

Valve protector for gas cylinders such as those for holding oxygen, nitrogen or acetylene. Gebhard Jaeger. U. S. 1,948,966, Feb. 27. Structural details.

Drills and associated devices for taking samples of materials such as in drilling wells. Sosthene Robichaux and George J. Barrett. U. S. 1,948,631-2, Feb. 27. Structural details.

Filling units of material carrying copper and vanadium compounds, etc., suitable for use in gas purifiers, etc. Wilbert J. Huff, Oscar W. Lusby and Lloyd Logan. U. S. 1,947,777, Feb. 20. Structural details.

Blow chamber and associated apparatus for producing rock and mineral wools. Edward R. Powell (to Banner Rock Corp.). U. S. 1,948,395, Feb. 20. Structural and mech. features.

Mercury boiler. Wm. L. R. Emmet and Bevis P. Coulson, Jr. (to General Elec. Co.). U. S. 1,948,371, Feb. 20.

Pressure still header. Samuel H. Edwards (to Standard Oil Co. of Calif.). U. S. 1,948,028, Feb. 20. Mech. features.

Header for tubular heat-transfer apparatus suitable for tube stills, etc. Harry M. Hope (to Alco Products, Inc.). U. S. 1,948,380, Feb. 20.

Valve-protecting device for gas containers such as cylinders for holding oxygen, nitrogen or acetylene. Henry Wayer and Gebhard Jaeger. U. S. 1,948,953, Feb. 27. Structural details.

Apparatus for coating sheet material. Cyril W. Bonnicksen and Protectoglass Ltd. Brit. 402,807, Dec. 4, 1933.

Blowpipe tip suitable for cutting with oxygen and a combustible gas. Lorn Campbell, Jr. U. S. 1,949,780, March 6.

Portable comparison photometer which can be used as a telephotometer for measuring the atmospheric transmission factor of light. Eric A. H. French. Brit. 401,426, Nov. 16, 1933.

Photometric apparatus for measuring the transparency

of a fluid. Light Sensitive Apparatus Corp. Brit. 401,514, Nov. 16, 1933.

"Glossimeter" suitable for testing the gloss of various surfaces. August H. Pfund. U. S. 1,949,619, March 6. Structural, mech. and optical details.

Apparatus for delivering measured quantities of granular material. James W. Pitt. Brit. 401,079, Nov. 9, 1933.

Device for delivering measured quantities of liquid. Oliver Coughtrie. Brit. 402,132, Nov. 27, 1933.

Means for controlling automatically the temperature of the gas or vapor filling of a discharge device. John H. Payne (to The British Thomson-Houston Co. Ltd.). Brit. 402,147, Nov. 30, 1933. Addn. to 401,379 (C. A. 28, 2226).

Cam-operated apparatus for controlling the proper sequential operation of industrial processes such as working of rubber. Edward B. Foote (to Taylor Instrument Cos.). U. S. 1,949,199, Feb. 27. Mech. features.

Jet pulverizers for minerals, etc. International Pulverizing Corp. Brit. 401,512, Nov. 16, 1933.

Ball mills. Fried. Krupp Grusonwerk A.-G. Brit. 402,289, Nov. 30, 1933.

Ball-and-ring mills. Babcock & Wilcox Ltd. Brit. 401,888, Nov. 23, 1933.

Ball-and-ring mills. Babcock & Wilcox Ltd. Brit. 402,244, Nov. 30, 1933.

Disk mills for cereals or substances of fragmentary nature. Geo. E. Smith. Brit. 402,217, Nov. 30, 1933.

Apparatus (with receptacles and overflow pipes arranged at successively lower levels) for gravity separation of materials such as in coal purification with sodium thiosulfate solution. Francis I. du Pont. U. S. 1,949,117, Feb. 27. An app. is described with supports for the sepg. containers so that they can be successively moved through the treating system.

X-ray apparatus. Julius J. Grobe and Arthur J. Kizaur (to General Elec. X-Ray Corp.). U. S. 1,947,846, Feb. 20. Structural and mech. details.

X-ray apparatus. Oscar H. Pieper. U. S. 1,949,760, March 6. Structural details.

X-ray tube. Albert Bouwers (to N.-V. Philips' Gloeilampenfabrieken). U. S. 1,949,005, Feb. 27.

X-ray tube. Thomas H. Forde. U. S. 1,949,463, March 6.

Cathode-ray tubes. Radioaktiengesellschaft. D. S. Loewe and Kurt Schlesinger. Fr. 757,658, Dec. 30, 1933.

Gas-filled cathode-ray tubes. Manfred v. Ardenne and Siegmund Loewe. Brit. 401,727, Nov. 20, 1933.

Luminescent tube. Frederick R. Balcar (to Air Reduction Co.). U. S. 1,949,069, Feb. 27. A tube contg. Ne also contains sufficient Kr or Xe to alter the color of the emitted light.

Light-sensitive cell. Ray S. Lyon (to United Research Corp.). U. S. 1,948,766, Feb. 27. Structural details.

Discharge apparatus. Thomas E. Allibone and Associated Electrical Industries Ltd. Brit. 401,738, Nov. 20, 1933. Graded high potentials in phase are applied to the sections of a cascaded discharge tube, e. g., a cathode tube, by an impulse generator.

Discharge tubes, e. g., Röntgen-ray tubes. C. H. F. Muller A.-G. Brit. 401,988, Nov. 23, 1933.

Electric discharge tubes. John H. O. Harries. Fr. 757,620, Dec. 29, 1933.

Electric discharge tubes. N. V. Philips' Gloeilampenfabrieken. Fr. 757,631, Dec. 29, 1933.

Electric discharge tubes. Elektrische Glühlampenfabriken Joh. Kremenezky. Austrian 136,204, Jan. 25, 1934 (Cl. 21a). When a conductive substance, e. g., a gettering metal, is vaporized in a discharge tube, its

condensation on certain parts of the tube may form an undesired elec. connection between different elements of the tube. This possibility is now obviated by coating the parts in question with  $MnO_2$ ,  $KClO_3$  or other substance which, when heated above the normal working temp. of the tube, will liberate O or another reagent capable of combining with the conductive substance to form a nonconductive substance.

Luminous electric discharge tube. Victor J. Francis

and John W. Ryde (to General Elec. Co.). U. S. 1,948,261, Feb. 20. Various details are described of a tube with a filling including a metal vapor such as Hg and operating with a "high pressure" discharge.

High-tension discharge tubes. C. H. F. Müller A.-G. Fr. 757,629, Dec. 29, 1933, and 757,681, Dec. 30, 1933.

Discharge devices having a hot cathode and an internal control electrode, provided with means, responsive to thermal radiation from the cathode, for preventing the discharge until the cathode has reached a predetermined temperature. Allgemeine Elektrizitäts-Gesellschaft (to International General Electric Co., Inc.). Brit. 401,828, Nov. 23, 1933.

Electrical discharge device suitable for use as a television receiving lamp. Dewey D. Knowles (to Westinghouse Elec. & Mfg. Co.). U. S. 1,948,720, Feb. 27. Various details are described of a device contg. a "noble gas" such as Ne mixed with H and having electrode which may be formed of Ni or Ta and which are spaced apart by a distance so small that a potential impressed across them causes a glow on one of the electrodes but no glow between them.

Emissive cathodes. Ernst Waldschmidt. U. S. 1,949,094, Feb. 27. The surface of a W wire is purified and it is heated in an oxidizing atm. to produce a coating comprising the higher W oxides; this coating is reduced in a reducing atm. comprising "water-steam" and H, to pure WO<sub>3</sub>, and an alk. metal is vaporized onto the WO<sub>3</sub> coatings. An arrangement of app. is described.

Electron-emissive cathode. Anton Lederer (to Ernest A. Lederer). U. S. 1,948,445, Feb. 20. For making a cathode which has a more const. and more lasting electron emission than "thoriated tungsten," an intimate mixt. is formed contg. Th and 50-100 times as much Os as Th, and the mixt. is heated in a non-oxidizing environment to above the m. p. of Th to form an intimate and uniform

alloy of Th and Os; the temp. is then raised close to the m. p. of Os to consolidate the material and render it pliable when cold.

Thermionic valves. Stephen P. de Laszlo. Brit. 401,740, Nov. 20, 1933.

Thermionic valves. The M-O Valve Co. Ltd. and Ernest C. R. Gant. Brit. 401,778, Nov. 23, 1933.

Thermionic valves. Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 401,859, Nov. 23, 1933.

Thermoelectric-couple material. Otto Hermann (to Thermo Elec. Co.). U. S. 1,947,595, Feb. 20. A neg thermoelec. element contains Sb 61-4, Zn 35-7 and Bi 0.5-2.0% and may be used with a pos. element such as an alloy of Cu 55 and Ni 45%.

Furnace for gaseous, liquid or pulverulent fuels. D. Siebenmann. Swiss. 166,145, Feb. 16, 1934 (Cl. 136).

Converters. Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. (Adolf Vogt, inventor). Ger. 591,040, Jan. 25, 1934 (Cl. 40a. 10.30). The interior surfaces of converters are given a high-melting coating of oxide. The converters are coated with metal which is then oxidized by blowing in O with steam, and the oxide layer is finally fused.

Rotary kiln or drying drum with internal partition. Friedrich Meyer. Ger. 592,258, Feb. 3, 1934 (Cl. 80a. 14.10).

Emptying device for shaft kilns for lime, etc. Albert Eberhard. Ger. 592,259, Feb. 5, 1934 (Cl. 80a. 16.20). Addn. to 553,485 (C. A. 26, 4510).

Blowpipe burner, consuming acetylene only. Idhis M. Evans. Brit. 401,663, Nov. 15, 1933.

Apparatus for catalytic heating. Frank A. Howard (to Standard Oil Development Co.). U. S. 1,948,298, Feb. 20. Various structural details are described of an app. suitable for use with a liquid fuel such as that of an automobile engine and a catalyst for the purpose of heating a radiator, engine, etc.

## 2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWN

P. A. Levene. Lawrence W. Bass. *Ind. Eng. Chem., News Ed.* 12, 105(1934).—Biography, with portrait.

Fritz Haber. Bonhoeffer. *Chem.-Ztg.* 58, 205-6 (1934).—Obituary.

Alfred Fabian Hess. Glanzmann. *Z. Vortragsforschung* 3, 1(1934).—Obituary notice.

In memory of D. I. Mendeleev. I. A. Kablukov. *J. Chem.-Ind. (Moscow)* 1934, No. 1, 25-9.—The life of Mendeleev and the history of the periodic table are described.

Frederick Walton. Centenary of the birth of the inventor of linoleum. R. D. Hodgson. *Chemistry & Industry* 1934, 214-16.

Discovery and early history of platinum in Russia. B. N. Menshutkin. *J. Chem. Education* 11, 226-9 (1934).

Grecian and Roman stucco, mortar and glass. Wm. Foster. *J. Chem. Education* 11, 223-5(1934); cf. C. A. 27, 2609.

The progress of modern alchemy. J. Velíšek. *Chem. Listy* 27, 66-9, 84-8. The effects of very penetrating radiations produced by bombarding He with alpha particles upon the removing of protons from the nucleus of paraffin and related substances are discussed. The work of Rutherford and Chadwick is discussed. Frank Mareah

Special exercises for students in general chemistry. III. Crystal growth. G. Bryant Buchanan. *J. Chem. Education* 11, 229-31(1934); cf. C. A. 28, 97.

Types of graphic classifications of the elements. II. Long charts. O. N. Quam and Mary Battell Quam. *J. Chem. Education* 11, 217-23(1934); cf. C. A. 28, 1232.

A program for organic chemistry in the liberal arts col-

lege. J. B. Culbertson. *J. Chem. Education* 11, 23, 4(1934).

Browne's "Hydriothaphia" with a reference to adipocere. Wm. H. Barnes. *Isss* 20, 337-43 (1934).—Sir Thomas Browne's "Hydriothaphia, Urne-Buriall, or, a Brief Discourse of the Sepulchrall Urnes Latently Found in Norfolk," first printed in 1658 and probably written two years earlier makes mention of a "fat concretion," "coagulated large lumps of fat" of "the consistence of the hardest castile soap" which was found "in a Hydriothaphia body buried 10 years in a churchyard." This is probably the earliest reference to the material which Fourcroy observed in 1750 when the *Cimetière des Innocents* at Paris was cleaned out. He studied the substance and named it "adipocera".

Lavoisier's early work in science—1763-1771. A. N. Meldrum. *Isss* 19, 330-63(1933). II. *Ibid* 20, 390-425(1934).

The atmospheric ozone at Pic du Midi by direct observation of the sun. J. Gault. *Compt. rend.* 198, 492-4 (1934); cf. C. A. 27, 5592.-The quantity of O<sub>3</sub> in the atm. above Pic du Midi was detd. with a visual spectro photometer. On Aug. 18, 1933 the O<sub>3</sub> above the peak was equiv. to a 0.158 cm. layer of pure O<sub>3</sub>, on the 24th, 0.165 cm., and on the 28th, 0.260 cm. This O<sub>3</sub> seemed to be partly (8-30%) diffused through the whole atm. and partly (70-92%) coned. in a relatively thin layer located from 18 to 45 km. above the peak.

Composition of the air in the stratosphere. A. F. Kapustinskii. *Compt. rend. acad. sci. U. R. S. S. (N. S.)*, 1, 108-9(in German 109)(1934).—The "Stratostat U. S. S. R." flight results show that the compn. of the atm. at 19 km. altitude is the same as at sea level. This is due to an equil. between the gravitational and the thermal tendencies toward variable compn.

Characteristics of the newly discovered lakes on the northern delta of the Volga River, the Deshsheshak, Bekesh-Sor and others. V. I. Nikolaev and B. I. Stepanov. *J. Applied Chem.* (U. S. S. R.) 6, 436-49 (1933).—The lye of the Deshsheshak and Bekesh-Sor lakes found under a layer of solid salt deposit was composed of (in July, 1931)  $\text{CaSO}_4$  below 0.10,  $\text{MgSO}_4$  7.17,  $\text{MgCl}_2$  15.08,  $\text{MgBr}_2$  0.12,  $\text{KCl}$  0.11 and  $\text{NaCl}$  6.73%; the solid crust contained  $\text{NaCl}$  98.10,  $\text{CaSO}_4$  0.94,  $\text{MgSO}_4$  0.23,  $\text{MgCl}_2$  0.48, insol. 1.26 and  $\text{H}_2\text{O}$  4.20%. The May, 1932, lye had the following compn.:  $\text{CaSO}_4$  0.20,  $\text{MgSO}_4$  1.05,  $\text{MgCl}_2$  1.57,  $\text{KCl}$  0.08 and  $\text{NaCl}$  24.02%. The mineral astrakanite found on the bottom of the Bekesh-Sor lake contained  $\text{MgSO}_4$  84.75,  $\text{Na}_2\text{SO}_4$  38.11,  $\text{NaCl}$  41.82,  $\text{H}_2\text{O}$  31.78% and insol. 1.02%. Its lye was composed (May, 1932) of  $\text{MgSO}_4$  1.29,  $\text{MgCl}_2$  1.25,  $\text{KCl}$  0.11,  $\text{MgBr}_2$  0.01 and  $\text{NaCl}$  28.29%, while it had the following compn. on July 17, 1931:  $\text{CaSO}_4$  0.10,  $\text{MgSO}_4$  8.65,  $\text{MgCl}_2$  8.69,  $\text{KCl}$  0.24,  $\text{KBr}$  0.01 and  $\text{NaCl}$  12.27%. The high content of some of the lakes in  $\text{NaCl}$  is remarkable. Many analytical data are given and the crystn. procedure for various salts is discussed.

A. A. Boetlingk  
The Batalpashinskii salt lake. P. N. Lashchenko and A. I. Morozova. *J. Applied Chem.* (U. S. S. R.) 6, 416-34 (in English 434-5) (1933).—The Batalpashinskii salt lake holds 4,500,000 cu. m. of water with about 700,000-750,000 tons of dissolved  $\text{Na}_2\text{SO}_4$ , the latter having a concn. range of 5-37°Bé, and a fairly const. ratio of  $\text{Na}:\text{Mg}$  and  $\text{Cl}:\text{SO}_4$  ions. Mirabilite is pptd. during the cold season and the compn. of the water fluctuates accordingly. It receives its salt from the ground waters, which are nearly of the same compn. as the lake water. The ground water on its way to the lake changes its compn. because of a reaction taking place between the  $\text{CaSO}_4$  and the colloidal Na particles present in the soil. Absorption by the mud on the bottom of the lake and in the water is of great importance. This lake cannot be used for the production of  $\text{NaCl}$  and  $\text{MgCl}_2$ .

A. A. Boetlingk  
Mass, electrostatic charge and constants of attraction. I. N. Longinescu. *Bul. soc. române fis.* 35, 161-7 (1933).—In a crit. consideration of basic units 2 classifications are proposed: (1) *Atomic units*. The neutron is the unit of mass, being the smallest electrically neutral unit. For the unit of electrostatic charge the charge of the proton or electron is taken. (2) *Scientific units*.—The g. is the unit of mass. A quantity equiv. to 98,500 coulombs is the unit of electrostatic charge. Based on these units the ratio between the Coulomb and the Newton consts. of attraction is  $1.3 \times 10^{10}$ . Calvin Brous

Interconversion of atomic and weight percentages. J. S. Marsh. *Metals & Alloys* 5, 48 (1934). D. S.

Determination of the atomic weight of molybdenum. Raymond Latité. *Compt. rend.* 197, 1730-1 (1933).— $\text{MoO}_3$  was purified by distn. with  $\text{HCl}$  gas in a Pyrex flask, and condensed in quartz; only the middle fraction is collected. The product was dissolved in  $\text{NH}_3$  soln., evapd. to dryness, treated with  $\text{HNO}_3$  and then heated in a current of  $\text{O}_2$  at  $400^\circ$ . The white oxide was sublimed in quartz above  $793^\circ$ . The product thus obtained was heated in a quartz boat in a stream of  $\text{H}_2$  at  $800^\circ$ , the  $\text{H}_2$  being replaced at the end of 10 hrs. by  $\text{A}$ , and the furnace cooled. The boat and  $\text{Mo}$  were weighed in an atm. of  $\text{A}$  or  $\text{N}_2$ . Seven expts. gave  $\frac{\text{Mo}}{\text{MoO}_3} = 0.66669 \pm 0.00001$ .

Reoxidation of the  $\text{Mo}$  gave the ratio  $\frac{\text{Mo}}{\text{MoO}_3} = 0.66668 \pm 0.00001$ , which gives an at. wt. of 96.01  $\pm$  0.01. L. W.

The periodic system of the elements. VIII. P. Petrenko-Kritchenko. *J. Gen. Chem.* (U. S. S. R.) 3, 587-9 (1933); cf. C. A. 28, 1688<sup>9</sup>.—The heats of formation of compds. of the alkali metals and of the alk. earth metals with  $\text{O}$ ,  $\text{S}$  and  $\text{F}$ ,  $\text{K} < \text{Ca}$ ,  $\text{Rb} < \text{Sr}$ ,  $\text{Cs} < \text{Ba}$ . For compds. with  $\text{Cl}$ ,  $\text{Br}$ ,  $\text{I}$  and  $\text{Se}$ ,  $\text{K} > \text{Ca}$ ,  $\text{Rb} > \text{Sr}$ ,  $\text{Cs} > \text{Ba}$ . Within each metallic group the relations are: for compds. with  $\text{O}$ ,  $\text{S}$  and  $\text{F}$ ,  $\text{Na} > \text{K} > \text{Rb} > \text{Cs}$ ,  $\text{Ca} > \text{Sr} > \text{Ba}$ .

1 With  $\text{Cl}$ ,  $\text{Br}$ ,  $\text{I}$  and  $\text{Se}$ ,  $\text{Na} < \text{K} < \text{Rb} < \text{Cs}$ ,  $\text{Ca} < \text{Sr} < \text{Ba}$ . Breaks in the curves representing periodic change in the properties of the elements occur because these changes are affected by 2 factors, the at. wt. and the no. of atoms, one playing a dominant role. Such breaks occur more frequently with change in the at. wt. in the case of the univalent metals than they do in that of the bivalent ones.

Lewis W. Butz

2 The relations between crystal lattice and atomic chemistry with respect to the periodic system of the elements. Ernst Sommerfeldt. *Centr. Mineral. Geol.* A1934, 33-46; cf. Reinicke, C. A. 26, 5233, 5808. M. F.

Electron optics and electron microscopy. E. Brüche. A. E. G. Mitt. 1934, 45-7; cf. C. A. 28, 947<sup>1</sup>.—Nine illus. A review. C. G. F.

Ionization potential and energies of formation of non-polar molecules. J. Savard. *Compt. rend.* 198, 751-3; J. phys. radium 5; 27-36 (1934); cf. C. A. 28, 694<sup>1</sup>.—D (energy of union) calcd. from the relation previously deduced agrees with the value detd. thermochemically or spectrographically for  $\text{H}_2$ ,  $\text{N}_2$ ,  $\text{C}_2$ ,  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{HCl}$ ,  $\text{Cl}_2$ ,  $\text{SO}_2$ ,  $\text{HCN}$ ,  $\text{C}_2\text{N}_2$  and  $\text{O}_2$ . The results with the 4 last point to  $\text{S}_2$  and  $\text{S}_8$  in S vapor,  $\text{H}_2\text{C}:\text{N}$  in  $\text{HCN}$ ,  $\text{N} \text{ C.C N}$  in  $\text{C}_2\text{N}_2$  and  $\text{O O}$  rather than  $\text{O O}$  in  $\text{O}_2$ . C. A. Silberrad

Comparison of quantum-theoretical formulas for electric double refraction with experiment. Th. Neugebauer. Z. Physik 86, 392-410 (1933).—The results of a theoretical paper (Z. Physik 73, 386 (1931); C. A. 27, 4724) agree as a whole with the general character of the exptl. results. The theory is extended to polyatomic mols. R. P.

Magnetic birefringence of gaseous oxygen. Tsai Belling. *Compt. rend.* 197, 1615-16 (1933).—Under the action of a magnetic field of about 45,000 gauss/cm. compressed  $\text{O}$  acquires a neg. birefringence, proportional to the pressure. The Cotton-Mouton const. is about  $-4.8 \times 10^{-14}$  at 100 kg./sq. cm. I. G. Vanden Bosch

Thermal variation of the magnetic birefringence of nitrobenzene, benzene and carbon disulfide. Antoine Goldet. *Compt. rend.* 197, 1612-14 (1933).—The relative variations of birefringence near  $20^\circ$  were found to be 1/144.6, 1/400 and 1/235 per degree for  $\text{C}_6\text{H}_5\text{NO}_2$ ,  $\text{C}_6\text{H}_6$  and  $\text{CS}_2$ , resp. Measurements were carried out with the same tube, current and field but with the yellow Hg line with  $\text{C}_6\text{H}_5\text{NO}_2$  and the green Hg line with  $\text{C}_6\text{H}_6$  and  $\text{CS}_2$ . E. G. Vanden Bosch

The change of resistance of single crystals of gallium in a magnetic field. I. W. J. de Haas and J. W. Blom. *Physica* 1, 134-44 (1933).—In continuation of similar work on Bi (Shubnikov and de Haas, C. A. 24, 5196; 25, 241; de Haas and van Alphen, C. A. 25, 855) the relation between high diamagnetism and resistance change in a magnetic field was studied for Ga. It has, like Bi, a vol. decrease on melting during which the diamagnetism disappears (Ehrenfest, C. A. 20, 1170). Ga monocystals were made with well-developed faces of the rhombic (pseudotetragonal) crystal; the length of the monocystal rod coincided with the "tetragonal" axis. Of 2 samples the less pure one (spectroscopically) had a larger change in resistance with magnetic field. The measuring wires were spot-welded to the crystal, a horizontal revolving Weiss magnet was used; the Ga rod was set vertical; the temp. was that of liquid  $\text{H}_2$ . Tables and curves are given of  $R/R_0$  with various orientations of magnet and field strengths (up to 22,300 gauss), temp.  $20.4^\circ$  down to  $9.9^\circ$  abs. The rotational curves, simple sine type at low field strength, become more complicated with secondary maxima and minima for higher field strength and lower temps. B. J. C. van der Hoeven

9 Magneto-thermoelectric effects in nickel and iron: experimental laws. A. Perrier and T. Kousmine. *Compt. rend.* 198, 810-12 (1934).—The differences,  $\Delta E$ , between the thermoelec. power of couples consisting of a nonmagnetic metal and Ni or Fe unmagnetized, and of couples of the same metal and Ni or Fe magnetized parallel,  $\parallel$ , or perpendicular  $\perp$ , to the direction of the temp. gradient are plotted against the magnetic field ( $H$  55.6-1800 gauss).  $\Delta E$  is pos. (i.e. indicates increase in ther-

molec. power) or neg. according as  $H$  is  $\parallel$  or  $\perp$ , and much greater when it is  $\parallel$ . In Ni the curves rise with increasing  $H$  approx. hyperbolically to a satn. limit; in Fe they attain a max. and then decline, also toward a limit. C. A. S.

Ferromagnetism of  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub>. J. G. Koenigsberger. *Naturwissenschaften* 22, 90(1934).—Sachse (C. A. 27, 4972) has recently rejected the possibility of ferromagnetic Fe<sub>2</sub>O<sub>3</sub>. K. repeatedly found hematite crystals of remanence up to 1.9 c. g. s. units, more than can be accounted for by the Fe<sub>2</sub>O<sub>3</sub> content (1.52%); furthermore for magnetite the Curie point of the susceptibility  $CP_K$  coincides with that of the coercive force  $CP_C$  at 585°, for hematite  $CP_K = 650^\circ$ ,  $CP_C = 730^\circ$ . Magnetization heating to 585° and demagnetization were applied to 9 samples of hematites and magnetites, artificial and natural. Fe<sub>2</sub>O<sub>3</sub> with magnetite and pure magnetite are demagnetized completely by this process; for hematite itself, however, the remanent magnetism is only partly weakened (36–40% remains), likewise for titanomagnetite and titanohematite (ilmenite). Hence under natural conditions  $t \geq 200^\circ$ ,  $p \geq 40$  atm. a ferromagnetic trigonal  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> is actually found (cf. Baudisch and Welo, C. A. 27, 5600; Danilov, et al. C. A. 27, 2858).

Paramagnetism of some rare earth ions. C. J. Rodden. *J. Am. Chem. Soc.*, 56, 648–9(1934).—The magnetic susceptibility at room temp. was measured for Pr<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>·8H<sub>2</sub>O, Nd<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>·8H<sub>2</sub>O, Nd<sub>2</sub>O<sub>3</sub>, NdFe(CN)<sub>6</sub>·4H<sub>2</sub>O, Sm<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>·8H<sub>2</sub>O, Sm<sub>2</sub>O<sub>3</sub> and Yb<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>·8H<sub>2</sub>O. The results agree with Van Vleck's theory. A screening const. of 34 is preferred for Sm.

Diamagnetic susceptibility of helium. Felix J. Wisniewski. *Acta Phys. Polonica* 2, 23–9(1933) (in French).—Generalized mechanics are applied for the calcn. of the diamagnetic const. of He, on the basis of Bohr's model. Calcd. and exptl. values agree.

The dielectric coefficients of gases. II. The lower hydrides of C and Si, O, N, oxides of N and C and fluorides of Si and S. H. E. Watson, G. Gundu Rao and K. L. Ramaswamy. *Proc. Roy. Soc. A* 143, 558–88(1934); cf. C. A. 25, 5320.—The dielec. consts. of 17 gases were measured at 2 or 3 temps. and their elec. moments deduced from the results. Only C<sub>2</sub>H<sub>6</sub>, CO, NO and N<sub>2</sub>O have measureable elec. moments, the value for N<sub>2</sub>O being discussed in relation to suggested structures for the mol. Compressibilities were also detd. by making measurements at different pressures. The construction and calibration of a precision variable condenser capable of measuring a change in capacity of 0.4  $\mu$ F with an accuracy of 0.0001  $\mu$ F is described.

Change of the dielectric constant of nitrobenzene with temperature. A. Piekara and J. Mazur. *Acta Phys. Polonica* 1, 401–4(1932) (in French); cf. C. A. 27, 880.—Mazur's statement (C. A. 26, 2358) that liquid PhNO<sub>2</sub> exists in 2 modifications aroused active opposition (e. g. Piekara, C. A. 27, 2358). The present joint investigations of P. and M. do not indicate the existence of a second modification. The question of an allotropic state of PhNO<sub>2</sub> must be regarded as not definitely solved.

The dielectric constant of nitrobenzene and its moisture content. Arkadiusz Piekara. *Acta Phys. Polonica* 1, 405–9(1932) (in German); cf. preceding abstract.—Dried and recrystd. PhNO<sub>2</sub>, m. 5.74°, shows a normal dielec. const.-temp. curve, without an anomaly at 9.6°. Addn. of H<sub>2</sub>O has little effect upon  $\epsilon$ . The resonance method as a standard in measuring  $\epsilon$  is proposed.

Dielectric constants of polar solutions. Jeffries Wyman, Jr. *J. Am. Chem. Soc.* 56, 536–44(1934).—The dielec. consts.,  $\epsilon$ , of a no. of aq. solns. of ampholytes were measured. There is a linear relationship between molar concn. and  $\epsilon$ . The increases in  $\epsilon$  per mole of ampholyte are equal for the same ampholyte in different solvents. Thus, in polar solvents  $\epsilon$  is a nearly additive property. "A discussion is given of a possible interpretation of this in terms of the internal field, which, if valid, would allow of approx. ests. of polarization and elec. moments with polar solns." Both dielec. consts. and ds.

are given for many solns. of amino acids and peptides in polar solvents.

The electric moment of dioxane. C. H. Schwingel and E. W. Greene. *J. Am. Chem. Soc.* 56, 653–4(1934).—The total molar polarization ( $=24.5$  cc.) of 1,4-dioxane in the vapor state is independent of temp., hence 1,4-dioxane has zero elec. moment. W. B. K., Jr.

Two types of dielectric polarization. S. O. Morgan. *Trans. Electrochem. Soc.* 65, 8 pp.(preprint)(1934).

The real part of the dielec. const.,  $\epsilon'$ , of a material having a polarizability due either to dipoles or to heterogeneity should be a decreasing function of frequency, while the imaginary part,  $\epsilon''$ , should have a max., a type of behavior usually designated as anomalous dispersion. The frequency at which anomalous dispersion occurs is detd. by the time of relaxation,  $\tau$ , of the polarization. For dipole polarizations changes of  $\tau$  with temp. are due largely to changes in viscosity, while for Maxwell-Wagner polarizations the value of  $\tau$  depends upon the dielec. const. and cond. of the components of the dielectric. It is shown that for glycerol anomalous dispersion is observed at 30 cycles as well as at  $98 \times 10^6$  cycles with no apparent discontinuity at intermediate frequencies. The value of  $\epsilon''_{\text{max}}$  increases with decreasing temp. as predicted for dipole polarizations. For halowax and paper anomalous dispersion is also observed, but with the distinct difference from glycerol that the values of  $\epsilon''_{\text{max}}$  decrease with decreasing temp. This behavior is predicted for Maxwell-Wagner polarizations in a heterogeneous dielectric, one component of which has a considerably greater conductance than the other. It is indicated that the anomalous dispersion in halowax and paper is due to Maxwell-Wagner polarizations, while that in glycerol is due to dipoles.

Derivatives of normal pentane and normal heptane. III. Dipole moments of the bromoethoxy and the dibromo derivatives. Mary L. Sherrill, Martha E. Smith and Dorothy D. Thompson. *J. Am. Chem. Soc.*, 56, 611–14(1934); cf. C. A. 24, 2984.—The d., n, b. p. and dielec. const. were measured for a series of bromoethoxy and dibromo derivs. of pentane and heptane. The dipole moments of the pentane derivs. are close to the values of the corresponding heptane derivs.

Volume coefficients of expansion of several gases at pressures below one meter. J. B. M. Coppock and R. Whytlaw-Gray. *Proc. Roy. Soc. (London)* A143, 487–505(1934).—By the use of a Callendar const.-pressure air-thermometer, detns. were made of the vol. coeffs. of expansion of C<sub>2</sub>H<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub>O, NO, CO, Me<sub>2</sub>O, and SF<sub>6</sub>, at several pressures between the temp. limits of 25–60° in Series I, and 11–48° in Series II. Measurements were made with 2 expansion bulbs, one of glass and the other of fused SiO<sub>2</sub>. Those for CO<sub>2</sub>, N<sub>2</sub>O and C<sub>2</sub>H<sub>4</sub>, obtained in the glass vessel, when extrapolated gave values for the coeff. at zero pressure markedly greater than the accepted value, but those detd. in SiO<sub>2</sub> yielded results in close agreement with this const. This discrepancy is due to the greater adsorption on glass than on SiO<sub>2</sub> which, when easily condensable gases are used gives rise to appreciable errors.

Refraction and dispersion of gases and vapors. I. General introduction. K. Fajans. *Z. physik. Chem.* B24, 103–54(1934).—The purpose of the measurements and the development of the exptl. method are summarized. The subjects of refraction and dispersion are discussed with particular reference to the results of the following papers. II. Refraction and dispersion of air, hydrogen sulfide and water vapor in the visible region. J. Wust and H. Reindel. *Ibid.* 155–76.—A gas interferometer of the Zehnder type (*Z. Instrumentenk.* 11, 275(1901)) is described. Measurements were made with air, H<sub>2</sub>S and H<sub>2</sub>O, the latter at 130–150°. Refraction and dispersion agreed within the exptl. error with results obtained by earlier workers. This was used as a test of the performance of the interferometer. III. Refraction and dispersion of gaseous mercuric halides in the visible region. M. A. Bredig, Th. v. Hirsch and J. Wust. *Ibid.* 177–86.—Refraction and dispersion were measured at



340° for  $\text{HgCl}_2$ ,  $\text{HgBr}_2$ , and  $\text{HgI}_2$ . A measurement for  $\text{HgBr}_2$  at 440° shows that the temp. coeff. of refraction is less than 0.008% per degree. The mol. refraction is not the sum of the refraction of the free gaseous ions and the same conclusion is drawn for the mol. dispersion. This may be due to the non-noble-gas-like character of mercuric ions. IV. Refraction and dispersion of gaseous aluminum chloride and bromide in the visible region. M. A. Bredig and F. K. V. Koch. *Ibid.* 187-93.—Refraction and dispersion of  $\text{AlCl}_3$  and  $\text{AlBr}_3$  were measured at 230-300°. Decrease in refraction increases with increasing deformability of halide ion. A brief appendix discusses an arrangement for reducing vibrations in the interferometer. V. Refraction and dispersion of gaseous aluminum iodide in the visible region. F. K. V. Koch and H. Kohner. *Ibid.* 194-8.—Further improvements were made in the mounting of the interferometer. Refraction and dispersion measurements were made on  $\text{AlI}_3$ . The decrease in refraction in the formation of the mol. from free gaseous ions is smaller than was to be expected from the behavior of the chloride and bromide. This is probably attributable to the existence of double mols. of the type  $\text{Al}_2\text{X}_6$  and their complicated structure. VI. Refraction and dispersion in the visible region of a few gaseous halides of elements of the fourth group of the periodic system. P. Hölemann and H. Goldschmidt. *Ibid.* 199-209.—The slow changes in the zero point of the interferometer were investigated and found to be due to thermal effects from the oven. This was remedied and the refraction of  $\text{H}_2\text{O}$  vapor and  $\text{HgCl}_2$  again measured to test the interferometer. Refraction and dispersion were measured for  $\text{CCl}_4$ ,  $\text{SiCl}_4$ ,  $\text{SnCl}_4$ ,  $\text{SnBr}_4$ , and  $\text{SnI}_4$ . VII. Refraction and dispersion of stannous halides in the visible region. H. Goldschmidt and P. Hölemann. *Ibid.* 210-14.—Refraction and dispersion were measured for  $\text{SnCl}_2$ ,  $\text{SnBr}_2$ , and  $\text{SnI}_2$  at 700°. Although the dispersion for  $\text{SnCl}_2$  and  $\text{SnBr}_2$  could be represented by a formula with only one term there were deviations between calcd. and exptl. values for  $\text{SnI}_2$  that are attributed to the strong absorption of this compd. in the region investigated. The change of refraction in the formation of the mols. from free gaseous ions does not show the systematic gradation that is exhibited by numerous other compds. In the change from stannic to stannous halides there is a strong rise of the equiv. refraction that increases with increasing size of the anions. G. M. Murphy

Deviations from Paschen's law. S. P. McCallum and L. Klatzow. *Phil. Mag.* 17, 201 7(1934).—Min. sparking p. ds. between parallel plates were measured in He, Ne, A and Kr for various plate sepn. and gas pressures. The sparking p. d. was const. in He, while that in Ne, A and Kr increased as the ratio of the electrode area to the electrode sepn. decreased. This effect is ascribed to the lateral diffusion of the electrons, which is greater in Ne, A and Kr than in He. E. J. Rosenbaum

Flame temperatures in carbon monoxide and air mixtures. W. T. David and J. Jordan. *Phil. Mag.* 17, 172 81(1934).—The temp. produced by the inflammation of a CO-air mixt. at atm. pressure in a closed vessel was measured by a fine-Pt-Rd resistance thermometer. The temps. measured were in the range 1200-1800°. The max. temp. was reached when CO and O were present in their combining proportions. When the pressure was increased to 5 and 8 atms. the flame temps. were considerably greater. The difference between the wire temp. and the gas temp. is discussed. The temp. actually measured was less than that calcd., indicating an abnormality in the freshly burned gas. E. J. Rosenbaum

Statistics of polyatomic gases. Kálmán Széll. *Z. Physik* 86, 810-17(1933).—The deviations from classical statistics due to Fermi-Dirac or Bose-Einstein statistics (degeneracy) are, for polyatomic gases, negligible except under conditions such that the gas behaves practically like a liquid. R. Peierls

Diffusion of gases at high temperatures through porous materials. P. Brémont. *Compt. rend.* 196, 1651-3 (1933); cf. C. A. 27, 4144.—Expts. with unglazed porcelain and air,  $\text{CO}_2$ ,  $\text{H}_2$ ,  $\text{SO}_2$  and coal gas<sup>1</sup> between 17° and

700° show that the diffusion effects are not in accordance with the requirements of Graham's law. B. C. A.

Low-pressure data of state of nitric oxide and of nitrous oxide between their boiling points and room temperature. Herrick L. Johnston and Harry R. Weimer. *J. Am. Chem. Soc.* 56, 625-30(1934).—By means of a const.-vol. gas thermometer and an intercomparison of the known P-V-T data for  $\text{H}_2$  with the data of state obtained for NO between 122° and 308°K. and for  $\text{N}_2\text{O}$  between 197° and 298°K. the 2nd virial coeffs. were computed for each gas over the exptl. range of observations. These values were plotted as functions of temp. and compared with those calcd. from D. Berthelot's equation. Previous work on NO by Eucken and d'Or (cf. C. A. 26, 5002) is reviewed. H. S. v. K.

The critical miscibility of liquids. P. Brun. *J. chim. phys.* 31, 76-8(1934); cf. C. A. 27, 224.—Reply to P. Mondain-Monval (C. A. 27, 5624). E. R. Smith

Variations in volume of mixtures of water, ethyl alcohol, ether. Pierre Brun. *Compt. rend.* 197, 1637-8(1933).—Polemical with Mondain-Monval (C. A. 27, 5624). E. G. Vanden Bosche

Refractive dispersion of organic compounds. IV. Cyclohexene and 1,3-cyclohexadiene. C. B. Allsopp. *Proc. Roy. Soc. (London)* A143, 018-30(1934); cf. C. A. 26, 1839.—For cyclohexene  $n$  at 20° was detd. at 67 wave lengths between 6708 and 2420 Å., and for 1,3-cyclohexadiene  $n$  was detd. at 48 wave lengths between 6708 and 2940 Å. The data are represented by equations. Mol. extinction coeffs. for both compds. in soln. in cyclohexane are given. The partial refraction of the ultra-violet absorption band of 1,3-cyclohexadiene is much larger than that of cyclohexene, and is responsible both for the increase of  $n$  that accompanies the introduction of the second double bond into the 6-C ring and for a rapid increase observed in the  $n$  of cyclohexadiene at short wave lengths. Allen S. Smith

Surface free energy of liquids and liquid mixtures. Yonezo Morino. *Sci. Papers, Inst. Phys. Chem. Research* (Tokyo) 23, 49-117(1933).—The surface tensions of  $\text{C}_6\text{H}_6$ ,  $\text{CCl}_4$ ,  $\text{C}_6\text{H}_5\text{Cl}$ ,  $\text{Et}_2\text{O}$ ,  $\text{EtOAc}$ ,  $\text{MeOH}$ ,  $\text{EtOH}$ ,  $\text{PrOH}$ ,  $\text{HOAc}$  and binary mixts.  $\text{C}_6\text{H}_6$ -PhMe,  $\text{C}_6\text{H}_6$ - $\text{CCl}_4$ ,  $\text{PhMe}$ - $\text{CCl}_4$ ,  $\text{C}_6\text{H}_6$ -PhCl,  $\text{PhMe}$ -PhCl and  $\text{CCl}_4$ -PhCl were measured by the Ramsay-Shields capillary-rise method in the temp. range of 20° to 170°. An app. for measuring the surface tension and the liquid d. on the same sample is described. Katayama's formula (cf. C. A. 10, 994) holds for the surface tension of the normal liquids. Expressions are deduced that extend this to binary mixts. van der Waals equation of state can be extended to binary mixts. and expressions obtained for the consts.  $a$  and  $b$ . An isothermal relation between mol. surface free energy and compn. is derived that agrees well with expts. of other investigators. Various equations expressing the dependence of surface tension and other related properties on compn. as proposed by Pavlov, Volkmann, Poisson and Worley are special forms of M.'s more general expression. The abnormality of the surface tension of alcs. is explained on the assumption that liquid alcs. are binary mixts. of single and triple mols. in equil. Explanations of abnormalities in the observed values of vapor pressure,  $b$ ,  $p$ , and heat of vaporization of alcs. are attempted on a similar assumption. L. H. Reyerson

Relations among the maximum vapor tensions of some organic groups. I. Emanoil Lucatu. *Bul. soc. române fiz.* 35, 127-8(1933).—Data are compiled to establish the relation: On increasing the no. of C atoms of an org. series by arithmetic progression, the vapor tensions corresponding to the compds. decrease in a geometric progression which varies with the temp. in a linear manner. Calvin Brous

Amorphous metal layers. H. Zahn and J. Kramer. *Z. Physik* 86, 413-20(1933).—Thin layers of various metals deposited electrolytically change irreversibly in cond. at a definite temp. This change is attributed to a transition from an amorphous to a cryst. state. Expts. made with a condenser contg. a thin metal film show satn. when sub-

jected to very intense elec. charge. These expts. confirm the postulated amorphous state. R. Peierls

The increase in electrical conductance of crystalline substances upon approaching the melting point. M. Le Blanc and E. Möbius. *Z. Elektrochem.* 40, 44-6(1934).—Previously reported work (cf. C. A. 28, 961<sup>1</sup>) is extended to  $\text{AgNO}_3$  (thrice recrystd. and dried over  $\text{CaCl}_2$  in *vacuo*) m. 209.01  $\pm$  0.01°. The finely powd.  $\text{AgNO}_3$  was compressed to a pellet under pressure of 200 kg. and its cond. measured in a specially designed app. maintained in an oven at 193°. The Pt crucible contg. the  $\text{AgNO}_3$  under a pressure of 4 kg. was heated electrically. The less the impurity ( $\text{H}_2\text{O}$ ) the lower the cond. The effects of traces of  $\text{Ag}_2\text{SO}_4$  ( $10^{-4}$  mols./g.) on cond. were readily detected. E. R. Schierz

The free mobility of lead ions in amicronic crystals of lead sulfate. I. M. Kolthoff and Charles Rosenblum. *Phys. Rev.* 45, 341(1934).—Freshly formed microscopic crystals of  $\text{PbSO}_4$  have a spongy structure. They consist of primary cryst. particles (of 1000 to 10,000 mols.) sepd. by fine capillaries through which Th B ions can move freely, but which are impervious to wool violet (4BN). On aging, the internal surface decreases. Pb ions can move freely through the primary particles and cause a homogeneous distribution of Th B through the entire system; it is concluded that Pb ions can move freely through the amicronic primary particles. With crystals of  $\text{PbSO}_4$  up to 1 by 2  $\mu$ , Th B was uniformly distributed through the entire cryst. ppt. by shaking with a radioactive Pb soln. 3 min. immediately after the formation of the ppt., or in 17 hrs., starting 50 min. after pptn. Gerald M. Petty

The superconductivity of zinc. W. H. Keesom. *Physica* 1, 123-7(1933)(Comm. Leiden 230a).—A no. of metals (wires wound on glass tubes) were studied as to supercond. at extremely low temps. (method C. A. 26, 4514). A phosphor-bronze wire resistance thermometer was used; its calibration curve has an inflection point at 2.3° abs. Zn (Bur. Standards) hammered at 300°, drawn to 0.7 mm. and rolled to a flat band has a higher residual resistance at 4° abs. than former Zn samples, probably because of stresses; the vanishing point of the resistance lies at 0.79° abs. For Cd the residual resistance  $R/R_0 = 0.00080$ , it is not superconductive at 0.73° abs. For Au  $R/R_0 = 0.00259$ , not superconductive at 0.78° abs. For Pt  $R/R_0 = 0.0091$ . For Pt as compared with Al this is contrary to Dorfman's rule (C. A. 27, 4506) of a low product of Hall coeff. and elec. cond. for superconductive metals. Cu, as evident from the phosphor-bronze used, is not superconductive at 0.75°. B. J. C. v. d. H.

Electrical conductance and other similar characteristics in binary aggregates. Karl Lichtenecker. *Z. Elektrochem.* 40, 11-14(1934).—The summarizing report of G. S. von Frey in this field (cf. C. A. 26, 3710) is supplemented with a new proof based on Grunisen's relation ( $W = W_0 f(T)$ ), that the logarithmic mixing law is a limiting case of the exponential law.  $W$  = resistance. E. R. Schierz

Crystal structure and electric properties. II. Lattice structure and conductivity of bismuth monocrystals in transverse magnetic fields. O. Stierstadt. *Z. Physik* 85, 310-31(1933); cf. C. A. 27, 2357. III. Lattice structure and conductivity of bismuth monocrystals in longitudinal magnetic fields. *Ibid.* 897-707.—Measurements of the elec. resistance of different specimens of Bi crystals with different orientations of the axes show that it follows the same symmetry as all other properties of the crystal. This is a convenient way of detg. the orientation of a given specimen without cutting it and also of detg. the symmetry class without making x-ray photographs. R. Peierls

Lattice structure of the lithium-cadmium alloys. E. Zintl and A. Schneider. *Z. Elektrochem.* 40, 107(1934); cf. C. A. 27, 2407.—Polemical with A. Baroni (C. A. 28, 1645<sup>1</sup>). Curtis L. Wilson

Crystal structure of enargite ( $\text{Cu}_3\text{AsS}_4$ ). Katsutoshi Takané. *Proc. Imp. Acad.* (Tokyo) 9, 524-7(1933).—Laue photographs indicate that enargite belongs to the orthorhombic holohedral class. Rotation reflection

photographs about [001], [010] and [100] give  $a_0 = 6.39 \pm 0.05$  A.,  $b_0 = 3.68 \pm 0.05$  A., and  $c_0 = 6.15 \pm 0.05$  A. This leads to axial ratios  $a:b:c = 1.734:1:1.674$ , which is double for the  $b$  and  $c$  axes given by Groth. The unit cell contains one mol. of  $\text{Cu}_3\text{AsS}_4$ ,  $V_h^{12}$  is the space group, leading to positions  $(m_1, 1/2, p_1)$ ;  $(\bar{m}_1, 1/2, \bar{p}_1)$ ;  $(m_1 + 1/2, 0, p_1 + 1/2)$ ;  $(\bar{m}_1 + 1/2, 0, \bar{p}_1 + 1/2)$  for the 4  $\text{CuAs}$ , and  $(m_2, 0, p_2)$ ;  $(\bar{m}_2, 0, \bar{p}_2)$ ;  $(m_2 + 1/2, 1/2, \bar{p}_2 + 1/2)$ ;  $(\bar{m}_2 + 1/2, 1/2, p_2 + 1/2)$  for the 4 S.

Louis Waldbauer

The structure of the trithionate group,  $(\text{S}_3\text{O}_6)^{2-}$ . W. H. Zachariasen. *J. Chem. Physics* 2, 109-11(1934). The unit cell of  $\text{K}_2\text{S}_3\text{O}_6$  contains 4 mols. and has the dimensions  $a = 9.77 \pm 0.04$  A.,  $b = 13.63 \pm 0.04$  A.,  $c = 5.76 \pm 0.02$  A. The space group is  $Pnam$  ( $V_h^{12}$ ). In  $(\text{S}_3\text{O}_6)^{2-}$  2 of the S atoms form 4 bonds with 3 O and 1 S directed tetrahedrally; the third S forms only 2 bonds, both with S atoms at an angle of 103°. The deviation from 90° is attributed to repulsion between the S atoms. The S-O distance is 1.50 A., and S-S 2.15 A. P. S. Roller

The  $\text{Si}_2\text{O}_7$  chains in space groups  $V_h^{12}$  and  $C_{2h}^{12}$ . Tetsuichi Ito. *Proc. Imp. Acad.* (Tokyo) 9, 526-30(1933), cf. C. A. 27, 3651.—The compd.  $\text{HNaBeSi}_2\text{O}_7$  exists as epididymite in rhombic form, and as eudidymite in monoclinic form. Chains are built up of linked tetrahedra of Si and O atoms of compn.  $\text{Si}_2\text{O}_7$ . The chains are joined into a sheet by a sharing of half the no. of O atoms on the fringe by adjoining chains, by placing centers of symmetry on those points lying midway between every 2 atoms on one of the O layers of the chain. Blocks joined at the edges might represent a sheet. In 3 dimensions, there should be one above the other, but in 2 forms: (1) the successive sheets are parallel to each other; (2) the successive sheets are in the mirror-image relation. If 1.3 A. is assumed as the O-ionic radius with close packing, 2 arrangements contg. 24 Si and 56 O atoms are obtained; arrangement (1) corresponds to  $C_{2h}^{12}$  (monoclinic), (2) to  $V_h^{12}$  (rhombic). Epididymite corresponds to (2).

L. Waldbauer

The crystal structure of  $\text{BPO}_4$  and  $\text{BaSO}_4$ . Gustav E. R. Schulze. *Z. physik. Chem.* B24, 215 40(1934), cf. C. A. 27, 5605.  $\text{BPO}_4$  and  $\text{BaSO}_4$  have the same crystal structure with the space group  $S_6^2 - I^4$ . Consts. for the crystals are:  $a = 4.332 \pm 0.006$ ;  $4.458 \pm 0.006$  A.,  $c = 6.640 \pm 0.008$ ;  $6.796 \pm 0.008$  A.;  $d = 2.802$ ;  $3.660$ ,  $R = 12.87$ ;  $15.54$  for  $\text{BPO}_4$  and  $\text{BaSO}_4$ , resp., in which  $R$  = mol. refraction and  $a$  and  $c$  are the crystal lattice consts. G. M. Murphy

Thermodynamic diagrams of liquid helium. W. H. Keesom and A. P. Keesom. *Physica* 1, 128-33(1933), (Suppl. Leiden, 76b).—A d. table for liquid He ( $T = 1.25^\circ$  to  $4.20^\circ$  abs.,  $p = 1$  to 35 atm.) and a set of isobars and isopycnals as well as curves for their 3 differential coeffs. are given for He. The discontinuities at the passing of the  $\lambda$  curve (transition point) are evident.

B. J. C. van der Horven

Remarkable optical properties of the alkali metals. R. de L. Kronig. *Nature* 133, 211-12(1934); cf. C. A. 28, 946<sup>1</sup>.—A modification of Zener's interpretation (C. A. 28, 1275<sup>1</sup>) of the optical behavior of the alkali metals observed by Wood (C. A. 27, 5240). Gerald M. Petty

The supposed allotropy of liquid nitrobenzene. Ernst Cohen and L. C. J. te Boekhorst. *Z. physik. Chem.* B24, 241-58(1934); cf. C. A. 27, 642.—Pure  $\text{PhNO}_2$  was prepd. by 2 different methods and had a m. p. in a dry H atm. of  $5.76 \pm 0.01^\circ$ . Measurements of  $d$  and viscosity were made between  $3^\circ$  and  $20^\circ$  and the results were fitted to a quadratic equation. The sp. vol.,  $v_s = 0.81769 + 6.634 \times 10^{-4} t + 4.8 \times 10^{-7} t^2$  and the fluidity,  $f_s = 31.98 + 0.80348 t + 0.002742 t^2$ . Samples of  $\text{PhNO}_2$  contg. enough  $\text{H}_2\text{O}$  to lower the m. p. to  $5.58^\circ$  and  $5.57^\circ$  were used to measure  $d$  and viscosity, resp., and the results obtained fell upon a curve that was parallel to the curve obtained with the dry compd. No sign of a discontinuity were noticed in any case, which contradicts the results of Wolfke and Masur (C. A. 26, 2355<sup>1</sup>). Since the latter

claim similar results with  $\text{Et}_2\text{O}$  and  $\text{CS}_2$ , their expts. should also be repeated with very pure samples of these compounds.

G. M. Murphy

The dependence of volume and solidification point of carbon tetrachloride upon thermal pretreatment. Wilhelm Brill and E. Nümann. *Z. Elektrochem.* 40, 8 10 (1934).—Results previously reported (cf. *C. A.* 26, 5240) are in error. The vol. change was due to retention of air by the  $\text{CCl}_4$  and the variation of f. p. to hysteresis of the Beckmann thermometer.

F. R. Schier

Adsorption and capillary condensation. A. A. Sluichkovitzkil. *Kolloid-Z.* 66, 139-47 (1934). If the adsorption potential,  $A$ , is considered as the sum of 2 potentials,  $I$ , caused by the adsorbent, and  $\pi$ , caused by the meniscus of the adsorbate, vapor adsorption isotherms may be divided into 4 classes: (1)  $F > A$ , corresponding to a very thin film of adsorbate; (2)  $F = A$ , to which Polanyi's theory applies, and the forces between adsorbent and adsorbate are greater than the intermolecular adsorbate forces; (3)  $F < A$ , the transition field, in which present methods of isotherm prediction fail; and (4)  $A = \pi$ , and  $F$  very small compared to  $\pi$ , to which the theory of capillary condensation applies. For cases 2, 3 and 4, an expression is derived for evaluating the equation,  $Q_1 = \ln(P_0/P_1)/\ln(P_0/P_2)$  (cf. Lindau, *C. A.* 26, 5810), in which  $P_0$  and  $P$  are the satd. and partial vapor pressures of liquids 1 and 2, resp. It satisfactorily expresses the data of the literature, especially in the intermediate field 3, as shown by the constancy of  $Q_0$ . Statistical vol. characteristics calculated by the capillary condensation theory (cf. Kubelka, *C. A.* 26, 355) are not real.

Arthur Fleischer

The relation between activated and van der Waals adsorption. John Howard. *Trans. Faraday Soc.* 30, 278-57 (1934), cf. *C. A.* 26, 949. It was found experimentally that gas adsorbed on the surface of  $\text{Cr}_2\text{O}_3$  in an activated form markedly decreases the van der Waals adsorption that can occur at a given temp. Activated adsorption is a true surface phenomenon, and cannot be attributed to impurities on the surface or to diffusion and soln. in the interior. Exptl. results indicate that the *para*  $\text{H}_2$  conversion occurs, at low temps. among mols. adsorbed on the surface of a catalyst by van der Waals forces, and at high temps. by activated adsorption.

R. R.

The sorption of hydrogen by reduced nickel I. Quantities of hydrogen adsorbed by, and diffused in, pure and contaminated reduced nickel, isothermal adsorption lines, and heat of adsorption. Shun-ichiro Iijima. *Sci. Papers, Inst. Phys. Chem. Research (Tokyo)* 22, 285-300 (1933).—The adsorption of  $\text{H}_2$  by reduced Ni is due to both adsorption and diffusion. Quant. distinction is drawn between the amt. of  $\text{H}$  adsorbed and the amt. diffused. Isotherms showing the quantities of  $\text{H}$  adsorbed under low pressures agree with the Freundlich equation. Heats of adsorption are calcd. by means of the Clapeyron equation, and an av. of 16,850 cal./per mole is obtained. Reduced Ni that was brought into contact with air before the adsorption studies showed lower adsorptive capacity for  $\text{H}$ . The heat of adsorption in one such case was 6479 cal./per mole.

II. Adsorption of hydrogen by reduced nickel at low temperatures. *Ibid.* 23, 34-43.—Adsorption of  $\text{H}$  under low pressures by reduced Ni was measured at 100°, 19°, 0°, -45.2°, -78.5°, -112° and -183.5°. The results of Nikitin (cf. *C. A.* 20, 3255) at 19° were not confirmed. Ni and  $\text{H}_2$  did not form a compd. at 19°. Isobars all showed maxima between 0° and 20°, and minima were found between -80° and -180°. The lower the equil. adsorption pressure the lower the temp. of the min. Irregularities in the isothermal at -183° are accounted for on the basis of local heating of the adsorbent due to adsorption of large quantities of  $\text{H}$ . The isothermal is smooth when  $\text{H}_2$  is admitted slowly. III. Heat treatment of reduced nickel and its relation to the sorption velocity and to the quantity of hydrogen sorbed. *Ibid.* 164 72.—Reduced Ni was successfully heat-treated in  $\text{H}_2$  for 1 hr. at temps. ranging from 300° to 500°. Between each heat treatment the adsorptive capacity for  $\text{H}$  at 0° and 20.8 cm. pressure was measured. Increasing temps. of heat treatment shortened the time necessary for ad-

sorption to reach equil. and diminished the quantity of  $\text{H}$  adsorbed. The velocity with which  $\text{H}$  diffused into reduced Ni was unaffected by heat treatment up to 500°.

L. H. Reyerson

Vapor retentivity of active charcoal. I. Dependence of retentivity on the magnitude of vapor content of the charcoal. Franz Krczil and Herbert Wejroch. *Kolloid-Z.* 66, 155-63 (1934).—Retentivity was detd. by a dynamic method at 20° by passing dry air at the rate of 500 cc./sq. cm./min. through a charcoal satd. with  $\text{C}_2\text{H}_6$  and noting the rate of loss with time. The charcoals used were Acticarbene Ordinaire, Acticarbene NC 35, Acticarbene Supérieur and Auerkohle, dried at 120°. During the initial loss, the rate curve was steeper the higher the original adsorption. There was no relation between the losses at 500 and 900 l. of air and order of satn. capacities.

Arthur Fleischer

Adsorption and adsorbent quantity. II. Adsorption of dyes by hydrophilic adsorbents. T. P. Pankova-Kwizel. *Kolloid-Z.* 66, 148-55 (1934); cf. Rabenstein, *C. A.* 27, 2079.—Adsorption anomalies were noted in the isotherms of methyl violet and acid violet B on neg. and pos.  $\text{Al}(\text{OH})_3$  and on  $\text{SiO}_2$  gel. In the acid violet-neg. adsorbent system, the anomalies are due to an apparent adsorption due to decreased surface hydration, along with dispersity changes in opposite directions produced by increase in charge and dehydration. In the methyl violet- $\text{SiO}_2$  system, the anomalous max. is due to the charge decrease, causing coagulation and dehydration.

A. F.

Adsorption of electrolytes on crystalline surfaces. Effect of sign of charge on adsorbent. L. de Brouckère. *Compt. rend.* 198, 822-4 (1934); cf. *C. A.* 27, 4981.—Pptd.  $\text{BaSO}_4$  is pos. when aq.  $\text{H}_2\text{SO}_4$  is poured rapidly into aq.  $\text{BaCl}_2$ , neg. when aq.  $\text{BaCl}_2$  is added slowly to aq.  $\text{K}_2\text{SO}_4$ . The log  $\pi/\log C$  ( $\pi$  being the amt. of electrolyte adsorbed,  $C$  concn. of soln. thereof at equil.) curves for  $\text{KCl}$ ,  $\text{KI}$  and  $\text{NaCl}$  with neg.  $\text{BaSO}_4$  are similar to those previously obtained with pos.  $\text{BaSO}_4$ , and agree with the hypothesis of a unimol. layer. The differences for low concn. indicate that the cations are now in contact with the (neg.)  $\text{BaSO}_4$ . In both cases the phenomenon is consistent with the adsorption, being wholly or partly due to electrostatic action.

C. A. Silberrad

The effect of salts on the adsorption of cupric ions by ferric hydroxide. J. Hubert Hamence. *Trans. Faraday Soc.* 30, 299-303 (1934); cf. Toporescu, *C. A.* 14, 3030.—The adsorption of small quantities of  $\text{Cu}$  by  $\text{Fe}(\text{OH})_3$ , and the effect of salts upon the adsorption were studied in some detail. The av. value for  $\pi$  in the adsorption equation,  $a = k\pi^{1/n}$ , was 1.7, in agreement with Toporescu's results. Equil. is established immediately after the coagulation of the  $\text{Fe}(\text{OH})_3$ . The greater the concn. of  $\text{NH}_4^+$  (1) the less the adsorption of the  $\text{Cu}$  ions and (2) the lower the rate of coagulation. Salts of Na and K exert very little effect on the adsorption.  $\text{NH}_4^+$  salts have a considerable effect; with sufficient  $(\text{NH}_4)_2\text{SO}_4$  the adsorption is reduced to 0. Colloidal  $\text{Pb}(\text{OH})_2$  is readily adsorbed by  $\text{Fe}(\text{OH})_3$ , and if sufficient  $\text{Pb}$  salt is present no adsorption of the  $\text{Cu}$  results.

Reuben Roseman

Rate of heating of wires by surface combustion. W. Davies. *Phil. Mag.* 17, 233-51 (1934).—The rate of heating of Pt, Pd, Au and Ag wires in mixts. of  $\text{H}_2$ ,  $\text{CO}$  and air was studied by using the elec. resistance of the wires as a measure of their temp. For Au and Ag wires, no heating due to surface combustion was found in any mixt. of  $\text{H}_2$  or  $\text{CO}$  with air. Surface combustion begins with Pt and  $\text{H}_2$  at 200°, Pd and  $\text{H}_2$  at 120°, Pt or Pd and  $\text{CO}$  at 400°. When mixts. of  $\text{H}_2$  and  $\text{CO}$  are used, the  $\text{CO}$  suppresses the low-temp. reaction of  $\text{H}_2$ . The data are explained in terms of the Langmuir adsorption activation theory. The rate at which the combustion reactions occur is limited by diffusion. Since the concn. of combustible gas is greatly reduced near the heated wire an explosion can occur only when the temp. of a layer of gas rich enough to be inflamed is raised to the ignition point.

E. J. R.

The burning of graphite on osram filaments in a current of gas. V. Silvonen. *Ann. Acad. Sci. Fennicae A38*, No. 2, 34 pp. (1933) (in German).—An at.-O adsorbent is

formed when a current of  $H_2O$  vapor acts upon C at low glowing temps. It vaporizes immediately as CO or is oxidized to  $CO_2$  by  $H_2O$  vapor.  $CO_2$  can slowly oxidize the graphite under glowing conditions to CO; the CO, formed primarily from O, can be oxidized at high temps. by  $H_2O$  vapor when adsorbed on a finely porous C surface. When  $H_2O$  vapor at room temp. acts upon a brightly glowing graphite filament, the formation of CO decreases with increasing temp.  $CO_2$  under the same conditions causes a vaporization of CO above  $1400^\circ$ . The mol. heat of vaporization of the loose CO groups is 17 kg.-cal. Oxidizing a filament, which has been poisoned by CO, with O under similar conditions yields CO exclusively above  $900^\circ$ . The mol. heat of vaporization of CO is 24.5 kg.-cal. If the filament is not poisoned,  $CO_2$  and 2CO are formed between  $800^\circ$  and  $1400^\circ$ . The same products of reaction appear above  $1500^\circ$  in a current of O as primary vaporization of CO. At lower temps.  $CO_2$  and CO are formed.

A. E. Beitlich

Extension of the duration period of  $\beta$ -phenyl- $\beta$ -chloroethylamine on charcoal. H. Freundlich and G. Salomon. *Helv. Chim. Acta* 17, 88-98(1934); cf. C. A. 28, 399<sup>3</sup>.—The rearrangement of  $PhCHClCH_2NH_2$  (I) to styrenimine-HCl (II) in alk. soln. is highly restricted at a charcoal-water interface, the inhibition increasing with diminishing surface concn. A similar heterogeneous reaction on blood charcoal takes place in the rearrangement of  $BrCH_2CH_2NH_2$  (III) to ethylenimine-HBr (IV) (C. A. 24, 3487). Since the heterogeneous reaction of I shows, within a definite temp. range, a greater dependence on the temp. than in the homogeneous system, it is conceivable that only those mols. of I suffer rearrangement that are driven from the boundary surface by thermal pressure. The velocity of the rearrangement from I to II was measured for limited surface concns. between  $0^\circ$  and  $37^\circ$  on charcoal and on carboraffin. Comparison of the dependence of temp. of the heterogeneous reaction with the temp. coeff. of the homogeneous reaction showed that there is heterogeneous reaction at the blood charcoal- $H_2O$  boundary surface and that the temp. coeff. of the heterogeneous reaction is at least as great as the coeff. of the homogeneous reaction. The temp. coeff. of the reaction on carboraffin is, however, smaller than that of the homogeneous reaction and thus the reaction actually takes place at the boundary surface. This smaller temp. coeff. of the heterogeneous reaction corresponds to a smaller heat of activation, which has been previously observed in the rearrangement of III to IV on blood charcoal and in similar ring closures in org. solvents. Possible explanations of these phenomena on the grounds of restricted motion in the adsorbed layer and catalytic effects are discussed. C. R. Addinall

The adsorption of copper sulfate by sphalerite and its relation to flotation. S. Frederick Ravitz and W. A. Wall. *J. Phys. Chem.* 38, 13-18(1934).—The quantities of Cu adsorbed by sphalerite of various particle sizes from a 0.02 M  $CuSO_4$  soln. are equiv. to surface films of CuS many mols. thick. If  $T$  is the apparent "thickness" (i. e., no. of monomol. layers) of the surface film and  $d$  the av. particle size in microns, the "thickness" of the surface film decreases with decreasing particle size in accordance with the equation  $T = (d/0.37)^{0.608}$ . The results are explained satisfactorily by the theory of the mosaic structure of crystals. The Cu ions are assumed to penetrate between the elementary blocks of sphalerite crystals and to form a unimol. layer of CuS on the external surface. If the individual blocks were liberated, only the amt. of Cu required to form a unimol. film is adsorbed. Extrapolation of the above equation to  $T = 1$  indicates that the size of these blocks is 0.37 micron. The larger the particles, the more crevasses between the blocks there are for Cu ions to diffuse into and hence the greater the apparent film thickness. Oscar T. Quimby

The electrokinetic (zeta) potential of thin metal films. Grant W. Smith and L. H. Ryerson. *J. Phys. Chem.* 38, 133-51(1934).—The streaming-potential method was employed for detg. the  $\zeta$  potentials of the systems  $Ag-Ag^+$  and  $Ni-Ni^{++}$ , with metallized  $SiO_2$  gels prep. by adsorption of complex ions of  $NH_4$  on the gel and reduction

to the metallic state. Fundamental differences were found between the  $\zeta$  and Nernst potentials for these systems. J. H. Moore

Phase-boundary potentials of monolayers of long-chain fatty acids. N. W. H. Addink and Eric K. Rideal. *J. Chem. Physics* 2, 144(1934).—On compressing a liquid expanded film of myristic acid to areas between  $40A^2$  and  $20A^2$  a high phase-boundary potential is observed which decreases with time. During this decrease the film is heterogeneous. After 4-5 hrs., when the area is  $25A^2$ , the film becomes homogeneous. The time is diminished to  $1\frac{1}{2}$  to 2 hrs. on adding tannic acid to the soln. P. S. Roller

Phase-boundary potentials of monolayers of fatty acids on metals. L. Jacobs. *Trans. Faraday Soc.* 30, 303-10(1934); cf. C. A. 27, 4461.—The adsorption of fatty acids by metal surfaces can be followed by measurement of the phase-boundary potential. Uniform spreading from a solvent can be obtained on a dry metallic surface. The *sp. surfaces of sheet Au, Ag and Pt* were evaluated. With myristic acid evidence of different 2-dimensional phases, as the surface concn. is increased is presented; the limits of existence of the phases were verified by an optical method. Reuben Roseman

The capillary depression of mercury in wide tubes. A. Klemenc and O. Bankowski. *Naturwissenschaften* 22, 10-11(1934).—The capillary depression of Hg was measured by light interference (Michelson interferometer) in wide tubes. For a tube width of 30 mm. (Jena app. glass no. 2) the depression was 0.002 mm.; for 40 mm. width it was less than 0.0002 mm. B. J. C. van der Hoeven

Capillary activity and association of aqueous solutions. H. Cassel. *Naturwissenschaften* 22, 60(1934).—Direct measurement of the adsorption of sol. substances on the water-air interface by the bubble method (cf. Gans, C. A. 25, 2345) gave results for *p*-toluidine and iso-AmOH solns. twice those expected from capillary curves by the Gibbs equation. C. attributes this to double mols. B. J. C. van der Hoeven

Physical chemistry of wetting and flotation processes XI. Wetting ability of aqueous solutions of surface-active substances on paraffin. P. Rebinder, Marie Lipetz and Marie Rimskaia. *Kolloid-Z.* 66, 212-19(1934); cf. C. A. 28, 1906<sup>9</sup>.— $B_{11}$  and  $B_{21}$ , in which  $B = \cos \theta$ , the contact angle, were measured at the interface paraffin-aq. soln. for various solutes including fatty acids, alcs., phenols, amines, xanthates and soaps. On a paraffin surface, change to a hydrophilic condition occurs because of a "reversed" orientation of the adsorption film, i. e., the polar groups are oriented away from the surface. The inversion concns., at which  $B = 0$ , correspond very nearly to equal surface energy decreases for reagents of a homologous series and show a close relation between wetting activity and surface activity. Traube's rule is obeyed.  $B_{11}$ -concn. curves show a greater wetting than  $B_{21}$ -concn. curves, which is readily explained by orientation of films. In the  $B_{11}$  case, the drop of water is coated with an adsorption film with hydrocarbon groups outward and these wet the paraffin easily. In the  $B_{21}$  case where an air bubble is brought to a paraffin surface immersed in aq. soln., the paraffin and air interfaces meet with polar groups oriented toward each other, requiring a rearrangement of orientation. The theoretical wetting curve was calcd. from surface-tension measurements in the system air-molten paraffin-heptylic acid soln. The shape of this equil. curve agreed with the exptl. curves. Arthur Fleischer

Colloid correlation principle. S. C. Blacktin. *Chemistry & Industry* 1933, 544-5.—The mode of growth of colloidal aggregates in smokes and of the degradation of dust particles is related to their gravitational distribution in the atm. B. C. A.

Sedimentation of molecules in centrifugal fields. The Svedberg. *Chem. Rev.* 14, 1-15(1934).—A description of S.'s method for detg. mol. wts. of proteins. References. Louise Kelley

Validity of the Clausius-Mosotti law in emulsions. W. S. Urbanski. *Acta Phys. Polonica* 1, 411-12(1932)

(in German).—Polemical with Piekara (*C. A.* 27, 3658).

**The aggregation of colloidal electrolytes from transport number and conductivity measurements:** Some benzidine dyes. Conmar Robinson and John L. Moilliet. *Proc. Roy. Soc. (London)* A143, 630-63(1934).—Transport nos. and conductivities of benzopurpurine 4B, its isomer prep'd. from *m*-tolidine, and Bordeaux Extra were measured over a range of concns. Conclusions: The 3 dye soles. contain neg. micelles, more mobile than the simple anions. Appreciable amts. of bound Na are included in the micelles of benzopurpurine 4B and its isomer but not in those of Bordeaux Extra. The micelles of the 4B dye are more stable than those of the other 2 and do not break down on diln., as do those of the others, into simple ions. The no. of simple R radicals included in the mean effective micelle of each dye is in the order 4B > meta > Bordeaux Extra.

**Dielectric constants of colloidal systems.** Erich Heymann. *Kolloid-Z.* 66, 229-35(1934).—Review. A. F.

**Effects of silicic acid sol on the solubility of phosphate.** Shigeru Osugi and Komao Saegi. *J. Agr. Chem. Soc. Japan* 9, 810-30(1933).—SiO<sub>2</sub> sol was prep'd. by pouring water glass into HCl. The addn. of SiO<sub>2</sub> sol increased the solubilities of Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, AlPO<sub>4</sub>, and FePO<sub>4</sub> in H<sub>2</sub>O. The concn. of SiO<sub>2</sub> sol was parallel to the increase of the soly. When SiO<sub>2</sub> sol was added to sand or to soil similar effects were observed.

**Production of "colloidal single crystals."** Alexander Goetz. *Phys. Rev.* 45, 282-3(1934).—Small particles that have more than one axis of max. paramagnetism, such as graphite may be oriented by rotating the container of the suspension within the magnetic field about an axis parallel to the direction of the [0001] axis which one wishes to obtain for the suspension (see *C. A.* 26, 1843; 27, 4998).

**New data on the effect of traces of sodium sulfide in the preparation of colloidal gold by the formalin method (the Au<sub>2</sub> of Zeigmondy).** Preparation at room temperature. Raúl Wernicke and Raúl Birabén Losson. *Anales asoc. quim. Argentina* 21, 149-55(1933); cf. *C. A.* 25, 859, 27, 1561.—In prepg. Au<sub>2</sub> at boiling temp. it is difficult to obtain uniform results. At room temp., in the presence of Na<sub>2</sub>S in quantities as low as 10<sup>-10</sup> molar, concordant results are obtained.

**A new theory of ferric oxide hydrosols.** W. F. Fair, Jr. *J. Phys. Chem.* 38, 19-34(1934).—Fe hydrosols are thought to be formed by progressive hydrolysis of Fe salts and the law of mass action is applied to such equilibria. Flocculation is interpreted in the light of chem. reactions governed by soly.-product relationships. In peptization expts. on Fe<sub>2</sub>O<sub>3</sub>, it is shown that weak acids, as HOAc, propionic and butyric, peptize little more than equiv. amts. of Fe but an all amts. of chloride greatly increase the amt. peptized.

**A method of preparing colloid-soluble iron oxide and the properties of its hydrosol.** A. v. Buzágh. *Kolloid-Z.* 66, 129-37(1934).—Fe<sub>2</sub>O<sub>3</sub> is pptd. from boiling 5% FeCl<sub>3</sub> soln with slight excess of NH<sub>3</sub>, heated with H<sub>2</sub>O at 150-60° for 4 hrs., yielding a brick-red granular ppt. I. Washing I by decantation forms a stable sol but it can be washed free from electrolyte on a suction filter without peptization. On dialysis the sol flocculates when electrolyte-free. I can be dried without loss of peptizability. The electrolyte-free ppt. is peptized by dil. FeCl<sub>3</sub> or HCl. The washed, dried ppt. consists of pure Fe<sub>2</sub>O<sub>3</sub> with less than 0.01% Cl. Peptization by alkali hydroxide gives sols with neg. particles. The ppt. rule applies, and the sol with highest concn., 2.8% Fe<sub>2</sub>O<sub>3</sub>, results when 4 g. of ppt. is treated with 100 cc. of H<sub>2</sub>O contg. 0.06% Cl. Fe<sub>2</sub>O<sub>3</sub> pptd. hot and autoclaved is more highly dispersed and easily peptized than cold-pptd. Fe<sub>2</sub>O<sub>3</sub>. Autoclaving with mother liquor makes a product difficult to free from Cl. FeCl<sub>3</sub> peptizes by adsorption, shows an optimum concn. and closely parallels the  $\zeta$ -potential curve. The sol is highly electro-sensitive. Examin. in the ultramicroscope shows decidedly lyophobic particles, with lively Brownian movement, and particle sizes from 20 to 70  $\mu$ .

**The behavior of the sols with electrolytes is consistent with the hydrophobic properties.** The sols show no thixotropy. Coagulation values with NaNO<sub>3</sub> and NaCl increase rapidly with concn. to a const. max. value, indicating a change in the elec. properties of the elec. double layer. With Na salts of SO<sub>4</sub>, IO<sub>3</sub>, and PO<sub>4</sub>, the relation is linear. Quant. expts. show a replacement of Cl by the multivalent anion, the amt. depending on sol and anion concns. With excess of flocculating reagent all of the Cl was replaced.

**Rhythmic precipitation with organic precipitants.** J. E. Heck and M. G. Mellon. *J. Phys. Chem.* 38, 85-93 (1934).—Agar gels and acid, basic and neutral silicic acid gels were prep'd. contg. various org. precipitants used in analytical chemistry. To the set gels N or satd. solns. of different salts were added. In most cases ppts. were obtained with different types of structure upon which light had little or no effect.

**A new regularity of periodic reactions in gels.** P. F. Mikhalev, V. Nikiforov and F. M. Shemyakin. *Kolloid-Z.* 66, 197-200(1934).—The equation,  $\lambda v = \text{const.}$ , in which  $\lambda$  is the distance between rings and  $v$  is the actual spreading velocity of the diffusion field, has a formal analogy to de Broglie's wave equation. The equation represents the data for the diffusion of AgNO<sub>3</sub> into dichromate in gelatin, Pb(NO<sub>3</sub>)<sub>2</sub> into KI in agar, Na<sub>2</sub>HPO<sub>4</sub> into CaCl<sub>2</sub> in gelatin, and AgNO<sub>3</sub> into Na<sub>2</sub>HAsO<sub>4</sub> in agar or gelatin. The const. varies from 2.10 to 2.51  $\times 10^{-8}$  sq. cm./sec. for the above systems.

**Formation of Liesegang rings by electrolysis.** E. Banderet. *Compt. rend.* 198, 821-2(1934); cf. *C. A.* 27, 4152.—The rings obtained by B.'s electrolytic method obey Veil's law, i. e.  $\sqrt{\delta} = an + b$ , in which  $\delta$  is the distance between the *n*th and (*n* + 1)th rings and *a* and *b* are consts. The effect of continued application of the e. m. f. is shown.

**The orientation of the micelle in unstretched agar films (preliminary report).** Ichiro Sakurada and Keiroku Futuno. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 162-3(1934); cf. Sakurada and Futuno, *C. A.* 27, 3373; 28, 947.—Röntgen photographs of specially prep'd. films of com. agar show that the micelle is either rod-like or leaf-like. Reducing the water content to 20% by freezing gave a Röntgen spectrum showing 7 interference lines. Powd. agar gave a picture somewhat similar to those obtained by Katz and Derksen (*C. A.* 26, 4227) with an agar gel of 9% water content.

**Some experiments with ordinary gelatin in contact with solutions of potassium dichromate and chromic acid.** M. Chanoz and P. Ponthus. *Compt. rend. soc. biol.* 115, 522-6(1934).—Gelatin was placed in solns. of K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> contg. various proportions of CrO<sub>3</sub>, and the effects on swelling, cond., polarization, electroosmosis and salt concn. were observed.

**Dielectric constant and conductivity of aqueous solutions of gelatin.** A. Piekara and B. Piekara. *Compt. rend.* 198, 803-5(1934).—With a gelatin "for emulsions" electro-dialyzed for 2-3 days at 0°, the dielec. const.,  $\epsilon$ , and cond.,  $\kappa$ , were det'd. for concns. 0.51-1.2%.  $\epsilon$  for a soln. of gelatin exceeds that of H<sub>2</sub>O, and increases with increased concn., the excess over that of H<sub>2</sub>O increasing with temp. Both  $\epsilon$  and  $\kappa$  of the sol exceed those of the gel under the same conditions. Both show thermal hysteresis (cf. *C. A.* 23, 4393; 25, 2345).

**Measurement of the arc temperature from C<sub>2</sub> bands. The transition probability of vibrational transitions.** D. Th. J. ter Horst and G. Krijgsman. *Physica* 1, 114-18(1933).—The temp. measurement of the C arc in air of Ornstein et al. (*C. A.* 24, 2671; 25, 5842) from CN bands (6500° abs.) was checked from the C<sub>2</sub> spectrum. From the intensity curve a corrected (for plate sensitivity at 5165 Å.) temp. of 6000° abs. was found. If this same temp. is assumed for the distribution of the vibrational states the ratio of the vibrational transition probabilities is  $A_{00}:A_{11} = 100:50$  from an intensity ratio of the 2 band heads:  $I_{00}:I_{11} = 3.00$ . This result is in good agreement with quantum mech. calcns. of Wurm (*C. A.* 27, 24) and



leads to a variation of the nuclear distance  $\Delta r = 0.044 \text{ \AA}$ .

B. J. C. van der Hoeven

Adsorption and swelling of cellulose in electrolyte solutions of varying concentrations. Kiso Kanamaru. *Kolloid-Z.* 66, 163-75 (1934); cf. *C. A.* 25, 3805, 4700.—Cellophane was washed in boiling distd. water until the  $p_H$  was const. (prepn. I). Two samples were subjected to a pretreatment with 1% NaOH or 1% HCl (prepn. II and III, resp.). The  $p_H$  after adsorption by washed I in HCl,  $H_2SO_4$ , and NaOH solns. was detd. with a H electrode. Plotting H and OH ions adsorbed against the  $p_H$  yielded two curves tending to become asymptotic at  $p_H$  7.4, which is an apparent isoelec. point. At this point the swelling is 63% and hence the point is not a true isoelec. point but one at which hylotropic adsorption occurs. For samples II and III this point lies at  $p_H$  8.15 and 5.20, resp. The swelling- $p_H$  curves show maxima and minima in acid and alk. solns.; swelling is less in  $H_2SO_4$  than in HCl solns. Swelling and  $\zeta$ -potential curves are parallel in KCl solns.  $AlCl_3$  solns. reverse the charge of the cellulose with a true isoelec. point at  $p_H$  4.65. A. F.

Paradoxical salt polarity in the presence of colloids. Rudolf Keller. *Kolloid-Z.* 66, 205-11 (1934).—A classification of neutral salts into two groups with respect to their relations in the presence of biocolloids is based on anodic or cathodic migration in the Furth app. under high voltage, Hofmeister ion series, Loeb ion antagonism, Wicowski's tissue and fluid salts, and capillary analysis. The cathode migration group includes Li, Na, Ca (under some conditions),  $SO_4$ , and  $PO_4$ . The anode migration group includes Rb, Cs,  $NH_4$ , Mg; unionized Ca, Cl, Br and  $H_2O$  are often pos. Arthur Fleischer

The solubility of iodine in vapors of its solvents. Wilhelm Brüll and W. Ellerbrock. *Z. anorg. allgem. Chem.* 216, 353-66 (1934).—At satn. the concn. of I was detd. in air, N, O,  $CH_4$ , and  $CO_2$ . Similar measurements were made in the vapors of  $CS_2$ ,  $CHCl_3$ ,  $CCl_4$ , and  $C_6H_6$ . In all cases the concn. at satn. was the same at the same temp. and agreed with literature data. In  $Et_2O$  vapor I dissolved slowly to form  $Et_2O \cdot I_2$ . At high ether concns. a brown product sepd. from the vapor satd. with I. Similar results were obtained with vapors of other solvents such as  $Me_2CO$ , MeOH and EtOH which dissolve I to give a brown soln., rather than the violet of true soln.

Foster Dee Snell

Solution freezing as a method investigating some problems of pure chemistry. X. Mixtures containing active alkylsuccinic and  $\alpha$ -chlorobutyric acids. Jean Timmermans and J. van der Haegen. *Bull. soc. chim. Belg.* 42, 448-60 (1933); cf. *C. A.* 27, 652.—dl-Hexylsuccinic acid, m.  $87.3^\circ$ , was resolved with brucine into the d-acid, m.  $83.2^\circ$ ,  $[\alpha]_D$   $14.3^\circ$ , but not the l-acid. dl-Propylsuccinic acid, m.  $100.5^\circ$ , treated with strychnine gave the d-acid, m.  $93.9^\circ$ ,  $[\alpha]_D$   $9.6^\circ$ , only. M.-p. curves indicate that mixts. of d-hexylsuccinic and d-propylsuccinic acids form a continuous series of mixed crystals with a min., while mixts. of l-hexylsuccinic and d-propylsuccinic acids form an equimol. addn. combination. Treating l-hydroxybutyric acid (K salt  $[\alpha]_D$   $-3.9^\circ$ ; iso-Bu ester,  $-7.7^\circ$ ) with  $PCl_5$  gives l-chlorobutyric acid,  $[\alpha]_D$   $-8.6^\circ$  (K salt  $[\alpha]_D$   $-6.7^\circ$ , iso-Bu ester,  $-10.5^\circ$ ), while  $PCl_5$  gives d-bromobutyric acid,  $[\alpha]_D$   $3.8^\circ$  (K salt,  $[\alpha]_D$   $2.9^\circ$ , iso-Bu ester,  $6.7^\circ$ ). F.-p. curves of various binary mixts. are appended and interpreted. A. L. Henne

Determination of densities and refractive indexes of solutions at higher temperatures. G. Pesce and P. Hölemann. *Z. Elektrochem.* 40, 1-5 (1934).—By use of specially designed pycnometers (25 cc.) (one of "supremax" glass, one of quartz) built on the principle of a dilatometer with Hg as the retaining liquid, a method of detg. d. of solns. with an accuracy of  $\pm 0.00002$  at temp. to  $85.0^\circ$  was developed. At  $24.92^\circ$ ,  $44.86^\circ$ ,  $64.88^\circ$  the ds. of  $CCl_4$  are, resp., 1.58461, 1.54566, 1.50562 and those of AcOH 1.04384, 1.02136, 0.99857;  $d_{40} = 0.97550$ . The app. for detg.  $n$  with a Pulfrich refractometer previously reported (cf. *C. A.* 25, 5334) was improved to yield an accuracy  $\pm 0.000014$  up to  $85^\circ$ . E. R. Schierz

The compressibility of aqueous solutions. Edith H.

1 Lanman and Beveridge J. Mair. *J. Am. Chem. Soc.* 56, 390-8 (1934).—With the Harvard technic the compressibility coeffs. of LiCl, NaCl, KCl, HCl, NaOH, KOH, AcOK and AcOH were detd. at  $25^\circ$ , between 100 and 300 megabars. B. A. Soule

The apparent molar volume of dissolved electrolytes. II. The pressure coefficient of apparent molar volumes. W. Geffcken. *Z. physik. Chem.* A167, 240-4 (1933); cf. *C. A.* 25, 4765.—At a sufficient diln. the apparent compressibility of a salt in soln. depends on the apparent molar vol. Roy H. Baechler

Polarizability and molar refraction of the alkali ions. R. Schoppe. *Z. physik. Chem.* B24, 259-62 (1934).—Mol. refraction and polarizability were calcd. by the method of Wolf and Herzfeld (*C. A.* 21, 532). The results are compared with those obtained by Fajans and Joos and Mayer. For the mol. refraction and polarizability the results are: 0.0610, 0.0243; 0.38, 0.152 1.8, 0.74; 3.43, 1.38; 6.25, 2.38 for Li, Na, K, Rb, Cs ions, resp. The mol. refraction for the alkali halides was also recalcd. and is compared with expt. G. M. M

The formation and properties of precipitates. Theory of coprecipitation. I. M. Kolthoff. *Chem. Weekblad* 31, 102-3 (1934); cf. *C. A.* 26, 5798.—The classification of occurrences in connection with copptn. is given in more detail. HgS has a strong catalytic effect on the pptn. of ZnS from supersatd. solns. E. Schotte

The partial pressures of formic and acetic acids above some aqueous solutions, and their partial molar free energies at 1.0 molal concentration. Wm. A. Kaye and George S. Parks. *J. Chem. Physics* 2, 141-2 (1934).—The partial pressures at  $25^\circ$  over 5 solns. between 0.5 M and 2.89 M are given. The partial molar free energy of formation in 1.0 M soln. is calcd. to be  $-87,690 \text{ cal}$  for HCOOH and  $-96,320 \text{ cal}$  for AcOH. P. S. Rollet

Cryoscopic determination of total hydration of ions of nickel chloride. O. Hun. *Compt. rend.* 198, 740-2 (1934); cf. *C. A.* 27, 4154.—By the same method the hydration of the ions in 0.5 M  $NiCl_2$  corresponds to  $NiCl \cdot 28.5H_2O$ ; and in 0.25 M  $NiCl_2$  to  $NiCl_2 \cdot 33.1H_2O$ . C. A. Silberrad

Cryoscopic determination of total hydration of ions of barium chloride. E. Rouyer. *Compt. rend.* 198, 742-4 (1934); cf. preceding abstr.—Similarly the hydration of the ions in 0.5 M and 0.25 M  $BaCl_2$  corresponds, resp., to  $BaCl_2 \cdot 26.1$  and  $BaCl_2 \cdot 29.1 H_2O$ . C. A. Silberrad

Constitution of hydrobromic acid solutions of cobalt and copper salts. P. Job. *Compt. rend.* 198, 827-8 (1934); cf. *C. A.* 27, 2083.—Examd. in similar fashion HBr solns. of Co and  $Cu^{++}$  salts indicate the presence of the ions  $[CoBr]^+$  and  $[CoBr_2]^-$  and  $[CuBr]^+$  and  $[CuBr_2]^-$ . The equil. consts. are, resp.,  $5 \times 10^{-3}$  and  $1.1 \times 10^{-3}$ , and  $6.3 \times 10^{-3}$  and  $6 \times 10^{-4}$ ; those of  $[CoCl]^+$  and  $[CoCl_2]^-$   $4.5 \times 10^{-3}$  and  $2.9 \times 10^{-4}$ . C. A. Silberrad

Electrolytic conduction in aqueous solutions. A. C. D. Rivett. *Rept. Australian and New Zealand Assoc. Advancement of Sci.* 21, 420-31 (1933).—Liversidge lecture, 1932. E. R. Smith

Mixed electrolytes. II. The proof of a new method of measuring electrical conductivity. V. K. Semenchenko, B. V. Erofeev and V. V. Serpinski. *Z. physik. Chem.* A167, 188-96 (1933). See *C. A.* 27, 3382. III. The electrical conductivity of mixed electrolytes. V. K. Semenchenko and V. V. Serpinski. *Ibid.* 197-208.—See *C. A.* 28, 1605. Roy H. Baechler

Constancy of the viscosity of strong lithium chloride solutions at low velocity gradients. G. W. Scott Blair and R. K. Schofield. *Phil. Mag.* 17, 225-9 (1934); cf. *C. A.* 26, 3159.—Previous measurements of the viscosity of concd. LiCl solns. were in error because of the creep of the soln. under rubber sleeves that held the capillary of the viscometer in place. When the joints were sealed the data were in accord with Poiseuille's law. Measurements of the damping of the rotational oscillation of a cylinder immersed in a LiCl soln. showed no anomaly, although the max. velocity gradient was only 0.003 sec.<sup>-1</sup>. E. J. R. Using solubility data in the determination of activity coefficients of acid molecules in chloride solutions. Erik



Larsson. *Swensk Kem. Tids.* 45, 236-45(1933); cf. C. A. 21, 8206, et seq.—The activity coeffs. of  $\text{BzOH}$ ,  $n\text{-C}_6\text{H}_4(\text{OH})\text{CO}_2\text{H}$ ,  $o\text{-}$  and  $m\text{-C}_6\text{H}_4\text{ClCO}_2\text{H}$ ,  $\text{PhC}(\text{OH})(\text{O}_2\text{H})$ ,  $p\text{-C}_6\text{H}_4(\text{OMe})\text{CO}_2\text{H}$  and  $\text{PhCH}_2\text{CO}_2\text{H}$  are calcd. from their solubilities in  $\text{NaCl}$  and  $\text{KCl}$  via log  $f_\pm = h\kappa$ .

A. R. Rose

The potentials in electrolytes containing foreign ions. (1) Eain and M. Lozmanova. *Z. physik. Chem.* A167, 209-20(1933).—The potentials were measured at the boundaries  $\text{Au}|\text{CuSO}_4$ ,  $\text{Au}|\text{Cu}(\text{NO}_3)_2$ ,  $\text{Au}|\text{AgNO}_3$  as well as the corresponding potentials  $\text{Cu}|\text{CuSO}_4$ ,  $\text{Cu}|\text{Cu}(\text{NO}_3)_2$ ,  $\text{Ag}|\text{AgNO}_3$ . The Au potential is a linear function of the metal of the electrolytic cation. The potential may be explained on the basis of power of adsorption.

Roy H. Baechler

Current density-potential curves. V. Sihvonen and O. Rnwald. *Acta Chem. Fennica* B6, 74(1933).—Simultaneous measurements of current potentials on anodes and cathodes were made in  $\text{NaOH}$  soln. with high and low c. d. in a special cell with diaphragm and rotating  $\text{Ni}$  and  $\text{Fe}$  electrodes. The c. d.-potential curves could be expressed by the formula  $\epsilon = \epsilon_0 + a \ln d + a\beta d$ , in which the coeff.  $\epsilon$  and the absorption coeff.  $\beta$  decreased with increasing temp. and concn. of the soln.

A. E. B.

Determination of normal potentials. M. Quintin. *Compt. rend.* 198, 718-20(1934).— $\Delta H$ , the heat of the reaction at concn.  $c$ , is a linear function of  $c$  for the cell  $\text{Cu}$  (amalgam two phases) $|\text{CuSO}_4(c)|\text{HgSO}_4|\text{Hg}$ , and extrapolated to  $c = 0$  gives  $\lim_{c \rightarrow 0} \Delta H = 18,640 \text{ cal./g. mol.}$  The normal potential,  $E_0$ , given by the equation  $E_0 = -\lim_{c \rightarrow 0} \Delta H / nF + T \lim_{c \rightarrow 0} dE_0/dT$  ( $E_0 = E_0$  when  $c = 0$ ), is  $0.4042-0.00050 T$ . Both Lewis' and La Mer's methods are unsatisfactory (cf. C. A. 27, 3873).

C. A. Silberrad

A study of the effect of an electric field on the potential at a metal-solution interface. H. K. McClain and H. V. Tartar. *J. Phys. Chem.* 38, 161-70(1934).—Expts. with very small electrodes of pure Au and Pt wire in various solns. contg. electrolytes other than Au and Pt salts showed that the potential against the soln. is only slightly affected by an elec. field of moderate strength. Changes that do occur may be caused by any 1 of several factors, and it is concluded that in cataphoresis expts. with Au and Pt soln. both the Nernst and  $\zeta$  potentials of the metals against the solns. are unchanged by the elec. field. Twenty-seven references.

J. H. Moore

Theory of glass electrodes. Philipp Gross and Otto Halpern. *J. Chem. Physics* 2, 136-40(1934).—A glass electrode is considered schematically to be a difficultly sol. electrolyte that absorbs  $\text{H}_2\text{O}$  and salts. A distribution potential exists at the boundary surface. Quant. agreement with exptl. potentials is obtained by using only one empirical const. Calcns. based on diffusion potentials were not satisfactory.

P. S. R.

Thermodynamics of aqueous sodium sulfate solutions from electromotive-force measurements. Herbert S. Harned and John C. Hecker. *J. Am. Chem. Soc.* 56, 650-3(1934).—The e. m. f. of the cell  $\text{Pb}(\text{Hg})|\text{PbSO}_4(s)|\text{Na}_2\text{SO}_4(m)|\text{Na}_2\text{Hg}|\text{Na}_2\text{SO}_4(0.05)|\text{PbSO}_4(s)|\text{Pb}(\text{Hg})$  was measured at  $0-40^\circ$  from a  $\text{Na}_2\text{SO}_4$  concn. of 0.05  $M$  to satn. Activity coeffs. were calcd. from the Debye-Huckel equation. The value of the apparent ionic diam.  $u$  is const. at 3.5 Å. Relative partial molal heat contents and sp. heats are tabulated.

E. J. Rosenbaum

Thermodynamic study of dilute thallous chloride solution by electromotive-force measurement of the cell  $\text{Ti-Hg}|\text{TiCl}(m)|\text{AgCl}(s), \text{Ag}(s)$ . I. A. Cowperthwaite, V. K. La Mer and J. Barksdale. *J. Am. Chem. Soc.* 56, 514-9(1934).—By combining e. m. f. data for this cell with data for the cell  $\text{Ti-Hg}|\text{Ti}_2\text{SO}_4(m)|\text{Ti}(s)$ , the e. m. f. of the cell  $\text{Ti}(s)|\text{TiCl}(m)|\text{AgCl}(s), \text{Ag}(s)$  was detd. at  $0-50^\circ$ , with concns. from 0.0005  $M$  to satn. For cell I at  $25^\circ$ ,  $E^\circ = 0.55833 \text{ v.}$ ,  $dE^\circ/dT = 6.646 \times 10^{-4}$ ,  $-\Delta F^\circ = 12,877 \text{ cal.}$  and  $-\Delta H^\circ = 8307 \text{ cal.}$  The Debye-Huckel limiting law is confirmed for the region of high diln. When the ion size parameter  $a$  is assumed to be 0.98 Å. the Gronwall, La Mer and Sandved equation fits the data. If  $a$  is assumed to be 3 Å. and the mass-action const. is 0.31,

a const. value is obtained for  $E^\circ$ . Partial molal heats of diln. of  $\text{TiCl}$  at  $25^\circ$  and  $12.5^\circ$  are tabulated.

E. J. Rosenbaum

Reversibility of oxidation-reduction systems derived from carbohydrates. R. Wurmer and J. A. de Loureiro. *Compt. rend.* 198, 738-40(1934).—The reversibility of oxidation-reduction systems consisting of reduced carbohydrates in neutral or alk. soln. or of ascorbic acid is demonstrated by the agreement between the normal potentials detd. electrometrically, and those detd. colorimetrically by detg. the amt. of a leuco deriv., e. g., of methylene blue, capable of being reoxidized (for which latter a convenient arrangement is described). The prior result as regards ascorbic acid was due to the use of an acid not freshly recryst. and so contg. traces of "redoxine" (characterized by a band at 2780 Å. in a soln. of  $pH$  7 or 2650 in one of  $pH$  1). (Cf. C. A. 27, 4468; Borsook and Kellieley, 28, 806<sup>1</sup>.)

C. A. Silberrad

Oxidation-reduction properties of glucides formed out of contact with oxygen. Nelicia Mayer-Reich. *J. chim. phys.* 31, 9-42(1934); cf. C. A. 27, 3657.—The oxidized form of the oxidation-reduction product formed in solns. of glucides is not stable. The system is, however, reversible, as shown by electrometric titration. Attention is drawn to the theory that one of the essential parts of respiration is that of maintaining the cellular medium at a const. level of oxidation-reduction.

E. R. Smith

The equilibrium in the reaction  $\text{Cl}_2 + \text{Br}_2 = 2\text{BrCl}$ . Harold G. Vesper and G. K. Rollefson. *J. Am. Chem. Soc.* 56, 620-5(1934).—The dissocn. const. of  $\text{BrCl}$  as reported in the literature is probably 30-60% too high. Accurate values for the dissocn. const. and the extinction coeff. of  $\text{BrCl}$  were obtained by using the green He lines with center of gravity at  $0.502 \mu$ . For this wave length the ratio  $\alpha_{2.01}/\alpha_{2.02}$  is about 0.1; hence  $\alpha = \log I_0/I$  for  $\text{BrCl}$  can be readily measured. The value for  $K$  in the reaction  $2\text{BrCl} = \text{Br}_2 + \text{Cl}_2$  at  $28^\circ = 0.107 \pm 0.002$  and  $\alpha$  (for a layer of 1 cm. corrected to 1 atm. and  $0^\circ$ ) =  $0.384 \pm 0.006$ .

H. S. v. K.

Chemical equilibria of reactions between hydrocarbons. V. Constants of equilibria of the reactions:  $\text{C}_6\text{H}_5\text{CH}_3 + 3\text{H}_2 \rightleftharpoons \text{C}_6\text{H}_{11}\text{CH}_3$ ;  $\text{C}_6\text{H}_5\text{C}_2\text{H}_5 + 3\text{H}_2 \rightleftharpoons \text{C}_6\text{H}_{11}\text{C}_2\text{H}_5$ ;  $n\text{-C}_6\text{H}_{13} + 3\text{H}_2 \rightleftharpoons n\text{-C}_6\text{H}_{17}$ . A. A. Vvedenskii, S. G. Vinnikova, V. R. Zharkova and B. M. Funduller. *J. Gen. Chem.* (U. S. S. R.) 3, 718-28(1933); cf. C. A. 27, 2369.—The consts. of the equilibria of the reactions of hydrogenation of  $\text{PhMe}$ ,  $\text{PhEt}$  and  $\text{PhPr}$  were detd. within  $200-300^\circ$  in the presence of Pd catalysts. The data agree with the following equations:  $\log K_p = 10970/T - 20.387 \pm 0.053$  for  $\text{PhMe} + 3\text{H}_2 \rightleftharpoons \text{C}_6\text{H}_{11}\text{Me}$ ;  $\log K_p = 9620/T - 18.041 \pm 0.049$  or  $\log K_p = 10,970/T - 20.526 \pm 0.088$  for  $\text{PhEt} + 3\text{H}_2 \rightleftharpoons \text{C}_6\text{H}_{11}\text{Et}$ ;  $\log K_p = 9875/T - 18.560 \pm 0.084$  or  $\log K_p = 10,970/T - 20.569 \pm 0.105$  for  $\text{PhPr} + 3\text{H}_2 \rightleftharpoons \text{C}_6\text{H}_{11}\text{Pr}$ . Under similar conditions  $\text{PhMe}$  is hydrogenated more thoroughly than  $\text{C}_6\text{H}_5$ ;  $\text{PhEt}$  and  $\text{PhPr}$  are hydrogenated equally thoroughly but less so than  $\text{C}_6\text{H}_5$  and  $\text{PhMe}$ .

Chas. Blanc

Kinetics and mechanism of decomposition of hydrocarbons. I. Thermal decomposition of hexane at atmospheric pressure. A. I. Dintzes and A. V. Frost. *J. Gen. Chem.* (U. S. S. R.) 3, 747-58(1933); cf. C. A. 28, 2169<sup>1</sup>.—Hexane (I) (from  $\text{PrOH}$ ), b.  $68.8-9.2^\circ$ ,  $n_D^{20}$  1.3749, was heated at  $525-65^\circ$ , the duration of the reaction being 0.1-90.8 sec. with 3-8% decompn. of I. The thermal decompn. of I began at  $520^\circ$ . Results of detns. of the gases and the unsatd. liquid compds. lead to the following conclusions:  $\text{C}_6\text{H}_{14} \rightarrow \text{C}_2\text{H}_6 + \text{H}_2$  (1);  $\text{C}_6\text{H}_{14} \rightarrow \text{CH}_4 + \text{C}_5\text{H}_{10}$  (2);  $\text{C}_6\text{H}_{14} \rightarrow \text{C}_2\text{H}_4 + \text{C}_4\text{H}_{10}$  (3);  $\text{C}_6\text{H}_{14} \rightarrow \text{C}_2\text{H}_2 + \text{C}_4\text{H}_8$  (4);  $\text{C}_6\text{H}_{14} \rightarrow \text{C}_2\text{H}_6 + \text{C}_3\text{H}_6$  (5);  $\text{C}_6\text{H}_{14} \rightarrow 2\text{C}_2\text{H}_6 + \text{C}_2\text{H}_4$  (6);  $\text{C}_6\text{H}_{14} \rightarrow \text{C}_2\text{H}_6 + \text{C}_3\text{H}_8$  (7);  $\text{C}_6\text{H}_{14} \rightarrow 2\text{C}_2\text{H}_6$  (8). The primary decompn. of I follows 1, 2, 3 and 4, and is always accompanied by a secondary decompn. of the type  $\text{C}_n\text{H}_{2n+2} \rightarrow \text{C}_m\text{H}_{2m+2} + \text{C}_{n-m}\text{H}_{2n-2m+2}$ , viz., 6, 6, 7 and 8, with only 1 tertiary reaction:  $\text{C}_6\text{H}_{14} \rightarrow 2\text{C}_2\text{H}_6$  as a result of the decompn. of  $\text{C}_6\text{H}_{14}$  formed in the process. The correlation of velocities of the primary reactions is almost independent of temp. and degree of decompn. With increasing degree of decompn. the relative quantity of products

of secondary decompn. noticeably increases. The energy of activation of primary decompn. of I within the limits 525-65° is  $E = 64,500 \pm 1,500$  cal. and the dependence of the velocity upon temp.  $\log K_1 = 14.22 - 14,105/T = 0.081$ . Chas. Blanc

The oxidation of graphite by electrical discharges. V. Sihvonen. *Ann. Acad. Sci. Fennicae A38*, No. 3, 22 pp. (1933) (in German).—Elec. discharges of high-tension d. c. between 2 close parallel graphite and Pt electrodes cause 2 reversible reactions:  $\text{CO}_2 + \text{Pt} \rightleftharpoons \text{CO} + \text{Pt}_2\text{O}$  and  $\text{CO}_2 + \text{C}_s \rightleftharpoons 2\text{CO} + \text{C}_{s-1}$ . Under moderate elec. discharges a linear elec. equil. with respect to the pressures of CO and  $\text{CO}_2$  is reached, which is shifted toward  $\text{CO}_2$  by  $1/2$  of the value of the equil. const. if the Pt acts as cathode after changing the polarity. Intensive a.-c. discharges cause homogeneous disocn. of  $\text{CO}_2$ :  $2\text{CO}_2 = 2\text{CO} + \text{O}_2$ . No oxidation of the anode could be observed in O atm. With weak a.-c. discharges in O of low pressure the surface of the graphite that was covered with the at. O adsorbent was attacked. Equations of the reactions caused by various elec. discharges in different atms. are given. A. E. Beitlich

The oxidation of graphite by Röntgen rays. V. Sihvonen. *Ann. Acad. Sci. Fennicae A38*, No. 4, 13 pp. (1933) (in German).—Two reactions, similar to the ones observed with elec. discharges (see preceding abstr.), were found when graphite was exposed to Röntgen rays in  $\text{CO}_2$  or CO atm. of low pressure. Treatment in O atm. yielded first  $\text{CO}_2 + 2\text{CO}$ , then  $2\text{CO}_2 + 2\text{CO}$ . With very low O pressure, the oxidizing effect of the rays was active only on direct exposure of the graphite. A. E. B.

Autoxidation of stannous chloride. IV. Effect of some nonaqueous solvents. Robert C. Haring and James H. Walton. *J. Phys. Chem.* 38, 153-60 (1934); cf. *C. A.* 27, 2881-2.—F.-p. measurements show complex formation between  $\text{SnCl}_2$  and HCl in dioxane. A mol. compd. between  $\text{SnCl}_2$  and dioxane in the ratio of 1:1 was found. The autoxidation of  $\text{SnCl}_2$  in dioxane and in benzyl alc. increases linearly with acid concn. until the acid concn. is nearly the same as that of  $\text{SnCl}_2$ , and then becomes const. The chloro-acid complex is the form in which oxidation occurs. Induced oxidation of dioxane and benzyl alc. also occurs. Several pos. and neg. catalysts have the same effect, qualitatively in aq. and nonaq. solns. I. J. Patton

Calcium carbide and calcium cyanamide. Birger W. Nordlander. *Tek. Tid. Uppf. C, Kemi* 64, 9-16 (1934).—Gelhaar's conclusions regarding the mechanism of the reaction between  $\text{CaC}_2$  and N (cf. *C. A.* 27, 4470) are based on misinterpreted observations. His observations on the effect of the particle size of  $\text{CaC}_2$  show that the reaction is heterogeneous rather than homogeneous. The equation for the diffusion velocity of a gas through a compact layer of solid is  $w = K\sqrt{i}$ , ( $w$  = wt. of diffused gas per sq. cm. that has reacted with the substance in the time  $t$ ). Application of an adaption of the equation for the system  $\text{CaC}_2/\text{N}$  to G.'s measurements shows that the reaction velocity is detd. solely by the diffusion velocity of N through the  $\text{CaCN}_2$  formed. G.'s theory that the increase in the reaction velocity with temp. depends on an ionization of N is invalid. The true degree of ionization at 1000° is normally about  $10^{-22}$  and in a Ni tube it is even less,  $10^{-24}$ . On the other hand, the effect of temp. fully agrees with expectation for a diffusion process. The only logical explanation of the increase in the reaction velocity which takes place on addn. of certain compds. is the ability of the latter to increase the diffusion velocity of N through a loosening or sintering of the  $\text{CaCN}_2$  formed. The increase in the reaction velocity which G. observed in the expts. with Ni tubes is attributed to the ability of this metal to remove CO from the reaction chamber either by direct absorption or formation of  $\text{Ni}(\text{CO})_4$ . Twenty-five references. D. Thuesen

The "temperature-independent factor" of unimolecular reactions. G. Salomon. *Helv. Chim. Acta* 16, 1354-60 (1933).—If the velocity of a reaction of the 1st order depends on the solvent, any value of the temp.-independent

factor  $Z$  and the heat of activation  $E$  of the Arrhenius equation  $k = Ze^{-E/RT}$  is possible. The value  $Z \approx 10^{14}$ , theoretically established by Polanyi and Wigner for unimol. reactions, is exptly. confirmed; it is valid for decompn. reactions and rearrangements of mols. that consist of about equally heavy atoms. Exptly. detd. deviations may be due to a steric factor or to disturbance of the unimol. course. Louise Kelley

Kinetics of thermal cis-trans isomerization. III. G. B. Kistiakowsky and Walter R. Smith. *J. Am. Chem. Soc.* 56, 638-42 (1934).—For the homogeneous, unimol. isomerization of isostilbene to stilbene, the rate const.  $k = 6 \times 10^{12} e^{-43800/RT}$  per sec. at pressures above 5 mm. At least 12 oscillators participate. At 330°, equil. is reached at 93% stilbene. Diethyl maleate and dimethyl citraconate undergo homogeneous decompn. at 300°; the isomerization of the latter resembles that of dimethyl maleate (*C. A.* 26, 3985). H. A. Beatty

Kinetic study of aqueous formaldehyde solutions. I. The polymerization reactions of K. Hess and co-workers Motoi Wadano, Carl Trogus and Kurt Hess. *Ber* 67B, 174-90 (1934).—The depolymerization of paraformaldehyde in aq. soln. is interpreted as a first-order reaction limited by an equil. The rate was followed by interferometer and cryoscopic measurements. The rate as a function of  $p_{\text{H}_2}$  has a flat min. between 2.6 and 4.3. MeOH reduces the reaction velocity. G. B. Taylor

The acid nature of aqueous formaldehyde solutions Motoi Wadano. *Ber.* 67B, 191-7 (1934).—Potentialmetric titration curves of HCHO vary with the purity of the sample, and have the same general shape as a curve with  $\text{HCO}_2\text{H}$ . The presence of acid in all HCHO solns must be taken into account in interpreting disocn. consts. G. B. Taylor

Decomposition of malic acid by sulfuric acid. Robert E. DeRight. *J. Am. Chem. Soc.* 56, 618-20 (1934).—The velocity of the reaction between malic acid and concd  $\text{H}_2\text{SO}_4$  was detd. by measuring the vol. of  $\text{CO}_2$  evolved. As the quantity of  $\text{H}_2\text{O}$  present is increased, the velocity of the reaction first increases and then decreases markedly.  $\text{SO}_2$  is also an inhibitor. The rate of decompn. is accounted for in terms of Taylor's theory of neg. catalysis. E. J. Rosenbaum

Kinetics of the thermal reaction of gaseous alkyl iodides with hydrogen iodide. Richard A. Ogg, Jr. *J. Am. Chem. Soc.* 56, 526-36 (1934).—The reactions of MeI, EtI and  $n$ -PrI with HI were investigated at 250-320° and pressures up to 0.5 atm. The results are expressed by the equation  $d(I_2)/dt = K_1(\text{RI})(\text{HI}) + K_2[(\text{RI})(\text{HI})/(\text{HI}) + (I_2)]$ . This rate equation is explained by a mechanism involving a bimol. metathesis between alkyl iodide and HI (rate const. =  $K_1$ ) and a concurrent unimol. decompn. of alkyl iodide into alkyl radical and I (rate const. =  $K_2$ ). For MeI and EtI  $K_2$  falls off at low pressures. Walter B. Keighton, Jr.

The kinetics of the decomposition of the trichloroacetates in various solvents. Frank H. Verhoek. *J. Am. Chem. Soc.* 56, 571-7 (1934).—The rates of decompn. of aniline trichloroacetate were detd. in  $\text{H}_2\text{O}$ , EtOH and PhNH<sub>2</sub>, and those of Na and Ba trichloroacetates were detd. in  $\text{H}_2\text{O}$  and in EtOH. The rates increase in the orders given. The mechanism suggested is the unimol. decompn.  $\text{CCl}_3\text{COO}^- = \text{CCl}_3^- + \text{CO}_2$  followed by  $\text{H}^+ + \text{CCl}_3^- = \text{CHCl}_3$ , and oxidation to chloride ion. In 3 cases  $k$  increases as decompn. proceeds. This is attributed to changes in the degree of ionization. Temp. coeffs for the decompn. in the several solvents indicate that the stability of the  $\text{CCl}_3\text{COO}^-$  ion is detd. by its solvation. Walter B. Keighton, Jr.

Allotropic varieties of calcium. P. Bastien. *Compt. rend.* 198, 831-3 (1934); cf. *C. A.* 25, 2355.—Breaks in the cooling, thermolec. power and dilatation curves, and sudden changes in hardness at 240-265° (there is considerable hysteresis), and 430-440° indicate 3 allotropic modifications. C. A. Silberrad

Cooling curves of sodium stearate in the presence of electrolytes. E. Angelescu and Dem. M. Popescu. *Kolloid-Z.* 66, 175-83 (1934); cf. *C. A.* 24, 3693, 3941.

and K chlorides, bromides, iodides, acetates, thiocyanates, palmitates and propionates were detd. and results expressed in terms of  $(T - T_0)/C$ , in which  $T$  and  $T_0$  are the break-points with and without salt, resp., and  $C$  is the molar salt concn. All Na salts except the palmitate raise  $T$  and above 0.05  $N$ , the ratio is const. K salts have a smaller effect and often lower  $T$ . Acetates and propionates raise  $T$  strongly, indicating a salting-out effect. The heats of gelatinization and heat cond. of the gel were calcd. While Fischer's theory (cf. C. A. 17, 2908; 23, 3144) is confirmed, an extension is necessary to explain the special effects, such as that of acetate and propionate, where degree of hydration is small.

Arthur Fleischer  
Electrical conductivity and equilibrium diagrams of binary alloys. IX.—The system magnesium thallium. (C. Grube and J. Hille. *Z. Elektrochem.* 40, 101-6 (1934); cf. C. A. 28, 959<sup>1</sup>.—The compd.  $Tl_2Mg$ , m. 385°,  $TlMg$  m. 345°. The peritectic reaction forming  $TlMg_2$  takes place at 390° between 28.57-34.5 atoms %  $Tl$ .  $TlMg$  and  $Mg$  form a eutectic at 80 atoms %  $Tl$  and 202°.  $Tl$  dissolves  $TlMg$ ; the  $\beta$  solid soln. contains 95.2 atoms %  $Tl$  at 202°, and decomposes into a eutectoid at 160° and 96.73 atoms %  $Tl$ . The  $\alpha$  solid soln. contains 98.7 atoms %  $Tl$ .

Curtis L. Wilson  
The nature of the solid phase in the system antimony-bismuth. W. F. Ehret and M. B. Abramson. *J. Am. Chem. Soc.* 56, 385-8 (1934).—Microscopic and x-ray diffraction exams. show that Sb-Bi alloys of all compos. consist of only one phase when properly annealed above the m. p.

B. A. Soule  
The partially miscible pair aniline-water. Paul Mondvain-Monval and Hélène Schlegel. *Compt. rend.* 197, 1632-4 (1933).—Above 168° mixts. of  $PhNH_2$  and  $H_2O$  are miscible in all proportions. Below 77° layers rich in  $PhNH_2$  have the greater d., while above this temp. the aq. layer is the denser. A capillary tube was suspended in the mixt. so that one end was in each layer; the capillary rise  $h = kT/(d - d')$ , in which  $k$  is a const. and  $d - d'$  is the difference in density of the two liquids.

E. G. Vanden Bosche  
Variation in the thermal behavior of methane at 20.4° absolute as a phase transformation of the second order. K. Clusius and A. Perlick. *Z. physik. Chem.* B24, 313-27 (1934).—Phase transformations of the 2nd order as defined by Ehrenfest (C. A. 27, 5235) were found in  $CH_4$  at 20.4° abs. The sp. heat was measured between 15° and 25° abs.; the mol. heat dropped from 81 to 13 cal. at the transition point. The pressure dependence of the temp. of discontinuity was followed up to 195 kg. per sq. cm. The optical properties of solid  $CH_4$  at low temp. were investigated with a polarization microscope.

C. M. Murphy  
The equilibrium of the quaternary system:  $Na_2SO_4$ -( $NH_4$ ) $_2$  $SO_4$ - $NH_4H_2PO_4$ - $H_2O$ . A. P. Belopolski and N. P. Aleksandrov. *J. Applied Chem.* (U. S. S. R.) 6, 390-114 (in German 414-15) (1933).—The equil. of the quaternary system  $Na_2SO_4$ -( $NH_4$ ) $_2$  $SO_4$ - $NH_4H_2PO_4$ - $H_2O$  was investigated at 0-15° to ascertain the possibility of treating mother liquors by the "ammonia method" obtained in the carbonation of the ammonia solns. of  $Na_2SO_4$ . The results are presented in graphs of space configurations, the character of which shows that both isotherms belong to the same type of equil. The isotherms are characterized by the following crystn. regions: (a) mirabilite, (b) thenardite, (c) the double salt  $Na_2SO_4 \cdot (NH_4)_2SO_4 \cdot 4H_2O$  and (d)  $(NH_4)_2SO_4$ . At the quintuple points the regions in contact with each other are, at point  $N$  mirabilite, thenardite and the double salt; at point  $R$ , which is located in the area of the higher  $NH_3$  concns., thenardite,  $(NH_4)_2SO_4$  and the double salt. The last point is that of decompn. of the double salt under the influence of  $NH_3$ . For the decompn. of the double salt at 0° an  $NH_3$  concn. of 65.25 g. per 100 g. of  $H_2O$  is needed. At lower temps. lower concns. of  $NH_3$  are needed for decompn. of the double salt. For practical utilization of the equil. diagrams, there is given a series of soly. curves that correspond to an identical concn. of the  $NH_3$  in g. per 100 g.  $H_2O$ . The theoretical

material proves that for the prepn. of a fertilizer with 18-20% of  $N$  mirabilite must first be sepd. from the soln. by cooling.

A. A. B.  
Double decomposition in the absence of a solvent. XVII. Reciprocal systems with a single surface of crystallization. A. G. Bergman and N. S. Dombrovskaya. *J. Gen. Chem.* (U. S. S. R.) 3, 729-34 (1933); cf. C. A. 24, 2367; 28, 2250<sup>1</sup>.—Possible variations in the form of crystn. surfaces in various combinations of continuous solid solns. of binary systems entering the compn. of the reciprocal system are discussed. For systems with a single surface interpretation is difficult, but in the case of division of the crystn. surface within the reciprocal system into sep. planes of crystn. caused by disintegration of the solid solns. or complex formation, all the interrelations become more simple. Examples of a system with a single surface are:  $AgCl + NaBr \rightleftharpoons AgBr + NaCl$ ;  $NaCl + KBr \rightleftharpoons NaBr + KCl$  and  $NaBr + KI \rightleftharpoons NaI + KBr$ . The last 2 systems have on all 4 sides continuous solid solns. with minimums, because of which with the complete reversibility of the reciprocal pair, the crystn. surfaces of these systems have a cup-like form.

XVIII. Reciprocal system with a single surface of crystallization.  $AgCl + NaBr \rightleftharpoons AgBr + NaCl$ . N. S. Dombrovskaya. *Ibid.* 735-41.—The reciprocal system  $AgCl + NaBr \rightleftharpoons AgBr + NaCl$  is the first one investigated in which there are a single crystn. plane and 4 binary salts forming continuous solid solns. and sepg. in the form of isomorphous crystals. According to the thermal effect (5.1 Cal.) and the curvature of the isotherms, the stable pair is  $AgBr + NaCl$ . Within the system is observed the isotherm curvature, causing "inflow" on the crystn. surface as a result of the lowered reciprocal soly. of the components of the stable pair. The inconcurrence of the "inflow" with the plane of the stable diagonal cut of  $AgBr-NaCl$  is the analog of the ridge shift of the crystn. surfaces of the stable components, appearing in many irreversible-reciprocal systems, e. g.,  $Ag_2SO_4 + 2TiNO_3 \rightleftharpoons 2AgNO_3 + Ti_2SO_4$ ;  $Ag_2SO_4 + Ti_2Cl_2 \rightleftharpoons Ag_2Cl_2 + Ti_2SO_4$ ;  $Ag_2SO_4 + Ti_2Br_2 \rightleftharpoons Ag_2Br_2 + Ti_2SO_4$ ;  $Na_2SO_4 + MgCl_2 \rightleftharpoons 2NaCl + MgSO_4$ . In such systems the shift of the max. from the plane of the stable cut indicates some decompn. in the fused state.

XIX. Reciprocal system:  $NaI + KBr \rightleftharpoons NaBr + KI$ . A. P. Obukhov. *Ibid.* 787-91.—The crystn. surface of the reciprocal system represents one continuous surface shaped like a flat cup with 2 raised edges adjacent to the side binary systems, and is related in its external characteristics to the first type of the first class in the classification of B. and D. In the system  $NaBr + AgCl \rightleftharpoons AgBr + NaCl$ , consisting of continuous solid solns., of which  $NaBr + NaCl$  and  $AgBr + AgCl$  have a min., while  $AgBr + NaBr$  and  $AgCl + NaCl$  have not, there was observed a shift of the reaction toward a more stable pair of  $NaCl + AgBr$ , which is related to the thermochem. reaction effect of 5.1 (cf. B. and Palkin, *Tech. entkloped. sprav.* 7, No. 7, 198-9; 203-7, figs. 13, 16, 17 and 19). XX. Melting-point diagrams of the ternary systems:  $NaCl-NaBr-NaI$  and  $KCl-KBr-KI$ . V. P. Radishchev. *Ibid.* 843-51.—The fusion diagrams of the 2 systems showed a close resemblance. The surface *liquidus* (Jancke, C. A. 4, 705) of both systems represents 1 crystn. plane of the ternary solid solns., which near the binary system of chloride-iodide is split into 2 planes of limited ternary solid solns. The curve of the joint crystn. of the 2 kinds of limited ternary solid solns., beginning in the eutectic p. of the binary system of chloride-iodide is terminated within the system at higher temps., and, therefore, shows an upward course. According to the classification of Jancke the 2 systems must be related to the 2nd type of systems with ternary solid solns. and a sphere of limited solid solns., taking its origin from the binary system with invariant point. The system of the K salts has a flatter crystn. surface than that of the Na salts. The curve of joint crystn. of the 2 solid phases in the 1st system is shorter than in the 2nd. These facts indicate a more complete isomorphism and a greater stability of the solid solns. in the system of K salts than in that of Na salts. XXI. Irreversible-reciprocal system:  $2NaCl + K_2CO_3 \rightarrow 2KCl + Na_2CO_3$ . *Ibid.* 852-64.—The

diagram of the reciprocal system obtained by thermal analysis discloses a shift of the reaction in the direction of formation of  $2KCl + Na_2CO_3$ , which agrees with the pos. thermal effect of the formation of this pair of salts (7.3 cal. or 3.65 cal. based on the equiv.). The system must be related to the class of the irreversible-reciprocal systems of the classification of B. and D. The decompn. of the continuous solid solns. of the binary systems ( $K_2Cl_2$ - $Na_2Cl_2$  and  $K_2CO_3$ - $Na_2CO_3$ ) on adding a 3rd component was observed only for the chlorides. The solid solns. of the carbonates are stable also within the reciprocal system. The surface *liquidus* of the system is formed by only 3 fields:  $K_2Cl_2$ ,  $Na_2Cl_2$  and the solid solns. of  $K_2CO_3$ - $Na_2CO_3$ . Of the ternary systems, into which the investigated system is decompd. at the stable diagonal cut, one represents the ternary eutectic ( $Na_2Cl_2$ - $K_2Cl_2$ - $Na_2CO_3$ ), and the other a system with continuous solid solns. of 2 components in which the 3rd does not dissolve ( $K_2Cl_2$ - $K_2CO_3$ - $Na_2CO_3$ ). XXII. Irreversible-reciprocal system:  $K_2SO_4 + Li_2Cl_2 \rightarrow K_2Cl_2 + Li_2SO_4$ . O. S. Dombrovskaya. *Ibid.* 1007-16.—This system is irreversible-reciprocal with the equil. shifted in the direction of the stable pair  $Li_2SO_4$ - $K_2Cl_2$ , which is also indicated by the thermal coeff. of decompn. (+6.4 Cal.). The 2 decompn. products are sepd. at the metastable diagonal cut. Characteristic is the deflection of both ridges of the stable components from the planes of the stable diagonal cut. XXIII. Reciprocal systems:  $Cs_2Cl_2 + K_2SO_4 \rightleftharpoons Cs_2SO_4 + K_2Cl_2$ ;  $Rb_2Cl_2 + K_2SO_4 \rightleftharpoons Rb_2SO_4 + K_2Cl_2$ . *Ibid.* 1017-25.—The 2 systems supplement the series of reciprocal systems, in which pairwise 2 salts form continuous solid solns., and the other 2 pairs simple eutectics, *vis.*  $Ag_2Cl_2 + HgBr_2 \rightleftharpoons Ag_2Br_2 + HgCl_2$ ;  $AgCl + KBr \rightleftharpoons AgBr + KCl$ ;  $AgBr + KI \rightleftharpoons AgI + KBr$  and  $Ag_2SO_4 + Na_2Cl_2 \rightleftharpoons Ag_2Cl_2 + Na_2SO_4$  (Bergman and Palkin, *loc. cit.*). While the investigated systems together with the system  $Ag_2Cl_2 + HgBr_2$  belong to the series of reciprocal systems, the system  $AgCl + KBr \rightleftharpoons AgBr + KCl$  is a transition to the continuous system, the representative of which for the given type of systems is the system:  $AgBr + KI \rightarrow AgI + KBr$ . The system  $Rb_2Cl_2 + K_2SO_4 \rightleftharpoons Rb_2SO_4 + K_2Cl_2$  represents the 1st sub-type of the system with 2 surfaces, the eutectic line of which has no min. In the system:  $Cs_2Cl_2 + K_2SO_4 \rightleftharpoons K_2Cl_2 + Cs_2SO_4$ , because of the considerable thermal reaction effect and the lower isomorphism than in the K-Rb system, there is a very deep min. on the eutectic line, and also some shift of the decompn. reaction toward the somewhat more stable diagonal pair  $Cs_2Cl_2$ - $K_2SO_4$ , which is shown by a corresponding curvature on the isotherms of the plane of isomorphous sulfates. Such a curvature of isotherms is not observed in the system:  $Rb_2SO_4 + K_2Cl_2 \rightleftharpoons K_2SO_4 + Rb_2Cl_2$ . XXIV. Irreversible-reciprocal system: sodium chloride-lithium sulfate. M. A. Kiochko. *Ibid.* 1028-39.—The surfaces of solidification and the diagrams of side binary systems of the reciprocal system:  $Li_2Cl_2 + Na_2SO_4 \rightarrow Li_2SO_4 + Na_2Cl_2$  were detd. The diagram of "compn.-temp. of m." of the binary system  $LiCl$ - $Li_2SO_4$  is given for the first time. The direction of reaction and the character of double decompn. in the system were detd. An investigation must be made of the reciprocal systems between the m. p. of each compn. and abs. 0 to obtain a clear conception of transformations proceeding in the system at all temps during its stable existence. C. B.

The para-hydrogen transformation on carbon surfaces at low temperatures. K. W. Rummel. *Z. physik. Chem.* A167, 221-39(1933).—A statistical method is described for following the ortho-para H conversion on C surfaces at low temps. With C from different sources the effects of contamination, gas satn. and activation on catalytic activity were studied. Catalysis is not due to impurities. Treatment with H, O or N at room temp. depressed the low-temp. catalysis in contrast to previously reported acceleration produced by satn. with O at the temp. of liquid air. Pressure-temp. relations were established. Most of the C surface is catalytically effective but not all parts are equally so. A small portion is subject to poisoning. The conversion is unimol. The para-ortho

change has a weakly pos. temp. coeff.; the ortho-para change has a neg. temp. coeff. Roy H. Baechler

The emission of alkali atoms from various ammonia catalysts. A. Keith Brewer. *J. Chem. Physics* 2, 116 18(1934).—The quantity of alkali deposited from promoted Fe catalyst filaments on an Fe reference electrode was measured photoelectrically. Temps. were 675-760° at a pos. ion current of  $1 \times 10^{-6}$  amp. At first the no. of atoms leaving the surface far exceeds that of ions, but decays to a negligible value in the course of several min. Atom emission is increased by  $Al_2O_3$  in the catalyst, as is also the temp. for equiv. ion currents. Both atom and ion emission increase when sintering occurs. The atom emission is explained by lowering of the work function. P. S. Roller

The thermal conductivities of chemically related substances in the liquid state. A. Kardos. *Z. tech. Physik* 15, 79-82(1934).—A survey of existing data shows that in general thermal cond. decreases with increasing mol wt. J. B. Austin

The effect of accommodation on heat conduction through gases. B. G. Dickinson. *Proc. Roy. Soc. (London)* A143, 517-40 (1934).—A modification of the "hot-wire" method for detg. the thermal cond. of a gas is described in which the errors due to convection, effect of accommodation and the temp. discontinuity between the gas and solid surface surrounding the gas are eliminated by exptl. means in one operation, while the radiation correction is very small. By this method the conductivities and accommodation coeffs. were detd. for He, A, H, CO, O, air, N,  $N_2$ ,  $CO_2$ ,  $NH_3$  and  $SO_2$ . Morris Muskat

The heat conductivities of various liquids. A. Kardos. *Z. ges. Kälte-Ind.* 41, 1-6, 29 35(1934).—Data are given for the heat conductivities of  $CO_2$ ,  $MeCl$ ,  $SO_2$  and  $NH_3$  in the liquid state, from -15° to 30°. The heat cond in the crit. region is discussed. F. D. Rossini

Measurement of the specific heats of liquids by a cooling method. R. W. B. Stephens. *Phil. Mag.* 17, 297 312(1934).—The sp. heats of  $C_2H_6$  and  $C_3H_8$  were measured in the temp. range 5-15° by finding the rate of temp. decrease when the liquid was in a vessel in a cooling bath of known temp. The app. was calibrated with  $H_2O$ . An accuracy of 1-2% was attained. E. J. Rosenbaum

The heat content of mixtures of ammonia and water as a function of the composition and temperature. Karl Zinner. *Z. ges. Kälte-Ind.* 41, 21-9(1934).—The exptl. method, app. and procedure are described and data are given in tabular and graphic form for the range -70° to 180° and 0 100%  $NH_3$ . F. D. Rossini

Thermal chemical measurements of the oxides of copper, rhodium, palladium and indium. Lothar Wohler and N. Jockum. *Z. physik. Chem.* A167, 169-79(1933).—The heat of formation of  $CuO$  as calcd. from the exptl. value for its O tension did not agree with the accepted value. The heat of formation was detd. by reduction with H and compared with the theoretical value. Analogous measurements were made on Rh, Pd and Ir. The close agreement of the calcd. and exptl. values indicated the greater reliability of the data as compared with those previously obtained. Roy H. Baechler

The heat of formation of mixed crystals of potassium chloride and potassium bromide. II. M. M. Popov and S. F. Yavorovskaya. *Z. physik. Chem.* A167, 180-2 (1933); cf. *C. A.* 24, 3423.—In studying the effect of time of crystn. on the heat of formation it was found that homogeneous crystals are obtained when 20 g. of the salt is crystd. in not less than 1 1/2 hrs. The method of cooling does not affect the heat of formation but the period of tempering does. By grinding the salts it was impossible to obtain mixed crystals whose heat of formation agreed with that of crystals obtained from the liquid phase. Roy H. Baechler

The thermochemistry of iron. Walter A. Roth and F. Wienert. *Arch. Eisenhüttenw.* 7, 455-60(1934).—The heats of formation of the Fe oxides were redetd. from pure synthetic materials; methods are described in detail. The heats of reaction, at 20.7°, were found to be:  $Fe + 1/2 O_2 = FeO + 64.6 \pm 0.1$  kg. cal.;  $8Fe + 2O_2 =$

$\text{Fe}_2\text{O}_3 + 266.74 = 0.24 \text{ kg. cal.}$ ;  $2\text{Fe} + 1\frac{1}{2}\text{O}_2 = \text{Fe}_2\text{O}_3 + 195.14 = 0.24 \text{ kg. cal.}$ ;  $\text{FeO} + \text{Fe}_2\text{O}_3 = \text{Fe}_3\text{O}_4 + 6.94 = 0.84 \text{ kg. cal.}$ ;  $\text{Fe} + 1\frac{1}{2}\text{Cl}_2 = \text{FeCl}_3 + 93.54 = 0.24 \text{ kg. cal.}$ ;  $\text{Fe}_2\text{O}_3 + 3\text{Cl}_2 = 2\text{FeCl}_3 + 1\frac{1}{2}\text{O}_2 + 8.07 = 0.44 \text{ kg. cal.}$  A comparison with older values is added.

M. Hartenheim

The heat of dissociation of  $\text{Bi}_2$  determined by the method of molecular beams. Cheng Chuan Ko. *J. Franklin Inst.* 217, 173-99(1934).—Method, app. and procedure for detg. the velocity spectrum of Bi atoms and  $\text{Bi}_2$  mol., and for detg. the vapor pressure of Bi are discussed. The data obtained are: heat of dissociation of  $\text{Bi}_2$ ,  $77.1 \pm 1.2 \text{ kg. cal.}$ ; vapor pressure of Bi,  $\log_{10} P_{\text{mm}} = -(52.23 \times 195.26/T) + 8.56$ , between  $1100^\circ$  and  $1220^\circ\text{K}$ . F. D. Rossini

Calculation of the heat of dissociation of gaseous  $\text{KCl}$ ,  $\text{KBr}$ ,  $\text{KI}$ ,  $\text{NaCl}$ ,  $\text{NaBr}$ ,  $\text{NaI}$  and  $\text{LiI}$  into atoms from thermal and optical data. Appendix: The heat of vaporization of potassium and lithium. H. Beutler and Hilde Levi. *Z. physik. Chem.* B24, 263-81(1934).—Thermochem., phys. and optical data are used in a Haber-Born cycle to calc. the heats of dissociation. Results are:  $\text{KI}$  76.0,  $\text{KBr}$  90.3,  $\text{KCl}$  101.2,  $\text{NaI}$  70.7,  $\text{NaBr}$  87.7,  $\text{NaCl}$  97.5,  $\text{LiI}$  75.3 kg. cal., with an error of  $\pm 1.6$  for the Na and K salts and  $\pm 3.0 \text{ kg. cal.}$  for  $\text{LiI}$ . The results are compared with those obtained by other investigators. Electron affinities are also calcd. The heats of sublimation of K and Li are also calcd. by means of the chem. const. and found to be, resp.,  $21.42 \pm 0.2$  and  $33.3 \pm 0.8 \text{ kg. cal.}$  G. M. M.

Thermodynamic derivation of the Boltzmann formula. N. Barbulescu. *Bul. soc. române fiz.* 35, 69-73(1933).—Theoretical.

F. D. Rossini

Formula for reduction of an experimental heat of combustion to the corresponding isothermal heat of combustion. L. J. P. Keffler. *J. chim. phys.* 31, 1-8(1934).—The correction term  $[1.7a + 7.75b + 2.5(c + d)/M] W' - 0.52 W / \Delta t$  is derived, in which  $a, b, c, d$  are the nos. of atoms of C, H, O, N, resp., in a substance of mol. wt.  $M$

of which  $W'$  g. burned in a bomb calorimeter produce a temp. rise of  $1^\circ$ .  $W$  is the mass in g. of standard  $\text{BzOH}$  required to produce  $1^\circ$  rise in temp. and  $\Delta t$  is the actual rise observed.

E. R. Smith

Nature of radiocolloids (Halasinsky) 3.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Evolution of the electron theory, according to Langevin. Jean Ullmo. *Scientia* 55, 103-17(1934).—An address.

L. E. Gilson

The theory of the magnetic electron of Dirac. L. de Broglie. *Arch. sci. phys. nat.* 15, 405-83(1933); cf. C. A. 27, 2374 5.—A review is given of the general assumptions on which the Dirac theory of the electron is based, and of the implications of the theory. The significance of mean values derived from the theory is pointed out and the question of the conformity of the Dirac equations to the requirements of relativity is discussed in some detail.

Morris Muskat

The existence of a proton with negative charge; the constitution of the nucleus of the isotope of hydrogen. Ioan I. Placinteanu. *Bul. soc. române fiz.* 35, 95-102(1933); cf. C. A. 27, 5631.—A neg. proton may be obtained either through disintegration of a photon with great energy (about  $10^9 \text{ e. v.}$ ) or through coupling of a neutron with a neg. electron. The pos. and neg. protons may be considered as complex particles formed from the union of neutrons, primary particles of matter, with pos. and neg. electrons, elementary units of electricity. By applying the uncertainty relation,  $\Delta D \cdot \Delta q \sim h/mc$  for the coeff.  $D$  of reflection of a particle of mass  $m$  on the potential barrier, to electrons and protons an explanation of the great affinity of neutrons for pos. electrons is obtained. Between 2 neutrons the potential  $\pi e^2/r$  exists. The union of 2 neutrons and a pos. electron constitutes the nucleus of  $\text{H}^2$ . Its calcd. mass ( $m_{\text{H}^2} = 2m_n + m_e = 2.0120$ ) is in accord with experience, 2.0130, the calcd. mass defect being  $2m_e$ .

Calvin Brou

Approximate representation of the wave functions of interpenetrating orbits. V. A. Pok. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 241-4(in German 244-7)(1934). Math.

F. H. Rathmann

Results of calculations of atomic wave functions. II. Results for  $\text{K}^+$  and  $\text{Ca}^+$ . D. R. Hartree. *Proc. Roy. Soc. (London)* A143, 506-17(1934); cf. C. A. 27, 5239.—The results of calcns. of at. wave functions by the method of the "self-consistent field" are presented for  $\text{K}^+$  and  $\text{Ca}^+$ . Addnl. results are also given for  $\text{Cu}^+$ .

Morris Muskat

The distribution of wave function and characteristic value among the individual electrons of an atom. T. Koopmans. *Physica* 1, 104-13(1933)—The Fok method (*Z. Physik* 61, 126(1930)) is applied.

B. J. C. van der Hoeven

Importance of kinetic energy of electrons for interatomic forces. H. Hellmann. *Z. Physik* 85, 180-90(1933).—The exchange forces predicted by quantum theory and responsible for chem. bonds between atoms can be qualitatively understood by treating the electrons classically, taking into account the (unclassical) fact that each electron occupies a region of volume  $h^3$  in phase space. Whenever the space available for the electron is decreased, its kinetic energy increases. Two electrons can occupy the same region only if their spins point in opposite directions. This point of view gives a simple picture of the dependence of interatomic forces (chemical forces) on distance. However, this picture must not be taken too literally because, although it gives an approx. correct result for the value of the energy, it leads to wrong predictions as to how this energy is made up of kinetic and potential energy. The same holds for perturbation methods of all kinds. A formula is derived to calc. potential and kinetic energy separately, if only the total energy and its dependence on atomic distance are known.

R. Pederis

Selective photoeffect. M. V. Savost'yanova. *Uspekhi Fis. Nauk* 14, 7-34(1934).—A review discussing selective photoeffect as an optical phenomenon and its observance

with films on metals, non-metals, mono- and polyatomic layers, and complex layers. Twenty-three diagrams illustrate various systems. F. H. Rathmann

The electron theory of metals. A. Sommerfeld. *Naturwissenschaften* 22, 49-52(1934).—A review and discussion of certain features of the electron theory of metals.

B. J. C. van der Hoeven  
A new photoelectric phenomenon. Quirino Majorana *Atti accad. Torino, Classe sci. fis., mat., nat.* 68, 114-34 (1933); cf. *C. A.* 27, 5000. A. W. Contieri

Studies on some photoelectrically conductive substances. I. Some properties of a photoelectrically conductive thallium cell. Chika Asai. *J. Chem. Soc. Japan* 55, 153-8(1934).—The Tl cell in the darkness is a good insulator. The sensitivity of the cell is proportional to the intensity of light. Electric fatigue does not take place when the direct current is smaller than  $10^{-3}$  amps. A. c. at 100 v. does not cause electric fatigue. The sensitivity of the cell is easily spoiled by exposure to strong white light. The cell is more sensitive toward red or infra-red light. In this case elec. fatigue does not occur. II. Temperature effect on the electric resistance of the photoelectrically conductive selenium. *Ibid.* 159-67.—In the darkness between  $17^{\circ}$  and  $109^{\circ}$ , the elec. resistance of Se decreases with the rise of temp. The photoelec. cond. decreases with the rise of temp. and finally disappears at about  $140^{\circ}$ . T. Katsurai

Photocathode and barrier-film effect. P. Görlich. *Naturwissenschaften* 22, 11-12(1934).—Rectifier effects are obtained with composite photocathodes ( $\text{CaO-Cs-Ag}$ , *C. A.* 28, 32<sup>a</sup>) as well as a photocurrent ( $10^{-7}$ - $10^{-8}$  amps. per lumen). On one cathode an external photoeffect (with auxiliary potential) and a barrier effect (without potential) can be observed simultaneously from their additive currents. B. J. C. van der Hoeven

The surface ionization of potassium on tungsten. M. J. Copley and T. E. Phipps. *Phys. Rev.* 45, 344-5(1934).—The surface ionization of K on W and W-O surfaces was detd. at temps. up to  $2550^{\circ}\text{K}$ . Application of the modified Saha equation to the data suggests that a factor, which multiplies the exponential term and cancels at least in part the statistical weights ratio, has been omitted. The work function of W, detd. independently of the thermionic emission, is between 4.50 and 4.57 electron v. Gerald M. Petty

Continuous electron radiation in gas discharges. Wolfgang Finkelnburg. *Phys. Rev.* 45, 341-2(1934); cf. *C. A.* 27, 4733.—The total intensity and intensity distribution of the continuous gas spectra emitted by all condensed discharges are not dependent, to a first approximation, on the electrode material or the medium through which the discharge passes. Their intensity increases with the c. d. This is analogous to the observed property of the continuous spark spectra, in which the intensity of the electron radiation is proportional to the c. d. and the ion density, and is, to a first approximation, independent of the individual properties of the ions. Gerald M. Petty

Electron release in cathode spots of an arc discharge. F. Lüdi. *Z. Physik* 82, 815-32(1933).—Current theories fail to explain the release of electrons from cathode spots, and an attempt is made to explain it as due to collisions of the 2nd kind of multiple charged pos. ions. B. C. A.

Investigation of thin films of organic substances by electron diffraction. C. A. Murison. *Phil. Mag.* 17, 201-25(1934).—The substances studied were tap grease, petrolatum, paraffin wax, heavy thermostat oil,  $\text{C}_{20}\text{H}_{42}$ ,  $\text{C}_{26}\text{H}_{54}$ , picein, tallow, lard, tripalmitin,  $\alpha$ -bromostearic, palmitic and stearic acids and benzyl phthalate. From the spacing in the diffraction pattern of some of these substances an av. distance of 2.56 Å. was obtained which is considered to be the distance between alternate C atoms in a long-chain mol. The backing of the film did not affect the pattern obtained. The mols. of most of the substances studied are extensively oriented. The discontinuities at the film-vacuum and the film-backing interfaces cause the orientation. The theory of the various types of patterns observed is given. The orientation of a hydrocarbon mol. is the more pronounced, the

longer is the mol. Greases are oriented more markedly than are pure substances. The lubricating value of a film is related to the degree of orientation of the mols. in it. E. J. Rosenbaum

Symbols and names for the hydrogen isotopes. Robert S. Mulliken. *Science* 79, 228-9(1934). E. H.

Isotopy of hydrogen. Heavy water. E. Bamann. *Suedent. Apoth.-Ztg.* 74, 115-16(1934).—A review. W. O. E.

The manufacture of deuterium and its compounds. Wells A. Webb. *Ind. Eng. Chem., News Ed.* 12, 63 (1934). E. H.

Heavy hydrogen, a significant discovery. Ernest B. Ludlam. *Pharm. J.* 131, 741-2; *Chemist and Druggist* 119, 764-5(1933).—A lecture. S. Waldbott

New data on the positron. V. V. Shpolskii. *Uspekhi Fis. Nauk* 14, 125-9(1934).—A review. F. H. R.

Diffusion and absorption of positive electrons traversing matter. J. Thibaud and F. Dupré la Tour. *Compt. rend* 198, 806-8(1934); cf. *C. A.* 28, 1921<sup>a</sup>.—By applying the same method as used with Pt to screens of 17 other elements the range of positrons is shown to be in general equiv. to a passage through matter amounting to  $< 500$  mg. per sq. cm.,  $\mu/\rho$  being approx. const. and  $\approx 8.5$ . This value is also obtained by the same method (*mutatis mutandis*) for neg. electrons. Both behave alike until the positrons, after losing most of their kinetic energy, begin to disappear. C. A. Silberrad

The mass of the neutron and the stability of heavy hydrogen. Rudolf Ladenburg. *Phys. Rev.* 45, 224-5 (1934).—The literature on the calcn. of the mass of the neutron is reviewed. Radioactivity in heavy water indicates for  $\text{H}^3$  a transformation period greater than  $10^{14}$  years. This makes Livingston, Henderson and Lawrence's value of 1.0006 (*C. A.* 28, 966<sup>a</sup>) for the mass of the neutron improbable. Louis Goldman

Disintegration of beryllium by deuterons. H. R. Crane and C. C. Lauritsen. *Phys. Rev.* 45, 226-7(1934).—The mixt. of neutrons and  $\gamma$ -rays produced was analyzed by a comparison of the Pb and paraffin absorption curves. The disintegration is represented by the equation  $\text{Be}^9 + \text{H}^2 \rightarrow \text{B}^{10} + n^1 + \gamma$ . Louis Goldman

The emission of protons and neutrons from various targets bombarded by three million volt deuterons. Ernest O. Lawrence and M. Stanley Livingston. *Phys. Rev.* 45, 220(1934).—The neutron yield, given for 8 targets, and a roughly proportional proton yield vary inversely with the at. no. The change is attributed to deuteron and nucleus disintegration. Louis Goldman

Neutrons and magnetic nuclear moments. B. Venkatesachar and T. S. Subbaraya. *Z. Physik* 85, 264-7(1933), cf. *C. A.* 27, 1269.—From the assumption that of the protons and neutrons forming a nucleus as many  $\alpha$  particles as possible are combined in  $\alpha$ -particles and that the remaining neutrons are arranged in shells like the at. electrons, having both orbital and intrinsic magnetic moment, one can deduce values for the magnetic moments of the nuclei which seem to agree in general with those observed from hyperfine structure. The value of the magnetic moment of the neutron that has to be inserted in order to give the agreement is half a proton magneton (The result of Stern, giving 2.5 proton magnetons for the proton, seems not to be taken into account.). R. P.

Gamma-rays from carbon bombarded with deuterons. C. C. Lauritsen and H. R. Crane. *Phys. Rev.* 45, 345-6 (1934).—A very penetrating radiation was obtained from carbon bombarded with deuterons; it consists of very hard  $\gamma$ -rays. The process is probably represented by the equation  $\text{C}^{12} + \text{H}^2 \rightarrow \text{C}^{13} + \text{H}^1 + \gamma$ . G. M. P.

Bombardment of the heavy isotopes of hydrogen by  $\alpha$ -particles. Lord Rutherford and A. E. Kempton. *Proc. Roy. Soc. (London)* A143, 724-30(1934).—In investigating the structure of the deuteron and the mass of the neutron, expts. were made to det. whether the deuteron can be broken up into a neutron and a proton in the bombardment of  $\text{H}_2^3$  by the  $\alpha$ -particles from Po. The no. of neutrons produced by the bombardment of heavy water, if any, was less than  $1 \times 10^7$  of the no. of bombarding



$\alpha$ -particles. \*The max. range of recoil in air of the deuteron in a head-on collision with an  $\alpha$ -particle is about 7% greater than that of recoil of the proton. The stopping power for the  $\alpha$ -particle is the same in  $H_2$  as in H. No difference could be detected in a comparison of the scattering of  $\alpha$ -particles by  $H_2$  with that by H. Conclusion: The field of force surrounding the deuteron is sensibly the same as that of the proton. Allen S. Smith

Exchange of heavy hydrogen atoms between water and organic compounds. K. F. Bonhoeffer and R. Klar. *Naturwissenschaften* 22, 45(1934).—Between water and dissolved sugar only the OH hydrogen is exchangeable (cf. C. A. 28, 406<sup>7</sup>).  $CH_3$  hydrogen is not exchangeable in NaOAc. Mobile H of  $CH_2$  groups, e. g., keto-enol H, however, is exchangeable against water hydrogen. Pure aq. acetone solns. (keto) do not show exchange; after addn. of small amts. of Na (enol formation) exchange appears. The extent increases with the alkyl. B. J. C. van der Hoeven

Exchange of heavy hydrogen atoms between water and molecular hydrogen. K. F. Bonhoeffer and K. W. Rummel. *Naturwissenschaften* 22, 45(1934).—Efforts were made to catalyze the reaction between heavy water and ordinary  $H_2$  by Pt sponge. By shaking the mixt. under pressure, equil. is established in a few days. Agreement with theoretical expectations of being on the side of heavy water at room temp. and with a const. of 3 is found (cf. Oliphant, C. A. 28, 1265<sup>4</sup>; Horiuchi and Polanyi, C. A. 28, 1256<sup>1</sup>, 1254<sup>4</sup>). B. J. C. van der Hoeven

The concentration of  $H^2$  and  $O^{18}$  in heavy water. Walker Bleakney and Austin J. Gould. *Phys. Rev.* 45, 281-2(1934).—A mass spectrograph analysis showed that in  $H_2$  contg. 91 to 98%  $H^2$ , the ratio  $H^2:H^1$  is less than  $1:10^6$ . Accordingly, in ordinary  $H_2$ ,  $H^2:H^1$  is less than  $2:10^6$ .  $O_2$  collected from the cell which yielded 98%  $H^1$  showed the same ratio of  $O^{18}:O^{16}$  as in ordinary water, contrary to the results of Washburn, Smith and Frandsen (C. A. 28, 706<sup>7</sup>). Gerald M. Petty

The isotopic composition of sea water. Edward S. Gillilan, Jr. *J. Am. Chem. Soc.* 56, 406 8(1934); cf. C. A. 28, 377<sup>7</sup>.—Purified sea water has d. 1.0000023 times that of purified Cambridge (Mass.) tap water. The difference is believed due to a variation in isotopic compn. A method of measuring small differences of d. is described. B. A. Soule

Indications of a simple rule relating nuclear resonance levels with atomic number. Ernest Pollard. *Phys. Rev.* 45, 218-19(1934); cf. C. A. 27, 5023.—The energy for penetration of  $\alpha$ -particles into a nucleus by resonance with a "virtual" energy level inside rises linearly with the at. no. because the  $\alpha$ -particle forms a standing wave of const. radius within the potential barrier of the nucleus. Louis Goldman

Oxidation of mercury vapors under the influence of ultra-violet light. \*I. M. Frank. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1933, 146-7 (in English 147-8); cf. Dickinson and Sherrill, C. A. 20, 1954; Noyes, C. A. 22, 2717; 23, 3165; Leipunskii and Sagulin, C. A. 23, 1054, 5089.—In the oxidation of Hg vapors with O under the influence of ultra-violet, e. g., exciting the Hg atoms with the line 2537 Å., the reaction may follow the following course:  $Hg^* + O_2 \rightarrow Hg + O_2^*$ ;  $O_2^* + O_2 \rightarrow O_3 + O$ ;  $O_3 + Hg \rightarrow HgO + O_2$ , where  $O_2^*$  is an excited mol. in the state  $^2\Sigma$  or  $^2\Pi$ . The exptl. procedure carried out under subatm. pressure measured manometrically confirmed this assumption. The removal of short-wave light from the exciting rays has no effect on the reaction, but a decrease in the exciting rays has an adverse effect. The most effective lines are those of Al at 1880, 1935 and 1990 Å., which induce the formation of  $O_3$  and Hg is not needed under the above conditions provided that some  $O_2$  is already preformed. A. A. Boetlingk

The calculation of internal conversion coefficients of  $\gamma$ -rays. J. B. Fisk. *Proc. Roy. Soc. (London)* A143, 674-8(1934).—The internal conversion coeff. of  $\gamma$ -rays was calcd. for the  $L_1$  shell of Ra C, on the assumption that the nucleus radiates the field of a quadrupole. Previous K-shell results (cf. Taylor and Mott, C. A. 27,

896) were extended. Limiting values for the very soft  $\gamma$ -rays for the K and  $L_1$  shells, quadrupole and dipole, were obtained. The ratio of internal conversion in the K and  $L_1$  shells is about 1:6.7 for hard  $\gamma$ -rays, and remains nearly const. up to a value of  $\theta (= mc^2/h\nu)$  of 2. The theory predicts almost complete conversion in the  $L_1$  shell for the softest  $\gamma$ -rays which could be converted in this shell. Allen S. Smith

Measurements of the relative velocities of the  $\alpha$ -particles from radon, radium A and radium C'. G. H. Briggs. *Proc. Roy. Soc. (London)* A143, 604-17(1934); cf. C. A. 27, 3137.—The relative velocities of the  $\alpha$ -particles from Rn, Ra A and Ra C' were found by the direct deflection method to be in the ratios 0.84553:0.88403:1.00000, resp. The probable error is estd. to be one part in 80,000. Morris Muskat

The ratio of the actinium to the uranium branches in the uranium family. M. Francis and Cheng-da-Chang. *Compt. rend.* 198, 733-5(1934).—The U and Po were sepd. from 3 samples of Belgian Congo pitchblende and one of Colorado carnotite (cf. C. A. 26, 5007). Thin layers were prepd. by crushing in the usual way, by ultrasonic pulverization and (for U only) by electrolysis of aq.  $UO_2(NO_3)_2$  at 60° in presence of AcOH and  $NH_4OAc$ , and conversion of the resultant hydrate to  $U_3O_8$  at 700°. The ratio of the ionization currents, measured with a Pohl electrometer, was 0.023, giving as the ratio of the branches 0.04 (cf. Grosse, C. A. 27, 220). C. A. S.

Two new  $\alpha$ -radiators and a new radiation of unknown origin. G. Dieck. *Naturwissenschaften* 21, 800-7(1933).—From a great no. of measurements of the  $\alpha$ -rays from metal surfaces (Cu plate, Cu wire and Au wire,  $N_2$  atm.) 2 new  $\alpha$ -radiators were found with ranges 0.9 and 1.5 cm. in air. Identification of this radiation with the one of U isotopes (Wilkins and Rayton, C. A. 27, 6836) is uncertain. A novel corpuscular radiation was found; it reached satn. at 50 v. instead of 1200 v. and was independent of the material of the chamber wall. The total path of the rays lay inside the spherical chamber of 3.9 cm. radius. This radiation was perhaps due to secondary neutrons from cosmic radiation (Feather, C. A. 28, 1264<sup>4</sup>). It was similar to the neutron effect described by Locher (C. A. 28, 908<sup>4</sup>). B. J. C. van der Hoeven

Phenomena associated with the anomalous absorption of high-energy gamma radiation. II. L. H. Gray and G. T. P. Tarrant. *Proc. Roy. Soc. (London)* A143, 681-706(1934); cf. C. A. 26, 4241.—C, O, K, Cu, Fe, Sn and Pb emit a comparatively soft secondary  $\gamma$ -radiation when irradiated by the hard  $\gamma$ -rays of either Th C' or Ra C. The quality of the secondary radiation was studied by absorption methods. The absorption curve of the ordinary Compton scattered radiation (at 125°) was calcd. and also detd. with a C radiator. The observations are discussed. In attempting to interpret the observations in terms of nuclear structure, any hypothesis which implies that the major portion of the emission is a "characteristic radiation" of the absorbing system must be abandoned. III. *Ibid.* 706-24.—Conclusions which can be derived from results of expts. presented in part II regarding the proportion of the  $\gamma$ -ray energy absorbed by a nucleus which is emitted by it as radiation having a smaller quantum energy are discussed. Evidence was obtained that the secondary radiation was really a  $\gamma$ -radiation. Some new exptl. results of the isotropic distribution of this radiation, and of addnl. expts. made to det. the mechanism of the interaction are presented. A. S. S.

The calculation of the ionization caused by radon in a spherical volume. P. C. Capron. *Bull. soc. chim. Belg.* 43, 25-34(1934).—Mathematical. A. L. Henne

Quantitative experimental investigations on the decomposition of hydrogen sulfide by  $\alpha$ -particles. W. Mund, M. Schouwenaars and K. Devriendt. *Bull. soc. chim. Belg.* 43, 49-72(1934).—At low pressure, and with a small radiation intensity, the decompn. of gaseous  $H_2S$  by  $\alpha$ -particles has an ionic efficiency of 2.12; confirming Colmant's measurements (C. A. 27, 663). The ionic yield rises with increasing pressure (30% from 6 to 140 cm.). When the irradiation intensity becomes very

large, the ionic efficiency decreases (as much as 10% in the reported expts.). There is no reason to believe that, on the path of an isolated  $\alpha$ -particle, the chem. effect should not be strictly proportional to the ionization. Adding H to H<sub>2</sub>S lowers the ionic efficiency negligibly, as long as the proportion of inert gas remains lower than 10%.

A. L. Hanne

Distribution of radium in crystals of radiferous barium bromide. B. E. Marques. *Compt. rend.* 198, 819-21 (1934); cf. C. A. 27, 3665.—Two methods show a marked decrease in the relative amts. of Ra from the center to the periphery of a crystal of BaBr<sub>2</sub>·2H<sub>2</sub>O contg. RaBr<sub>2</sub> (cf. C. A. 23, 750).

C. A. Silberrad

Segregation of polonium in a bismuth crystal. Alfred B. Focke. *Phys. Rev.* 45, 219-20 (1934).—The no. of  $\alpha$ -particles emitted per unit time by a Bi crystal infected with Po while molten and cleaved parallel to the (111) planes is a discontinuous function of the effective distance from the crystal in air, showing segregation in layers parallel to the (111) planes.

Louis Goldman

Oil-soluble compound of polonium. M. Servigne. *Compt. rend.* 198, 731-3 (1934).—If an alk. soln. of Po is slightly acidified with alc. camphorcarboxylic acid and extd. with C<sub>6</sub>H<sub>6</sub> 40% of the Po passes into the C<sub>6</sub>H<sub>6</sub>, from which on centrifuging 22.2% seps. as a colloidal suspension. CHCl<sub>3</sub> or C<sub>6</sub>H<sub>6</sub> exts. about 40% of the Po when added to the product formed by adding H<sub>2</sub>O and camphorcarboxylic acid to dry Po hydroxide. H<sub>2</sub>O dissolves most of the Po resulting from the evapn. of such a (CHCl<sub>3</sub> or C<sub>6</sub>H<sub>6</sub>) soln. to dryness; olive oil if added to the soln. and the CHCl<sub>3</sub> or C<sub>6</sub>H<sub>6</sub> removed by heat will act in a similar way (cf. C. A. 25, 4760).

C. A. Silberrad

The chemical and physical-chemical properties of polonium. I. A chemical study of several compounds of polonium. M. Servigne. *J. chim. phys.* 31, 47-64 (1934).—Po was pptd. as the oxalate from dil. HNO<sub>3</sub> solns. contg. La, Y, Sc, Ca and Sr. The Po ppt. was entrained best, and about equally, by the La and Y; next by Sc; and rather poorly by Ca and Sr. The analogy with the trivalent elements gives further proof that the element is trivalent. Metallic acetylacetonates of the Al, Fe, In, group have the general formula M(Ac<sub>2</sub>CH)<sub>3</sub>; of the rare earth group, M<sub>2</sub>(Ac<sub>2</sub>CH)<sub>6</sub>; Th(Ac<sub>2</sub>CH)<sub>4</sub> distills with slight decompn. at 8-10 mm. and at 260-270°. The Po acetylacetonate distills at 10 mm. and at 230° with partial decompn.; it is sol. in org. solvents, and practically insol. in H<sub>2</sub>O. (cf. C. A. 27, 1559). G. M. P.

Radioactive thermal springs at Mangalia (Roumania), determinations made during August, 1932. T. Donescu. *Bul. bilunar soc. fis. romania* 1933, No. 56, 6-8.

G. T. Motok

Radioactive minerals from Shinden, Gifu Prefecture Satoyasu Iimori, Jun Uoshimura and Shin Hata. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 209-11 (1934).—Weakly radioactive samples of allanite and gadolinite were found in a quarry in the granite region of Shinden. Analysis of the gadolinite showed 0.49% U<sub>3</sub>O<sub>8</sub> and 1.78% ThO<sub>2</sub>. Of the gadolinite 0.2 g. had a radioactivity nearly equal to that of 2 mg. U<sub>3</sub>O<sub>8</sub>. The allanite contained no U<sub>3</sub>O<sub>8</sub> but 1.55% ThO<sub>2</sub>. The microcline-perthite in which these minerals were embedded shows a brilliant thermoluminescence.

Oden B. Sheppard

Nature, effects and menace of radium poisoning in water. Leonard B. Loeb. *Water Works Eng.* 87, 217-18 (1934).—The dangers of the use of radioactive waters sold by nostrum vendors are pointed out. A dosage of  $2 \times 10^{-6}$  g. of Ra has been known to be fatal.

W. A. Moore

Nature of radiocolloids. Colloidal solutions produced from bismuth nitrate. M. Haissinsky. *Compt. rend.* 198, 580-3 (1934).—The degree of coagulation after 2-3 days of a series of solns. of Bi(NO<sub>3</sub>)<sub>3</sub> of equal concn. in Bi but varying  $\rho_H$  (1-14), or after 1-2 hrs. on addn. of an electrolyte, plotted against  $\rho_H$  gives a curve with 2 max. A similar curve is obtained on centrifuging such a soln. to which Th C or Ra E is added and plotting radioactivity against  $\rho_H$  (cf. C. A. 26, 367). Such behavior is inherent in compds. of Bi (and its isotopes Th C and Ra E), and

1 adsorption on impurities is of secondary importance, the Bi(OH)<sub>3</sub> forming a colloidal soln. in which it is positively charged (cf. C. A. 8, 297, 2805). The first max. follow, ionic soln. of Bi(OH)<sub>3</sub> with formation of Bi<sup>+++</sup>; the following min. is due to the action of HNO<sub>3</sub> as an electrolyte, the second max. to the peptizing action of H<sup>+</sup> in very low concn., followed by a decrease due to ionic soln. of Bi(OH)<sub>3</sub> to form bismuthate. C. A. Silberrad

The limits of validity of the Klein-Nishina equation 2 M. P. Bronshtein. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 272-3 (in German 273-5).—The upper limit is  $h\nu < 10^7$  e. v.

F. H. Rathmann

Atom disintegration by cosmic radiation. E. C. Steinke, A. Gastell and H. Nie. *Naturwissenschaften* 21, 898-9 (1933).—The pressure effect in atom disintegration by cosmic radiation (cf. C. A. 27, 5635) was found to be as high as 5% per mm. Hg for radiation penetrating 10 cm. Pb as against 0.2% per mm. Hg for the total cosmic radiation. The effect is attributed to a new, very soft cosmic radiation. The effect is not observed in the ionization by secondary radiation. The pressure effect is not noticeable inside a 30-cm. Fe wall. Many details are given.

B. J. C. van der Hoeven

Soft radiation on the Pic du Midi. H. Garigue. *Compt. rend.* 198, 764-5 (1934); cf. *Ibid.* 494.—Measurements with the author's app. of the soft radiation of terrestrial radioactive origin at the Pic du Midi (2860 m.) in July-Aug. and Nov.-Dec., 1933, show that this is about 4.5 times stronger in winter than in summer. C. A. S.

A high-intensity mass-spectrometer. W. R. Smythe, L. H. Rumbach and S. S. West. *Phys. Rev.* 45, 220 (1934).—A magnetic lens is described by which a current of 0.1 ma. of K<sup>40</sup> ions and a resolving power sufficient for Li were obtained.

Louis Goldman

The constant in the Compton equation. P. A. Ross and Paul Kirkpatrick. *Phys. Rev.* 45, 223 (1934).—An exptl. value of  $(0.02380 \pm 0.00003) \times 10^{-8}$  cm. was obtained for the const. specifying the wave-length modification of scattered x-rays as compared with the simple theoretical value of  $0.02415 \times 10^{-8}$  cm. and a theoretical value of  $0.02384 \times 10^{-8}$  cm. which R. and K. compute. I. G.

The relativistic photoelectric effect. Harvey Hall. *Phys. Rev.* 45, 216-17 (1934).—The relativistic quantum electrodynamics expression for the photoelectric cross section of a Dirac electron in the field of a nucleus is evaluated, giving for the total absorption from the K shell for lead for  $\lambda = 4.7$  X. U. a value of  $1.1 \times 10^{-24}$  sq. cm.

Louis Goldman

Atomic scattering factors for Röntgen rays as a problem of the dispersion theory (for the K-levels). H. Honl. *Ann. Physik* 18, 625-55 (1934); cf. C. A. 26, 5003. Math. The dispersion formula of Waller (C. A. 22, 912) is divided into two parts, the first corresponding to the geometric interference theory of at. scattering factors and the second to anomalous scattering by electron shells. This second part is developed on the basis of an addn. theorem for spherical functions according to the idea of multipoles. A parameter  $\kappa$  is introduced equal to  $2\pi a/\lambda$ , where  $a$  is the mean shell radius of the layer concerned. Calcn. of the relation of frequency is given for the dipole and quadrupole of the K shell. The calcd. at. scattering factor curves are in general in good agreement with recent measurements.

L. P. Hall

The structure of the K radiation of very light atoms A. Hautot. *J. phys. radium* [7], 5, 20-6 (1934); cf. C. A. 27, 5646.—An app. is described for studying the fine structure of the x-rays from light atoms. Results are given for the K rays of O, N, C, B and Be. The theory of Langer explains the structure of the rays observed for C and the heavier elements, while B and Be give anomalous radiations as well as continuous bands. The theory that these are due to a continuous energy spectrum of the valence electrons of B and Be in the crystal lattices is contradicted by the occurrence of a very sharp K $\alpha$  line for B and the fact that the structure of the B rays is the same for various B crystals. It is suggested that the anomalous B and Be radiations are due to unquantized forbidden transitions.

Morris Muskat

**Fine structure of the  $K_{\alpha}$  line of beryllium.** F. C. Chalklin. *Nature* 133, 293-4 (1934).—The  $K_{\alpha}$  line of Be consists of 2 diffuse components, sep'd. by 5.3 Å. The long-wave line is the strongest; it coincides with the 5th-order  $K_{\alpha}$  of O.

**An attempt to determine the influence of chemical bonds upon the absorption of x-rays.** A. Soltan. *Acta Phys. Polonica* 1, 317-28 (1932) (in French).—The absorption of x-rays by  $H_2O$  and gaseous and liquid O is det'd. by measuring the thickness of glass layers equiv. to the masses of O and  $H_2O$  per sq. cm. of the screen. The absorption coeffs. obtained are:  $H_2O$   $1.047 \pm 0.005$ , O,  $1.165 \pm 0.010$ ;  $H_2$  (calcd.)  $0.29 \pm 0.080$ . The results do not permit det'n. of a variation of the absorption coeff. of x-rays depending on the structure of the mol. This variation is camouflaged by expl. errors. J. W.

**Ionization of inert gases by x-rays.** E. Wilhelm. *Z. Physik* 83, 341-50 (1933).—The mean energy per ion pair produced is 27 electron v. for Ne and 24.6 for Ar; the values are independent of the ionizing wave length

**An improved x-ray measuring apparatus.** E. Hasche. *Z. tech. Physik* 15, 68-72 (1934).—A circuit using 2 tube-electrometers is described. J. B. Austin

**The x-ray absorption spectra of the alloy gold-copper.** Takeshi Hayashi. *Naturwissenschaften* 22, 90 (1934).—From the results of Coster and Veldkamp (*C. A.* 26, 1180) on the fine structure of the Au  $L_{III}$  and Cu  $K$  absorption spectrum in a Au-Cu alloy (50 at. %) it is concluded that the Au  $L_{III}$  absorption maxima of pure Au coincide with the Cu  $K$  absorption maxima of the alloy and vice versa, and that the Cu  $K$  minima of pure Cu coincide with the Au  $L_{III}$  minima of the alloy and vice versa. B. J. C. van der Hoeven

**X-ray spectroscopic studies of complex chemical structure problems.** IV. Otto Stelling. *Z. physik. Chem.* B24, 282-92 (1934); cf. *C. A.* 27, 1270.—X-ray absorption spectra were obtained for the compds.:  $MnCl_2 \cdot 2py$ ,  $MnCl_2 \cdot 2quin$ ,  $MnCl_2 \cdot 4tu$ ,  $MnCl_2 \cdot 4urea$ ,  $ZnCl_2 \cdot 2py$ ,  $ZnCl_2 \cdot 2quin$ ,  $ZnCl_2 \cdot 2an$ ,  $ZnCl_2 \cdot 2NH_3$ ,  $ZnCl_2 \cdot 3en + 2H_2O$ ,  $ZrCl_4 \cdot 8NH_3$ ,  $ZrCl_4 \cdot 2(pyHCl)$ ,  $CdCl_2 \cdot 2py$ ,  $CdCl_2 \cdot 2quin$ ,  $CdCl_2 \cdot 2an$ ,  $CdCl_2 \cdot 2pip$ ,  $CdCl_2 \cdot 3en + H_2O$ ,  $SbCl_3 \cdot 3an$ ,  $SbCl_3 \cdot 3quinHCl$ ,  $CeCl_3 \cdot 7H_2O$ ,  $(pyHCl)_2CeCl_3$ ,  $(quinHCl)_2CeCl_3$ ,  $(quinHCl)BiCl_3$ , where  $py$  = pyridine,  $quin$  = quinoline,  $tu$  = thiourea,  $an$  =  $PhNH_2$ ,  $en$  =  $(NH_2CH_2)_3$ ,  $pip$  = piperidine. Photometer curves of the band edges are shown and the results are discussed with relation to binding of the complex groups. G. M. M.

**The absolute intensity of the nebular lines.** E. U. Condon. *Astrophys. J.* 79, 217-34 (1934).—Formulas are developed for the transition probabilities of magnetic dipole and elec. quadrupole radiation in at. spectra. These are used to calc. the abs. intensities of the nebular lines due to transitions within the  $p^1$ ,  $p^1$  and  $p^4$  configurations. C. C. Kless

**"Doublet" intervals for  $H^1\alpha$  and  $H^2\alpha$ .** R. C. Gibbs and R. C. Williams. *Phys. Rev.* 45, 221 (1934).—The interval between intensity peaks is  $0.304 \text{ cm}^{-1}$  for  $H^1\alpha$  and  $0.317 \text{ cm}^{-1}$  for  $H^2\alpha$ , discrepancies with theory of 6 and 2%, resp. Louis Goldman

**Anomalous dispersion of the doublet  $H\alpha$  of ionized calcium.** L. Puccianti. *Nuovo cimento* 10, 373-82 (1933).

**The  $K$  line ( $\lambda$  3933.7) has an intensity 1.98 times that of the  $H$  line ( $\lambda$  3968.5). The app. is described. J. B. A.**

**Reversibility of red line of cadmium.** A. Pérard. *Compt. rend.* 198, 727-9 (1934).—An improved Cd vapor lamp is described showing more readily the reversal of the Cd red line, and its resolution into 2 components. The possible error due to this renders the Cd red line of doubtful value as an international standard of length. C. A. S.

**The mean lives of excited neon atoms.** J. H. E. Griffiths. *Proc. Roy. Soc. (London)* A143, 588 (1934).—A method of measuring the av. lives of the excited states of Ne is described, in which a Kerr cell is used to find the lag between the emission of light and the current in a high-frequency discharge in Ne. It is shown theoretically how this lag should depend on the av. life of the state. The results obtained agree with the theory if

allowance is made for a small lag between the excitation and the current in the discharge tube. The values of the av. life measured ranged from  $3.9 \times 10^{-8}$  seconds for the line  $\lambda$  5853 to  $20 \times 10^{-8}$  seconds for  $\lambda$  6402, and it is shown that lines originating from the same upper level give the same value of the av. life. The method possesses the advantages that it may be used for any atom whose spectra can be produced in a high-frequency discharge, and that sufficient light is produced to enable a spectrograph to be used. Morris Muskat

**The fluorescence of a mixture of cadmium and zinc vapors.** R. Śpiwankiewicz. *Acta Phys. Polonica* 1, 345-50 (1932) (in German).—The fluorescence of a mixt. of Cd and Zn vapors, excited by intense light, *e. g.*, sparks between different metals as Cd, Zn, Bi, Mg, Al and Fe, is yellow green and takes place already at  $450^\circ$ . Its intensity increases with the rise of temp. At  $900^\circ$  it is less visible because of the radiation of the oven. The spectrum obtained at  $780^\circ$  shows a continuous band extending from 4850 to 6400, with a max. at 5200 Å. In pure vapor of either Zn or Cd this band does not exist. The main region of excitation of the fluorescence of the Cd-Zn vapor mixt. lies between 2300 and 2150 Å.

**Degree of polarization of fluorescence of mercury vapors.** A. Kastler. *Compt. rend.* 198, 723-5 (1934); cf. *C. A.* 28, 409<sup>a</sup>.—The degree of polarization,  $P = (I - i)/(I + i)$ , where  $I$  and  $i$  are, resp., the intensities of light vibrating vertically and horizontally in the fluorescent lines 4048, 4358 and 5461 produced by incidence of 2537 and 4358 from a Hg arc in various states of polarization and unpolarized (in this case with a magnetic field in the direction of the incident beam), on Hg vapor, has been calc'd. The calc'd. results for the last case show qual. agreement with the expl. results, and vary greatly with temp. J. Wiertelak

**Degree of polarization of fluorescence of mercury vapor in presence of nitrogen.** A. Kastler. *Compt. rend.* 198, 814-16 (1934); cf. preceding abstr. C. A. Silberrad

**Resonance in collisions of the second kind.** W. Hanle and K. Larché. *Z. Physik* 85, 548-54 (1933).—In collisions of the second kind, where excitation energy has to be transferred from one atom to another, the cross section depends very much upon the difference in excitation energies. If one considers the depolarization of Na fluorescence by collisions, one of the atoms is an excited Na, the other one must be excited to an oscillation in a different direction. By applying a suitable magnetic field one can vary the difference between the energies of the 2 excited states without getting any depolarization through the direct action of the field. The observed decrease of depolarization with increasing field strength (taken from old measurements by Hanle) det's., therefore, the resonance function, which is steeper than that given theoretically by Kallmann and London. R. Peierls

**Scattering of light by excited atoms.** V. Weisskopf. *Z. Physik* 85, 451-81 (1933).—The natural breadth of an absorption line starting from an excited (and not metastable) state of the atom has been investigated theoretically. As the initial state has a finite life time, there must be some external action (thermal excitation, electron impact, etc.) which always again excites new atoms. In general the results will depend on the special character of this action. One can find such conditions, however, that the absorption depends only upon the no. of excited atoms, and it is not necessary to take explicitly into account the way in which they have been excited. Formulas for the absorption and scattering coeffs., also for processes involving more than one light quantum, have been obtained. R. Peierls

**The absorption spectrum of thallium vapors in the short ultra-violet.** G. S. Kvater, N. V. Krencnevskii and A. N. Filippov. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 110-11 (in German 111 12) (1934).—A band was observed at 2007 Å., another at 2376 Å. and lines were observed at 2205.5, 2169.5 and 2150.1 Å. The bands broaden, on heating, toward the low wave lengths. F. H. Rathmann

**The resonance series of lead vapor.** Marja Domaniew-

- ska-Kruger. *Acta Phys. Polonica* 1, 357-62(1932)(in German).—The fluorescence of Pb vapor shows 2 doublet series of bands, one excited by the Hg line 4358.3 Å., and another faint band excited by the Hg line 5461.0 Å. The presence of the series indicates a formation of stable Pb mols. in the vapor. The intensity of the series components decreases considerably with the distance from the exciting wave length. J. Wiertelak
- The intensities of some multiplets of Fe II and Ti II in stellar spectra. C. T. Elvey. *Astrophys. J.* 79, 263-70 (1934).—The intensities of selected absorption lines of Fe II and Ti II in the spectra of 8 stars exhibit a tendency to be directly proportional to the emission intensities as observed in the flash spectrum instead of to the square roots of the emission intensities. C. C. Kiess
- Spark spectra of bismuth, Bi III and Bi II. M. F. Crawford and A. B. McLay. *Proc. Roy. Soc. (London)* A143, 540-57(1934).—With the aid of new wave-length data extending from 1000 Å. in the extreme ultra-violet to 10,000 Å. in the infra-red the analyses of Bi III and Bi II previously given (*C. A.* 25, 457) are now revised and extended. The spectra were excited by an electrodeless discharge in Bi vapor, which gives lines narrow enough to permit measurement of hyperfine structures. Comprehensive tables present for these spectra the classified lines, hyperfine structures, and the terms, including the basic term  $6p^2P$  of Bi III. C. C. Kiess
- Notes on intensities in the spectrum O II. K. G. Emeleus. *Proc. Natl. Acad. Sci.* 20, 115-17(1934).—It is suggested that some cumulative effect, probably successive electron impacts, is the process by which certain multiplets of O II are excited. These multiplets do not appear with other O II groups in the neg. glow of a cold-cathode discharge of low c. d., but require for their excitation heavier currents such as prevail in hollow cathode and condensed discharges. C. C. Kiess
- Anomalous multiplet intensities in stellar spectra and sunspots. A. D. Thackeray. *Monthly Notices Roy. Astron. Soc.* 94, 99-115(1933).—The intensities of the 12 lines of the Fe I multiplet  $a^4F - s^2D^2$  were measured microphotometrically on spectrograms of stars of classes F, G, K and M. The observed and theoretical intensities are in good agreement for stars of classes F<sub>0</sub>, G<sub>0</sub> and K<sub>0</sub>; but for cooler stars of classes K<sub>0</sub> and M the weak members of the multiplet are strengthened relative to the stronger members. The same effect is observed on comparison of the disk and spot spectra of the sun. C. C. Kiess
- Possible variations in the intensity of the Fraunhofer lines. M. Minnaert, W. Bleeker and A. P. H. van der Meer. *Z. Astrophys.* 8, 59-61(1934).—Measurements of the profiles of the H and K lines of Ca have been made on spectrograms of the scattered light of the northern sky. At sun-spot max. the lines underwent fluctuations in intensity which showed a striking correlation with the solar const. of radiation, their profiles becoming deeper with increase in value of the solar const. At sun-spot min. the fluctuations were small and of the order of the error of observation. C. C. Kiess
- Calibration of Rowland's scale of intensities for solar lines in equivalent breadth. G. F. W. Mulders. *Z. Astrophys.* 8, 62-5(1934).—Rowland's intensity ests. of the absorption lines in the sun's spectrum have been expressed in terms of equiv. breadth, which is defined as the ratio of the total amt. of energy absorbed in the line to the energy contained in a strip of continuous spectrum 1 Å. in width close to the line. It was found that the equiv. breadth corresponding to a certain intensity is not const. for different wave lengths, but increases gradually in value from the ultra-violet to 5500 Å., then decreases strongly from 5500 to 5000 Å., from which point it again increases steadily to the red. C. C. Kiess
- Photography of the near infra-red region of stellar spectra. Paul W. Merrill. *Astrophys. J.* 79, 183-202 (1934).—The new types of photographic plates described by Mees (*G. A.* 26, 4546) have been used to study the near infra-red spectra of stars of various classes. Lines of H, N I, O I, Mg II and Ca II are conspicuous in the earlier type spectra, and those of Ca I, Ti I and Fe I in the spectra of types K and M. Heads of TiO bands are also prominent in spectra of type M. C. C. Kiess
- Flame and spark-in-flame spectra of rare earths. C. J. Rodden and O. S. Plantinga. *Phys. Rev.* 45, 280 (1934).—A spark passing through the flame directly above the inner cone considerably shortened the time of exposure; the same bands were shown as in the flame alone. The acetate, nitrate, chloride and sulfate all gave the same bands. Nineteen bands are reported for LaCl<sub>3</sub>, 7 for PrCl<sub>3</sub>, 26 for Nd, 41 for SmCl<sub>3</sub>, 16 for GdCl<sub>3</sub>, 14 for YbCl<sub>3</sub>, and 13 for YCl<sub>3</sub>. Gerald M. Petty
- Ultra-violet bands of beryllium chloride. W. R. Fredrickson and Martin E. Hogan, Jr. *Phys. Rev.* 45, 222-3(1934).—A band system lying in the near ultra violet region (3468-3700 Å.) due to a  $^2\Pi \rightarrow ^2\Sigma$  electronic transition is described. Louis Goldman
- The infra-red absorption spectrum of water, containing protium and deuterium. A. L. Casselman. *Phys. Rev.* 45, 221-2(1934).—The absorption curve of water containing 56% deuterium is shown. It has strong bands at 4.2  $\mu$  and 6.9  $\mu$  not shown by ordinary water. L. G.
- The band spectrum of ionized CdH. Erik Svensson and Folke Tyrén. *Z. Physik* 85, 257-63(1933).—More exact measurements permit interpretation of bands, which could not previously be analyzed. The disson. energy is approx.  $2.0 \pm 0.1$  v., in agreement with other values. R. Peierls
- A triplet band spectrum of aluminum hydride. W. Holst. *Z. Physik* 86, 338-47(1933); cf. *C. A.* 28, 1272<sup>4</sup>.—A triplet band system has been found. It shows pre-dissocn. The disson. energy of the lower state is less than 0.52 v. R. Peierls
- Structure of the second positive group of nitrogen. Arnold Guntch. *Z. Physik* 86, 262-73(1933).—Measurements in the band spectrum of N<sub>2</sub> are made. R. P.
- The so-called second positive group in the nitrogen spectrum. D. Coster, F. Brons and A. van der Ziel. *Z. Physik* 86, 411-12(1933); cf. *C. A.* 28, 411<sup>1</sup>.—Correction of some errors concerning the interpretation of the bands and the assumed values of disson. and excitation energies. R. Peierls
- The first negative group of ionized CO. Helmut Biskamp. *Z. Physik* 86, 33-41(1933).—A new method for obtaining intense band spectra of ionized CO has been developed and made it possible to photograph 22 new bands. One can obtain the potential curves for 3 electronic states and calc. their disson. energies. R. Peierls
- Rotational analysis of the  $^2\Sigma \rightarrow ^2\Sigma$  and  $^4\Pi \rightarrow ^2\Sigma$  bands of ionized CO. R. Schmid and L. Gerö. *Z. Physik* 86, 297-313(1933).—An analysis of exact measurements proves, as expected before, that the final states of these bands are identical. A complete analysis is given. R. Peierls
- Zeeman effect of the "comet tail" bands. R. Schmid and L. Gerö. *Z. Physik* 86, 314-20(1933).—Measurements of the Zeeman effect of these bands are given. R. Peierls
- Combination relations in the absorption spectrum of liquid oxygen. J. W. Ellis and H. O. Kneser. *Z. Physik* 86, 583-91(1933); cf. *C. A.* 27, 5641.—Measurements and suggested interpretation of some absorption bands of liquid O are given. R. Peierls
- Rotational analysis of the absorption bands of ICl. W. E. Curtis and J. Patkowski. *Phil. Trans. Roy. Soc. (London)* A232, 395-430(1934).—The absorption band of ICl, in the region from 6500 to 6800 Å., were observed under high dispersion to derive wave nos. of the lines sufficiently accurate for a rotational analysis. The bands are of the  $^2\Pi_1 \leftarrow ^2\Sigma$  type, consisting of P, Q and R branches. In all, 12 bands due to the more abundant isotope Cl<sup>35</sup> have been completely analyzed, accounting for practically all the stronger lines measured. The analysis yields accurate values for the band origins and the chief const. of the normal and excited states,  $^2\Sigma$  and  $^2\Pi_1$ , resp. C. C. K.
- The absorption spectrum of diatomic antimony (Sb<sub>2</sub>). S. M. Naudé. *Phys. Rev.* 45, 280(1934).—The spectrum of Sb<sub>2</sub> has been studied, and an equation is given for the heads of the bands observed. The observed intensities due to the mols. (Sb<sup>121</sup>)<sub>2</sub>, Sb<sup>121</sup>Sb<sup>123</sup> and (Sb<sup>123</sup>)<sub>2</sub> are in

agreement with the theoretical ratio of 5:8:3. The spectrum is very sensitive to changes in temp. and pressure.

Gerald M. Petty

**Magnetic extinction of tellurium ( $\text{Te}_2$ ).** J. Genard. *Compt. rend.* 198, 816-19(1934); cf. C. A. 28, 708<sup>8</sup>, 1273<sup>8</sup>.—By similar methods but with a more powerful magnetic field Smoluchowski's results (cf. C. A. 28, 394<sup>8</sup>) are confirmed, save that the percentage of quenching is slightly less.

C. A. Silberrad

**The resonance excitation of thallium spectrum in the vapors of its halide salts.** H. Neulmin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 212-13 (in English 213 14).—Ultra-violet emission lines, from spark discharges, of nearly the same wave length as the absorption lines of the Tl atom, were observed to excite high-energy Tl I lines in the vapors of some halide salts. This resonance phenomenon is not a photodissocn. of the Tl X mol., but is accounted for by the fact that the Tl X vapor contains enough free Tl atoms to absorb energy from the wings of the exciting lines, which are broadened sufficiently for resonance to occur.

C. C. Kiess

**Elementary notions of quantum mechanics.** Karl K. Darrow. *Rev. Modern Physics* 6, 23-68(1934). E. H.

**Dissociation of excited diatomic molecules by external perturbations.** C. Zeuer. *Proc. Roy. Soc. (London)* A140, 660-8(1933).—Math. Elec. fields of 20,000 v. cm.<sup>-1</sup> have a marked dissoc. effect on excited states which are crossed by appropriate repulsive states. All types of transitions are readily induced by collisions.

B. C. A.

**Influence of light on paramagnetic susceptibility.** D. M. Bose and P. K. Raha. *Nature* 133, 258-9(1934); cf. C. A. 27, 227.—The change,  $\Delta K$ , in the paramagnetic susceptibility of a soln., produced by the absorption of light, is given by  $\Delta K = 2\mu_0 n_2(p_2 - p_1)/3kT$ , where  $p_1$  and  $p_2$  are the magnetic moments of the ion in the ground and excited states, resp., and  $n_2$  is the no. of ions in the excited state.  $n_2$  is proportional to the light energy absorbed. Recent expts. on a  $\text{CrCl}_3$  soln., for which  $K = 13.42 \times 10^{-6}$ , give  $\Delta K = 7 \times 10^{-11}$  in a field of 40,000 gauss when 81% of the light from a Hg arc is absorbed. Sclwood's neg. results are explained by the smallness of the effect compared to the sensitivity of his app., but the justice of his remark on the difficulty of explaining the effects observed in didymium nitrate by a temporary breakdown of  $l$ -coupling is acknowledged.

W. W. S.

**Nuclear spins and magnetic moments.** W. E. Curtis. *Nature* 133, 256(1934).—Under favorable conditions the magnetic moment of the nucleus can be evaluated from hyperfine structure data, while under favorable conditions the spin quantum no.,  $I$ , can be obtained both from hyperfine data and from band spectrum observations. With  $\text{Li}^7$ ,  $\text{F}^{19}$  and  $\text{Na}^{23}$  the 2 methods give concordant results. Nuclei of even mass no. are of particular interest. With the possible exception of  $\text{N}^{14}$ , these show no hyperfine structure, and except for  $\text{H}^2$  and  $\text{N}^{14}$ , for which  $I = 1$ , band spectrum data give  $I = 0$ . Hence it has been assumed that except for these, and possibly  $\text{Li}^6$  and  $\text{B}^{10}$ , all nuclei of even mass no. have  $I = 0$ . Present exptl. knowledge does not justify this assumption and it is very desirable that spectroscopists be on the lookout for new band systems, especially in elements for which the mass no. is of the  $4n + 2$  type.

W. W. Stifler

**The atmospheric water vapor band 6324 Å. in the solar spectrum.** V. N. Kondrat'ev and D. I. Brodskii. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 170-2 (in German 172-5)(1934).—Sixty-nine new water lines and 3 O lines were identified. From these the valence angle  $\text{HOH}$  is  $\alpha = 104^\circ 18'$  and  $\text{KOH} = 1.016 \times 10^{-4}$  cm.

F. H. Rathmann

**Rotation spectra of  $\text{NH}_3$  and  $\text{NH}_4^+$ .** R. Bowling Barnes, W. S. Benedict and C. M. Lewis. *Phys. Rev.* 45, 347 (1934).—The formula  $\nu = 2BJ - 4DJ^2$ , which represents well the rotation spectrum of  $\text{NH}_3$ , does not represent that spectrum for  $\text{NH}_4^+$  unless  $4D$  is nearly zero or even neg. The spectrum was measured between 49 and 68  $\mu$ ,

and consists, in that region, of 6 lines, which were identified as nos. 20-15.

Gerald M. Petty

**The atmospheric ozone absorption in the visible spectrum.** Oliver R. Wulf, Alfred F. Moore and Eugene H. Melvin. *Astrophys. J.* 79, 270-2(1934).—Sunlight which has traversed long air paths because of multiple scattering, when observed in the eastern sky before sunrise, was found to exhibit pronounced absorption at the positions of the 2 main ozone bands in the yellow and orange.

C. C. Kiess

**Doublet and staggering in the simple emission bands of carbon dioxide.** R. Schmid. *Z. Physik* 85, 384-8(1933); cf. C. A. 28, 411<sup>7</sup>.—Some bands of  $\text{CO}_2$  which were repeatedly stated to be simple have been photographed in fifth order of a large grating, special care being taken to avoid overlapping of different orders and to increase the intensity. They were found to be doublets and to show "staggering" as well. It seems probable, therefore, that all bands of this spectrum show the same behavior.

R. Peierls

**Spectrum of infra-red absorption and the structure of polyatomic molecules.** Radu Titeica. *Bul. bilunar soc. fis. romania* No. 57, 31-8(1933).—In case of infra-red spectrum, the electronic energy does not vary and therefore  $h\nu = \Delta E_2 + \Delta E_3$ , where  $\Delta E_2$  is the energy of at. vibration in the mol. and  $\Delta E_3$  is the energy of rotation of the mol. It was found that the spectrum of acetone contains 27 strong bands. The mol. of acetone is of the type  $\text{Me-CO-Me}$  in the Y form. The form of the mol. is then  $\text{A}_1\text{BC}$  and there are 6 fundamentals. By adding 4 more fundamentals of Me there is for acetone a total of 10. In this series the following substances have been studied:  $\text{HClHO}$ ,  $\text{Me-CO-Me}$ ,  $\text{Me-CO-Et}$ ,  $\text{Et-CO-Et}$ , Me, Et, Bu, iso-Bu and iso-Am formates, Me, Et,  $\text{H}^2$  and Bu acetates, and Me and Et propionates. Absorption spectrum of MeOH contains 28 measured bands with 8 fundamentals of which 4 are single and 4 are double. EtOH contains 30 intense bands with a total of 13 fundamentals.

G. T. Motok

**Infra-red absorption spectra of stereoisomeric 1,2-dimethylcyclohexanes.** O. Miller and J. Lecomte. *Compt. rend.* 198, 812-13(1934); cf. C. A. 27, 5002, 5248.—The infra-red absorption spectra of the *cis* and *trans* isomerides differ markedly between themselves and from the Raman spectra.

C. A. Silberrad

**Infra-red absorption of benzene vapor.** Radu Titeica. *Bul. soc. romania fis.* 35, 89 92(1933).—With benzene vapor at a pressure of 55 mm., the following bands were observed: 678, 774, 840, 885, 945, 1036, 1169, 1265, 1370, 1501, 1767, 2000, 2222, 2541 and 3077  $\text{cm}^{-1}$ .

F. D. Rossini

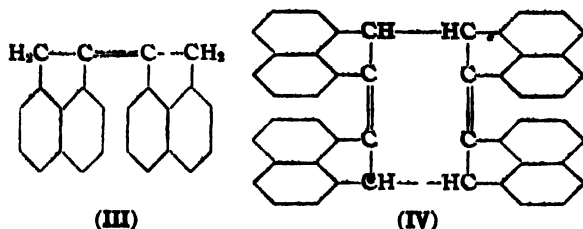
**The ultra-violet absorption spectra of several aromatic substances.** I. Armin Hillmer and Paul Schorning. *Z. physik. Chem.* A167, 407-20(1934).—A study was made of the laws governing the changes in the ultra-violet absorption spectra of  $\text{C}_6\text{H}_6$ , propylbenzene, allylbenzene, and propenylbenzene when nuclear H atoms are replaced by 1 or 2 adjacent OH groups either free or etherified with MeOH or methylene glycol.

Roy H. Baechler

**Absorption and fluorescence of alcoholic solutions of phenanthrene.** Radu Titeica. *Bul. soc. romania fis.* 35, 149-55(1933).—The absorption bands of phenanthrene in alc. soln. were detd. By means of a Hilger E 1 spectrograph, the region 2800-3800 Å. comprising a structure of several continuous bands was photographed. For very feeble concns. 2 large bands occur with maxima about 2420 and 2515 Å. At higher concns. the 2 bands become one with the max. at about 2450 Å.; there also appears a series of bands somewhat diffuse and feeble at 2740, 2810 and 2930 Å. At concns. still higher are obtained a series of fine, sharp bands to about 3900 Å. In fluorescence, with increased concn. the spectrum of solns. of phenanthrene in EtOH narrows, leaving bands in only the visible and near ultra-violet. This is attributed to increased concn. causing absorption of the shorter waves by the first layers of the soln., the only light able to penetrate and excite fluorescence being that feebly absorbed and approaching the visible.

Calvin Brous

**Absorption and fluorescence spectra of naphthalene derivatives.** Bela Hurwicz. *Acta Phys. Polonica* 1, 339-44 (1932) (in German).—The absorption spectra of  $C_6H_6$  solns. of naphthalene, (I), acenaphthene (II), biacenaphthylidene (III) and fluorocyclene (IV) contain



common bands, specific to the naphthalene group.  $C_6H_6$  solns. of I and II show no fluorescence, those of III and IV a strong blue-purple fluorescence, except when they are irradiated by light of the wave length corresponding to the naphthalene bands. The max. of the absorption bands are: I, 3235, 3180, 3130, 3080, 3030, 2982, 2930 Å.; II, 3380, 3332, 3280, 3235, 3185, 3135, 3085, 3028, 2980 Å.; III, 4035, 3805, 3607, 3418, 3240, 3185 (very faint), 3132, 3075, 2982 Å.; IV, 4110, 3842, 3612, 3370, 3230, 3185, 3132 and 3078 (very faint) Å. The max. of the emission bands are: III, 4158, 4343, 4628 and 5034 Å.; IV, 4060, 4390, 4685 and 5030 Å. Since II contg. the groups  $CH_2CH_2$  shows no fluorescence, while III exhibits a pronounced fluorescence, it seems that the group  $C:C$  is responsible. J. Wiertelak

**Absorption and fluorescence spectra of decacycene and tribenzyldecacycene.** Bogna Klarner and Saturnina Woszczerowicz. *Acta Phys. Polonica* 2, 1-5 (1933) (in German).—The absorption spectrum of decacycene (I) in a  $C_6H_6$  soln. shows 8 bands with max. at 4480, 4230, 4040, 3830, 3620, 3415, 3230 and 3125 Å. The absorption spectrum of tribenzyldecacycene (II) in  $C_6H_6$  is similarly composed of 8 bands with max. at 4520, 4265, 4060, 3840, 3650, 3430, 3240 and 3125 Å. Both I and II show, in addn., an absorption field which is not dissected into bands, extending from 3125 Å. toward the absorption region of  $C_6H_6$ . (I) as well as (II) shows 4 emission bands each. The max. are as follows: (I) 5950, 5520, 5105 and 4765 Å.; (II) 6080, 5600, 5195, 4845 Å. J. W.

**Notes on the Raman diffusion of polarized light.** S. Pieńkowski. *Acta Phys. Polonica* 1, 309-16 (1932) (in French). J. Wiertelak

**Raman effect and dipole moment in relation to free rotation.** San-ichiro Mizushima and Yonezo Morino. *J. Chem. Soc. Japan* 55, 131-42 (1934).—Dipole moments of  $C_6H_5Cl$ ,  $C_6H_5Br$ , and  $C_6H_4(CH_2Br)_2$  were measured in various kinds of solns. over a wide range of temp. The results were computed theoretically (cf. C. A. 27, 2075) and the following conclusions were drawn. The 2  $CH_2X$  groups can rotate around a common axis, but not all the rotational states are equally probable. The probability for a rotational state decreases as the angle of rotation from the trans position increases. At higher temps. or in a medium with larger dielec. consts. the probability for the states of larger rotational angle increases. Benzene and toluene solns. are exceptional, where the deviation from the trans position is larger than one can expect from their dielec. consts. From the intensity measurements of Raman lines of  $C_6H_5Cl$  in the above solns. it is concluded that  $I_{\text{trans}}/I_{\text{rot}}$  (the ratio of the intensity of the 2 strong lines of  $\Delta\nu = 752$  and 653) decreases as the no. of mols. in trans position increases. Theoretical discussions are given with regard to the relation between the intensity and the symmetry property of the mol. in different rotational states. T. Katsurai

**The Raman spectra of ring compounds. II. Polysubstituted benzene compounds.** John W. Murray and Donald H. Andrews. *J. Chem. Physics* 2, 119-24 (1934); cf. C. A. 27, 3668.—Raman spectra are reported for PhF, 1,2,4- $C_6H_3Cl_3$ , 1,2,4,5- $C_6H_2Cl_4$ ,  $C_6H_5Cl$ ,  $C_6Cl_6$  and  $C_6Me_6$ . PhF had not been previously investigated; in each of the

other cases several lines were found which had not been previously reported. Gerald M. Petty

**Circular polarization of Raman lines of pinene illuminated by circularly polarized light and observed longitudinally.** P. Daure. *Compt. rend.* 198, 725-7 (1934)  $I_v, I_h$ , being the intensities of the light emitted from d pinene in the same direction as that of an incident beam of circularly polarized light that is polarized in the reverse and same direction, resp.,  $r = I_v/I_h$ , the ratio of inversion, was visually estd. for 43 lines ( $\Delta\nu = 1.39$  1659  $cm^{-1}$ ). It varies ( $< 0.25 - > 4$ ) for the different lines, but is independent of the direction of rotation of the incident beam (cf. C. A. 26, 3184). C. A. Silberrad

**The Raman effect. XXIX. The Raman spectra of halo acetic acid esters.** Hua-Chih Cheng. *Z. physik. Chem.* B24, 293-312 (1934); cf. C. A. 28, 44<sup>1</sup>.—Raman spectra were obtained for the Me, Et, Pr, iso-Pr, Bu, iso-Bu, secondary Bu, Am and iso-Am esters of  $AcOH$ , for bromoacetic acid and its Me, Et, Pr, iso-Pr and Bu esters; and for the Me, Et, Pr, iso-Pr, Bu and Am esters of chloroacetic acid, of dichloroacetic acid and of trichloroacetic acids. The characteristic frequencies of the various group have been discovered and discussed. G. M. Murphy

**Molecular diffusion of light in fluorescent liquids.** J. Canals and P. Peyrot. *Compt. rend.* 198, 746-9 (1934) cf. C. A. 28, 944<sup>1</sup>.—By means of dil.  $H_2SO_4$  solns. of quinine sulfate of  $p_H$  2 and varying concns. in quinine, c, in a glass vessel, at 18°, and a quartz-Hg lamp (cf. C. A. 21, 3158), the depolarization factor,  $\rho$ , is const., while the intensity of fluorescence is proportional to c, and the specific fluorescence is therefore const., and obeys Vavilov's law (cf. C. A. 19, 663). The proportionality is such that the method may be used for detn. of small amts. of quinine. C. A. Silberrad

**Diffusion of light and molecular polymorphism.** R. Lucas. *Compt. rend.* 198, 721-2 (1934).—It is suggested that as polymorphism affects rotatory power, magnetic birefringence, etc., of liquids (cf. C. A. 27, 5225) so it will affect diffusion of light, and in the case of Raman spectra, increase the no., and modify the relative intensities, of the lines. This explains the anomalies observed in these respects in the case of  $C_6H_6$  (cf. C. A. 27, 445<sup>1</sup>, 28, 2582<sup>2</sup>). C. A. Silberrad

**The spectrum of fluorine oxide,  $F_2O$ .** A. Glissmann and H. J. Schumacher. *Z. physik. Chem.* B24, 328-34 (1934)

—The absorption spectrum of  $F_2O$  was investigated between 8000 and 2100 Å. Absorption begins about 5400 Å and is continuous with max. at 4210, 3580, 2940 Å and at some other wave length lower than 2100 Å. The absorption coeffs. have been detd. for the region investigated. The first 3 max. correspond to a disson. into  $F_2 + O$  or  $F + FO$  but the max. below 2100 Å. is probably due to disson. into 3 atoms. The compd. decomposes photochemically with the formation of  $F_2$  and  $O_2$  and in glass or quartz spp.  $SiF_4$  and  $O_2$  are formed. G. M. M.

**Correlation of the photosyntheses of phosgene and hydrogen chloride.** G. K. Rollefson. *J. Am. Chem. Soc.* 56, 579-83 (1934).—The photochem. reactions occurring in an illuminated mixt. of  $CO$ ,  $H$  and  $Cl$  were studied. The reciprocal of the fraction of  $CO$  which reacts with  $H$  varies linearly with the ratio of  $(Cl)$  to  $(H_2)$ . The equal  $CO + Cl \rightleftharpoons COCl$  is not essential in the phosgene mechanism. The active form of  $Cl$  in both the phosgene and the  $HCl$  syntheses is identified as the  $Cl_2$  mol., which is stable enough to be present at equil. concn. This is consistent with the data on the temp. coeff. of  $HCl$  formation. The heat of disson. of  $Cl_2$  into  $Cl_2 + Cl$  is approx. 5 kg.-cal. E. J. Rosenbaum

**Photolysis of nitrogen oxides:  $N_2O_3$ ,  $N_2O$ , and  $NO_2$ .** Harrison H. Holmes and Farrington Daniels. *J. Am. Chem. Soc.* 56, 630-7 (1934).—Absorption coeffs. in the wave-length range 265-536  $m\mu$  were detd. for  $NO_2$ ,  $N_2O$ , and  $N_2O_3$ . From expts. on the mixed oxides quantum efficiencies were detd. The presence of  $N_2O_3$  does not affect the quantum efficiency of  $NO_2$  decompn. for which the values are 1.93 at 313, 1.88 at 366, 0.50 at 405 and 0.0 at 436  $m\mu$ . Absorbed light of wave lengths 380 and 265  $m\mu$  decomposes  $N_2O_3$  with a quantum efficiency of 0.6.  $N_2O$



is decompd. at 265  $m\mu$  with a quantum efficiency of 0.4. Though light of longer wave length is absorbed, no decompn. was observed. He, A, N, O, H, CO<sub>2</sub> and N<sub>2</sub>O when added as foreign gases lower the quantum efficiency slightly. The fluorescence is quenched by a small pressure of the foreign gas. The quantum efficiency for photodecompn. in CCl<sub>4</sub> soln. is near zero. The Norrish mechanism for the photodecompn. is confirmed. E. J. R.

Steady states produced by radiation with application to the distribution of atmospheric ozone. Oliver R. Wulf. *Phil. Mag.* 17, 251-63 (1934).—The steady state existing when a substance, formed by the action of radiation of a certain wave length, is decompd. by radiation of a different wave length is studied. For long paths there is a marked difference between the distribution of the absorbed radiation and the distribution of the material formed in the steady state. Weakly absorbed radiation which penetrates deeply is most important for the total amt. of the substance formed, since this is present at great diln. Use of the equations derived shows that the O<sub>3</sub> produced in the atm. by solar radiation will be distributed not as a layer but over a range of altitudes. The actual distribution depends on mech. disturbances. E. J. Rosenbaum

Effect of ultra-violet rays on the ultra-violet absorption spectrum of aqueous methylene blue solutions. Carl E. Nurnberger and L. Barle Arnow. *J. Phys. Chem.* 38, 717 (1934).—The method of using the Judd Lewis sector photometer with a quartz spectrograph and an underwater spark for obtaining absorption spectra is described. The ultra-violet absorption spectrum of methylene blue in distd. water is given and has 2 regions of absorption with maxima at 2920 and 2460 Å. Radiating the soln. with a Hg arc causes a decrease in the absorption in the visible and ultra-violet.  $\phi_H$  has no effect on the ultra-violet absorption spectrum but irradiation with ultra-violet causes greatest change in solns. of highest  $\phi_H$ . The wave lengths most active in decreasing the absorption are shorter than 2700 Å. For this reason the change in aq. solns. of methylene blue caused by ultra-violet radiation cannot be used for a measure of light intensity in the "physiologically active" region, 3100-2900 Å.

Howard A. Smith  
Fluorescence of synthetic pyocyanine. Charles Dhéré. *Compt. rend.* 198, 126-8 (1934).—In H<sub>2</sub>O, pyocyanine-HCl (I) dissociates in part into the free base (II), without manifesting fluorescence. In CHCl<sub>3</sub>, I shows a greenish yellow fluorescence, which was also shown when I in H<sub>2</sub>O was cautiously reduced with Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> in the presence of AmOH, with Zn powder, with Mg and Hg, or with compressed yeast. Glucose added to II, in aq. NaOH gives a red reduction product with a greenish fluorescence. A similar result was obtained by the action of Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> on  $\alpha$ -hydroxyphenazine, of which II is the Me deriv.

Louis E. Wise  
Influence of intensity of light on photovoltaic phenomena. R. Audubert and Geneviève Lebrun. *Compt. rend.* 198, 729-31 (1934).—The relation  $E = (RT/nF) \log(1 + aI)$ , where  $a$  is a const. depending on the nature of the photosensitive substance, the liquid in contact therewith, and the therap.,  $I$  the intensity of the light, and  $R$ ,  $T$ ,  $n$  and  $F$  have their usual meanings, is valid for the electrodes Cu|CuO, Cu|Cu<sub>2</sub>O, Cu|brilliant green, Cu|malachite green and Ag|Ag<sub>2</sub>S, provided that  $n = 1$ .

C. A. Silberrad  
The catalytic influence of phosphorus on chemiluminescence. F. Schacherl. *Atti congresso nas. chim. pura applicata* 4, 599-608 (1933).—The literature is reviewed. The Semenov explanation (*C. A.* 22, 901, 2842; 23, 350, 2870; 24, 543) is favored. E. M. Symmes

Application of a hyperbolic function to the representation of the extinction of phosphides. V. L. Levshin and V. Antonov-Romanovskii. *Compt. rend. acad. sci.* 193, 100-102 (1933).—The extinction of the phosphorescence of Zn and Zn-Cd phosphides by infra-red rays is due to auto-excitation of the phosphide and is given by  $I = At^{-n}$ . F. H. R.

Coloration of fluorides of different elements by cathode rays. Hantaro Nagaoka, Yoshikatsu Sugiura and Tadao

Mishima. *Proc. Imp. Acad.* (Tokyo) 9, 486-9 (1933).—The coloration of fluoride disks by cathode rays (at 0-8000 v.) is described. CaF<sub>2</sub> gave violet coloration; LiF and NaF pink; MgF<sub>2</sub>, straw; AlF<sub>3</sub>, ash-gray; TiF<sub>4</sub>, dark straw; MnF<sub>2</sub>, straw; CrF<sub>3</sub>, black; ZnF<sub>2</sub>, gray; PbF<sub>2</sub>, black. Curves for LiF, TiF<sub>4</sub> and PbF<sub>2</sub> were plotted by taking  $V^{1/2}$  as abscissas, and ratio of intensity of coloration to reflected light as ordinates. The curve shows a bend at 680 v. (excitation potential of K radiation from F); a second bend corresponding to  $M$  radiation for Pb and  $K$  radiation for Ti. It is suggested that dissociation of F from the compd. causes the coloration, although no direct evidence is available. L. W.

Thermoluminescence spectra of fluorites. IV. Spectra of thermoluminescence restored by x-rays. Eiichi Iwase. *Sis. Papers Inst. Phys. Chem. Research* (Tokyo) 23, 212-23 (1934); cf. *C. A.* 28, 1928.—The thermoluminescence spectra of several fluorites of various origins were studied by methods previously described (*C. A.* 28, 973-4). Fluorites which lose their luminescence through heat treatment may be grouped according to the manner in which they recover it on exposure to x-rays: (1) those that regain their original emissive properties; (2) those in which the relative intensities of the emission bands are altered as compared with the original spectrum; (3) those that emit an entirely new set of bands as compared with the original spectrum. C. C. Kiess

Cathodoluminescence spectra of fluorites, calcites and certain synthesized phosphors containing samarium. Jun Yoshimura. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 23, 224-47 (1934).—Fluorites excited to luminescence by cathode rays contain the rare earths Sm, Eu, Dy, Tb and sometimes Er, Pr, Nd and Gd as activators. The narrow line-like bands emitted by these substances have been measured. Various calcites, on the other hand, emit a broad band, with max. near 6000 and 6310 Å., which is attributed to the presence of Mn. Synthesized fluorides and carbonates of the alk. earths, contg. Sm, exhibit the line-like bands characteristic of other phosphors contg. rare earths and entirely different from the luminescence of the oxides of the same elements. C. C. Kiess

The use of gas photoelectric cells in photometric measurements. Applications. Trajan D. Gheorghiu. *Ann. phys.* 20, 133-242 (1933); cf. *C. A.* 24, 1796.—Two photoelec. cells both having KH cathodes and W anodes and filled with A at reduced pressure are used in a spectrophotometer whose construction is described in detail with the method of procedure and corrections. The proportionality of the current to the illumination was verified in various ways for each cell. One of the cells controls the radiation so that relatively unstable sources may be used. The Hg lines from a Heraeus arc and small sections

(20-30 Å.) of the continuous spectrum of a Philips W ribbon lamp gave the most satisfactory results. The reliability of the results depends on the influence of the variable quantity of diffused light. The use of colored solns. or colored glass of various thicknesses as filters reduces the effects of diffused light and gives reproducible results. The precision is about 0.2%. The absorption curve of CuSO<sub>4</sub> (mol. extinction coeff.  $\epsilon$  plotted against  $\lambda$ ) in the region 4200-5600 Å. obtained by this method agrees with those obtained by other methods. Beer's law and Lambert's law are verified. The absorption curve of CuCl<sub>2</sub> does not follow Beer's law and differs considerably from that of CuSO<sub>4</sub>.  $\epsilon$  increases with concn. especially in the short wave lengths. On addn. of NaCl to a given concn. of CuCl<sub>2</sub>,  $\epsilon$  increases greatly for the short wave lengths and decreases slightly for the longer wave lengths. The spectra of solns. contg. 1, 2, 3 equivs. per l. of CuOH<sub>2</sub> and, resp., 3, 2, 1 equivs. of NaCl interlace. These variations appear to be due to the change in no. of anions contg. Cu and of hydrated cation. Solns. of  $d$ -,  $l$ - and  $d$ -Cu tartrate do not obey Beer's law. The alk. solns. of the active tartrates (2 g. per 100 cc. of 2% KOH soln.) give identical absorption curves with a min. at 4800 Å. The min. for the curve of the racemate is at the same  $\lambda$  for a 2% soln. although  $\epsilon$  is slightly greater throughout, but the min. for the curve of an equimol. mixt. of the  $d$ - and  $l$ -tar

itates (concn. 0.02) is at 4400 Å. The mixt. cannot be simply the racemate but probably contains complex anions contg. Cu.

Janet E. Austin

Precision and accuracy of a photoelectric method for comparison of the low light intensities involved in measurement of absorption and fluorescence spectra. F. P. Zschelle, Jr., T. R. Hogness and T. F. Young. *J. Phys. Chem.* 38, 1-11 (1934).—A photoelec. method has been developed for detg. specific absorption coeffs. and opacities with a precision better than 1.5 and 1.0%, resp. The app. consists of a monochromator, photocell, electrometer and high-resistance leak. Photoelec. sensitivities as great as  $2 \times 10^{-17}$  amp. per mm. permit the use of slits so narrow that spectral regions varying in width from 3 Å. at 4000 Å. to 13 Å. at 7000 Å. can be investigated with a source of a continuous spectrum. The method is also applicable for measuring spectral intensities of fluorescence.

Howard A. Smith

The effect of unipolar charged air, Röntgen rays and of ultra-violet light on the properties of Congo red and albumin solutions. B. S. Puchkovskii and V. N. Nekludov. *Kolloid-Z.* 66, 191-7 (1934).—Positively and negatively charged air had no effect on 0.005% Congo red and on

0.3 and 0.15% albumin solns., while x-rays had only a slight effect on the latter. Ultra-violet light gradually caused a fading of the Congo red; the effect was shown not to be due to  $O_2$ . Up to 3 hrs., the protective action of albumin slowly increases; on further exposure it sharply decreases. The changes are probably related to dielectricity changes.

Arthur Fleischer

2 Refractive dispersion of org. compds. (Allsopp) 2  
Oxidation of graphite by Röntgen rays (Sihvonen) 2  
Absorption in the ultra-violet and reactivity of certain classes of org. compds. (Grunfeld) 10.

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#### 4-ELECTROCHEMISTRY

COLIN G. FINK

A coreless induction furnace for alternating current of line frequency. Werner Hessenbruch and Wilhelm Rohn. *Stahl u. Eisen* 54, 77-82 (1934).—Sintered  $MgO$  is used as a refractory. The bath motion causes little erosion at the slag line. The reacting slag may be agitated to such an extent as to mix with the metal and form an emulsion resulting in a high refining velocity. The operations of the furnace for the production of 99.95% Fe and for the decarburization of 18-8 Cr-Ni steel to below 0.02% C are described. Costs of these operations are discussed.

C. B. Jenni

Utilizing carbon monoxide produced in the electric sublimation of phosphorus. I. B. N. Dolgov, B. A. Bolotov and A. N. Popova. *J. Applied Chem.* (U. S. S. R.) 6, 470-8 (1933).—A gas contg.  $CO$  75-85,  $CO_2$  2-5,  $H_2$  7-5,  $CH_4$  0-2,  $O$  0.2,  $N$  10-20,  $PH_3$  0.05-0.8 and  $H_2S$  0.04% is obtained in the sublimation of apatite or phosphorites for the production of yellow P. Of various methods a treatment with steam in the presence of siderite at 350° with at least 0.5 vol. of steam per vol. of gas produced best results.  $P_2O_5$  vapors and various suspensions are disposed of by passing the gas through a bubble app. and special filters. The life of the siderite may be prolonged by briquetting or by impregnation with  $Al_2O_3$  and its efficiency can be improved by the addn. of  $CuO$ . Through the use of siderite in the purification of steam the gas becomes enriched with  $H$  (by 5-10%). The purification may also be carried out with  $Cu$  shavings at 300-400° provided the gas is properly dried before.  $PH_3$  may be used as a catalyst for purification at 300-400° in the presence of steam, the conversion of  $CO$  being insignificant (2-3%).  $P$  and  $PH_3$  are converted into  $H_2PO_4$  by the presence of steam. The gas purified in the above manner can be used for heating and for the prepn. of  $H$  as well as of mixts. of  $CO$  and  $H$  to be used in the synthesis of  $MeOH$  and other org. syntheses under pressure.

A. A. B.

Conversion of gas obtained in the electric sublimation of phosphorus. II. B. N. Dolgov, B. A. Bolotov and N. P. Silina. *J. Applied Chem.* (U. S. S. R.) 6, 479-93 (1933); cf. preceding abstract.—The gas obtained in the elec. sublimation of P can, after a preliminary purification, be almost entirely converted with steam into the corresponding mixt. of  $CO$  and  $H$  to be used for org. syntheses and particularly for the synthesis of  $MeOH$ . The conversion is carried out best in the presence of heat-treated siderite and 10%  $Cr_2O_3$  or  $Al_2O_3$  and a catalyst composed of  $Al_2O_3$  60,  $Fe_2O_3$  30,  $Cr_2O_3$  8 and  $ThO_2$  2%. The first two catalysts when used in the conversion of the gas mixt. composed of  $CO$  and  $H$  in a ratio of 1:2 and 1:3 need a process temp. of

450-75° with 2 vols. steam. The mixed catalyst gives the required conversion at 375-400° for a gas-steam ratio 1:1. An increase in the amt. of steam up to 2-3.5 vols. at a temp. of 475-500° may give a 90-5% conversion with the mixed catalyst, this lowering the amt. of  $CO$  in the gas to 2-3%. Since the conversion gas contains some  $H_2S$ , it requires a preliminary purification with water under pressure for the removal of  $H_2S$  and  $CO_2$ .

A. A. B.

Electrolysis of molten silicates and preparation of silicon and silicides. L. Andrieux and M. Dodero. *Compt. rend.* 198, 753-5 (1934); cf. C. A. 23, 4893

With a C crucible as anode, an Fe rod as cathode, and a current of about 25 amp. at 10 v., a mixt. of  $2SiO_2 + Li_2O + 6LiF$  at 950° gave a product contg. Si 24.1-46.8%, Si combined with Li 30.7-55.5; Si with Fe 0.7-2.6, Li 17.0-17.8 and Fe 0.7-2.6%. With water-cooled cathode and  $SiO_2 + Li_2O + 2LiF$  with or without  $LiCl$  at 800-920°, the corresponding figures were 0-6.4, 48.0-61.8, 0.5-2.5, 26.3-36.4 and 0.5-2.5. In the latter case the product was spontaneously inflammable in air, as was also the gas evolved on contact with  $H_2O$ . The Li silicide is violet-colored, and approx.  $Si_2Li$ .

C. A. Silberrad

Theory of chromium plating. E. Liebreich. *Z. Elektrochem.* 40, 73-87 (1934).—Purified  $CrO_3$  alone and with foreign acids was electrolyzed with Au and Pt cathodes. The current-potential curves for  $CrO_3$  consisted of 2 branches; foreign acids produced 4 branches, each having about the same position, regardless of the nature of the acid. With Pt cathodes an addnl. branch appeared when  $H$  was evolved without deposition of  $Cr$ .  $HClO_4$  and  $H_3PO_4$  at high concn. caused reduction;  $H_2BO_3$  did not. The existence of a film on the Au cathode was proved and the film isolated. The dropping of the potential to neg. values was due to satn. of the cathode with  $H$ , directly in the case of Pt, and through the medium of the film in the case of Au.

Curtis L. Wilson

Nickel-plating aluminum sheet. Robert J. Snelling. *Metalwaren-Ind. u. Galvano-Tech.* 32, 289 (1934) Methods of removing the oxide layer and various suitable plating baths are described.

Curtis L. Wilson

Structure of electrolytic copper deposits obtained in the presence of certain colloids. P. Jacquet. *Compt. rend.* 198, 74-6 (1934); cf. C. A. 27, 909.—Cu was deposited from a soln. of 125 g./l.  $CuSO_4 \cdot 5H_2O$  and 25 g./l.  $H_2SO_4$  plus addn. agent (varying from 1 mg. to 5 g./l.), gelatin, serum albumin, gum arabic, gum tragacanth, dextrin or glycine. Each electrolysis lasted 5 hrs. at 18-20°; c. d. 2 amp./sq. dm. A section 1 cm. sq. was polished and etched. Three classes of colloids were discernible: (1)

very effective (gelatin, serum albumin); (2) av. effectiveness (gum arabic and tragacanth); and (3) relatively ineffective (dextrin and glycine). The most effective (finest grain size) are the most easily adsorbed.

**L. Waldbauer**  
**Direct determination of the number of active centers on a crystalline metallic cathode.** N. Thon. *Compt. rend.* 197, 1806-8 (1933).—Cu was deposited from a soln. contg 200 g./l.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  and 30 g./l.  $\text{H}_2\text{SO}_4$ , at a c. d. of 0.4 amp./sq. dm. For a deposit 0.3 mm. thick an av. of  $3.0 \times 10^6$  crystals per sq. cm. was found; at higher c. d. the no. of crystals was greater.

**E. G. Vanden Bosche**  
**The electrolysis of cupric chloride in methanol solution.** J. Guillermet. *Compt. rend.* 197, 1608-10 (1933).—A 5% soln. of  $\text{CuCl}_2$  in  $\text{MeOH}$  was electrolyzed at a c. d. of 1.3 amp./sq. dm. At the Pt cathode deposits of  $\text{CuCl}$  contg 3% Cu were formed. A Cu anode was superficially converted into  $\text{CuCl}$ . With a Pt anode the  $\text{CuCl}$  cathodically formed remains in soln. The addn. of  $\text{HCl}$  and  $\text{CuCl}$  increases and decreases, resp., the Cu content of the deposits. Low yields are believed due to the recombination of  $\text{CuCl}$  and  $\text{Cl}$ , products of the primary reaction of electrolysis.

**E. G. Vanden Bosche**  
**Selenium rectifiers for electroplating plants.** Karl Maier. *Metallwaren-Ind. u. Galvano-Tech.* 32, 67-9 (1934).—Circuits for various sizes and kinds of electroplating plants are described.

**Curtis L. Wilson**  
**Health protection in plating plants.** R. J. Piersol. *Metal Cleaning and Finishing* 6, 25-9 (1934).—A detailed description of methods employed in plating plants to guard against health hazards.

**D. Thuesen**  
**Electrochemistry of the systems:  $\text{AgBr}-\text{AlBr}_3$  and  $\text{CuBr}-\text{AlBr}_3$  in ethylene dibromide.** V. A. Plotnikov and V. A. Kiketz. *J. Gen. Chem.* (U. S. S. R.) 3, 52-8 (1933).—The cond. of the system  $\text{AgBr}-\text{AlBr}_3-\text{C}_2\text{H}_4\text{Br}_2$  or  $\text{CuBr}-\text{AlBr}_3-\text{C}_2\text{H}_4\text{Br}_2$  is of the order of 0.001 mho. The sp. cond.,  $\kappa$ , rises with concn. of  $\text{AgBr}$  or  $\text{CuBr}$  when  $[\text{AlBr}_3]/[\text{C}_2\text{H}_4\text{Br}_2]$  is const.; the value of  $\kappa$  increases in the order  $\text{CuBr} < \text{KBr} < \text{AgBr}$ . Where  $[\text{MBr}]/[\text{AlBr}_3]$  is const.,  $\kappa$  diminishes with diln. Cryoscopic measurements indicate the formation of compds. of the type  $\text{Al}_2\text{Br}_6 \cdot n\text{MBr}$ . Cu or Ag is deposited on the cathode during electrolysis in accordance with Faraday's law; the decompn. potential is 0.76 v. for  $\text{AgBr}$  and 1.0 v. for  $\text{CuBr}$ .

**H. C. A.**  
**Anodic oxidation of aluminum.** C. L. Mautell. *Metal Cleaning and Finishing* 6, 11-16, 29 (1934).—The production of oxide films on Al for protective and decorative purposes by the use of the chromic acid and the  $\text{H}_2\text{SO}_4$  anodic oxidation processes is described in detail. The compn. of such films and their elec., chem. and mech. properties are discussed. Paint, varnish and other coating materials adhere much better to Al thus treated. The color of the oxide films may be varied, depending on the purity of the Al, the electrolyte and the operating conditions.

**D. Thuesen**  
**Certain properties of the oxide coating formed by the anodic polarization on the surface of oxidizable metals.** M. Marinescu. *Bul. ps. soc. române fis.* 35, 135-42 (1933).—M has investigated by means of an oscillograph the instantaneous current-voltage relationships for sinusoidal a. c. voltages existing at these surfaces at such low c. d. that O and H absorptions are reversible. Simple math. expressions for the current at different portions of the cycle are derived. The application of the shown neg. elec. resistance to the field of radio and telephonic transmission is suggested.

**Calvin Brous**  
**The electrolytic oxidation of glycolic acid in alkaline solution.** Eero Tommila. *Ann. Acad. Sci. Fennicae* A38, No. 6, 55 pp. (1933) (in German); cf. C. A. 28, 713<sup>h</sup>.—In the oxidation of glycolic acid with Pt anodes the oxidation is brought about by the catalytic action of Pt. The oxidation yields either  $\text{HCHO}$  (high v. and Pt anodes) or glyoxylic acid (low v. and Fe, Ni or Cu anodes) as primary products. Fe and Ni act as pure peroxide anodes. Above a certain potential H gas is formed at Pt anodes.

**A. E. Beitlich**  
**Electron paths in solutions during electrolysis with a**

**sparkling cathode.** P. Fisher and Katznelson. *J. Gen. Chem.* (U. S. S. R.) 3, 5-6 (1933).—The blue striae observed by Pissarshevski and Rozenberg (C. A. 18, 1424) in KI-starch solns. during electrolysis with the cathode not immersed in the soln., and ascribed by them to the action of electrons discharged from the cathode, are in reality due to  $\text{O}_2$ .

**B. C. A.**  
**Action of condensed spark on mixtures of carbon monoxide and hydrogen.** H. Lefebvre and M. van Overbeke. *Compt. rend.* 198, 736-8 (1934); cf. C. A. 27, 5052, and Montagne, C. A. 26, 3997. By the method used previously the condensed spark has very little action on mixts. of C() and H contg. 20-80% of either at low pressures (not more than 9 mm. Hg) unless the products of reaction are removed as formed, e. g., by connecting the reaction tube with one cooled in liquid O. Pressure then decreases and ultimately only CO or H remains, the 2 having interacted as far as possible to form  $\text{H}_2\text{O}$ ,  $\text{CO}_2$  and  $\text{C}_2\text{H}_2$ , the ratio  $\text{CO}_2:\text{C}_2\text{H}_2$  increasing with the initial percentage of CO.

**C. A. Silberrad**  
**The validity of Faraday's law in the case of electrode reactions during electric discharges in diluted gases.** V. Sihvonen. *Acta Chem. Fennica* B6, 71-4 (1933).—In general, Faraday's law seems to be valid for gas electrolyses when gas ions, formed at the electrodes, cause heterogeneous reactions in equiv. proportions. However, there must be no interfering side reactions. The law is applicable to (1) plain chem. and elec. reactions depending preferably only on heterogeneous formations and discharges of gas ions, (2) certain gases and materials for electrodes, (3) parallel and close electrodes, (4) highly dil. gases and (5) short duration of the expt. The mechanism of the reactions depends on the applied potential. The reactions with graphite and Pt electrodes in CO,  $\text{CO}_2$  and O under various conditions, pressures, a. c. and d. c. discharges are analyzed.

**A. E. Beitlich**  
**Water conditioning of flue gas for electrical precipitation process.** Ichiro Inomata. *Proc. Imp. Acad.* (Tokyo) 9, 506-9 (1933). The smelter fumes from the Ashio Copper Mine are humidified before entering the Cottrell treater. A formula for the proper amt. of  $\text{H}_2\text{O}$  to be used depends on the fume temp. (which varies from 40° to 110°) and the relative humidity of the fumes. Originally the purpose of the pptn. was to abate the nuisance; now the recovery of  $\text{As}_2\text{O}_3$  and the production of Pb-Sn alloy and refined Bi are of primary importance. The recovered  $\text{As}_2\text{O}_3$  and Bi amt. to 70-90% of the total Japanese productions.

**Louis Waldbauer**  
**Sodium vapor lamps and their use along automobile highways and in tunnels.** Alfred Salmoney-Karsten. *Tech. Gemeindeblatt* 37, 13-16 (1931). M. G. Moore

**Cu refinery in Canada [electrolytic plant] (Altmeyer) 9.** Elec. tar separators at gas works and coke-oven plants (Biring) 21. Electrolysis of ether solns. of the Grignard compd. (Evans, Lee) 10. [Elec.] refining reactions in steel making (Guedras) 9. Elec. protection for pipe lines against soil corrosion (Thayer) 9. Influence of cathodic H on the strength of steel (Alekseev, et al.) 9. Adherence in metal plating (Altmanberger) 9. Formation of Liesegang rings by electrolysis (Banderet) 2. Oxidation of graphite by elec. discharges (Sihvonen) 2. Electron optics and electron microscopy (Brüche) 2. Zn sheets for use in galvanic cells (U. S. pat. 1,947,948) 9. Refining cracked petroleum products for motor fuel [by elec. pptn.] (U. S. pat. 1,949,673) 22. Elec. vulcanizing app. for treatment of the insulation of elec. cables (Brit. pat. 401,486) 30. Depositing Ag on nonconducting materials (Austrian pat. 136,376) 18.  $\text{H}_3\text{PO}_4$  (Japan. pat. 99,102) 18.

**Primary cells.** Graphitwerk Kropfmühl A.-G. Ger. 563,410, Feb. 2, 1934 (Cl. 21b. 6.02). C obtained by thermal decompn. of graphitic acid is used as an ingredient of depolarizing compns. for primary cells.

**Dry cell.** Ralph R. Smith (to National Carbon Co.). U. S. 1,949,586, March 6.

**Storage batteries.** Soc. des accumulateurs électriques

(Anciens établissements Alfred Dinin). Fr. 757,315, Dec. 23, 1933. Dismountable assemblage of plates and diaphragms is described.

**Electrolytic cells.** N. V. Philips' Gloeilampenfabrieken. Brit. 402,967, Dec. 14, 1933. Cells, *s. g.*, electrolytic rectifiers or condensers, storage batteries, have a gas-escape aperture closed by a valve, the inner side of the vessel around the aperture being coated with wax, etc., not wetted by the electrolyte, to prevent creeping.

**Electrolytic condenser.** Harold I. Danziger (to Condenser Corp. of America). U. S. 1,948,289, Feb. 20. Structural features.

**Impregnated electrostatic condensers.** Richard E. Carlson (to Western Elec. Co.). U. S. 1,948,331, Feb. 20. Various details of heating to expel moisture and gases, impregnating, etc., are described.

**Electrolytic electrodes.** Maschinenfabrik Oerlikon. Ger. 592,130, Feb. 1, 1934 (Cl. 12a. 13). See Swiss 161,836 (C. A. 28, 422').

**Uniting ferrous metals with copper.** Bert L. Quarntrom (to Bundy Tubing Co.). U. S. 1,949,623, March 6. In a process involving electrodeposition, a body of ferrous metal and a body of Cu are united by a zone in which the Cu is in solid soln. with the ferrous metal, the total amount of Cu in this uniting zone not exceeding the possible soly. of Cu in  $\alpha$ -iron.

**Plating aluminum with other metals.** Johannes Fischer (to Siemens & Halske A.-G.). U. S. 1,947,981, Feb. 20. For producing firmly adherent coatings, articles of Al or its alloys are subjected to an elec. current in a bath contg. electrolytes of such nature as to produce an electrolytic coating of oxidized character; the articles, thus treated, are flash-coated electrolytically in an alk. bath with a metal such as Cu, brass, Cd, Ag or Au, and the flash-coated articles are then finish-coated electrolytically.

**Chromium plating.** Siemens & Halske A.-G. Ger. 591,642, Jan. 24, 1934 (Cl. 40c. 12). Elastic compact depositions of Cr are obtained by electrolysis of  $H_2CrO_4$ , the gas generated at the cathode being led away more or less horizontally, *s. g.*, by conduits.

**Chromium.** Siemens & Halske A.-G. Ger. 591,511, Jan. 23, 1934 (Cl. 48a. 604). In the electrolytic deposition of Cr from  $H_2CrO_4$  soln., an addn. of 1.6% of  $HClO_4$  is given to the  $H_2CrO_4$ . A small addn. of  $H_2SO_4$  may also be given.

**Electroplating nickel-chromium alloy on metals such as steel plates or sheets.** George L. Wallace (to Fiberloid Corp.). U. S. 1,948,145, Feb. 20. A cathode such as sheet steel and an anode of Cr-Ni alloy are immersed in a bath formed of Ni sulfate, Cr carbonate, boric acid and water (the Ni sulfate being in the proportion of 32-96 oz. and the Cr carbonate in the proportion of 16-32 oz. per gal.).

**Rhodium plating.** Thomas P. Shields. U. S. 1,949,131, Feb. 27. A bright lustrous deposit of Rh is obtained by use of an electrolyte comprising an aq. soln. of a sol. Rh salt such as the sulfate or chloride, a sol. Al salt such as K Al sulfate or  $AlCl_3$  and a free inorg. acid such as  $H_2SO_4$  or  $HCl$ .

**Electrolysis of fused salts.** Wintershall A.-G. Fr. 757,698, Dec. 30, 1933. The resistance of the cathodes is improved by directing a current of air or inert gas through the cell so as to pass over the place where the cathodes are immersed.

**Electrolytic iron and iron alloys.** Ernst Kelsen (to Kelsen Special Sheet Holding, S. A.). U. S. 1,948,235, Feb. 20. For producing iron of good magnetic qualities from raw materials contg. S, the S content of the electrolytically produced iron is reduced by adding to the electrolyte contg. the Fe salt a salt of an alk. earth metal such as  $BaCl_2$  having a cation forming an insol. ppt. with  $SO_4$  ion in an amount sufficient completely to effect such pptn.

**Refining copper.** James W. Scott (to Western Elec. Co.). U. S. 1,948,316, Feb. 20. The metal is inductively heated and melted and a reducing agent comprising H is introduced under the surface of the molten metal to combine with O; a vacuum of about 1 mm. to 4 mm. is then

applied to promote reactions between the reducing agent and the O to remove the latter from the Cu.

**Piperidine.** Deric W. Parkes. U. S. 1,947,732, Feb. 20. In an electrolytic process for producing piperidine by the electrolysis of pyridine and  $H_2SO_4$  in a diaphragm cell, pyridine is placed in the cathode chamber in such amt. that 10% of the catholyte is pyridine, and the content of  $H_2SO_4$  in the catholyte is adjusted to the ratio of 2.0-6.0 equivs. of the pyridine; the quantity of  $H_2SO_4$  in the anode chamber is such as to give the anolyte a d. of at least  $60^\circ Tw$ , and the electrolysis is conducted at specified temps. the creasing as the proportion of  $H_2SO_4$  increases.

**Cell for the electrolysis of alkali chlorides.** Paolo Pestalozza. Ger. 591,533, Jan. 23, 1934 (Cl. 12a. 9).

**Multiple-cell apparatus for carrying out electrolysis under pressure.** Ludwig Lacher. Ger. 582,725, Nov. 28, 1933 (Cl. 12a. 13).

**Apparatus for carrying out electrolytic decomposition at high pressure.** J. E. Noeggerath. Ger. 578,705, Jan. 12, 1934 (Cl. 12a. 13).

**Metal tubes.** Metallurgie du nickel. Fr. 757,539, Dec. 28, 1933. A metal wire, *s. g.*, of Fe, is coated with graphite and passed through an electrolytic bath, whereby a metal such as Ni is deposited to form a tube of any desired length.

**Tiltable electric furnace.** Akt.-Ges. Brown, Boveri & Cie. Ger. 592,014, Jan. 31, 1934 (Cl. 31a. 2.40).

**Electric furnace with a Carborundum tube and graphite resistor.** Fred E. O'Neil and Joseph F. Callahan (to Acheson Graphite Co.). U. S. 1,947,793, Feb. 20. A material more readily oxidizable than the resistor, such as lampblack, is placed between the resistor and the tube, for taking up O to lessen oxidation of the resistor at high temps.

**Electric resistance furnaces for metallurgical purposes.** Johann B. Felder. Swiss 162,845, Sept. 16, 1933, 165,979, Feb. 16, 1934 (Cl. 113).

**Electric resistance furnace suitable for heat-treating metal sheets.** Wm. E. Moore (to Pittsburgh Research Corp.). U. S. 1,947,612, Feb. 20. Structural features.

**Electric resistance ovens, having an internal fan of the centrifugal type for air circulation.** Lancelot W. Wild and Wild-Barfield Electric Furnaces Ltd. Brit. 401,491, Nov. 16, 1933. Addn. to 334,621 (C. A. 25, 884).

**Electric furnace for producing lead pigments.** "Subox" A.-G. Elektro-Chemische Fabrik. Swiss 163,392, (Cl. 16, 1933 (Cl. 113)).

**Electrical apparatus for testing conductivity of low resistance units.** Wm. E. Prince (to Western Elec. Co.) U. S. 1,948,238, Feb. 20.

**Constant-voltage device.** Fritz Michels (to Telefunken Ges. für drahtlose Telegraphie m. b. H.). U. S. 1,949,617, March 6. A tube suitable for use in circuits for smoothing out pulsating d. c. such as that derived from rectifying a. c. contains 2 electrodes and a filling of only substantially inert gases such as Ar, Kr, Xe, H and N.

**Annealing; tempering.** Herbert L. Clarke. Brit. 401,366, Nov. 13, 1933. Thin flexible safety-razor blades with medial slots have their medial end portions reduced in hardness by passing through them an elec. current, the blade being of such configuration that the current intensity is greater over the medial end portions than at or near the cutting edges. Oxidation may be avoided by surrounding the strip by an inert gas while in the tempering chamber and while being differentially heated.

**Heating metal objects.** Akt.-Ges. Brown, Boveri & Cie. Fr. 757,651, Dec. 30, 1933. Articles are heated in an evacuated pot in a chamber of an elec. furnace, the chamber being itself evacuated when the temp. reaches  $700^\circ$ , to prevent breakage of the walls of the pot.

**Use of gallium for electric contacts such as those of circuit breakers.** Richard Swinne (to Westinghouse Elec. & Mfg. Co.). U. S. 1,948,687, Feb. 27.

**Electrical precipitation apparatus.** Research Corp. of New York. Brit. 401,932, Nov. 23, 1933.

**High-tension conductor for electrofuses.** Metallgesellschaft. Ger. 592,291, Feb. 8, 1934 (Cl. 12a. 5).

**Electric resistance.** Robert Beyer (to Robert Beyer

Corp.). U. S. 1,947,692, Feb. 20. An elec. resistance suitable for use as a heating element at high temps. comprises a compacted mass contg. finely divided C particles penetrated with an oxide of a metal of relatively high m. p. such as oxide of Mn or of W. Various details of manuf. are given.

**Metallic vapor rectifiers.** Laurence F. Perrott (to The British Thomson-Houston Co. Ltd.). Brit. 401,815, Nov. 23, 1933.

**Preserving fats.** Otto Colm and Otto Karpeles. Austrian 136,241, Jan. 10, 1934 (Cl. 53b.). Fats are preserved by passage between electrodes of an earth metal, e. g., Al, connected to a source of d. c. at 4–40 v. and a c. d. of 3–12 milliamperes per sq. cm.

**Electric ozone generator.** Wm. R. Ridd (to Milprint Products Corp.). U. S. 1,948,240, Feb. 20. Various structural and operative details are described.

**Discharge lamps.** Willem F. Westendorp (to The

British Thomson-Houston Co. Ltd.). Brit. 401,793, Nov. 23, 1933. Two lamps, operating, resp., on the pos. and neg. half-waves of a single-phase a. c. supply to produce illumination without visible flicker, have glass or quartz envelopes filled with A, Ne, He, Kr, Xe, Hg or Na and have auxiliary electrodes connected to the anodes.

**Electric discharge lamps.** The General Electric Co. Ltd. and John W. Ryde. Brit. 401,846, A reflector or other sep. surface which is coated with an inorg. substance that phosphoresces with the emission of light of relatively long wave length, e. g., Zn-Cd sulfide, contg. a small admixt. of Cu, is used in combination with a high-pressure metal-vapor elev. discharge lamp running at considerably above atm. temp. to correct for the deficiency in such light in that emitted by the lamp.

**Apparatus and method for applying getter material to lamp filaments.** John Flaws, Jr. (to The British Thomson-Houston Co. Ltd.). Brit. 401,576, Nov. 10, 1933.

## 5—PHOTOGRAPHY

R. P. WIGHTMAN

**Photographic chemical data.** I. F. Hand. *Miniature Camera* 2, 61–3(1934).—Tables of formulas of several org. developers and chemicals used in photography are given. Relative solubilities and mol. wts. are included.

**Color photography.** G. Schweitzer. *Photo-Review* 43, 249(1931); 44, 105–6, 185–7, 201–3, 217–18, 232–4, 249–51, 265–6, 281–3, 297–9, 313–15, 332–3, 346, 361–3, 377–9 (1932).—A general review and discussion are given of photographic sensitive materials, filters, processes and app. for making photographs in color. H. D. Russell

**Temperature dependence of the photographic process.** H. Luft. *Phot. Korr.* 69, 161–5(1933).—This is an extension, with a review of the literature and a bibliography, of work already reported (Eggert and Luft, *C. A.* 26, 3738). Tests of sensitivity at temps. down to  $-190^{\circ}$  and tests on the influence of temp. on solarization are described. With temps. rising from  $-190^{\circ}$ , the sensitivity to light of various emulsions increases from practically at about  $-20^{\circ}$ , then falls to a min. at about  $-50^{\circ}$ , and finally rises again, this time irreversibly. The sensitivity to x-rays increases uniformly from  $-60^{\circ}$  to  $0^{\circ}$ ; below  $-60^{\circ}$  it is practically const., amounting to  $1/4$  or  $1/5$  of the sensitivity at room temp. (which result has been confirmed by H. Simon for a temp. of  $-250^{\circ}$ ). For the sensitivity to  $\alpha$ -rays the influence of temp. is of still less importance. As regards solarization with light, the max. d. is displaced toward higher exposures with increasing temp., with a simultaneous flattening of the descending (solarized) portion of the characteristic curve. For  $\gamma$ -rays this effect is similar but less pronounced.

**Physical development.** Allan F. Odell. *Camera* (Phila.) 48, 73–8(1934).—Phys. development, as described previously (*C. A.* 27, 4182), has been found satisfactory for high-speed panchromatic materials. There is claimed to be improvement over chem. development in regard to graininess of the negative and clearness of detail. No loss in emulsion speed was observed. A desensitizing bath may be used between the iodizing and developer baths. The sizes of the aggregates causing graininess are approx. 2–3  $\mu$  for chlorobromide emulsion (lantern slides), 20  $\mu$  for bromide emulsions by phys. development, 20–200  $\mu$  for the various "fine-grain" developers and 200  $\mu$  for chem. development.

**New formula for the representation of characteristic curves.** F. Chapuis. *Sci. ind. phot.* [2], 4, 249–50, 281–9, 313–20(1933); cf. *C. A.* 27, 5659.—The new formulas in their relationship to partial development are dealt with analytically—the effect of bromide, opaque emulsion, transparent emulsion and the effect of thickness. The "surface characteristics" of an emulsion are represented by a series of characteristic curves distributed

in a 3-dimensional envelope. The max. curves as well as the tracing of curves f. ters is demonstrated. Detns. of inertia, max. d. and transition point are made. Exptl. verification is given for the exactness of the general formula for a simple emulsion. Duplicating positive and process emulsions are said to give good agreement. Practical applications are discussed.

**Chemistry and purpose of materials used in compound-emulsion photographic fixative solutions.** C. Importance of ammonium chloride in the acid fixation bath. Fritz Hagelstein. *Pharm. Zentralhalle* 74, 754–6(1933); cf. *C. A.* 28, 265<sup>o</sup>.—The reasons underlying their use are emphasized and discussed.

**Highly disperse emulsions.** II. Lippo-Cramer. *Z. wiss. Phot.* 32, 182–4(1933); *C. A.* 26, 2385.—When a "grainless" AgBr emulsion is dyed with erythrosin or rhodamine immediately after mixing, its blue sensitivity is greatly diminished, while its yellow sensitivity (as tested with a tartrazine filter and the Eder-Hecht wedge) is either unaffected or slightly increased. After subsequent ripening, its sensitivity even to yellow is diminished in comparison with the ripened undyed emulsion, while addn. of the dye after preliminary ripening increases color sensitivity.

**Quinine hydrochloride in emulsion.** K. Kieser. *Phot. Ind.* 31, 997–8(1933).—The use of quinine-HCl and related compds. to produce blue-black tones with AgCl emulsions is discussed. Alteration of grain structure to coarser grain is apparently responsible for a change of green-black to blue-black tone.

**The action of supersonic waves on a photographic emulsion.** B. Claus. *Z. tech. Physik* 15, 74–8(1934).—Under the action of high-frequency mech. vibrations from a piezoelec. oscillator, the stability and homogeneity of an emulsion are improved, the Ag halide concn. can be increased and the general sensitivity is improved.

**Experiments on the latent image.** C. Wintner and E. H. Mynster. *Z. wiss. Phot.* 32, 157–81(1933).—Expts. of Kof and Haehn in 1907 (*C. A.* 1, 2981) have been repeated and extended. The fog produced by the vapor of a reacting mixt. of HCl and SnCl<sub>4</sub> in soln. is attributed to an indirect action of the Hg vapor given off; this reacts with traces of HCl and the O<sub>2</sub> in the air over the mixed soln. to form HgCl<sub>2</sub>, which later combines with the excess of Hg to form Hg<sub>2</sub>Cl<sub>2</sub>, the immediate fogging agent, in the emulsion film. Characteristic curve formulas are deduced for plates either when untreated or after exposure to HgCl<sub>2</sub> vapor. In the former case,  $S = K_1 a_1 e^{-a_1/n} + K_2 (1 - e^{-a_2/n})$ , where  $S$  is the d., and  $a_1$  and  $a_2$  are the sensitivity and fog nuclei, resp., per sq. cm. of the emulsion surface. A satisfactory agreement with the actual curves

has been found for the 2 very different plates, Ilford Process and Agfa Extra Rapid. E. R. Bullock

**Nucleus etching and grain isolation.** Lüpke-Cramer. *Phot. Korr.* 69, 177-9(1933).—After a discussion of the conceptions of nucleus etching and grain isolation, a series of comparative tests on the fogging of 32 brands of German plates by 3 different agents is described. Each plate was bathed for 2.5 min. in a soln. of either 2%  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ , 1%  $\text{H}_2\text{O}_2$  or 0.002% methylene blue, washed briefly, and then developed, together with an untreated plate, for 4 min. in metol-hydroquinone. Large differences which are seen from 1 kind of plate to another, in the amt. of fog produced by the 1st 2 solns., are attributed in part to an action (when present in the emulsion) of sensitizing dye. Such displacement of adsorbed gelatin by a dye (grain isolation) may help explain the easy fogging, on storage, of infra-red sensitized plates. E. R. Bullock

**Grainless photographic silver.** Fritz Weigert. *Naturwissenschaften* 22, 71-2(1934).—Dichroism of Ag or Au contg. gelatin after drying under stress has been known (Anbrunn and Zsigmondy, *Ber. Sachs. Ges.* 57, 13(1899)) for some time; likewise the Ag of an exposed and developed photographic Ag halide emulsion after drying of the plate is dichroic. Hence part of this Ag is grainless, the particle size being of the order of a light wave. Three typical emulsions, Agfa extra rapid and contrast and Gevaert Vittachrom, developed with either metol-hydroquinone (rapid type developer), dil. Fe oxalate (chem.) or dil. *p*-phenylenediamine + sulfite (physical) were studied in a polarimeter with monochromator. Three types of dichroism were found: (I) The sign from red to blue is neg., the strength almost const. (grey dichroism), no double refraction, (II) neg. dichroism increasing toward blue, weakly neg. double refractive, (III) pos. dichroism for long waves, neg. for short waves, strongly neg. double refraction. Type III was found for the Gevaert plates with the wave length of sign reversal from 470 to 650  $\mu$  depending on developer and developing time, also for Agfa contrast (reversal 650-700  $\mu$ ) for the last 2 developers. Both Agfa plates were of type I in the first developer, Agfa extra rapid of type II in the last 2 developers. The dichroism is closely related to the colloid photographic theory of W. and Matulis (*C. A.* 28, 1909\*).

B. J. C. van der Hoeven

**Silver layer which forms positives directly.** Hans Arens and John Eggert. *Camera* (Luzern) 12, 225-7(1934).—A Ag halide direct pos. coating is described which may be coated on films, plates or paper. It is developed and fixed in a manner similar to other Ag halide materials. It is not too slow for practical work. Uses suggested are in the making of x-ray duplicate negatives, and the enlargement of single frames of motion-picture positives. The developed image is said to be very fine-grained.

O. E. Miller

**Intensification with mercuric iodide.** R. Namias.

*Il progresso fot.* 40, 261-4(1933).—See *C. A.* 28, 1941\*

Katharine Goepf

**Hardening of negatives in the tropics.** C. J. van Mansum. *Focus* 20, 761(1933).—Negatives can be processed in the tropics without the use of formalin or cooling, by the following procedure: The metol-hydroquinone-borax developer is used which suppresses softening. Development is followed by rinsing for 1 min. in running water or in a large tank (60 by 60 by 60 cm). Next, the film is immersed for 1 min. or longer in a hardening bath consisting of a 10% soln. of K alum. After a rinse of  $1/2$ -1 min., it is fixed in the usual acid-fixing bath. It is then rinsed in running water and washed for 10 and 30 min., resp., in 2 large tanks (as above). C. E. I.

**The new standardized procedure for the determination of the light sensitivity of photographic negative films for picture taking.** Martin Biltz. *Angew. Chem.* 47, 61-71(1934).—The standardizing method and the underlying principles are discussed. The statement of the sensitivity in standard degrees (Degree DIN) guarantees (1) the proper time of exposure, (2) absence of a disturbing developing fog and (3) constancy of the stated sensitivity during the specified time limit. Five references.

Karl Kammermeyer

**Panchromatic film.** Curt Emmermann. *Film für Alle* 7, 283-5(1933).—E. claims that the speeds given by film manufacturers are usually too high. Tests made with various high-speed panchromatic materials show much less speed than those advertised. A. K. W.

**The action of various elements and compounds on photographic plate.** S. Aoyama, T. Fukuroi and I. Takahashi. *Kinsoku no Kenkyu* 11, 21-37(1934).—The mechanism of the action was studied and the authors concluded from expts. on 59 kinds of material that the photoelec. action is due to activated air or other gas which are desorbed from the materials used, or reflected from the active centers on their surfaces. It has not been detd. whether the photoelec. action is affected by the direct chem. reaction between the activated gases and the halides or by some ultra-violet ray, emitted when dissociation or association takes place. M. Kuroda

**Photoelectric cell in [photographic] densitometry.** J. M. Blair, M. C. Hyman and G. T. Meredith. *Phot.* 7, 73, 409-11(1933). B. C. A.

**Further experiments on the Sterry effect with chloride development papers.** F. Formstecher. *Phot. Ind.* 31, 691-2(1933).—An exposed chloride development paper (Mimosa Sunotype extra hard) has been bathed in solns. of  $\text{K}_3\text{Fe}(\text{CN})_6$ ,  $\text{K}_2\text{C}_2\text{O}_7$  or  $\text{CuCl}_2$  of varying concn., in some cases with the solns. mixed and in others successively, and the changes in gamma and total gradation on a given development are recorded numerically. In connection with a difference in the action of  $\text{K}_3\text{Fe}(\text{CN})_6$  as compared with the other agents, it is recalled that Valenta showed (*C. A.* 10, 2852) that a ferricyanide soln. converts the  $\text{AgCl}$  of an emulsion to  $\text{Ag}_3\text{Fe}(\text{CN})_6$ . E. R. Bullock

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

**Progress of inorganic chemistry 1930-1933.** II. Systematic investigations (measurements). Wilhelm Klemm. *Angew. Chem.* 47, 79-84, 99-104(1934); cf. *C. A.* 28, 1613\*.—*Equilibria*.—A review of the following subjects: (1) heterogeneous systems, (2) homogeneous systems and (3) various subjects. *Properties of compounds*.—(1) Diffraction of x-rays and electron rays, (2) dipole measurements, (3) Raman effects and infra-red spectra, and (4) magnetochemistry. *General data*.—(1) Complex compds., (2) transition between bond types and (3) structure of at. nuclei. One hundred and sixteen references. Karl Kammermeyer

**Reactions of inorganic compounds with liquid hydrogen sulfide.** Harlan P. Guest. *Iowa State Coll. J. Sci.* 8, 197-8(1933).—Liquid  $\text{H}_2\text{S}$  reacts: with  $\text{CaO}$  forming a mixt. of  $\text{CaS}$  and  $\text{CaSHOH}$ ; with  $\text{CaC}_2$  forming  $\text{CaS}$

with some  $\text{Ca}(\text{SH})_2$ ; with  $\text{C}_2\text{H}_2$  to form a little  $\text{CH}_3\text{CHS}$ , with pure dry  $\text{SO}_2$  above  $68^\circ$  with increasing violence until explosions result; with  $\text{VOCl}_3$  to form a mixt. of  $\text{VSCl}_3$  and  $\text{VCl}_3\text{SHOH}$ .  $\text{H}_2\text{S}$  is oxidized slowly by  $\text{POCl}_3$  and not affected by  $\text{P}_2\text{O}_5$ . In liquid  $\text{H}_2\text{S}$  hydrated  $\text{Na}_2\text{S}$  reacts with  $\text{CS}_2$  to form  $\text{Na}_2\text{CS}_3$ . In an alc. soln. of  $\text{H}_2\text{S}$  and  $\text{CS}_2$ ,  $\text{NH}_3$  reacts to form  $(\text{NH}_4\text{S})(\text{NH}_4\text{S})\text{CS}$ . F. E. Brown

**Amphoteric oxide hydrates, their higher molecular compounds and solutions thereof.** XXII. Iso- and heteropolyvanadic acids, purpureo- and luteophosphovanadates—a contribution to the clarification of the question of the synthesis and constitution of heteropoly compounds. Gerhart Jander, Karl F. Jähr and Hans Witzmann. *Z. anorg. allgem. Chem.* 217, 65-79(1934). cf. *C. A.* 28, 2269\*.—By the diffusion method previously



described, a large no. of vanadate solns. contg.  $H_3PO_4$  were examd. to det. the nature of the V compds. existing in these solns. and to prove again the existence of an octavanadic acid already indicated in previous expts. (cf. C. A. 27, 4187). Tabulated results show that in vanadate solns. contg. acid phosphate, anions of an octavanadic acid exist. Crystn. expts. confirmed the presence of octavanadic acid in the dark red purpureophosphovanadates. These purpureovanadates can be arranged in 4 groups with the following molar proportions of  $H_3PO_4$  and octavanadic acid: 2:1, 1:1, 2:3, 1:3. The complicated changes and processes which rising  $[H^+]$  produces in these  $H_3PO_4$ -alkali vanadate solns. are indicated: (1) In alk. and weakly acid vanadate solns. the phosphate ions have no influence on the aggregation process; and (2) in all acid solns. the  $H_3PO_4$  has a threefold role: (a) it stabilizes the octavanadic acid ion, and therefore from  $H_3PO_4$ -vanadate solns. salts of octavanadic acid, isopolyvanadates, are obtained; (b)  $H_3PO_4$  forms with octavanadic acid double compds. of higher order, the so-called heteropoly acids, the salts of which are the purpureophosphovanadates; (c) in strongly acid solns. the  $H_3PO_4$  with the vanadate ions therein forms the vanadate phosphates or alkali vanadate phosphates, the so-called luteophosphovanadates. M. McMahon

The formation of alkali metal hydrides by atomic hydrogen. Edna Ferrell, Thomas G. Pearson and Percy L. Robinson. *J. Chem. Soc.* 1934, 7-8. Li, Na and K readily combine with at. H at ordinary temp. to form their resp. hydrides. B. A. Soule

Ammonium arsenates. C. Matignon and A. de Passillé. *Compt. rend.* 198, 777-9(1934).  $NH_4H_2AsO_4$ , prepd. from aq.  $NH_3$  and  $As_2O_3$  in correct proportions, forms nondeliquescent prisms,  $d_4^{20}$  2.340; 100 g.  $H_2O$  dissolves at 0°, 20°, 60° and 80° 33.74, 48.67, 83.05 and 122.4 g., resp.; it loses  $NH_3$  above 300° to form an almost insol. acid metaarsenate  $NH_4H(AsO_3)_2$ , which is unchanged at 435°. No trace of  $As_2O_3$  or As is formed. When boiled with  $H_2O$  the metaarsenate re-forms orthoarsenate.  $(NH_4)_2HASO_4$  is pptd. by EtOH from soln. of its constituents. The aq. soln. loses  $NH_3$  to form  $NH_4H_2AsO_4$ , as also does the dry salt on gentle heating, though it is stable in dry air in the cold. Its equil. formula is  $\log p = (-15,500/4.57T) + 1.75 \log T + 3.3$ .  $(NH_4)_2AsO_4 \cdot 3H_2O$  is pptd. on satg. a soln. of  $As_2O_3$  or of either acid salt with  $NH_3$ ; it rapidly loses  $NH_3$ . The anhyd. salt is formed when an acid salt absorbs  $NH_3$  at 8 atms. pressure; it also rapidly loses  $NH_3$ . Its equil. formula is  $\log p = (-13,070/4.57T) + 1.75 \log T + 3.3$ . C. A. Silberrad

Boron arsenate and mixed crystals of boron arsenate-phosphate. G. R. Levi and G. Ghiron. *Atti accad. Lincei* 18, 394-8(1933).  $BAsO_4$  has been prepd. by 2 methods: (1) Equimolar aunts. of a concd. soln. (80%) of  $H_2AsO_4$  and solid  $H_3BO_3$  are heated on a water bath, till the mass solidifies. The product is vacuum-dried, as pure  $BAsO_4$ , d. 3.583. It forms tetragonal crystals,  $c/a$  1.524,  $a$  4.46. These values were also detd. for  $BPO_4$ , and are 1.532, and 4.33, resp. They form mixed crystals in all proportions. (2) Solid  $(NH_4)_2HASO_4$  is heated with solid  $H_3BO_3$ , eventually under vacuum, to eliminate all  $NH_3$ . This method is also used to prep.  $BPO_4$ . A. W. Contieri

Reaction differentiating the hydrated calcium aluminates. A. Travers and P. Leduc. *Compt. rend.* 198, 828 31(1934); cf. C. A. 27, 5019. The cubic  $3CaO \cdot Al_2O_3 \cdot 6H_2O$  (cf. C. A. 23, 5125) scarcely reacts with boiling alc.  $NH_4Cl$ , whereas all other hydrated Ca aluminates do so more or less readily. As  $CaO$  is obviously more turnly combined in the hexahydrate, it is suggested that it is derived from the acid  $H_2AlO_3$ , while the other Ca aluminates are basic salts of  $HAlO_2$ , i. e.,  $CaO \cdot Al_2O_3 \cdot nCaO$ , convertible into the former type on heating. C. A. Silberrad

Action of chlorates on sulfur, selenium and tellurium. J. Amiel. *Compt. rend.* 198, 1033-5(1934).—The chlorates of Ba, Sr, Ca, Pb,  $Cu^{++}$ ,  $Cr^{+++}$ , Mg, Ni, Co, Zn and Cd (with increasing ease in this order) in presence of S

and a little  $H_2O$  evolve  $ClO_2$  below, and  $Cl_2 + O_2$  above, 50-60°; with S  $S_2Cl_2$  is formed, which is decompd. by  $H_2O$ , and sulfate is finally formed. If org. matter, e. g., paper or gum arabic, is present, inflammation may occur. Se reacts similarly but more vigorously, a slightly moist mixt. thereof with any chlorate except that of K becoming incandescent. Te is attacked only by concd. aq.  $HClO_3$  or aq.  $X(ClO_3)_3$  if  $X = Mg, Ni, Co, Zn$  or  $Cd$ . Ammoniacal chlorates, e. g.,  $Zn(ClO_3)_2 \cdot 4NH_3$  or  $Cd(ClO_3)_2 \cdot 6NH_3$ , do not react with S or Se. A dry mixt. of S +  $Sr(ClO_3)_2$  may be preserved indefinitely over  $P_2O_5$ ; and addn. of an alkali acetate prevents the action of any chlorate on S or Se. C. A. Silberrad

Investigations of iodates. I. The iodates of aluminum, chromium and iron. A. v. Endredy. *Z. anorg. allgem. Chem.* 217, 53 61(1934).—Compds. of the composition  $R^{+++}(IO_3)_3 \cdot xH_2O$  were prepd., where R represents Al, Cr and Fe. With Al,  $x = 6$ , for Cr,  $x = 2, 4\frac{1}{2}$ , and 5, and for Fe,  $x = 0$ . With increasing ionic radius and decreasing electroaffinity, the stability of the hydrates decrease, and the soly. falls. The structure of the Al compd. was that of a hexaquo complex cation. The structures of the Cr compds. were not established, and the Fe compd. was considered to be similar to ferric phosphate. C. E. P. Jeffreys

The sulfides, selenides and tellurides of the six platinum metals. Lothar Wohler, K. Ewald and H. G. Krall. *Ber.* 66B, 1638 52(1933); cf. C. A. 26, 340. —As a procedure, Se and the metal chloride were heated in  $CO_2$ , this giving  $2MCl + 2Se_{21/2} = 2MSe + xSe_2Cl_2$ . The melt was then heated in a tube *in vacuo* with Se. With Te the procedure was the same. S was introduced directly into the tube *in vacuo*. Excess S was extd. with  $CS_2$  and then boiled with 5%  $Na_2S$  soln., Se by 0.5 N KCN soln., Te with 2 N  $HNO_3$  followed by dil. KOH except for  $OsTe_2$  and  $PdTe_2$ , which were purified only with 10 N KOH. Each residue was washed with  $H_2O$ , dil. HCl, EtOH and  $H_2O$  and dried at 130° in  $CO_2$ . Many sulfides were also made by reaction of  $MeCl$  with dry  $H_2S$ . Ir and Se give no reaction at 300°.  $IrCl_3$  and Se at 600° give  $IrSe_2$ . Further heating with Se at 450° gives  $IrSe_3$ . At 400° in  $H_2$  this goes to  $IrSe_2$ .  $IrCl_3$  and Te at 750°, followed by reheating at 700°, give  $IrTe_2$ . If  $IrTe_2$  is heated in  $H_2$  at 600°  $IrTe_2$  is obtained.  $IrCl_3$  and S at 600° give  $IrS_2$ .  $IrCl_3$  and dry  $H_2S$  at 600° give  $IrS_2$ . In N. at 700°  $IrS_2$  or  $IrS_3$  gives  $IrS$ .  $RhCl_3$  and Se at 600° give  $Rh_2Se_3$ .  $RhTe_2$  was similarly obtained.  $RhCl_3$  and S at 600° form  $Rh_2S_3$ .  $RuSe_2$ ,  $RuTe_2$ ,  $RuS_2$  (by  $H_2S$ ),  $OsSe_2$ ,  $OsTe_2$ ,  $OsS_2$ ,  $PdSe_2$ ,  $PdTe_2$ ,  $PtSe_2$  and  $PtTe_2$  were obtained.  $PdCl_2$  and S at 450° gave  $PdS_2$ . Above 600°  $PdS$  is obtained.  $PtCl_2$  and  $H_2S$  followed by heating with S at 600° gave  $PtS_2$ . Above 630° this decomposes to  $PtS$ . The reactivity of the compds. varies with at. wt. of the neg. radical. Sulfides are extremely stable; selenides are more or less slowly attacked by *aqua regia*; tellurides are more or less easily attacked. Foster Dee Snell

Magnetic study of hydrated thoria. F. Bourion and D. Beau. *Compt. rend.* 198, 916-18(1934).—The magnetic susceptibility of hydrated thoria varies linearly with the content of  $H_2O$ ; it is therefore a mixt., and not a true hydroxide (cf. C. A. 17, 697; 23, 1330).

C. A. Silberrad

Magnesium sulfate. Hiroshi Hagisawa. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 976-83(1933) (Abstracts (in English) published with *Sci. Papers Inst. Phys.-Chem. Research (Tokyo)* 23, Nos. 468-77).—From the detn. of soly. over the temp. range 0-95°, 2 hydrates,  $MgSO_4 \cdot 6H_2O$  and  $MgSO_4 \cdot 3H_2O$ , the transition point of which lies at 40°, have been found; the dehydration of  $MgSO_4 \cdot 6H_2O$  has been examd. by the thermobalance, and no other hydrates than these have been found. The soly. of  $MgSO_4 \cdot 6H_2O$  in  $SO_2$  soln. of various concns., and the partial pressures of  $SO_2$ , have been detd. at 25° by the statical method. K. Konda

The existence of mercuric permanganate. A. Oliverio. *Atti IV Congr. nas. chim. pura applicata* 1933, 552-6. —Addn. of aq.  $KMnO_4$  to concd.  $Hg(OAc)_2$  soln. ppts.

well-formed, flat, violet crystals contg. the OAc, Hg, and MnO<sub>2</sub> groups, exploding by shock or rapid heating. The reaction  $2\text{AgMnO}_4 + \text{HgCl}_2$  pptg. well-formed crystals, rather sol. in H<sub>2</sub>O, which decomp. at 130° with sublimation of HgCl and which contain the groups Cl, MnO<sub>2</sub> and Hg. The action of HMnO<sub>4</sub>, prepd. from BaMnO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub>, on HgO, gives a basic salt of Hg(MnO<sub>2</sub>)<sub>2</sub>.

E. M. Symmes

The solubility of sodium and potassium ferrocyanides in aqueous solutions of ammonia. A. Tettamanzi. *Atti accad. sci. Torino, Classe sci. fis., mat. nat.* 68, 506-12 (1933).—See C. A. 28, 1589°.

A. W. Contieri

The reaction of cyanide ions with tetrathionate and pentathionate ions. B. Foresti. *Z. anorg. allgem. Chem.* 217, 33-47 (1934).—The reactions between KCN and alkali tetra- and pentathionates were studied. In the presence of buffers in the pH range of 7-8 the formation of the CNS ion from the CN ion was quant., and it was not necessary to express the reactions in neutral and alkali soln. by different equations. In unbuffered solns.  $\frac{1}{2}$  the CN ion is transformed before the reaction is halted. With both S<sub>4</sub>O<sub>6</sub> and S<sub>5</sub>O<sub>6</sub> ions the reactions with the CN ion were second order. The velocity consts. at pH 7.31 were 5.44 and 25.05. At pH 7.54 the consts. changed to 10.25 and 51.2. The effect of pH was about the same on both reactions. The reaction of the S<sub>5</sub>O<sub>6</sub> ion with the CN ion takes place in 2 steps. The S<sub>5</sub>O<sub>6</sub> ion reacts with the CN ion forming CNS ion and tetrathionate, which in turn reacts with a second CN ion. It appears that the S<sub>5</sub>O<sub>6</sub> ion might be useful as an antidote for HCN poisoning.

C. E. P. Jeffreys

Heteropoly compounds IV. Borotungstates and metatungstates. A. V. Rakovskii and A. V. Babaeva. *J. Gen. Chem. (U. S. S. R.)* 3, 59-66 (1933); cf. C. A. 27, 2395.—For the detn. of the character of H<sub>2</sub>O in boron- and metatungstates the salts were gradually dehydrated over H<sub>2</sub>SO<sub>4</sub> of definite concn. in a desiccator (van Bemmelen). The tabulated results show the existence of crystallhydrate regions. Thus in 5BaO B<sub>2</sub>O<sub>3</sub> 24WO<sub>3</sub> · xH<sub>2</sub>O 1 region corresponds to a content of H<sub>2</sub>O from 13.35 to 12.83%, and the other from 10.07 to 0.24%, while 5K<sub>2</sub>O B<sub>2</sub>O<sub>3</sub> 24WO<sub>3</sub> · xH<sub>2</sub>O showed 1 region with 9.57-9.22% H<sub>2</sub>O. BaO 4WO<sub>3</sub> · xH<sub>2</sub>O (I) showed 2 regions with 13.78 to 10.68% H<sub>2</sub>O. The results of hydration and dehydration of I indicate similar processes typical of adsorption compds., requiring further study to obtain exact data.

Chas. Blanc

The energy relationships of nitrous oxide and the structure of its acid. L. V. Pissarzhvskii. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, No. 7, 971-4.—The stability of a mol. cannot be measured by its heat of formation. The heat of formation of N<sub>2</sub>O is 17.7 and that of Cl<sub>2</sub>O is 16.2 Cal.; calcn. of the work of decompn. of these mols. shows that the stability of N<sub>2</sub>O is almost three times that of Cl<sub>2</sub>O. Since on decompn. into atoms there takes place combination of atoms of N, Cl and O into their mols., and since the release of the energy of N is 4 times that of Cl, the release of energy in the formation of mols. N<sub>2</sub> and O<sub>2</sub> from N<sub>2</sub>O is almost the same as that in formation of Cl<sub>2</sub> and O<sub>2</sub> from Cl<sub>2</sub>O.

V. D. K.

Binary system: thallium nitrate-thallium carbonate. A. S. Broun. *J. Gen. Chem. (U. S. S. R.)* 3, 998-1000 (1933).—From the fused mixts. of TlNO<sub>3</sub>, m. 206°, and Tl<sub>2</sub>CO<sub>3</sub>, m. 272-3°, the complex compds. 2TlNO<sub>3</sub> · Tl<sub>2</sub>CO<sub>3</sub>, m. 218°, and TlNO<sub>3</sub> · Tl<sub>2</sub>CO<sub>3</sub>, m. 214°, sepd.

Chas. Blanc

Potentiometric investigation of the formation of thio-sulfate from alkali sulfide and sulfurous acid. Erich Müller and K. Mehlhorn. *Angew. Chem.* 47, 134-9 (1934).—The following expts. were carried out: (1) action of aq. SO<sub>2</sub> soln. upon Na<sub>2</sub>S solns., (2) action of gaseous SO<sub>2</sub> upon Na<sub>2</sub>S solns., and (3) action of gaseous SO<sub>2</sub> upon concd. Na<sub>2</sub>S solns. with NaOH addns. The expts. with gaseous SO<sub>2</sub> were carried out with dil. (7%) and concd. gas (100%). The potentiometric investigation of the expts. showed that the reaction steps can be detected by sudden changes in the pH value. A no. of equations are discussed as tentative representations of the

reaction mechanisms. Several possible methods are given, for tech. applications, which aim to avoid the loss of S caused by the formation of Na<sub>2</sub>SO<sub>3</sub>.

K. K.

The peroxides and superacids of the halogens. L. V. Pissarzhvskii. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, No. 8, 1121-4.—Tetroxide of Cl can be obtained by the action of I on ether solns. of AgClO<sub>4</sub>. The ClO<sub>4</sub> ions give off one electron to iodine atoms and as anions react with each other to form tetroxide, (ClO<sub>4</sub>)<sub>2</sub>, having the same grouping of O atoms as O in H<sub>2</sub>O<sub>2</sub> (ClO<sub>4</sub>)<sub>2</sub> must be the anhydride of HClO<sub>4</sub> and HClO<sub>3</sub>, by reaction with H<sub>2</sub>O these acids are formed. HClO<sub>4</sub>, having the same grouping of O atoms as H<sub>2</sub>O<sub>2</sub>, is superchloric acid.

V. D. Karpenko

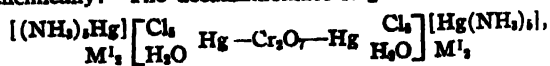
Nitrosylsulfuric acid. I. Ernst Weitz and Fritz Achterberg. *Ber.* 66B, 1718-27 (1933).—The alternative

structure of  $\left[ \begin{array}{c} \text{O} \quad \text{O} \\ \diagdown \quad \diagup \\ \text{O} \cdot \text{S} \cdot (\text{NO})_2 \end{array} \right] \text{H}$  with a coordination no. of

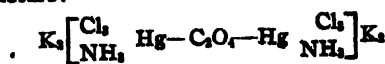
4 rather than 5 is presented.  $\text{K}_2\text{SO}_4 \cdot 2\text{NO} + \text{K}_2\text{SO}_4 + \text{H}_2\text{O} = \text{K}_2\text{S}_2\text{O}_8 + \text{N}_2\text{O} + 2\text{KOH}$ . This reaction is stopped by the building up of alkali on the right. Analogously, the reaction in alc. soln. to form  $\text{C}_2\text{H}_5\text{OSO}_3\text{K}$  is stopped by formation of KOH. These reactions do not agree with theories in which  $-\text{SO}_3\text{K}$  is one unit of the mol. but do agree with the structure suggested, that of a mixed anhydride of sulfuric and hyponitrous acid. This is in agreement with the incomplete decompn. in the lead chamber process.  $\text{K}_2\text{SO}_4 \cdot 2\text{NO}$  is quantitatively oxidized by KMnO<sub>4</sub> in 0.1 N KOH to K<sub>2</sub>SO<sub>4</sub> and KNO. On acidifying, the latter is converted to KNO<sub>2</sub>. *Ibid.* 1728-33.—Addn. of K<sub>2</sub>SO<sub>4</sub> · 2NO to FeSO<sub>4</sub> (NH<sub>4</sub>)<sub>2</sub> · SO<sub>4</sub> · 6H<sub>2</sub>O gives a red-yellow ppt. of K<sub>4</sub>Fe(SO<sub>4</sub> · 2NO)<sub>2</sub>, which decomposes when dried or on standing. Free NH<sub>4</sub> in the soln. does not alter the apparent result but the ppt. is more stable and the salt a basic one. Addn. of more NO to the soln. is without effect. Passing NO into a suspension of FeSO<sub>4</sub> in Na<sub>2</sub>SO<sub>4</sub> soln. gives oxidation of Fe<sup>++</sup> to Fe<sup>+++</sup> and reduction of NO to NH<sub>4</sub>OH. Addn. of NO to FeSO<sub>4</sub> in NH<sub>4</sub>OH soln. with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> gives pptn. of Fe(OH)<sub>3</sub> but no NH<sub>4</sub>OH. FeS and K<sub>2</sub>SO<sub>4</sub> · 2NO react to give KFeS<sub>2</sub>(NO)<sub>2</sub> · H<sub>2</sub>O, which ppts. AgNO<sub>3</sub> as Ag<sub>3</sub>(NO)<sub>2</sub> showing ON:NO<sup>++</sup> to be present. K<sub>2</sub>SO<sub>4</sub> · 2NO and a Co salt give a mixt. of K<sub>4</sub>Co(SO<sub>4</sub> · 2NO)<sub>2</sub> and K<sub>2</sub>Co(SO<sub>4</sub> · 2NO)<sub>3</sub>, stable in air. In NH<sub>4</sub>OH soln. gas is evolved and a complex formed. K<sub>4</sub>Zn(SO<sub>4</sub> · 2NO)<sub>2</sub> and K<sub>4</sub>Mn(SO<sub>4</sub> · 2NO)<sub>2</sub> were prepd. The corresponding Na salts are not pptd. but more intense colorations indicate their presence in soln. Cu<sup>++</sup> salts give a red-violet with Na<sub>2</sub>SO<sub>4</sub> · 2NO followed by evolution of N<sub>2</sub>O, and decolorization. La gives colorless double salts. TlNO<sub>3</sub> and Na<sub>2</sub>SO<sub>4</sub> · 2NO give Tl<sub>2</sub>SO<sub>4</sub> · 2NO. K<sub>2</sub>SO<sub>4</sub> · 2NO gives the same in lower purity. BaCl<sub>2</sub> and Na<sub>2</sub>SO<sub>4</sub> · 2NO give BaSO<sub>4</sub> · 2NO · 2H<sub>2</sub>O. Luteo-cobalt chloride gives [Co(NH<sub>3</sub>)<sub>6</sub>]Cl(SO<sub>4</sub> · 2NO) · H<sub>2</sub>O. Luteo-chromium salts are similarly pptd.

Poster Dee Snell

The existence of double salt ammoniates. II. G. Spacu and P. Spacu. *Z. anorg. allgem. Chem.* 217, 80-4 (1934); cf. C. A. 28, 1619°.—Tensimetric investigations yielded evidence for the following structures for some complex ammoniates prepd. and previously investigated chemically. The decaammoniate is given the structure



where M'<sub>4</sub> is K<sup>+</sup> or NH<sub>4</sub><sup>+</sup>, and the diammoniate is given the structure:



C. E. P. Jeffreys

Structure of the thio-ether compounds of platinum and palladium chlorides. E. G. Cox, H. Saenger and W. Wardlaw. *J. Chem. Soc.* 1934, 182-6.—K<sub>2</sub>PtCl<sub>6</sub> and Me<sub>2</sub>S in H<sub>2</sub>O at 0° on standing overnight deposit a mixt. of [Pt(Me<sub>2</sub>S)<sub>4</sub>][PtCl<sub>6</sub>] (I), insol. in cold CHCl<sub>3</sub>, and α- (II) and β-Pt[Me<sub>2</sub>S]<sub>2</sub>Cl<sub>2</sub> (III). II, orange, monoclinic plates, m. 159°, readily sol. in Me<sub>2</sub>CO and CHCl<sub>3</sub>; III,

citron-yellow, monoclinic prisms,  $m. 159^\circ$ , sol. in  $H_2O$  (0.0986 g. in 100 cc. at  $15^\circ$ ),  $Me_2CO$  and  $CHCl_3$ , sepp. from the last with 1 mol. of  $CHCl_3$  of crystn., which is quickly lost; III is more sol. in  $Me_2CO$  than II. I is slightly sol. in  $CHCl_3$  and  $EtOH-CHCl_3$ , undergoing transformation into III; it breaks down to a mixt. of II and III on standing at room temp., warming at  $85^\circ$  or dissolving in excess aq. boiling  $Me_2S$ ; on warming in  $H_2O$  I changes into a mixt. of II and III, finally giving a yellow soln., from which solely III seps. Treating I with  $(NH_4)_2PtCl_6 \cdot H_2O$  gives the green salt of Magnus. II is completely converted into III on soln. in boiling  $H_2O$  and almost completely by treating with further aq.  $Me_2S$ . It is only partially transformed on recrystn. from  $CHCl_3$  or on melting, the solidified melt remelting at  $154-61^\circ$ . III is partially converted into II on recrystn. from  $CHCl_3$ . The conversion of either II or III into the other is very slight in  $Me_2CO$ , even on warming the soln. III reacts in a few min. with  $Ag_2O$  in  $H_2O$  with the production of  $AgCl$  and a markedly basic yellow-brown varnish-like substance; II reacts only very slowly, with evolution of  $Me_2S$ , formation of  $AgCl$  and pptn. of Pt as the oxide or hydroxide. III immediately pptn.  $AgCl$  on addn. of  $AgNO_3 \cdot HNO_3$ ; II does not give a ppt. II in  $CHCl_3$  gives an  $\alpha$ -tetrachloride, orange,  $m. 219-29^\circ$  (decompn.); III gives a tetrachloride, yellow prisms, very slightly sol. in  $CHCl_3$ , while the  $\alpha$ -form is very sol.  $\beta$ - $Pt[Me_2S]_2Cl_2$  dissolved in  $H_2O$  contg. a drop of  $C_2H_5(NH_2)_2$  and immediately treated with aq.  $K_2PtCl_6$  gives bisdimethylsulfinethylenediaminoplatinous chloride, rose, monoclinic prisms which are unstable on standing in  $H_2O$ ; the  $\alpha$ -isomer reacts much less readily;  $Me_2S$  is evolved and only  $[Pt(en)_2][PtCl_6]$  is obtained; in cold  $Me_2CO$  immediate reaction occurs, with evolution of  $Me_2S$  and pptn. of  $[Pt(en)_2]Cl_2$ . According to Barker's system, II has  $a:b:c = 1.089:1:1.4060$ ,  $\beta = 105^\circ 52'$ ; other crystallographic data are given. X-ray examn. gives  $a 10.16$ ,  $b 6.01$ ,  $c 8.48$  A.;  $\beta = 105^\circ 55'$ ;  $d$  is 2.58 g./cc. (by flotation, 2.56); the space group is either  $P2_1/m$  or  $P2_1/c(C_{2h}$  or  $C_{2h}')$ . Each mol. of II has very nearly full  $C_{2h}$  symmetry, i. e., a plane and a 2-fold axis, so that, at any rate to a close approx., the 4 valencies to the Pt atom must be coplanar, with the thio-ether groups in  $s$ -position. The  $\alpha$ -bromide is completely isomorphous with II. X-ray examn. of III gives  $a 9.3$ ,  $b 13.2$ ,  $c 8.7$  A.,  $\beta 105^\circ$  approx.,  $d$  2.50 g./cc. (by flotation).  $\alpha$ -Bisdimethylsulfinethylenediaminoplatinous chloride, monoclinic prisms,  $a:b:c = 1.588:1:1.013$ ,  $\beta = 93^\circ 56'$ ; x-ray measurement gives  $a 12.0$ ,  $b 7.9$ ,  $c 7.7$  A.,  $d$  2.08 g./cc. Bisdimethylsulfinethylenepalladous chloride, deep red,  $m. 128^\circ$ , monoclinic prisms,  $a:b:c = 1.719:1:1.419$ ,  $\beta = 105^\circ 42'$ ,  $d$  1.99 g./cc. The complete isomorphism of  $Pd(SMe_2)_2Cl_2$  with  $Pt(SMe_2)_2Cl_2$  leaves no doubt that the former also has a planar trans-configuration. C. J. West

**Interhalogen compounds:** dissociation of halide complexes, dissociation, hydrolysis, distribution ratios in acid solution. J. Horace Faull, Jr. *J. Am. Chem. Soc.* 56, 522-6(1934).—The distribution ratios of  $ICl$  and  $IBr$  between  $CCl_4$  and  $H_2O$  are  $(ICl)/(ICl)_{aq.} = 0.34$ ;  $(IBr)/(IBr)_{aq.} = 3.9$ . The dissociation constants for the several interhalogen complexes studied are:  $(IBr)(Br^-)/(IBr_2^-) = 0.0027$ ;  $(IBr)(Cl^-)/(IBrCl^-) = 0.023$ ;  $(ICl)(Cl^-)/(ICl_2^-) = 0.0060$ . The expl. method is described. The dissociation constants for  $ICl$  and  $IBr$  in aq. soln. are calcd. from prior measurements:  $(I_2)(Cl^-)/(ICl_2^-) = 1.6 \times 10^{-10}$ ;  $(I_2)(Br^-)/(IBr_2^-) = 1.2 \times 10^{-10}$ . Preliminary values are given for the equil. constants for 5 equilibria arising in the hydrolysis of  $ICl$  and  $IBr$ . Compared to the individual halogens these complexes are very stable, have larger hydrolysis constants, and are more completely extd. from  $H_2O$  by  $CCl_4$ . W. B. K., Jr.

**Configuration and optical rotation of inorganic complex compounds.** Werner Kuhn and Karl Bein. *Z. anorg. allgem. Chem.* 216, 321-48(1934).—There is a far-reaching correspondence in the optically active properties of materials of analogous configuration of the types  $[M(en)_2AB]X_n$  and  $[M(Ox)_2]K_n$ . ( $Ox$  = oxalate radical.) It is necessary that the optically active properties of a substance be defined

not by estn. of the mol. rotation, which is characteristic of the compds. at the same selected wave length, but by the sign of the rotation, which furnishes analogous absorption bands. The longest wave-length absorption bands of these compds. can be balanced by absorption bands of analogous origin. These absorption bands remain unchanged if in  $[Co(en)_2]Br$  an en is replaced with any other acid or basic residue or if Cr, Rh or Ir is substituted for Co. This is also true of substitution of Cr, Rh or Ir for Co in  $[Co(Ox)_2]K_3$ . A schematic model shows characteristic mutual features for these compds. which cause them to give corresponding maxima, left in yellow light, right in red light. Foster Dec Snell

**Compounds of triethanolamine with various metallic salts.** Felice Garvelli. *Atti accad. sci. Torino, Classe sci. fis., mat. nat.* 68, 398-401(1933).— $N(C_2H_4OH)_3$  forms compds. in aq. soln. with  $NiCl_2$ ,  $CuSO_4 + KSCN$ ,  $CoCl_2$ ,  $Co(SCN)_2$ , and  $CoI_2$ , the last 2 salts being prepd. by addn. of  $CoCl_2$  to  $KSCN$  and  $KI$ , resp.  $NiCl_2 \cdot 2[N(C_2H_4OH)_3]$  is a blue cryst. solid;  $CuSCN \cdot [N(C_2H_4OH)_3]$  is light green.  $CoCl_2$ ,  $CoSCN$  and  $CoI_2$  also form compds., in which the ratios Co:base:acid radical are 1:1:1, 1:1:1, and 2:2:1, resp. They are violet, deep violet and reddish violet in color. Their structures have not been detd. II. A. Tuttamanzi and B. Carli. *Ibid.* 68, 500-5(1933). See C. A. 28, 1295<sup>4</sup>. A. W. Conticri

**Complex salts with  $\alpha$ -dipyridyl.** Complex salts of bivalent nickel. P. M. Jaeger and J. A. van Dijk. *Proc. Acad. Sci. Amsterdam* 37, 10-15(1934).—The base  $\alpha$ - $\alpha'$ -dipyridyl (I)  $m. 71^\circ$  was prepd. by the action of anhyd.  $FeCl_3$  on pyridine in sealed tubes at  $300^\circ$  (C. A. 23, 143). I crystd. from  $AcOEt$  in big lustrous monoclinic crystals. Evapn. of the deep red soln. formed on mixing a soln. of 2.5 g. of  $NiSO_4 \cdot 7H_2O$  with 4.7 g. of I in alc. soln. gave red monoclinic-prismatic plates of  $[Ni]_2SO_4 \cdot 7H_2O$  (II) occasionally mixed with blue triclinic needles of  $[Ni](H_2O)_2SO_4 \cdot 4H_2O$  (III). This blue salt exists in a 2nd modification consisting of long, pale-blue, hair-like needles. II is a deriv. of a moderately strong complex cation, decompd. by heating with concd.  $HNO_3$  or aq. regia but giving no ppt. with boiling  $NH_4OH$  and only a slight ppt. with  $NaOH$  at room temp.  $NiS$  is only slowly formed by repeated heating of the soln. with excess of fresh yellow  $NH_4$  sulfide soln. Salts of the type  $[Ni]_2X_2$  could not be obtained in aq. soln. Treatment of aq. III with  $Ba(OH)_2$  gave a greenish colloidal ppt. of a mixt. of  $BaSO_4$  and  $Ni(OH)_2$  in a red soln. of  $[Ni]_2(OH)_2$ . Diagrams of the crystal forms of I, II and III are given, together with the data on the forms observed, the measured and calcd. angular values and the optical properties. C. R. Addinall

**Chemical evidence for the planar structure of platotetrammines.** H. D. K. Drew and F. S. H. Head. *J. Chem. Soc.* 1934, 221-6.— $\alpha$ -Aminoethylaminoplatinous chloride (I), Pt am ae  $Cl_2$ , bright yellow,  $m. 216-6^\circ$  (decompn.), results by heating  $\beta$ - $[Pt am_2 ac_2]Cl_2$  with concd.  $HCl$ ; it dissolves in hot aq. isobutylenediamine (II) to give a mixt. of  $\alpha$ - and  $\beta$ - $[Pt ib_2]Cl_2$ ,  $NH_3$  and  $EtNH_2$  being displaced.  $[Pt am Cl_2]K$  and aq.  $EtNH_2$  in  $H_2O$  give 58% of the  $\beta$ -isomer (III), pale yellow,  $m. 206^\circ$  and  $196^\circ$  when recrystd. from dil.  $HCl$  and  $H_2O$ , resp. Evapn. the mother liquor from III or oxidizing III with  $H_2O_2$  gives  $\alpha$ -aminoethylaminoplatinous chloride, Pt am ae  $Cl_2$ , bright yellow,  $m. 238^\circ$ ; with I it gives a red compd., probably  $[Pt am ae Cl_2]_2$ .  $\alpha$ -Pt am  $ae Cl_2$ ,  $EtNH_2$  and then  $K_2PtCl_6$  give  $\alpha$ -diamminobisethylenediaminoplatinous chloroplatinite, dichroic (blue-green) needles,  $m. 211^\circ$  (decompn.); the  $\beta$ -plato salt, dull green,  $m. 202^\circ$  (decompn.). III (4 g.) in  $H_2O$ , treated with 3.5 cc. of 40% II, gives a mixt. of  $\alpha$ -(IV) and  $\beta$ -aminoethylaminoisobutylenediaminoplatinous chloride (V), sepd. by crystn. from  $EtOH$ , the yields being 25-45% IV and 20-5% V. IV forms glassy crystals and gives a plato-salt,  $C_6H_5N_4Cl_4Pt_2$ , Ag-pink rhombic or hexagonal plates; V forms spear-shaped, rhombic crystals; the plato-salt seps. in woolly masses of chamolite-colored needles. Aq.  $C_2H_5(NH_2)_2$  and III give aminoethylaminobisethylenediaminoplatinous chloride,  $[Pt am ae en]Cl_2$ ,

prismatic needles, whose platino-salt forms bundles of small violet needles.  $\beta$ -Aminopyridinoplatinous chloride, from  $C_5H_5N$  and  $K[Pt am Cl_2]$  at room temp., is yellow; with  $C_5H_5(NH_2)_2$  it gives *aminopyridinoethylenediaminoplatinous chloride*, which seps. as a monohydrate; the platino-salt,  $C_7H_{11}ON_4Cl_2Pt_2$ , forms red plates.  $EtNH_2$  gives  $\alpha$ -aminopyridinoethylenediaminoplatinous chloride,  $[Pt am py ac_2]Cl_2$ , whose platino-salt forms a monohydrate, rose pink, and anhyd. salmon-pink crystals, which can be hydrated to the rose form. The action of aq. II upon  $\alpha$ -Pt  $am_2 Cl_2$ , Pt  $ib Cl_2$  or  $K_2PtCl_4$  gives a mixt. of  $\alpha$ - $(VI)$  and  $\beta$ -bis(isobutyl)enediaminoplatinous chloride (VII), sepd. by crystn. from EtOH, the yield being 31 and 38%, resp. VI seps. from 96% EtOH or  $H_2O$  as the dihydrate; the anhyd. VI is very hygroscopic and forms a monohydrate in 1 hr. and a dihydrate in 12 hrs.; the platino-salt,  $\alpha$ - $[Pt ib_2]PtCl_4$ , deep chamois-yellow plates. VII seps. from 96 or 85% EtOH as the monohydrate; from  $H_2O$  it forms a dihydrate, but the anhyd. salt rehydrates only to the monohydrate. A slight excess of II with  $K_2PtCl_4$  at room temp. gives *isobutylenediaminoplatinous chloride*, S-yellow. The  $\alpha$ -isomer represents the *trans*- and the  $\beta$ - the *cis*-pair of positions in the plane of the metallic atom. C. J. West

**Iridium hydroxopentammines.** Bertram E. Dixon. *J. Chem. Soc.* 1934, 34 6. —Concd.  $NH_4OH$  acts on Ir aquo-pentammines to form a hydroxo series,  $[Ir(NH_3)_5(OH)]X_4$ . The individual members (a) are stronger bases than the corresponding Co salts, much stronger than those of Cr; (b) liberate  $NH_3$  from a cold soln. of  $NH_4^+$ ; (c) approach the similar Pt compds. in stability; (d) resemble the pentammine rather than the hexammine type in behavior toward Palmier's specific reagents. Details of prepn. are given. B. A. Soule

**Metallo-ammino complex compounds of nitrosulfonic acids of naphthalene and benzene.** N. N. Vorozhtzov and V. V. Kozlov. *J. Gen. Chem.* (U. S. S. R.) 3, 917-20 (1933). —By the interaction of nitrosulfonic acids of  $C_{10}H_7$  and  $C_6H_5$  with aq.  $NH_3$  in solns. of Cu and Ni salts, or by mixing the sol. Cu and Ni salts of these acids with aq.  $NH_3$ , there were pptd. pure, cryst. metallo-ammino complex compds. insol. or nearly insol. in  $H_2O$  and common org. solvents (cf. Ephraim, C. A. 14, 2309; 15, 2373; 17, 912). The structures of these complexes are  $Cu(NH_3)_4R_2^+$  and  $Ni(NH_3)_4R_2^+$  (cf. Chugaev, Werner, *et al.*). The ability of  $NO_2^-$  and halogen-substituted sulfonic acids to give such complex compds. is ascribed to their increased electroneg. character. The ability of 1,2- $O_2NC_{10}H_6SO_3H$  (I) to give most easily these complexes shows the influence of the *o*-position of the  $NO_2$  and  $SO_3H$  groups in the ring (cf. C. A. 27, 2440). The influence of the electroneg. radicals is further dis-

played by the inability of the sulfonic acids of  $C_{10}H_7$  and  $C_6H_5$  to give such insol. complexes, while  $\alpha$ - and  $\beta$ -anthraquinonesulfonic acids produce them. The sparingly sol. Cu and Ni salts of disulfonic and nitrodisulfonic acids of  $C_{10}H_7$  gave sol.  $NH_3$  complexes. Some dinitro-naphthalenesulfonic acids, such as 1,8,5- $(O_2N)_2C_{10}H_7SO_3H$ , some  $\beta$ -nitrosulfonic acids (2,1- and 2,4,8-) and 1,3- and 1,8- $O_2NC_6H_4SO_3H$  produced no complex compds.  $p$ - $(O_2N)C_6H_4SO_3H$  (II) gave no complex  $NH_3$  compds. with Ni and Co salts, but produced the insol. Cu complex. The formation of some metallo-ammino complexes with the sulfonic acids of  $\alpha$ - $C_{10}H_7NO_2$  is so highly sensitive that the reaction can be used for detection and detn. of Cu and Ni and nitrosulfonic acids. All complex compds. prepd. lose some  $NH_3$  at room temp. and all the  $NH_3$  at  $110^\circ$ . By substituting aromatic and aliphatic amines for  $NH_3$  in the reaction, there were obtained ppts. of the salts of the corresponding  $\alpha$ - $O_2NC_{10}H_6SO_3H$  and amines free from Cu and Ni. By addn. of  $NH_4Cl$  or  $(NH_4)_2SO_4$  to a soln. of Cu salt of an  $\alpha$ - $O_2NC_{10}H_6SO_3H$  or  $O_2NC_{10}H_6SO_3H$  there were obtained cryst., sol. and ionized ppts. of the type  $(NH_4)_2SO_4 \cdot CuR_2$  (cf. Gmelin-Kraut, *Handbuch anorg. Chem.* 5, 876). The sensitiveness of the following reactions is given in parts of Cu, Ni or Co in parts of  $H_2O$ . (1,2- $O_2NC_{10}H_6SO_3$ ) $_2Cu(NH_3)_4 \cdot 2H_2O$ , m.  $241^\circ$  (decompn.), blue-violet plates; sensitiveness 1:58,000. Na salt of I gave with  $NH_3$  and  $CuSO_4$  a gray isomer, m.  $248^\circ$ , with the same empirical formula. (1,2- $O_2NC_{10}H_6SO_3$ ) $_2Ni(NH_3)_4$ , a white ppt. from dil. solns. and green needles from concd. solns. (the Ni- $NH_3$  complex compds. have no definite m. p.); the sensitiveness is 1:120,000. The Co- $NH_3$  complex of I formed microscopic prisms; the sensitiveness is 1:15,000. The Cu- $NH_3$  complex of 1,5- $O_2NC_{10}H_6SO_3H$  obtained from highly concd. solns. in long, colorless needles, was not analyzed (1,6- $O_2NC_{10}H_6SO_3$ ) $_2Cu(NH_3)_4 \cdot 4H_2O$ , light-blue crystals without a definite m. p., the anhydrous product is colorless; the sensitiveness is 1:18,000. (1,6- $O_2NC_{10}H_6SO_3$ ) $_2Ni(NH_3)_4$ , greenish prisms; the sensitiveness is 1:100,000. The Co- $NH_3$  complex of 1,6-acid is sensitive 1:25,000 (1,7- $O_2NC_{10}H_6SO_3$ ) $_2Cu(NH_3)_4 \cdot 2.5H_2O$ , m.  $242^\circ$  (decompn.), green needles; (1,7- $O_2NC_{10}H_6SO_3$ ) $_2Ni(NH_3)_4$  bluish gray needles, the sensitiveness is 1:700; the Co- $NH_3$  complex of the 1,7-acid formed irregular needles; the sensitiveness is 1:750. 1,8- $O_2NC_{10}H_6SO_3H$  formed dark-green solns. of Cu- $NH_3$  complex without pptn., gold plates of the Ni- $NH_3$  complex with a sensitiveness of 1:17,000, and small needles of Co- $NH_3$  complex from highly concd. solns. ( $p$ - $O_2NC_6H_4SO_3$ ) $_2Cu(NH_3)_4$ , m.  $270^\circ$  (decompn.), violet needles; the sensitiveness 1:400 ( $NH_4$ ) $_2SO_4 \cdot Cu(1,2-O_2NC_{10}H_6SO_3)_2$  was not further investigated. Chas. Blanc

## 7--ANALYTICAL CHEMISTRY

W. T. HALL

**Qualitative analysis without hydrogen sulfide.** L. A. Munro. *J. Chem. Education* 11, 242-5 (1934).—See C. A. 28, 1297<sup>4</sup>. G. G.

**Inclusion of rarer metals in elementary qualitative analysis.** I. Inclusion of tungsten and molybdenum in Groups I and II. Lyman K. Porter. *Ind. Eng. Chem., Anal. Ed.* 6, 138-9 (1934).—When 10 mg. of W or 20 mg. of Mo is present, students experience no difficulty in detecting them. Only slight modifications of the conventional procedure are necessary. These are described. W. T. H.

**Notes on quantitative microanalysis.** Friedrich Hecht. *Mikrochemie* 14, 283-5, 286-8 (1934); cf. C. A. 28, 64<sup>4</sup>.—A. A. Benedetti-Pichler. *Ibid.* 285-6, 288.—Polemical. W. T. H.

**Electroanalysis.** H. Hölemann. *Z. anal. Chem.* 96, 193-209 (1934).—A review of 44 papers published during the last 2 years. W. T. H.

**Microchemical notes.** X. L. Rosenthaler. *Mikrochemie* 14, 268-70 (1934); cf. C. A. 27, 3776; 28, 63<sup>4</sup>.—

Helpful hints are given with respect to the crystalline appearance of  $BaSO_4$ ,  $SrSO_4$ , and  $CaSO_4$  under the microscope. W. T. H.

**New method of preparative microchemistry.** Joachim Winkelmann. *Mikrochemie* 14, 171-80 (1934).—The technique required in prepg. suitable microscope slides with preps. on them is described in detail. W. T. H.

**An experiment in utilizing a new principle in ultimate analysis by the microchemical method.** Karl Schwarz. *Mikrochemie* 14, 271-9 (1934).—An app. is shown in which some gas volumetric studies were made of the gases from the combustion furnace. The gases contain  $O_2$ ,  $H_2O$  and  $CO_2$  for the most part. It would seem to be fairly easy to base the compn. of the substance burned upon the content of  $H_2O$ ,  $CO_2$ , and sometimes N (in the case of substances contg. N). The studies were not completed and cannot be continued at this time, but considerable preliminary work is described. W. T. H.

**Retention of dithionates by glassware after exposure to potassium dichromate cleaning solution.** Edwin P. Laug.

*Ind. Eng. Chem., Anal. Ed.* 6, 111-12(1934).—The safest and quickest way to remove all traces of cleaning soln. from glassware consists in boiling with several successive changes of water; at least 15 min. is allowed for each treatment. If such pains are not taken, enough chromic acid may remain to interfere with biol. work.

W. T. H.

The application of potential-forming systems of metal/metal ion for potentiometric titrations. Erich Müller and Kurt Mehlhorn. *Z. anal. Chem.* 96, 173-5(1934); cf. Brintinger and Jahn, *C. A.* 28, 71<sup>1</sup>.—A somewhat different explanation of the reactions is given.

W. T. H.

2,4-Dinitrophenylhydrazine as a quantitative reagent for benzaldehyde. R. E. Houghton. *Am. J. Pharm.* 106, 62-4(1934).—Dissolve 0.1 g. of aldehyde in 5 cc. EtOH. Dil. with 50 cc. water and add, while stirring, 50 cc. of a soln. of 0.25 g. 2,4-dinitrophenylhydrazine in 1.8 N H<sub>2</sub>SO<sub>4</sub>. When the ppt. has settled, filter, wash with 2 N H<sub>2</sub>SO<sub>4</sub>, dry at 110° and weigh.

W. G. Gaessler

Colorimetric determination of antimony in copper. A. A. Vasil'ev and M. E. Shub. *J. Applied Chem.* (U. S. S. R.) 6, 500-2(1933).—Clarke's method (*C. A.* 22, 3369) for detg. Sb on Cu metal is modified slightly. Instead of pptg. the Sb on Cu and stripping off the deposit with Na<sub>2</sub>O<sub>2</sub> and water, it is preferred to ppt. the Sb with MnO<sub>2</sub>·H<sub>2</sub>O or with Fe(OH)<sub>3</sub>. Moreover, instead of measuring the color produced in the aq. soln. by the reaction of Sb<sup>+++</sup>, pyridine and iodide, it is recommended to ext., the yellow org. compd. with AmOH and measure the color of this soln.

A. A. Boetlingk

Determination of traces of bismuth in presence of other metals. L. A. Haddock. *Analyst* 59, 163-8(1934).—If org. matter is present, destroy it by wet combustion, using H<sub>2</sub>SO<sub>4</sub> and 30% H<sub>2</sub>O<sub>2</sub>. Transfer the neutral or acid soln. to a sepg. funnel and add 2 g. of citric acid, or, if very much Fe is present, use as much as 10 g. Add concd. NH<sub>4</sub>OH until nearly neutral to litmus, keeping cold by running water. Add 10 ml. of 6 N NH<sub>4</sub>OH and to this alk. soln. add 2 g. of KCN, or more when large quantities of Cu, Ag, etc., are present. Shake vigorously with 4 sep., 15-ml. portions of 0.1% diphenylthiocarbazon in CHCl<sub>3</sub>. Wash each CHCl<sub>3</sub> ext. with 10 ml. of water in another sepg. funnel and transfer all the portions to a 100-ml. Kjeldahl Pyrex flask. Evap. the solvent, add 1 ml. of concd. H<sub>2</sub>SO<sub>4</sub> and heat carefully with 30% H<sub>2</sub>O<sub>2</sub> until all org. matter is oxidized. Transfer to a sepg. funnel with 20 ml. of water, well cooled. Add dil. 1, soln. dropwise to remove any SO<sub>2</sub> present. After this add 4 drops of approx. 5% SO<sub>2</sub> water, 2 ml. of 30% H<sub>3</sub>PO<sub>4</sub> and 5 ml. of fresh 10% KI soln. Shake with 3-ml. portions of a mixt. of 3 parts AmOH and 1 part EtOAc to dissolve the HBiI<sub>4</sub>. The final ext. should be nearly colorless. Collect all the exts. in a graduated cylinder and compare with standards prepd. from 0.001% Bi soln. and extd. similarly. The method is suitable for detg. 0.005-0.1 mg. of Bi. Not more than 0.5 mg. of Pb or Tl should be present.

W. T. H.

Analytical reactions of cesium and rubidium. Wm. J. O'Leary and Jacob Papish. *Ind. Eng. Chem., Anal. Ed.* 6, 107-11(1934).—After studying various reagents, it was found that a satisfactory sepn. of Cs and Rb from K can be made by treatment with luteophosphomolybdic acid which does not ppt. K when not more than 1 g. of KCl is present. To det. Cs and Rb in the ppt., the Mo is removed by pptn. with H<sub>2</sub>S under suitable conditions and the Ce + Rb are pptd. together with H<sub>2</sub>PtCl<sub>6</sub>. The ppt. is treated with water and hydrazine salt to reduce the Pt and the Cs is pptd. as silicotungstate. The Cs in the ppt. and the Rb in the filtrate are detd. as chloroplatinates after removing the silicotungstate by pptn. with HgNO<sub>3</sub>. The results obtained were within about 2% of the truth.

W. T. H.

New color test for cobalt. Eduardo F. Brau. *Rev. facultad cienc. quim.* (Univ. La Plata) 8, Pt. 2, 65 70(1933).—In Chiarottino's test for Co (*C. A.* 27, 2396) diimidine, tollidine, 2,7-diaminodibenzofuran, or 2,7-diaminofluorene may be used in place of benzidine.

L. E. Gilson

Copper beads. Hans Rakett. *Z. anal. Chem.* 96, 192-3(1934).—As little as 0.001 mg. of Cu can be detected by the bead test.

W. T. H.

Determination of small quantities of copper by measuring the catalytic effect. Friedrich L. Hahn. *Mikrochemie* 14, 240-2(1934).—Further information is given concerning the effect of traces of Cu in accelerating the reaction between Fe(CNS)<sub>3</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> (cf. Hahn and Leimbach (*C. A.* 17, 701) and Pavelka and Morth (*C. A.* 28, 66<sup>4</sup>)).

W. T. H.

Effect of nitric acid on the determination of iron with permanganate. D. Totoiescu. *Z. anal. Chem.* 96, 183-8(1934).—Further evidence is furnished to the effect that if a soln. contg. small quantities of HNO<sub>3</sub> is reduced by Zn and the reduced soln. titrated with K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, the results in detg. Fe are too high. The HNO<sub>3</sub> is reduced for the most part to NH<sub>4</sub>OH.

W. T. H.

Notes on iodometry. I. Microdetermination of iron. F. Rappaport and R. Hohenberg. *Mikrochemie* 14, 119 28(1934).—Transfer the sample (0.2-2.0 mg. of Fe) and 2 cc. of 20% H<sub>2</sub>SO<sub>4</sub> to a specially designed flask with thick walls and glass connections to a flask contg. water for a steam distn., to a dropping funnel and to a receiver contg. 2 cc. of a cold mixt. of 20 cc. N NaOH + 15 cc. of 2% Na<sub>2</sub>SO<sub>3</sub> soln. Introduce steam into the flask until the exit tube is hot and all air is removed. Add through the dropping funnel 2 cc. of a soln. made by dissolving 0.01 mg. of pure KI in 20 cc. of 20% CdSO<sub>4</sub> soln. Distil with steam for 2 min. This causes the reduction of the Fe<sup>+++</sup> to Fe<sup>++</sup> with liberation of an equiv. quantity of I<sub>2</sub> which is carried over into the receiver by the steam. Lower the receiver and distil for another 2 min. to rinse out all the soln. from the tubing which was previously immersed in the sulfite soln. To the contents of the receiver add 5 drops of indicator soln. prepd. by dissolving 10 mg. of methyl red in 10 cc. of N NaOH and 100 cc. of water. Now, to oxidize all I<sup>-</sup> to IO<sub>3</sub><sup>-</sup>, add 20% H<sub>2</sub>SO<sub>4</sub> dropwise to acid reaction followed by 3 cc. of 15% NaOAc soln. and a soln. of 3 cc. Br<sub>2</sub> in 100 cc. of glacial AcOH until the soln. has a yellow color due to excess Br<sub>2</sub>. After 2 min. remove the excess Br<sub>2</sub> by adding concd. HCO<sub>2</sub>H until the color of Br<sub>2</sub> is lost: Br<sup>-</sup> and CO<sub>2</sub> are formed. Suck out any Br<sub>2</sub> fumes from the flask by means of the suction pump, and add 2 cc. more of 20% H<sub>2</sub>SO<sub>4</sub>. Add a little KI, to reduce IO<sub>3</sub><sup>-</sup> to I<sub>2</sub> and titrate with 0.005 N Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> with starch as indicator. If the Fe is present in org. material, first treat with concd. H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O<sub>2</sub>. To avoid trouble due to excess H<sub>2</sub>O<sub>2</sub> add a little Ti(SO<sub>4</sub>)<sub>2</sub> which acts as a catalyst for destroying org. material and forms with H<sub>2</sub>O<sub>2</sub> a peroxide which is decompd. more easily than H<sub>2</sub>O<sub>2</sub> itself.

W. T. H.

Determination of small amounts of lead. Karl Seelkopf and Harald Toeger. *Z. ges. expl. Med.* 91, 539-48(1933).—The electrolytic micro method for Pb of Schmidt (*C. A.* 27, 2741) was tested and found less accurate than the method of Bohnenkamp and Linnewech (*C. A.* 27, 5680).

Milton Levy

Titrimetric determination of magnesium with o-hydroxyquinoline in the brine from salt lakes. N. V. Komar and R. E. Kirillova. *J. Applied Chem.* (U. S. S. R.) 6, 358-61(1933).—In detg. Mg with 8-hydroxyquinoline the pptn. must be repeated. The soln. must contain NH<sub>4</sub><sup>+</sup> salts and be hot. The procedure is described.

A. A. B.

Potentiometric determination of nickel in steel by potassium cyanide. W. Hiltner and W. Grundmann. *Arch. Eisenhüttenw.* 7, 461-4(1934).—The possibility of cyanometric detn. of Ni by means of the AgI-Ag<sub>2</sub>S electrode is discussed and expts. described which show that the latter is useful as indicator electrode for cyanogenic ions even in the presence of oxidizing agents.

M. H.

New spot test for potassium. N. S. Poluektov. *Mikrochemie* 14, 265-6(1934).—The Na or NH<sub>4</sub> salt of [C<sub>2</sub>H<sub>5</sub>(NO<sub>2</sub>)<sub>2</sub>]<sub>2</sub>NH is sold as a dye under the name "aurantia." The amine itself is sol. in dil. NaOH or NH<sub>4</sub>OH, forming a strongly colored orange-yellow soln. On adding acid, yellow flakes of the amine are pptd. If to the slightly alk. soln. a little K<sup>+</sup> is added an orange-red cryst. ppt. is formed. The reaction can be carried out

conveniently as a spot test on filter paper. As reagent, dissolve 0.3 g. of the dye in 2 cc. of  $N Na_2CO_3$  and 20 cc. of water heated to boiling. Add a drop of the soln. to be tested to filter paper and promptly follow with a drop of the reagent. 0.003 mg. of K can be detected. Also in *Kali* (U. S. S. R.) 1933, No. 10, 44. W. T. H.

**Determination of potassium by the cobalt nitrite method.** O. M. Kosman. *J. Applied Chem.* (U. S. S. R.) 6, 362-6 (1933).—The use of the cobaltinitrite method is advocated, and detailed directions are given for obtaining a ppt.  $K_2Na[Co(NO_2)_6] \cdot 6H_2O$  of definite compn. A. A. B.

**Detection of sodium with uranyl acetate.** L. Rosenthaler. *Mikrochemie* 14, 267 (1934).—The difficulties encountered in the testing for Na in the presence of  $KNO_3$  (cf. C. A. 27, 2902) were due to the fact that the  $NaNO_3$  assumed to be present was really  $KNO_3$ .

W. T. H.

**Detection and microdetermination of silver, mercury and iodides.** I. M. Korenman. *Mikrochemie* 14, 181-8 (1934).—When starch reacts with free  $I_2$  in the presence of iodide, a blue color is produced. The addn. of  $Hg^{++}$  or  $Ag^+$  causes the blue color to disappear and yellow  $HgI_2$  or  $AgI$  is formed of which the color is much less intense. It is shown that this behavior can be made the basis for the detection and detn. of small quantities of  $Hg^{++}$ ,  $Ag^+$  or  $I^-$ .

W. T. H.

**Determination of fluorine.** M. Frommes. *Z. anal. Chem.* 96, 211-23 (1934).—A review of about 40 recent papers.

W. T. H.

**The colorimetric determination of traces of fluorine.** L. Szegő and B. Cassoni. *Giorn. chim. ind. applicata* 15, 599-602 (1933).—In detg. F by the colorimetric method according to Steiger (C. A. 2, 1104) volatilization of  $SiF_4$  is incomplete in the presence of large amts. of colloidal  $SiO_2$ , whereas, with  $Na_2SiF_6$ , it is complete. A. W. C.

**Detection and estimation of small amounts of fluorine.** Application of the zirconium purpurin test. I. M. Kolthoff and Maurice E. Stansby. *Ind. Eng. Chem., Anal. Ed.* 6, 118-21 (1934).—The qual. test for F described uses a modification of the de Boer-Bussart reagent and is sensitive to 0.003 mg. of fluoride. Various anions have an interfering effect. A simple distn. method is described by which 0.005 mg. of F can be detected in the presence of any cation or anion. A procedure for the titration of 0.5 to 15 mg. of F, in which  $ZrOCl_2$  is used as reagent and purpurin as indicator, is accurate to 2%. A colorimetric method for quantities of F between 0.01 and 0.05 mg. is also described which is accurate to 0.002 mg. of F. In the presence of interfering substances the F is sepd. by a distn.

A. L. Henne

**Determination of iodine.** P. Kuhn and A. Loeser. *Arch. expl. Path. Pharmacol.* 170, 609 (1933).—A reply to criticism (Barkan and King, *ibid.*, C. A. 27, 2168).

B. C. A.

**Determination of mercury in air and in urine.** A. M. Fraser. *J. Ind. Hyg.* 16, 67-77 (1934).—Air is passed through a tube in solid  $CO_2$  and ether and the Hg condensed and weighed. The Hg is converted to  $HgCl_2$  by use of aq.  $Cl_2$ , then pptd. as  $HgS$ , redissolved, deposited electrolytically and weighed on a microbalance. To det. Hg in the ash of urine, the acid ext. is treated with  $H_2S$ , the ppt. dissolved in aqua regia and the Hg pptd. on Fe wire from a soln. contg.  $CuSO_4$  and  $KCl$ . The Hg is volatilized in a capillary tube and the diam. of the condensed droplet measured. If over 0.20 mg. of Hg is present the electrolytic method is preferred. A. L. E.

**Rapid method for the determination of phosphorus in copper and copper-zinc alloys.** A. A. Vasil'ev and Z. V. Churilina. *J. Applied Chem.* (U. S. S. R.) 6, 563-6 (1933).—Slight modifications of known methods are suggested whereby satisfactory results can be obtained with weighing of the yellow phosphomolybdate ppt.

A. A. Boettingk

**Determination of sulfur in steel by Herwig's method.** B. Sosnovskii and P. Telnikh. *Steel* (U. S. S. R.) 1933, No. 3, 128-9.

H. W. Rathmann

**Synthetic cryolite analysis.** F. J. Frere. *Ind. Eng. Chem., Anal. Ed.* 6, 124-5 (1934); cf. C. A. 27, 928.

**Synthetic cryolite differs from the native product in not contg. the various constituents in definite proportions.** In the hope of eventually establishing a satisfactory procedure for the complete analysis, expts. were performed to det. the soly. of natural cryolite in aq.  $Na$  solns. It was found that no cryolite dissolves if the soln. contains 0.1 g.  $NaF$  in 100 cc. If, therefore, a synthetic cryolite contains  $NaF$  in excess of that required to form  $Na_3AlF_6$ , the excess  $NaF$  will dissolve in the dil.  $Na$  soln. and can be detd. by the method already described. The procedure fails if sol.  $Al$  salt is present. Expts. are also described in which known methods for detg.  $Na$  and  $H_2O$  were tested. W. T. H.

**Volumetric determination of chromic oxide in its compounds.** I. Yumánov. *J. Chem. Ind. (Moscow)* 1933, No. 9, 61.—The sample is heated in  $NaOCl$  soln. and the  $CrO_4^{--}$  formed is titrated with  $KI$  and  $Na_2S_2O_3$ .

H. M. Leicester

**New potentiometric method for analyzing mercurous salts.** G. Spacu and P. Spacu. *Z. anal. Chem.* 96, 188-92 (1934).—The method depends upon the pptn. of  $Hg_2(IO_3)_2$  in a vol. of about 80 cc. of 30%  $EtOH$ . A. indicator electrode a Pt wire coated with  $Hg$  is used against a normal calomel cell. If the soln. is more dil., e. g., 0.01 M, the results are inaccurate because the indicator electrode becomes passive.

W. T. H.

**Action of sodium amide on silicates and refractories.** P. Victor Peterson and F. W. Bergstrom. *Ind. Eng. Chem., Anal. Ed.* 6, 186-8 (1934).—If silicates, glasses, and certain refractories are ground to pass through a 200-mesh sieve, they can be decompd. by fusion with  $NaNH_2$  at 300-375°. A 100-cc. Ni crucible is recommended and an elec. muffle through which  $NH_3$  gas is passed. After the fusion, the  $SiO_2$  can be detd. in the usual way.

W. T. H.

**Gas-volumetric determination of lead dioxide.** M. L. Blanc and E. Eberius. *Z. anal. Chem.* 93, 447 (1933), cf. C. A. 26, 4768; 28, 1301<sup>9</sup>.—Polemical. B. C. A.

**Hypochlorite determinations.** F. K. Revva and V. V. Illarionov. *J. Applied Chem.* (U. S. S. R.) 6, 568-70 (1933).—A comparative study was made of the bromate and permanganate methods. Both are capable of giving good results, but  $HCl$  is better than  $H_2SO_4$  for making the soln. acid.

A. A. Boettingk

**Detection of carbon monoxide.** Fritz Bayer. *Berg- und Hüttenmännisches Jahrb.* 81, 135-9 (1933).—The newer methods are reviewed and described with particular reference to the reaction with  $I_2O_5$  and to the reduction to  $CH_4$ .

M. Hartenheum

**Oxidation of nitric oxide in small concentrations and its determination.** V. P'yankov. *J. Gen. Chem.* (U. S. S. R.) 3, 652-9 (1933).—Studies of the air in factories and mines by the Griess method for detg.  $N_2O_3$  in  $NaOH$  soln. through which the air was passed, disclosed the fact that  $NO$  in small concns. is oxidized rapidly to  $N_2O_3$  and more slowly to  $NO_2$ . When 0.6 mg.  $NO$  per l. of air is present, 95% is converted to  $NO_2$  in 2.5 hrs. Chas. Blanc

**A rapid method of dust sampling and approximate quantitation for routine plant operation.** Theodore Hatch and E. Ward Thompson. *J. Ind. Hyg.* 16, 92-9 (1934). A method based on the use of the Owens' counter is described.

A. L. Eldor

**The interferometer in air protection (use of the interferometer in measuring low concentrations of toxic gases).** Hans Görlacher. *Gasschutz u. Luftschutz* 4, 19 (1934). On the basis of some preliminary expts. and theoretical considerations the use of the Zeiss interferometer is suggested as a convenient method of detg. low concns. of foreign gases in the atmosphere.

A. L. Kibler

**The colorimetric determination of sodium in vegetation.** J. G. Louw. *Onderstepoort J. Vet. Sci.* 1, 425-34 (1933).—The procedure of Malan and van der Lingen (C. A. 27, 5358) was tested and found satisfactory for detg. 0.04-0.1 mg.  $Na$  in the presence of 0.1 mg.  $P$ . Not more than 0.8 mg. of  $K$  should be present.

K. D. Jacob

**Quantitative spectrophotoelectric analytical method applied to solutions of chlorophylls a and b.** F. Paul Zscheile, Jr. *J. Phys. Chem.* 38, 95-102 (1934).—By the



recently developed method (C. A. 28, 2623<sup>1</sup>) quant. light-absorption data were obtained for pure chlorophylls *a* and *b* and their mixts. The accuracy of the detn. of the compn. of mixt. is better than 1.0%. Exptl. details are discussed which are essential for a high degree of accuracy.

Howard Agnew Smith  
Use of Benedict's solution for the micro detection of sugar in urine and other solutions. Henry Tauber. *Mikrochemie* 14, 169-70 (1934).—Use 0.05 cc. of the clear or filtered urine in a tiny test tube and 0.5 cc. of Benedict's soln. As little as 0.1% glucose can be detected in a sample of 0.05 cc.

W. T. H.  
Methods of organic chemical analysis by hydrogenation and some oxidation methods of analysis. H. ter Meulen. *Rec. trav. chim.* 53, 118-25 (1934).—Recent changes in the app. and catalysts used in hydrogenation methods are described. The changes affect the detn. of O, N, S, Hg, As and Cd. Improvements have also been made in the technic of detg. C and H by combustion with  $MnO_2$  or  $PbO_2$  to absorb  $SO_2$  and for detg. S in gasoline. The experience of the lab. at Delft with methods published elsewhere is described.

W. T. H.  
Calorimetric analysis. II. Testing the purity of organic substances. R. N. M. A. Malotaux and J. Straub. *Rec. trav. chim.* 53, 128-40 (1934).—In the previous paper (C. A. 27, 2007) app. and technic were described for detg. melting and solidification lines which show the quantities of heat liberated or evolved during a run. In the present paper it is shown that a practical application of the method is the detn. of the purity of org. substances. The theoretical form of the melting curve is shown and the effect of impurities upon it. The purity of various chemicals was tested and concordant results were obtained and in cases where a definite quantity of impurity had been added, the results were found to be accurate. The substances studied were nitrotoluene, guaiacol, indole,  $\alpha$ -naphthylamine, azobenzene, benzophenone, stearic acid, triglycerides from tallow and lard and dihenzyl.

W. T. H.  
Determination of iodine in organic compounds. Joseph I. Goldberg. *Mikrochemie* 14, 161-6 (1934).—The conversion of the I to inorg.  $I^-$  can be accomplished satisfactorily by the method given in Pregl's book but without the addn. of bisulfite. Wash the carbonate soln. into an Erlenmeyer flask, neutralize to methyl orange with  $N H_2SO_4$  and add 0.1 cc. in excess. The total vol. at this point should not exceed 75 cc. Add 1 cc. of satd.  $Br_2$  water, shake and allow to stand 2 min. Then remove excess  $Br_2$  by adding 1 cc. of 5% phenol which contains no quinone. Shake again and after 2-3 min. add 1 g. of KI and titrate with thiosulfate. Excellent results were obtained with 5-7 mg. portions of materials contg. 10-70% I.

W. T. H.  
Detection and determination of small quantities of cholesterol and of  $\alpha$ - or  $\beta$ -stearins. Alfred Wasitzky. *Mikrochemie* 14, 289-310 (1934).—A review.

W. T. H.  
New micro method for detecting monoses in the pres-

ence of reducing biose. Henry Tauber. *Mikrochemie* 14, 167-9 (1934).—To 1 drop of neutral monose-biose soln. suitably diluted so that not more than 1.25 mg. per cc. is present (2.5 mg. of sucrose can be present) add 1 drop of a new reagent which is prepd. by dissolving 24 g.  $Cu(OAc)_2$  in 450 cc. of boiling water, adding 25 cc. of 8.5% lactic acid after filtering, shaking, filtering again and dilg. to 500 cc. Add the same reagents to 0.05 cc. of water in another small test tube. Heat the 2 tubes for 8 min. in boiling water and allow to cool for 2 min. Then add to each 1 drop of  $MoO_3$  soln. (150 g.  $MoO_3$  + 75 g.  $Na_2CO_3$  in 500 cc. Filter, add 800 cc. of 85%  $H_3PO_4$  and, when cool, dil. to 1 l). Shake and after 2 min. add 10 drops of distd. water. A blue color shows the presence of a monose. In the case of a biose, both solns. will be green.

W. T. H.  
Influence of hydrogen peroxide on the determination of glucose by the Bertrand method. A. Malkov. *J. Applied Chem.* (U. S. S. R.) 6, 567 (1933).—If  $H_2O_2$  is present, the glucose results are high.

A. A. Boetlingk  
Quantitative estimation of furfural at 0° with bromine. Elizabeth E. Hughes and S. F. Acree. *Ind. Eng. Chem., Anal. Ed.* 6, 123-4 (1934).—Treat furfural at 0° for 5 min. with an excess of 0.1 N  $KBrO_3$  in the presence of KBr and 3% HCl. The furfural combines with 1 mol. of  $Br_2$ . Det. the excess oxidant by treating with KI and titrating with  $Na_2S_2O_3$  soln.

W. T. H.  
Determination of amino acids by titration with formalin. N. I. Bulgakov. *J. Applied Chem.* (U. S. S. R.) 6, 375-9 (1933).—As buffer soln. borax is better than  $Na_2HPO_4$  for titrating amino acids with  $HCHO$ . The soln. should have  $pH = 9.00$  at the end point.  $CO_2$  must be absent. The procedure is described.

A. A. Boetlingk  
Detection of tri(hydroxyethyl)amine and a new reaction of cobaltous salts. F. Garelli and A. Tettamanzi. *Industria chimica* 8, 577-8 (1933).—Solns. of  $CoCl_2$  or  $CoSO_4$  give with  $N(C_2H_4.OH)_3$  an intense violet-pink color. This can be used to detect the base at concns. as low as 1:2000. The base can also be used to detect 1 part of  $Co^{II}$  in 15,000 parts of soln.

B. C. A.  
Mol. diffusion of light in fluorescent liquids [detn. of small amts. of quinine] (Canals, Peyrot) 3.

Lunge, Geo.: Technical Gas Analysis. Rewritten by H. R. Ambler. London: Gurney & Jackson. 410 pp. 21s.

Starck, H. P.: Volumetric Analysis. London: Baillière, Tindall & Cox. 228 pp. 7s. 6d.

Separating manganese from calcium, magnesium, iron and aluminum in the analysis of manganese ores. I. A. Ivanov. *Russ.* 31, 427, Oct. 31, 1933. After the usual treatment with acids the sepn. of  $SiO_2$  and the pptn. of Fe and Al and heating of the soln. with alkali acetate, Mn is pptd. with  $K_2Cr_2O_7$  in a weakly acidic soln., and this is followed by neutralization with  $NH_4OH$ .

## • 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIERER

The pyrite-marcasite relation. M. J. Buerger. *Am. Mineral.* 19, 37-61 (1934).—A critical study of available analyses indicates that pyrite corresponds closely to ideal  $FeS_2$ , while marcasite is definitely S-low. Comparison of unit cell ds. with detd. ds. shows that the excess Fe is present as proxy solid soln. The relation of the 2 minerals is primarily a chem. one. In the formation of marcasite in acid soln. the function of the  $H^+$  seems to be to remove some of the S from the normal  $FeS_2$  groups, forming  $H_2S$  and S-deficient  $FeS_2$ .

A. M. Brant  
A recent find of bixbyite and associated minerals in the Thomas Range, Utah. Arthur Montgomery. *Am. Mineral.* 19, 82-7 (1934).—Small black cubes of bixbyite occur in rhyolite, assocd. with topaz, garnet, beryl, etc.

A. M. Brant

Crystallographic study of Hungarian calcites. Maria Vendl. *Math. naturw. Anz. ungar. Akad. Wiss.* 49, 167-78 (1932).

S. S. de Finály  
Zoisite and other minerals included in mica from Spruce Pine, North Carolina. George M. Hall. *Am. Mineral.* 19, 76-80 (1934).—Zoisite occurs as long flat needle crystals parallel to the cleavages or as fibrous spherical masses penetrating the mica. Biotite, magnetite and garnet are also found as inclusions.

A. M. Brant  
Allanite from Wyoming. R. C. Wells. *Am. Mineral.* 19, 81-2 (1934).—Analysis shows the presence of Th 1.12%, U 0.01% and Pb 0.102%.

A. M. Brant  
Sorption of gas by mineral. IV. Zeolites and bentonite. Jitsusaburo Sameshima and Hachiro Hemmi. *Bull. Chem. Soc. Japan* 9, 27-41 (1934); cf. C. A. 26,

8978.—Data are given for the sorption of  $\text{NH}_3$ ,  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{C}_2\text{H}_6$ , O and H at  $0^\circ$  and  $25^\circ$  and 1 atm. by dehydrated laumontite, stilbite, mordenite (a), natrolite, apophyllite, analcite (b), inesite and bentonite (c). Apart from b, all samples sorb much  $\text{NH}_3$ , the sorption being of the chem. type except with a and c; a is a sorbent of the chabazite class, c of the silica gel class.

**The genesis of titanite crystals.** K. Obenauer and H. Behmenburg. *Centr. Mineral. Geol.* A1934, 47-55.—The frequencies of occurrence of zones and faces are statistically evaluated. The 29 genetic types listed by Bauer (*Mineralog. petrog. Mitt.* 43, 319-31 (1933)) are reduced to 5. The simplest types are found to be mineralogenetically oldest.

**A natural mineral gel from Vashegy.** László Zombory. *Földtani Közlöny* 63, 219-20 (1933).—A natural mineral gel, a transparent, brownish thick liquid, contained insol. 0.08,  $\text{SiO}_2$  2.07,  $\text{Fe}_2\text{O}_3$  11.32,  $\text{Al}_2\text{O}_3$  19.58, CaO 1.68, MnO 1.60,  $\text{SO}_3$  37.89,  $\text{P}_2\text{O}_5$  6.25, Cl 1.26,  $\text{H}_2\text{O}$  18.36, sum 100.11%. This compn. corresponds to  $(\text{Fe}, \text{Al})_2\text{O}_3 \cdot 2\text{SO}_3 \cdot x\text{H}_2\text{O}$  or  $(\text{Fe}, \text{Al})_2\text{O}_3 \cdot 3\text{SO}_3 \cdot y\text{H}_2\text{O} + n(\text{Fe}, \text{Al})(\text{OH})_3$ . It may have been formed by the oxidation and hydrolysis of decompg. sulfidic ores. The gel probably was chiefly a mixt. of Fe and Al sulfates. Also in *Centr. Mineral. Geol.* 1934A, 90-1.

**A hydrothermal deposit in Wayne County, Missouri.** W. A. Tarr and Joseph J. Bryan. *Econ. Geol.* 29, 84-92 (1934).—Intense hydrothermal alteration has almost completely altered granite to sericite, epidote and chlorite for short distances from the joints. Sphalerite and a little pyrite and galena were introduced during the closing stages.

**New observations on the ores of the basin of the Niari.** A. E. F. V. Lebedeff and G. Choubert. *Compt. rend.* 198, 484-6 (1934).—The ores contain Zn, Pb and Cu. The principal minerals are calamine, willemite, galena, chalcocite, diopside, etc. Less common are descloizite, vanadinite, phosgenite and wulfenite.

**The molybdenum mine at Azegour, Morocco.** Arnold Heim. *Econ. Geol.* 29, 76-83 (1934).—Pneumatolytic molybdenite assoc. with garnet occurs in a metamorphosed limestone near a granite batholith. It forms disseminated grains and rosetts and is rarely found in pockets. The ore averages 1.2%  $\text{MoS}_2$ .

**Survey of the character of the petroleum deposits of Roumania.** L. Mrazec. *Intern. Bohrtech., Erdolbergbau u. Geol.* 41, 229-34, 239-45 (1933).—The historical geology and stratigraphy are treated with a view to aiding in search for oil. About 50% of the petroleum now produced in the world comes from Tertiary formations. The oil facies is characterized by the presence of liquid and gaseous hydrocarbons together with "old" or fossil salt water. The water is high in Br and I, the I indicating the org. origin of the oil. The gaseous hydrocarbons probably far exceed the liquid in total wt. The older deposits appear to be highest in said. hydrocarbons, which represent the most stable equil. between C and H. E. E. C.

**The origin and migration of petroleum.** Karl Kröjci-Graf. *Intern. Z. Bohrtech., Erdolbergbau u. Geol.* 41, 101-5, 203-10 (1933); cf. C. A. 28, 9961. A summary of hypotheses.

**The origin of iodine and bromine in oil-bearing waters.** A. P. Vinogradov. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1, 214-15 (in English 216) (1934).—The oil-bearing waters of the Caucasus and the marine muds of the Black, Barents and Kara Seas contain 0.003-0.02% I and 0.0025-0.007% Br. The origin of the I is in the fossil mud of marine bottoms.

**The mode of intrusion of deep-seated alkaline bodies.** Helge G. Backlund. *Bull. Geol. Inst. Univ. Upsala* 24, 1-24 (1933).—Evidence favors the theory of gravity differentiation of a single magma (cf. Bowen, *The Evolution of Igneous Rocks*). The conical shape often assumed by these intrusive bodies is explained by the assumption of convection currents (cf. Holmes, C. A. 25, 4496).

**Chemical analyses of Swedish rocks.** Walter Larsson. *Bull. Geol. Inst. Univ. Upsala* 24, 47-196 (1933).—A com-

pilation and classification of 1004 analyses of Swedish silicate rocks. A statistical comparison of granitic and leptitic rocks is made.

**Ophitic texture and the order of crystallization of basaltic magmas.** Torsten Krokström. *Bull. Geol. Inst. Univ. Upsala* 24, 197-216 (1933).—Examn. of olivine dolerites from Sweden and Greenland showed that the plagioclase crystd. before the pyroxene. The rock could not have been formed by simple fractional crystn. of a single magma as postulated by Bowen. The possibility of liquid immiscibility as a contributing factor is defended.

**Pyroxene andesites of Mount Cserhát.** Aladár Vendl. *Math. naturw. Ans. ungar. Akad. Wiss.* 49, 504-61 (1932).—Detailed chem. and petrographic description, with 75 rock analyses and 12 photomicrographs.

**Rocks of Kenya.** E. Jérémie. *Compt. rend.* 198, 838-40 (1934).—Analyses of the following are given: oceanite; banded spherulitic phonolite contg. poikilitic egirite and enigmatite; phonolite contg. large crystals of nephelite and sphene, with egiritic augite, hedenbergite and enigmatite; and similar phonolite with kataforite and Na amphibole in place of hedenbergite.

**Minerals from the limestone at Gökum (Sweden).** Christer Enberg. *Bull. Geol. Inst. Univ. Upsala* 24, 257-72 (1933).—Examn. of garnet, pyroxene and vesuvianite indicate that the rock has been subjected to several distinct metamorphic processes.

**Emery (rock) of Samos.** J. de Lapparent. *Compt. rend.* 198, 760-1 (1934); cf. C. A. 27, 4756.—The vein of emery rock, 6 m. thick, is in cryst. limestone; the lower 4.5 m. is homogeneous and consists of diaspore contg. white mica and Fe oxides, but no corundum; the upper 1.5 m. consists of pisolitic ferruginous nodules in an Fe-free matrix, and mainly diaspore, but contg. mica, chloritoid and a little kaolin. The emery contains about 3.5%  $\text{TiO}_2$  and 24%  $\text{Fe}_2\text{O}_3$ , and is a metamorphosed ferruginous siliceous bauxite. The Naxos emery is similar, but metamorphism has proceeded further with formation of corundum.

**The geochemistry of boron.** I. V. M. Goldschmidt and Cl. Peters. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1932, 402-7.—With a Cu arc, it was found possible to det. as little as 0.0005%  $\text{B}_2\text{O}_3$  in rocks, meteorites, ashes, etc. German granites and gabbros contd. 0.001%  $\text{B}_2\text{O}_3$ , meteorites somewhat less. Argillaceous sedimentary rocks averaged about 0.1%  $\text{B}_2\text{O}_3$ . This higher B content must come from the hydrosphere, especially from sea water. The B content of sea water may be due either to the primordial atm. having contained  $\text{B}_2\text{O}_3$ , or to its being thrown into the air by the many volcanic eruptions during the course of geological time. In the region of metamorphic descendants of the above-mentioned sedimentary rocks (phyllite and mica schist), considerable amts. of freshly formed tourmaline occur. A marked concn. of B is found in coal ash. II. *Ibid.* 528-45. Numerous detns. of the B content in rocks, minerals, waters, soils, plants, etc., have been made. Magmatic rocks contain about 0.0005-0.001%  $\text{B}_2\text{O}_3$ . The content for sea salts and sediments is high. The siliceous skeletons of sea organisms and coral contain B. The B content of plants runs as high as 0.5% in peas and 1% in a tropical nectar. The origin of B and Cl in the sea is discussed.

**The geochemistry of germanium.** V. M. Goldschmidt and Cl. Peters. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* 1933, 141-66.—Analyses of a large no. of substances contg. Ge were carried out by means of arc- and x-ray spectral methods. A method for the detn. of 0.0001% of Ge is described. Ge was found in almost all magmatic rocks and minerals, except dunite. Its distribution in these and in sedimentary rocks is discussed. In meteorites, the Ge accumulates in the Fe-Ni and not in the troilite. Bituminous coals contained 0.001-1.6%  $\text{GeO}_2$ , brown coals generally less than 0.01%. The enrichment of Ge in the coals is discussed. The av. Ge content of silicate rocks is about 0.0005%.

**Formation of the earth.** René Perrin. *Compt. rend.* 198, 105-7(1934).—The formation of the earth has followed the laws governing the equil. of a 3-phase system: solid-magma-gas, the resistance to diffusion being taken into account. The partition of elements among the phases has been thus conditioned. The formation of a solid crust, leading to a state of false equil., permits the existence of an atm. At a true equil., all the  $O_2$  of the atm. would be bound by a thickness of less than 1 m. of the metallic nucleus. P. discusses the hypothesis that the first stage of condensation is the formation of liquid slags, composed of the silicates of Ca and Mg. It is possible that bodies

<sup>1</sup> composed mainly of light elements have always been "dead stars," all their  $O_2$  having been combined in their rocks from the beginning. L. Waldbauer

Ocher and earth color deposits in the Upper Palatinate (Kruse) 26. Iron mine region of Bilbao (Wohlbiel, et al.) 9.

<sup>2</sup> Lacroix, Alfred: Contribution à la connaissance de la composition chimique et minéralogique des roches éruptives de l'Indochine. Paris: Berger-Levrault. 208 pp.

## 9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

**Soap flotation.** John M. Patek. *Eng. Mining J.* 135, 125(1934).—A study of the action of depressing gels. Results of flotation tests on the recovery of cassiterite from silicate gang minerals are tabulated. Control of  $pH$  is important in making the silicate gels. It should be slightly on the alk. side (7.2). W. H. Boynton

**A study trip through the iron mine region of Bilbao.** H. Wohlbiel, Otto Muller and B. Kochanowsky. *Kohle u. Erz* 30, 248-50(1933); *Chimie & Industrie* 31, 78.—A description of the geological formation and of the working of the mines. A. Papineau-Couture

**The silver problem in milling silver-lead-zinc ores.** Hartley Sargent. *Can. Mining J.* 55, 112-13(1934).—Tables of assays and recoveries in the sepn. of Ag minerals from Zn minerals by milling methods are shown. W. H. Boynton

**Treatment of waste from silver manufacture.** Ernest A. Smith. *Metal Ind.* (London) 43, 827-9(1933); 44, 6-8(1934).—In Ag mfg. processes the net Ag losses may total 1 5% of the Ag used. Clean Ag scrap is melted without other treatment. Common scrap is sent directly to the smelters for melting, assaying and refining. Filings and turnings are freed from Fe, Ni or nickel silver before melting. Floor sweepings may contain 15 100 oz. Ag per 100 lb. These are burned to remove the bulk of the material, then ground to about  $1/32$  in. previous to sampling. The coarse metallics which remain on the screen may be melted without further treatment and the finer material usually goes to the smelter. Buffing sand, lime and pumice materials frequently contain 175-200 oz. per 100 lb. This material goes to the refiners for cupellation treatment.  $H_2SO_4$  stripping solns., contg.  $HNO_3$  or  $KNO_3$ , are freed from Ag by HCl or NaCl. The Ag may be pptd. by Cu or Fe and sold directly to the refiners. Spent plating solns. contain 2-3 oz. Ag per gal. and from these the Ag may be sepd. electrolytically or as  $AgCl$ , or with Zn, or the soln. may be evapd. and the dry salts recovered. H. E. Messmore

**The refinement of metal by the method of A. S. Tochinskii.** E. Kostyuchenko. *Stal* 3, No. 7, 18 (1933).—The method described by Perrin (*C. A.* 27, 422) was first worked out by Tochinskii in 1928. H. W. Rathmann

**A modern copper refinery in Canada.** M. Altmeyer. *Cuivre et laiton* 7, 7 12(1934).—The works of the Canadian Copper Refiners Ltd. in Montreal-East are described, especially the electrolytic plant. M. Hartenheim

**Deoxidizers and fluxes.** G. I. Bailey. *Metal Ind.* (London) 43, 561-4, 583-8, 592(1933).—Deoxidizers must be capable of reducing existing oxides in molten metals and the resulting oxide must be readily removable from the metal bath. Free energy of oxidation is a more reliable guide to the selection of deoxidizers than the heat of formation of the oxide. The oxides resulting from deoxidation should be capable of coagulation into comparatively large particles to facilitate removal. A compd., Cu phosphide, contg. 10-15% P is an excellent deoxidizer for molten Cu. This deoxidizer probably by reduction of  $Cu_2O$  prevents the reaction  $Cu_2O + H_2$  (dissolved) =  $2Cu + H_2O$  (steam). B. suggests the formation of a

metaphosphate slag of the approx. compn.  $Cu_3PO_4$ . Pellets contg. 10-20% P, the remainder Zn, added to oxidized brass or bronze quickly removes the surface oxide. In the casting of Ni and its alloys Mn is an excellent deoxidizer and desulfurizer. Si and boric acid form fluid slags with certain metallic oxides. Al is a powerful deoxidizer but the  $Al_2O_3$  is not slag forming. Ca, Ba, Sr, Li, Zn and Be have been used as deoxidizers for Cu with some success. Sound Cu castings can be made with H, as the deoxidizer provided air is excluded from the molten metal. Co may also be used. H. E. Messmore

**Pyrites processing in the Dwight-Lloyd plant.** H. E. Wosin. *Metallog. Periodic Rev.* No. 8, 25-8(1934).—Roasting of pyrites is an exothermic process expending energy in heat, while agglomeration is an endothermic process requiring addn. of heat. It was successfully tried to combine the 2 methods to obtain a more economical heat utilization. It was found in expts. that roasted pyrites to which crude pyrites had been added to bring the S content up to about 12% could be re-roasted without difficulty to a S content below 0.2%, yielding at the same time a good solid and porous agglomerate. Coke dust could be saved and the cost of agglomerate reduced considerably. The operation of a plant is described. M. Hartenheim

<sup>6</sup> **Sulfur enrichment in washed pyrite.** Arthur J. Cad-dick. *Mining Mag.* 50, 154-5(1934); cf. *C. A.* 23, 4655.—Where heap leaching of cuprous pyritic minerals is conducted the classification of the crude mineral is of prime importance, for it should ensure the max. quantity of washed ore of a quality that will yield cinders, after the roasting of the washed pyrites for  $H_2SO_4$  manuf., of sufficient purity for economic use as Fe ore. In this respect the classification of the crude mineral is largely governed by the  $SiO_2$  content. In the present paper the causes are outlined whereby the S content of the washed pyrites resultant from heap leaching is higher than that of the original cuprous pyrites. The presence in partially oxidized or sulfated mineral of  $CuSO_4 \cdot 5H_2O$  would naturally lower the S content of the mineral, as the amt. of S in this constituent is only 12.8%; however, since it is sol. and in the course of heap leaching is extd. from the mineral, it follows that the elimination of 12.8% S material increases the S content of the residual ore. Again, but in lesser degree, the presence of  $Cu_2S$  of only 20.14% S lowers the S content of the original ore. Other S combinations are considered. In general it can be taken that the enrichment shown in S content in relation to that of the original ore is due to the removal, in whole or part, of constituents contg. less S than that of the true Fe pyrite,  $FeS_2$ . A. W. Furhank

<sup>9</sup> **Automatic control of metallurgical furnace conditions.** H. J. Velten. *Instruments* 7, 42-4(1934); *Mech. Eng* 56, 223-6.

**Review of British blast-furnace practice.** W. S. Allen. *Iron & Steel Ind.* 7, 101-5(1934). E. H.

**Centralized remote-control and regulation in a modern German blast-furnace plant.** Rene W. P. Leonhardt. *Iron & Steel Ind.* 7, 159-64(1934). E. H.

- Heat transfers in open-hearth furnaces. G. W. Putnam. *Iron Age* 133, 14-17(1934). E. H.
- Plant results with an open-hearth furnace for the centrifugal casting of pipe. Ewald Bertram. *Stahl u. Eisen* 54, 125-33(1934).—The construction and operation of a tilting open-hearth furnace which supplies metal at 1880° to a Moore sand-casting machine are described. Curtis L. Wilson
- Open-hearth steel furnace practice in 1933. H. C. Wood. *Iron & Steel Ind.* 7, 119-20, 152(1934). E. H.
- Insulation of open-hearth furnaces. N. Allen Humphrey. *Blast Furnace Steel Plant* 22, 149-51(1934). E. H.
- Modern iron foundry practice. R. C. H. Weeks. *Foundry Trade J.* 50, 185-8(1934). D. S.
- Special foundry and alloy irons in 1933. J. E. Hurst. *Iron & Steel Ind.* 7, 113-14(1934). E. H.
- High-test cast iron in the United States of America. R. S. MacPherran. *Proc. Inst. Brit. Foundrymen* 25, 223-53(1931-32). E. H.
- Modern practice in cast-iron testing. H. W. Swift. *Proc. Inst. Brit. Foundrymen* 25, 644-75(1931-32). E. H.
- Light castings for enameling. H. B. McNair. *Foundry Trade J.* 50, 148-51(1934).—Practical and theoretical information for the proper foundry procedure in the production of Fe castings for enameling. Downs Schaaf
- Refractory materials for the iron and steel industries. Alfred B. Searle. *Iron & Steel Ind.* 7, 115-18(1934). E. H.
- Bessemer steel. Revival of its manufacture in Great Britain. L. P. Sidney. *Iron & Steel Ind.* 7, 121-4, 133(1934). E. H.
- Manufacture of rimmed steel ingots. J. H. Nead and T. S. Washburn. *Metals & Alloys* 5, 43-7(1934).—A presentation of the factors which affect the quality and production of ingots for deep-drawing sheets and strips. Downs Schaaf
- Refining reactions in steel making. Marcel Guedras. *Aciers spéciaux* 8, 371-2(1933); cf. C. A. 27, 4197.—Deoxidation and desulfurization in the elec. furnace process are described. Desulfurization is the resultant of the deoxidation, that is, there is an important relation between the S content and that of oxide. S is partly eliminated as CaS and partly as SO<sub>2</sub>. G. T. Motok
- Mounting of small metallographic specimens and metal powders in bakelite. H. M. Schleicher and J. L. Everhart. *Metals & Alloys* 5, 59-60(1934).—Bakelite resinoid is used as a mounting medium, the hardening taking place by heat alone (temp. ranging from 85° to 130°). D. S.
- Relation between plastic deformation in deep drawing and tensile properties of various metals. M. H. Sommer. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 541, 19 pp.(1934). Alden H. Emery
- Application of the pendulum for measuring hardness, rigidity of structures and modulus of elasticity. P. Le Rolland. *Usine* 43, No. 8, 29(1934).—The principle and the method of measurement are described. Accuracy is 1/500. M. Hartenheim
- Deoxidation of technical silver melts. K. W. Frochlich. *Mitt. Forschungsinst. Probieramt Edelmetalle* 7, 132-5(1934).—Of all deoxidizing agents P is the cheapest and also the most economical. The use of phosphor-copper is advantageous because of its easy castability; H disease will not occur during bright annealing; elongation and deep drawability are considerably improved while tensile strength and hardness are lowered very little; intermediary annealing between rolling, drawing, etc., can be of the shorter duration the more P remains in the alloy; and P-contg. Ag-Cu alloys are not easily attacked by acidic foodstuffs. Care must be taken not to heat over 646° in intermediary annealing, as red-brittleness follows. M. Hartenheim
- Properties of German silver. J. Cournot and F. Hiltbold. *Compt. rend.* 198, 749-51(1934).—The effect of cold working and annealing on German silvers contg. 55-60% Cu and 8-22% Ni has been studied. Cold working produces a Brinell hardness, *H*, < 200, increasing with increased content of Ni. *H* of a cold-worked alloy contg. 60% Cu + 9Ni when heated at 250-300° increased from 200 to 230, but after 10 min. at 300° or 1 hr. at 650° fell to 67; corresponding figures for an alloy contg. 60% Cu + 15Ni are 220-240 and 80-90. With const. Ni *H* decreases linearly with increase of Cu; with const. Cu it increases with increased Ni. Homogenization by long-continued annealing at a high temp. is necessary to remove the dendritic structure of the cast metal. C. A. Silberrad
- Influence of impurities on the technical properties of zinc. Wilhelm Herrmann. *Chem.-Ztg.* 57, 958-9(1933).—Cd increases the hardness, brittleness and red-shortness of Zn and also influences the malleability and ductility; 0.20-0.25% Cd is the max. for rolling, 0.30% Cd gives crack formation at the edge of the sheet, while 0.50% Cd makes rolling of Zn impossible. Brasses of high m. p. or high casting temp. contain little Cd. Brasses of low m. p. or low casting temp. retain most of the Cd; if the content is high, crack formation may occur. Cd has a slightly favorable influence on the corrosion resistance of the Zn Pb is the least harmful of the impurities of Zn. Pb up to 1.0% has a favorable effect on the rolling properties of Zn. Small amts. of PbS, however, make the Zn very brittle. Pb up to 0.3-0.5% increases the softness of the Zn and neutralizes the embrittling action of other impurities such as Cd, Fe, As and Sb. Flaking and scaling of galvanizing on bending results if the Pb content of the Zn is above 1.25%. In alloys up to 2%, Pb is used to increase machinability. In Zn-rich brasses the corrosion resistance against alk. reagents is increased by a Pb content up to 2.5%, especially if a few tenths percent Fe is present. Fe makes Zn hard and brittle; 0.015% Fe has a decided harmful effect on the rolling properties of Zn. Fe also acts unfavorably on galvanizing Zn. Hardness and brittleness of Zn are raised extraordinarily by Sn, a Sn content of 0.02% makes rolling impossible. For normal galvanizing work Sn has beneficial properties, 0.50-0.60% Sn may be present in the Zn. Sn reduces the bending stability of galvanized shapes and must be kept to a low max. for the galvanizing of plate, wire and other articles requiring great bending properties. Cu up to 0.05% has no influence on the forging and rolling of Zn, at 0.07% small edge cracks form; at 0.08% the influence of hardness becomes noticeable. Zn contg. 0.18-0.19% Cu can no longer be rolled. Cu influences the color of galvanizing and Zn casting and is limited below 0.2%. Arsenic and Sb diminish the usefulness of Zn for practical purposes, influencing the rolling properties, galvanizing properties and corrosion resistance of the Zn. Al is never present in the virgin Zn, yet is often added up to 0.01% in galvanizing and Zn casting to remove the color caused by Cu and Sb and to keep the Zn fluid, lustrous and uniform. Larger amts. of Al increase hardness. Ten refrences. C. B. Jenni
- Protective coatings for metal work. E. A. Hurst. *Ind. Finishing* 10, No. 4, 16-22(1934).—The results of investigations of the rust-inhibitive power of red lead, Fe<sub>2</sub>O<sub>3</sub>, chromates and metallic Zn in porous and non-porous vehicles are described. Red lead is inferior to Fe<sub>2</sub>O<sub>3</sub> as well as to Zn, the latter giving very satisfactory results when non-porous vehicles are used. D. T.
- Galvanizing malleable castings. G. M. Thrasher. *Foundry* 62, No. 2, 19-20, 60(1934).—Galvanizing malleable fittings by the basket method is described in detail. The importance of a low dross production is stressed. Downs Schaaf
- New process for making zinc-coated farm fencing more durable. J. L. Schueler. *Agr. Eng.* 14, 339-40(1933).—The thoroughly cleaned wire is passed through a molten Pb bath; held at a temp. (not specified) which develops certain desired phys. properties (not specified) in the steel wire, and then through the molten Zn bath. The wire is then subjected to the action of a flame which evens the distribution of the coating and seals up pin holes or other voids. Wire produced by this process shows greater resistance to corrosion than that produced by the ordinary galvanizing processes. K. D. Jacob
- Antirust agents for polished machine parts. Beugl

Kjerrnäs and John Bergstedt. *Tek. Tid. Upp. C, Kemi* 64, 4-8(1934).—The efficiencies of 28 different anti-rust agents, comprising clear and pigmented varnishes, petroleum, heavy cylinder oils, wool-fat solns., etc., were investigated for use on machines and mech. parts. The tests showed that petroleum (drop point 44-8°) gave the best protection. Among the drying materials a red varnish with an odor of wool fat, also gave satisfactory results.

D. Thuesen  
The mechanics of adherence in metal plating. K. Altmanberger. *Oberflächentech.* 11, 15-16(1934).—The problem of good adherence of layer to the surface of a metal is discussed for varnishing, enameling and plating. Electrolytic plating is considered, like galvanizing, to be an alloying process between base metal and cover, the latter diffusing into the former and forming with it solid solns. or intermetallic compds.; the crystal lattices grow together. H retards the formation of an alloy. One reason for unsatisfactory adhesion is that all electrodeposited metals tend to contract during deposition, in particular Ni, Co, Fe, Cr, etc., which absorb H easily; this causes internal stresses. The best adhesion is obtained when the formation of solid solns. between base and cover is as complete as possible, that is if the crystals of the base metal continue, during electrodeposition, to grow in the same crystal lattice. For this reason the metal must be as clean as possible. The adhesive force is detd. by measuring that force which is required to lift a deposit off the base metal. Some other tests by twisting, Brinell test and the Erichsen test are mentioned.

M. H.  
The formation of basic copper chloride and its identity with atacamite. H. P. Rooksby and R. C. Chirnside. *J. Soc. Chem. Ind.* 53, 33 5T(1934).—Basic Cu chloride corresponding to the mineral atacamite is formed by the corrosion of Cu in chloride solns. as shown by its x-ray pattern. The corrosion product of Eureka metal by chlorides has substantially the same pattern, but contains a small amt. of Ni.

L. W. T. Cummings  
Causes of porosity in nonferrous castings. J. H. Cheetham. *Iron Age* 133, No. 5, 22-4(1934).—Several causes of faulty brass; bronze and other nonferrous castings are detailed.

Downs Schaaf  
Testing cast iron. E. Siebel and M. Pfender. *Giesserei* 21, 21-7(1934).—A discussion of the exptl. results of expansion, tensile and elongation tests.

C. L. W.  
The dependence of gray cast iron upon the nature of the mold. A. Vath. *Giesserei* 21, 1-3(1934).—Bending strength, hardness and graphite nucleus no. increase with the water content of the mold. The phosphide eutectic is likewise more strongly developed; this results in increased brittleness.

Curtis L. Wilson  
The influence of copper on the graphitization behavior of white cast iron. Louis Lykken. *Iowa State Coll. J. Sci.* 8, 207-10(1933).—The Acm point of white cast iron suitable for malleabilizing is lowered 45°F. by the addn. of 3% Cu. The presence of 2% of Cu shortens the time in both stages of graphitization of white cast iron. Copper tends to refine the grains, and the castings etch faster.

F. E. Brown  
The system: Liquid iron-carbon oxides. H. C. Vacher. *Bur. Standards J. Research* 11, 541-51(1933).—A known mixt. of C oxides, at 1 atm. pressure was passed over liquid Fe maintained at a temp. of 1580° for approx. 90 min.; the Fe was then allowed to solidify, and the resulting ingot was analyzed for C and O. The C-O product obtained for molten Fe under mixts. of C oxides contg. approx. 11% CO<sub>2</sub> was found to be 0.0028. Addnl. expts. on the system liquid Fe-H<sub>2</sub>O vapor showed that the data of both systems were in good agreement with data for the water-gas reaction.

Downs Schaaf  
Survey of the magnetic changes in some irons and steels as a function of the temperature. J. Seigle. *J. phys. radium* [7], 5, 37-48(1934).—After a general chapter outlining the various reversible and irreversible magnetic transformations and their assocd. anomalies in expansion produced by heat treatments, detailed results for a no. of irons and steels are discussed. A large no. of complicated diagrams are presented, correlating these anomalies with

1 magnetic behavior and with the Curie point. The results of x-ray studies are summarized. W. W. Stiffer

The microoptical investigation of iron and steel by polarized light. N. Ahmad and M. F. Schwarz. *Metalurgia* 9, 33-7, 77-80(1933-34).—The app. used is briefly described. Pearlite in certain orientations appears very bright with crossed nicols. Slip bands can be brought out sharply with crossed nicols, and internal stresses can be detected. Several forms of Fe oxide can be differentiated with polarized light, other inclusions can be identified, and the structure of graphite in cast iron can be brought out. Flow lines found in such materials as cold-headed bolts can be followed. Constituents in Fe-W, Fe-Mo and other Fe alloys can be identified. Micrographs obtained with parallel nicols and with crossed nicols are shown.

J. L. Gregg  
Passage of hydrogen through steel. T. N. Morris. *Nature* 133, 217-18(1934).—H<sub>2</sub>, formed by the reaction between dil. citric acid and mild steel at 25°, is almost as likely to penetrate the steel sheet as to pass into the acid solution.

Gerald M. Petty  
Alloy steels—their properties and uses. W. H. Hatfield. *Iron & Steel Ind.* 7, 129-33(1934).

E. H.  
The difficult problem of selecting alloy steels. H. W. McQuaid. *Heat Treating and Forging* 20, 15-18, 21(1934).—The properties of many alloy steels are considered in their proper application to many industrial uses.

Downs Schaaf  
Structure of an alloy steel. Owen W. Ellis. *Iron Age* 133, No. 3, 20-3(1934); cf. *C. A.* 27, 5288; 28, 1842<sup>a</sup>.—A new constitutional diagram for quenched steels is drawn up and discussed. Mechanism of the formation of pearlite, troostite and nodular troostite is presented.

C. B. J.  
Crystal structure and forming as exemplified in Elektron metal. Walther Schmidt. *Z. Metallkunde* 23, 229-36(1933).—A discussion of the forming of the alloy Elektron based upon previous observations on the crystallography of the deformation process and upon new observations, in which it is shown that crystallographic reasoning, at least in this case, is of practical importance.

R. F. M.  
Nonoxidizing steels. Moreau. *Usine* 43, No. 2, 31(1933).—From the standpoint of the metal and the condition of its surface 3 principal points influence corrosion: the law of homogeneity, law of concn. limit of solid solns. and law of self-protection. An alloy forming a solid soln. is homogeneous, and therefore does not oxidize and can be readily worked. Addns. of other metals made to increase chem. resistance should enter into solid solns; below a certain concn. chem. resistance is not obtained. Self-protection is given by adding a nobler metal than the solid soln. so that an oxide film is formed on the surface of sufficient thickness and continuity to prevent corrosion. Martensitic, ferritic and austenitic steels on a Cr-Ni basis satisfy these claims very well, also steels with addns. of Cu, Mn, Al, etc. Compas., properties and fields of application are described.

M. Hartenheim  
The hardness testing and heat treatment of high-speed tools steels. J. Garland. *Machinery* (London) 43, 194-5(1933).—A discussion is given on the differences found in the hardness of high-speed steel tools supplied to a standard analysis and specification by the same and different makers. Recommended practice in hardening is a temp. range of 1228° to 1320°, followed by reheating at 570° to 620°.

A. W. Furbank  
Rate of age-hardening of duralumin as determined by upsetting tests. J. O. Lyst. *Metals & Alloys* 5, 57-8(1934).—An upsetting test is described for studying the workability of various alloys of Al in such operations as riveting. It was found that duralumin aged at room temp. after quenching begins to age-harden appreciably in 1 1/4 hrs. after quenching; the same alloy stored at 0° immediately after quenching began to age-harden 36 hrs. after quenching and when stored at -45° did not age-harden appreciably over a period of 14 days.

Downs Schaaf  
Recent progress in case-hardening of steels. Léon Guillet. *Génie civil* 104, 7-12, 29-36, 58-62, 82-4(1934).—Case-hardening agents, pastes, liquids and gases, are dis-

cussed. The factors in case-hardening are: the metal, temp., time, agent used, its conductivity, humidity, relation of its vol. to that of the pieces and the grain size of the metal. Ni steels require a lower temp. than ordinary steels, because Ni retards the migration of C. The Cowan process is discussed, and the Cowan, Ripoché, Hurni and Aube furnaces are compared. Micrographs are given of normal and abnormal structures, along with fractures and cooling curves. Cooling practices, hardness after annealing and some of the irregularities that appear are discussed. A long table of hardnesses obtained by different means is added. The treatment and properties of special steels is reviewed. A. N. H.

The influence of cathodic hydrogen on the strength of steel. D. Alekseev, P. Afanas'ev and V. Ostroumov. *Z. Elektrochem.* 40, 92-8(1934); cf. C. A. 20, 2779.—The cathodic brittleness of steel in  $H_2SO_4$  to which  $H_2S$ ,  $SO_2$  and  $As_2O_3$  were added was studied, with variation of c. g., stress, concn., time and temp. Metallographic and x-ray analyses gave no evidence of structure changes, so it was assumed that the H penetrates the intercryst. spaces. Part is loosely bound and easily removed by bending or heating; part remains as a solid soln.

Temper brittleness of common structural steels. Paul Borul. *Rev. mét.* 31, 14-31(1934).—A group of killed steels was compared with a representative number of open and rimming steels. Any heat treatment which permits pptn. of  $O_2$  renders open and rimmed steels more brittle than killed. In killed steels all treatments used produce practically the same impact strength; this varies greatly in rimmed steels.  $O_2$  acts as a catalyzer of germination extending greatly the range in which the physical structure of steel undercooled below  $A_1$  is unstable.

Red brittleness of copper steels; means of prevention. F. Nehl. *Usine* 43, No. 4, 31(1934); *Stahl u. Eisen* 53, 773-8(1933).—Red brittleness of Cu steels in tube making can be avoided when the following points are observed: steel with not more than 2% Cu worked between 800° and 1100° does not show cracks; above 1100°, steels with more than 0.5% Cu produce cracks when bending; with less than 0.5% cracks are not formed at any temp. The addn. of Ni in an amt. higher than half that of Cu prevents cracking at all rolling temps. M. Hartenheim

Some micrographic aspects of an annealed hard ordinary carbon steel. J. Seigle. *Chimie et industrie* 30, 1282-9(1933).—A detailed micrographic examn. of a steel having the following compn.: C 0.58, Mn 0.68, Si 0.15, S 0.020, P 0.021%, led to the following conclusions: (1) On heating pearlite subsists practically unchanged to the end of the dilatometric anomaly, except in the case of very prolonged heating or of very strong cold-working after the 1st heating; the 2nd heating then gives a coalesced structure. (2) On cooling, pearlite forms at the very beginning of the dilatometric anomaly. (3) The pearlite of a given hard steel can have a C content considerably lower than the generally admitted 0.85-0.90%, while the steel retains all the characteristics of an annealed steel.

The effect of nitrogen content on high-chromium steels. S. M. Norwood. *Can. Chem. Met.* 18, 86(1934).—Large columnar grains of the straight-Cr alloys contg. over 18% Cr have been improved by the addn. of appropriate amounts of N as high-N ferrochrome. The N should be present in an amount equal to about 1% of the Cr content, thereby improving the strength and toughness of the casting without materially affecting the hardness or the machinability. One detrimental effect of N on the properties of wrought Cr-Ni steels is decreased stability at elevated temps. These steels are, like usual types, subject to intergranular attack. N improves Cr-Ni steels in machinability and provides nonmagnetic castings of relatively high strength. W. H. Boynton

Resistance of nitrified austenitic manganese steel against sea water. Shun-ichi Satō. *Proc. Imp. Acad. (Tokyo)* 9, 402-3(1933).—The potentials of Fe, of a special steel contg. C 0.42, Si 0.21, Mn 0.55, P 0.024, S 0.012, Ni 0.25, Cr 1.47, Al 1.38, Mo 0.25% and of a

steel contg. C 1.21, Si 0.03, Mn 11.72, P 0.04, S 0.007%, both before and after nitriding, were measured in sea water. The attack of the specimens was in relation to their potential. The nitrified austenitic Mn steel showed the highest potential and was entirely unattacked.

Chromium alloy steel castings. J. H. Critchett. *Foundry* 62, 16-18, 43(1934).—Certain phys. and chem. properties are listed for plain Cr-steel castings contg. (1) 1-3% Cr, (2) 4-7% Cr, (3) 12-14% Cr, (4) 18% Cr and (5) 25% Cr. N addns. to over 20% Cr steels is advocated in order to reduce the tendency toward large columnar grains and grain growth on holding for long time periods at high temp.

Deterioration of chromium-tungsten steels in ammonia gas. P. R. Kisting. *Metals & Alloys* 5, 54-6(1934).—Results are given for 1-year exposure tests of a series of Cr-W steels (Cr up to 2.7%, W up to 11.7%) to a 3:1 mixt. of H and N with 10%  $NH_3$  at a temp. of 300° and at a pressure of 600 atm.

Heat-treating steel wheels. Anon. *Heat Treating and Forging* 19, 12-13, 17, 40-1(1933).—A compact unit is described in which movement and heating are precisely controlled.

"Union Bau-Stahl" as the material for bridge construction. S. Ohta and S. Kawaguchi. *Tetsu to Hagane (J. Iron Steel Inst., Japan)* 20, 29-34(1934).—Mechanical and corrosion tests were carried out and results are given. Plates, T-bars and rivets of this steel showed, resp., yield point, 38-41, 37-38, 36-40; tensile strength, 57-61, 58-60, 52-53; elongation 20-24, 19-23, 27-30; hardness (Brin.) 183-192, 183-187, 153-156; (Izod) 6-4, 6, 15. Corrosion tests were made in air, water, sea water and solns. of  $H_2SO_4$ , HCl,  $HNO_3$  and NaCl. This U. B. steel is generally superior to ordinary C steel except in the case of  $H_2SO_4$ .

Research on metals and alloys. F. C. Frary. *Ind. Eng. Chem.* 26, 281-4(1934).—A review of some of the important considerations involved in the production of a new com. alloy, with emphasis on the effect of impurities in metals; workability in relation to crystal structure and annealing; the problem of melting metals; and the "customers' problems" such as the utilization of the finished product, casting processes and corrosion resistance.

Beryllium and its alloys. H. A. Sloman. *Metal Ind. (London)* 44, 160-2, 183-6, 210-11(1934).—A survey of the present position of Be; its occurrence, extrn., technic of production by electrolysis, properties and uses. The production, usefulness, application and properties of Be-Al alloys, Be bronzes, Be-Ni alloys and Be plating also are discussed.

Hall effect and some other physical constants of alloys II. The tin-bismuth series of alloys. W. Rheinalt Thomas and R. J. Evans. *Phil. Mag.* 47, 65-83(1934); cf. C. A. 26, 3419.—The Hall coeffs., resistivity, temp. coeff. of resistance, thermoelectric power and d. were detd. for Sn-Bi alloys over the entire compn. range. The samples were carefully annealed. The most rapid variations in properties occur in the region of low Sn content. The Hall coeff. changes sign as the magnetic field is increased. The max. value occurs at a compn. of 94% Bi for a magnetic field of 3096 gauss. For more intense magnetic fields, the max. is shifted toward higher concns. of Bi. The results indicate a solid soln. of Sn in Bi at the Bi end of the compn. range. E. J. Rosenbaum

Magnetostrictive alloys with low temperature coefficients of frequency. John McD. Ide. *Proc. Inst. Radio Engrs.* 22, 177-90(1934).—A study of 34 magnetic alloys of Fe, Ni, Cr and Co was made with rods of these alloys used as secondary frequency standards to stabilize the frequency of magnetostrictive oscillators. The temp. coeff. of frequency is a function of compn., heat treatment, temp. and magnetization. Seven alloys gave temp. coeffs. of the order of 1 cycle in a million per degre, when properly heat-treated and magnetized. Five alloys showed large magnetostriction and gave good frequency stabilization when used with C magnetostriction oscil-



lators. All alloys contained Ni and Fe, with Cr or Co or both included. The best results were obtained with the following contents: Cr 8-10%, Ni 38-38% and the balance Fe together with 1% Mn to facilitate forging.

W. H. Roynton

**Metallic alloys stable toward phosphoric acid.** O. I. Ver and M. M. Romanov. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1933, 111 14 (in German 114-17).—All steels with high Cr content are stable toward  $H_3PO_4$  at room temp. Steels contg. up to 18% Cr are unsuitable, for although an increase in Si content (4 to 10%) decreases the loss in wt. of the alloys in boiling 80%  $H_3PO_4$ , the alloys are hard and brittle. Steels contg. about 20% Cr are more stable toward  $H_3PO_4$ , but increase of the C content (up to 1%) decreases their stability. Steels contg. 30% and more Cr show the greatest stability toward boiling 60%  $H_3PO_4$ . Toward 80%  $H_3PO_4$  at 135° almost all the Cr-contg. steels tested were not stable; an exception was the steel contg. 0.148% C, 2.74% Si and 38% Cr, which when exposed to boiling 80%  $H_3PO_4$  for 48 hrs. lost only 1.26 g. per sq. m. per hr. Increasing the C content to 0.8%, but no higher, did not affect the stability unfavorably. A series of Cr-Mn steels contg. not more than 0.23% C, 8-11% Mn and an av. of 18% Cr, also several steels contg. Cr, Mn and Ni and a Cr-Ni steel of type V2A (18% Cr, 8% Ni, 0.20% C) were forged, rolled to sheets 2 mm. thick, quenched in water at 1100°, and tested in boiling 60%  $H_3PO_4$ . Steels in which the ratio of Cr to Mn corresponded to that for Cr and Ni in a Cr-Ni steel of type V2A showed the greatest stability; their loss in wt. was 0.41 g. per sq. m. per hr. A Cr-Ni steel of type V2A was more stable; its wt. loss was 0.14 g. per sq. m. per hr. Cr-Mn steels which had been quenched at different temps. showed smaller wt. losses after testing in 80%  $H_3PO_4$  than did annealed steels. A cast iron with 2.60% C, 1.39% Si, 0.63% Mn and 34.66% Cr possessed max. stability toward boiling 73%  $H_3PO_4$ ; its loss in wt. was 1.97 g. per sq. m. per hr. Cast irons with other proportions of C, Si and Cr are slightly stable toward acid of this concn. A simple Al bronze, 9 Al bronzes contg. from 0.02-0.67% Cr, and one contg. 3% Fe were tested in boiling 60%  $H_3PO_4$  at 135° and in the com. acid at 15°. The alloys were quenched in water at 900° and tempered at 700°. All the Al bronzes were stable toward both pure and com.  $H_3PO_4$  at room temp. In 80%  $H_3PO_4$  at 135-40° an Al bronze contg. 0.5% Cr was most stable (loss 0.25 g. per sq. m. per hr.). To simplify the alloying of the Al bronzes with Cr, melts were made in which the Cr was introduced in the form of ferrochromium. One of these alloys contg. 9.46% Al, 0.37% Cr, 0.26% Fe and 89.91% Cu was stable toward boiling 87%  $H_3PO_4$ ; its wt. loss was 0.076 g. per sq. m. per hr. in a 240-hr. test. Al bronzes alloyed with Cr and Fe are therefore very stable toward boiling  $H_3PO_4$  of high concns., but the casting of these alloys is difficult, because of the separation of large quantities of gases. The authors recommend the use of degasifiers in the fusion, such as  $CaC_2$  mixed with borax in equal quantities and used in an amt. equal to about 1% of the wt. of the charge. The mech. properties of the Al bronzes alloyed with Cr are satisfactory.

Louise Kelley

**Special alloys for working barrels and balls and seats.** Walter F. Rogers. *Proc. Am. Petroleum Inst. 14th Ann. Meeting, Sect. IV*, 51-7 (1933).—See C. A. 28, 842.

E. H.

**An apparatus for the production of high-melting alloys.** F. Beck. *Z. tech. Physik* 14, 554-6 (1933).—An app. is described which utilizes the elec. resistance of a pressed metal powder for melting it without the use of a crucible.

J. B. Austin

**Cupro-nickel containing beryllium.** M. Bailly. *Compt. rend.* 198, 578-80 (1934); cf. C. A. 27, 693.—The alloy, Ni 67.52, Cu 29.94, Be 1.14, Fe 0.02, Mn 0.25, Mg 0.07%, was quenched in  $H_2O$  from 1075° and cold-rolled, then (a) heated 15 min. at 1025° and quenched in  $H_2O$ ; (b) as (a) but cold-worked by 20% elongation; (c) as (a) but cold-rolled. The samples were then heated for varying times at varying temp. 100-750°. The Brinell

hardness of (a), initially at least 154, increases more rapidly when heated at 200-400° than those of (b) or (c), which change little (250-289) and are approx. similar until heated at 400° and upward; at this point there is a rapid increase to about 420, after which all decrease to 217 after heating at 750°. Cold working probably retards pptn. of some compd. Changes in hardness are accompanied by little change in corrosion by  $NHCl$  or  $NHNO_3$ , with little indication of intergranular corrosion.

C. A. Silberrad

**The resistances of some copper-palladium alloys.** D. Stockdale. *Trans. Faraday Soc.* 30, 310-14 (1934).—At room temp. the sp. resistance of Cu-Pd alloy wire contg. 58.02 at. % Pd (5 other Cu-Pd alloys were studied) is of the same order ( $46.6 \times 10^{-6}$  ohm-cm.) as those of the more complex alloy wires, and is usually considerably greater than those of the pure binary alloys. On the other hand, while the temp. coeff. ( $1.1 \times 10^{-4}$ ) is considerably smaller than those of most of the binary alloys, it is too large to permit of the use of this material in the construction of standard resistance coils. Reuben Roseman

**Mechanical properties of gold-copper alloys.** W. Broniewski and K. Wesolowski. *Compt. rend.* 198, 569-71 (1934).—Curves showing for rapidly and slowly cooled alloys resistance to tensile stress, elastic limit, Brinell hardness, reduction, elongation and resilience indicate a slight formation of AuCu in the quickly cooled alloy and marked formation of both AuCu and AuCu<sub>2</sub> in the slowly cooled, the first three properties increasing, the last three decreasing with slow cooling. The mechanical properties of alloys contg. not less than 850 fine and 583 fine are satisfactory, but those of the 750-fine alloy are distinctly the worst of the alloys examd. (920-583 fine).

C. A. Silberrad

**Some defects in the working of gold alloys.** E. Raub. *Mitt. Forschungs-inst. Probieramt Edelmetalle* 7, 104-8 (1933), 127-32 (1934).—Defects which become noticeable in gold alloys during or after working or in manufacturing processes can be traced to: (1) foreign metallic impurities, (2) oxidation of base metals in the alloys, (3) slag-like impurities, (4) particular properties of the alloys. Of foreign metallic impurities, Bi, Pb and Te are very harmful at as low as 0.05%; the Au alloy becomes brittle and cracks when rolled. P causes hot-brittleness. Base metals, e. g., Cu, Cd, Zn and Ni, form compds. with O at elevated temps. which segregate when the melt solidifies and cause defects in rolling, drawing, etc., and also when the finished article is polished. Inclusions of small particles of corundum, emery or other impurities originating sometimes in the scrap used for melting also cause defects particularly in polishing. The defects under (4) can be traced to rapid growth of crystal grains, which occurs particularly if Au alloys of 18 and more carats are annealed before they have been greatly deformed (rolling, etc.); unless the alloys are annealed only after they have undergone a strong deformation, cracks occur during or after working. Internal stresses can exist which lead to tearing; sometimes these can be caused by the corroding action of perspiration, especially in alloy contg. 33% or less Au. Heating to 250-300° generally suffices to equalize internal stresses.

M. Hartenheim

**Recrystallization of iron alloys with closed  $\gamma$ -field at the A<sub>1</sub> and A<sub>2</sub> points.** Albert Heinzel. *Arch. Eisenhüttenw.* 7, 470 82 (1934).—Recrystn. as a result of polymorphous transformations was studied on alloys of Fe with Al, Si, V and W. It was found that the nuclei no. of the alloys is, at the A<sub>1</sub> transformation, essentially independent of concn. of the added components, that a refinement of the grain does not take place in the entire concn. range of the  $\gamma$ -field but stops at the concn. corresponding to 4/5 of the satn. limit of the  $\gamma$ -solid soln.; further, that with increasing addns. the crystallites formed at A<sub>1</sub> assume more and more crystallographic direction until they are unidirectional. The gradual disappearance of grain refinement takes place with the lowering of the A<sub>1</sub> temp. which makes the recrystn. of Fe at the A<sub>1</sub> point similar to the recrystn. of cold-worked metals.

M. Hartenheim

Shifting of the eutectic temperature in iron-carbon alloys. Bugen Piwowarsky. *Stahl u. Eisen* 54, 83-4 (1934).—Time-temp. curves on alloys prepd. from electrolytic Fe and sugar charcoal were carefully studied. Eutectic temp. falls with rising superheat of the melt; rises with increased C content. Cast Fe, cooled immediately after the addn. of Si or Mn, lowered the eutectic point. If more time is given the melt after the addn. this undercooling vanishes. On addn. of Ni the temp. of the eutectic drops with the time of standing. Mo stands between Ni and Si in its action. C. B. Jenni

Diffusions that take place in iron-silicon alloys during heat treatment. N. A. Ziegler. *Am. Inst. Mining Met. Engrs., Tech. Pub. No. 538*, 6 pp. (1934).—No appreciable diffusion resulting in a change of chem. compn. takes place in Si-Fe during heat treatment. When unalloyed Fe is heat-treated, Fe oxide scale is formed on the surface, but there is nothing to prevent O from diffusing into the metal and satg. it, if heated to a sufficiently high temp. In Si alloys (at least 2% Si) a film of Fe silicate on the surface acts as a barrier to O diffusion, but does not interfere with diffusion of C to the surface and escape as CO. Alden H. Emery

The intermediate phases of the iron-tungsten system. W. P. Sykes and Kent R. Van Horn. *Trans. Am. Inst. Mining Met. Engrs.* 105, 198-214 (1933).—The constitutional diagram of the Fe-W system was constructed. The temp. of the peritectoid reactions ( $\alpha + \beta \rightleftharpoons \epsilon$ ) was about 1040°. The homogeneity ranges of the intermediate phases were not detd. exactly because of difficulty in forming the compounds and attaining equil. However, alloys contg. 68-69% W after protracted sintering at 1800° appear to consist solely of  $\beta$  Fe<sub>3</sub>W<sub>2</sub>, while the liquid formed at the eutectic temp. can be detected in concns. between 67.5 and 68% W. Probably the compn. range of  $\beta$  at 1800° does not exceed 1%. The  $\epsilon$  phase appears to be represented by the formula Fe<sub>3</sub>W. A. H. E.

Hardness measurements on binary alloys of lead-antimony, antimony-tin and lead-tin. N. Aoki. *Kinsoh no Kenkyuh* 11, 1-20 (1934).—Brinell hardness of these binary alloys was detd. and the relationship to the microstructure and the equil. diagram was studied. The hardness is not const. for different loads; Brinell hardness of alloys, rich in  $\gamma$  and  $\delta$  phase increases with load to a max. and then decreases gradually; that of alloys rich in  $\alpha$  or  $\beta$  phase increases till the samples break. Time of loading, aging at room temp. and annealing affect the hardness. The effects depend on the structure of phase. M. Kuroda

The ternary alloys: magnesium-zinc-calcium. René Paris. *Compt. rend.* 197, 1634-6 (1933).—The temp.-compn. diagram for the system is given. The compds. in the system include Ca<sub>2</sub>Mg<sub>3</sub>, Ca<sub>2</sub>Zn<sub>3</sub> and Ca<sub>2</sub>Mg<sub>2</sub>Zn<sub>3</sub>; the last exists as large polygonal crystals, insol. in HNO<sub>3</sub>, m. without decompn. at 495°. Alloys contg. 30% or more Ca oxidize readily; alloys rich in Zn oxidize slightly, are hard, break easily and are difficult to work; alloys rich in Mg are light, oxidize but slightly and are easily worked. E. G. Vanden Bosche

The system: Fe-Fe<sub>3</sub>C-ZrC Fe<sub>3</sub>Zr<sub>2</sub>. Rudolf Vogel and Karl Loehberg. *Arch. Eisenhüttenw.* 7, 473-8 (1934).—The constitutional diagram for Fe with up to 6% C and 30% Zr was detd. by thermal and structural examn. A pseudobinary section Fe-ZrC in which a  $\gamma$ -solid soln. with 0.8% C and 6.08% Zr forms a eutectic with the ZrC with 1.8% C and 9.88% Zr, divides the examd. concn. quadrangle Fe-Fe<sub>3</sub>C-ZrC-Fe<sub>3</sub>Zr<sub>2</sub> into 2 areas with similar equil. conditions. In the area Fe-Fe<sub>3</sub>C-ZrC, a eutectic plane exists at 1145°, where a binary Fe-C melt is in equil. with a binary solid soln. of  $\gamma$ -iron with C, cementite and zirconium carbide. In the area Fe-ZrC-Fe<sub>3</sub>Zr<sub>2</sub>, an Fe-Zr melt at 1330° is in equil. with a binary solid soln. of  $\gamma$ -iron with Zr, ZrC and Fe<sub>3</sub>Zr<sub>2</sub>. The eutectoid disintegration of the  $\gamma$ -solid solns. shifts from the Fe-Zr side to Fe-C side to lower temps.; in the disintegration range two 4-phase planes were found. One, at 780°, is a transition phase where a  $\gamma$ -solid soln. with 0.1% C and 0.8% Zr disintegrates into almost pure  $\alpha$ -iron and ZrC in presence of Fe<sub>3</sub>-

Zr<sub>2</sub>. The other 4-phase plane is a eutectoid plane at the temp. of pearlite; all ZrC is segregated at higher temps. which transforms finally the remainder of the  $\gamma$ -solid soln. into pure pearlite. The occurrence of Fe-Zr compds. reduces the hardness; increasing ZrC increases hardness. The structure of quenched Zr steels consists of martensite which is less brittle than pure Fe-C martensite. M. H.

Behavior of some light alloys towards sea-water corrosion. J. Cournot, M. Chaussain and H. Fournier. *Compt. rend.* 198, 85-7 (1934).—Immersion and alternate immersion tests were made with two groups of Cu-free Al alloys, one contg. approx. 9% Mg and minor amts. of Mn and Si, and the other contg. Mg 2-3, Mn 1-3, Sb 0.2-0.5, Si 0.3-0.5%. The loss of wt. of the alloys high in Mg compares favorably with that of ordinary duralumin and is slightly better than that of a duralumin contg. Ni and Cr. The loss of wt. of an alloy contg. Mg 9.18, Si 0.66, Mn 0.34% was less than half of that of an alloy of similar compn., but contg. only 0.03% Mn. These alloys show promise for marine service. Leopold Pessel

A new method for prevention of corrosion of aluminum and its alloys. M. Tasaki. *Tetsu to Hagane (J. Iron Steel Inst. Japan)* 20, 42-6 (1934).—To prevent corrosion, Al is anodically oxidized at the same time that it is being annealed, in a bath which is kept at 500° for duralumin or at 230° for pure Al, and which contains equal parts of KNO<sub>3</sub> and NaNO<sub>3</sub>. A.c. is used at 65 v. and 0.04 amp./sq. cm for duralumin, or at 100 v. for Al. After 30 min. for duralumin or 1 hr. for Al, the metal is quenched in water and washed. Changes in the bath, effects of impurity, loss of the salt, recovery of the salt and analytical methods for impurities were studied. Corrosion resistance produced by this method is equal or superior to that by other methods, and the mechanical properties of the metal are not injured. M. Kuroda

Corrosion and protection of magnesium and its light alloys. Guy D. Bengough and L. Whitby. *Trans. Inst. Chem. Engrs.* (London) Advance Copy, Dec. 8, 1933, 13 pp.; *Metal Ind.* (London) 44, 3-5, 83-5 (1934), cf. C. A. 27, 5704.—Data are given on the compn. of the corrosion products of Mg exposed to an indoor and to an outdoor atm. Curves of wt. increment vs. time show that no permanently protective film is formed on Mg exposed outdoors. Losses of wt. are given for a no. of Mg alloys, exposed outdoors and under various indoor conditions. The value of lanolin as a protective coating is indicated. A slight loss of wt. may be accompanied by a considerable loss in elongation. Data on sea water immersion and salt spray tests are given, illustrating the effectiveness of various protective chem. films, especially that produced by the "selenium treatment," with and without the addn. use of org. protective coatings. Leopold Pessel

The theories of corrosion. V. O. A. Knight. *Mineral Industries, Penna. State Coll.* 3, No. 5, 2, 4 (1934), cf. C. A. 28, 1647.—Soil corrosion is considered. Alden H. Emery

Practical problems of corrosion. VIII. Inhibitive action of certain pigments on rusting. K. G. Lewis and U. R. Evans. *J. Soc. Chem. Ind.* 53, 25-33T (1934), cf. C. A. 24, 2619.—Steel and Fe specimens of different analysis, in contact with a no. of paint pigments and inert materials suspended in 7 different kinds of water and dil salt solns., with and without the addn. of O<sub>2</sub>, were examd. for loss of wt. Red lead, litharge, PbO<sub>2</sub>, Pb<sub>3</sub>O<sub>4</sub>, Pb oxalate, Pb<sub>2</sub>CrO<sub>4</sub>, white lead, Pb sulfate, Fe<sub>2</sub>O<sub>3</sub>, ZnO, MnO<sub>2</sub>, silica, magnesite, Ca carbonate, Ba sulfate, glass beads, Carborundum, sand, emery flour, "Blom Pigment S," "Blom Pigment N" and silica gel were investigated. Magnesite, litharge, "Blom Pigment S" and "Blom Pigment N" prevented attack almost completely in most liquids, while some of the other solids indicated inhibitive action in some liquids. Some pigments, especially MnO<sub>2</sub> and PbO<sub>2</sub>, accelerated the attack. In the presence of added O<sub>2</sub>, As<sub>2</sub>O<sub>3</sub> and Mg carbonate showed inhibitive action, 7 different types of Fe<sub>2</sub>O<sub>3</sub> behaved irregularly. ZnO acted as inhibitor. In sea water, red lead indicated inhibitive possibilities. Another set of expts. comprised scratch tests made on paint films contg. the pigments, and visual

observation of corrosion attack. Litharge, red lead, ZnO, "Blom Pigment S," Zn dust and Zn dust mixed with ZnO were corrosion inhibiting. PbO<sub>2</sub>, MgO, Mg carbonate and MnO<sub>2</sub> were doubtful. Lack of inhibitive action at the scratch was shown by Fe<sub>2</sub>O<sub>3</sub>, As<sub>2</sub>O<sub>3</sub>, Sb<sub>2</sub>O<sub>3</sub>, SnO<sub>2</sub>, Ti oxide, emery flour, Carborundum, Pb oxalate, Pb sulfate, white lead, Pb chromate, Ba sulfate, graphite, lamp black, Al pigment, Al coarse powder. Expts. made with mixts. of graphite with red lead or ZnO showed red lead to be more effective in giving inhibitive properties to graphite paints. The inhibitive phenomena are explained by the influence exerted by the pigments upon the phys. characteristics of the primary corrosion films and are similar to the phenomena caused by NaOH or K<sub>2</sub>CrO<sub>4</sub>.

<sup>1</sup> Leopold Pessel  
The usefulness of corrosion tests to the chemical engineer. A. S. White. *Ind. Chemist* 10, 98-101(1934).

<sup>2</sup> E. H.  
Fatigue and corrosion. K. Laute. *Oberflächenforsch.* 10, 281(1933).—Present views on corrosion fatigue are discussed; it is due not only to electrolytic effects, but the presence of O is necessary. Decrease of endurance strength under simultaneous corrosion is twice as great as in air; simple spraying with water may cause this effect which may even reach 80% in highly refined steels. Cu is, however, perfectly resistant. Protective coatings of metallic nature (spherulizing, galvanizing, etc.) and of red lead increase the length of life but do not prevent corrosion. Nitriding reduces fatigue 4-20% and promises well for future application; cold-pressing promotes more favorable distribution of stresses and gives an improvement up to 30%. Frequency of alternating stresses seems to have an influence on corrosion fatigue only above 1000 cycles per sec. Corrosion fatigue can be explained, according to present theories, that a film of different thickness is formed which tears under mech. stress; low frequencies of stress permit the film to form again, so that only high frequencies have the harmful effect of baring the surface for corrosion.

M. Hartenheimer  
Corrosion fatigue and sucker-rod failures. Blaine B. Wescott and C. Norman Bowers. *Proc. Am. Petroleum Inst. 14th Ann. Meeting Sect. IV*, 29-42(1933).—See C. A. 28, 449.

<sup>3</sup> E. H.  
Report on Bureau of Standards soil-corrosion and pipe-coating investigation. Leonard P. Wood. *J. Am. Water Works Assoc.* 26, 176-88(1934).—The materials tested included all forms of Fe, Cu, brass and their alloys that have or might have underground use. The data cover varying periods up to 8 or 10 years. Soil character rather than nature of material controls the type and severity of corrosion. Aside from high-Si cast iron, which under a wide number of conditions showed little corrosion, no ferrous pipe material showed marked superiority. Galvanizing showed substantial protection. Alloys of 75% or higher Cu content showed excellent corrosion resistance. Thin paint films and coatings affected by soil stresses are not satisfactory. Tentative recommendations are made.

D. K. French  
Soil-corrosion, studies 1932. Rate of loss of weight and pitting of ferrous and nonferrous specimens and metallic protective coatings. K. H. Logan and R. H. Taylor. *Bur. Standards J. Research* 12, 119-45(1934)(Research Paper No. 638).—Data obtained from specimens removed in 1932 are given. In most soils the rate of corrosion decreases apparently with time, because of more stable trench conditions or because of the formation of corrosion products, tending ultimately toward a fixed rate of corrosion. Prediction of the rate of corrosion, based upon the soil types established by the U. S. Department of Agriculture, seems possible. The type of soil rather than the variety of ferrous material is usually the controlling factor with respect to corrosion, but in certain soils proper choice of the material assumes great importance. Cu and alloys high in Cu corrode less rapidly than most ferrous materials in the soils investigated. A Zn coating weighing 1 ounce per sq. ft. should extend the life of the coated material at least 6 years in very corrosive soils and much longer under more favorable conditions.

<sup>4</sup> A practical method of electrical protection for pipe lines against soil corrosion. Starr Thayer. *Natural Gas* 14, No. 11, 6-12(1933); *Proc. Am. Petroleum Inst. 14th Ann. Meeting Sect. IV*, 148-52.—Expts. in lab. and field showed that a hot application of coal-tar enamel and the maintenance of a p. d. of 0.3 v. is sufficient to stop corrosion. Expts. with grease-coated lines showed that the cost of protecting them electrically is at least 9 times as much as that for the enameled lines, which are completely protected. Any high elec.-resistance coating is adaptable to this type of permanent protection. A. W. Furbank

<sup>5</sup> Corrosion troubles with cast-iron pipes laid in Groninger soil; causes and methods of combatting. C. M. Wichers. *Wasser* 7, 117-32(1933).—From the results of studies of conditions of the mains and chem. tests on samples of earth taken from around the pipes W. concludes that corrosion is independent of the type of Fe and is favored by these factors: (1) loosely packed soil immediately around the pipes through which air and water pass readily, (2) high concn. of H ions, (3) presence of H<sub>2</sub>S, (4) absence of CaCO<sub>3</sub>, and (5) presence of sulfate. The reduction of sulfate (by bacterial action) is not in itself regarded as a cause of corrosion but the entrance of O makes this condition dangerous. In the case of a soil contg. FeS where entrance of O is possible, the p<sub>H</sub> is no measure of the danger of corrosion, as FeSO<sub>4</sub> formed would have an acid reaction but basic ferric salts an alk. reaction. Corrosion may be prevented by keeping the mains dry, as by the use of a protective coating. A cheap means of decreasing corrosion is packing the pipes when laid with a well packed layer of clay or loam 10 cm. thick. Lime should be added if the clay or loam is in itself corrosive. In the appended discussion the use of protective coatings, particularly bituminous ones, is considered.

M. G. Moore  
Behavior of steel pipe under strongly corrosive conditions. F. Eisenstecken and E. Gerold. *Gas u. Wasserfach* 76, 93-1(1934); cf. C. A. 27, 5042.—Electrolytic corrosion is independent of the pipe material and can be minimized by the use of insulating coatings, insulating couplings and elec. drainage systems. The p. d. across insulating couplings should not exceed 0.1 v. Periodic tests should be made on both insulating couplings and drainage systems.

<sup>6</sup> R. W. Ryan  
Protection of metallic pipes buried in soil against electrolytic corrosion, especially from stray earth currents. F. Besig. *Gas u. Wasserfach* 77, 37-42(1934); cf. C. A. 27, 2411.—Potential or current measurements are required to det. definitely whether a given case of corrosion is electrolytic or chemical. Pipe coatings are perhaps the most important protective measure. The various coating types are mentioned. While it is desirable to remedy stray currents at their source, in some cases insulating couplings may be used where the drop across the coupling does not exceed 0.1 v., but this must be frequently checked. Five types of insulating couplings are illustrated and described. Such couplings should not be used in low-resistance soil. Elec. drainage methods sometimes give good results but care must be taken in their installation and they must be continually supervised while in use.

<sup>7</sup> R. W. Ryan  
Electrolytic corrosion in a hospital. Wilhelm Franckenstein. *Gas u. Wasserfach* 76, 934-6(1933).—Electrolytic corrosion of water and steam lines, etc., was found to be due to defective grounds on the 3-wire d. c. system within the hospital, and was remedied by the use of a suitable independent ground.

<sup>8</sup> R. W. Ryan  
Effect of the hydrogen-ion concentration on the corrosion of iron. J. M. Bryan. *Trans. Faraday Soc.* 29, 1198-1209(1933); cf. C. A. 27, 5625.—Expts. were carried out, by the previously described method, on a mild steel as used in tin-plate manuf. Ferric Fe causes a slight inhibition of corrosion at higher and an acceleration at lower acidities. With ferric Fe present initially, O causes acceleration over the whole range of p<sub>H</sub> studied. In the presence of ferric Fe most of the R is removed through polarization, irrespective of the p<sub>H</sub> or the presence or absence of O. With ferric Fe present initially, free O has a max. effect on corrosion at about p<sub>H</sub> 4, because of

the polarization of H. Part of this depolarization is apparently due to the action of the dissolved Fe as O carrier.

Leopold Pessel

The effect of water on iron pipes. John R. Baylis. *Proc. Am. Soc. Munic. Engrs.* 39, 177-83 (1933).—A brief review is made of the theory of corrosion, the formation and building up of tubercles, and their destruction.

W. H. Boynton

Corrosion in gearing. J. R. Kammel. *Commonwealth Engr.* 21, 75-6 (1933).—By continuous impact elec. potentials are set up which, if the lubricant contains traces of electrolytes, may cause considerable electrolytic corrosion. Addn. of approx. 50% of ZnO to the lubricant was found to overcome this difficulty. Metallic Zn is deposited on the running surfaces by electrochem. action and exerts anodic protection.

Leopold Pessel

The corrosion of telegraph wire. N. Taitz and V. Yuza. *Steel* (U. S. S. R.) 1933, No. 3, 74-85.—Corrosion in acid soln., in salt soln., and in artificial and natural atms. is increased by drawing, by non-metallic inclusions on the surface and by even a small amt. (0.50%) of Mn. Annealing decreases corrosion. A Cu content of 0.25-0.30% is recommended. Loss in wt. of annealed specimens is 4 times as great in the first 24 hrs. as in the following 72 hrs.; on other specimens the loss is proportional to the time.

H. W. Rathmann

Corrosion prevention by protective coatings with particular consideration of the industries of viscose rayon and viscose films. Fritz Ohl. *Metallbörse* 23, 1390-1, 1422-3 (1933).—Red lead and Fe oxide paints, also the slightly better bituminous coatings, are decidedly inferior to certain modern proprietary coatings, as was shown by extensive tests of 3 such paints, "Nust," "Harvel," "Daprenol," under a great variety of corrosive conditions occurring in these industries.

Leopold Pessel

Arc-welding of aluminum and a few properties of weld metal. L. Anastasiadis. *Z. Metallkunde* 25, 97 8, 141, 285-6 (1933).—Brief discussion of the possibilities of arc-welding Al, with some test data. Halogen salts were used as fluxes. Details in welding technic are given, and several welds illustrated and described. Photomicrographs and data on phys. properties and corrosion expts. are given.

R. F. Mehl

Welding copper for the chemical and allied industries. Werner Froelich. *Can. Chem. Met.* 18, 13-15 (1934).—Welding of Cu should not commence at one end and proceed to the farther end of the weld. Starting at a point 5-10 inches (12.7-25.4 cm.) away from one end, proceeding to the other end and then returning to the starting point to complete the weld to the other end avoids the mech. stresses always imposed upon rolled or forged Cu section by straight-through welding. Fluxes should not be applied until the surface is red-hot. Where hammering is impracticable, careful annealing and chilling of the weld will go far toward balancing mech. and chem. properties within the section affected.

W. H. Boynton

Gas services and their protection from corrosion (Clark) 21. Activation of blast-furnace slags (Budnikov) 20. Effect of Bordeaux mixt. on galvanized Fe wire (Goodwin) 15. Reduction of corrosion in water pipe (Hopkins) 14. Water-conditioning of flue gas for elec. pptn. process (Inomata) 4. Amorphous metal layers (Zahn, Kramer) 2. Adsorption of CuSO<sub>4</sub> by sphalerite and its relation to flotation (Ravitz, Wall) 2. Protecting pipes from corrosion (U. S. pat. 1,948,007) 20. Lubricant for metal-drawing or stamping operations (U. S. pat. 1,948,194) 22. Phys. chemistry of wetting and flotation processes (Rebinder, et al.) 2.

Cammissa, Michele: Lavorazione dei metalli a caldo e a freddo. Milan: A. Vallardi. 161 pp. L. 3.

Gruschka, G.: Zugfestigkeit von Stählen bei tiefen Temperaturen. Berlin: V. D. I.-Verlag. 20 pp. M. 5.

Flotation of ores. Adolf Thöl. *Fr.* 757,715, Dec. 30, 1933. Phosphatides obtained from grains or pods of soy

beans or the residue from the manuf. of soy-bean oil are used as froth producers.

Flotation reagent. P. D. Trusov and D. A. Shvedov. *Russ.* 31,380, Oct. 31, 1933. A flotation reagent contg. the ions of Ca, Ba, Sr or Pb contains also oleic acid or an animal or vegetable oil contg. the glycerides of unsatd acids which have been preliminarily treated with H<sub>2</sub>SO<sub>4</sub>.

Concentrating ores. Richard Fromm. *Brit.* 401,819, Nov. 16, 1933. Phosphatide made from soy beans or the mud or slime by-product of the manuf. of soy-bean oil is added to ore pulp in froth flotation concn. as a "froth accumulator."

Concentrating ores. Stanley Tucker and Minerals Separation Ltd. *Brit.* 401,720, Nov. 20, 1933. Ore, particularly that in which the values are intergrown with the gang, is coarsely ground and concd. by flotation, the unfloated part is then subjected to a 2nd flotation operation to give a 2nd concentrate and this, after the whole of the coarser particles thereof have been reground, is again concd. by flotation to recover the remainder of the values. Application of the process to the concn. of chalcopyrite, mixed with pyrite, and the differential sepn. of galena and zinc blende is described.

Apparatus for slush concentration of materials such as ores. Wm. C. Rickel. *U. S.* 1,947,877, Feb. 20 Mech. features.

Rotary disintegrating mill adapted for ore or coal treatment. Arthur J. Weinig. *U. S.* 1,948,606, Feb. 27 Structural and mech. features.

Electromagnetic ore separator. Robert Becker. *Ger* 591,881, Jan. 29, 1934 (Cl. 1b. 4.01).

Recovering metal values from silica precipitates. The Rhodesia Broken Hill Development Co., Ltd. *Ger* 592,354, Feb. 7, 1934 (Cl. 40a. 13.01). See *Brit.* 274,297 (C. A. 22, 1947).

Extracting metals from complex copper-gold ores, etc. Alva D. Lee. *U. S.* 1,947,850, Feb. 20. Finely divided ore is introduced into an air-tight furnace and continuously fed in a comparatively thin layer or stream and is subjected to the action of a highly reducing flame for a sufficient length of time substantially to reduce at least part of the metallic elements; metallic vapors are collected and condensed, and the hot residue is gradually and continuously removed and quenched without prior subjection to oxidizing conditions. App. is described.

Apparatus for dezincing molten lead by injection of a gaseous reagent such as chlorine. Karl A. Lindner (to American Smelting and Refining Co.). *U. S.* 1,949,391 2, Feb. 27. Various details of app. and operation are described.

Treating molten metals as in the refining of bearing metals. Wm. H. Kelly (to Mary E. Kelly). *U. S.* 1,949,051, Feb. 27. A perforated cage contg. water-retaining material such as asbestos satd. with water is introduced beneath a surface of molten metal so that steam is generated and dissoed. into H and O which are released into the metal through the perforations of the cage.

Pump for molten metals such as lead and its alloys. Joseph E. Rhoads and George H. White (to Chester A. Macomic). *U. S.* 1,947,876, Feb. 20. Structural and mech. details.

Flux. Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. *Ger.* 591,906, Jan. 29, 1934 (Cl. 40a. 15.10). A flux or purifying agent for smelting metals or alloys consists of a mixt. of ferrocyanides and phosphates, especially pyro- or meta-phosphates, with or without SiO<sub>2</sub>, silicate, alkalies or other slag-forming substances. Compds. of B such as H<sub>3</sub>BO<sub>3</sub> or borates may be present. Examples are given.

Treatment of metallurgical slags. Treibacher chem Werke A.-G. *Austrian* 136,400, Jan. 25, 1934 (Cl. 80d). In the manuf. of products resembling pumice by treating a fused slag with water, the slag is preheated to a temp. above that at which it is produced. The slag may also be treated with substances which raise its m. p., e. g., CaO, Al<sub>2</sub>O<sub>3</sub> or coke.

Dwight-Lloyd apparatus. Blei- und Silberhütte Bru-

bach G. m. b. H. and Paul Wefelscheid. Ger. 580,105, Dec. 8, 1933 (Cl. 40a. 3.60). Addn. to 578,968 (C. A. 28, 732<sup>2</sup>).

Siemens-Martin furnace plant. "Terni" Società per l'industria e l'elettricità. Ger. 591,807, Jan. 29, 1934 (Cl. 24c. 5.01).

Siemens-Martin furnace of refractory materials. Friedrich Siemens A.-G. Ger. 590,242, Dec. 29, 1933 (Cl. 18b. 14.01). Addn. to 516,887 (C. A. 25, 2804).

Rotary-hearth furnace for roasting ores. Felix Baron von Schlippenbach. Ger. 592,235, Feb. 3, 1934 (Cl. 40a. 18.01).

Multiple-hearth furnace for roasting ores. John Harris and Robert John Harris. Ger. 592,234, Feb. 3, 1934 (Cl. 40a. 4.30).

Apparatus for collecting gases from metallurgical converters. Soc. générale métallurgique de Hoboken. Ger. 592,246, Feb. 3, 1934 (Cl. 40a. 29). The gases evolved at different periods of the process are passed to sep. holders.

Apparatus for washing exhaust gases from metallurgical furnaces, etc. Charles M. Gerhold. U. S. 1,948,348, Feb. 20. Structural and operative details.

Vertical shaft furnace suitable for melting steel scrap or reducing iron ore. Hermann A. Brassert, Fredrik Wille and Paul Zimmermann (to H. A. Brassert & Co.). U. S. 1,948,696, Feb. 27.

Furnace suitable for heat-treating metals. George J. Hagan. U. S. 1,948,173, Feb. 20.

Hot-surface members for steel recuperators. Rekuperator G. m. b. H. Ger. 591,630, Jan. 24, 1934 (Cl. 24c. 5.02).

Composite metals. The Mond Nickel Co., Ltd. Fr. 757,254, Dec. 22, 1933. A solid metal such as Fe or steel is covered with Ni or an alloy of Ni by forming between the 2 metals an alloy having a hardness, a chem. compn., a resistance to corrosion, a microstructure and an at. structure revealed by the diffraction of x-rays, different from those of the 2 original metals. Thus, if steel is used as base metal an intermediate Fe-Ni alloy contg. 2-7% Fe of 0.0012-0.5 mm. thickness is formed for a final thickness of 0.65-1.5 mm. of Ni. Fr. 757,255. Ni or an Ni alloy is heated in contact with a base metal in a reducing atm. to 1175-1300°, and worked at 1300-975° with successive reductions in section of 10-25%. An intermediate ductile alloy is thus produced between the 2 metals.

Hard metal articles. Wolfram & Molybdaen A.-G. Fr. 757,375, Dec. 26, 1933. Hard metal powder is introduced into a supply tube of rubber, etc., and hydraulic pressure acting in all directions is applied. The compressed tube of metal is worked to the desired shape and concreted at a high temp.

Refining metals. Theodor Laible. Swiss 163,948, Nov. 16, 1933 (Cl. 76). Molten industrial metal, Cu is refined by adding fluorspar, CuO, SiO<sub>2</sub>, CaCO<sub>3</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>7</sub>. The method is useful for refining "new-silver," Cu bronze and brass.

Heat treatments such as hardening or tempering. John W. Harsch (to Leeds & Northrup Co.). U. S. 1,949,716, March 6. Various details of furnace construction and operation are described, involving heat regulation by forcibly circulating gas in different heating zones.

Heat-treating cobalt-molybdenum alloys. Werner Köster (to Vereinigte Stahlwerke A.-G.). U. S. 1,949,313, Feb. 27. For obtaining alloys of high hardness, an alloy of Mo together with Co 10-35% is heated to above 1000° but below the m. p. and then rapidly cooled and subsequently annealed at temps. of 500-900°.

Plant for annealing bars and tubes in commercial lengths. Allmänna Svenska Elektriska Aktiebolaget and Lennart Högel. Brit. 401,559, Nov. 16, 1933.

Apparatus for cleaning and annealing small metal articles, etc. George Webb (to Colt's Patent Fire Arms Mfg. Co.). U. S. 1,949,438, March 6. Mech. features.

Cementation. Cecil F. Simmonds and Sheepbridge Stokes Centrifugal Castings Co. Ltd. Brit. 401,421, Nov. 16, 1933. The grooves and bore of a peripherally grooved cylinder, from which piston rings are made, are rendered impervious to hardening, prior to surface harden-

ing of the exposed parts, by tinning or by painting with a compn. of Na silicate and powd. Al or Cr<sub>2</sub>O<sub>3</sub>.

Nitriding ferrous materials. John J. Egan (to Electro Metallurgical Co.). U. S. 1,949,082, March 6. For producing a nitride case, the material is heated at nitriding temps. below the eutectoid at about 600° in the presence of NH<sub>3</sub> and an accelerating agent such as pyridine or quino-line.

Increasing the resistance of springs to fatigue. Paul O. F. Vorwerk (to Edelstahlwerk Rochling A.-G.). U. S. 1,947,927, Feb. 20. The surface layers of springs such as leaf springs are compacted by blasting with hard small bodies free from sharp edges and points, such as surrounded steel particles.

Aluminum. Joseph A. Nock, Jr. (to Aluminium Ltd.). Can. 339,340, Feb. 13, 1934. Al or an Al-base alloy and a preliminary alloy contg. Ti in sufficient quantity to produce in the final melt a Ti content of 0.01-0.5% are separately melted, the melted Al-base alloy is combined with the melted preliminary alloy and the resulting melt is immediately cast.

Gold and silver. Bernard Gautier. Swiss 164,595, Dec. 16, 1933 (Cl. 76). A process for extg. Au and Ag from mineral sulfides, poor in Pb, by cyanization and flotation is described.

Iron. Eugen Piowowsky. Ger. 590,058, Dec. 21, 1933 (Cl. 18a. 1.20). Addn. to 564,681 (C. A. 27, 944). Cast Fe which does not deteriorate or corrode contains 0.1-3% As, as in 564,681, and also, Ni up to 3, Cr 1.5, Al 0.5, Mo 0.5 and Ti 0.2%, singly or severally.

Iron. Ernst J. Kohlmeier. Ger. 591,759, Jan. 26, 1934 (Cl. 18a. 18.05). A process is described for smelting Fe by heating a mixt. of Fe compd., S-free and S-contg. materials, or a mixt. of Fe compd. and S-contg. material, to above 1400° to give Fe-S, allowing this to congeal, and removing the S by chilling, granulating and sintering.

Iron. Vereinigte Stahlwerke A.-G. Ger. 591,875, Jan. 29, 1934 (Cl. 18a. 18.01). Fe is obtained by treating Fe ores with HCl under high pressure.

Iron sponge. Klockner-Werke A.-G. Abteilung Georgs-Marien-Werke and Friedrich v. Holt. Ger. 583,124, Jan. 31, 1934 (Cl. 18a. 18.01). A mixt. of Fe ore with 6-10% of fuel is treated with a reducing gas under such conditions that the product does not sinter.

Means for siphoning iron from cupola furnaces. Friedrich Schinke. Ger. 592,426, Feb. 7, 1934 (Cl. 31a. 1.20).

Producing metals such as iron and steel from ore. Hermann A. Brassert (to H. A. Brassert & Co.). U. S. 1,948,697, Feb. 27. The lower portion of a column of descending ore is surrounded with a reducing flame adjacent to but spaced from the column to melt the reduced ore in the lower portion of the column; the column is supported out of contact with the melted metal and gases from the flame are passed upwardly through the upper portion of the column to effect ore reduction. App. is described.

Manufacture of iron and steel articles such as tubes, wire or sheets. Nikolaus Bregger. U. S. 1,949,599, March 6. For producing products by successive elongation treatments or passes, without preliminary or intermediate annealing and without pickling or fresh coating of the material between the passes, scale is first removed from the material by a pickling treatment and the cleaned surface is converted into a rough and spongy condition by corroding it with an etching substance such as HCl and H<sub>2</sub>SO<sub>4</sub> soln. and the surface is then coated with a thin film-like layer of anti-friction material such as a Pb-Sn alloy penetrating into and filling all the cavities of the spongy surface, and the treated material is then subjected to the required number of elongation passes.

Steel. Hermann A. Brassert (to H. A. Brassert & Co.). U. S. 1,948,695, Feb. 27. Steel scrap is melted in a vertical shaft furnace solely by means of fuel such as gas or liquid fuel injected into the furnace and burned out of contact with the scrap so that the latter is maintained free of contact with carbonaceous-fuels; the molten steel is transferred to a second furnace and there refined. App. is described. Cf. C. A. 28, 1322<sup>2</sup>.

Steel. Compagnie des forges de Chatillon-Commentry

et Neuves-Maisons. Ger. 592,290, Feb. 5, 1934 (Cl. 18d. 1.30). The mech. properties of austenitic steel are improved by including 0.1-0.75% of As in the steel. Specific steels are described.

Device for heating and agitating melted ferrous materials for making steel. Vassily V. Soldatoff. U. S. 1,949,731, March 6.

Burnishing steel, etc. Berardo Guccini. Swiss 164,555, Dec. 16, 1933 (Cl. 44d.). Fe and its alloys are burnished chemically by defatting, and immersing in an alk. bath contg. alkali nitrate, an org. nitro compd. and PbO<sub>2</sub>. The objects are then immersed in vegetable oil. Cf. C. A. 27, 262.

Refining steel. Vere B. Browne (to Allegheny Steel Co.). U. S. 1,949,529, March 6. For refining steel contg. dissolved basic oxides and having on it a surface slag, material such as sand is added to supply an excess of SiO<sub>2</sub> over that theoretically necessary to convert all the dissolved oxides to silicates and such a change in the relative soln. pressures is effected as to set up a migratory tendency of the dissolved oxides from the steel to the slag with conversion of the oxides in the slag to the corresponding silicates (the excess SiO<sub>2</sub> in the slag maintaining the latter free from uncombined oxides other than SiO<sub>2</sub> and preventing premature equil. or reversal of the migration).

Non-corrodible surfaces on "sucker rods". Vere B. Browne (to Allegheny Steel Co.). U. S. 1,947,969, Feb. 20. Various details are given for the manuf. of rods with a steel core covered with a tube of non-corrodible Cr-Ni alloy steel.

Armor plate. Fried. Krupp A.-G. Brit. 401,491, Nov. 16, 1933. Addn. to 401,364 (C. A. 28, 2317<sup>a</sup>). Armor plate, hardened on 1 side, is made from those steel alloys of 401,364 which, as regards the relation between the C content and the sum of the Cr and Ni contents, fall under a curve shown in a diagram, preferably within an area similarly shown thereon.

Colored and hardened strip steel. Albert R. Stargardter (to Gillette Safety Razor Co.). U. S. 1,948,192, Feb. 20. The strip is heated to a temp. above its crit. point and then immersed in a gaseous medium having a reducing constituent such as CO but of oxidizing effect, and the oxidized strip is then chilled to harden it. App. is described.

Steel and its alloys from ores. Wm. J. Popham (to Minnesota Metallurgical Co.). U. S. 1,947,735, Feb. 20. Fe oxide ore or a mixt. of such an ore is melted while commingled with a flux such as lime and fluorspar and with a salt of a polycarboxylic acid such as Na mucate in the proportion of 15-35 g. per 15 lb. of ore, which serves as a catalyst.

Alloy steel rails. Christer P. Sandberg, Oscar F. A. Sandberg and Nils P. P. Sandberg. Brit. 401,666, Nov. 16, 1933. The rails are rolled from an alloy steel contg. C 0.35-0.6, Mn about 1 and Cr 0.30-1 or Ni 1.0-3.0%, and, after leaving the rolls, are subjected to an accelerated cooling through the crit. range. The temp. thereof is then equalized at above 500° and the rail is then caused to cool slowly to about 350°. The steel may also contain 0.25-1.0% Cu.

Alloys. Joseph Decock. Brit. 401,431, Nov. 16, 1933. See Fr. 733,673 (C. A. 27, 945).

Alloys. Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Brit. 402,254, Nov. 30, 1933. Addn. to 395,060 (C. A. 28, 90<sup>a</sup>). See Fr. 42,643 (C. A. 28, 734<sup>a</sup>).

Alloys. Emil Reuter. Ger. 582,937-8, Dec. 30, 1933 (Cl. 40b. 16). An alloy for tool consists of Cr 2.5-9, Mo 6-20, W 3-10, Co 10-36, V 2-5, Ta 0.5-5, C 0.73-2.33% and the rest Ni. The sum of the Mo, W and V contents is 15 times the C content and the ratios of the content of Cr to Co and Mo to W are 1:4 and 2:1, resp., (582,937). The Ni may be replaced by Fe (582,938).

Alloys resisting sulfur. Heraeus-Vacuumschmelze A.-G. Ger. 591,641, Jan. 25, 1934 (Cl. 40b. 14). An alloy resisting S and S-compds., particularly H<sub>2</sub>S, consists of Ni 44-79, Cr 9-31, Al at least 9, Si at least 2, and 0-14% of one or more of the following, Fe, Mo, Cu, Mn and C.

Hard alloys. Wolfram & Molybdaen A.-G. Swiss

1 163,608, Nov. 1, 1933 (Cl. 76). Fr. 757,410, Dec. 26, 1933. A hard alloy contains carbide of a metal of the 4th to 6th group of the periodic table and up to 25% of an alloy of B with a metal of the Fe group. Thus, the alloy may contain 25% of Fe-B or Fe-Ni and 75% of WC, TaC, TiC, NbC, VC, ZrC, HfC or Mo<sub>2</sub>C. The mixt. may be pressed and sintered. Cf. C. A. 28, 458<sup>a</sup>.

Magnetic alloys. Wm. Jessop & Sons Ltd., and John E. Gould. Brit. 401,476, Nov. 16, 1933. A permanent magnet has at least 1 of the members forming the pole pieces, of steel having a coercive force of not less than 100 c. g. s. units, contg., e. g., 6-35% Co, and another part of steel of coercive force of 30-80 units, contg., e. g., 6% W or Cr.

Alloy for turbine blades. Wilhelm Rohn. U. S. 1,948,448, Feb. 20. Blades of steam turbines are made of an alloy contg. Fe 46-98.5, Ni 39-0.5 and metals, such as Mo and W, of the 6th group of the periodic system m. above 2000° 15-1% and C less than 0.04%. Such alloys are highly resistant to corrosion and to erosion.

Aluminum alloy. Louis W. Kempf (to Aluminium Ltd.). Can. 339,339, Feb. 13, 1934. An Al alloy contg. Si 5-25 and Mg 0.02-3.0% is hard and resistant to corrosion.

Aluminum alloys. Akt.-Ges. vorm. Skodawerke. Austrian 136,265, Jan. 25, 1934 (Cl. 40b). Al alloys for making motor pistons and cylinders contain Si 5-25 and Te, Sr and (or) La up to 5% each, with or without Mg, Cu, Fe, Mn, Ni, Co, Cr and (or) Li up to 2% each. Specific alloys are described.

Aluminum alloys. Jean Hanco. Ger. 592,323, Feb. 6, 1934 (Cl. 40b. 18). See Fr. 638,159 (C. A. 23, 88).

Aluminum alloys. J. Stone & Co., Ltd. Fr. 757,025, Dec. 29, 1933. Alloys of Al with Cu, Ni, Mg, Fe and Si also contain up to 1% of Ce to make the alloy more easily cast. The alloys may contain Cu 0.5-5, Ni 0.5-3, Mg 0.1-2.5, Fe 0.2-2, Si 0.2-2.5, Ce up to 1% and Al the rest.

Riveted plated products of aluminum alloy sheets. Gustav Schreiber (to I. G. Farbenind. A.-G.). U. S. 1,949,112, Feb. 27. Articles are formed of a high-strength Al alloy in the form of sheets which are riveted together with rivets of a high-grade Al alloy contg. Mg about 4-7% and having an electrolytic potential approx. equal to that of "technically pure" Al. The sheets may be coated with "technically pure" Al and the rivets may also contain Mn 0.3-1.0%.

Alloys of beryllium with heavy metals. Ernst Pokorný (to I. G. Farbenind. A.-G.). U. S. 1,949,082, Feb. 27. See Fr. 736,847 (C. A. 27, 1319).

Cadmium alloys. American Smelting & Refining Co. Fr. 757,392, Dec. 26, 1933. An alloy for bearings contains Ni 0.25-7% and Cd the rest. Al, Sb, Cu, Mg and Zn not above 3% may be added.

Copper alloys. George H. Whiteman and Imperial Chemical Industries, Ltd. Brit. 402,118, Nov. 27, 1933. Tubes for use in heat exchangers are made from Cu alloys contg. Al 2-8 and Ni 1-3%, the Ni being always less than the Al.

Copper-zinc alloys. Oesterreichische Dynamit Nobel A.-G. Fr. 757,232, Dec. 22, 1933. Alloys which are resistant to corrosion and easily worked are made by adding a small amt. of Ni or (and) Co to  $\gamma$ -brasses (alloys of Cu and Zn contg. 31-40% of Cu). One example contains Cu 38-33, Co 1-6 and Ni 4% and Zn the rest. Fr. 757,233. Alloys having the above properties are made by adding a small amt. of Ni or (and) Co to Cu-Zn alloys in the  $\beta + \gamma$  zone, i. e., alloys contg. Cu 40-50%. One example contains Cu 45, Ni 2, Co 2.5% and Zn the rest.

Iron alloys. Soc. anon. des hauts-fourneaux, forges et aciéries de Pompey. Fr. 757,518, Dec. 28, 1933. An Fe alloy resistant to corrosion contains C < 0.05, Mn 0.2-0.6, Si 0.2-0.6, P < 0.02, S 0.015, Cu 0.3-0.6 and W 0.01-0.15%. Cr (0.01-0.04%) may be added to improve the mech. characteristics. Cf. C. A. 27, 4210.

High-carbon chilled iron alloy roll. Wm. H. Seaman. U. S. 1,948,243, Feb. 20. Chilled rolls are formed contg. high-carbon iron asfeed. with Mn 0.15-0.27, Si 0.15-0.65, Cr 0.20-0.50 and Ni 2.5-5.0%. U. S. 1,948,244



relates to chilled rolls of Fe alloy contg. Si 0.25–0.35, Cr 0.25–0.35, Mn 0.18–0.22, and Ni about 3.2 and C 3.5–4.0%. U. S. 1,948,245 relates to rolls which may be formed of chilled Fe alloy contg. Si 0.15–0.25, Cr 0.25–0.35, Mn 0.15–0.20, C about 3.3 and Ni 4.75–5.0%. U. S. 1,948,246 relates to rolls of Fe alloy contg. C 2.60–3.35, Mn 0.10–0.40, Cr 0.15–0.65, Mo in about the same proportion as the Cr, and Ni 1.25–5.0%. Cf. C. A. 28, 91<sup>1</sup>.

**Ledeburitic, preliminary iron alloy free from graphite.** Josef Novak and Roman Kesselring. U. S. 1,947,650, Feb. 20. A "pre-alloy" of this type suitable for use in the manuf. of steels contains Fe with some impurities together with Cr 20–30, W 2–6, Ni 6–15, Cu 10–15 and C 2.5–3.0%.

**Ferromagnetic alloys.** Vereinigte Stahlwerke A.-G. Brit. 401,443, Nov. 16, 1933. Addn. to 346,013 (C. A. 26, 416). See Fr. 42,094 (C. A. 27, 4707).

**Alloy for magnetically recorded sound records.** Theodore Cohen (to Scientific Research Trust). U. S. 1,949,409, March 6. An alloy is used such as music-wire contg. Ni 5% and Co 5%.

**Lead alloys.** Henry Harris. Ger. 592,461, Feb. 7, 1934 (Cl. 40b. 10). See U. S. 1,860,095 (C. A. 26, 3772).

**Refining magnesium and its alloys prior to casting.** Frederick Badger and British Maxium Ltd. Brit. 401,072, Nov. 13, 1933. Cf. Brit. 375,743 (C. A. 27, 3185). The  $MgCl_2$  contains 2–10%  $H_2O$ .

**Silver alloys.** Tadashi Tanabe. Brit. 401,527, Nov. 16, 1933. See Japan. 99,246 (C. A. 28, 2317<sup>4</sup>).

**Tin alloys.** Max Speichert. Ger. 592,237, Feb. 3, 1934 (Cl. 40c. 44.00). Waste Sn alloy contg. Sb, Cu and Pb, with or without Ni and As, is fused and treated with  $PbS$  and (or)  $Sb_2S_3$ , with or without S. The upper of the 2 layers into which the mixt. seps. contains most of the Sn and Cu as sulfides, together with Pb and possibly Sb. This layer is withdrawn, roasted to oxides, freed from Cu by lixiviation, and reduced to yield a solder. The lower layer comprises a modified alloy of higher Pb or Sb content. An example is given in which an alloy contg. Sn 30, Pb 52, Sb 15 and Cu 3% yields a solder contg. Sn 46, Pb 52, and Sb 1.6% and a hard alloy contg. Pb 87, Sb 11.4 and Sn 1.6%.

**Bimetallic thermostatic elements.** Howard D. Matthews (to W. M. Chace Valve Co.). U. S. 1,948,121, Feb. 20. Elements used together such as a Si-Cu alloy and a Ni-steel alloy are heat treated at temps. above those of contemplated use in order to relieve internal stress in the metals.

**Apparatus and process for treating ribbons of safety razor blades.** Heinrich Bassat. Brit. 402,002, Nov. 23, 1933. A strip of contiguous razor blades, after the grinding, polishing, etching and cleansing or rinsing operations have been completed, is fed forward and sprayed on both sides with oily liquid to remove rinsing water, wiped and finally dried by hot air.

**Protected metal sheets.** John E. Burns and H. H. Robertson Co. Brit. 401,783, Nov. 23, 1933. In forming protected sheets covered on both sides with fibrous material, e. g., asbestos, impregnated with asphalt, etc., which is protected by a layer of asphalt, the unprotected side edges are provided with covering means surrounded by the final coating of asphalt, etc., so that the sheet may be bent near said edges without rupturing the protective coating.

**Zinc sheets for use in galvanic cells.** Paul Mittmann (to American Lurgi Corp.). U. S. 1,947,948, Feb. 20. Relatively thin Zn plates are cast at a temp. of about 420–

40°, rolled into sheets in the usual manner, and the sheets are then cold rolled.

**Multiple wire-drawing apparatus.** Walther Nacken Brit. 401,991, Nov. 23, 1933.

**Process for obtaining coherent masses from powdered hard metal, e. g., a mixture of a hard carbide and a metal of lower melting point.** Wolfram & Molybdaen A.-G. Brit. 401,521, Nov. 16, 1933.

**Forming compound metal bodies such as copper-clad iron, etc.** Ernst Schubarth. U. S. 1,948,242, Feb. 20. Various details of app. and operation are described for nesting, heating and extrusion of assocd. metals in coaxial layers.

**Optical system, etc., for discovering and recording defects in metal plates such as those of steam boilers.** Jared P. Morrison (to Hartford Steam Boiler Inspection and Insurance Co.). U. S. 1,947,729, Feb. 20. A photographic app. may be used.

**Tools with working portions of tantalum carbide.** Clarence W. Balke (to Ramet Corp. of America). U. S. 1,948,489, Feb. 27. A working portion of Ta carbide is Ni-plated, baked and attached with Ag solder to a steel body. Cf. C. A. 28, 1013<sup>4</sup>.

**Coating metals.** Alessandro Salvi and Francesco Gianni. Ger. 591,781, Jan. 26, 1934 (Cl. 48b. 8). See Brit. 381,956 (C. A. 27, 4521).

**Coating metals such as iron, zinc, magnesium and their alloys.** Robert R. Tanner and Herman J. Lodegren (to Metal Finishing Research Corp.). U. S. 1,949,090, Feb. 27. A bath is formed contg. phosphate of Zn, Mn or Fe, a sol. compd. of a metal less basic than the metal to be coated, such as Cu nitrate, and an oxidizing agent such as  $HNO_3$ ; the article to be coated, which is formed of Fe, Zn, Mg or their alloys, is immersed in the bath while it is at room temp. The total acidity of the bath as measured with phenolphthalein as indicator is at least 15 times the free acidity as measured with methyl orange as indicator.

**Coating iron or steel with zinc.** John L. Bray. U. S. 1,948,505, Feb. 27. The article to be coated is dipped in molten Zn, removed and cooled to below the solidifying point of the Zn, then dipped in a bath of molten Pb contg. Zn materially below the satn. point at the operating temp. of the bath. A portion of this Pb-Zn bath is removed from time to time and Pb is added to maintain the bath with a desired proportion of Zn below the satn. point.

**Polishing metals.** Udylyte Process Co. Fr. 757,702, Dec. 30, 1933. Zn, Cd and Mg are given a brilliancy by dipping them in an oxidizing bath, not nitrogenated and contg. an acid or a base, e. g., an aq. bath contg. chromic acid and  $H_2SO_4$  or  $NaMnO_4$  and  $NaOH$ .

**Reacting on zinc with tin salts, etc., to form alloys for soldering or other purposes.** Ernest Hey. U. S. 1,947,938, Feb. 20. Zn which may be in the form of sheets is treated with a soln. such as may be formed by dissolving Sn in  $HCl$  until there results from the reaction a gas-distended, coherent sponge-like material around the Zn and the reaction is regulated (as by adjustment of the strength of the acid metal soln.) to avoid detachment of the reaction product from the Zn. Alloys also contg. Cu, Pb, Ag and Au may also be formed from similarly assocd. materials.

**Coated welding electrode.** John B. Austin (to Una Welding, Inc.). U. S. 1,949,398, Feb. 27. A nitrocellulose lacquer is used for securing coating materials such as fluxes, etc., to a metal rod and the coating is substantially free from inorg. binding agents.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

**Nature of valencies in organic chemistry.** G. Urbain. *Bull. soc. chim.* 53, 637–52 (1933).—A lecture. B. C. A. H.

**Neopentyl deuteride.** Frank C. Whitmore, Geo. H. Fleming, D. H. Rank, E. R. Bordner and K. D. Larson.

*J. Am. Chem. Soc.* 56, 749 (1934).—Neopentylmagnesium chloride reacts with  $H_2O$  (d. 1.0735) to give a mixt. of neopentane and neopentyl deuteride, m. —22° to —21° (neopentane, —21° to —20°),  $n_D^{20}$  1.35360 (neopentane,

1.35375); the deuteride boils about 0.2° below pure neopentane.

C. J. West

Preparation of butyl and hexyl alcohols from by-products obtained in the synthesis of divinyl from ethyl alcohol. III. B. A. Kazanskii, A. A. Balandin, I. M. Tzerkovnikov, K. A. Ivanova and E. N. Staroverova. *J. Applied Chem.* (U. S. S. R.) 6, 260-73 (1933).—The Bu fraction sepd. from the above by-products b. 115-20°,  $d_4^{20}$  0.8352,  $n_D^{20}$  1.4085, Br no. 49.3; it constituted about 22.18% of the unsatd. alcs. of the formula  $C_4H_8O$  in the fraction. This fraction was hydrogenated by the Sabatier method in the presence of various catalysts, such as Ni pptd. on pumice stone with a glass and a Cu tube, Cu on asbestos, Fe, and Ni (hydrogenation is the liquid phase). The process was carried out at 340-50°, 320-30°, 120°, 350°, 200° 5', 400-80° and 100°. The catalysts had the following consts.: b<sub>744</sub> 115.5-17° (mainly 116°),  $n_D^{20}$  1.4008,  $d_4^{20}$  0.8105, which are fairly close to those given in the literature for BuOH. The hexyl fraction was also redistd. and hydrogenated under similar conditions. It yielded a product b. 150-5°,  $n_D^{20}$  1.4187,  $d_4^{20}$  0.8205. This is not a uniform product. The yield of BuOH amounted to 19.2% of the total of the alc. by-products. The best hydrogenation temp. for the Bu fraction lies at 120°, although hydrogenation takes place at 50°; Ni pptd. on asbestos is the best catalyst at 150°.

A. A. B.

Dynamics and mechanism of aliphatic substitution. R. A. Moelwyn-Hughes. *Nature* 133, 294 (1934).—Slator's data (*J. Chem. Soc.* 85, 1286 (1904)) on the reaction velocities of  $Na_2S_2O_8$  with alkyl halides, sym. ethylenedihalides,  $C_2H_4I_2$  and  $C_2H_4Br_2$  are in agreement with the theory of Hughes and Ingold (*C. A.* 28, 1983<sup>a</sup>, 2324<sup>a</sup>).

Gerald M. Petty

Peroxide effect in the addition of reagents to unsaturated compounds. IV. The addition of halogen acids to vinyl chloride. M. S. Kharasch and C. W. Hannum. *J. Am. Chem. Soc.* 56, 712-14 (1934); cf. *C. A.* 27, 3444.—The addn. of HX to  $CH_2=CHCl$  can occur to give  $MeCHClX$  or  $CH_3XCH_2Cl$ . Under normal "non-peroxide catalyzed" conditions the formation of  $MeCHXCl$  was found to occur exclusively as predicted. Without solvent or a good antioxidant the addn. of HBr leads to a rapid, nearly quant., formation of  $CH_3BrCH_2Cl$ ; in the presence of metal catalysts the peroxide effect is destroyed and nearly quant. yields of  $MeCHClBr$  are obtained. Under the influence of sun or artificial light, at room temp. or near 0°, the effect of *p*-thiocresol and other antioxidants is almost completely destroyed; strong illumination, particularly sunlight, increases tremendously the velocity of the "abnormal" reaction. The addn. of HBr at elevated temps. in the dark proceeds at an increased velocity but decreases the yield of "normal" product,  $MeCHBrCl$ , showing the "peroxide" effect to be increased under these conditions. In the presence of air, the solvent effect is of minor importance since the "peroxide catalyzed reaction" proceeds so fast that it obliterates quite effectively any antioxidant effect of the solvent; some 1,1-isomer was formed, without the use of antioxidants, by the addn. *in vacuo* in  $PhNO_2$  and particularly in mesitylene. The addn. of HCl in the absence of metal salt catalysts does not proceed at a sufficiently rapid rate to be studied conveniently. The addn. of HI under any condition forms only  $MeCHICl$ ; the strongly reducing HI destroys all peroxides, even at -40°.

C. J. West

$\beta$ -Chloroethyl methyl sulfide. W. R. Kinier and Wallace Windus. *Org. Syntheses* XIV, 18-19 (1934).— $MeSCH_2CH_2OH$  and  $SOCl_2$  give 75-85% of  $MeSCH_2CH_2Cl$ .

C. J. West

$\beta$ -Hydroxyethyl methyl sulfide. Wallace Windus and P. R. Schildneck. *Org. Syntheses* XIV, 54-6 (1934).—[HN:C(SMe)NH<sub>2</sub>]<sub>2</sub>·H<sub>2</sub>SO<sub>4</sub> and NaOH give MeSH, the Na salt of which reacts with  $HOCH_2CH_2Cl$  to give 74-82% of  $MeSCH_2CH_2OH$ .

C. J. West

The *aci*-form of trinitromethane. Leslie W. Andrew and Dalziel J. L. Hammick. *J. Chem. Soc.* 1934, 244.—The K salt of nitroform, stirred into concd. H<sub>2</sub>SO<sub>4</sub> at room temp., gives a product m. 50°; the liquid melt solidifies below 0° and then m. 14°; the higher-melting solid could

not be purified; it is almost certainly the *aci*-form.

C. J. West

Quantitative study of the reaction between some primary aliphatic alcohols and sulfuric acid. C. M. Suter and Elmer Oberg. *J. Am. Chem. Soc.* 56, 677-9 (1934).—The extent of ester formation at equil. in the reaction between a no. of alcs. and H<sub>2</sub>SO<sub>4</sub> has been detd. at 25°. The equil. const. (K) in general increases with a decrease in the concn. of H<sub>2</sub>O in the reaction mixt. Values for K with 96.7% H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>SO<sub>4</sub> with 5.20, 22.6 and 31.98% SO<sub>3</sub> were found as follows: MeOH 3.30, 3.42, 3.62, 3.67; EtOH 1.76, 2.02, 2.08, 1.98;  $ClCH_2CH_2OH$  2, 2, 2.44, 2.55; PrOH 2.30, 2.38, 2.59, 2.76; BuOH 2.60, 2.83, 2.82, 3.04; (1st 2 acids only) iso-BuOH 3.14, 3.32, AmOH 2.78, 2.98;  $C_6H_5OH$  2.57, 2.70. In the prepn. of alkyl H sulfates the use of H<sub>2</sub>SO<sub>4</sub> contg. 30% SO<sub>3</sub> increases the yields 10-15% over those obtainable from the concd acid when the mol. ratio of the reactants is unity.

C. J. West

Quaternary ammonium salts from bromopropylidialkylamines. IV. Formation of four-membered rings. C. F. Gibbs and C. S. Marvel. *J. Am. Chem. Soc.* 56, 725-7 (1934); cf. *C. A.* 27, 2936.— $\gamma$ -Phenoxycyclopropylidethylamine, b<sub>1</sub> 118-20°; chloroplatinate, m. 134-5°; di-Pr analog, b<sub>1</sub> 137-9°,  $d_4^{20}$  0.938,  $n_D^{20}$  1.4983; di-Bu analog, b<sub>1</sub> 148-50°, d. 0.931,  $n_D^{20}$  1.4939; chloroplatinate, m. 150-3°,  $\gamma$ -bromopropylidipropylamine, b<sub>1</sub> 77-8°; chloroplatinate, m. 194-6°; di-Bu analog, b<sub>1</sub> 96-8°, d. 1.073,  $n_D^{20}$  1.4082; bromoaurate, m. 130°. These Br derivs. undergo spontaneous intramol. condensation to give the corresponding cyclic dialkyltrimethylammonium bromides,  $(CH_2)_3NR-Br$ ; R = Et, m. 175-8°; Pr, m. 52-9°; Bu, m. 120-1°; Diethylallylamine-HBr, m. 189-90°. The above reaction is of theoretical interest since the corresponding bromopropylidethylamines condense to produce only linear polymers.

C. J. West

Thermal decomposition of organic compounds from the standpoint of free radicals. VII. The ethylidene radical. F. O. Rice and A. L. Glasbrook. *J. Am. Chem. Soc.* 56, 741-3 (1934); cf. *C. A.* 27, 5714; 28, 1655<sup>a</sup>.—The expts. seem to indicate that, if the  $MeCH$  radical is formed in the decompn. of  $MeCH:N$ , it is a radical of exceedingly short life, since in contrast with the behavior of  $CH_3N_2$ , the Paneth effect with metallic mirrors is not shown. Furthermore, no  $MeCH:CO$  can be detected when the decompn. is carried out in an atm. of CO<sub>2</sub>. Since  $C_2H_4$  is the only condensable gas formed during this decompn., in particular since neither  $C_2H_2$  nor 2-butene is formed, it seems likely that the  $MeCH$  radical rearranges very easily according to the equation  $MeCH \rightarrow CH_2:CH$ . The decompn. of  $MeCH:NN:CHMe$  was studied, 60% appearing to decompose to  $C_2H_4$  and N<sub>2</sub>; the remaining 40% gave a non-volatile oil, some HCN and probably  $CH_4$ .

C. J. West

Electrolysis of ether solutions of the Grignard compound. Isolation, identification and determination of anodic products. W. V. Evans and F. H. Lee. *J. Am. Chem. Soc.* 56, 654-7 (1934).—The anodic products of the electrolysis of EtMgCl, EtMgBr or EtMgI are  $C_2H_4$ ,  $C_2H_6$  and traces of H<sub>2</sub>; PrMgX gives  $C_2H_4$ ,  $C_2H_6$  and traces of H<sub>2</sub>; mixts. of EtMgX and PrMgX give chiefly  $C_2H_4$ ,  $C_2H_6$ ,  $C_3H_8$  and  $C_4H_{10}$ ; mixts. of EtMgX and PhMgX give  $C_2H_4$  and  $C_2H_6$ . The electrolytic products of  $MeMgX$  vary with the concn.; at high concn.  $C_2H_4$  is the chief product; at low concn. more  $CH_4$  and unsatd. hydrocarbons as  $C_3H_4$  and iso- $C_4H_8$  are produced. The mechanism of these reactions is suggested.

C. J. West

Ease of ring formation in the case of cyclic imines. G. Salomon. *Helv. Chim. Acta* 16, 1361-73 (1933); cf. *C. A.* 27, 3448.—In the prepn. of cyclic imines from halogenated alkylamines the formation of 3- and 4-membered rings requires a higher heat of activation than that of the 5- and 6-membered rings. The reaction can occur only when an activated mol. is in the "ring position." The statistical equil. ring position  $\approx$  chain position is expressed by the reaction const. On thermodynamic grounds it seems probable that this equil. depends on the solvent. The ring position of the dissolved mol. will

predominate if the mol. is physically very different from the solvent. In agreement with this theory, the reaction const. of this ring-closure reaction is 5–6% smaller in org. solvents than in  $H_2O$ . Since the org. solvent also lowers the heat of activation by 5 kg. cal., the reaction-checking influence of the org. solvent is less obvious in a comparison of the reaction velocities. Stoll's theory in regard to the space-filling of many-membered rings was applied to this idea of "ring position." By means of this theory the appearance of a large heat of activation in the formation of hexamethylenimine was traced to an unfavorable spatial arrangement of the ring-forming mol. Louise Kelley

**The formation of acids from aldehydes and water vapor.** Stefan Goldschmidt, Paul Askenasy and Hermann Grimm. *Ber.* 67B, 202-13(1934).—CuO contg. a little  $Cr_2O_3$  is a good catalyst for the reaction of aldehydes and steam to form acids and H. At  $350^\circ$  53% conversion of AcH to AcOH was obtained. The equil. in this reaction is discussed. Alcs. also react; aldehydes and acids are formed.

G. B. Taylor

**Wood alcohol oils.** S. I. Ruibin and S. S. Medvedev. *J. Applied Chem.* (U. S. S. R.) 6, 311-19(1933).—In the investigation of wood alc. oils the following substances were detected: in the water-insol. part:  $EtCOCHMe_2$ ,  $EtCOPr$  and  $MeCOBu$ ; in the water sol. part: acetone,  $EtCOCHMe_2$ , cyclopentanone, allyl and crotonyl alcs., and  $(CH_3O)_2$ . The main constituent of the oil is a ketone, this making it a valuable solvent. A. A. B.

**The action of metallic sodium on aliphatic ketones.** A. B. Favorskii and I. N. Nazarov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 1309-51; cf. *C. A.* 27, 3445.—Na reacts with  $(Me_2C)_2CO$  (I) in  $Et_2O$  to give a dark red ketyl (II) decomp. in the presence of air, with disappearance of the color. The colorless soln. with  $H_2O$  gives  $H_2O_2$  as in the case of aromatic ketones. Na with I in  $Et_2O$  in a sealed tube gives II, which after several days passes to a ppt. of  $[(Me_2C)_2(NaO)C]_2$  (III) unlike the corresponding aromatic compds. Also  $[(Me_2C)_2(HO)C]_2$  (IV) does not give II with  $EtONa$ . Na also reacts with I without solvent to give orange II and III. In a typical expt., addn. of 9 g. Na ribbon to 30 g. I at ordinary temp. gave II with rise of temp. to  $60-80^\circ$ . After a day the mass thickened owing to sepn. of III and reaction ceased. Completion of the reaction by heating at  $100-20^\circ$  for 5-6 hrs. with shaking, cooling and shaking with abs.  $Et_2O$  for several days until all color had permanently disappeared, resulted in the removal of one Na for each mol. of I. No H was evolved. II with  $H_2O$  gave I, IV and  $(Me_2C)_2CHOH$  (V), in equal quantities. I and V arose from IV. IV at  $220-50^\circ$  gave  $(Me_2C)_2CCOCMe_2$  (VI), and with Na in  $Et_2O$  gives III. IV,  $b_p$   $156^\circ$ , m.  $85-6^\circ$  from abs.  $EtOH$ . Gradual addn. of 5.5 g. IV with const. shaking to 35 g. concd.  $H_2SO_4$  at  $-10^\circ$ , pouring the mixt. onto ice, extn. with  $Et_2O$ , removal of the  $Et_2O$  and distn. with steam gave 82% of VI, colorless liquid (even at  $20^\circ$ ) with camphor odor,  $b_p$   $119-21^\circ$ . VI (3 g.) in 17 cc. abs.  $EtOH$  with 3 g. Na gave 2.5 g.  $(Me_2C)_2CC(H)(OH)CMe_2$  (VII),  $b_p$   $122-4^\circ$ . VII without solvent did not react with Na. VI with Na gave a violet product which changed to yellow in 20 days. A suspension of 0.5 g. VI in 10 cc.  $H_2O$  cooled with ice with 15 cc. of 2% Br in  $H_2O$ , added gradually with const. shaking, gave a yellow ppt. which was filtered and dried by pressing between filter paper and then placed *in vacuo* in the dark for 2 days. The product, 0.56 g. of  $(Me_2C)_2CCBr(OH)CMe_2$  (VIII), m.  $74-5^\circ$  (decampn.). VIII was also obtained from VII and Br. VIII decomposes on standing, is stable to dil.  $H_2SO_4$ , and is easily decompd. by alkali, giving VI, HBr and HBrO. VII gave neither a urethan nor a Bz deriv. To 30 cc. abs.  $Et_2O$  and 5 g. Na in a flask, through which well-dried  $CO_2$  ( $CaCl_2$ ,  $H_2SO_4$ , and  $P_2O_5$ ) was passed, was added 10 g. I in 10 cc.  $Et_2O$ , over a period of 3 days with frequent shaking. The  $Et_2O$  lost by evapn. was replenished. The white cryst. ppt. formed was sepd. from the Na with  $Et_2O$  and decompd. with  $H_2O$ . Acidification of the aq. soln. and extn. with  $Et_2O$  gave 2 g. of a hydroxy acid. Seven g. of unchanged I was recovered.  $Me_2CCOCHMe_2$  reacted with Na in

the same manner as I, but the proportion of pinacol in the mixt. of products obtained by decomp. the Na ketyl with  $H_2O$  was smaller and it was not isolated in the pure state.  $Me_2C(IX)$  reacted with Na in the absence of a solvent to a slight extent as an enol, but the principal product was the pinacolate,  $[(Me_2C)(ONa)CMe]_2$  (X). No colored ketyl was observed, although this is probably formed momentarily since  $H_2O_2$  was detected. IX (90 g.) and 22 g. Na gave H for 1-1.5 hrs. After cessation of the evolution of gas, the mixt. was heated in a sealed tube at  $110^\circ$  for 16-20 hrs. with frequent shaking. Careful opening of the tube (H under pressure present), and sepn. of the colorless product from the excess Na with  $Et_2O$  and Fe wire gave X. X with  $H_2O$  gave IX,  $Me_2CCH(OH)Me$ , and 80% of a mixt.  $b_p$   $90-107^\circ$ , which was sepd. into a lower (90-99°) (XI) and a higher (99-107°) (XII) fraction. XI was  $(Me_2C)Me_2CCOCMe_2$  and XII was the unsatd. alc.,  $CH_2=C(CMe_2)CMe(OH)(CMe_2)$ . No pinacol corresponding to X was isolated. Distn. of XII at ordinary pressure caused further dehydration to give  $[CH_2=C(CMe_2)]_2$  (XIII), b.  $168-70^\circ$ , best prepd. by heating XII with anhyd.  $(CO_2H)_2$ . XII with  $KMnO_4$  gave IX,  $Me_2CCOCH_2$  and  $Me_2CCO_2H$ . XIII added 1 mol. Br and reacted with maleic anhydride in  $C_6H_6$  to give 5,6-di-tert-butyl-1,2,3,4-tetrahydrophtalic anhydride, m.  $128-9^\circ$ , which was converted to the corresponding alc. m.  $183-4^\circ$ , with NaOH and  $H_2SO_4$ . XI  $b_p$   $200-2^\circ$ ,  $d_4^{20}$  0.8434, M. R. 58.377. Reduction of XI with Na and abs.  $EtOH$  gave  $(Me_2C)Me_2CCH(OH)CMe_2$ ,  $b_p$   $99^\circ$ ,  $d_4^{20}$  0.8481; Bz deriv. m.  $48-9^\circ$ . XI was accompanied by a small amt. of  $(Me_2C)_2MeC(OMe)_2$ . Lewis W. Rutz

**The highly activated carbonyl group: mesityl glyoxal.** Arzy R. Gray and Reynold C. Fuson. *J. Am. Chem. Soc.* 56, 739-41(1934).— $\beta$ -Isoduryloyl chloride and Mg in  $Et_2O$  give 30% of dimesityl diketone (I), yellow, m.  $120-1^\circ$ , which does not react with alkali,  $MeMgI$  or  $H_2NNHCO-NH_2$ ; a 2nd product m.  $231-2^\circ$ . Reduction of acetomesitylene with  $SnO$  in  $H_2O$ -dioxane gives 82.5% of mesityl glyoxal (II),  $b_p$   $105-6^\circ$ ,  $b_p$   $118-9^\circ$ ,  $n_D^{20}$  1.5520; the hydrate m.  $100-100.5^\circ$ ; the oxime m.  $138.5-9^\circ$ ; the phenylhydrazone, yellow, m.  $145.5-6.0^\circ$ ; the semicarbazone, pale yellow, m.  $207-8^\circ$ ; the menthone deriv.,  $C_{10}H_{18}O_3$ , m.  $194.5-5^\circ$ . In contact with alkalies II rearranges to mesityl glycolic acid. II with  $PhMgBr$  gives *Ph mesityl diketone*, pale greenish yellow, m.  $136-7^\circ$ ; the monosemicarbazone m.  $203-4^\circ$ . II and mesitylmagnesium bromide give I and 1,2-bis( $\beta$ -isoduryloyl)ethylene glycol, m.  $160.5-61.5^\circ$ ; this was also prepd. in 39% yield by the use of Mg and  $I_2$  in  $Et_2O-C_6H_6$ ; its diacetate m.  $185-5.5^\circ$ .

C. J. West

**Absorption in the ultra-violet and chemical reactivity of certain classes of organic compounds.** Maximilien Grunfeld. *Ann. chim.* 20, 304-70(1933); cf. *C. A.* 26, 2967, 4301.—The absorption spectra in the region 2600-2100 Å. of the following synthetically prepd. compds. have been measured by the rotating sector method: formic, acetic, butyric, caproic, caprylic, lauric, myristic, palmitic and stearic acids; aceto-, propio-, valero- and octano-nitriles; amyl- (I), octyl- (II), dodecyl- (III), cyclohexyl- (IV), *o*-methylcyclohexyl-amine (V), and 4-aminoheptane (VI) and their HCl salts; pimelic acid (VII), azelaic acid (VIII), Et azelate (IX), Me tetradecanedioate (X), dibenzyl tetradecanedioate (XI), benzyl alc.; pivalic amide (XII), *N*-diethyltrimethylacetamide (XIII), dimethylheptylacetic acid (2,2-dimethylnonanoic acid) (XIV) and amide (XV), triethylacetamide (XVI), *N,N'*-diethylmalonamide (XVII), *N,N'*-di-*o*-methylcyclohexylmalonamide (XVIII), dimethylheptylacetophenone (XIX) and semicarbazone, *N*-dodecylbenzamide (XX), *N*-dodecylphenylacetamide (XXI), *N*-dodecylphenylpropionamide (XXII), *N*-dodecylphenylbutyramide (XXIII), *N*-dodecylphenylvaleramide (XXIV). 95% alc. was used as solvent and also, in some cases, water and hexane. Methods of synthesis are described. Curves are given for some of the compds. and numerical data for others. For the monobasic acids the absorption is continuous in this region. The curve for  $HCO_2H$  is nearest the visible. The higher homologs beginning with the 3rd term have practically identical coeffs. of absorp-

tion, i. e., the groups  $\text{CH}_2$  and Me cannot be considered as chromophores in this region of the spectrum. The spectra of the nitriles and amines confirm this conclusion. The amine HCl salts in water are more transparent than the free bases. The primary amines in alc. differ from the secondary especially for the long wave lengths. The absorption spectra of dibasic acids already given (C. A. 24, 2951) were reexamined, using synthetic products. For nearly all the results are the same, but the curves of VII, VIII, IX and X are given since they are more transparent than the former samples. The former conclusions are substantiated. The curves of XII, XIII, XIV, XV and XVI are of the same form as those of compds. having the same chromophoric group without  $\alpha$ -substitution but are shifted to the red. This absorption is probably due to the mutual influence of the alkyl radicals and the functional group since the hydrocarbon groups do not absorb in this region. The speeds of reaction of Et malonate in abs. alc. with I, II and III are the same and greater than those with IV, V and VI. The speeds of reaction of II and V in petroleum ether are greater than in alc. These results parallel the absorption spectra and agree with the theory (C. A. 26, 8775). The speeds of reaction of esters with III in abs. alc. were measured in sealed tubes at  $100^\circ$ .  $\text{BzOEt}$  does not react under these conditions.  $\text{PhCH}_2\text{CO}_2\text{Et}$  reacts with the greatest speed; Et phenylpropionate and Et phenylbutyrate have practically the same reactivity. These variations are in accord with the variations of their absorption spectra (C. A. 26, 5081). New compds. described are: XIX,  $b_m$  188-90°, prep'd. by treating iso-PrCOPh with  $\text{NaNH}_2$  and heptyl bromide in PhMe and boiling 5 hrs. (71% yield), oxime, m.  $130^\circ$ ; semicarbazone, m.  $59^\circ$ ; XV, m.  $97-8^\circ$ , from XIX on heating 7 hrs. with  $\text{NaNH}_2$  in PhMe; XIV,  $b_m$   $163^\circ$ , from XV by treatment at  $0^\circ$  with  $\text{H}_2\text{SO}_4$  and  $\text{NaNO}_2$ ; XI,  $b_m$   $295-307^\circ$ , m.  $54^\circ$ , by heating the corresponding Na salt with excess  $\text{PhCH}_2\text{Cl}$  in the presence of KI for 7 hrs., adding  $\text{H}_2\text{O}$ , extg. with ether and distg. XX, m.  $68^\circ$ , XXI, m.  $78^\circ$ , XXII, m.  $61^\circ$ , XXIII, m.  $58^\circ$ , and XXIV, m.  $54^\circ$ , were prep'd. by heating equimol. quantities of the corresponding Et esters and dodecylamine in a sealed tube at  $280^\circ$  for 8 hrs. Janet E. Austin

Preparation of sodium formate from sodium hydroxide and carbon monoxide (as a laboratory experiment). H. Rheinboldt. Z. physik. chem. Unterrichts. 46, 1(1933). Purified CO from a gasometer is passed through a wash bottle contg. 50% KOH and through one contg. slightly colored (indigo) water, into the reaction chamber (a large test tube) which is electrically heated; the excess CO is burned. The mass with which the reaction chamber is filled is prep'd. by dissolving 40 g. NaOH in  $\text{H}_2\text{O}$ , adding 30 g. of soda lime, and heating and stirring the mass until it begins to solidify; it is then rapidly dried at  $105-10^\circ$  and ground in a mortar. Glass wool is used to provide the necessary surface. The reaction chamber is carefully heated and swept out with CO until the CO burns at the end of the train. The flow is then decreased to 60-100 bubbles per min. When the no. of bubbles in the end wash bottle is less than those in the bottle before the reaction chamber, the temp. is kept const. ( $160-210^\circ$ ); with proper control, there should be complete absorption of the CO. On extn. of the reaction mass, the test is obtained. No yield is given. Louis Waldbauer

Analysis of the dispersion curves of substituted propionic acids. P. A. Levene and Alexander Rothen. J. Am. Chem. Soc. 56, 746(1934).—A preliminary paper on the dispersion curves and partial rotation of derivs. of Et- $\text{CO}_2\text{H}$ . C. J. West

Catalytic decompositions of several complex alcohols. Urion. Ann. chim. [11], 1, 5-87(1934).—The catalytic decompn. of several  $\alpha$ -ethylenic  $\alpha$ -glycols by passage over heated pumice, alumina or reduced Cu gave very complex mixts. of liquids which were extremely difficult to fractionate. These mixts. contained straight-chain  $\alpha$ -diketones, isocyclic 5-membered C compds. consisting of ethylenic hydrocarbons formed by dehydration, and  $\alpha$ -diketones from dehydrogenation which were studied in both keto and enol modifications, unsat'd. erythronic

compds. and aldehydes from the breakdown of certain secondary products. Many compds. occurring as aldehydes or ketones in complex mixts. were characterized through their oximes, phenylhydrazones and semicarbazones without previous isolation. Reliance on the simplification theory stated by Prévost and Kirrmann (C. A. 25, 3809) permitted the prediction of certain results and gave justification for the most complicated isomerisations and transformations. Inversely, the present work has given a new series of verifications of the theory. Erythrol (I),  $\text{CH}_2\text{:CHCH(OH)CH}_2\text{OH}$ ,  $b_m$   $94-5^\circ$ , prep'd. in 35% yields by the controlled heating of inactive erythritol with  $\text{HCO}_2\text{H}$  and sapon. of the formate with BaO, was only partially decomp'd. with formation of crotonaldehyde (II) and  $\text{H}_2\text{O}$  on passage over heated pumice at  $320^\circ$ . Catalytic decompn. of I over  $\text{Al}_2\text{O}_3$  at  $310-20^\circ$  gave some Et-CHO but produced mainly II, b.  $102-4^\circ$ , and a dimer of II,  $b_m$   $78-80^\circ$ ,  $d_4^{25}$  1.008,  $n_D^{25}$  1.4780 (semicarbazone, m.  $191-2^\circ$ ), formed by polymerization. The dehydration operates at the expense of the more mobile secondary OH group of I and yields the enolic form of vinylacetaldehyde, which reverts to II, the more stable form. Decompn. of 75 g. of I, by streaming at the rate of 20 g. per hr. over Cu heated to  $280^\circ$  in a Pyrex tube, produced 2 g. of EtCHO, 15 g. of a mixt. of  $\text{H}_2\text{O}$ , MeCH:CHCHO and (EtCO) $_2$  (oxime, m.  $180-3^\circ$ ; semicarbazone, m.  $160-1^\circ$ ), 30 g. of unaltered I and 12 g. of ethylketol in the enolic form MeCH:C(OH)CH $_2$ OH,  $b_m$   $51.5^\circ$ ,  $d_4^{25}$  1.020,  $n_D^{25}$  1.4250. The gaseous products of decompn. contain, in addn. to CO,  $\text{CO}_2$ , H and traces of sat'd. hydrocarbons, some erythrene, converted on bromination into the tetrabromide, m.  $118^\circ$ . [ $\text{CH}_2\text{:CHCH(OH)}_2$ ] (III), prep'd. by the reduction of acrolein with a Zn-Cu couple in AcOH, gave, on thermal decompn. of 45 g. of the glycol at the rate of 25 g. per hr. over pumice at  $300^\circ$ , 3 g. of a mixt. of acrolein and EtCHO; 3 g. of  $\text{H}_2\text{O}$  contg. traces of org. products; 6 g. of cyclopentylformaldehyde (IV), and 25 g. of unaltered III contaminated with small quantities of adipic aldehyde (V) (dioxime, m.  $184-6^\circ$ ). The results obtained by decompn. of III over  $\text{Al}_2\text{O}_3$  are qualitatively the same although the isomerization into V and its dehydration are more complete. This thermal decompn. provides an excellent procedure for the prep'n. in 28% yields from acrolein of notable quantities of IV, b.  $146^\circ$ ,  $b_m$   $48^\circ$ ,  $d_4^{25}$  0.970,  $n_D^{25}$  1.4828, M. R. 28.27 (calcd. 27.24); p-nitrophenylhydrazone, m.  $198^\circ$ . IV was catalytically reduced in the presence of PdO, on active charcoal to cyclopentylformaldehyde (VI),  $b_m$   $34^\circ$ ,  $b_m$   $136^\circ$ ,  $d_4^{25}$  0.930,  $n_D^{25}$  1.4390, M. R. 27.72 (calcd. 27.72) (C. A. 9, 2067), semicarbazone, m.  $124^\circ$ . Oxidation of IV with  $\text{Ag}_2\text{O}$  produced cyclopentenylcarboxylic acid (VII), m.  $121^\circ$ , brominated to the 1,2-dibromocyclopentyl acid, m.  $133^\circ$ , and oxidized by  $\text{KMnO}_4$  to glutaric acid, m.  $97^\circ$ , thus establishing the position of the double linkage in IV and VII. By the action of  $\text{RMgBr}$  (R = Me, Et or Pr) on IV were formed the corresponding cyclopentyl-1-alkylcarbinols,  $\text{C}_7\text{H}_{12}\text{O}$ ,  $b_m$   $165-8^\circ$ ,  $b_m$   $67-8^\circ$ ,  $d_4^{25}$  0.939,  $n_D^{25}$  1.4710, M. R. 33.34 (calcd. 33.38);  $\text{C}_8\text{H}_{14}\text{O}$ ,  $b_m$   $179-80^\circ$ ,  $b_m$   $78-9^\circ$ ,  $d_4^{25}$  0.982,  $n_D^{25}$  1.4750, M. R. 38.05 (calcd. 38.00), and  $\text{C}_9\text{H}_{16}\text{O}$ ,  $b_m$   $197-8^\circ$ ,  $b_m$   $92-4^\circ$ ,  $d_4^{25}$  0.920,  $n_D^{25}$  1.4710, M. R. 42.55 (calcd. 42.62). Dehydration of these alcs. by passage over  $\text{Al}_2\text{O}_3$  supported on pumice and heated to  $320^\circ$  gave the erythronic hydrocarbons,

$\text{CH}_2\text{:(CH)}_2\text{CH:CCH:CHR}$  (R = H, Me or Et): 1-vinylcyclopentene,  $b_m$   $114-15^\circ$ ,  $d_4^{25}$  0.824,  $n_D^{25}$  1.4870, M. R. 32.78 (calcd. 31.99) M. E. 1.39; 1-propenylcyclopentene,  $b_m$   $142-4^\circ$ ,  $d_4^{25}$  0.885,  $n_D^{25}$  1.4865, M. R. 37.18 (calcd. 36.01) M. E. 1.17, and (1-cyclopentenylethyl)-ethylene,  $b_m$   $59-62^\circ$ ,  $d_4^{25}$  0.833,  $n_D^{25}$  1.4850, M. R. 41.67 (calcd. 40.62) M. E. 1.35. Examn. of the vinylcyclopentene by a study of its Raman spectra showed that it contained not more than 1% of impurities consisting of ethylcyclopentene and ethylidenecyclopentene. The products isolated from the decompn. of III over Cu result from the superposition of the effects of the temp. and the catalytic action of the metal. In addn. to the formation of acrolein and EtCHO, IV and  $\text{H}_2\text{O}$ , together with un-

altered III mixed with a little of V, the catalyst provokes the formation of bipropionyl (VIII),  $\alpha$ -methylcyclopentane-1,2-dione (IX), and  $\text{EtCH}(\text{OH})\text{COEt}$  (X),  $b_p$  57–8°,  $d_4^{25}$  0.956,  $n_D^{25}$  1.4340, M. R. 31.59 (calcd. 31.44) (osazone, m. 161°). The passage of III over Cu at 300–20° gave 28% of VIII,  $b_p$  130°,  $b_m$  32°,  $d_4^{25}$  0.941,  $n_D^{25}$  1.4180, M. R. 30.19 (calcd. 30.10) (semicarbazone, m. 270°). Agitation of VIII with aq.  $\alpha$ -( $\text{H}_2\text{N}$ ) $_2\text{C}_2\text{H}_4\cdot 2\text{HCl}$  and  $\text{Na}_2\text{CO}_3$  yielded the *diethylquinazoline*, m. 50.5°. Oxidation in the cold with  $\text{H}_2\text{O}_2$  converted VIII into  $\text{EtCO}_2\text{H}$ . The dehydrogenation of III over Cu at 280° yielded 20% of IX, m. 104.5° (crystg. from  $\text{H}_2\text{O}$  as  $\text{C}_8\text{H}_{10}\text{O}_2\cdot 2\text{H}_2\text{O}$ , m. 78–9°); *dioxime*, m. 148–9° (decompn.); *dihydrazone*, m. 143°, *semicarbazone*, m. about 280° (Maquenne block); *quinazoline deriv.*, m. 73–3.5°; *monophenylurethan*, m. 137–8°, *disbromide*, m. 163–4°. [ $\text{MeCH:CHCH}(\text{OH})$ ] $_2$  (XI), prep'd. in 60% yields by the Zn-Cu reduction in AcOH of crotonaldehyde (Charon, *Ann.* 17, 217 (1899)), was decomp'd. by the passage of 50 g. over  $\text{Al}_2\text{O}_3$  at 320° and yielded 6 g. of a mixt. of crotonaldehyde and  $\text{H}_2\text{O}$ ; 18 g. of the *cis* and *trans* isomers of 2,3-dimethyl-1-cyclopentenylaldehydes (XII); 5 g. of the dimer of crotonaldehyde and 8 g. of XI. The mixt. XII,  $b_p$  64–72° (semicarbazone, m. 185–7° (C. A. 18, 1988)), on oxidation with  $\text{AgNO}_3$  in NaOH (C. A. 3, 2677) gave a mixt. of the corresponding acids,  $\text{C}_8\text{H}_{10}\text{O}_4$ ,  $b_p$  105–7°, from which the *trans* form, m. 42° (dibromide, m. 160–1°), crystd. Decompn. of 110 g. of XI over Cu at 280° gave 10 g. of a mixt. of crotonaldehyde and  $\text{H}_2\text{O}$ , 25 g. of dimethylhexatrienes, b. 135–48°, 10 g. of bibutylryl, 8 g. of XII, 16 g. of  $\alpha$ -ethyl- $\beta$ -methylcyclopentanediene, b. 106–8°, and 12 g. of XI. The mixt. b. 135–48° was fractionated into 2 portions, b. 137–43° and 144–8°. The latter gave a solid hydrocarbon, 1,6-dimethyl-1,3,5-hexatriene, m. 52.5°,  $b_p$  43°,  $b_m$  147–8°,  $d_4^{25}$  0.7961,  $n_D^{25}$  1.5131, M. R. 40.50 (calcd. 37.74) M. E. 2.76; *hexabromide*, m. 122°. On account of its higher b. p. and m. p. the structure *trans-trans* has been allotted to this modification. The liquid hydrocarbon,  $b_p$  137–43°,  $d_4^{25}$  0.794,  $n_D^{25}$  1.4708, absorbing 6 atoms of Br, is contaminated with its isomer. It may have the *trans-cis-trans* configuration. The essential portion of the fraction  $b_p$  57–60° was bibutylryl,  $b_p$  57–8°,  $d_4^{25}$  0.929, recognized by its greenish yellow vapor and identified through the oxime, m. 186–7°. On agitation with 10% KOH and redistn., the portion  $b_p$  106–8° gave the dienolic modification of  $\alpha$ -ethyl- $\beta$ -methylcyclopentane-*o*-dione, m. 24°,  $b_p$  107–8°,  $d_4^{25}$  1.036,  $n_D^{25}$  1.5042, M. R. 40.01 (calcd. 39.06). The properties of the dione are parallel in every respect to those of the lower homolog (IX) isolated in the decompn. of III. The keto form yields a *dioxime*, m. 150–2°, and a *diphenylhydrazone*, m. 132°. The enolic modification is indicated by the violet color with  $\text{FeCl}_3$ . It gives a *disbromide*, m. 142°, which on heating with powd. Zn in alc. reverts to the diketone, m. 24°; osazone, m. 135°. Thermal decompn. of 60 g. X,  $b_p$  61–2°, prep'd. by the method of Bouveault and Locquin (*Bull. soc. chim.* 35, 637 (1906)), over  $\text{Al}_2\text{O}_3$  at 320° yielded 3 g. of  $\text{EtCHO}$ , 20 g. of a mixt. of  $\text{H}_2\text{O}$  and  $(\text{EtCO})_2$ , and 25 g. of unchanged material. The sapon. with 2% MeOH.HCl of  $\text{AcCH}_2\text{OAc}$ , prep'd. from  $\text{ClCH}_2\text{Ac}$  by heating with AcOH,  $\text{Ac}_2\text{O}$  and AcONa, gave  $\text{AcCH}_2\text{OH}$ , b. 47–9°. The decompn. of 50 g. of the  $\alpha$ -ketol over  $\text{Al}_2\text{O}_3$  at 325° yielded 1 g. of AcH and 5 g. of Ac. Decompn. over Cu gave similar results except that the Ac was contaminated with AcCHO, resulting from the direct dehydrogenation of the acetal, provoked by the catalytic action of the Cu. Glycidol (XIV) (C. A. 24, 2428) gives 2 fundamental reactions when decomp'd. over  $\text{Al}_2\text{O}_3$ ; a dehydration producing  $\text{CH}_2\text{:CHCHO}$  and an isomerization into acetal which, in turn, is cleaved into AcH, Ac, CO and  $\text{CO}_2$ . Treatment of 80 g. of XIV with  $\text{Al}_2\text{O}_3$  at 320° yielded 1 g. of AcH, 8 g. of  $\text{CH}_2\text{:CHCHO}$ , 5 g. of Ac, 8 g. of acetal, 25 g. of unaltered XIV and 5 g. of glycerol. Identical results were obtained by decompn. over Cu at 280°. The thermal decompn. of 80 g. of  $\text{AcCO}_2\text{H}$  gave 6 g. of AcH and 5 g. of a mixt. of Ac and aq. AcCHO formed by the interaction of the intermediary ions Ac and H. The AcCHO formed a mixt. of mono- and dimethyl-

glyoxime, m. 130–60° (C. A. 9, 1328), and evidently resulted from the reduction of  $\text{AcCO}_2\text{H}$  favored by the presence of Cu. The residue in the distn. flask solidified on cooling to a faintly colored mass of methylsuccinic acid (XV), m. 112.5°, formed by an addolization of 2 mols. of  $\text{AcCO}_2\text{H}$  to the diacid,  $\text{MeC}(\text{OH})(\text{CO}_2\text{H})\text{CH}_2\text{COCO}_2\text{H}$ , which is transformed to XV by the loss of 1 mol. of  $\text{CO}_2$  and rearrangement. C. R. Addinall

Decamethylene glycol. R. H. F. Manske. *Org. Syntheses* XIV, 20 2 (1934).—Reduction of  $(\text{CH}_2)_{10}(\text{CO}_2\text{Et})_2$  with EtOH and Na gives 73–6% of  $(\text{CH}_2)_{10}(\text{OH})_2$ ; various other glycols have been prep'd. by the same method in yields of 57–88%. C. J. West

$\beta$ -Diethylaminosthyl alcohol. W. H. Hartman. *Org. Syntheses* XIV, 28–9 (1934).— $\text{Et}_2\text{NH}$  and  $\text{ClCH}_2\text{CH}_2\text{OH}$  with NaOH give 68–70% of  $\text{Et}_2\text{NCH}_2\text{CH}_2\text{OH}$ . C. J. West

Syntheses in the homoneurine series. III. Homoneurines of the quinine alkaloids as qualitative reagents for the iodide ion. Eugen Macovski, Alexandru Silberg, Eugen Ramontianu and Elieue Crăciunescu. *J. prakt. Chem.* 139, 254–60 (1934); cf. C. A. 27, 956.—Quinine and allyl bromide in EtOH, heated at 100° for 30–45 min., give *quinine dibromoallylate* (*quinine dihomoneurine bromide*) (I), crystals with 3 mols.  $\text{H}_2\text{O}$ , m. 145–7° (decompn.); the *iodide* crystallizes with 3 mols.  $\text{H}_2\text{O}$  and m. 140° (decompn.). I in a 5–7% aq. soln. gives a qual. test for I ion in a diln. of N/20; no ppt. is obtained with concd. aq. KCl, KBr and KCN;  $\text{K}_2\text{Fe}(\text{CN})_6$  gives a red soln. but no ppt.;  $\text{K}_2\text{Fe}(\text{CN})_6$  gives a yellow ppt. which at once dissolves; KCNS gives a difficultly sol. ppt. *Cinchonine-dihomoneurine bromide*, m. 232° (decompn.); this will detect I ion in a concn. of N/40, giving the yellow iodide, m. 247–50°. Benzoylcinchonine monomethyl bromide will detect the I ion in a diln. of N/400. C. J. West

Glycerol  $\alpha,\gamma$ -dibromohydrin. Geza Braun. *Org. Syntheses* XIV, 42–4 (1934).—Details are given of the prep'n. of  $\text{CH}(\text{OH})(\text{CH}_2\text{Br})_2$  from  $\text{C}_3\text{H}_7(\text{OH})_3$ , Br and red P, the yield being 52–4%. C. J. West

Glycine ethyl ester hydrochloride. C. S. Marvel. *Org. Syntheses* XIV, 46–7 (1934).— $\text{CH}_3\text{NCH}_2\text{CN}$  and  $\text{EtOH}$  with HCl give 89–91% of  $\text{EtO}_2\text{CCH}_2\text{NH}_2\cdot\text{HCl}$ . C. J. W.

*di*-Methionine. G. Barger and T. E. Weichselbaum. *Org. Syntheses* XIV, 58–60 (1934).—Details are given of the prep'n. of Et Na phthalimidomalonate, Et 1-methylthiol-3-phthalimidopropane-3,3-dicarboxylate, the free acid and methionine, the yields being 82–5, 70–81, 95.5–8 and 84–5%, resp. The overall yield, based on the  $\text{MeSC}_2\text{H}_5\text{Cl}$  used, is 54–60%. C. J. West

Canavanine, an amino acid. IV. The constitution of cananine, a product of enzymic hydrolysis of canavanine. Matsuno-uke Kitagawa and Shinichi Mononobe. *J. Agr. Chem. Soc. Japan* 9, 845–58 (1933); cf. C. A. 28, 1021°.—Canaline (I) on reduction with  $\text{H}_2$  and Pt black in AcOH or MeOH absorbed 2 atoms of H and set free 1 mol. of  $\text{NH}_3$ .  $\gamma$ -Hydroxy- $\alpha$ -aminobutyric acid, m. 201–2° (decompn.), was isolated from the product. Canavanine and dibenzoylcanaline (II) were not catalytically reduced. Acetylation of II in acid or neutral soln. gave dibenzoylcanaline anhydride, m. 163–4°. No OH group could be found in I. I warmed with mineral acid did not give a lactone. The OH group may be introduced in the  $\gamma$ -position by catalytic reduction. The formula  $\text{CH}_3(\text{ONH}_2)\text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{H}$  is assigned to I. Canavanine is not toxic to mice. Y. Kihara

Ethyl acetosuccinate. Homer Adkins, Neville Ishell and Bruno Wojcik. *Org. Syntheses* XIV, 38–9 (1934).—The Na comp'd. of  $\text{AcCH}_2\text{CO}_2\text{Et}$  and  $\text{ClCH}_2\text{CO}_2\text{Et}$  gives 56–62% of Et acetosuccinate; similarly Et  $\alpha$ -acetoglutarate results in 52% yield. C. J. West

Polarimetric study of complex ferri-tartrates. Pariselle and Delaol. *Compt. rend.* 198, 83–5 (1934).—Polarimetric rotation curves for solns. of varying concns. of tartaric acid and  $\text{Fe}(\text{NO}_3)_3$  showed a max corresponding to the formation of  $[\text{C}_4\text{H}_4\text{O}_6\text{Fe}]_2$ . On neutralization, a yellow ppt. insol. in  $\text{H}_2\text{O}$ , but sol. in acids and hydroxides, was obtained. With equimol. solns. of tartaric acid and  $\text{Fe}(\text{NO}_3)_3$  and with varying concns. of NaOH, the



same type of curve was obtained, the min. corresponding to the Na ferritartarate and the max. to the free acid. With 1 mole of Fe for 1, 2, 3— $n$  moles of tartaric acid and with varying concns. of NaOH, the 1st max. corresponds to the ferritartaric acid as before, the min. to the complex  $[\text{C}_4\text{H}_2\text{O}_6\text{Na}]_n\text{Fe}$  (I); this is formed when for  $n$  moles of acid per mole of nitrate,  $(n+3)$  moles of NaOH are used; a 2nd max. is obtained for  $(2n+3)$  moles of NaOH corresponding to  $[\text{C}_4\text{H}_2\text{O}_6\text{Na}]_n\text{Fe}$  (II). For Na tartrate and  $\text{Fe}(\text{NO}_3)_3$  solns. there is mutarotation. The curve has a max. at 1 mole Na tartrate, 1 Fe, preceded by a clear break at 3 moles of tartrate, 2 Fe; a min. for 3 tartrate and 1 Fe, and a 2nd max. at 9 tartrate, 1 Fe. Mutarotation is explained by an equil. between I and II for 3–9 moles, and an equil. between I and the ferritartaric acid for values between 1.5–3 moles of tartrate. Below 1.5 mutarotation no longer occurs, because only the ferritartaric acid is formed.

Louis Waldbauer

**Some tartaromanganic salts.** G. Lejeune. *Compt. rend.* 197, 1650–2 (1933).—On soln. of 7 g. of Job's mangano-tartrate,  $[(\text{C}_4\text{H}_2\text{O}_6)_2\text{MnNa}]\text{Na} \cdot 17\text{H}_2\text{O}$  (cf. C. A. 1, 1930), in tartaric acid soln. (10 g. in 20 cc. water) and filtration of the bitartrate ppt. 2 g. of red crystals is obtained from the filtrate, corresponding to  $[\text{C}_4\text{H}_2\text{O}_6\text{Mn}(\text{OH})]\text{H}_2\text{H}_2\text{O}$ . The same compd. can be prepd. by soln. of  $\text{MnO}_2$  in concd. tartaric acid. On soln. of  $\text{MnO}_2$  in Na bitartrate soln.  $[\text{C}_4\text{H}_2\text{O}_6\text{Mn}(\text{OH})]\text{NaH}_4\text{H}_2\text{O}$  is obtained.

I. J. Patton

**Pyrophosphate ester of citric acid.** Eugen Wertyporoch and Hermann Kiekenberg. *Biochem. Z.* 268, 8–10 (1934).—Mol. quantities of the Ba salt of diethylpyrophosphoric acid and citric acid are heated 3–4 hrs. A yellow-brown, thick oil is obtained:  $(\text{HO}_2\text{CCH}_2)_2\text{C}(\text{CO}_2\text{H})\text{OP}(\text{O})(\text{OH})\text{OP}(\text{O})(\text{OEt})_2$ . The oil is freed from the excess of reagents by shaking out first with  $\text{CHCl}_3$ , then with  $\text{Et}_2\text{O}$ . The citric acid pyrophosphate ester is crystd. as the brucine salt which m. 142–3°.

S. Morgulis

**Reaction of aliphatic imino ethers with hydrazine.** Wilfrid Oberhummer. *Monatsh.* 63, 285–300 (1933).— $\text{MeC}(\text{NH})\text{OEt} \cdot \text{HCl}$  (I) (30 g.), added in several portions during 5 min. to 8 g.  $\text{N}_2\text{H}_4$  in 150–200 cc.  $\text{EtOH}$  at  $-10^\circ$  to  $-12^\circ$  and stirred for 1 hr., gives 12–14 g. (50%) of *acetamidrasone-HCl* (II),  $\text{MeC}(\text{NH})\text{NHNH}_2 \cdot \text{HCl}$ , rose, m. 131–2°; the free base is stable in cold  $\text{H}_2\text{O}$  or abs.  $\text{EtOH}$  but warming with dil. alkali gives  $\text{AcOH}$ ,  $\text{N}_2\text{H}_4$ , and  $\text{NH}_3$ . I (1 mol.) and 2 mols.  $\text{N}_2\text{H}_4$  in abs.  $\text{EtOH}$  at  $-3^\circ$  to  $1^\circ$  give *acetylhydrazidine-HCl* (III),  $\text{MeC}(\text{NH})\text{NHNH}_2 \cdot \text{NHNH}_2 \cdot \text{HCl}$ , rose, decomp. 140–50°; *picrate*, decomp. 126–8°; *chloroplatinate*, 2III.PtCl<sub>4</sub>; *sulfate*, m. 192–3°; hydrolysis of III gives  $\text{AcOH}$  and  $\text{N}_2\text{H}_4$ . The free base gives ppts. with several metallic salts. Dry distn. of III gives 3,5-dimethyl-1-amino-1,2,4-triazole (IV) and  $\text{N}_2\text{H}_4 \cdot \text{HCl}$ . When 60 g. I in 400 cc.  $\text{EtOH}$  is treated with 15 g.  $\text{N}_2\text{H}_4$  in 50 cc.  $\text{EtOH}$  during 2.5 hrs., there results a good yield of IV and a small amt. of *Et acetate asine*,  $(\text{N}:\text{CMeOEt})_2$ , m. 28°. II and  $\text{EtNO}_2$  in abs.  $\text{EtOH}$  give 5-methyltetrazole, m. 145–6°. II and  $\text{HNO}_3$  in acid soln. give  $\text{N}_2\text{H}_4$ ,  $\text{NH}_4\text{Cl}$  and  $\text{AcOH}$ ; III gives  $\text{N}_2\text{H}_4$ ,  $\text{N}_2\text{H}_4 \cdot \text{HCl}$ , etc.

C. J. West

**Action of ammonia and amines on the esters of unsaturated acids.** III. Action of ammonia, methylamine and diethylamine on methyl acrylate. Karl Morsch. *Monatsh.* 63, 220–35 (1933); cf. C. A. 27, 713.— $\text{CH}_2=\text{CHCO}_2\text{Me}$  (I) and 10%  $\text{MeOH-NH}_3$ , allowed to stand 1 day at room temp., give 23% of *di-Me  $\beta,\beta'$ -iminodipropionate* (II),  $\text{HN}(\text{CH}_2\text{CH}_2\text{CO}_2\text{Me})_2$ , b<sub>10</sub>, 132.5° (*HCl salt*, m. 136.5–7.5°), and 48% of *tri-Me  $\beta,\beta',\beta''$ -tripropionatamine* (III),  $\text{N}(\text{CH}_2\text{CH}_2\text{CO}_2\text{Me})_3$ , b<sub>9</sub>, 171–4° (*HCl salt*, m. 93°; *chloroplatinate*, m. 172.5° (decompn.)). I and 20%  $\text{MeOH-NH}_3$ , allowed to stand 3 days, give 2% II, 5% III, 26% of the *diamide* (IV) of II, m. 144.5–5.8° (*chloroplatinate*, m. 200.5° (decompn.)), 4% of the *triamide* (V) of III, m. 185.5–6° (*chloroplatinate*, m. 196.5° (decompn.)), and 3% of the *monoamide* from III, whose *chloroplatinate* m. 178.8.5° (decompn.). I and satd.  $\text{MeOH-NH}_3$  (at room temp.), allowed to stand 14 days at room temp., give 39.5% IV and 36.5% V; after standing

5 months the yield of IV was 35% and of V 44%. I in 10%  $\text{MeOH-NH}_3$ , heated 8 hrs. at  $100^\circ$ , gives 3%  $\text{H}_2\text{NCH}_2\text{CH}_2\text{CO}_2\text{Me}$  (VI) and 6.5% of II; in  $\text{EtOH}$  the yields are 8% VI, 54% II and 5% III. With about an equal vol. of liquid  $\text{NH}_3$  at room temp., the following yields are obtained: 100 hrs., 2.5% VI, 42% II, 15.5% III; 14 days, 35% IV and 13% V; 5 months, 33% IV and 56% V. I and 10%  $\text{MeOH-MeNH}_2$  (0.55 mol.) for 2 days at room temp. give 22% *Me  $\beta$ -methylaminopropionate* (VII), b<sub>11</sub>, 50° (*HCl salt*, liquefies in the air), and 70% of *di-Me  $\beta,\beta'$ -methyliminodipropionate* (VIII), b<sub>9</sub>, 123–4° (*HCl salt*, m. 120.5–1.5°); 1.1 mols.  $\text{MeNH}_2$  for 2 days, give 24% VII, 35% VIII and 5.5%  *$\beta$ -methylaminopropionic methylamide* (IX), b<sub>9</sub>, 131–2° (*HCl salt*, m. 134.5°); 4 mols.  $\text{MeNH}_2$  for 4 days give 64% IX. With 1.1 mols.  $\text{MeNH}_2$  in abs.  $\text{EtOH}$  (2 days) there results 39.5% VII, 32% VIII and 4% IX. With liquid  $\text{MeNH}_2$  the following results were obtained on heating 8 hrs. at  $60-5^\circ$ : 0.55 mol., 5% VII, 89.5% VIII; 1.1 mols., 31% VII, 36.5% VIII and 9% IX; 4 mols., 71.5% IX. I and  $\text{Et}_3\text{NH}$ , allowed to stand several days at room temp. or refluxed 1 hr., give  $\text{Et}_3\text{NCH}_2\text{CH}_2\text{CO}_2\text{Me}$ , b<sub>9</sub>, 66.5°; heating I with 3 mols.  $\text{Et}_3\text{NH}$  24 hrs. at  $190-200^\circ$  gives  *$\beta$ -diethylaminopropionic diethylamide*, b<sub>10</sub>, 123.5–4.5°. C. J. West

**$\delta$ -Ethoxybutylurea.** E. Wertheim. *J. Am. Chem. Soc.* 56, 735–6 (1934).—Details are given of the prepn of  $\text{EtOC}_4\text{H}_8\text{CN}$  and of  $\text{EtOC}_4\text{H}_8\text{NH}_2$ , which reacts with  $\text{KCNO}$  to give  *$\delta$ -ethoxybutylurea*, m. 68–9°. This compd. is faintly bitter, showing that the sweet taste of dulcin depends upon the presence of the  $\text{C}_6\text{H}_5$  ring;  $\text{HOC}_6\text{H}_4\text{NHCONH}_2$  is also not sweet, while *o*- $\text{HOC}_6\text{H}_4\text{NHCONH}_2$  is very sweet.

C. J. West

**Synthesis of ethyl N-3-methyl-5-benzalhydantoin-N-1-acetate and certain of its derivatives.** Anne Litzinger. *J. Am. Chem. Soc.* 56, 673–7 (1934).—The Na compd. of methylbenzalhydantoin and  $\text{ClCH}_2\text{CO}_2\text{Et}$  in  $\text{EtOH}$ , heated until the soln. is neutral, give *Et N-3-methyl-5-benzalhydantoin-N-1-acetate* (I), m. 50.5–1.5°; this rearranges to the *isomer*, m. 121–2° (II), by treating the hot  $\text{EtOH}$  soln. with dry  $\text{HCl}$ ; 1 g. II is sol. in 5 cc. hot and 60 cc. cold  $\text{EtOH}$  or 4 cc. hot  $\text{CCl}_4$ . The *Me ester* m. 115.5–6°; 1 g. dissolves in 2 cc. hot and 11 cc. cold abs.  $\text{MeOH}$  and in 8 cc. hot and 33 cc. cold 90%  $\text{MeOH}$ . Hydrolysis of I gives a *Na salt*, decomp. 294–5° (1 g. is sol. in 25 cc. hot  $\text{EtOH}$ ), of *N-3-methyl-5-benzalhydantoin N-1-acetic acid* (III), m. 160–1°; 1 g. dissolves in 110 cc. hot and 1000 cc. cold  $\text{H}_2\text{O}$ . II gives a *Na salt*, decomp. 299–300°; a *K salt*, decomp. 235–7°, crystals with 1 mol.  $\text{EtOH}$ ; and a *Pb salt*, m. 241–2° (decompn.). (1 g. is sol. in 210 cc. hot and 400 cc. cold  $\text{H}_2\text{O}$ ) of the *isomer* of III, m. 222–3°, 1 g. of which dissolves in 1100 cc. hot and 2200 cc. cold  $\text{H}_2\text{O}$ . Reduction of either acid gives the *benzyl deriv.*, m. 150–1° (1 g. dissolves in 8 cc. cold  $\text{EtOH}$  and in 13 cc. hot and 100 cc. cold  $\text{H}_2\text{O}$ ); *Et ester*, m. 49.5–51°; *Na salt*, crystals with 2 mols.  $\text{EtOH}$ , decomp. 275–6° (1 g. is sol. in 2.5 cc. cold  $\text{H}_2\text{O}$  and 24 cc. cold abs.  $\text{EtOH}$ ). Both I and II add  $\text{Br}$  and give the same *product*,  $\text{C}_{15}\text{H}_{15}\text{O}_4\text{N}_2\text{Br} \cdot \text{EtOH}$ , m. 113–3.5°.

C. J. West

**Optically active allantoin.** R. Fosse, P.-E. Thomas and P. de Graeve. *Compt. rend.* 198, 689–93 (1934)

Allantoinase of soy bean acts on allantoin to give a pure *cryst. l-rotatory form*,  $[\alpha]_D^{20} -3.24^\circ$ . Rachel Brown

**Mutarotation of  $\beta$ -D-ribose and  $\beta$ -l-ribose.** Francis P. Phelps, Horace S. Isbel and Ward Pigman. *J. Am. Chem. Soc.* 56, 747–8 (1934).—At  $1^\circ$  2.0236 g. of *D*-ribose in 45.223 g.  $\text{H}_2\text{O}$  gave 1.5 min. after soln.  $[\alpha]_D^{20} -23.1^\circ$ , 5 min.  $-21.3^\circ$ , 10 min.  $-19.5^\circ$ , 20 min.  $-18.8^\circ$ , 30 min.  $-19.1^\circ$ , 60 min.  $-21.2^\circ$ , 120 min.  $-23.1^\circ$ , 300 min.  $-23.7^\circ$ ; 1.9941 g. of *l*-ribose in 45.223 g.  $\text{H}_2\text{O}$ : 2 min.  $23.2^\circ$ , 5 min.  $21.5^\circ$ , 10 min.  $19.9^\circ$ , 20 min.  $18.7^\circ$ , 30 min.  $19.4^\circ$ , 60 min.  $21.5^\circ$ , 120 min.  $23.2^\circ$ , 300 min.  $24.3^\circ$ , 24 hrs.  $24^\circ$ . Cryst. *D*- and *l*-ribose in  $\text{H}_2\text{O}$  establish equil. with at least 3 isomers, 1 of the isomers being less *l-rotatory* and the other more *l-rotatory* than the *cryst. D* sugar. The *cryst. sugar* is tentatively designated as  *$\beta$ -D-ribose* and its mirror image as  *$\beta$ -l-ribose*.

C. J. West

**Reactions of carbohydrates in liquid ammonia.** Preliminary paper. Irving E. Muskat. *J. Am. Chem. Soc.*



56, 693-5(1934).—All the ordinary sugars, their methylated, acetylated and acetone derivs. are quite sol. in liquid  $\text{NH}_3$ ; the polysaccharides are also quite sol. With the exception of the free sugars, liquid  $\text{NH}_3$  is without effect on these carbohydrates and their derivs. The free sugars react in liquid  $\text{NH}_3$  to give the corresponding amines; thus glucose gives quant. 1-aminoglucose. The alkali metal salts of carbohydrates may be prep'd. by treating the soln. in liquid  $\text{NH}_3$  with K or K in  $\text{NH}_3$  with the sugar in  $\text{NH}_3$ ;  $\text{KNH}_2$  may also be used. These salts react with alkyl halides;  $\alpha$ -Me mannoside gives 92% of the tetra-Me deriv.; monoacetoneglucose gives 95% of the tri-Me deriv.; the diacetone deriv. gives 96% of the 3-Me deriv.; sucrose yields the octa-Me deriv. Certain of the aryl halides react with these K salts but no details are given here. The dry salt (free from  $\text{NH}_3$ ) in a suitable solvent reacts with acyl halides; thus,  $\alpha$ -Me mannoside gives almost quant. the tetra-Ac deriv. These K salts also react with  $\text{POCl}_3$ ,  $\text{SOCl}_2$ , and  $\text{SCl}_2$  to give the corresponding esters. C. J. West

**Mutarotation of  $\alpha$ -D-glucose in deuterium water.** Eugene Pasquy. *J. Am. Chem. Soc.* 56, 745 6(1934); *C. A.* 28, 744<sup>9</sup>.—The velocity of mutarotation of  $\alpha$ -D-glucose in pure  $\text{H}_2\text{O}$  at  $20^\circ$  is identical with that in  $\text{H}_2\text{O}$  at  $10^\circ$ ; the effect of the  $\text{H}_2\text{O}$  is equiv. to a drop of  $10^\circ$  in the temp. In  $\text{H}_2\text{O}$   $[\alpha]_D^{20}$  is 52.14<sup>9</sup> for the equil. mixt. as compared with 52.06<sup>9</sup> in  $\text{H}_2\text{O}$ . Evidently, the replacement of the displaceable H atom of glucose by  $\text{H}^2$  does not change the value of the sp rotation for the wave length of Na light. C. J. West

**Action of pyridine-acetic anhydride on aldose oximes.** Production of hexaacetylaldomannose oxime. Venancio Dulofeu, Pedro Cattaneo and German Mendivilzina. *Chem. Soc.* 1934, 147-8. Two reagents were used, I contg. 6.3 cc.  $\text{C}_5\text{H}_5\text{N}$  and 4.2 cc.  $\text{Ac}_2\text{O}$  and II contg. 2 cc.  $\text{C}_5\text{H}_5\text{N}$  and 5 cc.  $\text{Ac}_2\text{O}$ . With both reagents, even at  $0^\circ$ , the only product obtained from arabinose, xylose and thiamine oximes was the acetylated nitrile; evidently the oximes react in the open-chain form. Glucose oxime and I give the hexa-Ac deriv. (III), m. 113-5<sup>9</sup>, in decreasing yields as the temp. is increased from  $0^\circ$  to  $90^\circ$ ; at  $100^\circ$  and above the product is pentaacetylglucononitrile (IV); with II at  $0^\circ$  and  $30^\circ$  III is formed; at  $60^\circ$  both III and IV result and above  $70^\circ$  only IV was obtained. Mannose oxime (V) gives a mixt. of acetylated oxime and nitrile with both I and II; above  $30^\circ$  only nitrile was formed. V (5 g.) in 31.5 cc.  $\text{C}_5\text{H}_5\text{N}$  and 21 cc.  $\text{Ac}_2\text{O}$  at  $0^\circ$  for 8 days gives 6.7 g. hexaacetylaldomannose oxime, m. 94<sup>9</sup>,  $[\alpha]_D^{20}$  8.3<sup>9</sup>; heating 10 min. at  $130^\circ$  gives the nitrile, m. 93<sup>9</sup>. C. J. West

**Crystallization of the osazones and hydrazones as a means of identification of various sugars.** M. Wagenaar. *Chem. Weekblad* 71, 229 42(1934).—A qual. study of the formation of hydrazones and osazones from a no. of pentoses and hexoses with  $\text{PhN}_2\text{H}_2$ ,  $\text{PhNMeNH}_2$ ,  $\text{Ph}_2\text{N-NH}$ ,  $\text{O}_2\text{NC}_6\text{H}_4\text{N}_2\text{H}_2$  and  $p\text{-BrC}_6\text{H}_4\text{N}_2\text{H}_2$ . The reagent recommended is a soln. of the hydrazine (0.15-0.5 g.) in 2 cc. of glycerol and 1 cc. of glacial  $\text{AcOH}$ . In some expts. a small quantity of  $\text{Na}_2\text{SO}_3$  was added, or another acid (lactic, citric, oleic) used in place of  $\text{AcOH}$ . A. W. Dox

**Conversion of 2-p-toluenesulfonyl- $\beta$ -methylglucoside into methylepiglucoamine.** E. W. Bodycote, W. N. Haworth and E. L. Hirst. *J. Chem. Soc.* 1934, 151-4.—This work was undertaken with the intention of effecting a synthesis of glucosamine by direct substitution of an  $\text{NH}_2$  group into a suitable glucose deriv. 3,4,6-Triacetyl- $\beta$ -methylglucoside and  $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Cl}$  give the 2-p-toluenesulfonyl deriv. (I), m. 157<sup>9</sup>,  $[\alpha]_D^{20}$  1.5<sup>9</sup> ( $\text{CHCl}_3$ ,  $c$  2); hydrolysis gives 2-p-toluenesulfonyl- $\beta$ -methylglucoside (II). Either I or II in  $\text{MeOH}$ , satd. with  $\text{NH}_3$  at  $0^\circ$  and heated in a sealed tube at  $110^\circ$  for 18 hrs., gives methylepiglucoamine-HCl (III), m. 210 12<sup>9</sup>,  $[\alpha]_D^{20}$  -145<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  0.9); the yield from I is 40%. I and  $\text{MeOH-NH}_3$  at  $15^\circ$  give after 72 hrs. 75% of II. Hydrolysis of III with boiling  $\text{HCl}$  of any concn. greater than 1% gives 80% of methylepiglucoamine-HCl, m. 228<sup>9</sup> (decompn.),  $[\alpha]_D^{20}$  184<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  0.7); boiling 8 hrs. with 0.5%  $\text{HCl}$  gives epiglucoamine, whose phenyllosazone m. 225 7<sup>9</sup>

(decompn.). Deamination of III with  $\text{AgNO}_3$  in  $\text{H}_2\text{O}$  gives a sirup which does not reduce Fehling soln. until after hydrolysis; the hydrolysis product had  $[\alpha]_D^{20}$  -100<sup>9</sup> (approx.) in  $\text{H}_2\text{O}$ . The deamination product (mainly Me hexoside) gives 40% of a tetra-Ac deriv.,  $[\alpha]_D^{20}$  -23<sup>9</sup> ( $\text{CHCl}_3$ ); the tetra-Me deriv. b.p. 105<sup>9</sup>,  $n_D^{20}$  1.4588,  $[\alpha]_D^{20}$  -47<sup>9</sup> ( $\text{CHCl}_3$ ,  $c$  1.8), -32<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  1.7). The deamination product may be  $\beta$ -Me altroside. C. J. W.

**Isolation of a crystalline dimethylanhydromethylhexoside. Characterization of 3,4,6-trimethylglucose.** W. N. Haworth, E. L. Hirst and L. Punizzon. *J. Chem. Soc.* 1934, 154-7.—2-p-Toluenesulfonyl- $\beta$ -methylglucoside with  $\text{MeI}$  and  $\text{Ag}_2\text{O}$  in  $\text{MeOH}$  gives 70-5% of 2-p-toluenesulfonyl-3,4,6-trimethyl- $\beta$ -methylglucoside, m. 67<sup>9</sup>,  $[\alpha]_D^{20}$  -10<sup>9</sup> ( $\text{CHCl}_3$ ,  $c$  1.4); this is unchanged by heating with 18%  $\text{MeOH-NH}_3$  at  $120^\circ$  for 76 hrs.; boiling with 4%  $\text{MeONa-MeOH}$  for 8 hrs. gives 3,4,6-trimethyl- $\beta$ -methylglucoside, b.p. 95<sup>9</sup>, m. 51<sup>9</sup>,  $[\alpha]_D^{20}$  -20<sup>9</sup> ( $\text{CHCl}_3$ ,  $c$  1.1); hydrolysis with 5%  $\text{HCl}$  gives 3,4,6-trimethylglucose,  $[\alpha]_D^{20}$  71<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  2). Oxidation with  $\text{Br}$  gives 3,4,6-trimethylgluconolactone, b.p. 140<sup>9</sup>,  $n_D^{20}$  1.4688,  $[\alpha]_D^{20}$  87<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  1); phenylhydrazide, m. 126<sup>9</sup>; the rate of hydrolysis in  $\text{H}_2\text{O}$  was closely similar to that of other  $\delta$ -lactones of the glucose series. At equil. the lactone and acid are present in the proportion of 9 and 91%, resp. The amide with  $\text{NaOCl}$  gives 2,3,5-trimethyl- $d$ -arabofuranose, b.p. 95<sup>9</sup>,  $n_D^{20}$  1.450,  $[\alpha]_D^{20}$  45<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  1). 2-Toluenesulfonyl-3,4,6-triacetyl- $\beta$ -methylglucoside in  $\text{CHCl}_3$  with  $\text{MeONa}$  at  $0^\circ$  gives anhydro- $\beta$ -methylhexoside (I),  $[\alpha]_D^{20}$  -25<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  1), -40<sup>9</sup> ( $\text{AcOEt}$ ,  $c$  2); heating with 5%  $\text{HCl}$  gives a hygroscopic sirup, the rotation changing from -25<sup>9</sup> to -77<sup>9</sup>;  $\text{MeI}$  and  $\text{Ag}_2\text{O}$  give a di-Me deriv. of I, m. 69<sup>9</sup>,  $[\alpha]_D^{20}$  40<sup>9</sup> ( $\text{AcOEt}$ ,  $c$  1), 24<sup>9</sup> ( $\text{H}_2\text{O}$ ,  $c$  1); during hydrolysis with 5%  $\text{HCl}$  the rotation changes from 21<sup>9</sup> to 67<sup>9</sup>. The high neg. rotation of the hydrolysis product of I suggests that the substance has passed into the altrose series. C. J. West

**Analysis of  $\gamma$ -methyl fructoside mixtures by means of invertase.** I. C. B. Purves and C. S. Hudson. *J. Am. Chem. Soc.* 56, 702 7(1934).—By using the polarimeter and a Cu reduction method to follow the partial hydrolysis with invertase of  $\gamma$ -Me fructoside, the sp. rotation of the constituent unstable to the enzyme was found to be  $[\alpha]_D^{20}$  -52  $\pm$  2<sup>9</sup> in  $\text{H}_2\text{O}$ ; it was tentatively assumed to be a true Me fructoside of mol. wt. 194. The optical changes suggested that the enzyme hydrolyzed a  $\gamma$ -fructose deriv. possessing the  $\beta$ -configuration. Under comparable conditions invertase hydrolyzed sucrose 13.5 times as rapidly as the  $\gamma$ -fructose deriv. and the types of the 2 hydrolysis-time curves, while not logarithmic, were similar. A fermentation with yeast removed the constituent unstable to invertase from  $\gamma$ -Me fructoside but left the remainder unchanged in amt. and in sp. rotation. When the condensation of fructose with acid  $\text{MeOH}$  was arrested at the point of max.  $d$ -rotation, approx. 45% of the total non-reducing product was hydrolyzed by invertase and the sp. rotation of the remaining 55% was approx.  $[\alpha]_D^{20}$  50<sup>9</sup> in  $\text{H}_2\text{O}$ , calcd. as Me fructoside. These figures, in contrast to the amt. of fructose left uncondensed, did not change with wide variation in the conditions of the condensation. When the condensation was prolonged past the pt. of max.  $d$ -rotation, only 10-20% of the non-reducing product was hydrolyzed by invertase and the sp. rotation of the remainder became strongly  $l$ -rotatory, due to the production of Me fructoside of the normal less-easily hydrolyzable type. II. Isolation of a new crystalline methyl fructoside. *Ibid.* 708 11.—After a soln. contg. pure fructose in dry  $\text{Me}_2\text{CO}$ -free  $\text{MeOH}$  and  $\text{HCl}$  had reached its max. rotation ( $[\alpha]_D^{20}$  0.5<sup>9</sup> in  $\text{MeOH}$ ), it was neutralized with  $\text{Ag}_2\text{O}$ , the  $\text{MeOH}$  removed and the product fermented with baker's yeast; the non-reducing sirup, contg. 70-80% solids, was extd. with  $\text{AcOEt}$  and  $\text{AmOH}$ ; the  $\text{AcOEt}$  and 1st  $\text{AmOH}$  exts. gave 10% of  $\gamma$ -Me fructoside, m. 60<sup>9</sup>,  $[\alpha]_D^{20}$  93<sup>9</sup> ( $\text{H}_2\text{O}$ , 0.4911 g. in 25 ml.), 91.6<sup>9</sup> ( $\text{MeOH}$ , 0.1852 g. in 25 ml.); its reducing power is at least 250 times less than that of fructose under the same conditions; it is practically unchanged after heating 1 hr. at  $60^\circ$  and 0.1 mm. Approx. 41% of the condensation product remained as an

unfermentable sirup of variable sp. rotation and derived from  $\gamma$ -fructose; this mixt. contained at least 3-non-reducing derivs.; a liquid  $\gamma$ -Me deriv.,  $[\alpha]_D^{25} = -52 = 2^\circ$ , fermentable by yeast, a liquid deriv.,  $[\alpha]_D^{25} 51^\circ$ , not fermentable, in the more sol. portion, and a deriv. with  $25.2^\circ$  in the less sol. portion. Raybin's diazouracil test for sucrose was given by none of the 3  $\gamma$ -fructose derivs., although 1 of them was hydrolyzed by invertase. This test is therefore more sp. for the sucrose linking than the action of invertase.

The sulfonation of cane sugar. Tokuro Soda. *Bull. Chem. Soc. Japan* 9, 1-8(1934); cf. C. A. 17, 2872.—Treatment of sucrose in pyridine with  $\text{ClSO}_3\text{H}$  gives a complex mixt. of esters contg. 1-4  $\text{SO}_3\text{H}$  groups, of which only 1 is in the glucose group, as shown by hydrolysis and fermentation. The mixed esters form cryst. K, Ba and brucine salts whose optical character is shown by photographs and detn. of  $[\alpha]$ . Recrystn. of these does not effect a sepn. of the individual compds. H. A. B.

The structure of high-molecular organic compounds. H. Staudinger. *Naturwissenschaften* 22, 65-71, 84-9 (1934); cf. C. A. 27, 948.—A lecture reviewing recent work on large org. mols. (cf. S., *Die hochmolekulare org. Verbindungen*, Kautschuk u. Cellulose, C. A. 26, 3513). Many references are given. B. J. C. van der Hoeven

The chemistry of lignin. Max Phillips. *Chem. Rev.* 14, 103-70(1934).—A review, with many references.

Louise Kelley  
The formation of cyclic compounds. I. The relative ease of formation and the relative stability of simple carbon rings. Shin-ichi Sako. *Bull. Chem. Soc. Japan* 9, 41-54 (1934).—A discussion. The relative stability and ease of formation of C rings are not necessarily the same, since the latter depends not only on the probability of the terminal atoms coming close together, but also on the effect of free rotation about the C-C bonds on the position of these atoms. H. A. Beatty

Decarboxylation of 1-phenylcycloparaffin-1-carboxylic acids. Francis H. Case. *J. Am. Chem. Soc.* 56, 715-17 (1934).—1-Phenylcycloparaffin-1-carboxylic acids were prepd. by adding 1 mol. of the requisite alkylene dibromide to the Na deriv. of  $\text{PhCH}_2\text{CN}$  (2 mols.  $\text{NaNH}_2$  to 1 mol. nitrile), refluxing for 10 hrs. and hydrolyzing with alc. KOH. 1-Phenylcyclopentane-1-carboxylic acid, m.  $158-0^\circ$  (45.8% yield); amide, m.  $157-8^\circ$ ; the cyclohexane deriv. m.  $121^\circ$  (22.2% yield); amide, m.  $95-6^\circ$ ;  $\text{Br}(\text{CH}_2)_6\text{Br}$  gave no acid;  $o\text{-C}_6\text{H}_4(\text{CH}_2\text{Br})_2$  gave 8.3% of 2-phenylhydropentene-2-carboxylic acid, m.  $194-5^\circ$ . The Ba salt of the acid (1 mol.) and 3 mols. dry  $\text{MeONa}$ , distd. at  $40\text{ mm.}$ , yielded the corresponding phenylcycloparaffin; phenylcyclobutane,  $b_{10} 101-2^\circ$ ,  $b_{15} 190-1^\circ$ ,  $d_4^{20} 0.9378$ ,  $n_D^{20} 1.5277$ , 28.1% yield; the cyclopropane, cyclopentane and cyclohexane derivs. were prepd. in 5.5, 57.1 and 64% yields, resp. C. J. West

Bicyclo[3.3.0]octane-2,6-dione. L. Ruzicka, A. Borges de Almeida and A. Brack. *Helv. Chim. Acta* 17, 183-200(1934).—A degradation product of desoxycholic acid described by Wieland and Dane (C. A. 27, 2689) is the only previously recorded deriv. of bicyclo[3.3.0]octane (I). Reduction of bicyclo[3.3.0]octane-2,6-dione (II) would yield the unknown fundamental hydrocarbon I, and II would be a suitable starting point for the prepn. of bicyclo[3.3.0]octatetrene (III) and compds. of the bicyclofulvene type such as the tetra-Me deriv. (IV) (C. A. 26, 976). The synthesis of II has been accomplished by the cyclization of di-Et cyclopentane-1-one-3-carboxylate-2- $\beta$ -propionate (V) to Et bicyclooctane-2,6-dione-3-carboxylate (VI) and the double cyclization of tetra-Et hexane-1,3,4,6-tetracarboxylate (VII) to di-Et bicyclooctane-2,6-dione-3,7-dicarboxylate (VIII). The keto esters (VI and VIII) were sapon. to the diketone II. Condensation of 640 g. of  $\text{CH}_3(\text{CO}_2\text{Et})_2$  and 275 g. of  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{Et}$  in the presence of 40 g. Na in 700 cc. abs. alc. gave 80% of tri-Et propane-1,1,3-tricarboxylate,  $b_{12} 157-8^\circ$ , which was condensed with  $\text{BrCH}_2\text{CO}_2\text{Et}$  to form tetra-Et butane-1,2,2,4-tetracarboxylate (XVI),  $b_{12} 166-8^\circ$ , in 70 83% yields. Cyclization of XVI with powd. Na in benzene gave a mixt. of both possible tri-Et cyclopentane-1-one tricar-

boxylates,  $b_{12} 145-50^\circ$ . By boiling 346 g. of XVI for 8 hrs. with 400 cc. 20% HCl, evap. to dryness and heating the residue with a 4-fold amt. of 25% alc.  $\text{H}_2\text{SO}_4$ , extg. and reesterifying 95% of tri-Et butane-1,2,4-tricarboxylate (IX),  $b_{12} 110-2^\circ$ , was obtained which gave on sapon. with 20% HCl for 8 hrs., the free acid, m.  $122-3^\circ$ . Cyclization of 137 g. of IX with 13.8 g. Na (1.2 atoms) in 350 cc. benzene produced a mixt. of di-Et cyclopentane-1-one-2,3- (X) and 2,4-dicarboxylate (XII), both  $b_{12} 115^\circ$ . X is more acidic than XII and was extd. from the mixt. by a mixt. of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$ . Condensation of X with  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{Et}$  gave a mixt. of the expected tri-Et cyclopentane-1-one-2,3-dicarboxylate-2- $\beta$ -propionate (XI) and VII resulting from ester cleavage. The sepn. of this mixt. by fractional distn. was difficult. Sapon. with 20% HCl for 8 hrs. gave trans-hexane-1,3,4,6-tetracarboxylic acid (trans-XIV), m.  $202-3^\circ$ . The residue from the evapd. mother liquor was esterified with alc.  $\text{H}_2\text{SO}_4$  and the careful fractionation of the distd. ester gave V,  $b_{12-16} 113-6^\circ$  (sapon. to the free acid, m.  $119-20^\circ$ ), and VII,  $b_{12} 162-6^\circ$ , which on sapon. yielded in addn. to a small amt. of trans-XIV, an appreciable quantity of a mixt. of cis-hexane-1,3,4,6-tetracarboxylic acid (cis-XIV) and its anhydride, m. and mixed m. 161. The mixt. of esters resulting from the similar condensation of XII with  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{H}$  gave, after analogous treatment, in addn. to a limited amt. of trans-XIV, 2 new compds., hexane-1,2,4,5-tetracarboxylic acid (XX), m.  $149-50^\circ$  (sinters about  $140^\circ$ ), and cyclopentane-1-one-4-carboxylic-2- $\beta$ -propionic acid (XIX), m.  $109-10^\circ$ . The above-mentioned hexanetetracarboxylic acids were synthesized. The addn. of 113 g. (1 mol.)  $\text{NCCH}_2\text{CO}_2\text{Et}$  and 68.5 g.  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{Et}$  (0.5 mol.) to 14.5 g. Na (0.5 mol.) in 170 cc. cold abs. alc. gave on working up the reaction mixt. and distg. at 11 mm., 58 g.  $\text{NCCH}_2\text{CO}_2\text{Et}$ , 31 g. di-Et  $\alpha$ -cyanoglutarate (XXII),  $b_{12-16} 140^\circ$ , and further 49 g. tri-Et 3-cyanopentane-1,3,5-tricarboxylate,  $b_{12} 108^\circ$ . The condensation of XXII with  $\alpha$ -bromoglutaric ester (C. A. 15, 3078) produced tetra-Et 3-cyanohexane-1,3,4,6-tetracarboxylate (XXIII),  $b_{12-16} 152^\circ$ , which can be obtained in better yields by first condensing XXI with  $\text{NCCH}_2\text{CO}_2\text{Et}$  to tri-Et 1-cyanobutane-1,2,4-tricarboxylate (XXIV),  $b_{12-16} 142^\circ$ , and condensing this compd. with  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{Et}$ . The sapon. of XXIII with 20% HCl gave trans-XIV, m.  $202-3^\circ$  (Silberrad, *J. Chem. Soc.* 85, 614(1904), found  $215^\circ$ ). From the mother liquor was obtained cis-XIV mixed with its anhydride, m.  $162^\circ$ . By heating in 20 cc. of 20% HCl for 20 hrs. at  $185^\circ$ , 0.5 g. cis-XIV was converted into the trans-modification. Condensation of  $\text{CH}_3\text{CH}(\text{CO}_2\text{Et})_2$  (C. A. 6, 1749) with  $\text{ClCH}_2\text{CH}_2\text{CO}_2\text{H}$  gave XXV,  $\text{C}_{12}\text{H}_{22}\text{O}_{10}$ ,  $b_{12} 158-60^\circ$ , which was condensed with  $\text{BrCH}_2\text{CO}_2\text{Et}$  by the aid of Na in alc. to hexa-Et hexane-1,2,2,4,4,6-hexacarboxylate (XXVI),  $b_{12-16} 173^\circ$ . On heating with 20% HCl XXVI was sapon. to the desired tetracarboxylic acid, XX (C. A. 20, 3446). Extn. of the reaction mixt. from the cyclization of trans-VII with Na in benzene, by  $\text{Na}_2\text{CO}_3$  and then NaOH gave di-Et bicyclo[3.3.0]octane-2,6-dione-3,7-dicarboxylate (VIII),  $\text{C}_{14}\text{H}_{18}\text{O}_6$ , m.  $57.5^\circ$  (from pentane), and tri-Et cyclopentane-1-one-3,5-dicarboxylate-2- $\beta$ -propionate (XXVII),  $\text{C}_{16}\text{H}_{20}\text{O}_7$ . The use of 2.4 atoms of Na gave VIII as the main product. With 1.2 atoms Na, XXVII predominated. Cyclization of the cis-ester with 2.4 atoms of Na gave only VIII. Since the same bicyclo product VIII is formed from both cis- and trans-modifications of the tetracarboxylate it cannot be decided whether VIII is derived from cis- or trans-bicyclo[3.3.0]octane. By shaking with 100 cc. of 20% HCl for 5 days, 5 g. of VIII was sapon. with 85% yields of II,  $b_{12-16} 83^\circ$ , m.  $45^\circ$ ,  $d_4^{20} 1.1290$ ,  $1.1013$ ,  $1.0753$ ,  $1.0481$  at  $60^\circ$ ,  $94^\circ$ ,  $125^\circ$ ,  $156^\circ$ ;  $n_D^{20} 1.4877$ ,  $1.4730$ ,  $1.4604$ ,  $1.4486$  at  $54^\circ$ ,  $93^\circ$ ,  $127^\circ$ ,  $159^\circ$ ;  $M_D 35.04$ ,  $35.13$ ,  $35.22$ ,  $35.37$  (calcd.  $34.76$ ) at  $60^\circ$ ,  $94^\circ$ ,  $125^\circ$ ,  $156^\circ$ , dioxime, m.  $201^\circ$ . Condensation of II with  $\text{BzH}$  in the presence of dry HCl gave a dibenzylidene compd., m.  $239-40^\circ$ . Treatment of II with isomyl formate and EtONa gave an unstable dihydroxymethylene deriv. on ozonization yielded the expected butane-1,2,3,4-tetracarboxylic acid, m.  $195^\circ$  (Auwers and Jacob, *Ber.* 27, 1114(1894)), converted on heating with  $\text{Ac}_2\text{O}$  into

the dianhydride, m. 234-6°. The reactivity of 2 of the methylene groups of II eliminates the possibility of the alternative bicyclo[3.2.1]octanedione formulation.

C. R. Addinall

**Anionotropic and prototropic changes in cyclic systems.**  
**II. The hydroxy-3,4-diphenyl-5-benzylidenecyclopentenones.** Harold Burton and Charles W. Shoppee. *J. Chem. Soc.* 1934, 197-201; cf. *C. A.* 27, 4219.—Anhydroacetonebenzil and BzH with NaOH (cf. Gray, *C. A.* 4, 1032) give 4-hydroxy-3,4-diphenyl-5-benzylidene- $\Delta^2$ -cyclopentenone (I), the bulk of which m. 232°, only a trace of the isomer (II)\*, m. 213.5°, being formed. I, MeI, AgO and NaOH, refluxed 10.5 days, give the 4-MeO deriv. of I, pale yellow, m. 158°; 4-EtO deriv., pale yellow, m. 159°; II gives a 4-MeO deriv., m. 122°. I could not be acetylated by any of the usual methods. The isomeric 2-HO deriv. (III), m. 216°, yields a 2-MeO deriv., yellow, m. 212°; III and EtOH-HCl give the 2-EtO deriv., yellow, m. 122-3°, but MeOH-HCl gives the isomeric III, m. 223°, whose MeO deriv., pale yellow, m. 124°. I and SOCl<sub>2</sub>, refluxed for 0.5 hr., give the 2-Cl deriv. (IV), bright yellow, m. 175°, and some 2,4-di-Cl deriv. (?) (V), pale yellow needles or prisms from Pr<sub>2</sub>O, m. 173°; the needles are converted into the prisms on standing in the solvent at 15°. IV with AcOAg in MeOH gives a 2-MeO deriv., yellow, m. 143°; with AcOAg in AcOH there results the 2-Ac deriv., m. 174-5°, identical with the acetylation product of I. V with AcOAg in MeOH gives the 2-chloro-4-methoxy deriv., pale yellow, m. 155°, which appears to contain 0.5 mol. MeOH of crystn.; with AcOAg in AcOH there is formed the 2-chloro-4-acetoxy deriv., yellow, m. 160°, and 3,4-diphenyl-5-benzylidene- $\Delta^2$ -cyclopentene-1,2-dione, bright red, m. 198-9° (2,4-antitrophenylosasone, m. 279-80° (decompn.)). 3,4-Diphenyl- $\Delta^2$ -cyclopentenone and BzH with EtONa give the 2,5-dibenzylidene deriv., orange, m. 202°.  $\alpha$ -Methyl-anhydroacetonebenzil and BzH give 4-hydroxy-3,4-diphenyl-5-benzylidene-2-methyl- $\Delta^2$ -cyclopentenone, m. 227°; with Ac<sub>2</sub>O and a trace of H<sub>2</sub>SO<sub>4</sub> this gives 3,4-diphenyl-5-benzylidene-2-methylene- $\Delta^2$ -cyclopentenone (VI), orange-red, m. 253°; O<sub>2</sub> gives HCHO, BzOH and unidentified substances. A 2nd product of the action of AcO is the compd. C<sub>20</sub>H<sub>18</sub>O<sub>2</sub>, yellow, m. 225°, which appears to be a dimer of VI. The reactions undergone by I are explicable on the basis of triad anionotropic and prototropic changes. **III. The isomeric chloro-3,4-diphenylcyclopentenones.** *Ibid.* 201-5.—Anhydroacetonebenzil and AcCl give 4-chloro-3,4-diphenyl- $\Delta^2$ -cyclopentenone (II), m. 116-17° (cf. Allen and Spanagel, *C. A.* 27, 80); SOCl<sub>2</sub> gives only a poor yield of II; refluxing with AcOH and AcOAg gives the dimer, C<sub>40</sub>H<sub>34</sub>O<sub>4</sub>. II with MeOH and AcOAg forms the 4-MeO deriv. (III), m. 123.5°; this also results from I, Ag<sub>2</sub>O, NaOH and MeI by refluxing 1 week. With excess of Br in CHCl<sub>3</sub> at 15° for 48 hrs. there results a compd. C<sub>18</sub>H<sub>16</sub>OBr<sub>2</sub>, buff, m. 145°. III and BzH give the 5-benzylidene deriv., m. 158° (cf. preceding abstr.), and some of the isomer, m. 122°. I and cold satd. EtOH-HCl after 24 hrs. give 2-chloro-3,4-diphenyl- $\Delta^2$ -cyclopentenone (IV), m. 124.9° which is unchanged by boiling EtOH-AgNO<sub>3</sub>, MeOH-AcOAg or C<sub>6</sub>H<sub>5</sub>N; quinoline splits off HCl but the EtO-sol. products could not be crystd.; piperidine also splits off HCl and gives the dimer, C<sub>40</sub>H<sub>34</sub>O<sub>4</sub>; the chloride is very slowly attacked by Zn in AcOH, a compd. C<sub>24</sub>H<sub>22</sub>OCl, orange-pink, m. 210° (decompn.), being isolated. Oxidation of the chloride with O<sub>2</sub> gives traces of an aldehyde and BzOH; KMnO<sub>4</sub> gives 88% of desylacetic acid. With dil. EtOH-KOH the chloride gives only yellow resins but not the dimer; MeOH-MeONa gives amorphous high-melting brown solids. 3,4-Diphenyl- $\Delta^2$ -cyclopentenone and Cl at 115° give the 2-Cl deriv., m. 50°, and a mono-Cl dimer, C<sub>40</sub>H<sub>34</sub>O<sub>2</sub>Cl, m. 216° (decompn.); this is also formed with SO<sub>2</sub>Cl<sub>2</sub> at 20°; oxidation with NaOBr gives diphenylmaleic anhydride. It is inferred that the initial stage in the production of the dimer C<sub>40</sub>H<sub>34</sub>O<sub>4</sub> from Japp's chloride (IV) is a prototropic change. **IV. Hydroxy-3,4-diphenyl-5-isopropylidenecyclopentenones.** *Ibid.* 205-7. (Japp and Knox, *J. Chem. Soc.* 87, 673 (1905).—The

transformations undergone by the compds. of the isopropylidene series are fundamentally identical with those displayed by the 5,5-di-Me and 5-benzylidene compds. 4-Hydroxy-3,4-diphenyl-5-isopropylidene- $\Delta^2$ -cyclopentenone with Ac<sub>2</sub>O and a trace of H<sub>2</sub>SO<sub>4</sub> yields the 2-Ac deriv. (I), buff, m. 140-1°; reduction with HI gives 3,4-diphenyl-5-isopropylidene- $\Delta^2$ -cyclopentenone, whose benzylidene deriv., orange, m. 234°. Alkalies cause a deep-seated decompn. of I. Hydrolysis with HCl in Me<sub>2</sub>CO gives a mixt. of 2-chloro-3,4-diphenyl-5-isopropylidene- $\Delta^2$ -cyclopentenone (?), m. 188°, and a small quantity of 2-hydroxy-3,4-diphenyl-5-isopropylidene- $\Delta^2$ -cyclopentenone (II), m. 207°; the chloride and EtOH-KOH give the isomeric  $\Delta^2$ -compd. (III), m. 253°. II was not converted into III by brief treatment with hot EtOH-EtONa. The chloride was unchanged by refluxing with AcOAg in MeOH for 0.5 hr. On oxidation it gives a small quantity of diphenylmaleic anhydride. Its structure has not been definitely established.

C. J. West

**Active cis- and trans-1-methyl-3-cyclohexanol.** Marcel Godchot and Germaine Cauquil. *Compt. rend.* 198, 663-5 (1934).—The cis- and trans-forms of 3-MeC<sub>6</sub>H<sub>11</sub>OH can be fractionally crystd. from MeOH as the p-nitrobenzoates. Sapon. gave the free cis- and trans-forms which have the following properties, resp.: b<sub>D</sub> 167-8°, 70-7°; d<sub>4</sub> 0.9274, 0.9201;  $\eta_{25}^0$  1.4590, 1.4589;  $\eta_{40}^0$  0.2652, 0.3774;  $[\alpha]_{D20}^{20}$  -7.29°, -4.06°;  $[\alpha]_{D25}^{25}$  -7.83°, -4.26°;  $[\alpha]_{D30}^{30}$  -8.76°, -4.68°;  $[\alpha]_{D35}^{35}$  -14.2°, -7.03°. Phenylurethans, 90°, 117-17.5°;  $[\alpha]_D^{20}$  -12.43°, -23.55°. p-Nitrobenzoates, m. 78-9°, 45-45.5°;  $[\alpha]_D^{20}$  -27.15°, -2.44°; acid phthalate, non-cryst., m. 92.3°;  $[\alpha]_D^{20}$  not obtained, -13.7°. Oxidation of both forms, resp., with CrOSO<sub>4</sub> gave 3-MeC<sub>6</sub>H<sub>4</sub>O (semicarbazone, m. 186°).

Julius White

**Nitrosites and nitrosates.** III. Lydia Monti and F. Bucci. *Gazz. chim. ital.* 63, 708 12 (1933); cf. M. and Dimelli, *C. A.* 26, 4803.—The decompn. of other nitrogenated compds. was studied. Heated in an inert gas in the same way as in the previous expts., methylcyclohexene nitrosate (I) decompn. similarly to amylenenitrosate, with about the same proportions of N, NO, CO<sub>2</sub> and H<sub>2</sub>O. It is probable therefore that this mode of decompn. is a general property of nitrosates. In an inert gas, stilbene pseudonitrosite (II) decompn. as do  $\alpha$ -nitrosites, i. e., it evolves a higher proportion of gas and of total N (58% compared with 40%) than do other nitrosites, and only a trace of CO<sub>2</sub>. As a result of the intramol. oxidation, the II mol. tends to rupture at the diatomic chain between the 2 C<sub>6</sub>H<sub>5</sub> nuclei, with formation of BzH and BzOH, which are found in all cases as decompn. products. The following data give the decompn. temp., the percentage of N, percentage of NO, percentage total N and percentage of the total N in the original I or II evolved, resp.: I, 5, 2.87, 0.34, 42.72; II, 1.64, 10.17, 66.37, 58.2. As would be foreseen from its constitution, PhCH(NO<sub>2</sub>)CH(NO<sub>2</sub>)Ph is more resistant to heat than are I and II. Heated in an inert gas for 3-4 hrs. at 100-150°, it does not evolve any gas, but sublimates unaltered. However, when heated rapidly to 240° it partially sublimates, but also in part decompn., with evolution of a gas composed chiefly of NO.

C. C. Davis

**Chloro derivatives of p-xylene.** Henri Wahl. *Compt. rend.* 198, 100-2 (1934); cf. *C. A.* 28, 1670°.—On nitration, 2,4-ClMeC<sub>6</sub>H<sub>3</sub>Me yielded a mixt. of 2,4,5-ClMe(O<sub>2</sub>N)C<sub>6</sub>H<sub>2</sub>Me (I), m. 77°, b<sub>D</sub> 139-40°; 2-chloro-6-nitro-p-xylene (II), yellow needles, m. 36°, b<sub>D</sub> 133-4° and 2,4,3-ClMe(O<sub>2</sub>N)C<sub>6</sub>H<sub>2</sub>Me (III), m. 56°, b<sub>D</sub> 135-6°. 4,2,6-Me(H<sub>2</sub>N)(O<sub>2</sub>N)C<sub>6</sub>H<sub>2</sub>Me prepd. by Soum's method (*C. A.* 10, 1537) was converted into II by the Sandmeyer reaction. The corresponding amine, from II, needles, m. 40°, b<sub>D</sub> 133°; Ac deriv. m. 171°, Bz deriv., m. 177°; picrate, m. 171°. The amine derived from I m. 92°, b<sub>D</sub> 136°; Ac deriv., m. 181°; Bz deriv., m. 163°; picrate, m. 195°. The amine derived from III m. 41°, b<sub>D</sub> 127°; Ac deriv., m. 179°; Bz deriv., m. 144°; picrate, m. 120°.

Louis R. Wise

**Side-chain chlorination of toluene.** Harold S. King and W. H. Reazley. *Proc. Nova Scotian Inst. Sci.* 18, 204-12

(1931).—The progress of the side-chain chlorination of PhMe can be conveniently detd. by reference to the b.-p. curve of mixts. of PhMe, PhCH<sub>2</sub>Cl and PhCHCl<sub>2</sub>. The compn. of these mixts. was detd. by refractometer, the relation between  $\pi$  and compn. being linear. The following values were found: PhMe  $n_D^{20}$  1.4971, PhCH<sub>2</sub>Cl  $n_D^{20}$  1.5391, PhCHCl<sub>2</sub>  $n_D^{20}$  1.5502. C. M. Pert

**Syntheses of chloromethyl derivatives of phenyl ethers.** Raymond Quelet. *Compt. rend.* 198, 102-5 (1934); cf. C. A. 27, 3921 and Blanc, C. A. 17, 2103.—4-MeOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Cl, b<sub>15</sub> 117°, d<sub>4</sub><sup>20</sup> 1.159,  $n_D^{20}$  1.553, was prepd. in 50% yield, by passing a rapid stream of HCl for 1 hr. into a well-stirred mixt. of 200 g. PhOMe, 100 g. 40% HCHO, 100 cc. petr. ether and 40 g. ZnCl<sub>2</sub> at 0-5°. (4-MeOC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>CH<sub>2</sub> is formed as a by-product. A similar reaction with PhOEt gave low yields of the unstable 4-EtOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Cl, b<sub>15</sub> 123°,  $n_D^{20}$  1.536. Analogously, *o*-, *m*- and *p*-MeC<sub>6</sub>H<sub>4</sub>OMe, and 3,4-MeO(iso-Pr)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Me gave risc, resp., to 3-methyl-4-methoxy- $\alpha$ -chlorotoluene (I), fairly stable, b<sub>15</sub> 119°, d<sub>4</sub><sup>20</sup> 1.13,  $n_D^{20}$  1.549; 2-methyl-4-methoxy- $\alpha$ -chlorotoluene (II), very unstable fuming liquid, b<sub>15</sub> 123°, 5-methyl-2-methoxy- $\alpha$ -chlorotoluene, stable, b<sub>15</sub> 121°, d<sub>4</sub><sup>20</sup> 1.128,  $n_D^{20}$  1.545, obtained in 75% yield; and 2-methyl-5-methoxy-3-isopropyl- $\alpha$ -chlorotoluene, fairly stable, b<sub>15</sub> 148°, d<sub>4</sub><sup>20</sup> 1.067 and  $n_D^{20}$  1.539. By-products of these reactions were: 3,3'-dimethyl-4,4'-dimethoxydiphenylmethane (from I), b<sub>10</sub> 207-9°, needles, m. 24°, the corresponding benzophenone, m. 115°, by oxidation in AcOH with Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> (cf. Gomberg and Anderson, C. A. 19, 2486); 2,2'-dimethyl-4,4'-dimethoxydiphenylmethane (from II), b<sub>15</sub> 215-6°, m. 60°, the corresponding benzophenone, m. 71°; 5,5'-dimethyl-2,2'-dimethoxydiphenylmethane (from III), b<sub>10</sub> 197-9°, m. 55°, the corresponding benzophenone, m. 82°. Louis E. Wise

**Nitromesitylene.** Garfield Powell and F. R. Johnson. *Org. Syntheses* 14, 68-70 (1934).—Nitration of 1,3,5-C<sub>6</sub>H<sub>3</sub>Me<sub>3</sub> in AcOH-Ac<sub>2</sub>O gives 74.6-6.5% of the 2-NO<sub>2</sub> deriv. C. J. West

**Synthesis of  $\beta$ -hydroxy- $\beta$ -phenylethylamine.** I. R. Rafter. *Industria chimica* 8, 575-7 (1933). H<sub>2</sub>NCH<sub>2</sub>COCI is condensed (AlCl<sub>3</sub>) with C<sub>6</sub>H<sub>6</sub>, and the H<sub>2</sub>NCH<sub>2</sub>COPH hydrogenated catalytically to a 71% yield of pure HOC-HPHCH<sub>2</sub>NH<sub>2</sub>. B. C. A.

**Amphoteric nature of organic oxygen compounds.** N. A. Pushin and R. Živadinović. *Bull. soc. chim. roy. Yougoslav.* 4, 23-30 (1933).—The fusion diagrams of the systems NH<sub>2</sub>Ph-piperonal and  $\beta$ -C<sub>10</sub>H<sub>11</sub>NH<sub>2</sub> camphor do not give evidence of compd. formation; *p*-MeC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub> forms a compd. with 1 mol. of *o*-C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>O, m. 195°, and with 2 mols. of coumarin, m. 42°. B. C. A.

**Internal molecular compounds.** L. Dede and A. Rosenberg. *Ber.* 67B, 147-53 (1934). The color of solns. of isomeric nitroanilines is explained as due to formation of internal complexes and is substantiated by color changes occurring on addn. of HClO<sub>4</sub>, showing variation in the stability of the complex as related to color intensity. This is further substantiated by similar behavior of nitrophenols and similarity in the forms of absorption curves of various mononitro and of various monoamino compds. Foster Dee Snell

**Color reactions of organic compounds. I. Color reactions of arylthioureas.** George M. Dyson. *J. Chem. Soc.* 1934, 174 7. —(Certain NO<sub>2</sub>-substituted arylthioureas dissolved in warm concd. H<sub>2</sub>SO<sub>4</sub> with the formation of a violet color (C. A. 18, 3363). These colors are due, first, to the formation of the corresponding amine and, secondly, to the oxidation of this amine by a trace of HNO<sub>3</sub> produced from the NO<sub>2</sub> group. In compds. of the type ANHCS-NiIB, in which A comprises a NO<sub>2</sub> group attached to an aryl residue, no color is produced unless B is an aromatic residue, and the inclusion of a NO<sub>2</sub> group in B, even if attached to an aromatic residue, precludes color formation; further, the nature of the color produced is dependent on the aromatic group B, but is independent of the orientation of the NO<sub>2</sub> group in A. *o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub> (25 g. in 500 ml. 20% HCl), agitated with 15 g. CSeCl<sub>2</sub> for 70 hrs., gives 20 g. *o*-nitrophenylthiocarbamide, yellow, m. 74°; 3-nitro-*o*-tolyl analog, brown, m. 84°; 4-NO<sub>2</sub> isomer, pale

cream, m. 74°; 5-NO<sub>2</sub> isomer, lemon-yellow, m. 92°; 2-nitro-*p*-tolyl analog, pale yellow, m. 68°; 3-NO<sub>2</sub> isomer, yellow, m. 67°; 6-NO<sub>2</sub> isomer, pale yellow, m. 77°; 5-nitro-2-methoxyphenyl analog, m. 83°. Thioureas: *N*-*o*-nitrophenyl-*N'*-propyl, cream, m. 168°; *o*-nitro-*s*-diphenyl, golden yellow, m. 188°; 2-nitro-2'-methyl-*s*-diphenyl, bright yellow, m. 192°; 3'-Me isomer, deep golden yellow, m. 150°; 4'-Me isomer, lemon, m. 207°; 4'-bromo-2-nitro-*s*-diphenyl, golden yellow, m. 210°; *N*-*o*-nitrophenyl-*N'*- $\alpha$ -naphthyl, olive-green, m. 145°;  $\beta$ -naphthyl isomer, ochre, m. 170°; *s*-di-*o*-nitrophenyl, orange, m. 160°; 2,3'-dinistro-*s*-diphenyl, orange, m. 116°; 2,4'-di-NO<sub>2</sub> isomer, pale yellow, m. 153°; *N*-*m*-nitrophenyl-*N'*-propyl, m. 110°; 3-nitro-*s*-diphenyl, yellow, m. 156°; 3-nitro-2'-methyl-*s*-diphenyl, lemon-yellow, m. 154°; 3'-Me isomer, yellow, m. 158°; 4'-Me isomer, m. 157°; 3,3'-dinistro-*s*-diphenyl, ochre, m. 168°; 4'-bromo-3-nitro-*s*-diphenyl, pale yellow, m. 173°; 2,4'-dichloro-3-nitro-*s*-diphenyl, m. 151°; 3,2'-dinistro-6-methyl-*s*-diphenyl, deep orange, m. 160°; *N*-*m*-nitrophenyl-*N'*- $\alpha$ -naphthyl, yellow, m. 156°;  $\beta$ -naphthyl isomer, yellow, m. 164°; 3,3'-dinistro-6'-methyl-*s*-diphenyl, deep lemon, m. 136°; 3,4'-di-NO<sub>2</sub> isomer, orange, m. 158°; 3,4'-dinistro-*s*-diphenyl, m. 172°; 3,3'-dinistro-1'-methyl-*s*-diphenyl, deep orange-red, m. 115°; 3,3'-di-NO<sub>2</sub> isomer, m. 188°; *N*-*p*-nitrophenyl-*N'*-propyl, cream, m. 170°; 4-nitro-*s*-diphenyl, pale yellow, m. 175°; 4-nitro-2'-methyl-*s*-diphenyl, lemon-yellow, m. 132°; 3'-Me isomer, pale orange, m. 135°; 4'-Me isomer, lemon yellow, m. 165°; 4,4'-dinistro-*s*-diphenyl, orange-red, m. 175°; 4'-bromo-1-nitro-*s*-diphenyl, cream-yellow, m. 161°; 4'-Cl deriv., yellow, m. 179°; 4'-MeCl deriv., yellow, m. 155°; *N*-*p*-nitrophenyl-*N'*- $\alpha$ -naphthyl, yellow,  $\beta$ -naphthyl isomer, yellow, m. 157°; 4,3'-dinistro-6'-methyl-*s*-diphenyl, bright orange, m. 175°; 4'-Me isomer, pale yellow, m. 176°; 4,4'-di-nitro-6'-methyl deriv., pale yellow, m. 181°; 4,2'-dinistro-4'-methyl deriv., yellow, m. 176°; 4-nitro-*o*-tolyl, yellow, m. 140°; *N*-4-nitro-*o*-tolyl-*N'*-propyl, cream, m. 173°; 5-nitro-2-methyl-*s*-diphenyl, m. 171°; 4'-Br deriv., m. 183°; 5-nitro-2,2'-dimethyl-*s*-diphenyl, yellow, m. 149°; 2,3'-di-Me isomer, pale yellow, m. 156°; 2,4'-di-Me isomer, pale yellow, m. 161°; *N*-4-nitro-*o*-tolyl-*N'*- $\alpha$ -naphthyl, yellow, m. 191°;  $\beta$ -naphthyl isomer, m. 154°; 3,3'-dinistro-6,6'-dimethyl-*s*-diphenyl, very pale yellow, m. 162°; *N*-5-nitro-*o*-tolyl-*N'*-propyl, pale yellow, m. 157°; 1-nitro-2,2'-dimethyl-*s*-diphenyl, lemon-yellow, m. 14°; 2,3'-di-Me isomer, pale yellow, m. 153°; 2,4'-di-Me isomer, light yellow, m. 150°; *N*-5-nitro-*o*-tolyl-*N'*- $\alpha$ -naphthyl, yellow, m. 166°;  $\beta$ -naphthyl isomer, pale yellow, m. 165°; 2-nitro-*p*-tolyl, orange, m. 122°; *N*-2-nitro-*p*-tolyl-*N'*-propyl, m. 147°; 3-nitro-1-methyl-*s*-diphenyl, cream, m. 152°; 4'-Br deriv., lemon yellow, m. 173°; 3-nitro-2',4'-dimethyl-*s*-diphenyl, m. 111°; 3',4'-di-Me isomer, pale yellow, m. 152°; 4,4'-di-Me isomer, yellow, m. 176°; *N*-2-nitro-*p*-tolyl-*N'*- $\alpha$ -naphthyl, m. 165°;  $\beta$ -naphthyl isomer, yellow, m. 212°; 3-nitro-*p*-tolyl, yellow, m. 138°; *N*-3-nitro-*p*-tolyl-*N'*-propyl, m. 144°; 2-nitro-4-methyl-*s*-diphenyl, orange, m. 125°; 4'-Br deriv., yellow, m. 156°; 2-nitro-2',1-dimethyl-*s*-diphenyl, pale yellow, m. 164°; 3',4'-di-Me isomer, yellow, m. 156°; 4,4'-di-Me isomer, pale yellow, m. 162°; *N*-3-nitro-*p*-tolyl-*N'*- $\alpha$ -naphthyl, citron-yellow, m. 168°;  $\beta$ -naphthyl isomer, ochre, m. 159°; 5-nitro-2-methoxyphenyl, orange; *N*-5-nitro-2-methoxyphenyl-*N'*-propyl, pale yellow, m. 171°; 5-nitro-2-methoxy-*s*-diphenyl, pale brown, m. 173°; 4'-Br deriv., m. 180°; 2'-Me deriv., pale brown, m. 162°; 3'-Me deriv., pale brown, m. 168°; 4'-Me deriv., yellow, m. 162°; 3',5'-dinistro-2-methoxy-*s*-diphenyl, orange, m. 164°; 4',5'-di-NO<sub>2</sub> isomer, orange, m. 162°; *N*-5-nitro-2-methoxyphenyl-*N'*- $\alpha$ -naphthyl, ochre, m. 178°;  $\beta$ -naphthyl isomer, yellow, m. 175°; 5,5'-dinistro-2,2'-dimethoxy-*s*-diphenyl, brown, m. 175°; 3-nitro-*o*-tolyl, pale yellow, m. 171°; 4'-bromo-2-nitro-6-methyl-*s*-diphenyl, pale yellow, m. 164°; *N*-3-nitro-*o*-tolyl-*N'*- $\alpha$ -naphthyl, pale yellow, m. 171°; 2-nitro-4',6'-dimethyl-*s*-diphenyl, pale yellow, m. 160°; 4-nitro-3-methyl-*s*-diphenyl, m. 158°; 4'-F deriv., m. 154°; 4'-Br deriv., yellow, m. 147°; *N*-6-nitro-*m*-tolyl-*N'*- $\alpha$ -naphthyl, cream,

m. 142°; *β*-naphthyl deriv., m. 172°; 4-nitro-3,4'-dimethyl-*s*-diphenyl, pale yellow, m. 110°. C. J. West

**Inhibitory effect of substituents in chemical reactions.**  
**III. The reactivity of the isothiocyanato group in substituted arylthiocarbimides.** Donald W. Browne and G. Malcolm Dyson. *J. Chem. Soc.* 1934, 178-9; cf. C. A. 26, 1586.—The rate of disappearance of various thiocarbimides from a *N*/13.5 soln. in EtOH was measured at the b. p. of the soln., 78.5°, over periods from 10-90 min. The general trend of addn. of EtOH to arylthiocarbimides is that of a side-chain reaction favored by "electron-recession"; in nearly all the cases examd., the *m*-substituted compd. is more reactive than the corresponding *o*- and *p*-substituted compds.; the reaction is favored by unsat. in the substituents. The percentages of thiocarbimide disappearing in 60 min. were: 1-naphthyl 11.5; 2-naphthyl 28.5; 4-acenaphthyl 5; 3-carboxyphenyl (m. 163° (decompn.)) 55; 4-isomer (decompn. 220°) 72.5; 2-carbomethoxyphenyl 33; 3-isomer 65; 4-isomer 70; 2-carbethoxyphenyl 28.5; 3-isomer 65; 4-isomer 75; 4-carbopropoxyphenyl (m. 32°) 77.5; 4-carbomethoxyphenyl (yellow oil, b<sub>p</sub> 180°) 75.5; 4-carbomethoxyphenyl (yellow, b<sub>p</sub> 205°) 79; *Et* phenylacetate-4- (m. 58°) 23.5; *Et* *β*-phenylpropionate-4- (yellow, b<sub>p</sub> 296°) 11; *Et* cinnamate-4- (golden, m. 62°) 55; 4-acetamidophenyl 20.5; 3,4-dichlorophenyl 80; 3,4,5-trimethoxyphenyl (m. 65°) 33; 4-diethylaminophenyl, no reaction. The following derivs. of thiourethan (*Et* thionocarbamate) were prepd. during this work: 1-naphthyl, m. 106°; 4-isomer, m. 92°; 3-acenaphthyl, brown, m. 140°; 3-carboxyphenyl, m. 210°; 4-isomer, m. 212°; 2-carbomethoxyphenyl, m. 70°; 3-isomer, m. 104°; 4-isomer, m. 121°; 2-carbethoxyphenyl, m. 48°; 3-isomer, m. 76°; 1-isomer, m. 118°; 4-carbopropoxyphenyl, m. 97°; butoxy homolog, m. 83°; amoxy homolog, m. 67°; *Et* phenylacetate-1-, m. 69°; *Et* cinnamate-4-, m. 128°; 4-acetamidophenyl, m. 173°; 3,4-dichlorophenyl, m. 125°; 3,4,5-trimethoxyphenyl, m. 132°. C. J. West

**Halogenation of phenolic ethers and anilides.** IV. Chlorination of some *p*-substituted anilides. Brynmor Jones. *J. Chem. Soc.* 1934, 210-13; cf. C. A. 26, 1263.

The measurement of the velocity coeffs. for the chlorination of substances of the type *p*-AcNH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>X in 99% AcOH at 20°, where X is *p*-Cl, *p*-Br and *p*-CO<sub>2</sub>H, gives the following series of diminishing directive powers: EtCONH > MeCONH > PhCONH > C<sub>6</sub>H<sub>5</sub>SO<sub>2</sub>NH > PhSO<sub>2</sub>NH >> Cl<sub>2</sub>CCONH; in both the *p*-Cl and the *p*-NO<sub>2</sub> series the theoretical sequence •MeCONH > PhCONH is found and in the *p*-Cl and *p*-Br series the order C<sub>6</sub>H<sub>5</sub>SO<sub>2</sub>NH > MeCONH observed in the unsubstituted anilides is reversed. A comparison of the relative directive influences of Br, Cl and CO<sub>2</sub>H in *p*-substituted phenolic ethers and anilides shows that with the anilides all 3 groups display similar effects, while in the ethers the deactivation due to the CO<sub>2</sub>H group becomes much more pronounced. C. J. West

**Thiocarbamide formation under different conditions.** I. Chas. Raiford and G. Mervin McNulty. *J. Am. Chem. Soc.* 56, 680-1 (1934).—Four methods for the prepn. of thiocarbamide were studied: (1) heating 10 g. amine, 2 mols. CS<sub>2</sub>, 25 cc. EtOH and 0.5 g. S as long as H<sub>2</sub>S was evolved; (2) heating 10 g. amine, 1.5 mols. CS<sub>2</sub>, 30 cc. EtOH and 0.2 g. powd. NaOH for 4 hrs.; (3) Fry's method (C. A. 7, 3980), the mixt. being stirred; (4) Snedker's method (C. A. 20, 174), the mixt. being shaken instead of stirred. 3-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, 3,5-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub> and 3,4- and 3,5-Br<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub> gave no product by method (1), while with method (3) the yields were 87, 71, 47 and 85%, resp.; on the other hand, with method (4) the yields of thiocarbamide from 2,4-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>, 2,5-MeO(MeO)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>, 2-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>Ph and 2-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>-C<sub>6</sub>H<sub>4</sub>-Cl-4 were 84, 10, 84 and 63%. 2-Methoxy-4-bromo-*n*-methylphenylamine, m. 96°; *Ac* deriv., m. 122-3; *n*-methyl-4-acetylaminovaniline, m. 120-30° (74% yield); *n*-bromo-4-acetylaminovaniline, m. 120-30° (71%); 3-Br isomer, m. 210-11° (41%); 3,5-di-Br deriv., m. 244-5° (78%); 2-(4-chlorophenyl)aniline, m. 52 (61%). New sym diarylthioureas, (RNH<sub>2</sub>)<sub>2</sub>CS, were prepd. with R as

follows: 3,5-dibromophenyl, m. 134-5° (85% yield); 3,4-di-Br isomer, cream, m. 100-3° (47%); 2,5-di-Cl analog, m. 175-6° (68%); 2,4-di-Cl isomer, brown, m. 184-5° (79%); 3,5-di-Cl isomer, m. 156-7° (71%); 2-bromo-4-chloro analog, m. 206-7° (64%); 2-chloro-4-bromo isomer, pale brown, m. 159-60° (65%); 2-methoxy-5-methyl analog, m. 143-4° (72%); 2-methoxy-4-bromo-5-methyl analog, m. 175-6° (62%); *p*-phenylphenyl, m. 230 (90%); *p*-(*p*-chlorophenyl)phenyl, m. 219-20° (88%); *o*-phenylphenyl, m. 154-5 (90%); *o*-(*p*-chlorophenyl)-phenyl, m. 193-4° (70%). These yields are by method (4).

C. J. West

**Thiocyanogenation of aromatic compounds with the aid of chloroamides.** II. Thiocyanogenation of toluidines. M. V. Likhoshershtov and A. A. Petrov. *J. Gen. Chem.* (U. S. S. R.) 3, 759-64 (1933); cf. C. A. 28, 1677.

Thiocyanogenation of the isomeric toluidines with the aid of CO(NHCl)<sub>2</sub>, AcNHCl and dichloropentamethylenetetramine (I) (Delépine, C. A. 6, 622) proceed rapidly with the liberation of heat. AcNHCl is more stable than CO(NHCl)<sub>2</sub> and I produced best results. The addn. of a few drops of H<sub>2</sub>SO<sub>4</sub> to the reaction mixt. checks the oxidation process and gives purer products. Practically all the thiocyanate derivs. can be halogenated with the aid of the chloroamines; the yields of Br, Cl and I derivs. obtained decrease in the order given. The CNS group easily takes up the *p*-position to the available NH<sub>2</sub> group in the ring, especially when 1 or both *m*-positions are vacant; if the *p*-position is engaged the CNS group difficultly enters 1 of the vacant *o*-positions, whereby with an excessive heat liberation the product becomes yellow with a considerable formation of a thiazole: 5,2,3-RC<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)SCN + H<sub>2</sub>O → RC<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)SCONH<sub>2</sub> -

H<sub>2</sub>O → RC<sub>6</sub>H<sub>3</sub>N:C(NH<sub>2</sub>)<sub>2</sub>S. Such a thiazole regrouping of *o*-aminothiocyanates does not always proceed spontaneously and must be aided by heating with acids. When 2 substituents are present in the *o*- and *p*-positions, the thiocyanogenation either does not take place or with a considerable resubstitution of the reaction product. The thiocyanogenated toluidines and their halogen derivs. are becoming important as the intermediates in the production of thiondigo (French pat. 650,955; U. S. pat. 1,703,140), for medicinal preps. (Kaufmann, C. A. 23, 2244-5; Taubmann, C. A. 24, 4840) and for insecticides (U. S. pat. 1,794,046). 2,5-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)SCN (II), m. 69-70°, was obtained in 80-85% yield by adding 0.1 mol. dry AcNHCl to a mixt. of 0.1 mol. each of *o*-toluidine and NH<sub>4</sub>SCN in 200 cc. 80% AcOH, allowing the mixt. to cool, then dilg., filtering and crystg. from alc. Similar results were obtained with the aid of CO(NHCl)<sub>2</sub> and I; the acetyl deriv. of II m. 140.5°. To a mixt. of 0.1 mol. each of II and KBr in 200 cc. 60% AcOH was added with shaking 0.5 mol. CO(NHCl)<sub>2</sub>, the mixt. was heated and filtered cold, giving 2,3,5-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Br)SCN, m. 98-9.5°; the *Ac* deriv. m. 150°. With the exception of 3,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>(NH<sub>2</sub>)SCN (III) (see Ger. 495,879, C. A. 24, 3518), the following thiocyanate derivs. of *m*-toluidine are new compds. obtained by the methods described above. *m*-Toluidine, in distinction from the *o*- and *p*-isomers, easily produced dithiocyanates and large yields of various halogen derivs. III heated with 1 mol. AcNHCl and a little HCl in AcOH gave 3,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Cl)SCN, m. 95-7°; this, heated with equimol. amts. of CO(NHCl)<sub>2</sub> or AcNHCl and KBr, produced 95% 3,2,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Br)(Cl)SCN, m. 105°; III with 2 mols. AcNHCl gave 3,2,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Cl)<sub>2</sub>SCN, m. 105-6°. III produced 3,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Br)SCN, m. 78°, and 3,2,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Br)<sub>2</sub>SCN, m. 103.5°. This monobromide with AcNHCl gave 3,2,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(Cl)(Br)SCN, m. 98°. III with AcNHCl and KI gave a small yield of 3,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(I)SCN, m. 80-7°. *m*-Toluidine with 2 mols. of CO(NHCl)<sub>2</sub> or AcNHCl and NH<sub>4</sub>SCN produced 3,4,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>(SCN)<sub>2</sub> (IV), m. 142-3°. IV heated with dil. HCl gave 5-methyl-6-thiocyano-2-aminobenzothiazole, Me(NCS)-

C<sub>6</sub>H<sub>3</sub>N:C(NH<sub>2</sub>)<sub>2</sub>S, m. 210°, which, diazotized and coupled



with  $\alpha$ -C<sub>10</sub>H<sub>7</sub>OH, gave a violet dye, while IV is difficultly diazotized and gives with  $\alpha$ -C<sub>10</sub>H<sub>7</sub>OH a red dye. IV with CO(NHCl)<sub>2</sub> and KBr in AcOH gave 2,3,4,6-MeC<sub>6</sub>HBr-(NH<sub>2</sub>)<sub>2</sub>(SCN)<sub>2</sub> (V), disintegrating at 162° and m. 241°. Evidently at about 160° V is isomerized to 4-bromo-5-methyl-6-thiocyano-2-aminobenzothiazole (Hunter, C. A. 20, 195). *p*-Toluidine with 1 mol. of NH<sub>2</sub>SCN and AcNHCl produced a thiocyanate, m. 56°, which is decomd. in the air. The product recrystd., m. 142° (Kaufmann, C. A. 23, 2244-5). *p*-Toluidine with 2 mols. each of NH<sub>2</sub>SCN and a chloramine gave a resinsified mixt. of a dithiocyano-*p*-toluidine, m. 123°, and 4-thiocyano-6-methyl-2-aminobenzothiazole, m. 225° (Kaufmann, loc. cit.). Chas. Blanc

Action of sodium ethoxide upon phenyl thiocyanate. John Ross. *J. Am. Chem. Soc.* 56, 727-9 (1934); cf. C. A. 27, 5065.—EtONa in EtOH reacts with PhSCN to give PhSNa, PhSEt and Ph<sub>2</sub>S<sub>2</sub>. The mechanism of the formation of the last 2 compds. is discussed. PhSOEt is reduced by PhSH to give PhSEt and Ph<sub>2</sub>S<sub>2</sub>. *Et benzene-sulfonate*, b. 100°, and PhSH give Ph<sub>2</sub>S<sub>2</sub>. PhSH and PhCNO give 15% of Ph<sub>2</sub>S<sub>2</sub>. EtOH-free EtONa and PhSCN give only Ph<sub>2</sub>S<sub>2</sub>. C. J. West

*p*-Nitrophenyl isocyanate. R. L. Shriner, W. H. Horne and R. F. B. Cox. *Org. Syntheses* 14, 72-4 (1934).—AcOEt is satd. with COCl<sub>2</sub> and *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub> in AcOEt introduced during 3-4 hrs., the stream of COCl<sub>2</sub> being continued; the *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NHCOCl is converted to *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NCO during crystn. from CCl<sub>4</sub>; yield 85-95%. C. J. West

Derivatives of *m*-phenylenediamine. F. Bell and R. Cohen. *J. Chem. Soc.* 1934, 243.—*m*-C<sub>6</sub>H<sub>4</sub>(NHSO<sub>2</sub>C<sub>6</sub>H<sub>4</sub>Me-*p*) (I) and Br in C<sub>6</sub>H<sub>5</sub>N give 4,6-dibromo-1,3-bis-(*p*-toluenesulfonamido)benzene, m. 209°; excess Br in C<sub>6</sub>H<sub>5</sub>N gives the 2,4,6-tri-Br deriv., m. 223°. *m*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub> and *m*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>Cl in C<sub>6</sub>H<sub>5</sub>N give 1,3-bis-(*m*-nitrobenzenesulfonamido)benzene, m. 195°; fuming HNO<sub>3</sub> in AcOH gives the 4,6-di-NO<sub>2</sub> deriv., m. 235°; further nitration gives the 2,4,6-tri-NO<sub>2</sub> deriv., m. 218°. Nitration of I gives 4,6-dinitro-1,3-bis-(*p*-toluenesulfonamido)benzene, pale yellow, m. 208-10°; further nitration gives the 2,4,6-tri-NO<sub>2</sub> deriv., m. 223°. C. J. West

*m*-Phenylenediamine sulfate. M. S. Rozhdestvenskii and T. N. Karskaya. *J. Gen. Chem.* (U. S. S. R.) 3, 558 (1933).—*m*-Phenylenediamine sulfate forms a stable hydrate, 3[C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>·H<sub>2</sub>SO<sub>4</sub>]·4H<sub>2</sub>O. Lewis W. Butz

Extension of Michael's reaction. III. Tejendra Nath Ghosh and Praphulla Chandra Guha. *J. Indian Inst. Sci.* 16A, 103-12 (1933); cf. C. A. 24, 4787.—The action of the Na derivs. of AcCH<sub>2</sub>CO<sub>2</sub>Et, NCCH<sub>2</sub>CO<sub>2</sub>Et, Ac<sub>2</sub>CH<sub>2</sub> and H<sub>2</sub>NCO<sub>2</sub>Et on systems contg. the unsatd. linkages N:N and C:N has been studied. PhN:NCO<sub>2</sub>Et (*Ber.* 28, 1927 (1895)) reacts with AcCH<sub>2</sub>NaCO<sub>2</sub>Et (I), NCCH<sub>2</sub>NaCO<sub>2</sub>Et (II) and Ac<sub>2</sub>CHNa (III) to yield *Et β*-N-carbethoxyacetylmethyl-β-phenylcarbasinate (IV), C<sub>12</sub>H<sub>15</sub>N<sub>2</sub>O<sub>4</sub>, m. 103-4°, and the corresponding carbethoxycyanomethyl and diacetylmethyl compds., m. 69-70° and 130-1°, resp. The yields are generally very poor and the compds. are unstable in the presence of cold dil. alkali and hot acids. Hydrolysis of IV into PhNC confirms the direct attachment of the acetoacetic ester grouping to the β-N atom. PhN:NCO<sub>2</sub>Et reacts with NaHNCO<sub>2</sub>Et (V) to form an unstable intermediate which is readily hydrolyzed to H<sub>2</sub>NCO<sub>2</sub>Et and *Et β*-N-hydroxy-β-phenylcarbasinate (VI), m. 178-9°. Treatment of VI with aq.

KOH gives PhN:N:C(OK).O (VII), m. 135-6°, converted on acidification into PhN:N:C(OH).O (VIII), m. 214-6°.

Ring structures are ascribed to VII and VIII since VIII could not be esterified; treatment of VII with MeI or EtI gives C<sub>6</sub>H<sub>5</sub>N<sub>2</sub>O<sub>3</sub>, m. 128 9°, or C<sub>6</sub>H<sub>5</sub>N<sub>2</sub>O<sub>3</sub>, m. 130-1°; the corresponding tolyl-substituted compd. (IX) does not contain any H<sub>2</sub>O of crystn. and hence cannot possess an open-chain structure, and finally, though K salts and esters of carbazinic acids and substituted carbazinic acids are known to exist, no such free acid is known. Et *p*-tolylazocarboxylate reacted similarly with

V to yield MeC<sub>6</sub>H<sub>4</sub>N:N:C(OH).O (IX), m. 168-70°. The condensation of I with (:NCO<sub>2</sub>Et)<sub>2</sub> gave similarly di-*Et β*-N-carbethoxyacetylmethylhydrazocarboxylate, m. 74-5°. From the inactivity of azobenzene in such reactions the conclusion is drawn that for a Michael condensation with N:N systems there should be at least 1 strongly neg. group attached to one of the N atoms, (cf. C. A. 19, 1424). The compds. PhN:CHPh and PhN:CHCO<sub>2</sub>Et contg. the unsatd. grouping N:C do not lend themselves to Michael's condensation. PhNH:N:C(CO<sub>2</sub>Et)<sub>2</sub> reacts with I, II and NaCH(CO<sub>2</sub>Et)<sub>2</sub> (X) to yield addn. compds. easily hydrolyzed to PhNHNH:CH(CO<sub>2</sub>Et)CO<sub>2</sub>H, m. 110-1°, oxidized by FeCl<sub>3</sub> to PhN:NCH(CO<sub>2</sub>Et)CO<sub>2</sub>H, m. 174-8°, and hydrolyzed by alc. KOH to PhNHNHCH<sub>2</sub>CO<sub>2</sub>H, m. 152-3°. Attempts were made to utilize the condensation with mustard oils and isocyanates for the synthesis of pyridine derivs. Carbethoxythiocarbimide was condensed with I, III and X to form the monobasic acids EtO<sub>2</sub>CCHAcSCNHCOC<sub>2</sub>H<sub>5</sub> (XI), (EtO<sub>2</sub>C)<sub>2</sub>CHSCNHCOC<sub>2</sub>H<sub>5</sub> (XII), m. 70-2°, and Ac<sub>2</sub>CHSCNHCOC<sub>2</sub>H<sub>5</sub> (XIII), m. 121-2°. By analogy with the compd. XIII in which the CO<sub>2</sub>H group must have been derived from the CO<sub>2</sub>Et group attached to the N atom, the free CO<sub>2</sub>H groups in XI and XII are shown as attached to the end N atoms. After esterification XI was treated with a mol. proportion of EtONa but no pyridine compds. formed by cleavage of 1 mol. of EtOH were obtained. Treatment of carbethoxythiocarbimide with II gave *Et thiocarbethoxycyanoacetylcabamate*, m. 152-3°, hydrolyzed by cold 0.1 N KOH to the free acid (XIV), m. 158-60°. On heating, the compds. XI, XII, XIII and XIV were not converted into the corresponding thioamides by loss of CO<sub>2</sub> but were decomd. C. R. A

Diazoaminobenzene. W. W. Hartman and J. B. Dickey. *Org. Syntheses* 14, 24-6 (1934).—Detailed directions are given for the prepn., in 82-5% yield, of PhN<sub>2</sub>NHPh from PhNH<sub>2</sub>. C. J. West

The preparation of certain organomagnesium (compounds) by "entrainment" (cleansing action). Grignard. *Compt. rend.* 198, 625-8 (1934).—G. has found that difficultly sol. halides which reacted only slightly with Mg could be made to react if EtMgBr (I) was added to the reaction. G. believes that I acts as a cleansing agent for the Mg and the halides. C<sub>6</sub>Me<sub>2</sub>Br in the presence of equimol. amts. of I reacted with Mg to give C<sub>6</sub>(MgBr)Me<sub>2</sub> (II). II treated with CO<sub>2</sub> followed by hydrolysis gave C<sub>6</sub>Me<sub>2</sub>CO<sub>2</sub>H (85% yield). Similarly II treated with BzH gave C<sub>6</sub>Me<sub>2</sub>CH(OH)Ph, m. 107.5° (80% yield) 3,4-(MeO)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>MgBr treated with CO<sub>2</sub> gave 3,4-(MeO)<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H, m. 178.5° (25% yield). With 2 mols. of I, *p*-Br<sub>2</sub>C<sub>6</sub>H<sub>3</sub> gave *p*-(BrMg)<sub>2</sub>C<sub>6</sub>H<sub>3</sub> (40%) and *p*-BrC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Br gave *p*-BrC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>MgBr (60%). The latter on further treatment with (2 mols.) gave (BrMgC<sub>6</sub>H<sub>4</sub>)<sub>2</sub>. Julius White

The organomagnesium (compound) of pentamethylbenzene. Henri Clement. *Compt. rend.* 198, 665-7 (1934); cf. preceding abstr.—Equimol. amts. of C<sub>5</sub>Me<sub>5</sub>Br and EtBr were treated with 25% excess Mg in anhyd. Et<sub>2</sub>O. The addn. of CO<sub>2</sub> to this mixt. gave PrOII and C<sub>5</sub>Me<sub>5</sub>CO<sub>2</sub>H (82% yield). Likewise BzH gave C<sub>5</sub>Me<sub>5</sub>CH(OH)Ph, m. 107.5° (80% yield); EtOAc gave C<sub>5</sub>Me<sub>5</sub>COMe (I), m. 241.7° (42% yield); oxime of I, m. 190.6°; semicarbazone, m. 241.7°. Julius White

The action of hydrobromic acid on benzenearsonic and *p*-aminobenzenearsonic acids. J. Prat. *Compt. rend.* 198, 583-5 (1934); cf. C. A. 27, 495.—By the action of aq. HBr (d. 1.76) on PhAsO<sub>3</sub>H<sub>2</sub> (I) and *p*-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>AsO<sub>3</sub>H<sub>2</sub> (II) the Br derivs. were obtained. These undergo 2 types of decompn. (cf. La Coste and Michaelis, *Ann.* 201, 198 (1880)). In the decompn. of I, PhBr, AsBr<sub>3</sub>, and PhAsBr<sub>2</sub> were isolated. II gave *p*-BrC<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, HBr, 2,4-Br<sub>2</sub>C<sub>6</sub>H<sub>3</sub>NH<sub>2</sub>, HBr, AsBr<sub>3</sub> and a small amt. of HBr.H-N-C<sub>6</sub>H<sub>4</sub>AsBr<sub>2</sub>. W. A. Moore

Biaryls. VII. 4,4'-Dihydroxy- and 3,3',3''-tetrahydroxy-tetraphenylbiaryl. Reaction between 4-hydroxy- and 4-aminophenylarsine and tetraphenylarsyl oxide. F. F. Blicke and J. F. Oneto. *J. Am. Chem. Soc.*



56, 685-7(1934); cf. C. A. 28, 1674<sup>3</sup>.—4-Nitrodiphenylarsinic acid, m. 177-8°; the 4-NH<sub>2</sub> deriv., m. 215-6°, and the 4-HO deriv., m. 203-4°; the action of H<sub>3</sub>PO<sub>4</sub> gives 4,4'-dihydroxytetraphenylbiarsyl, m. 161-3°. 3,3'-Dihydroxydiphenylarsinic acid (I), darkens about 202°; di-MeO deriv., m. 151-3°. I and HBr in AcOH, satd. with SO<sub>2</sub>, give 3,3'-dihydroxydiphenylbromoarsine (II), m. 131-3°; I deriv. (III), orange, m. 130-1°. I and H<sub>3</sub>PO<sub>4</sub> give 3,3',3'',3'''-tetra(hydroxyphenyl)biarsyl (IV), m. 207-8°; it decolorizes I instantly, giving III. Heating II with 10% NaOH gives 3,3',3'',3'''-tetra(hydroxyphenyl)arsyl oxide, a gum, which yields IV with Ph<sub>3</sub>AsH. 4-IO(C<sub>6</sub>H<sub>4</sub>)AsH<sub>2</sub> and (Ph<sub>3</sub>As)<sub>2</sub>O yield 4,4'-dihydroxyarsenobenzene and Ph<sub>3</sub>As; 4-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>AsH<sub>2</sub> gives the 4,4'-di-NH<sub>2</sub> deriv. and Ph<sub>3</sub>As. C. J. West

Hydrolysis of substituted sulfonanilides. II. Margaret Pezold, R. S. Schreiber and R. L. Shriner. *J. Am. Chem. Soc.* 56, 996-7(1934); cf. C. A. 28, 1674<sup>4</sup>.—A study of the alk. cleavage of substituted benzenesulfonanilides indicates that NO<sub>2</sub> groups are more effective in promoting the cleavage than Br or Me groups. Wt., size or steric hindrance effects are not factors in this cleavage. The following new compds. are reported: 2,4-dibromobenzene-sulfonanilide, m. 145.4-6.5° (N-Me deriv., b. 210-4°); 2,4,6-tri-Br deriv., m. 118° (N-Me deriv., m. 148-8.5°); 2,4,6-tri-Me deriv., m. 108-9° (N-Me deriv., m. 95-6°). The following figures give the temp. and percentage of hydrolysis by means of 80% NaOH: PhSO<sub>2</sub>NHPh, 250°, 0; 2,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>SO<sub>2</sub>NHPh, 170-225°, 0; N-Me deriv., 185-225°, 0; 2,4-Br<sub>2</sub>C<sub>6</sub>H<sub>3</sub>SO<sub>2</sub>NHPh, 210-5°, 0.8%; N-Me deriv., 210-5°, 0.56%; 2,4,6-Br<sub>3</sub>C<sub>6</sub>H<sub>2</sub>SO<sub>2</sub>NHPh, 210-5°, 5.3%; N-Me deriv., 210-5°, 3.4%; 2,4-(O<sub>2</sub>N)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>SO<sub>2</sub>NHPh, 155°, 79%; N-Me deriv., 155°, 71%. *o*-m-C<sub>6</sub>H<sub>3</sub>(NO<sub>2</sub>)<sub>3</sub> could not be sulfonated and all attempts to obtain 2,4,6-(O<sub>2</sub>N)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>SO<sub>2</sub>Cl have failed. Picryl chloride and Na<sub>2</sub>S<sub>2</sub> give almost quant. 2,2',4,4',6,6'-hexanitrodiphenyl sulfide, decomp. 227-8°. C. J. W.

The hydrolytic decomposition of *o*-xylenesulfonic acid. N. Kirzhner. *J. Gen. Chem.* (U. S. S. R.) 3, 578-80(1933). When 20 cc. *o*-xylene (I) was shaken with 24 cc. concd. H<sub>2</sub>SO<sub>4</sub> (II) 68% of I dissolved in 0.5 hr. and 82% in 2 hrs. Earlier expts. (C. A. 20, 2316) showed that under the same conditions 64% of *p*-xylene (III) dissolves in 0.5 hr. and only 68% in 2 hrs. The sulfonic acid (IV) from I is more stable toward hydrolysis than that (V) from III. This greater stability is attributed to the fact that the SO<sub>3</sub>H group occupies a position para to one Me group. 2,3-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub>SO<sub>3</sub>H in the presence of H<sub>2</sub>SO<sub>4</sub> isomerizes to the 3,4-acid at a temp. below that required for hydrolysis to I. When I (40 cc.), dissolved in 48 cc. II by heating on a water bath, was dild. with 40 cc. H<sub>2</sub>O and heated, regeneration of I began at 150° and continued to 210° when the I formation practically ceased because of concn. of the H<sub>2</sub>SO<sub>4</sub>; 23.2% of the IV was decompd. in this 1st distn. After repeating the process 6 times, adding 40 cc. H<sub>2</sub>O and recovering I from 160-210° each time, 73.6% of the IV had been hydrolyzed. Under similar conditions V is 67% hydrolyzed after 1 distn. and 96% after 2 distns. If III is dissolved in 1.8 vols. of II instead of 1.2 vols. and the soln. is dild. with 0.5 vol. of H<sub>2</sub>O and distd., 93% of III is regenerated by 1 distn. With I no increase in yield of the hydrocarbon was observed following an increase in the proportion of II taken. Lewis W. Butz

Hydrogenation of oxygen-containing compounds. I. The catalytic reduction of phenol and *o*-cresol. B. L. Moldavskii and S. E. Livshitz. *J. Gen. Chem.* (U. S. S. R.) 3, 603-14(1933).—Phenol (I) and *o*-cresol (II) were hydrogenated at various pressures at 330-70° in the presence of MoS<sub>3</sub>. The app. consisted of a Bergius autoclave rotating 50 times per min. and furnished with a thermocouple. The catalyst was prepd. by reducing MoS<sub>3</sub> in the autoclave with H<sub>2</sub> at 60 atm. and 350-80° for 6 hrs., the MoS<sub>3</sub> being poured from the autoclave into a vessel filled with CO<sub>2</sub> (freshly prepd. MoS<sub>3</sub> is pyrophoric) and then sieved and kept in CO<sub>2</sub>. The MoS<sub>3</sub> was prepd. by satg. an NH<sub>4</sub>OH soln. of NH<sub>4</sub> molybdate with H<sub>2</sub>S and decomp. the resulting soln.

with dil. H<sub>2</sub>SO<sub>4</sub>. Natural MoS<sub>3</sub> (molybdenite) was an inferior catalyst. I gave 90% PhH at 25 atm. As the pressure increased more C<sub>6</sub>H<sub>12</sub> + C<sub>6</sub>H<sub>10</sub> was formed (25 atm. 10%, 50 atm. 17%, 100 atm. 30%), although the ratio C<sub>6</sub>H<sub>10</sub>:C<sub>6</sub>H<sub>12</sub> decreased. C<sub>6</sub>H<sub>11</sub>Ph (III) and *p*-C<sub>6</sub>H<sub>4</sub>(C<sub>6</sub>H<sub>5</sub>)OH (IV) were by-products. II gave similar yields of PhMe, C<sub>6</sub>H<sub>11</sub>Me, C<sub>6</sub>H<sub>5</sub>Me and a substance which is probably MeC<sub>6</sub>H<sub>4</sub>C<sub>6</sub>H<sub>4</sub>Me (V). No MeC<sub>6</sub>H<sub>4</sub>H<sub>2</sub>C<sub>6</sub>H<sub>4</sub>(OH)Me was found. The yields of C<sub>6</sub>H<sub>10</sub> under given conditions were greater than those of C<sub>6</sub>H<sub>5</sub>Me. Satd. alcs. were not found. Hydrogenation of PhH and PhMe at 350° and 125 atm. with 5% MoS<sub>3</sub> gave only 4% conversion. It is therefore concluded that the hydroaromatic substances are formed directly from I and

II, e. g., I  $\xrightarrow{3H_2}$  C<sub>6</sub>H<sub>11</sub>OH  $\xrightarrow{-H_2O}$  C<sub>6</sub>H<sub>10</sub>  $\xrightarrow{H_2}$  C<sub>6</sub>H<sub>12</sub>. IV may arise from condensation of C<sub>6</sub>H<sub>11</sub>OH and PhOH, and C<sub>6</sub>H<sub>11</sub>Ph by hydrogenation of IV. This mechanism is supported by the observation that V is oxidized to *m*-C<sub>6</sub>H<sub>4</sub>(CO<sub>2</sub>H)<sub>2</sub>, since direct condensation of MeC<sub>6</sub>H<sub>4</sub>OH and PhMe would give hydrocarbons oxidizing to *o*- and *p*-C<sub>6</sub>H<sub>4</sub>(CO<sub>2</sub>H)<sub>2</sub>. There were calcd. the energy of activation and the temp. coeff. of av. velocity of reduction and hydrogenation of I and II for the temp. interval 330-70°. Lewis W. Butz

Rearrangement of phenyl ethers. Course of the reaction in the presence of foreign aromatic bodies. Richard A. Smith. *J. Am. Chem. Soc.* 56, 717-18(1934); cf. C. A. 27, 5067. —PhOCHMe<sub>2</sub> and AlCl<sub>3</sub> gave 65% of phenolic products, of which 10% was diisopropylphenol, 5% high-boiling material and the remainder *o*- and *p*-Me<sub>2</sub>CHC<sub>6</sub>H<sub>4</sub>OH, the *p*-isomer predominating; in the presence of 1/2 mol. quantity of Ph<sub>2</sub>O the yield of the same products was 30%; the other products were *o*- and *p*-isopropylphenyl Ph ether, the *p*-isomer b. 288.9°, d<sub>4</sub> 1.041, n<sub>D</sub><sup>20</sup> 1.5609; the *o*-isomer b. 263.4°, d<sub>4</sub> 1.053, n<sub>D</sub><sup>20</sup> 1.5688; free PhOH in 33% yield was obtained. *p*-MeC<sub>6</sub>H<sub>4</sub>OCMe<sub>2</sub> with AlCl<sub>3</sub> alone gives 70% of 4,2-Me(C<sub>6</sub>H<sub>4</sub>)C<sub>6</sub>H<sub>4</sub>OH; in the presence of 3 vols. of C<sub>6</sub>H<sub>6</sub>, *p*-MeC<sub>6</sub>H<sub>4</sub>OH is the predominant alkali-sol. product; the alkali-insol. material consisted of C<sub>6</sub>H<sub>6</sub>, cumene (60%) and higher-boiling materials; in the presence of excess Ph<sub>2</sub>O there was 8 10% isomerization product, about 5% *p*-MeC<sub>6</sub>H<sub>4</sub>OH and about 40% isopropyl-substituted Ph<sub>2</sub>O. PhOCH<sub>2</sub>CHMe<sub>2</sub> in the presence of excess C<sub>6</sub>H<sub>6</sub> yields 5-6% *p*-Me<sub>2</sub>CC<sub>6</sub>H<sub>4</sub>OH, 70% of the ether being converted into PhCMe<sub>2</sub> and some di- and tri-*tert*-butylbenzene. In the cases of Ph ether isomerizations reported the primary course of the reaction is intermol. in character and the reaction therefore involves scission. C. J. West

*p*-Nitrodiphenyl ether. Ray Q. Brewster and Theodore Groening. *Org. Syntheses* 14, 66-7(1934). —PhOK and *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>Cl with Cu catalyst give 80-2% of *p*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OPh; the *o*-NO<sub>2</sub> deriv. results in 84% yield. Details are given of the prepn. of Cu powder. C. J. West

*o*-Bromophenol. Ralph C. Huston and Murel M. Ballard. *Org. Syntheses* 14, 14 16(1934). —PhOH is sulfonated, the Na salt brominated and the SO<sub>3</sub>H groups are removed by hydrolysis, giving 40-4% *o*-BrC<sub>6</sub>H<sub>4</sub>OH. C. J. West

Diphenyl sulfide. W. W. Hartman, L. A. Smith and J. B. Dickey. *Org. Syntheses* 14, 36-7(1934). —See C. A. 27, 71. C. J. West

Some derivatives of 3,5-dibromo-1-ethoxy-2-aminobenzene and 4,6-dibromo-1-ethoxy-2-aminobenzene. E. Bureš and B. Tusarová. *Časopis Českoslov. Lékárnictva* 14, 1-14(1934). —3,5-Dibromo-1-ethoxy-2-aminobenzene (I), m. 57°, was prepd. by bromination of *o*-phenetidine in glacial AcOH. Derivs. of I prepd. were: HCl salt; sulfate, m. 145°; di-Ac deriv., m. 108°; Bz deriv., m. 151°; *N*-Et deriv., b. 152°. 3,5-Dibromo-1-ethoxybenzene (II), b. 268°. Derivs. of II: 4-nitro, m. 128°; 2-HO; 2-Cl; 2-Br, m. 72°; 2-I, m. 82°. The bromination of *o*-acetophenetidine, in glacial AcOH, leads to 4,6-dibromo-1-ethoxy-2-acetamidobenzene, m. 141°, which on sapon. gave 4,6-dibromo-1-ethoxy-2-aminobenzene (III), m. 60°. Derivs. of III prepd. were: HCl salt; di-Ac deriv., m. 151°; Bz deriv. m. 159°;

di-Me deriv. Derivs. of 4,6-dibromo-1-ethoxybenzene: 2-HO; 2-Cl, m. 61°; 2-Br, m. 73°; 2-I, m. 69°.

William J. Husa

Action of nascent thiocyanogen on bi- and trivalent phenols. Guido Machek. *Monatsh.* 63, 216-19 (1933).—Nascent SCN does not react with hydroquinone, resorcinol, pyrogallol and phloroglucinol. With pyrocatechol it gives the compd.  $C_6H_3(OH)_2SCN$ , m. 142° (48% yield); the di-Ar deriv. m. 58° (both m. ps. corr.). C. J. W.

Tautomerism of quinone oxime-*p*-nitrosophenol systems. Leigh C. Anderson and R. L. Yanke. *J. Am. Chem. Soc.* 56, 732-5 (1934).—Absorption spectra data indicate that the equil. mixt. of quinone monoxime and *p*-ONC<sub>6</sub>H<sub>4</sub>OH exists largely in the quinonoid modification in dioxane, CHCl<sub>3</sub>, abs. EtOH and aq. acid solns. The absorption spectrum of 3-chloroquinone 4-oxime is very similar to that of its Me ether, while that of 3,4-Cl-(ON)C<sub>6</sub>H<sub>3</sub>OH is unlike that of its ether or isomeric quinonoid modification. This difference is due neither to ionization nor to assocn. of the ONC<sub>6</sub>H<sub>4</sub>OH form. The absorption spectra of alk. solns. of the quinone oximes are due to a highly ionized form, and it appears probable that they are also due mostly to the ion from the quinonoid modification. Various curves are given. C. J. West

Optical method for the study of reversible organic oxidation-reduction systems. II. Halogenated benzoquinones. D. E. Kvalnes. *J. Am. Chem. Soc.* 56, 667-70 (1934); cf. *C. A.* 26, 4314. —The detn. of the oxidation-reduction potentials of the known haloquinones has been completed. The relative potentials in C<sub>6</sub>H<sub>6</sub> of benzoquinone, its Cl, 2,6-, 2,5- and 2,3-di-Cl, tri-Cl and tetra-Cl, Br, 2,6- and 2,5-di-Br, tri-Br and tetra-Br, I and 2,6-di-I derivs. have been calcd. by arbitrarily assigning the value of 0.711 v. to the benzoquinone hydroquinone system in C<sub>6</sub>H<sub>6</sub>; these values have been compared with the electrochemically detd. potentials in EtOH and H<sub>2</sub>O. The introduction of any 1 of the 3 halogens results, in aq. soln., in only a slight increase in the potential (13, 16 and 7 mv. for Cl, Br and I), but in EtOH the increase amts. to 25 and 26 mv. for Cl and Br, and in C<sub>6</sub>H<sub>6</sub> it is practically the same (23, 26 and 26 mv. for Cl, Br and I). The relationship approaches more nearly that for the gaseous state in C<sub>6</sub>H<sub>6</sub> than in either of the other solvents. Any conclusions regarding the influence of the positions of the substituents seem hardly justified. 3-Iodo-4-amino-phenol, m. 140° with charring; oxidation gives iodoquinone, reddish orange, m. 62°; iodoquinone, m. 115-16°; diacetate, m. 86-7°. III. Preparation and use of a new optically active standard. *Ibid.* 670-2.—*d*-Camphor-10-sulfonyl- $\alpha$ -naphthohydroquinone, m. 159-60°,  $[\alpha]_{D}^{25}$  44.7° (C<sub>6</sub>H<sub>6</sub>, c 0.3916); the quinone, bright yellow, m. 131°,  $[\alpha]_{D}^{25}$  355° (C<sub>6</sub>H<sub>6</sub>, c 0.2524). The *p*-tolylsulfonyl derivs. m. 181° and 172-3°; the *p*-bromophenylsulfonyl derivs. m. 221-2° (decompn.) and 175°. The introduction of a Me group into benzoquinone results in a marked decrease (59 mv.) in the relative potential of the quinone; the effect of the 2nd Me group is not quite as great as the 1st and its position is of no importance. The decrease in the potential due to the 1st MeO group is more than twice that due to the 2nd MeO group (69 and 30 mv., resp.). A PhO group is less efficient than a Me or MeO group in decreasing the potential of the quinone structure. With an increase in the size of the substituted alkyl group little change in potential results. A HO group causes a lowering of 111 mv. The introduction of 2 Br atoms in 2,6-dimethoxyquinone and *p*-xyloquinones causes a rise in the potential of about 40 mv. The *d*-camphor-10-sulfonyl group raises the relative potential of *p*-xyloquinone by 135 mv. In general the relative potentials in C<sub>6</sub>H<sub>6</sub> are higher than the potentiometrically detd. potentials in EtOH. C. J. West

Action of alkali on dianilindibromobenzoquinone. Murray M. Sprung. *J. Am. Chem. Soc.* 56, 691-3 (1934). —2,5-Dianilino-3,6-dibromo-*p*-benzoquinone (I), KMnO<sub>4</sub>-brown, m. 261° (decompn.), was prepd. from PhNH<sub>2</sub> and bromoanil in EtOH or from 2,5-diphenoxy-3,6-dibromoquinone and PhNH<sub>2</sub> in EtOH. I (10 g.) in 40 cc. 95% EtOH and 250 cc. 12.5% NaOH, heated 5 min.

and treated with about 450 cc. 2 N HCl, give about 3.1 g. of the 3,6-di-HO deriv. (II), lemon-yellow, m. 206° (decompn.), and about 3.2 g. of the monoanil of II, chocolate-brown, m. 139-41°; the structure of the anil was established by its hydrolysis to II and its synthesis from II and PhNH<sub>2</sub>. Both II and its anil are acidic but the former is a considerably stronger acid than the latter. Bromoanilic acid is unaffected when heated with PhNH<sub>2</sub> or when boiled with excess alkali. HO groups markedly decrease the ease of replacement of other substituent in such symmetrically substituted quinones; the ease of replacement under comparable conditions is roughly in the order PhO > Br > PhNH > OH. C. J. West

The stycerols. Ch. Prevost and Losson. *Compt. rend.* 198, 659-61 (1934).—The two *dl*-mixts. of PhCH(OH)CH<sub>2</sub>OH can be sepd. by their different solubilities as tribenzoates. The  $\beta$ -form (85% of the total of the 2 *dl*-mixts.), m. 116.5°, crystallizes from ligroin. A study of a mixt. of the  $\alpha$ - and  $\beta$ -forms gave a eutectic m. 109.5° which contained 78% of the  $\beta$ -racemic form. Benzoylation of PhCH(OBz)CH<sub>2</sub>CH<sub>2</sub> gave 10% of the  $\beta$ -form. Julius White

Constitution of tannins. I. Reduction products of chalcones and the synthesis of a typical phlobatannin. Alfred Russell. *J. Chem. Soc.* 1934, 218-21. —Since catechol is the only member of its class known to occur naturally, it is likely that phlobatannins are related, not to 3-hydroxy- but to 4-hydroxyflavans. Substances hydroxylated in position 4 have been prepd. and compared with typical natural phlobatannins. Gallacetophenone 3,4-di-Me ether and piperonal give 60% of 2-hydroxy-3,4-dimethoxy-3',4'-methyleneoxyflavone (I), orange, m. 175°; *p*-HOC<sub>6</sub>H<sub>4</sub>CHO gives 45% of 2,4'-dihydroxy-3,4-dimethoxychalcone, bright yellow, m. 106°; gallacetophenone tri-Me ether and *p*-MeOC<sub>6</sub>H<sub>4</sub>CHO give 2,3,4,4'-tetramethoxychalcone, light yellow, m. 94°. Reduction of I with Zn in EtOH-AcOH gives amorphous 4-hydroxy-7,8,4'-trimethoxyflavan, cream, m. 85-95°; 4-hydroxy-7,8,3',4'-tetramethoxyflavan, m. 90-110° (80% yield); 4-hydroxy-7,8-dimethoxy-3',4'-methyleneoxyflavan, m. 110-25° (90% yield); 4,4'-dihydroxy-7,8-dimethoxyflavan, light cream, amorphous, m. 120-5°; it turns dark red in daylight. Reduction of chalcone gives an unsatd. compd., C<sub>20</sub>H<sub>18</sub>O<sub>6</sub>, m. 192°, the 4'-HO deriv. and the 2,3,4,4'-tetra-MeO deriv. gave products m. 204-5° and 168°, resp. Resacetophenone dibenzoate and protocatechuic aldehyde dibenzoate with HCl in AcOEt give after hydrolysis 2,1,4,1'-tetrahydroxychalcone (butein), reduced by Zn in EtOH-AcOH to 4,7,3',4'-tetrahydroxyflavan, golden red vitreous mass, changing to a light red, amorphous product on grinding; a comparison with hemlock and mimosa tannins showed the same behavior in all 3 cases toward various reagents. C. J. West

Color and structure of aromatic oximes. Mine. Ramat Lucas. *Compt. rend.* 198, 97-9 (1934).—Of the 3 possible structures :C.NH.O (I), :C:NOH (II), and :C:CNH.OH

(III), I is the "transparent" and II is the "absorbent" form. Absorption spectra of compds. which must have the structure II, where type III is definitely excluded, are very similar in the form of the curve and the position of the absorption max. to those of compds. in which :NOH is replaced by either :CH<sub>2</sub> or :CHMe groups. The main differences are the lowered absorption coeffs. in the ethylenic analogs. Absorption spectrographs of the following compds. are given: PhCH:NOH, PhCH:C(H)Me, PhCMe:NOH, PhCMe:CH<sub>2</sub>, 4-MeOC<sub>6</sub>H<sub>4</sub>CH:NOH, 4-MeOC<sub>6</sub>H<sub>4</sub>CMe:CH<sub>2</sub>, 3,4-CH<sub>2</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH:NOH, 3,4-CH<sub>2</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CH:C(H)Me, 3,4-CH<sub>2</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CMe:NOH and 3,4-CH<sub>2</sub>O<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CMe:CH<sub>2</sub>. *Ibid.* 267-9. —When the :NOH group in "absorbent" oximes is replaced by :CH or :CHMe, the absorption spectra are scarcely altered. However, :CHPh has the effect of changing the form of the absorption curve and shifting it nearer the visible spectrum. Oximes of all ketones examd. have the CHCR:NOH (I) form. The tautomeric C:CR(NH)OH form can only be present in traces, as evidenced by the

similarity in the shape and position of the absorption curves of  $\text{PhCH}_2\text{Bz}$  and  $\text{BzMe}$  oximes with that of  $\text{PhCMe:CH}_2$  and their dissimilarity from that of  $\text{PhCMe:C(H)Ph}$ . Spectrographs of 4-MeOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>Bz and 4-MeOC<sub>6</sub>H<sub>4</sub>Ac oximes resemble closely that of 4-MeOC<sub>6</sub>H<sub>4</sub>CMe:CH<sub>2</sub> but not that of 4-MeOC<sub>6</sub>H<sub>4</sub>CMe:CHPh. The curve of  $\text{AcCO}_2\text{Et}$  is much like that of  $\text{PhCH}_2\text{CO}_2\text{Et}$  but both differ from that of  $\text{PhCH:CMeCO}_2\text{H}$ . Oximes of the following ketones evidently have form I:  $\text{ArCOCH}_2\text{Ph}$  (where  $\text{Ar} = \text{Ph}$  and 4-MeC<sub>6</sub>H<sub>4</sub>-),  $\text{Ph}_2\text{CHBz}$ ,  $\text{PhCH}_2\text{COCO}_2\text{Et}$ ,  $\text{ArCOCH}_2\text{R}'$  and  $\text{CH}_2\text{O}_2\text{C}_6\text{H}_4\text{COCH}_2\text{R}'$  (where  $\text{R}' = \text{H}$ , Me or Et). Eleven absorption curves are given. Louis E. Wise

**Anil of 2-hydroxy-6-methylbenzaldehyde.** Thomas Love. *J. Chem. Soc.* 1934, 244.—Tl<sub>2</sub> anil of 6,2-Mc-(HO)C<sub>6</sub>H<sub>3</sub>CHO, yellow, m. 51.5°; the 4-Me deriv. m. 93°. C. J. West

**Aceto-*p*-cymene.** Charles F. H. Allen. *Org. Syntheses* XIV, 1-3 (1934).—*p*-MeC<sub>6</sub>H<sub>4</sub>CHMe<sub>2</sub> and  $\text{AcCl}$  with  $\text{AlCl}_3$  give 50-55% of 2,5-Me(Me<sub>2</sub>CH)C<sub>6</sub>H<sub>3</sub>Ac; the method may be used with cumene and *tert*-butylbenzene. C. J. W.

**Gallacetophenone (2,3,4-trihydroxyacetophenone).** 1. C. Badhwar and K. Venkataraman. *Org. Syntheses* XIV, 40-1 (1934).—Pyrogallol and  $\text{Ac}_2\text{O}$  with  $\text{ZnCl}_2$  give 54-77% of 2,3,4-(HO)<sub>3</sub>C<sub>6</sub>H<sub>2</sub>Ac. Other phenolic ketones may be prep'd. in the same way. C. J. West

**Reversible addition of aromatic compounds to benzalacetophenone.** J. T. Eaton, D. B. Black and Reynold C. Fuson. *J. Am. Chem. Soc.* 56, 687-8 (1934).—*m*-Chlorobenzalacetophenone (I) m. 75-6°. I, the *o*- and *p*-isomers, the *m*- and *p*-Br and the *p*-Me deriv., in C<sub>6</sub>H<sub>6</sub>, sat'd. with  $\text{HCl}$  and treated with  $\text{AlCl}_3$ , give  $\text{Ph}_2\text{CHCH}_2\text{Bz}$ . With  $\text{PhCl}$  under similar conditions these compts. give  $\beta,\beta$ -bis-(*p*-chlorophenyl)propiofenone, m. 120-1°; this reacts with C<sub>6</sub>H<sub>6</sub> to form  $\text{Ph}_2\text{CHCH}_2\text{Bz}$ . These results are in accord with the theory that the addn. of aromatic compts. to  $\alpha,\beta$ -unsat'd. CO compts. (and similarly constituted compts.) is reversible. C. J. West

**Perkin's reaction. I. First phase of the Perkin's reaction.** Seiichi Ishikawa and Ryoji Kojima. *Science Repts. Tokyo Bunrika Daigaku* 1, 289-96 (1934); cf. C. A. 26, 115.—The hypothesis of Kalnin (C. A. 23, 823) as to the enolization of  $\text{Ac}_2\text{O}$  in the 1st phase of the Perkin's reaction is supported by findings on the enolization of  $\text{Ac}_2\text{O}$  in the presence of org. bases or salts of carboxylic acids (C. A. 22, 384) and by the isolation of an enolate of homophthalic anhydride and its condensation with  $\text{BzH}$  to form a lactone of the corresponding HIO acid (C. A. 26, 1269). Detn. of the active H content of various acid anhydrides by the method of Zerevitinov has shown that, in pyridine, any anhydride such as  $\text{Ac}_2\text{O}$ , butyric, isovaleric, succinic or phenylacetic, which contains neighboring CO<sub>2</sub>H and Me or :CH<sub>2</sub> groups, invariably has an active H content varying from 1.21 for phenylacetic to 0.14 for isovaleric. Anhydrides such as maleic and  $\beta$ -methylcrotonic, which do not possess vicinal CO<sub>2</sub>H and Me or :CH<sub>2</sub> groups show no active H under these conditions. Thus pyridine acts as an enolizing agent for acid anhydrides and the 1st phase of the Perkin's reaction may take place through such an enolization. Measurements of the active H content of  $\text{PhCH}_2\text{CN}$ , fluorene and  $\text{Ph}_2\text{CH}_2$  show that the 1st is highly enolized, fluorene is only slightly so and the latter not at all. The tautomerization of fluorene may be due to the influence of the base on the :CH<sub>2</sub> group and it is surmised that the 1st phase of the Perkin's reaction is a loosening of the H atom of the Me or :CH<sub>2</sub> group adjacent to the CO<sub>2</sub>H group of the acid anhydride by the basic substance. Since it was found that enolization phenomena take place also in anisole and xylene (C. A. 26, 4009; 27, 1620) the degree of enolization of the anhydride may depend not only on the basicity but on some other property of the solvent used in the reaction. A modified Zerevitinov reaction flask permitting the use of an inert gas in the detn. and the methods of purification of the materials are described. A tabulation of the exptl. results is recorded. II. Condensation of  $\beta$ -methyl crotonic anhydride with aldehydes. Seiichi Ishikawa and Hatusaka Katoh. *Ibid.* 297-305.—

In the presence of  $\text{NEt}_3$  condensation of  $\beta$ -methylcrotonic anhydride (I) with  $\text{BzH}$  gave 38% of  $\alpha$ -isopropenylcinnamic acid (II), C<sub>11</sub>H<sub>10</sub>O<sub>2</sub>, m. 133° (cor.). II formed  $\text{HCHO}$  on ozonization and by catalytic hydrogenation in the presence of  $\text{Pd-BaSO}_4$  was reduced to a tetrahydro acid which, on warming with  $\text{SOCl}_2$  and  $\text{PhNH}_2$  in pyridine, was converted into the anilide, C<sub>11</sub>H<sub>11</sub>NO, m. 126.1° (all m. ps. cor.), identical with the comp'd. prep'd. synthetically from  $\beta$ -benzylacetoacetic ester, b<sub>3</sub> 149-154°, by conversion through  $\alpha$ -benzyl- $\alpha$ -isopropylacetoacetic ester, b<sub>3</sub> 143-54°, into  $\alpha$ -isopropylhydrocinnamic acid, b<sub>3</sub> 155-60°. Substitution of  $\text{AcOK}$ , pyridine and quinoline for  $\text{NEt}_3$  gave decreasing amts. of II, suggesting that the yields are directly proportional to the strength of the base employed. Chem. structure and other factors than the basic strength must be considered since the secondary amines piperidine and  $\text{HNEt}_2$  are ineffectual in promoting the reaction. I was also condensed, in the presence of  $\text{NEt}_3$ , with  $\text{PhCH:CHCHO}$ , *o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>CHO, MeO-C<sub>6</sub>H<sub>4</sub>CHO, piperonal and furfural to give  $\alpha$ -isopropenylcinnamylacrylic acid, m. 167°;  $\alpha$ -isopropenyl-*o*-nitrocinnamic acid, C<sub>12</sub>H<sub>11</sub>NO<sub>3</sub>, m. 192°;  $\alpha$ -isopropenyl-*p*-methoxycinnamic acid, C<sub>12</sub>H<sub>11</sub>O<sub>3</sub>, m. 175.6°;  $\alpha$ -isopropenyl-3,4-methylenedioxycinnamic acid, C<sub>13</sub>H<sub>12</sub>O<sub>4</sub>, m. 154-8°;  $\alpha$ -isopropenylfurfuralacetic acid, C<sub>10</sub>H<sub>10</sub>O<sub>4</sub>, m. 127°. Condensation of vanillin under these conditions was not possible. In the presence of  $\text{Ac}_2\text{O}$  and  $\text{NEt}_3$  the condensation of  $\beta$ -methylcrotonic acid instead of the anhydride was successfully effected. C. R. Aldinal

**Alkaline halogenation. I. The chlorination of sodium benzoate.** J. C. Smith. *J. Chem. Soc.* 1934, 213-18; cf. C. A. 27, 3023. Analysis of the products of the chlorination of  $\text{BzONa}$  gives *o*-substitution 47, *m*- 33 and *p*- 20%. Details of the method of analysis of the chlorination products are given. The f. p.-solv. curves are given for the systems *o*- and *m*-ClC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H,  $\text{BzOH}$  *m*-ClC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H, ternary mixts. of  $\text{BzOH}$  with *o*- and *m*-ClC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H and quaternary mixts. of the 4 acids. C. J. West

**Orienting influences in the benzene ring. A review of experimental evidence.** John Smith Reese, IV. *Chem. Rev.* 14, 55 102 (1934). A review of exptl. evidence regarding the orienting influences of 9 substituent groups—CO<sub>2</sub>H, NO<sub>2</sub>, SO<sub>3</sub>H, CCl<sub>3</sub>, OH, NH<sub>2</sub>, Cl, Br and I—upon 3 types of secondary substitution—halogenation, nitration and sulfonation in the benzene ring. Some attention is given to derived substituents and to the role of mol. rearrangements. Many references are given. L. K.

**Benzonitrile.** M. S. Rozhdestvenskii and L. A. Zepalova-Mikhailova. *J. Applied Chem.* (U. S. S. R.) 6, 274-7 (1933).— $\text{PhCN}$  was prep'd. as follows: (I) Prepn. of the complex salt To 275 g. of com.  $\text{CuSO}_4$  (98.5-98%) in 500 cc.  $\text{H}_2\text{O}$  (70-80°) is added in a no. of batches 286 g. of KCN (100% prep'n.) in 400 cc.  $\text{H}_2\text{O}$ , 186 g. of 24%  $\text{NH}_3$  having been previously added to the KCN soln. The ppt., which is formed in the course of the reaction finally redissolves. (II) Diazotization. Aniline (186 g.) is gradually added under const. agitation to 530 g. (461 cc.) of  $\text{HCl}$  (d. 1.146) with cooling, the aniline gradually dissolving. The agitation is continued until a temp. of 20-5° is reached, when a ppt. of aniline-HCl appears. The agitation is still continued and ice is added to the substance and the temp. brought down to 2° to 0°, and finally to -15° to -20°. One hundred and thirty-eight g. of  $\text{NaNO}_2$  in 50 g.  $\text{H}_2\text{O}$  and 140 g. ice are added and the temp. is raised to 2°; this is followed by the addn. of 115 g. of  $\text{HCl}$ . (III) Steam distn. of the  $\text{PhCN}$  formed. (IV) Purifying. Washing with a  $\text{HCl}$  soln. of  $\text{SnCl}_4$  with a preliminary addn. of ether to the  $\text{PhCN}$  to facilitate the sepn. of the latter from the wash water. The ether soln. is washed a few times with 2 *N*  $\text{NaOH}$  and with water till neutral, dried with  $\text{CaCl}_2$  and distd. *in vacuo* after distg. off the ether. The air passed through the substance is dried with  $\text{CaCl}_2$  and  $\text{P}_2\text{O}_5$ . The yield is 71% of a product of which 81% b. 190°, d<sub>4</sub><sup>20</sup> 1.00664, d<sub>4</sub><sup>20</sup> 1.00485. These consts. are in agreement with those of Perquin. The appended literature index contains 32 references. A. A. Boechtingk

**Phenylmalonic and nitrophenylmalonic acids and esters.** S. Basterfield and L. A. Hamilton. *Trans. Roy. Soc. Can.* III, 27, 125-31 (1933).—Shaking  $\text{PhCH}(\text{CO}_2\text{Me})_2$  (I) in  $\text{Et}_2\text{O}$  with dil. aq.  $\text{NaOH}$  for 1 hr. at room temp. gives an aq. alk. soln. which with acid gives 80-90% of  $\text{PhCH}(\text{CO}_2\text{H})_2$  (II). The method of Wialicemus (*Ber.* 27, 1091 (1894)) gives only a 25% yield. I with concd.  $\text{HNO}_3$  and concd.  $\text{H}_2\text{SO}_4$  gives *Me p-nitrophenylmalonate* (III), m. 95°. III on hydrolysis by the above method gives only  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CO}_2\text{H}$ . II with concd.  $\text{HNO}_3$  and concd.  $\text{H}_2\text{SO}_4$  gives *o-nitrophenylmalonic acid*, m. 133° (decompn.). Contrary to expectations  $p\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CO}_2\text{Me}$  does not condense with  $(\text{OC}_2\text{Me})_2$  (cf. Rising and Stieglitz, *C. A.* 12, 908).  $p\text{-EtOOCNHC}_6\text{H}_4\text{CH}_2\text{CO}_2\text{Me}$  condenses with  $(\text{CO}_2\text{Me})_2$  to give *Me p-carboethoxyaminophenylmalonate*, viscous oil, b<sub>p</sub> 110°. Reduction of  $2,4(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{CH}(\text{CO}_2\text{Me})_2$  (IV) with  $(\text{NH}_4)_2\text{S}$  gives 2 isomeric *Me nitroaminophenylmalonates*, m. 131° and 190°. IV on hydrolysis does not give the expected acid.

R. B. Sandin  
**Preparation of  $\gamma$ -(*p*-aminophenyl)butyric acid and  $\epsilon$ -(*p*-aminophenyl)caproic acids.** J. van der Scheer. *J. Am. Chem. Soc.* 56, 744-5 (1934).— $\text{Ph}(\text{CH}_2)_3\text{CO}_2\text{H}$  (30 g.), slowly added to 140 cc. concd.  $\text{HNO}_3$  at 20-5° and allowed to stand 6 hrs., gives 5 g. of the *p-NO* deriv., m. 92-3°; reduction of 10 g. with Zn and HCl gives 6.8 g. of the *p-NH* deriv., m. 130-1°.  $\text{Ph}(\text{CH}_2)_5\text{CO}_2\text{H}$  (30 g.) gives 11 g. of the *p-NO* deriv., m. 64-5°; 10 g. give 7.5 g. of the *p-NH* deriv., m. 108-9°.

C. J. West  
**Hydrogenation of optically active compounds over nickel and copper-chromium oxide.** Everett Bowden and Homer Adkins. *J. Am. Chem. Soc.* 56, 689-91 (1934).—In these expts. the temp., rate and extent of hydrogenation and probably other variables det. the extent to which racemization occurs during the reduction of optically active esters, but no definite conclusions can be drawn with regard to these factors. In general the expts. were carried out at 250° and 150-200 atm. over various samples of Cu-Cr oxide in a Cu liner. Et  $\alpha$ -phenylpropionate,  $[\alpha]_D -22.9^\circ$ , gives 17% ester,  $[\alpha]_D -2.4^\circ$ , 33% iso-PrPh and 16% 2-phenylpropan-1-ol,  $[\alpha]_D 2.5^\circ$  (2 g. catalyst and 16 g. ester); with 6 g. catalyst to 12 g. ester there results 80% iso-PrPh and 4 g. ester,  $[\alpha]_D 1.8^\circ$ . Bu lactate,  $[\alpha]_D 4.9^\circ$ , gives 9 g. ester,  $[\alpha]_D 3^\circ$ , and 81 g. propane-1,2-diol. Menthyl  $\alpha$ -phenylbutyrate, m. 58°,  $[\alpha]_D -82^\circ$ , gives 23 g. ester with  $[\alpha]_D -66.1^\circ$ , 17 g. 2-phenylbutan-1-ol,  $[\alpha]_D -3.7^\circ$ , and 26 g. sec-BuPh,  $[\alpha]_D 0.4^\circ$ . Menthyl  $\beta$ -phenylbutyrate,  $[\alpha]_D -90.3^\circ$ , forms 9-20 g. ester and 73-61% 3-phenylbutan-1-ol,  $[\alpha]_D -26^\circ$  or  $-31.4^\circ$ , depending upon the amt. of catalyst used; a sample with  $[\alpha]_D -40.9^\circ$  gives 33-61% alc. with  $[\alpha]_D 12.2^\circ$  to  $15.7^\circ$ , depending upon the time of reduction. The recovered "menthol" has  $[\alpha]_D -17^\circ$ , d<sub>4</sub><sup>20</sup> 0.927, n<sub>D</sub><sup>20</sup> 1.4610, and is apparently an isomeric compd. or a mixt. of isomers. Et  $\alpha$ -phenylbutyrate with  $[\alpha]_D -6^\circ$  gives 3.5% ester, 50% 2-phenylbutan-1-ol,  $[\alpha]_D -0.50^\circ$ , and 24% sec-BuPh; a sample with  $[\alpha]_D -2.3^\circ$  gives 5% ester and 61% alc. with  $[\alpha]_D -0.10^\circ$ . Et  $\alpha$ -methylbutyrate,  $[\alpha]_D 3.04^\circ$ , gives 80% of 2-methylbutan-1-ol, inactive; an ester with  $[\alpha]_D -8.3^\circ$  gives 97% of alc. with  $[\alpha]_D 1.2^\circ$ ; Et  $\beta$ -methylvalerate, with  $[\alpha]_D 1.79^\circ$ , gives 90% of 3-methylpentan-1-ol,  $[\alpha]_D 1.8^\circ$ .  $\alpha$ -Ethylpelargonic acid b<sub>p</sub> 117-18°; the *l*-Et ester b<sub>p</sub> 131°, d. 0.879,  $[\alpha]_D -0.65^\circ$ ; reduction gives 50% of recovered acid,  $[\alpha]_D -0.6^\circ$ , and 50% of 2-ethylnonan-1-ol, b<sub>p</sub> 126°, d. 0.860,  $[\alpha]_D -0.20^\circ$ .  $\alpha$ -Ethyl- $\beta$ -phenylvaleric acid b<sub>p</sub> 141-3°; *d*-Et ester b<sub>p</sub> 162-5°, d. 1.000,  $[\alpha]_D 0.26^\circ$ ; reduction gives 55% recovered ester and 47% of 2-ethyl-5-phenylpentan-1-ol, b<sub>p</sub> 150-3°, d. 0.984,  $[\alpha]_D 0.26^\circ$ . 3-Phenylbutan-1-ol,  $[\alpha]_D 14^\circ$ , gives 91% of *d*-3-cyclohexylbutan-1-ol, b<sub>p</sub> 130°, d. 0.946,  $[\alpha]_D 4.02^\circ$ . The 2-Ph isomer,  $[\alpha]_D -2.4^\circ$ , gives 68% of the *l*-2-cyclohexyl isomer, b<sub>p</sub> 119-21°, d. 0.948,  $[\alpha]_D -1.22^\circ$ . In 1 expt. camphor gave 100% of "born-ol," m. 197°,  $[\alpha]_D -9.2^\circ$ , and in another expt. an " $\alpha$ -isoborneol," m. 208-9°,  $[\alpha]_D -22.3^\circ$ .

C. J. West

The oxidation of organic compounds by potassium

permanganate under the conditions of the Kubel-Tiemann method. M. L. Compennolle. *Natuurw. Tijdschrift* 15, 237-43 (1933).—The attack of various org. compds. in dil. soln. by  $\text{KMnO}_4\text{-H}_2\text{SO}_4$  under the conditions of the Kubel-Tiemann oxidation method (for detn. of org. material in drinking water) was studied. For various concns. the extent of the oxidation is tabulated. For *o*-, *m*- and *p*-hydroxybenzoic acid the oxidation is complete at the highest concn. (5 mg.); it drops off for lower concns. (0.5 mg.), salicylic acid being oxidized most readily. For aminobenzoic acids the oxidation is incomplete (max. 12% at the lowest concn.), the *o*-compd. being most easily attacked. The nitrobenzoic acids are still harder to oxidize, the *o*-acid again being the easiest. Increased oxidation is observed in the series of N compds. urea, hippuric acid, asparagine, aspartic acid, glycine, dimethylphenylpyrazolone, uric acid, the action increasing with decreasing concn. Many references are given.

B. J. C. van der Hoeven  
**2-Hydroxy-3,5-diiodobenzoic acid (diiodosalicylic acid).** G. H. Woollett and W. W. Johnson. *Org. Syntheses* 14, 52-3 (1934).— $\text{o-HOC}_6\text{H}_3\text{CO}_2\text{H}$  in AcOH with ICl gives 91-2% of 3,5,2-I<sub>3</sub>(HO)C<sub>6</sub>H<sub>3</sub>CO<sub>2</sub>H; 4-HOC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H gives 84% of the 3,5-di-I deriv. Directions are given for the prepn. of ICl in 87% yield.

C. J. West  
***p*-Hydroxybenzoic acid.** C. A. Buehler and W. E. Cate. *Org. Syntheses* 14, 48-50 (1934).—Heating  $\text{o-HOC}_6\text{H}_4\text{CO}_2\text{K}$  (from the acid and  $\text{K}_2\text{CO}_3$ ) at 230° and acidification give 70-80% of  $p\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$ .

C. J. W.  
**The reactions of diphenyl thiocarbonate with the salts of heavy metals.** G. A. Garkusha. *J. Gen. Chem.* (U. S. S. R.) 3, 596-602 (1933).— $(\text{PhO})_2\text{CS}$  (I) reacts with salts of heavy metals as follows:  $\text{I} + 2\text{AgCl} + \text{H}_2\text{O} \rightarrow (\text{PhO})_2\text{CO}$  (II) +  $\text{H}_2\text{S} + 2\text{AgCl}$ ;  $\text{H}_2\text{S} + 2\text{AgCl} \rightarrow \text{Ag}_2\text{S} + 2\text{HCl}$ . Boiling dry I (2.3 g.) and 1.4 g. freshly pptd. AgCl in PhH for 64 hrs. gave no decompn. products. In 90% EtOH the same substances did not react during 12 hrs. in the cold, but after 40 hrs. boiling reaction was complete according to the above equations. I and AgI in 90% EtOH had not reacted after 80 hrs. boiling. I (2.3 g.) and 2.7 g.  $\text{HgCl}_2$  in  $\text{Et}_2\text{O}$  in the presence of a little  $\text{H}_2\text{O}$  gave II and  $\text{Hg}_2\text{Cl}_2$ . I (4 g.) and 8.2 g. red  $\text{HgI}_2$  did not react when heated 6 hrs. at 200° and 20 mm. The same substances heated for 18 hrs. in aq. EtOH gave  $\text{HgS}$  and II.  $\text{AcOAg}$ ,  $\text{C}_6\text{H}_4(\text{CO}_2\text{Ag})_2$ ,  $(\text{CO}_2\text{Ag})_2$ ,  $\text{C}_6\text{H}_4(\text{OH})(\text{CO}_2\text{Ag})$  and  $(\text{BzO})_2\text{Cu}$  react with I in moist PhH to give the corresponding acids,  $\text{Ag}_2\text{S}$  or  $\text{CuS}$  and II, in dry PhH the reaction is much slower, the products being metallic sulfide, II and acid anhydride, except that  $(\text{CO}_2\text{Ag})_2$  gives  $\text{CO} + \text{CO}_2$ , and  $\text{C}_6\text{H}_4(\text{OH})\text{CO}_2\text{Ag}$  an intermol. polymer of  $\text{C}_6\text{H}_4(\text{OH})\text{CO}_2\text{H}$ . I reacts with  $(\text{AcNH})_2\text{Hg}$  or  $(\text{BzNH})_2\text{Hg}$  in the presence of  $\text{H}_2\text{O}$  to give II,  $\text{HgS}$  and  $\text{AcNH}_3$  or  $\text{BzNH}_3$ . There is no reaction in the absence of  $\text{H}_2\text{O}$  on heating at 100° for 20 hrs.

Lewis W. Butz  
**Oxidation of some  $\alpha$ -hydroxy acids with lead tetraacetate.** Haruomi Oeda. *Bull. Chem. Soc. Japan* 9, 8-14 (1934).—Oxidation with  $\text{Pb}(\text{OAc})_4$  in  $\text{C}_6\text{H}_6$  or glacial HOAc of the acids  $\text{RCH}(\text{OH})\text{CO}_2\text{H}$  gives aldehydes  $\text{RCHO}$ , where  $\text{R} = \text{Me}$ , iso-Bu, Ph,  $\text{PhCH}_2$  and *p*- $\text{HOC}_6\text{H}_4\text{CH}_2$ .

H. A. Beatty  
**Reactions of certain  $\beta$ -ketonic acids.** I. Ketonic  $\beta$ -lactones. E. P. Kohler and R. H. Kimball. *J. Am. Chem. Soc.* 56, 729-31 (1934).— $\text{PhCH}(\text{CO}_2\text{H})\text{CHBrBz}$  in 1%  $\text{NaHCO}_3$  gives 90% of  $\alpha$ -phenyl- $\beta$ -benzoylpropiolactone (I), m. 95°; the action of  $\text{NaHCO}_3$  on I gives  $\alpha$ -phenyl- $\beta$ -hydroxy- $\beta$ -benzoylpropionic acid, m. 182°, the MeOH soln., satd. with HBr, gives the Me ester of the original Br acid. A 2nd HO acid is also formed. The action of 5% aq. NaOH on I gives a small amt. of  $\text{PhCH}_2\text{CPh}(\text{OH})\text{CO}_2\text{H}$ , m. 165°, *hydroxydiphenyl ketone*, m. 115° (whose structure was established by its synthesis from  $(\text{PhCH}_2)_2\text{CO}$  through the Br deriv.), and  $\alpha$ -hydroxy- $\beta$ -phenylpropionophenone, m. 66° (whose structure was established by brominating  $\text{PhCH}_2\text{CH}_2\text{Bz}$  (the  $\alpha$ -Br deriv. m. 56-7°) and replacing the Br by HO). The Br acid, dissolved in  $\text{C}_6\text{H}_6\text{N}$ , gives the  $\text{C}_6\text{H}_6\text{N}$  salt of *cis*-phenylbenzoylacrylic acid (II), but when it is extd. from

an  $\text{Et}_2\text{O}$  soln. with a dil. aq. soln. of the base it forms a  $\text{C}_8\text{H}_8\text{N}$  salt, m.  $135^\circ$  (disocc.). Traces of  $\text{C}_8\text{H}_8\text{N}$ , like traces of  $\text{AcOK}$ , generally induce polymerization of I in  $\text{MeOH}$  or  $\text{Me}_2\text{CO}$ , but excess of  $\text{C}_8\text{H}_8\text{N}$  dissolves the polymer and both the lactone and polymer are converted quantitatively into II. I and 10%  $\text{H}_2\text{SO}_4$ , boiled 20 hrs., give  $\alpha$ -phenyl- $\beta$ -hydroxy- $\beta$ -benzoylpropionic acid, m.  $132^\circ$ ;  $\text{H}_2\text{SO}_4$  in  $\text{MeOH}$  gives the *Me ester*, m.  $89^\circ$ , of this acid. I and  $\text{HBr}$  give the original  $\text{Br}$  acid;  $\text{HBr}$  in  $\text{MeOH}$  gives the *Me ester* of the higher-melting  $\text{Br}$  acid.

**Preparation of homopiperonylic acid.** K. H. Slotta and G. Haberland. *J. prakt. Chem.* 139, 211–19 (1934).—Piperonal is transformed through the nitrile (I) and the imino ether into *Me 3,4-methylenedioxy-mandelic acid*, m.  $99^\circ$  (87% yield); with  $\text{SOCl}_2$  in  $\text{C}_6\text{H}_6$  there results 92% of *Me 3,4-methylenedioxyphenylchloroacetate* (II), b.p.  $173^\circ$ . With  $\text{MeOH-NaOH}$  II gives *3,4-methylenedioxyphenyl-methoxyacetic acid*, m.  $80^\circ$  (94.5% yield). Reduction of II with  $\text{Zn}$  in dil.  $\text{Me}_2\text{CO}$  gives 30–6% of homopiperonylic acid and 53–60% of methylenedioxy-mandelic acid. I treated with  $\text{Ac}_2\text{O}$  and  $\text{C}_6\text{H}_5\text{N}$  and then with  $\text{HCl}$  in  $\text{MeOH-HCl}$  forms 80.5% of the imino ether, m.  $131^\circ$  (decompn.), of *Me 3,4-methylenedioxy-O-acetylmandelate*, m.  $102^\circ$ . 3,4,5-( $\text{MeO}$ ),  $\text{C}_6\text{H}_3\text{CHO}$  and  $\text{KCN}$  give 91% of the nitrile of trimethoxymandelic acid, m.  $101^\circ$ ; warming with  $\text{Ac}_2\text{O}$  and  $\text{C}_6\text{H}_5\text{N}$  and satg. with  $\text{HCl}$  give the imino ether, m.  $120^\circ$ , of *Me 3,4,5-trimethoxy-O-acetylmandelate*, m.  $82^\circ$  (82% yield).

**2-Nitrohomoveratric acid.** K. H. Slotta and F. Lauer sen. *J. prakt. Chem.* 139, 220–8 (1934).—Details are given of the prepn. of 2-nitrovanillin through the  $\text{Ac}$  deriv.; this was transformed into 2,3,4- $\text{O}_2\text{N}(\text{MeO})_3\text{C}_6\text{H}_2\text{CHO}$ , 2,3,4- $\text{O}_2\text{N}(\text{MeO})_3\text{C}_6\text{H}_2\text{CH}_2\text{OH}$  and 2,3,4- $\text{O}_2\text{N}(\text{MeO})_3\text{C}_6\text{H}_2\text{CH}_2\text{Cl}$ ; through the nitrile and imino ether this yields 2-nitrohomoveratric acid (29% on the original vanillin). Reduction of 2,3,4- $\text{O}_2\text{N}(\text{MeO})_3\text{C}_6\text{H}_2\text{CHO}$  in abs.  $\text{EtOH}$  with  $\text{Al}(\text{OEt})_3$  gives 97% of 2,3,4- $\text{O}_2\text{N}(\text{MeO})_3\text{C}_6\text{H}_2\text{CH}_2\text{OH}$ ; this yields 99% of the bromide, b.p.  $155$ – $80^\circ$ , m.  $71^\circ$ ; the yield of the cyanide is 85%. The reduction of 2- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$  with  $\text{Al}(\text{OEt})_3$  gives nearly quantitatively 2- $\text{O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{OH}$ ; this does not form a chloride with concd.  $\text{HCl}$ .

**Chemical studies of algine and alginic acid.** Manuel López Gómez. *Inst. espan. oceanograf. Notas y resúmenes Ser. II*, No. 74, 98 pp. (1933).—Alginic acid (I), from *Fucus vesiculosus*, *Laminaria flexicaulis* and *Ascophyllum nodosum*, by extn. with  $\text{Na}_2\text{CO}_3$  and pptn. with  $\text{HCl}$ , is thermostable, carbonizes at 250–300° after softening at  $180^\circ$ , has an acid no. of 194, and contains ash varying in different preps. from 0.47 to 2.5%, depending on the source and method of purification and consisting of  $\text{Al}$ ,  $\text{Ca}$  and  $\text{Mg}$ . This appears not to be bound in salt formation and is incompletely removed by dialysis. *Na salt* of I,  $[\alpha]_D^{20}$  –130.5–132°,  $n_D^{20}$  1.3343. From analyses of many other salts the formula  $(\text{C}_6\text{H}_7\text{O}_7)_n$  is indicated, where  $n$  is 4 or a multiple thereof and with 1 replaceable  $\text{H}$  per unit. When heated with mineral acids I gives  $\text{CO}_2$  and furfural, indicating the presence of uronic acids, and it also gives the characteristic reactions of a pentose. No evidence of a free aldehyde group was obtained. Acid hydrolysis gives exclusively *d-mannuronic acid* (II), identified by the cinchonine salt, and in quantities warranting the assumption that I is a polymer of II. In acidic strength I is of the order of  $\text{ClCH}_2\text{CO}_2\text{H}$ . Contrary to the experience of previous workers G.'s algin contained no  $\text{N}$ . The cellulose in the so-called cellulose residue after extn. of I does not possess the properties of true cellulose. A very good bibliography is given.

**Synthesis of pinastric acid.** Georg Koller and Adolf Klein. *Monatsh.* 63, 213–15 (1934).—*p*- $\text{MeOC}_6\text{H}_4\text{CH}_2\text{CN}$  and  $\text{PhCH}_2\text{CN}$  with  $(\text{CO}_2\text{Na})_2$  in  $\text{EtOH}$  give *p*-methoxy-pulvic acid dinitrile, decomp.  $255^\circ$ ; heating with concd.  $\text{HCl}$  2 hrs. at  $130^\circ$  gives a crude dilactone, which yields pinastric acid with  $\text{MeOH-KOH}$  (*C. A.* 27, 2683).

**Saxatilis acid and capraric acid.** Georg Koller, Adolf Klein and Karl Pöpl. *Monatsh.* 63, 301–10 (1933).—

Protocapreric acid,  $\text{C}_{16}\text{H}_{32}\text{O}_8$ , is obtained by extg. *Parmelia caperata* with  $\text{Et}_2\text{O}$ , extg. the residue with  $\text{C}_6\text{H}_6$  and crystg. from  $\text{Me}_2\text{CO}$ ; the monobromoanilide was prepd. Boiling the acid with  $\text{EtOH}$  for 12 hrs. ( $\text{H}$  atm.) gives an *EtO deriv.*, decomp.  $260^\circ$ . With  $\text{Zn}$  and  $\text{NaOH}$  the acid gives orcinol. The hydroxylactone ring is shown by the addn. of  $\text{AcOH}$  (splitting off of 1  $\text{H}$ ), giving the compd.  $\text{C}_{16}\text{H}_{32}\text{O}_{10}$ ; the acid also probably contains an ether  $\text{O}$  atom. Saxatilis acid,  $\text{C}_{16}\text{H}_{32}\text{O}_{10}$ , is obtained in 30 g. yield (crude) from 800 g. *Parmelia saxatilis*; it is a dibasic acid; it yields a *di-m-bromoanilide*, decomp.  $280^\circ$ ; heating with  $\text{EtOH}$  causes the introduction of 2  $\text{EtO}$  residues (2  $\text{H}$  displaced), the compd. decomp.  $172^\circ$ ;  $\text{Zn}$  and  $\text{NaOH}$  give atranol but no orcinol. The di- $\text{EtO}$  compd. gives a monobromoanilide, yellow. Provisional formulas are suggested.

***d*- $\Delta^8(9)$ -*p*-Menthadiene from *d*-pulegone.** Wm. J. Grubb and John Read. *J. Chem. Soc.* 1934, 242–3.—*d*-Pulegone reacts slowly with (iso- $\text{PrO}$ ) $_2\text{Al}$  in dry iso- $\text{PrOH}$ ; no pulegol is found, the sole product being *d*- $\Delta^8(9)$ -*p*-menthadiene, b.p.  $69^\circ$ ,  $n_D^{20}$  1.4966,  $d_4^{25}$  0.8585,  $[\alpha]_D^{25}$  140.6°; oxidation gives  $\beta$ -methyladipic acid.

**Constituents of Indian turpentine from *Pinus longifolia*, Roxb. III (continued).** A. H. Bradfield, E. M. Francis and J. L. Simonsen. *J. Chem. Soc.* 1934, 188–97; cf. *C. A.* 18, 247.—The oxidation of longifolene (I) with  $\text{O}_3$  gives  $\text{HCHO}$  and a mixt. of acid and aldehyde, which, oxidized with excess  $\text{H}_2\text{O}_2$ , gives  $\alpha$ -longifolic acid,  $\text{C}_{14}\text{H}_{26}\text{O}_2$ , m.  $140$ – $2^\circ$ ,  $[\alpha]_{441}$  –31° ( $\text{EtOH}$ ,  $c$  3.86); a labile form m.  $121$ – $2^\circ$ . Isolongifolic acid has been found to have  $[\alpha]_{441}$  –12.7° ( $\text{EtOH}$ ,  $c$  14.064); its *Me ester* has  $[\alpha]_{441}$  5.94° ( $\text{MeOH}$ ,  $c$  4.68). Thus I contains a vinyl side chain. Oxidation of I with  $\text{MnO}_2$  and  $\text{H}_2\text{SO}_4$  gives trimellitic acid and an acid, decomp.  $261$ – $5^\circ$ , whose *Me ester*,  $(\text{C}_6\text{H}_5\text{O})_n$ , m.  $145$ – $7^\circ$ . Oxidation of I with  $\text{HNO}_3$  is somewhat difficult to control and gives the following products: a tribasic acid,  $\text{C}_{14}\text{H}_{18}\text{O}_8$ , m.  $283$ – $5^\circ$ ,  $[\alpha]_{441}$  –36.25° ( $\text{Na}$  salt in  $\text{H}_2\text{O}$ ); the acid can be crystd. from concd.  $\text{HNO}_3$  and is not attacked by hot alk.  $\text{KMnO}_4$  or  $\text{CrO}_3$  in  $\text{AcOH}$ ;  $\text{Se}$  at  $300^\circ$  has no action nor has fusion with  $\text{KOH}$  or  $\text{HBr}$  in  $\text{AcOH}$  at  $180^\circ$ ; *Me ester*, m.  $73$ – $4^\circ$ ,  $[\alpha]_{441}$  42.2° ( $\text{AcOEt}$ ,  $c$  3.556); a 2nd tribasic acid,  $\text{C}_{14}\text{H}_{20}\text{O}_8$ , decomp.  $222$ – $4^\circ$ ,  $[\alpha]_{441}$  52.81° ( $\text{EtOH}$ ,  $c$  2.630); with  $\text{AcCl}$  it gives a gummy anhydride; in 1 expt., an isomeric acid, m.  $190$ – $200^\circ$  and yields a cryst. anhydride, m.  $103^\circ$ ; a dibasic acid,  $\text{C}_{11}\text{H}_{18}\text{O}_6$ , m.  $183$ – $5^\circ$ ; *as*-dimethylsuccinic acid and  $\text{Me}_2\text{C}(\text{CO}_2\text{H})_2$ . The relation of these products to the structure of I is discussed.

The acid chloride of longifolic acid in ligroin, added during 2 hrs. to twice as much ligroin, cooled and mechanically stirred, while a rapid stream of  $\text{NH}_3$  is passed in, gives a good yield of longifolamide,  $[\alpha]_{441}$  –20.5° ( $\text{MeOH}$ ,  $c$  4.197); ordinary prepn. of the amide gives principally longifonitrile, b.p.  $145$ – $50^\circ$ ; the urethan m.  $76$ – $77^\circ$ ,  $[\alpha]_{441}$  –11.1° ( $\text{MeOH}$ ,  $c$  2.624); heating with  $\text{AmONa}$  at  $160^\circ$  for 8 hrs. gives *l*-amino-*l*-methyl-longifane (II),  $\text{C}_{15}\text{H}_{25}\text{N}$ , b.p.  $150^\circ$ ,  $[\alpha]_{441}$  –35.3° ( $\text{EtOH}$ ,  $c$  10.874); *HCl salt*, decomp.  $280$ – $2^\circ$ ; *nitrile*, decomp.  $132^\circ$ ; *as*-*Ac deriv.*, m.  $191$ – $2^\circ$ ,  $[\alpha]_{441}$  –56.4° ( $\text{EtOH}$ ,  $c$  2.146); *as*-*Ac deriv.*, m.  $163$ – $5^\circ$ ; *3,5-dinitrobenzoate*, pale yellow, m.  $199$ – $200^\circ$ ,  $[\alpha]_{441}$  –12.2° ( $\text{CHCl}_3$ ,  $c$  2.372); *as*-methiodide, m.  $258$ – $9^\circ$ ; *as*-methiodide, crystals with 1 mol.  $\text{H}_2\text{O}$ , decomp.  $184^\circ$ . The hydroxides from these 2 methiodides on distn. lose  $\text{MeOH}$  with the formation of the dimethylamino base, isolated as the *HCl salt*,  $\text{C}_{14}\text{H}_{27}\text{N}\cdot\text{HCl}$ , m. above  $280^\circ$ . II, on treatment with  $\text{NaNO}_2$  in  $\text{H}_3\text{PO}_4$  and heating of the alc. mixt. with  $\text{KHSO}_4$  at  $200^\circ$ , gives a hydrocarbon, b.p.  $124^\circ$ ,  $d_4^{25}$  0.95,  $n_D^{25}$  1.4995,  $[\alpha]_{441}$  6.04° ( $\text{Me}_2\text{CO}$ ,  $c$  18.222); this is a mixt., since titration with camphoric acid peroxide gives only 54.8% unsatn.;  $\text{HCl}$  yields a liquid *HCl deriv.*,  $\text{C}_{14}\text{H}_{25}\text{Cl}$ . Oxidation of this mixt. with alk.  $\text{KMnO}_4$  is very slow but gives very small yields of a dibasic acid,  $\text{C}_{14}\text{H}_{20}\text{O}_8$ , m.  $235$ – $6^\circ$ , which forms a liquid anhydride, and a lactone,  $\text{C}_{11}\text{H}_{18}\text{O}_2$ , m.  $190^\circ$ . Oxidation with  $\text{O}_3$  and decompn. of the ozonides by catalytic hydrogenation gives  $\text{HCHO}$ , a ketone,  $\text{C}_{12}\text{H}_{18}\text{O}$  (*semicarbazone*, m.  $208$ – $9^\circ$ ) (this contains a  $\text{CH}_2$  group adjacent to the



CO group, since it yields a liquid hydroxymethylene deriv. whose semicarbazone,  $C_{14}H_{21}O_2N_2$ , m. 190°, and 1-methyldehydrolongifane,  $b_p$  125-7°,  $d_4^{25}$  0.9514,  $n_D^{25}$  1.4967,  $[\alpha]_D^{25}$  18.8° (AcOEt,  $c$  17.10), which yields a liquid HCl deriv.,  $C_{15}H_{21}Cl$ ; the mol. refraction shows an exaltation of 0.51, which is of the same order as that shown by tricyclics. A 2nd fraction of the ketone yields a 2,4-dinitrophenylhydrazon, terra cotta, m. 250-1°. Oxidation of II with  $KMnO_4$  in  $Me_2CO$  gives as the main products the  $\alpha$ -Ac deriv. of II and an acid,  $C_{16}H_{23}O_2N$ , m. 122-4°, which gives by loss of  $CO_2$  a substance, m. 144°,  $[\alpha]_D^{25}$  -69.8° (EtOH,  $c$  1.146) isomeric with the  $\alpha$ -Ac deriv. The acid yields a semicarbazide, decomp. 179-80°.

C. J. West

**Carvone series. I. Some ketones and amines.** John Read and Robert G. Johnston. *J. Chem. Soc.* 1934, 226-33.—*d*-Carvone,  $[ \alpha ]_D$  about 62°, catalytically reduced with Pd-CaCO<sub>3</sub> in MeOH, gives a *l*-rotatory carvomenthone (I),  $b_p$  98-9°,  $n_D^{25}$  1.4552,  $[\alpha]_D^{25}$  -30.62°. Oxidation of *d*-carvomenthone with  $CrO_3$  gives a *l*-carvomenthone,  $b_p$  90-6.5°,  $n_D^{25}$  1.4548,  $[\alpha]_D^{25}$  -6°; the oxime m. 99-100°,  $[\alpha]_D^{25}$  -38.7° (EtOH,  $c$  2). The dynamic isomerism of the menthones and carvomenthones may be summarized in a preliminary form as follows: *d*-menthone ( $[\alpha]_D^{30}$ )  $\rightleftharpoons$  *l*-isomenthone (-92°); *l*-carvomenthone (-6°)  $\rightleftharpoons$  *l*-isocarvomenthone (? -90°). In the carvomenthone series the equil. appears to lie further to the left and to be attained more rapidly than in the menthone series. *d*-Carvomenthylamine, prep'd. from *l*-carvomenthone oxime with  $[\alpha]_D$  -37° (EtOH,  $c$  2) by reduction with Na in abs. EtOH, and purified by crystn. of the HCl salt from AcOEt,  $b_p$  89.8-90°,  $d_4^{25}$  0.8505,  $n_D^{25}$  1.4578,  $[\alpha]_D^{25}$  12.47°,  $[\alpha]_D^{25}$  14.58°; 15.20° (CHCl<sub>3</sub>); HCl salt, m. above 250°,  $[\alpha]_D^{25}$  12.2°; formyl deriv., m. 95°,  $[\alpha]_D^{25}$  62.1°,  $[\alpha]_D^{25}$  72.8° (CHCl<sub>3</sub>,  $c$  1); Ac deriv., m. 160-1°,  $[\alpha]_D^{25}$  67.8, 79.6° (for I and 5461, so given for other derivs. also); propionyl deriv., m. 128-9°,  $[\alpha]_D^{25}$  65.7°, 77°; butyryl deriv., m. 123-1°,  $[\alpha]_D^{25}$  59.4°, 71.2°; hexoyl deriv., m. 104°,  $[\alpha]_D^{25}$  55.5°, 63.8°; octoyl deriv., m. 97-8°,  $[\alpha]_D^{25}$  50°, 56.6°; phenylacetyl deriv., m. 177°,  $[\alpha]_D^{25}$  41.7°, 47.7°; Bz deriv., m. 161°,  $[\alpha]_D^{25}$  45.1, 52.6°; *d*-camphor-10-sulfonyl deriv., m. 95°,  $[\alpha]_D^{25}$  61.2°; carbimide, m. 206-7°; the salicylidene deriv. is phototropic and the optical rotatory dispersion is anomalous; the formate m. 152°,  $[\alpha]_D^{25}$  12.1° ( $H_2O$ ,  $c$  2); *H d*-tartrate, m. 143-4°,  $[\alpha]_D^{25}$  20.1° ( $H_2O$ ,  $c$  2); *d*-camphor-10-sulfonate, m. 138-40°,  $[\alpha]_D^{25}$  19.5° ( $H_2O$ ,  $c$  2); it is too sol. to be fractionated; the *l*-isomer m. 144-5°,  $[\alpha]_D^{25}$  -8.4° ( $H_2O$ ,  $c$  2). The above reduction also gives 7.5% of a 2nd base, termed *l*-neocarvomenthylamine (II); the best source of II is the mixt. of stereoisomeric formylcarvomenthylamines formed when I is heated with  $HCO_2NH_4$  at 130° for 48 hrs. II  $b_p$  87.8-88°,  $d_4^{25}$  0.8558,  $n_D^{25}$  1.4560,  $[\alpha]_D^{25}$  -26.55°,  $[\alpha]_D^{25}$  -31°; in CHCl<sub>3</sub> ( $c$  4)  $[\alpha]_D^{25}$  -20.13°,  $[\alpha]_D^{25}$  -23.94°; HCl salt,  $[\alpha]_D^{25}$  -31.9° ( $H_2O$ ,  $c$  2); formate, m. 131.5-2°,  $[\alpha]_D^{25}$  -31.5° ( $H_2O$ ); *H d*-tartrate, m. 162°,  $[\alpha]_D^{25}$  -5.7° ( $H_2O$ ); formyl deriv.,  $b_p$  298-9°, m. 50°,  $[\alpha]_D^{25}$  -61.2°,  $[\alpha]_D^{25}$  -74.2° (CHCl<sub>3</sub>,  $c$  2); Ac deriv., m. 114°,  $[\alpha]_D^{25}$  -61.9°, -75.4°; propionyl deriv., m. 101°,  $[\alpha]_D^{25}$  -60.1°, -72.4°; butyryl deriv., m. 98°,  $[\alpha]_D^{25}$  -57.6°, -69°; Bz deriv., m. 120°,  $[\alpha]_D^{25}$  -33.0°, -38.3°; phenylacetyl deriv., m. 81°,  $[\alpha]_D^{25}$  -40.6°, -48°; salicylidene deriv., yellow, m. 36-7°, exhibits anomalous rotatory dispersion. The sirupy product formed in the oximation of carvomenthone,  $[\alpha]_D^{25}$  -24.85°,  $b_p$  135-40°,  $[\alpha]_D^{25}$  -43.5° (EtOH,  $c$  2); reduction with Na and EtOH gives a new base, whose HCl salt has  $[\alpha]_D^{25}$  -11.8° ( $H_2O$ ) and whose Bz deriv. m. 151-2°,  $[\alpha]_D^{25}$  -38.8°. A product accompanying II is dicarvomenthylamine,  $b_p$  178-9°,  $b_p$  187-8°,  $d_4^{25}$  0.8956,  $n_D^{25}$  1.4787,  $[\alpha]_D^{25}$  -3.5°, which is probably a mixt. of isomers and does not yield characteristic derivs. Reduction of *d*-carvoxime with Na and EtOH gives *d*-dihydrocarvylamine,  $b_p$  111°,  $d_4^{25}$  0.8775,  $n_D^{25}$  1.4781,  $[\alpha]_D^{25}$  16.4° (CHCl<sub>3</sub>,  $c$  5.8); Bz deriv., m. 182°,  $[\alpha]_D^{25}$  48.3° (CHCl<sub>3</sub>); formate, m. 145°,  $[\alpha]_D^{25}$  21.2° ( $H_2O$ ); Ac deriv., m. 131-2°,  $[\alpha]_D^{25}$  91.8° (CHCl<sub>3</sub>); salicylidene deriv., lemon-yellow, m. 58°; it displays anomalous rotatory disper-

sion; catalytic reduction of the Bz deriv. gives benzoyl-*d*-carvomenthylamine, m. 180-1°. *d*-Camphor-10-sulfonyl-*m*-hydroxybenzaldehyde, m. 87°; the vanillin deriv. m. 128°,  $[\alpha]_D^{25}$  35.8°.  $\beta$ -Naphthalenesulfonylsalicylaldehyde, m. 74-5°; vanillin deriv., m. 98°.  $\beta$ -Naphthalenesulfonylsalicylidene-*d*-carvomenthylamine, m. 104°,  $[\alpha]_D^{25}$  44.5°. II. Some unsaturated alcohols. R. G. Johnston and J. Read. *Ibid.* 233-7.—Reduction of *d*-carvone ( $[\alpha]_D^{25}$  62.4°) in iso-PrOH with (iso-PrO)<sub>2</sub>Al at 110° gives a carveol (77-9 g.)  $b_p$  98-104°,  $n_D$  1.4984,  $[\alpha]_D^{25}$  100.9 108.2°; this was transformed into the 3,5-dinitrobenzoates and fractionated from abs. EtOH (3 parts) and AcOEt (1 part): *d*-trans-carveol (I),  $b_p$  102.2-2.4°,  $n_D^{25}$  1.4942,  $d_4^{25}$  0.9484,  $[\alpha]_D^{25}$  213.1°; *p*-nitrobenzoate, m. 77°,  $[\alpha]_D^{25}$  264.4° (CHCl<sub>3</sub>,  $c$  2); *o*-isomer, sirup,  $[\alpha]_D^{25}$  110° (CHCl<sub>3</sub>,  $c$  2); acetate,  $b_p$  106-6.5°,  $n_D^{25}$  1.4770,  $[\alpha]_D^{25}$  177.5°; 3,5-dinitrobenzoate, pale brown, m. 111.5°,  $[\alpha]_D^{25}$  232° (CHCl<sub>3</sub>,  $c$  2); with *d*-camphor-10-sulfonyl chloride in  $C_6H_5N$  dehydration occurs, giving a mixt. of a terpene and *p*-cymene. *d*-cis-Carveol (II),  $b_p$  101.2-1.4°, m. 24-5°,  $n_D^{25}$  1.4959,  $d_4^{25}$  0.9521,  $[\alpha]_D^{25}$  23.9°; 3,5-dinitrobenzoate, yellow, m. 92.5°,  $[\alpha]_D^{25}$  -43.8° (CHCl<sub>3</sub>,  $c$  2); *p*-nitrobenzoate, m. 20.5-8°,  $[\alpha]_D^{25}$  -57.4° (CHCl<sub>3</sub>,  $c$  2); acetate,  $b_p$  108-8.5°,  $n_D^{25}$  1.4779,  $[\alpha]_D^{25}$  46.4°. II reacts more slowly with  $p$ -O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>COCl than does I. I-I and -II are also prep'd. from *l*-carvone; the two 3,5-dinitrobenzoates m. 111-1.5° and 92-2.5° and have  $[\alpha]_D^{25}$  -230.7° and 44.2° (CHCl<sub>3</sub>,  $c$  2), resp. *dl*-I  $b_p$  108°,  $d_4^{25}$  0.9510,  $n_D^{25}$  1.4950; it is very viscous at -25°; *p*-nitrobenzoate, m. 101°; 3,5-dinitrobenzoate, m. 119°; *dl*-II  $b_p$  108°,  $n_D^{25}$  1.4972; *p*-nitrobenzoate, m. 94°; 3,5-dinitrobenzoate, m. 91.5°. *d*-I is practically unaffected by Na in boiling EtOH; catalytic reduction (1 mol. H<sub>2</sub>) gives a small quantity of carvotanacetol 3,5-dinitrobenzoate, m. 109-10°,  $[\alpha]_D^{25}$  177.5° (CHCl<sub>3</sub>,  $c$  5), complete hydrogenation gives 2 new carvomenthols with  $[\alpha]_D^{25}$  -36.42° and 57.56°, resp., to be described later. Reduction of *d*-carvone with Na and dry EtOH gives *d*-dihydrocarveol,  $b_p$  106.8-7.2°,  $d_4^{25}$  0.9223,  $n_D^{25}$  1.4781,  $[\alpha]_D^{25}$  34.2°; *p*-nitrobenzoate, m. 37°,  $[\alpha]_D^{25}$  52.5° (CHCl<sub>3</sub>,  $c$  2); 3,5-dinitrobenzoate, m. 121.5-2°,  $[\alpha]_D^{25}$  55.2° (CHCl<sub>3</sub>). Reduction of *l*-dihydrocarvone ( $[\alpha]_D^{25}$  -16.91°) with (iso-PrO)<sub>2</sub>Al gives, among other products, a *l*-neodihydrocarveol,  $b_p$  101-2°,  $n_D^{25}$  1.4812,  $[\alpha]_D^{25}$  -33.22°; 3,5-dinitrobenzoate, pale yellow, m. 138-8.5°,  $[\alpha]_D^{25}$  6.8°; *p*-nitrobenzoate, m. 107°,  $[\alpha]_D^{25}$  14.9° (CHCl<sub>3</sub>,  $c$  2); *d*-camphor-10-sulfonate, m. 91-3°; heating at 125° gives  $\alpha$ -phellandrene; *dl*-Carvenone is reduced by (iso-PrO)<sub>2</sub>Al to a product  $b_p$  99-102°,  $n_D^{25}$  1.4799, which yields a *dl*-carvenyl 3,5-dinitrobenzoate, yellow, m. 75-6°; the *p*-nitrobenzoate m. 65°.

C. J. West

**Catalytic reduction of diosphenol.** James Walker and John Read. *J. Chem. Soc.* 1934, 238-42.—Catalytic reduction of diosphenol (I) in Et<sub>2</sub>O gives a dihydro deriv. (2-hydroxymenthone),  $b_p$  108-15°,  $n_D^{25}$  1.4648,  $d_4^{25}$  0.9915; semicarbazone, m. 210-11° (decompn.); *p*-toluenesulfonyl deriv. (II), m. 106-7°; the *d*-camphor-10-sulfonyl deriv. (III) is a sirup,  $[\alpha]_D^{25}$  22.1° (CHCl<sub>3</sub>,  $c$  1.75); thermal decompn. of III at 150° gives a mixt. of *dl*-piperitone (IV) (oxime, m. 115-16°) and *dl*- $\Delta^4$ -menthen-3-one (V) (oxime, m. 64-5°). The *p*-toluenesulfonyl deriv. of I, m. 76°, and II are not catalytically reduced at 3 atm. pressure of H<sub>2</sub>. *dl*-Piperitone oxide (13.9 g.), on reduction, gives 12.7 g. of an oil, from which were obtained 5.2 g. of an oil,  $b_p$  125°,  $n_D^{25}$  1.4570, and 7.1 g. of 1-hydroxymenthone (?),  $b_p$  137-9.5°, m. 88.5-90.5°,  $n_D^{25}$  1.4695. *dl*-Carvenone oxide gives 4-hydroxycarvomenthone (?),  $b_p$  137-42°, m. 72.5-4°. This work affords the first passage from menthone (VI) to IV (the I used being prep'd. entirely from VI), opens a new route from VI to V, and discloses the important fact that I may be used as a "turn-table" between the menthone and the carvomenthone series.

C. J. West

The use of phosphorus pentoxide in the preparation of *p*-benzoylbiphenyl and 4-benzoylacenaphthene. Angela Cannoni de Degiorgi. *Annales assoc. chim. Argentina* 21, 135-41 (1933).—By means of the Lecher method (C. A. 8, 100),  $C_{16}H_{12}Bz$  was obtained by substituting  $P_2O_5$  for



$\text{AlCl}_3$ . The use of  $\text{P}_2\text{O}_5$  instead of  $\text{AlCl}_3$  to produce  $p$ - $\text{BzC}_6\text{H}_4\text{Ph}$  gives 2.5% of an isomer, structure yet unknown, and in the prepn. of 4-benzoylacenaphthene  $\text{P}_2\text{O}_5$  increases the yields 15%. Chlorination of  $o$ - $\text{PhC}_6\text{H}_4\text{CO}_2\text{H}$  by  $\text{SOCl}_2$  should be at as low temp. as possible, because heating to 70–90° for 2 hrs. forms fluorene quantitatively. E. M. S.

**Diphenylmethane.** W. W. Hartman and Ross Phillips. *Org. Syntheses* 14, 34–5 (1934).— $\text{PhCH}_2\text{Cl}$  and  $\text{C}_6\text{H}_5\text{I}$  with  $\text{Al-Hg}$  give 49.5–52.5% of  $\text{Ph}_2\text{CH}_2$ . C. J. West

**Benzopinacol.** W. B. Bachmann. *Org. Syntheses* 14, 8–10 (1934).— $\text{Ph}_2\text{CO}$  (150 g.), 1 drop  $\text{AcOH}$  and 665 g.  $\text{Me}_2\text{CHOH}$ , warmed to 45°, and then exposed to bright sunlight for 8–10 days, give 93.5–4% of benzopinacol; abs.  $\text{EtOH}$  may be used but the reaction is slower.

**$\beta$ -Benzopinacolone.** W. E. Bachmann. *Org. Syntheses* 14, 12–13 (1934).— $\text{Ph}_2\text{C}(\text{OH})\text{C}(\text{OH})\text{Ph}$  (100 g.) in 500 cc.  $\text{AcOH}$  contg. 1 g.  $\text{I}$ , refluxed for 5 min., gives 95.6% of  $\text{BzCPh}_2$ ; the  $\text{AcOH}$  may be used for further rearrangements until 500 g. have been used. C. J. West

**Structure of ethyl bis(diphenylmethyl)malonate.** Arthur C. Cope. *J. Am. Chem. Soc.* 56, 721–5 (1934).—Et bis(diphenylmethyl)malonate (I) (Kohler, *Am. Chem. J.* 34, 132 (1905)) has been proved to be  $(\text{Ph}_2\text{CH})_2\text{C}(\text{CO}_2\text{Et})_2$  rather than a ketene acetal,  $\text{Ph}_2\text{CHC}(\text{CO}_2\text{Et})_2$ ;  $\text{C}(\text{OEt})\text{OCiPrPh}$ , as was originally proposed. At Et  $\text{I}$  was obtained as plates, m. 136–6.5°; after several months a sample which had been exposed to the air of the lab. for a few days m. 176–7°; after once melting or recrystg. all samples m. 176°; the high-melting form is much less sol. in  $\text{EtOH}$  and seps. from  $\text{EtOH}$  or  $\text{AcOH}$  in prisms. In the hydrolysis the 1st reaction is the cleavage of a  $\text{Ph}_2\text{CH}_2$  group; this cleavage originally led to the formulation of the compd. as an  $O$ -alkyl deriv. but must be interpreted as resulting from the breaking of a  $\text{C}$  to  $\text{C}$  linkage weakened by the substituent groups. Et  $p$ -toluylmalonate and  $p$ - $\text{MeC}_6\text{H}_4\text{MgBr}$  give 90% of the  $\text{Et}$  ester, m. 71–1.5°, b<sub>1</sub> 192–6°, of (di- $p$ -tolylmethyl)malonic acid, m. 184° (decompn.), giving  $\beta$ , $\beta$ -di- $p$ -tolylpropionic acid, m. 187–8°; if in this reaction, after refluxing 30 min. ( $p$ - $\text{MeC}_6\text{H}_4$ ) $_2\text{CHCl}$  is added, it gives 88% of Et bis(di- $p$ -tolylmethyl)malonate (II), m. 148.9°; this was also prepd. through the Na enolate. Et benzalmalonate and  $\text{PhMgBr}$ , refluxed 30 min. and treated with ( $p$ - $\text{MeC}_6\text{H}_4$ ) $_2\text{CHCl}$ , give 81% of Et (diphenylmethyl)(di- $p$ -tolylmethyl)malonate (III), m. 122–3°; when Et  $p$ -toluylmalonate was treated with  $p$ - $\text{MeC}_6\text{H}_4\text{MgCl}$  and then with  $\text{Ph}_2\text{CHBr}$ , there resulted a mixt. of I, II and III; the formation of I and II involves the disproportionation of an unsym. dialkylmalonic ester into the 2 sym. homologs. II reacts with the bromomagnesium enolate of Et (diphenylmethyl)malonate to give III. By analogy the deriv. of  $\text{NCCH}_2\text{CO}_2\text{Et}$  corresponding to I is probably a dialkylcyanooacetic ester rather than an  $O$ -alkyl deriv. C. J. W.

**Grignard reaction in the synthesis of ketones.** IV. A new method of preparing isomeric unsymmetrical benzoinis. Sanford S. Jenkins. *J. Am. Chem. Soc.* 56, 682–4 (1934); cf. *C. A.* 27, 3929.—The method depends on the fact that ketones of the type  $\text{R}'\text{CH}_2\text{COR}$  and  $\text{R}(\text{H})_2\text{COR}$ , in the presence of a source of light energy of sufficient intensity, can be converted into Br derivs., which react with  $\text{RONa}$  to give the diacetals, hydrolyzed by mineral acids to benzoinis.  $p$ - $\text{MeOC}_6\text{H}_4\text{CH}_2\text{Bz}$  yields an  $\alpha$ -Br deriv., m. 93–4° (all m. ps. cor.) (84% yield), and an  $\alpha$ -H( $O$ ) deriv., m. 90° (74%);  $p$ - $\text{MeOC}_6\text{H}_4\text{COCH}_2\text{Ph}$  yields an  $\alpha$ -Br deriv., m. 72.5–3.5° (80%), and an  $\alpha$ -H( $O$ ) deriv., m. 106.5° (94%);  $p$ - $\text{ClC}_6\text{H}_4\text{COCH}_2\text{Ph}$  gives an  $\alpha$ -Br deriv., m. 67.5–8.5° (78%), and an  $\alpha$ -H( $O$ ) deriv., m. 90–1° (94%);  $p$ - $\text{ClC}_6\text{H}_4\text{CH}_2\text{Bz}$  gives an  $\alpha$ -Br deriv., m. 62–2.5° (79%), and an  $\alpha$ -H( $O$ ) deriv., m. 116–17° (93%). The  $\alpha$ -Br derivs. may be analyzed by boiling 0.2–0.3 g. in  $\text{MeOH-KOH}$ , refluxing about 15 min. and titrating with 0.1  $N$   $\text{HCl}$ . C. J. West

**Alleged color and dyeing properties of some derivatives of tetraarylmethanes.** Arnold Weissberger and Johannes Hueck. *J. Chem. Soc.* 1934, 148–51; cf. Sen and Banerji, *C. A.* 25, 4255; Sen, Chattopadhyay and Sen-Gupta, *C. A.* 25, 3043. The color and dyeing property of the

condensation products obtained by S. and B. from  $p$ -rosaniline (I) and phenols are to be ascribed to the I with which they are contaminated; the compds. are complex but probably contain derivs. of  $\text{CPh}_4$ . The N content of the compd. from I and  $\text{PhOH}$  varies with the agent used to ppt. it;  $\text{NH}_3$  gives a product with 12.4% N;  $\text{AcONa}$ , 9% N. Details are given of the isolation of  $p,p',p''$ -triamino- $p'''$ -hydroxytetraphenylmethane, m. 257° (cor., decompn.), from the reaction product in a yield of 0.62 g. from 5 g. of initial reaction mixt. The color and dyeing properties of the compds. obtained from  $m$ - $\text{C}_6\text{H}_4(\text{OH})_2$  and ketones by S., C. and S.-G. are considered due to substances formed from the  $m$ - $\text{C}_6\text{H}_4(\text{OH})_2$  alone by the action of dehydrating agents used for the condensation or at high temps. The products obtained from  $m$ - $\text{C}_6\text{H}_4(\text{OH})_2$  and  $\text{ZnCl}_2$  both with and without the addn. of  $\text{Ph}_2\text{CO}$  are similar dark brown powders, which show a strong green fluorescence in alkali; their absorption spectra are nearly the same and their behavior shows that they are not homogeneous. C. J. West

**Derivatives of 2-methylnaphthalene.** Francisco Giral y Gonzalez. *Rev. acad. cienc. Madrid* 30, 519–54 (1933).—The prepn. of 25 derivs. of 2- $\text{C}_{10}\text{H}_7\text{Me}$  is described. New compds. prepd. are: 1,4-dimethoxy-2-methylnaphthalene, orange liquid, b<sub>1</sub> 175.8°; 2-methyl-1-nitro-8-naphthylamine and its sulfate; 2-methyl-1,8-naphthylendiamine (I), red crystals, m. 63°, b<sub>1</sub> 213.14°, nearly insol. in water, sol. in most org. solvents; actanuide of I, m. 136°; neutral sulfate of I, m. 197°; and 1-amino-2-methyl-8-naphthol, by boiling I first with  $\text{NaHSO}_3$  and then with  $\text{NaOH}$ , large white needles from benzene, m. 133°, very sol. in hot water. Forty-four references. L. E. Gilson

**Derivatives of 1,6-dimethylnaphthalene.** Franz Feist. *J. prakt. Chem.* 139, 261–8 (1931).—1,6- $\text{C}_{10}\text{H}_6\text{Me}_2$  and Br with a little Fe powder give a mixt. of 2 di-Br derivs., m. 134.5° and 62–4°, the action of Br in  $\text{CHCl}_3$  for 4 days gives a 4,5,8-tri-Br deriv., m. 115.16°, which also results on bromination in  $\text{H}_2\text{O}$ ; still further bromination gives a tetra-Br deriv., m. 180.1°. The tri-Br deriv. does not react with  $\text{AcCl}$  ( $\text{AlCl}_3$  in  $\text{CS}_2$ ). 1,6- $\text{C}_{10}\text{H}_6\text{Me}_2$  with 1 or 2 mols.  $\text{AcCl}$  and 1 or 2 mols.  $\text{AlCl}_3$  in  $\text{CS}_2$  or  $\text{PhNO}_2$  gives only a mono-1c deriv., m. 43°, which yields a tetra-Br deriv., m. 183.4°; part of the Br is in the Ac group; chlorination of the Ac deriv gives a perchloride,  $\text{C}_{10}\text{H}_4(\text{CCl}_3)_2\text{COCCl}_3$ , golden yellow, b<sub>1</sub> 244.50°, setting to a resin; hydrolysis with  $\text{H}_2\text{SO}_4$  did not give the desired  $\text{C}_{10}\text{H}_4(\text{CO}_2\text{H})_2$ ; hydrolysis with  $\text{KOH}$  at 170° for 8 hrs. gives trumalic acid (?),  $\text{C}_{10}\text{H}_4\text{O}_6$ , m. 222° (decompn.). Oxidation of the Ac deriv. with  $\text{CrO}_3$  in  $\text{AcOH}$  gives acetyl-1,6-dimethylnaphthoquinone, canary yellow, m. 150°. C. J. West

**Nitration of some  $\alpha$ -naphthalides.** Herbert H. Hodgson and John Walker. *J. Chem. Soc.* 1934, 180–1; cf. *C. A.* 27, 5737.—The ortho/para ratio for mononitration of aceto- $\alpha$ -naphthalide has been found to be 0.37–0.44; values are now reported for the formo (I), benzo (II) and  $o$ -carboxybenzo derivs. to be 0.4–0.6, 1.1–1.3 and 1.1–1.3, resp.; considerable dinitration occurs with the  $p$ -toluenesulfono deriv (III). The nitration product of I was extd. 3 times with 5% aq.  $\text{NaOH}$ , the insol. part being the 4-nitroformo deriv., greenish yellow, m. 182°; rapid working is necessary because of the ease of hydrolysis of the 2- $\text{NO}_2$  deriv. II gives 88% of mixed 2- $\text{NO}_2$ , m. 175°, and 4- $\text{NO}_2$  deriv., m. 224°. In the prepn. of III there results 2–3% of di- $p$ -toluenesulfono- $\alpha$ -naphthalide, m. 224°, and 94.5% III; the nitration of III was studied in dil.  $\text{HNO}_3$ ,  $\text{AcOH}$ ,  $\text{C}_2\text{H}_4\text{Cl}_2$  and  $\text{PhNO}_2$ ; with 30%  $\text{HNO}_3$  the 2,4-di- $\text{NO}_2$  deriv. (IV) resulted; in  $\text{AcOH}$  and the theoretical quantity of  $\text{HNO}_3$  some IV is formed; with 100% excess  $\text{HNO}_3$  the product was mainly IV; nitration with 20%  $\text{HNO}_3$  at 5° did not improve the yield of the mono- $\text{NO}_2$  deriv.; in  $\text{PhNO}_2$  50% excess  $\text{HNO}_3$  gives 40% of the mono- $\text{NO}_2$  deriv. Di- $p$ -toluenesulfonamide, m. 184°;  $o$ -toluide, m. 169°;  $p$ -toluide, m. 158°. C. J. West

**Derivatives of 8-bromo- and 8-chloro-1-naphthoic acids and their orientation by dehalogenation and de-**

carboxylation. H. Gordon Rule, Wm. Pursell and Robert R. H. Brown. *J. Chem. Soc.* 1934, 169-71.—The orientation of a substituted 8-halo-1-naphthoic acid may be detd. by (a) dehalogenation by boiling the acid in PhMe with Cu bronze, followed if necessary by (b) decarboxylation in boiling quinoline with the aid of Cu bronze. These acids are nitrated first in position 5 and eventually in the 4,5-positions. Halogenation occurs readily only in position 5. 8-Bromo-1-naphthoic acid (I), for which a method of prepn. is given (*Et ester*, m. 52°), with concd. HNO<sub>3</sub> at 65° gives the 5-NO<sub>2</sub> deriv., yellow, m. 245° (*Me ester*, m. 97°; *Et ester*, m. 103°). Further nitration with H<sub>2</sub>SO<sub>4</sub>-HNO<sub>3</sub> gives the 4,5-di-NO<sub>2</sub> deriv., grayish white to yellow, m. 280-2° (decompn.); *Me ester*, m. 155°; *Et ester*, m. 127-8°; dehalogenation gives 4,5-dinitro-1-naphthoic acid, buff, m. 265° (*Et ester*, m. 143-4°). I and Br in AcOH, heated at 150° for 2 hrs., give the 5,8-di-Br acid, m. 232°. Further action of Br gives a mixt. of C<sub>10</sub>H<sub>6</sub>Br<sub>2</sub> and C<sub>10</sub>H<sub>4</sub>Br<sub>4</sub>.

C. J. West

The addition of hydrogen to acetylene derivatives. XXI. The synthesis of symmetrical diphenylid- $\alpha$ -naphthylbutenediol and its hydrogenation. Yu. S. Zalkind and S. V. Nedzvetzki. *J. Gen. Chem.* (U. S. S. R.) 3, 573-7(1933).—A warm satd. soln. of 35 g.  $\alpha$ -C<sub>10</sub>H<sub>7</sub>Bz (I) in Et<sub>2</sub>O, added with stirring to (BrMgC≡), prepd. from 6 g. Mg, 30 g. Et<sub>2</sub>O and C<sub>2</sub>H<sub>2</sub>, gave after standing 20 hrs., refluxing 5 hrs. on a H<sub>2</sub>O bath and standing 20 hrs. more, a mixt. which sepd. into 2 layers. The Et<sub>2</sub>O layer with ice H<sub>2</sub>O and dil. AcOH yielded 1.5 g. I. The heavy lower layer by extrn. with Et<sub>2</sub>O, drying with fused K<sub>2</sub>CO<sub>3</sub>, distn. of the Et<sub>2</sub>O, and recrystn. successively from PhH and EtOH, gave 17 g. of sym. diphenylid- $\alpha$ -naphthylbutenediol (II) [Ph(C<sub>10</sub>H<sub>7</sub>)C(OH)C≡]<sub>2</sub>, with 1 mol. of EtOH of crystn. Removal of the EtOH by heating at 125° for 2.5 hrs. gave II, m. 182-3°. II adds Br, does not react with KMnO<sub>4</sub> soln. in the cold, and gives with concd. H<sub>2</sub>SO<sub>4</sub> an intense green coloration destroyed by diln. with H<sub>2</sub>O. II (0.8 g.), heated at 140° with powd. KOH in H<sub>2</sub>, gave I and C<sub>2</sub>H<sub>2</sub>, the latter identified by passing into NH<sub>3</sub>-CuCl, forming C<sub>2</sub>Cu<sub>2</sub>. Only 1 optical isomer of II was obtained. II is hydrogenated more slowly than [PhC(OH)C≡]<sub>2</sub> (III) in EtOH with colloidal Pd, 0.005 mol. II with 50 mg. Pd requiring 5 hrs. for addn. of 2 H, 0.005 mol. III, 1.5 hrs. After addn. of 2 H, H<sub>2</sub> is much more slowly absorbed. II gives 2 geometric isomers, [Ph(C<sub>10</sub>H<sub>7</sub>)C(OH)CH]<sub>2</sub>, 96% of  $\alpha$ -1,4-di- $\alpha$ -naphthyl-1,4-diphenylbutenediol (IV) and 4% of the  $\beta$ -compd. (V). IV is difficultly sol. in EtOH and crystallizes out during the hydrogenation. IV seps. from EtOH with 1 mol. EtOH of crystn., m. 132-4° (decompn.). The EtOH-free IV thus formed or crystd. from petr. ether, m. 167°. IV adds Br more slowly than II, does not react with KMnO<sub>4</sub> in the cold and gives with concd. H<sub>2</sub>SO<sub>4</sub> an intense green coloration changing rapidly to red and destroyed by diln. with H<sub>2</sub>O. Oxidation of IV with KMnO<sub>4</sub> in AcMe with or without heating gave only CO<sub>2</sub>. IV treated with CrO<sub>3</sub> in glacial AcOH gave an unidentified substance, yellow crystals, m. 190-3°. IV was the *cis*-compd. since it gave 2,6-di- $\alpha$ -naphthyl-2,5-diphenyl-2,5-dihydrofuran (VI) when warmed for 1 hr. with 10 cc. Ac<sub>2</sub>O and fused AcONa. VI was isolated from the reaction mixt. by pptg. the oil by addn. of H<sub>2</sub>O, washing with H<sub>2</sub>O, dissolving in PhH, and pptg. with petr. ether, crystals, m. 221-2° from EtOH. VI reacts with Br but not with cold KMnO<sub>4</sub>. IV (1.3 g.) in AcOEt with 1.8 g. Pt added 2 H after 8.5 hrs. giving 1,4-di- $\alpha$ -naphthyl-1,4-diphenylbutenediol (VII), m. 220°, from PhH. Addn. of 4 vols. H<sub>2</sub>O to the mother liquor from IV gave a ppt. of IV + V. Successive recrystn. from PhH and EtOH gave V, m. 231-2°, which in contrast to IV, did not crystallize with EtOH. V resembled IV in its behavior toward Br, KMnO<sub>4</sub>, and concd. H<sub>2</sub>SO<sub>4</sub>. The slower hydrogenation of II, the greater the yield of V. V (1 g. in 15 cc. AcOEt with H<sub>2</sub> and 0.7 g. Pt gave VII in 2 hrs. V is the *trans*-isomer. The solubilities in 100 cc. PhH (temp. not given) were II 2.13 g., IV 0.26 g., V 0.99 g., VII 0.40 g., VI undetd. but very sol. VII

was also prepd. from II in Et<sub>2</sub>O by addn. of H<sub>2</sub> in the presence of Pt black.

Lewis W. Butz

Technical naphthalene hydrogenation products and their uses. R. C. Bickmore. *Chem. Industries* 34, 205-8(1934).

E. H.

Trihalomethylketonic acids of the naphthalene series. Benton A. Bull and Reynold C. Fuson. *J. Am. Chem. Soc.* 56, 736-8(1934).—1-Aceto-2-naphthoxyacetic acid (I) in 10% NaOH and NaOCl give the 1-trichloroacetyl deriv. (II), m. 163-5° (decompn.); this is stable in a mixt. of 10 cc. EtOH and 24 cc. 0.01 N NaOH for at least 5 min.; the 1-tribromoacetyl deriv. (III) m. 171-2° and has the same stability. Heating I and NaOCl for 1 hr. gives the 1-carboxy deriv., m. 189° (decompn.), with NaOBr 2 hrs.' boiling were necessary; II and III give the same acid after heating 30 min. with 10% NaOH. 2-Aceto-1-naphthoxyacetic acid (IV) and NaOBr or NaOCl give the 2-carboxy deriv. (V), m. 206-7°. IV, treated with a soln. of Cl in Na<sub>2</sub>CO<sub>3</sub>, gives the 4-Cl deriv., m. 184-5° (decompn.), and the 4-Cl deriv. of V, m. 245-6°; the corresponding 4-Br deriv. m. 195-6° (decompn.) and 242-3°. These results show that the ease with which a trihalomethyl ketone is cleaved by aq. alkalis is diminished by the introduction of steric hindrance and enhanced by an increase of soly. of the ketone.

C. J. West

2-Methyl-1,4-naphthoquinone. Juan Madinaveita. *Anales soc. españ. fis. quim.* 31, 750-9(1933).—Reactions resembling diene addn., i. e., addn. at the same time to one of the O atoms and in the 3-position with formation of a 1,2-double bond, are much more difficult with 2-methyl-1,4-naphthoquinone than with 1,4-naphthoquinone. 2,3-Addn. can be readily effected. Oxidation with HClO gives 1,4-diketotetrahydronaphthalene 2,3-bis-oxide, m. 102°. With HBr this oxide gives 2-methyl-3-bromo-1,4-naphthoquinone and with PhNH<sub>2</sub> it gives 2-methyl-3-anilino-1,4-naphthoquinone, m. 163°. Five g. of the oxide in 50 cc. H<sub>2</sub>SO<sub>4</sub> and 150 cc. H<sub>2</sub>O, at 95° for 12 hrs. with frequent stirring, gives 4.5 g. 2-methyl-3-hydroxy-1,4-naphthoquinone (I), m. 173° when recrystd. from boiling EtOH, slightly sol. in cold EtOH and AcOH, cold or hot Et<sub>2</sub>O, more sol. in boiling AcOH, sol. in concd. H<sub>2</sub>SO<sub>4</sub>, reprecip. on diln. I is a strong acid, decomposing carbonates, forming highly colored salts, and at pH 4.7 changing from light yellow to orange-red. I is not methylated with MeOH satd. with HCl; its 1% AcOH soln. dyes wool directly. It can be exposed to light without change. Sunlight decolorizes 2-methyl-1,4-naphthoquinone with formation of a compd., m. 235°, which is probably 2,3,2',3'-tetrahydro-2,3'-dimethyl-2,3,2',3'-binaphthylene-1,4,1',4'-tetrone. E. M. Symmes

Constitution of dinitronaphthenequinone and of dinitronaphthalic acid. Preparation of a new dinitronaphthalene. H. Gordon Rule and Robert R. H. Brown. *J. Chem. Soc.* 1934, 171-4.—The oxidation of the mono-NO<sub>2</sub> deriv. of acenaphthenequinone (I) gives 4-nitronaphthalic anhydride, which upon mercuration and bromination gives a small yield of 8-bromo-4-nitro-1-naphthoic acid (II), m. 201-3°. Similarly the di-NO<sub>2</sub> deriv. of I gives the 4,5-di-NO<sub>2</sub> analog of II, m. 248-52° (decompn.). Naphthalic anhydride was converted into 3-nitronaphthalic acid, mercurated and brominated giving 8-bromo-3-nitro-1-naphthoic acid, m. 240-2°, the structure of which was established by dehalogenation to 3-nitronaphthoic acid; *Me ester*, m. 173°; *Et ester*, m. 155-6°. In a similar manner was prepd. 8-bromo-3,6-dinitro-1-naphthoic acid, m. 273-5° (*Me ester*, m. 137-8°; *Et ester*, m. 205-7°). The Hg deriv. warmed with dil. NaOH, then treated with concd. HCl and boiled for 4 hrs., gives 3,6-dinitro-1-naphthoic acid, buff, m. 273.5-4° (*Me ester*, m. 196-7°; *Et ester*, m. 145-6°). The orientation of the NO<sub>2</sub> groups in the above derivs. is dependent upon the structure of the dinitronaphthalic acid, which was detd. by decarboxylation, giving 2,7-dinitronaphthylene, yellow, m. 234°; thus the acid is the 3,6-compd.

C. J. West

1-Methylhydrindene-4-carboxylic acid. Hans Hoyer. *J. prakt. Chem.* 139, 242-4(1934).—o-BrC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>CH<sub>2</sub>



give  $\alpha$ -benzoyl- $\alpha$ -ethanol- $\alpha$ -phenylthiourea (I), m. 154°; on standing in 80%  $\text{H}_2\text{SO}_4$  or in 48%  $\text{HBr}$  for 48 hrs. there results 80–90% of 2-benzoylimino-3-phenylthiazolidine, m. 122°; oxidation of I with yellow  $\text{HgO}$  in  $\text{C}_6\text{H}_6$  gives 2-benzoylimino-3-phenylloxazolidine, m. 117°.  $\beta$ -Benzoyl- $\alpha$ -ethanol- $\alpha$ -(*o*-tolyl)thiourea, m. 141°; *p*-tolyl deriv., m. 138°; 2-benzoylimino-3-(*o*-tolyl)thiazolidine, m. 137–8°; *p*-tolyl deriv., m. 154°; 2-benzoylimino-3-(*o*-tolyl)oxazolidine, m. 103°; *p*-tolyl deriv., m. 134°.  $\beta$ -Benzoyl- $\alpha$ -ethanolthiourea, m. 128°; 2-benzoyliminothiazolidine, m. 168°.  $\beta$ -Benzoyl- $\alpha$ -phenyl- $\alpha$ -propanolthiourea, m. 94°; 2-benzoylimino-3-phenylthiazane, m. 137°. *Et* ( $\beta$ -benzoyl- $\alpha$ -phenylthioureido)acetate, m. 165°; the free acid m. 166–7°; with  $\text{H}_2\text{SO}_4$  both give 3-benzoyl-1-phenyl-2-thio-4-imidazole, m. 163°. Anthranilic acid gives *o*-( $\beta$ -benzoylthioureido)benzoic acid, m. 160° (decomp.), and then at 190–200°; above its m. p. it loses  $\text{H}_2\text{S}$ , giving a S-free compd., m. 207–8°;  $\text{H}_2\text{SO}_4$  gives the 3-Bz deriv., m. 158°, of 4-keto-2-thiotetrahydroquinazoline, m. 305–10°, methylation of which gives the 2-methylthio deriv., m. 219°, or with excess  $\text{Me}_2\text{SO}$ , 2,4-diketo-3-methyltetrahydroquinazoline, m. 236°. The Me ether of phenylthiourea and  $\text{BzSCN}$  give 7-methylthio-1,7-diphenyl-7-thiodihydrotriazine, yellow, m. 211°. The following derivs. of furoyl isothiocyanate (thiouras) were prepd.: furoyl, m. 183°;  $\alpha$ -furoyl- $\beta$ -methyl, m. 142°;  $\beta$ -*Et* deriv., m. 101–2°;  $\alpha$ -benzyl- $\beta$ -furoyl, m. 122°;  $\alpha$ -furoyl- $\beta$ -phenyl, m. 116°;  $\beta$ -(*o*-tolyl) deriv., m. 115–6°; *m*-isomer, m. 99°; *p*-isomer, m. 130°;  $\alpha$ -naphthyl deriv., m. 186°;  $\beta$ -isomer, m. 139–40°;  $\beta$ -furoyl- $\alpha$ -methyl- $\alpha$ -phenyl, m. 98–9°;  $\alpha$ -benzyl- $\beta$ -furoyl- $\alpha$ -phenyl, m. 124°;  $\beta$ -furoyl- $\alpha$ -*di*-phenyl, m. 139–40°;  $\alpha$ -ethanol- $\beta$ -furoyl- $\alpha$ -phenyl, m. 111°; 2-furoylimino-3-phenylthiazolidine, m. 123°. Methods of hydrolyzing some of these compds. are given.

C. J. West  
Dioximes. C. G. Ponzio. *Gazz. chim. ital.* 63, 730–43 (1933); cf. C. A. 27, 3708. The new peroxides which are described differ from those previously known in that they are not transformed by bases into isomers, but into compds. contg. 1 less O atom. These peroxides are dioximes,  $\text{ArC}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NOH})\text{Ar}$ , of the peroxides,  $\text{ArCO}(\text{C}_2\text{N}_2\text{O})\text{COAr}$ , of diarylglyoximes,  $\text{ArCOC}(\text{:NOH})\text{C}(\text{:NOH})\text{COAr}$ , and the compds. formed from them by elimination of 1 O atom are the dioximes,  $\text{ArC}(\text{:NOH})\text{C}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{Ar}$ , of aroylformylarylfurazans,  $\text{ArCOCO}(\text{C}_2\text{N}_2\text{O})\text{Ar}$ .  $\alpha$ -Phenylglyoxime peroxide,  $\text{Ac}_2\text{O}$  and  $\text{AcONa}$ , let stand and poured into water, yield the *di-Ac* deriv. of dibenzoylfuroxan dioxime,  $\text{PhC}(\text{:NOAc})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOAc})\text{Ph}$  (I), m. 117–18°, which is the same compd. as that considered in earlier work to be  $\text{PhC}(\text{:NOAc})\text{CNO}$  (cf. C. A. 17, 3875). There is also formed another unidentified compd., which will be studied later. Heated several hrs. at 125–30° it forms an isomer,  $\text{C}_{10}\text{H}_{11}\text{O}_5\text{N}_3$  (II), m. 125–30°; in boiling  $\text{EtOH}$  it reverts to I. In 20% aq.  $\text{NaOH}$ , both I and II ppt. the Na salt of dibenzoylfuroxan dioxime,  $\text{PhC}(\text{:NONa})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NONa})\text{Ph}$ , which with dil.  $\text{H}_2\text{SO}_4$  forms dibenzoylfuroxan dioxime (III), m. 115°, decomp. slowly in dry air; it gives yellow solns. in dil.  $\text{NaOH}$  (repptd. by acids). In dil.  $\text{EtOH}$  with  $\text{Cu}(\text{OAc})_2$  it ppts. a Cu deriv., grass-green. It does not form a Ni salt. In concd.  $\text{HNO}_3$ , III evolves nitrous vapors and is transformed into the compd.  $\text{C}_{10}\text{H}_{11}\text{O}_5\text{N}_3$ , m. 122°, the constitution of which was not identified. Its formula indicates, however, that 1 of the 2 NOH groups in III is oxidized, which is in contrast to the behavior of  $\text{PhC}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NOH})\text{Ph}$ ,  $\text{MeC}(\text{:NOH})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOH})\text{Me}$  and  $\text{MeC}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NOH})\text{Me}$  with  $\text{HNO}_3$  (cf. Vianello, C. A. 26, 4053). III is an isomer of the dioxime (IV), m. 156°, formed by the action of  $\text{Na}_2\text{CO}_3$  on phenylchloroglyoxime.  $\text{Ph}[\text{C}(\text{:NOH})]_2\text{Ph}$ , previously prepd. from IV by reduction with Zn and  $\text{AcOH}$  or with  $\text{PhHNH}_2$  (cf. C. A. 18, 661; Borino, C. A. 21, 1098), is also formed by reduction of IV with  $\text{SnCl}_2$  in a mixt. of glacial  $\text{AcOH}$  and concd.  $\text{HCl}$ . On the other hand, III is not reduced by any of these reagents. In hot 5%  $\text{NaOH}$ , III, II and I yield on acidification  $\text{PhC}(\text{:NOH})\text{C}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{Ph}$  (cf. C. A.

27, 3708). It is also formed by heating in 5%  $\text{NaOH}$  (contg.  $\text{EtOH}$ ) a compd. m. 139°, which was earlier thought to be  $[\text{PhC}(\text{:NOBz})\text{CNO}]_2$  (cf. C. A. 26, 708), but which is instead a *di-Bz* deriv. of dibenzoylfuroxan dioxime,  $\text{PhC}(\text{:NOBz})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOBz})\text{Ph}$ . When fused or in boiling dil.  $\text{HCl}$  the acid at 120° inhibits the formation of resin, III forms  $\text{Ph}(\text{C}_2\text{N}_2\text{O})_2(\text{C}_2\text{N}_2\text{O})\text{Ph}$  (cf. C. A. 27, 3708). If in all the peroxides, the  $\text{C}_2\text{N}_2\text{O}$  group had the furoxan  $[(\text{C}_2\text{N}_2\text{O})\text{O}]$  structure, then on the geometric isomerism theory III and IV would be 2 forms of dibenzoylfuroxan dioxime. However, their behavior is too different to be accounted for by spatial differences in the NOH groups. They are probably structural isomers, which would be in accord with earlier results on  $\text{Bz}(\text{C}_2\text{N}_2\text{O})_2\text{Bz}$  (cf. C. A. 26, 5564). In this case III would be dibenzoylfuroxan dioxime,  $\text{Ph}(\text{HON})$ :-

$\text{CC}(\text{:N O N}(\text{:O}))\text{CC}(\text{:NOH})\text{Ph}$ , while III would be 4,5-dibenzoyl-1,2,3,6-dioxdiazine dioxime,  $\text{Ph}(\text{HON})$ :-

$\text{CC}(\text{:N O O N}(\text{:O}))\text{CC}(\text{:NOH})\text{Ph}$ . This would explain the isomerism of methylaryl peroxides studied by P. and Milone (cf. C. A. 23, 3665; Milone, C. A. 25, 955; 26, 5564) and of the dioximes prepd. from  $\text{MeC}(\text{:NOH})\text{C}(\text{:NOH})\text{Cl}$  and  $\text{MeC}(\text{:NOH})\text{C}(\text{:NOH})\text{NO}_2$  by Vianello (cf. C. A. 26, 4053). The transformations of III are very complicated, and it is possible that further investigations will show fallacies in the present interpretations. However, it is certain that the furazan ring,  $(\text{C}_2\text{N}_2\text{O})$ , is much less stable than has been generally believed; in fact, since in III and in  $\text{PhC}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NOH})\text{Ph}$  the  $\text{C}_2\text{N}_2\text{O}$  ring is displaced from the center to the end of the aliphatic chain, it is easily opened and reformed in new positions. By the procedure used in prep. I,  $\alpha$ -*p*-tolylglyoxime yields the *di-Ac* deriv. of *di-p*-tolylfuroxan dioxime,  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOAc})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOAc})\text{C}_6\text{H}_4\text{Me-p}$  (V), m. 136°. The mother liquor yields an unidentified compd., m. 111°, which is not a monomer. V was obtained by Avogadro (cf. C. A. 18, 1401) and believed to be  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOAc})\text{CNO}$ . In hot 5%  $\text{NaOH}$  (contg.  $\text{EtOH}$ ), V yields on acidification  $\alpha$ -*p*- $\text{MeC}_6\text{H}_4\text{C}(\text{:NOH})\text{C}(\text{:NOH})(\text{C}_2\text{N}_2\text{O})\text{C}_6\text{H}_4\text{Me-p}$  (VI) (cf. C. A. 27, 3708). VI is also formed from a compd., m. 174°, which was earlier believed to be  $[p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOBz})\text{CNO}]_2$  (cf. C. A. 26, 708), but which should now be considered to be a *di-Bz* deriv. of *di-p*-tolylfuroxan dioxime,  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOBz})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOBz})\text{C}_6\text{H}_4\text{Me-p}$ . When the diacyl derivs. are heated with alc.  $\text{PhHNH}_2$ , they lose 1 extranuclear O atom of the  $[(\text{C}_2\text{N}_2\text{O})\text{O}]$  ring, while the 2  $(\text{:NOCOR})$  groups are replaced by  $(\text{:NNHPh})$  residues, with the final formation of furazan *o*-azones. These latter are not, as might be expected, the already known *o*-azones of diarylfurazans, i. e.,  $\text{ArC}(\text{:NNHPh})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NNHPh})\text{Ar}$ , but isomers which are *o*-azones of aroylformylarylfurazans,  $\text{ArC}(\text{:NNHPh})\text{C}(\text{:NNHPh})(\text{C}_2\text{N}_2\text{O})\text{Ar}$ , since the furazan group is easily displaced to the end of the chain in all the compds. studied in the present work and earlier. Either  $\text{PhC}(\text{:NOAc})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOAc})\text{Ph}$  or  $\text{PhC}(\text{:NOBz})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOBz})\text{Ph}$  form, on addn. of excess, dil.  $\text{AcOH}$ , benzoylformylphenylfuroxan *o*-azone,  $\text{PhC}(\text{:NNHPh})\text{C}(\text{:NNHPh})(\text{C}_2\text{N}_2\text{O})\text{Ph}$  (VII), brown-yellow, m. 177–8°; like  $\text{PhC}(\text{:NNHPh})(\text{C}_2\text{N}_2\text{O})\text{C}(\text{:NNHPh})\text{Ph}$  (VIII), it is not hydrolyzed by acids or bases. According to Angeli (*Ber.* 26, 529 (1893)), VII m. 172°, but prepd. otherwise in the present work, viz. by heating alc.  $\text{Bz}(\text{C}_2\text{N}_2\text{O})\text{Bz}$  with  $\text{PhHNH}_2$ ,  $\text{HCl}$ , it m. 175–6°. A mixt. of VII and VIII m. 150–60°, so that they are different compds. Prepd. similarly to VII, but from  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOAc})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOAc})\text{C}_6\text{H}_4\text{Me-p}$ , or  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NOBz})[(\text{C}_2\text{N}_2\text{O})\text{O}]\text{C}(\text{:NOBz})\text{C}_6\text{H}_4\text{Me-p}$ , *p*-tolylformyl-*p*-tolylfuroxan *o*-azone,  $p\text{-MeC}_6\text{H}_4\text{C}(\text{:NNHPh})\text{C}(\text{:NNHPh})(\text{C}_2\text{N}_2\text{O})\text{C}_6\text{H}_4\text{Me-p}$ , is brown-orange, m. 179°. Its isomer is already known (cf. De Paolini, C. A. 22, 578). In general the work proves the facility with which dioximes of diarylfuroxans and their diacyl derivs. are transformed into derivs. of aroylformylarylfurazans. CI. M. Milone.

*Ibid.* 744-6.—Though there are numerous data on the transformation of labile compds., including oximes, to stable geometric isomers by sunlight, no data are available on even the simplest dioximes. Most aromatic glyoximes exist in a form characterized by complex Ni salts of the  $(\text{DH})_2\text{Ni}$  type, which can be detd. with precision. The present work shows that ultra-violet radiation (Gallois Hg-vapor lamp, 4000 c. p., 50 cm. distance) isomerizes the  $\alpha$ - and  $\gamma$ -forms of certain glyoximes, both in the solid state and in dil. EtOH, at 18° to the  $\beta$ -forms, from which the  $(\text{DH})_2\text{Ni}$  salts can be obtained. This is the same phenomenon which is brought about by heat and chem. reagents. The isomerization is also promoted by sunlight but very slowly, while Wood light (3650 Å.) is ineffective. Isomerization is more rapid in 30-40% EtOH than in the solid state, as shown by the following data, which give the hrs. exposure and the percentage of  $\beta$ -compd. formed from EtOH and the hrs. exposure and percentage from the solid state, resp.:  $\alpha$ -phenylglyoxime, 23, 44.8; 17, 20.7;  $\alpha$ -*p*-tolylglyoxime, 22, 38.8; 19, 20.2;  $\alpha$ -methylphenylglyoxime, 21, 30.3; 19, 15;  $\alpha$ -diphenylglyoxime, 20, 29; 20, 15.9;  $\gamma$ -diphenylglyoxime, 28, 41; 10, 22.4. In sunlight behind glass,  $\alpha$ -phenylglyoxime yielded only 0.93% of  $\beta$ -compd. after 16 months. CII. E. Durio. *Ibid.* 747-51.—Nothing has been known about the behavior of sym. and asym. glyoximes with  $\sigma\text{-C}_6\text{H}_4(\text{NH}_2)_2$  (I). Since  $\text{AcC}(:\text{NOH})\text{I}$  and  $\text{BzC}(:\text{NOH})\text{I}$  react with I to form 2-methyl- and 2-phenylquinoxaline, resp., there may be a general reaction:  $\text{I} + \text{H}(\text{HON}:\text{O})\text{CC}(:\text{O})\text{R} \rightarrow$

$\text{C}_6\text{H}_4\text{N}:\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{CR}:\text{N} + 2\text{NH}_2\text{OH} + \text{H}_2\text{O}$ , and corresponding a general reaction of glyoximes thus:  $\text{I} + \text{HO}-$

$\text{N}.\text{CRC}(:\text{NOH})\text{R}(\text{or R}') \rightarrow \text{C}_6\text{H}_4\text{N}:\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{CR}:\text{N} + 2\text{NH}_2\text{OH}$ . Expts. with various sym. and asym. glyoximes show, however, that none reacts with I, and that there is no difference between the  $\alpha$ - and  $\beta$ -form of the same glyoxime. Likewise,  $\text{MeC}(:\text{NOH})\text{Rz}$  and  $\text{PhC}(:\text{NOH})\text{Ac}$  fail to react with I. On the contrary, chloroglyoximes react easily with 2 mols. of I, with formation of quinoxalines in which 1 of the substituents is the  $\text{HNC}_6\text{H}_4\text{NH}_2$  residue, thus:  $2\text{I} + \text{HON}:\text{CCIC}(:\text{NOH})\text{R} \rightarrow$

$\text{C}_6\text{H}_4\text{N}:\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{CR}:\text{N} + 2\text{NH}_2\text{OH} + \text{HCl}$ . The same quinoxalines are formed from chloroantrosos ketones, thus:  $2\text{I} + \text{HON}:\text{CCIC}(:\text{O})\text{R} \rightarrow$

$\text{C}_6\text{H}_4\text{N}:\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{CR}:\text{N} + \text{NH}_2\text{OH} + \text{H}_2\text{O} + \text{HCl}$ , and are basic compds. which can be acetylated and hydrolyzed by HCl to the corresponding hydroxyquinoxalines.  $\alpha\text{-HC}(:\text{NOH})\text{C}(:\text{NOH})\text{Cl}$  does not react with I, which confirms the doubt already expressed regarding its structure (cf. C. A. 25, 70). On the other hand, alc.  $\beta\text{-IC}(:\text{NOH})\text{C}(:\text{NOH})\text{Cl}$  and excess I form directly 3-phenylenediaminoquinoxaline,

$\text{C}_6\text{H}_4\text{N}:\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{CII}:\text{N}$ , greenish yellow, decomp. 160-70°; it gives red solns. in very dil. acids and is decompd. by bases. Alc.  $\text{AcC}(:\text{NOH})\text{Cl}$  or  $\text{MeC}(:\text{NOH})\text{C}(:\text{NOH})\text{Cl}$  and excess I yield, after purification with dil. HCl and NaOAc, 2-methyl-3-phenylenediamino-

quinoxaline,  $\text{C}_6\text{H}_4\text{N}:\text{C}(\text{Me})\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{N}$ , brown-yellow, m. 242° (decompn.); its solns. in very dil. acids are red. Prolonged heating in 20% HCl yields

$\text{C}_6\text{H}_4\text{N}:\text{C}(\text{Me})\text{C}(\text{OH})\text{N}$  and I.  $\text{BzC}(:\text{NOH})\text{Cl}$  or  $\text{PhC}(:\text{NOH})\text{C}(:\text{NOH})\text{Cl}$ , heated with I, and purified with HCl and NaOAc, yield 2-phenyl-3-phenylenediaminoquinoxaline, yellow, decomp. 217-8°; in warm  $\text{Ac}_2\text{O}$  it

forms an *Ac deriv.*,  $\text{C}_6\text{H}_4\text{N}:\text{C}(\text{Ph})\text{C}(\text{NHC}(\text{C}_6\text{H}_4\text{NH}_2-\sigma))\text{N}$ , yellow, m. 155-6° (decompn.), which hydrolyzes in dil. HCl at room temp.  $\beta\text{-MeC}_6\text{H}_4\text{COC}(:\text{NOH})\text{Cl}$  (II) or  $\beta\text{-MeC}_6\text{H}_4\text{C}(:\text{NOH})\text{C}(:\text{NOH})\text{Cl}$  and I give 2-*p*-tolyl-3-phenylenediaminoquinoxaline, yellow, m. 217° (decompn.). II, described by Rheinboldt and Schmitz-

Dumont (C. A. 20, 300), can be prepd. more conveniently by treating  $\beta\text{-MeC}_6\text{H}_4\text{COC}(:\text{NOH})\text{H}$  in glacial AcOH with Cl under the conditions used for  $\text{BzC}(:\text{NOH})\text{Cl}$  (cf. C. A. 26, 2733). Contrary to Richter-Anschütz (cf. Chemie der Kohlenstoffverbindungen, 12th Ed. 1930, p. 300), quinoxalines are formed by the action of I, not on all oximes of 1,2-dicarboxylic compds., but only on monoximes of  $\alpha$ -keto aldehydes. C. C. Davis

Guanazole. R. Stollé and W. Dietrich. J. prakt. Chem. 139, 193-210 (1934).—For purposes of naming the compds. described in this paper, guanazole (I) is assumed to be  $\text{H}_2\text{NC}:\text{N}:\text{N}:\text{C}(\text{NH})\text{NH}$ . I (2 g.) and 2.4 g.

$\text{AmNO}_2$  in EtOH give a mono-NO deriv (3-amino-5-nitrosoamino-1,2,4-triazole), canary-yellow, decomp. about 172°; warming with AcOH causes the splitting off of  $\text{HNO}_2$ ; with concd. HCl it rearranges to 3-amino-1,2,4-triazole-5-diazonium chloride. I (5 g.) in 28.5 cc. 7 N EtOH-HCl and 11.7 g.  $\text{AmNO}_2$  give 6.5 g. of the *di-NO deriv.* (3,5-dinitrosoamino-1,2,4-triazole) (II), orange-red, amorphous, decomp. 187°. Reduction of II with  $\text{SnCl}_2$  and concd. HCl gives 3-amino-5-hydrazino-1,2,4-triazole *di-HCl* (III), m. 217° (decompn.), which reduces Fehling soln. and  $\text{NH}_4\text{OH-AgNO}_3$  in the cold;  $\text{FeCl}_3$  gives a blue-violet color; with excess  $\text{BzH}$  there results 3-benzaldehydeamino-5-benzalhydrazino-1,2,4-triazole,  $\text{PhCH}(\text{OH})\text{NHC}:\text{N}:\text{N}:\text{C}(\text{NH}:\text{CHPh})\text{NH}$ , pale yel-

low, m. 232°; with EtOH-AgNO<sub>3</sub> there results a canary-yellow ppt.; dil. HCl splits off BzH; heating 2 hrs. at 139° in a vacuum drying app. gives the 3-benzal-amino deriv., citron-yellow, m. 232°. With NaNO<sub>2</sub> the ice-cold aq. soln. of III gives 5-azido-3-nitrosoamino-1,2,4-triazole, ochre, amorphous, detonates at 134°; HCl gives a diazonium chloride; in the presence of HCl, coupling with  $\beta\text{-C}_6\text{H}_4\text{OH}$  gives 5-azido-3-[(2-hydroxy-1-naphthyl)-azo]-1,2,4-triazole, orange, m. 105°; concd.  $\text{H}_2\text{SO}_4$  gives a violet, alkali a red soln.; the 3-(4-dimethylamino-1-benzene)azo deriv., Bordeaux-red, decomposes 185°. The diazo soln. of I (10 g. I, 21 g. NaNO<sub>2</sub> and 200 cc. concd. HCl) on heating gives 8 g. 3,5-dichloro-1,2,4-triazole, m. 148°, and a compd., possibly 3-amino-5-chloro-1,2,4-triazole-HCl, m. 112°. Coupling of the diazo soln. with PhOH gives a mixt. of 3,5-bis(4-hydroxyphenylazo)-1,2,4-triazole (IV) and 3-amino-5-(4-hydroxyphenylazo)-1,2,4-triazole-HCl (V), sep'd. by extn. of V with hot H<sub>2</sub>O. IV, cinnamon-red, m. 270° (decompn.), could not be crystd. IV (10 g.) and 50 g.  $\text{Ac}_2\text{O}$ , boiled 2 hrs., give 7.5 g. of the *di-Ac deriv.* (VI), orange, m. 235°; when 3.1 g. IV and 80 g.  $\text{Ac}_2\text{O}$  are boiled 15 hrs., there results the 4-*Ac deriv.* of VI, cinnamon-red, m. 107°. V, yellow-red, crystals with 1 mol. H<sub>2</sub>O, decomp. about 240°; the free base, ochre, m. 286° (decompn.), crystals with 1 mol. H<sub>2</sub>O. I (3 g.) and 30 g.  $\text{Ac}_2\text{O}$ , boiled 3 hrs., give a 3,5-di-Ac deriv., does not m. 300°. The 3,5-di-Bz deriv. m. 300° (decompn.). I (3 g.) and 0.4 g. BzH, heated 0.5 hr. on the water bath, give the monobenzal deriv., yellow, m. 234°. I (4 g.) in 80 cc. 2 N HCl, treated with 100 cc. 65% HNO<sub>3</sub>, gives a dinitrate of I, pale yellow, decomp. at 145°. I (5 g.) in 200 cc. bleaching powder soln. contg. 7% perchloron gives 7 g. of 3,5-dichloroimino-3,5-dihydro-1,2,4-triazole,  $\text{ClN}:\text{C}:\text{N}:\text{N}:\text{C}(\text{NCl})\text{NH}$ , amorphous, yellow, detonates

at 135°  $\beta\text{-C}_6\text{H}_7\text{NH}_2$  gives a brown-red dye, m. 285°, which gives a diazo soln., coupling in alk. soln. with  $\beta\text{-C}_6\text{H}_4\text{OH}$  and R salt. Aminoguanazole (triamino-1,3,4-triazole) yields a benzal deriv., yellow, m. 184°; the diazo soln. couples with alk.  $\beta\text{-C}_6\text{H}_4\text{OH}$  to give a violet dye. A dibenzal compd. is also formed in the above reaction. C. J. West

Synthetic experiments with methyltrihydroxybenzenes. I. Synthesis of 2,6-dimethylpolyhydroxyflavanones. Shin-ichiro Fujise and Sekio Mitsui. Bull. Chem. Soc. Japan 9, 24-6 (1934); cf. C. A. 27, 4233; Shinoda and Sato, C. A. 23, 4210.—Two g. 2,4-dimethylphloroglucinol, m. 162-3°, with 3.45 g. piperonylacrylyl chloride and 6 g.  $\text{AlCl}_3$  in  $\text{PhNO}_2$  give a tar which on extn. with dil.



alc. NaOH yields 0.2 g. 5,7-dihydroxy-6,8-dimethyl-3',4'-methylenedioxyflavanone, m. 207°, together with an isomeric yellow compd., m. 222-3°, which gives no flavanone reaction and may be a chalcone deriv. The same reaction with carbethoxyferulyl chloride (the free acid m. 178°) yields 0.3 g. 5,7-dihydroxy-6,8-dimethyl-3'-methoxy-4'-hydroxyflavanone, yellow needles, m. 254.5-5.5°, giving a dark green color with FeCl<sub>3</sub> and cherry-red with Mg and HCl. Absorption spectra of these flavanones are given. H. A. Beatty

**Synthesis of flavones at room temperature.** H. S. Mahal and K. Venkataraman. *Current Sci.* 2, 214-15 (1933).—NaNH<sub>2</sub> converted 2-acetyl-1-naphthyl benzoate in Et<sub>2</sub>O into 2-acetyl-1-naphthol (I). Treatment of I with cold concd. H<sub>2</sub>SO<sub>4</sub> gave α-naphthoflavone. Since these reactions occurred below 16°, the reaction is of obvious phytochem. significance. C. H. Peet

**Ononin.** II. Fritz Wessely, Franz Lechner and Konstantin Dinjaski. *Monatsh.* 63, 201-9 (1933); cf. C. A. 25, 3327.—Ononin yields a tetra-Ac deriv., C<sub>20</sub>H<sub>20</sub>O<sub>11</sub>, m. 182.5°. Formononetin, C<sub>16</sub>H<sub>14</sub>O<sub>8</sub>, m. 265°; the Ac deriv. m. 170° and the Me deriv. m. 156-60°. These compds. show no depression in m. p. when mixed with the isoflavone derivs. previously described. 2,4-(HO)-C<sub>6</sub>H<sub>3</sub>COCH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OMe-p and α-acetobromoglucose give a compd. identical with natural onospin; the Me deriv., on hydrolysis, gives 4,2-HO(MeO)C<sub>6</sub>H<sub>3</sub>COCH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>OMe, m. 173°, which was synthesized from m-HOC<sub>6</sub>H<sub>4</sub>OMe and p-MeOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>CN with ZnCl<sub>2</sub> and HCl. C. J. W.

**The yellow dahlia pigment.** Leopold Schmid and Ludwig Haschek. *Monatsh.* 62, 317-22 (1933).—In addn. to apigenin yellow dahlia blooms contain an isomeric pigment, dahlia II. It is not a flavonol nor is it a chalcone deriv. It gives a red color with alkalis. Its Me deriv. is identical with that of apigenin and yields the latter on demethylation. Ac<sub>2</sub>O converts it into a tri-Ac compd., m. 182°, identical with triacetylapiogenin and capable of yielding apigenin upon sapon. Its absorption spectrum is different from that of apigenin. It may be a dimorph of apigenin, but if so should yield phloroglucinol when subjected to decompn. by alkali; none of this substance has been observed, but p-HOC<sub>6</sub>H<sub>4</sub>COMe is formed. It may be a stereoisomer, or even a position isomer, of apigenin easily convertible into the latter. The material at hand did not suffice to permit the isolation of intermediate products of detd. structure, the possible syntheses of which would test the latter view. G. A. H.

**The volatile base of valerian roots.** A. E. Chichibabin and M. P. Oparina. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 119-20 (in English 121-2) (1934).—Dry valerian roots (2 kg.) were treated with HCl, steam-distd. with soda, acidified and extd. with ether; the acid aq. portion was made alk., extd. with ether, dissolved in alc. and picric acid added. Recrystn. from hot alc. gave 0.24 g. picrate, C<sub>10</sub>H<sub>11</sub>N<sub>3</sub>C<sub>6</sub>H<sub>5</sub>(NO<sub>2</sub>)<sub>3</sub>OH. The free base with HCl and H<sub>2</sub>PtCl<sub>6</sub> gave the chloroplatinate (C<sub>10</sub>H<sub>11</sub>NHCl)<sub>2</sub>PtCl<sub>6</sub>. The free base is a colorless oil at 0°, insol. in H<sub>2</sub>O, has a pyridine homolog odor, gives ppts. with HgCl<sub>2</sub> or I<sub>2</sub> in KI and slowly reacts with KMnO<sub>4</sub>. F. H. Rathmann

**2,6-Dimethylpyridine.** Alvin Singer and S. M. McElvain. *Org. Syntheses* XIV, 30-3 (1934).—Detailed directions are given for the condensation of AcCH<sub>2</sub>CO<sub>2</sub>Et, HCHO and NH<sub>3</sub> with Et<sub>3</sub>NH to 1,4-dihydro-3,5-dicarbethoxy-2,6-dimethylpyridine (84-9% yield), oxidation with HNO<sub>3</sub> in H<sub>2</sub>SO<sub>4</sub> to 3,5-dicarbethoxy-2,6-dimethylpyridine, its hydrolysis and distn. of the Ca salt giving 30-6% 2,6-dimethylpyridine (based on the AcCH<sub>2</sub>CO<sub>2</sub>Et used). C. J. West

**Reaction of organic halides with piperidine.** IV. Bromo esters. W. V. Drake and S. M. McElvain. *J. Am. Chem. Soc.* 56, 697-700 (1934); cf. C. A. 27, 1884.—The rate and course of the reaction of 13 Br esters with piperidine have been detd. and from the results obtained mechanism for the elimination of halogen acid and for the reaction involving replacement of the halogen by the piperidine (I) radical have been suggested. Results are given for BrCH<sub>2</sub>CO<sub>2</sub>Et, MeCHBrCO<sub>2</sub>Et, EtCHBr-

CO<sub>2</sub>Et, Me<sub>2</sub>CBrCO<sub>2</sub>Et, Br(CH<sub>2</sub>)<sub>2</sub>CO<sub>2</sub>Et, Br(CH<sub>2</sub>)<sub>3</sub>CO<sub>2</sub>Et, Br(CH<sub>2</sub>)<sub>4</sub>CO<sub>2</sub>Et, BrCH<sub>2</sub>CHMeCO<sub>2</sub>Et, MeCHBrCH<sub>2</sub>CO<sub>2</sub>Et, MeCHBr(CH<sub>2</sub>)<sub>2</sub>CO<sub>2</sub>Et, MeCHBr(CH<sub>2</sub>)<sub>3</sub>CO<sub>2</sub>Et, MeCHBr(CH<sub>2</sub>)<sub>4</sub>CO<sub>2</sub>Et and MeCHBr(CH<sub>2</sub>)<sub>5</sub>CO<sub>2</sub>Et at 90° for periods from 0.25 to 168 hrs. With certain exceptions the order of reactivity as detd. by the amt. of I. HBr produced in a given time is primary > secondary > tertiary, the same as with the alkyl bromides. There is, however, a general activating effect of the CO<sub>2</sub>Et group which is quite marked when this group is close to the halogen and persists even when the halogen is in the β-position. The esters contg. the Br in the β-position are definitely the most reactive. Even though these esters give mainly *tert* amines with I, their high reactivities indicate that the reaction product is not the result of a simple replacement reaction; the reaction is probably the formation of an unsatd. ester, which then adds I. Org. bromides may undergo 2 distinctly different and, in some cases, simultaneously occurring reactions with I, (a) the replacement of the halogen by the piperidine radical with the formation of a *tert* amine and (b) the elimination of HBr with the formation of an unsatd. compd. With the exception of the β-Br esters, the order of reactivity for reaction (a) is primary > secondary > tertiary, while for reaction (b) the order is reversed. The mechanism of the reaction of the β-Br esters is discussed in detail. The following HCl salts of *piperidino* esters were prepd., in which N is C<sub>4</sub>H<sub>9</sub>N and Y is CO<sub>2</sub>Et: NCH<sub>2</sub>Y, m. 130-1°, MeCHN<sup>+</sup>Y<sup>-</sup>, m. 131-2°; EtCHN<sup>+</sup>Y<sup>-</sup>, m. 118-4°; N(CH<sub>2</sub>)<sub>2</sub>Y, m. 163-4°; N(CH<sub>2</sub>)<sub>3</sub>Y, m. 128 0°; N(CH<sub>2</sub>)<sub>4</sub>Y, m. 154 5°; NCH<sub>2</sub>CHMeY, m. 134 5°; MeCHNCH<sub>2</sub>Y, m. 177-8°; MeCHN(CH<sub>2</sub>)<sub>2</sub>Y, m. 128-9°; MeCHN(CH<sub>2</sub>)<sub>3</sub>Y, m. 135-6°; MeCHN(CH<sub>2</sub>)<sub>4</sub>Y, m. 121 2°; MeCHN(CH<sub>2</sub>)<sub>5</sub>Y, m. 116 7°. C. J. West

**Quinoline derivatives. XLIV. Synthesis of α-arylated 2-phenylquinolyl-4'-β-aminoacetic acids.** Hanns John and Ernst Pietsch. *J. prakt. Chem.* 139, 237 41 (1934); cf. C. A. 28, 2356°.—2-Phenyl-4'-β-aminoquinoline, NaCN and BzH give 2-phenylquinolyl-4'-β-(α-phenyl)aminoacetic acid, C<sub>16</sub>H<sub>14</sub>N<sub>2</sub>CH<sub>2</sub>NHCHPhCO<sub>2</sub>H, yellow, m. 178 80° (Et ester, m. 173°); the α-p-tolyl deriv., m. 158 62° (Et ester, m. 95°); the α-p-isopropylphenylene deriv., orange, m. 102-5°; the α-benzyl deriv., m. 120°; the α-ethyl-ω-phenyl deriv., yellow, m. 170-90°. XLV Derivatives of 2-phenyl-4-quinolyl-β-aminoacetic acid II. John and Georg Behmel. *Ibid.* 284 8.—2-Phenyl-4-quinolyl-β-aminoacetic acid, PhC<sub>6</sub>H<sub>4</sub>NNHCH<sub>2</sub>CO<sub>2</sub>H, yields a *Pr* ester, m. 91° (HCl salt, m. 180-2°, soly. in H<sub>2</sub>O at room temp. about 0.5%); the *Bu* ester m. 74.5° (HCl salt, m. 181°, soly. 0.7%); *iso-Bu* ester, m. 105° (HCl salt, m. 130°, soly. 1%); *iso-Am* ester, m. 76° (HCl salt, m. 140°, soly. 0.5%); *Ph* ester, m. 108° (HCl salt, m. 232° (decompu.)); *benzylamide*, m. 187°; *p-phenetide*, m. 127°; *α-pyridineamide*, m. 233°; *piperidide*, m. 192°. C. J. West

**The synthesis of β-aryl-β-uraminopropionic acids and their phenyl and naphthyl derivatives.** V. M. Rodionov and S. A. Vyazkova. *J. Gen. Chem. (U. S. S. R.)* 3, 628-35 (1933).—A soln. of 2 g. β-phenylalanine (I) in 40 cc. hot H<sub>2</sub>O heated on a water bath for 4 hrs. with 1.5 g. KCNO gave on cooling, filtering, acidification of the filtrate with HCl to Congo red paper, and standing for 10-12 hrs., 80% of β-phenyl-β-uraminopropionic acid (V), m. 190° from hot EtOH. β-Piperonylalanine (II) (5 g.) and 3.5 g. KCNO similarly gave 80% of β-piperonyl-β-uraminopropionic acid (VIII), m. 176°, from EtOH. Addn. of 3 g. PhNCO with const. cooling and stirring to a soln. of 4 g. I in 32 cc. of 1 N NaOH (the mixt. is allowed to react until the odor of PhNCO and the superficial scum has disappeared) and acidification with HCl to Congo red gave 97% of β-phenyl-β-phenyluraminopropionic acid (VII), m. 170° from EtOH, insol. in H<sub>2</sub>O, EtO and CHCl<sub>3</sub>. II (5 g.) in 50 cc. of 1 N NaOH and 3.2 g. PhNCO similarly gave 98% of β-piperonyl-β-phenyluraminopropionic acid (III), m. 165° from EtOH. III (3 g.) in 18 cc. abs. EtOH satd. with HCl and warmed at 40-50° for 0.5 hr. gave a viscous yellow soln. which

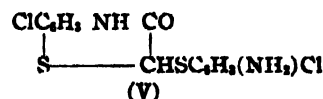
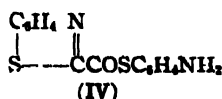
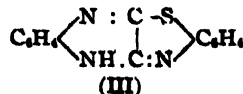


on dilg. with  $H_2O$  gave 57% of the Et ester of III, m. 65°. An excess of  $C_{10}H_7NCO$  added with const. shaking to 3 g. I in 120 cc.  $H_2O$  and 30 cc. 1 N NaOH gave after 0.5 hr. a ppt. of  $(C_{10}H_7NH)_2CO$  which was filtered out. Acidification of the filtrate with HCl gave  $\beta$ -phenyl- $\beta$ -naphthyluraminopropionic acid, m. 180° from EtOH. II (3 g.) in 180 cc.  $H_2O$  and 30 cc. 1 N NaOH and 3.2 g.  $C_{10}H_7NCO$  similarly gave  $\beta$ -piperonyl- $\beta$ -naphthyluraminopropionic acid (IV), m. 176° from EtOH. The Et ester of IV was prepd. in 31% yield, m. 105°. Attempts to esterify V resulted in the formation of 4-phenyl-4,5-dihydropyrimidine (VI). V (1 g.) in 350 g. HCl, d. 1.124, heated 0.5 hr. on cooling, gave VI, m. 218° from EtOH. By concg. the mother liquor a quant. yield of VI is obtained. VII (1 g.) in 400 g. concd. HCl, heated for 0.5 hr., on cooling gave 83% of 1,4-diphenyl-dihydropyrimidine, m. 224° from hot EtOH. The  $C_{10}H_7$  derivs. did not give dihydropyrimidines. VII (2 g.) in 15 cc. cold abs. EtOH satd. with HCl and heated on a water bath for 2 hrs. gave on standing 4-piperonyl-4,5-dihydropyrimidine, m. 225°. Lewis W. Sutz

Reaction of benzoyl chloride and  $\alpha$ -naphthylamine. K. Dzienowski and L. Sternbach. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 416-31.—Ten g.  $\alpha$ - $C_{10}H_7NH_2$  (I), heated at 175-80° with 15-20 cc.  $BzCl$  for 5 min. with gradual addn. of 5 g.  $ZnCl_2$  gave 1-benzoyl-amino-4-benzoylnaphthalene (II), m. 178° (crystd. from AcOH), which on alk. sapon. gave 1-amino-4-benzoylnaphthalene (III), m. 103-6° ( $C_8H_6$ ); *picrate*, m. 142°. III on diazotization and coupling in the presence of NaOAc with  $\beta$ - $HOC_{10}H_7$  gave 4-benzoyl-2'-hydroxy-1,1'-azonaphthalene, m. 220° ( $PhNO_2$ ). III coupled with  $PhN_2Cl$  gave 1-amino-2-benzoyl-4-benzoylnaphthalene, m. 209-10° (AcOH), which with  $Na_2S_2O_4$  gave 4-benzoyl-1,2-naphthylenediamine, m. 198° (alc.), in which the relative positions of the  $NH_2$  groups were shown by condensation with phenanthraquinone to give phenanthrobenzoylnaphthiazine, m. 252-5° (AcOH). II on further heating at 190° with  $BzCl$  and  $ZnCl_2$  gave 1-benzoylamino-2,4-dibenzoylnaphthalene, m. 224-6° (AcOH). I (200 g.) was heated with 300 cc.  $BzCl$  at 180° with gradual addn. of 120 g.  $ZnCl_2$  until the evolution of HCl moderated and then heated for 2 hrs. at 240°. Extn. of the reaction mass with boiling HCl and AcOH left the  $ZnCl_2$  salt of 2,4-diphenyl-3-1'-naphthyl-7,8-benzoquinazolinium chloride (IV), m. above 310° ( $PhNO_2$ ). IV also resulted from fusion of II with  $BzCl$  and  $ZnCl_2$  at 180° for 1 hr. and from iso-1-benzoylamino-2-benzoylnaphthalene (V) with I and  $ZnCl_2$  for 10 min. IV warmed with 50% alc. KOH gave 2,4-diphenyl-3- $\alpha$ -naphthyl-4-hydroxy-7,8-benzo-3,4-dihydroquinazoline (VI), m. 184° ( $C_8H_6$ ); *HCl salt*, m. 209°; *picrate*, m. 260-1°. VI on crystn. from EtOH gave the Et ether, m. 224° (*HCl salt*, m. 202°) and from MeOH gave the Me ether, m. 193°. VI on warming to 200° passed into a yellow isomer, m. 265°, and on refluxing with alc. HCl the pyrimidine ring was ruptured with the formation of V and I. On refluxing in  $PhNO_2$  for 30 min. VI gave 2,4-diphenyl-2-hydroxy-3- $\alpha$ -naphthyl-7,8-benzo-2,3-dihydroquinazoline (VII), m. 265° ( $PhNO_2$ ), which on short warming with alc. HCl gave V or the cyclized isomer, 4,5-naphtho-2,6-diphenyl-6-hydroxymetoxazine, m. 161-2° (alc.). V on sapon. gave 2-benzoyl-1-aminonaphthalene (VIII),  $b_p$  263-5° (*picrate*, m. 200-1°). This with  $Ac_2O$  gave 1-acetamido-2-benzoylnaphthalene, m. 194-5°, and with  $BzCl$  gave 1-benzoylamino-2-benzoylnaphthalene (IX), m. 202°. V with  $NH_4OH$  gave the oxime of IX, m. 211°, which on sapon. gave the oxime of VIII, m. 178°, and which by passage of dry HCl through its satd. soln. in  $Ac_2O$  for 1 hr. gave 3,7-diphenyl-4,5-naphtho[2',1']hept-1,2,6-oxadiazine, m. 188-9° ( $C_8H_6$ ); *HgCl\_2 salt*, m. 209°. IV in  $H_2O$  suspension treated with excess concd.  $NH_4OH$  gave 2,4-diphenyl-7,8-benzoquinazoline, m. 160° ( $C_8H_6$  alc.); *HgCl\_2 salt*, m. 212-5° decompn.; *picrate*, m. 168-70°. This was also prepd. from VI or VII and alc.  $NH_3$  in the cold or from V by heating in a sealed tube at 180° with alc.  $NH_3$  for 4-6 hrs. R. C. Elderfield

Bisbenzothiazine; several regularities in the formation

of thiazoles and thiazines. Georg Walter, Richard Hübsch and Hans Pollak. *Monatsh.* 63, 186 200 (1933).—A homogeneous product is not obtained by the action of  $o$ - $H_2NC_6H_4SNa$  (I) or  $[4,2-Cl(NH_2)C_6H_4S]_2Zn$  (II) upon dichloroquinoxaline, even in the presence of  $AlCl_3$ ;  $o$ - $H_2NC_6H_4SH$  gives diphenasinthiazine (III), yellow, m. 270°. I (2 mols.) and 1 mol.  $Cl_3CCOCl$  give 2'-amino-phenyl benzothiazole-3-thiocarboxylate (IV), reddish yellow, decompg. 160-70°; the presence of the  $NH_2$  group is shown by diazotizing and coupling with  $\beta$ - $C_{10}H_7OH$  (red dye); the CO group is indicated by the formation of a phenylhydrazone, m. 198°.  $ZnCl_2$  did not split off a mol. of  $H_2O$ ; the thiazole ring was indicated by the reaction with HI and P, CS,  $PhNH_2$  and ethenylamino-phenyl mercaptan being formed. II and  $Br_2CHCO_2H$ , heated 3 hrs. at 150°, give 2-(4'-chloro-2'-aminophenyl-mercapto)-6-chloro-3-ketodihydro-p-benzothiazine (V), m. 202°; phenylhydrazone, yellow, m. 210°.  $C_6Cl_4$  does not react with  $o$ - $H_2NC_6H_4SH$ ;  $(COCl)_2$  gives bisbenzothiazole (VI). 2,3-Diketodihydrobenzo-1,4-thiazine and  $o$ - $H_2NC_6H_4SH$ , heated 8 hrs. at 200°, give 13.3% of 1,1'-bisbenzothiazine (VII),  $C_{18}H_{12}N_4S_2$ , yellow, decompg. 301-5°,  $n$  1.42447 (for VI,  $n$  is 1.42407); the concd.  $H_2SO_4$  soln. is orange-red with fluorescence; *Br deriv.*, brown, decompg. 157°; *di-Br deriv.*, m. above 300°. The absorption spectra for VI and VII are given. Dichloroketodihydrobenzothiazine and  $o$ - $H_2NC_6H_4SH$  give a yellow compd., m. 204°, analyzing for  $C_{18}H_{12}O_2N_4S_4$ , for which no structural formula can be given at present. The results of this study indicate that acids and acid halides react with  $o$ - $H_2NC_6H_4SH$  to form  $\mu$ -substituted benzothiazoles; halogenated acid halides give aminophenylmercaptobenzothiazoles; monohalogenated acids give benzothiazines and polyhalogenated acids give aminophenylmercaptobenzothiazines.



C. J. West

Hydrastinine and its preparation from narcotine. K. Topchiev. *J. Applied Chem.* (U. S. S. R.) 6, 529-35 (1933).—Hydrocotarnine.—One kg. of air-dry cotarnine is dissolved in approx. 10 l. cold dil.  $H_2SO_4$  (9 l.  $H_2O$  and 1 l.  $H_2SO_4$  of d. 1.82) and 1 kg. of granulated Zn is added to the cold soln., the whole being slightly agitated for 24 hrs. The mixt. is filtered, the residue washed with small amts. of 5%  $NH_4OH$  and water and the filtrate and the wash waters are then poured into 6-7 l. of 25%  $NH_4OH$ . The residue is left for 12 hrs., filtered with suction and washed first with weak  $NH_4OH$ , then with  $H_2O$  and dried in air. The resulting hydrocotarnine contg. some water of crystn. is dried *in vacuo* on a water bath. The red sirup is filtered while hot through cloth, yielding finally about 750 g. of a solid vacuum-dry hydrocotarnine. Reduction of hydrocotarnine to hydrohydrastinine.—From 400 to 500 g. hydrocotarnine is dissolved in 5 vol. anhyd. AmOH, 600-750 g. Na is added and the mixt. is heated on an oil bath (178-180°) to 145-150°, 20 vols. of AmOH (in comparison to hydrocotarnine used) is introduced. The reaction should be carried out in 50 min.; the hot soln. is then carefully poured off the excess of Na and water (equal vol.) is carefully added to the soln. The AmOH layer is sepd. from the aq. layer after 10-12 hrs. and the AmOH is removed by vacuum distn. The residue is vacuum-distd., the portion  $b_p$  170-75° being collected. The higher- and lower-boiling fractions are combined and redistd. Oxidation of hydrohydrastinine to hydrastinine.—Two hundred g. hydrohydrastinine is dissolved in 0.5 l. alc. and 140 g. anhyd. NaOAc, the contents are heated to the b. p. of the alc. and 320 g. of I in 3.2 l. of alc. is introduced within

1 hr. through the reflux condenser. The mixt. is allowed to crystallize during 12 hrs., filtered by suction and the hydrastinine-HI is washed with 200-300 cc. alc., followed by drying. The yield of the HI salt and periodide of hydrastinine amounts to 300-400 g. *Hydrastinine base*.—From 300 to 400 g. of the oxidation product of hydrohydrastinine with I is dissolved in 3 vols. boiling H<sub>2</sub>O and the insol. periodide is filtered off. The filtrate is shaken until cold and converted to a finely cryst. mass; a cold soln. of 100 g. KOH in 200 cc. is then added, the shaking is continued and the sepd. base, after proper cooling for 0.5 hr., is filtered off with suction, washed with water and dried with air. The yield amounts to 100-110 g. *Hydrastinine-HCl*.—The hydrastinine base (650 g.) is dissolved in 1.5 l. cold alc., filtered from the insol. material, the ppt. is carefully washed with 0.5 l. cold alc. and alc. HCl is then added to the absolutely clear filtrate to a slightly acidic reaction with Congo red. If the acid contains 37-40% HCl about 300 cc. of the latter is needed. Three vols. of ether is added to the lukewarm soln. which is left standing for 12 hrs. The substance is then filtered with suction, washed with a mixt. of alc.-ether (1:3) and finally with ether, followed by drying first with air and then *in vacuo*. About 500-520 g. of the HCl salt, m. 212°, is thus obtained. The EtOH left from the above operation contains hydrastinine-HI and some of the hydrohydrastinine which was not oxidized. The alc. is distd. off to dryness and the residue is dissolved in hot H<sub>2</sub>O and is boiled with animal charcoal, filtered and some CaH<sub>2</sub> and NH<sub>4</sub>OH to a noticeable NH<sub>3</sub> odor are then added. The last 2 substances promote the sepn. of the entire hydrohydrastinine and hydrastinine-HI in a solid form. They are washed with alc. and dried. The alc. which contains the AcOH ester and AcOH is boiled with KOH on a reflux condenser and distd. off, a small amt. of H<sub>2</sub>SO<sub>4</sub> is then added (5 cc. H<sub>2</sub>SO<sub>4</sub> of d. 1.82 per l. of alc.) and the liquid is redistd. The AmOH is regenerated after distg. off the product of reaction with Na, is distd. and the fraction b. 128-32° is collected. The H<sub>2</sub>O contained in the alc. is used for decomp. the AmONa in a new portion of the product to be reduced. The periodide after grinding into fine powder, which cannot be dissolved with water, is added in small portions to the warm (50-60°) soln. of an equal amt. (by wt.) of Na hyposulfite and a double amt. of H<sub>2</sub>O. The sepd. S is filtered off and the hydrastinine-HI sepd. after 12 hrs. is filtered off by suction and finally converted into the base by the method described above, yielding about 70% of the hydrastinine base. A. A. B.

*Licorice extract and glycyrrhizic and glycyrrhetic acids*. Daniel Sanroma y Beovide. *Rev. acad. cienc. Madrid* 30, 555-76(1933).—K glycyrrhizate was prepd. from com. licorice ext. by Karrer's method (*C. A.* 15, 2427), then hydrolyzed by heating with 100 parts of 1% H<sub>2</sub>SO<sub>4</sub> for 2 hrs. at 140° in an autoclave, and the pptd. glycyrrhetic acid (I) collected on a filter. Glucuronic acid was recovered from the filtrate. The best solvent for crystg. I was found to be CCl<sub>4</sub>. White crystals m. 245° were obtained. When I was heated with Zn dust or Se powd. no C<sub>10</sub>H<sub>8</sub> was formed; hence it is concluded that the mol. does not contain the C<sub>10</sub>H<sub>8</sub> nucleus. L. E. G.

*Constitution of saponins. IV. Hederagenin and oleanolic acid* (3). Zenjiro Kitasato and Chuzaburo Sone. *J. Chem. Soc. Japan* 54, 461-74(1933).—See *C. A.* 27, 4807.

*Chlorophyll. XL. Oxoporphyrins*. The fine structure of chlorophyll *a*. Hans Fischer, Josef Riedmair and Johann Hasenkamp. *Ann.* 508, 224-49(1934); cf. *C. A.* 28, 1641.—Pheophorbide *a* (1 g.) in 100 cc. C<sub>6</sub>H<sub>5</sub>N, heated 5 hrs., gives 700 mg. of pyropheophorbide *a* (I), extd. with 15-16% HCl. I (100 mg.) in 100 cc. AcOH at room temp., treated with 0.1 cc. HI (d. 1.96) and, after 12 hrs., with 0.3 cc. HI, gives 60% of *oxyphytyloerythrin* (II), C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>8</sub>; *Me ester*, m. 275° (dioxime, brick-red, acid no. 7; *Fe complex*, C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>8</sub>FeCl). II and its dioxime are completely destroyed by Al-Hg; amalgamated Zn does not reduce II. II and MeOH-KOH in O<sub>2</sub> atm. give a tricarboxylic acid. Dihydro-

1 pheophorbide *a* reacts very slowly with HI in AcOH, while the leuco compd. of pheoporphyrin *a*<sub>1</sub> gives neg. results. Oxochloroporphyrin *a*<sub>1</sub> tri-Me ester yields an *oxime*, C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>7</sub>, brick-red, m. 257°. The degradation of pheophorbide *a* allomerized by I with HI at room temp. gives neopheoporphyrin *a*<sub>1</sub> (cf. below) and a new porphyrin extd. by 14% HCl, termed *oxoneopheoporphyrin a*<sub>1</sub>; on standing in 14% HCl for 24 hrs. there results *oxorhodoporphyrin*, acid no. 7; *Me ester*, C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>8</sub>, m. 274° (*oxime*, decomp. 268°, acid no. 6); reduction of the porphyrin gives principally rhodoporphyrin with Na in C<sub>6</sub>H<sub>5</sub>N-EtOH; EtOH-KOH gives *oxyrhodoporphyrin*. The oxo-reaction appears to be a general reaction for chlorophyll derivs. Methylpheophorbide *a* and NH<sub>4</sub>OH. HCl in C<sub>6</sub>H<sub>5</sub>N after 8-10 days give 88% of the *oxime* (III); with HI in AcOH at 65° there results pheoporphyrin *a*<sub>1</sub> *oxime*. Hydrolysis of III with HCl gives 30% chlorin *e* ester and also pyropheophorbide; purpurin was not observed. *Me chlorophyllide a* and *b* and NH<sub>4</sub>OH. HCl in C<sub>6</sub>H<sub>5</sub>N after 60 hrs. give III and possibly the *b* *oxime*! The position of the CO group in the oxo-compds. is discussed and several structural formulas are given. **XLI. Transformation of pheoporphyrin *a*<sub>1</sub> into pheoporphyrin *a*<sub>1</sub> and neopheoporphyrin *a*<sub>1</sub>**. H. Fischer and Josef Heckmaier. *Ibid.* 250-62.—Pheoporphyrin *a*<sub>1</sub> *Me ester* (I) in EtOH with I<sub>2</sub> and AcONa, warmed 0.5 hr. on the water bath, gives *neopheoporphyrin a*<sub>1</sub> *di-Me ester acetate* (II), m. 305° (Cu salt, m. 305° (decompn.)); hydrolysis with concd. H<sub>2</sub>SO<sub>4</sub> and esterification gives *neopheoporphyrin a*<sub>1</sub> *Me ester* (III), m. 276°. Hydrolysis of II with alkali in C<sub>6</sub>H<sub>5</sub>N-EtOH gives as the principal product allopheoporphyrin *a*<sub>1</sub> (IV) and a porphyrin spectroscopically identical with rhodoporphyrin- $\gamma$ -carboxylic anhydride. Oxidation of I with I and Na<sub>2</sub>CO<sub>3</sub> gives pheoporphyrin *a*<sub>1</sub> *ester*. Neopheoporphyrin *a*<sub>1</sub>, Ac<sub>2</sub>O and AcONa, heated 2 hrs. in a boiling water bath, give the *Ac deriv.* (V), m. 305°; the *p-nitrobenzoyl ester* of III m. 257°; the *Bz deriv.* m. 202° (cor.). Methylpheophorbide *a*, I and AcONa in abs. EtOH give the *Ac deriv.* of 10-hydroxymethylpheophorbide *a*, which yields V with HI and AcOH. Pheoporphyrin *a*<sub>1</sub> and 15% HCl give traces of IV, and as the main product, isopheoporphyrin *a*<sub>1</sub>. The lactone of chloroporphyrin *a*<sub>1</sub> *di-Me ester* with 30% oleum at room temp. for 3 days gives IV. The mono-*ester* with I and AcONa in EtOH give pheoporphyrin *a*<sub>1</sub>. Methylchlorophyllide *a* + *b* on allomerization gives pheoporphyrin *a*<sub>1</sub> *di-Me ester*. Isopheoporphyrin *a*<sub>1</sub> *di-Me ester* and 30% oleum for 24 hr. give pheoporphyrin *a*<sub>1</sub>. **XLII. Mesorhodin and its transformation to chlorophyllporphyrins, as well as its oxidation to phytyloerythrins**. H. Fischer and Josef Ebersberger. *Ibid.* 509, 19-37.—Mesoporphyrin *di-Me ester* (100 g.) in 300 cc. concd. H<sub>2</sub>SO<sub>4</sub>, treated with 325 cc. 20% oleum, gives 75% mesorhodin (I), C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>7</sub>, the *di-Me ester* m. 269°. Its *oxime* and that of I were prepd. Oxidation of I with KMnO<sub>4</sub> in NaOH-C<sub>6</sub>H<sub>5</sub>N gives rhodoporphyrin- $\gamma$ -carboxylic acid (II) and chloroporphyrin *a*<sub>1</sub> (III), identified by its *Me ester* and other derivs. II was also prepd. by passing O<sub>2</sub> through a soln. of III in 1:1 HCl on the water bath for 2 days. III was further characterized by reduction to chloroporphyrin *a*<sub>1</sub>, its reduction by TiCl<sub>3</sub> in concd. HCl to hydroxymethylrhodoporphyrin lactone and its degradation to pyropheoporphyrin IX. II was degraded to rhodoporphyrin. Pheoporphyrin *a*<sub>1</sub> is reduced by TiCl<sub>3</sub> to chloroporphyrin *a*<sub>1</sub> lactone. Oxidation of phytyloerythrin with SeO<sub>2</sub> gives a *hydroxyphytyloerythrin* and a *diketone*, whose *ester*, C<sub>41</sub>H<sub>52</sub>N<sub>4</sub>O<sub>8</sub>, m. 273° (cor.); the *monoxime*, steel-blue needles, does not m. 300°.

**C. J. West**  
9 **Polyterpenes and polyterpenoids. LXXXVI. Dehydrogenation of cholesterol, ergosterol, cholic acid and phytosterols**. L. Ruzicka, G. Thomann, E. Brandenberger, M. Furter and M. W. Goldberg. *Helv. Chim. Acta* 17, 200 21(1934); cf. *C. A.* 27, 4809.—From absorption spectra measurements Diels asserts the identity of the chrysene obtained by treatment of cholesterol with Pd with that of tar chrysene (Schuchardt) and believes the statement of Ruzicka, Goldberg and Thomann (*C. A.*

27, 4808), that the hydrocarbons  $C_{27}H_{48}$  obtained by him from cholesterol and ergosterol are not identical, to be erroneous. To clear up these matters the dehydrogenation of cholic acid has been repeated and an addnl. dehydrogenation of phytosterols has been performed. After dehydration, ten 100-g. portions of cholic acid (cholatrienic acid) were each heated with 150 g. of Se in a metal bath for 6 hrs. at 280–300° and then for 60 hrs. at 350–400° (bath temp.). The product was twice fractionally distd. at high vacuum and the following cuts were taken: (1) 80–150° at 12 mm., and at 0.1 mm., (2) 100–50°, (3) 160–70°, (4) 170–210°, (5) 210–30°, (6) 230–40°, (7) 240–80°. The fractions 6 and 7 solidified on cooling and were taken up in pyridine to which hexane was gradually added. Recrystn. from AcOBu yielded conglomerated thin scales of picene (I),  $C_{27}H_{48}$ , m. 354–5° (cor., Berl block) (2,7-dinitroanthraquinone deriv.,  $C_{27}H_{48}N_2O_6$ , m. 291–2°), showing a pale blue fluorescence in ultra-violet light and identical in every respect with tar picene. Fractional crystn. of fraction 6 from pyridine and BuOAc gave, after more than 20 seps., a hydrocarbon (II),  $C_{27}H_{48}$ , m. 273–4° (cor.). The mother liquor of 5, together with fractions 3 and 4, yielded a mixt. of hydrocarbons, m. about 250°, depressed by admixt. with tar chrysene (III) and contg. traces of II. By repeated fractionation was obtained a very small quantity of leaflets of impure chrysene (IV), analyzing for  $C_{28}H_{48}$  instead of  $C_{28}H_{42}$  and m. 243–5°, mixed m. p. with III (m. 251°), 247–8°, 2,7-dinitroanthraquinone deriv. m. 297–9° (mixed m. p. with corresponding deriv. of III (m. 304–5°), 300°); trinitrobenzene complex, m. 194–5°, identical with that from III. Traces of a needle-like material, m. 243–5°, not depressed on admixt. with III and analyzing for  $C_{28}H_{48}$ , were obtained. Two 100-g. lots of cholic acid were dehydrated and heated with 150 g. of Se in a metal bath for 4 hrs. at 300–20°. In the course of 4 hrs. the temp. was raised to 420° and the heating was continued at this temp. for 60 hrs. The reaction mixt. gave, after distn., sublimation and fractional crystn., I and IV, m. 248–9°. The differences between the former findings of R. *et al.* and those of Diels and Karstens are fully explained. The smooth formation of IV, as noted by D. and K., was due to the use of a higher temp. than that actually recorded. The 275° compd. of R. is either not formed or is destroyed at 420° (bath temp.) and this elimination facilitates the ready isolation of IV, which is also formed in greater amt. at 420° than at 360°. It is vital to the understanding of the mechanism of dehydrogenation of cholic acid that more I than IV is formed at both 360° and 420°, since under similar conditions no trace of I is yielded by cholesterol. A mechanism for the formation of I, IV and cyclopentanophenanthrene by the dehydrogenation of cholic acid is offered. Two 100-g. lots of a mixt. of phytosterols, b. 437–8°,  $[\alpha]_D^{25} -28^\circ$  (in  $F_2O$ ),  $I_2$  no. 80.8, prepd. from soya bean, were vacuum-dried and each heated with 150 g. of Se up to 320° in 2 hrs., at 320° for 35 hrs. and finally at 350° for 10 hrs. After extn. and distn. the fraction b.p. 220° was carefully purified by recrystn., treatment with 1% alc. KOH and further recrystn. to yield rhomboidal leaflets of a hydrocarbon (V),  $C_{27}H_{48}$ , m. 202–3°; 2,7-lindroanthraquinone deriv.,  $C_{27}H_{48}N_2O_6$ , m. 246–7°. If the sterols, cholesterol (VI) and ergosterol (VII), contg., resp., 27 and 28 C atoms, both give the same dehydrogenation product as maintained by D., then the same product must be obtained by a similar treatment of phytosterol (VIII) with its 29 C atoms. If, on the contrary, the dehydrogenation product of VII is the next higher homolog of the dehydrogenation product of VI, then V, the dehydrogenation product of VIII; must be the next higher member of the homologous series. The step-wise nature of the consts. for the dehydrogenation products of VI, VII and VIII is demonstrated by the C and H analyses, the m. ps. and the m. ps. of the dinitroanthraquinone derivs. As a further control, absorption spectra (to 367 m $\mu$  in contrast to the 334 m $\mu$  limit in the D. observations) and röntgenograms of these products and of I and IV were

taken. From these results, together with addnl. published crystallographic data, it is concluded that the differences in the dehydrogenation products from VI and VII do not depend on variations in the state of purity of a single substance but that they are homologous compds. with the same fundamental ring structure, differing only in the length of the side chain. C. R. Addinall

Constitution of estrin. J. F. Danielli. *J. Am. Chem. Soc.* 56, 740–7 (1934); cf. Butenandt, *C. A.* 27, 3211.--B.'s work, when taken in conjunction with the results obtained with unimol. films of estrin derivs., offers a clear proof of the fact that the 5-membered ring is in the same position as in the sterols, *i. e.*, 14, 13. The elimination of the 8,14-structure is supported by the work of Bernal (*Chemistry & Industry* 1932, 259). C. J. W.

Position of the nucleus double bond in stigmasterol. E. Fernholz. *Ann.* 508, 215–24 (1934); cf. *C. A.* 28, 1687.—Stigmasterol acetate (20 g.) and  $BzO_2H$  in  $CHCl_3$  (12 hrs. at 5°) give 11 g. of the acetate (I), m. 143°,  $[\alpha]_D^{25} -36.7^\circ$  (18.1 mg. in 2 cc.  $CHCl_3$ ), of  $\alpha$ -stigmasterol oxide (II), m. 152°; there also results 0.6 g. of the acetate, m. 170°,  $[\alpha]_D^{25} -32^\circ$  (16.9 mg. in 2 cc.  $CHCl_3$ ), of the  $\beta$ -oxide, m. 153°. II and 1:1 HCl, heated 4 hrs., give stigmasteretriol, m. 254°, oxidized by  $CrO_3$  in AcOH at room temp. to a diol,  $C_{28}H_{48}O_2$ , m. 280° (decompn.); with HCl gas in  $CHCl_3$  there results a dienedione, yellow, m. 155° (phenylhydrazone, yellow, m. 250° (decompn.)), reduced by Zn and AcOH to the diene,  $C_{28}H_{46}O_2$ , m. 197°;  $N_2H_4 \cdot H_2O$  gives a pyridazine deriv.,  $C_{28}H_{46}N_2$ , decompn. 260°. Catalytic reduction of 3.3 g. of I gives much resin but 0.8 g. stigmasterol monooxalate, m. 200°. II is stable to Na and EtOH. These results prove that the double bond must be between  $C_5$  and  $C_6$ , as originally assumed from analogy with cholesterol; stigmasterol differs from cholesterol only in the structure of the side chain. Sitosteronol and HCl in  $CHCl_3$  give a sitosteronediene, yellow, m. 120°; pyridazine deriv., m. 197–200°. Thus sitosterol contains 1 component in which the double bond and HO group are situated as in cholesterol. C. J. West

Electrolytic oxidation of glycolic acid in alk. soln. (Tommila) 4. Spectrum of infra-red absorption and the structure of polyat. mols. (Titeica) 3. Utilizing CO produced in the elec. sublimation of P (Dolgov, *et al.*) 4. Refractive dispersion of org. compds. (Allsopp) 2. Extension of the duration period of  $\beta$ -phenyl- $\beta$ -chloroethylamine on charcoal (Freundlich, Salomon) 2. Soln. freezing as a method investigating problems of pure chemistry. X. Mixts. contg. active alkylsuccinic and  $\alpha$ -chlorobutyric acids (Timmermans, van der Haegen) 2. Kinetics and mechanism of decompn. of hydrocarbons (Kintzes, Frost) 2. Rotenone (Takei, Miyajima) 11H.

Richter's Organic Chemistry. Vol. I. Aliphatic Series. 12th ed., edited by Richard Anschütz and Fritz Reindel. Translated and enlarged by E. N. Allott. London: Routledge Kegan Paul. 42s.

Treating hydrocarbons. I. G. Farbenind. A.-G. Fr. 757,453, Dec. 26, 1933. In processes such as distn., decompn., polymerization, etc., of hydrocarbons, the metal parts coming in contact with the heated hydrocarbons are partly or completely covered with elements of high m. p. of the 4th group, C excepted, particularly Si or Ti, the coatings being produced by baking the substances in a powd. form. No deposition of C is produced.

Oxidizing aliphatic hydrocarbons. Theodor Hellthaler and Erich Peter (to A. Riebeck'sche Montanwerke A.-G.). U. S. 1,947,989, Feb. 20. Hydrocarbon material such as paraffin is subjected in liquid state to the action of O (suitably at a temp. of about 180–200° in the production of alcs., esters, etc., from paraffin) in the presence of boric, phosphorous or arsenious acids, which serve to esterify alcs. formed by the oxidation. Various examples with details are given.

Hydrogenation of aromatic hydrocarbons. Edward

D. Kamm and Imperial Chemical Industries Ltd. Brit. 401,724, Nov. 20, 1933. A W sulfide catalyst is used for hydrogenating aromatic hydrocarbons at not exceeding 10 atm. at 170–300°. Sufficient S must be present to insure the continuance of the catalyst as sulfide and S or H<sub>2</sub>S may be added to the reactants for this purpose. The conversion of C<sub>10</sub>H<sub>8</sub> into tetrahydronaphthalene is described.

Refining hydrocarbon mixtures. I. G. Farbenind. A.-G. (Carl Krauch, Mathias Pier and August Eisenhut, inventors). Ger. 536,794, Sept. 13, 1933 (Cl. 12o. 1.04). Natural or synthetic high-boiling hydrocarbons are refined by washing with aromatic or satd. cyclic hydrocarbons and MeOH. Examples are given.

Separating mixed hydrocarbons of different series. Charles O. Young and Granville A. Perkins (to Carbide & Carbon Chemicals Corp.). U. S. 1,948,777, Feb. 27. See Can 328,052 (C. A. 27, 991).

Absorbing cyclic hydrocarbons such as cyclohexene in acids. Adrianus J. van Peski (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,948,891, Feb. 27. A catalyst comprising a metal of group 8 of the periodic system (such as ferrocyanic acid) is used in absorbing unsatd. hydrocarbons, such as cyclohexene, in acids such as 80% H<sub>2</sub>SO<sub>4</sub> for the production of cyclohexanol (by further hydrolysis) or like processes.

Partial oxidation products of hydrocarbons (suitable for denaturing alcohol). Wm. P. Bitler (to C. P. Byrnes, trustee). U. S. 1,948,161, Feb. 20. A liquid partial-oxidation product such as may be made as described in U. S. 1,697,653 (C. A. 23, 1136) is agitated with 8 lb. lime per 100 gal. oxidized oil, to form lime soaps; the non-saponifiable oil is then distd. off while agitating to prevent the soaps from burning onto the walls of the still, and toward the end of this step the lime soaps and resins take a colloidal state and the residue may be drained off. A distillate is obtained of light yellow color, practically free from high-boiling resins and metallic compds., having an acid number of less than 0.30 and contg. a mixt. of aldehydes, alcs., unsatd. hydrocarbons and satd. hydrocarbons.

Amino-nitrogen-containing conversion products of aliphatic hydrocarbons containing at least nine carbon atoms. Karl Keller (to General Aniline Works). U. S. 1,948,924, Feb. 27. A dichlorinated (or more highly chlorinated) deriv. of paraffin, paraffin oil, transformer oil or the like is heated with NH<sub>3</sub> (suitably in an alc. soln.) in a closed vessel at 140–190°. The products are generally viscous oils which may be isolated in the form of their salts and may be used as acid soaps in dyeing processes, etc.

Halogenated pyridines. Johan P. Wibaut and Hermann J. den Hertog, Jr. Brit. 401,356, Nov. 13, 1933. See Ger. 574,655 (C. A. 27, 4542) and Dutch 29,614 (C. A. 27, 4542).

Stereochemical models. Oskar Huppert. Austrian 136,357, Jan. 25, 1934 (Cl. 42.). Structural features are described.

Alcohols. Air Reduction Co., Inc. Brit. 402,613, Dec. 7, 1933. In continuously converting alkylene hydrocarbons into alcs. by passing them with steam, preferably under pressure, over a catalyst, a combined boiler and heat exchanger, preferably working in counter-current, is provided to vaporize H<sub>2</sub>O and heat the hydrocarbon and steam by means of the reacted gases which are cooled thereby and the alc. recovered from the condensate. Cf. C. A. 27, 1983.

Alcohols. Helmut Legerlotz. Ger. 522,790; Jan. 13, 1934 (Cl. 12q. 32.21). See U. S. 1,903,927 (C. A. 27, 3222).

Secondary alcohols. Benjamin T. Brooks (to Standard Alc. Co.). U. S. 1,948,286, Feb. 20. For obtaining secondary alcs. with 3 to 6 C atoms per mol. from acid reaction products formed by treating olefins with aq. H<sub>2</sub>SO<sub>4</sub>, such an acid reaction product is dild. with water, the dild. material is permitted to stratify, forming an aq. layer and a layer consisting mainly of hydrocarbons; the hydrocarbon layer is sepd. and is washed with dil. aq. H<sub>2</sub>SO<sub>4</sub>, thus producing an aq. H<sub>2</sub>SO<sub>4</sub> contg. secondary

alc. in soln. and hydrocarbon material substantially free from secondary alc. and these materials are sepd. and the secondary alc. is recovered. Cf. C. A. 28, 2013.

Purifying secondary alcohols. Robert B. Lebo (to Standard Alc. Co.). U. S. 1,949,211, Feb. 27. For removing tertiary alc. from secondary alcs. such as isopropyl alc. contg. tertiary alcs. in minor proportion, the material is heated to not higher than about 40° with aq. H<sub>2</sub>SO<sub>4</sub> of not more than 40% strength in the presence of a catalyst including V, Al or Cu, such as V pentoxide, for a prolonged period, and the hydrocarbon formed by the decompn. of the tertiary alc. is removed as by distn. and absorption with H<sub>2</sub>SO<sub>4</sub>.

Diacetone alcohol. British Industrial Solvents Ltd and Ernest E. Cornolly. Brit. 402,788, Dec. 8, 1933. The sepn. of diacetone alc. from unchanged Me<sub>2</sub>CO is effected by distn. under ordinary pressure in presence of added H<sub>2</sub>O, which may be 10% by vol. of the alc. After the temp. of the still reaches 105–107° practically all Me<sub>2</sub>CO and some H<sub>2</sub>O have been distd. off and the rest of the H<sub>2</sub>O is then distd. off under considerably reduced pressure to prevent a rise of temp. above 105°, and finally the alc. is distd. Alternatively, the initial stages of distn. may be effected before the addn. of H<sub>2</sub>O which must be added below 105°.

Ketones. Martin De Simo (to The Shell Development Co.). Can. 339,529, Feb. 20, 1934. Ketones are manufd. by dehydrogenation of secondary aliphatic alcs. by means of a catalyst contg. Cu and Zn below 500° and in the absence of O.

Ketones. Antares Trust Registered. Swiss 165,822, Feb. 16, 1934 (Cl. 36o.). Ketones are obtained by treating satd. non-aromatic hydrocarbons with COCl<sub>2</sub> in the presence of non-volatile metal halides at temps. below normal. Thus, the mineral oil fraction b. 29–32° consisting mostly of *n*- and iso-pentane, is mixed with COCl<sub>2</sub> and AlBr<sub>3</sub> at –15° to give a ketone b. 80–90° at 15 mm. Another example is given.

Aliphatic ketones. Henry Dreyfus. U. S. 1,949,412, March 6. For making a ketone such as acetone, the vapor of an alc. or aldehyde such as EtOH or acetaldehyde or of an ester such as EtOAc is contacted with a Ca silicate catalyst at temps. of 200–700° in admxt. with steam. Other alk. earth silicates, borates or phosphates also may be used. Cf. C. A. 27, 5337.

Primary aromatic amines. Wm. C. Calvert (to Wingfoot Corp.). U. S. 1,948,330, Feb. 20. In reactions such as the production of 2,4-diaminodiphenylamine, a nitro-substituted aryl compd. such as 2,4-dinitrodiphenylamine is subjected to reduction with finely divided Fe and NH<sub>4</sub>Cl (suitably with moderate heating).

Polycyclic amines. I. G. Farbenind. A.-G. (Walter Mieg, Rudolf M. Heidenreich and Heinrich Nerebumer, inventors). Ger. 592,202, Feb. 6, 1934 (Cl. 12q. 37). Pyridinium derivs. of anthracene, anthraquinone and other condensed-ring compds. are treated with basic reagents. Under relatively energetic conditions, the pyridine ring is split off, and simple amino derivs. of the condensed-ring compds. are obtained. Under milder conditions, the pyridine ring is disrupted to form a chain, which remains attached to the N atom. Thus, anthraquinone-1-pyridinium chloride yields 1-aminoanthraquinone when boiled for 10 mins. in PhNH<sub>3</sub>, but yields AN:CHCH:CHCH:CHOH, where A is the 1-anthraquinonyl residue, when boiled for a short time with dil. Na<sub>2</sub>CO<sub>3</sub> soln. Other compds. which have been prepd. include *Bs*-1-aminobenzanthrone, m. 240°, 2,7-diaminoanthanthrone and 9-chloro-10-aminoanthracene, m. 158°.

Esters. Carl Zerbe. Ger. 590,052, Dec. 21, 1933 (Cl. 12o. 11). Addn. to 563,969 (C. A. 27, 4812). Esters of carboxylic acids are obtained by heating water-free metal salts of the acid (obtained by treating the acid with a weak base) with an alc. contg. the desired alkyl group, under pressure. Thus, anhyd. (BzO)<sub>2</sub>Fe is heated to 180° in a pressure vessel with EtOH to give BzOEt. Other examples are given.

Esters. H. Th. Böhme A.-G. (Heinrich Bertsch,

inventor). Ger. 592,053, Jan. 31, 1934 (Cl. 12o. 11). Esters of mono- or poly-basic aliphatic carboxylic acids contg. more than 9 C atoms, with monohydric alcs. contg. more than 3 C atoms, are prepd. by heating equimol. amts. of the acid and the alc. with a mineral acid catalyst to a temp. not above 90°. The water formed in the reaction seps. at the bottom of the mixt. and is withdrawn. When  $\text{H}_2\text{SO}_4$  is used as the catalyst, about 5–10% of anhyd.  $\text{Na}_2\text{SO}_4$ , calcd. on the org. acid, is preferably added also. Examples are given of the prepn. of butyl ricinoleate and sebacate.

Esters such as those of secondary hexyl, heptyl and octyl alcohols with phthalic and other polycarboxylic acids. Robert H. Van Schaack, Jr. (to Van Schaack Bros. Chemical Works). U. S. 1,949,093, Feb. 27. Esters suitable for use as plasticizers for pyroxylin may be chosen from simple or mixed esters such as the secondary hexyl, heptyl or octyl esters of phthalic acid which may also include esterification groups such as Me, Et, isopropyl, butyl, amyl or the radicals of ethylene glycol, diethylene glycol or ethoxyethanol, mention also being made of the sec. hexyl, sec. heptyl and sec. octyl esters of oxalic, tartaric, citric, maleic, isophthalic, chlorophthalic, phenylglutaric and mellitic acids.

Producing esters by catalytic dehydrogenation of polyhydric alcohols. Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 1,949,425, March 6. For producing an ester such as glyceryl glycerate, an aliphatic polyhydric alc. such as glycerol is contacted under superatm. pressure and at temps. of 250–500° with a dehydrogenation catalyst such as may contain Zn and Cu chromites and oxides.

Esters of organic acids. James R. Buckley and Carrol A. Doran (to E. I. du Pont de Nemours & Co.). U. S. 1,949,267, Feb. 27. For prepg. an ester such as EtOAc or BuOAc by reacting an aliphatic monohydroxy alc. with an aliphatic monocarboxylic acid such as HOAc and distg. off the ester formed from the reaction mixt., the acid, in liquid phase, is subjected to the action of a reducing agent such as a metal,  $\text{NaHSO}_3$  or  $\text{SnCl}_2$  of sufficient strength to reduce impurities in the acid without effecting material reduction of the alc. and acid.

Esters of sulfated higher aliphatic organic acids. Heinrich Bertsch (to H. Th. Böhme A.-G.). U. S. 1,947,673, Feb. 20. A "polybasic," higher aliphatic carboxylic acid such as the "dibasic" hydroxy acid,  $\text{C}_{11}\text{H}_{21}\text{O}_3$ , is reacted with a monohydroxy deriv. of a hydrocarbon such as BuOH and with a sulfating agent such as concd.  $\text{H}_2\text{SO}_4$ , to form a dispersing agent.

Esters of gluconophosphoric acid. Schering-Kahlbaum A.-G. (Walter Schoeller, Hans Goebel, Erwin Schwenk and Siegfried Michael, inventors). Ger. 591,822, Jan. 27, 1934 (Cl. 12o. 11). The above are prepd. by treating gluconic acid or its alk. earth salts with alkyl esters of  $\text{HPO}_4$ . Thus, the Ca salt of gluconic acid is treated with  $\text{EtPO}_4$  in the presence of  $\text{CaCO}_3$  to give a gluconophosphoric acid ester contg. 20.5%  $\text{P}_2\text{O}_5$ . Other examples are given.

Refining liquid alkyl esters such as dibutyl phthalate. Franklin D. Smith (to Monsanto Chemical Co.). U. S. 1,948,281, Feb. 20. For refining liquid alkyl esters derived from acids produced by the catalytic oxidation of aromatic hydrocarbons, so that distn. of the ester is rendered unnecessary, and the color and cast of the ester is improved, the material is exposed to the action of ultra-violet light.

Sulfuric esters of aminoanthrahydroquinones. David A. W. Fairweather and John Thomas (to Scottish Dyes, Ltd.). U. S. 1,949,299, Feb. 27. Sulfuric acid esters of aminoanthrahydroquinones are formed by the treatment of acyl aminoanthraquinones such as anthraquinonyl urethans with pyridine- $\text{SO}_3$  in the presence of a metal such as Cu powder and a tertiary org. base, with hydrolysis of the resulting ester to remove the acyl group and, if desired, conversion of the product into a Na or other salt. 2-Aminoanthrahydroquinone 9,10-disulfuric acid ester in the form of its di-Na salt dyes bright brownish yellow converted to bright blue by boiling acid  $\text{CuSO}_4$

soln. Some other examples also are given. Cf. C. A. 27, 3482.

Methyl ether. John C. Woodhouse (to R. I. du Pont de Nemours & Co.). U. S. 1,949,344, Feb. 27. See Can. 334,121 (C. A. 27, 4818).

Monoalkyl ethers of aromatic polyhydroxy compounds. I. G. Farbenind. A.-G. (Karl Marx and Erich Lehmann, inventors). Ger. 591,534, Jan. 23, 1934 (Cl. 12q. 14.04). Anhyd. monoalkali salts of polyhydroxy compds. are suspended in org. liquids and the suspension treated with alkyl chloride. Thus, a soln. of 1,2-dihydroxybenzene in abs. alc. is treated with metallic Na to give the mono-Na salt. This is suspended in PhCl and treated with  $\text{CH}_3\text{Cl}$  to give a 75% yield of 1-methoxy-2-hydroxybenzene. Other examples are given.

Monoalkyl ethers of protocatechuic aldehyde. J. D. Riedel-E. de Haën A.-G. Brit. 401,502, Nov. 16, 1933; Fr. 751,687, Sept. 7, 1933. The monoalkyl ethers are produced by treating pyrocatechol monoalkyl ethers with salts of glyoxalic acid in a basic medium and subjecting the product, preferably without isolation, to mild oxidation, e. g., with a reducible heavy metal compd. or an aromatic nitro compd. In an example a soln. of glyoxalic acid, obtained by the electrolytic reduction of  $(\text{COOH})_2$ , is neutralized with NaOH and allowed to stand some days with a soln. of guaiacol in the equiv. amt. of NaOH; after removal of excess guaiacol by steam distn.,  $\text{CuSO}_4$  and more NaOH are added and the mixt. heated; by extn. of the filtered soln. with  $\text{C}_6\text{H}_6$ , vanillin is obtained. Cf. C. A. 27, 4243.

Inhibiting decomposition of liquid amino compounds. George R. Boud, Jr. and Clark W. Davis (to E. I. du Pont de Nemours & Co.). U. S. 1,947,578, Feb. 20. Compds. such as aniline or toluidine, etc., are rendered relatively light-stable by displacing the dissolved O which they contain by an inert gas such as N.

Arylides. Soc. pour l'ind. chim. à Bâle. Swiss 162,895, Sept. 16, 1933 (Cl. 36p.). Addn. to 159,665. New arylides of the pyrazolone series are obtained by condensing 1-(3'-carboxyphenyl)-3-methyl-5-pyrazolone with  $\beta$ -naphthylamine in the presence of tertiary bases and with addn. of chlorides such as  $\text{PCl}_5$  or  $\text{POCl}_3$ . Examples are given.

Halohydrins. N. V. de Bataafsche Petroleum Maatschappij. Brit. 402,880, Dec. 14, 1933. See Fr. 740,850 (C. A. 27, 2160).

Indophenols. Imperial Chemical Industries Ltd. Fr. 757,453, Dec. 27, 1933. Indophenols are prepd. by condensing compds. of the formula  $\text{Ar}-\text{NH}-\text{CHXY}$  (Ar is an aryl radical having a free p-position, X is H, alkyl or aryl and Y is CN or  $\text{CONH}_2$ ) with a nitrosophenol or a quinone chloroimide or by oxidizing a compd. of the above formula with p-aminophenol. Leuco-indophenols and S dyes are prepd. from the compds. Examples are given starting with anilinoacetamide (by boiling the corresponding nitrile with a soln. of  $\text{Na}_2\text{CO}_3$  and p-aminophenol), o-toluinopropionitrile (from o-toluidine, AcH-bisulfite and NaCN),  $\text{C}_6\text{H}_5\text{NHCH}(\text{C}_6\text{H}_5)\text{CN}$  (from PhNH $_2$ , BzH-bisulfite and NaCN) and  $\text{C}_{10}\text{H}_7\text{NHCH}(\text{CH}_3)\text{CN}$  (from  $\alpha$ -naphthylamine, AcH and NaCN). Cf. C. A. 27, 4935.

Quinones. I. G. Farbenind. A.-G. (Hermann Hagenest, Erich Reiche and Emanuel Blümel, inventors). Ger. 591,821, Jan. 27, 1934 (Cl. 12o. 10). Addn. to 589,777 (C. A. 26, 2374). The method of 589,777 for producing quinones and  $\text{CrCl}_3$  by reducing aq. chromate soln. acidified with HCl by anthracene, is modified by replacing the latter by other quinone-forming substances such as hydroquinone, phenanthrene, aniline, etc. Examples are given.

Tetrazoles. Knoll A.-G. Chemische Fabriken. Brit. 401,887, Nov. 23, 1933. Tetrazoles are prepd. by (1) the process of Ger. 574,943 (C. A. 27, 4541) (the components of the compds. may be used) or (2) sulfonating a hydrocyclic ketoxime and simultaneously or subsequently treating the resulting sulfoperamidic acid compd. with an azide. Examples are given.

Anthraquinone derivatives. Paul Nawiasky, Artur

Krause and Berthold Stein (to General Aniline Works). U. S. 1,948,183, Feb. 20. Derivs. of 1,4-diaminoanthraquinone are obtained by treating 1-amino-4-arylsulfamidoanthraquinone-2-sulfonic acids with dil. alkali metal alcoholates, *i. e.*, solns. in mono- or poly-hydric alcs. of alkali metals or alkali metal hydroxides. Generally the 1-amino-4-arylsulfamido-2-alkoxyanthraquinones are formed as the final products, so that no saponification of the acyl group takes place. The reaction is usually carried out at temps. between 50° and 120° (preferably between 70° and 100°). The alcs. are preferably chosen from the lower members of the aliphatic series. The resulting acyl derivs. are initial materials for the manuf. of dyes and may also be used as dyes themselves. Details are given of the production of 1-amino-2-methoxy-4-*p*-toluenesulfamidoanthraquinone and the 2-monoglycol ether of 1-amino-4-*p*-toluenesulfamidoanthraquinone. Cf. C. A. 28, 2016<sup>4</sup>.

**Anthraquinone derivatives.** I. G. Farbenind. A.-G. (Paul Nawiasky and Albert Palm, inventors). Ger. 592,366, Feb. 7, 1934 (Cl. 12o. 10). Nitroanthraquinones are prepd. by treating 2-(3'-nitrobenzoyl)-benzoic acid or its substitution products with P<sub>2</sub>O<sub>5</sub>, preferably at about 200° in an inert solvent.

**Quinoline derivatives.** J. D. Riedel-E. de Haën A.-G. Ger. 592,199, Feb. 3, 1934 (Cl. 12p. 1.10). Addn. to 579,226 (C. A. 27, 4542). See Brit. 383,920 (C. A. 27, 4246).

**Asymmetric arseno compounds.** I. G. Farbenind. A.-G. Ger. 589,187, Dec. 4, 1933 (Cl. 12q. 32.30). Addn. to 554,951 (C. A. 26, 6071). Two different sym. arson compounds. contg. no primary amino groups and one of which contains two hydroxyacetic acid residues are heated together in alk. soln. Thus, 3,3'-diacetyldiamino-4,4'-dihydroxyarsenobenzene and Na 4,4'-diacetyldiaminoarseno-2,2'-phenoxycetate are heated together in NaOH to give an asym. product. Other examples are given. Cf. C. A. 28, 859<sup>1</sup>.

**Purifying aromatic nitro compounds.** Clark W. Davis (to The Canadian Industries Ltd.). Can. 339,579, Feb. 27, 1934. Trinitrotoluene, trinitronaphthalene, tetranitroaniline, etc., are purified by washing the surface of the crystals with an aq. soln. contg. 40-70% of acetone at a temp. not exceeding 30°, sepg. the purified nitro compd. from the soln., and dilg. the extg. medium with water to complete pptn. of the dissolved material. The dissolved material and acetone are separately recovered.

**Condensation products.** Soc. anon. M. Naef & Cie. Swiss 152,906, Sept. 16, 1933 (Cl. 36o). A mixt. of 1,1,7-trimethylcycloheptene-2-aldehyde and acetone is condensed by the aid of a non-neutral condensing agent such as NaNH<sub>2</sub> or HCl. Examples are given.

**Condensation products from aldehydes and phenols.** Max Weiler, Berthold Wenk and Hermann Stötter (to I. G. Farbenind. A.-G.). U. S. 1,948,894, Feb. 27. A phenolic compd. such as 2,4-dichlorophenol is reacted upon with about an equimol. proportion of an aldehydic compd. such as Na benzaldehyde-*o*-sulfonate in the presence of either an alk. condensing agent or an acid condensing agent such as oleum or ZnCl<sub>2</sub>, and the resulting product is then condensed with about one mol. proportion of the same or another phenolic compd. such as *p*-chlorophenol. Products may be obtained which are colorless or nearly colorless powders, sol. in alkalies and at least nearly insol. in water with the exception of the compds. contg. a sulfonic acid group, suitable for use as *reserving* and *moldproofing agents* or for preserving canned goods, glue, paste, etc. Several examples with details of procedure are given.

**Resin acid condensation products.** Ewald Fonrobert and Arthur Greth (to Resinous Products & Chemical Co.). U. S. 1,948,573, Feb. 27. Resin acid is transformed into its anhydride by heating it with the anhydride of an aliphatic monocarboxylic acid of the lower aliphatic acid series such as Ac<sub>2</sub>O and the anhydride thus formed is treated with alcs. such as EtOH, BuOH or PhOH, to form esters.

**Polymerized pentoses.** Holzhydrolyse A.-G. (Fried-

rich Koch, Eduard Färber, Hugo Koch and Helmut Urban, inventors). Ger. 585,739, Jan. 19, 1934 (Cl. 12o. 7.03). Solns. of monomeric pentoses in mineral acids are dried, *e. g.*, by atomization, and subjected to a hot air current to polymerize the pentoses.

**Polymerized carbohydrates.** Holzhydrolyse A.-G. (Friedrich Koch, Eduard Färber, Hugo Koch and Helmut Urban, inventors). Ger. 587,975, Jan. 23, 1934 (Cl. 12o. 6). Addn. of 585,739 (preceding abstr.). Solns. of monomeric aldohexoses are treated with a small amt. of HCl and evapd. to dryness. The product is then treated with a hot air current after the manner of 585,739 to polymerize the aldohexoses.

**Acetylene polymers.** E. I. du Pont de Nemours & Co. Brit. 401,678, Nov. 13, 1933. Addn. to 384,654 (C. A. 27, 4251) and 390,179 (C. A. 27, 4541). The processes of 384,654 and 390,179 are modified by removing monovinylacetylene from the reaction mixt. before substantial amts. of divinylacetylene are formed so that a product consisting mainly of monovinylacetylene is obtained. App. is described.

**Formic acid and sodium nitrate.** Gewerkschaft Victor (Hans Schmalfeldt and Alfred Braune, inventors). Ger. 592,054, Jan. 31, 1934 (Cl. 12o. 11). HCOONa is prepd. in known manner from Na<sub>2</sub>SO<sub>4</sub>, CuO and CO, and then treated at 20° with HNO<sub>3</sub> of not more than 40-50% concn.

**Acetic and formic acids.** I. G. Farbenind. A.-G. (Walter Flemming and Walter Speer, inventors). Ger. 590,305, Jan. 8, 1934 (Cl. 12o. 12). Addn. to 583,704 (C. A. 28, 1055<sup>4</sup>). The method of 583,704 for producing AcOH and HCO<sub>2</sub>H by the catalytic oxidation of methyl ethyl ketone is modified by replacing the latter by acetone. Examples are given.

**System for recovering concentrated acetic acid from aqueous solutions by extraction.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler (Karl Grunert, inventor). Ger. 592,119, Feb. 8, 1934 (Cl. 12o. 12).

**Glutamic acid and its compounds.** Reisque Masuda, Celestian L. Royal and Albert E. Marshall (to Larrow-Suzuki Co.). U. S. 1,947,563, Feb. 20. A glutamic "mother substance" such as Steffen's waste water is hydrolyzed in an alk. soln. having an alkyl. of 3-7% expressed as NaOH at a temp. and for a time sufficient to form glutamate. A concd. soln. of a *d*-glutamic acid compd. and HCl having a *pH* of about 2.1 may be treated with NH<sub>3</sub> until the *pH* is about 3.2, and the *d*-glutamic acid then crystd. Cf. C. A. 28, 1364<sup>4</sup>.

**Separation of active glutamic acid without racemization.** K. K. Suzuki Shōten (Seiō Kanan, inventor). Japan. 99,153, Jan. 24, 1933. Addn. to 97,583. In the sepn. of active glutamic acid from its hydrochloride or salts of mineral acids, glycine derivs. (such as betaine or sarcosine) are used as a neutralization material, in order to avoid racemization.

**Oxalic acid.** Hans G. Duus (to E. I. du Pont de Nemours & Co.). U. S. 1,948,441, Feb. 20. An alkali metal oxalate such as that of Na is treated in soln. with an acid such as H<sub>2</sub>SO<sub>4</sub> in an org. medium such as MeOH contg. acid such as that recovered as a residue from a later stage of the process involving distn. and crystn.

**Benzoic acid and benzoates.** Bozel-Malétra Société industrielle de produits chimiques. Brit. 402,882, Dec. 14, 1933. See Ger. 585,332 (C. A. 28, 1364<sup>4</sup>).

**Benzoic acid and benzoates.** Bozel-Malétra (Société industrielle de produits chimiques). Ger. 591,880, Jan. 29, 1934 (Cl. 12o. 14). Addn. to 573,982 (C. A. 27, 4248). See Fr. 753,918 (C. A. 28, 1056<sup>4</sup>).

**Barbituric acids.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. Fr. 787,655, Dec. 30, 1933. Barbituric acids are made by condensing malonic esters and urea by means of alkali alcoholates contg. more than 3 C atoms, *e. g.*, butylate or amylate.

**Aminocarboxylic and iminodicarboxylic acids.** I. G. Farbenind. A.-G. Brit. 395,074, July 13, 1933. In the manuf. of  $\alpha$ -aminocarboxylic acids, iminodicarboxylic acids and salts thereof by condensation of an aliphatic aldehyde with NH<sub>4</sub>CN and sapon. of the resulting  $\alpha$ -



aminocarboxylic acid nitrile, the condensation is carried out in the presence of an amt. of free  $\text{NH}_3$  corresponding at least to that present in the  $\text{NH}_4\text{CN}$ . The nitriles are saponified, preferably directly after prepn. and without previously removing the  $\text{NH}_3$ , by an alkali or alk. earth metal hydroxide, strong bases, e. g.,  $\text{NaOH}$ ,  $\text{Ba}(\text{OH})_2$ , being used advantageously while heating as rapidly as possible to obtain  $\alpha$ -amino carboxylic acids and weaker bases, e. g.,  $\text{Ca}(\text{OH})_2$ , to produce iminodicarboxylic acids. Among examples (1)  $\text{AcH}$  is treated with  $\text{NH}_4\text{CN}$  and  $\text{NH}_3$ , with cooling, to produce  $\alpha$ -aminopropionitrile, which is saponified with  $\text{NaOH}$  to yield  $\alpha$ -aminopropionate, and (2)  $\text{CH}_3\text{O}$  is condensed with  $\text{NH}_4\text{CN}$  and  $\text{NH}_3$  to produce aminoacetone nitrile, which is saponified with  $\text{Ca}(\text{OH})_2$  to yield  $\text{Ca}$  iminodiacetate.

**Alkoxy-2-hydroxynaphthalene-3-carboxylic acids.** Arthur Zitscher, Hans Mildner and Wilhelm Luee (to General Aniline Works). U. S. 1,947,819, Feb. 20. By mild alkylation of substances such as 2,6- or 2,8-dihydroxynaphthalene-3-carboxylic acid, products are obtained such as 6-methoxy-2-hydroxynaphthalene-3-carboxylic acid, yellow needles, m.  $233^\circ$ , the corresponding 6-ethoxy compd., m.  $219^\circ$ , or 8-methoxy-2-hydroxynaphthalene-3-carboxylic acid, m.  $248^\circ$ . Various examples with details of procedure are given.

**1,4,5,8-Naphthalenetetracarboxylic acid and its substitution products.** Heinrich Greune and Wilhelm Eckert (to General Aniline Works). U. S. 1,949,202, Feb. 27.  $\text{H}_2\text{SO}_4$  of high concn. is caused to act on a 1,4,5,8-naphthalenetetracarboxylic acid diimide or a deriv. at a temp. of about  $160$ – $270^\circ$ , to produce the corresponding 1,4,5,8-naphthalenetetracarboxylic acid.

**Substituted benzocarbazolecaboxylic acids.** Georg Kalischer, Otto Limpach and Karl Hager (to General Aniline Works). U. S. 1,948,923, Feb. 27. The Na salt of 2,8-dihydroxynaphthalene-3-carboxylic acid, on heating with a  $\text{NaHSO}_4$  soln., and further heating of the resulting bisulfite addn. compd. with phenylhydrazine in the presence of an acid such as  $\text{H}_2\text{SO}_4$ , yields 7,8-benzocarbazole-3'-hydroxy-2'-carboxylic acid, m.  $329$ – $30^\circ$ . Similarly, except with use of  $N$ -methylphenylhydrazine, 7,8-benzo- $N$ -methylcarbazole-3'-hydroxy-2'-carboxylic acid, m.  $310^\circ$ , is obtained; and, in a generally similar manner, there may be formed: 3-methyl-7,8-benzocarbazole-3'-hydroxy-2'-carboxylic acid, m.  $334^\circ$ ; 7,8-benzo-1-methylcarbazole-3'-hydroxy-2'-carboxylic acid, m.  $330^\circ$ ; 2-chloro-7,8-benzocarbazole-3'-hydroxy-2'-carboxylic acid, m.  $330^\circ$ ; 1,2,7,8-dibenzocarbazole-3'-hydroxy-2'-carboxylic acid, 3,4,7,8-dibenzocarbazole-3'-hydroxy-2'-carboxylic acid; a chloro-1,2,7,8-dibenzocarbazole-3'-hydroxy-2'-carboxylic acid, bi(1,2,7,8-benzocarbazole)-3',3'-dihydroxy-2',2'-dicarboxylic acid; and 1-methyl-7,8-benzocarbazole-2'-hydroxy-3'-carboxylic acid. These products are, in general, yellow substances sol. in dil.  $\text{Na}_2\text{CO}_3$  soln.

**Anilinesulfonic acids.** Erich Fischer, Albert Kissling and Herbert Kracker (to General Aniline Works). U. S. 1,947,837, Feb. 20. See Ger. 565,412 (C. A. 27, 1004).

**Dehydrating acids.** Rudolf Scheuble. Ger. 575,677, Dec. 5, 1933 (Cl. 120. 11). Solns. of low-mol. aliphatic monocarboxylic acids, especially  $\text{AcOH}$ , are partly dehydrated by extn. with liquid  $\text{SO}_2$ .

**Aliphatic acids and anhydrides.** Henry Dreyfus. Brit. 403,075, Dec. 6, 1933. Ethylidene chloride, alone or mixed with other liquids, e. g., kerosene,  $\text{C}_6\text{H}_6$ , ethers, etc., is used for removing  $\text{H}_2\text{O}$  as vapor from org. liquids such as  $\text{AcOH}$ , propionic and other aliphatic acids or the mixts. of acid and anhydride obtained by thermal decomn. of such acids.

**Aliphatic anhydrides.** Henry Dreyfus. U. S. 1,947,977, Feb. 20. For making an anhydride such as  $\text{Ac}_2\text{O}$ , the vapor of an aliphatic acid such as  $\text{HOAc}$  is subjected to thermal decomn. in the presence of at least one aliphatic polyhydroxy compd., contg. at least 2  $\text{Ox}$  groups where  $x$  represents  $\text{H}$  or a satd. lower alkacyl residue, attached to sep.  $\text{C}$  atoms, such as glycerol.

**Aliphatic anhydrides.** Henry Dreyfus. Brit. 402,462, Dec. 4, 1933.  $\text{H}_2\text{O}$  is removed from the anhydrides as

1 an azeotropic mixt. with methylene chloride which may be used alone or with other liquids, e. g., light paraffins, gasoline, kerosene, ethers or mixts. of ethers with petroleum hydrocarbons.

**Mixed anhydrides.** Henkel & Cie. G. m. b. H. Brit. 402,973, Dec. 14, 1933. See Fr. 751,571 (C. A. 28, 10574).

**Benzoic anhydride.** Michael N. Dvornikoff (to Monsanto Chemical Co.). U. S. 1,948,342, Feb. 20. Benzoic acid is caused to react with benzoyl chloride under sub-atm. pressure (suitably at a temp. of about  $220^\circ$ ), and other anhydrides of monocarboxylic acids of the benzene series may be similarly formed.

**Solid diazo salts.** I. G. Farbennind. A.-G. Brit. 403,013, Dec. 14, 1933. Diazo salts are made by monodiazotizing a halogenated  $p$ -phenylenediamine (no  $\text{HSO}_3$  or  $\text{COOH}$  groups) and sepg. the monodiazoo compd. as a solid, mineral acid salt or stabilized salt, according to known methods. In examples the 2,5- and 2,6-dichloro, 2,6-dibromo, 2-chloro-5-methyl, 2-chloro, 2-chloro-6-bromo and 2-bromo derivs. are monodiazotized and the diazonium compds. pptd. as the (1) chloride, (2) sulfate, (3)  $\text{ZnCl}_2$  or  $\text{CdCl}_2$  double salt, (4) fluoroborate, (5) 1,5- or 2,6-naphthalenedisulfonate, (6)  $p$ -chloro-benzenesulfonate, etc.

**Caustic alkali fusions.** Joseph E. Jewett (to National Aniline and Chemical Co.). U. S. 1,947,852, Feb. 20. In a process such as the production of indoxyl by fusing a phenylglycine compd. with caustic alkali and sodamide, the caustic alkali is circulated in molten condition as a stream into which the reacting material is introduced. App. is described.

**Metal carbamates.** Alwin Mittasch and Paul Chall (to I. G. Farbennind. A.-G.). U. S. 1,948,002, Feb. 20. A metal salt such as  $\text{Ca}(\text{NO}_3)_2$  in an inert liquid such as  $\text{MeOH}$  in which this salt is at least slightly sol. but in which the resulting carbamate is difficultly sol. is reacted on with  $\text{NH}_3$  and  $\text{CO}_2$ .

**Potassium formate.** Rudolph Koepp & Co. Chemische Fabrik A.-G. Fr. 757,381, Dec. 25, 1933.  $\text{HCOOK}$  is made by causing  $\text{CO}$  to act on  $\text{K}_2\text{SO}_4$  and  $\text{CaO}$  in aq. medium at a relatively high temp. and pressure, the amt. of  $\text{K}_2\text{SO}_4$  being calcd. so that there is formed a solu. 6 which contains practically exclusively  $\text{HCOOK}$  and a compd.,  $(\text{CaSO}_4)_x \cdot \text{K}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ , which is made usable again by decomn. Cf. C. A. 28, 13629.

**Sodium ethyl oxalacetate.** Ray M. Carter and Wm. L. Johnson (to U. S. Industrial Alc. Co.). U. S. 1,948,201, Feb. 20.  $\text{Na}$  is dissolved in abs.  $\text{EtOH}$ , the soln. is cooled to  $0$ – $15^\circ$ , diethyl oxalate and  $\text{EtOAc}$  in substantially stoichiometrical proportions are added and the reaction is allowed to proceed substantially to completion at the lowered temp. and the liquid reaction mixt. is then warmed for about 15–30 min., cooled to a pasty mass, and a substantially solid product is obtained by expressing liquid from the mass under high pressure.

**Peroxide of tetrahydronaphthalene.** Soc. pour l'ind. chim. à Bâle. Swiss 162,998, Sept. 16, 1933 (Cl. 360.). A cryst. peroxide is prepd. by heating 1,2,3,4-tetrahydronaphthalene to temps. below  $100^\circ$  and subjecting 8 it to the action of  $\text{O}$  or air, the resulting peroxide being isolated from the reaction mixt. The product 1,2,3,4-tetrahydronaphthalene 1-peroxide, m.  $53$ – $4^\circ$ , has com. and therapeutic uses. Examples are given.

**A sulfonyl chloride.** Soc. pour l'ind. chim. à Bâle. Swiss 162,735, Sept. 16, 1933 (Cl. 362.). The substance  $p$ -nitroaniline- $o$ -sulfonyl chloride is prepd. by the action of a chloride of  $\text{H}_2\text{P}_2\text{O}_5$ , such as  $\text{POCl}_3$  or  $\text{PCl}_5$ , on  $p$ -nitroaniline- $o$ -sulfonic acid.

**Triarylstibine iodides.** Ludwig Kaufmann. Ger. 580,515, Feb. 7, 1934 (Cl. 120. 26.01). See U. S. 1,917,207 (C. A. 27, 4630).

**Polyglycol nitrates.** Westfälisch-Anhaltische Sprengstoff A.-G. Ger. 592,007, Jan. 31, 1934 (Cl. 120. 5.04). Polyglycol nitrates are recovered from spent acid from the nitration of polyglycols by washing the acid with a nitrate of another polyhydric alc., e. g., nitroglycerol. The nitrate used for washing may be produced in the

spent acid, if necessary after addn. of a further amt. of nitrating acid, or it may be produced simultaneously with the polyglycol nitrates. Cf. Ger. 548,427 (C. A. 26, 3670).

**Dialkyl sulfates.** Thomas F. Carruthers (to Carbide and Carbon Chemicals Corp.). U. S. 1,949,366, Feb. 27. Gaseous olefins such as  $C_2H_4$  are absorbed in concd.  $H_2SO_4$  which contains appreciable amts. of carbonaceous impurities, and there is added to the acid liquid water and at least one liquid solvent for dialkyl sulfate such as ether which is substantially immiscible with water, for effecting sepn. and recovery of dialkyl sulfate.

**Dialkyl sulfates.** Henry L. Cox (to Carbide and Carbon Chemicals Corp.). U. S. 1,949,369, Feb. 27. A gaseous olefin such as  $C_2H_4$  is absorbed in concd.  $H_2SO_4$  which contains appreciable amts. of carbonaceous impurities and there is added to the acid liquor formed a solvent liquid comprising at least one volatile O-contg. solvent such as  $EtOAc$ ,  $MeOH$ ,  $EtOH$ , ether, acetone or ethylene glycol and the flocculated carbonaceous impurities are removed, the solvent is removed from the acid liquor, and the dialkyl sulfate formed is sepd. and removed in an immiscible layer.

**$\beta$ -Bromoethyltrimethylammonium double salt.** Hermann Koch (Heinrich Hornstein, inventor). Ger. 576,712, Nov. 29, 1933 (Cl. 12p. 7.10). See U. S. 1,920,697 (C. A. 27, 4818).

**Stable salts of cyclohexenylethylbarbituric acid.** I. G. Farbenind. A.-G. (Clemens Lutter, inventor). Ger. 591,938, Jan. 29, 1934 (Cl. 12p. 7.02). The acid is converted to its solid Ca, Sr, Mg or Li salts by usual methods.

**Acetylene.** Franz Fischer and Kurt Peters. Ger. 591,756, Jan. 26, 1934 (Cl. 12o. 19.01). A mixt. of  $CH_4$  or other hydrocarbons and steam is subjected to an elec. discharge at very low pressure, e. g., 80 mm. The amt. of steam present is at least equal to the amt. of hydrocarbon. Examples are given.

**Methyl formate.** Ges. fur Kohlentechnik m. b. H. (Wilhelm Gluud, Fritz Brodkorb and Walter Klemp, inventors). Ger. 591,581, Jan. 24, 1934 (Cl. 12o. 11). In prepg.  $HCOOCH_3$  by the action of CO at high pressure on  $MeOH$  in the presence of alkali alcoholate at room temps., the amt. of the latter present is equal to about 3 g. of alkali metal per 100 cc. of  $MeOH$ .

**Ethylene oxide.** Société française de catalyse generalisée. Brit. 402,438, Dec. 4, 1933. See Fr. 739,562 (C. A. 27, 2163); 402,749, Dec. 4, 1933, addn. to 402,438. See Fr. 41,811 (C. A. 27, 4546).

**Paraformaldehyde.** Otto Fuchs and Erich Naujoks (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 1,948,069, Feb. 20. See Ger. 558,470 (C. A. 27, 312).

**Separating thiourea from ammonium thiocyanate.** Max Donauer (to Koppers Co. of Del.). U. S. 1,949,738, March 6. The mixt., at ordinary room temp., is treated with a quantity of a solvent such as water which at such temp. serves as a selective solvent for the  $NH_4CNS$ .

**Recovering benzene vapors in sulfonation.** E. A.

Piotrovskii. Russ. 31,428, Oct. 31, 1933. The gases obtained in the neutralization of crude sulfonated  $C_6H_6$  with carbonates are passed through concd.  $H_2SO_4$  with or without a preliminary removal of  $H_2O$ , for the absorption of  $C_6H_6$  and the spent acid is returned for the sulfonation of a new batch of  $C_6H_6$ .

**$\alpha$ -Naphthol.** Wm. J. Cotton (to National Aniline & Chemical Co.). U. S. 1,949,243, Feb. 27. A mixt. contg. 1-naphthalenemonosulfonic acid and a naphthalene-disulfonic acid is fused with  $NaOH$  to form a mixt. contg. the alkali metal compds. of 1-naphthol and of a naphthol-sulfonic acid but contg. substantially no alkali metal dihydroxynaphthalene compd., and 1-naphthol is recovered from the mixt.

**Optically active menthols.** John Read and Wm. J. Grubb. U. S. 1,949,329, Feb. 27. A mixt. of *d*-menthol and *l*-menthol is converted into their esters of an optically active menthoxyacetic acid, one of the esters is isolated by fractional crystn. and the isolated ester is hydrolyzed under conditions under which the menthoxyacetic acid liberated during the hydrolysis is not decompd.

**Acetylation of linalool.** V. I. Isagulyantz, and E. Smol'yaninov. Russ. 31,430, Oct. 31, 1933. Linalool is treated with  $Ac_2O$  in the presence of phosphoric acid. The reaction temp. is thus lowered.

**Trimethylcycloheptanone.** Soc. anon. M. Naef & Cie. Swiss 163,533, Oct. 16, 1933 (Cl. 36o). The compd. 1,1,7-trimethylcyclo-2-heptanone,  $b_p$  80-83°, is obtained by heating a metal salt of 2,3-dimethylheptane-2,7-dicarboxylic acid to 300-400°. Examples are given.

**Isoviolanthrone.** Lucas P. Kyrides (to National Aniline Chemical Co.). U. S. 1,947,858, Feb. 20. The fusion of a *Bs*-halobenzanthrone compd. such as *Bs*-chlorobenzanthrone with an alc. and an alkali metal hydroxide in the absence of an inert solvent or diluent liquid is effected with a reaction mixt. contg. about 5 to 18 mols. alkali metal hydroxide per mol. of halobenzanthrone compd.

**Camphene.** Soc. pour l'ind. chim. à Bâle. Swiss 163,004, Dec. 1, 1933 (Cl. 36o). Camphene is obtained by heating bornyl chloride above its m. p. with a small amt. of heavy metal as catalyst, with exclusion of moisture. An example is given.

**Indene.** Rütgerswerke-A.-G. and Leopold Kahl. Ger. 590,233, Jan. 4, 1934 (Cl. 12o. 1.04). Addn. to 589,560 (C. A. 28, 2373<sup>3</sup>). Tar oil fractions contg. at least 80% indene are cooled to low temps. to solidify the indene. This is mechanically sepd. from the liquid constituents, melted, recooled and again sepd., to give indene.

**Protocatechualdehyde.** Vanillin-Fabrik G. m. b. H. (Hans Puttfarcken and Leo Schulz, inventors). Ger. 591,888, Jan. 29, 1934 (Cl. 12o. 9). Heliotropin is treated with  $AlCl_3$  in the presence of a mixt. of an aromatic  $NO_2$  compd. and an aromatic hydrocarbon, and the  $CH_3$  group split off by mild heating. Thus, heliotropin is heated to 40-50° with anhyd.  $AlCl_3$ ,  $PhNO_2$ , and toluene to give a 93.5% yield of the aldehyde.

## 11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

### A—GENERAL

ARTHUR W. DOX

**Evidence for the existence of [blood] protoporphyrin by the fluorescence spectrum of its stannous complex.** H. Bierry and B. Gouzon. *Compt. rend.* 198, 615-17 (1934); cf. C. A. 27, 4500.—By the action of  $SnCl_2$  on hematin or hemoglobin a stannous deriv. of protoporphyrin is formed.

**Morphology of chemical reactions in gels.** VI. Significance of "autoform" and of "form" catalysis in colloidal media for the interpretation of certain biological phenomena. F. M. Shemyakin. *J. Gen. Chem. (U. S. S. R.)* 3,

137-43 (1933); cf. C. A. 27, 5230.—"The close resemblance between the morphology of periodic reactions taking place in gels and certain figures encountered in living cells is discussed."

**Problems of asymmetry in biochemical processes.** M. Schoen. *Ann. bull. soc. roy. sci. méd. nat., Bruxelles* 1932, Ann. 51-84.—A review covering 41 references, dealing with specificity of microorganisms and enzymes in their action on sugars, polyhydric alcs., acids and esters.

**Determination of inorganic and lipid phosphorus in blood during and after ultra-violet irradiation.** H. Stiemens and G. C. Heringa. *Nederl. Tijdschr. Genees-*

*hunde* 77, II, 1035-9(1933).—Lipoid P remains unchanged, but inorg. P is increased. R. Beutner

The potassium in serum. Heinrich Walsch and Sigurd Kittel. *Kolloid-Z.* 66, 200-5(1934).—In serums to which  $K_2SO_4$ -NaCl was added, and in acidified serums at  $pH$  4, K was found to migrate with albumin anodically in the Fürth app. (cf. C. A. 20, 865). Na behaves normally, migrating to the cathode. Arthur Fleischer

Increase of yeast fermentation by animal, plant and chemical substances. K. Heinrich Zeller. *Biochem. Z.* 266, 367-76(1933); cf. C. A. 28, 793<sup>4</sup>.—The substances tried included juices of common fruits and vegetables, juices of various animal organs and 40 pharmaceutical products, chiefly animal tissue preps. The substances were added in several proportions to a standard yeast-glucose soln. mixt. and the rate of  $CO_2$  formation was observed at intervals. After an initial period of slow fermentation a large increase in  $CO_2$  output was observed in nearly all cases. Sometimes the increase was large (as high as 24-fold in some cases) but transient, sometimes less marked but lasting several hrs. Owing to the great variety of substances used no definite conclusions can be drawn. A method of calcg. the sp. accelerating effect is given. L. E. Gilson

Action of some pure metals on the growth of osteoblasts in vitro. G. Ménégau, D. Odiette and P. Moysse. *Compt. rend. soc. biol.* 115, 38-40(1934); cf. C. A. 28, 1724<sup>1</sup>.—The expts. previously reported were repeated on osteoblasts instead of fibroblasts, with identical results. Action of some alloys on the growth of fibroblasts and osteoblasts in vitro. *Ibid.* 504-6.—By using the same technic as before, Al bronze was found to be very toxic, duralumin nontoxic, and other Al alloys more or less toxic. Ordinary steels were very toxic and stainless steels nontoxic or nearly so. L. E. Gilson

Influence of the constituents of glutathione on a certain spectral property of hemoglobin. G. Litarczek, G. T. Dinischiotu and I. Cosmulesco. *Compt. rend. soc. biol.* 115, 678-80(1934); cf. C. A. 27, 5402.—The span between the  $\alpha$ -bands of oxyhemoglobin and carboxyhemoglobin, previously discussed, is influenced by the —SH of reduced glutathione. The addn. of cysteine increases the span in a similar way. L. E. Gilson

Activation of trypsin at the surface of membranes polarized by an electric current. Philippe Fabre and Paul Boulanger. *Compt. rend. soc. biol.* 115, 681-3(1934). L. E. Gilson

Physicochemical properties of the chlorocruorin of *Spirographis spallanzanii*. Jean Roche. *Compt. rend. soc. biol.* 115, 776-8(1934); cf. C. A. 28, 181<sup>6</sup>, 1045<sup>2</sup>.—The neutralization curve is given. Oxygenated chlorocruorin acts like a monoacid base with  $pK = 2.8-2.9$  and a tribasic acid with  $pK = 5.8, 8.1$  and  $10.2$ . L. E. G.

The law of mass action and the chemical reactions in living cells. Otto Rahn. *Scientia* 55, 130-8(1934).—Discussion. Even in the smallest cells the law of mass action can be applied to all processes except cell division. L. E. Gilson

Biology of heavy water. G. N. Lewis. *Science* 79, 151-3(1934).—Tobacco seeds germinated slowly in  $H_2O$  contg. 50%  $D_2O$ , but not at all in  $H_2O$ . Bacteria and molds did not grow in  $H_2O$ . Flat-worms (*Planaria maculata*) lost their activity over several hrs., but, when replaced in  $H_2O$ , regained it. A 10-g. mouse drank 0.66 g. of  $H_2O$  in 3 hrs., and showed temporary signs of intoxication. The effect of the  $H_2O$  is to be found in the reduced rate of all physicochem. processes when  $H^+$  is substituted for  $D^+$ . W. D. Langley

The permeability of the skin to radium emanation. W. Santholzer. *Strahlentherapie* 48, 519-34(1933).—The radioactivity of blood taken during bathing in radioactive water demonstrates the permeability of the skin to Rn in small amts. Milton Levy

Enzymic hemolysis. Dionys Kanócz. *Z. ges. expl. Med.* 91, 56-66(1933).—Lecithin becomes markedly hemolytic after gastric lipase has acted on it. Rabbits fed lecithin and injected with gastric lipase have a second

dary regenerative anemia. Cholesterol inhibits the hemolysis both *in vitro* and *in vivo*. Milton Levy

"Trypsin poisoning" in acute pancreatic necrosis and a sensitive method for the determination of trypsin. Johannes Baumann. *Z. ges. expl. Med.* 91, 120-77(1933).—The method depends on detg. the exact amt. of soln. required to digest casein under standard conditions. Simple ligation of the pancreatic duct does not increase the active trypsin of urine but oil injections which produce necrosis increase the urinary trypsin greatly. Milton Levy

The effect of parenteral lipase on the lipase contents of the blood of rabbits. Tomaso Oliaro and Josef Adler. *Z. ges. expl. Med.* 91, 362-5(1933).—Parenteral lipase injections increased the blood lipase and diminished the blood fat. Milton Levy

Carbonic anhydrase. Its preparation and properties. N. U. Meldrum and F. J. W. Roughton. *J. Physiol.* 80, 113-42(1933).—An enzyme which is present in red blood cells and catalyzes both phases of the reaction  $H_2CO_3 \rightleftharpoons CO_2 + H_2O$  was sepd. by 3 methods. Without this enzyme  $CO_2$  could not be excreted in the lung rapidly enough for the needs of the body. It seems to be entirely distinct from any enzyme previously described. J. F. Lyman

The occurrence of carbonic anhydrase in lower marine animals. R. Brinkman. *J. Physiol.* 80, 170-3(1933).—In lower marine animals carbonic anhydrase occurs quite independently of hemoglobin or of catalase or peroxidase. J. F. Lyman

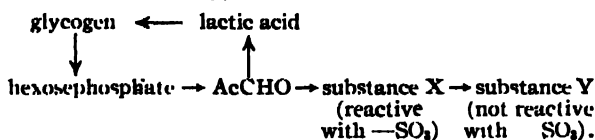
The microchemical behavior of certain splenic cells of the cat. Augusto Corradetti. *Boll. soc. ital. biol. sper.* 8, 1381-2(1933).—Feulgen's test on the cat spleen revealed the fact that certain cells showed reddish violet granulations which are round, regular, distributed around the nucleus and covering part or all of it or gathered at one or both poles. There are 2 types of cells: (a) cells with a diam. of 4-6.5  $\mu$  with minute, well-colored granulations; (b) cells with a diam. of 6-16  $\mu$  with larger but less colored granulations. The granulations do not take the Giemsa stain or the more common dyes. These cells have been observed only in the cat spleen; human, guinea-pig or frog spleen do not contain them. Peter Masucci

Variations in the electrical conductivity of certain natural colloidal systems with varying temperatures. I. The behavior of the conductivity of chicken egg yolk at various temperatures. A. Orru. *Boll. soc. ital. biol. sper.* 8, 1386-7(1933).—Egg yolk subjected to gradual heating shows 3 crit. points (76, 84, 96°) with regard to variations in elec. cond. These crit. points are related to the profound changes caused by heat in the colloidal system constituting the egg yolk. Peter Masucci

The phenomenon of blood radiation as applied to the study of certain organic conditions (normal blood radiometry). G. Protti. *Boll. soc. ital. biol. sper.* 8, 1412-17(1933).—The radiant power of the blood is a physicochem. property manifested by an emission of electromagnetic radiation belonging to the ultra-violet field. This photoelec. manifestation is closely assoc. with processes of combustion of polypeptides and carbohydrates. Previous exptl. data support the view that the radiant power of blood is an index of the oxidative and enzymic processes occurring in the organism. Blood radiometric results are discussed in relation to age groups, sex, diet, glucemia, azotemia, alk. reserve, basal metabolism, fatigue, menstruation and pregnancy. The av. inductive effect (av. of male and female detns.) is +44.4. Bloods are classified according to their radiant power: sub-radiant (0 to +30); normoradiant (+35 to +60); super-radiant (+60 to +90). Blood radiometric data seem to support the hypothesis that equal radiometric figures correspond to equal or equiv. metabolic rhythms. P. M.

Formation and destruction of methylglyoxal during glycolysis. Camillo Artom. *Boll. soc. ital. biol. sper.* 8, 1426-9(1933).—Rabbit liver was fried and defatted with acetone according to the Willstätter method and allowed to act on Ca or K hexosediphosphate or on synthetic AcCHO. The system had a vol. of 20 cc. and included:

(a) dried liver powder 0.5 g.; (b) Ca hexosediphosphate 100 mg. or K hexosediphosphate 50 mg. or synthetic AcCHO 8 mg.; (c) a phosphate buffer soln. 0.04 *M*, *pH* 6.7; (d)  $\text{Na}_2\text{SO}_3$  (0.03 *M*). Toluene was added to the tubes, the mixt. was incubated at 38° for 22 hrs., brought to 50 cc. with colloidal  $\text{Fe}(\text{OH})_3$  and  $\text{MgSO}_4$  and filtered through paper and aliquot portions were taken for tests. Conclusions: (1) Dried defatted rabbit liver splits hexosediphosphates with formation of AcCHO. (2) In the presence of  $\text{Na}_2\text{SO}_3$ , the reaction is almost completely arrested at this point, but in the absence of sulfite, the AcCHO is in most part further transformed into products not reactive with sulfite. (3) Although dried liver forms and destroys AcCHO without producing lactic acid, it contains "glycolase," but not "glyoxalase." The results of this investigation preclude the new transformation of AcCHO through the lactic acid stage. (4)  $\text{NaF}$  or  $\text{ICl}_2\text{CO}_2\text{H}$  in sufficient concn. to arrest the production of lactic acid in muscle is without effect on the destruction of AcCHO formed as an intermediate product of hexosediphosphate scission. (5) Synthetic AcCHO behaves differently from that formed by the enzymic splitting of hexosediphosphate whether in the presence or absence of sulfite. In the absence of sulfite it is also transformed by the liver, but the transformation ceases with formation of reactive products with sulfite; in the presence of sulfite, synthetic AcCHO is also largely transformed into products reactive with sulfite. The presence of  $\text{NaF}$  or  $\text{ICl}_2\text{CO}_2\text{H}$  does not modify the transformation of synthetic AcCHO. The following hypothetical scheme of transformation is suggested:



**Peter Masucci**

The presence of phosphatidases in the suprarenal cortex and in the pancreas. I. The lecithinase power of aqueous extracts. V. Gronchi. *Boll. soc. ital. biol. sper.* 8, 1596 9(1933).—The aim of this investigation was to determine whether there was present in the suprarenal cortex and in the pancreas an enzyme capable of splitting lecithin into lysocethin. The results indicate that aq. exts. of the suprarenal cortex, of the pancreas and of bee poison have marked lipolytic power; they contain enzymes with phosphatidase activity. Suprarenal cortex exts. of the ox or horse when placed in contact with emulsions of egg yolk or ovo lecithin do not produce lysocethin; guinea-pig suprarenal exts. rarely produce traces of lysocethin. Ox or horse pancreatic exts. when placed in contact with emulsions of lecithin produce lysocethin in contact for 4 hrs. at 38°, but only traces are found after 20 hrs. Bee poison placed in contact with lecithin produces lysocethin. II. Lecithinase power of the enzymes. *Ibid.* 1599-1603.—The enzyme extd. from the pancreas is a lecithinase. There are also present other phosphatidases which split lecithin further and attack lysocethin. Phosphatidases are present in suprarenal exts. which attack lecithin and lysocethin but no lecithinase is demonstrable. P. M.

**The esterases of enteric secretion. III. Lorio Reale.**  
*Boll. soc. ital. biol. sper.* 8, 1622 5(1933); cf. C. A. 28, 187f. -The aim of this investigation was to ascertain the effects of neutral salts and of high temp. on the activity of enteric esterases. Inactivation by neutral salts: Detns. were made at  $p_H$  5.8 and 8.6. The  $p_H$  played a minor part. The important factors were concn. and the nature of the anion or cation involved. At  $p_H$  8.6, the intensity of inactivation for the chloride of various cations was: concn. 0.75*N*, Ca > Mg > K > Ba > Na > Li; concn. 0.50*N*, Ca > Ba > Mg > K; Na and Li produced some activation; concn. 0.1*N*, all the cations showed more or less marked activation. At  $p_H$  8.6 the intensity of inactivation of the Na salts of various anions was: concn. 0.75*N*, F > I,  $\frac{1}{2}$  SO<sub>4</sub>, Br, Cl, NO<sub>3</sub>; concn. 0.50*N*, F >  $\frac{1}{2}$  SO<sub>4</sub> > NO<sub>3</sub>; Br, I, Cl, showed activation; concn.

**1** 0.10 *N*, all the anions showed activation. Inactivation by heat: (a) Moist heat at  $p_H$  7.3. At a temp. of 38–70° for 1 hr. the activity of the enzyme decreased with increasing temp., becoming zero at 80–70°. At 53° for 1 hr.  $\frac{1}{4}$  of the enzyme became inactivated. (b) Dry heat. Complete inactivation resulted after 1 hr. at 100°. At 76°,  $\frac{1}{2}$  of the enzyme became inactivated. At 80°,  $\frac{1}{2}$  to 2 hrs., the inactivation process proceeds as an irreversible unimol. reaction. Peter Masucci

2 The electrophoresis of calcium in blood serum and its dialyzate. G. Peretti. *Boll. soc. ital. biol. sper.* 8, 1645 9(1933).—Three groups of expts. were made: (1) Whole serum was introduced in the middle compartment of the app., 0.9% NaCl in the lateral compartments. (2) Dialyzed serum was introduced in the middle compartment, the dialyzate of the same serum in the lateral compartments. (3) The serum dialyzate was introduced in the middle, 0.9% NaCl in the lateral compartments. At the end of the electro dialysis, the liquid in each compartment was made up to vol. and Ca detd. in each. In (1) and (2) the protein content was also detd. Results: (1) there was from 0 to 5.2% more Ca transported to the anode; also 10 to 23% protein was transported to the anode, none to the cathode; (2) there was from 2.9 to 12% more Ca transported to the cathode, while the proteins in amts. similar to (1) were transported to the anode; (3) in half the expts. more Ca migrated to the anode and in half more Ca migrated to the cathode. The results indicate that there are present in serum complex anions which behave similarly to artificial systems of  $\text{CaCl}_2$  + alk. citrate.

**Peter Masucci**

**Significance of carotene in the living organism** S. D. Balakhovskii. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1, 28-9 (in French 29-30) (1934). -Expts. show that the rate and the amt. of O absorbed by erythrocytes are increased by addn. of carotene in water or EtOH. Osmotic stability of erythrocytes is also improved by addn. of a colloidal soln. of carotene. Application of carotene in water or dil. EtOH is beneficial in curing burns, eye diseases (diseases of cornea, burns by ultra-violet light, trachoma, etc.), and infected open wounds. N. N. M.

The reabsorption of exudates and transudates; proteolytic activity. G. Barbaro-Forleo. *Arch. sci. med.* 6 57, 285 324(1933).--Reabsorption is facilitated by a proteolytic enzyme present in the fluids. A. E. M.

**The reductases of liver and milk and enzyme activation by mineral waters.** M. Loeper, A. Mougeot and V. Aubertot. *Bull. acad. m'ed.* 109, 179-82 (1933). Mineral waters accelerate the reduction of methylene blue by formol in presence of liver and milk. A. E. Meyer

**Inhibition and activation of pancreatic enzymes:** lipase, amylase, trypsin. II. Adsorption of enzymes on proteins. H. Dyckerhoff, H. Michler and V. Tadsen. *Biochem. Z.* **268**, 17 33(1934); cf. *C. A.* **27**, 2165.—The pancreas contains substances which inhibit the activity of the enzymes hydrolyzing fats, glucides and proteins. This factor has not been completely eliminated in quantitative studies of the pancreatic enzymes. In addition to these substances, pancreatic trypsin contains also a sp. inhibitor which is removed by the enterokinase.<sup>4</sup> It is also found that trypsin can split protein without enterokinase.

**S. Morgulis**

**Crystalline myoglobin. II. Sedimentation constant and molecular weight of myoglobin.** Hugo Theorell. *Biochem. Z.* 268, 46-54 (1934); cf. C. A. 26, 5587.—The sedimentation const. of the myoglobin present in the press juice from horse, cow and cat skeletal muscles is about  $2 \times 10^{-13}$ . The myoglobin from horse muscle is a monodisperse system of mol. wt. 34800. In the aq. ext. of the washed horse heart muscle 2 myoglobins are present with sedimentation consts. of  $2 \times 10^{-13}$  and  $4 \times 10^{-13}$ , corresponding to mol. wts. of 34000 and 68000. The  $p_H$  range of stability of the myoglobin of lower mol. wt. is extraordinarily large, extending from  $p_H$  6 to 13. The sp. vol. at  $20^\circ$  in salt-free medium is 0.741, the mol. extremely aspherical with an asymmetry index of 1.8. The permeability of the kidney to myoglobin is probably due to its low mol. wt. III. Absolute light absorption of oxy-, car-

boxy-, meta- and reduced myoglobin. *Ibid.* 55-63.—The light absorption of various forms of myoglobin is recorded. The absorption can be heat used for detns. of myoglobin in the form of metaglobin provided the  $p_H$  is properly controlled. IV. Myoglobin in equilibrium with oxygen and carbon monoxide. *Ibid.* 64-72.—The detns. were made either in a salt-free medium or in a phosphate buffer at 20° and 37° and at  $p_H$  6.0 and 7.4, and under a const. mild illumination. In a salt-free medium or in a phosphate buffer at 20° the value of  $K = [MgbO_2]pCO/[MgbCO]pO_2$  is 19.2. The ratio of CO and O<sub>2</sub> affinity of myoglobin is quite different from that of hemoglobin, but the relation between the log  $K$  and the "span" (in A. units) is linear just as in the latter. The effect of temp. on the reaction of myoglobin with CO and O<sub>2</sub> is quantitatively and qualitatively similar to that of the hemoglobin. The  $p_H$  has no influence on the  $K$  values. V. Oxygen-binding curve of myoglobin. *Ibid.* 73-82.—Myoglobin has a very high affinity for O<sub>2</sub>. At 37° and  $p_H$  7.4 myoglobin is half satd. with O<sub>2</sub> at a pressure of 3.26 mm. whereas for hemoglobin a pressure of 20 mm. is required; in other words, its O<sub>2</sub> affinity is 6 times as great. The O<sub>2</sub>-binding curves of myoglobin are strongly hyperbolic, whereas those of hemoglobin are S-shaped. Hill's formula for hemoglobin  $y/100 = Kx^n/(1 + Kx^n)$  is applicable here, the value of  $n$  being 1. The influence of temp. and  $p_H$  on the magnitude of  $K$  has been detd. in a no. of expts. van't Hoff's coeff. of the heat of reaction between O<sub>2</sub> and myoglobin, corrected for molar concn. of O<sub>2</sub>, was found to be  $q = -17,500$  Cal. at 32°. By calcn. the coeff. for the CO reaction,  $q = 22,300$  Cal. at 32°. For hemoglobin, under comparable conditions,  $q_0 = -30,500$  Cal.; in other words, the combination with O<sub>2</sub> is affected more than in the case of myoglobin. The myoglobin + O<sub>2</sub> reaction is only slightly affected by the changes in  $p_H$ , not did the salt concn. (2.5-6.5%) have any effect. The myoglobin plays apparently a very important role as an O<sub>2</sub> reservoir in muscle (red), and since it contains  $1 \times 10^{-4}$  to  $5 \times 10^{-4}$  g. Fe per g. dry substance it is more important in this respect than cytochrome with only  $1 \times 10^{-6}$  g. Fe per g., but their function is thought to be reciprocal. Thus, fly muscle contains much cytochrome but very little myoglobin while in mammalian skeletal muscle the myoglobin predominates and in cardiac muscle both substances are present.

Alcoholdehydrogenase from yeast. II. D. Müller. *Biochem. Z.* 268, 152-7 (1934); cf. *C. A.* 27, 4824. Alcoholdehydrogenase from yeast has an optimum activity from  $p_H$  7.5 to 10; from  $p_H$  10 to 11 the activity decreases abruptly to a min. while it decreases more slowly from  $p_H$  7.5 to 3.5. Heating for 30 min., at 58° at  $p_H$  6.3 causes a destruction of 50% of the enzymic activity. HCN at 0.01  $M$  has little effect, but at 0.1  $M$  causes a loss of 50% in activity.

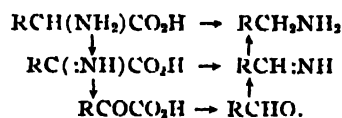
Quinones as enzyme models. XII. Metal salts as activators of the enzyme model. Bruno Kisch and K. Schwirith. *Biochem. Z.* 268, 158-63 (1934); cf. *C. A.* 27, 4825. The catalytic deamination of glycine by quinone in the presence of various salts in concns. ranging from 0.001  $M$  to 0.0000005  $M$  has been studied. CdCl<sub>2</sub> was found to exert the greatest effect under the conditions of the expt.

Activation of prochymosin. Rich. Ege and Erling Lundsteen. *Biochem. Z.* 268, 164-73 (1934).—Aq. exts. from calf stomachs contain very little active chymosin. Acid activation begins at  $p_H$  5 at 40° although the optimum  $p_H$  for chymosin activity is between 5 and 6. The activation velocity increases with acidity, and at  $p_H$  3.4 50% activation requires 30 min. but at  $p_H$  3.0 only about 1.5 min. Activation also results spontaneously at  $p_H$  7 on long standing or with the aid of pancreatin. S. M.

Determination of pancreatic lipase. Ernst Waldschmidt-Leitz and Renate Junowicz. *Biochem. Z.* 268, 178-80 (1934).—Reply to Steudel's criticism (*C. A.* 27, 5348) of the method for lipase detn. S. confused the relation between degree of splitting of substrate (olive oil) and amt. of lipase (lipase units) with that of the degree of hydrolysis and amt. of gland used. S. Morgulis

Specificity of dipeptidase and aminopolypeptidase. W. Grassmann and H. Bayerle. *Biochem. Z.* 268, 211-19 (1934).—The peptidase system of yeast consists of 2 components: one splits dipeptides, the other polypeptides. Expts. with dipeptides in which the NH<sub>2</sub> group either of asparagine or aspartic acid is combined with another amino acid show that these are hydrolyzed by dipeptidase but not by aminopolypeptidase from yeast or from intestine, while glycylglycyl-L-asparagine is hydrolyzed by aminopolypeptidase but not by the dipeptidase. The aspartic acid peptides are not as easily hydrolyzed as those of asparagine. S. Morgulis

The transformation of amino acids in buds. W. Grassmann and H. Bayerle. *Biochem. Z.* 268, 220-8 (1934).—The buds from *Rosacea*, but not of other families, decompose with considerable speed added amino acids but the only product under anaerobic conditions is NH<sub>3</sub>, so that no decarboxylation occurs. Formation of primary amines was never observed. The biol. amine production must therefore be due either to intact cellular activity or to some secondary product of dehydration or decamination of the amino acids:



Solubility of lead and zinc sulfides in organ pulp. C. G. Santesson. *Skand. Arch. Physiol.* 67, 196-200 (1934). The soly. of HgS, Bi<sub>2</sub>S<sub>3</sub> and CuS in Ringer soln. is markedly increased by the presence of liver tissue pulp. The soly. of PbS or ZnS is not increased by the liver tissue. Addn. of HCl increases the soly. of the sulfides but much less so in the presence of the liver pulp, except with CuS, which dissolves readily. The slight effect of PbS or ZnS as compared to that of HgS, Bi<sub>2</sub>S<sub>3</sub> or CuS is attributed to their low soly.

Hydrolysis of starch by amylose and amylose complement. K. Myrback and S. Myrback. *Svensk. Kem. Tids.* 45, 230-6 (1933).  $\alpha$ - and  $\beta$ -Amylose separately do not hydrolyze starch completely but leave about 30% of amylose as dextrin. Acting jointly they convert the amylose completely into maltose, leaving 15% residue in the case of raw starch. So-called amylose complement (cf. Pringsheim, *et al.*) from autolyzed yeast is not a complement but a protective agent analogous to peptic protein products.

Significance of cytochrome in cell respiration. Keita Shibata and Hiroshi Tamiva. *Acta Phytochim.* (Japan) 7, 191-231 (1933).—After reviewing in detail the theories of Warburg and of Keilin on the mechanism of action of respiration enzymes, the authors present some new data that bear out their own theory. In the oxygenation of cytochrome, O<sub>2</sub> is not bound to a single component of the cytochrome complex, but to several, and CO is bound to but a fraction, 1/ $m$ , of the complex. The quant. effect of CO in inhibiting respiration is expressed by the formula  $\sqrt{N}/(1 - N) \times \sqrt{CO}/O_2 = K$ , in which  $N$  is the residual respiration after the addn. of CO, and  $K$  a const. The spectral characteristics of 3 components of cytochrome are given. J. J. Willaman

Systematic study of the cytochrome spectra of various microorganisms. Hiroshi Tamiya and Seizaburo Yamaguchi. *Acta Phytochim.* (Japan) 7, 233-44 (1933).—Spectral analyses are given of the cytochrome of 44 species of bacteria and 17 of yeast. A no. of spectral types are classified. J. J. Willaman

Enzyme studies. Hans v. Euler and Erika Klusmann. *Arkiv Kemi, Mineral., Geol.* 11B, No. 23, 6 pp.—Yeast dehydrogenase transfers H from hexosemonophosphate to methylene blue very rapidly. It dehydrogenates glucose and xylose very slowly. Cozymase is required for the dehydrogenase of corpus luteum, ovarian tissue, anterior and posterior pituitary. J. J. Willaman

Enzymic oxido-reduction by yeast dehydrogenase. Hans v. Euler and Carl Martius. *Arkiv Kemi, Mineral.,*

1. 11B, No. 22, 6 pp.—Yeast dehydrogenase transfers H from lactic acid to methylene blue and decolorizes the latter. It dehydrogenates lactylglycine more slowly, lactic acid still more slowly, and EtOH more rapidly than lactic acid. Cozymase is required in the system.

J. J. Willaman

Constitution of estrin (Danielli) 10. Oxidation-reduction properties of glucides formed out of contact with O (Mayer-Reich) 2. Optically active allantoin (Fosse, *et al.*) 10.

Onderstepoort Journal of Veterinary Science and Animal Industry (*New Journal*). Published quarterly by the Dept. of Agriculture, Onderstepoort, Pretoria, S. Africa. Vol. 1, No. 1 appeared in July 1933.

Fowler, Gilbert J.: An Introduction to the Biochemistry of Nitrogen Conservation. New York: Longmans, Green & Co. 280 pp. \$4.50.

Hewitt, L. F.: Oxidation-Reduction Potentials in Bacteriology and Biochemistry. 2nd ed. Issued by London County Council. London: P. S. King & Son, Ltd.

Biochemical and Allied Research in India in 1932. Bangalore: Society of Biological Chemists. 86 pp.

Chemie der Enzyme. Edited by Hans v. Euler. Tl. II. Spezielle Chemie der Enzyme. Abschnitt 3. Die Katalasen und die Enzyme der Oxydation und Reduktion. Edited by H. v. Euler, W. Franke, R. Nilsson and K. Zeile. Berlin: J. Springer. About 650 pp. Cf. C. A. 23, 2997.

## B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Determination of lactose in blood. R. Moracchini and B. Cossu. *Diagnostica tec. lab. (Napoli) Riv. mensile* 3, 140-8(1932).—In Folin and Malmros' micro method fermentation with brewer's yeast gives good results in differentiating blood glucose and lactose. B. C. A.

Iron hematoxylin [stability of staining solutions]. R. T. Hance. *Stain Tech.* 8, 117(1933).—Stock solns. of Fe hematoxylin (10% EtOH solns.) should be renewed yearly. A trace of NaHCO<sub>3</sub> added to a new 0.5% soln. enables it to be used immediately. B. C. A.

Determination of the fat content of the blood. H. Festen. *Nederland. Tijdschr. Geneeskunde* 77, II, 1893-6(1933).—The method, based upon sapon. and titration of the free fatty acids, can be applied to 0.2-cc. samples. The alc.-ether ext. of the blood is purified by extn. with petr. ether; glucose is thus eliminated and the formation of org. acids from sugar by means of the NaOH used for saponification of the fats is avoided. A buret is described which can be used for the titration of very small quantities of fatty acids. R. Beutner

Determination of indican in the blood serum. J. Broekmeyer. *Nederland. Tijdschr. Geneeskunde* 77, II, 2795-8(1933); cf. C. A. 27, 5357.—Indican is detd. by means of Obermayer's reagent. The color obtained from standardized indican made from urine is used as a stable colorimetric standard. R. Beutner

A modified respiration vessel for the manometric determination of  $p_H$ . Hans Borei. *Z. vergleich. Physiol.* (Abt. C, Z. wiss. Biol.) 19, 583-6(1933).—A Barcroft-Warburg respiration vessel is designed to provide for a single side arm for storage of H<sub>2</sub>SO<sub>4</sub> and a divided side arm for storage of KMnO<sub>4</sub> and NaI. The  $p_H$  is detd. according to Dickens and Sinner (C. A. 26, 1312, 3578). After mixing slightly acid KMnO<sub>4</sub> and NaI (cf. Krebs, C. A. 24, 4066), the alkali produced absorbs the CO<sub>2</sub> originally present plus CO<sub>2</sub> from carbonates. Subtraction gives the CO<sub>2</sub> initially present. Since the ratio of free to total CO<sub>2</sub> is known, the  $p_H$  can be read from a reference curve giving this ratio as a function of the  $p_H$  (cf. C. A. 27, 2500 for use of similar app. on sea-urchin eggs).

B. C. Brunstetter

Gasometric determinations carried out with a ureometer of the calcimeter type. IV. Determination of urea, ammonium salts, total nitrogen and the alkaline reserve

of body fluids. G. D'Este. *Boll. chim. farm.* 72, 601-14(1933); cf. C. A. 27, 476. Lewis W. Butz

The osazone reaction in glucosuria and lactosuria. Guggero Forti. *Boll. chim. farm.* 72, 802-4(1933).—Glucose and lactose can be detected in concns. of 0.02 and 0.05%, resp., in urine (20 cc. sample) by the Quagliarello and Caponetto method (C. A. 21, 1967) modified by using PhNHNH<sub>2</sub>.HCl instead of PhNHNH<sub>2</sub>. The mixed osazones can be sepd. by dissolving out the lactosazone (I) with hot H<sub>2</sub>O. By adding 1 cc. of Q.'s buffer to the filtrate, characteristic crystals of I were formed on cooling. Lewis W. Butz

Some recent methods for the determination of blood bilirubin. G. Ferrari. *Diagnostica tec. lab. (Napoli), Riv. mensile* 4, 696-716(1933).—All methods proposed so far have practical defects and sources of error. Bilirubin detn. is of considerable clinical significance, especially if both the H<sub>2</sub>O-sol. and the CHCl<sub>3</sub>-sol. fractions are detd. Lewis W. Butz

The pathology of creatinine. I. Analytical technic. Giovanni Ferro-Luzzi. *Diagnostica tec. lab. (Napoli), Riv. mensile* 4, 932-55(1933).—F.-L. suggests modifying Folin's method for creatinine as follows: The use of 2 cc. of serum, deproteinization with tungstic acid, colorimetric detn. with a standard soln. of 0.5 N K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, and correction of results by means of tables. L. W. B.

The determination of albuminoid nitrogen. I. S. Yaichnikov. *J. Gen. Chem.* (U. S. S. R.) 3, 434-6(1933).—The ppts. obtained by treatment of spermine with Cu(OH)<sub>2</sub>, (CH<sub>3</sub>COO)<sub>2</sub>Pb and phosphotungstic acid are not of albuminoid nature; these ppts. contain xanthine and hexone bases. W. P. Bricks

The relative concentrations of esterase and lipase in adipose tissue. Joseph S. Hepburn and Harry McDuffy Moore. *Am. J. Pharm.* 106, 14-15(1934).—Mix 50 g. chopped tissue with sand, triturate with several successive portions of water, filter through wire gauze, then through several thicknesses of cotton gauze, obtaining 500 cc. of filtrate. Place a 100-cc. aliquot portion in a 250-cc. Erlenmeyer flask for each detn. proper and each blank or control expt. For the control expts. boil the filtrate, then cool it to room temp. before addn. of the other reagents. Add 1 cc. of the proper substrate (ethyl butyrate for esterase, and tributyrin for lipase) and 0.3 cc. of phenolphthalein soln. (1% in alc.) to each flask, mix thoroughly and neutralize with 0.1 N NaOH; add 1 cc. of toluene as a bactericide, stopper the flask and keep at 37.5° for 72 hrs. Titrate with 0.1 N NaOH. The numerical difference between the vols. of standard alk. soln. required to titrate the sample and the control is a measure of the butyric acid liberated by the hydrolytic enzyme. Three samples of chicken fat showed, resp. esterase 210, 240 and 265; lipase 9.25, 9.90 and 10.10. Turkey fat gave esterase 4.40, 4.50; lipase 9.90, 11.20. Goose fat contained esterase 9.55, 9.25; lipase 8.60, 9.00. Lamb fat contained esterase 44.35; 47.50; lipase, 19.25, 17.80. Human fat contained esterase 7.15, 7.80; lipase 5.50, 5.95. W. G. Gaessler

New technic for the colorimetric determination of adrenaline by reaction with iodine. Georges Weller. *Bull. soc. chim. biol.* 15, 1308-16(1933).—The fresh or dried tissue is ground with sand, treated with 10% CCl<sub>4</sub>-CO<sub>2</sub>H soln. to ppt. protein and filtered. The  $p_H$  of the filtrate is raised to about 4 by the addn. of KOAc, a dil. soln. of I added, the excess of free I removed by Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, and the resulting red soln. compared with a standard. By means of this method, no adrenaline was detected in the liver, spleen, pancreas, thyroid, kidneys, lungs, heart or skeletal muscles of dogs. The fresh adrenals of male dogs averaged 1.425 mg. adrenaline per g., those of females 1.482 mg. Thirty references. L. E. Gilson

Determination of adrenaline in fresh adrenal glands. Léon Binet and Georges Weller. *Compt. rend. soc. biol.* 115, 598 9(1934); cf. preceding abstract.—Addnl. comment on the method. L. E. Gilson

Technical remarks on the use of the Zeiss interferometer in the interferometric method of Hirsch. C. O. Guillaumin. *Bull. soc. chim. biol.* 15, 1392-414(1933);



cf. "C. A. 27, 2973.—Sources of error in Hirsch's method of detg. endocrine conditions are discussed.

L. E. Gilson  
Chemical study of the nitrogen balance. H. Pénau and J. Gauduchon. *Bull. soc. chim. biol.* 15, 1483 (1933).—Analytical methods are discussed. L. E. G.

Technic for the microdetermination of magnesium in blood serum. Léon Velluz. *Compt. rend. soc. biol.* 115, 253-4 (1934).—An *o*-hydroxyquinoline method.

L. E. Gilson  
The preparation of vagotonin completely free from insulin. D. Santenaise, G. Fuchs and M. Vidacovitch. *Compt. rend. soc. biol.* 115, 472 5 (1934); cf. C. A. 27, 4552.

L. E. Gilson  
Value of the Takata-Ara reaction as a test for hepatic insufficiency. G. Hugonot and R. Sohler. *Compt. rend. soc. biol.* 115, 708-11 (1934).—The technic of the method is given, and the interpretation of the results discussed.

L. E. Gilson  
Colorimetric method of determining the polypeptides of serum. R. Goiffon and J. Spaey. *Compt. rend. soc. biol.* 115, 711-13 (1934).—A colorimetric method of detg. tyrosine in the  $\text{CCl}_3\text{CO}_2\text{H}$  filtrate is described. The peptide content is said to be in direct proportion to the tyrosine.

L. E. Gilson  
Fermentation of blood sugars. Humberto Giovannibattista. *Rev. facultad cienc. quim.* (Univ. La Plata) 8, Pt. 2, 47-63 (1933).—In detg. fermentable sugar in blood identical results were obtained by using *Saccharomyces cerevisiae*, *S. ellipsoideus* and *Zygosaccharomyces mullis*. Whole blood defecated with tungstic acid gave higher values for nonfermentable reducing substances than when defecated with  $\text{Zn}(\text{OH})_2$ . With plasma or serum there was little or no difference observed. Defecation by  $\text{Hg}(\text{AcO})_2$  and  $\text{NaHCO}_3$  gave still lower values. L. E. G.

New simple quantitative microcrystallographic estimation of phosphates in blood serum. E. A. Fribrum. *Arch. Path.* 16, 520 1 (1933). The pptn. of phosphates by means of a proper  $\text{NH}_4\text{Mg}$  sulfate reagent (Dowd's reagent, *Ill. Med. J.* 56, 286 (1924)) can be used for an estn. of the phosphates in the blood serum. Equal quantities of serum, dild. with increasing amts. of 2.5%  $\text{NaCl}$ , are pptd. with the reagent; the last tube in which the crystals are found within 45 min. contains 3 mg. of P in 100 cc. of serum. The percentage of serum phosphates is calcd. from the dild. Harriet F. Holmes

The estimation of urea by urease methods in fluoride blood. C. F. M. Rowe. *Brit. J. Exptl. Path.* 14, 339 42 (1933).—Means of treating fluoride blood to permit urease activity has been examd. Mg is suggested as the most suitable metal for counteracting the inhibitory effect of fluoride, and in the form of caffeine Mg salicylate is very suitable for this purpose. It is not probable that the organically combined Mg merely replaces the  $\text{NaF}$  as 25 mg. of caffeine Mg salicylate is capable of rendering non-effective between 20 and 30 mg. of fluoride, that is to say, about 6 times as much as the max. on this assumption. It is inferred, therefore, that the principal mechanism involved is one of adsorption. Harriet F. Holmes

Chemical blood studies. I. Comparative studies on blood, laked and unlaked blood filtrates of animals in health and disease, with particular reference to methods and technic employed. H. Graf. *Onderscheppoor J. Vet. Sci.* 1, 269 78 (1933).—Methods for the prepn. of laked and unlaked blood filtrates and for the detn. of amino acids, uric acid, urea, nonprotein N, creatinine, total N and sugar are outlined. II. A contribution to the determination of urea in animal blood filtrates (laked and unlaked). T. J. Wilken-Jorden and H. Graf. *Ibid.* 279-83. —In the detn. of urea by the Folin and Svedberg method (cf. C. A. 24, 5780) the urease activity reaches an optimum at  $pH$  5.0-5.5. Below  $pH$  5.0 there is a very sudden fall in activity resulting ultimately in stagnation. In order to insure max. efficiency of the urease, 1.5-2.0 cc. of the acetate buffer soln. should be used per 5 cc. of blood filtrate, instead of the 2 drops recommended by F. and S. K. D. Jacob

Test for cholesterol. H. Mühlpfordt. *Dermatol. Woch-*

*schr.* 97, 1651-3 (1933).—To 2 cc. of cholesterol soln. in  $\text{CHCl}_3$  add 3 drops of 1% digitonin in MeOH and 5 cc. water. A crystalline ppt. at the junction is cholesterol digitonide. Milton Levy

The measurement of insensible weight loss of man in the laboratory and clinic. Francis G. Benedict. *Z. ges. exptl. Med.* 91, 340 61 (1933).—A discussion of conditions and balances and the relationship of weight loss to metabolism. Milton Levy

Is the picric acid reaction practically useful for blood-sugar determinations? E. Kaufmann. *Z. ges. exptl. Med.* 92, 480 9 (1933).—The rapidity of and convenience of the picric acid method recommends it as a clinical method. Milton Levy

The determination of the plasma volume and the blood volume of the rabbit by the injection of homologous anti-crystallized egg-albumin serum. J. T. Culbertson. *Am. J. Physiol.* 107, 120 7 (1934).—Blood-plasma vol. in the rabbit can be detd. by finding the dild. which a known amt. of homologous pptg. antiserum undergoes after injection into the circulation. In the rabbit, plasma vol. = 3.21 and total blood vol. = 5.82% of the body wt. J. F. L.

A sensitive physical test for adrenaline. J. H. Gaddum and H. Schild. *Proc. Physiol. Soc., J. Physiol.* 80, 9P (1933).—If adrenaline solus., in faintly acid soln. and in the presence of O, are irradiated with ultra-violet, a fluorescence develops. This is more sensitive for adrenaline than any other known chem. test. Interfering substances in blood have prevented the application of the test successfully to that fluid. J. F. Lyman

The localization of mineral salts in cells of some mammalian tissues by microincineration. Gordon H. Scott. *Am. J. Anat.* 53, 243 248 (1933). Only Fe and Si can be recognized with certainty. Ca in aggregates of small cells or large ones can be recognized. Microincineration does indicate location and amount of total minerals. In dividing cells the mineral is concd. in the chromatin. Exposed surfaces such as cell surfaces along vascular channels show concn. of inorg. salts. C. M. McCay

A new test for glucolytic insufficiency. Michel Polonovski and Henri Warenbourg. *Presse méd.* 41, 793-6 (1933). The C corresponding to unknown compds. in the plasma is detd. as follows: Heat 2 cc. of Folin-Wu filtrate with 0.1 N  $\text{K}_2\text{Cr}_2\text{O}_7$  contg. 25%  $\text{H}_2\text{SO}_4$  to 100° for one hr. Det. the excess of  $\text{K}_2\text{Cr}_2\text{O}_7$  iodometrically. The chromic index is the quantity of 0.1 N  $\text{K}_2\text{Cr}_2\text{O}_7$  soln. necessary to oxidize one cc. of plasma. One g. of glucose requires 1.33 cc. The difference between the chromic factor for glucose and the total index gives the residual chromic index. An increase of the latter beyond 0.6 45 min. after the ingestion of 100 g. glucose indicates a disturbance of the glucose metabolism. A. E. Meyer

Studies on the galactose test. Torben Geill. *Acta Med. Scand.* 81, 31-62 (1934).—To obtain correct galactose values in the urine, the latter must be shaken with animal charcoal and AcOH in a 1-10 ratio. In hepatitis cases the galactose test is generally pos. In acute cases neg. results were found in very mild attacks. In cases of stagnation icterus all the tests were neg. Pos. tests were frequently obtained in Basedow patients, and are attributed to a thyrotoxic liver effect. The test, however, must be interpreted in conjunction with other clinical observations. S. Morgulis

Preparation of hemin with formic acid. Josef Brückner. *Biochem. Z.* 268, 181-6 (1934).—Coagulate by heat, with addn. of 1 g.  $\text{Na}_2\text{SO}_4$  per l., horse blood or a soln. of horse oxyhemoglobin, press the coagulum, wash several times with alc. and ext. with a 3-4% formic acid in alc. (EtOH or MeOH). Filter the ext. through a cotton wad and leave at room temp. to crystallize out. Dissolve the crude prepn. in a mixt. of 3.5 cc. pyridine and 5 cc.  $\text{CHCl}_3$ , filter and pour slowly into 100 cc. 10% alc. soln. of formic acid. The cryst. substance is easily sol. in aq. or alc. alkali, 5%  $\text{Na}_2\text{CO}_3$ , pyridine; it is difficultly sol. in hot or cold acidified alc., and is insol. in cold pure EtOH, MeOH,  $\text{CHCl}_3$ , ether, acetone and dil. mineral acid. The substance yields typical Teichmann crystals when heated with  $\text{NaCl}$  and AcOH. Its empirical compn. is  $\text{C}_{26}\text{H}_{30}\text{O}_4\text{N}_4\text{Fe}$ .

2( $C_2H_5OH$ ), and represents a formic acid hemin, which shows an absorption curve very closely resembling that of hemin.

**Determination of citric acid in blood serum by Thunberg's method.** Otto Østberg. *Skand. Arch. Physiol.* 68, 265-74(1934).—Some modifications in the Thunberg procedure are discussed. S. Morgulis

**An improvement in the methylene blue reduction test.** L. A. Burkey. *J. Bact.* 27, 67-8(1934). The addn. of 0.1-0.5% of peptone to milk-methylene blue mixts. shortens the reduction time 25-30%. John T. Myers

**The estimation of trypsin with hemoglobin.** M. L. Anson and A. E. Mirsky. *J. Gen. Physiol.* 17, 151-7(1933).—The formation from hemoglobin of split products which are not pptd. by  $CCl_3CO_2H$  is a measure of the tryptic activity. Add 1 cc. enzyme soln. to 5 cc. of specially prep'd. hemoglobin soln., whirl and place in the water bath at 25°. After 5 min., add 10 cc. of 5%  $CCl_3CO_2H$ , thoroughly mix, allow to stand 5 min. and filter. To 5 cc. of the filtrate add 10 cc. of 0.5 N NaOH and 3 cc. of the phenol reagent of Folin and Ciocalteu (*C. A.* 21, 3210) which has been dild. 3 times. Read the blue color, appearing in 1-10 min., colorimetrically against that of a standard (0.15 mg. tyrosine dissolved in 5 cc. of 0.2 N HCl soln.). The standard is prep'd. from thrice-crystd. tyrosine; its concn. is estd. by Kjeldahl, 100 mg. tyrosine being equiv. to 7.74 mg. N. It may be stored at room temp. if 0.5% HCHO is added.  $CuSO_4$  soln. or a blue glass may be used as a standard in a fairly monochromatic red light. The hemoglobin soln. is prep'd. from red corpuscles from defibrinated bovine blood. Water is added to give a soln. contg. 10.5 g. hemoglobin (1.86 g. N) per 100 cc. It is stored in a frozen condition. For use, it is denatured as follows: 220 cc. of 10.5% hemoglobin soln. and 11 cc. of N NaOH soln. are heated to 50-60°, and then 1300 cc. water, previously brought to 100°, is added. Then 26 cc. of a soln. 5 M in respect to NaCl and 0.5 M in respect to  $KH_2PO_4$  is added with mech. stirring. The soln. is filtered, the ppt. is washed with water, and water is added to it to make 400 g.; 400 g. urea and 160 cc. of N NaOH soln. are stirred into the ppt.; after complete soln. of the ingredients, 200 cc. of M  $KH_2PO_4$  and 240 cc. water are added. The soln. is kept in a cool place with toluene as a preservative. Methods are given for the prep'n. of solns. of com. dried proteins which can be used instead of freshly prep'd. hemoglobin. Charts show the color values of various amts. of tyrosine in hemoglobin filtrates, and the relation of trypsin concn. to the color value of digestion products. The method is rapid and different samples of hemoglobin yield the same result. **The estimation of active native trypsin in the presence of inactive denatured trypsin.** *Ibid.* 159 64.—Inactive denatured trypsin changes to active native trypsin in protein solns. which have been used to est. tryptic activity. This change does not take place, however, if sufficient alk. and urea are present in the digestion mixt. A method, a modification of the above, is described for the estn. of active native trypsin in the presence of inactive denatured trypsin. C. H. Richardson

**The determination of the sugar content of urine.** Gerhard F. Materna. *Med. Klin.* 29, 259-60(1933)

Louis J. Soffer

**Micro method of determination of serum calcium and potassium.** Kinei In. *J. Chosen Med. Assoc.* 23, 1844-52 (in German 142 (1933)).—The Kramer-Tisdall method is so modified that instead of titrating with  $KMnO_4$ , an excess of  $KMnO_4$  is added, then 5% KI soln., and then the iodine set free is titrated as usual with  $Na_2S_2O_3$  soln. S. Tashiro

**Zinc hydroxide powder as a precipitant in a simplified procedure for the preparation of protein-free filtrate of blood.** T. V. Letonoff. *Am. J. Med. Sci.* 187, 146 (1934).—Powd.  $Zn(OH)_2$  possesses many advantages that recommend its more general application in place of other protein precipitants. It offers all the advantages of the Somogyi procedure, yet eliminates the need for standardized solns. of NaOH and  $ZnSO_4$ . Only traces of Zn appear in the filtrate. Saccharides are removed completely, so

that the level of true fermentable sugar can be detd. directly by alk. Cu reagents. The filtrates are neutral and can be used also for detns. of urea N, nonprotein N, creatinine and creatine. R. C. Willson

**Detection and detn. of small quantities of cholesterol and other sterarins (Wasitzky) 7.** Use of Benedict's soln. for the microdetection of sugar in urine (Taubert) 7. Micro-manipulator for pure culture and microchem. work (Fitz) 1. Detn. of Hg in urine (Fraser) 7.

**Koch, Frederick C.: Practical Methods in Biochemistry.** Baltimore, Md.: Williams & Wilkins Co. 280 pp. \$2.25.

## C—BACTERIOLOGY

CHARLES B. MORREY

**Nature of the reaction of Escherichia coli on Endo's medium.** L. A. Margolena and P. A. Hansen. *Stain Tech.* 8, 131-8(1933).—The typical reaction is caused by MeCHO. B. C. A.

**A study of actinomycosis.** L. R. Vawter. *Cornell Veterinarian* 23, 126-49(1933).—A study was made of the fermentation of carbohydrates by 17 strains of *Actinobacillus* isolated from soft tissue lesions of bovines and grown under aerobic conditions on a sugar-free basic medium of meat infusion peptone broth. Dextrose, levulose, galactose, maltose, sucrose and mannitol were fermented in 1 day, lactose and raffinose in 4-10 days and glycerol in 14-21 days. Fermentation was slight and irregular in xylose; definite acidity appeared in 2 days with some strains and was delayed and almost negligible with others; a reversion in reaction occurred in all strains, the acidity disappearing in 14-28 days. Dulcitol, inulin, salicin and arabinose were not fermented; no change occurred in litmus milk in 30 days, and gelatin was not liquefied. Gas was not produced by any strain. Ten strains of Type I *Actinomyces* isolated from bone lesions of bovines slowly fermented dextrose, levulose, galactose, maltose, sucrose and salicin without gas production; acidity developed in 3-7 days in all except salicin, which developed acidity in 14-21 days. Arabinose, xylose, inulin, raffinose, dulcitol, mannitol and glycerol were not fermented. Gelatin was not liquefied but a granular sediment slowly formed in the tubes when they were incubated at 37° for 2 weeks or longer. This type of *Actinomyces* did not digest meat particles and hemolysis did not occur on blood agar plates in the presence of 10-15%  $CO_2$ . With Type II *Actinomyces*, isolated from bone lesions, gas and acidity occurred in mono- and disaccharides; this did not occur consistently with any individual strain, which indicates that the cultures designated as *Actinomyces* Type II may consist of more than 1 species. In many respects, *Corynebacterium pyogenes*, isolated from bone lesions, resembled *Actinomyces* Type I; it fermented xylose but not salicin. Thirty-four references. K. D. Jacob

**Sterilizing action of acids. IV. Sterilizing action of unsaturated monobasic acids.** Sogo Tetsumoto. *J. Agr. Chem. Soc. Japan* 9, 761-7(1933); cf. *C. A.* 27, 5144.—Acrylic and crotonic acids have approx. equal sterilizing powers at the same mol. concn. Though undecylenic acid is difficultly sol. in  $H_2O$ , its action is remarkable. Acrylate and crotonate have no sterilizing power but undecylenate has a strong action. The sterilizing action of unsatd. acids is generally stronger than that of satd. acids at the same concn. V. Sterilizing action of dibasic aliphatic acids on putrefactive bacteria, *Eberthella typhi* and *Vibrio cholerae*. *Ibid.* 1284-93.—The sterilizing action of oxalic acid was strongest among dibasic acids in equal mol. concn. The salts of  $Na$ ,  $Ca$  and  $NH_4$  had little or no action. For the acids  $C_2$ ,  $C_3$  the action of dibasic acids was stronger than that of monobasic acids. This is due to  $p_H$ . For acids over  $C_4$  the relation was the reverse. This is due to the properties of non-dissoc. mols. The action of monobasic satd. acid was strongest in aq. soln. at an equal  $p_H$ . This is due to the mol. concn. of the acids. No relation could be found between the no. of COOH groups and the sterilizing action. Y. K.

A bacterium that requires a vitamin-like substance for

1934).—*Micrococcus cytharidis* n. sp. grows on peptone unless a product from other bacteria is provided. The product is heat-stable and not pptd. by photophoretic acid. Milton Levy

Fixation of atmospheric nitrogen by enzymes extracted from *Azotobacter chroococcum*. A. N. Bakh, Z. V. Ermol'eva and M. P. Stepanian. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1, 22-4 (1934).—Ext. of *Azotobacter* culture filtered at 300 atm. through a Chamberlain L<sub>2</sub> candle fixes atm. N in presence of glucose or mannitol soln. Thus 1 cc. of ext. analyzing 1.976 mg. N (0.622 mg. as NH<sub>3</sub>) contained after 9 days 2.783 mg. N (0.551 mg. as NH<sub>3</sub>), while in presence of glucose the N content was 14.683 mg. (10.678 mg. as NH<sub>3</sub>), and in presence of mannitol 10.645 mg. (8.269 mg. as NH<sub>3</sub>). N. N. M.

Direct spectroscopic demonstration of the oxygen-transferring enzyme in *Azotobacter*. Erwin Negelein and Waltraut Gerischer. *Biochem. Z.* 268, 1-7 (1934).—*Azotobacter* has a very high O<sub>2</sub> consumption, 2000 cu. mm. per mg. dry substance per hr. Spectroscopic evidence points to a mechanism similar to that ascribed to respiration of aerobic cells (C. A. 28, 791<sup>9</sup>). In this scheme an Fe compd. is the O<sub>2</sub>-transferring enzyme, while a second and a third Fe are the 2 cytochrome components. O<sub>2</sub> changes the Fe<sup>++</sup> to Fe<sup>+++</sup> of the enzyme with a shift of the band from 632 to 647 mμ; CO reacts with the Fe<sup>++</sup> form shifting the band from 632 to 637 mμ; HCN reacts with the Fe<sup>++</sup> form and the band 647 mμ disappears. The cytochrome (Fe compounds 2 and 3) reacts with neither O<sub>2</sub>, CO nor HCN, and when the 1st Fe<sup>++</sup> compd. is blocked by CO or the 1st Fe<sup>++</sup> compd. by HCN, the 1c<sup>+++</sup> forms of compds. 2 and 3 can still be reduced but the Fe<sup>++</sup> form can no longer be oxidized, and even in the presence of much O<sub>2</sub> their bands 563 and 550 mμ remain unchanged. The enzyme band *Azotobacter* differs from that of the AcOH bacteria, being in the red region, 632, instead of the yellow, at 589 mμ. Such bands in the red region have never been found in the pheohemins but occur in the group of substances which result when the Mg in chlorophyll is replaced by Fe. S. Morgulis

Nitrogen assimilation by *Aspergillus niger* under different nutritive conditions. Heinrich Hardtl. *Biochem. Z.* 268, 104-15 (1934).—The N assimilation begins with the development of mycelium, reaching a max. in relation to the growth in the first few days, but an abs. max. is not reached until a much later phase. Changes in the N value occur with alterations in the available amts. of C and N, and the higher their supply the lower is the N percentage. A limited C supply at first occasions a quick and intensive N assimilation which stops sooner but the N percentage never reaches such low values as on a high sugar concn. The max. utilization of N is obtained with low quantities of N. With high N concns. the utilization of the sugar is also improved, apparently for purposes of a more intensive respiratory process. The formation of citric acid depends upon the amt. of N in the medium, being always present when the N supply is low, but only for a short time after development begins when there is much N. S. Morgulis

Fermentative capacity and anaerobic growth of paratyphus-B bacilli. Kurt Aaron. *Biochem. Z.* 268, 121-51 (1934).—Paratyphus-B bacilli activate as H donors the following compds.: org. acids: formic, acetic, propionic, lactic, pyruvic, butyric, succinic, fumaric, glutaric, dl- and l-malic and citric; alcs.: EtOH, glycerol, adonitol, mannitol, dulcitol, sorbitol; carbohydrates: arabinose, xylose, glucose, levulose, galactose, maltose, raffinose; nitrogenous compds.: alanine, serine, valine, leucine, arginine, histidine, proline, glycylglycine, uric acid, asparagine and the Na salts of aspartic and glutamic acids. Apparently there is no relation between the ability of the paratyphus organism to dehydrogenate these substrates and their function as a source of C. The paratyphus-B organism activates the following as H acceptors: NaNO<sub>3</sub>, Na fumarate, Na malate, Na asparaginate and asparagine. With NaNO<sub>3</sub> as H acceptor and lactic acid as H donor, the paratyphus-B organism can grow an-

aerobically on synthetic media with the following sources: leucine, serine, lysine, arginine, phenylalanine, tryptophan, histidine, proline, glycylglycine, asparagine and Na salts of aspartic and glutamic acids, but cannot utilize NH<sub>4</sub>Cl, glycine, alanine, urea or uric acid. Glycine can be utilized when glucose is used as a source of C. With serine anaerobic growth is obtained when only Na lactate alone, without NaNO<sub>3</sub>, is available. Sixteen strains of coli were unable to grow anaerobically in the presence of lactate + NaNO<sub>3</sub> or NH<sub>4</sub>Cl + glucose. A no. of other combinations were found which made anaerobic growth possible. S. Morgulis

The Endo medium as a trapping agent and indicator for aldehyde. Lubow A. Margolena and P. Arne Hansen. *J. Bact.* 27, 33 (1934).—The color is caused by AcH which is normally absent in cultures of coli but invariably present when sulfite is added. The restored color is chemically different from the original fuchsin. John T. Myers

Can Endo medium be standardized? H. J. Conn and Mary A. Darrow. *J. Bact.* 27, 33-4 (1934).—Any fuchsin in America is satisfactory if the ratio between Na<sub>2</sub>SO<sub>3</sub> and fuchsin is 12.5:1. John T. Myers

An apparatus for the control of composition and rate of flow of gas mixtures through culture solutions. C. L. Senseman. *J. Bact.* 27, 62-3 (1934). J. T. M.

The physiology of acetic bacteria. I. Formation of gluconic acid. Kiyoshi Tanaka. *Acta Phytochim.* (Japan) 7, 265-97 (1933).—The gaseous exchange of *Acetobacter aceti* is greatly enhanced by the presence of glucose in the medium, although the O absorption is increased more than the CO<sub>2</sub> evolution. This is due to the formation of gluconic acid. If CH<sub>3</sub>ICOOH is present, CO<sub>2</sub> production is almost completely inhibited, and this indicates that EtOH is being formed. The oxidation of glucose by this organism is at an optimum at pH 5-6. The ease of oxidation of the various sugars is: glucose 100, mannose 34, galactose 25, maltose 21. Fructose, sucrose and lactose are not oxidized. If glucose and EtOH are both present, the latter is consumed first. Not only O, but methylene blue and quinone can act as acceptors for H, indications that a typical dehydrogenase is involved. Gluconic acid fermentation with O is inhibited by KCN, CO and toluene, whereas with quinone the KCN is not an inhibitor. J. J. Willaman

## D—BOTANY

THOMAS G. PHILLIPS

Localization of fatty oils and starch in cells of cultivated beets. S. Kopuil-Gomolyako. *Nauk. Zapiski Tsukrovoi Prom* 10, No. 33, 91-100 (1933).—Fatty oils in the cells serve as a characteristic sign of cultivated beets. Differences of fat content between individual groups are not as great as among sep. plants of the same group. During the digging period roots have a greater amt. of fat than sprouts or roots in their early stages of development. The deposition of fatty oils chiefly in the peripheral parts of the root indicates their action probably as a protecting substance of the covering tissue against rotting and freezing. The variation in the fatty oil may indicate importance of the fatty oils as reserve substance in the beet. Starch is found only in the Mangold group and may serve as a distinguishing feature of this group. Several photomicrographs are given. V. E. Baikow

Nutrition of *Euglena*. II. *E. stellata*, *klebsii*, *anabaena*, *deses* and *pisciformis*. H. Dusi. *Ann. inst. Pasteur* 50, 840-90 (1933); cf. C. A. 28, 2030<sup>1</sup>.—*E. stellata* is very sensitive to the reaction of the medium, pH 5.5 being the optimum for growth. A significant an. of Ca must be present in the medium for cultivation to occur, and in this respect *E. stellata* differs from all the other *Euglena* studied. Lysine exerts a most favorable influence on the growth of these cultures. *E. klebsii* shows optimum growth at pH 6-7, and gives very poor growth with mineral salts (nitrate and NH<sub>4</sub> salts) as the source of N, but good growth with certain amino acids (I) and with peptones (II). *E. anabaena* is difficultly cultivated in mineral media, NH<sub>4</sub> phosphate alone of the

salts tested being satisfactory as a source of N; I are not very satisfactory, but II are very favorable to growth. Culture is possible over the range pH 5.5-8.5 and best at 6.0-8.0. *E. deses* does not multiply in a purely mineral medium contg. nitrate or  $\text{NH}_4$  salts, but requires org. N in the form of I or II. No culture of *E. pisciformis* was possible with nitrate,  $\text{NH}_4$  salts, I or with hydrolyzed silk as the source of N, but II mixts. from muscle proteins gave good growth. The results of the expts. with these *Euglena* and with *E. gracilis* are tabulated and the findings discussed in relation to the function of chlorophyll and light. B. C. A.

Sap stains of wood in Japan. I. *Ceratostomella* sp., Rumbold, the cause of a blue stain of pine trees in western Japan. Y. Nishikado and K. Yamauchi. *Ber. Ohara Inst. landw. Forsch.* 5, 501-39 (1933).—The growth and activity of the organism are described.  $\text{O}_2$  is necessary for its growth. B. C. A.

Action of injected nutrient substances on plants. A. Mazzaron. *Boll. soc. Eustach.* 29, 61-9 (1931).— $\text{NH}_4$  salts and nitrate are equally effective whether injected or absorbed by the root. B. C. A.

Algae which excrete soluble organic pigmented matter in the sea. G. Ranson. *Compt. rend.* 196, 1927 30 (1933).—The pigmented substance excreted by *Navicula ostrearia* Bory is probably a phosphatide. B. C. A.

Formation of components of wood from the plant sap. Fructose as the source of "lignin." H. Wislizenus and H. Hempel. *Cellulosechem.* 14, 149-68 (1934).—A study of substances in wood saps, involving sepn of sap components, sedimentation speeds, adsorptions with  $\text{Al}_2\text{O}_3$ , viscosity and pH measurements, sp. grs., chem. tests, use of some specialized equipment, etc. Adsorption increases in the oxidative synthesis of *d*-glucose to pyrogallol, gallic acid and tannin. Sieve tube sap of young red oak contains 16-19% total solids while the descending cambial sap contains about 1/2 as much. Sap changes in these 2 wood structures are described in detail. The sieve tube sap of young red oak contains about 80% sucrose, 2.6% *d*-glucose and 1.1% *d*-fructose, computed on the dry basis. With a sp. gr. of 1.06, about 15% sugar is present, and with a sp. gr. of 1.03 there is about 8% sugar. Some albumin is present in the saps together with very small amts. of pentose and tannin-like substances. The effect of other sugars such as xylose on rotation was considered. No adsorbable high-mol. wt. compds. were found and sucrose is not appreciably adsorbed from the dil. saps. Sugars were detd. in the slimy cambial saps from the wood and bark sides of conifers. Adsorption measurements after treatment with dil.  $\text{KMnO}_4$  solns indicate that *d*-fructose absorbs much more O than *d*-glucose under the same conditions. *d*-Fructose can therefore be regarded as the mother substance of lignin. C. A. B.

Lead assimilation by plants in litharge-containing soil. W. Stoldt. *Pharm. Zentralhalle* 75, 97 8 (1934); cf. C. A. 28, 6597.—It is shown that 320 g. of grass (thoroughly washed) grown in such soil, some 30 m. distant from a bridge sprayed with paint, contained 4 mg. Pb, while the sandy residue from the washed grass yielded 10 mg. Pb. Furthermore, it is shown that grass (about 500 g. thoroughly washed) grown on soil, otherwise Pb-free, but subsequently strewn with  $\text{PbO}$ -contg. sand, yielded 5 mg. Pb. Thus it appears that Pb-contg. soil permits assimilation of Pb by the grass rootlets, subsequently passing into the aerial portion of the plant. W. O. E.

Protoplasmic and nutrient tissues for phosphorus compounds. Their physiology. M. Javillier. *Ann. bot.* 15, 1552-62 (1933).—The protoplasmic, nucleic, phytin and mineral tissues are described. The values found for dried lentils, resp., 0.381, 0.046, 0.001, and for dried wheat germ 1.356, 0.001, 0.001.

L. E. Gilson. The effect of lipid concentrations (steroids) on the growth of the bulb. *Compt. rend.* 200, 1000-1002 (1935).—The

bodies contain a mixt. of phospholipids, phytosterols and other lipoids, enclosed in a protein envelope. L. E. Gilson.

Atlantic Coastal Plain plants in the sand barrens of northwestern Wisconsin. W. T. McLaughlin. *Ecological Monographs* 2, 335-83 (1932).—The relation between the pH of the natural waters and the distribution of plant species in this region is discussed. K. D. J.

The structure and growth of the tea bush. W. Wight. Indian Tea Assoc., Sci. Dept., *Quart. J.* 1932, 150-62, 200-17.—The chem., phys. and enzymic processes concerned in the structure and growth of plant cells and of tea leaves are discussed. K. D. Jacob

Study of some aspects of the physiology of the tendrils of Cucurbitaceae. R. H. Dastur and M. C. Billimoria. *J. Indian Bot. Soc.* 11, 148-68 (1932).—The curled tendrils have very little respiratory activity in comparison to straight tendrils, and there is no increased output of  $\text{CO}_2$  when the tendrils curve. As the age advances respiration decreases. The temp. in the plant organs is lower than that of the atm., and the temp. at the base is lower than that at the apex; it is also lower in curled tendrils than in straight tendrils of corresponding lengths. As the age of the tendril advances the water content increases per unit length and per unit dry wt., and reaches a max. in the fully grown tendril. In straight tendrils the suction pressure increases with length and is higher at the apex than at the base; it is also higher in straight tendrils than in curled tendrils of corresponding lengths. K. D. Jacob

Influence of some solutions on the rate of permeability in *Zea mays* seeds. R. C. Malhotra. *J. Indian Bot. Soc.* 11, 188-201 (1932).—As detd. by the wt. increase method, the absorption of liquids and solns. by corn seeds in 64 hrs. at 25° was in the descending order 0.1 M NaOH, 0.05 M NaOH, 0.1 M NaOH plus CaO, 0.1 M AcOH, 0.05 M AcOH, 0.1 M caffeine, 0.05 M caffeine, 0.05 M  $\text{NaHSO}_4$ , 0.1 M  $\text{NaHSO}_4$ , pure water, 0.05 M NaCl, 0.1 M NaCl and abs. EtOH. The various solns. were absorbed at different rates and, as a rule, the less concd. permeated more than the more concd. ones. Ca showed distinct ability to counteract NaOH injury, probably because of its effect in inhibiting the rapid entrance of  $\text{Na}^+$  ions. There was no visible sign of injury to the seeds, except for those immersed in NaOH and 0.1 M AcOH. Thirty-four references. K. D. Jacob

Variability of the osmotic strength of the sap of *Cuscuta reflexa* Roxb. P. Parija and A. B. Saran. *J. Indian Bot. Soc.* 11, 271-5 (1932). The concns. of the cell sap of the host plants and of the parasite *C. reflexa* were detd. before and after glucose injection by the plasmolytic method, with  $\text{KNO}_3$  as the plasmolyzing medium. The osmotic strength of *C. reflexa* growing on 7 species of host plants was always higher than that of the host, and ranged from 0.40 to 0.45 in terms of mols. of  $\text{KNO}_3$ . With 0.6 and 0.8% glucose the cells of the parasite contained more starch grains than before, and in the last case signs of wilting occurred. When the parasite was grown on *Duranta plumieri* Jacq., the osmotic strength of its cell sap could be varied from 0.43 mol.  $\text{KNO}_3$  to a max. of 0.45 mol. beyond which the excess glucose was converted into starch. K. D. Jacob

Germination of *Zea mays* seeds as influenced by their protoplasmic immersion in water and desiccation. R. C. Malhotra. *J. Indian Bot. Soc.* 11, 276-84 (1932).—Germination of *Zea mays* was hastened by soaking the seed in water for 1-5 hrs. and then drying them in a current of air for 36 hrs. Immersion of the seed for 40-200 hrs. had a decidedly adverse effect on germination and the seedlings made poor growth. It is suggested that long immersion followed by desiccation inhibited the action of the enzymes to such an extent that the embryo was unable to utilize the nutrient reserves present in the seed. K. D. Jacob

The effect of the type of water on *Zea mays* germination. R. C. Malhotra. *J. Indian Bot. Soc.* 11, 285-90 (1932).—Corn seeds were germinated in distilled water, tap water, river, sea water and in water from a well. The seeds in

(III) tap water that had been subjected to the action of an elec. current; (IV) tap water; (V) distd. water and (VI) electrified distd. water. The effect of the waters on the total length of the 10-day seedlings was in the descending order I, II, III, IV, V, VI; the total dry wt. of the seedlings was in the same order, except that V made more growth than IV. The favorable effect of I is attributed to the presence of org. matter and inorg. compds. The max. chlorophyll development was also obtained in I. The favorable effect of the elec. current on tap water is attributed to its action in increasing the ionization of the inorg. compds. present.

K. D. Jacob

A note on the emission of globules of basophilic material from the nucleus into the cytoplasm during the telophase of nuclear division. N. S. Rau. *J. Indian Bot. Soc.* 12, 287-92 (1933).—The globules stain deeply with the ordinary "nuclear" dyes such as safranin, gentian violet or Fe hematoxylin. They probably represent a phase in the cyclic exchange of nucleic acid compds. between the nucleus and the cytoplasm. The increase in the intensity of the staining reaction of the chromosomes during the transfer of this material suggests that the substance thus added on is the nucleic acid component rather than the permanent protein base of the chromatin. Nineteen references.

K. D. Jacob

Changes in plants during low temperatures. III. Some chemical and anatomical changes in plants grown under controlled temperatures. R. C. Malhotra. *J. Indian Bot. Soc.* 12, 273-85 (1933); cf. *Ibid.* 10, 293 (1931).—Cabbage, lettuce, Hungarian kale and tomato plants were grown at 50° and 75°F. Half of the plants were transferred from cold to warm and vice versa. Moisture, pentosans, hemicelluloses, total proteins, ash, H-ion concn. and f. ps. were detd. Definite conclusions could not be drawn. The investigation is being continued. Nineteen references.

K. D. Jacob

Studies in absorption and transpiration. I. Cut shoots treated with twenty percent formalin. T. Ekambaram and I. Madhusudana Rao. *J. Indian Bot. Soc.* 12, 293-324 (1933).—When 20% formalin was absorbed through the cut ends of shoots of *Barleria cristata* the rate of absorption of O by the leaves decreased to a min. when the leaves were completely killed; it then recovered to a certain extent and remained const. for some hrs.; the transpiration rate behaved similarly but to a smaller extent. When the leaves were killed by coating them on both sides with pure formalin the O-absorption rate reached a min. in 1 hr.; it then immediately recovered and remained const. for at least 4 hrs. The initial transpiration rate was maintained for about 4 hrs. and then slowly decreased. The cortical cells of the stem were not affected. The O-absorption rate of leaves killed by coating with pure formalin was not affected by absorption of 20% formalin through the cut end. The rate of O absorption was not affected by killing the cortical cells of a long portion of the stem with formalin.

K. D. Jacob

*Psilocaulon absimile* N. E. Br. as a stock poison. I. Determination of oxalic, malic, tartaric acids, etc. Claude Rummington and D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 439-55 (1933).—Both the sun-dried and the green plants in 100-g. doses caused the death of rabbits within 15 hrs. Aq. exts. of the green plants contained acid equiv. to 5.15 cc. 0.1 N NaOH per g. of dry material. The ash, which amounted to 24.6% of the dry plants, contained K<sub>2</sub>O 5.2 and CaO 8.19%. The dry plants contained oxalic acid 8.66, tartaric acid 0.068 and malic acid 11.02%; citrates and succinates were absent. The toxicity of *P. absimile* is due in part to the presence of oxalic acid and in part to another substance, as yet unidentified, which passes through into the filtrate from the Pb acetate pptn. When 4.4 g. Na oxalate was administered per os to a 3-kg. rabbit death occurred in approx. 1 hr. The interrelations of the org. acids and their physiol. function in plants are discussed and methods for the detn. of oxalic, malic and tartaric acids in plants are outlined. Forty-five references.

K. D. Jacob

The physiological action of *Psilocaulon absimile* on the transpiration of *Psilocaulon absimile* and the effect of the transpiration on the growth of this para-

site. MARCEL SCHMIDT. *Planta (Abt. E, Z. wiss. Biol.)* 20, 407-59 (1933).—When *C. fulvum* was grown on substrates prepd. from certain parts of potato and tomato plants, the solanine content of the media had the same effect on spore germination and on the form of the germinating tubes as did the same concn. of solanine in a pure medium. Spore germination usually did not occur when 1 part of a 0.06% solanine soln. was added to 10 parts of the media. Germination occurred in very dil. concns. of solanine with the formation of short, thick, gnarled, strongly branched hyphae (BB-type), whereas in solanine-free media long, slender, weakly branched hyphae (W-type) were formed. With progressively decreasing concns. of solanine the BB-type was gradually transformed into the W-type. Germination of the conidia of *C. fulvum* did not occur in decoctions and in the expressed juice of leaves of the tomato variety, *Solanum racemigerum*, which is resistant to the brown-spot disease; the germination-preventing substance is water-sol. and loses its effectiveness when it is heated for 20-30 min. at 100° or when the leaf decoction is pptd. with tannic acid. The solanine content of *S. racemigerum* is no higher than that of other varieties of tomatoes which are not resistant to brown spot. Addn. of 5% of either KI, citric acid, berberine or nicotine to the media entirely prevented germination of spores of *C. fulvum*; MnSO<sub>4</sub> and atropine did not always prevent germination, and saponin had no effect. MnSO<sub>4</sub> completely nullified the effect of high concns. of solanine in preventing germination of the spores in decoctions of the green fruit of Bonny Best tomatoes.

K. D. Jacob

The graphic registration of the transpiration of leaves. Karl Borech. *Planta (Abt. E, Z. wiss. Biol.)* 20, 448-69 (1933).

K. D. Jacob

The formation of betaine and alkaloids in plants. III. Preliminary experiments on the formation of nicotine. G. Klein and H. Linsch. *Planta (Abt. E, Z. wiss. Biol.)* 20, 470-5 (1933); cf. *C. A.* 27, 4024. —The nicotine content of cut tobacco plants, grown in nutrient media for 9 days, was increased 19-55% by the addn. of proline, ornithine-HCl or the hydrochloride of glutamic acid to the media. As compared with the controls, proline increased the nicotine content of the leaves and decreased that of the stems in some instances, whereas in others it increased the nicotine content of both stems and leaves.

K. D. Jacob

Swelling and permeability of the cell walls of *Rhizoclonium*. Karl Forster. *Planta (Abt. E, Z. wiss. Biol.)* 20, 476-505 (1933).—Org. substances (nonelectrolytes and acids) with small mols., e. g., MeOH, do not act as astringents. In high concns. substances, such as EtOH, that have medium-size mols. often act as astringents, if they prevent swelling of the cell walls. Glycerol, sucrose and other substances of high mol. wt. may cause shrivelling of the cell wall even though they act as swelling agents. Expts. with aq. solns. of numerous salts showed that the permeability of the cell walls of *Rhizoclonium* depends upon the nature of both the cations and the anions and that the ion series is very nearly the same as the ion series that has been detd. for the permeability of plasma. The nature of the solvent may have a pronounced effect on the permeability of the walls to various salts and org. compds. Salts that cause swelling in aq. soln. frequently cause more or less shrivelling of the walls in nonaq. solvents. Concd. solns. of gum arabic and dextrin, and to a less extent albumin, cause shrivelling. Data are given on the permeability of the cell walls to various dye-stuffs. Thirty-one references.

K. D. Jacob

The influence of carbohydrate on the daily course of photosynthesis. A. L. Kursanov. *Planta (Abt. E, Z. wiss. Biol.)* 20, 535-48 (1933).—Expts. were carried out with *Eriobotrya japonica*, *Pirus malus* and *Cladophora* sp. Photosynthesis was at a min. either at the beginning or toward the middle of the day. With plants suffering from carbohydrate deficiency the depression in photosynthesis during the course of the day was less pronounced than with plants grown under normal conditions; storage of carbohydrates increased the depression. K. D. J.

*Rept. 9th Ann. Date Grower's Inst.* 1932, 3-5.—Blackness (abnormal shrivelling and darkening of the tips of the fruit) was prevented on Deglet Nour dates by covering the green fruit, on the tree, with brown paper bags. The bagged fruit contained 64.8-70.2% sugar, as compared with 74.0-74.8% in unbagged fruit.

K. D. Jacob  
Carbohydrates of the bulb of *Narcissus tazetta* L. var. *chinensis* Roem. II. Enzymic hydrolysis of glucomannan. Yoshihiro Kihara. *J. Agr. Chem. Soc. Japan* 9, 770-2 (1933); cf. *C. A.* 26, 3541; 28, 1073.—Glucomannan was prepd. from *Narcissus tazetta* L. and kept with *Eulalia* ext. for 3 days. The viscosity of the soln. decreased rapidly. The soln. was evapd. to a sirup under diminished pressure and extd. with hot alc. A white ppt. was formed on cooling the ext. The product, a white cryst. powder, is sol. in  $H_2O$  and hot alc., m. 183° (decompn.), has  $[\alpha]_D^{25} +47.26^\circ$ . It does not ppt. with  $Ba(OH)_2$  and Pb acetate. It was hydrolyzed by maltase but not by emulsin. An Ac deriv., m. 137°, was prepd.

Y. Kihara  
Biochemistry of molds. II. A metabolic product of *Aspergillus melleus* Yukawa. Eijiro Nishikawa. *J. Agr. Chem. Soc. Japan* 9, 772-4 (1933); cf. *C. A.* 28, 1073.—*A. melleus* Yukawa was grown in a soln. contg. sucrose 50,  $NaNO_3$  2,  $KH_2PO_4$  1, KCl 0.5,  $MgSO_4 \cdot 7H_2O$  0.5 and  $FeSO_4 \cdot 7H_2O$  0.01 g. in 1 l. of  $H_2O$ . A substance having the odor of the mold was extd. with ether from the fermentation products. "Mellein,"  $C_{10}H_{10}O_5$ , m. 58°,  $[\alpha]_D^{25} -108.15^\circ$  in  $CHCl_3$ , was isolated from the ext. in a yield of 0.3 g. per l. of the culture soln. It is sol. in org. solvents and slightly sol. in  $H_2O$ , gives a violet color with  $FeCl_3$ ; mononitro deriv., needles, m. 183-4°,  $[\alpha]_D^{25} -171.59^\circ$  in  $CHCl_3$ .

Y. Kihara  
Chemical constituents of tobacco. III. Coloring matters of the flower of tobacco. 1. Kazuo Yamafuji. *J. Agr. Chem. Soc. Japan* 9, 797-802 (1933).—The powd. dry flower was extd. with MeOH contg. HCl. An anthocyan was isolated as an insol. picrate and decomposed into 1 mol. each of an anthocyanidin and a monosaccharide. The residue was mixed with  $CaCO_3$  and then extd. with hot alc. Flavone was detected in the ext.

Y. K.  
The influence of the composition of the air on the development of cultures of *Aspergillus niger*. Jean Bousquet. *Bull. sci. pharmacol.* 41, 28-34 (1934).—The retarding influence of  $H_2CO$  in a concn. of 1:20,000 on the growth is noticeable; at a concn. 1:5000, growth is inhibited. Aromatic oils have a variable influence;  $CHCl_3$  has an inhibiting effect. Low concn. of  $NH_3$  stimulates growth, with an optimum at 1:5750. Higher concn. inhibits growth. Favorable effects are shown by  $NH_4OAc$  and  $NMe_3$ ,  $Me_2NPh$  only in high diln. They become antiseptic rapidly with higher concn. Fumes of  $N_2O_5$  are highly poisonous. Gas produced by putrefaction has a stimulating effect.

A. R. Meyer  
Occurrence of choline in sea algae. Alfred Zeller. *Biochem. Z.* 268, 187-8 (1934).—Choline was found in the following algae Chlorophyceae: *Enteromorpha* sp.; Phaeophyceae: *Laminaria saccharina*, *Chorda filum*; Rhodophyceae: *Chondrus crispus*, *Cystoclonium purpurascens*, *Delesseria sanguinea*, *Placodium coccineum*, *Polysiphonia furciculata* and *Rhododela subfusca*. No choline could be found in the brown algae but on special treatment pos. reactions were obtained with exts. of *Fucus* and it is suggested that probably this also applies to all these algae.

S. M.  
The  $pH$  necessary for germination of pollen grains and for vital stain of vacuoles. Mme. Hurel-Py. *Compt. rend.* 198, 195-7 (1934); cf. *C. A.* 27, 3738.—Pollen grains from 6 species of plants showed optimum germination in 12% sucrose soln., having a  $pH$  less than 5. In solns. of  $pH$  between 5.2 and 7.0 germination was poor, and no germination occurred in solns. with  $pH$  7.2-7.8. Neutral red did not color pollens in solns. with  $pH$  5.2 or below. Pollen grains of *Lilium tigrinum* were colored by neutral red in a soln. having a  $pH$  of 7.2; transplanted to sugar soln. with  $pH$  of 4.7, germination occurred without showing color in the vital stain system.

James C. Munch  
Influence of antagonistic ions on inhibitive action of radium on growth of rootlets. A. Sartory, R. Sartory, J. and Ernst Meyer. *Compt. rend.* 198, 197-9 (1934).—

Mg was a more powerful antagonist than K in protecting the rootlets of *Lilium tigrinum* Mochl. from Rn. The rootlets were exposed in isotonic aq. solns. of  $MgSO_4$  and KCl for 24 hrs.

James C. Munch  
Varietal differences in nitrogen, phosphoric acid and potassium contents of wheat. L. Maume and J. Dulac. *Compt. rend.* 198, 199-202 (1934).—Chemical analyses were made on 15 varieties of wheat grown under identical conditions of soil, climate and culture. Figured on a dry basis, the N ranged from 0.54 to 1.26%; the  $P_2O_5$  from 0.28 to 0.49% and the K from 1.13 to 3.32%. Results are presented graphically. The variety of wheat appears to be an important factor.

James C. Munch  
Carbon dioxide storage. V. Breaking the dormancy of potato tubers. Norwood C. Thornton. *Contrib. Boyce Thompson Inst.* 5, 471-81 (1933); cf. *C. A.* 22, 3014; 27, 5780.—The rest period is shortened by 25-35 days when dormant potato tubers are treated for 3-7 days with 40-60%  $CO_2$  with 20%  $O_2$ . Potatoes sprout more rapidly after storage in pure  $N_2$  or  $CO_2$  than when stored in pure  $O_2$ .  $CO_2$  increased the rate of respiration of potato tubers, caused an increase in reducing properties of the juice and a change from  $pH$  6.02 to about  $pH$  6.7. The glutathione content of the juice was decreased by  $CO_2$  treatment, but was increased over controls when tubers were planted.

N. M. Naylor  
Transpiration of the tobacco plant in relation to radiant energy in the visible and infra-red. John M. Arthur and W. D. Stewart. *Contrib. Boyce Thompson Inst.* 5, 483-501 (1933); cf. *C. A.* 24, 4069.—With the light from a 1000-w., 105-v. lamp operating on a 120-v. line, an increase of 2.3 times the energy doubles the rate of water loss (temp. 76° to 78°F.), independent of humidity between 50 and 88% relative. At 98° to 100°F., high humidity decreases transpiration. A heat-transmitting filter (infra-red) decreases the rate of water loss. At 98°-100°F., the infra-red rate of water loss increases rapidly until the visible rate is about 1.3 times that of the infra-red. Stomata were completely closed under infra red. Water losses hold the leaf at a temp. not exceeding 107°F. under all test conditions.

N. M. Naylor  
The physiological role of boron. M. Ya. Shkolnik. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 141-3 (in English 143-6) (1934).—Boron increases root growth of flax and *Vicia faba*, decreases the permeability of the plasma and the absorption of  $NO_3$ ,  $PO_4$  and Ca ions but increases absorption of K ions.

F. H. Rathmann  
Capacity of cotton to withstand cold. V. I. Tzviniskii. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 147-8 (in English 149-50) (1934).—Within a group the resistance to frost of different species is proportional to the concn. of the cellular sap.

F. H. Rathmann  
The accumulation of rubber in the roots of *Tau-sagui* as a result of its disappearance from the leaves. V. A. Novikov, A. I. Grechushnikov and Ya. N. Barmenkov. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 205-7 (in English 207-9) (1934).—On shading of the leaves rubber migrates from the leaves into the roots. By ringing of the roots a high concn. of rubber results in the upper part of the root.

F. H. Rathmann  
The age of plants and the photoperiodic reaction. M. Kh. Chalakhyan. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 306-11 (in English 311-14).—Shortening and lengthening of the time of exposure to light produce max. changes in growth effects in very young plants and in plants in their max. growth-rate stage.

F. H. R.  
Spectroscopic study of the wood of *Pinus sylvestris* from Rascafría (Spain). Leon Lemmel. *Compt. rend.* 198, 496-7 (1934).—In the ash, which constituted 0.24% of the wood, there were present, by ultra-violet spectroscopy, Ca, Mg, Na, K, Mn, Al, B (confirmed by chemical methods), Pb, Ag, P, Fe, Si and possibly Cr and Sn.

K. V. Thimann  
Amount and distribution of manganese in the grain of wheat. P. Bruère. *Compt. rend.* 198, 504-6 (1934).—Wheat grains contain 2.5-3.9 mg. Mn per 100 g. dry wt., the figures increasing with decrease in the size of the grains. In grains of medium size, the 2.9 mg. Mn is distributed



thus: endosperm 0.58, envelope 3.02, germ 0.36 mg. In the endosperm the highest concn. is found in the peripheral part; in the envelope it is in the inner layers, which have 17 mg.%. The highest concn. is in the germ, which has 19 mg.%, calcd. on the dry wt. K. V. T.

Factors affecting assimilation of ammonium and nitrate nitrogen, particularly in tomato and apple. Victor A. Tiedjens. *Plant Physiol.* 9, 31-57 (1934); cf. C. A. 26, 4671; 27, 1702.—The expts. were carried out in sand cultures with a modified Jones and Shive soln. (*Ann. Bot.* 37, 355 (1932)) with  $\text{Ca}(\text{NO}_3)_2$  or  $\text{NaNO}_3$  or  $(\text{NH}_4)_2\text{SO}_4$  as the carrier of N. The  $\text{NO}_3$  ion was best assimilated by tomato and apple plants at  $p_{\text{H}}$  approx. 4.0, whereas the most satisfactory assimilation of  $\text{NH}_4$  ions occurred at  $p_{\text{H}}$  6.0. Previous results carried out in soil (C. A. 27, 1702) suggest that the  $p_{\text{H}}$  value of the media must be comparatively high (about 8.0) for satisfactory assimilation of  $\text{NH}_4$  ions; but the present results indicate the necessity for interpreting earlier work on the basis of values intermediate between the  $p_{\text{H}}$  of the solns. before and after dripping through the sand. Thus, the growth from  $\text{NH}_4$  salts as the source of N at a const.  $p_{\text{H}}$  of 6.0 was comparable with that produced by plants grown in a soln. changing from  $p_{\text{H}}$  8.0 to 4.0. The  $\text{NH}_4$  ions were absorbed without change and synthesized to amino acids and other N compds. directly and more rapidly than the  $\text{NO}_3$  ion because of the tendency of the  $\text{NO}_3$  ion to accumulate as the result of reduced reductase activity under certain conditions. Plants required much lower concn. of  $\text{NH}_4$  ions than of  $\text{NO}_3$  ions in the nutrient soln. to produce an equal vol. of growth. In field expts. where comparisons are made between  $\text{NaNO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$  under optimum conditions for each, the only advantage one salt would have over the other would be brought about as a secondary effect by the ion with which the  $\text{NO}_3$  or  $\text{NH}_4$  ion was assocd.

Walter Thomas

New microcalorimeter for measuring the heat production of fungi. Hiroshi Tamiya and Atsui Yamamoto. *Acta Phytochim.* (Japan) 7, 245 63 (1933).—A detailed explanation, with drawings, is given of a microapp. for the simultaneous detn. of heat production, growth, O absorption and  $\text{CO}_2$  elimination of a fungus culture.

J. J. Willaman

Starchless potato induced by the introduction of foreign enzymes. R. F. Sutt and Harold Hibbert. *Science* 79, 78-9 (1934).—A culture of *B. subtilis* was introduced into the tip of the main stem of 30 potato plants every few days for 10 weeks. Tubers of 4 of the plants showed no starch, except in a peripheral zone a few mm. thick. This organism has been shown in previous work to synthesize levan from sugar.

J. J. Willaman

Plant growth hormones (auxin A and auxin B). Fritz Kogl. Brit. Assoc. Advancement Sci. Rept. 1933, 800-9; cf. C. A. 27, 4823, 5797.—A review. E. J. C.

Exchange adsorption in root systems—influence of the technic and time of introduction of fertilizers on the nature of plants (Sabunin) 15. Chemistry of lignin (Phillips) 10.

## \*B—NUTRITION

PHILIP B. HAWK

Toxicity of preparations of irradiated ergosterol. M. Schieblich. *Deut. tierärztl. Wochschr.* 39, 750 (1931).—Administration of excessive amts. of irradiated ergosterol causes hypercalcemia in dogs and hyperphosphatemia in Herbivores. Heating to 200° destroys the antirachitic properties of the prepn. without affecting its toxicity. The toxic action is ascribed directly to vitamin D rather than to secondary substances present. B. C. A.

Significance of calcium and phosphorus in the development and growth of pigs. J. H. W. T. Reimers and D. B. Smuts. *Arch. Tierernähr. Tiermucht* 7, 471-531 (1932).—Pigs developed rickets with a ration low in Ca and optimum in P (Ca:P = 1:4). The corrective action of cod-liver oil resulted from increased Ca and decreased P retention. Rations having excessive Ca and optimum P (Ca:P = 3.5:1) induced fits and blindness, high Ca and

very low P contents in blood serum, and decreased Ca and P retention. The Ca and P of the bones were unaltered. A ration having Ca:P = 1.8:1 produced no abnormal effects. The effects of excess-Ca rations were corrected by administration of  $\text{Na}_2\text{HPO}_4$ . Addn. of  $\text{CaO}$  to a rachitic diet to produce Ca:P = 1.2:1 gave excellent results, which were not further improved by supplying cod-liver oil. Addn. of Ca and P above certain limits to a ration having a normal Ca:P ratio increased the total ash content of bones without alteration of the percentage of Ca and P. B. C. A.

Digestibility, metabolism and energy exchange in hens as a basis for rational feeding. M. J. Diakow. *Arch. Tierernähr. Tiermucht* 7, 571-637 (1932).—Data are given showing respiratory and heat exchanges in hens receiving varied diets. Unbroken grain is most advantageous when used in such quantities that it is wholly utilized for heat maintenance. B. C. A.

Digestive power of, and nitrogen retention by, four types of pigs. J. Schmidt, M. P. von Lagneau and C. Zimmermann. *Arch. Tierernähr. Tiermucht* 8, 453-96 (1933).—The digestive power of pigs was not affected by age or type. N retention varied considerably among individual animals, but av. values for 6-8 individuals of each of 4 types showed significant type differences. B. C. A.

A magneto-optic method of determining the vitamin content of various substances. G. M. Wissink. *Physics* 5, 31-4 (1934).—A magneto-optic app., with the Hg 4358 line for illumination and a photoelec. cell for recording the minima, gives a min. at 32.9 with solns. of cod-liver and Haliver oils, spinach, orange and tomato juices, egg yolk and irradiated carotene crystals. This min. is not found for peanut, Wesson and oxidized cod-liver oils or normal carotene, and it is therefore ascribed to vitamin A. B. C. A.

H. A. Beatty

The comparative calcium and phosphorus retention of pigs fed rations supplemented with limestone, bone meal and "Dicapho." John M. Ramsbottom. *Iowa State Coll. J. Sci.* 8, 221 3 (1933).—Pigs receiving rations which were adequate except for deficiencies in Ca and vitamin D were fed  $\text{CaCO}_3$ , steamed bone meal and "Dicapho" (com.  $\text{CaHPO}_4$ ). No differences in retention of Ca and P were noted except when enough  $\text{CaCO}_3$  was given to make the Ca:P ratio 2.13:1. No differences in gains in wt. or in feed consumption were produced. F. E. Brown

Lactose, its properties, alimentary and dietetic value. Gaetano Cornalba. *Boll. chim. farm.* 72, 915-918 (1933). Lewis W. Butz

Activity of crystalline preparations of vitamin B<sub>1</sub>. A. G. van Veen. *Nature* 133, 137 (1934); cf. C. A. 27, 2183, 4279.—A more active antineuritic material is reported. The crystals are flatter and the m. p. is 2° higher than in the case of the previously reported material. Its behavior in other respects is the same as the earlier prepn. G. C. Crooks

Distribution of vitamin B<sub>2</sub> in the animal body. Paul György, Richard Kuhn and Theodor Wagner-Jauregg. *Z. physiol. Chem.* 223, 21-7 (1934); cf. C. A. 27, 5380.—The relative vitamin B<sub>2</sub> contents of various animal tissues were detd. by feeding them to young rats maintained on an otherwise B<sub>2</sub>-free diet. In confirmation of the findings of other investigators, liver and kidney showed the highest B<sub>2</sub> values. Heart muscle was about 5 times as effective as striated muscle in promoting growth, and was about equiv. to yeast. Skeletal muscle showed variations depending on age and species, veal and dark meat of poultry being especially high in B<sub>2</sub> content. Hemin had no growth-promoting action. Beef spleen gave a high value, thymus and pancreas much lower values, and carcinoma tissue very much lower. Boiled exts. of yeast, liver, kidney, heart and muscle showed 50-80% of the activity of the fresh tissues, but max. growth was not attained even with excessive doses, probably because a  $\text{H}_2\text{O}$ -insol. growth substance had been removed, perhaps the so-called R factor. The press juice from yeast and liver contained less B<sub>2</sub> than the corresponding boiled ext. Vitamin B<sub>2</sub> is completely diffusible through Cellophane and parch-

ment. Its activity is almost entirely destroyed in 24 hrs. in the presence of 0.25 N NaOH at room temp., whereas N H<sub>2</sub>SO<sub>4</sub> has no harmful effect.

**Preparation of vitamin B<sub>2</sub> concentrates.** Paul György, Richard Kuhn and Theodor Wagner-Jauregg. *Z. physiol. Chem.* 223, 27-35(1934).—By the following procedure the vitamin B<sub>2</sub> present in boiled ext. of beef liver was concd. 5-8-fold with a yield of 8.3-10%: pptn. with Pb(OAc)<sub>2</sub>, decompn. of the ppt. with H<sub>2</sub>S, pptn. with phosphotungstic acid in N H<sub>2</sub>SO<sub>4</sub>, removal of excess phosphotungstic acid from the filtrate by shaking with AmOH, pptn. with AgNO<sub>3</sub> in N H<sub>2</sub>SO<sub>4</sub>, pptn. of the filtrate with AgNO<sub>3</sub> at neutral reaction, decompn. of the ppt. by dil. HCl, pptn. of concomitant substances by EtOH. Further concn. was then effected by adsorption on fuller's earth in the presence of N acid and elution with dil. pyridine. Vitamin B<sub>2</sub> is a flavin pigment, and the activity of the prepn. is proportional to the intensity of the yellow color and green fluorescence. Attempts at further purification by adsorption on frankonite from neutral soln. resulted in loss of activity without loss of color, a phenomenon attributed to the sepn. of the vitamin into its components. For the prepn. of B<sub>2</sub> concentrate from boiled ext. of beef heart the following procedure is recommended: To 450 cc. of ext. add 37 cc. concd. HCl, centrifuge, and stir 1 hr. with 2.5 g. of fuller's earth. Centrifuge, wash the fuller's earth free from chloride, stir with a mixt. of 120 cc. H<sub>2</sub>O, 30 cc. MeOH and 30 cc. pyridine for 1.5 hrs. Centrifuge, conc. the soln. *in vacuo* to 60 cc. at a temp. not exceeding 60°. Centrifuge again, add an equal vol. of abs. MeOH, centrifuge and evaporate *in vacuo* to 20 cc. When this soln. was dild. so that 1 cc. was equiv. to 5 g. of fresh heart, 1.5 cc. added to the B<sub>2</sub>-free ration caused a rat to gain 19 g. in 14 days.

**Nutritive value of marine products. VI. Vitamin A potency of salmon-liver oil.** B. E. Bailey. *Contrib. Can. Biol. Fisheries* 8, 267-74(1934); cf. C. A. 27, 1918. —The vitamin A content of liver oils of 5 species of salmon in the genus *Oncorhynchus* was detd. The richest samples contained 40 times, and the poorest twice, as much vitamin A per g., as a sample of cod-liver oil stated to contain 500 American Drug Manufacturers' Assocn units per g. Potencies of samples were in the descending order: Skeena spring, Vancouver spring and sockeye, coho, pink and chum salmon. Oil content of the livers averaged 5% and percentage of liver in the fish 2%. The m.p., sapon value and I value of the oils were detd. Eleven references.

**The absorption and assimilation of food protein during pregnancy.** O. Bokelmann and W. Scheringer. *Arch. Gynakol.* 153, 201-12(1933).—Expts. carried out on pregnant and nonpregnant women showed that the absorption of protein was the same but retention of N occurred during the latter half of pregnancy. There was no retention of amino acids or nonprotein N in the blood, nor of N in the tissue fluids. Conclusion: N is retained as protein in the tissues.

**Influence of the preceding diet upon the rate of glucose absorption and glycogen synthesis.** Eaton M. MacKay and H. C. Bergman. *J. Nutrition* 6, 515-21(1933).—In the rat the diet preceding the starvation period, as varied by being composed chiefly of protein, carbohydrate or fat, was without significant effect, after 24 and 48 hrs. of starvation, upon the rate of absorption of administered glucose from the intestine or the rate of glycogen deposition in the liver or skeletal muscle. Conclusion: Variations in the blood glucose tolerance curve produced by the preceding diet are due to changes in the rate of glucose uptake by tissues other than the liver probably produced by variations in the rate of glucose oxidation.

**Peroxidase reaction. XXXVIII. Relation between Arakawa's reaction and suitability of human milk.** Kyumatsu Asakura. *Tōhoku J. Exptl. Med.* 19, 275-81(1932); *Physiol. Abstracts* 18, 117; cf. C. A. 27, 761, 4562.—Mice fed on polished rice were protected from vitamin B deficiency by milk which gave Arakawa's peroxidase reaction, but were not protected by milk which was neg. If a mother mouse with neg. milk was given

large amounts of vitamin B the pups died well, although the milk contained neg.

**Effect of dietary deficiency of cystine on tissue glutathione.** A. D. Marenzi and B. Braier. *Compt. rend. soc. biol.* 115, 337-8(1934).—When rats were put on a cystine-deficient diet the total glutathione of the various tissues decreased 24-36%. The greatest decreases occurred in the kidneys and liver. Growth was slow and mortality high. Adding extra cystine to the diet of normal rats did not appreciably increase the tissue glutathione.

**Vitamin C and the adrenals.** P. E. Galvao and D. M. Cardoso. *Compt. rend. soc. biol.* 115, 350-2(1934).—When guinea pigs were placed on a scorbutic diet the vitamin C of their adrenal cortex disappeared in a few days.

**The chemical (as distinct from physiological) tests for vitamins. Chemical evaluation of the vitamins.** A. L. Bacharach and E. Lester Smith. *Analyst* 59, 70-81(1934).—A brief summary of our present knowledge concerning the chem. compn. of the various vitamins and the chem. tests which serve for their detection, with particular reference to the blue test with SbCl<sub>5</sub> which can be used as a routine test for the control of factory operations. **Determination of vitamin A.** Norman Evers. *Ibid.* 82-4.—Data on the SbCl<sub>5</sub> color test are given. When detd. on the unsaponifiable matter of cod-liver oil, the values agree better with the biol. values than do the tests made with the original oil, but it seems doubtful whether the prepn. of the unsaponifiable matter is really worth while because the blue test on the original oil gives an approx. idea of the vitamin A content that is sufficiently accurate for com. purposes. **Relationship between the Carr-Price value and the 328 mμ absorption coefficient of preparations containing vitamin A.** Sydney K. Crews and Stanley J. Cox. *Ibid.* 85-90.—For nearly 10 years it has been customary in the British Drug Houses, Ltd., Labs. to exam. all products contg. vitamin A for their chromogen content by the Carr-Price SbCl<sub>5</sub> test, but recent work has indicated the value of measuring the selective absorption shown in the ultra-violet region of the spectrum by products contg. vitamin A, and there have also been spectroscopic studies of the blue color produced by the SbCl<sub>5</sub> reagent. The activity due to vitamin A is attributed to a chromogen showing absorption of 328 mμ in the ultra-violet. Data are given concerning the results obtained by these 2 methods of testing. **Titration of vitamin C in citrus juices.** A. H. Bennett. *Ibid.* 91-3; cf. C. A. 28, 1387<sup>1</sup>.—A discussion of results obtained by Tillmans' method of titrating with a soln. of 2,6-dichlorophenolindophenol. The exclusion of air greatly retards, but does not entirely prevent, the disappearance of the reducing factor in sterilized or preserved fruit juices kept at room temp.

**Avian carbohydrate metabolism. IV. Factors in influencing the maintenance of respiration in surviving brain tissue of the normal pigeon.** Rudolf A. Peters and Hugh M. Sinclair. *Biochem. J.* 27, 1677-86(1933); cf. C. A. 28, 507<sup>2</sup>.—The decrease in respiration rate in minced avian brain systems is reduced in the presence of lactate. It is not reduced by galactose, mannitol, Na β-glycerophosphate, hexosediol- and hexose-mono-phosphates. Lactate and pyrophosphate are essential constituents of the respiration system. α-Glycerophosphate has a remarkable addnl. influence.

**Influence of vitamin C on intracellular enzyme action.** Arnulf Purr. *Biochem. J.* 27, 1703-5(1933).—Arginine is activated by the system ascorbic acid + Fe. The conception is developed of a regulation of intracellular protein metabolism by the interaction of glutathione and ascorbic acid.

**Determination of antineuritic vitamin.** Katharine H. Coward, Joshua H. Burn, Harold Wm. Ling and Barbara G. E. Morgan. *Biochem. J.* 27, 1717-43(1933).—The methods for estg. potency are based on (1) tests in which pigeons are cured of head retraction, (2) tests in which the growth of rats is observed. With pigeons, the duration of cure and the percentage of birds cured give the same

1. of potency provided the results are interpreted by means of suitable curves relating response to dose of vitamin B<sub>1</sub> given. The rat and pigeon methods give the same estn. of potency of a soft ext. of yeast in comparison with the International Standard. In tests of 2 different samples of dried yeast, the pigeon test indicated a vitamin B<sub>1</sub> potency about double that indicated by the rat test. Although the probable error of the pigeon test is much greater than that of the rat test, the former has the great advantage of being sp. for the factor it is used to est. B. H.

Chemistry of vitamin A. Marston T. Bogert. *J. Chem. Education* 11, 203-7 (1934). E. H.

Vitamin A and lipid metabolism. H. J. Jusatz. *Naturwissenschaften* 21, 800 (1933).—The cholesterol content of the serum of rabbits fed on a vitamin-free diet is raised (colorimetric detn.) 180% after 10-14 days by addn. to the food of 0.5-1.5 cc. Vogan (Merek, 1 cc. = 40,000 R units of vitamin A) daily. This agrees with the influence of vitamin A on lipid metabolism predicted by Moll, *et al.* (C. A. 27, 2984, 4277). B. J. C. van der Hoeven

Avitaminosis. XVI. Production of gastric ulcers in the albino rat as a result of specific influence of deficiency of vitamin B. B. Sure and H. S. Thatcher. *Arch. Path.* 36, 800-16 (1933); cf. C. A. 27, 5099.—Gastric ulcers have been produced in the albino rat as a result of sp. deficiency in vitamin B, uncomplicated by the factor of inanition. It is suggested that vitamin B therapy may be indicated in human gastric ulcer. H. F. H.

Some abnormalities in rats subsisting on diets poor in mineral nutrients. A. M. Yudin, L. R. Farquhar and A. J. Wakeman. *Arch. Path.* 17, 40-5 (1934).—Rats deprived of an adequate dietary source of inorg. salts developed certain skeletal abnormalities which in some cases were accompanied by protrusion of the eyes. Histological examn. of the tissues of the eye, the suprarenals and the pituitary gland showed no striking abnormalities; apparent changes in the thyroid gland are being further investigated. A marked osteoporosis of the bones was revealed by x-ray photographs and by a chem. examn. of the femurs. The realimentation of such animals with a diet that contained an adequate supply of inorg. salts or a sufficiently high level of Ca resulted in marked calcification of the bones, an increase in the hemoglobin content of the blood and a general improvement in the appearance of the animals. Harriet F. Holmes

Amyloidosis: experimental studies. H. G. Grayzel, M. Jacobi, H. B. Warshall, M. Bogin and H. Bolker. *Arch. Path.* 17, 50-75 (1934).—Amyloidosis can be produced in all albino mice by subcutaneous or intramuscular injections of a 5% aq. suspension of Na caseinate. The earliest amyloid appears within the fixed and wandering cells of the reticular system. As these cells disintegrate, extracellular amyloid appears, grows in amt. and finally replaces the parenchyma of the organ involved. Amyloidosis is probably the result of an endogenous protein metabolic disturbance. When the rate of formation of these catabolic products exceeds the ability of the tissues to dispose of them, amyloid appears. With the present technique, amyloidosis cannot be produced in albino rats. Except in albino mice, showing precursory or very early evidences of amyloidosis no spontaneous resorption of amyloid in definite cases of amyloidosis was observed. Albino mice given a prepn. of powd. whole liver in their diet showed resorption only when the degree of amyloidosis was no more than moderate. Comparative studies indicate that a well-balanced, thoroughly adequate diet exercises a retarding influence on the production of amyloidosis. The addn. of a prepn. of desiccated powd. whole liver to the stock diet results in delay of the formation of amyloidosis. Inadequate or deficient diets do not accelerate the development of amyloidosis. Mice fed a synthetic and so-called stock diet to which vitamins A and B were added showed definite evidence of retardation of the production and formation of amyloidosis. Harriet F. Holmes

Absorption of calcium in normal animals. N. B. Taylor, C. B. Weld and J. F. Sykes. *Br. J. Exptl. Path.* 14, 355-66 (1933).—In normal animals the Ca in the diet is completely absorbed. Even if extra Ca is given, the Ca

excretion does not increase until the intake reaches a high figure. Though overdosage with irradiated ergosterol depresses the excretion of Ca through the bowel, small doses do not exert this effect, and there is no indication that the net absorption of Ca is increased by the administration of the sterol in therapeutic dosage. Though high-Ca feeding converts a neg. Ca balance to pos., such a result has not been observed as a result of ergosterol administration, and when an animal is on a high-Ca intake the administration of ergosterol does not increase the quantity of Ca absorbed. The results seem to indicate that the sterol diminishes rather than increases the net absorption of Ca. The action of Ca in augmenting the overdosage effects of ergosterol may be explained without assuming that the latter encourages Ca absorption. Overdosage with irradiated ergosterol causes the withdrawal of Ca from the skeleton. The Ca absorbed from the intestinal tract fails to be deposited in the bones at such a time that the Ca stream, as a result of overdosage with irradiated ergosterol, is flowing from bones to blood. A rise in the serum Ca and increase of its excretion would follow inevitably. Harriet F. Holmes

Metabolism studies on dry and milking animals. Balwant Singh. *Agr. Live-stock India* 3, 411-31 (1933).—Expts. on dairy cows showed that a ration consisting of concentrates and *bhoosa* as the sole roughage is deficient in Ca; the balance becomes pos. only when the animal is near its drying stage. Under all conditions pos. Ca balances were obtained by fortifying this ration with limestone or bone meal. Pos. Ca balances were obtained on heavily milking cows on a ration of berseem, *bhoosa* and concentrates, whereas dry animals showed pos. Ca and P balances on a *bhoosa* diet alone. As compared with dry animals, heavy-milking cows showed an increased assimilation of Ca and P. When an all-round maintenance ration was fed the total intake of Ca or P bore no particular relation to the digestibility of these elements. Twenty-three references. K. D. Jacob

The relation of vitamins to nutritional deficiencies and abnormalities in dogs. John F. McKenna and O. A. Longley. *North Am. Veterinarian* 14, No. 4, 33-7 (1933). K. D. Jacob

The clinical significance of vitamins and minerals in the diet of dogs. John F. McKenna and O. A. Longley. *North Am. Veterinarian* 14, No. 8, 37-46 (1933). A review, with 13 references. K. D. Jacob

Significance of copper and iron in blood restoration. C. A. Elvehjem. *Am. J. Pub. Health* 23, 1285-9 (1933).—J. A. Kennedy

Feeding experiments with decomposition products of protein. III. Shiro Maeda. *Bull. Agr. Chem. Soc. Japan* 9, 169-72 (1933); cf. C. A. 27, 123.—When rats were fed on a diet consisting of glycine 2, *dl*-alanine 13, *l*-leucine 15, *l*-proline 4, *l*-hydroxyproline 4, *l*-tyrosine 3, *l*-phenylalanine 3, *l*-cystine 3, *d*-glutamic acid 15, *dl*-aspartic acid 6, *dl*-tryptophan 2 and diamino acids 30%, they soon lost appetite and their body wt. rapidly decreased. The monocarboxylic fraction was sepd. from the monoamino fraction of the acid hydrolyzate of fish protein. From this fraction through the Cu or Zn salt was obtained hydroxyaminovaleic acid, colorless needles, m. 220°. Normal growth of the animal was obtained by the addn. of this substance to the above diet. Y. Kihara

Digestion of food. III. Digestion of synthetic fats. Shigeo Suzuki. *J. Agr. Chem. Soc. Japan* 9, 1007-18 (1933).—Tristearin and triolein, instead of fat, were given in standard ration of dogs. Triolein was generally more digestible than tristearin. Triolein had no effect on other components of the food, while tristearin retarded the digestion of other components, especially protein. The difference between the digestive coeffs. of tristearin and triolein increased with the amt. Y. Kihara

Nutritive effect of ethyl alcohol. Tsune Ariyama. *J. Agr. Chem. Soc. Japan* 9, 1035-44 (1933).—Albino rats were fed a diet contg. fish protein 29, hard 40, batter fat 25 and McCollum's salt mixt. 6%. Excess of fat had a bad effect on animal nutrition. Normal growth was observed when alc. was added. The optimum amt. of alc.

was 5%. The contents of the fat in the liver and the total body increased remarkably on the addn. of 5% EtOH. EtOH did not affect the quantity of glycogen in the liver.

Vitamin B<sub>1</sub> deficiency in carbohydrate-free diets and the behavior of ethyl alcohol toward vitamin B<sub>1</sub>. Tsune Ariyama. *J. Agr. Chem. Soc. Japan* 9, 1045-8(1938).—Though 0.4 g. of the yeast heated in an autoclave was added to carbohydrate-free diets per day as the vitamin B<sub>1</sub> source, vitamin B<sub>1</sub> deficiency could not be prevented. When glucose was added to the diets, the symptoms of vitamin B<sub>1</sub> deficiency appeared earlier. When EtOH was added, the appearance of the symptoms was delayed.

Y. Kihara

Vitamin C. XI. Efficacy of vitamin C and the manner in which it is supplied. Tomiji Matsuoka. *J. Agr. Chem. Soc. Japan* 9, 1117-23(1938); cf. *C. A.* 27, 4282.—For guinea pigs 1-1.5 g. of vitamin C source per 100 g. of the body wt. added to the basal ration was sufficient to prevent scurvy. After the appearance of the symptoms 2 g. of vitamin C source per day was necessary. Even though 4 g. of vitamin C source was given, it was difficult to cure serious scurvy. XII. Vitamin C in the liver and the adrenal glands of cattle. *Ibid.* 1124-9.—Vitamin C was extd. from the liver and the adrenal glands of cattle with alc. and acetone. The ext. of the adrenal glands was richer in vitamin C than that of the liver and was extd. again with acetone. Pb acetate was added to the ext. and then NH<sub>4</sub>OH to bring the pH of the soln. to 7-8. A yellowish white ppt. was obtained and was decompd. by H<sub>2</sub>S. From the filtrate a cryst. substance, m. 174-8°, was isolated. It showed the chem. reactions of hexuronic acid and the activity of vitamin C. XIII. Extraction of vitamin C and solvents. *Ibid.* 1130-6.—Cabbage juice was evapd. under reduced pressure and dried over H<sub>2</sub>SO<sub>4</sub>. Vitamin C is sol. in alc. and acetone, but insol. in ether and petroleum ether. XIV. Extraction of vitamin C and pH of the solution. *Ibid.* 9, 1136-40(1938).—The vitamin C in cabbage juice was extd. with the solvents at various pH values. The pH of the soln. had no effect on the soly. in alc. and acetone. Vitamin C is insol. in petroleum ether irrespective of the reaction.

Y. Kihara

Diet and teeth. F. Breese. *Brit. Dental J.* 56, 120-4(1934).—Case observation in 3 institutions showed correlation between places in teeth where lodgment of carbohydrate food occurs persistently and those where caries commences.

Frances Krasnow

Diet and dental caries. Evelyn Sprawson. *Brit. Dental J.* 56, 125-30(1934); cf. *C. A.* 27, 1920.—Raw milk is advocated as particularly helpful in preventing caries.

Frances Krasnow

Carbohydrate metabolism of the liver. I. Glycogen and other carbohydrates in decapitated cats. Chiao Tsai. *Chinese J. Physiol.* 7, 215-28(1933).—The other carbohydrates as well as the glycogen of the liver fall and then rise after anesthesia and decapitation of cats. Hence glycogen is not regenerated at the expense of these other carbohydrates. The glucose formed in the liver causes the blood sugar to rise. This blood sugar falls before the glycogen increases.

C. M. McCay

The vitamin A reaction with antimony trichloride. II. Spectroscopic investigation of some chromogens. Helene Goldhammer and Franz M. Kuen. *Biochem. Z.* 267, 406-16(1933); cf. *C. A.* 24, 1144.—Spectroscopic examn. of the color produced with SbCl<sub>3</sub> by a no. of chromogenic substances gave the following results: carotene, blue color, with strongest absorption bands 563-568 mμ; xanthophyll, greenish blue, with absorption bands at 490-504 and 580-592 mμ; ergosterol, blue, with strongest absorption band at 561-575 mμ; cholesterol, after 1 hr. red, with principal absorption bands at 492-502 and 560-569 mμ; cholesterol irradiated 3 hrs., rose color, with absorption bands at 490-504 and 568-570 mμ; cholesterol irradiated 9 hrs., immediate blue color with principal absorption band at 550-573 mμ, changing to red with the appearance of several other bands; orycholesterol, blue with chief band at 564-576 mμ. Carotene and xanthophyll thus have practically the same absorption spectrum;

cholesterol and ergosterol each have 4 bands, of which 3 are practically the same, while orycholesterol likewise gives 4 bands but entirely different from those of cholesterol. Heating cholesterol in air or irradiating it with the quartz lamp gradually changes its spectrum to that of orycholesterol. Liver oil shows 6 bands: the vitamin A band at 610 mμ, a band at 572 mμ and 4 cholesterol bands. In alc. extp. of the liver oil the spectrum is shifted toward the short-wave side, and the vitamin band lies now at 590-614 mμ, while in the unsaponified portion of the oil the bands are shifted toward the red end, and the vitamin band lies at 618-629 mμ. In the unsaponified portion of the oil there are 2 chromogens absorbing at 574-583 mμ. In the unsaponified portion of butter, on reaction with SbCl<sub>3</sub>, the characteristic absorption bands of vitamin A, carotene and cholesterol all appear. III. Placenta and serum. *Ibid.* 417-23.—In human or horse serum a colorless chromogen was found which gives a blue color reaction with SbCl<sub>3</sub> having absorption bands at 595 and 541 mμ. Carotene and xanthophyll were always present, but vitamin A was present only occasionally, in the serum. Drying human placentas at about 40° in air causes the destruction of its lipochromes with the formation of a colorless chromogen which reacts with SbCl<sub>3</sub> as that of serum. The development of the chromogen seems to be assoc. with the presence of xanthophyll. The xanthophyll is from the blood, the placental tissue contg. carotene and vitamin A. Cow placenta or human placenta, from which the blood has been well removed, retains the carotene on drying and the colorless chromogen fails to develop.

S. Morgulis

Cataract in the albino mouse resulting from a deficiency of vitamin G (B<sub>2</sub>). Wm. C. Langston, Paul L. Day and K. W. Cosgrove. *Arch. Ophthalmology* 10, 508-14(1933).—Seventy-nine % of 47 young albino mice showed keratitis after an av. of 43 days on a diet deficient only in vitamin G. Cataract was seen in 96% after an av. of 48 days, and ophthalmia in 57% after 50 days. Vitamin G deficiency appeared to be the sole cause of the eye conditions.

Bernard L. Oser

Seasonal variation in antirachitic action of Arkansas sunshine. Paul L. Day. *Am. J. Diseases Children* 43, 1455-60(1932).—The av. daily amts. of sunshine at Little Rock necessary to afford the same partial protection against rickets in rats receiving a rachitogenic diet varied from 5 min. in May, June and July, to 168 min. in December.

Bernard L. Oser

Activity of crystalline preparations of vitamin B<sub>1</sub>. H. W. Kinnerley, J. R. O'Brien and R. A. Peters. *Nature* 133, 177(1934); cf. *C. A.* 27, 2183.—Most vitamin B<sub>1</sub> crystals probably contain inactive vitamin. Analytical figures for the crystals of the authors differ significantly from those of van Veen, i. e., C 42.2% instead of 40.7%. Active lorum (from bakers' yeast) appears to be different from active oryzanin.

W. J. Peterson

Hypervitaminosis in the chicken: the mobilization of calcium under the influence of irradiated ergosterol. G. E. Hall and E. J. King. *Trans. Roy. Soc. Can.* V27, 149-58(1933).—Daily oral administration of 0.5 cc. irradiated ergosterol to young cockerels resulted in loss of wt. and an increase in serum Ca. Addn. of 10% Ca HPO<sub>4</sub>·2H<sub>2</sub>O to the basal ration increased the degree of hypercalcemia of the birds receiving ergosterol. The absence of osteoclasts from the bones of these birds leads H. and K. to suggest that loss of Ca occurs through some other mechanism than that of degradation by the osteoclasts, such as a combination of the ionized Ca of the serum in some complex form.

W. Gordon Rose

Avitaminosis A and utilization of lipides. Lucie Randoin and Roger Netter. *Compt. rend.* 198, 395-7(1934).—Rats maintained on a vitamin-A-free diet contg. lard as their source of fat lost weight after 60-70 days and eventually died. Hence lard is vitamin-A-free. The addn. of small amts. of vitamin D did not reduce the symptoms of vitamin-A deficiency.

Julius White

Effect of vitamins A and D on the humoral reactions in the tuberculous of man. J. Donato, R. Japinet and H. Penau. *Compt. rend.* 198, 397-9(1934).—In tubercular

D mist. in tubercular man resulted in an increase in blood Ca from 80-90 mg. to an av. of 115 mg., an increase in cholesterol from 1.44-1.8 g. to 2.5 g. per l. and a decrease in sero-flocculation until the normal was reached. Julius White

Frank, Carl: Die diätetische Behandlung der Allergie bei inneren Erkrankungen. Leipzig: J. A. Barth. 92 pp. M. 2.40.

## F—PHYSIOLOGY

HOMER W. SMITH

Relation between the excretion of creatinine nitrogen and several body measurements. H. H. Beard. *Human Biol.* 4, 351-62(1932).—An attempt to find correlation coeff. between the amt. of creatinine (I) eliminated and body wt.,  $\frac{1}{2}$  body wt., height or surface area failed to show any significant relationships. Creatine and I are the end products of exogenous rather than the endogenous metabolism. B. C. A.

Adaptations to hydrostatic pressure in whales. A. H. Laurie. *Nature* 132, 185-6(1933).—The blood of blue whales contains organisms which absorb N and account for the increased soly. of N in the blood. In presence of O, N fixation apparently occurs and the excess N resulting from compression of the lungs in deep diving is removed from the blood. B. C. A.

Bromine content of human blood. F. Ewer. *Z. klin. Med.* 122, 242-52(1932).—Blood Br varies about 1 mg. per 100 cc., even during administration of I or NaCl. After intravenous injection of thyroxine the blood I increases rapidly, becoming normal after 48 hrs. Cl also increases, but Br falls, although to not less than 0.7 mg. per 100 cc. Increased urinary Br was not observed. B. C. A.

Artificial production of menstruation with ovarian hormones in cases of primary and secondary amenorrhea. Alfred Loeser. *J. Obstet. Gynaecol. Brit. Empire* 41, 86-8(1934). Rachel Brown

Presence and effect of the ovarian hormones and gonadotropic substances. S. Aschheim. *Edinburgh Med. J.* 41(1934), *Trans. Edinburgh Obstet. Soc. Session* 93, 17-35(1933-34).—A review. Rachel Brown

Medical investigations in the 1933 FIS contests at Innsbruck. F. Gaisböck. *Wien. klin. Wochschr.* 46, 1377-80, 1418-21, 1446-9, 1477-84, 1512-15(1933).—Observations were made on many physiol. functions before and after races. D. B. Dill

Changes in  $p_n$ , neutralization curves and buffer coefficients of the constituents of hen eggs during incubation. M. Rubinstein. *Arch. phys. biol.* 11, 40-71(1933).—See C. A. 27, 125-6. L. E. Gilson

Anterior hypophysis of sheep and melanophore reactions. R. Collin and P. L. Drouet. *Compt. rend. soc. biol.* 115, 161(1934).—Criticism of Popa and Fielding, C. A. 28, 1748. L. E. Gilson

Mechanism of lactic acid formation [in muscle]. E. Aubel and E. Simon. *Compt. rend. soc. biol.* 115, 378-4(1934); cf. C. A. 28, 1061. Mg hexosediphosphate was added to an aq. ext. of muscle. Some lactic acid was produced under aerobic conditions, and over twice as much under anaerobic conditions. In both cases the addn. of glutathione greatly increased the amt. of lactic acid formed. In the same mixts., without glutathione, more methylglyoxal was formed under aerobic than under anaerobic conditions, and in both cases only traces were formed when glutathione was added. L. E. Gilson

Effect of folliculin on the fertility of the male mouse. A. Lacasagne. *Compt. rend. soc. biol.* 115, 460-71(1934).—Large repeated doses of folliculin render male mice infertile, but the mechanism is uncertain since there is no atrophy of the testicles or suspension of spermatogenesis. Action of folliculin on the fertility of male rabbits. *Ibid.* 579-81.—Large repeated doses cause atrophy of the testicles and arrest of spermatogenesis. In one case a return to normal occurred in about 10 weeks after treatment was discontinued. L. E. Gilson

Fixation of potassium by young white rats. Albert

Leukler and Georges Vanhems. *Compt. rend. soc. biol.* 115, 532-4(1934); cf. C. A. 28, 201, 1772.—The K content of the entire carcasses of rats is, at birth 0.206, 5 days old 0.223, 10 days old 0.250 (max.), 15 days old or older 0.247%. L. E. Gilson

Variations in total protein, albumin-globulin ratio and cholesterol of the blood of rabbits after heavy daily bleedings. P. Mauriac, L. Servantie and G. Demezier. *Compt. rend. soc. biol.* 115, 558-60(1934).—Graphs are given. The albumin-globulin ratio showed no marked changes. Cholesterol varied inversely as the total proteins. During the exptl. period total blood protein decreased to half and cholesterol increased to twice the normal value. L. E. Gilson

Relation between alkali reserve, corpuscle chloride-plasma chlorine ratio and plasma  $p_n$ . J. Loiseleur. *Compt. rend. soc. biol.* 115, 619 20(1934).—Math. L. E. G.

Elimination, in the bile, of thyroxine given parenterally. A. W. Elmer and Z. Luczynski. *Compt. rend. soc. biol.* 115, 647(1934); cf. C. A. 28, 515.—When 2 mg. thyroxine was given intravenously to rabbits 5-0.5% of the total I was eliminated in the bile, and when 2 mg. was given by stomach tube 0.8-1.4% was so eliminated. L. E. Gilson

Fat metabolism and heat regulation. Anna Lănczos. *Arch. ges. Physiol. (Pflügers)* 233, 787-92(1934).—Mice placed on ice maintain their body temp. for some hrs. if allowed free muscular movements. The fat content of the liver may be doubled or tripled without an appreciable diminution in the "basal" total carbohydrate content of the liver. Arthur Grollman

The oxygen saturation curve of blood of various animals. W. von Buddenbrock. *Naturwissenschaften* 22, 41-4(1934).—A study was made of all available data on O satn. curves of different blood species. Nonvertebrates with hemoglobin blood as well as the larger part of the cold-blooded vertebrates follow the Hill law:  $(Hb \times O_2)/Hb = KpO_2^n$  with const.  $n$ . A typical curvature in the logarithmic curve is found for warm-blooded animals and for *Amphiuma*, crocodiles and a few fishes. The larger  $n$  is, the lower is the O pressure required to produce satn. (95%) of the blood. An exception to this rule is the blood of birds, which has high  $n$  as well as high satn. pressure. In the series fish, amphibia, reptiles, warm-blooded animals,  $n$  becomes increasingly variable. B. J. C. van der Hoeven

The change in muscle metabolism in relation to the increased performance of work by the muscle under the influence of adrenal cortex hormone. Konrad Lang. *Naturwissenschaften* 22, 91(1934).—Increased work by the muscle due to cortex hormone goes parallel with chem. changes (C. A. 26, 3557). Isolated frog muscles treated with purified adrenal exts. show 30% increase in performance, and their phosphagen content increases by about the same amt. B. J. C. van der Hoeven

Action of vitamin D and of the parathyroid hormone on the calcium metabolism as interpreted by studying the effect of single doses on the calcification of dentin. I. Schour and A. W. Ham. *Arch. Path.* 17, 22-39(1934).—Since the dentin of the incisor of the rat is placed in apposition day by day, it was selected as an index of the normal calcification process as affected by the administration of single massive doses of either vitamin D or the parathyroid hormone. Doses of either substance resulted in the formation of, first, a stripe of dentin which was imperfectly calcified and, secondly, a stripe of dentin which was normally or excessively calcified. The poorly calcified dentin represented the area calcified while the serum Ca level was rising, and the well-calcified stripe represented that calcified while the serum Ca level was falling, after the attainment of a hypercalcaemia. As no osteoclasts were found in the dentin, the action of the parathyroid hormone in preventing calcification for a time did not appear to depend on its supposed ability to stimulate the active liberation of Ca from bone. The observation could be explained by the theory which postulates that the parathyroid hormone controls a fraction of the serum Ca. The results with vitamin D could be explained by the

theory that vitamin D acts through a parathyroid mechanism, provided the shift in Ca during the upswing of the curve is considered to be toward the blood and during the downswing of the curve, from the blood to the bones, dentin, soft tissues and intestine. Harriet F. Holmes

Urea clearance after unilateral nephrectomy in dogs. H. T. Karsner, R. F. Hanzal and R. A. Moore. *Arch. Path.* 17, 46-9(1934).—With the urea clearance test as a criterion unilateral nephrectomy is followed by a transient period during which the remaining kidney is physiologically deficient. After 6 months the remaining kidney functions as well as did both kidneys originally. Thus the enlargement of the remaining kidney of the dog is a true hypertrophy. This result agrees with those of previous expts. on the rabbit by the urea tolerance test and with the results of Ellis and Weiss (*Am. J. Med. Sci.* 186, 242 (1933)) in man with the urea clearance test. H. F. H.

Significance of sulphydryl as a growth factor. W. C. Hueper. *Arch. Path.* 17, 218-42(1934).—A general review with 74 references Harriet F. Holmes

The presence of an anterior pituitary hormone for fat metabolism in "Inkretan." Felix Boenheim and Franz Heimann. *Z. ges. expil. Med.* 83, 637-40(1932); cf. Anselmino and Hoffmann, *C. A.* 26, 2229. M. L.

Excretion of nitrogen in the bile. Hans Lucke and Joachim Frey. *Z. ges. expil. Med.* 86, 1-11(1933).—Dogs with biliary fistulas were used in N-balance expts. The N in the bile is normally less than 0.1 g. per day and about 0.5 1% of the total excretion. Renal insufficiency produced by HgCl<sub>2</sub> caused the appearance of 1 7% of the N in bile. These figures minimize the possible vicarious excretion of N waste products in the bile in renal disease. Milton Levy

Hormonal blood-sugar regulation. F. Höglér and F. Zell. *Z. ges. expil. Med.* 86, 144-57(1933); cf. *C. A.* 28, 829<sup>3</sup>.—Parathormone heightens adrenalinic hyperglucemia but does not affect the action of Mg, pyramidone or glucose. It has no effect of itself or with ergotamine or atropine nor does it influence insulin. Milton Levy

Reflex blood-sugar regulation through the sinus caroticus. Paul Thelen. *Z. ges. expil. Med.* 86, 231-43 (1933).—It was impossible to demonstrate a clear reflex blood-sugar regulation through the carotid sinus in acute expts. on rabbits. Milton Levy

The contents and distribution of the melanophore hormone in the human hypophysis. A. Jores and O. Glogner. *Z. ges. expil. Med.* 91, 91-9(1933); cf. *C. A.* 27, 2992. —Acetone-dried powder of human pituitary contains 0.25 units of melanophore hormone per mg. The anterior lobe contains 8 times as much as the rest of the gland. A basophilic adenoma contains large amts., whereas a chief cell adenoma contains very little. The hormone is probably formed in the basophilic cells of the anterior pituitary. Milton Levy

The mechanism of the action of the anti-insulin hormone of the anterior pituitary. I. Anterior pituitary, thyroid and carbohydrate metabolism. H. Lucke, E. R. Heydemann and F. Duensing. *Z. ges. expil. Med.* 91, 106-13(1933); cf. *C. A.* 27, 3510, 4569. —Removal of the thyroid does not change the hyperglucemia produced in dogs by anterior pituitary exts. Anti-insulin is not identical with the thyrotropic hormone. II. Anterior pituitary, adrenal insufficiency and carbohydrate metabolism. H. Lucke, E. R. Heydemann and H. Hahndel. *Ibid.* 91, 483-91. —Adrenalectomized dogs are very sensitive to insulin and react normally to injected adrenaline. Hyperglucemia does not occur in these animals after the injection of anti-insulin. Anti-insulin produces its effect through the mediation of the adrenals. III. Anterior pituitary, denervation of the adrenals and carbohydrate metabolism. *Ibid.* 492-501. —Hyperglucemia does not occur after anti-insulin if the adrenal is denervated. Anti-insulin reacts directly on the central nervous system. IV. The effect of the hormone in the cerebrospinal fluid. H. Lucke and H. Hahndel. *Ibid.* 499-52. —Anti-insulin is much more potent when administered intraspinally than by other methods. V.

1 The effect of sympathetic poisons on the blood sugar after anti-insulin. *Ibid.* 693-703. —Ergotamine and central narcotics reduce or abolish the hyperglucemia produced by anti-insulin. VI. The presence of anti-insulin in cerebrospinal fluid. *Ibid.* 704-9. —After intramuscular injections of large amts. of anti-insulin it could be demonstrated in the cerebrospinal fluid of dogs. Anti-insulin formed in the anterior lobe of the pituitary passes into the cerebrospinal fluid where it acts directly on the sugar center and impulses sent through the sympathetic system cause adrenaline production which produces the hyperglucemia. Milton Levy

The excretion of urinary constituents in the gastrointestinal tract of nephrectomized dogs. I. Vicarious secretion. Georg Hessel. *Z. ges. expil. Med.* 91, 267-73 (1933). II. Gastric secretion in nephrectomized animals. Georg Hessel, Emanuele Pekelis and Hans Meltzer. *Ibid.* 274-306. —The gastric secretion of nephrectomized animals was analyzed for HCl, Cl, N, rest N, urea, NH<sub>3</sub>, creatinine, indican and phenols. While the HCl and Cl did not change the N-contg. substances increased steadily to high values in the uremic state. The concn. was always less than in the blood. A true vicarious secretion does not occur. III. Bile secretion in nephrectomized animals. *Ibid.* 307-24. —Urinary constituents increase in the bile in the uremic state and may reach concns. somewhat above blood levels. Whether this is due to true secretion or to concn. of bile is not known. The amt. of secretion is too small to be of practical importance. IV. The drainage of gastric and duodenal juices through a fistula of the jejunum. *Ibid.* 325-30. —The fluids obtained from a high jejunal fistula contained higher concns. of urea and rest N than blood indicating vicarious secretion. The indican equals and the creatinine is less than that in blood. V. The course of uremia influenced by urinary substances in the digestive juices. Georg Hessel and Emanuele Pekelis. *Ibid.* 331-9. —The removal of gastric and duodenal secretions through a jejunal fistula prolonged the life and lowered the accumulation of urinary constituents in the blood of nephrectomized dogs. Milton Levy

6 Fat storage in the lungs. Tomaso Oliaro. *Z. ges. expil. Med.* 91, 366-9(1933). —Fat contents of blood from the left and right heart, peripheral veins and vena cava establish a loss of blood fat in passing through the lungs. The fat content of the lungs increases after a fat meal. Milton Levy

Comparison of the creatinine contents of blood serum and cerebrospinal fluid. Roland B. Maydell. *Z. ges. expil. Med.* 91, 455-62(1933). —In 18 normal human beings the blood creatinine averaged 1.6 mg.% and the cerebrospinal fluid contained 1.18 mg.%. In renal disease the cerebrospinal creatinine rises more slowly than that of the serum. Milton Levy

7 The liver in cholesterol and phosphatide metabolism. H. Heinlein. *Z. ges. expil. Med.* 91, 638-82(1933); cf. *C. A.* 28, 812<sup>4</sup>. —Of ingested cholesterol 30-70% and of phosphatide 3-6% are excreted by either young or grown dogs. The absorption of cholesterol does not depend on the presence of bile but that of phosphatide does. Milton Levy

8 Urine pigment excretion and intestinal putrefaction. I. The source of urochrome. L. Heilmeyer and F. Pfotenhauer. *Z. ges. expil. Med.* 91, 714-19(1933). II. Urobilin, urochrome and indican excretions of dogs after the removal of the intestinal tract. A. Billi, L. Heilmeyer and F. Pfotenhauer. *Ibid.* 720-8. —The urine of the newborn does not contain urobilin or indican until 8-24 hrs. after birth. The excretion of urochrome is large even in the first hr. The removal of the intestinal tract of dogs is followed by an increase in urochrome excretion then a drop to normal levels. Urobilin and indican fall at once. Urochrome does not originate in the intestinal tract. Milton Levy

Cerebrospinal fluid. IX. The lactic acid contents of cerebrospinal fluid. Michio Kasahara and Teiji Kai. *Z. ges. expil. Med.* 91, 784-6(1933); cf. *C. A.* 28, 4593, 27, 2488. —Rabbit cerebrospinal fluid contains 2.5-14.6



mg. % of lactic acid. The blood lactic acid is always less but changes are parallel.

The effect of splenic hormone, Prosplein, on chloride metabolism. Hans Probst. *Z. ges. expil. Med.* 92, 311-23(1933).

Theory of metabolism in oxygen deficiency. VI. Change of blood proteins after oxygen deficiency and glucose feeding. H. Elias and H. Kaunitz. *Z. ges. expil. Med.* 92, 397-408(1933); cf. *C. A.* 27, 3510.—The increase of serum protein in O deficiency is largely due to water loss. Feeding carbohydrate prevents this. VII. Water balance in oxygen deficiency. H. Elias, H. Kaunitz and R. Laub. *Ibid.* 409-29. VIII. The protein content of the liver and the effect of glucose. H. Elias and H. Kaunitz. *Ibid.* 430-5. IX. The nonprotein nitrogen and its fractions in the liver. Effect of glucose. H. Elias, H. Kaunitz and R. Laub. *Ibid.* 436 9. X. The inhibition of the characteristic changes of protein metabolism at low pressures by glucose. H. Elias and H. Kaunitz. *Ibid.* 92, 450-68. XI. The mechanism of glucose effect in oxygen deficiency. *Ibid.* 469 79.

The metabolic activity of the pancreas. E. U. Still, A. D. Bennett and V. B. Scott. *Am. J. Physiol.* 106, 509-23(1933).—The gaseous metabolism of the dog pancreas *in situ* was measured. The secretion of pancreatic juice results in an increased O consumption. The respiratory quotient of the resting gland is 0.79 and of the secreting gland 1.05.

The fatty acids of human duodenal bile, their quantitative separation; estimation and the effect of foodstuffs on their secretion. C. W. McClure, Mildred E. Huntsinger and A. T. Fernald. *Am. J. Physiol.* 107, 1-12 (1934).—Duodenal bile was collected from human subjects by means of the duodenal tube. Stimulation of bile flow was effected by introducing into the duodenum cottonseed oil, beef peptone or glucose. After cottonseed oil administration the soaps of the bile were always increased several fold, while bile fats and free fatty acids were increased to a smaller extent. Peptone stimulation produced an intermediate effect upon the fatty acid distribution of the bile, while glucose had much less effect. Cottonseed oil stimulation caused a very large increase in org. P of the bile and a somewhat smaller increase in the inorg. P. Peptone stimulation produced an intermediate effect on the bile org. and inorg. P, while glucose stimulation had the least effect. Br nos. of the fatty acids of the blood and bile indicate that the lipoids of the bile are the result of secretory activity of the liver rather than a mere filtration product from the blood.

The effects of high oxygen pressure. I. Effect of high oxygen pressure upon the carbon dioxide and oxygen contents, the acidity and the carbon dioxide-combining power of the blood. A. R. Behnke, L. A. Shaw, C. W. Shilling, R. M. Thomson and A. C. Messer. *Am. J. Physiol.* 107, 13-28(1934).—Dogs breathing pure O at 4 atms. pressure for 2-4 hrs. showed: convulsive seizures, pulmonary damage, O tension in the arterial blood equal to the tension of O in the alveolar air. Seven cc. of pure O dissolved in 100 cc. of blood, sufficient to supply the tissues without any reduction of oxyhemoglobin, normal CO<sub>2</sub>-combining capacity of the blood, a slight increase in the CO<sub>2</sub> tension of the venous blood, and a slight increase in the  $p_{H}$  of the arterial blood and a slight fall in that of the venous blood. II. Effect of high oxygen pressure on the sugar, phosphorus, nonprotein nitrogen, chloride, creatinine, calcium and potassium contents of the blood. C. W. Shilling, R. M. Thomson, A. R. Behnke, L. A. Shaw and A. C. Messer. *Ibid.* 29-36.—Dogs breathing pure O at 4 atms. for 2-4 hrs. showed, in the main, a constancy of the chem. constituents of the blood. Animals having convulsions or apnea, or those dying as a result of the exposure showed increases in blood sugar and in blood P. These changes are probably the result of the toxic effects of O rather than the cause of convulsions or lung damage which also occurred.

Lung extract and blood clotting. H. P. Smith, E. D. Warner and K. M. Brinkhaus. *Am. J. Physiol.* 107,

63-9(1934).—Thromboplastin, free from prothrombin, can be prepd. by extg. perfused lung with saline.

Effects of administration of pure foodstuffs and inorganic substances on external secretory activities of the liver, pancreas and stomach. C. W. McClure, Mildred E. Huntsinger and A. T. Fernald. *Am. J. Physiol.* 107, 94-112(1934).—The biliary, pancreatic and gastric fractions of human duodenal contents obtained after the intraduodenal administration of pure foodstuffs and inorg. compds. show: (1) the concns. of bile and pancreatic juice in the duodenum vary with the type of stimulant; (2) the acid of gastric contents is not the essential factor in stimulating the secretion of concd. bile or pancreatic juice; (3) cottonseed oil and peptone stimulate the liver and pancreas through secretagogic influences.

Changes in the viscosity of the blood in normal, splenectomized and adrenalectomized animals following emotional excitement. L. B. Nice and D. Fishman. *Am. J. Physiol.* 107, 113-19(1934).—The viscosity of the blood in rats whose adrenals have been removed is higher than in normals, both in the quiet and in the excited state. In rats 2 days after removal of the spleen, blood viscosity is higher than normal in the quiet state, but the increase after excitement is less than normal. Four days after spleen removal blood viscosity decreases markedly both in the quiet and excited states.

Relation of the oxygen and nitrogen contents of cerebrospinal fluid to barometric pressure. C. J. Cunningham, J. H. Rand, 3rd, and E. C. Weckesser. *Am. J. Physiol.* 107, 164-7(1934).—The O content of the cerebrospinal fluid is a little more than doubled, and the N content is trebled, when the barometric pressure is increased from 1 atm. to 3 atms.

The action of histaminase on the gastric secretory response to histamine and to a meal. A. J. Atkinson and A. C. Ivy. *Am. J. Physiol.* 107, 168-9(1934).—Histaminase injected intravenously did not prevent or inhibit the gastric response to histamine or to a meal.

The function of the adrenal cortex—general, carbohydrate and circulatory theories. S. W. Britton, H. Silvette and R. F. Kluc. *Am. J. Physiol.* 107, 190-206 (1934); cf. *C. A.* 27, 3246.—There is no water lack in animals whose adrenals have been removed. The carbohydrate loss alone is sufficiently critical to cause death.

The state of carbon dioxide in blood. N. U. Meldrum and F. J. W. Roughton. *J. Physiol.* 80, 143-70(1933); cf. *C. A.* 27, 4255.—If the carbonic anhydrase in blood is prevented from acting by adding HCN, CO<sub>2</sub> is taken up in two phases. Of these the rapid one is due in part to phys. soln. but in the main to some nonbicarbonate compd., whereas the 2nd slow phase is due to the formation of bicarbonate. CO<sub>2</sub> uptake with NH<sub>3</sub>, certain amino acids and peptides gives results so similar to those with cyanide blood that it may be assumed that the same type of CO<sub>2</sub> compd. is concerned in all these cases, viz., a carbamino compd.

Relation of the pituitary gland to the action of insulin and adrenaline. A. B. Corkill, H. P. Marks and W. E. White. *J. Physiol.* 80, 193-205(1933).—After removal of the pituitary gland in rabbits there is increased response to insulin and diminished response to adrenaline. Liver glycogen is abnormally stabilized after pituitary removal.

A comparison of fetal and maternal hemoglobins in the goat. E. F. McCarthy. *J. Physiol.* 80, 206-12 (1933).—There is no difference in mol. wts. of fetal and maternal hemoglobins, but fetal hemoglobin has a greater affinity for O than does that of the mother.

The effect of muscle length on the energy for maintenance of tension. W. O. Fenn and W. B. Litchford. *J. Physiol.* 80, 213-19(1933).—The energy for the maintenance of tension varies with changes in muscle length in exactly the same way as the energy for the development of tension.

The excretion of nonmetabolized sugars by the mam-

malian kidney. C. L. Cope. *J. Physiol.* 80, 229-33 (1933).—Xylose is excreted in the kidney entirely by glomerular filtration with no absorption in the tubules. After the administration of phlorizin the same holds true for glucose and sucrose, but not exactly so for creatinine.

J. F. Lyman

The chemical transmitter at synapses in a sympathetic ganglion. W. Feldberg and J. H. Gaddum. *Proc. Physiol. Soc., J. Physiol.* 80, 12P(1933).—The liberation of acetylcholine is the normal mechanism by which the effects of preganglionic impulses pass synapses in the ganglion.

J. F. Lyman

The mechanism of the nervous discharge of adrenaline. W. Feldberg, B. Minz and H. Tsudzimura. *Proc. Physiol. Soc., J. Physiol.* 80, 15P(1933).—The impulses in splanchnic nerves which cause output of adrenaline from the adrenals pass by chem. transmission, and the transmitting agent directly affecting the medullary cells has all the properties of acetylcholine.

J. F. Lyman

The chemical transmitter of effects of the gastric vagus. H. H. Dale and W. Feldberg. *Proc. Physiol. Soc., J. Physiol.* 80, 16P(1933).—The effects of the vagus on the muscular walls of the alimentary canal seem to be transmitted by a substance with the properties of acetylcholine.

J. F. Lyman

Glucoytic formation of blood lactate. C. L. Evans, Fong-Yen Hsu and Takao Kosaka. *Proc. Physiol. Soc., J. Physiol.* 80, 19P(1933).—Lactate formation in defibrinated blood perfused through ventilated lungs is 2-3 times as rapid as when the blood is oxygenated by circulation outside the body.

J. F. Lyman

Frequency and characteristics of blood groups. Umberto Izzo. *Boll. soc. ital. biol. sper.* 8, 1402-4(1933).—Group O is the most frequent among the inhabitants of Trieste, followed by the groups A, B and AB. The blood of the newborn contains agglutinogens A and B. The velocity of reaction is characteristic and is inherited. With the discovery by Landsteiner and Levine of the new properties M, N, P of the red corpuscles, the detn. of paternity is rendered more certain.

Peter Masucci

Investigations on fatigue by means of a reaction which determines the capacity of urine to produce a peculiar phenomenon (inhibition phenomenon). A. Donaggio. *Boll. soc. ital. biol. sper.* 8, 1456-9(1933).—D. has devised a reaction which reveals in urine or fluids the capacity to prevent the pptn. of thionine by  $\text{NH}_4$  molybdate. The presence of this reaction under various conditions of muscular fatigue has been investigated.

P. M.

Studies on the colloid-osmotic pressure of the blood in the pregnant and puerperal state. Michele Orru. *Boll. soc. ital. biol. sper.* 8, 1463-5(1933).

P. M.

Changes in the glucemic titer by the action of warm baths. R. De Marco and A. Imbesi. *Boll. soc. ital. biol. sper.* 8, 1485-8(1933).—Warm baths (38-40°, 45°, 50°) produce in pigeons an increase of the glucemic titer of 10-30%.

Peter Masucci

Ammoniaemia in dogs deprived of the intestine. Felice D'Arbela and Amedeo Billi. *Boll. soc. ital. biol. sper.* 8, 1504-7(1933).—Dogs deprived of the large and small intestines with the exception of a portion of the upper duodenum showed a large decrease or almost complete disappearance of  $\text{NH}_3$  in the blood. This diminution did not occur in animals with a high intestinal occlusion.

Peter Masucci

Photodynamic action of bile. Viviani Angelica. *Boll. soc. ital. biol. sper.* 8, 1536-7(1933).—Cystic bile was treated with HCl to ppt. the free insol. biliary acids; the liquid was filtered and the filtrate neutralized with NaOH. Two series of tubes were prepd., (1) containing the neutralized filtrate, (2) the same bile to which was added an amt. of NaCl corresponding to that found in neutralizing the filtrate. The intensity of hemolysis was compared in the dark and in the light. The results showed that the photodynamic action of bile on hemolysis was not decreased by removing the biliary salts. Likewise, it was shown that biliverdin has no photodynamic action on erythrocytes.

Peter Masucci

1 Variations in the phosphorus content of the sub-marginal gland of the dog. G. Scov. *Boll. soc. ital. biol. sper.* 8, 1563-6(1933).—P was detd. by the Lohmann method and Fe by the San Jim Wong method. The results show that the wt. of the fresh gland is 5-5.8 times the wt. of the dry gland at rest and 3 times that of the dry active gland. The amt. of water in the gland is greater during rest than during activity. The total P in the gland varies little with the functional state but if referred to 100 g. of substance then with respect to the fresh tissue the percentage varies from 140 to 250 mg. % according as to whether the gland is at rest or active. The percentage if referred to dried wt. varies very little. The amt. of Fe varies with the functional state; it is less in the gland at rest than in the active gland. The max. figures are 12 mg. % for the fresh tissue and 37 mg. % for the dried tissue.

Peter Masucci

3 Cylindruria, hematuria and albuminuria in normal man. Oscar Cantoni and Franco Fossati. *Boll. soc. ital. biol. sper.* 8, 1561-3(1933).—The presence of cylinders, cells and protein in appreciable amts. in perfectly normal human beings has been confirmed with the Addis method.

Peter Masucci

The phosphorus content of the saliva of the dog and of man. G. Scov. *Boll. soc. ital. biol. sper.* 8, 1570-4(1933).—The saliva secreted by a dog under the influence of pilocarpine showed: total P, in mg. %, min. 7.5, max. 14.5; orthophosphoric P min. 2.9, max. 3.8; pyrophosphoric P min. 0.4, max. 1.1; org. P min. 2.9, max. 9.6. The free flowing saliva of man showed: total P, in mg. %, min. 18.1, max. 21.0; orthophosphoric P, min. 7.4, max. 12.5; pyrophosphoric P, min. 1.5, max. 10.0; org. P min. 0.7, max. 5.5.

Peter Masucci

5 Changes in the blood cells in animals transfused with formalized heterogeneous blood. A. Cardin. *Boll. soc. ital. biol. sper.* 8, 1632-3(1933).—Dogs rendered anemic and transfused with formalized heterogeneous blood show higher blood counts compared to the animals transfused with nonformalized heterogeneous blood or compared to the control animals not transfused.

Peter Masucci

The influence of cortical-suprarenal hormones on certain biochemical constituents of the blood. S. Flandaca. *Boll. soc. ital. biol. sper.* 8, 1637-9(1933).—The results of Schmitz and Kühnau (C. A. 27, 3511) have been confirmed in regard to phosphatides and cholesterol. The injection of fraction A produces a diminution of the  $\pi$  of the blood and an increase of inorg. P. The injection of fraction B causes a diminution of the  $\pi$  and of calcemia, and an increase of inorg. P and K. The injection of fraction C produces little or no change in the  $\pi$ , glucemic titer, Ca, Cl or Na, but produces an increase in P and Mg.

Peter Masucci

7 Plastein content of the muscular tissue of the mammoth. V. S. Isupov. *Compt. rend. acad. sci.* (U. R. S. S.) 1933A, 99-102(in French 102-3).—Striated muscular tissue of mammoth was hydrolyzed by 0.5% pepsin in HCl soln. ( $pH$  1.6) at 37.5° for 24 days. The content of plastein was 5.1%, while that of ox tissue was 13.2%. This shows that albumin is not decomposed at low temps., and that pepsin obtained from living animals has a similar action on albumins of prehistoric animals.

N. N. M.

The formation of fibrinogen and thrombin in the blood as a secretory function of reticulo-endothelial tissue. Pietro Campellone. *Arch. fisiol.* 33, 92-115(1933).

A. E. M.

The influence of thyroidectomy on the glutathione of the blood and of the organs. Roberto Zanini. *Arch. fisiol.* 33, 116-23(1933).—The glutathione is reduced after thyroidectomy.

A. E. Meyer

The formation of uric acid in the surviving liver of the chick. I. Absence of a relation between urea and uric acid. Giuseppe Russo. *Arch. fisiol.* 33, 124-41(1933); cf. C. A. 27, 3746. The urea of blood streaming through the liver is not altered. Added urea was quantitatively found present after the perfusion. Uric acid is not formed from urea.

A. E. Meyer

Liver metabolism. II. Glucemic curve in the heart-lung-liver preparation. B. Bassani. *Arch. fisiol.* 33, 137-74(1934); cf. C. A. 28, 1099. The

is constantly decreasing to values of 30 mg. per 100 cc. The fraction of glucose in the liver is independent of the hormonal and nervous influences and is in proportion to the amount of glucose in the blood.

**Glutathione and adrenals.** Virgilio Martini. *Arch. f. physiol.* 33, 175-218(1934).—The glutathione in the blood is decreased by adrenalectomy, the reduced more than the oxidized. The injection of cortical hormone prevents the drop. The content of reduced glutathione is lower in the adrenal vein than in the jugular vein; the opposite is true with oxidized glutathione. Venous blood contains more reduced glutathione than the arterial; the highest content is found in the portal vein. Adrenals, liver and muscles contain a substance that reduces cystine to cysteine; the substance is not present in the blood, is stable at 100° and can be extd. It is connected with a protein complex.

**Spleen, adrenals and pancreas in relation to hemorrhage and blood coagulability.** Franz Cortese. *Arch. f. physiol.* 33, 231-46(1934).—The increase of blood coagulability in the dog obtained by frequent hemorrhages is explained by a reflex action of the adrenals, causing a deficiency of adrenaline and an increase of prothrombin in the system. The increase of coagulability is not obtained during narcosis, when the reflexes are extinguished. Adrenalectomy has the same effect. Extirpation of the pancreas causes a reduced supply of prothrombin. The contraction of the spleen is of no influence.

**The presence of pituitary hormones in the human spinal fluid.** Camillo Colombi and Virginio Porta. *Arch. f. physiol.* 33, 274-99(1934).—The presence of the hormones of the posterior lobe could be proved, while the melanophorotropic hormone and the hormones of the anterior lobe were not found.

**Relation between thyroid and spleen function.** Antonio Gasparini. *Arch. sci. med.* 57, 153-72(1933).—Splenectomy causes hypofunction of the thyroid.

**Gastric mucus and its protective action.** R. H. Monceaux and R. Fontaine. *Presse méd.* 41, 927-8(1933).—A review.

**Catabolism of cholesterol in the animal organism.** III. Studies on the elimination of metabolic products. Karl Rosert, Irvine H. Page and Wilhelm Meuschik. *Biochem. Z.* 268, 93-103(1934); cf. C. A. 27, 4286.—Studies were made on the products present in the unsaponifiable fraction from feces of rabbits which were fed with or without the addn. of cholesterol. In the former there was an increased elimination of substances not precipitable by digitonin, of low m. p., pos rotation and modified sterol color reactions. Similar expts. can be made with carnivorous animals. However, in neither case is more than a fraction of the metabolic products present in the unsaponifiable portion. In the rabbit feces a wax alc. was found which has cholesterol-like crystals. It is satd. with respect to Br, has m. p. 79.5°, is easily sol. only in warm org. solvents, and apparently has the compn.  $C_{26}H_{46}O$ . The origin of this substance is obscure. It is not present in the unsaponified fraction of oats but is in the unsaponifiable fraction of the pasture hay. It is obtained from the feces of exptl. as well as control rabbits.

**Occurrence of citric acid in tissues.** C. L. Gemmill. *Skand. Arch. Physiol.* 67, 201-10(1934).—Thunberg's method for the detn. of citric acid in tissues was applied after previous removal of the coenzyme systems by boiling and  $CH_3BrCO_2K$  and removal of glycogen by ultrafiltration. Citric acid was found in the frog liver and in muscles of frogs under anaerobic conditions. The normal resting or stimulated frog muscle contained no citric acid. Citric acid was also found in the normal resting muscle, liver, brain and kidney of the rabbit.

**The observations and the data obtained by means of Thunberg's citric acid method.** A. Lender. *Skand. Arch. Physiol.* 68, 221-5(1934).—Important methodological details are discussed for carrying out the citric acid detn. by Thunberg's method. There is no difference in the citric acid content of oxalated plasma or

serum. The serum citric acid content of a given normal person remains practically const., the differences observed in women being apparently assoc. with the menstrual cycle. During pregnancy the serum citric acid level is const. or practically const., but increases during childbirth. Two or 3 days after parturition it falls to a min. of 8-10γ, then slowly rises again and after 6 months is back to normal again. By raising the serum citric acid of the mother, the citric acid serum level of the fetus is also increased; hence the acid passes through the placenta. Both the urine of the newborn and the colostrum contain citric acid.

**Excretion of folliculin in the urine of the child, woman and man.** Gonadal, extragonadal and placental folliculin. Diet and folliculin. Bernhard Zondek and Hans v. Euler. *Shand. Arch. Physiol.* 68, 259-64(1934).—The male and female of all ages excrete 5-30 mouse units per l. of folliculin which is of endogenous but extragonadal origin. These small quantities of folliculin do not come from the food. Folliculin thus has an extragonadal source in addn. to the gonadal or placental origin.

**Does follicular fluid contain a substance influencing metabolism?** E. Dingemans and S. E. de Jongh. *Acta Brava Neerland. Physiol., Pharmacol., Microbiol.* 3, 79-81(1933).—Frog larvae were immersed in dil. soln. of menformone, follicular fluid or blood serum, and fed cooked frog muscle. The hind legs developed first in those larvae showing most rapid growth, either in blood serum or in follicular fluid.

**The cholesterol content of the suprarenal capsules.** S. E. de Jongh and W. Rosenthal. *Acta Brava Neerland. Physiol., Pharmacol., Microbiol.* 3, 86-8(1933).—Chem. detns. of the cholesterol content of the suprarenal gland of rats were in good agreement with histological exams. with Sudan as a stain. Feeding cholesterol in olive oil did not increase the cholesterol content of the blood. The suprarenal gland of the normal rats ranged from 3 to 6.9% in 8 animals, with an av. of 4.45%; in 4 fatigued animals it ranged from 1.2 to 1.7, averaging 1.45% of cholesterol.

**The constancy of cholesterol content in rat blood.** R. Kooy and W. Rosenthal. *Acta Brava Neerland. Physiol., Pharmacol., Microbiol.* 3, 135-8(1933).—The cholesterol content of the blood of normal rats was 92 mg. %. Fatigued animals or those fed cholesterol for a short time showed no change from this value. Marked hypercholesterolemia followed feeding of cholesterol for 8 days, or more. The suprarenal cortex of rats suffering from beriberi showed cholesterol values between 0.7 and 1.3%.

**Effect of anterior pituitary growth hormone on the composition of growth.** Milton O. Lee and Norwood K. Schaffer. *Ohio J. Sci.* 34, 1-3(1934).—Twelve groups of litter mates of rats were fed by the "paired feeding" technic for 8-11 weeks, then killed and analyzed. Twelve controls originally weighing 2382 g. gained 764 g. Twelve injected with an ext. of fresh beef anterior pituitary gland originally weighed 2358 g. and gained 1295 g. Chem. analyses on the original rats, the controls and the treated animals, gave, resp.: water 62.0, 58.0 and 62.5%; fat 12.7, 19.1 and 12.9%; N 3.3, 3.0 and 3.2%; total ash 4.3, 4.0 and 4.1%. Statistically these changes were believed to be significant. Conclusion: The growth hormone through its influence on metabolic processes affects growth independently of the food intake.

**Functions of the adrenal cortex.** Frank A. Hartman. *Ohio J. Sci.* 34, 4-8(1934).—Cortin given to guinea pigs on a diet deficient in vitamin C delayed the onset of scurvy. The adrenal cortex produces two hormones: (1) cortin, a general tissue hormone, and (2) "cortilactin," which is necessary for milk production.

**Oxidation-reduction processes during muscular work.** II. Oxidation-reduction potential of blood and urine as influenced by muscular labor. A. Yu. Kharit and I. I. Fedorov. *Compt. rend. Acad. Sci. U. R. S. S. [N. S.]*, 1, 180-2(in German 183-5)(1934); cf. C. A. 28, 2402.—The potential of arterial blood decreased from 0.007 to

0.578 v., of venal blood from 0.580 to 0.557 after work (in dogs), and of urine from 0.118 to 0.073 in 40 min. and was normal after 4 hrs. (in man). F. H. R.

**Biochemical studies of pregnant and puerperal blood.**

**II. Nitrogenous compounds.** Shin Kio. *J. Chosen Med. Assoc.* 23, 1019-45 (German 81-3) (1933).—The blood of ear (*E*), and uterine (*U*) veins of nonpregnant, pregnant and puerperal rabbits was analyzed for the total N, nonprotein N, urea N and amino N. There is no nitrogenous difference between *E* and *U* of nonpregnant animals. In pregnant rabbits, total N of *E* is the same as *E* of the normal, but that of *U* shows a progressive decrease. Total nonprotein N slightly increases in *U*. There is no change of urea N in *E*, but an increase in *U*. There is a slight increase of amino N in *E* during early and later stages of pregnancy, but not the middle period; and there is the corresponding, but more pronounced, change in *U*. In *E* of puerperal rabbits, there is no change in total N, but a slight increase in nonprotein N and amino N, and a pronounced increase in urea N. Total N, nonprotein N and urea N of *U* of puerperal rabbits are much greater than *E* of the same animal. **III. Serum protein.** *Ibid.* 1046-59 (German 83-4).—Serum protein contents of *E* and *U* are the same in nonpregnant animals. Total serum protein and serum albumin of *E* of pregnant animals are greater than the animals found in *E* of nonpregnant animals. In *U* of puerperal rabbits, there is no difference, but in *E*, there is a decrease. **IV. Water contents.** *Ibid.* 1060-5 (German 84-5).—H<sub>2</sub>O contents of *E* and *U* are the same in nonpregnant rabbits. In pregnant rabbits, *E* contains more H<sub>2</sub>O than *E* of nonpregnant and less than *U* of the pregnant. In the puerperal rabbit, H<sub>2</sub>O contents of both *E* and *U* increase. S. Tashiro

**Method of estimating the functional activity of the thyroid by means of urine or serum.** **IV. The influence of anterior lobes of the pituitary gland on the thyroid.** Mun Lyong Koh. *J. Chosen Med. Assoc.* 23, 1274-81 (in English 103-4) (1933); cf. *C. A.* 27, 5803.—Thyroid function test (*C. A.* 26, 5600) was made with urine and serum of the rabbits injected daily with antuitrin (0.2 cc. per kg.), to see if antuitrin contains thyrotropic principle. Thyroid function increases in 3 hrs. after the injection, reaches a max. in 3 days and tends to disappear in 9 days. By a series of injections, this hyperfunction can be sustained until the 15th day, but no longer even if a larger dose is given. This increased thyroid function was confirmed also by the histological studies. S. Tashiro

**A kidney hormone controlling nonprotein nitrogen balance in the blood.** Hayao Miyazaki. *J. Chosen Med. Assoc.* 23, 1683-709 (in English 125-31) (1933).—See *C. A.* 27, 4841. S. Tashiro

**The effect of spleen and various hormones on basal metabolism.** I, II and III. Mitsuo Takahashi. *Sei-i-kwaï Med. J.* 52, No. 3, 104-32, 133-53, 154-61 (in German 7-8) (1933).—I. With normal and splenectomized mice, the effects of various hormones on CO<sub>2</sub> production, O<sub>2</sub> consumption and R. Q. were measured. The presence of spleen influences the action of adrenaline on basal metabolism. Spleen acts as a synergetic with adrenaline. This synergetic spleen substance can be extd. by NaCl soln. II. The injection of a small amt. (0.001-0.0015 cc.) of insulin acts as an antagonistic to the spleen, but that of larger amts. produces a synergetic effect. Thyroxine acts as an antagonist. III. Both pituitrin and pituitary gland are antagonistic to the spleen, but hypophorine is synergetic. S. Tashiro

**Cahn, T., and Houget, J.: Biochimie de la contraction musculaire.** Paris: Hermann & Cie. 42 pp. P. 12.

**Harrow, Benjamin, and Sherwin, Carl P.: The Chemistry of the Hormones.** Baltimore, Md.: Williams & Wilkins Co. 218 pp. \$2.50.

**Die Hormone. Ihre Physiologie und Pharmakologie.** By Paul Trendelenburg. Bd. II. Schilddrüse. Nebenschilddrüsen. Inselzellen der Bauchspeicheldrüse. Thymus. Epiphyse. Edited by Otto Kraye. Berlin: J. Springer. 502 pp. M. 45; cloth, M. 46.80. Cf. *C. A.* 23, 4503.

## G—PATHOLOGY

H. GIDEON WELLS

**The ultra-violet absorption spectrum of syphilitic serum.** Mladen Paic. *Compt. rend.* 198, 286-8 (1934).—Normal and syphilitic human blood serums are indistinguishable by their ultra-violet absorption spectra. Syphilis does not affect the structure of the serum proteins. Philip D. Adams

**The action of infra-red, visible and ultra-violet rays on hemolytic alexin (complement) and the absorption spectrum of guinea-pig serum.** M. Paic and P. Haber. *Compt. rend.* 198, 613-15 (1934).—The inhibiting action of mixed light on complement is appreciable after irradiation for 30 min. and destruction is complete in 10 hrs. Infra-red, visible and ultra-violet rays hinder equally the complementary action. The optical density of irradiated serum is greater than that of nonirradiated, the effect being greatest at 2800 mμ. Philip D. Adams

**Mineral metabolism in inflammatory conditions of the ear, nose and throat. I. Content of fluids and total mineral content.** R. Mittermaier. *Arch. Okren-, Nasen u. Kehlkopf-heilk.* 134, 147-59 (1933).—In acute and chronic inflammatory conditions of the nose and antrum the highest mineral content (I) of the dried substance of the mucosae and nasal secretions accompanies acute rhinitis. Secretion which remains for a long period in the antrum occasionally has a high I. A change from an inflammatory to a mucous secretion increases I. The parallel increases of H<sub>2</sub>O and I in mucosae and secretion suggest osmotic regulation. B. C. A

**Relation between the growth vigor of tumors and their vitamin A contents.** E. Vogt. *Med. Klin.* 28, 1344 (1932); cf. *C. A.* 27, 1283.—Vitamin A is present in benign and malignant tumors; in myoma little or no vitamin A is present. In 2 cases sarcomatous neoplasm contained small quantities, and in carcinoma the large quantities are present in rapidly developing growths. B. C. A

**Arsenical keratoses and epitheliomas.** Gordon Mc Neer. *Ann. Surgery* 99, 348-53 (1934).—The keratoses and epitheliomas produced by the ingestion of quinquavalent As are discussed. Rachel Brown

**Silica in relation to pulmonary disease.** M. G. Stewart. *Edinburgh Med. J.* 41, 226-32 (1934). Rachel Brown

**Metabolic response to injury.** D. P. Cuthbertson. *Glasgow Med. J.* 3, 41-58 (1934).—During the initial phase of depressed vitality resulting from physical injuries anuria occurs, followed by increased vol. of urine and N<sub>2</sub> and P output. The S:N and P<sub>2</sub>O<sub>5</sub>:N ratios suggest that the material catabolized was mainly muscle. The initial period is also accompanied by a rise in body temp. and pulse rate and a 20 to 25% increase in the basal consumption of O. Metabolic disturbances in pneumonia are similar in kind to those resulting from trauma but less marked. Rachel Brown

**Tissue reactions in immunity. XIV. The specific reacting capacities of different tissues of an immunized animal.** Reuben L. Kahn. *Science* 79, 172-5 (1931)

As the result of immunization both tissue and fluid had the property of combining with antigen. The reactivities of the skin and serum of immune rabbits were not necessarily parallel. Rabbits previously immunized with horse serum and injected with 50 units of diphtheria antitoxin intravenously or into various tissues were not protected against an intracutaneous injection of 50 units of toxin, while normal rabbits were. By detg. the amt. of antitoxin which would protect these immunized rabbits, it was shown that the skin and peritoneal tissues possessed a capacity for reacting with horse serum 10 times that of *in vivo* plasma, skeletal muscle or brain tissue. R. B.

**The detection of hematoporphyrins in the feces as a method of determining the ulcerative period in typhoid fever.** Renzo Dusso. *Diagnostica tec. lab. (Napoli), R. mensile* 4, 855-62 (1933).—By using the method of fluorescence with Wood's light, hematoporphyrin was detected in the feces of 25 patients with typhoid fever at that period

which corresponds to the ulcerative stage (clinical) of the disease.

**Protein metabolism and renal function in diabetes mellitus.** O. Da Rin and M. Repetti. *Russ. clin. terap. sci. affini* 32, 127-30(1933).—A comprehensive survey of the subject with clinical analyses from 16 patients and a large bibliography.

**The acidosis question in uremia.** Joseph Csapó and Edmund Kerpel-Fronius. *Wien. klin. Wochschr.* 46, 1173-5(1933).—In 4 cases it is shown that uremic acidosis is a consequence of increase in org. acids.

**Variations in blood potassium and calcium in acute eczema and dermatitis.** G. I. Umansky and A. P. Stepanowa. *Wien. klin. Wochschr.* 46, 1262-5(1933). In dermatitis ac. acute eczema with edema serum K is increased and Ca may be decreased.

**The oxidation-reduction of cancer tissue.** Alois Fritz Ladbeck. *Wien. klin. Wochschr.* 46, 1589-90(1933). A significant decrease in reduction velocity was found in cancer tissue.

**The chemical composition of exudates.** Joseph S. Hepburn and Homer B. Fegley. *Am. J. Pharm.* 106, 16-17(1934).—A pleural exudate, from a patient who died before a diagnosis could be made, consisted of a white, milky fluid, measured approx. 26 cc., contained a small clot of fibrin which was discarded, total solids 5.96, moisture 94.04, ash 0.40, fat 0.72, total N 0.03, occult blood absent. A peritoneal exudate was slightly yellow, apparently serous, measured approx. 750 cc. and contained total solids 5.64, moisture 94.36, ash 0.48, fat 0.83, total N 0.20%, occult blood absent, esterase absent, amylase present.

**Variations in the albumin-globulin ratio of the blood of rabbits with hypercholesterolemia.** P. Mauriac, L. Servantig and G. Demeuier. *Compt. rend. soc. biol.* 115, 177-8(1934); cf. *C. A.* 28, 1771<sup>a</sup>.—When a marked hypercholesterolemia was produced in rabbits by the method previously described there occurred at the same time a marked decrease in serum albumin and a corresponding increase in globulins, the total serum protein remaining practically unchanged.

**Flocculation of various serums in distilled water.** V. Chorine and R. Prudhomme. *Compt. rend. soc. biol.* 115, 290-2(1934); cf. *C. A.* 28, 1007<sup>a</sup>.—One part serum was mixed with 9 parts water and the opacity measured with a Vernes-Bicq-Yvon photometer immediately after mixing and again after incubating 3 hrs. at 37° and cooling. Normal serums showed little or no flocculation, syphilitic serums a slight, and malarial serums a heavy, flocculation.

**Hypercholesterolemia after splenectomy.** J. Didry. *Compt. rend. soc. biol.* 115, 369-70(1934); cf. *C. A.* 28, 1393<sup>a</sup>.—In dogs splenectomy causes a large increase in blood cholesterol which returns to normal in a few weeks. Thyroidectomy causes a permanent increase (sometimes 100%) in blood cholesterol. Splenectomy decreases the already high blood cholesterol of thyroidectomized or ovariectomized dogs. After such a decrease spleen ext. causes an increase.

**[Blood] proteins and lipides in diabetes.** A. de Morais Sarmiento and M. J. Bruno da Costa. *Compt. rend. soc. biol.* 115, 451-2(1934).—In diabetes the blood albumin/globulin ratio is usually increased to 2.5 or higher, largely as the result of an increase in the albumin. Hyperlipidemia and hypercholesterolemia were not found in any of the cases studied.

**Lipoid-protein equilibrium during plasmapheresis in dogs.** A. de Morais Sarmiento and M. J. Bruno da Costa. *Compt. rend. soc. biol.* 115, 453-4(1934).—The decrease in blood proteins during plasmapheresis is not always accompanied by a decrease in blood lipoids.

**Ratio of cholesterol to cholesterol esters in hepatic diseases.** A. de Morais Sarmiento and M. J. Bruno da Costa. *Compt. rend. soc. biol.* 115, 449-51(1934).—In Laënnec's cirrhosis, without other complications, and in biliary lithiasis and cardiac liver the cholesterol/cholesterol esters ratio of the blood remains within normal limits. In severe lesions of the hepatic parenchyma the proportion of

esters decreases before impaired carbohydrate metabolism due to hepatic insufficiency becomes apparent.

**Action of diphtheria toxin on blood plasma. Effect of the toxin on the coagulation of serum by heat.** H. Goldie. *Compt. rend. soc. biol.* 115, 400-9(1934); cf. *C. A.* 28, 503<sup>a</sup>, 2054<sup>a</sup>.—Diphtheria toxin (active, or inactivated by heat) and anatoxin hinder or prevent the coagulation of human or horse serum at 80°. The toxin and anatoxin hinder the heat coagulation of the globulins of blood or egg but not albumins.

**Partition of antibodies in the blood. Presence of antibodies in the red corpuscles.** Ong Sian Gwan. *Compt. rend. soc. biol.* 115, 587-90(1934). Expts. with rabbit blood and *Es. coli* showed that the red corpuscles had a greater agglutinating power than the serum. Some specimens of human blood showed similar properties.

**Adsorption of agglutinins by red corpuscles.** *Ibid.* 695-7—Discussion.

**Albuminuria.** H. R. Olivier. *Compt. rend. soc. biol.* 115, 609-10(1934).—The albumin/globulin ratio of the proteins of the urine ranges from 0.15 to 15.0 and bears no relation to the ratio in the blood. The possible relation of different values of the ratio to certain diseases is discussed.

**Cancer and the amino acids indispensable to growth.** R. Courrier and G. Coste. *Compt. rend. soc. biol.* 115, 631-5(1934).—Feeding rats diets sufficiently low in lysine to check the growth of the animals decreased but did not entirely check the growth of grafted Jensen sarcoma.

**Protein sugar [of the blood] in tuberculosis.** G. Carrière and P. Martin. *Compt. rend. soc. biol.* 115, 684-5(1934).—The protein sugar tends to increase slightly as the disease progresses, but this condition also occurs in other diseases such as arthritis.

**Hodgkin's disease.** A. Wallhauser. *Arch. Path.* 16, 522-62, 672-700(1933).—A general review. Thirty-six references.

**Calcification of the skin in diabetes mellitus.** A. H. Davis and S. Warren. *Arch. Path.* 16, 852-61(1933).—Unexplained calcification of the subcutaneous tissue and corium was found in 2 elderly diabetic patients. The usual causes for metastatic calcification have been ruled out. The Ca of the blood was within normal limits.

**Mechanism of the formation of pure cholesterol gallstones.** H. B. Weiser and G. R. Grav. *Arch. Path.* 17, 1-9(1934).—Pptn. of cholesterol in the gall bladder is in itself altogether inadequate to account for the formation of pure cholesterol concretions. Gallstones have been synthesized which simulate the natural concretions in both macroscopic and microscopic appearance and in properties by pouring fat supersatd. with cholesterol into Na glycocholate soln., emulsifying, allowing to stand for some time, and then sepg. the mass of fat and cholesterol from the remainder of the emulsion by centrifuging. After absorbing the excess fat with blotting paper, it was formed into a ball and dried. Particular attention should be called to the importance of fat in the synthesis of pure cholesterol stones. Not only does it serve as a collecting agent which brings together the particles of pptd. cholesterol but its solvent action is responsible for the growth of the interlacing crystals which bind the mass into a concrement.

**Melanin. I. Its mobilization and excretion in normal and in pathologic conditions.** V. C. Jacobsen and G. H. Klink. *Arch. Path.* 17, 141-51(1933).—The normal distribution of melanin is confined to the skin, to the pigment layer of the retina, the ciliary body, the choroid, certain parts of the central nervous system and the medulla and zona reticularis of the suprarenal gland. While melanin is sol. *in vitro* only in strong alkali or acid, it must be sol. or in colloidal suspension in the body fluids, because it or its precursor, melanogen, colors the urine in many cases of melanoma. The pigment has probably rarely, if ever, been detected in particulate form in the leucocytes of the blood. The mobilization of melanin from areas of

normally or pathologically pigmented cells and the paths of its excretion from the body have been studied in aged blondes and brunettes, in adult negroes, in patients with Addison's disease, in those with melanoma and in more than 400 white mice each of which had the transplantable Harding-Passey mouse melanoma. The paths of excretion of melanin appear to be from the skin by desquamation, through the intestinal tract and through the kidneys. The ingestion of melanin in foods and the synthesis of melanin in the intestines may account for much of the pigment in melanosis coli. The pigment of the zona reticularis of the suprarenal gland appears to be melanin, and it is suggested that the pigment is absorbed from the neurogenic cells of the contiguous suprarenal medulla, thus adding the epithelial cells of the suprarenal cortex to the list of possible melanophores. This explanation of the origin of melanin in the suprarenal gland is in harmony with the Soltan-Masson theory of the origin of melanotic tumors and suggests that melanin, wherever it is encountered, is always of neuro-ectodermal origin.

Harriet F. Holmes

**Experimental edema: Further experiments on the type of edema produced by a diet low in protein.** S. A. Sheldrake. *Arch. Path.* 17, 152-9 (1934).—Hypoproteinemia and edema were produced in 2 of 4 dogs fed a diet low in protein for a long time. A crit. level of plasma proteins for the formation of edema in the dog is probably 4 g. of total protein per 100 cc. and 2 g. of plasma albumin. The renal tubules of the dogs fed a diet low in protein uniformly showed a large excess of isotropic fat when compared with those of the control animals. No significant changes were noted in the blood cholesterol or fatty acids during the prolonged periods of observation.

Harriet F. Holmes

**Lipoid pneumonia.** J. Rabinovitch and M. Lederer. *Arch. Path.* 17, 160 8 (1934).—Lipoid pneumonia occurs most frequently in infants and young debilitated children from the use of oily substances administered by way of the nasopharynx. When it occurs in old persons it is usually due to laryngeal paralysis or to direct intratracheal introduction of oil, such as iodized poppy-seed oil as a diagnostic aid. The pulmonary reaction to the oily material is much the same as that to any other foreign body. The greater portion of the oil is engulfed by monocytes and is either expectorated or carried to the regional lymphatics. Part of it is encysted in granulomatous tissue. It is suggested that the diagnosis of lipoid pneumonia can be made in a certain no. of cases by the examn. of expectorated material for oily substances in the monocyte cells.

Harriet F. Holmes

**Nature and origin of the xanthoma cell.** L. W. Plewes. *Arch. Path.* 17, 177-86 (1934).—A series of 18 cases of xanthoma, in which the nodules were removed surgically, was studied from a standpoint of the origin and nature of the xanthoma cell. A study of fatty lesions of the arteries was made in relation to a fundamental similarity of atheroma and xanthoma. It is believed that the xanthoma cell and the foam cell of atheroma, of chronic suppurative reactions and of certain systemic diseases are of identical nature. Furthermore, it is believed that the origin of both of these cells is from the reticulo-endothelial system, and that the foam cell is an evidence of specific reaction of the cells of the reticulo-endothelial system to certain lipoids, especially cholesterol and its esters, when conditions favorable for their deposition in tissues are present.

Harriet F. Holmes

**Specific agglutination of bacteriophage particles.** F. M. Burnet. *Brit. J. Exptl. Path.* 14, 302-8 (1933).—One of the large particle phages (C16) can be specifically aggregated by homologous high titer antiphage serum. The aggregates when examd. by ultra-violet microphotography appear to be composed of granules whose optical properties suggest that they are of approx. uniform size and about 80 m $\mu$  in diam. The reaction can be obtained with washed phage preps. and sera freed from bacterial agglutinins and must represent a true agglutination of the phage particles.

Harriet F. Holmes

**Detection of snake venoms and the application of the**

**resulting antigens to rapid methods of antivenomous vaccination and serum production.** E. Grasset and A. Zoutendyk. *Brit. J. Exptl. Path.* 14, 308-17 (1933).—The action of a no. of possible detoxicants of venoms has been studied. Concd. solns. of both viperine and colubrine venoms are most readily detoxicated at 37° by means of formalin. In general, viperine venoms are detoxicated more readily and more satisfactorily when dissolved in saline and colubrine venoms when dissolved in broth. The atoxic derivs. are highly antigenic. Domestic animals and monkeys have been actively vaccinated by a course of 3 or 4 subcutaneous injections. By the hyperimmunization of horses, univalent and multivalent antivenins of exceptional potency are obtained in a few weeks with ease and safety.

Harriet F. Holmes

**The reaction of the arterial blood in cancer.** S. Dickinson and R. E. Havard. *Brit. J. Exptl. Path.* 14, 394-400 (1933).—From a no. of patients with and without malignant diseases, 8-10 cc. of blood was withdrawn from the radial artery of each subject into a syringe contg. 1 cc. of a soln. of 5% K oxalate and 2% NaF (neutralized) and the  $p_H$  of the blood at 37° was measured by 2 independent glass electrodes. No significant difference was found between the  $p_H$  of the arterial blood of patients with surface cancer or secondary glands, and that of patients of corresponding ages with other complaints. There is a fairly wide range of variation in the measurements from subjects of the first and second groups. The reaction of the arterial blood depends finally on the activity of the respiratory center; a momentary interference with the normal functioning of the center may possibly give rise to alterations in the reaction of the blood.

H. F. Holmes

**Further observations on the electric charge of the erythrocytes in certain protozoal diseases.** H. C. Brown. *Brit. J. Exptl. Path.* 14, 413-21 (1933); cf. *C.* A. 23, 4960.—The cause of the reduction of the elec. charge of the erythrocytes in bird malaria is due to the action of the serum on these cells. The action of the serum on the red cells is in no way specific. The charge-reducing action of the serum is due to an increase in the euglobin content of the serum. When one takes into account the protein changes in malaria, together with the charge-reducing action of euglobulin, it would seem quite conceivable that the rationale of the treatment of general paralysis by malaria might be due to phagocytosis of the spirochete induced by an increased euglobin content of the serum of the patient.

Harriet F. Holmes

**The nature of the tumors induced in fowls by injections of tar.** J. McIntosh. *Brit. J. Exptl. Path.* 14, 422-34 (1933).—Tumors of the sarcomatous type can readily be induced in the fowl by intramuscular injections of tar and lard. Four tar-induced tumors have been transmitted in series in fowls by injections of tumor emulsion, and of these, 3 have also been transmitted by means of cell-free filtrates. Tar-induced sarcomatous tumors of the fowl conform closely in morphological and biol. characteristics with the naturally occurring sarcomatous tumors of the fowl.

Harriet F. Holmes

**Changes in the esterase and fat contents of the serum induced by cancer and cancer-producing agents.** H. N. Green. *Brit. J. Exptl. Path.* 15, 1-14 (1934).—During the growth of the rat Jensen sarcoma the esterase content of the serum falls progressively, ultimately reaching a very low level. The esterase content of the liver, lung and kidney is also greatly diminished. The phosphatase content of the serum also falls, but the av. fall is less than half that of the esterase. In rats resistant to inoculation of the Jensen sarcoma the esterase content of the serum tends to rise. The fatty acid content of the serum rises in many and possibly all rats during the growth of the Jensen sarcoma. It may reach a max. level approaching 2% and then falls during the terminal stages of tumor growth. There is an assocd. rise in the cholesterol, but of a much less degree. In tar epitheliomata of mice and in localized human carcinomata the serum esterase content ranges around normal, with a tendency to rise slightly. The application of tar or the inoculation of tar produces a rise in the esterase content of the serum of rabbits in a propor-



tion of cases. The fact that a fall in the esterase content of the serum is not found in animals with tar epitheliomata, and that there is a tendency for the reverse effect to occur, is possibly due to the enormous difference in the rate of growth of these tumors as compared with that of the rat sarcoma. It is tempting to suggest that this change is an expression of the resistance of the animal to tumor growth. Appendix. The estimation of fat in blood serum. C. N. Jenkinson. *Ibid.* 13.—As it was found that the amt. of fat in serum from defibrinated or clotted blood was the same as that in plasma from blood collected with oxalate, serum was used in this work for detg. the degree of lipemia. The method used was that described by Leathes and Raper ("The Fats," Chapter 7, Longmans, Green and Co., 1925) adapted to much smaller quantities than were contemplated there. H. F. H.

**Protein-free suspensions of viruses.** V. The nature and antigenic properties of a highly purified phage. I. J. Khigler and L. Olitzki. *Brit. J. Exptl. Path.* 15, 14-23 (1934); cf. C. A. 26, 5116.—Kaolin adsorption of the coliphage from broth cultures followed by elution with 0.01 N  $\text{NH}_4\text{OH}$  yields a potent phage relatively free from protein. Successive elutions from the same kaolin adsorbate followed by dialysis yield active phage suspensions giving neg. protein and ninhydrin reactions. The residue on the kaolin after repeated elutions has a marked inhibitive effect on the phage. This effect does not appear to be specific. The purified phage retains its antigenic potency. Harriet F. Holmes

**Pressor bodies in the blood of hypertensive subjects.** O. L. V. S. de Wesselow and W. J. Griffiths. *Brit. J. Exptl. Path.* 15, 45-52 (1934).—The authors conclude that with the methods used they have not obtained any evidence of pressor bodies in the blood of hypertensive patients. These results seem to be in direct disagreement with those of Bohn (*Z. klin. Med.* 119, 100 (1931-32)). Harriet F. Holmes

**Attempts to locate the site of antibody production.** G. A. H. Buttle. *Brit. J. Exptl. Path.* 15, 64-70 (1934).—Substitution of the blood with normal blood, removal of the liver and spleen and removal of the skin do not affect the rate of production of diphtheria antitoxin in rabbits. It appears probable that all tissues take part in the production of antibodies and as these organs form a relatively small part of the total mass of the animal, the effect of their removal is not obvious. Harriet F. Holmes

**Biological and biochemical observations on cobra venom used in cancer and in malignant tumors.**

Taguet and R. Rousseau. *Néoplasmes* 12, 232-40 (1933).—Injections of cobra venom retard cancer cachexia and diminish greatly paroxysms of pain. When cobra venom acts upon yolk of egg a cryst. product may be obtained, the cobralecithin of Kyes or the lysocithin of Delezenne. This substance, a palmitophosphoglyceric ester of choline, is the result of the action of phosphatase of the venom on the egg yolk. This phosphatide has a cytolytic action while cholesterol has an anticytolytic action. On the injection of 0.5 cc. of a 1/80,000 cobra venom cholesterol is adsorbed from the cells or blood and the combination venom + cholesterol results. When this complex reaches the nerve cell it combines with the lecithin to form the complex venom + lysocithin + cholesterol which has analgesic but not cytolytic power. The retardation of the cancer cachexia is probably due to a coagulation of the  $\text{pH}$  of the blood in the direction of alk., but the chief clinical results obtained are from the action of the cobra venom on the nervous system. H. F. H.

**The importance of the phenomena of autolysis in the cancerous process.** P. Lemay. *Néoplasmes* 12, 286-90 (1933).—Cancer tissue removed aseptically autolyzes more rapidly than normal tissue and the autolysis is especially rapid in the surrounding tissue which is being cancerized. According to Carrel cells in tissue culture in order to grow and multiply require certain albuminoid substances which are very unstable. These trephones exist in large quantity in leucocytes and in embryonal tissue. The serum, on the other hand, contains an inverse factor with inhibitory power which is probably related to

the lipoids. In the normal cell these trephones and the inhibitory factor are in equilibrium. In irritation and cicatrization the cell membranes are injured, permitting the entrance of trephones and also of lipases and lipoidases which destroy the lipoids of the cell membrane. In cicatrization the influx of trephones is temporary and ceases when sepsis is completed but in cancerization there is a continual influx of trephones and in some cancers, as in sarcoma, the cancer cell itself may produce trephones. The trephones in cancer are attracted from the surrounding normal cells and these cells, deprived of the trephones which block the autolyzing enzymes, undergo autolysis. Thus the cancer cells gain both the trephones which facilitate synthesis and the materials essential for the synthesis. H. F. H.

**The iron in the bile and its dissociated retention.** R. Russev. *Wien. Arch. inn. Med.* 24, 255-8 (1933).—In 15 cases of icterus (hemolytic, hepatic and mech.) the duodenal juice was tested for Fe. After combustion the dry residue was treated with  $\text{HCl}$  and the presence of Fe was demonstrated by  $\text{NH}_4\text{CNS}$ , the merest trace of Fe giving a pale pink tint. In the same cases a Brugsch test was made, which consists of the injection of 0.1 cc. of a 1% soln. of K ferricyanide. A blue coloration at the site of injection is a pos. reaction and indicates, according to Brugsch, the presence of disso. Fe in the skin, and occurs only in cases of hepatic icterus where the function of the liver cells is impaired and not in cases of mech. icterus unless the condition had persisted long enough to bring about a secondary disturbance of liver function. R.'s findings do not wholly agree with those of Brugsch as regards the forms of icterus in which Fe retention occurs. However, the pos. Brugsch reaction is always assoc. with a disappearance of Fe from the duodenal juice and indicates a retention of Fe in the body. R.'s findings indicate that Fe retention may have a mech. as well as a biol. cause. The Brugsch test is due to disso. Fe and Fe retention does not always parallel bile pigment or bile salt retention. The Brugsch reaction is of great clinical value as it gives a convenient method of detg. whether Fe is present or absent in the bile without having recourse to a duodenal sound. Harriet F. Holmes

**The ketones of the blood and urine of the cow and ewe in health and disease.** Jesse Sampson, A. C. Gonzaga and C. E. Hayden. *Cornell Veterinarian* 23, 184-207 (1933).—In a study of approx. 25 cases of milk fever in cows a fairly large no. showed a definite ketonuria. In 19 samples of urine from cows suffering from some disease other than milk fever the total ketones as acetone did not exceed 15 mg./100 cc.; the blood from these cows did not contain more than 6 mg. acetone per 100 cc. Studies on ewes indicated that there is a definite acetoneuria in cases of so-called pregnancy disease, and that a disturbance of the Ca metabolism is not the cause of the acidosis. Thirty-six references. K. D. Jacob

**Further observations on the functional pathology of pregnancy disease of ewes.** Lee M. Roderick, G. S. Harshfield and W. R. Merchant. *Cornell Veterinarian* 23, 348-53 (1933).—Detns. of the crude fat and moisture contents of the livers of ewes with pregnancy disease showed an enormous degree of fatty metamorphosis; although the percentage moisture content of the liver as a whole decreased markedly there was no reduction in the total amt. of moisture. The glycogen content of the liver was reduced to a fraction of its normal content, and the function of the liver, as measured by the ability promptly to remove rose bengal from the blood, was seriously impaired. Significant deviations in the cholesterol and amino acid contents of the blood did not occur. K. D. Jacob

**Acetonemia, and acetonemia with parturient paresis.** C. E. Hayden, M. G. Fincher and Jesse Sampson. *Cornell Veterinarian* 23, 368-76 (1933).—Detns. of the sugar, serum Ca, total ketones and inorg. phosphate in the blood and urine of cows suffering from a disease that resembled parturient paresis gave little if any evidence that these cases were acetonemia, or acetonemia with milk fever. In most cases the concns. of ketone substances were within the normal range of the blood and urine of cows. In several

cases the Ca and inorg. phosphate contents of the blood were suggestive of milk fever. K. D. Jacob

**Chemical blood studies. III. Comparative studies on laked and unlaked blood filtrates of sheep in health and during heartwater (Rickettsia ruminantium infection) and bluetongue (catarrhal fever).** H. Graf. (*Onderstepoort J. Vet. Sci.* 1, 285-334 (1933).—In heartwater the concns. of sugar, nonprotein N and urea N in both laked and unlaked blood filtrates are higher than those in normal blood. The total creatinine N shows a tendency to decrease, with a rise in some cases just before death. The hemoglobin content varies, but is generally in the direction of a decrease. In bluetongue of sheep there is generally an increase in the sugar, nonprotein N and urea N of the blood. In severe cases a decrease in hemoglobin and a corresponding decrease in total N occur. The degree of the variations corresponds approx. to the severity of the disease. **IV. Comparative studies on laked and unlaked blood filtrates of horses in health and during horse sickness (Pestis equorum).** *Ibid.* 335-69.—No definite change in the compn. of the blood occurs during horse sickness. **V. Comparative studies on laked and unlaked blood filtrates of bovines in health and during anaplasmosis (A. marginale infection) and piroplasmiasis (P. bigemini infection).** *Ibid.* 371-401.—In anaplasmosis the hemoglobin and total N contents of the blood decrease markedly; the uric acid N also decreases. Striking increases occur in the nonprotein and urea N, with less marked though well-defined increases in the sugar level. The amino acid and rest N increase shortly before death in fatal cases. In the only case of piroplasmiasis studied, marked increases occurred in nearly all the nitrogenous constituents and the sugar of the blood, assocd. with the period of max. erythrocyte destruction. K. D. J.

**Mineral metabolism in renal disease. II. Excretion of minerals in the urine on diets high in potassium and sodium.** Hans Glatzel. *Z. ges. expil. Med.* 86, 103-29 (1933); cf. C. A. 27, 3986, 4577.—The excretion of minerals depends mainly on the anion-cation balance of the diet. In renal disease the concn. power of the kidney is somewhat limited. Milton Levy

**Iron in anemia. III. Iron in the urine.** A. Hermann Müller. *Z. ges. expil. Med.* 91, 463-70 (1933); cf. C. A. 27, 3986.—Healthy urine contains not over 2 mg. Fe in 24 hrs. Fever has no effect. In secondary and pernicious anemias a small increase above normal occurs. Normal amts. of Fe in the diet do not influence the urine Fe but 1 g. of reduced Fe per os causes a prompt increase in Fe in the urine. **IV. The effect of alimentary iron on the iron balance in untreated secondary and pernicious anemias.** *Ibid.* 579-84.—In secondary and pernicious anemias the Fe balance is pos. The retention depends on the intake but is not related to the clinical picture, hemoglobin content, erythrocyte count, color index or concn. of Fe in blood. **V. Iron balance in secondary anemia on liver therapy.** *Ibid.* 585-92.—In the treatment of secondary anemia with liver ext. less Fe is retained than in untreated cases. The Fe balance may even become neg. M. L.

**Mineral metabolism in renal disease. IV. Mineral excretion of normal people after long periods on diets containing equivalent amounts of potassium and sodium chlorides.** **V. Mineral excretion in renal disease under the same conditions.** Hans Glatzel and Walter Mecke. *Z. ges. expil. Med.* 91, 504-22, 522-38.—Cf. C. A. 27, 3986. Milton Levy

**Calcium and cholesterol in blood and in bladder bile in cholelithiasis and cholecystitis.** Mario Cattaneo. *Z. ges. expil. Med.* 91, 683-8 (1933). Milton Levy

**Gastric tetany.** Rudolf Klingner. *Z. ges. expil. Med.* 92, 129-46 (1933).—Four cases of persistent vomiting were studied. Characteristic hypochloremia, hyperazotemia and high alkali reserve were observed. In one case a 13-day balance expt. shows the restoration of the normal blood picture during parenteral absorption of water and NaCl. Milton Levy

**Renal resorptive hyperazotemia.** Giovanni Ferro-Luzzi. *Z. ges. expil. Med.* 92, 382-8 (1933).—Hyperazotemia without creatinine retention can be observed.

**The normal resistance of kidney tubules to the diffusion of urea is impaired.** Milton Levy

**Ketonemia in rabbits.** Liselotte Kallós-Defner. *Z. ges. expil. Med.* 92, 389-93 (1933).—In starvation acetone bodies appear in the blood of rabbits in considerable quantities. Low atm. pressures produce ketonemia. Milton Levy

**Acidosis: Acid intoxication or acorbia.** Y. Henderson and L. A. Greenberg. *Am. J. Physiol.* 107, 37-48 (1934).—Dogs breathing air of 7-8% O showed the same bicarbonate content of the blood and the same respiration response whether or not they had received moniodoacetic acid; hence the formation of lactic acid is not the cause of the increase of breathing and decrease of bicarbonates. The supply of O<sub>2</sub> is the principal factor influencing the sensitivity of the neuro-respiratory mechanism. A slight deficiency of O increases the sensitivity. Extreme deficiency diminishes the sensitivity so that an abnormally strong stimulus is required to excite activity. J. F. Lyman

**The respiratory quotient, oxygen consumption and glycogen content of the mammalian heart in agluemia.** B. W. H. Cruickshank and C. W. Startup. *J. Physiol.* 80, 179-92 (1933); cf. C. A. 27, 4303.—The gaseous metabolism of the isolated dog heart was detd. when perfused with sugar-free blood, kept so by the frequent addn. of insulin. The glycogen content of the heart does not change. O consumption is at about the normal rate, but the CO<sub>2</sub>/O ratio falls to 0.7, indicating purely fat metabolism. There is evidence of a brief transitional stage between the utilization of carbohydrate and that of fat, during which protein is metabolized. J. F. Lyman

**The presence of agglutinins in milk.** Antonio Colavecchio. *Boll. soc. ital. biol. sper.* 8, 1410-12 (1933).—The milk of lactating women does not react any differently from the milk of normal women toward the red corpuscles of normal or luetic individuals. Human milk, whether under physiol. or pathol. conditions, has a hemagglutinating power which follows the biol. law of blood serum in so far as it relates to blood groupings. Peter Masucci

**The antigenic power of the corneal parenchyma.** Bruno Pister. *Boll. soc. ital. biol. sper.* 8, 1407-9 (1933).—Guinea pigs were sensitized by injecting them intracorneally with a finely divided suspension of guinea pig corneal tissue. A shocking dose was administered in the same way 14 days later. A grayish disk immediately formed in the cornea as in the 1st injection which disappeared within 48 hrs. The animals showed no local or systemic symptoms of anaphylaxis. Peter Masucci

**Complement in the blood of pigeons.** Giuseppe Brotzu and Ernesto Nussbächer. *Boll. soc. ital. biol. sper.* 8, 1435-8 (1933).—By a special technic, it can be shown that certain species of pigeons contain complement in their blood serum; the titer is very low. Peter Masucci

**Curves showing the "inhibition phenomenon" in urine and spinal fluid under various febrile conditions.** A. Donaggio. *Boll. soc. ital. biol. sper.* 8, 1459-62 (1933).—After the injection of chem. substances having pyrogenic properties (S, proteins, vaccines, etc.), the reaction is not revealed by the urine or spinal fluid until 24-36 hrs. after the injection or 12-24 hrs. after the onset of fever. Phys. agents, such as general diathermy, do not show this latent period. Malarial pyrogenesis causes the reaction to appear in urine a few hrs. before the onset of fever. Urine or spinal fluid which gives a pos. "inhibition reaction" loses this property if dialyzed or if mixed with kaolin or animal charcoal and filtered. Peter Masucci

**Donaggio's "inhibition phenomenon" in the urine and in the spinal fluid of neuro and psychopathic individuals.** Gastone Canziani and Vito Longo. *Boll. soc. ital. biol. sper.* 8, 1476-8 (1933).—Normal individuals gave a neg. Donaggio reaction; a delayed pptn. of the thionine occasionally was noted. Individuals in the febrile state (malaria, suppurative processes) gave a pos. D. reaction. There was a close parallelism between the D. and Buscaino reaction. Epileptics only in convulsions gave a pos. reaction; otherwise, they gave a neg. reaction. De-

mentia precox and neuropsychopathic cases always gave a neg. D. reaction. Peter Masucci

The possibility of separating complement from serum by adsorption and elution. F. Ferranti. *Boll. soc. ital. biol. sper.* 8, 1508-10(1933).—The solns. necessary are: (1) Na borate 1%; (2) casein 2%; (3) buffer consisting of 82 g. Na acetate and 60 g. AcOH in 1 l. H<sub>2</sub>O; (4) dil. buffer obtained by dilg. soln. (3) 100 times. Place 1 cc. of fresh guinea-pig serum in a 10-cc. centrifuge tube and add 1 cc. of soln. (2). Mix and ppt. the casein by adding 0.40 cc. of soln. (3). Centrifuge, discard supernatant liquid and wash the ppt. one or more times with soln. (4); to the final ppt. add 0.50 cc. of soln. (1); make up to 1 cc. with physiol. saline. Test for complement activity. Casein added to fresh guinea-pig serum and treated as described has complement activity. Peter Masucci

Renal glutathione in toxic nephritis from uranium salts. Michele Vetri. *Boll. soc. ital. biol. sper.* 8, 1542-5 (1933).—Glutathione was detd. in the kidneys of normal albino rats which had been injected with 5-30 mg. U per kg. The av. glutathione content in the normal kidneys was 144.6 mg. per 100 g. of tissue; that of kidneys from rats treated with U was 76.42-124.3 mg. % (64-112 hrs. after the injection). Peter Masucci

Changes in the electrolyte content of blood serum during inanition. D. Torrisi. *Boll. soc. ital. biol. sper.* 8, 1546-7(1933). Peter Masucci

Relations between lipoids and immunological reactions of ophiotoxins. V. Gronchi. *Boll. soc. ital. biol. sper.* 8, 1593-6(1933).—Lyocetthin does not possess the property of producing in rabbits or guinea pigs any immunological reactions; it plays no part in the immunological reactions produced by ophiotoxins. Peter Masucci

Changes in the serum protein as an index for liver function in hepatic disturbances. Aldo Cionini. *Arch. sci. med.* 57, 341-88(1933).—The serum globulin is increased in chronic liver insufficiency, whereas the albumin is diminished. The disturbance is in parallelism with the severity of the symptoms. At a const. ratio of both, a low abs. value indicates a more progressive injury than a higher value. A. E. Meyer

Bilirubinemia I. Methods. Giorgio Dominici and Giorgio Marengo. *Arch. sci. med.* 57, 505-22(1933).—A description. II. The mechanism of the diazo reaction. *Ibid.* 523-66. III. Bilirubinemia in the first days of life and pathogenesis of the jaundice of the newborn. *Ibid.* 569-93. A. E. Meyer

Alterations of the mineral equilibrium in the blood in nephropathy with special reference to true uremia. Renato Molfese and Domenico De-Alessi. *Arch. sci. med.* 57, 594-610(1933); cf. C. A. 28, 2084.—Report of laboratory findings in a no. of cases. A. E. Meyer

Carbohydrate metabolism in cholelithiasis and its complications. Franco Molino. *Arch. sci. med.* 57, 611-40(1933).—A slight hyperglucemia is frequently found in lithiasis without symptoms. The glucemia of fasting may or may not be increased in acute cases, but the glucemic curve is almost constantly high and prolonged. Icteric cases show frequently increased blood sugar from the beginning. In colics, elevations up to glucosuria have been observed, though the fasting blood sugar is not const. A. E. Meyer

The influence of hemorrhage on some biochemical components of the blood and on the acid-base equilibrium in hypertension. R. Scotti-Douglas and R. Martinetti. *Arch. sci. med.* 57, 673-94(1933).—The acid-base equil. is influenced toward the acid side, but this is of short duration and frequently followed later on by a slight alkalosis. The urea level in the blood is lowered. A. E. Meyer

The significance of fatty substances in the kidney in pathological conditions. C. Cioni and L. Franceschi-Buchicchi. *Arch. sci. med.* 57, 705-24(1933). A. E. M.

Acid-base equilibrium in the sick infant. L. Ribadeau-Dumas, Max Lévy and Suzanne Mignon. *Bull. acad. med.* 110, 416-19(1933). A. E. Meyer

Hypochloremia and azotemia as a consequence of vomiting in pregnancy. A. Schwaab and P. Walther. *Presse méd.* 41, 874-6(1933). A. E. Meyer

Epilepsy and hypoglycemia. Ph. Pagniez. *Presse méd.* 41, 876-8(1933). A. E. Meyer

Nitrogen metabolism and acidosis in relation to vomiting in pregnancy. Marcel Labbé. *Presse méd.* 41, 921-2(1933). A. E. Meyer

Complement and snake poisons. J. Velard and M. Vianna. *Rev. med.-Chirurg. Brasil.* 41, No. 10(1933); *Rev. sud-americana endocrinol. immunol. quimioterap.* 17, 82-3(1934).—The venoms of *Lachesis* and *Trimeresurus* destroy the action of complement; however, the different species vary considerably. *Naja tripudians* is less active; *Crotalus terrificus* and *Vipera aspis* have no influence on the complement. The destructive action is developed by incubation for 15 min. The venom itself remains unchanged in every respect. A. E. Meyer

The preputiary syndrome of basophilism. Basophilia. E. B. del Castillo, N. Contreras Ortiz and J. Reforzo Membreives. *Semaná méd.* (Buenos Aires) 1934, 1, 234-9.—Description of a case. A. E. Meyer

Postoperative acidosis and ketonuria. Fredrik Roscher. *Acta Med. Scand., Suppl. XXIX*, 303 pp.(1933).—

This monograph contains a discussion of the maintenance of the acid-base balance of the organism and the origin of acidosis, also a description of the biochem. changes in carbohydrate, fat and protein metabolism assocd. with postoperative acidosis and ketonuria. A moderate ketonuria is an immediate sequel of most operations performed under narcosis but is a rare occurrence in operations under local anesthesia. Studies were made on both blood and urine in postoperative conditions after narcosis or local anesthesia. The reaction of the human organism to operations under narcosis is almost stereotyped. There is a deviation of the acid-base balance in an acidotic direction, the development of the acidosis beginning with the initiation of narcosis and gradually increasing during the operation. This is nearly completely compensated within 24 hrs. after the operation, and occasionally this compensation brings about secondarily a deviation to the alkalotic side. The urinary changes furnish corroborative evidence, the titratable acidity increasing considerably in most instances during 24 hrs. postoperatively, then gradually decreasing, accompanied by corresponding changes in the NH<sub>4</sub> excretion. The total base excretion generally decreases immediately after an operation. In operations performed under narcosis there is an increase in the blood sugar of 50-80%, but under local anesthesia there is no hyperglucemic reaction or only a very slight one. Under spinal anesthesia the blood sugar likewise rises slightly. The hyperglucemic reaction to narcosis begins even before the operation begins and gradually reaches a max. at its termination. In most cases the normal sugar level is reestablished in about 24 hrs. In expts. on rabbits, in which ether or ClHCl<sub>2</sub> narcosis is used as well as procaine-adrenaline anesthesia a decrease in liver glycogen was found which varied directly with the duration and the quantity of anesthetic administered. As similar decrease of glycogen is also observed in the heart muscle it is thought that the glycogen mobilization is general, but in addn. the carbohydrate metabolism is likewise reduced. Under narcosis there has always been an abnormally high N excretion postoperatively, which is generally not found after uncomplicated operations under local anesthesia. The high N excretion usually becomes manifest 48 hrs. after the operation, and even after 8-10 days may constitute 20-30 g. per day. In the blood the nonprotein N increases very slightly shortly after the operation. There is likewise a rise in the blood fat and lipid content, with an increased fat in the liver parenchyma, to which the postoperative ketosis is attributed. In adults, after operation under narcosis, there is always moderate and variable ketonuria, but in children this was much more pronounced and at times to a surprisingly severe degree. In children the ketosis is always accompanied by hyperglucemia, and where the condition is very alarming the use of a combination of insulin and glucose is recommended in these cases. S. Morgulis

The other number of serum. Franz Seelich. *Biochem. Z.* 268, 34-45(1934).—Serum has the property of

taking up successive quantities of ether and forming on shaking a transparent, elastic gelatinous mass. This quantity of ether which can be taken by 1 cc. serum is reproducible and limited. This constitutes the "ether no." It represents a phenomenon of emulsification similar to that observed when aq. solns. of Na oleate and glycocholate are shaken with ether. The ether no. decreases when the serum is heated to 52° and the ether-serum interfacial tension rises at the same time. With an aq. Na oleate soln. the emulsifying quantity of ether depends only on the amt. of dissolved substance but not on the concn. of the soln. whereas with Na glycocholate both quantity and concn. are determining factors. Normal horse serum shows upon diln. the same behavior as does an aq. soln. of Na glycocholate. When heated for 10 min. at 57° the ether no. of normal horse serum increases. This increase depends upon the CO<sub>2</sub> content of the dilg. fluid. The lowered ether no. of serum previously heated to 50° can be partly restored by treatment with CO<sub>2</sub> but this effect becomes progressively less and fails completely as the temp. is raised up to 55°. S. M.

**Effect of temporary bile stagnation on the bilirubin content of rabbit serum and its influence on the number of erythrocytes.** A. Vischer. *Biochem. Z.* 268, 116-20 (1934).—In normal rabbits the serum bilirubin value does not exceed 0.1 mg. %, but on clamping off the ductus choledochus this rises to 0.155 mg. % in 2 hrs., to 0.2 mg. % in 3 hrs. and in 24 hrs. reaches 0.9 mg. %. Normal bilirubin values are found again 24 hrs. after the release of the bile stagnation. The serum bilirubin concn. of 0.1 to 0.2 mg. % causes a rise in the number of red blood cells, but in concn. greater than 0.2 mg. % it brings about a decrease. S. Morgulis

**The calcium-phosphorus ratio in rickets.** G. Mouriquand and A. Leulier. *Compt. rend.* 198, 208-10 (1934).—Human milk contained 842 mg. of Ca per l. and 468 mg. of P. Cow milk contained 1599 mg. of Ca and 974 mg. of P per l. These results are obtained on ash and may not show the portions of Ca and P present in the original combinations in milk. Cow milk is apparently more rachitogenic than human milk. James C. Munch

**Hepatic complications in the treatment of syphilis. The rose bengal test as a means of detecting disturbances of liver function and its use as a guide in the therapy of syphilis.** Gerson R. Hiskind, Norman N. Epstein and Wm. J. Kerr. *Ann. Internal Med.* 7, 906-80 (1934). The test is useful. John T. Myers

**Hypoglycemia and hyperinsulinism.** Milo K. Tedstrom. *Ann. Internal Med.* 7, 1013-25 (1934). John T. Myers

**Absorption in intestinal obstruction.** R. Russel Best, Lyle A. Newton and Roy Meidinger. *Arch. Surg.* 27, 1080-6 (1933).—There was no appreciable change in the rate of absorption of methylene blue above and below intestinal obstruction in dogs, suggesting that increased absorption above an obstruction is not the cause of death. John T. Myers

**Hyperinsulinemia secondary to an adenoma of the pancreas.** Lloyd I. Ross and John M. Tomasch. *Arch. Surg.* 28, 223-31 (1934). John T. Myers

**Pathogenesis of acute pancreatitis (acute pancreatic necrosis).** Lester R. Dragstedt, H. R. Haymond and James C. Ellis. *Arch. Surg.* 28, 232-91 (1934).—The end products of the partial or complete digestion of the pancreas by active pancreatic juice are not sufficiently toxic, if placed in the peritoneal cavity, to cause death. The *in vivo* autolysis of sterile fetal pancreas and the intraperitoneal digestion of autoclaved pancreas by sterile pancreatic juice did not produce toxemia. The toxemia resulting from exptl. *in vivo* autolysis of the pancreas is chiefly due to the presence of fecal proteolytic organisms which proliferate in the pancreatic tissue, and produce amines and similar substances from protein decomposition. The toxin of *B. welchii* may contribute slightly. John T. Myers

**A new approach to the chemistry of immunity.** A. E. Stearn. *J. Bact.* 27, 88-9 (1934).—An attempt was made to apply quantum mech. considerations in calcg. the

potential energies of arbitrarily chosen configurations of certain groups. This may afford a method of studying immunochemistry. John T. Myers

**The chemo-immunological properties of the specific capsular polysaccharide of pneumococcus Type I.** Oswald T. Avery and Walther F. Goebel. *J. Bact.* 27, 89-90 (1934).—The Ac polysaccharide absorbs from Type I pneumococcus serum all type sp. precipitins, agglutinins and protective antibodies. Used as an antigen it produces Type I sp. immunity in mice, but not in rabbits. The Ac polysaccharide is readily converted into its deacetylated deriv. by treatment with dil. alkali. The deacetylated form is nonantigenic and functions solely as a hapten. John T. Myers

**The distribution of the immunizing antigen in the pneumococcus.** Lloyd D. Felton. *J. Bact.* 27, 90 (1934); cf. *C. A.* 27, 1673.—Only about 10% of the immunizing activity of the cell substance remains in the acid-insol. fraction. The sepn. of the acid-sol. fraction into alc.-sol. and alc.-insol. fractions gave fractions which varied in immunizing activity. John T. Myers

**The influence of the molecular weight of antigen on the proportion of antibody to antigen in precipitates.** Sanford B. Hooker and Wm. C. Boyd. *J. Bact.* 27, 91-2 (1934). The ratio antigen:antibody in ppt. formed at the equivalence point differs widely in different systems. To account for these differences, it is assumed that at the equivalence point the antigenic mol. is just completely covered by mols. of antibody. The mol. wt. can be calcd. from the above ratio. John T. Myers

**Serum reactions in the disimmunized state.** Reuben L. Kahn and Elizabeth B. McDermott. *J. Bact.* 27, 94 (1934).—It is likely that the difference between agglutinin and precipitin reactions in the disimmunized state is largely due to the difference between the total reacting surface of the minute colloidal particles of the protein antigen and the comparatively large surface of the bacterial antigen. The former could absorb relatively much more precipitin. John T. Myers

**The antigenic value of unprecipitated and alum-precipitated tetanus toxoid.** D. H. Hergey and S. Etris. *J. Bact.* 27, 95-6 (1934).—The alum-pptd. toxoid seems more active as an antigen. John T. Myers

**The antigenic structure of Staphylococcus aureus and its variants.** Rachel E. Hoffstadt, Guy P. Youmans and Wesley Clark. *J. Bact.* 27, 97-8 (1934). No univalent salt agglutinated any strain or variant. Bivalent salts of Pb, Cu and Fe and all trivalent salts in some concn. agglutinated all strains. High concns. of Al and Cr retarded agglutination of all forms. John T. Myers

**The adjustment of the blood volume after transfusion.** A. E. Boycott and C. L. Oakley. *J. Path. Bact.* 38, 91 (1934).—The plasma vol. returns to normal in 2 or 3 days, but the blood vol. remains too large by the vol. of the injected erythrocytes, which are not destroyed. Most of the injected plasma proteins disappear from the blood. John T. Myers

**The porphyrins in human disease.** R. Mason, Cyril Courville and E. Ziskind. *Medicine* 12, 355-430 (1933)

A general review of the chemistry of the natural and artificial porphyrins is given. Their occurrence in the urine, methods for detecting them by means of photosensitivity and fluorescence, the various clinical features accompanying hematuria, the pathol. anatomy, pathogenesis and treatment are discussed. F. B. S.

**Diphtheria toxin and antitoxin. Determination of formaldehyde and methods by which it can be removed from anatoxin.** Saburo Suzuki. *Kiobato Arch. Exptl. Med.* 10, 267-78 (1933).—The flocculation between toxin and antitoxin is a sp. reaction. Anatoxin also flocculates with antitoxin. The flocculation-product, substance can be sepd. from diphtheria toxin by pptn. with alc. or (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, the latter giving a product which retains its toxicity for over 3 years. The flocculation occurs only at a certain concn. of toxin or anatoxin and does not, therefore, follow the law of multiples. A method is given for detg. the units of low immune sera.

$\text{CH}_2\text{O}$  could not be detected in purified anatoxin by the dimedon method.

**Chloruremia in burns.** A. G. Chiariello. *Ann. ital. chir.* 12, 787(1933); *J. Am. Med. Assoc.* 101, 961.—A drop in the chloride content of the blood occurred in experimentally produced burns in dogs. This diminution in chlorides is proportional to the size and degree of the burn. Improvement following intravenous hypertonic saline is not due to replacement of the chlorides but to elimination of toxic products due to the diuresis caused by the intravenous soln.

**Halogen balance of blood, spinal fluid and urine in patients with convulsive states on bromide-chloride therapy.** J. Notkin, Teresa Garcia and John A. Killian. *Arch. Neurol. Psychiatry* 30, 114-22(1933).—Relative concns. of Br and Cl in whole blood, plasma, spinal fluid and urine were detd. in a group of epileptic patients who had been receiving bromide-chloride therapy for 1 year or more. The distribution of Br between blood cells and plasma was similar to that of Cl, and the total halogens of plasma did not exceed the normal level for Cl while in the cells the total halogen content was 15-36% above the av. normal for Cl. The concn. of Br in spinal fluid was less than that in whole blood while the Br-Cl ratio of urine as contrasted to that of blood varied between plus 4 and minus 67% of the blood ratio. These changes in halogen balance occurred within 24 hrs. after the therapy was started and Br could be detected in these fluids for 44 days after cessation of therapy. The Cl is apparently replaced by Br in plasma and in spinal fluid but in blood cells addn. as well as substitution effects may take place.

**Chemical investigations and new theories on immunity.** Felix Haurowitz. *Med. Klin.* 29, 936-9(1933).—A discussion of the recent advances in the chemistry of antigens and antibody formation and their compn.

**Carbohydrate production from fat with special reference to diabetes.** Margaret Dänm. *Yale J. Biol. Med.* 5, 359-72(1933).—From a review of the literature D. concludes that the interpretation of the R. Q. and the D. N ratio as well as fat-feeding expts. in normal animals favors the view of noncombustion of carbohydrates during diabetes.

**Lecithin in fractionation of antitoxic serum, and transformation of pseudo- to euglobulin.** I. Pirosky and F. Modern. *Anales asoc. quim. Argentina* 21, 142-8(1933). See *C. A.* 28, 818<sup>a</sup>.

**Carbohydrate metabolism in obstructive jaundice.** Sadao Nishigaki. *J. Chosen Med. Assoc.* 23, 550-63 (in English 34-6)(1933).—With rabbits and chickens with ligated common duct, sugar tolerance, glycogen content of the liver and muscle, blood bile acids and pancreatic hormones were detd. The results show that hypoglycemia in jaundice is partly due to an increase of bile acids in the blood, but chiefly due to hypersecretion of pancreatic hormones, and the decrease of the liver glycogen.

**Bile acids. I. Bile acid content of the blood of patients suffering from hepatic and biliary diseases.** Shosen Roku and Kogyoku Gon. *J. Chosen Med. Assoc.* 23, 1075-96 (in German 87-8)(1933). Analysis of the normal blood with Szirald's method gave 0.626-4.106, av. 1.298 for the corpuscle, 1.080-17.850, av. 5.080 for the plasma, and 0.517-10.629, av. 2.912 for the whole blood in mg. %. The value for non-hepatic cases, and hepatic and biliary cases without jaundice falls within the normal variations. With jaundice, bile acids increase, but later fall to normal. In fatal cases, bile acids often fall below normal. Both urine and spinal fluids of the normal human being contain bile acids. **II. Effect of food on blood bile acids.** *Ibid.* 1365-81 (in German 111-12).—Regardless of the kind of diets, food intake reduces the normal blood bile acids. This increase does not occur in the blood of hepatic and biliary cases. In obstructive jaundice, the meal may increase blood bile acids. The variation of blood bile acid is under the control of hepatic function.

**Clinical and experimental studies on xanthoproteic reaction of the blood of hepatic disorders.** H. Inoue.

*J. Chosen Med. Assoc.* 23, 1178-88 (in German 94)(1933).—With Becher's method (*C. A.* 20, 1666), the blood of the normal human being (15 cases) gave the xanthoproteic value 14-24, av. 19; and that of hepatic patients (40 cases), 12-46, av. 22, the blood of a secondary atrophic liver case and coma being the highest. The blood of the normal dog gave 12-24, av. 18, which rose when Eck fistula was produced. With Eck fistula and ligation of the hepatic artery together, still greater values were obtained. The great increase of xanthoproteic value in the case of hepatic coma is due to interference of the detoxicating function of the liver accompanied with an increased decompn. of body protein.

**Metabolism in hepatic diseases. I. Total nitrogen and nonprotein nitrogen.** Susumu Nakao, Yohitsu Kin and Shichimi Matsuzaki. *J. Chosen Med. Assoc.* 23, 1758-86 (in German 135-6)(1933).—The total N content of the blood of hepatic patients (comatose and abscess excepted) is lower than the normal average due to anemia. In these 2 exceptions, there are marked increases. The ingestion of peptone or gelatin to healthy persons or patients with hepatic disorders causes an increase in blood and urinary N, but their return to normal is more rapid in the former, probably because of the different rates of absorption. In dogs poisoned with P, or with blocked bile duct, or Eck fistula with ligated hepatic artery, blood nonprotein N greatly increases, but not in the animal with Eck fistula alone. These different N distributions in hepatic cases have some diagnostic value, but should not be attributed to the change in protein metabolism.

**III. Amino acids.** Keitaro Tsushima. *Ibid.* 1348-64 (in German 110-11).—Blood amino N of the healthy Oriental is about the same as that of the Occidental, but urinary amino N is lower (av. 11.82 mg. %). There is no change in the amt. of these in simple jaundice, a slight increase in cancer and cirrhosis of the liver, and pronounced increase in the comatose. In hepatic disorders, rate of the return of amino N to normal values after ingestion of protein is much slower than in the normal individual, probably because of the delay in amino acid absorption. When the bile duct of the dog is ligated, amino N of the blood and urine increases; and their return to normal after ingestion of protein is exceedingly slow. The ingestion of peptone to Eck fistula dogs produces a very slight increase in amino N, but when the hepatic artery is ligated in addn. there is a large increase. **IV. Uric acid.** Hideo Inoue. *Ibid.* 1410-19 (in German 117).—There is no noticeable difference in uric acid contents between healthy and hepatic cases. In leucemia and advanced cases of cancer of the liver, both blood and urinary uric acid show a decided increase. The ingestion of peptone increases both in healthy and hepatic cases, but there is in the latter case a considerable delay in this increase and its elimination.

**The  $p_H$  of horses' blood in health and disease.** A. Meyer. *Arch. wiss. prakt. Tierheilkunde* 66, 512-20 (1933).—The normal  $p_H$  ranged from 7.38 to 7.56. Deviations from this were found in gastro-intestinal disease, in chronic heart and lung disease, in acute respiratory disease, in tetanus, in myoglobinuria, in agony and in morbus maculosus.

**The etiology of grass tetany: the influence of high protein intake.** B. Sjollem and L. Seekles. *Arch. wiss. prakt. Tierheilkunde* 66, 60-9(1933).—Cows kept on a very high protein diet (earth nut, soy and meat gluten) showed toxic symptoms resulting in some cases in death. The total blood N was increased; proteins, urea and amino acids were normal. The urinary constituents were markedly changed including high sugar excretion indicating kidney damage.

**Comparative antigenic studies on egg albumin denatured by intense audible sound and by other means.** E. W. Flosdorf and L. A. Chambers. *Am. J. Med. Sci.* 187, 294; *J. Bact.* 27, 92(1934); cf. *C. A.* 27, 4151.—Antigenic studies with the washed coagulum from treated albumin indicate an altered specificity and antigenic power similar to that produced by other means such as heating in an alk. or acid soln. Long treatment with the sonic vibrator redisperses the coagulated fraction into a very

opaquecent soln. which cannot be sepd. by centrifuging at ordinary speeds. This mixt. yields a ppt. both with anti-native-albumin and with antiheat-denatured-albumin rabbit sera. After subcutaneous immunization rabbits were tested for degree of immunization both by intradermal injection and by pptn. with the serum obtained after bleeding. Excellent agreement as to degree of immunization and to antigenic specificity was observed in the results of the Arthus phenomenon, after both types of testing. R. C. Willson

Andersen, William T.: Studies on Blood Sugar and Glycosuria in Exophthalmic Goitre. Translated from Danish. Copenhagen: Levin & Munksgaard. 206 pp. Reviewed in *J. Am. Med. Assoc.* 102, 870 (1934).

Labbe, Marcel: Le traitement du diabète. 4th ed., revised and enlarged. Paris: Masson & Cie. 206 pp. F 15.

## H - PHARMACOLOGY

A. N. RICHARDS

The toxicity of aluminum with respect to the method of administration. Gabriel Bertrand and P. Serbesco. *Compt. rend.* 198, 517-20 (1934).—Intraperitoneal injection of 100 mg. Al sulfate (1% soln.)/kg. body wt. in 5 rabbits gave av. survival time of 4 hrs. 44 min.; subcutaneous injection of 100 mg. 8 hrs. 9 min.; 125 mg. 6 hrs. 12 min.; 150 mg., 4 hrs. 31 min.; 400 mg. per os, 7 hrs. 7 min. Fifty mg. introduced directly into the stomach caused death in 4 of 5 rabbits in 33-49 days. Al introduced in food from cooking utensils is harmless. Philip D. Adams

Injections of acetylcholine in ulcera cruris varicosa. B. A. Hardenberg. *Nederland. Tijdschr. Geneeskunde* 77, II, 1778 83 (1933).—Neg. results were obtained in 30 cases. R. Beutner

Treatment of pemphigus vulgaris and of pemphigus chronicus recidivans (Dühring's disease) with Bayer 205. J. J. Zoom. *Nederland. Tijdschr. Geneeskunde* 77, II, 2419-30 (1933).—Reports on successful intravenous treatment with Bayer 205 of 1 case of pemphigus vulgaris and 6 cases of Dühring's disease. R. Beutner

The application of pernocton in eclampsia attacks. M. C. Boon v. Ochsée. *Nederland. Tijdschr. Geneeskunde* 77, II, 2810-16 (1933).—Favorable case reports. R. B.

Two fatal cases of lumbar anesthesia by means of percarine (nupercaine). E. Behr and A. Zeckel. *Nederland. Tijdschr. Geneeskunde* 77, III, 3405-7 (1933).—In 2 cases nupercaine, injected intraspinally, produced fatal lesions of the membranes and nerve roots of the cord. Histological exams. indicated that next to the general toxic action of nupercaine individual factors played a role. R. Beutner

Experience with a new intravenous narcotic sodium evipan. A. J. M. Duyzings. *Nederland. Tijdschr. Geneeskunde* 77, III, 3154-7 (1933).—Na evipan (cf. C. A. 27, 2216) is recommended for surgical narcosis; it should be administered intravenously. R. Beutner

Avertin in the pain crisis of blood-vessel spasm. Bertram M. Benheim and Raymond A. Taylor. *Ann. Surgery* 99, 550-3 (1934).—Favorable use of avertin in one case of blood-vessel spasm is described. R. B.

Treatment of hypochromic anemia with soluble ferrous salts. Harold W. Fullerton. *Edinburgh Med. J.* 41, 90-107 (1934).—FeSO<sub>4</sub> in a daily dose of 9 grains is a cheap and efficient method of treatment in hypochromic anemia. Rachel Brown

Diiodotyrosine and thyroid function. A. W. Elmer. *Quant. J. Exptl. Physiol.* 24, 95-9 (1934).—Hyperfunction in the thyroid of the guinea pig produced by thyrotropic hormone can be inhibited by the administration of diiodotyrosine (I). The same effect is produced by KI in equiv. dosage. I is easily broken down in the body and its effect is probably due to the nonsp. action of the liberated I. Rachel Brown

Mercury-laden air: the toxic concentration, the proportion absorbed and the urinary excretion. A. M. Fraser, K. I. Melville and R. L. Stehle. *J. Ind. Hyg.* 16, 77-91

(1934).—Dogs were used as the exptl. animals. A concn. of 1.89 mg. of Hg vapor per cu. m. of air, inhaled 8 hrs. daily during a period of 40 days, produced no ostensible evidence of Hg poisoning. The daily excretion of Hg was about 0.5 mg. for dogs weighing 12 kg. An average of 24% of the Hg in air contg. 2.91-26.18 mg. of Hg per cu. m. of inhaled air was absorbed. A. L. Elder

The effects of the inhalation of hydrogen fluoride. I. The response following exposure to high concentrations. Willard Machle, Frederick Thamann, Karl Kitzmiller and Jacob Cholak. *J. Ind. Hyg.* 16, 129-45 (1934).—Exposure to concns. of HF above 1.5 mg. per l. for any period of time is dangerous for rabbits and guinea pigs. Concns. of 1.0 mg. per l. and less caused no deaths in rabbits and guinea pigs exposed for as long as 30 min. although evidences of injury were definite. Concns. below 0.1 mg. per l. were tolerated by rabbits and guinea pigs for 5 hrs. without injury severe enough to produce death. 0.0245 mg. per l. caused no deaths in 6 animals exposed for 41 hrs. Data on other acid gases are conflicting but in magnitude of toxicity HF appears to be of the same order as HCl and SO<sub>2</sub>. Observations on the effects of sublethal exposures in animals should be carried out for at least 6 months and preferably 8 months after the period of exposure. A. L. Elder

Elimination of iodine after ingestion of diiodotyrosine. P. Sainton, F. Kayser and E. Anschel. *Compt. rend. soc. biol.* 115, 244-7 (1934); cf. C. A. 27, 3005. In normal persons 40-60% and in Basedow's disease 35-40% of the I in diiodotyrosine was eliminated in the urine during the period 2-36 hrs. after ingestion. L. E. Gilson

Effect of insulin on the metabolism of amino acids. P. de Nayer, A. Lacquet and J. P. Bouckaert. *Compt. rend. soc. biol.* 115, 437-8 (1934). When small doses of glycine were injected into rabbits the administration of insulin increased the rate at which it disappeared from the blood, but with large doses of glycine the rate of disappearance was slower in insulinized animals than in controls. L. E. Gilson

Action of vagotonin on cardiac rhythm. L. Merklen, R. Grandpierre and M. Vidacovitch. *Compt. rend. soc. biol.* 115, 475-7 (1934); cf. C. A. 28, 531. In dogs, vagotonin completely free from insulin caused a decrease of the cardiac rhythm whereas insulin completely free from vagotonin always caused an increase. Conflicts in the results of other workers on the cardiac action of insulin are probably due to the presence of more or less vagotonin in the preps. used. L. E. Gilson

Adrenaline and its ethylamine homolog (dihydroxyphenylethylamine) can provoke hypotension and renal vasoconstriction at the same time. Raymond-Hamet. *Compt. rend. soc. biol.* 115, 512-15 (1934). L. E. Gilson

Insulin hypoglycemia tests in obesity. Marcel Labbe and R. Boulin. *Compt. rend. soc. biol.* 115, 515-16 (1934). In obese non-diabetic cases the effects of insulin were practically the same as in normal subjects. L. E. G.

A ferric derivative of adrenaline of a probable quinone nature. Chemical preparation. Cardiac-renal action in rabbits. J. Paviot, F. Arloing, A. Mord, A. Jossier and A. Badinand. *Compt. rend. soc. biol.* 115, 517-21 (1934); cf. C. A. 28, 1101. Pulped bovine adrenals were treated with FeCl<sub>3</sub> and NH<sub>4</sub>OH in such proportions that a blue, very sol. compd., *adrenoferrine*, was formed. The compd. is about 1/4 as toxic as adrenaline. In rabbits it produced cardiac dilation, without hypertrophy of the myocardium, and often inflammatory nodules in the kidneys accompanied by hyperazotemia. Anatomical study of the renal lesions observed in normal rabbits and rabbits treated with adrenoferrine or adrenaline. F. Arloing, A. Jossier and M. Levrat. *Ibid.* 521-2. L. E. Gilson

Intravenous injections of hypertonic solution of magnesium for the treatment of migraine. Auguste Lumière and Paul Meyer. *Compt. rend. soc. biol.* 115, 534-6 (1934).—Five cc. 50% MgSO<sub>4</sub> soln. in 1-cc. installments about 1 min. apart gave prompt relief. A transient in-



crease in blood Cl was produced, and followed by diuresis and increased excretion of chlorides. L. E. Gilson

**Sparteine and the vasomotor reflexes of the carotid sinus.** Fernand Mercier, J. Delphaut and C. Rizzo. *Compt. rend. soc. biol.* 115, 544-6 (1934).—Sparteine has a depressive action on the reflexes. L. E. Gilson

**The carotid sinus and the respiration-stimulating action of some nicotine-like drugs.** Fernand Mercier, C. Rizzo and J. Delphaut. *Compt. rend. soc. biol.* 115, 546-9 (1934).—"Kinkiliba de Kita" (C. A. 27, 3751), Me<sub>2</sub>N and choline did not produce their usual stimulating effect on respiration in dogs after removal of the carotid sinus. L. E. Gilson

**Antagonism of curare and pilocarpine.** Raymond-Haniet. *Compt. rend. soc. biol.* 115, 602-4 (1934). L. E. Gilson

**Vagotonin and adrenaline-chloroform syncope.** D. Santenoise, L. Merklen, R. Grandpierre and M. Vidacovitch. *Compt. rend. soc. biol.* 115, 612-14 (1934); cf. C. A. 28, 1407<sup>8</sup>.—Vagotonin prevents the syncope, insulin does not. L. E. Gilson

**Action of potassium cyanide on the respiration of the dog with reference to the respiratory nerve centers and the reflex zones of the carotid sinus.** Lucien Camus, Henri Bédard and Félix P. Merklen. *Compt. rend. soc. biol.* 115, 614-18 (1934). L. E. Gilson

**Action of some diuretics of the purine series on the functioning of the blood-spinal fluid barrier.** L. Stern and G. Kussil. *Compt. rend. soc. biol.* 115, 625-7 (1934). Rats and cats were treated with xanthine, guanine, uric acid, theobromine, theophylline and diuretin. No effect on the permeability of the blood-spinal fluid barrier to K<sub>2</sub>Fe(CN)<sub>6</sub>, trypan blue or arspenamin, could be detected. L. E. Gilson

**Further investigation of the action of vagotonin on the parasympathetic system.** D. Santenoise, L. Merklen and M. Vidacovitch. *Compt. rend. soc. biol.* 115, 697-701 (1934); cf. C. A. 27, 338. L. E. Gilson

**A comparative study of adrenaline, sympathol and ephedrine.** E. Schilling and G. Kopp. *Deut. med. Wochschr.* 58, 1399-1401 (1932).—The pharmacodynamic reactions to sympathol are much less pronounced than those of adrenaline or ephedrine. Intramuscular injection of 180-240 mg. of sympathol produces only a slight pressor action; oral doses of 1-2 g. produce no effects. Arthur Grollman

**Rotenone a new parasiticide.** Douglas B. Crane. *Cornell Veterinarian* 23, 15-31 (1933).—Rotenone was nontoxic to dogs when given in ams. up to 0.2 g./kg. of body wt. Transitory gastritis and enteritis were caused by doses of 0.1-0.2 g. Doses of 0.05-0.20 g. caused no symptoms of motor paralysis in dogs of any age. Young dogs were less apt to be depressed or nauseated by very large doses than were old animals. Rotenone, at the rate of 0.05 g./kg. of body wt., was effective against the dog hookworm, *Ankylostoma canina*, and the roundworms, *Toxascaris limbalis* and *Belascaris marginata*; it was only moderately effective against the coccidium of dogs and was ineffective against canine tapeworms. In general, rotenone caused an unusually rapid recovery from follicular mange. The best results were obtained when the drug was administered after the animal had been starved for 18-24 hrs. Fourteen references. K. D. Jacob

**Uses of some drugs acting upon the circulatory system.** H. J. Mills. *Cornell Veterinarian* 23, 152-60 (1933).—A discussion of the physiol. effects of various chem. compds. on domestic animals. K. D. Jacobs

**The campaign against liver flukes in California and the results.** Robert Jay. *Cornell Veterinarian* 23, 272-9 (1933).—Sheep that were put on cultivated crops or on hand feeding after being grazed on sparse pasture frequently became stiff and moved with difficulty when they were treated with CCl<sub>4</sub> for control of the liver fluke. The symptoms were similar to those produced experimentally in dogs by repeated treatments with CCl<sub>4</sub> while on a Ca-deficient diet. However, the same symptoms appeared in sheep after being turned into feeds rich in Ca or after a change to feeds supplemented with Ca.

1 Complete control of *Galba bulimoides* in streams, pools and marshes was obtained by treating the water with CuSO<sub>4</sub>. K. D. Jacob

**Glucose therapy in a parturient disorder atypical of milk fever and resembling acetoneuria.** A. T. Gilyard and R. T. Gilyard. *Cornell Veterinarian* 23, 377-8 (1933).—Immediate and complete recovery from the disorder was obtained by injecting 1 l. of a 12% glucose soln. into the jugular veins of the cows. K. D. Jacob

**The chemotherapy of oesophagostomiasis in sheep.** H. O. Monnig. *Onderstepoort J. Vet. Sci.* 1, 67-76 (1933).—In general liquid and H<sub>2</sub>O-sol. drugs, with or without astringents and laxatives, were ineffective against the nodular worm, *Oesophagostomum columbianum*, in sheep. The best results were obtained with relatively insol. compds., which are most likely to reach the colon and which may apparently be ingested by the parasites. 3 As<sub>2</sub>S<sub>3</sub> and Na<sub>2</sub>SiF<sub>6</sub>, in doses of 0.25-1.3 g. and 1-4 g., resp., gave fairly good control and had no toxic effect on the sheep; the efficiency of As<sub>2</sub>S<sub>3</sub> seems to be reduced when it is used in combination with other inorg. compds. Certain compds. of Cu and Hg may be useful against the worms. K. D. Jacob

**The toxicity of sodium chlorate.** D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 157-62 (1933).—NaClO<sub>3</sub> in daily ams. up to 5 g. in a 10% soln. produced no ill effects on rabbits, but 10 g. in a single dose was either fatal or produced severe symptoms of poisoning. In sheep 3 daily doses of 15 g. each produced death 20 hrs. after administration of the last dose; two 30-g doses were fatal, whereas 20 daily doses of 7.5 g. produced only transient diarrhea and inappetence. A horse developed fairly severe symptoms of poisoning after the administration of 120 and 130 g. NaClO<sub>3</sub>, resp., whereas 60 g. produced only slight methemoglobinemia. Because of its low toxicity to animals, the use of NaClO<sub>3</sub> as a weed killer on pastures offers considerable promise. K. D. Jacob

**Recent investigations into the toxicity of known and unknown poisonous plants in the Union of South Africa.** D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 173-82 (1933); cf. C. A. 27, 5121. The plants *Psilocaulon abumile* N. E. Br. and *Chironia transvaalensis* Gilg., not previously known to be poisonous, were toxic to animals. K. D. Jacob

**Fungi in relation to health in man and animal.** D. G. Steyn. *Onderstepoort J. Vet. Sci.* 1, 183-212 (1933). The chemistry and symptoms of fungus poisoning are discussed. When it was administered by means of a stomach tube, the mold skin (60 g. over a period of 3 days) of *Fusarium moniliforme* var. *sub-glutinans* grown on Raulin's medium caused the death of rabbits in 4-14 days. Sixty-nine references. K. D. Jacob

**Photosensitization of animals in South Africa I. The action of various fluorescent dyestuffs.** J. I. Quin. *Onderstepoort J. Vet. Sci.* 1, 459-68 (1933).—Intravenous injection of 1 g. eosin, erythrosine or rose bengal into sheep and goats caused marked photosensitization within a few min. when the animals were exposed to sunlight; no effects were observed in the absence of sunlight, and in no case was there any derangement of the internal organs. Dyestuffs of the anthracene group gave no pos. results of photosensitization. In the acridine group, acriflavine produced marked light sensitivity which soon passed off. In the thiazine group, methylene blue, methylene violet and thionine produced marked sensitization of short duration and accompanied by hemolysis; the nonfluorescent methyl violet had no sensitizing effect. Injections of quinine salts did not photosensitize sheep but caused hemolysis and hemoglobinuria. II. The presence of a lethal factor in certain members of the plant genus *Tribulus*. Claude Rimington and J. I. Quin. *Ibid.* 469-89. See C. A. 28, 2056<sup>8</sup>. III. The photodynamic action of *Hypericum ethiopicum* var. *glaucescens* Sond. and *Hypericum leucoptychodes* (syn. *H. lanceolatum* Lam.). J. I. Quin. *Ibid.* 491-6. Dried pulverized *H. ethiopicum*, when drenched to Merino sheep, caused intense photosensitization and edematous swelling of the exposed parts of the skin; such affected skin later be-

came necrosed and was followed by sloughing. A deep-red fluorescent pigment, sol. in acetone, alc. and water was extd. from the dried plant; this pigment when injected into sheep caused well-marked photosensitization, but the symptoms were not accompanied by icterus and resembled those produced by hematoporphyrin. *H. leucoporphodes* caused a much weaker and delayed photosensitization. IV. The toxicity of *Lopholaena coriifolia* (Harv.) Phill. and C. A. Sm. (= *L. randii* sp. Moore). *Ibid.* 497-9.—*L. coriifolia* contains an active liver poison which, however, in drenching expts. did not cause geeldikkop in sheep. When it is ground in a mill, the dry material emits a peculiar resinous odor. V. The toxicity of *Lippia rehmanni* (Pears) and *Lippia pretoriensis* (Pears). *Ibid.* 501-4.—When they were drenched to sheep, both species caused photosensitization accompanied by icterus. *L. rehmanni* was much more toxic than *L. pretoriensis*. The toxic agent of *L. rehmanni* is sol. in 75% alc. VI. The effect of surgical obstruction of the normal bile flow. *Ibid.* 505-26.—Surgical obstruction of the extra-hepatic bile tracts in sheep caused photosensitization within 1 week when animals having closely shorn heads and backs were exposed to sunlight. The effects of administering  $\text{CCl}_4$ ,  $\text{CHCl}_3$ ,  $\text{AsH}_3$ ,  $\text{MnCl}_2$  and phenylhydrazine to sheep having surgically obstructed bile tracts are discussed.

K. D. Jacob

Rotenone, the effective constituent of derris root. XVI. The relative toxicities of rotenone, deguelin and rotenone resin. Chemical behavior of deguelin. Sankichi Takei and Shikuro Miyajima. *Bull. Inst. Phys.-Chem. Research (Tokyo)* 12, 946-52 (1933), cf. C. A. 28, 1039<sup>1</sup>.—Toward the mudfish, *Cobitis fossilis*, l- and dl-deguelin in 0.02-0.002% concn. have half the toxicity of rotenone in the same concn., while the toxicity of the deguelin in 0.001-0.0001% concn. is  $1/10$  to  $1/100$  that of rotenone. In 0.005, 0.0025 and 0.00125% rotenone, rotenone resin and artificial rotenone resin soln., *Cobitis fossilis* dies in 60, 79, 86; 64, 98, 113; 60, 91, 95 min., resp. l-Deguelin from rotenone resin, m. 166°, has  $[\alpha]_D^{25} - 23.22^\circ$ , *deguelin isoxime*, colorless, m. 149°. The catalytic hydrogenation of deguelin with Pd-BaSO<sub>4</sub> gives a dihydro deriv., m. 170°, identical with isodihydrorotenone from  $\beta$ -dihydrorotenone. On sapon. of deguelin with alc. alkali, there results  $\beta$ -tubaic acid,  $\text{C}_{17}\text{H}_{16}\text{O}_4$ , m. 161°, dihydro deriv.,  $\text{C}_{17}\text{H}_{18}\text{O}_4$ , m. 170°, identical with  $\beta$ -dihydrotubaic acid. Tl  $\beta$ -tubaate m. 201°. Also in *J. Agr. Chem. Soc. Japan* 10, 81 7 (1934).

K. K.

Effects of cigaret smoking upon the blood sugar. Howard W. Haggard and Leon A. Greenberg. *Science* 79, 165-6 (1934).—When the R. Q. is above 0.85 and the blood sugar above 0.13%, neither is changed by the smoking of a cigaret. When the R. Q. and blood-sugar levels are below these values, and especially when the fasting level has been reached, the values obtained after 15 min. may be 0.85 or 0.90 and 0.12 or 0.14%, resp. During the next 30 min., the values fall to, or below, those observed before the cigaret was smoked. The effect is due to nicotine.

W. D. Langley

The absorption of iodine through the skin and its fate in the organism. H. Anthes and F. Salzmann. *Z. ges. expil. Med.* 91, 100 5 (1933).—Bathing in KI soln. produced a rise in blood I which reached its max. 1.5-3 hrs. after the bath. The I did not appear in the urine.

Milton Levy

The effects of sulfide, sulfite and sulfate compounds on metabolism. M. Kojima. *Z. ges. expil. Med.* 91, 257-66 (1933); cf. C. A. 28, 832<sup>1</sup>.—Sulfides influence the oxidative processes as indicated by urinary C, N and "vacat-oxygen" to a greater extent than sulfites or sulfates. All produced transitory hyperglucemias in rabbits but the sulfides were much more effective than the others.

Milton Levy

Production of nephrosclerosis with tyramine. Ludwig Paunz. *Z. ges. expil. Med.* 91, 424-31 (1933).—Daily injection of tyramine for a year produced in dogs the histological picture of nephrosclerosis except for the absence of fat deposition.

Milton Levy

The effects of soporifics on blood sugar. J. Lerman.

*Z. ges. expil. Med.* 85, 536-46 (1932).—Barbituric acid derivs. generally lower glucemia. Chlorotone produces a rise and then a fall. Chloralose requires large doses to produce a lowering. Chloral, Formamidol and Dionin have no characteristic action.

Milton Levy

Phenol and indole metabolism. VI. Latent phenol and indole intoxication and adrenal hypertrophy. M. Biebl. *Z. ges. expil. Med.* 91, 822-37 (1933); cf. C. A. 27, 5422.

Milton Levy

Anterior hypophysis extracts and abnormal glycogen storage. H. Fasold. *Z. ges. expil. Med.* 92, 68-5 (1933).—A patient with disturbed glycogen storage was given praphyson. The blood sugar did not rise. Praphyson acts through adrenaline and these subjects are not sensitive to adrenaline. The result is expected. The excretion of ketone bodies increased. Praphyson has no value as a therapeutic agent in this disease.

Milton Levy

The effects of phenylhydrazine, phosphorus and arsenic poisonings on the lipoids and amino acids of blood. Sándor Láng and J. Starker. *Z. ges. expil. Med.* 92, 98-101 (1933); cf. C. A. 27, 3006, 5114.—In dogs phenylhydrazine poisoning was accompanied by a fall of amino acidemia and a rise of cholesterolemia. In chronic P poisoning the opposite is true. Arsenic has no regular effect.

Milton Levy

The effects of thyroid and bone marrow on plasma proteins. Sándor Láng. *Z. ges. expil. Med.* 92, 102-7 (1933).—Thyroid ext. and thyroxine do not produce changes in the plasma proteins except as they affect water content. Bone marrow ext. increases the albumin and globulin contents of plasma. Bone marrow is perhaps involved in the formation of plasma proteins.

Milton Levy

The effects of cholesterol and phlorizin on fat metabolism. The fat contents of the livers of cats and rabbits after injection of these substances. Hsienli Tseng. *Z. ges. expil. Med.* 92, 108 28 (1933).

Milton Levy

Physiology of creatine-creatinine metabolism. The treatment of muscular disease with glycine. A. Mader, E. Selter and R. Schellenberg. *Z. ges. expil. Med.* 92, 151-64 (1933).—In progressive muscular dystrophy the creatinine coeff. is low and creatine excretion above normal. Glycine had therapeutic effects in 2 cases.

Milton Levy

The pharmacology of lead. IX. The distribution of lead by the method of autohistodiagraphy. Behrend Behrens and Anny Baumann. *Z. ges. expil. Med.* 92, 241-50 (1933); cf. C. A. 26, 3272.—Radioactive Pb (Th B) was injected. The distribution could be followed by the radioactivity. Pb storage occurred particularly in the bones. Large quantities led to storage in the liver and spleen. X. The relation of lead storage to calcium metabolism. *Ibid.* 251-64.—Pb is always stored where mobilizable Ca exists.

Milton Levy

The effect of anti-prothrombin on erythrocyte resistance. Hans W. Schmidt. *Z. ges. expil. Med.* 92, 351-60 (1933). Anti-prothrombin prepps. increase the resistance of red cells to hypotonic NaCl.

Milton Levy

The fate of intravenous sodium chloride in normal and nephrotic men. Aldo Gandellini. *Z. ges. expil. Med.* 92, 361 6 (1933).—Injected NaCl is excreted by normal people but is partially stored in the tissues in nephrotic.

Milton Levy

The effect of carbon monoxide on tissue respiration. F. O. Schmitt and Mary G. Scott. *Am. J. Physiol.* 107, 85 93 (1934).—CO contg. 21% O has little effect on the consumption of skin, nerve, kidney or intestine, but produces definite accelerations with skeletal muscle, stomach, liver, spleen and particularly with heart muscle. Illumination causes partial, and in some cases complete, recovery of the CO-poisoned tissues, with some indication that the catalyst of CO combustion is also light-sensitive.

J. F. Lyman

Physiological effects of high-frequency current. V. The non-protein nitrogen partition and the secretion of urine in anesthetized dogs. J. W. Karr and E. S. Nassif. *Am. J. Physiol.* 107, 170-7 (1934); cf. C. A. 26, 4101. In fever caused by high-frequency current the urea, amino acid, creatinine and uric acid N fractions of the blood

maintain essentially the same relative concns. up to a rectal temp. of 42–44°. There is some evidence that protein metabolism, as judged by urea production, may be doubled, with no disturbance to the endogenous protein metabolism. Probably dehydration and damage to the kidneys are important factors in the loss of kidney function.

J. F. Lyman

The excretion of cyanol by the mammalian kidney. C. L. Cope. *J. Physiol.* 80, 253–60 (1933).—The dye "Cyanol extra" has the same clearance value in the normal mammalian kidney as does xylose. Under the action of phlorizin the cyanol clearance falls to about 42% of the xylose clearance.

J. F. Lyman

The behavior of liver glycogen during decerebration hyperglucemia and the influence of atropine and of ergotamine on this condition. M. Louisa Long. *J. Physiol.* 80, 206–204 (1933).—When liver glycogen is high in rabbits, atropine has only a slight retarding effect on the development of decerebration hyperglucemia. With both high- and low-liver glycogen ergotamine almost completely prevents the hyperglucemia without increasing blood lactic acid. There is no parallelism between the rate of glycogen disappearance from the liver and the rise in blood sugar after decerebration.

J. F. Lyman

The correlation between the action of insulin and adrenaline upon the muscle and liver glycogen. K. M. Daoud and H. A. F. Gohar. *J. Physiol.* 80, 314–22 (1933).

With intact rats, injection of insulin in convulsive doses causes an almost complete disappearance of liver glycogen and a considerable fall in muscle glycogen. In rats whose adrenals have been removed, insulin causes a similar loss of liver glycogen but has no effect upon the muscle glycogen. The depletion of muscle glycogen therefore can be brought about by insulin only indirectly through an increased activity of the adrenals.

J. F. Lyman

The effect of splanchnotomy and of phlorizin on decerebration hyperglucemia. M. G. Foster. *J. Physiol.* 80, 323–8 (1933).—Pontine decerebration in fasted rabbits, in which the splanchnic nerves have been cut several days previously, is not followed by an increase in blood sugar. Injection of phlorizin does not prevent decerebration hyperglucemia when the renal vessels are ligated, but does so when these are intact.

J. F. Lyman

Calcium tolerance in cats. J. L. D'Silva. *Proc. Physiol. Soc., J. Physiol.* 80, 6P (1933). Intravenous injection of  $\text{CaCl}_2$  into cats was highly toxic in some individuals while others showed a remarkable tolerance. Blood Ca was raised in one case to 53.5 mg. per 100 cc. plasma without fatal effects, suggesting that the Ca is in an inactive form in the blood.

J. F. Lyman

The influence of adrenaline on the blood potassium. J. L. D'Silva. *Proc. Physiol. Soc., J. Physiol.* 80, 7P (1933).—Intravenous injection of 0.5 cc.  $1/10,000$  adrenaline into cats caused a 65% increase in serum K which returned to normal within 15 min.

J. F. Lyman

Acclimatization of animals to 0.3% carbon monoxide in the inspired air. J. A. Campbell. *Proc. Physiol. Soc., J. Physiol.* 80, 11P (1933).—Young mice and rabbits exposed to CO in the air in gradually increasing concns. maintained body growth when inhaling as much as 0.3%. The CO tension in the tissues of these animals was 0.15%.

J. F. Lyman

The sensitization of leech muscle to barium by eserine. A. Vartiainen. *Proc. Physiol. Soc., J. Physiol.* 80, 21P (1933).—Eserine has some sensitizing action on the response of leech muscle to Ba, but this sensitization was not comparable with that to acetylcholine.

J. F. L.

The hemopoietic disturbances induced in the albino rat by administration of thyroxine. J. S. Latta and M. C. Renner. *Am. J. Anatomy* 54, 115–42 (1934).—The injection of thyroxine into rats changes the differential count probably because of the increased basal metabolism. Reticulated erythrocytes tend to increase as the injections progress. There is also an increase of about 10% in the neutrophilic leucocytes. The initial injection of thyroxine is followed by a decrease in the total no. of erythrocytes. More hemoglobin is found in the spleen in these cases.

C. M. McCoy

Diuresis caused by hyper-, iso- and hypotonic solutions of glucose in animals rendered nephritic by potassium dichromate. G. Ravasini and R. Da Prato. *Boll. soc. ital. biol. sper.* 8, 1371–2 (1933).—Rabbits were rendered nephritic with  $\text{K}_2\text{Cr}_2\text{O}_7$  and treated with various concns. of glucose. With a hypertonic soln. 4 N, diuresis was little or none; with a 3 N soln. about 90% of the vol. introduced was eliminated; with a 2 N soln. diuresis was abundant, being equal to about double the vol. of the soln. injected. With less concd. solns. the vol. of urine eliminated decreased in relation to the vol. of soln. introduced so that with 0.5 N soln. about 90% of the vol. introduced was eliminated. With iso- or hypotonic solns. only a few drops of urine were eliminated. The glucose eliminated was almost zero with the 4 N soln.; 5% with the 3 N; and with diminishing hypertonicity the amt. of glucose eliminated increased and reached 80% of the amt. introduced when the soln. was 0.5 N. With iso- and hypotonic solns. there was no elimination of glucose.

Peter Masucci

The diuresis caused by hyper-, iso- and hypotonic solutions of glucose in animals rendered nephritic by cantharidin. G. Ravasini and R. Da Prato. *Boll. soc. ital. biol. sper.* 8, 1372–3 (1933). Max. diuresis was obtained with a 4 N soln. of glucose; the vol. of urine eliminated was about triple that of the soln. injected. By diminishing the hypertonicity, the diuresis decreased proportionately so that with 0.5 N soln. the vol. of urine eliminated equaled the vol. of soln. introduced. With an isotonic soln. the vol. of urine eliminated was 70% and with hypotonic solns. it was 50–70% of the vol. injected. The amt. of glucose eliminated was about 20% of that introduced with a 4 N soln. and increased progressively with diminishing hypertonicity reaching 70% with 0.5 N soln. With an isotonic soln. the glucose eliminated was 37%, and with hypotonic solns. the amt. eliminated gradually decreased to almost zero.

P. M.

The action of acid and alkaline liquids on the movements and tone of the bladder. Giorgio Ravasini. *Boll. soc. ital. biol. sper.* 8, 1374–5 (1933).—Strips of isolated bladder of the rabbit and cat were subjected to solns. of varying pH values. Up to pH 9.4 the rabbit bladder maintained unchanged its tone and the frequency and amplitude of its movements; at pH 9.4–10.3 there was a distinct increase in the tone but the movements remained the same; at pH 10.4 there was an increase in the tone and a diminution of the amplitude and frequency of the movements. On the acid side, the tone and movements remained the same down to pH 5.8; below this (pH 4.4) the tone diminished and the movements disappeared completely. With alk. solns. the behavior of the cat bladder was the same as the rabbit but in acid solns. it was much more resistant than the rabbit.

Peter Masucci

Action of benzene in pregnancy. Gemma Barzilai. *Boll. soc. ital. biol. sper.* 8, 1388–92 (1933). Pregnant white mice showed a decreased resistance of their nervous system toward the narcotic effects of benzene; narcosis was reached in less time than the controls and recovery took longer time. The diminished resistance of the pregnant mice was especially evident when they were exposed to a benzene-air mixt. of 35–43 mg. per l.

Peter Masucci

Cause of the toxicity of methanol. Italo Samou. *Boll. soc. ital. biol. sper.* 8, 1376–9 (1933).—Exptl. data fail to support the view that the toxicity of MeOH is due to its products of oxidation ( $\text{HCOOH}$  and  $\text{HCOOH}$ ) in the animal body; instead, the toxicity is probably due to the unchanged MeOH mol. The action of MeOH on blood serum is distinctly different from that of EtOH or PrOH. The former ppt. the proteins fractionally, the latter in mass. EtOH and PrOH if left in contact with serum for some time and in doses which do not cause a pptn. of the proteins produce an increase in the viscosity of the serum, while MeOH does not produce this effect because it has the power of combining with the proteins and transforming them into a precipitable form.

P. M.

Variations in the chloremia of normal and thymectomized animals after intravenous injections of sodium chloride. P. Masucci. *Boll. soc. ital. biol. sper.* 8, 1379–

80(1933).—In thymectomized animals the chloremic curve showed higher values than in the normal animals. Max. values were found in animals that had been thymectomized 20 days.

**A positive Wassermann test after the injection of cinchophen preparations.** Dario Tuchten. *Boll. soc. ital. biol. sper.* 8, 1396-7(1933).—In certain individuals injected with Atophanil or Urosol, intravenously or intramuscularly, the Wassermann reaction of the blood became pos. and a few days after interrupting the treatment became neg. again. Five out of 100 patients treated with cinchophen gave this pos. reaction. In each case repeated serological tests before and after cinchophen treatment failed to show lues.

**The action of sympathetic and parasympathetic mimetic drugs on gaseous exchange.** VII. The action of nicotine. Alberto Cirimigna. *Boll. soc. ital. biol. sper.* 8, 1471-3 (1933); cf. C. A. 28, 1104<sup>a</sup>.—Nicotine does not modify appreciably the gaseous exchange in albino rats. It exerts no influence against the excitometabolic action of adrenaline or pilocarpine. The simultaneous injection of ergotamine and nicotine into normal rats causes a diminution in the gaseous metabolism identical to that caused by ergotamine alone. The simultaneous injection of ergotamine and nicotine into rats followed immediately by the injection of adrenaline causes a diminution of the excitometabolic action of the adrenaline but no different from that caused by ergotamine alone. Neither ergotamine nor nicotine nor both those substances, therefore, can block the excitometabolic action of adrenaline.

**The influence of acetylcholine on accommodation.** A. Santonastaso. *Boll. soc. ital. biol. sper.* 8, 1513-17(1933).—Studies were made on the refractive and accommodative state of the eye before and after the injection or instillation of acetylcholine with or without the addn. of atropine. The results lead to the conclusion that after the injection of acetylcholine there is a widening of the proximate point (P. P.) which is greater in individuals who make a continual use of their accommodation; the shifting of the P. P. is very likely to be attributed to various factors and especially to the action on the ciliary muscle and more particularly on the Brücke portion.

**The action of ricin on the isolated heart of the rabbit.** Riccardo Attimonelli. *Boll. soc. ital. biol. sper.* 8, 1525-8 (1933).—Ricin in doses of 0.5-3 g. per 100 cc. (in Locke-Lewis soln.) inhibits the activity of the isolated heart of the rabbit diminishing gradually the height of the contractions while the frequency remains practically unchanged except at the end of the cardiac activity. If the heart is then perfused with Locke-Lewis soln. alone, cardiac activity is not resumed; the heart stops.

**Experimental notes on poisoning by uranium salts.** Alberto Cannava. *Boll. soc. ital. biol. sper.* 8, 1551-5 (1933).—U poisoning was studied in relation to various doses and different routes of administration. The M. L. D. per kg. of rabbit was: hypodermically 4-10 mg.; intravenously, little difference was noted between the various doses; orally, 100 mg. was inactive, 200 mg. was barely active but 500 mg. was lethal. The course of the poisoning was the same regardless of the route of administration.

**The anti-oxygen-inhibiting action of thyroxine.** L. De Caro. *Boll. soc. ital. biol. sper.* 8, 1555-8(1933); cf. C. A. 27, 4727.—That the anti-oxygen-inhibiting action *in vitro* of thyroxine toward suspensions of carotene is independent of its hormone action has been confirmed experimentally. Three cc. of a benzene soln. of carotene contg. in all 0.0135 g. is mixed with 15 cc. linoleic acid; the benzene is removed by a warm current of O-free N and 5 cc. of this soln. is mixed with 50 cc. N NaOH and diluted to 125 cc. with water. To 20 cc. portions of this are added, resp.: (a) 20 cc. 0.04 N NaOH (control); (b) 20 cc. 0.01 M thyroxine in 0.04 N NaOH; (c) 20 cc. 0.01 M thyroxine in 0.04 N NaOH; (d) 20 cc. 0.01 M monomethylhydroquinone in 0.04 N NaOH. The color intensity of each soln. is detd. by a Pulfrich photometer

with an S 47 filter wave length 470 m. From the degree of decolorization of the solns. the degree of oxidation of the carotene is deduced. The results show not only the protective action of thyroxine, but even more pronounced that of thyronine and of monomethylhydroquinone on maintaining the coloration of carotene. This anti-oxygen capacity of thyroxine is probably due to the suppression of oxidizing catalysts such as Fe or Cu.

**The autoglucolytic, autolipolytic and glucolytic power of adipose tissue from thyroxinized dogs.** G. Scoz. *Boll. soc. ital. biol. sper.* 8, 1567-70(1933).—The expts. were made on dogs, before, during and after treatment with thyroxine. The methods used were those previously described by S. The results seem to affirm that the autoglucolytic power of adipose tissue increases in the animal treated with thyroxine during and after the treatment; the glucolytic power increases during the treatment; and the autolipolytic power probably decreases during the treatment and increases afterward.

**Antidotism between sodium thiosulfate, mercuric and mercurous salts.** E. Menghetti. *Boll. soc. ital. biol. sper.* 8, 1589-91(1933).—HgCl<sub>2</sub> and HgNO<sub>3</sub> were used. In the animal organism HgCl<sub>2</sub> circulates mostly as chlorinated Hg; HgNO<sub>3</sub> is transformed immediately into HgCl; Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> is oxidized mostly into sulfate, passing through the polythionate phase. Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> and HgCl<sub>2</sub>: No antidote action may be expected because HgS or Hg polythionates do not form. Instead, the following reactions may take place: (1) HgCl<sub>2</sub> + Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> = HgS<sub>2</sub>O<sub>4</sub> + 2NaCl (formation of a slightly sol. Hg salt); (2) HgCl<sub>2</sub> + 3Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> = Hg(S<sub>2</sub>O<sub>4</sub>)<sub>2</sub>Na<sub>4</sub> + 2NaCl (formation of a complex sol. Hg salt). In both reactions a decrease of Hg<sup>++</sup> ions is obtained compared to HgCl<sub>2</sub>. When HgCl<sub>2</sub> is still in the digestive tract, the 1st reaction may bring good results; the 2nd would prove harmful because Hg is extd. from the Hg-protein complexes and thus facilitates absorption. Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> and HgNO<sub>3</sub>: The 2 react to form metallic Hg, HgS and a complex sol. Hg<sub>2</sub>-Na salt. Since in every case HgNO<sub>3</sub> is transformed into HgCl, the following possibilities arise: (a) when HgNO<sub>3</sub> is in the subcutaneous or muscle tissues or in the gastro-intestic tube the above-mentioned reaction is harmful because it transforms the slightly sol. HgCl into a sol. compd. easily absorbed such as the complex salt; (b) when HgNO<sub>3</sub> is injected intravenously, the reaction mentioned is useful because the HgCl formed in the circulation is highly dispersed and therefore the concn. of Hg ions is greater than that resulting from the products of interaction between HgCl and Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> (Hg and HgS, insol.; complex Hg<sub>2</sub>-Na salt little dissociated).

**The action of ammonium chloride on cardiac function.** B. Bassani. *Boll. soc. ital. biol. sper.* 8, 1591-3(1933).—The action of NH<sub>4</sub>Cl was studied on the cardiac function of the heart-lung prepn. The substance was injected in various doses and at different velocities. The results show that NH<sub>4</sub>Cl, in the heart-lung prepn., is either lethal or its action is very transitory even in doses approaching the lethal. If the velocity of injection is decreased, the prepn. resists doses greater than the lethal. Therefore, the detoxicating mechanism against NH<sub>4</sub>Cl is very active even in the heart-lung prepn.

**The action of opium alkaloids on the glucemic titer.** I. The action of morphine. Giovanni Rizzotti. *Boll. soc. ital. biol. sper.* 8, 1603-5(1933).—The mechanism by which morphine alone produces hyperglucemia is entirely different from that by which in assocn. with insulin it produces hypoglucemia. In the assocn. morphine-insulin the hypoglucemic action diminishes rapidly with diminishing dose of insulin but is hardly influenced by marked variations in the dose of morphine.

**The behavior of certain digestive enzymes in experimental intoxication by sodium fluoride.** Aldo Costantini. *Boll. soc. ital. biol. sper.* 8, 1605-8(1933); cf. C. A. 28, 210<sup>r</sup>.—There was a marked diminution in the digestive activity of the exts. of organs of guinea pigs which had received orally daily doses of 4 cg. NaF per kg. body wt. The diminution was not only marked compared to the controls but also greater than that of guinea pigs which

had received an equiv. dosage of NaF intraperitoneally.

**Peter Masucci**  
The stability of blood in relation to dilution and anticoagulants. Luigi Robuschi. *Boll. soc. ital. biol. sper.* 8, 1608-11(1933).—Neohirudin increases the sedimentation velocity (S. V.) of human blood; diln. with NaCl 40% decreases the S. V. of both citrated blood and of blood rendered incoagulable with neohirudin. Neohirudin also accelerates the sedimentation of red corpuscles of blood from tuberculous individuals; the S. V. may be twice that observed in citrated blood. P. M.

The behavior of the sedimentation velocity of blood by the action of anticoagulants and suspensions. Luigi Robuschi. *Boll. soc. ital. biol. sper.* 8, 1612-16(1933).—The anticoagulant (neohirudin) decreases the sedimentation velocity (S. V.) whether injected by itself or assocd. with the suspension (India ink); the suspension alone also produces a decrease in the S. V. but not so marked. The effect of the anticoagulant and suspension is not one of summation but of a semi-summation. The addn. of the anti-coagulant, or of the suspension, or of both, *in vitro* gives results similar to those obtained *in vivo*. Diln. increases almost proportionally the S. V. both *in vivo* or *in vitro* and at a concn. of 20% of blood the effects of the anticoagulant and suspension are nullified. P. M.

**Pharmacologic studies on thallium sulfide and iodide.** Salvatore Sapienza. *Boll. soc. ital. biol. sper.* 8, 1616-18 (1933).—That the transformation of TlCl in the organism into TlI or Tl<sub>2</sub>S would be of little or no advantage as an antidote measure is proved experimentally. The M. L. D. (intravenously) of colloidal TlI is about 0.00014 g.-equiv. per kg. of rabbit; that of colloidal Tl<sub>2</sub>S is similar to that of TlOAc, 0.0001 g.-equiv. per kg. When injected subcutaneously and the animals are sacrificed at various intervals, the following observations may be made: Tl<sub>2</sub>S produces a black stain which is transformed to a reddish color and then disappears. TlI produces a stain which disappears rapidly without undergoing any color transformation. Injected intravenously Tl<sub>2</sub>S is gradually oxidized to Tl<sub>2</sub>SO<sub>4</sub> and eventually transformed into TlCl like the acetate. Hence, the similarity of the pharmacol. action of the 2 compds. Injected subcutaneously, the transformation is: colloidal Tl<sub>2</sub>S → pptd. Tl<sub>2</sub>S → sol. Tl<sub>2</sub>SO<sub>4</sub>. Injected intravenously, colloidal TlI is transformed into sol. TlI; injected subcutaneously, the transformation is: colloidal TlI → pptd. TlI → sol. TlI. TlCl is about 70 times more sol. *in vitro* than TlI; *in vivo* the soly. of TlCl is much less. This may account for the fact that the 2 compds. behave quite similarly in their pharmacol. action. Peter Masucci

The action of sympathetic-parasympatheticomimetic drugs on the estrus. M. Maino. *Boll. soc. ital. biol. sper.* 8, 1626-8(1933).—The injection of adrenaline + follicular hormone or pilocarpine + follicular hormone does not in any way influence the estral reaction in spayed female rats. Estrus is, therefore, not disturbed by drugs which act on the sympathetic and parasympathetic endings of the vessels and of the muscles of the uterus and vagina. Peter Masucci

**Pharmacology of phosphorus.** The elimination after introduction of phosphates. Emilio Trabucchi. *Arch. fisiol.* 33, 1-32(1933).—The quantity of P eliminated by rabbits in the urine is inferior to the elimination in the feces. Large doses of NaH<sub>2</sub>PO<sub>4</sub> and Na<sub>2</sub>HPO<sub>4</sub> given by mouth or intramuscularly increase the urinary output only slightly; the initial increase is followed by a drop to subnormal values. Even intravenous injection has little influence on the urinary P in comparison with the elimination through the intestine. A. E. Meyer

**Diuresis.** V. The influence of intravenous injections of glucose solutions of different concentrations. G. Ravasini and A. Cossio. *Arch. fisiol.* 33, 33-66(1933); cf. C. A. 27, 340.—The quantity of urine, eliminated by the rabbit after intravenous injections of hypertonic glucose soln., is higher than the amt. injected. Iso- or hypotonic solns. cause an output of urine inferior to the liquid injected. VI. Diuresis after intravenous administration of sodium sulfate solutions. G. Ravasini and L.

1 Martini. *Ibid.* 67-91; cf. C. A. 27, 341.—Hypertonic solns. cause a urine flow exceeding the vol. of liquid injected, but part of the Na<sub>2</sub>SO<sub>4</sub> is retained. Isotonic solns. cause an elimination of salt and fluid at the same ratio, as injected, but the quantities are slightly smaller. Hypotonic solns. show a retention of fluid and of salt; this retention is the more marked, the more hypotonic the soln. is. A. E. Meyer

2 The excitability of the nervous system and sodium perchlorate. G. Spagnol. *Arch. fisiol.* 33, 219-30(1934).—See C. A. 27, 1945. A. E. Meyer

The action of ephedrine on the cardiac vagus excitability. Emilio Beccari. *Arch. fisiol.* 33, 247-60(1934).—Doses of 0.3-0.5 mg. per kg. cause first an increase, later a decrease, of excitability. A. E. Meyer

The lipid composition of the cerebrospinal centers as influenced by neurotropic substances. Giselda Biancalani. *Arch. fisiol.* 33, 261-73(1934); cf. C. A. 28, 1774.—The free cholesterol and its esters increase in ether and veronal narcosis. A. E. Meyer

The action of veratrine, eserine and nicotine on the neuromuscular activity studied by sound reflexes. R. De Marco and G. Boccia. *Arch. fisiol.* 33, 300-6(1934); *Boll. soc. ital. biol. sper.* 8, 1491-3(1933).—All 3 alkaloids produce an increase of the reflex activity. Nicotine and veratrine have a longer action than eserine. Nicotine first produces an inhibition of the reflexes for a certain period. A. E. Meyer

The influence of uric acid on the diffusion of dyes in the tissues and on inflammation. Wally Beltrami. *Arch. sci. med.* 57, 221-44(1933).—The injection of a soln. of uric acid into the peritoneal cavity of rats causes an increased diffusion when a dye soln. is injected into the tissues. The degree of diffusion varies with the nature of the dye. Some inflammations, such as produced by croton oil, are activated by uric acid. Inflammations produced by serum or casein are not greatly influenced. A. E. M.

The mechanism of diuresis and antidiuresis by mercury. Francisco Bua. *Arch. sci. med.* 57, 389-434(1933); cf. C. A. 27, 4300.—The influence of salyrgan in different types of disturbances is investigated. A. E. Meyer

Experimental production of hepatitis and cirrhosis. Vittorio Pennati and Luigi Telatin. *Arch. sci. med.* 57, 457-504(1933).—Blood and ascites liquid from animals with hepatic cirrhosis and ext. from human cirrhotic livers, when injected intravenously, produce liver cirrhosis in rabbits. A. E. Meyer

Intoxication with carbon tetrachloride and its treatment with calcium. A. Ravina. *Presse med.* 41, 809-10 (1933).—Treatment with CaCl<sub>2</sub> is successful. A. E. M.

Postoperative azotemia with chlorine deficiency cured with chloride medication. H. Chabanier, C. Lobo-Onell and E. Lelu. *Presse med.* 41, 987-90(1933).—A case is described and discussed. A. E. Meyer

Treatment with cod-liver oil by rectal administration. Robert Clément. *Presse med.* 41, 1001-2(1933).—Doses of 120 cc. for adults and 60 cc. for children given by rectum gave good results. A. E. Meyer

The action of monosodium phosphate in nervous depression of diabetic patients. Alberto Lacroze. *Semana med.* (Buenos Aires) 1934, I, 201-2.—Favorable results were obtained with doses of 2 g. 1 or 2 times daily 30 min. after meals. Undesirable effects on the elimination of ketonic compds. or on the gastric acidity were not observed. A. E. Meyer

Hyperthyroidism and Lugol treatment. III. J. Tillgren and Nils Sundgren. *Acta Med. Scand.* 81, 133-212(1934).—A study of 120 patients with very complete records. S. Morgallis

Behavior of 5-vanillalbarbituric acid in the rabbit organism. Eisci Kataoka. *J. Biochem.* (Japan) 19, 11-13(1934).—5-Vanillalbarbituric acid is synthesized by dissolving vanillin and barbituric acid in hot water, digesting the cryst. mass in H<sub>2</sub>O and recrystg. from hot MeOH. It is insol. in H<sub>2</sub>O, Et<sub>2</sub>O or benzene, sol. in EtOH or in hot Me<sub>2</sub>CO and MeOH. When 2-3 g. was fed to rabbits vanillic acid was found in the urine. The oxidation of

vanilla in the animal organism proceeds similarly whether it is administered free or in combination with barbituric acid.

S. Morgulis

**Effect of lead and zinc sulfides.** C. G. Santesson. *Skand. Arch. Physiol.* 67, 177-95(1934).—Injections of PbS into rabbits produce only slight effects at the site of the injection and a few insignificant bleedings or necroses in the liver but not typical Pb effects otherwise. Subcutaneous injections of ZnS cause more serious local irritation with inflammation but not to the same severe degree as HgS does. The bleedings and necroses in the liver are more extensive and numerous but not nearly as much as with CuS. In the kidney necroses of the epithelium with Ca infarcts were not very common.

S. Morgulis

**Effect of potassium and calcium on the heart.** C. E. Raha, M. Merikoski and A. Nyman. *Skand. Arch. Physiol.* 67, 211-20(1934).—K promotes the synthesis while Ca promotes the hydrolysis of creatinephosphoric acid. Furthermore, K may inhibit the hydrolysis and Ca the resynthesis of creatinephosphoric acid. K promotes lactic acid formation in so far as the energy set free in this reaction is utilized in the increased creatinephosphoric acid resynthesis. Ca promotes an increased lactic acid formation in the heart muscle which, however, is not sufficient to compensate for the creatinephosphoric acid hydrolysis, which proceeds far ahead of the lactic acid formation.

S. Morgulis

**The alteration of the electrical excitability of the heart vagus by various means. I. The action of heart remedies.** Chyutaro Saito. *Acta Schol. Med. Univ. Imp. Kioto* 16, 146-51(1933).—Digitalis bodies first increased and then decreased the excitability of the vagus and always increased the frequency and amplitude of the auricle while the amplitude of the ventricular beat may either be increased or decreased. Strophanthin decreased the amplitude of both auricle and ventricle, increased frequency and first increased and then decreased vagus excitability. Caffeine Na benzoate decreased frequency and amplitude of the auricle while the amplitude of the ventricle may be increased or decreased. Vagus excitability was first increased and then decreased. Vitacamphor and Coramine decreased frequency and amplitude of the auricle; they always increased the amplitude of the ventricle and always decreased vagus excitability. II. The action of salts.

*Ibid.* 152-8.—K decreased frequency and amplitude of auricular beat, had a variable effect on ventricular amplitude and first increased and then decreased vagus excitability. Ca usually decreased frequency, decreased both auricular and ventricular amplitude and usually increased vagus excitability. Mg increased frequency slightly, always increased the amplitude of the auricular beat and usually that of the ventricular. MgSO<sub>4</sub> first increased and then decreased vagus excitability, while MgCl<sub>2</sub> either increased frequency and vagus excitability or decreased both. NH<sub>4</sub> and Ba decreased all phases.

III. The action of pilocarpine, atropine, morphine, cocaine and chloral hydrate. *Ibid.* 159-64.—Pilocarpine seldom affected frequency, usually decreased amplitude of both auricle and ventricle and first increased and then decreased vagus excitability. Atropine seldom affected frequency, increased both amplitudes and had a variable effect in vagus excitability. Morphine decreased all phases. Cocaine increased frequency and decreased other phases. Chloral hydrate decreased frequency, amplitude of auricular beat and vagus excitability and had a varying effect on the amplitude of the ventricular beat. IV. The action of hormones. *Ibid.* 165-9.—Adrenaline produced a momentary increase, then a decrease of frequency, an increase in auricular amplitude, a decrease in ventricular amplitude and a variable effect on vagus excitability. Insulin produced slight decreases in frequency and auricular amplitude, a slight increase in ventricular amplitude and a decrease in vagus excitability. Thyroxine decreased all phases except ventricular amplitude which was increased after a preliminary decrease. Pituitrin decreased frequency, auricular amplitude and vagus excitability and increased ventricular amplitude.

T. H. Rider

**The chemotherapy of acetarsone (stovarsol) by intravenous and subcutaneous administration.** John A. Kolmer and Anna M. Rule. *J. Chemotherapy* 10, 37-42 (1933).—Acetarsone, Na salt (I), is well born by human beings in intravenous doses of 0.5-1 g. per week and when administered in conjunction with iodide and intramuscular Bi is of value in the treatment of neurosyphilis. The max. tolerated dose (rats) is 0.3 g. per kg. The min. trypanocidal dose (rats, intravenous) is 0.120 g. per kg., the chemotherapeutic index being 2.5 approx.

T. H. Rider

**The point of action of pilocarpine, tested on isolated toad heart-nerve preparations.** Kosuke Furuta. *Japan J. Med. Sci. IV. Pharmacol.* 7, 113-31(1933).—Detailed expts. are described leading to the conclusion that the effects of pilocarpine are complex and not directed to a single point of action.

T. H. Rider

**The reaction to fine- and medium-sized quartz and aluminum oxide particles. Silicotic cirrhosis of the liver.** Leroy U. Gardner and D. E. Cummings. *Am. J. Path.* 9 (Suppl.) 751-63(1933).—Of silica particles of 6-12 or 1-3 microns in diam., injected intravenously into rabbits, the largest particles were caught in the pulmonary capillaries, those of intermediate size in the spleen and hepatic lymph node, and the finest ones in the liver. Fine silica particles are most active and produce a progressive, coarsely nodular cirrhosis of the liver attended by extensive destruction of the parenchyma, followed later by regeneration in certain areas. Coarse silica particles, 10-12 microns in diam., are much less irritating and excite a simple foreign body type of reaction. The injury produced by silica is specific, since fine Al<sub>2</sub>O<sub>3</sub> particles of the same size produce no fibrosis in the stroma of any organ.

F. B. Seibert

**The effect of cesium chloride on transplanted tumors of mice.** Arthur W. Wright and Clarence F. Graham. *Am. J. Path.* 9 (Suppl.) 789-99(1933).—CsCl injected into mice which have Twort carcinoma does not affect in any way the capacity of the tumor cells to divide and multiply. On the contrary, the necrosis of the neoplastic tissue may be more extensive. If the CsCl is injected into mice before the tumor is implanted, then there is some evidence of its deterrent effect upon the growth of the neoplasm. There were 41.6 and 53.8% of takes in mice who had received Cs injections and 83.3 and 84.6% in the controls. When individual tumors appeared in the treated animals they were smaller and more firm in consistency than the control growths.

F. B. Seibert

**Benzene poisoning with hyperplasia of the bone marrow.** Dorothy H. Anderson. *Am. J. Path.* 10, 101-11(1934).—One patient with the complaint of weakness and bleeding from the nose and gums had progressive diminution of the cellular elements of the blood and the bone marrow was extremely hyperplastic. He had had considerable exposure to benzene.

F. B. Seibert

**Anthelmintic power of some chlorinated butanes in the cyclostomosis of the horse.** Marrenac. *Compt. rend.* 198, 510-12(1934).—To be active against the nematode worm responsible for the disease, a compd. must combine toxicity to all the developmental stages of the worm with relative insolub., so that it is not easily lost from the intestine. These conditions are fulfilled by 2,2-dichlorobutane and its unsatd. deriv., 2-chlorobutene, MeCCl:CHMe. In a dose of 0.2 cc. per kg. body wt. the effectiveness of these compds. is 4-6 times as great as that of other, classical, anthelmintics. The solubilities are so low that about 6 days is required for complete removal from the alimentary canal.

K. V. Thimann

**Association of the cinnamic (acid) radical and copper in the treatment of the leper.** Feron and André Lancien. *Compt. rend.* 198, 683-4(1934).—Intravenous injections of a colloidal soln. of Cu and the complex "cin-ethyl-formine" (Simionescu and Lancien, C. A. 19, 134) were administered to a large group of lepers. The results indicate that this treatment attacks the cause of the disease and alleviates the symptoms.

Julius White

On the reactions of reticulo-endothelial system follow-



ing the repeated injections of foreign materials. Yosimi Harada. *Trans. Japan. Path. Soc.* 22, 480-83 (1932).—The author found that in the repeated intravenous injections of foreign materials, lithium carmine, collargol and vaccines into the rabbits, there occurred generally severe hyperplasia of the reticulo-endothelial system in the spleen, liver, bone marrow, adrenals and lymph nodes, and also the proliferation of the alveolar epithelial cells were shown. I. S. Yun

Cinchona and civilization (Howard) 17. Pyrazolones derived from the carbethoxypiperidones (Englert, McElvain) 10. Furan compds. of barbituric acid (Iseki) 10.

Cattaneo, Cesare: Le cure salsodioidiche nelle malattie dei bambini. Fidenza: A. Mattioli. 25 pp. L. 1.20.

## 12—FOODS

F. C. BLANCK AND H. A. LEPFER

**Foods.** Walter H. Eddy, et al. *Am. Pub. Health Assoc. Year Book 1933* 34, 59-62. Rept. of the comm. reviewing the year 1933.

**Examination of fermented foods by laboratory methods.** Carl S. Pederson. *Am. J. Pub. Health* 24, 229-34 (1934); cf. C. A. 27, 349. —The quality of sauerkraut bears a definite relation to its chem. compn. Defects in fermentation or in canning can often be detected by careful analyses and proper interpretation of the results supplemented by a microscopic examn. J. A. Kennedy

**The colloid chemistry of wheat gluten.** Th. Ruemele. *Z. Untersuch. Lebensm.* 67, 41-50 (1934). —A study of the swelling phenomena of 12 different types of wheat gluten in oxalic acid of different normalities. 0.1 N oxalic acid is especially serviceable for showing the swelling capacity of gluten. For a quant. study of this phenomenon of swelling of gluten, oxalic acid is preferable to lactic acid, but the reverse is true with the flour itself. F. L. D.

**Tempering factors affecting the quantity and quality of wheat flours.** R. O. Pence and C. O. Swanson. *Kans. Agr. Expt. Sta., Director's 6th Biennial Rept. 1932*, 4950. The rate of evapn. from wheat and mill stocks does not primarily depend on the length of the tempering period nor upon the temp. of the tempering water, provided that the conditions are such that the tempering water is completely absorbed. The rate of evapn. is influenced by the character, moisture content, and temp. of the stocks. Relative humidity is the most important factor influencing evapn.; a relative humidity of slightly above 50% is the optimum. The length of the tempering time had no effect on the percentage of extn. or its distribution. That is, wheat tempered a short time ground as easily as that tempered a long time. Shriveled and extremely dry wheats required a considerably longer tempering period than plump wheats in good condition. The amt. of water absorbed by wheat during washing depends upon the original moisture content of the grain, its phys. condition and the speed of the revolving agitator. Wheat washing improves color of the flour, but does not consistently lower the ash content. C. R. Tellers

**Effect of certain salts on fermentation in dough.** R. H. Callow. *Analyst* 59, 156-60 (1934). —Practically all Ca compds. have an activating effect on yeast, and the effect on gas production is relatively larger on a weak yeast than on a strong one. Ca compds. also affect the gluten of dough so that it retains gas better, and apparently Ca also increases the rate of reproduction of the yeast. By adding 0.25 lb. of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ , 0.1 lb. of  $\text{NH}_4\text{Cl}$  and 0.003 lb. of  $\text{K}_2\text{HPO}_4$  to a dough made from 280 lb. of flour, the fermentation losses are reduced at least 50%. W. T. H.

**A comparison of the leucocyte count, the bromothymol blue reaction and the catalase content of freshly drawn milk.** C. C. Prouty. *J. Dairy Sci.* 17, 75-81 (1934).

A total of 1019 samples of freshly drawn milk from the individual udder quarters of 40 cows in the early stages of lactation were tested. An av. leucocyte count of 225,000 was obtained for 870 samples from 31 cows free from pos. evidence of mastitis. As the leucocyte count increased, there was a deviation from normal which was more pronounced by the catalase test than by the bromothymol blue test. The percentage of animals producing milk normal by the bromothymol blue and catalase tests from all quarters and at all times is low. Fifteen references. James C. Munch

**Special milks.** Wm. B. Palmer, et al. *Am. Pub. Health Assoc. Year Book 1933* 34, 63-6; cf. C. A. 27, 3990. A committee report reviewing papers published in 1933 on vitamin D milk and homogenized milk.

**Bacteriological, chemical and biological studies of reconstituted milk.** Raymond Randall. *Philippine J. Sci.* 52, 219-33 (1933). A reconstituted fluid milk can be made in a properly equipped reconstituting plant from skim-milk powder, sweet (unsalted) butter and water, that closely agrees in compn. with pasteurized cow milk. The vitamin A requirement for rats was satisfied by 10 cc. per day and the requirements for vitamins B<sub>1</sub> and B<sub>2</sub> were satisfied by 20-30 cc. daily. James C. Munch

**Milk of unpleasant odor or taste; the influence of the feeding of the cows and of some industrial treatment.** A. Nevot. *Bull. acad. m'd.* 110, 50-1 (1933). —Feeding of preserved turnips or oil cakes causes only a slight odor in the raw milk. But when such milk is pasteurized and air is excluded during the whole process, a rancid or soapy taste is developed. This does not happen, if air has access during the cooling period after heating. A. E. M.

**Examination of one thousand milks by the Hortvet freezing-point process.** J. R. Stubbs. *Analyst* 59, 146-52 (1934). —Nine tables are given and explained. The av. f.-p. depression was 0.544°; individual results varied from 0.529 to 0.563°. No material difference was found between morning and evening milk nor between milk of different seasons. There was no apparent correlation between the f.-p. depression and the content of "solids not fat." W. T. H.

**Nitrates in milk.** W. F. Elvidge. *Analyst* 59, 170-2 (1934). —The danger of reporting nitrate when hypochlorite is present is pointed out. W. T. H.

**Quality of milk stored in containers of different metals.** E. Caserio. *Ind. ital. conserve aliment.* 9, 65-74 (1934). —The best results were obtained with Al of 98% purity. G. A. Bravo

**Protein, minerals and vitamins of evaporated milk.** Frank E. Rice. *Am. J. Pub. Health* 24, 194-8 (1934). Review with 33 references. J. A. Kennedy

**Manufacture of low-lactose skim milk for use in ice cream.** B. H. Webb and O. E. Williams. *J. Dairy Sci.* 17, 103-14 (1934). —Fresh skim milk contg. 5.9 lb. cane sugar per 100 lb., concd. in a vacuum, ppts. about 65% of the lactose, without altering dispersion of the milk proteins. Use of low-lactose milk for the manuf. of ice cream increases the milk solids-not-fat to 11-13%, this producing ice cream mixes with an improved body and texture, which may be handled without developing sandiness. James C. Munch

**Ice cream investigations.** W. H. Martin and W. J. Caulfield. *Kans. Agr. Expt. Sta., Director's Sixth Biennial Rept. 1932*, 68-71. —Whole fresh eggs in amts. up to 4% of the ice cream mix and egg yolks up to 2% improved whipping properties of the mix and the texture of the ice cream. Egg yolks for ice cream manuf. may be suitably preserved and stabilized by the addn. of 5% corn sugar, 1% glycerol, and 0.5% gelatin, and stored at 0-10° F. The ice cream made from the stabilized frozen yolks whipped approx. 2 min. faster than that made from a check mix contg. the unstabilized yolks. C. R. F.

**Manufacture of ice cream mixes in a vacuum pan.** W. J. Caulfield. *Kans. Agr. Expt. Sta., Director's*

**5th Biennial Rept. 1930, 80.**—In every case superheating the ice cream mix. to 180°F. or higher resulted in a cooked flavor in the finished ice cream. However, the body and texture and viscosity of the heated mixes and resulting ice creams were improved. The process reduces materially the bacteria present but cannot be recommended for com. use.

C. R. Fellers  
**Layer cheese.** G. Stamm. *Z. Untersuch. Lebensm.* 66, 593 (1933). Analyses are given and the general subject of this type of cheese is discussed. F. L. Dunlap

**Coloring of cheese by tin foil.** J. Gangl and F. Becker. *Milchwirtschaft. Forsch.* 15, 281-93 (1933).—Pasteurized cheese of sufficient acidity ( $pH < 5.0$ ), if a suitable oxidizing medium is present, will dissolve Sn from Sn foil whether it is pure or contains Sb or Pb. The black stain on such cheese is due to finely divided Sb or Pb, the gray stain to Sn. A method is described for detg. Sb in Sn foil.

B. C. A.

**Variable composition of casein and its role in the manufacture of cheese.** E. Cherbuliez. *Compt. rend. soc. phys. hist. nat. Genève* 50, 156 (1933); in *Arch. sci. phys. nat.* 15, (July-Aug.).—Of two cow milks, that contg. the higher proportion of the  $\alpha_2$  constituent (cf. C. A. 27, 4548) of casein coagulated the more readily. B. C. A.

**Effect of washing on the keeping quality of hen eggs.** Reece L. Bryant and Paul F. Sharp. *J. Agr. Research* 48, 67-89 (1934).—Eggs washed with a no. of different solns. did not lose wt. during storage at 35° more rapidly than unwashed eggs, but oil-dipped eggs showed a smaller loss in wt. than eggs that were not oil-dipped. A significant pos. correlation was found between the no. of pores in the eggshell and the loss in wt. of the egg. Washing in itself does not cause eggs to deteriorate if they are properly handled after washing. The deterioration of washed eggs is caused by bacterial infection of the egg from the dirt that was on the shell. W. H. Ross

**The choline factor of egg yolk and the phosphatide-lecithin number of egg lecithin.** F. R. Nottbohm and F. Mayer. *Z. Untersuch. Lebensm.* 66, 585-92 (1933).—A method is proposed for the detn. of choline in egg yolk. For the detn. of the egg content of foods a "choline factor" is serviceable. This factor corresponds to the amt. of choline found in 100 g. egg yolk. The proposed choline factor for the yolk from the eggs of hens and ducks is 1.000. The method of Brodrick-Pittard for obtaining egg-yolk lecithin is satisfactory. In the egg yolk of hens, practically all of the choline is in the form of choline-lecithin. Duck egg yolk seps., on mixing with H<sub>2</sub>O, a non-emulsifiable ingredient, but there is no reason to believe that the sepd. substance carries significant amts. of undetd. choline. As an expression of the ratio of the total phosphatide to the choline-lecithin, a "phosphatide-lecithin no." is proposed. This no. gives a significant view into the building up of those phosphatides which in the main consist of choline-lecithin and cephalin. The phosphatide-lecithin no. for hen egg-yolk lecithin is, in round nos., 1.4 and for that from ducks 1.5. The dried mass yields the following:

	Total phosphatide	Choline-lecithin	Cephalin
Hen egg yolk	19.99	14.27	5.72%
Duck egg yolk	16.48	10.90	5.58%

Calcd. to liquid egg yolk, hen egg yolk contains 8.53-10.90% phosphatide and duck egg yolk 7.96-9.77%.

F. L. Dunlap

**Meat extracts.** Giulio Buogo. *Ind. ital. conserve aliment.* 9, 75-7 (1934).—The methods for the detn. of H<sub>2</sub>O, Cl (as NaCl), amino acids and creatinine are given. The method of Baur and Barschall for the detn. of creatinine (cf. C. A. 6, 1180) does not give exact results. Analyses of typical com. meat exts. are reported.

G. A. Bravo

**Chemical and spectrophotometrical detection of gelatin in bouillon cubes.** H. Mohler, E. Helberg and F. Almasy. *Z. Untersuch. Lebensm.* 66, 602-6 (1933).—A discussion of methods.

F. L. Dunlap

**Antagonism of univalent and multivalent metals in bio-**

**logical processes.** H. H. King and J. L. Hall. *Kans. Agr. Expt. Sta., Director's Sixth Biennial Rept. 1932, 62-3.*—The hydrophilic antagonism of minerals in the lipin fraction of meat was applied to a study of the keeping quality of the meat. Bone meat improved the condition of the beef when the cattle were on P-deficient pasture. The cuts from the animals receiving the P supplement withstood decompn. better and were edible after a 30-day ripening period, whereas cuts from other animals were so decompd. that they were unfit for food. The elec. resistance of the fresh meat was outstandingly high. There was a significantly high Na:Ca ratio where shrinkage losses were high and spoilage was most pronounced. This is explained on the basis of the hydrophilic antagonism of Na and Ca. Elec. cond. has possibilities of being developed into an indicator of meat quality. The ripening process nearly reduces the elec. resistance of all samples to a common level. C. R. Fellers

**The examination of the edibility of [canned] tunny and sardines.** M. Pergola. *Boll. soc. intern. microbiol., Sez. ital.* 5, 283-7 (1933). The methods used in the Italian labs. for the systematic examn., prepn. of cultures, bacteriol. and bio-toxicological investigations are reviewed.

G. A. Bravo

**Rice in British Guiana, 1927-1932.** I. Varietal and industrial investigations. L. E. W. Codd and E. M. Peterkin. *British Guiana Dept. Agr., Rice Bull.* 1, 1-38 (1933). Six samples of paripiled rice prepd. from gram grown in British Guiana contained H<sub>2</sub>O 40.84-41.38, fat 0.43-0.58, protein 6.33-8.76, carbohydrates 78.79-81.19, fiber 0.17-0.34, ash 0.65-0.77 and P<sub>2</sub>O<sub>5</sub> 0.391-0.525%. The polished rice contained H<sub>2</sub>O 11.49, fat 0.34, protein 7.16, carbohydrates 80.21, fiber 0.34, ash 0.45 and P<sub>2</sub>O<sub>5</sub> 0.134%. The coarse and fine grades of the husks and embryos (contg. small amts. of broken rice from the sheller) contained H<sub>2</sub>O 10.72, 10.02; fat 4.56, 6.00; protein 8.40, 11.82; carbohydrates 60.01, 57.96; fiber 8.18, 5.13; ash 8.04, 9.07; and P<sub>2</sub>O<sub>5</sub> 0.390, 0.565%, resp. The bran from the 1st and 2nd cones, resp., contained H<sub>2</sub>O 9.85, 9.98; fat 18.42, 9.20; protein 12.99, 11.49; carbohydrates 44.73, 62.07; fiber 4.85, 1.42; ash 9.10, 5.24; and P<sub>2</sub>O<sub>5</sub> 0.769, 0.552. K. D. Jacob

**The soy bean as human food.** Frances L. Dittles. *J. Tenn. Acad. Sci.* 8, 323-5 (1933).—Chem. analysis of meal from *Glycine max* gave: moisture 9.9, protein 36.5, fat 17.5, N-free ext. 26.5, fiber 4.3 and ash 5.3%. The chief protein is glycinin, similar to the amino acids of beef but more available to the human organism.

A. Lloyd Taylor

[Report of] department of chemistry [on the protein content of bean varieties]. S. D. F. Harwood, L. W. Cole and I. B. Prowse. *J. South-Eastern Agr. Coll. Wye, Kept 1943, No. 33, 81-3.*—The Windsor, Long Pod, Maragan and Tick varieties contained 24.8, 27.9, 21.3 and 20.3% protein, resp. The starch equiv. was practically the same for each variety. K. D. Jacob

**Effect of preserving agents and spices on the digestion of proteins.** H. Amelung. *Chem.-Ztg.* 57, 614 (1933). Digestion of albumin is retarded slightly by 0.1% of H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>BO<sub>3</sub>, salicylic acid, and various condiments and spices, but the retardation is less than with 0.5-2% NaCl, which is a normal constituent of prepared foods.

B. C. A.

**Pectin studies. II. Sugar-acid-pectin relationships and their bearings upon routine evaluation of apple pectin.** R. Stuewer, N. M. Beach and A. G. Olsen. *Ind. Eng. Chem., Anal. Ed.* 6, 143-6 (1934); cf. C. A. 27, 3536. The optimum pH of apple pectin jellies varies with the age of the sample, method of prepn. and concn. of pectin. For routine comparisons of pectins the jelly mixt. is prepd. without acid and is poured into a glass contg. an excess of acid. Amy LeVesconte

**The maturity test for grapes.** V. A. Putterill. *Farming S. Africa* 8, 427-9 (1933).—In 48 samples representing 14 varieties of grapes that had been packed for export, the sugar content ranged from 10.8 to 22.9% and the acid from 0.45 to 1.04%. In sweet grapes the sugar:acid ratios ranged from 15.9:1 to 32.5:1 and in sour grapes

from 9.1:1 to 10.8:1. Methods for detg. sugar and acids in grapes are outlined.

**Storage pit (bitterpit) of apples.** Len Verwoerd. *Farming S. Africa* 8, 418, 430(1933).—Development of bitterpit in apples during storage is due to a deficiency of water for the normal ripening processes in fruits of those varieties in which starch changes occur in an irregular manner; the deficiency of water is the result of harvesting maturing fruit in an immature condition. In the York Imperial and other varieties where starch hydrolysis takes place evenly and regularly throughout the fruit, no bitterpit occurs. Where starch hydrolysis is uneven and irregular, the cells maturing first draw their full water requirements from their neighboring cells, and these in turn from their neighbors; this procedure continues until eventually a no. of cells lack the required water for their starch hydrolysis, and these cells eventually die and through further chem. changes become brown and give rise to the characteristic lesions. The proper time for picking apples is shown by the presence of small spots of starch scattered through the pulp outside the core line but none within the core line, as indicated by testing with 1-KI soln.

**Apple flour.** F. Zago. *Ind. ital. conserve aliment.* 9, 19-21(1934). Apples are washed and broken in small pieces, dried at 55° and then milled. The chem. analysis of the flour gave:  $H_2O$  6.29, dry matter 93.71, pectin 7.04, cellulose 8.10, malic acid 1.44, tannic acid 0.45, reducing sugars 42.46 and sucrose 7.81%. G. A. B.

**The behavior of the coloring matter of the raspberry toward mineral water.** W. Diemair and J. Schormüller. *Z. Untersuch. Lebensm.* 67, 59-64(1934). The  $pH$  of fresh raspberry juice and raspberry sirup has been detd., also the color nuances after diln. of the juice with buffers. The  $pH$  of a no. of mineral waters was detd. as well as of admixts. of these with raspberry juice and raspberry sirup, the color nuances also being noted. The color and  $pH$  with increasing mineral water diln. were studied, and the stability of these mixts. at 100° was detd. In the study of the system raspberry juice-mineral water consideration was given to those factors responsible for its stability, of the optimal  $pH$  and the limiting values for fine color.

**Microscopic diagnosis of vegetables. II. Legume hulls, root and tuber vegetables, leaf and stem vegetables.** H. Volger. *Z. Untersuch. Lebensm.* 67, 1-41(1934).—Forty references.

**Composition of eggplant fruit at different stages of maturity in relation to its preparation and use as food.** C. W. Culpepper and H. H. Moon. *J. Agr. Research* 47, 705-17(1933).—The total solids are low at all stages of maturity and range from 7 to 9% of the fresh green wt. The total sugars vary from 2.0 to 3.5% of the fresh green wt. The starch, or other material converted into sugar by acid hydrolysis, and the titratable acidity are low and vary but little with stage of maturity. The differences in the compn. of the varieties studied are too small to be of any practical significance. Chem. and cooking tests indicate that the failure of the eggplant fruit to hold its form during cooking is due to the high moisture content of the material and to the change of a considerable part of the protopectin into pectin as a result of heating.

**Results of experimental cultures with some varieties of tomatoes in the Parma Province, in the year 1933.** F. Emanuele, A. A. Mazzotta, M. Guastalla and G. Mauri. *Ind. ital. conserve aliment.* 8, 283-91(1933); cf. *C. A.* 27, 3537.—Two varieties of English tomatoes and 21 of Italian, resp., averaged dry residue 4.10-6.00, 4.40-6.90; reducing sugars 1.95-4.54, 2.17-4.50; acid 0.40-0.55, 0.30-0.78; NaCl 0.045-0.059, 0.028-0.060%. G. A. B.

**Change in canned anchovies.** Rolando Cultrera. *Ind. ital. conserve aliment.* 9, 31-2(1934). A crystd. substance formed on the surface of canned anchovies was identified as tyrosine; to eliminate this, treatment with NaOH soln. before canning is recommended. G. A. B.

**The possibility of determining glucose in sirups and beverages.** Giulio Buogo. *Ind. ital. conserve aliment.* 9, 35-8(1934).—Formulas are given for the detn. of su-

crose, glucose and fructose in sirups and beverages; if they contain dextrans, the detn. becomes impossible.

G. A. Bravo

**Sirups from natural fruits, and beverages.** Giovanni Mauri. *Ind. ital. conserve aliment.* 9, 61-4(1934). Suggestions are given to avoid fermentation of beverages made with natural fruits sirups.

G. A. Bravo

**Reactions during the fermentation of honey.** G. Borries. *Z. Untersuch. Lebensm.* 67, 65-75(1934).—The fermentation of honey is a slow and weakly alc. one. The  $CO_2$  developed is partly given off and partly retained in the honey. The  $CO_2$  was detd. and from it, the amt. of fermented sugar was detd. This fermented sugar is but a small proportion of the total sugar. The  $CO_2$  remaining in the honey was detd. by the vol. increase in the honey when it was subjected to lowered pressures. No detn. was made of the increase in the amt. of free acid and volatile acids accompanying the formation of  $CO_2$ . Conclusion: In the fermentation of honey, it is not accompanied by AcOH and lactic acid fermentations. During fermentation, there is no loss in diastase.

F. L. Dunlap

**Determination of benzoic, salicylic, cinnamic and saccharic acids, and of the esters of *p*-hydroxybenzoic acid.** Rolando Cultrera. *Ind. ital. conserve aliment.* 8, 298-301(1933).—The method of Fischer and Stauder (*C. A.* 26, 4409) for the detection of these compds. in wines is applied to alimentary conserves; it is possible to obtain the sublimation of 0.01 g. of the antifermentive compd. from 10 g. sample.

G. A. Bravo

**Means of processing and packaging pecans for an extended use.** Genie F. Cameron. Texas Pecan Growers' Assoc., *Proc. 13th Ann. Meeting 1933*, 37-41.—When shelled pecans were stored in an O-free atm. of  $CO_2$  in hermetically sealed cans for 4-6 weeks the nuts developed a taste somewhat similar to that of coconuts or Brazil-nuts. The best results were obtained by sealing the nuts in cans with no further treatment.

K. D. Jacob

**The determination of chlorogenic acid in roasted coffee.** C. Massatsch. *Z. Untersuch. Lebensm.* 67, 88-91(1934). A brief discussion of various methods and polemical against the work of Plucker and Keilholz (cf. *C. A.* 27, 5838).

F. L. Dunlap

**Examination of coffee and coffee substitutes.** R. Strohacker. *Z. anal. Chem.* 96, 229-36(1934). A review of 18 papers.

W. T. H.

**Tea manufacture in Ceylon.** D. I. Evans. Tea Research Inst. Ceylon, *Bull.* 9, 70 pp.(1932?). The changes occurring during the processing of tea are discussed, with particular reference to moisture. The compn. and the degree of oxidation of the nontannin fraction of tea fermented under dry conditions were practically the same as in tea fermented under moist atm. conditions. The infusions of tea made under dry conditions were greener, and fermentation seemed to be slower.

K. D. Jacob

**Capsanthin determination in ground paprika products.** Laszlo Benedek. *Z. Untersuch. Lebensm.* 66, 600-2(1933). The colorimetric method of Zechmeister and Chelnoky (cf. *C. A.* 25, 4887-8) for the detn. of the coloring matter in paprika has been simplified. Results based on this simplified method are given.

F. L. Dunlap

**Inspection of commercial feedstuffs. Water-soluble protein in meat scraps and fish meal.** Philip H. Smith. Mass. Agr. Expt. Sta. *Control Series Bull.* 70, 50-2(1933); cf. *C. A.* 26, 5616.—In an effort to see whether water-insol. protein might not be a more accurate index to protein quality than total protein, 45 samples of meat scraps and 22 samples of fish meals were examd. The amt. of water-sol. protein in meat scraps was dependent upon the character of the material rendered. Samples which were high in connective tissue were also high in sol. protein. The fish meals contg. the lowest percentages of sol. proteins are probably glue residues. Fish meals show greater variability in sol. protein content than do meat scraps. In meat scraps the percentage of sol. protein of the total, varied from 17.3-54.9; and in the fish meals from 6.1-40.1%. No conclusions are deduced.

C. R. Fellers

**Results of silage making by the A. I. V. method.** L.

Spildo. *Tids. Norske Landbruk* 40, 84-6 (1933).—Silage made by the A. I. V. method from meadow grass, first-cut and aftermath, and from leaves of root crops is high in digestible protein and low in  $\text{PrCO}_2\text{H}$  and  $\text{AcOH}$ .

B. C. A.

Influence of feed on the color, chemical composition and cooking quality of the meat of grass-fat cattle. G. W. McCampbell, D. L. Mackintosh, W. L. Latshaw, J. I. Hall, Martha S. Pittman and Martha M. Kramer. *Kans. Agr. Expt. Sta., Director's Fifth Biennial Rept.* 1930, 70-2; *Sixth Biennial Rept.* 1932, 60-2; cf. *C. A.* 27, 1414.—The color of beef brightens very materially for a few min. after cutting. The color of the raw meat, muscle, has no correlation to the color, quality or palatability of the cooked beef. Blood analyses showed no significant variations among cattle kept on different feeds. The degree of unsat. of the fat (I no.) is inversely proportional to the moisture content of the original fat. The moisture content of the original fat is directly proportional to the m. p., i. e., the greater the moisture, the higher the m. p. The collagen content of meat ripened 30 days is approx. 60% that found in fresh meat. The av. muscle hemoglobin content was highest in animals fed on blue-grass alone; namely 0.458% as compared with 0.416 for those on corn and grass, and 0.396% for those in a dry lot. A moderate ripening period for grass-fat beef was satisfactory, but on prolonged ripening, the fat took on objectionable flavors. Without the addn. of water during cooking, the shrinkage varied 16-25%. The lean meat was much more const. in compn. than the fat among different cattle. In human subjects, balance studies showed that the protein and P of ground meat from very tender and from very tough cuts were utilized with the same ease. A high collagen and elastin content in meat did not affect the utilization of the meat by human beings. C. R. Fellers

Detrn. of the rancidity of fats (Korpácy) 27. Behavior of fruit juices and wines in their spectrographic examn. (Heiduschka, Muller) 16. Pecan oil (Simis) 27. Direct crystn. of citric acid from lemon juice (Ajon) 16. Preservation of cosmetics [and food products] (Bohm) 17. Starchless potato (Suit, Hihbert) 11D. Rept. of the Water Pollution Research Board [biol. filtration of milk-factory effluents] (Robertson; Calvert) 14. Disk mills for cereals (Brit. pat. 402,217) 1.

Damm, H., and Döring, H.: Die Gebrauchswasser-versorgung von Molkereien und anderen Nahrungsmittel-fabriken. Hildesheim: Molkerei-Ztg. 141 pp. M. 3.

Jordan, Stroud, and Langwill, Kathryn E.: Chocolate Evaluation. No. 3 of Confectionery Studies. New York: Applied Sugar Labs. Inc. 225 pp.

Minguzzi, Luigi: Caseificio. Importanza del latte e derivati nei riguardi dell'Italia; il latte per il consumo diretto; la tecnica del caseificio; burro; formaggi; legislazione sul latte e sui latticini. Milan: A. Vallardi. 113 pp. L. 3.

Sangiorgi, Giuseppe: Microbiologia. La chimica dei principali alimenti ed oggetti d'uso. Andria: F. Rossignoli. 43 pp.

Food product. Hubert C. Meyers. *Fr.* 757,454, Dec. 27, 1933. A product rich in proteins, mineral salts and vitamins is made by applying heat to the germ of grain, without carbonizing it, for a sufficient time to prevent rancidity and to remove bitterness without destroying the nutritive value.

Apparatus for mechanically preparing gluten from flour. Pierre Barbade (to Établissements Tripette & Renaud Fils). U. S. 1,948,453, Feb. 20. Various mech. and operative details are described.

Dough. Tritikum A.-G. *Ger.* 591,932, Jan. 29,

1934 (Cl. 53a. 2.01). Dough is formed by mixing rye meal to a paste with concd.  $\text{H}_2\text{O}_2$  soln.

Bread making. Willy Gätlin. *Fr.* 757,637, Dec. 29, 1933. A product favoring fermentation and cooking is made by introducing into a sirup of lactic acid, nutritive substances for yeast, i. e., saccharose and dextrose, and absorbing substances such as reduced flour (flour transformed to a paste and dried), and drying the mixt, which should contain at least 20% of lactic acid when dry.

Filter for milk, etc. Horace Cousins. *Brit.* 401,715, Nov. 20, 1933. A filtering element comprises 2 pieces of woven fabric with wadding secured between them by stretching and adhesive.

Tubular heat-exchange apparatus for cooling milk, etc. Albert T. Light (to York Ice Machinery Corp.). U. S. 1,949,126-7, Feb. 27. Structural features.

Reducing the acidity of butter, cream, fats, oils, etc. Otto Karpeles. *Austrian* 136,322, Jan. 25, 1934 (Cl. 53a). The material is washed with milk or skim milk, the acidity of which has been reduced by electrochem. treatment in known manner.

Junket powders. Crosse & Blackwell, Ltd., and Wm. Clayton. *Brit.* 401,395, Nov. 16, 1933. In making junket powders, which consist of sugar, rennet or pepsin and flavoring and coloring substances, a small amt., i. e., 0.1-1%, of an edible salt, i. e., Ca lactate, Mg citrate, which restores to heated milk the properties destroyed by pptn. of the Ca content due to heating, is added to the powder.

Preserving meat. Fernand Nieninek. *Brit.* 393,803, June 2, 1933. Divided on 393,935. Meat, except beef, is preserved by a single-stage process in a gaseous atm. at a suitable temp. by simultaneously withdrawing or displacing air from the storage chamber and replacing it by  $\text{CO}_2$  (mixed with N) so that the atm. contains more  $\text{CO}_2$  than O. In 393,935, June 2, 1933, beef is so preserved.

Pectin-sugar composition suitable for use in cakes, confectionery, jellies, etc. Robert M. Preston. U. S. 1,949,657, March 6. See *Brit.* 377,084 (*C. A.* 27, 3262).

Stable mayonnaise emulsion. Albert K. Epstein and Marvin C. Reynolds. U. S. 1,949,791, March 6. App. and various details of use in mayonnaise-emulsion manuf. are described. An inert gas such as N or  $\text{CO}_2$  may be used.

Preserving alimentary oils and fats. Swift & Co. *Ger.* 592,392, Feb. 6, 1934 (Cl. 53a. 1.01). See *Brit.* 399,639 (*C. A.* 28, 1883\*).

Emulsions. Ivo Deiglmayr. *Ger.* 575,922, Feb. 8, 1934 (Cl. 23c. 2). \*High percentage stable aq. emulsions of oil, fats or waxes are prepd. by the aid of pectin, the emulsifying being carried out in the presence of milk sugar.

Emulsions. Ivo Deiglmayr. *Ger.* 585,586, Feb. 8, 1934 (Cl. 23c. 2). Addn. to 575,922 (preceding abstr.). The method of 575,922 for making high percentage stable aq. emulsions of oils, fats and waxes by the aid of pectin and in the presence of milk sugar, is modified by replacing the latter by fruit sugar, invertose, grape or manna sugar.

Cocoa product. John H. Kellog, George L. Teller and Wm. K. Teller (to Battle Creek Food Co.). U. S. 1,947,717, Feb. 20. To remove theobromine selectively, material such as cocoa powder is treated with a reagent including an alc. such as  $\text{MeOH}$ , an alkali such as  $\text{KOH}$  and water, the liquid is sepd. and the sepd. solids are washed with 90%  $\text{MeOH}$ . Cf. *C. A.* 27, 5483.

Caffeine-free coffee. Wilhelmus H. Levelt. *Ger.* 592,355, Feb. 5, 1934 (Cl. 53d. 5). See *Brit.* 362,313 (*C. A.* 27, 1063).

Tannins, fatty acids, caffeine, theobromine and glycerol from coffee, cacao or maté. Franz Köck and Franz Messner. *Austrian* 136,388, Jan. 25, 1934 (Cl. 12c). These substances are recovered from the liquid by-product obtained in the process of *Austrian* 132,410 (*C. A.* 27, 3540). Methods of procedure are indicated.

## 13-GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The importance of chemistry to planned industry. Wilhelm Krumbhaar. *Ind. Eng. Chem., News. Ed.* 12, 68-9(1934).

The future of the chemist in industry. S. Reginald Price. *Paper Maker & Brit. Paper Trade J.* 87, 121, 126, 128(1934).—An address. A. Papineau-Couture. *Some principles of industrial research.* H. A. Schwartz. *Metals & Alloys* 5, 49-53(1934).

Coordinating research with practical mill operation. K. A. Taylor. *Chem. & Metal Eng.* 41, 124 6(1934); cf. *C. A.* 28, 2527.

Transporting and handling bulk chemicals. R. F. Bergmann. *Chem. & Met. Eng.* 40, 474 7(1933).

Isothermal flow of liquid layers. C. M. Cooper, T. B. Drew and W. H. McAdams. *Ind. Eng. Chem.* 26, 428-31(1934).—See *C. A.* 28, 5436.

Glycerol ethers as solvents. Otto Merz. *Farben-Chem.* 5, 91-5(1934).—The b. ps., sp. grs., ns and solubilities in  $H_2O$  of a no. of glycerol ethers are tabulated. Glycerol dimethyl ether, glycerol diethyl ether, epithylin and -piphenylin are compared with ethylene glycol in their miscibility, solvency, evapn. rates. In general, they are miscible in all proportions with alcs., ethers, ketones, and esters; have good solvency for cellulose esters and resins; and are almost odorless.

Alignment chart for plant dilution problems. Norman M. Wickstand. *Chem. & Met. Eng.* 40, 487(1933).

Determining the efficiency of the radiant surface. A. G. Korenevskii and M. V. Meiklyar. *Izvestiya Isplokh. Inst.* 1933, No. 9, 23 6.—Calcs. are made of heat transfer.

Modern methods of attacking heat-transmission problems. C. H. Lander. *Trans. Inst. Chem. Engrs.* (London), Advance copy, Feb. 16, 1934, 10 pp.—Measurements of gas radiation, free convection from a horizontal wire in air at pressures up to 650 atm., and free convection from various surfaces by optical means are discussed.

Heat liberation and transmission in large steam-generating plants. E. W. Robey and W. P. Harlow. *Proc. Inst. Mech. Engrs.* (London) 125, 201-89; *Engineer* 136, 586-8, 611; *Engineer* 156, 524(1933).—Data from the literature are described with respect to mech. work, secondary air, heat release per unit vol. and the effect of thicker fuel beds, and principles are evolved which point to a reduction in boiler size. New exptl. data are reported for heat transfer and draft loss for gas flowing between parallel plates. Higher gas velocities in boilers are justified economically. Delayed heat release in flue gases and air-heater corrosion as affected by high gas dew points are discussed. Cf. Johnstone, *C. A.* 25, 1509.

Friction and heat transmission in moving fluids. Vladimir Margoulis. *Chaleur & ind.* 14, 347-56, 531 6, 591 6(1933); 15, 30-8(1934). A math. treatment of fluid flow with examples of exptl. verifications of the theories by various investigators.

New media for heat transfer in industry. Organic liquids as heat-transfer agents. Freitag. *Apparaturbau* 46, 11-12(1934).—A review of the development of the use of biphenyl and diphenyl oxide in the U. S.

Heat transfer in fire boxes. V. N. Timofeev. *Izvestiya Isplokh. Inst.* 1933, No. 9, 10 19. Calcs. are made of heat transfer in fire boxes.

Heat transfer between metal pipes and a stream of air. Edgar Griffiths and J. H. Awbery. *Ice and Cold Storage* 37, 14-16(1934).

Steam-film heat-transfer coefficients for vertical tubes. M. Hebbard and W. L. Badger. *Ind. Eng. Chem.* 26, 420-4(1934).—See *C. A.* 28, 544.

The absorption capacity of respiratory filters and their

limitations. Gerhard Stampe. *Angew. Chem.* 47, 95-9 (1934).—The filter action and absorption capacity are discussed and exptl. results are reported on the effects of gas velocity, gas concn., construction of air path, rest periods of the used filter before re-use and mutual influences of different gases in a filter. Thirteen references.

Consideration of the insulating properties of plastics. Marcel Belin. *Rev. gén. mat. plastiques* 9, 322-6(1933).—A brief discussion of the merits of plastics as elec. insulators.

Thermal insulation with aluminum foil. J. F. O. Strutton. *Paper, Trade J.* 98, No. 9, 37 9(1934).—Thermal insulation with a metal is obtained by taking advantage of the low thermal emissivity of Al foil and the low cond. of air. Al foil when applied is usually crumpled so that 3 layers take up an in. thickness of space. The advantages of Alfol, an Al-foil insulator, are discussed.

Polystyrene as an insulating material. N. P. Bogoroditzkii, G. F. Duletzkii and V. N. Malishev. *J. Tech. Phys.* (U. S. S. R.) 3, 831-39(1933).—Pure polystyrene at room temp. and relative moisture content of 60% had a specific vol. resistivity of  $\rho = 3 \cdot 10^{17}$  ohm/cc., and specific surface resistivity of  $\rho = 1.2 \cdot 10^{10}$  ohm/sq. cm. Pure polystyrene shows no variation of dielec. loss with temp. at high or low frequencies. Plasticized polystyrene shows no variation at high frequencies, but at low frequencies rises to a max. at 66.5° and then decreases.

Styrene-coated marble as an insulating material under high frequencies. N. P. Bogoroditzkii and G. F. Duletzkii. *J. Tech. Phys.* (U. S. S. R.) 3, 1200-2(1933).—Marble dried and then given a coating of polymerized styrene was found suitable for adoption as a radio insulator.

Heat content of mixts. of  $NH_3$  and  $H_2O$  as a function of the compn. and temp. (Zinner) 2. Heat conductivities of various liquids (Kardos) 2. Interferometer in air protection (Gorlach) 7.

Annuaire des produits chimiques, produits pharmaceutiques, droguerie, couleurs. 8th année. Mechlin: G. Tacoen. F. 15.

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1933. Vol. XXIII. London: The Society. 770 pp. 12s. 6d. Reviewed in *Chem. Trade J.* 94, 200; *Ind. Chemist* 10, 116(1934).

British Standard Specifications. No. 516. Crude Carbolic Acids, 60's and 45's. No. 516. Distilled Carbolic Acids, 60's and 45's. No. 517. Cresylic Acid of High o-Cresol Content. No. 521. Cresylic Acid (50/55% m-Cresol). No. 522. o-, m- and p-Cresol. No. 523. Phenol. No. 524. Refined Cresylic Acids. Prepared by Tech. Comm. of Chem. Divisional Council. London: Brit. Standards Inst. 2s. 2d. each.

Beiträge zur Geschichte der Technik und Industrie. Bd. XXII. Edited by Conrad Mutschoss. Berlin: V. D. I.-Verlag. 156 pp. Cf. *C. A.* 27, 1420.

Berl-Lunge, Chemisch-technische Untersuchungsverfahren. Bd. V. 8th ed., edited by Ernst Berl, with contribution by Hans Ed. Fierz-David and A. Monsch: Organische Farbstoffe. Contribution by J. F. Sacher: Die anorganischen Farbstoffe. Berlin: J. Springer.

Effecting endothermic reactions. Metallges. A.-G. (Helmuth Wendeborn, inventor). Ger. 577,103, Feb. 7, 1934 (Cl. 80c. 11). In effecting endothermic reactions such as the manuf. of cement and the thermal decompn. of sulfates, chlorides and alk. earth carbonates, a mixt. of the starting material with fuel and a substantial proportion of an inert material is supported on a grate through

which air is blown so as to effect combustion of the fuel. The presence of the inert material facilitates the completion of the reaction and the formation of a uniform product. The inert material may be, e. g., blast-furnace slag or the final product of a preceding operation. Examples and exptl. results are given.

**Magnetic separation of materials.** Bartel Granigg. U. S. 1,948,419, Feb. 20. Various app. and operative details are described.

**Mechanical separation of dust from gases.** Soc. d'électricité de la région de Valenciennes-Anzin. Fr. 757,541, Dec. 28, 1933.

**Removing condensable material from gaseous mixtures by adsorption.** Cornelius F. Abbott and Charles A. Conklin, 3rd (to the receiver of the Silica Gel Corp.). U. S. 1,948,779, Feb. 27. A gaseous mixt. such as an contg. moisture to be removed is successively contacted with 2 batches of adsorbent such as silica gel one of which is partially satd. with the condensable material and is under reduced pressure for enrichment of the mixt. and activation of the adsorbent, the mixt. being then cooled and condensate formed removed before passing the mixt. into contact with active adsorbent (an app. for periodical reversal of flow being described). Cf. C. A. 27, 5223.

**Separating mixtures of gases and vapors.** I. G. Farbenind. A.-G. (Fritz Stöwener, inventor). Ger. 592,417, Feb. 7, 1934 (Cl. 12e. 3.02). Addn. to 573,400 (C. A. 27, 3017). Mixts. contg. water vapor as well as other easily adsorbed components are treated with 2 or more adsorbents in series, as described in Ger. 573,400, under such conditions that water and one or more of the other easily adsorbed components are recovered together.

**Detecting the presence of gases.** Otto Schmidt. Ger. 591,710, Jan. 30, 1934 (Cl. 42l. 4.16). The presence of H, CO and NH<sub>3</sub> is detected by mixing powd. ZnO with a catalyst and noting changes of the dielec. const. of the mixt.

**Means for producing compressed gas from liquefied gas.** Leo I. Dana. Ger. 592,298, Feb. 6, 1934 (Cl. 17g. 5.02).

**Apparatus for freezing out water from compressed gases or gas mixtures to be liquefied.** Adolf Messer. U. S. 1,949,616, March 6. Various details of a compression and heat-exchange system are described.

**Apparatus for liquefying gases.** Sebastian Haller. Ger. 595,462, Feb. 9, 1934 (Cl. 17g. 1).

**Apparatus for liquefying solid carbon dioxide.** Philipp Stapp. Ger. 592,118, Feb. 1, 1934 (Cl. 12i. 35).

**Solid carbon dioxide.** Raymond C. Pierce (to York Ice Machinery Corp.). U. S. 1,949,179, Feb. 27. Various structural and mech. details are described of app. for manuf. of solid CO<sub>2</sub>.

**Apparatus for solid carbon dioxide production and compression.** Mark Shoeld (to Koppers Co. of Del.). U. S. 1,949,730, March 6. Various structural, mech. and operative details are described.

**Purifying liquids.** Éliée C. Duhamel and Compagnie générale des industries textiles. Fr. 757,503, Dec. 28, 1933. The sepn. from liquids of solids in suspension is facilitated by causing a modification of the compn. of the suspended particles, e. g., by adding an emulsion of fat to the liquid or by removing gas from the particles to cause them to sink or by increasing the vol. of the gas to cause the particles to float. Fr. 757,504. Removal or change of vol. of the gas attached to solid particles is used to purify liquids used for washing textiles, etc.

**Cleaning organic liquids.** Terlinden & Co. Swiss 163,269, Oct. 2, 1933 (Cl. 36d). Org. liquids contg. fat and dirt are cleaned by circulation in app. in which the

water and suspended particles are first removed. The fats are then removed by an adsorbent filter.

**Fusing inorganic substances.** Deutsch-englische Quarzschmelze G. m. b. H. Ger. 592,378, Feb. 5, 1934 (Cl. 80b. 8.17). Inorg. conductors of the 2nd class, e. g., bauxite, rutile, monazite sand and Cr<sub>2</sub>O<sub>3</sub>, are fused by electromagnetic high-frequency heating after they have been preheated, by another source of heat, to the temp. at which they become conductive.

**Crushing or milling gelatinous materials.** Carl Nachtigall. Ger. 591,536, Jan. 23, 1934, and 591,537, Jan. 24, 1934 (Cl. 22a. 8).

**Separating emulsions such as those of petroleum by the combined action of magnetic and electric fields.** Claudius H. M. Roberts (to Petroleum Rectifying Co. of Calif.). U. S. 1,949,660, March 6. Various details of app. and operation are described.

**Separating mixed material such as "run-of-mine" coal.** Richard Peale and Rembrandt Peale, Jr. (to Peale-Davis Co.). U. S. 1,949,729, March 6. Various structural and operative details of an air-pervious table app. are described. Cf. C. A. 28, 51.

**Freezing agent.** Hermann Geppert. Ger. 591,819, Jan. 30, 1934 (Cl. 12a. 7). Solid CO<sub>2</sub> hydrate is used as freezing agent.

**Warning of hydrocyanic acid fumigation.** Ludwig Gassner (to Deutsche Ges. für Schadlings-Bekämpfung m. b. H.). U. S. 1,949,466, March 6. There is added to a HCN fumigating compn. a warning agent having a higher vapor pressure than HCN, such as cyanogen chloride or bromide, and another warning substance having a lower vapor pressure than HCN, such as bromoacetophenone so that warning will be given throughout the period in which a toxic concn. of HCN exists.

**Mask for absorbing poisonous gases.** Modesto B. Seijo. U. S. 1,948,945, Feb. 27.

**Heat-insulating material suitable for use in building and refrigerator construction.** Merrill D. Squiers. U. S. 1,919,087, Feb. 27. Asphalt emulsion 10 is stirred into a mixt. of mineral 100 and soft water 1500 parts and the material is molded to desired shape.

**Apparatus for baking insulation on wire, etc.** Henry M. Larsen (to Western Elec. Co.). U. S. 1,947,993, Feb. 20. Various structural and operative details are described.

**Extrusion machine and method for sheathing electric conductors, etc., with two differently colored layers of rubber, bitumen, etc.** The Liverpool Electric Cable Co. Ltd. and Thomas H. Tweedle. Brit. 401,529, Nov. 16, 1933.

**Insulators.** Emil Schmalz. Swiss 163,900, Dec. 1, 1933 (Cl. 37g). A protective agent for the insulation of cables, etc., comprises water, CH<sub>2</sub>O, dextrin, a filling agent and linseed oil.

**Binder suitable for securing mica plates together.** George F. Hadley (to Westinghouse Elec. & Mfg. Co.). U. S. 1,948,756, Feb. 27. A mixt. of a vegetable drying oil such as China wood oil, a natural hydrocarbon pitch or stearin pitch, glycerol and a resin such as rosin is heated to 250-300° until the oil polymerizes, the resin reacts with the glycerol and all excess volatile matter is driven off, leaving a thermoplastic compn. suitable for use with mica in making high-voltage insulation.

**Sound-absorbing material.** Brouwer D. McIntyre (to Insulation Development Corp.). U. S. 1,947,788, Feb. 20. A sound-absorbing panel comprises an outer covering of vulcanized sheet rubber and a filler contg. about 60% of fibrous material such as waste jute and about 40% of powd. rubber.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Rijkman's test on water supplies in the Madras Presidency.** W. J. Webster and T. N. S. Raghavachari. *Indian J. Med. Research* 21, 525-34 (1934).—In a series

of comparative tests with MacConkey's bile salt lactose broth on waters from a variety of sources, the Rijkman test (fermentation of glucose at 46°) was found to be an



reliable, samples showing true coli in 0.1 cc. giving, in some instances, a neg. Bijkman test in amts. up to 50 cc. Bijkman tubes which showed turbidity and occasionally acidity but no gas frequently yielded lactose fermenters on sub-culture. *Aerobacter aerogenes* is inhibited in Bijkman medium to a greater extent than *Es. coli*. Streptococci were noted far more frequently in the Bijkman than in the MacConkey tubes. R. E. Thompson

**Water supplies—mechanical filtration.** Ernest Minors. *Water and Water Eng.* 36, 79(1934).—Pressure filters and double coagulation with Na aluminate and Al sulfate are used. The bacterial count is thus reduced from 14,000/cc. in the raw river water to 65/cc. in the filtered water. Post-chlorination is used to lower the *Es. coli* tier.

**Principles of water purification.** W. C. Miller. *Eng. Contract Record* 48, 19 22, 80-81, 187 90(1934).—Water-purification practice is discussed. R. E. Thompson

**Purification of water. A practical method of purifying water for an army on the march.** M. Garret. *Tribuna farm.* 2, 56 8(1934); cf. C. A. 26, 1997, 4118.—Four light compact canvas filters will supply a squad of 25 men for 10 days on the march. For each man is supplied 2.1 l. of clean palatable water per day. The filter consists of a layer of  $KMnO_4$ , talc and alum, and one of  $Na_2S_2O_4$ , talc and  $Na_2CO_3$ , sepd. and covered with pressed cotton batting and flannel. G. H. Conant

**Recent developments in the field of water-works practice.** Henry A. Mentz. *Proc. Am. Soc. Munic. Engrs.* 39, 157-76(1933).—A rept. of the Comm. on Water Works of the Society. Applications of activated C, aeration, taste and odor control, the  $NH_4$ -Cl treatment, etc., are briefly mentioned. W. H. Boynton

**Determination of fluorides in natural waters.** J. M. Sanchis. *Ind. Eng. Chem., Anal. Ed.* 6, 134 5(1934). Slight modification of the Thompson-Taylor procedure (C. A. 27, 2072) to adapt it to routine detns. A. L. H.

**Chlamydomonas in storage reservoirs.** Stanley Thomas and J. W. Burger. *J. Am. Water Works Assoc.* 25, 991 2(1933); *U. S. Pub. Health Eng. Abstracts* 13, W, 100(Oct. 21, 1933).—Studies conducted at the Easton, Pa., water-works plant showed that *Chlamydomonas* may cause serious unpleasant odors and tastes in water. Their presence greatly increases the Cl demand of water. The organism may assume a variety of forms, some of which resist treatment with  $CuSO_4$  when used up to 8 lb. per million gals. C. R. Fellers

**Determination of the hardness of water with the potassium salts of acids from cottonseed oil.** E. A. Nikiforov. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 42-4.—The natural cottonseed oil contains 22.26% of the glyceride of palmitic acid, 26.90% of that of oleic acid and 46.50% of that of linoleic acid, in addn. to 1.85% unsaponifiable matter. This oil was heated (for the prepn. of acids) on a water bath with a concd. soln. of KOH and the lumps, which were formed in the course of the process were dissolved in a large vol. of distd.  $H_2O$  and the soln. was filtered. The soap obtained was split with HCl and the excess of the latter was washed off with warm water. A 0.1 N soln. of the above acids, corresponding to 0.28° (German hardness degrees), was then prepd. in a manner similar to the C. Blacher, P. Grunberg, M. Kissa soln. (C. A. 7, 1938). The detn. of the hardness was carried out by the C. Blacher, *et al.*, method. The procedure is described and a few illustrations are given. A. A. Bochtlingk

**Lowering the residual hardness of the water during filtration.** Yu. M. Kostrikin. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 44-5.—Expts. carried out with softening of water by the permute method indicate that a preliminary treatment of the water with lime, which should be pptd. after treatment; produces a water which is more suitable for boiler feed water than water which has received only a permute treatment. A. A. Bochtlingk

**Influence of the marble filter on the residual hardness of water softened by the soda-lime method.** N. E. Koshlyanskii. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 47.—The procedure is reported in detail (results are

tabulated) and the following conclusions are derived: Filtration through crushed marble or other crushed stone lowers the residual hardness of water softened by the soda-lime method or preliminary lime treatment. The degree of the lowering of the residual hardness is in direct relation to the temp. of the water to be filtered and it is inversely proportional to the velocity of filtration. Crushed marble is 50% more efficient than sand-quartz filters. A. A. Bochtlingk

**Determination of the total hardness of boiler feed water.** E. V. Khalapsin. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 40 2.—A crit. review of various methods is given. A. A. Bochtlingk

**Coagulation of organic substances in the Shatura power plant.** R. B. Grinberg. *Izvestiya Teplotekh. Inst.* 1933, No. 10, 40 50.—The boiler feed water derived from "Chernoe Ozero" was treated with  $Al_2(SO_4)_3$  and it was found that 20 mg. per l. does not effect a complete coagulation at 20° and even a treating temp. of 40° does not show an improvement, while 40 mg. produces better results at both temps. A further increase of the substance decreases the coagulation. The best conditions are: 40 mg. per l. of  $Al_2(SO_4)_3$  at 40° and a filtration velocity of 5 m. per hr. The method is discussed and the results are tabulated. A. A. Bochtlingk

**Solid matter in boiler-water foaming. II. Loss of foam-stabilizing properties at higher pressures.** C. W. Foulk and S. F. Whirl. *Ind. Eng. Chem.* 26, 263 7 (1934); cf. C. A. 26, 1997.—Studies made in an exptl. boiler similar to that of Joseph and Hancock showed that the rate of loss of foam-stabilizing power of solids (e. g., limestone) increases with the pressure (temp.) of the soln. At pressures of 7.0-10.6 kg. per sq. cm., the foam-stabilizing properties were lost in 5-10 min. "Solids that have lost their foam-stabilizing effects not only no longer promote foaming and priming in a boiler but actually reduce it because of the greater smoothness of boiling induced." Oscar T. Quimby

**Deposits caused by impurities of boiler water.** W. Reicher. *Gaz. Cukrownicza* 72, 280 302(1933). Deposits in boilers of a sugar plant consisting mainly of  $CaSO_4$  and humic acids were formed from so-called cold-water feeding. The humic substances may have had their origin in small amts. of sugar entering the boiler. Im proper lubrication was also a factor in the formation of deposits. J. Wiertelak

**Chlorinated copperas as a coagulant.** L. C. Billings. *Water Works and Sewerage* 81, 73-7(1934).—The use of chlorinated copperas ( $FeSO_4$ ) at the Dallas, Texas, municipal water works has resulted in marked savings and increased efficiency of coagulation of then highly turbid water. G. H. Young

**Reduction of corrosion in water pipe.** Edward S. Hopkins. *Ind. Eng. Chem.* 25, 1050(1933).—The  $pH$  of water is an indication of its corrosive action. Detailed analytical data show that water with a  $pH$  value at the satn. point of  $CaCO_3$  deposits a coating that retards corrosion. With bright Fe surfaces  $pH$  values between 5.0 and 9.0 are of equal merit in retarding corrosion by waters that do not form protective coatings. Lime treatment of water to give pipe protection is described, with cost data. R. R. Shaw

**Well water causes sewer stoppages.** M'Kean Maffitt. *Eng. News-Record* 112, 226(1934).—A sewer stoppage in an office building in Wilmington, N. C., was found to be due to a deposit consisting of 80-90%  $CaCO_3$ . The private well supply to the building contained 267 p. p. m. free  $CO_2$  and 196 p. p. m. Ca. R. E. Thompson

**New experiences with small sewage-treatment plants.** Paul Wiese. *Tech. Gemeindeblatt.* 35, 275-6(1932); *U. S. Pub. Health Eng. Abstracts* 13, S, 71(Nov. 4, 1933).—The disadvantages of Emischer tanks and Siedler tanks with Hoffman sepg. app. for treatment of sewage from sep. houses are pointed out. In an improved design the sludge and sewage are sepd. in a channel corresponding to the Hoffman sepg. app. and the sludge is carried by a sludge channel to a point beneath the scum layer in the digestion chamber. The object of the design is to prevent

access of septic sludge or liquid to the fresh clarified sewage.

C. R. Fellers

Performance of Dearborn's chemical sewage-treatment plant. A. M. Buswell. *Water Works and Sewerage* 81, 87-91(1934).—B. presents the results of a 30-day intensive study of the treatment at the Dearborn sewage works. The process tested consists of: (1) coagulation by use of lime, ferric salts and paper pulp (made from waste-paper collected from the city schools and municipal bldgs.), (2) sedimentation, followed by (3) rapid filtration through a Laughlin magnetite sand screen. Complete operating data and analytical results are included.

G. H. Young

Six months' operation of a chemical sewage-purification plant. G. H. Gleason and A. C. Loomis. *Public Works* 65, No. 3, 9-10(1934); cf. *C. A.* 27, 2510.—An exptl. sewage-treatment plant at Chicago, Ill., uses ferric sulfate for coagulation, followed by liming. Zeolite reaction filters are used for final treatment of the effluent. Solid sludge is collected on an Oliver vacuum filter and incinerated. The incinerator ash contains 30-32% Fe oxide, and is treated with 66°Bé.  $H_2SO_4$  at 150°; it is then leached with water in a rubber-lined steel tank. This gives an iron soln. which after diln. is applied to the raw sewage in the first dosing tank. The process has proved consistently more efficient and gives a better effluent than the activated-sludge process.

G. H. Young

Operation of Prüss pump at Baltimore sewage works. C. E. Kiefer. *Water Works and Sewerage* 81, 78-83; *Gesundh.-Ing.* 57, 54-7, 65-8(1934).—Comparison of a digestion tank having Prüss circulating equipment with a tank in which the sludge was not circulated showed that: (1) sludge digestion was not accelerated; (2) the solid content in the ripe sludge was much lower; (3) the liquefaction of solids was one half as great; (4) more digested sludge and less supernatant liquor were withdrawn; (5) less scum formation resulted; (6) heat losses from the tank were no greater; (7) there was no increase in the percentage of volatile solids in the ripe sludge withdrawn; (8) there was only a slight increase in the  $CO_2$  content of the gas; (9) the total gas production was increased 21%. Some operating difficulties were encountered.

G. H. Young

Notes on operation of sewage-treatment plants. LeRoy W. Van Kleeck. *Sewage Works J.* 5, 625-44(1933). The common methods of sewage treatment in New England are described. Plain settling, sep. sludge digestion, Imhoff tanks, septic tanks, sand filters and sludge drying are discussed.

E. Hurwitz

History of chemical precipitation. Leon B. Reynolds. *Sewage Works J.* 5, 595-9(1933).—A history of the chem. pptn. method of sewage treatment is presented, describing early English, French, German and American experiences as well as plants built and chemicals used. Results indicate that under favorable conditions the chem. pptn. treatment removed 80-90% suspended org. solids, 20-30% dissolved org. solids, 50-60% total org. matter and 80-90% bacteria. Chemicals used were 0.25-0.75 ton per million gallons. The remaining suspended and dissolved org. matter caused the effluent to be putrescible, and cost difficulties finally resulted in the abandonment of all plants except a few treating sewage high in certain industrial wastes.

E. Hurwitz

How sewage is purified. I. H. H. Bach. *Chem.-Ztg.* 58, 33-5, 46-8(1934). The various processes of sewage treatment and their applicability are discussed, including both mech. and biol. processes—both aerobic and anaerobic. For unknown reasons some sewages cannot be satisfactorily treated by the activated-sludge process. This process, when functioning properly, produces an effluent of very good quality.

M. G. Moore

Chlorination in sewage treatment. A. M. Ruwn. *Water Works and Sewerage* 81, 96-8(1934).—R. discusses briefly the general role of Cl in sterilization, in odor control, as an aid in coagulation, in reducing the  $O_2$  demand, in stabilization, structure protection, etc., in sewage treatment. Seventeen references.

G. H. Young

The selection and maintenance of mechanical sewage

equipment. John Lewis. *Sewage Works J.* 5, 652-4(1933).—Mech. sewage equipment should be selected on the basis of 3 important factors: (1) simplification which will reduce the no. of moving parts to a minimum; (2) durability and resistance to conditions of erosion and corrosion; (3) accessibility in order to insure proper maintenance. These factors are discussed in detail with information on maintenance and lubrication.

The Zentri-Sieb (centrifugal screen). Wilhelm Seeger. *Gesundh.-Ing.* 57, 68-70(1934).—A drum-shaped screen revolves on a vertical axis in the path of the sewage flow. Because of centrifugal force the heavier sewage solids are thrown away from the revolving screen and the sewage thus concd. leaves by one outlet; while another outlet carries the more dil. effluent which passes through the screen. The device is particularly useful in an emergency outlet as it enables the plant operator in times of high flow after heavy rains, etc., to deliver a large percentage of the sewage solids to the plant, while the more dil., partially purified fraction is by-passed. The screen is self-cleaning, since any deposit would be dislodged by centrifugal force.

M. G. Moore

The "population equivalent" in the estimation of the degree of pollution of sewage. H. Rohde. *Gesundh.-Ing.* 57, 45-6(1934).—Formulas are given for calc. biochem.  $O$  demand values for given temps. and time intervals from biochem.  $O$  demand  $\Delta$  obtained at 20° for either 5 or 20 days. Since av. German domestic sewage requires 45 g.  $O_2$  per contributing inhabitant per day, this value is taken as a measure of 1 unit population equiv. The population equivs. per 1000 kg. for various materials found in industrial sewage are given. The convenience of the unit in calc. plant dimensions, permissible load on a receiving stream, etc., is discussed.

M. G. Moore

The effect of sewage on cast-iron Venturi meters. C. I. Kiefer. *Eng. News-Record* 112, 44(1934).—Examn. of five 42 X 21-in. cast-iron Venturi meters installed at Baltimore, Md., in 1911 indicated that domestic sewage has little, if any, disintegrating effect on cast iron, provided it is free of  $O_2$  and grit and is not flowing at excessive velocities.

R. F. Thompson

Present trends in sludge disposal. Robert A. Allison. Ohio Conference Sewage Treatment, 6th Ann. Rept. 1932 35-7.

E. H.

Operation of activated-sludge plants practically considered. R. J. Spode. *Surveyor* 83, 391-2(1933). *U. S. Pub. Health Eng. Abstracts* 13, S, 58(Sept. 1933).—The fundamental requirements of a successful activated-sludge process are: (1) intimate mixing of the sludge and sewage during the aeration period; (2) preservation of aerobic conditions in the plant; (3) storage capacity in the plant to deal with the peak load flow; (4) provisions made for the regular and systematic discharge of surplus sludge under controlled conditions. The reactivation of sludge and activated-sludge disposal are also discussed.

C. R. Fellers

Circulation of sewage sludge. W. Husmann. *Techn. Gemeindeblatt* 37, 21-2(1934).—The practical significance of the lab. expts. of Herb (cf. *C. A.* 28, 239<sup>6</sup>) is discussed. The fact that  $CH_4$  production begins later in stirred than in unstirred sewage is explained as follows: Fresh domestic sewage is usually acid. Alk. reaction favors the development of  $CH_4$ -producing bacteria. In unstirred sludge, the sludge itself may acquire an alk. reaction, favoring  $CH_4$  fermentation, while the supernatant liquid is still acid. During stirring the acid liquid would be mixed with the sludge, keeping the whole acid for a longer period. In practice, stirring should not begin until  $CH_4$  fermentation has been established. In Herb's expts. the total amt. of gas evolved up to complete digestion is practically the same in the stirred and unstirred samples. The fact that the digested sludge shows the same compn. in both cases indicates the same type of fermentation took place in both cases.

M. G. Moore

Sludge digestion at Peoria, Illinois. Leon S. Kraus. *Sewage Works J.* 5, 623-34(1933).—The sewage-treatment plant of the Greater Peoria Sanitary and Sewage Disposal District is of the activated-sludge, sep. sludge-

digestion type. The sludge-disposal equipment is described. The method of operation of single- and two-stage sludge-digestion systems at 90°F., and the digestion of beer slops are also given. The sludge-digestion tanks were started by providing temporary heating app., filling tanks with water until heating coils were submerged and maintaining a temp. of 85-90° after sludge was introduced. The  $p_H$  was kept at 6.5 by addn. of lime until normal digestion brought this value above 6.5. The load is increased in such a way as not to increase greatly the percentage of volatile acids. Cost data and general conclusions based on 2 years of plant operation are also given.

E. Hurwitz

**Incineration of skimmings.** A. P. Banta. *Sewage Works J.* 5, 659-61(1933).—The practice of digesting the screenings and skimmings in the same tank with raw and activated sludge resulted in drying difficulties with the sludge from the main digestors. Incineration of skimmings at high temps. (1700°F.) with gas from the digestion tanks as fuel resulted in normal sludge-drying conditions and an efficient method of disposing of skimmings.

E. Hurwitz

**Detection and measurement of certain types of gases.** S. H. Ash. *Sewage Works J.* 5, 662-73(1933).—A general description is given of the phys. properties, physiol. action, measurement and detection of gases that may be encountered in the field of sewage treatment. After inspection of many types of sewer and sewage gases the following were found to be most common:  $CO_2$ , illuminants, O, H, CO,  $CH_4$ ,  $C_2H_6$ , gasoline vapor and N.

E. Hurwitz

**Sewerage system utilized for disposal of garbage.** C. E. Keefe. *Eng. News-Record* 112, 227-9(1934).—Equipment was installed in Baltimore, Md., in 1933, at a cost of \$8585, for grinding a portion of the garbage during periods of peak production, the pulp being discharged into the outfall sewer 2.1 miles from the sewage-treatment works. The equipment was operated for 24 days, during which period 1693 tons of garbage were disposed of in this manner. The av. sewage flow during the period was 83 million gals. per day. The power consumed in grinding was 4.35 kw.-hrs. per ton of garbage. The only effect on the operation of the sewage-treatment plant, which consists of settling tanks, trickling filters, humus tanks, digestion tanks, and sludge-drying beds, was an increased amt. of screenings, due to imperfectly ground corn husks, and appreciably increased scum formation in the primary settling tanks. Tabulated data are given showing the variations in the compn. of the raw sewage due to addn. of the garbage. Lab. expts. showed that garbage may be readily digested with sewage sludge in 30-40 days.

R. E. Thompson

**Report of the Water Pollution Research Board, for the year ended June 30, 1932.** Robert Robertson and H. T. Calvert. Dept. Sci. Ind. Research, *Rept.* 1932, 53 pp.—No improvement was noted in the treatment of beet-sugar-factory effluents in a percolating filter by inoculating the filter with organisms specially efficient in sugar oxidation. Lab. expts. to det. the effect upon biol. filtration of the addn. of N-compds. to pure substances such as sucrose, lactic acid and AcOH indicated that a ratio of C to N of 15 to 1 gave the best results.  $NH_4$  salts,  $NaNO_2$  and  $NaNO_3$  were equally effective as N sources. The presence of phosphate and K was found to be essential but optimum amts. were not detd. Errors in the biochem. O demand test on beet-sugar-factory wastes are as high as 1%. Dissolved salts and nitrogenous substances in diln. water effect O absorption. In 5 days the O taken up rarely exceeds  $\frac{1}{2}$  of the amt. required for complete combustion of sucrose to  $CO_2$  and  $H_2O$ . The biol. filtration of milk-factory effluents was similar to the treatment of beet-sugar-factory wastes. Aeration of the milk wastes reduced difficulties due to "ponding." In a survey of the River Tees cyanides in coke-oven wastes were found to be killing large nos. of fish. The cyanides could be rendered harmless by mixing with spent pickle liquor ( $FeCl_3$ ) or by aeration at 60°. A variation in the time of regeneration in a base-exchange water softener affects the exchange

value, which increases as the time of contact with the brine is increased from 2 to 90 min. NaCl in the water to be softened caused marked decreases in the softening powers of both synthetic and natural materials. With synthetic material complete softening did not occur in the presence of 0.2% NaCl. Water contg. 100 p. p. m. Al destroyed the exchange power of both synthetic and natural materials. Righty p. p. m. of Mn greatly decreased the exchange value but repeated brine treatment restored it. The activated-sludge process of sewage treatment was studied with the biochem. O demand test. No O absorption took place after sterilization of sewage in an autoclave or filtration through a Seitz disk or after treatment with chem. sterilizing agents if sterility was maintained. The time required for the methylene blue stability test was shortened by use of mixts. of sewage and sludge. The colloids in sewage form only a small part of the domestic sewage studied. The major portion of the dispersed matter will sep. by simple sedimentation or centrifuging. Gas-works effluents contain polluting substances known as crude  $NH_3$  liquor. Expts. have indicated that phenols and higher tar acids in  $NH_3$  liquor can be extd. by benzene, tritoyl phosphate and certain tar oils. Biol. purification of the wastes is accomplished at one plant. The process is expensive but av. purification of 80-90% is obtained as measured by the O consumed test.

G. L. Kelso

To what extent can the relation between permanganate consumption and chlorine number be taken to indicate pollution of waters? Alfons Kaess. *Gesund.-Ing.* 57, 30 2, 41 5(1934).—Investigations were carried out on a dil. sewage, a drinking (ground) water and river water. Permanganate consumption was detd. by the method of Kubel-Tiemann,  $Cl_2$  no. by Frohse's modification (cf. C. A. 15, 913) of the method of Ilmanowitsch and Zaleski except that the reaction mixt. was heated 30 min. in a rapidly boiling water bath. Data presented in tables and graphs indicate that the ratio (permanganate consumption)/( $Cl_2$  no.) cannot be taken as an index of fecal pollution and that this value shows no definite relation to the coli titer. In cases where pollution is slight (as it would be in drinking waters) the org. matter is readily oxidized although optimum conditions of temp.,  $p_H$ , etc., may favor multiplication of *Es. coli*. The permanganate consumption and  $Cl_2$  no. were parallel in samples of the same river water taken on various days.

M. G. Moore

**Treating a badly polluted supply.** Horace A. Brown. *Water Works Eng.* 87, 204-7(1934).—A discussion of the treatment of a water in which the bacterial count ranges from a few thousand per cc. to several hundred thousand. Sufficient lime is added in an aeromix to maintain a  $p_H$  of 10.5. The water then passes to the flocculator from which it flows through a baffle system to a primary settling basin. Soda ash is added in the basin to reduce non-carbonate hardness to 10-15 p.p.m.  $Al_2(SO_4)_3$  is also added to bring the  $p_H$  to 9.8. From the primary basin the water passes over a second baffle system to the secondary settling basin which is equipped with a clarifier. It then passes to an aeromix where sufficient  $CO_2$  is added to maintain a residual of 0.88-1.0 p. p. m. of free  $CO_2$  and a  $p_H$  of 7.7 in the influent to the filters.

W. A. Moore

**Observations on changes in numbers of bacteria in polluted water.** C. T. Butterfield. *Sewage Works J.* 5, 601-22(1933).—The av. results of intensive observations made on bacterial changes occurring in 166 samples of polluted water collected from 4 sources (2 points on the Ohio River, a small stream draining a densely populated area, and a city sewer) and held at 10°, 20°, 37° indicate that at all 3 temps. the bacteria increased to a maximum and then decreased. The rate of increase in no. of bacteria varied with the temp. of storage, the rate being most rapid at the higher temps. A study of the following factors was made to det. which might affect the tendency of the bacteria in the samples to increase and decrease in nos. on storage: the nature of the containing vessel, size of sample, exposure to light, the presence or absence of an air surface and occasional agitation of the sample. Centrifuging or filtering a sample very materially increased

the tendency of the bacteria to multiply on storage. As waters in a polluted stream, after max. bacterial concn. has been reached, tend to a consistent and rapid decrease, the results show that the more extensive the interference with normal conditions, the greater the increase in bacterial nos.

E. Hurwitz

**Impurities in water and their elimination.** A Taibo. *Quim. e ind.* 10, 305-9(1933).—A general review.

O. W. Willcox

**Purification of cyanide-containing waste waters.** Friedrich Neuwirth. *Berg- und Hüttenmannisches Jahrb.* 81, 126-31(1933).—Two methods are described to free waste waters of cyanides in solu.: (1) By action of  $\text{CO}_2$ -contg. waste gases which liberate  $\text{HCN}$ . The latter can eventually be recovered. This method has been successfully used in actual operation. (2) By action of ozonized air. This reaction is somewhat slow but can be accelerated by addn. of Fe and Mg salts as carriers of O; this can be simply done by using Fe ores for filling the reaction towers. The latter method also destroys the phenols in phenol-contg. waste waters.

M. Hartenhiem

**The harmful effect of ammonia liquor and still waste of coke plants on the fish in public waters.** G. A. Brendler & Brandis and W. Keeman. *Helv. Gas* 54, 2-13(1934).—A review. Data (15 tables) are given on the compn. and quantity of ammonia liquor and of still waste of various types of plants, on the toxicity of  $\text{PhOH}$ ,  $\text{Ca}$ ,  $\text{CNS}$ ,  $\text{CN}$ ,  $\text{NH}_3$ ,  $\text{NH}_4$ ,  $\text{H}_2\text{S}$ ,  $\text{PhNH}_2$ , pyridine, tar,  $\text{CO}_2$  and  $\text{SO}_2$  for fish; methods for improvement of the waste liquors are discussed. An extensive reference list is given.

B. J. C. van der Hoeven

**Effect of sunlight on dissolved oxygen in the White River.** C. K. Calvert. *Sewage Works J.* 5, 685-94(1933).—Although the measure of dissolved O in a polluted stream is of value in detg. the condition of the water, expts. made on samples of polluted water from the White River, Indiana, indicate that conditions of temp. and light and darkness affect these values; consequently they must be used with care and in full knowledge of conditions. By comparing chloride concns. with dissolved O values under varying conditions, the following conclusions were reached. The org. load in the White River below Indianapolis is frequently such that in bright sunlight the biologic activity of the river is able to maintain considerable O concn., but in the absence of sunlight the O content may be zero.

E. Hurwitz

**Use of copper and silver for the elimination of micro- and macroorganisms from swimming-bath water.** H. Ivekovic. *Z. Gesundheitsleh. Statist.* 24, 251-4, 314-20(1932).

E. H

**Experimental application of chloropicrin and carbon disulfide in the control of mosquito larvae and pupae.** A. Politov. *Med. Parasitology and Parasitic Diseases* (Moscow) 1, No. 1, 32-6(1932); *Trop. Diseases Bull.* 30, 606-7(1933); *U. S. Pub. Health Eng. Abstracts* 13, Ma, 31 (Nov. 25, 1933).—Unless atomized or used as a fine spray chloropicrin sinks to the bottom of pools or streams. In both lab. and field expts. a concn. of 1.0% in 5-6 min. killed all larvae, pupae and immature mosquitoes; at 0.1% concn. up to 90% were killed during the first 30 min.; at 0.01% concn., nearly all larvae were killed after 22 hrs. The action of chloropicrin upon larvae is much more rapid than upon pupae. The action of the poison is both phys. and chem.; it poisons and acts as an adhesive. It destroys tadpoles, fish and other animals in the water as well as mosquitoes. However, the drinking of water contg. 0.1% chloropicrin had no harmful effect upon larger animals. By spraying the chemical on the surface, the max. larva destruction occurred. The rate for swamps was 0.01-0.02 g. per l. and was very effective. The use of chloropicrin is independent of atm. conditions.  $\text{CS}_2$  was tested in the same way as chloropicrin but was less toxic.

C. R. Fellers

**Smoke of cities and industrial centers.** N. P. Danilov. *Vsesoyuzniy Nauch.-Issledmatel. Inst. Vodostokhneniya i Sanitarnoi Tekh. (All-Union Sci. Research Inst. Water*

*Supply Sanit. Tech.*) 1932, 24 pp. (Separate).—The discussion of the smoke and soot nuisance of the city and industrial centers and of the measures for its abatement is based on the practice of Europe and America. Recommendations are made to follow the findings and legislation of America in combating the smoke evil by tech. improvements.

Chas. Blanc

**Fertilizer from activated sludge** (Hincks) 15. Rept. on Bur. of Standards pipe-coating investigation (Wood) 9.

**Ashworth, J. R.:** Smoke and the Atmosphere; Studies from a Factory Town. London: Manchester Univ. Press. 143 pp. 7s. 6d. Reviewed in *Nature* 133, 362 (1934).

**Water purifying.** Carbo-Norit-Union Verwaltungs-G. m. b. H. (Max Jaenicke, inventor). Ger. 591,527, Jan. 23, 1934 (Cl. 85b. 1.01). The effective life of water-purifying masses contg. active C, coke, wood charcoal, etc., is prolonged by treating the water with  $\text{CO}_2$  before purification.

**Apparatus for electroosmotic purification of water or other liquids.** Oswald Gerth (to Siemens-Elektro-Osmose G. m. b. H.). U. S. 1,949,467, March 6. Structural features.

**Treatment of water.** Minami Manshū Tetsudō K. K. (Inosuke Watanabe and Kitarō Sagada, inventors). Japan. 100,177, March 20, 1933. Addn. to 94,848 (C. A. 27, 2747). Water contg. free  $\text{CO}_2$  and bicarbonate is mixed with  $\text{Ca(OH)}_2$  more than twice the equiv. of the  $\text{CO}_2$  and the bicarbonate in the water; thus the bicarbonates of Ca and Mg are pptd. The treated water is then mixed with fresh water in such amt. that a small amt. of  $\text{Ca(OH)}_2$  remains after pptn. of  $\text{CO}_2$  and bicarbonate in the added water. The remaining  $\text{Ca(OH)}_2$  is pptd. by adding  $\text{NaHCO}_3$ .

**Apparatus for softening water by use of zeolitic material** Andrew J. Dotterweich (to Automatic Water Softener Co.). U. S. 1,919,044, Feb. 27. An electrically controlled valve system, etc., is described.

**Artificial zeolites.** Arlie W. Schorger (to C. F. Burgess Laboratories, Inc.). U. S. 1,949,360, Feb. 27. An aq. gel is formed of a compd. of base-exchanging character and the gel is then frozen, in order to obtain a product of high base-exchange capacity.

**Apparatus for treating water for boilers, etc.** Minami Manshū Tetsudō K. K. (Inosuke Watanabe, Masuzo Isokane and Kitarō Sagada, inventors). Japan. 100,178, March 20, 1933. Diagrammatical.

**Prevention of fur and rust in water containers.** Akt.-Ges. für Hydrologie. Swiss 163,557, Nov. 1, 1933 (Cl. 43). The formation of fur and rust in vessels contg. water which is not heated to boiling is prevented by adding a neutral  $\text{NH}_4$  salt such as  $(\text{NH}_4)_2\text{SO}_4$  to the water.

**Sewage disposal.** Champlain L. Riley (to Industrial Associates, Inc.). U. S. 1,949,181, Feb. 27. Sewage is concd. to form sludge and the sludge is centrifugally atomized in a current of hot gases to convert the sludge into dry comminuted solid form of uniform moisture content suitable for use as a fertilizer.

**Apparatus for treating sewage water with purifying slurry.** Barnag-Meguain A.-G. Ger. 591,528, Jan. 23, 1934 (Cl. 85c. 3.02).

**Mechanism for collecting and removing sludge or grit from sewage and other sedimentation chambers.** The Dorr Co., Inc. Brit. 401,804, Nov. 23, 1933.

**Polluted-water purification.** Oliver M. Urbain (to Charles H. Lewis). U. S. 1,947,747, Feb. 20. A polluted water contg. alcs. and amines such as the waste water from packing houses, canneries, etc., is treated with a mono acid halide of a "dibasic" acid such as succinic acid in at least gram-mol. equiv. proportion to the alcs. and amines present, and  $\text{Ca(OH)}_2$  or  $\text{Ba(OH)}_2$  is added to form insol. products. Cf. C. A. 28, 846<sup>a</sup>.

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

**The American system of soil surveying and mapping.** Charles F. Shaw. *Arch. Suikerind.* 42, 53-9(1934).—Reply to criticisms by Koningsberger et al. (*C. A.* 27, 515). Postscript. V. J. Koningsberger. *Ibid.* 59-61. Rebuttal. F. W. Zerbe.

**Studies in Malayan soils. III.** R. G. H. Wilshaw. *Malayan Agr. J.* 22, 4-24(1934).—Large quantities of N may be lost from nitrogenous fertilizers in the form of  $\text{NH}_4$  ion under fallow conditions on some soils in this country within a very short time, apparently on account of heavy leaching combined with a slow rate of nitrification and a low absorption or retaining capacity of the soil colloids. Malayan conditions are practically ideal for the rapid and complete destruction of org. matter to  $\text{CO}_2$  and  $\text{H}_2\text{O}$  and unsuitable for the formation of humus on the plains of Malaya, on free-draining soils. Where covers have been turned into the soil, the amt. of humus subsequently extd. shows no real increase. Immediately after turning in green manures, rapid production of ammoniacal and nitrate N occurs, and this production is absorbed by growing plants. J. R. Adams

**Report of the assistant director and agricultural chemist.** A. J. W. Hornby. Nyasaland Protectorate Dept. Agr., *Ann. Rept.* 1932, 36-47(1933).—*Soil investigations.* The qualities of Nyasaland soils progressively increase to maxima at depths ranging from approx. 10 to 90 in., depending on the soil type, and then decrease more or less rapidly at further depths. The  $\text{SiO}_2\text{-Al}_2\text{O}_3$  ratio in the clay fraction of the soils increases in inverse proportion to the av. annual rainfall. For soil work in Nyasaland analysis of the clay fraction gives useful information for characterizing series and types. *Chlorides in Nyasaland macco.* Data are given on the amts. of K, Cl, Ca and Mg in numerous samples of the dried leaves. The  $\text{K}_2\text{O-Cl}$  ratio varies within wide limits according to the rainfall during growth, the form in which K is supplied, the type of soil on which the tobacco is grown, the length of time required for ripening, and the variety of the tobacco. As compared with other tobaccos, Nyasaland tobacco is low in Mg, Ca and Cl, and the  $\text{K}_2\text{O:Cl}$  ratio is usually high. K. D. Jacob

**Report of the mycologist for 1932.** R. Leach. Nyasaland Protectorate Dept. Agr., *Ann. Rept.* 1932, 53-4(1933).—*S deficiency in soils.* Cowpeas grown on soil affected with tea yellows and not fertilized with S produced very few root nodules. Addn. of S to the soil caused ten-fold increase in the no. of root nodules, and also increased the size and no. of leaves per plant. K. D. J.

**The composition of the soils used in the Potterne transplant experiments and of portions of Centaurea and Silene grown thereon.** C. G. T. Morison. *J. Ecology* 21, 475-8(1933).—Data are given on the phys. and chem. compns. of the soils and on the N, Ca, P, K and ash contents of the leaves of *Centaurea nemoralis* and of the roots of *Silene vulgaris* grown thereon. K. D. Jacob

**Physical and chemical properties of the soils of the Hulton and Morton areas, Monroe County, and their relation to orchard performance. III.** J. Oskamp and L. P. Batjer. Cornell Univ. Agr. Expt. Sta., *Bull.* No. 575, 34 pp.(1933).—Soils in which the colloid fraction of the  $B_1$  horizon is not greater than that of  $A_1$  possess satisfactory internal drainage for orchards. Where the rate of  $\text{H}_2\text{O}$ -percolation through  $A_1$  is more than 2.5 times that through  $B_1$ , injurious water-logging is to be anticipated. High satn. with bages is assocd. with poor drainage of soils and low productivity, and vice versa. The limiting factor in orchard production in this area is slow drainage rather than fertility. B. C. A.

**Studies of West Indian soils. III. The cacao soils of Tobago.** F. Hardy, C. G. Akhurst and G. Griffith. *Trin. Coll. Trop. Agr.*, Trinidad, 23 pp., Suppl. to *Trop. Agr.* (Trinidad) 8, No. 2(1931); cf. *C. A.* 26, 2002.—Samples (334) were collected from 35 profiles and examd. for reaction, index of texture, org. matter, N, readily

available plant nutrients and rate of soln. of plant nutrients. The cacao soils are immature, shallow, nearly neutral, sandy and fairly well supplied with org. matter. Nearly all soils yielding over 8 bags of cacao beans per 1000 pickets had high C/N ratios with an av. of 8.7; all those yielding under 8 bags averaged 6.6. High pos. correlations were found between yielding capacity and rate of soln. of soil nutrients and org. matter content of the top soil. These soils are frequently deficient in  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$ . The soil types, rock weathering and soil formation in Tobago are discussed. A. L. Mehring

**A new apparatus for measuring soil shrinkage.** A. N. Puri, E. M. Taylor and A. G. Asghar. *Soil Sci.* 37, 59-63(1934).—An app. is described for measuring pore space, apparent density and shrinkage of moist soil on drying. Typical shrinkage curves are given. Soils satd. with Na, K, Ca and Ba show little difference in the characteristics of their shrinkage curves. M. S. A.

**The settling volume of soils.** H. E. Middleton and H. G. Byers. *Soil Sci.* 37, 15-27(1934).—The settling vol. of soils and soil colloids is measured on a group of 10 soils of widely differing character, taken from soil-erosion expt. stations. This is a new soil- $\text{H}_2\text{O}$  and soil colloid- $\text{H}_2\text{O}$  relation. The detn. is made as follows: Place the air-dry equiv. of 50 g. of dry soil in a beaker, add about 40 cc. of  $\text{H}_2\text{O}$  and thoroughly agitate, place in a vacuum desiccator and evacuate, boiling at room temp. Transfer to a 100-cc. graduated cylinder, shake, make up to a total vol. of 100 cc., allow to settle 24 hrs. and note the vol. Shake the graduate again and allow to stand 24 hrs. Repeat the process until const. vol. is reached. The vols. vary from 41 cc. for Kurvin fine sandy loam, A horizon, to 68 cc. for Marshall silt loam, B horizon. There is some relation between the settling vol. of soils and their erosion ratio (*C. A.* 26, 5306). The sp. grs. of the suspensions of 9 soil colloids vary from 0.38 to 0.63. The vol. wt. at the settling vol. is the lower limit to which the field vol. wt. may approach. The term "water saturation capacity" is used to define the percentage  $\text{H}_2\text{O}$  content of soils at their settling vol. A comparison is made of this value, the  $\text{H}_2\text{O}$  absorption and the moisture equiv. of soils. All of these values are affected by the soil colloid compn. as well as by soil texture. The settling vol. of soil colloids is affected by the character of the acids and oxides present, the org. matter and the kind and quantity of bases. M. S. Anderson

**Mechanical properties of disperse systems. II. The deformation of soils by pull.** G. I. Pokrovskii and V. G. Bulnichev. *Kolloid-Z.* 66, 137-9(1934); cf. *C. A.* 26, 5684; 27, 5608.—The equation, previously deduced, applies to both pressure and pull strains. There is no step-wise change in the elasticity modulus on passing from a pressure to a pull force. Arthur Meischer

**Variation in the composition of the displaced soil solution.** A. M. Smith. *Proc. 2nd. Intern. Congr. Soil Sci., Leningrad 1930* 2, 175-8(1933)(in English); cf. *C. A.* 22, 1206.—A silt loam and a sandy loam, 6 and 3% ignition loss, resp., were mixed with ground dolomite equiv. to  $1/2$ , 1 and 2 times the Truog line requirement of 3 tons/acre. The mixts. were made to optimum  $\text{H}_2\text{O}$  content, stored and sampled at the end of 3, 11 and 31 days. The samples were percolated with 0.5%  $\text{NH}_4\text{CNS}$  to displace the soil soln., which was examd. Increasing addns. of dolomite and time before sampling increased Mg and Ca, but the latter showed a tendency toward satn.; Ca in the soln. appeared to depend upon the amt. of biol. action rather than upon the size of the addn. The  $pH$  of soil suspensions also increased with amt. of dolomite added; in every case, max.  $pH$  was at 11 days and decreased slightly at 31 days. Soil from unlimed and limed plots was examd. in a similar manner;  $pH$  was the same at the end of 3 and 11 days; Ca and Mg increased with time of storage; Ca was highest in the limed soil but Mg was

lower. Evidently the changes in soil stored moist are very rapid, and the soil soln. in the field is variable; the results of small pot expts. are dependent to a great extent upon aeration and preliminary treatment of the sample.

C. J. Schollenberger

**Oxidation-reduction potentials in soils. I. Principles and electrometric determination.** Lindsey A. Brown. *Soil Sci.* 37, 65-76(1934).—A 7-g. soil sample is ground with a rubber pestle, sieved and mixed with 4 cc. of  $H_2O$  in a 30-cc. vial. A well-cleaned  $pH$  electrode is inserted and left in contact 30 min. The vial and contents are then centrifuged and the potential of the suspension half cell is measured as soon as the centrifuge is stopped. Potentials obtained by this method are comparative, and have a deviation from the mean of not more than 0.003 v. A study is made of the influence of various factors, such as time of contact, soil-water ratio and a wide variety of other factors. Water-logging for 12 hrs. or more causes a decided negative shift in the potential of a soil. Very long and very short soil water contacts are apparently highly variable.

M. S. Anderson

**Dynamics of the oxidation-reduction potential in podzolized soils.** N. P. Remezov. *Proc. 2nd. Intern. Congr. Soil Sci., Leningrad 1930* 2, 212-26(1933)(in German); cf. *C. A.* 26, 547; 24, 3850.—Factors operating in the podzolization of grass soils and their degeneration with respect to drainage and aeration are discussed. As the latter decline, reduction processes predominate. The theory of oxidation-reduction potential is outlined; at a particular time,  $r_H$  is an index to soil processes, of special importance to plants and microorganisms, and can be detd. electrometrically. Expts. with podzols poor in humus showed no difference in  $E_h$  on standing for this period, whether or not the suspensions were sterile. Electrode potential in the chain with a satd. KCl-HgCl electrode is  $E_h$ , and at  $18^\circ$   $r_H = (E_h/0.020) \div 2p_H$ . A detn. of  $p_H$  with the quinhydrone electrode is therefore made on the sample after  $E_h$  is detd. Data obtained by examn. of a no. of soils variously treated are discussed. The higher the value for  $E_h$ , the greater the oxidation potential, and consequently the smaller the reducing tendency.  $E_h$  is affected by weather, supply of org. matter, biol. action and variation in  $p_H$ .

C. J. Schollenberger

**Comparison of methods of treatment of soil samples before mechanical analysis.** V. Novák and P. Hrubec. *Věstník Českoslov. Akad. Zemědělské* 9, 19-25(1933).

B. C. A.

**An examination of the Degtjareff method for determining soil org. matter, and a proposed modification of the chromic acid titration method.** A. Walkley and J. Armstrong Black. *Soil Sci.* 37, 29-38(1934); cf. *C. A.* 24, 2823.—The Degtjareff method for org. soil carbon gives excessively high values when the C contents are small. The errors decrease progressively with increasing amts. of C. When 4% or more of C is present, the results agree fairly well with those by the dry combustion method. The modified method proposed is as follows: A sample of finely divided soil contg. 10-25 mg. of C is placed in a 350-cc. conical flask. About 10 cc. of  $N K_2Cr_2O_7$  is added from a buret, then 20 cc. of strong  $H_2SO_4$ . The mixt. is shaken 1 min. When cool it is dild. to 150 cc. and 5 g. NaF added. The excess of chromic acid is titrated with 0.4 N  $(NH_4)_2Fe(SO_4)_2$ , with diphenylamine as an indicator. One cc. of N  $K_2Cr_2O_7$  equals 4 mg. of C. The procedure is rapid and may prove useful for comparative purposes where no very exact detn. is required.

M. S. Anderson

**The carbon-nitrogen ratio of soil organic matter.** W. McLean. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 181(1933)(in English).—The C:N ratio for 50 varied British soils was 6.5-13.5:1, averaging  $10.2 \pm 0.3$ ; by plotting to a normal frequency curve with a well-defined max. corresponding to the av., the C:N ratio for 16 foreign soils varied 2.0-23.0:1. Whether high or low, the C:N ratio of a particular region and climate seems to be nearly a specific figure; cultivated soils do not differ much from grasslands, although soils in high fertility have higher ratios than poor soils. It is suggested that

total org. matter or N might be useful as an index of fertility for a region, if differences due to altitude or  $H_2O$  relations are excluded.

C. J. Schollenberger

**Soil respiration and the carbon dioxide content of the soil air of cultivated soils.** Helmut Wurmbech. *Arch. Pflanzbau* 10, 424-532(1934).—The  $CO_2$  content of the soil air and soil respiration increase after a period of warm, wet weather. Legumes caused the greatest production of  $CO_2$ , increasing the percentage in the soil air in a loam from 0.2 in April to 1.0 in June. At the time of the max. growth the cereals produce large quantities of  $CO_2$ , but sugar beets increased the  $CO_2$  content only about fourth as much as did alfalfa. The 2 soil types studied a loam and a humus soil, showed an appreciable difference only at the peak production of  $CO_2$  where the humus soil showed a  $CO_2$  content in the soil air of 4.7% in contrast to a max. of 1.0% for the loam. The excessive content of  $CO_2$  does not seem to be harmful unless high moisture causes crusts to form which prevent the proper diffusion of the air through the soil. A higher soil respiration was found in fertilized than in unfertilized plot but the  $CO_2$  content of the soil air of unfertilized plot was the higher of the 2.

K. C. Bresson

**Soil acidity in relation to vegetational succession in Calthorpe Broad, Norfolk.** H. Godwin and J. S. Turner. *J. Ecology* 21, 235-62(1933).—The water of the Broad is alk. ( $p_H$  7.30-7.43) and the general character of the vegetation conforms to that of low-moor soils. Throughout the vegetational succession the soil acidity increases as the ground-level rises and the distance from the Broad increases; the communities lowest and nearest the Broad have approx. neutral soil, and those away from it have  $p_H$  values as low as 5.0. The progressive soil acidification and the corresponding establishment of acidophilous species is regarded as the normal result of vegetational succession.

K. D. Jacob

**Influence of soil acidity upon the decompn. of organic matter in soils.** J. W. White, F. J. Holben and C. D. Jeffries. *Soil Sci.* 37, 1-15(1934).—A stock soil is prepd. consisting of 5 parts Hagerstown silt loam with one part each of sewage sludge and fine sand. This is divided into 10 portions and 9 of these are treated with different amts. of S and incubated in small field plots for 2 years. The  $p_H$  values then range from 7.4 to 3.2. These soils are treated with various nutrients and org. matter and their respiration capacities studied by detns. of the  $CO_2$  evolved. There is a close correlation among the  $p_H$  value of a soil, its respiratory capacity and its power to decompose org. matter. Addns. of sol. N to soils treated with org. matter cause an increase in  $CO_2$  production. Addns. of  $K_2HPO_4$  to soil treated with cellulose and various forms of N have little effect upon  $CO_2$  production. Lime applied to the acid soils treated with cellulose and N greatly stimulates  $CO_2$  production. Air-dry soils produce  $CO_2$  more rapidly than does freshly screened moist soil with similar org. and nutrient addns. Corn-starch added to soil is decompd. at about the same rate in acid as in alk. soils, while cellulose, manure and cottonseed meal are greatly influenced by soil reaction. Respiratory capacity and power to decompose org. matter run parallel with the nbs. of microorganisms present.

M. S. Anderson

**The acidity of tea soils of northeast India. III. The effect of fertilizers on soil acidity.** C. J. Harrison. *Indian Tea Assoc., Sci. Dept., Quart. J.* 1932, 189-90 (cf. *C. A.* 28, 554).— $NH_4Cl$  and  $(NH_4)_2SO_4$  increased, and  $CaCN_2$  and basic phosphates decreased, the acidity of tea soils. K salts, superphosphate, org. manures and  $NaNO_3$  tended to decrease the acidity slightly when they were applied in large amts. over an extended period. Cattle manure temporarily decreased the acidity to some extent, but the effect was transient and due to liberation of free  $NH_3$  in the soil.

K. D. Jacob

**The application of differential titration of the chloride ion to the analysis of soil extracts.** P. A. Kryukov. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 141 (1933)(in German).— $Cl^-$  in soil exts. colored by humus and contg. some suspended soil was accurately titrated with  $AgNO_3$  by an electrometric method.

C. J. S.



**Reversal of charge on soils by acids and anion fixation.** I. N. Antipov-Karatayev and A. I. Rabinerson. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 108-33 (1933) (in German).—The nature of the charge on the entire soil mass was detd. by electrobiosis expts. The reversal of charge on representative Russian soil types by common inorg. and org. acids was investigated. The most pronounced effects were observed with the 60-65 cm. horizon of a red earth (I); podzol soils were less affected. The charge on solonetz and chernozem soils (II) was not reversed by acids. Most of the soils were affected by HCl and HNO<sub>3</sub>, but only I by other acids. No connection with SiO<sub>2</sub>:R<sub>2</sub>O<sub>3</sub> in the fraction < 1  $\mu$  was noted, but there was marked correlation of charge reversal with the content of "immobile" R<sub>2</sub>O<sub>3</sub>, i. e., that extd. by oxalate or KOH. Charge reversal is attributed to a soln. effect; R<sub>2</sub>O<sub>3</sub> is partially dissolved in the acid, then adsorbed upon particles, whence the latter become pos. The anion-fixing property does not closely parallel the ability to reverse charge; for sulfate and phosphate, it was strongly developed in soils not exhibiting the latter phenomenon. Nevertheless, both depend upon the content of active R<sub>2</sub>O<sub>3</sub>, the former also upon the soly. of salt-like combinations formed, buffering the soln. at an optimum not below pH 2.2. Max. fixation of phosphate and sulfate was observed with I, min. with II. Fixation of nitrate was not observed; Cl<sup>-</sup> was fixed by some soils irrespective of ability to reverse the charge, and with one podzol and II was neg. for the lower consns. of HCl. The max. was with I, likewise the only soil showing adsorption of carbonate from satd. CO<sub>2</sub> in H<sub>2</sub>O. There are numerous references.

C. J. Schollenberger  
The question of particle charge in soil suspensions and the separation of soil colloids by cataphoresis. V. Kovda. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 134 (1933) (in German).—See C. A. 26, 2810.

C. J. Schollenberger  
Vine growth and soil reaction. K. Müller and H. Sleumer. *Weinbau u. Kellerwirtsch* 12, 11-14 (1933).—With a soil mixture and with sand + nutrient solution optimum growth occurred at pH 6.1.

B. C. A.  
Rapid determination of small quantities of calcium in soil extracts. H. Rentelspacher. *Z. anal. Chem.* 96, 161-72 (1934).—To 1 cc. of freshly centrifuged ext. or to a dil. Ca<sup>++</sup> soln., contg. not more than 0.16 mg. of CaO, add 1 cc. of Na<sub>2</sub>WO<sub>4</sub> soln. prepd. by dissolving 5.241 g. of Na<sub>2</sub>WO<sub>4</sub>·2H<sub>2</sub>O in 1 l. of water and adjusting the concn. so that 1 cc. = exactly 0.200 mg. Ca. Evap. to dryness on the water bath and to the residue add exactly 2 cc. of distd. water. Rub well with a rubber-tipped stirring rod and transfer to the point of a centrifuge tube. Rotate for 5-10 min. at 3000 r. p. m. Pipet off 1 cc. of the supernatant soln. and det. the excess W colorimetrically by adding 0.2 cc. of N HCl and 1 cc. of TiCl<sub>3</sub> soln. which is exactly equiv. to 2 mg. of Fe, and comparing with a set of standards prepd. similarly in the analysis of synthetic samples contg. 0.02, 0.04, 0.06, 0.08 and 0.10 mg. CaO.

W. T. H.  
A critical examination of analytical methods used in the determination of exchangeable potassium and sodium of soils. M. L. M. Salgado. *Soil Sci.* 37, 39-48 (1934).—NH<sub>4</sub>OAc soln. is a satisfactory reagent for the extn. of exchangeable Na and K from soils. Analytical technic is described which is rapid and gives reliable results. A 25-g. sample of soil is leached with 500 cc. of NH<sub>4</sub>OAc soln. The soln. is evapd. to dryness, dried at 110° and finally ignited at a low temp. to burn off org. matter and to convert acetates to carbonates. The residue is extd. with hot H<sub>2</sub>O and filtered, the soln. contg. Na<sub>2</sub>CO<sub>3</sub> and K<sub>2</sub>CO<sub>3</sub>. The K detn. is made by the volumetric cobaltinitrite-permanganate method (C. A. 23, 5535). Na is detd. by the direct uranyl Zn acetate gravimetric method (C. A. 24, 5060). When definite amts. of K are added to the acetate ext. about 98% is recovered by the method described.

M. S. Anderson  
Experiments on the movement of iron and aluminum in the soil. J. S. Joffe. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 135-45 (1933) (in English).—

1 Review and discussion of the movement of Fe and Al in the soil in the light of colloid reactions. Expts. show that the removal of electrolytes from soil decreases the rate of movement. Fe(NO<sub>3</sub>)<sub>3</sub> treatment exts. Al, a substitution or replacement; repeated expts. indicated this goes on for a long time at a decreasing rate. The reverse exchange does not take place. Some Al can be percolated from Al-treated soil by H<sub>2</sub>O. Hence Fe is fixed mainly in the upper soil, while Al tends to reach lower depths prior to fixation.

2 Twenty-three references. C. J. Schollenberger  
Adaptability and accuracy of the Emerson lime analyzer for testing the neutralizing value of various liming materials in Virginia. N. A. Pettinger and R. L. Selby. *J. Am. Soc. Agron.* 26, 240-8 (1934).—The Emerson portable CaO analyzer, as sold by the manufacturer, is not suitable for testing fluffy limes, such as burnt, hydrated and air-slaked, but is well adapted to testing ground 3 CaCO<sub>3</sub>, marls and oyster shells. Modifications have been suggested for making the equipment usable for testing the fluffy limes. The accuracy of the values obtained by the Emerson equipment gave very good agreement with those obtained by the tentative Assoc. Official Agr. Chem. method. The values obtained by the 2 methods differed by less than 1% CaCO<sub>3</sub> equiv. in 64% of the total no. of samples tested and by less than 4% CaCO<sub>3</sub> equiv. in all the tests. The Emerson method is usually more rapid than the official method when single detns. only are made or for materials which have a CaCO<sub>3</sub> equiv. of more than 100%. Materials with a CaCO<sub>3</sub> equiv. less than 100% may be tested more quickly by the official method.

J. R. Adams  
The influence of liming upon the structure of podzol soils. N. P. Remezov and O. I. Izmailovich. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 162-74 (1933) (in German).—See C. A. 26, 287.

C. J. S.  
Effect of hydrogen peroxide on soil organic matter. W. McLean. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930 2*, 182-3 (1933) (in English); cf. C. A. 26, 3595.—While pure cellulose from filter paper is not attacked by 6% H<sub>2</sub>O<sub>2</sub> alone, in the presence of soil it is considerably attacked, the action varying with soils. Hence it is not possible to det. "degree of humification" of soil org. matter accurately by means of H<sub>2</sub>O<sub>2</sub>. M. would distinguish by this means "readily oxidizable org. matter" and "residual org. matter." Residual C and N are detd. as follows: Place 4 g. soil in a 400-ml. beaker with 60 ml. H<sub>2</sub>O<sub>2</sub>, boil 20 min., add 40 ml. H<sub>2</sub>O and boil to small vol. Filter through hardened paper and wash with boiling H<sub>2</sub>O. Dry and grind the residue and det. C and N. The results obtained with 6 soils treated with 1-6% H<sub>2</sub>O<sub>2</sub> or repeatedly with 6% H<sub>2</sub>O<sub>2</sub>, without and with 0.15 g. added cellulose, are summarized: Residual C decreased with increasing percentage of H<sub>2</sub>O<sub>2</sub> or repetition of treatment to a const. figure of 4-5% of the original C in the sample. Residual N decreased with strength of H<sub>2</sub>O<sub>2</sub> up to 2-3% but was const. with more severe treatment. From 7 to 47% of the added cellulose was oxidized by 2 treatments with 40 ml. 6% H<sub>2</sub>O<sub>2</sub>. The C:N ratio of the residue increased with decreasing percentage of H<sub>2</sub>O<sub>2</sub> to a max. at 1-3% H<sub>2</sub>O<sub>2</sub>, then decreased. These max. values for the C:N ratio varied 11.2-19.7, and are considered to indicate the ratios in the original added plant material for each soil. The condition of the org. matter is, therefore, indicated by the C:N ratio in the "residual org. matter"—if high, the org. matter is capable of further oxidation in the soil, if low, a stable condition has already been reached.

C. J. Schollenberger  
Influence of irrigation on the soil microflora. N. N. Sushkina. *Trans. Irrigation Comm., Acad. Sci. U. S. S. R.* 1, 87-94 (1933).—Saline soils on irrigation can support a microflora of the kind required for agricultural plants. The application of CaCO<sub>3</sub> + (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> to irrigated land gave rise to intense nitrification. B. C. A.

Relation of the absolute reaction of the soil solution to the quantity of nitrogen fixed by Azotobacter. P. L. Chisney. *Kans. Agr. Expt. Sta., Director's 5th Biennial Rept. 1930*, 25-8; cf. C. A. 25, 4077.—A series of cylinders inoculated with *Azotobacter* in 1923 showed no

living bacteria of this group in 1930 except in cylinders to which lime had been added. Soil samples from fertile-appearing spots in wheat fields showed 2-3 times the nitrate content of normal soils; similarly plant growth and percentage of N in the plants grown on these spots were greatly increased. P was no higher in the fertile spots. The relationships of *Asotobacter* to these N-rich spots are being investigated. C. R. Fellers

**Determination of the fertilizer requirement of soil. I. Mitscherlich and Neubauer methods for estimating available phosphorus and potash vs. field fertilizers experiments.** G. Sundelin, O. Franck and C. Larson. *Agl. Landbruks-Akad. Handl. Tid.* 71, 974-1001 (in English 1001-3) (1932).—Comparative tests on various Swedish soils show that Mitscherlich's method gives a quantitative measure of the requirement. Neubauer's method is less satisfactory. B. C. A.

**Commercial fertilizers and soil reaction.** S. Tørvhøj Jensen. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 154-61 (in English) (1933).—Tests on plot soils long fertilized with superphosphate, KCl,  $\text{NaNO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$  indicated inconsiderable effects except from the last, which greatly increased soil acidity and buffer effects toward  $\text{Ca}(\text{OH})_2$ . C. J. Schollenberger

**The influence of fertilizers and lime on the exchangeable bases and soil reaction of a light acid soil after 50 years of continuous barley and wheat.** E. M. Crowther and J. K. Basu. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 146-51 (in English) (1933); cf. C. A. 26, 3594.—Examination of soil samples from plots at Rothamstead indicates that exchangeable Ca of unfertilized soil has decreased from 9.2 to 4.2 mg. equivs. %.  $(\text{NH}_4)_2\text{SO}_4$  fertilization has strongly acidified the soil and caused Ca to fall to 1.16, of which 0.54 is  $\text{H}_2\text{O}$ -sol., leaving only 0.62 mg. equivs. % exchangeable Ca. There was no conclusive evidence that bases other than Ca had been reduced. On the limed part of the  $(\text{NH}_4)_2\text{SO}_4$  plots, exchangeable Ca was increased and K consistently reduced; the latter was possibly due to increased draft by the larger crops. The use of  $\text{NaNO}_3$  as the source of N has probably conserved exchangeable Ca. The data indicate a difference in the effects with crop; apparently the mineral fertilizers have displaced H from surface to subsoil by an ionic exchange process in the barley plots only. Superphosphate with  $\text{K}_2\text{SO}_4$  is shown to have no permanent or cumulative acidifying effect upon the soil. The evidence indicates that loss by leaching of Ca from soil tends to decrease with the amt. remaining, until it falls to a permanent level balanced by new supplies from weathering and upward movement. A practically permanent agriculture is therefore possible without liming, if only crops of low Ca requirement are grown, and the superior economy of min.  $\text{CaO}$  dressings is indicated. C. J. Schollenberger

**An electrometric-titration method of finding the  $p_H$  value and lime requirement of soils.** A. N. Puri and B. Anand. *Soil Sci.* 37, 49-58 (1934).—Two antimony electrodes are used, one dipping into soil suspension and the other into a universal buffer soln., the  $p_H$  of which is continuously varied until a galvanometer through which the 2 electrodes are joined shows no deflection. The universal buffer mixt. contains 5.445 g.  $\text{KH}_2\text{PO}_4$ , 5.44 g.  $\text{PhCH}_2\text{CO}_2\text{H}$  and 2.406 g. boric acid per l. The buffer solns. are prepd. by adding 5, 10, 15 and 20 cc. of 0.2 N NaOH to 25 cc. of the universal buffer. These are used to locate the  $p_H$  range within which the soil suspension may lie. After the buffers between which the true  $p_H$  value lies have been located, 0.2 N NaOH is added to 25 cc. of the universal buffer in amt. equal to that corresponding to the buffer having the lower  $p_H$  value. The Sb rod is then dipped in it and connected to one in the soil suspension. More NaOH soln. is then added from a buret to the buffer soln. until there is a balance in the galvanometer. The true  $p_H$  is read from a graph prepd. by titration of the universal buffer with NaOH. Lime requirements are detd. by titrating a soil to  $p_H$  6.5 or any desired value and balancing an Sb electrode in this against a universal buffer of known  $p_H$  value. M. S. Anderson

**Report on results of research work carried out in connection with soil acidity and the use of ammonium sulfate as a fertilizer for putting greens and fairways.** R. B. Dawson and Robert Greig. *J. Board Greenkeeping Research* 3, 65-78 (1933).—When turf plots composed of a pure stand of New Zealand bent grass received 4-6 applications of  $\text{NH}_4$  phosphate or  $(\text{NH}_4)_2\text{SO}_4$  annually (32.3 lb. N per application) over a period of 3 yrs., the plots remained free from foreign grasses, weeds and earthworms; plots treated with equiv. amts. of N as  $\text{NaNO}_3$  became extremely weedy and were gradually invaded by *Poa annua*. The plots treated with  $\text{NH}_4$  salts were distinctly acid. When  $(\text{NH}_4)_2\text{SO}_4$  is applied to turf contg. *Poa annua* this species spreads very rapidly in the initial stages until the soil becomes too acid to permit germination of the seeds. The fungus *Fusarium nivale* frequently appears on bent plots that have been treated with  $\text{NaNO}_3$  or lime, but it was not observed on plots that had received regular applications of  $(\text{NH}_4)_2\text{SO}_4$  over a period of 3 yrs. On turf plots that had been treated with Fe sulfate exclusively for 4 yrs. fescue was the predominating herbage, whereas on plots receiving  $(\text{NH}_4)_2\text{SO}_4$  in addn. bent grass predominated. Fe sulfate had a marked effect in preventing the invasion of weeds into plots treated with nitro-chalk, dried blood,  $\text{NaNO}_3$ , etc. In general, plots receiving  $(\text{NH}_4)_2\text{SO}_4$  and Fe sulfate withstood drought far better if treated with lime in the winter. Twenty-two references. K. D. Jacob

**The relation of the carbon-nitrogen ratio of a mulch to the accumulation of nitrates in soil.** W. J. Moore, Jr. and A. B. Beaumont. *J. Am. Soc. Agron.* 26, 252 (1934).—Data are given supporting the hypothesis that nitrification occurs mainly in the lower layers of a mulch of waste hay and straw rather than in the soil and only after the C:N ratio of the mulch has been considerably narrowed through processes of decay. It appears that under the exptl. conditions a period of about 3 years is necessary to reduce the C:N ratio of the mulch to the point where nitrates are produced in excess of the needs of the decay organisms. The upper limit of this ratio appears to be about 15:1. J. R. Adams

**Are superphosphate and plaster capable of lowering the  $p_H$  of the soil?** Georges Joret. *Engrais* 49, 119 (1934).—The intimate incorporation of either superphosphate or  $\text{CaSO}_4$  in a soil of  $p_H$  6.6 in the proportion of 1 g. of fertilizer to 1000 g. of soil did not cause a decrease in the  $p_H$  of the soil over a period of 6 months. In fact, the  $p_H$  increased slightly with  $\text{CaSO}_4$ . J. R. A.

**Growth peculiarities of hemp as a result of a lack of nutritive substances in the soils.** L. G. Dobrunov. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 281 (in English 285-6) (1934).—In a poor soil flax uses up most N,  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$ ; oats are second for  $\text{K}_2\text{O}$ , and hemp for N and  $\text{P}_2\text{O}_5$ . In a rich fertilized soil hemp uses up relatively most N and  $\text{K}_2\text{O}$  but least  $\text{P}_2\text{O}_5$ . F. H. Rathmann

**Meadows and meadow grasses in middle Germany. IV. Classification and distribution of varieties in relation to the soil reaction.** E. Klapp, A. Stahlin and F. W. Wacker. *Arch. Pflanzenern.* 10, 533-57 (1934); cf. C. A. 25, 161.—About 200 grasses are classified in 9 groups according to their observed frequency on soils of varying reactions from a  $p_H$  of 3.4 to 8.5. About 25% were grouped in the class ranging in  $p_H$  from 5.5 to 6.0, and about 20% each were grouped in the classes 4.5-5.4 and 6.7-7.2. In most cases the reaction of the top soil was characteristic for the class of the meadow. In 4 cases where there were extreme differences of  $p_H$  between the top soil and the sub soil, 6.4-4.4, 5.9-4.5, 5.1-3.5 and 5.1-4.1, the reaction of the sub soil influenced the type of grass. The absorption of quantities of moisture appeared to influence extreme reactions whether acid or basic. Fertilization had little effect on the frequency of any grass on a particular soil class. In general the best yields of grass were obtained on soils having a reaction range between  $p_H$  5.5 and 7.5. K. C. Beeson

**Reactions of some pecan soils and the effect of fertilizers on soil reaction.** A. O. Alben and Hugh M. Boggs

Texas Pecan Growers' Assoc., *Proc. 15th Ann. Meeting* 1933, 59-64.—Soils from several districts in La. and Texas were studied. In most soils the  $pH$  values ranged from 4.45-7.70 in the 1st 12 in. to 5.83-9.08 at a depth of 5-6 ft. With 1 exception, the acidity of the soils decreased with increase in the depth at which the sample was taken. Annual applications of com.  $CaCN_2$  caused a significant decrease in the acidity of the 1st 6-in. layer of pecan soils in 2-3 yrs. but had little or no effect on the 2nd 6-in. layer;  $NaNO_3$  caused a significant decrease in acidity to a depth of 12 in.;  $(NH_4)_2SO_4$  increased the acidity of the 1st 12 in. of soil. K. D. Jacob

The relative growth rate, the carbohydrate contents and the yield of the rice plant (*Oryza sativa* L.) under different treatments. R. H. Dastur and A. R. Pirzada. *Indian J. Agr. Sci.* 3, 993-1012 (1933).—The fresh and dry wts. of rice plants, their leaf areas, the vols. of the roots and the carbohydrate contents when fertilized about Aug. 15th, the period at which the relative growth rate of the plants was highest, with a nitrate or  $(NH_4)_2SO_4$  or both together on equal total-N basis, were higher than when the plants were fertilized at any other period. A mixt. of  $NH_4$  salts and nitrates had a more beneficial effect on the growth, yield and carbohydrate contents of grain of the rice plant than either form of N used singly in equiv. amt. A greater production of grain as compared to the vegetative growth was obtained by the use of mixts. of the 2 forms of N than by the use of either alone. As compared with the unfertilized plants, application of nitrates at the flowering stage caused no increase in the carbohydrate contents or in the yields of grain or straw. The effects of superphosphate on the production of carbohydrates and on the yields and dry wts. of the plants were greatest when the fertilizer was applied in Aug.; superphosphate caused a proportionately greater vegetative growth than reproductive growth.  $KNO_3$  and  $NaNO_3$  were equally effective as sources of N for the rice plant. Data are given on the sucrose, starch and total carbohydrate contents of rice plants at various stages and conditions of growth. K. D. Jacob

Harmful effects upon young rice and corn plants of rice straw when added to clay loam soil in pots. R. B. Espino and F. T. Pantaleon. *Philippine Agr.* 22, 534-56 (1934).—Rice straw and rice straw ash greatly injured the development of young rice and corn plants in clay loam soil, and the effect increased with the quantity present. The effect was not due to increase of acidity, nor was it corrected by additions of  $CaO$ . After the straw had decomposed 75 days in the soil it proved beneficial. The chemistry underlying these effects is discussed at length. Twenty references. A. L. Mehring

Queensland tobacco soils. E. H. Gurney and J. I. F. Foran. *Queensland Agr. J.* 40, 495-503 (1933).—In general, the soils are sands deficient in mineral plant foods and humus; the  $pH$  values of the aq. suspensions of several samples ranged from 5.0 to 6.4. Mech. analyses are given. K. D. Jacob

Soil treatment for Brassica. I. The effect of sterilization of the soil by mercuric chloride on the seedling growth of Brussels sprouts. R. M. Woodman, G. H. Brenchley and F. Hanley. *J. Soc. Chem. Ind.* 53, 35-67 (1934).—The use of 0.05-0.2% solns. of  $HgCl_2$  to sterilize seed beds infected with *Plasmodiophora brassicae* previous to sowing reduces the dry wts. of the tops, roots and total seedlings of Brussels sprouts. J. R. H.

Tree roots and the field layer. A. S. Watt and G. K. Fraser. *J. Ecology* 21, 404-14 (1933).—Application of  $NH_4NO_3$  at the rate of 21 lb. N per acre, to plots of pine-wood (*Pinus silvestris*) forest soil had a beneficial effect on the growth of *Deschampsia flexuosa*; larger amts. of N, either as  $NH_4NO_3$  or  $(NH_4)_2SO_4$ , had an adverse effect.  $NH_4NO_3$ , applied at the rate of 21-42 lb. N per acre, had no stimulating effect on the growth of *Oxalis acetosella*; 84 lb. N as  $NH_4NO_3$  or 42 lb. as  $(NH_4)_2SO_4$  completely eliminated *O. acetosella* from the plots. Trenching the plots to a depth of 8-18 in. into the mineral-soil layer caused a marked increase in the N content of *D. flexuosa*. K. D. Jacob

Growing cotton in solution cultures of a higher salt concentration. A. F. Pankrat'eva-Glagoleva. *Nauch. Issledovatel. Inst. Khlopkovodstva (Sci. Research Inst. Cotton Culture)* (Tashkent), Sept. 1932, 24 pp.—A concn of 0.0625 M and 0.125 M NaCl in a Hellriegel medium prevented the normal growth of cotton. The introduction of antagonistic salts, KCl and  $CaCl_2$ , did not have favorable effect. Similar results were obtained in sand cultures, but the antagonistic effects of K and Ca were more marked. In sand cultures an osmotic concn. up to 3 atms. was tolerated by cotton. In soil cultures the concns. mentioned did not decrease the yields as much as in soln. cultures, 83% against 58.4%, resp. An increase of the Cl content to 0.250 M NaCl caused a complete failure of the crop. In the soil cultures the antagonistic effects of K and Ca were extremely favorable. In soil cultures cotton withstood an osmotic concn. of 5 atms. With an increase in concn. of salts the transpiration coeff. was lowered. The presence of NaCl in soln. seems to cause an increase of N in the seed and a lowering of the crude fat. J. S. Joffe

Exchange adsorption in root systems. Influence of the technic and time of introduction of fertilizers on the nature of plants. D. A. Sabinin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 136-8 (in English 138-40) (1934).—Daily "breathing" and nitrate and phosphate absorption curves run parallel. Absorption is preceded by adsorption of the ions. Placing and mixing of fertilizer phosphate may raise (100%) or lower (30%) the yield. N fertilizers introduced  $1/3$ ,  $1/3$ ,  $1/3$  (at times of planting, budding, flowering) to unnaive cause excess female inflorescence while K fertilizers cause excess male inflorescence. F. H. Rathmann

Fertilizer experiments carried out in Burma by the agricultural department from 1912-13 to 1930-31. R. Watson and V. V. Subramanian. *Burma Dept. Agr., Bull.* 29, 72 pp. (1933).—When they were applied at the rate of 50 lb. N per acre, synthetic farmyard manures prep'd. from straw, ordinary farmyard manure and straw increased the yields of paddy grain 34.67, 35.1 and 18.9%, resp., as compared with an increase of 26.47% from  $(NH_4)_2SO_4$  and  $CaCO_3$ . Coarse rice bran, contg. 1.93% N and applied at the rate of 20 lb. N per acre, increased the yield 1.7-28.9% in 3 seasons. A compost prep'd. from the water hyacinth (*Eichhornia crassipes*) contained N 0.260,  $P_2O_5$  0.208 and  $K_2O$  0.759% and gave good results when it was applied at the rate of 10 tons/acre. Ammophos, Nicfos, Leunaphos, Diammophos and other  $NH_4$  phosphate fertilizers increased the yields of paddy in some instances but had little or no effect in others. Superphosphate and basic slag increased the yield approx. 7-32% in different years and on different soils; basic slag seemed to have a beneficial effect on paddy soils apart from its fertilizer value. Urea and com.  $CaCN_2$  were not as effective as  $(NH_4)_2SO_4$  as sources of N for paddy. Detailed chem. and mech. analyses of the soils used in the expts. are given. K. D. Jacob

The influence of various calcium and magnesium ratios upon plant crops. D. V. Druzhinin. *Proc. 2nd Intern. Congr. Soil Sci., Leningrad 1930* 2, 152 (1933) (in English); cf. C. A. 28, 2103<sup>a</sup>.—A very brief note to the effect that Loew's "lime factor" (cf. C. A. 3, 1505) is incorrect because only the total  $CaO$ /total  $MgO$  ratio is taken into account, whereas "moving" forms should be considered. The optimum for barley and oats has been observed to be 1. C. J. Schollenberger

Agricultural importance of potash salts containing magnesium salts. H. Kappen. *Zuckerrübenbau* 16, 1-7 (1934).—Kainite and other K salts contg. Mg and Ca chlorides tend to increase the acidity of sour soils. Much better results on such soils follow the use of K fertilizers contg.  $MgSO_4$ . K. suggests that the fertilizer manufacturers supply the existing lack of physiologically alk. K fertilizer by treating carnallite with steam at 400-500° to expel Cl and leave a residue of  $MgO$ . O. W. W.

Recovery of phosphorus from prairie grasses growing on central Oklahoma soils treated with superphosphate. H. F. Murphy. *J. Agr. Research* 47, 911-17 (1933).—

The use of superphosphate on 2 common pasture and grassland soils in central Okla. increased the yield of native prairie grasses and raised the P content of the hay produced. When N as well as P was applied in the fertilizer, the yield of hay was increased, but the percentage of P in the hay was of the same order as when superphosphate only was applied. The percentage of P in hay from plots that received N alone was essentially the same as that in hay produced on unfertilized soil. The recovery of P from the applied superphosphate was very small. The P applied did not penetrate to any great distance in the soil, being confined largely to the surface 3 in.

W. H. Ross

The effect of nitrogenous fertilizers on the growth of lawn grasses. J. W. Zahuley and P. L. Duley. *J. Am. Soc. Agron.* 26, 231 4(1934).—Tests on Kentucky bluegrass, Washington bent and German mixed bent grasses showed that  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NaNO}_3$ , and  $\text{CO}(\text{NH}_2)_2$  were about equally effective when used at such rates that equiv. amts. of N were supplied.  $\text{CO}(\text{NH}_2)_2$  had a slight advantage with each grass. Combined treatment of  $(\text{NH}_4)_2\text{SO}_4$  and compost gave a slight increase over  $\text{CO}(\text{NH}_2)_2$ . Applications as high as 1633 lb. of  $(\text{NH}_4)_2\text{SO}_4$  or 2156 lb. of  $\text{NaNO}_3$  per acre, supplied in 6 applications during the season, were used without injury to the grasses. Heavy applications of  $(\text{NH}_4)_2\text{SO}_4$  greatly reduced the no. of dandelions. The  $p_H$  value of this soil has not been greatly affected even by these heavy fertilizer treatments.  $(\text{NH}_4)_2\text{SO}_4$ , however, has tended to make the soil slightly acid.

J. R. Adams

The influence of nitrogen and phosphoric acid on the speed of growth and yield under conditions of pot experiments. O. F. Tueva. *Lenin Acad. Agr. Sci. U. S. S. R., Central Asia Sci. Research Cotton Inst., Ak-Kavak Central Expt. Sta. (Tashkent), Fertilizers for Cotton*. Pt. 1, 52-9(in English 60)(1933).—The higher the ratio of  $\text{P}_2\text{O}_5$  to N in the fertilizer mixt. the earlier the blooming period arrives and the quicker the plants mature. N alone retards the maturity of cotton.

J. S. Joffe

The influence of nitrogen and phosphoric acid fertilizers on the yield of cotton in pot experiments. D. A. Sabinin, G. A. Bogdanovskiy, G. D. Panfilova and M. I. Popova. *Proc. All-Union Sci. Research Inst. Cotton Culture and Ind. (Tashkent)*, No. 37, 36 pp.(1931).—Pot expts indicate that high applications of N retard germination, formation of bolls, flowering and maturity. Addns. of superphosphate counteract the inhibitory effect of N. The relation of the yield increases to the application of mixts. of N and  $\text{P}_2\text{O}_5$  appears to be more complicated, as indicated by the Mitscherlich-Baule equation.

J. S. Joffe

Potassium fertilization of cotton. D. V. Kharkov and L. N. Pershakova. *Lenin Acad. Agr. Sci. U. S. S. R., Central Asia Sci. Research Cotton Inst., Ak-Kavak Central Expt. Sta. (Tashkent), Fertilizers for Cotton* Pt. 1, 38-47 (in English 47)(1933).—A series of expts. with K fertilizers shows that it is effective on cotton only in combination with N and  $\text{P}_2\text{O}_5$  on the soils in central Asia.

J. S. Joffe

The influence of potassium on cotton. O. F. Tueva. *Lenin Acad. Agr. Sci. U. S. S. R., Central Asia Sci. Research Cotton Inst., Ak-Kavak Central Expt. Sta. (Tashkent), Fertilizers for Cotton* Pt. 1, 48-51(1933).—K alone extends the period of the flowering of cotton. It is effective on the yield primarily in combination with N and  $\text{P}_2\text{O}_5$ . It increases the total leaf surface when applied in moderate quantities. Increased applications of KCl decrease the total leaf surface.

J. S. Joffe

Field experiments with sugar cane. II. C. Holman B. Williams and R. R. Follett-Smith. *British Guiana Dept. Agr., Sugar Bull.* 2, 48 pp.(1933); cf. *C. A.* 27, 3355.—Application of 400 lb.  $(\text{NH}_4)_2\text{SO}_4$  per acre of flood-fallowed front-land clay gave the heaviest yields of 1st ratoon cane but decreased the sucrose quality and the juice purity. Heavy applications of  $(\text{NH}_4)_2\text{SO}_4$  (300-600 lb./acre) to the plants and 1st ratoons of Diamond 10 cane grown on unflooded front-land soil did not impair the sucrose quality and had no residual effect on the 2nd

ratoon crop. There were definite indications that different cane varieties have different N requirements. On pegassy clay soil, application of either ground limestone or agricultural slaked lime in the row at planting increased the yield, sugar content and juice purity of the cane. Application of  $\text{K}_2\text{SO}_4$  to 1st ratoons grown on pegassy clay soil had a favorable effect on the yield of cane, sucrose quality and juice purity. Chem. analyses of the soils used in the expts. are given. K. D. Jacob

Physiology of nutrition of the sugar cane. II. Experiments on phosphate absorption. T. H. van den Honert. *Arch. Suikerind.* 41, III, *Mededeel. Proefsta. Java-Suikerind.* 1119-56(1933); cf. *C. A.* 27, 1705.—The results of previous investigations are critically discussed. An app. and method for making water culture expts. on sugar cane under const. replacement of the nutrient soln., and with  $p_H$  control, are described, and the results are presented in tables and graphs. The effect of light and temp. on the expts. was excluded as far as possible by taking samples at the same time of day. Sugar cane is able to take up  $\text{P}_2\text{O}_5$  from very dil. solns. At  $p_H$  6 and a concn. of 0.03-0.05 mg.  $\text{P}_2\text{O}_5$  per l., 15-20% of the max. amt. is absorbed per hr.; at a concn. of 1 mg. per l., nearly 100%. These are approx. the concns. found in the soil soln. Other conditions being equal, even the 20% absorption appears sufficient for normal growth, because sugar cane is able to absorb several times the  $\text{P}_2\text{O}_5$  actually required. At  $p_H$  7 the absorption of  $\text{P}_2\text{O}_5$  is only 1/2 of that at  $p_H$  6. The plant evidently utilizes the  $\text{H}_2\text{PO}_4^-$  ion, but not the  $\text{HPO}_4^{--}$  ion. When the  $\text{P}_2\text{O}_5$  concn. in the nutrient soln. is extremely small, the plants may release  $\text{P}_2\text{O}_5$ , and then show symptoms of phosphate hunger. The results of this study confirm the conclusions of von Wrangell (*C. A.* 23, 3006; 25, 1019) that the  $\text{P}_2\text{O}_5$  concn. in the soil soln. is an essential factor in the  $\text{P}_2\text{O}_5$  absorption by the plant, and that the influence of the roots and the contact with the soil particles play a less important part. F. W. Z.

Importance of potash for the nutrition of the sugar beet. O. Engels. *Zuckerrubensbau* 16, 7 20(1934).

O. W. Willcox

Earliness in northern corn as affected by phosphate fertilizers, manure and other soil treatments. P. J. Olson and H. L. Walster. *J. Am. Soc. Agron.* 26, 205 13(1934).—P advanced the silking date of corn 2 days and combined with manure advanced it 3 days. Manure alone advanced maturity somewhat. Neither CaO nor  $\text{K}_2\text{O}$  influenced maturity consistently. The increased yield of corn, wheat and oats, the rotation crops, was apparently sufficient to cover the cost of the  $\text{P}_2\text{O}_5$  application, and thus the enhanced maturity essentially represented the margin of profit from the soil treatment.

J. R. Adams

Rice in British Guiana, 1927-1932. II. Fertilizer investigations. R. R. Follett-Smith. *Brit. Guiana Dept. Agr., Rice Bull.* 1, 39 50(1933); cf. Codd and Peterkin, *C. A.* 28, 2804<sup>3</sup>.—Analyses of the soil and of the rice straw and other org. material used as fertilizers are given. Applications of limestone depressed the yield of rice straw; small increases were obtained with superphosphate,  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{K}_2\text{SO}_4$ . Application of limestone at the rate of 1 ton per acre tended to increase the incidence of "man rice." N and P fertilizers and rice straw decreased lodging. None of the treatments affected the flowering date. III. Insect pests of rice and padi. F. A. Squire. *Ibid.* 51 7. —Addn. of 1/4 lb.  $\text{Na}_2\text{SiF}_6$  per bag gave good control of the rice weevil (*Calandra oryzae* L.) in stored rice. Naphthalene gave good results when the rice was stored for a short time in closed containers. K. D. J.

The composition and mixing of commercial fertilizers. F. T. Adriano. *Philippine J. Agr.* 3, 289-309(1932).

A general review with annexed tables showing (1) the amt. of plant food elements removed from the soil by crops such as bananas, cacao, coconuts, coffee and rice, (2) the value of com. fertilizers imported into the Philippines from 1920 to 1930, (3) the compn. and price of com. fertilizers sold in Manila in Aug., 1931, (4) the analysis of some com. fertilizers and Philippine bat guanos used in the Philippines, (5) comparison of the fertilization values of some Philippine seed cakes with that of cottonseed meal, and

(6) the analysis of some possible Philippine fertilizer fillers. Fourteen references. John O. Hardesty

Making fertilizer from activated sludge. Harvey W. Hincks. *Am. City* 49, No. 3, 45-8 (1934).—Excess sludge resulting from the activated sludge treatment at the Tri-City disposal plant, Pasadena, Calif., is converted into "nitrogeanic" fertilizer. The excess sludge is drawn from the re-aerating tanks, coagulated with  $\text{FeCl}_3$ , filtered off, dried in revolving cylindrical driers, ground to size, and sacked for distribution. The annual production is approx. 3000 tons or 1 ton of dried com. fertilizer per million gals. of sewage processed. The fertilizer analyzes approx. 70% org. matter, 3% total P as phosphoric acid and 6% total N.

Inspection of commercial fertilizers. H. D. Haskins. Mass. Agr. Expt. Sta., *Control Series Bull.* 69, 46 pp. (1933).—Chem. analyses for N, P and K are given for 495 brands of fertilizers sold and registered in Mass. The N fraction is differentiated by reporting as ammonia N, nitrate N or as org. N.

Inspection of agricultural lime products. H. D. Haskins. Mass. Agr. Expt. Sta., *Control Series Bull.* 71, 8 pp. (1933).—The chem. compns. of 39 samples of lime products and 1 sample of gypsum are tabulated.

Photonitrication of some compounds. Ram Singh Sarkaria and Faqal-Ud-Din. *Indian J. Agr. Sci.* 3, 1057-63 (1933).—When 1% solns. of urea and  $\text{NH}_4$  oxalate were exposed to the sunlight for 14 days in the presence of ZnO, 13.48 and 10.16%, resp., of the N was converted into nitrite and nitrate. Under similar conditions, appreciable oxidation of the N was also obtained in 1% solns. of uric acid, hippuric acid, acetamide, glycocoll,  $\text{NH}_4\text{OAc}$ , dicyanodiamide, monoethylamine and diethylamine; sterile soil was much less efficient than ZnO as a catalyst for the photo-oxidation of these compds., but was more efficient for the oxidation of aniline. Animal charcoal was more efficient than ZnO as a catalyst for the oxidation of  $(\text{NH}_4)_2\text{SO}_4$ , but sterile soil had no effect.  $\text{NaNO}_2$  was oxidized to  $\text{NaNO}_3$  in the presence of ZnO and sunlight. The presence of the  $\text{NH}_4$  radical in the nitrifying solns. indicated that org. compds. were first converted into  $\text{NH}_4$  compds. and subsequently into nitrite and nitrate.

Composts and fertilizers in relation to greenkeeping. II. Nitrogenous fertilizers. T. W. Evans. *J. Board Greenkeeping Research* 3, 99-103 (1933); cf. *C. A.* 28, 2152.—The use and effects of soot, dried blood, hoof and horn meals, leather, shoddy, sewage sludge, oil cakes, malt culms and spent hops on golf greens are discussed.

Turf diseases and their control. John Monteith, Jr., and Arnold S. Dahl. *Bull. U. S. Golf Assoc., Green Sect.* 12, 85-186 (1932).—Formalin, S and various Cu compds. were ineffective in controlling turf diseases caused by *Rhizoctonia*; metallic Hg and various org. and inorg. Hg compds. gave good results and were almost equally effective when applied on the basis of equiv. Hg content, but there were slight differences in the rapidity with which the diseases were checked, in the length of time that a recurrence of the diseases was prevented, and in the danger of burning the turf. Repeated use of Bordeaux mixt. resulted in serious injury to turf owing to Cu poisoning. None of the Hg compds. caused permanent injury to turf, but  $\text{HgCl}_2$  caused less burning of the grass than did other Hg compds. when they were applied at comparable rates; when turf had been treated year after year less Hg was required to check the diseases than on turf where no treatments had ever been applied.  $\text{HgCl}_2$  and  $\text{HgCl}_2$ , used at the rate of 2-5 oz./1000 sq. ft., effectively controlled the snow-mold disease caused by *Fusarium nivale*. A discussion is given of the injuries to turf caused by chem. deficiencies in the soil, excessive coupons. of salts and unfavorable soil acidity.

*Fusarium* patch disease of bowling and golf greens. F. J. Bennett. *J. Board Greenkeeping Research* 3, 79-86 (1933).—The disease, known as "snow mold," is caused

by the fungus *Fusarium nivale*. Growth of the fungus on wheat-meal agar substratum was completely inhibited by the addn. of 1 part of malachite green to 20,000 parts of the medium; a 10-fold concn. of  $\text{CuSO}_4$  had no effect, and  $\text{KMnO}_4$  (1:1000) was not toxic but induced earlier production of the dark growth assoc. with the calometria stage of the fungus. Because of its soly. in water, malachite green when used alone did not effectively control the fungus on grass swards; excellent results were obtained by the use of malachite green-Bordeaux mixt. sprays (1 qt. 1:20,000 malachite green plus 3 gal. Bordeaux mixt.) applied at the rate of  $3\frac{1}{4}$  gal. to 150 sq. yd. of sward at approx. weekly intervals.

Susceptibility of treated and untreated turf to brown-patch and dollarspot. H. F. A. North and L. E. Erwin. *Phytopathology* 24, 15 (1934).—Good control of the diseases was obtained with a mixt. of  $\text{HgCl}_2$   $\frac{1}{2}$  and calomel  $\frac{1}{2}$ , but much depends on the weather conditions.

Control of crabgrass and other turf weeds with chemicals. Fred V. Grau. *Bull. U. S. Golf Assoc., Green Sect.* 13, 47-52 (1933).— $\text{NaClO}_2$  gave excellent control of crabgrass, milk purslane and chickweed in turf and markedly increased the stand of Kentucky bluegrass; the treatment had practically no effect on the nutritive elements in the soil or on the soil reaction.  $\text{NH}_4\text{CNS}$  gave promising control of crabgrass, but it stimulated the growth of plantain, dandelion and other perennial weeds, as well as that of the grass.  $\text{As}_2\text{O}_3$ ,  $\text{Na}_2\text{AsO}_4$  and  $\text{NaAsO}_4$  were ineffective against crabgrass, but gave a high percentage control of plantain, white clover, chickweed, ground ivy, knotweed and pennywort; they were not injurious to either the grass or the soil. Pb arsenate had no effect on crabgrass but was of some value in controlling chickweed.  $\text{FeSO}_4$  alone and in mixt. with  $(\text{NH}_4)_2\text{SO}_4$  stimulated the growth of crabgrass.

Further experiments on the root-gall nematode, *Heterodera marioni* (Cornu) Goodey, in South India. P. N. Krishna Ayyar. *Indian J. Agr. Sci.* 3, 1064-71 (1933); cf. *C. A.* 27, 3244.—Treating the soil with com.  $\text{CaCN}_2$  (1000 lb./acre) or with a mixt. of  $\text{KCN}$  (800 lb.) and  $(\text{NH}_4)_2\text{SO}_4$  (1000 lb.) 5 weeks before sowing the seed, gave practically complete control of the root-gall nematode on *Hibiscus esculentus* plants. Moderate control was obtained with  $\text{Ca}(\text{CN})_2$ , but S and  $(\text{NH}_4)_2\text{CO}_3$  had little or no effect. None of the treatments was injurious to the plants.

Codling-moth control. W. S. Hough. Va. State Hort. Soc., *Proc. 38th Ann. Meeting; Va. Fruit* 22, No. 1, 165-71 (1934); cf. *C. A.* 28, 2114.—In heavily infested orchards, 4 applications of Pb arsenate were more effective than 6 applications of either Ca arsenate or Mn arsenate in preventing the entrance of codling-moth larvae into apples; Paris green was ineffective. Addn. of Bordeaux mixt. (1:3:50),  $\text{Zn}(\text{OH})_2$  or  $\text{ZnSO}_4$ -lime mixts. to Ca arsenate sprays more or less completely prevented the foliage injury resulting when Ca arsenate was used alone; the Zn compds. caused severe russetting of the Winesap, Stayman, Delicious, Grimes Golden and York apple varieties. The efficiency of Ca arsenate-Bordeaux mixt. sprays in controlling the codling moth was increased by the addn. of summer-oil emulsion. None of the As sprays could be used sufficiently late in the season to control late worms without the necessity for washing the fruit to remove As residue; Mn arsenate seemed to adhere to the fruit to a greater extent than Pb arsenate. Addn. of oil to the sprays increased the As residue and made its removal more difficult. Summer-oil emulsion, 1 gal., and nicotine sulfate, 1 pint per 100 gal., gave about the same control of codling moth as did Pb arsenate, and the fruit did not require washing to remove objectionable residues. Combinations of  $\text{Na}_2\text{AlF}_6$  and fish oil gave results almost equal to those obtained with Pb arsenate, but when the spray was used in July it was necessary to wash the fruit in order to reduce the F residue to the tolerance of 0.01 grain per lb.

The entrance of codling-moth larvae into fruit, with special reference to the ingestion of poison. Paul M.

Gilmer. *J. Kansas Entomol. Soc.* 6, 19-25 (1933).—Most of the *As* ingested by the larvae is probably obtained by the taking into the buccal cavity of bits of skin and pulp cut from the sprayed fruit during the process of entering. These bits are afterward expelled, but a considerable portion of the foreign material remains within the mouth cavity. When fruit was sprayed with carmine, varying amts. of the dye were present in  $\frac{3}{4}$  of the larvae within 24 hrs. after entrance into the fruit; the amt. ingested indicated that 25-33% of the larvae would survive were the material Pb arsenate. The larvae pick up considerable foreign matter on the setae, legs and other appendages, some of which is carried into the fruit at entrance.

K. D. Jacob

The control of insects boring in ornamental shrubs and shade trees. Clyde C. Hamilton. Natl. Shade Tree Conf., *Proc. 9th Ann. Meeting* 1933, 59-73. —Good control of several species of cambium bark borers on pin-oak trees was obtained by painting the trunks, limbs and twigs of the trees with refined pine oil contg. 5% of 95% free nicotine, with or without the addn. of 5-10% of paraffin; good results were also obtained when solns. of resin in McOH or isopropyl alc. were substituted for the pine oil. Mixts. of pine oil and 5% of nicotine with resins, corn oil or cottonseed oil also gave effective control of the insects. The treatments caused no injury to pin oaks, except where they were applied to twigs of smaller diam. than a lead pencil; hard maples showed bark injury about 6-8 weeks after the materials were applied, and in some instances the trees were killed. Oil sprays and tree paints of all kinds were injurious to the sugar maple, black walnut, butternut and beech. Eighteen references.

K. D. Jacob

Top-dressing corn for the control of stalk-borer. Geo. C. Haines. *Farming in S. Africa* 8, 434, 436 (1933).—Good control of *Calamistis fusca* grubs on corn plants was obtained by applying approx. 10 cc. of a 1:1000 aq. soln. of Derrisol (a proprietary deriv. prepn.) to the crowns of the plants at the peak period of moth emergence.

K. D. Jacob

Stimulation of potatoes by magnesium Bordeaux spray. Reimer Honde. *Phytopathology* 24, 3 (1934).—Spraying potatoes with Bordeaux mixt. prepd. from hydrated lime high in Mg (30%) stimulated growth in the absence of insects and diseases; while spraying with Bordeaux mixt. prepd. from a high-Ca hydrated lime failed to stimulate growth or increase yield. The stimulation is apparent only on soils deficient in Mg, and the beneficial effect of the spray is probably due to the Mg supplied.

R. C. Burrell

Tar-oil distillates (tar creosotes) as dormant spray materials for the control of aphids and other insect pests. R. H. Hurt. Va. State Hort. Soc., *Proc. 38th Ann. Meeting; Va. Fruit* 22, No. 1, 149-60 (1934).—The compn., properties and uses of tar-distillate sprays are discussed. Emulsions contg. tar oil 3% and petroleum oil 3% gave excellent control of rosy aphids and scale on apple trees and caused little or no twig injury. Cresylic acid 1% in combination with petroleum oil 6% gave good control of aphids and caused no injury to buds and twigs. Combinations of cresylic acid 0.5%, water-gas creosote 1% and petroleum oil 2.5% gave good results but produced considerable bud burning, which was caused by the water-gas creosote.

K. D. Jacob

Lime-sulfur substitutes and their role in the Virginia spray program. A. B. Grove. Va. State Hort. Soc., *Proc. 38th Ann. Meeting; Va. Fruit* 22, No. 1, 116-26 (1934).—The compn., properties and uses of S-spray materials are discussed.

K. D. Jacob

Pecan roset—a nutritional disease. J. R. Cole, A. O. Alben, C. L. Smith and B. G. Sittin. Texas Pecan Growers' Assoc., *Proc. 13th Ann. Meeting* 1933, 52-6; cf. *C. A.* 27, 3771.—Pecan roset was prevented or largely controlled by spraying the trees with 0.25%  $ZnSO_4$  soln. at intervals of 3-4 weeks during the growing season. Results with Zn-lime or Zn-Bordeaux mixt. sprays were inconclusive. Promising results were obtained by injecting  $ZnSO_4$  into the trunks of pecan trees at the rate of 0.36

g. per sq. in. of cross section of trunk. Addn. of 100 lb.  $ZnSO_4$  to the ton of fertilizer used on pecan trees gave more or less complete control of roset on trees growing in acid soils but had little or no effect on those growing in neutral and basic soils.

K. D. Jacob

Notes on pear psylla and San José scale control. W. A. Ross, T. Armstrong and D. F. Patterson. *Entomol. Soc. Ontario, 63rd Ann. Rept.* 1932, 21 4 (1933).—In lab. expts., oil-lime-S sprays (lubricating oil 3 gal., water 3 gal. and Ca caseinate 6 oz., dild. in 100 gal. lime-S, 1:9) and 3% lubricating oil emulsion alone effectively prevented the deposition of gravid psylla eggs on the sprayed wood; eggs at different stages of incubation were very susceptible to the combination spray, but were resistant to the oil emulsion. Effective control of San José scale was obtained by spraying with 3 and 4% oil emulsions, and the oil sprays killed more quickly than lime-S.

K. D. Jacob

Additional recommendations for the control of blue mold of tobacco. L. F. Mandelson. *Queensland J. Agr.* 40, 465-9 (1933).—An efficient colloidal Cu spray soln. is prepd. as follows: Dissolve 1 lb.  $CuSO_4 \cdot 5H_2O$  in 2 qts. water; add 1 pint of molasses and then make slightly alk. by slowly adding a soln. of 5 oz. NaOH in 1 qt. water. This stock soln. should be stored for at least 1 week before use. For spraying purposes, 1 part of the stock soln. is dild. with 30 parts q<sup>r</sup> water, and 0.5% by wt. of potash soft soap is added as a spreader.

K. D. Jacob

Fungicidal experiments for the control of blue mold of tobacco. L. F. Mandelson. *Queensland Agr. J.* 40, 470-94 (1933). In general, sprays were more effective than dusts in controlling blue mold (*Peronospora tabacina* Adam.) of tobacco. A home-made colloidal Cu spray, contg. 0.4%  $CuSO_4$  and 0.5% soft soap as spreader, was most suitable as a fungicide for tobacco seedlings. Bordeaux mixt. without a spreading agent was not effective, addn. of 0.25% of Agral No. 1 or 2% of soft soap as spreading agents caused some spray injury to the plants. Colloidal Cu spray prepd. from a stock soln. that was at least 6 weeks old gave better results than that made from a freshly prepd. stock.

K. D. Jacob

Experiments on the control of downy mildew of tobacco. R. G. Henderson. *Phytopathology* 24, 11 (1934). A sulfide (Cal-Mo-Sul) alone, of all fungicides tested, gave results approaching com. control.

R. C. Burrell

Fungicidal control of *Gymnosporangium juniperi virginianae* and related species. Ivan H. Crowell. *Phytopathology* 24, 5 6 (1934).—A special form of colloidal S was effective in controlling cedar-apple rust. If the method proves satisfactory on a large scale, it will make unnecessary the eradication of the red cedar to control apple rust.

R. C. Burrell

Soil treatment with mercurials for control of potato scab. C. W. Frutchey and J. H. Muncie. *Phytopathology* 24, 9 (1934).— $HgCl$ ,  $HgO$  and an org. Hg prepn. failed to control potato scab when applied at the rate of 20, 10 and 10 lb. per acre to soils of a pH of 6.8-7.2. Several strains of *Actinomyces scab* grew well in acid solns. of  $HgO$  and  $HgCl$  in tyrosinate media.

R. C. Burrell

Promising fungicides. M. C. Goldsworthy and F. I. Green. *Phytopathology* 23, 561-2 (1933).—Copper oxide, Cu silicate or Cu phosphate when finely ground and combined with bentonite flocculated by lime show promise as fungicides.

R. C. Burrell

Comparing soil fungicides with special reference to *Phymatotrichum omnivorum*, root rot. W. N. Eckel and J. J. Taubenhaus. *Phytopathology* 24, 8 (1934).

Of a large no. of chemicals examined, direct toxicity tests showed pentachloroethane, tetrachloroethane, xylene and  $NH_3$  most toxic to *Phymatotrichum*. In soil tests tetrachloroethane injected 6 in. into the soil had within 15 days killed *Phymatotrichum* on infected cotton roots to a depth of at least 24 in.

R. C. Burrell

The effect of sulfur fungicides, applied during the bloom, on the set of apple fruits. L. H. MacDaniels and A. B. Burrell. *Phytopathology* 24, 144-50 (1934).—Data are



presented which confirms the view that S applied as dust or lime-sulfur spray, either before pollination takes place or shortly after, reduces the set of fruit. R. C. Burrell

**Toxic action of *Trichoderma* on *Rhizoctonia* and other soil fungi.** C. Mc Haenseler and M. C. Allen. *Phytopathology* 24, 10(1934).—A liquid nutrient medium in which *Trichoderma* had grown for 5 days, sterilized by passing through a Seitz filter, proved to be lethal to *Rhizoctonia* and *Pythium*. The occurrence of *Trichoderma* in soils may have an antagonistic effect on *Rhizoctonia* and other soil-borne pathogens. R. C. Burrell

**Purification of the virus of tobacco mosaic.** Carl G. Vinson. *Phytopathology* 24, 20(1934). Juice from diseased plants may be increased in infective power more consistently by the addn. of activated C after the addn of Lloyd's reagent in the usual procedure. R. C. B.

**Zinc oxide as a seed and soil treatment for damping off.** J. G. Horsfall. *Phytopathology* 24, 12(1934). ZnO may be more effective than the usual red Cu oxide treatment, especially for control of post-emergence damping off. R. C. Burrell

**Seed-treatment studies of spinach.** L. E. Fwim and F. K. Crandall. *Phytopathology* 24, 8(1934).—Of 10 fungicides tested, red oxide of Cu, and to a lesser degree, CuSO<sub>4</sub> (sol.), gave the best control of the damping-off fungus with spinach. R. C. Burrell

**The stimulation of fungus spore germination by aqueous plant extracts.** Frank Wilcoxson and S. E. A. McCallan. *Phytopathology* 24, 20(1934). Spores which failed to germinate readily in H<sub>2</sub>O would often show 100% germination when small quantities of yeast, tuber or fruit juices were added. R. C. Burrell

**Further studies on a non-infectious leaf-deforming principle from mosaic tomato plants.** M. H. Thornton and H. R. Graybill. *Phytopathology* 24, 19(1934). After the expressed juice of mosaic tomato plants was autolyzed and the virus inactivated by boiling, the juice still contained a noninfectious, leaf-deforming principle. R. C. Burrell

**The action of trypsin on tobacco mosaic virus.** W. M. Stanley. *Phytopathology* 24, 18(1934). Addn. of a soln. of cryst. trypsin to the juice of mosaic-diseased tobacco plants rendered the juice practically noninfectious, although no protein digestion could be demonstrated. R. C. Burrell

**A study of the potato eelworm (*Heterodera schachtii*) in the Irish Free State.** J. Carroll. *J. Helminthol.* 11, 137-56(1933).—No relation between the pH of the soil and eelworm abundance was found. It was definitely shown that soils having a pH above 7.0 are not unfavorable to eelworm. Of a no. of compds. tested CaCN<sub>2</sub> was the only one that decreased the occurrence of eelworms in soil and the attack on the roots of potatoes. K. D. Jacob

**Sodium fluoride as a control for cattle lice.** R. W. Thompson. *Entomol. Soc. Ontario, 63rd Ann. Rept.* 1932, 54-6(1933).—When they were applied in the powd. form, NaF, Na<sub>2</sub>SiF<sub>6</sub>, CaSiF<sub>6</sub> and BaSiF<sub>6</sub> were equally effective in controlling the cattle lice *Trichodectes scalaris*, *Iaemalopinus euryternus* and *H. vituli*. NaF killed biting lice more quickly than did derris. Sprays contg. NaF were very effective. K. D. Jacob

**The sheep blowfly problem in Australia.** I. R. J. Lillyard and H. R. Seddon. *Australia Council Sci. Ind. Research, Pamphlet No. 37*; N. S. Wales Dept. Agr., *Sci. Bull.* 40, 136 pp.(1933).—A review of investigations on the use of chemicals for jetting, swabbing and dipping sheep for blowfly control, for dressing blowfly wounds, for the treatment of harts in blowfly traps and for the control of blowfly larvae in sheep carcasses. Numerous references. K. D. Jacob

**Derris in fly sprays.** I. Kerosene extracts of derris root as house-fly sprays. F. L. Campbell, W. N. Sullivan and Howard A. Jones. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 3, 81-3, 85, 87, 103, 105, 107(1934).—Kerosene exts. of *derris* root, cubé root and haiari stems were all effective against house flies varying in effectiveness in that order. A modified lab. method of testing such insecticides was used with the mortality of flies as an index.

<sup>1</sup> The toxic action of kerosene exts. of *derris* extends over a period of 3 days or more during which mortality of flies increases. Rotenone is an important but not the only toxic constituent of such exts. The methoxy content may be a better chem. index of insecticidal value than the rotenone content of such plants. Eleven references. Henry H. Richardson

**Colloidal bentonite-sulfur.** A. S. McDaniel. *Ind. Eng. Chem.* 26, 340-5(1934).—The fungicide is made by adsorbing molten S into dry, finely ground bentonite clay and permitting the S to solidify. After grinding, the mixt. will absorb H<sub>2</sub>O to form a gel, the bentonite-S being the continuous phase. The toxicity of this product is much greater than mech. mixts. of bentonite and S. H. E. Messmore

**Removing spray residue.** Arthur J. Farley. *Va. State Hort. Soc., Proc. 35th Ann. Meeting; Va. Fruit* 22, No. 1, 133-41(1934).—A HCl wash that was effective in removing As and Pb from apples which had been sprayed with combination oil-Pb arsenate sprays consisted of 20" B6. HCl 5-5.5 gal., water 100 gal. and Vatsol, a proprietary wetting agent, 8 lb. Apples originally contg. 0.17 grain Pb per lb. showed 0.000 grain per lb. after immersion in the HCl-Vatsol bath for 1.5-2.5 min., whereas fruit washed with HCl alone showed 0.50 grain Pb per lb. Degras, a crude wool-grease product, has been developed for the prevention of excessive foaming when HCl-Vatsol washes are used in the spray or flood types of washers. K. D. Jacob

**[Report of] department of advisory chemistry [Effect of Bordeaux mixture on galvanized iron wire].** W. Goodwin. *J. South-Eastern Agri. Coll., Wye, Kent* 1934, No. 33, 31-7.—When galvanized Fe wires of various thickness and ages were dipped in Bordeaux mixt. and then immersed in rain water in open containers for several months the amt. of corrosion (as shown by the Fe and Zn contents of the water) was, in general, somewhat less than that of wire which had not been dipped in Bordeaux mixt. K. D. Jacob

**A review of Derris patents.** R. C. Roark. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 3, 91, 95, 97, 99(1934); cf. *C. A.* 25, 4081, 27, 2244. —Patents issued in the U. S. and foreign countries since 1930 are reviewed. Henry H. Richardson

**Corrosion troubles with cast-Fe pipes laid in Groninger soil (Wichers) 9. Soil-corrosion studies (Logan, Taylor) 9. Thiocyanogenation of aromatic compds. [production of insecticides] (Likhoshershtov, Petrov) 10.**

**Jahresbericht für Agrikultur-Chemie.** Folge 4. Jg. 73. Edited by F. Mach. Berlin: P. Parcy. 608 pp. M. 92.

**Fertilizer.** Christian J. Hansen (to Koppers Co. of Del.). U. S. 1,949,715, March 6. A dry dusty fertilizer salt, consists principally of originally dry (NH<sub>4</sub>)<sub>2</sub>H<sub>2</sub>PO<sub>4</sub> dry (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and a damp clotting K salt such as "technical" KCl contg. a small proportion of hygroscopic Mg salts.

**Fertilizer.** Charlotte Wilberg. *Gér.* 574,743, Feb. 10, 1934 (Cl. 16.4). A radioactive fertilizer is prep'd. by treating monazite sand or similar radioactive material, with excess of concd. H<sub>2</sub>SO<sub>4</sub>, removing the solid residue, neutralizing the filtrate with NH<sub>4</sub>OH or KOH and crystg the resulting NH<sub>4</sub>-K-phosphate-sulfate mixt.

**Fertilizer.** F. L. Schmidt. *Ger* 591,758, Jan. 26, 1934 (Cl. 16.3). Slag, e. g., from Thomas or Martin furnaces, is heated with *m*- or *p*-phosphates of alkali metals, especially with the reaction product of H<sub>2</sub>PO<sub>4</sub> and KCl, to form a fertilizer.

**Fertilizers.** Kali-Forschungs-Anstalt G. m. b. H. *Fr.* 757,610, Dec. 29, 1933. Mixed fertilizers are obtained by treating (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> or (NH<sub>4</sub>)<sub>2</sub>P<sub>2</sub>O<sub>5</sub> or both with HNO<sub>3</sub> in amt. corresponding to one or 2 atoms of NH<sub>3</sub>. Mixts. of di- and tri-phosphates in which the H<sub>2</sub>PO<sub>4</sub> is joined on the one hand to K and on the other to NH<sub>4</sub> may be used.

**Fertilizers.** Bamag-Meguain A.-G. Fr. 757,657, Dec. 30, 1938. Fertilizers contg.  $\text{NH}_4\text{NO}_3$  are colored a distinctive color by org. dyestuffs which are added to the limestone or other ingredients to be mixed with the  $\text{NH}_4\text{NO}_3$ .

**Mixed fertilizers containing ammonium nitrate.** Carl Krauch, Carl Eyer, Gottwald Baetz and Friedrich Korn (to I. G. Farbenind. A.-G.). U. S. 1,947,601, Feb. 20. A melt of mixed fertilizer material contg.  $\text{NH}_4\text{NO}_3$  and which also may contain  $\text{CaCO}_3$  is treated with up to 10% of  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{CaCl}_2$  or mono-Ca phosphate, in order to produce a final product in the form of globular granules. Cf. C. A. 27, 1082.

**Fertilizer from superphosphate and ammonia.** Charles I. Burdick (to E. I. du Pont de Nemours & Co.). U. S. 1,948,454, Feb. 20. A superphosphate is treated with anhyd.  $\text{NH}_3$  to the extent of about 4% N incorporation, and the material is then treated with aq.  $\text{NH}_3$ . Cf. C. A. 27, 2526.

**Fertilizer from superphosphate and ammonia.** Edward W. Harvey (to Barrett Co.). U. S. 1,948,520, Feb. 27.  $\text{NH}_3$  is incorporated with a mixt. of superphosphate material and a "represser salt" such as  $(\text{NH}_4)_2\text{SO}_4$  in the proportion of not substantially less than 23 lb.  $\text{NH}_3$  per 1000 lb. superphosphate, so that reversion of available  $\text{P}_2\text{O}_5$  in the superphosphate to an unavailable form is inhibited by the represser salt.

**Converting the calcium sulfate in superphosphate into ammonium sulfate.** Hermann Oehme (to Chemische Fabrik Kalk, G. m. b. H.). U. S. 1,949,129, Feb. 27. Superphosphate is neutralized with  $\text{NH}_3$ , the neutralized

product is thoroughly mixed with  $\text{NH}_4$  carbonate and only a little water; the  $\text{NH}_4$  carbonate is then removed by blowing off (the quantity of water used being so small that a product is obtained in a dry comminuted condition ready for use as a fertilizer without preliminary drying or pulverization).

**Insecticide and fungicide.** Dehne & Co. Orbono-Ges. Fr. 757,450, Dec. 26, 1938. A mixt. is used contg. soft soap 33, a 2% soln. of cresol soap 11, 10% aq. ext. of tobacco 17, N<sub>2</sub> soln. of  $\text{KMnO}_4$  22, gliadine (vegetable glue) 17 and alc. 0.5-2 parts.

**Insecticide suitable for use on plant foliage.** Hugh Knight (to Emulsoids, Inc.). U. S. 1,949,722, March 6. A mineral oil having a viscosity of about 30-50 sec. Saybolt at 38° is compounded with an oil-sol. ester such as stearyl (suitable in a proportion about 20% the quantity of the oil).

**Seed disinfectant.** Vartkes Migrdichian and John L. Horsfall (to American Cyanamid Co.). U. S. 1,949,485, March 6. Pb, Zn, Hg, Cd, Bi and Fe salts of aromatic hydrocarbon-substituted cyanamids such as the phenyl cyanamides are used for treating seeds.

**Treating seed grains such as wheat to combat smut, etc.** Adolf Steindorff, Kaspar Pfaff and Michael Erlenbach (to Winthrop Chemical Co.). U. S. 1,947,926, Feb. 20. A tetrahalobenzene or the like such as 1,2,4,6-tetrachloro-3,5-dinitrobenzene is used as an active treating agent and may be mixed with tcl.

**Weed killer.** Säurefabrik Schweizerhall, Swiss 164,406, Dec. 16, 1933 (Cl. 2e). A weed killer contains  $\text{H}_3\text{PO}_4$  mixed optionally with fertilizer salts.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

**Biological action of short electromagnetic waves. I. Alcoholic fermentation of sugar by malt under the influence of the Lakhovski oscillator** Francesco Pirrone. *Industria chimica* 9, 16 21(1934). Exposure to radiation  $\lambda$  1885 accelerates the fermentation of sucrose soln. by malt slightly, as measured by the amt. of  $\text{CO}_2$  evolved.

**The determination of methanol in ethyl alcohol and potable spirits.** Olli Ant-Wuorinen. *Teknillinen Aikakauslehti* 24, 69-75(1934); cf. C. A. 27, 2755.—The alc. soln. to be analyzed is dild. to a concn. of 10% total alc. To 5 ml. of the soln. is added 2 ml. of 5 N  $\text{H}_3\text{PO}_4$ , and the soln. is placed in a thermostat at 15°. After 15 min. 2 ml. of  $\text{KMnO}_4$  (3 g. in 100 ml. of  $\text{H}_2\text{O}$ ) and 1 ml. of  $(\text{COOH})_2$  (10 g. in 100 ml. of  $\text{H}_2\text{O}$ ) are added, both being brought to 15° in a thermostat before addn. After 5 min. the soln. is shaken, and 10 min. after the  $(\text{COOH})_2$  has been added, 1 ml. of concd.  $\text{H}_2\text{SO}_4$  (sp. gr. 1.84) is added, followed by 3 ml. of fuchsin soln. (200 mg. fuchsin, 2 g.  $\text{Na}_2\text{SO}_3$  and 10 ml. of 2 N HCl, diluted to 200 ml.). Exactly 1 hr. after the addn. of the fuchsin a portion of the soln. is placed in a cuvette and the color intensity detd. in a Pulfrich photometer. All phases of the operation are standardized, and no parallel tests are required with known solns. The accuracy of the new method is  $\pm 0.01-0.02$  mg. MeOH in 1 ml. test soln. contg. 10% by wt. of total alc.

**New studies in the direct crystallization of citric acid from lemon juice.** Guido Ajon. *Ann. merceologia siciliana* 1, 33 pp.(1933).—With the increasingly sharp competition of fermentation citric acid, the old Scheele method for producing the acid from lemon juice is ceasing to be profitable and a more efficient method is required. A. treats the fresh juice with a few dg. per l. of tannic acid in aq. soln., heats slowly with const. stirring to 70-75°, adds 4 g. decolorizing C per l., maintains the temp. 1 hr., stirs while cooling to room temp., filters, adds suitable organisms for complete fermentation (8-15 days) of the sugars, filters, evaps. to about 1/3 the initial vol., adds aq.  $(\text{NH}_4)_2\text{C}_2\text{O}_4$  to the hot residue to ppt. all Ca and Mg, stirs while cooling, filters after 24 hrs., adds 7-8 g. tartaric

acid per l., lets stand 24 hrs., filters and finally ppts. citric acid by cong. the liquid. A little  $\text{H}_2\text{SO}_4$  accelerates the final crystn. Equipment for com. production by this method is described, and costs are discussed. Analytical data are given for Sicilian lemon juice and analytical methods are described. The new method, as yet hardly beyond the lab. stage, is expected to compete successfully with the fermentation method in which cheap carbohydrate raw materials are used.

**Citric acid fermentation.** Antonio Angeletti. *Ann. Schnapparelli* 7, 72-5(1933). The fermentative capacities of the various species of *Aspergillus niger* vary greatly, but the dark-colored or black colonies of the fungus seem to be the most active. The fermentation may be carried out at the surface of the liquid (sucrose, molasses) or solid substrate (wheat meal, horse chestnuts, lupine seeds) or even within the liquid. These methods can be of use in the natural citric acid industry.

**Influence of oxygen on fermentation.** K. Bengtson. *Svensk Bryggareforen. Månadsbl. Svensk Bryggmästare Tidn.* 47, 331-7(1932).—Small addns. of  $\text{O}_2$  enhance the fermenting power of yeast, but large addns. adversely affect it.

**The tartaric acid contents of the 1932 Mosel musts.** J. Seiler. *Z. Untersuch. Lebensm.* 66, 609-15(1933). Many analytical data are presented on both the fermented and unfermented musts.

**Inhibition of fermentation of maceration juice by oxygen in the presence of positive-oxidation-reduction systems.** Fritz Lipmann. *Biochem. Z.* 268, 205-13(1934). 1. inhibits the fermentative activity of maceration juice when it exceeds the quantity of SH in the juice. Not sensitive to  $\text{O}_2$ , the fermentation is, however, inhibited by it in the presence of pos. oxidation reduction systems. In the presence of a very small amt. of thionine as sensitizer maceration juice has a fairly const. potential of 60 mv. with a blank Pt electrode, and when this is raised to 160 mv. by the addn. of naphtholsulfonate-indophenol the fermentation is very greatly diminished.

**Rapid commercial analysis of crude potash from beet vinasses.** K. Dömötör. *Z. Spiritusind.* 56, 195(1933).

In the crude residue ("Schlempekohle"), total carbonate is detd. directly as  $\text{CO}_2$ , total K as  $\text{KClO}_4$ , and K + Na as chloride, or Na may be detd. directly. B. C. A.

Turbidities in colored wine vinegar. Heinrich Kreipe. *Deut. Essigind.* 38, 41-2(1934).—The turbidities or ppts. often observed when certain wine vinegars are colored with com. caramel products result from the formation of protein-tannin compds. W. O. E.

Spectrographic examination of fruit juices and wines. A. Heiduschka and H. Müller. *Pharm. Zentralhalle* 75, 141-3(1934).—The feasibility of examg. fruit juices and wines spectrographically is demonstrated, notably by the photographic method, since the absorption thereby may be readily detd.; this cannot be accomplished by purely ocular observation. While the photographic method does not at present permit conclusions respecting the detection of berry wines in grape wines, its utility in this respect shows hopeful possibilities, sufficient in fact to warrant further investigations. W. O. E.

Fermentation of red wine. W. V. Cruess. *Fruit Products J.* 13, 199-204, 207, 212, 214, 217(1934).

E. H.  
Volatile acidity of wines containing sulfurous acid. Alberto A. Perazzo and Armando C. Arbecchi. *Anal. asoc. quim. Argentina* 21, 156-8(1933).—Detn. of volatile acids in wines by the official method (decree of Aug. 19, 1910) can be in error because of  $\text{SO}_2$ . To avoid the influence of  $\text{SO}_2$ , place in a Cazenave volatimetric tube 10 cc. of wine, add 4-5 drops of starch soln., add drop by drop 0.2 N I soln. until a blue color is obtained, add 1-0.3 cc. more 0.2 N I soln., add a few drops of paraffin oil and proceed with the Cazenave detn. Tests show that the  $\text{H}_2\text{SO}_4$  formed from the  $\text{SO}_2$  by the I soln. does not break up org. esters and set free org. acids.

R. M. Symmes  
Effect of refrigerants on brewery apparatus. H. Schulze. *Allgem. Brauer-Hopfen-Ztg.* 72, 1112(1932).— $\text{NH}_3$  attacks Cu and its alloys, but not Fe. Explosions in  $\text{NH}_3$  compressors are frequently due to decompn. owing to superheating and entry of explosive oil vapors.  $\text{CO}_2$  does not attack Fe or Cu.  $\text{SO}_2$  does not attack Fe or Cu at  $< 100^\circ$ . B. C. A.

Color of beer. T. Hajek. *Z. ges. Brauw.* 55, 115-18(1932).—The effect of differences in the  $\text{H}_2\text{O}$ , hops and malt and of treatment on the color of beer has been studied. B. C. A.

The influence of phosphates and bromates as catalysts for the growth of *Saccharomyces cerevisiae*. E. Caserio. *boll. ist. sieroterap. milan.* 12, 742-51(1933).—Small quantities of bromates (optimum 0.04%) and phosphates (optimum 0.2%) added to the culture media favor the growth of *S. cerevisiae*, but when bromates are  $> 0.1\%$  and phosphates  $> 0.5\%$ , the growth ceases. G. A. B.

Staining of yeast cells with methylene blue and studies on the permeability of the cell membrane. IV. H. Fink and R. Kühles. *Wochschr. Brau.* 50, 185(1933); cf. *A.* 27, 4021.—Some earlier investigation (*C. A.* 24, 104; 26, 251) showed that living yeast cells are stained blue in the absence of electrolyte. To obviate this source of error the authors suggest the incorporation of phosphate in the staining soln. S. Józsa

The effect of age on the nitrogen content of yeast. Niels Nielsen. *Compt. rend. trav. lab. Carlsberg* 19, No. 10, 11 pp.(1933).—Inoculations were made with a const.

amt. of a yeast suspension of const. age (9 days) into 100 ml. wort, and the total dry wt. and N followed for 48 hrs. Growth, plotted as dry matter, followed a sigmoid course, the increase beginning after a 10 hrs. lag and the max. being reached in 96 hrs., after which autolysis caused a slight decrease in dry matter. However, the percentage of N in the dry matter increased about 30% during the last 12 hrs., i. e., while growth was only starting; it fell to a min. in 70-80 hrs., i. e., while growth was slowing down, and it increased slightly during autolysis. A high

concn. of N thus precedes the period of rapid growth. The decrease is not due to a decrease in the N content of the wort, which is insignificant, but to internal conditions in the cells. K. V. Thimann

Acid formation in yeast autolysis. Hugo Haehn and Heinrich Leopold. *Z. Untersuch. Lebensm.* 67, 50-8(1934).—In an alk. medium, the increase in amino acids is less than in an acid one. This holds at  $30^\circ$ ,  $45^\circ$  and  $55^\circ$ . On the other hand, alk. autolysis develops more acid than the acid autolysis. It is possible that this is due to an energetic deaminating breaking down to N-free acids. While asparaginase acts strongly in an alk. medium, these expts. do not offer a complete insight into this. An important practical result of these expts. is that in the normal yeast autolysis at higher temp. the acids which result in a purely enzymic way keep down the albumin-putrefying bacteria. F. L. Dunlap

Heteroxanthine, isolated from yeast. P. W. Wiardi and B. C. P. Jansen. *Roc. trav. chim.* 53, 205-8(1934). Forty kg. of dried brewer's yeast, extd. with water contg. 0.1%  $\text{H}_2\text{O}_2$  and adjusted with HCl to pH 4.5, gave 100 l. of ext., which was stirred with 6 kg. of fuller's earth. After sepn. the earth was extd. with baryta and ice, and filtered. The alk. filtrate was brought to pH 4.8 and a soln. of Na silicotungstate was added to complete pptn. The ppt., decompd. with baryta and ice, gave an alk. soln. which was acidified with  $\text{HNO}_3$  to pH 2 and then treated with excess  $\text{AgNO}_3$ . The ppt., which contained no vitamin  $\text{B}_1$ , was decompd. with HCl and filtered; the filtrate was evapd. to dryness and the residue extd. with dil.  $\text{H}_2\text{SO}_4$ . By repeating the  $\text{AgNO}_3$  purification, concg. the soln. and recrystg. from 0.5 N HCl, 1.2 g. of the HCl salt of heteroxanthine (7-methylxanthine), pale yellow, was obtained. When  $(\text{AcO})_2\text{Pb}$  and silicotungstic acid were used before the treatment with fuller's earth, the Ag ppt. contained not heteroxanthine but adenine. L. K.

Fermentation of honey (Borries) 12. Partial oxidation products of hydrocarbons (for denaturing alc.) (U. S. pat. 1,948,161) 10.

Tables to Be Used with Sikes's A. and B. Hydrometers. Part I. For Ascertaining the Strength of Spirits at Temperatures Ranging from  $30^\circ$  to  $100^\circ$  F. Part II. For Determining the Weight per Gallon of Spirits by Sikes's A. and B. Hydrometers. London: H. M. Stationery Office. 68 pp. 2s. 6d.

Denatured alcohol and ester. Wm. N. Davis and John T. Rutherford (to Standard Oil Co. of Calif.). U. S. 1,940,244, Feb. 27. The extd. oils derived by the  $\text{SO}_2$  extrn. treatment of petroleum oils and which contain org. S compds. and a relatively large amt. of unsatd. and aromatic constituents are used for denaturing alcs. or esters.

Vinegar from alcoholic solutions. Charles S. Ash (to Calif. Packing Corp.). U. S. 1,948,836, Feb. 27. For conversion by a plurality of intermittent fermenting steps, a porous bed of substantially insol. material such as pumice or wood shavings is inoculated with vinegar enzymes, a film of the alc. soln. is formed upon the surfaces of the bed and acetic fermentation is conducted on the surfaces, an excess of alc. soln. from storage being passed through the bed, drained off and recirculated. App. is described.

Beverage of low alcohol content. Erich Mertens and Bernhard Hanack. *Ger.* 543,777, Jan. 2, 1934 (Cl. 6b. 21). Cooled pasteurized skim milk is fermented in closed vessels with yeast, sugar and honey.

Filter for wine, etc. Gustave Gessner. *Swiss* 163,530, Oct. 16, 1933 (Cl. 36d).

Separating drums for yeast. Aktiebolaget-Separator. *Fr.* 757,294, Dec. 22, 1933.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**South American rose-wood oil and its original plants.** F. W. Freise. *Perfumery Essent. Oil Record* 24, 307-8 (1933).—Distn. of the wood or bark of the genuine rose-wood oil tree, *Aniba rosaeodora*, var. *amazonica*, gives oil having the following av. const.:  $d_{20}^{20}$  0.9055-0.9220,  $[\alpha]_D^{20} + 5$  45' to 6" 10',  $n_D^{20}$  1.4585-1.4020, soly. in 70% EtOH 3.5 vols. Seven other species of *Lauraceae*, the oils from which are used as substitutes, are described. The following are also frequently found in adulterated rose-wood oils: oil from *Hedwigia balsamifera*, Swartz, having  $d_{20}^{20}$  0.885-0.920,  $[\alpha]_D^{20} - 4$  30' to  $+6$  10',  $n_D^{20}$  1.550, and contg. *l*-linalool, terpineol and cineole; oil from *Bursera balsamifera*, Pois., having  $d_{20}^{20}$  0.8975,  $[\alpha]_D^{20} - 3$  50',  $n_D^{20}$  1.448, and sol. in 5 vols. of 70% EtOH; *Swietenia* oil (from *S. mahagoni*, L.) ( $d_{20}^{20}$  0.965-1.055), detected by its cedar-wood odor; and oil from a species of *Piper* having an odor of *Me salicylate*. B. C. A.

**Hop oil.** G. Louveau. *Rev. marques parfums. savonn.* 10, 420-1, 456 8 (1932).—The steam distillate afforded an insol. and a sol. oil; characteristics of oils from Bavarian, Bohemian and Burgundian hops are recorded. For Bavarian hops (insol. and sol. oils, respectively) the oils have:  $d_4$  0.8617, 0.9101;  $n_D$  1.4850, 1.4910;  $[\alpha]_D + 0$  18', —; acid value 9.1, 25.6; ester value 21.0, 45.5. B. C. A.

**A new preparation of colloidal mercuric sulfide, Mercol, in the therapy of syphilis.** Ettore Soscia. *Ann. Schiapparelli* 7, 87-93 (1933).

**Locust oil as a therapeutic agency** F. G. Cawston. *J. Trop. Med. Hyg.* 37, 49 (1934).

**Microsublimation of asafetida in the Swiss Pharmacopeia V.** L. Kofler and A. Kutnak. *Pharm. Monatsh.* 15, 7-9 (1931). The following test is described: "Pon the Et<sub>2</sub>O ext. from 1 g. asafetida into petr. ether (A). A ppt. is obtained; wash with A, dry, subject to fractional microsublimation and in the 1st fraction is obtained *vanillin*, in the 2nd fraction, *ferulic acid* and in the 3rd, *umbelliferone*." The authors show that the 1st crystals obtained are not *vanillin* but *ferulic acid*. H. M. B.

**Sixty years of the Austrian Pharmaceutical Society.** Hans Heeger. *Pharm. Monatsh.* 15, 11-18 (1934).

**Remedies for leprosy in Mexico.** Victor A. Reko. *Pharm. Post* 67, 49-55 (1934).—A discussion.

**Wallflower and stock.** Alfons M. Burger. *Riechstoff Ind.* 9, 1-2 (1934).—Use of the wallflower (*Cheiranthus cheiri*, L.) and the stock (*Matthiola annua*, Sweet.) in perfumery and formulas is described. H. M. Burlage

**Skin-cream bases.** K. Pfaff. *Riechstoff Ind.* 9, 2 5 (1934).—A discussion of skin-cream bases sold under the following trade names: (1) *Tegin*, a glycol ester of stearic acid, (2) *Protegin*, a petrolatum-like substance, (3) *Protegin X*, (4) *Tegacid*, (5) *Emulsifier 157*, (6) *Lanette Wax SX* (a mixt. of palmitin and stearin alcs.), (7) *Ivorit*, (8) *Thoreps* and *Vaneps*, (9) *Paremulsol*, (10) *Noremulsol*, (11) *Kleblatt Cream Base* and *Emulsifier* and (12) *Aquaphil*. Formulas illustrating their uses are given. H. M. Burlage

**A portable distillation apparatus for the recovery of essential oils.** Paolo Rovesti. *Industria chimica* 9, 6 11 (1934).—A portable app. for the steam distn. of essential oils is described. It is carried around the country so that the essences may be distd. as soon as possible. There is an optimum period when yields are best.

**Identification of *p*-phenylenediamine in the presence of other diamines in hair dyes.** C. Griebel and F. Weiss. *Z. Untersuch. Lebensm.* 67, 86-8 (1934); cf. C. A. 27, 4626.—Methods for the identification of *p*-phenylenediamine in the presence of 2,5-diaminoanisole are discussed. F. L. Dunlap

**Eryngium planum.** W. Peyer. *Apoth. Ztg.* 49, 253-4 (1934).—The histology of this drug has been studied in

connection with its saponin constituent and probable occurrence of an alkaloid. W. O. E.

**New Pharmacopoeia Helvetica (Ed. quinta).** H. Harms. *Apoth. Ztg.* 49, 256-65 (1934).—A commentary. W. O. E.

**Saponins as emulsifiers in practical pharmacy.** Wolfgang Brandrup. *Pharm. Zentralhalle* 75, 129-30 (1934) W. O. E.

**Investigations of homeopathic iron preparations.** A. Kuhn. *Pharm. Zentralhalle* 75, 131-4 (1934).—Triturations of FeCl<sub>3</sub> decomp., especially when exposed to light, into bivalent biologically active Fe, the amt. of which was detd. according to Simon with benzidine sulfate. The demonstrable limits of peroxidative action were detd. by means of benzidine, while those for ferrous ions were detd. by means of  $\alpha,\alpha'$ -bipyridyl and isonitrosoacetophenone. Dilns. of ferr. muriat. are unaffected in this respect. The importance of biologically active Fe is emphasized. Other typical homeopathic preps., as Fe sulfate, carbonate and lactate, contain biologically active Fe. The detection of active Fe in ferr. iodat. was scarcely possible. W. O. E.

**Reactions of eucalyptole.** Lad. Ekkert. *Pharm. Zentralhalle* 75, 145 (1934).—The color reactions arising from the action of aldehydes and concd. H<sub>2</sub>SO<sub>4</sub> on an alc. soln. of eucalyptole are: With furfural, the ring is dark garnet; it becomes green to deep indigo blue on gentle agitation; it changes to deep violet-red when shaken; it becomes blue with a green cast on diln. with alc. With anisaldehyde the ring is carmine-red; when gently agitated the upper liquid becomes green followed by deep blue and finally violet; on shaking it changes from cochineal to cherry red; when dild. with alc. it changes from blue-violet to blue. With salicylaldehyde, the ring is deep garnet; it changes from green to blue and violet on gentle agitation; on shaking it becomes deep bluish red; when dild. with alc. it becomes brown-violet. With *vanillin*, the ring is garnet; on gentle agitation it changes from violet-rose to violet; it cyclamen to cochineal-red when shaken; it is bright rose-violet to violet-blue on diln. with alc. With cinnamaldehyde, the ring is garnet; when gently agitated or shaken it is garnet; when dild. with alc. it is brown-rose. With piperonal, the ring is garnet with violet cast; when gently agitated it is violet-rose to rose-violet; when shaken it is cyclamen to cochineal-red; when dild. with alc. it is violet-rose. With *p*-dimethylaminobenzaldehyde, the ring is garnet; when gently agitated it is violet-rose, when shaken it is brown to bluish red. Coloration with  $\alpha$ - and  $\beta$ -naphthol are also recorded. W. O. E.

**Specific rotation of alkaloid and alkaloid salt solutions.** R. Lillig. *Pharm. Ztg.* 79, 198-200 (1934).—The [α]<sub>D</sub> values for various cinchona and opium alkaloids, as also for cocaine, gelsemine, retamine, chelidonium, corydine, lupinine, etc., are recorded. W. O. E.

**Steam sterilization in apothecaries and hospitals.** Reinold Kummer. *Pharm. Ztg.* 79, 205-8 (1934).

**Detection and estimation of copper in pharmaceutical preparations.** F. Feigl and P. Krumholz. *Scientia Pharm.* 5, 19-20 (1934).—In the case of exts. ignite 0.2 g. of the sample in a 5-cc. porcelain crucible, fume with 2 drops of HNO<sub>3</sub> to disappearance of C, warm with 1 drop concd. HCl after prior evapn. with 1 drop concd. HCl, add 2 cc. H<sub>2</sub>O, transfer to a cylinder, then after addn. of about 50 mg. NH<sub>4</sub>F to mask the Fe always present treat with 1 drop 5% ZnSO<sub>4</sub> soln. and 0.5 cc. NH<sub>4</sub> Hg thiocyanate (8 HgCl<sub>2</sub> and 9 NH<sub>4</sub>CNS in 100 cc. H<sub>2</sub>O). The presence of Cu is indicated by an intense violet color, which on comparison with standards may serve for quant. results. In the case of essential oils, shake 1 cc. in a separatory funnel with 2 cc. 0.1 N HCl, add a granule of NH<sub>4</sub>F to the aq. layer, and proceed as above. W. O. E.

**Histochemical detection of the active glucosides in folia**

**digitalis and in semen strophanthi.** Gundis Rotter and A. Pünkel. *Scientia Pharm.* 5, 9-15(1934).—The glucosides digitoxin, gitoxin and gitalin, the saponin digitonin, the leaves from the fresh plants of *Digitalis purpurea* and *D. lanata*, and finally the seeds of *Strophanthus kombe*, *S. hispidus* and *S. gratus* were treated with the following reagents: Na nitroprusside, concd.  $H_2SO_4$ , 80%  $H_2SO_4$ ,  $FeCl_3$ - $H_2SO_4$ ,  $EtOH$ - $H_2SO_4$ ,  $EtOH$ - $H_2SO_4$ - $Ac_2O$ ,  $EtOH$ - $H_2SO_4$ - $FeCl_3$ ,  $H_2SO_4$ - $Ac_2O$ , Wasicky's reagent (with and without  $H_2O$ ),  $H_2SO_4$ -glycerol,  $Br$ - $H_2O$ ,  $KBr$  and tannin, some of which yield characteristic colors (with tannin fine-grained ppts.). Of value in this connection are for digitalis, tannin, Wasicky's reagent and  $EtOH$ - $H_2SO_4$ - $Ac_2O$  mixt.; for strophanthus, Wasicky's reagent, concd.  $H_2SO_4$  and glycerol,  $H_2SO_4$ - $Ac_2O$  and  $EtOH$ - $H_2SO_4$ - $Ac_2O$  mixt. W. O. E.

**Improvement of drugs through chemical intervention.** C. Rohmann. *Sueddeut. Apoth.-Ztg.* 74, 132 5(1934).—An address. W. O. E.

**Sterilizing action of carveol, dihydrocarveol and their ozonization products.** A. Morel, A. Rochaix, J. Dœuvre and F. Dénard. *Compt. rend. soc. biol.* 115, 536-8(1934), cf. C. A. 28, 1138<sup>4</sup>. L. E. Gilson

**Arsenic in tobacco smoke.** C. R. Gross and O. A. Nelson. *Am. J. Pub. Health* 24, 36-42(1934).—An app. is described for detg. volatile As and other substances evolved during the smoking of cigars, cigarettes and pipe tobacco. The range of  $As_2O_3$  found in popular domestic brands of cigars, cigarettes and smoking tobaccos ranged from 8.3 to 50 p. p. m. On the basis of av. figures the As inhaled in smoking 1.35 lb. of cigars, 0.57 lb. of cigarettes or 0.16 lb. of pipe tobacco is calcd. to be equiv. to that present in 1 lb. of food contg. 1.43 p. p. m. of  $As_2O_3$ —the max. permitted by law for food products. The proportion of total As volatilized during smoking ranges for cigars from 15.1 to 34.7%, for cigarettes from 32.2 to 41.3% and for pipe tobaccos from 26.1 to 32.8%. J. A. K.

**The assay of insulin and the blood-sugar level.** M. Caroline Hrubetz. *Am. J. Physiol.* 107, 284-32(1934).—In fasting rats, after the administration of insulin in doses less than 0.5 units per kg., the % drop in blood sugar is a logarithmic function of the dosage. The fall in blood sugar 0.5 hr. after the injection of less than 0.5 unit of insulin per kg., therefore, can serve as a basis for insulin assay. J. F. Lyman

**Colobot essential oil from Citrus hystrix dc. var. Torosa.** Simona Santiago Tanchico and Augustus P. West. *Philippine J. Sci.* 52, 263-7(1933).—The colobot grows wild and is cultivated to some extent in the Philippine Islands. The crushed fruit is used in shampoos and crushed rind is added to flavor and scent coconut oil. Steam distn. of the peel gave 2.15% of an essential oil which contained 26% of citronellal. The oil contains double bonds, gives a test for aldehydes and with  $NaHSO_3$  produces a cryst. addn product. The unaltered material sepd. from crystals had an odor resembling pinene and appeared to consist of a mixt. of terpenes.

James C. Munch

**Simple and rapid micro methods for tobacco analysis.** V. Microtitrimetric determination of ammonia in tobacco.

J. Budnár, Vitéz L. Nagy and Ladislaus Barta. *Biochem. Z.* 268, 174-7(1934); cf. C. A. 25, 558.—Heat for 15 min. on a boiling water bath and with const. shaking 0.25 g. finely ground tobacco with about 15 cc. 1/2%  $HCl$  in a 50-cc. volumetric flask. Add to this acid tobacco suspension 2-3 cc. 10% silicotungstic acid, then more reagent drop by drop until no further ppt. or opalescence appears. Cool, dil. with  $H_2O$  to the mark, and after an hr. filter through a small paper. Transfer 20 cc. filtrate + 0.1 g. tobacco to a Parnas-Wagner distn. app., add about 0.1 g.  $MgO$  and drive off the liberated  $NH_3$  with steam into 10 cc. 0.01 N  $HCl$  until about 50 cc. distillate is obtained. Titrate excess 0.01 N  $HCl$  with 0.01 N  $NaOH$  with methyl red. Analysis of 15 samples of tobacco gives  $NH_3$  content ranging from 0.46 to 1.07%. S. M.

**Violet perfumes.** R. M. Gattefossé. *Parfumerie moderne* 27, 313 19(1933).—A discussion of synthetic products. A. Papineau-Couture

**Preservation of cosmetics.** Bohm. *Parfumerie moderne* 27, 373 83, 487(1933).—A discussion of the merits of esters of  $p$ - $C_6H_4(OH)CO_2H$  (nipagin, nipasol, nipabenzyl and nipakombin) as preservatives, particularly for cosmetics, and also for pharmaceuticals and food products.

A. Papineau-Couture

**Note on an insecticidal ointment.** R. Louis Joly. *Parfumerie moderne* 27, 577, 579(1933).—Ointment that soothes the burning of mosquito bites and drives away mosquitoes and similar insects contains as essential constituents citral and camphor. A. P.-C.

**Quinine iodobismuthate.** Picon. *Compt. rend.* 198, 926 8(1934).—Detn. of the heat evolved on addn. of increasing amts. of  $Me_2CO$  to  $C_{20}H_{24}N_2O_7 \cdot 2HI \cdot 2BiI_3$  (I) shows that the viscous fluid product obtained with 20%  $Me_2CO$  is  $C_{20}H_{24}N_2O_7 \cdot 2HI \cdot 2BiI_3 \cdot 6Me_2CO$  (II). I with > 60%  $Me_2CO$  forms a clear soln.; with > 60% two layers form, the heavier (a) being II satd. with  $Me_2CO$ , the lighter (b) a soln. of II in  $Me_2CO$ , contg. resp. at 19° 104.9 and 1.97, and at 49° 130.2 and 0.7793 g. of I per 100 cc. soln.  $H_2O$  increases the amt. of I in b and decreases it in a until with 4%  $H_2O$  no sepn. occurs; with 10%  $H_2O$   $BiOI$  is pptd. I is sol. in all proportions in cyclohexanone, to form an increasingly viscous red soln. with which small amts. of Bi or quinine can be detd. colorimetrically. In diethylene glycol a limpid soln. is formed (cf. C. A. 17, 3508). C. A. Silberiad

**Fluorescence analysis of pharmaceutical products.** J. A. Radley. *Chemist and Druggist* 119, 612 3, 708 (1933); cf. C. A. 28, 1130<sup>4</sup>.—A review is given of the studies of Metzner (C. A. 24, 5335; 25, 1122), Wasicky (C. A. 23, 2244) and others on seeds, of Dummer (C. A. 24, 1934) on tinctures, Wimmer and Kennedy (C. A. 24, 3319) on essential oils, Mushet and Willoughby (C. A. 23, 1585; 24, 1532), Loew (C. A. 25, 2316), Pierce (C. A. 24, 5175) and others on fixed oils. R. reports detection of mineral oil in a sample of "genuine" seal oil, confirmed by chem. detn. which revealed the presence of 60% mineral oil. S. Waldbott

**The essential oils of the Swiss Pharmacopoeia.** Ernest J. Parry. *Chemist and Druggist* 120, 95 6(1934).—A crit. discussion of the 27 essential oils of the pharmacopoeia. The absence of values for  $n$  is noted. S. W.

**New perfume compounds and synthetics.** H. S. R. Pharm. J. 131, 605, 715(1933).—Many new com. perfumes are named; the formula for a built-up gardenia odor contains 14 different perfumes in alc. soln. Addn. of certain synthetics, e. g., methylheptim carbonate (for violet odors), phenylacetaldehyde dimethyl acetal (for lilacs, etc.) and phenylpropyl dimethyl ether (e. g., in rose compns.) gives a "fresh leafy note" to perfumes. Eugenyl formate (a), terpinyl cinnamate (b) and valerate (c) are recommended as fixatives in face powder perfumes (a and b); c is a tobacco perfume. *Longue oil* from the root or whole plant of *Levisticum officinale* Koch is not well known; the root oil combines the odors of angelica root, oakmoss and celery seed. S. Waldbott

**Cinchona and civilization.** Bernard P. Howard. *Pharm. J.* 131, 707 8, 709, 742 3, 765-6; *Chemist and Druggist* 119, 734-6(1933).—A lecture. The part played by cinchona and its alkaloids in combating malarial fever is emphasized. Close collaboration between the pharmacologist, clinician, research chemist and manufacturer is still desirable. S. Waldbott

**The new Swiss Pharmacopoeia, 5th ed.** P. Casparis. *Schweiz. Apoth.-Ztg.* 71, 437-9, 470, 473-7, 485-9, 497 9, 577-9, 593 4, 625-6, 637-41, 653-5(1933); 72, 13-15, 25 7, 41-3(1934).—A review of its history and detailed discussion of its contents. S. Waldbott

**History of medicine and pharmacy in St. Gall.** R. G. Maeder. *Schweiz. Apoth.-Ztg.* 71, 453-7(1933).—An illustrated review, with an unusual portrait of Paracelsus from the Historical Museum. S. Waldbott

**Origin and early history of the Swiss Apothecaries' union.** A. Tschirch. *Schweiz. Apoth.-Ztg.* 71, 457-65 (1933). S. Waldbott

**Assay methods for some N. F. VI preparations containing bromides.** Donald C. Grove and Edward M.

Hoshall. *J. Am. Pharm. Assoc.* 22, 545-8 (1933).—Six preps. contg. bromides are proposed for N. F. VI. These are elixir of  $\text{NH}_4\text{Br}$ , elixir of  $\text{KBr}$ , elixir of  $\text{NaBr}$ , elixir of 3 bromides ( $\text{NH}_4\text{Br}$ ,  $\text{KBr}$  and  $\text{NaBr}$ ), elixir of 5 bromides ( $\text{NH}_4\text{Br}$ ,  $\text{KBr}$ ,  $\text{NaBr}$ ,  $\text{CaBr}_2$  and  $\text{LiBr}$ ) and sirup of 5 bromides ( $\text{NH}_4\text{Br}$ ,  $\text{KBr}$ ,  $\text{NaBr}$ ,  $\text{CaBr}_2$  and  $\text{LiBr}$ ). The Volhard method is satisfactory for the assay of these preps. Factors were calcd. for the titration of each of the mixed salt preps. after due allowance is made for the purity of the U. S. P. salts. One cc. of 0.1 N  $\text{AgNO}_3$  = 0.01059 g. of the mixed salts in the elixir of 3 bromides. One cc. of 0.1 N  $\text{AgNO}_3$  = 0.01037 g. of the mixed salts in the elixir of 5 bromides. One cc. of 0.1 N  $\text{AgNO}_3$  = 0.01058 g. of the mixed salts in the sirup of 5 bromides. L. E. Warren

Licorice fern and wild licorice as substitutes for licorice. Louis Fischer and E. V. Lynn. *J. Am. Pharm. Assoc.* 22, 1225-30 (1933).—This is a continuation of studies on licorice fern *Polypodium vulgare* L. var. *occidentalis* Hook. (C. A. 25, 4087) and a new study of wild licorice *Glycyrrhiza lepidota* (Nutt) Pursh. Material was identified by G. N. Jones. Licorice fern rhizomes (A) and leaves (B) were collected near Seattle, Wash. and wild licorice rhizome (C) near The Dalles, O. in June, 1929. Loss in air was (A) 75.6, (B) 74.4 and (C) 59.0%. Loss at 110° was (A) 79.2, (B) 77.1 and (C) 59.0%. The cleaned and air-dried material was used. Total ash was (A) 2.7, (B) 6.2 and (C) 5.2%. Acid-insol. ash was (A) 0.27, (B) 0.08 and (C) 0.55%.  $\text{Et}_2\text{O}$ -sol. ext. was (A) 7.3 and (C) 1.67%.  $\text{CHCl}_3$ -sol. ext. was (A) 7.7 and (C) 1.75%.  $\text{EtOAc}$ -sol. ext. was (A) 15.6 and (C) 3.7%.  $\text{EtOH}$ -sol. ext. was (A) 35.8 and (C) 14.3%.  $\text{H}_2\text{O}$ -sol. ext. was (A) 41.2 and (C) 27.9%. Reducing sugars were (A) 4.2, (B) 17.0 and (C) 2.3%. Sucrose was (A) 15.5, (B) 0.66 and (C) 3.64%. Starch was (A) 6.3 and (C) 3.5%. Pentosans (A. O. A. C.) were (A) 7.75 and (C) 14.0%.  $\text{N} \times 0.25$  was (A) 9%. Tannin was (A) 2.5%. Alkaloids were absent in each. Glycyrrhizin, Housemann's method (C. J. 15, 2959) (real licorice), was 7.89 and (C) 8.39%. The residues from (A) and (C) were not sweet. The Tschirch and Cedarberg method gave the characteristic sweet acid from genuine licorice but not for (A) and (C). Hence it was concluded that neither of the plants contained genuine glycyrrhizin. Benzoic and salicylic acids were obtained from (B); also a phytosterol m. 132.3° and an unidentified substance m. 74°. A new glucoside *polydin* was isolated from (A). It had no effect when fed to a rat. If previously extd. with  $\text{CHCl}_3$  preps. of (A) might be used in medicine in place of genuine licorice. Licorice fern may be cultivated. L. E. Warren

A reaction for phenobarbital. G. D. Beal and C. R. Szalkowski. *J. Am. Pharm. Assoc.* 23, 18-19 (1934). The Ph group is converted into *m*-dinitrobenzoic acid by heating with  $\text{H}_2\text{SO}_4$  and  $\text{KNO}_3$ . The reaction mixt. is made alk. with  $\text{NH}_4\text{OH}$  and reduced with  $(\text{NH}_4)_2\text{S}$ . The *m*-diamino compd. is formed with the production of a red-brown color. In a large, hard-glass test tube mix 0.2 g. of the unknown with 0.5 g. of  $\text{KNO}_3$  and 2 cc. of  $\text{H}_2\text{SO}_4$ . Heat the mixt. in a water bath for 20 min., cool and add 3 cc. of  $\text{H}_2\text{O}$ . Make alk. with  $\text{NH}_4\text{OH}$  and boil gently. Cool and add without mixing 2-3 drops of  $(\text{NH}_4)_2\text{S}$ . A reddish brown ring forms which diffuses through the liquid to an orange color. L. E. Warren

Isolation of a glucoside from *Gnidia polyccephala* (Januaris bossie). M. Kindl. *Trans. Roy. Soc. S. Africa* 21, 239-44 (1933).—From the aerial portions of the plant collected in S. Africa a new glucoside (I) of daphnetin was isolated. It probably has the same empirical formula as daphnetin (II), and has the same content of aglucone (daphnetin). I differs from II, however, as follows: (1) I m. 197-8°, II m. 223.4°; (2) I, dextro rotatory, II, levo; (3) I, much less sol. in  $\text{EtOH}$  and  $\text{MeOH}$ ; (4) m. p. is depressed when mixed with II. J. J. W.

Chem. compn. of "St. John's root" (Almeida Costa, Dias da Silva) 25. Thiocyanogenation of aromatic

compds. [production of medicinal preps.] (Iakhushevstov, Petrov) 10. Peroxide of tetrahydronaphthalene (Swiss pat. 162,066) 10.

Cerbelaud, René: Formulaire de parfumerie. Paris: The Author (82, Avenue de Suffren). 764 pp. F. 200 Reviewed in *Pharm. J.* 132, 283 (1934).

Cerbelaud, René: Manuel du parfumeur. Paris: The Author (82, Avenue de Suffren). 543 pp. F. 150 Reviewed in *Pharm. J.* 132, 283 (1934).

Rehberger, G. E.: Lippincott's Pocket Formulary. 3rd ed., revised. London: J. B. Lippincott Co. 15s. Reviewed in *Indian Med. Gaz.* 69, 113 (1934).

The Chemist and Druggist Diary, 1934. 66th Year. London: Chemist & Druggist. 438 pp.

Pharmaceutical Formulas. Vol. 11. The Chemist's Recipe Book. 10th ed., revised and rewritten by G. P. Forrester. London: Chemist & Druggist. 641 pp. 15s. Reviewed in *Chem. Trade J.* 94, 159 (1934). Cf. C. A. 23, 4536.

Therapeutic basic ethers containing halogen. Max Hartmann and Hans Iskt (to Soc. pour l'ind. chim. Bâle). U. S. 1,949,046, Feb. 27. 1-Diethylamino ethoxy-4-bromonaphthalene, the hydrochloride of which m. 179-80°, is obtained from diethylaminoethoxy naphthalene and Br by boiling in acetone. The free base is a yellowish oil and the hydrobromide m. 174.5°. The production of the following compds. also is described: 1-diethylaminoethoxy-2-isopropyl-4-chloro-5-methylbenzene, b<sub>p</sub> 142-3°; 1-bromoethoxy-2-isopropyl-4-chloro-5-methylbenzene, b<sub>p</sub> 154-5°; 2,4,6-tribromo-1-diethylaminoethoxybenzene, b<sub>p</sub> 170-1° and hydrochloride m. 163-4°; 1-diethylaminoethoxy-2-amino-4-chlorobenzene, b<sub>p</sub> 158-60°; 5-chloro-7-iodo-8-diethylaminoethoxyquinoline, a yellow viscous oil forming a mono hydrochloride, m. 187.8°, and a dihydrochloride, m. 153-4°; 5,6,7-trichloro-8-diethylaminoethoxyquinoline, an oil, dihydrochloride, m. 134-5°; 2-diethylaminoethoxy-4-methyl-7-chloroquinoline, an oil forming a dihydrochloride, m. 154-5°, and a methane sulfonate, m. 133.5°; 5-chloro-8-diethylaminoethoxyquinoline, an oil, hydrochloride, m. 191-3°; mention also being made of 1-dicyclohexylaminoethoxy-4-chlorobenzene-HCl, m. 198.0°; 5-bromo-8-diethylaminoethoxyquinoline-di-HCl, m. 178.0°; 5-chloro-8-dicyclohexylaminoethoxyquinoline-di-HCl, m. 239.40°; 5-chloro-7-bromo-8-diethylaminoethoxyquinoline-di-HCl, m. 142-3°; 5,7-dibromo-8-diethylaminoethoxyquinoline-di-HCl, m. 165.6°; 5-bromo-7-iodo-8-diethylaminoethoxyquinoline-di-HCl, m. 142.3°; 5,7-diiodo-8-diethylaminoethoxyquinoline-di-HCl, m. 168-9°; and 4-methyl-7-chloro-9-piperidinoethoxyquinoline-di-HCl, m. 150-1°. The products are therapeutic antiseptics, and may be made by various described methods. Cf. C. A. 27, 1994.

Curative specifics containing sulfonated santalene or cyclophyllylene derivatives. Joao da Veiga Soares and Nicanor B. Gonçalves da Silva. Brit. 395,007, July 1, 1933. Sulfonates of the sesquiterpenes, santalene or cyclophyllylene, are prepd. by adding concd.  $\text{H}_2\text{SO}_4$  to a mixt. of the hydrocarbon with  $\text{Ac}_2\text{O}$ . After addn. of  $\text{H}_2\text{O}$  and neutralization with alkali, the oil layer is removed. The alk. sulfonate is extd. from the aq. soln. with  $\text{CHCl}_3$ , the  $\text{CHCl}_3$  evapd., the residue dissolved in  $\text{H}_2\text{O}$  and extd. with  $\text{Et}_2\text{O}$  to remove any remaining oil and the aq. soln. evapd. to dryness. The products are used medicinally.

Stable salt of primula-saponin. Chemische Fabrik Pilot A.-G. Swiss 163,890, Nov. 16, 1933 (Cl. 36). A stable salt m. 212-13° and useful in pharmacy is obtained by treating primula-saponin with  $\text{NH}_3$ .

Racemic 1-hydroxyphenyl-2-amino-1-alkanol. I. G. Farberind. A.-G. (Max Bodmann, Gustav Bernhart and Leonhard Stein, inventors). Ger. 591,939, Jan. 29, 1934 (Cl. 12g. 32.21). 1-1-Hydroxyphenyl-2-amino-1-alkanol is subjected to a catalytic reduction with metals of the Ni group or with noble metals, at high temps. and in the



presence of  $\text{NH}_3$  or primary amines. The products are used in medicine. Examples describe the prepn. of *dl*-*m*-hydroxyphenylpropanolamine-HCl, m.  $178^\circ$ , *dl*-*m*-hydroxyphenylbenzylaminopropanol-HCl, m.  $168^\circ$ , and *dl*-3,4-dihydroxyphenylaminopropanol-HCl, m.  $178-80^\circ$ .  
**Magnesium lactobionate.** Chemische Fabrik vorm. Sandoz... Swiss 103,398, Nov. 16, 1933 (Cl. 116k).  $\text{Mg}$  lactobionate is prepd. by treating lactobionic acid with  $\text{MgCO}_3$  in the presence of water. The salt is used in therapy.

**Piperazine salt.** Chemische Fabrik Tempelhof A.-G. (Josef Zeltner, inventor). Ger. 591,808, Jan. 27, 1934 (Cl. 30k. 2). Solns. of the above salt suitable for injection purposes are prepd. by dissolving the substance in a mixt. of water and  $(\text{CH}_3)_4\text{N}_4$ .

**Tetraiodophenolphthalein composition.** Henry W. Wendt, Jr., administrator of the estate of Isco F. Ellzey, deceased (to The National Aniline and Chemical Co. Inc.). Can. 339,390, Feb. 13, 1934. A compn. for oral administration is produced by mixing together the di-Na salt of tetraiodophenolphthalein, water, gelatin, Na citrate and Na acid citrate in such amts. that the molar ratio of the total Na in the citrates to the di-Na tetraiodophenolphthalein employed is about 0.7 to 0.9 and about 2 to 7% of the tetraiodophenolphthalein is in the form of the mono-Na salt and the remainder is in the form of the di-Na salt.

**Compounds of the 1-phenyl-2-amino-1-alkanol series hydroxylated in the phenyl nucleus.** Max Bockmühl, Gustav Ehrhart and Leonhard Stein (to Winthrop Chemical Co.). U. S. 1,948,162, Feb. 20. Compds. of this series of the general formula  $\text{RCH}(\text{OH})\text{CH}(\text{NH}_2)\text{Y}$  in which R stands for a phenyl nucleus substituted by at least one hydroxyl group and Y for an alkyl group, are obtained by causing  $\text{HNO}_2$  to act upon a compd. of the general formula  $\text{R}'\text{COCH}_2\text{Y}$  in which R' stands for a phenyl nucleus substituted by at least one radical of the group comprising alkoxy, aralkoxy and acyloxy and Y for an alkyl group and subjecting the isonitroso compd. thus obtained to reduction. The introduction of the nitroso group is preferably carried out in the presence of a diluent, as by dissolving the aliphatic-aromatic ketone, in which the hydroxy groups of the phenyl nucleus are esterified or etherified, in an org. solvent, as ether or benzene. The  $\text{HNO}_2$  is preferably produced in the reaction mixt., for instance, by causing an inorg. acid, preferably gaseous  $\text{HCl}$ , to act upon a salt or another deriv. of  $\text{HNO}_2$ , such as  $\text{NaNO}_2$  or Pr nitrite. The isonitroso compds. are preferably reduced by a catalytic process to which they may be subjected in the form of their salts or as free bases, preferably dissolved in an org. solvent, such as alc. As catalysts may be used precious metal or other hydrogenation metal catalysts, for instance, those of the iron group. When using a precious metal catalyst, for instance, Pd catalyst, the isonitroso group is reduced by the hydrogenation to the amino group and the keto group is reduced to the  $\text{CHOH}$  group and when the hydroxy groups of the phenyl nucleus are substituted by aralkyl radicals these are simultaneously split off. When using as a catalyst a metal of the iron group, for instance, a Ni catalyst, the hydrogenation only causes reduction of the isonitroso and the keto group and when the parent compds. are substituted by aralkyl oxy groups in the phenyl nucleus, the reduction products are further treated in order to split off the said aralkyl radicals from the O atom attached to the phenyl nucleus, for instance, by subjecting them to a further catalytic hydrogenation in the presence of a precious metal catalyst. When the compds. are substituted by acyl radicals in the hydroxy groups of the phenyl nucleus, the acyl radical or radicals may be split off after the introduction of the isonitroso group at any stage of the process, for instance, before the reduction of the isonitroso compd., by heating with an inorg. acid, for instance,  $\text{HCl}$ . The 1-phenyl-2-amino-1-alkanols hydroxylated in the phenyl nucleus as obtained according to this process are therapeutics and can be utilized as remedies for treating diseases of the circulation of blood. Examples are given of the production of *o*-hydroxyphenylpropanolamine-HCl,

*m*-benzyloxyphenylpropanolamine, m.  $125^\circ$ , *p*-hydroxyphenylpropanolamine-HCl, 3,4-dihydroxyphenylpropanolamine-HCl, m.  $178^\circ$ , and some related and intermediate compds.

**Arsenic compounds of quinoline, etc.** I. G. Farbenind. A.-G. (Karl Streitwolf and Friedrich Hampe, inventors). Ger. 591,987, Jan. 20, 1934 (Cl. 12p. 1.10). 2-Methylquinoline compds. in which the Ph nucleus contains an arsenic acid residue are treated with aromatic aldehydes or their substitution products. Thus, quinaldine-6-arsonic acid is heated with  $\text{BzH}$ . The products are used as intermediates for the prepn. of drugs.

**Mercury-containing purine compounds.** Carl L. Lantenschlager, Max Bockmühl and Walther Persch (to Winthrop Chemical Co.). U. S. 1,948,179, Feb. 20. Therapeutic, strongly diuretic compds. are obtained by causing  $\text{Hg}$  salts, such as mercury acetate, to act upon purine derivs. contg. an unsatd. side chain, such as allyltheobromine or butenyltheobromine, allyltheophylline or butenyltheophylline or the like. The mercury in these new compds. is fixed in the side chain, the double bond being split by the reaction. Several examples with details of procedure are given.

**Derivative of phenylethylhydantoin.** Chemische Fabrik vorm. Sandoz. Swiss 166,004, Feb. 10, 1934 (Cl. 116k). The substance 3-methyl-5,5-phenylethylhydantoin is obtained by the action of 1 mol. of  $\text{Me}_2\text{SO}_4$  on 1 mol. of 5,5-phenylethylhydantoin. The substance m.  $136-7^\circ$  and is used in therapy.

**Alkylolamine derivatives.** Otto Eisleb (to Winthrop Chemical Co.). U. S. 1,949,247, Feb. 27. Compds. of the general formula  $\text{XCH}(\text{OH})\text{CH}_2\text{N}(\text{CH}_2\text{Ar})_2$  in which each Ar stands for a benzene or naphthalene radical which may be substituted by Cl and X stands for H or a lower alkyl are obtained by causing a 1-amino-2-alkanol to react with an arylmethyl chloride the aryl radical of which may be substituted by Cl (suitably at temps. of about  $60-110^\circ$  and in the presence of an acid-binding substance, with addn. of ether to sep. the reaction product from the resulting soln.). The products may be used as intermediates for prep. therapeutic compds. and dyes. *N,N*-Dibenzylaminoethanol, m.  $40-7^\circ$  and b.  $170-5^\circ$ ; *N,N*-dibenzylaminoethyl chloride-HCl, m.  $192^\circ$ ; *N,N*-bis(4-chlorobenzyl)aminoethanol, b.  $212^\circ$  and forms a colorless cryst. hydrochloride only sparingly sol. in water; *N,N*-bis(1-naphthylmethyl)aminoethanol, b.  $283^\circ$  and forms a hydrochloride m.  $211-12^\circ$ , 1-*N,N*-dibenzylamino-2-propanol, b. about  $168^\circ$ .

**Barbituric acid derivatives.** I. G. Farbenind. A.-G. Brit. 401,693, Nov. 17, 1933. *N*-Mono- or di-alkylated 5-cyclohexenyl- or cyclopentenyl-5-alkylbarbituric acids and their salts are prepd. by known processes for the manuf. of barbituric acid derivs., e. g., by introducing a substituent group into the corresponding barbituric acid compd. or by condensing alkylureas, guanidines, thioureas and isourea ethers with 5-cyclohexenyl- or cyclopentenyl-5-alkylmalonic acids, cyanoacetic acids or their derivs., with subsequent treatment if necessary. The products are useful as soporifics. Among examples (1) 5,5- $\Delta^1$ -cyclohexenylmethyl-*N*-methylbarbituric acid is prepd. by condensing Et  $\Delta^1$ -cyclohexenylmethylcyanoacetate with monomethylurea in alc. soln. contg. dissolved Na, and (2) monomethylurea is treated with Et  $\Delta^1$ -cyclopentenylmethylcyanoacetate and the product heated with dil.  $\text{H}_2\text{SO}_4$ . Cf. C. A. 27, 3947.

**Barbituric acid derivative.** F. Hoffmann-La Roche & Co. A.-G. Swiss 163,608, Nov. 1, 1933 (Cl. 116k). The compd. 5-isopropyl-5-methylolbarbituric acid, m.  $195-9^\circ$ , is obtained by the action of  $\text{CH}_3\text{O}$  on isopropylbarbituric acid. The compd. is used in medicine. Cf. C. A. 28, 1140<sup>2</sup>.

***N*-Alkylated derivatives of barbituric acid.** Walter Kropp and Ludwig Taub (to Winthrop Chemical Co.). U. S. 1,947,944, Feb. 20. By methods customary for the manuf. of substitution products of barbituric acid (I), generally tasteless, whitish cryst. hypnotic products are obtained such as the following derivs. of I: 5- $\Delta^1$ -cyclohexenyl-*N*,5-dimethyl, m.  $140^\circ$  and forming Na, Li and

- Ca salts; *N*-ethyl homolog, m. 134-5°; the corresponding *N*-allyl deriv., m. 127-8°; 5- $\Delta^1$ -cyclohexenyl-5-allyl-*N,N'*-dimethyl, m. 58-60°; the corresponding *N,N'*-diallyl compd., b<sub>1</sub> 158-60°; 5-methyl-5-(4-methyl- $\Delta^1$ -cyclohexenyl)-*N*-methyl, m. 133-4°; 5-ethyl homolog, m. 119°; 5-ethyl-5- $\Delta^1$ -cyclopentenyl-*N*-methyl, m. 127-8°; 5-methyl-5-(methyl- $\Delta^1$ -cyclopentenyl)-*N*-methyl, m. 116°; the corresponding 5-ethyl homolog, m. 73-4°; 5- $\Delta^2$ -cyclohexenyl-*N*,5-dimethyl, m. 127°; 5- $\Delta^2$ -cyclopentenyl-5-allyl-*N*-methyl, m. 98°; 5- $\Delta^1$ -cyclohexenyl-5-ethyl-*N*-methyl, m. 111-12°; 5- $\Delta^1$ -cyclohexenyl-5-ethyl-*N,N'*-dimethyl, m. 146°; 5- $\Delta^1$ -cyclohexenyl-5-ethyl-*N*-allyl, m. 84°. Various details of procedure are given for making some of these compds.
- Veratric acid derivative.** F. Hoffmann La-Roche & Co. A.-G. Swiss 163,700, Nov. 1, 1933 (Cl. 116k). A deriv. useful in medicine is obtained by the action of HNEt<sub>3</sub> on halide of veratric acid. The resulting veratric acid diethylamide b<sub>1</sub> 201-5°.
- Adenosinephosphoric acid.** I. G. Farbenind. A.-G. (Carl L. Lautenschlager and Fritz Lindner, inventors). Ger. 591,920, Jan. 20, 1934 (Cl. 12p. 7.01). See Brit. 396,135 (C. A. 28, 578<sup>9</sup>).
- Surgical sutures.** George M. Randall (to Plastic Products, Inc.). U. S. 1,949,111, Feb. 27. A "synthetic" surgical suture comprises a thread of absorbable animal tissue such as that of bovine ligamentum nuchae in its original chemical state homogeneously distributed through a cellulose base material such as regenerated cellulose.
- Wax of the tubercle bacillus.** I. G. Farbenind. A.-G. (Carl Ludwig, inventor). Ger. 473,846, Jan. 20, 1934 (Cl. 30k. 6). See Brit. 287,041 (C. A. 23, 483).
- Lyzed bacterial protein preparation suitable for topical treatment of local infections.** Frank G. Jones (to Eli Lilly and Co.). U. S. 1,949,375, Feb. 27. Lyzed bacterial proteins such as those from staphylococci are mixed with a germicide comprising a water-sol. Hg compd. such as Na ethyl mercurithiosalicylate.
- Hormones.** Soc. pour l'ind. chim. à Bâle. Swiss 163,140, Oct. 2, 1933 (Cl. 116k). See Brit. 401,574 (C. A. 28, 2469<sup>9</sup>).
- Hormones.** C. F. Boehringer & Soehne G. m. b. H. (Fritz Johannessohn and Erich Rabald, inventors). Ger. 592,200, Feb. 3, 1934 (Cl. 12p. 17.10). Sexual hormones are pptd. from aq. soln. by means of water-insol. or sparingly sol. alkaloids. The ppt. may be worked up by treatment with HCl followed by extn. with an org. solvent. Examples are given.
- Hormone preparations.** Soc. pour l'ind. chim. à Bâle. Swiss 163,699, Nov. 1, 1933 (Cl. 116k). A growth-promoting prepn. is obtained by extg. a thymus gland
- ext. with a 70% water-sol. aliphatic alc. The solvent is evapd. *in vacuo*. The residue is dissolved in water and treated with concd. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> soln. The resulting ppt. is washed with satd. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> soln., dried and washed with 70% alc. The dried product is probably pure thymus hormone, and has strong growth-promoting properties.
- Sexual hormones.** Soc. pour l'ind. chim. à Bâle. Swiss 163,139, Oct. 2, 1933 (Cl. 116k). See Brit. 400,520 (C. A. 28, 2129<sup>9</sup>).
- Enzyme.** Francis J. W. Roughton and Norma U. Meldrum. Brit. 403,096, Dec. 1, 1933. An enzyme which catalyzes reactions in which CO<sub>2</sub> or carbonates are involved is obtained by centrifuging slaughterhouse blood, sepg. the red corpuscles, washing them by centrifuging with isotonic saline (if desired), pptg. the hemoglobin with CHCl<sub>3</sub>, and sepg. the enzyme from the supernatant liquid by evapn., preceded, if desired, by ultrafiltration. Various applications of the product are described.
- Antiseptics and disinfectants.** Lehn & Fink, Inc. Fr. 757,580, Dec. 28, 1933. Diphenylalkyl compds. contg. an OH group and a halogen element, e. g., 3-chloro-4-hydroxydiphenylmethane, 5-chloro-3-methyl-2-hydroxydiphenylmethane, 4'-chloro-3-methyl-4-hydroxydiphenylmethane and 4'-bromo-4,6-dimethyl-2-hydroxydiphenylmethane.
- Stable antiseptic cream containing carron oil.** Harry Noonan (to Drug Products Co.). U. S. 1,947,568, Feb. 20. Unctuous bases are incorporated with carron oil, lime water, triethanolamine and chloramine, producing a "carron oil" in a solid colloidal state so dispersed that it is not reactive with the Cl slowly evolved from the chloramine.
- Intestinal absorbent comprising kaolin and aluminum hydroxide gel.** John C. Bird (to John Wyeth & Brother) U. S. 1,949,266, Feb. 27.
- Alkyl phenols.** Hyvm E. Buc and Reuben Schuler (to Standard Oil Development Co.). U. S. 1,948,287, Feb. 20. See Fr. 731,556 (C. A. 27, 731).
- Acid tooth paste.** Einar Bergve. U. S. 1,947,635, Feb. 20. A tooth paste is prepd. contg. silica-water-glycerol gel and an acid constituent such as tartaric acid, boric acid or benzoic acid rendering the colloids liquid at an increased grinding temp. without preventing re-coagulation upon cooling, the mixt. thus formed being peptized by subjecting it to a colloidgrinding at an increased temp. not higher than 70°.
- Removing nicotine from tobacco.** Leonhard Frank (to Generaldirektion der Österreichischen Tabak-Regie.). U. S. 1,949,012, Feb. 27. See Brit. 392,336 (C. A. 27, 4882).

## 18-ACIDS, ALKALIES, SALTS AND SUNDRIES

F. M. SYMMES

- Production of sulfuric acid by the tower process.** V. N. Shultz. *J. Chem. Ind. (Moscow)* 1933, No. 9, 14-20.—A detailed criticism of the work of S. D. Stupnikov (*Khimstroj* 1932, No. 7) is given. H. M. Leicester
- The technology of the process and the value of a one-tower system for sulfuric acid production.** P. V. Samarskii and E. K. Zefberlikh. *J. Chem. Ind. (Moscow)* 1933, No. 9, 20-4.—One tower composed of 3 zones is described. In the first zone, SO<sub>2</sub> is oxidized by nitrosyl-sulfuric acid, in the second NO is oxidized and in the third it is absorbed by pure H<sub>2</sub>SO<sub>4</sub>, which is returned to the first zone. H. M. Leicester
- Obtaining sulfuric acid by purifying smoke gases.** B. D. Shnererson. *J. Chem. Ind. (Moscow)* 1933, No. 9, 24-8.—The smoke is passed over Fe rings through a descending stream of H<sub>2</sub>O. Most of the SO<sub>2</sub> forms FeSO<sub>4</sub> and can be recovered. After a month the Fe must be washed with HCl to remove FeS. H. M. Leicester
- The corrosion of andesite in the tower process for the production of sulfuric acid.** I. E. Adadurov and E. A. Hauman. *J. Chem. Ind. (Moscow)* 1933, No. 9, 33 5.—
- The soly. in H<sub>2</sub>SO<sub>4</sub> of Fe and Al in andesite shows a max. in 60% acid and a min. in 80% acid. The soly. of Ca decreases regularly with increasing acid concn., while Mg is not dissolved at all. HNO<sub>3</sub> and HNO<sub>2</sub> have little action on andesite. Increasing temp. and degree of porosity of the andesite cause increased corrosion. H. M. L.
- The oxidation of sulfur dioxide by nitrosylsulfuric acid in the liquid phase.** E. K. Lopatto and A. M. Savinaev. *J. Chem. Ind. (Moscow)* 1933, No. 9, 28 33.—A hydraulic compressor, or a SO<sub>2</sub> injector, gives a degree of dispersion of the gas in acid higher than previously obtained. In this intimate mixt. reaction is practically instantaneous at 20-50°, and is a function of the concn. of the acid. The production rate is greater than in the tower process. H. M. Leicester
- The formation of ammonia on highly dispersed metals.** D. P. Dobuchin and A. V. Frost. *Z. Elektrochem.* 40, 89-91 (1934).—The synthesis of NH<sub>3</sub> on Fe, which, together with NaCl, was vaporized in a H<sub>2</sub>-N<sub>2</sub> mixt. at 0.04 mm. Hg pressure at the temp. of liquid air, was investigated. No NH<sub>3</sub> was formed. This substantiates the work

of Frankenger, Mayrhofer and Schwamberger (*C. A.* 24, 2026; 26, 60) and refutes that of Müller and Schwabe (*C. A.* 27, 881). Frick Müller and Kurt Schwabe. *Ibid.* 91-2.—The authors defend their previous results (*C. A.* 27, 881) and criticize those of Dobinichin and Frost.

**Absorption of nitric oxide.** Carlo Toniolo and Giuseppe Giammarco. *Atti IV Congr. naz. chim. pura applicata* 1933, 828-43.—Many graphs of the course of oxidation of NO and absorption of NO<sub>2</sub> under various conditions are given. From these, under plant conditions, the exact course of the reactions at any stage of the operations can be detd. The use of the graphs is explained by examples from actual plant operations.

**Catalytic oxidation of ammonia.** Carlo Toniolo and Giuseppe Giammarco. *Atti IV Congr. naz. chim. pura applicata* 1933, 843-59; cf. preceding abstr. The literature and com. operations are reviewed. Preheaters made of Al, higher oxidation temps., multiple gauze catalysts are favored. Addn. of O<sub>2</sub> to the NH<sub>3</sub> gas mixt. and operation under superatm. pressure have the most favorable effects in absorption of NO<sub>2</sub>.

**Physicochemical investigation on the preparation of ammonium phosphates.** II. The solubility isotherm of the system: H<sub>2</sub>O-NH<sub>3</sub>-P<sub>2</sub>O<sub>5</sub>-SO<sub>3</sub> at 25°. L. E. Berlin and B. M. Mantzev. *J. Applied Chem.* (U. S. S. R.) 6, 85 9(1933).—The following detns. are given: (1) the isotherm of the system H<sub>2</sub>O-NH<sub>3</sub>-P<sub>2</sub>O<sub>5</sub>-SO<sub>3</sub>; (2) the crystn. surface of NH<sub>4</sub> phosphates, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>H(SO<sub>4</sub>)<sub>2</sub>; (3) the boundary curves of the crystn. surface of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> with the surfaces of NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>H(SO<sub>4</sub>)<sub>2</sub> and the soly. of NH<sub>4</sub> thiophosphate. The satd. solns. corresponding to the crystn. surfaces of NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>, NH<sub>4</sub>HSO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>H(SO<sub>4</sub>)<sub>2</sub> and the acidic part of the crystn. surface of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> contain an approx. const. amt. of NH<sub>3</sub> (10-11%). In the soln. corresponding to the alk. part of the crystn. surface of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> there is originally a slight decrease in the NH<sub>3</sub> content and it increases rapidly with a simultaneous slow decrease in the P<sub>2</sub>O<sub>5</sub> and SO<sub>3</sub> contents. The satd. solns. which correspond to the acidic part of the crystn. surface of NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> contain, depending upon the decrease of the acidity (P<sub>2</sub>O<sub>5</sub> content), from 4% (in the soly. curve of NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> in phosphoric acid) up to 11% (boundary curve of NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>-NH<sub>4</sub>HSO<sub>4</sub>) of NH<sub>3</sub>. In the solns. corresponding to the crystn. surface of (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> the fluctuation of the NH<sub>3</sub> content is insignificant (11-13%). Depending upon the increase of the alk. of the solns. which correspond to the crystn. surfaces of (NH<sub>4</sub>)<sub>2</sub>PO<sub>4</sub>·3H<sub>2</sub>O, the NH<sub>3</sub> content originally decreases (up to 5% in the solvation point (NH<sub>4</sub>)<sub>2</sub>PO<sub>4</sub>·3H<sub>2</sub>O) and increases then sharply with a simultaneous rapid decrease in the P<sub>2</sub>O<sub>5</sub> content. The split procedure is described and numerical data are tabulated.

**Isolation of helium and the utilization of the gases at Larderello.** Piero Ginori-Conti. *Industria chimica* 8, 1561 7(1933).—See *C. A.* 28, 2131.

**The synthetic nitrogen industry during the world crisis.** Carlo Toniolo. *Atti IV congresso naz. chim. pura applicata* 1933, 127-70.—A review of the present status; largely statistical.

**Mining sulfur under water in Louisiana.** Lawrence O. Donnell. *Chem. & Met. Eng.* 40, 454-8(1933).

**Grande Ecaille sulfur development overcomes marsh conditions.** Wilson T. Lundy. *Chem. & Met. Eng.* 41, 110 20(1934).

**The question of purification of sulfur-burner gases containing arsenious oxide by absorbing it in sulfuric acid.** V. E. Postnikov, L. L. Kuzmin and N. K. Vorob'ev. *J. Chem. Ind.* (Moscow) 1933, No. 9, 55-9. The hot gases are passed through 77-79% H<sub>2</sub>SO<sub>4</sub> and then through 100% acid. H<sub>2</sub>O is an unsatisfactory solvent. The mixt. of As<sub>2</sub>O<sub>3</sub> and SO<sub>2</sub> recovered from the acid is washed rapidly with H<sub>2</sub>O and gives practically pure As<sub>2</sub>O<sub>3</sub>.

**Incomplete oxidation of methane with oxygen and air.** Padovani and P. Franchetti. *Giorn. chim. ind.*

*applicata* 15, 429-32(1933).—The reaction CH<sub>4</sub> + 1/2 O<sub>2</sub> → CO + 2H<sub>2</sub> + 8 Cal. is influenced markedly by the presence of catalysts such as Ni, e. g., at 850-950° with a space velocity of 500, practically equil. conditions were obtained. At 900° less than 1% CH<sub>4</sub> remained in the reaction product. CH<sub>4</sub>, from petroleum cracking as well as from illuminating gas, was used. With reduced cost of O, the above reaction may become of interest in the prepn. of H, NH<sub>3</sub> and alcs.

**Effect of shape and size of pieces of contact mass on the catalytic [sulfuric acid] process.** I. E. Adadurov and D. V. Gernet. *J. Applied Chem.* (U. S. S. R.) 6, 450-68 (in German 469) (1933).—Expts. were made with a Sn-Ba-V catalyst from which pieces of various configurations were prepd. and the effects of their shape, etc., on the prepn. of SO<sub>3</sub> investigated. A catalyst characterized by permanent shape and size of contact pieces is not more efficient the less SO<sub>3</sub> in the gas mixt. and the lower the vol. velocity. The shape of the catalyst does not directly affect its activity but there is an effect exerted by the area of the surface, which depends upon the free space unit, the sp. surface and the effective and unscreened surface. Size of the contact pieces is of the utmost importance because it governs the sp. surface as well as the unscreened surface. Duration of contact is the dominant factor in catalysis. The amt. of heat generated, removal of the SO<sub>3</sub> from the reaction sphere because of its poisonous effect on the catalyst and the difference in the temp. between the catalyst surface and the gas mixt. must also be considered. The higher the percentage of the SO<sub>2</sub> gas in the gas mixt. and the higher the vol. velocity, the higher the magnitude of contacting in catalysts that have relatively low effective surface per unit of free vol. On the other hand, in catalysts with a larger surface this effect is either absent in case it is equalized by the total increase in no. of active centers, or it is reversed when the no. of active centers available is insufficient to handle the quantity of gas to be converted. For each catalyst with its peculiar shape and magnitude of contact mass there is a max. vol. velocity, a concn. of gas and a duration of contact that assure max. efficiency and max. transformation.

**Experiments on the work on vanadium catalysts in the Vladimir Works.** A. G. Ameln. *J. Chem. Ind.* (Moscow) 1933, No. 9, 40 3.—The development of the plant is described.

**The regeneration of vanadium catalysts.** I. E. Adadurov and P. P. Pershin. *J. Chem. Ind.* (Moscow) 1933, No. 9, 38-40.—Finely ground Sn-V catalyst on a zeolite base is extd. with 89% H<sub>2</sub>SO<sub>4</sub>; 22% acid may be used, but extn. is then less efficient. Not more than 76% of the V is dissolved. About 22% more can be recovered by converting the residual SiO<sub>2</sub> to water glass. The catalyst must be freshly prepd. from the V thus recovered.

**The action of poisons on a vanadium contact substance and the fight against poisoning.** M. O. Kharmandar'yan and K. I. Brodovich. *J. Chem. Ind.* (Moscow) 1933, No. 9, 35-8.—H<sub>2</sub>O, H<sub>2</sub>S and HCl do not poison Si-Pb-V catalysts. As<sub>2</sub>O<sub>3</sub> and CO do, but in the presence of CO<sub>2</sub> their poisonous action is prevented.

**Highly adsorptive substances prepared by the action of sulfuric acid on sugars, starches, etc.** G. Sollazzo. *Industria chimica* 8, 1554 61(1933).—Activated charcoals were prepd. by the action of H<sub>2</sub>SO<sub>4</sub> on sucrose, natural and artificial mannitol, glucose, lactose and rice starch, both at ordinary pressure and *in vacuo*. They adsorb the color from a 0.1% soln. of methylene blue more rapidly than do com. activated charcoals, e. g., if the adsorption of Merck's is 100, that of C from glucose is 134, from gum arabic 210, from lactose 163, mannitol 85, rice starch 153, sucrose 95. Prepd. *in vacuo*, the last six show the adsorptions: 172, 179, 156, —, 164 and 153.

**Adsorptive properties of volcanic minerals of Armenia.** S. M. Veller and A. Kh. Arutyunyan. *J. Applied Chem.* (U. S. S. R.) 6, 571 3(1933).—The Anii pumice stone found in Armenia possesses adsorptive power, approx.

equiv. to that of diatomite. The adsorptive power of pumice stone for kerosene and cottonseed oil is lower than that of diatomite. Exptl. results are reported.

**Velocity of calcination of chalk.** K. Smoleński and H. Iwanik. *Prace Centr. Lab. Cukrownic. Łódź.* 1928-31, 145-50.—A study of marble and 15 other varieties of  $\text{CaCO}_3$  is reported.

**Installations for purifying and cooling of furnace gases.** S. A. Fotiev. *Bumashnaya Prom.* 12, No. 10, 23-9 (1933).—Various Russian and foreign installations and methods of purifying and cooling of pyrite burner gases are discussed.

**Drying and burning flotation pyrite (tailings).** I. L. Pelsakhov, V. M. Ramm and N. P. Sosnovskii. *J. (Chem. Ind. (Moscow))* 1933, No. 9, 43-55.—Various methods for the treatment of such pyrites are discussed and compared.

**Control of house ants.** Alfred Weed. *Soap (Insecticide and Disinfectant Sect.)* 10, No. 3, 89, 101, 103 (1934).—A review with 13 references. In addn. to other methods W. states that household fly sprays may also be used for house-ant control.

**Equipment in the inorg. chem. industry [manuf. of  $\text{Na}_2\text{CO}_3$ ,  $\text{NaOH}$ ,  $\text{Cl}_2$ ,  $\text{HCl}$ ,  $\text{Na}_2\text{S}$ ,  $\text{H}_2\text{SO}_4$  and  $\text{NH}_3$ ].** (Waeser) 1.  $\text{CaC}_2$  and  $\text{Ca cyanamide}$  (Nordlander) 2. Formic acid and  $\text{NaNO}_2$  (Ger. pat. 592,054) 10. Effecting endothermic reactions [thermal decompn. of sulfates, chlorides and alk. earth carbonates] (Ger. pat. 577,103) 13.

**Hydrochloric acid.** Chemische Fabrik Hugo Stoltzenberg. Fr. 757,361, Dec. 26, 1933.  $\text{HCl}$  is obtained by combustion of  $\text{H}$  and  $\text{Cl}$  under high pressure. The  $\text{HCl}$  may be liquefied directly. An app. is described.

**Nitric acid by oxidation of ammonia.** Louis J. A. Marmier. U. S. 1,947,804, Feb. 20. A catalyst is used comprising lumps of material such as pozzuolana capable of withstanding temps. above  $900^\circ$  without substantial modification, each lump having its peripheral portion impregnated with a finely divided  $\text{Cr}$  oxide. Cf. C. A. 26, 3078.

**Phosphoric acid.** Toragorô Tanabashi. Japan. 99-102, Jan. 18, 1933. After oxidation with  $\text{HNO}_3$ , crude  $\text{H}_3\text{PO}_4$  is purified by passing an electric current into the acid at  $90-100^\circ$ , with a  $\text{Pt}$  plate as an anode and a graphite plate as a cathode. The c. d. at the cathode is 12-35 amp. per sq. dm.

**Sulfuric acid.** G. Schuy Nachf. A.-G. Ger. 591,925, Jan. 29, 1934 (Cl. 12i. 25).  $\text{As}$  is removed from concd.  $\text{H}_2\text{SO}_4$  by converting the  $\text{As}$  into  $\text{AsCl}_3$  by the aid of  $\text{HCl}$  and a reducing agent such as  $\text{H}_2\text{S}$ , thionate or polythionate, and then driving off the  $\text{AsCl}_3$ .

**Ammonia.** I. G. Farbenind. A.-G. (Fritz Stowener, Emil Keunecke and Josef König, inventors). Ger. 591,531, Jan. 23, 1934 (Cl. 12k. 3).  $\text{NH}_3$  is prep'd. synthetically from a mixt. of  $\text{N}$  and  $\text{H}$  by the aid of a catalyst comprising a  $\text{Fe}$  or  $\text{Mo}$  basis (obtained by reducing their oxides) in which  $\text{CN}$  compds. are pp'd. Thus, fused  $\text{Fe}$  contg. a small amt. of  $\text{Al}$  and  $\text{KNO}_3$  is oxidized. The mass is then reduced by  $\text{H}$  at  $500^\circ$ . The resulting mass is treated with a cold satd. soln. of  $\text{K}_2\text{FeC}_2\text{N}_4$  and dried *in vacuo*.

**Aqua ammonia.** Wm. L. Spalding (to National Aniline & Chemical Co.). U. S. 1,948,948, Feb. 27.  $\text{NH}_3$  is introduced into a flowing stream of recirculating aq. liquid (in a described app.).

**Nitrogenous products from ammonia oxidation.** Gustav A. Kramer and Ludwig Rosenstein (to Shell Development Co.). U. S. 1,948,968, Feb. 27. Water is sep'd. from products such as are formed by the combustion of  $\text{NH}_3$  and the oxides of  $\text{N}$  are removed from elemental  $\text{N}$  by fractionating in the presence of  $\text{NO}$  more than sufficient to react with substantially all the free  $\text{O}$  present, liquid oxides of  $\text{N}$  being produced as one end product and substantially pure  $\text{N}$  as the other.

**Alkali salts.** I. G. Farbenind. A.-G. (Robert Griessbach and Karl Neundlinger, inventors). Ger. 589,270,

Dec. 5, 1933 (Cl. 12i. 15). Addn. to 588,506 (C. A. 28, 1477\*). Alkali salt hydrates are converted to globular form by stirring the dehydrated or partly hydrated salt with a satd. salt soln., allowing to congeal, and drying in a rotary drum.

**Alkali cyanides.** N. V. Stikstofbindingsindustrie "Nederland." Brit. 401,827, Nov. 16, 1933. See Ger. 588,823 (C. A. 28, 2132\*).

**Alkali nitrates.** I. G. Farbenind. A.-G. (Christoph Beck and Helmut Weissbach, inventors). Ger. 591,874, Jan. 29, 1934 (Cl. 12i. 6). In forming the above nitrates by treating alkali chlorides or sulfates with  $\text{HNO}_3$ , the mother liquor, after sepn. of the nitrates by cooling, is treated with  $\text{SO}_2$ . The  $\text{N}$  oxides thus driven out are led into  $\text{HNO}_3$ , which is used for treating further alkali chloride or sulfate.

**Alkali metal phosphates from ferrophosphorus.** Victor Chemical Works. Brit. 401,950, Nov. 23, 1933. See U. S. 1,909,996 (C. A. 27, 4035).

**Alkali and ammonium compounds.** Friedrich Bartling (to Alterum Kredit-A.-G.). U. S. 1,947,671, Feb. 20. An alkali sulfate such as  $\text{Na}_2\text{SO}_4$  is heated with lime and carbon in an atm. of  $\text{N}$ ; the resulting product is treated with steam to produce an alkali compd. such as  $\text{NaOH}$ , a  $\text{S}$  compd. and  $\text{NH}_3$ ; the  $\text{S}$  compd. is converted into  $\text{H}_2\text{SO}_4$  and the  $\text{NH}_3$  is absorbed in the  $\text{H}_2\text{SO}_4$  to produce  $\text{NH}_4$  sulfate. Cf. C. A. 27, 670.

**Alkaline earth metal oxides.** Oswin Nitzschke (to I. G. Farbenind. A.-G.). U. S. 1,947,952, Feb. 20. See Ger. 567,605 (C. A. 27, 2786\*).

**Chromates.** Omar F. Tarr (to Mutual Chemical Co. of America). U. S. 1,948,143, Feb. 20. Chrome ore (100 is roasted in admixture with basic refractory material such as burned lime about 50 parts and with about 50-70% of the amt. of alkali base such as  $\text{Na}_2\text{CO}_3$ , theoretically required to combine with the  $\text{Cr}$  present in the ore, and about 90 parts of the leached residue from the previous roasting of a similar charge (details of roasting being regulated so as to maintain the charge in a porous condition without fusing it or forming balls or lumps).

**Thiocyanates of quaternary ammonium bases.** Kah Chemie A.-G. Brit. 401,954, Nov. 23, 1933. See Ger. 589,331 (C. A. 28, 1472\*).

**Finely divided metal compounds.** Chemische Werke Schuster & Wilhelmy Patentverwertungs-Ges. m. b. H. Fr. 757,604, Dec. 29, 1933. See Ger. 590,481 (C. A. 28, 2133\*).

**Removing water of crystallization from crystals such as those of potash alum.** Wilfrid C. Powelson. U. 1,948,313, Feb. 20. Various details of operation are described involving heating the material to a temp. for liberation of water of crystn. and carrying particles of the material in a current of a gas such as air having a greater avidity for moisture than the particles possess.

**Aluminum chloride.** A. P. Khorki. Russ. 31,426, Oct. 31, 1933. A mixt. of kaolin and coal is chlorinated in a kiln subdivided by baffles permitting a downward movement of the mass. In the upper section the mixt. is heated to about  $850^\circ$ , while the chlorination is carried out in the lower section of the furnace.

**Aluminum oxide or aluminum chloride.** M. E. Mandenov and A. M. Monoszon. Russ. 31,424, Oct. 31, 1933. The material contg.  $\text{Al}$  is mixed with acid sludge or a similar waste from acid-refined petroleum, etc., and heated to the disappearance of  $\text{SO}_2$  or  $\text{S}$ . The mass is then reworked for  $\text{Al}_2\text{O}_3$  or it is chlorinated.

**Alumina.** Walter M. Sanders (to Kalumite Co.). U. S. 1,948,887, Feb. 27. See Brit. 397,409-411 (C. A. 28, 1152\*).

**Aluminum sulfate.** Robert S. Perry (to Paper Makers Chemical Corp.). U. S. 1,948,004, Feb. 20. Bauxite ore is ground in the presence of water and the resulting mixt. is then treated with  $\text{H}_2\text{SO}_4$  and heated at atm. pressure.

**Sulfated ammonium nitrate.** Gewerkschaft Vichy. Fr. 757,342, Dec. 23, 1933. See Brit. 397,532 (C. A. 28, 1148\*).

**Ammonium sulfate.** Frederic M. Pysal (to The Shell

Development Co.). Can. 889,400, Feb. 13, 1934.  $(\text{NH}_4)_2\text{SO}_4$  is formed by injecting  $\text{NH}_3$  and  $\text{H}_2\text{SO}_4$  into a liquid stream of narrow cross section in a cyclic system at the lowest point in the system. The stream is circulated through the system, part of the stream is withdrawn at each circulation and the crystals are removed from the part of the stream withdrawn. Cf. C. A. 28, 586<sup>3</sup>.

**Ammonium sulfate.** Ges. für Kohlentechnik m. b. H. (Walter Klempt, inventor). Ger. 591,754, Jan. 26, 1934 (Cl. 12k. 2). Addn. to 563,552 (C. A. 27, 1151). The method of 563,552 for producing  $(\text{NH}_4)_2\text{SO}_4$  is modified by treating synthetic  $\text{NH}_3$  with  $\text{H}_2\text{SO}_4$ .

**Ammonium sulfate.** Alfred Mentzel. Ger. 592,108, Feb. 3, 1934 (Cl. 12k. 7). Briquets prepd. from a mixt. of an alkali hydroxide or carbonate and coal of high S content are heated in steam to 800-500°, and the  $\text{H}_2\text{S}$  evolved is converted in known manner into  $\text{H}_2\text{SO}_4$ . The briquets are then heated to 950-1000° in N to form alkali cyanide, which is heated to 350° in steam to yield  $\text{NH}_3$ . The latter is combined with the  $\text{H}_2\text{SO}_4$ .

**Saturator for making ammonium sulfate.** F. J. Collin A.-G. Ger. 592,051, Jan. 31, 1934 (Cl. 12k. 2).

**Beryllium hydroxide.** Emil Baggi and Edwin Burger (Walter Plau and Paul Cipán, inventors). Ger. 592,418, Feb. 7, 1934 (Cl. 12m. 4). An aq. soln. of  $\text{BeF}_2 \cdot 2\text{NaF}$  is warmed with HCl to form a soln. contg.  $\text{BeCl}_2$ , which is treated with  $\text{NH}_3$  to ppt.  $\text{Be}(\text{OH})_2$ .

**Purifying calcium chlorate.** Sheldon B. Heath (to Dow Chemical Co.). U. S. 1,949,204, Feb. 27. For removing a small proportion of associated  $\text{CaCl}_2$ , the impure chlorate is dissolved to form a soln. satd. with respect to  $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$  at a temp. below 60°, and the purified chlorate dihydrate is cryd. on cooling and sepd. Cf. C. A. 27, 2256.

**Calcium cyanamide.** George E. Cox (to American Cyanamid Co.). Brit. 401,788, Nov. 23, 1933. See Fr. 728,685 (C. A. 27, 1998).

**Granulating calcium cyanamide.** George E. Cox (to American Cyanamid Co.). U. S. 1,947,971, Feb. 20. The cyanamide is completely hydrated, cooled, treated with a soln. of an alk. earth metal salt such as  $\text{Ca}(\text{NO}_3)_2$ , and granulated, and the granules are quickly dried until their free water content is below 5%.

**Material containing calcium cyanamide.** Hans H. Franck. U. S. 1,948,106, Feb. 20.  $\text{NH}_3$  gas is caused to react on  $\text{CaCO}_3$  at about the disson. temp. of the latter at ordinary pressure. Cf. C. A. 27, 2767.

**Decomposition of calcium alkali sulfates.** Chem. Fab. Buckan (Erich Wiedbrauck, Hans Schrader and Karl Buche, inventors). Ger. 592,496, Feb. 9, 1934 (Cl. 12l. 5). Calcium alkali sulfates are heated under pressure with water or an aq. soln. until decomn. into alkali sulfate soln. and insol.  $\text{CaSO}_4$  is complete. The process may be applied to the isolated double sulfates or to crude reaction mixts. contg. a double sulfate as an undesired by-product, e. g., to the reaction product of aq.  $\text{K}_2\text{SO}_4$  and  $\text{Ca}(\text{NO}_3)_2$ . Details are given. Cf. C. A. 27, 4634.

**Nitric oxide.** Thaddeus Hobler and Hydro-Nitro Soc. anon. Swiss 168,880, Dec. 1, 1933 (Cl. 36r). Conc'd. NO, especially for making  $\text{HNO}_3$ , is prepd. by bringing hot gases contg. NO into contact with  $\text{HNO}_3$  so that the gases are enriched in NO by the resulting decomn. of the  $\text{HNO}_3$ . The NO gases may be obtained by the burning of  $\text{NH}_3$ . App. is indicated.

**Utilizing nitrogen oxide gases for producing nitrate, etc.** Mayor F. Fogler (to Atmospheric Nitrogen Corp.). U. S. 1,949,462, March 6. A soln. contg. a nitrite such as  $\text{NaNO}_2$  is treated with a gas contg.  $\text{N}_2\text{O}$ , dild. with other gases to convert the nitrite to nitrate; unabsorbed gases and the resulting nitrate soln. are sepd. from each other, and N oxides in the unabsorbed gases are absorbed in an alk. soln. such as  $\text{Na}_2\text{CO}_3$ .  $\text{HNO}_3$  may be produced by reaction of O, water and an excess of liquid  $\text{N}_2\text{O}$ , which is insufficient to form 2 liquid phases in the reaction product. App. is described.

**Nitrosyl chloride.** Kali-Forschungs-Anstalt G. m. b. H. Fr. 757,387, Dec. 28, 1933. The N in  $\text{NOCl}$  is utilized by transforming the  $\text{NOCl}$  with O or gas contg. it into a

mixt. of  $\text{NO}_2$  and Cl and causing the mixt. of  $\text{NO}_2$  and Cl to react with acid alkali chlorides or their mixts. Cf. C. A. 27, 814.

**Caustic soda.** I. G. Farbenind. A.-G. (Walter Schmid, inventor). Ger. 585,951, Jan. 10, 1934 (Cl. 12l. 15). See Fr. 718,040 (C. A. 26, 2931).

**Sodium bromide.** A. I. Chertak and S. L. Rakhmievich. Russ. 31,419, Oct. 31, 1933. The interaction of Na formate and Br is effected in the presence of NaOH.

**Sodium cyanide from sodium calcium cyanide.** Edward J. Franke (to Grangers Mfg. Co.). U. S. 1,947,570, Feb. 20. Na Ca cyanide is mixed with liquid anhyd.  $\text{NH}_3$ , the soln. thus formed is sepd. from insol. matter and NaCN is obtained from the soln. Cf. C. A. 27, 3567.

**Sodium silicate.** Henkel & Cie. G. m. b. H. (Franz Albertshausen, inventor). Ger. 592,202, Feb. 5, 1934 (Cl. 12i. 38). A soln. or melt of Na metasilicate is caused to crystallize, and as soon as crystn. has begun a solid hydrated Na water glass contg. more  $\text{SiO}_2$  than  $\text{Na}_2\text{O}$  is added. The mixt. is allowed to set and the product is ground. A water-sol. product stable to storage is obtained. The Na metasilicate soln. may be prepd. in the process from com. Na water glass and NaOH. Details are given.

**Sodium sesquisilicate.** George W. Morey (to Philadelphia Quartz Co.). U. S. 1,948,730, Feb. 27. For producing  $3\text{Na}_2\text{O} \cdot 2\text{SiO}_2 \cdot 11\text{H}_2\text{O}$ , a soln. is prepd. composed of  $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$  together with equal proportions of NaOH and water, and crystn. is effected.

**Thorium oxide and salts.** Chemische Fabrik von Heyden A.-G. Brit. 402,040, Nov. 23, 1933; Fr. 757,246, Dec. 22, 1933. A  $\text{ThO}_2$  which dissolves readily to form salts when heated with acids is made by heating Th oxalate at below 500° under normal or reduced pressure. The time of heating is such that "aging" of the oxide is prevented. In examples the oxalate is heated at 300° 24 hrs., resp., in *vacuo* and at normal pressure, and  $\text{Th}(\text{NO}_3)_4$  and  $\text{ThCl}_4$  are produced by dissolving the oxide in  $\text{HNO}_3$  and HCl. Cf. C. A. 28, 1481<sup>4</sup>.

**Zirconia.** Frederick L. Clark and Imperial Chemical Industries, Ltd. Brit. 401,756, Nov. 23, 1933. In the production of Fe-free  $\text{ZrO}_2$ , impure  $\text{ZrO}_2$  or Zr-contg. material is brought into soln. and the Fe pptd. by adding an alkali ferrocyanide or ferricyanide. Prior to treatment with ferrocyanide, the soln. is, if necessary, treated with an oxidizing agent, e. g.,  $\text{HNO}_3$ ; with ferrocyanide a preliminary reducing treatment, e. g., with  $\text{SO}_2$ , may be advisable.

**Extraction of aluminum from the ash from Moscow coals.** V. I. Gusev, M. K. Stebbe and heirs of P. A. Solodovnikov. Russ. 31,425, Oct. 31, 1933. The ash is mixed with  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NH}_4\text{F}$  and burned at temps. exceeding 400° until  $\text{Al}_2(\text{SO}_4)_3$  is formed.

**Argon.** Bayerische Stickstoffwerke A.-G. (Rudolf Wendlandt, inventor). Ger. 577,919, Jan. 13, 1934 (Cl. 12i. 27). A or gases rich in A are obtained from air by removing the N by liquefaction and converting the O into water and oxides of N by treatment with  $\text{NH}_3$ .

**Hydrogen.** Otto Emersleben. Ger. 591,753, Feb. 2, 1934 (Cl. 12i. 1). The prepn. of H by the decomn. of water by the aid of Ca, Sr or Ba in the presence of water-sol. halides such as  $\text{CaCl}_2$  or  $\text{MgCl}_2$  is described.

**Sulfur.** I. G. Farbenind. A.-G. (Fritz Giller, inventor). Ger. 590,173, Dec. 27, 1933 (Cl. 12i. 17). Addn. to 565,538 (C. A. 27, 2541). The method of 565,538 for producing pure S by treating org. solns. of S contg. impurities with fuming  $\text{H}_2\text{SO}_4$ ,  $\text{ClHSO}_4$  or  $\text{SO}_3$ , to remove the impurities, is modified by removing suspended impurities by treatment with moistened burned lime. In the example a soln. of S in  $\text{CS}_2$  is treated with slaked and granular burned lime.

**Sulfur.** Metallgesellschaft A.-G. (Conway Freiherr v. Gerswald and Hans Weidmann, inventors). Ger. 591,924, Jan. 29, 1934 (Cl. 12i. 17). S is obtained from gases contg.  $\text{SO}_2$  and O, especially gases obtained by roasting pyrite, etc., by the following steps: (a) the gases are treated with water at high pressure and low temp. to dissolve the  $\text{SO}_2$ ; (b) the  $\text{SO}_2$  is driven from the soln. ob-

tained as in (a) by raising the temp. to above 40° and decreasing the pressure; SO<sub>2</sub> free from O is so obtained; (c) this SO<sub>2</sub> is reduced to S by treatment with a carboniferous reducing agent, in optional presence of a catalyst.

**Colloidal sulfur.** A. G. Bosin. Russ. 31,420, Oct. 31, 1933. A soln. of K polysulfide is treated with an amt. of tartaric acid equiv. to the K ion. The reaction is carried out in the presence of gelatose and a protective albumin and the soln. is then filtered to sep. K tartrate, neutralized with chalk, filtered and evapd. *in vacuo*.

**Air preheater for use with sulfur burners in acid manufacture.** Thomas J. Ellis and Edwin F. Burns. U. S. 1,949,605, March 6. Structural features.

**Sulfate furnace.** S. P. Kovalev. Russ. 31,423, Oct. 31, 1933. The furnace is equipped with a rotating agitator and a ladle attached to the agitator shaft for the distribution of the H<sub>2</sub>SO<sub>4</sub>.

**Solar evaporation of salt solutions.** A. V. Nikolaev. Russ. 31,422, Oct. 31, 1933. The mother liquor is dyed black so as to increase the absorption of the sun's energy by the water.

**Kiln for carbonizing sea weeds.** M. F. Smirnov. Russ. 31,418, Oct. 31, 1933. Construction details.

**Catalyst.** Herrick R. Arnold and Wilbur A. Lazier (to The Canadian Industries, Ltd.). Can. 339,435, Feb. 20, 1934. SiO<sub>2</sub> gel is heated at 400° under a pressure of less than 1 mm. for 4 hrs., cooled to room temp. and impregnated with a soln. of Al(NO<sub>3</sub>)<sub>3</sub> still under a vacuum. The impregnated gel is dried and ignited at 400-450° for 4 hrs. Cf. C. A. 28, 1483<sup>3</sup>.

**Reworking hydrogenation catalysts.** Rhea N. Watts (to Standard-I. G. Co.). U. S. 1,948,407, Feb. 20. A spent hydrogenation catalyst contg. Mo which may have been used in hydrogenating oil, tar or coal is roasted, the roasted material is digested with an acid soln. such as 6 N HCl capable of dissolving molybdc oxide, the soln. is sepd. from the residue and is treated with an amount of alkali such as NH<sub>3</sub>, insufficient for neutralization, whereby the molybdc oxide is pptd., and the recovered molybdc oxide is reincorporated with suitable materials such as alk. earth and rare earth oxides, carbonates, alumina, clay or asbestos, for further use as a hydrogenation catalyst.

**Hydrogenation catalysts.** Rhea N. Watts and Wm. E. Spicer (to Standard-I. G. Co.). U. S. 1,948,408, Feb. 20. A catalyst suitable for use in hydrogenating comprises a compd. of the heavier metals of the 6th periodic group such as U or W oxide prepd. by pptn. from an acid soln. contg. 1-4% excess acid such as HF or H<sub>3</sub>PO<sub>4</sub> which serves to produce an active acidic oxide.

**Apparatus for catalytic oxidation of gases such as sulfur dioxide to trioxide.** Robert C. Jeffcott (to Calco Chemical Co.). U. S. 1,949,122, Feb. 27. Various structural and operative details are described of an app. having a converter with a plurality of spaced foraminous trays on which the catalyst is carried, with bases and a heat-regulating system.

**Complex polymerization products.** I. G. Farhenind. A.-G. (Arthur Voss, Ewald Dickhäuser, and Werner Starck, inventors). Ger. 592,231, Feb. 3, 1934 (Cl. 39b. 4.02). See U. S. 1,939,422 (C. A. 28, 1484<sup>7</sup>).

**Plastic compositions.** Helmut Fritz and Emil Glaser. Austrian 136,422, Feb. 10, 1934 (Cl. 80e). See Fr. 752,452 (C. A. 28, 1154<sup>9</sup>).

**Plastic materials.** Soc. anon. des pneumatiques Dunlop. Fr. 757,432, Dec. 26, 1933. Compns. and articles are made from at least 2 plastic materials practically insol. in each other. One plastic material is dispersed in another which will form the continuous phase, the 2 being mutually insol., and the dispersion thus prepd. is mixed with a 3rd practically insol. plastic material under such conditions that the 1st dispersion will itself disperse in this 3rd plastic material. Thus, rubber factice and plastified casein are incorporated in a mill and the dispersion is incorporated in rubber. Other examples are given.

**Plastic materials.** Paul Fisch. Fr. 757,485, Dec. 27, 1933. Graphite (1-10%) is added to plastic materials in

general, but rubber and its derivs. in particular, to increase resistance to wear by friction and to the attack of chem. agents.

**Machines for extruding thermo-setting plastic materials.** Rockhard Resins, Ltd., and Frederick W. Jones. Brit. 401,428, Nov. 16, 1933.

**Plastic masses.** Röhm & Haas A.-G. Brit. 401,653, Nov. 30, 1933<sup>1</sup>. Plastic masses are prepd. by incorporating (partially) polymerized methacrylic acid Me or Et ester with 1 or more addnl. substances at any stage in the polymerization, which may be effected, if desired, in soln. or in aq. emulsion and with the aid of catalysts. Addnl. substances are softeners, e. g., phthalic, tartaric, H<sub>2</sub>PO<sub>4</sub>, and stearic acid esters, drying oils, camphor, hardeners, e. g., paraformaldehyde, plastifiers, cellulose derivs., resins, fillers, etc. The products may be used for the manuf. of rayon, films, lacquers, varnishes, glass substitutes, and in the production of knife and umbrella handles, elec. insulating materials, tiles, billiard balls, rayon, leather, bandaging material, etc. Among examples polymerized methacrylic acid Et ester, which may be polymerized by heat or light or with Bz peroxide, is mixed with di-Bu tartrate and dissolved in AcOEt. By evapn. of the solvent from the soln. on bands, films or plates are obtained suitable for use as boiler linings, protective coatings and gas-tight materials.

**Plastic masses.** Soc. pour l'ind. chim. à Bâle. Swiss 163,020, Sept. 16, 1933 (Cl. 41). Masses obtained by condensing primary amines and CH<sub>2</sub>O in the proportions 1:2, in the presence of at least 1/2 equivalent of strong mineral acid, are hot-pressed.

**Plastic masses.** Soc. pour l'ind. chim. à Bâle. Swiss 163,552, Nov. 1, 1933 (Cl. 41). Polynuclear aromatic amine bases, whose nuclei are bound with -NH-CH<sub>2</sub>- and -CH<sub>2</sub>- groups, are treated with aldehydic hardening agents and the products hot-pressed to form infusible insol. objects. Thus, 1 mol. of diaminodiphenylmethane in alc. is heated with 2 mols. of CH<sub>2</sub>O. The product is treated with PhNH<sub>2</sub> and glacial AcOH to give NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>-NH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>NHCH<sub>2</sub>-C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, which is kneaded with wood meal, salicylic acid and CH<sub>2</sub>O. The product is dried, molded and heated. Several other examples are given.

**Artificial masses.** "Kolloidchemie" Studiengesellschaft m. b. H., Johannes B. Carpzw, Martin March and Robert Lenzmann. Ger. 591,540, Jan. 23, 1934 (Cl. 39f. 26). Albuminous substances, such as blood, casein, keratin or resins, gums or oxidizable oils, are used as binding agent with sea- or fresh-water slime. The mixt. is hot-pressed and hardened by treatment with aq. or gaseous CH<sub>2</sub>O. Material such as cellulose, cellulose derivs., B compds., S, soot or heavy metals may be added. Many examples are given.

**Hardening mass.** Josef Schafer. Swiss 163,283, Oct. 2, 1933 (Cl. 41). A hardening mass consists of a mixt. of fiber, size, glue, wax and gypsum.

**Molding powders.** Soc. pour l'ind. chim. à Bâle. Brit. 401,905, Nov. 23, 1933. The powders are prepd. from a mixt. of a filling material and an acid soln. of an aromatic amine and an aldehyde, which has a tendency to gelatinize, by disintegrating the gel during or after its formation but before complete solidification. Among examples (1) a soln. of PhNH<sub>2</sub>·HCl in H<sub>2</sub>O is treated with CH<sub>2</sub>O and mixed with wood meal with stirring, the product being treated with NaOH, washed and dried to yield the molding powder.

**Molding materials.** Soc. parisienne artistique de moulage (S. à r. l.). Fr. 757,592, Dec. 28, 1933. A glue having a basis of gelatin is used as binder for molding articles from sandstone, etc. Glucose may be added to prevent breakage on drying and a little dichromate is added to the glucose if the articles are exposed to weather.

**Molded objects.** Soc. pour l'ind. chim. à Bâle. Swiss 163,902, Nov. 16, 1933 (Cl. 41). Carbamide-aldehyde condensation products are mixed with fiber, dried and hot-pressed.

**Casein.** Soc. pour l'ind. chim. à Bâle. Swiss 163,550, Nov. 1, 1933 (Cl. 41). Benzoylated casein is obtained by



treating a soln. of casein in a liquid mixt. of a quaternary  $\text{NH}_4$  salt and a tertiary base with  $\text{BzCl}$ . The dried product is completely insol. in all solvents and useful for making fibers, films, articles, etc.

**Casein products.** Hugo Wilcken. Ger. 501,550, Jan. 23, 1934 (Cl. 22i. 2). Adhesive sheets of casein are produced by hot-pressing a mixt. of casein, a hygroscopic substance such as glycerol, and rubber latex.

**Apparatus for making vegetable glue in powdered form.** Soc. H. Gouthière et Cie. Fr. 757,525, Dec. 28, 1933.

**Adhesives.** Amelie T. Arnot and Michael Stenier (legal representatives of Robert Arnot, deceased). Brit. 401,674, Nov. 2, 1933. Films or sheets of materials adapted to act as adhesives in the presence of moisture in the materials to be joined or in the films or sheets themselves are manufd. by mixing adhesives, *e. g.*, casein or aluminous substances, glues, gums, with solns. or pastes of cellulose (derivs.) and drying so as to furnish an adhesive film or sheet. Thus viscose solns. may be mixed with a soln. of casein, hydrolyzed glue or gum arabic, or a cellulose acetate or celluloid solp. may be mixed with a non-aq. soln. of an adhesive or gum obtained, *e. g.*, by dissolving casein in dil. pyridine and diluting with a solvent, *e. g.*,  $\text{Me}_2\text{CO}$ .

**Adhesive.** Katsuji Uchiume (Jitsutarō Konishi and Katsuji Uchiume, inventors). Japan 100,295, March 27, 1933. An adhesive is made by mixing waste vulcanized rubber (boiled with  $\text{NaOH}$  soln. in a closed vessel), heated pitch, asphaltic substances, resin, solvent naphtha, etc.

**Adhesive suitable for use with materials such as cellophane.** John E. Clegg (to Aralcol Mfg. Co.). U. S. 1,948,334, Feb. 20. Various details are described for producing adhesives as by heating G rosin with Venetian turpentine at about  $120^\circ$ , cooling to about  $100^\circ$  and adding diethylene glycol monobutyl ether or a similar compd.

**Adhesive coating.** Richard G. Drew (to The Minnesota Mining and Manufacturing Co.). Can. 339,517, Feb. 20, 1934. An adhesive coating contains glue, glycerol,  $\text{CaCl}_2$ , alum and water, in proportions to maintain the coating normally tacky and sensitive to pressure, and a quantity of  $\beta$ -naphthol to inhibit the formation of mold.

**Water-repelling impregnating preparations.** H. Schenk Swiss 164,203, Dec. 1, 1933 (Cl. 38c). A prepn. for impregnating plaster, wood, stone, bricks, etc., to render these impervious to water consists of an emulsion of mineral oil of sp. gr. 0.8–0.9 and of viscosity 2–6° Engler at  $50^\circ$ , in a substance in which the oil is insol., *e. g.*, in an aq. emulsion.

**Waterproofing agents.** I. G. Farbenind. A.-G. Brit. 401,712, Nov. 13, 1933. Porous materials, *e. g.*, wool, cotton and rayon fibers, yarns and fabrics, paper, leather, wood, bricks, concrete, are waterproofed by impregnation with aq. media contg. (1) open-chain or cycloaliphatic acids contg. at least 8 C atoms, *e. g.*, stearic, ricinoleic, myristic, abietic, naphthenic or their  $\text{H}_2\text{O}$ -sol. salts, *e. g.*,  $\text{NaI}$ , alkali metal and hydroxyalkylamine salts, (2)  $\text{H}_2\text{O}$ -sol. salts of multivalent metals, *e. g.*, Al, Cu, Zn, Cd, Ca, Ba, Sr, Co, La, Pr formates, acetates, chlorides or sulfonates, and (3)  $\text{H}_2\text{O}$ -sol. protective colloids having the formula  $\text{RY}(\text{C}_2\text{H}_4\text{O})_x\text{H}$ , in which  $x$  is 2 or more, R is an org. radical contg. at least 6 C atoms and Y is O, NH or  $\text{NR}'$  ( $\text{R}'$  being an org. radical which may be the same as R), and obtained by treating  $\text{H}_2\text{O}$ -insol. or difficultly sol. org. compds., contg. at least 6 C atoms and at least 1 reactive H, with an ethylene halohydrin, ethylene oxide, polyglycerol or epihalohydrin to prevent pptn. in the bath. The  $\text{H}_2\text{O}$ -insol., etc., org. compds. include aliphatic acids, *e. g.*, lauric, oleic, palmitic, linoleic; the alkyl, hydroxyalkyl and hydroxyaminoalkyl esters of such acids, *e. g.*, the glyceryl esters contained in olive, castor, soybean, sperm and train oils and tallow and wool fat; their Me, Et and Bu esters; their esters with long-chain alcs., *e. g.*, stearyl stearate, octadecyl stearate; their amides or the amide prepd. from the acids of coconut fat and monoethanolamine as described in Brit. 337,737 (C. A. 25, 2307); the reaction products of long-chain aliphatic acid chlorides with aminocarboxylic acids, *e. g.*, from oleic

or stearic chloride and glycolcol, sarcosine or protalbinic acid; alcs. contg. at least 10 C atoms, *e. g.*, oleic or lauric alc. or montanol; alkylamines contg. at least 6 C atoms and their arylated derivs., *e. g.*, octadecylamine, hydroxyethylododecylaniline, octadecyl- $\alpha$ -naphthylamine; aromatic hydroxy compds. contg. at least 10 C atoms, *e. g.*,  $\beta$ -naphthol; aromatic amines, *e. g.*,  $\alpha$ - or  $\beta$ -naphthylamine; high-mol.-wt. natural products, *e. g.*, casein, gelatin, glue; carbohydrates, *e. g.*, starch, cellulose. Cf. C. A. 27, 611.

**Detergents.** Albert G. Rodwell. Brit. 402,091, Nov. 20, 1933. A detergent consists of gelatinous (as distinct from colloidal)  $\text{SiO}_2$ , soap and  $\text{H}_2\text{O}$ , with or without fatty acid, Na silicate or other mild alkali, naphtha or other grease solvent, abrasive or filler.

**Cleaning composition.** Wilmer C. Gangloff (to The Drackett Chemical Co.). Can. 339,065, Feb. 27, 1934.

A cleaning compn. for vitreous surfaces consists of an alkyl ether of a glycol or a glycol ester with suitable solvents, as water, Stoddard solvent, light naphtha, benzene and toluene, and with or without abrasives, perfume oils and dyes.

**Protecting silverware from tarnishing.** George E. Heering and Frank E. Dean (to Associated Silver Co.). U. S. 1,949,205, Feb. 27. An app. is described suitable for treating the air of show cases, etc., and in which are placed chemicals such as Pb acetate and  $\text{CaCl}_2$  adapted to remove tarnishing gases and moisture from the atm.

**Impregnated fabric for protecting silverware from tarnishing.** Arthur D. Champlin. U. S. 1,949,781, March 6. Fabric suitable for wrapping silverware is impregnated with a soln. of salts such as  $\text{Al}_2(\text{SO}_4)_3$ , borax and  $\text{Na}_2\text{SO}_4$ .

**Protective coating for surfaces such as those of golf balls.** Wm. C. Geer. U. S. 1,948,202, Feb. 20. The surface is treated with a soln. of an anhyd. halide of an amphoteric element such as  $\text{SnCl}_4$  in a solvent such as a mixt. of normal BuOH and  $\alpha$ -chloronaphthalene, ethylene dichloride or  $\text{EtOAc}$ .

**Contact cleaner for silver, etc.** Trost Nachf. Ger. 556,719, Nov. 28, 1933 (Cl. 48a. 1.03). A contact cleaner for noble metals consists of soda and a wrapping of Al foil.

**Depositing silver on nonconducting materials.** Martha Marchetti and Hubert Wenzl. Austrian 136,376, Jan. 25, 1934 (Cl. 48b.). Articles made of nonconducting material capable of swelling are swollen by treatment with a chloro hydrocarbon and then, without washing, treated with a soln. of Ag salt to which a reducing agent is added. The deposit of Ag may then be strengthened by electrolysis.

**Compositions for cleaning metals.** Josef Kraft. Austrian 136,519, Feb. 10, 1934 (Cl. 67c.). An alkali silicate soln. contg. a fat solvent is treated with sufficient acid, preferably  $\text{H}_2\text{SO}_4$  or  $\text{H}_3\text{PO}_4$ , to form a neutral or acid gel, which is mixed with abrasives or other appropriate addns. The acid may contain  $\text{FeCl}_3$  and an oxidizing agent, *e. g.*,  $\text{H}_2\text{O}_2$ .

**Cleaning and polishing materials.** Kalamazoo Vegetable Parchment Co. Ger. 592,407, Feb. 6, 1934 (Cl. 67c. 3). Pads for cleaning and polishing furniture, etc., are made from soft porous paper impregnated with paraffin oil, which may contain a mild abrasive, *e. g.*,  $\text{CaCO}_3$ .

**Furniture polish.** Lorne D. Parker (to Warren F. Malott  $\frac{1}{2}$  interest). Can. 339,547, Feb. 20, 1934. Furniture polish contains diamond paraffin oil 12, white gasoline 6, asphaltum varnish 4 quarts, lilacina 6 fluid oz. and varnish 1 pt. thoroughly mixed by agitation.

**Sheet packing of interposed metallic and non-metallic material suitable for gaskets.** Claude B. Bailey (to McCord Radiator & Mfg. Co.). U. S. 1,948,252, Feb. 20. Sheets of materials such as steel and asbestos may be used together, various structural details being described.

**Magnetic bodies suitable for cores.** Charles C. Neighbors (to Western Elec. Co.). U. S. 1,948,308, Feb. 20. Finely divided particles such as those of Fe-Ni alloy are mixed with an insulating material including an org. acid, such as tartaric acid, Na silicate, talc and kaolin, and the mixt. is dried, then mixed with a further quantity of the insulating material and again dried.

**Oxidation-resisting carbon articles** such as heating resistors. Harry V. Johnson (to National Carbon Co.). U. S. 1,948,382, Feb. 20. The article is provided with a SiC coating about 0.01-0.05 in. in thickness and with an overlying glaze comprising a fluoride of an alkali or alk. earth metal in combination with an oxide of one or more of the elements: B, Si, Al, P, Mg and Ca.

**Composition for reconditioning wood** such as abraded spike holes in rail sleepers. Sri Krishna. U. S. 1,948,422, Feb. 20. Asphalt 50-57 is first mixed with rosin 7-12 parts at a temp. of about 115° and powdered S 5 parts is gradually added to this mixt., followed by the further addn. of a soln. of rubber in a fatty oil such as castor oil and vulcanization of the mixt. by heating with S.

**Mercurized printing plates.** Hermann G. Zimmermann U. S. 1,949,233, Feb. 27. A base of a metal, such as Cu, amalgamable with Hg is coated with a metal, such as Ni, not amalgamable with Hg, the design is formed on the coating, exposed parts of the base are amalgamated with Hg, the amalgamated parts are treated with a soln. of AgNO<sub>3</sub> and HNO<sub>3</sub> to produce a layer of Hg having a mat surface and metallic Hg is applied to the surface thus produced.

**Fluid suitable for use in hydraulic brake systems.** Jules Bebie and George L. Doelling (to Wagner Elec. Corp.). U. S. 1,949,775, March 6. Castor oil 35, alc. 45 and a toluenesulfonamide ester such as an ethyl ester mixt. 20 parts are used together.

**Ornamenting semiprecious stones.** Albert Wild and Otto Wild. Brit. 401,969, Nov. 23, 1933. See Ger. 576,233 (C. A. 27, 3790).

**Projection screens.** Trans-Lux Daylight Picture Screen Corp. Brit. 401,700, Nov. 14, 1933. A rear projection screen comprises a sheetlike body of cellulose acetate material having incorporated therein an agent, e. g., triphenyl phosphate, castor oil, to impart flexibility and having light-diffusing means, e. g., ZnO, Sb<sub>2</sub>O<sub>3</sub>, BaSO<sub>4</sub>, TiO<sub>2</sub>, and, if desired, light-filtering means, e. g., cobalt blue, Victoria blue, erioglaucine blue, oil-sol. ulizarin blue, assocd. therewith or formed thereon.

**Acoustic horns.** Alexander I. Abrahams. Brit. 401,474, Nov. 16, 1933. Layers of textile material having a deep pile are stretched over a form so that the piles thereof intermesh and the whole is impregnated with a H<sub>2</sub>O-sol. varnish. The varnish may have a base of cashew-nut-shell oil, contg. cardol and anacardic acid combined with CH<sub>3</sub>O or Mn oxide, all dissolved in a hydrocarbon, or alternatively the varnish may include 25-35.5% China wood oil and 25-12.5% resin. The horn may, after baking, be further coated with the varnish.

**Protective layers.** Soc. pour l'ind. chim. à Bâle. Swiss. 165,152, Feb. 1, 1934 (Cl. 36f). Layers which conduct heat but resist the action of chemicals consist of rubber mixed with about 50% of Si or Fe-Si in powder form.

**Brake linings.** Firma Louis Blumer. Ger. 591,846, Jan. 27, 1934 (Cl. 39b. 26). These are made by mixing glycerol, PbO, natural or synthetic resin, fatty oils, fiber and filling materials, molding and hardening.

**"Foamite" corrosion inhibitor.** Gerald M. Fisher. U. S. 1,948,029, Feb. 20. An acid aq. soln. for foam formation and contg. Al sulfate or alum is mixed with 1-10% of molasses to prevent corrosion of iron containers by the soln.

**Fire-extinguishing gas.** Minimax A.-G. and Werner Ursum. Ger. 591,542, Jan. 23, 1934 (Cl. 61b). Fire extinguishers contain compds. which evolve N when heated, such as NH<sub>4</sub>NO<sub>3</sub> or (NH<sub>4</sub>)<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>.

**Fireproof preparation.** Les Pils Levy-Finger. Fr. 757,699, Dec. 30, 1933. A coating which is incombustible and impermeable to gases is made from Na<sub>2</sub>SiO<sub>3</sub> or K<sub>2</sub>SiO<sub>3</sub>, water and powd. mica.

**Fireproofing materials.** Eduard S. Ali-Cohen. Fr. 757,333, Dec. 23, 1933. Insulating materials for elec. cables are fireproofed by impregnation or coating with a double borosilicate of Al<sub>2</sub>O<sub>3</sub> and a metal oxide, with a binding agent such as an ammoniacal soln. of casein. The agent may be prepd. by treating a mixt. contg. ZnO and sol. glass by a soln. of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and mixing the ppt. with a sol. salt of boric acid, the whole being dried, ground and mixed with the binder.

## 19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. R. BARTON, C. H. KERR

**Essentials of glass technology based on American practice.** Samuel R. Scholes. *Ceram. Ind.* 22, 208-12 (1934); cf. C. A. 28, 1820<sup>9</sup>. Herbert S. Willson

**Preparation of high-melting glasses.** M. K. Hoffmann. *Fortschr. Mineral. Krist. Petrog.* 17, 420-1 (1932). --The magnetically deflected arc is employed; the molten drops fall into H<sub>2</sub>O. Cr<sub>2</sub>O<sub>3</sub> is readily melted at 2200°; BeO and Al<sub>2</sub>O<sub>3</sub> give alexandrite, while ZrO<sub>2</sub> and SiO<sub>2</sub> give zircon. Phenacite, beryl, mullite, alexandrite, corundum, zircon, fluorite, MgO, BeO, ThO<sub>2</sub> and ZrO<sub>2</sub> dissolve in glass. B. C. A.

**The briquetting of glass batch in practice.** Fritz Hoffmeister. *Glastech. Ber.* 12, 1-7 (1934). --The successful use of briquetting over a period of 2 1/2 years in the operation of both pots and tank furnaces is described. The advantages listed are: storage of larger stock in smaller space, decrease in loss of batch, quicker and easier introduction of batch, longer life of refractories and chambers, better glass by improved homogeneity, increase in melting efficiency of at least 20%. The amt. of Fe introduced by such a process is negligible. J. F. Hyde

**Suggests continuous glass tank design.** Wm. G. Bergman. *Ceram. Ind.* 22, 190-1 (1934). --It is claimed that the new design, while upsetting old theories, effects improvements by confining batch and finished glass in definite channels. Herbert S. Willson

**A rapid method of analysis of soda-calcium glasses and its application to potash glasses.** A. Noël. *Verre et silic.* 5, 86-7 (1934). Herbert S. Willson

**Stony glass.** Ludwig Springer. *Glashütte* 63, 742 (1934). --Stony glass can be classified into: (1) batch or melt stones (to these belong also sulfate stones); (2)

grog or Dinas crown stones; (3) devitrification stones. The reason for the appearance of the first group of stones is due to (a) the batch being too hard; (b) coarse-grained material, especially sand; (c) bad mixing; (d) low melting temp. Sulfate stones are due to undissolved Glauber salt. The 2nd group is due to irregularly melted or broken pots and brick material or drops from the crown. The 3rd group comes from seeps in the glass when the batch is wrongly adjusted, the melting is badly conducted, or the temp. of working is too low; they may be formed also because of keeping the finished melted glass at a low temp. for a long time. Batch stones are mostly colorless, are surrounded by blisters, and show devitrification at their edges. Sulfate stones are dull, of elliptic form, and have a net-shaped structure. Grog stones are mostly yellow to brown, are nontransparent, show rare crystal formations, and have cracks. Devitrification stones are dull, white, and have a radial felt structure. M. V. Kondoidy

**Safety glass.** F. Franceschini. *Ind. silicati* 11, 7-14 (1933). --Several types of safety glasses were examd., and the results of the expts. on the resistance to light, heat, water, etc., are given. The hardened glasses recently proposed as safety glasses did not give the expected results. G. A. Brayo

**Some factors affecting furnace practice.** R. J. Sarjant. *Trans. Ceram. Soc.* 32, 113-40 (1933). --The phys., mechanical and chem. properties of the special Ni-Cr heat-resisting steels and the application of these materials in kiln construction are described in detail. Extensive data are given for the loss of heat from, and the storage of heat in, simple and composite refractory walls. B. C. A.

One-fire sanitary ware. J. B. Nealey. *Ceram. Age* 1 23, 73-5(1934).  
Herbert S. Willson

Light castings for enameling (McNair) 9. Action of Na amide on silicates and refractories (Peterson, Bergstrom) 7. Refractory materials for the Fe and steel industries (Searle) 9. Siemens-Martin furnace of refractory materials (Ger. pat. 590,242) 9.

Glass. James A. Jobling & Co. Ltd. and Ernest Joseph Jobling-Purser. Brit. 401,710, Nov. 20, 1933. Variegated glassware is made by adding glass of 1 or more colors, e. g., as short tubes or rods, powder, granules or molten, to a mass of molten glass contained in a suitable receptacle. The addnl. colored glass is preferably introduced into the forehearth of an automatic feeder. The mass of glass may also be contained in a rotating pot from which charges are gathered by suction into the molds of a forming-machine.

Apparatus for delivering measured quantities of molten glass. Oliver M. Tucker, Wm. A. Reeves and James M. Beatty. Ger. 592,457, Feb. 8, 1934 (Cl. 32a. 5). This corresponds to Brit. 258,228 (C. A. 21, 3114).

Method of and apparatus for circulating molten glass through a trough from which charges are gathered by suction-gathering, or are delivered by a feeder. Alexander F. McNish. Brit. 402,366, Nov. 30, 1933.

Mold for glass vessels. Soc. anon. d'études et de constructions d'appareils mécaniques pour la verrerie. Fr. 757,536, Dec. 28, 1933.

Glass-blowing apparatus suitable for use in making lamp bulbs, etc. Harold R. Schutz (to Libbey Glass Mfg. Co.). U. S. 1,949,435, March 6, 1933. Mech. features.

Glass-working apparatus suitable for manufacture of bottles. Benjamin T. Headley and Parke H. Thompson (to Hartford-Empire Co.). U. S. 1,948,218-19, Feb. 20, 1933. Mech. features.

Glass-blowing apparatus suitable for use in the manufacture of bottles, jars, etc. James W. Lyuch and Edward G. Bridges (to Lynch Corp.). U. S. 1,948,928, Feb. 27, 1933. Mech. features.

Machine for producing short sections of flared glass tubing, particularly the "flares" used for constructing electric lamp bulbs. Alfred Hofmann and Victor Anderson (to Alfred Hofmann & Co.). Brit. 402,306, Nov. 30, 1933.

Apparatus for manufacture of hollow glassware such as bottles. Adolf Schiller. U. S. 1,948,682, Feb. 27, 1933. Mech. features.

Glass furnace. Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 1,949,380, Feb. 27, 1933.

Sliding plug for glass-melting furnace. Schlesische Spiegelglas-Manufactur Carl Tielsch G. m. b. H. Ger. 592,315, Feb. 5, 1934 (Cl. 32a. 5).

Furnace for hardening glass plates, "Mühlig-Union" Glasindustrie A.-G. Ger. 591,967, Jan. 30, 1934 (Cl. 32a. 30).

Hardening glass. Rudolf Seiden. Austrian 136,536, Feb. 10, 1934 (Cl. 32b). Sheet glass is hardened by heating different parts of the sheet simultaneously to different temps. Methods of procedure are indicated.

Mirrors. Peter Schlumbohm. Brit. 401,530, Nov. 16, 1933. The glass used in a mirror contains coloring matter giving the image of the user's face in artificial light an appearance simulating that given by an ordinary mirror in daylight. For use with gas-filled elec. lamps the glass is colored with equal proportions of Cu and Co oxides, a suitable compn. being  $\text{SiO}_2$  74,  $\text{CaO}$  11,  $\text{K}_2\text{O}$  4 and  $\text{Na}_2\text{O}$  11%, with a max. addn. of  $\text{CuO}$  0.025 and  $\text{CoO}$  0.025% for glass of 8 mm. thickness. Cf. C. A. 27, 5920.

Red-colored coating or patterns on glass. Norbert Kreidl. U. S. 1,947,781, Feb. 20, 1933. Compns. contg. Cu compds. which are reducible by sulfide glasses are applied to and burned upon the latter.

Apparatus for sheet glass manufacture. Carroll Cone (to Libbey-Owens-Ford Glass Co.). U. S. 1,948,563, Feb. 27, 1933. Mech. features.

Apparatus for drawing glass tubing or the like. Jean Cardot (to Corning Glass Works). U. S. 1,949,037, Feb. 27, 1933. Structural and mech. features.

Apparatus for drawing sheets of glass. N. V. Hollandische Maatschappij Voor de Vervaardiging van Glas. Fr. 757,403, Dec. 26, 1933.

Composite sheets of glass. Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey. Fr. 757,502, Dec. 28, 1933. Composite glass is made by heat-welding 2 or more sheets of glass having different coeffs. of expansion, the sheets being heated separately or side by side to temps. such that their viscosity is between  $10^8$  and  $10^{10}$  C. G. S. units.

Apparatus for making laminated sheets of glass. Schlesische Spiegelglas-Manufactur Carl Tielsch G. m. b. H. Fr. 757,404, Dec. 26, 1933.

Laminated glass. John L. Drake (to Libbey-Owens-Ford Glass Co.). U. S. 1,948,506, Feb. 27, 1933. Mech. features.

Machine for extruding clay, etc. Charles Edward Morris. Brit. 402,014, Nov. 23, 1933. Addn. to 383,399 (C. A. 27, 5921).

Machinery for molding hollow bricks, closed at one end. Avon A.-G., Gesellschaft zur Verwertung von Ziegelpatenten. Brit. 401,995, Nov. 23, 1933.

Gray burned brick resembling granite. Ralph L. Atkinson (to Arthur D. Little, Inc.). U. S. 1,949,524, March 6, 1933. A normally buff burning clay is mixed with a small amt. of a finely divided Co compd. such as the oxide which will produce a Co silicate, and coarse granules of Mn ore are also incorporated with the material.

Kiln for ceramic ware. Fours électriques Borel Soc. anon. Swiss 162,939, Sept. 16, 1933 (Cl. 8c).

Ceramic electrical insulator and like products. Isador Kitsee (to Mineralite Corp.). U. S. 1,949,311, Feb. 27, 1933. A minor proportion of mineral wool is mixed with a major proportion of clay, and the mixt. is molded and baked at a temp. sufficiently high to fuse the mineral wool and produce a hard, dense, homogeneous product.

Ceramic "acoustical" material suitable for sound- or heat-insulation. Richard Ericson, James S. Offutt and Joseph R. Parsons (to U. S. Gypsum Co.). U. S. 1,948,878, Feb. 27, 1933. A deflocculated clay slip is treated with tenacious foam and an agent such as alum capable of reflocculating the slip after a definite lapse of time; ligneous fibers are incorporated in the mixt. and it is molded, allowed to set up in the mold, dried and then fired to harden it and burn out the added fibers and produce passages connecting the voids left by the foam.

Refractory bricks, etc. Feldmühle, Papier- und Zellstoffwerke A.-G., Friedrich Klein and Karl Rehtel. Ger. 589,500, Dec. 8, 1933 (Cl. 80b. 18.02). Addn. to 588,805 (C. A. 28, 1934<sup>9</sup>). In making fireproof bricks, etc., by the method of 588,805, the fused oxides are given an addn. of gas or vapor-forming substances shortly before cooling.

Refractory blocks, bricks, etc., for the construction of glass-melting and other furnaces. E. J. & J. Pearson Ltd. and Charles W. Thomas. Brit. 401,816, Nov. 23, 1933.

Compound refractory blocks, etc. Corning Glass Works. Brit. 402,160, Nov. 30, 1933. Blocks for glass-melting tanks, etc., are cast by pouring molten refractory material, consisting mainly of  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$ , e. g., Al silicate, in contact with a backing member of different refractory material, e. g., unburnt slag.

Refractory articles such as bricks, etc. Trevor M. Caven (to Corning Glass Works). U. S. 1,949,038, Feb. 27, 1933. Refractory Al oxide grains are used together with a binder of refractory Al phosphate.

Refractory bodies. Arthur Sprenger. Ger. 590,357, Dec. 30, 1933 (Cl. 80b. 8.09). Addn. to 565,899 (C. A. 27, 2554). Fireproof bodies are made by using small amts. of finely divided Cr ores as binding agent for granular masses of  $\text{MgO}$ ,  $\text{Al}_2\text{O}_3$ , and small amts. of  $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{Fe}_2\text{O}_3$ , etc. Cf. C. A. 28, 1832<sup>9</sup>.

Abrasive. Soc. pour l'ind. chim. à Bâle. Swiss 163,625, Nov. 1, 1933 (Cl. 85b). Granular abrasive material is

mixed with an amine resin and molded to a solid body by hot-pressing. Thus,  $\text{PhNH}_2\text{HCl}$  is treated with  $\text{CH}_3\text{O}$  and the product mixed with corundum and hot-pressed.

**Enamels.** Philipp Ever. Fr. 757,363, Dec. 26, 1933. White enamels and other pre-opacified glazes are made by adding to the mixts. in fusion an opacifying agent having a basis of  $\text{ZrO}_2$  and glass. The  $\text{ZrO}_2$  is freed from Fe. The glass may be made by fusing sand 100,  $\text{CaO}$  10,  $\text{K}_2\text{CO}_3$  10, soda 21 and saltpeter 1 part.

**Vitreous enamels.** Charles J. Kinzie and Charles H. Commons, Jr. (to Titanium Mfg. Co.). U. S. 1,949,479, March 6. An opaque frit for vitreous enamels resistant to acids is formed by fusion of a raw batch comprising Na Zr silicate 7.08, quartz 40.58, borax 14.94,  $\text{Na}_2\text{CO}_3$  19.65,

$\text{NaNO}_3$  3.5,  $\text{TiO}_2$  13.86,  $\text{PbO}$  3.04, Sh oxide 6.98 and fluorspar 5.94 parts.

**Opaque enamels for ironware, etc.** Ignaz Kreidl. U. S. 1,948,461, Feb. 20. While grinding an enamel frit in the presence of water, there is added to it, in lieu of previously known white insol. oxide clouding media, substances such as methylene blue or an inorg. nitrate which themselves do not serve as clouding agents but which evolve gases on burning of the enamel which remain in the latter together with a gas-adsorbing clay the quantity of which used serves to control the size and number of gas bubbles evolved on firing. Cf. C. A. 28, 1498<sup>1,2</sup>.

**Enameled sheet iron.** Ignaz Kreidl. Brit. 401,650, Nov. 13, 1933. See Austrian 136,003 (C. A. 28, 2491<sup>2</sup>)

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**A modern cement mill in Czechoslovakia.** W. Zollikofer. *Rev. matériaux construction trav. publics* 1934, 40 3.—A description.

Karl Kammermeyer

**Simple apparatus for testing cement characteristics.** S. C. Pierce and H. McC. Larmour. *Eng. News-Record* 112, 114 16(1934).—Methods of detg. vol. change and a simple, inexpensive app. for detg. heat of hydration by the heat-of-soln. method are described. Results are given showing the variations in these properties between com. cements that are similar in chem. characteristics, indicating that mfg. details have as much bearing as compn on the ultimate results.

R. E. Thompson

**Temperature and humidity control in cement testing.** M. Houghn. *Eng. News-Record* 112, 17-18(1934).—A brief description of a const.-temp. and humidity-storage cabinet constructed in the phys. testing lab. at Columbus, by means of which the humidity can be maintained between 90 and 100% and the temp. within 1° of 70°F.

R. E. Thompson

**The influence of alkalinity and acidity in the setting of limes and cements.** Maurice Dérivé. *Rev. matériaux construction trav. publics* 1934, 33 5.—Expts. are reported of mixing water varying in  $p_{\text{H}}$  from 2 to 12. Cements show a distinct max. of strength at a  $p_{\text{H}}$  of about 6.5, while the phenomena are less distinct with the lime, showing max. strength from a  $p_{\text{H}}$  of 4.7-8. D. concludes that 2 distinct zones exist: (1) A  $p_{\text{H}}$  of 1 to about 5.5, where the formation of salts of  $\text{CaO}$  with the acid components cause a decrease of the  $p_{\text{H}}$ . When set takes place, the phenomenon is accelerated by the decrease of the ratio:  $(\text{CaO salts})/\text{CaCO}_3$ . (2) Above a  $p_{\text{H}}$  of 5.5, various carbonates are formed and on setting a delay is caused by the increase of the ratio:  $(\text{carbonates})/\text{CaCO}_3$ . Exptl. results are presented together with a crit. discussion of the work of other investigators. Six references.

Karl Kammermeyer

**Destruction of cement by magnesium salts.** J. Lopez Cayetano. *Afinidad* 13, 594-5, 609-12(1933); *Química e industria* 31, 106-7.—Briquets were made from 1 part of ordinary portland cement or of pozzuolana cement and 3 parts of sand. After complete hardening they were immersed for 28-180 days in fresh water or in sea water, and finally in 10% and 30%  $\text{MgSO}_4$  solns. Others were exposed to the air for 30 days and then immersed in the  $\text{MgSO}_4$  solns. Conclusions: Attack of the briquets increases with the  $\text{MgSO}_4$  concn; attack proceeds from the surface toward the center; pozzuolana cement is much more resistant than portland; briquets exposed to the air before immersion in  $\text{MgSO}_4$  soln. were decomposed much more slowly than those which had been immersed in either fresh or sea water.

A. Papineau-Couture

**The manufacture of portland cement by the dry process.** Salvador Mdsqueira R. *Ingeniera* 8, 15 25(1934).—Plant operations are described.

R. M. Symmes

**The nature of portland cement clinker.** H. G. Fisk. *J. Chem. Education* 11, 195-203(1934).

B. H.

**The activation of blast-furnace slags and the preparation of clinkerless cement.** P. P. Budnikov. *Compt.*

*rend. acad. sci. U. R. S. S. [N. S.]*, 1, 255 9(in English 259 63)(1934).— $\text{CaSO}_4$  as dihydrate, hemihydrate or anhydrite, dolomite dust, and mixts. of these two to the extent of 8-10% were added during the grinding process to blast furnace slags contg. not less than 46%  $\text{CaO}$ , 9%  $\text{Al}_2\text{O}_3$ , 3%  $\text{MnO}$  and not more than 2% Fe to give high-grade cements. Addn. of  $\text{CaS}$  or  $\text{CaCO}_3$  increased the mechanical strength, but oxidation again decreased it.

F. J. Rathmann

**Cementing oil wells.** S. B. Kocharov. *Nefte* 2, No. 18, 14 17(1931).—A general discussion on cementing oil wells including the standards for a good cement, temp. conditions, pressure of the column of water, influence of bore-hole waters, mud and crude oil admixts., and the action of accelerators.

A. A. Boettingk

**Activation of pozzuolana materials by heat.** Corrado Vittori. *Industria chimica* 9, 21-7(1934).—Pozzuolana cements made by addn. of pozzuolana from 5 sources to portland cement were heated to temps. ranging from 300° to 900° and the time of set and strength of a test piece from each measured. Each pozzuolana mix had an optimum temp. of treatment which gave the best results, but the pozzuolana giving the best results of all was one whose optimum temp. was 300°. This appears logical, for at lower temps. there is less clinkering, and thus greater surface, which would favor more rapid setting.

A. W. Conner

**Presence of silt and clay in sands used in cement mortars.** D. G. R. Bonnell. *J. Soc. Chem. Ind.* 53, 54 7T(1934).—The disadvantages of the A. S. F. M. method of detg. silt and clay in sands are: (1) clay present as adsorbed film is not completely removed, and (2) the method is tedious and requires considerable time. The proposed method uses dil.  $\text{Na}_2\text{C}_2\text{O}_4$  soln. to peptize the clay. The suspension is sampled and analyzed. A pipet is mechanically mounted so that it can be accurately lowered exactly 10 cm. in the liquid and the sample secured. By varying the time of sedimentation the concn of particles of various size can be detd. The effect of clay on the tensile strength of mortars was studied; with few exceptions clean sand increases the strength of mortars.

C. B. Jenn

**Concrete and industrial gases.** F. W. Friese. *Concrete Constr. Eng.* 28, 299-303(1933).—Corrosion of concrete by  $\text{H}_2\text{S}$  is caused by reaction with the free  $\text{Ca(OH)}_2$  in the cement. Oxidation products of  $\text{H}_2\text{S}$  also react with the concrete and with the reinforcements. Losses in strength up to 40-50% have been observed.  $\text{SO}_2$  reacts with the Fe compds. in the cement. Pure  $\text{CS}_2$  is harmless, but when  $\text{COS}$  is present, corrosion occurs. In the presence of moisture  $\text{COCl}_2$  causes disintegration. Examples are given and the mechanism of reactions is discussed. Dense concrete well cured before coming in contact with gases is recommended, to avoid corrosion, but certain protective coatings, details of which are given, may be used.

B. C. A.

**Test on methods of pouring under-water concrete.** Ambrose G. Hampton. *Eng. News-Record* 112, 17

(1934).—Brief data are given regarding exptl.-scale tests on the pouring of under-water concrete. R. E. T.

**Determining silt content in concrete aggregates.** D. T. M. Davis. *Eng. News-Record* 112, 53 (1934).—A rapid, simple and accurate pycnometer method is described for detg. sp. gr., moisture and silt content of aggregates.

R. E. Thompson  
**Standard specifications for brick pavements.** Roy L. Phillips. *Proc. Am. Soc. Munic. Engrs.* 39, 268 75 (1933).—New specifications are given for mastic cushion and for asphalt filler.

W. H. Boynton  
**Specifications for bituminous pavements.** H. F. Clemmer. *Proc. Am. Soc. Munic. Engrs.* 39, 276 (1933).

W. H. Boynton  
**The setting of plaster of Paris.** R. Stratta. *Industria chimica* 9, 28-34 (1934).—Measurements of the time of set of samples of plaster of Paris, together with the inspection of spectrographs of these samples while setting, indicate that there are 2 phases present in set plaster of Paris. These forms are: the semihydrate,  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ; and an insol. anhydrite, whose structure is identical with that of natural anhydrite, but which has a more rapid time of set than the natural product. The semihydrate forms on heating below  $160^\circ$ ; the second, when heating at  $160$ – $400^\circ$ ; heating above  $400^\circ$  produces a product identical with the natural product. A. W. C.

**Roofing-felt raw materials and quality control.** A. O. Bragg. *Paper Ind.* 15, 699 703 (1934).

A. P.-C  
**The chemical resistance of some important native [German] woods.** Edgar Morath. *Wochbl. Papierfabr.* 64, 742-5 (1933).—Spruce, pine and larch lose less than 10%, linden, oak and beech less than 30% of their (wet) bending strength when treated with acid or alkali in the pH range 3-11. They should be more widely used for construction involving chem. exposure. R. H. D.

**Effecting endothermic reactions [manuf. of cement]** (Ger. pat. 577,103) 13.

**Modern Road Emulsions.** London: The Carriers Pub. Co. Ltd.

**Acoustic plaster.** Charles A. Longley and Rhenolite Products Ltd. Brit. 401,360, Nov. 13, 1933. Fine granular pumice is mixed with  $\text{Ca}(\text{OH})_2$  and Na silicate and allowed to dry and the product used as a base for acoustic plaster by admixt. with ordinary plaster or cement or pumice plaster produced according to Brit. 401,361 (following abstr.).

**Plasters, etc.** Charles A. Longley and Rhenolite Products Ltd. Brit. 401,361, Nov. 13, 1933. A cementitious compn. is produced by admixt. of finely ground pumice and quick lime. Trachytic pumice is preferably used. 1-5% of natural rock asphalt is also preferably added to prevent formation of blow holes when using as a plaster. Calcined gypsum or anhydrite is added when the material is used as plaster for inside work and ordinary cement for outside work. For making slabs, boards or blocks a fibrous binder, e. g., asbestos, is added.

**Preserving wood.** Harold W. Walker (to Pennsylvania Lubricating Co.). U. S. 1,948,551, Feb. 27. Wood is impregnated with an oil such as creosote or fuel oil to which diphenylamine and  $\text{AsCl}_3$  have been added. Naphthalene also may be used.

**Preserving wood.** Carl Schmittutz. Brit. 402,023, Nov. 23, 1933. The process of Brit. 381,030 (C. A. 27, 5510) is applied to growing trees.

**Cements.** Foster D. Snell. Brit. 401,522, Nov. 16, 1933. A  $\text{H}_2\text{O}$ - and acid-proof cement, which forms a hard-setting plastic material with  $\text{H}_2\text{O}$ , comprises a drv. mixt. of ground aggregate, e. g., stoneware or other grog, powd. Na silicate and a fluosilicate, e. g.,  $\text{Na}_2\text{SiF}_6$ , in such proportion that it will react with all the  $\text{Na}_2\text{O}$  of the Na silicate and preferably leaves some fluosilicate in excess. In a modification a portion of the fluosilicate is replaced by a  $\text{H}_2\text{O}$ -sol. acid fluoride, e. g.,  $\text{KHF}_2$ . The material is

1 suitable as acid-proof lining, for binding abrasive wheels and for floors.

**Cement.** Constantin J. Choremi. Swiss 165,438, Feb. 1, 1934 (Cl. 8b). A hydraulic cement is made by mixing  $\text{CaO}$  with a substance contg. Si and Al compds., the amt. of  $\text{CaO}$  being 4-18% of the wt. of the Si and Al compds. "Santorine" earth may be used as the substance contg. Si and Al.

**Cements.** Paul Fisch. Fr. 757,484, Dec. 27, 1933.  
2 Graphite (0.5-5%) is added to hydraulic and refractory cements to render them waterproof, resistant to chem. agents and to wear by friction.

**Cement compositions.** Hans Opalsky. Austrian 136,398, Jan. 25, 1934 (Cl. 80c). Cement compns. are improved in their mech. properties and resistance to water by addn. of up to 2.5% of a protein and up to 12% of an alk. earth oxide or hydroxide, calcd. on the dry cement.  
3 These substances may be added before or during the addn. of water.

**Portland cement.** Willoughby E. Snyder. U. S. 1,948,433, Feb. 20. Raw material having a lime base such as  $\text{CaCO}_3$  is subjected to a temp. which will form  $\text{CaO}$  but insufficient to produce hydraulic properties, and the heat-treated material is then subjected to hydration, while in the unground condition resulting from the heat treatment and is thus reduced to finely divided condition for use in a cement-forming mixt.

**Rotary feed drum and kiln for cement manufacture.** Arno Andreas. U. S. 1,948,742 Feb. 27. Various structural and operative details are described.

**Rotary kiln and burner for use in portland cement manufacture.** Richard D. Cheesman (to Traylor Engineering & Mfg. Co.). U. S. 1,949,560, March 6.

**Concrete.** Ernest H. Coleman. Brit. 401,685, Nov. 17, 1933. A light aggregate for concrete is made by breaking gneiss, schist, slate, shale, etc., to a required particle size, e. g., 0.25-0.5 in., and heating, e. g., in a rotary kiln, to about  $1100^\circ$  until softening and expansion under the action of contained gas or moisture occurs.

**Apparatus (including an electric motor provided with an unbalancing weight) for subjecting concrete to vibration during placement.** Corwill Jackson. U. S. 1,947,941, Feb. 20. Mech. features.

**Bituminous emulsion.** Lester Kirschbraun (to Patent and Licensing Corp.). U. S. 1,948,881, Feb. 27. For producing a product suitable for road work, etc., an emulsion of a bitumen such as asphalt with water and clay is mixed with another emulsion of a bitumen of substantially the same m. p., water and soap, to produce a combined emulsion system having a consistency thinner than either of the original emulsions and a bitumen content higher than either of the original emulsions at the same consistency.

**Bitumen dispersion.** Hermann Planson. Swiss 164,100, Dec. 1, 1933 (Cl. 6c). An aq. dispersion of bituminous material for road surfacing contains a deriv. of cholesterol as the stabilizing dispersion agent, an org. solvent and an alkali. Thus, bitumen is added to a soln. contg.  $\text{KOH}$ ,  $\text{K}_2\text{C}_2\text{O}_4$ ,  $\text{C}_6\text{H}_6$  or toluene, lanolin and bone fat or wool fat. The fats may be chlorinated or sulfonated.

**Protecting metallic bodies such as pipes from corrosion.** Joseph F. Putnam (to Standard Oil Co. of Calif.). U. S. 1,948,007, Feb. 20. A body such as a pipe line is provided with a covering of bituminous mastic such as asphalt and mineral aggregate which is covered with a spirally wound sheathing which may be formed of paper with an overlying spirally wound fibrous covering such as paper and an interposed layer of flexible asphaltic material.

**Building material from ore slime.** "Kolloidchemie" Studiengesellschaft m. b. H., Johannes B. Carppow, Martin March, Robert Lenzmann and Hermann Sanders. Ger. 591,745, Jan. 26, 1934 (Cl. 80b.3.07). Cement, building material, plaster, etc., are prepd. by intimately mixing oxides or salts of heavy, alkali or alk. earth metals with ore slime, drying and, optionally, burning. Thus, slime is mixed with  $\text{Al}_2(\text{SO}_4)_3$  and dried to give a plaster suitable for walls. Several other examples are given.

**Bituminous coating composition suitable for uniting**

layers of laminated building board. George B. Dunford. U. S. 1,948,906, Feb. 27. A coating compn. flowable at atm. temps. contains asphalt with at least as much naphtha and at least half as much talcous-agalite. Asbestos, linseed oil, etc., also may be used.

Sheet material suitable for roofing. Philip W. Codwise (to Certain-Teed Products Corp.). U. S. 1,948,979, Feb. 27. A weather-resisting material comprises a sheet of felt contg. a substantial amount of soda pulp, impregnated with a water-proofing agent such as asphalt.

Waterproof bituminous compositions suitable for roofing tiles or the like. Frank W. Yeager (to Barrett Co.). U. S. 1,949,220, Feb. 27. Bituminous material such as pitch 15-45 is mixed with clay 15-40, sand 15-50, fiber such as asbestos, 17 parts and water to form a plastic mass, which is shaped and dried and then heated to above the m. p. of the bituminous material but below 425°.

"Anti-slip" material suitable for floors. Edward Van der Pyl (to Norton Co.). U. S. 1,949,517, March 8. A veined material in imitation of natural stone or marble is formed by mixing abrasive aggregates and cement in dry form, sepp. the mixt. into plastic masses by regulated addn. of water, coating the masses with coloring material, and then compressing them together before they have hardened.

Floor coverings. Karl Schneble. Swiss 162,932, Sept. 16, 1933 (Cl. 4d). A plastic mass for covering floors comprises cement, cork chips, calcined kieselguhr, filling and coloring materials.

Coating composition suitable for use on floor coverings, etc. Michele Croce (to Sloane-Blabon Corp.). U. S. 1,948,959, Feb. 27. A solidified oxidized and polymerized drying oil is dispersed in an aq. vehicle such as water contg. also rosin, a pigment, emulsifier, etc.

## 21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Motor fuels containing high percentages of alcohol. Sandro Doldi. *Giorn. chim. ind. applicata* 15, 593-8 (1933).—The process of L. Livraghi [Ital. pats. 307,368 and 309,243] has been applied in prepg. motor fuels contg. up to 70% alc., the rest being crude benzene. It is prepd. by heating the mixt to 500° at ordinary pressures. With a mixt contg. 32% MeOH, the distn. showed 97% distd. at 135°, while after treating, 90% distd. over at 83°. The loss is less than 3%. The calorific value is higher than that of the sum of the components, i. e., with a 40% MeOH mix, the values are 7720 and 8008 cal./g., resp. The S content remains low even when high in the original mix. The sp. gr. is very slightly lowered, while the viscosity is somewhat raised. Tests indicate that on a vol. basis, gasoline, benzene and the fuel give about the same power. This is probably due to these factors: (a) the exhaust gases from gasoline have a higher sp. heat [about 75% more H<sub>2</sub>O is formed than with the special fuel]; (b) the special fuel has a 50% higher rate of flame propagation, and the temp. of combustion reaches a higher figure; (c) the special fuel has a higher antiknock value.

A. W. Coniari

Heat loss through incomplete combustion of fuel. P. Vukoborov. *Neft* 3, No. 2, 21-3 (1932). A few illustrations are given pertaining to the calcn. of losses through incomplete combustion detected by various amts. of CO in the flue gases.

A. A. Boethlingk

Alloy skeletons as catalysts for benzene synthesis from carbon monoxide and hydrogen. Franz Fischer and Karl Meyer. *Ber.* 67B, 253 61 (1934). Catalysts prepd. by Raney's method (cf. C. A. 21, 2116) of dissolving Al or Si from alloys with Ni and Co are effective in hydrocarbon synthesis from water gas. Fe decreases the activity of a mixed Ni-Co catalyst.

G. B. Taylor

Development of formula to determine carbon dioxide in products of combustion. P. B. Place and J. Cruise. *Combustion* 5, No. 4, 28-9 (1933).—Stoichiometric formula based on the ultimate analysis of the fuel are presented.

Leslie B. Bragg

Progress in production of motor spirit by coal hydrogenation. C. H. S. Tupholme. *Ind. Eng. Chem., News Ed.* 12, 107 (1934).

E. J. C.

The making and interpretation of systematic petrographic analyses of coal-bed profiles. F. Kuhlwein, E. Hoffmann and E. Krupe. *Glückauf* 70, 1-8, 32-41 (1934).—Examples are given showing application of British (Threlfall, et al., C. A. 26, 5727) and American (Fieldner, et al., C. A. 26, 828) methods of petrographic analysis, and of the German method as modified by the authors. British and German methods are based mainly on macroscopic sepn. of coal constituents—vitrain, clarain, durain and fusain—whereas the American method as developed by the U. S. Bur. of Mines involves microscopic analysis of thin sections covering the whole profile. The

latter is most exhaustive and precise, but the macroscopic method is sufficiently accurate for practical purposes. Microscopic examin., where carried out in Germany, usually involves etching of polished specimens and study by reflected light. This is a more rapid method than that of the Americans which requires thin translucent sections. No relation can be traced between rank of coal and the distribution of petrographic constituents. Petrographic analysis enables one to distinguish between coking and noncoking or weakly coking material and serves as a guide in coal prepn.

J. D. Davis

Blending coals for carbonization. G. E. Foxwell and John Roberts. *Gas Eng.* 51, 145, 147 (1934).—Notes are given on the blending of coking and noncoking coals in order to obtain a uniform coke of a suitable texture for use in domestic open grates. Overcoking detracts from the combustible properties of the coke. Sized coals are usually preferred, but encouraging results have been obtained by blending slacks.

P. J. Wilson, Jr.

Significance of solvent extraction and rational analysis in coal carbonization. E. B. Kester, E. J. Schneider and P. W. Jung. *Ind. Eng. Chem., Anal. Ed.* 6, 98-103 (1934).—Twenty coals were studied exhaustively by extn. with C<sub>6</sub>H<sub>6</sub> under pressure, resolution of coal into  $\alpha$ -,  $\beta$ - and  $\gamma$ -constituents (Wheeler method), and analysis of the rational constituents, i. e., bitumens, ulmins and resistant plant residues. Methods and results are reported in detail. An attempt was made to correlate among themselves the quant. relationships so obtained, as well as with the gas-, coke- and by-product-making properties of the coal, and other functions of the coal numerically expressible. All such attempts at correlation proved disappointing; one may interpret little from a knowledge of the quantities of extractable constituents present within the restricted range of coking coals studied. It would be unwise to predict any aspect of the behavior of coal during the coking process or any properties of the coke produced from results so far obtained.

W. C. Ebaugh

Low-temperature carbonization of Lisichanskil coal in an oven with internal heating. G. V. Gritzevich. *Izvestiya Teploekkh. Inst.* 1933, No. 9, 35-45; cf. C. A. 27, 1735. According to expts. reported in detail the Lisichanskil coal may be subjected to low-temp. carbonization in ovens with an internal-heating arrangement provided the process is maintained within very stringent specifications such as the rate of feeding the coal through the oven, proper stoking, etc. The temp. of the air-steam mixt. should be kept at 80-82° and its vapor pressure, should amount to 70-72 mm. at the intake. The yield of liquid products amounts to 6.62% and that of semi-coke 54.82%, the latter contg. 29.90% ash. The gas amounts to 1.308 cu. m. per kg. coal and its calorific value is close to that of water gas. It contains 18.04 g. of H<sub>2</sub>S per m. of gas, and the tar contains 7.13% gasoline which is difficult to refine because of the high S content. Numerical data



on distn., yields and properties of the products are tabulated.

**A. A. Bochtlingk**  
Application of particular washing systems to specific coal-washing problems. E. Blümel. *Glückauf* 70, 29-32 (1934).—In coal-washing practice where coals from 2 or more beds are treated it is customary to treat them all together by one washing system because of the cost of app. for sep. treatment. This is bad practice because different coals require different treatments for the best results. B. shows (washing charts) that where only 1 system must serve to treat several beds the results can be varied and improved by judicious proportioning of the coals before treatment.

**J. D. Davis**  
Fusion characteristics of fractionated coal ashes. A. H. Moody and J. D. Langan, Jr. *Combustion* 5, No. 4, 15-17 (1933).—Low-fusion portions of coal ash may become sepd. in the boiler and exhibit different fusion temps. from the av. coal-ash mixt. Leslie B. Bragg.

**Determination of volatile matters in coals by the furnace method.** César Pablo Fernández. *Quim. e ind.* 10, 310 (1933).—The sample of coal is placed in a covered porcelain crucible and heated 8 min. in a Simon-Müller furnace electrically heated to 1000°. The results can be reduplicated in different labs.

**O. W. Wilcox**  
Velocity of adsorption of oxygen by coal in the presence of occluded gases. V. A. P'yankov and M. L. Loevskil. *Izol* No. 95, 60-9 (1933).—Expts. with various samples of coal from the Don basin contg. occluded  $\text{CH}_4$  at 20°, 30° and 40° show that the ratio of expelled  $\text{CH}_4$  to adsorbed  $\text{O}_2$  is a const. at a given temp. for all dry samples regardless of the time of exposure to air. The ratio decreases as the temp. increases. The ratio is not const. if moisture is present. Adsorption of  $\text{O}_2$  decreases with length of exposure and if moisture is present. Increasing the temp. decreases adsorption in some samples and increases it in others.

**H. W. Rathmann**  
Effects of fusain on the coking properties of coals. M. Mayer and L. E. Zukerman. *Coke and Chem.* (U. S. S. R.) 1933, No. 4, 51-62.—The effects of admixt. of fusain on the coking properties of different coal mixts. were studied. While addn. of 10-20% fusain to expanding coals high in volatile matter improved the quality of coke produced, addn. of more than 5% fusain to coals with good coking properties was harmful.

**James Sorrel**  
Low-temperature distillation of Bayac brown coal. Charrin. *Mat. grasses* 24, 9674-5 (1932).—The coal (20%  $\text{H}_2\text{O}$ ) affords 15% of tar and benzene (30% < 160°). The semicoke is briquetted with 10% of pitch.

**B. C. A.**  
Colloidal solution and hydrogenation of lignite. J. M. Portierra. *Anales soc. españ. fis. quim.* 31, 779-809 (1933).—Reaction between gaseous  $\text{H}_2$  and solid C is at a much higher velocity than in the first Bégins process, because of increase in C surface, due to the colloidal state. Velocity of hydrogenation reactions should exceed those of carbonization of the org. matter, and the most important result is conversion of all colloidal, org. matter dissolved in liquids and gases, without formation of coke or solid residue. To prep. colloidal lignite solns., lignite is treated with anthracene oil or its fractions under reflux at about 300°. Grinding lignite smaller than 200-mesh has little advantage over grinding to 60-mesh. In a  $\text{H}_2$  or  $\text{N}_2$  atm., almost all the lignite dissolves at 375°. Such ready soln. of lignite in anthracene oil is explained by a preliminary hydrogenation, which depolymerizes the combustible solid. Filtration of colloidal solns. seps. a large proportion of inorg. matter. Continuous hydrogenation of 1681 g. of a colloidal soln. contg. 80 g. of org. matter from Gualdo Cataneo lignite at 400-430° for 2 hrs. with  $\text{H}_2$  pressure 200 atm., catalyst  $\text{Mo}$  oxide, converted all the org. matter into products sol. in  $\text{Et}_2\text{O}$  and  $\text{CHCl}_3$ , without residue. The quantity converted into gas was 11.5% of the charge.

**E. M. Symmes**  
Simple method of calculation of the specific volume of superheated steam. Forner. *Arch. Wärmewirt.* 15, 15 (1934).—The product of pressure and vol. is nearly const. for a given total heat regardless of pressure. A diagram based on this fact is given. Also the product is

nearly proportional to the total heat; a diagram of the value of the correction term is given. The accuracy is better than 0.2%.

Ernest W. Thiele

**Pyrolysis of the lower paraffins. V. Conversion of the gaseous paraffins to aromatics in baffled metal tubes and the chemical composition of the products.** Adrian Cambron and Colin H. Bayley. *Can. J. Research* 10, 145-63 (1934); cf. C. A. 28, 1506°.—The thermal conversion of propane to aromatic compds. has been investigated by passing the gas through externally heated alloy steel tubes under conditions of turbulent flow. Recycling expts. carried out under pressure have shown that, when the gas flow is turbulent, high rates of conversion can be obtained at temps. as low as 800-810°. Heat-resistant Cr-Ni alloys of the 18:8 type have been found unsuitable for this purpose because of the catalytic formation of C. Yields of 23.3 lb. of light oil per 1000 cu. ft. of propane put through were obtained at 800° together with 10 lb. of liquids boiling above 200°. The compn. of the liquids obtained in these expts. has been detd. by fractionation and chem. methods. The light oil obtained under the above conditions contains about 64% benzene, 14% toluene, 7.8% styrene and small amts. of cyclopentadiene, xylenes and higher aromatic compds. The liquids boiling above 200° contain about 25% naphthalene and 12.5% anthracene together with smaller amts. of mono- and dimethyl-naphthalenes, acenaphthene and phenanthrene.

**J. W. Shipley**  
Midland Association of Gas Engineers and Managers. Presidential address. R. S. Ramsden. *Gas J.* 205, 689-93 (1934); *Gas World* 100, 243-5, 277.—Some trouble with dirty gas from oxide catch boxes during warm weather is described. The waste liquor from the sulfate plant is discharged at a uniform rate into the Leamington sewers by means of an orifice and recorder.

**P. J. W., Jr.**  
The development of the gas industry in France. A. Baril. *J. usines gas* 57, 577-82 (1933); cf. C. A. 28, 2857.—A lecture.

**B. J. C. van der Hoeven**  
Natural gases of Upper Daghestan (Caucasus). N. Yu. Uspenskaya. *Neft* 3, No. 2, 5 (1932).—A gas found in Akhtui (about 100 km. from the station Bilindzhi of the Transcaucasian R. R.) in a mineral water spring contained mainly  $\text{CH}_4$  in addn. to some  $\text{CO}_2$ ,  $\text{N}_2$  and rare gases. The investigation is being continued.

**A. A. Bochtlingk**  
Study of the pressure drop in small diameter pipe lines. E. Biard. *J. usines gas* 57, 532-41, 560-9, 587-95 (1933). Prevot. *Ibid.* 610-16.—A study of pressure losses in steel and lead piping, fittings, etc. Conclusions: The pressure loss is proportional to pipe length and to the d. of the gas. The division of flow in Poiseuille or Venturi ranges is only valid in straight pipes of const. area; in all other cases these ranges are poorly defined or nonexistent. General equations are given for steel pipe: for Poiseuille flow  $H_1 = 2.12 \nu Q L / D^4$ , for turbulent flow (flow rate above crit. value)  $H_2 = 3.56 Q^{1.8} L / D^{4.8}$ , where  $H$  is pressure drop in mm.,  $\nu$  density of gas (air = 1),  $Q$  cu. m. gas per hr.,  $L$  length of pipe in m. including equivalents for fittings,  $D$  diam. of the pipe in cm.,  $\nu$  the ratio of viscosity gas:air. For Pb pipe the factor for  $H_2$  is 3.24 instead of 3.56;  $H_1$  is unchanged. These equations are more accurate than those of Monnier. Many curves, exptl. data and nomograms are given.

**B. J. C. van der Hoeven**  
Gas services and their protection from corrosion. K. L. Clark. *Gas J.* 205, 256-9 (1934).—See C. A. 28, 1840°.

**P. J. Wilson, Jr.**  
Industrial gas heating. Peter Lloyd. *Gas J.* 205, 557-60, 622-4 (1934); *Gas World* 100, No. 2589, *Ind. Gas Suppl.* 23-9.—Industrial gas-heating operations are classified. The importance and detn. of thermal efficiency are discussed and illustrated with examples. Special emphasis is laid on heat losses and equations for their calcn. are given.

**P. J. Wilson, Jr.**  
Desulfurization of industrial gases with recovery of elementary sulfur. I. M. V. Hoftman and S. G. Aronov. *Coke and Chem.* (U. S. S. R.) 1933, No. 1, 41-50.—The iron-soda process for elementary-S recovery from coke-oven gas developed by Kharkov Coal-Chem. Inst. is described. The chemistry of the process is as

follows: absorbing liquid (a 0.5-1% soda soln. + 0.2-0.5%  $\text{Fe}(\text{OH})_3$  in suspension) is circulated counter-current with gas contg.  $\text{H}_2\text{S}$  in an absorption app. The reactions are:  $\text{H}_2\text{S} + \text{Na}_2\text{CO}_3 = \text{NaHS} + \text{NaHCO}_3$ ;  $3\text{NaHS} + 2\text{Fe}(\text{OH})_3 = 2\text{FeS} + \text{S} + 3\text{NaOH} + 3\text{H}_2\text{O}$ . To regenerate the absorbing liquid air is blown through the soln. The reactions are:  $4\text{FeS} + 3\text{O}_2 + 6\text{H}_2\text{O} = 4\text{Fe}(\text{OH})_3 + 4\text{S}$ ;  $2\text{NaHCO}_3 = \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$ ;  $\text{NaHS} + \text{NaHCO}_3 = \text{H}_2\text{S} + \text{Na}_2\text{CO}_3$ . Some other secondary reactions also take place forming  $\text{Na}_2\text{S}_2\text{O}_3$ ,  $\text{NaCNS}$ , etc., which result in some loss of the absorbing liquid. A semi-plant was constructed and operated to study the technology of the process. This exptl. plant consisted of a scrubber, a vertical and a horizontal regenerator, 3 pumps, compressor and a centrifuge. It was found possible to remove practically all  $\text{H}_2\text{S}$  from the gas. The yield of elementary S was 70-75% of the total S absorbed. From 20 to 30% of S remained in combination with non-regenerable parts of absorbing liquid. The elementary S contained 40-50% moisture and 20% entrapped  $\text{Fe}(\text{OH})_3$ . II. Iron-ammoniacal method. M. V. Hofman, S. G. Aronov, S. E. Senichenko and M. B. Khvat. *Ibid.* No. 2, 47-53.—A similar study was made with the iron-ammoniacal method. The chemistry of this method consisted in: scrubbing the coke-oven gas with a weak soln. of  $\text{NH}_4\text{OH}$  with  $\text{Fe}(\text{OH})_3$  in suspension. The reactions are:  $\text{NH}_3 + \text{H}_2\text{S} = \text{NH}_4\text{HS}$ ;  $2\text{NH}_3 + \text{H}_2\text{S} = (\text{NH}_4)_2\text{S}$ ;  $3\text{NH}_4\text{HS} + 2\text{Fe}(\text{OH})_3 = 2\text{FeS} + \text{S} + 3\text{NH}_4\text{OH} + 3\text{H}_2\text{O}$ ;  $3(\text{NH}_4)_2\text{S} + 2\text{Fe}(\text{OH})_3 = 2\text{FeS} + \text{S} + 6\text{NH}_4\text{OH}$ . The absorbing liquid was then regenerated:  $4\text{FeS} + 3\text{O}_2 + 6\text{H}_2\text{O} = 4\text{Fe}(\text{OH})_3 + 4\text{S}$ ;  $\text{NH}_4\text{OH} = \text{H}_2\text{O} + \text{NH}_3\uparrow$ ;  $\text{NH}_4\text{HS} = \text{H}_2\text{S} + \text{NH}_3\uparrow$ ;  $3\text{H}_2\text{S} + 2\text{Fe}(\text{OH})_3 = 2\text{FeS} + \text{S} + 6\text{H}_2\text{O}$ . The yields of elementary S were 80% of the total S absorbed contg. 40-45% moisture and 20-25%  $\text{Fe}(\text{OH})_3$ . J. S.

**Production of gas rich in hydrogen for municipal supply and (chemical) synthesis.** Otto Hubmann. *Metallurg. Periodic Rev.* No. 8, 9-15 (1934).—A gas rich in H, poor in N and  $\text{CO}_2$  can be made by a new method from low-grade bituminous coals and lignite under pressure of O. A gas made from lignite contg. 18%  $\text{H}_2\text{O}$ , with O under moderate pressure, contained 50%  $\text{H}_2$ , 16%  $\text{CO}$ , 28%  $\text{CO}_2$ , 3%  $\text{CH}_4$ , and the remainder  $\text{N}_2$ , etc. After the 28%  $\text{CO}_2$  had been washed out a gas contg. 72%  $\text{H}_2$  was left from which H was sepd. by refrigeration. The crude gas made with 1, 10 and 20 atm. pressure contained, resp.,  $\text{CO}$  49, 25.8, 20.2;  $\text{H}_2$  37.0, 30.4, 25.8;  $\text{CO}_2$  11.3, 27.5, 31.8;  $\text{CH}_4$  2.7, 16.3, 22.2%. By modifying the working conditions a gas suitable for municipal supply was produced under a pressure of 20 atm. pressure with O and water vapor in suitable proportions; it contained, after  $\text{CO}_2$  and  $\text{H}_2\text{S}$  were washed out,  $\text{CO}$  2,  $\text{C}_2\text{H}_2$  0.4,  $\text{CO}$  18.4,  $\text{CH}_4$  20.2,  $\text{H}_2$  56.2,  $\text{N}_2$  3%, and had a max. heating value of 4300 cal. Fine and high-ash fuels with very high gasification capacities can be used in this process. M. Hartenbeim

**Oxygen determination in illuminating gas by combustion over platinum.** J. G. de Voogd and S. F. Bohlken. *Helv. Gas* 54, 43-6 (1934).—The error in detn. of  $\text{O}_2$  by P or pyrogallic acid is 0.2% in a total of 0.3% by vol. The Ambler method (C. A. 25, 262) was studied; its accuracy is 0.01%. It was somewhat simplified. In an Orsat app. with a buret especially accurate at low percentages, with  $\text{Na}_2\text{SO}_4$  soln. contg. some free  $\text{H}_2\text{SO}_4$  as confining liquid, the gas sample is freed of  $\text{CO}_2$  and illuminants by alkali and oleum, resp., as usual ( $\text{SO}_2$  vapors are removed by alkali); it is then passed back and forth through a thick quartz capillary contg. a 10 cm. Pt wire, twice folded, in and out of a second alkali pipet until the vol. contraction (3 times the  $\text{O}_2$  content) is const. The "combustion" of  $\text{O}_2$  to  $\text{H}_2\text{O}$  takes place rapidly (max. of 3 passes) at 450-580°;  $\text{CH}_4$  does not interfere; the contraction is 90% of the final after the first pass. The Pt wire is essential; care should be taken to protect it against alkali fog; the temp. of the capillary is checked by a thermometer inside a little asbestos heating box with the flame. Before use the Pt is cleaned with dil. HCl and water, ignited in an oxidizing flame, not activated. Il-

luminants if present will increase the contraction somewhat. The accuracy is 0.03%  $\text{O}_2$ . The method is especially applicable to detn. of the effect of  $\text{O}_2$  addn. in purification boxes. B. J. C. van der Hoeven

**The cold-warm tube principle applied to the dry purification and desulfurization of coal gas.** A. Pott, H. Broche and H. Thomas. *Gluckauf* 69, 1153-9 (1933).—The chief disadvantages of the dry purification method are the room required and cost of installation. The conversion of  $\text{Fe}_2\text{O}_3$  to  $\text{FeS}$  in removing  $\text{H}_2\text{S}$  from the gas is very rapid whereas the regeneration of  $\text{Fe}_2\text{O}_3$  (*in situ*) is relatively slow. Therefore the purifier space required is detd. by the speed of the latter reaction. Ninety % removal of  $\text{H}_2\text{S}$  ordinarily takes place in the first purifier box and takes place most efficiently at room temp. Regeneration, however, proceeds much more rapidly if the temp. is raised. By heating the discharge gas from the first box to 40-50° and humidifying the authors were able to increase the capacity of a given system approx. three fold. J. D. Davis

**Generation of carbureted water gas in the upper part of coke ovens.** Schumacher. *Gas u. Wasserfach* 77, 65 70 (1934).—Slight modifications in oven design or in existing ovens make it possible to gasify tar directly in the upper part of a coke oven or retort with an increase in heating value of the gas and an increased gas yield up to 15%. Diagrams are given of the application of this process to various types of ovens and retorts. R. W. Ryan

**Gas dehydration.** H. Brückner and W. Ludewig. *Gas u. Wasserfach* 77, 132-7 (1934).—A review of the economic advantages of gas dehydration for German conditions and a very complete and crit. summary of existing or proposed processes for gas dehydration. Fifty-five references. R. W. Ryan

**The combustion characteristics of city gases freed from carbon monoxide by the Müller (biological) process.** W. J. Muller and K. Graf. *Gas u. Wasserfach* 77, 122 4 (1934). The av. percentage compn. of the city gas and that of the gas treated by the biol. process (in parentheses) were:  $\text{CO}$  3.2 (2.4); illuminants 2.1 (2.3);  $\text{O}$  0.7 (0.6);  $\text{CO}_2$  15.8 (2.4);  $\text{H}_2$  44.1 (56.5);  $\text{CH}_4$  18.9 (19.7);  $\text{N}_2$  15.2 (16.1%). The heating values were 420 (424) B. t. u. and the sp. grs. 0.55 (0.42). The vol. of treated gas was about 1% less than that of the city gas, so that the products of the gas quantity and heating value were equal within exptl. error. Combustion expts. showed that the treated gas could be used in existing appliances without readjustment. \*The Ott not of this gas was larger, the min. pressure at which the flame was extinguished was smaller, the unburned combustible gas in the flue gas was less, the cooking time was shorter for the same gas pressure, and the distribution system could be utilized to better advantage. R. W. Ryan

**The combustion characteristics of gases with low carbon monoxide content.** Dietrich Witt. *Gas u. Wasserfach* 77, 97 102; *Gas J.* 295, 921 (1934).—Manufd. gases for use in Germany should have heating values in the range of 419-450 B. t. u. per cu. ft., and not below 419 B. t. u. or mains may be overloaded, although the heating value may rise 10-20% above 450 B. t. u. The sp. gr. should be between 0.54 and 0.40. The ignition velocity should be between 50 and 60-70 cm. per sec. The Ott not should not be below 55 or striking back may occur. Addn. of blue gas to coal gas increases sp. gr. and max. ignition velocity; addn. of producer gas or flue products decreases max. ignition velocity. Gases of low  $\text{CO}$  content (below 1%) were prepd. from manufd. gas by catalytic conversion of  $\text{CO}$  to  $\text{CO}_2$  with steam and by methanation of the remaining  $\text{CO}$ . Sufficient  $\text{N}_2$  was added to give a gas of the original sp. gr. and H then added to adjust the ignition velocity. The ignition velocity was found to be too low for a mixed gas having a sp. gr. of 0.4 and a heating value of 440 B. t. u. per cu. ft. By subsequent complete removal of  $\text{CO}_2$  and addn. of  $\text{H}_2$ , a satisfactory ignition velocity was obtained at the expense of the sp. gr. For gases having a sp. gr. of 0.5 and a low  $\text{CO}$  content the ignition velocity was too low and long flames resulted, with danger of incomplete combustion. The sp. gr. of

such gases should not exceed 0.40 to 0.48 for a heating value of 419 to 450 B. t. u. Such a gas is best prepd. by mixing coal gas and blue gas before removing CO. The CO<sub>2</sub> must then be partly removed to adjust the sp. gr. of the resulting gas.

R. W. Ryan

**Gum formers in purified manufactured gas.** K. Bunte. *Gas u. Wasserfach* 77, 81-6(1934); cf. C. A. 27, 3001. The work of Berkhoff (cf. C. A. 26, 1755)<sup>9</sup> Fulweiler (cf. C. A. 26, 5732), Schuffan (cf. C. A. 26, 2849) and others is reviewed. Gum formation in gas is due to the presence of such gas constituents as cyclopentadiene, styrene, indene, cumarone, etc., and the chemistry of these substances is reviewed. These react with NO to form isonitroso compds. Gum formation is accelerated by O<sub>3</sub>, NH<sub>3</sub> or S compds. The removal of NO by dry purifiers is attributed to the formation of nitroprusside compds. (Fe<sub>2</sub>FeCN<sub>5</sub>NO).

R. W. Ryan

**Removal of sulfur compounds from stack gases in Great Britain.** David Brownlie. *Combustion* 5, No. 8, 18-21(1934); cf. C. A. 28, 2883. The water-spraying system at Battersea and milk of lime scrubbing are discussed. The present trend is toward high stacks with electrostatic dust separators.

Leslie B. Bragg

**Absorption of hydrogen sulfide from gas and sulfur recovery with arsenic salts solution.** S. G. Aronov. *Coke and Chem.* (U. S. S. R.) 1933, No. 3, 47-52. Expts. were made to develop a method for recovery of pure S from coke-oven gas. The absorbing liquid was prepd. as follows: a soln. of Na<sub>2</sub>CO<sub>3</sub> was heated to boiling, As<sub>2</sub>O<sub>3</sub> soln. added and boiling continued for 2-8 hrs. (6Na<sub>2</sub>CO<sub>3</sub> + As<sub>2</sub>O<sub>3</sub> + 3H<sub>2</sub>O = 2Na<sub>3</sub>AsO<sub>3</sub> + 6NaHCO<sub>3</sub>). The soln. was oxidized with air and pure H<sub>2</sub>S blown through it to form Na<sub>3</sub>AsS<sub>4</sub>; air was blown through the soln., forming Na<sub>3</sub>AsOS<sub>3</sub> + S. The resulting soln. was used to absorb H<sub>2</sub>S from the gas in the expts thus: Na<sub>3</sub>AsOS<sub>3</sub> + H<sub>2</sub>S = Na<sub>3</sub>AsS<sub>4</sub>·H<sub>2</sub>O. The soln. was regenerated by blowing air through it. For best results the absorbing soln. should contain 5 g./l. As<sub>2</sub>O<sub>3</sub> and an amt. of Na<sub>2</sub>CO<sub>3</sub> just sufficient for the formation of Na<sub>3</sub>AsO<sub>3</sub>; an excess of Na<sub>2</sub>CO<sub>3</sub>, although it increases the absorption of H<sub>2</sub>S, interferes with the regeneration by promoting secondary reactions. Elementary S yields of 90% of the total S absorbed by the liquid were obtained in a single cycle. The best temps. for absorption and regeneration are 40-60°. Recovered S contained 0.5-2.0% As compds.

J. S.

**Removal of hydrogen sulfide from ammonia liquor.** D. F. Bezugliuf and F. A. Ignatenko. *Coke and Chem.* (U. S. S. R.) 1933, No. 3, 53-60. Several methods for removing H<sub>2</sub>S from NH<sub>3</sub> liquor were tried. Shaking the liquor with Fe ore in suspension (acidic ore of 65% suspension, i. e., sp. gr. liquor + ore = 1.72, gave the best results) followed by sepn. of the FeS formed was the most practical means of freeing the liquor from H<sub>2</sub>S. For the complete removal of the gas 15 parts ore to 1 part H<sub>2</sub>S in the liquor was necessary. The app. is described.

J. S.

**Ammonium sulfate from ammonia and roaster gases.** A. Girsowald and E. Stahl. *Metallges. Periodic Rev.* No. 8, 3-8(1934). (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> is made directly from the H<sub>2</sub>SO<sub>4</sub> of roaster gases without intermediate production of H<sub>2</sub>SO<sub>4</sub>. SO<sub>2</sub> concn. of the roaster gases is immaterial, even poor gases with 1 vol. % or less can be used; the gases can be hot and dry or wet and cold, and the flow does not need to be regular as for the H<sub>2</sub>SO<sub>4</sub> process. The sulfite formed in the process is oxidized rather rapidly when still in soln. The exptl. plant is described in detail; satd. solns. of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> have been produced contg. 640-650 g. sulfate per l. at 80°. On cooling to 25°, 100-120 g. per l. of sulfate crystallizes out entirely free from sulfite; the mother liquor returns to the process without evapn. The rate of reaction is 15-20 g. SO<sub>2</sub> per l. per hr. The cost of production of cryst. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> from SO<sub>2</sub> gases in this manner was approx. equal to the H<sub>2</sub>SO<sub>4</sub> process, based on a production of 15 tons (metric) daily. The process has the advantage that SO<sub>2</sub> gases can be used which cannot be used economically for making H<sub>2</sub>SO<sub>4</sub> and when such a plant would be too small for economic working. German and foreign patents have been applied for (not given).

M. H.

**Crude benzene recovery from vertical retort gas.**

H. J. Reynolds. *Gas World* 100, 278-81(1934).—Directions are given for operating, yields and costs for a wash oil process plant, erected in 1917, but now newly returned to operation.

P. J. Wilson, Jr.

**The recovery of benzene from vertical retort gas.** Experience at Swindon. C. H. Chester. *Gas J.* 205, 551-6(1934); *Gas World* 100, 246-51.—2.2 gal. of C<sub>6</sub>H<sub>6</sub> (76-77% off at 120°) is profitably recovered by washing the gas from steamed Glover-West verticals with gas oil. The quantity of C<sub>6</sub>H<sub>6</sub> available during carbonization of several coals and the portion recoverable without reducing the heating value of the gas below 150 B. t. u. and under the plant conditions have been detd.

P. J. W., Jr.

**Progress in producing benzene from municipal and coke-oven gases using "Benzorbon" activated carbon.** G. Mueller and W. Herbert. *Metallges. Periodic Rev.* No. 8, 16-24(1934).—Production of benzene from a national economic standpoint as well as from that of being the starting point of a no. of industries (motor fuels, explosives) is discussed and methods used so far are reviewed. A simpler method of using activated C made it possible to debenzolize coke-oven or other gases practically completely and to arrive at a substantial improvement in gas purification. Activated carbon, "Benzorbon," consists of molded hard granules of about 4 mm. diam. which are made up by a patented process from different materials, mixed, compressed, dried, activated and subjected to a special after-treatment. Each granule contains numerous ultra-microscopic fine capillaries giving an increase of interior surface amounting to 650 sq. m. of effective adsorption surface for 1 g. material. The operation and equipment of a plant since 1932 with a daily capacity of 80,000 kg. benzene from about 2,100,000 cu. m. of gas is described in detail; the benzene yield is 95-98%; 1 kg. of "Benzorbon" is required for 100 kg. benzene. The process has the further advantage of reducing HCN content and so to retard pipe corrosion; only 0.108 g. of this acid was contained per cu. m.

M. Hartenheim

**Technical practicability of the production of liquid fuels in gas works and coke-oven plants.** F. Schuster. *Chem.-Ztg.* 57, 661-2(1933).—The various methods for converting coal into liquid products by way of gasification and hydrogenation are brought together into a single flow-sheet. The table shows the temp., pressure and catalysts necessary, and the suitability of the different methods for use in gas works and coke ovens is discussed.

B. C. A.

**Electric tar separators at gas works and coke-oven plants.** II. Eirng. *Gas u. Wasserfach* 77, 113-19(1934).—The theory of elec. pptn. is reviewed, with special reference to tar separators. Elec. tar separators completely remove the tar from gas, as indicated by tests with the Drory filter, while these filters show a heavy stain with gases purified with the P. and A. extractor, even after passing through the naphthalene and ammonia washers. Elec. tar separators can be greatly overloaded without appreciable drop in efficiency. Power requirements vary from 1.4 to 1.5 kw. hrs. per M. cu. m. The pressure loss is only 3 mm. water. Tar fog is efficiently removed from carbureted water gas. Other advantages are the lessened contamination of benzene wash oil and the greater efficiency of dry purifiers. It may well be combined with low-temp. condensation. Bibliography is given.

R. W. Ryan

**Tar dehydration at small gas works.** Sonnabend. *Gas u. Wasserfach* 77, 104-5(1934).—A small tar dehydrator constructed at the works is described.

R. W. R.

**Use of coal-tar oil for firing boilers of heating systems.** H. Flasdieck. *Warme* 56, 472-4(1933); *Chimie & Industrie* 31, 62.—Comparative tests on low-pressure boilers showed that operation was satisfactory and reliable with an efficiency of about 85%. Comparative costs of heating with different fuels were: coke 1, gas oil 1.24, lignite-tar oil 1.23, and coal-tar oil 1.06 and 0.94 (fresh oil), illuminating gas 1.99.

A. Papineau-Couture

**Cracking of tar.** L. I. Ryabov. *Coke and Chem.* (U. S. S. R.) 1933, No. 2, 28-31.—It is claimed that the industrial cracking of cleaned coal oils at well-chosen

narrow temp. ranges, pressures and periods of time will make it possible to produce  $C_2H_4$  with yields not less than with cracking of mineral oils. James Sorrel

Glover-West verticals at Wellingborough. C. C. W. *Gas J.* 205, 684 (1934).—The operating results during 1933 are given for a new plant. Tests with South Yorkshire and Derbyshire coals indicate that the best results and the cheapest 440 500 B. t. u. gas are produced by use of the former, but the Derbyshire coals take steam more easily and might prove more valuable when a calorific value of less than 460 B. t. u. is required. P. J. W., Jr.

Results of C. O. L. intermittent vertical chamber ovens plant at the Brentford station of the Gas Light and Coke Co. Anon. *Gas Eng.* 51, 128 (1934).—Operating results are given from 48 ovens, holding 4.2 long tons each, and with a combined gas capacity of 5,000,000 cu. ft. of gas per day. P. J. Wilson, Jr.

Gibbons-Kogak coke ovens: New installation at the Robin Hood Coke Works of J. and J. Charlesworth, Ltd., Nr. Wakefield. J. Sinclair. *Colliery Guardian* 148, 433-6 (1934). R. H.

Efficiency and safety of coke oven charging gases. S. S. Naumov and G. L. Khazan. *Coke and Chem.* (U. S. S. R.) 1933, No. 2, 13 20.—The efficiency of steam ejection of gases in coke ovens of the Otto Co.'s construction is estd. to be 50-60% (on the basis of percentage ejection of gas into the hydraulic main to the total gas formed during the gas-generating period). The cause of poor efficiency is explained by the sucking in of air during the opening of the leveling door causing excessive loss of gas into the air; a steam counter blast at this point is proposed to increase the efficiency. James Sorrel

Application of oxygen for heating of coke ovens. Ya. O. Gabinskiĭ and V. I. Fontalin. *Coke and Chem.* (U. S. S. R.) 1933, No. 4, 8-15.—Stoichiometric computations were made to det. the temps., heat-transfer rate, and effects on coking for conditions when either coke-oven or blast-furnace gas was burned in an atm. of  $O_2$ -enriched air to heat the coke oven. The burning of gases in  $O_2$ -enriched air under the ovens will reduce the height of the gas flame and raise its temp., slow down the gas rate of flow, heat the lower parts of the coke oven to an excessively high temp. leaving the upper parts insufficiently heated, etc. The application of  $O_2$  in coke ovens, therefore, is believed undesirable. James Sorrel

Coke as a complementary fuel to gas. F. M. H. Taylor. *Gas World* 100, 254-6 (1934).—Utilization of coke is discussed. Its gasification in water-gas beds would greatly increase the importation of oil into Great Britain. The capital cost for the substitution of coke for coal or oil in boilers or central heating plants for the larger buildings is small as compared to the savings. The cost for applying thermostatic control to coke is less than with any other fuel, and the operating cost is negligible.

P. J. Wilson, Jr.  
A new method for taking average samples of coke. I. A. Kopoliovich and V. M. Bogin. *Coke and Chem.* (U. S. S. R.) 1933, No. 2, 20-8.—A new method for sampling coke is proposed to replace the method used at present in U. S. S. R. It consists in disintegrating the sample so that it will pass through 40-mm. mesh and then classifying it to size (sepg. into fractions). Each fraction is thoroughly mixed (this is easier to accomplish because of the uniformity of the particles), a small quantity taken from each fraction (proportional to its wt.), finely ground and all of the resulting ground portions are mixed together. Numerous data show the closer approach to the true average by this method of sampling with saving of time and reduction of the size of the sample. J. S.

Mountain wax (Ivanovsky) 27. Rept. of the Water Pollution Research Board [gas-works effluent] (Robertson, Calvert) 14. Harmful effect of  $NH_3$  liquor and still waste of coke plants on the fish in public waters (Brenner & Brandis, Keeman) 14. Reworking [tar or coal] hydrogenation catalysts (U. S. pat. 1,948,407) 18. App. for gravity sepn. of materials such as in coal purification (U. S. pat. 1,949,117) 1. Destructive hydrogenation of tars

(U. S. pat. 1,948,109) 22. Sepp. "run-of-mine" coal (U. S. pat. 1,948,730) 13. Rotary disintegrating mill for coal treatment (U. S. pat. 1,948,408) 9.

Fuel. John Tod. Brit. 401,820, Nov. 23, 1933. Fuel comprises a suspension of coal or coke and of cork flour or ground cork bark in oil in such proportions that the sp. gr. is above that of salt water but not above 1.10.

Fuel. Holzhydrolyse A.-G. Ger. 591,590, Jan. 23, 1934 (Cl. 10b. 16.01). Lignin residues from wood-sac charification processes are briquetted by pressing without hindering agents, and coking slowly, to preserve the briquet form.

Fuel. Imperial Chemical Industries, Ltd. Fr. 757,380, Dec. 20, 1933. A fuel which furnishes heat for a relatively short time is made by dissolving nitrocellulose in MeOH or EtOH, incorporating in the soln. a gel-forming substance, e. g., a compd. of Cu, Pb or Sn which is sol. at least in traces, in the soln., and adding a small amt. of an anti-solidifying aliphatic hydroxy acid, e. g., citra, tartaric or malic acid, before the soln. has thickened as a firm gel.

Motor fuel. Gustave Capart. Fr. 757,535, Dec. 28, 1933. The mixt. of fuel and air is ionized by a radioactive material surrounded by an appropriate glaze.

Hydrogenating fuel. Reinhard Wusew. Ger. 564,782, Dec. 12, 1933 (Cl. 12a. 1.05). Fuels, especially coal and hydrocarbons, are hydrogenated by mixing with  $Na_2CO_3$  and treating with a  $CO-H_2O$  mixt. at high temp. and pressure.

Destructive hydrogenation of carbonaceous materials. Lajos von Szeszich. U. S. 1,948,058, Feb. 20. Material such as brown coal-tar oil is subjected to the action of H at high temp. and pressure in the presence of  $H_2S$  and a catalyst contg. Mo or W; reaction products are sepd. into gaseous and liquid portions by cooling under substantially the reaction pressure; corrosive S compds. including  $H_2S$  are removed from the reaction products; the gaseous portion is pumped back to the reaction, and a portion of the recovered  $H_2S$  is added to this gaseous portion after it has passed the pumping app. and in such proportion that the activity of the catalyst is increased. An arrangement of app. is described.

Hydrocarbons. Pierre F. D. Dubois. Fr. 757,379, Dec. 26, 1933. Hydrocarbons (benzenes and petroleum derivs.) are submitted at a convenient temp. to the action of air or  $O_2$ . Gums are formed and the S and  $H_2S$  are transformed into inoffensive products and the hydrocarbon distd., giving a high quality motor fuel.

Fuel briquets. M. A. Tokarnik. Russ. 31,411, Oct. 31, 1933. Wood waste, such as bark and sawdust, is passed through rollers, pressed, dried with steam and warm air and passed finally through a tar or an asphalt bath heated to 110-120°.

Carbonized fuel briquets. Henry O. Loebell and Albert L. Klees (to Combustion Utilities Corp.). U. S. 1,948,471, Feb. 20. Readily ignitable briquets suitable for domestic use are prepd. from fuel mixts. such as coal and coke after carbonizing at temps. substantially above those of the low-temp. carbonization range while the material is in the form of a thin moving layer and continuous maintenance under a low pressure. App. is described.

Carbonizing solid fuel. Henry O. Loebell and Albert L. Klees (to Henry L. Doherty). U. S. 1,948,472, Feb. 20. Process and app. are described for compacting and reshaping the opposite surfaces of a uniform thin layer of finely divided carbonizable fuel while below its carbonization temp., then carbonizing the compacted and reshaped fuel while preventing substantial disturbance of the individual fuel particles and while continuously maintaining a regulated low pressure upon the fuel.

Low-temperature coal-carbonizing plant. Compagnie internationale de carbonisation (Soc. anon.). Fr. 757,208, Dec. 22, 1933. Construction of cellular plates.

Carbonizing coal, etc. Ira H. Derby and Harold R. Horner (to Peter C. Reilly). U. S. 1,948,515, Feb. 22. A charge of the material (in a described app.) is provided with heat-distributing channels extending through it.

and the upper exposed surface of the charge, to which the channels open, is subjected to the direct action of a gaseous heating medium such as combustion gases which, together with evolved distillates, is drawn down through the channels in direct contact with material of the charge.

Pulverizing coal pieces or other minerals, etc., by the action of jets such as superheated steam. Norwood H. Andrews and Walter J. Willoughby (to American Pulverizing Corp.). U. S. 1,948,609, Feb. 27. Various details of app. and operation are described.

Coal-washing and slurry sedimentation system. Bertram Norton. U. S. 1,948,184, Feb. 20. Various details of app. and operation are described.

Siphon gravity separator, etc., for use in cleaning coal with water, etc. Harrison A. Strohl. U. S. 1,948,140, Feb. 20. Various structural, operative and mech. details are described.

Cleaning coal by flotation. Rudolf Lessing. Ger. 592,116, Feb. 3, 1934 (Cl. 1c. 1.01). See Brit. 276,723 (C. A. 22, 2456).

Apparatus for dry cleaning of coal (with a reciprocated pervious deck). Edward O'Toole, Sr. U. S. 1,949,324, Feb. 27. Structural and mech. features.

Apparatus for dry removal of stones from coal. Auguste J. Revelart. U. S. 1,948,800, Feb. 27. Structural and mech. details.

Apparatus for compressing fine coal, etc. Maschinenfab. Augsburg-Nürnberg A.-G. Ger. 592,495, Feb. 9, 1934 (Cl. 16a. 15).

Apparatus for coking and compressing coal. Gustav Hilger. Ger. 591,676, Jan. 25, 1934 (Cl. 10a. 15).

Apparatus for stamping coal before coking. Carl Still G. m. b. H. Ger. 592,435, Feb. 7, 1934 (Cl. 10a. 14).

Filling masses for storing acetylene, etc. Alfred Burgeni. Ger. 586,534, Dec. 28, 1933 (Cl. 26b. 44.20). A foam of viscous or similar material is poured into containers for storing  $C_2H_2$ , etc., when set.

Apparatus for generation and superheating of steam. Walter G. Noack (to Akt.-Ges. Brown, Boveri & Cie.) U. S. 1,948,939-40, Feb. 27. Various structural and operative details are described.

Removing carbon deposits from engine cylinders. Charles A. Thomas and Carroll A. Hochwalt (to Thomas & Hochwalt Laboratories, Inc.). U. S. 1,949,588, March 6. A compn. for use in carbon removal comprises substances such as  $\alpha, \beta, \beta'$ -dichlorodimethyl ether, denatured alc., monochloronaphthalene,  $C_6H_6$  and gasoline or the like.

Device for mixing gases such as those for operating internal-combustion engines. Edwood T. Larkin (to Charles A. Crique). U. S. 1,947,603, Feb. 20. Structural and mech. details.

Fuel gas. Metallges. A.-G. (Otto Hubmann, inventor). Ger. 592,223, Feb. 3, 1934 (Cl. 24c. 2.05). Bituminous fuel or coke is treated under several atms. pressure with a mixt. of O (or oxygenated air) and steam in such proportions as to yield a gas contg. substantial amts. of  $CO_2$  and hydrocarbons. Thus, the fuel may be treated at 600-700° and 20 atms. pressure with a mixt. contg. O 1 and steam 6 parts. The gas may be purified, e. g., by removing  $CO_2$  and condensable hydrocarbons, with releasing the pressure. Cf. C. A. 27, 3806.

Water gas. Niels E. Rambush (one-half to Power Gas Corp. Ltd.). U. S. 1,947,614, Feb. 20. Primary air is passed through a coke bed, the air blow gases thus formed are led off and burned in contact with preheater elements by means of secondary air while avoiding direct impingement of the blow gases on these elements, which may be in the form of vertical U-tubes. At the same time steam is passed through the elements; the primary and secondary air are cut off; the superheated steam is passed up through the coke bed; the steam is then cut off; and steam is led around the preheater elements for superheating, and down through the coke bed. App. is described.

Water gas. Wm. V. Duke (to Carsten I. Johnsen). U. S. 1,949,503, March 6. Spaced hollow bodies such as triangular tubes are subjected to continuous internal heating (as by combustion gases) and the entraining action of

a current of water gas is utilized to carry pulverized coal and steam in proper proportions to form water gas between and in contact with the heated bodies. App. is described.

Water gas. Gerald J. Nordmeyer (to Koppers Co. of Del.). U. S. 1,949,728, March 6. In the operation of a water-gas plant including a generator having a bed of solid fuel and a superposed carbureting chamber, air blasts and steam are passed separately and successively in opposite directions through the fuel bed, a portion of the blast in each direction being utilized for the purpose of driving residual gas resulting from a previous steam run into a collecting medium, and heavy oil is admitted into the carbureting chamber coincidently with the steam runs to enrich the made gas; the gas is conducted to a collecting medium and the major portion of the reverse air blast passes downwardly through the upper portion only of the fuel bed and hence is withdrawn circumferentially of the generator at a point below the top of the fuel bed, so that carbonaceous deposits on the fuel bed resulting from admission of the heavy oil are consumed. App. is described.

Carbureted water gas. Gerald J. Nordmeyer and Thomas W. Stone (to Koppers Co. of Del. and Western Gas Construction Co.). U. S. 1,947,792, Feb. 20. An air blast and a steam run are alternately introduced into a fuel bed of a gas generator, and heavy oil is admitted into the top of the generator simultaneously with the steam run to enrich the resulting gas, the air blast being introduced in a reverse direction and downwardly through at least the upper portion of the fuel bed to consume carbonaceous deposits resulting from the heavy oil, and the air blast being withdrawn from the generator at a point below the top of the fuel bed. App. is described.

Apparatus for carbureting water gas, etc. Ges. zur Förderung der Braunkohlengaserzeugung B. V. Ger. 592,189, Feb. 2, 1934 (Cl. 24c. 2.07).

Producer-gas manufacture utilizing sodium carbonate. Alfred H. White and David A. Fox. U. S. 1,948,086, Feb. 20. For the manuf. of fuel gas low in  $CO_2$  from solid carbonaceous fuel in a gas generator, the carbonaceous fuel is mixed with less than 10% of a Na compd. such as  $Na_2CO_3$  which is capable of reacting with the fuel and evolving a continuous stream of the alkali metal vapor; the mixt. is ignited as a fuel bed and is blasted with air and steam so that a reaction zone is formed and  $CO$ ,  $H_2$ ,  $CO_2$  and a substantial amount of alkali metal vapor are evolved, the alkali metal vapor reacting with  $CO_2$  so that solid  $Na_2CO_3$  is formed which is filtered out in its passage through the upper part of the fuel bed and returned to the reaction zone as the fuel descends through the generator. App. and details of operation are described.

Apparatus for gasifying subdivided liquid fuels in presence of steam. Franz Herzberg. Ger. 588,089, Feb. 6, 1934 (Cl. 28a. 11).

Apparatus for complete gasification of subdivided solid or liquid fuels. Franz Herzberg. Ger. 589,426, Feb. 8, 1934 (Cl. 24c. 1.04).

Catalyst for manufacturing gas rich in hydrogen from hydrocarbons and steam. Garland H. B. Davis and James A. Franceway (to Standard Oil Development Co.). U. S. 1,948,338, Feb. 20. A catalyst is used which is prepd. by mixing an oxide such as that of Ni or Cr with a refractory oxide such as that of Al, Th, Zr or Ti, and with concd.  $H_3PO_4$  and baking the mixt. at a temp. (suitably about 160°) below the temp. of fusion of either oxide.

Gas generator for producing gas from coal or other fuel. Frank C. Greene. U. S. 1,947,590, Feb. 20.

Gas producer. Ernst Mahlkuch. Ger. 591,768, Jan. 26, 1934 (Cl. 24c. 5). Addn. to 547,555 (C. A. 26, 3661).

Fuel-distributing device for gas producer. N. V. Maschinenleen- en Apparaten-Fabrieken. Ger. 592,160, Feb. 2, 1934 (Cl. 24c. 9).

Apparatus for charging gas producers. N. V. Maschinenleen- en Apparaten-Fabrieken. Ger. 592,149, Feb. 2, 1934 (Cl. 24c. 9). The charging app. is automatically operated as soon as a predetd. vol. of air has been blown through the producer.

Apparatus for producing and purifying gas. Wilbert J.

- Huff, Lloyd Logan and Oscar W. Lushy. U. S. 1,947,778, Feb. 20. In a gas app. having cyclic operation including making and heating periods, a gas-purifying app. is included in the path of the hot gas contg. S-fixing substances from the 5th, 6th or 7th periodic groups such as Cr or V in promoter assocn. with Cu, Ag, Fe, Ni, Co, Pb, Sn, Sb or their oxides. App. is described.
- Gas-purifying apparatus.** Wilbert J. Huff, Lloyd Logan and Oscar W. Lushy (to Wilbert J. Huff, agent). U. S. 1,947,779, Feb. 20. Various structural features are described of an app. comprising a receptacle contg. refractory materials and chemicals contg. an element of the 5th and 7th series of the periodic classification such as Cu in intimate assocn. with material such as Cr, U or V contg. at least one element of the 4th and 12th series of the 5th, 6th and 7th groups of the periodic table; means is provided for alternately passing combustible gas such as blue or water gas and O-contg. gas over the materials and for automatically regulating the amt. of O in the O-contg. gas after passing through the purifying materials.
- Gas purification.** Wilbert J. Huff and Oscar W. Lushy. U. S. 1,947,776, Feb. 20. A gas such as that for domestic use contg. org. S compds. and  $H_2S$  is passed at a temp. above  $250^\circ$  over a unitary absorbent material consisting of an intimate mixt. of substances, one component of which, such as Cu, forms a metallic oxide easily reducible to the metal under the conditions of use, in admixt. with another component which contains at least one member of the sixth or seventh periodic group such as Cr and U which forms an oxide not reducible under the conditions of use; and the S removal is followed by revivification of the absorbent by an O-contg. gas in another phase of the cycle.
- Gas purification.** Wilhelm Glud, Fritz Brodkorb and Walter Klempf (to Ges. fur Kohlentchnik m. b. H.). U. S. 1,947,983, Feb. 20. For removing  $H_2S$  from gases, they are treated with an alk. aq. suspension of Fe hydroxide, and the Fe sulfide contained in the suspension is oxidized with an oxidizing gas such as air in an ammoniacal soln. in the presence of a sulfite in order to prevent sepn. of raw S.
- Reclaiming fouled wash such as that used in washing fuel gas to remove light oil.** Irvin H. Jones (to Koppers Co. of Del.). U. S. 1,949,746, March 6. A fouled oil which originally consisted of petroleum fractions all boiling above  $350^\circ$  is treated, at a temp. below  $70^\circ$ , with about 2-40% its volume of 60-66° B $\epsilon$ .  $H_2SO_4$  by which the oil is clarified; sludge formed by this treatment is removed, followed by washing with water and aq. alkali soln. App. is described.
- Combustible-gas detector.** Jerzy Malecki. Brit. 402,011, Nov. 23, 1933.
- Automatic control apparatus for use with two or more associated water-gas sets.** Walter A. Barr (to Western Gas Construction Co.). U. S. 1,948,004, Feb. 20.
- Device for controlling the flow of gases to and from regenerators such as those associated with coke ovens.** Carl Otto. U. S. 1,949,177, Feb. 27. Structural and operative details of valve arrangement.
- Apparatus for working up tars, oils, hydrogenated coal products, etc.** I. G. Furbenind. A.-G. (Karl Schoenemann, inventor). Ger. 591,729, Jan. 26, 1934 (Cl. 12a. 1.04). App. in which asphalt is pptd. and sepd. is described.
- Phenol, cresols and benzene hydrocarbons from crude tar phenols.** Fritz Hofmann and Karl Lang (to Ober-schlesischer Berg- und Huttenmännischer Verein e. v.). U. S. 1,947,648, Feb. 20. See Brit. 376,509 (C. A. 27, 4061).
- Coke oven.** G. N. Pannotov and G. N. Samofanov. Russ. 31,405, Oct. 31, 1933. Construction details.
- Coke oven.** N. P. Chizhevskii. Russ. 31,406, Oct. 31, 1933. Construction details.
- Coke oven.** G. A. Chernov. Russ. 31,407, Oct. 31, 1933. Construction details.
- Coke-oven battery.** The Koppers Co. Ger. 592,117, Feb. 1, 1934 (Cl. 19a. 13).
- Coke-oven doors.** N. I. Grachev. Russ. 31,408, Oct. 31, 1933. Construction details.
- Coking apparatus.** N. D. Tenet. Russ. 31,409, Oct. 31, 1933. Construction details.
- Plant for dry-cooling hot coke.** Gebrüder Sulzer, A.-G. Swiss 164,772, Dec. 16, 1933 (Cl. 12a).
- Apparatus for manufacture of coke and gas from peat.** A. G. Rembashevskii. Russ. 31,410, Oct. 31, 1933. Peat is distd. and the tar vapors in the crude gas are cracked by heating in a vertical chamber with a row of horizontal heating channels supplying the heat to the peat as well as to the cracking vessel.

## 22 - PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. PARAGHER

- Twenty years of petroleum research—a retrospect.** A. E. Duistan. *Proc. Am. Petroleum Inst. 14th Ann. Meeting*, Sect. III, 124-31 (1933). See C. A. 28, 617<sup>a</sup>.
- E. H.
- Hydrogenation of petroleum.** C. E. Nabuco de Araujo, Jr. *Chimica (Brasil)* 1, 174-6 (1933).—A brief review.
- H. C. A.
- Oil acidity determination by means of electrotitrimetric methods.** Some observations concerning the antimony electrode used in one of these methods: a new mode of preparing this electrode. Ed. Leclerc. *Ind. chim. belge* [2], 4, 415-26 (1933).
- A. L. Henne
- Emulsified oils for the lubrication of cylinders of hot steam locomotives.** J. Vincent. *Compt. rend. congr. graissage* 1931, 442-8.
- Cementing oil wells (Kocharov) 20.** Petroleum deposits of Roumania (Mrazec) 8. Origin and migration of petroleum (Krejci-Graf) 8. Reworking [oil] hydrogenation catalysts (U. S. pat. 1,948,407) 18. App. for working up oils (Ger. pat. 591,729) 21. Hydrocarbons (Fr. pat. 757,379) 21. Reclaiming fouled wash such as that used in washing fuel gas to remove light oil (U. S. pat. 1,949,746) 21. Sepg. emulsions such as those of petroleum (U. S. pat. 1,949,660) 13.
- Reducing the sulfur content of petroleum oils.** Wm. M. Malisoff (to Atlantic Refining Co.). U. S. 1,948,528, Feb. 27. Oil such as a cracked gasoline is maintained at a temp. of  $100-150^\circ$  in the presence of 0.5-4.0% anhyd.  $AlCl_3$  and agitated for not more than about an hr. to polymerize selectively S compds., and the latter and  $AlCl_3$  are sepd. by filtration or settling and decanting.
- Refining and dewaxing petroleum oils.** Ross J. Garofalo (to Union Oil Co. of Calif.). U. S. 1,948,346, Feb. 20. The oil is dissolved in a normally gaseous hydrocarbon diluent such as a propane mixt., and the dild. oil is treated with  $H_2SO_4$  to form finely divided sludge; a portion of the normally gaseous diluent is vaporized to chill the oil and ppt. the wax, the sludge and wax are sepd., and the diluent and oil are then sepd. from each other. An arrangement of app. is described.
- Preventing gum formation in petroleum distillates.** Robert E. Burke (to The Standard Oil Co.). Can. 339,715, Feb. 27, 1934. To prevent gum formation, cracked petroleum distillates are treated with 0.0004-0.5% of an org. compd. contg. the group  $-N=N-$ , as semicarbazide or a deriv. thereof, e. g., 4,4-diphenylsemicarbazide, or as hydrazine substituted with one or more alkyl or aryl radicals, except mononaphthyl. The inhibitor may first be dissolved in ether, benzene or the like and the soln. mixed with the petroleum.
- Incorporating resins in petroleum oil.** Marion B. Hopkins (to Standard Oil Development Co.). U. S.



1,948,267, Feb. 20. In forming compns. such as those for *elec. insulation*, an oil is heated with a resin to a temp. above that at which steam condenses, and steam is passed through the mixt. and maintained over its surface under nonoxidizing conditions until the resin is completely dissolved in the oil. App. is described.

**Breaking petroleum emulsions.** Murray E. Garrison and Wm. F. Van Loenen (to Petroleum Rectifying Co. of Calif.). U. S. 1,947,709, Feb. 20. The emulsion is passed through a porous mass of comminuted  $Al_2O_3$  crystd. in an *elec.* furnace, so that the disperse phase of the emulsion is agglomerated (numerous details of app. and operation being described).

**Apparatus for dehydrating petroleum oil emulsions by heating, etc.** John B. Turner. U. S. 1,948,481, Feb. 20. Various structural and operative features are described.

**Apparatus for hydrogenating petroleum oils.** Ralph H. Price (to Standard Oil Co. of Ind.). U. S. 1,948,732, Feb. 27. Various structural and operative details are described.

**Destructive hydrogenation of petroleum hydrocarbons.** Clarke T. Harding (to Standard-I. G. Co.). U. S. 1,948,378, Feb. 20. In a continuous recycling process for the destructive hydrogenation of hydrocarbon materials such as oils, at temps. above  $380^\circ$  under more than 20 atm. pressure in which the mixt. of fresh oil and recycled oil is first heated in a heating coil and then discharged into an enlarged reaction zone, the temp. in the hydrogenation zone is maintained within the optimum range for destructive hydrogenation by changing the proportion of recycle oil to fresh oil in the feed as required. App. is described.

**Refining cracked petroleum oils.** Jacque C. Morrell (to Universal Oil Products Co.). U. S. 1,949,756, March 6. The oil is treated with plumbite soln., and the reaction products of the plumbite treatment are removed by subjecting the oil to the action of a sol. sulfide and an adsorbing agent such as fuller's earth capable of removing suspended solids.

**Refining cracked petroleum products for motor fuel.** Walter S. Baylis (to Patco, Inc.). U. S. 1,949,673, March 6. To obtain a motor fuel substantially free from unstable compds., the products are passed in vapor phase through a treating zone into which finely divided solid adsorptive polymerizing material such as an acid treated clay is introduced along with the vapors and by their motive action, and the adsorptive material is subsequently sepd. (suitably by *elec.* pptn.). App. is described.

**Cracking oils.** Ross J. Garofalo (to Union Oil Co. of Calif.). U. S. 1,948,345, Feb. 20. Oil is heated under pressure to vaporize it, and the resulting vapor is relieved of pressure and intimately commingled with hot molten metal such as Pb or a Pb alloy in an injector. App. is described.

**Cracking oils.** Texaco Development Corp. Brit. 401,691, Nov. 17, 1933. Oils are cracked to obtain products of low b. p. by heating a condensate oil to a high-cracking temp., *e. g.*,  $1000-1050^\circ F.$ , under pressure, passing the products into a reaction chamber where they are cooled by contact with an oil at lower temp. and where sepn. into liquid and vapor occurs, passing the vapors to 1 or more digestion zones maintained at cracking temp. and thence to a fractionating zone in which a final light distillate is sepd. out to leave a reflux condensate which provides the condensate oil used as the starting material. Crude oil is cracked at low temp., *e. g.*,  $825^\circ F.$ , by passage through a coil and the products are passed through a pipe into a tower where they mix with and cool the products formed by cracking the condensate oil. App. is described.

**Cracking hydrocarbon oils.** Homer P. Parrigin and Ralph P. Currie (to Texas Co.). U. S. 1,948,003, Feb. 20. Oil is subjected to cracking conditions in an enlarged still chamber; vaporized cracked products are separately withdrawn and passed to a sep. zone where they are subjected to a limited dephlegmation, a small amt. of reflux condensate is sepd. and at least a portion of the condensate is introduced directly into the vapors

within the still adjacent the point of vapor withdrawal to wash the vapors just before their withdrawal. Vapors from the dephlegmating zone are passed to a sep. fractionating zone in which undesired higher boiling constituents are sepd. as reflux condensate and this reflux is passed through an elongated passageway in which it is heated to cracking temp. and thence is discharged into the enlarged still chamber for further cracking. App. is described.

**Cracking hydrocarbon oils.** Gustav Egloff and Harry P. Benner (to Universal Oil Products Co.). U. S. 1,948,567, Feb. 27. Various structural and operative details are described of an app. comprising a heating coil, enlarged chamber and assoc. app. including a second chamber to which vapors pass and from which they are taken off.

**Cracking hydrocarbon oils.** Lyman C. Huff (to Universal Oil Products Co.). U. S. 1,948,713, Feb. 27. Oil is subjected to cracking conditions in a heating zone such as a pipe coil and thence is passed to an enlarged reaction chamber for sepn. of vapors and unvaporized residue; it is withdrawn from this chamber and is subjected to distn. in a zone of reduced pressure, for further sepn. of vapors and residue; the first and second vapors sepd. are subjected to partial condensation, and the heavy components of the second vapors are withdrawn as condensate and commingled, without prior heating to cracking temp., with heated oil from the heating zone prior to its entrance into the reaction chamber, to cool the heated oil. App. is described. U. S. 1,948,714 relates to a process in which vapors from the reaction zone (of a generally similar installation of app. which is described) are dephlegmated to form a reflux condensate, the unvaporized oil being flash-distd. by pressure reduction and the resulting flashed vapors dephlegmated to form a flash reflux condensate of higher b. p. than the first-mentioned reflux condensate, which, unadmixed with heavier oil, is passed through a heating zone and heated to a cracking temp., thence discharged into the reaction zone, the flash reflux condensate being commingled, without prior heating to cracking temp., with the heated reflux condensate discharging from the heating zone into the reaction zone. Cf. C. A. 28, 25164.

**Cracking hydrocarbon oils.** Harris A. Smith (to Texas Co.). U. S. 1,949,029, Feb. 27. An oil is cracked and vaporized under superatm. pressure to produce a gasoline fraction and a liquid residue; the residue is separately distd. as reduced pressure in a flash distn. zone and the vapor thus formed is dephlegmated to produce a reflux condensate and a vapor fraction; the reflux condensate is revaporized, an unvaporized tarry portion is sepd. and the revaporized condensate, free from tar, is conducted to a vapor-phase-cracking zone; the uncondensed vapor fraction from the dephlegmation is passed to the vapor-phase-cracking converter and commingled with the other vapors in the converter for vapor-phase cracking. App. is described.

**Cracking hydrocarbon oils.** Gustav Egloff (to Universal Oil Products Co.). U. S. 1,949,460, March 6. In a process in which oil is maintained under cracking conditions of temp. and pressure in an enlarged reaction zone from which vapors are removed for fractionation, a portion of the charging oil for the process is preheated by heat exchange with the vapors undergoing fractionation, and this preheated oil, in mixt. with reflux condensate formed by the fractionation, is passed to a heating zone where it is heated to a cracking temp. under pressure and thence discharged to the enlarged reaction zone. Another portion of the charging oil is subjected to indirect heat-exchange relation with hot liquid oil constituents in the reaction zone where it is heated to a higher temp. than the first mentioned portion of the charging oil and is then combined with the hot oil stream discharging into the reaction zone. App. is described.

**Cracking hydrocarbon oils.** Lester Kirschbraun (to Universal Oil Products Co.). U. S. 1,949,480, March 6. Oil from a bulk supply is circulated through heating tubes and back to the bulk supply, and the heating

gases for a pressure-cracking still are passed first in heat exchange with oil in sep. heating tubes and then in heat exchange with the heating tubes of the oil-circulation system mentioned; an auxiliary supply of oil (without substantial admixt. with the oil of the circulating system mentioned) is passed once only through the sep. heating tubes mentioned and thence directly into the said bulk oil supply. Various features of app. are described.

**Cracking hydrocarbon oils.** Jacques C. Morrell (to Universal Oil Products Co.). U. S. 1,949,486, March 6. In cracking in an app. comprising a heating coil and reaction chamber, with fractionation of vapors from the reaction chamber, reflux condensate from the fractionator is returned to the heating coil for further treatment, vapors from the fractionator are recovered; non-vaporized residue from the reaction chamber is introduced into a coking chamber of lower pressure, vapors there liberated are fractionated and reflux condensate is returned to the heating coil, and overhead vapors from the latter fractionation are heated to a vapor-phase conversion temp. in a sep. heating coil and are introduced into the coking chamber for devolatilization and coking. Various features of app. arrangement are described.

**Cracking hydrocarbon oils.** Walter M. Cross (to Gasoline Products Co.). U. S. 1,948,492, Feb. 27. A stream of a relatively light hydrocarbon oil is heated to a cracking temp. under a relatively high pressure; another stream of a relatively heavier oil is heated to temps. above the b. p. of the lighter constituents; the 2 heated streams are passed to a common evapg. stage maintained under relatively low pressure, above the liquid level in this stage, and vapors are sep'd. from the 2 oils before mixing their unvaporized portions, and the vapors of one stream are prevented from contacting with unvaporized oil of the other stream while blending the vaporized and unvaporized portions and separately removing the blended vaporized and unvaporized portions. App. is described.

**Cracking hydrocarbon oils.** Harry L. Pelzer (to Sinclair Refining Co.). U. S. 1,949,655, March 6. Oil in the vapor phase is heated to a high-cracking temp. and the vapors are maintained at cracking temp. for a time in a digesting chamber, freed from tar by scrubbing with a liquid such as fresh stock or reflux and, in a subsequent refluxing operation, fresh stock is introduced in direct contact with the vapors to condense a part of the vapors and to preheat the fresh stock; reflux condensate and preheated fresh stock are passed to the heating stage, and sep'd. tar is discharged without being returned to the heating stage. An arrangement of app. is described. U. S. 1,949,656 relates to a generally similar process in which vapors produced are refined by contact with an adsorbent earth such as fuller's earth. App. is described.

**Cracking hydrocarbon oils.** Jean Delattre-Seguy (to Universal Oil Products Co.). U. S. 1,949,765, March 6. Oil is heated to a cracking temp. under pressure in a heating coil and thence passed to a reaction drum and sep. zone for sep. vapors and unvaporized oil; sep'd. vapors are removed and a portion of the withdrawn vapors are heated to a vapor-phase-cracking temp. and then injected into the unvaporized oil in the sep. zone, under such control as to distil the unvaporized oil substantially to dryness. App. is described. Cf. C. A. 27, 5180.

**Vapor cracking of hydrocarbon oils.** Willis F. Sims and Venus U. Cloer (to Panhandle Refining Co.). U. S. 1,948,890, Feb. 27. Charging oil is forced under regulable pressure into a preheating zone under super-atm. pressure, where it is preheated to a temp. sufficient to flash it into vapor under sub-atm. pressure, and is then passed into a flashing zone under sub-atm. pressure, and the vapors only, thus produced, are passed to a cracking zone such as a pipe coil, which is under a lower sub-atm. pressure, whence vapors are drawn off to maintain the low pressure and passed through fractionating zones, and a cooling and sep. system. App. is described.

**Cracking and hydrogenating heavy hydrocarbon oils.** Robert F. Ruthruff (to Standard Oil Co. of Ind.). U. S. 1,948,736, Feb. 27. An app. is described arranged for

1 heating oil to a cracking temp. at relatively low pressures, sep. gasoline and coke from the remaining reaction products, compressing the remaining liquid reaction products to above 100 atm. and heating them to above 400° while contacting them with H<sub>2</sub>, sep. gasoline and lighter products formed by the hydrogenation, and cracking the remaining hydrogenation products at a pressure of about 200 lb. and contacting the cracked vapors with the hydrogenated products, and returning the cracked residues to a prior stage of the system.

**Apparatus for cracking hydrocarbon oils.** Hans Magnus. U. S. 1,948,072, Feb. 20. An oil reservoir is connected with a preheating coil, and also directly with a cracking coil, and a pump is provided in a pipe between the juncture of the pipe from the reservoir to the cracking coil with the pipe between the 2 coils and the cracking coil; thermostatically operated valves increase the flow through the direct pipe when the temp. in the cracking coil rises and reduce it when such temp. falls.

**Pressure apparatus for use in cracking oils.** Thomas Montgomery and John C. Morrison (to Standard Oil Development Co.). U. S. 1,948,391, Feb. 20. A pressure shell which may be formed of steel is provided with a liquid-tight lining of concrete.

**Fractionating column suitable for use in oil-cracking systems.** Wm. H. Bahlke and Ernest W. Thiele (to Standard Oil Co. of Ind.). U. S. 1,947,577, Feb. 20.

**Refining overhead products of hydrocarbon oil cracking.** Jacques C. Morrell and Gustav Egloff (to Universal Oil Products Co.). U. S. 1,947,868, Feb. 20. Heated vaporous overhead products are subjected to the action of SO<sub>2</sub>, free O and steam in the presence of a nonmetallic solid contacting agent such as bauxite, fuller's earth or a zeolite to remove gum-forming substances, etc. U. S. 1,947,869 relates to a generally similar process in which the vapors are treated with a mixt. of SO<sub>2</sub> and steam in the presence of discrete particles of a solid metallic salt such as ZnSO<sub>4</sub>. Cf. C. A. 28, 2516<sup>a</sup>.

**Tower suitable for refining cracked hydrocarbon vapors with fuller's earth.** Philip S. Nisson (to Gray Processes Corp.). U. S. 1,948,126, Feb. 20.

**Bubble-cap fractionating apparatus suitable for use with hydrocarbon oils.** Raymond W. Hielfeldt. U. S. 1,948,500, Feb. 27. Structural details.

**Stabilization of hydrocarbon oils.** Joseph K. Roberts and George W. Watts (to The Standard Oil Co.). Can. 330,405, Feb. 13, 1934. From hot hydrocarbon-oil vapors are condensed undesired high-boiling constituents, and then a portion of the desired constituents. The vapor, contg. some of the desired constituent together with undesired excessively volatile constituents, is passed to an absorption system in which the desired constituent is absorbed in a liquid medium. The absorption liquid may be the condensate of the first fractionation contg. the constituents desired in the final product.

**Treating hydrocarbon oils with greensand to remove gum-forming substances, etc.** Charles D. Lowry (to Universal Oil Products Co.). U. S. 1,949,749, March 6. An oil such as a cracked distillate is treated in the vapor phase with greensand (suitably in the presence of HCl).

**Distilling hydrocarbon oils.** John S. Wallis (to Alco Products, Inc.). U. S. 1,947,817, Feb. 20. Vapors produced by heating a hydrocarbon oil are passed counter-current to and in contact with reflux oil in a fractionating zone; an intermediate fraction of the reflux oil is withdrawn from the fractionating zone, stripped of its lighter constituents in an external stripping zone; the heaviest reflux oil fraction is stripped with steam in an internal stripping zone sep. from the unvaporized oil while the steam and evolved vapors from the internal stripping zone are permitted to enter the fractionating zone. App. is described.

**Hydrocarbon oil conversion.** Malcolm H. Tuttle (to Gyro Process Co.). U. S. 1,948,872, Feb. 27. In a process in which hydrocarbons in vapor phase are pyrolytically converted at temps., of about 540-700° to form lower-boiling products, the conversion is arrested to prevent excessive formation of undesirable products such as fixed

gas and free carbon by flashing the preheated oil into vapors in a vaporizing zone, and directly admixing the vapors with the hydrocarbons formed in the pyrolytic conversion zone of the vapor phase conversion process to bring the temp. of the resulting mixt. to about 370–480°. App. is described.

**Destructive hydrogenation of heavy hydrocarbon oils in the vapor phase.** Howard W. Strong (to Imperial Chemical Industries Ltd.). U. S. 1,949,080, Feb. 27. Hydrogenation of vapor from oils is effected under a total pressure of at least 10 atm. and at an elevated temp. (suitably about 500°) with simultaneous use of juxtaposed catalytic materials one of which is of the massive type (formed of iron coated with Sn) and the other of the porous type comprising  $\text{Fe}_2\text{O}_3$ . App. is described.

**Destructive hydrogenation of heavy hydrocarbon oils.** Philip L. Young (to Standard-I. G. Co.). U. S. 1,949,230, Feb. 27. A heavy hydrocarbon oil such as a crude or lubricating stock is passed in liquid condition with free H under pressure above 20 atm. through a reaction zone contg. a sulfactive catalyst, with conditions of feed rate, partial pressure of H and temps. suitably interadjusted to increase materially, by destructive hydrogenation, the lubricating qualities of the heavier fractions, with a limited formation of lower-boiling fractions; liquid oil is withdrawn and lower-boiling fractions unsuitable for use as lubricants are sepd., and the lower-boiling fractions are passed, at a relatively higher temp. with free H under pressure above 20 atm., but with reduced H partial pressure, over a second sulfactive catalyst to produce, by destructive hydrogenation, a light low-boiling product of antidetonating properties suitable for use as a motor fuel. App. is described.

**Catalytic hydrogenation of hydrocarbon oils.** Robert P. Russell and Willard C. Ashbury (to Standard-I. G. Co.). U. S. 1,949,630, March 6. Various details of app. and operation are described for treating oil at an elevated temp. in the presence of a finely divided suspended catalyst such as Cr and Mo oxides.

**Hydrogenating higher-boiling oils to produce motor fuel.** Robert P. Russell (to Standard-I. G. Co.). U. S. 1,949,631, March 6. Hydrogenation is effected under pressures above 100 atm. at temps. above 480° in a reaction vessel at least the inner surface of which is formed of an alloy of Fe with Cr about 27%, Ni 22%, Si not more than 2% and C less than 0.5%. Various details of app. arrangement are described. U. S. 1,949,632 relates to the treatment of materials such as heavy reduced crude oils, refinery residues, etc., in liquid phase with H under more than 100 atm. pressure while it is passing through a reaction zone packed with lumps of solid catalytic material comprising oxides and sulfides of metals of the 6th group of the periodic system, such as those of Cr, Mo and W, at a temp. of about 460°, removing total liquid and vaporous products in a single stream without distn. from the reaction zone after most of the oil is converted into naphtha and heavier nonviscous fractions, cooling under full pressure to a temp. at which only the naphtha remains vaporized, and sepg. the products into fractions. App. is described.

**Partial oxidation of hydrocarbons.** Joseph H. James (to Clarence P. Byrnes, trustee). U. S. 1,948,817, Feb. 27. A mixt. of a finely divided hydrocarbon material such as gas oil or naphtha and an O-contg. gas such as air is fed through a hot reaction zone and thence in contact with a series of sep. oil layers contg. oxidation products which are maintained at different temps. for condensing compds. of different av. mol. wts. in the different layers. App. is described. Cf. C. A. 28, 1354°.

**Apparatus for condensing hydrocarbon vapor mixtures.** John C. Mahoney (to Alco Products, Inc.). U. S. 1,947,863, Feb. 20. Vapor is introduced into a cooling coil unit within a shell and directed downwardly over the unit to the lower portion of the shell and upwardly to the upper portion independently of the down-flowing vapor. Various structural details are described.

**Apparatus for determining critical pressures of substances such as hydrocarbons.** Gellert Alleman and

Augustine F. S. Musante (to Sun Oil Co.). U. S. 1,947,821, Feb. 20. Various structural and operative details are described.

**Separating hydrocarbons.** Sigbert Seelig. Ger. 591,877, Jan. 20, 1934 (Cl. 23b. 1.04). Addn. to 582,717 (C. A. 28, 890°). The method of 582,717 for obtaining oils by heating distn. residues in a rotary furnace is modified by introducing high-boiling residues from a fractionating plant and the products from a "cracking" plant, into the rotary drum furnace while still hot.

**Oils.** Max Naphtali. Fr. 757,490, Dec. 27, 1933. Fractions of gas oil, paraffin oil and lubricating oils are subjected, before cracking or before filtering and purifying, to an intermediate treatment by a mixt. of air or other gas contg. O and Cl, the amt. of Cl not being above 2% and the temp. below 50°. The treatment may be followed by treatment with alk. products or  $\text{H}_2\text{SO}_4$ .

**Oil recovery.** N. V. Olie-Zuivering-Maatschappij "Olzum." Fr. 757,234, Dec. 22, 1933. Waste lubricating and insulating oils are recovered by removing solid impurities, centrifuging and treating with alk. liquids, e. g., a soln. of  $\text{Na}_2\text{PO}_4$ .

**Combustible oil.** Imperial Chemical Industries Ltd. Fr. 757,320, Dec. 23, 1933. An oil for compression motors contains in the dissolved state a small amt. of an easily inflammable accelerator chosen to reduce the delay period (time between injection and lighting) and a small amt. of another accelerator chosen to lower the spontaneous flash point of the oil. The 1st may be an alkyl nitrite or nitrate (2%), and the 2nd an org. Br compd., e. g., benzyl or Bu bromide or an org. O compd., such as Cu oleate or stearate (0.1%).

**Refining mineral oil.** Jack F. M. Taylor and Harold I. Lounsbury (to The Shell Development Co.). Can. 339,531, Feb. 20, 1934. Mineral oil distillate is sepd. into a number of fractions. One or more of these fractions is treated in such a way as to change the constitution of S-bearing components so that these components can be sepd. by distn. After sepn. of the S compds. these fractions are blended with the others, which may or may not have been chemically treated.

**Vacuum- and steam-distillation system for mineral oils.** Metallges. A.-G. (Max Gensecke, inventor). Ger. 590,218, Feb. 1, 1934, and 592,311, Feb. 5, 1934 (Cl. 23b. 1.03).

**Apparatus for generating gas to be used in hydrogenation of petroleum.** Milton J. Trumble and Wm. L. Seeley (to Processco, Ltd.). U. S. 1,948,808, Feb. 27. Structural details of an app. are described. Superheated steam is brought into contact with carbonaceous oil sludge to sep. lighter oil in a continuous cyclic hydrogenation system. U. S. 1,948,809 relates to a petroleum-hydrogenating and -dephlegmating app. of the bubble-tower type.

**Destructive hydrogenation of oils, tars or the like.** Mathias Pier, Kurt Wissel and Walter Dinkler (to Standard-I. G. Co.). U. S. 1,949,109, Feb. 27. Material such as a tar or heavy oil, CO, etc., is heated with a hydrogenating gas under at least 20 atm. pressure in a reaction vessel the inner surface of which is formed of a Zn alloy having a m. p. above 500° such as an alloy of Zn 42, Cu 51 and Ni 7%. An arrangement of app. is described.

**Pressure-filter apparatus for separating solidified wax from diluted oil at low temperatures.** Chester E. Adams (to Standard Oil Co. of Ind.). U. S. 1,948,018, Feb. 20. Various structural, mech. and operative details are described.

**Condensation and separation of constituents of mixtures of gases, hydrocarbon vapors and steam.** Robert Pyzel (to Universal Oil Products Co.). U. S. 1,948,595, Feb. 27. Various details of structure and operation of a condensing and sepg. system are described, suitable for treating mixts. produced by hydrocarbon-oil conversion.

**Water-soluble "petroleum sulfonates."** Leo Libერთსონ (to L. Sonneborn Sons, Inc.). U. S. 1,947,861, Feb. 20. Water-sol. petroleum sulfonates in laminar form are obtained from sludges resulting from the treatment of petroleum oils with  $\text{H}_2\text{SO}_4$  and contg. green petroleum sul-

ionic acids together with non-acid org. compds., by selectively removing the non-acid org. compds., then reacting the acids with a base forming water-sol. salts, dissolving the resulting salts in a solvent and applying the resulting soln. as a thin film to a smooth heated metal surface to evaporate the solvent, so that laminae fragments can be dislodged and collected.

**Treating asphaltic oils with employment of aluminum chloride.** Ulric B. Bray and Claude E. Swift (to Union Oil Co. of Calif.). U. S. 1,948,163, Feb. 20. For producing lubricating oil, the oil is commingled with an "asphalt-pptg. solvent" such as a propane mixt. and the asphalt is removed from the oil dissolved in the solvent; solvent is removed from the substantially asphalt-free oil and the latter is treated with  $AlCl_3$  at a temp. below that at which any substantial cracking takes place, and the  $AlCl_3$  and assocd. reaction products are sep'd. from the purified oil. An arrangement of app. is described. U. S. 1,948,164 relates to a generally similar process in which the treatment with  $AlCl_3$  is at a temp. sufficiently high to convert the unstable hydrocarbons into reaction products.

**"Sweetening" gasoline.** Roland B. Day (to Universal Oil Products Co.). U. S. 1,948,565, Feb. 27. The gasoline is treated with a mixt. of a Cu compd. such as  $CuSO_4$  or Cu oxide and  $NH_4Cl$  and filtered through fuller's earth. App. is described.

**Purifying and deacidifying acid-treated gasoline.** Samuel J. Dickey. U. S. 1,949,786, March 8. Gasoline distillate which has been treated with  $H_2SO_4$  and contains sulfonates is heated, in a stream and in the absence of alkalis, to a temp. at which the sulfonates are decompd.; the stream is withdrawn from contact with any heated surface and in liquid form is immediately contacted, without previous material change in temp., with solid  $NaOH$ ; any resulting liquefied alkali is sep'd. from the stream, and the material is then fractionated. App. is described.

**"Antiknock" motor fuel.** Ludwig Rosenstein (to Shell Development Co.). U. S. 1,948,449, Feb. 20. An org. deriv. of a metallocyanic acid such as tetraisopropyl ester of hydroferrocyanic acid is added to motor fuel such as gasoline (suitably in a proportion of about 0.2-0.4%). Isopropyl alc., cyclohexanol, etc., may be used as blending agents. Cf. C. A. 27, 4390.

**Lubricating oil.** David R. Merrill and Philip Subkow (to Union Oil Co. of Calif.). U. S. 1,948,042, Feb. 20. For sepn. of a hydrocarbon oil into fractions, the oil is extd. with  $\beta, \beta'$ -dichloroethyl ether and liquid  $SO_2$  to form a raffinate phase and an ext. phase, and these phases are sep'd. from each other.

**Lubricating oils from unrefined viscous petroleum fractions.** Philip L. Young (to Standard-I. G. Co.). U. S. 1,949,231, Feb. 27. A viscous oil such as a reduced crude or lubricating stock is extd. with a selective solvent such as phenol and glycerol to sep. the oil into liquid portions of high- and low-lubricating value, and a fraction of the latter is subjected to destructive hydrogenation under a pressure above 50 atm. and at temps. of about 370-450° for conversion into oil of high-lubricating value.

**Apparatus for filtering and purifying lubricating oils.** Charles A. Winslow (to Catherine B. Winslow). U. S. 1,948,282, Feb. 20. Structural features.

**Apparatus for cleaning used oils.** Antonio E. Lega. Swiss 163,281, Oct. 2, 1933 (Cl. 384). App. for cleaning dirty used mineral oils by clarifying with an aq. alk. soln. of  $Na_2SiO_3$ , and filtering, is described.

**Lubricant for metal-drawing or stamping operations.** Robert C. Williams (to Ironsides Co.). U. S. 1,948,191, Feb. 20. A wax or wax-like material such as beeswax or carnauba wax which will remain in the form of solid or semi-solid particles at the usual operating temps. and prior to the contact of the parts to be lubricated is dispersed in a liquid vehicle such as a soap soln.

**Lubricants for textile machinery.** Deutsche Hydrierwerke A.-G. Ger. 592,267, Feb. 5, 1934 (Cl. 23c. 1) Use is made of oleic alc. or mixts. thereof with the lubricants ordinarily used.

**Wax-free blended asphalt.** Robert E. Haylett (to Union Oil Co. of Calif.). U. S. 1,948,296, Feb. 20. An oil contg. asphalt and wax, such as a crude or topped oil, is commingled with a liquefied normally gaseous hydrocarbon such as propane to sep. asphalt from the oil and wax dissolved in the solvent, as by settling, and the asphalt is removed and is then blended with oil to produce wax free blended asphalt. An arrangement of app. is described.

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**Cellulose chemistry in 1933.** D. Krüger. *Zellstoff u. Papier* 14, 89-93(1934).—A review of the literature on the structure and mol. wt. of cellulose, the homogeneity of cellulose ( $\alpha$ -,  $\beta$ -,  $\gamma$ -cellulose), the action of salt solns. on pulps, hemicelluloses, the constitution of lignin, and the chemistry of ligninsulfonic acids, with 53 references.

**Assumed non-identity of cotton and wood cellulose.** J. Barsha and Harold Hibbert. *J. Am. Chem. Soc.* 56, 748(1934).—Bell (C. A. 26, 5414) has questioned the identity of the chem. structures of cotton and wood cellulose on the basis of methylation expts. These expts. cannot be duplicated, cellulose from spruce, beech and maple giving 44.24, 43.08 and 43.72% MeO, which are not max. figures.

**The heating of cotton when bulked and its effect on seed and lint.** H. P. Smith, M. H. Byrom, D. T. Kilough and D. L. Jones. *Agr. Eng.* 14, 280-4(1933).—Heating of piled cotton is caused by excessive moisture due to pulling the cotton before it is fully mature and to the presence of green leaves and green unopen bolls. Seed taken from the surface of a pile of cotton that had been heated in storage contained 17.21% fat, whereas those from the inside of the pile contained 15.34%. Heating of the seed on the inside of the pile caused the free fatty acids to sep. more readily, and this resulted in the production of a lower grade of refined oil. There was no significant difference in the water content of seed from the inside and the outside of the heated pile. Exces-

sive heating destroyed the germinating power of the seed, lowered the grade of lint and caused a loss of 31-35% in the strength of the fiber.

**The real meaning of  $\beta$ - and  $\gamma$ -cellulose.** E. L. Ritman. *World's Paper Trade Rev.* 100, 968-74(1933).—Analysis of a no. of European pulps (sulfite, sulfate, straw and hardwood) showed that: (1)  $\beta$ -cellulose content is a linear function of Cu no.; (2) Cl absorption no. is a linear function of the sum of lignin and  $\gamma$ -cellulose. It is concluded that: (1)  $\beta$ -cellulose is real cellulose, the micelle being affected in such a way that this form of cellulose is readily dispersed by mercerizing liquor and the ability to reduce Fehling's soln. is enhanced; (2)  $\gamma$ -cellulose contains a constituent which is affected by bleaching; as pure pentosans are not affected by Cl, but are sol. in mercerizing liquor,  $\gamma$ -cellulose is probably a mixt. of pentosan and a Cl-absorbing constituent. A. Papineau-Couture

**Recent advances in the knowledge of cellulose and fiber structure, and their relation to the beating process.** Leslie G. Cottrill. *World's Paper Trade Rev.* 100, 1216, 1218, 1250-61, 1295-8, 1336-44, 1375-80, 1420, 1427, 1463-8, 1502, 1504, 1546, 1584-90(1933); *Paper Maker & Brit. Paper Trade J.* 86, TS8-16, 25-30(1933).—A review of modern concepts of the mech. and chem. structure of cellulose fibers, and their bearing on the effects produced by the beating process, both in the stock and in the paper produced therefrom. C. advances a theory which is essentially the same as that of Campbell (C. A. 24, 1976; 26, 5416; 27, 4394). A. Papineau-Couture

**Manufacture of cellulose acetate foil by drying methods.** Max Ullmann. *Kolloid-Z.* 66, 247-51 (1933); cf. *C. A.* 28, 2178<sup>a</sup>.—Patent review. Arthur Fleischer

**The dielectric strength of acetylcellulose in thin films.** D. Fedorov. *J. Tech. Phys.* (U. S. S. R.) 3, 859-69 (1933).—The dielec. strength of acetylcellulose practically coincides with those of other materials of high mol. wt.

Eino Hanninen

**Preparation of triacetylcellulose.** Ichiro Sakurada and Ryohei Inoue. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 53-5 (1934).—Eleven samples of surgical cotton were acetylated after different pretreatments. The exptl. data show that the proper pretreatment of the cellulose with water or AcOH may accelerate the reaction 50- to 100-fold. The authors feel that AcOH is to be preferred to H<sub>2</sub>O, on account of the detrimental effect of H<sub>2</sub>O upon esterification and the long periods (about 10 days) necessary for the uniform distribution of H<sub>2</sub>O.

Karl Kammermeyer

**Comparative lignin determinations by the Forest Products Laboratory and the Waldhof [Noll] methods.** August Noll and Fritz Bolz. *Papier-Fabr.* 31, Tech.-wiss.-Teil 593-6 (1933).—Contrary to the results of Lewis, *et al.* (*C. A.* 27, 4393) the 2 methods give comparable results on a wide variety of pulps. It is necessary that the sample be finely ground, and an EtOH-C<sub>2</sub>H<sub>5</sub> extn. must be used with sulfite pulps. The improved Noll method (*C. A.* 27, 2804) has been accepted as tentative standard by the German pulp chemists.

R. H. Doughty

**New light on the structure and properties of cellulose.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 86, TS1-2 (1933).—Recent work confirms statements made by S. us far back as 1923. A Papineau-Couture

**Progress of the division of industrial and cellulose chemistry, McGill University.** Harold Hibbert. *Pulp & Paper Can.* 35, 163 6 (1934).—A review of work on cellulose and lignin chemistry carried out during 1933.

A. Papineau-Couture

**Research progress in the division of physical chemistry, McGill University.** O. Maass. *Pulp Paper Can.* 35, 167-71 (1934); cf. *C. A.* 27, 2806.—A review of the work of interest to the pulp and paper industry carried out during 1933.

A. Papineau-Couture

**Research progress in the pulp and paper division of the Forest Products Laboratories (of Canada).** J. H. Ross. *Pulp Paper Can.* 35, 172-4 (1934); cf. *C. A.* 27, 3329.—A review of the work done during 1933.

A. P.-C.

**Report of the Committee on Physical and Chemical Standards (of the Technical Section of the Canadian Pulp & Paper Association).** C. A. Sanky, *et al.* *Pulp Paper Can.* 35, 74 5 (1934).—The comm. recommend: (1) adoption as official by the section of the British pulp evaluation app. and method; (2) use of the metric system, insofar as possible, as a common method for expressing test results. Appendix A. Determination of drainage factor with the British sheet machine. *Ibid.* 75.—A description of the technic of the detn., based on the work of Campbell (*C. A.* 27, 2807). Appendix B. Recent developments in classification of paper-making fibers at the pulp and paper division (of the Forest Products Laboratories of Canada). G. D. O. Jones and H. Wyatt Johnston. *Ibid.* 76 8; cf. *C. A.* 27, 2805.—Different devices for classifying fibers according to length were constructed and tested, and the theoretical basis of their action was examd. The previously described instrument has been simplified by reducing the no. of units from 5 to 2. The new arrangement has been shown to be practicable and has been adopted as a standard instrument by the pulp and paper division. Appendix C. Developments in standards during 1933. *Ibid.* 78-81.—Brief review with bibliography of 112 references. A. Papineau-Couture

**The future of cellulose and pulping processes.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 86, TS177-8 (1933).—A very brief discussion. A. P.-C.

**Drum barking.** W. Schmid. *Papier-Fabr.* 31, Tech.-wiss.-Teil 596-8 (1933).—Mech. R. H. Doughty

**Groundwood studies: theoretical efficiency.** W. Boyd Campbell. *Pulp Paper Can.* 35, 218-19 (1934).—The

amt of useful work done in grinding wood is estd. to be about 0.012% of the total energy consumed by the machine. Though some of the values used in the calcs. are admittedly not very accurate, the estns. are of value in showing the order of magnitude of the efficiency of the wood grinder; if anything, the figure arrived at is on the high side.

A. Papineau-Couture

**The problem of bamboo.** Anon. *World's Paper Trade Rev.* 100, 1121-6 (1933).—Comparative semi-com. pulping and paper-making tests were carried out on old flowered bamboos, freshly flowered bamboos and mature bamboos. The results clearly showed that flowered bamboos, even after 4 yrs. standing and though dry and dead, retained their paper-making qualities, but required slightly more drastic treatment than mature bamboo.

A. Papineau-Couture

**Report on the manufacture of newsprint from southern pine under commercial operating conditions.** L. C. Anderson. *Paper Trade J.* 98, No. 9, 31-2 (1934).—Report by an observer on the com. run of newsprint made at the Thorold mill of Beaver Wood Fibre Co., from groundwood and sulfite made from southern pine in semi-com. equipment at Savannah, Ga., which proved conclusively that newsprint could be made commercially from southern pines. The quality did not measure up to that of standard Canadian newsprint, but could doubtless be improved with pulps produced on regular com. units.

A. Papineau-Couture

**Marginal problems in mill and woodlands departments.**

F. L. Mitchell. *Pulp Paper Can.* 35, 89-94 (1934).—Howard Kennedy. *Ibid.* 95-6.—Address discussing problems of direct interest to both the woodlands department and the mill-operating departments of pulp and paper companies.

A. Papineau-Couture

**Swelling wood with water and aqueous solutions.** C. G. Schwalbe and Willi Beiser. *Papier-Fabr.* 31, Tech.-wiss.-Teil 655-67 (1933); cf. Beiser, *C. A.* 28, 1163<sup>a</sup>. The swelling of sawdust is greater in both acids and bases than in distd. water, contrary to the behavior of wood pulp, as detd. by sedimentation vol. Time and nature of previous drying treatment have a large effect; rapid drying reduces the effect of electrolytes while slow seasoning intensifies it, relative to water. No differences were noted in the effect of water and electrolytes on wood sections that could be ascribed to the inhibiting effect of structure. There was no evidence of swelling into the lumen. The factors affecting swelling are: nature of drying treatment, d., percentage of springwood and presence of hair cracks. The rate of swelling is much greater in liquid than in vapor.

R. H. D.

**The influence of temperature on the rate of natural penetration of electrolytes into wood.** O. Maass. *Can. J. Research* 10, 180 9 (1934); cf. *C. A.* 27, 1253.—The rates of diffusion of NaOH, NaCl and HCl into chips of black spruce heartwood impregnated with water were measured for different shapes of chips at 20°, 50° and 75°. In the longitudinal direction of the wood, HCl diffuses the most rapidly and NaOH and NaCl diffuse at nearly the same rates. In the lateral direction NaOH diffuses the most rapidly, because of its action on the wood. Concn. of electrolyte is practically without influence on the time to half-value for NaOH and HCl. The d. of the wood does not affect the rate of diffusion of NaOH. The rate of diffusion of water into air-dry chips was measured at 20° and 50°.

J. W. Shipley

**Report of the Committee on Pulpwood (of the Technical Section of the Canadian Pulp & Paper Association).** R. W. Sterns, *et al.* *Pulp Paper Can.* 35, 82-3 (1934); cf. *C. A.* 27, 2803.—Two com. tests carried out with the preservative "lignasan" (the toxic constituent of which is Et mercuric chloride) by spraying on wood sent to the storage pile gave contradictory results—in the 1st test the wood was in practically the same condition after storage for 9 months; in the 2nd test it was badly discolored and showed considerable surface developments of fungus after storage for 4 months. Preliminary expts. have indicated, merely as a general trend, that as the sp.

gr. of wood increases there is an almost proportionate increase in the yield of pulp per unit of wood vol.

A. Papineau-Couture

Penetration of western hemlock chips by calcium bisulfite liquor. C. E. Hrubesky and G. H. Chidester. *Paper Trade J.* 98, No. 7, 34-7(1934).—Bomb-scale penetration tests on 5/8-in. chips of western hemlock (*Tsuga heterophylla*) heartwood and sapwood, both in freshly cut and oven-dry condition, were made at const. temps. of 110°, 115° and 120°, to det. the rate of penetration of the  $\text{CaH}_2(\text{SO}_3)_2$  liquor and the time required to burn the chips. Cooking acids contg. 3, 6 and 8% total and 0.8, 1.20 and 1.20% combined  $\text{SO}_3$ , resp., were used for each of the conditions stated. The time required for penetration of moist heartwood chips with each of the acids during a uniform rate of temp. rise from 30° to 110° was also detd. Penetration was accelerated by an increase in temp. and an increase in the excess  $\text{SO}_3$  content of the liquor. It was more rapid in the sapwood than in the heartwood and was, to a very slight extent, more rapid in oven-dry than in moist woods. The temp. at which the chips were burned varied with the acid concn. and  $\text{H}_2\text{O}$  content. At 110° the only burning occurred in moist sapwood chips when treated with the 8% acid.

A. Papineau-Couture

Circulation with heating brings automatic control of cooking. A. R. MacAllister. *Pulp Paper Can.* 35, 175-6(1934).—A discussion of the Babcock-Wilcox forced-circulation, indirect-heating sulfite cooking system installed at the Kimberly-Clark mill, Kimberly, Wis. (cf. Swanson, Lang and Smith, C. A. 26, 5204-5).

A. Papineau-Couture

Digester circulation systems. G. L. M. Hellstrom. *Pulp Paper Can.* 35, 135-6, 144(1934); cf. C. A. 27, 1750.—A brief discussion of forced circulation systems for sulfite cooking with particular reference to the Hellstrom system. The chief characteristics are: (1) downward circulation inside the digester; (2) elimination of a screen at the liquor intake, a trash-type of circulating pump being used that can handle any chips that are carried by the circulating liquor; (3) introduction of a glass inspection-piece just above the pump to observe the circulating liquor.

A. Papineau-Couture

Sulfite-digester circulating systems. A. H. Lundberg. *Pacific Pulp Paper Ind.* 7, No. 10, 15-17(1933).—A brief discussion bringing out the advantages of the use of hot acid.

A. Papineau-Couture

Acid circulation and gas re-absorption. A. D. Merrill. *Pulp Paper Can.* 35, 133-4(1934).—The advantages of circulating both liquor and the gas which seeps in the top of the digester are pointed out. This effects uniform distribution of both temp. and acid concn., and also maintains the strength of the acid at a higher level during the cook, so that a weaker initial cooking acid can be used. In the *Lurgi* system, all of the circulating piping and the siphon are located inside the digester.

A. P.-C.

Probable error and accuracy of testing (in the pulp and paper industry). Ragnar Monnberg. *Paper Trade J.* 98, No. 12, 41-2(1934).—M. presents and briefly discusses the results of error detns. characterizing the accuracy which has prevailed in a com. lab. in the detn. of:  $\alpha$ -cellulose, Cu no., pitch extn., ash (all in sulfite pulp), "Mead value" test and Valley beater test.

A. Papineau-Couture

Modern practice in screening pulp. L. E. Kendall. *Pulp Paper Can.* 35, 111-16(1934).—A review of present groundwood-screening layouts and of the variables affecting groundwood-screening.

A. Papineau-Couture

Effect of various methods of preparing the disintegrated pulps before beating on the strength and other characteristics after beating. H. Ainsworth Harrison. *Paper Maker & Brit. Paper Trade J.* 86, TS175-6; *World's Paper Trade Rev.* 99, 1698, 1700(1933).—Data are presented showing that different test results may be obtained depending on the method adopted for concg. the disintegrated pulp prior to beating in the Lampén mill. It is recommended that during the concn. of all pulps the filtered liquid should be repassed through the mat of pulp till quite free from fine fibers.

A. Papineau-Couture

The changes in pulp during beating. Kristian O. Berg. *Papier-Fabr.* 31, Tech.-wiss.-Teil 605-11, 617-22(1933).—

The length-diam. ratio ( $l/d$ ) of pulp fibers may either (1) decrease continuously, (2) approach a min. or (3) pass through a min. value during beating. Behavior 3 is characteristic of slow-growth northern conifers. The measuring technic of Bergman and Backmann (C. A. 23, 5580) was used. In an attempt to find a rapid means of obtaining representative fiber dimension values a sedimentation test was developed by means of photoelectric indication of concn. changes (cf. Hart, C. A. 24, 6031). To eliminate swelling effects and to obtain suitable  $d$  and viscosity of the suspension medium, alc.-glycerol mixts. were used; the results were anomalous. Tests in 98% EtOH gave more uniform results. Based on the sedimentation curves, the rate of fiber size reduction falls off considerably as beating progresses. The particle diam. by Stokes' law (if it is assumed that the particles are spherical) and the  $l/d$  via Gans' equation (C. A. 23, 3843), calcd. from the time required for 60% sedimentation, agree fairly well with the av. values obtained by microscopic means. Fiber strength via Ruhlmann (C. A. 20, 3567), increased during beating in a way characteristic of the pulp type, reaching 18 k<sub>g</sub>/sq. mm. for strong bleached pulps. Apparently the fibers rupture at their weakest points under beating. That sheet strength passes through a max. with beating while fiber strength continually increases may result from inability of small particles to mat together in a way to develop their full strength.

K. H. Doughty

(The evaluation of) pulp characteristics. V. Hottenroth. *Papier-Fabr.* 31, Tech.-wiss.-Teil 557 78(1933).—The methods and results of extensive cooperative tests of sulfite pulps for pulping degree, lignin, ash, cellulose, wood gum, pentosans, EtOH and Et<sub>2</sub>O soly., Cu no., viscosity, swellability and microscopic characteristics are recorded and discussed. The agreement attained is fairly good, but methods should be better standardized. The lignin content or a related test (bleachability, color reaction) offers a basis for a precise chem. scale of pulp hardness. Such a system, based on pulping degree, would take no account of strength and would not be directly applicable to bleached pulps. It would force a clear distinction between the present confused concepts of hard-soft and strong-weak as applied to pulps. Much work is required to select a strength test method and set up pulp specifications based thereon. The mass of special properties required in particular pulps must also be reduced to some sort of order.

R. H. Doughty

The substitution of purified (wood) pulp for rag pulp in the manufacture of high-grade paper. S. A. Fotov. *Zellstoff u. Papier* 14, 105-6(1934).—The effects of cooking (sulfite) and bleaching on the compn., strength and other properties of spruce fibers were studied. Medium-hard sulfite has greater strength than either the hard or soft varieties. Multiple-stage bleaching is more favorable to the strength characteristics of the pulp than single-stage bleaching. Also in *Leningrad. Oblastnoi Sovet Nauch. Issledovaniya Tekh. Obshchestva Tsellyulozno-Bumazhnoi Prom. New Problems of Cellulose-Paper Production* 1933, 37-63.

S. L. Aronovskiy

Permanganate number of pulp. R. H. Wiles. *Paper Trade J.* 98, No. 11, 34-6(1934).—A detailed description is given of a technic which has been found satisfactory, but the conditions of which must be adhered to strictly to obtain good duplication of results. In order that duplicate tests should agree within 0.5 cc., not more than the following tolerances should be allowed: wt. of test specimen 1.00  $\pm$  0.02 g. (oven-dry); temp. at start of reaction 25  $\pm$  2°; time of reaction 5 min.  $\pm$  20 sec.;  $\text{KMnO}_4$  concn. N/290 to N/310; acid concn. 0.128-0.139N. Modifications which can be made in the technic for routine mill control work are indicated.

A. Papineau-Couture

Ammonium bisulfite: its use as a base in the sulfite process. E. O. Houghton. *Pulp Paper Can.* 35, 97-101(1934).—Exptl. cooks were carried out to compare the relative effect of  $\text{NH}_4$  and Ca bisulfites in cooking acid on the properties of the pulp. Increasing concn. of  $\text{NH}_4$



HSO<sub>4</sub> or combined SO<sub>2</sub> tends to increase the cooking time necessary to obtain a pulp of a desired degree of digestion. Pulp (both unbleached and bleached) cooked with a Ca-base acid have a much lower Mullen test than those cooked with NH<sub>4</sub>-base acid. For a given Cl no., the  $\alpha$ -cellulose content of the unbleached pulp is higher with Ca-base acid than with NH<sub>4</sub>-base acid. Pulp from Ca-base acid yielded considerably more screenings.

**Fungus attack on sulfite pulp.** E. Opfermann. *Papier-Fabr.* 31, Tech.-wiss.-Teil 642-3 (1933).—Fresh moist roll pulp acquired a luxurious mold growth in 5 days from a contaminated freight car.

**The annual report of pulp bleaching for 1933.** Ladislav Rys and Alfred Bönnisch. *Zellstoff u. Papier* 14, 97 100 (1934).—A review with 33 references.

**Bleach requirements of pulp.** C. O. Seborg. *Paper Trade J.* 98, No. 8, 109 (1934).—The method is as follows: weigh out 5 portions of pulp each equiv. to approx. 15 g. oven-dry pulp, place in 2-quart wide-mouthed fruit jars, mix thoroughly by a small high-speed stirrer with enough distd. water to give a consistence of 1.5–2.1% after addn. of the bleach liquor, add amts. of standardized bleach forming a series extending both above and below the estd. bleach requirements of the sample, place in a thermostat at 40  $\pm$  2° with a suitable agitating device, let bleaching proceed till a drop of starch-KI soln. added to a small portion of the mixt. produces a light blue color which persists for 5 sec. (corresponding to about 99% exhaustion of the bleach), make test sheets from the pulp after washing, air-dry between filter papers, det. the color of the sheets in a suitable color-measuring device, calc. the bleach requirement of each sheet, and est. the min. bleach requirement which gives the color accepted as standard. The method is applicable to all types of pulps, and gives results that check within 1–2% on duplicate tests and that differ by not more than 1–3% from the actual amt. of bleach required in com. bleaching.

**Review of bleaching technics.** R. T. Steedman. *Pulp Paper Can.* 35, 101–2 (1934).—An outline of the phases passed through during the past 15–20 yrs., culminating in the Thorne tower type and pre-bleaching with Cl.

**Rapid methods for the determination of bleached and unbleached fibers in pulp and paper.** M. S. Kantrowitz and R. H. Simmons. *Paper Trade J.* 98, No. 10, 46–8 (1934).—The official Bright stain requires approx. 1 hr. for staining; the malachite green-Congo red stain of Seibert and Minor (*C. A.* 15, 2183), approx. 30 min.; the method using malachite green alone, not more than 5 min., and shows a fair degree of accuracy in the hands of experienced analysts. The malachite green-Congo red stain, with various concns. of Congo red, gives erroneous results (generally low for unbleached fiber content). The Filz method (*C. A.* 25, 589) takes approx. 15 min.; it has been further simplified by eliminating 2 steps in the procedure (solns. "A" and "B" are not mixed previous to application on the fiber; the FeCl<sub>3</sub>-K<sub>3</sub>Fe(CN)<sub>6</sub> stain is not completely removed by washing; a clear soln. of benzopurpurin is used, instead of a soln. of a colloidal nature). In this form it gives fully as accurate results as the Bright method, and allows the fibers to be sepd. sufficiently from one another to permit the use of the count method in detg. percentage of bleached and unbleached fibers.

**Continuous stuff preparation.** C. W. Morden. *Pacific Pulp Paper Ind.* 7, No. 12, 11–13 (1933).—A brief outline of trends and developments at present under way in Pacific Coast mills in the field of continuous stuff prepn.

**Trade names and their significance.** Frederick C. Clark. *Paper Trade J.* 98, No. 8, 71–108 (1934).—A paper classification chart based on the decimal system is presented, by means of which the relationship between all kinds of paper may be established.

**Paper and other thin sheet materials. Flexibility or stiffness tests using the flexometer.** R. I. Martin and

G. R. Bray. *World's Paper Trade Rev.* 100, 2008–20, 2068 (1933).—Detn. of the relative flexibility or stiffness of thin sheet elec. insulating materials by means of the flexometer (F. T. Peirce, *C. A.* 25, 820) promises to have application to such materials as fabrics, papers (both untreated and varnished), leatheroid, etc. With many materials the plain rectangular strip specimen curls and kinks, sometimes to such an extent as to make any reading impossible; in such cases, by using a pear-shaped loop specimen much more consistent readings were obtained. The method of making the test and of calcg. the results is explained.

**Machinery for the manufacture of paper.** Kurt Geisler. *Eng. Progress* 15, 41 8 (1934).—A review.

**Some possible developments in machine design for low-sulfite news [print] furnishes at high speeds.** E. M. Little. *Pulp Paper Can.* 35, 110 (1934).—A discussion emphasizing the importance of improving wire drainage conditions.

**Reduction of corrosion and wear by the use of laminated resinous machine parts.** G. E. Landt. *Paper Trade J.* 98, No. 7, 38–40 (1934).—A discussion of the contribution which resinous machine parts make in securing continuous and uniform operation in the paper mill.

**The vacuum-forming paper machine. Its present field and possible future applications.** A. N. Russell. *World's Paper Trade Rev.* 101, 586 94, 632 8 (1934).—A general description of the machine, with a discussion of its practical application to the making of certain grades of paper.

**Manufacture of parchment, imitation parchment and glassine papers.** Papyro. *Papeteria* 56, 126–33 (1934). Practical operating directions.

**Waterproofing of paper.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 87, TS49 50 (1934).—A very brief discussion, giving an outline of early history of waterproofing of paper in England, a classification of water-resistant and waterproof papers and indications on the choice of such papers.

**Removal of static electrical charges from paper.** J. Rathier. *Papier* 37, 83 4 (1934).—Static electricity was effectively discharged from rolls of paper 750 mm. long and 600 mm. in diam. by exposing the end of the roll to the action of ultra-violet light for 10 min. at a distance of 1 m. from a Hg-arc lamp. Exposure for such a short period did not affect the color of the paper.

**Superficial esterification of paper.** N. Ya. Solechnik and N. N. Motovilova. *Bumashnaya Prom.* 12, No. 10, 39–43 (1933).—Paper was esterified with stearyl chloride by the method of Pringsheim, Lorand and Warel (*C. A.* 26, 6123), with such changes in the conditions of the reaction, time and temp. as to insure only a partial and superficial esterification. The lab. expts. were made in a glass app. with the exclusion of air and humidity. The paper was dried at 105°, and xylene was washed with metallic Na and redistd. The paper (4 g.) wetted with 40 g. quinoline and then heated in an oil bath with 46 g. stearyl chloride in 150 cc. xylene was washed with boiling alc and dried at 100°. The paper treated with quinoline and the soln. of stearyl chloride in xylene were preheated to the desired temp. of the esterification before use in the process. The increase in wt. of the esterified paper was 44% (esterification of 0.25 of 1 OH group) on heating 3 min. at 160° and 73% in 10 min. at 145° (0.5 of 1 OH). The products showed inferior mech. properties. Esterification to 30% decreased the hygroscopicity 50%. Esterification to 73% changed the hygroscopicity from 11.3% to 2.2% (the detns. were made at 15° in an atm. of 80% relative humidity). The elec. resistance of 73% esterified paper was  $8.95 \times 10^{14}$  as compared with  $2.04 \times 10^{10}$  for the same paper (after an exposure of 44 hrs. in an atm. of 100% humidity).

**Analysis of wool in paper.** V. Gruenman. *Papier* 37, 165–70 (1934).—A brief review and discussion of methods for the detection and detn. of wool in paper. The Kjeldahl method is considered most suitable for papers contg. no textile fibers, and the H<sub>2</sub>SO<sub>4</sub>-soln. method for papers contg. no highly lignified fibers.

**Glue in the paper industry.** E. Pallas. *Papier-Fabr.* 31, Tech.-wiss.-Teil 634-7(1933).—Analytical methods and recommendations for the use of glue sizing are given.

R. H. Doughty

The permeability of transparent papers to water and water vapor. Giulio Tocco and Emilio Cerbaro. *Boll. reparto fibre tessili vegetali staz. sper. ind. carta e fibre tessili vegetali* 5, 166-70(1933).—Results of comparative expts. are given. A new app. is suggested. G. A. B.

**The high-pressure acid system.** A. H. Lundberg. *Pacific Pulp Paper Ind.* 8, No. 2, 8-9(1934).—In this system, by varying the pressure in the pressure tower and the amt. of gas sent through the compressor, it is possible to produce at any time sulfite acid of desired total and combined  $\text{SO}_2$ , regardless of the water temp. and water contents of wood and steam. A. Papineau-Couture

Colorimetric determination of the  $p_{\text{H}}$  of turbid and colored solutions in the paper industry. Maurice Déribéré. *Papeterie* 56, 118-25(1934).—A description of the construction and operation of Caillé's ionocolorimeter (C. A. 22, 2495). A. Papineau-Couture

**Application of  $p_{\text{H}}$  value to titrimetric analysis.** A. Nicollet. *Papier* 37, 55-68(1934).—An explanation of the application of  $p_{\text{H}}$  values to titrimetric analysis, more particularly of liquors used in pulp manuf. A. P.-C.

**Studies in sizing, sizing troubles, and the preparation of rosin size.** Eicke. *Papier-Fabr.* 31, Tech.-wiss.-Teil 667-73(1933).—Practical mill experiences and tests made to eliminate operating troubles are reported. An explanation of sizing which differs in part from accepted theories but at least takes account of all the observations is offered. It is shown that salts present in water or pulp are not as deleterious as has been supposed. The sizing is improved when white water is used in the beaters. The effect of  $p_{\text{H}}$  seems to be mainly on the sintering point and floe size of the rosin ppt.; at optimum  $p_{\text{H}}$  the sintering point is below the drier temp. but the floe size is not yet large enough to destroy the sizing effect. The most important factor is the specific nature of the pulp, which depends on the wood and the cooking treatment. In particular, the ease of sizing runs parallel to the pentosan content (cf. Young and Rowland, C. A. 27, 5988). Methods of prep. size are discussed; the dispersity of the size soln. and of the ppt. in the beater are the factors which must be controlled for successful mill operation.

R. H. Doughty

**A sizing test and a sizing theory.** R. M. Cobb and Donald V. Lowe. *Paper Trade J.* 98, No. 12, 43-6(1934).—A new test for estg. the liquid resistance of papers is proposed and described. It consists essentially in detg. the amt. of liquid absorbed in a given time, is applicable to specimens that vary in thickness, and is particularly useful on all heavy stock, on hard-sized light stock, and for sizing research on hand-made sheets. The difference between surface sizing and internal sizing is shown to be due in part to difference in energy release. Internal sizing is effective only against liquids of poor wetting properties. Surface sizing seems to differ from internal sizing not only because of a difference in protective film at the surface and sheet structure, but also because of the difference between surface wetting and immersion wetting. A. Papineau-Couture

**Gloss and its measurement.** A. Klughardt. *Papier-Fabr.* 31, Tech.-wiss.-Teil 521-4(1933).—Reflected light is measured at various selected angles to the sheet. By means of the Lambert and Fechner laws and the Ostwald brightness scale these measurements are calcd. to apparent gloss,  $G$ .  $G$  depends on the fundamental brightness  $h_0$ , and for equally smooth surfaces is inversely proportional to it. From this relation the optical smoothness can be evaluated (cf. following abstr.). R. H. D.

**Gloss and smoothness.** A. Klughardt. *Papier-Fabr.* 31, Tech.-wiss.-Teil 697-705(1933).—The Ostwald brightness scale is redivided into physiologically equal parts. The gloss value  $G$  (cf. preceding abstr.) is a linear function of brightness expressed in these units, and can by this means be corrected for brightness, color and  $n$  of the surface elements. This leaves of the factors controlling

$G$  only the orientation of the surface elements, or surface smoothness, which is thus evaluated. At present too little is known of the  $n$ s of paper-making materials to develop the full use of the method; it is offered for trial and criticism. Representative data are given. R. H. Doughty

**Dyestuff problems (in the paper industry).** J. R. Roberts. *Paper Mill* 57, No. 4, 4, 10(1934).—A brief discussion of fastness to light, to acid, to alkali and to Cl and of 2-sidedness. A. Papineau-Couture

**Improvements in the production of light-fast shades by beater coloring.** M. Niederhauser. *Papier* 37, 71-3(1934).—Attention is drawn to the merits of Diazol Lumière, Solanthrene and Lutetia dyestuffs, of Etablissements Kuhlmann, for the production of fast shades on bleached pulps. A. Papineau-Couture

**Some problems of fading (in the paper industry)**

Julius Grant. *World's Paper Trade Rev.* 100, 1866, 1904, 1906, 1944, 1946, 1984-9(1933); *Paper Maker & Brit. Paper Trade J.* 87, TS59-63(1934).—The possibilities of making fading tests by noting the min. time required to produce a change in the fluorescence of the sample when exposed to unfiltered light of the Hg-arc lamp were investigated, and the results indicated that: (1) concordance with sunlight tests is not perfect, the greatest divergencies being experienced with basic colors and pigments; (2) the accuracy of the method is comparable to that obtained with the C arc, and the method is superior to the use of the Hg lamp to produce a fading visible in daylight; (3) the method is particularly suited for routine testing, where colors of known nature are under investigation; (4) on account of the rapidity of the test, the influence of temp. or humidity is minimized; (5) the unfiltered light of the Hg arc gives much more rapid and consistent results than the filtered light; (6) the appearance of the fluorescence varies according as the specimen is exposed to filtered or unfiltered light, to daylight, or to heat treatment, even if these processes produce changes which appear identical when viewed in daylight. With Prussian blues, C blacks and chrome yellows, the method gave fairly satisfactory results; with 2 competitive ultramarines, there was a rapid change (practically the same in both cases) in the fluorescence as viewed in ultra-violet light, while observation by daylight (after exposure to ultra-violet light) differentiated distinctly between the 2; the rapid initial change in fluorescence was traced to the action of the ultra violet rays on the paper, as distinct from the color. Artificial stimulation (ultra-violet light, C arc, heat) produces a more marked decrease in the folding resistance than natural exposure (daylight), and this decrease is greater for paper that has been treated with starch; there is no conclusive proof that accelerated aging tests produce the same changes in the fiber as natural aging. Sizing lowers slightly the stability of the color of undyed and sun-bleached pulp, and bleaching raises the natural color stability (possibly because of removal by bleaching of a light-sensitive constituent). When paper is exposed to tropical conditions, with increase in the Cu no. of the hall-stuff the stability to direct light increases and the stability on storage out of light decreases, indications that, under such conditions, there are at least 2 factors at work, one due to light and the other to other climatic conditions, the latter being the more important from a practical standpoint. Preliminary expts. indicated that: (1) light of short wave length tends to destroy resistance to water penetration conferred by rosin sizing; (2) heat, even for prolonged periods, has no deleterious effect on water penetration; the latter is sometimes even improved by heat treatment, apparently because of the action of heat on cellulose rather than on the size materials; (3) tub sizing exerts no protective nor deleterious effect on paper exposed to daylight, ultra-violet light, tropical light, C arc, or heated at 100° for 6 hrs.; (4) ultra-violet light seems to have less action on the water resistance of colored than of white papers, presumably because the coloring matter can absorb such light. A. Papineau-Couture

**Zinc sulfide pigments in today's paper industry—their incorporation and the resulting products.** V. A. Belcher. *Paper Trade J.* 98, No. 11, 37-9(1934).—The use of  $\text{ZnS}$

pigments to increase the opacity of a sheet permits the use of lighter sheets for mailing. New uses for ZnS pigments include: waxing paper for food wraps, boxboard, absorbent paper, fruit wraps, paper pie plates.

**Color problems in fillers.** John R. Roberts. *Paper Mill* 56, No. 43, 9-10(1933).—A brief discussion of the problems in paper coloring occasioned by the use of fillers.

**Beating and coloring problems.** H. C. Reimer. *Paper Mill* 56, No. 52, 4(1933); *Pacific Pulp Paper Ind.* 7, No. 12, 8(1933).—A brief discussion indicating remedies for 2-sidedness and mottled fibers.

**Visible and tangible effects of beating.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 86, TS17-19(1933).—An explanation of the visible effects of beating on fibers.

**Curl in sulfite papers.** W. A. Ketchen. *Pulp Paper Can.* 35, 103-9(1934).—Curling is essentially due to 2-sidedness of the sheet with respect to H<sub>2</sub>O content, and can be largely eliminated by adjusting conditions so that both sides of the sheet have the same H<sub>2</sub>O content when it leaves the paper machine and also when it is used, either by the printer or by the converter.

**Microscopic and micrographic testing of paper.** A. R. Matthis. *Ann. chim. anal. chim. appl.* 16, 97-112(1934); cf. *C. A.* 28, 2293<sup>3</sup>.—The microscopic appearances of some of the fibers likely to be encountered are shown and described. The prepn. of the sample for microscopic examn. is also considered.

**Imperishable documents.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 87, TS33-4(1934).—From a brief discussion of the Digby process\* (Pt printing on sheet Au) from both a common-sense and a scientific point of view, it is considered extremely unlikely that this method of preserving valuable records will ever become a practical proposition.

**Production of printing paper from waste paper.** B. N. Moiseev and P. V. Shumilov. *Bumazhnaya Prom.* 12, No. 9, 48-51(1933).—A general discussion. C. B.

**Breaker beaters for old papers.** Fritz Hoyer. *Wochbl. Papierfabr.* 64, 790-1, 809-12(1933).—Nine designs are illustrated and discussed, with patent citations.

**A revolutionary de-inking process.** Alex. Annandale. *World's Paper Trade Rev.* 100, 1077-8(1933).—The process consists in pulping the waste papers in a breaker heater in presence of a mixt. of chemicals (the nature of which is not disclosed) and washing in a specially designed washer, the whole operation requiring less than 1 hr. Its advantages are briefly indicated.

**Reprocessing printed groundwood papers.** Sidney D. Wells. *Paper Trade J.* 98, No. 10, 41-3(1934).—A new process is described wherein groundwood papers printed with an ink having an Fe lake of hematein as a pigment are re-used by removing the ink by the reducing and solvent action of SO<sub>2</sub> soln. on the wet stock which has been nodulized in rod mills.

**Results on newsprint obtained by use of the Bekk smoothness and porosity tester.** L. C. Anderson. *Pulp Paper Can.* 35, 85-6(1934).—A study of the instrument as used for the testing of standard newsprint (33 lb. basis wt.) showed that the time factor for converting results by the "rapid" method to those by the "precise" method is about 10.6; that the time with the "rapid" method must be read to 0.1 sec. to obtain the same accuracy as with the "precise" method; and that there is a rather large probable error in testing newsprint due to lack of uniformity, so that at least 10 (and preferably 20) tests should be made to obtain a good av. value.

**Water resistance of paper board.** Philip W. Codwise. *Paper Trade J.* 98, No. 10, 43-5(1934).—A description of an adaptation of the dry-indicator test which is considered suitable as a standard method for detg. H<sub>2</sub>O penetration through paper board.

**Safety papers.** James Strachan. *Paper Maker & Brit. Paper Trade J.* 86, TS161-2(1933).—The principal

methods used for making modern safety papers are indicated.

**Residual waters of paper factories.** R. Escat Serra. *Quim. e ind.* 10, 333-8(1933).—A general outline of the utilization and disposition of waste liquors of paper factories.

**Corrosion prevention by protective coatings in the industries of viscose rayon and viscose films (Oll) 9.** Adsorption and swelling of cellulose in electrolyte solns. of varying concns. (Kanamaru) 2. Chemistry of lignin (Phillips) 10. Formation of components of wood from the plant sap—fructose as the source of "lignin" (Wislicenus, Hempel) 11D. Esters for use as plasticizers for pyroxylin (U. S. pat. 1,949,093) 10.

**α-Cellulose.** Adolf Basler. *Ger.* 591,516, Jan. 23, 1934 (Cl. 55b. 1.40). Grasses are treated first with aqua regia and then with alkali.

**Continuous system for recovering cellulose from wood, etc.** Victor Jansa and Gunnar Planck. *Ger.* 592,332, Feb. 5, 1934 (Cl. 55b. 2.10).

**Cellulose esters.** Carl J. Malm and Charles L. Fletcher (to Kodak Ltd.). *Brit.* 401,918, Nov. 23, 1933. The esterification of fibrous cellulose or cellulose derivs. contg. free OH groups, e. g., cotton linters, surgical cotton wool, sulfite wood pulp, hydrocellulose, etc., is carried out in a reaction mixt. contg. an ether of h. p. above 70° as diluent, e. g., Pr, Bu, iso-Bu, Am and iso-Am ethers. Examples are given.

**Cellulose esters.** Lonza Elektrizitätswerke und Chemische Fabriken A.-G. (Giorgio Renato Levi and Guiseppe Benaglia, inventors). *Ger.* 591,755, Jan. 26, 1934 (Cl. 12o. 6). Esters contg. N are obtained by treating cellulose with an anhydride of a monocarboxylic acid contg. N, such as cyanoacetic acid, amino- or acetyl amino-benzoic acid, nitrobenzoic acid, etc. Alternatively cellulose may be treated with an acid such as AcOH and the CN group finally introduced. These esters have a strong affinity for dyes. Examples are given. Cf. *C. A.* 28, 634<sup>8</sup>.

**Cellulose esters.** C. F. Boehringer & Soehne G. m. b. H. (Richard Muller, Martin Schenck and Wilhelm Wirhatz, inventors). *Ger.* 591,936, Jan. 20, 1934 (Cl. 12o. 6). Addn. to 581,827 (*C. A.* 28, 1196<sup>9</sup>). In esterifying cellulose, nitromethanedisulfonic acid is used as the catalyst instead of methanedisulfonic acid. Examples are given. In one, cotton is esterified by treatment with Ac<sub>2</sub>O, C<sub>6</sub>H<sub>5</sub> and H<sub>2</sub>SO<sub>4</sub> in the presence of nitromethanedisulfonic acid as catalyst to give a product contg. 62.5% of AcOH.

**Cellulose esters.** I. G. Farbenind. A.-G. *Fr.* 757,319, Dec. 23, 1933. Fibrous cellulose or fibrous derivs. of cellulose are partly or completely esterified to produce esters, mixed esters or ether esters which retain the fibrous structure, by carrying out the esterification in the presence of a mixt. of chlorinated aliphatic hydrocarbons and org. liquids which have the power of reducing the solvent power of the reaction mixt. for the esters formed. Examples are given of the use of a mixt. of CH<sub>2</sub>Cl<sub>2</sub> and toluene, C<sub>2</sub>H<sub>5</sub>Cl<sub>2</sub> and AcOEt, and CH<sub>2</sub>Cl<sub>2</sub> and CCl<sub>4</sub>.

**Precipitating cellulose esters such as cellulose acetate, propionate or benzoate.** Donald B. Mason (to U. S. Industrial Alc. Co.). *U. S.* 1,949,213, Feb. 27. A stream of soln. of the ester dispersed in liquid SO<sub>2</sub> is discharged under pressure and commingled with a stream of pptg. agent such as water and steam under such conditions as to vaporize and release the SO<sub>2</sub> as pptn. of the cellulose ester is effected, the ester being obtained in loose condition suitable for various subsequent treatments. App. is described, and U. S. 1,949,214 also relates to such app.

**Cellulose ester and ether articles.** Celluloid Corp. *Brit.* 402,877, Dec. 14, 1933. Articles made of or contg. cellulose esters or ethers, e. g., sheets, photographic films, fountain-pen parts, containers, screw caps and other closures for bottles, parts of elec. app., are rendered resistant to H<sub>2</sub>O, acids, alkalis, gases or vapors and org. solvents by coating with a material comprising a polym-

erized vinyl hydrocarbon, particularly polymerized styrene or its homologs, ethylstyrene or *p*-methylstyrene. The coating must not contain a (synthetic) resin. Plasticizers or softening agents, drying oils, cellulose ethers and pigments or dyes may be incorporated. The polymerized compd. is preferably applied as a soln. in an org. solvent, *e. g.* (halogenated) hydrocarbons.

**Cellulose derivative compositions.** British Celanese Ltd. and Wm. H. Moss. Brit. 402,071, Nov. 15, 1933. A solid moldable plastic compn. is prepd. by admixt. of a cellulose ether or ester with at least its own wt. of a synthetic resin which consists substantially of or includes a phenol-ketone-aldehyde resin, preferably the diphenoxypropane-CH<sub>2</sub>O resin prepd. according to Brit. 299,065 (C. A. 23, 3115). The preferred addnl. resin is a phenol-aldehyde resin prepd. with acid catalyst. Suitable proportions of fillers, *e. g.*, china clay, bentonite, and of plasticizers are used. The product is used for the prepn. of gramophone records.

**Improving the color of organic derivatives of cellulose such as cellulose acetate.** Camille Dreyfus and George Schneider (to Celanese Corp. of America). U. S. 1,948,517, Feb. 27. Directly after pptn., the material is treated with a soln. such as NaOCl which is capable of liberating Cl<sub>2</sub> at temps. above 50°, and then washed and dried. Cf. C. A. 27, 4395.

**Precipitation and dehydration of cellulose derivatives** Donald B. Mason (to U. S. Industrial Alc. Co.). U. S. 1,948,625, Feb. 27. Streams of a soln. of a cellulose deriv. such as a soln. of cellulose acetate in liquid SO<sub>2</sub> and a precipitant such as water are commingled and the pptd. cellulose deriv. is centrifuged for dehydration. App. is described.

**Plasticizing cellulose derivatives such as cellulose acetate.** George Schneider (to Celanese Corp. of America). U. S. 1,949,434, March 6. An org. deriv. of cellulose such as cellulose acetate is caused to absorb plasticizers such as dimethyl phthalate and triphenyl phosphate in the presence of a penetrating agent such as Turkey-red oil and xylene while both materials are suspended in a liquid such as water.

**Cellulose acetate.** Ernst Berl. Brit. 402,692, Dec. 7, 1933. Addn. to 381,991 (C. A. 27, 4395). The process of 381,991 is modified by passing the pretreating liquor and (or) the acetylating liquor intermittently or continuously through the cellulose while the latter is kept in a quiescent state, *e. g.*, supported on 1 or more perforated plates. The resultant fibrous cellulose triacetate may be treated with a warm neutral salt soln., *e. g.*, 2% Na<sub>2</sub>SO<sub>4</sub> at 80°, to render it stable.

**Improving the stability of acyl celluloses such as cellulose acetate.** Erich Correns and Albert Möhring (to I. G. Farbenind. A.-G.). U. S. 1,948,903, Feb. 27. The material is treated with a hydrolytically acting agent such as very dil. aq. or alc. H<sub>2</sub>SO<sub>4</sub> soln. at atm. pressure and at temps. up to 100°, and the process is interrupted before any of the org. acyl groups are split off.

**Increasing the tensile strength of cellulosic material such as cotton by artificial ultra-violet radiation.** August J. Pacini (to Milprint Products Corp.). U. S. 1,948,276, Feb. 20. The material is subjected to the action of artificially produced ultra-violet radiation controlled to prevent the formation of detectable oxycellulose.

**Copper oxide-ammonia cellulose solutions.** Emil Hubert and Karl Weisbrod (to I. G. Farbenind. A.-G.). U. S. 1,947,939, Feb. 20. A cellulose soln. is prepd. in aq. CuO-NH<sub>3</sub> in the presence of a cyanide such as KCN, K<sub>2</sub>FeC<sub>6</sub>N<sub>6</sub> or cyanoacetamide, which serves to inhibit depolymerization of the cellulose.

**Apparatus for fibering and cleaning cellulose.** Felix Göbl and Sixten M. Hjelte. Ger. 591,658, Jan. 24, 1934 (Cl. 55c. 12).

**Apparatus for producing closed-ended tubes of celluloid or the like.** John N. Whitehouse. U. S. 1,948,605, Feb. 27. Structural and mech. details.

**Lignin derivatives suitable for use as adhesives, fillers and sizing.** Guy C. Howard. U. S. 1,948,858, Feb. 27. A heated aq. dispersion contg. free lignin sul-

fonic acid and which is substantially free from nonligneous org. matter is exposed to an atm. such as air and water vapor which is favorable to a substantially complete escape of SO<sub>2</sub> from the dispersion. An arrangement of app. is described. Various other details and modifications of procedure also are described.

**Piston pump for viscose.** Gustav Krienelku. Ger. 592,400, Feb. 6, 1934 (Cl. 59a. 15).

**Regenerating viscose.** Wm. D. Wolfe (to Wingfoot Corp.). U. S. 1,948,323, Feb. 20. A viscose-contg. film is treated with a compn. contg. water, a sol. org. polyhydroxy compd. such as glycerol or dextrose and borax or boric acid.

**Rayon.** Feldmühle A.-G. vorm. Loeb, Schoenfeld & Co. Rorschach. Swiss 164,803, Jan. 2, 1934 (Cl. 18b). Fine rayon is spun from viscose to which a higher fatty alc., such as that obtained by reducing ricinoleic acid, has been added during its ripening.

**Colored rayon.** Henry Dosne. Brit. 403,049, Dec. 14, 1933. Regenerated cellulose materials in the form of threads, ribbons, films, etc., are obtained directly in a dyed state by adding to the viscose, etc., soln. an ester salt of a substance yielding by acid oxidation a colored compd., preferably an ester salt of a leuco vat dye, the color being developed simultaneously with or subsequent to coagulation. Alternatively the cellulose soln. may be applied to a fabric and the color similarly developed during or after coagulation of the effect coating. In examples colored viscose and cuprammonium threads are produced by using salts of the acid sulfuric esters of leucoindigo, leuco-6,6'-diethoxyindigo, leucodimethoxydibenzanthrone, leucodibenzopyrenequinone, 3,3'-dichloro-1,2,2',1'-dianthronequinoneazine, etc., suitable oxidizing agents being NaNO<sub>2</sub>, Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, CuSO<sub>4</sub> and FeCl<sub>3</sub>.

**Rayon, etc.** Henry Dreyfus. Fr. 757,276, Dec. 22, 1933. In making filaments, ribbons, cloth, etc., org. derivs. of cellulose which contain NH<sub>2</sub> groups and which are prepd. from substances contg. a relatively low proportion of N are incorporated with the cellulose acetate or other org. deriv. of cellulose. Fast dyes, particularly with anthraquinone derivs., are obtained on the products. Thus, a spinning soln. contains a mixt. of cellulose acetate and the product obtained by the action of NHEt<sub>3</sub> on cellulose chloroacetate (cf. Brit. 320,842, C. A. 24, 2599) or the product obtained according to Fr. 704,871 (C. A. 25, 4705).

**Rayon, etc.** Henry Dreyfus. Fr. 757,324, Dec. 23, 1933. Di- or poly-glycerols, their esters and ethers (including cyclic ethers and cyclic ether esters) are used for drawing threads, etc., contg. org. derivs. of cellulose. Substances include diglycerol, polyglycerol acetate, diglycerol mono-, tri- and tetra-acetates, diethyl deriv. of diglycerol chlorohydrin, monoacetyl deriv. of diglycerol trichlorohydrin and acetyl derivs. of triglycerol tetra-chlorohydrin.

**Artificial threads.** British Celanese Ltd. and Wm. I. Taylor. Brit. 401,652, Nov. 14, 1933. Threads are produced from a plurality of artificial filaments contg. org. derivs. of cellulose, particularly cellulose acetate, by causing them to adhere superficially to one another by application thereto of a substance exerting a solvent or softening action, the adherence being effected without substantial alteration in the cross-sectional form of the filaments, to yield a product having a flexibility substantially equal to that of an ordinary thread of similar compn. and from which individual filaments can be withdrawn substantially without rupture.

**Apparatus for producing artificial threads of materials such as cellulose acetate.** Henry Dreyfus and Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,949,004, March 6. Various structural and operative details are described.

**Films, artificial threads.** Cyril W. Bonniksen and Protectoglass Ltd. Brit. 402,784, Dec. 4, 1933. The formation of bubbles during the coagulation of cellulose ester films, sheets or threads is obviated by subjecting the ester soln. before use to a vacuum to remove air and also

by deaerating the coagulation liquid by boiling or vacuum treatment. App. is described.

**Cellophane yarn.** Earl W. Twitchell. U. S. 1,949,065, Feb. 27. A ribbon of sheet cellulose having a straight edge and an irregular edge is twisted to form a yarn of substantially uniform diam. but varying in flexibility throughout its length. App. is described.

**Sheet-metal spinning jet for producing artificial filaments, yarns, threads, etc.** Henry Dreyfus. Brit. 401,732, Nov. 20, 1933.

**Dry-spinning cell for rayon, etc.** "Chatillon," Società anon. italiana per la seta artificiale. Brit. 395,115, July 13, 1933. Addn. to 372,503 (C. A. 27, 3607).

**Blowpit operation.** Robert W. French (to Hammermill Paper Co.). U. S. 1,947,707, Feb. 20. A blowpit is filled with liquid to a level above the drainage surface; the contents of a digester are blown into the pit in the presence of the liquid, and a continuous circulation of a portion of the same liquid is maintained during the blowing operation. App. is described.

**Apparatus for digesting wood chips, etc.** Sidney D. Wells. U. S. 1,949,669, March 6. App. is described provided with a measuring device adapted to feed a cooking liquor (such as alk. liquor for making kraft pulp) from a supply tank to a digester at a controllable rate.

**Pulp production from wood.** Carl B. Thorne. U. S. 1,947,888, Feb. 20. Liquids and solids are discharged from a digester into a blowpit, liquids are allowed to drain from the blowpit, and the liquids are pumped back into the blowpit until a sufficient quantity of the solids has accumulated in the blowpit to form a filter for the liquids. App. is described. U. S. 1,947,880 relates to pulp manuf. in which material such as wood is cooked in a digester, fluids relieved from the upper part of the digester are passed through a heat exchanger to recover heat from them and, after the cooking operation has been completed, solids and liquids from the bottom of the digester are discharged into a blowpit, liquid from the blowpit is drained and passed through a heat exchanger, and circulating liquid to be heated is passed through the heat exchanger countercurrent to the hot fluids from the digester. App. is described.

**Refined cellulose pulp.** George A. Richter (to Brown Co.). U. S. 1,949,549, March 6. An alkali-liberated and alkali-refined cellulose pulp is prepd. (suitably from wood) so that it has an  $\alpha$ -cellulose content of at least 93% and a tear resistance of at least about 50% greater than that of the unrefined pulp (the preparatory treatment suitably including heating for 30 min. to 2 hrs. at 30° with 5-8% NaOH soln.).

**Disintegrating, hydrating and partially dewatering cellulose pulp stock.** Wm. T. Doyle (to Sturtevant Mill Co.). U. S. 1,949,534, March 6. Various details of app. and operation are described.

**Apparatus for purifying pulp, cellulose, etc.** Maschinenfabrik zum Buderhaus and Willy Wamser. Ger. 583,551, Dec. 9, 1933 (Cl. 55d. 2.01).

**Paper-pulp refining apparatus.** Judson A. DeCew. U. S. 1,947,900, Feb. 20. Structural and mech. details.

**Beating or refining engine for paper pulp.** John Gell. Brit. 401,536, Nov. 16, 1933.

**Aqueous fibrous pulp suitable for sheets or molded articles.** Harry C. Fisher (to Richardson Co.). U. S. 1,949,249, Feb. 27. A mixt. of fibers such as those of sulfite pulp or cotton linters is formed with an adhesive binder such as asphalt to individualize and coat the fibers, a substance is further incorporated such as "Kontakt" which will aid in partially washing away the adhesive coating of the fibers, and the mixt. is beaten with wax.

**Paper.** Daniel A. Smith (to Dist. of Columbia Paper Mfg. Co.). U. S. 1,949,188, Feb. 27. An over-sized paper sheet is formed from which a strip is then cut at a point removed from the cylinder mold, the pulp of the cut strip being then returned to the stock supply vat. An arrangement of app. is described.

**Paper.** Armand Deplanche. Fr. 757,540, Dec. 28, 1933. Paper for checks, etc., has a sensitive product ap-

plied to its surface which is immediately scraped while drying to allow only a very thin film to remain on the surface. Any subsequent washing or scraping will destroy the film.

**Apparatus for disintegrating fibrous materials for paper making.** Hans Unglaub. Ger. 591,780, Jan. 26, 1934 (Cl. 55d. 12).

**Shell lining for Jordan engines.** Frank M. Gloyd (to Simonds Worden White Co.). U. S. 1,947,644, Feb. 20. Structural and mech. features.

**Paper-making apparatus.** Hans Krenn. Ger. 592,476, Feb. 9, 1934 (Cl. 55d. 33.01). Means is described for regulating a paper-making machine so that a product of const. wt. per sq. m. is obtained.

**Paper-making apparatus with nozzles for treating the paper web with hardening agents, etc.** Leon M. Yoerg (to American Writing Paper Co.). U. S. 1,948,874, Feb. 27. Various structural and operative details are described.

**Suction-box for paper-making machine.** Rohrbacher Lederfabrik Jos. Poeschl's Söhne A.-G. Austrian 136,501, Feb. 10, 1934 (Cl. 55b). Addn. to 133,780 (C. A. 27, 4925).

**Driving mechanism for paper-making machine.** Karl Schönmann. Ger. 592,125, Feb. 1, 1934 (Cl. 55d. 25).

**Drive for calenders of paper-machines, etc.** Eric H. Laabs (to Igranite Electric Co. Ltd.). Brit. 401,538, Nov. 16, 1933.

**Perforated rubber-surfaced rolls for paper-making apparatus.** Earl E. Berry (to Beloit Iron Works). U. S. 1,947,636, Feb. 20. Structural and mech. details of manuf.

**Press roller for paper-making and other machines.** Frank Reddaway and Jabez Muskett. Brit. 401,800, Nov. 23, 1933.

**Device for regulating the dehydration of stuff-conveying bands in paper-making machines.** Firma J. M. Voith. Ger. 591,715, Jan. 25, 1934 (Cl. 55d. 8.01).

**Machine for making laminated paper.** Beloit Iron Works. Ger. 592,396, Feb. 8, 1934 (Cl. 55d. 8.10). See Brit. 380,599 (C. A. 27, 5540).

**Apparatus for treating paper with bleaching, sterilizing and deodorizing baths, etc.** Wm. R. Redd. U. S. 1,949,330, Feb. 27. Mech. features.

**Apparatus for drying paper.** Frank C. Ladd. U. S. 1,949,125, Feb. 27. Structural and mech. details.

**Nitrating paper.** Milton O. Schur, Benjamin G. Hoos and Thomas C. Morris (to Brown Co.). U. S. 1,948,943, Feb. 27. Paper is nitrated after transferring waxy material such as 0.1% of paraffin from a transfer surface such as a roll to the outermost fibers of the paper, in order to inhibit undesired by-reactions. U. S. 1,948,944 (Milton O. Schur, to Brown Co.) relates to a process in which compact sheets of cellulosic material such as wood-pulp sheets are steeped in a stationary bath in a bath of nitrating acid to which addnl. acid of the desired compn. is fed while acid is progressively withdrawn from the bath as nitration proceeds. App. is described.

**Coating paper, etc.** Carrier-Ross Engineering Co. Ltd. Brit. 401,980, Nov. 23, 1933. Webs of paper, etc., are coated by applying an excess of coating material with 1 roll, removing the coating from the surface of the web by a 2nd roll, removing excess coating material from the 2nd roll and re-applying the coating material remaining on the 2nd roll to the web. App. is described.

**Sizing paper with a "synthetic super-resin" of petroleum origin.** Carleton Ellis (to Standard Oil Development Co.). U. S. 1,948,442, Feb. 20. Paper is treated with a synthetic resin compn. such as an emulsion comprising gas-oil synthetic resin and paraffinic acids obtained by the oxidation of paraffin wax.

**Recovery of rosin size from paper.** Shigenari Yano. U. S. 1,949,000, Feb. 27. Rosin-sized paper is submitted to steaming at 55-100°.

**Applying adhesives to the surface of webs such as those of paper or metal foil.** John A. Johnson. U. S. 1,949,419-20, March 6. Various details of app. and operation are described.

**Apparatus for applying substances, e. g., gum, to a web**

of material such as paper or cardboard. Anciens Etablissements L. Chambon (to Chambon Ltd.). Brit. 402,007, Nov. 23, 1933.

Corrugated board suitable for shipping containers, etc. Charles L. Keller (to Richardson Co.). U. S. 1,940,255, Feb. 27. A corrugated board is formed with at least one inner ply and at least one corrugated filler ply formed from the felted product of a pulp contg. asphalt in minute

uncoated particles and vegetable fibers in intimate and stable relation, consolidated under heat and pressure.

Cigaret paper. Neuburg'sche Verwaltungsgesellschaft m. b. H. Ger. 591,744, Jan. 26, 1934 (Cl. 55f. 16). See Fr. 747,943 (C. A. 27, 5189).

Waterproof cigaret paper. Louis P. Schweitzer and Wm. P. Schweitzer. Brit. 402,346, Nov. 30, 1933. See U. S. 1,909,924 (C. A. 27, 4082).

## 24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Modern explosives. Guido Guastalla and Giovanni Raccui. *Industria chimica* 8, 1533-7 (1933); cf. C. A. 28, 2185<sup>7</sup>. — Picryl sulfide is discussed. A. W. Contieri

Modern war explosives. Franco Grotjanelli. *Atti congresso naz. chim. pura applicata* 4, 81-97 (1933). — A review of recent developments. B. M. Symmes

The thermic analysis of explosives. T. Tucholski. *Acta Phys. Polonica* 1, 351-5 (351 in French) (1932); cf. C. A. 25, 4798; 28, 1584<sup>7</sup>. — The thermic analysis of alkali and alkali earth picrates reveals a change of the initial temp. of explosion with the at. no. of the cation. If heated slowly the picrates show 2 distinct phases: in the first dehydration takes place; in the second an exothermic decompn. takes place ending in an explosion. The temp. just before the explosion is higher than the initial temp. of the explosion itself. J. Wiertelak

Pentrit and Hexonit. An experimental contribution to the theme of high brisance in military and civil respects. Alfred Stettbacher. *Nitrocellulose* 4, 179-84, 189-206, 222-7 (1933); 5, 6-12 (1934). — Pentrit is a mixt. of nitroglycerin and pentaerythritol tetranitrate (I). Hexonit contains at least 10% of hexogen (trimethylenetrinitramine) in place of I. Pentaerythritol and (C<sub>12</sub>H<sub>22</sub>N<sub>4</sub>) can be nitrated by concd. HNO<sub>3</sub> alone, no H<sub>2</sub>SO<sub>4</sub> being needed to give good yields. Many tests of explosive effects are shown. B. M. Symmes

The inflammability of painted wood. C. A. Lobry de Bruyn. *Verhroniek* 6, 322-5 (1933). — To measure the inflammability of painted wood, the method of Truax and Harrison (*Proc. Am. Soc. Test Materials* 29, 973 (1929); 30, 463 (1930)) is recommended. Exptl. results are given. B. J. C. van der Hoeven

Explosive force and its determination. I. A. Haid and H. Koenen. *Z. ges. Schiess-Sprengstoffw.* 28, 369-72 (1933). — A discussion of theory. II. *Ibid.* 29, 11-14, 37-9 (1934). — A modification of Kast's app. for measuring explosive force by the compression of Cu cylinders is described. In order to allow for the fact that the force exerted by the explosive is not directly proportional to the linear compression of the cylinders, the compression in mm. is converted into "compression units" which indicate the relative brisance of the explosives. Comparative results were as follows: dinitrobenzene 6.2, TNT 10.1, picric acid 12.2, tetryl 14.0, tetranitropentaerythritol 17.0, Hg(NCO)<sub>2</sub> 18.6. C. G. Storm

Microscope as aid to study of detonation. A. Michel-Lévy and H. Muraud. *Compt. rend.* 198, 825-6 (1934). — Microscopic examn. of the result of detonating a minute particle of PbN<sub>6</sub> shows a central space dotted with globules of Pb, surrounded by an almost continuous ring of Pb, and this again by radially arranged pulverized Pb. A second similar particle 3-4 mm. distant is detonated almost simultaneously, i. e., by the explosion wave, one distant 15 mm. after a larger interval, i. e., on arrival of the hot gases (cf. C. A. 25, 5032). C. A. Silberrad

Ionisation during explosions of solid explosives. S. Kalandyk. *Acta Phys. Polonica* 1, 295-308 (295-7 in French) (1932). — Total charges obtained during the explosion of K capionate, K, Cu, Fe and Ca picrates and of nitrocellulose are of the same order of magnitude as those in gaseous explosions. With picrates the ionization potential is independent of the cation present. The charge seems to increase with the intensity of the explosion, the neg. charge being about twice as large as

the pos. one. An increase of the p. d. causes a not proportional rapid rise of the charge, probably because of an irregular distribution of the flame. The course of the current as a function of time is studied during explosion and slow combustion of nitrocellulose by means of a cord galvanometer. The total charges are the same in both reactions. The duration of the combustion is independent of the p. d. applied. The above method of testing is adapted to the study of the ionization of explosions in conditions prevailing in fire arms. Thus, the charge obtained on explosion of black powder is found to be about 10 times as large with the same mass and potential, as in the explosion of nitrocellulose. J. Wiertelak

Explosion of a diethylsulfate container. Karl Siebenicher. *Angew. Chem.* 47, 105 (1934). — The results of an investigation of an explosion led to the belief that moisture in the container caused formation of H<sub>2</sub>SO<sub>4</sub> and ald. with resulting corrosion of the container and formation of FeSO<sub>4</sub> and accumulation of H<sub>2</sub> giving rise to excessive pressures. Karl Kammermeyer

Explosive. Walter C. Holmes (to The Canadian Industries Ltd.). Can. 339,449, Feb. 20, 1934. An explosive compn. comprises nitroglycerin, nitrocellulose, one or more O-carrying compds., absorbent materials for the liquid explosive, and 0.1-2.0% of dicyanodiamide; e. g., nitroglycerin 34.0, nitrocellulose 1.0, NaNO<sub>2</sub> 52.0, wood pulp 8.0, starch 3.0, S 1.6 and dicyanodiamide 0.4%.

Explosive. Clifford A. Woodbury (to The Canadian Industries Ltd.). Can. 339,467, Feb. 20, 1934. An explosive compn. comprising nitroglycerin 85, nitro cotton 1, wood pulp 13 and chalk 1% is capable of being subsequently combined with addnl. ingredients to form various types of nitroglycerin high explosives.

Explosive. Clifford A. Woodbury (to The Canadian Industries Ltd.). Can. 339,468, Feb. 20, 1934. A blasting gelatin comprises nitroglycerin 86-92, nitrocellulose, and kieselguhr 3-6%.

Explosive. Clifford A. Woodbury (to The Canadian Industries Ltd.). Can. 339,469, Feb. 20, 1934. Gelatinous dynamite is manufd. by mixing nitrocellulose 1-5, a dope material 3-10, and gelatinizing the resulting compn. with a liquid nitric ester 33-92 parts.

Dynamite. William E. Kirst and John Marshall (to The Canadian Industries Ltd.). Can. 339,433, Feb. 20, 1934. A dynamite of low d. comprises nitroglycerin, NaNO<sub>2</sub>, NH<sub>4</sub>NO<sub>3</sub> and the pith of cornstalks, e. g., nitroglycerin 15, NH<sub>4</sub>NO<sub>3</sub> 58, NaNO<sub>2</sub> 9 and cornstalk pith 18%. Part of the cornstalk pith may be replaced by wood pulp.

Gunpowder. Wolff & Co. Komm.-Ges. auf Aktien und Otto Erler. Ger. 592,339, Feb. 6, 1934 (Cl. 78c. 1). The speed of combustion of gunpowder is regulated by treating it superficially with a fatty oil or latex or a mixt. of these. Thus, the powder may be sprayed in a polished drum at 100° with rapeseed, linseed or castor oil or an aq. emulsion thereof. The process is particularly useful in the manuf. of fuses.

Explosive suitable for blasting deep well holes. John M. Jeffries (to Atlas Powder Co.). U. S. 1,948,583, Feb. 27. A main body of gelatinous dynamite is provided with a core of less gelatinous dynamite having a propaga-



tion sensitiveness materially in excess of that of the main charge under the conditions of use.

**Fuses for explosives.** Bickford & Co. A.-G. Austrian 136,397, Jan. 25, 1934 (Cl. 78b). Fulminate fuses, which have been treated with aq. glycerol in known manner, are rendered stable to storage by impregnation with a reagent which displaces the water but not the glycerol, e. g., fused paraffin.

**Fireworks.** Vincenz Prey and Soc. de pyrotechnie du Sud-Est (Soc. à r. l.). Austrian 136,232, Jan. 10, 1934 (Cl. 78b); Fr. 757,444, Dec. 26, 1933. For the manufacture of fireworks giving a colored spray effect, a mixt. of a combustible substance, e. g., a resin, fat, cellulose or nitrocellulose, with flame-coloring salts such as nitrates,

chlorides, oxides, carbonates, acetates of Ba, Sr, Ca, Th, Cu, K or Na is worked into granules with the aid of a nonaq. binder, e. g., a nitrocellulose lacquer. The granules are coated with a metal, e. g., Cu, by known elec. or mech. means, and are then attached to a combustible core formed, e. g., from a mixt. of dextrin 10, Al 5, Fe 30 and Ba(NO<sub>3</sub>)<sub>2</sub> 55%.

**Miners' safety and like lamps, burning gaseous fuel.** Flame Lamp Research Association Ltd. and Richard L. Woosnam. Brit. 401,042, Nov. 9, 1933.

**Non-flaming combustible composition for cigar and cigaret lighters.** Hector M. Minnie (to Reynolds Metals Co.). U. S. 1,947,790, Feb. 20. Materials such as tinder, rjter and tapioca starch are used together.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**Interesting sources of natural dyestuffs.** C. D. Mell. *Textile Colorist* 56, 50-2, 57, 125-8(1934); cf. C. A. 27, 1758.—The following sources are discussed: the British yellow-wort (*Chlora perfoliata*) for a yellow dye and tannin; the chucum (*Pithecolobium ubicans*), which inhabits the Peninsula of Yucatan, for dyes and tannin; the bark of the buckthorn trees (*Rhamnus utilis* and *R. chlorophora*), indigenous to Asia Minor and the warmer parts of China, for a green dye; the cornflower of England and Europe (*Centaurea cyanus*), for a blue dye; the milfoil or wild yarrow (*Achillea millefolium*) for yellow and brown dyes; many species of the genus *Iris* for dyes; the aroeria vermiclia tree of Brazil (*Schinus terebinthifolia*) as substitute for the quebracho tree for dyes and tannin and the American white walnut or butternut (*Juglans cinerea*) for brown and black dyes. Ruby K. Worner

**Chemical composition of "St. John's root."** Oswaldo de Almeida Costa and Renato Dias da Silva. *Rev. soc. brasil. quim.* 4, 199-201(1933).—Analysis is given. St. John's root is used in dyeing and as a source for berberine which has therapeutic properties. John Ladino

**Colorimetric determination of sulfur dyes.** G. E. Levant and R. I. Nemtsova. *J. Applied Chem.* (U. S. S. R.) 6, 546-51(1933).—The dye to be tested and a standard are oxidized with H<sub>2</sub>O<sub>2</sub> and compared in a colorimeter. A. A. Bochtlingk

**Neutralizing naphthol AS developing baths.** H. Jager. *Melliand Textilber.* 14, 401-2(1933).—Excess of NaOH introduced by the naphtholated fabric into the bath contg. the diazotized base is progressively neutralized by the addn. of NH<sub>4</sub>Cl and CH<sub>3</sub>O, thus: 4NH<sub>4</sub>Cl + 6CH<sub>3</sub>O + 4NaOH = (CH<sub>3</sub>)<sub>2</sub>N<sub>2</sub> + 4NaCl + 10H<sub>2</sub>O. Coupling may occur between the (CH<sub>3</sub>)<sub>2</sub>N<sub>2</sub> and the diazotized base, and in the absence of NaOH acidity may develop; as both these reactions are comparatively slow they usually have no adverse effect on the development. B. C. A.

**Dyeing textiles with colors resistant to alcoholic stains.** Geo. Rice. *Textile Colorist* 56, 34, 60(1934). R. K. W.

**Dyeing wool flocks for decorating walls.** Geo. Rice. *Textile Colorist* 56, 103, 137(1934). R. K. W.

**Influence of iron on the coloration of the fibers in the retting [of flax and hemp] by Bac. felsineus.** III. D. Carbone. *Boll. soc. intern. microbiol., Sez. ital.* 5, 339-40(1933); cf. C. A. 26, 4479.—Several nonoxidizing steels and other metals were tested with good results (except for Al) in the retting of flax. All of the metals examined gave good results for hemp. G. A. Bravo

**A note for naphthol dyers on the prevention of occupational dermatitis.** Hilton Radley. *Dyer* 71, 127(1934).—A light greasing of the hands and the wearing of comparatively tight-fitting cotton gloves over which are worn the usual loose-fitting rubber gloves are recommended. The cotton undergloves are not to be removed until the completion of the working period. R. K. W.

**Mechanism of direct dyeing.** J. S. Brown. *Textile Colorist* 56, 83-5, 132(1934). Ruby K. Worner

**Aluminum with regard to textile dyeing and finishing**

**machinery.** G. L. Atkinson. *Textile Colorist* 56, 129-30(1934). The advantages of more frequent use of Al for textile finishing machinery in place of iron and steel are pointed out. Ruby K. Worner

**Pumps for the dyeing and allied industries.** The theory of the centrifugal pump. F. Marshall. *Dyer* 71, 39, 41(1934). Ruby K. Worner

**The feeding of silkworms with mulberry leaves sterilized with silver fluoride and the ratio between fibroin and sericin [content of the silk].** Guido Colombo. *Boll. ufficiale staz. sper. seta* 3, 99(1933); cf. C. A. 28, 20692.—Contrary to the results of Trauquilli (*Atti commiss. inchiesta ind. biologica e serica* 2, 119) the treatment with AgF does not modify the ratio fibroin/sericin of the silk. G. A. Bravo

**Matt rayon under the microscope.** R. Laesse. *Melliand Textilber.* (Sept. 1933); *Dyer* 69, 617, 619; 70, 35, 137, 341, 115, 447, 551, 553, 657, 659(1933). R. K. W.

**Faults in rayon woven cloth.** H. Chadwick. *Dyer* 71, 87-91(1934).—A survey of causes of defects from winding to making up operations. Ruby K. Worner

**Determination of oxidized fatty acids in threads and crepes.** G. Baroni. *Boll. ufficiale staz. sper. seta* 2, 100-3(1932).—Oxidation of linseed oil on threads is fairly rapid at room temp.; max. oxidation is reached after 1 hr. at 110°. For the detn. of OI acids the fibers are boiled for 1 hr. with a soln. of neutral Marseilles soap. B. C. A.

**Effect of mercerization on the "counts" of cotton yarn.** O. Mecheels and G. Stuhmer. *Melliand Textilber.* 14, 463-4(1933).—Data are given for various single and two-fold cotton yarns. Prepn. of yarn for mercerization by

boiling for 3 hr. in 0.05% Na<sub>2</sub>CO<sub>3</sub> soln. increases the counts by 2%; subsequent mercerization allowing length changes of -5 and +5% results in counts changes of -5 and +10%, resp. Soln. of the cotton cellulose and impurities during mercerization increases the counts appreciably. Shrinkage (previous to the usual subsequent stretching) in mercerization is a reliable means for comparing the consequent luster increases of cotton yarns only when they have nearly equal original luster. Data relating to the original and final luster, and the shrinkage produced in mercerization, are given for various types of yarns. B. C. A.

**The elimination of cloth-milling defects.** F. C. Pratt. *Textile Colorist* 56, 45, 65(1934). Ruby K. Worner

**The elimination of [wool] carbonizing defects.** F. C. Pratt. *Textile Colorist* 56, 101, 130(1934). R. K. W.

**Piece-bleaching machinery.** A. Grunert. *J. Soc. Dyers Colourists* 49, 285-90(1933).—An account of modern app. B. C. A.

**Sodium perborate as a bleaching agent.** A. Jones. *Dyer* 70, 589-90(1934). Ruby K. Worner

**Old-time scouring agents.** D. Kermode. *Dyer* 70, 391(1933).—The use of lant and hog's manure ("seark") for scouring wool is described. Ruby K. Worner

**The converting of mohair pile upholstery fabrics.** B. S. Hillman. *Textile Colorist* 56, 39-41, 59, 93-4, 132(1934).

--The scouring, dyeing and finishing of mohair pile fabrics for use in furniture and automobiles are described. Dye formulas are given. Ruby K. Worner

Dyestuff problems (Roberts) 23. Improvements in the production of light-fast shades by beater coloring (Niederhauser) 23. Alleged color and dyeing properties of derivs. of tetraarylmethanes (Weisberger, Thiele) 10. Condensation products from aldehydes and phenols [for use as mothproofing agents] (U. S. pat. 1,948,894) 10. Purifying liquids [used for washing textiles] (Fr. pat. 757,503) 13. Amino-nitrogen-contg. conversion products of aliphatic hydrocarbons [used as acid soaps in dyeing] (U. S. pat. 1,948,924) 10. Alkylolamine derivs. [used as dye intermediates] (U. S. pat. 1,949,247) 17. Aniline-sulfonic acids [products used as dye intermediates] (U. S. pat. 1,947,837) 10.

Klinger, J.: Die textilmikroskopischen Untersuchungen in der Praxis. Vienna: Verlag Sullmayersche Buchhandlung. 93 pp. M. 7.50. Reviewed in *J. Textile Inst.* 25, No. 2, P19(1934).

Mayer, Fritz: Chemie der organischen Farbstoffe. 3rd ed. Bd. 1 Kunstliche organische Farbstoffe. Berlin: J. Springer. 255 pp. M. 23.60; bound, M. 24.80.

Dyes. Soc. pour l'ind. chim. à Bâle. Swiss 163,541, Nov. 1, 1933 (Cl. 37a). The *o*-hydroxyazo dye obtained by coupling diazotized 1-amino-2-naphthol-4-sulfonic acid with  $\beta$ -naphthol is treated with a Cr-yielding agent and then an alkali. The dye colors wool from an acid bath in fast marine blue shades.

Dyes. Soc. pour l'ind. chim. à Bâle. Swiss 161,443, Dec. 1, 1933 (Cl. 37b). Addn. to 161,051 (C. A. 28, 648<sup>7</sup>). The dye 1,4-dimethyldiaminoanthraquinone is prepd. by heating 1-methoxy-4-aminoanthraquinone with alc. MeNH<sub>2</sub>, till a test shows that the methoxy and amino groups are replaced by MeNH<sub>2</sub> groups. The dye gives blue shades to acetate silk. Cf. C. A. 28, 648<sup>7</sup>.

Dyes. 1. G. Farbenind. A.-G. (Hermann Berthold and Erwin Liese, inventors). Ger. 591,547, Jan. 23, 1934 (Cl. 8a. 1.02). Preps. of vat and S-dyes contain oxidation products of thiodiglycol or its homologs or analogs. Thus, a printing paste of the dye *N*-dihydro-1,2,1',2'-anthraquinonazine contains thionylglycol.

Water soluble dyes. Chemische Fabrik vorm. Sandoz. Swiss 163,186 to 163,188. Oct. 2, 1933 (Cl. 37b.). Addns. to 160,757 (C. A. 28, 648<sup>7</sup>). 1-Benzoylamino-4- $\beta$ -naphthylaminoanthraquinone is treated with H<sub>2</sub>SO<sub>4</sub> (163,186); or 1-benzoylamino-2-bromo-4- $\beta$ -naphthylaminoanthraquinone with fuming H<sub>2</sub>SO<sub>4</sub> (163,187); or 1-acetylamino-2-methyl-4- $\beta$ -naphthylaminoanthraquinone with H<sub>2</sub>SO<sub>4</sub>.H<sub>2</sub>O.

Dyes containing chromium. Soc. pour l'ind. chim. à Bâle. Swiss 164,434 to 164,442. Dec. 1, 1933 (Cl. 37a). Addns. to 162,464 (C. A. 28, 650<sup>1</sup>). See Fr. 756,136 (C. A. 28, 2195<sup>4</sup>).

Dye preparations. Soc. pour l'ind. chim. à Bâle. Swiss 165,137, Jan. 16, 1934 (Cl. 24a). A prepn. for dyeing acetate silk is made by mixing dyes of similar constitution which are practically insol. in water, and which have an affinity for the silk. Thus, a prepn. is made by mixing 1-amino-4-anilinoanthraquinone and 1-amino-4-toluiinoanthraquinone to a paste with H<sub>2</sub>SO<sub>4</sub>, to impart blue shades to acetate silk.

Dyes (anthraquinone derivatives). 1. G. Farbenind. A.-G. Brit. 402,605, Dec. 7, 1933. Cf. Ger. 578,502 (C. A. 28, 902<sup>9</sup>). H<sub>2</sub>BO<sub>3</sub> is required. The dyes are suitable for dyeing acetate rayon.

Dyes of the benzanthrone series. David C. R. Jones and Robert F. Thomson (to Imperial Chemical Industries Ltd.). U. S. 1,948,116, Feb. 20. For obtaining a dye-dyeing cotton from the vat in blue shades, a monobenanthrone is reacted with an *o*-halobenzoic acid in the presence of an alk. condensing agent such as KOH, the alkali-sol. portion of the reaction product is recovered, boiled with hot concd. HOAc and the residue is recovered.

Mordant dyes (condensation products of the benzanthrone series). Georg Kraenzlein and Martin Corell (to General Aniline Works). U. S. 1,947,948, Feb. 20. Dyes crystg. from glacial HOAc and having good fastness are obtained from initial materials such as 2,3-hydroxynaphthoic acid, benzoic or *m*-chlorobenzoic acid ester by heating with Na Al chloride, preferably at a temp. of about 140-60° for several hrs., forming products such as 4-hydroxybenzanthrone-3-carboxylic acid, m. 285°, and 4-hydroxy-6-chlorobenanthrone-3-carboxylic acid, m. 250-2°. Various details of procedure are given.

Azo dyes. Emmet F. Hitch (to E. I. du Pont de Nemours & Co.). U. S. 1,947,550, Feb. 20. Monoazo dyes practically insol. in water, suitable for use as pigment colors, and which when developed on the fiber give orange to red to blue shades of good fastness, may be obtained by combining any diazo compd. not contg. a sulfonic or carboxylic acid group with derivs. of 3-hydroxy-2-naphthoic acid having the general formula 3-(HO)-2-(R'YNCORNHCO)C<sub>10</sub>H<sub>6</sub>, in which R represents any radical of the C<sub>6</sub>H<sub>5</sub> series not contg. a sulfonic or carboxylic acid group, R' represents any org. radical of the aliphatic or aromatic series not contg. a sulfonic or carboxylic acid group and Y is H or an aliphatic or aromatic radical. Various examples are given.

Azo dyes. Werner Lange (to General Aniline Works). U. S. 1,947,945, Feb. 20. Substitution products of 4-nitro-1,3-diaminobenzene that contain no further neg. substituents, such as Cl, the nitro or sulfonic acid group, may be diazotized to form a monodiazocompd. and the latter may be coupled with any azo component in an acid, neutral or alk. medium to form azo dyes. As substituents contained in 4-nitro-1,3-diaminobenzene, the alkyl and the alkoxy group may be present. The azo dyes obtainable according to this procedure may be further diazotized either in substance or on the fiber and coupled with azo components. The monoazo dyes contg. sulfonic acid radicals, dye wool or leather or other animal fibers from an acid dyeing bath, while such dyes contg. a greater no. of azo groups substantively dye cotton. The monoazo dyes contg. no sulfonic acid or carboxylic acid radicals serve as pigments or fat dyes; alternatively, they may be used for dyeing acetyl cellulose and the products made thereof. They too may be diazotized on the fiber and coupled with further azo components. Several examples with details of procedure are given.

Azo dyes. Leopold Laska and Arthur Zitscher (to General Aniline Works). U. S. 1,947,946, Feb. 20. Azo dyes insol. in water (various examples of which dye garnet, red, brown or black shades) are obtained by combining any diazo, tetrazo or diazoazo compd. (numerous examples being given) with a 4-(2'-hydroxy-3'-naphthylamino)diphenylamine compd. (none of the components contg. sulfonic or carboxylic groups). If after-treatment with Cu compds. derivs. of good fastness to light are obtained.

Azo dyes. Friedrich Felix and Wilhelm Huber (to Soc. pour l'ind. chim. à Bâle). U. S. 1,948,208, Feb. 20. Monoazo dyes dyeing acetate rayon and various other cellulose derivs. fast red to violet tints are formed from components such as diazotized 5-nitro-*o*-aminophenols with an aromatic base such as (*o*-hydroxyethyl)aniline or the like.

Azo dyes. Emil E. Misslin and Rudolf von Capeller (to Soc. pour l'ind. chim. à Bâle). U. S. 1,948,224, Feb. 20. Diacyldiaminohydroxynaphthalenes such as may be produced by reducing the dyes obtained by coupling 1,5-aminonaphthol, or a deriv. which may be coupled in the 4-position to the amino group, in an acid medium, or by coupling 1,8-aminonaphthol or its derivs. which may be coupled in the 5-position, and acylating the diamino-products thus obtained to form 1,4-(or 1,5-) diacyldiamino-8-hydroxynaphthalenes are used with various other dye components to form dyes suitable for dyeing cotton or various artificial silks, and may be used for ice-color dyeing. Numerous examples with details of procedure are given.

**Azo dyes.** Hermann Winkler, Hans Reindel and Guido Freiherr von Rosenberg (to General Aniline Works). U. S. 1,949,228, Feb. 27. Dyes generally producing orange shades on wool and producing bluish to yellowish red dyeings when chromed are obtained by coupling 1-phenyl-5-pyrazolone-3-carboxylic acid amide (or a deriv. substituted, as by Et, on the amino N atom) with diazotized 1-hydroxy-2-amino-4-methyl(or, chloro)benzene-6-sulfonic acid or the like. Several examples with details of procedure are given.

**Azo dyes; dyeing.** I. G. Farbenind. A.-G. Brit. 395,026, July 10, 1933. H<sub>2</sub>O-sol. azo dyes are made by coupling a diazo or tetrazo compd. contg. a heavy metal complex in *o*-position to at least 1 azo group with a carbazole deriv., in which the substituent is OH or NH<sub>2</sub> and the nuclei may contain further univalent substituents. When coupling tetrazo compds. 1 mol. of a component of above formula and 1 mol. of another component may be used. They may be treated in substance or on the fiber with heavy metal compds. Blackish violet shades are obtained. Among examples (1) 6-chloro-2-aminophenol-4-sulfonic acid → 2-hydroxy-3-aminocarbazole (in presence of pyridine) (brownish violet on wool on after-chroming), and (2) 2-hydroxycarbazole ← benzidine-3,3'-dicarboxylic acid → resorcinol.

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 403,007, Dec. 14, 1933. Azo dyes of the stilbene series are obtained by subjecting to the action of alk. reducing agents and of oxidizing agents, in either sequence, dyes obtained by condensing (a) 4,4'-dinitrostilbene-2,2'-disulfonic acid, (b) 4,4'-dinitrodibenzyl-2,2'-disulfonic acid or (c) a product of the alk. conversion of 4-nitrotoluene-2-sulfonic acid, with aminoazo compds. The products give orange to red dyeings of redder and brighter shades and more fast, especially to Cl and light, than the parent dyes. Examples are given. Cf. C. A. 28, 1542<sup>3</sup>.

**Azo dyes** I. G. Farbenind. A.-G. Brit. 403,022, Dec. 14, 1933. Azo dyes for leather are made by coupling 1 mole of resorcinol, or a COOH acid thereof, with 2 moles of 2-nitro-1-amino-4-diazobenzene (I), or with 1 mole thereof and 1 mole of another diazo or diazoazo compd., or by coupling 2 moles of I with 1 mole of an azo dye: amine → resorcinol, or a COOH acid thereof. In examples, (1) 2-nitro-1,4-diaminobenzene (II) → 1,3-dihydroxybenzene-5- or -6-carboxylic acid ← 1-amino-4-nitrobenzene-2-sulfonic acid; the 2nd component may be sulfanilic acid, an aminonaphthalenesulfonic acid, e. g., 1-amino-4-nitronaphthalene-6- or -7-sulfonic acid, or an amino compd., e. g., 4-aminoazobenzene-4'-sulfonic acid, or 2-naphthylamine-4,8-disulfonic acid → α-naphthylamine, (2) 2-nitro-1,4-diaminobenzene (1 or 2 moles) → resorcinol → H, K, J or γ-acid, and (3) II ← resorcinol, or its 5- or 6-carboxylic acid.

**Azo dyes.** J. R. Geigy A.-G. Swiss 163,804, Nov. 16, 1933 (Cl. 37a). A new dye is obtained by coupling *o*-chloro-*p*-nitrodiazobenzene with *N*-[ethyl-(*ω*-hydroxyethyl)]-*m*-toluidine. The dye imparts fast bluish red shades to lacquer and acetate rayon.

**Azo dyes.** J. R. Geigy A.-G. Swiss 163,805, Nov. 16, 1933 (Cl. 37a). A new dye is prepd. by coupling diazotized 2,4-dinitroaniline with bis(β-hydroxyethyl)-*m*-toluidine. The dye gives bluish violet shades to lacquer and acetate rayon.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 162,740, Sept. 16, 1933 (Cl. 37a). A direct acting dye is prepd. by diazotizing the dye from 1-diazo-2-hydroxy-4-nitro-5-benzenesulfonic acid and 1-amino-2,5-dimethoxybenzene and coupling the product with 2-benzoylamino-5-hydroxynaphthalene-7-sulfonic acid. The dye colors cotton in clear blue shades, which, by after-treatment with Cu-yielding agents, become fast greenish blue shades.

**Azo dye.** Soc. pour l'ind. chim. à Bâle. Swiss 163,008, Sept. 16, 1933 (Cl. 37a). A new dye is obtained by coupling diazotized 5-nitro-2-aminophenol with 1-(β-hydroxyethyl)amino-2-methoxy-5-methylbenzene. The dye colors acetate rayon in red-violet shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 165,039 and 165,040, Jan. 2, 1934 (Cl. 37a). Addns. to 163,080

(preceding abstr.). New dyes are obtained by coupling diazotized 5-nitro-2-aminophenol with ethyl(β-hydroxyethyl)aniline (165,039), or with β-hydroxyethylaniline. The dyes impart blue-red and yellow-red shades, resp., to acetate silk.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 163,539, Nov. 1, 1933 (Cl. 37a). A new dye is produced by coupling diazotized 2-chloro-4-nitroaniline with β-phenethylaminomethyl methyl ether. The dye colors acetate rayon in Bordeaux red shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 165,406 to 165,415, Jan. 16, 1934 (Cl. 37a). Addns. to 163,539 (preceding abstr.). Diazotized 4-methoxy-1-aminobenzene is coupled with β-phenethylaminomethyl methyl ether to give a dye coloring acetate silk in yellow shades (165,406). The other patents described dyes obtained by coupling differently substituted diazotized PhNH<sub>2</sub> and similar ethers.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 166,072, Feb. 16, 1934 (Cl. 37a). Addn. to 163,539 (second preceding abstr.). A new dye is obtained by coupling diazotized 6-chloro-2,4-dinitroaniline with 1-(ethoxyethylamino)naphthalene. The dye colors acetate rayon in blue shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 163,540, Oct. 16, 1933 (Cl. 37a). A new dye is produced by coupling 1-diazotriphenylamine with the *p*-chloroanilide of 2,3-hydroxynaphthoic acid. The dye colors cotton, wool and rayon in fast blue shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 163,542, Oct. 16, 1933 (Cl. 37a). The dye obtained by coupling diazotized 3-sulfo-2-aminobenzene-1-carboxylic acid with 1-(2'-methyl-4'-sulfophenyl)-3-methyl-5-pyrazolone is treated with a Cl-yielding agent. The product gives wool from an acid bath fast reddish yellow shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 166,079 to 166,088, Feb. 16, 1934 (Cl. 37a). Addns. to 163,542 (preceding abstr.). A new dye is produced by chroming the dye from diazotized 5-chloro-2-aminobenzene-1-carboxylic acid and 1-(2',5'-disulfophenyl)-3-methyl-5-pyrazolone. The dye colors wool from an acid bath in fast golden yellow shades, (166,079). The other patents describe dyes obtained by chroming dyes from differently substituted aminobenzene-1-carboxylic acids and pyrazolones.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 163,546, Nov. 1, 1933 (Cl. 37a). A new dye is prepd. by coupling 1 mol. of tetrazotized 4,4'-diaminostilbene-3,3'-dicarboxylic acid with 2 mols. of 1-amino-8-naphthol-4-sulfonic acid. The dye gives cotton from a neutral or weakly alk. bath grayish blue shades, which, by treatment with Cu salts are converted to fast greenish blue shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 164,190, Dec. 1, 1933 (Cl. 37a). A new dye is produced by coupling the diazo compd. of the PhOH ester of *p*-nitroaniline-*o*-sulfonic acid with 2-amino-8-naphthol-6-sulfonic acid in an acid medium. The dye imparts fast violet-blue shades to wool from an acid bath.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 164,420, Dec. 16, 1933 (Cl. 37a). Addn. to 161,841 (C. A. 28, 649<sup>9</sup>). A new dye is produced by coupling 2-diazo-4,4'-dimethoxy-5-acetylaminomethyl-1,1'-diphenyl ether with the *p*-anilide of 2,3-hydroxynaphthoic acid. The dye imparts fast violet shades to cotton, wool and rayon.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 164,430 to 164,433, Dec. 16, 1933 (Cl. 37a). Addns. to 161,842 (C. A. 28, 650<sup>1</sup>). New dyes are produced by coupling esters of diazocarboxylic acid diphenyl ethers with arylides of hydroxynaphthoic acid. In 164,430, the methyl ester of 2-diazo-4-carboxylic acid-4'-methyl-1,1'-diphenyl ether is coupled with the 2-methyl-4-methoxyanilide of 2,3-hydroxynaphthoic acid. In 164,431, the same methyl ester is coupled with the *m*-nitroanilide of the same acid. In 164,432, the phenyl ester of the same ether is coupled with the anilide of the same acid. In 164,433, the butyl ester of 2-diazo-4-carboxylic acid-4'-chloro-1,1'-diphenyl ether is coupled with the 5-chloro-2-toluidine

of the same acid. The dyes produced give fast scarlet shades to cotton, wool and rayon.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 164,546, Dec. 1, 1933 (Cl. 37a). A new dye is prep'd. by coupling 4 - (methoxyphenoxyl)acetyl amino - 2,5 - dimethoxy - 1 - aminobenzene with the hydroxychrysene obtained by mononitrating chrysene, reducing to aminochrysene and heating this with dil. acid. The dye imparts fast violet shades to vegetable fibers.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 164,738 to 164,741, Dec. 16, 1933 (Cl. 37a). Addns. to 162,405 (C. A. 28, 650<sup>2</sup>). A new dye is obtained by further diazotizing the monoazo dye from 2-diazonaphthalene-4,8-disulfonic acid and  $\alpha$ -naphthylamine and coupling with 3',3''-diaminodibenzoyl - 1,4 - diamino - 8 - hydroxynaphthalene-6-sulfonic acid. The dye colors cotton in blue shades (164,738). In 164,739, the dye from 1-diazo - 8 - toluenesulfonylnaphthalene - 3,6 - disulfonic acid and  $\alpha$ -naphthylamine is further diazotized and coupled with 4',4''-diaminodibenzoyl - 1,4 - diamino - 8 - hydroxynaphthalene-6-sulfonic acid. In 164,740, the same monoazo dye is further diazotized and coupled with 1-naphthylamine-6-sulfonic acid, and the product still further diazotized and coupled with 3',3''-diaminodibenzoyl - 1,4 - diamino - 8 - hydroxynaphthalene - 6 - sulfonic acid. In 164,741, the dye from 2-diazonaphthalene-4,8-disulfonic acid and  $\alpha$ -naphthylamine is diazotized and coupled with a mixt. of 1-naphthylamine-6- and -7-sulfonic acid. The product is further diazotized and coupled with the previously mentioned 3',3''-diaminoderiv. of naphthalene.

**Azo dyes.** Soc. pour l'ind. à Bâle. Swiss 165,830, Feb. 16, 1934 (Cl. 37a). A new dye is produced by chroming the dye from diazotized 1-amino-2-hydroxynaphthalene-4-sulfonic acid and 2-hydroxynaphthalene, in an alk. medium. The dye colors wool from an acid bath in marine-blue shades.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 166,070 and 166,071, Feb. 16, 1934 (Cl. 37a). Addns. to 161,050 (C. A. 28, 649<sup>2</sup>). A new dye is obtained by chroming the dye from nitrated 1-diazo-2-hydroxynaphthalene-4-sulfonic acid and  $\beta$ -naphthol in a medium of  $p_n$  value less than 7. The chroming is finished in an alk. soln. The dye colors wool from an orange H<sub>2</sub>SO<sub>4</sub> bath in fast black shades (166,070). The first component may be replaced by diazotized 1-amino-2-hydroxynaphthalene-4-sulfonic acid and the second by naphthol giving a dye which colors wool from an acid bath in fast marine blue shades (166,071).

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 592,087, Feb. 1, 1934 (Cl. 22a. 2). *o*-Hydroxymonoazo dyes formed from a substantive dye component are converted by standard methods into complex compds. contg. both Cr and another metal, e. g., Ni, Fe or V. Dyes for vegetable and artificial fibers are obtained. Examples are given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Ger. 592,088, Feb. 1, 1934 (Cl. 22a. 2). Azo dyes, prep'd. from unsulfonated *o*-hydroxy- or *o*-carboxy-diazo compds. and unsulfonated nitrogenous derivs. of naphthalene, are converted into their complex metal derivs. by treatment with suitable metal compds. in the presence of an org. base not contg. OH. Dyes useful for coloring cellulose esters or ethers or as pigment dyes are obtained. Numerous examples are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Fritz Müller, inventor). Ger. 590,255, Dec. 28, 1933 (Cl. 22a. 1). Addn. to 551,883 (C. A. 26, 4950). See U. S. 1,929,328 (C. A. 28, 331<sup>4</sup>).

**Azo dyes.** I. G. Farbenind. A.-G. (Karl Schnitspahn and Wilhelm Koch, inventors). Ger. 591,549, Jan. 23, 1934 (Cl. 22a. 1). Dyes insol. in water are prep'd. by coupling the 4-monodiazo compds. of 2,6-dihalo-1,4-diaminobenzene with arylides of 2,3-hydroxynaphthoic acid or their products substituted in the naphthalene residue, neither the azo nor coupling components contg. soly.-inducing groups. Examples, a table of diazo and coupling components and colors produced are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Alfred Gressly, inventor). Ger. 591,628, Jan. 25, 1934 (Cl. 22a. 13). Dyes of the stilbene series are prep'd. by subjecting the dyes obtained by condensing dinitrostilbenedisulfonic acid, dinitrobibenzylidene-sulfonic acid or products of nitro-toluenesulfonic acid, with aminoazo compds., and subjecting the products to an alk. reduction and finally oxidizing. Thus, the dye obtained by condensing Na dinitrostilbenedisulfonate with 4-aminoazobenzene-4'-sulfonic acid is reduced by treatment with Na<sub>2</sub>S and NaOH. The reaction mixt. is finally treated with NaClO to give a dye which colors cotton in a soda-alk. bath in orange shades fast to Cl and light. Other examples are given.

**Azo dyes.** Aceta G. m. b. H. Fr. 757,264, Dec. 22, 1933. Cellulose esters or ethers or polyvinyl esters are dyed by coupling diazo components on the fibers with acyl compds. of hydroxy compds. capable of coupling and sepp. the acyl group by sapon. before or during the coupling. Acyl compds. prep'd. from Ac<sub>2</sub>O and 2-hydroxynaphthalene-3-carboxylaminobenzene or 1-phenyl-3-methyl-5-pyrazolone or from the Me ester of chloro-carbonic acid and 2-hydroxynaphthalene-3-carboxylaminobenzene or 1-(2',4'-dichlorophenyl)-3-methyl-5-pyrazolone may be used.

**Azo dyes insoluble in water.** I. G. Farbenind. A.-G. Fr. 757,628, Dec. 29, 1933. Diazo, tetrazo or diazoazo components are combined with 1-hydroxy-3,5-diarylaminobenzenes. Shades going from bordeaux to brown and black are obtained. Thus, 1-amino-2,5-dichlorobenzene  $\rightarrow$  1-hydroxy-3,5-bis(4'-methoxyphenylamino)-benzene gives a yellow-brown.

**Metalliferous azo dyes.** Soc. pour l'ind. chim. à Bâle. Brit. 401,544, Nov. 16, 1933. See U. S. 1,936,276 (C. A. 28, 905<sup>4</sup>).

**Monoazo dyes; dyeing.** I. G. Farbenind. A.-G. Brit. 402,849, Dec. 14, 1933. H<sub>2</sub>O-insol. azo dyes are made in substance or on the fiber by coupling 2,3-hydroxynaphthoyl - 1' - amino - 2',4' - dimethoxy - 5' - chlorobenzene with diazotized derivs. of 2-amino-1-methoxybenzene-4-sulfonamide in which the H atoms of the amide residue are substituted by the same or different aliphatic, araliphatic or aliphatic-araliphatic residues contg. together at least 3 C atoms, with the exception of sulfodiethylamide. Fast Turkey-red shades are obtained. In examples the di-Bu, methylbenzyl, dibenzyl, MeEt, MePr, di-Pr, MeBu, EtBu, Me-iso-Bu, MeAm, Bu-iso-Bu, di-iso-Bu and Ar<sub>2</sub>-isocapryl-amides are specified as diazo components.

**Monoazo dyes.** I. G. Farbenind. A.-G. (Leopold Laska and Arthur Zitscher, inventors). Ger. 591,692, Jan. 25, 1934 (Cl. 22a. 1). Diazotized 2-(*p*-methoxyethoxy)-4-nitroaniline is coupled with 1-(2'-hydroxynaphthalene - 3' - carbonylamino) - 4 - methoxy - 3 - methylbenzene. Examples are given.

**Disazo dyes.** I. G. Farbenind. A.-G. Brit. 395,027, July 10, 1933. Disazo dyes contg. Cu are made by treating with a Cu-yielding agent a disazo dye obtainable by coupling in alk. soln. 1 mol. of a tetrazotized aromatic diamine, contg. an alkoxy group in *o*-position to each diazo group, with 2 mols. of 2-amino-5-naphthol-1,7-sulfonic acid, or a *N*-acyl deriv. thereof, or with 1 mol. of said acid, or a *N*-acyl deriv., and 1 mol. of a naphthol sulfonic acid, the coppering being performed so that the alkoxy groups are split up. In the case of urca dyes, a corresponding aminoalkoxy monoazo dye may be prep'd. first, converted into the urca and coppered. They dye silk, cotton and viscose violet to blue shades of good fastness to light. Among examples, (1) the dye di-anisidine  $\rightarrow$  2-acetyl amino-5-naphthol-1,7-disulfonic acid (I) is treated with ammoniacal CuSO<sub>4</sub>, and (2) the dye 4,4'-diamino-3,3'-dimethoxydiphenylurea  $\rightarrow$  I is coppered as in (1).

**Disazo dyes.** I. G. Farbenind. A.-G. Brit. 402,920, Dec. 14, 1933. Rubber is colored by incorporating into the mix H<sub>2</sub>O-insol. disazo dyes, free from NO<sub>2</sub> groups and corresponding to the formula RN:NC<sub>2</sub>X<sub>2</sub>YC<sub>2</sub>X<sub>2</sub>N:NR, where X is H or a univalent substituent, e. g., halogen, alkyl, alkoxy, R is a coupling component and Y represents

a bridge contg. O, *e. g.*, O, CO, NHCO, NHCONH,  $\text{SO}_2$  or  $\text{NHSO}_2$ . Such dyes are obtained by tetrazotizing diamino compds. of formula  $p\text{-H}_2\text{NC}_6\text{H}_4\text{YC}_6\text{H}_4\text{NH}_2$ , *p* and coupling with coupling components, *e. g.*, acetoacetic acid arylides, pyrazolones,  $\beta$ -naphthol and its derivs., *e. g.*, 2,3-hydroxynaphthoic arylides, or hydroxycarbazoles or their carboxylic arylides.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 163,279, Oct. 2, 1933 (Cl. 37e). A new vat dye is obtained by condensing 7-chloro-4,6-dimethyl-3-hydroxythionaphthene with the 2-(*p*-dimethylamino)anil of 5-chloro-7-methyl-3-hydroxythionaphthene. The dye colors cotton from a yellow vat in fast red-violet shades.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 165,047, 165,048 and 165,050, Jan. 16, 1934 (Cl. 37e). Addns. to 163,279 (preceding abstr.). 7-Chloro-4,6-dimethyl-3-hydroxythionaphthene is condensed with the 2-(*p*-dimethylamino)anil of 6-ethoxy-3-hydroxythionaphthene (165,047), or of 5-methyl-6-chloro-3-hydroxythionaphthene (165,048), or by condensing the first-mentioned 7-chloro-4,6-dimethyl-3-hydroxythionaphthene with 5,7-dibromoisatin  $\alpha$ -chloride (165,050). The formulas and colors of the dyes produced are given, together with examples.

**Vat dye.** Soc. pour l'ind. chim. à Bâle. Swiss 163,280, Oct. 2, 1933 (Cl. 37e). A new vat dye is produced by condensing the 2-*p*-dimethylaminoanil of 5-chloro-4,7-dimethyl-3-thionaphthene with 1-chloro-2,3-naphthothioindoxyl. The dye colors cotton from an orange-brown vat in fast blue-violet shades.

**Vat dyes.** Soc. pour l'ind. chim. à Bâle. Swiss 165,051 to 165,058, Jan. 16, 1934 (Cl. 37e). Addns. to 163,280 (preceding abstr.). New vat dyes are obtained by condensing 5-chloro-4,7-dimethyl-3-hydroxythionaphthene with the 2-*p*-dimethylaminoanil of 6-ethoxy-3-thionaphthene (165,051), or of 1,2-naphthothioindoxyl (165,052), or of 7-methyl-3-thionaphthene (165,053). Dyes are formed condensing the 2-*p*-dimethylaminoanil of 4,7-dimethyl-3-thionaphthene with 2,1-naphthothioindoxyl (165,054), or with 1-chloro-2,3-naphthothioindoxyl (165,055). Other dyes are produced by condensing 6-chloro-4-methyl-3-hydroxythionaphthene with the 2-*p*-dimethylaminoanil of 5-chloro-4,7-dimethyl-3-thionaphthene (165,056), or of 4,7-dimethyl-3-thionaphthene (165,057), or of 5-chloro-7-methyl-3-thionaphthene (165,058). Structural formulas and colors of the dyes produced are given, with examples.

**Vat dye.** Soc. pour l'ind. chim. à Bâle. Swiss 161,842, Jan. 2, 1934 (Cl. 37b). A vat dye is prep'd. by halogenating 1-benzoylamino-8-haloanthraquinone to give the 1,8-dihalo deriv. One mol. of this is treated with 2 mol. of 1-aminoanthraquinone and a condensing agent.

**Vat dyes of the dipyrazolanthrone series.** Max A. Kunz and Karl Koeberle (to General Aniline Works). U. S. 1,948,178, Feb. 20. Dyes of various shades are obtained by condensing dipyrazolanthrone, its derivs. or homologs, contg. a neg. substituent with compds. to which a reactive H or metal atom is attached by means of N, O or S. As negatively substituted dipyrazolanthrone, preferably such as contain from 1 to 4 halogen atoms, nitro or sulfonic acid groups may be employed. Suitable reacting components contg. a H or metal atom attached to N, O or S are for example amines, imines, acid anilides or imides, hydroxy and mercapto compds., or compds. of the said kind contg. a metal atom instead of the reactive H atom. When dipyrazolanthrone contg. several neg. substituents are employed as initial material only one of the neg. substituents or several thereof may be replaced, but in the latter case the neg. substituents should be replaced by the same radical. The condensation is preferably carried out in org. dissolving or suspending media, for example in nitrobenzene, naphthalene, etc., and in the presence of acid-binding agents, such as for example the oxides of alkali or alk. earth metals, or alk. salts thereof, or org. bases, for example dimethylaniline. Condensing catalysts, such as metals or metal compds., are preferably added to the reaction mixt. The imines produced may be subjected, in the same reaction mixt.

in which the condensation is carried out, if desired, to alkylation, acylation, or carbazolation by means of acid or alk. condensing agents, or to saponification or to further condensation to higher mol. compds. in cases in which the radicals introduced are capable to undergo such further condensation, for example, when benzanthrone radicals have been introduced which may be further condensed to dibenzanthrone radicals.

**Indigoid vat dyes.** Jakob Muller and Robert Stocker (to Soc. pour l'ind. chim. à Bâle). U. S. 1,947,055, Feb. 20. Numerous examples are given of the production of dyes of various colors by condensing compds. such as the 5-chloro-6-methyl, 5-chloro-6-ethyl, 5-bromo-6-methyl, 5-methyl-6-chloro, 5-methyl-6-bromo derivs. of 3-thionaphthene (I), the 2-anil and the *p*-dimethylamino-2-anil of these compds. (which are obtainable for example by condensing the I with an aromatic nitroso compd.), the thionaphthenequinones corresponding with the said derivs. of I (obtainable, for example, by treating the 2-anils with a saponifying agent, such as  $\text{H}_2\text{SO}_4$ ), the corresponding thionaphthenequinone 2-mono- or 2-dihalides (obtainable for example from the derivs. of I by action of halogen or agents yielding halogen), and the thionaphthenequinone oximes with compds. such as five-membered condensed ring systems, as for example isatins, naphthisatins, indoxyls, thionaphthenequinones, hydroxythionaphthene, naphthohydroxythionaphthene, acenaphthenequinones and the like, their homologs and substitution products, anils and halides. The condensation takes place by heating the components in a solvent which may act as condensing agent. The resulting dyes may be halogenated if desired and have good fastness. Cf. C. A. 28, 2545<sup>1</sup>.

**Dye intermediates.** Soc. pour l'ind. chim. à Bâle. Swiss 162,898-162,901, Sept. 16, 1933 (Cl. 36q). Addns. to 160,170 (C. A. 28, 655<sup>1</sup>). Intermediates of the naphthalene series are obtained by introducing a *p*- or *m*-nitrobenzoyl group into both the amino groups of 1,4-diamino-5-naphthol-7-sulfonic acid and, if desired, reducing. Examples are given.

**Brominated dibenzanthrones.** Max A. Kunz and Karl Koeberle (to General Aniline Works). U. S. 1,949,209, Feb. 27. By brominating dibenzanthrone or isodibenzanthrone in sulfuric acid in the presence of a halogen carrier, there is obtained a brominated dibenzanthrone contg. 3 to 4 atoms of Br per mol., forming violet solns. with concd.  $\text{H}_2\text{SO}_4$ , which dyes vegetable fiber from blue vats blue shades. Cf. C. A. 27, 3832.

**Sulfonic acid.** Soc. pour l'ind. chim. à Bâle. Swiss 163,005, Sept. 16, 1933 (Cl. 36p). A new acid is obtained by treating  $\mu$ -heptadecylbenzimidazole with a sulfonating agent. The soap-like product is used in the textile industry.

**Sulfonic acids.** Soc. pour l'ind. chim. à Bâle. Swiss 164,730 to 164,736, Dec. 16, 1933 (Cl. 36p). Addns. to 163,005 (preceding abstr.). A new sulfonic acid is produced by sulfonating  $\mu$ -undecylbenzimidazole (164,730). The other patents describe the products obtained by sulfonating  $\mu$ -heptadecylbenzimidazole (164,731),  $\mu$ -heptadecyl-*N*-phenylbenzimidazole (164,732),  $\mu$ -heptadecyl-*N*-benzylbenzimidazole (164,733),  $\mu$ -heptadecylperimidine (164,734),  $\mu$ -heptadecyl-1,2-naphthimidazole and the imidazole mixt. obtained by condensing *o*-phenylenediamine with a com. mixt. of stearic and palmitic acids. The sulfonic acids are used in the textile industry.

**Condensation product.** Soc. pour l'ind. chim. à Bâle. Swiss 163,770, Nov. 1, 1933 (Cl. 36q). Addn. to 160,430 (C. A. 28, 653<sup>1</sup>). A product useful for reserve printing on animal fibers is obtained by treating the sulfonic acid mixt. resulting from the sulfonation of 1 mol. of 2-hydroxynaphthalene, with 1 mol. of benzoin.

**Condensation products.** Soc. pour l'ind. chim. à Bâle. Swiss 162,902-162,906, Sept. 16, 1933 (Cl. 36q). Addns. to 160,430 (C. A. 28, 653<sup>1</sup>). Products useful as reserve agents for printing wool or other animal fibers are obtained by condensing 2 mols. of benzoin with 1 mol. of 2-naphthol-3,6-disulfonic acid (162,902), or 1 mol. of benzoin with 1 mol. of 2-naphthol-6-sulfonic acid (162,903), or with 1 mol. of 1-naphthol-4-sulfonic acid (162,904), or with 1 mol. of 1-naphthol-4,8-disulfonic acid (162,905), or,

finally, with 1 mol. of 4,4'-dihydroxybiphenyl-2,2'-disulfonic acid (182,906). Examples are given.

**Condensation products of the pyrenequinone series.** Georg Kränzlein and Heinrich Vollmann (to General Aniline Works). U. S. 1,948,928, Feb. 27. A 4,5,8,9-dibenzopyrene-3,10-quinone is obtained by condensing a 2-arylbiphenylanthrone (such as 2-benzoyl- or 2-*p*-tolyl- or  $\alpha$ -naphthoyl-2-biphenylanthrone, or *p*-bromobenzoyl-2-benzanthrone) with  $\text{AlCl}_3$  or Na Al chloride (suitably with introduction of O or air and at 110–125°). The products dye cotton from orange-yellow vats intense yellowish red, and the chlorinated derivs. give brighter and the brominated derivs. darker tints. Various examples with details of procedure are given.

**Solutions for use in dyeing and textile printing.** Mordecai Mendoza and Arthur G. Murray (to Imperial Chemical Industries Ltd.). U. S. 1,948,589, Feb. 27. An agent such as  $\text{KBrO}_3$  and  $\text{KBr}$  which in acidified aq. soln. has oxidizing properties is formed into a dry mixt. with an arylidiazonium sulfonic acid, arylhydrazine- $\alpha$ - $\beta$ -disulfonic acid or  $\alpha$ -arylhydrazine- $\beta$ -sulfonic acid derived from an arylamine free from hydroxyl, sulfonic and carboxylic groups. In use, the mixt. is dissolved in water. Cf. C. A. 28, 2546<sup>a</sup>.

**Decorative colored compositions for use on cloth.** Wm. H. Adams (to Eastern Finishing Works). U. S. 1,948,464, Feb. 20. An adherent, penetrating and flexible compn. comprises a mixt. of Al, Pb and Cu soaps dissolved in a non-oxidizable neutral volatile solvent such as petroleum naphtha together with a pigment or lake in specified proportions.

**Discharge pastes.** R. I. du Pont de Nemours & Co. Brit. 401,850, Nov. 13, 1933. Discharge pastes, particularly suitable for use on materials made of or contg. cellulose esters or ethers, contain a  $\text{CH}_3\text{O}$ -sulfoxylate discharging agent,  $\text{Zn}(\text{CNS})_2$  and diethylene glycol (I). In an example  $\text{Zn}(\text{CNS})_2$  and I are added to a soln. of Na  $\text{CH}_3\text{O}$ -sulfoxylate in aq. gum tragacanth. Among examples of the production of discharge effects, a cellulose acetate fabric, dyed in the usual manner with Lomamine A diazotized on the fiber and developed with 2,3-hydroxynaphthoic acid, is printed with the above discharge paste, dried, aged at 100°, washed at 60° and dried to obtain pure white discharge effects.

**Colored discharge effects on textile materials.** George H. Ellis (to Celanese Corp. of America). U. S. 1,949,413, March 6. Material contg. an org. cellulose deriv. such as cellulose acetate is treated locally with an acid prepn. contg. a stannous compd. such as  $\text{SnCl}_2$  and an unreduced anthraquinone coloring substance such as 1-acetylaminoanthraquinone which in the unreduced state has an affinity for the cellulose deriv. material. Various examples are given.

**Dyeing.** British Celanese Ltd., George Holland Ellis and Ernest William Kirk. Brit. 396,429, July 26, 1933. Divided on 396,412 (C. A. 28, 650<sup>a</sup>). Azo dyes are made on the fiber by coupling thereon an amide or substituted amide of an aromatic hydroxycarboxylic acid with a diazo compd. obtained by diazotizing an anthraquinone compd. contg. an external diazotizable amino group (excluding 1-amino-4-hydroxyanthraquinones). Components specified are the aminoaryl or aminoaryl derivs. of 1-amino- or 1,5- or 1,8-diaminoanthraquinone, *e. g.*, 1,5-di-*p*-aminophenylaminoanthraquinone, 1-*p*-aminophenylaminoanthraquinone, 1-amino-5-*p*-aminophenylaminoanthraquinone; 1-amino- or 1-alkylamino-4-aminoarylaminanthraquinones, *e. g.*, 1-amino-1-methylamino-, 1-dimethylamino- and 1-hydroxyalkylamino-4-aminoarylaminanthraquinone. Coupling components may be arylides of hydroxy carboxylic acids of the  $\text{C}_6\text{H}_4$ ,  $\text{C}_6\text{H}_3$  and carbazole series, *e. g.*, arylides of salicylic, 2,3- and 1,4-hydroxynaphthoic acids, *e. g.*, the *o*-toluide and *m*-nitroanilide of 2,3-hydroxynaphthoic acid and di-2,3-hydroxynaphthoylbisanisidine.

**Dyeing.** Imperial Chemical Industries Ltd., Simon Thomson McQueen and Alexander Stewart. Brit. 401,665, Nov. 13, 1933. Cellulose ester or ether materials are dyed or printed in permanent colors by applying  $\text{H}_2\text{O}$ -

insol. dyes in aq. media in presence of an  $\alpha$ -mono- or  $\alpha,\gamma$ -diaryl or alkaryl ether of glycerol, *e. g.*,  $\alpha$ -mono-phenyl,  $\alpha$ -mono-*o*-tolyl,  $\alpha,\gamma$ -di-*o*-tolyl,  $\alpha,\gamma$ -dibenzyl ethers. Among examples, printing pastes are prepd. contg. dark British gum thickening, sol. oil and glycerol and (a) Duranol brilliant blue G and an emulsion of glycerol  $\alpha,\gamma$ -di-*o*-tolyl ether, or (b) Duranol green BS and glycerol  $\alpha,\gamma$ -dibenzyl ether.

**Dyeing.** I. G. Farbenind. A.-G. Brit. 401,731, Nov. 20, 1933. Acetate rayon is dyed by treatment with aminoanthrapyrimidines or their substitution products. Such dyes are prepd. by treating heteronuclear amidated anthraquinones contg. at least 1 amino group in  $\alpha$ -position with formamide; diluents, *e. g.*, phenols, and catalysts, *e. g.*,  $\text{H}_2\text{BO}_3$ ,  $(\text{COOH})_2$ , may be present. Among examples 2-, 3-, and *Py*-C-aminoanthrapyrimidines (orange to red shades), 4- and 5-methylaminoanthrapyrimidines, 4-amino-*Py*-C-aminoanthrapyrimidine, 4-amino-*Py*-C-phenoxyanthrapyrimidine, 4-amino-*Py*-C-chloropyrimidine, etc., are used.

**Dyeing textiles.** British Celanese Ltd., Geo. H. Ellis and Henry C. Olpin. Brit. 401,338, Nov. 6, 1933. Dischargeable full black dycings are produced upon cellulose esters or ethers in textile materials by applying a dischargeable yellow, orange and (or) red dye having affinity for said esters or ethers and resistant to diazotization, *e. g.*, benzeneazobenzeneazophenol (I), benzeneazophthaleneazophenol (II), 4-nitro-2-methoxybenzeneazodimethylaniline (III), applying also a diazotizable base having affinity for said esters or ethers and yielding navy blue or thin black shades upon diazotization and development, *e. g.*, *p*-aminobenzeneazodimethylaniline (IV), *o*-methoxybenzeneazobenzeneazophenol (V), 4,4'-diaminoazobenzene, bisaniline and then effecting diazotization and development. The amt. of diazotizable base used is such as will not, in the absence of the yellow, etc., dye yield full black shades. Among examples a cellulose acetate fabric is dyed (1) with aq. dispersions of 0.60% of IV, 0.36% of I and 0.04% of III, based on the wt. of the fabric, and the dyed fabric is diazotized and developed with 2,3-hydroxynaphthoic acid; the fabric is then printed with a discharge paste contg. "Decroline," diethylene glycol, Et lactate and gum arabic, dried, aged, washed and finished to obtain a white discharge on a full black ground, and (2) with 0.6% of V, 0.1% of II and 0.08% of III, based on the wt. of the fabric, the dyed fabric is diazotized and developed with 2,3-hydroxynaphthoic acid, printed with a discharge paste contg. Zn  $\text{CH}_3\text{O}$ -sulfoxyate, diethylene glycol, Et lactate and gum arabic, dried, aged, washed and dried to obtain a parchment white discharge on a full black ground. Cf. C. A. 28, 2197<sup>a</sup>.

**Dyeing wool.** Soc. pour l'ind. chim. à Bâle. Brit. 401,938, Nov. 23, 1933. Wool is grounded in an alk. bath with an arylide of an org.  $\text{COOH}$  acid, treated with a liquid, which contains a buffer substance that reacts with caustic alkalis, to finish the alk. of the grounded wool, and developed with a diazo compd. In examples wool is grounded with (1) 2,3-hydroxynaphthoic anilide, NaOH,  $\text{Na}_2\text{SO}_4$  and sulfite cellulose liquor, washed with  $\text{NaHCO}_3$  and developed with diazotized 4-ethoxy-4-aminodiphenylamine and (2) an alk. soln. contg. 2,3-hydroxynaphthoic acid  $\alpha$ -naphthylamide, washed with a soln. contg.  $\text{NaHCO}_3$  and "Igepon A" or other washing agent and developed with diazotized 4-chloro-2-toluidine.

**Dyeing acetate rayon.** Karl Roerberle and Joachim Mueller (to General Aniline Works). U. S. 1,947,855, Feb. 20. A bath comprising 4-amino-1,9-anthrapyrimidine or a deriv. is used dyeing yellow or orange shades. Cf. C. A. 27, 5198.

**Dyeing furs.** Soc. pour l'ind. chim. à Bâle. Ger. 591,411, Jan. 20, 1934 (Cl. 8m. 10.02). See Fr. 755,871 (C. A. 28, 2196<sup>a</sup>).

**Treating cellulose esters; dyeing and printing.** I. G. Farbenind. A.-G. Brit. 401,735, Nov. 20, 1933. The capacity for dyes of materials made of cellulose esters is increased by treatment with tetrahydronaphthalene- $\beta$ -sulfonic acid or a salt thereof. Among examples (1)



acetate rayon is immersed 0.5 hr. at 95° in a 10% aq. soln. of the Na salt, rinsed and dried, the product giving stronger dyeings or printings than the untreated rayon, (2) an aq. paste is prepd. from (a) the condensation product of Na 1-*p*-sulfomethyl-2-naphthol-6-sulfonate and a PhOH-CH<sub>2</sub>O resin in dil. NaOH at 126–150°, (b) Na ligninsulfonate and (c) Na tetrahydronaphthalene- $\beta$ -sulfonate (I); the dried and powd. product is used for the manuf. of printing pastes yielding very strong, even printings and (3) acetate rayon material is printed with a mixt. contg. industrial gum, I, thiodiglycol and H<sub>2</sub>O, steamed 0.5 hr., and dried or rinsed.

**Printing carpets, etc.** Hermann Toeller and Heinz von Bothmer. Ger. 591,751, Jan. 26, 1934 (Cl. 8c. 1). Carpets, etc., are soaked in a wetting agent and the excess of liquid removed. They are then printed by usual processes and the wetting agent removed from the backing by hot air drying.

**Foam treatment of textile materials as in dyeing, bleaching, etc.** Leon deR. Faber and Charles J. Carroll (to Faber Engineering Co.). U. S. 1,948,568, Feb. 27. Foam is generated the bubbles of which carry a treating agent such as a washing or bleaching agent and the bubbles are applied to material such as cloth and constituents from the bubbles are forced through the material by a differential pressure. App. is described.

**Machine for dyeing fabrics in the piece.** H. W. Mettler. Swiss 163,858, Nov. 16, 1933 (Cl. 14a).

**Dyeing and washing tray suitable for heating by steam.** Paul Tschammler. U. S. 1,949,287, Feb. 27. Structural and operative details.

**Treating fibers.** Ter Horst & Co. Fr. 757,341, Dec. 23, 1933. Crude fibers such as jute, hemp, linen, are bleached and made suitable for spinning by the action of a bath of NaOCl in the absence of air and at about 0°, after which they are dechlorinated.

**Treating fibers.** Ter Horst & Co. Fr. 757,377, Dec. 26, 1933. Crude vegetable fibers or threads or cloth made therefrom are treated at a low temp., e. g., about 0°, and in the absence of air, by an alk. bath contg. a stannate or aluminate and NH<sub>3</sub>, aerated for a few mins., bleached in a chlorinating bath, dechlorinated in a bath of sulfite and finally submitted for some mins. to the action of a bath contg. hyposulfites and, e. g., Marseilles soap, Turkey-red oil and suint, this bath being heated to a max. of 90°.

**Treating vegetable fibers.** Wladimir Wacngler. Austrian 136,231, Jan. 30, 1934 (Cl. 8c). The buckling, bleaching or like treatment of cotton, linen and other vegetable fibers is facilitated by pretreating the fibers in the warm with a dil. soln. contg. a bisulfite, e. g., NaHSO<sub>3</sub>, an alkali, e. g., Ca(OH)<sub>2</sub>, and NH<sub>4</sub>Cl. Alternatively, the fibers may be treated with a soln. contg. NaHSO<sub>3</sub> and NH<sub>4</sub>Cl, and then with a soln. of Ca(OH)<sub>2</sub>, or treatment with a soln. contg. NaHSO<sub>3</sub> and Ca(OH)<sub>2</sub> may be followed by treatment with NH<sub>4</sub>Cl soln.

**Purifying textile fibers.** Puschel & Co. Fr. 757,650, Dec. 29, 1933. Wool and other animal fibers are freed from grease and sticky substances by submitting them to a mech. treatment at below 0°.

**Greasing agents for fibers.** Deutsche Hydrierwerke A.-G. Ger. 562,921, Jan. 15, 1934 (Cl. 23c. 1). In spinning textile fibers, esters of higher alcs., such as octyl alc., and lower fatty acids, such as AcOH, are used for greasing the fibers.

**Oil for treating textiles.** Bruno Rewald (to Hanscatische Mühlenwerke A.-G.). U. S. 1,946,332, Feb. 6. A dressing, sizing and softening oil for treating textiles comprises an emulsion of soy-bean phosphatides and chemically uncombined fatty oil, fatty acid, Turkey-red oil and water (substantially free from remaining constituents of the vegetable material other than the oil).

**Preparations for treating textiles.** Soc. pour l'ind. chim. à Bâle. Swiss 163,274, Oct. 2, 1933 (Cl. 86p). The imidazole mixt. obtained by condensing *o*-phenylenediamine with a tech. mixt. of stearic and palmitic acids, such as obtained from beef tallow, is treated with a benzylating agent to give a soapy product useful in the textile industry.

**Preparations for treating textiles.** Soc. pour l'ind. chim. à Bâle. Swiss 165,036 and 165,037, Jan. 2, 1934 (Cl. 86p). Addns. to 163,274 (preceding abstr.). Preps. for dressing textiles are obtained by methylating (165,036) or benzylating (165,037) the imidazole mixt. produced by condensing *o*-phenylenediamine with the tech. mixt. of stearic and palmitic acids obtained from beef tallow.

**Incorporating metal oxides in textile materials.** Franz Hoelkeskamp (to American Bemberg Corp.). U. S. 1,947,507, Feb. 20. Materials such as those which undergo swelling are satd. with a metallic oxide-NH<sub>3</sub> compd. such as Ni hexamine aluminate in aq. soln. followed by drying at 70–80° to volatilize the NH<sub>3</sub>, leaving the metal oxide in the material where it may serve as a weighting agent, etc.

**Treating acetate rayon to improve its dyeing properties.** etc. Karl Beck. U. S. 1,947,928, Feb. 20. See Fr. 710,209 (C. A. 26, 1136).

**Treating artificial filaments, films, etc.** Henry Dreyfus. Brit. 401,679, Nov. 13, 1933. Artificial yarns, foils, etc., especially those contg. cellulose acetate, are treated, while traveling from 1 point to another, with a moving body of liquid contg. a softening agent for the materials, the concn. of softening agent in (a portion of) the liquid is then altered by the incorporation of a liquid therewith and the materials are subjected, preferably after stretching, to a further treatment with the liquid of altered concn. App. is described.

**Stretching cellulose ester or other filaments, yarns, films, etc.** Henry Dreyfus. Brit. 402,776, Dec. 7, 1933. Org. di-esters and ether-esters of alkylidene glycols, e. g., methylene, ethylidene or propylidene diacetate or dipropionate, methoxymethyl acetate, ethylidene acetate propionate, are used as softening or assisting agents, either alone or dild. with H<sub>2</sub>O, alcs., ethers and hydrocarbons or mixed with other solvents. In 403,072, Dec. 6, 1933, an improvement in tenacity of the product is effected when stretching by mech. means by treating with an assisting agent comprising a H<sub>2</sub>O-miscible solvent and an oily or fatty substance or soap or wetting agent either dissolved or emulsified in the assisting agent. Animal or vegetable oils, the soaps of such oils, including ethanalamine and other org. soaps, sulfonated soaps, *o*-alkylamides of fatty acids and their sulfonated derivs. and alkylated naphthalenesulfonic acids may be used. In 403,106, Dec. 14, 1933, the extensibility and tensile strength of stretched cellulose ester or ether products are improved by subjecting the material, while traveling, to a shrinking treatment prior to the stretching operation. In examples methylene chloride-C<sub>6</sub>H<sub>6</sub> and aq. dioxane are used both as shrinking and stretching agents.

**Saponifying cellulose ester threads, etc.** Henry Dreyfus. Brit. 403,071, Dec. 6, 1933. By conducting the sapon. of filaments, threads, yarns, etc., of cellulose acetate and other org. cellulose esters on the materials while traveling at a speed which diminishes along their path so that contraction may take place, an improvement in tensile strength results. Washing and drying are also preferably so conducted.

**Creping rubberized material.** Jay J. Siedler (to Hodgman Rubber Co.). U. S. 1,948,138, Feb. 20. A soft flexible sheet material such as cotton cloth is coated with a vulcanizable rubber compn., the sheet being rendered temporarily adherent, and it is creped in a described app.

**Ventilated fabric comprising rubber and textile fabric.** Alfred A. Glidden and Virgil H. Boffe (to Hood Rubber Co.). U. S. 1,949,189, Feb. 27. A fabric suitable for shoe uppers, etc., comprises a reticulated elastic sheet of rubber formed with crossed bands of rubber, with facing plies of porous textile material such as knitted fabric secured to the rubber sheet by adhesive such as a rubber dispersion.

**Rubberized cloth.** The International Latex Processes Ltd. Fr. 757,230, Dec. 22, 1933. Floccular or granular ppts. composed wholly or partly of rubber obtained from aq. dispersions are applied to cloth. The rubber may be applied by spreading or spraying.

- Apparatus for rinsing rayon and other fibers.** Carl Hamel Spinn- und Zwirnereimaschinen A.-G. Swiss 162,969, Sept. 16, 1933 (Cl. 19d).
- Centrifuge for removing liquids from wound yarns.** Glanzstoff-Courtauld G. m. b. H. Ger. 592,285, Feb. 5, 1934 (Cl. 8a. 19).
- Rinsing rayon spools.** Feldmühle A.-G. vorm. Loeb, Schoenfeld & Co. Rorschach. Swiss 162,984, Sept. 16, 1933 (Cl. 24f).
- Mercerizing textiles.** Chemische Fabrik vorm. Sandoz. Ger. 591,923, Jan. 29, 1934 (Cl. 8k. 2). The wetting capacity of a mercerizing lye is increased by addn. of a mixt. of phenols and hydrogenated phenols. Thus, a mercerizing lye is given an addn. of cresol and methylcyclohexanol. Cf. C. A. 27, 4102.
- Bleaching.** H. Th. Böhme A.-G. Brit. 401,199, Nov. 9, 1933. See Fr. 755,637 (C. A. 28, 2198<sup>3</sup>).
- Bleaching.** I. G. Farbenind. A.-G. Brit. 403,009, Dec. 14, 1933. Cotton fibers are kier-boiled in a lye which contains no org. solvent but has, besides an alkali, an adsorptive inorg. substance, other than a metal hydroxide, and a wetting or washing agent. Among examples the lyes contain (1) NaOH, fuller's earth and the Na salt of the condensation product of oleic acid chloride and phenyltaurine, (2) NaOH, waterglass and an alkylated naphthalenesulfonic acid and (3) calcined  $\text{Na}_2\text{CO}_3$ , the oleic acid ester of Na hydroxyethanesulfonate and silicic acid gel.
- Bleaching textiles.** Walther Huesy and Walther Krauer. Brit. 402,622, Dec. 7, 1933. The goods are boiled in a closed kier, the liquid withdrawn so as to expose them to steam action and the liquor then returned, said alternate treatment under const. pressure and temp. being repeated as often as desired. App. is described.
- Closed bleaching vessel for textiles.** N. V. de Eibergsche-Stoomblekerij v/h. de Firma Gerrit Jan ten Cate & Zonen. Ger. 591,750, Jan. 26, 1934 (Cl. 8a. 18).
- Apparatus for subjecting clothes to ultra-violet radiation and ozone in laundry operations.** Wm. R. Redd (to Milprint Products Corp.). U. S. 1,948,230, Feb. 20. Various details are described of an app. with a belt conveyor, etc.
- Peroxide solutions.** H. Th. Böhme A.-G. Brit. 403,035, Dec. 14, 1933. Peroxide solns., especially for bleaching textiles, are stabilized against hardness and alkalis by adding alk. earth, Mg or Al salts of the sulfonation products of higher satd. or unsatd. alcs. Said salts also have a capillary action which results in more efficient bleaching action. Examples are given.
- Washing and other agents for textiles.** Soc. pour l'ind. chim. à Bâle. Swiss 163,536, Oct. 16, 1933 (Cl. 36c). A prepn. for dressing textiles is obtained by treating a salt of *p*-toluenesulfonic acid with a hydrogen halide ester of lauryl alc., and sulfonating the resulting sulfine. An example is given.
- Derivatives of montan.** Michael Jahrstorfer and Hans G. Hummel (to I. G. Farbenind. A.-G.). U. S. 1,948,299, Feb. 20. For producing a dispersing agent suitable for use with textile-treating compns., etc., a deriv. of montan such as a montancarboxylic amide is treated with a sulfonating reagent such as chlorosulfonic acid.
- Sulfuric acid derivatives.** Soc. pour l'ind. chim. à Bâle. Swiss 164,195, Dec. 1, 1933 (Cl. 36c). A new deriv. is obtained by sulfonating the hydrogenation product of 4,4'-dihydroxydiphenylmethylmethane consisting of 4-hydroxyphenyl-4'-hydroxycyclohexyldimethylmethane and perhydro-4,4'-dihydroxydiphenyldimethylmethane. The product is used for treating textiles.
- Mothicide.** J. R. Geigy A.-G. Swiss 162,658, Oct. 2, 1933 (Cl. 3c). A mothicide is produced by condensing isatin-5-sulfonic acid with thymol by the aid of an acid condensing agent.
- Mothicide.** J. R. Geigy A.-G. Swiss 165,030 to 165,032, Jan. 2, 1934 (Cl. 3c). Addn. to 162,658 (preceding abstr.). Isatin-5-sulfonic acid and *p*-chlorophenol are condensed by the aid of an acid-condensing agent (165,030). The second constituent may be replaced by 2,4-dichlorophenol (165,031) or 6-chloro-cresol (165,032).
- Dry cleaning.** Warren T. Reddish. Brit. 401,752, Nov. 23, 1933. See U. S. 1,911,289 (C. A. 27, 4104).
- Clarifying "dry-cleaning" solvents.** Victor G. Norquist and Earl E. Treanor (to Butler Mfg. Co.). U. S. 1,947,873, Feb. 20. Contaminated solvent withdrawn from a washing zone is mixed with a purifying chemical in a mixing zone and some of the same chemical is simultaneously introduced into a clarifying zone (of a described app.) and the mixt. from the mixing zone is passed through the chemical in the clarifying zone.
- Fluid for dry cleaning of textile fabrics.** George I. Parkhurst (to Standard Oil Co. of Calif.). U. S. 1,948,045, Feb. 20. 1,1-Dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane or 1,1,1,2-tetrachloroethane is used, suitably in admixture with petroleum naphtha.

## 26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

- Effect of cold weather upon paint films.** Henry A. Gardner. *Natl. Paint, Varnish Lacquer Assoc. Circ.* No. 451, 38-46(1934).—An epidemic of peeling of paint from metal surfaces, such as trucks, sign boards, etc., is ascribed to a combination of unusual cold weather and high humidity along the eastern coast of the U. S.
- G. G. Sward
- Influence of light on paint.** W. Toeldt. *Farben-Ztg.* 39, 140(1934).—Various methods of reporting the effects of light on paint films are reviewed. The use of the Pulfrich step photometer together with the Ostwald color system is recommended.
- G. G. Sward
- The dealer and the oil content of oil paints.** Cornelius Hebing. *Farbe u. Lack* 1934, 87, 101-2, 123-4, 138-9.—The functions of the oil and the pigment in paints are discussed.
- G. G. Sward
- Oil requirements and thixotropy of linseed oil paints.** Hans Wolff. *Farben-Ztg.* 39, 194-6(1934).—See C. A. 28, 1204<sup>4</sup>.
- G. G. Sward
- Drying of white lead paint films.** C. P. van Hoek. *Verfkronek* 7, 16(1934).—A short review. The drying action of white lead on linseed oil is not due to sapon. but probably to (1) catalytic effect on autoxypolymerization of the oil, (2) chem. binding of acid oxidation products, (3) relatively low oil content of paint, (4) little adsorption of the driers.
- B. J. C. van der Hoeven
- Satin white.** Edw. Sutermeister. *Paper Ind.* 15, 696 8(1934).—From a discussion of the properties of satin white, it is considered that, in the present state of our knowledge, it seems most likely that it is  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{CaSO}_4 \cdot 3\text{H}_2\text{O}$ .
- A. Papineau-Couture
- Ocher and earth color deposits in the Upper Palatinate.** A. Kruse. *Farbe u. Lack* 1934, 98, 114.—The ocher and similar deposits in the Upper Palatinate are small but widely distributed. High-grade products are available but unlimited competition on lack of railway facilities have made profitable operation of mines difficult.
- G. G. Sward
- Effect of tung and fish oils in outside white paints.** Toronto Club. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. 423, 1 p.(1932).—A preliminary account is given of exposures of straight linseed-oil paints and similar paints in which fish oil and tung oil have been incorporated.
- B. C. A.
- Experimental studies on colloid nature of Chinese black ink.** I. Torahiko Terada, Ryuzo Yamamoto and Tetu Watanabe. *Sci. Papers Inst. Phys. and Chem. Research (Tokyo)* 23, 173-84(1934).—The ink is a stable

aq. suspension of sumi, a lampblack from vegetable oil mixed with gelatin glue, molded and dried. The particles in the ink are less than  $1\ \mu$  and average  $0.12\ \mu$  by count. When sumi is spread on water, it may be expanded to a film which is calcd. to be  $6.9\ \text{\AA}$  thick. The film can be solidified by Cu ions, compression and other means. After compression, it may again be liquefied by expansion. The solidified film yields characteristic radiating cracks and jets when pierced. In the liquid film, if sufficiently thick, vortices arise by convection. Dyeing with sumi film is briefly described. Also in *Proc. Imp. Acad.* (Tokyo) 10, 10-12 (1934).

**Zinc sulfate for tung-oil groves.** Henry A. Gardner. *Natl. Paint, Varnish Lacquer Assoc. Circ.* No. 452, 47-8 (1934).—Early expts. on the use of  $\text{ZnSO}_4$  to combat "bronzing" of tung-oil trees are briefly reviewed.

**American and German methods of preparing albertol tung oil varnishes.** E. Fourolbert, C. P. Holdt and F. Wilborn. *Farben-Ztg.* 39, 89-90, 113 (1934).—The German method of prep. albertol tung oil varnishes consists in thickening the oil at about  $280^\circ$ , subsequently dissolving the resin. The American practice consists in heating the oil and resin together throughout the procedure. The former method gave varnishes of paler color, lesser skinning tendencies, lower  $\eta$ , better flow and harder films (because of thinner films). The latter method gave varnishes of lesser wrinkling when baked, better gas proofness, more resistance to alkalis and to hot  $\text{H}_2\text{O}$ .

**The manufacturing of insulating varnish.** E. R. Grunsey. *Paint Manuf.* 4, 44-8 (1934).—Formulation, requirements, methods of test and application of insulating varnishes are described.

**The influence of film-forming components of nitro varnish on the properties of the nitro-varnish film.** G. M. Zilbermann, S. V. Yakubovich, P. M. Romanova and S. Rozhdetsvenskii. *J. Applied Chem.* (U. S. S. R.) 6, 289-302 (1933).—Films obtained from freshly prep. nitro varnishes after they had been kept for 2 days indicate that nitrocellulose of high viscosity is superior to that of low viscosity, this being expressed in the elasticity of the films. The greatest influence on the properties of the films of freshly prep. nitro varnishes is shown within a viscosity range of 0.5-10.5 sec. The properties of the films prep. from nitro varnishes stored for 3 months do not have exactly a direct relation to the viscosity of the nitrocellulose. In most of the cases, however, films from low-viscosity varnishes were superior to those from the high-viscosity ones, except with the 0.5 sec. nitrocellulose. The elasticity and the elongation of the films are increased with prolonged storage of the varnish independently of the viscosity of the nitrocellulose. Conclusion: There is no need for the nitrocellulose to have a high viscosity for the prep. of high-quality films.

**The effect of dust on wet varnish films.** R. Meldau. *Farben-Ztg.* 39, 169-70 (1934).—The effects of dust on the durability of varnishes vary according to the period of contact, being in general more severe if appearing before or soon after application.

**Lacquers for special purposes.** Ray C. Martin. *Metal Cleaning and Finishing* 6, 17-20 (1934).—The formulation and characteristics of crackle, cryst. and heat-resisting lacquers used in the finishing of certain products are discussed.

**Metallic soaps.** P. H. Faucett. *Paint, Oil & Chem. Rev.* 96, No. 3, 8-10 (1934).—Alc. pastes provide a convenient form of metallic soaps for use as flattening agents in varnishes and lacquers. To prep. them, the pptd. soap is given a final washing with alc., but is not dried.

**Linoleum and possible modifications thereof.** Felix Fritz. *Chem.-Ztg.* 57, 907-9 (1933); cf. *C. A.* 27, 3349.—The compn. of linoleum has remained practically stationary since its invention 70 years ago, but the standard materials are now difficult to obtain in Germany. As substitutes F. discusses: for linseed oil, the oil of seeds of

certain native weeds, as Binkelkraute (*Mercurialis* sp.) and Wolfsmilch (*Euphorbia* sp.); for kauri gum, chloronaphthalenes; for rosin, solid chloronaphthalene; for cork flour, ground peat; for jute, paper; for triolin, nitrocellulose. Other materials considered are soft resin from naphthalene and  $\text{C}_{12}\text{H}_{10}$  and other artificial resins, coumarone resin, stearin pitch, glue, rubber, asphalt. Thirty-two references.

**Chemical investigation of amber.** II. Leopold Schmid and Fajek Tadros. *Monatsh.* 63, 210-12 (1933); cf. *C. A.* 27, 4697.—The hydrocarbon  $\text{C}_{12}\text{H}_{14}$  on oxidation and esterification gives tri-Me hemimellitate; the oily filtrate with  $\text{HNO}_3$  gives trimellitic acid, which is probably due to an impurity.

**Natural vs. synthetic resins in the paint and varnish industry.** A. F. Suter. *Oil & Colour Trades J.* 85, 606-9 (1934).

**Corrosion prevention by protective coatings (Ohl) 9.** Protective coatings for metal work (Hurst) 9. Inflammability of painted wood (de Bruyn) 24. Glycerol ethers as solvents (Merz) 13. Mechanics of adherence in metal plating [in relation to varnishing and enameling] (Altmaierberger) 9. Anodic oxidation of Al [in relation to paint and varnish] (Mantell) 4. Azo dyes [for lacquer] (Swiss pats. 163,894 and 163,895) 25. Coated fabrics (Brit. pat. 402,269) 30.

**Rust-preventing paint.** Adolf Schneider. Brit. 402,255, Nov. 30, 1933. Addn. to 343,993 (*C. A.* 25, 4723). A pigment is prep. from magnetite by grinding the ore with  $\text{H}_2\text{O}$  in crushing mills having vertical runners from which it is discharged over rotating tables supplied with a current of  $\text{H}_2\text{O}$ . The lighter materials are washed away, the finely powd. oxide being left. This is removed from the tables by magnetic separators and dried and wind-sifted to obtain the finest concentrate particles which are incorporated in a binding medium.

**Anti-fouling metal sulfonates suitable for use in paints, etc.** Siegfried L. Langedijk (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,947,652, Feb. 20. A material suitable for use in soln. with paint oils comprises a heavy metal salt such as the Cu salt of those sulfonic acids which are extd. from the oil layer only of the product resulting in the sulfonation of a mineral oil previously subjected to purification with sulfurous acid.

**Compositions for preparing metal surfaces for painting.** James H. Gravell (to American Chemical Paint Co.). U. S. 1,949,713, March 6. A trihydric inorg. acid such as  $\text{H}_3\text{PO}_4$  is used with a wetting agent comprising a sulfonated aromatic isopropyl compd. such as "neomerpin."

**Pigments.** I. G. Farbenind. A.-G. (Paul Weise and Friedrich Raspe, inventors). Ger. 592,382, Feb. 8, 1934 (Cl. 22f. 7). Details are given of the manuf. of mixed pigments from solns. contg. a sulfate of Ti and a filler, e. g.,  $\text{BaSO}_4$ , by a process of the kind described in Fr. 738,620 (*C. A.* 27, 2050).

**Writing ink.** Consortium für elektrochemische Industrie G. m. b. H. (Wolfram Haehnel, and Willy O. Herrmann, inventors). Ger. 591,979, Jan. 30, 1934 (Cl. 22g. 1). Ink for writing is prep. from a mixt. of pigment and aq. solns. of highly polymerized vinyl alc. and fatty oil. Water colors, jelly preps., dichlorohydrin, Na oleate, mastix, copaiba balsam, etc., may also be added. The mixt. is specially suitable for white inks, dispersions of  $\text{ZnO}$  being used.

**Coating compositions.** James K. Hunt and George H. Latham (to E. I. du Pont de Nemours & Co.). U. S. 1,948,582, Feb. 27. A drying oil is used with a pos. oxidation catalyst such as a Mn compd. and creosol which in the proportions used prevent oxidation of the compn. in bulk without materially retarding the normal drying rate of the compn. in thin film form. Numerous examples are given. Cf. *C. A.* 27, 1530.

**Coating compositions.** Paul Glöckner, Josef Janoušek, and Wenzel Šuma. Austrian 136,371, Jan. 25, 1934 (Cl. 22c). A freshly boiled and filtered aq. alk. soln. of bone

glue is mixed at about its b. p. with neutralized comminuted cellulose, and a subordinate amt. of linseed-oil varnish is added to the hot mixt., with or without another filler, e. g.,  $Al_2O_3$  or kaolin, a softening agent, e. g., glycerol or castor oil, and a pigment. The compns. may be applied directly to walls, floors and other rigid surfaces or products of the linoleum type may be made by applying the compns. to flexible supports such as paper or fabric. A specific compn. is described.

**Bituminous coatings.** Adele Thielmann. Ger. 591,539, Jan. 23, 1934 (Cl. 39b. 24). The coatings consist of melted depolymerized soft rubber vulcanizates with a 10% addn. of molten mineral oil bitumen. A filling material may be added. The mass is especially suitable for coating metal objects.

**Nonchalking coating composition suitable for use on automobiles, etc.** Robert T. Hucks (to E. I. du Pont de Nemours & Co.). U. S. 1,948,580, Feb. 27. A cellulose compd. vehicle such as a nitrocellulose lacquer is used with Zr oxide as the sole white pigment in the compn.

**Apparatus for baking enamel coatings on wire.** Hal F. Fruth and Raymond L. Reading (to Western Elec. Co.). U. S. 1,947,548, Feb. 20.

**Hydroxyalkylamino compounds.** I. G. Farbenind. A.-G. Brit. 401,435, Nov. 16, 1933. See Fr. 740,410 (C. A. 27, 2318).

**Condensation products from dimethylolurea.** Martin Luther (to I. G. Farbenind. A.-G.). U. S. 1,947,997, Feb. 20. Dimethylolurea is heated in admixt. with an aliphatic alc. such as isobutanol together with a buffer substance such as phosphates; a pH of about 6.0 is maintained to form a product which may be used for lacquers, etc.

**Urea- and thiourea-aldehyde condensation products of resinous character.** Karl Eisenmann and Theodor Kollmann (to Unyte Corp.). U. S. 1,948,343, Feb. 20. Condensation is effected in the presence of a substantially anhyd. alc. such as BuOH and of an inert org. dehydrating agent such as  $CaCl_2$ .

**Resinous reaction products from diolefins and alkyl benzenes.** Charles A. Thomas (to Dayton Synthetic Chemicals, Inc.). U. S. 1,947,626, Feb. 20. A resinous product substantially free from halides and metallic compds. is formed from a diolefin and an alkyl benzene in the presence of  $AlCl_3$ , and is suitable for use in coating compns. Numerous examples are given.

**Synthetic resins.** Madhav R. Bhagwat (to Combustion Utilities Corp.). U. S. 1,948,465, Feb. 20. For producing curable resinous condensation products of the phenol-formaldehyde type from a coal-tar distillate, the distillate is caused to react with a dil. aq. soln. of a caustic alkali, thus dissolving the tar acids contained in the distillate to form a soln. of salts of the tar acids; the soln. is sepd. from

1 residual oily liquid, and is then treated with an active  $CH_3$ -radical-contg. substance such as formaldehyde.

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Brit. 401,535, Nov. 16, 1933. See Fr. 750,025 (C. A. 28, 666<sup>9</sup>).

**Synthetic resins.** Soc. pour l'ind. chim. à Bâle. Brit. 401,589, Nov. 13, 1933. Urea- or thiourea-aldehyde condensation products are produced as covering layers on materials of various kinds, e. g., an asbestos plate, absorbent paper, a printed material, by coating (and impregnating) with a suspension of the condensation product, drying and hardening by heat and pressure. The liquid phase is a soln., in  $H_2O$  or org. solvent, of a carbamide-aldehyde condensation product. As the solid phase a powd. carbamide-aldehyde condensation product may be used in such condition that it is not dissolved but only swollen by the liquid phase. Fillers, luminous, and coloring substances and plasticizers may be incorporated with the solid phase together with bronze powder or metal filings. When the suspension is allowed to dry at ordinary temps. a compact hard layer is obtained on the support.

**Synthetic resins.** British Celanese Ltd. <sup>6</sup> Brit. 401,971, Nov. 23, 1933. Resins are prepd. by heating a resin acid, e. g., abietic acid (I), colophony, with a partial AcOH ester of a di- or poly-hydric alc., thereby esterifying the free OH group (s) of the ester. Suitable esters are mono- and di-acetin, glycol monoacetate and propylene glycol monoacetate. The resins, with or without added solvents, plasticizers, dyes, pigments and cellulose derivs., may be used in the prepn. of yarns, lacquers, films or sheets, molding compns. and adhesives, especially in the manuf. of laminated glass. In an example monoacetin is esterified with I in presence of Al as catalyst

**Oil-soluble synthetic resins.** Kenneth M. Irey (to Resinox Corp.). U. S. 1,948,469, Feb. 20. Reaction, at refluxing temp., is effected of a mixt. of a bis(4-hydroxyaryl)dialkylmethane such as  $\beta,\beta$ -bis(4-hydroxyphenyl)propane and a bis(4-hydroxyaryl)dialkylmethaneketone condensation product such as the condensation product of  $\beta,\beta$ -bis(4-hydroxyphenyl)propane with acetone with not an excess of 0.5 mol. of an aldehyde such as formaldehyde for each mol. of phenol reacted in producing a specified mixt. The resulting product is sol. in China wood oil and like oils.

**Synthetic resin compositions.** Allgemeine Elektrizitäts-Ges. Ger. 592,310, Feb. 5, 1934 (Cl. 22h. 3). Suspensions of synthetic resins in org. liquids, e. g., synthetic resin coating compns., are stabilized by addn. of a small proportion of an "organophile sol," e. g., a soln. of rubber, nitrocellulose or a polymerized vinyl ester. Specific compns. are described.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**Identification of foreign fats in cacao butter.** Bruno Paschke. Z. Untersuch. Lebensm. 67, 79-84 (1934); cf. C. A. 27, 4702.-A further development of P.'s work, including an investigation of various fats and oils and an admixt. of some of them with cacao butter. F. L. D.

**Removal of stearin from fatty oils with liquefied hydrocarbon gases.** C. E. Adams, G. L. Parkhurst and V. Voorhees. Oil and Soap 11, 43-5 (1934).—Propane and butane have been used experimentally in concns. of 70-75% as diluents for vegetable oils and animal fats in the sepn. of stearin. The procedure is to put the oil or fat in soln., cool to  $-10^\circ F.$  and  $-30^\circ F.$ , resp., and allow to stand until the top layer becomes clear, when it is drawn off; and the diluent is removed by distn. and the oil tested for haze at  $32^\circ F.$  The process is adapted to handle large quantities of material with lower labor costs. Lower cloud points are also possible. E. Scherubel

**Determination of the rancidity of fats by the Stamm reaction.** István Korpácz. Z. Untersuch. Lebensm. 67, 75-9 (1934).—See C. A. 28, 1881<sup>4</sup>. F. L. D.

**Permanent color standards for fats, oils and other colored liquids.** J. E. Doherty and J. F. Abcarin. Oil and Soap 11, 46-52 (1934).—A new set of color standards for fats and oils is proposed to replace the present F. A. C. color standards. The following solns. are recommended: 1 to 19 F. A. C. inclusive (except 11C)—uranyl chloride,  $CoCl_2$  and  $CuCl_2$  in distd. water, 11C, 21 to 25 and 31 to 41 inclusive— $Na_2Cr_2O_7$ ,  $CoSO_4$  and  $CuSO_4$  in 0.02 N  $HNO_3$ . Nos. 27, 29, 43 and 45— $Na_2Cr_2O_7$ ,  $CoSO_4$  and  $CuCl_2$  in 0.02 N  $HNO_3$ . These standards have been tested in the Fadeometer and no fading occurred in any of the colors in 119 hrs. Some variation in color occurs with changes in temp. and extremes have to be avoided when readings are made. E. Scherubel

**Free fatty acid content of herring-meal fat.** A. Moeu. Tids. Norske Landbruk. 40, 153-7 (1933).—Herring meal of low  $H_2O$  content keeps better than that of high. Quality can sometimes be judged on  $NH_3$  content, but the  $NH_3$  content of well-dried meal may be low. In such cases the content of free fatty acids, normally about 5% of the fat,

gives a good indication of quality, being as high as 40% in samples where much decompn. has occurred. B. C. A.

A micro method for the determination of the acetyl and of the hydroxyl number of fatty acids. Otto Furth, Hans Kaunitz and Minna Stein. *Biochem. Z.* 268, 189-201(1934).—Boil about  $\frac{1}{2}$  g. fat with at least 3 times the amt. of HCl for 0 hrs. under a reflux and in a  $N_2$  atm., cool, make slightly alk. with 60% KOH, cool again and ppt. the sol. soaps with lime water. Filter off the Ca soaps, suspend the ppt. in  $H_2O$  and set free the fatty acids with HCl, warming the mixt. for a time on the water bath to secure complete decompn. of the soaps. Cool, and ext. with petr. ether in a separatory funnel. Distil off the petr. ether and dry the residu. at  $60^\circ$ . Boil the mixt. of fatty acids in a  $N_2$  atm. and under a reflux with purest  $Ac_2O$ , and ext. in a small separatory funnel with  $H_2O$  until the wash water is absolutely neutral. Now ext. the acetylated fatty acids with petr. ether, place in flat dishes and dry at about  $70^\circ$ . Place 0.2-0.3 g. of the carefully weighed substance in a 10 cc. flask with a ground-in reflux, boil 2 hrs. in a  $N_2$  stream with 4 cc. 0.5 N alc. KOH, transfer the contents quantitatively to a 10 cc. vol. flask and dil. to the mark. With 3 cc. aliquots, the material is distd. in the Friedrich app. on a boiling water bath with 25 cc. 25% toluenesulfonic acid. Distd.  $H_2SO_4$  is removed by adding starch and 0.01 N  $I_2$  to the water, and finally the distd. AcOH is treated with  $KIO_3$  and KI, and the  $I_2$  set free titrated with 0.01 N  $Na_2S_2O_3$ . The method for calcg. the Ac. no. or mg. KOH bound by AcOH from 1 g. of the Ac product is fully discussed. Cod-liver oil has an Ac value of 32-33; dog fat 9.5-12.3; human fat 25-27.

S. Morgulis

The determination of the iodine number. C. H. Liberalli. *Rev. soc. brasil. quim.* 4, 250-263(1933).—L. discusses the Hubl, Kartus, Wijs, Waller and Winkler methods. The official labs. of Brazil have accepted the Winkler method for unity in official procedure.

John Ladino

Gravimetric microdetermination of unsaponifiable matter. G. Gorbach and A. Sablatnog. *Mikrochemie* 14, 256-62(1934). Dissolve 2-3 mg. of the fat or oil, or more if less than 2% of unsaponifiable matter is present, and transfer the soln. to a small sapon. flask. After the removal of all toluene by evacuation, det. the exact wt. of the sample taken on a microbalance. The sapon. flask which is recommended has a capacity of 1-15 cc. Place this flask in a wider vessel and add to the weighed fat 0.4-0.6 cc. of a mixt. of 2 parts N NaOH in EtOH and 1 part toluene. Heat in a Pregl drying block to  $120-130^\circ$ , under reflux condensation. After an hr. remove the condenser, evap. off the alc. and toluene almost completely and add 1 cc. of cold satd.  $Ba(OH)_2$  soln. Evap. without boiling almost to dryness and dry in a vacuum at  $30-50^\circ$ . Subject the residue to extn. with low-boiling petr. ether. Minute directions are given for carrying out the entire procedure. W. T. H.

Fatty oil of *Parinarium macrophyllum* (Néon oil). Alph. Steger and J. van Loon. *Rec. trav. chim.* 53, 197-204(1934).—The consts. found for this oil were:  $d_4^{20}$  0.8901, sapon. no. 190.0, R.-M. no. 0.33,  $n_D^{20}$  1.4741, unsaponifiable 0.9%, glycerol 4.3%. The percentage compn. of the acids was: satd. acids 11, eleostearic acid 32, linoleic acid 34, oleic acid 23. The extn. of Néon oil will not be carried out on a tech. scale on account of the low oil content of the put, 5.9%, and the great difficulties connected with the removal of the very hard shell.

E. Scherubel

The properties of fatty oils at their ignition points. F. Eckert. *Fettechem. Umschau* 41, 21-5(1934).—Method: A block of  $V_2A$  steel with 4 borings 15 mm. in diam.  $\times$  40 mm. deep is built into an elec. oven so that a regulated stream of O can be introduced (Jentzsch app.). A thermometer rests in one of the borings. The elec. current is regulated to  $10^\circ$  per min. When near the ignition point, a droplet of oil is placed upon a fresh combustion disk within the borings every 30 sec. until ignition occurs. The current is then cut out but testing is continued until ignition stops; the current is again cut in and regulated to 2-3° per min.

The first ignition is considered the "point of self-ignition." Results: The fatty oils decompose at their initial ignition point so rapidly that not enough O can be supplied for combustion; this causes a break in the curve in plotting the O required against the temp. The mineral oils show no such interruption in their ignition points but simply demand more O up to a max.; they then drop off again. Several curves and 2 tables illustrate the values obtained for 8 vegetable and 3 fish oils, accompanied by a discussion of results. P. Escher

Polymerization of fatty oils. III. The boiling of linseed oil in connection with the production of turbidity in the stand oils prepared therefrom. Alph. Steger and J. van Loon. *Rec. trav. chim.* 52, 1073-82(1933); cf. *C. i.* 1, 27, 201.—Both crude and pretreated linseed oils which are free from mucin and protein show a characteristic turbidity after boiling. In the prepn. of stand oils, linseed oils undergo decompn.; the unsaponifiable ingredients thus formed are liquid and oil-sol. even at low temp. and do not cause turbidity. However, at the same time there are produced free acids which are half-solid at room temp. The higher the acid no. of a stand oil, the more turbid it becomes as a result of the presence of these free, satd., slightly sol. acids. Stand oils which contain practically no free fatty acids always show a distinct opalescence if they are cooled at ice-box temp.; at room temp. they are transparent. Possibly during the polymerization there occurs a slight enrichment in satd. acids or their glycerides, as a result of the greater decompn. of the unsatd. portions as compared with the satd. From one linseed oil was isolated the very insol. croctic acid, which caused turbidity in the unboiled oil. The lower the content of satd. acids in different linseed oils, the less turbid do the stand oils prepd. therefrom become. The glycerides which contain these satd. acids are somewhat less sol. in the stand oil than in the linseed oil and therefore sep. from the former at a somewhat higher temp. than in the unpolymerized material. Louise Kelley

Train oil and its adulterants. S. Salm. *Allgem. Oel-u. Fett-Ztg.* 30, 385-7(1933).—Several commercial mixts. labeled as "Kunsttran" or "Helltran" consist only of mineral oils mixed with not more than 10-20% of marine-animal oils. B. C. A.

Cooking cottonseed meats containing high moisture. R. H. Fash. *Oil and Soap* 10, 125-6(1933).—In general, the plan is to assist the evapn. of the excess moisture in the meats by means of open steam, either superheated or not. E. Scherubel

Recovery of palm oil in Sumatra and Java. Hans Junwirt. *Chem. App.* 20, 137-9(1933). M. C. R.

Possibilities in pecan oil. W. D. Sims. Texas Pecan Growers' Assoc., *Proc. 13th Ann. Meeting* 1933, 41-3.—For cooking purposes, pecan oil can be substituted for nearly all other cooking oils with comparable results; it clouds at a lower temp. than other cooking oils and has a lower smoking temp. than cottonseed oil. A yield of 40 lb. of oil was obtained from 140 lb. of native (Texas) pecans, crushed in the hull and extd. by the cold process. K. D. Jacob

The constituents of Menuke oil. I. Determination of the aliphatic acids. Sei-ichi Ueno and Masayoshi Iwai. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 52-3 (1934).—Phys. and chem. consts. of the oil and acids are given. The acids consist of about 12% satd. and 88% unsatd. acids. The following satd. acids were identified: myristic, palmitic and stearic acid, the palmitic acid amounting to about 70%. Unsatd. acids found were  $C_{18}H_{32}O_2$  (probably zoomaric acid), mainly oleic acid,  $C_{20}H_{38}O_2$  (gadoleic acid) and  $C_{22}H_{40}O_2$  (probably cetoleic acid). Some more strongly unsatd. acids were also found, with 18, 20 and 22 C atoms. The acids of Menuke oil are characterized by the high contents of  $C_{18}$  and  $C_{20}$  acids of the oleic acid series, which are analogous to those of herring oil. Karl Kammermeyer

Castor-oil plant, its culture and utilization in the Italian Colonies. Isaia Baldrati. *Rass. econ. colonia* (Italy) 21, 469-517, 697-749, 930-85(1933).—The various species and varieties, the yields and industrial

uses of castor-oil plants are examd. Analyses of oils from cultivated and wild *Erythraea* plants, gave, resp.:  $d_{15}$  0.9655, 0.9643; acids (calcd. as oleic) 0.16, 0.11; I no. 84.5, 85.4; sapon. no. 180, 179.1; f. p. 18-22°, 18-20°.

G. A. Bravo

The weeds of the Urals as oil-producing plants. A. A. Khrebtov and V. S. Dvornikov. *Bull. inst. recherches biol. Perm* 8, No. 6-8, 259-64 (1933).—Specimens of weeds growing in the Ural region were collected and the frequency of their occurrence and conditions of growth studied. The oil contents in the seeds of 14 specimens (half of the total no.) were detd.: *Galeopsis tetrahit* 41.8, *Galeopsis ladanum* 40.7, *Galeopsis versicolor* 40.4, *Stachys palustris* 38.0, *Brassica campestris* 34.8, *Camelina glabrata* 31.7%; and less in others.

Walter P. Ericks

A new rapid method for determining the oil in a part of the seed. A. I. Ermakov. *Bull. Applied Botany, Genetics, Plant Breeding* (U. S. S. R.) Ser. A, 7, 61-8 (1933).—The method is based upon the difference in wt. of the seed before and after extn. of oil from the seed by ether in a special app. The construction of the app. and comparative tables of results of this method and previous one are given.

V. D. Karpenko

Paper-pulp beater in oil manufacture. Fred W. Freise. *Chem. App.* 20, 125-6 (1933).—Beater engines are employed in the pulping of oil-contg. seeds and fibers for oil recovery.

M. C. Rogers

Investigation of Japanese beeswax. III. Composition of a hydroxy fatty acid. Haruichi Ikuta. *Analyst* 59, 161-2 (1934).—See C. A. 27, 5999.

W. T. H.

Montan wax and wool fat, obtaining and refining them. Leo Ivanovszky. *Allgem. Oel-u. Fett-Ztg.* 31, No. 2, Mineralöle 7, 77-87 (1934).—A review, principally of patents.

E. H.

Table of the refractive index of pure glycerol at 20°. L. F. Hoyt. *Ind. Eng. Chem.* 26, 329-32 (1934).—The  $n_D$ s of glycerol-H<sub>2</sub>O solns. have been detd. with the dipping refractometer, and when plotted give nearly a straight line. The  $n_D^{20}$  was 1.47367. The temp. coeff. averages 0.000225 from 10° to 20°.

H. E. Messinore

Utilization of soap-stock in oil refining. K. Bandau. *Fettchem. Umschau* 40, 157-9 (1933).—The pptn. of soap-stock contg. a min. amt. of neutral oil is discussed, and also the recovery of oil from stock with a max. amt. of oil.

P. Escher

New synthetic products with soap-like properties. E. L. Lederer. *Angew. Chem.* 47, 119-25 (1934).—Com. Igepon A and T pastes were examd. for soly. in H<sub>2</sub>O and org. solvents, density of aq. solns., viscosity, surface and interfacial tension, emulsifying action, foam no. and foam consistency with and without the presence of electrolytes, and salting-out processes. The results are parallel to those obtained for soap solns. The reduction of the surface tension of H<sub>2</sub>O is far greater than in the case of equally concd. soap solns., and the interfacial tension with oil is also reduced to a greater extent. The emulsifying action toward org. solvents in general is less than with soaps. Many exptl. data are presented. Igepon A and T have the following compns., resp.: active substance 45, 33.5%; soap 4, 2.5%; salts 16, 8%; H<sub>2</sub>O 35, 56%; mol. wt. 412 and 425. The active substance in Igepon A and T consists of sulfonated products; in A the carboxyl group is modified by condensation and in T by amidation.

Karl Kammermeyer

Determination of free alkali in soap base. C. Bergell. *Seifensieder-Ztg.* 61, 89-90 (1934).—A 0.15% or more free alkali content in soaps causes skin irritation; 0.05% or less causes rancidity or brown spots. Its detn. in dried soap chips by the usual methods yields misleading results, because the Na<sub>2</sub>CO<sub>3</sub> and NaHCO<sub>3</sub>, which form through CO<sub>2</sub> absorption during drying, become increasingly sol. when during titration the H<sub>2</sub>O of the standard soln. dilutes the alc. soap soln. Method: Detn. the reaction of the soap as follows: Dissolve about 2 g. in hot alc. previously neutralized to a rose tint. If the color deepens immediately and remains so on cooling, free NaOH is present; any free fatty acid usually accumulates on the surface of the chips and decolorizes the alc. soln. Detn.

of total acidity including CO<sub>2</sub>: Boil 30 cc. of neutralized alc. alc.; add from a narrow-tipped buret 10 drops (= 0.2 cc.) of 0.5 N NaOH. Dissolve 2 g. of the chips with gentle boiling, cool to 40-50° and titrate back with 0.5 N acid. Run a blank and subtract if necessary. Detn. of free fatty acids alone: Dissolve 10 g. of the sample in 100 cc. of neutral ether-alc. by shaking every 10 min. for 3 hrs. and titrate against 0.5 N alc. NaOH; run a blank, which usually requires 3 drops 0.5 N NaOH to restore the original rose tint, and subtract from the no. of cc. used for titration.

P. Escher

Estimation of alkali in soap making. R. Krings. *Allgem. Oel-u. Fett-Ztg.* 31, 17-19 (1934).—The estn. of free alkali by the depth of color caused by phenolphthalein must be carefully carried out to give reliable results. Quicker and more reliable is the old method of testing with the tongue, which detects as little as 0.2% free alkali and differentiates between 0.2-0.3 and 0.3-0.6%. Occasional checking against values obtained by titration is sufficient.

Arnold M. Collins

Persulfate soap bleaching. Paul I. Smith. *Soap* 10, 55-6 (1934).—A min. amt. of persulfate should be used and must be found by expt., but 1% should not be exceeded. The bleach should be added to soap liquor and water in a sep. container and mixed before running into the kettle. The soap should be alk. before addn. of the persulfate and preferably in a finished condition.

E. Scherubel

Gross examples of rancidification of soaps. F. Wetka. *Allgem. Oel-u. Fett-Ztg.* 30, 381-5 (1933).—Abnormally rapid rancidification and discoloration of a certain soap were traced to the use of mowrah fat (I) (which contains a high proportion of unsatd. unsaponifiable constituents) in the stock, the oxidation being accelerated by traces of Cu derived, in one case, from the bronze of the stamping machines, and, in another, from Cu which is added to give a green color to the partly bleached I used by the soap-maker.

B. C. A.

Rancidity of toilet soaps. Paul I. Smith. *Am. Perfumer* 28, 666-7; 29, 50 (1934).—A review.

E. II.

Do perfumes affect the rancidity of soaps? Monsvin. *Parfumerie moderne* 27, 363, 365 (1933).—A brief discussion showing that perfumes are never the primary cause of the rancidity of soap.

A. Papineau-Couture

Determination of perborate in washing compounds. Stiepel. *Seifensieder-Ztg.* 61, 108 (1934).—S. modifies Grun-Jungmann's method as follows: Weigh 2.5 g into a 250-cc. graduated flask, add 150 cc. H<sub>2</sub>O and shake. Add enough CaCl<sub>2</sub> soln. to ppt. the soap and Na<sub>2</sub>CO<sub>3</sub>. Fill to 250 cc. or better to 251 cc., filter through a glass-wool plug. Acidify 100 cc. with H<sub>2</sub>SO<sub>4</sub> and titrate with KMnO<sub>4</sub>.

P. Escher

Addition to contribution to washing action. E. Götte. *Kolloid-Z.* 65, 236 (1933); cf. C. A. 27, 5564.—The standard method of soiling of the cloth was previously used by Dr. Frederking at Staatl. chen Materialprüfungsamt.

Arthur Fleischer

Evaluation of foam-producing and wetting-out materials and detergents, etc. Hetzer. *Chem.-Ztg.* 57, 715-16, 735-6 (1933).—The effects on the foam test of variations in exptl. technic and in fatty acid contents of the original oil are discussed. The foam values of soaps made from tallow are greater than those of soaps derived from palm kernel oil or hardened oils, particularly if the air space in the shaking vol. is large, and for const. results this should be a min. Foam value decreases with an increase in the age of the soln. up to 12 hrs., when it becomes const., this being partly accounted for by the longer duration of contact with air. To obtain const. results, 50 cc. of fresh sample is shaken 40 times in a 120-cc. cylinder at 20° and (or) 50°, and the percentage of foam is read at 1-min. intervals over 10 min.

B. C. A.

Heating of cotton when bulked and its effect on seed [oil] (Smith, et al.) 23.

Apparatus for extracting fats or fatty oils. I. G.



Farhenind. A.-G. (Julius Voigt, inventor). Ger. 592,187, Feb. 2, 1934 (Cl. 23a. 2).

**Separating solid and liquid aliphatic acids.** Ernst Schlenker. U. S. 1,948,083, Feb. 27. For sepg. substances such as oleic and stearic acids, a sol. and an insol. soap are formed by saponifying the material with 2 different alkalies one of which includes NaOH and the other  $\text{Ca}(\text{OH})_2$ , each in a quantity insufficient for complete saponification, the resulting ppt. is sepd. from sol. soap, and the soaps are retransformed to the acids by acidification.

**Nitrogen-containing derivatives of higher aliphatic acids.** Karl Keller (to General Aniline Works). U. S. 1,947,650, Feb. 20. Compds. such as hexachlorinated ricinoleic acid, hexachlorostearic acid, chlorinated linoleic acid or a tetrachlorinated deriv. of oleic acid ethylanilide in an org. solvent such as an alc. are treated with  $\text{NH}_3$  (suitably under pressure of 18–20 atm. and at a temp. of 140–50°), with or without a catalyst, to form N-contg. products which may be used as *wetting agents* in treating textile materials or as intermediates for making other acid derivs. Several examples with details of procedure are given.

**Removing water-soluble impurities from stearic acid, etc.** Stephen Juzsa (to Standard Brands Inc.). U. S. 1,948,585, Feb. 27. An alc. soln. contg. about 5% of impure stearic acid is injected in a finely divided condition into water, and the ppt. of stearic acid is skimmed off and dried in a vacuum. Various details of procedure are described and a generally similar process may be used for the sepn. of other substances from impurities.

**Apparatus for hydrogenation of oils, etc.** Nihon Tishiryō K. K. (Aiji Honda, inventor). Japan. 99,871, March 1, 1933. Diagrammatical.

**Neat's-foot oil.** Deutsche Hydrierwerke A.-G. Ger. 567,618, Jan. 2, 1934 (Cl. 23c. 1). A substance suitable for addn. to neat's-foot oil consists of the esterified aliphatic acids of sperm oil.

**Soap.** Paul Kuller. Brit. 401,866, Nov. 23, 1933. See Fr. 743,799 (C. A. 27, 4114).

**Soap.** Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Wilhelm Schulenburg, inventor). Ger. 592,090, Feb. 1, 1934 (Cl. 23e. 4). See Fr. 746,401 (C. A. 27, 4707).

**Resin soaps.** Antoine C. Gillet. Fr. 757,571, Dec. 28, 1933. Resin soaps having a high content of free resin are made by treating the resin in the presence of a protective colloid and at a total concn. of 35–55% of resin, by an amt. of alkali carbonate corresponding to satn. of resinic acids between 25 and 55%, without agitation and near the h. p., but without boiling.

**Wetting agent.** Soc. pour l'ind. chim. à Bâle. Swiss 164,811, Jan. 2, 1934 (Cl. 24a). A wetting agent for alk. baths is prepd. by mixing a terpene alc. with a sulfonated fatty substance resisting alkali. An example is given.

**Wetting agents, etc.** Soc. pour l'ind. chim. à Bâle. Fr. 757,725, Dec. 30, 1933. Sulfuric derivs. sol. in water are made by treating with sulfonating agents the partly or completely hydrogenated condensation products prepd. on the one hand from phenols and their derivs. and on the other hand from aldehydes or ketones. Thus, (*p,p'*-dihydroxydiphenyl)dimethylmethane is hydrogenated and then sulfonated with  $\text{HClSO}_3$ . Hydrogenated products of the type of "bakelite" may also be used. The products are used in the textile, leather and rubber industry as wetting agents, etc.

**Wetting and other agents.** J. R. Geigy A.-G. Swiss 162,732 and 162,733, Oct. 2, 1933 (Cl. 36a). A wetting, dispersing, emulsifying and washing agent is obtained by treating the fatty alc. mixt. resulting from the reduction of esters of palm-nut and coconut oil fatty acids, with

glycerol monochlorohydrin. The resulting monoglycerol ether is treated with  $\text{CH}_3\text{ClCOCl}$ . The product is then treated with  $\text{Na}_2\text{SO}_3$  to give a prepn. of the above character (162,732). In 162,733, the  $\text{CH}_3\text{ClCOCl}$  is replaced by phenoxyacetic acid chloride and the  $\text{Na}_2\text{SO}_3$  by  $\text{H}_2\text{SO}_4$  or a sulfonating agent.

**Wetting and other agents.** J. R. Geigy A.-G. Swiss 165,385 to 165,400, Jan. 16, 1934 (Cl. 36a). Addns. to 162,732 (preceding abstr.). The method of 162,732 for producing wetting, emulsifying and other agents is applied to monoglycerol ether, obtained from palm nut and coconut oil fatty acids in the same way as the glycerol ether of 162,732, or to monoglycerol or monoglycerol or similar ethers of oleyl alc., cetyl alc., myristyl alc., lauric alc., etc.

**Wetting and other agents.** J. R. Geigy A.-G. Swiss 165,401 and 165,402, Jan. 16, 1934 (Cl. 36a). Addns. to 162,733 (second preceding abstr.). Oleyl alc. or cetyl alc. is esterified with phenoxyacetic acid chloride and the product sulfonated, to give a wetting, emulsifying and other agent.

**Wetting and other agents.** J. R. Geigy A.-G. Swiss 163,000 to 163,003, Oct. 2, 1933 (Cl. 36a). A prepn. for wetting, dispersing, emulsifying or washing is obtained by esterifying with  $\text{CH}_3\text{ClCO}_2\text{H}$  the fatty alc. mixt. obtained by the reduction of esters of coconut or palm-nut fatty acids, and treating the ester mixt. with water-sol. salts of  $\text{H}_2\text{S}_2\text{O}_4$  (163,000). An agent for similar purposes is prepd. by esterifying lauryl alc. with  $\text{SO}_2\text{Cl}_2$  and treating the product with the Na salt of sulfanilic acid in the presence of an acid binding agent (163,001). The salts of  $\text{H}_2\text{S}_2\text{O}_4$  of the first process may be replaced by the Na salt of sulfanilic acid (163,002). The ester of the second process may be treated with the neutralized sulfonation product of  $\text{PhOH}$ , and an acid binding agent (163,003).

**Wetting and other agents.** Chemische Fabrik vorm. Sandoz. Swiss 163,766 to 163,769, Nov. 1, 1933 (Cl. 36a). Addns. to 160,755 (C. A. 28, 670\*). Wetting, washing, emulsifying and dispersion agents are prepd. by the interaction of a sulfonating agent,  $\text{BuOH}$  and ethers of glycol or glycerol. In 163,766,  $\text{BuOH}$ ,  $\text{H}_2\text{SO}_4$  and a mixt. of isomers of chlorocresyl glycol ethers are used. In 163,767, the first two substances and a mixt. of isomers of xylene glycol ether are used. In 163,768, a mixt. of isomers of dioxylene glycol ethers, and in 163,769,  $\alpha$ -naphthyl glycerol ether, are used. Cf. C. A. 28, 1213\*.

**Wetting and other agents.** J. R. Geigy A.-G. Swiss 165,403 and 165,404, Jan. 16, 1934 (Cl. 36a). Addns. to 163,000. Washing, wetting, dispersing or emulsifying agents are obtained by esterifying oleyl or cetyl alc. with  $\text{CH}_3\text{ClCO}_2\text{H}$  and treating the resulting ester with water-sol. salts of  $\text{H}_2\text{S}_2\text{O}_4$ . The products are used for dressing and other treatments of textiles.

**Acyl polyalkylene polyamines.** Wilhelm Neelmeier, Theodor Nocken and Hermann Friedrich (to General Aniline Works). U. S. 1,947,951, Feb. 20. By condensation of varying proportions of substances such as olive oil, the ethyl ester of oleic acid, stearic acid, linseed oil, train oils, wool fat, beef fat or the like with diethylenetriamine, triethylenetetramine or the mixt. of bases obtained by the action of  $\text{NH}_3$  on ethylene chloride under 10 atm. pressure at 80–120° to form bases  $b_1$ , 90–300°, products are obtained which are oily or solid substances suitable for use as, or for making, *wetting agents*, the mono-acyl products being sol. in dil.  $\text{HCl}$ ,  $\text{HOAc}$ , alc. and fats such as linseed oil but insol. in alkalies, the mono- or mixed mono- and di-acyl products yielding strongly lathering solns. with dil.  $\text{HCl}$  or  $\text{HOAc}$ . Various examples with details of procedure are given.

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

Contribution to the history of the French sugar industry. Anon. *Betterave* 44, No. 578, 3–5 (1933). O. W. W.

Electrical control and regulation of  $p_{\text{H}}$  in sugar factories. II. V. Khainovsky. *Arch. Suikarind.* 41, III, Mededeel.

**Proefsta. Java-Sukerind.** 1157-288(1933); cf. C. A. 28, 924<sup>5</sup>.—The theoretical foundations for the construction and functioning of the various parts of the previously described recording  $p_H$  meter are discussed in detail. The new instrument is cheaper than other app. on the market, can be built and repaired on the spot, and handled by native labor. The zero point is easily kept const., a. c. may be used as a source of current and the  $p_H$  range is large and even. F. W. Zerbán

**Warehousing of sugar.** Th. van Beneden. *Arch. Suikerind.* 42, 1-9(1934).—The advantages and disadvantages of various ways of arranging the bags are discussed from the standpoint of easy control of the quantity stored. A layer of bagasse 10 cm thick, covered by bamboo matting, is recommended for heat insulation. F. W. Zerbán

**The one-solution method of analysis of sugar products.** Frederick R. Bachler. *Facts About Sugar* 28, 420 3 (1933).—The method depends upon (a) the prepn. of a sufficient vol. of the normal wt. soln. of the sugar product (20 g. in 100 cc., without the addn. of any reagents) to provide for whatever estns. are required; (b) the use of a special modification of the dipping refractometer for estimating the dry substance in this soln.; (c) the use of Horne's dry lead for defecating where required in the other estns. The refractometer has a special prism and scale with a range from  $n_D$  1.33300 at scale reading -3.0, to  $n_D$  1.37398 at scale reading 105.0, ample for any  $n$  obtainable with the normal wt. concn. The instrument is mounted on a stand and is provided with a water-jacketed Zeiss-Goldbach flow-through tube, which operates like a continuous polariscope tube, and serves also to protect the prism from injury. The method was used exclusively and without difficulty for all routine analyses involving purity estn. at Oxnard during the campaign of 1932. The reliability of the refractive dry substance readings is indicated by the fact that 3 observers always checked within  $\pm 0.02$  Brix, while duplicate dryings by 2 analysts varied by  $\pm 0.08$  to  $\pm 0.11\%$  dry substance, Brix hydrometer readings by  $\pm 0.08$  to  $\pm 0.15$ , and polarizations by 3 observers by as much as  $\pm 0.1$  from the av. M. J. P.

**Sugar-cane cultivation and present prospects of a white-sugar industry in Burma.** A. McKerral. *Burma Dept Agr., Bull.* 28, 15 pp.(1933) K. D. Jacob

**Thermophiles in refined cane sugars and their elimination.** W. L. Owen and R. L. Mobley. *Facts About Sugar* 28, 382-5(1933).—The thermophile content of refined sugars varies widely from month to month, showing no direct correlation with the thermophile content of the raw sugar from which it is made, but tending to lag about a month behind the raw sugar entering the refinery. Filter aids reduce the numbers of thermophiles more extensively than do the char filters. The production of thermophile-free sugar depends upon (a) the attainment of effective filtration and (b) the minimizing of thermophile spore accumulation by means of dust prevention and scrupulous cleanliness. Max J. Proffitt

**Filtration in the cane-sugar industry.** Filtration of first carbonation juices. P. Honig and W. Thomson. *Arch. Suikerind.* 41, 111; *Mededeel. Proefsta. Java-Sukerind.* 1289 343(1933); cf. C. A. 28, 925<sup>4</sup>.—The filtration formulas previously developed are applicable to first carbonation juices. Addn. of lime to satd. juices increases the filtration rate slightly, not enough to overcome the disadvantages of high alk. Addn. of raw juice to the satd. juice also has little effect. When the amt. of lime used in de Haan's carbonation method is varied, the sp. filtration const.  $C_v$  increases rapidly with the quantity of lime. The amt. of insol. dry substance in the satd. juice rises linearly with that of the lime. The total filtration const.,  $C_v \times \sqrt{1/\eta} \times \sqrt{1/R}$ , plotted against percentage of lime added, gives a curve from which each factory can find the amt. of lime to be used under given conditions to attain a desired speed of filtration. Rapid satn. and high alk. during satn. lower the filterability of the ppt. If a juice is first defecated, and then carbonated, less lime is required to attain the same filtration rate; on the other hand, if  $P_2O_5$  is added in connection

with carbonation, more lime must be used. Good correlation was found between the calcd. and observed filtration rates. The filterability is affected not only by chem. but also by mech. factors, such as the method of juice transportation to the presses and the age of the filter cloths. It is better technic to increase the pressure as the cake builds up than to work at const. pressure. The capacity of the usual filter-press station in Java factories is too small. F. W. Zerbán

**$p_H$  control of limed sugar-cane juices.** Jorge A. Solano. *Intern. Sugar J.* 36, 107-8(1934).—Previous attempts at Central Tuman to utilize continuous-liming devices were unsatisfactory owing to an improper mixing of lime and juice and to the dependence upon a hand-controlled stream of milk of lime. With the introduction of the Campbell Automatic Limer a thorough mixing was obtained, but it was necessary to devise a method for rapid and easy sampling of the juice, and a method of heating it in a "sample deposit box," so that it could be rapidly filtered and its lime requirements quickly ascertained. Almost complete uniformity has been obtained with this device, although the variation in the raw juice requirements for lime were as great as before. A cut of the apparatus is shown. W. L. Owen

**Use of "salfosol" in (beet) juice purification.** Emile Saillard. *Circ. hebdom. fabr. sucre Suppl.* No. 2343(1934).—The operations of 2 French beet sugar factories employing "salfosol" (a hydrosol of  $SiO_2$  and  $Al_2O_3$  with  $H_2O$ ) as a juice-purifying agent are described. O. W. Willcox

**Modified Teatini process for beet-juice purification.** Emile Saillard. *Circ. hebdom. fabr. sucre Suppl.* No. 2344 (1934).—Raw beet diffusion juice is heated to 80-85°, treated with 2.2-2.3 g. CaO per liter and then with 15 g liquid anhyd.  $SO_2$  per l., reheated to 95° and filtered; the filtrate is gassed with  $SO_2$  to reduce the alk., to 0.05 g. of CaO per l.;  $Na_2CO_3$  is added at the rate of 8 kg. to 80 hl. to throw out Ca, after which the usual routine is followed. The total amt. of CaO used is only a tenth that usually employed. O. W. Willcox

**Considerations on the Teatini process.** Pingris Priet. *Bellerave* 44, 15-17(1933).—Review, with summary of av. results. O. W. Willcox

**Juice purification by the "Mutosel" process.** K. Smoleński. *Gas. Cukrownicza* 72, 144-9(1933). The French "Mutosel" process of purifying sugar-beet juice by means of zeolites, i. e., hydrated silicoaluminates containing an interchangeable cation is a modification of earlier methods, the only innovation being the use of Al zeolites instead of the formerly used Ca zeolites. The "Mutosel" process must be regarded as still in the exptl. stage. J. Wiertelak

**Colloidal juice clarification with an alumina hydrosol.** H. C. Prinsen Geerligs. *Arch. Suikerind.* 42, 294 32 (1934); cf. C. A. 27, 3633, 4356.—This process, used in a beet-sugar factory in France, saves time, filter-press space, filter cloths and labor. It has not yet been tried on cane juice. F. W. Zerbán

**Comparative evaluation of several activated carbons.** K. Smoleński and W. Zero. *Gas. Cukrownicza* 72, 206 22, 250-63(1933).—The following activated carbons are tested: Norit Standard (I), Norit Superior (II), Carboraffin (III), Sumacarb Super Grade (IV), Hiagenit, normal (V), Hiagenit, special (VI), Carbolmel, (VII) and Hordenska (VIII). I, II and III are German, IV English, V and VI Austrian, VII a Polish charcoal prepd. from molasses, and VIII another Polish product. The results are tabulated below:

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Moisture (air-dry)	15.50	11.91	13.46	23.05	16.13	15.38	7.30	5.40
Total ash (oven-dry)	7.42	4.31	3.13	10.85	6.87	1.22	4.75	14.07
H <sub>2</sub> O sol ash	1.85	0.34	0.83	3.51	2.08	0.41	2.02	2.80
H <sub>2</sub> O-sol substances	1.36	0.32	0.59	1.37	2.01	0.28	1.20	2.00
$pH$ of H <sub>2</sub> O extracts (H <sub>2</sub> O = 6.4)	8.6	6.1	6.1	6.2	9.4	5.4	7.4	4.1

Charcoals of the carboraffin type have a pronounced ability for adsorbing cations from solns., while those of the Norit

type adsorb only minute amts. These carbons may be divided into 3 groups: (1) those with the highest adsorption ability and the lowest filtering rate, *i. e.*, III and IV, (2) those of a medium adsorption capacity and filtering rate, *i. e.*, VII, VIII, VI, and (3) those of a low adsorption capacity and a high filtering rate, *i. e.*, II, I and V.

Conductometric pan-boiling control. S. Stare. *Facts About Sugar* 28, 451-2(1933).—See C. A. 28, 674<sup>2</sup>.

Commercial analysis of molasses. Emile Saillard. *Circ. heb. fabr. sucre Suppl.*, No. 2341(1933).—A method is described for quant. fermentation of beet molasses. S. notes that the direct polarization of the slop after defecation with Pb subacetate is equal to the acid polarization after inversion, which is held to prove that the rotation of the active nonsugar is not changed by the inversion with HCl.

Starch. II. Amylose and amylopectin. 2. Sukeharu Nishimura. *J. Agr. Chem. Soc. Japan* 9, 767-70(1933).—When malt amylase soln. was heated at 70° for 10 min. its amylolytic power decreased markedly. It converted amylose and amylopectin, in 15 min. at 25°, to H<sub>2</sub>O-sol. forms. The hydrolysis of amylose was more rapid and more complete than that of amylopectin. Cf. C. A. 26, 5783.

Molecular complexity of amylose in potato starch. J. Reilly, P. A. O'Donovan and H. Murphy. *Sci. Proc. Roy. Dublin Soc.* 21, 37-42(1934).—Amylose extd. with H<sub>2</sub>O from potato starch, pptd. with alc. and dried over CaCl<sub>2</sub>, loses 9.8% moisture on exhaustive drying, and then contains 0.85% ash, 44.24% C and 6.09% H

(ash-free basis); it gives a mean mol. wt., (cryoscopically, in AcNH<sub>3</sub>) of 342;  $[\alpha]_D^{25} = 150$  (5% NaOH soln.).

M. Benov

Importance of potash for the nutrition of the sugar beet (Engels) 15. Field expts. with sugar cane (Williams, Follett-Smith) 15. Nutrition of the sugar cane (van den Honert) 15. Localization of fatty oils and starch in cells of cultivated beets (Kopul-Gomolyako) 11D. Rept. of the Water Pollution Research Board [beet-sugar factory effluents] (Robertson, Calvert) 14. Deposits caused by impurities of boiler water [of a sugar plant] (Reicher) 14.

Washing and clarifying plant for sugar beet, etc. Carl Ulrich. Ger. 591,964, Jan. 30, 1934 (Cl. 89a. 2).

Vacuum pan control system adapted for use in boiling sugar juices. Walter E. Smith. U. S. 1,948,052, Feb. 20. A water boiler is provided in which a pressure identical with that in the vacuum pan is maintained; elec. resistance thermometers are located in the pan and boiler, and a temp.-difference-indicating device in circuit with the thermometers serves to indicate the b. p. elevation of the liquor in the vacuum pan. Various details of app. are described.

Cooker for sugar juices, etc. Paul Knichalik. Ger. 590,277, Dec. 29, 1933 (Cl. 89e. 2). Addn. to 579,621 (C. A. 28, 1213<sup>4</sup>).

Device for moistening sugar completely dried during refining. Zuckerfabrik & Raffinerie Aarberg A.-G. and Alois Rölz. Swiss 165,499, Feb. 1, 1934 (Cl. 32d).

## 29—LEATHER AND GLUE

ALLEN ROGERS

Chemistry of the animal skin and the problem confronting the tanner. Dorothy Jordan Lloyd. *J. Intern. Soc. Leather Trades Chem.* 18, 144-51(1934).—A review.

H. B. Merrill

Chemistry of skin and catechin tannin. M. Bergmann. *J. Intern. Soc. Leather Trades Chem.* 18, 159-65(1934).—Action of trypsin on collagen and tanned leather is used to elucidate mechanism of tanning. The "Trypsin Index" (percentage digested) of leathers varies widely. It is lower for leather tanned with natural quebracho than for leather tanned with either sulfited quebracho or a mixt. of quebracho and  $\beta$ -naphthalenesulfonic acid.

H. B. Merrill

Tannins and their behavior toward proteins. K. Wreudenberg. *J. Intern. Soc. Leather Trades Chem.* 18, 152-5(1934).—Tanning takes place in 3 steps: (1) formation of mol. compd. between phenolic OH of tannin and N group of protein; (2) permeation of tannin into the fiber; (3) polymerization of tannin to form insol. compds.

H. B. Merrill

Combination tannage for upper leather. J. A. Sago-schen. *Cuir Rech.* 23, 37-8(1934).—Unhaired and bated skins are pickled with alum and salt, tanned with gambier, lightly oiled with fish oil and neat's-foot oil and retanned with sumac, chestnut or sulfited quebracho. They are then fat-liquored with moellon, olive oil, fish oil, soap and borax, and colpred and finished.

H. B. Merrill

Use of trisodium phosphate in tanneries. M. Querciois. *Cuir tech.* 23, 57(1934).—Suggested uses are as a water softener, neutralizing agent and soaking agent for dry skins.

H. B. Merrill

Simplification of the filter method [of tannin analysis]. J. v. Schroeder. *Collegium* 1933, 631-3.—A filter tube is preferable to the Procter bell.

I. D. Clarke

Manufacture of leather cloth. A. Jones. *Synthetic and Applied Finishes* 4, 208-11(1933).—A brief description.

B. C. A.

Constitution of tannins (Russell) 10.

Tanning extracts. The Forestal Land, Timber & Railways Co. Ltd., Andrew Turnbull and Frederick B. Hobson. Brit. 402,126, Nov. 27, 1933. Vegetable tanning exts. are decolorized by treatment with a hot aq. soln. contg. H<sub>2</sub>SO<sub>4</sub> and HCOOH. A temp. of 90-95° is preferable.

Phenol ethers (tanning substances). Georg Kränzlein and Arthur Voss (to I. G. Farbenind. A.-G.). U. S. 1,948,607, Feb. 27. A substance such as a Na benzyl-chloride sulfonate is caused to react with a phenol, and the product obtained is condensed with formaldehyde to obtain a phenol ether easily sol. in water and alkalies, pptg. gelatin and giving characteristic colorations with ferric salts.

Treatment of hides or leather. I. G. Farbenind. A.-G. (Richard Alles, inventor). Ger. 592,224, Feb. 3, 1934 (Cl. 28a. 3). Addn. to 589,175 (C. A. 28, 1567<sup>4</sup>). The compds. of Cr salts with urea, used in the process of Ger. 589,175, are replaced by complex compds. of Al salts with urea. Examples are given.

Leather. I. G. Farbenind. A.-G. Brit. 401,481, Nov. 16, 1933. Tanned or nontanned hides and furs are treated with aq. solns. of compds. of formula RCOXR'SO<sub>2</sub>Z, in which R is an aliphatic radical having more than 8 C atoms, X is O, NH, N-alkyl, N-aryl or N-aryl, R' is an aliphatic radical and Z an alkali metal, NH<sub>4</sub> or H. R and R' may be substituted, but R' must not contain a sulfonic group. Such compds. have a tanning and greasing effect, but addnl. tanning agents and greasing agents may be added. The compds. readily emulsify oils and fats and may be used in dye baths, whereby the leather is both dyed and tanned. They may also be used in tanning with basic dyes. In examples (1) sheep pelt, pretreated and bated in a soln. contg. H<sub>2</sub>SO<sub>4</sub> and NaCl, is treated in a bath contg. the reaction product of the fatty acid chloride of train oil and hydroxyethanesulfonic acid, and (2) chrome-tanned cowhide is greased with an emulsion comprising mineral oil, neat's-foot oil, soap, H<sub>2</sub>O and the reaction product of (1), the emulsion being added to a dye bath or forming a sep. bath. The provisional application

- also covers the subject matter abstracted in Fr. 743,517 (C. A. 27, 3851) and U. S. 1,927,910 (C. A. 27, 6012).
- Tempering leather.** Horace S. Pochin. U. S. 1,948,984, Feb. 27. The leather is immersed in water and subjected to a vacuum, the vacuum is broken during immersion and is subsequently reestablished before immersion is completed, and the leather is finally withdrawn from the water and the vacuum gradually broken. App. is described.
- Reducing frothing in operations such as leather dressing,** etc. Arthur Macarthur and Alexander Stewart (to Imperial Chemical Industries Ltd.). U. S. 1,947,725, Feb. 20. An antifothing agent is used contg. a water-insol. soap such as Al stearate and a mixt. of the liquid (c)-contg. compds. b. 195° and higher obtainable as a by-product in the synthesis of MeOH from CO under pressure.
- Leather substitute.** Seiichi Yamamoto. U. S. 1,949,034, Feb. 27. The bark of *Artocarpus kunsi* ("Kavutaru") is opened, and the resulting coarse network is pasted together with rubber material which forms a coating for the product, which is suitable for floor covering or various uses as a leather substitute, etc.
- Artificial leather.** Soc. anon. Prodotti salpa e affini S. A. P. S. A. Austrian 136,258, Jan. 25, 1934 (Cl. 28b). Waste hide or leather is neutralized, e. g., with borax or NaHCO<sub>3</sub>, and comminuted in water to form a fibrous suspension, which is treated with a tanning agent, e. g., sumach, and then with latex and a salt, e. g., NaCl, and finally worked into a sheet on a paper-making machine. Not more than 1 hr. should elapse between the addn. of the latex and the production of the sheet. K-Na tartrate and an oil or fat, with or without an emulsifying soap, may be added to the suspension before addn. of the tanning agent. Specific compns. are described.
- Suede leather having a high polish.** Meyer Weyner. U. S. 1,949,384, Feb. 27. Suede leather is prepd. with a content of less than 1% of fat liquor and a wax polish upon the nap.
- Oxidized linseed oil suitable for use in making "artificial leather,"** etc. Alexander Schwarzman (to Spencer Kellogg and Sons, Inc.). U. S. 1,949,028, Feb. 27. A product sol. in turpentine substitutes and miscible in all proportions with mineral oils is prepd. by quickly and briefly heating linseed oil to about 315° (the heat treatment being insufficient to produce substantial bodying and to decrease the I value) and then rapidly cooling the heated oil to about 160° and air-blowing it.
- Apparatus for making small pieces of gelatin or glue.** G. Eberlein's Sohn. Ger. 592,333, Feb. 6, 1934 (Cl. 24, 8).

### 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

- Scientific progress in the field of rubber in 1929-1933.**
- A. Natural rubber.** R. Pummerer. *Angew. Chem.* 47, 111 19(1934). A review dealing with latex, rubber as cheap raw material, its fractionation and crystn., its state in solns., phys. tests for detg. its mol. wt., its chem. reactions, the addn. of halogens, its reaction with C(NO<sub>2</sub>)<sub>4</sub> and PhNO, its thermal decompn., O<sub>2</sub> splitting, autoxidation, protection against aging, vulcanization and polymerization. Seventy references. K. K.
- Nonangular thin rubber fibers from latex.** Review of the most important methods of preparation. W. Schlitt. *Kolloid-Z.* 66, 252 4(1934).—Patent review. Arthur Fleischer
- Dipped goods from latex solutions.** George D. Kratz. *India Rubber World* 89, No. 6, 33-4(1934).—A discussion of the chemistry and technology of dipped goods manuf. leads to the conclusion that latex will eventually displace cements for most dipping processes. C. C. Davis
- Some experiences with chlorinated rubber.** Wilhelm Krumblhaar. *Official Digest Federation Paint Varnish Production Clubs* No. 133, 33-8(1934). The best solvents for chlorinated rubber are the aromatic hydrocarbons, the best plasticizers are the soft alkyds, chlorinated naphthalenes and some synthetic oils. The advantages and disadvantages of chlorinated rubber coatings are discussed. G. G. Sward
- Physical properties of rubber at low temperatures.** S. Ilvostovskaya and V. Margaritov. *J. Rubber Ind.* (U. S. S. R.) 10, 231-41(1933).—A simple app. was constructed to det. the mech. properties of rubber at -20°—-80°. A series of tests with various rubber mixts. was made. The most important conclusions are that total loss of elasticity takes place at temps. below -55°; a shorter time of vulcanization at relatively high temps. increases the resistance of rubber to cold; generally, fillers reduce the resistance to low temps.; mixts. with the best cold-resisting properties are obtained with ZnO and chalk. James Sorrell
- The electrodeposition of rubber on a zinc anode.** B. Dogadkin and D. Sandomirsky. *Rev. gén. caoutchouc* 10, No. 97, 17-20(1933).—During the electrophoresis of rubber on a Zn anode in a weakly alk. latex (below 2% NH<sub>3</sub>) there is a sudden drop in the current and a corresponding diminution of the rate of deposition of rubber, and after a short time the deposition practically ceases. On the other hand, in a strongly alk. bath, i. e., above 3% NH<sub>3</sub>, the rate of deposition remains practically const.
- The addn. to the latex of salts whose anions form sol. compds. with Zn reduces considerably the magnitude of this drop in the current. This was true of NaCl, KNO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub>, KSCN and NaOAc, which form salts that diffuse into the rubber film, as shown by ash detns. of the latter. The electrodeposition of rubber on Zn electrodes surrounded by a plaster or glass diaphragm takes place at a practically const. rate, independent of the concn. of alkali in the latex. Addn. to the bath of salts whose anions form insol. compds. with Zn has no influence on the electrophoresis, i. e., the rate at which rubber is deposited diminishes as suddenly as with latex contg. no NH<sub>3</sub>. This was true of Na<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>Fe(CN)<sub>6</sub>, K<sub>2</sub>HPO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. The action of salts of the 2nd group and the action of alkalis are explained by the nature of the phenomenon at the anode and by the structure of the film of rubber deposited, i. e., by the formation of a compact, nonconducting film of rubber and insol. Zn salts, combined with proteins and other serum substances by adsorption. C. C. Davis
- The temperature coefficients of viscosity of liquids in relation to the structure of rubber in solutions.** Warrey F. Busse and Enoch Karrer. *Kolloid-Z.* 65, 211-23(1933).—Dunn's (cf. C. A. 21, 1388) equation,  $\log 1/\eta = A/T + B$ , where  $\eta$  is the viscosity,  $T$  the abs. temp., and  $A, B$  are const., is derived from the Maxwell viewpoint that viscosity is a measure of the velocity with which the potential energy, stored in the material by the shear force under conditions of laminar flow, is transferred to heat. This energy factor is represented by  $A$ , while  $B$  is a factor depending on the weight, form, size, etc., of the moving mols. or complexes. The equation applies only to reversible thermal changes. The irreversible changes were held as small as possible in the expts. The results on rubber solns. are expressed as kinematic values, whose temp. coeff. is not appreciably different from the abs. values, since the expansion coeff. is small. For 0.25 and 5% solns. of bleached crepe rubber, milled 15 min. under 200 lb. load, the equation applied from -10° to 60°, in toluene, turpentine, toluene-turpentine mixts., bromobenzene, CHCl<sub>3</sub>, and xylene, but not for ether solns. which are slowly transformed to a white firm mass on cooling.  $A$  increases with concn., while  $B$  decreases. Fluidity is practically a linear function of mech. working of the rubber. After prolonged heating at high temp. the viscosity does not return to the original value on cooling because of the effect of traces

of  $O_2$  left in the solvent. Since the equation does not contain a mol.-wt. term, changes in viscosity cannot be ascribed to rubber polymerization or to  $\alpha$ - $\beta$  transformation. When the equation does not apply, the change is due to changes in the no. of mol., and degree of solvation or aggregation. The validity of the equation does not form a criterion as to whether the soln. is a true soln., or contains solvated mol., micelles or mech. mol.

Arthur Fleischer

**The transformation of rubber during "rest."** B. Dogadkin and K. Berezan. *J. Rubber Ind.* (U. S. S. R.) 9, 198-205 (1933).—The extent of recovery of "nerve" in smoked sheet during rest was studied. Smoked sheet milled from 5 to 23 min. was allowed to rest. Samples were taken from each large sample after 0.5 to 10 hrs. and placed at once in  $C_6H_6$  in dark bottles, which were shaken from time to time, soln. taking 4-5 days. The capillary test of Greinert and Behre (cf. *C. A.* 20, 2095) was used with 9.5%  $C_6H_6$  solns. The nerve, expressed as sq. mm. area of filter paper wet by the soln., was 7500 for unrolled sheet, 5000 for sheet rolled 15 min. and 4450 for sheet rolled 23 min. The recovery of nerve during rest was found to be very slight, and occurred during the first 2-3 hrs. Similar results were obtained by viscosity tests with 0.8% solns. in  $C_6H_6$  at 25° in an Ostwald viscometer, with a pressure-gage connection. This test was based on the decrease in viscosity at increased pressures shown by colloid solns. which contain non-spherical dispersed particles. Calculs. were made by the formula of de Woele-Ostwald.  $dl/dt = RP^2/\eta$  ( $P$  = pressure;  $\eta$  = viscosity at pressure  $P$ ;  $t$  = time,  $l$  = distance) for structural colloids. The plotted results showed a flattening of the curves for samples taken from sheets that were milled longer, indicating a loss of nerve and a tendency to recover the original shape for samples taken from sheets after rest. Surface-tension detns. were made by a stalagmometer, but the results were unsatisfactory.

James Sorrell

**The resistance of anisotropic rubber sheets to cutting and to tearing.** F. Kirchhof. *Kautschuk* 9, 130-4 (1933). Expts. with films prep'd. from latex are described, a technic which made it possible to avoid the effects of mastication. Films from latex contg. shellac resin NII, soaps showed considerable resistance in all directions to tearing, but after repeated elongations became anisotropic and could be cut and torn more easily longitudinally. Films which after being stretched were warmed to 80° behaved similarly. This anisotropy brought about by stretching is also manifest in x-ray diagrams. In contrast to this, films which contained no shellac but which had been racked and warmed showed no anisotropy, while in the racked condition there was a ready sepn. into fibers, as observed by Feuchter (cf. *C. A.* 20, 1149). Shellac must, therefore, fix in position the rubber particles deformed by stretching. It is proposed to distinguish the resistance of a unidirectional anisotropic rubber sheet to tearing in this direction from its resistance to cutting by characterizing the former as the resistance to sepn. The latter can be expressed in g. per mm. of thickness. Shellac also had a great reinforcing and stiffening effect on evapd. latex films, and increased considerably the permanent elongation after stretching.

With high proportions of shellac, the mixts. resembled balata. This toughening effect of shellac does not persist through vulcanization, and the mere heating of a raw film to 80° destroys it to a large extent, with formation of thermoplastic products. These phenomena are explained by the fact that in rubber-shellac mixts. each latex particle is enveloped by an adsorbed shellac film, which makes a structure which is isotropic in all directions.

On stretching, the particles are deformed, and the enveloping films are ruptured and coagulated by internal friction. The less the adsorption and degree of dispersion of the shellac, the less the disturbance of the cleavage planes (boundary of the particles) in the direction of stretching, with resulting greater tendency to rupture and less resistance to tearing in this direction. Conversely the greater the adsorption, the greater the absorption of

energy by the rubber and the stronger the latter. Though true calender grain is to a large extent destroyed by heat before vulcanization, the mill grain persists after vulcanization because of the rigidity of the oriented particles, so that anisotropy as judged by cutting, tearing, tensile strength and extensibility is found in some vulcanized sheets. A technic for measuring the tensile strength and resistance to tearing of thin calendered sheets is described.

C. C. Davis

**The oxidation of rubber. III. The Russell effect from rubber.** A. van Rossem and J. H. B. Hessels. *Kautschuk* 9, 181-4 (1933); 10, 4-7 (1934); cf. van R. and Talen, *C. A.* 25, 5795; 26, 334.—The object was to det. whether the Russell effect (R. e.) will detect the 1st stages of oxidation of raw rubber, and whether it can be utilized to detect incipient oxidation in vulcanized rubber. The samples were placed in direct contact with very sensitive photographic plates for 17-18 hrs., then developed and fixed. After raw rubber has been exposed to light and air, its ability to show a pos. R. e. depends upon: (1) the components of the smoke; (2) its tackiness and (3) its acetone ext. Smoked sheet gives a strong R. e. as a result of the presence of substances acquired from the smoking, whereas Para gives no R. e. because the particular smoke does not contain the requisite active compds. Most crepes (nontacky) show only a slight R. e., but after acetone extn. and then long exposure they become tacky and show an increased R. e. The acetone ext. of rubber shows a strong R. e., and its addn. to unextd. rubber increases the R. e. of the latter. However, rubbers whose acetone exts. give a strong R. e. do not necessarily show any R. e. themselves, perhaps because the concn. of acetone-sol. components is insufficiently high. At 80° rubber loses most of its R. e., indicating the volatility or decompn. of the active compds. After exposure to  $O_2$  (instead of light) rubber loses its R. e. from 30° to 60°, indicating that the peroxides are different in the 2 cases. Antioxidants do not influence the R. e., but  $NaHSO_3$  diminishes it considerably ( $Na_2SO_3$  has no effect). Neither mastication nor heating previous to exposure to light influences the R. e., nor does the addn. of S, ZnO or most org. accelerators influence it, but the simultaneous presence of S and most accelerators almost destroy the R. e. Only mercaptobenzothiazole weakens it without the aid of S. On the other hand, treatment with S and accelerator after exposure to light does not influence the R. e., showing that the active compds. are formed by light and air. Vulcanized rubber (normal, over-cured or oxidized naturally) of various compns. shows a very weak R. e., so that the latter is of no value for detecting incipient oxidation or a tendency to oxidize. On the other hand, after exposure to air contg.  $O_3$  (below 1.01%  $O_3$ ) both raw rubber and vulcanized rubber showed a very strong R. e., and therefore Hg-vapor quartz lamps are not suited to expts. on the R. e., because  $O_3$  is formed.

C. C. Davis

**Experimental study of "Agerite" as an antiaging agent in rubber.** N. Chesnokov. *J. Rubber Ind.* (U. S. S. R.) 9, 400-13 (1933).—The values of aldol- $\alpha$ -naphthylamine ("Agerite") as an antiaging agent for rubber and as a softening and dispersing agent for C black rubber mixts. are discussed. Light crepe of different consignments varied considerably in aging, independently of the resin content or acid number. "Tau-saguz" (Russian plant rubber) was inferior to smoked sheet and hard Para rubber in its resistance to aging, but showed a marked increase in resistance with Agerite. Rubber with the highest resistance to tearing does not make an article with the longest life. At the proper state of vulcanization, a rubber mixt. should have a fair resistance to tearing and the highest resistance to aging. Phenyl- $\beta$ -naphthylamine had the same action on rubber as did Agerite.

James Sorrell

**Titanium fillers in rubber mixtures.** V. Kreps. *J. Rubber Ind.* (U. S. S. R.) 9, 305-7 (1933).—The distribution and extent of Ti ores of industrial importance in U. S. S. R. are estd. Because of the properties of Ti white, and for economic considerations, its manuf. and

use by the U. S. S. R. rubber industry are urged.

**Compounding of benzene-resisting and oil-resisting rubber mixtures.** V. Kartzev and A. Golubev. *J. Rubber Ind.* (U. S. S. R.) 10, 301-11(1933).—A study of the swelling of rubber in org. solvents and the effect of the compn. of the rubber on its resistance to swelling. Mixts. contg. different ingredients were immersed in benzene (for 24 hrs.) and in lubricating oils (for 48 hrs.); the extent of swelling was detd. and expressed as the percentage gain in wt. The ingredients tested included "GET" black, "Maikop" black, kaolin, ZnO, CaO, MgCO<sub>3</sub>, MgO, chalk, lithopone, talc, infusorial earth, S, horn dust, mica, graphite, animal glue, etc. The results of these tests are given in 48 diagrams and show that to prep. benzene- and oil-resisting rubber mixts. the S should not exceed 10-15%; the addn. of "GET" black, Se, "Neozon D" and "Agerite" gives excellent results; and lime, lithopone, infusorial earth and horn dust are of no benefit.

**Combination of gas black and inorganic fillers in SKB rubber mixtures.** A. Ermolaev and A. Bobrov. *J. Rubber Ind.* (U. S. S. R.) 10, 130-6(1933).—The possibility of substituting kaolin, lithopone, ZnO, talc, infusorial earth and molten chalk for gas and lamp blacks in Na-butadiene rubber mixts. is studied. Addn. of 15-25 vols. of kaolin to rubber contg. 10 vols. of black increased the resistance to tearing. Addn. of 15-25 vols. of kaolin to mixts. contg. 20-25 vols. of black had no effect on the resistance to tearing, while further addn. of kaolin reduced it. Addn. of 15-25 vols. of lithopone to mixts. contg. 10 vols. of black had no effect on the resistance to tearing of rubber, while the same vol. in 20-25 vols. of black mixt. reduced it. Addn. of talc and ZnO in combination had the same effect as lithopone. Addn. of infusorial earth and chalk reduced the resistance to tearing.

**Determination of sulfur in rubbers by oxidation with aqua regia.** A. Serebrennikov. *J. Rubber Ind.* (U. S. S. R.) 10, 243-6(1933).—To det. S in raw rubber, add to 0.5-g. sample of finely cut rubber 15 cc. of aqua regia (HNO<sub>3</sub>, d. 1.4; HCl, d. 1.19), heat, evap. to the consistency of honey, add 3-5 cc. of HCl, evap. to dryness; dissolve in dil. HCl soln., filter, dilute, neutralize with NH<sub>4</sub>OH, acidify with HCl and ppt. from hot soln. with 1% BaCl<sub>2</sub>. The detn. of S in vulcanized rubber is carried out with some minor modifications, e. g., MgO is added to the sample before treatment.

**Asphalt-rubber-mixtures.** F. C. van Heurn and M. A. Begheyn. *Kolloid Z.* 66, 219-28(1934); cf. C. A. 25, 5810; 26, 4731.—The types of mixts. which are possible are classified on the basis of their method of prepn. and are, (1) mill-mixed with less than 20% of rubber, (2) mill-mixed with greater than 20% rubber, (3) mixing latex and asphalt emulsions, then drying or coagulating, (4) evapn. of a mixt. of molten asphalt and rubber soln. and (5) direct soln. of finely divided rubber in molten asphalt. Mixes were prepd. by method five. The soly. time decreased from 480 min. at 160° to 40 min. at 260°. There is a linear decrease in free rubber content by the ebontite test, with increased temp. The tendency to flow is least for mixts. prepd. at 140°. Flow was measured by the distance moved in 20 hrs. when a coated plate was placed at an angle of 45° in an oven at 100°.

**Apparatus for studying the effect of cold on rubber.** Jeannin and Maugras. *Rev. gén. caoutchouc* 10, No. 97, 3-4(1933).—The app. which is described and illustrated will chill small samples to -35° by the forced evapn. of a very volatile liquid, e. g., Et<sub>2</sub>O, from an insulated jacket surrounding the chamber contg. the samples. The loss of liquid by pumping is replenished automatically, and it is possible to cool the samples in any gas. The app. is also useful for studying the freezing of salt solns. and of oils and for measuring eutectic points.

**Adhesion of rubber to metal objects.** Lucien Ernaux. *Rev. gén. caoutchouc* 10, No. 97, 5-9(1933).—Tests of various methods of adhering rubber to metals showed that

the best general method is to coat the metal with brass by the galvanoplastic process. Preliminary sanding gives poor adhesion, and it is recommended to clean the surface by successive immersions in electrolytic alk. (hot) and acid baths, and a final rinsing in a cyanide bath, with inversion of the current twice per min. for 4-5 min. Brass-plating is then effected in a cyanide bath at 38° with a c. d. of 0.5-0.6 amp. per sq. dm. until the film is 0.00125-0.00150 mm. thick, after which the surface is washed with boiling water and dried at 65°. No As, Sb, Bi or Pb should be present in the bath. The surface should be rubberized immediately or else protected by a varnish. The best results are had with electrolytic brass contg. 70% Cu, and both a little below and above this value, the adhesion becomes poorer. Not all types of rubber mixts. adhere to the same degree, and it was found that the inclusion of considerable ZnO, some white, factice and diphenylguanidine or mercaptobenzothiazole as accelerator gives favorable results. A technic for measuring the adhesion is described.

**Standardizing and control instruments in the rubber and cable industries, and vulcanization by pressure and temperature.** M. J. Mohr. *Kautschuk* 10, 1-4(1934).—A review and discussion.

**Wire and cable stocks. The evolution of rubber insulation compounds.** F. B. Wilson. *India Rubber World* 89, No. 6, 28(1934).—Historical, including present-day chem. developments.

**Rubber printing plates.** Joseph Rossmann. *India Rubber World* 89, No. 4, 37-8; No. 6, 35-6(1934).—A review of various patents.

**A shearing-disk plastometer for unvulcanized rubber.** Melvin Mooney. *Ind. Eng. Chem., Anal. Ed.*, 6, 147-51(1934).—In the new app., the sample is sheared between the surfaces of a rotating disk and a stationary chamber surrounding the disk. To prevent slippage the rubber is kept under a confining pressure and the surfaces which shear it are roughened. The stator chamber is made in 2 sections which close together by a powerful lever system, and in doing so they automatically cut and form the sample of rubber. A complete plasticity measurement, including heating the sample, can be made in 3 min. The measurement obtained, called the *shearing viscosity*, is proportional to the mean abs. viscosity of the sample.

**Rubber erasers.** A. Hutin. *Rev. gén. caoutchouc* 10, No. 97, 26-7(1933).—Various formulas are given to obtain products of different qualities.

**Isoprene and rubber. XLI.** The hydrogenation of rubber and balata. H. Staudinger and E. O. Leupold. *Ber.* 67B, 304-11(1934); cf. C. A. 27, 2843.—The viscosity of solns. and therefore the chain length of rubber or balata remains const. upon partial or complete hydrogenation under mild conditions. The purified hydrocarbons were hydrogenated at 100 atm. and 100° in dil. O-free hexahydrotoluene solns. with 5-10 times their weight of Ni catalyst. Hydorrubber possesses the elastic properties of rubber. Both hydorrubber and hydrobalata are relatively resistant to oxidation but the former deteriorates upon 1 yr. of exposure to air and light.

**The heat treatment of synthetic sodium butadiene rubber.** M. Farberov and F. Merzlikin. *J. Rubber Ind.* (U. S. S. R.) 10, 123-5(1933).—A preliminary report on expts. to reduce plasticity of synthetic Na butadiene rubber (produced by U. S. S. R. plants), a property which makes its milling in the usual way impossible. Treatment of this rubber with dry steam in a vulcanizer and then drying in a vacuum drier were tried in order to reduce plasticity. A gas black mixt. from this product had a plasticity 20% lower, no longer had a disagreeable odor, was calendared without difficulty, and showed a 5-10% increase in its resistance to tearing.

**Scorching of mixtures of sodium butadiene and SKB rubber.** P. Kaplin. *J. Rubber Ind.* (U. S. S. R.) 10, 139-41(1933).—Expts. showed that Na butadiene and "SKB" rubber and their mixts. are inclined to scorch. The degree of scorching depends on the plant equipment



and the heat treatment of the synthetic rubber.

**Organic accelerators in mixtures with "Tau-saguiz" rubber.** V. Maslov. *J. Rubber Ind.* (U. S. S. R.) 10, 147-57 (1933).—The elasticity and the resistance to tear of "Tau-saguiz" (Russian plant rubber) contg. 0.5% diphenylguanidine were approx. those of medium crepe, but were considerably lower with 1.0% of this accelerator. The rate of vulcanization of "Tau-saguiz" is about the same as with crepes, while aging properties are poorer.

**Accelerators of vulcanization.** F. Jacobs. *Caoutchouc et gutta-percha* 30, 16669-71 (1934); cf. C. A. 28, 2217. Diithiocarbamates are reviewed.

**Low-temperature vulcanization.** T. E. H. O'Brien. *Trop. Agr.* (Ceylon) 81, 361-5 (1933).—The exptl. prepn. of self-vulcanizing crepe rubber is described. Dil. the fresh latex to 3 lb. of dry rubber/gal. and treat with 1 part of  $\text{NaHSO}_3$ , added in the form of 5% soln., to 200 parts of rubber. The vulcanizing ingredients are 3 lb. of  $\text{ZnO}$ , 1.5 lb. of S, 0.75 lb. of accelerator ( $\text{Zn}$  or  $\text{Na}$  diethyldithiocarbamate) and 0.5 lb. of coloring matter (Vulcafor). The wetting ingredients are 0.25 lb. of vulcastol A paste or 1.25 lb. of saponin dissolved in 1.5 gal. of  $\text{H}_2\text{O}$ . The coagulant is 3.25 lb. of alum in 3.25 gal. of  $\text{H}_2\text{O}$ . Thoroughly grind the vulcanizing ingredients into a cream with the soln. of wetting agent and slowly add the cream to the latex with vigorous stirring. Add the alum soln. and stir until thickening occurs. After 1 hr. the thick paste forms a coagulum when stirred. It is preferable to machine the coagulum within a few hrs. but it can be left overnight. The rubber is made into lace crepe and air dried within 3-4 days. Dry rolling is done 12-14 days after prepn. and the rubber is made into laminated sheets by the usual Ceylon sole crepe method. The product, suitable for table mats, bath mats, etc., resists heat and sunlight and absorbs  $\text{H}_2\text{O}$  less readily than raw rubber. Tests showed that alum was a better coagulant than  $\text{HCO}_2\text{H}$  for this type of mixing and that  $\text{NaHSO}_3$  assisted vulcanization and improved the color of the product.

**Heat changes in the vulcanization of rubber.** I. Qualitative test by way of comparison. Hukio Horie and Kikuo Morikawa. *J. Soc. Rubber Ind. Japan* 7, 5-11 (1934).—To 100 parts untreated raw rubber (I), a substance (II) free from resin and pure raw rubber (III), 5, 10, 15 and 20 parts of S, resp., are added; they are milled 10 times on rolls and pressed to 0.5 mm thickness. Samples are then heated in an oil bath at  $180 \pm 0.2^\circ$  and the change in temp. is noted. There was little or no change in temp. in samples without S. In samples compounded with S, there was but 1 exothermic point during the heating and the max. temp. attained by  $\text{I} > \text{II} > \text{III}$ ; the time required to reach a max. temp. by  $\text{III} > \text{I} > \text{II}$  and it was shortened by an increased use of S, except that of a sample with 10% S. The presence of nitrogenous matter was rather injurious to the vulcanization process until it reached 5% combined S, but it was necessary to obtain more than 5% of combined S. It is evident that the substance which accelerates the vulcanization process is a nitrogenous substance and not a resinous substance.

**Accumulation of rubber in the roots of Tau-saguiz** Novikov, et al. 11D. Rubberized cloth (Fr. pat. 757,230) 25. Creping rubberized material (U. S. pat. 1,948,138) 25. App. for controlling the working of rubber (U. S. pat. 1,949,199) 1. Plastic materials (Fr. pats. 757,432 and 757,485) 18. Protective coating for golf balls (U. S. pat. 1,948,292) 18. Disazo dyes [for rubber] (Brit. pat. 402,920) 25.

**Fischer, Emil J.:** Guttapercha und Balata, ihre Ersatzstoffe und technischen Gemenge. Berlin Lichterfelde: Allgemeine Industrie-Verlag. 181 pp. M. 9; bound, M. 10.

**Rubber.** Hermann Playson. Swiss 163,330, Oct. 16,

1933 (Cl. 81). In coagulating rubber latex, the latex is subjected to strong mech. agitation during coagulation. The latex may be mixed with water before coagulation.

**Rubber.** J. R. Geigy A.-G. Swiss 163,553, Nov. 1, 1933 (Cl. 41). The resistance of rubber masses to chem. and elec. influences is increased by adding 2-naphthol-glycol ether to the mass with the filling material, before vulcanization.

**Rubber.** J. R. Geigy A.-G. Swiss 165,709 to 165,713, Feb. 1, 1934 (Cl. 41). Addns. to 163,553 (preceding abstr.). The resistance of rubber masses to chem. and elec. influences is increased by adding 2-naphtholglycerol ether prior to vulcanization (165,709). The latter ether may be replaced by *o*-cresol glycol ether (165,710), by the glycerol ether of a com. mixt. contg. 3 isomeric cresols (165,711), by a resin obtained from phenol glycerol ether, urea and  $\text{CH}_3\text{O}$  (165,712) or by a resin obtained from phenol glycerol ether and phthalic anhydride (165,713).

**Rubber.** Soc. anon. des pneumatiques Dunlop. Fr. 757,335, Dec. 23, 1933. A cellular or spongy rubber, the particles of which have dimensions below 12.7  $\mu$ , is obtained by submitting cellular or spongy rubber to a succession of shocks having a cutting action.

**Rubber low in albumin.** Hermann Miedel (to Revertex Ltd.). U. S. 1,947,949, Feb. 20. See Brit. 363,193 (C. A. 27, 1546).

**Rubber compositions.** Soc. anon. des pneumatiques Dunlop. Fr. 757,680, Dec. 30, 1933. Comps. are made by forming a dispersion of rubber, etc., in a plastic substance or substances which then constitute the continuous phase and mixing the dispersion thus prepd. with further amts. of rubber, etc., under such conditions that this dispersion itself disperses in the rubber used in the 2nd place.

**Use of rubber dispersions in forming irregular ornamental surfaces.** Edward A. Murphy and Eric W. B. Owen (to Dunlop Rubber Co. Ltd.). U. S. 1,947,870, Feb. 20. A dispersion of rubber material contg. about 25-30% total solids and of an alky. equal to 0.5% of  $\text{NH}_3$  is superficially contacted with a 5% HIOAc soln. as a coagulant to produce a coagulum of such low mech. strength as to permit the superficial gathering of the coagulated layer to simulate wave-like contours, this layer being suitable for ornamental purposes simulating alligator leather, etc.

**Preserving rubber and like materials.** Hugh M. Bulbury, Wm. J. S. Naunton and Keith W. Palmer (to Imperial Chemical Industries Ltd.). U. S. 1,949,240, Feb. 27. A small proportion of a mercaptophenol such as 1-mercapto-2-naphthol is added.

**Apparatus for cutting rubber and other tubes into lengths.** The India Rubber, Gutta Percha and Telegraph Works Co. Ltd., Frank C. Matthews, Frederick E. Brown and John W. Pengelly. Brit. 402,077, Nov. 9, 1933.

**Rubber threads, filaments and tubes from aqueous dispersions.** Edward A. Murphy and Robert G. James (to Dunlop Rubber Co. Ltd.). U. S. 1,947,871, Feb. 20. A shaped jet of an aq. dispersion is caused to flow into contact with a liquid dehydrating and setting medium having a continuous penetrative osmotic action and comprising a concd. soln. of a largely dissoed. hydrolyzable salt of a weak acid such as  $\text{NH}_4\text{OAc}$  and a free weak acid such as  $\text{HOAc}$  in such amt. that the  $p_H$  is not lower than 5.0, and there are added to the aq. dispersions before contact substances such as  $\text{NH}_4$  oleate which are substantially inactive to the dispersions and capable of being decompd. when brought into contact with the weakly acid medium into substances inducing coagulation in the dispersions.

**Rubber bands.** John R. Gammeter (to Revere Rubber Co.). U. S. 1,949,465, March 6. Rubber is deposited from a liquid on a surface formed with an endless groove and with sharp edges at each side so that the rubber will collect in the groove and will deposit quite thinly over the sharp edges, and pressure is applied to facilitate sepn. and removal of the rubber deposit so that a tube of loosely joined bands is obtained. U. S. 1,949,500 (Roger Weston,

to Revere Rubber Co.) relates to a generally similar process.

**Hollow rubber articles such as football bladders directly from aqueous dispersions.** Andrew Szegvari (to American Anode, Inc.). U. S. 1,949,502, March 6. The cavity of a divided mold is coated with a coagulant, the parts of the mold are separately immersed in a coagulable dispersion of rubber, and are united beneath the surface of the liquid. App. is described.

**Mold for manufacture of rubber articles such as inner tubes of tires.** Ernest Hopkinson (to U. S. Tire Co.). U. S. 1,949,473, March 6. Mech. features.

**Molding rubber heels, etc.** Wilhelm Rischer (to Wingfoot Corp.). U. S. 1,948,344, Feb. 20. Mech. features.

**Rubber half-sole for shoes with a united layer of Canton flannel.** Charles P. Mebane (to National Glove Co.). U. S. 1,948,390, Feb. 20. Various details of manuf. are described.

**Conveyer belts of rubberized fabric.** Raymond S. Carter (to Wingfoot Corp.). U. S. 1,948,332, Feb. 20. Various details of manuf. are described.

**Hydrocarbon polymerization products.** I. G. Farbenind. A.-G. (Georg Ebert, Friedrich A. Fries and Paul Garlsch, inventors). Ger. 592,096, Feb. 1, 1934 (Cl. 39b. 4.01). Addn. to 575,439 (C. A. 27, 3638). Butadiene hydrocarbons are polymerized by treatment with an alkali or alk. earth metal or hydride, or an organometallic compd., in the presence of a small proportion of an unsatd. compd. (other than an unsatd. ether) which is capable of displacing a metal from an organometallic compd. Suitable addnl. compds. are thiophene, HCN,  $\text{CH}_2\text{CHCN}$ ,  $\text{PhCH}_2\text{CN}$  and  $\text{MeC}\equiv\text{CH}$ . Oily or plastic products are obtained. Examples are given. Cf. C. A. 27, 5330.

**Rubber-like composition.** Waldo L. Semon (to The B. F. Goodrich Co.). Can. 339,377, Feb. 13, 1934. A resilient rubber-like compn. is manufd. by dissolving 1 part of insol. polymerized vinyl chloride at an elevated temp. in 0.5-4.0 parts of a solvent contg. *o*-nitrodiphenyl ether 2 parts, dinitrobenzene 1 part and dinitrotoluene 1 part, and causing the compn. to gel by cooling. The compn. is an excellent insulator, of high dielec. strength and is corrosion-resistant.

**Machine for mixing plastic materials, e. g., rubber** The Firestone Tire and Rubber Co. Brit. 401,981, Nov. 23, 1933. Addn. to 362,357 (C. A. 27, 1237).

**Coated fabrics.** John C. Emhardt (to Sidnev Blumenthal & Co., Inc.). Brit. 402,269, Nov. 30, 1933. Material for floor coverings, etc., consists of fabric upon which a thin layer of resilient cellular rubber is formed from an aq. dispersion of rubber after application thereof to the fabric. The dispersion may be (artificial) latex, mixed with modifying and vulcanizing ingredients and including a small amt. of added  $\text{H}_2\text{O}$ ; it may also include a filler. After application of the mixt. to the back of a pile fabric by a doctor blade, the material is passed into a chamber heated above  $100^\circ$ , the  $\text{H}_2\text{O}$  imparting, by boiling, a cellular structure to the rubber which is simultaneously vulcanized and caused to adhere firmly to the fabric.

**Article of cellular rubber and ebonite with closed cells.** Maurice P. H. L. Raepsaet (to Soc. belge du caoutchouc mousse). U. S. 1,948,046, Feb. 20. In the production of articles such as ice boxes, plates for floor coverings and tubes sheathed with metal, the crude rubber is subjected to a first partial vulcanization in a mold in an autoclave charged with a gas under high pressure, with a following expansion, coating of the metal with a rubber soln., assembly of the expanded rubber with the metal and a supplementary vulcanization.

**Cellular rubber and ebonite.** Ugo Pestalozza and Società italiana Pirelli. Brit. 402,067, Nov. 21, 1933. In the manuf. of cellular rubber or ebonite from aq. rubber dispersions, e. g., latex, the dispersion is gasified dur-

ing coagulation by effecting fermentation of material, e. g., glucose, molasses, in the mass with consequent evolution of gas, which is preferably insol. or slightly sol. in the dispersion. Among examples a mixt. of 100 g.  $\text{NH}_4$ -free latex concd. to 50% dry rubber content, 10 cc. of a 50% aq. soln. of sugar contg. 2 g. yeast, 1.5 g. each of crystd.  $\text{MgSO}_4$  and  $(\text{NH}_4)_2\text{SO}_4$  in 10 cc.  $\text{H}_2\text{O}$  and 15 cc. of a 5% aq. soln. of glue, having suspended therein S 1, Zn dimethyldithiocarbamate 0.5, ZnO 0.2 and pumice stone 2 g., is fermented 6 hrs. at  $30^\circ$ , the mass transferred to a network mold coated with rubber soln., enclosed in a suitable container and immersed in boiling  $\text{H}_2\text{O}$  1.5 hr. for vulcanization. The cage is then left in cold  $\text{H}_2\text{O}$ , dried and the mass removed.

**Rubber-vulcanization accelerator.** Lorin B. Schrell and Albert M. Clifford (to Wingfoot Corp.). U. S. 1,948,317, Feb. 20. An accelerator is used such as the dithiocarbamate of dibutyl ethylenediamine or various compds. of the general formula  $\text{R-NH-X-NH-R'}$ , in which the groups R, X and R' are aliphatic hydrocarbon residues (R and R' contg. each not less than 2 C atoms).

**Dithiophosphate compounds (rubber-vulcanization accelerators).** Charles J. Romieux and Kenneth D. Ashley (to American Cyanamid Co.). U. S. 1,949,629, March 6. Accelerators are produced by the reaction of  $\text{S}_2\text{Cl}_2$  or a similarly reactive Cl compd. upon a dithio phosphate such as di-isopropyl, di-ethyl, or glycol di-isopropyl dithiophosphates or their salts or esters (several examples with details of procedure being given). Cl. C. A. 27, 1721, 2124.

**Apparatus for vulcanizing molded strip material** Clarence E. Siegfried (to Construction Materials Patents, Inc.). U. S. 1,948,011, Feb. 20. Mech. features.

**Apparatus for vulcanizing rubber belting.** James C. Heintz. U. S. 1,949,275, Feb. 27. Structural and mech. features.

**Apparatus for continuous vulcanization of rubber hose, belting, etc.** Archibald L. Wallace. U. S. 1,949,226, Feb. 27. Structural and mech. features.

**Electric vulcanizing apparatus, particularly applicable to the treatment of the insulation of electric cables.** The Macintosh Cable Co. Ltd. and Robert F. D. Milner. Brit. 401,486, Nov. 16, 1933.

**Vulcanizing rubber.** Wm. B. Wiegand. Ger. 501,951, Jan. 30, 1934 (Cl. 39b. 5). Rubber is vulcanized by adding inactive gas soot. The usual active gas soot is added and is inactivated by heating to  $600^\circ$  in a non-oxidizing atm. The soot is heated till its content of volatile constituents is not greater than 4%. In an example, rubber is vulcanized with gas soot, S, ZnO and diphenylguanidine.

**Vulcanizing rubber.** The Goodyear Tire & Rubber Co. Fr. 757,442, Dec. 26, 1933. Nitro hydroxy aromatic compds. are used as premature vulcanization retarders. Such compds. include 2,4-dinitrophenol, 2,2-di-(3-nitrohydroxyphenyl) propane, -dinitro-4-hydroxydiphenyl and nitrated methylenedi- $\beta$ -naphthol.

**Vulcanizing stretched and twisted rubber.** Edward N. Cunningham (to B. F. Goodrich Co.). U. S. 1,947,751, Feb. 20. For producing rubber thread, strip rubber of polygonal cross section is stretched to several times its unstretched length and twisted until it has a substantially circular cross section, and in this condition is vulcanized, with compds. of S with H, P or Cl such as S chloride, to a point at which it permanently retains at least most of its elongation and twist. App. is described.

**Manufacture of vulcanized rubber articles such as tires.** Charles W. Leguillon (to B. F. Goodrich Co.). U. S. 1,949,057, Feb. 27. The major portion of an article such as a tire is formed including masticated rubber at the surface and a surfacing layer is applied comprising unvulcanized rubber relatively non-flowing at vulcanizing temp., and the article is vulcanized while holding it distended by fluid pressure applied directly to the surfacing layer (which may be the inner layer of a tire).

# CHEMICAL ABSTRACTS

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## 1—APPARATUS AND PLANT EQUIPMENT

W. L. RADGER

**The manipulation of apparatus in laboratory work.** P. Fuchs. *Chem. Fabrik* 1934, 97-9. —Notes on devices for expediting filtrations, pipeting, siphoning, condensing, etc., with 6 references. J. H. Moore

**Apparatus for the laboratory purification of gases.** T. P. Hoar. *Chemistry and Industry* 1934, 244-5. —The app. described purifies and stores a quantity of gas which can then be delivered at a speed not affecting its purity. W. J. Peterson

**Standard and normal measuring and mixing cylinders.** F. Friedrichs. *Glas u. App.* 14, 9-11 (1933); *J. Soc. Glass Tech.* 17, 196A; cf. *C. A.* 27, 3359. —Mixing cylinders for dilg. liquids are calibrated for making up vols. to various vols. The sepn. of scale divisions is 1 mm. up to 25 cc. capacity, and the divisions have to have a length from 0.5 to 1.0 times the circumference. The error permissible is the vol. corresponding to half a division, in the case of a 250-cc. cylinder. The cylinder height has to allow 20 mm. above the highest scale marking, and the min. foot diam. is to be 0.35 of the total height of the cylinder. It is not necessary for the glass to be of the 3rd hydrolytic class, since the liquid is only retained in the cylinder for a short time. Full details are given in tabular form for cylinders of from 5 to 2000 cc. capacity. G. G.

**Calibrated and standard measuring flasks.** F. Friedrichs. *Glas u. App.* 14, 17-19 (1933); *J. Soc. Glass Tech.* 17, 199A. —A comparison is made between the specifications and standards of the State Institute of Technical Physics (P. T. R.), the Bureau of Standards, Washington, and the Duchena specifications. G. G.

**Calibrated and standard pipets.** F. Friedrichs. *Glas u. App.* 14, 25-6 (1933); *J. Soc. Glass Tech.* 17, 197A. —F. tabulates the limits and specifications given by 3 authorities for pipets of the usual type, delivering a single measured quantity of liquid. No new proposals are made. G. G.

**Calibrated and standard graduated pipets.** F. Friedrichs. *Glas u. App.* 14, 33-5 (1933); *J. Soc. Glass Tech.* 17, 196-7A. —The new proposals for standard app. compare the requirements of the chemist and of the State Institute of Technical Physics with those of the glass industry for com. production. A table gives the permitted limits of error for graduated pipets for complete and partial delivery of the contents. G. G.

**Calibrated and standard burets.** F. Friedrichs. *Glas u. App.* 14, 41-2 (1933); *J. Soc. Glass Tech.* 17, 198A. —Comparisons of the P. T. R., Bureau of Standards and DIN. Denog specifications embody some new proposals which are tabulated. G. G.

**Calibrated and standard gas burets.** F. Friedrichs. *Glas u. App.* 14, 57-8 (1933); *J. Soc. Glass Tech.* 17, 198-9A. —The specifications of the State Institute of Technical Physics (P. T. R.), are compared with those of DIN. Denog, 56, 57 and 58, and some new proposals made for gas burets of 3 types: Hempel, Bunte and Dickschmidt. Proposals were also made to specify inner length and width, and that all be graduated in divisions of 1/10 cc. G. G.

**Manufacturing glass filters.** M. F. Lifshitz and B. L. Goshman. *Keram. i Steklo* 9, No. 9, 4-5 (1933); cf. *C. A.* 28, 2221<sup>1</sup>. —Basic operations for obtaining glass filters are described. Four kinds of filters with a diam. of pores from 120 to 10 microns are manufactured in the U. S. S. R. M. V. Kondoldy

**Fractional distillation.** R. G. W. Eadie. *Chemistry &*

*Industry* 1933, 618. —Modifications of McIntyre's app. (*C. A.* 27, 4002) are suggested. B. C. A.

**A fractionating column with fritted glass plates.** S. T. Schicklitz. *Bur. Standards J. Research* 12, 259-61 (1934) (Research Paper No. 651); cf. *C. A.* 26, 877. —This paper describes a fractionating column with fritted glass plates which has a higher plate efficiency than the usual lab. bubble-cap column. The efficiency of this type of plate is approx. 98% as compared to 87% for the bubble-cap plate. R. Rowman

**A pipet bulb.** Pels Leusden. *Munch. med. Wochschr.* 81, 100 (1934). —A rubber bulb with 3 valves arranged for filling a pipet without loss of fluid and without danger of infection is described. Milton Levy

**How can the chemist see more?** Haus Kropelin. *Chem. Fabrik* 1934, 93-5. —K. advocates a wider use of the microscope, spectroscope, stroboscope and camera. Eighteen references. J. H. Moore

**Automatic densimeter, automatic gas analyzer and universal apparatus for studying the permeability of solid bodies.** Paul Walter. *Bull. soc. encour. ind. natl.* 133, 31-44 (1934); cf. *C. A.* 27, 5582. —The densimeter is a hydrostatic balance with which a detn. can be made in 10 secs. The gas app. depends on the absorption of the various gases by atomized solvents which are condensed, and the elec. cond. is measured automatically. The app. for the detn. of the permeability, porosity and aging of wood, leather, rubber, cement, etc., are described with 3 cuts and 11 graphs showing results under various conditions of temp., pressure and gas. J. H. Moore

**Microbalance of glass.** Horacio Damianovich. *Anales inst. investigaciones cient. tecnol.* (Univ. nacl. litoral) 2, 85-90 (1933). —A sensitive and easily constructed microbalance is described in which a glass fiber is substituted for the quartz fiber of the common-type balance. An improved optical system with a mirror at the center of oscillation, a graduated scale and an eye glass are provided. M. McMahon

**An extractor for fluid systems.** Wm. F. Bruce. *Science* 79, 253-4 (1934). —The app. consists of a boiling flask with a 2-hole stopper, 1 connected to an elevated condenser and the other to the higher end of an inclined tube, the condenser discharge being connected to the lower end of this tube which is filled with the soln. to be extd. and through which the drops of lighter solvent pass while returning to the flask. It may be arranged for solvents heavier than the soln. (cf. *C. A.* 27, 633). J. H. M.

**Calculation of bubble towers for periodical operation.** S. N. Ohryadchikov and P. A. Khokhryakov. *Neftyanoe Khozyaistvo* 26, No. 1, 50-3 (1934); cf. *C. A.* 27, 5951. A. A. Boettlingk

**A screenless universal chamber for measurement of x-ray dosages.** Robert Jaeger. *Physik. Z.* 35, 184-7 (1934); cf. *C. A.* 28, 2205<sup>1</sup>. —A new universal chamber is described which has no Pb screen and which must be fully irradiated. Having a diam. of only 2 cm. it can be irradiated simultaneously with a comparison chamber. For hard rays the dependence on direction is so small that in the short-wave region the app. approaches in behavior a spherical chamber. The new chamber is independent of wave length, without change of the window, from the limiting radiation, 6 kv. or  $\lambda$  approx. 0.2 A., to the hard therapeutic rays, 190 kv. or  $\lambda$  approx. 0.15 A. Calvin Brous

**Improved method for the construction of quartz spirals.**

L. M. Pidgeon. *Can. J. Research* 10, 252-3(1934).—Quartz spirals for the McBain-Bakr sorption balance (*C. A.* 20, 1151) are made by winding softened quartz filaments on a slightly tapered fluted C rod. Local fusion is obviated by the use of a comparatively large cool flame.

J. W. S. Test of the Dräger carbon monoxide meter. *Chemisch-Technische Reichsanstalt. Draeger-Heft* No. 170, 2430-41(1934).—The percentage of CO in air is measured by measuring the heat of oxidation of CO as the air passes through a catalyst. Concns. of CO as low as 0.004% can be measured or at least detected with certainty. Concns. between 0.01 and 0.1% can be measured with an accuracy of  $\pm 0.005\%$ . Below 0.01% CO the accuracy is 0.002 to 0.003%. Above 0.1% CO the error is relatively smaller than for 0.1%. Variations in velocity of the air current through the meter do not affect the results materially. The presence of H or CH<sub>4</sub> does not affect the results up to a CO content of 0.3% which was the highest CO content tested. At this concn. the temp. rise caused by the oxidation of CO was approx. 15°.

A. L. Kibler Use of the photoelectric cell in nephelometry. E. Canals and A. Hortala. *Bull. soc. chim. biol.* 15, 1535-51 (1933); cf. *C. A.* 27, 928.—In nephelometry by transmitted light the photoelec. cell is far superior to the eye. Curves showing the relation of concn. to transmission are given for suspensions of mastic, AgCl and argyrol, with several different colors of monochromatic light. The shapes of the curves vary greatly. For AgCl violet light of about 410 m $\mu$  gives the most accurate results. Green light is preferable for argyrol.

L. E. Gilson Rotary electromagnetic viscometer. Guillermo Berraz. *Anales inst. investigaciones cient. tecnol. (Univ. nac. litoral)* 2, 79-84(1933).—A new rotary electromagnetic viscometer in which the viscosity varies directly with the current intensity and inversely with the speed of rotation, other factors remaining invariable, is described and illustrated.

M. McMahon Falling-sphere viscometer for opaque liquids. A. Zart. *Chem. Fabrik* 1933, 266.—To the 25-mm. diam. sphere is attached a straight wire 1 mm. diam. and 500 mm. long with 2 marks 60 and 300 mm. from the sphere. The sphere is placed in the liquid and the time detd. between the passage of the marks through a slit in the cover of the jar. The error due to the wire is about 2%.

J. H. M. The Höppler viscometer—preliminary report. W. Knop. *Z. Ver. deut. Zuckerind.* 83, 932-41(1933).—The time required for an oval ball to fall through 100 mm. in an inclined column of the fluid is the basis for the measurement. Balls of various sizes are used. The dynamic viscosity ( $\eta$ ) = (time of fall)  $\times$  (sp. gr. of the ball - sp. gr. of the fluid)  $\times$  (const.). Values are given for the constns. of the balls. The results ( $\eta$ ) are accurate to within  $\pm 0.5\%$ ; hence the instrument is more reliable than the other viscometers used in the sugar industry. The range of applicability is very great, i. e., about 1 to 15,000 centipoises. For molasses, the rate of change of viscosity with temp. ( $d\eta/dt$ ) dropped with increasing temp. Thus at 84° Brix the values of  $d\eta/dt$  were 12.7 and 8.7% at 35° and 51°, resp.

F. Camps-Campins Ball milling. Alexander M. Gow, M. Guggenheim, A. B. Campbell and Will H. Coghill. *Am. Inst. Mining Met. Engrs. Tech. Pub.* No. 517, 52 pp.(1934).—The fundamental principles of ball milling are discussed on the basis of lab. and plant studies. The difference between slow-speed grinding (attrition) and higher speed (impact) is one of degree rather than kind. The effect of slipping and amt. of ore in the mill on power consumption is shown. A method and formula are developed whereby the power required by a cylindrical mill of any size and operating under any conditions may be calcd. The effect on power and grinding of the following are discussed: size and design of mill; amt. and size of ball charge; the size, type, feed rate and pulp density of the feed; speed of rotation efficiency of classification in closed circuit; slipping and amt. of material in mill at any instant. Ball paths and trajectories cannot ex-

plain power requirements or grinding capacity of a mill. The percentage of over-all circulating load is not necessarily indicative of the amt. of stage grinding. Rationing of feed rate to ball action (power) and of ball size to grain size are necessary for good operation. Proper ball size is independent of the hardness of ore. Grinding may be made proportional to the power expended. Means for measuring the degree of stage grinding and suggestions for amt. of circulating load for good stage grinding are offered. The necessity for thorough classification is pointed out, and the efficacy of hydraulic classifiers and tables for desliming and the efficiency of rolls in fine-grinding are illustrated.

Alden H. Emery The practice of lining with acidproof stone. L. Kogel. *Chem. Fabrik* 1934, 77-82.—Suitable materials for the prepn. of the stone and cement, the construction of the forms and the applications of the linings are discussed, with 5 cuts.

J. H. Moore Sandstone blocks for pickling baths. C. Campbell. *Sands, Clays and Minerals* 2, No. 1, 43-4(1934).—Tank constructed of slabs of sandstone are particularly effective in resisting acid corrosion under almost all circumstances. Practical points in the selection of sandstone for this purpose are given.

M. V. Kondoidy Sodium lamp. W. A. N. Markwell. *Perfumery Essent. Oil Record* 24, 294 5(1933).—Two glow electrodes (W), surrounding an electron-emitting material, are contained in an atm. of inert gas together with some Na. The electrodes provide the necessary heat during the starting period (20 sec.), and are then switched off. The discharge then takes place through the Na. The emitting surface is about 10  $\times$  15 mm. and of the total intensity about 99% is due to Na D line. Little heat is generated and radiation is const. in intensity.

B. C. A. The problem of the production of an exact indicating colored-liquid thermometer which is constant with time. Walter Grundmann. *Z. tech. Physik* 15, 119 26(1934), cf. *C. A.* 28, 2574.—The influence of the following sources of error is discussed and a no. of recommendations are made: thermal lag in the thermometer as a whole, compressibility, gas absorption or evolution, adhesion and viscosity of the liquid, influence of coloring matter and of the gas above the liquid.

J. B. Austin Experiences with regulators. Gustav Neumann. *Arch. Eisenhüttenw.* 7, 490-503(1934).—The theory of regulators and controllers is illustrated by example of regulation of a gas container, water level of a steam boiler, steam pressure before the steam engine of a rolling mill, pressure, pulsating flow and furnace temp.

Eleven references. M. Hartenhem A gas thermostat. A. J. Bailey. *Science* 79, 277 (1934).—A description, with 1 cut, of an easily constructed device that will hold an air bath within less than 0.1° of a desired temp.

J. H. Moore Thermostats for temperatures between 5° and 20°. L. M. Pidgeon. *Can. J. Research* 10, 252(1934). A small Dewar flask in which the usual evacuated space is filled with Hg constitutes the thermostat liquid and thermoregulator. The heating element is resistance wire wound around the flask giving 5-10 ohms resistance. Temp. variations are not more than 0.005°.

J. W. S. Method [and app.] for detn. of diolefin hydrocarbons (Korotkov) 7. Impregnated asbestos cement for chem. equipment (Borodulin) 20.

Tongue, Harold: The Design and Construction of High-Pressure Chemical Plant. London: Chapman & Hall, Ltd. 420 pp. 30s.

Rectification columns. Jacob Rosin. *Fr.* 758,741, Jan 22, 1934. The vapor is progressively and continuously cooled by a cooling agent circulating in a closed cycle in the opposite direction to the vapor.

Manometers. Percival R. Boulton. *Brit.* 403,687, Dec. 18, 1933.

Viscometer (flow type). Glasplakatefabrik Union

G. m. b. H. Ger. 593,095, Feb. 20, 1934 (Cl. 421.7.01). 1  
Tray for bubble towers suitable for absorption or  
fractionation operations. Daniel Irwin. U. S. 1,950,247,  
March 6.

Apparatus for effecting exothermic catalytic gas re-  
actions. "L'Air liquide" (Soc. anon. pour l'étude et  
l'exploitation des procédés Georges Claude). Ger.  
593,360, Mar. 2, 1934 (Cl. 12g.4.02). See Brit. 307,039  
(C. A. 23, 5280).

Electric thermometer. A. T. Kuchugin. Russ.  
31,610, Oct. 31, 1933. Construction details of a thermom-  
eter of the type of a balanced Wheatstone bridge.

Distant-reading thermometers. King-Sceley Corp.  
Brit. 402,875, Dec. 14, 1933.

Temperature-indicating apparatus suitable for use with  
apparatus at a distance. Herbert Hastings. U. S.  
1,950,141, March 6. Mech. details.

Thermocouple. A. S. Mikhelson. Russ. 31,658, Oct.  
31, 1933. A thermocouple placed in an Fe tube has one  
branch made of constantan while the other branch is  
made of an alloy of Cu and Al or a similar compn., so  
that the oxidizability of both branches is lower than that  
of the Fe tube.

Thermocouples. Ya. Sh. Averbukh. Russ. 31,513,  
Oct. 31, 1933. The cold joints of thermocouples are  
selected from a metal whose c. m. f. coincides with the  
basic thermoelectromotive force of the bridge to com-  
pensate the decrease of the latter caused by the heating of  
the joints.

Graphite and tantalum carbide thermocouple for  
measuring high temperatures. Allgemeine Elektrizitäts-  
Ges. Ger. 593,022, Feb. 20, 1934 (Cl. 421.8.01).

Filters. Dario Teatini. Fr. 758,073, Jan. 10, 1934.  
The filter cloth or material has an undulating or corrugated  
form, and the perforated surfaces supporting the cloth are  
also corrugated.

Filters. Anciens établissements C. I. M. E. and Daniel  
Pétrier. Fr. 758,345, Jan. 15, 1934. The filtering  
element is composed of closely packed wires or piled  
plates, with grooves therein running at right angles to  
the direction of flow of the liquid. Part of the sediment  
becomes lodged between the wires or in the grooves and  
acts as a filter for the rest of the liquid.

Edge filters. N. V. Maatschappij tot Exploitatie van  
"ten Bosch" Oerfouwen. Brit. 402,070, Nov. 14, 1933.

Glass filter. Jenaer Glaswerk Schott & Gen. Fr.  
758,950, Jan. 26, 1934. The funnel and plate are made  
separately and afterward joined. The holes in the plate  
are enlarged in the direction of flow of the liquid.

Filters for liquids. Soc. industrielle du traitement des  
liquides par les gaz. Fr. 759,193 and 759,194, Jan. 30,  
1934. Means for cleaning the filter beds or cloths is  
described.

Rotary drum filter for press juices, etc. Bergedorfer  
Eisenwerk A.-G. Astra-Werke. Ger. 590,659, Jan. 8,  
1934 (Cl. 12d.15.02).

Air and gas filters. Sturtevant Engineering Co. Ltd.  
and Maurice F. Stevens. Brit. 403,069, Dec. 11, 1933.

Tube filters for air. Soc. Bühler Frères. Fr. 758,640,  
Jan. 20, 1934. Automatic cleaning means is described.

Apparatus suitable for filtering water of engine-cooling  
systems. Gilbert Lien. U. S. 1,950,254, March 6.

Apparatus for cleaning filtering layers. Adrien Chabal.  
Fr. 758,249, Jan. 12, 1934.

Filter press. Soc. pour l'ind. chim. à Bâle. Ger. 590,710,  
Jan. 9, 1934 (Cl. 12d.5.01).

Apparatus for hydraulic removal of dust from gases.  
André Rigollet. Fr. 758,997, Jan. 26, 1934.

Apparatus for separating dust from gas. Percy G. Ryder.  
Brit. 402,075, Nov. 20, 1933.

Apparatus for separating dust particles from gases or  
grading dust particles. Joseph L. Musgrave and Richard  
Cuttall & Co. Ltd. Brit. 402,476, Dec. 7, 1933.

Sifting apparatus. Windham F. Carey and Imperial  
Chemical Industries Ltd. Brit. 402,402, Nov. 28, 1933.

Sifting apparatus. Frank Pascall. Brit. 402,673, Dec.  
7, 1933.

Vibratory-screen sifting apparatus. Wilfred Barker.  
Brit. 403,210, Dec. 21, 1933.

Centrifugal machine for cleaning or purifying liquids.  
Johann Bányay. Brit. 403,042, Dec. 14, 1933.

Centrifuge for the treatment of granular or fibrous  
material, e. g., that obtained from animal raw materials  
by decomposition. Gustav Honnicke. Brit. 403,031,  
Dec. 14, 1933.

Servo-motors for initiating the various operations of a  
centrifuge, e. g., the filling of the drum, the washing, the  
emptying of the drum, etc. Gustav ter Meer. Brit.  
402,840, Dec. 11, 1933.

Low-temperature evaporators for liquids. Edwin J. R.  
Drake. Fr. 758,476, Jan. 18, 1934.

Drying-apparatus. John H. Morton. Brit. 403,398,  
Dec. 12, 1933.

Pneumatic driers. Paul Rosin. Brit. 402,707, Dec. 7,  
1933.

Vertical tower for drying malt or the like. Giuseppe  
Pellegrino and Mario Pellegrino. U. S. 1,950,263, March  
6. Various structural and operative details are described.

Apparatus for drying and distilling fine grain material  
at a low temperature. Ludwig Honigmann. Fr. 750,133,  
Jan. 29, 1934.

Combined drying and grinding apparatus for clay,  
brown coal, gypsum, etc. Ernst C. Loesche. Ger.  
593,122, Feb. 21, 1934 (Cl. 82a.25.01).

Furnaces. Soc. anon. des établissements A. Valuy.  
Fr. 758,027, Jan. 9, 1934. Construction of walls and roofs  
is described.

Gas-fired muffle furnaces. The Gas Light and Coke  
Co., W. Dieterichs, David J. Davies and Peter Lloyd.  
Brit. 403,112, Dec. 13, 1933.

Shaft furnace. Vereinigte Stahlwerke A.-G. Fr.  
758,139, Jan. 11, 1934. Form of blower is given.

Rotatable tuyères for shaft furnaces. Vereinigte  
Stahlwerke A.-G. Brit. 403,321, Dec. 21, 1933.

Hollow air-cooled furnace walls. The Morgan Crucible  
Co. Ltd. and John Walker. Brit. 401,768, Nov. 23, 1933.

Burner blocks for rotary or semi-rotary furnaces.  
Wm. F. Wiltshire. Brit. 402,712, Dec. 7, 1933. Divided  
on 400,956 (C. I. 28, 18983).

Gas burner for open-hearth furnaces. George R. Mc-  
Dermott (to Surface Combustion Corp.). U. S. 1,950,007,  
March 6.

Stirring device for furnace for drying coal, salts, etc.  
Erma J. G. Lindner. Ger. 593,362, Feb. 24, 1934  
(Cl. 82a.12.02).

Rotary kilns. Johan S. Fastang. Brit. 403,447, Dec.  
28, 1933.

Recuperator. Didier-Werke A. G. Ger. 590,681, Jan.  
8, 1934 (Cl. 24c.5.02).

Recuperators. Soc. anon. fours et appareils Stein.  
Brit. 402,649, Dec. 7, 1933.

Plate heat-exchangers. Harrison Radiator Corp.  
Brit. 402,241, Nov. 30, 1933.

Tubular heat-exchangers, e. g., surface condensers.  
Benoit Elie Chamayou. Brit. 402,628, Dec. 7, 1933.

Combined heat-exchanger and centrifugal dust ex-  
tractor, particularly for preheating air by and separating  
dust from flue gas. Metallgesellschaft A.-G. Brit.  
402,693, Dec. 7, 1933.

Continuous combustion apparatus for estimating oxygen  
in gas mixtures. Siemens & Halske A.-G. (Heinz Grüss,  
inventor). Ger. 593,157, Feb. 22, 1934 (Cl. 421.4.05).

Röntgen-ray apparatus. C. H. F. Müller A.-G. Brit.  
403,010, Dec. 14, 1933.

High-tension devices, e. g., Röntgen-ray tubes. C. H.  
F. Müller A.-G. Brit. 402,691, Dec. 7, 1933. Structural  
features.

Cathode-ray tubes. Electric & Musical Industries  
Ltd. Brit. 402,460, Dec. 4, 1933.

Cathode-ray tubes. Siemens-Schuckertwerke A.-G.  
Brit. 402,781, Nov. 30, 1933.

Cathode-ray tubes. Allgemeine Elektrizitäts-Gesell-  
schaft (to International General Electric Co., Inc.).  
Brit. 403,018, Dec. 14, 1933.

Cathode-ray tubes. Radioaktiengesellschaft D. S.

- Loewe and Kurt Schlesinger. *Fr.* 758,576, Jan. 19 and 1 758,616, Jan. 20, 1934.
- Light-sensitive cells.** Franz Rother. *Brit.* 403,041, Dec. 14, 1933. In making Cu oxide light-sensitive cells of the "suppression-layer" type by heating Cu and scraping off the outer layer of CuO, the Cu is, by sputtering, electrolysis, spraying, etc., finely coated with a metal, *e. g.*, Au, before being heated. An alloy may be used instead of Cu, and coatings of more than 1 metal may be applied.
- Photoelectric cell.** Compagnie française pour l'exploitation des procédés Thomson-Houston. *Fr.* 758,270, Jan. 13, 1934. Means for regulating the operation of a control circuit is described.
- Photoelectric cells.** N. V. Philips' Gloeilampenfabrieken. *Fr.* 758,665, Jan. 22, 1934. See *Brit.* 396,348 (*C. A.* 28, 380<sup>u</sup>).
- Discharge devices.** Clifton G. Round and Willem F. Westendorp (to The British Thomson-Houston Co. Ltd.). *Brit.* 403,428, Dec. 12, 1933. In a pos.-column discharge device having a plurality of auxiliary anodes located at intermediate points between the anode and cathode and connected to the main anode by resistances, the value of each resistance is inversely proportional to the distance between the cathode and the corresponding auxiliary anode. These resistances and a ballast resistance in series with the device may be incandescent filaments located within the device.
- Discharge tubes.** Telefunken Ges. für drahtlose Telegraphie m. b. H. *Fr.* 758,726, Jan. 22, 1934.
- Electric discharge tubes.** Edward A. Leach (to The British Thomson-Houston Co. Ltd.). *Brit.* 402,703, Dec. 7, 1933.
- Electric discharge tube suitable for rectifiers or "wireless" purposes.** Karel M. van Gessel and Jan H. de Boer (to Radio Corp. of America). *U. S.* 1,949,849, March 6. A thermionic metallic cathode which may be formed of W is used with a surrounding anode and with an intervening control electrode having a surface of coherent Zr.
- Electric vacuum tubes, particularly whole-wave rectifiers.** Ferranti, Ltd., and Arthur L. Chilcot. *Brit.* 402,503, Dec. 7, 1933. Structural features.
- High-vacuum production in electric discharge devices.** Arthur Mutscheller (to Westinghouse X-Ray Co.). *U. S.* 1,950,008, March 6. Various details of procedure are described.
- Means for adjusting from outside the position of an electrode within a vacuum.** Ferranti Ltd. and John L. Miller. *Brit.* 402,748, Nov. 30, 1933.
- Electron tubes and their circuits.** Compagnie française pour l'exploitation des procédés Thomson-Houston. *Fr.* 757,986, Jan. 4, 1934.
- Grids for electron-discharge tubes.** N. V. Philips' Gloeilampenfabrieken. *Brit.* 402,294, Nov. 30, 1933. A grid consists of a no. of parallel wires of about 100  $\mu$  thickness, or less, spaced apart by cross-members, the wires and cross-members, which are secured to each other, being coated, at least at their points of attachment, with a layer of a material substantially less refractory than the material of the members and the wires. Thus wires of 80  $\mu$  diam., consisting of Mo with a Ni sheath, are laid longitudinally on a solid Fe core and a grid wire of 40  $\mu$  diam. is wound around the assembly. Two Ni or Ni-sheathed Mo stays are welded along the grid to serve as supports and cooling members. The grid is then heated a few minutes at 1100° to sinter the wires to the cross-members, and the core is removed.
- Cathodes for discharge tubes.** The M-O Valve Co. (*Ger.* 593,491, Feb. 27, 1934 (*Cl.* 21g. 12.01)). Cold cathodes for gas-filled discharge tubes are made by coating Fe or Ni with Ba(NO<sub>3</sub>)<sub>2</sub> and applying heat, *e. g.*, at 750° *in vacuo*, until the coating is reddish brown. The cathodes are not affected by air.
- Incandescent cathode for vacuum discharge apparatus.** Akt.-Ges. Brown, Boveri & Cie. *Fr.* 758,525, Jan. 18, 1934.
- Discharge electrodes for electrical precipitation apparatus.** Metallgesellschaft A.-G. *Brit.* 403,665, Dec. 27, 1933.
- Thermionic apparatus, *e. g.*, lamps and ultra-violet radiators.** Compagnie des lampes. *Brit.* 402,566, Dec. 7, 1933.
- Thermionic valves.** Radioröhrenfabrik G. m. b. H. *Brit.* 402,650, Dec. 7, 1933.
- Thermionic valves.** Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. *Brit.* 403,298, Dec. 31, 1933. Means for cooling is described.
- Evacuated electric discharge vessels (thermionic valves).** The M-O Valve Co. Ltd. and Colin J. Smithells. *Brit.* 402,207, Nov. 30, 1933.
- Device for estimating the water in solids, especially salts.** I. G. Farbenind. A.-G. (Karl Ackermann and Albert Krust, inventor). *Ger.* 590,826, Jan. 11, 1934 (*Cl.* 42f. 9.50).
- Apparatus for determining the boiling curve of liquid mixtures.** Reichskraftsprit G. m. b. H., Cuno Conrad and Carl O. Ostwald. *Ger.* 593,026, Feb. 20, 1934 (*Cl.* 42f. 18.04). Addn. to 537,151 (*C. A.* 26, 1046).
- Device, using a light-sensitive element, for suppressing or reducing froth or scum formation on liquids.** The Distillers Co. Ltd. and John Everett. *Brit.* 402,826, Dec. 11, 1933.
- Apparatus and process for crystallizing liquids by evaporative cooling in stages under increasing vacuum in presence of culture crystals.** Metallgesellschaft A.-G. and Wilhelm Gensecke. *Brit.* 402,324, Nov. 30, 1933.
- Apparatus for atomizing liquids.** Arthur J. Adam. *Brit.* 402,437, Nov. 27, 1933.
- Apparatus for atomizing liquids.** Francis Nazari. *Brit.* 402,525, Dec. 7, 1933.
- Treating liquids with gases in the treatment of water or sewage with chlorine.** Wm. H. Fulton (to Paradox Co.). *U. S.* 1,949,934, March 6. Various details of app. and operation are described.
- Tank with internal pockets for separating liquids and gases such as oil and gas by centrifugal action.** Richard Battle and Floyd I. Ross (to Hanlon-Waters, Inc.). *U. S.* 1,950,285, March 6. Structural details.
- Gas-pressure regulator suitable for use with gas-supply systems.** Garnet W. McKee. *U. S.* 1,950,120, March 6. Structural and mech. details. *U. S.* 1,950,121 also relates to gas-pressure regulators.
- Device for controlling the flow of gas.** Frederick I. Smith. *U. S.* 1,949,885, March 6. Structural details.
- Gas washer.** Hermann Kleibren and Alfred J. Elmer (to Freyn Engineering Co.). *U. S.* 1,950,020, March 6.
- Centrifugal gas cleaner or steam drier.** Frederick K. O. Moynan. *Brit.* 402,455, Dec. 4, 1933. Addn. to 341,532 (*C. A.* 25, 4447).
- Cylindrical metal containers for storing gas under pressure.** Walter Kidde & Co., Inc. *Brit.* 402,795, Dec. 11, 1933.
- Apparatus for a fractional combustion of gases.** P. K. Sakmin. *Russ.* 31,668, Oct. 31, 1933. Construction details of a modified Rasfeld app. for the detn. of H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, etc.
- Apparatus for removing solid particles suspended in gases.** Charles M. Stein (to Soc. anon. fours et appareils Stein). *U. S.* 1,950,069, March 6. Structural details.
- Air-humidifying apparatus.** The Imperial Tobacco Co. (of Great Britain & Ireland) Ltd. and Charles F. Shanahan. *Brit.* 403,649, Dec. 20, 1933.
- Humidifying apparatus for the air in incubators and other enclosed structures.** Edwin T. Brace. *Brit.* 403,099, Nov. 30, 1933.
- Grid-work for cooling-towers.** L. G. Mouchel and Partners Ltd. and Robert B. Elmer. *Brit.* 402,857, Dec. 14, 1933.
- Cooling apparatus for high-voltage discharge apparatus, *e. g.*, Röntgen-ray tubes.** C. H. F. Müller A.-G. *Brit.* 402,242, Nov. 30, 1933.
- Apparatus and method for transforming molten material into the form of solid round bodies such as pellets.** Aktieselskapet Ferrosan. *Brit.* 402,611, Dec. 7, 1933.



- Jigging conveyors.** Ernest Hughes. Brit. 402,233, Nov. 30, 1933.
- Jigging conveyors.** Tage G. Nyborg and Mark F. Higgins. Brit. 403,490, Dec. 28, 1933.
- Ball mills with means for indicating the level of the charge therein.** Foster Wheeler Ltd. Brit. 402,655, Dec. 7, 1933.
- Ball-and-ring grinding mills of the air-borne type.** James J. C. Brand and Leo St. J. Colley. Brit. 402,854, Dec. 14, 1933.
- Roller and breast mills.** The Gas Light and Coke Co. and Edward Eric Calvert. Brit. 402,481, Dec. 7, 1933.
- Apparatus for treating granular and other substances with fluids, the substance to be treated being contained in one or more cells arranged to be rotated.** Cyrille A. Delemme. Brit. 403,642, Dec. 19, 1933.
- Rotary washing drum for gravel, sand, etc.** Eduard Friedrich. Ger. 693,434, Feb. 27, 1934 (Cl. 1a. 12.01).
- Apparatus for the production of binding materials, dressings, etc., e. g., dextrins, glutens, including a device for mixing, direct spraying, drying, calcining and cooling.** Adolf Dreyer and Fred Kutzner. Brit. 402,601, Dec. 7, 1933.
- Bell gas holders with sliding seals.** Maschinenfabrik Augsburg-Nürnberg A.-G. Brit. 401,911, Nov. 23, 1933. Addn. to 361,798 (C. A. 27, 870).
- Machine for spreading plastic material upon articles, e. g., grease or grease and graphite upon jointing material.** Frank C. Fulcher. Brit. 402,756, Dec. 1, 1933.
- Apparatus for transferring rolled material from the cooling bed to a train of delivery rollers.** Bruno Audrieu (to Fried. Krupp Grusonwerk A.-G.). Brit. 401,975, Nov. 23, 1933.
- Extrusion press, especially for lead-coating cables.** Siemens-Schuckertwerke A.-G. Brit. 403,108, Dec. 14, 1933.
- Ultra-violet testing apparatus, particularly for detecting forgery in documents, etc.** Alexander Callo. Brit. 402,136, Nov. 27, 1933.
- Chamber for protection against toxic gases, with air-circulating and -regenerating means, sanitary apparatus and means for detecting toxic gases in the external atmosphere.** Ernest A. Payen. Brit. 403,097, Dec. 5, 1933.
- Flashlight lamps.** John F. Crowley. Brit. 403,427, Dec. 19, 1933. A bulb contg. a flashlight charger of powder, gas, vapor or metal strip, foil, wool or dust, or mixts. thereof, is provided with a disruptible seal to be pierced by the stem of an igniting device.
- High-pressure acetylene generator.** Josef Muller. Fr. 759,084, Jan. 29, 1934.

## 2-GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

- Prof. Fran Bubanovic—in honor of his fiftieth birthday.** S. S. Miholić. *Bull. soc. chim. roy. Yougoslav.* 4, 127 8 (1933).—A brief biographical sketch. G. S. Stamatoff
- Fritz Haber.** M. Bodenstein. *Z. Elektrochem.* 40, 113 15(1934).—Obituary, with portrait. G. G.
- Charles Porcher.** E. Nicolas. *Bull. soc. chim. biol.* 16, 160-5; *Lail* 14, 113 24(1934).—Obituary. L. E. Gilson
- Harold C. Urey, the man.** T. R. Hogness. *Chem. Bull.* 21, 87-8(1934). B. H.
- A letter from Justus v. Liebig.** Pincus. *Munch. med. Hochschr.* 81, 114(1934).—Dates from 1860. M. L.
- Etymological explanation of the names applied to the most important elements and minerals.** Walter Meyer. *Apoth. Ztg.* 49, 363 8(1934). Some 72 elements and 144 minerals are listed. W. O. E.
- Chemistry in the libraries.** Gino Testi. *Chim. ind. agr. Mol.* 10, 26 9(1934).—Several damages of the ancient books and manuscripts are examd., especially the books carbonized by dehydration of cellulose. Several books stained by Fe were bleached with alc. solns. of NaClO and NH<sub>4</sub>OH. G. A. Bravo
- The electrical nature of iron sparks emitted from a grinding wheel.** Ukichirō Nakaya. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 23, 185 201(1934). It is well known that the appearances of sparks emitted from Fe took upon sharpening with a grinding wheel are quite different for tools of various constituents. E. Pitois (cf. C. A. 19, 2018) found that a sample of pure Fe gave a straight form of spark (a molten drop of Fe heated to a red-hot state by the heat of oxidation), while one contg. C gave a branched form, the general appearance becoming more complicated as the C content became greater (branching caused by the explosive combustion of C in the Fe). The present report deals with (1) results of former expts. on the nature of the spark (cf. Nakaya and Sakiguchi, *Bull. Inst. Phys. Chem. Research (Tokyo)* 6, 1083(1927)); (2) the elec. nature of the spark (it is positively charged at its earlier stage and negatively charged at the stage near its end, changing the sign of charge on its way); (3) the detn. of ions emitted from the Fe spark (both pos. and neg. ions are actually emitted at the same time); and (4) the calcn. of  $e/m$  of the spark from the photograph of the track (curves of  $e/m$  obtained show that the pos. charge accumulates at the earlier stage and reaches a max. value; then the sign changes rapidly and the neg. electricity thus obtained is again lost gradually). R. Roseman
- Rhenium.** M. Piettre. *Bull. soc. chim.* 53, 669 81 (1933).—A lecture on the extrn., properties, detn. and compds. of Re. B. C. A.
- Distribution of ozone in the atmosphere.** D. Barbier. *Compt. rend.* 198, 1060 2(1934). Theoretical. A new method of calcn. is given, and Gauzit's results are criticized (cf. C. A. 26, 3186; 28, 2580). C. A. Silberrad
- Use of charcoal in maintaining high vacua.** C. H. Collic. *Proc. Phys. Soc. (London)* 46, 252-5(1934). The limiting pressures obtainable with com. SiO<sub>2</sub> gel, a special SiO<sub>2</sub> gel freed from adsorbed salts by prolonged dialysis, birchwood charcoal, gas-mask charcoal, Norlite and other special charcoals were detd. The most effective procedure is to cool the exhausted charcoal with liquid H<sub>2</sub>. E. R. Rushton
- Black-body radiation a rational basis of pyrometry.** Marcel Berthou. *Ceram. verriere emaille* 2, 7-11(1934). Alice W. Epperson
- Degrees alpha.** Giuseppe Siboni. *Nomenclatura chim.* 3, 37 8(1933). New scale of absolute temperatures. *Ibid.* 4, 53(1934); cf. C. A. 26, 5797. A. M. P.
- New methods of obtaining low temperatures.** E. Justi. *Z. Physik* 87, 273 6(1933).—The method of obtaining low temp. by adsorption and desorption of H and Ne which was advanced by Simon (C. A. 21, 3532 3) does not work as shown by theoretical and exptl. considerations. The success obtained by Meidelsohn (C. A. 26, 2089) is due to the Joule-Thomson effect. The method is useful only for maintaining temps. between the fixed points. Franz Simon. *Ibid.* 815-18.—Polemic. Egon Bretscher
- Thermomolecular pressure differences, especially at lower temperatures.** Sophus Weber and W. H. Keesom. *Rapports et Communications, No. 6, Congr. intern. froid, Buenos Aires, Communications Kamerlingh Onnes Lab. Univ. Leiden No. 223*, 9-31(1932); cf. C. A. 27, 5597.—On the basis of known data, the effect of thermomol. pressure differences in gas thermometry, especially in the range of very low temps. such as that of liquid He, is discussed. A systematic investigation was made of this effect in the cases of Ne, H<sub>2</sub>, A, O<sub>2</sub>, N<sub>2</sub> and especially He. Earlier expts. on H<sub>2</sub> and O<sub>2</sub> at higher temp. are correlated with measurements at low temp. A complete correlation of the results with the theory is promised. C. E. P. J.

The correction for thermomolecular flow. P. C. Tompkins and D. E. Wheeler. *Trans. Faraday Soc.* 29, 1248-54 (1933).—For the accurate measurement of pressure it is important to calibrate any app. contg. parts at different temps. (e. g., liquid-air traps or furnaces). In a liquid-air trap at 90°K., with  $H_2$  at  $1 \times 10^{-3}$  cm. and tubing 1 cm. in diam. the pressure was nearly 20% lower than in the rest of the app. This difference decreased to 0 at  $1.4 \times 10^{-3}$  cm. The effect was greater at 90°K. than at 193°K. The correction becomes essential as soon as the pressure is such that the mean free path of the gas approaches the diam. of the tube at the temp. gradient. Inlet and outlet tubes of the traps must be of the same diam. When the bulb is filled with a powder the time necessary to attain pressure equil. is very great. With CO and A at  $1 \times 10^{-3}$  to  $1 \times 10^{-2}$  cm. the results are the same as for  $H_2$  at pressures at which their mean free paths are equal.

Janet E. Austin

Valence-theoretical calculation of energy of aromatic compounds. Hidechiko Tamaki. *Proc. Phys.-Math. Soc. Japan* 16, 52-66 (1934) (in English).—The combining energy of some aromatic compds. is calcd. by means of the Heitler-Weyl theory of chem. valency, and their stabilities are examd.; Rumer's idea is extended. The energy level of a hexagonal ring of trivalent radicals is about equal to that of 3 pairs of them. If directional valency is also considered it may be possible to explain why the  $C_6H_6$  ring is more stable than the  $C_6H_5$  mol.

Gerald M. Petty

Molecular theory of the chemical bond. Yu. B. Rumer. *Uspekhi Fiz. Nauk* 14, 35-62 (1934).—Theoretical-mathematical. Simple and polyatomic mols., and *cis-trans* isomerism are discussed on the basis of the theories of Hund, Hertzberg and Mulliken.

F. H. Rathmann

Compounds of bivalent carbon. M. S. Ashkinazi. *Uspekhi Khim.* 2, 700-13 (1933).—A review on the results of phys. methods (parachor, dipole moments, Raman spectra, thermochem. data, etc.) as applied to the study of the compds. of bivalent C.

F. H. Rathmann

Shapes of molecules. N. V. Sidgwick. *Proc. Roy. Inst. Gr. Brit.* 28, 35-46 (1934).—A general discussion. There are 3 possible deformations of the mol.; twisting of the groups around the lines of a link, stretching and compressing the links and bending them. Rotation around the line of a single link is always possible, but not with a double link. Absorption spectra show that the resistance of a double link to stretching and compression is about twice as great as for a single link, and, for a triple link, 3 times as great. It is about 5 times as easy to bend a link as to stretch it to the same extent.

E. R. R.

Magnetic investigations of insoluble amorphous materials. I. Magnetic susceptibilities of various iron salts. Laxmi Bhargava and Satya Prakash. *Z. anorg. allgem. Chem.* 217, 27-32 (1934).—The magnetic susceptibilities of arsenates, phosphates, molybdates, borates, tungstates, oxalates and benzoates of Fe were measured. The susceptibility increased much more on heating than would correspond with the loss in wt. The Fe oxide resulting from heating ferrous oxalate is strongly paramagnetic, while the corresponding oxides prepd. from ferric oxalate and benzoate are ferromagnetic. Ferric phosphate is very sol. in  $(COOH)_2$ ; the  $(COOH)_2$  soln. has a proportionally higher paramagnetic value than the corresponding solns. of the same concn. in HCl or  $H_2SO_4$ . Addnl. expts. on the Curie const. and the effect of temp. on these materials are in progress.

M. McMahon

The magnetic investigation of organic radicals. Helmut Katz. *Z. Physik* 87, 238-44 (1933).—The magnetic susceptibilities  $\sigma$  of the following org. radicals were detd. in the range of 1-95°: (the first figure in brackets means  $\sigma$  in units of  $10^{-6}$ , the second, the Curie temp., the third, the no. of Weiss magnetons  $n$ ): (*p*- $MeOC_6H_4$ ) $_2NO$  (115.5, -13°, 8.4) and  $ON(SO_3K)_2$  (115.0, 2°, 8.4); (*p*- $MeC_6H_4$ ) $_2N^+ClO_4^-$  (105.5, 2°, 7.8), *p*- $Me_3NC_6H_4N^+Me_3(CIO_4^-)$  (104.5, -17°, 8), *dihydro-p-naphthophenazinium perchlorate* (102.7, 7, 8), *dihydropyocyanin* (48.8, —, —), *tetra-p-tolylhydrazinium perchlorate* (48.4, —, —),  $\alpha,\alpha'$ -*diphenyl-p-trinitrophenylhydrazyl* (32.8, -20°, 4.5). Ac-

cording to theory the no. of magnetons should be const. = 8.0 because the no. of electrons can always be assumed to be 1.  $n$  is obtained from the slope  $1/c$  of the  $1/\sigma$  vs.  $T$  curve:  $n = 14.06 \cdot \sqrt{c}$ .

Egon Bretscher

Magnetic susceptibility of liquid ozone and of mixtures thereof with liquid oxygen. P. Lainé. *Compt. rend.* 198, 918-19 (1934), cf. C. A. 27, 3367.—By use of similar methods the sp. magnetic susceptibility of liquid  $O_3$  at temps. near that of liquid air is about  $1.5 \times 10^{-7}$  and the thermal variation thereof is less than  $1/3$  of that required by the Curie law. The thermomagnetic method of detg. the amt. of  $O_3$  present is verified. By maintaining a vacuum above an agitated mixt. of liquid  $O_2$  and  $O_3$ , liquid  $O_3$  contg. less than 0.01%  $O_2$  is obtainable.

C. A. Silberrad

Magnetic rotation of hydrogen selenide. R. de Malle-mann and P. Gabiano. *Compt. rend.* 198, 1030-1 (1934).—Verdet's const. for  $H_2Se$  ( $\lambda$  5780) is  $61 \times 10^{-6}$ , the mol. rotation  $40 \times 10^{-6}$ , giving for the at. rotation of Se  $36 \times 10^{-6}$  (perhaps a little low because of decompn. of  $H_2Se$  in light).

C. A. Silberrad

Diamagnetism of nitroso compounds. E. Bright Wilson, Jr. *J. Am. Chem. Soc.* 56, 747 (1934).— $NOCl$ ,  $PhNO$  and *p*- $Me_2NC_6H_4NO$  are diamagnetic; the conclusion is that these compds. at least are in singlet states (cf. Pauling, C. A. 25, 2910), and this indicates that they do not have the similarity to O previously suggested.

C. J. West

Study of the dielectric constants of substances containing water. J. Tausz and H. Rumm. *Kolloid-Beihfte* 39, 58-104 (1933). The dielec. properties of sucrose, starch (potato, rice, wheat), silicic acid, tobacco (fibers and dust), borax, lithographic slate and lignite were studied, as a function of the moisture content. Water is present in a solid and a liquid fraction. The effect of temp., packing vol., structural properties and frequency was detd. The dielec. const. of dried materials can be measured by an isodielec. method: the materials are suspended in a mixt. of liquids of the same dielec. const. The dielec. const. of sucrose and starch in the literature could not be confirmed, because previous investigators had not dried these substances properly. Substances of higher moisture content were placed between the condenser plates in powder form. Dielec. values were thus obtained, from which dielec. const. can be calcd. Dielec. measurements are a convenient way of detg. moisture content. Substances contg. moisture in the form of solidified water show a low temp. coeff. of the dielec. const. At room temp. 9% of the water in cut tobacco is present in the solidified form. Water in  $SiO_2$  is mostly in the liquid state. The dielec. const. varies considerably with frequency, if the water content is liquid. The lithographic slate of Solnhof shows an abnormally high dielec. const. of 1000-1100 at a frequency of 1100. After drying, i. e., removal of 0.7% moisture, the dielec. const. is 14 (John-son-Rahbeck effect). This is due to capillary water which is rocked back and forth by a. c. The capacity of Se increases when illuminated.

Frank Urban

Study of the dielectric properties of Rochelle salt by Röntgen rays. Hans Staub. *Helv. Phys. Acta* 7, 3 (1934).—An ionization chamber for x-rays employing electrometer tubes to register the ionization current was used to det. the changes in reflective power of Rochelle salt for x-rays when an elec. field was applied to the crystal. A very marked intensity variation was observed which was due to a shift of the ions. The high dielec. const. of Rochelle salt is therefore due to displacement of the ion. The effects of moisture and space charges are discussed. A very suitable method of cutting Rochelle salt crystals is given as well as a detailed theory for the elimination of fluctuations of the app.

Egon Bretscher

Determination of dipole moments in solution. S. Sugden. *Nature* 133, 415-16 (1934).—Substances the mols. of which contain a large permanent dipole markedly decrease the measured values of the mol. polarization in soln. as the concn. of the soln. increases. This effect is too large to be due to chem. assocn. Mol. polarization is

plotted against the vol. polarizability for solns. of PhCN, PhNO<sub>2</sub>, and PhCl in a no. of non-polar solvents. All the points for each compd. lie near a straight line.

Gerald M. Petty

**Dipole moments of acetic anhydride and some fatty acids.** A. Piekara and B. Piekara. *Compt. rend.* 198, 1018-20 (1934).—From the mol. polarization,  $P$ , of Ac<sub>2</sub>O in CS<sub>2</sub> soln. for concn. not more than 10%  $P_{\infty}$  is deduced (196.5 at 5°, 187.5 at 25°), and hence the dipole moment,  $\mu = 2.82 \times 10^{-18}$  (or  $2.46 \times 10^{-18}$  if deduced from the temp. variation of  $P_{\infty}$ ).  $P$  of AcOH and propionic acid in hexane soln. at 10° and 30° increases with both concn. and temp., but  $P_{\infty}$  (22 and 26, resp.) is independent of temp.; the mean values of  $\mu$  deduced therefrom are 0.38 and 0.64. The dielec. consts. of AcOH, propionic, butyric and isobutyric acids are, resp., at 10° 6.430 (liq.), 3.296, 2.980 and 2.705; and at 40° 6.529, 3.435, 3.036 and 2.730 (cf. C. A. 24, 2649, 3683; 27, 4453).

C. A. Silberrad

**The relation between dipole moment and cohesion forces.** IV. A. E. van Arkel. *Rec. trav. chim.* 52, 1013-27 (1933); cf. C. A. 27, 4973.—The relation among mol. structure, dipole moment and b. p. may be used in certain cases for the detn. of structure. The method is of special value in cases where the chem. detn. of structure does not give clear results, e. g., with the *cis-trans* isomers of ethene derivs. V. A. E. van Arkel and J. L. Snoek. *Ibid.* 53, 91-4 (1934).—The dipole moments of 7 diazine derivs. were measured, to furnish exptl. proof of assertions made concerning the dipole moments of compds. contg. N in place of 1 or more CH groups of C<sub>6</sub>H<sub>6</sub> or C<sub>10</sub>H<sub>8</sub>. The moments were detd. as exactly as possible only when this seemed necessary in the course of the reasoning, e. g., with the following compds.: 2,5-dimethylpyrazine, d<sub>20</sub> 0.9887, b. 154.5°, m. 15°, picrate m. 154°, dipole moment = 0; 2,6-dimethylpyrazine, d<sub>20</sub> 0.9647, b. 155.6°, m. 39°, picrate m. 173.5°, dipole moment =  $0.53 \times 10^{-18}$ . VI. A. E. van Arkel. *Ibid.* 246-56.—In unsatd. compds. the b. p. is affected in the same way by the kind and position of substituent groups as in satd. ones. However, in the transition of an alkyl group from an aliphatic union to an unsatd. one, the b. p. rises; the b. p. falls when a halogen atom goes through this transition.

Louise Kelley

**Measurements of the indexes of water by an interferential method.** O. Jasse. *Compt. rend.* 198, 163-4 (1934).—By means of the interferential method (cf. *Ibid.* 185, 1268 (1927))  $n_D$  of H<sub>2</sub>O (in comparison with air) were detd. for the Hg radiations 579, 577, 546 and 436 m $\mu$  at 0-93.53°. The max. error does not exceed 8 units in the 6th decimal place.

Reuben Roseman

**A critical test for the purity of gases.** Martin Shepherd. *Bur. Standards J. Research* 12, 185-91 (1934) (Research Paper No. 644); cf. Washburn, C. A. 22, 522.—This paper reports a method by which the purity of gases (and liquids having normal b. ps. below room temps.) may be critically tested. It involves 1 approx. isothermal distn., whereby a small initial distillate, a middle cut and a small final residue are obtained. The pressures of these 3 fractions are compared by means of a simple differential manometer and form the basis for indicating impurities of higher and lower b. ps. than that of the approx. pure substance. The method eliminates the exacting temp. requirements of the widely used criterion of constancy of pressure during an isothermal condensation or vaporization, offers more information than the isothermal condensation, and is suitable for testing mixts. contg. more than 2 components. In many cases the order of magnitude of the impurities may be calcd. Like the isothermal condensation, it is not suitable for studying azeotropic mixts.

R. Roseman

**Experimental determination of the thermal conductivity of air between 0° and 100°.** S. W. Milverton. *Phil. Mag.* 17, 397-422 (1934).—The hot-wire method was used. The value at 0° is  $581.0 \times 10^{-7}$  cal. cm.<sup>-1</sup> sec.<sup>-1</sup> deg.<sup>-1</sup>. The data are represented within 1% by  $K = 5.626T^{1/2}/(1 + (165/T))10^{-7}$  in which  $K$  is the thermal cond. and  $T$  is the mean abs. temp. of the air. The radiation loss

from a bright Pt wire is represented by  $E = 5.88 (T_1^{1.22} - T_2^{1.22})10^{-12}$  in which  $E$  is the rate of radiation loss in cal. sec.<sup>-1</sup> per sq. cm. of wire surface and  $T_1$  and  $T_2$  are the abs. temps. of the wire and the wall, resp.

E. J. Rosenbaum

**Compressibility of certain gases at low pressures.** T. Batuecas. *J. chim. phys.* 31, 65-75 (1934).—Reply to Cawood and Patterson (C. A. 27, 4454).

L. K.

**Fractionation of hydrogen by diffusion through palladium.** V. Lombard and C. Eichner. *Compt. rend.* 198, 932-4 (1934); cf. C. A. 27, 2079; 28, 2246.—The rate of re-diffusion through Pd of H<sub>2</sub> that has once diffused through it is approx. 19% greater than that of diffusion of the portion that did not diffuse. Accumulation of impurities being very improbable, a genuine fractionation of H<sub>2</sub> into 2 allotropic modifications appears to have taken place to at least some extent. (Cf. Farkas, C. A. 28, 1922.)

C. A. Silberrad

**Interfacial tension of mixtures of organic liquids.** A. G. Nasini and C. Rossi. *Atti IV Congr. naz. chim. pura applicata* 1933, 524-36.—The Bartell and Mack rule for interfacial tension of mixts. of 2 liquids (C. A. 26, 1494) is confirmed. In 2 liquids of very low soly., the mixt. curve is apparently a straight line.

R. M. S.

**The surface tension at the interface of two immiscible liquids.** III. Constantin Belcote. *Bul. soc. române fis.* 35, 119-25 (1933); cf. C. A. 22, 1509.—To verify the previous hypothesis that a lowering of the surface tension is caused by OH ions, the inverse phenomenon was studied in dil. HCl solns. The capillary method was applied to a study of the hydrolysis of NaOPh, NH<sub>4</sub>OAc, NH<sub>4</sub>Cl, HCOONH<sub>4</sub> and NaHCO<sub>3</sub>. IV. Conductance ratio and activity coefficient for ammonium hydroxide solutions. *Ibid.* 157-9.—The variation with concn. of cond. ratio ( $\gamma = \Lambda/\Lambda_{\infty}$ ) and true activity coeff.,  $\alpha$ , for solns. of NH<sub>4</sub>OH was measured. The cond. measurement detg.  $\gamma$  is equiv. to the activity of the ions at great diln. only. The activity varies with the concn. in a manner differing according to the substance studied. With increasing concn. the value of  $\alpha$  passes through a min. while  $\gamma$  undergoes only a gradual decrease.

Calvin Brous

**Application of Bachinskii's formula to viscosities of molten salts at elevated temperatures.** M. P. Volarovich. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 1431-7. Exptl. results of Dantuna (C. A. 23, 557) on viscosities of molten KNO<sub>3</sub> and NaCl conform to Bachinskii's formula (C. A. 7, 3060; 8, 277) which holds for non-assoc. liquids. The formula of LeChatelier (C. A. 19, 2114) modified by Lazarev (C. A. 21, 3506) should be used for expressing viscosities of assoc. liquids.

V. A. Kalichevsky

**Measurements of the viscosity of basalt glass at high temperatures.** I. Koichi Kani. *Proc. Imp. Acad. (Tokyo)* 10, 29-32 (1934).—The viscosity was measured by the rotation of a cylinder immersed in molten glass. The true viscosity was obtained by comparison with rice jelly, with which the accuracy of the method was checked.

E. R. Rushton

**The mobility of the molecules in the surface layer.** S. E. Bresler, B. A. Talmud and D. L. Talmud. *Physik. Z. Sowjetunion* 4, 864-72 (1933).—Layers of cetyl alc. and oleic acid were forced through a "flat capillary" onto a water surface. The curve of surface tension against time shows a period of slow variation indicating a low mobility. A relation between rate of flow, viscosity of the film, and the resistance of the base is calcd.

Louis Goldman

**The structure of the surface layer of a liquid.** V. P. Berdennikov, S. E. Bresler, I. L. Zelmanov and E. A. Strauf. *Physik. Z. Sowjetunion* 4, 873-84 (1933).—The orienting effect of the surface extends to within  $10^{-6}$  cm. as shown by the thickness of bubbles in paraffin 2-3° above its m. p. and the thickness of a paraffin film that prevents the coalescence of 2 Hg layers. Electron interference diagrams for Hg show a quasi-cryst. structure for the surface.

Louis Goldman

**Temperature variation of the orthobaric density of unassociated liquids.** Allan Ferguson and J. T. Miller.

*Proc. Phys. Soc. (London)* 46, 140-7(1934).—A formula connecting the orthobaric d. of a liquid and its temp. is developed:  $\rho = 2\rho_c[A(1 - m)^{0.5} + (1 - 1/Am)]$ , in which  $m$  is the reduced temp. and  $A$  is a const. that varies slightly from liquid to liquid, and may be taken to have a mean value of 0.91. This long-range formula was tested for 30 pure org. substances and applied to the evaluation of expansion coeffs. and to show the variation of free and total mol. surface energies with temp. E. R. R.

Distribution of molecules in liquids. E. Amaldi. *Nuovo cimento* 9, cxli-cii(1932).—Theoretical.

Theory of anisotropic liquids. XX. Simplest cases of the symmetry of free energy of molecules and their orientation. C. W. Oseen. *Arkiv Mat. Astron. Fysik* 24A, No. 14, 18 pp.(1933); cf. C. A. 27, 4974.—Math. analysis from group theory is given. C. D. W.

Anisotropic liquids in an electric field. III. Measurements of the dielectric losses of *p*-azoxyanisole. W. Kast and P. J. Bouma. *Z. Physik* 87, 753-62(1933); cf. C. A. 26, 5805.—The dielec. losses of the cryst. liquid phase of *p*-azoxyanisole increases rapidly with temp. The usual explanation of dielec. losses of dipole mols., which supposes that the rotational friction of the dipoles in the liquid causes the losses, does not explain the abnormally high temp. coeff. of the observed dielec. losses. Similar observations are made with the substance in the cryst. solid state which are interpreted in the same way as Debye has explained the dielec. behavior of ice.

Egon Bretscher  
Registrations of the transparency of anisotropic melts of *p*-azoxyanisole in a magnetic field. (A contribution to the swarm theory of liquid crystals.) W. Kast and L. S. Ornstein. *Z. Physik* 87, 763-7(1933).—The transparency of layers of *p*-azoxyanisole of various depths was studied as a function of the time interval that elapsed after a magnetic field of 1600 gauss was switched off. The results seem to support the swarm theory of liquid crystals.

Egon Bretscher  
A case of periodic efflorescence of alums. F. M. Shemyakin. *J. Gen. Chem. (U. S. S. R.)* 3, 1005-6(1933).—The periodic efflorescence of a mounted crystal of  $K_2C_2(SO_4)_4 \cdot 24H_2O$  under a glass jar is described. C. B.

Paramagnetism of salts. C. J. Gorter. *Physica* 11, 171-82(1931).—A discussion. B. C. A.

Application of a new statistical method for calculating magneto-mechanical phenomena. N. A. Kulov and E. Kondorskii. *J. Exptl. Theoret. Phys. (U. S. S. R.)* 1933, 109-14. The distribution function of the axis of spin in elastically deformed monocrystals is worked out as a function of the external field and of the tension. The relations so obtained are used for calcg. the magnetostriction of elastically deformed monocrystals for any direction of the tension and field relative to the axis of the monocrystal. The possibility of a change in length in ferromagnetic materials as a result of the reorientation of the axis of spin, due to the effect of the elastic tension (which can also be present in the absence of an external field, e. g., mechano-contraction) is established. It follows that Hooke's law does not hold strictly for ferromagnetic substances. The  $E$  effect is attributed to the diminishing of the mechano-contraction as the magnetization is increased.

Marie Goyer  
Magneto-thermoelectric effects in nickel and iron: theoretical interpretation. A. Pernier and T. Kousmine. *Compt. rend.* 198, 920-1(1934); cf. C. A. 28, 2582.—Theoretical inferences are drawn from the thermoelec. anisotropy ( $\Delta E_{\parallel} - \Delta E_{\perp} = 43.7 \times 10^{-8}$  v./° for Ni and  $14.8 \times 10^{-8}$  for Fe) deduced from the previous results; in particular that both  $\Delta E_{\parallel}$  and  $\Delta E_{\perp}$  are intrinsic properties of the metals independent of contact potential, and that there is no simple relation between  $\Delta E$  and the intensity of magnetization. C. A. Silberrad

Measurements with the help of liquid helium. XXIII. Superconduction of vanadium. W. Meissner and H. Westerhoff. *Z. Physik* 87, 206-9(1933); cf. C. A. 27, 4976.—The temp. of transition to supercond. is  $4.3-4.4^\circ$ .

Egon Bretscher

1 The primary crystallization of metals. The effect of temperature gradients on the orientation of zinc monocrystals. V. D. Kuznetsov and D. D. Saratovkin. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 248-51 (in German 251-5)(1934).—Crystal formation was observed in a Zn-filled glass tube as it slowly moved out of a furnace. Up to a velocity of 90 cm. per hr. monocrystals result; above that polycrystals. Angular orientation of monocrystals is independent of the speed.

F. H. Rathmann  
Modification of form of crystals grown in solutions containing foreign material. L. Royer. *Compt. rend.* 198, 949-51(1934); cf. C. A. 28, 2234.—(Figures in brackets give the lattice dimensions in A. of the similarly spaced faces.) Although  $NaNO_3$  [ $5.07 \times 8.67$ ] and  $NH_4I$  [ $5.09 \times 8.70$ ] exhibit epitaxy on muscovite [ $5.15 \times 8.02$ ], succinic acid [ $5.06 \times 8.90$ ] neither does so, nor affects in any way the crystn. of  $NaNO_3$  or  $NH_4I$  from a soln. contg. it; this is attributed to differences in sign of the ions or incompatibility in the linkings in the crystals. C. A. Silberrad  
Liquid crystals. Wm. Bragg. *Nature* 133, 445-56; *Proc. Roy. Inst. Gr. Brit.* 28, 57-92(1934).—A review.

B. W.  
Liquid crystals obtained by rapid evaporation of an aqueous solution. P. Gaubert. *Compt. rend.* 198, 951-3(1934); cf. C. A. 28, 1239.—Both liquid and solid crystals of tartrazine are hydrated. The birefringence of its smectic state is not less than that of calcite, and greater than that of its nematic state. Addn. of various dyes to a soln. of tartrazine increases the polychroism, but does not otherwise affect the formation of liquid crystals unless not less than about 5% is present, when the smectic state is suppressed. Some dyes, e. g., Na alizarinsulfonate, increase the stability of the nematic state, causing it to persist for several hrs. A soln. of brilliant croceine (Na benzeneazobenzeneazo- $\beta$ -naphtholdisulfonate) gives rise to a viscous birefringent liquid.

C. A. Silberrad  
Work function of metals. I. Lamar and D. Blokhintzev. *J. Exptl. Theoret. Phys. (U. S. S. R.)* 1933, 77-100; cf. C. A. 27, 3135.—The method of deriving the work function of a metal given in the *J. Exptl. Theoret. Phys.* (U. S. S. R.) (31-33) is more fully developed on the assumption that an ideal potential barrier exists at the surface of the metal. The following formula is derived for the work function in electron v.  $\chi = 4.0(z/\gamma)^{1/4}$  in which  $z$  is the no. of free electrons per atom and  $\gamma$  is the vol. of a g. atom. If the method of Fermi and Thomas is used for obtaining the potential at the surface of a metal, the work function is equal to the mean kinetic energy of the electrons at zero abs. in accordance with the theory of Sommerfeld. This leads to the formula  $\chi = 15.6(z/\gamma)^{1/4}$ . In this case the model assumed is an infinitely long metal with a smooth surface. Both the formulas give values of the work function of the right order of magnitude and in both cases the graphs of  $\chi$  plotted against  $(1/\gamma)^{1/4}$  roughly follow the course of the value of the work function of the various metals (for  $z = 1$  and  $z = 2$ ) through the periodic system. The second formula gives values in closer agreement with expt. Thus the work done in removing electrons from a metal can be explained not by the potential jump at the surface but by the elec. image force. A table of values of the effective valency is also calcd. from the second formula for Ag, Au, Ta and W, but the results are not as good as might be expected. Marie Goyer

Measurement of small dilatations: dilatation of fused silica. L. Dunoyer. *Compt. rend.* 198, 909-11, 1132-4 (1934).—Various methods of detg. the coeff. of dilatation are discussed; that adopted as suitable for use at ordinary temp. depends on the detn. of the form of the meridian line of a tube of the material when a definite temp. difference is maintained between 2 opposite generatrices of the tube. Applied to glass and fused  $SiO_2$  it gave as the coeff. for temp. approx.  $0-40^\circ$ ,  $6.9 \times 10^{-6}$  and  $-6.6 \times 10^{-6}$ , resp.

C. A. Silberrad  
The thermal expansion of calcite. J. Weigle and H. Saini. *Helv. Phys. Acta* 7, 267-68(1934).—The thermal

expansion of the crystal lattice was detd. with x-rays. The coeffs. of expansion are  $\alpha_{||} = 2.10 \times 10^{-5}$  and  $\alpha_{\perp} = -0.380 \times 10^{-4}$ . Egon Bretscher

Thermal expansion of sodium nitrate determined with the help of x-rays. H. Saini and A. Mercier. *Helv. Phys. Acta* 7, 267-72(1934). The coeff. of thermal expansion in the direction parallel to the axis of symmetry is:  $\alpha_{||} = \alpha_0 (1 + 7.53 \times 10^{-4} + 2.56 \times 10^{-7} t^2)$ , perpendicular to it  $\alpha_{\perp} = \alpha_0' (1 + 8.8 \times 10^{-4} + 2.7 \times 10^{-7} t^2)$ .  $\alpha_1$  is at  $20^\circ$  5.060 A.,  $\alpha_2$  16.784 A. Egon Bretscher

Measurement of a hexagonal crystal lattice: Zinc. J. Weigle. *Helv. Phys. Acta* 7, 51 6(1933).—The parameter of the base of Zn is 2.6585 A. Egon Bretscher

Crystal structure and orientation in zinc oxide films. G. I. Finch and A. G. Quarrell. *Proc. Phys. Soc. (London)* 46, 148-62(1934); cf. *C. A.* 27, 4978. A new type of electron-diffraction camera is described. Partially and completely oxidized Zn films were exand. and a ZnO pseudomorphic with Zn was found to be formed by oxidation at room temp. It is converted to normal ZnO by heat, but is still sepd. from the metal by a layer of the pseudomorphic oxide. The corrosion-resistant properties of Zn seem to be due mainly to this coating of pseudomorphic oxide. E. R. Rushton

Structure of oxide films on nickel. G. D. Preston. *Phil. Mag.* 17, 466-70(1934). Electron diffraction patterns were obtained of very thin oxide films on Ni. The film structure is identical with that of NiO in massive form, with parameter 4.10 A. E. J. Rosenbaum

The structure of metallic layers formed by condensation of metallic vapor on a cold surface. M. Ya. Gen. I. Zelmanov and A. I. Shalnikov. *Physik. Z. Sowjetunion* 4, 825 34(1933) (in German). Investigation of layers of Ni, Fe, Cd and Hg by electron refraction by the reflection method, show that the layers consist of small crystals differing from the ordinary metals only in having a higher degree of dispersion. The lower-melting metals form the larger crystals. Louis Goldnan

The recrystallization of dispersed quartz. S. I. Bresler, E. A. Strauf and I. L. Zelmanov. *Physik. Z. Sowjetunion* 4, 909-10(1933).—A film of amorphous quartz formed by condensation of the vapor recrystallizes at about  $400^\circ$  as compared with  $1000^\circ$  for the recryst. of quartz glass. Louis Goldnan

Softening of vitreous substances. E. Rencker. *Compt. rend.* 198, 934 6(1934); cf. *C. A.* 28, 2234. Differential cooling curves for  $B_2O_3$ ,  $HPO_3$ , etc., show that at the transformation or softening point there is merely a change in the sp. heat, coincident with that in the coeff. of dilatation (cf. *C. A.* 15, 155; 22, 1881; 24, 4210). C. A. Silbergard

The vicinal faces of topaz. St. Krutz. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 169 72. Goniometric measurement of several crystals reveals many reflections vicinal to {120} as well as to other forms in the {001} zone. Structure examn. by the Laue and Bragg methods gives no evidence of these vicinal faces, which are thus to be attributed to anomalies of growth rather than of structure. C. D. West

Space group of tourmaline. W. H. Barnes and A. V. Wendling. *Trans. Roy. Soc. Can.* III, 27, 169-75(1934). An x-ray examn. of a green tourmaline through Laue photographs established the space group as  $C_{2v}$ . J. W. Shipley

Investigation of symmetrical triphenylbenzene with Röntgen rays. B. P. Orelkin. *J. Gen. Chem. (U.S.S.R.)* 3, 643-51(1933).—Detn. of the magnitudes of the  $C_6H_5$  nucleus in  $C_6H_5Ph_3$  produced mean results for  $o$ -,  $m$ - and  $p$  distances, resp., of 0.79 A., 1.12 A. and 1.38 A. These values fully correspond with the Sachs structure of  $C_6H_6$ , because  $0.79:1.12:1.38 = 1:2:3$ . Though the mol. has only 1 true plane of symmetry, it nearly possesses a triple axis of symmetry also. Chas. Blanc

Guanidine *d*-tartrate. Crystallographic study. A. Swaryczewski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 359-65.—Guanidine *d*-tartrate is prepd. from equimol. mixts. of *d*-tartaric acid and guanidine carbonate in an aq. soln. From the N content

the formula is  $[(CN_2H_5)_2(C_6H_5O_6)] \cdot 1\frac{1}{2}H_2O$ . The crystals are tabular, wedge-shaped or columnar. By optical measurements the symmetry is monoclinic with  $a:b:c = 0.7056:1:0.3366$ ,  $\beta = 104^\circ 57'$ , and  $n_\alpha = 1.5186$ ,  $n_\beta = 1.5470$ ,  $n_\gamma = 1.5900$  for Nap. Rotating-crystal x-ray photographs give  $a_0 = 9.88 \pm 0.02$ ,  $b_0 = 14.77 \pm 0.15$ ,  $c_0 = 4.78 \pm 0.01$  A. with 2 mols. per elementary cell. Victor Hicks

Crystal form and crystal optics of the optically active methylpropylcarboxymethylarsine sulfide. David Malmqvist. *Bull. Geol. Inst. Univ. Uppsala* 24, 243-55(1933).

The 2 optically active forms crystallize in large, brittle, colorless, transparent plates with a vitreous luster, having monoclinic-sphenoidal symmetry, with  $a:b:c = 1.4176:1.14488$ , and  $\beta = 104^\circ 50'$ . The angles between the observed faces, and the etch figures, show the 2 forms to be morphotropic. The optical orientation is:  $\alpha = c$ ,  $\gamma = b$ ,  $\beta:a = 15^\circ$ . The optical constants for both forms are:  $V_\gamma = 13.1^\circ$ ;  $n_\alpha = 1.601$ ,  $n_\beta = 1.603$ ,  $n_\gamma = 1.645$ , for Nap; birefringence, 0.0405. Victor Hicks

A crystal study of nitropentaminocobaltic chloride. Lester W. Strock. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 366 73; cf. *C. A.* 28, 943.

A reinvestigation of the crystal form of this compd. shows the symmetry to be not higher than monoclinic hemimorphic, because twinning of 2 di-habit crystals occurs on the {101} and on the {001} faces. The axial ratio,  $a:b:c = 0.8834:1.08215$ , with  $\beta = 92^\circ 08'$ , obtained with a new orientation is in approx. agreement with the values of F. M. Jaeger (*Z. Krist.* 39, 555(1904)) when calcd. for J.'s orientation. Crystals are strongly pleochroic and show strong double refraction with  $\gamma = c$ ,  $\alpha = b$ ,  $\beta = a$ .  $d_{22} = 1.832$ . Victor Hicks

The crystalline structure of naphthazarin. J. Palacios and R. Salvia. *Anales soc. espan. fis. quim.* 32, 49-52 (1934). From Weissenberg diagrams of a revolving crystal, the elementary structure is monoclinic-sym.,  $a_0 = 3.85 \times 10^{-8}$ ,  $b_0 = 8.02 \times 10^{-8}$ ,  $c_0 = 14.5 \times 10^{-8}$  cm.,  $\beta = 97^\circ 6'$ . The no. of mols. in the lattice is 2, grouping  $C_{2h}$ , the mol. having a center of symmetry. E. M. Symmes

Crystal structure and composition of cubic chromium carbide. Arne Westgren. *Jernkontorets Ann.* 117, 501-12(1933); cf. *C. A.* 27, 5228, 5697. The carbide phase of stainless steel with 13% Cr and 0.1-0.4% C has the same structure as the lowest Cr carbides have. This is face-centered cubic with a lattice parameter of 10.638 A. and the nearest stoichiometric compn. is  $Cr_3C$ . A re-examination of the grouping shows that it is in fact  $Cr_2C$ . The space grouping is  $O_h^h$  and the at. positions in Wyckoff's notation are 4 Cr at 4 (a); 32 Cr at 32 f; 8 Cr at 8 (c); 48 Cr at 48 h, 24 Cr at 24 (e), with  $u = 0.385$ ,  $v = 0.165$  and  $w = 0.275$ . In a Cr W carbide, the W atoms are mainly at 8 (c) and therefore have the formula  $Cr_{12}W_4C_4$ . In low-W and low-Mo steels, the carbides are analogous to cubic Cr carbide. These substances may be considered to be  $Fe_{21}W_2C_8$  and  $Fe_{21}Mo_2C_8$ , in which W and Mo are largely replaced by Fe. H. C. Duus

Crystal structure of barium nickelocyanide. H. Brasseur, A. de Rassenfosse and J. Piérard. *Compt. rend.* 198, 1048 50(1934); cf. Bozorth and Pauling, *C. A.* 26, 2300.—This salt contains  $4H_2O$  and not 3 (cf. Weselsky, *Wien. Akad. Ber.* 60, 261(1869)). It is monoclinic  $a:b:c = 0.8722:1:0.4940$ ,  $\beta = 104^\circ 50'$ ,  $d^{20} = 2.383$ . X-ray examn. gives  $a$  11.89,  $b$  14.08,  $c$  6.54,  $\beta$   $103^\circ 42'$ , with  $4[BaNi(CN)_4 \cdot 4H_2O]$  in the unit cell, and a structure identical with that of  $BaPt(CN)_4 \cdot 4H_2O$ .  $[Ni(CN)_4]^{2-}$  is therefore plane, with Ni in the center of a square formed by 4(CN). C. A. Silbergard

Structure and formula of 12-phosphotungstic acid. J. F. Keggin. *Proc. Roy. Soc. (London)* A144, 75-100 (1934); cf. *C. A.* 27, 5228.—The formula was found to be  $H_{12}P(W_{12}O_{40})_4$ , which agrees with most chem. evidence. The prepn. and dehydration of the acid are described. E. R. Rushton

Vapor pressure of mixtures of light and heavy hydrogen. Gilbert N. Lewis and W. T. Hanson, Jr. *J. Am. Chem. Soc.* 56, 1000-1(1934).—Preliminary results indicate that

mixts. of  $H_2$  and  $H_2$  approximate closely Raoult's law, in which the total vapor pressure is plotted against the mole fraction of  $H_2$  at 18.05°K. The temp. at which freezing begins also proved to be nearly linear with the mole fraction. There appeared to be no great difference in vapor pressure before and after treatment with a hot Pt filament for 30 hrs. C. J. West

**Vapor pressure of solid and liquid heavy hydrogen.** Gilbert N. Lewis and W. T. Hanson, Jr. *J. Am. Chem. Soc.* 56, 1001-2 (1934).—The ratio of  $p_2$ , the vapor pressure of  $H_2$ , to  $p_1$ , that of  $H_2$  (para) is plotted and tabulated as a function of  $p_1$ . The measurements are extremely sensitive to an impurity of light H. The triple point of  $H_2$  is 18.66°K. Treatment with charcoal caused no change in the vapor pressure. C. J. West

**Some properties of heavy water.** Hugh S. Taylor and P. W. Selwood. *J. Am. Chem. Soc.* 56, 998-9 (1934).—The max. d. attainable by the electrolytic method of prepn. of  $H_2O$  is believed to be higher than that reported by Lewis and Macdonald (*C. A.* 27, 4147); the ratio of  $d_{H_2O}^{25}$  of  $H_2O$  and  $H_2O$  is found to be 1.1079 (L. and M., 1.1056); the difference in  $n_D$  is -0.00462 at 20°. Such  $H_2O$ , subjected to prolonged electrolysis, gives fractions varying in d. from 1.100 to 1.1059; the ratio of sp. rates of discharge of light and heavy H at these high concns. is about 6.  $H_2O$  must be treated as an anhyd. liquid; a sample with  $d_{25}^{20}$  of 1.1038, exposed to the air overnight, had d. 1.1016. The f. p. of max. d.  $H_2O$  is 3.82° and  $\eta_{20}$  12.6 millipoises. Prolonged fractional freezing of 90%  $H_2O$  yielded no concn. The ratio of  $H_2O/H_2O$  in natural water is about 1 in 5000-6000. C. J. West

**Vapor pressure of liquid and solid deuterocyanic acid [deuterium cyanide].** Gilbert N. Lewis and Philip W. Schutz. *J. Am. Chem. Soc.* 56, 1002 (1934); cf. *C. A.* 28, 1587. The vapor pressure of HCN(l.) can be expressed by the equation  $\log_{10} p = 7.795 - 1467/T$ ; for the solid,  $\log_{10} p = 9.372 - 1877/T$ ;  $H^2CN(l.)$ ,  $\log_{10} p = 7.695 - 1440/T - 175/T^2$ ; solid,  $\log_{10} p = 9.476 - 1907/T$ . There is very little difference between the vapor pressures of the liquid forms of HCN and  $H^2CN$ . The f. p. of HCN is calcd. to be 259°K.; of  $H^2CN$ , 261°K. C. J. West

**Ionization constant of deuteracetic acid [deuterium acetate].** Gilbert N. Lewis and Philip W. Schutz. *J. Am. Chem. Soc.* 56, 1002-3 (1934).— $AcOH^2$  in 97%  $H_2O$  at 25° and concns. of 0.0722 and 0.1444 *M* has sp. cond. of 1.83 and  $2.59 \times 10^{-4}$ , both giving for the ionization const. the value  $0.59 \times 10^{-4}$ ; the  $H_2O$  used had a sp. cond. of  $2.3 \times 10^{-4}$ . The const. is less than  $1/3$  that of  $AcOH$  in  $H_2O$ . C. J. West

**The heat of adsorption of carbon monoxide on copper.** Ralph A. Beebe and Edwin L. Wildner. *J. Am. Chem. Soc.* 56, 642-5 (1934); cf. *C. A.* 27, 882. In a calorimeter designed to eliminate all the known sources of error, the differential heats of adsorption of CO on Cu at 0° and pressures between 0 and 0.3 mm. were measured; the differential heat of adsorption was about 20,000 kg.-cals. per mol. for the first gas adsorbed and decreased rather sharply to about 13 kg.-cals. for the last quantities of gas added. P. H. Emmett

**Adsorption of carbon dioxide and hydrogen on bare and oxygen-covered silver surfaces.** Leonard C. Drake and Arthur F. Benton. *J. Am. Chem. Soc.* 56, 500-11 (1934).—On bare Ag,  $CO_2$  showed only an instantaneous phys. adsorption at -78° and 0°, with a heat of adsorption of about 5 kg.-cals.; complete covering of the surface requires about the same amt. of  $CO_2$  as of  $O_2$ . On Ag surfaces occupied by adsorbed O, activated adsorption of  $CO_2$  occurred between 0° and 200°, the energy of activation being about 5 kg.-cals.; also, some phys. adsorption occurred at 0°. Ag surfaces occupied by  $Ag_2O$  reacted with  $CO_2$  to form  $Ag_2CO_3$  at temps. as low as 56°, the energy of activation being 13 kg.-cals., the heat of formation 17.3 kg.-cals. Phys. adsorption of  $H_2$  was very small even at -183° on bare Ag; some activated adsorption appeared at about 200°. P. H. Emmett

**Adsorption of hydrogen by zinc oxide, zinc chromite and zinc oxide-molybdenum oxide.** Hugh S. Taylor

and Corneille O. Strother. *J. Am. Chem. Soc.* 56, 588-90 (1934).—On ZnO,  $H_2$  undergoes 3 types of adsorption (1) a van der Waals adsorption between -190° and -78°, (2) an activated adsorption over the temp. range 0° to 100° having an energy of activation of about 5 kg.-cals. and (3) an activated adsorption in the temp. range 100° to 300° having an energy of activation of about 12 kg.-cals. A ZnO- $Cr_2O_3$  catalyst had only 1 type of activated adsorption; the energy of activation was low, the rate being appreciable at -78°. Activated adsorption, on a ZnO-Mo oxide catalyst occurred at about 200°, the energy of activation being about 17 kg.-cals. P. H. Emmett

**Adsorption of hydrogen.** Thomas D. Phillips. *Phys. Rev.* 45, 215 (1934).—The rate of adsorption by charcoal, which starts soon after outgassing, rises to a max. in about 30 sec. This effect is explained by assuming that the adsorption occurs at the boundaries of "puddles."

Louis Goldman

**The sorption of iodine vapor by some inorganic substances.** Ernst Beutel and Artur Kutzelnigg. *Monatsh.* 63, 99-116 (1933).—Numerous inorg. substances of different periodic groups absorb I vapor. Those absorbing most rapidly are  $MgO$ ,  $ZnO$  (from basic Zn carbonate at 300°),  $Ca(OH)_2$  and  $SiH_4O_2$ . These were powdered and ground with solid I or heated with its vapor. The method of prepn. and condition of surface are important. The color of the sorbate varies from yellow to black, depending on the amt. sorbed. Sorption at room temp. in I vapor is slow because the air film on the powd. substances was not removed by evacuation. Much greater sorption was obtained by heating or grinding. The only case of definite chem. action with the vapor observed was  $HgCl_2$ . Channing Wilson

**Kinetics of adsorption. I. Velocity of adsorption of gaseous nitrous oxide and nitric oxide by glass walls.** M. Crespi. *Anales soc. españ. fis. quim.* 32, 30-42 (1934); cf. *C. A.* 28, 1243. Exptl. results of velocity of adsorption of  $N_2O$  and  $NO$  gases on glass walls are given. Equations of velocity of adsorption are deduced from the Langmuir and Freundlich isotherms of velocity of condensation and evapn. It is probable that gas follows a different course, represented by  $dy/dt = k(a - y)(y_0 - y)/y$ , in which  $y$  = concn. of adsorbed gas in adsorbent,  $t$  = time to adsorb quantity  $y$ ,  $y_0$  = final concn., and  $a$  = initial concn. in the gaseous phase. E. M. Symmes

**Adsorption at high pressures. I.** Albert S. Coolidge. *J. Am. Chem. Soc.* 56, 554-61 (1934).—The phenomenology and thermodynamic theory of adsorption systems are generalized and made applicable to the entire range of conditions within which the adsorbed substances normally exists as a fluid. Special attention is devoted to the corrections required when expts. are performed at high pressures. The conclusion is reached that several different methods of defining adsorption can advantageously be adopted. The consequences of adopting each of these definitions are followed in some detail and illustrated by computations based upon the Polanyi theory. II. Albert S. Coolidge and Holmes J. Fornwalt. *Ibid.* 56, 561-8. Adsorption equil. between charcoal and  $CO_2$ ,  $N_2O$  and  $SiF_4$  was measured over the temp. range -100° to about 100° and the pressure range 0.01 to 100 atm., particular attention being paid to the region near the crit. point. The results are of the general nature anticipated. In the case of  $CO_2$  the Polanyi theory was applied successfully. P. H. Emmett

**Adsorption capacity of silica gel precipitated from metallic salts.** V. K. Markov. *Ukrain. Khim. Zhur* 8, No. 1, Wiss. Teil 16-20 (1933).—Benzene was used as the adsorbed agent. The following combinations were studied:  $SiO_2$  and  $Al_2O_3$ ,  $Cr_2O_3$ ,  $Fe_2O_3$ ,  $NiO$  +  $Ni_2O_3$ ,  $CoO$  +  $Co_2O_3$ ,  $CuO$ ,  $SnO$  and  $Sb_2O_3$ . A complete table is given presenting the adsorption efficiency in percentage at various concns. and at 25°. B. S. Levine

**The absorption of dyestuffs by cellulose. I.** The kinetics of the absorption of sky blue FF on viscose sheet, in the presence of various amounts of sodium chloride. S. M. Neale and W. A. Stringfellow. *Trans. Faraday*



*Soc.* 29, 1167-80(1934).—Methods are described for accurately measuring the amt. of sky blue FF, absorbed by regenerated sheet cellulose and for rendering the amts. reproducible within about 2%. The effect of the variations in the concn. of NaCl and dyestuff upon the rate of absorption and upon the satn. absorption was studied. Absorption of the dyestuff from pure aq. soln. was negligible but it increased rapidly with the addn. of salt. Results obtained for the rate of absorption are explained in terms of the math. theory of diffusion. It is assumed that the outside of the sheet is dyed immediately on immersion, the color then diffusing towards the center at a rate proportional to the gradient of concn. in the cellulose phase. In agreement with this assumption it was found that cellulose sheets of half the usual thickness dyed to a given fraction of satn. in one quarter of the time. The diffusion const. of sky. blue FF through Cellophane immersed in water at 100° was found to be of the order of  $10^{-7}$  sq. cm./min. It rose to a max. and then fell with increasing salt concn. but appeared to be independent of the concn. of dyestuff within the limits studied.

L. H. Reyerson

**Linear phenomena. II. • Linear adsorption isotherms.** B. A. Talmud. *Physik. Z. Sowjetunion* 4, 854-60 (1933); cf. *C. A.* 27, 1798, 5607.—Surface tension vs. mol. area is plotted for a diethylcellulose layer on water and solns. of various org. acids and alcs. The linear adsorption increases with mol. wt. Satn. of linear adsorption occurs sooner than satn. of the surface layer.

Louis Goldman

**Thin films on a water surface.** R. G. Whitmore, R. Richmond and H. A. McTaggart. *Trans. Roy. Soc. Can. III*, 27, 113 23(1933); cf. *C. A.* 24, 2351. The conditions under which liquid films of triolein and oleic acid pass from the unimol. state to a state showing droplets with Brownian movement were studied. The transition occurs at a lower pressure when the temp. is raised but the films remain liquid in both states. The vol. of the droplets appears to be that of a sphere of diam.  $0.5 \mu$  and their shape lens-like. Films of palmitic and stearic acids show Brownian movement at low pressures but become rigid at higher pressures while mixts. of triolein and palmitic acids give films that seem partly liquid and partly rigid. The Brownian movement appears when a solid film of tripalmitin is heated to its m. p. Benzyl benzoate on water forms a film which on compression exhibits the Brownian movement. Substances that form rigid films exhibit no other phenomenon at the point of collapse than the crumpling up of a solid but those that remain liquid require further study.

J. W. Shipley

**Spreading of ovalbumin.** G. Th. Philipp. *Rec. trav. chim.* 53, 81-90(1934). Ovalbumin spread on weak buffer solns. in the  $p_H$  range 4.0-5.5 does not spread over the whole available surface but forms a unimol. layer of coherent structure and of practically always the same size. The surface of this "coherent film" is 1.3 sq. m./mg. At  $p_H > 5.7$  homogeneous films could not be obtained. For  $p_H < 3.9$  the coherent film breaks apart. The surface occupied is larger the further the  $p_H$  of the substrate is below 3.9. In certain  $p_H$  ranges the surface p. d. becomes const. at a definite degree of compression and always at the same surface, 0.7 sq. m./mg. It is concluded that in these compressed films the amino acids, which are linked to polypeptides, protrude from the surface, the polypeptide backbone lying tightly packed in the plane of the surface; in the coherent film the amino acids lie, tightly packed, flat on the surface. Structures are proposed for the coherent and compressed states of the film. The linkages in the coherent state are mainly ascribed to the attraction of oppositely charged groups in various polypeptide chains.

Louise Kelley

**Several instructive routine lessons for colloidchemical courses.** A. Lottemoser. *Kolloid-Z.* 66, 188-91(1934).—HgS sol can be prepd. by pouring a soln., made by adding dropwise  $\text{Na}_2\text{S}$  soln. to 1 cc. of satd.  $\text{HgCl}_2$  soln. until the ppt. just redissolves, into 1 l. of distd.  $\text{H}_2\text{O}$ . If a large excess of sulfide is used, HgS ppts. because of the low velocity of decompn. of the higher complexes. Tap water

causes a fairly rapid coagulation of the sol. Sol formation by soly. decrease may be illustrated by pouring  $\text{MgCO}_3$  solns. of S into  $\text{H}_2\text{O}$ . To illustrate change in dispersity, ppt. various dilns. of  $\text{H}_2\text{AsO}_4$  with  $\text{H}_2\text{S}$ . Slow titration of KI with  $\text{AgNO}_3$  illustrates pos. and neg. sols, with coagulation at the neutral point. The system pyridine-water is convenient for detn. of surface tension-concn. curve with the Traube stalagmometer. A. F.

**Dust and smoke.** R. Whytlaw-Gray. *Proc. Roy.*

*Inst. Gt. Brit.* 28, 149-63(1934).—Various smokes were formed inside a tank of 1 cu. m. capacity and the particles counted with the slit ultramicroscope. The wt. concn. was found by the increase in wt. of small asbestos filters. In all cases the no. of particles per cc. diminished very rapidly for the first 20 min., then more slowly; at the end of 2 hrs., the rate of decrease was nearly const. The corresponding wts. changed only slowly with time, showing that coagulation is the main factor in the disappearance of smoke from a closed space. Microscopic examn. of the deposits showed characteristic structures, depending on the nature of the material and the method of formation. Curves showing the decrease in the no. of particles with time for  $\text{MgO}$ , resin and stearic acid are given. Straight lines are obtained by plotting the reciprocals of the no. of particles against time, and the no. of particles present can be calcd. from the equation  $1/n - 1/n_0 = Kt$ , in which  $n$  is the no. of particles in the smoke  $t$  min. after formation,  $n_0$  is the initial no. and  $K$  is a const. that does not vary much for different smokes. A table for  $K$  is given which shows that  $K$  is much greater for very small units (nuclei and small ions) as predicted by H. S. Patterson's modification of Smoluchowski's equation. Initially homogeneous smokes coagulate more slowly than others. Coagulation apparently occurs at every chance encounter of the particles.

E. R. Rushton

**Foams.** A. V. Dumanskii, T. A. Granskaya and N. V. Novikov. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 361-91 (1933). Exptl. studies of foams showed the descending order of foaming power in hydrophilic colloids to be: saponin, molasses, peptone, gelatin, albumin, pectin, casein. For albumin the max. occurs just below the coagulation temp.; max. foam stability was found at  $p_H$  4.7. Replacing air by  $\text{CO}_2$  or  $\text{SO}_2$  decreases the stability but not the amt. of the foam.

Julian P. Smith

**Emulsions. I. Proteins and allied substances as emulsifiers for phenolic liquids.** R. M. Woodman. *J. Soc. Chem. Ind.* 53, 57-60T(1934).—Proteins, proteincontg. substances, and their degradation products often yield dual types of emulsions with phenolic liquids. Gels are formed in certain systems, making verification of the type difficult. The formation of gels is discussed. Results indicate that some measure of swelling in  $\text{H}_2\text{O}$  is necessary before emulsoid colloids can emulsify;  $\text{H}_2\text{O}$  must therefore be present for emulsification in these instances.

C. B. Jenni

**Gelatinized emulsions.** S. R. Bresler, M. Katz and L. Kremnev. *Physik. Z. Sowjetunion* 4, 889 93(1933).—The prepn. of gelatinized emulsions is described. They contain up to 99% by vol. of an org. liquid which in the emulsion has a frothy structure.

Louis Goldman

**Physicochemical nature of emulsions.** G. R. Vishnevskaya and A. G. Kniga. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 392-405(1933).—Emulsifying power for  $\text{C}_{12}\text{H}_{26}$  in  $\text{H}_2\text{O}$  was measured with agar, saponin, albumin, pectin, gelatin, lecithin and casein. Results are plotted in triangular coordinates to show emulsification and coagulation ranges. Large concns. of sugar favor emulsification. Hitherto unobserved double emulsions with lecithin are described. Use of 2 emulsifying agents, e. g., lecithin and casein, may lessen the stability of the emulsion.

J. F. S.

**A method for determining colloids in aqueous solutions.** A. V. Dumanskii and A. P. Dumanskaya. *Schriften zentral. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 406-22(1933).—Breaking aq. emulsions with  $\text{EtO}-\text{EtOH}$  mixts. can be utilized for detn. of colloids in hydrosols, within 0.5-2%; but no generally exact

procedure can be specified because optimum conditions must be ascertained for each hydrosol, preferably by plotting the area of complete coagulation on triangular coordinates. For albumin sols the optimum  $pH$  is about 6. Sugars do not affect accuracy in sols of albumin, gelatin, starch, dextrin, etc. Results for these 4 colloids are described.

Julian F. Smith

**Separation of constituents of clays.** P. Urbain. *Compt. rend.* 198, 904-7(1934). -Electrolytes are removed by suspension in  $H_2O$  and centrifuging 3 times. The solids are then suspended in  $H_2O$  in an inverted cylindrical vessel closed by a cap, and subjected to a vertical elec. field of about 100 v./cm., pos. below, neg. above, the neg. colloids being subsequently sepd. from the cryst. solids (with which they have settled) by a similar method while the pos. colloids remain in suspension. All trace of electrolytes is finally removed by electrodialysis, and 4 fractions are thus obtained: cryst. solids, pos. colloids (metallic hydroxides), neg. colloids (Al silicates) and a saline soln.

C. A. Silberrad

**A sedimentation method for determining the particle size of finely divided materials (such as hydrated lime).** Dana L. Bishop. *Bur. Standards J. Research* 12, 173-83 (1934) (Research Paper No. 642). -Pyrex glass spherules, fractionated so that most of the particles had a diam. within  $2\mu$  of the av. diam. of the fraction, were dispersed in a liquid and weighed as they settled out of suspension with an automatic weighing device. From this sedimentation record the particle size distribution was calcd. The same sample was then used to det. the particle size distribution by measuring the diams. of several hundred particles with a microscope. Here the spherules were mounted in liquids of various  $n$ s; it was found that differences in  $n$  of the mounting medium produced appreciable changes in the apparent diam. (more than 20% in some cases). The microscopic and sedimentation measurements showed similarly shaped distribution curves but there was some variation between them. Particle-size distributions of hydrated lime are also reported.

R. Roseman

**Formula for the variation in the scattering of light in colloids during aging and slow coagulation.** K. Krishna murti. *Current Sci.* 2, 206-7(1933). Aging properties of sols vs. time give S-shaped curves. Equations for the curves take the form  $I = c + [k/(1 + be^{at})]$ .

G. B. Taylor

**Magnetic study of sols and gels.** I. Satya Prakash. *Indian J. Physics* 8, 243-58(1933). -The paramagnetic susceptibilities of  $FeCl_3$  and  $CrCl_3$  solns., with and without  $NaOAc$  added, were detd.  $Fe_2(HAsO_4)_3$ ,  $Fe_2(HPO_4)_3$ , ferric borate,  $Fe_2(WO_4)_3$ ,  $Fe_2(MoO_4)_3$ ,  $Cr_2(HPO_4)_3$  and  $Cr_2(HAsO_4)_3$  in the colloidal state, produced by adding the K salt to the chlorides, had a slightly higher paramagnetic value than in the powd. form. The susceptibility of  $Fe_2(HPO_4)_3$  sol was not much changed when it was converted to a gel. The opalescent gels of  $Al(OH)_3$  and  $Zr(OH)_4$  increased in diamagnetic value on aging.

E. R. Rushton

**Viscosity curves of lyophile colloids and some other curves.** F. M. Shemyakin. *J. Gen. Chem.* (U. S. S. R.) 3, 13-16(1933). A theoretical discussion of the effect of salts, such as  $MgSO_4$ ,  $CaCl_2$ ,  $(NH_4)_2SO_4$ , etc., on viscosity of linseed-oil emulsions. Curves show that with increase of salt concn. the viscosity passes through a min., after which it increases gradually above the value of pure linseed oil.

S. L. Madorsky

**Absolute viscosity measurements with the aid of the Brownian molecular movement.** VII. The effect of light on the viscosity of the cell fluids. J. Pckarek. *Protoplasma* 20, 359-75(1933); cf. C. A. 28, 1369. -The effect of light and darkness on the viscosity of the cell juices of the protonema cells of *Leptobryum piriforme* (L.) Schpr. and the epidermal cells of *Rheum palmatum* L. was studied. The viscosity of the cell juices of protonema cells of *Leptobryum piriforme* that have been submitted to the action of light is, in round nos., 1.9 times greater than that from protonema cells that have been in the dark for a long time and, in round nos., 1.5 times greater

than the viscosity of  $H_2O$  at the same temp. The viscosity of juices of these substances held in the dark is on the av. 20% less. The viscosity decrease of *Leptobryum piriforme* in the dark is a reversible one—one undergoing a recurrent periodical daily rhythm. The viscosity of the cell juices of the epidermal cells of *Rheum palmatum* undergoes no change in viscosity through light and darkness, the cell juice viscosity being a const. and independent of any light factor and is, in round nos., 1.9 times greater than that of  $H_2O$  at the same temp. In the protonema cells of *Leptobryum piriforme*, the light factor is not the primary cause of the viscosity changes in the dark but the changes are due probably to the increase in acidity of the cell juices in the dark, in consequence of the lack of  $CO_2$  assimilation. The "light" value is to be regarded as the normal viscosity condition of the cell juices. Also the viscosity of the cell juices of the protonema cells of *Leptobryum piriforme* is not primarily increased in the light, but lowered in the dark. The phenomena observed are understandable only on the assumption that colloids are present. Arguments for this assumption are presented. Twenty-two references.

F. L. Dunlap

**Liesegang gas layers.** D. L. Talmud. *Physik. Z. Sowjetunion* 4, 861-3(1933). Lens-shaped bubbles formed in a gel are interpreted as Liesegang gas layers as indicated by the fact that the bubbles assume shapes similar to the gel-acid interface.

Louis Goldman

**Wave theory of periodic reaction.** F. M. Shemyakin, V. K. Nikiforov and P. F. Mikhalev. *S. Gen. Chem.* (U. S. S. R.) 3, 798-801(1933). -By applying the equation  $\lambda v = \text{const.}$  to 2 periodic reactions on gelatin and agar, (1)  $2AgNO_3 + K_2C_2O_4 \rightleftharpoons Ag_2C_2O_4 + 2KNO_3$ , and (2)  $Pb(NO_3)_2 + 2KI \rightleftharpoons PbI_2 + 2KNO_3$ , it was experimentally confirmed that the product of velocity of field diffusion and the distance between the rings is a const. The value of the const. apparently depends upon the electrolytes, upon the age of gelatin, and upon the nature of the gel, and under various conditions it deviates within a relatively small range.

W. P. Briggs

**The mobility of chlorine and hydrogen ions in the presence of gelatin.** S. A. Shchukarev and V. M. Vdovenko. *Physik. Z. Sowjetunion* 4, 804-905(1933) (in English). The decrease in cond. of a 0.1 N soln. of HCl on addn. of gelatin at 40° depends on the selective binding of the H ions as shown by the rapid drop in its activity. The transference no. of Cl (values given correct to 10-12%) rises because of this selective action and because the mobility rises to a max. as the gelatin concn. increases.

Louis Goldman

**Electrical resistance of gel-forming mixtures during setting.** R. K. Upadhyaya and Mata Prasad. *Current Sci.* 2, 216(1933). -The elec. resistance of solns. of silicate and HOAc or citric acid does not change on gelation.

G. B. Taylor

**Cryotropic behavior of some inorganic jellies.** Satya Prakash. *Indian J. Physics* 8, 231-42(1933); cf. C. A. 27, 5611. -Jellies that are again converted into a sol after freezing in liquid air and warming to room temp. are called *cryotropic*. The sol, on standing, is again converted to jelly, and the process can be repeated indefinitely. The same substance may give a cryotropic or noncryotropic jelly according to the method of preparation. Jellies that have developed marked agglomeration tendency are noncryotropic. Ferric phosphate and arsenate,  $Al(OH)_3$  and  $Zr(OH)_4$ , and Th molybdate and phosphate are cryotropic and  $Fe(OH)_3$ ,  $Cr(OH)_3$ , Th arsenate and phosphate are not.

E. R. Rushton

**Fundamental principles involved in determining jelly strength with instruments commonly used.** S. Gradshteyn and H. Mendel. *Kungsidninger u. Leim* 30, 312-13(1933). -The authors derive equations for calcg. the true const. of elasticity of jellies from data obtained with the Greiner glutinometer or the Bloom gelometer. Errors in previous work (cf. C. A. 23, 5059; 24, 4184) are corrected.

J. W. Peitz

**Elastic properties of glycerol-gelatin gels and of gelatin gels hardened with formaldehyde.** Emil Hatschek. *Trans. Faraday Soc.* 29, 1108-31(1933). -Methods are

described of detg. Young's modulus on specimens of gelatin in compression and of prepg. accurate test pieces for this purpose. Results show that (a) gels contg. between 8 and 14% of dry gelatin have a well-defined modulus for stresses up to 45 g./sq. cm., and (b) the values of the modulus from 2 detns. at different stresses on the same test piece, and at the same stresses on duplicates having the same history agree within about 3%. Both cane sugar and glycerol raised the modulus above aq. gels, but there was no simple relation between the increase and the sugar or glycerol concn. The modulus of carefully kept glycerol gels increased for 2 months and probably longer. Test pieces were permanently compressed and the modulus was detd. in the direction of compression and in the direction of dilatation at right angles to it. The former retained about the same value as the original gel while the latter was found to be greater. Increases in the modulus due to hardening by  $\text{CH}_2\text{O}$  were measured against time. Evidence appeared to show that more  $\text{CH}_2\text{O}$  was removed than could be accounted for by reaction with  $\text{NH}_2$  groups. The formation of condensation products is tentatively suggested. L. H. R.

**Calcium acetate gels.** Herbert Henstock. *Trans. Faraday Soc.* 29, 1101-7 (1933).— $\text{Ca}(\text{OAc})_2$  gels were made by adding abs. alc. to concd. solns. of the salt. The gels usually began to liquefy after 24 hrs. with part of the salt crystg. out in contact with the satd. soln. When an excess of the anhyd. salt was boiled with  $\text{MeOH}$  for about 30 sec. and filtered, solid, elastic, water-clear gels set on the addn. of about twice its weight of (1) the normal or isomeric alcs. up to heptyl alc., except  $\text{EtOH}$ , (2) simple ethers, (3) esters, (4) benzene or toluene, (5)  $\text{Et benzoate}$ . These gels persisted for periods of from 48 hr. up to 6 months in closed vessels. Many other org. substances produced thinner gels. Water was not necessary for the formation of these colloids. Heat tends to break the jellies. Optical properties,  $n_D$  and elec. cond. of these gels were studied. By use of methods of Zsigmondy the radius of the gel capillaries was found to be  $7.06 \times 10^{-7}$  mm. L. H. Reyerson

**The solubility of silicon in hydrofluoric acid.** H. Funk. *Ber.* 67B, 464 (1934). F. criticizes the work of Bédell (C. A. 28, 1243<sup>1</sup>) in that B. measures the soly. of Si in HF by loss of weight of the Si, thus including the soly. of  $\text{SiO}_2$ , whereas F. (C. A. 24, 5654) detg. soly. by  $\text{H}_2$  production. W. B. Keighton, Jr.

**The solubility of urea in water. The heat of fusion of urea.** F. W. Miller, Jr., and H. R. Dittmar. *J. Am. Chem. Soc.* 56, 848-9 (1934).—The soly. of urea in water from 70° to 132.7° was detd. by the synthetic method. From these data the heat of fusion of urea was calcd. to be 3.47 kg.-cal. per mol. F. D. Rossini

**Solubility of glucose in methanol.** J. Gillis and H. N. Nachtergaele. *Rec. trav. chim.* 53, 31-3 (1934); cf. C. A. 18, 1117.—The soly. of anhyd. glucose in pure  $\text{MeOH}$  was detd. between 0° and 128.5°. The temp. for the transition  $S_{\text{anhyd}} \rightarrow S_{\text{anhyd}} + L$  (soln.) deduced from the soly. curve is 108°. Louise Kelley

**A study of the solubility of strong electrolytes in concentrated solutions.** Gösta Åkerlöf and Henry C. Thomas. *J. Am. Chem. Soc.* 56, 593-601 (1934).—If one of a group of electrolytes of the same valence type is chosen as a reference substance, the logarithm of the ratio of the activity coeff. of any other electrolyte varies linearly with the molality: i. e.,  $\log \gamma/\gamma_R = k.m(I)$ . It holds for uni-univalent electrolytes with  $\text{HCl}$  as reference substance. The behavior of a given strong uni-univalent electrolyte in mixed soln. with another electrolyte of the same valence type is completely analogous to its behavior in pure solns. The meager data available for strong electrolytes of higher valence type are in harmony with the statement that in a series of solns. with 2 electrolytes present at const. total ionic strength the slope of the curve obtained for  $\log \gamma$  of either one of them as plotted against their resp. concns. should be independent of the total concn. The relation holds not only for mixts. of strong electrolytes of the same, but also of different valence

types. Soly. measurements of  $\text{Ag}_2\text{SO}_4$  in  $\text{H}_2\text{SO}_4$  and sulfate solns. justify the conclusions: (1) that a variation similar to I should hold for a third strong electrolyte present in small quantities; and (2) that if one of the first 2 electrolytes is only partially dissoed. with the result that the actual ionic strength of the soln. differs from its stoichiometrical value, a deviation from the linear variation is obtained for  $\log \gamma$ . These conclusions suggest a very simple method for calcg. the compn. of satd. mixed solns. of highly sol. strong electrolytes. The method is tested for  $\text{HCl-KCl-H}_2\text{O}$  and for  $\text{CoCl}_2\text{-KCl-H}_2\text{O}$ . W. C. Fernelius

**Volumes of compounds in the free state and in solutions.** I. I. Zaslavskii. *J. Gen. Chem.* (U. S. S. R.) 3, 897-903 (1933). Study of the changes of vols. of solns. in relation to the total vols. of the solvent and the dissolved substance prior to soln. led to the following conclusions: (1) On dissolving a no. of nonelectrolytes in  $\text{H}_2\text{O}$  there was contraction, in some cases of considerable magnitude. Electrolytes showed a considerably greater diversity in the change in vol. during soln. in  $\text{H}_2\text{O}$  with cases of expansion and very considerable contraction. Thus on dissolving  $\text{LiOH}$ ,  $\text{NaOH}$ ,  $\text{KOH}$ ,  $\text{Na}_2\text{S}$ ,  $\text{Na}_2\text{CO}_3$ , and  $\text{Na}_3\text{PO}_4$  in  $\text{H}_2\text{O}$  at low and in some cases at higher concns. there was so much contraction that the vol. of the soln. was smaller than the vol. of  $\text{H}_2\text{O}$  used as a solvent. (2) A series of solns. of Na salts demonstrated the relative effect of anions on the vol. changes of solns. For the explanation of these phenomena the theory of electrostriction (Nernst, *Z. physik. Chem.* 15, 79 (1894)) often proved inadequate. Halides, nitrates and sulfates conclusively demonstrated a parallelism in the vol. changes of solid compds. and of the corresponding aq. solns. There is a close relation between the vol. changes of solns. and the chem. nature of anions. The relative character of the vol. changes in a series of compds. with chemically analogous structure depends only slightly upon the concn. of the solns. The chem. interpretation of the phenomena of solvation and the theory of electrostriction are not contradictory but supplementary. Chas. Blanc

**Accelerated diffusion in dye solutions.** Samuel Lenhet and J. Edward Smith. *J. Am. Chem. Soc.* 56, 999-1000 (1934).—When an aq. soln. of the Na salt of *p*-sulfo-benzeneazobenzeneazo-6'-benzoylamino-1-naphthol-3-sulfonic acid and  $\text{NaCl}$  is allowed to stand 1 month at 25°, the rate of diffusion of the color ion is markedly affected by the presence of  $\text{NaCl}$  in the soln. into which diffusion occurs. Measured increases of 25-50% in the diffusion const. of aged dye solns. into dil.  $\text{NaCl}$  soln., as compared with diffusion into  $\text{H}_2\text{O}$ , were observed. The diffusion rate into more concd.  $\text{NaCl}$  solns. is increased several fold. In the aged soln. the dye has adsorbed a large portion of the electrolyte originally added. C. J. West

**Negative viscosity of solutions.** H. N. Desai, D. B. Naik and B. N. Desai. *Current Sci.* 2, 206 (1933).— $\text{KCl}$ ,  $\text{KI}$ ,  $\text{KNO}_3$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{NH}_4\text{I}$ ,  $\text{NH}_4\text{NO}_3$  in  $\text{H}_2\text{O}$  show neg. viscosity (less than solvent) in certain concn. ranges. In  $\text{CH}_3\text{OH}$  and  $\text{C}_2\text{H}_5\text{OH}$ ,  $\text{KCl}$  and  $\text{NH}_4\text{Cl}$  show neg. viscosity. In  $\text{PrOH}$  only  $\text{KCl}$  shows neg. viscosity. G. B. Taylor

**Cryoscopic determination of hydration of ions of strontium chloride.** E. Rouyer. *Compt. rend.* 198, 1156-8 (1934); cf. C. A. 28, 2596<sup>3</sup>.—The hydration of the ions in 0.5 *M* and 0.25 *M*  $\text{SrCl}_2$  corresponds with  $\text{SrCl}_2 \cdot 26.7 \text{ H}_2\text{O}$  and  $\text{SrCl}_2 \cdot 30.3 \text{ H}_2\text{O}$ , resp. C. A. S.

**Cryoscopic studies in anhydrous acetic acid.** Wm. C. Eichellberger. *J. Am. Chem. Soc.* 56, 799-803 (1934).—The app. and procedure are described. The f.-p. depression was measured in anhyd.  $\text{AcOH}$  solns. of  $\text{NH}_4\text{NO}_3$  from 0.005 to 0.044 *M* and of  $\text{H}_2\text{SO}_4$  from 0.02 to 0.08 *M*.  $\text{NH}_4\text{NO}_3$  behaves as though assocd. into at least binary ion pairs.  $\text{H}_2\text{SO}_4$  is appreciably dissoed. at low concns. but assocd. (in the Bjerrum sense) above 0.1 *M*. F. D. Rossini

**The cryoscopic study of certain aliphatic alcohols.** T. J. Webb and C. H. Lindsley. *J. Am. Chem. Soc.* 56,

874 8(1934).—By means of a rapid method, the procedure for which is described and the accuracy of which (estd. to be 0.1%) was checked by expts. with aq. solns. of  $\text{Pb}(\text{NO}_3)_2$ ,  $\text{NaCl}$  and mannitol from 0.01 to 0.1  $M$ , exptl. data were obtained on the f.-p. depressions for the following aq. solns.:  $\text{MeOH}$ ,  $\text{EtOH}$ , iso- $\text{PrOH}$ ,  $\text{BuOH}$ , 0.01–0.5  $M$ ;  $\text{PrOH}$ , iso- $\text{BuOH}$ , *sec*- $\text{BuOH}$ , 0.01–0.2  $M$ ; *tert*- $\text{BuOH}$ , 0.02–0.15  $M$ ; isopentanol, benzyl alc., 0.02–0.1  $M$ . F. D. Rossini

Statistical theory of solutions. A. Ganguli. *Current Sci.* 2, 212–13(1933).—Math. G. B. Taylor  
Nonelectrolyte solutions. Geo. Scatchard. *J. Am. Chem. Soc.* 56, 995–6(1934).—A reply to Hildebrand (*C. A.* 28, 955<sup>2</sup>). Reply. J. H. Hildebrand. *Ibid.* 996. C. J. West

The conductivity of titanium, tin and silicon tetrachlorides in nonaqueous solutions. Eugen Wertyporoch and Bernhard Altmann. *Z. physik. Chem.* A168, 130(1934).—The molar conductivities of  $\text{Ti}$ ,  $\text{Sn}$  and  $\text{Si}$  tetrachlorides in  $\text{MeOH}$  and  $\text{EtOH}$  resemble those of true salts in soln. and increase with diln. The values are in the order:  $\text{SiCl}_4$ ,  $\text{TiCl}_4$  and  $\text{SnCl}_4$ .  $\text{Et}_2\text{O}$  gives a yellow ppt. with  $\text{TiCl}_4$ , a white ppt. with  $\text{SnCl}_4$  and no ppt. with  $\text{SiCl}_4$ . Salt-like solvates seem to be formed as is the case in  $\text{EtBr}$ ,  $\text{PrCl}$  and iso- $\text{PrCl}$ .  $\text{AcH}$  is decompd. by the 3 chlorides.  $\text{Me}_2\text{CO}$  forms salt-like solvates with small concns. of  $\text{TiCl}_4$ ; on the addn. of more  $\text{TiCl}_4$  an addn. compd. ppts. The solns. of  $\text{SnCl}_4$  and  $\text{SiCl}_4$  remain clear. The molar conductivities were const. at all concns. tested, showing that solvates are not dissocd. on diln. Solns. of  $\text{TiCl}_4$  in acetonitrile showed high cond.  $\text{SiCl}_4$  had no effect but  $\text{SnCl}_4$  formed solvates. The solns. in benzonitrile were colored and showed low molar conductivities. R. H. B.

The conductivity of aluminum bromide in nonaqueous solutions. Eugen Wertyporoch and Bruno Adamus. *Z. physik. Chem.* A168, 31–44(1934); cf. *C. A.* 27, 887. Aromatic hydrocarbons readily dissolve  $\text{AlBr}_3$ . The solns. are nonconducting. Passing in  $\text{HCl}$  or  $\text{HBr}$  results in the sepn. of a thick oil consisting of 3 components that have high conductivities. Of the 4 monohalogen derivs. of  $\text{C}_6\text{H}_6$ , only  $\text{C}_6\text{H}_5\text{F}$  and  $\text{C}_6\text{H}_5\text{I}$  solns. of  $\text{AlBr}_3$  conduct. The mol. cond. decreases upon diln. Molten *p*- $\text{C}_6\text{H}_4\text{Cl}_2$  does not conduct nor does its soln. of  $\text{AlBr}_3$  but *o*- $\text{C}_6\text{H}_4\text{Cl}_2$  behaves like  $\text{C}_6\text{H}_5\text{F}$ . The  $\text{MeC}_6\text{H}_4\text{Cl}$  and  $\text{MeC}_6\text{H}_4\text{Br}$  conduct, especially the *m*-compds. Nitro derivs. and nitriles form addn. compds. with  $\text{AlBr}_3$  that will not take part in the Friedel-Crafts reaction. The max. mol. cond. is found at low concn. Acetonitrile dissolves  $\text{ZnCl}_2$  upon the introduction of  $\text{HCl}$  gas and forms strongly conducting solns. contg. acids such as  $\text{HZnCl}_2$  and  $\text{H}_2\text{ZnCl}_4$ . Roy H. Baechler

Electrochemical investigation of the system  $\text{AlBr}_3$ - $\text{KBr}$  in the solid phase. V. A. Plotnikov and S. I. Yakubson. *J. Gen. Chem.* (U. S. S. R.) 3, 869–71(1933).—The sp. cond. of the complex  $2\text{AlBr}_3 \cdot \text{KBr}$  in the solid phase at 93° is  $5.6 \times 10^{-4}$ . The cond. of the system  $\text{AlBr}_3 \cdot \text{KBr}$  in  $\text{C}_6\text{H}_6$  soln. of compn. 51.5%  $\text{C}_6\text{H}_6$ , 41.5%  $\text{AlBr}_3$ , and 7%  $\text{KBr}$ , is  $61 \times 10^{-4}$ ; and of the same system in toluene soln. of identical concn. is  $4 \times 10^{-4}$ . During electrolysis of  $2\text{AlBr}_3 \cdot \text{KBr}$ , the  $\text{Al}$  anode was considerably attacked and  $\text{Al}$  was deposited on the  $\text{Cu}$  cathode. The addn. of  $\text{KBr}$  to the complex caused a slight variation in cond. W. P. Bricks

"Tension" effect with strong and weak bases. J. Schiele. *Physik. Z.* 34, 60–1(1933); cf. *C. A.* 26, 4525.—The increase in elec. cond. with increasing high-frequency a. c. potential gradient is approx. the same for weak bases as for weak acids. For 0.031  $M$   $\text{NH}_3$  soln. the increase is 12.5% at 240 kv./cm. The effect is much weaker for the stronger bases. For an agar-agar gel, the cond. increase is 77% at a field strength of 165 kv./cm. F. J. Rosenbaum

The electrophoretic effect of the concentration effect. J. Schiele. *Physik. Z.* 34, 61–4(1933).—The increase in elec. cond. at large high-frequency field strengths of dil. solns. of  $\text{LiIO}_3$ ,  $\text{Li}_2\text{SO}_4$  and  $\text{K}_2\text{SO}_4$  was compared with that for  $\text{KCl}$ . The tension effect removes the relaxation effect and also the electrophoretic effect. The limiting

value of the tension effect was not reached at a field strength of 270 kv./cm. The results confirm, at least as to the order of magnitude, the values required by the Debye-Onsager theory. E. J. Rosenbaum

Conductivities of sodium hydroxide and potassium hydroxide solutions at elevated temperatures. P. M. Korotkov and N. K. Sokolov. *J. Gen. Chem.* (U. S. S. R.) 3, 670–8(1933).—Sp. conductivities (in ohms<sup>-1</sup>) of  $\text{KOH}$  and  $\text{NaOH}$  solns. carefully prepd. from metallic  $\text{K}$  and  $\text{Na}$  are as follows:  $\text{NaOH}$  at 54.8, 63.7 and 77.0°, resp.: 14.2  $N$ , 0.517, —, 0.883; 9.9  $N$ , 0.635, —, 0.985; 9.0  $N$ , —, 0.792, 1.000; 7.9  $N$ , 0.706, —, 1.021; 7.0  $N$ , 0.723, 0.837, 1.019; 6.2  $N$ , 0.727, 0.824, 1.010; 4.4  $N$ , 0.695, 0.785, 0.928;  $\text{KOH}$  at the same temps.: 10.6  $N$ , 0.928, 1.058, 1.264; 9.2  $N$ , 0.950, 1.108, 1.312; 8.8  $N$ , 1.006, 1.127, 1.324; 7.4  $N$ , 1.016, 1.137, 1.331; 6.9  $N$ , 1.014, 1.130, 1.320; 6.1  $N$ , 1.004, 1.115, 1.291; 3.8  $N$ , 0.853, 0.937, 1.078. Expts. show that concns. of  $\text{NaOH}$  and  $\text{KOH}$  that correspond to max. cond. vary with temp. The concns. (in percentage by wt.) and max. conductivities at 18°, 50°, 55°, 64°, 77° and 100° are, resp.:  $\text{NaOH}$ : 13.8, 4.762; 19.7, 4.476; 20.5, 1.370; 21.5, 1.190; 23.0, 0.980; 27.5, 0.708;  $\text{KOH}$ : 27.2, 1.84; —, —; 31.5, 0.98; 32.0, 0.875; 33.0, 0.75; —, —. V. K.

The conductance of aqueous solutions as a function of concentration. I. Potassium bromide and lanthanum chloride. Grinnell Jones and Charles F. Heckford. *J. Am. Chem. Soc.* 56, 602–11(1934).—The elec. cond. and d. of solns. of  $\text{KBr}$  from 0.00025 to 3.75  $M$  and of  $\text{LaCl}_3$  from 0.00025 to 1.0  $M$  were detd. at both 0° and 25°. For  $\text{KBr}$  at 25°  $d. = 0.99707 + 0.08555c - 0.002006c^2$  (cf. *C. A.* 27, 1562<sup>2</sup>), and at 0°,  $d. = 0.99987 + 0.089674c - 0.003210c^2$ ; for  $\text{LaCl}_3$  at 25°,  $d. = 0.99707 + 0.22028c - 0.01179c^2$ , and at 0°,  $d. = 0.99987 + 0.23673c - 0.01567c^2$ . The Shedlovsky cond. equation (*C. A.* 26, 2911) fits the data for  $\text{KBr}$  up to 0.1  $N$  better than any other equation, but is not applicable to the data for  $\text{LaCl}_3$ . The Jones and Dole equation (*C. A.* 24, 3696) fits the data for both salts at both temps. better than any known equation. W. C. Fernelius

The optical determination of ionic equilibria in dilute alcoholic solutions. Philipp Gross, Amalia Jamock and Franz Patut. *Monatsh.* 63, 117–26(1933).—The extinction coeffs. for  $\text{NH}_4^+$  and  $\text{NMe}_4^+$  picrates in abs. alc. solns. were measured at concns. from  $2.5 \times 10^{-4}$  to  $2.9 \times 10^{-3}$  mols./l. at 4360 Å. Since they were found to be const. throughout this range it was concluded that there was complete disocn. Traces of water in the alc. had a very marked effect on the coeffs. The absorption spectrum of picrate ion and undissocd. mols. in alc. were detd. in the visible and ultra-violet regions. Changes in the extinction coeff. of picric acid and picrates with change in water concn. were followed and the equil. const. for the reaction  $(\text{EtOH} \cdot \text{H}^+) + \text{H}_2\text{O} = \text{H}_3\text{O}^+ + \text{EtOH}$  was found to be 0.0524. This is the equil. of proton distribution between water and alc. Channing Wilson

The existence of a complex in racemizing solutions. Alan N. Campbell and Alexandra J. R. Campbell. *Trans. Faraday Soc.* 29, 1240–7(1933); cf. *C. A.* 27, 889.

The d.,  $n$  and viscosity at 30° of  $M$  solns. of Rochelle salt (I) and *dl*-mandelic acid (II) and of 0.1 or 0.05  $M$  solns. of *l*-mandelic acid (III) in 0.97 to 12.15  $M$   $\text{NaOH}$  were measured together with the consts. of the  $\text{NaOH}$  solns. and the heats of soln. of I, II and III. The increase in the differences between the viscosities of the alk. solns. of I and the corresponding  $\text{NaOH}$  solns. with increasing concn. of  $\text{NaOH}$  is taken as evidence of complex formation. The decrease in  $n$  and the change in heat of soln. from a small — to a small + value may also be due to the complex. Attempts to isolate the complex gave a substance contg. 20–40%  $\text{NaOH}$ , i. e., 2, 3 or 4 mols. of  $\text{NaOH}$  per mol. of I. The viscosities of II and III also give some evidence of complex formation but the proportion must be small. The efficiency of a catalytic reaction must depend on the instability of the complex, not on the amt. present at a given time. Thus catalytic racemization is a kind of homogeneous catalysis. The

heat of hydration of  $\text{H}^+$  is +7.65 large cal. The heats of neutralization of II and III are +12.1 and +13.4 large cal., resp.

**Hydration of splute ions in relation to acidity, alkalinity and  $p_{\text{H}}$ .** Lewis H. Flint. *Plant Physiol.* 9, 107-20 (1934); cf. *C. A.* 26, 3426.—The literature of the biological sciences abounds with examples of apparent inconsistency accompanying the interpretation of  $p_{\text{H}}$  measurements involving unknowns. An examn. of the ionic velocity-charge products of many representative solute electrolytes suggests that acidity and alk. are soln. characteristics resulting from the dominant activity of pos. and neg. ions, resp., and bear no essential relation to the presence of H or OH ions. Notwithstanding the alleged specificity of the H electrode there appear to be sound reasons for associating acid-alkali reactivity with all ions present, and accordingly variable with the nature of the ions.

Walter Thomas

**Thermodynamic dissociation constant of a weak base.** Elliott J. Roberts. *J. Am. Chem. Soc.* 56, 878-9 (1934).—The method of using the cell  $\text{Ti}(\text{Hg})|\text{TiCl}_4(m_1)|\text{BCl}_4(m_2)|\text{HOH}(m_3)|\text{H}_2$ , to det. the disocn. const. of the weak base, BOH, is described.

F. D. Rossini

**Chemical constitution and the dissociation constants of monocarboxylic acids. I. Some substituted phenylacetic acids.** J. Frederick J. Dippy and Frank R. Williams. *J. Chem. Soc.* 1934, 1616. The cond. is measured and the classical and thermodynamic disocn. consts. are calcd. over wide ranges of concn. for the following acids and their Na salts: phenylacetic (I), diphenylacetic (II), *p*-chlorophenylacetic (III), *p*-bromophenylacetic (IV), *p*-iodophenylacetic (V) and *p*-nitrophenylacetic (VI). III, m. 105° (1.7 g. after recrystn. from water with charcoal) was prepd. by heating 40 g. of VI with 160 g.  $\text{SnCl}_4$ , 400 cc. concd.  $\text{HCl}$  and 320 cc.  $\text{EtOH}$  for 3 hrs. on a steam bath, diazotizing, adding to hot 10%  $\text{Cu}_2\text{Cl}_2$  and steam-distg.  $\text{PhCH}_2\text{Cl}$  (56 cc.), 28 cc.  $\text{Br}_2$  and 0.5 g.  $\text{I}_2$  yielded 55 g. *p*-bromobenzyl chloride (VII), m. 50°, b. 238°. VII (6 g. in 20 cc.  $\text{EtOH}$ ) refluxed 3 hrs. with 7 cc. of 50%  $\text{NaCN}$  gave *p*-bromobenzyl cyanide, m. 50°. Hydrolysis with  $\text{H}_2\text{SO}_4$  gave 4.5 g. IV, m. 114°. V, m. 135-6° (after recrystn. from  $\text{C}_6\text{H}_6$ -light petroleum, b. 80-100°), and then from water with charcoal) was prepd. in 10% yield similarly to III, by adding KI and powd. Cu to the diazo soln. The classical and thermodynamic consts. ( $K \times 10^3$ ) were, resp.: I 5.03, 4.88; II 11.7, 11.5; III 6.61, 6.45; IV 6.63, 6.49; V 6.74, 6.64; VI 14.3, 14.1. Mean  $\Lambda_0$  values for the same acids and for their Na salts were, resp.: 380.3, 80.7; 375.0, 75.4; 383.0, 83.4; 382.0, 83.0; 382.8, 83.2; 377.8, 78.2.

G. Calingaert

**The dissociation constants of organic acids. VIII. Phenylacetic acid.** George H. Jeffery and Arthur I. Vogel. *J. Chem. Soc.* 1934, 1668; cf. *C. A.* 28, 1502.—The mobility of the phenylacetate ion is 34.7, and the mean value of the thermodynamic disocn. const. is  $4.889 \times 10^{-5}$ . The classical disocn. const. increases with concn. and has a mean value between 0.003 and 0.01  $N$  of  $5.968 \times 10^{-5}$ . Phenylacetic acid is easily purified, and its use as standard is suggested.

G. C

**Colosimetric determination of  $p_{\text{H}}$  at high temperatures.** Walter Neumann. *Z. anal. Chem.* 96, 175-83 (1934); cf. *C. A.* 27, 5619.— $\text{NaCl}$  solns. of different concns. were treated with suitable indicators, repeatedly heated to boiling and cooled out of contact with air contg.  $\text{CO}_2$ . There tended to be a decrease in the  $p_{\text{H}}$  values as a result of such treatment, and this decrease was more marked as the concn. of the salt was low. With pure water a change of 0.96 unit was noted, but with 25%  $\text{NaCl}$  there was a loss of only 0.24 unit. The results were similar with  $\text{KCl}$  solns.

W. T. H.

**A method for determining true  $p_{\text{H}}$  values.** James N. Evans. *Combustion* 5, No. 4, 12-14 (1933).—A method for detg. true  $p_{\text{H}}$  values is described that involves addn. of small measured quantities of  $\text{NaOH}$  and  $\text{HCl}$  with the detn. of the  $p_{\text{H}}$  before and after each addn. Possible errors are pointed out.

Leslie B. Bragg

**An optical method of investigating the concentration**

**polarization during electrolysis.** A. G. Samarcov. *Z. physik. Chem.* A168, 45-58 (1934).—An optical method, based on the use of a Lebedev interferometer (*C. A.* 26, 369), is described. The concn. distribution in the diffusion layer and the thickness of this layer are shown graphically for different conditions of electrolysis. Conc. gradient, current  $d$ , and diffusion coeff. are related according to the equation:  $D = -0.895 na i / C^2$ , in which  $i$  = current  $d$ ,  $C^2 = dC/dx$  = concn. gradient, and  $D$  = diffusion coeff. In the cells:  $\text{Cu}|\text{CuSO}_4 \text{ aq.}|\text{Cu}$  and  $\text{Ag}|\text{AgNO}_3 \text{ aq.}|\text{Ag}$ , the total polarization is greater than the concn. polarization.

Don Brouse

**Evolution of gas from graphite under high temperatures.** A. P. Ievlev and I. A. Eltzin. *J. Tech. Phys.* (U. S. S. R.) 3, 1018-30 (1933). With increasing temp. the evolution of gas from graphite proceeds in two stages, the 1st rapidly from the surface, and ceasing at 1100°, and the 2nd by diffusion from within, the coeff. of diffusion decreasing.

Eino Hanninen

**The combination of hydrogen with fluorine.** Max Bodenstein and Helmut Jockusch. *Sitzber. preuss. Akad. Wiss., Physik.-math. Klasse* 1934, 27-37.—The reaction between F and H was studied in glass, quartz and Ag. In new glass at 190°, the pressure decreased from 500 to 470 mm. in 30 min.; in used glass at -190°, evacuated at -190°, the pressure decreased from 500 to 485 mm. in 30 min.; in used glass at -190°, evacuated when hot, the mixt. exploded; in used glass at 20°, the pressure decreased 1/2 in about 100 min. In quartz at -80° and -190° there was a shattering explosion in a few seconds, regardless of which element was introduced first; at 20°, the mixt. ignited and burned with a flame; at 20°, when F stood 20 min. in the quartz and was removed, and H was introduced first, the reaction resembled that in glass. In Ag, with a film of  $\text{AgF}$ , at 20° there was an explosive reaction; at -190°, the reaction was slow. Both of the reactions  $\text{F} + \text{H} = \text{HF} + \text{H}$  and  $\text{H} + \text{F}_2 = \text{HF} + \text{F}$  may occur.  $\text{F}_2$  was detd. by the increase in wt. of Ag (and of Cu tubing); a small residue reacted with  $\text{SiO}_2$  and was detd. as  $\text{H}_2\text{SiF}_6$  by titration with  $\text{KOH}$ .

Gerald M. Petty

**Equilibrium between ammonium thiocyanate and thiourea in solution.** Wm. Cre and P. A. de Lisle. *Trans. Roy. Soc. Can.* 11, 27, 105-11 (1933).—Concn. at equil. for  $\text{CS}(\text{NH}_2)_2$ ,  $\text{NH}_4\text{CNS}$  gave as the value of  $K$  0.0254 at 162.2°, 0.0341 at 178.3° and 0.038 at 184.4°. These are av. values from many detns. Discrepancies in previous detns. are attributed to side reactions in which the mea is decompd.

J. W. Shipley

**Speed of "uniform movement" of flame in mixtures of carbon monoxide and oxygen.** W. Payman and R. V. Wheeler. *Nature* 133, 257 (1934).—The results of Bone and Bell (*C. A.* 28, 1236) are not accepted as final.

C. D. W.

**A general law relating to exothermal processes.** N. Semenov. *Physik. Z. Sowjetunion* 4, 906-8 (1933) (in English).—For any reaction bearing the features of "degenerate explosions" the percentage of a substance changed equals  $100/(1 + e^{\theta'})$ , in which  $\theta'$  is the time reckoned from the time when half of the reaction is completed multiplied by a const. characteristic of the reaction. By using a suitable scale of coordinates, different reaction-rate curves are superposed on a typical curve shown.

Louis Goldman

**Kinetics of the reaction of hydrogen and oxygen.** T. A. Kontorova and A. B. Nalbandyan. *Physik. Z. Sowjetunion* 4, 758-63 (1933) (in German).—The activation energy is calcd. for the reaction  $\text{H} + \text{O}_2 \rightarrow \text{OH} + \text{O}$  as 32,000 cal. as compared with Semenov's value of 28,000 cal. (cf. *C. A.* 26, 5820).

Louis Goldman

**The kinetics of the burning of hydrogen.** A. Kovalskii. *Physik. Z. Sowjetunion* 4, 723-34 (1933) (in German).—Pressure change and reaction rate plotted against time, values for the difference of the probability of chain branching and chain breaking divided by the life of active centers, and the pressure of the remaining unburnt gas are recorded for initial pressures of 3.7-8.4 mm. at 485°, 520° and 560°. Theoretical and exptl. curves of reaction

rate plotted against quantity that has reacted are compared. The max. reaction rate is proportional to the square of the pressure of the gas burned. L. G.

**Detonation in gaseous mixtures. I. The principles of detonation characteristics of inflammable gas mixtures.** A. Sokolik and K. Shchelkin. *Physik. Z. Sowjetunion* 4, 795-817 (1933) (in English).—The predetonation length in a  $\text{CH}_4\text{-O}_2$  mixt. drops with tube length at const. pressure, rises with vol. at const. tube length, and is a min. for the compn.  $\text{CH}_4 + 1.9 \text{ O}_2$ . The velocity of the detonating wave in a stoichiometric mixt. is 2500 m./sec., const. to 3% between 100 and 500 mm. Consideration of the origin of the detonation wave shows that the ratio of the heat d. to the ignition temp. is a measure of the probability of detonation. Louis Goldman

**The mechanism of the upper limit of ignition of a mixture of ethane and oxygen (molar ratio 2:7).** P. Sadovnikov. *Physik. Z. Sowjetunion* 4, 743-6 (1933) (in German).—Curves for the pressure change against time in the explosion range show that CO is formed first and ignites after an induction period. Above the explosion range CO oxidizes slowly. Louis Goldman

**Some considerations of the theory of the upper pressure limit of ignition.** N. N. Semenov. *Physik. Z. Sowjetunion* 4, 709-22 (1933) (in English); cf. C. A. 28, 148.—It is shown theoretically that for large concns. of O, the upper limit of partial pressure of O is proportional to the square root of the pressure of the 2nd reactant. For mixts. of O with P, S and  $\text{PH}_3$  there is an upper limit of total pressure. For mixts. of H + O and CO + O,  $p_1^2/p_2 = \text{const.}$ , in which  $p_1$  and  $p_2$  are resp. the lower and upper limits of total pressure. These results check exptl. data in the literature. Louis Goldman

**The mechanism of the upper limit and the kinetics of the ignition of detonating gas.** A. Nalbandyan. *Physik. Z. Sowjetunion* 4, 747-57 (1933) (in German).—The detonation range is widened and the induction period is diminished by H or O atoms formed electrically. Similar behavior in an Al vessel shows that the upper limit is a property of the gas, not of the surface. The induction period plotted as a function of pressure drops sharply, passes through a min. and rises sharply at the upper pressure limit. Louis Goldman

**The effect of inert admixtures on the lower limit of ignition of gases.** A. A. Lavrov. *Physik. Z. Sowjetunion* 4, 787-94 (1933) (in German). The ratios of the concns. of A to those of N and He necessary to raise the lower limit of a mixt. of  $\text{CH}_4$  and air to one atm. are calcd. as 1.2 and 1.73, resp. Similarly for a mixt. of H and air, the ratios of the concns. of  $\text{CO}_2$ , HCl and He to N are 1.05, 1.06 and 0.26, resp. Louis Goldman

**The effect of the diameter of the reaction vessel on the velocity of oxidation of ethane.** P. Sadovnikov. *Physik. Z. Sowjetunion* 4, 735-42 (1933) (in English).—The rate of reaction in quartz vessels treated with  $\text{H}_2\text{F}_2$  is independent of the dimensions of the vessel. L. G.

**The effect of the surface of the oxidizing agent (iodine pentoxide) on the rate of oxidation of carbon monoxide.** Astapenya, Vapnik and Zelkin. *J. Gen. Chem. (U. S. S. R.)* 3, 839-42 (1933).—The disagreement between various investigators concerning the oxidation temp. of CO is explained by their failure to consider the effect of the surface of the oxidizing agent. The oxidizing reaction of CO according to the equation:  $\text{I}_2\text{O}_5 + 5\text{CO} = 5\text{CO}_2 + \text{I}_2$ , was investigated. *Detns. of small concns. of CO* are more conveniently made with a large surface of the oxidizing agent, which decreases the time of analysis, assures more complete oxidation, permits operation with larger vols. of the air under investigation, and hence correspondingly increases the accuracy of the analysis. W. P. Ericks

**Theory of the induction period.** T. A. Kontorova and M. B. Neumann. *Physik. Z. Sowjetunion* 4, 818-24 (1933) (in English).—Pressure change-time curves for consecutive reactions in the thermal decompn. of  $\text{EtSH}$  show that the theory of two consecutive reactions cannot explain the induction period in unimol. reactions. Louis Goldman

**Lecture demonstration showing abnormality during induced reactions.** Karl Gleu. *Z. anorg. allgem. Chem.* 215, 271-2 (1933).—A soln. of 250 ml. of 2 N  $\text{H}_2\text{SO}_4$  and 50 ml. of 0.1 M  $\text{NaVO}_3$  is not reduced by 40 ml. of 0.5 N  $\text{As}_2\text{O}_3$ . After the addn. of 5 drops of 0.01 M  $\text{OsO}_4$  and 150 ml. of 0.0167 M  $\text{KClO}_4$ , the yellow vanadic acid is instantly reduced to blue quadrivalent.

V. F. Urban

**The speed of oxidation of hydroquinone by oxygen.**

I. W. Reinders and P. Dingemans. *Rec. trav. chim.* 53, 209-30 (1934); cf. C. A. 19, 2441.—Buffered solns. of hydroquinone were kept satd. with O at const. pressure, and the oxidation was followed by the rate of absorption of O, measured in a gas buret. The reaction mixt. must be stirred vigorously enough to keep the soln. satd. with O; otherwise the factor measured is the speed of soln. of O and not the speed of oxidation of hydroquinone. The speed is proportional to the concn. of the hydroquinone, the O pressure and the square of the OH-ion concn. OH ions, however, are not consumed during the oxidation. The primary reaction product is oxyquinone, which is unstable; in alk. solns. it polymerizes to humic acid, and in neutral or acid soln. it combines with a 2nd mol. of hydroquinone to form quinhydrone. None of the reaction mechanisms previously reported can be correct. No  $\text{H}_2\text{O}_2$  is formed, and quinone is not an intermediate product. The following mechanism is proposed: (1)  $\text{C}_6\text{H}_4(\text{OH})_2 + 2\text{OH}^- \rightarrow \text{C}_6\text{H}_4\text{O}_2^{2-} + 2\text{H}_2\text{O}$ ; (2)  $\text{C}_6\text{H}_4\text{O}_2^{2-} + \text{O}_2 \rightarrow \text{C}_6\text{H}_4\text{O}_2^{--} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_4(\text{OH})\text{O}_2 + 2\text{OH}^-$ . By varying the buffers and using samples of hydroquinone of different histories, it was shown that the speed of the reaction is not due to catalysts accidentally introduced.  $\text{CuSO}_4$  catalyzes the reaction through the formation of a sol by the  $\text{Cu}^{++}$  and hydroquinone.  $\text{MnSO}_4$  is also active, but to a smaller extent. II. Influence of sodium sulfite. *Ibid.* 231-8.—The oxidation of either  $\text{Na}_2\text{SO}_3$  or hydroquinone is repressed by the presence of the other. The speed of oxidation of  $\text{Na}_2\text{SO}_3$  in alk. soln. is too fast to be measured; hence the solns. are buffered by adding phosphates or borates. Borates do not repress the reaction as much as phosphates giving the same  $p_{\text{H}}$ , since the former contain traces of  $\text{Cu}^{++}$ , which is a pos. catalyst for the oxidation of  $\text{Na}_2\text{SO}_3$ . As shown by color changes and e. m. f. measurements,  $\text{Na}_2\text{SO}_3$  is first attacked. The hydroquinone interferes by forming complexes with the sp. catalysts for the reaction ( $\text{Cu}^{++}$  or  $\text{Co}^{++}$ ). A chain mechanism of reactions is rejected in favor of the following series of reactions: (1)  $\text{Cu}^{++} + \text{SO}_3^{--} \rightarrow \text{CuSO}_3$ ; (2)  $2\text{CuSO}_3 \rightarrow \text{Cu}_2(\text{SO}_3)_2$ ; (3)  $\text{Cu}_2(\text{SO}_3)_2 + \text{O}_2 \rightarrow 2\text{CuSO}_4 \rightarrow 2\text{Cu}^{++} + 2\text{SO}_4^{--}$ . J. H. Reddy

**Speed of oxidation of metol by air and the effect of sodium sulfite.** W. Reinders and P. Dingemans. *Rec. trav. chim.* 53, 239-245 (1934); cf. preceding abstrs. For the  $p_{\text{H}}$  range of 6.0-6.6, the oxidation of metol ( $\text{Me-NHC}_6\text{H}_4\text{OH} \cdot \text{H}_2\text{SO}_4$ ) varies as the concn. of metol, the O pressure and the concn. of OH ions. The following mechanism is proposed: (1)  $\text{MeNHC}_6\text{H}_4\text{OH} + \text{OH}^- \rightarrow \text{MeNHC}_6\text{H}_4\text{O}^- + \text{H}_2\text{O}$ ; (2)  $\text{MeNHC}_6\text{H}_4\text{O}^- + \text{O}_2 \rightarrow \text{MeNHC}_6\text{H}_4\text{O}_2^{--}$ ; and (3)  $\text{MeNHC}_6\text{H}_4\text{O}_2^{--} + \text{H}^+ \rightarrow \text{MeN} \cdot \text{C}_6\text{H}_4\text{O}_2 + \text{H}_2\text{O}$ . Reaction (2) is the slow step, and fixes the measured velocity.  $\text{Cu}^{++}$  is a weak catalyst, and the effects of  $\text{Mn}^{++}$ ,  $\text{Ni}^{++}$ ,  $\text{Fe}^{++}$ ,  $\text{Co}^{++}$ ,  $\text{Ag}^+$  and  $\text{Sn}^{++}$  are still less.  $\text{Na}_2\text{SO}_3$  and metol mutually repress the oxidation of each other, because of removal of sp. catalysts. Again the  $\text{Na}_2\text{SO}_3$  is first attacked. No satisfactory mechanism is forthcoming. J. H. R.

**The kinetics of polymerization of butadiene in a glow discharge.** L. Rubanovskii. *J. Phys. Chem. (U. S. S. R.)* 4, 431-6 (1933).—During the action of the glow discharge on butadiene at a pressure of  $10^{-3}$  to  $10^{-1}$  mm. the pressure in the discharge tube increases to what corresponds to the cracking of the butadiene; at a pressure above  $10^{-1}$  mm. it decreases because of the polymerization of butadiene. Polymerization is also caused by the shock impact of the H atom during discharge in the mixt. of H and butadiene. The induction period of 3-7 min., typical for chain reactions, was observed in



all cases of polymerization. The chain character of the reaction is confirmed by the acceleration of the latter by admixed A and O, which hamper the diffusion and the breaking of chains on the sides of the tube, and also by the fact that the process is about 20% faster in a 10-cm. tube than in a 1.5-cm. tube. The kinetics of the process are affected neither by the characteristics of the discharge nor by the material of the electrodes. F. H. R.

**Unimolecular and intramolecular energy exchange.** C. C. Coffin. *Trans. Roy. Soc. Can.* III, 27, 161 (1934).—The generalities arising from the kinetics of gaseous reactions of the type (1)  $\text{RCH}(\text{OOCR}')_2 \rightarrow \text{RCHO} + \text{O}(\text{OCR}')_2$ , (2)  $(\text{RCHO})_2 \rightarrow 2\text{RCHO}$  are considered from the point of view of the relation of the energy of activation to the bonds concerned in the reactions. The heats concerned indicate that factors other than the exponential Arrhenius  $E$  must be taken into account in *a priori* attempts to calc. unimol. reaction velocities. An equation relating the no. of mols. reacting to the no. of mols. colliding and based upon the increased reaction probability for a sp. case is given.

J. W. Shipley.  
**Reaction velocity and mobility.** K. Posthumus. *Rec. trav. chim.* 53, 63 73 (1934); cf. *C. A.* 27, 3386.—Reaction consts. are not important for the detn. of the "mobility" or the "light or loose binding" of constituent parts of mols. The energy of activation gives a better insight into the state of binding of the atom than does the reaction const., in which factors occur that have nothing to do with the mobility. Contrary to the usual conceptions, the Na atom in  $\text{MeONa}$  is approx. as strongly bound as in  $\text{EtONa}$ ; Cl in the compds. discussed by P. is more strongly bound than Br in corresponding compds., and  $\text{NO}_2$  in  $o\text{-C}_6\text{H}_4(\text{NO}_2)_2$  is less strongly bound than in  $p\text{-C}_6\text{H}_4(\text{NO}_2)_2$ . Louise Kelley

**Calculation of reaction velocity as a function of temperature.** Anton Skrabal. *Monatsh.* 63, 23 38 (1933).—A rapid and accurate method of calcg. the consts. for a no. of the usual velocity temp. functions is described. Methods of extrapolation and extrapolation errors are considered. Channing Wilson

**The kinetics of the oxidation of picric acid by potassium permanganate in aqueous solution.** F. F. Mungrave and E. A. Moelwyn-Hughes. *Trans. Faraday Soc.* 29, 1162 7 (1933).—Kinetics of the reaction between picric acid and  $\text{KMnO}_4$  were studied in aq. soln. Picric acid was completely oxidized to  $\text{HNO}_3$  and  $\text{CO}_2$ . Permanganate ions were reduced to  $\text{MnO}_2$ . The reaction was unimol. over a wide range of conditions, the const. being independent of the concn. of H ions and only slightly affected by the addn. of electrolytes. The abs. velocity was lower than the values calcd. by making reasonable assumptions about the type and no. of activating collisions. Superficially the results resembled those found for the hydrolysis of esters. L. H. Reyerson

**Oxidation-reduction potential of the system xanthine = uric acid.** S. Filitti. *Compt. rend.* 198, 930-2 (1934); cf. *C. A.* 28, 12511. The normal potential of the reaction  $\text{C}_4\text{H}_4\text{O}_2\text{N}_4 + \text{H}_2\text{O} \rightleftharpoons \text{C}_4\text{H}_4\text{O}_2\text{N}_4 + \text{H}_2$  is  $+0.113 \pm 0.0015$  v., and  $\Delta F = 5220$  g.-cal. The heat of reaction at const. pressure is  $-12,000$  g.-cal. If the (acid) disson. of hypoxanthine ( $K_H = 2.12 \times 10^{-13}$ ) is taken into consideration,  $\Delta F$  for the reaction  $\text{C}_4\text{H}_4\text{O}_2\text{N}_4 + 2\text{H}_2\text{O} \rightleftharpoons \text{C}_4\text{H}_4\text{O}_2\text{N}_4 + 2\text{H}_2$  is 5720 g.-cal. C. A. Silberrad

**The oxidation of hydrazine by potassium ferricyanide.** I. The effect of gaseous supersaturation on the measurement of reaction velocity. Thomas N. Richardson and Kenneth C. Bailey. *Sci. Proc. Roy. Dublin Soc.* 21, 43-9 (1934).—Many reaction rates are assumed proportional to the rate of evolution of a gaseous product. When hydrazine is oxidized by  $\text{K}_3\text{Fe}(\text{CN})_6$  in alk. soln., the rate of evolution of N over an initial period depends on the efficiency of stirring. Thus stirring is required to overcome a strong tendency for supersatn. of the soln. by N. This phenomenon can easily invalidate quant. work on chem. kinetics. II. The reaction in the presence of acetone. *Ibid.* 49-56.—With  $\text{Me}_2\text{CO}$  in excess in a soln. buffered with  $\text{Na}_2\text{HPO}_4$ , oxidation of hydrazine

by  $\text{K}_3\text{Fe}(\text{CN})_6$  is slow and incomplete mainly because of formation of dimethylketazine. Hydrolysis of the latter requires H ions, while oxidation of hydrazine requires OH ions. Hence rapid simultaneous action is impossible. B. E. Anderson

**The thermal decomposition of nitrogen pentoxide at low pressures.** E. F. Linhorst and J. H. Hodges. *J. Am. Chem. Soc.* 56, 830 41 (1934).—The rate of decompn. was measured in a 22-l. flask at  $35^\circ$ ,  $45^\circ$ ,  $55^\circ$  and  $65^\circ$ , and from 0.05 to less than 0.001 mm. The reaction deviates from 1st order at about 0.05 mm. and at 0.001 mm. the order is about 1.8. A 2.5-fold change in the ratio of surface to vol. has no effect down to 0.005 mm., below which pressure the surface appears to retard the reaction slightly. The data are compared with current theories of unimol. reaction. F. D. Rossini

**Esterification velocities of alcohols in acetic acid.** II. Anton Kailan and Simche Schwebel. *Monatsh.* 63, 52 78 (1933); cf. *C. A.* 28, 1021. The velocities of esterification of the following alcs. were measured at  $25^\circ$  by means of f.-p. depression:  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ ,  $\text{PhCH}_2\text{OH}$ ,  $\text{Ph}(\text{CH}_2)_2\text{OH}$ ,  $\text{Ph}(\text{CH}_2)_3\text{OH}$ ,  $\text{PhCH}(\text{CH}_2\text{OH})_2$ , 2-, 3- and 4-nitrobenzyl alcs.,  $\text{PhCH}(\text{OH})\text{Me}$  and  $\text{PhCH}(\text{OH})\text{Et}$ . The solvents were dil. and concd.  $\text{AcOH}$ ,  $\text{AcOH} + \text{Ac}$  esters of the alcs., and  $\text{AcOH} + \text{HCl}$  solns. The consts. of  $\text{PhCH}(\text{CH}_2\text{OH})_2$  and secondary alcs. were uncertain, probably because of side reactions. All the alcs. were almost completely esterified under the conditions used. Channing Wilson

**Velocity of hydrolysis of simple ethers.** Anton Skrabal and Alfred Zahorka. *Monatsh.* 63, 1 22 (1933).—The velocity consts. of the hydrolysis of  $\text{Et}_2\text{O}$ , iso- $\text{PrOEt}$  and (iso- $\text{Pr})_2\text{O}$  are compared in aq. soln., between  $55^\circ$  and  $90^\circ$ , with  $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{H}$  as catalyst. The unimol. consts. of the 3 ethers stand in the ratios 1:10:33. The hydrolysis of  $\text{Et}_2\text{O}$  is the slowest reaction ever measured. Its velocity const. at  $25^\circ$  is  $0.146 \times 10^{-10}$ . The velocity of hydrolysis of iso- $\text{PrOEt}$  lies between the geometric and arithmetic means of the velocities of the other two. Consts. in the expression  $\log k = -(A/T) - BT + C$  for the 3 compds. are  $A = 14,535, 13,445.6, 14592$ ;  $B = 0.057176, 0.04812, 0.06015$ ;  $C = 55.069, 49.635, 57.711$ . Channing Wilson

**Studies on ether-like compounds. XII. The determination of the velocity of acetal hydrolysis.** M. H. Palomaa and Aini Salonen. *Ber.* 67B, 424-9 (1934); cf. *C. A.* 27, 3194; 28, 4659. The rates of acetal hydrolysis as catalyzed by HCl were detd. with an improved dilatometer of very simple construction. The values obtained for  $k_{20}$ ,  $k_{30}$  and  $k_{40}/k_{20}$  (time in min.) are, resp.,  $\text{MeCH}(\text{OEt})_2$ , 76.5, 206, 3.48;  $\text{PhOCH}_2\text{CH}(\text{OEt})_2$ , 0.132, 0.512, 3.88;  $\text{CH}_2(\text{OEt})_2$ , 0.00930, 0.0387, 4.13;  $\text{CH}_2(\text{OMe})_2$ , 0.00187, 0.00853, 4.56;  $\text{CH}_2(\text{OMe})\text{OEt}$ , 0.00469, 0.0191, 4.07;  $\text{CH}_2(\text{OMe})\text{OPr}$ , 0.00471, 0.0195, 4.11. These unimol. consts. were cor. linearly to concn.  $\text{HCl} \rightarrow 1$  N. With acetals  $\text{R}'\text{CH}(\text{OR})_2$  an expansion occurs during hydrolysis, for those like  $\text{CH}_2(\text{OR})_2$  or  $\text{CH}_2(\text{OR})\text{OR}'$  contraction occurs. W. B. K., Jr.

**Reaction between solids.** Alvaro Alberto R. soc. brasil. quim. 4, 202 18 (1933). Discussion and bibliography. John Ladino

**The theory of topochemical reactions.** S. V. Izmailov. *Physik. Z. Sowjetunion* 4, 835 42 (1933) (in English).—The reaction velocity in the case of decompn. of a single crystal is initially proportional to the 3rd power of the time if it is assumed that the reaction centers appear continuously during the reaction period. The log of the time interval in which the reaction velocity reaches its max. equals  $[(2E + E_1)/3RT] + \text{const.}$  in which  $E$  is the crit. increment of the velocity at which the interface is advancing. Louis Goldman

**Critical solution phenomena.** M. Freed. *Trans. Roy. Soc. Can.* III, 27, 179-81 (1934).—Crit. soln. temp. ( $C. S. T.$ ) measurements were made on the systems (1)  $\text{MeOH}$ -hexane- $\text{H}_2\text{O}$  and (2)  $\text{AcOH}$ - $\text{C}_6\text{H}_6$ - $\text{H}_2\text{O}$ . Purification of the synthetic hexane resulted in lower values for the  $C. S. T.$  of the system, a final value for one sample giving the  $C. S. T.$  as  $34.6^\circ$ . Because of the great effect

of impurities in the hexane the Crismer method is recommended for detg.  $H_2O$  in  $MeOH$  by using the system cyclohexane- $MeOH$ . No noticeable effect of pressure on the C. S. T. of the system  $AcOH-C_6H_6-H_2O$  could be observed when the presence of moisture in the gas space above the system was accounted for. J. W. Shipley

**Note on phase equilibria in the system  $Na_2O-TiO_2$ .** Edward W. Washburn and Elmer M. Bunting. *Bur. Standards J. Research* 12, 239 (1934) (Research Paper No. 648); cf. C. A. 28, 1595<sup>2</sup>.—The following compds. are formed in the binary system  $Na_2O-TiO_2$ :  $Na_2TiO_3$ , m.  $1030^\circ$ ,  $Na_2Ti_2O_5$ , m.  $985^\circ$  and  $Na_2Ti_3O_7$ , m.  $1128^\circ$ .

R. Roseman

**The system carbon tetrachloride-water-methanol at  $30^\circ$ .** H. A. Showalter. *Trans. Roy. Soc. Can.* III, 27, 183-5 (1934); cf. Bonner, C. A. 5, 817.—The binodal curve for the system  $CCl_4-H_2O-CH_3OH$  at  $30^\circ$  was detd. by the method of titration, titration with water being employed for systems contg. less than 35%  $H_2O$  and titration with  $CCl_4$  for systems for 20-55%  $H_2O$  thus giving both methods for systems contg. 20-35%  $H_2O$ . The plait point was found at 0.018 g.  $H_2O$  and 0.187 g.  $CH_3OH$  per 1 g. sample. Especially pure alc. was not necessary in securing const. values. J. W. Shipley

**Thermal analysis of the system antipyrine-chloretone.** A. Rychterówna. *Wiadomości Farm.* 61, 95-7 (1934).—The system antipyrine-chloretone represents a simple soln. A eutectic is formed contg. 40 mols. % antipyrine and 60 mols. % chloretone. This eutectic exhibits an excellent anesthetic effect; it is used also in ointments, against neuralgia, rheumatism and arthritis. J. W.

**Physicochemical analysis of systems with diamines. III. Internal friction and melting of the systems ethylenediamine-butyl alcohols.** D. E. Dionisiev. *J. Gen. Chem. (U. S. S. R.)* 3, 976-89 (1933); cf. C. A. 25, 3908; Glinin, C. A. 23, 2345; Elgort, C. A. 24, 289. The systems  $C_4H_9(NH_2)_2$  (I) and  $BuOH$  (II),  $Me_2CHCH_2OH$  (III),  $EtMeCHOH$  (IV) and  $Me_3COH$  (V) were studied by the methods of sp. gr., viscosity at  $0^\circ$ ,  $25^\circ$  and  $50^\circ$  and melting. The data obtained by the viscosity method at  $0^\circ$  showed the formation of mol. compds. only of I-2 II and I-2 III with the viscosity maxima shifted in the direction of the more viscous alc. components. The system I IV produced no viscosity max. at  $0^\circ$ , while I-V gave a concave curve for the viscosity at  $0^\circ$ . The viscosity curves at  $25^\circ$  showed the greatest increase in viscosity for the systems I II and I III and a concave curve for I IV and I V. The viscosity curves at  $50^\circ$  formed almost straight lines, thus indicating an almost complete dissoen. of all these mol. compds. at  $50^\circ$ . The melting curves for the 4 systems produced 2 eutectics and 1 max. with the sharpness I-III > I II > I-IV, and a markedly flat max. for I-V. Data for the melting of the 4 systems and the viscosity of the systems I-II and I-III suggest that at low temps. all 4 Bu alcs. form with I mol. compds. in the proportion of 1 I to 2 alc. V. Reciprocal solubility of ethylenediamine and some hydrocarbons of the series  $C_6$ . A. S. Broun. *Ibid.* 973-5; cf. Obukhov, C. A. 25, 3908.—The reciprocal soly. of the mixts. of 100% I and hydrocarbons of the fatty and cyclic series was studied with anhyd. c. p. hexane (VI), cyclohexane (VII) and diisopropenyl (VIII). The solubilities of 4.8% I in VI and 0.9% VI in I at  $25^\circ$  slowly increased with rising temp. to 14 and 19 at  $90^\circ$ , and then rapidly with further rise in temp. to 45 and 55 at  $98.5^\circ$ . The curve of the soly. of the mixt. of I and VII is analogous to that of I and VI with the max. solv. of 22% I at  $91.5^\circ$ . In the triple mixt. of I, VI and VII the reciprocal soly. of I is decreased, reaching the max. at  $160-5^\circ$ . Expts. with the soly. of I in VIII produced inconclusive results.

Chas. Blanc

**Catalytic oxidation of butyl alcohol to butyraldehyde.** A. M. Rubinshtein, A. A. Balandin, B. A. Dolgoploska, K. A. Morozov and L. I. Vagranskaya. *J. Applied Chem. (U. S. S. R.)* 6, 278-88 (1933).—The oxidation was effected with air and with  $CO_2$ , the following catalyst being investigated: (1)  $Cr_2O_3$  catalyst in a brass tube, (2)  $Cr_2O_3 + MnO_2$  (35:65) in a brass tube, (3)  $CuO$ ,

(4)  $Cr_2O_3 + Fe_2O_3$  (1:3) in a brass tube, (5)  $MnO_2$  in a brass tube, (6)  $MnO_2 + Fe_2O_3$  (2:3) in a brass tube, (7)  $Fe_2O_3$  in a brass tube, (8) fused  $V_2O_5$ , (9) Ag (40%) on asbestos, (10) Ag (50%) on asbestos, (11) Ag (75%) on asbestos, (12) Ag (50%) on asbestos obtained by pptg. Ag on asbestos with  $HCHO$  from  $NH_3-AgNO_3$ , (13) Ag gauze in a glass tube, (14)  $Cu$  (7.5%) + Ag (42.5%) on asbestos, and (15)  $Cu$  (25%) + Ag (25%) on asbestos (50%) prep. as in (14). The reaction is accompanied by evolution of heat (with the Ag catalyst); the catalyst, however, retains its activity. With 40-75% of Ag pptd. on asbestos there is no change in the yield of aldehyde and acid. Water improves the process and the best temp. for all Ag catalysts is  $350-80^\circ$ . The most efficient catalyst is Ag (50%) pptd. on asbestos with  $HCHO$ . The yields of aldehyde and acid were, resp., as follows, with air as oxidant: with finely pptd. Ag 72 and 4%, finely pptd. mixt. of Ag and Cu on asbestos 68 and 7%, with (8) 49 and 23%, with (7) 40.7 and 6.9%, with (5) 33 and 0.3%. The highest yields were obtained with a Ag catalyst, a furnace temp. of  $350-80^\circ$  and an air velocity of 1-1.5 l. per min. through a tube 15 mm. in diam., the alc.-water mixt. (2:3) being preheated to  $85-90^\circ$ . The temp. is lower for a Ag-Cu catalyst by  $25-50^\circ$ ; for  $V_2O_5$  it is about  $400^\circ$  and for  $Fe_2O_3$   $400-550^\circ$ . The  $Cr_2O_3$ ,  $Cr_2O_3 + MnO_2$  and  $CuO$  catalysts in sticks procured from Kahlbaum were useless. Expts. on the oxidation of  $BuOH$  with  $CO_2$  in the presence of  $V_2O_5$  were quite successful when made at  $500-50^\circ$  and at an alk. temp. of  $80-95^\circ$ .

A. A. Boehlingk

**The oxidation of carbon monoxide with a silver catalyst.** Arthur F. Benton and Richmond T. Bell. *J. Am. Chem. Soc.* 56, 501-5 (1934).—The rate of oxidation of CO over Ag in the temp. range  $80-140^\circ$  is proportional to the partial pressure of CO. With 675-745 mm. of CO present, the rate is the same for 10 mm. of  $O_2$  as for 75 mm. With excess  $O_2$ , the rate per unit pressure of CO is about 5 times as great as with excess CO. The av. energy of activation is 13.3 kg.-cals.  $CO_2$  does not inhibit the reaction. Adsorption measurements reveal no adsorption of  $CO_2$ , a small adsorption of CO, and a slow irreversible activated adsorption of  $O_2$ . The catalytic reaction is considered to consist of 2 steps (1) the activated adsorption of  $O_2$  and (2) the reaction of CO with the adsorbed  $O_2$ . The rate of  $O_2$  adsorption is such as to permit about a 30-40% coverage of the surface at the steady state reached during the catalysis. P. H. E.

**The physics of the phenomenon of catalysis. Structure and genesis of catalysts.** P. D. Dankov. *Uspekhi Fiz. Nauk* 14, 63-94 (1934).—Interatomic spacing, crystal structure, surface structure, promoters, mixed catalysts are discussed as studied by x-ray and other phys. methods.

F. H. Rathmann

**Exact measurement of the specific heats of solid substances at higher temperatures. XIII. The specific heats of vanadium, columbium, tantalum and molybdenum from  $0^\circ$  to  $1500^\circ$ .** F. M. Jaeger and W. A. Veenstra. *Proc. Acad. Sci. Amsterdam* 37, 61-6 (1934); cf. C. A. 28, 1257<sup>1</sup>.—The exptl. data yield the following values for the heat capacity, in cal. per g. atom: V,  $C_p = 6.0414 + 0.1600 \times 10^{-2} - 0.34446 \times 10^{-4} + 0.7234 \times 10^{-6}$ ; Nb,  $C_p = 6.0120 + 0.722533 \times 10^{-4} + 0.21952 \times 10^{-6}$ ; Ta,  $C_p = 6.0244 + 0.38066 \times 10^{-4} + 0.19919 \times 10^{-6}$ ; Mo,  $C_p = 5.8604 + 0.11828 \times 10^{-4} + 0.9949 \times 10^{-6}$ .

F. D. Rossini

**The heat capacities of magnesium, zinc, lead, manganese and iron carbonates at low temperatures.** C. Travis Anderson. *J. Am. Chem. Soc.* 56, 849-51 (1934).—From heat-capacity data in the range  $55^\circ$  to  $300^\circ K.$ , the following values of entropy were calcd. for  $298.1^\circ K.$  in cal. mol.<sup>-1</sup> deg.<sup>-1</sup>:  $MgCO_3$  (magnesite),  $15.7 \pm 0.2$ ;  $ZnCO_3$  (smithsonite),  $19.7 \pm 0.3$ ;  $PbCO_3$  (cerussite),  $31.3 \pm 0.8$ ;  $MnCO_3$  (rhodochrosite),  $20.5 \pm 0.3$ ;  $FeCO_3$  (siderite),  $22.2 \pm 0.4$ .

F. D. Rossini

**The heat capacities and entropies of potassium bromate and iodate from  $15^\circ$  to  $300^\circ$  absolute. The entropies of bromate and iodate ions.** J. Elston Ahlberg and Wendell M. Latimer. *J. Am. Chem. Soc.* 56, 856-8 (1934).

From the heat capacity and auxiliary data the following values of the entropy were calcd. for 298.1°K.: KBrO<sub>3</sub> (c), 35.65 ± 0.1; KIO<sub>3</sub> (c), 36.20 ± 0.1; BrO<sub>3</sub><sup>-</sup> (aq., hypothetical 1 M), 37.4 ± 1.0; IO<sub>3</sub><sup>-</sup> (aq., hypothetical 1 M), 26.9 ± 1.0, cal. mol.<sup>-1</sup> deg.<sup>-1</sup>. F. D. R.

The specific heat of aqueous solutions of strong electrolytes. A. G. Samoylovich. *Physik. Z. Sowjetunion* 4, 843-53 (1933) (in English). The drop in sp. heat is due to hydration, which decreases the no. of degrees of freedom, and to depolymerization of water. Polarization increases the sp. heat, this effect prevailing in concd. soln.

Louis Goldman

The energies of the atomic linkages in methane, ethane, methanol and ethanol. Frederick D. Rossini. *J. Chem. Physics* 2, 145 (1934). Data recently obtained on heats of combustion yield for the reaction RII (gas) + 1/2 O<sub>2</sub> (gas) = ROH (gas),  $\Delta H_{298}^\circ = -30.24 \pm 0.00$  and  $-36.00 \pm 0.15$ , kg.-cal. per mole, for MeOH and EtOH, resp. These data show that the energy of the process of breaking a C-H bond in RII and inserting O to form R-OH is appreciably affected by the nature of the radical R.

F. D. Rossini

The Le Chatelier-Braun principle. Max Planck. *Sitzber. preuss. Akad. Wiss., Physik.-math. Klasse* 1934, 79-83.—From the math. formulation of the principle (C. A. 5, 3361), it is necessary to distinguish between the quant. factor (vol., entropy, mech. displacement) and the intensity factor (pressure, temp. and mech. force) expressed by 2 parameters.

E. R. Rushton

Heat of formation of the iron carbide Fe<sub>3</sub>C. Gerhard Naeser. *Mitt. Kaiser-Wilhelm Inst. Eisenforschung, Düsseldorf* 16, No. 1, 1-7 (1934).—A review of measurements of heat of formation of Fe<sub>3</sub>C shows very variable values between pos. and neg. max. It was again detd. from amorphous C and  $\alpha$ -Fe at room temp. by converting the carbide (under sepn. of C) and the pure Fe into the iodide and chloride, resp. From both methods the heat of formation was found to be  $+8 \pm 0.25$  kg.-cal./mol, which corresponds to  $44.6 \pm 1.4$  cal./g. cementite,  $47.8 \pm 1.5$  cal./g. Fe,  $668 \pm 20$  cal./g. C. The heat of combustion of finely distributed amorphous C on disintegration of carbide was found to be 107.9 kg.-cal. mol. The heat of reaction in the formation of FeS from  $\alpha$ -Fe and rhombic S was  $23.89 \pm 1.16$  kg.-cal. mol. The final result is that the heat of formation of Fe<sub>3</sub>C lies in the range of  $+8$  to  $-4$  kg.-cal./mol. according to the state of C and decreases with increasing graphitization.

M. Hartenhem

Phosphoric anhydride as drying agent. W. A. Rouse. *Chemistry & Industry* 1933, 246-7.—The necessity of

purifying P<sub>2</sub>O<sub>5</sub> before use as a drying agent in studying gas reactions is emphasized. B. C. A.

Expansion characteristics of some common glasses and metals (Burger) 19. Mechanism of macropolymerization reactions (Chalmers) 10.

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### 3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Some views on the wave and electron theories. Maurice de Broglie and Louis de Broglie. *Scientia* 55, 77-85 (1934).—A non-math. discussion. L. E. Gilson

Value of  $e/m$ . W. N. Bond. *Nature* 133, 327 (1934).—Some (or possibly all) of the detns. of  $e/m$  are really measurements of  $(136/137)(1.77031 \pm 0.00014) \times 10^7$ .

E. R. Rushton

The theory of the electron and the positive. W. H. Furry and J. R. Oppenheimer. *Phys. Rev.* 45, 245-62 (1934).—A new math. formalism is given for the Dirac electron theory. A distinction is made between even and odd operators; only dynamical variables corresponding to even operators can be detd. without rendering the no. of electrons and positives in the system indeterminate; the momenta of an electron are even, but the coordinates are not. Thus the position of an electron cannot be given by a probability d.; the original Dirac theory gave false neg. energy states as a penalty for trying to localize the electron. In the new formalism the infinite d. of neg. energy states has disappeared, but the pos. electron remains. On account of the polarizability of nascent electron-positive pairs, the dielec. const. of a vacuum exceeds

that of truly empty space; the effect might be found as a deviation from the Coulomb law when  $10^8$  v. protons are scattered in H. The entire theory applies only to distances greater than  $e^2/mc^2$ . L. S. Kassel

A step forward in explaining the Pauli exclusion principle. Mitikadu Hayakawa. *Proc. Phys.-Math. Soc. Japan* 16, 67-70 (1934) (in German).—Math.

Gerald M. Petty

Relativistic theory of atoms with many electrons. J. Solomon. *Compt. rend.* 198, 1023-5 (1934).—The Thomas-Fermi theory leads to a paradox when applied in the immediate neighborhood of the origin, as the field there decreases much more rapidly than indicated by the Coulomb law (cf. Jensen, C. A. 28, 1919<sup>a</sup>). C. A. S.

The value of  $e/m$  from the Zeeman effect. L. E. Kinsler and W. V. Houston. *Phys. Rev.* 45, 104-8 (1934).—From very careful measurements of the Zeeman effect of the red singlets of Cd and Zn,  $e/m = 1.7570 \pm 0.0010$  c. m. u. L. S. Kassel

Technical and scientific uses of the diffraction of fast electrons. J. J. Trillat. *Oesterr. Chem.-Ztg.* 37, 29-33 (1934); cf. C. A. 28, 1239<sup>a</sup>.—An address. Diffraction

of electrons by metals (foils and powders), org. crystals, cellulose and gases is discussed. A. B. F. Duncan

**Diffraction of electrons by thin silver films acting as two-dimensional gratings.** Hans Lassen. *Physik. Z.* 35, 172 5(1934).—A method is given for depositing thin Ag films on polished rock-salt surfaces by condensation from the vapor. A beam of 35-kv. electrons is diffracted by some of these films as if by a two-dimensional grating of Ag atoms arranged as in the (100) plane of a single Ag crystal. C. D. W.

**Electron diffraction experiments with graphite and carbon surfaces.** R. O. Jenkins. *Phil. Mag.* 17, 457-66 (1934).—From the position of diffraction spots, the side of the C hexagon in graphite is 1.44 Å. with an inner potential of 10.7 v. The 002 lattice spacing is 3.40 Å. When a graphite surface is polished even lightly the crystals are all oriented with the main cleavage plane (001) in the plane of the surface. Polishing amorphous C results in orientation similar to that in graphite, indicating that grains of amorphous C consist of aggregates of small crystals bound together. When a piece of Fe is rubbed with a suspension of colloidal graphite in oil, an adsorbed film of graphite is formed on the metal, since washing does not eliminate the graphite diffraction pattern. When this adsorbed film is rubbed, the graphite crystals are reduced in size and become oriented, thus preventing metal-to-metal contact. E. J. Rosenbaum

**Electronic diffraction by cellulosic films.** J. J. Trillat. *Compt. rend.* 198, 1025 7(1934).—Diffraction diagrams were prep'd. by passing a monokinetic pencil of electrons of 20 25 kv. through films 50-100 Å. thick of cellulose trinitrate (13% N), triacetate, tripropionate, and tributrylate, prep'd. by allowing a drop of a suitable soln. to evaporate on Hg. A freshly prep'd. film is usually amorphous; microcrystals appear in a few hrs., and in a few days (sometimes weeks) the whole film is cryst. with some areas consisting of single crystals. With the pencil perpendicular to the film all 4 esters give identical diagrams, but with it at 35 60° they differ. The cellulosic chains lie parallel and flat in the film with equiv. atoms at the nodes of a (probably) monoclinic network with  $a$  7.10,  $b$  4.68,  $c$  2.5 or 5.0 Å. C. A. Silberrad

**Penetration of talc by fast electrons.** G. Aminoff and B. Broome. *Arkiv Kemi, Mineral., Geol.* 11B, No. 25, 5 pp.(1933). The diffraction pattern of electrons after passage through a very thin plate of talc was photographed. Whether the crystal structure was hexagonal or pseudo-hexagonal could not be det'd. From the spacing of the diffraction spots, the value of  $a$  is 5.25 Å. E. J. R.

**The role of the spin in multipole radiation.** H. C. Brinkman. *Physica* 1, 97 103(1933).—In magnetic multipole radiation the change of the magnetic spin moment of the electron with time contributes to the effect as shown from Dirac equations. B. J. C. van der Hoeven

**Negative sections of the cold-cathode glow discharge in helium.** K. G. Emelius, W. L. Brown and H. McN. Cowan. *Phil. Mag.* 17, 146 60(1934).—Cold-cathode discharges in He at 1 mm. pressure were studied by collector methods supplemented optically. Electron concns., electron temps. and potentials were det'd. in various sections of the discharge. Current-p. d. characteristics are discussed. E. J. Rosenbaum

**Investigations on positive and neutral rays. I. Neutralization of positive rays.** Antonio Rostagni. *Nuovo cimento* 11, 34-47(1934).—An app. is described for measuring the neutralization of ions of different velocities in gases and at metal surfaces. In grazing collision with a Cu plate, the percentage of A ions neutralized is very small. The effective cross sections of A, Ne, He and H<sub>2</sub> for the neutralization of their resp. ions are practically independent of the velocity between 6 v. and 400 v. The ionization of A and Ne by collision with A<sup>+</sup> occurs in the range 50 v. to 100 v. J. B. Austin

**The theory of alloys in the  $\gamma$ -phase.** H. Jones. *Proc. Roy. Soc. (London)* A144, 225 34(1934).—The zones of allowed energies for the loosely bound electrons in alloys with the  $\gamma$ -structure were investigated. The lowest group of energy levels is almost completely filled by the no. of

loosely bound electrons given by the Hume-Rothery rule. Large diamagnetic susceptibilities may be expected for alloys in this phase, and the Hall coeff. should change from large pos. to large neg. values as the comp. varies through the phase in the direction of increasing no. of loosely bound electrons. Gerald M. Petty

**Time variation of current in semiconducting material with low voltage.** G. Dechène. *Compt. rend.* 198, 1021-23(1934); cf. *C. A.* 24, 3048; 27, 4173.—With Hg electrodes and as semiconducting material yellow HgO, PbCl<sub>2</sub>, ZnO or effloresced Na<sub>2</sub>CO<sub>3</sub>, the counter c. m. f. increases slowly with the e. m. f. of the d. c. (0.28 v. with a potential of 2 v., 0.50 with one of 96); with low voltage (e. g., 4 v.) the resistance increases with time at the anode, and decreases at the cathode, but on reversal shows an increase followed by a decrease. C. A. Silberrad

**Remarks on the objections to my theory of the crystal photoelectric effect.** H. Teichmann. *Z. Physik* 87, 204-72(1933).—The criticisms of T.'s paper (*C. A.* 27, 1568, by Joffé and Joffé (*C. A.* 27, 4161), Draglio (*C. A.* 27, 4728) and Mönch and Stühle (*C. A.* 28, 31<sup>6</sup>) are discussed. Egon Bretschner

**Application of photoelectric emission laws to a barrier film photocell.** G. Liandrat. *Compt. rend.* 198, 1028-30(1934).—Recent work (cf. *C. A.* 27, 865; L. A. Wood, *Rev. Sci. Instr.* 4, 434(1933)) is discussed and the advantage of comparing the current/p. d. curves for cells unilluminated and illuminated with monochromatic light, in both cases with imposed p. d., is emphasized, the cell then functioning as a photo-resistant cell. C. A. S.

**Electronic conduction in alkali halide crystals.** R. Hilsch and R. W. Pohl. *Z. Physik* 87, 78 88(1933).—The temporal course of cond. of alkali halide crystals (artificial and natural NaCl, KCl, KBr) on irradiation reveals that the high primary photoelectric current diminishes with time because the pos. centers annihilate the field and so diminish the no. of migrating particles (center polarization). A high dark current due to high temp. neutralizes this effect. With artificial crystals another polarizing effect is observed which is due to the higher imperfection of artificial crystals (crystal cracks). Egon Bretschner

**Combinations of fields for velocity- and mass-spectrography.** Walter Hennberg. *Ann. Physik* 19, 335 41 (1934).—Theoretical study of combined elec. and magnetic fields for focusing, dispersion and sepn. of masses in beams of charged particles. E. J. Rosenbaum

**Direct experimental measurement of electron affinities.** Paul P. Sutton and Joseph E. Mayer. *J. Chem. Physics* 2, 145-6(1934).—Through measurement of the equil. const. of the reaction,  $X^- \rightarrow X + e^-$ , the electron affinity of an electroneg. gas at 0°K. can be calcd. At equil. under low pressure the electron affinity can be det'd. from the nos. of  $X^-$ ,  $X$  and  $e^-$  leaving the surface of a hot thermionic emitter. Above 1500°K., I<sub>2</sub> mols. are completely dissoc. into atoms; since very few of the atoms are converted into ions the no. of atoms leaving the surface is twice the no. of mols. impinging. For calcn. the temp. of the surface, the pressure of the gas  $X_2$ , and the ratio of currents carried by ions and electrons are necessary. Preliminary measurements on I<sub>2</sub> give a value of 74.2 kg.-cals., in good agreement with other methods. A description of the app. is included. Calvin Broun

**Attempt at a theory of  $\beta$ -rays.** Enrico Fermi. *Nuovo cimento* 11, 1-19(1934).—A quant. theory to explain the emission of  $\beta$ -rays is based on the existence of the neutron. The emission of electrons and neutrons from a nucleus in the act of  $\beta$ -disintegration is treated by methods similar to those used to describe the emission of light from an excited atom. Formulas for the half life and for the form of the continuous  $\beta$ -ray spectrum deduced from this theory give results in reasonable accord with expt. J. B. A.

**Scattering of hard  $\gamma$ -rays by lead, and the annihilation of positive electrons.** E. J. Williams. *Nature* 133, 415 (1934).—The backward scattering of hard  $\gamma$ -rays by a Pb sheet 0.1 mm. thick is increased 25  $\pm$  3% when a 3-mm. Al sheet is placed on the side of the Pb sheet away from the radiator. A wax sheet is placed between the Pb sheet

and the ionization chamber to absorb pos. electrons escaping from the Pb. This is an addnl. verification of the hypothesis of Blackett and Occhialini, that the "nuclear" scattering of hard  $\gamma$ -rays by heavy elements is due to the annihilation of pos. electrons produced by the  $\gamma$ -rays (cf. Joliot, *C. A.* 28, 1921' and Thibaud, *C. A.* 28, 1921').

**The use of the interferometer in the isotopic analysis of water.** R. H. Crist, G. M. Murphy and H. C. Urey. *J. Chem. Phys.* 2, 112-15 (1934); cf. *C. A.* 28, 897'.—The Zeiss interferometer has been applied to the analysis of  $H_2O$  contg.  $H^3$ . The instrument was calibrated with samples of  $H_2O$  whose d. had previously been detd. by means of a pycnometer. Cells 40, 10 and 1 mm. long were used, the min. quantity of  $H_2O$  required being 1.5, 0.3 and 0.05 cc., resp. With the 40-mm. cell, the precision is about 0.01%.

**Isotopic fractionation of water by distillation.** Norris F. Hall and T. O. Jones. *J. Am. Chem. Soc.* 56, 749-50 (1934).— $H_2O$  contg. about 3% of the heavier isotope on distn. gave 3 fractions with sp. gr. 1.003365, 1.003444 and 1.003546; at 10 mm. the 1st fifth of the distillate contained 32% less heavy isotope and the last fifth about 25% more.

**Electrolytic concentration of the heavy hydrogen isotopes.** R. Topley and H. Eyring. *Nature* 133, 292 (1934); cf. *C. A.* 28, 907'.—Electrolysis of  $H_2O$  with various metals as electrodes gave values for the electrolytic sepn. factor ranging between 7.9 and 2.8. \*The metals studied, in decreasing order of this factor, were: smooth Pt, Pb, Fe, Cu, Ag, Ni, W, Pt black, liquid Ga and Hg. The factor is slightly less in acid than in alk. soln. Moderate changes in c. d. have little effect. The theory of the sepn. is discussed.

**Chemical separation of the isotopes of hydrogen.** B. D. Hughes, C. K. Ingold and C. I. Wilson. *Nature* 133, 291-2 (1934).—The ratio,  $\alpha$ , for the sp. rates of discharge of  $H^1$  and  $H^2$  when metals are dissolved in  $H_2O$  is not characteristic of the metal but depends in some unknown way on exptl. conditions. For Na the ratio is 2.9 and varies very little from strongly acid to basic soln. The values for Ca and Al range between 1.3 and 1.6 and 4.0 and 4.9, resp. These depend on conditions with better results in alk. soln. For very pure Zn and com. Zn the ratios are 5.6 and 6.8, resp. Zn-Cu couples gave values as high as 8.0. This suggests that couples may be of use in sepn. D. deins. were made to det. the concn. of  $H^2$ . Various metals were studied as well as compds. forming volatile hydrides with  $H_2O$ .

**Research on heavy hydrogen at Princeton.** Hugh S. Taylor. *Science* 79, 303-5 (1934).

**Heavy hydrogen and the work of Harold C. Urey.** W. D. Harkins. *Chem. Bull.* 21, 83-7 (1934). E. H.

**Preparation of heavy hydrogen.** P. Harteck. *Proc. Phys. Soc. (London)* 46, 277-80 (1934).—The prepn. of heavy H by the electrolysis of an alk. soln. with Ni electrodes is described.

**Natural separation of the isotopes of hydrogen.** Malcolm Dole. *J. Am. Chem. Soc.* 56, 999 (1934).—Combustion of kerosene from Oklahoma oil fields gave a  $H_2O$  with a d. 7 pts. per million greater than that of ordinary  $H_2O$ ; thiophene-free  $C_6H_6$  from the destructive distn. of coal gave a product with a d. 8 pts. per million heavier;  $H_2O$  from honey showed an increase of 4 pts.

**The relative reactivities of the hydrogen isotopes with chlorine.** G. K. Rollefson. *J. Chem. Phys.* 2, 144-5 (1934).—The photochem. reaction:  $CO + H_2 + 2Cl_2 \rightarrow COCl_2 + 2HCl$  was studied with  $H^2$ .  $H^2$  is less reactive in this reaction than  $H^1$  because of the fact that the reaction with  $H^2$  has a slightly higher heat of activation.

**Exchange reactions of hydrogen atoms.** Norris F. Hall, Everett Bowden and T. O. Jones. *J. Am. Chem. Soc.* 56, 750 (1934).—Approx. 2% heavy  $H_2O$  was allowed to dissolve various substances and later sepd. from them by distn. at atm. pressure. No interchange of H was found during brief contact with KCl,  $KH_2PO_4$ , AcOK,  $BzONa$  or  $H$  gas;  $1/2$  of the  $H_2$  in the substance immediately ex-

changed in  $C_2H_5(OH)_2$ ; the extent of exchange increased markedly with the time of contact with AcOK and with  $H$  gas. The work with  $H_2$  does not yet indicate the position of equil.

**The disintegration of deuterons by high-speed protons and the instability of the deuteron.** Gilbert N. Lewis, M. Stanley Livingston, Malcolm C. Henderson and Ernest O. Lawrence. *Phys. Rev.* 45, 242-4 (1934); cf. following abstract.—Otherwise identical targets contg.  $H^1$  and  $H^2$ , resp., were bombarded with protons of  $1.5 \times 10^6$  v. energy. The  $H^2$  targets gave an excess yield of long-range protons, attributed to deuteron disintegration. The range of these protons indicates a neutron mass of about 1.001.

**The hypothesis of the instability of the deuteron.** G. N. Lewis, M. S. Livingston, M. C. Henderson and E. O. Lawrence. *Phys. Rev.* 45, 497 (1934); cf. preceding abstract.—It is suggested that the long-range protons of the former work may have been produced by  $C^{12} + H^2 \rightarrow C^{12} + H^1 + \gamma$  or a similar process; on this view, the role of  $H^2$  in the target would be to contaminate the  $(H^1)_2^+$  beam with  $(H^2)^+$ .

**Transmutation effects observed with heavy hydrogen.** M. L. Oliphant, P. Harteck and Rutherford. *Nature* 133, 413 (1934).— $NH_4Cl$ ,  $(NH_4)_2SO_4$  and  $H_2PO_4$ , in which the  $H^1$  was largely displaced by  $H^2$ , were bombarded with protons and with ions of  $H^2$ . With protons, no large differences were observed between the  $H^1$  and  $H^2$  compds.; with  $H^2$  ions, there was an enormous emission of fast protons from the  $H^2$  compds. with a range of 14.3 cm. and an energy of emission of  $3 \times 10^6$  v. An equal no. of singly charged particles of 1.6 cm. range was observed, as well as other weak groups. A slightly smaller no. of neutrons of  $3 \times 10^6$  v. energy was also observed. It seems likely that two deuterons unite to form a He atom of mass 4.0272 and charge 2. This nucleus, on account of its large surplus of energy over that of ordinary He of mass 4.0022, breaks into two components. A possible reaction is  $2H^2 \rightarrow H^1 + H^1$ ; this agrees with the ranges of 14 and 1.6 cm. which were found. Another possible reaction is  $2H^2 \rightarrow He^2 + n^1$ ; this He<sup>4</sup> particle should have a recoil of 5 mm. This group has not, as yet, been detected.

**Disintegration of the separated isotopes of lithium by protons and by heavy hydrogen.** M. L. Oliphant, E. S. Shire and B. M. Crowther. *Nature* 133, 377 (1934).—The isotopes of Li were sepd. in the nearly pure state in aunts. of 1  $\gamma$ . Ion currents of several microamp. passed through elec. and magnetic fields and the metal was collected on metal disks cooled with liquid N. It was fixed by exposure to HCl.  $Li^6$  and  $Li^7$  when bombarded with protons gave  $\alpha$ -particles of 11.5 mm. and 8.4 cm. range, resp. When bombarded with deuterons the former gave  $\alpha$ -particles of 13.2 cm. range and protons of 30 cm. range.  $Li^7$  gave  $\alpha$ -particles with ranges up to 8 cm. and neutrons.

**Production of induced radioactivity by high-velocity protons.** J. D. Cockcroft, C. W. Gilbert and E. T. S. Walton. *Nature* 133, 328 (1934).—A target of Acheson graphite was bombarded with protons, then removed and placed against a Geiger counter. The observations suggest that the unstable isotope  $N^{13}$  is produced by the addn. of a proton to  $C^{12}$ . No marked increase in the no. of counts was observed when a mixed beam of  $H^2$  and protons was substituted for the proton beam.

**Artificial production of radioactive substances.** C. C. Lauritsen, H. R. Crane and W. W. Harper. *Science* 79, 234-5 (1934).—Curie and Joliot, *C. A.* 28, 2202<sup>1</sup>, point out that if their explanation of the artificial radioactivity induced in B, Mg and Al by  $\alpha$ -particle bombardment is correct,  $N^{13}$  should be produced by bombarding C with deuterons. Targets of LiF, Bc,  $H_2BO_3$ , C, Mg and Al were bombarded for 15 min. with a 5-microampere deuteron current at 900,000 v. and promptly observed in the Geiger counter. C gave the largest effect and B next. The other substances gave appreciable effects which may have been caused by C contamination. The nature of the delayed activity was detd. by use of a Wilson cloud chamber.

Both the decay period (14 min.) and the max. energy of the electrons from C indicate that the active isotope here concerned is the same as in the case of B bombarded with  $\alpha$ -particles as reported by Curie and Joliot. About one radioactive atom is produced for about  $10^{10}$  deuterons incident on the target. Emission of  $\gamma$ -rays from C during deuteron bombardment is probably assoc. with the emission of protons and the formation of  $C^{13}$ . Formation of  $C^{13}$  accounts for about 99% of the transformations and formation of  $N^{13}$  less than 1%. Oden E. Sheppard

**Artificial transmutation of magnesium by polonium  $\alpha$ -particles.** H. Klarmann. *Z. Physik* 87, 411-24(1933).—The Rutherford-Geiger counting tube is used to study the disintegration of Mg by Po  $\alpha$ -rays. Special stress is laid on a max. of efficiency together with good geometrical conditions. Four groups of protons of 7.1, 8.5, 9.8 and 11.6 cm. range are found. They correspond to the "resonance groups" of Pose (*C. A.* 25, 248, 4178), in confirmation of P.'s observations. Egon Bretscher

**Angular distribution of protons ejected by neutrons.** N. A. Dobrotin. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1, 179-80 (in English 180-1) (1934).—Ra-Em + Be was used as the source of neutrons. Protons were ejected from a paraffin plate placed inside a Wilson chamber so that the bundle of neutrons was approx. perpendicular to its surface. The image of the chamber was projected on ground glass, upon which the track of the proton was recorded as it appeared. The angular distributions of the projections of 77 observed protons are shown in a figure. Calcd. results are closer to those of Kurie (*C. A.* 27, 5635) than of Auger and Monod-Herzen (*C. A.* 27, 3137). E. R. Rushton

**Experiments with neutrons.** L. Meitner and K. Philipp. *Z. Physik* 87, 484-97(1933).—The tracks due to collisions of neutrons with H, A, N or O atoms are studied in a Wilson chamber. The max. neutron energy (from Be with Po  $\alpha$ -radiation) is about  $13-14 \times 10^6$  v. This gives for the mass of the neutron 1.0053-1.0042 (from the reaction:  $Be^9 + \alpha = C^{12} + n$ ). Most of the protons have an energy of  $0.19-1.9 \times 10^6$  v. The same max. energy is found for collisions of neutrons with N atoms. Some disintegrations have been observed with O and N. The 1st reaction is due to:  $O^{16} + n = C^{13} + \alpha$  with a high heat of reaction, the 2nd to:  $N^{14} + n = B^{11} + \alpha$  with no surplus of energy. The neutron mass as deduced from the last reaction is 1.0056. The scattering of the collision protons is of spherical symmetry with reference to the center of gravity of the moving particles. E. B.

**Some experiments on the production of positive electrons.** J. Chadwick, P. M. S. Blackett and G. P. S. Occhialini. *Proc. Roy. Soc. A* 144, 235-49(1934); cf. *C. A.* 27, 2873.—The emission of positrons was observed under different exptl. conditions: (1) from Pb exposed to  $\gamma$ -rays from a Th active deposit, (2) directly from a Th active deposit and (3) from Pb exposed to the  $\gamma$ -rays and neutrons emitted by Be, B and F when bombarded by Po  $\alpha$ -particles. About 4000 tracks of electrons and about 400 tracks of positrons were obtained. The energies of the positrons ejected from Pb by Th  $\gamma$ -rays support the view that a positron and an electron are produced simultaneously by the interaction of a  $\gamma$ -ray and an atom, and that the masses of positron and electron are equal. The positron and electron are probably created in the elec. field outside the nucleus. The area of cross section of the Pb atom for the production of a positron is calcd. to be  $2.8 \times 10^{-24}$  sq. cm., in good agreement with the calcs. of Heitler and Sauter (*C. A.* 28, 1921<sup>8</sup>). When  $\gamma$ -rays of high frequency pass through Pb, about  $1/4$  of the energy absorbed from a  $\gamma$ -ray of  $h\nu = 2.6 \times 10^6$  v. is used in creating a positron and an electron. Nine photographs of positron and electron tracks are shown. Gerald M. Petty

**Investigation of the secondary radiation excited by a hard  $\gamma$ -radiation.** Th. Heiting. *Z. Physik* 87, 127-38 (1933); cf. *C. A.* 28, 406<sup>3</sup>.—The  $\gamma$ -radiation scattered by Al, Fe, Cu and Pd on irradiation with the Th C'  $\gamma$ -rays ( $\mu = 4.7$  X. U.) at an angle of  $130^\circ$  is studied by an ionization method. The secondary radiation has for all

elements the same wave length of  $3.8$  X. U. This corresponds to an energy of  $h\nu = mc^2/c$ . According to Dirac's theory the following mechanism is adopted: The Th C'  $\gamma$  radiation releases a positron from the nucleus which combines with a shell electron to give 2 quanta of light of energy  $mc^2$ ,  $m$  is the mass of electron at rest,  $c$  is the velocity of light. The intensity of this radiation increases with the square of the at. no. of the scattering element. A hard component is found in the case of Pb. Contrary to Meitner (*C. A.* 26, 27, 4241) no radiation of the primary frequency is found. Egon Bretscher

**Measurements of the fluctuations of the cosmic radiation.** W. Messerschmidt. *Z. Physik* 87, 800-5(1933); cf. *C. A.* 28, 36<sup>1</sup>.—The Pb shield of the ionization chamber has an opening which is rotated every hr. by  $90^\circ$ . A 0.3% surplus of radiation is coming from the west. This points to pos. particles as constituents of the cosmic radiation. Egon Bretscher

**Ionization by cosmic-ray particles and swift  $\beta$ -particles.** Gordon L. Locher. *J. Franklin Inst.* 217, 39-58(1934).—Examm. of the cloud tracks produced by cosmic rays and by fast  $\beta$ -particles shows primary ionization and also branch tracks due to secondary ionization. These branches are of 2 kinds: "collision-branches," having a wide range of energies, and "radiation-branches," having select. groups of energies, characteristic of electron transitions of the atoms of the gas. The production of the radiation-branches is exactly similar to the Auger effect. The fact that radiation-ionization occurs produces discrepancies between the energy lost along tracks and the ionization produced, and immensely complicates the problem. Helen S. Hopfield

**The path of a secondary cosmic-ray charged particle in the earth's magnetic field.** I. S. Bowen. *Phys. Rev.* 45, 349-51(1934).—The cosmic-ray latitude effects cannot be explained by the action of the earth's magnetic field on charged secondaries produced by primary photons. L. S. Kassel

**The mechanism of cosmic-ray counter action.** Carl D. Anderson, R. A. Millikan, Seth Neddermeyer and Wm. Pickering. *Phys. Rev.* 45, 352-63(1934).—Two Geiger counters were used to actuate a cloud chamber in a strong magnetic field. Such an arrangement has a strong selective action on showers. The counters respond simultaneously when no single particle could penetrate both. Showers contain pos. and neg. electrons; in leaving the nucleus, these electrons sometimes generate an intense photon spray. This photon spray is of increasing importance in activating two counters simultaneously as the intervening Pb is increased. A light element, e. g., C, has little power to produce showers or sprays. The total energy in a shower is not larger than that which has been observed for single electrons. These effects are not entirely consistent with the Dirac theory. L. S. Kassel

**A  $\gamma$ -ray ionization chamber for use with a direct-current amplifier.** L. F. Curtiss. *Bur. Standards J. Research* 12, 167-72(1934)(Research Paper No. 641).—A new type of  $\gamma$ -ray ionization chamber, in which the source is within the central electrode, is described. The chamber is so designed with guard rings that only an annular zone of ionization about the source of  $\gamma$  rays contributes to the measured ionization current. This arrangement yields ionization currents for av. preps. of Ra of the order of  $10^{-11}$  amp. which are readily amplified by a vacuum-tube amplifier so as to be readable on a microammeter. Results obtained were accurately comparable with detns. made by means of a gold-leaf electroscope. The arrangement possesses advantages over the electroscope, and is particularly suited to the routine standardization of com. preps. of Ra and Rn. R. Roseman

**The  $\beta$ -ray spectrum of Th B + C + C'.** Kan Chang Wang. *Z. Physik* 87, 633-46(1933).—The energy distribution of  $\beta$ -rays is detd. by deflection in a magnetic field and use of an electron counter. Twenty lines are found belonging to energies between 500 and 4000 H $\mu$ . The primary spectrum of Th B has an upper limit for 2340 H $\mu$ , that of Th C at 8500 H $\mu$ . The probability of the internal photoeffect for the K, L, M and N levels is



detd. from the intensity ratio of the primary  $\beta$ -spectrum of Th B and that of the photoelec. active line of the energy  $h\nu = 3.77 \cdot 10^4$  v. Egon Bretscher

Portable detector for radium. L. F. Curtiss. *Bur. Standards J. Research* 12, 379-82(1934)(Research Paper No. 663). E. H.

Redetermination of the half life of radium. D. Ernst Walling. *Z. Physik* 87, 603-6(1933).—The half life of Ra D is  $22.3 \pm 0.4$  years. Egon Bretscher

The distribution of the radioactive thallium isotope Th C' in solutions of thallium salts. Johannes Zirkler. *Z. Physik* 87, 410(1933).—A soln. of  $TlNO_3$  made radioactive by addn. of Th C' is mixed with  $Tl(NO_3)_3$ . The  $Tl^{+++}$  is sepd. and its  $\gamma$ -activity detd. It is found to be more feeble than it should if complet. exchange is assumed. Egon Bretscher

Working formula for the age determination of a radioactive mineral. Alois F. Kovarik. *Am. J. Sci.* 27, 193-203(1934).—The hypotheses assumed for the soln. of the problem of the age of a radioactive mineral are stated. Two previously derived equations are indicated as giving a correct basis for solution. A third equation is derived, based partly on the intensities of the isotopic leads in the Pb of the mineral and in ordinary Pb and on the equation giving the amt. of ordinary Pb derived from the basic equations. Act D and ordinary Pb may be considered as Pb of at. wt. 207.2, initially present, without an error greater than observational. On this basis, equations having term: for only the U and Th quantities involving time are given. A suggested procedure is indicated and an example given. Alden H. Emery

Radioactivity of mineral springs of Greece. M. Pertessis. *Compt. rend.* 198, 1053 5(1934); cf. *C. A.* 27, 3266.—The salts, temp. and radioactivity of 32 mineral springs of Greece have been detd., and the radioactivity and compn. of the gases evolved at 4 are given. C. A. Silberrad

Biological detection of radioactivity of rocks. O. Muck. *Strahlentherapie* 46, 378 83(1933).—The reaction depends on the vasoconstriction of probed nasal mucous membrane after contact of the human body with radioactive material. B. C. A.

The quantum scattering of x-rays. I. Multiple Compton effect. H. Hulubei. *Ann. phys.* [11], 1, 5-53(1934); cf. *C. A.* 27, 3879.—(1) Expressions for the change in wave length with multiple Compton scattering are derived for the electron at rest and in motion. This scattering was studied with a Cauchy's focusing spectrograph (cf. *C. A.* 27, 464, 2622) for the K series lines of Mo and Rh scattered from paraffin and Li at angles between  $0^\circ$  and  $130^\circ$ . Double scattering was found for all angles, and triple, for some. The distribution of the intensity of the scattered rays shows that triple and higher-order scattering is not negligible. II. Non-existence of partial absorption. *Ibid.* 53-8.—No evidence was obtained of the partial absorption of Ray (cf. *C. A.* 24, 4213; 25, 2360) with absorbers of lampblack, Al and B, although exposures were sufficient to detect rays much weaker than expected for this effect. III. Weak characteristic emission lines. *Ibid.* 59-71.—Wave-length measurements obtained for the forbidden K series lines of Rh are:  $\beta_4 = 533.11$ ;  $\beta_5 = 540.12$ ; and the spark satellite,  $\beta_6 = 548.23$  X. U., and, for Mo,  $K\beta_6 = 635.65$  X. U. (cf. *C. A.* 27, 3605). Victor Hlicks

Preliminary experiments with x-rays on oxygen, acetylene and ethylene, in the solid state. H. H. Mooy. *Rapports et Communications*, No. 24, *Congr. intern. froid*, Buenos Aires, *Communications Kamerlingh Onnes Lab. Univ. Leiden* No. 223, 1-8(1932).—Debye-Scherrer spectrograms of O,  $C_2H_2$  and  $C_2H_4$  in the solid state were obtained. O was at the temp. of liquid  $H_2$  and the other substances were at the temp. of liquid air. The data did not allow a detn. of structure, but seemed to indicate the presence of inferior symmetries. C. H. P. Jeffreys

Scattering of homogeneous x-rays of 0.25 to 0.4 A. Ivor Backhurst. *Phil. Mag.* 17, 321-51(1934).—The relative angular intensity distribution at 0.31 A. was measured for Be, paraffin wax,  $H_2O$ , turpentine,  $C_6H_6$ , EtOH and Ph-

COPh. The data for Be agree closely with the wave-mech. expression. The relative proportions of modified and unmodified radiation of wave lengths 0.25, 0.31 and 0.395 A. scattered at  $150^\circ$  were detd. for Be, C, Al, S, Fe, Cu, Mo, W and Pb. The abs. value of the angular scattering coeff. at  $150^\circ$  was obtained for C and Al at 0.31 and 0.395 A. These data agree well with the values calcd. for gas scattering. E. J. Rosenbaum

Extension of the x-ray spectrograph. Spectrograph focused by a curved crystal. X-ray emission spectra of gases. Y. Cauchois. *Ann. Phys.* [11], 1, 215-66(1934); cf. *C. A.* 27, 4165. J. B. Austin

X-ray spectra of the L-series of silicon and silica. Manne Siegbahn and Torsten Magnusson. *Nature* 133, 257(1934).—Differences in the lines of Si and  $SiO_2$  at about 135 A. are described and compared with the analogous case of Al and  $Al_2O_3$ . C. D. W.

Determination of crystal orientations with the Weissenberg x-ray goniometer. J. Palacios, J. Hengstenberg and J. García de la Cueva. *Anales soc. españ. fis. quim.* 31, 811 21(1933).—An analysis of the problem and its application to wire and rolled foil of Al are described. C. D. W.

Characteristic x-rays from metals in the extreme ultra-violet. H. M. O'Bryan and H. W. B. Skinner. *Phys. Rev.* 45, 370 8(1934).—X-rays in the region 50 500 A. are studied for Li, Be, C, Na, Mg, Al, Si and Ba. The Ba band is an  $O \rightarrow N$  transition. The bands for the other metals are due to conduction electrons falling into the K or L shell. The energy spread of the bands may be calcd. from Sommerfeld's theory of metals, and permits the no. of conduction electrons to be detd.; the result is 1 for Li and Na, 2 for Be and Mg, 3 for Al, and possibly not far from 4 for Si, though the theory is not strictly applicable to it. L. S. Kassel

The spectroscopy of ultra-soft Röntgen radiation. H. Manne Siegbahn and T. Magnusson. *Z. Physik* 87, 291-309(1933); cf. *C. A.* 24, 5212. Egon Bretscher

Widths of x-ray lines from alloy targets. Lyman G. Parratt. *Phys. Rev.* 45, 364 9(1934). L. S. K.

Precision measurements of rhombohedral crystal lattices. J. Weigle. *Helv. Phys. Acta* 7, 46-50(1933). A method is developed to obtain from Debye-Scherrer patterns precise results of the dimensions of a crystal lattice even for non-cubic crystals. The method is applied to  $NaNO_3$ . Egon Bretscher

Focusing method for x-ray crystal analysis. A. Rogozinski. *Compt. rend.* 198, 953-5(1934).—The method consists essentially in arranging the substance under examn. in a hoop, the plane of which is perpendicular to the incident beam of x-rays, and of which the center lies in that beam. A small Pb screen prevents direct incidence of the beam on the photographic film. The method greatly reduces the period of exposure. C. A. S.

Photographic means of reflection of x-rays. XII. Comparison of photographic and ionization methods. J. A. Barasoain and R. Salvia. *Anales soc. españ. fis. quim.* 32, 53-61(1934).—Greatest accuracy was obtained when all lines were darkened to about the same degree. Under these conditions, both methods give the same results. E. M. Symmes

The law of photographic blackening due to very soft Röntgen radiation. H. Broili and H. Kiessig. *Z. Physik* 87, 425-31(1933).—The density of various photographic plates on irradiation with  $K_{\alpha}$  C (45 A.) or Cu (1.54 A.) radiation is proportional to the incident energy in the last case only. The plot for the C radiation is strongly curved, the sensitivity of the plate decreasing very much with intensity. This is due to the high absorption of the soft radiation. Egon Bretscher

Relative merits of film and paper for industrial x-ray work. Ancel St. John and H. R. Isenburger. *Proc. Am. Soc. Testing Materials* 33, Pt. II, 761-9(1933).—Both films and papers were exposed for 1 min. to x-rays under Pb shields varying in thickness from 0.005 to 0.080 in. in steps of 0.005 in. When the tube was operated at 150,000 v. the emulsion under the Pb strips up to 0.020 in. was over-exposed on both film and paper. Gradations

in density on both could be distinguished from 0.020 to 0.065 in. of Pb. One-in. welded boiler plate with a small plate 4% of the thickness of the boiler plate was placed between the x-ray tube and the emulsions. A hole was placed in the sheet for comparison purposes. The sheet and hole were distinguishable in both film and paper. Films may be contact-printed for comparison purposes; paper "negatives" were photostated. Papers dried in 2 hrs., films in 3. The cost of paper is less than that of film. With respect to speed and contrast, film and paper are of equal value. With respect to general convenience the balance is in favor of papers. H. E. M.

**Shift and unsymmetric broadening of absorption lines by foreign gases.** Chr. Fuchtbauer and F. Gössler. *Z. Physik* 87, 89-104(1933); cf. C. A. 28, 409<sup>4</sup>.—The broadening effect of He, Ne, Ar and N<sub>2</sub> on the Cs doublet 4555 and 3876 Å. is detd. independently of pressure and temp. as well as the shift of the absorption max. and the dissymmetry of the line due to the addn. of gas. The half width of the Cs line is found to be about 25% larger than that of K. The broadening increases from Ne, N<sub>2</sub>, Ar and He to the max. with H<sub>2</sub>. Egon Bretscher

**The nuclear moment of xenon.** Hans Kopfermann and Eva Rindal. *Z. Physik* 87, 460-9(1933).—Xe<sup>130</sup> has an angular moment of  $I = 1/2$  and a neg. magnetic moment, Xe<sup>131</sup> has  $I = 3/2$  and a pos. magnetic moment. Egon Bretscher

**Non-Ritzian nature of the <sup>3</sup>S terms of mercury.** I. Walerstein. *Nature* 132, 139(1933). G. G.

**The anomalous Zeeman effect of some single hyperfine structure components of the mercury resonance line 2537 Å.** I. The  $\pi$ -components. Anton Žvironas. *Helv. Phys. Acta* 7, 224-56(1933); cf. C. A. 28, 40<sup>8</sup>.—The method of taking resonance curves due to Malinowski modified by Schein (C. A. 23, 4888) is used in combination with Mrozowski's procedure (C. A. 27, 229, 890) to study the Zeeman effect of some hyperfine components of Hg 2537 Å. The results are complicated because the Zeeman splitting is of the same order of magnitude as the hyperfine structure. The results are in agreement with the observations by Schüler on the hyperfine structure carried out with interference spectroscopes and those calcd. by Inglis (C. A. 28, 408<sup>7</sup>). Egon Bretscher

**The Paschen-Back effect. I. L-S coupling; the <sup>3</sup>P<sup>3</sup>D multiplets of zinc and cadmium.** J. B. Green and D. E. Gray. *Phys. Rev.* 45, 273-6(1934). L. S. K.

**The fine structure of the Balmer lines.** W. V. Houston and Y. M. Hsieh. *Phys. Rev.* 45, 263-72(1934).—A new method of treating interferometer patterns of doublets is used to det. the sepns. of the centers of gravity for the 1st 5 Balmer lines. The exptl. sepns. are less than expected from the theory, giving a calcd. fine-structure const. of  $(1/\alpha) = 139.9$ . The difficulty must be in the theory of the H atom, possibly in the neglected interaction of the electron with the radiation field. L. S. Kassel

**Arc spectrum of tellurium.** S. Gopala Krishnamurty. *Current Sci.* 2, 210(1933).—Note on an arc spectrum from the visible to  $\lambda$  1600. G. B. Taylor

**Perturbation in the spectrum of Se II.** K. R. Rao and S. Gopala Krishnamurty. *Nature* 133, 328(1934). A perturbation in intensity, obviously due to the mutual interaction of adjacent spectral lines, is found. The other characteristics are generally analogous to those of As I or S II. Details will be published shortly. E. R. R.

**The arc spectrum of radium.** Ebbe Rasmussen. *Z. Physik* 87, 607-15(1933).—The arc spectrum of Ra is studied in the region 3000-10,000 Å. The ionization potential is 5.176 v. Egon Bretscher

**Pressure shift of the iron multiplets. Comparison of two independent methods.** Erwin Beglinger. *Helv. Phys. Acta* 7, 149-69(1933).—The pressure shift of 2 multiplets of the arc spectrum and of some spark lines of Fe are detd. by visual and photometric methods. Egon Bretscher

**Absorption spectra resulting from the excitation of the inner electrons. III. The cadmium spectrum between 1100 and 600 due to excitation of the (4d)<sup>10</sup> shell of Cd I<sup>0</sup>.**

H. Beutler. *Z. Physik* 87, 19-27(1933); cf. C. A. 28, 1266<sup>9</sup>.—Thirty absorption lines are observed which correspond to transitions  $(4d)^9(5s)^2, {}^1S_0 \rightarrow (4d)^9(5s)^2m^2P_1, {}^3P_1, {}^3D_1$  or  $(4d)^9(5s)^2m^2P_1$  or  ${}^3P_1$ . The terms agree well with the arc spectrum of the succeeding element (In). The lowest terms are diffuse because they only differ a little energetically from the series limit of Cd I. The  $m^2D_1$  (not diffuse) and the  $m^2P_1$  terms (diffuse) converge to the  ${}^3D_1(4d)^9(5s)^2$  level of Cd<sup>+</sup>. IV. The zinc spectrum between 1150 and 700 Å. obtained by excitation of the  $3d^{10}$  shell (Zn I<sup>0</sup>). Supplement: Comparison of the terms of Hg I<sup>0</sup>, Cd I<sup>0</sup> and Zn I<sup>0</sup>. H. Beutler and K. Guggenheimer. *Ibid.* 176-87. V. The doublet at 660 Å. due to the excitation of the  $(3p)^4$  shell of potassium. (K I<sup>0</sup> resonance lines.) *Ibid.* 188-91. E. B.

**Investigation in the Schumann region. III. The spectra of iron, cobalt and nickel in the spectral region from 2000 to 1670 Å.** R. Gräfin zu Dohna. *Z. Physik* 87, 616-32(1933). Egon Bretscher

**Studies of series spectra. IV. Molybdenum. I. Miguel A. Catalán and Pilar de Madariaga. Rev. acad. cienc. Madrid 30, 621-59(1933); cf. C. A. 28, 908<sup>8</sup>.—644 lines are classified into 120 quintet and septet levels and many terms are assigned. A no. of analogies to the spectrum of Cr I are pointed out. A general method of fixing series limits is given. The fundamental limit given by Kiess for Mo (50,660, cf. C. A. 17, 3453) gives results incompatible with those of Cr I and other elements of this period. The value 57,200  $\pm$  200 gives better results and leads to an ionization potential of 7.06 v. J. B. A.**

**The spectrum of fluorine, F II, F III, F IV.** I. S. Bowen. *Phys. Rev.* 45, 82-6(1934).—A no. of lines are classified, and the ionization potentials detd. to be 34.81, 62.35 and 87.34 v., resp. L. S. Kassel

**Large electronic isotope effects in molecular spectra.** Herrick L. Johnston. *Phys. Rev.* 45, 79-81(1934). Curves are given showing the isotopic shift in the spin doublet sepn. for BO and OH; the sepn. is zero for zero  $K$ , increases to a max. of 2 cm.<sup>-1</sup> for B<sup>10</sup>O<sup>16</sup> — B<sup>10</sup>O<sup>18</sup> and 20 cm.<sup>-1</sup> for O<sup>16</sup>H<sup>2</sup> — O<sup>16</sup>H<sup>18</sup>, and decreases as  $K$  increases further. The isotope effect is fitted by the theoretical treatment of Hill and Van Vleck (C. A. 23, 34) though the separate doublets are not given correctly. Other curves show the isotopic effect in the  $\Delta$ -doublets for <sup>11</sup>B<sup>11</sup> and <sup>11</sup>B<sup>10</sup>, of OH, which are not accounted for by theory. No appreciable isotope effect exists for the  $\Sigma$  level. L. S. K.

**A relation between internuclear distances and bond force constants.** Richard M. Badger. *J. Chem. Phys.* 2, 128-31(1934).—For diat. mols. the relation between the bond force const.,  $k_{\text{ex}}$ , and the internuclear distance,  $r_e$ , is accurately expressed by the equation:  $k_{\text{ex}}(r_e - d_{11})^{-1} = 1.86 \times 10^6$ . The const.,  $d_{11}$ , depends only on the  $\alpha$  in the periodic table in which the elements of the mol. are located. The equation is applicable not only to the normal state but also with a few possible exceptions to all excited states. Uses of the relation are discussed and the extension to polyat. mols. is suggested. Calvin Broug

**Rotation-vibration coupling in diatomic molecules.** C. L. Pekeris. *Phys. Rev.* 45, 98-103(1934).—The wave equation for a rotating-vibrating mol. with a Morse potential energy is solved. It is found that  $\alpha_v = 2x_e B_v [3(B_v/x_e \omega_e)^{1/2} - (3B_v/x_e \omega_e)]$ , the factor in brackets having been added by the rotation. This factor has an av. value of 0.7 for 93 mols.; the exptl. values scatter considerably, but have nearly the same av. L. S. Kassel

**Investigations on the continuous spectra of atomic and molecular hydrogen.** Daniel Chalange. *Ann. phys.* [11], 1, 123-214(1934); cf. C. A. 27, 4169.—The continuous spectrum of at. H was obtained by a condensed discharge in H; the continuous mol. spectrum was produced by an uncondensed discharge. The distribution of energy in the at. spectrum as a function of wave length is represented by a curve with 2 level stretches, one assoc. with the Balmer series and beginning where the series ends, the other assoc. with the Paschen series. The interat. Stark effect is important in this spectrum. The continuous mol. spectrum increases in intensity from the red to the blue, reaches

a max. at 2350 Å., then falls off rapidly in the Schumann region. The results are explained by the theory of Winans and Stueckelberg (*C. A.* 23, 1054). These continuous bands are also found in the spectra of stars of types A and B. J. B. Austin

**Predissociation in the first positive group of nitrogen.** A. van der Ziel. *Nature* 133, 416-17 (1934).—The electronic level diagram of the normal  $N_2$  mol. is shown. Transitions between mol. levels and between electronic levels are given. Gerald M. Petty

**Active nitrogen and the auroral spectrum.** Joseph Kaplan. *Nature* 133, 331 (1934); cf. *C. A.* 28, 970<sup>2</sup>, 1271<sup>4</sup>.—A photograph is given of the afterglow in N, which resembles the auroral spectrum and shows a trace of the second pos. bands. E. R. Rushton

**Hydrocarbon bands in the solar spectrum.** R. S. Richardson. *Astrophys. J.* 77, 195-211 (1933). G. G.

**The visible absorption spectrum of iodine and the induced predissociation of the iodine molecule.** V. Kondrat'ev and L. Polak. *Physik. Z. Sowjetunion* 4, 764-86 (1933) (in German).—The absorption curves of I in the range 6500-5100 Å. for various pressures of  $N_2$ ,  $O_2$ , HCl and of  $I_2$  are recorded, showing 3 maxima corresponding to the levels in the excited mol. corresponding to the vibrational quantum nos., 22, 29 and 39. The effective cross section of N was calcd. to be 30 times the cross section from kinetic theory. The effect of added I on the adsorption spectrum resembles that of other gases. L. G.

**Absorption effect in the M-series [of tungsten and tantalum].** V. Kunzl. *Nature* 132, 139 (1933). G. G.

**The spectrum of MgF.** F. A. Jenkins and Rafael Grinfeld. *Phys. Rev.* 45, 229-33 (1934)<sup>2</sup>; cf. *C. A.* 27, 4170.—Measurements of the band heads and of the partially resolved rotational structure are used to evaluate  $\nu_{00}$ ,  $B_0'$  and  $B_0''$  for the  $^2\Sigma$ ,  $^2\Pi$  and  $^2\Sigma$  systems of MgF. For the normal state,  $\nu_0'' = 1.75 \times 10^4$  cm.<sup>-1</sup>. L. S. K.

**The absorption spectrum of water vapor in the region below 2000 Å.** Gert Rathenau. *Z. Physik* 87, 32-56 (1933).—The conditions for obtaining an intense continuous spectrum below 2200 Å. are stated. The results are used to study the absorption spectrum of  $CO_2$  and water in the extreme ultra-violet. Predissoc. bands of  $H_2O$  begin at 1780 and 1340 Å. Continua were found at 10, 17.8, 16 and 24.5 v. The last two are new. The absorption of  $CO_2$  is perceptible only for light of  $< 10^4$  v. Three regions of continuous absorption are found between 600 and 900 Å. Egon Bretscher

**The vibrational energy level system of the linear molecule HCN.** Arthur Adel and E. F. Barker. *Phys. Rev.* 45, 277-9 (1934)<sup>2</sup>; cf. *C. A.* 28, 1925<sup>7</sup>.—New measurements of the absorption spectrum of HCN give the 3 fundamental frequencies as 2037.0, 712.1 and 3364.2 cm.<sup>-1</sup>; the 7 second-order anharmonic consts. are also given. The frequencies for  $H^{13}C$  are predicted to be 1920, 570, 2580 cm.<sup>-1</sup>, with a probable accuracy of 1%. L. S. Kassel

**Electromagnetic waves of 1.1 cm. wave length and the absorption spectrum of ammonia.** C. F. Cleaton and N. H. Williams. *Phys. Rev.* 45, 234-7 (1934).—By means of a magneto-static oscillator as a source, the absorption spectrum of  $NH_3$  gas was mapped between wave lengths of 1.06 and 3.8 cm. Max. absorption is at 0.8 cm.<sup>-1</sup>; this absorption is due to transition between the 2 lowest states of  $NH_3$ , which exist because the N atom has 2 equiv. positions. The frequency as detd. by the far infra-red measurements of Wright and Randall (*C. A.* 27, 5247) is 0.67 cm.<sup>-1</sup>. The difference is at least partially due to the dissymmetry of the line. L. S. Kassel

**The band spectrum of phosphorus nitride.** P. N. Ghosh and A. C. Datta. *Z. Physik* 87, 501-4 (1933).—The wave no. of the emission spectrum of PN is given by:  $\nu = 39818.2 + [1100.5(v' + 1/2) - 6.8(v' + 1/2)^2] - [1337.0(v'' + 1/2) - 7.0(v'' + 1/2)^2]$ . The heats of disson. for the states with  $v' = 0$  and  $v'' = 0$  are 5.4 and 7.9 v., resp. Egon Bretscher

**Remarks on the publication by A. Petrikala and J. Hochberg: The molecular spectra of some indium and gallium halides.** E. Miescher and M. Wehrli. *Z.*

*Physik* 8, 310-11 (1933); cf. *C. A.* 28, 411<sup>4</sup>, 1273<sup>4</sup>.

Egon Bretscher

**Photographing in the infra-red region of the spectrum by the method of the extinction of a phosphorescing screen.** V. L. Levshin, V. V. Antonov-Romanovskii and D. A. Tunnerman. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1933, 276-8 (in French 278-9).—Some data on Zn phosphide screens are given. F. H. Rathmann

**Infra-red absorption of organic compounds. III.** Albert Roth. *Z. Physik* 87, 192-205 (1933).—The infra-red absorption between 0.8 and 2.6  $\mu$  is detd. for the following compds.: *PrCl*, *iso-PrCl*, *formic acid*, *Me formate*, *Et formate*, *benzotrìchloride*, *benzoyl chloride*, *Me benzoate*, *anisole*, *anisaldehyde*. The absorption maxima are collected in a table revealing the correspondence of valency bonds and infra-red absorption maxima. E. B.

**The Raman effect of nitrobenzene.** H. F. Hertlein. *Z. Physik* 87, 744, 8 (1933).—Raman spectra of nitrobenzene are studied above and below the transition point observed by Wolfke and Mazur (*C. A.* 26, 637, 2358). No difference is found. Egon Bretscher

**Raman spectrum of heavy water.** R. W. Wood. *Nature* 133, 106 (1934); cf. *C. A.* 28, 1602<sup>6</sup>. M. McM.

**Raman frequencies of the  $NH_4$  group.** I. Ramakrishna Rao and C. Sambasiva Rao. *Current Sci.* 2, 209 (1933).

**Raman spectra of  $NH_4$  salts, solid and in soln., show a band due to  $NH_4$  radical, not  $H_2O$  as claimed by some workers.** G. B. Taylor

**The Raman spectrum of lead tetramethyl.** A. B. F. Duncan and John W. Murray. *J. Chem. Physics* 2, 146 (1934).—For the Raman spectrum of  $PbMe_4$  the following lines were found: 135 (8 hr), 458 (10), 472 (8), 766 ( $1/2$ ), 930 (0), 1155 (3), 1169 (2), 2021 (8), 3000 (3) cm.<sup>-1</sup>. Lines 2021 and 3000 are assigned to vibrations of the C—H bond; 930 is probably a harmonic of 458. The other lines are attributed to bending and stretching motions of a tetrahedral pentatomic mol., the 3 lowest to bending and the others to stretching. Calvin Brous

**The Raman spectrum of arsenic trifluoride and the molecular constants of arsenic trifluoride, arsenic trichloride, and phosphorus trichloride.** Don M. Yost and John E. Sherborne. *J. Chem. Physics* 2, 125-7 (1934).—The Raman frequencies of  $AsF_3$  were found to be:  $\omega_1(1)$ , 707;  $\omega_2(1)$ , 341;  $\omega_3(2)$ , 614<sup>2</sup> and  $\omega_4(2)$ , 274 cm.<sup>-1</sup>. The atoms describe a regular triangular pyramid with the As atom at the vertex. The bond angles for  $AsF_3$ ,  $AsCl_3$  and  $PCl_3$  were established from electron-diffraction data. The entropies of the 3 trihalides were calcd. The standard free energies of formation of  $AsCl_3(l)$  and  $AsCl_3(g)$  at 25° were detd. to be -65,190 cal. and -62,718 cal., resp. Calvin Brous

**Changes in the Raman spectrum of sulfuric acid on dilution.** L. A. Woodward and R. G. Horner. *Proc. Roy. Soc. (London)* A144, 129-43 (1934).—Microphotometer curves of the Raman spectra of  $H_2SO_4$  are reproduced for 6 concns. ranging from 10 to 100%. The characteristic frequencies are:  $H_2SO_4$ , 381, 555.5, 910, 978 and 1121;  $HSO_4^-$ , 595, 895.5 and 1036;  $SO_4^{--}$ , 452 and 982; while 417 and 1195 cm.<sup>-1</sup> are common. The inherent breadth of the lines is about 25 cm.<sup>-1</sup>. Measurements on solns. of  $MgSO_4$  give no evidence for a variation of the  $SO_4^{--}$  frequency (982 with concn. Cf. also Nisi (*C. A.* 24, 3437), Woodward (*C. A.* 25, 2918) and Bell and Fredrickson (*C. A.* 25, 5005). Gerald M. Petty

**Study of electrolytic dissociation by the Raman effect. II. Nitrates.** I. Ramakrishna Rao. *Proc. Roy. Soc. (London)* A144, 159-65 (1934); cf. *C. A.* 24, 3952, 5577; 28, 954<sup>2</sup>.—Raman frequencies of the nitrates of Li, Na, K, NH<sub>4</sub>, Mg, Ca, Sr, Ba and Pb are given; in the crystal state they differ for different cations, but in soln. they are all the same, being 725, 1049 and 1357 cm.<sup>-1</sup>. Frequencies are higher in the crystal state, except for  $NH_4NO_3$  and possibly  $KNO_3$ . The spectra of concd.  $NaNO_3$  and  $NH_4NO_3$  solns. did not reveal a trace of any addnl. line due to undissoc. mols. The intensity of the nitrate line is proportional to the concn. in  $NaNO_3$  solns. Conclusion: Nitrates are completely dissocd. in aq. soln., even at

high concns. This disagrees with results obtained from cond. data.

Gerald M. Petty

Continuous spectrum in the light scattered by glycerol and other liquids. O. H. Howden and W. H. Martin. *Trans. Roy. Soc. Can. III*, 27, 91-6 (1933); cf. *C. A.* 26, 2656.—The continuous spectrum in light scattered by glycerol was found to be due to a fluorescent impurity which was produced by photochem. decompn. caused by the Hg line 4047 Å. or shorter wave lengths and which fluoresced when excited by 4358 Å. Glycerol recrystd. 4 times gave a continuum about  $1/4$  of its original intensity but after irradiation for 24 hrs. with the whole Hg spectrum the purified sample showed so much continuum as to mask the Raman lines almost completely. J. W. S.

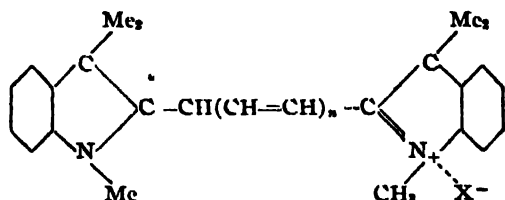
Magneto-optical dispersion of organic liquids in the ultra-violet region of the spectrum. VII. The magneto-optical dispersion of isobutyl formate, methyl butyrate and ethyl malonate. R. H. Lavery and E. J. Evans. *Phil. Mag.* 17, 351-69 (1934); cf. *C. A.* 27, 5646.—Values of  $n$  and the Verdet const.  $\delta$  were obtained in the wavelength range 6678-2961 Å. For iso-Bu formate at  $10.7^\circ$   $n^2 = 1.9038 + 0.944 \cdot 10^{-3}/\lambda^2 - (0.1083)^2$  and  $n\delta = 5.38 \cdot 10^{-3} \lambda^2/[\lambda^2 - (0.1083)^2]$ . For Me butyrate at  $12.25^\circ$   $n^2 = 1.9082 + 0.914 \cdot 10^{-3}/\lambda^2 - (0.1076)^2$  and  $n\delta = 5.114 \cdot 10^{-3} \lambda^2/[\lambda^2 - (0.1076)^2]$ . For Et malonate at  $18.5^\circ$   $n^2 = 1.9701 + 0.979 \cdot 10^{-3}/\lambda^2 - (0.1124)^2$  and  $n\delta = 5.25 \cdot 10^{-3} \lambda^2/[\lambda^2 - (0.1124)^2]$ . The values of  $e/m$  in e. m. u. ( $e$ , the charge and  $m$ , the mass) are: iso-Bu formate  $0.99 \cdot 10^7$ , Me butyrate  $0.98 \cdot 10^7$  and Et malonate  $0.94 \cdot 10^7$ . It is assumed that the same absorption band is responsible for ordinary dispersion as well as magneto-optical dispersion. E. J. Rosenbaum

The rotatory power and the absorption of isosteric molecules. Magnetic rotatory dispersion of thiophene, furan, pyrrole and benzene. Peter Preiswerk. *Helv. Phys. Acta* 7, 203-23 (1933).—The absorption and rotation of benzoin, methyldeoxybenzoin and desyl chloride are detd. The rotation is anomalous in the absorption band itself. The contribution of this band (due to the C—O bond) to the total rotation is calcd. from Kuhn's theory. The magneto-rotatory power of thiophene, pyrrole, furan and benzene is followed to the beginning of absorption. E. B.

Light absorption and double bonds. K. W. Hauser. *Z. tech. Physik* 15, 10 (20) (1934).—The absorption spectra of complx. contg conjugated double bonds are given for the region 750-200  $m\mu$  (mol. absorption coeff. plotted against frequency): Me(CH=CH) $_n$ CO $_2$ H ( $n = 1, 2, 3, 4$ ) in abs. alc. (and for  $n = 4$  at  $-190^\circ$  as well as at room temp.), Ph(CH=CH) $_n$ CO $_2$ H ( $n = 1, 2, 3$ ), O—CH=CH—

CH=CH(C(CH=CH) $_n$ CO $_2$ H ( $n = 0, 1, 2, 3, 4$ ), Ph(CH=CH) $_n$ —

Ph ( $n = 1, 2, 3, 4, 5, 6, 7$ ) in C $_6$ H $_6$  at room temp. and at  $-190^\circ$ , crocetin, carotene, lutein, zeaxanthin, physalien, taraxanthin, violaxanthin, methylloxin, lycopene and the indolenine dyes



( $n = 0, 1, 2, 3$ ). The fluorescence emission spectra of the diphenylpolyenes and the Raman spectra of Me(CH=CH) $_n$ CO $_2$ H ( $n = 1, 2, 3, 4, 5$ ) and their mono-( $n'$ ) and di-Me( $n''$ ) derivs. in EtOH, BuOH or CCl $_4$  are also given. The strongest absorption band increases in intensity and is shifted to the longer wave lengths with increasing no. of double bonds ( $n$ ). The dependence of the position of the band on  $n$  is shown by the simple curve obtained by plotting the max. frequency (corr. for solvent action) against  $n$  plus the color equivs. of the other chromophors in the compd. (cf. *C. A.* 24, 343). Isolated double bonds appear to have no effect. All but the ionizable compds.

(indolenine dyes, cyanidin chlorid $^f$  and polyenes in concd. H $_2$ SO $_4$ ) are of the same spectral type and show a cleavage of the band at the max. which appears more clearly the larger  $n$  is, the lower the temp., or the more sym. the mol. The fluorescence emission spectra are almost mirror images of the absorption spectra, but according to Stokes' law are displaced to the smaller frequencies. This frequency difference is brought about by the loss of energy by absorption and emission and by a solvent effect. The emission spectra of diphenyloctatetracene in various solvents are practically the same but the absorption spectra vary considerably. The cleavage in both emission and absorption is controlled by the frequency (about 1600 cm $^{-1}$ ) of the C double bond. This frequency is also obtained from the Raman spectra. The principle Raman lines are for  $n = 1, 1655; 2, 1644; 2', 1639; 3, 1618; 2'', 1608; 3', 1601; 4, 1599; 5, 1576$  cm $^{-1}$ . This decrease with increase of  $n$  shows that the conjugated double bonds form a simple system which acts as a whole optically as well as chemically. The intensity of the Raman lines increases strongly with increase in  $n$  for similar concns. Janet E. Austin

Polarimetric investigations on narcotine. Pariselle. *Compt. rend.* 198, 928-30 (1934).—Measurements of  $[\alpha]$  are for the green, of dispersion,  $\Delta$ , for the indigo and yellow lines of Hg at  $17^\circ$ . In HCl aq. soln.  $[\alpha]$  of narcotine (I) increases with addn. of HCl to  $+240^\circ$  for 1 mol. (I) + 30 HCl,  $\Delta$  to 1.35. In CHCl $_3$   $[\alpha]$  of (I)  $[\alpha]_{D_1}$  is  $+050^\circ$ ,  $\Delta$  1.96; of (I)'  $[\alpha] = -1006^\circ$ ,  $\Delta$  2.44. (I) dissolved in excess of aq. NaOH has  $[\alpha] +273^\circ$ ,  $\Delta$  1.94; on adding HCl  $[\alpha]$  diminishes until with formation of the hydrochloride of the Na salt it is  $-587^\circ$ ,  $\Delta$  1.9; further addn. of HCl causes mutarotation,  $[\alpha]$  after 48 hrs. becoming  $+230^\circ$ . The changes of sign of  $[\alpha]$  are attributed to rotation of the meconic group around its linking with the isoquinoline nucleus. C. A. Silberrad

The chemical action of light. Fritz Lieben. *Oesterr. Chem.-Ztg.* 37, 20-3 (1934).—A historical review from the biochem. standpoint. The effect of ultra-violet light on sp. amino acids and proteins is given qualitatively.

A. B. F. Duncan

Photochemical action of complex radiations. M. Padoa and N. Vita. *Z. wiss. Phot.* 32, 185-95 (1933); cf. *C. A.* 27, 4173.—It is explained that the thickness of the green filter (NiSO $_4$  soln.) was not 1 cm. but 8.2 cm., and Winther's criticism (*C. A.* 27, 5645) regarding its light absorption accordingly fails; his other objections are also met, and several sources of error in his own expts. are pointed out. E. R. Bullock

The permeability of the atmosphere and glass to ultra violet radiations. J. Doetsch. *Anales, soc. esp $^n$ . fis. quim.* 32, 65-71 (1934). E. M. Symm

Action of light on diiodo hydrocarbons: diiodoethylenes. G. Emschwiller. *Compt. rend.* 198, 1151-4 (1934).—as-Diiodoethylene is prepd. by the action of NaOH on an Et $_2$ O-EtOH soln. of CH $_2$ CH $_2$ I $_2$ , as a colorless, pleasant-smelling liquid,  $d^{20}_4$  2.94,  $b^{20}_D$  61° or  $b^{20}_m$  about 165° with decompn. and, after a short time, detonation. It combines readily with HI to MeCl $_2$ . Kaufmann's supposed CH $_2$ Cl $_2$  (*C. A.* 16, 2302) was a mixt. of (CHI) $_2$  and C $_2$ H $_4$ . It is decompd. by ultra-violet light: 2CH $_2$ Cl $_2$  + (HI)  $\rightarrow$  C $_2$ H $_4$  + C $_2$ I $_4$  + 2HI; 2C $_2$ I $_4$   $\rightarrow$  C $_2$  + C $_2$ I $_6$ ; CH $_2$ Cl $_2$  + (HI)  $\rightarrow$  MeCl $_2$ ; and also small quantities of CH $_4$  and C $_2$ H $_4$ . Though (CHI) $_2$  is not oxidized in ultra-violet light CH $_2$ Cl $_2$  is so completely with formation of HCO $_2$ H, a trace of HCHO, I $_2$  and gas (57% CO + 23% CO $_2$  + 20% C $_2$ H $_4$ ) (cf. *C. A.* 28, 2271 $^b$ ). C. A. Silberrad

The emission of electrons under the influence of chemical action. II. Some general conclusions and a further study of the case of carbonyl chloride. A. K. Demisoff and O. W. Richardson. *Proc. Roy. Soc. (London)* A144, 46-75 (1934); cf. *C. A.* 25, 5097.—The emission of electrons caused by the reaction of K $_2$ Na with 22 gases has been investigated; with 15, the emission was sufficiently large that the distribution of kinetic energy among the electrons was detd. at pressures near  $10^{-6}$  mm. of Hg. The energy distribution is usually not of the Maxwellian type. The distribution curves all pass from a small value at zero energy ( $V = 0$ ) through a max. at a certain energy

( $V = V_m$ ), then fall to zero at a certain max. energy  $E_m$ . The curves have a "tail," and approach  $E_m$  gradually; the practical max. energy  $E_m$ , obtained by disregarding the "tail," includes 91.9% of the electrons. Distribution curves for energies between  $V_m$  and  $E_m$  are closely represented by  $N(V)dV = Ae^{-k(V-V_m)^c}$ ,  $A$ ,  $k$  and  $c$  being consts. For the most energetic reactions this equation is a fair approximation from zero energy to  $E_m$ . For Cl compds.,  $E_m + D = \text{const.}$ , where  $D$  is the disson. energy of the relevant reaction (the data for other compds. are insufficient). At low pressures electron emission is proportional to the pressure of the reacting gas; as the pressure rises the emission usually, but not always, passes through a sharp max.; but in COS, for example, the emission steadily diminishes to zero. The yield of electrons diminishes rapidly as the available chem. energy diminishes. It is assumed that a polar bond is formed between the gas and the metal, which involves a rearrangement of the electronic systems of the atoms concerned; the bond is stabilized by a 3-body collision with a free metallic electron which carries away all the reaction energy. The equation  $E_m + D = \text{const.}$  then becomes  $E_m = E_e - \phi$ , where  $E_e$  is the energy of the corresponding elementary chem. reaction responsible for  $E_m$  and  $\phi$  is the work function of the metal. This relation appears to be general and is similar to the fundamental law of photoelectricity.

**The excitation of alkali halide crystals.** M. V. Savost'yanova. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 1, 113-15 (in German 115-18) (1934).—Absorption curves are given for KCl, KBr and KI crystals colored by atomically dispersed K metal before and after excitation (decrease of absorption coeff. caused by exposure to light). There is no direct connection between excitation and luminescence of such crystals.

**Photographic measurement of the transmission of fluorite in the extreme ultra-violet.** E. G. Schneider. *Phys. Rev.* 45, 152-3 (1934).—The transmission of a piece of colorless fluorite for wave lengths between 124 and 160  $m\mu$  was measured photographically, and the results were compared with those obtained by a photoelec. method.

I. M. Lowry

An intensity filter for the mercury line at 253.7  $m\mu$ .

H. W. Melville and H. J. Walls. *Trans. Faraday Soc.* 29, 1255-9 (1933).—A filter consisting of S-free  $\text{CCl}_4$  mixed with hexane or cyclohexane purified for spectrographic use may be used to alter the intensity of the 253.7  $m\mu$  line of a Hg-arc lamp. The solns. obey Beer's law. Cyclohexane is slightly to be preferred because its b. p. is nearer that of  $\text{CCl}_4$  and errors from evapn. are small. A filter was not used for more than 15 min. since some decompn. was shown when solns. contg. 2.78 moles per l.  $\text{CCl}_4$  in each solvent were exposed for 4 hrs.. By use of the filter the rate of the photochem. chain reaction between  $\text{H}_2$  and  $\text{N}_2\text{O}$  at high and low pressures was shown to be proportional to the sq. root and to the first power of the intensity, resp., as predicted.

Janet E. Austin

**Photochemistry of endothermic Ag compds. (Arcus, Eggert) 5.** Light quantum yield in chromate gelatin processes (Biltz, Eggert) 5. Schwarzschild effect in Röntgen photography (Luft) 5.  $\text{H}^+$  and heavy water in electroplating (Forstner) 4. Formation of hemiacetals and hydrates of carbonyl and carboxyl derivs. [absorption spectra] (Herold) 10. Aq.  $\text{BaSO}_4$  suspensions for x-ray purposes (Himg. pat. 108,618) 18.

Curie, Mme Pierre: Les rayons  $\alpha$  et  $\beta$  des corps radioactifs en relation avec la structure nucléaire. No. 62 of "Actualités Scientifiques et Industrielles." Paris: Hermann & Cie. 40 pp. F. 12.

St. John, Ancel, and Isenburger, Herbert R.: Industrial Radiography. New York: J. Wiley & Sons, Inc. 232 pp. \$3.50. Reviewed in *Ind. Eng. Chem., News Ed.* 12, 109 (1931).

Seeliger, Rudolf: Einführung in die Physik der Gasentladung. 2nd ed., enlarged. Leipzig: J. A. Barth. 563 pp. M. 40; cloth, M. 48.

Swings, P.: Spectres moléculaires, étude de molécules diatomiques. No. 74 of "Actualités Scientifiques et Industrielles." Paris: Hermann & Cie. 51 pp. F. 14.

Apparatus for charging highly adsorbent solids with radium emanation. Decca A.-G. (Auerger.). Ger. 593,393, Feb. 26, 1934 (Cl. 21g. 28.02).

#### 4—ELECTROCHEMISTRY

COLIN G. PINK

**The chemist in the electrical field.** T. H. Chisholm. *Can. Chem. Met.* 18, 48-9, 59 (1934). An address.

W. H. Boynton

**The high-frequency furnace and its use for the manufacture of steel castings.** T. R. Middleton. *Proc. Inst. Brit. Foundrymen* 25, 608-23 (1931) 1932). E. H.

**Electric steel practice in 1933.** Viktor Stobie. *Iron & Steel Ind.* 7, 125-8 (1934); cf. *C. A.* 28, 1929<sup>b</sup>. E. H.

**Rational operation of electric arc furnaces.** E. Decherf. *Rev. universelle mines* 10, 1 6, 37-44 (1934). See *C. A.* 28, 413<sup>b</sup>.

M. Hartenheimer

**The current-conducting properties of slags in electric furnaces.** I. Axel Wejnarth. *Trans. Electrochem. Soc.* 65, 11 pp. (preprint) (1934); cf. *C. A.* 28, 414<sup>b</sup>.—The elec. conductivities of series of meta-, ortho- and sesquiosilicates of Fe and Ca-Fe were detd. in an especially constructed Fe crucible heated in an elec. furnace. A sharp break in cond. was found at the f. ps. of these slags. The higher the CaO content, the poorer the cond. The sesquiosilicates show a lower cond. than the monosilicates. Data are tabulated and plotted.

C. G. F.

**Equalization of temperature in electric ovens.** F. G. H. Tate. *Analyst* 59, 108-70 (1934).—By the use of an elec. fan it was possible to obtain equality in temp. of all parts of an elec. oven. Without the fan the temp. at different parts varied 20° when the heating was adjusted to 100°.

W. T. H.

**Process innovations of the German aluminum industry; production of aluminum from clay.** Freitag. *Oberflächen-*

*tech.* 11, 27-8 (1934). A new method of producing Al from  $\text{Al}_2\text{S}_3$  has been developed; fused rock salt is used as electrolyte. An Al-Fe-Si alloy is at first made in the elec. furnace from clay and while in the molten state is treated with pyrite to produce  $\text{Al}_2\text{S}_3$ , which is then electrolyzed into Al and S; the decompn. voltage is 1 v. less than for bauxite.

M. Hartenheimer

**The electrochemical production of oxide films on aluminum.** I. Electrolysis in sulfuric acid solutions. D. V. Stepanov, T. G. Lyapunova, D. I. Kamkin, D. I. Berdichevskaya, G. A. Shchepetil'nikov. *J. Phys. Chem.* (U. S. S. R.) 4, 395-405 (1933).—The peculiarities in behavior of Al electrodes were studied in  $\text{H}_2\text{SO}_4$  solns. in relation to various elec. and chem. factors with the object of obtaining oxide layers of good insulating properties. Both d. c. and a. c. were tried. The curves for increase in the overvoltage in the baths during the process of formation of oxide films were obtained. The relationship of the gap overvoltage of films to the concn. of electrolyte, c. d., etc., was detd. Films obtained had a gap overvoltage of 600 v. on formation by a. c. and of 800 v. on formation by d. c. Qualitatively it was shown that films produced by a. c. had a large elasticity. Addn. to the electrolyte of  $\text{Al}_2(\text{SO}_4)_3$  had no influence on gap overvoltage and elasticity but reduced the c. d. permissible and raised the overvoltage.

G. Farrman

**Electrical properties of oxide insulation on aluminum.** S. S. Gutin. *J. Tech. Phys.* (U. S. S. R.) 3, 1185-90 (1933); cf. *C. A.* 27, 5652.—Oxide layers obtained in

$\text{H}_2\text{C}_2\text{O}_4$  are cryst., being the  $\gamma$  modification, and those in  $\text{H}_2\text{SO}_4$  are of very fine cryst. structure. Size of structure influences dielec. coeff. only. The layers are very porous, absorbing water up to 32.6% by vol. Sp. vol. resistivity is  $10^9$  ohm/cc. Cond. and dielec. loss up to  $140^\circ$  depend chiefly on absorbed water, at  $250^\circ$  they are very satisfactory, but at higher temps they increase rapidly. The oxide layers are brittle, increasingly so with increasing thickness. Low dielec. strengths are due to absorbed water, but may be increased several times by compounding with org. compds. and filling the pores with N. It is possible to obtain layers with thicknesses of tenths of a mm. having a dielec. strength of thousands of volts.

•Bino Hanninen

**Fluorine-preparation cell.** L. M. Dennis and E. G. Rochow. *J. Am. Chem. Soc.* 56, 879 (1934); cf. *C. A.* 26, 657. A trap is fitted to the anode side which catches any  $\text{KF}\cdot\text{HF}$  which may foam over when the cell is operated at 80% efficiency.

•A. L. Henne

**Electrodeposition of rhodium.** R. H. Atkinson and A. R. Kaper. *Metal Ind.* (London) 44, 191 4; *Metal Ind.* (N. Y.) 32, 119 21 (1934).—After describing the historical development of Rh plating and pointing out the properties of Rh coatings, the authors give directions for preplating salts, especially  $\text{NH}_4$  rhodinitrite. One l. of soln. contg. 5 g. Rh as chloride is boiled with 40 g.  $\text{NaNO}_2$  until light yellow; then 3 g.  $\text{Na}_2\text{CO}_3$  is added to remove traces of Bi, and the soln. is filtered. After cooling, 50 cc. of satd.  $\text{NH}_4\text{Cl}$  soln. is added and the ppt. of  $\text{NH}_4$  rhodinitrite filtered and washed with cold  $\text{H}_2\text{O}$ . The salt (8.52 g., contg. 2 g. Rh) is fumed down with 33 cc. concd.  $\text{H}_2\text{SO}_4$  and after cooling dil. to 1 l. The best conditions for deposition are: Pt electrodes,  $40^\circ$  and a c. d. of 5 amp. per sq. ft. The deposits are very white, bright and almost free from porosity. The cathode current efficiency is about 45%. Plating for 15 min. gives 4.5 mg. Rh per sq. in. A few applications for Rh plating are cited.

A. E. Beilich

**Examination of electrolytic silver deposits by x-rays.** G. R. Levi and M. Tabet. *Att. acad. Lincei* 18, 463 7 (1934). Bright deposits of Ag were examd. The Ag is deposited in isodiametric particles, whereas Cr is deposited as plates (*C. A.* 27, 5251). This is proof that plate structure is not a necessary condition for producing bright deposits.

A. W. Contier

**The electrodeposition of indium from cyanide solutions.** Daniel Gray. *Trans. Electrochem. Soc.* 65, 4 pp. (preprint) (1934). Aq. solns. of In cyanide dissolved in an excess of cyanide are not very stable. There is a marked tendency for  $\text{In}(\text{OH})_3$  to sep. out. This pptn. may, however, be avoided and the bath rendered very stable by adding a very weak acid, such as glucose or glycine ( $1\frac{1}{2}$  g. glucose per g. In content of bath). Soft silver-white deposits of In are obtained from this bath of 30–60 g./l. In, at c. d. of 1–16 amp./sq. dm. and at room temp. C. G. F.

**The electrodeposition of copper, nickel and zinc alloys from cyanide solutions.** I. Charles L. Faust and G. H. Montillon. *Trans. Electrochem. Soc.* 65, 12 pp. (preprint) (1934).—Cu-Ni-Zn may be simultaneously deposited from KCN solns. of the metals, as an alloy. Zn is more readily deposited than Cu, and both of these metals are much more readily deposited than Ni. The percentage of Cu in the deposit is relatively greater than the percentage of Cu in the bath. The Ni in the deposit is relatively much less than the Ni in the bath. The Zn in the deposit is more nearly the same as that in the bath. Increase in c. d. favors deposition of Zn and Ni over Cu. However, Zn deposits more readily than Ni with increase in c. d. Increase in temp. causes an increase in the percentage of Cu in the deposits. Increase in temp. causes relatively a greater decrease in the Zn in the deposit than the Ni. At about  $50^\circ$  there is a rearrangement of the factors controlling deposition. This causes a reversal in the slope of the curves plotted for the percentages of Cu and Zn in the deposit versus the percentages of these metals in the bath. The same effect is noticed upon the ternary curves giving the compn. of the deposits. C. G. F.

**Electroplating copper on manganin.** C. R. Cosens.

*J. Sci. Instruments* 10, 256 (1933).—Surface "demanganization" by making the wire alternately anode and cathode in concd. aq. NaOH, and following this by treatment in  $\text{H}_2\text{SO}_4$ , allows an adherent Cu plating suitable for soft-soldering to be deposited subsequently. B. C. A.

**Practical regulation of chrome-plating baths in the shop.** J. Loiseau. *Usine* 43, No. 11, 27 (1934).—A review.

M. Hartenheim

**Chromium-plating literature.** XXIII. L. H. Decker. *Platers' Guide* 30, Mar. 13–15 (1934); cf. *C. A.* 28, 2274.

W. H. Boynton

**Chrome plating.** Max Schlötter. *Oberflächentechn.* 11, 40–1 (1934).—The fact that on chrome-plated brass, especially often-used handle bars, railings, etc., the fact that the Cr peel's off must be ascribed to a layer of H formed during plating between the brass surface and the Cr plate; an intermediate layer of Ni does not help very much, as Ni, too, dissolves H, so that a H layer comes between Ni and Cr, and H diffuses through the Ni layer to the basis if there is not enough Ni to absorb all H. The pressure with which H diffuses through electrolytically deposited Ni may amount to 10 atm., and this easily explains the fact that the Cr deposit is cracked and thrown off. The Ni layer must be thick enough to absorb all H generated in Cr plating; the different expansion coeffs. are not the cause of the peeling. Degreasing by electrolysis is not to be recommended; bright Ni plating should be applied, so that the object can be brought directly into the Cr-plating bath.

M. Hartenheim

**Nickel-chromium plating technic.** Maurice Cook and B. J. R. Evans. *Metal Ind.* (London) 44, 279–81, 320–31 (1934).

E. H.

**Ductility and adhesion of nickel deposits.** F. P. Romanoff. *Trans. Electrochem. Soc.* 65, 16 pp. (preprint) (1934).—The ductility of electrodeposited Ni is a function of the crystal structure and of the contained basic salts and gases.

Hard fibrous or columnar Ni structures have an apparent hardening effect on a ductile base even when very thin. This apparent hardening of the base disappears upon removing the deposit. Full ductile conical Ni structures of any thickness will not affect the base adversely. Ductile Ni can be hardened by absorption of H through action as a cathode in alk. or acid solns. Cr deposition on Ni has the same effect. Part of this hardening can be overcome through vacuum or heat treatment, or by Cr plating under conditions which prevent the absorption of too much H. Testing for adhesion by the Erichsen extruded cup test, or modifications thereof, is shown to be unreliable. A modified cup test is given which will always detect poor adhesion. C. G. F.

**Heavy hydrogen and heavy water in electroplating**

H. M. Forstner. *Oberflächentechn.* 11, 39 (1934). Since  $\text{H}_2$  and "heavy" water can be produced most conveniently by electrolysis, and particularly by electrolysis with Ni electrodes in  $\text{NaOH}$  soln., possibly many of the difficulties and failures connected with Ni plating can be traced to the accumulation of heavy water in the electrolyte. M. Hartenheim

**Accelerated tests of electroplated metal coatings on steel.** P. W. C. Strausser. *Monthly Rev. Am. Electroplaters' Soc.* 20, No. 5, 6 16 (Jan., 1934).—This study was to det. the relation between accelerated and atm. tests, and to select methods and conditions useful in the specifications and inspection of electroplated coatings.

Companion specimens to those employed for the atm. exposure tests (cf. *C. A.* 26, 5534; 27, 900, 2628) were taken. The solns. and conditions used in the 3 tests studied, viz., ferroxyl, salt-spray and intermittent immersion (in 20% NaCl) tests, are given. Conclusions: The ferroxyl test yields, in a short time, results for Ni and Cr finishes that correspond approx. to their behavior in the atm. Being a porosity test, it readily distinguishes between very good and very bad coatings whose protective value is related to their porosity, e. g., coatings contg. Cu, Ni and Cr. The salt spray and intermittent immersion tests yield results that represent roughly the relative order in a marine atm., provided the relative extent of rust constituting initial



failure, or the proportion of rust at the end of a specified period, is at least approx. defined, for example, by the system used for atm. ratings. In general, the accelerated tests failed to develop the same kind and distribution of rust spots as are found in atm. corrosion, even in marine locations; no simple test includes all the factors involved in atm. corrosion, and exact test specifications for electro-deposited coatings are, at present, impossible.

**Electrolytic oxidation. IV. Anodic polarization in halide solutions.** S. Glasstone and A. Hickling. *J. Chem. Soc.* 1934, 10-18; cf. *C. A.* 27, 5253.—With app. previously described, (*C. A.* 27, 407) the variation with time of the potential of a Pt anode in the electrolysis of chloride solns. at const. c. d. was studied under a variety of conditions. Two potential stages were observed, one corresponding approx. to that for reversible Cl-ion discharge, the other being about 0.6 v. higher. The change from the lower to the upper potential condition was favored by increased c. d., lower concn. of halide, increase of  $p_H$ , and the presence of catalysts for the decompn. of  $H_2O_2$ . Two similar stages were found when the anode potentials at a series of c. d.s. were measured at short intervals of time in chloride, bromide and iodide solns., the case of onset of the polarization corresponding to the higher electrode potential decreasing in the order given. The addn. of  $H_2O_2$  catalysts tended to suppress the lower potential condition. The potential of a platinized-Pt anode did not, normally, rise appreciably above the reversible value for Cl-ion discharge, but in the presence of  $H_2O_2$  catalysts, or if the electrode was previously polarized anodically (cf. *C. A.* 27, 5253), the 2 stages of anode potential were readily observed. Increase of temp. (from 18° to 60°) favored the polarization to the upper potential condition in certain Cl and I solns., but had little effect on the polarization in Br solns. The current efficiency for halogen liberation at the anode was, in some cases, markedly decreased by the addn. of  $Mn^{++}$  salts to the electrolyte. The results are discussed in the light of the theory that there is, in addn. to the reversible discharge of halogen ions at the anode, the irreversible formation of  $H_2O_2$  resulting from the combination of discharged OH ions. The peroxide is able, under certain conditions, to oxidize the halide ions to form free halogen, or else it may decompose, yielding O. The relative extent to which these 2 processes occur det. the influence of the nature of the halide, the effect of concn. of the halide, current strength,  $p_H$  of the electrolyte, temp., and the presence of catalysts for peroxide decompn., on the onset of the higher potential condition. E. B. Sanigar.

**Electrolytic reduction potentials of organic compounds. XI Reduction potentials of nitroanilines.** Masuzo Shikata and Eiichi Taguchi. *Mem. Coll. Agr. Kyoto Imp. Univ.* No. 29, 17 pp. (1934).—See *C. A.* 27, 1280.

**Alkaline anodic pickling of high-speed steel.** Raymond R. Rogers. *Trans. Electrochem. Soc.* 65, 4 pp. (preprint) (1934).—High-speed steel parts are anodically treated at 2.7 amp./sq. dm. in an alk. bath contg. 115 g./l. NaOH + 15 g./l. citric acid. When the gas evolution is entirely uniform, the pickling has been completed. The parts are then washed and dipped for an instant into a HCl soln. The alk. anodic treatment causes W to go into soln. with comparative ease, whereas in the older HF dip, the interaction with W compds. was unsatisfactory. C. G. F.

**Antimony electrodes.** Arvid Holmquist. *Svensk Kem. Ind.* 46, 2 10 (1934); cf. *C. A.* 26, 5853.—The potentials of Sb rods are very different from Sb powder and these electrodes in HBr or HCl are not like those in  $H_2SO_4$  or  $HClO_4$ . Plotting  $p_H$  against acid concn. gives different types of curves. There are tables giving oxidation-reduction potentials for  $Sb^{III}$  and  $Sb^V$ , also partition data for  $SbCl_3$  in  $H_2O/Et_2O$ . A. R. Rose.

**Silver electrodes.** Werner Hiltner. *Z. anal. Chem.* 96, 193 (1934); cf. Hahn, *C. A.* 28, 1278.—Polemical. W. T. H.

**Cell: lead | lead sulfate | cupric sulfate | copper.** M. Quintin and A. Lebetre. *Compt. rend.* 198, 1140-1 (1934).—Comparison of the normal potentials of the cells:

$1 - Pb(amalgam\ 2\ phases) | PbSO_4(s) | CuSO_4(c) | Cu(amalgam\ 2\ phases)^+ (I)$  for  $c = 0.105 - 0.00105$  and  $Cu(amalgam\ 2\ phases) | CuSO_4(c) | Hg_2SO_4(s) | Hg^+(II)$  shows that the irregularities in II when  $c < 0.003 M$  are due to the soly. of  $Hg_2SO_4$ . Similar irregularities are exhibited by I if  $c$  is  $< 0.001 M$  (cf. *C. A.* 27, 3873).

C. A. Silherrat.

**The history of the development of electroanalysis.** In memory of Alexander Classen. Hellmut Fischer. *Angew. Chem.* 47, 129 30 (1934). Karl Kammermeyer.

**The electrolytic valve action of columbium and tantalum on alternating-current circuits.** D. P. Calhane and A. J. Laliberte. *Trans. Electrochem. Soc.* 65, 7 pp. (preprint) (1934).—Oscillograph records are presented showing the film behavior of Ta and Nb on a.-c. circuits. Ta gives fairly efficient rectification of a. c. in  $H_2SO_4$  soln., while Nb, even at 2.5 v. a. c. shows very little electrolytic valve action. At 7 v. a. c., the valve action of Nb fails nearly entirely. The oscillographic curves for current and voltage give an interesting visual record of the momentary progress of film behavior on each half cycle. Data on the comparative rectifying abilities of Ta and Nb are presented. C. G. F.

**The mechanism of rectification.** W. Ch. van Geel and H. Emmens. *Z. Physik* 87, 220 30 (1933); cf. *C. A.* 25, 5100. From current and capacity measurements of electrolytic Al rectifiers it is concluded that the emission theory advanced for solid  $Cu_2O$  rectifiers also holds in this case. The great difference of electron d. in the metal and the solid oxide layer is, therefore, responsible for the rectifier action. This is also evident from the fact that the emission formula for the current  $i$  is  $i = A F^2 e^{-h/F}$ , in which  $F$  = field strength. Impurities such as Fe and Cu salts are dangerous, as metal is deposited and the rectifying action destroyed. Egon Bretscher.

**The development of gaseous conduction lamps.** L. J. Buttolph. *Trans. Electrochem. Soc.* 65, 14 pp. (preprint) (1934). Recent developments in gaseous conduction lamps have involved new principles of electrode design and operation, the use of vapors and gases not previously found practical, and the adaptation of the glass compn. of the tubes or bulbs to the vapors used. Sources of line and band spectra are of recent interest because of their use as efficient sources of ultra-violet, as sources of colored light of high purity, and of subjective colors of unique characteristics. C. G. F.

**Elec. properties of alkyd resins (Kienle, Ruce) 26.** Cl smelting with chloride electrolysis (Ashcroft) 9. Mg from Solikamsk carnallite [by electrolysis] (Sheherbakov) 18. Electrolytic Zn from fume produced from Trail Pb blast furnace slags (Hamay, Bryden) 9. Ceramic insulating parts for elec. resistance furnaces (Albers) 19. Impregnated asbestos cement for chem. equipment [Cl manuf.] (Borodulin) 20.

**Lorentini, Ascanio:** Elementi di elettrolitica generale ed applicata. 2nd ed. Milan: U. Hoepli. 294 pp. 1. 15. Reviewed in *Nomenclatura chim.* 3, 8 (1933).

**Batteries.** Jens P. Gjerulf and Hans P. Nielsen. *Brit.* 402,564, Dec. 7, 1933. A diaphragm for sepg. or wrapping round the electrodes of dry cells consists of paper-like material prepd. from a Japanese plant, mitsumata (*Edgeworth papyrifer*).

**Electric battery.** József Janicska. *Hung.* 108,668, March 1, 1934. Structural details.

**High-tension electric batteries.** The Chloride Electrical Storage Co. Ltd. and Arthur W. Browne. *Brit.* 403,376, Dec. 21, 1933.

**Dry batteries.** Thomas John Brown. *Brit.* 402,643, Dec. 7, 1933.

**Machine for applying molten sealing material for closing the tops of dry batteries.** Kasimir Baufgarten and Ferdinand Roessler. *Brit.* 402,258, Nov. 30, 1933.

**Storage batteries.** The Chloride Electrical Storage Co. Ltd. and Herbert Dean. *Brit.* 402,210, Nov. 30, 1933.

**Storage batteries.** Charles J. V. Fery. Brit. 402,290, Nov. 30, 1933. Sn is used as the material for the neg. electrode of a battery in which the electrodes are imbedded in porous granular material, *e. g.*, earthenware. An alloy of Sn 90 and Sb 10 parts may be used instead of pure Sn.

**Storage batteries.** Drumm Battery Co. and Robert H. D. Barklie. Brit. 402,752, Nov. 28, 1933. Some or all of the following parts of an alk. storage battery are made of (an alloy contg.) Mg: pole pieces, spacing washers, the pos. grids and their frames, clamps for holding the 2 sets of electrodes together, the battery container. Alloys of Mg and Ni with Mn, Cd or Zn or with Cd and Cr may be used.

**Storage batteries.** Jacob van Geggns. Fr. 758,708, Jan. 22, 1934. The electrolyte for batteries of the Pb- $\text{PbO}_2$  type is composed of a mixt. which when dissolved in water or  $\text{H}_2\text{SO}_4$  gives one or more alkali metal ions, one or more bivalent ions of Mg, Be, Zn or Cd, ions of Al and one or more neg. org. ions, none of the ions forming insol. compds. in the medium. An example contains  $\text{MgSO}_4$  63.5,  $\text{Na}_2\text{SO}_4$  5.6, ammoniacal alum 3.7, K tartrate 0.6,  $\text{MgCO}_3$  0.8, glycerol 0.1, cochineal 0.3 and  $\text{PhNO}_2$  0.1 parts.

**Machine for manufacture of dry batteries.** Ludwig Anker and Carl Anker (trading as L. Anker Maschinenfabrik). Brit. 402,517, Dec. 7, 1933.

**Alloys for storage-battery plates.** Max Schlötter. Brit. 402,709, Dec. 1, 1933. See Fr. 737,785 (C. A. 27, 1578).

**Kerr cells.** Wm. W. Jacob and Baird Television Ltd. Brit. 403,155, Dec. 21, 1933.

**Electric condenser.** Jesse T. Curtis (to Curtis Continental Corp.). U. S. 1,950,352, March 6. Spaced metal plates, including Al, Mg or Ta plates are used with an interposed electrolyte formed with  $(\text{NH}_4)_2\text{CO}_3$ ,  $\text{H}_2\text{BO}_3$  and an alc. of low hygroscopicity such as ethylene glycol.

**Electrolytic condenser.** Julius B. Lilienfeld (to Ergon Research Laboratories, Inc.). U. S. 1,950,119, March 6. Structural features of a condenser which may have cathodes of nonfilming metal such as Cu and an electrolyte such as  $\text{H}_2\text{RO}_2$  or salicylic acid soln. and a cathodic Al container.

**Electrolytic condenser.** Elektrizitats A.-G. Hydrazwerk. Fr. 758,220, Jan. 12, 1934. Silk cloth is used between the metallic sheets.

**Electrolytic deposition of metals.** Anaconda Copper Mining Co. Fr. 758,205, Jan. 12, 1934. The vat contains a principal and an auxiliary cathode; a current is maintained through the mass of electrolyte from the anode to those parts of the principal cathode where a deposit is desired; and a current is maintained from those parts of the principal cathode where a deposit is not required to the auxiliary cathode through a 2nd electrolytic mass practically isolated from the first.

**Electrodeposition of cobalt as powder.** Société générale de constructions électriques et mécaniques (Alsthom) (to The British Thomson-Houston Co. Ltd.). Brit. 403,281, Dec. 21, 1933. See Fr. 750,097 (C. A. 28, 4207).

**Tarnish-resisting metal.** Blasius Bart (to The Precious Metals Developing Co. Inc.). Can. 340,007, Mar. 13, 1934. Tarnishable metal is rendered nontarnishing by electrodepositing over it a coating of Ni and then electrodepositing over the Ni from an acid bath a coating of Rh. Cf. C. A. 28, 22791.

**Coating aluminum.** Aluminum Colors Inc. Fr. 758,545, Jan. 18, 1934. Al or its alloys is coated by anodic treatment in a bath of  $\text{H}_2\text{SO}_4$  of 35-60% by wt. and under such conditions that the anode is kept at a low temp.

**Protecting aluminum.** Aluminum Colors Inc. Fr. 758,363, Jan. 15, 1934. Al and its alloys are protected by a layer of oxide formed by a soln. of  $\text{H}_2\text{SO}_4$  in an electrolytic cell, Al being the anode.

**Apparatus for electrolysis of brine.** David J. Evans. Fr. 758,303, Jan. 15, 1934.

**Temperature-compensated apparatus for estimating and controlling the composition of electrolyte solutions by measuring their electric resistance.** Wilhelm Schmidts. Ger. 593,023, Feb. 20, 1934 (Cl. 421.3.04).

**Effecting chemical reactions.** René C. Sabot. Brit. 402,419, Nov. 17, 1933. In carrying out nonexplosive chem. reactions between liquids and (or) solids and liquids and (or) solids and gases, a gaseous suspension of the said solids and (or) liquids, physically stabilized by ionization of the gaseous medium, is prepd. and used to effect the required reaction. Known ionizing agents may be initially used, and a high-frequency elec. discharge is used to maintain the ionized condition. According to an example dyes may be stably suspended, as such or in soln., in a previously ionized gaseous medium and may be pptd. on the body to be dyed by electrostatic means. The coloring effect may be localized by the interposition of suitably shaped dielec. screens.

**Synthesis of nitrogen oxides.** Gutehoffnungshütte Oberhausen A.-G. Ger. 593,063, Feb. 21, 1934 (Cl. 121.26). A mixt. contg. N and O is passed in contact with a solid substance, *e. g.*, granular  $\text{Fe}(\text{OH})_3$  of asbestos, arranged between electrodes to which current of high frequency and high tension is supplied, the frequency and the tension and the distance between the electrodes being adjusted so that the solid is highly heated while the formation of sparks is avoided as far as possible.

**Annealing razor blades.** Herbert L. Claiss. Brit. 403,537, Dec. 28, 1933. Addn. to 401,366 (C. A. 28, 26287). In the process of 401,366 the current is passed through the blades in the transverse direction.

**Hardening metals.** Paul Mouravieff. Fr. 758,323, Jan. 15, 1934. Metal objects, particularly steel, are hardened by moving them in a continuous manner in contact with an incandescent electrode, *e. g.*, an anode, contg. in its compn. the substances it is desired to incorporate in the metal. The heating is regulated to provoke, on the one hand, on the surface of the object a fusion of the metal allowing the formation of an alloy with the disaggregation materials of the electrode, and on the other hand a deeper softened zone in which the particles of the substance forming the electrode become incorporated, the core of the metal being unaltered by heating.

**Colloidal suspensions.** Maurice C. L. Borne and Gabriel J. A. Pelletier. Fr. 758,797, Jan. 23, 1934. Pure colloidal suspensions of various substances are prepd. by the action of a cathodic bombardment in a vacuum or rarefied gas, the particles being collected in a liquid in which the suspension is desired.

**Boron.** Jean L. Andrieux. Ger. 593,425, Feb. 26, 1934 (Cl. 40c. 13). A fused mixt. of Mg borate (or  $\text{B}_2\text{O}_3$  and  $\text{MgO}$ ) with a fluoride is electrolyzed. A suitable mixt. contains  $\text{B}_2\text{O}_3$  140,  $\text{MgO}$  40 and  $\text{MgF}_2$  62 parts, and may be treated at  $1100^\circ$  and 10-15 v.

**Boron carbide.** Raymond R. Ridgway (to The Norton Co.). Can. 339,873, Mar. 6, 1934. A resistance furnace is charged with a mixt. of 2 mol. equivs. of anhyd.  $\text{B}_2\text{O}_3$  which is substantially free from Fe, Al and Si, and 7 mol. equivs. of C. An elec. current is passed through the furnace, raising the temp. of the inner zone of the mixt. in an atm. of CO above the m. p. of boron carbide. There is thus formed an ingot of boron carbide which is characterized by a continuous crystal structure substantially devoid of free graphite and having substantially the formula  $\text{B}_4\text{C}$ .

**Chlorine and alkali hydrates.** Electrochlor. Fr. 757,871, Jan. 5, 1934. An electrolytic cell for Cl and hydrates has anodic and cathodic compartments mounted alternately in filter-press fashion and sepd. by diaphragm permeable to the ions but almost impermeable to liquids. The brine circulates through all the anodic compartments mounted in series, then through all the cathodic compartments also in series. One or more anodic and cathodic elements are mounted in a vat constructed of reinforced cement which has on one of its walls baffled saturators into which the salt is introduced directly.

**Nitrogen.** Emile Briner and Charles H. Wakker. Ger. 590,806, Jan. 13, 1934 (Cl. 121.26). N and air or hydrocarbon vapors are converted to N oxide mixts. or N hydrocarbon mixts, by subjection to a luminous arc between electrodes of Cu or Fe alloyed with alkali or alk earth metals.

**Electric arc furnace.** Demag-Elektrostahl G. m. b. H. Fr. 758,537, Jan. 18, 1934. A vessel is described for charging metal to the furnace.

**Induction furnaces.** The Roessler & Maschlacher Chemical Co. Brit. 402,824, Dec. 11, 1933. An app. for effecting gas reactions requiring a supply of heat comprises a reaction chamber of small cross section the walls of which form the secondary circuit of a step-down transformer.

**Electric induction muffle furnaces for heating fluids or solids.** Edwin F. Northrup (to Electric Furnace Co. Ltd.). Brit. 402,988, Dec. 14, 1933.

**Induction fusion furnace.** Heinz Ilberg. Fr. 758,972, Jan. 26, 1934.

**Induction furnaces for fusing metals.** Victor Stobie. Fr. 758,937 and 758,938, Jan. 26, 1934.

**Induction furnace crucible.** Siemens & Halske A.-G. (Heinz Siegel, inventor). Ger. 590,597, Jan. 5, 1934 (Cl. 31a. 3.01).

**Etching plates for electrolytic converters and for photocells.** A. A. Ivanov and N. G. Roslyayev. Russ. 31,516, Oct. 31, 1933. Cu plates covered with a layer of Cu<sub>2</sub>O are etched with HCl and washed with an aq. soln. of a Cl salt of any alkali or alk. earth metal.

**Graphite resistor bodies suitable for thermostatic heaters, etc.** Sterne Morse. U. S. 1,950,089, March 6. Graphite particles are suspended in a liquid and sedimentation of the particles is permitted to form a cake which is compacted and portions of the cake material are formed in a press. App. is described.

**High-emission cathodes.** Radioaktiengesellschaft D. S. Loewe and Ernst Waldschmidt. Fr. 758,750, Jan. 22, 1934. On a wire support is produced a compact and coherent intermediate layer which contains one or more alk. earth metal oxides as well as the oxide of the metal of the support, and this layer is powd. with a light metal such as Ba.

**Spark-plug electrodes.** Harry D. DeLong (16% to Paul J. Weitkam). U. S. 1,949,955, March 6. A spark-plug center electrode is provided with a sleeve of conducting material which attains and retains a relatively high degree of heat, such as equal proportions of bronze, brass and "red aluminum."

**Electric conductors.** The International Latex Processes Ltd. Fr. 757,849, Jan. 5, 1934. Conductors are insulated by treating them with aq. dispersions of rubber which have been partly or wholly freed from sol. substances other than the rubber, e. g., by dialysis or electro-dialysis.

**Electric contacts.** P. R. Mallory & Co., Inc. Brit. 402,888, Dec. 14, 1933. In the manuf. of make-and-break contacts of W the material is treated to increase the size of the surface granules or reduce the amt. of amorphous material between the granules, a single crystal or large granule, in the limit, being used as the contact. Such single-crystal contacts may be formed by crystal growth around a single-crystal wire so as to form a slug or bar which is cut into individual contact points. In 1 method

contacts already mounted, and subjected or not to a preparatory treatment, are electrolytically conditioned in a soln. of KOH or K or Na carbonate or bicarbonate, but preferably in a soln. contg. NaOH 40, Na<sub>2</sub>WO<sub>4</sub> 4 and H<sub>2</sub>O 1000 parts.

**Electrical purification of gases.** Siemens-Schuckertwerke A.-G. Brit. 402,423, Nov. 23, 1933. In the elec. sepn. of suspended particles from gases by a nonhomogeneous nondischarging field, the gases are treated under superatm. pressure. App. is described.

**Apparatus for ionizing gases, especially for the electrical purification of gases.** George Brion and Arthur J. Krutzsch. Brit. 403,431, Dec. 17, 1933.

**Grids for electric discharge valves.** Telefunken Gesellschaft für drahtlose Telegraphie m. b. H. Brit. 403,003, Dec. 14, 1933.

**Discharge rectifiers with gas or vapor filling.** Soc. anon. Hewittie and Marcel Demontvignier. Brit. 403,126, Dec. 15, 1933.

**Discharge lamps.** Nikolaus Lebedenko, Rudolf Levy and Wladislaw Zeitlin. Brit. 403,208, Dec. 21, 1933.

**Discharge lamps.** Rudolf Zaddach. Brit. 402,747, Dec. 4, 1933. An elec. gaseous arc discharge lamp, provided with hot actuated electrodes between which an elongated arc is produced, is provided with a filling of rare gas or metal vapor having a comparatively high ionization potential and a comparatively high pressure during operation, with at least 1 addnl. metal vapor of lower ionization potential and vapor pressure which serves as a source of light, the other part of the filling not participating perceptibly in the light emission. Metal vapors, e. g., of Na, Li, K, Zn, Cd, Hg, etc., at about 200-300° and pressures of 0.1-10 mm. are brought to light emission within an auxiliary gas or vapor, e. g., Ar, Ne, Hg vapor, at pressures up to 1000 mm. The lamp bulbs or tubes may consist of borate glass or have a SiO<sub>2</sub> content of less than 60%. Preferably about 5-15% Al<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub> or BaO is incorporated to make them resistant to the action of the hot metal vapors.

**Electric discharge lamp.** "Osa" Participations Industrielles (Soc. anon.). Fr. 758,622, Jan. 20, 1934. The lamp contains an amalgam of Na contg. not more than 10% of Hg.

**Base cut-out for electric lamps.** Daniel S. Gustin (to Westinghouse Lamp Co.). U. S. 1,950,028, March 6. A wall of compressed Cu powder and Na silicate closes one end of a metal cylindrical shell and supports a contact member spaced from the shell. When the filament is broken, current is by-passed.

**Incandescent-lamp bulbs.** Egyesült Izzólámpa és Villamosági R. T. Brit. 402,690, Dec. 7, 1933. Addn. to 359,749 (C. A. 27, 672). The gas-filled lamp of 359,749 is provided with a glass bulb, e. g., of quartz glass, which is permeable to ultra-violet rays.

**Device for feeding wires, e. g., filaments for electric incandescent lamps, toward a point of operation.** N. V. Philips' Gloeilampenfabrieken. Brit. 403,215, Dec. 21, 1933.

## 5—PHOTOGRAPHY

E. P. WIGHTMAN

**The Agfa bipack motion-picture photography.** A. v. Biehler. *Veröffentlich. wiss. zentral-Lab. phot. Abt. 1gfa 3*, 221-33(1933).—The 2-color process is simpler and requires less light in photography and in projection than the 3-color process, and gives for many purposes satisfactory color reproduction. Extinction curves for the usual orange and green filters of the 2-color process are compared with the filter of the Agfa front film. The bipack process, in which 2 film strips are placed together with the emulsions facing, is described with reference to photography and the printing and color process. The Agfa front film is sensitized for the green spectrum and carries a special orange-red filter. The back film is panchromatic. The characteristic and rate-of-development

curves are given for front and back films and for dipole films. The conversion of the Ag images into colored images proceeds in general with the aid of toning methods, virage methods and relief or bleaching processes. The extinction curves of the different agents used for these purposes are given.

**Comparison of film and paper in Röntgen photography.** Richard Herz. *Veröffentlich. wiss. zentral-Lab. phot. Abt. 1gfa 3*, 234-44(1933).—Because of reflection the paper can be practically as sensitive as the film, but at high density it falls far behind the film. The density range is less for the paper than for the film. The range of exposure time is also appreciably less for the paper. Photometric measurements show that the film gives greater

contrast than the paper. On the basis of phys. and technical considerations it is deduced that no fundamental technical improvement of Röntgen paper is possible.

Paul S. Roller

**The Schwarzschild effect in Röntgen photography.** Fritz Luft. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 245-7(1933).—The ordinary reciprocity law  $It = k$ , where  $I$  is the light intensity,  $t$  the time of exposure and  $k$  a const., holds for equal density by pure x-rays. The Schwarzschild law,  $I^p t = k$  holds when the rays are passed through foil, the range of intensity and of time varying by a factor of 1000 and 10,000, resp.;  $p$  is a const. which may be greater or less than 1. P. S. R.

**A photographic paper of constant form ("Correctostat").** Walter Kahts. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 312-13(1933).—Ordinary photographic paper after drying shrinks linearly 0.3-0.5%, while the shrinkage of Correctostat is less than 0.01%. This result is obtained by impressing the blank paper with Al foil, on which a clear varnish is then painted. The emulsion is poured on the varnish layer. Paul S. Roller

**The nature of the latent image in physical development.** Hans Arens. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 32-40(1933); cf. C. A. 27, 5663.—A review. Paul S. Roller

**The alteration during storage of the latent image in silver halide-gelatin layers.** Erwin Heisenberg. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 47-51(1933).—At a  $pH$  of 7.5 a sensitive panchromatic AgBr-AgI emulsion showed an increase in latent image after 4 weeks' storage of the exposed layer. On reduction of the  $pH$  to 5.7 by the addn. of dil.  $H_2SO_4$  before sensitization, the emulsion showed a marked retrogression after the same length of storage. The strengthening of the latent image on storage appears to be due to the sensitization. Paul S. Roller

**Theory of sensitization.** Erwin Heisenberg. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 115-24(1933).—Gelatin had little effect on the adsorption of pinacyanol by a AgBr emulsion. At optimum sensitization of the dried and undried photographic film the amt. of added dye is considerably less than the max. possible adsorption by the AgBr; furthermore the adsorption of the added dye is practically complete, leaving but a small percentage in the gelatin layer. The same result was obtained for different emulsions and dyes. On the addn. of larger quantities of pinacyanol there is a decrease in sensitivity. This is due not only to increased light absorption by the dye but to an actual desensitization of the individual grain. Paul S. Roller

**Standardization of the measurement of color sensitivity.** Martin Biltz and Herbert Blandes. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 85-92(1933).—The color convertibility of a photographic film is defined as the ratio of the photographic to visual efficiency for a given color. Nomograms are set up for detg. the color convertibility in terms of the photographic action for yellow, red, green and blue. A nomogram for detg. the extension factor of exposure is given for yellow filters in terms of the color sensitivity. Paul S. Roller

**Determination of the sensitivity of photographic films.** Martin Biltz and Erwin Heisenberg. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 75-84(1933).—From a practical standpoint the sensitivity is best characterized by the reciprocal of the quantity of light necessary to produce a predetd. density between 0.1 and 0.3, or by the reciprocal of the quantity of light at which an angle of  $11.3^\circ$  to the abscissa has been reached in the characteristic curve. The former method is preferable because of better reproducibility. P. S. R.

**A direct positive-forming photographic layer.** Hans Arens and John Eggert. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 166-9(1933).—See C. A. 28, 2631.

Paul S. Roller

**The graininess and resolving power of photographic layers.** Alfred Küster. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 93-105(1933).—The graininess,  $K$ , of a developed layer was detd. by the relation  $K = 100$

$\log Q_{0.5}$  where  $Q_{0.5}$  is the ratio of the densities in parallel light to that in diffused light.  $K$  varied in this way from 5 to 31. The photographic broadening of a slit image increases with the max. density at equal development. The broadening is widely independent of the width of the slit. At equal densities the greater the degree of development the less the photographic scattering. The loss of contrast is independent of the degree of development and of the density provided the density is not taken at a strongly bent part of the characteristic curve. The loss depends, however, on the contrast of the object. There is a great difference in resolving power of different photographic films in spite of equal size of the AgBr grains and equal graininess. Paul S. Roller

**Recent research on solarization.** Hans Arens. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 52-66(1933); cf. C. A. 27, 4182.—A review. P. S. R.

**The solarization of photographic plates.** Alexander Smakula. *Z. Physik 87*, 231-7(1933).—The solarization of AgBr plates has a max. for light of 400  $m\mu$ . This is explained as a re-formation of AgBr mols. from Ag under the action of excited Br atoms. Egon Bretscher

**The photochemistry of endothermic silver compounds.** Hans Arens and John Eggert. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 67-74(1933).—The prepn., development and fixation of gelatin emulsions of  $Ag_2C_2O_4$ ,  $AgN_3$  and  $Ag_2C_2$  are described. Absorption by the 3 colorless compds. and the sensitivity lie in the same region as for AgCl, except that there is a rapid decline of sensitivity for  $AgN_3$  and  $Ag_2C_2$  towards the shorter wave lengths. Despite the endothermic nature of the compds. the amt. of Ag liberated on equal light absorption is of the same order. The sensitivity to x-rays and  $\alpha$ -rays is much less than that of AgCl except for  $AgN_3$ , which is 15 times as sensitive to  $\alpha$ -rays. The decompn. of the Ag azide yields  $N_2$  at high light intensity and  $HN_3$  at low intensity, and of the  $Ag_2C_2$  free C. Paul S. Roller

**The light-quantum yield in chromate gelatin processes.** Martin Biltz and John Eggert. *Veröffentlich. wiss. zentral-Lab. phot. Abt. Agfa 3*, 294-302(1933).—Chromated Agfa-Pinatype plates were exposed to monochromatic light,  $\lambda$  436, and the amt. of  $NH_4$  chromate (I) converted into an insol. form detd. analytically, and the amt. of gelatin (II) rendered nonswelling detd. by comparison with an unilluminated plate. The quantum yield of I decreases continuously with time. This is due to absorption by the insol. compd. that is formed. The quantum yield of I corrected to zero time is  $\phi = 0.5 \pm 0.05$ , or 2 quanta absorbed per mol. of reacted  $(NH_4)_2CrO_4$ . A similar time decrease in  $\phi$  holds for II. Corrected to zero time,  $\phi = 0.3 \pm 0.07$  for II, or 3 quanta absorbed per mol. of converted gelatin. The compn. of the insol. product of I corresponds to  $(CrO)_2CrO_4$ , the II for reduction presumably coming from the gelatin. A yield of  $\phi = 0.3$  for II signifies that 2 mols. of gelatin unite with one mol. of the insol. chromic chromate to give a nonswelling adsorption copolymer. Paul S. Roller

**Chief factors in trichrome carbros.** Frank R. Newens. *Brit. J. Phot. Suppl.* 28, 5-6(1931).—Success in trichrome carbros depends more upon satisfactory bromide prints than upon any other factor. The factors controlling the quality of the bromide print are: (1) correctly exposed and (2) correctly developed negatives, (3) correctly exposed and (4) correctly developed bromide prints, (5) inclusion, whenever possible, of a "wedge" or neutral graded strip of black, gray and white in the picture. These factors are discussed. E. P. Wightman

**Development with *p*-phenylenediamine.** Rudolf v. Erhardt. *Am. Phot.* 27, 656 (6); *Brit. J. Phot.* 80, 663-4(1933).—A combined developer consisting of *p*-phenylenediamine and metol has been investigated. A metol developer is first used to develop the shadow portions. This is: metol, 0.5 g.;  $Na_2SO_3$ , 75 g.;  $H_2O$ , to 500 cc. Develop for only about 8 min. at  $21^\circ$ . Prolonged development gives graininess. Subsequently, develop 20 min. at  $21^\circ$  in *p*-phenylenediamine 5 g.;  $Na_2SO_3$ , 30 g.;  $H_2O$  to 500 cc. Wash between developments for about 5 min. in running water. E. P. W.

**Streamer markings in tank development.** F. Luft. *Brit. J. Phot.* 81, 75-4 (1934).—A method has been worked out for studying the streamer currents which cause streaks in film. With film which has not been previously washed in water, streaks occur down from the parts which yield in the developing process and are more pronounced the heavier the d. obtained. With washed film the streaks rise upward and are weaker the greater the d. produced. It can be plainly shown that in stagnant tank development, the currents which have been assumed to exist, but which previously had not been made visible, are in fact present. These facts are in agreement with assumptions previously made and hence lead to the same conclusions. E. P. Wightman

**Intermediates and dyes [useful as photographic sensitizers]** (Fr. pat. 757,708) 25. Photographically printing designs on textile piece goods (Brit. pat. 403,001) 25.

**Wall, E. J.:** The Photographic Darkroom. Boston: Am. Photographic Pub. Co., 107 pp. Bound, \$1.50. Reviewed in *Ghimie & industrie* 31, 630 (1934).

**Photography.** August Boettger and Michael Kronschnabel. *Brit.* 402,082, Nov. 20, 1933. To obtain finer gradations of color or of light and shade, without retouching, negatives and diapositives are obtained by exposing a light-sensitive surface through photographic masking negatives or diapositives of the original and following the masked exposures with unmasked exposures. Thus, for black-and-white pictures the original is photographed through a neg. mask to record the finer shades, the mask removed and a brief exposure made to record the highlights. For color-printing plate negatives, a panchromatic layer is successively exposed through a series of masking negatives, with appropriate filters, and the unmasked exposure is also made through an appropriate filter.

**Color photography.** Thomas T. Baker, Charles Bonamico, Ralph A. S. Grist and Spicers Ltd. *Brit.* 401,719, Nov. 20, 1933. To prevent the screen dyes of a multicolor screen film from wandering from the screen layer into the emulsion layer, a layer of synthetic resin, which may contain a plasticizer, is interposed between said layers.

**Color photography.** Durkoppwerke A.-G. *Brit.* 402,599, Dec. 7, 1933. See Fr. 747,337 (*C. A.* 27, 4748).

**Color photography.** Anna Weckfort. *Brit.* 402,231, Nov. 30, 1933. Addn. to 332,797 (*C. A.* 27, 5666). The color screen elements are supported upon or incorporated with a permeable top coating, e. g., of gelatin, superimposed upon the light-sensitive coating, or some elements may be supported upon the coating and incorporated therewith. The local selective sensitization may be limited to certain screen elements, e. g., blue, the portions under the remaining elements, e. g., green and red, being panchromatically sensitized. The screen may be made by applying fatty inks or substances which give off color to the coating; or by dyeing the coating between resists. To allow access of developing and fixing solns., impermeable screen elements may be removed by a solvent, e. g.,  $C_6H_6$ .

**Color photography.** Béla Gáspár. Fr. 757,376, Dec. 26, 1933. In using several layers one on the other, a part of which contain dyes or dye-forming substances, and the other part only substances sensitive to light, preferably Ag halide, chem. actions forming or destroying the dye are brought about in the latter layers, after the development of the image, these reactions acting on one of the neighboring layers to produce or destroy the dye. (*C. A.* 28, 720).

**Color photography.** Béla Gáspár. Fr. 757,417, Dec. 26, 1933. In producing color images in layers contg. dyes or dye-forming substances, the Ag image is transformed into a compd. which exercises a chem. action contrary to that of the treating baths forming or destroying the dye, which compd. prevents or slows down locally the action of the subsequent treating baths, destroying or forming the dye.

**Color photography.** Kalle & Co. A.-G. (Wilhelm Krieger, inventor). Ger. 593,251, Feb. 23, 1934. A component image colored with a water-insol. azo dye is first formed in known manner in a layer sensitized with a diazo compd. Other component images are then formed by imbibition. An example is given.

**Color cinematography.** Wm. van D. Kelley. *Brit.* 402,113, Nov. 23, 1933. A positive film is made from a pair of color-component negatives, alternate frames of the positive being made from the respective negatives, and 1 series of frames only being tinted corresponding to 1 color component, the positive being projected at twice the normal speed. The negatives may be made by exposing alternate frames through complementary color filters from superposed sensitive emulsions, 1 sensitive, the other insensitive to red, or by using a double or triple film for simultaneous presentation to the lens. The positive may be made by using stock coated with a dye insol. in the developing baths. When developed and fixed, the color-component frames corresponding to the dye color are coated with a colorless transparent waterproofing material, and the dye is bleached out of the other series of frames. The positives may also be made by coating alternate frames with a colored transparent waterproof coating material. Benzopurpurine, Congo red, eriochrome and neptune green SGX may be used as dyes. Suitable bleaching solns. include  $Na_2O_2$  or  $Na_2S_2O_4$ . The soln. for waterproofing may comprise celluloid dissolved in Am or Et lactate.

**Color printing.** Eduard Warnecke. *Brit.* 401,556, Nov. 16, 1933. In a process for making correctly colored printing forms for multicolor printing where a set of positive or negative half-tone part-pictures is produced from the original and the pictures retouched to obtain correct color values, each negative or positive part-picture is produced on a sep. light-sensitive layer applied to a white substratum carried by a nonexpandable body. The carrier may be a metal or glass plate coated with a white layer, e. g., baryta white, or a glass plate colored white throughout may be used. Alternatively, a sep. white layer may be dispensed with if a light-sensitive paper is used as the sensitive layer. In this case an intermediate layer, e. g., of water glass or of gelatin hardened with chrome alum may be applied to the carrier and the paper secured thereto by an adhesive of spirit varnish contg. gum elemi.

**Color photographs.** Béla Gáspár. *Brit.* 397,150, Aug. 16, 1933. In the production of reversed dye images from diffusely colored photographic and cinematographic metal deposit images the dye is decolorized, bleached or destroyed at the points of the metal deposit image by a reagent which is itself incapable of destroying the dye during the normal time of treatment but which decolorizes, etc., by the formation of reaction products or complex compds. of the metal. Suitable classes of reagents are: (a) nitrogenous org. compds., e. g., KCNS, cystein salts, phenylhydrazine, (b) compds. of the urea group, e. g., thiocarbamide, semicarbazide, thiosemicarbazide, guanidine, amidoguanidine, (c) indifferent inorg. S compds., e. g.,  $Na_2S$ , Ca polysulfide and (d) and (e) indifferent org. S compds. or indifferent acids, e. g., thiodiglycolic acid. The action may be increased or accelerated by the addn. of acids, phenols, aminophenols or their substitution products, aldehydes or sugar or by adding catalytically acting salts, e. g., of V, U, Mo or Fe. Azo dyes, particularly acid and substantive dyes, are most suitable. In applying the invention to color photography and cinematography a no. of differently colored and sensitized layers may be poured 1 over the other, or the dyes may be impressed, sprayed or otherwise applied to the support in the manner of a screen, admixed with sensitizers and filter dyes. Suitable dyes for a 3-color material are Diamine Pure Blue FF, Mordant Yellow GG and Diamine Fast Pink BBF. The colors are preferably fixed by mordant formation or deposition. Double tones may be produced by using dyes which bleach at different speeds. Dyes may be used which form colored reaction products at the points of the image, e. g., alizarin viridine.

Films coated on both sides and colored red on 1 side and blue-green on the other may be used. Transparencies for printing purposes may be obtained from negatives by coloring with a dark dye and performing subsequent reversal. Ag and Hg images are mentioned. In 397,188, Aug. 16, 1933, divided on 397,159, multicolor photographic images and cinematograph films are obtained by causing oxidizing agents to act simultaneously on a plurality of colored layers which contain deposit part-images. Thus 3 Ag halide emulsions are formed 1 on another, the lower contg. a blue dye and sensitive to red, the middle layer contg. a red dye and sensitive to green and the uppermost contg. a yellow dye. After exposure or printing the layers are developed, fixed and treated in a bath comprising (1)  $\text{NaClO}_2$ ,  $\text{HCl}$  and  $\text{H}_2\text{O}$  or (2)  $\text{KBrO}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{CuSO}_4$ ,  $\text{KI}$  and  $\text{H}_2\text{O}$ . When the desired coloration is obtained, the image is further fixed in  $\text{Na}_2\text{S}_2\text{O}_3$ . Reversed dye images are obtained. In 397,192, Aug. 16, 1933, divided on 397,159, oxidizing agents are used immediately after development of the metal-deposit part-images in the plurality of superimposed and differently colored and sensitized layers. After treatment in the oxidizing bath, *e. g.*, (1) of 397,188 or a bath comprising  $\text{Ca}$  hypochlorite and  $\text{AcOH}$  (which gives a pos. image), the images are fixed in the usual manner. Cf. C. A. 28, 720<sup>4</sup>.

**Photographic diazotype processes.** Philippe Frangioli and Robert Lantz. Brit. 402,883, Dec. 14, 1933. A diazosulfonate of an aromatic monoamine contg. an alkoxy group is used, and fixation is effected by a reagent which chemically suppresses the sensitiveness to light, *e. g.*, an aldehyde or an acid. In an example a support is impregnated with a mixt. of a soln. of *p*-anisidine diazosulfonate and the Na salt of  $\text{H}$  acid, and the exposed print is fixed by gaseous  $\text{HCl}$  or  $\text{HCOOH}$  or by an aldehyde, *e. g.*,  $\text{CH}_3\text{CHO}$ ,  $\text{AcH}$  or glyoxal. Cf. C. A. 27, 925.

**Photographic toning processes.** Emil Mayer and Nikolaus Benedik (trading as E. Mayer & Benedik). Brit. 401,648, Nov. 16, 1933. See Fr. 751,594 (C. A. 28, 982<sup>3</sup>).

**Photographic development.** Fritz J. Hepner. U. S. 1,949,911, March 6. Photographic Ag halide emulsions are developed by horizontal placement for several hrs. in an aq. metol or glycine developer of a concn. of about 0.06-0.25% contg. water-sol. sulfite but substantially free from alkali.

**Photographic emulsion.** Soc. pour l'ind. chim. à Bâle. Swiss 165,523, Feb. 1, 1934 (Cl. 40b). At least two emulsions of different degrees of ripeness are mixed and the whole ripened. In an example, the following are mixed: (1) a soln. contg. water,  $\text{AgNO}_3$ ,  $\text{NH}_4\text{OH}$  and citric acid; (2) water, gelatin,  $\text{KBr}$ ,  $\text{KI}$ ,  $\text{Na}_2\text{CO}_3$  and erythrosin soln.; (3) water, soft gelatin and medium gelatin; (4) water, soft gelatin, medium gelatin and  $\text{KBr}$ ; (5) alc.,  $\text{Cr}$  alum soln. and tartrazine soln. These solns. are mixed to give a photographic emulsion.

**Photographic emulsions.** Deutsche Maizena Ges. m. b. H. Fr. 757,451, Dec. 27, 1933. A binder for emulsions contains starch capable of being disaggregated, gelatins and a hardening agent such as  $\text{Cr}$  alum. The starch is heated with water, the  $\text{Cr}$  alum is added and to the slightly cooled mass a soln. of gelatin is added.

**Photographic emulsions.** Opticolor A.-G. Fr. 758,130, Jan. 11, 1934. In developing emulsions, where a solvent for the Ag salt, *e. g.*,  $\text{NH}_3$ , is added to the developer, the emulsion is treated in a preparatory bath to render the action of the developer and solvent regular. Such a bath may comprise a soln. of solvents for the Ag salt, or a soln. of  $\text{Na}_2\text{SO}_3$  or  $(\text{NH}_4)_2\text{SO}_3$ .

**Photographic sensitizers.** I. G. Farbenind. A.-G. Brit. 402,458, Dec. 4, 1933. Carbocyanine dyes suitable for displacing the max. of sensitivity of Ag halide emulsions toward the long-wave region of the spectrum are obtained by condensing a quaternary salt of a 2-methyl- $\alpha$ -naphthothiazole-*contg.* a nuclear alkoxy group with an alkyl ester of orthoacetic acid. The dyes may be added to the emulsion at any stage of its production or after it has been coated, *e. g.*, in alc. soln. In an example 1-methyl-6-methoxy- $\alpha$ -naphthothiazole- $\text{EtI}$  is condensed with  $\text{Et}$

orthoacetate to yield a dye which imparts to a  $\text{AgBr-AgI}$  emulsion a range of sensitivity from 520 to 670  $\mu$ . The halides, perchlorates, *p*-toluenesulfonates, alkylsulfates and nitrates of the dyes are mentioned.

**Photographic sensitizers.** I. G. Farbenind. A.-G. Brit. 402,521, Dec. 7, 1933. A Ag halide emulsion is sensitized to red by incorporating in the emulsion a dialkyl or diarylaminoindocarbocyanine dye. The dyes sensitize for the range 545-750  $\mu$ , permit of photography of distant objects with use of a red filter with a short exposure, are used as the bromide, iodide, perchlorate, etc., and are prepd. by treating a quaternary  $\text{NH}_4$  salt of a 2-methyl-3-dialkylindole, substituted by a dialkylamino or a diarylamino group, with an ester of an orthocarboxylic acid. In an example 2-methylketol is treated with  $\text{CH}_3\text{I}$  and the quaternary  $\text{NH}_4$  salt nitrated; reduction and ethylation give a 4-diethylamino-2,3,3-trimethylindole iodide which is heated in pyridine with triethyl orthoformate. Esters of higher orthocarboxylic acids yield dyes substituted in the central C atom of the trimethine chain by an alkyl or aryl residue.

**Photographic sensitizers.** Kodak-Pathé. Fr. 757,313, Jan. 5, 1934. New dyes which are sensitizers for emulsions are prepd. by condensing 2 heterocyclic rings contg. N, in the presence of a strong org. base ( $\text{Et}_3\text{NH}$ ,  $\text{Et}_3\text{N}$ , piperidines, triethanolamine), quinoline or a quinoline deriv. to neutralize the acids. Examples are given of the prepn. of halides of 1,1'- and 2,1'-diethylo-, 2,1'-diethylthio-, 2,1'-diethylseleno- and 1,3,3,1'-tetramethylindolo-pseudocyanine, 1,1'-dimethyl-5,6-benzo-2,1'-diethylthio-2', 1,1'-dimethyl-2,2', 4,1'-dimethyl-3-ethylthiazolo-2' and 3,4,1'-trimethylselenasolo-2'-pyridocyanine, 2,1'-diethylseleno-, 2,1'-diethylthio- and 7-methyl-2,1'-diethylthio-isocyanine, 8-methyl-2,2'-diethyl-, and 2,2'-dimethyl-8-ethyl-oxocarbocyanine, 9-bromo-2,2'-diethylthio-, 9-bromo-2,2'-diethyl-5,6,5', 6'-dimethio-, 11-bromo-1,1'-diethyl-2,2', 11-bromo-1,1'-diethyl-4,4'- and 3-methyl-2'-ethyl-8-bromothiazolinthio-dicarbocyanine, 2,2'-diethyl-, 1,1'-diethyl-2,2', 1,1'-diethylseleno-, 1,1'-diethyl-4,4', 3,3'-diethylthiazolino-, 3,3'-diethylthiazolo- and 3,4,3,4'-tetramethylthiazolo-tricarbocyanine. Cf. C. A. 27, 3677.

**Photographic films.** I. G. Farbenind. A.-G. Fr. 758,695, Jan. 23, 1934. In making photographic films contg. bleaching dyes, partially hydrolyzed cellulose esters or ethers are used as binders for the dyes.

**Apparatus for developing photographic films with ammonia gas or other vapor.** Benjamin J. Hall. Brit. 401,406, Nov. 16, 1933.

**Photographic films, etc.** Kalle & Co. A.-G. (Oskar Süss, inventor). Ger. 591,517, Jan. 23, 1934 (Cl. 57b 12.05). Light-sensitive films are prepd. from Fe salts, especially ferric citrate and ovalate or their double salts. The layers contain also unsatd. carboxylic acids. Thus, a sensitive film may contain green ferric ammonium citrate,  $\text{K}_2\text{FeC}_6\text{N}_6$  and maleic acid. Other examples are given.

**Photographic films and plates.** Kodak A.-G. Ger. 502,398, Feb. 8, 1934 (Cl. 57b 17.03). See Brit. 387,015 (C. A. 27, 5015).

**Lenticular films.** Siemens & Halske A.-G. Fr. 758,225, Jan. 12, 1934. Prints for color projection are formed on lenticular films by using a copying film provided with an emulsion of  $\text{AgBr}$  which, after development of the Ag, gives a colored image layer, preferably brown, the shade or tone of this layer being, in the complementary colors, compensated by a corresponding shading of the color filters, preferably filters serving for the reproduction.

**Lenticular film and color filter for color photography.** Carl L. Gregory (to Kislun Corp.). U. S. 1,949,714, March 6. Structural and optical details.

**Photographic prints.** Kalle & Co. A.-G. (Maximilian P. Schmidt, Wilhelm Krieger and Eduard Sprüngers, inventors). Ger. 502,603, Dec. 23, 1933 (Cl. 57b 12.05). Light-sensitive layers giving a positive print from a positive are obtained by coupling a dye with a diazo compd. in alk. soln., and placing the product on the film, etc., in an acid or neutral medium. Thus, the diazo compd. from 1'-amino-4'-piperidyl-3'-benzoyl-1-amino



**8-naphthol-3,6-disulfonic acid** (obtained by condensing 1,8-aminonaphthol-3,6-naphthalenedisulfonic acid with 1-nitro-4-chloro-3-benzoyl chloride, treating the product with piperidine and reducing) is dissolved in water and tartaric acid. The soln. is spread on paper and dried. After exposure, the print is developed with gaseous  $\text{NH}_3$  to give a blue-violet print.

**Photographic prints.** I. G. Farbenind. A.-G. Ger. 590,919, Jan. 12, 1934 (Cl. 57b. 14.02).—Optically transparent Ag prints are prepd. by bleaching an ordinary Ag print with acidified I-KI soln. and developing with an org. soln. such as metol-hydroquinone.

**Photographic prints.** N. V. Philips' Gloeilampenfabrieken. Fr. 758,019, Jan. 9, 1934. Prints are obtained from negatives with a luminous source emitting ultra-violet radiations by means of a sensitive material contg. a mixt. of an uncolored oxidizing compd. and a phenol, the mixt. giving by irradiation with ultra-violet light a colored oxidation product, but being almost completely insensitive to light of the visible spectrum. Several examples are given. Cf. C. A. 28, 1292<sup>4</sup>.

**Treating photographic prints.** Gevaert Werke G. m. b. H. (to Gevaert Photo-Producten N. V.). Brit. 401,961, Nov. 23, 1933. To minimize the loss of clarity of the prints during drying, they are treated with a toning soln. in such concn. or for so short a time that no visible toning is produced. In examples (1) a soln. contg. 40 g.  $\text{NH}_4\text{CNS}$  and 40 cc. 1%  $\text{AuCl}_3$  soln. in 1 l.  $\text{H}_2\text{O}$  and (2) 0.1 g. Na selenite in 1 l. fixing soln. are used.

**Diazotypes.** N. V. Chemische Fabriek L. van der Grinten. Ger. 591,969, Jan. 30, 1934 (Cl. 57b. 12.05). Diazotypes are obtained by exposing a sensitized carrier sizing, and developing in a soln. contg. an alkali such as alkali carbonate soln. The developer may contain size. In an example, paper is sensitized with an aq. soln. contg. 1-diethylaminobenzene-4-diazonium chlorostannate,  $\text{H}_3\text{PO}_4$ , and gelatin. The paper is exposed and developed with a soln. contg. phenolglucinol,  $\text{K}_2\text{CO}_3$ , and Na stearate, to give a positive.

**Diazotypes** Kalle & Co. A.-G. Fr. 757,863, Jan. 5, 1934. See Ger. 588,994 (C. A. 28, 1944<sup>3</sup>).

**Apparatus for the development of photographic papers by ammonia.** Jean Breton. Brit. 402,949, Dec. 14, 1933.

**Light-sensitive paper.** V. P. Petrov and I. I. Levkov. Russ. 31,763, Oct. 31, 1933. A stable compd. of diazo aromatic compds. of the secondary or tertiary amines and their derivs. together with hydroxy derivs. of the aromatic series is placed on the paper.

**Preparing drawings for contact printing.** S. G. Gurevich. Russ. 31,762, Oct. 31, 1933. Drawings are made with pencil or ink on paper that has been impregnated with a colloidal soln. of Ag. The Ag is then made light-sensitive by halogenation, exposed from the side of the drawing to an actinic light and developed in the usual manner.

**Photographic tanned colloid images.** Kalle & Co. A.-G. Brit. 409,898, Nov. 23, 1933; cf. Ger. 581,007 (C. A. 28, 983<sup>3</sup>). The support may be glass, metal or films of  $\text{H}_2\text{O}$ -insol. cellulose esters or ethers or regenerated cellulose instead of paper.

**Projection apparatus and process for printing on non-lenticular sensitive material separate monochrome records from a multicolor record taken on a linear lenticular film in a camera having an objective fitted with a color-band filter.** I. G. Farbenind. A.-G. Brit. 402,902, Dec. 14, 1933.

**Photomechanical printing surfaces.** Albert Nadin. Brit. 402,332, Nov. 30, 1933. A color printing process for use in newspaper or other high-speed printing work consists in superimposing prints in selected colors by a no. of half-tone blocks each of complete subject but adapted to produce prints of different strengths. From the original subject a half-tone block is prepd. photographically to produce a print in black or dark color and one or more "ghost" half-tone blocks for printing in lighter colors are prepd. in exactly the same way but in a form adapted to produce faint prints. These "ghost" blocks may be produced by photographing the subject through a semi-transparent mask of frosted or tinted glass or mat celluloid, and parts of these blocks may be modified by darkening or whitening corresponding parts of the masks or by applying local patches of resist to the blocks during the etching operations.

**Photochemical production of forms or patterns for planographic printing.** Hans Weil (to Bekk & Kaulen Chemische Fabrik G. m. b. H.). U. S. 1,948,604, Feb. 27. Various details of procedure are described.

## 6—INORGANIC CHEMISTRY

A. R. MIDDLETON

**Constitution of dysprosium, holmium, erbium, thulium, ytterbium and lutecium.** F. W. Aston. *Nature* 133, 327 (1934); cf. C. A. 28, 983<sup>3</sup>.—Examn. by the method of anode rays showed that Dy (86) consists of mass nos. 161, 162, 163, 164;  $\text{Ho}$  (67), simply 165; Er (68) (pure sample), 166, 167, 168 and a weak 170; Tm (69), simply 169; Yb (70), 171, 172, 173, 174, 176 (174 strongest); Lu (71) simply 175. No isobars were shown. A full account will be published.

**Boron hydrides.** XVIII. Preparation of  $\text{B}_2\text{H}_6$  from boron chloride and hydrogen. Alfred Stock, Hans Martini and Walther Sütterlin. *Ber.* 67B, 396-407 (1934); cf. C. A. 27, 911.—In studying the method by Schlesinger and Burg (C. A. 26, 663) for the prepn. of  $\text{B}_2\text{H}_6$  from  $\text{BCl}_3$  and H by means of elec. discharges, the authors found that only  $\text{B}_2\text{H}_5\text{Cl}$  is apparently formed at first. This decomposes into  $\text{B}_2\text{H}_6$  and  $\text{BCl}_3$ . Treatment with K was found to be a convenient, practical and fast method for complete sepn. of  $\text{B}_2\text{H}_6$  from HCl. Elec. discharges in mixts. of much  $\text{BCl}_3$  and little H yielded little  $\text{B}_2\text{H}_6$  among the products of reaction.  $\text{BH}_3\text{Cl}$  and  $\text{BHCl}_2$  were not observed.  $\text{B}_2\text{H}_6$  and HCl form  $\text{B}_2\text{H}_5\text{Cl}$  and an equil.:  $6\text{B}_2\text{H}_5\text{Cl} \rightleftharpoons 5\text{B}_2\text{H}_6 + 2\text{BCl}_3$ . Small amts. of HCl or  $\text{B}_2\text{H}_6$  disappear practically completely. The reaction is much faster in  $\text{B}_2\text{H}_6$ -HCl mixts. obtained in prepg.  $\text{B}_2\text{H}_6$  than in mixts. of pure  $\text{B}_2\text{H}_6$  and HCl. A catalytic admixt. of unknown nature seems to be present in the first mixt. Hg does not affect the speed of reaction.  $\text{BBr}_3$  is more suit-

able than  $\text{BCl}_3$  for practical prepn. of  $\text{B}_2\text{H}_6$ . XIX. Preparation of  $\text{B}_2\text{H}_6$  from boron tribromide and hydrogen. Alfred Stock and Walther Sütterlin. *Ibid.* 407-11.— $\text{BBr}_3$  and H form (analogously to the Cl compd.)  $\text{B}_2\text{H}_5\text{Br}$  which decomposes (slower than the Cl compd.) to  $\text{B}_2\text{H}_6$  and  $\text{BBr}_3$ . The advantages of the Br method are: (1) a liquid starting material instead of a gas; (2) no cooling bath is necessary; (3) smoother reaction in the discharge chamber; (4) little B and solid hydrides are formed (5) the second procedure to produce  $\text{B}_2\text{H}_6$  is very simple; (6) the  $\text{HBr}$  from the first distillate contains practically no  $\text{B}_2\text{H}_6$  and (7)  $\text{B}_2\text{H}_6$  and  $\text{HBr}$  are easier to sep. A. E. B.

**The significance of the hydrides of the carbonyls of iron and cobalt.** Arthur A. Blanchard and Manly M. Windsor. *J. Am. Chem. Soc.* 56, 826-7 (1934).—The electronic structure proposed for  $\text{Ni}(\text{CO})_4$  (C. A. 20, 1570) also exists in  $\text{Fe}(\text{CO})_5$  (C. A. 26, 935, 3198) and  $\text{Co}(\text{CO})_4\text{H}$  (C. A. 28, 106<sup>6</sup>), where H furnishes the extra electrons necessary to complete the  $\text{Ni}(\text{CO})_4$  pattern. In nitrosyl carbonyls and polymeric carbonyls the same electron pattern is completed. W. C. Fernelius

**Active oxides.** LXXII. The course of reactions in the solid state. Emil Rosenkranz, Bela Steiner, Herbert Kittel and Gustav F. Hüttig. *Z. anorg. allgem. Chem.* 217, 22-6 (1934); cf. C. A. 28, 398<sup>4</sup>.—The course of the reaction  $\text{MgO} + \text{Fe}_2\text{O}_3 \rightarrow \text{MgFe}_2\text{O}_4$  was followed by studying its catalytic action upon a heated mixt. of CO and  $\text{O}_2$ . The max. catalytic activity is given by a mixt. which

had been preheated to 525°, the temp. at which the formation of crystd. aggregates of spinel first begins. Lower temps. for a longer time will probably lead to the same result. MgO, prepd. by thermal decompn. of MgCO<sub>3</sub> or MgC<sub>2</sub>O<sub>4</sub>, also catalyzes CO<sub>2</sub> formation from CO and O<sub>2</sub>. If the MgO is heated for different lengths of time at 700°, the catalytic activity decreases with increasing length of preheating. If the MgO is obtained from a mineral contg. Fe, like magnesite, catalytic activity first falls with increasing time of preheating, but with a great increase in time it commences to rise again and then again falls off in the usual manner.

**Oxides of manganese.** M. Le Blanc and G. Wehner. *Z. physik. Chem.* A168, 59 7b(1934).—Expts. in synthesis were made by adding O<sub>2</sub> to reactive MnO together with expts. in disintegration by the removal of O<sub>2</sub> from MnO<sub>2</sub>. The products resulting were investigated analytically and röntgenographically. MnO is very active and can take up O<sub>2</sub> to MnO<sub>1.12</sub> without change of lattice and without the appearance of a new solid phase. Mn<sub>2</sub>O<sub>3</sub> can absorb O<sub>2</sub> up to MnO<sub>1.12</sub> and Mn<sub>2</sub>O<sub>3</sub> to MnO<sub>1.12</sub> without change. A new modification was obtained from Mn<sub>2</sub>O<sub>3</sub> by synthesis; by tempering it can be changed to the known modification. Mn<sub>2</sub>O<sub>3</sub> can give off no O<sub>2</sub> without the appearance of the Mn<sub>2</sub>O<sub>3</sub> lattice. A mixed-crystal formation between the individual oxides could not be established; instead a two-phase system appeared.

**Thallous oxide.** I. Halla, H. Tompa and L. Zimmermann. *Z. Krist.* 86, 303 5(1933).—TlOH was obtained in white needles by evap. its aq. soln. *in vacuo*; these turn yellow below 100°. Its powder diagram is incompatible with the cubic form, and so lends no support to the existence of Pb<sub>2</sub>O (C. A. 27, 3499). Six days' heating *in vacuo* failed to remove CO<sub>2</sub> from Tl<sub>2</sub>CO<sub>3</sub>; if Tl<sub>2</sub>CO<sub>3</sub> is melted *in vacuo* in a SiO<sub>2</sub> vessel a bright yellow solid soln. of Tl<sub>2</sub>O in Tl silicate is obtained on the walls. Tl<sub>2</sub>O is distinctly volatile *in vacuo* at 300°. It is not obtained by heating Tl<sub>2</sub>O<sub>3</sub>. Decompn. of Tl<sub>2</sub>C<sub>2</sub>O<sub>4</sub> yields Tl.

**Oxidation by oxygen of the tellurides, selenides and sulfides of sodium in liquid ammonia.** R. L. McCleary and W. Conrad Fernelius. *J. Am. Chem. Soc.* 56, 803-4 (1934).—The following schemes represent the action of O upon liquid-NH<sub>3</sub> soln. of the salts given: Na<sub>2</sub>Te(Se, S) → Na<sub>2</sub>Te(Se, S)O<sub>2.4</sub> (little reaction with S); Na<sub>2</sub>Te(Se, S) → Na<sub>2</sub>Te(Se, S)O<sub>2.1</sub> + (x-1)Te(Se); Na<sub>2</sub>S<sub>2</sub> → Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub>; Na<sub>2</sub>S<sub>x</sub> (x > 2) → Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> + (x-2)S. Solns. of S and S<sub>2</sub>N<sub>4</sub> similarly treated give small amts. of S<sub>2</sub>O<sub>4</sub>.

**Compounds of germanium and hydrogen: Some of their reactions and derivatives. I. Preparation of monogermene. II. Sodium trihydrogermanides.** Charles A. Kraus and E. Seaton Carney. *J. Am. Chem. Soc.* 56, 765-8(1934).—By a method described in detail, 60 70% yields of mixed germanes are obtained. The highest germanes are then converted to GeH<sub>4</sub> of 99.7% purity by Na in NH<sub>3</sub> followed by NH<sub>4</sub>Br. GeH<sub>4</sub> and Na in NH<sub>3</sub> give NaGeH<sub>3</sub> quantitatively. Its properties are given. At -33° the solid phases of the system NH<sub>3</sub>-NaGeH<sub>3</sub> are: NaGeH<sub>3</sub>·6NH<sub>3</sub>; NaGeH<sub>3</sub>·4.5NH<sub>3</sub>; NaGeH<sub>3</sub>·2NH<sub>3</sub>; and NaGeH<sub>3</sub>.

**Formation of aluminum nitride from aluminum and amines.** V. A. Plotnikov and P. T. Kalita. *J. Gen. Chem.* (U. S. S. R.) 3, 872 3(1933).—In treating the fused monamine of AlCl<sub>3</sub> with Al, H is evolved and a complex compd. is formed according to the equation: AlCl<sub>3</sub>·NH<sub>3</sub> + Al = AlCl<sub>3</sub>·AlN + 3/2H<sub>2</sub>. The complex compd. formed is so stable that complete decompn. does not take place even when heated to a glow.

**Double decomposition of ammonium nitrate and sodium chloride in the presence or absence of ammonia.** L. Hackspill, A. P. Rollet and Lauffenburger. *Compt. rend.* 198, 1231-3(1934).—By representing the state of the system NaNO<sub>3</sub>·NaCl-NH<sub>4</sub>NO<sub>3</sub>-NH<sub>4</sub>Cl-H<sub>2</sub>O at 20° by Lowenherz's method (*Z. phys. Chem.* 13, 459(1894)) the possibility is demonstrated of obtaining crystn. (either of pure NaNO<sub>3</sub> in the presence of excess of NH<sub>3</sub> (10-12 N, which increases the soly. of NH<sub>4</sub>NO<sub>3</sub> and NH<sub>4</sub>Cl), or, on

at least partial removal of NH<sub>3</sub>, of NH<sub>4</sub>Cl. Simultaneous addn. of 2 mols. NaCl and NH<sub>4</sub>NO<sub>3</sub> causes crystn. of 2 mols. each of NaNO<sub>3</sub> and NH<sub>4</sub>Cl, the concn. of NH<sub>3</sub> having been simultaneously reduced from 12 (d. 8 N. If KCl replaces NaCl, KNO<sub>3</sub> is obtained (cf. C. A. 15, 1445; 16, 3423)).

**Dissociation of alkaline earth nitrites.** M. Tzvetnirshver and W. Piskelny. *Bull. intern. acad. polonaise Classe sci. math. nat.* 1933A, 380 96.—The nitrite decomposes into the oxides, NO and NO<sub>2</sub>. The latter oxidizes more nitrite to nitrate, being reduced to NO. This reaction is not reversible; thus the decompn. sets in very sharply. The temp. depends on the superimposed (inert) gas pressure. Ca, Sr and Ba nitrites decompose at 316°, 389°, 362° under 1 atm. An equation relating pressure and temp. is given.

**The so-called red hydrogen chloride.** Erich Tiede and H. Reinicke. *Ber.* 67B, 492-4(1934).—The red compd. which v. Antropoff (C. A. 26, 5863) described as K<sub>1</sub> chloride was found to be an addn. compd. of NO and HCl, formed from small traces of air in the app. A red modification of HCl does not exist. Expts. made by Giauque and Wiebe (C. A. 22, 719) were repeated with purer reagents. The red compd. could not be observed when NO was completely removed. Traces of NO *in vacuo* yielded a pink compd. which turned dark red with increasing amts. of NO.

**Comments on our work: Preparation of pure hydrogen sulfide, its vapor tension and density.** A. Kilmsted and O. Bankowski. *Z. anorg. allgem. Chem.* 217, 62 4(1934).—A reply to criticism by Batuecas (C. A. 27, 5288).

**The compound of stannic chloride and ether.** Sapwei Ai. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 107 (1934).—SnCl<sub>4</sub> combines energetically with Et<sub>2</sub>O, evolving a large amt. of heat and forming white crystals. The compd. was prepd. by a variety of methods, by adding Et<sub>2</sub>O to SnCl<sub>4</sub>, or *vice versa*, at room temp. and also by adding cooled SnCl<sub>4</sub> to cold Et<sub>2</sub>O. The analysis agreed quite well with the formula SnCl<sub>4</sub>·2(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>O. The compd. burns weakly without explosion and volatilizes at ordinary temp. without decompn.

**New hydroxy-nitrogen compound of phosphorus.** P. Renaud. *Compt. rend.* 198, 1159 61(1934).—When PN [C. A. 28, 984] is heated with H<sub>2</sub>O for 15 days at 100° in N<sub>2</sub> or a sealed tube it hydrolyzes with a 90% yield of PNO<sub>2</sub>H<sub>2</sub>: 5PN + 6H<sub>2</sub>O → 2RH<sub>2</sub> + 3PNO<sub>2</sub>H<sub>2</sub> + N<sub>2</sub>·2PNO<sub>2</sub>H<sub>2</sub>. forms large white tetragonal crystals, a:c = 1:1.004, n<sub>D</sub> 1.522, n<sub>F</sub> 1.579; (x-ray) a 7.60, c 7.57 Å, and 6PNO<sub>2</sub>H<sub>2</sub> in the unit cell. It dissolves unchanged in H<sub>2</sub>O to form a slightly conducting soln., m. 195°, decompn. at 210°, or on heating with aq. KOH *in vacuo* at 50° with evolution of NH<sub>3</sub>: 3PNO<sub>2</sub>H<sub>2</sub> = 2NH<sub>3</sub> + PNO + P<sub>2</sub>O<sub>5</sub>. To bring all P into soln. it must be heated for 200 hrs. with H<sub>2</sub>SO<sub>4</sub>. It dissolves in aq. NH<sub>3</sub>, apparently with production of new cryst. substances.

**Calcium aluminate hydrates and their double salts.** C. R. W. Mylius. *Acta Acad. Abornsis. Math. et Phys.* 7, No. 3, 147 pp.(1933); *Bldg. Sci. Abstracts* 6, 124.—This investigation was undertaken to discover whether the retardation of setting of cement caused by gypsum is connected with the formation of the Ca sulfogaluminate compd. and whether corresponding compds. of other Ca salts can be produced. A series of di-, tri- and tetra-Ca aluminate hydrates obtained is tabulated; and double salts with Ca chloride, nitrate, bromide, iodide, chlorate, iodate and acetate are described. These compds. are highly unstable and are produced only in solns. of definite concn. On account of their slight soly. and marked instability, optical examn. of the crystals provides the only practicable method of analysis. Tabulated results of such examns. are given. The Ca salts that retard setting form sparingly sol. compds. which crystallize well. The constitution of the aluminates is discussed. A table of analyses and dehydration curves for the isolated substances and a bibliography are included.

**Substitution of O<sup>17</sup> by F<sup>19</sup> in aluminates and silicates.**

B. Kordes. *Fortschr. Mineral. Kryst. Petrog.* 17, 432 3 (1932).—Fusion of  $\text{SiO}_2$  with NaF and LiF does not lead to compd. formation. NaF and  $\text{Al}_2\text{O}_3$  afford needles of undetd. compn. Substitution of MgO in  $\text{MgO} \cdot \text{Al}_2\text{O}_3$  by LiF affords crystals of the spinel type, m. above  $1400^\circ$ , d. 3.6.  $\text{CaF}_2$  and  $\text{Al}_2\text{O}_3$  afford at least one cryst. compd. B. C. A.

The preparation of hydrazine sulfate by the Raschig method. J. Henrion. *Bull. soc. chim. Belg.* 43, 115 16 (1934).—Dissolve 5 g. NaOH in 100 cc. water; feed Cl slowly to the soln. cooled in a freezing mixt. up to a 4-g. increase in weight. Allow the soln. to stand in the open for at least 12 hrs., to remove all free Cl. Add it to a mixt. of 200 cc. of satd.  $\text{NH}_4\text{OH}$  and 20 cc. of 5% gelatin soln. Boil vigorously, reducing the vol. to half its original. Cool thoroughly; allow a cool mixt. of 10 cc. of coned.  $\text{H}_2\text{SO}_4$  and 50 cc.  $\text{H}_2\text{O}$  to drip in; add ethanol until a slight ppt. forms; hydrazine sulfate ppts. on standing. A. L. Henne

Reaction of pyridine with Cleve's salt and Gérard's salts. I. I. Chernyayev and A. M. Rubinshteyn. *Compt. rend. acad. sci. U. R. S. S. [N. S.]*, 1, 187-9 (in English) 189 92 (1934).—When pyridine reacts with Cleve's salt,  $(\text{NH}_4)_2\text{Cl}_2\text{Pt}$ , a replacement of the mols. of  $\text{NH}_3$  by pyridine takes place and  $(\text{PyCl})_2\text{Cl}_2\text{Pt}$  is formed; with Gérard's salt,  $(\text{NH}_4)_2\text{Cl}_2\text{Pt}$ , pyridine replaces 2 ions of Cl to form  $(\text{NH}_4)_2(\text{PyCl})_2\text{PtCl}_2$ . These reactions may serve as a qual. reaction for these salts. Three geometrical isomers of the tetramine of the compn.  $[(\text{NH}_4)_2(\text{Py})_2\text{PtCl}_2]\text{X}_2$  have been obtained. E. R. Rushton

The reduction of silver salts with hydroxylamine. M. L. Nichols. *J. Am. Chem. Soc.* 56, 441 5 (1934).  $\text{H}_2\text{NOH}$  (I) reacts with  $\text{AgBr}$  in the presence of NaOH to give a mixt. of N and  $\text{N}_2\text{O}$ :  $2\text{I} + 2\text{AgBr} = 2\text{Ag} + \text{N}_2 + 2\text{HBr} + 2\text{H}_2\text{O}$ ;  $2\text{I} + 4\text{AgBr} = 4\text{Ag} + \text{N}_2\text{O} + 4\text{HBr} + \text{H}_2\text{O}$ . With ammoniacal  $\text{AgNO}_3$ , I gives pure N.  $2\text{I} + \text{Ag}_2\text{O} = 2\text{Ag} + \text{N}_2 + 3\text{H}_2\text{O}$ . With alk.  $\text{AgNO}_3$  in the presence of  $\text{Na}_2\text{SO}_3$ , I gives a mixt. of N and  $\text{N}_2$ , but the N return is low because of a coupled or induced reaction between the  $\text{Ag}_2\text{O}$  and  $\text{Na}_2\text{SO}_3$ . The relative amts. of N and  $\text{N}_2$  vary with temp. and concn. of alkali. W. C. F.

Basic salts. III. Equilibria in the system  $\text{CuO} \cdot \text{CrO}_3 \cdot \text{H}_2\text{O}$ . Erich Havelk. *Z. anorg. allgem. Chem.* 216, 315 20 (1934); cf. C. A. 27, 1838. —In the system  $\text{CuO} \cdot \text{CrO}_3 \cdot \text{H}_2\text{O}$ , the solids  $2\text{CuCrO}_7 \cdot 3\text{H}_2\text{O}$  (I),  $\text{H}_2\text{O}$  (II) and  $\text{CuCrO}_4 \cdot \text{Cu}(\text{OH})_2$  (III) are present, and in soln.  $\text{CuCrO}_4$  is found. I is a yellowish brown powder which loses  $\text{H}_2\text{O}$  over  $\text{CaCl}_2$ . II exists in 2 forms, a copper red and a chocolate brown to lilac black. The first of these, heated with  $\text{H}_2\text{O}$ , is hydrolyzed to a yellowish brown basic salt. The dark form is believed to have each hydroxide mol. surrounded by chromate, while in the red form the hydroxide mols. are on the outside. H. Stoertz

Preparation of ductile tantalum by thermal dissociation of  $\text{TaCl}_5$ . W. G. Burgers and J. C. M. Basart. *Z. anorg. allgem. Chem.* 216, 223-7 (1934).—A very ductile form of Ta can be prepd. by thermal disocn. of  $\text{TaCl}_5$  on a glowing filament. Care must be taken to exclude foreign gases,  $\text{TaCl}_5$  being sublimed in a vacuum for this reason. Ta prepd. in this manner has a temp. coeff. of dec. resistance given by the expression  $10^6\alpha = 364$  and a sp. resistance of  $10^6\rho_0 = 0.124 \Omega \text{ cm}$ . For lattice const.  $a = 3.296 \pm 0.0005 \text{ \AA}$ . Ch prepd. in the same manner shows  $a = 3.294 \pm 0.001 \text{ \AA}$ . H. Stoertz

Formation of high-melting metallic carbides by igniting a carbon filament in the vapor of a volatile halogen compound of the metal. W. G. Burgers and J. C. M. Basart. *Z. anorg. allgem. Chem.* 216, 200 22 (1934).—The reaction produced when a C filament was ignited in vapors of  $\text{TiCl}_4$ ,  $\text{ZrCl}_4$  or  $\text{TaCl}_5$  was studied by means of the changes in the resistance of the wire and with the aid of an x-ray study. The compds.  $\text{TiC}$  and  $\text{ZrC}$  are formed, while with  $\text{TaCl}_5$  both  $\text{TaC}$  and  $\text{Ta}_3\text{C}$  are produced, and Ta also seps. At  $2500^\circ$  the formation of Ta and  $\text{Ta}_3\text{C}$  can be avoided. The carbide phases contain a certain amt. of the metal in excess in solid soln. In order to obtain the pure carbides, the reaction product must be heated either in a vacuum or in a hydrocarbon atm. The carbide wires prepd. in this

manner have the form of hollow tubes. Lattice consts. are given. H. Stoertz

Reactions in liquid ammonia. I. Sulfides of germanium. Warren C. Johnson and A. C. Wheatley. *Z. anorg. allgem. Chem.* 216, 273-87 (1934).—Both amorphous and cryst.  $\text{GeS}$  and  $\text{GeS}_2$  were prepd. from germanite ore. Crystd.  $\text{GeS}_2$  is a white, needle-like powder, converted into  $\text{GeO}_2$  by long heating. It is slowly hydrolyzed by water at room temp.,  $\text{H}_2\text{S}$  being evolved by heating the soln.  $\text{GeS}_2$  is quite sol. in  $\text{NH}_4\text{OH}$  and moderately sol. in liquid  $\text{NH}_3$  at  $-33^\circ$ . Cryst.  $\text{GeS}$  forms black plates which are red in transmitted light and steel-gray in reflected light. Heated in air or treated with  $\text{HNO}_3$  it easily oxidizes. It is sol. in 10%  $\text{KOH}$ , from which amorphous  $\text{GeS}$  is pptd. by addn. of  $\text{HCl}$ . This is a reddish brown powder, rapidly hydrolyzed by  $\text{H}_2\text{O}$ , easily sol. in  $\text{NH}_4\text{OH}$  and only slightly sol. in liquid  $\text{NH}_3$ . These sulfides are not ammonolyzed in liquid  $\text{NH}_3$ . They are reduced by Na in liquid  $\text{NH}_3$  to  $\text{Na}_2\text{Ge}_2$ . This is decompd. by  $\text{NH}_4\text{Br}$  as follows:  $\text{Na}_2\text{Ge}_2 + 4\text{NH}_4\text{Br} = 4\text{NaBr} + 4\text{NH}_3 + \text{GeH}_4 + (x-1) \text{Ge}$  and  $\text{GeH}_4 = \text{Ge} + 2\text{H}_2$ . H. Stoertz

Thermometric study of formation of inorganic complexes. P. Mondan-Monval and R. Paris. *Compt. rend.* 198, 1151-3 (1934). By plotting the temp. rise against the amt. of aq. KI added to aq.  $\text{HgCl}_2$  (cf. C. A. 16, 3011), breaks occur in the curve corresponding with formation of  $\text{HgI}_2$  and  $\text{K}_2\text{HgI}_4$  (C. A. 27, 677). Similarly when aq. KCN is added to aq.  $\text{NiSO}_4$ ,  $\text{ZnSO}_4$  or  $\text{CoSO}_4$  breaks indicate formation of (1)  $\text{M}(\text{CN})_2$ , and (2)  $\text{K}_2\text{Ni}(\text{CN})_4$ ,  $\text{K}_2\text{Zn}(\text{CN})_4$  and  $\text{K}_2\text{Co}(\text{CN})_6$ , resp. (cf. C. A. 4, 1723; 18, 2662). C. A. Silberrad

Stereochemistry of complex inorganic compounds. I. The Walden inversion as exhibited by diethylenediaminocobaltic compounds. John C. Bailar, Jr. and Robert W. Auten. *J. Am. Chem. Soc.* 56, 774 6 (1934). An unquestionable example of Walden inversion of an inorg. compd. is found. 1-Dichlorodithylenediaminocobaltic chloride (I) reacts with  $\text{K}_2\text{CO}_3$  to give the d-carbonato compd. (II),  $\text{Ag}_2\text{CO}_3$  gives the l-carbonato compd. Either  $\text{K}_2\text{C}_2\text{O}_4$  or  $\text{Ag}_2\text{C}_2\text{O}_4$  with I gives the dextro oxalato compd. (III).  $\text{HCl}$  and II give I, but  $\text{H}_2\text{C}_2\text{O}_4$  and II give III. Foster Dec Snell

Aminoformates of copper and zinc, relatively stable internal complexes involving four linkings. G. Gutzeit and R. Duckert. *Compt. rend. soc. phys. hist. nat. Geneve* 50, 168 73 (1933) in *Arch. sci. phys. nat.* 15, July-Aug. —The formulas  $(\text{NH}_2\text{COO})\text{M}^{\text{II}}$  are established. B. C. A.

Constitution of Stromholm's double salts  $2\text{MCl} \cdot \text{M}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O}$ . G. Spacu and C. G. Macarovici. *Z. anorg. allgem. Chem.* 216, 263 72 (1934).—The following salts were prepd.:  $2\text{KCl} \cdot \text{K}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O}$  (I),  $2\text{KCl} \cdot \text{K}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 6\text{C}_6\text{H}_5\text{NH}_2$ ,  $2\text{KCl} \cdot \text{K}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 8\text{C}_6\text{H}_5\text{NH}_2$ ,  $2\text{KCl} \cdot \text{K}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 8\text{C}_6\text{H}_5\text{N}$ ,  $2\text{KCl} \cdot \text{K}_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 10\text{NH}_3$ ,  $2\text{NH}_4\text{Cl} \cdot (\text{NH}_4)_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 8\text{C}_6\text{H}_5\text{NH}_2$ ,  $2\text{NH}_4\text{Cl} \cdot (\text{NH}_4)_2\text{Cr}_2\text{O}_7 \cdot 4\text{HgCl}_2 \cdot 2\text{H}_2\text{O} \cdot 10\text{NH}_3$ . These double salts are obtained by the action of (I) on solns. of the basic compd. in  $\text{C}_6\text{H}_6$ . (I) is believed to have the

structure  $\begin{array}{c} \text{Hg} \text{---} \text{Cl} \\ | \\ \text{K}_2 \text{---} \text{H}_2\text{O} \end{array} \quad \text{Hg} \text{---} \text{Cr}_2\text{O}_7 \text{---} \text{Hg} \quad \begin{array}{c} \text{Cl} \text{---} \text{Hg} \\ | \\ \text{H}_2\text{O} \text{---} \text{K}_2 \end{array}$ . For the

other compds. similar coordination formulas are given in which the central group is the same and the nitrogen bases are represented as being bound to the 2 Hg atoms outside the central group. H. Stoertz

Constitution of potassium antimonyl tartrate and related antimony compounds. K. Bodendorf. *Pharm. Presse* 48, Wiss.-prakt. Heft 8 9 (1933).—Reihlen's formula is supported by therapeutic properties and analogies. Formulas are given for  $\text{NH}_4$  Sb dipyrocatechol oxide and  $\text{K} \cdot (\text{K} \text{ Sb bispyrocatechol disulfonate})$ . B. C. A.

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B. B. R. Prideaux. London: C. Griffin & Co., Ltd. 1 Hartmann, Friedrich: Wandtafel zur anorganische Chemie. Schematische Darstellung über Aufbau und Reaktion der Stoffe. Stuttgart: Ulmer, M. 3.

## 7—ANALYTICAL CHEMISTRY

W. T. HALL

The development of analytical chemistry. P. F. 2 Thompson. *Chem. Eng. Mining Rev.* 26, 213-17 (1934).—A historical lecture

W. H. Boynton Laboratory instructions for students of quantitative analysis. I. Gravimetric determination of iron. A. H. Kunz and G. Sterling Bailey. *J. Chem. Education* 11, 247-9 (1934).—A series of 68 analyses proves that a double pptn. of  $\text{Fe}^{+++}$  by  $\text{NH}_4\text{OH}$  in the sepn. of  $\text{Fe}^{+++}$  from sulfate is unnecessary (cf. Pattinson, *J. Soc. Chem. Ind.* 24, 7 (1905)). W. T. H.

A series of simple basic indicators. III. The zero point of the acidity function scale. Louis P. Hammett and Martin A. Paul. *J. Am. Chem. Soc.* 56, 827-9 (1934); cf. *C. A.* 27, 39.—By measuring the ionization in dil. HCl of some azobenzene indicators, a zero of the scale of acidity functions was established. This  $H_0$  value is 0.29 unit below the zero adopted provisionally by Hammett and Deyrup. Acidity functions were detd. for HCl and  $\text{HNO}_3$  solns. up to 7 and 9.5 N. W. T. H.

Metric units of volume. W. O. Kermack. *Chemistry & Industry* 1934, 227 8 Because of the possible presence of the heavy isotope of H in water, it is claimed that the legal definition of the liter is faulty. W. T. H.

Conrady system of weighing as an aid to the chemist. W. H. J. Vernon. *Chemistry & Industry* 1934, 211-14. See *C. A.* 16, 2623. W. T. H.

Simultaneous standardization of tenth-normal hydrochloric acid and sodium hydroxide using calcite. A. J. Hammer. *J. Chem. Education* 11, 245-7 (1934). W. T. H.

Complete combustion in gas analysis. R. S. Yakovlev. *J. Applied Chem.* (U. S. S. R.) 6, 333-47 (1933).—The temp. required for a complete combustion of gas is about  $1050^\circ$ ; the use of a quartz tube is recommended. The combustion of  $\text{CH}_4$  requires more time than any other gas, and gas mixts. contg.  $\text{CH}_4$  need 7-10 min. for combustion. The soly. of various gas components (especially  $\text{CO}_2$ ) in the liquid seals is a source of error. The use of NaCl soln in the seals is recommended. For complete combustion  $\text{CO}_2$  should be absorbed after each transfer, and a gas high in CO should be passed 3-4 times through a  $\text{CuCl}_2$  soln. A. A. Bochtimsk

Reactions of Nessler's solution. M. L. Nichols and C. O. Willits. *J. Am. Chem. Soc.* 56, 769-74 (1934).—The color developed in Nessler's soln. by  $\text{NH}_3$  is due to negatively charged colloidal particles of  $\text{NH}_4\text{HgI}_2$ . The compn. was substantiated both indirectly and by analysis. With the soln. 3 N in NaOH the range of permanent color is increased by addn. of stabilized alk. ash-free gelatin as a protective colloid. F. D. S.

Separation of the components of the ammonium sulfide group. Johannes Kunz. *Helv. Chim. Acta* 17, 369-72 (1934).—In the procedure previously recommended (*C. A.* 26, 4552) it was assumed that Co could be sepd. from Ni by pptg.  $\text{Co}(\text{OH})_2$  with Br aq. in a well-buffered soln. This assumption is false, although the dark color produced is an excellent qual. test for Co and the depth of color gives a good indication of how much  $\text{KNO}_3$  is necessary in the pptn. of  $\text{K}_2\text{Co}(\text{NO}_3)_6$ . In the filtrate from this nitrite complex, Ni can be pptd. as  $\text{Ni}(\text{OH})_2$  by NaOH, or better as  $\text{Ni}(\text{OH})_2$  by NaClO and NaOH. In the analysis of the portion of the  $(\text{NH}_4)_2\text{S}$  ppt. that dissolves in dil. HCl, it is advantageous to ppt. Fe, Mn, Zn, Cr and Al by pouring the oxidized soln. into 100 cc. of boiling 3%  $\text{Na}_2\text{CO}_3$  soln. Then after filtering and drying the ppt., mixing with  $\text{KNO}_3$  and fusing with NaOH in a crucible of Ag, a melt is obtained from which  $\text{Na}_2\text{CrO}_4$ ,  $\text{Na}_2\text{ZnO}_4$  and  $\text{NaAlO}_2$  can be extd. with water. Any  $\text{MnO}_4^{--}$  that dissolves can be pptd. as  $\text{MnO}_2 \cdot \text{H}_2\text{O}$


by adding  $\text{H}_2\text{O}_2$  to the alk. ext. The tests for Al, Cr and Zn are essentially as described in the former paper. In the analysis of the ppt. contg.  $\text{MnO}_2$  and  $\text{Fe}_2\text{O}_3$ , a 10% soln. of  $\text{K}_2\text{S}_2\text{O}_8$  is recommended for dissolving the  $\text{MnO}_2$ . From the soln.  $\text{MnO}_4^{--}$  can be formed by treatment with NaClO and alkali hydroxide. W. T. H.

The benzoate method. A new procedure for the separation of iron, aluminum and chromium from the other ions of the third group and the alkaline earth ions. I. M. Kolthoff, V. A. Stenger and B. Moskovitz. *J. Am. Chem. Soc.* 56, 812-15 (1934).—To 100 cc. of soln. contg. 0.05-0.2 g. of ions to be pptd., add  $\text{NH}_4\text{OH}$  until the ppt. that first forms redissolves very slowly on stirring. Then add 1 cc. of AcOH and enough  $\text{NH}_4\text{Cl}$  to make the total content at least 1 g. Slowly stir into the soln. 20 cc. of 10%  $\text{NH}_4$  benzoate soln. for every 65 mg. of Al, 126 mg. of Fe or 125 mg. of Cr, heat until boiling starts and keep at this temp. 5-20 min. according to whether Cr is absent or present. Filter and wash the ppt. with hot 1%  $\text{NH}_4$  benzoate soln. contg. 2% AcOH. For very precise work, dissolve the ppt. in acid and repeat the above procedure. Fe, Al and Cr are pptd. as basic salts. The sepn. is said to be more satisfactory than the classic basic acetate treatment, but, although no exact data are given concerning phosphate, it is said to divide between the ppt. and filtrate. W. T. H.

Determination of traces of arsenic by the method of Cribier. I. Experimental study of the mechanism of the technic. Henri Griffon and Maurice Buisson. *J. pharm. chim.* 18, 422-37 (1933); cf. *C. A.* 16, 35, 2385. —A crit. exptl. study of the exactness of the method is made. Results: (a) Whether 0.1 mg. or 0.0001 mg. As is employed, the colored band reaches its max. length simultaneously with the max. concn. of H evolved; this takes place within less than 20 min. Further evolution of  $\text{AsH}_3$  results in merely deepening the color of the stain. (b) The progressive increase of the length of the stain as a function of the total quantity of As employed thus depends on the manifest relation between the simultaneous evolution of maximal quantities of  $\text{AsH}_3$  and H. (c) Contrary to the belief of C., only about 33% of the As employed is volatilized, contributing to the formation of the stain. Yet this does not vitiate the value of the method, as the results based on color standards prepd. from known quantities of As are comparable, which is also confirmed by (a) and (b). When details are minutely observed, the method is extremely sensitive and reliable. A completely quant. evolution of  $\text{AsH}_3$  will still further increase its sensitiveness. Also in *Bull. soc. chim.* 53, 1548-63 (1933). S. Waldbott

Determination of small amounts of arsenic. G. A. Qunicke and M. Schmetka. *Z. Unters. Lebensm.* 66, 581-5 (1933).—A procedure is described for producing  $\text{AsH}_3$  electrolytically and causing it to react with paper impregnated with  $\text{HgCl}_2$ . F. L. Dunlap

Detection of bismuth by means of organic reagents containing sulfur. I. Detection with dimercaptothioazole. J. V. Dubsý and A. Okáč. *Z. anal. Chem.* 96, 267-70 (1934).—A suitable method for prepg

HS——SH is described. The reagent is prepd. by

dissolving 0.7 g. of  $\text{C}_2\text{H}_5\text{N}_3\text{S}_2$  in 35 cc. of 0.1 N KOH. A few drops of the reagent added to an acid soln. of Bi salt produces a red ppt. which is probably a mixt. of  $\text{Bi}(\text{C}_2\text{HN}_3\text{S}_2)_2$  and  $\text{Bi}(\text{C}_2\text{HN}_3\text{S}_2)_3\text{Cl}$ . The test is sensitive but not specific, since all the other members of the first 2 qual. groups give colored ppts. W. T. H.

A simple determination of chromium in steels containing vanadium and molybdenum. W. Erhard. *Mit. Forschungsanstalt. Gutehoffnungshütte-Konzern* 2, 268-70 (1934).—Dissolve the steel sample in  $\text{HNO}_3$ , oxidize with  $\text{KClO}_3$  and buffer the free  $\text{HNO}_3$  with  $\text{NaOAc}$ . To the cold soln. thus obtained add  $\text{Pb(OAc)}_2$  which ppt.  $\text{PbCrO}_4$  and  $\text{PbMoO}_4$  while  $\text{HVO}_3$  remains in soln. when not more than 4.3% V is in the steel. Cr can then be detd. iodometrically from the  $\text{PbCrO}_4$ . M. II.

New method for the volumetric determination of cobalt. G. Spacu and M. Kuraš. *Bul. soc. stiint. Cluj* 7, 377-83 (1934) (in French).—If a  $\text{Co}^{++}$  soln. is treated with pyridine and  $\text{NH}_4\text{CNS}$ , a pink ppt. of  $\text{Co(C}_6\text{H}_5\text{N)}_4(\text{CNS})_2$  is formed. A soln. contg. 0.02-0.05 g. Co in 50-60 cc. of water can be analyzed by heating on the water bath, adding 1 cc. of pyridine and a measured vol. of 0.1 N  $\text{AgNO}_3$ , filtering and titrating the excess Ag with thiocyanate with ferric alum as indicator. W. T. H.

Determination of nickel in steel. André Guédras. *Aciers spéciaux* 8, 373-4 (1933). Detn. with dimethylglyoxime and titration with KCN are described.

G. T. Motok  
Electroanalysis and macroelectroanalysis of nickel, with iron cathodes. J. Guzmán and G. García. *Anales soc. españ. fis. quim.* 32, 72-86 (1934).—Comparisons are made between Cu and Fe cathodes in Ni electrodetn. Cf. Guzmán, *ibid.* A. 26, 4550. The min. quantity of Ni necessary to deposit for quant. results with a new Fe cathode is 1.2 g. per 162 sq. cm. of cathode area. The best Ni deposits were obtained with an electrolyte contg. 5 g.  $(\text{NH}_4)_2\text{SO}_4$ , 3 g.  $\text{Na}_2\text{SO}_4$ , and 15 cc. of concd.  $\text{NH}_4\text{OH}$ , at 3 v. for 45 min. Poorer deposits were obtained with electrolytes contg.  $(\text{NH}_4)_2\text{C}_2\text{O}_4$ - $\text{NH}_4\text{OH}$ ,  $\text{HCO}_2\text{H}$ - $\text{NH}_4\text{OH}$ ,  $\text{Na}_2\text{HPO}_4$ - $\text{NH}_4\text{OH}$  in this order, and the worst with tartaric acid- $\text{NH}_4\text{OH}$ . E. M. Symmes

Potentiometric study of the quinhydrone electrode in the estimation of nickel. B. K. Chatterjee and J. B. Jha. *J. Indian Chem. Soc.* 10, 727-33 (1933). In a soln. contg. 0.34-0.09 g. of Ni in 25 cc. an end point is obtained at about  $\text{pH}$  7.5 in titrating with KCN which corresponds to the formation of  $\text{Ni(CN)}_4$ . W. T. H.

Indirect method for the potentiometric determination of nickel. G. Spacu and P. Spacu. *Z. anal. Chem.* 96, 270-7 (1934).—The method depends upon pptg. the Ni with  $\text{K}_2\text{CNS}$  and pyridine, whereby  $[\text{NiPy}_4(\text{SCN})_2]$  is formed, in which Py denotes pyridine. The excess of  $\text{K}_2\text{CNS}$  is then titrated with  $\text{AgNO}_3$  soln. To 10 cc. of Ni soln. in a 100-cc. measuring flask add 20 cc. of 0.1 N  $\text{K}_2\text{CNS}$  soln. and 0.6 cc. of pyridine. After the Ni ppt. has settled, fill with water to the mark, mix well and take 50 cc. of filtrate. Neutralize to methyl orange with  $\text{HNO}_3$ , add 30-40 cc. of water and titrate with  $\text{AgNO}_3$ . The results are within 0.5% of the truth. W. T. H.

Gravimetric determination of magnesium as magnesium ammonium arsenate. J. Dick and A. Rudnei. *Z. anal. Chem.* 96, 245-8 (1934).—The pptn. of  $\text{MgNH}_4\text{AsO}_4 \cdot 6\text{H}_2\text{O}$  is always preferable to that of  $\text{MgNH}_4\text{AsO}_4 \cdot 6\text{H}_2\text{O}$  except when it is desirable to remove the excess precipitant after the Mg ppt. has been removed. In that case there is danger of losing some As during the ignition of the filter. This danger of volatilizing As can be avoided, however, by weighing the ppt. on a Gooch-Neubauer or Munroe crucible. For pptg. 0.1 g. of Mg, the total vol. of soln. should not exceed 70 cc. To the concd. Mg soln. add 3-5 g. of  $\text{NH}_4\text{Cl}$  and 1 g. of Na or  $\text{NH}_4$  arsenate. Add concd. HCl dropwise until the ppt. dissolves, then make neutral to phenolphthalein and add concd.  $\text{NH}_3$  soln. equal to  $1/2$  of the total vol. After it has been in cold water 90 min., filter, wash with 2.5%  $\text{NH}_3$  soln., then with alc. and finally with ether. Weigh as  $\text{MgNH}_4\text{AsO}_4 \cdot 6\text{H}_2\text{O}$  after drying in a vacuum desiccator and wiping off the sides of the crucible with a linen cloth. The results of 10 expts. were all slightly high, but the greatest error was only a little more than 1% of the total Mg content of 0.03 g.  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ . With a small crucible and a total vol. of 5 cc. fairly satisfactory results were obtained in the analysis of 3-11 mg. of Mg salt. W. T. H.

Semimicro, rapid, gravimetric determination of mag-

nesium as magnesium ammonium phosphate or as magnesium ammonium arsenate. L. W. Winkler. *Z. anal. Chem.* 96, 241-5 (1934).—To 20 cc. of boiling-hot aq. soln. contg. 0.15-0.9 g. of  $\text{Mg}^{++}$  add 0.5 g. of  $\text{NH}_4\text{Cl}$ , 1 cc. of 20%  $\text{NH}_3$  soln. and 2 cc. of 10%  $\text{Na}_2\text{HPO}_4$  soln. Shake a little, allow to cool 5 min. in the air and then for another 5 min. in cold water. Stopper the flask and shake vigorously for 5 min. Filter, wash with 10 cc. of 1%  $\text{NH}_3$  soln. and then with about 6 cc. of 96% alc. Draw dry air through the filter for 10 min. and weigh as  $\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$ . The results are accurate within 0.3 mg. A similar procedure succeeds with  $(\text{NH}_4)_2\text{HAsO}_4$  except that the pptn. takes place in the cold and the flask is shaken once every 5 min. for 0.5 hr. The procedure succeeds also in a soln. from which the Ca has been pptd. as  $\text{CaC}_2\text{O}_4$  from 20 cc. of soln. contg. 0.5 g.  $\text{NH}_4\text{Cl}$ , 2 cc. of N  $\text{AcOH}$  and 4 cc. of 2.5%  $(\text{NH}_4)_2\text{C}_2\text{O}_4$  (cf. *C. A.* 28, 12997). W. T. H.

A new test for potassium. Santiago A. Celis. *Anales. farm. bioquím.* (Buenos Aires) 4, 55-9 (1933). To 10 cc. of pure MeOH add 1 drop of a soln. contg. 7 g.  $\text{Co(NO}_3)_2$  dissolved in 50 cc. of 80% MeOH and 1 drop of a soln. contg. 10 g.  $\text{Na}_2\text{S}_2\text{O}_8$  in 50 cc. of water. When a violet color develops, add 1-4 drops of the soln. to be tested. A sky-blue ppt. is formed if  $\text{K}^+$  is present. The test is very sensitive. B. S. Levine

Methods for determining potassium. S. N. Rozanov. *Kabiz* (U. S. S. R.) 1933, No. 7, 17-34; cf. *C. A.* 27, 5025; 28, 1951<sup>6</sup>.—A review covering 218 papers. J. S.

Determination of sodium by the uranyl method. S. Z. Makarov and V. V. Bukina. *J. Gen. Chem.* (U. S. S. R.) 3, 581-91 (1933). The pptn. of  $\text{NaZn(UO}_2)_2\text{Ac}_2 \cdot 6\text{H}_2\text{O}$  gives excellent results even in the presence of salts of a large no. of other metals. The presence of K greatly interferes with the direct detn. of Na. When the ratio is  $\text{K/Na} > 20$ , a preliminary removal of K by the perchlorate method is necessary. W. P. Bricks

Detection of small quantities of tantalum and columbium. Walter R. Schoeller. *Z. anal. Chem.* 96, 252-7 (1934). The work of Rienacker and Schiff (*C. A.* 28, 68<sup>8</sup>) is criticized on the basis of prior work by S. (cf. *C. A.* 27, 2110). W. T. H.

Determination of tin. M. Frommes. *Z. anal. Chem.* 96, 280-9 (1934).—A review. W. T. H.

Volumetric determination of tin; use of potassium iodate. J. B. Ramsay and J. G. Blann. *J. Am. Chem. Soc.* 56, 815-18 (1934). To 50 cc. of soln. in 3 N HCl contg. about 0.15 g. of dissolved Sn in a 500-cc. Erlenmeyer flask add 1.5-2.0 g. of 20-mesh Zn. Cover with the lid of a porcelain crucible and incline the flask a little to one side. When the evolution of  $\text{H}_2$  stops, wash down the cover and sides with 10-15 cc. of water. Boil gently while passing a stream of  $\text{CO}_2$  through the flask for 10 min. Add 7-8 cc. of concd. HCl and 0.1 g. of  $\text{NiCl}_2$  or  $\text{CoCl}_2$ . Boil 5 min. to dissolve any pptd. metal, cool to room temp. in  $\text{CO}_2$ , add 100 cc. of 0.2 N  $\text{NaHCO}_3$ , make approx. 1 N in HCl and add  $\text{KIO}_3$  soln. until a slight yellow color due to free  $\text{I}_2$  is produced. Titrate this  $\text{I}_2$  with  $\text{Na}_2\text{S}_2\text{O}_3$ . The  $\text{SnCl}_2$  reduces the  $\text{IO}_3^-$  to  $\text{I}^-$  which reacts with excess  $\text{IO}_3^-$  to form  $\text{I}_2$ . The results are high if  $\text{Sh}^{+++}$  or  $\text{As}^{+++}$  is present. W. T. H.

Colorimetric estimation of uranium in low-grade ores. I. Chernichov and E. Guldina. *Z. anal. Chem.* 96, 257-63 (1934).—Digest 0.5 g. of the ore with 20 cc. of 7.5 N  $\text{H}_2\text{SO}_4$  and 5 cc. of 6 N HCl for 30 min. at the boiling temp. Dil. to 50 cc. and filter off the insol. residue. Ppt the sesquioxides by adding  $\text{NH}_3$  water (free from carbonate) together with 4-5 cc. of 3%  $\text{H}_2\text{O}_2$ . Filter and wash the ppt. with hot 3%  $(\text{NH}_4)_2\text{SO}_4$  soln. contg. a few drops of  $\text{NH}_4\text{OH}$ . Dissolve in a little hot 1% (by vol.)  $\text{H}_2\text{SO}_4$ . Electrolyze the soln. with a cathode of Hg at 4-5 amp. to remove Fe. In the electrolyzed soln. (not over 100 cc. in vol.) ppt. Al and U again with  $\text{NH}_4\text{OH}$  and  $\text{H}_2\text{O}_2$ . Dissolve the washed ppt. in 3%  $\text{H}_2\text{SO}_4$ . Add 6 N  $\text{NH}_4\text{OH}$  until a slight turbidity results, and dissolve this in as little  $\text{H}_2\text{SO}_4$  as possible. Dil. to 40 cc., add 5 cc. of 6 N  $\text{AcOH}$  and 15 cc. of 0.33 M  $\text{Na}_2\text{HPO}_4$  soln. Heat to boiling and add a little  $\text{Al}^{+++}$  if not

already present so that the uranyl phosphate ppt. will coagulate. After 10 min. filter, wash with  $N$   $NH_4NO_3$  soln., dissolve in hot 0.2%  $H_2SO_4$ , make up to 100 cc. and match the color produced on treating an aliquot part of the soln. with 10%  $K_4Fe(CN)_6$  soln. with that obtained similarly with known quantities of U.

W. T. H.

**Best conditions for the precipitation of zinc sulfide and aluminum hydroxide and a method for the gravimetric determination of zinc and aluminum.** C. Mayr. *Z. anal. Chem.* 96, 273-4(1934).—The assertion of Frers (*C. A.* 28, 431<sup>3</sup>) that the proper  $pH$  had not been detd. prior to his work is disputed.

W. T. H.

**Determination of zirconium.** M. Frommes. *Z. anal. Chem.* 96, 288-91(1934).—A review.

W. T. H.

**Detection and determination of small quantities of mercury.** F. Cucucl. *Mikrochemie* 13, 321-64(1933). A review of 180 papers, most of them recent.

W. T. H.

**Determination of nitrogen.** K. Fresenius. *Z. anal. Chem.* 96, 298-300(1934). A review.

W. T. H.

**Analysis of crude sulfur.** Salvatore Vinti. *Ann. chim. applicata* 23, 573-6(1933). The best results are obtained by dissolving S in  $CS_2$  (together with the bitumen), then detg. the bitumen by oxidation with  $H_2SO_4$  (concd.). The Fresenius and Beck method of distg. the S at 200-220° usually shows slightly higher values of S and lower for bitumen, because of some volatilization of the latter.

A. W. Contieri

**Sensitive test for the iodate ion.** G. Spacu and P. Spacu. *Bul. soc. stiinta Cluj* 7, 398-9(1934)(in French).—If a few drops of 0.1 molar  $Hg_2(NO_3)_2$  is added to a soln. of 0.03 mg. or more of iodate, a white ppt. of  $Hg_2(IO_3)_2$  is formed. An excess of the reagent must be avoided or the ppt. will dissolve.

W. T. H.

**The microchemical identification of some cations with the aid of  $\alpha$ -aminopyridine.** Adolfo Sá. *Anales. farm. biogéom.* (Buenos Aires) 4, 77-80(1933).  $\alpha$ -Aminopyridine and  $NH_4SCN$  form characteristic crystals with  $Co^{++}$ ,  $Cu^{++}$  and  $Zn^{++}$ . Four photomicrographs are shown.

B. S. L.

**Indirect determination of halogen hydride acids.** Th. I. Pirtea. *Z. anal. Chem.* 96, 263-6(1934).—To a soln. contg. KCl and KBr add an excess of  $AgNO_3$ , filter and weigh the  $AgCl + AgBr$ . Dissolve the weighed ppt. in a hot satd. soln. of KBr. Add a little  $HNO_3$ , dil. and filter off the  $AgBr$  and weigh. In case the soln. contained KCl and KI, proceed similarly but use a satd. soln. of KI to dissolve the ppt. The KI soln. dissolves the  $Ag$  halides more readily than does KBr soln. If all 3 halides are present, treat the weighed  $Ag$  ppt. with KBr soln. first to dissolve out  $AgCl$  and  $AgBr$  and then with KI to dissolve the  $AgI$ .

W. T. H.

**Determination of chlorogenic acid by the method of H. Jurany.** W. Plucker and W. Keilholz. *Z. anal. Chem.* 96, 249-52(1934); cf. Jurany, *C. A.* 28, 229<sup>2</sup>.—It is claimed that the conclusions drawn by J. are untenable.

W. T. H.

**Comparative clarification of sugar solutions. Copper reduction and iodine titration methods.** L. G. Saywell and E. P. Phillips. *Ind. Eng. Chem., Anal. Ed.* 6, 116-17(1934).—When neutral  $Pb(OAc)_2$  and  $Na_2C_2O_4$  were used for clarifying invert sugar solns., complete recovery was obtained by the iodometric method and 99.7% recovery by the Cu reduction method.

Amy Le Vesconte

**The estimation of plant poisons in Chili saltpeter.** E. S. Tomula and Katri Pelkonen. *Acta Chem. Fennica* 7B, 58(1934)(in German).—To det.  $Cl^-$  dissolve 10 g. of the sample in water and titrate with  $AgNO_3$  by the method of Volhard. To det.  $ClO_3^-$  treat a similar sample with 0.5 g. mossy Zn, 6 ml. of 2  $N$   $H_2SO_4$  and 1-2 drops of 10%  $CuSO_4$  soln., heating 0.75 hr. on the water bath to reduce  $ClO_3^-$  to  $Cl^-$ . Titrate with  $AgNO_3$  as before, allowing for the  $Cl^-$  originally present. To det.  $ClO_4^-$  dissolve 10 g. of the salt in water and add 3-5 ml. of 40% formalin, 1 ml. of 0.5  $N$   $FeCl_3$  and 2 ml. of 6  $N$   $HNO_3$ . Heat 0.5 hr. on the steam bath, add 20 cc. of concd.

<sup>1</sup>  $HCl$  and evap. to dryness. Take up in a little water and repeat the evapn. with concd.  $HCl$ . After 4 evapns. with  $HCl$  treat the residue with 60 ml. of concd.  $HCl$  and filter off  $NaCl$  through a Jena filter. Evap. the filtrate to dryness and weigh the residue. Analyze an aliquot for  $Cl^-$  by the  $AgNO_3$  titration. To the remainder add the exact vol. of  $Ag_2SO_4$  required to combine with all  $Cl^-$ , filter and in the dild. filtrate reduce the  $ClO_4^-$  to  $Cl^-$  with  $Ti^{++}$  and  $Fe^{++}$  and titrate with  $AgNO_3$ .

S. A. Karjala

**Physiological identification of strychnine in forensic toxicology.** A. Seria Negrão. *Arch. med. legal* 5, 45-50(1932).—White mice 14-16 days old are preferable to frogs for identification of strychnine. Injection of a min. of 0.001 mg. of the nitrate or sulfate induces tetany accompanied by a characteristic tremor in the tail.

B. C. A.

<sup>3</sup> **Detection of hydrocyanic acid in cadavers in cases of poisoning.** Otto Schmidt. *Deut. Z. ges. gericht. Med.* 21, 334-6(1933).—To 2 cc. of 10%  $KOH$  add water and about 10 drops of yellow  $(NH_4)_2S_2$  soln. Moisten a strip of filter paper with this soln. and hang in a closed vessel, as in the Schonbein-Färgenstein guaiac-Cu sulfate test, before using for the cadaver material. The addn. of dil.  $H_2SO_4$  liberates  $HCN$ . If  $Hg(CN)_2$  poisoning is suspected, it is necessary to add  $NaCl$ . The  $KCN$  formed on the paper strips is converted to  $KCNS$  by carefully heating in a test tube. Cool and add a slightly acid soln. of  $FeCl_3$ ; if 0.1 mg. of  $HCN$  per l. is present, red  $Fe(CNS)_2$  is formed.

Frances Krasnow

**The determination of blood alcohol by the method of D. Widmark, and its forensic importance.** Josef Koller. *Deut. Z. ges. gericht. Med.* 21, 269-74(1933); cf. *C. A.* 27, 1651.—It is important to do blanks on all solns. and also analyze a known alc. mixt.

Frances Krasnow

<sup>5</sup> **The incineration of small laboratory animals for the determination of bismuth.** C. Mesgrez, M. Glaume and R. Wolff. *Bull. soc. chim. biol.* 15, 1527-34(1933). In the destruction of org. matter of animal tissues by  $HCl$  and  $KClO_3$  some loss of Bi occurs. Rapid incineration at red heat also causes a loss. A satisfactory method is to cut up the tissues or the whole rat or guinea pig in a porcelain dish, dry at 100-120° 2-3 days, heat in a muffle below dull red heat until gassing ceases, grind the residue and ignite to a gray ash over a Bunsen burner with occasional stirring. The ash is treated with  $HCl$  and the Bi pptd. as  $Bi_2S_3$ , then converted into the yellow  $K$  iodobismuthate and detd. colorimetrically. A few mg. of Bi in a guinea-pig carcass can be detd. with a possible error of 2%.

J. E. Gilson

<sup>7</sup> **Can the kind of powder be determined microscopically from the traces of powder after a shot?** W. Karhan. *Deut. Z. ges. gericht. Med.* 21, 451-6(1933). Microscopic examn. detcs. only whether nitro or black powder was used.

Frances Krasnow

**The retention on clothing of traces of nitro and black powder from nearby shots.** Walter Karhan. *Deut. Z. ges. gericht. Med.* 21, 202-25(1933).

F. K.

<sup>8</sup> **Catalytic microhydrogenation of organic compounds.** Richard Kuhn and Ernst F. Möller. *Angew. Chem.* 47, 145-9(1934). An app. based upon the principle of the differential manometer is described. From 1 to 5 mg. of substance is dissolved in a suitable solvent and treated with  $H_2$ , and the course of the pressure is observed for the unknown and for a comparative standard. The accuracy of the method is  $\pm 0.5\%$ . The equations for the calcn. of the no. of double bonds are derived. Exptl. data are presented for 26 compds., which include hydrocarbons, xanthophylls, polycyclohexenoic acids, carbonylpolycyclohexenes, vitamins. Sorbic acid was used as a comparative standard. The use of solvent mixts. frequently exerted a favorable influence on the velocity of hydrogenation, e. g., for carotenoids mixts. of decalin and glacial  $AcOH$  (1:2 to 2:1).  $PtO_2$ ,  $PdO_2$  and  $SiO_2-Pt$  were used as catalysts.

Karl Kammermeyer

<sup>9</sup> **New method for determination of diolefin hydrocarbons in gas.** A. A. Korotkov. *Sintet. Kauchuk* 1933, No. 4, 23-31.—The app. is described in detail. It has a gradu



ated buret for holding the gas and a "reactor" [U-shaped tube contg. malic anhydride reacting with the butadiene of the gas], which is immersed in boiling water to keep the reagent in a molten state. The upper parts of the U-shaped tube and the buret are water-jacketed to cool the gas leaving the reactor and maintain a const. temp. in the app. outside the reaction zone. The procedure for carrying out the analysis and the advantages of the app. are discussed.

**Determination of butadiene in gases.** Hans Tropsch and W. J. Mattox. *Ind. Eng. Chem., Anal. Ed.* 6, 104-6 (1934).—The method is the same as that of the preceding abstr.

**Determination of acetylene.** A. Krauss. *Azetylen Wiss. Ind.* 35, 73 5 (1932). An app. for detg.  $C_2H_2$  in welding gases is described.

**Determination of the air content of high-percentage acetylene.** M. Korschak. *Azetylen Wiss. Ind.* 35, 118-22 (1932).

**Determination of air in high-percentage acetylene.** C. Assmann. *Azetylen Wiss. Ind.* 35, 184 6 (1932).—Korschak's method (preceding abstr.) is troublesome, but gives accurate results.

**The detection of alcohol denatured with pyridine bases in incendiarism.** Oskar Schmidt. *Angew. Chem.* 47, 151-2 (1934).—The reaction of pyridine with  $CNBr$  and aniline gives a yellow to red color which is definite proof of the presence of pyridine. Aniline can be replaced by  $p$ -phenylenediamine or  $\beta$ -naphthylamine. Charred wood which has not been treated before charring with denatured alc. gives distillates which do not react with the amines and  $CNBr$ . Therefore these color reactions, if pos., can be used as proof of the presence of alc. denatured with pyridine bases in charred wood or the like.

**Determination of the composition of recovered alcohol-benzene mixture.** Franz Khyut and R. L. Grodzinskaya. *Bumazhaya Prom.* 12, No. 11, 37 9 (1933). The detn. is based on the oxidation of  $EtOH$  to  $AcOH$  with  $K_2Cr_2O_7$ .

**Determination of alkyl alcohol sulfonates in dilute solution.** W. Kling and F. Puschel. *Melliand Textilber.* 15, 21 3 (1934). The alkyl alc. sulfonate is pptd. with benzidine-HCl, filtered, dissolved in hot alc. to sep. it from inorg. sulfate and the benzidine alkyl sulfate is titrated with  $NaOH$ . Results with a soln. contg. 0.1 0.2 g./l. were within  $\pm 5\%$ .

**Acidimetric determination of formaldehyde and sulfites.** Malaprade. *Compt. rend.* 198, 1037-9 (1934). The soln. of  $HCHO$  under examn. is neutralized, an excess of neutral aq.  $Na_2SO_3$  is added, and the resultant  $NaOH$  is titrated:  $HCHO + Na_2SO_3 + H_2O = HCHO(NaHSO_3) + NaOH$ . Conversely, to det. sulfite an excess of neutral  $HCHO$  is added to the sample which must have been neutralized in absence of air, and the resultant  $NaOH$  titrated with phenolphthalein; all other neutralizations should be with thymolphthalein as indicator.

**A volumetric method for determining furfural in pentoses and pentosans.** V. S. Sadikov and K. S. Belkova. *Schriften Zentral. biochem. Forschungsinst. Nahr.-Genuss-mittelind.* (U. S. S. R.) 3, 209 307 (1933).—The Kullgren-Tveden volumetric method for furfural and xylose, e. g., in pentosans, with  $NaCl$  for distg. furfural, is equal to the Tollens' gravimetric method in accuracy and superior in convenience and in temp. uniformity during distn. of  $HCl$ . The Tolman colorimetric method is not sufficiently accurate.

**Determination of organic acids.** R. I. Sotnikov. *Compt. rend. acad. sci. U. R. S. S.* 1933A, No. 6, 83-7.—To det. oxalic and citric acids formed in plant tissue as a result of metabolism, take 10-20 cc. of soln. to be analyzed, add 10 cc. of 15-20%  $AcOH$  and 20-30 cc. of water. Heat to boiling, add 10 cc. of 10%  $CuCl_2$  and continue boiling for 3 min. After it has stood 12-16 hrs. at room temp., filter off the  $CaC_2O_4$  ppt., wash and dissolve in 80-100 cc. of boiling 5%  $H_2SO_4$  and titrate hot with 0.1  $N$   $KMnO_4$ . To the filtrate from the  $CaC_2O_4$

ppt. add 1-2 drops of phenolphthalein soln. and  $NH_4OH$  to alk. reaction. Boil to expel almost all excess  $NH_4OH$ . Without cooling, filter off the ppt. of  $Ca$  citrate and wash with hot water until free from chloride. Dissolve the ppt. in 10-20 cc. of 0.1  $N$   $HCl$ , neutralize with 10-20 cc. of 0.1  $N$   $NaOH$  and add 10 cc. of 10-15%  $AcOH$ . Heat to boiling and ppt. the  $Ca$  equivalent to the citric acid with 10-25 cc. of boiling 2% oxalic acid. Filter, wash and titrate this  $CaC_2O_4$  ppt. as above.

**Identification of  $p$ -chlorobenzoic acid in the presence of benzoic acid.** F. Weiss. *Z. Untersuch. Lebensm.* 67, 84-6 (1934).—The Grossfeld modification of the Mohler reaction is carried out as a ring reaction, in that a soln. of hydroxylamine is poured as a layer over the reaction liquid. The nitration product of  $p$ -chlorobenzoic acid gives a green coloration, that of benzoic acid an orange-red one. In the identification of benzoic acid by the Mohler reaction as carried out by Grossfeld, consideration should be given to the fact that  $p$ -chlorobenzoic acid likewise gives a red coloration. An approx. quant. sepn. of  $p$ -chlorobenzoic acid and benzoic acid may be brought about by the difficult soly. of the former in  $H_2O$ .

**The microscopic determination of barbital and of dial by means of ammoniacal silver nitrate, with a crystallographic study.** C. Strzyzowski and L. Déverin. *Helv. Chim. Acta* 16, 1288-91 (1933).—The treatment of small quantities of barbital with warm ammoniacal  $AgNO_3$  gave octahedral crystals while the similar treatment of diallyl-barbituric acid gave needle clusters. The 2 crystal forms are discussed.

**Detection of sucrose in lactose.** M. Wagenaar. *Pharm. Weekblad* 71, 281-4 (1934). The method is based on the fact that ketoses (fructose) give a violet color with  $\alpha$ -naphthol and  $H_2SO_4$  while aldoses remain colorless. A 5-mg. sample of the lactose is suspended in a drop of a glycerol soln. of  $\alpha$ -naphthol, and a drop of concd.  $H_2SO_4$  stirred in with a Pt wire. If sucrose is present, a blue-violet color develops within 10 min. The reaction may be rendered more sensitive by warming the mixt. 0.5 min. on a steam bath and comparing the color with that of a control test with pure lactose. One % of sucrose can readily be detected.

**Determination of hydroquinone with particular reference to its determination in salt herrings.** W. Preiss. *Z. Untersuch. Lebensm.* 67, 144-60 (1934). It is shown by expt. that in the iodometric detn. of hydroquinone (in small amts.) the use of  $KHCO_3$  for neutralization leads to incorrect results. If  $CO_2$  is used to full satn. before introducing the  $KHCO_3$ , the method is usable. The use of either  $Na_2HPO_4$  or  $AcONa$  is preferable. Statements in the literature to the contrary, quinone can be distd. with water vapor without decompn. if one maintains a suitable  $pH$ . On the basis of this fact, a distn. method was worked out which seps. the hydroquinone and quinone in a simple fashion from other substances and they are then detd. The qual. methods for detecting hydroquinone and quinone are discussed and a new sensitive method is given for identifying them in salt-hydroquinone mixts. Convenient methods are given for the identification of hydroquinone and quinone in herring brine and in salt herring, as well as for their detn. in salt mixts. and of hydroquinone in herring brine and in salt herring. Hydroquinone undergoes changes through the action of other substances in herrings, whereby the hydroquinone content decreases on letting the herrings stand. Expts. indicate that this reduction in the amt. of hydroquinone is due to reactions of quinone produced by the oxidation of the hydroquinone. Twenty-two references.

**Methods for determining nicotine.** P. Koenig and W. Dörr. *Z. Untersuch. Lebensm.* 67, 413-44 (1934).—The physiol., colorimetric and nephelometric procedures for the detn. of nicotine are not satisfactory. The titrimetric detn. of nicotine by the methods of Toth, Rundshagen, Keller, Bodnar and some others detn. some of the  $NH_3$  and other bases. To a great degree, these methods depend on the alkyl, fineness of the material

and the method of extn. Because of the significant errors that arise, these methods should be abandoned. Only the Küssing method with modifications can lay claim to accuracy. The gravimetric detn. of nicotine according to Javillier, Rassmussen and Mach, as modified by Peter, is suitable for the exact detn. of nicotine if the cryst. ppt. is further worked up according to the proposals of the authors. The maintenance of a controlled HCl concn. is of great importance. The selective pptn. methods of Pfyl and Schmitt fulfil in all cases the basic requirements for a method of that character. A no. of modifications suggested by the authors do not in the least alter the basic principles of the method, but make the carrying out of the analysis much easier. For analysts who make only single detns., the authors recommend the silicotungstic acid pptn. method in its modified form. For more extended investigations, especially where a series of detns. must be made, the picric acid method possesses the merit of ease of operation and an accuracy which satisfies all demands, this limit being 0.5 mg. Almost 100 references. F. L. Dunlap

Gravimetric and volumetric determination of antipyrine in the presence of amidopyrine. I. M. Kolthoff. *J. Am. Pharm. Assoc.* 22, 947-50 (1933).—The iodometric method for the detn. of antipyrine is not applicable in the presence of amidopyrine. However, in acid media antipyrine yields with  $K_4Fe(CN)_6$  a cryst. ppt. of  $(C_{11}H_{13}N_3O)_2H_2Fe(CN)_6$ , whereas amidopyrine does not react. From 0.2 to 0.3 g. of antipyrine is dissolved in 30 cc. of 0.8 N HCl and 20 cc. of 0.5 M  $K_4Fe(CN)_6$  added with stirring. After standing for 30 min. the ppt. is collected in a weighed Gooch crucible, by using the filtrate for transferring. The ppt. is washed with  $H_2O$  freshly satd.

with the ppt., the residue dried at  $105-10^\circ$  and weighed. A correction of 0.005 g. is added for soly. The ppt. contains 63.53% of antipyrine. For the volumetric detn. the undried ppt. is suspended in  $H_2O$  and dissolved with stirring in a measured excess of 0.05 N or 0.1 N NaOH in the presence of phenolphthalein. The ppt. dissolves slowly and the alkali is added until the pink color persists for 2-3 min. A blank should be run with  $H_2O$ . A correction of 0.34 cc. of 0.1 N NaOH is added for the soly. of the ppt. 1 cc. of 0.1 N NaOH = 0.0094 g. of antipyrine. The method is not recommended for quantities less than 0.1 g. L. E. Warren

Effect of the surface of the oxidizing agent on the rate of oxidation of CO [detn. of small concns. of CO] (Astapenya, *et al.*) 2

Caron, H., and Raquet, D.: Analyse chimique quantitative à l'aide de liqueurs titrées. Paris: Librairie Vuibert. 304 pp. F. 40.

Matuszak, Maryan P.: Gas-Analysis Manual for Use with Apparatus of the Orsat Type. Pittsburgh: Fisher Sci. Co. 64 pp. Gratis.

Tognoli, Edgardo: Reattivi e reazioni (Analisi chimica) 2nd ed. Milan: U. Hoepli. 392 pp. L. 18. Reviewed in *Nomenclatura chim.* 3, 22-3 (1933).

Gas analysis. Svenska Aktieförlaget Mopra and Olof Rodhe. Brit. 403,324, Dec. 21, 1933. In a method of gas analysis involving alternate dissimilar detns., e. g., of  $CO_2$  alone and  $CO + CO_2$ , resp., a difference between successive detns. is used to operate a signaling or controlling device. App. is described.

## 8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

RODGER L. WHERRY AND J. F. SCHAIERER

The dependence of the luminescence in minerals on their occurrence and their formation. St. Kreutz. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, No. 4 8, 215-25. —Fluorite, apatite, topaz and calcite were illuminated by light with  $\lambda$  3890. The color, intensity and wave-length limits of the fluorescent light are recorded. A. B. F. Duncan

Frequent presence of pyrite crystals in the diatoms of lacustrine chalk: their probable bacterial origin. E. Joukowsky. *Compt. rend. soc. phys. hist. nat. Genève* 50, 182-5 (1933) (*Arch. sci. phys. nat.* 15, July-Aug.).—Descriptions are given. B. C. A.

Mineralogy of cassiterite and other pegmatitic and pneumatolytic minerals. B. N. Artem'ev. *Bull. acad. sci. U. R. S. S. Classe sci. math. nat.* No. 8, 1125-44 (1933).—A discussion of the physicochem. properties of cassiterite, beryl, columbite, tantalite and monazite with regard to the place and time of their crystn.

V. D. Karpenko

The chemical composition of pegmatitic and magmatic alkali feldspars. B. Zamewska-Chlipalska. *Centr. Mineral. Geol.* 1934A, No. 3, 91-3; cf. C. A. 27, 2052; Chudoba, C. A. 27, 5033. Reply. Karl Chudoba. *Ibid.* 93.—Polemic. Michael Fleischer

Anapaite, enigmatite and eudidyimite. C. Palache. *Z. Krist.* 86, 280-91 (1933).—Anapaite,  $Ca_2Fe(PO_4)_2 \cdot 12H_2O$ , is triclinic,  $a:b:c = 0.8575:1:0.9401$ ,  $\alpha = 108^\circ 56' 40''$ ,  $\beta = 104^\circ 5' 40''$ ,  $\gamma = 78^\circ 25' 24''$ . Enigmatite (or cosvyrite) (cf. Gossner and Musgrug, C. A. 24, 2403) is triclinic,  $a:b:c = 1.0014:1:0.5853$ ,  $\alpha = 97^\circ 2' 5''$ ,  $\beta = 96^\circ 49' 5''$ ,  $\gamma = 112^\circ 26' 5''$ . Eudidyimite is monoclinic,  $a:b:c = 1.7103:1:1.8951$ ,  $\beta = 76^\circ 42'$ . Previous results are discussed. B. C. A.

The wöhlerite and mosandrite groups. B. Gossner and O. Kraus. *Centr. Mineral. Geol.* 1934A, 72 9; cf. C. A. 27, 5684; 28, 9937.—Rotation spectrograms and goniometric measurements gave: wöhlerite (I)  $a = 10.80$ ,  $b = 10.20$ ,  $c = 7.26$  A.,  $\beta = 108^\circ 57'$ ; *lavenite* (II)  $a = 10.93$ ,  $b = 9.99$ ,  $c = 7.18$  A.,  $\beta = 110^\circ 18'$ ; *hioridahlite*

(III)  $a = 10.91$ ,  $b = 10.29$ ,  $c = 7.32$  A.,  $\alpha = 90^\circ 29'$ ,  $\beta = 108^\circ 50'$ ,  $\gamma = 90^\circ 8'$ . Though III is triclinic, its close agreement in chem. compn. places it in this group. The general formula for the group is  $(SiO_4)_2(ZrF)Ca_2Na$ . In I about 40% of (ZrF) is replaced by (CbO), in II, 20% of  $Ca_2$  by  $Zr_1$ , in III about 25% of (ZrF)Na by  $Ca$ . For mosandrite  $a = 18.47$ ,  $b = 5.67$ ,  $c = 7.46$  A.,  $\beta = 91^\circ 13'$ ; *rinkite*  $a = 18.37$ ,  $b = 5.63$ ,  $c = 7.42$  A. The general formula for the group is  $(SiO_4)_2[(Ti,Ce)F]Ca_2Na$ . In *johnstrupite*, (TiF)Na is partly replaced by  $Ca_2$ , while in mosandrite, there is apparently an open structure with II replacing Na and OH replacing F. M. F.

A geophysical exploration in Chile. N. Gella and M. Bertram Bateman. *Mining Mag.* 50, 84 5 (1934). Gold ore occurs at the Chivato mine, 15 km. south of Talca, as a mineralized zone in a granodiorite. With the typical pyrite, chalcopyrite, galena and cinnabar have also been deposited. Decompn. has produced limonite, resulting in a certain recon. of the Au at a lower horizon in faults and fissures. A new zone has been opened up through this geophys. exploration. A. W. Furbank

The Climax molybdenum deposit, Colorado. B. S. Butler, J. W. Vanderwilt and Charles W. Henderson. *U. S. Geol. Survey Bull.* 846-C, 195-237 (1933). E. H.

Ore deposits in the Tertiary of Sardinia. Giovanni Pavan. *Riscontri assoc. mineraria sarda* 38, No. 7, 9-23 (1933).—Pb and Zn sulfides in these deposits are scarce, of greater importance are the Cu and Cu-Fe sulfides and Mn minerals (contg. Mn 15-38,  $SiO_2$  15-25, Fe 1-5%). The most important minerals are kaolin and lignite. Kaolin is practically free from  $MgO$  and contains a max. of 1.8%  $Fe_2O_3$ , 50-60%  $SiO_2$  and 30-40%  $Al_2O_3$ ; it is a good material for the manuf. of refractory and porcelain ware. The lignite contains great quantities of S, and has 5500-6000 cal.; by distn. at low temp. it gives (for 100 pts. of lignite): 3 pts. benzine, 1 pt. petroleum, 2 pts. gas oil, 0.75 pt. phenols, 2 pts. S, 6 pts. gas (at 6500 cal.) and 65 pts. of semicoke. G. A. Bravo

The talc and steatite deposits of Orani (Sardinia).

Luigi Gerbella and Giuseppe Alfano. *Riscontri ass. mineraria sarda* 39, No. 1, 14-17 (1934).—The eruptive granite rocks were transformed into tremolite, which, in the Tertiary, was transformed into talc. Several uses of these minerals are suggested.

G. A. Bravo. The deposits in the southern part of Baichunas, Ural-Emba district. Geological structure and crude oil deposits. Kh. V. Buskin. *Neftyanoe Khosyaistvo* 26, No. 1, 12-19 (1934).—B. discusses geography, stratigraphy, prospecting work, capacity of the oil-bearing strata, phys. and chem. properties of the crude oils, and compn. of waters. The characteristics of the crude oils, depending upon the depth of the deposit were: sp. gr. 0.8751-0.8930,  $E_v$  viscosity 2.32-5.14, resins 3.6-4.7, gasoline 0.3-0.6, heavy naphtha 0.5-0.87, kerosene 8.3-17.25, gas oil 1.13-11.2 and bottoms 68.55-79.7%. The borehole water had the av. compn.: alkyl. 0-5.4, sp. gr. 1.1427-1.1490, dry residue 187.4-250.4,  $Ca^{++}$  0.942 g per l.,  $Mg^{++}$  0-6.895,  $Na + K^{+}$  49.804-78.662 g./l.,  $SO_4^{--}$  0-1.363 g./l.,  $Cl^{-}$  97.44-137.088 g./l.,  $HCO_3^{-}$  0.043-0.433 g./l. The analytical procedure is described.

A. A. Boethlingk. Survey of gas deposits in the Melnikov gas fields, lower Volga river. V. A. Sokolov and Yu. K. Yur'ev. *Neftyanoe Khosyaistvo* 26, No. 1, 20-2 (1934). The compn. of gases obtained through drilling up to a depth of 100 m. and suction exercised by the difference in the water level in bottles placed on the ground was  $CO_2$  1.5-3,  $O_2$  16.8-20.2, and hydrocarbon gases about 0.01%. The radioactivity of the gases was 0.62-1.88 divisions of the electroscope per min.

A. A. Boethlingk. Aegirine-augite hyalo-rhyolite from Tokachi, Hokkaido. Tadahiyo Nemoto. *Proc. Imp. Acad. (Tokyo)* 10, 21-4 (1934).—The microscopical character and chem. compn. are given.

E. R. Rushton. Genesis of a lithium pegmatite on the Bear mineral claim, southeast Manitoba. C. H. Stockwell. *Trans. Roy. Soc. Can. IV* 27, 27-36 (1933).—The materials of the pegmatite body crystallized chiefly from the magma of the dike beginning at the surface of contact with the walls and progressing inward into the magma. Replacements took place between the solidifying magma and the crystal structures formed, eventually leading to the distribution of minerals as found.

J. W. Shipley. Genesis of pegmatites of southeast Manitoba. C. H. Stockwell. *Trans. Roy. Soc. Can. IV* 27, 37-51 (1933).—The pegmatites of southeast Manitoba (dominantly of microcline and quartz) formed chiefly by crystallization from the magma, while those with biotite and magnetite were formed entirely by this process. Replacements took place from residual and interstitial solns.

J. W. Shipley. Composition of basic rocks, intrusive and metamorphic,

of the Kasai, Belgian Congo. M. E. Denayer. *Compt. rend.* 198, 956-8 (1934).—These include hypersthene-gabbros, dolerites passing into basalts, with spessartite and aegirites, all apparently derived from the same magma; associated with them are amphibolites, with much diopside and plagioclase, and also an orthoamphibolite contg. zoisite. Magmatic parameters are given for 11 varieties. Mt. Musungu, near Satsbigioia, consists of a dark red rock made up of red garnet, magnetite and hypersthene with vein quartz.

C. A. Silberrad. Nature of alteration of feldspars in granite sands of the Vosges. A. S. Mihara. *Compt. rend.* 198, 955-6 (1934).

The white altered feldspars of the sands, etc., formed from the granite of Hohwald (Vosges) contain 55% plagioclase, 36% phyllites (28 sericite and 8 kaolinite) and 9% free  $SiO_2$ . Analyses of altered (*i. e.*, with sericitized feldspar), but not yet disintegrated granite compared with one of the granite-sand shows insufficient  $Al_2O_3$  in the former for kaolinite to be present there as such; this must, therefore, result from sub-aerial action accompanying disintegration.

C. A. S. The volcanic region of Vesuvius: a chemical and geographical study. I. The high zone. O. Bottini. *Ann. sper. agrar. (Rome)* 12, 7-56 (1933). II. The plains zone. *Ibid.* 57-81. The chem. analyses of the soils near Vesuvius (51 samples from the high zone and 47 from the plains) are given. The soils are very rich in fertilizing elements. The  $H_2O$  content is 4-5.5,  $P_2O_5$  0.3-0.5, humus 1-3, N 0.1-0.2%. The Ca content is variable. The reaction of the soils is generally acid, although the rocks from which they are formed are basic; this is due to the presence of org. matter.

G. A. Bravo. Analysis of gas extracted from monazite and ilmenite. Piero De Cori. *Atti IV Congr. naz. chim. pura applicata* 1933, 714-20.—Ilmenite from Travancore (India), heated to 1100° in *vacuo* produced 52.04 cc. of gas per 100-g. sample, the gas contg.  $CO_2$  86.10,  $CO$  5.43,  $N_2$ ,  $H_2$ , rare gases 8.47%. Helium recovered was 0.380 cc. per 100 g. of sample. A monazite sand from Polynesia, heated to 1100°, produced a gas contg.  $CO_2$  24.3,  $CO$  9.1,  $H_2$  30.3,  $He$  34.5, hydrocarbons 1.7%. Helium recovered was 63 cc. at 800°, 68 cc. at 900°, 50.23 cc. at 1100°. Radioactivity of the sample, compared to  $U_3O_8$ , was about 5 times less than would correspond to the He content.

R. M. Symmes

Deutsches Bergbau-Jahrbuch. Jahrbuch der deutschen Braunkohlen-, Steinkohlen-, Kali- und Erzindustrie, der Salinen, des Erdöl- und Asphaltbergbau. Jg. XXV. Edited by Heinrich Hirt and Wilhelm Pothmann. Halle: W. Knapp. 52 pp. M. 14.50.

## 9 METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Experimental work in the field of flotation reagents. D. A. Shvedov. *Results and Achievements Field of Ore Dressing, U. S. S. R.* 1932, 49-73. —A description of the work done at the Inst. of Mekhanobr. S. L. Madorsky.

Electrokinetics of flotation. J. Proszki and L. Ūrmosi. *Mitt. berg-huittenmann. Abt. ungar. Hochschule Berg-Forstw. Sopron* 5, 22-37 (1933).—Examn. of 3 essentially different coarsely disperse systems (galenite, quartz suspensions and a paraffin oil emulsion) showed quite different behavior and sensitivity toward the same electrolyte. Measurements of the velocity of settling of these systems by means of a special app. proved that the degree of coagulation of such systems like that of colloidal dispersions reaches its max. at the isoelec. point. The elec. condition of ore pulps may be specifically influenced to obtain selective flotation.

S. S. de Pinily. Effect of particle size on flotation of sphalerite. R. L. Kidd and W. A. Wall. *Mining Met.* 14, 421-2 (1933).—The finer sizes of sphalerite require less cresylic acid to give the best froth character than do the larger sizes.

With cresylic acid alone, much better recoveries are obtained with the finer than the coarser sizes. In general, recoveries increase with increase in amt. of frother used but more gang is carried over. In fine sizes, better recoveries are obtained with cresylic acid alone than when  $CuSO_4$  or  $CuSO_4$  and K Et xanthate are present. The reverse is true in larger sizes. The recovery of fine sizes can be improved by increasing the length of the collecting period, such as by using more flotation cells. A. H. E.

Why do minerals float? S. Frederick Ravitz. *Mining Met.* 15, 506-7 (1933).—A review.

Alden H. Emery. Review of fine grinding in ore concentrators. Alexander M. Gow, Morris Guggenheim and Will H. Coghill. *Bur. Mines, Information Circ.* 6757, 29 pp. (1934).—The fine-grinding practice in 49 concentrators in the U. S., Alaska, Canada, Mexico and Cuba is reviewed. The methods of operation, grinding capacities and milling costs for 470 ball, rod and pebble mills are tabulated.

Alden H. Emery. Electromagnetic concentration of ores. V. Yu. Pirker

- Results and Achievements Field of Ore Dressing, U. S. S. R. 1932, 93-113.**—Six types of magnetic separators constructed by the Inst. of Mekhanobr are described. The problem of electromagnetic sepn. is reviewed, and a plan for future work at the Inst. is given. S. L. Madorsky.
- Crushing, screening and wet and dry concentration. M. K. Shirokinskii. Results and Achievements Field of Ore Dressing, U. S. S. R. 1932, 74-92.**—Review. S. L. Madorsky.
- Ores and minerals as objects of ore dressing. I. N. Maslennitskii. Results and Achievements Field of Ore Dressing, U. S. S. R. 1932, 7-19.**—A review of the problem of ore dressing as related to the Russian mineral industry. S. L. Madorsky.
- Operating experience in chromium ore dressing and the economic utilization of poor ores. A. Fönger. Metall u. Erz 31, 25 9(1934).**—A discussion of means for avoiding loss in the utilization of low-grade chromite and Cr-Fe ores in Macedonia, Bulgaria, Servia and Turkey. H. S. Chiuin.
- Iron and manganese ores and their dressing. N. N. Chiuin. Results and Achievements Field of Ore Dressing, U. S. S. R. 1932, 114-50; cf. C. A. 25, 5371.**—Review. S. L. Madorsky.
- Dressing of nonferrous metals. K. A. Razumov. Results and Achievements Field of Ore Dressing, U. S. S. R. 1932, 151-77.**—A review of the problem as related to Russia. S. L. Madorsky.
- Possibilities of the use of German ore deposits. H. Schneiderholm. Metallwirtschaft 13, 151-7(1934).**—A discussion of the ore deposits of common and rare metals in Germany, possibilities of greater com. development from the economic standpoint and the development of new processes for refining low-grade ores. C. F. M.
- Recent condition of technical development in German metal mines. H. v. Scothi. Metall u. Erz 31, 59 62(1934).**—A short survey of important German metal mines. H. Stoertz.
- Present condition of gold mines in Chile. K. H. Brehm. Metall u. Erz 31, 86 7(1934).** H. Stoertz.
- Methods of prospecting, extraction and treatment of gold ores. Ch. Berthelot. Chimie & Industrie 31, 3 31, 262 79(1934).**—Descriptive. A. Papineau-Couture.
- Effect of the quantity of lead salts on the extraction of gold by the cyanide process. Milutin Mladenović and Vojislav Stajić. Bull. soc. chim. roy. Yougoslav. 4, 179-82 (in English 182)(1933).**—A no. of leaching expts. of Au ore from oxidized zones in the presence of Pb acetate indicate that the increase in the quantity of Pb salt increases the extn. to a certain point (2000 g. per ton of ore) after which the extn. decreases. Formation of insol. Pb cyanide complexes is a logical suggestion explaining the decrease of the extn. It is also noted that for Au extn. the Pb salt should be added in smaller amts. to the ore. G. S. S.
- How the consumption of alkali cyanides is affected by its concentration in the cyanide processes. Milutin Mladenović and Vojislav Stajić. Bull. soc. chim. roy. Yougoslav. 4, 183-5 (in English 185 6)(1933).**—When the concn. of alkali cyanide in the cyanide process of Ag extn. is increased, the consumption of the cyanide increases with the proper increase in the Ag extn. If a small concn. of alkali cyanide is used, the time of extn. does not extend remarkably. G. S. Stamatoff.
- Gold in 1933. E. Balfour Scott. Mining J. 184, Special Review No., 1-2 (Feb. 17, 1934). Silver in 1933. Ibid. 4, Tin in 1933. Ibid. 7-9. Copper in 1933. Ibid. 11 12. Platinum and the associated metals. Ibid. 12. Nickel in 1933. Ibid. 13. Tungsten in 1933. Ibid. 13. Lead and zinc in 1933. O. W. Roskill. Ibid. 14-15. Light-metal developments in 1933. Ibid. 16-17. Iron and steel in 1933. J. H. Thompson. Ibid. 18. A. H. E.**
- Silicon: its applications in modern metallurgy. A. B. Kinzel. Mining Met. 14, 489-92(1933).**—A review. Alden H. Emery.
- Metallurgy of lead. Carle R. Hayward. Mining Met. 15, 22-3(1934). Metallurgy of zinc. E. H. Bunce. Ibid. 22-3. Copper reduction. A. B. Young. Ibid. 24-5. Metallurgy of gold. Allan J. Clark. Ibid. 25 7.**
- Ore dressing. Charles E. Locke. Ibid. 27-9. The iron and steel industry. Clyde E. Williams. Ibid. 31. Iron ore and smelting. T. I. Joseph. Ibid. 31-2. Steel-making progress. C. H. Herty, Jr. Ibid. 32-3. Alloy steels. Jerome Strauss. Ibid. 33-5. Cast iron. J. T. MacKenzie. Ibid. 35-6. Steel foundry practice. R. A. Bull. Ibid. 36, 45. Nonferrous physical metallurgy. Albert J. Phillips. Ibid. 39. Aluminum. E. H. Dix, Jr. Ibid. 39-40. Wrought copper and copper alloys. D. K. Crumpton. Ibid. 40 1. Lead and tin. J. E. Harris. Ibid. 41. Zinc. W. M. Pearce. Ibid. 41-2. Secondary metals. W. A. Scheuch. Ibid. 42-3. The precious metals. E. M. Wise. Ibid. 43-4. Nonferrous foundry practice. H. M. St. John. Ibid. 45. Theoretical metallurgy. Robert F. Mehl. Ibid. 46-51. Rare metals. Paul M. Tyler and Zany Jeffries. Ibid. 59-62.**—Reviews of developments in 1933. Alden H. Emery.
- Progress in sintered hard metals. Karl Becker. Metallwirtschaft 13, 159 60(1934).**—A review of patents issued during the last 4 months on carbides, borides, silicides and nitrides of W, Mo, Co, Cr and Ni. C. E. Macfarlane.
- A chemical method of determining tonnage in mill circuits. A. J. Weinig. Mining Met. 14, 505-6(1933).**—A chemical, such as NaCl, is added to mill flow at a uniform rate. Detn. of its concn. in the pulp permits calcn. of tonnage. Alden H. Emery.
- Milling methods and costs at the Alaska Mine flotation plant of the Southern Rhodesia Base Metals Corporation, Limited, Southern Rhodesia. C. P. McMillin. Bull. Inst. Mining Met. No. 353, 29-31(1934); cf. C. A. 28, 794.**—Discussion. Alden H. Emery.
- Beryllium developments and the outlook for supply. C. B. Sawyer. Mining and Met. 15, 93 4(1934).**—A review. Alden H. Emery.
- History of reverberatory smelting in Montana 1879-1933. Frederick Laist. Trans. Am. Inst. Mining Met. Engrs. 106, 23-87(1933).**—The evolution of small reverberatories into huge, continuously operating furnaces is traced, with reasons for all changes and results achieved through them. Alden H. Emery.
- Reverberatory smelting of raw concentrates at the International Smelter, Miami, Arizona. P. D. I. Honeyman. Trans. Am. Inst. Mining Met. Engrs. 106, 88-98(1933).**—Smelting a wet charge is described. Costs compare favorably with dry charging. Dusting is eliminated, working conditions are improved, losses reduced and brickwork replacement is lessened. Alden H. Emery.
- Recovery of smelter dust and oxide at a secondary metals plant. Wm. Romanoff and C. O. Thime. Mining Met. 14, 425-7(1933).**—Descriptive. Alden H. Emery.
- Chlorine smelting with chloride electrolysis. Edgar A. Ashcroft. Bull. Inst. Mining Met. No. 352, 29 32(1934); cf. C. A. 28, 4389.**—Discussion. A. H. E.
- Metal losses in the smelter and their avoidance. V. Tafel and H. Porzig. Metall u. Erz 31, 49 59(1934).**—Losses due to atomizing, vaporization and in the marketing of com. products are discussed. Vaporization loss of Ag was detd. in various gases at 1100° for 2 hr. and was found to be about 17% in CO, 23% in CO<sub>2</sub>, 30% in N<sub>2</sub>, 42% in air and 46% in O<sub>2</sub>. Vaporization losses were also detd. for Ag<sub>2</sub>O, Ag<sub>2</sub>SO<sub>4</sub> and Ag<sub>2</sub>S in air and N<sub>2</sub> and found to be even greater than those for pure Ag, Ag<sub>2</sub>S losing almost 62% in air. Finally the vaporization of Ag in mixts. with PbO, CaO and SiO<sub>2</sub> was detd. in air and N<sub>2</sub>. PbO hinders vaporization; CaO is practically without effect and SiO<sub>2</sub> greatly increases it. H. Stoertz.
- Smelting copper concentrates in a converter. Geo. E. Beavers. Trans. Am. Inst. Mining Met. Engrs. 106, 149-50(1933).**—Operating data for a Pierce-Smith converter over 1 yr. of operation are given. A. H. E.
- Development of copper converting at Butte and Anaconda. Wm. Kelly and Frederick Laist. Trans. Am. Inst. Mining Met. Engrs. 106, 122 31(1933).** A. H. E.
- Developments in converting lead and copper mat at Tooele. B. L. Sackett. Trans. Am. Inst. Mining Met. Engrs. 106, 132 9(1933).**—From 1914 to 1927 Pb mat

was blown until Pb and Zn were largely eliminated by volatilization. The remaining charge, high in Fe and Cu, was transferred to another converter contg. Cu mat, where it was blown with addn. of siliceous ore, to blister Cu. In 1927, siliceous ore was added to mat in the Pb converter, the slag skimmed, and the charge blown to white metal; later this was combined with that made from Cu mat to finish to blister Cu. Ay. slag contained 17% SiO<sub>2</sub>. To protect lags, lime is added to gases. The change decreased the time of blowing, amt. of magnetite and Cu in slag, and reduced the proportion of shell to granulated converter slag. In 1930, still more siliceous ore was added at no addnl. converting cost.

Alden H. Emery

**The Messina stationary basic copper converter.** R. G. Knickerbocker. *Trans. Am. Inst. Mining Met. Engrs.* 106, 140-8 (1933).—High-grade Cu can be converted economically to blister Cu in a stationary converter with the intermittent use of addnl. heat and without the use of machinery in the usual standard converting practice. Refined Cu meeting A. S. T. M. specifications can be produced from molten Messina blister Cu without allowing it to solidify before charging to the refining furnace. Messina practice is good for small or medium-sized Cu producers. Operating practice and costs are described.

Alden H. Emery

**Conditions inside a blast furnace.** R. C. Tucker. *Iron & Steel Ind.* 7, 165-71 (1934).—Combustion, temp., formation of cyanides and thermal balance are reviewed.

Curtis L. Wilson

**Volume and production of blast furnaces.** The importance of the preliminary treatment of the charge. Paul Roubine. *Rev. mét.* 30, 63-9 (1933).—Speculation made on the useful vol. of blast furnaces and the effects which the grading of the charge might have on the production.

J. D. Gat

**The formation of cyanides in the blast-furnace process.** L. Adamovich and Ya. Avrasin. *Stal* 3, No. 9, 62-73 (1933).—The cyanogen content in the out-going gases is increased by increasing the coke ratio, temp. and pressure, by decreasing the O<sub>2</sub> content, and by maintaining a basic slag. The presence of Cl decreases cyanide formation.

H. W. Rathmann

**Electrolytic zinc from fume produced from Trail lead blast-furnace slags.** H. W. Hannay and James Bryden. *Trans. Can. Inst. Mining Met.* 1934 (in *Can. Mining Met. Bull.* No. 263), 141-64.—ZnO fume analyzed: Ag 1.2 oz. per ton, Zn 61.0%, Pb 15.6, Cd 0.04, Sb 0.230, As 0.037, Sn 0.05, Ge 0.02, Cl 0.005, S (as sulfate) 1.3, SO<sub>2</sub> 0.35%, Cu trace and Co trace. Amts. of impurities present alone in ZnSO<sub>4</sub> solns. necessary to cause loss of current efficiency are, in mg. per l.: Sb 0.15, Ge 0.15, Fe 0.5, Se < 1.0, Sn 3.0, As 5.0, Co 10.0, Ni 12.0, Bi 20.0, Cu 30.0, Pb 70.0, In harmless up to 50.0, and F no effect. Amts. below crit. concn. may be beneficial. In purification, Fe(OH)<sub>3</sub> is pptd. and removes As, Sb, etc. Treatment with Zn dust and small amts. of CuSO<sub>4</sub> at elevated temps. removed other toxic elements. F in the solns. caused excessive corrosion of the Al cathodes, and methods for its removal are discussed. The oxide leaching plant is described.

Alden H. Emery

**Comparison of hot blast stoves with single and multiple zone brick work.** Franz Koller and Josef W. Gilles. *Stahl u. Eisen* 53, 393-7 (1933).

J. A. Szilard

**Oxygen-enriched air in open-hearth practice.** M. Hoguechev. *Stal* 3, No. 9, 34-7 (1933).—The use of air contg. 30-5% O<sub>2</sub> permits operating without regenerators when using high-grade gas, regulating the temp. by varying the O<sub>2</sub> content, raising the capacity of old furnaces, and reaching higher temp.

H. W. Rathmann

**The metallurgical reactions during the open-hearth process.** Peter Bardenheuer. *Stahl u. Eisen* 53, 488-96 (1933).—Changes in the concn. of the molten bath and the slag during the basic open-hearth process were followed. The more FeO there is in the slag, the more O is available for the reaction  $\text{FeO} + \text{C} \rightarrow \text{CO} + \text{Fe}$ . The formation of CO is facilitated by increased temp. causing a more violent boiling up of the bath. Mn regulates the

amt. of FeO by the reaction  $\text{FeO} + \text{Mn} \rightarrow \text{Fe} + \text{MnO}$ . A min. amt. of Mn is necessary for the manuf. of a steel easily cast and free of hot-shortness. The concns. of P and S during the melt are also followed. Examples are given for the melt process under varying conditions.

J. A. Szilard

**Development of gun-feed reverberatory furnaces at Garfield Plant of American Smelting and Refining Co.** R. A. Wagstaff. *Trans. Am. Inst. Mining Met. Engrs.* 106, 90-103 (1933).—A method for feeding fine charge under the moving gas stream of the combustion zone and spread uniformly over the mat is described. Dust losses and Cu content of dust are reduced. Furnace life is doubled. A deep bath furnace is desirable, because it gives lower metal losses, better fuel ratios and easier manipulation of operations. Repair costs are increased, but gun feeding offsets these.

Alden H. Emery

**Repairs to steel furnaces.** Walter Lister. *Metallurgia* 9, 145-7 (1934).—Directions are given for making the bottoms in basic and acid open-hearth furnaces. J. L. G.

**Aluminum bearing shells for heat dissipation.** B. C. McPadden. *Iron Steel Eng.* 11, 95-6 (1934).—Al is very desirable for use in bearing shells because of its high heat cond. The best possible bond is obtained by timing the Al shell before pouring the babbit.

W. H. Hoynton

**The small coke-oven gas consumers in the iron industry.** Albert Herberholz. *Stahl u. Eisen* 53, 417-22 (1933).—The use of coke-oven gas for the heating of rooms, molds, troughs, for the drying of converter bottoms and linings and for miscellaneous other purposes is described. The design of the stoves used is given.

J. A. Szilard

**Flash roasting of iron concentrate.** Geo. E. Beavers. *Am. Inst. Mining Met. Engrs.*, Contribution No. 65, 5 pp. (1931).—The material roasted is pyrrhotite and pyrite (5:1). The SO<sub>2</sub> content of the roaster exit gas can be varied between wide limits (8% is common; 13% SO<sub>2</sub> is possible). Temps. of exit gases are high (2000°F. when roasting 60 tons of Fe concentrate per 24 hrs. in a modified Wedge roaster). Heat of combustion of dry Fe concentrate is 5,150,000 B. t. u. per ton.

A. H. E.

**Low total-carbon cast irons and their service to foundrymen.** W. West. *Proc. Inst. Brit. Foundrymen* 25, 408-40 (1931-32); cf. *C. A.* 26, 947.

Curtis L. Wilson

**The basis of desulfurization of pig iron and steel.** P. Bardenheuer and W. Geller. *Mitt. Kaiser-Wilhelm-Inst. Eisenforschung Düsseldorf* 16, No. 7, 77-91 (1934).—Methods and processes used for desulfurization and their theoretical principles are discussed in general and practical experiences compared. Lime is superior to Mn for desulfurization with basic slags. Desulfurization with 7 alumina is not possible. Forty-two references. M. H.

**Résumé of the work of the Malleable Iron Subcommittee of the Technical Committee.** Anon. *Proc. Inst. Brit. Foundrymen* 25, 254-306 (1931-32).

C. L. W.

**Influence of vanadium and cobalt additions to cast iron.** J. B. Huust. *Iron & Steel Ind.* 7, 67-70 (1933), 177-9 (1934).—About 0.15% V is recommended for cast Fe. Ti prevents loss of V. Small addns. of Co are without influence on graphitization and mech. properties.

Curtis L. Wilson

**The precipitation of phosphorus, sulfur and oxygen during the manufacture of high-quality steel in open-hearth furnace.** Fritz Better. *Stahl u. Eisen* 53, 369-75, 398-404 (1933).—The effect of the pptn. of P, S and O on the irregularities of cast steel blocks was investigated as a function of the type of steel, slag, ore and the melting method used. The O contents of both basic and acid slag were detd. and based on the velocity of the burning up of C in the melt; curves were developed to show the course of the reactions in the open-hearth furnace.

J. A. Szilard

**The manufacture, casting and treating of Thomas-steel ingots for rails.** Karl Eichel. *Stahl u. Eisen* 53, 521-32 (1933).—The quality requirements of the raw materials and the entire mfg. process required to obtain high-quality ingots are reviewed.

J. A. Szilard

**Treatment and preparation of green foundry sands.** G. Itam. *Rev. fonderie moderne* 28, 31-5(1934).—Good castings in green sand require that the different parts of the mold can be repaired without breaking under the tool, the sand render all lines of the pattern in true shape, patterns can be taken out without damage to the mold, cores have sufficient rigidity, that the sand is not eroded under the action of the live metal and that the gas can escape freely. In order to prevent the sand from adhering to the casting and from vitrifying a suitable powder such as graphite, etc., is applied. The prepn. and treatment of sands from these points of view are discussed.

M. Hartenhein

**Porosity in nonferrous metal castings.** G. L. Bailey. *Foundry Trade J.* 50, 175-8(1934).—A review in general terms of the 3 main causes of porosity in castings: (1) shrinkage; (2) the evolution of dissolved gases and (3) the entrapping of gases.

Downs Schaal

**Magnesium contg. silumin, capable of temper hardening.** O. Bauer, B. Blumenthal and M. Hansen. *Mitt. deut. Materialprüfungsanstalt*, Special Issue No. 23, 60-5 (1934).—Hardness, tensile strength and elastic limit of Mg contg. silumin can be considerably increased by tempering the cast material or by tempering after annealing and quenching. The hardness of an alloy contg. 0.3% Mg, after 50-60 hrs. of tempering, is increased by 30-35%. An alloy contg. 0.34% Mg, after 96 hrs. of tempering at 150°, shows approx. 25% increase in tensile strength, and approx. 65% increase of the elastic limit. The ductility shows corresponding decreases. Diagrams and photomicrographs are given.

Leopold Pessel

**Method for testing individually the even distribution of hardness on specimens.** C. Benedicks and C. F. Mets. *Arkiv Mat., Astron. Fysik* 24A, No. 15, 14 pp.; *Jernkontorets Ann.* 118, 1 22(1934).—A fine grating is produced automatically by parallel scratches with a diamond point. Microscopic examn. of the scratches reveals local discrepancies of hardness, especially those caused by local work-hardening which cannot be detected by other methods.

Leopold Pessel

**The conditions of formation of Widmanstätten structure.** I. Dolgopolskiĭ and E. Shumovskii. *Stal* 3, 28 40, 51 61(1933).—Three types of steel were heat-treated by various methods and micrographically examd. The formation of Widmanstätten structure is favored by holding the steel a long time at a high temp., by slowly cooling through the crit. range, and by chem. and phys. heterogeneity of the austenite grains. In general, Widmanstätten structure increases the tensile strength and decreases elongation.

H. W. Rathmann

**Manufacture, wear and fracture of rails. Protection against wear and oxidizing agents.** Carlo De Benedetti. *Riv. tec. ferrovie ital.* 43, 125-35(1933).—Mn steels with a max. of 0.5% C, rolled at low temp., are useful to obtain rails of high resistance to wear. For rails in tunnels, steels with 0.6% Cu are suggested.

G. A. Bravo

**Test method for determining the reactivity of aluminum and aluminum alloys.** H. Rohrig. *Korrosion u. Metallschutz* 10, 38-9(1934).—After pickling for 1 min. in 30% NaOH at 90°, and for 1 min. in concd. HNO<sub>3</sub>, the specimens are weighed and exposed for 1 hr. to a mixt. of 4 parts concd. HNO<sub>3</sub>, 1 part concd. HCl and 4 parts water, held at 20°. After rinsing and drying, the loss of wt. in g. per sq. m. is detd. Many specimens may be treated simultaneously in the same soln. The method offers a sensitive test for detg. the thermal history of the material.

Leopold Pessel

**Utilization of cadmium.** A. F. Burstall. *Giesserei u. Maschinenbau Ztg.* 5, 7-8(Jan., 1932); *Met. Abstracts* (in *Metals & Alloys*) 4, 257. —Cd exerts favorable influences on soft solders. American solders contain about Cd 25, Sn 50, Pb 25%, while a standard German alloy runs as follows: Cd 10, Sn 10, Pb 80%. Cd-bearing solders sometimes darken when exposed to atm. influences, but this is only under unfavorable circumstances. The tendency of Cd solders toward oxidation can be largely checked by addns. of 1.5-3% Zn. Zn, furthermore, enlarges solidification range, lowers solidification point and

1 results in a gain of strength. The best flux is ZnCl<sub>2</sub>.

G. G.

**Simultaneous effect of the degree of cold work and of the temperature on the mechanical properties of mild steel, copper and nickel.** A. Ancelle. *Revi. mét.* 30, 266-74, 309 18(1933).

E. H.

**Cementite.** Pierre Pingault. *Ann. chim.* 20, 371-438 (1933).—Fe (C 0.03, Si 0.005, Mn trace, S 0.002 and P 0.000%) was crushed, and the portion between 30 and 200 mesh used in 50-g. quantities for making cementite, Fe<sub>3</sub>C. The NaCN used was 98-99% pure. After carburization, the cyanide was removed with H<sub>2</sub>O, the residue washed with alc. and ether and dried in a vacuum. The Fe<sub>3</sub>C was sepd. mechanically and contained 6.65-6.70, ± 0.03% C (theoretical for Fe<sub>3</sub>C = 0.68%). It contained 0.05% or less graphitic C. The grains were grayish white, dull metallic and very brittle. The NaCN was easily oxidized at 650° and after heating 24 hrs. only 5% was left; hence fresh cyanide was added. At 650°, 48 hrs. was required for complete carburization, at 600°, 80 hrs., and at 800°, 30 hrs. Fe contg. 0.12% C was heated in N with 76% NaCN; the resulting Fe contained about 0.1% C, the NaCN remained 76%, and no Na was liberated, indications that there was no carburization in the absence of O. On electrolysis of fused NaCN the (Fe) cathode surface remained unchanged, but the Fe anode surface was hardened by C<sub>2</sub>N<sub>2</sub>. H under atm. pressure at 450° was without action on Fe<sub>3</sub>C. Pieces of Fe carburized at 650° became quite hard and on prolonged carburization regions on the surface became raised and brittle, and almost pulverulent. Small blocks of Fe were completely carburized after 500 hrs., and contained 6.65% C with no graphite. The presence of Ni or Cr did not affect the carburization of steel. Gray cast iron was not uniformly carburized even after heating 24 hrs. at 650° with 76% NaCN. Two-mm. soft steel wire was case-hardened at 900-920° in NaCN in 1.5 hrs. By prolonged heating Fe<sub>3</sub>C was formed. Purified illuminating gas case-hardened a soft steel wire (C = 0.09%) in 1.5 hrs. while 8 hrs. was required for complete cementation. A 6-mm. soft steel rod showed the same phenomenon. CH<sub>4</sub> functioned as a carburizer similarly to the illuminating gas. Steel could be carburized by CO. An equil. was established between the carburizing action of CO and the decarburizing action of CO<sub>2</sub>. CCl<sub>4</sub> was used as the reference liquid for detn. of Fe<sub>3</sub>C, the values being 7.39-7.46. Fe<sub>3</sub>C reduced by H gave 7.30 at 0°. Fe<sub>3</sub>C was thermodynamically unstable at ordinary temps. When heated for 1 hr. at 1225° globules resembling cast iron rich in C resulted, while a powder contg. much graphite was formed. Near the m. p. of cast iron Fe<sub>3</sub>C decompd. rapidly. After slow heating at 1000°, a break in the cooling curve of Fe<sub>3</sub>C occurred at 740-700°. A soft steel wire (0.6 mm. in diam.) contg. C 0.09, Si 0.02, Mn 0.25, S and P 0.02%, and a piano wire contg. C 0.85, Si 0.15, Mn 0.45, S 0.01 and P 0.02% were used for equil. studies. At 790° the CO<sub>2</sub> content increased to 6.8% in 120 hrs., and by decarburization, beginning with 15% CO<sub>2</sub>, 12% was reached only after some time. Heating 500 hrs. failed to result in equil. at temps. below 800°. Decarburization reached equil. in 7 hrs. at 950° and maintained this equil. at 2.1% CO<sub>2</sub> for 30 hrs. CO<sub>2</sub> content against temp. was plotted for the two reactions (1) 2CO = CO<sub>2</sub> + C, and (2) 2CO + 3Fe = CO<sub>2</sub> + Fe<sub>3</sub>C. These curves intersected at 820°. Attempts were made to carburize Cr with NaCN at 650° during 100-hr. periods. By combustion the Cr yielded only 0.68% C, while it originally contained 0.4%. It was then assumed that a protective layer of Cr carbide formed rapidly on the surface and prevented further carburization. Powd. Cr when carburized yielded 0.8% C. Mn could not be carburized by NaCN or else the carbide was decompd. during the washing process. In an attempt to carburize Mn by CH<sub>4</sub> at 950-975° for 24 hrs., C was deposited in the app. and on the Mn. One sample yielded free C 3.55, combined C 4%. After 48 hrs. the combined C increased to about 5%.

H. E. Messmore

The effect of aluminum and cobalt on the miscibility



gap of iron and copper in the solid state. F. Roll. Z. *anorg. allgem. Chem.* 216, 133-7(1933).—Ni and Mn increase the soly. of Cu in Fe considerably, Co only moderately. In general, investigation of the soly. of different elements in the system Fe-Cu shows that all those elements which can form series of solid solns. in the binary systems Fe-X and Cu-X are particularly apt to reduce the miscibility gap in the system Fe-Cu-X. Since a wide gap in the solid solns. of the binary system Cu-Co exists, it reduces the miscibility gap in the Cu-Fe alloys less than Ni or Mn. Al, Sn, Sb and P have only a small influence on the reduction of the Cu-Fe gap.

M. Hartenhein

X-ray testing of iron and steel. Franz Wever. *Stahl u. Eisen* 53, 497-505(1933).—Review with numerous references.

J. A. Szilard

Possible uses of nonrusting steels and cast-iron alloys in the chemical industry. Ernst Blau. *Chem. Ztg.* 57, 999 1000(1933).—A general discussion of the properties of Ni-steel, Cr-Ni-steel and other Cr-Fe alloys, and high-Si cast iron ("Thermisilid") of interest to the chem. industry.

O. W. Willeox

Steels in marine engineering service. T. H. Burnham. *Trans. Inst. Marine Engrs.* 46, 1-41(1934).—A discussion, with recommended analyses, of the steels used in the various parts of boiler furnaces and oil engines. Above a steam temp. of 800° F. the use of alloy steel is necessary. For long exposure to heat Mo steel should have over 0.5% Mo.

Ann Nicholson Hind

New theory proposed for the formation of annealed steels. J. Seigle. *Génie civil* 103, 369-73; 400 2(1933).—On cooling through  $A_1$  it is  $Fe_3C$  rather than ferrite which is in excess of its soly. in the solid soln. of  $\alpha$ -Fe, and which seps., carrying with it some  $\gamma$  soln. The transformation  $\alpha \rightleftharpoons \gamma$  is progressive and acts upon both the free ferrite and that in pearlite. The proportion of  $\alpha$ -Fe necessary to transform pearlite into solid soln. depends upon the C content. The C content of pearlite may be as low as 0.58%, at least locally, in 0.58% C steels. It is not necessary to consider a special iron  $\beta$  between  $A_1$  and  $A_2$ . This is merely a solid soln. mixt.  $\alpha\gamma$ , the magnetic change at 770° being due to the Currie point of  $\alpha$ -Fe. Dilatometric changes are due to the  $\alpha \rightleftharpoons \gamma$  transformation.  $A_1$  can be taken as the point at which the curve leaves the tangent of the line of dilatation of a soln. of pure  $\alpha$ -Fe;  $A_2$  as the point where the curve leaves the tangent of the line of dilatation of pure  $\gamma$ -Fe. Dilatometric and magnetic curves are given showing the effect of temp. for various steels.

Ann Nicholson Hind

Fatigue and impact strength of steel at low temperatures. Otto Forsman. *Jernkontorets Ann.* 117, 519-30(1933).—Tests were made on C steel, Cr-Ni steel and ordinary rail steel, all of Swedish manuf. Tensile tests were at 20°, fatigue tests with one-sided load at 20° and -18°, and notched-bar impact tests at -40° to +40°. There is a slight rise in fatigue limit with increased temp. The impact figure falls rapidly in a crit. region between -20° and +20°, but may be markedly changed by heat treatment. The change from high to low impact figures is gradual for hard steels, but rapid for mild steels used for structural purposes.

H. C. Duus

Nickel steels. Leon Guillet. *Japan Nickel Rev.* 1, 134-67(1933); cf. C. A. 27, 3903. —Review of the properties and applications of the Ni steels.

Leopold Pessel

Low-nickel cast steels. F. Renaud. *Actiers spéciaux* 8, 350-62(1933).—The compps. of 7 cast steels of the pearlitic nickel class used in industries are given. Heat treatments of these steels consist in: annealing at 850-980°, so-called homogenization (annealing in order to relieve the internal stresses due to irregularities of parts of a casting); grain refining at 770-850°; hardening with water or oil quench or air cooling depending on the kind of steel used; drawing of the quenched steels at temps. below the  $A_1$  or in the range 550-700°. A simplified heat treatment for self-hardening steels consists in homogeneity treatment at high temp. followed by air cooling. Mech. properties are given for the 7 steels subjected to a complete heat treatment or a simplified normalizing treatment

and drawing. At temps. around 500° Ni-Cr-Mo steels maintain better mech. properties than any of the other steels. Ni-Cr-Mo steels are free from temper brittleness that usually occurs when Ni-Cr steels are heated at 400 600° and slowly cooled. Low-Ni cast steels are preferably made in open-hearth or elec. furnaces, in England and the U. S. by the acid process, in France by the basic process. Soft Ni steel is used for casting chains. The heat treatment of these chains consists in an annealing followed by water quench and drawing. Special uses for these steels are indicated.

G. T. Motok

High-strength sand-casting aluminum alloys. W. C. Devereux. *Proc. Inst. Brit. Foundrymen* 25, 517-59(1931 1932); cf. C. A. 26, 1556; 27, 1852. C. L. W.

X-ray study of aluminum-zinc alloys. E. A. Owen and John Ball. *Phil. Mag.* 17, 433 57(1934); cf. C. A. 27, 5227. X-ray powder photographs were taken of Al-Zn alloys over the entire concn. range at room temp. and at temps. in the range 200-450°. Only alloys below the eutectoid transformation temp. could be investigated by quenching from the desired temp. The transformation temp. is between 300° and 310°. The at. vol. of the  $\alpha$ -phase (close-packed hexagonal structure) changes from 15.109 A.<sup>3</sup> for pure Zn to 15.164 A.<sup>3</sup> for the alloy satd. with Al. The  $\beta$ -phase is a solid soln. with face-centered cubic structure. At 375° it extends from 19 to 45% Al with the corresponding parameters 4.016 A. and 4.058 A. The  $\gamma$ -phase consists of alloys with more than 80% Al. The parameter changes from 4.0406 A. for pure Al to 4.0345 A. for an alloy with 80% Al.

E. J. Rosenbaum

Equilibria in the iron-carbon system. Alfred Stansfield. *Trans. Roy. Soc. Can.* 111 27, 177 8(1934).—A simple and relatively rapid method is described for measuring the equilibria between a mixt. of CO, CO<sub>2</sub> and various alloys of Fe and C.

J. W. Shipley

Activity of carbon in iron-carbon-alloy melts and the equilibrium between carbon and oxygen. G. Phragmen. *Jernkontorets Ann.* 117, 563 71(1933).—From an examn. of the equil. diagram it is concluded that the activity of C in molten Fe-C alloys in equil. with oxide and CO at 1550° lies between 0.00025 and 0.0005 and the percentage C between 0.0004 and 0.0008. The soly. product of C and O lies between  $10^{-7}$  and  $2 \times 10^{-7}$ . Seven references.

H. C. Duus

Hot-working properties of binary and complex copper-zinc alloys. P. Röntgen and W. Donike. Z. *Ver. deut. Ing.* 78, 220-3(1934).—Brasses with  $\alpha + \beta$  crystals can be worked hot without the formation of cracks. Pb, P and O<sub>2</sub> were found harmful to the hot-working properties. Al, Fe, Mn, Ni and Sn up to 5% do not influence hot working. These elements with the exception of Fe form solid solns. Fe enters between the crystals but is plastic and does not destroy the cohesion of the crystals. The harmful elements are found between the crystals as liquid or solid brittle films and greatly influence the cohesion of crystals. Investigation was made on alloys prepd. from electrolytic Cu 99.96% and electrolytic Zn 99.98%. The following alloys were investigated: 63 brass which at hot-working temp. is in the  $\alpha + \beta$  condition; 67 brass which is on the border line between  $\alpha$  and  $\alpha + \beta$  at the working temp.; and 84 brass which is pure  $\alpha$ -brass at all temps. The carefully prepd. slabs were hot-rolled and hot-pressed; their working ability was judged by the extent of crack formation.

C. B. J.

X-ray investigations on zinc-nickel alloys. Vincenzo Caglioti. *Atti IV Congr. naz. chim. pura applicata* 1933, 431-41; *Chem. Zentr.* 1934, 1, 1283. —The system Ni-Zn contg. up to 53% Ni was tested by x-rays. At 5% Ni there was a poorly defined  $\epsilon$ -phase, at 15-22% Ni a better-defined  $\gamma$ -phase, at 40% Ni a  $\beta$ -phase, and with 53% Ni a cubical  $\alpha$ -phase. Soly. of Ni in the Zn lattice was not found. For the cubical  $\gamma$ -phase, Ni<sub>2</sub>Zn, is probable. This compd. forms solid solns. both with Ni and Zn. The eutectic of the  $\gamma$ - and  $\beta$ -phase is at about 40% Ni. The  $\beta$ -phase (NiZn), according to the Hull system, can be regarded as tetragonal, with  $c/a = 0.83$ , corresponding to the type of  $\gamma$ -Mn or Au-Cu with  $a_0 = 3.867$  A. and 4

atoms in the elementary cell ( $\text{Zn} = 0\ 0\ 0, \frac{1}{2}, \frac{1}{2}, 0, \text{Ni} = \frac{1}{2}, 0\ \frac{1}{2}, 0\ \frac{1}{2}, \frac{1}{2}$ ). E. M. Symmes

**Composition of crystalline amalgams of zinc, lead, tin and cadmium.** Henry H. Hosford. *J. Dental Research* 14, 33-7 (1934).—When Zn, Pb, Sn and Cd are immersed for many days in Hg, cryst. amalgams form contg., resp., Zn 41-45, Pb 63-65, Sn 78-79 and Cd 15-16%. Under these conditions Ag and Cu form almost no crystals. These results apparently confirm the existence of the compds.  $\text{HgPb}_2$  and either  $\text{Hg}_2\text{Cd}$  or  $\text{Hg}_3\text{Cd}$ . J. S. H.

**Gold as a corrosion resistant.** P. Stein and O. P. van Steewen. *Werkstoffe und Korrosion* 8, 37-9 (1933).—Gold in the form of plating has the advantages of being resistant to oxidation, acids and alkalis; it has low heat radiation coeffs., small crystal structure and other advantages which are discussed. M. C. Rogers

**Organic substances and the acid corrosion of iron.** Hanns Pirak and Wilhelm Wenzel. *Korrosion u. Metallschutz* 10, 29-38 (1934).—A detailed classification and listing of a large no. of inhibitors, with numerous references and a list of patents. A relation exists between the inhibiting action of org. substances and their chem. constitution. Active at. groups, mol. wt. and dimension, and the position of substitutes within the mol. are important factors. Leopold Pessel

**Corrosion in steam-generating stations and its correction.** Sheppard T. Powell. *Combustion* 5, No. 7, 14-18 (1934).—A general discussion of corrosion, deacration, scale, protective coatings, etc. Leslie B. Bragg

**Fusion welding of alloy steels and nonferrous metals.** Hugo Schroeder. *Werkstoffe und Korrosion* 9, 1-2, 5-6 (1934).—Methods of welding various alloys, compns., patent protection, app., etc., are given for Cr-Ni steels, Cu, Al, Ag, Ni, Pb, monel metal and others. M. C. R.

Ball milling (Gow, *et al*) 1. How gas fuel has been applied at the Toole smelter (Nealey) 21. Theory of alloys in the  $\gamma$ -phase (Jones) 3. Crystal structure and compn. of cubic Cr carbide (Westgren) 2. Primary crystn. of metals (Kuznetsov, Saratovkin) 2. Producing glass from blast-furnace slag (Basore) 19. Tempering plates or sheets of steel or other metals (Brit. pat. 403,438) 19.

**Stoughton, Bradley:** The Metallurgy of Iron and Steel. 4th ed. New York: McGraw-Hill Book Co., Inc. 559 pp.

Le fer. T. II. Paris: Soc. d'Edit. géogr. maritimes et coloniales. 436 pp. F. 36.

**Stainless Steels and Their Uses.** New York: Electro Metallurgical Co. 19 pp.

**Ore flotation.** Ira H. Derby and Orin D. Cunningham (to Peter C. Reilly). U. S. 1,949,956, March 6. In the flotation treatment of ores such as partially oxidized Cu sulfide ore, an org. nitrogenous base salt of a hydrocarbon compd. of an org. thiophosphoric acid, such as an aniline or pyridine compd. of naphthalene thiophosphoric acid-tar acid compd. is used as a flotation agent.

**Flotation agent.** Stuart A. Falconer and Ludwig J. Christmann (to The American Cyanamid Co.). Can. 339,815, Mar. 6, 1934. A promoter consisting of a mixt. of Na mercaptobenzothiazole and NaSH is added to the flotation circuit in the concn. of minerals, especially of oxide minerals.

**Flotation agent for ores.** Ludwig J. Christmann (to The American Cyanamid Co.). Can. 339,814, Mar. 6, 1934. Agents for use in flotation of sulfide ores are made by the reaction of  $\text{P}_2\text{S}_5$  with aliphatic alcs. contg. 3 or more C atoms, particularly isopropyl or *sec*-butyl alc. E. g., to isopropyl alc. in a closed vessel heated to 50-60°.  $\text{P}_2\text{S}_5$  is added in small portions. Since the reaction is exothermic, the vessel is cooled to prevent the temp. from rising above 85°; toward the end of the reaction it is necessary to heat the mixt. to complete the reaction. The product probably is  $(\text{iso-PrO})_2(\text{HS})\text{P:S}$ .

**Flotation apparatus.** Fried. Krupp Grusonwerk A.-G.

Ger. 593,185, Feb. 22, 1934 (Cl. 16, 6). Means is described for mixing the suspension with the aid of compressed air.

**Drum for washing ores.** Hardinge Co. Inc. Ger. 590,928, Jan. 15, 1934 (Cl. 1a, 12.01).

**Differential flotation of sulfuretted copper and zinc ores.** Edmond M. C. Barthelemy. U. S. 1,950,537, March 13. For sepg. Cu sulfide ores from zinc blende by differential flotation, the ore is converted into a pulp which is rendered alk., and before flotation there is added an alkali ferrocyanide which can produce a colloidal Cu ferrocyanide in the pulp, flotation of zinc blende then being effected in the presence of a collecting agent of the dithiophosphate type which broadly has no destructive chem. action on colloidal Cu ferrocyanide, and flotation of Cu sulfides is then being effected in the presence of a collecting agent of the xanthate type which broadly has a destructive chem. action on colloidal Cu ferrocyanide.

**Recovering metals from ores.** Carl Goetz. Ger. 593,153, Feb. 22, 1934 (Cl. 40a, 11.50). Finely divided sulfidic or arsenical ores are treated under pressure with a reducing gas in counterflow in a vertical-retort furnace at a temp. considerably below the m. p. of the ore. Ger. 593,154, Feb. 22, 1934 (Cl. 40a, 11.70). The process of Ger. 589,448 (Cl. 1, 28, 13157) is applied to the treatment of oxide ores.

**Treating argentiferous lead bullion containing impurities such as antimony, arsenic and tin.** Jesse O. Betterton, Robert A. Crites and Henry P. Wagner (to American Smelting and Refining Co.). U. S. 1,950,380, March 13. The bullion is charged into a lead softening furnace, melted and subjected to oxidizing conditions to effect concn. of impurities in a dross; the dross is treated *in situ* with a carbonaceous reducing agent in sufficient quantity to reduce Pb oxide in the dross in amounts adequate to carry and return the Ag in the dross to the bath proper without reducing substantial amounts of the impurities such as Sb, As and Sn to the metallic state (the reducing treatment being conducted at relatively low temps. whereby fuming of the impurities in the dross is prevented) and the resulting argentiferous lead is sepd. from the drossed impurities.

**Treating impure lead containing antimony.** Jesse O. Betterton, Robert A. Crites and Henry P. Wagner (to American Smelting and Refining Co.). U. S. 1,950,388, March 13. A charge of impure Pb contg. Sb is introduced into a furnace contg. a quantity of molten softened lead covered by an antimonial slag formed during the final oxidation stage of the preceding charge; the furnace is heated to form a molten bath, which is agitated and maintained at a temp. of about 760° so that impurities, including some Sb, are oxidized and collect on the surface of the bath; the oxidation is continued until the Sb content of the bath is 0.5-0.9%; oxidized impurities are removed from the surface of the bath, Pb oxide is added, and oxidation is continued so that remaining impurities are reduced to a desired low proportion; a desired quantity of softened lead is removed from the bath, and some of the softened lead covered by the final oxidized impurities is allowed to remain in the furnace for the succeeding charge.

**Treatment of sulfide ores containing lead.** Paul Gamichon. U. S. 1,950,000, March 6. The ore is wetted with an alkali metal chloride such as NaCl or CaCl<sub>2</sub> soln. and the wet, heated ore is treated with Cl gas in the presence of a mixt. of an acid such as HCl and FeCl<sub>3</sub> acting as a catalyst.

**Chloridizing tin ores, etc.** Louis A. Wood, Henry L. Sulman, Hugh F. K. Picard and British American Mines Ltd. Brit. 403,122, Dec. 15, 1933. In extg. Sn from ores or concentrates contg. addnl. metallic bases and free  $\text{SiO}_2$  by chloridization in the presence of carbonaceous material, the quantity of the latter is not substantially less than that theoretically necessary to reduce all the bases present, fritting during chloridization being thus prevented. Brit. 403,123, Dec. 15, 1933. See U. S. 1,931,944 (C. A. 28, 4529).

**Igneous concentration of zinc ores.** Robert G. Hall.

U. S. 1,949,905, March 6. In treating ZnS ore for the sepn. of Zn from other materials, a molten magma is formed contg. the ZnS of the ore in igneous soln., and, while so dissolved, the ZnS is subjected to the action of an oxidizing agent such as air, and the resulting ZnO is thereafter subjected to the action of a reducing agent while there is maintained in the magma material such as Fe, Cu, SiO<sub>2</sub>, and lime compds. capable of maintaining ZnO in igneous soln.; reduced Zn is volatilized from the magma and the residual magma is utilized in cyclic operation for further ore treatment. App. is described.

**Agglomerating finely divided gold, etc., by heating ores.** Georg Bürg, Martha Harbort née Wermke, Waldtraut Harbort, Erika Harbort, Lotte Harbort and Gertrud Harbort. Ger. 590,852, Jan. 11, 1934 (Cl. 1a. 36).

**Distilling readily volatilizable metals such as zinc and cadmium.** Friedrich Johannsen (to Fried. Krupp Grusonwerk A.-G.). U. S. 1,950,249, March 6. Various details are described of the construction and operation of a rotary retort.

**Treatment of bituminous copper shale.** Fried. Krupp Grusonwerk A.-G. Ger. 593,186, Feb. 23, 1934 (Cl. 1c. 10.01). The ore is worked up by flotation, and the middle portion of the suspension is sepd., treated with concd. H<sub>2</sub>SO<sub>4</sub>, neutralized if necessary, and again subjected to flotation.

**Metal founding.** Markus Sondheim. Ger. 590,085, Jan. 13, 1934 (Cl. 31c. 01). Cores or molds for foundry work are formed from a mixt. of molding sand and potato flakes or meal. Pitch, resin, naphthalene, etc., may also be added.

**Mold materials.** Pinspongs Metallverks Aktiebolag. Brit. 402,686, Dec. 7, 1933. A chill mold is lined with or made of an alloy contg. not more than 2% Al. When an Al-Cu alloy is used, it may contain Zn or Ni up to 45, Fe, Mn or Sn up to 8%, or a combination thereof.

**Slag formation and reduction in lead softening.** Jesse O. Betterton and Charles W. Hanson (to American Smelting & Refining Co.). U. S. 1,950,387, March 13. In the treatment of Pb bullion contg. a relatively high percentage of Sn, a molten bath of the bullion is subjected to oxidizing conditions in the presence of a caustic flux by which impurities including Sn are slagged and softened Pb is obtained; the slag is transferred to a reverberatory furnace and is reduced to form a Sn slag which is further processed for the recovery of Sn.

**Vertical retort construction and setting suitable for treating cinnabar ore, etc.** Donald D. Shelton. U. S. 1,950,066, March 6.

**Furnace for the metallurgy of zinc.** O. Dony. Belg. 398,839, Oct. 31, 1933. Structural features.

**Furnaces for heating metal, etc.** Ernest E. Lucas. Brit. 401,942, Nov. 23, 1933.

**Furnace and other apparatus for producing hot billets from metal pieces.** Stewarts & Lloyds Ltd. and Gavin S. McLay. Brit. 402,979, Dec. 14, 1933.

**Metal-heating furnaces with step-by-step conveyors for carrying work therethrough.** British Furnaces Ltd. and Percy Hopkinson. Brit. 401,857, Nov. 23, 1933.

**Rotary furnaces for working spongy iron into blooms.** Fried. Krupp Grusonwerk A.-G. Brit. 402,743, Nov. 21, 1933.

**Metal powders.** I. G. Farbenind. A.-G. Fr. 758,659, Jan. 22, 1934. Ductile metals such as Mg are powd. by dividing the compact metal by means of bands provided with steel needles and fixed on cylinders.

**Deoxidizing metals.** Soc. Metallchemische Fabrik A.-G. Fr. 759,155, Jan. 30, 1934. Metals are deoxidized by adding mixts. of powd. metals and amorphous P, or alloys having a high content of P (P-Fe, P-Zn, P-brass) or pure phosphides, in a finely disseminated state to the fused metal.

**Improving metal surfaces.** I. G. Farbenind. A.-G. Fr. 758,730, Jan. 22, 1934. Fe or its alloys is improved superficially by cementation with a Si powder to which about 2% of S or salts contg. combined S or halogen is added.

**Working metals.** Vereinigte deutsche Metallwerke

A.-G. Zweigniederlassung süddeutsche Metallindustrie. Fr. 757,750, Dec. 30, 1933. Alloys of Cu are heated to a temp. below the limit of recrystn., preferably 300-600°, and subjected to high pressure in a press.

**Etching metals.** M. E. Loginov, T. N. Kozlyarova and P. G. Smolyanskaya. Russ. 31,729, Oct. 31, 1933. To the H<sub>2</sub>SO<sub>4</sub> bath is added up to 1% of a soln. of carpenters glue or 2-2.5% sulfite liquor which has been evapd. to the concn. of a thick ext. and then dild. with 15 parts of H<sub>2</sub>O.

**Treating metal waste.** David R. Tullis and Percy Oakley. Brit. 403,179, Dec. 21, 1933. Small waste metal, e. g., turnings chips, is heated to about 300-400° in a reducing atm., e. g., CO, to which Cl or the vapor of a volatile halide, e. g., BCl<sub>3</sub>, may be added, to expel volatile matter and soften and anneal the metal without melting; the metal is then sifted, passed to a magnetic separator and briquetted. Expelled oil vapors may be condensed in original or cracked form and used for heating the furnace.

**Apparatus for treating metal strip, etc., by passage of current therethrough, the contact at the outgoing end comprising a mercury bath covered with liquid to cool the heated metal before it enters the mercury.** Wm. E. Burnand. Brit. 403,401, Dec. 11, 1933.

**Lead, antimony and bismuth.** "Berzelius" Metallhütten-G. m. b. H. Ger. 590,505, Jan. 8, 1934 (Cl. 40a. 18.01). Addn. to 589,738 (C. A. 28, 2313\*). The method of 589,738 for obtaining Pb, Sb or Bi by treating their O-compds. with their S-compds., is modified by blowing air onto the O-compds. in a tilting furnace heated by flue gases, before adding the S-compds.

**Magnesium.** The Dow Chemical Co. Brit. 402,311, Nov. 30, 1933. Molten Mg (alloy) is heated in a tilting crucible with a fluid flux of higher sp. gr. than Mg and of such surface tension that it does not materially spread over the surface of the metal and in the presence of a protective atm. The flux may be a mixt. of MgCl<sub>2</sub>, K, Na or Li chloride and an alkali or alk. earth fluoride or a mixt. of CaCl<sub>2</sub>, NaCl, BaCl<sub>2</sub> and such a fluoride. The atm. may be (a) S vapor made by dusting powd. S over the metal surface, (b) N and (or) CO, CO<sub>2</sub>, SO<sub>2</sub>, mixed with a small proportion of CS<sub>2</sub>, or (c) F or a F compd., e. g., NH<sub>4</sub>BF<sub>4</sub>, CCl<sub>2</sub>F<sub>2</sub>, with or without a diluent, e. g., air, N. App. is described.

**Zinc.** The New Jersey Zinc Co. Fr. 758,865, Jan. 24, 1934. Zn is volatilized in a retort contg. a series of trays one above the other, the molten Zn overflowing from one tray to one beneath it.

**Zinc and like metals.** Fried. Krupp Grusonwerk A.-G. Fr. 758,722, Jan. 22, 1934. The reduction and volatilization of Zn, Cd, etc., are carried out in a muffle made of Ni, Co or their alloys.

**Coloring zinc.** Heinz Tichauer. Fr. 758,593, Jan. 19, 1934. The Zn is dipped into a bath contg. an aq. soln. of a salt of a heavy metal, e. g., a sulfate, to which a polyhydrate, e. g., of NH<sub>4</sub>, is added.

**Electric motor rotor windings of special cast aluminum containing silicon.** Cyril S. Taylor (to Aluminum Co. of America). U. S. 1,950,197, March 6. Cast Al rotor windings are used contg. about 1-3% Si, which are of substantial structural uniformity and have an elec. resistivity not greater than about 4.0 microhms per cm. cube.

**Carbonizing ferrous metals.** John H. Kyte (to Swedish Iron & Steel Corp.). U. S. 1,950,118, March 6. Surface carbonization is effected by treating the surface with HNO<sub>3</sub> and subsequently exposing it to a carbonizing gas at a suitable carbonizing temp. The HNO<sub>3</sub> treatment serves to facilitate the carbonizing for increasing heat radiation.

**Cementation.** P. R. Mallory & Co., Inc. Brit. 402,894, Dec. 14, 1933. In mfg. make-and-break contacts of W or Mo for ignition systems of motor vehicles the material is treated to increase the size of the surface granules or to reduce the amt. of amorphous material between the granules by heating the W<sup>0</sup>, etc., with a Si compd., e. g., Na silicate, which is reduced to SiO<sub>2</sub> by the heat, and then mechanically working to form a body

having an interlocked grain structure. Details of a preferred process are given.

**Annealing.** Albert Schmitz (to Vereinigte Stahlwerke A.-G.). Brit. 403,170, Dec. 21, 1933. In the bright annealing of metals, *e. g.*, sheets, a protective gas, *e. g.*, coke-oven or producer gas, is introduced at various points in the annealing box only after the metal has cooled below the annealing temp. and preferably down to about 400°. The gas is purified before entry by passing it over a heated contact substance which removes the O therein. App. is described.

**Annealing steel and iron objects.** Akt.-Ges. für Industriegasverwertung (C. W. Paul Heylandt, inventor). Ger. 590,664, Jan. 12, 1934 (Cl. 18c. 8.50). A low-temp. process for annealing Fe and Fe-C objects is described.

**Apparatus for handling flat metal stock when annealing, etc.** Marshall S. Allen (to Morgan Construction Co.). U. S. 1,950,377, March 13. Structural and mech. features.

**Means for cooling annealed metal articles in a non-oxidizing atmosphere.** Siemens-Schuckertwerke A.-G. Ger. 593,112, Feb. 21, 1934 (Cl. 18c. 8.80).

**Bending and hardening leaf springs.** Collet & Engelhard Werkzeugmaschinenfabrik A.-G. Ger. 590,584, Jan. 5, 1934 (Cl. 18c. 2.21).

**Increasing the surface hardness of aluminum articles.** Aluminium Ltd. Brit. 402,609, Dec. 7, 1933; cf. Fr. 749,608 (C. A. 28, 456<sup>3</sup>). Hard wear-resisting surfaces are produced on Al pistons for internal-combustion engines.

**Cutting tools.** Jean H. L. DeBats. U. S. 1,950,355, March 6. Tools such as cutting tools or dies are formed in part of an abrasive alloy which may comprise W carbide 70-97% reacted with Ni, Co or Fe. U. S. 1,950,356 also relates to the manuf. of similar products.

**Apparatus for drawing rods, wire, etc.** Schumag Schumacher Metallwerke A.-G. für Präzisionsmechanik. Brit. 403,547, Dec. 28, 1933.

**Magnetic induction testing apparatus for determining the crystal structure of iron, the identity of alloy constituents, etc.** Sigfrid Specht (to The Ferrous Magnetic Corp.). Brit. 403,409, Dec. 18, 1933.

**Cast iron.** Soc. d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. Fr. 759,187, Jan. 30, 1934. In making addns. to cast Fe such as Cr, Mo, Ti, V or Co, the added metal is incorporated with a reducing substance combining readily with O (Si, Mg or Al) and forming, with the addn. metal, very fusible crystd. compds. and, with the oxide of the metal, slags of low m. p. rising easily to the surface. An example contains Cr 50, Si 12-20% and Fe and C the rest.

**Preparation of sheet iron for plating with heavy metals.** A. I. Rabiner and V. A. Avdyukin. Russ. 31,728, Oct. 31, 1933. The sheets are etched, passed through a washer charged with a soln. of ZnCl<sub>2</sub> or of ZnCl<sub>2</sub> and alkali and through a flux composed of lard to which is added a soln. of alkali (NaOH, KOH, NH<sub>4</sub>OH, Ca(OH)<sub>2</sub>, etc.) to a complete saponification and the formation of an emulsion. ZnCl<sub>2</sub> is then added and the whole is kept warm.

**Rustless iron or steel alloys.** Virginio Angelini. Brit. 402,430, Nov. 28, 1933. A molten Cr-Fe alloy is prepd. by melting a mixt. of chrome ore (48% Cr<sub>2</sub>O<sub>3</sub>) 65, CaSi<sub>2</sub> 23, Al 4, fluorspar 4, Fe-Si (80% Si) 2 and CaO 2% and incorporating with molten Fe, a fused mixt. of chrome ore 30, CaO 25, bauxite 20, fluorspar 15 and Fe oxide 10% being added as a protective layer. In a modification the molten Fe is added in portions to the molten alloy until the desired Cr alloy is produced, the slag mixt. being present in the molten alloy. Cf. C. A. 28, 89<sup>5</sup>.

**Hard steels.** Vereinigte Stahlwerke A.-G. Fr. 757,983, Jan. 3, 1934. The tendency to form fissures in hard steels, due to tensions produced by cooling, is reduced by the addn. of Mo 0.15-1, V 0.1-0.6 or Zr 0.1-0.6% or of more than one of these.

**Steels for use at high temperatures.** Soc. industrielle & commerciale des aciéries. Fr. 758,991, Jan. 26, 1934. Steels for use at above 400° contain C up to 0.5, Co 0.3-10 and Mo 0.3-3%. Up to 6% of Cr or a total up to

1.5% of Cu, Ti, V, Ni, Si, Mn and Al, separately or mixed, may be added.

**Nitriding steel articles such as toothed wheels, clutch couplings, bearings.** Adolf Fry and Roland Wasmuht (to Fried. Krupp A.-G.). U. S. 1,950,540, March 13. An article is shaped from a steel alloy contg. one or more elements such as Al, Cr, Mo or Mn adapted to accelerate nitridation and one or more elements such as Cu, Be, B or Ti adapted to cause pptn. hardening at nitriding temp., and the article is cooled from a temp. below the m. p. and above the nitriding temp., further shaped, and then subjected to a nitride-hardening and pptn.-hardening process.

**Working steel alloys.** Herman J. Van Royen. Brit. 402,972, Dec. 14, 1933. Addn. to 277,031. Articles adapted to resist wear, made from steel contg. double carbide formers, *e. g.*, Mn, Cr, W, Mo, V, in such amt. that the C content is less than 0.89% and their structure exclusively lamellar pearlitic, are shaped finally at below 850°. The steel may contain Si 0.35-0.8, Ni 1-7 and Cu 1.5%. Mn, if present, may be 0.6-0.8%. The initial shaping may be at the usual temp. of 950-1150°.

**Alloys.** Joseph Sunnen. Brit. 403,302, Dec. 21, 1933. The non-abrasive blocks of a cylinder grinding machine are formed of comparatively friable material such as a die cast alloy of compn. given in Brit. 395,271 (C. A. 28, 92<sup>3</sup>).

**Alloys.** Gustaf N. Kirschom and Calloy Ltd. Brit. 403,120, Dec. 11, 1933. A metal that does not readily alloy with Al, *e. g.*, Pb, is mixed with an Al alloy contg. an alk. earth metal (including Mg and Be) and the resulting layers of Al and alloy of Pb, etc., with alk. earth metal are sepd. Thus pieces, grains, etc., of an alk. earth metal compd. may be added to an Al bath and, after reduction of the compd., molten Pb added; alternatively the compd. may be added to a bath comprising Al and Pb. The pure alk. earth metals may be extd. from the alloys, *e. g.*, by volatilizing the complementary metals.

**Alloys; annealing.** Henry W. Brownson and Imperial Chemical Industries Ltd. Brit. 402,796, Dec. 4, 1933. Metal articles having a threaded portion and (or) distinct head and stem portion, *e. g.*, bolts, studs, nuts, screws, are formed from a soft Cu-Ni-Al alloy, the Al being 0.5-5% and the Ni 3-4 times the Al, and are hardened by heating to 300-600°. The alloy may be softened by heating to 800-900° and rapidly cooling and may contain up to 37% Zn and (or) 0.5-15% Mn.

**Alloys for pistons.** Elektronmetall G. m. b. H. Brit. 402,945, Dec. 14, 1933. In a light-metal piston having an Fe alloy insert for carrying piston rings the coeff. of expansion of the Fe alloy is less than, but not more than 10% less than, that of the light metal by reason of Ni (and Mo) in the Fe alloy and not more than 5% Si in the light metal. Suitable Fe alloys contain Ni 27 and Mo 5% or Ni 25 and W 5%. For examples of light-metal alloys see Fr. 42,833 (C. A. 28, 1324<sup>2</sup>).

**Alloys of hard metal carbides.** Ejner Schjøth. Fr. 758,891, Jan. 24, 1934. Colloidal suspensions of the constituents are made separately, emulsified together in the absence of air and the sediment is sepd. and dried under vacuum. The product obtained is fritted to give a homogeneous and resistant alloy.

**Oxide alloys.** Siemens & Halske A.-G. Fr. 759,029, Jan. 27, 1934. Articles are made by agglutinating, at above 1600°, Al<sub>2</sub>O<sub>3</sub> contg. less than 5% of an oxide of Fe, Mg, Zr or Th.

**Masses containing silicon.** I. G. Farbenind. A.-G. (Hans Häuber, inventor). Ger. 590,711, Jan. 9, 1934 (Cl. 12f. 3). Molded masses contg. Si are prepd. by mechanically working Si alloys or silicides at temps. below 1000°, raising the temp. to over 1000° after the working, and finally molding.

**Type metal.** Metallgesellschaft A.-G. (Kurt Paarman and Ernst Koch, inventors). Ger. 590,686, Jan. 8, 1934 (Cl. 40b. 11). Addn. to 589,679 (C. A. 28, 2317<sup>7</sup>). An alloy suitable for type metal consists of 20-30% Sb, 5-12% Sn, 0.5-2% Cu, 0.5-3% Cd, 0.1-0.5% As, 0.01-0.02%

Al, 0.01–0.8% alkali and (or) alk.-earth metal, including 1  
Mg, 0–2.99% Zn, and the rest Pb.

**Aluminum alloys.** J. Stone & Co. Ltd., Alfred J. Murphy and Stanley A. E. Wells. Brit. 403,700, Dec. 20, 1933. Al alloys, contg. Cu 0.5–5, Ni 0.5–3, Mg 0.1–2.5, Fe 0.2–4 and Si 0.2–2.5%, are improved by adding up to 1% Ce; Mn, Cr and (or) Ti may be present. The alloys may be aged at not over 300° and aging may be preceded by quenching from 480–570°. Cf. C. A. 28, 2668.

**Alloys of iron and chromium.** Electro Metallurgical Co. Fr. 759,006, Jan. 27, 1934. The alloy contains Cr 2–30, C not more than 0.5%, Cl at least 4 times the amt. of C and Fe the rest.

**Improving the magnetic properties of iron alloys.** Electrical Research Products Inc. Ger. 590,506, Jan. 11, 1934 (Cl. 407.1.65). A process is described for improving the magnetic properties of Fe–Co–Ni alloys, etc., by heating to 400–400° in a strong magnetic field.

**Palladium alloys.** The International Nickel Co., Inc. Ger. 593,406, Feb. 26, 1934 (Cl. 406.4) See Brit. 354,239 (C. A. 26, 2061).

**Devices for passing wire through degreasing, pickling, plating, etc., baths.** Max Schlötter. Brit. 403,136, Dec. 21, 1933.

**Centrifugal machine for scaling or cleaning metal plates, castings, etc., by throwing abrasive thereon.** Walter Scheinmann and Fritz Kottmann. Brit. 403,263, Dec. 21, 1933.

**Cleaning metals.** James H. Cravell. Brit. 403,373, Dec. 15, 1933. A dilutable compn. for cleaning metal surfaces, e. g., motor car bodies prior to painting, comprises a trihydric metal-etching mineral acid, e. g.,  $H_3PO_4$ ,  $H_2AsO_4$ , and a sulfonated hydrocarbon wetting agent compatible with aq. solns. of acids and alkalis, e. g., "Neomerpin" ("Nekal"). A solvent, increasing the soly. of the wetting agent, e. g., alcs., ketones, ethers, esters, may be added. In 403,374, Dec. 15, 1933, soldering fluxes are removed from metal surfaces by an aq. alk. soln. comprising an alkali, e. g., NaOH,  $Na_2CO_3$ , borax,  $Na_2PO_4$ , and an alkali salt of "Neomerpin" or other sulfonated aromatic hydrocarbon having an isopropyl radical attached to the nucleus. An indicator to show when the alkali is used up is preferably present.

**Metal cleaning and rust prevention.** Wm. K. Schweitz-

zer (to Grasselli Chemical Co.). U. S. 1,949,921, March 6. Metals are treated with aq.  $H_3PO_4$  together with isopropyl ether, and other similar ethers, alc., etc., also may be used.

**Apparatus for passing tinplates through a branning machine.** Harold D. Jones. Brit. 402,753, Nov. 30, 1933.

**Coating metal objects with molybdenum.** Patent-Trenhand Ges. für elektrische Glühlampen m. b. H. (to The General Electric Co. Ltd.). Brit. 402,010, Dec. 14, 1933. See Ger. 580,748 (C. A. 28, 1014).

**Soldering aluminum.** Edward Jones. Brit. 402,497, Dec. 7, 1933. Al (alloy) is prepd. for soldering to Al, brass, Cu, Fe, etc., by coating the surface thereof with Sn by means of a scraper fixed in the center of a Bunsen burner so that the flame completely surrounds the scraper. After tinning, the Al surfaces are soldered together by heating the parts and applying further Sn with the scraper. In soldering to other metals these are first tinned and any flux used is removed prior to the soldering operation.

**Soldering aluminum.** Émile N. Deleuze. Fr. 757,001, Jan. 8, 1934. A product for soldering Al contains borax 0.1–0.5, boric acid 0.1–0.4, resin 0.3–0.8, Sn 15–22, pure Al 20–28 and fused Al 50–65%.

**Solder for aluminum.** Arthur Steffen. Fr. 758,394, Jan. 15, 1934. The solder contains, e. g., Zn 8, Sn 1, Cu 0.5, Al 1 and Bi 0.025 kg.

**Silver solder.** Harold Turner and Johnson Matthey and Co. Ltd. Brit. 402,640, Dec. 7, 1933. A Ag solder contains at least 60% Ag, up to 9% Sn and Zn, Cd and (or) Sb, with or without a small percentage of Cu.

**Soldering articles such as cylinder covers of internal combustion engines, etc.** Kurt Bassler (to General Elec. Co.). U. S. 1,950,214, March 6. Articles sepd. from each other by a crevice which is narrow but somewhat wider than one into which molten Cu or brass solder could be drawn by capillary action are heated in a reducing atm. and bonded with an alloy which may be formed of Cu 64, Ni 25 and a readily fusible metal such as Zn 11 parts.

**Soldering flux.** Howard S. McQuaid (to Grasselli Chemical Co.). U. S. 1,949,916, March 6. The hydrochloride of an aliphatic amine such as that of an ethanolumine is used in soft soldering. Colophony and aniline-HCl, *o*-toluidine-HCl, etc., also may be used.

## 10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

A new laboratory method for the preparation of pure ethylene and propylene. P. K. Sakmin. Ber. 67B, 392–3 (1934). The Ipat'ev method for the prepn. of  $C_2H_4$  from EtOH has been greatly simplified. The app. is a Cu tube, the heated portion of which is filled with pieces (the size of a pea) of unglazed clay plate, held in position by a ring of asbestos at the lower end. The upper end is closed with a stopper connected with a dropping funnel and the lower end is connected with a 2-necked bottle (to catch the condensed EtOH vapors) and a gasometer. The advantages of this app. and catalyst are: (1) Instead of the 3 weeks' work required for the prepn. of c. p.  $Al_2O_3$ , only 1 hr. is needed to fill the tube with the pieces of clay plate; (2) by using a Cu tube all danger of damage on heating or changing the catalyst is avoided; (3) no special furnace with a porcelain tube is required, since the resistance wire is wound directly on the asbestos wrapping of the Cu tube; (4) no separate condenser is required for the unchanged alc. vapors; (5) the temp. can be measured with a simple Hg thermometer inserted in the well soldered to the tube. The catalyst is not only cheap but remains active for a long time. By keeping the outside temp. of the tube at about 400° by means of a rheostat and dropping in the alc. at the rate of 1–2 drops per sec. 1000 l. of 96–8%  $C_2H_4$  (20 l. per hr.) can be obtained without any decrease in the activity of the catalyst. Propylene can be simi-

larly obtained from PrOH if the temp. is kept at around 350°.

**Addition of hydrogen bromide to 1-pentene and 1-heptene.** Mary L. Sherrill, Katherine E. Mayer and Gertrude F. Walter. J. Am. Chem. Soc. 56, 926–30 (1934). 1-Pentene was prepd. from allyl bromide and EtMgBr and from  $PrCH(OEt)CH_2Br$  and Zn; 1-heptene was similarly prepd.; the phys. consts. agree with those reported. The addn. compd. formed by satg. the olefin in an org. solvent with dry HBr and allowing the reaction to take place under atm. pressure is exclusively the 1-Br deriv.; with aq. HBr the 2-Br deriv. is formed. The difference in the products formed by the 2 methods is believed to be due primarily to the difference in the solvents and not to the presence of any peroxide in the olefin. 1-Olefins do not readily form peroxides whereas those olefins with the double bond in the 2- or 3-position form peroxides easily; if peroxides were present in any of the reactions, it would be in the aq. HBr expts. for these were well mixed with air in the shaking process.

**Preparation of divinyl directly from alcohol.** I. S. V. Lebedev. J. Gen. Chem. (U. S. S. R.) 3, 698–717 (1933); cf. Brit. pat. 331,482 (C. A. 25, 115); U. S. S. R. pat. 24,393 (1931).

**The vapor phase catalytic hydrolysis of alkyl halides II. The preparation of methanol, formaldehyde and**

benzoyl chloride from methyl chloride, dichloromethane and benzotrichloride. A. Abkin and S. Medvedev. *J. Chem. Ind. (Moscow)* 1934, No. 1, 30-4; cf. *J. Phys. Chem. (U. S. S. R.)* 4, 731 (1933).—MeCl and  $\text{CH}_2\text{Cl}_2$  may be hydrolyzed by passing them with steam over Sn phosphate deposited on pumice.  $\text{TiO}_2$  and mixts. of Sn and Fe phosphates are unsatisfactory. When hydrolyzed at  $460^\circ$ , MeCl gives 16% MeOH and 18.6%  $\text{CH}_3\text{O}$ .  $\text{CH}_2\text{Cl}_2$  gives 75.5%  $\text{CH}_3\text{O}$ . If mixts. of MeCl and  $\text{CH}_2\text{Cl}_2$  are run at  $460^\circ$ ,  $\text{CH}_2\text{Cl}_2$  gives 90%  $\text{CH}_3\text{O}$  and the MeCl is 30% hydrolyzed. The residual MeCl may be recirculated, in which case 3-4 cycles are required for its complete hydrolysis, or it may be further chlorinated to  $\text{CH}_2\text{Cl}_2$ . The ratio of chlorides to  $\text{H}_2\text{O}$  for hydrolysis should be 1:10.  $\text{PhCCl}_3$  and  $\text{H}_2\text{O}$  in the ratio 1:1 at  $240^\circ$  give 96%  $\text{H}_2\text{Cl}$ . H. M. Leicester

Halogen derivatives of vinyl sulfides. S. M. Klier. *J. Gen. Chem. (U. S. S. R.)* 3, 904 8 (1933); cf. *C. A.* 27, 952. The subject of the study was the reduction of  $(\text{ClCH}_2\text{CHCl})_2\text{SO}_2$  (I) to  $(\text{ClCH}_2\text{CHCl})_2\text{S}$  (II) and conversion of II to  $(\text{ClCH}:\text{CH})_2\text{S}$  (III). Contrary to Muller and Metzger (*C. A.* 21, 52), II decomposes by distn. *in vacuo*, producing III after repeated fractionation. Similarly  $(\text{BrCH}_2\text{CHBr})_2\text{SO}_2$  (IV) is converted to  $(\text{BrCH}_2\text{CHBr})_2\text{S}$  (V) and this to  $(\text{BrCH}:\text{CH})_2\text{S}$  (VI). The results of the interaction of I and  $\text{PCl}_5$  demonstrated that the intermediate compd.  $(\text{ClCH}_2\text{CHCl})_2\text{SCl}_2$  (VII) splits off HCl with the formation of  $\text{ClCH}_2\text{CHClSCHClCHCl}_2$  (VIII) (Michaelis and Gaudehaus, *Ber.* 24, 763 (1891)) and not  $\text{Cl}_2$  with the formation of II as presumed by M. and M. (*loc. cit.*). A yield of 17 g. II,  $d_4^{20}$  1.634, was obtained by passing a current of  $\text{H}_2\text{S}$  into 25 g. I in 200 g. 100% AcOH while adding slowly 60 g. of satd. soln. of HBr in 100% AcOH; the reaction mixt. was dild. with  $\text{H}_2\text{O}$  and the oil dried by repeated filtration through dry filters until entirely clear. III,  $b_p$  71-2°,  $d_4^{20}$  1.365, resulted by successive fractionations (4) of II *in vacuo*. From 20 g. IV was prepd. 10 g. V as described above. V twice distd. *in vacuo* gave VI,  $b_p$  94-8°. An almost theoretical yield of VII,  $d_4^{20}$  1.557, resulted from I and  $\text{PCl}_5$  by cooling the exothermic reaction with ice. VIII,  $b_p$  95-7°, resulted from VII by repeated vacuum fractionation. All products give with  $\text{HgCl}_2$  in alc. white, amorphous ppts. insol. in common org. solvents. C. B.

Bibliography of chloropierin. R. C. Roark. *U. S. Dept. Agr. Misc. Pub.* 176, 88 pp. (1934). A revision of Bur. Chem. Bibliography 1 (*C. A.* 20, 2079), contg. 533 references arranged alphabetically, with brief abstracts. R. C. Roark

Preparation of dibromoamine and its reaction with Grignard reagents. Geo. H. Coleman, Charles B. Yager and Harold Soroos. *J. Am. Chem. Soc.* 56, 965 6 (1934).— $\text{NIHBr}_2$  was prepd. by passing  $\text{NIH}_3$  into Br in  $\text{Et}_2\text{O}$  at  $-50^\circ$ ; the ratio of Br to N was usually 1.98 to 2.05. At  $0^\circ$   $\text{NIHBr}_2$  is less stable than  $\text{NH}_2\text{Br}$ ; both are relatively stable at  $72^\circ$ .  $\text{NIHBr}_2$  reacts with  $\text{RMgX}$  to give  $\text{RNH}_2$ ,  $\text{R}_2\text{NH}$ ,  $\text{NH}_3$  and  $\text{N}_2$ ; the yields of  $\text{RNH}_2$  are less than those obtained with  $\text{NIH}_2\text{Br}$ ; the yields of  $\text{R}_2\text{NH}$  are much less than those of  $\text{RNH}_2$ . With  $\text{BuMgCl}$ ,  $\text{BuMgBr}$  and  $\text{BuMgI}$  the yields of  $\text{RNH}_2$  and  $\text{R}_2\text{NH}$  were: 15 and 5, 5 and 1, 2 and 0.4%, resp.; with *tert*- $\text{BuMgX}$  the yields were 24 and 5, 16 and 5, 3 and 1, resp. C. J. West

Enolization as directed by acid and basic catalysts. II. Enolic mechanism of the haloform reaction. Paul D. Bartlett. *J. Am. Chem. Soc.* 56, 967 9 (1934); cf. *C. A.* 28, 756<sup>3</sup>.—The reaction of  $\text{Me}_2\text{CO}$  with strongly alk. soln. of HOBr and HOI involves enolization of the  $\text{Me}_2\text{CO}$  as a rate-controlling step. The reaction with HOCl is several hundred times slower than the rate of enolization at the concn. employed; the rate of this reaction is controlled by a 2nd order reaction between the enol and the OCl ion. An interpretation of the unsym. halogenation of  $\text{Me}_2\text{CO}$  is given in terms of the electronic theory. C. J. West

Preparation of pure eleostearic acid from Chinese wood oil. Arthur W. Thomas and James C. Thomson. *J. Am. Chem. Soc.* 56, 898 (1934).—Details are given for

the prepn. of  $\alpha$ -eleostearic acid from tung oil and of the  $\beta$ -isomer from "wood oil butter." C. J. West

Spectroscopic study of eleostearic acids from Chinese wood oil. Andrew Dingwall and James C. Thomson. *J. Am. Chem. Soc.* 56, 899-901 (1934).—The absorption characteristics of  $\alpha$ - and  $\beta$ -eleostearic acids (I and II) are very similar, yet sufficiently different to enable them to be identified easily by this means. Although it is well recognized that light may cause profound changes in the acids, yet the light sources used in characterizing the acids had, under the conditions specified, no apparent action. A much stronger source, however, did cause very decided changes in the structure of I. I (15% soln. in 95% EtOH), irradiated for 2 hrs. under certain standard conditions, was converted into an acid that had the same absorption spectrum, in the region 2500 to 2850 Å., as the acid obtained from the solid glyceride. It is possible to det. spectroscopically the percentage compn. of a mixt. of I and II. C. J. West

Conjugated systems. X. The electrolytic reduction of vinylacrylic acid. Irving E. Muskat and Barbara Harriet Knapp. *J. Am. Chem. Soc.* 56, 943-5 (1934); cf. *C. A.* 27, 5066.—Electrolytic reduction of vinylacrylic acid (I) until approx. 1 mol.  $\text{H}_2$  per mol. I was absorbed gives 25-30% of  $\Delta^3$ -pentenoic acid, showing that the H is first added in the 4,4-positions. This is in agreement with the reduction of I by Na-Hg but is in contrast with the catalytic reduction of I, whereby  $\text{H}_2$  is added in the 3,4-positions. No reduction (electrolytic or I occurred in a soln. which was 0.5 M in H<sup>+</sup> ion nor in alk. soln.; it was reduced most rapidly in a soln. which was neutral or faintly acid. C. J. West

A novel, nondestructive oxidation of bixin. F. Viehöck. *Ber.* 67B, 577-83 (1934).—Two of the 9 double bonds in bixin (I) are especially reactive, for when I suspended in AcOH is shaken with  $\text{Mn}(\text{OAc})_4$  2 atoms of O are rapidly taken up while the consumption of a 3rd atom requires several days. Norbixin (II) and methylbixin (III) behave in the same way, except that the oxidation of III is somewhat slower. In every case, on pouring the product into water there are obtained amorphous chrome-yellow ppts. contg. 2 HO and 2 AcO or 1 HO and 3 AcO groups. If the oxidation is effected in the presence of  $\text{Ac}_2\text{O}$  a triacetate is formed exclusively. The remaining HO group is probably tertiary, for it has thus far not been possible to acetylate it; more vigorous acetylating methods result in decomposition. Concordant analytical results are obtained only with III, as partial lactone or lactide formation leads to irregularities with I and II. One mol. AcOH can be split off from the yellow products with striking ease. The triacetate  $\text{C}_{22}\text{H}_{30}\text{O}_7$  (IV) from III, heated in AcOH, very quickly gives an intensely red soln. yielding a red substance  $\text{C}_{20}\text{H}_{28}\text{O}_6$ . Simple heating of IV at  $110^\circ$  in N does not split off AcOH but the triacetate (V) from I loses 1 mol.  $\text{H}_2\text{O}$ , forming a lactone or lactide, since the product is no longer an acid. The reaction on alk. sapon. must be similar to that on heating with AcOH, for there is obtained, instead of the expected tetrahydroxydicarboxylic acid, a dicarboxylic acid  $\text{C}_{22}\text{H}_{30}\text{O}_7$  with 2 HO groups and an O atom, probably as C:O; there is a marked deepening of color (dark red) and the product forms condensation products with  $\text{Ph-NHNH}_2$ . Hydrolysis of the oxidation products after hydrogenation likewise yields only dihydroxyketo acids. Attempted oxidation degradation of the hydrogenated products with  $\text{KMnO}_4$  had to be abandoned because of the difficulties encountered, but the Me ester (perhydrodihydroxyketomethylbixin,  $\text{C}_{22}\text{H}_{44}\text{O}_7$ ) of the hydrolysis product of hydrogenated V (prepd. with  $\text{CH}_3\text{N}_3$ ) gives with  $\text{Ph}(\text{OAc})_2$  according to Criegee a small amt. of an ester aldehyde  $\text{C}_{12}\text{H}_{24}\text{O}_3$  as a mobile oil of pleasant odor which takes up O from the air to form a peroxide; repeated distn. therefore gives a mixt. of the aldehyde with the ester acid. The latter is also obtained by oxidation with  $\text{CrO}_3$ . Besides the ester aldehyde, which results from an exact halving of the mol., there was obtained a small amt. of a higher-boiling product, but the other cleavage fragment corresponding to it, which is probably



smaller than half the original mol., could be detected only in vanishingly small amts. Nor has it been possible to isolate the fragments carrying the ketone O, which are probably lost in the large quantities of resinous non-distillable residu, which is not the unchanged starting material for its mol. wt. is only 0.5 as great. By oxidation in  $\text{CHCl}_3$  there has been obtained from III an orange-yellow product with 1 HO and 1 AcO group; I is oxidized with extraordinary rapidity and yields a red product; cleavage of these monooxidation products results again in halving of the mol. The work has been temporarily discontinued because of lack of material. C. A. R.

**Direct synthesis of acid fluorides from acids and the preparation of formyl fluoride.** A. N. Nesmeyanov and E. J. Kahn. *Ber.* 67B, 370-3(1934).—The readily available alkali fluorides are in general completely insol. in acid chlorides and can therefore not be used for the reaction  $\text{RCOCl} + \text{NaF} \rightarrow \text{RCOF} + \text{NaCl}$ . KF is sol. in  $\text{Ac}_2\text{O}$  and especially in AcOH, however, and in both of these solvents  $\text{AcCl}$  and KF give good yields of AcF. With higher acid chlorides, the product is always AcF, because the AcOH is converted into AcCl and then into AcF which, being more volatile than the fluoride of the higher acid, escapes from the reaction mixt. This difficulty can be overcome by treating the soln. of KI in the acid  $\text{RCO}_2\text{H}$  with  $\text{BzCl}$  or  $\text{PhCCl}_2$ , whereby there is formed  $\text{BzOI}$ ,  $\text{RCOF}$  and  $\text{KCl}$ . The hitherto unknown **formyl fluoride** (I) was prepd. in this way. The reaction is carried out under an upright condenser (cooled with water at  $10^\circ$  and  $<5^\circ$  in the prepn. of AcF and I, resp.) connected at its upper end with a receiver cooled with ice and salt (in prepg. I a 2nd receiver in  $\text{Et}_2\text{O}-\text{CO}$  is used). AcF, b.  $20.2^\circ$ , was obtained (1) in 76% yield from 15.7 g.  $\text{AcCl}$  gradually dropped into 15 g. KF and 50 cc. AcOH on the water bath, (2) in 60% yield from AcOH and KF slowly treated with  $\text{BzCl}$ , (3) in 64% yield from KF and  $\text{Ac}_2\text{O}$  with  $\text{BzCl}$ , and (4) in 70% yield from AcOH, KF and  $\text{PhCCl}_2$ . I is obtained in 16% yield, together with an amt. of CO corresponding to 30%  $\text{HCO}_2\text{H}$ , from 1 mol. each of  $\text{HCO}_2\text{H}$ , KF and  $\text{PhCCl}_2$ , heated 1 hr. on the water bath. I  $b_{760} -26^\circ$ , d. 1.195, 1.160, 1.090 at  $-30^\circ$ ,  $-26^\circ$  and  $0^\circ$  under its own vapor pressure, has an intense but not unpleasant odor, dissolves solid  $\text{CO}_2$  well, does not dissolve NaCl, NaF, KF,  $\text{C}_{10}\text{H}_8$  or sucrose, dissolves I very slightly with yellow color, is sol. in ether, acetone and  $\text{CHCl}_3$ , insol. in  $\text{CCl}_4$  and hydrocarbons, hydrolyzes in water but apparently not instantaneously, forms alkyl formates with alc., reacts readily with amines to give the formyl derivs., is stable at low temps. but at room temp. decomposes in the course of a few hrs. into CO and HF. Mixts. with air are difficultly inflammable. To insects, I is about 3 times more toxic than chloroform and AcF. C. A. R.

**Systematic study of the preparation of acyl chlorides.** R. H. Clark and Alan Bell. *Trans. Roy. Soc. Can.* III, 27, 97 107(1933).—The acyl chlorides of 25 acids were prepd. by the action of (1)  $\text{PCl}_5$ , (2)  $\text{PCl}_3$  and  $\text{ZnCl}_2$ , (3)  $\text{SOCl}_2$ , and a quant. comparison was made.  $\text{PCl}_5$  was found to be satisfactory only for the lower mono- and dibasic acids.  $\text{PCl}_3$  gave better yields with  $\text{ZnCl}_2$ . This did not hold for  $\text{PCl}_5$ . With  $\text{SOCl}_2$  the yield from the aliphatic acids increased with the mol. wt. of the acid and a ratio of 1 mol. acid:1.5 mols.  $\text{SOCl}_2$  gave the best results. The  $\text{SOCl}_2$  method is recommended. Tables are given.

R. B. Sandin

**The use of methoxyacetic anhydride for the determination of hydroxyl groups.** Douglas W. Hill. *J. Am. Chem. Soc.* 56, 993-4(1934).— $(\text{MeOCH}_2\text{CO})_2\text{O}$  is suggested as a substitute for  $\text{Ac}_2\text{O}$  in the detn. of HO groups, since the micro-MeO detn. is more satisfactory than the micro-Ac detn. *Bis(methoxyacetyl)hydroquinone*, m.  $89.5-90^\circ$ ; *p-methoxyacetoxycinnamic acid*, m.  $164.5^\circ$ ; *methoxyacetoxycinnaldehyde*, pale yellow, m.  $93^\circ$ ; *p-methoxyacetoxycinnophenone*, m.  $58-7^\circ$ ; *pentamethoxyacetoxycinnol*, m.  $97.8^\circ$ .

C. J. West

**2,3-Butanediol and its derivatives. I. Halohydrins of pseudobutylene.** M. V. Likhoshestov and S. V. Alekseev. *J. Gen. Chem.* (U. S. S. R.) 3, 927-32(1933).—

$\text{MeCHClCH(OH)Me}$  (I) was obtained from 2-butene (II) and  $\text{NH}_2\text{CONHCl}$  (III) with  $\text{CuCl}_2$  catalyst in weak acid solns. The reaction is based on the hydrolysis of aq. III into  $\text{HClO}$  and  $\text{CO(NH}_2)_2$ . III was prepd. by chlorinating  $\text{CO(NH}_2)_2$  in the presence of  $\text{Cu(OAc)}_2$ , the formed  $\text{CuCl}_2$  acting as a catalyst in the formation of chlorohydrins (cf. Frahm, *C. A.* 25, 2690; U. S. pats. 1,315,228, 1,496,675, *C. A.* 18, 2345). III was used in concns. capable of producing not less than 20%  $\text{HClO}$ , and the recovered  $\text{CO(NH}_2)_2$  was used again in the process. With gaseous II the conversion to I takes place in 30-40 min. and with liquid II in 15-20 min.; the latter reaction is exothermic and must be kept at  $15-17^\circ$  by outside cooling. The reaction results in a mixt. of I and  $\text{MeCHClCHClMe}$  (IV), which can be sep'd. by distn. The content of I and IV in the mixt. depends on the acid used in the reaction: 5%  $\text{HCl}$  gave 38.8% I and 61.2% IV, 5%  $\text{H}_2\text{SO}_4$  52.98 and 47.02, 0.4%  $\text{H}_2\text{SO}_4$  75.05 and 24.95, and 5%  $\text{AcOH}$  79.92 and 20.08. The formation of IV is thus explained:  $\text{III} + \text{HCl} = \text{CO(NH}_2)_2 + \text{Cl}_2$ . The quant. sep'n. of I and IV was effected by converting I to  $\text{MeCHClCH(OAc)Me}$ , b.  $152.6^\circ$  (uncor.),  $d_{15} 1.0890$ ,  $n_D^{20} 1.4224$ , and  $\text{MeCHClCH(OBz)Me}$ , b.  $203.5.5^\circ$  (uncor.), which are new compds.  $\text{MeCHBrCH(OH)Me}$  (V), b.  $152.4^\circ$ ,  $d_{15} 1.4797$ ,  $n_D^{20} 1.4740$ , was obtained from 2-butene oxide (VI) with concd.  $\text{HBr}$  at  $0-10^\circ$  (Read and Hook, *C. A.* 15, 57). VI, b.  $56.8^\circ$ , was prepd. by the method of Etekov (*J. Russ. Phys. Chem. Soc.* 14, 371). Better yields of V were obtained by the action of  $\text{AcNHBr}$  on II in an acid medium.  $\text{AcNHBr}$  was prepd. from  $\text{AcNH}_2$  in  $\text{H}_2\text{O}$  and  $\text{Br}$  at  $0-3^\circ$  in the presence of  $\text{ZnO}$  or  $\text{CaCO}_3$ . The exothermic reaction of II and  $\text{AcNHBr}$  is completed in 5-6 min., the content of V and  $\text{MeCHBrCHBrMe}$  (VII), b.  $156.9^\circ$ , in the reaction mixt. depending on the acid used. Five%  $\text{HCl}$  gave 20.2% V and 78.80% VII, 5%  $\text{H}_2\text{SO}_4$  55 and 45, 0.4%  $\text{H}_2\text{SO}_4$  70 and 30, and 3%  $\text{AcOH}$  75.80 and 20.5%.  $\text{MeCHBrCH(OAc)Me}$ , b.  $165.7^\circ$  (uncor.),  $d_{15} 1.6121$ ,  $n_D^{20} 1.4800$ .  $\text{MeCHClCH(OH)Me}$  (VIII), prepd. from VI and III, is decompt. at  $65.7^\circ$  at atm. pressure and by distn. *in vacuo*. V and its Ac deriv. and VIII are new compds. Eighteen references. Chas. Blanc

**Preparation of anhydrous ethylenediamine.** John C. Bailar, Jr. *J. Am. Chem. Soc.* 56, 955(1934).  $\text{C}_2\text{H}_4(\text{NH}_2)_2$  and  $\text{ZnCl}_2$  in  $\text{H}_2\text{O}$  give the salt  $[\text{ZnCl}_2(\text{NH}_2)_2] \cdot \text{C}_2\text{H}_4$ ; the dry salt, heated *in vacuo* at  $200^\circ$ , gives nearly quant. anhyd.  $\text{C}_2\text{H}_4(\text{NH}_2)_2$ , b.  $116.7^\circ$ ,  $d_4^{20} 0.907$ .

C. J. West

**Absorption of oxygen by linseed oil in the presence of catalysts of different oxidation-reduction potentials.** Bacon F. Chow. *J. Am. Chem. Soc.* 56, 894 8(1934).—An empirical equation relating the rate of O absorption of linseed oil to the potential of the catalysts is given. The effect of H-ion concn., concn. of catalyst and the ratio of ferrieyanide to ferrocyanide is shown in tables. Acetoxime is a fairly powerful inhibitor,  $5 \times 10^{-4}$  mol. cutting the rate to one-half; all the amino acids show definite inhibition, though there is no relation between their structures and power of inhibition; ethanolamine is not a very powerful inhibitor; cinnamic acid reduces the rate considerably.  $\text{PhNMe}_2$  is a catalyst for the  $\text{O}_2$  absorption. A "secondary"  $\text{O}_2$  absorption has been found when molybdcyanide or tungsticyanide was used as catalysts in  $pH$  9 or greater.

C. J. West

**Optically active thiodilactylic acid.** Arne Fredga. *Svensk Kem. Tids.* 46, 10 15(1934)(in German); cf. Lovén, *Ber.* 29, 1134(1896).—Inactive thiodilactylic acid (m.  $125^\circ$ ) was changed to the quinine salts (98 g.) and fractionated by crystn. from MeOH, giving 2 active products, 17 g.,  $[\alpha] 197^\circ$ , and 25 g.,  $[\alpha] -198^\circ$ . Both acids m.  $117^\circ$  separately and  $127^\circ$  when mixed,  $[\alpha] 200.5^\circ$ , and  $-200.9^\circ$ .

A. R. Rose

**Ricinoleic acid condensations.** As. Zlatarov and V. Brelavski. *Ann. univ. Sofia, Faculté phys.-math.* 28, No. 2, 21 38(in German 39-44)(1932).—The isolation of diricinoleic acid, i. e., the condensation product of OH group of 1 mol. with the  $\text{CO}_2\text{H}$  group of another mol. of ricinoleic acid, has been undertaken. The following

condensations have been studied: Promoted by light, ultra-violet light, heating at 90° for 36 hrs. and at 103° for 48 hrs., heating with various catalysts such as boric acid,  $\text{SnCl}_4$ ,  $\text{H}_2\text{SO}_4$ , and piperidine. The diricinoleic acid, extd. with alc. at -10° from the condensation products in 5-10% yields, had Ac no. 84.4 and I no. 88.8. It is a thick yellowish oil, sol. in alc., ether,  $\text{CHCl}_3$ ,  $\text{AcOH}$ , acetone and  $\text{C}_6\text{H}_6$ . Cu and Ni hydroxides give Cu diricinoleate, m. 109°, and Ni diricinoleate,  $n_D^{20}$  1.4773. These salts are insol. in alc., but sol. in  $\text{C}_6\text{H}_6$  and  $\text{CHCl}_3$ . Diricinoleic acid and  $\text{H}_2\text{SO}_4$  react to produce a sulfuric acid ester of unsatd. character. A possible mechanism for the structure and formation of Turkey-red oil from castor oil has been suggested.

G. S. Stamatoff

Proteins in liquid ammonia. II. Reaction of sodium in liquid ammonia with amino acids and related substances. C. O. Miller and R. G. Roberts. *J. Am. Chem. Soc.* 56, 935-7 (1934); cf. *C. A.* 25, 5800.—In liquid  $\text{NH}_3$  glycine and alanine react with Na as monobasic acids; the phenol group of tyrosine is slightly acidic; leucine liberates more  $\text{H}_2$  than does a monoaminomono-carboxylic acid; cystine is reduced, in part, by the Na acting directly upon the disulfide bond. The peptide linkage in dipeptides is not acidic in liquid  $\text{NH}_3$ . Diketopiperazine is reduced by Na. Mixts. of amino acids and of amino acids with diketopiperazine do not liberate  $\text{H}_2$  additively, as is to be expected. Thus glycine and tyrosine liberate 67% of the  $\text{H}_2$  that they would liberate if taken separately; other examples are given. C. J. West

Iron compound of gluconic acid. A. Proskuriakoff and R. J. Titherington. *J. Am. Chem. Soc.* 56, 996-7 (1934).—Ca gluconate (3 mols.) and  $\text{Fe}_2(\text{SO}_4)_3$  (1 mol.) in hot  $\text{H}_2\text{O}$  give a light yellow amorphous ppt.,  $\text{C}_6\text{H}_{12}\text{O}_6\text{Fe}$ , which is probably a basic ferrigluconic acid; it is acid to litmus and the soln. can be made distinctly alk. to litmus without pptg.  $\text{Fe}$ . The compd. is of value in the treatment of secondary anemia.

C. J. West

Preparation of lactones from the phenylhydrazides of the acids of the sugar group. Raymond M. Hann and C. S. Hudson. *J. Am. Chem. Soc.* 56, 957-8 (1934).  $\alpha$ -Galaleptonic phenylhydrazide (50 g.) and 40 g.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in 500 cc.  $\text{H}_2\text{O}$ , refluxed 5 hrs., cooled and treated with  $\text{H}_2\text{S}$  to ppt. the Cu and with  $\text{Ba}(\text{OH})_2$  to ppt. the  $\text{H}_2\text{SO}_4$ , give 85% of  $\alpha$ -galaleptonic lactone; in the same way 90% of mannonic lactone is prepd. from the phenylhydrazide.  $\beta$ -Galaleptonic acid is obtained in 65 g. yield from 100 g. of the phenylhydrazide (theory, 71.5 g.). The  $\text{PhNHNH}_2$  is oxidized to  $\text{C}_6\text{H}_6$  and N. The hydrolysis with  $\text{Ba}(\text{OH})_2$  is often very slow or incomplete.

C. J. West

Certain derivatives of alkyl  $\gamma$ -oxalylcrotonates. Albert B. Boese, Jr. and Randolph T. Majer. *J. Am. Chem. Soc.* 56, 949-52 (1934).—In the attempt to synthesize  $\text{CH}_2\text{:CHCH}(\text{COCO}_2\text{Et})\text{CO}_2\text{Et}$  by the condensation of  $\text{CH}_2\text{:CHCH}_2\text{CO}_2\text{Et}$  (I) with  $(\text{CO}_2\text{Et})_2$  in presence of Na the resulting product is Et  $\gamma$ -oxalylcrotonate (II), m. 79-80°; apparently I rearranges to  $\text{MeCH:CHCO}_2\text{Et}$ , which then reacts normally with  $(\text{CO}_2\text{Et})_2$ . With  $(\text{CO}_2\text{Me})_2$  there results the Me ester, m. 124.6°. The Na deriv. of II and cold 30% NaOH give  $\gamma$ -oxalylcrotonic acid, m. 212°; oxidation of the acid gives glutamic acid. The Na deriv. of II and  $\text{ClCO}_2\text{Et}$  in  $\text{Et}_2\text{O}$  give 71% of Et O-carbethoxy- $\gamma$ -oxalylcrotonate,  $b_p$  160-3°; catalytic reduction gives di-Et adipate; the corresponding Me O-carbomethoxy deriv.  $b_p$  158-60° (88% yield) and gives di-Me adipate on reduction. The Na deriv. of Et oxalylacetate and  $\text{ClCO}_2\text{Et}$  give Et O-carbethoxyoxalylacetate,  $b_p$  143.6° (65% yield); reduction gives di-Et succinate. Reduction of Et O-acetyloxalylcrotonate gives di-Et adipate. Di-Et  $\alpha$ -acetoxyadipate could not be catalytically reduced. The mechanism of these reductions is discussed.

C. J. West

Tautomerism of cyanourea with guanyl isocyanate. J. S. Blair and G. R. P. Smith, Jr. *J. Am. Chem. Soc.* 56, 907-10 (1934).—It has been known since 1875 that the compd. called cyanourea (I) or amidodicyanic acid reacts with  $\text{H}_2\text{O}$  in the presence of acid to yield biuret; it is now found that guanidine is simultaneously formed

under these conditions. From this and other considerations it appears that the chemistry of I is best explained by the assumption of tautomerism between a 4-membered ring and 2 different chain structures for the substance. All 3 of the H atoms of I are dissociable, as attested by the fact that I behaves as a tribasic acid in liquid  $\text{NH}_3$ ; K, di-K and tri-K salts were prepd. The labile structure and acid character of I are in accord with the point of view that I should be regarded as a mixed aquo ammonio pyrocarbonic acid. The validity of a ring structure for I is attested by the results of work with Hoffmann's diphenyl diisocyanate; mol.-wt. detns. show that it is a dimer, and it probably has the ring structure assigned by H. C. J. West

Monophenyl nitrogen esters of biuret. J. S. Blair. *J. Am. Chem. Soc.* 56, 904-7 (1934).—Three monophenylbiurets, in which the Ph group is attached to N, are described, m. 156-65° (I), 190° and 197° (II); according to the accepted theory of structure only 2 should exist. The wide variation in the reported m. p. of I is due to the fact that it decomposes on melting but without charring, rapid evolution of gas or other obvious evidences of decomposition. II is a mol. compd. of 3 mols. I with 2 mols. of phenylisocyanuric acid (III); it forms a continuous series of solid solns. with each component. The soly. of I in abs.  $\text{EtOH}$  at 22-4° is 33.96 g. per l., of III, 4.75 g.; the compn. of II is not altered by leaching with a solvent (abs.  $\text{EtOH}$ ), in which 1 of its components is 7 times as sol. as the other, so that II is a definite compd. The "isomerization" of II into I by alkali is explained as follows: both I and III are acids but III is much the stronger acid and its soly. is much more increased by adding a base than is the soly. of I; under proper conditions I will crystallize out, though in small yield. The substance m. 190° is being studied.

C. J. West

Formation of hemiacetals and hydrates of carbonyl and carboxyl derivatives. W. Herold. *Z. Elektrochem.* 39, 568-71 (1933); cf. *C. A.* 26, 5257, 5290.—Abnormalities in the ultra-violet absorption spectra of alc. and aq. solns. of CO compds. are due to hemiacetal and hydrate formation, the extent of which can be estd. from absorption measurements. As the no. of groups surrounding either the CO group or the OH group of the alc. solvent increases, the extent and velocity of addn. compd. formation decrease. This compd. formation gives an insight into the mechanism of esterification and explains why Walden's inversion is never observed when an active alc. is esterified and then saponified. The more pos. the groups adjacent to the CO group, the greater is the additive tendency and the deeper the color of the solid. The aq. and alc. solns., however, are usually colorless because of compd. formation. On the other hand, no examples have been found of CO derivs., negatively substituted in the  $\alpha$ -position, in which the CO group is responsible for color or hydrate formation. It is shown that  $\alpha$ -HO ketones form dimers (cyclic hemiacetals) and that the structure of alloxanic acid, which is colorless, is  $\text{CO NH.CO NH C(OH)CO}_2\text{H}$

and not  $\text{NH}_2\text{CONHCOCOCO}_2\text{H}$ . The spectroscopic data upon which the conclusions of this paper are based are not presented.

Arnold M. Collins

N-Methyluridine and its bearing on the structure of uridine. P. A. Levene and R. Stuart Tipson. *J. Biol. Chem.* 104, 385-93 (1934); cf. *C. A.* 27, 4528.—In order to prove that uridine has the ribose residu in position 3, monotriyluridine (I) was prepd., and the 2 remaining OH groups were protected by acetylation. Treatment of the resulting diacetyltriyluridine (II) with  $\text{CHI}_3/\text{N}_2$  gave diacetyltriyl-N-methyluridine (III), which on complete hydrolysis yielded 1-methyluracil. Hence position 3 must have been occupied by the ribose. The properties of I are different from those given by Bredreck (*C. A.* 27, 2156); it is cryst., m. 200° without foaming, is not hygroscopic,  $[\alpha]_D^{25}$  9.5° ( $\text{Me}_2\text{CO}$ ). Compds. II and III were glasses,  $[\alpha]_D^{25}$  50.9° ( $\text{MeOH}$ ), and  $[\alpha]_D^{25}$  55.3° ( $\text{MeOH}$ ), resp. Partial hydrolysis of III with 1%  $\text{HCl}$  in  $\text{MeOH}$  yielded N-methyluridine, m. 108-10°,  $[\alpha]_D^{25}$  16.5°. The properties of the 1-methyluracil obtained

here were identical with those of the synthetic prepn. of Johnson and Heyl (G. A. 1, 2373). K. V. T.

**Crystalline lead and strontium salts of *d*-xyloic acid and a crystalline triacetate of *d*-threose.** Robert C. Hockett. *J. Am. Chem. Soc.* 56, 994-5 (1934).—Hasenfratz (C. A. 27, 1880) has reported a Pb salt of *d*-xyloic acid; this was first isolated by H. in 1932; the salt seps. with 5 mols.  $H_2O$ , m. 58-9° and has  $[\alpha]_D^{25} = -6.8^\circ$  (0.7571 g. in 25 cc.  $H_2O$ ). The Sr salt also forms a pentahydrate, the  $H_2O$  being lost in 24 hrs. at 55°;  $[\alpha]_D^{25} 18.2^\circ$  (0.4206 g. in 25 cc.  $H_2O$ ); this salt is obtained in 96% yield from xylose by the electrolytic method; it should be useful in identifying and purifying xyloic acid because of its sparing soly. in cold  $H_2O$ . *d*-Threose triacetate, m. 113-14°,  $[\alpha]_D^{25} 35.5^\circ$  ( $CHCl_3$ ). C. J. West

**Action of triphenylmethyl chloride on  $\alpha$ -methyl *l*-fucoside.** R. C. Hockett and C. S. Hudson. *J. Am. Chem. Soc.* 56, 945-6 (1934).— $\alpha$ -Me *l*-fucoside (13 g.) in 100 cc. dry  $C_6H_5N$  and 30 g.  $Ph_3CCl$ , allowed to stand 5 days at room temp. and then heated 1 hr. on the water bath, give 25 g. *monotriphenyl deriv.*, crystg. with 1 mol.  $EtOH$ ,  $[\alpha]_D^{25} -51.4^\circ$  (0.5906 g. in 25 cc.  $CHCl_3$ , m. 123-6° (cor.); drying *in vacuo* at 75° gives the anhyd. compd., m. 126-8° (cor.),  $[\alpha]_D^{25} -59.5^\circ$  (0.5437 g. in 25 cc.  $CHCl_3$ ). The sugar decomposes on drying at 80°, giving  $Ph_3COH$  and  $\alpha$ -Me fucoside. This reaction disproves the hypothesis that  $Ph_3CCl$  is completely sp. in action toward primary HO groups, although a preferential action is known to take place in many individual cases. C. J. West

**Free aldehyde form of fucose tetraacetate.** M. L. Wolfson and J. A. Orsino. *J. Am. Chem. Soc.* 56, 985-7 (1934).—*l*-Fucose Et mercaptal in  $C_6H_5N$  and  $Ac_2O$  at 0° for 1 hr. and at room temp. for 18 hrs. gives 87% of the *tetraacetate*, m. 99-100°,  $[\alpha]_D^{25} 5^\circ$  ( $CHCl_3$ , c 3.8 g. in 100 cc.); treatment with  $CdCO_3$  and  $HgCl_2$  in  $Me_2CO$  gives *aldehyde-*l*-fucose tetraacetate* (I), m. 166-7°,  $[\alpha]_D^{25} 40^\circ$  ( $C_6H_5Cl_2$ , c 1.0); it shows mutarotation in  $MeOH$  (from 22.49° in 4 days at room temp.); it gives a pos. Schiff test in 2 min. and reacts with Fehling soln. immediately on heating; the *Et hemiacetal*, m. 120-1°,  $[\alpha]_D^{25} -3.4^\circ$  (c 1.7 in  $EtOH$ ), changing to 3.4° in 70 hrs.; in  $EtOH$ -free  $CHCl_3$  (c 1.5), -32° changing to 27.8° in hrs.; boiling  $H_2O$  gives the *aldehydrol*, m. 160-1°; the *semicarbazone* of I, m. 215° (decompon.). *l*-Fucose in  $C_6H_5N$  and  $Ac_2O$  gives  $\alpha$ -*l*-fucose *tetraacetate*, m. 92°,  $[\alpha]_D^{25} -120^\circ$  ( $CHCl_3$ , c 1.8). C. J. West

**Crystalline compounds of *d*-xylose and of *l*-arabinose with calcium chloride.** J. K. Dale. *J. Am. Chem. Soc.* 56, 932-4 (1934).—Xylose and  $CaCl_2 \cdot 2H_2O$  in  $H_2O$  give  $\alpha$ -*d*-xylose- $CaCl_2 \cdot 3H_2O$ , m. 126°; the initial and final sp. rotations in  $H_2O$  obtained from a mutarotation curve were 46.8° and 9.33°, resp. *l*-Arabinose gives  $\beta$ -*l*-arabinose- $CaCl_2 \cdot H_2O$ , decompos. 213°, initial and final sp. rotations 99.59° and 56.6°; the mother liquor yields the compd. ( $\beta$ -*l*-arabinose) $_2 \cdot CaCl_2 \cdot 2H_2O$ , which has no p., initial and final sp. rotations 124.6° and 69.94°, resp. The mutarotation curves of these compds. are similar to those of their sugar components. The initial sp. rotations calcd. for the xylose and arabinose components are higher than have been found previously. C. J. West

**New crystalline compound of  $\alpha$ -*l*-arabinose with calcium chloride and water.** W. C. Austin and J. P. Walsh. *J. Am. Chem. Soc.* 56, 934-5 (1934).—*l*-Arabinose (I) (16.7 g.), 32 g.  $CaCl_2 \cdot 2H_2O$  and 28 cc.  $H_2O$ , heated on a steam bath until crystals begin to appear, give 37% (16.7 g.) of the compd.  $\alpha$ -*l*- $CaCl_2 \cdot 4H_2O$ , which slowly liquefies at 112-15° and decomposes 214-15°; a 4% soln. in  $H_2O$  shows  $[\alpha]_D^{25} 36.41^\circ$  (3 min. after soln.), 40.44° (9.6 min.), 44.48° (22.2 min.) and 47.65° (18 hrs.). From these values there is calcd.  $[\alpha]_D^{25} 75.18^\circ$  for  $\alpha$ -I. C. J. West

**Crystalline triphenylmethyl derivatives of  $\beta$ -methyl *d*-xyloside.** E. L. Jackson, R. C. Hockett and C. S. Hudson. *J. Am. Chem. Soc.* 56, 947-9 (1934); cf. C. A. 26, 423.— $\beta$ -Me *d*-xyloside and  $Ph_3CCl$  in  $C_6H_5N$  at 20° yield a mixt. of *bistriphenylmethyl deriv.*, sepd. by

crystn. from  $EtOH$ ; the 1st m. 238-40° (all m. ps. cor.),  $[\alpha]_D^{25} -55.5^\circ$  ( $C_6H_5N$ , 0.2386 g. in 25 cc.); the 2nd m. 102.5-3°,  $[\alpha]_D^{25} -22.5^\circ$  ( $C_6H_5N$ , 0.2772 g. in 25 cc.); in addn. there is formed a sirup which on acetylation yields 2 isomeric *diacetylmonotriphenylmethyl- $\beta$ -methyl-*d*-xylosides*, m. 169-70°,  $[\alpha]_D^{25} -15.7^\circ$  ( $CHCl_3$ , 0.6130 g. in 25 cc.), and m. 125-7°,  $[\alpha]_D^{25} -49.1^\circ$  ( $CHCl_3$ , 0.4808 g. in 25 cc.). These results show that  $Ph_3CCl$  reacts with the sec. HO groups in this xyloside. The reaction at 100° gives the 2 bis- $Ph_3C$  derivs. C. J. West

**The synthesis of ribose-5-phosphoric acid.** P. A. Levene and Eric T. Stiller. *J. Biol. Chem.* 104, 299-300 (1934).—In order finally to confirm the fact that the ribosephosphate of muscle adenylic acid (I) is ribose-5-phosphoric acid, synthesis was carried out. From 2 g. *d*-ribose in 380 cc.  $Me_2CO$  and 20 cc.  $MeOH$  contg. 0.2%  $H_2SO_4$ , by shaking with anhyd.  $CuSO_4$  and fractional distn., was obtained 14 g. *monoacetone-methylribose* (II), b.p. 83-6°. That II is a furanose was shown by methylation and hydrolysis; the *p*-bromophenylosazone, m. 175°,  $[\alpha]_D^{25} -55.2^\circ$  ( $EtOH$ :pyridine, 3:2), from the resulting *monomethylribose* (III), was identical with that prepd. from 5-methylribofuranose (cf. Levene and Stiller, C. A. 28, 1049). Hence III is the furanose and therefore II a furanose. Phosphorylation of 8.5 g. II by  $POCl_3$  in pyridine, followed by hydrolysis of the acetone and Me groups, led to a Ba ribosephosphate, which was therefore the 5-phosphate,  $[\alpha]_D^{25} 5.99^\circ$  ( $H_2O$ ). The free acid (IV) had  $[\alpha]_D^{25} 16.54^\circ$  (1 N HCl), while the natural product, prepd. from the inosinic acid of fish muscle, had  $[\alpha]_D^{25} 16.09^\circ$  (1 N HCl). The rates of hydrolysis of the Ba salts of ribose-3- and -5-phosphoric acids are also very different. It follows that I and IV are identical. K. V. Thimann

**Methylated sugars. I. Preparation of tetramethylglucose.** Edward S. West and Raymond F. Holden. *J. Am. Chem. Soc.* 56, 930-2 (1934).—Details are given for the prepn. of  $\alpha$ , $\beta$ -tetramethylmethylglucoside from glucose by treatment with  $Me_2SO_4$  in  $CCl_4$  and 60%  $NaOH$ ; the yield is equal to the glucose used and the rotation corresponds to 83-5% of the  $\beta$ -form; hydrolysis is carried out with 2 N HCl, steam being passed through for 1 hr.; the entire operation to obtain cryst. tetramethylglucose (I) is 8-10 hr. I has  $[\alpha]_D^{25} 81.3^\circ$  ( $H_2O$ ), 2° lower than reported values. The methylation of  $\alpha$ -Me glucoside is also described. The equation  $[\alpha]_D = 85 - 0.1846t$  expresses the relation between  $\alpha$ . rotation and *t* between 5° and 37°. I in  $C_6H_6$  has  $[\alpha]_D^{25} 86.57^\circ$  (c 4.86);  $EtOH$ , 81.3° (c 4.35);  $CHCl_3$ , 85.42° (c 3.98); in  $MeOH$   $[\alpha]_D^{25} 82.91^\circ$  (c 4.87). C. J. West

**Anhydro- $\beta$ -methylhexoside from triacetyl-4-toluenesulfonyl- $\beta$ -methylglucoside.** Alexander Müller. *Ber.* 67B, 421-4 (1934); cf. C. A. 25, 685.—The study of the anhydro- $\beta$ -methylhexoside (I) obtained from triacetyl-4-*p*-toluenesulfonyl- $\beta$ -methylglucoside with  $NaORt$  has not yet led to a decision as to the position of the newly-formed O bridge and as to what is the parent sugar (rendered doubtful by a possible Walden inversion) but has given some interesting results. The 2 HO groups in I are readily methylated and by interrupting the reaction there can be obtained a homogeneous *mono-Me deriv.* (II), an indication that 1 of the HO groups occupies a preferred position. This is confirmed by the pos. trityl reaction, showing the presence of a primary HO group and excluding the possibility of a 4,6-bridge. Hydrolysis of the *di-Me deriv.* (III) and the subsequent osazone reaction give no information, however, as to the length of the ring, for the products cannot be purified and contain only traces of  $MeO$ . With dil. HCl, I readily adds 1 mol. HCl to form a *chloro- $\beta$ -hexose*, isolated as the *tetraacetate* (IV). III behaves in the same way. The ease with which the HCl is added points to the presence of a highly strained ring (possibly 3,4). III, obtained almost quantitatively from I, with  $MeI$  and  $Ag_2O$  in boiling acetone, m. 83-4°,  $[\alpha]_D^{25} -148.2^\circ$  ( $CHCl_3$ ), II, m. 121°,  $[\alpha]_D^{25} -141.6^\circ$  (water). 6-Trityl-acetyl-anhydro- $\beta$ -methylhexoside, from I allowed to stand 20 hrs. with  $Ph_3CCl$  in pyridine at 15-20°, then 20 hrs.

with  $\text{Ac}_2\text{O}$ , m. 180.5–1.5°, seps. with 0.5 mol.  $\text{EtOH}$ ,  $[\alpha]_D^{25}$  –91.8° ( $\text{CHCl}_3$ ). IV (yield 41%), m. 128°,  $[\alpha]_D^{25}$  –21.17° ( $\text{CHCl}_3$ ), reduces hot Fehling soln. *Di-methylchloro- $\alpha$ -hexose*, m. 135–7°,  $[\alpha]_D^{25}$  in water –53.7° shortly after soln., –67.6° (equil.) after 70 hrs.

C. A. R.

**Improvements in the preparation of crystalline *d*-mannose.** C. S. Hudson and E. L. Jackson. *J. Am. Chem. Soc.* 56, 958 9(1934).—Me *d*-mannoside can be obtained in 45% yield from vegetable ivory. Hydrolysis with 2%  $\text{HCl}$  by refluxing gently for 4 hrs. gives 70% of *d*-mannose, a yield of about 30% of the sugar from the vegetable ivory used.

C. J. West

**Halogenoacetates of the  $\beta$ -series and their use for syntheses.** VIII. Crystalline  $\beta$ -*h*-ethyl galactoside (galactofuranoside). Hans H. Schlubach and Klaus Meisenheimer. *Ber.* 67B, 429–30(1934); cf. *C. A.* 27, 493. —A new way of prep. pure  $\beta$ -*h*-Et galactoside (I) has been discovered. The now readily available  $\beta$ -pentaacetyl-*h*-galactose is converted by 24 hrs. treatment with anhyd.  $\text{HCl}$  into  $\beta$ -acetochloro-*h*-galactose, which, without preliminary isolation, gives with  $\text{Ag}_2\text{CO}_3$  in moist acetone 40% of  $\beta$ -2,3,5,6-tetraacetylgalactose, and the latter, refluxed 6 hrs. with  $\text{Ag}_2\text{O}$  in EtI, yields 57% of the 2,3,5,6-tetraacetate, m. 50° (cor.),  $[\alpha]_D^{25}$  –50.5° ( $\text{CHCl}_3$ ,  $c$  0.96), of I, hydrolyzed by  $N/3$   $\text{Ba}(\text{OH})_2$  at 60° to I (71% yield), m. 86° (cor.),  $[\alpha]_D^{25}$  –97.2° (water,  $c$  0.98).

C. A. R.

**Keto-fructose pentaacetate.** M. L. Wolfrom and Alva Thompson. *J. Am. Chem. Soc.* 56, 880 2(1934). —In the prepn. of  $\beta$ -fructose pentaacetate (I) by the acetylation of  $\beta$ -fructose tetraacetate with  $\text{ZnCl}_2$  the 1st crystals are nearly pure " $\alpha$ "-form (II), but the mother liquor gives the  $\beta$ -form, m. 108°; in 1 expt., in which the quantity of  $\text{Ac}_2\text{O}$  was greatly decreased, I was the only form which crystd. I undoubtedly has a ring structure, which then must open on further acetylation in the presence of  $\text{ZnCl}_2$ . II and  $\text{Na}_2\text{SO}_4$ , added to  $\text{ZnCl}_2$  in EtSH and kept at 0° for 3–4 hrs., give *d*-fructose Et thioacetal pentaacetate (III), m. 83°,  $[\alpha]_D^{25}$  20° ( $\text{CHCl}_3$ ,  $c$  3.7 g. in 100 cc. soln.);  $\text{NH}_3$  in MeOH gives *d*-fructose Et thioacetal (IV), m. 65–7°,  $[\alpha]_D^{25}$  35.8° (MeOH,  $c$  4); it is sensitive to acid and decomposes over an acid drying agent. Reacetylation of IV gives III. III with  $\text{CdCO}_3$  and  $\text{HgCl}_2$  in MeCO gives II; this shows no mutarotation and does not react with  $\text{Ni}(\text{OH})_2$ ,  $\text{H}_2\text{NNHCONH}_2$  or  $\text{H}_2\text{NNHCSNH}_2$ ; the reaction products with  $\text{PhNHNH}_2$  and substituted hydrazines are sirups, which decompose readily. Aldehyde-glucose or -galactose pentaacetate with EtSH,  $\text{ZnCl}_2$  and  $\text{Na}_2\text{SO}_4$  readily yields the Et thioacetal pentaacetates. I and EtSH with  $\text{ZnCl}_2$  give  $\beta$ -Et thiofructoside tetraacetate, m. 96–8°,  $[\alpha]_D^{25}$  –151.9° ( $\text{CHCl}_3$ ,  $c$  3.7); MeOH- $\text{NH}_3$  gives  $\beta$ -Et thiofructoside, m. 140°,  $[\alpha]_D^{25}$  –232.9° (MeOH,  $c$  3.6) without mutarotation; it reduces Fehling soln. only after hydrolysis. Thioacetal formation can be used as a proof of open-chain structure in an acetate when a product contg. 2 EtS groups is obtained without loss of Ac groups. C. J. W.

**Reactions relating to carbohydrates and polysaccharides.** XLVI. Structure of the cellulose synthesized by the action of *Acetobacter xylinus* on fructose and glycerol. J. Barsha and H. Hilbert. *Can. J. Research* 10, 170–9 (1934); cf. *C. A.* 25, 3960. —Membranes synthesized by *Acetobacter xylinus* on fructose and on glycerol have been shown by the recognized methods of methylation, acetylation, acetolysis and hydrolysis to be chemically identical with cotton cellulose. This is confirmed by x-ray analysis. The x-ray investigation by Sisson and Clark (cf. *C. A.* 27, 5963) indicates the identity of the cellulose membranes from glucose, fructose, glycerol, sucrose, galactose and mannitol by the action of *A. xylinus* and thus supports the view that the same polysaccharide is synthesized by the organism whenever cell-wall formation (growth) occurs and that this polysaccharide is chemically identical with cotton cellulose.

R. B. Sandin

**Highly polymerized compounds.** LXXXIX. The polyoxymethylenes as a model of cellulose (remarks on the

work of K. Hess and co-workers). H. Staudinger. *Ber.* 67B, 475–9(1934); cf. *C. A.* 28, 2521<sup>4</sup>; Wadano, Trogus and Hess, *C. A.* 28, 2600<sup>5</sup>. —Polymers. XC (also Cellulose. XII). Cellopentaose acetate and the constitution of cellulose. H. Staudinger and E. O. Leupold. *Ibid.* 479–80; cf. *C. A.* 28, 1589<sup>6</sup>. —Mol.-wt. detns. by the viscosity method used by S. and Freudenberg (C. A. 27, 3071) indicate that Zechmeister and Tot's cellohexaose acetate (C. A. 25, 4119) is really cellopentaose acetate. To test further the validity of the viscosity laws on which the method is based, measurements were made on *heptaacetylcellobiose nonylate*, m. 116–18°, and the *stearate*, m. 130 2°, prepd. from acetobromocellobiose and the Ag salts of the acids; for the stearate the  $\eta_{sp.}$  (1.4%) value for a glucose residue agrees with that for a glucose residue in the pentaose acetate and the highly polymerized cellobiose acetates; the value found for the nonylate is somewhat higher than the calcd. value. That the Z. and T. cellohexaose acetate is really the pentaose compd. was further confirmed by mol.-wt. detns. (Rast) in camphor by the Pregl micro method, which was found to give the cor. values with  $\beta$ -glucose pentaacetate, cellobiose octaacetate, cellotriose acetate and cellotetraose acetate.

C. A. R.

**Mechanism of macropolymerization reactions.** Wm. Chalmers. *J. Am. Chem. Soc.* 56, 912 22(1934). —An investigation has been made of the "stepwise" mechanism of macropolymerization supported by several writers. On the fundamental assumption that the rates of the consecutive reactions are not greater than that of the dimerization, it has been shown that the dimer and other low polymers would be formed in largest proportion. On the basis, 1st, of the compn. and complexity of the polymer, and, 2nd, of the reaction course of the monomer, the stepwise scheme has been rejected, and a "polymerization-chain" mechanism adopted. The polymerization chain is made up of a primary activation of the monomer and a subsequent process of concatenation which is rendered possible by the presence of free terminal bonds on all intermediate stages. The linking of the monomeric units proceeds initially at a rate which is almost instantaneous compared with that of activation but for very great chain lengths becomes increasingly slow. The start and propagation of the chain have been studied from the viewpoint of energetics and of the phenomenon of neg. catalysis. It is suggested that in catalytic processes the "trigger" mol. is formed by union of the catalyst with only 1 unsatd. atom of the monomer, giving a half-addn. product with a free bond. C. J. W.

**Starch.** VI (preliminary communication). A ditosyl-acetyliodomethylglucoside from tritosylstarch. Kurt Hess and Otto Littmann. *Ber.* 67B, 465–6(1934); cf. *C. A.* 28, 1147<sup>7</sup>. —Cleavage of ditosylodostarch with HBr gives a product (I) which was provisionally assigned the structure of a 1- $\alpha$ -bromo-2,3-ditosyl-4-acetyl-6-iodoglucose, and tritosylstarch gives 1- $\alpha$ -bromo-2,3,6-tritosyl-4-acetylglucose (?) (II). By analogy and from the known structure of starch it was to be expected that the 2,3,6-tritosyl-4-acetyl- $\beta$ -methylglucoside (?) obtained from II would give with NaI a 2,3-ditosyl-4-acetyl-6-iodo- $\beta$ -methylglucoside (?) (III) identical with the  $\beta$ -Me hexoside (IV) obtained from I. As a matter of fact, III m. 129–30° and shows  $[\alpha]_D^{25}$  13.16° ( $\text{CHCl}_3$ ), –8.59° (acetone), –16.18° (benzene), while the corresponding consts. for IV are 162–3°, 10.62°, 4.81°, –17.74°. The nature of the isomerism between III and IV remains unexplained as yet.

C. A. R.

**Cyclopentadiene in products of pyrolysis of kerosene.** I. A. Volzhinskii and A. P. Shecheglova. *Sigret. Kauchuk* 1933, No. 4, 31–5. —A preliminary report on the investigation made to det. the diene hydrocarbon content of the high-boiling fraction obtained in the process of rectification of bivinyll; bivinyll was produced by pyrolysis of kerosene *in vacuo*. It was found that cyclopentadiene formed the greater part of the diene content of the 28–50° fraction; the total diene content of this fraction was 30–35% as detd. by  $\text{SO}_2$ . James Sorrel

**Jasmine perfumes. I. The constitution of jasmone.** L. Ruzicka and M. Pfeiffer. *Helv. Chim. Acta* 16, 1208-14 (1933).—The structure of *jasmone* (I) is concluded to be  $\text{EtCH:CHCH}_2\text{C:CMc}_2\text{CH}_2\text{CH}_2\text{CO}$ . I

was isolated from that portion of jasmine oils  $b_{12} > 100^\circ$  as its *semicarbazone*, m.  $209.5-10^\circ$  (from alc.), which, when treated in water suspension with phthalic anhydride, gave I,  $b_{12}$   $134-5^\circ$ ,  $[\alpha]_D^{20}$   $0^\circ$ ,  $d_4^{20}$   $0.9437$ ,  $n_D^{20}$   $1.4979$ . I with  $\text{O}_3$  in cold  $\text{CCl}_4$  gave an amorphous *osonide* which when decompd. at  $100^\circ$  gave products among which  $\text{EtCHO}$ ,  $\text{EtCO}_2\text{H}$ ,  $\text{AcOH}$ , malonic and levulinic acids were detected. Among the oxidation products obtained from treating an aq. suspension of I with  $\text{KMnO}_4$  were propionic, levulinic, malonic and succinic acids. I was not reduced by  $\text{Zr}$  and alc.  $\text{NaOH}$ , but was reduced catalytically to *dihydrojasmone* (3-methyl-2-pentylcyclopenten-1-one),  $b_{12}$   $120^\circ$ ; *semicarbazone*,  $175-6^\circ$ ; *p-nitrophenylhydrazone*, m.  $111^\circ$  (from dil.  $\text{MeOH}$ ). The reduction of I with Adams Pt oxide catalyst gave *tetrahydrojasmone*; *semicarbazone*, m.  $156-7^\circ$ . T. H. Ryder

**The stereoisomers of 1-methyl-2-propylcyclopentane.** Gregoire Chierdoglu. *Bull. Soc. chim. Belg.* 43, 35-48 (1934).—Na and di-Et adipate give the Na deriv. of Et cyclopentanecarboxylate which with  $\text{PrI}$  gives 85% of Et  $\alpha$ -propylcyclopentanecarboxylate, m.  $-37.6^\circ$ ,  $b_{12}$   $126.0-6.2^\circ$ ,  $b_{14}$   $127.5-7.7^\circ$ ,  $d_4^{20}$   $1.0309$ ,  $d_4^{25}$   $1.0136$ ,  $n_D^{20}$   $1.4482$ ,  $n_D^{25}$   $1.4500$ ,  $n_{\text{He}}$  yellow  $1.4507$ ,  $n_{\text{He}}$   $1.4564$ ,  $n_D^{20}$   $1.4611$ , at  $20^\circ$  *semicarbazone*, m.  $160.2^\circ$ . Its hydrolysis yields 85% of  $\alpha$ -propylcyclopentanone, m.  $68.25^\circ$ ,  $b_{12}$   $183.10-3.20^\circ$ ,  $b_{14}$   $59.4^\circ$ ,  $b_{16}$   $62.8^\circ$ ,  $b_{18}$   $70.2^\circ$ ,  $d_4^{20}$   $0.9183$ ,  $d_4^{25}$   $0.9127$ ,  $d_4^{30}$   $0.9017$ ,  $n_D^{20}$   $1.4406$ ,  $n_D^{25}$   $1.4429$ ,  $n_{\text{He}}$  yellow  $1.4430$ ,  $n_{\text{He}}$   $1.4487$ ,  $n_D^{20}$   $1.4532$  at  $20^\circ$ . This ketone and  $\text{MeMgI}$  give 90% of 1-methyl-2-propyl-1-cyclopentanol, which can be sep'd. into a *trans*-isomer,  $b_{12}$   $84.5-5.0^\circ$ ,  $d_4^{20}$   $0.9141$ ,  $d_4^{25}$   $0.8976$ ,  $n_D^{20}$   $1.4530$ ,  $n_D^{25}$   $1.4553$ ,  $n_{\text{He}}$  yellow  $1.4554$ ,  $n_{\text{He}}$   $1.4610$ ,  $n_D^{20}$   $1.4656$  at  $20^\circ$ , viscosities  $\eta$   $0.15126$  at  $15^\circ$  and  $0.06449$  at  $30^\circ$ , and a *cis*-isomer,  $b_{12}$   $91.5-2.0^\circ$ ,  $d_4^{20}$   $0.9161$ ,  $d_4^{25}$   $0.9010$ ,  $n_D^{20}$   $1.4549$ ,  $n_D^{25}$   $1.4572$ ,  $n_{\text{He}}$  yellow  $1.4573$ ,  $n_{\text{He}}$   $1.4628$ ,  $n_D^{20}$   $1.4673$ , viscosities  $\eta$   $0.20509$  at  $15^\circ$  and  $0.09504$  at  $30^\circ$ . Dehydration of either alc. yields (90%) the same 1-methyl-2-propylcyclopentene, m.  $130^\circ$  (approx.),  $b_{12}$   $150.15$   $0.25^\circ$ ,  $d_4^{20}$   $0.8223$ ,  $d_4^{25}$   $0.8059$ ,  $n_D^{20}$   $1.4408$ ,  $n_D^{25}$   $1.4497$ ,  $n_{\text{He}}$  yellow  $1.4498$ ,  $n_{\text{He}}$   $1.4566$ ,  $n_D^{20}$   $1.4623$  at  $20^\circ$ . Hydrogenation over Pt black gave quantitatively 1-methyl-2-propylcyclopentane, which is sep'd. by fractional distn. into 2 *stereoisomers*, A, becoming a glass at about  $-123^\circ$ ,  $b_{12}$   $116.37-6.38^\circ$ ,  $d_4^{20}$   $0.79328$ ,  $d_4^{25}$   $0.77743$ ,  $n_D^{20}$  at  $20^\circ$ , for the lines  $6678$ ,  $6563$ ,  $5893$ ,  $5876$ ,  $461$ ,  $5016$ ,  $4861$ ,  $4358$  and  $4341$  A.  $1.42496$ ,  $1.42526$ ,  $1.42740$ ,  $1.42750$ ,  $1.42927$ ,  $1.43173$ ,  $1.43279$ ,  $1.43682$  and  $1.43705$ , resp., viscosities  $\eta = 0.0075$  at  $15^\circ$  and  $0.00622$  at  $30^\circ$ , crit. soln. temp. in aniline  $58.0^\circ$ ; and B, m.  $104.9^\circ$ ,  $b_{12}$   $152.58^\circ$ ,  $d_4^{20}$   $0.80783$ ,  $d_4^{25}$   $0.79212$ ,  $n_D^{20}$  at  $20^\circ$  for the above mentioned lines  $1.42471$ ,  $1.43211$ ,  $1.43432$ ,  $1.43442$ ,  $1.43616$ ,  $1.43858$ ,  $1.43962$ ,  $1.44377$ , and  $1.44395$ , resp., viscosities  $\eta$   $0.00941$  and  $0.00753$  at  $15^\circ$  and  $30^\circ$ ,  $n_D^{20}$ , crit. soln. temp. in aniline  $52.5^\circ$ . A. L. Henne

**Constitution of the polymers of cyclopentadiene.** Remarks on the communication under the same title by J. Pirsich. —Kurt Alder and Gerhard Stein. *Ber.* 67B, 115 (1934); cf. Pirsich, *C. A.* 28, 2335.—Detns. of the mol. m.-p. depression do not suffice for the soln. of problems of structure and configuration in the series of polymeric homologs of cyclopentadiene. C. A. R.

**Physical-chemical properties of styrene.** A. P. Aleksandrov. *J. Tech. Phys.* (U. S. S. R.) 3, 823-30 (1933). The cond. of styrene as a function of temp. was found to be  $\sigma = \gamma e^{-b/T}$ , for which  $b = 27,000$  in the temp. interval of  $74^\circ$ , and the viscosity  $\eta = \eta_0 e^{b_1/T}$ . Coeff.  $b$  is greater than  $b_1$ . Impurities do not alter the shape of the curve but merely move its position. At temps. where polymerization begins to bear an influence, the former equations do not hold and the viscosity increases while the cond. decreases. The cond. at  $35^\circ$  was  $2.5 \times 10^{-10}$  ohm/cm. In polystyrene a marked polarization is observed.

Riio Hanninen

**The synthesis of glycols and certain of their derivatives. Synthesis of divinylbenzenes, dipropenylbenzenes and diethynylbenzenes.** René Deluchat. *Ann. chim.* [11], 1, 181 255 (1934).—A résumé of previous work done by D. and others on the glycols and their derivs. is given. Some new compds. are also reported. 1,2-[ $\text{PhCH}(\text{OH})_2$ ] $_2\text{C}_6\text{H}_4$ , treated with  $\text{H}_2\text{SO}_4$ , yielded diphenylphthalane, m.  $93^\circ$ , contrary to Nelken and Simonis' report of this substance (cf. *C. A.* 2, 1960) as a heavy oil  $b_{12}$   $240^\circ$ . The following dibromohydrins were prep'd. by the method given in *C. A.* 25, 4532-3: 1,2-( $\text{EtCHBr}$ ) $_2\text{C}_6\text{H}_4$  (I) m.  $40^\circ$ ; 1,3-( $\text{MeCHBr}$ ) $_2\text{C}_6\text{H}_4$  (II),  $b_{12}$   $131^\circ$ ,  $d_4^{20}$   $1.567$ ,  $n_D^{20}$   $1.5914$ ; 1,4-( $\text{EtCHBr}$ ) $_2\text{C}_6\text{H}_4$ , m.  $70^\circ$ . Distn. of I under 5 mm. gave *o*-divinylbenzene and 1- $\alpha$ -bromoethyl-2-vinylbenzene,  $b_{12}$   $87.5^\circ$ ,  $b_{14}$   $115^\circ$ ,  $d_4^{20}$   $1.312$ ,  $n_D^{20}$   $1.5872$ , M. R. 54.05 (theory 52.32). II treated as I and fractionated yielded 2 fractions: the 1st,  $b_{12}$   $52^\circ$ , was *m*-divinylbenzene and the 2nd was 1- $\alpha$ -bromoethyl-3-vinylbenzene,  $b_{12}$   $86.5^\circ$ ,  $d_4^{20}$   $1.319$ ,  $n_D^{20}$   $1.5905$ , M. R. 54.02 (theory 52.32). When 1,2-[ $\text{EtCH}(\text{OH})_2$ ] $_2\text{C}_6\text{H}_4$  (III) was dist'd. with a large excess of quinoline as in *C. A.* 25, 4532, it yielded 2 fractions: the 1st  $b_{12}$   $108.0-8.5^\circ$ ,  $d_4^{20}$   $0.9185$ ,  $n_D^{20}$   $1.5760$ , M. R. 56.93; the 2nd  $b_{12}$   $108.5$   $9.0^\circ$ ,  $d_4^{20}$   $0.9263$ ,  $n_D^{20}$   $1.5732$ , M. R. 56.42 (theory 53.08). The 2 fractions m.  $-26^\circ$  and were apparently both *o*-dipropenylbenzene (IV). The *tetra-Br* deriv. of IV m.  $80^\circ$ . IV, on being exposed to the air for 1 month, gave the aldehyde. Its *semicarbazone* m.  $205^\circ$ . 1,3-[ $\text{EtCH}(\text{OH})_2$ ] $_2\text{C}_6\text{H}_4$  treated as III gave *m*-dipropenylbenzene (V),  $b_{12}$   $117$   $20^\circ$ ,  $d_4^{20}$   $0.9231$ ,  $n_D^{20}$   $1.5780$ , M. R. 56.80 (theory 53.08). The *tetra-Br* deriv. m.  $98$   $9^\circ$ . The *tetra-Br* deriv. of 1,4-( $\text{MeCH:CH}$ ) $_2\text{C}_6\text{H}_4$  m.  $187^\circ$ , contrary to Quelet's value of  $168$   $9^\circ$  (cf. *C. A.* 23, 3908). V, on exposure to air, gave the aldehyde  $b_{12}$   $97^\circ$ . W. A. M.

**Addition of methyl hypochlorite to phenylacetylene.** Ernest L. Jackson. *J. Am. Chem. Soc.* 56, 977-8 (1934).— $\text{PhC}\equiv\text{CH}$  and  $\text{Cl}$  in  $\text{MeOH}$  at room temp. give 70% of 1-phenyl-1,1-dimethoxy-2,2-dichloroethane (I), m.  $66$   $6.5^\circ$ ; this is evidently formed by the addn. of 2 mols.  $\text{MeOCl}$  to the triple bond. Its structure was established by hydrolysis with hot  $0.4$   $N$   $\text{HCl}$  to  $\omega,\omega$ -dichloroacetophenone,  $b_{12}$   $131-2^\circ$ . I is stable to  $\text{KOH}$  in  $\text{MeOH}$ . C. J. West

**Acetyl derivatives of diphenylthiosemicarbazide.** M. Busch and W. Renner. *Ber.* 67B, 384-7 (1934).—Some of the results reported by McKee (*C. A.* 9, 3223) do not agree with those given by Busch and Schneider in a paper (*J. prakt. Chem.* [2], 67, 201) of which McK. was apparently unaware, and the work has accordingly been repeated. His compd.  $\text{PhNHCSNHNHPh}$ , obtained from  $\text{PhNHCSNHNHPh}$  and  $\text{AcCl}$ , is undoubtedly identical with the product obtained in the same way by B. and S. and which has the structure  $\text{PhN.CMeCl.S.C}(\text{NHPh})_2$  (I). In the hydrolysis

of I there is formed, in addn. to McK.'s  $\text{PhNHCSNHNHPhAc}$  (II), m.  $160^\circ$ , depending on the concn. of the aq. soln. and the length of heating, an isomer (believed to be the carbinol base corresponding to I) which m.  $173^\circ$  (foaming) and is converted into II by repeated crystn. from boiling alc. or by boiling for some time in dil. alc. soln.; with  $\text{HCl}$  in alc. it gives I. II likewise gives I with alc.  $\text{HCl}$ . McK.'s "anhydride" of II, m.  $233-4^\circ$ , resolidifies and m. again  $265^\circ$ , is B. and S.'s 5-methyl-1,4-diphenyl-3,5-endothiotriazole (III); they had reported it as m.  $253^\circ$  but it has now been found that when freshly prep'd. it m. transiently  $233^\circ$ , then  $255-6^\circ$ . The lower m. p. is due to a labile form which is reformed when the higher-melting form is repeatedly recrystd. from or boiled  $0.5$  hr. in  $\text{MeOH}$ . In the acetylation of  $\text{PhNHCSNHNHPh}$  to  $\text{PhNHCSNHNHAc}$  (IV), m.  $133^\circ$ , with  $\text{Ac}_2\text{O}$  there is also formed  $\text{PhNHCSNHNHPh}$  (by rearrangement of the  $\text{PhNHCSNHNHPh}$ ) and finally III; that IV is formed from I with boiling alc.  $\text{KOH}$  could not be confirmed. McK.'s 2nd  $\text{Ac}$  deriv.,  $\text{PhNAcCSNHNHPh}$  (V), m.  $161-2^\circ$ , obtained from  $\text{PhNHCSNHNHPh}$ , has really the compn.  $\text{C}_{16}\text{H}_{12}\text{N}_4\text{S}$  and is the anhydride,  $\text{PhN:C.NPh.N:CMe}_2$ , of IV.

C. A. R.



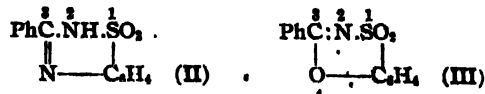
**Diarylsulfonylhydrazine series. III.** The oxidation of acetylhydrazobenzene. Frank O. Ritter. *J. Am. Chem. Soc.* 56, 975-6 (1934); cf. *C. A.* 25, 1227.—The oxidation of acetylhydrazobenzene with  $\text{Na}_2\text{Cr}_2\text{O}_7$  in AcOH gives *p*-benzenesulfonyl diphenylhydrazine (I), dark red with bronze luster, m. 163° (cor.). Reduction of I with EtOH-KOH gives 65% of *p*-PhNHC<sub>6</sub>H<sub>4</sub>N:Ph; reduction with Zn and AcOH gives *p*-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>NHPh, *p*-H<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>OH and PhNH<sub>2</sub>; titration with SnCl<sub>4</sub> requires 8 equivs. of H<sub>2</sub>. Reduction of Ph<sub>2</sub>NNH<sub>2</sub> with EtOH-KOH gives Ph<sub>2</sub>NH and NH<sub>3</sub>. It is suggested that an analogous bimol. compd. may be an intermediate in the semidine rearrangement of hydrazo compds. C. J. West

**Dissociation constants of the chlorophenyl- and phenetylboric acids.** G. E. K. Branch, David L. Yabroff and Bernard Bettman. *J. Am. Chem. Soc.* 56, 937-41 (1934).—The following values are reported for the mean  $K_a \times 10^{10}$  in 25% EtOH (except for the 1st 2, which are in H<sub>2</sub>O): boric 6.53, Ph deriv. 13.7; boric 1.34, Ph deriv. 1.97; *o*-chlorophenyl deriv. 14, *m*-isomer 14.5, *p*-isomer 6.23; *m*-phenetyl deriv., m. 130° (cor.), 3.05 (the anhydride m. 152-3° (cor.)), *o*-isomer 0.910, *p*-isomer 0.608; *o*-ClC<sub>6</sub>H<sub>4</sub>OII 7.97, *m*-isomer 3.30, *p*-isomer 1.46. These results are compared and discussed on the basis of the negativities and resonances of the groups involved. The relative importance of the alkoxyl type of resonance to the negativity factor is greater with alkoxyl than with Cl compds. and is greater in phenylboric acid derivs. than in phenols. A simplified *B* analysis is given. C. J. West

**Catalytic reduction of arylsulfonyl chlorides with palladium.** P. de Smet. *Natuurw. Tijdschrift* 15, 215-26 (1933).—A horizontal tubular glass reaction vessel, 25 × 4 cm., was used with a vertical side tube 10 cm. high provided with ground-glass connection to the gasometer and a magnetic trap to introduce the reagent. The vessel contained 50 cc. Me<sub>2</sub>CO (10% H<sub>2</sub>O) + 0.1 g. Pd (2.5 cc. PdCl<sub>2</sub> soln. + traces of ignited Pd); 2-2.5 g. of the sulfonyl chloride was added after closing, evacuation, H<sub>2</sub> filling of the app. and reduction of the PdCl<sub>2</sub>. The app. was shaken continuously. The course of the rapid reaction was followed by the vol. contraction; from the 2nd min. on the H<sub>2</sub> consumption was const. until 1 mol. H<sub>2</sub> had been absorbed, during this period the reaction rate is of zero order. The reaction product, sulfinic acid, was protected by immediate neutralization with 5% Na<sub>2</sub>CO<sub>3</sub> soln., evapn. and extn. with EtOH. After the initial rapid reaction a continued slow absorption of H<sub>2</sub> was observed for several days up to 1.5 to 1.8 mols. H<sub>2</sub> per mole chloride; the resulting substance pptd. from Me<sub>2</sub>CO by H<sub>2</sub>O addn. is diaryl disulfide; max. yield 50%. Even at 50 atm. pressure the final reduction product, mercaptan, could not be obtained from *p*-BrC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>Cl. Individual characteristics: for *p*-BrC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>Cl, H<sub>2</sub> consumption 12 cc. per min., sulfinic acid m. 130°, variable, and after 10 days (p-BrC<sub>6</sub>H<sub>4</sub>S)<sub>2</sub> (m. 93.5-94°). For *p*-ClC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>Cl, 10-11 cc. H<sub>2</sub> per min., sulfinic acid m. 97-8° (after 1 hr. in air 95°), after 14 days with 1.8 mols. H<sub>2</sub> used, *p,p'*-disulfide, m. 71-1.5°. For PhSO<sub>2</sub>Cl, 8 cc. H<sub>2</sub> per min., sulfinic acid m. 83°, after 10 days 1.7 mols. H<sub>2</sub> absorbed, disulfide m. 60-12°. For C<sub>6</sub>H<sub>5</sub>SO<sub>2</sub>Cl, 16 cc. H<sub>2</sub> per min., sulfinic acid m. p. variable, max. 105.5-6°, after 10 days 1.5 mols. H<sub>2</sub> used, *β,β'*-disulfide, m. 139°. For *m*-C<sub>6</sub>H<sub>4</sub>(SO<sub>2</sub>Cl)<sub>2</sub>, the H<sub>2</sub> absorption is somewhat faster than for PhSO<sub>2</sub>Cl, total amt. 10% below theory; the free disulfinic acid could not be isolated. For 1,3,5-C<sub>6</sub>H<sub>3</sub>(SO<sub>2</sub>Cl)<sub>3</sub>, an irregular reduction is observed, 2/3 of the calcd. H<sub>2</sub> is used, sulfite seems to be formed. B. J. C. van der Hoeven

**Preparation of *N*-benzoyl-*o*-aminobenzenesulfonamide. Condensation to heterocyclic compounds.** E. Werthmann. *J. Am. Chem. Soc.* 56, 971-3 (1934).—*o*-O<sub>2</sub>NC<sub>6</sub>H<sub>4</sub>SO<sub>2</sub>NH<sub>2</sub> and BzCl at 175-80° for 30 min. give *N*-benzoyl-*o*-nitrobenzenesulfonamide, m. 197.5-8°; reduction with FeSO<sub>4</sub> and NH<sub>4</sub>OH gives the *o*-NH<sub>2</sub> deriv. (I), m. 198-8.5°. I in EtOH, satd. with HCl and warmed until the ppt. dissolves, gives 3-phenyl-1,2,4-isobenzothiadiazine 1-dioxide (II), m. 302-3°; this also results by heating I at 210°. The diazo soln. from I added to HCl gives 3-phenyl-1,4,2-benzothioxazine 1-dioxide (III), m. 176-7°, when the light

yellow ppt. is heated in kerosene at 75-110°, in H<sub>2</sub>O or on allowing it to stand over H<sub>2</sub>SO<sub>4</sub> or H<sub>2</sub>O for some weeks; when I is diazotized in AcOH-AcCl with HCl and AmNO<sub>2</sub>, the diazonium chloride is pptd. as a white flocculent powder by Et<sub>2</sub>O; H<sub>2</sub>O gives the yellow cryst. compd. of the aq. diazotization; heating the AcOH soln. gives III. III dissolves almost completely in NaOH in about 40 hrs., acidification gives *o*-benzoxybenzenesulfonamide, m. 178-80°. Heating III in HCl gives BzOH.



C. J. West

**The Friedel-Crafts synthesis of *p*-iodoacetophenone, and *p*-iodo-*o*-bromoacetophenone.** Wasaburo Kinnura. *Ber.* 67B, 394-5 (1934).—In the prepn. of *p*-IC<sub>6</sub>H<sub>4</sub>COMe (I) according to Judefind and Reid (*C. A.* 14, 1832), who added AcCl slowly to a soln. of PhI and AlCl<sub>3</sub>, the yield is very small because of the abundant formation of a dark red oil; the more slowly the AcCl is added, the smaller is the yield of I. This is probably due to the splitting off of I as a result of secondary reactions between the excess of AlCl<sub>3</sub> and the I-contg. components of the reaction mixt. By mixing the 3 reagents beforehand in equimol. proportions in CS<sub>2</sub>, then cautiously heating to boiling and continuing the boiling until the evolution of HCl is still just barely perceptible (30-40 min.) the yield of I, m. 85° after crystn. from alc., is increased to 80-95%. The PhI is best prepd. (510 g., b.p. 75°) from I (381 g.) and benzene (400 g.) with HNO<sub>3</sub> (d. 1.50) at 60° (Dains and Brewster, *C. A.* 23, 2157). *p*-IC<sub>6</sub>H<sub>4</sub>COCH<sub>2</sub>Br, m. 118°, is obtained in 26 g. yield from I and Br in AcOH (J. and R.).

Q. A. R.

**Side-chain reactions of benzene derivatives.** W. S. Nathan and H. B. Watson. *Nature* 133, 379-80 (1934). The equation given for the energies of activation of *p*-substituted acetophenones (*C. A.* 28, 24<sup>a</sup>) is valid for *m*-substituted compds. except when the substituent is a halogen. Julius White

**Reactions of certain  $\gamma$ -ketonic acids. II. Hydroxyl derivatives.** E. P. Kohler and Louis Leers. *J. Am. Chem. Soc.* 56, 981-2 (1934); cf. *C. A.* 28, 2700<sup>a</sup>. PhCH:CHCOCH<sub>2</sub>CH<sub>2</sub>OMe with KCN in EtOH-AcOH gave 60% of PhCH(CN)CH<sub>2</sub>COCH<sub>2</sub>CH<sub>2</sub>OMe, m. 68°; the corresponding acid m. 141° (*Me* ester, m. 97°); PhCH(CO<sub>2</sub>H)CHBrCOCH<sub>2</sub>CH<sub>2</sub>OMe, m. 158°; PhCH(CO<sub>2</sub>H)(CH(OH)COCH<sub>2</sub>CH<sub>2</sub>OMe) (I), m. 159°. I in 1% aq. NaOH, allowed to stand 1 day, gives  $\alpha$ -phenyl- $\gamma$ -hydroxy- $\beta$ -keto- $\gamma$ -(*p*-methoxyphenyl)propane (II), m. 115°; this is obtained more easily by dissolving the Br acid in 2 equivs. of cold dil. NaOH; it was also synthesized from the cyanohydrin of anisaldehyde and PhCH<sub>2</sub>MgCl. Heating 6 g. II in 30 cc. 2% NaOH on the steam bath gives  $\alpha$ -phenyl- $\beta$ -hydroxy- $\gamma$ -keto- $\gamma$ -(*p*-methoxyphenyl)propane, m. 62°; the oxime was sepd. into 2 isomers, m. 135° and 118°. *p*-MeOC<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>MgCl and C<sub>6</sub>H<sub>5</sub>CH(OH)CN give  $\alpha$ -phenyl- $\alpha$ -hydroxy- $\beta$ -keto- $\gamma$ -(*p*-methoxyphenyl)propane, m. 126°, which is not affected by prolonged boiling with 2% aq. NaOH. The results establish the mechanism proposed in the earlier paper. C. J. West

**The isomeric oximes of ethylvanillin.** Raymond M. Hann. *J. Wash. Acad. Sci.* 24, 126-8 (1934).—Ethyl vanillin (I) and NH<sub>2</sub>OH in the presence of NaHCO<sub>3</sub> gave the anti-oxime, m. 102° (oxime acetate, m. 99°). This was dissolved in dry ether and the HCl salt pptd. by passage of HCl. On pouring into Na<sub>2</sub>CO<sub>3</sub> soln. the syn-oxime of I, m. 98°, was pptd., which, warmed with AcOH for 10 min., gave the nitrite, m. 102°. This on alk. hydrolysis gave 3-methoxy-4-ethoxybenzoic acid, m. 193-4.

R. C. Elderfield

**3,4-Dimethoxy-5-chlorobenzylidenediamides.** Raymond M. Hann. *J. Wash. Acad. Sci.* 24, 124-6 (1934). The aldehyde amide condensation reaction has been extended to include a solid aromatic aldehyde with various aliphatic amides. 5-Chlorovanillin and Me<sub>2</sub>SO<sub>2</sub> gave a quant. yield of 3,4-dimethoxy-5-chlorobenzaldehyde, m.



57°. This was condensed with amides by heating with 2 mols. of the amide and 1 cc. of AcOH at 140° for 15 hrs. *Diacetamide compd.*, m. 244–5°; *dipropionamide*, m. 235°; *diisobutyramide*, m. 204–5°; *diisopropionamide*, m. 172–3°; *di-n-butylamide*, m. 217°.

R. C. Elderfield  
Validity of Fremberg's displacement rule. Philip G. Stevens. *J. Am. Chem. Soc.* 56, 997–8 (1934); cf. Levene and Meyer, *C. A.* 28, 1661<sup>5</sup>.—Repetition of the work of L. and M. on *p*-nitrophenyl methylpropylpropionate gives a value of  $[M]_D^{25}$  —5.4°, thus proving that the shift in rotation, as evidenced by the change in sign on passing from the Et to the *p*-nitrophenyl ester, is in complete accord with the displacement rule. *l*-β-Methyl-β-propylpropionic acid,  $b_p$  109–9.5°,  $[M]_D^{25}$  2.19°,  $d_4^{25}$  0.9111,  $n_D^{25}$  1.4190; through the acid chloride this yields the *d*-*p*-nitrophenyl ester, purified by repeated distn.,  $b_p$  124–6°,  $d_4^{25}$  1.1121,  $n_D^{25}$  1.5113,  $[M]_D^{25}$  5.4°.

C. J. West  
Interaction of the acid chlorides of 2-benzoylbenzoic acid with phenols. I. Aryl esters and phenylaryloxyphthalides. F. F. Blicke and R. D. Swisher. *J. Am. Chem. Soc.* 56, 902–4 (1934).—The interaction of 2-BzC<sub>6</sub>H<sub>4</sub>COCl with the K derivs. of various phenols, with the phenols alone and with phenols in C<sub>6</sub>H<sub>5</sub>N gives, in general, 3 isomeric compds., 2 of which are presumably the aryl ester of BzC<sub>6</sub>H<sub>4</sub>CO<sub>2</sub>H and the phenylaryloxyphthalide, resp., and the hydroxydiaryloxyphthalide. The first 2 cannot be differentiated by chem. means; when heated with AlCl<sub>3</sub> or mixed with concd. H<sub>2</sub>SO<sub>4</sub>, both yielded the 3rd compd. PhOH gives compds. m. 80–2° and 162–3°; 4-BrC<sub>6</sub>H<sub>4</sub>OH, m. 92–4° and 170–2°; PhSH, m. 112–3° and 117–8°; *o*-xenol, 103–5° and 195–7°; *p*-xenol, 117–9° and 163–5°; *α*-C<sub>10</sub>H<sub>7</sub>OH, 102–4°; β-C<sub>10</sub>H<sub>7</sub>OH, 103–5° and 198–9°. II. Diaryloxyphthalides. *Ibid.* 923–5.—2-BzC<sub>6</sub>H<sub>4</sub>COCl (I) reacts readily at room temp. with a variety of phenols and aryl Me ethers to yield diaryloxyphthalides; in a few instances it is necessary to add AlCl<sub>3</sub> to the reaction mixt. I and PhOH give 4'-hydroxydiphenylphthalide, m. 168–70°; PhOMe gives the 4'-MeO deriv., m. 110–5°; reduced by Zn and NaOH to 4'-methoxytriphenylmethane-2-carboxylic acid, m. 146–7°; 4-BrC<sub>6</sub>H<sub>4</sub>OH gives 2'-hydroxy-4'-bromodiphenylphthalide, m. 210–11°, reduced to 2'-hydroxytriphenylmethane-2-carboxylic acid, m. 194–6° (Me ether, m. 191–3°); 2,6-Br<sub>2</sub>C<sub>6</sub>H<sub>3</sub>OH gives 4'-hydroxy-3',5'-dibromodiphenylphthalide, m. 199–200°; *o*-xenol gives phenyl-*o*-hydroxyphenylphthalide, m. 178–80° (Me ether, m. 152–4°); *p*-HO isomer, m. 220–2° (Me ether, m. 179–80°); *α*-C<sub>10</sub>H<sub>7</sub>OH gives phenyl-*α*-hydroxyphenylphthalide, m. 231–3° (Me ether, m. 206–7°); *p*-HO isomer, m. 234–5° (Me ether, m. 210–12°); 2-(4-HOC<sub>6</sub>H<sub>4</sub>-CO)C<sub>6</sub>H<sub>4</sub>COCl and PhOH give 4',4'-dihydroxydiphenylphthalide, m. 253–6°, while PhOMe gives the 4'-Me ether, m. 139–42°; 2-(4-MeOC<sub>6</sub>H<sub>4</sub>-CO)C<sub>6</sub>H<sub>4</sub>COCl and PhOH give the same Me ether, while PhOMe gives 4',4'-dimethoxydiphenylphthalide, m. 97–9°. 2-(4'-Methoxybenzoyl)benzophenone, by oxidation of the methane with HNO<sub>3</sub>, m. 133–5°; N<sub>2</sub>H<sub>4</sub> in AcOH gives a diazine, C<sub>21</sub>H<sub>18</sub>O<sub>2</sub>, m. 157–9°.

C. J. West  
Ramalic acid. Georg Koller, Erich Krakauer and Karl Pöpl. *Monatsh.* 64, 3–5 (1934).—*Ramalina farinacea* gives a small yield of ramalic acid, C<sub>11</sub>H<sub>8</sub>O<sub>6</sub>; boiling with 10% NaOH 38 hrs. gives the EtO deriv., C<sub>20</sub>H<sub>14</sub>O<sub>6</sub>, which yields with Me<sub>2</sub>SO<sub>4</sub> the Me ester of the di-Me ether of cetraric acid, m. 151°. Ramalic acid is therefore identical with protocetraric acid.

C. J. West  
Capraric acid. Georg Koller and Karl Pöpl. *Monatsh.* 64, 1–2 (1934).—Methylation of the reaction product of capraric acid and EtOH gives the Me ester of the di-Me ether of cetraric acid, m. 151°. Capraric acid differs from cetraric acid only in that the hydroxylactone ring is intact.

C. J. West  
Lichen substances. XXXIII. Enzymic cleavage of lichen depsides and related compounds. Yasuhiko Asahina and Takeo Higuti. *Ber.* 66B, 1959–64 (1933); cf. *C. A.* 28, 1032<sup>2</sup>; Koller and Pfeiffer, *C. A.* 28, 3092<sup>2</sup>. The tannase from *Aspergillus niger* and the enzyme from *A. oryzae* break down most lichen depsides into phenol-

carboxylic acids. Especially well adapted for this purpose is a taka-diastase specially prepd. by Sakyo and Co., Tokyo. The  $pH$  of the aq. soln. of the alkali salt of the depside and the diastase is adjusted to 7.0–8.5 and the soln. is allowed to stand at 37°; when cleavage sets in, the soln. becomes turbid and the  $pH$  falls appreciably. The ppt. generally consists of the phenolcarboxylic acid split off and unchanged depside set free by the acid. The  $pH$  of the soln. is again adjusted to the original value, more diastase is added and the process is repeated until further addn. of the enzyme produces no appreciable change. Acidification and extn. with ether now yields a mixt. of acids and unchanged depside which can be sep'd. without special difficulty, since the depside is in general much more difficultly sol. than the phenolcarboxylic acids. The sepn. of the latter from each other is not so easy, however, but as their esters are much more difficultly hydrolyzed by the diastase than the depsides, the diastase can be allowed to react on the Me ester of the depside rather than on the depside itself; the product then consists of an acid and an ester, which can readily be sep'd. from each other. Lecanoric, gyrophoric, evernic, olivetoric, sekikic, divaricatic and squamatic acids, atranorin, salicylsalicylic acid and the tannin from Chinese gall nuts can readily be broken down in this way; difractic, benzoylsalicylic and *p*-(*p*-hydroxybenzoyl)benzoic acids and the Me esters of gallic and salicylic acids are hydrolyzed with somewhat greater difficulty. Apparently those depsides which contain a free HO group in the *o*- or *m*-position to the carboxyl group involved in the depside union are more easily broken down by taka-diastase. XXXIV. Constitution of alectoronic and  $\alpha$ -collatolic acid. Yasuhiko Asahina and Fukujiro Fujikawa. *Ibid.* 67B, 103–8 (1934).—In the fusion of alectoronic acid (I) with KOH there had been obtained, in addn. to 31% caproic acid, orcinol, *sym*-xylenol and *sym*-cresotic acid; and  $\alpha$ -collatolic acid (II), a Me ether of I, had been found to give olivetonic Me ether with KMnO<sub>4</sub>. On the basis of these results II had been formulated as a C<sub>12</sub>H<sub>12</sub> deriv. (*C. A.* 27, 3461). It has now been found, however, that the xylenol and cresotic acid are either produced from an impurity or result from a secondary reaction during the fusion and that the structure assigned to II must be discarded. On heating with concd. aq. KOH, the di-Me ether Me ester, m. 114°, of II splits off 2 mols. caproic acid and the CO<sub>2</sub>H group is also involved. To remove the latter completely, the product must also be boiled with HCO<sub>2</sub>H. There is thus obtained an ether of a trihydric phenol, *aleclol tri-Me ether*, C<sub>21</sub>H<sub>20</sub>O<sub>4</sub> (III), m. 96°, gives no color with FeCl<sub>3</sub> or bleaching powder, dissolves in hot concd. H<sub>2</sub>SO<sub>4</sub> with grass-green color and depresses the m. p. of desoxyhyposalazolin (m. 95°) to 75°, mol. wt. in camphor 296. *Di-Cl deriv.*, from III and PCl<sub>5</sub> in PhNO<sub>2</sub> at 160°, m. 125°. *Tri-Cl deriv.*, from III and PCl<sub>5</sub> in CHCl<sub>3</sub> at 100°, m. 185–8°. *Tri-Br deriv.*, from III and Br in a little AcOH at room temp., m. 179°. With HI (d. 1.7) and PhOH at 150°, III yields orcinol; on fusion with KOH (because of its insol. in fused KOH, the III must previously be partially demethylated with III) it gives  $\alpha$ -resorcylic acid and orcinol. Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>-AcOH or 50% HNO<sub>3</sub> in AcOH oxidizes III to 6-methoxy-2-methyl-1,4-benzoquinone, yellow, m. 151°, which was synthesized from orcinol mono-Me ether through the nitroso and amino derivs. (Henrich and Nachtigall, *Ber.* 36, 894 (1903)), and from orcinol di-Me ether with Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>-AcOH. As further degradation of III, which was apparently a Ph<sub>2</sub>O deriv., gave no results of value, synthesis was resorted to. *Bromo-orcinol di-Me ether*, 2,3,5-Br-(MeO)<sub>2</sub>C<sub>6</sub>H<sub>2</sub>Me, m. 57°, prep'd. from bromo-orcinol with alk. Me<sub>2</sub>SO<sub>4</sub>, or by decarboxylation of bromo-*p*-orsellinic acid di-Me ether, couples with the K salt of orcinol mono-Me ether, when heated in the presence of Cu bronze to 210°, to yield III, which is thus shown to be a Ph<sub>2</sub>O deriv. Almost all the reactions of II can be explained on the basis

of the formula

$$\begin{array}{c} \text{CH:CR.C.CO.O.C.CH:COH} \\ | \quad | \quad | \quad | \quad | \\ \text{MeOC}_6\text{H}_4\text{---CH}_2\text{---C---O---C:CR:CCO}_2\text{H} \quad (\text{R =} \\ \text{CH}_2\text{COC}_6\text{H}_4\text{H}), \text{ or } \text{C}_6\text{H}_4\text{O}_2 \text{ instead of } \text{C}_6\text{H}_4\text{O} \end{array} \quad \text{XXXV.}$$

Identity of  $\alpha$ -collatolic acid with lecanorolic acid. *Ibid.* 189 70. — From a Japanese *Lecanora atra* Ach. has been isolated atranorin and an acid having all the properties of Zopf's lecanorolic acid (*Die Flechtenstoffe*, p. 284) and identical with  $\alpha$ -collatolic acid. XXXVI. **Fumarprotocetraric acid.** Yasuhiko Asahina and Yaitiro Tanase. *Ibid.* 411-16 (1934). On the basis of analyses (C 55.21-55.62, H 3.05-3.81%) Hesse (*J. prakt. Chem.* 70, 458 (1904)) assigned to fumarprotocetraric acid (I) from *Cetraria islandica* the formula  $C_{14}H_{16}O_{10}$ , while A. and T. obtain values (C 55.06-55.98, H 3.54-3.66%, mol. wt. (by titration as a dibasic acid) 466-78) agreeing better with the formula  $C_{12}H_{14}O_{10}$ . As protocetraric acid (II) has the compn.  $C_{13}H_{14}O_8$  (C. A. 27, 5318) and I gives with  $PhNH_2$  a *monoanil* (III) agreeing in compn. with the  $C_{22}$  formula, I seems to result from the condensation of 1 mol. each of fumaric acid and II, with elimination of 1 mol.  $H_2O$ . With  $Ac_2O$  and a few drops concd.  $H_2SO_4$  I yields a *tetra-Ac deriv.* (IV) (2 of the Ac groups in aldehyde diacetate form), and II gives a *penta-Ac deriv.* (V) (likewise with 2 Ac groups in the aldehyde diacetate form). Cetraric acid (VI) (Et ether of II) and the Me ether of II on similar treatment split off the alkyl group and give V. The mono-Ac deriv. (VII) of II with boiling alc. gives VI as easily as does I. On catalytic hydrogenation VII takes up 3 mols.  $H_2$  and yields hypocetraric acid (VIII),  $C_{13}H_{16}O_7$ , with loss of  $AcOH$ ; I takes up 4 mols.  $H_2$  and gives VIII + succinic acid, while V absorbs no  $H_2$  and remains unchanged, and IV absorbs 1 mol., the fumaryl group being reduced to succinyl with formation of a *compd.*  $C_{20}H_{22}O_{17}$  (IX). I is therefore assigned the same structure as VII, with  $OCOCH:CHCO_2H$  instead of  $OAc$  on the carbinol HO group. III, yellow-red amorphous powder, becomes discolored around 250° and gradually carbonizes, gives a red color with alc.  $FeCl_3$ . IV, needles with 3  $H_2O$ , m. 130-1° and (anhyd.) 155° (gas evolution), gives no color with alc.  $FeCl_3$ , dissolves in concd.  $H_2SO_4$  with deep yellow color soon changing to red, forms no anil. IX, needles with 2  $H_2O$ , m. 100 1° and (anhyd.) 107 8°, is easily sol. in  $NaHCO_3$  and gives no color with alc.  $FeCl_3$ . V, needles with 1  $H_2O$ , m. 112 13°, gradually decomposes when dried at 60°, dissolves in  $NaHCO_3$  without color at first but later becoming reddish, is sol. in concd.  $H_2SO_4$  with yellow color soon changing to red gives no color with alc.  $FeCl_3$ . XXXVII. **Constitution of spherophorin.** Yasuhiko Asahina and Akira Hashimoto. *Ibid.* 416 20. — Zopf's spherophorin (I) (*Ann.* 340, 278 (1905)), which A. and H. have obtained from *Spherophorus melanocarpus* DC (*S. compressus* Ach.), has the compn.  $C_{27}H_{34}O_{12}$ , not  $C_{26}H_{32}O_{12}$  (it escaped Z.'s observation that it readily loses  $CO_2$  on drying at elevated temps.). On hydrolysis with alc. KOH it gives evermic acid,  $CO_2$  and a phenol, *spherophorol*,  $C_{16}H_{20}O_2$  (II), shown by synthesis from Et caprylate and  $CO(CH_2CH_2)_4I$ , to be 1-heptyl-3,5-dihydroxybenzene. As I gives no color with bleaching powder and the occurrence of an *o*-depside in nature is excluded, I is assigned the structure  $2,6,4-C_6H_3(OH)[2,6,1-Me-(HO)(MeO)C_6H_3CO_2]C_6H_3CO_2H$ . Extn. of *S. globosus* Wain. f. *metophorus* A. Zahlbr., which is very closely related morphologically to the European *S. coralloides*, yielded isosquamatic acid (III), but it seems premature as yet to say that Zopf's spherophoric acid (m. 206 7°) is impure III (m. 227°), although the green  $H_2SO_4$  reaction described by Z. agrees with that of III. If, however, his observation that his product does not show green fluorescence when boiled with alkali and  $CHCl_3$  is correct, the identity of the 2 acids is entirely excluded. I (yield, 1% of the carefully selected thall), m. 140°; the alc. soln. reddens litmus paper, gives a violet color with a trace of  $FeCl_3$  but no color with bleaching powder; when stirred with concd.  $NaHCO_3$  or with  $Na_2CO_3$ , I becomes oily and dissolves completely only on diln. and the soln. foams strongly on shaking; KOH dissolves it at once and the soln. shows strong green fluorescence when boiled with a drop of  $CHCl_3$ . *Di-Ac deriv.*, m. 133 4°, is sol. in  $NaHCO_3$  and gives no color with alc.  $FeCl_3$ . *Tri-Me deriv.*, prepd. with  $CH_3N_3$ , m. 85-6°, gives no color with alc.  $FeCl_3$ . II, m. 57 8°; the aq. soln. foams considerably on

shaking and gives with bleaching powder a transient red, with  $FeCl_3$  no color; on boiling with KOH and  $CHCl_3$  it shows strong green fluorescence; over  $H_2SO_4$  it liquefies with loss of water but after long standing it resolidifies and then m. 51°; with  $KMnO_4$  in KOH it yields caprylic acid. C. A. R.

Organic compounds with high molar melting-point depressions. Josef Pirsch. *Ber.* 66B, 1694-7 (1933); cf. C. A. 27, 3381. — The following compds. gave values for  $E$ , the molar m.-p. depression, as listed: camphetillone 64.0, isocamphane 44.5, bornylene 33.5, tricyclene 35.9 and camphane 29.5. Louise Kelley

Action of carbon dioxide and sodium on 2,5-diketocamphane. Yasuhiko Asahina and Morizo Ishidate. *Ber.* 67B, 440 6 (1934). Unlike camphor, 2,5-diketocamphane (3-ketocamphor) (I) reacts very slowly with  $CO_2$  and Na in ether or benzene; the reaction takes place only in xylene at about 130°, yielding at least 3 carboxylic acids, while the original I is in part reduced to the di-HO compd. Recrystn. of the product from benzene yields first a 2,5-diketocamphanecarboxylic acid,  $C_{11}H_{14}O_4$  (II), which regenerates I by elimination of  $CO_2$ , gives a stable blue-violet color with aq. or alc.  $FeCl_3$  (hence the CO group adjacent to the  $CO_2H$  must be enolized) and gives with Br a *mono-Br deriv.* (III) which has no enolic properties and on elimination of  $CO_2$  yields the bromo-2,5-diketocamphane (IV) prepd. by Bredt and Pinten (C. A. 22, 2559) by direct bromination of I. By splitting off  $HBr$  from IV they obtained an unsatd. acid (V) which  $E$  and I. have converted into  $\alpha$ -ketoisocamphanonic acid with  $KMnO_4$ . Therefore V is the *ketocampholenic acid*  $Me_2C=CH-CO.CHCH_2CO_2H$ . As III gives no  $FeCl_3$  reaction, the

Br must occupy the position of the mobile H atom in II and the  $CO_2H$  group in II must likewise be in position 6. Along with II were obtained 2 acids  $C_{11}H_{14}O_4$ . One, provisionally designated *b-acid* (VI), is very unstable, immediately decolorizes  $KMnO_4$ , gives a wine-red color with alc.  $FeCl_3$  and its Na salt heated in water forms a neutral product which gives the same  $FeCl_3$  reaction as VI but quickly resinifies in the air. VI yields a more stable *Br deriv.*,  $C_{10}H_{12}O_2Br$  (VII) and with  $NH_4OH$  forms an oxime of the decarboxylated product. With Na-Hg VI gives 2 acids,  $C_{11}H_{14}O_4$ , m. 125 6° and 188-9°, and a neutral product  $C_{10}H_{12}O_2$  (VIII), which gives no color with  $FeCl_3$  and is stable toward  $KMnO_4$ . *c-Acid* (IX), obtained along with VI, is stable, yields neither an oxime nor a semicarbazone, does not reduce  $KMnO_4$  and gives no color with  $FeCl_3$ . II, m. 210 11° (loss of  $CO_2$ ,  $[\alpha]_D^{25}$  94.4° (abs. alc.)). III, m. 185 6° (decompn.). VI, m. 113 4° (decompn.), isolated as the *quinine salt*, m. 165 6° (decompn.); *Me ester*, m. 87°, VII, m. 91 2°, reacts neutral and gives a dirty blue color with alc.  $FeCl_3$ , corresponding *OAc deriv.*,  $C_{12}H_{16}O_5$ , m. 65 6°, is insol. in  $Na_2CO_3$ , stable toward  $KMnO_4$  and gives no color with  $FeCl_3$ ; *oxime*,  $C_{10}H_{12}O_2N$ , m. 165° (decompn.); *semicarbazone*, m. 215° (decompn.). VIII, m. 92 3°, is also obtained from the decarboxylation products of VI, together with a volatile product,  $C_{10}H_{14}O_2$ , m. 125° (*semicarbazone*, m. 225-6°). IX, m. 145.5°, is sol. in 50 parts water at 15°,  $[\alpha]_D^{25}$  -64.81° (abs. alc.); *quinine salt*, m. 133 4° (decompn.); *Me ester*, m. 98 9°, mol. wt. in PhOH 209.4. C. A. R.

The effect of halogens on the constitution and the color of nitroamines of the biphenyl series. I. The colored derivatives. Joseph B. Codolosa. *Anal. farm. bioquim.* (Buenos Aires) 4, 60 70 (1933). — Methods by which the following compds. were prepd. are described: *o*- $O_2NC_6H_4Cl$ , 3,4-( $O_2N$ ) $_2C_6H_3Cl$ , 4-chloro-4'-nitrobiphenyl, (*p*- $O_2NC_6H_4$ ) $_2$ , 4-nitro-4'-aminobiphenyl (by reduction from (*p*- $O_2NC_6H_4$ ) $_2$ , 4-chloro-4'-nitrobiphenyl (by diazotizing  $O_2NC_6H_4C_6H_4NH_2$ ), 4-chloro-4'-aminobiphenyl (by reduction from the 4-nitro compd. and by unilateral diazotizing of benzidine). The following condensations were then carried out: 4-chloro-4'-aminobiphenyl with *o*- $O_2NC_6H_4Cl$ ; 4-chloro-4'-aminobiphenyl with 2,4-( $O_2N$ ) $_2C_6H_3Cl$  giving ( $O_2N$ ) $_2C_6H_3NHC_6H_4Cl$ ; same by

fusion; 4-chloro-4'-aminobiphenyl with  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_7\text{Cl}$ , giving  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_4\text{NHC}_6\text{H}_4\text{C}_6\text{H}_4\text{Cl}$ ; same—by fusion. II. Bromine derivatives. *Ibid.* 86–91.—Prepus.: 4-bromo-4'-nitrobiphenyl from 4- $\text{O}_2\text{NC}_6\text{H}_4\text{Ph}$  by bromination in water; 4-bromo-4'-aminobiphenyl by reduction from the 4'-nitro compd. Condensations:  $\text{o-O}_2\text{NC}_6\text{H}_4\text{Cl}$  with 4-bromo-4'-aminobiphenyl; 4-bromo-4'-aminobiphenyl with  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_7\text{Cl}$ , giving dinitro- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_4\text{NHC}_6\text{H}_4\text{C}_6\text{H}_4\text{Br}$ ; same—by fusion; 4-bromo-4'-aminobiphenyl with  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_7\text{Cl}$  giving  $(\text{O}_2\text{N})_2\text{C}_6\text{H}_4\text{NHC}_6\text{H}_4\text{C}_6\text{H}_4\text{Br}$ ; same—by fusion. From a study of the reactions C. concludes that the Ph radical in the *p*-position to the reactive amino group simulates the halogenated radicals  $\text{XC}_6\text{H}_4$  ( $\text{X} = \text{Cl}, \text{Br}, \text{I}$ ).

**Anhydrous-acetylbenzilic acid.** Victor K. La Mer and Joseph Greenspan. *J. Am. Chem. Soc.* 56, 956 (1934).—Acetylbenzilic acid, as ordinarily prep'd., contains 1 mol.  $\text{H}_2\text{O}$ ; the  $\text{H}_2\text{O}$  is lost over  $\text{H}_2\text{SO}_4$  in 18–25 days; the anhyd. acid m. 104.5–4.8°.

**Retene field. III. Some new nitroreteneols, nitrofluorenes and related compounds.** Marston T. Bogert and Torsten Hasselström. *J. Am. Chem. Soc.* 56, 983 (1934); cf. *C. A.* 26, 4326.—6-Acetoxyretene and  $\text{HNO}_3$  (d. 1.52) in  $\text{AcOH}$  give a *NO* deriv., pale yellow, m. 194.5–5.5° (all m. ps. cor.); reduction with  $\text{SnCl}_4$  in  $\text{EtOH}$  sat'd. with  $\text{HCl}$  gives the *NH* deriv., amorphous, m. 215.7° (*Ac deriv.*, m. 203.5–4.5°). Retene ketone (1-methyl-7-isopropylfluorenone) yields a *NO* deriv., bright yellow, m. 165.5°; the *NH* deriv. dark red, m. 146.8° (*Ac deriv.*, bright yellow, m. 197.5–8.5°, whose oxime, pale yellow, m. 254–5° (decompn.)). *Retene ketoxime* (1-methyl-7-isopropylfluorenone oxime), m. 174.5°; with  $\text{PCl}_5$  in  $\text{Et}_2\text{O}$  there results *methylisopropylphenanthrone*, m. 219.5–20.5°. 6-Acetoxyretenequinone, refluxed with 50%  $\text{KOH}$  for 4 hrs., gives a compd. apparently identical with 6-hydroxyretenequinone; reduction of the  $\text{HO}$  deriv. with  $\text{Na}_2\text{S}_2\text{O}_4$  gives a pale yellow vat, which dyes cotton a peach-red, fairly stable to laundering but fugitive to light.

**Tribenzylmethane.** G. Albert Hill, Mervyn H. Little, Stephen Wray, Jr., and Roger J. Trimby. *J. Am. Chem. Soc.* 56, 911 (1934).—The compd. obtained by Schmierda (*C. A.* 4, 308) and by Trotman (*C. A.* 19, 1138) and assumed to be  $\text{C}_6(\text{CH}_2\text{Ph})_3$  is really *tribenzylmethane*, m. 81.8–2.0°; this was prep'd. by reduction of  $(\text{PhCH}_2)_3\text{COH}$  with red P and  $\text{HI}$ , by refluxing  $(\text{PhCH}_2)_3\text{CBr}$  with  $\text{NaNH}_2$  in  $\text{C}_6\text{H}_5\text{Me}$  for 40 hrs. at 145–50° and by reducing  $(\text{PhCH}_2)_3\text{CBr}$  with red P and  $\text{HI}$ . The tri- $\text{NO}_2$  compd. m. 74°. Mol.-wt. detns. confirm the structure.

**Preparation and reactions of benzil disodium.** W. E. Bachmann. *J. Am. Chem. Soc.* 56, 963–5 (1934). *Benzil di-Na*,  $\text{PhC}(\text{ONa})_2\text{C}(\text{ONa})_2\text{Ph}$ , is formed in quant. yield by the action of 2%  $\text{Na-Hg}$  on benzil in  $\text{Et}_2\text{O-C}_6\text{H}_6$  at room temp.;  $\text{I}_2/\text{O}$  gives 97% of benzoin;  $\text{I}$  gives 98% benzil, while  $\text{S}$  or  $\text{Ph}_3\text{CCl}$  gives 90%;  $\text{BzCl}$  gives 80% of stilbene dibenzoate;  $\text{Ac}_2\text{O}$  gives 82% of the diacetate;  $p\text{-MeC}_6\text{H}_4\text{COCl}$  gives 50% of the di-*p*-toluate;  $\text{MeI}$  gives 45% of stilbene di-Me ether; allyl bromide gives 84% of the diallyl ether;  $\text{CO}_2$  gives the Na salt of stilbenedicarboxylic acid, which with  $\text{H}_2\text{O}$  gives benzoin;  $\text{O}$  gives  $\text{BzOH}$  and some benzilic acid;  $\text{BzH}$  gives a mixt. of benzoin and benzyl benzoate;  $(\text{ClC}_6\text{H}_4)_2\text{CO}_2$  gives di-*ft* stilbenedicarboxylate. Anil, 4,4'-diphenylbenzil and  $\alpha$ -naphthyl yield di-Na derivs. under similar conditions, hydrolysis of which yields the corresponding anisoin, 4,4'-diphenylbenzoin and  $\alpha$ -naphthoin. With excess of 40%  $\text{Na-Hg}$  only a di-Na compd. of benzil is formed.

**Ortho effects. II. Observations in the naphthalene series.** Harry Willstaedt and Gabriel Scheiber. *Ber.* 67B, 106 (1934); cf. *C. A.* 26, 1271. It was desired to prep. the 2- and 8-halo derivs. of  $\beta$ -(1-naphthyl)acrylic acid (I) in order to det. the effect of 2- and 8-substituents on the velocity of addn. of  $\text{Br}$  to I. No attempt was made to prep. the necessary 2-halo-1-naphthaldehydes from the corresponding 2-halo-1-methylnaphthalenes with  $\text{CrO}_2\text{Cl}_2$  because of the difficulty of obtaining these methylnaphthalenes in large amts. Nitration of 1- $\text{C}_{10}\text{H}_7\text{Me}$  with  $\text{EtNO}_3$

in the presence of  $\text{AlCl}_3$  gave exclusively the 4-nitro deriv.,  $b_{12}$  176°, m. 71–2°. In the attempted series of reactions  $1,2\text{-C}_{10}\text{H}_6(\text{NO}_2)_2\text{NH}_2 \rightarrow \text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{X}$  ( $\text{X} = \text{halogen}$ )  $\rightarrow \text{C}_{10}\text{H}_6(\text{NH}_2)_2\text{X} \rightarrow \text{C}_{10}\text{H}_6(\text{CN})_2\text{X} \rightarrow \text{C}_{10}\text{H}_6(\text{CO}_2\text{H})_2\text{X}$ , the  $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{X}$  ( $\text{X} = \text{F}$  or  $\text{I}$ ) were readily obtained but they could in no way be reduced to the  $\text{C}_{10}\text{H}_6(\text{NH}_2)_2\text{X}$  ( $\text{Sn}$  and  $\text{HCl}$ ,  $\text{SnCl}_2$  and  $\text{HCl}$  in water or alc.,  $\text{Fe}$  and  $\text{AcOH}$ ,  $\text{Fe}$  and  $\text{H}_2\text{SO}_4$ ,  $\text{TiCl}_4$  and  $\text{HCl}$ ,  $\text{Cu-Zn}$  in  $\text{HCO}_2\text{H}$ ); the nitro compd. was always recovered unchanged. This hindrance of the reaction is not due to steric influences, for it is equally pronounced with the *F* and the *I* compd., but is probably related to the neg. nature of the *o*-substituent (1,2- $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{Me}$  is readily reduced by even  $\text{Fe}$  and  $\text{AcOH}$ ). It was next attempted to carry out the reactions  $1,2\text{-C}_{10}\text{H}_6(\text{N:NPh})_2\text{NH}_2 \rightarrow \text{C}_{10}\text{H}_6(\text{N}_2\text{Ph})_2\text{N}_2\text{Cl} \rightarrow \text{C}_{10}\text{H}_6(\text{N}_2\text{Ph})_2\text{N}_2\text{BF}_4 \rightarrow \text{C}_{10}\text{H}_6(\text{N}_2\text{Ph})_2\text{F} \rightarrow \text{C}_{10}\text{H}_6(\text{NH}_2)_2\text{F}$ , but although a well-crystd. diazonium borofluoride was obtained its thermal decompn. yielded only an oily product, and when, without attempting to isolate the pure azo compd., the red oil was treated directly with  $2\text{N-AcOH}$  or  $\text{Sn-HCl}$ , there were again obtained only products which were still colored bright red. 1- $\text{C}_{10}\text{H}_7\text{ClHO}$  is readily obtained from  $\text{C}_{10}\text{H}_7\text{MgBr}$  and  $\text{HC}(\text{OEt})_2$ , but 8,1- $\text{C}_{10}\text{H}_6\text{ClH}$  does not react with  $\text{Mg}$ . 8,1- $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{NH}_2$  yielded a diazonium borofluoride which, however, was so explosive that, even when mixed with much sand, it could not be used for the prepn. of 8,1- $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{F}$  by thermal decompn. In the course of this work the following compds. were prep'd.  $\alpha$ -Naphthalimide (II), from 1- $\text{C}_{10}\text{H}_7\text{ClHO}$  and malonic acid in  $\text{AcOH}$  on the water bath, m. 214–15°.  $\beta$ -Isomer, from 2- $\text{C}_{10}\text{H}_7\text{ClHO}$ , m. 193° (decompn., beginning 184°). I, from II heated until the evolution of  $\text{CO}_2$  ceases, m. 129–30°, adds  $\text{Br}$  in  $\text{CHCl}_3$  with about the same velocity as  $\alpha$ -1- $\text{C}_{10}\text{H}_7\text{CH}(\text{CH}_3)\text{CHCO}_2\text{H}$ , forming the  $\alpha,\beta$ -dibromopropionic acid, m. 189° (decompn.). 1-Nitro-2-fluoronaphthalene,  $b_{12}$  120–4°, m. 49–50°, is obtained in 33% yield (based on the  $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{NH}_2$ ) through the diazonium borofluoride (88% yield), decompn. 181°. 2-1 analog, from diazotized  $\text{C}_{10}\text{H}_6(\text{NO}_2)_2\text{NH}_2$  and  $\text{KI}$ , very light yellowish prisms,  $b_{10}$  172–5°, m. 81°. 1-Benzeneazomaphthalene-2-diazonium borofluoride (yield, 31%), decomposes 258°. 8-Chloro-1-iodonaphthalene, from diazotized  $\text{C}_{10}\text{H}_6\text{ClNH}_2$ , m. 80–2°,  $b_{10}$  196–8°. 8-Nitronaphthalene-1-diazonium borofluoride, yellow, decomposes 124° (violent deflagration). 1-Fluoro-2-methylnaphthalene, b. 200–2°, solid at room temp., is obtained from  $\text{C}_{10}\text{H}_6(\text{NH}_2)_2\text{Me}$  through the diazonium borofluoride, decompn. 150°. 1-Chloro-2-naphtholnitrile, from  $\text{C}_{10}\text{H}_6\text{ClNH}_2$  by the Sandmeyer method,  $b_{11}$  183–4°, seps. from  $\text{MeOH}$  in needles. 1-Br analog,  $b_{10}$  178°, m. 93°. 1-Iodo-2-acetonaphthalide, from 2- $\text{C}_{10}\text{H}_7\text{NHAc}$  and  $\text{ICl}$  in  $\text{AcOH}$ , turns brown above 140°, decomposes 167° and is hydrolyzed by concd.  $\text{HCl}$  in boiling alc. to 1-iodo-2-naphthylamine, m. 108°.

**Synthesis of 1-methyl-2-ethyl and 1-ethyl-2-methylnaphthalene.** Otto Brunner and Franz Grof. *Monatsh.* 64, 76 (1934).  $\text{PhCH}_2\text{CH}_2\text{Br}$  and  $\text{EtCH}(\text{CO}_2\text{H})_2$  with  $\text{Na}$  in  $\text{PhMe}$  give di-*ft* ( $\beta$ -phenylethyl)ethylmalonate,  $b_{11}$  186–7°; hydrolysis and removal of  $\text{CO}_2$  gives  $\gamma$ -phenyl- $\alpha$ -ethylbutyric acid,  $b_{11}$  172–3°; concd.  $\text{H}_2\text{SO}_4$  gives 2-ethyl-1-keto-1,2,3,4-tetrahydronaphthalene,  $b_{11}$  140°.  $\text{MeMgI}$  gives 1-methyl-2-ethyl- $\Delta^1$ -dihydronaphthalene,  $b_{11}$  135–45°; heating with  $\text{S}$  at 260–90° for 1 hr. gives 1-methyl-2-ethylnaphthalene,  $b_{11}$  140–5° (picrate, orange, m. 97°; styphnate, yellow, m. 114°).  $\gamma$ -Phenyl- $\alpha$ -methylbutyric acid,  $b_{11}$  155–65°; concd.  $\text{H}_2\text{SO}_4$  gives 2-methyl-1-keto-1,2,3,4-tetrahydronaphthalene,  $b_{11}$  140–50°, which yields with  $\text{EtMgBr}$ , as above, 1-ethyl-2-methylnaphthalene,  $b_{11}$  135–15° (picrate, golden yellow, m. 110–1°; styphnate, yellow, m. 141°).

**Synthesis of 1-ethyl-6-methyl- and 1-ethyl-7-methylnaphthalene.** Otto Brunner and Franz Grof. *Monatsh.* 64, 28–34 (1934).— $p\text{-MeC}_6\text{H}_4\text{CCl}_3\text{CHCO}_2\text{H}$  (48 g.) on reduction with 144 g.  $\text{Na}$  gives 22 g. 3-(*p*-tolyl)pentan-1-ol,  $b_{11}$  134–6°; the bromide  $b_{12}$  133°; through the cyanide there results  $\gamma$ -(*p*-tolyl)caproic acid,  $b_{12}$  189° (chloride,  $b_{11}$  141°);  $\text{AlCl}_3$  gives 1-ethyl-6-methyl-4-keto-1,2,3,4-tetrahydronaphthalene,  $b_{11}$  159° (semicarbazone, m. 156°);

this also results from the ketone and 5 parts concd.  $\text{H}_2\text{SO}_4$ ; reduction gives 1-ethyl-6-methyl-1,2,3,4-tetrahydronaphthalene,  $b_{10}$  126°; S at 250–80° for 16 hrs. gives 1-ethyl-6-methylnaphthalene,  $b_{12}$  135 8° (picrate, golden yellow, m. 81.5°; styphnate, yellow, m. 90°). 7-Methyl-1-keto-1,2,3,4-tetrahydronaphthalene and  $\text{EtMgBr}$  give 1-ethyl-7-methyl- $\Delta^1$ -dihydronaphthalene,  $b_{10}$  135°. Heating with S 16 hrs. at 250–80° gives 1-ethyl-7-methylnaphthalene,  $b_{11}$  128° (picrate, golden yellow, m. 106°; styphnate, yellow, m. 142–3°). C. J. West

Synthesis of condensed polynuclear hydrocarbons by the cyclodehydration of aromatic alcohols. II. Synthesis of ionenes. Marston T. Bogert, David Davidson and P. Max Apfelbaum. *J. Am. Chem. Soc.* 56, 959–63 (1934); cf. C. A. 28, 1091°.—The recently suggested structure of ionene as 1,1,6-trimethyltetralin has been confirmed by its synthesis from *m*-xylene. Reduction of *l*t *m*-methylcinnamate with Na in  $\text{AmOH}$  gives 68% of 3-(*m*-tolyl)-1-propanol (*m*-tolylpropyl alc.),  $b_4$  108°,  $b_{20}$  147°,  $d_4^{20}$  0.9776,  $n_D^{20}$  1.52004 (phenylurethan, m. 52–3°); the bromide  $b_{20}$  140–5° (67% yield); the Grignard reagent with  $\text{Me}_2\text{CO}$  gives 46% of 2-methyl-5-(*m*-tolyl)pentan-2-ol,  $b_5$  128–32°,  $d_4^{25}$  0.9493,  $n_D^{25}$  1.50818 (phenylurethan, m. 97–8°); dehydration with concd.  $\text{H}_2\text{SO}_4$  gives ionene. The synthesis of 1,1-dimethyltetralin (I) was carried out as follows:  $\text{Ph}(\text{CH}_2)_3\text{MgBr}$  and  $\text{Me}_2\text{CO}$  give 51% of 2-methyl-5-phenylpentan-2-ol (II),  $b_{10}$  130°,  $d_4^{25}$  0.9556,  $n_D^{25}$  1.50681 (phenylurethan, m. 101.5–2.5°); dehydration of II by distn. with I gives 2-methyl-5-phenyl-2-pentene (III), a sample contg. 85% olefin  $b_{10}$  108–12°; the structure is established by the action of  $\text{O}_3$ .  $\text{Ph}(\text{CH}_2)_3\text{MgBr}$  and  $\text{Me}_2\text{CHCHO}$  give 59.5% of 2-methyl-5-phenylpentan-3-ol (IV),  $b_{10}$  130.5–1.5°,  $d_4^{25}$  0.9563,  $n_D^{25}$  1.50466. Dehydration of II or IV with  $\text{H}_2\text{SO}_4$  or the action of 90%  $\text{H}_2\text{SO}_4$  upon III gives I,  $b_{10}$  98°,  $b_{20}$  220–2°,  $d_4^{25}$  0.9474,  $n_D^{25}$  1.52736, the yields being 82.5, 74.5 and 90%, resp.; the *di*- $\text{NO}_2$  deriv. of I m. 64.5° (32% yield); the sulfonamide m. 148–9° (33% yield). I was not dehydrogenated by boiling with S or Se. C. J. West

$\beta$ -Phenyl- $\beta$ -anthronylpropionic acid. 3-Anthronylindan-1-one. L. Gravel. *Naturaliste can.* 57, 221–55 (1933). — $\beta$ -Phenyl- $\beta$ -anthronylpropionic acid (cf. Meierwein, C. A. 13, 1310) [chloride (I), m. 115–16°; Me ester, m. 111–12°; Et ester, m. 88–9°; amide, m. 181–2°; anilide, m. 168–9°; Ag salt] is dehydrated by concd.  $\text{H}_2\text{SO}_4$  at 103–10° to 3-anthronylindan-1-one (II), m. 161–2° [2-Br deriv. (III), m. 170–1°; hydrazone (+ $\text{H}_2\text{O}$ ), m. 176°; phenylhydrazones, m. 224–5° (+1PhMe); oxime (+1PhMe), m. 181–4°], identified by oxidation ( $\text{HNO}_3$ , d. 1.2) to anthraquinone and *o*- $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$ . I with  $\text{AlCl}_3$  in  $\text{C}_6\text{H}_6$  or (better)  $\text{CS}_2$  gives II and in addn. an isomer, m. 188°, which on account of its conversion into III with Br is regarded as the enolic form of II; in  $\text{C}_6\text{H}_6$  Ph  $\beta$ -phenyl- $\beta$ -anthronyl-ethyl ketone, m. 115–16° (*loc. cit.*), is also obtained. The following are also described:  $\text{Me}_2$ , m. 58–9°,  $b_2$  175°, and Et *o*-chlorobenzylidenemalonate, m. 30°,  $b_2$  182–3°;  $\text{Me}_2$ , m. 148–9°, and Et  $\beta$ -*o*-chlorophenyl- $\beta$ -anthronylsuccinate, m. 119–20°; Et  $\beta$ -phenyl- $\beta$ -anthronylsuccinate, m. 104–5°; and  $\beta$ -*o*-chlorophenyl- $\beta$ -anthronylpropionic acid, m. 159–61°. B. C. A.

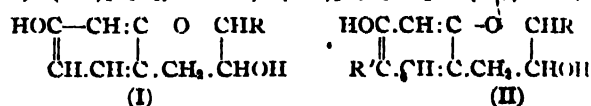
Nitric acid oxidation of 2,5-diphenylfurans to cis unsaturated 1,4-diketones. Robert E. Lutz and Frank N. Wilder. *J. Am. Chem. Soc.* 56, 978–9 (1934).—Various 2,5-diphenylfurans are oxidized consistently to cis unsatd. 1,4-diketones, probably through a 1,4-addn. mechanism; the yields are about 80%. The method has been applied to 2,5-diphenylfuran (*cis*- $\text{BzCH:CHBz}$ ), its 3,4-di-Cl and -di-Br derivs., bis(bromophenyl)dichloro- and -dibromofurans and triphenylfuran. C. J. West

The preparation and production of furfural. N. M. Chetverikov and A. I. Lazarev. *J. Chem. Ind. (Moscow)* 1934, No. 1, 72–6.—For reasons of economy, the amt. of steam used in steam distn. of furfural from an autoclave should be reduced near the end of the distn. Sunflower husks may be treated with  $\text{H}_2\text{SO}_4$  and then steam-distd., without the use of an autoclave. This yields 12% furfural as well as  $\text{HOAc}$  and C. H. M. Leicester

Toxicarol. V. 7-Hydroxytoxicarol and related com-

pounds. E. P. Clark. *J. Am. Chem. Soc.* 56, 3796–3798 (1934); cf. C. A. 26, 3795.—Butenandt (C. A. 26, 3796; 28, 1479) has designated the compd. obtained by the action of  $\text{EtOH}$ -alkali on toxicarol (I) as the hydrate; this is 7-hydroxytoxicarol (II). II is obtained by the action of 50%  $\text{KOH}$  on I in  $\text{EtOH}-\text{C}_6\text{H}_6$ , the reaction being one of atm. oxidation, since the yield is increased by stirring the soln.; it also results by the action of  $\text{Na-Hg}$  with stirring; it further results by oxidizing I with  $\text{CrO}_3$  in  $\text{AcOH}$ . II m. 226–7°,  $\eta_a$  1.580,  $\eta_s$  1.650,  $\eta_r$  slightly greater than 1.737. II and  $\text{As}_2\text{O}_3$  give acetyldehydrotoxicarol;  $\text{EtOH-HCl}$  gives dehydrotoxicarol (III). Diacetyltoxicarol and  $\text{Na}_2\text{Cr}_2\text{O}_7$  in  $\text{AcOH}$  give 7-hydroxymonoacetyltoxicarol (IV), m. 184°,  $\eta_a$  1.555,  $\eta_r$  between 1.700 and 1.737; alk. hydrolysis gives II; alc.  $\text{HCl}$  gives III. Catalytic reduction of IV gives 7-hydroxymonoacetyldihydrotoxicarol (V), m. 194–5°,  $\eta_a$  1.550,  $\eta_r$  1.685, which also results by  $\text{KMnO}_4$  oxidation of diacetyldihydrotoxicarol. Dihydrotoxicarol with alkali or with  $\text{Na-Hg}$  gives 7-hydroxydihydrotoxicarol, m. 222–3°,  $\eta_a$  1.576,  $\eta_s$  1.630,  $\eta_r$  1.695, which also results by hydrolysis of V. C. J. West

Chemistry of quebracho tannin. K. Freudenberg and P. Maffland. *J. Intern. Soc. Leather Trades Chem.* 18, 156–9 (1934).—Quebracho tannin is believed to be a polymerization product of "quebracho-catechol" (I, R = 3,4-(HO) $_2$  $\text{C}_6\text{H}_3$ ), a reduction product of fisetin, contg. 1 less OH than ordinary catechol. This quebracho-catechol has not been isolated from the tree, but has been synthesized (catalytic reduction of fisetinidin chloride, isolation as the Ac deriv., liberation by shaking with  $\text{Ba}(\text{OH})_2$ ). It readily polymerizes to a tannin-like substance on boiling with dil. acid, and gives decomposition products identical with those of natural quebracho tannin. Polymerization occurs by condensation without elimination of  $\text{H}_2\text{O}$  through opening up of oxonium rings (II, R = 3,4-(HO) $_2$  $\text{C}_6\text{H}_3$ , R' = 2,4-(HO) $_2$  $\text{C}_6\text{H}_3$ ,  $\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{R}$ )



H. B. Metcill

2-Methyl- and 2-ethyl-4-(*p*-halophenyl)thiazoles and some of their derivatives. J. P. Wetherill and Raymond M. Hann. *J. Am. Chem. Soc.* 56, 970–1 (1934).—The thiazoles were obtained by refluxing 0.05 M quantities of thioamides with the appropriate *p*-halophenacyl chloride in 95%  $\text{EtOH}$  for 15 min., the yields being 85–95%. 2-Methyl-4-*p*-chlorophenylthiazole, m. 122–3° (HBr salt, m. 186–7°; picrate, yellow, m. 163°; mercurichloride, m. 202–3°); 4-*p*-Br deriv., m. 134° (picrate, yellow, m. 160°); mercurichloride, m. 221°; 4-*p*-I deriv., pale yellow, m. 138° (picrate, yellow, m. 152°; mercurichloride, m. 233°); 2-ethyl-4-*p*-chlorophenyl deriv., m. 72° (picrate, yellow, m. 143–4°; mercurichloride, m. 164°); 4-*p*-Br deriv., m. 80° (picrate, yellow, m. 143°; mercurichloride, m. 177°); 4-*p*-I deriv., m. 99° (picrate, yellow, m. 148°; mercurichloride, m. 188°). All m. ps. are cor. These compounds are to be tested as larvicides. C. J. West

Oxidation-reduction relations and a color reaction for lactoflavin (vitamin  $\text{B}_2$ ). Richard Kuhn and Theodor Wagner-Jauregg. *Ber.* 67B, 361–3 (1934); cf. C. A. 28, 1613.—Reduction of lactoflavin in  $\text{AcOH}$ ; neutral or alk. soln. yields a colorless dihydro compd., leucolactoflavin. If reduction is conducted in a mineral acid soln. an intermediate monohydro compd. is formed having an intense red color, and showing an absorption band at 4900 Å. Shaken with air in the presence of  $\text{NaOAc}$ , it develops a yellow color and fluorescence with a max. absorption band at 4450 Å. The oxidation-reduction relations of lactoflavin resembled those with vitamin  $\text{B}_2$ . These properties are believed to be related to the sugar-like side chain  $-\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_2\text{OH}$ . J. C. Munch

Preparation of picolinic acid amide from  $\alpha$ -bromopyridine. Wallace R. Brode and Clarence Bremer. *J. Am. Chem. Soc.* 56, 993–4 (1934).—2-Bromopyridine (15 g.), 15 g.  $\text{KCN}$ , 2 g.  $\text{Cu}(\text{CN})_2$  and 20 cc.  $\text{H}_2\text{O}$ , heated

18 hrs. at 175°, give 25% of picolinic amide, m. 106.3–6.8° (cor.).

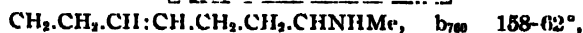
**C. J. West.** Comparison of the dimethylquinoline from aniline, isobutyraldehyde and methylal with 2,3-dimethylquinoline, and some new observations on the behavior of 2,3-dimethylquinoline toward benzil. G. Rohde. *Ber.* 67B, 431–4 (1934).—The 2 dimethylquinolines (I), v. Miller and Kinkelin, *Ber.* 20, 1934 (1887), and (II), Rohde, *Ber.* 22, 267 (1889) are identical. I, after crystn. from pure dry ether or ligroin (b. 75°), m. 68.8.5°; II m. 69.5°; mixed m. p. 68–8.5°. Both have the same crystallographic const.: short rhombic prisms,  $p[110], b[010], c[001], (110):(110) = 121^\circ 46', (110):(001) = 90^\circ 0'$ , plane of the optical axes parallel to  $\{001\}$ ,  $a:b:c = 0.5569:1:2$ . Picrates, m. 229–30°, 230–1°; mixed m. p., 229–30°. Chloroplatinates (spears, granules and hair-like crystals), blacken 225–50°, m. indistinctly 280–90° on rapid heating (the spears from I decompose 245°). Chloraurates, light golden yellow, m. 204–5°, 205–8°. The formation of the condensation product  $C_{22}H_{19}NO$  (III) from II and  $Bz_2$  (Rohde, *Diss. Erlangen*, 1888) is preceded by the formation of an addn. product  $C_{22}H_{19}NO_2$  (obtained from the components kept 20 hrs. at 100°), m. 145–6°, does not show in acids the intense yellow-green fluorescence of III, is converted into III by concd.  $H_2SO_4$ . Sulfate of III, light yellow leaflets, m. around 294°. III seps. from alc. in druses of hair-fine needles with a few yellowish prisms, the needles changing completely under the mother liquors in the course of several days into the prisms and the process repeating itself after every recrystn. from alc. Both forms m. 180–1°; if kept a few min. above their m. p., they solidify to the yellow isomer (also obtained from II and  $Bz_2$  at 160–70°), m. 246.7°. II and  $Bz_2$ , heated 15 hrs. in sealed tubes at 180° give the compd.  $C_{22}H_{19}N$  (possibly  $C_{22}H_{19}NMeCH_2CHPh_2$ ), m. 121–2°. Quinaldine likewise forms with  $Bz_2$  an addn. product, m. 134–5°, which loses water and yields a compd.  $C_{22}H_{17}NO$ , m. 189–9.5°, sol. in acids with intense yellow-green fluorescence. The latter does not undergo a transformation analogous to that of III, however, and quinaldine and  $Bz_2$  heated in a sealed tube at 180° form yellow prisms, m. 245–6°, having apparently the compn.  $(C_8H_5NCH: CPh_2)_2$ .

**C. A. R.** The hydroxyquinolines. Iodo derivatives of *o*-hydroxyquinoline. I. F. Pirrone and A. Cherubino. *Atti accad. Lincei* 18, 311–13 (1933).—By treating *o*-hydroxyquinoline (I) with  $I_2$  (both in  $EtOH$ ) at the boiling temp., 2 isomeric mono-I derivs. (cis, trans) have been prepd. The 1st isomer m. 124–6° (hydrated), or 114–16° (anhyd.), forms brilliant green needles, sol. in common org. solvents, and in 50%  $EtOH$ . The other isomer forms dark yellow needles, m. 174–5° (decompn.), is sol. in  $CHCl_3$ , less in  $EtOH$  or  $Et_2O$ . Both give a green-violet color with  $FeCl_3$ . Derivs. prepd.: a *N*-iodomethyl compd., m. 136–7°, brown needles with a metallic luster;  $HCl$  deriv., m. 206–8° (decompn.); picrate, m. 162.3°, golden yellow needles; sulfate, m. 208.9°, minute green crystals; a complex  $Cu$  salt as bright yellow plates; complex  $Ni$  salt, greenish yellow plates. The expl. part will appear in *Gazz. chim. ital.*

**A. W. Contieri.** Action of hydriodic acid on lupanine. Geo. R. Clemo and Richard Raper. *Ber.* 67B, 463–4 (1934).—Winterfeldt, Kneuer and Holschneider (*C. A.* 26, 465) still insist that 1 of the products of the action of fuming  $HI$  and red  $P$  on lupanine (I) at high temp. and pressure is  $\beta$ -lupanine (II). Clemo, Leitch and Raper in their work (*C. A.* 25, 1274) had used com.  $HI$  (d. 1.96); in the present work they used, in each of 4 pressure tubes, 0.65 g. purified *dl*-I, 0.9 g. red  $P$  and 3.5 cc.  $HI$  prepd. by freshly satg. the com. acid at  $-10^\circ$  to  $-15^\circ$ , and heated the mixts. 50 hrs. at 70–60°. On working up the product according to W., K. and H., they obtained less than 0.02 g. distillate  $b_m$  below 100°, from which they isolated a little II picrate, m. 163°. The higher-boiling fraction (0.85 g.  $b_m$  120–30°) had the properties of the 2nd cleavage product of W., K. and H. Lupanine (III) (0.65 g.), treated the same way, gave 0.1 g. II,  $b_m$  90–2°. Careful tests of the I used revealed that it contained traces of a base volatile with steam but

as yet no deriv. of III has been found of which traces could be detected in the I. Addn. of 10% III to I results in a considerably larger yield of II, but from a l m. 90° which had been very carefully purified (by converting it into the picrate or thiocyanate, liberating it from the salt, distg. it and recrystg. it twice from acetone) not a trace of II picrate could be isolated after treatment with  $HI$  and  $P$ . In parallel expts. in which 0.01 g. III was added to the I (0.65 g.) there were obtained traces of distillate  $b_m$  below 100° which had the characteristic odor of II and gave a picrate m. 162.3°. It is concluded that I free of III gives no II.

**C. A. R.** Catalytic dehydrogenation of cyclic bases. II. Maximilian Ehrenstein and Ilse Marggraff. *Ber.* 67B, 486–91 (1934); cf. *C. A.* 25, 3990.—From the behavior of piperidine and pyrrolidine rings, it might have been expected that in the bicyclic tropane (I) the piperidine ring would not be dehydrogenated, since it has a Me group on the N, while the pyrrolidine ring would, the only question being whether the resulting structure would be sufficiently strain-free; it was possible, therefore, that I would be unchanged by the catalyst. Expt. showed that I does not behave in either of these 2 ways; when its vapors are passed over  $Pd$ -asbestos at about 300° no II is split off but the distillate is not unchanged I. As the result of isomerization, the I, in part, at least, is changed into a secondary base,  $CH_2CH:CHCH_2CH_2CH_2CHNHMe$  or



which in the air at once changes into a white solid (presumably the carbonate), decolorizes  $KMnO_4$  in  $H_2SO_4$ , and yields a *Bz* deriv., m. 94.6.5°. Like cycloheptane, the N-analog, hexamethylenimine, shows no great tendency to lose H; when it is passed over  $Pt$ -asbestos, a considerable amt. is unchanged and there is regularly formed  $\alpha$ -picoline, together with pyrrole derivs. (detected by means of the pine splinter reaction). The dehydrogenation method is therefore not to be recommended for the detection of N-contg. 7-membered rings in alkaloids.

**C. A. R.** Strychnos alkaloids. LXXIX. Nature of the acid oxidation products from benzal- and 11-hydroxydihydrostrychnine. Hermann Leuchs and Hans Beyer. *Ber.* 67B, 459–63 (1934); cf. *C. A.* 28, 1707<sup>a</sup>. The acid  $C_{26}H_{22}O_8N_2$  which Kotake and Mitsuwa report having obtained by oxidation of benzaldihydrostrychnine (*C. A.* 27, 5334) has probably the compn.  $C_{27}H_{23}O_8N_2$  (I). The product obtained by pptn. from cold alk. soln. with  $CO_2$  seems to be a hydrate  $C_{26}H_{21}O_8N_2$ ; such preps. do not attain quite const. wt. at 100° and 15 mm. and lose 3.3–4.4% at 115–45°.  $[\alpha]_D^{25}$  of various preps. in 1 mol. 0.1 *N*  $NaOH$  ranges between 91° and 96.8°/d. *Perchlorate*, tablets and leaflets losing 8.0–8.1% at 20–95° under 15 mm. I dissolves clear in cold  $Ba(OH)_2$  and on heating 1 hr. at 95° yields at first broad prisms, giving a red-violet Otto reaction, which then disappear and are replaced by needles of  $Ba$  oxalate; the other cleavage product is isolated as a *perchlorate*,  $C_{26}H_{21}O_8N_2 \cdot 2HClO_4$ , prisms and leaflets losing 5.03–5.5% at 20–95° and 15 mm.,  $[\alpha]_D^{25} = -84.4^\circ/d.$ , gives no color with  $FeCl_3$  or with  $CrO_3$  in concd.  $H_2SO_4$  but does give a strong brown-red color in 2 *N* acid and with 14 *N*  $HNO_3$ . The following degradation may therefore be assumed to have occurred:  $N.CO.C:(CHPh).CH.O-CH_2 \rightarrow N.CO.CO.CH.O.CH_2 \rightarrow N.CO.CO_2H:CO.O-CH_2 \rightarrow NH(CO_2H).CO_2H(HO).CH_2$ . The bromination product of I is not  $C_{26}H_{22}(n)O_8N_2Br.AcOH$  but  $C_{26}H_{21}O_8N_2Br$ , obtained as prisms m. 237–0° (decompn.), losing 0.9% at 20° and 15 mm., then slowly 6.9–7.4% at 95–145° and increasing in wt. 6% in 6 days in the air,  $[\alpha]_D^{25}$  63.1–63.8°/d. in 1 mol.  $NaOH$ ; it is sol. in 2 *N*  $HCl$  and in  $NH_4OH$ , gives a strong blue color with  $CrO_3-H_2SO_4$  and is hydrolyzed by  $Ba(OH)_2$  to  $(CO_2H)_2$  and an acid isolated as the *perchlorate*,  $C_{26}H_{21}O_8N_2Br \cdot 2HClO_4$ , tables losing 4.25% at 100° in a high vacuum,  $[\alpha]_D^{25} = -103.5^\circ/d.$  L. and B. believe that the acid  $C_{27}H_{23}O_8N_2$ , m. 298°, obtained by Wieland and Kaziro (*C. A.* 28, 158<sup>a</sup>) by oxidation of 11-hydroxydihydrostrychnine (12-HO deriv. according to the



notation used by W. and K.), is identical with I.

C. A. R.

**Strophanthin. XXIX.** Dehydrogenation of strophanthin. Robert C. Elderfield and Walter A. Jacobs. *Science* 79, 279 80(1934); cf. *C. A.* 27, 5747.—Dehydrogenation of 180 g. strophanthin (I) with Se gave 72 g. oil b. up to 275°. Repeated fractionation gave a fraction b.p. 185–95°. Cryst. material from this was purified through the picrate and recrystn. with alc. A yield of 0.5 g. of a hydrocarbon  $C_{11}H_{14}$  was obtained which corresponded to that of Diels, Gädke and Körding obtained from cholesteryl chloride. These results confirm those of Tachesche and Knick obtained with dianhydrouzarigenin. The dimethylphenanthrene previously obtained from I was apparently the product of too rapid heating of the reaction mixt. Since the formation of  $C_{11}H_{14}$  appears to be a characteristic degradation product of the sterol skeleton and there is no evidence on hand to show that it is the result of extensive rearrangement, the ring system of the cardiac aglucones appears to be built on the same general plan as that of the sterols and bile acids. R. B.

**Constitution of the two solanines t and s.** Giuseppe Oddo and Gaetano Caronna. *Ber.* 67B, 448 58(1934); cf. *C. A.* 23, 2978; 27, 2957; Zemplén and Gerecs, *C. A.* 23, 1412. —Repetition of the work of Z. and G. has given results differing in almost all respects from theirs and showing beyond doubt that the 4 components of solanine t (I) (from *Solanum tuberosum*) are linked in the order solanidine t-d-glucose-d-galactose-d-rhamnose and that solanine s (II) (from *S. sodomum*) has the structure solanidine s-d-glucose-d-galactose-d-rhamnose solanidine s. The Ac deriv. (III), begins to decompose 190°, m. 204–5°, has the compn.  $C_{71}H_{108}O_{22}N$  (C 56.57, H 7.33%), not  $C_{70}H_{107}O_{21}N$ , and is the acetate of *tridecaacetylsolanine* t,  $C_{88}H_{140}O_{23}N$  (V), which has now been isolated in the free form, m. 120°. G. and Z. report that by the action of 70% HBr in AcOH on III they obtained an acetylated solanidine glucoside, m. 115–20° (decompn.), and rhamnosidogalactose and that oxidation of the latter with I and distn. with HCl gave a product which formed a ppt. with phloroglucinol, whence they concluded that the 2 cleavage products are united, in I, through the galactose residue. None of this could be confirmed by repetition of the process under the same conditions; the method of extn. was accordingly modified and there were obtained. (1) tetraacetylramnose, m. 90°, sol. in ether and reprecipitated by petroleum ether; (2) a monoacetylsolanidine t-glucose-galactose-HBr  $\cdot H_2O$  (C 56.34, H 7.09, Br 6.87%), m. 130°, sol. in benzene and reprecipitated by petroleum ether, in which, however, the HBr is not in ionizable form and which is converted by alc. KOH or NaOMe into the true solanidine t glucoside (VI) (C 70.02, H 9.31%), m. 170°; and (3) a pentaacetylsolanidine t-glucose-HBr  $\cdot H_2O$  (C 59.81, H 7.33, Br 7.75%), yellow amorphous powder, m. 115° (decompn.), insol. in ether and benzene, in which the HBr is present in ionizable form and which gives VI with alc. KOH. The results with II are entirely different. The Ac deriv. prepd. according to Z. and G. or by the method previously used by Oddo is decaacetylsolanine s,  $C_{70}H_{106}O_{21}N$  (C 59.51–59.52, H 7.10–7.15), m. 135–8°. Treatment with 70% HBr in AcOH gives: (1) the ether-sol. diacetylramnose, m. 75°; (2) an ether-insol., benzene-sol. heptaacetylsolanidine s-glucose-galactose  $\cdot H_2O$  (VII) (C 57.79–57.81, H 7.52–7.54%), faintly yellowish powder, begins to decompose 140°, m. 170°, hydrolyzed by alc. KOH to solanidine s glucoside (C 63.28–63.21, H 9.35–9.41%), m. 185°; and (3) an ether- and benzene-insol. bromoacetylsolanidine s,  $C_{12}H_{18}ONAcBr$  (VIII), begins to decompose when dried *in vacuo* and m. 135°. With 30% instead of 70% HBr in AcOH there were obtained: (1) an ether-sol. heptaacetylsolanidine s-glucose-galactose, mixed with a little diacetylramnose from which it was sepd. by treatment with 70% HBr in AcOH whereby the new glucoside lost 1 mol. water and was converted into the ether-insol. VII; (2) an ether-insol., benzene-sol. monoacetylated solanidine-rhamnose-HBr (IX) (C 55.50–55.52, H 7.73–7.78, Br 12.34–12.37%), yellow flocks, m. 132° (darkening), hydrolyzed by

1 70% HBr in AcOH to diacetylramnose and VIII; and (3) the ether- and benzene-insol. VIII. Oxidation of IX with I and distn. with HCl gave a distillate forming no ppt. with phloroglucinol. A further difference between I and II is that whereas I,  $C_{88}H_{140}O_{23}N$ , is formed by addn. of the 4 components with elimination of 3 mols.  $H_2O$ , II,  $C_{84}H_{134}O_{21}N$ , is formed by simple addn. of the 5 components + 1 mol.  $H_2O$  (which possibly adds to the N of 1 of the end solanidine residues).

C. A. R.

The flavanone glucoside in *Glycyrrhiza glabra* L. var. *glandulifera*, Regel et Herder. Junzo Shinoda, and Seichi Ueda. *Ber.* 67B, 434–40(1934).—Extn. of the powd. root with MeOH yields a glucoside, *liquiritin*,  $C_{21}H_{32}O_{10}$ , needles with 1  $H_2O$ , m. 212°, giving with Mg and HCl in alc. a violet-red color and hydrolyzed by aq. alc.  $H_2SO_4$  on the water bath to glucose and *liquiritigenin* (I),  $C_{15}H_{12}O_6$ , needles with 1  $H_2O$ , m. 207°, which likewise gives a violet-red color with Mg and HCl. Neither the glucoside nor I gives a color with alc.  $FeCl_3$ . I forms with  $Ac_2O$  and a drop of  $H_2SO_4$  a diacetate, m. 186°, and with  $NH_4OH.HCl.NaOAc$  in alc. an oxime, m. 118°; 50% KOH at 170–80° converts it into resacetophenone and  $p-HOC_6H_4CO_2H$ . I is therefore 4',7-dihydroxyflavanone. To det. the position of the sugar residue in the glucoside, the latter was decompd. with  $Ba(OH)_2$ , which yielded resacetophenone, but the part bound to the sugar residue could not be isolated. Alkylation of the glucoside in anhyd. acetone with  $K_2CO_3$  and MeI and treatment of the product with dil.  $H_2SO_4$  gave the Me deriv. of I only as a resin. Decompn. of the glucoside with 50% KOH yielded pemon (oxime, m. 131.5°) and  $p-HOC_6H_4CO_2H$ , whence the glucose residue must be on the 4'-HO group. Tamlor (*C. A.* 11, 1969) reports 4',7-dihydroxyflavanone as m. 182–3° and its diacetate as m. 175 6°. The flavanone was accordingly synthesized from  $p-EtO_2COC_6H_4CH_2CH_2CHCOCl$  and  $m-C_6H_4(OH)_2$  with  $AlCl_3$  in  $PhNO_2$  (Shinoda and Sato, *C. A.* 23, 836) and found to be identical with I.

C. A. R.

**Plant pigments. LV.** The occurrence of  $\alpha$ - and  $\beta$ -carotene in different natural products. P. Karrer and W. Schlienz. *Helv. Chem. Acta* 17, 7–8(1934).—In the ovary of the cow  $\beta$ -carotene is found with not more than 1% of  $\alpha$ -carotene. Carotene preps. from spinach, paprika and burning nettles were treated in a  $Ca(OH)_2$  chromatogram system and shown to consist essentially of  $\beta$ -carotene with very small, but detectable, amts. of  $\alpha$ -carotene. LVI. The autumnal coloration of leaves. P. Karrer and O. Walker. *Ibid.* 43 51. Dried green leaves of the horse-chestnut were extd. with petr. ether and with  $Et_2O$ . The exts. were treated with KOH, MeOH and with NaOMe. The dried petr. ether-sol. was passed through  $Ca(OH)_2$  and a 3-layer chromatogram resulted. The most abundant layer was treated with MeOH and this, on evapn., yielded an oil, which was dissolved in petr. ether and treated with  $I_2$ . The pptd. iodide was filtered, dissolved in  $Me_2CO$  and treated with  $Na_2S_2O_4$ . Petr. ether and  $H_2O$  were added. Some xanthophyll was pptd. and a new chromatogram made from the petr. ether soln. Isocarotene was obtained from one of the layers, proving that  $\beta$ -carotene was present in the original ext. Yellow horse-chestnut leaves, by similar treatment, yielded xanthophyll and isocarotene; oxidation products of carotene were also present. Yellow leaves of a maple, *Pseudoplatanus*, gave some material known as "autumn xanthophyll," probably carotenoid oxidation products. In green horse-chestnut leaves, gathered at a date later than those previously mentioned, xanthophyll seemed to be present, but none could be obtained crystalline. Yellow leaves of the ginkgo biloba were extd. with petr. ether. By the treatment of the unsaponif. ext., carotene oxidation products were obtained. Half of the ginkgo ext. was saponif. by KOH-MeOH. No isocarotene or xanthophyll-like products were observed, but some unknown material caused a shift of absorption bands toward the violet. The green leaves of *Ulmus campestris* were treated as indicated above. No isocarotene was obtained, carotene had disappeared and only xanthophyll-like substances could be detected. None was isolated. The dis



appearance of carotene and of phytozanthin as the leaves die is probably the result of oxidation. LVII. Caricaxanthin, kryptoxanthin, zeaxanthin monopalmitate. P. Karrer and W. Schlienz. *Ibid.* 55-7.—Caricaxanthin from the fruit of *Carica papaya* L. is identical with kryptoxanthin and hence should be represented by  $C_{45}H_{74}O$ , rather than by the formula previously assigned to it by Yamamoto and Tin. It is the 1st naturally occurring, O-contg. carotenoid to display a growth-producing action. The position of the OH in this  $\beta$ -carotene deriv. is not known. By the partial sapon. of physalinen, zeaxanthin monopalmitate, m. 148°, results, and by further sapon. it yields zeaxanthin. It is the 1st known representative of the partially esterified phytozanthins. G. A. H.

Carotene. VIII. Physical properties of carotenes from different plant sources. James H. C. Smith and Harold W. Milner. *J. Biol. Chem.* 104, 437-47 (1934); cf. C. A. 26, 3509; 27, 5747.—Pure  $\alpha$ -carotene (I) from carrot roots, m. 182.3-2.7°, had  $[\alpha]_D^{25} 297-311^\circ$ ,  $[\alpha]_D^{25} 352-4^\circ$  and  $[\alpha]_D^{25} 584-93^\circ$ . Leaf carotene, from spinach, sugar beet, alfalfa, chard, cauliflower or sunflower leaves, m. 180.5° and was always optically inactive. It is therefore pure  $\beta$ -carotene (II). Mixts. of I and II show depressed m. ps., the curve of m. p. against optical activity passing through a min. at m. p. 162°,  $[\alpha]_D^{25} 160^\circ$ , indicating a 2-component system in which solid solns., but not compds., are formed. Similarly mixts. of I and II are more sol. in heptane than either separately. The absorption spectra of such mixts. show a progressive shift toward the violet and intensification of the peak as the optical activity increases; from the spectra of pure I and II, spectra could be calcd. for mixts. on the basis of their optical activity, giving satisfactory agreement with the observations. All rotations are in benzene with isolated Hc lines. K. V. Thimann.

Chlorophyll. VI. Benzoyl compounds and oximes of methylpheophorbide *a* and pheophorbide *a*. Arthur Stoll and Erwin Wiedenmann. *Helv. Chim. Acta* 17, 163-82 (1934); cf. C. A. 28, 2361<sup>2</sup>.—(1) An improved method for the prepn. of the Bz deriv. ( $C_{55}H_{82}O_6N_4 - C_7H_5N$ ) from pheophorbide *a* is described. (2) Prepn. of the Bz deriv. from methylpheophorbide *a* is described. (3) The app. and method for the detn. of carboxyl groups in chlorophyll derivs. by absorption of  $NH_3$  are described. (4) Methylpheophorbide  $\alpha$ -oxime ( $C_{55}H_{80}O_6N_4$ ) is prepd. (5) Pheophorbide  $\alpha$ -oxime ( $C_{55}H_{78}O_6N_4$ ) is prepd. from the oxime in (4). (6) Phase-positive pheophorbide *a* prepd. from the oxime in (4) possesses properties similar to those of the natural product. H. M. Burlage.

Ring-system of sterols and bile acids. V. Constitution of ergosterol and its irradiation products. O. Rosenbaum and H. Kirs. *Chemistry and Industry* 1934, 190-200; cf. C. A. 28, 2302<sup>4</sup>. R. and K. give a review on the work done on the structure of ergosterol, placing the emphasis on the position of the nuclear double bonds and the HO group. A hypothesis is proposed for the formation of the different irradiation products of ergosterol. Absorption spectra curves are given for cholesterolene, hydroxycholesterolene and ergosterol. Julius White.

Dehydrogenation of estrin. J. W. Cook and A. Girard. *Nature* 133, 377-8 (1934); cf. C. A. 28, 145<sup>6</sup>.—The C:O group of ketohydroxyestrin was reduced to give the "deoxy" compd. (I) by the method of Kishner-Wolf. I gave the MeO compd. (II), m. 76-7°. II heated 24 hrs. with Se at 300-20° and distd. over Na in a high vacuum gave methoxycyclopentenophenanthrene (III), m. 134.5-6°, picrate, orange-yellow, m. 135-6.5°. Nitrobenzene complex, golden orange, m. 160-1°. III has been assigned the structure 7-methoxy-1,2-cyclopentenophenanthrene. Its synthesis is now in progress. Julius White.

Infra-red absorption of org. compds. (Roth) 3. Organic chemistry in physiology (Willstaedt) 11A. Magneto-optical dispersion of org. liquids in the ultra-violet region of the spectrum (Lavery, Evans) 3. Unsaponifiable fraction of spinach fat—glucoside of  $\gamma$ -spinasterol (Heyl, Lausen) 27. Enzymes of lichens and the constitution of

umbilicic acid (Koller, Pfeiffer) 11A. Electrolytic reduction potentials of org. compds. (Shikata, Taguchi) 4. Light absorption and double bonds (Hausser) 3. Glycerol (Hoover) 27. Investigation of sym. triphenylbenzene with Röntgen rays (Orelkin) 2. Catalytic oxidation of butyl alc. to butyraldehyde (Rubinshtein, *et al.*) 2. Magnetic investigation of org. radicals (Katz) 2. Speed of oxidation of hydroquinone by O (Reinders, Dingemans) 2. Compds. of bivalent C (Ashkinazi) 2. Diamagnetism of nitroso compds. (Wilson) 2. Esterification velocities of alcs. in AcOH (Kailan, Schwchel) 2. Kinetics of polymerization of butadiene in a glow discharge (Rubanovskii) 2. Velocity of hydrolysis of simple ethers (Skrabal, Zaliorka) 2. Ether-like compds. (Palomaa, Salonen) 2. Chem. constitution and the dissociation constants of monocarboxylic acids (Dippy, Williams) 2. Aminoformates of Cu and Zn (Gutzeit, Duckert) 6. KOH and oxalic acid (Fr. pat. 759,216) 18. Catalysts [for conversion of phenols into hydrocarbons and hydrogenation of unsatd. and aromatic hydrocarbons] (Brit. pat. 402,938) 18.

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Lowy, Alexander, and Baldwin, Wilmer E.: Laboratory Book of Elementary Organic Chemistry. 2nd ed. New York: John Wiley & Sons, Inc. 182 pp. \$2.50.

Hydrocarbons. Jean Mercier. Ger. 593,061, Feb. 21, 1934 (Cl. 12o. 1.03). See Brit. 312,916 (C. A. 24, 860-1).

Hydrocarbons. I. G. Farbenind. A.-G. (Fritz Winkler and Hans Häuber, inventors). Ger. 593,248, Feb. 23, 1934 (Cl. 12o. 1.03). Liquid hydrocarbons are obtained by passing  $C_2H_4$  and its homologs or gases contg. them at 100-300° and atm. or raised pressure over metal surfaces coated or superficially alloyed with Sn, Zn, Al or Cr.

Hydrocarbons. I. G. Farbenind. A.-G. Fr. 758,889, Jan. 21, 1934. Hydrocarbons rich in C are obtained by preliminary heating of  $CH_4$  and its homologs, to such a degree that at least 5% thereof is converted to olefins and that an addnl. proportion is eventually converted to liquid hydrocarbons, particularly of an aromatic nature. Condensable fractions are removed and the resulting gas incompletely burned.

Thermal treatment of hydrocarbons. I. G. Farbenind. A.-G. (Fritz Winkler, Hans Häuber and Paul Feiler, inventors). Ger. 593,257, Feb. 26, 1934 (Cl. 12o. 1.03). In the thermal treatment of gaseous or vaporized hydrocarbons, all or some of the app. parts exposed to a temp. above 500° are made of or lined with a compn. contg. free Si which has been molded into tubes, plates or other suitable shapes by the usual ceramic processes, with addn. of binders if necessary. Examples are given and app. is described.

Apparatus for the thermal treatment of hydrocarbons. I. G. Farbenind. A.-G. (Paul Feiler, inventor). Ger. 590,874, Jan. 12, 1934 (Cl. 23b. 1.04). App. for the thermal treatment of hydrocarbons, etc., is coated with Sn, Pb, Mo, Cr, W, etc., by the decompn. of carbonyls or alkyls of these metals within the app.

Apparatus for the thermal treatment of hydrocarbons. I. G. Farbenind. A.-G. (Fritz Winkler and Hans Häuber, inventors). Ger. 590,875, Jan. 13, 1934 (Cl. 23b. 1.04). App. for distg., decomposing or polymerizing hydrocarbons is coated internally with a high-melting element of the 4th group, especially Si or Ti, by firing the latter in the app. in powd. form.

Stabilizing chloro hydrocarbons. Imperial Chemical Industries Ltd. Ger. 593,384, Feb. 26, 1934 (Cl. 12o. 2.01). See Brit. 391,150 (C. A. 27, 4892).

Hydrogenation of unsaturated compounds. Yoshio Tanaka and Ryunosuke Kobayashi. Japan. 100,403, Apr. 4, 1933. Addn. to 89,632 (C. A. 25, 4281). Unsaturated compds. are reduced with  $H_2$  at ordinary or elevated pressure with Japanese acid clay or the like and reduced metals or hydroxides of metals as catalysts.

**Bi- and multi-valent organic compounds.** Léon Lilienfeld. Fr. 758,359, Jan. 15, 1934. Valuable bi- and multi-valent compds. (which may contain or not one or more free OH groups) contg. at least one atom of S, Te or Se and at least one halogen atom, are obtained when bi- and multi-valent halogen deriva. (which may contain or not one or more free OH groups and one or more other groups, *e. g.*, atoms of N or groups contg. N or O) are treated with inorg. sulfides or hydrosulfides in amt. appreciably less than the stoichiometric proportion. Examples are given of compds. from  $\alpha$ - and  $\beta$ -dichlorohydrin and trichlorohydrin. Other compds. are mentioned.

**Reducing organic compounds.** Farb- und Gerbstoff-Werke Carl Flesch, Jr. Fr. 758,969, Jan. 26, 1934. Org. compds. are reduced by means of alkali metals and alcs. *in vacuo*.

**Mercapto compounds.** Imperial Chemical Industries Ltd. Fr. 758,246, Jan. 12, 1934. 2,5 (and 2,8)-Dimercapto derivs. of 1-aminoanthraquinone are prepd. by treating 1-aminoanthraquinone-5 (and 8)-sulfonic acid with a hot alc. alkali sulfide or by treating 1-chloro-5- (and 8)-nitroanthraquinone with a hot alc. alkali acid sulfide. The compds. are converted by treatment with haloacetic acids to thioglycolic acids of anthraquinone and these give lactams when treated with hot dild. acids.

**Diazo compounds.** I. G. Farbenind. A.-G. (Anton Ossenbeck and Ernst Tietze, inventors). Ger. 593,260, Feb. 23, 1934 (Cl. 12g. 10). Solns. of diazo compds. are treated with cyclic sulfonic acids contg. at least one acylamino group, *e. g.*, 1-acetylaminobenzene-4-sulfonic acid. Stable solid compds. are obtained. Examples are given.

**Friedel-Craft reactions.** Fritz Hofmann and Carl Wulff. Ger. 513,414, Nov. 27, 1933 (Cl. 12o. 1.01). See Brit. 307,802 (C. A. 24, 127).

**Primary alcohols.** P. Ya. Loshakov and D. A. Alvin-Gutzetz. Russ. 31,431, Oct. 31, 1933. Primary alcohols with the same number of C atoms as the acid of the corresponding ester are prepared by reducing esters in abs. alc. with activated Al in the presence of catalysts such as ZnCl<sub>2</sub>, CuCl<sub>2</sub> or Zn.

**Alcohols.** N. V. de Bataafsche Petroleum Maatschappij. Fr. 758,141, Jan. 11, 1934. Alcs. are made by causing H<sub>2</sub>SO<sub>4</sub> to act on olefins obtained, *e. g.*, by cracking mineral oils, and the polymers formed are extd. by solvents of low b. p., *e. g.*, C<sub>6</sub>H<sub>6</sub>, toluene, xylene, CCl<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>Cl<sub>2</sub>, cyclohexane and isopropyl acetate, and the extn. agent is used as entrainer in the azeotropic distn. of the dild. alc. obtained by the distn. of the refined extn. product.

**Alcohols from olefins.** N. V. de Bataafsche Petroleum Maatschappij. Ger. 593,441, Feb. 28, 1934 (Cl. 12o. 5.02). In prepg. alcs. by absorbing olefins in H<sub>2</sub>SO<sub>4</sub> and hydrolyzing the sulfuric esters so obtained, impurities (polymerization products) are removed from the dild. sulfuric esters or from the aq. alcs. by extn. with an Edeleanu ext. of mineral oil. The esters may first be neutralized. Examples are given.

**Aliphatic alcohols; esters.** Henry Dreyfus. Brit. 402,060, Nov. 21, 1933. Aliphatic alcs. and (or) org. esters thereof are prepd. by subjecting hydrocarbons to thermal decompn. in the presence of the vapor of an org. acid, preferably a lower aliphatic acid, *e. g.*, AcOH, propionic acid. Suitable hydrocarbons are petroleum (fractions), C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>. In an example a mixt. of a vaporized petroleum fraction and AcOH vapor is passed through narrow tubes at 700° and atm. pressure and the products are passed at 400° and 400 atm. through tubes contg. H<sub>2</sub>PO<sub>4</sub> on pumice; the products include EtOAc.

**Aromatic amines.** Arthur W. Campbell (to B. F. Goodrich Co.). U. S. 1,950,079, March 6. When triphenylmethyl chloride is caused to react with diphenylamine in the presence of anhyd. AlCl<sub>3</sub>, the course of the reaction is modified and a considerable proportion of a new material is formed, which has the same empirical compn. as the *p*-phenylaminotetraphenylmethane already known, but which has a much higher m. p., namely, 350°. This new substance exhibits all the usual properties of a diarylamine, and is believed to be *p*-diphenylmethyl-*p'*-phenyl-

aminobiphenyl. Similar products may be obtained from other triarylmethyl halides such as tritolylmethyl chloride, trisbiphenylmethyl chloride, etc., when caused to react in the presence of AlCl<sub>3</sub> with diarylamines such as diphenylamine, phenyltolylamine, phenylanthrylamine, phenylbiphenylamine, etc., particularly when one of the aromatic rings in each component has a replaceable H in the *p*-position. However, the products of this new reaction are not necessarily para substituted compds., hence other positions of the constituent groups are not excluded. The reaction is not limited solely to diarylamines, for dimethyl-aniline, diethylaniline, and other aromatic amines and substituted aromatic amines undergo the same general reaction with triarylmethyl chlorides, with the formation of biaryl compds. having an amino group substituted on one of the aromatic rings and a diarylmethyl group on the other. The products may be used as dye intermediates, antioxidants, etc.

**Aromatic amines.** F. I. du Pont de Nemours & Co and Alexander J. Wuertz. Brit. 402,063, Nov. 13, 1933. Amines of the C<sub>6</sub>H<sub>5</sub> series are obtained by heating a halogenated C<sub>6</sub>H<sub>5</sub> with aq. NH<sub>3</sub> in the presence of an inorg. oxidant, *e. g.*, an alkali metal chlorate, perborate, perchlorate or dichromate. A metal (compd.), including and subsequent to Cu in the *t. m. f.* series, may be present as catalyst. In examples (1) PhNH<sub>2</sub> is obtained by heating PhCl with aq. NH<sub>3</sub> in presence of KClO<sub>3</sub>, NH<sub>4</sub>NO<sub>3</sub> and reduced Cu, and (2) *p*-phenylenediamine and *p*-nitroaniline are similarly obtained from *p*-dichlorobenzene and *p*-nitrochlorobenzene.

**Cyclic ketones.** I. G. Farbenind. A.-G. (Erwin Kramer, inventor). Ger. 590,579, Jan. 5, 1934 (Cl. 12o. 10). These are prepd. by heating carboxylic acid of the general formula *o*-HO<sub>2</sub>CC<sub>6</sub>H<sub>4</sub>XPh, their substitution products or derivs. with a free *o*-position to the X in the Ph nucleus, with aroyl acid halides, X being used to denote R<sup>1</sup>CR<sup>2</sup> where R<sup>1</sup> and/or R<sup>2</sup> denote H, a hydrocarbon residue or the groups C=O, S=O, O, S or NH. The H of the latter group may be replaced by the group denoted by R<sup>1</sup>. In an example, benzoyl-*o*-benzoic acid is heated with BzCl in C<sub>6</sub>H<sub>5</sub>Cl<sub>2</sub> to give a 90% yield of anthraquinone. Other examples describe the prepn. of phthaloylpyrene, m. 249-50°, anthraquinone-2,1(N-1',2'(N)-benzeneacridone, anthraquinone-2,1(N)-1',2'(N)-6,5(N)-1',2'(N)-dibenzeneacridone, 3',6'-dimethylantraquinone-2,1(N)-1',2'(N)-benzeneacridone, phenylantraquinone-2,1(N)-1',2'(N)-benzeneacridone and anthraquinone-2,3(S)-1',2'-benzenethioxanthone.

**Benzyl ethers.** Imperial Chemical Industries Ltd. Ger. 593,126, Feb. 21, 1934 (Cl. 12o. 5.09). See Brit. 393,937 (C. A. 27, 5752).

**Malonic esters.** Alexander Wacker Ges. für elektrochemische Industrie G. m. b. H. Fr. 758,043, Jan. 20, 1934. Diethylmalonic acid is esterified by alcs. of the fatty series by carrying out the reaction in the presence of a neutral solvent, *e. g.*, benzene or benzine. Examples are given of the prepn. of the di-Et (b<sub>15</sub> 100) and di-Bu ester (b<sub>15</sub> 143-6°).

**Phenols.** Soc. des usines chimiques Rhône-Poulenc Fr. 758,990, Jan. 26, 1934. Phenols are prepd. by hydrolyzing phenates in a molten, pasty or powd form and practically dry, the mass being maintained throughout the operation between 280° and 370° by a current of steam which carries off the phenol. The steam is passed through a mixt. of alkali arylsulfate and caustic alkali.

**Amides of higher fatty acids.** I. G. Farbenind. A. G. Fr. 757,867, Jan. 5, 1934. Amides of fatty acids contg. more than 10 C atoms are prepd. by passing NH<sub>3</sub> gas through a molten mass of the acids at a temp. betw. the m. p. of the acids and about 250°, and in the presence of a solid inorg. substance having a large surface.

**Hydrogenating pyridine or quinoline bases.** Schering Kahlbaum A.-G. Ger. 590,637, Jan. 6, 1934 (Cl. 12p. 1.01). Pyridine or quinoline bases are treated with hydrogenating agents in the presence of a catalyst. Thus, 1 mol. of pyridine is treated with 3 mol. of cyclohexanol and a hydrogenation catalyst at 210-30° in an autoclave

to give a qualitative yield of piperidine and cyclohexanone. Other examples are given.

**Aminodiphenylamine derivatives.** I. G. Farbenind. A.-G. Fr. 759,018, Jan. 27, 1934. Derivs. of 4-amino-diphenylamine are prep'd. by condensing *o*-chlorobenzoic acid or its substitution products with 1-amino-4-acylaminobenzenes substituted in the 3-position by an alkyl or alkoxy group and contg., if desired, other substituents except  $\text{SO}_2\text{H}$ ,  $\text{COOH}$  or  $\text{OH}$  groups, and eliminating the  $\text{COOH}$  and acyl group from the 4-acylamino-diphenylamine-2'-carboxylic acids, substituted in the 3-position. Examples are given of the prep'n. of 4-acetylamino-3-methoxydiphenylamine, m. 167-8° (uncorrected), and its 2'-carboxy deriv., m. 225-6° (uncorrected). Cf. C. A. 28, 781°.

**Anthrone derivatives.** I. G. Farbenind. A.-G. (Georg Kränzlein, Arthur Wolfram and Walter Broeker, inventors). Ger. 593,417, Feb. 26, 1934 (Cl. 12g. 37). 1-Amino-10-anthrone (I) and its homologs and substitution products are prep'd. by treating 2'-amino-2-benzylbenzoic acid and its homologs and substitution products or derivs. thereof with acid-condensing agents, e. g., with  $\text{H}_2\text{SO}_4$  at 60-65%. Examples are given of the prep'n. of I, m. 172-3°, and 3-methyl-I, m. 196-7°. The products yield the corresponding aminoanthraquinones when allowed to stand in the air.

**Albumin decomposition products.** I. G. Farbenind. A.-G. Fr. 757,988, Jan. 8, 1934. Certain plants rich in albumin, or their seeds, e. g., seeds of lupine or cucurbit, are decomposed directly and without preliminary treatment by dild. mineral acids, at a high temp. and preferably under pressure. The amino acids are sep'd. in the form of their heavy metal salts.

**Alkali alcoholates.** I. G. Farbenind. A.-G. (Paul Heisel and Eduard Berghelmer, inventors). Ger. 593,385, Feb. 28, 1934 (Cl. 12o. 5.04). Alkali metal amalgams are treated with vaporized alcs. App. is described.

**Alkaline earth formates.** Rudolph Koepp & Co. Ger. 590,635, Jan. 8, 1934 (Cl. 12o. 11). CO is caused to react on  $\text{Ca}(\text{OH})_2$ , etc., at raised temps. and pressures in the presence of 10-20 parts of alkali formate to each 100 parts of  $\text{Ca}(\text{OH})_2$ .

**Alkali metal oxalates.** Rudolph Koepp & Co. Chemische Fabrik A.-G. Fr. 759,253, Jan. 31, 1934. Alkali metal oxalates are made by heating alkali formates in the presence of an alkali hydroxide, the 2 being heated from the start in intimate admixt. with H, preferably at 200-350°.

**Copper compound of indophenol.** N. S. Tikhonov. Russ. 31,524, Oct. 31, 1933. To a soln. of phenyl-1-naphthylamine-8-sulfonic acid and  $\text{CuSO}_4$ , alkalis are added, the ppt. is mixed with an alk. soln. of *p*-aminophenol and air is blown through the mixt. until indophenol is formed. The Cu compd. of the indophenol is then isolated in the usual manner.

**Potassium and sodium xanthates.** I. Ya. Frenkel. Russ. 31,438, Oct. 31, 1933. Air satd. with  $\text{CS}_2$  vapors is blown through an alc. soln. of  $\text{NaOH}$  or  $\text{KOH}$  until a thick mass is obtained. This is sep'd. from the mother liquor by one of the usual methods such as centrifuging, and the mother liquor is again used in the process.

**Acetyl chloride.** I. G. Farbenind. A.-G. Brit. 102,328, Nov. 30, 1933. See Fr. 754,986 (C. A. 28, 1361°); Brit. 402,335, Nov. 30, 1933. See Fr. 755,052 (C. A. 28, 1361°).

**Organic phosphates.** Chemische Fabrik von Heyden A.-G. Fr. 758,362, Jan. 15, 1934. See Brit. 398,659 (C. A. 28, 1362°).

**Alkyl phosphates.** Hajime Ueda and Kyōhei Murakami. Japan. 99,857, March 1, 1933. The formation of phosphates from alcs. and  $\text{POCl}_3$  is improved by passing inactive gases such as  $\text{H}_2$  or  $\text{CO}_2$  into the reacting liquid. The addn. of metals, metallic halides, acid clay, silica gel or active C also is recommended.

**Aminoalkyl chlorides and alcohols.** Boot's Pure Drug Co. Ltd., Frank L. Pyman and Hyman H. L. Levene. Brit. 402,159, Nov. 30, 1933. Aminoalkyl chlorides of formula  $\text{R}(\text{CH}_2)_n\text{Cl}$ , in which R is a dialkylamino or

piperidyl residue and *n* is 7-11, are prep'd. by treating the corresponding amino alc. with  $\text{SOCl}_2$  at low temp., preferably below 0°, in a solvent such as  $\text{CHCl}_3$ . Examples are given of the prep'n. of  $\lambda$ -diethylaminoundecyl,  $\eta$ -diethylaminoheptyl,  $\alpha$ -dibutylaminodecyl,  $\alpha$ -*N*-piperidyldecyl and  $\lambda$ -dibutylaminoundecyl chlorides. The amino alcs. are obtained by (1) interaction of the appropriate secondary amine and chloro alc. or (2) reduction with Na and alc. of the corresponding amino carboxylic acid alkyl esters, which may be prep'd. by treating the halo-substituted carboxylic acid alkyl esters with the requisite secondary amine. Thus  $\eta$ -diethylaminoheptyl alc. results from the interaction of  $\eta$ -chloroheptyl alc. with diethylamine (I) and  $\lambda$ -diethylaminoundecyl alc. is obtained by treating Et  $\alpha$ -bromoundecate with I and reducing the Et  $\alpha$ -diethylaminoundecate formed.

**Aliphatic acids.** Gilbert B. Carpenter. Can. 339,932, Mar. 13, 1934. Aliphatic acids are produced by the reaction of olefins with formic acid. Diolefins form dicarboxylic acids. Pressures of 25 900 atm. and temps. of 100-500° are preferred for the reaction, and the efficiency is increased by the use of catalysts.

**Aliphatic acids.** Gilbert B. Carpenter. Can. 339,933, Mar. 13, 1934. Aliphatic acids are prep'd. by passing steam, CO and olefins in the vapor phase over a metallic halide. Chlorides, bromides and iodides of the alk. earth metals Ca, Ba, Sr, Mg, Na, K, Cs, Rb and Li and more particularly the iodides of these elements are preferred. Halides of Sn, Fe, Co, Ni, Bi, Mn, Pb, Ti, Zn, Cd and Mo may be used, but they do not generally have as long a life as the halides of the alkali and alk. earth metals. Pressure in excess of atm., say from 25-900 atm. is of advantage. The desired reaction temp. can be obtained at from 200-500°. Can. 339,935 specifies the use as catalyst of one or more acidic oxides of the groups III, IV, V and VI of the periodic table and particularly the oxides of Mo, P, As, W, U, Cr, V, Ti, Zr and B. Can. 339,937 specifies as catalyst acid Zn, Ca, Mg, Na, K, Cu, Ce, Th and other salts of the acids of P, As, W, Mo, U, Cr, V, B, Si and Zr.

**Formic acid.** Gilbert B. Carpenter (to E. I. du Pont de Nemours & Co.). U. S. 1,949,825, March 6. A gaseous mixt. of CO and steam is passed over a catalyst such as a silicotungstic, silicomolybdic or phosphomolybdic acid catalyst (suitably at a temp. of about 325°).

**Acetic acid from formaldehyde.** Stanley J. Green and Roy Sponson (to Celanese Corp. of America). U. S. 1,950,027, March 6.  $\text{CH}_2\text{O}$  vapor is subjected to heat (suitably at a temp. of about 300-400°) under a pressure of at least 100 atm. Cf. C. A. 28, 1055°.

**Separating mixtures of water, acetic acid and acetic anhydride.** Ernst Berl. Ger. 590,856, Jan. 11, 1924 (Cl. 12o. 12)°. Mixts. of water,  $\text{AcOH}$  and  $\text{Ac}_2\text{O}$  are shaken with satd. solns. of salts such as  $\text{NaCl}$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ , etc., which do not form mol. compds. with  $\text{AcOH}$ , and with aromatic hydroaromatic or aliphatic hydrocarbons, pure or halogenated. In an example, a mixt. of water,  $\text{AcOH}$  and  $\text{Ac}_2\text{O}$  is shaken with a satd. soln. of  $\text{NaCl}$  and  $\text{C}_6\text{H}_6$ . On allowing the layers to sep., the aq. salt layer is run off. The  $\text{C}_6\text{H}_6$  layer contains practically all the  $\text{Ac}_2\text{O}$  and some of the  $\text{AcOH}$ . The aq. layer contains all the water and the rest of the  $\text{AcOH}$ .

**Citric acid.** Arenella (Soc. per l'ind. dell'acido citrico ed affini). Fr. 759,259, Jan. 31, 1934. Juices contg. citric acid are treated to ppt. or remove colloids, then concd. to about 200 g. of citric acid per l., a sol. Ca salt is added to increase the concn. of Ca ions and  $\text{CaO}$  or  $\text{CaCO}_3$  is added to ppt. Ca citrate, but not in amt. to reach the  $p_{\text{H}}$  corresponding to the isoelectric pt. of the colloids still present. The citrate is decomposed with  $\text{H}_2\text{SO}_4$  to obtain pure citric acid.

**Oxalic acid.** V. A. Ioffe and A. V. Vodzinskaya. Russ. 31,436, Oct. 31, 1933.  $\text{Na}_2\text{C}_2\text{O}_4$  is treated with  $\text{H}_2\text{SO}_4$  to ppt.  $\text{NaHC}_2\text{O}_4$ . This is filtered off and further treated with  $\text{H}_2\text{SO}_4$  to form  $\text{H}_2\text{C}_2\text{O}_4$ .

**Benzoic acid and benzoates.** Bozel-Malétra (Société industrielle de produits chimiques). Brit. 402,529, Dec. 7, 1933. See Fr. 753,918 (C. A. 28, 1056°).

**Hydroxy dicarboxylic acids.** Standard Brands Inc. Fr. 759,225, Jan. 31, 1934. These acids or their salts are prepd. by oxidizing a dicarboxylic acid or its salt having an ethylenic structure, in the presence of a catalyst, in a liquid medium in which the proportion of acid to liquid medium is at the start greater than 1 to 10. A concd. soln. of the acid to be produced may be used as medium.

**Hydroxy-3,5-diiodo-2-pyridinecarboxylic acid.** Max Dohrn and Paul Diedrich (to Schering-Kahlbaum A.-G.). U. S. 1,950,543, March 13, 4-, or 6-Hydroxy-3,5-diiodo-2-pyridinecarboxylic acids are produced by the action of I in alk. soln. on 4- or 6-hydroxy-mono- or -polypyrindinecarboxylic acids which contain a carboxyl group in *m*-position to the hydroxy group. The 6-hydroxy deriv. discolors at 240° and seps. I at 272° and the 4-hydroxy deriv. decomposes at 250°. Their alkali metal salts dissolve readily in cold water. Various examples with details of procedure are given.

**2-Furaldehyde.** D. I. Miris and L. M. Sergel. Russ. 31,433, Oct. 31, 1933. 2-Furaldehyde is prepd. by treating in an autoclave in the presence of aq. solns. of H<sub>2</sub>SO<sub>4</sub> and NaCl or NaCl alone, spent tanning solns. alone or together with tanbark.

**2-Furaldehyde.** A. E. Arbuzov and B. P. Lugovkin. Russ. 31,434, Oct. 31, 1933. Pentosan-contg. substances are heated under pressure in a dild. phosphoric acid soln.

**Phenol from monochlorobenzene.** Russell L. Jenkins and James F. Norris (to Swann Research, Inc.). U. S. 1,950,359, March 6. In a process involving reaction of PhCl with steam, the HCl produced is neutralized with lime, and the mixt. is distd. until substantially all the PhCl is removed, CaCl<sub>2</sub> is added to produce a concn. of CaCl<sub>2</sub> equal to about 40% of the aq. layer, the aq. CaCl<sub>2</sub> layer is sepd. from the phenol layer, and the phenol layer is distd. to obtain PhOH. Various details of app. arrangement are described.

**Bornyl oxalates; borneols.** Léon Darrasse, Etienne Darrasse, Lucien Dupont and Fgon Elod. Brit. 402,286 Nov. 30, 1933; Fr. 751,276, Aug. 30, 1933. Bornyl oxalates are prepd. by treating pinene with anhyd. (COOH)<sub>2</sub> under the following conditions; (a) in the absence both of a solvent and of a condensing agent, (b) with continuous agitation at 110-25°, and (c) with elimination of the H<sub>2</sub>O formed, e. g., by Na<sub>2</sub>SO<sub>4</sub>, or in an O-free atm. or under reduced pressure. Borneols may be obtained by sapon. of the products. The O-free atm. may be obtained by passing N, CO<sub>2</sub> or C<sub>2</sub>H<sub>6</sub> through the

mixt. Borneol is obtained from pinene and isoborneol from essence of turpentine (in examples).

**Aminopyridylazoquinolines.** C. I. Boehringer & Soehne, G. m. b. H. Brit. 402,184, Nov. 30, 1933. 2',6'-Diaminopyridyl-8-azoquinolines are manufd. by diazotizing 8-aminoquinoline (I) or its substitution products and coupling with 2,6-diaminopyridine, both steps taking place in the presence of more than 1 equiv. of excess acid. Examples describe the use as diazo components of I and 6-methoxy-, 6-ethoxy- and 6-chloro-8-quinolines, in each case in presence of excess HCl. The free bases are liberated by NH<sub>3</sub> from the hydrochlorides obtained.

**Anthrapyrimidines.** I. G. Farbenind. A.-G. (Max A. Kunz and Karl Köhler, inventors). Ger. 590,747, Jan. 12, 1934 (Cl. 23b. 3.15); Fr. 759,263, Jan. 31, 1934.  $\alpha$ -Nitroanthraquinone or its substitution products are condensed with HCONH<sub>2</sub>. Thus, 1-amino-4-nitroanthraquinone in PhOH is heated with HCONH<sub>2</sub> in the presence of NH<sub>4</sub>VO<sub>3</sub> to give 4-amino-1,9-anthrapyrimidine, m. 278-80°. The prepn. of the following is also described: 1,9,5,10-anthradipyrimidine, m. 345°, 5-benzoylamino-1,9-anthrapyrimidine, and 8-amino-1,9-anthrapyrimidine, m. 276°.

**Terpinol hydrate.** P. P. Kolosov and F. D. Zeltzer. Russ. 31,439, Oct. 31, 1933. A continuous stream of turpentine is passed upward through a layer of wood shavings soaked in H<sub>2</sub>SO<sub>4</sub>.

**3-Hydroxyselenonaphthene.** Wilhelm Schneider (to Agfa Anso Corp.). U. S. 1,949,815, March 6. Reaction is effected between KCN and Se and a diazotized ester of an anthranilic acid such as diazotized methyl anthranilic ester. The reaction product is saponified, the saponified product is treated with monochloroacetic acid and the product thus obtained is transformed into the 3-hydroxyselenonaphthene by boiling with Ac<sub>2</sub>O and subsequent saponification.

***o*-(Carbomethoxymethoxy)- or (carbethoxymethoxy)-benzamide.** E. A. Tzofin and K. Chkhikvadze. Russ. 31,432, Oct. 31, 1933. Salicylamide is condensed with ClCH<sub>2</sub>CO<sub>2</sub>Me or ClCH<sub>2</sub>CO<sub>2</sub>Et in the presence of Na methylate or ethylate.

***N*-Allyl-*o*-(carboxymethoxy)benzamide.** E. A. Tzofin and K. Chkhikvadze. Russ. 31,437, Oct. 31, 1933. *o*-H<sub>2</sub>NOCC<sub>6</sub>H<sub>4</sub>COCH<sub>2</sub>CO<sub>2</sub>Et is treated with Na in neutral *o*-solvents such as C<sub>6</sub>H<sub>6</sub> or its homologs. The Na deriv. thus produced is treated with allyl bromide and the product saponified in the cold.

## II BIOLOGICAL CHEMISTRY

PAUL K. HOWE

### A—GENERAL

ARTHUR W. DOX

**Diffusion of alcohol in the organism and bounu water.** Maurice Nicloux. *Compt. rend.* 198, 983-5 (1934); cf. C. A. 27, 2969. Philip D. Adams

**Specificity of hydratases. Action of peas and yeast on crotonic acid.** K. P. Jacobsohn and P. Belo Pereira. *Compt. rend. soc. biol.* 108, 208-10 (1931). Crotonic acid is unattacked by peas or yeast at *p*<sub>H</sub> 7.0; hence furmarase is considered sp. B. C. A.

**Action of several alkaloids on invertase.** G. Mezzadrol and A. Amati. *Atti accad. Lincei* 18, 226-31 (1933); cf. C. A. 28, 2388. The enzymic action of invertase is retarded by the presence of larger amts. of alkaloids. Strychnine nitrate at 0.05, 0.1, 0.2 and 0.3% reduces the activity of invertase 70.13, 79.23, 85.07 and 87.02%, resp. In the same concns. caffeine reduces the activity 2.72, 4.76, 4.76 and 4.76%, and quinine sulfate 3.90, 12.34, 20.12 and 20.13%, resp. A. W. Contieri

**The dehydrogenation of the higher fatty acids contained in the liver.** II. F. P. Mazza and C. Zummo. *Atti accad. Lincei* 18, 461-3 (1933).  $\Delta^2$ - $\beta$ -Oleic acid is not dehydrogenated in the presence of liver exts. This is in ac-

cord with the theory of  $\beta$ -oxidation, as the 1st step in the oxidation of a satd. fatty acid is the formation of an  $\alpha$ - $\beta$  double-bond compd. *Es. coli* has been shown to behave in a similar manner (C. A. 28, 1731) as it oxidizes stearic acid, but not the unsatd. oleic acid. When, however, the liver ext. is buffered at *p*<sub>H</sub> 7.5, with phosphate, as described (C. A. 27, 5087) both stearic and oleic acids absorb 82-85% more O<sub>2</sub>, showing that there is present in the liver, a complex system which oxidizes fatty acids, of which dehydrogenase, described in the above paper, is one component. A. W. Contieri

**Preparation of the dipeptide-phosphoric acid from casein.** Comment on the paper of P. A. Levene and D. W. Hill. Gerhard Schmidt. *Z. physiol. Chem.* 223, 86-8 (1934); cf. C. A. 27, 5354. Further details are given of the prepn. of the dipeptide-phosphoric acid, contg. serine, glutamic acid and H<sub>2</sub>PO<sub>4</sub>, by tryptic digestion of casein (*Arch. sci. biol.* (Italy) 19, 313 (1933)). The same product has more recently been obtained by Levene and Hill (C. A. 27, 5354) by essentially the same procedure except that the digestion products were further hydrolyzed by HCl. The fact that the substance can be obtained by enzyme hydrolysis alone characterizes it as a biol. degradation product of casein. The Ba salt has the formula (C<sub>12</sub>H<sub>10</sub>

O<sub>2</sub>N<sub>2</sub>P)Ba. Ba salts with a lower P:N ratio yielded on hydrolysis a leucine in addn. to the serine and glutamic acid. The free acid gives a strong red biuret-reaction.

A. W. Dox

**The phosphatase balance in the tumorous organism.** Franz Köhler. *Z. physiol. Chem.* 223, 98 104 (1934); cf. *C. A.* 27, 4820.—The presence of cancer tissue exerts a profound influence on the activation capacity of phosphatase by MgCl<sub>2</sub>. The regular decrease in phosphatase activity of the aging tumor tissue and that of the muscle run parallel. Muscle phosphatase of the diseased organism falls below that of normal muscle. The kidney, which in the cancerous organism shows increased phosphatase activity, is especially rich in phosphatase in cancer-immune rats. Muscle and kidney phosphatase of normal rats is fully activated. In cancerous rats, on the other hand, the glycerophosphatase is only about 30% active while the tumor itself has much higher activity. Cancerous rats also show a large increase in phosphatase in the blood. It appears that the activator is transferred from the kidney to the blood.

A. W. Dox

**The occurrence of flavins in animal tissues.** Hans v. Euler and Erich Adler. *Z. physiol. Chem.* 223, 105 12 (1934).—Animal organs richest in vitamin B<sub>2</sub> have also the highest flavin content. Liver and kidney contain 10–20  $\gamma$  per g. of fresh wt., suprarenal and corpus luteum 5–10  $\gamma$ , various other organs still less, and blood and serum only 0.025  $\gamma$ . The method of detn. consisted in measuring the intensity of fluorescence of aq. solns. prep'd. from MeAc exts., with pure lactoflavin as the standard of comparison. The fluorescence attains a max. at pH 7 but disappears on addn. of mineral acid or alkali or on reduction by Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> to the leuco form. The retinas of fish eyes are rich in flavin; suggesting a physiol. function in light sensitization. The flavin extd. from corpus luteum of cows is accompanied by a substance with blue fluorescence, probably a secondary product formed during the course of extn. This is stable to acid and alkali, also to oxidation and reduction.

A. W. Dox

**Enzymic histochemistry. VII.** K. Linderström-Lang and Heinz Holter. a. **Peptidase in the eggs of *Psammochinus miliaris*.** Tore Philipson. *Z. physiol. Chem.* 223, 119–25 (1934); cf. *C. A.* 28, 2025<sup>a</sup>. b. **Note on the distribution of the mitochondria of the *Psammochinus* egg on centrifugation.** K. Linderström-Lang and Heinz Holter. *Ibid.* 125–6.—Centrifugation of unfertilized *Psammochinus* eggs at 8000–13000 revolutions per min. causes a stratification into 3 layers; the upper consisting of the yolk and having the greatest peptidase activity toward  $\alpha$ -nitylglycine. The egg fragments collect at the interface between the 2 upper layers. The lower layer of these fragments is richer in peptidase than the upper. A. W. D.

**The activation of "papain" by vitamin C-iron and its inhibition by vitamin C (ascorbic acid).** Ernst Maschmann and Erica Helmert. *Z. physiol. Chem.* 223, 127–35 (1934).—Hydrolysis of gelatin by papain is inhibited by vitamin C but activated by vitamin C plus Fe. Other metals such as Mn and Cu cannot replace Fe in this activation. Minute quantities of Cu completely suppress the activation by vitamin C + Fe. Different brands of commercial papain are not hydrolyzed to the same extent by the same concn. of papain, but after activation of the enzyme by vitamin C the extent of hydrolysis is quite uniform. Activation may occur either by overcoming the influence of inhibitory substances or by making available new points of attack in the substrate, e. g., by reduction of SS to SH. Ascorbic acid completely counteracts the inhibition of papain by vitamin C. Fe not only overcomes the inhibition by vitamin C, but activates the hydrolysis beyond that of the non-activated enzyme. Vitamin C in combination with Fe thus constitutes a special type of activator. Hydrolysis in the presence of this activator is retarded in the initial stages but attains its max. velocity after several hrs.

A. W. Dox

**Reducing substances of living tissues.** R. Bieri and A. Rosenbohm. *Z. physiol. Chem.* 223, 136–43 (1934); cf. *C. A.* 27, 5346.—On the basis of I titration values and feeding expts. evidence is believed to have been ob-

tained that exts. of various animal organs contain ascorbic acid, vitamin B<sub>2</sub> and another reducing substance, in addn. to the glutathione previously demonstrated. In living tissue glutathione occurs only in its reduced form.

A. W. Dox

**The problem of the reaction of protoplasm.** (New experimental studies on amebas.) Josef Spék and Robert Chambers. *Protoplasma* 20, 376–406 (1933).—The reactions of *Amoeba dubia* when injected with the whole series of Clark and Lubs pH indicators from bromophenol blue to thymol blue were studied. These indicators were also used in conjunction with NaOH, HCl, lactic acid and butyric acid. Various salts were also injected along with the dyes, such as CaCl<sub>2</sub>, MgCl<sub>2</sub>, MnCl<sub>2</sub>, ZnSO<sub>4</sub> and Co(NO<sub>3</sub>)<sub>2</sub>, and their effects noted. Twelve references. F. L. D.

**The limiting cell layer.** W. Kopaczewski. *Protoplasma* 20, 407–39 (1933).—A full discussion, including structure of cells, their chem. compn. and phys. characteristics, followed by K.'s conclusions. Two hundred and five references. F. L. Dunlap

**The influence of preservatives on the action of enzymes.** Th. Sabatichka. *Z. Untersuch. Lebensm.* 67, 203–4 (1934); cf. Kluge, *C. A.* 28, 1723<sup>1</sup>. Polemical.

F. L. Dunlap

**Influence of preservatives on animals suffering from avitaminosis.** H. Cremer. *Z. Untersuch. Lebensm.* 67, 205 (1934); cf. Kluge, *C. A.* 28, 1723<sup>1</sup>. Polemical.

F. L. Dunlap

**Influence of preservatives on the action of enzymes and on animals suffering from avitaminosis.** K. Kluge. *Z. Untersuch. Lebensm.* 67, 205–6 (1934).—Polemical with Sabatichka and with Cremer (cf. 2 preceding abstracts).

F. L. Dunlap

**The formation of urea from carbamino acids, hydantoins and albumins by the influence of enzymes (reductases) in neutral solution.** Mitsunori Wada. *Proc. Imp. Acad. (Tokyo)* 10, 17–20 (1934). An enzyme is present in milk, blood and pancreas or liver ext. which splits off urea from various carbamino acids, hydantoins and albumin. The enzyme is thermolabile and its character is not clear, although it apparently is a reductase, since urea formation and reducing power run parallel.

R. C. Elderfield

**Function of pH in the precipitation of blood-serum proteins and lipoids by neutral salts.** G. Sandoz, A. E. Bonnelor and P. Goret. *Bull. soc. chim. biol.* 15, 1472–82 (1933); cf. *C. A.* 28, 1065<sup>a</sup>. When serum proteins are ppt'd. by Macheboeuf's method by (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> at pH 3.0–3.8 the pptn. of both proteins and lipoids is complete. The proteins are not denatured. If a soln. of the proteins contg. much (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> is gradually acidified with H<sub>2</sub>SO<sub>4</sub> the ppt. attains a first max. at pH 6.55, then largely redissolves as more acid is added and again pptn., quantitatively, at pH 3.7.

L. E. Gilson

**Effect of temperature on the activity of amylase.** S. Frautmann and L. Ambuhl. *Bull. soc. chim. biol.* 16, 35–51 (1934).—See *C. A.* 28, 787<sup>1</sup>, 1724<sup>a</sup>. L. E. G.

**Hypoglucemic action of duodenal extracts.** Jean La Barre and Jules Ledrut. *Compt. rend. soc. biol.* 115, 750–2 (1934); cf. *C. A.* 28, 210<sup>1</sup>. Hydrolysis of secretin by pepsin or activated pancreatin gave a product which had no hypopietic action or stimulating effect on intestinal secretion, but which after oral or intravenous administration caused a marked decrease in blood sugar in normal or pancreatectomized dogs.

L. E. Gilson

**The calcium and sodium of [serum] proteins.** R. Cernatesco and I. Ornstein. *Compt. rend. soc. biol.* 115, 786–8 (1934).—The proteins ppt'd. from blood serum by EtOH contain 82% of the total Ca of the serum and less than 1% of the Na.

L. E. Gilson

**Heat-inactivation of crystalline pepsin; the critical increment of the process.** Wilfrid J. Loughlin. *Biochem. J.* 27, 1779–88 (1933).—The process of heat-inactivation follows the theoretical unimol. course. At a given temp. the rate of heat-inactivation varies with the pH, being min. at 3–4.5 and increasing rapidly in either direction beyond this range. With regard to the effect of temp., the critical increment of the process is of the order of 80,000

calories. The heat-inactivation of enzymes and the heat-denaturation of proteins are analogous except for the location of the min. speed (for which no explanation can be offered at present).

Benjamin Harrow

The physicochemical behavior of lecithin. III. The electrophoretic behavior of lecithin-cholesterol dispersions. Christopher W. Price. *Biochem. J.* 27, 1789-92(1933); cf. *C. A.* 27, 4404.—The mobility- $pH$  relationship of dispersions of lecithin + cholesterol in equimol. proportions has been detd. There is no change in the mobility at various  $pH$  values or in the position of the isoelec. point produced by the addn. of cholesterol to lecithin. The bonds or groups responsible for the formation of the lecithin-cholesterol complex cannot be the amphoteric groups of the lecithin or those on which ion adsorption takes place.

Benjamin Harrow

Velocity of solubility of various samples of dental enamel. Frank F. Kanthak. *J. Dental Research* 14, 21-8(1934).—Powd. dried enamel from teeth of individuals of various ages (6-67 yrs.) had the av. Ca:P ratio 2.38, and a quite uniform content of these elements. Both this ratio and the rate of soln. of the enamel in an acetate buffer of  $pH$  4.60 bore no apparent relation to either age or the state of the teeth.

Joseph S. Hephurn

The coagulation of muscle plasma. II. The solubility of myosin. E. C. Smith. *Proc. Roy. Soc. (London)* B114, 494-505(1934); cf. *C. A.* 24, 3044.—The coagulation of muscle plasma is due to the pptn. of myosin from a sol which is not originally present in muscle, but is formed by addn. of salt to the muscle before expression of the plasma. The soly. of myosin depends upon the concn. of salts,  $pH$ , and the total protein concn. In the muscle of a living rabbit, not more than 10% of the total myosin is present as a sol.

Joseph S. Hephurn

Phase changes in enzyme systems: azotase activity in relation to  $pH$ . Dean Burk and Haus Lineweaver. *J. Phys. Chem.* 38, 35-46(1934).—Azotase activity in *Azotobacter* varies abruptly with  $pH$ . A characteristic zero limit at 5.97 is approached reversibly and perpendicularly. Phase-rule analysis implicates a 2-component heterogeneous system with 3 phases in equilibrium at the crit.  $pH$ —aq., active non-aq. and inactive non-aq. The active (basic) component exists above the crit.  $pH$ ; the inactive (acidic) one below. Slight phase non-homogeneity may occur between  $pH$  5.97 and 6.37. Interpretation of the abrupt  $pH$  function, alternative to phase change, such as normal acid-base dissociation, large mol.-wt. change, multiple basicity and minimal charge or p. d. have been discarded as inconsistent with one or more characteristics of the reaction. Phase-rule applications to microheterogeneous systems, surfaces and problems of general enzyme reaction velocity and stability are indicated briefly.

L. K.

Cytochrome and the supposed direct spectroscopic observation of oxidase. D. Keilin. *Nature* 133, 290 1 (1934); cf. *C. A.* 27, 5342.—The absorption bands of cytochrome from microorganisms may be shifted in either direction from the normal. Bands are shown for baker's yeast, brewer's yeasts, *B. megatherium*, *Azotobacter*, *Es. coli* and *B. proteus*, *Es. coli* and CO, *Es. coli* with O and KCN, and oxidized *Es. coli*. All the absorption bands of hematin compds. seen by the direct spectroscopic examn. of cells of different organisms belong either to free hematin or to the different components; not to the oxidase or the O-transporting enzyme (of Warburg).

W. D. L.

Phosphatases of the bovine kidney. IV. V. A study of other enzymes in the enzyme powder of the kidney. Masamichi Morii. *Arb. drilt. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 1-9, 16-22(1933); cf. *C. A.* 27, 1647.—By pptn. with MeOH and dialysis M. obtained an enzyme powder from bovine kidney ext. which hydrolyzed carbohydrate  $H_2PO_4$  and Et pyrophosphoric esters, but which had no effect on the glycerophosphoric acid ester. He infers that the agent of bovine kidney ext. which hydrolyzes glycerophosphoric acid differs from the one which hydrolyzes ortho- and pyrophosphoric esters. Methods used for the sepn. of the enzymes by pptn. with  $CuCl_2$ ,  $FeCl_3$  and  $AlCl_3$  are described. The activity of the kidney diastase is expressed by the formula  $D_{25}^{37} =$

5, and that of lipase by  $L_{25}^{37} = 0.4$  cc. 0.1 N NaOH. No evidence was found of the presence in the kidney of disaccharidase, lecithinase, dipeptidase or protease.

B. S. Levine

The perfusion of the kidney with phosphoric acid ester. Masamichi Morii, Kuniaki Shibuya and Yutaka Iwaki. *Arb. drilt. Abt. Anat. Inst. Kaiser. Univ. Kyoto Ser. C*, No. 4, 52-3(1933); cf. *C. A.* 27, 1647.—Perfusion expts. were performed on the isolated kidney of the rabbit. The  $H_2PO_4$  ester is recovered from the perfusion fluid in its original state.

B. S. Levine

Hormones, vitamins, cell growth and carcinoma. Fritz Ludwig and Julius v. Ries. *Schweiz. med. Wochschr.* 64, 141-6(1934).—The influence on the growth of rat carcinoma and wheat seedlings of various hormone and vitamin preps. with and without light is described.

Milton Levy

The organic acids of urine. W. Mecke. *Z. ges. expl. Med.* 92, 688-91(1934).—The dissociation const. of creatinine is  $5.9 \times 10^{-10}$  at 21°. The org. acids of urine fall into 2 groups. One group has constants between  $10^{-3}$  and  $10^{-4}$  and the other between  $3 \times 10^{-4}$  and  $10^{-5}$ . On alk. diets the acids of the second group increase.

M. L.

The heat liberated by the beating heart. VIII. A new method of analyzing waves of heat production, also a study of variability of heat production, associated directly with the contractile act. C. D. Snyder. *Am. J. Physiol.* 107, 551-67(1934); cf. *C. A.* 22, 1786.—Heat production in heart muscle, both in the absence and presence of O, may vary considerably.

J. F. Lyman

Redistributions of water following transfusions and infusions. E. F. Adolph, M. J. Gerbasi and M. J. Lepore. *Am. J. Physiol.* 107, 647-66(1934).—Addn. of fluid to the blood caused concn. whenever the infusion liquid was more dil. than blood with respect to colloids, even though the crystalloids were highly concd. When the infusion fluid was blood itself a similar concn. occurred. When the fluid exerted colloid osmotic pressure only slightly greater than that of the plasma, as 6% gelatin of ucinia, then water was attracted into the blood stream and kept there for at least 1 hr., the limit of observation.

J. F. Lyman

Max v. Frey. H. Rein. *Ergebnisse Physiol.* 35, 1 (1933).—An obituary.

C. M. McCay

Olaf Hammarsten. T. Thunberg. *Ergebnisse Physiol.* 35, 13-31(1933).—An obituary.

C. M. McCay

Gustav Embden. H. J. Deuticke. *Ergebnisse Physiol.* 35, 31-49(1933).—An obituary.

C. M. McCay

Chemical processes in tissue culture. Albert Fischer. *Ergebnisse Physiol.* 35, 82-115(1933).—A review involving modern concepts of vitamins, hormones and pigments.

C. M. McCay

New methods of organic chemistry in physiology. •H. Willstardt. *Ergebnisse Physiol.* 35, 116-57(1933).—This review covers more recent syntheses of org. compds., such as pyrroles, of interest to biochemist.

C. M. McCay

Chemical studies of natural pigments. E. Bergmann. *Ergebnisse Physiol.* 35, 158-300(1933).—An extensive review.

C. M. McCay

The use of enzymes in the study of protein structure. K. Linderström-Lang. *Ergebnisse Physiol.* 35, 415-60(1933).—A review.

C. M. McCay

The chemical nature of enzymes. W. Langenbeck. *Ergebnisse Physiol.* 35, 470-97(1933).—A review.

C. M. McCay

Enzymes containing hemin. Karl Zeile. *Ergebnisse Physiol.* 35, 498-537(1933).—A review.

C. M. McCay

Changes which solutions of monosaccharides undergo when heated in the autoclave. V. Cianci and L. Pannam. *Boll. soc. ital. biol. sper.* 8, 1684-7(1933).—In a previous communication (cf. *C. A.* 27, 2170) the results obtained by heating glucose solns. in the autoclave were reported. The same procedure has been used in studying solns. of fructose and galactose. In general, under the same exptl. conditions, the 3 sugars behave alike; the changes are slightly more marked in fructose than in glucose, and the least in galactose solns. In unbuffered solns. the caramelization of fructose is more intense. Changes which solutions of disaccharides undergo when heated in the auto



clave. *Ibid.* 1687-91.—Sucrose, lactose and maltose solns. were subjected to the same exptl. conditions. Sucrose was least affected while lactose and maltose solns. showed more marked changes than sucrose, but less than the monosaccharide solns. However, the course of the reactions involved is the same for all sugars: solns. of sugars heated to 134° for 30 min. in the autoclave become acid and this acidity increases by increasing (1) temp. and time until a point of equil. is reached; (2) the initial  $p_H$  of the soln.; (3) the concn. of the sugar; (4) the concn. of the buffer. The last is the most important factor since it displaces the equil. of the reaction, thus permitting the formation of caramel and a production of acid proportional to the buffering power of the soln. Peter Masucci

The influence of the buffer veronal-acetate on the changes which solutions of glucose undergo in the autoclave. V. Cianci. *Boll. soc. ital. biol. sper.* 8, 1691-4 (1933).—The results obtained with a phosphate buffer were compared with those with the Michaelis veronal-acetate buffer. The changes produced in heating the glucose soln. were of similar nature if judged from the intensity of color and the amt. of titratable acid produced. These 2 factors are related to the concn. of buffer used regardless of whether it is phosphate or the veronal-acetate buffer. The quant. difference noted is ascribed to the difference in the concn. and disocn. of the substances functioning as buffers in the 2 solns. The more intensive action of the phosphate buffer with respect to other buffers is ascribed to the marked buffer power of the phosphates which probably liberate a larger no. of  $-OH$  ions. The amt. of acid produced is related to the quantity of  $OH$  ions free or capable of becoming free. The velocity of reaction is, therefore, dependent on the concn. of  $OH$  ions or on the  $p_H$ . Peter Masucci

The reaction of articular tissues to various degrees of acidity and alkalinity. Silvio Brambilla. *Sperimentale* 87, 417-34 (1933).—The joint tissue has a high buffering capacity. Only solns. as far from neutral as 0.1 N HCl or NaOH cause inflammation. A. B. Meyer

Changes in tissues caused by papain digestion. M. Calcinai. *Sperimentale* 87, 437-49 (1933).—The resistance of some tissue elements and the changes produced in others by papain activated with cysteine have been investigated. A. B. Meyer

Animal fat pigments. L. Zechmeister and P. Trazou. *Ber.* 67B, 154-5 (1931). From 900 g. of fatty tissue from a cow, 10 mg. of a pigment was obtained by extn. with alk. KOH and subsequent sapon., then extn. with ether. The lipochrome by spectral studies appeared to be a mixt. of  $\alpha$ - and  $\beta$ -carotene. James C. Munch

Reform of the nomenclature of biological chemistry. Anon. *Nomenclatura chim.* 4, 62-5 (1934).—A summary of decisions at the conferences of the International Union of Chemistry, 1923-30. Austin M. Patterson

The electromotive force in biological systems. I. The effect of homologous carbamates on the e. m. f. of frog skin. Edgar J. Bocil and A. B. Taylor. *J. Cellular Comp. Physiol.* 3, 355-83 (1933).—A technic is described by means of which practically continuous detn. of the individual e. m. fs. of a no. of frog skins can be made. The e. m. f. depressions of frog skin are reliable indications of the relative effectiveness of homologous urethans and are in accordance with Traube's rule. The correlation of surface activities and e. m. f. effects suggests that the latter are due to adsorption of the urethans on cellular interfaces. II. The surface activity of homologous carbamate solutions. A. B. Taylor and Edgar J. Bocil. *Ibid.* 385-95. —The depressions of the surface tension of water by homologous carbamates are recorded and are found to be in accordance with Traube's rule. T. H. Rider

Photodynamic action. IV. Photostimulation of skeletal muscle. C. R. Spelman and H. F. Blum. *J. Cellular Comp. Physiol.* 3, 397-404 (1933); cf. *C. A.* 26, 2523. —The production of contracture in frog skeletal muscle by ultra-violet light is independent of the presence of mol.  $O_2$ , whereas the response to photodynamic action (response to visible light in the presence of a photoactive dye)

occurs only in the presence of mol.  $O_2$ . The two actions are believed to involve different mechanisms. T. H. R.

The combination of carbon monoxide with hemocyanin. Raymond W. Root. *J. Biol. Chem.* 104, 239-44 (1934).—The hemocyanin of *Limulus* serum combines with CO to form a compd., but the affinity of the hemocyanin for CO is only about 5% of that for  $O_2$ . One mol. of  $O_2$  or CO is found for every 2 atoms of Cu present in the hemocyanin.  $O_2$  disocn. curves for the serum in the presence and absence of CO are given. K. V. Thimann

The chemical nature of rennin. Henry Tauber and Israel S. Kleiner. *J. Biol. Chem.* 104, 259-66 (1934).—A highly active prepn. of rennin was completely inactivated by dil. pepsin or trypsin in about 10 hrs. at 40°, but unaffected by erepsin. Attempts to confirm the results of Dyckerhoff and Tewes (*C. A.* 27, 2165) by suspending cryst. edestin in rennin solns. were unsuccessful, the edestin never taking on more than half the activity of the original rennin prepn. Rennin is a true protein and is not merely adsorbed on a protein carrier. It is also distinct from pepsin. K. V. Thimann

Studies on trypsin. I. The chemical nature of trypsin. Israel S. Kleiner and Henry Tauber. *J. Biol. Chem.* 104, 267-70 (1934). By autolyzing pig pancreas for 18 months with 33% alc., dialyzing and pptg. 4 times with  $MgCO_3$ , a trypsin prepn. was obtained free from protease. Its activity was about the same as that of Northrup and Kunitz' cryst. trypsin (*C. A.* 26, 5584) and it still possessed some milk-clotting power. Conclusions: Trypsin is not essentially a protein, and milk-clotting power is a property of trypsin. II. The effect of trypsin on casein. Henry Tauber and Israel S. Kleiner. *Ibid.* 271-4. —Milk was not clotted by concd. trypsin solns. but only by solns. of 0.1% concn. or less. After exposure for 10 min. to solns. too concd. to clot, the milk could not be clotted even by active rennin preps. However, this destructive action of trypsin could be prevented by bringing the  $p_H$  to the acid side to depress the hydrolytic action. With pepsin, trypsin and rennin the velocity of milk coagulation increases with the H-ion concn. K. V. T.

Glyoxalase. I. The applicability of the manometric method to the study of glyoxalase. Muriel E. Platt and E. F. Schroeder. *J. Biol. Chem.* 104, 281-97 (1933); cf. Lohmann, *C. A.* 26, 742; 27, 317, 4260; Grišavičius, *C. A.* 26, 1307. —The glyoxalase of acetone-yeast may be detd. manometrically through the  $CO_2$  set free from  $CaCO_3$  by the lactic acid produced. The correction for gas evolved by side reactions is small, and the results are reproducible to  $\pm 2\%$ . At 25° with low concns. of glutathione (GSH) and  $AcCHO$  the rate of reaction is independent of the concn. of substrate and closely proportional to the concn. of enzyme. With increasing GSH concns., the rate increases to a max., then slightly decreases. Further, in the higher GSH concns., the rate is no longer independent of the  $AcCHO$ , but becomes partly proportional to it. Mixts. of  $AcCHO$  with GSH rapidly lose their SH groups, indicating that the 2 substances combine to form a complex; this complex is believed to be the substrate for glyoxalase. However, even with 68 moles  $AcCHO$  to 1 of GSH, combination of the GSH is only 87% complete. When the enzyme has been poisoned with iodoacetate, it can be reactivated by washing the yeast and adding GSH; hence iodoacetate does not destroy the enzyme but exerts its action on the GSH. K. V. T.

Some analyses of azoproteins: casein, gelatin and zein coupled with arsanilic acid. Wm. C. Boyd and Sanford B. Hooker. *J. Biol. Chem.* 104, 329-37 (1934). —The view of Pauly (*C. A.* 9, 2905) that diazonium compds. couple only with the histidine and tyrosine in the protein mol. was tested by coupling casein, gelatin and zein with arsanilic acid and detg. the As:N ratio in the resulting azoprotein. In each product the As:N ratio was greater than that calcd. from the content of these 2 amino acids in the protein, and on subsequently treating again with diazonium compd. coupling continued and the ratio further increased. The amt. of arsanilic acid or of *p*-arsonic acid-azonnaphthylamine which could be adsorbed on the pure protein or the azoprotein was too small to account for the

increased ratio by adsorption of impurities. No evidence could be obtained, however, that diazotized anilic acid couples with any amino acid other than histidine and tyrosine, although 15 pure amino acids were tried. The evidence is thus against Pauly's view, although no explanation is available. K. V. Thimann

**The basic amino acids of keratins.** The basic amino acid content of human finger nails and cattle horn. Richard J. Block. *J. Biol. Chem.* 104, 339-41 (1934).—The finger nails contained, resp., 0.49, 2.42 and 9.3%, and the cattle horn (outer layers) 0.64, 2.76 and 9.8% of histidine and lysine and arginine. The ratios histidine:lysine:arginine are thus 1:5:15 and 1:5:13, agreeing with those previously found for other keratins by Block and Vickery (*C. A.* 25, 5003), but not with those found by Abderhalden and Heyns (*C. A.* 26, 3525, 3527). The view that this ratio is typical of keratins as a class is thus supported. K. V. Thimann

**The basic amino acids of serum proteins. II. The effect of heating to 58°** Richard J. Block. *J. Biol. Chem.* 104, 343-6 (1934); cf. *C. A.* 28, 1064<sup>4</sup>.—After heating cattle serum to 58° for 1-3 hrs. there was no significant decrease in albumin and no increase in globulin. The amts. of basic amino acids in the 2 proteins were also the same whether heated or unheated, the histidine, arginine and lysine constituting 2.0, 5.0 and 9.5% of the albumin and 0.8, 5.0 and 6.3% of the globulin, resp. The albumin is thus richer in lysine. **III. A chemical relationship between serum proteins of various origins.** Richard J. Block, Daniel C. Darrow and M. Katherine Cary. *Ibid.* 347-50. The total proteins of human blood serum—normal and from cases of nephrosis—of dog and cow serum, and of human urine, were analyzed for their basic amino acids and for the albumin:globulin ratio. Though the latter varied considerably, the amts. of basic amino acids were very const., the molar arginine:lysine ratio being 10.17 or 10.18 in every case. Since serum albumin has a higher lysine content than the globulin (cf. above abstr.), it follows that the sepn. into albumin and globulin is an artificial process, depending on the reagent used. The constancy of compn. of the total protein justifies consideration of the serum proteins as a chemically related group like the keratins. K. V. Thimann

**The preparation of a crystalline globulin from the albumin fraction of cow milk.** A. H. Palmer. *J. Biol. Chem.* 104, 359-72 (1934).—After pptn. of the casein from milk whey by acid and concn. of the filtrate by freezing out most of the water, 35% of the coagulable protein could be obtained cryst. The globulin was first removed by  $\text{Na}_2\text{SO}_4$  and the remaining protein then pptd. by increasing the concn. to 36 g.  $\text{Na}_2\text{SO}_4$  per 100 cc. at 30°. The ppt. was redissolved, dialyzed and brought to  $p_{\text{H}}$  5.2 and left to crystallize. Crystals up to 3 mm. in length were obtained. Since the cryst. protein is insol. in water between  $p_{\text{H}}$  4.5 and 5.5 it must be classed as a globulin, although it is not pptd. by half satn. with  $(\text{NH}_4)_2\text{SO}_4$ . Detns. of the soly. in  $\text{NaCl}$  and  $\text{Na}_2\text{SO}_4$  solns. show that over the range studied  $\log S$  is proportional to  $\sqrt{\mu}$ , where  $S$  is the soly. in salt solns. of ionic strength  $\mu$  (per 1000 g. water). K. V. Thimann

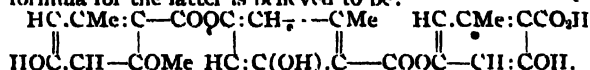
**The specific gravity of synthetic solutions of serum albumin and serum globulin.** R. L. Nugent and L. W. Towle. *J. Biol. Chem.* 104, 395-8 (1934).—When using the sp. gr. of plasma as a measure of its protein content, one must know the relative influences of the albumin and globulin on the sp. gr. The sp. grs. of mixts. of beef serum albumin and globulin in 0.9%  $\text{NaCl}$  at  $p_{\text{H}}$  7.3-7.5 were therefore detd. at various protein concns. For all albumin:globulin ratios the sp. gr. =  $1.0067 + 0.00273 C$ , where  $C$  is the total protein concn. in percentage. The 2 proteins thus have identical sp. grs. in soln. K. V. T.

**Activity coefficient of egg albumin in the presence of ammonium sulfate.** Crawford F. Failey. *J. Phys. Chem.* 37, 1075-82 (1933).—The  $\log$  of the activity coeff. of egg albumin in the presence of  $(\text{NH}_4)_2\text{SO}_4$ , calcd. from osmotic data, is a linear function of the salt concn. The activity coeff. is in satisfactory agreement with soly.

measurements when account is taken of the compn. of the solid phase. Frank Urban

**Determination of enzyme dissociation constants.** Hans Lineweaver and Dean Burk. *J. Am. Chem. Soc.* 56, 658-66 (1934).—Graphical methods involving const. slopes and straight-line extrapolations have been developed for testing and interpreting kinetic data and for detg. dissociation constants of enzyme-substrate and enzyme-inhibitor compds. and other related constns. when the data are found to be consistent with an assigned mechanism. Representative analyses are given for invertase, raffinase, amylase, citric dehydrogenase, catalase, oxygenase, esterase and lipase, involving substrate activation, substrate inhibition, general competitive and noncompetitive inhibition, steady states and reactions of various orders. The various methods described are applicable to gen. chem. catalysis, homogeneous or heterogeneous. C. J. West

**Enzymes of lichens and the constitution of umbilicic acid.** Georg Koller and Gerhard Pfeiffer. *Monatsh.* 62, 359-72 (1933); cf. *C. A.* 27, 3925. The presence of orcinol carboxylic acid in exts. of lichens was proved to be due to the action of an enzyme on umbilicic acid. The formula for the latter is believed to be:



**Enzymic splitting of disaccharide glucosides.** Siegfried R. Petersen. *Ber. Verhandl. sächs. Akad. Wiss. Leipzig Math.-phys. Klasse* 85, 154-65 (1933).—When the OH of the fourth C atom of  $\alpha$ -phenol lactoside and of  $\alpha$ -phenol cellobioside is substituted by either MeO or an acid, its hydrolyzability by  $\alpha$ -glucosidase of yeast is almost entirely lost. If the substitution is by another sugar the loss in activity is almost as great. Emulsin contains a  $\beta$ -maltosidase which is probably not identical with its  $\beta$ -glucosidase. J. J. Willaman

**Biol. detection of radioactivity of salts** (Muck) 3  
**Hydration of solute ions in relation to acidity, alkyl and  $p_{\text{H}}$**  (Flint) 2.

**Kohn-Abrest, E.:** Précis de toxicologie. Paris: G. Doin & Cie. 400 pp. F. 50

**Leschke, Erich:** Clinical Toxicology: Modern Methods in the Diagnosis and Treatment of Poisoning. Incorporating Material on Industrial Poisoning, by Franz Koelsch, and with 2 Appendices: 1. The Prevention and Compensation of Industrial Poisoning, by Franz Koelsch. 2. The Detection of Poisoning, Post Mortem, by Karl Meixner. Translated by C. P. Stewart and O. Daffer. London: J. & A. Churchill. 346 pp. 15s.

**Medizinische Kolloidlehre** Edited by L. Lichtwitz  
**Raph. Ed. Lipsegang, and Karl Spiro.** Lfg. 1. Dresden: Th. Steinkopff. Pp. 233-301. M. 5. Reviewed in *J. Am. Med. Assoc.* 102, 1184 (1931). Cf. *C. A.* 28, 2025<sup>1</sup>.

## B METHODS AND APPARATUS

STANLEY R. BENEDIC<sup>2</sup>

**Determination of amino acids and peptones in blood serum.** E. Cherbuliez and I. Trisfus. *Compt. rend. soc. phys. hist. nat. Genève* 50, 154-5 (1933) in *Arch. sci. phys. nat.* 15, July-Aug.— $\text{NH}_4$  acids and peptones in blood serum are detd. by addn. of solid and satd. aq.  $(\text{NH}_4)_2\text{SO}_4$ , filtration from pptd. proteins, addn. of a 1% soln. of triketohydrindene, boiling, extn. of the ppt. with  $\text{AmOH}$ , removal of extraneous coloring matter by 0.5%  $\text{NaOH}$ , and color matching of the resulting alc. soln. against a standard glycine soln. B. C. A.

**Iodometric determination of sugars in human milk.** M. Polonovski and A. Laspagnol. *Compt. rend. soc. biol.* 107, 301-3 (1931).—Gynolactose (I) combines with about 33% of the amt. of I corresponding with an equal wt. of lactose or the third sugar of human milk; the Cu-reducing power is, however, the same. The (I) content of milk sera is detd. by hydrolysis and iodometry. B. C. A.

**New Nessler reagent.** Hans J. Fuchs. *Z. physiol.*

**Chem. 223, 144-6 (1934).**—A stable Nessler reagent is obtained by substituting LiI and LiOH for KI and KOH. Dissolve 22.5 g. I in a soln. contg. 32.5 g. LiI.H<sub>2</sub>O in 20 cc. distd. H<sub>2</sub>O and set aside 2 cc. Add 30 g. of purified Hg and shake while cooling until the I color has disappeared. Decant and test for free I with 1% starch soln. Add small quantities of the 2-cc. portion set aside, until the starch reaction becomes pos. Dil. to 200-cc. and pour into 1 l. of LiOH soln. prepd. as follows: dissolve 1 kg. LiOH in 5 l. H<sub>2</sub>O contg. a few cc. of H<sub>2</sub>SO<sub>4</sub> (to remove traces of Ba), heat to boiling with frequent shaking, filter through glass wool into a flask contg. some liquid paraffin which forms a layer to exclude CO<sub>2</sub>, and adjust to 3.5 N alk. by addn. of H<sub>2</sub>SO<sub>4</sub>. The Li-Nessler reagent thus prepd. does not flocculate when kept several months at room temp. and exposed to light. A. W. Dox

**Creatine and creatinine metabolism. I. Method of creatinine determination in urine and blood.** H. Lieb and M. K. Zacherl. *Z. physiol. Chem.* 223, 169-79 (1934).—For detn. of creatinine by the Jaffé color reaction, the measurement of the extinction coeff. by means of the Pulfrich photometer with green filter S53 is claimed to be more reliable than the usual colorimetric method. Details of technic and calcn. of results are given. A. W. Dox

**The potential of the yellow oxidation-reduction pigment.** R. Bierich and A. Lang. *Z. physiol. Chem.* 223, 180-4 (1934).—By using a Au electrode the potential of the yellow CHCl<sub>3</sub>-sol. oxidation-reduction pigment of mammalian tissue was detd. over the  $p_H$  range 1.13-11.46. The normal potential at  $p_H$  7 and 20° is -208 mv. referred to the N H electrode. A. W. Dox

**The technic of the analysis of protoplasm.** W. W. Lepeschkin. *Protoplasma* 20, 321-5 (1933).—For chem. analysis protoplasmic material should be either living or suitably preserved with material which does not denature or dehydrate the protein bodies or affect the polysaccharides. For this purpose, material contg. alc. is unsuited. The salt content of the material should be as low as possible and a high CaCO<sub>3</sub> content is particularly unfavorable. A microscopic control of the protoplasmic material is absolutely necessary. Water-sol. and water-insol. substances of protoplasm should be analyzed separately, because they can play different roles. For the investigation of the compn. of protein bodies of protoplasm, hydrolysis of the material with 5% H<sub>2</sub>SO<sub>4</sub> is recommended. F. L. Dunlap

**Preservation and examination, chemical and optical coloration of urine sediments. Preparation of permanent slides.** Paul Lehugt. *Pharm. Ztg.* 79, 228-31 (1934).—Photomicrographs of urine sediments, wax, hyalin and epithelial casts are shown in connection with a complete description of the technic employed. W. O. E.

**Histochemical detection of fats.** Rich. Wasicky and E. Amarat. *Scientia Pharm.* 5, 1-4 (1934).—The histochem. detection of fats may be effected by specific lipase sapon. To this end a soln. of pancreatin absolute Merck prepd. with a borate buffer  $p_H$  = 8 is used. The enzymic sapon. is recognized by crystn. in needles of the higher fatty acids, after treatment of the sample for several hrs. to days in an incubator at 37°. The unsatd. acids of the oleic and linoleic series appear in droplet form. For the recognition of split acids, recourse is had to their solv. in 95% alc., and their behavior toward a mixt. of satd. Na<sub>2</sub>CO<sub>3</sub> soln. with a 1% NaOH soln. (9:1), as well as toward lime water and toward Cu(OAc)<sub>2</sub> soln. With the Na<sub>2</sub>CO<sub>3</sub> reagent the droplets resulting from the action of lipase show instantly an energetic and characteristic myelin formation. On account of the general distribution of oleic and other unsatd. acids in the fats of organized tissues and cells the myelin reaction results in greater or less degree following this procedure. With lime water in place of the Na<sub>2</sub>CO<sub>3</sub> reagent, the liquid acids yield Ca soaps in the form of blunt-sided or rounded protrusions in the acid droplets, finally gray, not infrequently cryst.-appearing masses. Addn. of 50% H<sub>2</sub>SO<sub>4</sub> transforms the Ca soaps into globules of acids and CaSO<sub>4</sub>, which crystallizes in small or large needles, adhering frequently to the

acid droplets. Cu(OAc)<sub>2</sub> changes the acid droplets into blue transparent globules or blue Cu soaps. The Twitchele cleavage with "Divulson L" did not prove satisfactory in the histochem. fat detection. The elaidin test may be utilized in the characterization of nondrying oils in tissues by exposure of the sample in a hanging drop of H<sub>2</sub>O to the fumes from Cu and HNO<sub>3</sub>, whereby a pos. test is shown by pptn. of fine needle-like stars. A soln. of C(NO<sub>2</sub>)<sub>3</sub> in 95% alc. (1:4) colors oil droplets (with glycerides of unsatd. acids in sections of fat-contg. tissues) yellow. W. O. E.

**The standardization of assayed biological products.** P. Bruère. *Bull. Soc. chim. biol.* 16, 150-9 (1934).—Discussion. L. E. Gilson

**Microdetermination of calcium in the serum of blood.** P. Wenger, Ch. Cimernan and P. Borgeaud. *Mikrochemie* 14, 111-58 (1934).—Details are given for obtaining CaC<sub>2</sub>O<sub>4</sub> from the Ca in 2 cc. of serum and titrating the ppt with KMnO<sub>4</sub> soln. W. T. H.

**Detection of enzymes by spot tests.** B. N. Sastri and M. Sreenivasaya. *Mikrochemie* 14, 159-60 (1934).—As reagents use one or more of the following: 0.5% sol. starch, 0.5% inulin, 0.5% cane sugar, 0.5% salicin, 0.5% indican, 0.2% olive-oil emulsion, 0.2% EtOAc-water emulsion, 1% urea, 1% tincture of guaiacum, tyrosine. Place a drop of the reagent on fat-free filter paper, add a drop of the fluid to be tested and allow to remain under a humidified bell jar for 30-60 min. The colors obtained with diastase, inulase, invertase, emulsin, lipase, butyrase, urease, phenolases and tyrosinase are given. With amylase and urease a modified drop test can be carried out on a glazed porcelain spot plate. Mix a drop of the starch indicator with a drop of the fluid and examine the color from time to time. W. T. H.

**Simple Tyndallimetric method for determining trypsin.** E. Herzfeld. *Mikrochemie* 14, 245-50 (1934).—The principle of the method consists in adding the trypsin to an albumin soln. of definite Tyndall effect and detg. the Tyndall value after 2 hrs. of incubation. A 1% soln. of NaHCO<sub>3</sub> acts as a suitable buffer. Into the 1st and 2nd of a series of tubes place 1 cc. of the body fluid to be tested or a NaHCO<sub>3</sub> ext. of the same. Every tube of the series except the 1st should contain at the start 1 cc. of 1% NaHCO<sub>3</sub> soln. Mix the contents of the 2nd tube and pipet off 1 cc. into the 3rd tube and continue in the same way until 10 or even 25 tubes are obtained in series with each contg. half as much of the material to be tested as the one before. Then, to each tube, add 1 cc. of fresh albumin soln. which is prepd. as follows: Dil. 20 cc. of cattle serum to 100 cc. with distd. water, transfer to a beaker and heat over a small flame while stirring with a rubber-tipped rod. At the boiling temp. add sufficient 1% AcOH (not over 2 cc.) until a coarsely dispersed or strongly opalescent colloidal soln. is obtained without appreciable flocculation. Filter hot through cotton and use after cooling under running water. After adding the fresh albumin soln. mix and heat 2 hrs. in the incubator oven and then det. the Tyndall effects of the various tubes. W. T. H.

**Micro-iodometric determination of iron (iron content of thyroid glands).** Janos Straub. *Mikrochemie* 14, 251-5 (1934).—To 8-9 cc. of the liquid to be tested in a 100-cc. Erlenmeyer flask add 2-3 drops of concd. HCl and 1-2 g. KI. Add a few drops of starch soln. and after 1-2 min. titrate with 0.02 N Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. The finely powd. gland can be appropriately prepd. for the test by ashing 0.5 g. in an elec. furnace in the usual way, digesting the ash with 2-3 cc. of hot, concd. HCl, rinsing the soln. into a flat porcelain dish, adding 2-3 drops of perhydro and evap. to dryness. Moisten the residue with 2-3 drops of concd. HCl and rinse into the titration flask with less than 10 cc. of water. W. T. H.

**Determination of bromine in blood.** Edmund D. Yates. *Biochem. J.* 27, 1763-6 (1933).—Protein is removed with tungstic acid, a portion of the filtrate is evap. to dryness with KOH and heated at 500° for 20 min., the residue is extd. with water, acidified and the bromide oxidized to Br by a chromic acid-H<sub>2</sub>SO<sub>4</sub> mixt. (this is in

such concn. as to oxidize the bromide but not the chloride). The Br is removed by aeration and absorbed in starch-iodide soln. The  $I_2$  is titrated with  $Na_2S_2O_3$ . Not more than 5 cc. blood need be used. The method is accurate to within 2% for amts. of 5-1000  $\gamma$  of Br. B. H.

Colorimetric determination of vitamin A by the alkali digestion method. Alan W. Davies. *Biochem. J.* 27, 1770-4(1934).—The digestion consists in heating the material with 5% aq. KOH, then extg. with alc. and ether. After evapg. the ether, the residue is dissolved in  $CHCl_3$ , and the vitamin A detd. in the Lovibond tintometer after the addn. of the  $SbCl_5$  reagent. Benjamin Harrow

Standardized collodion membranes in low-pressure ultrafiltration. Sydney J. Kolley. *Biochem. J.* 27, 1775-8(1934).—Details are given for making collodion tubes of standard and reproducible permeability. A method of low-pressure ultrafiltration making use of these membranes is described. The method has been used to det. ultrafilterable Ca in bovine blood serum. Benjamin Harrow

Continuous gas analysis with automatic recording. H. Ullrich. *Naturwissenschaften* 22, 11(1934).—An apparatus for continuous gas analysis is outlined in which a standard gas (air) and a test gas (e. g., air + some  $CO_2$ ) flow through 2 parallel symmetrical capillary systems with equal applied suction. Each capillary system includes an absorption space (for  $CO_2$ ); the pressure differential between the 2 absorption spaces indicates the amt. of gas absorbed. The accuracy is as high as 2 to 3% of the  $CO_2$  content in atmospheric air. The app. is designed for respiration and assimilation expts.; it can be made recording. B. J. C. van der Hoeven

Estimation of tissue phenols. Distribution of phenol in the tissues of the normal and of the poisoned rabbit. Maurice I. Smith. *U. S. Pub. Health Repts.* 48, 1487-96(1933).—The tissue is weighed accurately to the nearest cg. and is thoroughly pulped with pure sand in a glass mortar. From 5 to 10 g. of tissue will usually suffice; ext. with 5 vols. of 10% aq.  $CCl_3CO_2H$  (allow for the approx. 80%  $H_2O$  content of the tissue) and filter. With blood, a definite vol. is simply stirred into 4 vols. of the acid solns. and filtered. An aliquot of the filtrate, varying from 1 to 25 cc. (the equiv. of 0.2 to 5 g. of tissue according to the phenol content), is measured into a small distg. flask of 100-150 cc. capacity, dild. to about 30 cc. with  $H_2O$  and distd. directly into a 25 or 50 cc. vol. flask. To ensure complete recovery of the phenols, it is best that there be not much over 0.3 mg. in about 30 cc.; approx.  $\frac{2}{3}$  of this should be distd. over, about 15 cc. of distd.  $H_2O$  should then be added and the distn. continued until another  $\frac{2}{3}$  of the vol. has distd. over. To the combined distillates, 1-3 cc. of the Folin-Dennis phenol reagent, 4-8 cc. of 20%  $Na_2CO_3$  and  $H_2O$  to vol. are added. After 20-30 min. the reading is made in the colorimeter in the usual manner, with phenol or preferably resorcin as a standard. *o*-Cresol in tissues is detd. in a similar manner except that the final soln., after the reagent and alkali have been added, must be heated at 50-55° for about 20 min. to bring out the max. intensity of the blue color. Total phenol is estd., in the same manner after conjugated phenols have been dialyzed. For tissues contg. 10-200 mg. of conjugated phenols per 100 g., 2 cc. of concd.  $HCl$  added to 2 cc. or less of the 1-5  $CCl_3CO_2H$  filtrate dild. with  $H_2O$  to about 25 cc. is sufficient to hydrolyze completely the combined phenols in the course of distn. The tissue of a normal rabbit (oat and cabbage diet) contains less than 1.0 mg. % and usually not much over 0.5 mg. % of what might be regarded as true phenols. In acute lethal poisoning, free phenol was found in concns. of 7-26 mg. % per 100 g. tissue, the lowest value having been found in the skeletal muscle and the highest in the kidney. Conjugated phenols were not found in appreciable amt. anywhere. In subacute poisoning, conjugated phenols were found in all the tissues examd. with the exception of the central nervous system. Phenol conjugation is not limited to any one tissue although it occurs predominantly in the kidney, liver and intestine. As much as 6-8 mg. free phenol per 100 g. was found in the central nervous system

of the rabbit after the administration of a toxic but non-fatal dose of phenol. G. A. Kennedy

A new test to determine sex from blood traces. W. A. Nadeshdin. *Deut. Z. ges. gericht. Med.* 21, 23-6(1933).—A drop of toluidine blue is mixed with a drop of blood, sperm ext. and ovary ext., respectively. A sample of each mixt. is placed on a filter paper. If the blood spot matches that of the sperm ext. more closely than that of the ovarian ext., then it is of male origin, and vice versa. F. K.

Method of spectroscopic detection of carbon monoxide in blood. Josef Koller. *Deut. Z. ges. gericht. Med.* 21, 275-7(1933).—For concns. of CO over 20% the use of Na stannite gave very good results, even better than the use of  $(NH_4)_2S$ . For concns. below 20% either method was accurate. Frances Krasnow

Determination of urine sugar by calorimetric means. Werner Lanz. *Schweiz. med. Wochschr.* 63, 1289-91(1933).—The increase in temp. on mixing the sugar soln. with powd.  $Na_2CO_3$  and  $KMnO_4$  is compared with a control with water. The difference in temp. is proportional to the sugar concn. Exptl. conditions must be exactly duplicated for accurate results. Milton Levy

Testing gastric function by physicochemical methods. S. Cytronberg. *Wien. med. Wochschr.* 83, 1311-13, 1343-6, 1371-3, 1403-5(1933).—A lecture. M. L.

Microdetermination of iron in biological materials. Wolfgang Lintzel. *Z. ges. exptl. Med.* 86, 268-74(1933).—The material is ashed with  $H_2SO_4$  and  $HNO_3$ , and 30%  $H_2O_2$ . Excess oxidizing agents are removed with  $Na_2SO_3$ , and the soln. is made alk. with  $NH_4$ . The color is developed with dipyrldyl (cf. Hill, C. A. 25, 2387) and hydroquinone. The method is accurate for 2-10  $\gamma$  Fe per analysis. Milton Levy

Lipochrome in human beings. J. G. Thompson. *Z. ges. exptl. Med.* 92, 692-710(1934).—The photometric detn. of lipochrome in the fat of human tissues and organs is described. Milton Levy

A new method for the determination of free and bound water in tissues and blood. Surányi Gyula. *Magyar (russ) Arch.* 35, 71-4(1934).—The amt. of Argon gas under definite pressure, vol. and temp. absorbed in solvent  $H_2O$  is detd. manometrically. The difference between whole  $H_2O$  and solvent  $H_2O$  gives the bound  $H_2O$ . Henry Tauler

The solubility and preparation of phosphorus- and nitrogen-free glycogen. Michael Somogyi. *J. Biol. Chem.* 104, 245-9(1934).—Complete pptn. of glycogen from soln. is given by 47% EtOH at 22° or 43% at 0°; at lower concns. of alc. the soly. of glycogen is increased about 10 times by 1 M NaCl. NaOH, however, decreases the soly. 1 N NaOH giving complete pptn. by 33% alc. These figures are used to modify the method of prepn. of glycogen, the 1st pptn. being made with 33% alc. from alk. soln., the 2nd with 45% from acid soln. The resultant product is free from  $N$ ,  $P$  and inorg. matter. K. V. Thimani

The isolation and detection of bilirubin. Clarence J. May, Ruth Martindale and Wm. F. Boyd. *J. Biol. Chem.* 104, 255-7(1934).—Bilirubin gives highly colored products, stable for many days, with diazotized sulfanilic acid and *p*-nitroaniline, reacting with the former in neutral alc., with the latter in HOAc, and with both in alk. alc. Biliverdin gives no colors under the same conditions. The best salts for pptg. bilirubin from dil. aq. soln. are  $BaCl_2$  with either  $Na_2HPO_4$  or  $Na_3PO_4$ . K. V. T.

The iodometric determination of cystine in the urine. Robert W. Virtue and Howard B. Lewis. *J. Biol. Chem.* 104, 415-21(1934); cf. Lucas and King, C. A. 27, 3164.—The urine is made 3% in  $HCl$ , decolorized with norite, filtered and reduced with Zn dust, and cooled to 0°. An aliquot is added to a slight excess of I in  $KI$ , previously measured and then frozen solid, and thiosulfate is then run in while the I soln. melts, at such a rate as just to destroy the starch iodide as formed. For accurate detns., slightly less than the required amt. of thiosulfate is added first to the frozen I soln. With pure cystine solns. the decolorization is omitted. Cystine added to human or rabbit urine was recovered within 4-5%, the av. 10-

covery in 14 detns. being 101%. Methionine gives no titration value by this method, while homocystine reacts quantitatively. K. V. Thimann

A proximate method of determination of the carbon monoxide content of blood. H. Becker and E. Lempicki. *Wiadomości Farm.* 61, 45-7, 77-9 (79 in German) (1934).—Weizel's spectroscopic method (*Ber.* 22, 842 (1889)) of detg. CO in blood is supplemented by the following observations: It is necessary to standardize each spectro-scope in regard to the CO content at which the reduction with  $(\text{NH}_4)_2\text{S}$  is visible, since in the literature different data are given. The diln. of blood contg. CO must be made with CO-free blood, and the hemoglobin content of both blood samples must be ascertained. Since W.'s method permits detn. only of CO contents above 26.5%, it is advisable, in order to det. lower CO contents, to sat. with CO part of the blood analyzed and to dil. this said sample with the blood analyzed until the reaction is just visible. A simple calcn. then gives the CO content of the blood. J. Wiertelak

Micro methods for detg. proteins in biology (Wasitzky) 17.

## C—BACTERIOLOGY

CHARLES E. MORRIS

Studies on bovine mastitis. IX. A selective medium for the diagnosis of streptococcus mastitis. S. J. Edwards. *J. Comp. Path. Therap.* 46, 211-17 (1933).—A selective medium contg. crystal violet has been devised on which streptococci are more resistant than the majority of milk saprophytes. Organisms which are not inhibited can be differentiated from mastitis streptococci by the inclusion of esculin because of which they produce black colonies. Rachel Brown

Comparison of Koch's old tuberculin with a new synthetic-medium tuberculin. M. Dorset. *J. Am. Vet. Med. Assoc.* 37, 439-49 (1934).—Synthetic medium for the growth of tubercle bacilli is: asparagine 1.2 g.,  $\text{K}_2\text{HPO}_4$  0.18,  $\text{Na}_2\text{C}_2\text{O}_4$  0.09,  $\text{MgSO}_4$  0.15,  $\text{FeC}_2\text{H}_3\text{O}_7$  0.03, dextrose 1.00, glycerol 10.00 and  $\text{H}_2\text{O}$  to make 100 cc. At max. growth 2 g. of bacilli is obtained from 100 cc. of medium or 3-4 times the yield on glycerinated broth. Compn. of synthetic broth culture filtrate is: ash 0.15, protein 0.32, carbohydrates 0.30 and glycerol 0.04%. The proteins in the synthetic culture filtrates are derived entirely from the bacilli and the medium constituents are entirely used up except for a small amt. of mineral salts and a trace of glycerol. This product appears in field work to be more potent and reliable than the old glycerinated broth tuberculin. Rachel Brown

The viability and virulence of old cultures of tubercle bacilli. Studies on twelve-year broth cultures maintained at incubator temperature. H. J. Corper and Maurice L. Cohn. *Am. Rev. Tuberculosis* 28, 856-74 (1933). H. J. Corper

The inhibitory effect of normal blood on the growth of tubercle bacilli at incubator temperature. H. J. Corper and C. Pa Vidal. *Am. Rev. Tuberculosis* 28, 878-83 (1933).—The growth of human and bovine tubercle bacilli on good media is inhibited by normal blood from dogs or rabbits. The effect is due to the development of toxic autolytic products from normal blood, and is absent when the blood has been treated with 1 or 2 vols. of 6%  $\text{H}_2\text{SO}_4$  for  $1\frac{1}{2}$  hr. at 37°, which destroys the autolytic enzymes, and neutralized with isotonic  $\text{NaHCO}_3$  soln. (or other non-toxic alkalis). H. J. Corper

The chemical study of bacteria. Studies on the complex carbohydrates isolated from the culture medium and its ultrafiltrate after the growth of tubercle bacilli. Florence E. Hooper, Alice G. Renfrew and Treat B. Johnson. *Am. Rev. Tuberculosis* 29, 66-72 (1934); cf. C. A. 27, 321.—A carbohydrate fraction, isolated from the whole medium on which tubercle bacilli (H37) had been in culture for 6 weeks, was hydrolyzed. *d*-Galactose, addn. to the previously reported *d*-mannose and *d*-arabinose, was identified in the hydrolysis mixt. The presence of a small quantity of uronic acid in the crude carbohydrate

fraction from the whole medium was indicated by analysis. Some observations on the crystallographic properties of the methylphenylhydrazones of *d*-galactose, *d*-arabinose and *d*-mannose are recorded. A N-free and P-free polysaccharide was prepd. by alk. hydrolysis of the Ac product of the crude carbohydrate from the protein-free ultrafiltrate. This prepn. showed the same degree of sp. reactivity as that exhibited by prepn. from the whole medium characterized by the presence of small percentages of protein and P. H. J. Corper

Oxidation-reduction potential of certain tubercle bacillus strains in relation to their virulence. M. I. Aksianzew. *Z. Tuberk.* 68, 249-53 (1933).—The "Clare and Michaelis" detn. of the oxidation-reduction potential (ORP) for org. and inorg. systems has also found a place in the study of biol. systems. Aerobic bacteria reveal a pos. and anaerobic a neg. potential. The relation to virulence is not as yet clear. Various virulent, moderately virulent and avirulent tuberculosis strains (of bovine and human type) were studied. In the electrometric detns. virulent as well as avirulent tubercle bacilli revealed values of  $E_h = +380$  to  $+5$  mv. Appreciable differences of the ORP of various strains of tubercle bacilli in relation to virulence and the age of the culture were not revealed by the electrometric procedure. Study of the hydration tendency of tubercle bacilli by the methylene blue procedure (methylene blue as H acceptor) showed that the hydration tendency of virulent strains B7 and B8 (bovine tubercle bacilli) was more marked than the avirulent BCG strains. This finding also resulted for the virulent human types. Twenty-day-old cultures revealed somewhat higher hydration tendencies than younger cultures. H. J. Corper

Antivirus and amino acids. Carlos A. Sagastume and Arturo A. Solari. *Rev. facultad cienc. quim. (Univ. La Plata)* 8, Pt. 2, 15-35 (1933). Old cultures of *Staphylococcus aureus*, or *S. aureus* and *Es. coli* together, were killed by heating and then reinfected with *S. aureus* or *Es. coli*. Because of the antivirus present in the old medium the organisms ordinarily grew slowly. The addn. of glucose, fructose, lactose, maltose or sucrose accelerated growth. Alanine and glutamic acid greatly accelerated growth, presumably by inactivating the antivirus. Leucine, cystine, glycine, tyrosine, phenylalanine, arginine and aspartic acid had no effect, while tryptophan had an inhibiting action. L. E. Gilson

The presence of nitrifying bacteria in deep seas. Cornelia L. Carev and Selman A. Waksman. *Science* 79, 349-50 (1934). B. H.

Observations on anti-phage sera. I. "The percentage law." C. H. Andrews and W. J. Elford. *Brit. J. Exptl. Path.* 14, 367-76 (1933). Three phages that attack various strains of *Es. coli* and *S. dysenteriae* have been particularly chosen for study as representative phages of groups of very different sizes; C 13 is a small one, C 36 a moderate-size one and C 16 a large one. The neutralization of these 3 phages does not follow the multiple proportions law. On the contrary, neutralization is only demonstrable in the presence of a large excess of antiserum. A given strength of antiserum neutralizes, over a wide range, a definite percentage of phage, irrespective of the quantity of phage present. This phenomenon is referred to for convenience as the "percentage law." II. Properties of incompletely neutralized phage. *Ibid.* 376-83. Phage which is incompletely neutralized by—perhaps incompletely coated with—antiserum, when it is brought into contact with susceptible bacteria, only begins to multiply after a delay. For this reason it produces smaller plaques on agar than does free phage (C 36, not C 13 and C 16). This incompletely neutralized phage is normally adsorbed by susceptible bacteria (C 36). It is unable to pass a candle or a membrane permeable to phage and antiserum separately. Probably there is aggregation of the phage-serum complex (C 36, S 18). Phage which has been incompletely neutralized or even completely coated by antiserum may be reactivated by diln., provided that there has not been too long contact of phage and antibody (C 36, not C 13, C 16). Phage-



neutralization may be supposed, in common with other antigen-antibody reactions, to consist of 2 stages. The first stage probably takes place very rapidly and may be reversible. The second stage is irreversible and takes place more gradually. With reference to the "percentage law" described in the previous paper, if the affinity of phage for antibody is low the equil. may be of such a nature that the phage cannot receive a big enough coating of antibody to neutralize it, unless there is considerable excess of antibody in the fluid about each phage particle. If this excess is always necessary, it follows that over the whole range under study, phage particles must be few and far between compared with the available antibody.

Harrket F. Holmes

**Polyarthritides of sheep.** J. A. Howarth. *North Am. Veterinarian* 14, No. 9, 20-39 (1933).—The organism consistently isolated from the joint lesions of sheep suffering from polyarthritides is a pleomorphic diptheroid, nonmotile, Gram-pos., nonsporulating, facultative rod, which grows best under  $\text{CO}_2$ . All strains of the organism isolated from sheep and goats and several European strains of *Erysipelothrix rhusiopathiae* fermented dextrose, lactose and maltose when they were grown on Hiss serum water and Dunham's peptone solu. at 22° for more than 48 hrs. Several of the sheep strains slightly fermented galactose, levulose and sucrose. The organism belongs to the same family, order and class as *E. rhusiopathiae* but it is not pathogenic for hogs. Seventeen references.

K. D. Jacob

**Mechanism of bacteriophage lysis.** J. Broutenbrenner. *Am. J. Pub. Health* 24, 398-9 (1934).—The primary effect of phage apparently consists in the stimulation of bacterial metabolism. The lysis proper is a secondary phenomenon, which occurs as a direct result of imbibition of water by the bacteria following the osmotic changes set up by the increased metabolism. Whenever this imbibition of water is interfered with, the lysis is prevented.

J. A. K.

**Sensitivity, in vitro, of bacteria to the  $\beta$ - and  $\gamma$ -rays of radium.** R. R. Spencer. *U. S. Pub. Health Repts.* 49, 183-92 (1934).—The effect of Ra rays ( $\beta$  and  $\gamma$ ) upon broth cultures of actively multiplying bacteria (*S. scarlatinae*, *Proteus X<sub>18</sub>* and *Es. typhosa*) is first manifested by a retardation of growth within the first 6 hrs. after plating. After 24 hrs. there may be no perceptible difference between the gross appearance of irradiated and non-irradiated cultures. After several transfers the continuously irradiated cultures may be stimulated to a more vigorous growth, and the organisms tend to display pleomorphism and stain more deeply. Bacteria kept at sufficiently low temps. to prevent multiplication are gradually killed by irradiation. The lethal effect appears to be due to the  $\beta$ -rays. These expts. suggest rather strongly that the sensitivity or vulnerability of bacteria to Ra rays is in some way assoc. with the activity of the cell.

J. A. Kennedy

**Studies on specific precipitable substances and on carbohydrates extractable from bacteria of the dysentery and pseudodysentery group.** A. Fieschi and L. Cattaneo. *Boll. soc. ital. biol. sper.* 8, 1679-80 (1933).—These substances contained a high percentage of carbohydrate and a small amt. of N. Serologically they behaved differently. The polysaccharides extd. from the Shiga-Kruse organisms reacted specifically with anti-Shiga serums, while those extd. from the Flexner and Hiss-Russel bacteria were inactive against their resp. specific serums.

P. M.

**The influence of phosphate buffer on the acid fermentation of glucose by *Escherichia coli*.** V. Cianci. *Boll. soc. ital. biol. sper.* 8, 1694-8 (1933).—Acid fermentation caused by *Es. coli* in Naegeli glucose medium was studied in the presence of decreasing amts. of a phosphate buffer and at 25° and 37° incubation for 10 days. The results show that an increasing amt. of buffer ( $\text{KH}_2\text{PO}_4\text{-Na}_2\text{HPO}_4$ ) caused an increase in the growth, velocity of growth, amt. of acid formed and an increase in gas formation. The residual unfermented sugar was a min. in those cultures having a high concn. of buffer. The influence of veronal-acetate buffer on the acid fermentation of glucose caused by *Escherichia coli*. *Ibid.* 1698-1701.—The in-

fluence of veronal-acetate buffer was compared to that of  $\text{KH}_2\text{PO}_4\text{-Na}_2\text{HPO}_4$  buffer previously described. Since the Michaelis buffer has a weaker buffering action with respect to the phosphate buffer within the limits of the  $\text{pH}$  and concn. used, the results show (a) that the buffer action of the culture medium is the principal regulator of the acid fermentation of glucose by *Es. coli*; (b) increasing the amt. of buffer increases the velocity of reaction and the amt. of acid produced.

Peter Masucci

**The presence of salicylic and phenylacetic acids in the acetone-soluble fat of tuberculosis bacilli.** Nils Stendal. *Bull. sci. pharmacol.* 41, 69-72 (1934).—See C. A. 28; 23874.

A. R. Meyer

**Bacterial calorimetry. III. The production of heat in two percent peptone water by a strain of *Escherichia coli*.** Clarence F. Schmidt, Jr. and Stanhope Bayne-Jones. *J. Cellular Comp. Physiol.* 3, 405-18 (1933); cf. C. A. 23, 2200.

T. H. Rider

**The lipases of bacteria.** E. S. Tammisto. *Ann. Acad. Sci. Fennicae A38*, No. 5, 101 pp. (1933).—From 14 strains of *Ps. fluorescens* the most active in fat-splitting and ester-hydrolyzing power was selected. This and a strain of *S. marcescens* were far more active than any others of a no. of cocci, bacilli, etc., tested. In most cases the extent of hydrolysis of butter fat paralleled that of Et butyrate or tributyrin. The lipase activity of living cells of the two species used increases with increasing  $\text{pH}$ , no optimum being attained. Its optimum temp. is 32-7°, and it is relatively thermostable, 10 min. at 95° causing only 30% inactivation. The dried and toluene-treated cells, on the other hand, had a  $\text{pH}$  optimum 8.3 and were 90% inactivated by 10 min. at 70°. The enzyme in the dried bacteria is inhibited by quinine and by NaF, but not by atoxyl (cf. Rona, C. A. 19, 85; 17, 1077); it acts better on tributyrin than on olive oil or trilaurin, and is almost inactive on Me or Et butyrate. By Willstätter's elution method about 60% of the lipase could be extd.; this prepn. had a  $\text{pH}$  optimum 8.3-8.6, was completely destroyed by 10 min. at 60°, and was increased in activity 800% by addn. of 0.04%  $\text{CaCl}_2$  + 0.04% Na oleate. The living or dried cells were completely unaffected in lipase activity by these activators, which are therefore probably already in the cell. By continued adsorption and elution a purified prepn. of enzyme was obtained, giving a weak biuret and a neg. Molisch reaction, and responding to quinine, NaF and to  $\text{CaCl}_2$  + Na oleate in the same way as the crude prepn. The properties of this purified lipase correspond closely to those of pancreas lipase, and differ from those of other tissue or plant lipases. When the bacteria were grown in media in which tributyrin was the only C source, the lipase activity was about 10 times that reached on a peptone medium; media contg. both tributyrin and peptone gave intermediate activities. A mixt. of glycerol and  $\text{PrC}_2\text{H}_5$  added to peptone gave no increase in enzyme. The lipase of the bacteria is thus partly constitutive and partly adaptive in the sense of Kürström (C. A. 24, 4529).

K. V. Thimann

**Chemistry of *Lactobacillus acidophilus*. II. Composition of the neutral fat.** J. A. Crowder and R. J. Anderson. *J. Biol. Chem.* 104, 399-406 (1934); cf. C. A. 26, 5603. The total ether-sol. material, amounting to 7% of the dry wt. of the bacteria, yielded 35% neutral glyceride, 32% phosphatide and 28% free fatty acids, of which 3.4% was identified as dihydroxystearic acid. The fatty acids set free on hydrolysis of the neutral fat contained 57.8% of solid satd. acids which were sepd. by methylation and distn. into lauric acid 5, myristic acid 10, palmitic acid 45 and stearic acid 40%. There were 36.9% of unsatd. acids, yielding only stearic acid on reduction, a small amt. of liquid satd. acid, and 6.7% of unsaponifiable matter, mostly cholesterol, which may have been derived from the medium on which the bacteria were grown.

K. V. T.

**Therapeutic substances derived from unsymmetrical biphenyl compds. [killing power against *Eberthella typhi* (Harris, Christiansen) 17. Microbiol. analysis of butter (Parfitt) 12.**



## D—BOTANY

THOMAS G. PHILLIPS

Chemistry of corn-seed germination. R. C. Malhotra. *Cereal Chemistry* 11, 105-9(1934).—See C. A. 28, 804.

Endocellular hydrogen donors of yeast and their variation with the age of the culture. F. Chodat and M. Junquera. *Compt. rend. soc. phys. hist. nat. Genève* 50, 190-203(1933) in *Arch. sci. phys. nat.* 15, July-Aug.—The amt. of endocellular H donors in yeast increases slightly with the age of the culture for 2-3 days and then decreases rapidly, being nearly 0 after 6 days. B. C. A.

Quantitative investigation of the soluble carbohydrates of the unripe fruit of pumpkin (*Cucurbita pepo*) and the hydrolysis of its cellulose. M. G. Tikhmenev. *J. Applied Chem.* (U. S. S. R.) 6, 320-5(1933).—Pumpkin flour was freed from fats and extd. with 55% EtOH and boiled for 2 hrs. on a water bath after the addn. of chalk. The ext. was filtered through strong cloth and the extn. repeated twice. The ext. contained mainly monoses; mannose and galactose were absent; large amts. of *d*-fructose with an admixt. of dextrose were found. Galactose, mannose and arabinose were not found and the bi-rotation curve indicates the absence of an appreciable amt. of acid. A. A. Bochtlingk

Cultures of *Penicillium candidum*. L. Schioppa. *Ind. ital. conserve aliment.* 9, 39-42(1934).—Cultures of the organism (isolated from a sample of French Camembert cheese) show optimum growth at 12-25° on substrata contg. flour, maize flour and cheese. G. A. Bravo

The function of essential oils in plants. F. Bruno. *Lavori ist. botan. Palermo* 4, 11-23(1933). By distn. of the leaves, flowers and apexes of *Gymbopogon nartini* Stapf. var. *Molia*, were obtained: A insol. essence from 2-year-old leaves, B insol. essence from 1-year-old leaves, C sol. essence from 1-year-old leaves, D insol. essence from flowers, E sol. essence from flowers, F sol. essence from apexes, with the following properties:

	A	B	C	D	E	F
dis	0 9208	0 9201	0 9134	0 9201	0 9280	0 9010
$\alpha$	+43	+42	+17	+25	3	1 29
$\beta$	1 4096	1 4175	1 3685	1 3680	1 3690	1 3683
Acid no.	0 019	0 001	0 000	0 007	0 008	0 009
Water no.	16.80	16.80	7.47	18.67	13.07	18.67
Free alc. (as geraniol)	32.56	31.87	29.51	28.86	31.09	52.09
Sol. in 70% alc.	1.10	1.11	1.4	1.13	....	1.10
Sol. in 80% alc.	1.1	1.2	1.2	1.2	....	1.2

The presence of methylheptenone was shown in A, B and C (about 12%), D (14%) and E (20%); dipentene was found about 2%. Essential oils in this plant are probably gaseous materials. G. A. Bravo

Spectroscopical study of the green pigment of the funiculus and of the immature seeds of *Yacarándia mimosae-folia*. F. Bruno. *Lavori ist. botan. Palermo* 4, 155-67(1933).—The dark green pigment does not give the absorption spectrum of chlorophyll; the fluorescence of chlorophyll is blood-red, while that of the funiculus pigment is violet, and that of the seed pigment is pale red. G. A. Bravo

Factors affecting the sporulation of *Phyllosticta solitaria* in artificial culture. A. J. Mix. *Phytopathology* 23, 503-24(1933).—Quantity of nutrient exercises the greatest influence on spore production in cultures. As sources of C, dextrose, levulose, mannose and sucrose are equally favorable. KNO<sub>3</sub> is the best N source. Fertile pycnidia were produced when the initial pH of the media used was between 4.2 and 5.8. R. C. Burrell

Pathology of tobacco blackshank. F. T. Wolf. *Phytopathology* 23, 605-12(1933).—A thermostable, non-volatile compd., probably a protein, seems to be the toxic material responsible for the wilting and collapse of tobacco plants infected with *Phytophthora nicotianae*. The fungus secretes enzymes which enable it to utilize the middle lamella, the secondary membranes, starch, sucrose, dextrose and maltose. R. C. Burrell

An improved method of bleaching and clearing leaves.

1 Roy W. Strain. *Phytopathology* 24, 82-4(1934).—By introducing Cl into alc. instead of using aq. bleaching mixts. contg. it, better preps. of leaves for the study of vein endings, stomata, etc., may be obtained. In either case a final clearing must be carried out with the usual acid-phenol-glycerol soln. R. C. Burrell

Intermittent germination as illustrated by *Helianthemum guttatum* Miller. D. V. Juby and J. H. Phensant. *J. Ecology* 21, 442-51(1933).—The rate of germination was not increased by increasing the partial pressure of O<sub>2</sub> in the atm. in which seeds of *H. guttatum* were germinated. The rate of germination seems to be conditioned by the rate at which the testa is rendered permeable to water and salts in soln. K. D. Jacob

Autumn coloration [of leaves]. A. B. Stout. Natl. Shade Tree Conference, *Proc. 9th Ann. Meeting* 1933, 46-9.—The chem. changes involved in the autumn coloring of leaves are discussed. K. D. Jacob

A physiological study of fruit development in the pecan (*Hicoria pecan*). Charles L. Smith and Clifford J. R. Thorn. Texas Pecan Growers' Assoc., *Proc. 13th Ann. Meeting* 1933, 71-6.—The 1st period of growth until late Aug. or early Sept. was characterized chiefly by formation of structural elements of the shuck and shell. During the 2nd period, filling of the kernel was of major importance. Most of the oil, protein, mineral and acid-hydrolyzable polysaccharide content of the kernel developed during Sept. Very nearly the whole sugar content of the kernel, which is almost exclusively in a nonreducing form, appeared during the 1st half of Oct. Indications were that much of the sugar in the mature kernel may be a result of translocation from the shuck during the later stages of maturity. After the beginning of the filling process near Sept. 1st, the amt. of ash in the shell and of total N and acid-hydrolyzable polysaccharides in both shell and shuck remained practically const.; the ash content of the shuck increased rapidly during the filling process. Practically all of the oil content of the pecan kernel is formed from materials brought into the fruit from other parts of the tree at the time of oil formation; there is evidence that this is also true of the protein in the kernel. Different varieties of nuts showed no distinct differences in compn. K. D. Jacob

*Azygozygum chlamydosporum* nov. gen. et sp. A phycomycete associated with a diseased condition of *Anthriscum majus*. Chas. G. C. Chesters. *Trans. Brit. Mycol. Soc.* 18, 199-214(1933).—When the fungus was grown on any synthetic medium the greatest growth was obtained with maltose as the source of carbohydrate and KNO<sub>3</sub> as the source of N. When glucose was substituted for maltose the amt. of growth was almost the same but less aerial mycelium was formed. Sucrose was a poorer source of carbohydrate. When an org. source of N was substituted for KNO<sub>3</sub>, staling and abnormal development of the mycelium occurred in proportion to the concn. of the substance used. K. D. Jacob

A systemic disease of red clover caused by *Botrytis anthophila-anthophilthophila* Bond. R. A. Silow. *Trans. Brit. Mycol. Soc.* 18, 230-48(1933).—When the fungus was grown on Dox's synthetic medium the mycelium was very irregular and very frequently septate into short cells which were often swollen to approx. twice the diam. of the mycelium; spores were formed less abundantly than on prune and malt agars. On peptone agar there was much less development of mycelium both in and above the substratum; conidia were less abundant, frequently formed below the surface, and a large proportion of them were irregular in shape. K. D. Jacob

Regularity in the biosynthesis of plants. V. I. Nilov. *Sotsialistich. Rastenievodstvo* (Plant Ind. U. S. S. R., Lenin Acad. Agr. Sci., Inst. Plant Ind.) Ser. A, No. 7, 3-34(1933).—N. investigated the regularity in the dynamics of the accumulation and conversion of oils in a no. of plants with the purpose of establishing the mechanism of the synthesis of these oils. In the synthesis of these oils, parallel with the process of oxidation, a process of isomerization takes place. An examn. of the oil of *Trachispermum copiticum* during the various stages of its vegetative

period has shown that isomerization, accompanied by oxidation, takes place from terpenes through *p*-cymene to thymol. He investigated a series of other plants and presents data on *Lavandula vera* and *L. spica*, *Rosmarinus officinalis* and *Poenicium officinalis*. The plants obtained from various geographical regions were grown and analyzed botanically and agronomically and chemically-technologically over a no. of years. Within the specie, the varieties showed no marked differences in the quantity of oil nor in quality; the hybrids showed differences both in quantity and quality. N. attempts to bring out the regularity in the chem. attributes of the oils, making it possible to classify these plants on the basis of their chem. constancy. By this method the law of homologous series, established by Vavilov, may be proved. N. denies the contention of Blagoveshchenskiĭ that with the phylogenetic aging of the plant the no. of cyclic compds. increases. J. S. Joffe

Determining the condition of winter grains by the conductivity of their tissues. S. M. Ivanov. *Sotsialistich. Rastenievodstvo* (Plant Ind. U. S. S. R., Lenin Acad. Agr. Sci., Inst. Plant Ind.) Ser. A, No. 7, 49-50(1933).—1. detd. the cond. of the juices of plants subjected to various freezing temps. It was found that long before a casual examn. can detect injury there is a change in cond. With the injury the resistance drops, decreasing with the degree of injury. The next step was to use the plant tissue in place of the plant juices and the same results were obtained. A special type of cell was made to accommodate the plant material. The difficulty and tediousness of obtaining the same weight of material for every detn. make this method not strictly quant., but the tendencies are well expressed. The different varieties of any grain show a different behavior with respect to cond. It was possible to det. which of the varieties was subject to more or less injury. J. S. Joffe

A laboratory method of determining the drought resistance of plants. M. T. Timofeeva. *Sotsialistich. Rastenievodstvo* (Plant Ind. U. S. S. R., Lenin Acad. Agr. Sci., Inst. Plant Ind.) Ser. A, No. 7, 69-74(1933).—Seeds to be examd. are partially germinated between filter paper, placed in a 2 M soln. of sugar, kept there for 6 days, and then plated in sand cultures. The sugar soln. exts. the water and the more drought-resistant plants seem to be able to withstand the soaking in the sugar soln., as exhibited by continuing their growth when placed in sand cultures. J. S. Joffe

Changes in the living plant cell as a result of the action of chemical agents. I. Ultramicroscopic observation of the cells of *Allium cepa*. M. N. Melsel. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, No. 7, 985-95(in German 995-6).—The nuclei of the living cells of the epidermis of *Allium cepa* show in the dark field transitions from a light opalescence to well-formed granulations. In the limits of physiol. conditions the reduction of the activity causes the nuclei to become homogeneous and approx. optically empty. Narcotic substances of the type of alc. and  $\text{CHCl}_3$  cause an increase of opalescence and granulation of nuclei. The nuclei of dead cells differ from the live ones, under narcosis, by their whiter color and coarse lumpy contents. KCN and arsenic acid cause the same nuclear changes. V. D. Karpenko

The influence of boron and other accessory elements on the development of flax. M. Ya. Shkolnik. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, No. 8, 1163-88.—Normal plant growth of flax was obtained when there were added per l. of nutrient mixt.: B 0.5-1 g., Mn 0.0015 g., Al 0.0005 g., Cu 0.000125 g. and I 0.00025 g. None of these elements improved the growth of flax when B was absent. V. D. Karpenko

Determination of the acids of plant tissue. II. Total organic acids of tobacco leaf. Geo. W. Pucher, Hubert Bradford Vickery and Alfred J. Wakeman. *Ind. Eng. Chem., Anal. Ed.* 6, 140-3(1934); cf. C. A. 27, 4274.—Plant org. acids can be extd. with ether if acidified with  $\text{H}_2\text{SO}_4$  to  $p_H$  of 1. They are then detd. by electrometric titration. Amy Le Vesconte

Permeability in large plant cells and in models. W. J.

V. Osterhout. *Ergebnisse Physiol.* 35, 968-1021(1933).—A review. C. M. McCay

A study of *Endomyces capsulatus* (Reybridge, Dodge and Ayers). A causative agent of fatal cerebrospinal meningitis. Morris Moore. *Ann. Missouri Bot. Gardens* 20, 471-568(1933).—Expts. with 29 different media on which to grow the organism indicate that H-ion concn. influences growth as shown by thin hyphae and numerous conidia on acid media and thick-walled, shorter cells on alk. media. Optimum  $p_H$  for growth is 7.4, with no growth at  $p_H$  greater than 9.3 or less than 8.3. Optimum growth temp. is 25°, with no growth above 37° or below 8°. The carbohydrates used cause no acid or gas to be formed, and require a variation in time for production of alk. Gelatin is slowly liquefied. Under proper conditions, indole and skatole reactions are present. Light, white or red, has no effect on the organism. Certain dyes affect growth; others do not. N. M. Naylor

Sources of carbohydrate for germination and growth of orchid seedlings. F. Lyle Wynd. *Ann. Missouri Bot. Gardens* 20, 569-81(1933); cf. C. A. 27, 5374.—The relative growths of orchid seedlings over a period of 8 months, observed on sugars each added to 3 inorg. media in amts. to give 7 g. C per l., were  $d$ -mannose >  $d$ -glucose > maltose >  $d$ -fructose > sucrose > raffinose. No growth was obtained on  $d$ -galactose,  $l$ -arabinose,  $l$ -rhamnose and  $l$ -xylose. The mineral nutrient medium of La Garde plus  $d$ -mannose is considered the best symbiotic culture medium for orchids. N. M. Naylor

Kinetics of photosynthesis and allied processes. E. C. C. Baly and L. B. Morgan. *Nature* 133, 414(1934).—Math. equations are developed which show the effect of chlorophyll concn., light intensity and concn. of hydrated  $\text{CO}_2$  on the rate of photosynthesis. The equations agree well with the data of Emerson (C. A. 23, 3729) and Warburg (C. A. 14, 2361). The final equation is identical with the Michaelis equation for enzyme action. Gerald M. Petty

Growth rate and radiosensitivity in *Triticum vulgare*. P. S. Henshaw and D. S. Francis. *J. Cellular Comp. Physiol.* 4, 111-22(1933). T. H. Rider

Chemical investigation of the corns of *Arisaema triphyllum* (L.) Schott. Leo Marion. *Can. J. Research* 10, 164 9(1934).—The dried and ground corns lost 5% of their weight when extd. with petr. ether, and a further 0.9% on subsequent extn. with MeOH. Besides a trace of an essential oil, the MeOH ext. yielded water-sol. and water-insol. portions. The former contained an acid,  $\text{C}_{18}\text{H}_{32}\text{O}_8$ , m. 184°;  $\alpha$ -inositol,  $\text{C}_6\text{H}_{12}(\text{OH})_6$ , m. 224°; a sugar-forming phenylglucosazone; and a cryst. substance,  $\text{C}_{11}\text{H}_{16}\text{O}_4$  or  $\text{C}_7\text{H}_{12}\text{O}_4$ , m. 120°, exhibiting the properties of a lactone. In the water-insol. portion combined with the petr. ether ext., the following substances have been found present: myricyl alc.,  $\text{C}_{30}\text{H}_{60}\text{O}$ , m. 82-83°; a new sterol, arisacsterol,  $\text{C}_{30}\text{H}_{50}\text{O}_2$ , m. 135°; phytosterolin,  $\text{C}_{28}\text{H}_{48}\text{O}_2$ , m. 207°; and a mixt. of fatty acids. J. W. Shipley

A contribution to the chemistry of tomato pigments The coloring matter in American red and purple tomatoes (*Lycopersicon esculentum*). M. B. Matlack and Charles B. Sando. *J. Biol. Chem.* 104, 407-14(1934); cf. C. A. 28, 836.—The pigments from Italian-grown red, American-grown red and American-grown purple tomatoes were extd. with  $\text{CS}_2$ , pptd. with 3 vols. EtOH and recrystd. from a mixt. of  $\text{CS}_2$  and petr. ether in an atm. of N. The pigments were chemically and spectrographically identical. K. V. Thimann

Chlorophyll production under various environmental conditions. Gus B. Ulvin. *Plant Physiol.* 9, 59 81(1934).—The production of chlorophyll by radish and soybean plants grown in quartz sand in a greenhouse with Davidson's 4-salt nutrient soln. (*Proc. A.M. Soc. Hort. Sci.* 25, 354 (1928)) under conditions of (1) a short light period (10 hrs. daily), and (2) continuous light as supplied by natural daylight supplemented by three 1000-w. Mazda lamps was greater under conditions of continuous light. The chlorophyll content of sweet corn (Golden Bantam) grown in quartz sand in a 3-salt soln. with  $\text{Ca}(\text{NO}_3)_2$  as the source of N was increased by the addn.

of 1 p. p. m. Fe. No increase of chlorophyll was produced by addn. of 1 p. p. m. Mn; although it is recognized that impurities in the sand may have been disturbing factors.

Walter Thomas

**Responses of Kentucky blue grass to variations in temperature, light, cutting and fertilizing.** Chester M. Harrison. *Plant Physiol.* 9, 83-106 (1934).—The plants were grown under greenhouse conditions in white quartz sand with Jones and Shive's nutrient soln. (C. A. 15, 3659). Rhizomes of plants left uncut during the bright cool days of spring, early summer and early fall and continuously supplied with N gradually emerged into the light with the advent of the short cloudy days of late fall and winter. But if the amt. of N was limited or the light increased these rhizomes remained below the soil level, became stockier and new ones produced. A decreased supply of N resulted in decreased top growth relative to roots and rhizomes. The addn. of N during periods of short and frequent cutting at high temps. (80-100°F.) resulted in decreased growth because of the using up of available carbohydrates stored in the rhizomes, and in ultimate death provided carbohydrates were not made available through the activity of addnl. leaf area.

Walter Thomas

**Greenhouse studies on growth of Kentucky blue grass.** C. M. Harrison. *Bull. U. S. Golf Assoc., Green Section* 13, 23-39 (1933); cf. preceding abstr. K. D. J.

**Certain poisonous plants of Wyoming activated by selenium and their associates with respect to soil types.** O. A. Beach, J. H. Draize, H. F. Efron, C. S. Gilbert and O. C. McCrory. *J. Am. Pharm. Assoc.* 23, 947 (1934).—Several poisonous range plants owe their toxicity at least in part to Se. *Astragalus bisulcatus*, *A. grayi*, *A. pectinatus*, *Xylorhiza parryi*, *Onoposis condensata*, *Stanleya bipinnata* and *Mentzelia decapetala* contain Se. If grown on certain slate formations such plants also possess an offensive odor. Poisonous plants growing on the Niobrara, Steeple or Pierre shales are more toxic to stock than the same species on other formations. The root systems contain less Se than the above-ground portions of the plants. On the air-dry basis Se may amount to 0.1%. It is not known whether most of these species would be poisonous to stock if Se-free. *Astragalus bisulcatus* is toxic to animals if Se-free but much less so than otherwise. *Xylorhiza parryi* has not been found to be Se-free. In this plant the Se is probably combined with a toxic, saponaceous compd. Certain plants have a selectivity for Se, while others on the same soil do not take it up.

L. B. Warren

**Chemistry of mold tissue. IV. The lipides of *Aspergillus sydowi*.** F. M. Strong and W. H. Peterson. *J. Am. Chem. Soc.* 56, 952-5 (1934); cf. C. A. 27, 3237. Extn. of dried *Aspergillus sydowi* with EtOH-Et<sub>2</sub>O (1:1) gives 12% of a dark red liquid, contg. 22% free acid; this oil has  $d_{20}^{25}$  0.9198,  $n_D^{25}$  1.4682, I no. 114.4, sapon. no. 169.5, acid no. 43.4, ester no. 126.1, insol. acids 80.8%, volatile acids 0.46%, unsaponifiable 8.18%, P 0.26%, N 0.39%. The phospholipide was sepd. by pptg. with EtOH-MgCl<sub>2</sub> in Me<sub>2</sub>CO at -4°; purification by pptn. from CHCl<sub>3</sub> by Me<sub>2</sub>CO and treatment with MeOH-NH<sub>3</sub> gave a light brown product with P:N:Mg = 1.2:2. The Me<sub>2</sub>CO mother liquor contains an oil with 0.028% P, designated "simple lipides"; sapon. with 5% EtOH-KOH in N atm. gives C<sub>18</sub>H<sub>34</sub>(OII)<sub>2</sub> and oleic (I), linoleic (II), palmitic (III), stearic (IV) and tetracosanic acids (V). Ergosterol was isolated from the unsaponifiable material. The simple lipides contain 80.8% fatty acids, 0.46% volatile acid (calcd. as PrCO<sub>2</sub>H), 22.6% satd. acids (8.8% III, 11% IV and 0.9% V), 52.9% unsatd. acids (29.6% I, 16.3% II and 1.7% higher acids), 8.18% unsaponifiable (5.36% total sterols), 4.2% glycerol.

C. J. West

**Chemical composition of the fat produced by *Penicillium javanicum* van Beijma.** Geo. E. Ward and Geo. S. Jamieson. *J. Am. Chem. Soc.* 56, 973-5 (1934).—*Penicillium javanicum* van Beijma was cultured on 20% glucose soln. at 30°; 6240 g. of dried mycelium, extd. with petr. ether, gave 691 g. (11%) of orange-colored oil, with the following characteristics: solidification pt. 6-7°, m. p. 15°,  $d_{20}^{25}$  0.9145,  $n_D^{25}$  1.4680, acid value 10.6, sapon. value 191, I value (Hanus) 84, Reichert-Meissl value 0.3, Ac value

10.7, unsaponifiable matter 2%, satd. acids 30.8%, unsatd. acids 60.8%, m. p. of mixed satd. acids 52.5°. The unsatd. acids gave only stearic acid on hydrogenation and contain 52.1% oleic and 47.9% linoleic acids (percentage of acid in oil, 31.7 and 29.1, resp.); the satd. acids consist of 69.5% palmitic, 28% stearic and 2.5% of tetracosanic acids (percentage of acid in oil, 21.4, 8.6 and 0.8, resp.). This oil is entirely different from the fat isolated from a *Citromyces* by Browne (*J. Am. Chem. Soc.* 28, 465 (1906)).

C. J. West

**Nucleic acid of rye ergot.** M. Gatty-Kostyal and J. Tesarz. *Wiadomości Farm.* 61, 17-19, 31-2 (32 in French) (1934); *Bull. intern. acad. Polonaise, Classe sci. math. nat.* 1933B, I, 1-12 (in French).—Older findings that ergot contains large amts. of P (45-51% of the ash) induced G. and T. to verify the analyses and to identify the P compds. present. Ergot contains 1.40-1.60% P<sub>2</sub>O<sub>5</sub>, based on the dry wt. of the substance, which is distributed as follows: lecithinic 0.096-0.118%, total sol. 1.01-1.14%, nucleic 0.29-0.32%. Nucleic acid, C<sub>10</sub>H<sub>14</sub>N<sub>11</sub>O<sub>10</sub>P<sub>3</sub>, was demonstrated by P and N detns. and by color reactions.

J. Wiertelak

**Physiology of the leaf-roll disease of potatoes.** W. Ruhland and K. Wetzel. *Ber. Verhandl. Sachs. Akad. Wiss. Leipzig, Math.-phys. Klasse* 85, 141-9 (1933). Dextrin and reducing sugars were detd. by the methods of Lehmann (C. A. 26, 3812) and of Kerstan (C. A. 27, 3898). In leaves and in dormant and sprouted tubers of diseased plants there was always found a far higher dextrin, and lower sugar content than in the healthy plants. The diastase activity was much lower in the diseased leaves.

J. J. Willaman

**Plant sap and juice. I. Hydrogen-ion concentration and other data.** Arthur W. Barton. *Trans. Kansas Acad. Sci.* 36, 72-5 (1933). The sap from 20 species of trees growing at Hays, Kansas, was tested for pH values in 1932. All saps were acid, with an av. of about 6. The same held for a no. of herbaceous plants, *Oxalis* having the lowest, 1.8. No values above 7 were found. II. Data obtained in the spring of 1933. L. A. Breunen, Raymond Darland, Floyd M. Lee and A. W. Barton. *Ibid.* 76-7. All phanerogam saps were slightly acid. Studies on the grape (*Vitis palmata*) during the month of March showed that much moisture in the soil favors the flow of sap; that the flow is more copious when the air is warmer; and that the flow ceases when the buds burst.

J. J. Willaman

Major coffee diseases (McDonald) 15. I content of Pennsylvania potatoes (Pecar) 12. Molds putrefying tobacco (Nakazawa, et al.) 17. Plant pigments (Karrer, Schlienz) 10. Carotene. VIII. Phys. properties of carotenes from different plant sources (Smith, Milner) 10.

7. Demolon, Albert: Croissance des végétaux. Paris: Dunod. 308 pp. F. 78; bound, F. 88. Reviewed in *Ann. fols.* 26, 109 (1934).

Grainger, John: Virus Diseases of Plants. London: Oxford Univ. Press. 104 pp. 6s. Reviewed in *Nature* 133, 435 (1934).

## E- NUTRITION

PHILIP B. HAWK

**Calcium and phosphorus metabolism in rhizomelic spondylosis.** J. Morelle and J. Steenhoudt. *Rev. belge sci. méd.* 4, 623-39 (1932).—In 3 males suffering from spondylosis and receiving diets contg. less than 0.15 g. of Ca daily, but otherwise adequate, the serum Ca was 15.1, 11.6 and 10.5 mg. per 100 cc., resp. Plasma inorg. P was normal in all and there was a neg. Ca balance up to 0.7 g. in three-day periods, while a virtual equil. in P existed. In one case the hypercalcemia was controlled by low Ca. Irradiation of the spine caused no difference in mineral balance. Amelioration was produced in 2 cases, but activity of the disease recurred.

B. C. A.

**Calcium content of cow blood. I. Effect of feeding cod-liver oil.** W. L. Little and E. C. V. Mattick. *Vel. Record* 13, 238-45 (1933).—Although it leads to slight increase in the av. value for total and diffusible Ca and

P in the serum, administration of cod-liver oil (I) (4 oz. per day for 11-51 days *ante partum*) has no effect on the fall in the Ca content of the blood which occurs at calving. This fall is relatively greater in the diffusible fraction. Low values persist during 2-3 days *post partum*; I has also no effect on the fall in the P content of the blood which occurs at calving. Again the fall is relatively greater in the diffusible fraction. The return to normal value of P is almost always complete in the first 2 or 3 days. A simple technic for the detn. of diffusible Ca and P is given. B. C. A.

Vitamin D content of vegetable oils. T. Berzaczky and K. Rupilius. *Wien. klin. Wochschr.* 45, 1156-8 (1932).—Olive oil and a vegetable table oil contained prophylactic quantities of vitamin D for rats; they had also some therapeutic effect. B. C. A.

Influence of diet on the urinary excretion of oxalic acid and protective colloids in man. K. Eimer and H. Bartels. *Z. klin. Med.* 122, 1-22 (1932).—Normal daily urinary excretion of  $H_2C_2O_4$  in man is 12-20 mg.; it is independent of the vol. of urine and under the same dietary conditions is nearly const. in individuals. Raw vegetable diets increase the quantity 2-3 times; spinach and tomatoes have a particularly marked effect, although the  $H_2C_2O_4$  content of tomatoes is small compared with that of spinach. A raw vegetable diet diminishes, and a protein diet increases, the amt. of protective colloids in the urine. Cooking of food has no influence on the effects. B. C. A.

Changes in the blood picture in vitamin A deficiency. Th. Hart de Ruyter. *Nederland. Tijdschr. Geneeskunde* 77, 11, 2672-9 (1933).—Vitamin A-deficient rats, if not infected with *Bartonella*, show no anemia. But if this infection occurs after 5 months of vitamin A deficiency, a fatal anemia of the hyperchromic type occurs, as a result of the atrophy of the entire lymphoid system which appears in prolonged vitamin A deficiency. This atrophy leads to lymphopenia and to a decrease of the size of the spleen and thymus gland. R. Bentner

Amount and cost of salt for livestock. V. Buenacmino. *Sugar News* 15, 25 7 (1934).—The value of salt in the diet is reviewed and the proper rations are established for farm animals. L. Cusachs

Assay of vitamin A. J. B. Orr and M. B. Richards. *Nature* 133, 255 (1934).—"In carrying out a series of assays, by the curative method, of the vitamin A content of various samples of fish oils and dried milk, it was found that in a large proportion of cases the wt. curve did not give a reliable indication of the state of depletion of the vitamin A stores of the animal, and that increase in wt. after administration of a supplement could not always be ascribed to its vitamin A content. The evidence which has been obtained shows that when vitamin A is the only known factor absent from the diet, there is no cessation of growth, if growth is interpreted as increase in size. This has been detd. by measurements of length of the body in the live animal, and by comparison of the lengths of the bones, measured post-mortem, with Donaldson's values for the standard rat. It would appear that vitamin A has no greater claim to be considered essential for growth *per se* than any other of the many factors which are responsible for increase in wt. The characteristic loss in wt., which has been termed 'cessation of growth,' appears to be due entirely to pathol. conditions arising from the vitamin A deficiency. Even in animals killed at a stage when they are still increasing in wt., these conditions may be found on macroscopic examn. The diversity of the pathol. symptoms which may arise during the preliminary 'depletion' period makes it impossible to secure uniformity in the exptl. animals at the beginning of the test period. This constitutes a source of error which makes the curative method of vitamin A assay of doubtful value. It seems probable that the various discrepancies so frequently reported in such assays may find their explanation in the above observations." F. L. Dunlap

Occurrence of antirachitic vitamin in green plants. Ottar Rygh. *Nature* 133, 255 (1934).—Meadow hay,

consisting of Gramineae and some clover, which had been dried at 68° for 2 hrs. was investigated. Daily doses of 4 mg. of an  $Et_2O$  ext. cured rickets (method of Poulsson and J. Svenskjöld), showing the same antirachitic effect as a high-quality cod-liver oil, contg. about 250 Oslo units of vitamin D per g. This corresponds to 0.25 unit vitamin D per g. of hay powder. On treatment with alc. KOH, 8 g. of the  $Et_2O$  ext. yielded 0.508 g.  $Et_2O$ -sol. unsaponifiable matter. This was dild. with inactive peanut oil to make 8 g. With this soln., it was necessary to use 20 mg. in order to obtain the same antirachitic effect as was found in the  $Et_2O$  ext. before sapon. Vitamin D in green plants shows, accordingly, the characteristics described by Kon and Booth for vitamin D in butter, which is markedly different from the vitamin D of cod-liver oil and that obtained by ultra-violet irradiation of ergosterol; whereas 80% of the vitamin D in butter is lost by the usual sapon., this is not the case with vitamin D from the other 2 sources. Tintometric readings of the peanut-oil soln. of the unsaponifiable matter gave 10 blue units. Twelve hundred yellow and 20 red units were recorded as self-color on the Lovibond tintometer. F. L. Dunlap

Comparative nutritive values of dry matter in silage and fodder. A. D. Weber and W. E. Connell. *Kans. Agr. Expt. Sta., Director's 6th Biennial Rept.* 1932, 57.—Atlas sorgo dry fodder plus cottonseed meal was compared with Atlas sorgo silage with cottonseed meal. On a dry-matter basis, the silage contained 2.82% less reducing sugar, 1.54% less crude protein, 0.304% less true protein, 0.038% more free amino-N and 2.12% more N-free ext. than the ground fodder. The apparent digestibilities of the dry fodder and silage were practically identical at 73-73%. C. R. Felle

The relation between vitamin A metabolism and susceptibility to diphtheria toxin. Calvin C. Torrance. *Am. J. Hyg.* 18, 375-92 (1933).—The survival time of guinea pigs after an injection of diphtheria toxin was not increased by feeding increased amts. of vitamin A. A high degree of correlation was found between the vitamin A stored in the livers and the survival time, but no such relation existed between these stores and the amt. of vitamin A fed except with animals raised on an A-deficient diet. S. B. Foster

Increase in hepatic protein by a diet containing a natural mixture of amino acids. C. Gautier. *Bull. soc. chim. biol.* 15, 1563-5 (1933), cf. C. A. 26, 5128.—Frogs were fed pills consisting of crepsin, peptone, glucose, butter, salts and yeast ext. in the manner previously described. Their livers increased to about 2.25 times their original wt. The protein percentage of the livers decreased but the total wt. of liver protein increased 90-125%. L. E. Gilson

Do carbohydrates favor the development of experimental xerophthalmia? G. Mouriquand and Mme. P. Chaix. *Compt. rend. soc. biol.* 115, 528-30 (1934).—Rats on vitamin-A-deficient diets high and low in carbohydrates developed xerophthalmia after the same no. of days. L. E. Gilson

Influence of massive doses of vitamin A on animals on a normal diet. A. Chevallier, J. Cornilant, P. Chabre. *Compt. rend. soc. biol.* 115, 541-3 (1934).—Rats kept 45 days on a diet contg. 3200 times their normal requirement of vitamin A (an ext. of cod-liver oil was used) lost a little wt. but otherwise appeared healthy. Guinea pigs kept 50 days on a diet contg. 100 times their normal requirement of vitamin A gained wt. and appeared particularly vigorous. When the daily dose was increased to 3200 times their normal requirement they lost wt. and appeared miserable but no lesions were produced. Influence of massive doses of vitamin A on animals previously deprived of vitamin A. *Ibid.* 543-4.—When rats and guinea pigs in an unhealthy state from lack of vitamin A were given large doses of vitamin A (cod-liver oil ext.) their condition became worse and many of them died in a few days. L. E. Gilson

Lactic acid oxidation in the brain of hens suffering from avitaminosis B. P. E. Galvão and C. H. Florence.

*Arch. ges. Physiol.* (Pflügers) 233, 714-21(1934).—The ability of the brain tissue of hens to oxidize lactic acid is markedly decreased in avitaminosis B. The oxidation of succinic acid is unaffected. The accumulation of lactic acid in the brain may thus account for certain symptoms of avitaminosis B. Arthur Grollman

**Vitamin D milk from yeast-fed cows.** R. A. Woelffer. *Cornell Veterinarian* 23, 313-24(1933).—When cows that yielded an av. of 30 lb. milk daily were fed 10 oz. irradiated yeast (30-D potency) per day the milk had a vitamin D potency of 160 Steenbock units per qt. Fifteen references. K. D. Jacob

**Wool growth in sheep as affected by the carbohydrate content of the diet.** A. H. H. Fraser and J. E. Nicholls. *Empire J. Exptl. Agr.* 2, 9-19(1934).—Addn. of 200-500 g. corn starch daily to a basal ration of linseed-cake meal, turnips, oat straw and minerals caused a significant increase in the body wt. and gross fleece wt. of young Cheviot sheep. The increase in gross fleece wt. was reflected in the wt. of clean wool; this increase was due to a definite increase in fiber thickness, a slight increase in fiber length, and possibly also to an increase in the proportion of follicles actively elaborating fibers. It is suggested that the influence of starch in increasing wool production is due to the protein-sparing action of carbohydrates, thereby permitting the protein in the diet to be used for wool production rather than as a source of energy. K. D. Jacob

**Mineral metabolism. XXVII. The effect of two different calcium:phosphorus ratios upon the growth of calves.** P. J. du Toit, A. I. Malan and J. W. Groenewald. *Onderstepoort J. Vet. Sci.* 1, 421-4(1933); cf. C. A. 27, 5381.—Altering the CaO:P<sub>2</sub>O<sub>5</sub> ratio between the limits 1:0.3 and 1:1.4 had no significant effect. K. D. Jacob

**The chemistry of vitamins A and C.** Paul Karrer. *Chem. Rev.* 14, 17-30(1934).—A brief review. I. K.

**Digestion of fat.** II. The calculation of the digestive coefficient of fat. Shigeo Suzuki. *J. Agr. Chem. Soc. Japan* 9, 803-19(1933); cf. C. A. 28, 2758.—There is a relation between the digestive coeff. of the solid matter in the diet (x) and the ether-extractive matter of the dry feces which results from the fat-free diet (y), expressed by  $\log y = 0.09345(x - 88.1)$ . Hence the true digestive coeff. is calculated by subtracting y from the ether-extractive matter of the feces. This method was tested by animal expts. in which pure tristearin was given and the quantity of stearic acid in the feces was detd. The difference was only 0.5-1.5%. Y. Kihara

**The yellow color of the milk of goats deprived of the thyroid.** H. Fasold and E. R. Heidemann. *Z. ges. exptl. Med.* 92, 53-6(1933).—Normal goat butter contains vitamin A but no carotene. After thyroidectomy vitamin A is absent and large amts. of carotene are present. The lowered metabolism limits the change of carotene to vitamin A. Milton Levy

**The antagonism between vitamin A and thyroxine.** II. Fasold and H. Peters. *Z. ges. exptl. Med.* 92, 57 (1933).—Hypervitaminosis A in rats can be prevented or cured by thyroxine treatment. In exptl. thyrotoxicosis vitamin A restores normal growth. In this condition the liver stores carotene and vitamin A but not fat or glycogen. Milton Levy

**Fecal "fat" and its relation to fat in the diet.** A. Krakower. *Am. J. Physiol.* 107, 49-54(1934).—In human beings the I no. of the fecal lipins is uniform and unaffected by the degree of unsatn. of the dietary fat. There is comparatively little relationship between the amt. of fat in the diet and that recovered in the feces. J. F. Lyman

**Zinc in the nutrition of the rat.** W. R. Todd, C. A. Mvehjem and E. B. Hart. *Am. J. Physiol.* 107, 146-56(1934).—A ration low in Zn, contg. 1.6 mg. Zn per kg., caused interference with the normal fur development in rats fed thereon. The addn. of Zn accelerated the rate of growth. J. F. Lyman

**The vitamin A content of the livers of depancreatized dogs and its relationship to the symptoms occurring in**

**these animals.** R. P. Ralli, G. Pfau, P. Joffe and G. Stueck. *Am. J. Physiol.* 107, 157-63(1934); cf. C. A. 27, 2715.—The symptoms observed in dogs, whose pancreas glands have been removed, are not cured by the administration of vitamin A. J. F. Lyman

**Utilization of various carbohydrates by the depancreatized animal.** J. L. Bollman and F. C. Mann. *Am. J. Physiol.* 107, 183-9(1934).—Fifty g. of carbohydrate added to the basal diet of depancreatized dogs which received 6 units of insulin daily was completely recovered in the urine in those cases where digestion and absorption occurred. The following sugars, thus, are not utilized in the diabetic animal: glucose, galactose, corn starch, fructose and sucrose. Fructose appeared to be utilized at first but eventually all the fructose administered appears in the urine. Inulin is only slightly digested. J. F. Lyman

**The effect of diet, of insulin and of thyroxine upon the adrenaline content of the suprarenal glands.** II. A. F. Gohar. *J. Physiol.* 80, 305-13(1933).—A fat diet in the rat leads to a loss in the adrenaline content of the adrenals and to a decrease in the size of the glands. A carbohydrate diet also leads to a diminution of the absolute content of adrenaline with a slight loss in wt. of the glands. A protein diet has no effect. Repeated doses of insulin in small doses increase the wt. of the adrenals and their adrenaline content. In convulsive doses, insulin leads to a depletion of the adrenaline store. Repeated doses of thyroxine also lead to an increase in wt. and adrenaline content of the adrenals. J. F. L.

**The total fatty acids of the liver and of the blood after the administration of various fats.** G. Peretti and D. Tore. *Boll. soc. ital. biol. sper.* 8, 1429-33(1933).—The max. percentage increases in the liver fatty acids of rabbits produced by the following fats were: iodized fat (radiopol) 281.2, margarine 72.3, olive oil 46.5, sesame oil 40.6, poppy-seed oil 27.4, linseed oil 6.2. The max. increase occurred usually 9 hrs. after administration of the meal; after longer intervals the values decreased so that at the end of 72 hrs. the values approached those found in normal livers. The max. percentage increases in the blood fatty acids produced by the same fats were: 234, 161, 127, 90, 102, 282, resp. The max. values were found, in general, at a time when the fatty acid titer in the liver had shown a marked diminution. P. M.

**Parallelism between the course of avitaminosis C and the reducing power of the suprarenals of the guinea pig.** I. De Caro. *Boll. soc. ital. biol. sper.* 8, 1558-61(1933).—Guinea pigs were kept on a scorbutic diet. They were killed after 1, 2, 4, 10, 14 and 20 days, and the suprarenals extd. with 2.5% CCl<sub>3</sub>COOH. The reducing action of the clear exts. was detd. by Tillman's method with 2,6-dichlorophenolindophenol as indicator. The results show: (a) The reducing power of the suprarenals diminishes regularly and is a function of the duration of avitaminosis C; the diminution is very rapid during the early stages and gradual later (a hyperbolic curve). The decrease in wt. is very slow at first and rapid later. (b) The decrease in wt. becomes marked after the suprarenals have lost about 1/3 of their initial reducing power. (c) The total disappearance of reducing power of the suprarenal exts. precedes a few days the death of the animal from avitaminosis C. These results confirm the existence of a strict parallelism between the reducing power of the suprarenals and degree of avitaminosis C in the guinea pig. Peter Masucci

**The specific dynamic action of aliments. The behavior of glutamic acid administered to fasting pigeons.** Marco Stassi. *Boll. soc. ital. biol. sper.* 8, 1642-4(1933).—The specific dynamic action of glutamic acid in fasting pigeons is more than double that after the administration of the same substance to normal animals. P. M.

**Vitamin content of certain Italian cheeses.** Antonio Allegri. *Boll. soc. ital. biol. sper.* 8, 1574-8(1933).—Conclusions: (1) Pigeons treated with polished rice and with provolone or gorgonzola erborinato showed very attenuated symptoms of avitaminosis and survived much longer than the controls. No improvement over the

controls was shown by the pigeons receiving grana lodigiano, pannerone or pecorino Sardo. (2) Guinea pigs receiving a scorbutic diet plus the 5 mentioned cheeses showed no improvement over the controls: (3) Rats receiving a rachitic diet plus provolone showed a marked increase in wt. and recalcification processes; those receiving gorgonzola erborinato showed marked recalcification processes; slight recalcification was shown by the animals receiving grana lodigiano or pannerone and no effects were shown by those receiving pecorino. P. M.

**Studies of capillary resistance.** I. Lowered resistance due to vitamin C deficiency and other conditions in hospitalized patients. Paul Schultzer. *Acta Med. Scand.* 81, 113-32(1934).—The technic and special app. for detg. the capillary resistance are described. Among 149 patients taken at random 42 showed a lowered resistance. Of these 25 suffered from vitamin C avitaminosis, either originating before entering the hospital or resulting from the hospital fare. The lowered resistance was likewise observed in cases of gastric achylia in some of which vitamin C treatment brought about an improvement in the capillary resistance. In others no such improvement resulted even when HCl was also given. The remaining 17 patients with lowered capillary resistance, representing a variety of functional or systemic disorders, neither showed evidence of a vitamin C deficiency in their diet nor did they respond to treatment with vitamin C. S. Morgulis

**Biological value of the protein from peas.** I. P. and M. N. Chukichev. *Biochem. Z.* 268, 83-92(1934).—The authors' feeding expts. with the pea protein fractions (legumin, vicilin and legumelin) are contrary to the findings of Osborne and Mendel (*C. A.* 6, 3448, 7, 635), and of McCollum (*C. A.* 19, 2094) of the biol. inferiority of these proteins. S. Morgulis

**Vitamin C in invertebrates.** M. van Rekel. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* 3, 119-20(1933).—Ascorbic acid was determined by titration with 2,6-dichlorophenolindophenol before and after reduction with  $H_2S$ . Exts. from 13 marine invertebrates showed values before reduction ranging from 8 to 213 mg./kg.; after reduction from 41 to 687 mg./kg. Exts. of 7 marine plants showed values before reduction ranging from 62 to 675 mg./kg.; after reduction 394 to 770 mg./kg. In every case treatment with  $H_2S$  produced a definite increase in ascorbic acid content. J. C. M.

**Lyochrome and vitamin B<sub>2</sub>.** Erich Adler and Hans v. Euler. *Svensk Kem. Tids.* 45, 276-80(1933)(in German).—Macerated animal organs are extd. with acetone, and the acetone soln. is extd. with petroleum ether, which washed with  $H_2O$  gives an aq. soln. of the lyochrome from the tissue. Lyochrome in 80% MeOH is fluorescent and the relative degree of fluorescence is correlated with the vitamin G ( $B_2$ ) of the tissues. Flavin substances also occur in vegetable tissues known to be rich in vitamin G, e. g., yeast. A. R. Rose

**Vitamin A content of foods and feeds.** G. S. Fraps and Ray Treichler. *Tex. Agr. Expt. Sta., Bull.* 477, 34 pp.(1933); correction to *C. A.* 28, 1385.—The Bulletin no. should be 477. J. D. S.

**Studies on pregnant, puerperal and infant beriberi.** IV. Vitamin B content of various organs and secretions including blood, urine and embryo from pregnant or unmated rabbits fed on vitamin B deficient diets. Hitsuko Shin. *J. Chosen Med. Assoc.* 23, 423-40(1933); cf. *C. A.* 27, 4566.—The method of analysis used in III is extended to rabbits fed on deficiency diets. In these series, non-pregnant rabbits show a marked decrease of vitamin B content in the liver, brain and blood, and to a less degree in lung, heart and urine. The pregnant rabbits also show a great decrease, particularly in kidney and liver, as do the puerperal rabbits. V. Vitamin B content of the liver from very young rabbits. *Ibid.* 623-42 (English Abstract), 41-50(1933).—The vitamin B content of livers of the rabbits nursed by a mother fed on the deficient diet for only a short time during the puerperium or pregnancy is less than that of the liver from the young nursed by the normally fed mother. S. Tashiro

**Effect of B-avitaminous diets on pregnancy.** Hitsuko Shin. *J. Chosen Med. Assoc.* 23, 968-72 (English Abstract 76-7)(1933).—In rabbits, lack of vitamin B in the first half of pregnancy produces a miscarriage. Similar deficiency in the latter half of pregnancy gives normal delivery but the young have very low vitality. The effect of B-avitaminous diets on the estral cycle of female mice. *Ibid.* 973-6 (English Abstract 77).—If female mice are fed on avitaminous-B diets for 4-13 days, estrum disappears. If 3-5 units of folliculin are given at this time, the estral cycle reappears. This break in the estral cycle in vitamin B deficiency is brought about directly by a lack of ovarian hormone, and not by the avitaminosis B itself. S. Tashiro

**The diet of infants.** J. H. Burn. *Pharm. J.* 131, 737-9(1933).—A discussion, with detailed directions. S. Waldbott

**Physiologic activation of milk (Supplee, Dorcas) 12.** Ring-system of sterols and bile acids (Rosenheim, King) 10. Carotene (Smith, Milner) 10. Oxidation-reduction relations and a color reaction for lactoflavin (vitamin  $B_2$ ) (Kuhn, Wagner-Jauregg) 10.

## F—PHYSIOLOGY

\* HOMER W. SMITH

**Loss of sensitivity to anterior pituitary-like hormone of pregnancy urine.** II. Selye, J. B. Collip and D. L. Thomson. *Proc. Soc. Exptl. Biol. Med.* 34, 487-8 (1934).—Zoudek (*C. A.* 25, 2766) and others found that under the prolonged daily injection of exts. contg. the anterior pituitary-like hormone (A. P. L.) of pregnancy urine the rat ovary at first became greatly enlarged and later decreased in wt. The ovaries of 8 out of 10 rats which had been injected with 200 units of A. P. L. daily for 4 months were normal in size and had lost their sensitivity to the hormone as evinced by the absence of luteinization. In 4 similarly treated rats the daily injection of an aq. ammoniacal gonadotropic ext. of pig pituitary in addn. to A. P. L. caused great enlargement of the ovaries and the formation of many fresh corpora lutea. C. V. Bailey

**Influence of the uterus on ovary and mammary gland.** Hans Selye. *Proc. Soc. Exptl. Biol. Med.* 31, 488-90 (1934).—In 10 pregnant rats, during the 2nd half of gestation, the uteri were emptied and the spaces filled with paraffin (m. p. 42°). During the succeeding 6 weeks only 2 of these animals came to estrus; the ovaries weighed 75-100 mg. and contained many large corpora lutea such as are found during gestation; the pituitary gland weighed 11-17 mg.; the mammary glands were completely involuted. In control animals in which the uterus was not filled with paraffin normal estrus set in on the 3rd day, the ovaries weighed 40-45 mg., the corpora lutea of gestation shrank rapidly, the pituitary gland weighed 7-8 mg. and lactation occurred. In 10 other rats the distention of the uterus with paraffin stopped normal postpartum lactation and caused involution of the mammary glands. C. V. Bailey

**Survival of adrenalectomized rats after cortical hormone treatment.** Robert Gaunt and Jo Howland Gaunt. *Proc. Soc. Exptl. Biol. Med.* 31, 480-3(1934).—Approx. 50% of adrenalectomized rats survived for 30 days or longer after the withdrawal of prolonged treatments with cortical hormone; not more than 5% of the untreated animals survived. Cortical accessories capable of hypertrophy are present in many rats; the administration of cortical hormone causes a higher survival rate by allowing time for the cortical rests to hypertrophy. C. V. B.

**Glycogen and fat contents of liver in pregnant albino rats.** Carbohydrate metabolism in pregnancy. O. Bokelmann and W. Scheringer. *Arch. Gynäkol.* 152, 562-72(1933). In pregnancy the abs. value for the liver glycogen is greater and the relative value less than in the normal animal. The abs. liver fat is also on the av. higher in pregnancy, but the distribution is about the same as in the nonpregnant animal. Generally, there is evidence of



glycogen-fat antagonism in the livers of pregnant animals. Liver glycogen varies widely in different animals, but is related inversely, while liver fat is related directly, to the duration of pregnancy. Increased consumption of carbohydrate occurs in pregnancy. B. C. A.

Physiological variations in the concentration of various sugars in human milk. M. Polonovski, A. Lespagnol and H. Warembohr. *Compt. rend. soc. biol.* 107, 303-5 (1931).—Variations in concn. of the three forms of lactose are at first inconsiderable; after several months that of gylactose and that of the sugar sol. in MeOH appear to fall. B. C. A.

Action of the testicular hormone on cockscombs and seminal vesicles. K. Matsuzaki. *Proc. Imp. Acad.* (Tokyo) 9, 342-4 (1933).—Hormone preps. from male urine, active in promoting comb growth (I), showed no activity on the vesicles of rats (II). The testicular hormone (III) from pigs, on the other hand, showed activity in respect to both (I) and (II), although on treatment with  $KMnO_4$  in  $Me_2CO$  soln. (II) was no longer apparent. (III) is therefore considered to contain two different hormones. B. C. A.

Male hormone from pig testicles. A. Ogata and S. Hirano. *Proc. Imp. Acad.* (Tokyo) 9, 345-6 (1933).—An improved method for the isolation of the testicular hormone is described. Sapon. with 10% KOH in EtOH almost, oxidation with  $KMnO_4$  in  $Me_2CO$  soln. completely, destroyed the gonadotropic activity of the preps. B. C. A.

Approximation of certain components of the ash of the milk of cow and sheep to those of blood. F. E. Nottbohm and K. Philipp. *Z. Unterschl. Lebensm.* 65, 551-61 (1933).—With increasing Cl content, Na in cow milk regularly increases, K remains const. and the alkali no. diminishes until a crit. Cl content of approx. 0.2% is reached, when Na becomes irregular, K and the alkali no. fall to the value for blood, while the initial relation  $Cl > Na$  becomes, as in blood,  $Na > Cl$ . In sheep blood with high Cl the approximation of the ash constituent to those of the ash of blood is still more marked. The crit. Cl content marks the breakdown of the selective secretory activity of the alveolar cells with respect to blood constituents. B. C. A.

Studies of the blood in normal pregnancy. II. Hemoglobin, hematocrit and erythrocyte determinations and total amount of variations of each. Wm. J. Dieckmann and Carl R. Wegner. *Arch. Internal Med.* 53, 188-207 (1934); cf. C. A. 28, 1745<sup>2</sup>. III. Hemoglobin and cell volume coefficients; erythrocyte volume, hemoglobin content and concentration; color, volume and saturation indexes. *Ibid.* 345-52. IV. Percentages and grams per kilogram of serum protein and fibrin and variations in total amount of each. *Ibid.* 353-66. J. B. Brown

The digestion of beef proteins in the human stomach. Ernest J. Malby. *J. Clin. Investigation* 13, 193-207 (1934).—Peptic hydrolysis of beef proteins occurs rapidly in the human stomach; the rate of digestion varies widely in different individuals and in the same individual under different conditions. Patients with pernicious anemia fail to show appreciable gastric digestion of proteins; pepsin could not be demonstrated in such patients. Pepsin and acid secretion appeared to parallel each other under these conditions. The  $pH$  of the gastric contents varied from 1.23 to 0.63 in normal human beings. No patient with anemia had a  $pH$  below 5.75. The normal titratable acidity ranged from 151 cc. 0.1 N acid per 100 cc. to zero. Bile occurred in the stomach in 25% of the normal people and 18% of the subjects with anemia. J. B. Brown

The distribution of blood phosphorus after suppression of renal function. Alta Ashley and George M. Guest. *J. Clin. Investigation* 13, 219-35 (1934).—Renal function in rabbits and dogs, produced by intravenous injection of diphtheria toxin and  $HgCl_2$  and by bilateral ligation of the ureters, resulted in the following changes in the blood: increased org. phosphates, greater in the plasma than in the cells; increased inorg. acid-sol. P (ester P) in the cells; decreased Cl in both plasma and cells; increased

non-protein N. A reciprocal relationship exists between Cl and phosphoric esters as anions bound to alkali in the cells. J. B. Brown

Kidney function and blood pressure. H. C. A. Lassen and Erik Husfeldt. *J. Clin. Investigation* 13, 263-78 (1934). J. B. Brown

The lipemia of pregnancy. Eldon M. Boyd. *J. Clin. Investigation* 13, 347-63 (1934).—Discrepancies in former work on the lipemias of pregnancy may be explained by the fact that the lipide content of whole blood, plasma and red cells have not been followed simultaneously. This lipemia is due almost entirely to increase in plasma lipides. In plasma neutral fat begins to increase during the first trimester, followed by increase in phospholipide and cholesterol in the second trimester. At term neutral fat is most elevated (over 100%). With increase in total fatty acids no change in their compn. is evidenced by I no. J. B. Brown

Absorption of oxygen from the peritoneal cavity and the stomach. Indarjit Singhi. *Quart. J. Exptl. Physiol.* 24, 45-54 (1934).—In the decapitated dog the lungs are about 20 times more efficient in absorbing O than is the peritoneal cavity filled with pure O; and about 50 times more efficient than the stomach contg. 100 cc. O. In human subjects living in Rangoon the pulse rate in the prone position is always higher than in the supine. The cat stomach when filled with 100 cc. saline apparently slows the flow of fluid through the inferior vena cava when the animal is in the supine position. R. B.

"Fat-metabolism hormone" and hyperglucemia. Benjamin Harrow. *Science* 79, 272-3 (1934).—Preliminary work with an ext. of urine prep'd. according to Funk's method shows that a marked hyperglucemia comparable to that resulting from Doisy's exts. and a very definite increase in acetone in the blood can be produced. Rachel Brown

The female sexual hormone. XI. Constitution of the follicular hormone. 2. The degree of saturation and the aromatic character of the follicular hormone. Adolf Butenandt and Ulrich Westphal. *Z. physiol. Chem.* 223, 147-68 (1934); cf. C. A. 27, 4286.—Conclusive proof is now advanced that the follicular hormone is a 4-ring system with 3 conjugated double bonds in 1 benzene nucleus. Catalytic hydrogenation of the hormone hydrate gives a hexahydro deriv. which forms a cryst. triacetate, and, by removal of 1 OH, 2 by-products which are stereoisomeric diols, viz. hexahydrodesoxyhormone hydrate m. 152° and hexahydrodesoxyhormone hydrate, m. 162°, the ratio of these 3 products depending on the nature of the catalyst. The 2 diols form acetates, m. 84° and 131°, resp., and by distn. with  $KHSO_4$  in high vacuum yield the corresponding ketones  $C_{19}H_{28}O$  which form semicarbazones, m. 202.5° and 278.5°, resp. A 4th double bond is not present in the hormone, since all the hexahydro derivs. are stable to  $KMnO_4$ ,  $BzO_2H$ ,  $O_3$  and  $C(NO_2)_4$ . Detns. of mol. refraction corroborate the presence of 3 double bonds. The double bonds and the OH are on the same benzene ring as shown by color reactions for phenol, stability of the Me ether to hydrolysis, and absorption spectrum. The hormone forms an insol. addn. product with 1 quinoline, which decamps. 200°, gives a clear melt at 230°, and may be used for purposes of purification. Catalytic hydrogenation of the desoxyhormone gives a hexahydro deriv.  $C_{19}H_{28}O$   $H_2O$ , m. 80-90°, m. anhydrous 110°. The soly. of the hormone in  $H_2O$  is 2.1 mg. per l.; the dissocn. const. is  $K = 0.44 \times 10^{-9}$  and that of its hydrate is  $K = 0.77 \times 10^{-9}$ . Reduction of the hormone by the Clemmensen method, or of its semicarbazone by the Wolf-Kishner method, gives the desoxyhormone  $C_{18}H_{22}OH$ , m. 134°,  $[\alpha]_D^{20} 89^\circ$  (Me ether, m. 76.5°,  $[\alpha]_D^{20} 85^\circ$ ). A. W. Dox

Standards of basal metabolism for children of retarded growth. A. Topper. *Am. J. Diseases Children* 45, 1203-10 (1933). G. G.

Biological electronegativity of potassium. Rudolf Keller. *Arch. phys. biol.* 11, 31-9 (1933).—Some peculiarities in the distribution and behavior of K salts in living organisms are reviewed. L. E. Gilson

**Calcium balance.** C. O. Guillaumin. *Bull. soc. chim. biol.* 16, 152-5(1934).—Discussion. L. E. Gilson

**Theoretical basal metabolism of infants.** E. Léauté and R. Nattan-Larrier. *Compt. rend. soc. biol.* 115, 802-4(1934).—Discussion. Discussion of some results obtained in the study of the respiratory metabolism of infants. *Ibid.* 804 (1). L. E. Gilson

[Decrease in] the phosphorus of the liver of the fetal calf during embryonal development. Z. Grzewska and G. Roussel. *Compt. rend. soc. biol.* 115, 951-2(1934). L. E. Gilson

**The problem of hibernation.** H. Uiberall. *Arch. ges. Physiol. (Pflügers)* 234, 78-97(1934).—Hibernation is not associated with hypofunction of the thyroid. Administration of thyroid substance to hibernating hedgehogs did not affect their dormancy. Thyroidectomy did not induce hibernation. Arthur Grollman

**The mechanism of the second phase of secretory gastric function.** O. F. Scharovatova. *Arch. ges. Physiol. (Pflügers)* 234, 124-9(1934).—Removal of the pyloric portion of the stomach does not affect gastric secretion. Excision of the pylorus increases the pepsin and mucin contents of the gastric juice. The chem. stimulation of the pyloric mucosa by food is not essential for the occurrence of the 2nd phase of gastric secretion. A. G.

**The growth of the oviduct of the carp when subjected to the female sex hormone.** H. Walter Fleischmann and Susanne Kann. *Arch. ges. Physiol. (Pflügers)* 234, 130-6(1934); cf. C. A. 27, 120.—Progynon when added to the aquarium stimulated the growth of the oviduct of carp (*Rhodeus amarus*) within 48 hrs. In the castrated male fish, sex reversal, as indicated by hyperemia of the genital papilla, occurred after progynon medication. A. G.

**Oxidation of fatty acids in the liver.** Juda H. Quastel and Arnold H. M. Wheatley. *Biochem. J.* 27, 1753-62(1933).—By means of the Warburg tissue slice method, a study has been made of the oxidation of fatty acids by guinea-pig liver. All fatty acids, except formic acid, increase markedly the respiration of the liver. All fatty acids with an even no. of C atoms give rise to acetone production. Odd-C fatty acids produce little or no acetone bodies. Crotonic and isocrotonic acids (unsatd. acids) are vigorously oxidized to acetoacetic acid. A manometric method of estg. acetoacetic acid is described. Acetoacetic acid is not broken down appreciably to acetone and CO<sub>2</sub> in the liver; it is apparently the final oxidation product of butyric acid in the organ. Benjamin Harrow

**Effects of saliva upon gastric digestion.** Earl A. Zaas and Leonard S. Foslück. *J. Dental Research* 14, 3-13(1934).—The av. flow of saliva (cc. per min.) was 0.5 or less under basal conditions, and 2.5 under stimulation. The av. neutralizing power of basal saliva was approx. equal to 0.017 N NaOH; that of stimulated saliva was approx. equal to 0.025 N NaOH. Chewing sweetened and flavored indifferent substances caused "appetite" secretion of approx. 2.1 cc. of gastric juice per min.; this juice contained 340 mg. of 1:10,000 pepsin per 100 cc. The Gates gelatin film method for the detn. of pepsin was found superior to the Mett tube method. Swallowed saliva influenced the concn. of the solutes in gastric juice by diln., and the concn. of its free HCl by neutralization; at the height of the secretory curve, 100 cc. of gastric juice would be neutralized by 140 cc. of stimulated saliva. Saliva stimulated the acid-secreting glands, probably by virtue of the sugar and flavor used as salivary stimulants. Saliva influenced peptic activity directly by alteration of the pH of the gastric juice. With a const. pH, saliva inhibited peptic activity by 10%, while gastric mucin had a somewhat greater inhibitory power. The combination of salivary constituents with gastric-free HCl early in the digestive cycle promoted the action of ptyalin for some time after the food had entered the stomach. Joseph S. Hepburn

**Postmortem breakdown of glycogen and accumulation of lactic acid in fish muscle.** I. James G. Sharp. *Proc. Roy. Soc. (London)* B114, 506-12(1934).—In fish muscle

after death the rates of glycogenolysis and accumulation of lactic acid decrease with the temp. between 15° and 0°. The tissue freezes at approx. -1°. In the frozen state, these rates are almost the same at -2° as at 15°, but are reduced to practically 0° at -10°. When the original glycogen content of the muscle does not exceed 0.3%, during storage at either 0° or -2° glycogenolysis and the accumulation of lactic acid proceed with equal velocity until only a trace of glycogen remains. When the original glycogen content is 0.6-0.85%, the accumulated lactic acid at 0° corresponds to only 50-70% of the glycogen loss; a max. lactic acid concn. of 0.40-0.45% is attained; apparently a pH is reached which inhibits further glycogenolysis. Joseph S. Hepburn

**The glutathione content of the suprarenal glands.** A. D. Marenzi and B. Braier. *Anales farm. bioquim.* (Buenos Aires) 4, 50-4(1933).—The glutathione content of the suprarenal glands had been variously stated in the literature in values higher than the real ones, because of the fact that the methods used included the ascorbic acid and the adrenaline. M. and B. note that since the presentation of their work similar results were reported by Hirsch and Dann, C. A. 27, 3242. B. S. Levine

**The active principle of organ extracts for the treatment of vascular spasm.** Tiemann. *Münch. med. Wochschr.* 81, 58 9(1934). Milton Levy

**The effects of operative procedures on the anterior lobe of the pituitary on the metabolism of depancreatized dogs.** H. Lucke, E. R. Heydemann and O. Berger. *Z. ges. expil. Med.* 92, 711-23(1934); cf. C. A. 29, 1090.—Injury to the anterior lobe of the pituitary of depancreatized dogs improves their carbohydrate metabolism. Animals without either pancreas or anterior pituitary respond violently to insulin or anti-insulin because of the absence of the normal antagonist. Milton Levy

**The effect of hemorrhage on the normal and adrenalectomized dog.** W. W. Swingle, J. J. Pflüger, H. M. Vars and W. M. Parkins. *Am. J. Physiol.* 107, 269-74(1934).—Dogs whose adrenal glands have been removed develop symptoms of profound hemorrhagic shock after the removal of 4-8 cc. of blood per kg. of body wt.; whereas, in the normal dog such symptoms appear only after the removal of 40-54 cc. Administration of the cortical hormone restores the ability of the organism to regain normal blood vol. after hemorrhage. J. F. L.

**Seasonal and temperature factors and their determination in pigeons of percentage metabolism change per degree of temperature change.** O. Riddle, Guinevere C. Smith and F. G. Benedict. *Am. J. Physiol.* 107, 333-42(1934).—The seasonal difference in metabolism of adult tumbler pigeons, measured at 20°, is 15% in males and 8% in females, with lowest metabolism in spring and highest in autumn. The change in metabolism due to a change of 1° in temp. is variable depending upon the season of the year and the range of temp. scale which is used in measurement. J. F. Lyman

**The influence of exercise on the digestive work of the stomach. I. Its effect on the secretory cycle.** Frances A. Hellebrandt and Sara L. Hooper. *Am. J. Physiol.* 107, 348-54(1934).—Severe and exhausting exercise inhibits the initial gastric response and is assoc. with hypoacidity or anacidity lasting as long as one hr. Mild activity increases or leaves the peak of acidity unchanged. II. Its effect on emptying time. Frances A. Hellebrandt and Rubye H. Tepper. *Ibid.* 355-63. III. Its effect on the relation between secretory and motor function. Frances A. Hellebrandt and L. L. Dimmitt. *Ibid.* 364-9.—Gastric acidity and motility at rest and during muscular activity are parallel. IV. Its relation to the physiochemical changes in the blood. Frances A. Hellebrandt, H. D. Baernstein and Sara L. Hooper. *Ibid.* 370-7.—During strenuous exercise, physiochem. variation in the blood are concomitant rather than causal in their relation to alterations in gastric function. J. F. L.

**The acid-base composition of hepatic bile.** I. J. G. Reinhold and D. W. Wilson. *Am. J. Physiol.* 107, 378-87(1934).—The concn. of each of the cations of dog bile is usually higher than the concn. of the same cation

in the serum. The principal anions are cholate, Cl and  $\text{HCO}_3$ . The bile acid is quantitatively the most important constituent, although the amt. of phospholipin is nearly as great. The bile acid concn. appears to be the dominant factor in the regulation of the acid-base compn. of the bile. II. The changes induced by the injection of hydrochloric acid and inorganic salts. *Ibid.* 388-99.—Bile becomes more alk. after the intravenous injection of HCl because of rise in  $\text{NaHCO}_3$  and fall in cholate concn. of the bile. After injections of  $\text{NaHCO}_3$ , the concn. of the injected ions rises somewhat in the bile; but there is little change in the reaction of the bile. Large amts. of NaCl must be injected in order to bring about a change in its concn. in the bile. III. The effects of the administration of sodium taurocholate, sodium cholate and sodium dehydrocholate (decholin). *Ibid.* 400-5. After intravenous injection of Na taurocholate the total cholate and Na concns. increase in the bile while bicarbonate decreases. The total anion-cation concn. of the bile rises so that the total considerably exceeds that of the serum. Injection of Na dehydrocholate or of Na cholate causes the total anion-cation concn. of the bile to diminish to values approx. equal to those in the serum. J. F. Lyman

The occurrence of citric acid in the urine and body fluids. W. M. Boothby and Mildred Adams. *Am. J. Physiol.* 107, 471-9(1934).—Citric acid is present in normal human urine equal to about 0.5 g. daily. Analyses of over 300 hospital urines indicate no practical clinical value for the citric acid detn. Ingestion of  $\text{NaHCO}_3$  usually will increase citric acid elimination to about 2.0 g. daily; administration of HCl decreases or stops its excretion. Its chief function probably is not acid-base regulation. Rather it is an important intermediate in metabolism. J. F. Lyman

A comparison of intragastric and duodenal factors in lowering the acidity of gastric contents. C. M. Wilhelmj, I. Neigus and F. C. Hill. *Am. J. Physiol.* 107, 490-507 (1934); cf. *C. A.* 28, 1091<sup>4</sup>.—Both pyloric and duodenal secretions reduce acidity more by diln. than by neutralization and the greater efficiency of regurgitated duodenal contents is due to its larger amt. It is a mistake to consider the entire neutral Cl of gastric contents as arising from neutralized HCl. J. F. Lyman

The nervous control of lactation. H. Seyle. *Am. J. Physiol.* 107, 535-8(1934).—The act of suckling in the rat stimulates the production of prolactin in the pituitary gland. J. F. Lyman

The hydrogen-ion concentration of the mammalian voluntary muscle under various conditions. C. Voegtlin, R. H. Fitch, Herbert Kahler and J. M. Johnson. *Am. J. Physiol.* 107, 539-50(1934).—Normal rat skeletal muscle has a  $p_{\text{H}}$  of about 7.55. Death caused by asphyxia, CN,  $\text{CO}_2$  or curare is followed by a gradual decrease in  $p_{\text{H}}$ , rigor mortis appearing at  $p_{\text{H}}$  6.85-6.68. Death following intravenous injection of iodoacetic acid is followed by a rise in  $p_{\text{H}}$  to as high as 7.96. J. F. L.

The chemical stimulation of pain endings associated with small blood vessels. R. M. Moore, Ruth E. Moore and A. O. Singleton, Jr. *Am. J. Physiol.* 107, 594-602 (1934).—The pain which follows the intra-arterial injection of various solns. arises from stimulation of afferent endings which are located close to the capillary bed. Solns. having  $p_{\text{H}}$  values between 6.0 and 9.2 do not produce pain unless their mol. ionic concn. is 0.7-0.8 or unless they exert irritant action. Arranged in order of increasing power to stimulate the pain receptors comes: Na, Li, Cs, Ca, Mg, Sr, K, Rb, Ba, and for anions, thiocyanate, acetate, sulfate, thiosulfate, lactate, fluoride, phosphate, citrate. J. F. Lyman

The lysin present in normal urine. J. C. Abels. *Am. J. Physiol.* 107, 603-9(1934).—The lysin of human urine has properties like those of the lysin of *Es. coli*. It is not bile salt, soap or glucoside. J. F. Lyman

Lactic acid metabolism of muscles made non-irritable by sugar solutions. A. H. Hegnauer. *Am. J. Physiol.* 107, 667-76(1934).—The large increase in O consumption of muscles in isotonic glucose is qualitatively but not

quantitatively explained by the 5-6-fold increase in lactate content. Some other cause such as the electrolyte balance probably is involved. J. F. Lyman

The removal of lactic acid from the body during recovery from muscular exercise. R. Margaria and H. T. Edwards. *Am. J. Physiol.* 107, 681-6(1934).—The removal of lactic acid in mice, after exercise, is of the same character and speed as in the blood of man, thus indicating free diffusion of lactic acid between muscles and blood. At the beginning of recovery, when a rapid payment of O debt occurs, no corresponding rapid removal of lactic acid is observed; hence this fraction of the O debt is not related to lactic acid. There is a delay in the removal of lactic acid, which lasts 3-4 min., after the end of a 5-min. period of exhaustive exercise, indicating a delayed lactic acid formation. The speed of lactic acid removal is higher the smaller the amt. of lactic acid produced. J. F. Lyman

The lactic acid, total carbon dioxide and hydrogen-ion concentration of venous blood during recovery from severe exercise. E. P. Laug. *Am. J. Physiol.* 107, 687-92(1934).—The highest lactic acid and lowest  $p_{\text{H}}$  values in blood were obtained not immediately but within 3-6 min. after exercise. Total  $\text{CO}_2$  continues to decrease during recovery in face of a rise in  $p_{\text{H}}$  and a fall in lactic acid. J. F. Lyman

The second phase of thrombin action: fibrin resolution. Ruby S. Hirose. *Am. J. Physiol.* 107, 693-7(1934).—The syneresis of clots is in reality a resoln., ending finally in complete liquefaction. Unaltered prothrombin and a new protein are liberated, but there is no unchanged fibrinogen, active thrombin, free cephalin or Ca. J. F. Lyman

The alleged presence of "hemopoietine" in the blood serum of rabbits either rendered anemic or subjected to low pressures. A. S. Gordon and M. Dubin. *Am. J. Physiol.* 107, 704-8(1934).—Serum of anemic rabbits and of rabbits subjected to low pressures does not contain any substance possessing erythropoietic properties. J. F. Lyman

Changes in the chemical elements of the blood of rabbits during emotional excitement. II. L. Katz and L. B. Nee. *Am. J. Physiol.* 107, 700-16(1934).—In emotional excitement of rabbits the following constituents of the blood were increased: glucose, nonprotein N, urea, preformed creatinine, total creatinine, uric acid, cholesterol and hemoglobin. Inorg. P was decreased. Amino acids, Ca and Cl were unchanged. In rabbits after removal of the spleen the same changes were observed as in normal animals except hemoglobin was not increased. J. F. Lyman

Problems of histophysiology. A. Noll. *Ergebnisse Physiol.* 35, 50-81(1933).—This brief review covers liver cells, kidney secretion, muscle contraction and nerve function. C. M. McCay

The biochemistry of the testicular hormone. K. Tscherning. *Ergebnisse Physiol.* 35, 301-17(1933).—A review. C. M. McCay

The female sex hormones. Inge Störmer and Ulrich Westphal. *Ergebnisse Physiol.* 35, 318-41(1933).—A review of the chemistry and physiology of the follicular hormone. C. M. McCay

The comparative physiology of digestion in mammals. W. Lenkeit. *Ergebnisse Physiol.* 35, 573-631(1933).—This review devotes considerable space to digestion in the ruminant as well as in the more familiar omnivorous species. C. M. McCay

Recent advances in the chemistry of certain blood constituents. Claude Rinnington. *Ergebnisse Physiol.* 35, 712-43(1933).—New developments in the chemistry of proteins, blood sugar, P and S compds. are discussed. C. M. McCay

Chemical changes during the contraction of muscle. R. Lehnartz. *Ergebnisse Physiol.* 35, 474-486(1933).—A review. C. M. McCay

Factors capable of changing the functional activity in physical exercise. Cardiac and respiratory rhythm in running under a condition of alkalosis. G. Di Maccio.

*Boll. soc. ital. biol. sper.* 8, 1681-2(1933).—The expts. were performed on 9 individuals. Each one ran 2 races with and without previous administration of  $\text{NaHCO}_3$ . The results show that  $\text{NaHCO}_3$  produced an acceleration of the pulse while at rest and a more marked acceleration after the race compared to the controls. The pulse returned to normal values much more slowly in comparison with the controls. Peter Masucci

The delay in the appearance of prolactin in the body fluids of women after fecundation of the ovum. A. Brindeau, H. Hinglais and M. Hinglais. *Bull. acad. méd.* 110, 108-11(1933). A. E. Meyer

Basal metabolism and sedimentation of erythrocytes. León Goldemberg. *Semana méd.* (Buenos Aires) 1934, 1, 595-603.—The sedimentation of the erythrocytes is accelerated in most cases of increased basal metabolism caused by hyperthyroidism. The diagnostic value of this observation is limited. A. E. Meyer

The action of liver on blood serum to prevent the reversion of hemolysis due to sodium chloride. Arrigo Montanari. *Sperimentale* 87, 327-36(1933).—Rabbits deprived of the liver show in the peripheral blood serum an increase of the power to inhibit the reversion of hemolysis from solns. of  $\text{NaCl}$ . A. E. Meyer

The existence of factors in tissues capable of modifying cellular permeability. The action of testicle extract, of some calcium salts and of ethyl carbamate. Giovanni Pavilli. *Sperimentale* 87, 451-69(1933); cf. *C. A.* 27, 5813.—Testicle ext. injected into tissues together with substances of low permeability as urethans and  $\text{Ca}$  gluconate, or injected after such substances, spreads less into the tissue than when injected alone. The inhibition of vaccinia lesions in the skin prep'd. with urethan or  $\text{Ca}$  salt is explained by the decreased skin permeability. A. E. Meyer

Follicular hormone in the urine of males. Bernhard Zondek. *Arkiv Kemi, Mineral. Geol.* 11B, No. 24, 5 pp. (1933); cf. *C. A.* 25, 1853.—The nonpregnant mare excretes urine contg. less than 500 mouse units of follicular hormone per l.; the gravid mare over 100,000 units per l. Urine obtained from the jack showed an av. of 42,000 or more mouse units per l. The urine from the castrated jack contained less than 400 mouse units per l. Acetone-benzene extn. of the testicle showed 54,000 units per kg. Only 10-25% of the follicular hormone is directly extractable from the urine of the jack with ether or benzene. If the urine is boiled with a mineral acid the remainder is extractable. James C. Munch

The oxygen consumption of stimulated nerve. Susumu Harashina. *J. Cellular Comp. Physiol.* 3, 419-24 (1933).—The excess  $\text{O}_2$  consumption of nerve is practically the same whether stimulation is made on a portion inside or outside of the respiration chamber so long as the action current is of the same magnitude. T. H. R.

The anoxic recovery of asphyxiated nerve. R. H. Cohen and R. W. Gerard. *J. Cellular Comp. Physiol.* 3, 425-36(1933).—An asphyxiated nerve can be restored to function when, in place of free  $\text{O}_2$ , other oxidizers yielding sufficient energy on reduction are made available. Conclusion: The energy is necessary rather than any particular substances formed or removed. T. H. R.

The spectrophotometric differentiation of the hemoglobins of different species. Howard M. Winegarden and Henry Borsook. *J. Cellular Comp. Physiol.* 3, 437-48(1933).—The authors hold that with adequate technic it is possible by spectrophotometric methods to observe interspecific, and in the case of the rabbit even intraspecific, differences in the hemoglobins. T. H. R.

Gastric impulses in the vagus. Ruth C. Partridge and M. J. Wilson. *J. Cellular Comp. Physiol.* 4, 123-6 (1933); cf. *C. A.* 27, 3246. T. H. Rider

Respiration due to natural nerve impulses. A method for measuring respiration. R. W. Gerard and H. K. Hartline. *J. Cellular Comp. Physiol.* 4, 141-60(1934).—See *C. A.* 28, 2400<sup>a</sup>. T. H. Rider

The quantitative measurement of the permeability of the erythrocyte to water and to solutes by the hemolysis

method. M. H. Jacobs. *J. Cellular Comp. Physiol.* 4, 161-83(1934); cf. *C. A.* 28, 1724<sup>a</sup>.—Tables based on math. calcn. are presented with which a detn. of the time of hemolysis in water and in an isosmotic soln. of a penetrating substance are sufficient to det. permeability consts. for both water and solute. Where hemolysis in an isosmotic soln. requires more than 2-3 min. the permeability const. for the solute is approx. inversely proportional to the time of hemolysis. T. H. Rider

The effect of rapid changes in hydrostatic pressure upon the contraction of skeletal muscle. Dugald E. S. Brown. *J. Cellular Comp. Physiol.* 4, 257-81(1934). T. H. Rider

The chemical processes accompanying embryonic induction. M. W. Woerdenman. *Proc. Acad. Sci. Amsterdam* 36, 842-9(1933). W. Gordon Rose

Gastric juice. I. The relation of ions in gastric juice in various patients. S. Kozawa, K. Fukushima, M. Umeno, K. Kurihara, C. Takata and M. Horiuchi. *Japan. J. Med. Sci. VIII, Internal Med., Pediatrics and Psychiatry* 3, 15-32(1933).— $\text{Cl}$ ,  $\text{Na}$ ,  $\text{K}$ ,  $\text{NH}_4$ ,  $\text{P}$  and  $\text{Mg}$  were found in the gastric juice of fasting as well as of intoxicated persons ( $\text{Ca}$  was not estd.). The amt. of  $\text{Na}$  was usually greater than  $\text{K}$ ; where free  $\text{HCl}$  was lowest, the amt. of  $\text{K}$  exceeded the amt. of  $\text{Na}$ .  $\text{Cl}$  and  $\text{NH}_4$  in the blood serum were less than in the gastric juice, but  $\text{Na}$  and  $\text{K}$  were greater. The  $\text{Na}/\text{K}$  ratio for serum was 17:1; for gastric juice it was 2.8:1. K. Sugiura

Crepsin in liquor amnii and fetal intestines in every stage of pregnancy, and in the meconium of the newborn. M. Abe. *Japan. J. Obstet. Gynecol.* 16, 225-30(1933).—The optimum  $\text{pH}$  of crepsin of the human liquor amnii was 7.0-8.0. This enzyme was found in the liquor amnii as early as the 2nd gravid month and was markedly increased in the succeeding gravid months. Of the liquor amnii at the delivery, the one which had the meconium mixed with it showed more intense enzymic action than that which did not have the meconium. The crepsin was found even in the fetal intestines of the 3rd gravid month and its action increased with the advance of pregnancy. K. Sugiura

Quantity of "anterior pituitary lobe hormone" in human chorion and decidua. K. Mizuno. *Japan. J. Obstet. Gynecol.* 16, 238-41(1933).—The substance which caused the pregnant reaction (Aschheim-Zondek test), the so-called "anterior pituitary hormone," was present in the decidua in large quantities as well as in the chorionic tissues. The hormone content of these tissues decreased in the latter months of pregnancy. The pos. reaction was not shown by the decidua menstrualis in any case. K. Sugiura

Coagulation time of blood during pregnancy. Nemcszky Tivadar and Krompassky Sarolta. *Magyar Orvosi Arch.* 35, 54-7(1934).—The coagulation time is shorter. In 50% of cases there is a rise in blood  $\text{Ca}$ . Blood platelets show a slight increase. Fibrinogen increases considerably. Henry Taylor

Occurrence of growth substance B in urine. Vagu Hartelius. *Compt.-rend. trav. Lab. Carlsberg* 19, No. 18, 20 pp.(1933).—The substance promoting the growth of *Aspergillus niger* (Nielsen and Hartelius, *C. A.* 26, 4256, 4368) is present in human urine, its amt. increasing with increasing d. of the urine. However, the necessary co-growth substance, which is present in filter-paper ash, is not present in urine in sufficient amts. to allow of max. effect of the substance B.—On addn. of the  $\text{HCl}$  ext. of 5 mg. ash to 50 cc. of culture soln., the effect of added urine was trebled, and further addn. of ash produced no further increase. Under these conditions, the effect of increasing growth-promoting activity with increasing d. was still maintained. The concn. of growth substance B in urine is increased after meals. The co-growth substance present in urine is not the same as that in filter ash; it is probably  $\text{Zn}$ . The growth substance B itself is thermostable, insol. in  $\text{Et}_2\text{O}$ , and is not destroyed by  $\text{H}_2\text{O}_2$ ; hence its properties are similar to those of the

substance previously described, though the identity is not established. A further similarity is the necessity for the addn. of the co-growth substance or of Zn in small amts. K. V. Thimann.

**Excretion of ammonia and neutrality regulation.** A. P. Briggs. *J. Biol. Chem.* 104, 231-8 (1934).—Administration of KCl to dogs or men caused an increased excretion of metallic cations in the urine, the urine becoming more alk. as a result. At the same time the excretion of  $\text{NH}_3$  in the urine was decreased. On the other hand, when  $\text{Na}_2\text{SO}_4$  was given, anions were increased in the urine, with resultant increased acidity, and the excretion of  $\text{NH}_3$  was also increased. The excretion of  $\text{NH}_3$  is therefore not controlled by the acid-base balance in the tissues but rather by that of the glomeruli of the kidney. K. V. Thimann.

**Calcium content of the aqueous and vitreous humors and serum.** Peter W. Salit. *J. Biol. Chem.* 104, 275-80 (1934).—The Ca content of the aq. humor increases rapidly on standing a few hrs. after death, reaching or exceeding that of the vitreous humor. This may account for some of the discrepancies in the literature. The av. Ca content of the aq. humor falls from 5.8 mg. Ca per 100 g. fluid, in calves, to 4.60 in aged cattle, while that of the vitreous humor falls from 8.3 to 6.8 and that of the serum from 11.5 to 9.7. The ratios between the Ca of the aq. or vitreous humor and that of the serum are very const., 1.9-2.1 and 1.30-1.44, resp., indications of the direct dependence of the Ca content of the humors on that of the serum. K. V. Thimann.

**Recognition and comparison of prolan and prolan-like substances.** Herbert M. Evans, Miriam E. Simpson and Paul R. Austin. *J. Exptl. Med.* 58, 561-8 (1933).—The synergism phenomenon has made possible the recognition of substances ("prolan-like") in a wide variety of conditions, even in the urine of normal men. The method has shown a wide distribution of prolan-like substances in serums and urine of non-primates without demonstrating, however, significant difference in the reactions secured from pregnant as contrasted with non-pregnant states or in males as contrasted with females. The synergic principle with pregnancy prolan causes a definite increase in the development of the seminal vesicles in immature male rats. C. J. West.

**Concentration of the gonadotropic hormone in pregnant mare serum.** Herbert M. Evans, Edwin L. Gustus and Miriam E. Simpson. *J. Exptl. Med.* 58, 569-74 (1933).—For an abstr. of this paper see the abstr. entitled "Recognition and comparison of prolan and prolan-like substances" in C. A. 28, 2053, where the wrong title was printed. C. J. West.

## G PATHOLOGY

H. GIDRON WILLS

**Postoperative amino acid excretion in Graves' disease.** W. Krech. *Arch. klin. Chir.* 174, 662-6 (1933).—After operations on the thyroid (I) in Graves' disease, the urinary output of amino N increased; in other (I) conditions there was a postoperative fall in amino N. The urinary amino-N curve seemed to bear no relation to changes in temp. The differences between Graves' disease and other (I) conditions are attributed to the defect in the former of protein synthesis and the effect of preoperative I medication on the storage of protein in the (I). B. C. A.

**Postoperative changes in blood fat.** F. Frochnow and L. Findeisen. *Arch. klin. Chir.* 175, 121-37 (1933).—The total blood fat (I) in operative as distinct from metabolic diseases varies in the fasting condition from 230 to 310 mg. %. In cholelithiasis and cholecystitis (I) varies from 214 to 354 mg. %. The lowest values are 200 mg. (tuberculous peritonitis) and the highest 530 mg. (xanthomatosis). The normal individual variations are 13% (fasting) and 20-22% (fed). No significant change of (I) occurs with  $\text{K}_2\text{O}$  narcosis alone, but hyperlipemia arises as soon as operative work begins. Variation of (I) as a result of operations under local anesthesia

is very small and postoperative hypolipemia is rarely observed. B. C. A.

**Experimental fever in man. II. Energy exchange in fever: thermogenesis and metabolism.** E. Delcourt-Bernard. *Rev. belge sci. mid.* 5, 229-92 (1933).—In cases (I) exhibiting rigor, the metabolism tends to diminish beforehand, rises markedly (112%) during rigor, and remains approx. 30% high afterward until the temp. begins to fall. In cases (II) without rigor the mean rise is 16%. On deducting the extra metabolism due to shivering, the increase in (I) is similar to that of (II). Fat combustion increases, especially in the middle and later periods of expt., in (I) or (II). Carbohydrate combustion increases in (I), in which it is proportional to intensity of shivering, but diminishes in (II). Protein metabolism varies. B. C. A.

**Lipids and lipid diseases. II. Xanthomatosis (Schüller-Christian's type).** Dorman E. Lichty. *Arch. Internal Med.* 53, 379-99 (1934).—Analyses were made for lipid, cholesterol and phospholipid in the tissues in Schüller-Christian's disease and in one of anemia for comparison. There were no significant differences except where the xanthomatous masses were located, which were high in total lipid,  $\frac{1}{2}$  of which was cholesterol. J. B. Brown.

**Relation of the plasma cholesterol to obesity and to some of the complicating degenerative diseases.** Maurice Bruger and Charles A. Poindexter. *Arch. Internal Med.* 53, 423-34 (1934); cf. C. A. 27, 5106.—The plasma cholesterol was normal in 53 cases of obesity without metabolic, arthritic or endocrine disturbance; it was high in diabetes, essential hypertension and arteriosclerosis (with obesity); in 4 cases of infectious arthritis it was normal; in degenerative hypertrophic arthritis it was high. Change in cholesterol concn. is a complication rather than an etiologic factor. J. B. Brown.

**Muscular dystrophy and atrophy.** Clinical and biochemical results following the oral administration of amino acids. Carlo J. Tripoli and Howard H. Beard. *Arch. Internal Med.* 53, 435-52 (1934).—Administration of 10-20 g. doses of glycine or glutamic acid to patients with various dystrophies and atrophies resulted in a great increase in the excretion of creatine and creatinine. A new theory of the origin of creatine is given. J. B. Brown.

**Lipids of serum in diabetic acidosis.** Evelyn B. Man and John P. Peters. *J. Clin. Investigation* 13, 237-61 (1934).—During the acute phase of recovery from diabetic acidosis concn. of serum cholesterol, fatty acids and lipid P decreased. Fall of lipid is referable largely to hemodilution. Variations in cholesterol bear little relation to those of fatty acids. There is an extended bibliography. J. B. Brown.

**Pneumococcus antibodies. What are they?** Lloyd D. Felton. *Science* 79, 277-9 (1934). In the serum of a horse immunized against the entire pneumococcus cell there appears to be an antibody for each antigenic substance found in the microorganism. The antigen-antibody complex formed by the action of a sol. sp. substance and antiserum of types I and II can be dissociated by treatment with alkali and the polysaccharide removed by pptn. with  $\text{Ca}_3(\text{PO}_4)_2$ . The resulting antibody appears to be a salt-sol. protein. It has an isoelec. zone between  $\text{pH}$  6.8 and 7.4, is slightly sol. in  $\text{H}_2\text{O}$ , readily sol. in neutral salt, completely precipitable with 44% satn. of  $(\text{NH}_4)_2\text{SO}_4$  and sol. in satd. NaCl. Digestion by pepsin and trypsin is accompanied by loss in immunological activity. Pos. reactions were obtained with this dissociated protein indicating the presence of agglutinins, precipitins, bacteriolysins, opsonins, complement-fixing bodies and protective antibody. Rachel Brown.

**The effect of viosterol (vitamin D) and tuberculin on the healing of tuberculous lesions in guinea pigs.** Eugene C. deSavitsch, Virginia E. Trevorow, Wm. C. Black and Robert C. Lewis. *Am. Rev. Tuberculosis* 28, 699-710 (1933).—The use of a combination of viosterol and tuberculin in the treatment of moderately advanced

tuberculosis in guinea pigs gives definitely beneficial results, as judged by longevity, degree of tuberculous involvement and amt. of fibrosis. The optimum effect of the treatment is apparently obtained when the viosterol and tuberculin are given simultaneously rather than when one precedes the other by 48 hrs. H. J. C.

**Desensitization of tuberculous guinea pigs by means of natural tuberculin prepared from fractured bacilli.** John Weinzirl and Russell S. Weiser. *Tubercle* 15, 210-16(1934).—Desensitization in tuberculosis has previously been tried by the authors with the result that synthetic medium tuberculin was found capable of desensitizing tuberculous guinea pigs against a lethal dose of tuberculin. To this they now add "natural tuberculin" (N. T.) consisting of the inner contents of the tubercle bacillus, liberated by fracturing the organism by freezing with liquid air (about 35 times) according to the method employed by Nelson (C. A. 20, 2365). N. T. contains all the saline-sol. proteins unaltered by heat or chemicals. Solid CO<sub>2</sub> freezing proved less efficient. Tuberculous guinea pigs can be desensitized by means of sublethal doses of N. T. No desensitizing powers could be demonstrated for the cell debris remaining after removal of the N. T. The N. T. successfully desensitized guinea pigs infected with either nonvirulent or virulent tubercle bacilli. Desensitization was effected against both Sci-bert's synthetic medium tuberculin, and against the homologous natural tuberculin. H. J. Corper

**The prevention of pleural effusion with calcium gluconate.** V. V. Pisain and F. J. Smekjal. *Tubercle* 15, 216-21(1934).—Direct clinical observations extending over a period of 14 months indicate that Ca gluconate is of value in the prevention of pleural effusion complicating artificial pneumothorax, confirming the exptl. findings of Gold (C. A. 23, 903) in cats, that Ca injections diminish or prevent the formation of pleural effusion. H. J. C.

**Antitrypsin content of the blood of tuberculous individuals.** Ludwig Vajda. *Z. Tuberk.* 68, 414-17(1933). The blood of tuberculous individuals retards trypsin digestion more markedly than normal blood. In a high percentage of the cases the more marked antitrypsin action paralleled the shift of the leukocytic picture of the blood to the left and the acceleration of the blood corpuscle sedimentation, although incongruent cases were noted. Even active cases of tuberculosis, however, can reveal normal antitrypsin values, similar to the not rare possibility of the presence of a normal blood picture or a normal sedimentation rate in such cases. H. J. Corper

**Alkali reserve of the blood in bone-joint tuberculosis.** M. M. Altschuler and N. W. Strier. *Z. Tuberk.* 68, 417-20(1933).—The alkali reserve of the blood is shifted to an alkalosis in closed forms of bone-joint tuberculosis. In open forms, those with mixed infection, the alkali reserve of the blood is shifted to an acidosis. There occurs a certain parallelism between the severity of the disease and the amt. of alkali reserve of the blood. According to the changes in the alkali reserve, along with the other findings, the severity of the process can to a certain extent be evaluated. In the authors' material there was a 60% parallelism among the cases between the amt. of alkali reserve and the white blood picture. H. J. Corper

**Tumor problem in the light of researches on plant tumors and galls and its relation to the problem of mutation.** (A critical review from biophysical, biochemical and cytogenetical point of view.) Dontcho Kostov. *Protoplasma* 20, 440-56(1933); cf. C. A. 27, 5778. Thirty-seven references. F. L. Dunlap

**Ten years of research on the physicochemistry of cancer.** Fred Viès and A. de Coulon. *Arch. phys. biol.* 11, 5-30(1933); cf. C. A. 28, 2087.—The work of V. and associates (46 papers) is briefly reviewed. L. R. Gilson

**Variations in the metabolism of the thymus during ischemia.** M. Chèvremont. *Compt. rend. soc. biol.* 115, 744-8(1934). L. E. Gilson

**Insulin secretion during hyperaminoacidemia.** Jean La Barre. *Compt. rend. soc. biol.* 115, 748-50(1934).—

In dogs intravenous injections of small quantities of glycine cause a rise in glucemia while large doses (0.5 g./kg.) cause a rise followed by a marked drop to below normal. By the cross-circulation method it was shown that the large doses cause an increased secretion of insulin indirectly by stimulation of the adrenals. L. E. G.

**Thermogenesis during exogenous hyperthermia.** S. Gelineo. *Compt. rend. soc. biol.* 115, 865-7(1934).—Rats which had been raised in a room heated to 30-32° were placed for 30-100 min. in chambers heated to 36-41°. In all cases there was a 20-60% increase in metabolism and their body temps. rose to 1-3° above the temp. of the particular hot chamber employed. Several died 1-10 hrs. later. L. E. Gilson

**The insulin hypoglycemia test in hepatic cirrhosis.** Marcel Labbé and R. Boulin. *Compt. rend. soc. biol.* 115, 907-8(1934).—Insulin has a much weaker action in cases of hepatic cirrhosis than in normal persons. L. E. Gilson

**Catechin (inhibitory substance) of the thyroid gland and its therapeutic use in exophthalmic goiter.** E. Herzfeld and A. Frieder. *Deut. med. Wochschr.* 59, 84-6(1933).—The anti-thyroid substance described by Blum, and named "catechin" was prepd. from blood serum. It prevents the rise in metabolism following the administration of thyroid substance. *Tyronorm*, a proprietary prep. of catechin, was efficacious in patients suffering from Graves' disease when such patients were maintained on a special meat-free diet. "Arthur Grollman"

**Weltmann sero-coagulation test in hepatopathy in relation to the serum-protein picture.** E. Massobrio and U. De Michelis. *Minerva med.* 1934, I, 147-54.—Sero-coagulation, blood protein (Howe) and bilirubinemia were detd. in 12 cases of hepatic cirrhosis, 9 of catarrhal icterus, 8 tumors of the liver and biliary tract and 10 miscellaneous cases of liver disease. There was a marked widening of the area of coagulation in advanced cirrhosis, a moderate widening in precirrhotic conditions and in acute and sub-acute icterus, and lessened or normal values in inflammatory processes of the biliary tract. A certain parallelism was shown between the increase of the area of coagulation and the inversion of the protein quotient. H. L. G.

**The behavior and significance of the Weltmann sero-reaction in some disease conditions—studies on the electrolytic threshold of coagulo-flocculation with heat of exudates, transudates and normal and pathological cerebrospinal fluids.** Mario Pellegrini and Giulio Bafani. *Minerva med.* 1934, I, 154-62.—The Weltmann reaction was detd. on more than 300 sera from patients with various diseases, 28 exudates, 16 transudates, 12 normal and 4 pathol. cerebrospinal fluids. In inflammatory diseases of the biliary tract there was an alteration toward a higher electrolytic concn. while the opposite effect occurred in hepatic cirrhosis, catarrhal icterus, pernicious anemia, diabetes mellitus, chronic alcoholism and post-encephalitic parkinsonism. Exudates showed a more or less marked elevation of the electrolytic threshold of heat coagulation, the opposite occurring in transudates. Meningitic liquids coagulated at an electrolytic concn. of 0.3-0.4%. The abs. protein content was of no value in detg. electrolytic threshold. Equimolar solns. of electrolytes of the same valence (Ca, Ba, Mg) produced coagulation at different concns. Helen Lee Gruehl

**Chloropenic hyperazotemia.** Arcangelo Creazzo. *Minerva med.* 1934, I, 162-5.—A clinical case of chloropenic hyperazotemia of renal origin with arterial hypertension and severe cardiac insufficiency is described. The azotemic titer returned to normal after treatment with NaCl. Helen Lee Gruehl

**Refractometric examination of purified antitoxins.** Charles Siehenmann. *Biochem. J.* 27, 1745-52(1933).—No differences were found between the refractive properties (R. P.) of globulin solns. contg. diphtheria antitoxin and the R. P. of normal horse globulin solns. These findings were confirmed for purified tetanus, scarlet fever and erysipelas antitoxins. Benjamin Harrow



**Status thymicolymphaticus:** a manifestation of diminished calcium utilization. Harold T. Nesbit. *Arch. Pediatrics* 51, 54-57(1934).—In 6 patients exhibiting this syndrome, the Ca concn. of the spinal fluid was subnormal; symptoms ceased upon its elevation to 5 mg. Ca per 100 cc. of spinal fluid. The physiol. response may be produced by x-ray therapy or by intramuscular injection of Ca gluconate and parathormone. J. S. H.

**A soluble specific substance in spirochetes.** E. Hindle and P. Bruce White. *Proc. Roy. Soc. (London)* B114, 523-9(1934).—A highly sp. sol. haptene was isolated from a strain of *Spirochaete (Leptospira) biflexa* by extn. with 0.5% NaOH, differential pptn. with alc. in alk. and acid soln., and final pptn. with acetone. The haptene reacted by pptn. only with its homologous antiserum, and not with antisera derived from 6 other water strains and 8 strains of *S. icterohemorrhagiae*; these reactions demonstrated a sharp serological distinction between the water strains and the leptospira of infectious jaundice. Joseph S. Hephurn

**Sun and cancer: its relation to cholesterol heliotropism.** A. H. Roffo. *Neoplasmes* 12, 257-85, 521-44(1933).—The sun's rays (visible and invisible spectra) play an important role in the formation of keratotic carcinomas of the skin of the face and hands. These follow hyperkeratotic injuries of the skin exposed to the sun's rays. These hyperkeratotic injuries of the skin occur particularly in blondes, while the pigmented skins are more resistant to light rays. All the cases studied gave a history of prolonged exposure to the sun and only 3.62% were less than 40 years of age. The cutaneous hyperkeratosis must be considered as a precancerous condition as these lesions if not arrested form keratomas and finally cancer. The sun's rays produce these injuries by acting on the cholesterol, because of the heliotropic function of this substance. In the parts of the skin exposed to the sun there is an increased cholesterol content, which begins with activities in the sup; under the age of 3 it is very weak, and it does not exist in the fetus. By exposing animals to the sun or ultra-violet rays it is possible to increase the cholesterol content of the skin. There is a direct relation between the high percentage of carcinomas of the skin of the face and especially of the parts most exposed to the sun on the one hand, and the parts containing the most cholesterol on the other hand, which are also the parts most exposed to the sun. The part of the face most exposed to the sun (nose) forms the highest percentage of carcinomas and also contains the highest percentage of cholesterol. Harriet F. Holmes

**Biochemical study of the breaking-down of malignant tumors by cobra venom.** C. Taguet and E. Rousseau. *Neoplasmes* 12, 291-300(1933).—Following the work of Calmette, et al. (*Bull. Ac. Sc.* 3(1933)) that cobra venom injected into spontaneous or grafted tumors of mice had a marked curative effect the authors obtained analogous results from intratumoral injection of cobra venom in certain malignant human tumors. There was a breaking-down of the tumor tissue to a yellowish pseudopurulent fluid. Cobra venom is a complex substance but the enzymes responsible for its effect on the tumor cells are, in the order of their importance, a phosphodiesterase, a proteolysin, a hemolysin and a hemorrhagin. The cobra venom introduced into the tumor forms with the lecithin of the cells a lysocytin which has a pronounced cytolytic effect. In addn., the proteolytic enzyme, always present in abundance in tumor cells, is augmented in action by the proteolytic enzyme of the cobra venom. H. F. H.

**Urea retention in the dog.** Matthew G. Hanson and John J. Hanson. *North Am. Veterinarian* 14, No. 2, 18-9, 40(1933).—Under normal conditions, dog blood contains urea N 12-15, nonprotein N 30-45 and creatinine 1.2 mg./100 cc. In 2 cases of terminal nephritis, blood analyses showed urea N 140, 191; nonprotein N 298, 376; and creatinine 30.0, 22.8 mg./100 cc. The differences are less pronounced in the early stages of nephritis. K. D. Jacob

**Nature of antibodies.** J. Marrack. *Nature* 133, 202-3(1934).—When benzidine is tetrastotized and coupled

to R salt and to the serum proteins, a deep red compd. is formed, and the agglutinin is not wholly destroyed. When a weak soln. of the protein dye is used, a quant. difference can be shown between the degree of adsorption by homologous and heterologous bacteria. Two instances are given. W. D. Langley

**The role of the kidney in diabetes.** L. R. Grote. *Münch. med. Wochschr.* 81, 160-4(1934).—A lecture. Glucosurias due to insulin deficiency, renal, central nervous and hormonal disturbances are discussed. M. L.

**Uremia and loss of chloride.** Chloropenia from ascitic puncture. René S. Mach, Evelyn Mach and François Sciclounoff. *Schweiz. med. Wochschr.* 64, 54-7(1934).—In 3 cases of ascites on a salt-free diet treated with mercurial diuretics drainage of the ascitic fluid produced a true chloropenia with a very low urine Cl excretion. Milton Levy

**Gastric disease and industrial lead poisoning.** Erwin Klein and Alfred Selinger. *Wien. med. Wochschr.* 83, 1240-2(1933).—The high incidence of gastric disturbances in 195 lead workers points to an etiological connection. Milton Levy

**The relation between creatinuria and adrenaline hyperlactic acidemia in rabbits.** F. Quetol and A. Reuter. *Z. ges. expil. Med.* 92, 508-602(1934).—Conditions promoting creatinuria such as hunger, urethan and thyroxine prevent the rise in blood lactic acid which normally follows the injection of adrenaline. The effect disappears if the creatinuria is long continued. Milton Levy

**Uremia.** Joseph Csapó and Edmund Kerpel-Fronius. *Z. ges. expil. Med.* 92, 603-10(1934); cf. *C. A.* 28, 2773<sup>1</sup>.—The cause of acidosis in uremia is discussed with data on the acid-base balance, non-protein N and f. p. of blood in various types of uremia. Milton Levy

**Toxicology in the medicolegal necropsy.** Alexander O. Gettler. *Am. J. Clin. Path.* 4, 50-65(1934). E. R. M.

**Blood lipoids in children with scarlet fever and rheumatic fever.** Albert D. Kaiser and Mary S. Gray. *Am. J. Diseases Children* 47, 9-24(1934). The lipid content of the blood of children 5-16 yrs. of age is const. and somewhat lower than that of normal adults. The content of total lipoids is normally 427 mg. per 100 cc. of plasma; of phospholipide 90 mg.; cholesterol 150 mg. and residual fat 139 mg. In acute and chronic rheumatism and during convalescence from scarlet fever, the values are practically normal but show greater deviations than those of normal blood. There appears to be no difference in the lipid content of the blood of boys and girls. The values are somewhat lower in the summer months than in the winter and are not influenced by ordinary variations in diet. E. R. Main

**Cod-liver oil sensitivity in children.** Ray M. Balyeat and Ralph Bowen. *Am. J. Diseases Children* 47, 529-32(1934).—A coned. prepn. of carotene to which vitamin D has been added can be safely and effectively administered to children who show allergic reactions to cod-liver oil. E. R. Main

**The incidence of sugars in the urine of infants and children.** F. Fikri and Mah. A. El-Sayed. *Arch. Disease Childhood* 8, 409-12(1933).—The presence of lactose is observed occasionally in the urine of healthy children and is frequently assocd. with infectious diseases and with severe disturbances of the digestive tract. The presence of glucose may be indicative of diabetes, which is a possible etiological factor in the marasmus of infants. E. R. Main

**Glycogen disease.** S. van Creveld. *Arch. Disease Childhood* 9, 9-26(1934); cf. *C. A.* 28, 2067.—Glycogen disease (hepatomegalia glycogenica) is characterized by the accumulation in the liver and other organs of glycogen which is not readily mobilized. Glycogen is present in the blood in concns. much higher than normal and shows a marked resistance to splitting upon incubation for 1.5 hrs. at 37°. The glycogenolytic activity of the blood is normal, since added glycogen is split to the same extent as that added to normal blood. The disease is further characterized by the appearance of hypoglycemia and ketosis after fasting, by the absence of an initial insulin

hyperglucemia and of any distinct elevation in blood sugar after the administration of adrenaline. The cholesterol content of the blood is increased; the relation between free cholesterol and cholesterol esters remains normal. A method is described for the detn. of glycogen requiring 1 cc. of blood. E. R. Main

A clinical study of blood iron and hemoglobin. C. W. Dowden and Clyde McNeill. *J. Lab. Clin. Med.* 19, 362-7(1934).—Values for the Fe content of the blood, the hemoglobin and Fe contents of the individual cell furnish more valuable information than red cell counts and percentage hemoglobin, the latter values being variables and based upon an assumption of averages. E. R. Main

The relation of blood glutathione to the hemoglobin and amount of red cells. Rawson J. Pickard and Charles S. Marsden, Jr. *J. Lab. Clin. Med.* 19, 395-404(1934).—There appears to be no quant. relationship between the glutathione and hemoglobin contents of the blood. The glutathione content normally ranges from 20 to 30 mg. per 100 cc. The av. content in nonhemorrhagic secondary anemia is 24.9 mg. After severe hemorrhage the value may be decreased to 17.1 mg., the return to the normal level being more rapid than that of the red cells and hemoglobin. E. R. Main

Serology of syphilis. XIII. The use of the same antigen for the Wassermann reaction and the author's flocculation test; and a recommended Wassermann technic. Harry Eagle. *J. Lab. Clin. Med.* 19, 621-4(1934); cf. *C. A.* 27, 3987. E. R. Main

The partition of potassium between the serum and corpuscles in health and disease. Wm. S. Hoffman and H. R. D. Jacobs. *J. Lab. Clin. Med.* 19, 633-44(1934).—The concn. of K in the serum and red cells appears to be const. both in health and disease, increases in the serum K being noted only in asthma and in Bright's disease. The av. content of K in normal serum is 19.3 mg. and in the red cells 422.7 mg. per 100 cc. A method for the detn. of the K content of whole blood is described in which the K is detd. in a protein-free filtrate, prepd. by treating laked blood with  $\text{FeCl}_3$  and an alk. soln. of Na acetate. E. R. Main

Studies of the physiologic and pathologic chemistry of the skin. Preliminary report. Abraham Rudy. *J. Lab. Clin. Med.* 19, 654-9(1934).—A micro method is described for the detn. of the sugar content of the skin. A 50-mg. sample is minced and extd. with dil. tungstic acid soln. The sugar content of the ext. is then detd. as in Folin's micro method for the detn. of sugar in laked blood (*C. A.* 23, 4492). E. R. Main

A new method for the production of antishemp hemolysin. Margaret Beattie. *J. Lab. Clin. Med.* 19, 666-7(1934).—Hemolysin of unusually high titer is produced in rabbits which receive 5 preliminary intracutaneous inoculations of sheep serum at 48-hr. intervals, the initial dose being 0.5 cc. and the final dose 2.5 cc. After 4 days 3 intravenous injections of 1 cc. of a 10% suspension of sheep cells at 48-hr. intervals are made. E. R. Main

Sugar tolerance in the arthritic. H. Archibald Nissen and K. A. Spencer. *New Engl. J. Med.* 210, 13-19(1934).—A low sugar tolerance is often assoc. with arthritis of Type I or the Mixed Type. In patients with joint involvement or marked crippling, the lowered tolerance may persist over a period of several yrs. without the appearance of signs of diabetes. E. R. Main

Glutathione in the blood in chronic pulmonary tuberculosis. L. Béthoux and G. Carraz. *Bull. acad. méd.* 110, 51-7(1933).—Oxidized glutathione is decreased more than the reduced substance. A. E. Meyer

Phosphoric esters in normal and malignant tissues. E. L. Outhouse. *Trans. Roy. Soc. Can.* 27, 123-33(1933).—The total P content of human and bovine tumor tissues is lower than that of normal tissue. The  $\text{Ba}(\text{OH})_2$ -sol. fraction of the latter contained more org. P than the former. Fibrous tumor tissue contained only a small amt. of acid-sol. P. W. Gordon Rose

The possibility of glucolyzable hapten in tumor. W. R. Franks. *Trans. Roy. Soc. Can.* 27, 135-40(1933).—

Expts. with mice, rabbits and chickens failed to demonstrate a glucolyzable hapten in Rous sarcoma.

Change in the equilibrium of osmotic pressure of tissues in water poisoning. Gömöry Pál and Molnár István. *Magyar Orvosi Arch.* 35, 46-53(1934).—Death of animals poisoned by  $\text{H}_2\text{O}$  is not due to increased intracranial pressure but to osmotic pressure changes of tissues. The  $\text{H}_2\text{O}$  is first taken up by the muscles, then by the liver and finally by the central nervous system. H. T.

I content of Pennsylvania potatoes (Frear) 12.

Kopaczewski, W.: Perméabilité cellulaire et problème du cancer. Paris: Le François. 167 pp. F. 40.

Marrack, J. R.: The Chemistry of Antigens and Antibodies. Medical Research Council, Special Report Series, No. 194. London: H. M. Stationery Office. 135 pp. 2s. 6d.

Nye, L. J. Jarvis: Chronic Nephritis and Lead Poisoning. London: Angus & Robertson. 12s. 6d.

Immunizing serums. Josef Vorschütz. *Brit.* 402, 621, Dec. 7, 1933. See *Ger.* 582,558 (*C. A.* 28, 8204).

## H-PHARMACOLOGY

A. N. RICHARDS

Further contributions to methods of barbital research. Theodore Koppányi, Wm. S. Murphy and Stephen Krop. *Proc. Soc. Exptl. Biol. Med.* 31, 373-4(1933); cf. *C. A.* 28, 8261. Effect of barbiturates in the domestic fowl. Theodore Koppányi and Wm. S. Murphy. *Ibid.* 375-6. Effect of barbiturates in experimental nephrosis. Wm. S. Murphy and Theodore Koppányi. *Ibid.* 376-8.—In severe exptl. nephrosis, the dog and the rabbit reacted to barbiturates like totally nephrectomized animals; they remained anesthetized until death; barbital was retained in the blood and very little was excreted in the urine. In milder nephrosis, recovery from the sleep produced by barbiturates was retarded. Acute barbital poisoning in dehydration and diuresis. Theodore Koppányi, Wm. S. Murphy and Stephen Krop. *Ibid.* 31, 451-3(1934).—In the dog, dehydration did not prolong barbital narcosis, nor did the saline diuresis by the method of Gower and Van de Erve (*C. A.* 27, 4309), hasten recovery. The intravenous injection of 0.5-1.0% solns. of  $\text{NH}_4\text{Cl}$  did not shorten the period of depression; it did increase the rate of excretion of barbital in the urine. C. V. Bailey

Blood alcohol after administration of alcohol. O. Graf and E. Flake. *Arbeitsphysiol.* 6, 141-67(1932).—Widmark's analytical procedure (*C. A.* 24, 3029; 26, 2942) is modified; his results are confirmed. B. C. A.

Relation between blood alcohol and the psychological effect of alcohol. O. Graf. *Arbeitsphysiol.* 6, 169-213(1932).—Detn. of blood EtOH indicates the degree of psychological disturbance only within wide limits. B. C. A.

Presence and detection of diethylbarbituric acid in cerebrospinal fluid. G. Vitte. *Bull. soc. pharm. Bordeaux* 70, 255-6(1932); cf. *C. A.* 27, 3961.—In a case of barbital poisoning the substance was found in the cerebrospinal fluid; the procedure of sepn. is described. B. C. A.

Mechanism of the action of narcotics. H. Süllmann. *Protoplasma* 18, 321-44(1933).—Emulsions of olive oil in  $\text{H}_2\text{O}$  contg. soap or gelatin are rendered unstable by the addn. of narcotics, which accelerate phase inversion by  $\text{BaCl}_2$ . Urca and sugar have the reverse effect. The action of narcotics results from its disturbing effect on the emulsifier. Narcotic effects are discussed in relation to the physicochem. condition of living cells. B. C. A.

Pharmacology of evipan sodium. Walter P. Kennedy and Basudeva Narayana. *Quart. J. Exptl. Physiol.* 24, 69-75(1934).—The Na salt of cyclohexenylmethyl-N-methylbarbituric acid (evipan Na) (I) has a depressant action on the frog heart which is rapidly removed by washing and is antagonized by adrenaline. No significant effect is produced on the blood sugar of rabbits or guinea

pigs. Respiration is markedly slowed and temp. reduced. The detoxication of I in mammals is very rapid.

**Toxicity of the nitriles of  $\alpha$ -amino acids.** C. Sannicé. *Bull. soc. chim. biol.* 15, 1436-61 (1933); cf. C. A. 28, 1772<sup>2</sup>.—The literature on the toxicity of nitriles is briefly reviewed. S. prepd. the sulfates of the racemic nitriles of 14  $\alpha$ -amino acids (most of them unrelated to the amino acids of proteins) and studied their toxic effects in rabbits. The min. lethal dose ranged from 0.02 to 0.16 g./kg. Only a small part of the toxicity was due to the splitting off of HCN. In the aliphatic series increasing the length of the chain decreased the toxicity. Those of the type R(R')C(NH<sub>2</sub>)CN were the most toxic. In the aromatic series the toxicity was increased by the introduction of a MeO group on the benzene nucleus or a double bond in any side chain.

**Phlorizin and the formed elements of the blood.** Albert Lambrecht. *Compt. rend. soc. biol.* 115, 720-1 (1934); cf. C. A. 28, 1731<sup>2</sup>, 1772<sup>2</sup>.—Phlorizin is not adsorbed from the plasma by the corpuscles or platelets.

**Adrenaline, ephedrine and average bleeding time.** Jacques Roskam. *Compt. rend. soc. biol.* 115, 724-6 (1934); cf. C. A. 27, 3250.—Washing the cut with dil. solns. of adrenaline or ephedrine has little or no effect. Adrenaline or ephedrine given intravenously or subcutaneously prolongs the bleeding time 30-600% although the total amt. of blood lost may be decreased in some cases.

**Cancerigenic power of benzopyrene.** J. Maisin and P. Liégeois. *Compt. rend. soc. biol.* 115, 733-6 (1934); cf. C. A. 28, 1101<sup>2</sup>.—Benzopyrene was prepd. by the method described by Cook, *et al.* (C. A. 27, 3212). Applied to the skin of mice, it produced cancer in a shorter time than either dibenzanthracene or coal tar.

**Action of insulin on the amino acids of the blood.** René Martens. *Compt. rend. soc. biol.* 115, 752-4 (1934); cf. C. A. 27, 3507.—Insulin decreases the blood amino acids, probably by inhibiting proteolysis and promoting the synthesis of peptides.

**Sparteine and spinal anesthesia.** Fernand Mercier and C. Rizzo. *Compt. rend. soc. biol.* 115, 760-72 (1934). In dogs anesthetized with chloralose, sparteine causes a drop in arterial pressure but if the chloralose is supplemented by a spinal injection of pseudocaine-HCl (Delcaine) the sparteine causes a rise in arterial pressure.

**Influence of vagotropic and sympathicotrophic substances on the cholesterol and lecithin contents of [human] blood.** J. Ornstein, M. Sibi and F. Branover. *Compt. rend. soc. biol.* 115, 779-83 (1934).—Repeated hourly injections of pilocarpine produced slight increases in cholesterol and lecithin; atropine and adrenaline produced decreases; and the effects of Cynergene were irregular.

**Action of vagotonin on the acid-base equilibrium of the blood of normal animals [dogs].** D. Santenaise, E. Stankoff and M. Vidacovitch. *Compt. rend. soc. biol.* 115, 795-8 (1934); cf. C. A. 28, 1407<sup>2</sup>.—Vagotonin causes a slight increase in the alk. of the blood and a small decrease in combined CO<sub>2</sub>.

**Curative action of atropine in secondary cardiac syncope produced by chloroform.** L. Garrelon, R. Thuillant and R. Maleyrie. *Compt. rend. soc. biol.* 115, 801-2 (1934); cf. C. A. 25, 3392.—Previous results were confirmed.

**The phenomenon of double inversion of the effects of adrenaline.** Raymond-Hamet. *Compt. rend. soc. biol.* 115, 810-13 (1934).—Adrenaline normally has a hypertensive action, but after the injection of yohimbine its action is hypotensive. Sparteine or a com. hypophysis prepn. (Pituglandol) counteracts the effect of the yohimbine and the action of adrenaline again becomes hypertensive.

**Comparative actions of hyperthermia-producing agents in normal rabbits and rabbits habituated to morphine.** R. Cahen. *Compt. rend. soc. biol.* 115, 817-18 (1934).—

Injections of yeast juice or tetrahydro- $\beta$ -naphthylamine produced a much greater rise in temp. in rabbits habituated to morphine than in controls.

**Comparative actions of hypnotics in normal dogs and dogs habituated to morphine.** R. Cahen. *Compt. rend. soc. biol.* 115, 819-20 (1934).—Habituation of dogs to morphine made them more susceptible to the action of chloralose but had no effect on their sensitivity to butylethylmalonylurea.

**Mode of action of pilocarpine.** L. Lapique and M. Lapique. *Compt. rend. soc. biol.* 115, 827-30 (1934).

**Mescaline, a hallucination-producing substance.** Henri Claude and Henri Ey. *Compt. rend. soc. biol.* 115, 838-41 (1934).—The physiol. effects of mescaline are described, especially the effects on the mental state of the subject.

**Hypertensive action of atropine and pilocarpine.** Victor Papilian, Titu Spataru and Victor Preda. *Compt. rend. soc. biol.* 115, 802-3 (1934).

**The penetration of lipid-insoluble nonelectrolytes of relatively large molecular volume into mammalian erythrocytes.** Hans Ulrich. *Arch. ges. Physiol. (Pflügers)* 234, 42-50 (1934).—The rate of penetration of pentoses, hexoses, hexitols, disaccharides and amino acids into mammalian red blood cells was studied photometrically. The permeability of the erythrocytes of different animal species shows certain fundamental differences which contradict the lipid ultrafilter theory. The results indicate the existence of sp. affinities of the cell membrane for the penetrating mol.

**The action of drugs on the denervated gastrointestinal tract.** J. Le Heux and A. de Kleyn. *Arch. ges. Physiol. (Pflügers)* 234, 98-100 (1934).—The gastrointestinal tract of cats was denervated by cutting the vagi and the post-ganglionic fibers of the sympathetic nerves to the alimentary canal. After a Bi meal, the effect of drugs on this denervated system could be studied by the x-ray on the otherwise intact animal.

**Skin reactions to histamine and glaucoma.** Paolo Guerra. *Minerva med.* 1934, I, 254-61.—A review of the literature with discussion.

**The excretion of aloes.** G. F. Hall. *Analyst* 59, 152-5 (1934); cf. C. A. 27, 5277.—During the passage of the drug through the intestines, progressive hydrolysis occurs. The greatest absorption occurs in the large intestine and is mainly of the hydrolyzed product which is excreted fairly rapidly by the kidneys. After the peak has passed in urine excretion, some unchanged glucoside is still present and the modified Schoutelen test for the unhydrolyzed drug is more delicate and distinctive than the Borntrüger test for the hydrolyzed product. Tests on urine, therefore, in which the unhydrolyzed drug is sought are advantageous after the early stages of intense drug excretion have passed.

**Gold tribromide (aurum tribromidum) in the treatment of pertussis and other spasmodic and spasmophilic disorders with a note on gold in tuberculosis.** J. Epstein. *Arch. Pediatrics* 51, 58-62 (1934); cf. C. A. 27, 1939.—The action of AuBr<sub>3</sub> is neurosedative, antispasmodic and antibacterial. It is administered as an elixir.

**Stomatitis medicamentosa.** Sigmund S. Greenbaum. *Dental Cosmos* 76, 353-6 (1934).—Stomatitis can be produced by ingestion, parenteral injection or external application of certain compds., such as members of the acetanilide-antipyrine group, derivs. of As (arsphenamines), Bi, Hg and Au, bromides and iodides, the barbit group, cinchophen, phenolphthalein and derivs. of salicylic acid.

**Epithelial phagocytosis. II. A method for demonstrating the origin of dust cells.** H. M. Carleton. *Proc. Roy. Soc. (London)* B114, 513-23 (1934); cf. C. A. 21, 3971.—Administration of benzene to rabbits causes almost complete atrophy of the bone marrow, reduces the leucocyte count to a negligible value, and has little, if any, effect on the reticulo-endothelial system. The treated rabbits retain the power of phagocytosis of intratracheally intro-

duced colloids (e. g., hydrokollag); the dust cells do not take a vital stain like trypan blue, and are derived from the alveolar epithelium.

The toxicity of ethylene glycol, propylene glycol and diethylene dioxide (dioxane). G. Malcolm Dyson. *Ind. Chemist* 10, 102, 108(1934).

Histology of certain organs and teeth in chronic toxicosis due to fluorine. P. H. Phillips and A. R. Lamb. *Arch. Path.* 17, 169-76(1934).—As a direct result of including F (20-30 mg. per kg. per day) in the diet of rats, either in the form of the Na salt or as rock phosphate, pathol. changes have been noted in the kidneys, incisor teeth and thyroid glands. To a lesser and more variable extent, pathol. changes have been noted in the liver and suprarenal glands. Pathol. conditions in other tissues were not detected.

A combined treatment for neoplasms of Röntgen therapy and isamine blue. Denier. *Neoplasmes* 12, 545-52 (1933).—Favorable results may be obtained in tumor cases by a combination treatment of intravenous injections of isamine blue (tri- $\beta$ -naphthyl- $p$ -rosaniline) followed by radiotherapy. A freshly made sterile 0.5% soln. of isamine blue is injected in increasing amts. every other day until 1-1.2 g. has been injected if followed by radiotherapy or 2-2.5 g. injected if x-ray therapy is contraindicated. The isamine blue soln. is almost completely nontoxic and tends to accumulate about the tumor and sensitizes the tumor to radiotherapy. Isamine blue alone seems in some cases to improve the condition of the patient and there is a lessening of pain and of cachexia, but many injections are required and the results are not often permanent if isamine blue alone is used.

Studies of horses treated for strongylidosis. E. E. Slatter, S. E. Park and Robert Graham. *North Am. Veterinarian* 14, No. 3, 19-33(1933).—A study was made of the effects of various drugs on the hemoglobin, red blood cell count, body wt., etc., of horses after treatment with oil of chenopodium and  $\text{CCl}_4$  for *Strongylus* spp. infestation. Na cacodylate given subcutaneously seemed to exert a favorable influence as compared with tartar emetic alone or combined with  $\text{FeSO}_4$ , and  $\text{CuSO}_4$  alone or combined with  $\text{FeSO}_4$ , administered in the feed.  $\text{FeSO}_4$  given alone may have exerted a favorable effect.

Experimental studies on acute mercurial poisoning. Sanford M. Rosenthal. *U. S. Pub. Health Repts.* 48, 1543-60(1933).

Gelsemium poisoning. Victor A. Recko. *Deut. Z. ges. gericht. Med.* 21, 9-14(1933).—A review of the literature regarding dosage and symptoms of poisoning.

Fatal hydrocyanic acid poisoning due to the use of bitter almonds. Jacobi. *Deut. Z. ges. gericht. Med.* 21, 15-17 (1933).—A case report.

Prolonged alcohol retention in traumatically conditioned unconsciousness. Test in the presence of cardiazole. R. M. Mayer. *Deut. Z. ges. gericht. Med.* 21, 337-41 (1933).—Deep traumatically conditioned unconsciousness hinders removal of alc. from the human organism. Cardiazole (0.6 g.) administered during the unconscious period does not influence the results.

Experimental investigations on the pathology of industrial araine. G. Schfader. *Deut. Z. ges. gericht. Med.* 21, 342-58(1933).—Important degenerative changes were observed in the kidneys, liver and heart. Subacute AsII<sub>2</sub> poisoning in animals was studied in order to ascertain whether the changes were permanent. Histological exams. showed permanent degeneration of heart and liver.

Thallium poisoning. R. Fridle. *Deut. Z. ges. gericht. Med.* 21, 461-2(1933).—A case report.

Conjugated-phenol concentration of the blood in the different organs. Agustin D. Marenzi. *Anales farm. biogum.* (Buenos Aires) 4, 36-8(1933).—The portal vein carries more conjugated phenols than the vena cava or the carotid artery. Conclusion: The conjugation occurs in the greater part before the entrance of the phenol into the liver.

The phosphatase and pyrophosphatase in the sputum of

tuberculous patients. II. The phosphatase contents of sputum following yatoconin treatment. Yoshiaki Imagawa. *Arch. Brit. Abt. Anat. Inst. Kaiser Univ. Kyoto Ser. C*, No. 4, 143-4(1933); cf. C. A. 27, 1941.—After the 1st 10 injections of yatoconin the phosphatase of the sputum increases. After the 2nd 10 injections it decreases. The prognosis of tuberculosis cases showing phosphatase increase following 10 yatoconin injections is favorable, of those showing a decrease unfavorable, of cases with a low original phosphatase sputum content unfavorable, and vice versa. The richer the phosphatase content of the sputum the more rapidly the tuberculosis bacilli vanish. The phosphatase content of the sputum of tuberculous patients is an addnl. index in the clinical evaluation of tuberculosis cases.

The treatment of hyperthyroidism with diiodotyrosine. Annemarie Buresch. *Munch. med. Wochschr.* 81, 320-3 (1934).—Diiodotyrosine benefits ambulant cases.

Isalton, a new ephedrine derivative for bronchial asthma. Hans Handovsky. *Munch. med. Wochschr.* 81, 326-7 (1934).—1-Phenyl-2-[methyl(diethylaminoethyl)] amino-propanol is 0.5 as toxic as ephedrine, has practically no effect on blood pressure and has a strong bronchospasmolytic action.

Inter-relations of the action of neuro-vegetative pharmacological agents. E. Rothlin. *Schweis. med. Wochschr.* 64, 188-91(1934).—Pharmacol. relations of adrenaline, pilocarpine, ergotamine and atropine are discussed.

The fate of caffeine in the animal organism. A. Krupski, A. Kunz and F. Almasy. *Schweis. med. Wochschr.* 64, 191-7(1934).—The urine of horses contains 7-16% of ingested caffeine. With doses less than 50 mg. per kg. the blood caffeine does not rise above 15 mg. per 100 cc. The concn. of urine caffeine is 1-3 times that of the blood but parallels the latter.

The effect of x-rays on the spleen and iron metabolism. I. I. Arkusski. *Strahlentherapie* 49, 455-62(1934).—X-radiation of the spleen or its extirpation produces a diminished and not an increased Fe excretion.

The circulatory and diuretic effects of intravenous glucose injections. R. Pfeiffer. *Wien. med. Wochschr.* 83, 1243-5(1933).

Cerebrospinal fluid. XI. The effects of spinal anesthesia. Michio Kasahara and Nagao Kawashima. *Z. ges. expil. Med.* 92, 623-5(1934); cf. C. A. 28, 2764. XII. Changes after subdural infection with B. C. G. strains. Michio Kasahara and Hideo Ichikawa. *Ibid.* 626-8.

The lead content of blood in experimental lead poisoning with special reference to age. Michio Kasahara and Kusuo Arimichi. *Z. ges. expil. Med.* 92, 629-30(1934).—The injection of the same amt. of Pb acetate produced less rise in the blood Pb of old rabbits than in young rabbits.

The effect of glucose derivatives upon animals (rabbits) after hepatectomy. D. R. Drury and W. T. Salt. *Am. J. Physiol.* 107, 406-13(1934).—A large no. of hexose derivs. and triose derivs., which in the intact animal can be transformed to glucose, are incapable of prolonging life in an animal whose liver has been removed.

The effect of varying levels of iodine intake on the thyroglobulin content of the thyroid gland. Mildred B. Jones. *Am. J. Physiol.* 107, 511-17(1934).—There is an increased formation and storage of thyroglobulin during the administration of KI.

Pilocarpine and insulin secretion. S. Appelrot. *Am. J. Physiol.* 107, 526-8(1934).—Large doses of pilocarpine product a slight rise in blood sugar in normal dogs and a very pronounced rise in dogs whose pancreas has been removed. Pilocarpine stimulates the islets of Langerhans, also the adrenals and possibly the thyroid.

Resistance of surviving spinal animals to hypoglycemia induced by insulin. C. M. Brooks. *Am. J. Physiol.* 107, 577-83(1934).—Surviving spinal animals with the cord cut in the cervical region have a diminished resistance to insulin.

J. F. Lyman

The action of oxygen in counteracting alcoholic intoxication. A. L. Barach. *Am. J. Physiol.* 107, 610-15 (1934).—The ingestion of alc. markedly diminishes the efficiency of the performance of muscular work, but this efficiency can be partially restored by inhalation of O<sub>2</sub>. The influence of O<sub>2</sub> on alc. intoxication of men at rest is generally to improve their sensory functions and to increase their intelligence. J. F. Lyman

The oxygenation of mineral water from La Bourboule and glucemia in the rabbit. René Clogne and Andrée Drilhon. *Bull. acad. méd.* 110, 85-8 (1933).—The action on the blood sugar is destroyed by O<sub>2</sub>. A. E. Meyer

The disappearance of keratitis lesions and experimental opacities in the cornea after treatment with benzyl cinnamate. J. Jacobson. *Bull. acad. méd.* 110, 104-8 (1933).—The lesions were produced by injection of diphtheria toxin into the cornea of the rabbit. The treatment consists of subcutaneous injections of a 3.2% soln. in olive oil for 12 days, followed by a 2nd treatment after 15 days. The lesions heal and the opaque spots clear up in contrast with the controls. A. E. Meyer

The prevention of infection with syphilis by bismuth in monkeys and anthropoids. C. Levaditi, A. Vaisman and Y. Manin. *Bull. acad. méd.* 110, 176-80 (1933); cf. *C. A.* 27, 2215.—Injections of Bi compds. combined with cholesterol and myricin show a prophylactic effect against syphilis infections. A. E. Meyer

Injections of large doses of glucose and arterial pressure. M. Roch, E. Martin and M. Scielouff. *Bull. acad. méd.* 110, 244-9 (1933). From 400 to 500 cc. of a 20% soln. were given daily 10-20 times. Good results were obtained in nephritis with hypertension. It is supposed that a stimulation of the pancreas is responsible for the effect. A. E. Meyer

The inhibiting action of some mixtures of amino acids in cancer development. F. Vlès and A. de Coulon. *Bull. acad. méd.* 110, 714-7 (1933).—See *C. A.* 28, 1775. F. Vlès and A. Gussset. *Ibid.* 717-51. A. E. Meyer

The possibility of poisoning with fluorine during uterine life. H. Veln. *Bull. acad. méd.* 110, 799-800 (1933).—Young animals born from mothers exposed to the influence of F develop dental alterations which must have origin from the time before birth, since dental changes become evident only after 6 months of poisoning. A. E. Meyer

Ammonium chloride in the treatment of sclerodermia. René Leriche and Adolphe Jung. *Presse méd.* 41, 1041 (1933).—A case has been treated with excellent results. The mechanism of the action could not be explained. A. E. Meyer

Sclerosis of varicose veins by treatment with potassium chromic sulfate and glycerol. H. Jausion. *Presse méd.* 41, 1061-3 (1933).—A sterilized soln. of 1.5 g. KCr(SO<sub>4</sub>)<sub>2</sub> in 126 g. glycerol and 200 cc. H<sub>2</sub>O was injected in quantities of 5 cc. A. E. Meyer

Amino acid therapy and hay fever. Jacques Lenormand. *Presse méd.* 41, 1141-2 (1933).—Intradermal injections of 2-4 cc. of a soln. contg. 4% histidine and 2% tryptophan gave good results. A. E. Meyer

Preventive treatment of stomatitis produced by mercury and bismuth. L. Le Bourg. *Presse méd.* 41, 1153-4 (1933). A. E. Meyer

The mechanism of diuresis produced by mercurials (novasurol). Emilio Trosce. *Semana méd.* (Buenos Aires) 1934, I, 630-50.—The min. effective dose of novasurol given intravenously to dogs is 0.052 cc. per kg. The diuresis is inhibited by pilocarpine, increased by atropine and not influenced by pituitrin. Hypertonic glucose soln. given intraperitoneally has no influence; general anesthesia completely inhibits the diuresis. The vol. and pressure of the spinal fluid increase during the diuresis. The perfused kidney is not influenced by asurol. It has no influence on the imbibition of tissues. The alkali reserve and gas in the blood remain unchanged. The Na and Ca ions are considerably reduced, the total N only slightly. The plasma viscosity is increased. A. E. Meyer

The action of certain proteins in the treatment of pulmonary tuberculosis. Enrique de Cires. *Semana méd.* (Buenos Aires) 1934, I, 667-79. A. E. Meyer

The influence of urethan on the absorption of diphtheria antitoxin. Enrico Ciaranfi. *Sperimentale* 87, 471-6 (1933).—The absorption is delayed. A. E. Meyer

The effect of activated ergosterol administration on the calcium of the cerebrospinal fluid. C. R. K. Johnston and E. J. King. *Trans. Roy. Soc. Can.* V 27, 87-9 (1933).—Oral administration of activated ergosterol (1 cc. per 8 kg. body wt. to 1 cc. per 3 kg. body wt.) to adult dogs increased serum Ca, the max. being reached in 48-60 hrs. The Ca content of the spinal fluid increased only after the serum Ca had reached the max. value. Five to 8 days after ergosterol administration, a secondary increase in serum and spinal-fluid Ca was observed. This is attributed to an observed vacuolization of the cells of the parathyroid gland. W. Gordon Rose

Effects of narcosis on the quantity of glutathione in tissues, organs and blood. I. Kushiya. *Japan. J. Obstet. Gynecol.* 16, 360-4 (1933).—The av. glutathione contents in the organs of normal rabbits were: liver 0.27, intestines 0.197, spleen 0.191, suprarenal capsule 0.187, kidney 0.131, ovary 0.131, lungs 0.116, stomach 0.108, thyroid gland 0.102, pancreas 0.098, thymus gland 0.093, bone marrow 0.080, spinal cord 0.076, heart 0.071, brain 0.067, muscle 0.038, blood 0.023%. Twenty-four hrs. after inhalation of CHCl<sub>3</sub> for 30 min. at the rate of 0.5 cc. for each 5 min. there was increase in the glutathione content in the heart, kidney and blood, but there was marked decrease in the other tissues. Immediately after narcosis with ether, the glutathione content of the spleen, kidney, heart and liver increased, but no sp. change was noticed in the other tissues. In 24 hrs. after the ether narcosis, neither increase nor decrease was recognized. K. Sugiura

The effect of insulin and adrenaline on the amino acid content of the blood of adrenalectomized rabbits. Burt L. Davis, Jr., and Walton Van Winkle. *J. Biol. Chem.* 104, 207-15 (1934).—The administration of insulin to adrenalectomized rabbits, glucose being given at the same time to prevent convulsions, causes no fall in blood amino acids. Injection of adrenaline under the same conditions lowers the blood amino acid content to 50% of its initial level. Conclusion: The lowering of blood amino acids, observed in normal animals after injection of insulin, is due not to the insulin itself but to the increased secretion of adrenaline which the insulin stimulates. K. V. T.

The pigeon as a hematopoietic test animal. Wm. A. Peabody and R. C. Neale. *J. Am. Pharm. Assoc.* 22, 1231-7 (1933).—Studies were made by injecting normal saline soln., leucine, histidine, tryptophan, ash of liver ext. and several intramuscular liver preps. The technique is described in detail. The results of the studies show that inorg. constituents (liver ash and Cu), leucine and probably histidine and tryptophan are not the constituents of liver ext. which are effective in increasing the reticulocyte percentage in the blood of grain-fed pigeons. Injections of liver ext. significantly increase the concn. of red blood cells and probably the hemoglobin in such birds. These results strengthen the assumption that the pigeon response is a measure of the substance or substances effective in pernicious anemia. However, limited clinical comparisons indicate that pigeon effectiveness may not parallel the clinical response. Further clinical comparisons are necessary. L. E. Warren

Further study of the toxicity of derivatives of rotenone with the goldfish as the test animal. W. A. Gersdorff. *J. Am. Chem. Soc.* 56, 979-80 (1934); cf. *C. A.* 27, 2219.—The compds. studied have, according to each of 3 criteria (threshold of toxicity, max. rate of increase of the velocity of fatality and min. survival time), the following decreasing order of toxicity to goldfish: rotenone (I), acetyl-dihydro-rotenone (II), dihydro-rotenolone (III), its Ac deriv. (IV) and acetyl-rotenolone (V). Comparison according to the 2nd of these criteria, which is the more serviceable from the standpoint of practicality (inasmuch as it has reference to that portion of each curve in which the proportional change in the 2 variables, concn. and time, is not greatly different), shows that the results are consistent with those previously published in permitting the following

generalizations to be drawn: The dihydro compds. produced by satn. of the double bond in the side chain with H have appreciably higher toxicities than the corresponding unsatd. compds.; the enol acetates and the Ac derivs. of the HO compds. have appreciably lower toxicities and the HO compds. have much lower toxicities than the parent compds. The theoretical threshold of toxicity and the min. survival time are: I 0.01 mg. per l., 110 min.; II 0.02, 120; III 0.05, 150; IV 0.08, 305; V 0.09, 380.

C. J. West

Medicaments and nutrients in the treatment of tuberculosis (Schröder) 17. Fe compd. of gluconic acid (Proskouriakoff, Titherington) 10.

Larsen,<sup>6</sup> Esper and Stürup, Georg!<sup>1</sup> Farmakologi i Grundstræk. 2nd ed., revised by Erik Hagens. Copenhagen: Store Nordiske Videnskabsboghandel. 432 pp.

## I—ZOOLOGY

R. A. GORTNER

Chemical heterogeneity and the ground plan of animal growth. Joseph Needham. *Biol. Rev. Cambridge Phil. Soc.* 9, 79 (1934); cf. *C. A.* 27, 768.—A discussion of the application of the concept of heterogeneity to the chem. changes in growing metazoa including the heterogeneity equation, uniformity, similarity in the same organ, nutritive factors, effect of temp., heat production and ground plan of animal growth.

R. C. V. B.

Respiration of the ciliate *Glaucoma piriformis*. Marguerite Lwoff. *Compt. rend. soc. biol.* 115, 237-41 (1934).—HCN and CO, which block the Fe of respiratory hemins, caused but a transient decrease in the respiration of *G. piriformis*. As<sub>2</sub>O<sub>3</sub> and CH<sub>3</sub>ICOH, which block—SH groups, caused a lasting decrease. The urethans also caused a decrease. In all cases the organisms lived and recovered their normal rate of respiration when placed in fresh normal medium.

L. E. Gilson

Albumin and globulin contents of the serums of various fishes. G. Deunenier. *Compt. rend. soc. biol.* 115, 555-7 (1934).—In the 6 species studied the values varied greatly with the species and the season. Albumin ranged from 3.4 to 17.8 g. per l. and globulin from 10.8 to 44.7 g.

L. E. Gilson

Reactions of various isolated tissues of the squid, *Loligo pealii*, to adrenaline, acetylcholine, ergotamine and certain ions. Z. M. Bacq. *Compt. rend. soc. biol.* 115, 716-17 (1934); cf. *C. A.* 28, 1779.

L. E. Gilson

The ratio between the calcium and phosphorus contents of fish. A. de Clercq. *Natuurw. Tijdschrift* 15, 229-36 (1933).—A table is given of percentage of H<sub>2</sub>O, ash, P and Ca of 21 fish species with sep. figures for the meat and offal. The P:Ca ratio varies from 1.58 to 0.29 in the meat, from 0.75 to 0.12 in the offal. For 477 herrings with or without filled gonads the ratios are 0.42 and 0.73 resp., for *Pleuronectes platessa* 1.25 and 0.68, for *Scomber scombrus* 1.57 and 0.65, resp. This ratio is favorable for metabolism of vitamin D (cf. Massengale and Nussmeier, *C. A.* 24, 4082, Bethke, et al., *C. A.* 27, 750).

B. J. C. van der Hoeven

The relation of respiration of fishes to environment. I. Introduction. Edwin B. Powers. *Ecological Monographs* 2, 387-9 (1932). II. Behavior of gases in solution. *Ibid.* 389-94. III. Methods used in determining the oxygen content and the carbon dioxide tension of experimental water. *Ibid.* 394-5. IV. Relation of carbon dioxide and oxygen contents of the blood to the carbon dioxide and oxygen tensions of the environmental water. Edwin B. Powers, Florian G. Hopkins and Thressa A. Hickman. *Ibid.* 396-414.—The vol. percentage of the CO<sub>2</sub> of the venous blood of the blue catfish (*Ictalurus punctatus* Rafinesque) increases with an increase in the O content of the water; this is less obvious in the case of the German carp (*Cyprinus carpio* Linnaeus). The vol. percentage of the CO<sub>2</sub> of the blood of both the blue cat and the carp increases with an increase in the CO<sub>2</sub> tension of the water; this tendency is more marked in the carp than in the blue cat. The vol. percentage of the O in the blood

of the blue cat increases with the O content of the water; this relation if present in the carp is very slight. There is a very slight, if any, relation between the vol. percentage of the O in the blood and the CO<sub>2</sub> tension of the water in either the blue cat or carp. V. Effect of the oxygen and carbon dioxide tensions of the water upon the number of red corpuscles in the blood of the blue cat, *Ictalurus punctatus* Rafinesque. Edwin B. Powers and Lula Mac Shipe. *Ibid.* 414-20.—The no. of red blood corpuscles in the venous blood of the blue cat increases with a decrease in the O content of the water and *vice versa*; the CO<sub>2</sub> tension of the water has the reverse effect. VI. Oxygen and carbon dioxide dissociation curves of whole blood. Edwin B. Powers and Thressa A. Hickman. *Ibid.* 421-30.—The O disson. curves of the blood of the yellow catfish (*Leptops olinas* Rafinesque) followed the general form of the curves detd. by Bohr (*Contr. Physiol.* 17, 688 (1904)). The O disson. curves of blood in contact with O contg. 0.03 and 2.0% CO<sub>2</sub>, resp., differed from each other as would 2 different bloods contg. different amts. of hemoglobin; this indicates that the hemoglobin was changed either in kind or in content. At low CO<sub>2</sub> tensions, the CO<sub>2</sub> content of the blood of the yellow cat increased rapidly when it was equilibrated with small amts. (0.015-0.24%) of CO<sub>2</sub>; this was followed by a less rapid but irregular rise. Carp blood deteriorated too rapidly for any detns. to be made on it. VII. Relation of the p<sub>H</sub> to the carbon dioxide tension used to modify the blood. *Ibid.* 430-6.—Marked physicochem. changes occur in fish blood when it is exposed to CO<sub>2</sub> tensions 10-100 and more times greater than the CO<sub>2</sub> tensions of the water normally bathing the gills of fishes. This change in CO<sub>2</sub> tensions is sufficient in a stable physicochem. system to raise the H-ion concn. 10-100 and more times.

VIII. Notes on the formation of crystals in drawn blood. Edwin B. Powers, Lula Mac Shipe and Thressa A. Hickman. *Ibid.* 436-8.—The crystals first appeared within the red blood corpuscles, the amts. increasing with the age of the drawn blood. The types of crystals varied with different species of fish; their chem. nature was not detd. IX. The effect of the carbon dioxide tension with which the blood has been equilibrated upon the oxygen and carbon dioxide capacities of the blood. Edwin B. Powers and Thressa A. Hickman. *Ibid.* 438-42.—When fish blood is brought to a CO<sub>2</sub> tension 0.6-1.0 atm. higher than the CO partial pressure of the atm. it loses in capacity to combine with CO<sub>2</sub> and O, which when outside the body is not completely reversible. X. Mechanism of the deposition of gases into the swim-bladder. Edwin B. Powers. *Ibid.* 443-65. XI. General summary. *Ibid.* 465-7. One hundred and thirty-nine references. E. D. Jacob

The effect of chlorotone on the oxygen consumption of amphibian larvae (*Rana clamitans*). Herman Bernhard. *Physiol. Zool.* 7, 17-35 (1934).—The depression of the O consumption increased with chlorotone concn. from 0.005 to 0.06%.

Milton Levy

The phosphorus distribution in resting fly muscle. Ernest Baldwin and Dorothy M. Needham. *J. Physiol.* 80, 221-37 (1933).—The muscles of flies contain adenylyl pyrophosphate in about the same concn. as do the muscles of frogs or rats. The argininephosphoric acid content is small and the hexose ester content high in comparison with the frog or rat.

J. F. Lynan

Osmotic and ionic regulation in the shore crab, *Carcinus maenas*, with notes on the blood concentrations of *Gammarus locusta* and *Ligia oceanica*. J. B. Bateman. *J. Exptl. Biol.* 10, 351-71 (1933).—The Cl concn. of the body fluids of the crab varied from 0.396 to 0.641 moles per 1000 g. H<sub>2</sub>O. No consistent relation between foreign ion and the Cl of the body fluids was found. The gill membrane is almost impermeable to water. The detn. of the vapor pressure of the body fluids of the crab exposed to various external conditions proves that the crab has temporary osmotic independence.

C. M. McCay

Metabolic changes associated with endocrine activity and the reproductive cycle in *Xenopus laevis*. III. Changes in the calcium content of the serum associated with captivity and the normal reproductive cycle. II.



Zwarenstein and H. A. Shapiro. *J. Exptl. Biol.* 10, 372-8 (1933).—Throughout the reproductive cycle the serum Ca is higher in the females. This is assocd. with ovarian activity. In the male toad this value remains const. at 8.3-9.8 mg. throughout the year. The female exceeds the value of the male by 46% in August at the beginning of the breeding season. C. M. McCay

The carbon dioxide dissociation curves and the buffering of crab muscle and nerve preparations. S. L. Cowan. *J. Exptl. Biol.* 10, 401-11 (1933).—An almost linear relation holds between pressure of  $\text{CO}_2$  and  $\text{pH}$  over the greater part of the range 50-760 mm. for nerve and 70-400 mm. for muscle. C. M. McCay

An experimental study of hemopoiesis in *Necturus*: effect of lead poisoning on normal and splenectomized animals. Andrew B. Dawson. *J. Morph. Physiol.* 55, 349-86 (1933).—The blood stream of *Necturus* is an important site of red cell differentiation. The anemia that results from lead poisoning appears more rapidly after splenectomy and the regeneration of erythrocytes is delayed. C. M. McCay

Are isoreactions present in invertebrates? Leone Lattes. *Boll. soc. ital. biol. sper.* 8, 1433-5 (1933).—

Expts. *in vitro* or *in vivo* failed to reveal the existence of group-sp. isoreactions in silkworms. Peter Masucci

The action of cocaine on fishes. R. De Marco. *Boll. soc. ital. biol. sper.* 8, 1488-90 (1933).—Doses of cocaine  $\frac{1}{2}$ -1 mg. injected in fishes 10-30 g. in wt. produced no visible manifestations; larger doses at first produced an increase in respiration and in movements for locomotion but later a decrease of all muscular movements such that they failed to respond to stimuli. The M. L. D. was 0.166 g. for *Box boops*, 0.200 g. for *Mugil* and *Oblate*, 0.700 g. for *Pagellus* and 0.93 g. for *Scorpaene*. Peter Masucci

The consumption of oxygen by *Lumbriculus variegatus* and *Rhyncelmis limosella*. Jaroslav Lang. *Biol. Zentr.* 54, 85-8 (1934). A. E. Meyer

The snails of Snail Shell Cave. Geo. Davis, Arlie A. O'Kelly and Dorothy Bachtel. *J. Tenn. Acad. Sci.* 9, 47-50 (1934).—Chem. analysis of the shells of 17 species collected in Snail Shell Cave gave results varying widely according to species. The  $\text{CaO}$  reported was, in 11 cases, above that for pure  $\text{CaCO}_3$ , the highest being 65.5%. The authors suggest that a possible complex of  $\text{CaO}$  and  $\text{CaCO}_3$  is formed when there is a deficiency of  $\text{CO}_2$ . A. Lloyd Taylor

## 12—FOODS

C. C. BLANCK AND H. A. LITPLER

Some fundamental scientific problems in the food industry. L. W. Lampitt. *Chemistry & Industry* 1934, 283-90. E. H.

Performance tests of some laboratory emulsifiers. R. I. Johnson and J. F. Morse. *Food* 3, 173-5 (1934). The "Empire," "Universal Emulsor," "Cremac," "Q. P. Lab. Emulsifier" and "Impulsor" emulsifiers are briefly described. By means of a test mixt. consisting of a salad cream contg. 45% oil and prepd. in a mech. whisk, treatment in the "Cremac" and in the "Q. P. Lab. Emulsifier" produced emulsions of a degree of dispersion approaching that obtained in a com. viscolizer. A Papineau-Couture

Identification of organic preservatives and commercial sweetening substances in foodstuffs. R. Fischer. *Z. Untersuch. Lebensm.* 67, 161-72 (1934). A method is described for identifying 11 of the most important preservatives and sweetening substances. These substances are nipagin, Et *p*-hydroxybenzoate, nipasol, benzoic acid, *o*-chlorobenzoic acid, salicylic acid, cinnamic acid, *p*-hydroxybenzoic acid, dulcin, *p*-chlorobenzoic acid and saccharin. The extn. is carried out in the usual fashion with  $\text{Et}_2\text{O}$ ; the  $\text{Et}_2\text{O}$  ext. is then shaken out with an aq. alk. soln. The dulcin remains in the  $\text{Et}_2\text{O}$  soln., all other substances going over into the aq. alk. soln. After sepd. the aq. soln. from the  $\text{Et}_2\text{O}$ , it is acidified and thoroughly shaken out with petr. ether. The petr. ether ext. contains all the aromatic preservatives except *p*-hydroxybenzoic acid and saccharin, which are insol. in petr. ether. These 2 substances can be removed from the acidulated aq. alk. soln. by means of  $\text{Et}_2\text{O}$ . The soly. of *o*-chlorobenzoic acid in petr. ether is small, but the repeated use of this solvent removes the acid quantitatively. Dulcin is sepd. from the original  $\text{Et}_2\text{O}$  ext. by evapn., taking up in hot  $\text{H}_2\text{O}$ , filtering, taking up again in  $\text{Et}_2\text{O}$  and evapn. of the solvent. The other  $\text{Et}_2\text{O}$  and petr. ether exts. are evapd. and the residues submitted to microsublimation. The identification of the crystals obtained follows through a detn. of the micro melting point. The temp. of sublimation and behavior under polarized light are likewise considered. Exact methods of procedure are given for the investigation of sirups, fruit juices, wine, beer, must, vinegar, marmelade, milk, fats, preserved fish and meat and cheese. On the av. 3-10 g. of any substance is used for the test. The sensitivity of the identification varies between 0.01 and 0.001%. Particular weight is laid on the sepn. of the individual substances in dealing with a mixt. of preservatives, for recently such mixts. are frequently employed in foodstuffs. The sepn., which for all

substances is described in detail, depends in part on fractional sublimation, partly on the destruction of certain substances, partly on the identification of conversion products. A short practical method is also given for identifying hexamethylenetetramine and  $\text{CH}_3\text{O}$  in the presence of each other. F. L. Dunlap

Methods for determining sulfur dioxide in food products. I. A. Oberhard, A. D. Lebedev, G. F. Goldberg, A. N. Moshkova and E. V. Oshrina. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 3, 337-60 (1933). Iodometric, acidimetric and gravimetric (sulfate) methods of detg.  $\text{SO}_2$  (preservative in fruit juices, etc.) are compared. Sulfate detn. in the oxidized distillate is accurate; so is sulfate detn. in the sample before and after oxidizing the  $\text{SO}_2$ ; but iodometric detn. is more convenient, especially in strongly acid juices. In faintly acid juices the Tzerevitinov method, modified by adding the sample to a known vol. of standard I soln. and titrating back, is preferable. Direct titration with I is least accurate. For sulfited berries in kegs a proposed standard method is to take juice only, in a wide 20 cc. sampling tube, add to 25 cc. of 0.1 N I in a flask and titrate back after 10 min. Procedures are described for strongly and weakly acid fruit juices. Julian F. Smith

Need for uniform practices in the microbiological examination of food products. Lawrence H. James. *Am. J. Pub. Health* 24, 325-6 (1934). J. A. Kennedy

Formation of spots on tin cans. Freitag. *Oberflächentechnik*. 11, 53 (1934). Yellow-brown spots which are often found on the inner walls of tin cans of food are caused by org. S compds. contained in the food, as albumin, cystine, allyl sulfide, etc.; they are not injurious to the food. A thin layer of Sn sulfide is formed, and the Fe under the Sn is also sometimes attacked. The use of a lacquer contg. Sn sulfide for coating the interior wall is recommended instead of the ordinary copal lacquer; the sulfide lacquer remains intact also in the sterilization process. M. Hartenheim

Cereal foods, their advertising and the Committee on Foods of the American Medical Association. Raymond H. Hertwig. *Cereal Chem.* 11, 74-80 (1934). An explanation is given of the functions of the Comm. on Foods of the Am. Med. Assoc. The conditions under which a food is acceptable by the comm. and the procedure for having a food accepted by the comm. are given. L. H. Bailey

The possibility of characterizing hardened soft wheats according to the ratio between total and amino nitrogen of their seeds and energy of autolysis of the latter. A. V. Blagoveshchenski and N. I. Sosodov. *Cereal Chem.* 11,

117-20(1934).—All conditions of growth being identical, the seeds of hard wheats possess a higher amino index, i. e., a higher ratio between total N and the  $\text{CH}_2\text{O}$ -titratable N of the free amino groups (Sørensen), than the seeds of soft wheats. The energy of autolysis of the seeds shows a pos. high correlation ( $r = +0.8$ ) with the amino index and therefore it is higher in hard wheats than in soft ones. In the majority of cases vitreous seeds are characterized by a higher amino index than starchy ones. Semi-vitreous seeds occupy an intermediate position.

L. H. Bailey  
The quality of German wheat. P. Pelshenke. *Mühlentab.* 4, 1-8(1934); cf. *C. A.* 28, 833<sup>1</sup>.—Analytical data on 7500 samples, representing 73 winter and 10 spring wheat varieties of the 1931-33 harvests, indicate that varietal differences, especially in gluten quality (as detd. by the gluten-swelling and dough-ball tests) are not obscured even under extremely favorable or adverse conditions. By taking gluten quality as the criterion, the percentage of the best varieties grown in different districts is estd.

Clinton L. Brooke  
The wheat-meal fermentation time tests for evaluating soft wheat. O. B. Winter and Ardie G. Gustafson. *Cereal Chem.* 11, 49-56(1934).—The wheat-meal fermentation time test was compared with 3 other tests (protein content of flour, vol. of loaf and expansion of dough) for detg. quality of wheat. The wheat-meal fermentation time test shows a fair pos. correlation with vol. of loaf and expansion of the dough, but not with the protein content of the flour. This test shows proportionally greater differences between samples of flour than do any of the others. However, since there is only a fair correlation between the results by this test and the vol. of loaf or the protein in the flour, no attempt has been made to interpret the results obtained by its use. A modification of the test is described whereby the expansion of the dough ball is measured instead of the time of fermentation. Preliminary results by the modified test compare favorably with those of the time test and the modification requires less of the operator's time.

L. H. Bailey  
Some effects of heat exposure on wheat starches. C. E. Mangels. *Cereal Chem.* 11, 86-94(1934).—Exposure to 80°, 100° and 120° for 8 hrs. has very little effect on the specific rotation of wheat starch, but there is a tendency for specific rotation to decrease. Exposure to 100° for 8 hrs. decreases slightly the resistance of starch to diastase. When starches are exposed to dry heat for 8 hrs. at 80°, 100° and 120°, resp., the starch from hard red spring wheat flour shows relatively little change in swelling capacity. The starches from winter wheats, when subjected to heat treatment, show a much greater increase in swelling capacity than starches from hard spring wheat similarly treated. Exposure at 80° or 90° however, gives relatively small changes as compared to exposure at 100°. Durum starch shows about the same increase in viscosity as the winter wheat starches when exposed to heat.

L. H. Bailey  
The effect of fertilizers upon the baking quality of wheat. L. Borasio. *Giorn. risicoltura* 23, 254(1933).—A "Pneumodinamometer" was used in detg. the quality of the flour, viz., the tenacity, elasticity, extensibility and strength. The percentage of gluten was also detd. The yield of dough was const., 159-161; yield of bread 128-129; the vol. of bread varied from 730 to 760 cc. (based upon 300 g. dough). No great difference in quality was noted as the result of the different fertilizer treatments.

J. A. LeClerc  
Evaluating flour. C. O. Swanson. *Natl. and Am. Millers*, 61, No. 10, 11-21(1933).—The following characteristics should be known about flours used for bread making with yeast: (1) mixing tolerance or resistance of dough to mech. action; (2) rate of development; (3) sugar requirements or reserve yeast food; (4) sponge or straight dough; (5) reaction toward oxidation.

L. H. Bailey  
Flour from denatured wheats. Detection of coloring matter. Clément Gicquel. *Ann. fals.* 26, 91-2(1934).—

At the present time French wheat which is not to be milled for human consumption is denatured with methylene blue or eosin. Unscrupulous millers use such wheat; but small particles of dye are detached from the bran during the milling and remain in the flour, where they may be detected.

A. Papineau-Couture

A simplified method for the determination of carotene in flour extracts. W. F. Geddes, D. S. Binnington and A. G. O. Whiteside. *Cereal Chem.* 11, 1-24(1934).—The fundamental basis of the simplified method is the use of Hg-arc radiation as illumination for colorimetric comparison of flour exts. obtained with colorless redistd. solvent (gasoline). The carotene equivs. obtained are not comparable with those from methods in which other light sources have been used or solvents that are not entirely colorless. The only addnl. equipment required is a simple Nessler comparator and a suitable set of plane-parallel bottom comparison tubes. A comparison of the gasoline color values obtained by the Hg-arc illumination with spectrophotometric detns. of carotene on the same exts. in the instance of 358 flours of varying pigment concn. gave a pos. correlation of 0.985 and a straight-line regression. The arbitrary gasoline color value units may thus be expressed in terms of carotene by employing the regression equation as given.

L. H. Bailey

Practical observations on bread and cracker flours. Jan Micka. *Cereal Chem.* 11, 110-12(1934).—Flour is the major ingredient used (86.16%) in bread and (89.77%) in crackers. There are certain desired characteristics which are similar in both bread and cracker flours, viz., (1) general appearance and flavor as related to the finished product; and (2) working quality from a standpoint of high-speed, com. production. The following are certain characteristics which are very dissimilar in bread and cracker flours: (a) color, (b) absorption and (c) fermentation.

L. H. Bailey

The use of flour substitutes in baking. L. Borasio. *Giorn. risicoltura* 23, 193-212(1933). B. uses a "Pneumodinamometer" to measure the tenacity, extensibility, elasticity and strength of flour. Flour substitutes should be as finely granulated as wheat flour for the best results. Breads were made with amts. of substitutes (brown rice, broken rice, rye, oats, barley, corn, starch, beans) varying from 10 to 50% of the wheat flour. The basic wheat flours used were from (1) Manitoba wheat; (2) native wheat. The following bread measurements and tests were recorded: vol., sp. wt., sp. vol., vol. per 100 g. dough, vol. per 100 g. bread, baking quality. The standard bread made was based upon 300 g. dough fermented at 30° and baked at 250°. The compns. of the various substitutes are given. The quality of the bread depends upon the quality of the basic flour used and upon the amt. and kind of substitute. The amt. of substitute used in normal times should not exceed 5-10%. Barley and beans are the least adaptable; brown rice, rye, white corn and potato starch give good results. In emergencies, as much as 40-50% of rye and 25-30% of rice could be used.

J. A. LeClerc

Improvement of the baking quality of wheat flour through storage. Sten Abdon. *Mehlprobleme* 2, 39-40(1933).—Farinograms are used to support the contention that the improvement in baking quality of flour usually noted after storage for about 3 months can be effected at once by means of proper conditioning of the individual wheats in the mill mixt. A flour milled from a mixt. of two or more wheats is superior to one made by mixing the flours milled from the individual wheats.

C. L. B

Improvement of flour by means of sodium chloride Ferenc Gruzl. *Mezőgazdasági Kutatások* 7, 1-6(1934). The effect of addn. of 2.5% NaCl to flours of various qualities was studied. NaCl-contg. doughs were harder, and bread made from these doughs rose higher than bread made without NaCl. The effect of NaCl is attributed to the pptn. or the prevention of soln. of gluten-forming substances.

S. S. de Finály

Improvement of flour by means of sodium chloride, potassium bromate and ammonium persulfate. Lőránd

Å. Sæegf. *Meddelelser fra Statens Landbrugsforskningsanstalt* 7, 7-12(1934).—The farinograms of 8 different flour samples on addn. of 2% NaCl were detd. and the sol. albumin contents of the 10% flour suspensions measured. NaCl brought about a longer time of developing, greater stability and breadth of farinograms and a decrease in sol. albumins. The normal curve of the farinograph was not influenced by bromate and persulfate. Suspensions contg. persulfate were much higher, those contg. bromate much lower, in sol. albumin than untreated flour suspensions. The prepn. of a farinographic curve made with NaCl and yeast is necessary for the evaluation of improving agents.

S. S. de Finály

Banana or pisang, flour. W. Spoon. *Ber. Afdel. Handelsmuseum Koloniaal, Inst. No. 84; Indische Mercur* 57, 199-202(1934).—Banana or pisang flour from the Dutch Indies is prepd. by peeling the  $\frac{3}{4}$ -ripe fruit, slicing, drying and grinding. Av. analyses show  $H_2O$  12-13, ash 2.0-2.2, starch 72-3, albumin 3-4, fat 0.5-1%, sugars 0 trace; max. absorption of  $H_2O$  is 20% at 20° and relative humidity 90%. The viscosity of pastes prepd. from banana flour is much too low to be of interest in the textile industry. The vitamin content of banana flour corresponds approx. to that of whole-wheat flour, but is less than that of the fresh ripe fruit; in other respects the product is an easily digested starchy food.

O. W. Willcox

The determination of ash (in flour). Gerhard Mueller. *Mehlprobleme* 2, 35-6(1934).—The usual sources of error in the detn. of ash in flour are discussed, and a new muffle oven equipped with automatic temp. regulator and improved air circulation is described. Clinton L. Brooke

Quick ash methods. Earl B. Werking and E. J. Anderson. *Cereal Chem.* 11, 94-8(1934). An ash micro method is proposed. 0.3 g flour weighed on a light 4-oz scoop is transferred to a Pt dish (No. 2 or No. 3 Pt crucible cover) and flattened out by tapping. By means of a micropipet 0.35 cc of a soln. contg. 10 g. cryst.  $Mg(NO_3)_2$  in 500 cc. of 70% EtOH is dropped into the center of the flour. As soon as the soln. has penetrated it is ignited with a match, during which process the dish should rest on a cold plate of porcelain, metal or other material that will prevent it from becoming hot enough to cause spattering. As soon as the alc. is burned off the dish is placed in a muffle at 550° and the burning is usually complete in 5-10 min. The dish is cooled in a desiccator and weighed directly on a balance pan.

L. H. Bailey

The right gassing power at the right time. Gerhard Mueller. *Mehlprobleme* 3, 5-6(1934); cf. *C. A.* 27, 1952. German bakers require flours in which optimum gassing power and optimum gluten development extend over 1-2½ hrs. With the farinograph and fermentograph as means of control, such flours can be prepd. by selection of malts streams combining high gassing power with good gluten quality, by over-grinding certain streams to increase the fermentability of the starch, and where these measures are inadequate, by adding malt or malt flour. Care should be taken to select a malt with high diastatic and low proteolytic activity. C. L. B.

Should the large bakery install a laboratory? C. W. Brabender and C. Vavrena. *Mehlprobleme* 2, 27-9(1933).—A brief outline with diagrams illustrating the use of the farinograph and fermentograph in checking flour quality and controlling fermentation. C. L. B.

The Brabender Hydromat an automatic water-measuring device for bakeries. C. W. Brabender. *Mehlprobleme* 2, 26(1933). A device for delivering any desired quantity of water to the dough mixer at any desired temp. is described. Clinton L. Brooke

Four years' work with the farinograph and fermentograph. C. W. Brabender. *Mehlprobleme* 2, 47-9(1933).—An outline of the principal applications of the farinograph and fermentograph in the mill and bakery. Clinton L. Brooke

The standard baking test under English conditions. D. W. Kent-Jones. *Cereal Chem.* 11, 57-65(1934).—The results of applying the A. A. C. C. standard baking

test to European conditions are given and discussed. From the data obtained these results are not encouraging and suggest that this test is not useful in evaluating the baking properties of the various types of com. flours usually encountered. A suggestion is made that progress is most likely to be made by a more thorough study of the phys. properties of doughs. L. H. Bailey

Some comments on the paper by Kent-Jones entitled "The standard baking test under English conditions."

W. F. Geddes, R. K. Tarmour and C. E. Mangels. *Cereal Chem.* 11, 63-9(1934); cf. preceding abstr. These authors point out that Kent-Jones seems to have misunderstood the fundamental philosophy underlying the A. A. C. C. basic baking test and try to correct the wrong impression. L. H. Bailey

The laboratory baking test a science or a fine art?

M. J. Blish. *Cereal Chem.* 11, 70-3(1934); cf. preceding abstr. This paper largely justifies the existence of the A. A. C. C. standard baking test and further calls attention to misinterpretations of the method as made by Kent-Jones. L. H. Bailey

Diastatic activity in doughs and suspensions. Quick Landis. *Cereal Chem.* 11, 24-35(1934); cf. *C. A.* 28, 14117. Chem. methods of analysis of fermenting doughs for total sugars are at present inadequate. Some fermentation methods are described which are believed to be suitable for the present requirements of baking chemistry.

The potential sugar concn. ( $S_p$ ) after 1 hr. in buffered suspensions and yeast-free doughs at a const. temp. may be expressed by the equation  $S_p = (s/\log 2) \log t + p$ , where  $t$  is time,  $p$  is percentage of sugar at 1 hr. and  $s$  is the amt. of sugar formed during the 2nd hr. of diastasis. The potential sugar level in certain fermenting doughs and suspensions is shown to be higher than in yeast-free doughs and to consist of a linear and a logarithmic phase. L. H. Bailey

Roller-process and spray-process powdered skim milk in bread. L. J. Bohn. *Can. Baker and Confectioner* 46, No. 9, 33-5(1934).—There is no advantage in adding roller-process powd. skim milk to bread other than increase in nutritive value. With non-heated spray process powd. skim milk, 2% improves the score, 4% gives bread about equal to the standard without milk and 6% gives bread inferior to it. With preheated spray-process powd. skim milk there is a const. improvement up to 6% of the milk powder. L. H. B.

The staling of bread. J. R. Katz. *Baker's Weekly* 81, No. 3, 43-6(1934).—A monograph giving details of early investigations that led to intensive research. L. H. B.

Can we retard or prevent the staling of bread? J. R. Katz. *Baker's Weekly* 81, No. 6, 35-6, (8)(1934).—Results of research showing the influence of temp., humidity and added substances on the keeping quality. L. H. Bailey

Destroying mold spores on bread by ultra-violet radiation. J. W. Read. *Cereal Chem.* 11, 80-5(1934).—Freshly baked bread was heavily infected with the mature spores of the more common species of *Aspergillus*, *Penicillium*, *Rhizopus* and *Mucor* and subjected for varying lengths of time at given distances to the ultra-violet radiation from the different sources employed. The infected loaves were then wrapped in sterile waxed paper and incubated at 93-5° F. Expts. were made with 3 models of the Hg-vapor lamp and with the open C<sub>4</sub> type of the C lamp without reflectors or screens. For com. use the Hg-vapor lamp does not appear to offer the advantages to be obtained by use of the C lamp. Results obtained with the "C," "U," "K" and "Mg" carbons showed decreasing fungicidal potency in the order named. L. H. B.

The neutralization of milk and of cream by an electrical method. Otto Gratz. *Lait* 14, 145-54(1934).—A process is discussed for neutralizing dairy products by means of an elec. current. The electrolysis not only reduces the acidity but also improves the flavor and keeping qualities and reduces the bacterial count. Al electrodes are used on which a deposit is formed, which deposit reduces the total solids content of the milk by 0.1-0.4%. Some Al goes into soln. from the electrodes but most of it is re-

deposited. To prevent soln. of Al, the use of C electrodes is suggested. H and O formed by the electrolysis give rise to considerable foam on the milk surface but this foam is readily broken down and no loss of milk occurs.

A. H. Johnson

**Analysis of milk samples preserved with formaldehyde.** Marc Fouassier. *Ann. fals.* 26, 24-7(1934).—The best method of preserving milk samples seems to be to add to 250 cc. of milk 2 drops of formalin + 1 g. of paraformaldehyde which has been compressed sufficiently to prevent its disintegration, thus ensuring a slow and continuous supply of  $\text{CH}_2\text{O}$ . No trouble is encountered if the analysis is carried out within a few days. At the end of a variable period, the  $\text{CH}_2\text{O}$  combines with the casein, causing a slow pptn. thereof in very fine particles, which do not agglomerate, but which entrain and tenaciously hold part of the fat, giving results that are up to 0.4% low on the fat detn. This is most readily overcome by modifying the Gerber method as follows: first place 11 cc. of milk in the bottle, slowly add 10 cc.  $\text{H}_2\text{SO}_4$  with const. shaking, immerse completely in a boiling-water bath for 10 min. or until the fine brown ppt. is completely dissolved, add 1 cc. AmOH and complete as usual.

A. P.-C.

**Acid-free butyrometry.** G. Nadai. *Z. Untersuch. Lebensm.* 67, 178-80(1934).—A description of a new butyrometric "acid-free" method for the detn. of fat in milk through the use of BuOH as a distributing agent and complex Al tartrates or oxalates for the soln. of albumin and fat sepn. from the milk.

F. L. Dunlap

**Comparison of the Mathieu-Ferré molecular constant, and the serodensometric method of Olivari in recognizing addition of water to milk.** Giulio Buogo. *Ann. chim. applicata* 23, 598-604(1933).—The 2 methods are found to be equally reliable in detg. watering of milk.

A. W. Contieri

**The detection of the heating of milk.** M. Jansen. *Chem. Weekblad* 31, 156-62(1933).—Methods of detg. the degree of heating of milk in connection with pasteurization are discussed.

E. Schotte

**The physiologic activation of milk from the viewpoint of biology and of physics.** G. C. Supplee and M. J. Dorcas. *Lait* 14, 1-12, 125-32(1934).—By the use of the proper quality and quantity of radiant energy it was possible in a few sec. to increase considerably the antirachitic and calcifying properties of milk without producing undesirable secondary reactions which occur after longer irradiation periods. Satisfactory results were obtained by use of the quartz Hg-vapor lamp and the C lamp of the flaming arc type. From extended lab. studies, coordinating phys. and biol. observations confirmed by numerous clinical tests, it was found that standard antirachitic milk (liquid, dry or concd.) can be practically and economically produced. Irradiated milk which was dried by the Just process was found to be an excellent source of vitamin D.

A. H. Johnson

**Studies with standard agar as employed in milk control work.** C. S. Bowers and G. J. Hucker. *Am. J. Pub. Health* 24, 396-8(1934).

J. A. Kennedy

**Comparison of methods of determining *Es. coli* in milk.** K. J. Demeter, F. Sauer and M. Miller. *Milchwirtschaft. Forsch.* 15, 265-60(1933).—Ten different methods, including plate counts and gas formation, were carried out on a no. of milks and studied statistically. Crystal-violet broth and the indole test in tryptic broth gave the lowest results, and gas-production methods gave lower counts than did plate methods. Klimmer's bromothymol blue-trypanflavin-lactose-agar method gave the most satisfactory correlation with the remaining methods and is recommended as a standard.

B. C. A.

**Some causes of spoilage in sterilized milk.** L. M. Horovitz-Vlasova and A. D. Sontag. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 3-7(1933).—Spoilage of sterilized milk was traced to survival of coagulating and peptonizing organisms. If cooling is too slow, surviving organisms multiply rapidly. Local overheating, as revealed by color change, also favors spoilage. Preventive measures are strict sanitation in production, (low initial bacterial count); temp. control in

the autoclave for uniform heating at not above 120°; and rapid cooling of the sterilized milk.

J. F. Smith

**Why not make grape ice?** J. C. Hening and A. C. Dahlberg. *Ice Cream Trade J.* 30, No. 2, 19-20(1934).—The flavor of grape juice is quickly impaired when it comes in contact with tinned Fe or Cu. This flavor injury and the discoloration caused by the reaction between the metal of which the equipment is made and the tannin of the grape juice are the chief difficulties encountered in the development of satisfactory grape ice. By freezing the basic ice mixt. before adding the grape juice to the freezer, and thereby reducing the time of contact between grape-juice tannin and metal, it was possible to prepare satisfactory grape ices.

A. H. J.

**Butter from goat milk.** R. Casares López. *Anales soc. españ. fis. quim.* 32, 105-7(1934).—Av. analyses of goat-milk butter gave m. p. 34.2°, f. p. 20.1°, refraction at 40° 41.6°, I no. 26.2, butyric acid 16.0, caprylic acid 17.7, sapon. no. 239.9, Reichert-Meissl no. 24.2, Polenske no. 7.1. The high caprylic acid no. is notable.

E. M. Symmes

**Biacetyl and other butter aromas.** O. Gerhardt. *Seifensieder-Ztg.* 61, 113-14, 131-2(1934).—A review of the objections to the use of biacetyl in oleomargarine, arising from an application for a German patent 5-25 24 by the Unilever Concern for the use of biacetyl or other diketones as a butter aroma, or its production within the margarine. Austria has just granted a patent for its use to the amt. of 0.0003-0.0004%.

P. Escher

**Methods for the microbiological analysis of butter.** E. H. Parfitt. *Am. J. Pub. Health* 24, 303 8(1934).

J. A. Kennedy

**Detection of adulteration in butter by determining the temperature of freezing of its acids.** Enrico Zunini. *Ann. chim. applicata* 23, 557-67(1933).—Heat the butter to 60° and decant through filter paper to dehydrate it, and pipet off a 2-cc. sample. Saponify this with 5-cc. alc. KOH (80 g. KOH in 80 cc.  $\text{H}_2\text{O}$  dild. to 1 l. with EtOH). Add just enough dil. AcOH to neutralize the 5-cc. KOH soln. and 4 cc. pure isoamyl alc. Heat the soln. to 30-5° to dissolve the fat, then chill to det. the approx. temp. of clouding. Reheat the soln. to 35°, and cool slowly; det. the temp. at which clouding starts (I). Add 4 cc.  $\text{H}_2\text{O}$ , melt the fat again, and redet. the cloud temp. (II). For pure butter, temps. I and II lie between 19° and 20°, and the difference between them should be less than 0.3°.

A. W. Contieri

**The microscopy of food products. II. Butter and margarine.** Charles H. Butcher. *Food* 3, 140, 142(1934); cf. C. A. 28, 1415.—The technic of the prepn. of butter-fat samples for detection of foreign fat by microscopic examn. is described. III. Lard. *Ibid.* 176 8.—A description of the microscopic characteristics of lard, both as such and after crystn. from Et<sub>2</sub>O, more particularly from the standpoint of the detection of adulteration.

A. Papineau-Couture

**Examination of cheese.** R. Strohecker. *Z. anal. Chem.* 96, 295 7(1934).—A review.

W. T. H.

**Effect of heat, acidity and preservatives on anaerobic gas formers in pasteurized cheese.** J. Csizsar. *Milchwirtschaft. Forsch.* 15, 201-27(1933); cf. C. A. 27, 1682; 28, 1787.—Spores of *B. sporogenes*, *B. saccharobutylicus* and *B. putrificus*, the presence of which caused pasteurized cheese to be "blown," could be destroyed only by temp. and acidities too high to make a satisfactory product.

B. C. A.

**Control of mold fungi in dairy factories and meat works.** J. C. Neill. *New Zealand J. Agr.* 48, 70-5(1934).

**Renewed sporulation of *Penicillium puberulum*, *P. expansum* and *Cladosporium herbarum* on small blocks of unseasoned white-pine timber was completely inhibited by treatment of the blocks with 1 part of formalin (38.5%  $\text{CH}_2\text{O}$ ) in 20 parts of water. A 5% borax soln. inhibited renewed sporulation of the *Penicillia*, but failed to do so with *Cladosporium*. Proprietary Cl sterilizer, 10%  $\text{Na}_2\text{CO}_3$ , 5%  $\text{Na}_2\text{PO}_4$  and 5% soft soap solns. failed to control the molds, the last 2 stimulating renewed growth**

and sporulation.  $\text{CuSO}_4$  solns. (1-2%) controlled *Cladosporium*;  $\text{NaCl}$  and  $\text{NaNO}_3$  solns. (10%) stimulated the mold, and various Cl disinfectants were completely ineffective; effective control was obtained by thoroughly washing the wood with hot water (134-50° F.). The relative roughness of the wood surface and the degree of establishment of the mold colonies materially affected the degree of control obtained by steaming and by hot-water treatment.

**Meat and meat preparations.** J. Henry. *Food* 3, 127-30, 189-90, 229-30 (1934).—A rapid survey of the technology of the subject under the following headings: slaughtering, chilling and cold storage; curing; manufd. meats; preservation, by sterilization; by-products; prepn. of articles for pharmaceutical preps. A. P.-C.

**Chemical changes of muscle proteins in canning.** Yuzuru Okuda and Kazuo Yamafuji. *Bull. Chm. Soc. Japan* 9, 75-83 (1934).—Set C. A. 28, 2424. G. G.

**Chemical engineering and the edible fat industry.** Viscount Leverhulme. *Food* 3, 213-16 (1934).—An address. A. Papineau-Couture

**Fluorescence phenomena in ultra-violet light of fried-out lard.** Raimund Neseni. *Z. Untersuch. Lebensm.* 67, 192 5 (1934).—The fluorescence colors of native lards obtained by trying out depend essentially on the temp. at which the fat was obtained. Native fats obtained at a temp. over 150° cannot in general be distinguished from American fats under the lamp. Hence it is impossible, on the basis of findings with a quartz lamp, to distinguish whether a fat is a pure native lard or a mixt. F. L. Dunlap

**Chemical changes occurring during the salting of chicken and duck eggs under different treatments.** F. T. Adriano and T. V. Rigor. *Philippine J. Agr.* 4, 151 65 (1933).—Periodic analyses of eggs, preserved in 10%  $\text{NaCl}$  soln., satd.  $\text{NaCl}$  and a mixt. of soil and  $\text{NaCl}$ , showed that the different treatments had approx. the same effect upon the compn. The percentage of shell in the treated eggs remained const.; albumen increased and yolk decreased. The  $\text{NaCl}$  content increased and the ash content of the shell decreased during treatment. The  $\text{NaCl}$  and ash contents of the albumen and yolk increased. There was no relative change in the fat and protein contents.

**Microscopic detection of decomposition in fruit and vegetable products.** B. W. Clarke. *Food* 3, 223-4 (1934).—A brief description and explanation of the microscopical examn. of tomato and fruit products for mold, bacterium and yeast counts. A. P.-C.

**The storage behavior of limes.** Claude W. Wardlaw. *Imp. Coll. Trop. Agr., Trinidad, Low Temp. Sta.* 1933, 23 pp.—For prolonged storage limes should be picked at the yellow-ripe stage. Fruit picked at the full-grown, dark green stage undergoes excessive dehydration during prolonged storage. For best results, limes should be stored at a temp. of 45° F. and at a relative humidity of not less than 85%. For any given maturity, the loss in wt. of limes in storage proceeds at a steady rate over long periods, provided temp. and humidity remain const., and is directly related to the area of fruit-surface exposed. Losses in wt. during storage are lowest from limes wrapped in silver foil, followed in order by those (1) wrapped in Cellophane and (2) treated with wax dissolved in  $\text{Et}_2\text{O}$  or  $\text{C}_2\text{H}_5$ . Grease-proof and ordinary wrappers are ineffective. Numerous data are given on the loss in wt. of limes under different conditions of storage. K. D. Jacob

**Variations in the citric and malic acid and sugar contents of Alsatian whortleberries.** A. Guillaume and L. Léo. *Ann. fals.* 26, 12 18 (1934); cf. Muttelet, C. A. 19, 683.—The citric acid contents of green, semi-ripe and fully matured fruit, resp., were: 0.135, 1.10, 0.832%; 0.075, 1.72, 1.89 mg. per fruit. Corresponding values for malic acid were 0.100, 0.040, 0.044%; 0.055, 0.002, 0.100 mg. per fruit. Corresponding values for: (1) reducing sugars: 0.480, 1.51, 2.24%; 0.272, 2.350, 5.090 mg. per fruit; (2) sucrose 0.219, 0.20, 0.50%; 0.121, 0.312, 1.130 mg. per fruit; (3) total sugars: 0.708, 1.71, 2.74%; 0.393, 2.662, 6.220 mg. per fruit. A. P.-C.

**Fundamentals of the strength test for fruit juices.** B.

1 Alberti and B. Rossmann. *Z. Untersuch. Lebensm.* 67, 180-7 (1934).—A quant. study of the effect of diln. on the odor of raspberry juice and sirup. F. L. Dunlap

**Peas.** Raimund Neseni. *Z. Untersuch. Lebensm.* 67, 195-7 (1934).—An investigation of a considerable no. of samples of peas shelled and unshelled, halved and whole, showed that, in the main, they did not conform to the requirements of the Austrian Codex. A quartz lamp offers a simple means for the identification of the presence of fungi. F. L. Dunlap

**Changes in the composition of potatoes during winter storage.** Ladislaus Erdős. *Z. Untersuch. Lebensm.* 67, 198 202 (1934).—Twelve different types of potatoes were investigated. Tables are given of changes in sg. gr., dry substance, ash, protein and N-free ext. No regularity in the changes could be established, but storage results in the loss of valuable substances. F. L. Dunlap

**A study of the iodine content of Pennsylvania potatoes.** Donald E. H. Frear. *J. Agr. Research* 48, 171-82 (1934).—The I in 135 samples of potatoes grown in as many localities in Penna. ranged from 10 to 216 pts. per billion on a dry basis with an av. of 77.8 pts. per billion. The mean I content of the potatoes grown in the south-eastern section of the state was higher than that of the potatoes grown in the north-central section but no other sectional differences in I content were significant. Potatoes grown on glaciated soils contd. slightly more I than those grown on similar nonglaciated types. The I content of the potatoes analyzed was not affected by fertilization. No significant correlation was found between the I content of the potatoes and the size of the individual potatoes, between the I content and variety, or between the I content of the potatoes from the different parts of the state and the incidence of goiter in the same localities. W. H. Ross

**A poisonous adulteration of lentils.** Pierre Brun. *Ann. fals.* 26, 88-90 (1934).—An adulteration which caused illness of people consuming the lentils consisted in the addn. of a triphenylmethane dye, probably impure fuchsin contg. As. A. Papineau-Couture

**Mushroom proteins.** M. A. Gudlet. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 8 19 (1933).—Although mushroom proteins are unusually resistant to acid hydrolysis, they are about 80% dissolved by gastric juice, with an unusually high yield (up to 55%) of diamino acids. The test, made with dried mushrooms after extn. with  $\text{EtOH}$  and  $\text{Et}_2\text{O}$ , indicated high nutritive value. Julian P. Smith

**The refining of Philippine honey.** F. T. Adriano and S. Oliveros. *Philippine J. Agr.* 4, 201-13 (1933).—The problems involved in the various methods of filtration, the use of decolorizing C, and the heating of Philippine honey are discussed. The  $\text{H}_2\text{O}$ , invert sugar, sucrose, ash, dextrin and acid contents of Philippine honey are compared with those of foreign honeys. Thirteen references. John O. Hardesty

**Determining pectin in fruit and berry preserves.** V. V. Aleksandrov and A. I. Salishcheva. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 97-106 (1933).—Results of the Mehlitz method for detg. pectin are more concordant if the soln. is filtered through baiting and hydrolyzed and the clear filtrate used for pptn. Both the Mehlitz method and the modified procedure are superior to the A. O. A. C. method. The new procedure is superior in reagent economy and in convenience; and its accuracy is not affected by the commonly occurring amts. of dextrans, starch and sugars. Use of the method for judging the quality of preserves is discussed. Julian F. Smith

**Refractometric determination of sugar (extract) content of marmalades, fruit jellies, malt extracts, honey and similar substances.** D. Schenk. *Z. Untersuch. Lebensm.* 67, 187 91 (1934); cf. C. A. 27, 2735-6.—These addnl. investigations of S. show the value of the butter refractometer as an aid in the detn. of ext. and  $\text{H}_2\text{O}$  in marmalades, etc. The refractometric detn. may be used as a preliminary test in sorting out suspected samples, which may then be submitted to further investigation. F. L. Dunlap

**Determination of sugar, starch sirup and invert sugar in**

caramel and in fruit preserves. V. V. Aleksandrov and A. I. Saliabcheva. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 33-81 (1933).—A modified Kruisheer (C. A. 23, 3520; 24, 3064) method is superior to the Juckenack-Pasternak, Scherbakov and Grossfeld-Hollatz methods for detg. sucrose, starch sirup and invert sugar in caramel, jams, preserves, etc. For reagent economy 5 cc. of sugar soln. may be added to 5 cc. of 0.2 N I, after which alkali, acid, sulfite and alkali are added in succession, the vol. is made up with H<sub>2</sub>O to 25 cc. and the titration is completed with 0.1 N KMnO<sub>4</sub>, with no more I soln. Procedures are described in detail for detg. sucrose, fructose and invert sugar. J. F. Smith

Determining the hygroscopicity of caramels. A. N. Lebedev and A. S. Nechaeva. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 107-17 (1933).—The hygroscopicity of caramel preps. can be detd. with sufficient accuracy by keeping the samples over dil. (5.5%) H<sub>2</sub>SO<sub>4</sub> in a glass desiccator at 28° for 1 hr. The sample (about 30 g.) should be weighed to 1 mg. Equil. is practically attained in 1 hr.; deviations beyond that time are negligible. Julian F. Smith

A survey of the walnut position in England, 1932. J. B. Hamond. East Malling Research Sta., 20th Ann. Rept. 1932, 73-8 (1933).—Good control of the fungus *Chalaropsis thielavoides* which forms a sooty layer between the stock and scion of walnut grafts, thus preventing a union from taking place, was obtained by thoroughly spraying the propagation house with 1% formalin before the grafting season commenced. Rich-flavored walnuts that remained plump on storage contained approx. 50% or more of oil; nuts that contained approx. 30-40% oil were insipid in flavor and shrivelled considerably during storage. Storage of walnuts.—The hygroscopicity of NaCl in which walnuts were stored was reduced by mixing it with coconut fiber or Na phosphate; the fungicidal properties of the NaCl were not impaired by the admixts. K. D. J.

Walnuts—curing and storage trials. J. B. Hamond and A. W. Witt. East Malling Research Sta., 20th Ann. Rept. 1932, 32 (1933); cf. C. A. 28, 1790<sup>1</sup>.—Deshucked and dried walnuts were preserved more effectively by packing in direct contact with solid NaCl than by simply dipping in a satd. soln. of NaCl. Promising results were also obtained by dipping the nuts in molten paraffin before storing. When they were dipped in high-strength CaOCl<sub>2</sub> solns. a white deposit appeared on the nuts when dry. K. D. Jacob

A study of the chemical composition of chufa nuts. M. G. Ruitikov. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 136-44 (1933).—The chufa nut, or earth almond, is fairly rich in oil, starch and water-sol. carbohydrates; its edible oil has excellent flavor. If the tech. difficulties of efficient sepn. of shells and kernels at low cost can be solved, the chufa nut will provide a good but cheap substitute for the more expensive nuts in confections and baked goods. Analytical data are given for the sugars, starch and oil of the nuts. J. F. S.

Coating roasted coffee with resins. Francesco Di Stefano. *Ann. chim. applicata* 23, 577-81 (1933).—Gum copal and gum acroides have been used in coating roasted coffee. They can be detected as follows: Ext. 5-6 coffee beans in boiling EtOH, and evap. the ext. to dryness on a watch glass. Ext. with petr. ether, decant this, and dissolve the residue in Ac<sub>2</sub>O. When a drop of concd. H<sub>2</sub>SO<sub>4</sub> is added, gum copal gives a yellow-brown coloration, and gum acroides a deep-red color. If a weighed amt. of coffee is taken, then the residue on the watch glass may be weighed and the sum of the resins used detd. A. W. Contieri

Some pasture plants in Kenya. D. C. Edwards. Kenya Colony Dept. Agr., Bull. 1933, No. 1, 33 pp.—Data are given on the percentages of crude protein, Et<sub>2</sub>O ext., sol. carbohydrates, fiber, ash and SiO<sub>2</sub> in the leaves, stems and total herbage of *Chloris gayana*, *Cynodon plectostachyum*, *Pennisetum clandestinum*, *Amphiplophus perflua*, *Paspalum dilatatum*, *Panicum coloratum*, *Paspalum scarbiculatum*, *Pennisetum purpureum*, *Sorghum*

*sudanense*, *Panicum trichodadum*, *Pennisetum salifex*, *Echinochloa pyramidalis* and *Echinochloa stagnina*, grown in Kenya. K. D. Jacob

The seasonal variation of the feeding value of certain strains of grasses of the *Digitaria* species. D. J. R. van Wijk. Union S. Africa Dept. Agr., Sq. Bull. 126, 12 pp. (1933).—Data are given on the percentages of H<sub>2</sub>O, ash, fiber, carbohydrates, Et<sub>2</sub>O ext., P<sub>2</sub>O<sub>5</sub>, CaO and protein in 151 sample. of various strains of *Digitaria polevansii*, *D. littoralis*, *D. geniculata*, *D. smutsii*, *D. decumbens*, *D. swasilandensis*, *D. longiflora*, *D. eylesii*, *D. milanijana*, *D. pensii*, *D. valida* and *D. glauca* grown in S. Africa and cut at various stages of growth. In general, the young plants of a species contained the highest percentages of ash, P<sub>2</sub>O<sub>5</sub> and protein; the amts. of fiber, carbohydrates and Et<sub>2</sub>O ext. were remarkably uniform in plants of all ages. The Ca content usually increased as the plants matured, and did not seem to be related to the P content. When the growth of the plants was not allowed to exceed 3 in. (frequent cutting), the P and protein contents were maintained at uniformly high levels throughout the season. K. D. Jacob

Glycerol [application to food uses] (Hoover) 27. Detn. of hydroquinone in salt herrings (Preiss) 7. Application of refrigeration to the preservation of grapes (Billardon) 16. Disposition of drainage water from milking barns (Walker, Belton) 14. Foams (Dumanski, et al.) 2. Cong. fruit juices (Fr. pat. 750,299) 16. Stock feed from slaughter-house refuse (U. S. pat. 1,950,360) 15.

Bornand, Louis: La technique de la conserve. Paris: Pierre Johanet. 400 pp. Reviewed in *Ann. fals.* 26, 109 (1934).

Fortschritte in der Nahrungsmittelindustrie. Berichte des Fachausschusses für die Forschung in der Lebensmittelindustrie beim Verein deutscher Ingenieure und Verein deutscher Chemiker. Heft 2. Berlin: V. D. I.-Verlag in Komm. 44 pp. M. 2.50. Cf. C. A. 27, 3260.

Preserving foods. Halvor S. Egeberg. Ger. 593,054, Feb. 21, 1934 (Cl. 53c. 3.03). See Brit. 374,927 (C. A. 27, 3261).

Testing the vacuumizing of canned goods. Joseph B. High. U. S. 1,950,304, March 6. Various details of app. and of temp. and pressure regulation are described for producing "swells" in cans having less vacuum than a predetd. standard.

Treating cereals. John L. Kellogg. Brit. 402,188, Nov. 30, 1933. Cereal grains are cooked\* in the presence of moisture, rolled while moist and hot, partially dried, and sprayed or otherwise treated with some substance which, after drying, leaves a coating that prevents the escape of steam from within the grain during subsequent heating to a high temp. until the grains are browned and puffed by the steam pressure within. A soln. contg. a small amt. of egg albumin or a soln. of NaCl 2.5 and sugar 3-5 in H<sub>2</sub>O 20 parts may be used.

Cereal food. Luigi Bernardini. U. S. 1,949,895, March 6. Lipoids are extd. from the embryos of corn resulting as a by-product in corn milling; the extd. residue is milled to produce a flour high in phytin, and the phytin flour and corn meal are emulsified with the lipoids and added water to form a product in which the lipoids and phytin are present in the same ratio as in the original corn kernels.

Treating buckwheat. Rinjiro Sasaki and Zaidan\* Hojin Ryoshoku Kenkyu-Kwai. Brit. 401,884, Nov. 23, 1933. Buckwheat has its black outer husks removed by mech. means and is then immersed in an aq. soln. of protein-coagulating reagents, e. g., AcOH, propionic, lactic and malic acids, Et, Me, Pr and Bu alcs., the product being then treated with H<sub>2</sub>O vapor and finally rolled or flattened into flakes. In a modification, the dehusked grains are treated with H<sub>2</sub>O vapor contg. vapor of 1 or more volatile protein-coagulating reagents and then flaked.



**Soy-bean milk.** Max Adler. Brit. 402,948, Dec. 14, 1933. See Fr. 719,187 (C. A. 27, 5841).

**Stable malt product.** Konrad F. Schreier. U. S. 1,950,418, March 13. The grain is impregnated with water and permitted to germinate at a suitable germinating temp. until the coleorhiza in wheat and rye, or acrospire in barley, has reached a development where emergence of the primary rootlet is indicated, and the grain is then dried at a temp. not exceeding about 55° to obtain a product which may be ground to flour and bleached with "Novadel" or other standard bleaching agent.

**Flour preparations.** The Procter & Gamble Co. Fr. 758,058, Jan. 10, 1934. Synthetic glycerides of the group comprising mono- and diglycerides of fatty acids or of partially hydrogenated fats, or mono- and diglycerides

derived from hydrogenated vegetable oils of an I index of 60-70, are added to flour or flour preps. as flaking agents.

**Vacuum treatment of butter.** George H. Abel. Ger. 593,098, Feb. 21, 1934 (Cl. 53e. 6.10). See Brit. 306,541 (C. A. 27, 1685).

**Chocolate.** N. V. Algemeene Beleggings Maatschappij. Fr. 759,074, Jan. 29, 1934. The necessary fluidity of chocolate is obtained by means of a compd. prepd. by causing a polyhydric alc., a compd. introducing an acid radical contg. P and O and fatty acids or oils to interact. Examples are given.

**Fodder.** I. G. Farbenind. A.-G. Fr. 758,993, Jan. 26, 1934. Fodder is kept green by means of wetting agents such as sulfonated hydrocarbons or sulfonated fatty acids. Known preserving agents such as  $\text{SO}_2\text{Cl}_2$  may also be added.

### 13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

**Legal pitfalls for the chemical engineer.** J. Davidson Pratt and G. S. W. Marlow. *Chemistry & Industry* 1934, 235-44, 261-7. See C. A. 28, 17917.

**New method developed to produce pure carbon dioxide gas and lime.** Edward P. Gillette. *Pit & Quarry* 26, No. 3, 37-8 (1933).—A new method for producing lime, with  $\text{CO}_2$  content controlled within 1%, and dry ice at about 1/2 the present cost is described briefly. A. H. E.

**Calculation of condensation with a portion of condensate layer in turbulent motion.** Allan P. Colburn. *Ind. Eng. Chem.* 26, 432-4 (1934).—Math. derivation of formulas which are shown to check literature data (cf. Kirkbride, C. A. 28, 5443).

**Elutriation as an aid to fine grinding.** A. L. Curtis. *Sands, Clays and Minerals* 2, No. 1, 21-6 (1934).—Expts. made with the Andrews kinetic elutriator with a view of ascertaining the practical value of the app. in the control of crushing and grinding minerals to a fine state of subdivision are described. M. V. Kondoidy

**Combining drying and grinding operations.** L. T. Work. *Chem. Met. Eng.* 40, 306-9 (1933).—Combined drying and grinding is effected by closed-circuit operation, with warm air as carrier. Applications include the pulverization of coal and the combined grinding and dehydration of crystals as in the production of  $\text{CaSO}_4$ . Filter-press cakes may be treated in this way. Any type of mill may be used, the crucial point being the temp. of the air. The ground material is classified in an air separator. As an equil. curve exists between the  $\text{H}_2\text{O}$  content of any solid and the humidity of the air, the latter must be controlled to give even results, but the characteristic merit of warm-air grinding is that caking does not occur. H. C. A.

**Heat transfer by condensing vapor on vertical tubes.** C. G. Kirkbride. *Ind. Eng. Chem.* 26, 425-8 (1934); cf. C. A. 28, 5443.

**Heat contents of gases from 0° to 1900°.** Guy B. Taylor. *Ind. Eng. Chem.* 26, 470 (1934).—Tables give heat contents at 100° intervals for  $\text{H}_2$ ,  $\text{O}_2$ ,  $\text{N}_2$ ,  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$  and  $\text{H}_2\text{O}$ . These values are useful in calcs. for processes that include heating or cooling of, or by means of, gases. E. H.

**Use of liquefied gases in refrigerators.** F. Bordas. *Ann. fals.* 26, 95-103 (1934).—A discussion of the dangers arising from the various liquefied gases used in mech. refrigerators with regulations proposed governing their use. A. Papineau-Couture

**Methods of controlling ammonia in the refrigerating system.** A. N. Barnes, Jr., and D. P. Schivetz. *Ice Cream Trade J.* 30, No. 3, 27-9 (1934). A. H. Johnson

**Breathing through gas masks.** O. Bruns. *Draeger-Hefte* No. 170, 2436-9 (1934).—Two types of gas masks are described. In one type both inhaled and exhaled air pass through the air filter. In the other type inhaled air passes through the air filter and exhaled air passes out through an exhalation valve in the face piece. The

advantages and disadvantages of each type are described, and all factors of a gas mask as they relate to respiration are discussed. A. I. Kibler

**Iodized carbon as filter charge for respiratory masks in protection against mercury vapor.** Karl Ed. Putter and Max Hirsch. *Angew. Chem.* 47, 184-5 (1934); cf. Stock, C. A. 28, 20777. Tests with special "mercury" filters gave the following results: the filter affords reliable protection for about 100 hrs. under ordinary working conditions, and with an air consumption of 25-30 l./min. If no phys. work is being done, the air consumption decreases, and the protective period is considerably extended. This is also the case when dust of liq. compds. or colloidal liq. is present in the air. However, if the temp. is unduly high and hard phys. work is accomplished, where the air consumption rises to 50 l./min., an earlier exhaustion of the filters must be expected, but even under such conditions the min. protective period is not less than 50 hrs.

**The development and application of synthetic liquid dielectrics.** F. M. Clark. *Trans. Electrochem. Soc.* 65, 12 pp. (preprint) (1934).—Synthetic liquid dielectrics consisting of chlorinated aromatic mols. which contain at least a chem. equiv. of Cl and H are discussed. With such an equiv. not only are the chlorinated products themselves noninflammable in the usual sense, but in addn. show no tendency toward autogenous ignition and when decompd. by an elec. arc evolve only gases which are noninflammable and nonexplosive. New types of chlorinated aromatic hydrocarbons are indicated. These products, normally solid when pure, may be obtained in the liquid state. Properly blended, synthetic dielectrics having pour points lower than 20° are possible. These materials have several advantages over mineral insulating oils for use in elec. design. C. G. F.

**The thermal conductivities of various insulators at room temperature.** C. D. Niven. *Can. J. Research* 9, 146-52 (1933).—The values for thermal conds. of various common materials chiefly used in the walls of houses are given. By plotting the results obtained, as well as those obtained by other experimenters, on a density-cond. diagram there is a general indication that at higher densities thermal cond. increases with increase of density much more rapidly than it does at low densities. J. W. Shipley

**Calvet, E.: Química general aplicada a la industria con practicas de laboratorio.** T. I. Química inorganica. Pt. 1. Preliminares y cuerpos simples. Barcelona: S. A. Salvat Editores. 1105 pp. Ptas. 60; bound, Ptas. 67. Reviewed in *Chimie & industrie* 31, 754 (1934).

**Istruzione sull'impiego della nebbia artificiale.** Rome: Istituto poligr. dello Stato, Liberia. 66 pp. L. 6. V. D. I. Jahrbuch, 1934. Die Chronik der Technik. Berlin: V. D. I.-Verlag. 189 pp. M. 3.50.

**Exothermic reactions.** Zahn & Co. G. m. b. H. Fr.

758,040, Jan. 26, 1934. In strongly exothermic catalytic oxidation processes, removal of heat is effected by ariyl ethers such as diphenyl, naphthyl phenyl, and hydroquinone phenyl ether. The ether passes through a condenser in a closed cycle.

**Gas determinations.** Hugo Junkers. Fr. 758,228, Jan. 12, 1934. The d. or viscosity of a gas with respect to a standard gas is detd. automatically by passing equal quantities of the 2 gases per unit of time each through a constriction and detg. the pressure in front of each constriction by manometers which register the variation through the movement of the arms of a lever.

**Separating gas mixtures.** The Silica Gel Corporation. Brit. 402,470, Dec. 7, 1933. Condensable gases or vapors are removed from gaseous mixts. by passing them successively into contact with 2 batches of adsorbent, e. g., silica gel, conditioning the mixt. to activate one batch and to charge the other with the condensable components, removing any condensable gases from the mixt. in passing between the batches and periodically reversing the position of the batches in the circuit. App. is described.

**Separating gases.** Gesellschaft für Lindes Rismaschinen A.-G. Fr. 759,087, Jan. 29, 1934. The gases are condensed, and the vapors formed by the fractionated vaporization are passed in a continuous manner over an adsorbing agent, the temp., pressure and amt. of which are regulated so that at the end of the vaporization, it is approx. satd. by the component of next to the lowest b. p.

**Rectifying column suitable for separating constituents of liquid air.** Richard Linde (to Ges. für Linde's Rismaschinen A. G.). U. S. 1,950,313, March 6. Structural details.

**Apparatus for dispensing liquefied gases.** Leo I. Dana (to Linde Air Products Co.). U. S. 1,950,353, March 6. Various structural and operative details are described.

**Treating solids with gases.** Mikael Vogel-Jørgensen. Fr. 757,800, Jan. 5, 1934. The solids are passed in the form of fine grains and in a thin layer onto a screen-like surface, through which the grains tend to fall but are prevented by the pressure of ascending gas. The process may be applied to the recovery of heat and dust from furnace gases.

**Dispersions of solids.** Andrew Szegvari (to International Latex Processes Ltd.). Brit. 402,946, Dec. 14, 1933. See Fr. 750,305 (C. A. 28, 869').

**Manufacturing mixtures enriched in oxygen from air.** Mathias Frankl. Brit. 402,078, Nov. 17, 1933. A liquid mixt., rich in O, obtained in the base of a rectifying column, is conveyed through a pipe, with a regulating valve, to the top of a vaporizer, the liquid and the gas resulting from its vaporization passing down together to the bottom, where the liquid is completely vaporized and the gas forced passes away by an outlet. Air entering the column at its lower end passes upward between the vaporizer elements and is partially liquefied, N passing off at the top and O falling to the base. The vaporizer comprises corrugated double tubes, the liquid being spread along the walls by metallic gauzes pressed against them by bent plates. The process may be applied to the richer O obtained in 2-stage rectification.

**Washing liquids.** W. C. Holmes & Co. Ltd. Fr. 758,404, Jan. 17, 1934. Liquids of different ds. which do not mix, e. g., oils and acids or alk. solns., are brought into intimate contact in a horizontal tunnel-shaped vessel in which they travel in an undulating course and are agitated by impulses caused, e. g., by the to-and-fro motion of a piston.

**Colloidal solutions of metal compounds.** I. G. Farben-ind. A.-G. (Fritz Stöwenel, Josef König and Hermann Schula, inventors). Ger. 593,416, Feb. 20, 1934 (Cl. 12n. 1). A sol of silicic acid or  $\text{Al}(\text{OH})_3$  is used as a protective colloid in prepg. sols of metal compds. Preferably, the metal compds. are formed by double decompn. in the presence of the protective colloid. The products

are generally reversible sols. They may be freed from sol. electrolytes by dialysis, or in some cases the sols may be evapd. and the electrolytes removed by extn. with an org. solvent or by volatilization. Details of the prepn. of  $\text{AgCl}$  sols are given.

**Crystallizing.** Appareils et évaporateurs Kestner. Brit. 403,240, Dec. 21, 1933. See Fr. 731,065 (C. A. 27, 355).

**Crystallization.** The Dorr Co. Inc. Fr. 757,888, Jan. 5, 1934. The size of crystals of a solid reaction product resulting from the continuous reaction of 2 chem. agents, one of which is solid or relatively less sol. and the other, is liquid or relatively more sol., is regulated by dissolving the solid agent and simultaneously pptg. the soln. obtained. The pptn. of a coating on the undissolved solid particles is prevented by a continuous control of the concn. of the liquid reagent by the return to the reaction of a portion of the unsepd. products of the reaction, taking care that the concn. of the liquid reagent does not exceed a 6% excess over the theoretical amt. of the reaction.

**Granulating material.** Friedrich Uhde. Fr. 757,814, Jan. 5, 1934. An app. is described in which materials are made plastic with water and granulated by heating during movement.

**Washing granular material.** Thomas Chance. Brit. 403,150, Dec. 21, 1933. In the sand-flotation process coarse sand and refuse are withdrawn from the scpg. chamber through an upward current classifier contg. a fluid medium of lower sp. gr. than that of the fluid mass in the scpg. chamber. App. is described.

**Freezing agent.** Escher Wyss Maschinenfabrik A.-G. Ger. 590,577, Jan. 5, 1934 (Cl. 12a. 7). A freezing agent for compression freezing machines consists of unsatd. halogenated hydrocarbons b. above  $13^\circ$  at atm. pressure, such as vinyl bromide,  $\alpha$ - and  $\beta$ -bromopropylene or  $\alpha$ - and  $\beta$ -chloropropylene.

**Solid carbon dioxide.** Charles L. Jones and John D. Small (to American Dryice Corp.). U. S. 1,950,180, March 6. Liquid  $\text{CO}_2$  is expanded in a chamber against a pressure below the triple point, and the chamber pressure is then raised to or above the triple point; a second portion of liquid is discharged into the chamber in contact with the solid product made in the earlier step, and the liquid is then evapd. at the triple point at a slow rate regulated to produce crystals of large average size. App. is described.

**Protecting the skin against chemicals.** Drägerwerk Heur. u. Bernh. Dräger. Ger. 590,818, Jan. 11, 1934 (Cl. 30i. 10). The skin is protected against chemical of the dichloroethyl sulfide type by soaps made from bi- or trivalent metals and oils or fats.

**Oils, etc., used as dielectrics.** Compagnie française pour l'exploitation des procédés Thomson-Houston. Fr. 758,072, Jan. 10, 1934. The formation of muds in oil and waxes is prevented by the addn. of aromatic NO<sub>2</sub> compds., e. g., *p*-nitrochlorobenzene,  $\alpha$ -nitronaphthalene, *m*-dinitrobenzene, *o*- and *p*-nitrophenol, and nitrochlorophenol, and by making the containers of material cutting off the short-wave rays.

**Insulating material.** Carl Alfeis. Fr. 758,370, Jan. 15, 1934. A material which is insulating against moisture and does not swell is made from glass threads or wool and a plastic material such as asphalt, bitumen, paraffin, pitch, etc. The glass may be preliminarily treated with adhesives or agglomerants such as ethyl, acetyl or vinyl cellulose, rubber or synthetic resins.

**Electric insulating compositions.** Jaroslaw's Erste Glimmerwaren-Fabrik. Ger. 593,072, Feb. 21, 1934 (Cl. 21c. 2.02). Thin sheets or small particles of mica are united by an adhesive comprising a soln. of an inorg. colloid in an org. solvent. A suitable adhesive is an org. solvent soln. of  $\text{SiO}_2$  prepd. by sapon. an ester of silicic acid. Cf. C. A. 28, 842'.

## 14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

**Variation of the composition of natural waters according to the amount of rain.** Enrico Poda. *Ann. chim. applicata* 23, 581-4 (1933).—Electrometric detns. on the cond. of river water show it varies in compn. according to the amt. of rain falling. This change is noted immediately after a rain storm, whereas well waters show a change only some time later.

**The geyser area near Beowawe, Eureka County, Nevada.** T. B. Nolan and G. H. Anderson. *Am. J. Sci.* 27, 215-29 (1934).—The occurrence is described. Analyses of  $H_2O$  from 3 geysers and hot springs are given; they appear to be related to the alk.  $H_2O$  of Yellowstone Natl. Park.

**Keeping up with the demand for adequate pure water.** Harry R. Jordan. *Am. J. Pub. Health* 24, 111-16 (1934).—J. discusses (1) the probable trend of water demand in American cities, (2) the phys. elements in public water supply that need particular strengthening to meet this probable demand, (3) how water-works operating personnel measures up to its responsibility and (4) the trend in water-supply quality.

**The fundamental chemistry of water supply: How to read a water analysis.** J. H. Coste. *Water and Water Eng.* 34, 361-2, 408-12 (1932); *J. Am. Water Works Assoc.* 25, 1042.

**Simple graphic determination of ground-water yield by the Smreker potential law.** H. Weiland. *Gas u. Wasserfach* 77, 88-90 (1934).

**Step-photometric microanalysis of drinking and service water.** VIII-IX. Carl Urbach. *Mikrochemie* 14, 189-218 (1934); cf. C. A. 27, 4327.—Step-photometric methods are described and comprehensive tables given for the detn. of  $H_3PO_4$  and  $H_2SiO_3$  in water. The methods are based upon the formation of blue complexes of reduced phosphomolybdic or phosphosilicic acids. It was found that the former complex is less stable than the latter. By heating 3.5 min. on the water bath at  $70^\circ$ , the blue color due to reduced phosphomolybdic acid disappears while that of the corresponding Si complex remains. This fact permits the easy detn. of both. On the basis of the prior work of Tschopp and Tschopp (*C. A.* 26, 5112) the  $H_2SiO_3$  can be detd. in the presence of  $H_3PO_4$  by destroying the yellow phosphomolybdate complex with a 5-cc. portion of 4% oxalic acid soln. and  $H_3PO_4$  can be detd. in the presence of  $H_2SiO_3$  by adding 5 cc. of 7%  $NaHSO_4$  soln., before adding molybdate reagent, which prevents the formation of the silicomolybdate and not that of the phosphomolybdate.

**Variations in the carbonation coefficient of sea water.** P. T. Danilchenko and N. S. Spiro. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat.* 1933, 1430-58.—Carbonation coeff. ( $HCO_3^- \times 100/\Sigma = K$ ) is 1259 for av. river water and 0.15-0.72 for water from ocean or salt lakes. It is inversely proportional to salinity ( $S$  = total content of salts). The av.  $HCO_3^-$  content of fresh and sea waters is 0.0149% and 0.0148%, resp., and that of salt lakes is 0.0173%. For saline waters in direct contact with  $CaCO_3$  and atm.  $CO_2$   $KS = C = \text{const.}$  (av.  $C = 3.0$ , but varies from 5.1 for Caspian Sea to 1.7 for the Gulf of Kuyal'nitzkil and is 2.8 for ocean waters). All natural waters are usually satd. with respect to  $CaCO_3$  but occasionally they may contain an excess (Black and Caspian seas) or a deficient quantity (Baltic Sea) of it. The  $CaCO_3$  in oceans is supplied both by rivers and by the minerals present in the ocean bed. On evapn. ocean waters deposit  $CaCO_3$  and a mixt. of  $MgCO_3$  and  $CaCO_3$ ; this must result in migration of  $CaCO_3$  from the poles toward the equator where evapn. is more rapid.

**Occurrence of heavy metals in mineral waters.** Stanko S. Miholich. *Bull. soc. chim. roy. Yougoslav.* 4, 107-19 (in English 120); *Chem. Erde* 8, 410-8 (1933).—European waters can be divided into 3 groups according to the predominance of the heavy metals: (1) Ni-Cu group corre-

sponding to the Archean folding, (2) Sn group corresponding to the Hercynian folding, and (3) Pb-Zn group corresponding to the Alpine folding. The waters of Norway and Scotland have not been studied and it is not possible to establish any relationship between the presence of their heavy metals and Caledonian folding. G. S. S.

**The bacterial efficiency of certain intermediate stages of water treatment.** H. W. Streeter. *Public Works* 64, No. 12, 17-20 (1933); cf. C. A. 28, 1431.—The 3 stages of treatment studied were: (1) coagulation-sedimentation, (2) rapid sand filtration, (3) post-filter chlorination. S. concludes that the higher bacterial efficiency of double-stage sedimentation is due to the longer total periods of sedimentation rather than to any inherent advantages in sepg. this process into 2 sep. stages. In addn., it was found that (1) the efficiency of bacterial removal by coagulation-sedimentation varied with the ease and completeness of coagulation, which in turn was a function of the individual waters treated; (2) a combined filtration-chlorination treatment resulted in greater bacterial efficiency than the usual filtration followed by post-filter chlorination. Figures are given showing the limiting bacterial content of influent water at the various stages of treatment which should permit the delivery of a final chlorinated effluent meeting the primary requirement of the Treasury Dept. standard with respect to *Es. coli* content.

**Boiler feed waters: deaeration, preheating, accumulation.** M. Marcheix. *Science et ind.* 17, 499-503, 550-3 (1933); 18, 17-21 (1934).—A review. A. P.-C.

**A new boiler-water treatment for the United States Navy.** Thorvald A. Solberg and Robert C. Adams, Jr. *Combustion* 5, No. 6, 21-9 (1933).—After extensive studies of feed water and scales from 20 ships located at widely sepd. stations and comparative trials of the colloidal, coating, electrolytic and chem. methods of feed-water treatment at the U. S. Naval Expt. Station a new Navy formula was evolved. This consists of anhyd.  $Na_2HPO_4$  47, soda ash 44 and corn starch 9%.

**New Navy compound.** R. E. Hall. *Combustion* 5, No. 7, 32-4 (1934). Cyrus Wm. Rice. *Ibid.* 34-6. J. A. Holmes. *Ibid.* 36-7. A. C. Purdy. *Ibid.* 37; cf. preceding abstr.

**Collids in boiler-water conditioning.** Henry T. Hotchkiss, Jr. *Combustion* 5, No. 8, 26-8 (1934).—A discussion.

**A critical study of boiler scales and advanced methods of analysis and identification.** Shuppard T. Powell. *Combustion* 5, No. 3, 15-19 (1933).—Scale formation and methods of scale analysis are discussed. Chem. methods are not adequate because they do not permit accurate identification of the complex cryst. deposits occurring in high-pressure boilers. Petrographic analysis gives a satisfactory identification.

**Solubility of calcium salts in boiler water.** Fredrick G. Straub. *Trans. Am. Soc. Mech. Engrs. (Fuels and Steam Power)* 54, 221-30 (1932); cf. C. A. 27, 1426.—Soly. graphs for  $CaSO_4$ ,  $CaCO_3$ , and mixts. of  $CaSO_4$ ,  $CaCO_3$ ;  $CaSO_4$ ,  $Na_2CO_3$ ;  $CaSO_4$ ,  $Na_2SO_4$ ;  $CaSO_4$ ,  $NaOH$ ;  $CaCO_3$ ,  $Na_2SO_4$ ;  $CaCO_3$ ,  $CaSO_4$ ,  $Na_2CO_3$ ;  $CaCO_3$ ,  $CaSO_4$ ,  $Na_2SO_4$ ;  $CaCO_3$ ,  $CaSO_4$ ,  $NaOH$  are given for detns. at  $360^\circ$ ,  $405^\circ$ ,  $470^\circ$ ,  $540^\circ$  and  $600^\circ F$ . Soly. of  $CaCO_3$  decreases as the temp. increases. At the temps. studied  $CaCO_3$  is practically insol. in the presence of  $Na_2CO_3$  or  $NaOH$ . The soly. of  $CaSO_4$  is not directly proportional to the sulfate in soln., and  $CaSO_4$  cannot exist as a solid phase in equil. with solns. of  $Na_2CO_3$  even at pressures up to 1500 lb. The ratios of  $CO_3$ /sulfate as formerly calcd. to prevent  $CaSO_4$  formation in the solid phase are extremely high.

**The action of water on lead with special reference to the supply of drinking water.** Summary of existing knowledge. H. Ingleson. *Dept. Sci. Ind. Research*,

*Water Pollution Research, Tech. Paper No. 4*, 115 pp. (1934). E. H.

**Chemical behavior of Eternite (asbestos-cement) pipes.** H. E. Richter. *Gas u. Wasserfach* 77, 119-22 (1934).—Water allowed to stand for any length of time in new Eternite pipes becomes unusable. In the presence of aggressive  $\text{CO}_2$ , appreciable amts. of  $\text{Ca}(\text{HCO}_3)_2$  may be formed. In the absence of aggressive  $\text{CO}_2$ , a  $\text{CaCO}_3$  coating may be formed by adding  $\text{Ca}(\text{OH})_2$ , and when this coating is once formed no change takes place in water allowed to stand in the pipe unless aggressive  $\text{CO}_2$  is present. Fe and Mn bicarbonates favor the formation of such coatings. In the absence of these compds. with aggressive  $\text{CO}_2$  present, complete destruction of the pipe may result in time. R. W. Ryan

**Most probable numbers for evaluation of coli-aerogenes tests by fermentation tube method.** J. K. Hoskins. *U. S. Pub. Health Repts.* 49, 393-405 (1934); cf. *C. A.* 27, 4002. J. A. Kennedy

**Examination of Balakhna carton factory with respect to the fungal growths.** R. M. Pavlinova. *Bumashnaya Prom.* 12, No. 10, 51-5 (1933).—The investigation showed that the slime formation in the factory is composed of the fungus *Fusarium* and that of the water pipes of *Sphaerotilus natans* and some *Leptomyces lacteus* and *Fusarium*, which originate from the water supply of the Volga river. *Fusarium* develops within the limits of 2-35° and 3-9.5 pH, and therefore the circulating water must be maintained at 35-6° and either above 9.5 or below 2.5 pH. Chas. Blanc

**Recent advances in the chemical treatment of sewage.** F. W. Mohlman. *Am. J. Pub. Health* 24, 25-31 (1934). J. A. Kennedy

**Building and operation costs of sewage-treatment plants.** H. Rohde. *Gesundh.-Ing.* 57, 90-3 (1934).—Data collected from 40 German cities are presented in tabular form. M. G. Moore

**Sewage treatment at Shanghai.** Walter Buchler. *Munic. Sanit.* 4, 280-2 (1933); *U. S. Pub. Health Eng. Abstracts* 13, S, 70 (Oct. 28, 1933).—Sewage is treated by the activated-sludge process with air drying of the sludge, which is then used for fertilizer. C. R. F.

**Effects of gas liquor on sewage purification.** Walter Scott. *Surveyor* 85, 327 (1934).—One % of gas liquor in sewage has a distinct retarding effect on sewage-purification processes. No economical method for treatment has been devised thus far. Active C removed 86% of the impurities and was especially effective in removal of phenol. A. L. Elder

**Gas hazards in sewers and sewage-treatment plants.** R. R. Sayers. *U. S. Pub. Health Repts.* 49, 145-55 (1934); *Ohio Conference Sewage Treatment, 6th Ann. Rept.* 1932, 11-20.—Properties of the following gases found in sewers and treatment plants are given:  $\text{NH}_3$ ,  $\text{C}_2\text{H}_2$ ,  $\text{CO}_2$ ,  $\text{C}_2\text{H}_4$ ,  $\text{CH}_4$ , gasoline,  $\text{H}_2\text{S}$ ,  $\text{SO}_2$  and CO. S. also discusses prevention and treatment of poisoning by these gases. J. A. Kennedy

**The cause of gas troubles in sewage mains.** K. Dau. *Gesundh.-Ing.* 57, 80-2 (1934).—The results of a questionnaire on this subject sent to 57 German cities of 100,000 or more population are discussed. Sixty-one % of explosions and other accidents due to gases were due to gasoline vapors. M. G. Moore

**Nature and amount of colloids present in sewage.** IV. A comparative study of certain midland sewage liquors. E. V. Mills. *J. Soc. Chem. Ind.* 53, 61-8T (1934).—Methods of sedimentational analysis developed previously (*C. A.* 27, 3272) were applied. There is a sharp distinction between the disperse and dispersion medium. The disperse contained nitrogenous particles unaffected by sedimentational forces of 2000 times gravity. Crude sewage liquors from widely different sources differed only in degree, being similar in general characteristics. Applications of this system of analysis to sedimentation tank effluents divided the disperse into 3 parts: (1) a nitrogenous fraction easily sepd. by centrifuging, (2) a non-nitrogenous fraction sepd. with difficulty, (3) a

nitrogenous fraction not separable by centrifuging.

G. L. Kelso  
**Laboratory investigations and "practical sludge-digestion practice."** W. Husmann. *Techn. Gemeindeblatt* 37, 54-6 (1934).—In 6 flasks the same amts. of the same sludge were digested under identical conditions. The amt. of gas evolved in 35 days varied from 125 to 5200 cc. Thus this type of expt. is not reliable for a study of gas evolution, as the results are not an indication of results which would be obtained on a plant scale. However, detns. of the amt. of sludge decompd. from chem. analyses did check. A no. of recent papers of lab. or "miniature-technical" studies of sludge digestion are briefly criticized. M. G. Moore

**Rural sanitation.** H. E. Miller, et al. *Am. Pub. Health Assoc. Year Book* 1933-34, 88-90.—Report of a joint comm. J. A. Kennedy

**Liquid wastes—their treatment and disposal.** Langdon Pearse. *Am. J. Pub. Health* 24, 117-19 (1934).—Address. J. A. Kennedy

**Treatment of trade wastes.** L. F. Warrick. *Am. J. Pub. Health* 24, 372-8 (1934). J. A. Kennedy

**Contamination of rivers by industrial effluents.** Pequart. *Bull. assoc. chim. sucr. dist.* 50, 75-81 (1933).—Injury to fish and other ill effects attributed to industrial effluents are in many cases due more to a highly infected condition of the rivers, and would not occur in normally clean rivers. The wash waters from the beets in a French distillery are purified by subsidence but contain numerous algae; the diffusion effluent and vinasses are purified with  $\text{CaO}$  and  $\text{Al}(\text{OH})_3$ . The total vol. of effluent is < 1% of the river, which contained already 800,000 organisms per cc., including 5000 *Es. coli* and 40,000 *Micrococcus ureae*, besides numerous algae. The distillery effluent is relatively harmless in itself, though it contributes nutriment to the organisms in the river. The algae belong to the family Nostocaceae and form zoögleic masses which probably injure fish by obstructing the gill passages rather than by depriving the  $\text{H}_2\text{O}$  of  $\text{O}_2$ , for they contain chlorophyll. B. C. A.

**The disposition of drainage water from milking barns.** H. B. Walker and H. L. Belton. *Agr. Eng.* 14, 300-11 (1933).—Effluent water from selected dairies in the Los Angeles district contained total solids 4000-40,000, org. solids 3000-33,000 and inorg. solids 1200-28,000 p. p. m. The org. material was principally feces and urine with some waste feed from mangers. The inorg. material was mostly clay, silt, sand and some gravel. The waste liquid was dark green with the org. and inorg. materials mostly in suspension. Effective separ. of solids from the liquid waste was possible by means of shallow screen chambers. The tank effluent, which contained both org. and inorg. colloidal materials and approx. 45 p. p. m. of total N (equiv. to approx. 40% of the original N content of the sewage), could be used for the fertilization of fields by the broad-irrigation system. The tank effluent was easily clarified by means of  $\text{Fe}_2(\text{SO}_4)_3$ . K. D. Jacob

**Progress in the removal of sulfur compounds from waste gases.** H. F. Johnstone. *Combustion* 5, No. 2, 19-30 (1933).—Economical washing with untreated water of large quantities of gases, such as those from central power station boilers, is shown to be quite improbable. Catalytic oxidation methods of removal of  $\text{SO}_2$ , while successful with pure gases, fail with flue gases because impurities render the catalysts inactive. A regenerative system using alk. reagents is being investigated. Leslie B. Bragg

**Sulfur dioxide for the fumigation of ships. Methods of use and prospects of improvement.** C. L. Williams. *U. S. Pub. Health Repts.* 49, 89-100 (1934).—Liquid sulfur dioxide as a fumigant for ships. *Ibid.* 192-208.—Advantages, methods, app., costs, and expt. tests are given, including 6 photographs and 2 diagrams. J. A. K.

**Efficiency of the open method of burning sulfur for the fumigation of unloaded ships.** P. G. Stock, G. W. Monier-Williams, A. B. Page, O. F. Lubatti and C. F. White. *Bull. Hyg.* 9, 77-90 (1934).—The actual gas concns. obtained as the result of fumigating empty ships by burning S in open pans have been detd. Over 240 samples

of the atm. were collected and analyzed. For purposes of comparison 1 series of expts. was checked with HCN. Concns. of gas which would have been fatal were found at all but 6 of the sampling pts. SO<sub>2</sub> fumes appeared to enter pipe casings more readily than HCN possibly because of convection currents set up by the burning in open pans. Conclusions: In the fumigation of an empty ship by burning S in trays (3 lb. per 1000 cu. ft. of space) a lethal concn. of SO<sub>2</sub> is reached and maintained for more than the lethal period.

What are the essentials of typhoid fever control today? Geo. H. Ramsey. *Am. J. Pub. Health* 24, 355-62 (1934).

J. A. Kennedy  
Essentials of typhoid fever control today. Edwin O. Jordan. *Am. J. Pub. Health* 24, 349-54 (1934). J. A. K.

Swimming pools and bathing places. W. D. Stovall and W. L. Mallmann. *Am. Pub. Health Assoc. Year Book* 1933-34, 105.—Comm. rept.

J. A. Kennedy  
Bacterial pollution of swimming baths. B. L. Davis. *J. Roy. Army Med. Corps* 60, 181-90 (1933); *U. S. Pub. Health Eng. Abstracts* 13, Sw, 8 (July 8, 1933); cf. *C. A.* 28; 1124-5.—Conclusions from studies on the bacterial flora and the presence of pathogenic organisms in swimming pool waters are: No disease in epidemic form is spread by this agency although the possibility of infection does exist. The no. of cases of infection are negligible compared with the no. of bathers. Filtration and chlorination will entirely eliminate individual cases of infection.

C. R. Fellers  
Rept. on water analysis (Ancker) 16. Treatment of crude ammoniacal gas liquor (Oliver) 21. Treating liquids with gases as in the treatment of water or sewage with Cl (*U. S.* 1,949,934) 1.

Meerburg, P. A., and Massink, A.: Methodiek voor chemisch en bacteriologisch Drinkwateronderzoek. Groningen: P. Noordhoff. 19 pp. Fl. 3.25; bound, Fl. 3.90.

Parravano, Nicola, et al.: Le acque minerali d'Italia: Lazio. Rome: Via Quattro Novembre, 154. 238 pp.

Water Engineer's Handbook and Directory, 1934. London: Water & Water Eng. 8s. 6d. Reviewed in *Gas J.* 205, 821 (1934).

Water.\* I. G. Farberland. A.-G. (Kurt Ochatz, in-

ventor). Ger. 590,779, Jan. 9, 1934 (Cl. 85b. 1.35). Water-cooled surfaces for condensations are treated with an acid such as H<sub>2</sub>SO<sub>4</sub> to remove deposited carbonates, and with Cu waste to form a Cu salt with the acid to destroy algae.

Sterilizing water. Hrvoje Ivekovic. Ger. 593,303, Feb. 26, 1934 (Cl. 85b. 1.01). Water is slightly acidified, e. g., to a H-ion concn. of  $p_H$  5, and then treated with an oligodynamic metal, e. g., Cu, or a salt thereof.

Apparatus for chlorinating water. Wallace & Tiernan Products, Inc. Ger. 190,805, Jan. 12, 1934 (Cl. 12i. 4).

Washable sand or gravel filter for water. Adolf Graumann. Ger. 593,304, Feb. 24, 1934 (Cl. 85b. 2.01).

Softening water. Permutit A.-G. (Otto Læbknecht, inventor). Ger. 590,927, Jan. 15, 1934 (Cl. 85b. 1.05). Base-exchanging reactions, especially for softening water, are carried out by adding alkali salt such as NaCl and granulated minerals of the serpentine group. Serpentine minerals contg. amphoteric oxides such as Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, as well as Mg silicate, are preferred.

Apparatus for softening water. L'Auxiliaire des chemins de fer et de l'industrie. Fr. 758,828, Jan. 24, 1934.

Preventing incrustation of boilers. Joakime Kohseff. U. S. 1,950,494, March 13. An emulsion which is added to boiler feed water is prep'd. by passing steam, during its condensing stage, through a mass of seeds contg. mucilaginous material and oil, such as flaxseed, while the seeds are maintained in a quiescent state, and continuously withdrawing the emulsion formed from the seeds. App. is described.

Removing or preventing deposition of boiler scale. Allis Chalmers Manufacturing Co. Ger. 590,800, Jan. 11, 1934 (Cl. 85b. 1.35). Boiler scale is removed or prevented from deposition by addn. of colloidal metals of the Fe group, stabilized by Na<sub>2</sub>SiO<sub>3</sub>.

Sewage. Erz- und Kohle-Flotation G. m. b. H., "Eko" (W. Schafer, inventor). Ger. 590,780, Jan. 9, 1934 (Cl. 85c. 1). Sewage or waste water is clarified by accelerating the sedimentation by addn. of NH<sub>4</sub> resinate.

Apparatus for the biological purification of sewage. Fritz Stötzl. Ger. 593,366, Feb. 24, 1934 (Cl. 85c. 3.01).

Apparatus for sterilizing, deodorizing or otherwise treating air with vapor prior to use for ventilation. Hope's Heating & Lighting Ltd. and Albert E. Windram. Brit. 402,557, Dec. 7, 1933

## 15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Soils from the British Solomon Islands Protectorate. Anon. *Bull. Imp. Inst.* 31, 497-500 (1933).—Chem. and mech. analysis are given and briefly discussed of 4 samples of dark brown, heavy clay soil from Malaita Island, taken from a block yielding very poor crops of coconuts. Chemically the soil is poor, and is unlikely to repay artificial fertilizing, as the main cause of the poor crops produced probably lies in its phys. character, which is unusually heavy.

A. Papineau-Couture  
Studies in West Indian soils. VI. Some soil types of Jamaica. Their origin, formation and agricultural relationships. F. Hardy and H. H. Croucher. *Imp. Coll. Trop. Agr. Trinidad* Aug., 1933, 44 pp.; cf. *C. A.* 28, 2821<sup>9</sup>.—The agricultural soils of Jamaica are classified into calcareous and noncalcareous. These are further subdivided and the origin and characteristics of each soil series are discussed. The soils show a close connection with the geological features. Various detns. were made on soils taken from different layers exposed in 6-foot pits including index of texture,  $p_H$ , org. matter, N, C/N ratio, CaCO<sub>3</sub>, cond. of aq. exts., available P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and in some cases NaCl. The results are tabulated. The relationships between soil factors and productivity of banana and sugar-cane crops are discussed. Typical banana soils are decidedly alk. in reaction (av.  $p_H$  7.7), high in org. matter, have a low C/N ratio, are deep and open in texture, and

are particularly rich in available nutrients. The sugar-cane soils are more varied in quality. VII. The cacao soils of Trinidad. (A.) Montserrat District. J. A. McDonald, F. Hardy and G. Rodriguez. *Ibid.* Oct., 1933, 50 pp. The soil map nearly coincides with the geological map of the area. Twelve distinct soil types have been mapped in detail. Av. values on 85 samples of surface soils are: index of texture 37,  $p_H$  5.8, org. matter 4.0%, N 0.30%, C/N ratio 7.3, available P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O 38 and 162 p. p. m., resp. Individual detns. on 819 samples of soils and subsoils are tabulated and subjected to a statistical analysis. The chief factor controlling growth is the nutrient supply. There is a statistically significant difference between the org. matter, C/N ratio and P<sub>2</sub>O<sub>5</sub> content of the good and poor soils as det'd. in an economic survey. In Brasso clay a high content of sulfate is usually assoc'd. with low productivity of cacao. Balanced ratios between N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O contents of the soils are discussed from the standpoint of fertility.

A. L. Mehring  
Rendzina soils of Polesie. S. Nida. *Abh. Inst. Bodenk. Pulawy* 2, 124 56 (1932).—The parent material of these soils is cretaceous marl with more or less morainic material and varies widely in CaCO<sub>3</sub> content. No traces of podzolization were found in pure rendzinas, but on mixed rendzinas (with loess) distinct podzolization was observed.

B. C. A.

**Icelandic soil types.** F. Weiss. *Kong. Vet.-Landb. Kjöbenhavn, Aarskr.* 1933, 1-18. —These soils are derived from materials of glacial or volcanic origin. Although they contain no free CaO they have a  $pH$  varying from 6 to 7. The fraction sol. in  $(NH_4)_2C_2O_4$  is high, as is the total N. The C:N ratio varies from 10 to 18. The ratio hygroscopic  $H_2O$ :total absorption complex is fairly const. B. C. A.

**Coffee soils of Kenya and their cultivation.** G. H. Gethin Jones. Kenya Colony Dept. Agr., *Bull.* 1932, No. 21, 17 pp. —The general chem. characteristics of the different soil types are discussed. K. D. Jacob

**Analyses of earth profiles of northern Gudbrandsdal.** Harald Bjørlykke. *Norsk Geol. Tids.* 13:79-101(1933). —The northern part of Gudbrandsdal, in the central part of southern Norway, is a pronounced arid region, with a yearly pptn. of about 300 mm. Here there are beds of soils contg. high concns. of salts, rendering such soils incapable of cultivation, in spite of irrigation. In addn. to high-salt areas, there are also podzolized areas, where ground  $H_2O$  is low, and where evapn. is reduced by phys. conditions. Such podzolized areas show that ground  $H_2O$  and phys. conditions of the soil were of greater influence in profile development than the amt. of yearly pptn. E. M. Symmes

**Processes of salinization and desalinization and the salt profile of soils.** B. B. Poluinov. *Trans. Irrigation Commission, Acad. Sci., U. S. S. R.* 1, 107 31(1933); cf. C. A. 27, 1969. —A study of the formation and evolution of saline soils based on an examn. of the salt profile. B. C. A.

**Some soil problems.** A. B. Bryan. *Am. Fertilizer* 80, No. 6, 5, 6, 26(1934). —A review of the needs of the coastal plain soils for K, Mg, Mn and Fe, and of methods of supplying the requirements of the crop for these elements. W. H. Ross

**Soil erosion.** T. Eden. *Imp. Bur. Soil Sci. Tech. Comm.* No. 28, 30 pp.(1933). —Natural factors affecting erosion are discussed, and the influence of phys. and chem. soil properties is examd. Remedial measures are described. B. C. A.

**Adsorption capacity of soils.** E. N. Ivanova. *Trans. Dokuchaev Soil Inst.* 8, No. 8, 23-41(1933). cf. C. A. 27, 3376. —The results obtained in the detn. of the adsorption capacity depend on the diln. of the replacing ion, the abs. amt. of the ion being const. The presence of  $Ca^{++}$  depressed the amt. of  $Na^+$  adsorbed from mixts. of  $CaCl_2$  and NaCl, the depression effect increasing with increasing  $[Ca^{++}]$ . With Na/Ca const. the ratio of Na adsorbed from the mixt. to that adsorbed from a pure NaCl soln. of the same  $[Na^+]$  is a const. for all concns.  $CaSO_4$  acts similarly to  $CaCl_2$ , whereas  $CaCO_3$  hinders but little the adsorption of  $Na^+$ . B. C. A.

**Kappen's method for determination of the sum of adsorbed bases (S) [in soils].** G. A. Weiss. *Proc. Leningrad Dept. Inst. Fert.* 17, 89 100(1933). —The accuracy of the method could not be increased. The soil-acid mixt. is better set aside for 2-3 days. The original method gives good agreement between the S value and the sum of bases detd. by the acetate or the  $NH_4Cl$  methods on account of compensating errors. B. C. A.

**Soil colloids.** L. Smolik. *Věstník Českoslov. Akad. Zemědělské* 8, 750-3(1932); cf. C. A. 27, 3765. —A review. B. C. A.

**Colloidal loam isolated from podzol.** L. Smolik. *Věstník Českoslov. Akad. Zemědělské* 8, 744-7(1932); cf. C. A. 27, 1969. —The colloids from various podzol strata have different chem. properties, those from the illuvium being richest in Fe, Al and frequently phosphate. The chief distinction lies in the mol. ratio  $SiO_2:Fe_2O_3$ . B. C. A.

**Alkalinity and dispersion in solonchak soils.** S. Ya. Sushko and E. F. Dimitrieva. *Proc. Leningrad Dept. Inst. Fert.* 17, 191-208(1933). —These soils are divided into 3 groups: (1) sulfate, (2) sulfate-chloride and (3) chloride. In (1) leaching is rapid because of the presence of  $CaSO_4$ , which prevents the entry of Na into the adsorption complex. In (3)  $CaSO_4$  is present in very small

amts., or is absent, and Na enters the adsorption complex, increasing the dispersion and retarding leaching. In (2) increase in dispersion depends on whether sulfate or chloride predominates, and on the amt. of  $CaSO_4$  present. The presence of  $MgSO_4$  or  $MgCO_3$  in saline soils increases their alky. The detn. of alky. should be made only after all the easily sol. salts have been removed by leaching. B. C. A.

**The combustion of the organic matter of agricultural soils.** Désiré Leroux. *Compt. rend. acad. agr. France* 20, 122-5(1934). —There is no proportionality between the amt. of C initially in the soil and the oxidation of this C to  $CO_2$ . However, there is a relation between this phenomenon and temp. The combustion can occur at very low temps. (below  $0^\circ$ ). Mixing of the medium causes a recrudescence, although rather limited, of this combustion. J. R. Adams

**Application of electrofiltration, electro dialysis and electrolysis to soil analysis.** I. I. N. Antipov-Karatayev and K. N. Krasikov. *Trans. Dokuchaev Soil Inst.* 8, No. 8, 5-22(1933). —Adsorbed Ca and Mg are removed completely by electrofiltration, Mg being removed to a greater extent than by the acetate method. The amts. of K and Na were 2-3 times those of the acetate method. This is due to the destruction of part of the soil mass. Electro dialysis gives results similar to those obtained by electrofiltration, whereas electrolysis gives results for Ca + Mg which are generally < those obtained by the acetate method. B. C. A.

**Volumetric determination of humus in soils.** N. A. Komarova. *Proc. Leningrad Dept. Inst. Fert.* 17, 29 44(1933). —Humus is oxidized by 0.4 N  $CrO_3$  in dil.  $H_2SO_4$  (1:1) with  $HgSO_4$  as catalyst, the mixt. being kept at  $140-180^\circ$  for 5 min. After cooling, diln. and addn. of  $H_3PO_4$ , the soln. is titrated with standard  $Fe(NH_4)_2(SO_4)_2$  contg.  $H_2SO_4$ ,  $NHPh_3$  being used as indicator. Modifications of the method for the detn. of humus in aq., aq.- $NH_3$  and alkali exts. are given. The results agree with those obtained by Knop's method. B. C. A.

**A new method of determining base-exchange capacity of soils.** Amar Nath Puri. *Soil Sci.* 37, 105 8(1934). —A new method is described for the detn. of base-exchange capacity of soils: Leach a 10-20 g. soil sample with 1 l. of N NaCl soln. in 100-cc. lots. Stir the soil with 100 cc. satd.  $Ba(OH)_2$  soln. and leach with 900 cc. of 0.1 N  $Ba(OH)_2$  in 100-cc. lots. Make up the filtrate to 1 l., add phenolphthalein and pass  $CO_2$  through until the soln. just becomes colorless. Allow the ppt. of  $BaCO_3$  to settle and evap. 500 cc. of the supernatant liquid to 50 cc. Again pass  $CO_2$  through until the color is just discharged. Add about 25 cc. of approx. 0.5 N  $NH_4OH$ ; boil, filter and wash the ppt. with  $NH_4OH$ . Boil the filtrate until the vol. is reduced to about  $\frac{1}{2}$ , by which time the  $NH_4OH$  is all removed. Add excess of standard acid, boil and back-titrate, using bromothymol blue as indicator. The results are expressed as milliequivs. per 100 g. of soil. An important feature of the method is that no leaching is required after the NaCl treatment. The results are in good accord with those by the  $NH_4OH$  method (C. A. 25, 2224). M. S. Anderson

**The cryoscopic determination of the osmotic values of soil solutions.** Maximilian Steiner. *Ber. deut. botan. Ges.* 52, 16-25(1934). —The pressure applied (5.6 to 108 atm.) to press out the soln. does not influence the f. p. depression obtained. Lawrence P. Miller

**Influence of light on nitrification in soil.** N. R. Dhar, A. K. Bhattacharya and N. N. Biswas. *J. Indian Chem. Soc.* 10, 699-712(1933); cf. C. A. 27, 3277. —When  $NH_4$  salts mixed with sterilized or unsterilized soils are exposed to 550 hrs. of sunlight in contact with air over a period of a year, the amts. of the  $NH_4$  salts oxidized to  $NO_3$  in sterilized and in unsterilized soil are for  $NH_4Cl$  65% and 58%,  $(NH_4)_2HPO_4$  55 and 60.2% and  $(NH_4)_2SO_4$  16 and 28%. The amts. of  $NH_3$  and  $NO_2$  formed on exposing solns. of urea or suspensions of egg-yellow mixed with either soil to sunlight for 224 hrs. are always greater in light than in the dark and the amts. of  $NH_3$  are greater than those of  $NO_2$  produced. The optimum temp. for



bacterial nitrification in hot countries is 35°. The formaldehyde formed in the photo-oxidation of org. compds. present in the soil is likely to exert a harmful effect on the bacterial process taking place in the soil. The formation of  $\text{NH}_3$  from the amino acids obtained from protein decomps. appears to be mainly an oxidative deamination taking place on the soil surface by the O of air aided by light. Increasing the soil surface, soil temp., aeration or the amt. of light falling on the soil will cause increased  $\text{NH}_3$  formation as well as nitrification. The increased production of  $\text{NH}_3$  and nitrate on drying the soil, on heating it or putting it in sunlight or sterilizing it by volatile antiseptics cannot be explained from the protozoan and other existing theories based on microbial action, because all these processes lead to a decrease in the no. of organisms present in the soil. These processes increase the soil surface and aeration and hence the oxidation of amino acids by atm. O leading to the liberation of  $\text{NH}_3$  and its subsequent oxidation to  $\text{NO}_2$  are increased, these oxidations being accelerated by light. Thus it appears that both ammonification and nitrification in soil are oxidation reactions markedly accelerated by light and heat, and both these processes may actively go on in presence of light even in the absence of microorganisms. J. R. Adams

The effects of soil reaction upon the growth of several types of bent grasses. Mary E. Reid. *Bull. U. S. Golf. Assoc. Green Sec. 12*, 196-212 (1932).—Expts. were carried out on (I) a heavy clay loam relatively low in org. matter and plant nutrients and (II) a rich compost mixt. having a high content of these substances. The  $pH$  values of the soils were varied by the addn. of acids or alkalis. With II, the creeping bents and colonial bent grew well at reactions between  $pH$  4.5 and 8.3; velvet bent was somewhat less tolerant of the higher  $pH$  values. Under certain climatic conditions the best growth of Metropolitan bent occurred in I at  $pH$  8.3 and II at  $pH$  4.5. With I, the creeping bents thrived best at reactions slightly above neutral to strongly acid, and velvet bent at reactions distinctly acid. In general, growth of roots of bent grasses was favored by the same acidity conditions as favored growth of the tops; very high acidities were somewhat more unfavorable to root growth than to top growth. The chief factor causing preferences for rather definite  $pH$  values in poor soils was a deficient supply of some nutrient or nutrients essential for growth. The supply of available P was the chief factor causing variations in growth of Metropolitan bent in I at different reactions; the supplies of available N and P were both detg. factors in II; the supply of Mg was a minor factor. If the alkalization of I with  $\text{CaO}$  or  $\text{CaCO}_3$  plus  $\text{MgO}$  the best growth of Metropolitan bent was usually obtained at  $pH$  7.8-8.3, but with  $\text{KOH}$  the poorest growth was obtained at  $pH$  7.0. Excellent growth was usually obtained in I acidified to  $pH$  4.3-4.5 with  $\text{H}_2\text{PO}_4$ , but very poor growth if  $\text{H}_2\text{SO}_4$  or  $\text{HCl}$  was used, the detrimental effects of  $\text{HCl}$  usually being greater than those of  $\text{H}_2\text{SO}_4$ . There were indications that high concns. of Fe and Al compds. in the soil soln. of highly acid soils may be the chief limiting factor in the growth of bent on certain soils; this may be due either to a direct toxic effect on the removal of phosphates from the soil soln. or to a combination of these factors. The toxic effects of high sulfate concns. in the soil were overcome by application of lime. The acid tolerance of bent grasses seemed to be lower at midsummer than at other times of the year. Lime had a more beneficial effect when applied in summer than at other seasons. K. D. Jacob

Soil acidity and lime for bent turf. John Monteith, Jr. *Bull. U. S. Golf Assoc. Green Sec. 12*, 190-5 (1932).—The acidity of soils under bent turf was decidedly increased by the continued use of  $(\text{NH}_4)_2\text{SO}_4$  or  $\text{NH}_4$  phosphate over a period of years. These plots produced good turf throughout most of the season but showed a tendency to become easily injured in periods of extreme heat during July and Aug. Plots which had been fertilized excessively with  $(\text{NH}_4)_2\text{SO}_4$  were more susceptible to the dollarspot and brownpatch diseases and to nonparasitic injury commonly designated as scald. These injuries were decidedly reduced by an application of lime. On 1 type of soil the

best growth of bent grass was obtained at  $pH$  4.5, and on another type at  $pH$  8.3. Although bent grass usually thrives best on slightly acid soils, there is no definite  $pH$  value at which max. growth occurs on all soil types; the optimum  $pH$  must be detd. experimentally for each soil.

K. D. Jacob

The estimation of the plant-food content of soils by electrodialysis. A. Jacob. *Ernahr. Pflanze* 30, 100-8 (1934).—A review pointing out that difficulties, such as the uniformity of the filter, const. voltage and the rate of filtration, are still to be overcome. J. O. H.

Gas-volumetric determination of potassium in soils. V. M. Gortikov and L. A. Znamenskaya. *Proc. Lenin-grad Dept. Inst. Fert.* 17, 57-68 (1933).—If the conditions of pptn. (temp., vol. and concn.) are similar for both unknown and standard  $\text{KCl}$ , the method of Jander and Faber (*C. A.* 22, 3370; 23, 4639) is rapid and sufficiently accurate for the detn. of K in most soil exts. B. C. A.

The relation between replaceable potassium and field response to potash in Hawaiian soils. O. C. Magistad. *Soil Sci.* 37, 99-103 (1934).—There is a decided relationship between the content of replaceable K in soil and response of pineapples to added potash. When the quantity of replaceable K exceeds 0.5 milliequivs. per 100 g. of soil, no yield increase is obtained. Leaching with  $\text{N NH}_4\text{Cl}$  is used in the detn. of replaceable K. The crop results are in accord with former data by the *Aspergillus niger* method (*C. A.* 27, 3277). M. S. Anderson

The estimation of reserves of potash in the soil by the methods of Mitscherlich and Wiessmann. F. Scheffler. *Ernahr. Pflanze* 30, 101-6 (1934); cf. *C. A.* 22, 2425.—Pot expts. with oats were carried out by the 2 methods on 10 different poor soils. The ratio of soil to sand varied from 1.0 to 1:10. A parallel expt. was carried out in sand cultures with increasing amts. of K. The nutrient content of the soil, in the growing medium used, was greater the wider the ratio of soil to sand. The highest value for the nutrient content of the soil was with a soil-sand ratio of 1.5. These 2 methods may indicate large nutrient reserves in the soil, while under field conditions the effect of the nutrients present is greatly limited. J. O. H.

Magnesium deficiency in Aroostook potato soils. Jos. A. Chuska. *Am. Potato J.* 11, 29-35 (1934).—Approx. 20-30 lb.  $\text{MgO}$  per acre must be added to potato fertilizers to overcome the deficiency of Mg in the soils of Aroostook County, Maine. In fertilizers, sol. Mg compds. ( $\text{MgSO}_4$  and sulfate of potash magnesia) seemed to be more effective than dolomitic limestone in preventing Mg deficiency. Top-dressing the soil with 320 lb. per acre of  $\text{MgSO}_4$  or sulfate of potash magnesia, or spraying the plants with a soln. of  $\text{MgSO}_4$  (60 lb./acre), caused marked increases in the yields of potatoes. It is suggested that, in the case of sprays, the Mg may be absorbed directly by the leaves of potato plants. Lining soils with dolomitic limestone is recommended as the most practical method of preventing Mg deficiency. Addn. of high-Ca limestone to the fertilizers usually caused a decrease in the yield of potatoes. K. D. Jacob

The response of potatoes to magnesium under various soil conditions. H. C. Knoblauch and T. E. Odland. *Am. Potato J.* 11, 35-40 (1934).—In Rhode Island, Mg deficiency was found to be more severe on acid soils (approx.  $pH$  4.0-5.5) and under conditions where com. fertilizers had been used in large amts. for a no. of years. Addn. of  $\text{MgSO}_4$  (150 lb./acre) to P fertilizers (superphosphate and ground phosphate rock) markedly increased the yield of potatoes on acid soils, but had no effect on potatoes grown on limed soils. When they were applied in amts. equiv. to at least 25 lb.  $\text{MgO}$ /acre, dolomitic limestone,  $\text{Mg}(\text{OH})_2$  and  $\text{MgSO}_4$  were equally efficient in overcoming Mg deficiency in acid soils. High-Ca limestone (500-1000 lb./acre), contg. less than 1%  $\text{MgO}$ , increased the potato yield, but to a much smaller extent than did dolomitic limestone; it also increased the no. of scabby potatoes. K. D. Jacob

Some physical constants for certain Hawaiian sugarcane soils. H. A. Wadsworth. *Hawaiian Planters' Rec.* 37, 106-13 (1933).—Data are given on the vol. wt.,

ignition loss, moisture equiv., loss of moisture equiv. on oven-drying, wilting percentage, phosphate fixation and compn. of colloidal fraction (percentage of org. matter and  $\text{SiO}_2\text{-R}_2\text{O}_3$  ratio) for 17 representative soils from the islands of Hawaii and Maui. The nature of the soils as measured by these properties seemed to depend upon the conditions of weathering under which the soils were formed. Soils from windward Hawaii were characterized by low vol. wts., high ignition losses and high phosphate-fixing powers; those from Maui showed high vol. wts., low ignition losses and little or no phosphate-fixing capacity. There was no relation between the phys. characteristics of the soil and the growth failure of cane in certain districts. There were indications that phosphate fixation in the local soils is due to an abundance of Fe and Al in the colloidal separates, and that the presence of  $\text{SiO}_2$  in the separates tends to minimize the fixative characteristic of the Fe and Al with which it is assoc. K. D. J.

The relationship of sprouting in sugar beet to the nutrient content of the soil. E. Claus. *Centr. Zuckerind.* 42, 12-13, c.f. 73 (1934); cf. C. A. 27, 6003.—Detailed soil analyses were made on samples taken at depths of 10, 30 and 40-50 cm. With other conditions the same, a higher ratio of total N to  $\text{P}_2\text{O}_5$  and to  $\text{K}_2\text{O}$  was assoc. with sprouting in an increased no. of the beets. An excess of  $\text{KNO}_3$  nitrogen seemed to be especially effective. C. B. Purves

Summary of the results of the plot tests on various (sugar cane) problems in 1933. E. Demandt. *Arch. Suikerind.* 42, III, Mededeel. Proefsta. Java-Suikerind. 25-36 (1934); cf. C. A. 27, 3024.—Data similar to those given in previous reports are listed. F. W. Zerbán

Summary of the results of the fertilizer tests (on sugar cane) in 1933. E. Demandt. *Arch. Suikerind.* 42, III, Mededeel. Proefsta. Java-Suikerind. 1-24 (1934); cf. C. A. 27, 3024. The total no. of tests was 1574. The optimum dose of  $(\text{NH}_4)_2\text{SO}_4$  was the same as the yr. before, 4.0 quintals per hectare.  $\text{CaCN}_2$  again proved inferior to  $(\text{NH}_4)_2\text{SO}_4$ .  $\text{NH}_4$  phosphates, sold under various trade names, were found to be somewhat better than double superphosphate, Thomas slag giving intermediate results. Fertilization with molasses proved advantageous on a no. of soils of all types. Tests with K and with miscellaneous fertilizers were too few to permit definite conclusions. F. W. Zerbán

Sugar-cane cultivation and manufacture of white sugar at Palur Agricultural Research Station. C. S. Krishnaswami. *Madras Agr. J.* 22, 9-16 (1934).— $\text{NaNO}_3$ , either alone or in combination with peanut cake, was inferior to  $(\text{NH}_4)_2\text{SO}_4$  as a source of N for sugar cane. The stickiness and softness of jaggedy produced from cane fertilized with  $(\text{NH}_4)_2\text{SO}_4$  increased with the amt. of  $(\text{NH}_4)_2\text{SO}_4$  used. A compost prep. from cane trash, to which was added bone meal and cow manure at the rate of 50 and 200 lb./ton, resp., contained (after 3-4 months) N 0.36,  $\text{P}_2\text{O}_5$  0.45 and  $\text{K}_2\text{O}$  0.76%. K. D. Jacob

Studies on tropical soil microbiology. I. The evolution of carbon dioxide from the soil and the bacterial growth curve. A. Steven Corbet. *Soil Sci.* 37, 100-15 (1934); cf. C. A. 23, 2255.—The evolution of  $\text{CO}_2$  from a soil sample under lab. conditions and at const. temp. is expressed accurately by the relation  $y = Ft^m$ , where  $y$  represents the total yield of  $\text{CO}_2$  after time  $t$ , and  $F$  and  $m$  are consts.;  $m$  expresses the retardation in gas evolution due to lab. conditions, while  $F$  is the yield of  $\text{CO}_2$  in unit time at the beginning of the expt. and is a measure of biol. activity *in situ*. The curve obtained by plotting yield of gas in unit time against time elapsed conforms to the usual type of bacterial growth curve. During the phase of increase the relationship between the gas yield in unit time and the time elapsed is exponential. However, during the phase of decrease the relationship is not exponential, but total gas yield is related to time. Rate of evolution of  $\text{CO}_2$  is an accurate measure of rate of growth of the soil population. M. S. Anderson

Titanometric determination of ferric iron in presence of humic matter. P. A. Kryukov. *Proc. Leningrad Dept. Inst. Fert.* 17, 9-19 (1933).—Titration with  $\text{Ti}_2(\text{SO}_4)_3$  may be carried out electrometrically, or with  $\text{NH}_4\text{CNS}$

as indicator, in a current of  $\text{CO}_2$ . Even significant quantities of humus have no serious effect on results. The presence of  $\text{NH}_4\text{CNS}$  is necessary in  $\text{H}_2\text{SO}_4$  exts. and is desirable in other cases. An electrolytic method of prep.  $\text{Ti}_2(\text{SO}_4)_3$  from  $\text{Ti}(\text{SO}_4)_3$  is described. B. C. A.

Inheritance of resistance to copper. S. Frát. *Ber. deut. botan. Ges.* 52, 65-7 (1934).—*Melandrium sibiricum* (Schk.) Roehl, obtained from a region in which the soil contains much Cu, could be grown from seed in a mixt. of 1 part  $\text{CuCO}_3$  and 3 parts garden soil. The same species obtained from another source and exhibiting no morphological differences was much more sensitive. Plants did not survive in soil contg. 3%  $\text{CuCO}_3$ . Lawrence P. Miller

Distribution of nitrates in the soil and root development in coffee. V. A. Beckley and F. McNaughtan. *Nature* 131, 878 (1933).—The curve showing distribution of nitrate with depth for the lower levels of a Kikuyu lateritic red loam growing coffee is always of a definite given form. Comparison of the curves of nitrate distribution with those of root distribution shows that the zone of low nitrate concn. coincides with that of vigorous root growth; this indicates that the coffee bush obtains a substantial part of its N requirements from the lower levels of the soil. B. C. A.

The major coffee diseases. J. McDonald. Kenya Colony Dept. Agr., *Bull.* 1932, No. 20, 13 pp.—Applications of lime and fertilizers had no significant effects on the incidence of the coffee-berry disease which is caused by the fungus *Colletotrichum coffeanum* Noack. Analyses of soils and of coffee tissues indicated that if the coffee bushes are predisposed to attack by berry disease on account of some nutritional deficiency, this deficiency is not likely to be of a kind which can be corrected by applications of the usual com. fertilizers, but may possibly be connected with the intake of some minor element. Expts. on the growth of the fungus in media prep. from coffee berries indicated that berries which are susceptible to attack by the fungus differ in some chem. characteristic from those which are not susceptible to attack. In lab. expts. Cu-contg. sprays prevented germination of the fungus spores. There were indications that simsim-oil emulsion is more effective in controlling the disease than Cu or S sprays. Good control of the coffee-leaf disease, caused by the fungus *Hemileia vastatrix* B. and Br., was obtained by spraying the trees with half-strength Bordeaux mixt. K. D. J.

Choice of uniform and appropriate methods for the determination of fertilizer requirements of soils. Eilhard A. Mitscherlich. *Abh. II. Intern. Kunstdünger-Kongress 1933*, 61-71. A review of the literature. B. Dirks and F. Scheffer. *Ibid.* 72-8.—Methods for the detn. of  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$  in soils, based on the assumption that plant food is absorbed as ions, are described. The air-dry soil is mixed with  $\text{H}_2\text{O}$  when the  $pH$  of the soil is less than 6 or a carbonate-bicarbonate soln. for those soils having a  $pH$  greater than 7, and the filtrate is used for the detn. of the nutrient elements. H. C. Gerlach. *Ibid.* 77-86. A résumé of the most useful methods for the detn. of fertilizer requirements of soils. Eilhard Alfred Mitscherlich. *Ibid.* 87-108.—Criticisms based on numerous plant physiol. investigations are made of the newest and most widely used of the rapid methods of detg. the fertilizer requirements of soils. Pot-test methods give the most reliable and consistent results. H. Niklas and G. Vilsmeier. *Ibid.* 109-14.—*Aspergillus niger* was used to det. the  $\text{K}_2\text{O}$  and  $\text{P}_2\text{O}_5$  requirements of soils. Thirty cc. of nutrient soln. deficient in 1 of the plant-food elements was placed in a 75-cc. flask with 2.5 or 7.5 g. of soil and incubated at 35° for 5 days. The purified, dried and weighed mold was compared with growths in standard soln. M. H. V. Garner. *Ibid.* 133-40.—A field technic is described, which is sufficiently accurate to det. the fertilizer required for general economic needs. The preliminary tests consist of applications of all combinations of the 3 plant-food elements. The expt. is repeated with double portions of each fertilizer in all combinations. This shows the best proportion of each to use. Nitrogen applied to winter wheat may be lost due to climatic conditions. N (2.5 cwt./ha.) as  $(\text{NH}_4)_2\text{SO}_4$  in 8 applications.

during the winter gave no greater yield than 2 applications of the same amt. in the spring. When cyanamide was used, the spring fertilization increased yields nearly 25%. Application of 2.5 cwt. of  $(\text{NH}_4)_2\text{SO}_4$ /ha. increased the dry wt. of forage from 31.8 to 45 cwt./ha. The amt. of protein was decreased from 11.7 to 8.6% and of legumes from 41 to 20%. The cereals in the hay increased from 19 to 36 cwt./ha. Bronislaw Niklewski. *Ibid.* 204 9. - The mech. structure of soil influences its reaction toward tests designed to det. its fertilizer needs. In pot tests, mixing and screening a soil poor in  $\text{K}_2\text{O}$  reduced its reactivity toward  $\text{K}_2\text{O}$ . Similarly, plowing a field several times increased the amt. of  $\text{K}_2\text{O}$  available to the plant. G. Jonescu Sisezi and Teodor Seidel. *Ibid.* 214-24. - Comparative results from the Mitscherlich test, Neubauer test and chem. tests on various Rumanian soils are given. Typical chernozoms that proved to be deficient in  $\text{P}_2\text{O}_5$  by the Mitscherlich method were found to have sufficient as detd. by the Neubauer test.  $\text{K}_2\text{O}$  requirements of soils were about the same by either test except on podzolic soils and podzols for which the Neubauer tests showed too small a deficiency. For the  $\text{P}_2\text{O}_5$  lab. tests, 5 g. of soil in 60 cc. of 0.05 N  $\text{KCl}$  was satd. with  $\text{CO}_2$  and the soln. was clarified by centrifuging. The  $\text{P}_2\text{O}_5$  was detd. colorimetrically. A soil ext. made with 0.1 N  $\text{NH}_4\text{Cl}$  was used for the K detn. N. Leliedyantzev. *Ibid.* 247-257; cf. *C. A.* 28, 2100<sup>9</sup>. - Comparisons of several methods of detg. fertilizer requirements of Russian soils for the following zones are given: podzolic soils, gray forest soils, chernozoms, chestnut-colored soils in the southeast and gray soils in central Asia. Field investigations showed that the supply of N and  $\text{P}_2\text{O}_5$  in the soils increased regularly from the podzolic soils south to the zone of chestnut-colored soils. The same regularity was not disclosed by pot tests and König's method for N and  $\text{P}_2\text{O}_5$  and no regularity at all was found for  $\text{K}_2\text{O}$ . Lab. tests in all cases showed an excessive fertilizer requirement, while for  $\text{K}_2\text{O}$ , the pot tests and Neubauer method gave low results. Factors for use on various soils and with different tests are suggested.

K. C. Beeson

The preparation of concentrated fertilizers by treating phosphorite with nitric acid. G. I. Gorshtein and T. I. Khakharina. *J. Chem. Ind. (Moscow)* 1934, No. 1, 39-47. - The best results (98% decompn.) were obtained by treating the phosphorite for 30 min. with sufficient 25%  $\text{HNO}_3$  to decompose the  $\text{CaCO}_3$  and  $\text{Ca}_3(\text{PO}_4)_2$ . A concd. phosphate fertilizer was obtained by treating this soln. directly with  $\text{NH}_3$  in sufficient amt. to ppt. the P as  $\text{CaHPO}_4$  and then with  $(\text{NH}_4)_2\text{CO}_3$  to ppt. the remaining Ca as  $\text{CaCO}_3$ . The ppt., which was filtered without washing and dried at  $100^\circ$ , contained a high concn. of citrate-sol. P; at first it absorbed water rather rapidly from the atm., but not in sufficient amt. to affect its phys. condition.  $\text{NH}_4\text{NO}_3$ , contg. about 5%  $\text{Ca}(\text{NO}_3)_2$ , was obtained by evap. the filtrate.

H. M. Leicester

Phosphate fertilizers by calcination process. Action of silica and water vapor on phosphate rock. D. S. Reynolds, K. D. Jacob and L. F. Rader, Jr. *Ind. Eng. Chem.* 26, 406-12 (1934). - The influence of  $\text{SiO}_2$  and  $\text{H}_2\text{O}$  vapor on the calcination of phosphate rock to remove F and increase the citrate soly. of the P was investigated. In the presence of an ample supply of  $\text{H}_2\text{O}$  vapor, 95-100% of the F was volatilized and 85-95% of the P was converted into the citrate-sol. condition when 5-g. samples of phosphate were heated alone for 1 hr. at  $1400^\circ$ , or when mixts. of phosphate rock (3.5 g.) and  $\text{SiO}_2$  (1.5 g.) were heated for 30 min. at  $1400^\circ$ ; the best results were obtained when the particle sizes of the phosphate rock and  $\text{SiO}_2$  ranged between 40- and 80-mesh. A 2-stage reaction probably takes place; this involves 1st the conversion of the  $\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6$  into  $\text{Ca}_{10}(\text{X}, \text{F})(\text{PO}_4)_6$ , X probably being the hydroxyl radical, and 2nd the further volatilization of F and the formation of a citrate-sol. phosphate.

K. C. Beeson

Agronomical evaluation of potassium and potassium-containing fertilizers. D. V. Druzhinin. *Kalif. (U. S. S. R.)* 1934, No. 1, 28-31. - Data on the effect of K-contg. fertilizers on different plants are given.

J. S.

The relative efficiencies of nitrogen fertilizers. S. D.

Conner. *Am. Fertilizer* 80, No. 1, 57, 28, 30 (1934). - Tabulated results are given showing the relative efficiencies of 22 nitrogenous fertilizer materials in pot tests and of 7 of these materials in field tests with grain crops on silt loam soil. The field tests were continued over a period of 5 yrs. and the pot tests over a period of 7 yrs. In the pot expts. the water-sol. inorg. materials were more efficient than the more slowly sol. org. carriers of N;  $\text{AlN}$  was totally unavailable as a source of N;  $\text{NaNO}_2$  was 92% as efficient as  $\text{NaNO}_3$ ; and  $(\text{NH}_4)_2\text{SO}_4$  was more efficient on limed than on acid soil. The use of N in mixed fertilizers for corn is not profitable for Indiana.

W. H. Ross

The effect of sulfur and phosphorus on the availability of iron to pineapple and maize plants. C. P. Sideris and B. H. Krauss. *Soil Sci.* 37, 85-97 (1934). The replaceable base content and  $\text{pH}$  value of Hawaiian soils varies with elevation and rainfall. The acid soils have a relatively high content of replaceable Al and Fe. On the nearly neutral soils pineapple fruit yields increase with increments of added N. S increases the yields at low N concns. but not at high N concns. This is because of the acidifying effect of the N compds. The addn. of relatively large quantities of P to soils with moderate quantities of S decreases yields, while the addn. of large quantities of S and small quantities of P increases yields. Soils with high annual rainfall are very acid, because K, Ca and Mg have been replaced by H ions. On such soils, pineapples respond well to P fertilizers. The compds. formed with Fe or Al release  $\text{H}_2\text{O}$ -sol. P in very small quantities but sufficient for plant development. Soils of  $\text{pH}$  values from 6.0 to 7.0 do not respond well to P fertilizers unless S or some form of acid fertilizer is added. The biol. method of detg. Fe deficiency, at least with certain plants, is of greater sensitivity than various chem. methods. The influence of rainfall upon replaceable constituents is shown for a group of 13 soils.

M. S. Anderson

The influence of copper sulfate on iron absorption by corn plants. L. G. Willis and J. R. Miland. *Soil Sci.* 37, 79-83 (1934). - The dry wt. of corn plants is increased by the addn. of  $\text{CuSO}_4$  to peat soils. The Cu appears to be fixed in some insol. form by the org. matter and does not even affect the accuracy of a H electrode. Ash analysis shows that liming alone increases the ratio of Fe to other ash constituents, whereas the Fe:ash ratio is nearly const. when Cu is added. The influence of Cu on the intake of Fe and the accumulation of this element in the nodes is identical with that of K salts. These symptoms are not sp. for K deficiency and the effect of K in controlling them is probably distinct from its function as an essential nutrient. The Fe accumulations which may be corrected by the addn. of Cu are probably due to a peculiar soil condition rather than to a K deficiency.

M. S. Anderson

Some factors in the fertilizing of coffee. V. A. Heckley. Kenya Colony Dept. Agr., *Bull.* 1932, No. 16, 8 pp. - Ground rock phosphate and bone meal are more efficient than superphosphate and other sol. phosphates as sources of P for coffee grown on acid humus-deficient soils in Kenya; in these soils the sol. phosphates are rapidly converted into insol. forms that are utilized less readily by the coffee tree than are bone meal and rock phosphate. Although Kenya soils are usually well supplied with K, the most of this K is either present in a form unavailable to coffee plants or is so tightly retained by the soil particles that the plants are unable to obtain an adequate supply of K; marked responses are obtained from the application of K fertilizers. In general, the soils are deficient in N.

K. D. Jacob

The change in composition and decomposability of typical Ceylon green manures with age. A. W. R. Joachim and S. Kandiah. *Trop. Agr. (Ceylon)* 82, 3-20 (1934). - Two series of expts., with *Crotalaria anagyroides* and *Tephrosia candida* as typical bush types and *Erythrina lithosperma* and *Gliricidia maculata* as typical tree types of green manures, show that N, ash constituents and pentosan decrease while dry matter and lignin increase with advancing age. The min. N limit (1.73%) for decomposability of lopped material is reached at the time of flowering with the bush crops and about 5 or 6 months

after previously lopping with the tree crops. Twelve references.

John O. Hardesty  
Some physiological factors influencing the production of flax-fiber cells. B. R. Robinson. *J. Am. Soc. Agron.* 25, 312-28 (1933). Photomicrographs from seedling flax stems prove that the flax-fiber cells arise from the pericycle. Flax plants eventually attain the greatest height in short periods of light per day and yield 8 times as much fiber as the long-day plants which elongate and mature the quickest. A complete nutrient soln. was necessary in water cultures to produce the tallest seedlings. N, particularly in combination with other elements, produced the longest stems in field-grown seedling plants, but at maturity plants fertilized with  $P_2O_5$  and  $K_2O$  equaled or surpassed the N plants. Seedling field-grown plants gave the highest percentages of fiber with the following fertilizer treatments: 4-0-0, 4-16-0 and 4-16-8. The percentage of fiber in the mature field-grown plants was twice as great as it was in the seedling plants. The no. of fiber cells increased after seedling plants were 6 weeks old, and in field-grown seedling plants they increased with addns. of fertilizer. There was no significant increase or decrease in mature stems for any fertilizer treatment when compared with the check. Fertilizers tending to increase the area of stem and probably the no. of fiber cells will increase the area of fiber cells. Water cultures which produced the best yields of fiber were high in  $P_2O_5$  and medium high in  $K_2O$ . A fertilizer analysis closely approximating 4-16-8 is the most desirable for fiber flax where little is known regarding the soil requirements.

J. R. Adams  
Derris roots from New Guinea. Anon. *Bull. Imp. Inst.* 31, 469-72 (1933). A sample of fine roots and one of coarse roots, both from New Guinea but from unstated species, contained 3.2 and 2.1%, resp., of rotenone, on the dry basis, as compared with 2.2% in a com. sample of Malaysian roots.

A. Papineau-Couture  
Rotenone. K. Fresenius. *Z. anal. Chem.* 96, 300-2 (1934). - A review.

W. T. H.  
Rotenone and its value in plant protection. H. Krieg. *Zentr. Bakt. Parasitenk.* 2 Abt. 89, 475-6 (1934). - Rotenone seems to be quite valuable.

John T. Myers  
Bordeaux spraying, with particular reference to the leaf and berry fall of coffee. A. D. Trunch and T. L. McClelland. Kenya Colony Dept. Agr., *Bull.* 1932, No. 17, 14 pp. Leaf fall of coffee was entirely prevented by spraying the trees with Bordeaux mixt.; the treatment greatly reduced "die-back," more or less completely prevented "yellowing," and produced an effect on the general appearance of the trees that was very similar to that produced by heavy applications of org. fertilizers. Excellent results were obtained by substituting  $CaCl_2$  for either hydrated or quick lime in the Bordeaux mixt. Because of the absence of gritty material in the carbide mixt. there was less trouble from spray-nozzle stoppage and less wear through friction in the hose and nozzle apertures.

K. D. Jacob  
Two apple-capsid spraying trials and some notes on spray damage. W. Steer. East Malling Research Sta., *20th Ann. Rept.* 1932, 132-40 (1933). - Good control of the apple capsid was obtained with sprays contg. 6% of a light lubricating oil, and the control action was not impaired by the addn. of 4% of a strained anthracene oil. Although neither 6% petroleum oil nor 4% anthracene oil alone caused perceptible damage to the trees, a mixt. of the 2 caused severe bud injury. Petroleum sprays and low-boiling tar-distillate washes caused rather severe damage to strawberry and gooseberry plants growing beneath sprayed apple trees. High-boiling tar-distillate washes were not injurious to gooseberries, and none of the sprays was injurious to currants.

K. D. Jacob  
Development of a standard cage method for testing the effectiveness of stomach-poison insecticides on the Japanese beetle. Walter E. Fleming. *J. Agr. Research* 48, 115-30 (1934). - The best environment in which to conduct controlled tests of stomach-poison insecticides on the Japanese beetle is one with a temp. of 85-90°F., a relative humidity of 90-95% and a continuous illumination from the top with artificial yellow light having an av.

intensity of 85 candle meters. The results obtained with an improved glass cage constructed to meet these requirements confirmed the conclusion that com.  $PbHAsO_4$  is an effective stomach-poison insecticide against the Japanese beetle. The concn. of the arsenical governs the extent of feeding on the foliage and for a certain period the mortality of the beetles, but at the end of this period mortality is independent of the  $PbHAsO_4$  concn.

W. H. Ross  
A new method for the control of insects by means of insectifuges. L. Meunil. *Compt. rend. acad. agr. France* 20, 30-3 (1934). - Encouraging results have been obtained by the substitution of insectifuges for insecticides in the control of the flies which attack beet and cauliflower crops. Emulsions of pyridine, naphthalene, or creosote furnish some protection to cauliflower crops, while the latter 2 were the most effective of the materials tested against beet flies. The emulsion is prep'd. by emulsifying a mixt. of 100 g. of the material to be tested (creosote, nicotine, aniline, etc.) and 900 g. of peanut oil in 50 l. of  $H_2O$  with  $NH_4$  oleate. The emulsion is sprayed on the plants and the odor being objectionable to the flies prevents their laying eggs in these crops and destroying them.

J. R. A.  
The use of wetting agents in the control of plant insects. André Meyer. *Compt. rend. acad. agr. France* 20, 39-42 (1934). - A discussion of the work of Boutaric and co-workers (cf. *C. A.* 26, 5696; 27, 1706; 28, 2109).

J. R. Adams  
Coffee capsid bug (*Lygus simonyi* Reut.) and the use of kerosene extracts of pyrethrum for the control of "lygus" and "antestia." Richard H. Le Pelley. Kenya Colony Dept. Agr., *Bull.* 1932, No. 22, 18 pp. - The spray contained 1 lb. powd. pyrethrum flowers in 1 gal. highly refined kerosene cong. a low proportion of unsatd. hydrocarbons; the pyrethrum was grown in Kenya and contained total pyrethrins 1.5 and pyrethrin I 0.7%. The spray gave excellent control of the coffee capsid bug and antestia on coffee bushes.

K. D. Jacob  
Control of Thrips imaginis Bagnall. J. W. Ryans. *J. Council Sci. Ind. Research* 6, 99-102 (1933). - Among numerous wet-spray and dusting materials exam'd. as deterrents for thrips, a pyrethrum-S dust was the most effective, retaining its repellent action for 2 days. Nicotine dust, aq.  $Ca(OH)_2$  and  $CaO$ -S-resin spray were valueless in this respect.

B. C. A.  
Sod webworms and their control. W. B. Noble. *Bull. U. S. Golf Assoc. Green Sec.* 12, 14-17 (1932). - Practically complete control of sod webworms was obtained by spraying the turf with (1) com. pyrethrum exts., dil'd. to 1 fluid oz. per 4-5 gal. water and applied at the rate of 1 gal./sq. yard, and (2) kerosene emulsion, prep'd. by emulsifying  $\frac{1}{2}$  gal. kerosene in 1 gal. boiling water contg. 1 lb. laundry soap and applied at the rate of 1 gal./sq. yard; the sprays had no apparent injurious effects on the grass. Pb arsenate gave a max. kill of only 30%.

K. D. Jacob  
Further observations on the strawberry tarsonemid mite (*Tarsonemus fragariae* Zimm.). A. M. Mussee. East Malling Research Sta., *20th Ann. Rept.* 1932, 117-31 (1933). When mite-infested strawberry leaves were dipped in spray solns. for 10 sec. and then allowed to dry, microscopical examn. of the leaves indicated that 3% lime-S soln. and 2% high-grade white-oil emulsion had a marked toxic effect on the mites, which, however, was not apparent until some 15-20 hrs. after treatment; neither substance was effective against the egg stage of the mite or the quiescent larval forms. The efficiency of the sprays was increased by the addn. of 1% of com. powd. spray gelatin. Dusting the plants with flowers of S was ineffective. Fumigation of the runners of strawberry plants with HCN just prior to planting was highly toxic to the plants and did not control the mites. Incidence of the mites was reduced by dipping the runners in 3% lime-S soln. just before planting; the treatment had no detrimental effect on the plants. Thirty-eight references.

K. D. Jacob  
Spraying and dusting experiments on the control of apple scab (*Venturia inaequalis*) and apple mildew (*Podosphaera leucotricha*) at East Malling in 1931-1932. M. H. Moore.

*J. Pomology Hort. Sci.* 12, 57-79(1934); cf. *C. A.* 28, 2108<sup>9</sup>.—Field trials of spray<sup>9</sup> and dusts on Cox's Orange Pippin are described. The results are tabulated and discussed with relation to weather conditions. Former results were supported (*C. A.* 27, 1080), but seasonal conditions made 2. preblossom sprayings necessary for excellent scab control in 1932. Colloidal S was less effective than lime-S spray. Post-blossom S-dusting was useful as an adjunct to pre-blossom wet spraying but unreliable when used both pre- and post-blossom. Lime-S with gelatin is less effective against scab. Under some conditions fruit-drop resulted from post-blossom use of lime-S and S dust. Severe fruit-russeting was caused by the pre-blossom use of soft soap and Pb arsenate sprays. Eleven references.

John O. Hardesty

Field experiments on potato scab control in western New York. C. F. Taylor. *Am. Potato J.* 11, 40-5 (1934); cf. *C. A.* 28, 2111<sup>9</sup>. Expts. were carried out in a district characterized by soils of fairly high  $pH$  values (usually at least  $pH$  6.0). Dipping the seed pieces in  $HgCl_2$  and  $HgO$  solns. caused small but significant increases in the percentages of scabby potatoes; addn of  $HgCl_2$  or  $HgO$  (5-17 lb./acre) to the fertilizer also increased the incidence of scab. Small but significant reductions in potato scab were obtained by treating the seed pieces with formalin solns. (1:120-1:240) at 120° F. for 2.5 min. or in the cold for 90 min. Spring applications of S after plowing consistently reduced the occurrence of scab, while applications before plowing had no effect in the current season, with equal rates of application finely ground S was more effective than inoculated S. K. D. Jacob

Poison bait for army worms and cutworms. C. F. Pemberton. *Hawaiian Planters' Rec.* 27, 87(1933); cf. *C. A.* 27, 5465. Addn. of  $\frac{1}{2}$  lb. casein to the bait (ba-gasse 10, molasses 20,  $CaO$ , 1 lb. and water 2 qts.) greatly improved the coherence of the particles composing the mixt. and added considerably to its life by preventing breakage, scattering and washing away when beaten upon by drenching showers of rain. K. D. Jacob

The use of the salts of dinitrophenol and dinitroresol as anticyptogams and parasitocides. André Meyer. *Compt. rend. acad. agr. France* 20, 43-6(1934). Special protective precautions should be taken for the workers in the use of anticyptogams, or parasitocides contg. salts of dinitrophenol, dinitroresol or dinitromaphthol. These materials may poison the workers seriously if not fatally and are also dangerous if they contaminate the food given to domestic animals. J. R. Adams

The cause and control of chlorosis in western Kansas. H. B. Myers and E. W. Johnson. *Trans. Kansas Acad. Sci.* 36, 106-110(1933).—The chlorosis is caused by a lack of iron, probably because the alk. soil makes it unavailable. Spraying the leaves with a soln. of  $FeSO_4$  cured the condition. Treatment of the soil had no effect. J. J. W.

The treatment of grapevine mildew with copper mixtures. J. Branas and J. Lulas. *Compt. rend. acad. agr. France* 20, 34-9(1934); cf. *C. A.* 28, 849<sup>4</sup>, 1131<sup>9</sup> and 2110<sup>9</sup>.—The Bordeaux and Burgundy mixts. commonly used against mildew are ineffective against serious invasions of mildew because of the low soly. of the Cu deposits in rain water. J. R. Adams

Weed control in asparagus planting. R. M. Smock. Ohio Agr. Expt. Sta. *Bamonth. Bull.* No. 164, 124-5 (1933).—Applications of  $CaCN_2$  (either granular or pulverized) at the rate of 500 lb. per acre, when weeds were 1-2 in. high, effectually controlled annual weeds throughout the cutting season. B. C. A.

Eradication of weeds of arable land by sodium chlorate. A. W. Ling and A. Maggard. *J. Ministry Agr. (Engl.)* 40, 224-8(1933). Autumn applications of 2 cwt. of  $NaClO_3$  per acre cleared heavy land of shallow-rooting annual weeds and of couch and creeping bent grasses and crowfoot. Creeping thistle, dock and other fleshy-rooted weeds were not eradicated. B. C. A.

Disposition of drainage water from milking barns [fertilization of fields] (Walker, Belton) 14. Survey of

the walnut position in England [control of fungus] (Hamond) 12. Working up pyrites slag from  $H_2SO_4$  production into  $CuSO_4$  and insecticides or fungicides (Pomerantsev, Sorkina) 18. Sewage treatment at Shanghai [sludge used for fertilizer] (Buchler) 14. Synthesis of acid fluorides and prepn. of formyl fluoride [toxicity to insects] (Nesmeyanov, Kuhn) 10. 2-Methyl- and 2-ethyl-1-(*p*-halophenyl)thiazoles and some of their derivs. [tested as larvicides] (Wetherill, Hann) 10.  $Ca(NO_3)_2$ ;  $MgO$  (Brit. pat. 403,054) 18.

Long, H. C.: The Suppression of Weeds by Fertilisers and Chemicals. Surbiton, Surrey: The Author. 57 pp. 2s.

Apparatus for mechanical analysis of soils by the Sabani method. A. P. Mikhailov and B. V. Arkhangelskii. *Russ. Zh.* 31, 600, Oct. 31, 1933. Construction details.

Fertilizers. I. G. Farbenind. A.-G. Fr. 758,473, Jan. 18, 1934.  $NH_4HCO_3$  for use as a fertilizer is preserved unchanged by mixing it with cementing agents, such as waxes, fats or resins and substances increasing the solidity such as  $CaCl_2$ , plaster,  $NH_4Cl$ ,  $(NH_4)_2SO_4$ . Fr. 758,474. Fertilizers contg. C are made by causing Cl to act on carbonaceous materials such as lignite or humus charcoal and adding basic substances to neutralize the mass.

Fertilizers. I. G. Farbenind. A.-G. Fr. 758,505, Jan. 19, 1934. Granular fertilizers are obtained by agitating wet mixts. contg.  $NH_4Cl$  and an alk. earth carbonate or  $MgCO_3$  in the powder, state and drying the mixts.

Fertilizer. Societá anon. industria ammoniaca and Bruno Tanzi. Fr. 758,888, Jan. 24, 1934. A fertilizer is made by causing powd. lignite and peat to absorb  $NH_3$  and then treating with an acid or acid salt. Instead of  $NH_3$ , urea, cyanamide,  $(NH_4)_3PO_4$ ,  $(NH_4)_2CO_3$ ,  $NH_4HCO_3$  or  $NH_4COONH_4$  may be used.

Fertilizers. Atmospheric Nitrogen Corp. Fr. 757,909, Jan. 8, 1934. A liquid compn. which contains a relatively high proportion of a normally solid fertilizer is prepd. by dissolving urea and a salt of an inorg. acid, e. g.,  $NH_4NO_3$ , in an ammoniacal liquor. The urea may be synthesized from  $NH_3$  and  $CO_2$ .

Fertilizer or stock feed from nitrogenous or protein-containing materials such as slaughter-house refuse. Wm. Laubs (to Packers Equipment Development Co.). U. S. 1,950,360, March 6. The material is digested in a closed steam-tight container while heated in moist steam derived substantially entirely from the moisture contained in the material; the steam is released after the digestion is completed, and the pressure in the container is reduced to below atm. pressure to further removal of moisture. App. is described.

Plant for the continuous, automatic manufacture of superphosphate in the form of powder. Sturtevant Engineering Co., Ltd., Frederick Wm. R. Williams and Alexander Ogilvie. Brit. 402,832, Dec. 11, 1933.

Portable superphosphate chamber. N. I. Vinogradov. *Russ. Zh.* 31, 454, Oct. 31, 1933. Construction details.

Insecticides. Hugh Knight, Lloyd C. Swallen and Wm. J. Bannister (to Emuloids, Inc.). U. S. 1,949,798, March 6. A compn. suitable for spraying on foliage comprises an insecticidal mineral oil such as a white mineral oil mixed with 0.1-2.0% of a polyhydroxy alc. partially esterified with a high-mol.-wt. acid such as glyceryl-mono- or -di-oleate, ricinoleate or acetylricinoleate, etc. Cf. *C. A.* 28, 1133<sup>9</sup>.

Insecticides. Electro Chemical Processes, Ltd. Fr. 758,010, Jan. 9, 1934. An aq. colloidal suspension of an insol. Si fluoride (e. g., the double fluoride of Si and Ba) or of cryolite, is prepd. by heating a mixt. of Si fluoride or cryolite in an aq. liquid with a protective colloid (e. g., a sulfite lye) and, in the case of the double fluoride of Si and Ba, with a small amt. of a Ba salt of an acid more feeble than  $H_2SiF_6$  (e. g., 5% of  $BaCO_3$ ), until a thick aq. paste is obtained. A small amt. (0.2%) of Na caseinate may be added.

Insecticide. Faw Yap Chuck. Fr. 758,152, Jan. 11, 1934. Tannic acid and nicotine are added to milk of soy-



bean flour to form a ppt. of nicotine-glycinine tannate, and I is added to another portion of the milk to form a ppt. The ppts. are mixed and constitute an insecticide.

**Insecticide.** A. M. Finkelgluz. Russ. 81,697, Oct. 31, 1933. Liquid by-products from the prepn. of benzyl chloride, contg.  $\text{PhCl}_2\text{Cl}$ ,  $\text{PhCHCl}_2$  and  $\text{PhCCl}_3$  are used as insecticides.

**Insecticidal oil sprays suitable for application to foliage.** Hugh Knight (to Standard Oil Co. of Ind.). U. S. 1,949,799, March 6. A mineral oil such as "white rose oil" is used with a smaller admixt. (suitably about 2-10%) of an oil-sol. hydroxy ester of a high-mol.-wt. org. acid with a polyhydric alc., such as glyceryl naphthenate or partially esterified glyceryl oleate and Al naphthenate. Cf. C. A. 28, 2840<sup>2</sup>.

**Soil disinfectants.** I. G. Farbenind. A.-G. Fr. 758,000, Jan. 26, 1934. Harmful organisms in soil are destroyed by means of metal carbonyls, e. g., Fe carbonyl, alone or with other disinfectants such as  $\text{CS}_2$ .

**Disinfectant.** Georg Lockemann, Otto Geragross, Kurt Rülke and Werner Ulrich. U. S. 1,950,315, March 6. A thiocyanogen compd. such as NaCNS is used with an acid-reacting substance such as HCl, HOAc or citric or tartaric acid.

**Treating seeds.** Gino Radice. Fr. 759,014, Jan. 27, 1934. Seeds are treated before planting with solns. which increase the content of N and of other essential elements, e. g., a soln. of hemoglobin, casein,  $\text{NH}_3$  and CaO.

**Nutrient salt solutions for use in accelerating germination and growth of seeds.** Paul Spangenberg. U. S. 1,950,068, March 6. For accelerating the germination and growth of seeds, such as those of lupines, oats or rye, without earth, as in the production of an artificial food for animals and human beings, nitrogenous inorg. substances such as Ca basic nitrate and carbonaceous org. substances such as sugar and urea are used in aq. soln. together with a N- and O-contg. acid such as  $\text{HNO}_3$ , etc.

## 16—THE FERMENTATION INDUSTRIES

C. N. FREY

**Dehydration of alcohol by means of an absorbent and recovered vapor.** Usines de Melle. *Chimie & industrie* 4 31, 280 (1934).—Polemical with Du Bois (C. A. 28, 2117<sup>9</sup>). Reply. G. Du Bois. *Ibid.* 280-1. Reply. Usines de Melle. *Ibid.* 281. Reply. G. Du Bois. *Ibid.* 281.

A. Papineau-Couture

**Anaerobic fermentation of lignin.** C. S. Boruff and A. M. Buswell. *J. Am. Chem. Soc.* 56, 880-8 (1934).—Isolated lignin ferments very slowly and incompletely under anaerobic conditions? A complete analysis of all the constituents added to and withdrawn from an anaerobic fermentation of cornstalks shows that appreciable quantities of lignin in its natural state ferment to  $\text{CO}_2$  and  $\text{CH}_4$ .

C. J. West

**Note on an electromagnetic method of measuring specific gravity.** L. R. Bishop. *J. Inst. Brewing* 40, 92-4 (1934).—The method of Lamb and Lee (C. A. 8, 1899) is applied to worts.

Quick Landis

**Musts of Anjou (1933 vintage).** L. Moreau and E. Vinet. *Ann. fals.* 26, 18-24 (1934); cf. C. A. 27, 3554.—Analyses of a no. of samples of known origin and purity are given and discussed.

A. Papineau-Couture

**Development of amylases during the germination of barley.** H. Luers and W. Rummel. *Wochschr. Brau.* 50, 297-301 (1933).—The diastatic power, the liquefying power (L. P.) and the dextrinizing const. were detd. on barley samples steeped and grown to various stages up to 8 days. The green malt was dried at 95° to 20% moisture content. The saccharifying power of the barley decreased during steeping and the first day of growth; it increased then considerably to a max. reached on the sixth day and dropped slightly thereafter. The L. P. was found in traces only until the third day of growth; it increased very rapidly up to 4 days and slightly thereafter. The course of the dextrinizing const. was analogous to the L. P. course; this suggests the identity of the enzyme performing these 2 actions. By digestion with papain higher values were obtained; the course of the development, however, was approx. of the same range.

S. Józsa

**Regularities in the carbohydrate composition of barley grain.** L. R. Bishop and D. Marx. *J. Inst. Brewing* 40, 62-73 (1934); cf. C. A. 25, 1944.—Paralleling protein (P) behavior the individual carbohydrates (C) increase regularly with the total C, 2- and 6-row barleys showing differences. "Extract" C and P increase much more rapidly than "cell" C or P, suggesting a mass action equil. during growth. Insol. C is detd. as follows: Reflux 5 g. finely ground barley exactly 10 min. with 200 cc. 0.5%  $\text{H}_2\text{SO}_4$ ; add 20 cc. of 9.50% NaOH and continue the refluxing 10 min. Filter the contents with suction through two No. 41 Whatman filter papers. After

drying 4 hrs. at 110° one paper serves as a counterpoise.

Quick Landis

**Prediction of extract. III. Application of the carbohydrate regularity principle.** E. R. Bishop. *J. Inst. Brewing* 40, 76-91 (1934).—The earlier method and equation (C. A. 28, 2118<sup>9</sup>) is simplified:  $E = 1.0 \text{ lb.} = 134.7 - 9.0 N - 2.8 I$ , where E = brewers' lb. ext. per quarter, N = percentage of N, I = percentage of "insol. C" (cf. preceding abstr.), all on dry barley, independent of variety.

Quick Landis

**Report on malt samples analyzed in May and June, 1933.** F. Ancker. *Wochschr. Brau.* 50, 263-4 (1933).—Moisture, ext., modification, saccharification and various protein compds. were detd. on Pilsen type malt samples. Results on a total of 192 barley malt samples (Pilsen and Munich type and color malt) and 4 wheat malt samples are briefly discussed.

S. Józsa

**Report on malt samples analyzed in July and August, 1933.** F. Ancker. *Wochschr. Brau.* 50, 303-4 (1933).—Figures are given on 144 barley malts and 9 wheat malts.

S. Józsa

**Formation of color of malt on the kiln.** H. Kropff. *Wochschr. Brau.* 50, 278-9 (1933).—The problem is discussed in a general way. The starch is transformed into dextrins by acids present during kilning. The transformation of N compds. is responsible for the aroma. Dextrinization of green malt occurs at 120°; however, in case of abnormally high acidity it will take place at a lower temp. (70°). K. assumes that slow-drying malts become abnormally dark because their acidity increases during slow drying.

S. Józsa

**Distribution of bitter principles and tannin in hops.** H. Wildner. *Wochschr. Brau.* 50, 289-94 (1933).—The components of hops were sepd. mechanically. The dry substance consisted of bracts 66-9, lupulin 49-20, strings 6, stalks 5%. The moisture content of these components was 8% in the bracts, 3% in the lupulin, 9% in strings and stalks. From 77.2 to 79.5% of the dry lupulin was resin, bracts contained 4.9-7.4 resin, strings 3.2-3.4 and stalks 1.7-3.2%. The relative proportions of  $\alpha$ -,  $\beta$ - and  $\gamma$ -resins varied very little in the various components. The tannin content was 6.93-8.23 in the bracts, 1.86-2.39 in the lupulin, 1.10-1.75 in the strings and 1.54-2.05 in the stalks, showing that the tannin distribution is not uniform in the various components.

S. Józsa

**Occurrence of an ester odor in storage tanks from hops (dry hopping).** I. Janensch. *Wochschr. Brau.* 50, 286-7 (1933).—The hops removed from a storage tank showed a very peculiar odor resembling Et or Am acetate. The microorganisms on the sample were examd. It contained chiefly culture yeast with small amts. of *Torula* and a mycodermic yeast of the *anomala* type. The latter is



considered quite harmless in brewing since it is strictly aerobic. In the present case it developed in the storage tank which was only half filled and was, no doubt, responsible for the ester-like flavor. S. Józsa

**Notes from the laboratory of the Abteilung für Trinkbranntwein und Likörfabrikation.** C. Luckow. *Pharm. Zentralhalle* 74, 345-7(1933).—1. Coloring herbal exts. The color of an herbal ext. should be developed to a dark tone without the aid of artificial means. The suggestion is nevertheless made that the color tone may be deepened, without material impairment of the herbal aroma, by addn. of a small amt. of an alc. (60%) infusion of walnut shells, in the proportion of 1:5, or of a suitable amt. of caramel color. 2. Brandy with satisfactory but with unusual secondary aroma. 3. Comparative alc. detns. Both these factors are discussed at some length from the standpoint of the analytical chemist rather than from that of the manufacturer. Thus, in the evaluation of the typical and the cultly volatile wine bouquet, in the detn. of phys. const. and alc. strength, only one skilled in the art can hope properly to evaluate a questionable brandy. W. O. E.

**Estimation of colloidal proteins in wort by adsorption with active carbon.** P. Kolbach and R. Buse. *Wochschr. Brau.* 50, 249-54(1933).—The pptn. method with metallic salts or tannin acts specifically on certain proteins. Adsorption by active C is a simple and easy way to est. colloidal proteins. Details of the method are given. If the total N and  $\text{CH}_2\text{O}$  N is estd. on the original soln. and filtrate, about 50-60% of the total N is adsorbed, including 6%  $\text{CH}_2\text{O}$  N (15-20% of the total  $\text{CH}_2\text{O}$  N). The results are not affected by time of shaking (down to 1 min.) and are but slightly affected by variations of pH and concn. within reasonable limits. Only 1 type of active C was tried. Four grains per 100 cc. soln. is recommended. S. Józsa

**Transformation of proteins during mashing.** P. Kolbach and R. Buse. *Wochschr. Brau.* 50, 265-70, 273-7, 281 5(1933).—Earlier work by Windisch, Kolbach and Schild (C. A. 26, 1382) is supplemented. Ext. pH, total N, permanently sol. (non-coagulable) N not pptd. after boiling for 5 hrs. under the reflux condenser, coagulable N (by difference),  $\text{CH}_2\text{O}$  N, N adsorbed by active C (preceding abstr.), and N pptd. by  $\text{MgSO}_4$ , tannin and uranyl acetate were detd. on mashes. Lundin and Schröderheim's method was used for the pptn. with tannins (cf. C. A. 25, 5683). Pptn. with  $\text{MgSO}_4$  was carried out according to K. and S. Myrback (C. A. 25, 4455); a method by the same authors was used for the pptn. with uranyl acetate (C. A. 26, 5168). The effects of temp. (40, 50, 60 and 70°) and time of mashing ( $\frac{1}{2}$  hr., 1, 2 and 4 hrs.) were first studied. The results are tabulated and graphically represented. Increase of mashing time at a given temp. increases the colloidal N. For a const. mashing time the temps. for highest abs. values are 60-65° for the C fraction, 70° for the  $\text{MgSO}_4$  fraction, 60-70° for the tannin fraction. Expressed in percentage of non-coagulable N the highest values are attained at 70°. Higher temps. are more favorable for colloidal N. The action of peptidase and proteinase is given. Increase in acidity increases the amt. of non-coagulable N. The differences in the relative amts. of the various N fractions are very small when the malt-water proportion is changed except that higher mash concns. seem to have a protective action on the proteolytic enzyme. S. Józsa

**Wort boiling by direct fire and by steam.** H. Stadler. *Wochschr. Brau.* 50, 313-15(1933).—Mashes were prepd. from Munich malt by the usual three-mash process and boiled by direct fire and steam, resp. Maltose, total N and acidity showed no change; with direct firing the amt. of coagulable N was 25% less, the difference being the same on the fermented beer; this had considerable bearing on the stability of the finished beer. The N pptd. by tannin was 27% less with direct firing, and both surface tension and head retention were higher. No difference in final attenuation could be observed. The beer boiled by direct fire was more palatable. The difference is

attributed to more vigorous and intense boiling with direct fire. S. Józsa

**Report on water analysis during the second quarter of 1933.** F. Ancker. *Wochschr. Brau.* 50, 271 2(1933). A discussion of 55 samples of brewing liquor, 2 samples of boiler feed water, and 1 sample of steep water. S. J.

**Steam versus naked flame for heating brew kettles.** P. Petit. *Brasserie & malterie* 24, 1-5(1934).—A brief comparison of the 2 systems. A. Papineau-Couture

**Report on brewing raw material, auxiliary material and by-products for the second quarter of 1933.** F. Ancker. *Wochschr. Brau.* 50, 279(1933); cf. C. A. 27, 5887. —A brief summary covering 125 samples (barley 7, hops 4, pitch 11, wort 41, filter mass 3, malt coffee 32, various 27). S. Józsa

**Characteristics of Philippine vinegars.** F. T. Adriano and J. Banzon. *Philippine J. Agr.* 4, 229-37(1933).—

Analyses of 25 native vinegars from kaong, coconut, nipa, sugar cane and basi showed an av. content of 2.9% AcOH. Palm vinegars have a low sugar content and the total ash is high in sol. ash. John O. Hardesty

**Preparation of vinegar from Philippine fruits and other saccharine materials.** F. T. Adriano and H. L. Ylizarde. *Philippine J. Agr.* 4, 215-27(1933).—Lab. methods are given for the prepn. of vinegar from bananas, perunkila, lipoti, nipa and coconut milk. Alc. and the subsequent AcOH fermentations were carried out at 26.5-35° with the exception of 1 part of the process with nipa sap which was done at 24-26°. A banana cider from the mixed mash of the peel and pulp of Katali, lucatan and Latundan varieties gave the highest amt. of AcOH (8.42%). The banana vinegar is clear, pale brown in color, and retains the aroma of the original substance. Heating the nipa sap to the b. p. and cooling before fermentation increases the yield of AcOH. All of the materials with the exception of coconut milk produced vinegars contg. over 4% AcOH. John O. Hardesty

**Application of refrigeration to the treatment of wines and to the preservation of grapes.** R. Billardon. *Rev. gén. froid* 14, 229-32(1933); *Chimie & industrie* 31, 321. —A brief general discussion. A. P.-C.

**Experiments on the concentration of wine by cold.** E. Hugues. *Rev. gén. froid* 14, 233-4(1933); *Chimie & industrie* 31, 321. —Wine contg. 7% alc. was concd. to an 8.7% alc. content by freezing. There was a corresponding increase in the content of all the constituents except K bitartrate, which pptd. out in considerable quantities. This treatment seems to be favorable to the clearness and taste of the wine. A. Papineau-Couture

**Detection of fruit wine in grape wine by the sorbitol method of Werder and Zöch.** C. von der Heide. *Pharm. Ztg.* 78, 853 4(1933); cf. Kreipe, C. A. 28, 2120\*. —A highly technical procedure is suggested. W. O. E.

**The determination of quinosol in wine.** Luis De Prado. *Anales farm. biogén.* (Buenos Aires) 4, 75 6 (1933).—Into a tube place 30 cc. of the wine. Add 3 g.  $\text{Na}_2\text{CO}_3$ . Heat in a water bath for 5 min. Remove. Add 10 cc. of benzene. Cool slowly, while agitating. Decant the benzene. Filter. To another tube contg. 1 cc. of a weak soln. of colorless  $\text{FeCl}_3$  add 5 cc. of the filtrate. An emerald-green color develops, the intensity of which is proportional to the concn. of the quinosol. Hence the reaction is quant. B. S. Levine

**Application of the (French) regulations relative to the minimum alcohol content of wines.** L. Semichon and M. Planzy. *Ann. fals.* 26, 92-3(1934).—The official French method for detg. alc. in wines consists in distg. the sample and estg. the alc. content of the distillate by means of an alcoholometer. The indications of different instruments, even on the same distillate, vary by as much as 0.4% alc. by vol., and the discrepancies vary at different points of the scale. As the readings of a given instrument gradually change in time, it should be checked at intervals by comparative detns. either with the pycnometer or by the  $\text{K}_2\text{Cr}_2\text{O}_7$  titration method. A. Papineau-Couture

**Preparation of "pseudo-wines" from pure concentrated fruit juices.** J. Henri Fabre and Ernest Brémont. *Ann. fals.* 26, 81-8(1934).—With proper precautions, and

provided the concd. grape juices contain not more than 0.060 g. total Fe per l., they can be advantageously used for sweetening or strengthening wines according to French legislation (used in amts. such that they will not increase the alc. content by more than 2.5%). Fermentation of concd. grape juice after diln. to reconstitute the original juice gives only a "pseudo-wine" which has neither satisfactory compn., odor nor taste. In countries not subject to French (or similar) legislation regarding wine making, it would probably be both easier and more economical to prep. such "pseudo-wines" from dried raisins rather than pure concd. juice.

A. Papineau-Couture

**Report on beer samples analyzed in May and June, 1933.** F. Ancker. *Wochschr. Brau.* 50, 271 (1933).—Results on 104 samples are discussed.

S. Józsa

**Report on beer samples analyzed during the months of July and August, 1933.** F. Ancker. *Wochschr. Brau.* 50, 310-11 (1933).—Figures are given and comments made on 80 bottom- and 3 top-fermented beers.

S. J.

**New method of measuring head on beer.** E. Helm. *Wochschr. Brau.* 50, 241 3 (1933).—The beer flows out from an inverted bottle, with the least preliminary disturbance. Without regurgitation of air the beer flows from a tube into a funnel. Smooth and rapid outflow is assured by means of a double-tube arrangement. Two min. after the outflow the liquid is drawn off and measured and this procedure repeated after 8 min. (vols. a and b). The remaining froth is liquefied by adding 3 cc. alc. and its vol. measured (vol. c). The total head is expressed by the formula  $100(b + c)/(a + b + c)$  and the residual head by  $100c/(a + b + c)$ . Details for the technique are given and illustrated with pictures. The influence of temp. is discussed. The  $CO_2$  content affects the total head to a greater extent than the residual head.

S. J.

**Pseudomonas lindneri** Klayver (*Termodacterium mobile* Lindner). II. K. Schreder, R. Brunner and R. Hampe. *Wochschr. Brau.* 50, 233, 237, 243-5 (1933); cf. C. A. 27, 4872.—The by-products are investigated under aerobic and anaerobic conditions. With sugar on an inorg. nutrient medium  $CO_2$ , lactic acid, AcOH and small amts. of succinic acid are formed. Formic acid, propionic acid and its homologs, malic acid, oxalacetic acid, oxalic acid, tartaric and citric acids could not be detd.

Larger amts. of AcOH than lactic acid are formed. Considerably more AcOH is formed in aerobic fermentation. Small amts. of AcH, higher alcoh., glycerol and esters are formed. Conclusion? The *Termodacterium* seems to have a zymase complex similar to that of yeast.

S. Józsa

**Biological purity of pitching yeast.** I. Jänensch. *Wochschr. Brau.* 50, 237-9 (1933).—Three different types of cultures are made: (a) Drop cultures in sterile water (1:3) to find the infections which are liable to develop from the products secreted by yeast. (b) Drop cultures in sterile hopped wort to det. the presence of infections. (c) The Bettges Heller enclosed culture (*Ibid.* 23, 69-74 (1906)) to detect bacilli and *Sarcina*. The direct microscopical examn. is made with addn. of NaOH to dissolve proteins, and dead cells are detd. by methylene blue. The test requires 2 days. Results on 12 samples are tabulated and discussed.

S. Józsa

**Detn. of sugar content of malt exts.** (Schenk) 12. Tower for drying malt (U. S. pat. 1,950,263) 1. Device for suppressing or reducing froth or scum formation on liquids (Brit. pat. 402,826) 1.

**Non-alcoholic drinks.** J. Ziegler & Co. Ger. 590,574, Jan. 6, 1934 (Cl. 6b. 21). App. for producing drinks free from or poor in alc., from malt with a high content of maltose and dextrin and a small content of albumin and glucose, by fermentation with *Termodacterium mobile* is described.

**Concentrating wines, fruit juices, etc.** Louis Rieutord. Fr. 759,299, Jan. 31, 1934. The liquids are concd. by partial freezing, by adding solid  $CO_2$  in small pieces to effect the cooling.

**Device for accelerating the secondary fermentation of beer.** Josef Prégardien. Ger. 590,575, Jan. 5, 1934 (Cl. 6d. 3).

**Yeast and spirits.** Norddeutsche Hefeindustrie A.-G. Ger. 590,550, Jan. 5, 1934 (Cl. 6a. 17.02). Yeast and spirits are produced by fermenting molasses and mash contg. sugar. The rate of propagation of the yeast is regulated by addn. of nutritive medium and the rate of aeration is also regulated.

## 17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

**Hypochlorites as disinfectants.** J. Gibson. *Chemistry & Industry* 1933, 145-6; cf. Rawlinson, C. A. 27, 1713.—The superiority of coal-tar disinfectants in the presence of org. matter is emphasized by the fact that under these conditions the germicidal values of hypochlorites, permanganates and  $HgCl_2$  actually show a reduction.

B. C. A.

**New medicaments and nutrients in the treatment of tuberculosis for 1932.** G. Schröder. *Z. Tuberk.* 68, 253-62 (1933); cf. C. A. 27, 338.

II. J. Corper

**Microchemistry and microscopic identification of santonin.** M. Wagenaar. *Pharm. Weekblad* 71, 260-4 (1934).—A discussion of known methods for crystg. the oily sublimate of santonin and the various color reactions by which the substance is identified.

A. W. Dox

**Microchemistry of quinine carbonate (aristochin).** M. Wagenaar. *Pharm. Weekblad* 71, 316-19 (1934).—A description of the  $C_2O_4H_2 + I$  reaction by which quinine carbonate is distinguished from euquinine, the crystn. of insol. nitrate and the thallioquinine color reaction.

A. W. Dox

**Determination of morphine in opium.** N. Rusting. *Pharm. Weekblad* 71, 333-8 (1934).—Three modifications in R.'s method (C. A. 26, 3616, 4681) consist essentially in the use of coarse instead of finely powd.  $CaO$ , a greater vol. of  $H_2O$  for washing the ppt., and the addn. of glass fragments to the filtrate. The advantages gained are a great saving of time, greater purity of the morphine sep.,

and isolation of the entire morphine content instead of an aliquot.

A. W. Dox

**Volumetric estimation of barbituric acid derivatives.** Hans Budde. *Apoth. Ztg.* 49, 295 (1934).—Dissolve 0.2-0.3 g. of the accurately weighed sample in a mixt. of 30 cc.  $H_2O$  and 1 g.  $Na_2CO_3$ . To the clear soln. add 0.1 N  $AgNO_3$  soln. until a distinct turbidity persists for some time. One cc. 0.1 N  $AgNO_3$  soln.  $\approx 1/10,000$  mol. of the barbituric acid deriv. under examn.

W. O. E.

**Stability of a solution of belladonna extract and a new method for the evaluation of belladonna extract.** Günther Junghans. *Apoth. Ztg.* 49, 325 7 (1934).—A new procedure has been devised whereby consistent results may be obtained in the evaluation of belladonna exts. and nearly related alkaloids. The suggested procedure differs from the official method by the use of magnesia usta instead of  $NH_3$ , as also a smaller amt. of tragacanth. Errors in the official method are emphasized. The soln. of narcotic exts. in alc. and  $H_2O$  in the ratio of 1:1:1 is not only germ-free but stable as well.

W. O. E.

**Examination of drugs for arsenic by means of "sodium phosphite solution D. A.-B. VI."** R. Dietzel and M. Siegert. *Apoth. Ztg.* 49, 357-9 (1934).—A criticism of the official method.

W. O. E.

**Bath preparations.** XIII. W. Peyer and F. Gstriner. *Apoth. Ztg.* 49, 371-5 (1934); cf. C. A. 27, 5143.—A new series of bath preps. is enumerated in connection with their compn. and application.

W. O. E.

**New method for the estimation of phosphorus in phosphated oil.** F. Vieböck. *Arch. Pharm.* 272, 84-7 (1934).—In a small (about 180 cc.) stoppered flask weigh 1.5 cc. of the sample, add 3 g. NaOAc (as buffer to insure complete conversion of the P to  $H_3PO_4$ ), then from a buret run in quickly onto the inside wall of the flask 18-20 cc. 1 soln., thereby avoiding any undue agitation of the liquid, stopper and shake vigorously for 1 min. After a brief interval titrate the unexpended I with thiosulfate (with starch as indicator), 1 cc. 0.1 N I soln. being equiv. to 0.62 mg. P.

**Oxidation of white phosphorus with iodine and explanation of the reaction mechanism in the D. A.-B. VI procedure.** F. Vieböck. *Arch. Pharm.* 272, 88-100 (1934). An exptl. study has been made of the oxidative mechanism, in connection with a criticism of the official method.

**Recent investigations on alkaloids.** H. W. Bersch. *Arch. Pharm.* 272, 114-32 (1934).

**Supplementary data on essential oils.** Th. Ruemele. *Pharm. Zentralhalle* 75, 173 6 (1934).—Tabulated lists are given showing (1) the yields of volatile substance obtainable from 100 g. of the crude material, (2) the d.s., b.p.s. and solidification points (so far as detd.) and other pertinent data, of essential oils employed in perfumery and (3) a series of essential oils (with and without terpenes) with their resp. d.s.

**Evaluation of drugs by means of odor and taste.** C. Luckow. *Pharm. Zentralhalle* 75, 191-5 (1934); cf. Wasicky (*C. A.* 27, 2523).

**Preparation and evaluation of cinchona fluidextract and cinchona tincture and alkaloid determination in cinchona bark.** P. Göttrich. *Pharm. Ztg.* 78, 706-10 (1933).—Methods of prepn. and evaluation are discussed from the standpoint of pharmacopial requirements and suitable procedures are outlined in connection with a method for detg. the alkaloid content of cinchona bark.

**Diacolation of sirups.** H. Breddin. *Pharm. Ztg.* 79, 259-60 (1934).—Certain advantages are discussed in the prepn. of sirups by diacolation (instead of the usual cooking and filtration), notably simple sirup and those of manna, althaea, aurantium and K. guaiacolsulfonate.

**Linimentum ammoniatum D. A.-B. VI.** Otto Rothenkirchen. *Pharm. Ztg.* 79, 286 8 (1934).—An illustrated exptl. study of the official Ger. prepn.

**Determination of ammonia in tobacco smoke.** László Barta. *Magyar Gyógyszerésztud. Társaság Értesítője* 10, 42 4 (1934).—As expts. showed that the amine content of tobacco smoke is very small (about 0.8-0.9 cc. 0.02 N HCl) the ammonia can be detd. by distg. the alk. smoke soln. satd. with NaCl, then titrating the total alky. and deducting the no. of cc. due to nicotine content.

**Comparative evaluations of extractum liquoritiae spiritu depuratum Pharm. Hung. and the commercial succus liquoritiae.** Zoltán Csipke. *Magyar Gyógyszerésztud. Társaság Értesítője* 10, 60-73 (1934).—The detn. of glycyrrhizic acid is essential to the evaluation of commercial preps. of succus liquoritiae. High-grade preps. can be made by extg. drugs with ammoniacal water and purifying with alc. The method of Eder and Sack may well be used for the detn. of pure glycyrrhizic acid by means of furfural-benzotitric acid.

**Determination of mercury in pharmaceutical preparations.** Elemér Schulek and István Flóderer. *Magyar Gyógyszerésztud. Társaság Értesítője* 10, 147-59 (1934).—Hg was isolated from the preps. by treatment with dil. HCl, boiling or decompn. with  $H_2O_2$  and  $H_2SO_4$ . Hg was pptd. free from Bi in a 20% HCl medium. The treatment of a portion equiv. to 0.1 g. metallic Hg required 4-5 min. The soln. was dild. a  $HNO_3$ -contg. soln. of  $Fe(NO_3)_3$  added, 0.1 N  $KMnO_4$  introduced by drops until a pink color was produced, and the mixt. titrated with 0.1 N KCNS. Other methods for the sepn. may be applied.

**The scillin of Scilla maritima and the fructoside of Scilla**

**nutans.** H. Colin and A. Chaudun. *Bull. soc. chim. biol.* 15, 1520-6 (1933).—Different workers have reported different properties for scillin, a fructosan from *S. maritima*. Probably the bulbs contain different fructosans at different seasons. The authors, from bulbs collected in spring, prepd. a fructosan with a mol. wt. of 750 +,  $[\alpha]_{D_{20}} = -27^\circ$ ,  $[\alpha]_{D_{40}} = -32^\circ$ . When hydrolyzed it yielded 6 mols. of fructose to 1 of glucose. A somewhat similar compd., but having a higher mol. wt., was prepd. in impure form from the bulbs of *S. nutans*. L. K. G.

**Micro-methods for determining proteins in medicine and biology.** A. Wasitzky. *Mikrochemie* 14, 85 112 (1934).—A careful review of 102 papers. W. T. H.

**Molds putrefying tobacco.** I. Ryoji Nakazawa, Yoshito Takeda, Tadakatsu Okada and Mitsuo Shimoi. *J. Agr. Chem. Soc. Japan* 10, 135 92 (1934).—From the putrefied tobacco gathered from various places in Formosa, the molds belonging to *Aspergillus*, *Penicillium*, *Citromyces*, *Spicaria*, *Mucor*, *Rhizopus*, *Monilia*, *Syncephalostrium*, *Helminthosporium*, *Cladosporium* and *Fusarium* were isolated. The tobacco was kept in the vapor of chloropierin for 48 hrs., dried at  $70-90^\circ$  for 2-3 hrs., sealed in cans with  $CO_2$  or *in vacuo* (15 mm. of Hg) and then kept in a cool place under  $25^\circ$ . By this treatment it was completely prevented from putrefaction. The sugar contents of tobacco was decreased by the action of *Aspergillus*.

**The essential oils of green tea.** II. Sankichi Takei, Yajiro Sakato and Minoru Ono. *Bull. Inst. Phys.-Chem.-Research* (Tokyo) 13, 116-23 (1934) (abstracts (in English) published with *Sci. Papers Inst. Phys.-Chem. Research* (Tokyo) 23, Nos. 482 7); cf. *C. A.* 27, 2224. —As previously reported, oils of green tea are contained chiefly in the original fresh leaves and only a little is formed in the course of manuf. In order to discover what oils are actually specific to green tea, oils from leaves of tea (I) and some other plants such as the mulberry tree (II), acacia (III) and radish (IV) have been examd. The yield of volatile substances differs widely according to kind of plant and the age of the leaves; thus I, II, III and IV give 0.015, 0.0025, 0.010 and 0.002% yield, resp. From these 4 kinds of oils 5-6% of  $MeCH_2CH_2CH:CH:CHO$  (V) and 30-50% of  $\beta$ -hexenyl alc. (VI) have been obtained as cryst. derivs. V b.  $138-40^\circ$ , gives 2,4-dinitrophenylhydrazones, m.  $144^\circ$ , semicarbazone, m.  $173^\circ$ , and  $p$ -nitrophenylhydrazones, m.  $137^\circ$ . VI gives 4-iododiphenylurethan, m.  $157^\circ$ . In addn. to these two constituents, small amts. of butyraldehyde, isobutyraldehyde and isovaleraldehyde have been found as 2,4-dinitrophenylhydrazones, m.  $123^\circ$ ,  $182^\circ$  and  $123^\circ$ , resp. V and VI have the viridescent odor. The characteristic odors of various leaves are due not only to these lower-boiling constituents but also to the higher-boiling fractions. Therefore, the viridescent odor of all fresh leaves are caused chiefly by VI and a little by V.

**The microscopic identification of cocaine, procaine, estovaine and alypine.** Adolfo Sá and Armando D. Del Boca. *Anales farm. bioquim.* (Buenos Aires) 4, 81-5 (1933).—The appearances under the microscope of crystals formed with salts of  $UO_2^{++}$ ,  $Co^{++}$  and  $Cu^{++}$  are described and shown.

**Disinfectants. II. Monobasic fatty acids.** D. Bach. *Bull. sci. pharmacol.* 39, 425-34 (1932); cf. *C. A.* 27, 118. —The concn. of nonionized  $HCO_2H$  which inhibits the growth of *Aspergillus repens* is between 0.05 and 0.06%. A total concn. of 0.01 N gives only 0.046 nonionized acid and is not sufficient. For bacteria also the nonionized part is decisive for growth inhibition; 20-30 mg. per l. was sufficient for all species studied. *B. mesentericus*, *subtilis* and *Staphylococcus* were the most resistant. *Proteus vulgaris* and *B. kiliense* were the most sensitive. The  $p_a$  develops an addnl. inhibiting power only at high acidity.  $AcOH$  is about 20 times less effective than  $HCO_2H$ . The H ions also show more influence. The activity of  $EtCO_2H$  is slightly higher; the ions have some influence at a concn. of 0.01 N; at higher concn. only the nonionized part is of significance.

**The determination of morphine in opium by the lime**

method. E. Léger. *Bull. sci. pharmacol.* 41, 65-9 (1934).  
—The method of the French Pharm. consists in extn. of 4 g. opium mixed with 1 g.  $\text{Ca}(\text{OH})_2$  with 40 g.  $\text{H}_2\text{O}$ . The morphine is pptd. with  $\text{NH}_4\text{Cl}$  in 26 g. of the filtrate and titrated. The opium should be dried at  $100^\circ$ ; the error, committed by assuming that the 26 g. filtrate corresponds to 2.5 g. opium, is less than 0.00%. Two corrections must be made: for the morphine, which remains in soln., add 0.0285 g.; for the  $\text{CaCO}_3$ , which is admixed to the morphine, subtract 0.0042 g.

A. E. Meyer  
Medicinal plants of Indochina: *Quisqualis indica* L., an anthelmintic. Albert Sallet. *Bull. sci. pharmacol.* 41, 72-7 (1934).

A. E. Meyer  
A pure sulfurized oil from bituminous rocks in the Jura. J. Le Calvé. *Presse méd.* 41, 1205-7 (1933).—A colorless oil was obtained by extn. without further treatment, which contained 15% S. It gives stable emulsions with  $\text{H}_2\text{O}$ , can be incorporated into petrolatum or oil and has the same applications as ichthyol.

A. E. Meyer  
Essential oils of the flora of Tadzhikistan. V. Isaev. *Acta Horti botanici Tadzhikistan* 1932, 17; *Parfums de France* 11, 191-3 (1933).—Distn. of branches of *Juniperus polycarpus* C. Koch, yielded 0.6-0.75% of an oil with characteristic odor and very slight yellowish color which can be eliminated by a 2nd steam distn.; it has d. 0.8480,  $n_D^{20}$  1.4690,  $[\alpha]_D^{20}$  29.43°, acid value trace, ester value 2.3, ester value after acetylation 19.0, aldehydes and ketones 3%, phenols 2.5%. Distn. of *Ephedra procera* F. and M. yields 0.002% of yellowish brown oil. Light yellow oil of *Juglans fallax* Dode, obtained in 0.02% yield in April and in 0.005% yield in Aug., has: d. 0.907, acid value 4.2, ester value 23.4. Yellow oil of *Chenopodium botrys* L., of very disagreeable odor, obtained in 0.03-0.04% yield by distn. of the fresh plant and in over 0.1% yield from the dried plant, has:  $d_{20}$  0.908,  $n_D^{20}$  1.491,  $[\alpha]_D^{20}$  0.10°, b.  $142^\circ$ , acid value 0.6, ester value 22.8, aldehydes and ketones 5%, phenols 1%. A waxy oil is obtained in 0.03% yield by extn. of *Psoralea drupacea* Bge., with petr. ether. Thick dark brown oil is obtained in 0.005% yield by extn. with  $\text{Et}_2\text{O}$  of the steam distillate obtained from *Glycyrrhiza uralensis* Fisch. Deep greenish brown oil is obtained in 0.03% yield by extn. with  $\text{Et}_2\text{O}$  of the distillate from *Peganum harmala* L. Light yellow oil obtained in 0.005% yield by steam distn. of the semi-dried leaves of *Pistacia vera* has  $d_{15}$  0.89. Light yellow oil obtained in 0.07-0.08% yield from *Hypericum perforatum* L., has:  $d_{15}$  0.8726,  $n_D^{15}$  1.489,  $[\alpha]_D^{15}$  -11.72°, b.  $158^\circ$ , acid value 1.6, ester value 10.6, aldehydes and ketones 8.5%, phenols 3.0%. Light yellow oil of strong odor obtained in 0.06-0.07% yield from flowers of *Prangos ulopia* D. C. has:  $d_{15}$  0.8404,  $n_D^{15}$  1.4820,  $[\alpha]_D^{15}$  -12.59°, b.  $155^\circ$ , acid value 1.2, ester value 20.4, ester value after acetylation 44.5, aldehydes and ketones 4%, phenols 4%. Dark brown oil obtained in 0.04-0.05% yield from semi-dried *Nepeta olgae* L. has  $d_{15}$  0.989. Greenish yellow oil of *Salvia sclarea* L., obtained in 0.12-0.15% yield at the time of the falling of the flowers, has:  $d_{20}$  0.8961,  $[\alpha]_D^{20}$  -17.01°,  $n_D^{20}$  1.4680, acid value 0.6, ester value 85.0, aldehydes and ketones 3%, phenols 5%. Oil of *Salvia spinosa* L., obtained in 0.03% yield, has an agreeable odor and d. 1.0177. Steam distn. of the green portion of *Perovskia scrophulariaefolia* Bge., during the blossoming season yielded 0.2-0.45% (av. 0.325%) of lemon-yellow oil, turning rapidly darker in sunlight, with a strong odor recalling those of rosemary and lavender, which softens on aging. The crude oil is not utilizable in perfumery; a second steam distn. yielded a product of more delicate odor, having:  $d_{15}$  0.8775,  $n_D^{15}$  1.4600,  $[\alpha]_D^{15}$  9.01°, acid value 0.25, ester value after acetylation 25.0, b.  $142^\circ$ , ketones and aldehydes (via bisulfite) 3.0%, phenols 6%. Treatment with 10% alc. NaOH greatly improves the odor. Fractional distn. gives 20% of a fraction with a lipalol-like odor. Slightly yellowish oil obtained in 0.6-0.7% yield from *Ziziphora tenuior* L. (whole plant) has:  $d_{20}$  0.935,  $[\alpha]_D^{20}$  16.4°,  $n_D^{20}$  1.4875, acid value 2.8, ester value 40.35. Yellowish brown oil obtained in 0.4-0.48% yield by distn. of semi-dried *Origanum vulgare* L., has:  $d_{15}$  0.9109,  $n_D^{15}$  1.500,  $[\alpha]_D^{15}$  -1.71°, b.

1  $138^\circ$ , acid value 1.5, ester value 3.8, aldehydes and ketones (via bisulfite) 4%, phenols 36%. Rectification by steam distn. yields a product that is almost colorless and could be used in the best Cologne and toilet waters. Oil obtained in 0.009-0.01% yield by distn. of fresh leaves of *Menha silvestris* L., and 0.12-0.15% yield from the semi-dried leaves, has:  $d_{15}$  0.9924,  $[\alpha]_D^{15}$  -16.43°,  $n_D^{15}$  1.4695, acid value 1.4, ester value 52.7, ester value after acetylation 61.0, b.  $138^\circ$ , aldehydes and ketones 5%, phenols 3%.  
2 Steam distn. of the fresh leaves of *Lachnophyllum gossypinum* Bge., in Aug. and early Sept., yields 0.1-0.32% of dark greenish brown oil (obtained for the first time); it yields a mass of long cryst. needles at  $2.8^\circ$ ; b.  $166^\circ$ , ignites spontaneously at  $176^\circ$ , has a particularly strong and disagreeable odor, by redistn. with steam gives 50% of a resinified oil. On treatment with 10% NaOH it loses 35% of its wt. with considerable change in odor; the sepd. oil, on treating a 2nd time with 10% alc. NaOH and Zn dust for 24 hrs. and pptg. with  $\text{H}_2\text{O}$ , yields a yellowish brown liquid having an apricot-like odor, called "Lachnol" which can be used as a "houquet" in perfumery; it has  $d_{15}$  0.9894,  $n_D^{15}$  1.5260,  $[\alpha]_D^{15}$  0.54°, acid value 4.0, ester value 237.5, ester value after acetylation 67.0, aldehydes and ketones 4%, phenols 7.5%. Oil obtained in 0.15-0.2% yield by distn. of semi-dried *Pulicaria salviaefolia* Bge., gathered during the blossoming season, has:  $d_{15}$  0.8974,  $n_D^{15}$  1.4770,  $[\alpha]_D^{15}$  18.52°, acid value 2.0, ester value 22.0, ester value after acetylation 62.8, b.  $148^\circ$ , aldehydes and ketones 2%, phenols 1%; treatment with 10% alkali and Zn dust gives a product having a peculiar, fairly agreeable odor. Dark brown oil obtained in 0.04-0.06% yield from semi-dried *Achillea filipendulina* Lam., has:  $d_{20}$  0.9210,  $n_D^{20}$  1.4730,  $[\alpha]_D^{20}$  0.16°, b.  $140^\circ$ , acid value 1.4, ester value 37.6, aldehydes and ketones 3%, phenols 0.5%. Light straw-colored oil of agreeable odor, obtained in 0.8-1.0% yield from the leaves of *Artemisia scopariiformis* M. Pop., has:  $d_{15}$  0.8756,  $n_D^{15}$  1.4960,  $[\alpha]_D^{15}$  3.01°, b.  $158^\circ$ , acid value 0.2, ester value 7.4, ester value after acetylation 29.4, aldehydes and ketones 3%, phenols 1.5%. Light yellow oil obtained in 0.9-1.1% yield by steam distn. of semi-dried *Artemisia arenaria* D. C., has:  $d_{15}$  0.869,  $n_D^{15}$  1.4820,  $[\alpha]_D^{15}$  -0.06°, b.  $142^\circ$ , acid value 0.3, ester value 33, ester value after acetylation 27.8, ketones 2%, phenols 2%. Oil obtained in 0.15-0.75% yield from *Artemisia maritima* L., has:  $d_{15}$  0.8683,  $[\alpha]_D^{15}$  -2.54°,  $n_D^{15}$  1.4645, acid value 4.4, ester value 23.0, ester value after acetylation 51.5, b.  $135^\circ$ . Dark brownish green oil obtained in 0.06-0.07% yield from the fresh leaves of *Artemisia annua* L., and in 0.085-0.09% yield from the semi-dried leaves, has: d. 0.8254,  $[\alpha]_D^{20}$  -5.2°,  $n_D^{20}$  1.4745, acid value 4.9, ester value 10.30, aldehydes and ketones 3%. Oil obtained by distg. the flowers of *Antanthus glandulosa* Desf., on the same day that they are gathered, is a yellowish, cryst. solid, m.  $36^\circ$ . Steam distn. of *Dianthus crinitus* Sm., and *Elaeagnus angustifolia* gave only traces of oil; treatment of *Elaeagnus* with petr. ether gives about 0.1% of ext. having the same odor as the flowers.  
A. Papineau-Couture.

Effect of the preparation of the product prior to distillation and of the age of the plants on the yields of essential oils. J. B. H. Lejeune. *Agron. coloniale* 22, 161-5 (1933); *Parfums de France* 12, 46.—The materials were prepd. as follows: (1) distd. immediately after reaping; (2) dried slowly in the shade in a hot-air drier and distd. after complete desiccation; (3) dried rapidly in the sun and distd. after complete desiccation; (4) dried in the shade and piled from time to time to produce slight fermentation. Yields, based on the fresh plant, were as follows:  
9 *Acrocephalus masuianus* Briq.—(1) 0.075, (2) 0.162, (3) 0.156, (4) 0.190; *Ocimum viride* Willd., blossoming leafy tops—(1) 0.221, (2) 0.175, (3) 0.158, (4) 0.205; *Ocimum gracile*, blossoming leafy tops—(1) 0.192, (2) 0.220, (3) 0.286, (4) 0.180; *Ocimum basilicum*, blossoming leafy tops—(1) 0.076, (2) 0.072, (3) 0.058, (4) 0.068%. Distn. of *Ocimum viride* at different periods of maturity gave the following yields: (1) blossoming leafy tops 0.221, (2) leafy tops after fructification 0.224, (3) same

as preceding dried in the shade 0.231. Corresponding values for *Ocimum gracile* were (1) 0.192 and (2) 0.403%.

A. Papineau-Couture

Economic possibilities of the cultivation of geranium in Calabria. Francesco La Face. *Bol. uff. staz. sper. Reg. Calabria* 112 (Sept.-Oct., 1933); *Parfums de France* 12, 17-18.—Expts. carried out since 1923 have shown that the production of geranium in Calabria appears favorable in dry soil. Tables are given showing the yields of oil and grass per hectare and the analytical characteristics of the oils.

A. Papineau-Couture

Kino of *Pterocarpus anglicensis* from Southern Rhodesia. Anon. *Bull. Imp. Inst.* 31, 473-5 (1933).—Analysis of 2 samples gave the following results:  $H_2O$  15.4, 15.1; insol. matter 4.3, 4.9; extractive matter (non-tannin) 7.6, 10.5; tannin 72.7, 69.5; ash 1.4, 0.9%. The astringency of the 1st sample was comparable with that of Malabar kino, and its appearance, characters and reactions showed a general, but not entire, concordance with the requirements of the Brit. Phar. 1914. The astringency of the 2nd sample was slightly below the range for Malabar kino, and its appearance was inferior to that of the 1st sample.

A. Papineau-Couture

Analytical characteristics of essential oils: Algerian oil of geranium. B. Angla. *Parfums de France* 11, 180-4, 260-7 (1933); 12, 12-14 (1934); A. Sabatié and B. Angla. *Ann. fals.* 26, 70-81 (1934); cf. C. A. 27, 3289, 4028.—The following limits have been found by analyzing 30 samples of fresh oil of the 1932 crop and over 125 of the 1933 crop:  $d_{4}^{20}$  0.8900-0.9015,  $n_D^{20}$  1.4634-1.4704,  $n_D^{25}$  after acetylation 1.4593-1.4659,  $[\alpha]_D^{20}$  from -5.71 to -8.64°,  $[\alpha]_{\text{yellow}}$  from -7.97 to -12.00°,  $[\alpha]_{\text{violet}}$  from -9.30 to -14.11°,  $[\alpha]_{\text{violet}}/[\alpha]_{\text{yellow}}$  1.101-1.174,  $[\alpha]_{\text{violet}}/[\alpha]_{\text{red}}$  1.520-1.650, acid value 1.4-84, ester value 50-74.2, esters (as geranyl tiglate) 24.5-31.2%, ester no. after acetylation 202-219, free alcs. 42.51% (calcd. according to Gliichitch, C. A. 17, 3226), total alcs. 62 (88.5%, citronellol rhodinol 30-40%). The principal ester of oil of geranium is geranyl tiglate, which could not be used for adulteration because of its high cost. Adulteration with substances contg. esters in approx. the same proportion as contained in genuine oil would not be detected merely by detn. of the ester value. Such adulteration is best detected by fractional distn. and titration of an aq. soln. of the acids by Duclaux' method as follows: remove the alc. from the portion used for detg. ester value by alternate evapn. and addn. of  $H_2O$ , cool, ext. with  $Et_2O$ , evap. the dissolved  $Et_2O$ , add 15 cc. 0.5 N  $H_2SO_4$ , make to 110 cc., distil at the rate of about 1 drop per sec., collecting ten 10-cc. fractions and titrating each fraction separately with 0.05 N KOH (bromothymol blue indicator); for each fraction calc.  $R_1$  (ratio of total acidity distd. to that point to the total acidity of 100 cc. of distillate) and  $R_2$  (ratio of total acidity distd. to that point to the total acids in the sample). The limits for the several fractions of genuine oil of geranium are:  $R_1$ —(1) 10-12, (2) 19-22, (3) 29.5-30.5, (4) 37-39, (5) 46-48, (6) 54-57, (7) 64-66, (8) 73.5-75.5, (9) 85-87, (10) 100;  $R_2$  (10) 69-72. Adulteration with substances contg. no esters does not affect  $R_1$ , but is immediately detected by the lowering of  $R_2$ . Abnormal oils are occasionally found in which 1 or 2 of the consts. fall outside the limits given above, and a verdict of adulteration should be given only when several of the consts. fall outside the above limits. All limits given above are for fresh oils; on aging (about a yr. or more) the compn. of the oil changes resulting in a very appreciable decrease in  $[\alpha]$ , a considerable increase in free acidity, a decrease in the ester content and, especially, a large increase in non-volatile residue (8-9% for fresh oil, over 10%, and sometimes as high as 17-18% for old oil).

A. Papineau-Couture

Measuring rotatory dispersion in the ultra-violet range by photoelectric polarimetry. Y. R. Naves. *Parfums de France* 11, 185-6 (1933) (in French and English); cf. C. A. 27, 372.—Attention is drawn to Bruhat and Chate-lain's photoelec. polarimeter (C. A. 26, 5455, 5447-8) and its usefulness for studying essential oils. A. P. C.

Estimation of the primary alcohols content of essential

oils by phthalization. L. S. Gliichitch and Y. R. Naves. *Parfums de France* 11, 235-41 (1933); cf. C. A. 28, 575 (in French and English).—The method of Radcliffe and Chadderton, as modified by G. and N., is suitable for the detn. of primary + secondary alcs. in essential oils. The analytical characteristics of the products (20 alcs., 32 non-alc. compds., 7 essential oils) used in developing and proving the method are listed. A. P. C.

Bulgarian otto of roses and its rhodinol content. L. S. Gliichitch and Y. R. Naves. *Parfums de France* 12, 6-8 (1934) (in French and English); cf. C. A. 27, 5481.—Five samples of known origin and purity had the following analytical characteristics:  $d_{4}^{20}$  0.8541-0.8609,  $d_{4}^{25}$  (coeff. 0.008) 0.8621-0.8749,  $[\alpha]_D^{20}$  (100 mm.) -2°33' to -4°3',  $n_D^{20}$  1.4538-1.4603,  $n_D^{25}$  (coeff. 0.00045) 1.4560-1.4625, f. p. 15.8-19°, stearoptenes 7.5-20.6%, acid value 2.5-3.5, ester value 8.4-11.2, ester value after acetylation 217.7-248.4, ester value after formylation 153.9-196.9, esters (as  $C_{15}H_{25}O_2$ ) 2.93-3.9%; alcs. (as  $C_{10}H_{18}O$ )—free 68.24-80.04%, combined 2.30-3.08%, total 70.93-83.12%; formylizable products (as rhodinol) 46.3-60.75%. This confirms conclusively that Bulgarian otto of roses can contain considerably more than 40% "rhodinol," irrespective of the method of distn. used and the very large variations in the stearoptene and total alc. contents.

A. Papineau-Couture

Oil of verbena. Établissements Antoine Chiris. *Parfums de France* 12, 15 (1934) (in French and English).—The limits of the analytical consts. of true oil of verbena (*Verbena triphylla* L'Hérit.) of Southern France, based on the analysis of 40 lots of known purity, are:  $d$  0.890-0.912 (exceptionally to 0.920),  $[\alpha]_D^{20}$  -10° to -18°,  $n_D^{20}$  1.4793-1.4880, citral (via bisulfite) 32-38%, sol. in 0.5-6 vol. of 80% alc. sometimes with turbidity on diln. persisting even with 95% alc. The lighter oils are generally the most active and have the lowest citral contents. Distn. of a lot of flowers harvested at Grasse in 1933 gave a normal yield of oil having somewhat abnormal characteristics, as follows:  $d_{15}$  0.8990,  $[\alpha]_D^{20}$  -9°16',  $n_D^{20}$  1.4848, aldehydes (as citral) 50.6%, primary alcs. (as  $C_{10}H_{18}O$  by cold phthalization) 5.1%, sol. in 1.2 vol. of 80% alc. with pptn. of paraffin above 8 vol. and in 0.1 vol. of 95% alc. with pptn. of paraffin above 4 vol. A. P.-C.

Oil of angelica roots. Établissements Antoine Chiris. *Parfums de France* 12, 16 (1934).—The limits given by Gildemeister for the consts. of this oil are applicable to French oils, except that  $n_D^{20}$  should be 1.476-1.483, instead of 1.476-1.478. The majority of French oils fall within the following limits:  $d_{15}$  0.893-0.875,  $[\alpha]_D^{20}$  19-25°,  $n_D^{20}$  1.479-1.482, acid value 0-2.4, ester value 11-19. A batch of old roots gave a heavy oil with the following consts.:  $d_{15}$  0.938,  $[\alpha]_D^{20}$  0°26',  $n_D^{20}$  1.4922, acid value 14.7, ester value 47.6, sol. in 1.5 or more vol. of 80% alc.

A. Papineau-Couture

The constants of oil of clary sage. Georges Igolen. *Parfums de France* 12, 34-5 (1934) (in French and English).—Analysis of a large no. of oils produced in Southern France in the course of the last few yrs. gave the following limits for the analytical consts.:  $d_{15}$  0.8975-0.911,  $[\alpha]_D^{20}$  from -7° to -20° (generally from -8.3° to -11°),  $n_D^{20}$  1.4648-1.4658, acid value 0.1-0.7, ester value 140-194.1, esters (as linalyl acetate) 49-67.9%, ester value after cold formylation 238.9-259.7, frequently sol. in 3-5 vol. of 70% alc. with turbidity on diln., sol. in less than 1 vol. of 80% alc. without turbidity on diln.

A. Papineau-Couture

The ethereal oil of the American spruce *Picea alba* Lk. (*Picea canadensis* Sarg.). Gust. Komppa. *Ann. Acad. Sci. Fennicae* A38, No. 8, 8 pp. (1933).—The oil, constituting 0.3% of the dry twigs and needles, had  $d_{4}^{20}$  0.9235,  $n_D^{20}$  1.4733,  $[\alpha]_D^{20}$  18.32°, acid no. 1.87 and ester no. 46.67. Its properties are thus different from those of com. American spruce oil, which is *l*-rotatory and has an ester no. of 105-15. The constituents isolated include  $\beta$ -pinene, dipentene, *l*-limonene, *d*-camphor (5-8%), bornyl acetate, active fenchyl alc. (0.03%) and cadimene.

K. V. Thimann



The distribution of nicotine in cigaret smoke. Adolf Wenusch. *Chem.-Ztg.* 58, 208-7(1934); cf. Nagy, C. A. 26, 4412.—The amt. of nicotine passing unchanged into smoke varies with the rate of smoking. By burning the cigaret in a closed vessel and passing the smoke through a series of wash bottles contg. dil.  $H_2SO_4$  the whole contents of the smoke could be recovered. The nicotine was steam-distd. and pptd. as the dipicrate. On glowing without suction 45% of the total nicotine was recovered from the smoke; with intermittent glowing and suction (normal smoking) 25% was in the main smoke stream and 14% in the secondary stream from the glowing portion. However, with rapid continuous suction the corresponding figures were 80 and 3%, resp. The stump underwent no enrichment in nicotine. Similar results were obtained from 3 makes of cigalets. Hence with normal smoking more than 50% of the nicotine is decompd. (cf. Kovalenko, C. A. 26, 6066).

The chemical study of ma huang. Alice H. Hayden and C. B. Jordan. *J. Am. Pharm. Assoc.* 22, 616-25 (1933).—The imported ma huang consists of the mixed and broken parts of several species of *Ephedra*. The com. drug was studied. Total volatile constituents of 4 samples 4.7-5.5%. Two samples were subjected to various successive solvents: petr. ether 1.57-1.65;  $Et_2O$  1.34-1.35;  $CHCl_3$  0.58-0.67;  $HIOAc$  4.47-4.72;  $EtOH$  10.28-11.23;  $H_2O$  9.35-10.40; insol. residue 72.33-70.18%; crude fiber 19.5-24.16%;  $Et_2O$ -sol. ext. 0.523-0.736; sol. in 50%  $EtOH$  19.7-21.46;  $H_2O$ -sol. 10.1-15.06; benzene ext. 2.1-2.56%. Eight methods of assay for the drug were compared. The one found most satisfactory is that in which the alkaloids are liberated by  $Ba(OH)_2$ ; also the yield is higher. Mix 20 g. of drug with 75 cc. of 12%  $Ba(OH)_2$  soln., inactivate 2 hrs. and percolate with 25%  $HIOH$  contg. 2%  $NH_4OH$  until exhausted. Remove  $EtOH$  by evapn. and shake 3 times with  $CHCl_3$ . Add  $NH_4OH$  and again shake with  $CHCl_3$ . Unite the solvent portions, evap. spontaneously, and titrate the alkaloids in the residue with the usual precautions. A good grade of ma huang should yield 2% of total alkaloids. A catechin-tannin is present. A cryst. substance having glucosidal properties and a saponin were detected.

The assay of preparations containing pepsin official in the national formulary. Glenn L. Jenkins and Edward M. Hoshall. *J. Am. Pharm. Assoc.* 22, 625-38(1933).—Ten preps. contg. pepsin were prepd. according to the N. F. V. These were subjected to various assay methods. The Greenberg method (cf. C. A. 27, 3621) is not applicable to most of these preps. The methods based on proteolytic digestion of casein and subsequent blocking off of the amino group are inapplicable. The Vollhard-Löhlein method is based on the principle that if casein, which has combined with  $HCl$  be digested with pepsin the combined  $HCl$  is liberated and may be titrated. Corrections are made for the acidity of the original soln. and for the acidity of the pepsin soln. The method is too involved for practicality. The method was modified as follows: Place 3 g. of powd. casein, 50 cc. of  $H_2O$  and 10 cc. of 0.5 N  $HCl$  in a 250-cc. flask and heat the mixt. to  $90^\circ$ . Cool to  $40^\circ$  and add  $H_2O$  to 80 cc. Maintain at  $40^\circ$  for 30 min. with occasional shaking. Add 20 cc. of 20%  $Na_2SO_4$ , agitate and filter. To 50 cc. of the filtrate add a measured excess of 0.5 N  $NaOH$  and titrate back with 0.1 N  $HCl$ , with phenolphthalein as indicator. A blank is carried out with all the reagents except that the pepsin soln. is not added. Just before the back titration  $1/2$  of the vol. of pepsin soln. is added to correct for the acidity of the pepsin. The standard is prepd. by running a series of assays on pepsin of known strength. The method is as accurate as the egg albumin digestion method. On pepsin preps. the method checks within 10%.

L. E. Warren

Assay of glycerite of bismuth. Joseph L. Mayer. *J. Am. Pharm. Assoc.* 22, 653(1933).—The N. F. V. employs the  $H_2S$  method for the assay of glycerite of Bi. M. used this method: Measure 5 cc. of the prepn. into a 400-cc. beaker. Add 100 cc. of  $H_2O$  and heat to boiling. Add concd.  $HCl$  until the ppt. at first formed dissolves.

Add  $NH_4OH$  until a turbidity occurs. Add  $HCl$  until clear. To the boiling soln. add an excess of 10%  $(NH_4)_2PO_4$ , drop by drop. Allow to settle and collect the  $BiPO_4$  in a weighed Gooch crucible. Wash, dry, place in a Ni crucible and heat to const. weight.  $BiPO_4 \times 0.7603 = Bi_2O_3$ . The method is simple, accurate and rapid.

L. E. Warren

Determination of the specific gravity of paraffin. Berl S. Alstodt. *J. Am. Pharm. Assoc.* 22, 653-4(1933).—The U. S. P. X gives the d. for paraffin but prescribes no methods for its detn. A method is given for detg. the d. of yellow wax. This method (modified to warm the  $EtOH$  from "38-40" to "42-45") was applied to a sample of paraffin. The value found was 0.899. By the sinker method the value was 0.888. Several mixts. of  $EtOH$  and  $H_2O$  were made in such proportions that their densities varied from that of paraffin to that of wax. The densities of these mixts. were taken with a pycnometer. By placing a globule of the paraffin in each of these mixts. the d. may be read from the known d. of the diln.

L. E. Warren

A study of vehicles for medicines. Bernard Fantus, H. A. Dyniewicz and J. M. Dyniewicz. *J. Am. Pharm. Assoc.* 22, 655-8, 751-4(1933); cf. C. A. 27, 4028.—Many methods have been suggested for prepg. aromatic elixir. F., D. and D. formulate certain principles necessary to observe if any improvement in the process or product is to be hoped for. (1) Viscosity must be kept low until after clarification. (2) Filtration through talcum or other absorbent powder, must be abandoned because of the losses of oil and time and change in pH. (3) Pptn. of the oils in too fine globules must be avoided to prevent passage through filter paper. If the compd. spirit of orange is added to the mixed solvents and  $H_2O$  is used instead of sirup the subdivision of the oil is satisfactory. (4) Retention of any portion of the solvent until after clarification must be avoided, else the prepn. will not be satd. with oil. A satisfactory formula is: Mix 250 cc. of  $EtOH$  with 55 cc. of  $H_2O$ , add 12 cc. of compd. spirit of orange and agitate vigorously occasionally for 24 hrs. Filter through hard paper, dissolve 320 g. of sucrose in the filtrate and add diluted  $EtOH$  ( $2H_2O:1EtOH$ ) to make 1000 cc. "Isoalcoholic elixirs" are such as are designed to contain the same quantity of  $EtOH$  as the menstruum of the galenical prescriber. An "aqueous" elixir and an "alcoholic" elixir are prepd. which are miscible in all proportions. If these were made official the physician would prescribe them in the proper proportions to meet the  $EtOH$  content of the galenical desired in the prescription.

L. E. Warren

Chemical study of two Chinese drugs. Daniel Tsao and E. V. Lynn. *J. Am. Pharm. Assoc.* 22, 720-2(1933).

(1) Fang Fung is the root of *Siler divaricatum*, *Peucedanum rigidum* or *P. terebinthaceum*. The drug has a sweet, aromatic and mucilaginous taste. The material studied was purchased and was not identified as any single one of the species mentioned. By the A. O. A. C. methods the ground root gave: loss at  $100^\circ$  11.84; total ash 4.34; reducing sugars 6.4; sucrose 3.19; pentosans 11.46; starch (by acid hydrolysis) 2.21; starch (by diastase) 1.60%. To successive solvents the ground root yielded: petr. ether total 2.18; volatile 0.51;  $Et_2O$  total 1.24; volatile 0.38;  $EtOH$  7.90;  $H_2O$  13.77%. Tannins and alkaloids were absent. Traces of unidentified acids were found.  $EtOH$  and  $H_2O$  exts. given orally to rats produced no toxic effects. (2) Hsiung Ch'ung is the root of *Conioselinum univittatum* Turcz., an umbelliferous, cultivated plant. The active ingredient is a volatile oil which has been examd. repeatedly. Roots were purchased in the open market but not further identified. Proximate analysis yielded: volatile oil at  $100^\circ$  16.82; total ash 3.01; reducing sugars none; starch 28.95; protein ( $N \times 6.25$ ) 2.26;  $Et_2O$  ext. 9.06; crude fiber 4.68; tannin 0.38%. Alkaloids were absent. To successive solvents the drug yielded: petr. ether total 7.53; volatile 0.65;  $Et_2O$  total 8.30; volatile 1.22;  $EtOH$  15.73;  $H_2O$  18.43%. Fixed oil was obtained by



extn. with  $\text{Et}_2\text{O}$  and distn. of the volatile oil: d<sub>4</sub> 0.94672; n<sub>D</sub><sup>20</sup> 1.4821; acid no. 31.5 and 31.9; sapon. no. 205.2 and 200.4; ester no. 171.1; unsaponifiable 1.55 and 1.64%; I no. 70.34 and 71.2; R.-M. no. 0.1; Polénski no. 0.25; solid acid 10.78; liquid acids 89.22; titer test 24.3°. Drying tests indicated the oil to be about 80% as efficient as raw linseed oil. A high percentage of hydroxy acids was indicated. The presence of phytosterols was indicated.

L. E. Warren

**Therapeutic substances derived from unsymmetrical biphenyl compounds. I. Some mercury derivatives of 2- and 4-hydroxybiphenyl.** S. E. Harris and W. G. Christiansen. *J. Am. Pharm. Assoc.* 22, 723-7 (1933).—A no. of Hg derivs. of 2- and 4-hydroxybiphenyl were prepd. and their bactericidal properties studied. The compds. mercurated were of 2 types, (a) substituted hydroxybiphenyls and (b) phthaleins prepd. from hydroxybiphenyl. Some of the compds. were bromophenolphthalein derivs. The killing power against *Eberthella typhi* in 5 min. varied from 1-100 to 1-2500. L. E. W.

**A comparative study of the stability of emulsions with variation in the proportion of the ingredients.** Lillian M. Latgevin. *J. Am. Pharm. Assoc.* 22, 728-35 (1933).—The study had 2 objectives: (1) to det. the effect of dilns. upon the stability of emulsions of oils used pharmaceutically; (2) to det. the limits of emulsification or emulsibility of these oils, under variations in the proportions of ingredients. In all of the studies attempts were made to simulate conditions occurring in the av. drug store. The oils used were expressed almond, castor, cod-liver, cottonseed, raw linseed, olive and sesame. Emulsions contg. 5-55% of oil were prepd. from each oil. Cracking or breaking did not occur in any case. Creaming occurred in emulsions contg. more than 30% of oil but the cream layer could be easily incorporated by agitation. An increase in the proportion of acacia decreases the size of the oil globules in the emulsion and *vice versa*. An increase in the proportion of H<sub>2</sub>O results in an increase in the size of dispersed oil globules. Emulsions of low oil content had the smallest oil globules. It is probable that the smaller the range in variation of size of oil globules the more stable is the emulsion. Emulsions can be prepd. of much wider range than the 1:2:4 rule would indicate. Emulsions made according to this rule are not always optimum but are satisfactory. L. E. Warren

**The non-preexistence of azulene in milfoil.** Katherine Graham. *J. Am. Pharm. Assoc.* 22, 819-24 (1933).—The preexistence of azulene in plants has been questioned since 1895. The  $\text{CHCl}_3$  ext. of milfoil flowers contains a compd. which yields azulene during steam distn. The extd. flowers did not yield azulene by steam distn. The nature of this parent compd. has not been ascertained.

L. E. Warren

**Piperazine derivatives as local anesthetics.** W. Baker and W. G. Christiansen. *J. Am. Pharm. Assoc.* 22, 950-3 (1933).—*Et 1-piperazineacetate*, b<sub>m</sub> 153.9°, gives with 1,3- $\text{Cl}_2\text{C}_6\text{H}_3\text{OH}$  +  $\text{K}_2\text{CO}_3$  *Et 4-(γ-hydroxypropyl)-1-piperazineacetate*, yellow, viscous oil. Treatment with  $\text{SOCl}_2$  gives *Et 4-(γ-chloropropyl)-1-piperazineacetate*, yellow, viscous oil. By the action of  $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Na}$  was obtained *p*-aminobenzoate of 4-(carbethoxymethyl)-1-piperazinepropanol; viscous yellow oil. As an anesthetic this is comparatively inactive. 1,4-Bis(β-hydroxy-β-methylhexyl)piperazine diphenylurethan, small plate-like crystals, m. 180-181°, was too acid for biol. testing in 2% soln. of the dihydrochloride. L. E. Warren

**A modified assay process for alkali benzoates and salicylates.** Jacob E. Schmidt and John C. Krantz, Jr. *J. Am. Pharm. Assoc.* 22, 953-5 (1933).—The method recommended is a modification of the Henville process (cf. *C. A.* 21, 1787). Transfer 1.5 g. of the dried salt to a tall beaker of 300-cc. capacity, add 75 cc. of  $\text{Et}_2\text{O}$  and 5 drops of methyl orange test soln. Titrate with 0.5 N HCl with vigorous stirring until a permanent pink color is produced in the aq. layer. The method is superior to the U. S. P. X process in accuracy and time required.

L. E. Warren

**Essential oil in desert plants. IV. Examination of the**

**oil of *Tetrademia glabrata*.** Maxwell Adams and Gregory R. Adams. *J. Am. Chem. Soc.* 56, 991-2 (1934); cf. *C. A.* 28, 1814<sup>a</sup>.—The approx. % compn. of the oil of *Tetrademia glabrata* extd. by steam distn. is: α-dipentene 15, dipentene 25, aldehyde fractions 10, caryophyllene 8, nonacosane 7, ketone 1, colophonum and unidentified terpenes 34. The ketone gives a 3,4-dinitrophenylhydrazone m. 132.3°. C. J. West

Notes from the lab. of the Abt. für Trinkbranntwein u. Likorfabrikation [coloring herbal exts.] (Luckow) 16. Fraction of essential oils in plants (Bruno) 11D. Meat preps. [use in pharmacy] (Henry) 12. Thermal analysis of the system antipyrine-chloretone [use in treatment of diseases] (Rychterowna) 2. Jasmine perfumes (Ruzicka, Pfeiffer) 10. Purifying liquid toilet soaps and perfumed liquids (Russ. pat. 31,537) 27. Oxidation products [having disinfecting properties] of S contg. derivs. of high fatty acids (U. S. pat. 1,949,838) 27

**Thompson, C. J. S.: A Compendium of the Pharmacopoeias and Formularies.** London: John Bale, Sons and Danielsson, Ltd. 381 pp. 10s. 6d.

**Traveller, A.: Pour le parfumeur amateur ou professionnel. Comment préparer extraits et eaux parfumées, laits et lotions de toilette, poudres, fards, pommades, cold-creams, bandolines, épilatoires, teintures capillaires.** 2nd ed., revised. Paris: Dubois & Bauer. 189 pp.

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**Medizin und Chemie. Abhandlungen aus den medizinischen-chemischen Forschungsstätten der I. G. Farbenindustrie Akt.-Ges. Bd. II.** Leverkusen: Bayer-Meister-Lucius. 425 pp. M. 10.

**Zur Einführung in die Pharmacopoea Helvetica.** 5th ed. Zofingen: Wepf in Komm. 213 pp. M. 7.

**Pharmaceutical compounds. I. G. Farbenind. A.-G.** Fr. 757,989, Jan. 8, 1934. Useful compds. are prepd. by heating aliphatic α,ω-diamino carboxylic acids (in which at least 1 H atom is fixed to the N of the amino group not occupying the α-position) with aliphatic urethans, in the absence of water, and, if necessary in the presence of condensing agents. The amino group occupying the α-position is 1st protected by substituents. Examples are given of the prepn. of α-benzoyl-δ-carbamidoornithine and α-benzoyl-ω-N-acetylcarnamidolysine which is transformed to the corresponding α-carbamidolysine by sapon.

**Medicinal tablets.** Richard Passek. Ger. 593,145, Feb. 22, 1934 (Cl. 30h. 9.02). The manuf. of tablets from finely powd. materials is facilitated by addn. of a small proportion of dried milk or of a product obtained by spray-drying a homogenized mixt. of skim milk and an easily hardened fat.

**Medicinal compositions containing colloiddally dispersed sulfur.** Hans Kaufmann. U. S. 1,949,797, March 6. A H polysulfide is admixed with a medium which is substantially immiscible with water, such as  $\text{CHCl}_3$  and talcum or an ointment base and the H polysulfide is decompd. by means of water.

**Putting up medicines, etc., in gelatin capsules.** Karl Lüdecke. Ger. 593,271, Feb. 23, 1934 (Cl. 30h. 9.03). Oils or fats are emulsified, with the aid of a choline soap, in neutral or alk. aq. solns. which normally dissolve gelatin, whereby compns. are obtained which, when put up in gelatin capsules, do not dissolve them.

**Therapeutic chondroitin compounds.** Lathan A. Crandall, Jr. U. S. 1,950,100, March 6. Various details and modifications of procedure are described for obtaining from cartilage non-toxic Mg, Ca and Fe salts of chondroitin and chondroitin-sulfuric acid, suitable for the treatment of diseases such as migraine, urticarial eruptions, peptic ulcers, multiple sclerosis, various allergic phenomena, cachectic states assocd. with hepatic cirrhosis, obstruc-

tions in the biliary outflow, general nutritional disturbances and especially in nutrition in cases of Eick fistulae.

**Separating quinine from euquinine.** S. A. Elgazin. Russ. 81,441, Oct. 31, 1933. The aq. soln. of quinine and euquinine salts is treated with Na acetate to ppt. euquinine, which is then washed with hot water to remove quinine salts.

**Separating adrenaline from suprarenal organs.** A. A. Shmuk, N. I. Gavrilov and A. M. Krasilnikov. Russ. 31,582, Oct. 31, 1933. In the electrolytic sepn. of adrenaline the cathode is surrounded by a stream of CO<sub>2</sub> or another inert gas to protect the adrenaline from oxidation.

**Bismuth carboxylates.** Société des usines chimiques Rhône-Poulenc. Brit. 402,762, Dec. 4, 1933. See Fr. 752,768 (C. A. 28, 1145<sup>9</sup>).

**Soluble compounds of arsenic, antimony and bismuth.** I. G. Farbenind. A.-G. (Hans Schmidt, inventor). Ger. 590,582, Jan. 5, 1934 (Cl. 12g. 32.30). Addn. to 573,538 (C. A. 27, 4350). Sol. derivs. of aminoarylarsenobenzenic, -antimony or -bismuth compds. of the general formulas (NH<sub>2</sub>ArAs)<sub>n</sub>As<sub>m</sub>, (NH<sub>2</sub>ArAs)<sub>n</sub>Sb<sub>m</sub> or (NH<sub>2</sub>ArAs)<sub>n</sub>Bi<sub>m</sub>, are obtained by treating the derivs. with alkylene oxides or their derivs., alone or in the presence of CH<sub>3</sub>O-bisulfite or CH<sub>3</sub>O-sulfoxylate. Thus, 4-hydroxy-3-aminophenylarsenacetate in epichlorhydrin alc. is treated with SbCl<sub>5</sub> to give the As-Sb compd. Other examples are given.

**Ethylhydrocupreine derivative.** Laboratori Biochimici S. A. Brit. 403,188, Dec. 21, 1933. See Ger. 557,448 (C. A. 27, 810).

**Esters of amino alcohols.** F. Hoffmann-La Roche & Co. A.-G. Ger. 591,677, Jan. 25, 1934 (Cl. 12g. 32.01). Addn. to 586,247 (C. A. 28, 577<sup>7</sup>). Esters of optically active aryl-substituted aliphatic acids with alcs. of the formula RR'C(CH<sub>2</sub>OH)CH<sub>2</sub>NR<sub>2</sub>, in which R is an alkyl group and R' is H or an alkyl group, are prepd. by standard processes. The products are of therapeutic value. The following compds. have been obtained: (1) esters of *l*-α-phenyl-β-hydroxypropionic acid with 2,2-dimethyl-3-diethylaminopropanol (I) (HCl salt [α]<sub>D</sub> -37°), and 2,2-dimethyl-3-benzylmethylaminopropanol ([α]<sub>D</sub> -30°); (2) esters of *d*-α-phenyl-β-hydroxypropionic acid with I ([α]<sub>D</sub> 37°), 2,2-dimethyl-3-dimethylaminopropanol ([α]<sub>D</sub> 44°), and 2,2-dimethyl-3-piperidinopropanol ([α]<sub>D</sub> 39°).

**Mixtures of lecithin and oil.** Noble H. Thörl G. m. b. H. Fr. 759,007, Jan. 27, 1934. Mixts. of lecithin and oil which will keep are made by mixing soy-bean residues with glycerol, concd. solns. of sugar, molasses or a soln. of dry sugar in dry glycerol.

**Sulfur compounds of monoses.** Kali-Chemie A.-G. (Wilhelm Weber and Oskar Herrmann, inventors). Ger. 590,580, Jan. 10, 1934 (Cl. 12o. 23.03). *l*-Fructose, *d*-glucose, etc., are treated with aq. or aq.-alc. solns. of HCN. Examples are given. The products have therapeutic uses.

**Choline salts of bile acids.** Egon Glücksmann. Ger. 593,258, Feb. 23, 1934 (Cl. 12o. 25). These salts are prepd. by treating bile acids with choline, or by double decompn. between salts of bile acids and of choline. Examples are given of the prepn. of choline cholate and desoxycholate. The products are useful as purgatives.

**Antiscorbutic agent.** Chinoin Gyógyszer- és Vegyszertár Termékek Gyára. Hung. 108,184, Feb. 1, 1934. The juice of fresh or dried fruits (e. g., of paprika) is mixed with a soln. of a heavy metal salt (e. g., acetate of Ba or Pb); the ppt. is sepd. and decompd. by H<sub>2</sub>S or H<sub>2</sub>SO<sub>4</sub>. The freed active matter is concd. and purified by recrystn.

**Substance for cancer treatment.** Evagoras J. Georgiou. Brit. 403,269, Dec. 21, 1933. A substance for treating malignant tumors, especially cancer, is obtained by pptg. serum from the blood of individuals in an advanced stage of pregnancy with alc., sterilizing the ppt. with alc., taking up the ppt. in NaCl soln., e. g., physiol. salt soln., and removing the residual alc. by heating *in vacuo*.

**Bismuth salts suitable for use in treating syphilis, etc.** Maxwell M. Becker (to George A. Breon & Co.). U. S.

1,950,132, March 6. A complex double salt of Bi with mannitol and gluconic acid is suitable for use in soln. by injection. Similar compds. may be formed by use of glycerol, erythritol or adonitol instead of mannitol and by the use of tartaric, salicylic or lactic acid instead of gluconic acid. Various details of prepn. are given.

**Salt mixture.** Karl M. Seifert (to Griffith Laboratories). U. S. 1,950,459, March 13. A powder salt mass is formed the particles of which consist predominantly of NaCl with a minor proportion of another assocd. salt such as KI or other therapeutic agents, etc. (luminous compns. also being described).

**Purgatives.** Richter Gedeon Vegyészeti Gyár R. T. Hung. 108,773, March 1, 1934. Isatin or its derivs. are condensed with phenols or their homologs, and may be mixed with protective colloids or adsorbents.

**Bioactive matter.** Irén Hassan. Hung. 107,509, Dec. 1, 1933. Exts. of hormones or organs are mixed with plant or animal fatty oils and irradiated with infra-red rays. To shorten the time necessary for irradiation, org. and inorg. salts (chlorides, carbonates, nitrates, silicates, stearates, etc.) of Ca, Mn, Bi, Hg, Al or Mg are added. The mixt. is dried and converted to powders or incorporated in liniments.

**Hormones.** Allen & Hanburys Ltd., Norman Evers and Cyril J. Eastland. Brit. 402,433, Dec. 4, 1933.

**Hormone-contg. liquids** are obtained from parathyroid gland by adjusting the pH values of exs. of the gland, made by treatment with alkali solns., to 4.5-5.0, e. g., with H<sub>2</sub>SO<sub>4</sub>, sepg. insof. matter, adding alc. to ppt. alkali sulfates, sepg. the ppts. and evapg. off the alc. The aq. soln. after pptn. may be further treated with alc. and H<sub>2</sub>SO<sub>4</sub>, allowed to stand, adjusted to pH 4.8 with alkali, filtered and freed from alc. by evapn.

**Hormones.** Schering-Kahlbaum A.-G. Brit. 403,344, Dec. 21, 1933. Crystd. derivs. of germinial gland hormones are prepd. by combining the hormones with quinoline. Pure hormones may be obtained by decompn. the compds. with dil. acids. In an example follicle hormone is heated with an equal wt. of quinoline, the whole solidifying to a crystal paste on cooling.

**Impregnating bandages, etc., with iodine.** Asociación de productores de yodo de Chile. Ger. 593,329, Feb. 24, 1934 (Cl. 30i. 8.01). Addn. to 585,197 (C. A. 28, 1474<sup>3</sup>). The process of Ger. 585,197 is applied to bandages, etc., made partly of inmaterial other than silk, e. g., cotton, rayon or wool.

**Disinfectants.** Lehn & Fink Inc. Fr. 759,005, Jan. 27, 1934. A disinfectant is composed of an aq. dispersion of tertiary *p*-amylphenol. If disinfectants such as cresols and xylenols are added, the efficacy of the mixt. is much in excess of the arithmetical mean of the 2 disinfectants.

**Composition for germicidal and other uses from cashew nut shell liquid.** Mortimer T. Harvey (to Harvel Corp.). U. S. 1,950,085, March 6. A distillate is produced from cashew nut shell liquid under atm. pressure and at a temp. range of about 300-400°, which is of germicidal phenolic character.

**Depilatory cream.** Éva Dessoö and Mrs. K. Növág. Hung. 107,485, Dec. 1, 1933. The cream consists of BaS 40, American petrolatum 300, spermaceti 100, stearin 70, tincture of iodine 15, K<sub>2</sub>CO<sub>3</sub> 15 and water 400 g., made up to creamy consistency.

**Solid perfumes.** V. Ya. Serdyukov and P. S. Shandarovskii. Russ. 31,533, Oct. 31, 1933. Melted acetanilide is mixed with MgO or ZnO or with ZnCO<sub>3</sub> and aromatic cryst. substances are introduced. Such substances may be heliotropin, coumarin, etc. Beeswax with stearin or Na soap may also be added and finally scent from synthetic aromatic substances and essential oils are incorporated.

**Tissue filler for corpses.** Erling H. Haabstad (to Hydrol Chemical Co.). U. S. reissue 19,099, March 6. A reissue of original pat. No. 1,899,655 (C. A. 27, 1718).

**Nicotine from tobacco.** Tobacco By-Products & Chemical Corp. Fr. 758,487, Jan. 18, 1934. Free nicotine is expelled along with steam from tobacco and passed through an aq. soln. of an acid which combines with the nicotine.

to form a salt, the reaction being exothermic. The soln. is concd. and the steam used to ext. more nicotine. An app. is described in detail.

**Agent for detoxication of tobacco smoke.** Loránd Osvald. Hung. 108,646, March 1, 1934. Plant fibers are satd. with a soln. of  $\text{ZnCl}_2$  and an alkali tartrate, the excess soln. is removed and the product heated to 120–200°.

**Tobacco.** Sergjusz Pawlowski and Szymon Wojtowicz. Ger. 590,852, Jan. 8, 1934 (Cl. 79c. 1). Tobacco is im-

proved by addn. of 10–35% of sol. carbohydrates such as sugar.

**Treatment of tobacco waste.** Rudolf Hofmann. Ger. 503,259, Feb. 23, 1934 (Cl. 12p. 11.10). Tobacco waste is made alk. and steam-distd. to expel nicotine and other volatile bases, and the residue is carbonized in the absence of air and washed with water and HCl to yield a product useful as an adsorbent. The adsorbent may be used to recover ammonia-free nicotine from the steam-distn. products.

## 18—ACIDS, ALKALIES, SALTS AND SUNDRIES

R. M. SYMMES

**Hydrolysis of magnesium chloride.** G. I. Chufarov and A. P. Lohvitzkaya. *Kaliti* (U. S. S. R.) 1933, No. 8, 24–8. To develop a method for prepn. of  $\text{MgO}$  and HCl from  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  and reduce the steam consumption required by the process formerly reported, a no. of expts. were performed, which show that drying of  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  in 2 stages, 80–116°, and 116–150°, under atm. pressure produced a porous salt of the following approx. compn.:  $\text{MgCl}_2$  67–71,  $\text{MgO}$  19,  $\text{H}_2\text{O}$  32–20%. This salt easily hydrolyzed in 15 min. with steam at 600°; 0.7 part by wt. of steam was consumed to 1 part  $\text{MgO}$  formed. Yields of 15 g.  $\text{MgO}$  (contg. less than 1% Cl) and 30 35% HCl were obtained from 100 g.  $\text{MgCl}_2$ . Steam consumption was reduced 16 times by raising the hydrolysis temp. from 450° to 600°.

James Sorrel

**New growth in the production of liquid carbon dioxide.** A. I. Solov'ev. *J. Chem. Ind. (Moscow)* 1934, No. 1, 76–7.  $\text{CO}_2$  factories should be located near the point where the  $\text{CO}_2$  is to be used.

H. M. Leicester

**The conversion of a gas containing methane and other hydrocarbons by a continuous process.** V. A. Karzhavin and A. G. Lebusch. *J. Chem. Ind. (Moscow)* 1934, No. 1, 34–8; cf. C. A. 28, 14751. Such a gas is first heated to 650° in a cast Fe tube. The heavy hydrocarbons decompose and deposit C, which must be burned out every 5–7 days. The gas is then mixed with 26 8%  $\text{O}_2$  and passed over a Ni catalyst deposited on chamotte. Partial burning of the  $\text{H}_2$  and CO raises the temp. to 1050–1100°. This yields a gas contg. not more than 0.5%  $\text{CH}_4$ , which may be used for  $\text{NH}_3$  synthesis after removal of the CO. Poisoning of the catalyst by S compds. is reversible and slight at high temps.

H. M. Leicester

**Possible means for avoiding phosgene formation in the thermal decomposition of carbon tetrachloride.** B. Biesalski. *Angew. Chem.* 47, 149–51 (1934).—A no. of substances were investigated with respect to their ability to suppress phosgene formation or decrease it below the danger point in the use of  $\text{CCl}_4$  as a fire extinguisher. The app. which was developed for standardization tests is pictured and described. Addns. with catalytic action and  $\text{NH}_3$  failed completely in their expected action. Of the amines only  $\text{McNH}_2$  showed the desired result.

K. K.

**Substituting iron scrap for zinc used for the preparation of hydrogen for welding purposes.** S. Kondrashkin. *Neft* 2, No. 18, 20–1 (1931).—An app. for the generation of H from iron scrap and  $\text{H}_2\text{SO}_4$  is described.

8

A. A. B.

**Magnesium from Solikamsk carnallite.** I. G. Sheherbakov. *Kaliti* (U. S. S. R.) 1933, No. 8, 22 4.—A review of the method for dehydrating  $\text{MgCl}_2$  preparatory to electrolysis. Construction of a plant for dehydration of  $\text{MgCl}_2$  operated by the process developed at Unikhim is recommended, i. e., dehydrating  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  at 400–50° without melting carried out in 2 stages; (a) direct heating to remove most of the  $\text{H}_2\text{O}$  and (b) final drying in electrolytic  $\text{Cl}_2$  in the presence of powd. C in specially designed driers.

James Sorrel

**Commercial extraction of bromine from sea water.** Leroy C. Stewart. *Ind. Eng. Chem.* 26, 301–9 (1934).—Sea water contains 70 p. p. m. of Br. Previous processes (cf. Stine, C. A. 23, 5014) used the reaction  $3\text{NaBr} + 3\text{Cl}_2 + \text{PhNH}_2 = \text{C}_6\text{H}_5\text{Br}_3\text{NH}_2 + 3\text{NaCl} + 3\text{HCl}$ . The new process involves oxidizing NaBr-contg.

brines by  $\text{Cl}_2$  to set free Br, blowing out Br by air, absorbing Br from air by  $\text{Na}_2\text{CO}_3$  to form  $\text{NaBr}$ , from which Br can be obtained as usual or converted into  $\text{C}_6\text{H}_5\text{Br}_3$ . At present, 15,000 lb. of Br per day is recovered as  $\text{C}_6\text{H}_5\text{Br}_3$  at a yield of over 90%.

E. M. Symmes

**Obtaining bromine from bore-hole water in the form of tribromophenol.** A. G. Balchikov, L. A. Demidova and V. S. Efremov. *J. Chem. Ind. (Moscow)* 1934, No. 1, 58–65.—Acidified bore-hole water, from which the  $\text{I}_2$  has been removed, is treated with exactly 1.2 equivs. of  $\text{PhOH}$  and 3 equivs. of  $\text{Cl}_2$  per equiv. of  $\text{Br}_2$ . The reagents are added simultaneously and the mixt. is well stirred for 4 min. The ppt. is allowed to settle for 25–30 min. at 28°, with 2 short periods of light stirring.  $\text{C}_6\text{H}_5\text{Br}_3\text{OH}$  is obtained in 85.4% yield. This is fused with NaOH to recover the  $\text{Br}_2$  as  $\text{NaBr}$ . Full details of com. operations are given. The amts. of  $\text{Cl}_2$  and  $\text{PhOH}$  used may be somewhat reduced when large quantities are used.

H. M. Leicester

**The recovery of fluorine-containing gases in the superphosphate industry.** V. G. Timoshchev. *J. Chem. Ind. (Moscow)* 1934, No. 1, 66–72.—The theoretical reasons for the various steps in the absorption of  $\text{SiF}_4$  are discussed.

H. M. Leicester

**New American iodine industry.** G. Ross Robertson. *Ind. Eng. Chem.* 26, 376–8 (1934).—Oil-well brines in southern California are sand-filtered,  $\text{AgNO}_3$  in amt. equiv. to the I present is added, together with a small amt. of  $\text{FeCl}_3$ , settled, concd., HCl added, scrap Fe added, pptd. Ag removed for re-use, leaving  $\text{FeI}_3$ , which is treated with  $\text{Cl}_2$ ,  $\text{Na}_2\text{Cr}_2\text{O}_7$  and  $\text{H}_2\text{SO}_4$ , or  $\text{NaNO}_2$  and acid, pptg. I, which is melted under concd.  $\text{H}_2\text{SO}_4$ , removed and cooled. The C process involves treating clarified brine with  $\text{H}_2\text{SO}_4$  in amt. equiv. to the  $\text{NaNO}_2$  added later, further settling, adding  $\text{NaNO}_2$  in amt. equiv. to the I present, treating with activated C to absorb the I set free, filtering, treating the C contg. I with NaOH to form  $\text{NaI}$ , which is converted into I by  $\text{H}_2\text{CrO}_4$ – $\text{H}_2\text{SO}_4$ .

E. M. S.

**Obtaining iodine from natural bore-hole water without preliminary acidification.** A. G. Balchikov and V. A. Evstigneev. *J. Chem. Ind. (Moscow)* 1934, No. 1, 54–7.—The  $\text{H}_2\text{O}$  is shaken with 10% of its vol. of kerosene, to remove impurities. It is then shaken for 6–8 sec. with 10% of fresh kerosene and  $\text{Ca}(\text{OCl})_2$  equiv. to 15 g. of active  $\text{Cl}_2$  per l. Free  $\text{I}_2$  is formed and dissolves in the solvent. The kerosene layer is then treated with aq.  $\text{Na}_2\text{SO}_3$ , which reduces the  $\text{I}_2$  to  $\text{NaI}$ . The  $\text{Na}_2\text{SO}_3$  soln. is shaken with fresh kerosene exts. until it contains 2–3%  $\text{I}_2$ . The latter is then liberated with  $\text{KClO}_3$ , and is 90% pure. This method is much cheaper than the acid process.

H. M. Leicester

**Stability of a new chlorine product.** R. H. Aguilar and Lourdes Ocampo. *Philippine J. Sci.* 52, 281–5 (1933).—Lime water is satd. with  $\text{Cl}_2$  under specified conditions and evapd. to dryness, producing a high-test hypochlorite. A freshly prepd. sample contained 61% of available  $\text{Cl}_2$ : after 2 yrs. 35%. Stored for 8 months at 10° there was a loss of 2.46% of available  $\text{Cl}_2$ ; at 28°, 7.80%. This product was more stable than ordinary bleaching powder under conditions in the Philippines.

J. C. Munch

**A new method of formation of rutile.** Heinrich Rheinboldt and Werner Wisfeld. *Ber.* 67B, 375–6 (1934).—

Artificial crystals (colorless, 1-2 mm. long, sp. gr. 4.24) of rutile (pure  $\text{TiO}_2$ , free from Cl) were prepd. by passing 104 g.  $\text{TiCl}_4$  heated on an oil bath at  $134-6^\circ$  and  $\text{O}_2$  (1.5 l. per hr.) for 7 hrs. through a porcelain tube heated to about  $700^\circ$ . Thus 35% of the  $\text{TiCl}_4$  was oxidized. At  $630^\circ$  and  $600^\circ$ , 15 and 10%, resp., were oxidized. The distillate was treated several times in the same manner. No oxychlorides seemed to be present. A. E. Beilich

Industrial utilization of waste materials obtained in the manufacture of alumina from kaolin. P. P. Budnikov. *Chem.-Ztg.* 57, 1000-1 (1933).—Residues from the manuf. of  $\text{Al}_2\text{O}_3$  from kaolin by the  $\text{Na}_2\text{O}-\text{CaO}$  process have the compn.  $\text{SiO}_2$  26.48,  $\text{Al}_2\text{O}_3$  7.59,  $\text{Fe}_2\text{O}_3$  1.35,  $\text{CaO}$  28.50,  $\text{K}_2\text{O}$  1.97,  $\text{Na}_2\text{O}$  13.18, ignition loss 20.72%. Used in suitable proportion (5%) the residue serves as a catalyst in the manuf. of anhydrite cement and as a mixt. (10%) in the manuf. of anhydrite-dolomite cement. When finely ground and mixed with normal sand (1:3) in the Kuhl process it makes a good binder. O. W. Willcox

Working up pyrites slag from sulfuric acid production into copper sulfate and insecticides or fungicides. I. N. Pomerantsev and D. E. Sorkina. *J. Chem. Ind. (Moscow)* 1934, No. 1, 47-54.—One part of ground slag is extd. with 3 parts of 1%  $\text{H}_2\text{SO}_4$ . Each soln. is used for 6 fresh extns., 1%  $\text{H}_2\text{SO}_4$  being used each time. Of the Cu in the slag, 78.7% is removed, and about half as much Fe. Addn. of air during the extn. fails to oxidize the insol. sulfides and so does not increase the yield. The ext. is boiled with  $\text{KClO}_3$  to oxidize all the Fe; then  $\text{CaCO}_3$  is added and the soln. boiled.  $\text{Fe}(\text{OH})_3$  ppts., leaving nearly pure  $\text{CuSO}_4$  in soln. This can be obtained by evapn. of the soln. or the latter may be treated with  $\text{CaCO}_3$ ,  $\text{As}_2\text{O}_3$  or  $\text{Ca}_3(\text{AsO}_4)_2$  to give  $\text{Cu}(\text{OH})_2\text{CuCO}_3$ ,  $\text{CuHAsO}_4$  or  $\text{Ca}_3\text{Cu}_2(\text{AsO}_4)_4$ , resp. If Fe is not first removed, the yields of these compds. fall off, and  $\text{Na}_2\text{CO}_3$  must be added during their prepn. H. M. Leicester

The organic ingredient of fuller's earth. O. Eckart. *Allgem. u. Fett-Ztg.* 31, 9 10 (1934).— $\text{NH}_4\text{OH}$  exts. from 5-g. samples of several earths were acidified and titrated with  $\text{KMnO}_4$ . The amts. consumed were equiv. to 0.00064-0.00136 g. of humic acid. The gravimetric detn. of the org. matter was complicated by the difficulty of removing  $\text{H}_2\text{O}$ . The org. ingredient has no effect upon the activity of the earth. Arnold M. Collins

Concentration of U. S. S. R. graphite ores. I. I. Bekker, D. N. Liffyand, G. A. Osolodkov, S. S. Petrov, S. A. Kamenetskii, V. A. Glazkovskii and P. P. Solov'ev. *Inst. Mekhanicheskoi Obrabotki Polesnuikh Iskh. resur. (Inst. for Mech. Treatment of Ores) Collected Papers on Expl. Concn., Leningrad, 1932, 212 pp.*—The graphite industry in Russia in 1928 reached the pre-war volume of 2000 tons per year. The Pribug district contains about 225,000 tons of scaly graphite; Krivorog graphite is estd. at 1,500,000 tons; the Priazov district has about 1,685,700 tons; and Caucasian deposits are estd. at 1,000,000 tons. Most of these deposits contain about 80% ash and about 15% C. Other deposits are Kureisk and Aliberovsk, estd. at 2,250,000 and 65,000 tons, resp. Deposits recently discovered near Khabarovsk are estd. at 522,316,810 tons. The graphite requirements for the year 1932-3 are, for crucibles 3750, for electrodes 3500, colloidal graphite 2500, metallurgical 12,000, other requirements 4831 tons, a total of 26,531 tons. All concn. methods, except the electromagnetic, were tried out. Pine tar and kerosene, together or separately, were used as flotation agents. Flotation was followed by several washings, in some cases 5. Lab. and com.-scale expts. in various plants gave a large increase in the production of domestic graphite concentrates. Calcns. are given for plants to be located in various parts of the country. Expts. were also made to det. the best method of grinding the ore. The av. results for Russian graphites were graphite 11.5-25, quartz 50-60, mica 5-38, clay 10-27, Fe oxides 0.5-2%. Numerous tables, graphs, photographs and micrographs are given. S. L. Madorsky

Determination of  $p_H$  value in the production of organic urea glasses. Maurice Dérivé. *Rev. gén. mat. plastiques* 9, 406-8 (1933).—The importance of  $p_H$  detns. for

the mfg. control of urea-formaldehyde condensation products is pointed out, and the technic of its potentiometric detn. is described. A. Papineau-Couture

Plastics made from asbestos and rubber base. Dewey. *Rev. gén. mat. plastiques* 9, 414-15, 513-15 (1933); 10, 20-4 (1934); cf. C. A. 27, 1118, 2844, 3571, 3640, 4130, 4717.

A. Papineau-Couture  
The "vegetable ivory" button industry. L. Replat. *Rev. gén. mat. plastiques* 9, 660-3 (1933).—A brief description of the manuf. of buttons from the nuts of *Phytolophus microcarpa*, including dyeing and bleaching. A. P. C.

The making of putty plastics, in all its details. E. Perry. *Paint Varnish Production Mgr.* 10, No. 3, 16-19, No. 4, 24-7 (1934).—Users' requirements of putty vary widely. Formulations for a large no. of types of putty are given. G. G. Sward

The manufacture of wood flour. K. Diesing, P. Heymann and H. Rothgiesser. *Rev. gén. mat. plastiques* 9, 665-70 (1933).—A description of the production of wood flour suitable for use in the manuf. of plastics.

A. Papineau-Couture  
Ethylene oxide as fumigant. A. Hasc. *Arb. biol. Reichs. Land- u. Forstwirtschaft. Berlin-Dahlem* 20, 101-10 (1932).— $\text{C}_2\text{H}_4\text{O}$  has high penetrability. Sixty g. per cu. m. is toxic to insect eggs in 24, but not in 8, hrs. (cf. Z. Parasitenk. 4, 369-80 (1932)). B. C. A.

Use of thallium torpedoes [for rat control]. R. E. Doty. *Hawaiian Planters' Rec.* 37, 96 7 (1933); cf. C. A. 27, 803.—Torpedoes treated with paraffin and corn oil were eaten 4 times as readily by rats as were those treated with paraffin alone. Torpedoes dipped in paraffin that has been heated at too high a temp. became yellowish in color, developed a bad odor and were unpalatable to rats. The dipping should be carried out at a temp. not exceeding  $125^\circ$ , to prevent decmpn. of the paraffin. K. D. Jacob

Bardini, R. I.: Liscive liquide. Milan: U. Hoepli. 128 pp. L. 8. Reviewed in *Nomenclatura chim.* 4, 39 (1934).

Boric acid production from borax. Emil Franke (to Chemische Fabrik Grünau Landshoff & Meyer A.-G.). U. S. 1,950,106, March 6. Borax and concd.  $\text{H}_2\text{SO}_4$  are added to a mother liquor heated to about  $90-100^\circ$  and contg.  $\text{Na}_2\text{SO}_4$  and  $\text{H}_3\text{BO}_3$ , thus pptg. anhyd.  $\text{Na}_2\text{SO}_4$ , which is filtered out of the soln.; the filtrate is cooled to  $30-5^\circ$  to effect crys'n. of  $\text{H}_3\text{BO}_3$ ; the  $\text{H}_3\text{BO}_3$  crystals are removed, and the mother liquor is heated to  $90-100^\circ$  for further use in a cyclic process with more borax and concd.  $\text{H}_2\text{SO}_4$ . Cf. C. A. 28, 2132.

Nitric acid. Harry Pauling. Ger. 593,440; Feb. 26, 1934 (Cl. 12i. 26). See Fr. 752,042 (C. A. 28, 802\*).

Nitric acid. Harry Pauling. Ger. 759,258, Jan. 31, 1934. The interior of reaction chambers for making  $\text{HNO}_3$  is provided with heat exchangers in the form of truncated cones made of good heat-conducting materials and mounted on hanging cables or chains.

Mixture of phosphoric and hydrochloric acids. F. G. Farbenind. A.-G. (Friedrich A. Henglein and Friedrich W. Stauff, inventors). Ger. 590,807, Jan. 11, 1934 (Cl. 12i. 31). The above mixt. is obtained by treating  $\text{PCl}_5$  with water in iron vessels. Cf. C. A. 28, 1477\*.

Phosphoric acid. Chemische Fabrik Budenheim A.-G. (Guido Hedrich, inventor). Ger. 593,370, Feb. 24, 1934 (Cl. 12i. 31). Crude  $\text{H}_3\text{PO}_4$  prepd. from crude phosphates and  $\text{H}_2\text{SO}_4$ , is freed from compds. of Fe, Cr and V, which color it green, by treatment first with an oxidizing agent and then with a ferrocyanide of Ba and (or) K in an amt. corresponding to the amts. of Fe, Cr and V. The oxidizing agent may be  $\text{PbO}_2$ ,  $\text{BaO}_2$  or  $\text{H}_2\text{O}_2$ , and the acid should be treated at a  $\text{P}_2\text{O}_5$  concn. of at least 25% and preferably at the b. p. After the pptd. compds. of Fe, etc., have been removed, the acid may be further purified, if necessary, by treatment with a compd. of Ba, e. g.,  $\text{Ba}(\text{OH})_2$  and (or) a compd. of K, e. g.,  $\text{K}_2\text{CO}_3$ , whereby  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{SiF}_6$  are eliminated.

**Sulfuric and nitric acids.** Pierre Kachkaroﬀ and Camille Matignon. Brit. 402,529, Nov. 30, 1933. See Fr. 741,724 (C. A. 27, 2765).

**Sulfuric acid.** Harry Pauling. Fr. 758,147, Jan. 11, 1934. In a continuous process for concg. residual  $H_2SO_4$  wherein the high concn. takes place by the introduction of the acid into boiling concd.  $H_2SO_4$ , the steam which escapes from the dephlegmator of the vessel of high concn. serves to concentrate preliminarily the dil.  $H_2SO_4$  charged with impurities, and a part of the steam condensed during this operation is sent back to the dephlegmator. The  $H_2SO_4$  thus concd. is further concd. by the gases escaping from the high concn. heating before its introduction to the boiling acid, and the steam liberated in this 2nd step is returned to the preliminary concn. under vacuum after being united with the steam from the dephlegmator. An app. is described.

**Sulfuric acid.** Harry Pauling. Fr. 758,460, Jan. 18, 1934.  $H_2SO_4$  contg. oxides of N is denitrated in a column divided into 3 parts, with steam and air. The air is blown into the lower end of the lowest part of the column and passes in the form of a mixt. of air and steam in counter-current with the acid in the upper part, avoiding the central part, while undil. steam is introduced into the central part. The acid traverses the 3 parts of the column downwardly.

**Sulfuric acid.** René Moritz. Ger. 590,003, Jan. 15, 1934 (Cl. 12, 25). The construction of a Pb chamber for the prepn. of  $H_2SO_4$  is described.

**Alkali cyanides.** N. V. Stikstofbindingsindustrie "Nederland." Fr. 759,040, Jan. 27, 1934. See Ger. 588,823 (C. A. 28, 2132).

**Alkali sulfates.** Kali-Chemie A.-G. (Friedrich Rüsberg and Bruno Uchler, inventors). Ger. 590,633, Jan. 6, 1934 (Cl. 12, 5). Alkali sulfates and  $MgCO_3$  are prepd. by treating an aq. soln. of kieserite with  $(NH_4)_2CO_3$  or  $NH_4OH$  and  $CO_2$ . The ppt., which consists of the Mg part of the kieserite in the form of  $MgCO_3$ , is removed, leaving a soln. of  $(NH_4)_2SO_4$ . This is treated with solid alkali chloride and  $NH_4OH$  to give a ppt. of alkali sulfate.

**Converting alkali sulfates to hydroxides or carbonates.** Gyula Zorkóczy and Vilmos Weisz. Hung. 108,039, Jan. 15, 1934. Sulfates are reduced to sulfides and these decompd. by superheated steam or a mixt. of superheated steam and  $CO_2$ .

**Aluminates and hydrochloric acid.** Ivar Rennerfelt and Axel Sigurd Burman. Ger. 590,634, Jan. 10, 1934 (Cl. 12m. 5). Aluminiferous materials are treated with NaCl in the presence of C and  $SO_2$ . The raw material is dissolved in HCl to remove  $SiO_2$  and the resulting soln. evapd. App. is described.

**Aluminum salts.** J. R. Geigy S. a. Fr. 757,907, Jan. 8, 1934. Fe is removed from solns. of acid salts of Al by transforming the Fe to the ferrous state if necessary and treating the hot soln. with a slight excess of  $\beta$ -naphthalene-sulfonic acid or a sol. salt thereof and sepg. the ppt. in the cold by filtration.

**Alkaline earth nitrates.** Harry Pauling. Fr. 758,747, Jan. 22, 1934. See Ger. 588,274 (C. A. 28, 2133).

**Decomposing silicates.** Félix Jourdan. Brit. 402,977, Dec. 14, 1933. The silicate, e. g., 1 contg. Na, K or Li, and an aq. soln. of acid, e. g., HCl,  $HNO_3$ , are placed in the higher and lower parts, resp., of a closed container and the liquid is heated to produce a vapor which condenses over the silicate, the condensate with the dissolved substances falling into the soln. In an example leucite is extd. with  $HNO_3$ . Cf. C. A. 28, 2474.

**"Per compounds" such as percarbonates and peroxides.** Josef Müller. U. S. 1,950,320, March 6. A starting material capable of combining with  $H_2O_2$ , such as  $Na_2CO_3$ ,  $MgO$  or  $CaO$ , is treated with such a restricted quantity of an aq.  $H_2O_2$  soln. and in such a uniform manner that a moist mixt. is not even temporarily produced, and the water content of the product is still further reduced by careful drying before the liquid is fully bound. NaCl or  $MgCl_2$  and Na silicate or other stabilizers are used.

**Peroxide solutions.** H. Th. Böhm A.-G. Fr. 758,986, Jan. 26, 1934. See Brit. 403,035 (C. A. 28, 2923).

**Compounds of sesivalent chromium.** Bozel-Malétra (Société industrielle de produits chimiques). Ger. 590,662, Jan. 8, 1934 (Cl. 12m. 8). These compds. are prepd. by oxidizing  $Cr(OH)_3$ ,  $Cr_2O_3$  or materials contg. them at high temps. and pressure and in the presence of an alk. or alk. earth base. Thus,  $Cr_2O_3$  hydrate contg. 80% of the oxide is heated to 200–300° in an autoclave with O at 50–100° atm. in the presence of NaOH, to give  $Na_2Cr_2O_7$ .

**Molybdates, titanates, tungstates, vanadates and uranates.** Metallges. A.-G. and Max G. Freise. Brit. 403,025, Dec. 14, 1933.  $H_2O$ -sol. compds. of Mo, Ti, W, V and U are obtained by heating materials, contg. said metals, with an alkali metal compd., e. g.,  $Na_2CO_3$ , in a directly heated rotary-tube furnace. A reducing agent, e. g., coke, coal, may be added to the charge and easily reducible metals, e. g., Sn, Pb, Sb, may be reduced and sepd. and the remaining charge concd., adjacent to the reduction zone, in a pasty condition and fused shortly before leaving the furnace. Oxidic compds. of the alk. earth metals or similar substances that combine with or expel As and S may be added when these are present.

**Caustic potash and oxalic acid.** Rudolph Kuepp & Co. Chemische Fabrik A.-G. Fr. 759,316, Jan. 31, 1934.  $K_2SO_4$  is treated with an alk. earth formate to form  $HCOOK$  which is converted to K oxalate by heating and this changed to KOH and alk. earth oxalate. The KOH lye is sepd. and the oxalate treated with  $H_2SO_4$  to obtain oxalic acid.

**Alumina.** Jean C. Séailles. Fr. 759,012, Jan. 27, 1934.  $Al_2O_3$  is made by dilg. a Ca aluminate in water and pptg.  $Al(OH)_3$  or  $Al_2O_3$  and  $CaO$  by an appropriate reagent.

**Aluminum sulfate.** Merriam Chemical Co., Inc. Brit. 403,657, Dec. 27, 1933.  $Al_2(SO_4)_3$  is obtained by the reaction of sludge acid, resulting from the refining of oils with  $H_2SO_4$ , and calcined clay bodies which do not undergo substantial decrepitation under the conditions of the reaction. The acid should be dild. to 30–35% concn. before use, sepd. hydrocarbons being removed. The clay bodies may be molded and of various shapes and sizes. Extg. app. is described. The residue from the extn., after heating to about 700° in an oxidizing atm., consists of chemically active  $SiO_2$  and may be powd. and used for filling paper or filtering and clarifying oils. Cf. C. A. 28, 2475.

**Alum; aluminum sulfate.** Wm. B. Llewellyn and Peter Spence & Sons Ltd. Brit. 402,410, Nov. 20, 1933. Hot  $H_2SO_4$  is circulated through a mass of small pieces of uncalcined freshly mined and (or) unweathered coal-measure shales contg.  $Al_2O_3$  and  $K_2O$ , until the acid is neutralized to the required extent. As the digesting solns. approach neutrality they are maintained at sp. gr. 1.45–1.56 to prevent pptn. of basic salts contg. Al, Fe and K and to assist neutralization of the remaining acid. By sepg. the soln. while still somewhat acid and adding  $(NH_4)_2SO_4$  or  $K_2SO_4$ , alums are obtained. For the production of  $Al_2(SO_4)_3$  a fully neutralized soln. is dild. and cooled to sep. its K content as alum and the remaining soln. is concd. and cooled to crystallize  $Al_2(SO_4)_3$ .

**Ammonium sulfate.** W. C. Holmes & Co. Ltd. Ger. 593,312, Feb. 24, 1934 (Cl. 12, 7). See Brit. 356,283 (C. A. 26, 4422).

**Ammonium trinitrate.** Stockholms Superfosfat Fabriks Aktiebolag. Brit. 403,289, Dec. 21, 1933.  $NH_4NO_3$  is caused to react with a 90–99%  $HNO_3$  and the resulting soln. cooled to or below the m. p. of the  $NH_4$  trinitrate formed, i. e., 29°. The pptd. salt may be sepd. by centrifugal separators.

**Triammonium phosphate; potassium carbonate.** I. G. Farbenind. A.-G. (Robert Suchy and Rudolf Schulze, inventors). Ger. 593,371, Feb. 28, 1934 (Cl. 12, 7). A dil. soln. of a phosphate of K is satd. with  $NH_3$  in the presence of sufficient  $(NH_4)_2CO_3$  to convert all the K into  $K_2CO_3$ . A ppt. of  $(NH_4)_2PO_4$  and a soln. contg.  $K_2CO_3$  are obtained. A suitable starting material is a 23.4% soln. of  $K_2HPO_4$ .

**Barium oxide.** Kali Chemie A.-G. Ger. 590,874, Jan. 13, 1934 (Cl. 12m. 1). Highly porous  $BaO$  is

obtained by heating  $\text{BaCO}_3$  mixed with C in a current of dry inert gas,  $\text{CO}_2$  and oxidizing constituents.

Aqueous barium sulfate suspensions for x-ray purposes. Béla Moskovits. Hung. 108,618, March 1, 1934. Artificial or natural silicates (e. g., bentonite) or  $\text{SiO}_2$  gel, with or without such colloids as gum tragacanth, are used to hold  $\text{BaSO}_4$  in suspension for hrs.

**Beryllium fluoride.** Compagnie de produits chimiques et électrométallurgiques Alais, Fröges et Camargue. Fr. 757,932, Jan. 8, 1934. See Ger. 586,244 (C. A. 28, 588<sup>9</sup>).

**Calcium nitrate.** Otto Kippe and Klöckner-Werke A.-G. Ger. 590,855, Jan. 11, 1934 (Cl. 12m. 2).  $\text{Ca}(\text{NO}_3)_2$  is obtained, together with  $\text{MgO}$ , by treating burned dolomite with  $\text{HNO}_3$ . Examples are given.

**Calcium nitrate; magnesia.** Klöckner-Werke A.-G. Brit. 403,054, Dec. 14, 1933.  $\text{MgO}$ , poor in  $\text{CaO}$ , and a concd.  $\text{Ca}(\text{NO}_3)_2$  soln. are obtained by pptg. a soln. of dolomite in  $\text{HNO}_3$  by  $\text{CaO}$  or calcined dolomite in the presence of  $\text{NH}_3$  or an  $\text{NH}_4$  salt, e. g.,  $\text{NH}_4\text{NO}_3$ . The ammoniacal  $\text{Ca}(\text{NO}_3)_2$  soln. obtained may be evapd. to recover  $\text{NH}_3$  for re-use, and solid  $\text{Ca}(\text{NO}_3)_2$ , or neutralized with  $\text{HNO}_3$  to obtain a mixt. of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NH}_4\text{NO}_3$  for use as fertilizer.

**Dissolving cadmium with sulfuric acid in the presence of iron.** Harry P. Corson (to Grasselli Chemical Co.). U. S. 1,949,929, March 6. Cd is dissolved with boiling dil.  $\text{H}_2\text{SO}_4$  soln., the Fe serving to accelerate attack of the Cd by the acid.

**Copper and zinc sulfates from brass.** Harry P. Corson (to Grasselli Chemical Co.). U. S. 1,949,927, March 6. In effecting reaction of hot dil.  $\text{H}_2\text{SO}_4$  on brass, compressed air is introduced into the reaction mixt. and it is maintained at a temp. above  $100^\circ$ , in acid condition and under superatm. pressure.

**Copper sulfate from copper and its alloys such as brass.** Harry P. Corson (to Grasselli Chemical Co.). U. S. 1,949,928, March 6. The metal is reacted upon under superatm. pressure, while heated and in the presence of water, with a gas comprising  $\text{SO}_2$  and O.

**Sodium carbonate.** Electrochlore (Soc. anon.). Fr. 758,327, Jan. 15, 1934.  $\text{Na}_2\text{CO}_3$  is crystd. from a satd. soln. in a rotary crystallizer, water being evapd. by compressed air or the action of vacuum, or the soln. is cooled by flowing water on the outside of the crystallizer.

**Packing sodium hydroxide in cylindrical drums.** K. M. Goldberg. Russ. 31,809, Oct. 31, 1933. Disks are inserted in the drums at certain intervals. The molten  $\text{NaOH}$  is poured into the drum and is sepd. into cakes by the disk partitions.

**Sodium phosphate.** Chemische Werke vorm. H. & E. Albert (Hans Huber, inventor). Ger. 590,661, Jan. 8, 1934 (Cl. 12i. 31). Raw material contg. Al phosphate is heated with  $\text{Na}_2\text{CO}_3$  and water to  $500^\circ$  in an autoclave. The resulting Na Al phosphate mass is lixiviated with excess of  $\text{NaOH}$  to give the  $\text{Na}_3\text{PO}_4$  and Na aluminate which are sepd. by usual methods.

**Continuous manufacture of pure carbon dioxide and alkali hydroxides and (or) pure sulfur dioxide and salts of strong acids.** F. Leroy. Belg. 398,729, Oct. 31, 1933. Sulfites are produced from carbonates and gases with low  $\text{SO}_2$  content. The alkali sulfite is treated with lime, with formation of caustic alkali. The pptd.  $\text{CaSO}_3$  is sepd. by filtration and is either returned to the cycle of operations or is treated with  $\text{HNO}_3$  to produce  $\text{Ca}(\text{NO}_3)_2$  and pure  $\text{SO}_2$ .

**Purifying salt solutions.** Geza Austerweil and Charles Jeanprost. Brit. 402,770, Dec. 4, 1933; 402,953, Dec. 14, 1933. See Fr. 739,675 (C. A. 27, 2258).

**Preparing and purifying salt solutions.** Geza Austerweil and Charles Jeanprost. Brit. 403,077, Dec. 4, 1933. Divided on 402,770 (preceding abstr.). The prepn. of salt solgs. from solns. of 2 reacting salts is effected by use of a predetd. excess of a mass of mixed base exchangers contg. mobile cations corresponding to the cations of the reacting salts, the mass being so graded that it contains solely cations of 1 kind at 1 end and only cations of the other kind at the other end and the proportions of

each cation in intervening portions of the mass varying gradually. To effect reaction, relatively small and equiv. quantities of the 2 salt solns. are passed through the mass alternately and slowly in opposite directions (or the mass through the 2 solns., resp.). A pure soln. of a salt may be obtained from solns. contg. 2 salts by bringing the soln. first into contact with that part of the exchanger having the same proportion of cations as exists in the soln., the latter in its flow encountering progressively base exchangers contg. increasing quantities of cations of the salt that is to be produced pure. In 1 example  $\text{KNO}_3$  soln. is obtained by passing solns. of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{KCl}$  alternately in opposite directions through a graded mixt. of Ca and K zeolites. Other examples are given.

**Metals from salts.** Tréfileries et Laminoirs du Havre. Brit. 403,469, Dec. 28, 1933. See Fr. 743,183 (C. A. 27, 3785).

**Oxygen.** Marcel Manen. It. 758,827, Jan. 24, 1934. O is obtained by decompn. of a mixt. contg.  $\text{KClO}_4$  40,  $\text{KClO}_3$  40,  $\text{Fe}_2\text{O}_3$  3, wood charcoal 2 and infusorial earth 15%.

**Carbon.** Georges Boname. Fr. 758,824, Jan. 24, 1934. C is formed by passing  $\text{CO}$ , under high pressure or not, upwards at a speed below the critical (about 5 cm. per sec. at  $400^\circ$ ) through the C deposited by wt. in the reaction vessel contg. a catalyst such as  $\text{Fe}_2\text{O}_3$ . The C accumulates in the app. and finally escapes when it meets a gaseous current having a speed sufficient to carry it toward the exit. An app. is described.

**Carbon black.** N. V. de Bataafsche Petroleum Maatschappij. Brit. 402,322, Nov. 30, 1933. See Fr. 754,767 (C. A. 28, 1483<sup>9</sup>).

**Galalith.** A. S. Ryahov. Russ. 31,610, Oct. 31, 1933. In the prepn. of galalith with soap as plasticizer an acid such as  $\text{HCl}$  is added to the formalin bath.

**Burner of the rotary type for burning elemental sulfur.** Glen H. Prantz (to Grasselli Chemical Co.). U. S. 1,949,933, March 6. The rotary drum of a S burner is provided with internal projecting spikes having a length at least one-eighth the diam. of the shell.

**Catalysts.** I. G. Farbenind. A.-G. Brit. 402,938, Dec. 14, 1933. A catalyst carrier, e. g., (1) carbonaceous materials such as brown coal, coke, active C, wood charcoal, coal and peat, or (2) mineral substances such as bauxite, Florida earth,  $\text{Al}_2\text{O}_3$ , bentonite, active  $\text{SiO}_2$ , burnt clay and magnesite, is treated with (gases supplying free) H, preferably at  $300-50^\circ$  and at least 20 atm., before it is provided with all of the catalytic substance, which may be metals of the 2nd-8th groups or oxides, hydroxides, sulfides, carbonates, halides or other compds. thereof. The catalysts thus prepd. are applicable to the destructive hydrogenation of carbonaceous materials, the conversion of hydrocarbons such as middle oil, benzene, etc., into non-knocking motor fuels, the removal, by hydrogenation, of O, S and N compds. from carbonaceous material, the conversion of O and S compds., e. g., phenols, into hydrocarbons, and the hydrogenation of unsatd. and aromatic hydrocarbons.

**Condensation products.** I. G. Farbenind. A.-G. Fr. 757,841, Jan. 5, 1934. Phenols or their derivs. are caused to react with unsatd. acids such as oleic acid in the presence of B fluoride. The products are either viscous oils or may be drawn into threads.

**Condensation products of phenols with aldehydes.** G. S. Petrov. Russ. 31,614, Oct. 31, 1933. The condensation is carried out in the presence of fillers.

**Condensation products of shale tars with aldehydes.** S. N. Ushakov and G. S. Brodskii. Russ. 31,613, Oct. 31, 1933. The condensation is carried out in the presence of an acidic or alk. catalyst, mainly with a gasoline-stripped fraction of Baltic shale-oil tar b.  $170-320^\circ$  or of the alkali ext. of this tar, whereby the condensation product is freed from hydrocarbons by washing, and the mixt. is dried together with fillers.

**Plastic composition.** Carl F. Prutton (to Dow Chemical Co.). U. S. 1,950,516, March 13. In making a plastic compn. which is suitable for molding, etc., methylene dichloride and Na phenate are caused to react together.



(suitably by heating to 100–90° for 6 hrs. in the presence of a catalyst such as  $(\text{NH}_4)_2\text{CO}_3$ ).

**Plastic compositions.** Dunlop Rubber Co. Ltd., Douglas F. Twiss and John A. Wilson. Brit. 403,142, Dec. 21, 1933. A compn. of 2 or more insol. plastics dispersed 1 within the other so that the product contains 3 or more phases successively enveloping one another, all the phases except the last being in dispersed condition, is made by dispersing 1 of the plastics in another as the continuous phase, dispersing the mixt. obtained in a 3rd plastic, which may be identical with the 1st, and repeating the operations to obtain the desired no. of phases. Examples of 3-phase compns., the innermost phases being placed 1st, are (1) casein (I), rubber, I, (2) urea- $\text{CH}_2\text{O}$ , I, urea- $\text{CH}_2\text{O}$ , (3) vulcanized rape oil, I, rubber, etc.

**Plastic compositions.** Helmut Fritz and Emil Glaser. Brit. 403,230, Dec. 21, 1933. See Fr. 752,452 (C. A. 28, 11547).

**Preparing plastic masses.** N. I. Artem'ev. Russ. 31,811, Oct. 31, 1933. In the prepn. of plastic masses with the application of yeast, the latter is treated in a dry condition with strong  $\text{H}_2\text{SO}_4$ , washed and dried.

**Plastic materials.** I. G. Farbenind. A.-G. Fr. 758,454, Jan. 18, 1934. Polyvinyl halides, the halogen content of which is above 1 but below 2 atoms for each vinyl group, are used with cellulose derivs., pigments, fillers, dyes, softeners, etc., in admixt. if desired with other substances of a high degree of polymerization.

**Hardening plastic compositions containing casein.** International Galath-Ges. Hoff & Co. (Henri Dumont, inventor). Ger. 593,224, Feb. 23, 1934 (Cl. 39b. 18). Addn. to 588,177 (C. A. 28, 14859). Alkali and alk. earth thiocyanates are used as hardening accelerators in the process of Ger. 588,177.

**Apparatus for making films of glue, casein, etc.** Stockholm Bannjolsfabriks Aktiebolaget. Fr. 757,892, Jan. 5, 1934 and 268,000, Jan. 8, 1934.

**Casein glue and polish.** A. S. Ryabov. Russ. 31,532, Oct. 31, 1933. A soln. of casein is prepd. in the usual manner and condensation products of formalin with an excess of  $\text{NH}_3$  are added.

**Adhesives.** Victor C. É. Le Gloahec. Fr. 758,768, Jan. 23, 1934. A transparent adhesive for cellulose sheets contains gelatin,  $\text{H}_2\text{O}$ ,  $\text{ZnCl}_2$  and water.

**Adhesive and coating composition suitable for use on paper, etc.** Louis L. Larson (to Grasselli Chemical Co.). U. S. 1,949,914, March 6. Na silicate and cupramino solus. are mixed together in specified proportions to form a water-resistant adhesive.

**Adhesive suitable for plywood manufacture.** George H. Osgood. U. S. 1,950,060, March 6. An adhesive is prepd. by reaction of a vegetable seed meal or flour such as that of soy beans with water,  $\text{NaOH}$ , lime,  $\text{Na}_2\text{CO}_3$ ,  $\text{Na}_2\text{PO}_4$ ,  $\text{CS}_2$  and a proportion of an aldehyde bisulfite compd. equal to about 0.5–5.0% of the meal or flour which improves the spreading properties of the product.

**Bonding composition.** Joseph Rogerson and Arderne, Scott, Thesen Ltd. Brit. 403,159, Dec. 21, 1933. A wheel for treating fiberboard or wood molding, etc., has abrasive material spread upon, or mixed with, bonding material comprising a mixt. of pptd. chalk 40–50,  $\text{ZnO}$  25–30,  $\text{MnO}_2$  10–15, dry casein 10–15 parts, to which is added Na silicate of 81°Tw. in sufficient amt. to form a cementing mass.

**Multi-colored thermoplastic materials.** Celluloid Corp. Brit. 402,974, Dec. 14, 1933. A no. of portions of the material is worked, in a series of stages, into a coherent mass under heat and pressure so as to distribute throughout the mass a coloring agent, contained in the surface of at least 1 of the portions and of different color than the bulk of the portion. Various plasticizers for the material may be used.

**Porous articles.** Siemens & Halske A.-G. Fr. 757,864, Jan. 5, 1934. Oxides of Al, Be, Cr, Mn, Zr, Mg or Hf are fused, ground, screened to a detd. size, made into a paste by the addn. of a mud, made with the same or a similar material, and activated by a dil. acid, until a friable mass is obtained. The articles are formed by

pressing and agglutinated at a temp. above 1000°. Fr. 757,995, Jan. 8, 1934. A dil. acid is added to the finely ground material and a concd. acid to the larger-grained material so that a uniform extn. of moisture, with a min. period of absorption in the molds, is obtained.

**Adsorption compositions.** "Maximine" Soc. anon. Ger. 593,328, Feb. 21, 1934 (Cl. 30i. 5.01). See Fr. 690,684 (C. A. 25, 1344).

**Coating composition.** Arthur M. Dunstone. Brit. 402,805, Dec. 14, 1933. See Australia 2921–31 (C. A. 27, 3791).

**Artificial sheets.** I. G. Farbenind. A.-G. Fr. 757,786, Jan. 4, 1934. The elec. charge on sheets and other collod products of a high degree of polymerization is diminished by utilizing as constituents either in or on the products, polymeric polycarboxylic acids or their salts, or mixed polymerization or condensation products which contain polymeric polycarboxylic acids or their salts, e. g., a mixed polymerization product of acrylic acid nitrile and Na acrylate in acetone and MeOH, or a mixed polymerization product of polyvinyl chloride and polyacrylic acid in  $\text{CH}_2\text{Cl}_2$ .

**Magnetic cores.** Vladimir J. Polydoroff (to Johnson Laboratories, Inc.). Brit. 403,368, Dec. 18, 1933. A magnetic core material for radio-frequency inductance coils and transformers comprises a compressed mass of finely divided magnetic material bound by an insulating binder, the particles being fine enough to pass through a 400-mesh sieve and insulated from one another by a solid insulating material in addn. to the binder. Thus powd. Fe, prepd. by heating powd. Fe oxides in  $\text{H}_2$  is mixed with China wood oil varnish or a soln. of PhOH resin in  $\text{Me}_2\text{CO}$ , dried in air and baked. The insulated particles are then mixed with an insulating binder, placed in molds heated to 100° and subjected to 5–25 tons per sq. in. pressure, being finally treated so as to harden the binding material.

**Material for magnetic sound records.** Jacques E. Languelin (to Radio Corp. of America). U. S. 1,949,840, March 6. A backing of non-magnetic material such as paper is provided with a layer of magnetic particles which during their application to the backing are subjected to the action of a magnetic field to give them a definite arrangement such as to constitute a sound record.

**Friction facing material for brake linings or the like.** Raymond J. Norton (to Bendix Brake Co.). U. S. 1,950,262, March 6. Thin sheets of fibrous material such as an asbestos material are each treated with a non-oilaceous lubricant such as graphite or talc and bonded with a resinoid such as a furfural-phenol resin.

**Luminous substances.** I. G. Farbenind. A.-G. Brit. 403,233, Dec. 21, 1933. See Ger. 590,256 (C. A. 28, 2738).

**Cleansing agents.** Ramón Kovira-Fábregas and Julio Morin-Ostheim. Fr. 758,188, Jan. 11, 1934. The formation of lumps is avoided and the rate of soln. is increased by mixing with powd. or granulated cleansing agents a product capable of provoking a liberation of gas, e. g., a carbonate or bicarbonate and tartaric acid.

**Cleaning silver articles.** Fritz Sturmthal. Ger. 599,473, Feb. 19, 1934 (Cl. 48a. 1.03). The articles are placed in an Al vessel contg. a soln. of  $\text{NaHCO}_3$ , soap and an alkali. A suitable soln. is prepd. by dissolving in 1 l. of water 10 g. of a mixt. contg.  $\text{NaHCO}_3$  92.5, soap 5 and glucose 2.5%.

**Polishing, impregnating, dressing and other compositions.** I. G. Farbenind. A.-G. Brit. 402,513, Dec. 7, 1933. The compns. comprise waxy polymerized ethers of vinyl alc. and aliphatic alcs. contg. at least 10 C atoms and solvents therefor. Waxes, oils, (synthetic) resins, glues, abrasives, coloring materials and emulsifying agents may be added. Among examples (1) a liquid polish for linoleum, leather or wood is prepd. by dissolving 40 parts of polymerized vinyl octodecyl ether in 60 of a benzine fraction boiling at 150–90° and adding 0.4 part of Sudan Orange R; (2) an impregnating liquid for waterproofing wood consists of 30 parts polymerized vinyl cetyl ether and 2 of mineral oil fraction of sp. gr. 0.899 dissolved in PhMe 68 parts.

**Polishing or grinding appliances.** Deutsche Carborundum-Werke G. m. b. H. Ger. 593,499, Mar. 1, 1934 (Cl. 80b. 11). Polishing or grinding appliances are made from a mixt. of an org. binder, e. g., a  $\text{PhOH}\cdot\text{CH}_2\text{O}$  condensation product, with a trivalent metal oxide, e. g.,  $\text{Al}_2\text{O}_3$ ,  $\text{Cr}_2\text{O}_3$ , or  $\text{Fe}_2\text{O}_3$ , which has been obtained by pptg. and calcining the corresponding hydroxide.

**Floor polish.** János Bárány. Hung. 108,265, Feb. 1, 1934. One part resin and 3 parts paraffin are melted and poured into gasoline (in the ratio 1:6).

**Pencil leads.** (Firm of) J. S. Staedtler (personally responsible partners, Rudolf Kreutzer, Walter Kreutzer and Karl Kreutzer). Brit. 402,959, Dec. 14, 1933. Addn. to 383,330 (C. A. 27, 3302). Leads prepd. according to 383,330 are colored by a coloring material which is sol. in the agent used for fixing the marks and are also preliminarily colored with a fat-sol. coloring material. The coloring material is preferably a Sudan dye, e. g., Sudan yellow, which is sol. in spirit used as the solvent for the fixing agent, e. g., shellac. The fixing agent is applied by means of 2 or 3 very thin coats so that the solvent evaporates before the dye can spread in the solvent beyond

the marks. The leads are preliminarily coated by soaking in a soln. of a fat-sol. dye, e. g., Sudan yellow, in a solvent which is a thin liquid at ordinary temp., e. g., spirit, benzine, and, after removal of the solvent, treated with the fatty mass according to 383,330.

**Closures for bottles, etc.** Crown Cork & Seal Co., Inc. Brit. 402,623, Dec. 7, 1933. A closure comprises a cap with retaining means thereon and a sealing gasket contg. rubber-like material, sufficient lubricating material, e. g., ceresin, to provide a non-adhesive anti-frictional sealing surface and a blooming agent, i. e., a substance which insures that the lubricating material shall exude to the surface of the gasket, e. g., stearic acid, metallic stearates. The rubber-like material consists of compns. contg. (synthetic) rubber or rubber substitutes, a filler, e. g., clay, a vulcanizing agent, e. g., S, and an org. accelerator, e. g., tetramethylthiuramdisulfide, being used. A pigment, e. g.,  $\text{Fe}_2\text{O}_3$ , may be included in the gasket compn.

**Evaporation of natural hot water solutions.** József Székely. Hung. 108,359, Feb. 1, 1934. The evapn. is facilitated by changing the air above the hot soln. Mech. details are given.

## 19 - GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. HARTON, C. H. KERR

**Progress of the glass industry in 1932.** Oscar Knapp. (*Glashtute* 63, 791-92 (1933); cf. C. A. 28, 1827).—A brief review is given of investigations on: (1) the cryst. structure of some glasses; (2) the rate of crystn. of devitrification products of potash-lead glasses; (3) volatility and steam pressure of soda-silica glasses; (4) the system lime-boric acid; (5) formation of silicates; (6) effect of boric acid on the devitrification of soda-lime glasses; (7) behavior of Mn-colored glasses toward reduction; (8) dependence of density and optical properties on the chem. compn.; (9) sp. gr. of glass as a function of temp.; (10) tensile strength of glass; (11) dielec. consts. of glasses and their relationship to chem. compn.; (12) thermal shock and mech. strength of machine-made bottles.

M. V. Kondoidy

**Effect of the anion of the raw material upon the properties of glass.** III. K. Nakanishi. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 64 5 (1934); cf. C. A. 26, 3888.—The comparative effects of sulfates, carbonates and S upon the durability of glass were investigated. Alkali sulfate gave a more durable glass than alkali carbonate of the same strength in alkali oxide. S increased the durability of glass contg. alkali. Glass made from sulfate or a S-contg. batch always contained sulfate. K. K.

**Producing glass from blast-furnace slag.** C. A. Basso. *Chem. Met. Eng.* 40, 309 (1933). Blast-furnace slag offers a cheap source of  $\text{CaO}$ ,  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  for glass-making and its sensible heat is available. Addnl.  $\text{SiO}_2$  may be added in the form of cheap building sand. Such glass will be green, brown or black owing to the presence of Fe. It has good thermal resistance and excellent resistance to corrosive agents. B. C. A.

**Significance of analysis for determining the flow of glass.** A. Thürmer. *Glashtute* 63, 768-70 (1934). Expts. showed that the components of glass always have a different effect on the melt and the flow of the batch pile into the working tank, since the migration velocity of sep. oxides varies; hence the homogenizing of the glass is due not only to the thermal flow but also to the motion of the glass components and their capability of diffusion. It follows that when the batch is altered, the chem. effects on the change of flow should be considered. Slowly diffusing oxides should be varied in smaller amts. than those diffusing rapidly in order that the obstruction of the flow shall not cause a concn. and lowering of the homogeneity of the glass. The change in the glass compn. has no significance with regard to the thermal glass flow.

M. V. Kondoidy

**The expansion characteristics of some common glasses and metals.** F. E. Burger. *Gen. Elec. Rev.* 37, 93-6

(1934).—The comparative thermal expansion characteristics of glasses and metals used in making seals are given in the form of curves for temps. between 0° and 600°. The app., procedure and method of measurement are described.

M. E. Droz

**Calculation of volumes for soda-boric oxide-silica glasses.** O. Knapp. *Keram. Rundschau* 40, 659-62, 673-5 (1932); cf. C. A. 27, 5162.

Q. G.

**The formation of cristobalite in octahedrons in devitrified glass.** M. Bellière. *Verre, silicates ind.* 5, 102-3 (1934).

Herbert S. Willson

**Stones in glass and devitrification.** Albert Granger. *Ceram. verrerie émaillerie* 2, 5-6 (1934); cf. C. A. 28, 1100°. Stones in glass can be easily identified by the polarizing microscope. Outer form alone does not show the nature of such stones, because mineral products of similar appearance may have different chem. compns. The origin, including probable temp. of formation, and characteristic properties of various types of stones are given, including quartz, tridymite, cristobalite, wollastonite, diopside, Na Ca silicate, sillimanite, corundum, nephelite and amorphous substances. *Ibid.* 53-4.—These stones are apparently of 3 types: stones of devitrification, resulting from crystn. of constituents of the glass; stones of compn., due to incomplete soln. of one of the constituents in the melt; glass; and refractory stones, resulting from the surface of the pots. Among stones of devitrification are tridymite, wollastonite, diopside and the Na Ca silicate. Location of the source of refractory stones can be detd. by size and nature of the crystals. Alice W. Epperson

**Chilled glass.** L. v. Reis. *Rev. belge ind. verrerie, céram., émail.* 4, 194-99; *Z. Ver. deut. Ing.* 77, 615-18 (1933). Rapid cooling in the crit. zone produces a glass with marked internal stresses. Such glass is distinguished from ordinary glass by its particular properties, such as (1) great resistance to flexion, (2) resistance to great deformations, (3) high resistance to temp. variation, (4) regularity in the distribution of internal stresses, (5) inalterability, (6) suitability as safety glass. Methods of mfg. chilled glass are described. M. V. Kondoidy

**Shrinkage of clays during drying.** J. W. Mellor. *Brit. Clayworker* 42, 302-8 (1934).—See C. A. 28, 1828°.

Robert F. Ferguson

**Popasnyanskii clay.** V. V. Goncharov and R. Kashtelyan. *Keram. i Steklo* 9, No. 10, 17-19 (1933).—The clay is high in  $\text{SiO}_2$  and in alkali and low in loss on ignition. The  $\text{SO}_2$  and  $\text{Fe}_2\text{O}_3$  contents are low. M. V. Kondoidy

**Effect of thermal insulation on the structure of Dinas brick.** P. I. Yudinson. *Keram. i Steklo* 9, No. 9, 21-4 (1933).—Dinas brick from an insulated crown had a high

mech. resistance and was of a lighter color, while the unisolated brick consisted of several zones easily crumbled. Chem. analysis showed little difference. M. V. K.

**Thixotropy in ceramics.** S. V. Lipskii. *Keram. i Steklo* 9, No. 10, 24-6 (1933).—A discussion of the theory and researches dealing with thixotropy and thixotropic phenomena in colloidal systems. M. V. Kondoidy

**Mullite, a new ceramic substance.** B. A. Khizh and S. I. Skoblina. *Keram. i Steklo* 9, No. 9, 24-6 (1933).—A series of expts., based on the assumption that the size of grain of the  $Al_2O_3$  and its shape have a great effect on the temp. of vitrification, were made on mixes consisting of (1)  $Al_2O_3$  (obtained from corundum) with kaolin in varying proportions and (2)  $Al_2O_3$  (natural corundum) and kaolin. In mixes (2) the porosity increased with the corundum content, while in mixes (1), the reverse was true up to 80%  $Al_2O_3$  and 20% kaolin. Products from the mullite mixes are vitrified and only a little inferior to products from the German "sinter corundum." M. V. Kondoidy

**Employing leucite, plagioclase and porphyry in ceramic products.** V. P. Popova. *Keram. i Steklo* 9, No. 10, 30-3 (1933).—Mixes contg. these materials were compared with those contg. K feldspar. All mixes had about the same shrinkage. Feldspar mixes sintered more rapidly than plagioclase mixes, but leucite mixes sintered sooner than feldspar mixes. The sintering of porphyry mixes was similar to that of mixes contg. feldspar. All mixes had about the same resistance to breaking and the same thermal resistance. The deformation of leucite mixes was greater than that of feldspar mixes, while it was lower in porphyry mixes fired to cones 11, 13 and 14. Leucite and porphyry bodies were yellowish or grayish depending on the atm. and firing temp.; plagioclase bodies were white. Leucite glazes had a lower fusing temp. than feldspar glazes. M. V. Kondoidy

**Employing waste products from the production of aluminum chloride from kaolin in the ceramic industry.** P. P. Hudnikov and M. Ya. Solomin. *Keram. i Steklo* 9, No. 9, 9 (1933).—The waste products composed of 88.96%  $SiO_2$  in a finely dispersed state, 12.14%  $Al_2O_3$  and traces of CaO were used in making faience. The mix was composed of kaolin 33.1, clay 30.2, waste products 31.7 and cullet 5%. The ware was fired to 1280°. Porosity of the body was 14.16%. The ware was then glazed and fired to 1220°. The glaze mix was:  $SiO_2$  13.2, feldspar 33.6, chalk 14.4,  $PbO$  18.4, borax 19.9, kaolin 1.5; the glaze consisted of: frit 82.60,  $SiO_2$  10.60 and kaolin 6.80. M. V. Kondoidy

**Ceramic insulating parts for electric resistance furnaces.** E. Albers. *Elektrowarme* 4, 25 9 (1931).—Ceramic bodies used in elec. furnaces are discussed. Formulas for detg. various properties are reviewed and data are given on phys. properties of corundum-contg. fireclay, coarse-grained fireclay with soapstone, fine-grained fireclay without soapstone and kaolin fireclay. M. Hartenheim

**Notes on the discussion of Viehhaber: Cracked cooking utensils.** A. Dietzel. *Emailwaren-Ind.* 11, 1 5 (1934).—Kaolin as an opacifier produces an enamel of poor quality. The enamel when fired dissolves large amts. of kaolin which do not opacify. During its soln., kaolin disintegrates and its ingredients form various compounds which change basically the properties of the enamel, especially its expansion. With  $SnO_2$  only a little is used for opacification and this does not greatly change the enamel properties. It is not the large amt. of undissolved kaolin that produces faulty enamels but the high soly. of kaolin in the enamel that brings about an abnormal change in the enamel compn. and probably produces an inhomogeneous enamel. M. V. Kondoidy

**Acid lining for melting of nonferrous metals in high-frequency furnaces.** I. A. Klyucharev and S. A. Lowenstein. *Feuerfest-Ofenbau* 9, 157-9 (1933).—A review (cf. *Ogneuporii* 1933, nos. 2 and 3). For replacing Eisenberg sand, various Russian materials were studied. Successful test bodies ( $200 \times 20 \times 40$  mm.) were made of mixes of quartz, glass, Luga sand and Chasov-Yar clay. The sand must be partly pulverized; a certain amt. of

coarse granular quartz improves thermal resistance and d.; the clay binder addn. should be 10-15%; and the addn. of glass is essential. A crucible of 400 kg. content was pressed from a mix of the following compn.: Clay (dried at 100°) 12, glass 15, pulverized sand (through 3000 mesh) 30, natural Luga sand (through 100 mesh) 33, quartz (100-400 mesh per sq. cm.) 10, moisture content 0.7%. The crucible was dried for 30 hrs. and used for the first melt after 5 hrs. Its behavior was satisfactory. B. J. C. van der Hoeven

**New process of making refractories.** Maurice Barrett. *Brit. Clayworker* 42, 164 5 (1933).—Non-plastic material is bonded with about 5% of a clay slip contg. electrolytes. Robert F. Ferguson

**New ceramics of pure, highly refractory oxides.** B. Rishkevich. *Elektrowarme* 4, 30 1 (1934).—The difficulties in using metal oxides with very high m. ps. due to their low plasticity and deformability are discussed. The advantages and disadvantages of  $Al_2O_3$ ,  $BeO$ ,  $ZrO_2$ ,  $MgO$ ,  $ThO_2$ ,  $ZrSiO_4$  and  $MgO \cdot Al_2O_3$  are considered. M. Hartenheim

**The softening temperature of ordinary silica-alumina refractory products.** M. Lepingle. *Verre et silicates ind.* 5, 64 8 (1934); cf. *C. A.* 28, 21431. —Products from 42 firms were examd. Herbert S. Willson

**Sand-clay refractories and their use in glass furnaces.** N. B. Romancha. *Keram. i Steklo* 9, No. 9, 10-19 (1933). Sand-clay refractories contain a mixt. of 35% raw refractory clay and 65% quartz sand. The softening temp. is 1720-50°. They can be used in place of  $SiO_2$  brick in furnace crowns. Their mech. strength is low. M. V. Kondoidy

**Poisonous action of enamel and of enameled ware.** R. Aldinger. *Glashutte* 63, 617 19 (1933); *Emailwaren-Ind.* 11, 7 (1934). M. V. Kondoidy

**Barium nitrate in the production of enamels and glazes.** Thoma Grote. *Glashutte* 63, 492 4, 507 8 (1933); *Emailwaren-Ind.* 11, 7 (1934).— $Ba(NO_3)_2$  replaces alkali nitrates as far as the action of the nitrate is concerned, with less attack upon the melting vessels. One part of  $KNaO$  can be replaced by  $BaO$  without decreasing fusibility; stable and better enamels of purer colors are obtained. Expts. were made with frits in which  $K_2CO_3$  was replaced by  $BaNO_3$ ; a part of the  $Pb_2O_3$  could be replaced also.  $BaCO_3$  did not yield sufficiently fusible frits. M. V. K.

**Boric glaze for faience of the Slavutskii Works.** A. Shtenberg. *Keram. i Steklo* 9, No. 9, 7 (1933).—A leadless glaze was developed: frit: borax 33.65, chalk 11.25, feldspar 2.5,  $SiO_2$  34.7,  $Na_2CO_3$  1.2; glaze: raw kaolin 6.5, fired kaolin 6.5, frit 87.0; compn. of the glaze:  $SiO_2$  57.34,  $Al_2O_3$  13.39,  $CaO$  8.35,  $MgO$  trace,  $B_2O_3$  10.16,  $Na_2O$  6.62,  $K_2O$  2.21. The Seger formula is:  $CaO$  0.529,  $Al_2O_3$  0.162,  $SiO_2$  3.372,  $Na_2O$  0.388,  $F$  0.004,  $B_2O_3$  0.511,  $K_2O$  0.083, acidity 3.01. M. V. Kondoidy

**Permeability of glass to ultra-violet radiations (Doetsch)**  
3. Ore deposits in the Tertiary of Sardinia [material for the manuf. of refractory and porcelain ware] (Pavan)  
8. Thermal treatment of hydrocarbons [in app. made by ceramic process] (Get. pat. 503,257) 10.

**Guimaraes, Feliciano:** Azulejos de figura avulsa. Gaa: Edições Patria. Reviewed in *Times Lit. Supp.* 32, 709 (1933).

**Stanz- und Emailkalender, 1934.** Edited by W. Kerstan. Leipzig: Illustrierte Ztg. 320 pp. M. 12.70.

**Glass.** Jenaer Glaswerke Schott & Gen. Fr. 754,029, 9 Oct. 30, 1933. A glass which is not attacked by metal vapors contains boric acid 10-40,  $Al_2O_3$  10-35% and bi-valent oxides the rest. The content of  $BaO$  is preferably at least 40%. The total of quadrivalent oxides, alkalis and oxides of Sb, As and Pb should not exceed 5%.  
**Apparatus for feeding mold charges of molten glass.** Wm. T. Barker, Jr. (to Hartford-Empire Co.). U. S. 1,950,339, March 6. Mech. features.

**Ladling device for a glass-making machine.** A. A.

Zaitzev. Russ. 31,588, Oct. 31, 1933. Construction details.

Apparatus for forming glassware such as bottles. Leonard D. Soubier and John E. Collins (to Owens-Ill. Glass Co.). U. S. 1,949,886, March 6. Mech. features.

Manufacture of blown glass articles such as lamp bulbs. Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 1,949,887, March 6. Mech. features.

Apparatus for forming glass articles such as bottles. Joseph P. Benoit and Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 1,949,894, March 6. Mech. features.

Apparatus for manufacture of glass articles such as bottles and jars. John E. Collins and John E. McLaughlin (to Owens-Ill. Glass Co.). U. S. 1,949,899, March 6. Mech. features.

Glassware. Ernest A. Hailwood. Brit. 402,874, Dec. 14, 1933. Globes for gasoline pumps, etc., are formed in 2 or more parts which are decorated on their inner surfaces and then welded together to form the complete globe. In a modification the colored decoration is applied to the backs of suitable glass panels which are welded onto the globe parts. Also, the decoration may be applied to the outer surface of the globe and a protective coating of glass applied thereover by a suitable device for spraying molten glass.

Apparatus for fire-finishing glass articles such as bottles. Richard A. Cosh (to Owens-Ill. Glass Co.). U. S. 1,949,901, March 6. Various mech. and operative details are described.

Glass-blowing apparatus for making electric bulbs. I. N. Gollenskii. Russ. 31,587, Oct. 31, 1933. Construction details.

Apparatus for drawing glass in sheets. Joseph S. Gregorius (to N. V. Hollandsche Maatschappij voor de Vervaardiging van Glas). Brit. 403,083, Dec. 14, 1933.

Sheet-glass-drawing apparatus, with a skinning bar partly immersed in the molten glass, arranged transversely between the melting and drawing tanks. Howard L. Halbach (to N. V. Hollandsche Maatschappij voor de Vervaardiging van Glas). Brit. 402,690, Dec. 7, 1933.

Apparatus and process for tempering plates or sheets of glass or steel or other metals. Leonardo Mosmieri. Brit. 403,438, Dec. 21, 1933.

Ornamenting glass. Ferguson Pailin Ltd., George Pailin and Arthur Francis. Brit. 402,626, Dec. 7, 1933. Imitation leaded lights are made by roughening 1 or both sides of a sheet of glass in the desired parts and projecting molten metal, e. g., Pb, onto the glass, the metal adhering only to the roughened parts. The deposited metal may be colored chemically or oxidized.

Glass plaques. Soc. anon. des manufactures des glaces et produits chimiques de St. Gobain, Chauny et Cirey. Brit. 402,644, Dec. 7, 1933. Glass elements, which may be set in concrete for paving lights, are made with convex and concave surfaces which merge into each other without angles. For tempering, air or fluid is circulated by extn. or blowing over the concave surface, after solidification, while the convex surface is exposed to the atm.

Surface-coloring vitreous articles. Games Slayter (to Owens-Ill. Glass Co.). U. S. 1,949,844, March 6. A cold hard surface such as that of a glass bottle or block is provided with a layer of coloring material such as a paste of pulverized colored glass and is subjected to heating to approx. an annealing temp. and localized heating of sufficient intensity to fuse the coloring material and integrate it with the surface.

Nonsplintering glass. I. G. Farbenind. A.-G. (Manfred Dunkel, Wilhelm Breuers and Walter Wolff, inventors). Ger. 593,465, Mar. 2, 1934 (Cl. 39b. 27). Hydrogenated rubber or a hydrogenation product of a polymerized butadiene hydrocarbon is formed into a layer between two glass sheets or is used to unite an intermediate layer of another material, e. g., cellulose acetate, to the glass.

Apparatus for making nonsplintering glass. Adolf Kämpfer and Adolf C. Plötze. Ger. 593,016, Feb. 20, 1934 (Cl. 39a. 17.50). Means is described for applying plastic compns. to glass disks.

Safety glass. C. F. Boehringer & Soehne G. m. b. H. Fr. 758,954, Jan. 26, 1934. The intermediate "layer" is composed of at least 3 distinct layers, the outer 2 of which consist of cellulose esters or ethers or their mixts., contg. 100% or more of jelling or plastifying agents, or of resins with an appropriate amt. of softening agents, while the 3rd layer consists of cellulose ester, ether or hydrate contg. a smaller amt. of jelling or plastifying agents. The sheets should be such that they do not affect one another in such a way as to modify their properties, e. g., by diffusion into one another.

Safety glass. Imperial Chemical Industries, Ltd. Fr. 758,994, Jan. 26, 1934. The intermediate layer is composed of wholly or partly polymerized vinyl acetate in which is incorporated 5-25% by wt. of camphor, with or without the addn. of other plastifiers and (or) solvents, provided that the total amt. of plastifier and (or) solvent, including camphor does not exceed 35% by wt. of the polyvinyl acetate.

Apparatus for cutting extruded clay into bricks. Gerald H. Major. Brit. 402,197, Nov. 30, 1933.

Process and apparatus for applying sand and (or) coloring matter to the surfaces of bricks. John A. Johnson and The Norbiton Potteries and Brickworks Ltd. Brit. 402,918, Dec. 14, 1933.

Kiln for burning clay. Emrik I. Lindman. Ger. 590,724, Jan. 11, 1934 (Cl. 80c. 5).

Ceramic mass. Adolf Schondorff. Ger. 590,924, Jan. 12, 1934 (Cl. 80b. 12.01). A ceramic mass consists of a mixt. of finely divided binding agent, flux, mineralized and atomized water.

Vitreous silica ware. Frederick L. Clark and Imperial Chemical Industries, Ltd. Brit. 402,400, Nov. 27, 1933. Vitreous  $\text{SiO}_2$  articles are made by shaping them by casting a mixt. of  $\text{SiO}_2$  and  $\text{H}_2\text{O}$ , the  $\phi$  of which lies between 1.1 and 11.5, in a suitable porous mold or by pressing or molding a compn. obtained by dewatering such a slip, drying and then heating the shaped body to vitrify the  $\text{SiO}_2$ .

Apparatus for molding thimbles for supporting plates, etc., during firing, insulators, etc. Gerard Brammer. Brit. 403,030, Dec. 14, 1933.

Spark plugs. Robert Bosch A.-G. Brit. 403,287, Dec. 21, 1933. The electrode is cemented in the insulator by a silicate cement the  $\text{H}_2\text{O}$  content of which combines, in setting, with the solid ingredient. A mixt. of water-glass soln. and hydrated silicic acid, the latter being powd. naturally occurring hydrated flint ( $\text{SiO}_2 + n\text{H}_2\text{O}$ ) to which powd. Si (compds.) may be added, may be used.

Smoke consumer for ceramic kilns. Firma Hermann T. Padelt. Ger. 590,725, Jan. 9, 1934 (Cl. 80c. 9).

Tunnel kiln for burning refractory brick, etc. Albert B. Agnew. U. S. 1,950,375, March 13.

Refractory compositions. General Ceramics Co. Brit. 402,588, Dec. 7, 1933. In the manuf. of refractory materials contg. a high proportion of mullite from  $\text{SiO}_2$  or Al silicates and added  $\text{Al}(\text{OH})_3$  or  $\text{Al}_2\text{O}_3$ , accelerators are used comprising aluminates and aluminosilicates, e. g., natural or artificial zeolites and ultramarines. The compn. is finely ground, molded and fired at Seger cones 14-40 for 2-30 hrs. Known mineralizers, e. g., if compds., sulfates, phosphates, Ce and Zr compds. and already burnt grog, may be used in addn. Examples of mixts. with details of fineness, firing time and temp. are given.

Refractory compositions. Victor M. Goldschmidt. Ger. 591,747, Jan. 26, 1934 (Cl. 80b. 8.08). Addn. to 583,194 (C. A. 28, 278<sup>a</sup>). The process of Ger. 583,194 is modified by using serpentine in place of talc. Various details are given.

Refractory compositions. Ture R. Haglund. Ger. 593,498, Mar. 2, 1934 (Cl. 80b. 8.17). Refractory products are obtained by fusing  $\text{MgO}$  with a spinel-forming oxide, e. g.,  $\text{Al}_2\text{O}_3$  or  $\text{Cr}_2\text{O}_3$ , and another oxide, e. g.,  $\text{SiO}_2$ ,  $\text{TiO}_2$ , or  $\text{CaO}$ , in such proportions that the solidified products contain more than 50% of crystd.  $\text{MgO}$  spinel and at least 8% of compds. of lower m. p. than the spinel, e. g., silicates, titanates or Ca aluminates. The proportion of  $\text{MgO} + \text{CaO}$  in the compds. of lower m. p. must be less

than 20% or more than 45%. A suitable initial mixt. contains  $MgO$  33,  $Al_2O_3$  61 and  $SiO_2$  6%. The fused mixt. may be cast into bricks, etc., which may be tempered by heating them for at least 5 hrs. to 1000–1500°.

**Refractory bricks.** Heinrich Koppers A.-G. Ger. 593,254, Feb. 23, 1934 (Cl. 80b. 8.18). Dry binding clay is mixed with granular refractory material, e. g., chamotte, which has been moistened with water contg. a dispersing agent for the clay. The mixt. is then molded and fired in known manner.

**Oxide coatings.** The British Refractories Research Association, Arnold T. Green and Francis H. Clews. Brit. 402,203, Nov. 30, 1933. A refractory layer is produced on a refractory backing by introducing into an air or O blast an element or elements which form a refractory oxide on oxidation and directing the flame upon the surface of the material to be coated.  $Al$ ,  $Si$ ,  $Ca$ ,  $Mg$  or alloys thereof are suitable. They may be used alone or in combination with a proportion of refractory, e. g., finely

ground fireclay, firebrick,  $SiO_2$  brick, ganister, chrome ore, chrome brick or magnesite brick. A preferred example  $Al$  25 and finely divided refractory 75%.

**Gas burner for drying and heating refractory linings in pipes.** Gutchoffnungskütte Oberhausen A.-G. Ger. 593,412, Feb. 26, 1934 (Cl. 80c. 17.01).

**Abrasive carbides.** Norton Co. Fr. 758,016, Jan. 9, 1934. An abrasive carbide of  $Si$  or  $B$  is made by treating a mixt. of the oxide and charcoal in an elec. resistance furnace, the charge of the furnace being provided with a cone of granular material composed, for the greater part, of abrasive carbide, through which core the current passes.

**Abrasive sheets.** Minnesota Mining & Manufacturing Co. Fr. 757,776, Jan. 4, 1931. The support is impregnated with a waterproofing compn. and coated with a compn. contg. nitrocellulose, vegetable oil and resin and a material increasing the friction, e. g., ground  $SiO_2$ .

**Enameling.** The O. Hommel Co. Ger. 590,651, Jan. 8, 1934 (Cl. 48c. 2.02).  $TiO_2$  enamels are described.

## 20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

**Super-cements.** Dialin. *Rev. matériaux construction trav. publics* 1934, 76-9.—A general discussion.

**Zinc phosphate cement.** Franz Halla and Artur Kutzelnigg. *Z. Stomatol.* 31, 177-81 (1933).— $ZnO$  and 89%  $H_3PO_4$  afford a product giving x-ray lines of  $Zn_3(PO_4)_2 \cdot 4H_2O$  (hopeite); free  $ZnO$  is also present.

**Refractory cements: practical tests.** W. O. Lake. *Sands, Clays and Minerals* 2, No. 1, 35-9 (1934).—A detailed account is given of expts. made with 6 various kinds of refractory cement to test their refractory values and to det. in a practical way the capacity of each cement to bind firebrick.

**Slag cement without clinker by the method of the Ukraine Institute of Silicates.** E. I. Orlov, V. A. Tereshchenko and A. S. Frenkel. State Sci. Research Inst. Concrete, Supreme Council Natl. Economy (U. S. S. R.) Pub. No. 9; *Bldg. Sci. Abstracts* 6, 300-1.—Products having properties satisfying the standard requirements for portland cement are obtainable by addns. of 2% Na silicate, 2% gypsum and 2%  $NaCl$ . Only basic slag with a small proportion of Bessemer pig iron slag should be used. Study was also made of methods of improving the properties of slag for cement manuf. by addns. of gypsum and  $CaCl_2$  before granulating, and on the effect of adding Na silicate,  $CaCl_2$  or  $NaCl$  and  $CaSO_4$  to portland blast-furnace cement during grinding. The cements obtained by the last method satisfy the standard requirements for portland cement. The proportions suggested are 15% portland cement clinker, 85% blast-furnace slag and 2% each of Na silicate,  $NaCl$  and  $CaSO_4$ .

**The addition of calcium chloride to lime-pozzuolana cements.** F. Ferrari. *Cemento armato* 30, No. 6, 53 5 (1933); *Bldg. Sci. Abstracts* 6, 373-4.—The rather slow setting time of mortars and concretes made with pozzuolanic cements is improved by the addn. of  $CaCl_2$ . With a view to detg. the optimum quantity for general use, F. carried out tests on mixes of standard neat cement, mortar and concrete with and without addns. of  $CaCl_2$ . The tests were carried out in 2 series: (1) by adding 1.3% and 1.1% (by weight of cement) of  $CaCl_2$  at the time of mixing the batch, and (2) by adding like quantities at the moment of grinding the cement. The constitution and fineness of the cements used, and curing conditions of the test pieces are stated, and the results of tests at 3, 7 and 28 days, 6 months, and 1 and 2 yrs. are tabulated. F. concludes that an improvement in both setting time and strength is obtained by the addn. of  $CaCl_2$ .

**Impregnated asbestos cement for chemical equipment.** M. Borodulin. *Bautenschutz* 4, 44 (1933); *Bldg. Sci. Abstracts* 6, 386.—For the baths and other app. used in the production of  $Cl$  a mixt. of 92% portland cement and

8% asbestos is used in the U. S. S. R. works. The molded objects are placed in a steam bath for 3 6 hrs., dried in air for 10 days and finally immersed for 8 20 hrs. in melted coal tar. Impregnation with coal tar and pitch did not increase mech. strength.  $Cl$  was least destructive on deeply impregnated specimens. The best results were obtained with specimens impregnated with a mixt. consisting of coal tar contg. 25-30% pitch. Mortar composed of 1 part cement to 1 1/2 parts sand crumbled after exposure to  $Cl$ . The addn. of 3% of asbestos to the sand mortar mix produced good results.

**Effect of different cooling conditions on the quality of cement clinker.** W. R. Chandler. *Rock Products* 37, No. 4, 46 8 (1934).—At the plant where these tests were made, spraying clinker with water tended to cause a false set not found in cement made from air-cooled clinker.

**Recent investigations on the shrinkage of cements and the means of diminishing it.** Edmond Marcotte. *Rev. matériaux construction trav. publics* 1934, 50 3, 84 7.—An app. for testing the expansion and contraction of reinforced concrete which makes use of the combination of solid rods cast within tubes is described. The exptl. results show that pressures as high as 6 kg./sq. mm. existed in the test pieces and that abundant wetting of beams, several months after setting, should be tried to decrease the stresses. This applied likewise to ordinary concrete. The shrinkage distribution over the length of beams is discussed. Test results on pure cement pastes and normal mortars are given, and it is shown that the shrinkage is a logarithmic function of the age of the test piece. Theoretical considerations are presented.

**Production of high-silica cement by Santa Cruz Portland Cement Company.** Robert A. Kinzie, Jr. *Am. Inst. Mining Met. Engrs. Contribution* No. 67, 10 pp. (1934).—Portland cement clinker is ground with a properly calcined mixt. of siliceous material which reacts with the lime as it is liberated by hydration. The resulting high- $SiO_2$  cement has all the utility of portland cement, together with an increased resistance to the destructive action of many solns. Heat of hydration is reduced.

**Developing formulas for determining the "correct" lime content of cement.** Hans Kuhl. *Pit and Quarry* 25, No. 7, 36 43 (1933).—K. reviews various formulas expressing the relationship between  $CaO$ ,  $SiO_2$ ,  $Al_2O_3$  and  $Fe_2O_3$  in good cement, and develops the formula that  $CaO(max.) = 2.8 SiO_2 + 1.1 Al_2O_3 + 0.7 Fe_2O_3$ , regardless of the proportions of these in a cement. K. develops his formula using systems (1) free from  $Fe_2O_3$ , (2) with  $Fe_2O_3$  within range of normal portland cements, (3)  $Al_2O_3$  and  $Fe_2O_3$  in equiv. amts. and  $Fe_2O_3$  greater than  $Al_2O_3$ . A cement plant should aim to have  $100 CaO / (2.8 SiO_2 + 1.1 Al_2O_3 +$

(0.7 Fe<sub>2</sub>O<sub>3</sub>) = 100. If less, prepn. or burning process should be improved; if more, the product is approaching unsoundness.

Alden H. Emery

The reaction between high-alumina cement and water. G. Assarsson. *Sveriges Geol. undersökning*, Ser. C, No. 379. *Untersuchungen Zement* 1933, 22-60; *Bldg. Sci. Abstracts* 6, 374; cf. C. A. 27, 3578.—The hydration of com. cements depends upon 2 series of reactions. One, the primary, is based upon the soln. of the Ca aluminates and the subsequent decompn. of the solu. by crystn. and hydrolysis. The other consists in a slow soln. of the small quantities of alkalis which occur in the cement. This secondary reaction depends to a marked extent upon the quantity of water present; it is very conspicuous with the small quantities of water used in practice, but, with large quantities, this reaction is indistinguishable from the primary reaction. The changes in lime concn. show no discontinuity and are solely governed by the quantity of mixing water. If this is increased, the Al<sub>2</sub>O<sub>3</sub> concn. diminishes and the lime concn. increases. The mol. ratio Al<sub>2</sub>O<sub>3</sub>:CaO is about unity during the 1st hrs. of the reaction and thereafter decreases steadily if the quantity of mixing water is not too great. Very large quantities of water produce a steady rise in the mol. ratio of the solns. With normal quantities of mixing water, the hydration product is a gel formed by the hydration of the anhydrous monocalcium aluminate, a monoaluminate gel (CaO·Al<sub>2</sub>O<sub>3</sub>·10H<sub>2</sub>O), and dicalcium aluminate (2CaO·Al<sub>2</sub>O<sub>3</sub>·8H<sub>2</sub>O). Pentacalcium aluminate (5CaO·Al<sub>2</sub>O<sub>3</sub>·34H<sub>2</sub>O) and sulfoaluminates of various SO<sub>3</sub> content can occasionally be observed. With large quantities of water, Al(OH)<sub>3</sub>, tricalcium aluminate (3CaO·Al<sub>2</sub>O<sub>3</sub>·12.5H<sub>2</sub>O) and 2 other hexagonal aluminates are also found; the last 2 can be distinguished by their *ns*. When the pure aluminates present in the clinker are gaged with water, solns. are obtained in which the changes in concn. correspond to the primary concn. curve of the cements, but the mol. ratio Al<sub>2</sub>O<sub>3</sub>:CaO is very nearly unity if the amt. of water is not too great. When the pure clinker components are hydrated, the principle constituents of the hydrated cement are found. When mixts. of portland and high-alumina cements are gaged, films of liquid which crystallize and coagulate rapidly are formed about the clinker particles and these are indicated by a certain field in the crystn. diagrams of the Ca aluminate solns. In this connection the hydration of portland cement is discussed. The small quantities of alkali in the clinker are only gradually dissolved by the mixing water during the process of hydration. When small quantities of water are used, the alkali content can become so great during the first 3 hrs. that its significance must be taken into account in the interpretation of the results. If only the Al<sub>2</sub>O<sub>3</sub> and CaO contents are considered, the solns. are represented by a region of instability in the crystn. diagrams Al<sub>2</sub>O<sub>3</sub>:CaO:H<sub>2</sub>O. The final solns. must be looked upon as mixed Ca and alkali aluminate solns. The gels obtained from the cements and from the calcium aluminate were examd. by the x-ray method. Three stages of gel formation were observed. The first is a gel that can be observed during the 1st hr., particularly in the hydration of the anhydrous monoaluminate. The 2nd is the hydrated monoaluminate gel CaO·Al<sub>2</sub>O<sub>3</sub>·10H<sub>2</sub>O, while the 3rd is characterized by the formation of Al(OH)<sub>3</sub>. The gel in the 1st stage is of the greatest importance in the set cement. It is not only quantitatively the predominant product of hydration but probably also responsible for the aging (hardening) of the cement.

G. G.

Strength tests of cements require changes in methods. E. W. Reed-Lewis. *Concrete (Mill Section)* 41, No. 8, 26-9(1933).—The use of a graded sand mortar of plastic consistency is recommended for both tensile and compressive tests.

Raymond Wilson

The particle analysis of cement and gypsum by sedimentation. Wallace C. Riddell. *Rock Products* 36, No. 10, 30-1(1933).—A simple app. is described. The time required for a 25-micron sepn. is about 90 min. R. W.

Viscosity of cement slurry. Katsuzo Koyanagi. *Rock Products* 36, No. 12, 30-3(1933).—Tests of viscosity of a

slurry made from limestone and a shaly clay were made in a viscometer which discharged 200 ml. water in 16 sec. The relation between water content and viscosity is expressed by a hyperbola. Temp. has little effect on viscosity. Viscosity is decreased by storage, and by increases in CaCO<sub>3</sub> content, and increased by increased fineness.

Raymond Wilson

Problems encountered in application of filters for cement slurry. C. H. Sonntag. *Pit and Quarry* 26, No. 3, 31-6, 40(1933).

Alden H. Emery

Cementos Rezola plant in Northern Spain fully rebuilt and modernized. Anon. *Pit and Quarry* 26, No. 1, 28-31, 36(1933).—The plant is described and analyses of raw materials and product are given. A. H. Emery

The collapse of the bridge over the Oder near Gartz. P. Moll. *Bautenschule* 4, 35-7(1933); *Bldg. Sci. Abstracts* 6, 458.—M. attributes the failure of the pier to the presence of bicarbonate of Fe in the river. If the water at that time contained a normal quantity of CO<sub>2</sub>, Fe(OH)<sub>3</sub> would be formed and sufficient CO<sub>2</sub> released to combine with a considerable quantity of Ca(OH)<sub>2</sub> and thus prevent the normal setting of the cement. In support of this view M. points out the high CO<sub>2</sub> content shown by analysis of the concrete of the pier, the low O content of the water for a time, the fact that the vel. of the river for a few days during concreting was increased partly by drainage from neighboring fields, and that the water at that time was observed to be brown. (See also G. Haegermann, *Zement* 19, 494-7, 517-21(1930).)

G. G.

A rational expression for fineness of portland cement. E. W. Reed-Lewis. *Concrete (Mill Section)* 41, No. 3, 11-12(1933).—The "coefficient of effective fineness," a function of size distribution akin to specific surface, is recommended.

Raymond Wilson

The clays of portland cement. V. The "technical burning of tuff. Yoshiaki Sanada. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 62(1934); cf. C. A. 28, 1833.—Exptl. data on the ratio of coal shale (fuel) to tuff, on kiln output, and conditions of burning show that the best proportion of coal shale to tuff is 1:4. VI. Effect of burning degree of tuff upon burning and quality of cement. *Ibid.* 62-4. Five different tuff burns, varying in degree, were used to prep. raw mixes with limestone and Cu slag. The proportions, hydraulic modulus and fineness of the mixes are reported. Cements made from these mixes showed that well-burned tuff gave a good product. Exptl. data are reported on oil consumption, condition of burned cement, clinker output, compn. and properties, fineness, sp. gr., setting time, soundness and strength of cement.

Karl Kantermeyer

The [portland-cement] clinker minerals and their formation. Lennart Försen. *Angew. Chem.* 47, 162-6(1934).—The following explanation of the mechanism of cement burning is presented based upon available literature data and addnl. exptl. results: In the melt of CaO-silicates, -aluminates and -alumina ferrites, together with alkalis, Mg, etc., solu. takes place of CaO and siliceous material, or β-2CaO·SiO<sub>2</sub> formed in solid phase, with subsequent crystn. of 3 CaO·SiO<sub>2</sub> and α-2CaO·SiO<sub>2</sub>. The highest lime limit corresponds to 8CaO·SiO<sub>2</sub> and residual melt, without any free CaO. 2CaO·SiO<sub>2</sub> is formed in such a degree as is necessitated by the lack of CaO for the 3:1 ratio. The usual calcn. of the clinker components according to Bogue, which is based upon the assumption of equil. conditions is, therefore, not valid for the tech. portland-cement clinker. A correct mineralogical compn. of the various kinds of clinker can only be established by an investigation of the individual residual melt, without free CaO, which is characteristic of each raw material, and by a microscopic mineral analysis. Fifteen references.

Karl Kantermeyer

The changes that occur during the burning of portland cement. Wm. N. Lacey. *Pit and Quarry* 26, No. 1, 37-8, 40(1933).—The moisture in the raw mix was driven off rapidly near the upper end of the kiln. CO<sub>2</sub> evolution is appreciable in the early stages. CaCO<sub>3</sub> was decompd. at locations in the kiln where the av. temp. of the charge



would be expected to be below that at which such decomposition would occur at an appreciable rate, probably because of local overheating. Undecomposed  $\text{CaCO}_3$  persisted to within 20 ft. of the lower end of the kiln. Production of free lime began slowly at the upper end of the kiln, soon became rapid and a rather large percentage accumulated in the charge, in spite of rapidly increasing recombination reactions. About 25 ft. from the lower end of the kiln the reactions became very rapid and over 40% of the total lime in the charge reacted while travelling 5 ft.

Alden H. Emery

**A practical heat balance for studying problems of cement kilns.** A. W. Robinson. *Pit and Quarry* 26, No. 1, 41-4 (1933).—A heat balance is calcd. for a wet-process 240-ft. kiln, without waste-heat boilers, with limestone-clay as raw material, and coal as fuel, and the effect of several operating variables is studied.

Alden H. Emery

**Cement theory and concrete technic.** Interaction of water and cement in concrete. S. Gieritz-Hedström. *Betong* 1932, 213-19; *Bldg. Sci. Abstracts* 6, 160.—As a result of the reaction with water, cement becomes more or less completely hydrated, part of the water is chemically combined, part is adsorbed and part held in the capillaries, while water contained in the coarser pores may be regarded as free. The strength of the concrete is due to the gradual formation of a framework, the constituents of which—the new compds.—adhere to each other and to the aggregate, and also to the presence of adsorbed water. When concrete is satd., the pores are filled with water; the capillary water does not influence strength. When concrete is exposed to drying some of the pores become filled with air and the surface tension of the water acts as a cohesive force between the constituents where water is held by capillarity and has surfaces exposed to the air. Drying restricts the reaction between cement and water, the air-filled pores preventing the available water from reaching the cement. Freezing of the water in concrete also checks chem. reaction; the effect of temp. of  $-5^\circ$  to  $-10^\circ$  is approx. the same as drying out in air of 70 to 50% relative humidity. Diagrams show the volumetric proportions of aggregate, cement, water and air in the fresh concrete mix and in hardened concrete and the probable change in the vol. and distribution of the water—as free, combined, adsorbed and capillary—with increasing drying.

G. G.

**Vibrated concrete.** A. M. Bouillon. *Ing. New-Record* 112, 330 (1934).—A brief discussion of conditions under which vibration should and should not be employed.

R. E. Thompson

**The development of heat in concrete during hardening.** D. Wernick. *Detong* 1933, 1-9; *Bldg. Sci. Abstracts* 6, 123.—The max. possible rise in temp. due to the chem. reactions taking place during the hardening of concrete can be calcd. if the chem. compn. of the cement is known. Tables show the heat developed during different periods of time by the tricalcium aluminate, tricalcium silicate, brownmillerite and dicalcium silicate, which form the principal components of portland cement clinker, the heat developed or absorbed by the  $\text{Al}_2\text{O}_3$  as detd. by chem. analysis of the clinker, and also a nomogram for calcd. the max. rise in temp. in concrete for different mixing ratios and water/cement ratios, when the heat developed by the cement is known. This nomogram is based on the equation  $t_{\text{max}} = w(0.183 + r + 0.20n)$  in which  $w$  is the heat developed per kg. of cement measured in kg.-cal., 0.183 is the sp. heat of the cement,  $r$  the water/cement ratio, 0.20 the sp. heat of the sand and stone aggregate, and  $n$  the no. of parts by wt. of aggregate to one part of cement.

G. G.

**Decay and repair of concrete and masonry dams.** B. Hellström. *Structural Engr.* 11, 210-28 (1933).— $\text{H}_2\text{O}$  percolating through dams causes disintegration 1st through leaching out of free  $\text{Ca}(\text{OH})_2$ , then by breaking down of hydrated Ca compds. The effect becomes more serious as the  $p_{\text{H}}$  of the  $\text{H}_2\text{O}$  decreases. For repair the best method is considered to be the application of a sheet of a 1:1 cement-sand mortar covering the whole upstream face.

B. C. A.

**Effect on the strength of lime mortar of the addition of**

**molasses.** J. A. Swezey. *Hawaiian Planters' Rec.* 37, 113-21 (1933).—Addn. of 6% of sugar increased the compressive strength of lime mortar by 165%; up to 24% of molasses also increased the compressive strength, the greatest increase (206%) being obtained with 6% of molasses. As compared with sugar, the addn. of the same amt. of molasses produced a less fluid mix and higher compressive strength and gave a mortar which set with few, if any, checks or cracks. Although the strength tests at 6 and 9 months of age were inconclusive they indicated that aging probably will not overcome the harmful effects of insufficient curing of the lime putty. Although the strength of the mortar decreased with increase in its thickness or height, molasses was more effective than sugar in increasing the strength in samples of large thickness.

K. D. Jacob

**Bag lime.** E. Suenson. *Tonind.-Ztg.* 58, 47-50, 62-5 (1934).—As an ingredient for mortar, bag lime ( $\text{CaO}$  air-slaked and finely powd.) was compared with lump lime over 0.5 yr. old. Test blocks ( $2 \times 2 \times 12$  cm.) were made with 8% lime and 92% sea sand. They were aged (a) exposed to the lab. air, (b) same as a plus immersion in  $\text{H}_2\text{O}$  for 10 min. once a week, (c) in an atm. satd. with  $\text{H}_2\text{O}$ . In all samples, the d. after 91 days was the same, 1.87 g./cc.; hardening was complete for a blocks after 4 weeks; for b blocks it was much slower but greater; for c samples it was not appreciable the first month, then very rapid and greatest. Mortars contg. bag lime require less  $\text{H}_2\text{O}$  to give the same fluidity, give 2.1% smaller vol., harden more rapidly and produce a stronger product.

B. A. Soule

**Experiments with stone preservatives.** A. Stois. *Bautenschutz* 4, 1-10 (1933); *Bldg. Sci. Abstracts* 6, 147-8.—The efficiency of stone preservatives was investigated by detn. of the tensile strength of treated stone specimens as an indication of degree of weathering. A stone rich in lime and one contg. no lime were examd. In the case of dense sandstone, such as Abbach stone, pure linseed oil may cause severe damage if carelessly used, as a result of swelling of the oil film in the stone. On coarse-pored, rough sandstone swelling of the oil film has less effect, if any. Abbach sandstone impregnated with linseed oil emulsion did not crack. Cracking was reduced or prevented also when specimens treated with pure linseed oil were given a coating of paraffin. Specimens treated with fluosilicate showed no increase of strength after 13 months, but no harmful effect was observed. Treatment with linseed oil preceded by treatment with fluosilicate gave the same results as linseed oil alone. Cracking was not observed as a result of impregnation with linseed oil stand oil ext., because of the much lower hydrophilic properties of the film compared with those of the linseed oil film. Reduction of tensile strength was, however, observed; as with linseed oil, the stone surface is, apparently, rendered so dense that even a slight change of volume could have a harmful effect on strength. The effect of the atm. on small specimens is very much greater than on large specimens or masonry.

G. G.

**Decay of building stones by soot.** R. Warnes. *Sands, Clays and Minerals* 2, No. 1, 17-18 (1934).—Soot is a contributory cause of the decay of stone; it is due to the presence of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{Cl}$  and free  $\text{H}_2\text{SO}_4$ . The formation of  $\text{CaSO}_4$  from the  $\text{CaCO}_3$  of limestones and certain sandstones and also of mortars is one of the chief causes of decay, and this very detrimental substance is the result of the action on the  $\text{CaCO}_3$  of stones of not only  $\text{H}_2\text{SO}_4$ , but of  $(\text{NH}_4)_2\text{SO}_4$  in the presence of moisture. Soot when in thick masses holds water tenaciously and will keep the surface of the stone in a moist condition. The presence of moisture materially assists chem. reactions between the various substances contained in the soot and the  $\text{CaCO}_3$  of the stone.

M. V. Kondoidy

**The use of unfired clay as building material.** A. A. Bryushkov. Russo-German Soc. for Culture and Technology. *Trans. Gen. Conf. Standardisation and Manuf. New Bldg. Materials, Moscow* 1932, Feb. 8-15, 56-8; *Bldg. Sci. Abstracts* 6, 112-13.—Various methods have been suggested for modifying the properties of clay so as

to render it suitable for use as building material without firing. In B's "alginization" process, a gel obtained from alk. solns. of carbohydrates of seaweed is introduced into the clay; peptization of the clay colloids takes place and, in course of time, the formation of insol. alginates increases the resistance of the clay to the action of water. Waterproofing clay by treatment with  $H_2SO_4$  (cf. Shvetsov and Elshankin, C. A. 23, 1233; Grigor'ev and Galkin, C. A. 23, 1233) is not applicable to clay containing Ca and Mg salts; in addn., the  $H_2SO_4$  of "Keramolit" has a harmful effect on material contg. vegetable fibers. Other suggestions involve the introduction of Sorel cement, Fe sulfate and bitumen, lime, etc., into the clay. Lime and bitumen admixts. absorb up to 25% water and lack adequate resistance to frost. Clay of the type of "calined clay" but of low water absorption (up to 4%) and requiring considerably less lime and bitumen can be produced by slaking the lime with an aq. emulsion of bitumen. The compressive strength of this product is considerably higher than that required for lime plastering mortar, and its use instead of lime plaster for clay walls is suggested. In general, hydraulic properties were clearly evident in most clays tested on addn. of 10% of a hydraulic substance; CaO must also be added if not present in the admixt. Clay contg. 5% admixt. of lime and 10% of tripoli showed compressive strength at 28 days of 35 kg./sq. cm. (498 lb./sq. in.), and 53-61 kg./sq. cm. (753-867 lb./sq. in.) after curing in steam for 8 hrs. at atm. pressure. G. G.

Sands for building purposes. C. J. Morreau. *Sands, Clays and Minerals* 2, No. 1, 47-54 (1934).—The properties required from sand employed in concrete and cement mixes and in plastering are discussed. M. V. Kondoidy

Heating with producer gas in the building-material industry. Joseph Deforge. *Rev. matériaux construction trav. publics* 1934, 19 20, 46-9, 79-83.—A general discussion.

Karl Kammermeyer

The protection of buildings against the chemical and physical action of water. O. Graf. *Vedag Jahrb.* 1933, 18-28; *Bldg. Sci. Abstracts* 6, 137.—Various forms of staining, weathering and decay are illustrated in a no. of photographs of actual structures, and in each case the cause is discussed and suggestions are made as to methods of prevention or cure. G. G.

Bitumens and their use for the protection of buildings. C. R. Platzmann. *Bautenschutz* 4, 31 5 (1933); *Bldg. Sci. Abstracts* 6, 168.—For protection against the action of water and other deleterious agents bitumen and asphalt products possess certain advantages including the possibility of cold application, high degree of resistance to acid and salt solns., stability within a wide temp. range, impermeability to water and durability. The constitution and properties are briefly described of different types of bituminous coatings, such as fluid paints for protection of iron, concrete, etc., and material of thicker consistence for upkeep of impregnated paper roofing, for corrugated iron roofs, for insulation of concrete roofs and balconies, etc., and also of colored paints of this type. Cf. *Bautenschutz* 2, 100-4 (1931). G. G.

Wood preservation in buildings. K. O. Müller. *Bautenschutz* 4, 20-4 (1933); *Bldg. Sci. Abstracts* 6, 167.—Methods of detg. the value of wood preservatives include tests of the following properties: strength of fungicidal action, by observing the behavior of treated specimens of wood inoculated with dry rot; diffusion or depth of penetration in wood, observed by color reactions in cross sections; durability of the preservative, fixing on the wood fibers, leaching out or evapn., detd. by accelerated tests of behavior under various conditions by spraying with water, exposure to temp. variations and currents of air. The use and cost of Wolman salts for preservative treatment of wood are also considered. G. G.

Increasing the durability of wood. F. Moll. Russo-German Soc. for Culture and Technology. *Trans. Gen. Conf. 'Standardisation and Manuf. New Bldg. Materials, Moscow 1932, Feb. 8-15, 13-16; Bldg. Sci. Abstracts* 6, 128; cf. C. A. 27, 2553.—A review. G. G.

The protection of wood from fire by impregnation and painting. S. G. Vedenkin. Russo-German Soc. for

Culture and Technology. *Trans. Gen. Conf. Standardisation and Manuf. New Bldg. Materials, Moscow 1932, Feb. 8-15, 17-19; Bldg. Sci. Abstracts* 6, 129.—A brief description is given of fire-resistance tests of specimens of wood impregnated with various salts. Chlorides and sulfates of Na, Ca and Mg do not produce satisfactory resistance to fire. Borax and alum give better results but, because of their low soly., cannot be introduced into the wood in sufficient quantity. Ammonium salts give the best results. Theoretically, the best fireproofing agents are those which are easily decompd. at high temps. liberating noninflammable gases which drive atm. Q out of the wood, or those which fuse at high temps., coating the wood with a protective skin which prevents the penetration of O. The antiseptic properties of a no. of fireproofing salts were also studied. Phosphates,  $MgCl_2$  and, to a smaller degree,  $(NH_4)_2SO_4$  favor the development of fungi.  $NH_4Cl$  and borax gave satisfactorily toxic results, but require to be used with phosphates to prevent corrosion.  $ZnCl_2$  gives very good results, but renders wood hygroscopic and causes corrosion of metal. NaF (1%) protects wood from fungoid growths. As regards the effect of fireproofing on mech. strength, tests of impregnated specimens showed an av. loss of strength from 5 to 10%. G. G.

Utilization of waste materials obtained in the manuf. of  $Al_2O_3$  from kaolin [in manuf. of cement] (Budnikov) 18. Ca aluminate hydrates and their double salts [relation to setting of cement] (Mylius) 6.

Kofoid, Charles A., Light, S. F., Horner, A. C., Randall, Merle, Herms, W. B., and we, Earl E.: Termites and Termite Control. Berkel Univ. of California Press. 734 pp. \$5. Review in *Eng. News-Record* 112, 121 (1934); *Ecology* 15, 204

Rathgen, Friedrich, and Kocu, Jakob: Verwitterung und Erhaltung von Werksteinen. Beiträge zur Frage der Steinschutzmittel. Berlin: Verlag Zement und Beton. 122 pp. M. 8.50; cloth, M. 9.50.

British Standard Specifications No. 510: Single-Coat Asphalt (Cold Process). No. 511: Two-Coat Asphalt (Cold Process). London: Brit. Standards Inst.

Cement. Jenny Pohl geb. Hahn. Ger. 590,566, Jan. 5, 1934 (Cl. 80b. 3.12). Cement and like materials are heated to sintering temp. in a furnace and the hot product crushed; e. g., by rolling.

Cement. Metallgesellschaft A.-G., Fr. 758,528, Jan. 18, 1934. Portland and aluminous cement are made on a fixed or moving grating by the combustion of fuel mixed with the charge and air blown through the grating, the charge being composed of fresh fine material (1 part) and material returned from a previous firing (0.8-2.5 parts). The mixt. is preferably so chosen that the moisture content is 10-15%.

Cement. Soc. des ciments du Congo. Fr. 758,787, Jan. 23, 1934.  $CaCl_2$  in amt. of the order of 1% or less is added to the raw materials for making cement. The firing and clinkering may be carried out at a lower temp. HCl is formed during the heating and is recovered.

Cement. Cement Process Corp. Fr. 759,219, Jan. 31, 1934. CaO is mixed with a finely divided material from the group comprising  $SiO_2$ , sands, siliceous earths, clays and clayey materials, the mixt. being carried out in the presence of an amt. of water sufficient to hydrate all the CaO, the materials being subjected to a complementary malaxing in the presence of free moisture at a temp. sufficient to give rise to reaction between the CaO and the siliceous material.

Cement, etc. Soc. pour l'ind. chim. à Bâle. Fr. 758,641, Jan. 20, 1934. Cement, mortar, etc., are made waterproof by mixing with these substances an aq. emulsion of paraffin free from acid or substances capable of yielding acids, soaps, fixed alkalies or sol. salts.

Cement. Mikael Vogel-Jørgensen. Fr. 758,910, Jan. 26, 1934.

**Rotary calcining furnace.** Mikael Vogel-Jørgensen. Fr. 758,911, Jan. 26, 1934. App. for drying and heating the raw materials for cement manuf. Cf. preceding abstr.

**Rotary drum kiln for burning cement.** Fried. Krupp Grusonwerk A.-G. (Arno Andreas, inventor). Ger. 590,925, Jan. 13, 1934 (Cl. 80c. 14.01).

**Concrete.** Philipp Holzmann A.-G. Zweigniederlassung Berlin. Brit. 402,187, Nov. 30, 1933. Addn. to 393,429 (C. A. 27, 5928). The aggregate for concrete described in 393,429 is made by mixing clay with pore-forming material in a mill, cutting and disintegrating in 2 machines, delivering to a shaking screen which converts the pieces into balls, burning in a kiln, passing to a 2nd screen where the balls are coated with clay and again burning in a kiln.

**Waterproofing and bonding composition for use with concrete.** Raymond W. Bowman. U. S. 1,950,444, March 13. A compn. suitable for filling cracks or forming joints comprises  $\text{NH}_4\text{Cl}$  2, hydrated lime 1, and substantially oil-free comminuted grey iron 32 parts.

**Bituminous dispersions.** Deutsche Vialit-G. m. b. H. Ger. 590,723, Jan. 11, 1934 (Cl. 80b. 25.06). Coarse dispersions of bituminous material, especially for road surfacing, are obtained by using the pitchy product from the evapn. of sulfite liquor as dispersion agent, and stirring with water at about 90°.

**Bituminous emulsions.** Wilhelm R. Roederer. Brit. 402,891, Dec. 14, 1933. Addn. to 395,344 (C. A. 28, 6051). Producing bituminous emulsions by using brown coal, rich in bitumen, or oil shale as the dispersing agent, the latter is enriched with regard to its bitumen content before use, e. g., by treatment with acids or alk. lyes or other solvents. Examples are given.

**Applying bituminous emulsions to road surfaces.** Hermann Plauson (to Frederick W. Atack). U. S. 1,949,876, March 6. Water is mixed with a liquid bituminous material such as melted asphalt or tar, and the mixt. is conveyed under pressure and subjected to baffling to form an unstable emulsion which is then sprayed on the road surface (all in a continuous sequential operation).

**Tar emulsions for making roads.** Ges. für Teerstrassenbau m. b. H. Ger. 593,184, Feb. 22, 1934 (Cl. 80b. 25.06). Tar is mixed with about 5-20% of a resin, e. g., colophony or cumaron resin, and the mixt. is emulsified in hot water contg. a very small proportion of a soap inert to the resin. Emulsions stable to heat or frost are obtained.

**Tar, asphalt, etc.** Charles G. J. Lefebvre. Fr. 758,470, Jan. 18, 1934. Crusts of bituminous tar or asphalt from roads are renovated by blowing live steam into the mass in movement and adding an emulsion of tar and bitumen, and preferably a solvent such as oils from the distn. of coal or schists.

**Cement-rubber compositions.** Norman Swindin. Brit. 402,811, Dec. 7, 1933. A quick-setting compn. for the construction of roads, floors, etc., comprises a cement, e. g., portland, an aq. emulsion of rubber, e. g., latex, in amt. such that the dry rubber does not exceed 10% of the whole mix, and a gelling agent for the rubber for accelerating the setting. The gelling agent may comprise "waste pickle," or a soln. of  $\text{FeCl}_3$  and  $\text{HCl}$ , and powd.  $\text{Fe}$  may be added.

**Artificial stone.** Eduard J. Wilhelm. Ger. 563,359, Feb. 17, 1934 (Cl. 80b. 4.07). Bleaching earth, which has been used in refining saponifiable oils and fats, is freed as far as possible from oil or fat and then mixed with Sorel cement and the usual fillers. Specific compns. are described.

**Compositions for lining pipes.** Gutehoffnungshütte Oberhausen A.-G. Ger. 593,284, Feb. 23, 1934 (Cl. 80b. 845). Pipes for conveying hot waste gases are lined with a compn. comprising powd. chamotte 20, clay 30, comminuted cast iron 32, asbestos wool 1 and  $\text{NaOH}$  or  $\text{KOH}$  1 part. The compn. is made into a paste with water,

applied to the pipe and dried at a gradually rising temp., preferably until the free surface of the lining sinters.

**Building materials.** Leo C. Schilling. Ger. 593,121, Feb. 23, 1934 (Cl. 80b. 4.07). Sorel cement is mixed with the usual fillers and an aq. bituminous dispersion which does not flocculate on addn. of an electrolyte. A suitable dispersion may be prepd. with the aid of colloidal clay or humic acid, or by pptg.  $\text{Al}(\text{OH})_3$  in a feebly acid dispersion of asphalt.

**Building materials.** Hans P. Amundsen. Ger. 593,285, Feb. 23, 1934 (Cl. 80b. 21.04). The known compns. prepd. from a Sorel cement and wood meal, with or without other fillers, are improved by replacing the wood meal wholly or in part by a previously hardened and powd. compn. prepd. from Sorel cement and wood meal.

**Porous building materials.** Bruno Neuhof. Brit. 403,094, Dec. 13, 1933. See Ger. 586,795 (C. A. 28, 1500\*).

**Building bricks, etc.** Wm. Adams and Eric M. Adams. Brit. 402,845, Dec. 14, 1933. Building materials, e. g., bricks, tiles, concrete or cement blocks, wood and compressed fibrous materials, are impregnated with a protective compd., e. g., asphalt of low m. p., e. g., 100-110°F., and then (partly) covered with a protective coating of normally solid hydrocarbonaceous material, e. g., asphalt of relatively high m. p., e. g., 220-500°F., with or without fillers, e. g., fibrous material, which may be applied to the brick, etc., or incorporated in the asphalt.

**Protective coverings for buildings.** John F. Burr and Dirk de Lange. Brit. 402,993, Dec. 14, 1933. A covering for buildings, etc., consists of sand or other siliceous material, finely ground or laminated metal, e. g., steel, Cu, Zn, Al or scaly material, e. g., graphite, and a binder consisting of 1 or more synthetic resins dissolved in solvents of low b. p. The compn. is applied as a thick paste or as pre-formed blocks, sheets, etc.

**Plasters.** The Gypsum Mines Ltd. and Reginald Collins. Brit. 402,810, Dec. 7, 1933. A dry pulverulent compn., to be mixed with  $\text{H}_2\text{O}$  to form a plaster, comprises a mixt. of gypsum plaster or cement, portland cement or the like, and vulcanized rubber in shredded, powd. or granular form.

**Roofing material.** Lester Kirschbraun (to Patent and Licensing Corp.). U. S. 1,950,032, March 6. The butt end of composition shingles or the like is face-coated with blown asphalt and edge-coated with dried aq. emulsion of low-melting asphalt with a dispersing agent such as clay or bentonite.

**Plywood.** Jacob R. Brossmann (to The British Thomson-Houston Co. Ltd.). Brit. 402,677, Dec. 7, 1933. Laminated wood product is made by coating or sprinkling sheets or veneers of Yucca wood with powd. resin, e. g., a synthetic resin of the phenolic type, superposing several sheets and molding under pressure.

**Kiln for drying lumber and other material.** Wm. G. Crossle and Geo. C. M. Grant. Brit. 403,169, Dec. 21, 1933.

**Waterproofing compositions for wood, etc.** Albert G. Rodwell. Brit. 402,422, Nov. 20, 1933. See Fr. 754,666 (C. A. 28, 1502\*).

**Impregnating or coloring wood.** Carl Schmittutz. Fr. 758,728, Jan. 22, 1934. Impregnating or coloring agents are applied to the living tree near the ground, after removal of the bark.

**Preserving wood.** British Industrial Solvents Ltd., Henry B. Hutchinson, Herbert Langwell and Charles B. Maddocks. Fr. 758,957, Jan. 26, 1934. Wood and other cellulosic materials are preserved by derivs. of aliphatic alcs. and aldehydes which boil above 200° and are nontoxic, noninflammable and insol. in water. Examples are acetals such as dibutylbutylal, polymerized aldehydes or aldols and alkyl esters such as dibutylphthalate or hexyl butyrate.

## 21- FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

The problem of hydrogen in the hydrogenation of fuels.

L. Jacqué. *Ann. combustibles liquides* 19, 7-38 (1934). -- A comprehensive treatise on industrial methods of prepgr. H<sub>2</sub> for hydrogenation purposes. Fifteen references.

Karl Kammermeyer

Effects of pre-heating on the operation of a high-compression tractor engine using alcohol and alcohol-gasoline blends as fuels. A. L. Teodoro. *Philippine Agr.* 22, 625-52 (1934). -- Alc.-gasoline blends contg. 35% or more gasoline ran the engine satisfactorily without changing carburetor or compression ratio. With increased compression the drop in power at high temps. was less with alc. than with blended fuels.

A. L. Mehring

Determination of the flash point. Baader. *Mineralöl* 6 (in *Allgem. Oel- u. Fett.-Ztg.* 30, No. 12), 613-23 (1933); cf. *C. A.* 27, 5932. -- Based on a complete discussion of the factors involved, B. defines the true flash point as the min. temp. of inflammation at 1 atm. pressure, under the conditions most favorable for ignition. With a new type of crucible with elec. heating and ignition, and an O flow of 0.14 cc. per sec., true flash points 8-42° lower than the conventional values are obtained for a series of 14 typical oils.

H. A. Beatty

Development of the combustion in technical firing [of furnaces]. Kurt Rummel and Hellmuth Schwiedessen. *Arch. Eisenhüttenw.* 6, 513-9 (1933). -- Measurements of the temp. and velocity of the gases and detns. of their compns. at various points in the furnace do not provide sufficient data for evaluating the combustion process, since no deductions can be drawn from these data as to the state of combustion at any point or in any plane of the furnace. The process of combustion is considered mathematically, and the deductions made have been confirmed experimentally.

B. C. A.

The relation between the "volatile matter" and elementary composition of coal. Preliminary notice. Clarence A. Seyler. *J. Soc. Chem. Ind.* 52, 304-6T (1933). -- Reference is made to previous work on the classification of coals under the subhydrous, orthohydrous and perhydrous genera. From a study of the graph lines of isovols, isocals, and percentages of H, O and C of coals several equations are developed. Some of these equations are: (a) If Dulong's formula is applied to calcul. of the calorific value of volatile matter in coal,  $Q_v = 388.12 \text{ IP} + 124.52 \text{ C} - 4269$ ; (b) if it is assumed that the N in coal is approx. 1% then in "pure coal"  $\text{C} = 90 - \text{H} - \text{O}$  and  $\text{V} = 11.82 \text{ H} + 1.227 \text{ O} - 37.93$ , which shows the predominant effect of the H and secondary effect of the O; (c) the "hydrogen index,"  $i(\text{H}) = 0.01 Q_v + \text{V}$  and (d) the "carbon index,"  $i(\text{C}) = 0.01 Q_v - 1.1 \text{ V}/3$ . In these equations V, Q, H and C stand, resp., for volatile matter, gross calorific value in cal./g., and percentage of H, and percentage of C, all calcd. to the "pure coal" basis by Parr's formula, multiplying by the factor  $100/(100 - 1.08 \text{ A} - (22\text{S}/40) - \text{H})$ , when A = percentage of ash, S = combustible S, and H = moisture. This solves the difficulty hitherto found in comparing classifications based on elementary compn. (Seyler's) with those based on calorific value and volatile matter (Parr's). A chart gives Seyler's classification of coal by the indexes;  $i(\text{H})$  and  $i(\text{C})$ . This system does not apply to coals with much less than 10% volatile matter (anthracites). For other coals the av. errors are small. A table gives the provisional limits of various coal genera and species from perhydrous coals, H over 6,  $i(\text{H})$  over 128.5, to lignites, C under 75,  $i(\text{C})$  under 53.9. Should further investigations prove that for some coal fields the relation between volatile matter and elementary compn. is not the same, the difference will probably be in the consts. and not in the form of the "index."

W. W. Hodge

Anthracites: peranthracites and true anthracites. II. True anthracites. P. Lebeau. *Ann. combustibles liquides* 19, 77-115 (1934). -- *C. A.* 28, 1501<sup>h</sup>. Exptl. data are given on the compn. and properties of true anthra-

cites and their products of pyrolysis. The following conclusions are presented for the differentiation between peranthracites (I) and true anthracites (II): (1) for the examd. samples the gaseous products of pyrolysis give a yield as high as 160 cu. m. per ton for I but between 280 and 367 cu. m. per ton for II. The max. gas evolution takes place at 800-900° and up for I, but is between 700 and 800° for II. (2) The H<sub>2</sub> content of the gases of pyrolysis is high for both I and II, being between 80 and 90% except for materials which are comparatively high in ash. However, the difference is pronounced for the CH<sub>4</sub> content, I showing up to 2% only, while II shows 5-10%. (3) The solids differ in their H<sub>2</sub> content calcd. on a (C + H) basis. It is mostly less than 1% and reaches a max. of 2.05% for I, but for II it is practically always more than 3% and shows a max. of 4.07%. (4) The igniting point for I is almost always above 600°, but solids high in ash may give variations; for II it is usually between 525° and 545°. (5) I can be considered as a conductor of electricity, while II exhibits a vtry great resistance. (6) All of I decrepitate on rapid heating to about 300°, while none of II showed this property. (7) I do not give colored solns. with org. solvents while II give yellow solns. of varying intensity which can be evaluated colorimetrically. (8) HNO<sub>3</sub> of sp. gr. 1.48 in contact with I and II, when heated, attacks both, but the liquids, transparent in both cases, do not cloud much with addn. of H<sub>2</sub>O in the case of I, but give an abundant ppt. in the case of II. Similar reactions were observed for mixts. of H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>.

Karl Kammermeyer

The classification of bituminous coals and the degree of coalification of the humin portion. D. J. W. Kieulen. *Brennstoff-Chem.* 15, 11-12 (1934). -- Classification with regard to humic content in work with 60 coals shows the humic acid factor varies from 0 to 360 and can be correlated with cakingability. Combined H<sub>2</sub>O, calorific value, yield of primary tar and elementary analysis also agree well. Low-rank coals contg. free humic acids are classified particularly well. Only the temp. of max. gasification rate and explosibility are dependent upon content of volatile matter.

F. W. Jung

Lopinite, a new type of coal in China. C. Y. Hsieh. *Contrib. Sin Yuan Fuel Lab., Geol. Surv. China* No. 14; *Bull. Geol. Soc. China* No. 12, 463-90 (1933). -- Analyses of 13 samples of coal from Loping show ash 3.72-26.21%, heating value 5886-8130 cal., (on ash-free basis) moisture 0.23-1.26, volatile matter 45.50-65.15, and fixed C 34.36-53.50%. In 11, the volatile matter exceeds fixed C; in 1 it is more than twice. S is high, 2-5.8%, mostly org. Analyses of 9 related coals, intermediate between those of Loping and normal coals, are given. Yields on low-temp. carbonization of Loping coal are semicoke 54.28, oils 33.05, liquor + NH<sub>3</sub> 3.12 and gas 8.11%. The microstructure is described.

Alden H. Emery

The sulfur forms in Chinese coals. C. H. Young. *Contrib. Sin Yuan Fuel Lab., Geol. Surv. China* No. 15; *Bull. Geol. Surv. China* No. 23, 5-12 (1933). -- Proximate analysis, forms of S and Fe in 15 coals are given. Org. S is greater than pyritic S. Dil. HNO<sub>3</sub> will ext. small amts. of org. S from certain coals. Therefore, it is recommended that pyritic S be calcd. from pyritic Fe.

Alden H. Emery

Solvent extraction of Chinese bituminous coals. K. Ping. *Contrib. Sin Yuan Fuel Lab., Geol. Surv. China* No. 16; *Bull. Geol. Surv. China* No. 23, 21-30 (1933). -- Results of pyridine extn. of 16 coals are given. Pyridine ext. and  $\gamma$ -compds. increase to (fixed C)/(volatile matter + moisture) = 1.9, then decrease. Among coals of one age, cokingability is directly proportional to  $\gamma$ ; this does not hold if ages are mixed.

Alden H. Emery

Coal cleaning in U. S. S. R. I. M. Verkhovskit. *Results and Achievements of Ore Dressing*, U. S. S. R. 1932, 178-90; cf. *C. A.* 26, 827. -- Review. S. L. M.

Coal cleaning by a sand flotation process. John Dumi-

melow. *Fuel Economist* 8, 689-94 (1933).—The<sup>o</sup> Chance sand flotation process of coal cleaning is described.

Leslie B. Bragg

Coal cleaning in relation to description and size of coal. C. W. H. Holmes. *Fuel Economist* 9, 29-30 (1933).—A discussion of coal cleaning.

Leslie B. Bragg

Dry-cleaning tests on South African coals. J. C. Vogel. *J. Chem. Met. Mining Soc. S. Africa* 34, 205-13 (1933).—Dry-cleaning tests using a newly patented table are described and found satisfactory.

Alden H. Emery

Duration of drying coal particles. A. V. Luikov. *Isvestiya Teploekkh. Inst.* 1933, No. 9, 27-34.—A discussion of the first thermodynamic law applied to drying of coal dealing with the relation between the time of drying and the moisture content at various periods of the drying operation.

A. A. Bochtlingk

The course of carbonization of bituminous coal in the laboratory and upon plant scale. Fr. Sladek. *Brennstoff-Chem.* 15, 1-4 (1934).—Lab. assay tests have failed to consider factors as carbonizing time, rate of gas evolution and length of coal charge (conforming to  $\frac{1}{2}$  oven width). A new assay method and app. with by-product recovery train are described wherein coke-oven conditions and results are duplicated by a lab. test at 900° which can be adapted to various oven dimensions. Coal charges of 50-60 g. are carbonized in a refractory tube of  $\frac{1}{2}$  oven width either for a time calcd. in proportion to size (e. g., 55-70 min. for 2 sizes of Koppers ovens) or to conform to an oven gasification rate. Progressive heating simulating that in an oven is obtained by gradually moving the furnace out over the tube as the test proceeds, the off-take being through the already heated coal. Productions of coke, gas, tar, benzene, and  $\text{NH}_3$  are plotted to show the effect of variations in carbonizing time in the app. with both procedures for comparison with oven data.

F. W. Jung

Testing and blending coals for coking: Thos. Biddulph Smith. *Blast Furnace and Steel Plant* 21, 471-3, 479, 491 (1933).—By applying suction to a pipe placed in the middle of a coke-oven door and extending 4 ft. into the spongy center of the charge, considerable quantities of condensable oils were obtained. Samples collected during the initial stages of coking were of a light straw color, clear and of low viscosity; later samples were darker and more viscous, those from the plastic layer itself being black and semisolid at normal temp. This material was composed of oils and a mass of fine black particles all of about the same form and size and without the sharp faces and edges characteristic of finely ground coal. By extn. with benzene a dark slate-colored powder was obtained of sp. gr. 1.47. Further sepn. by washing the powder in a mixt. of benzene and  $\text{CHCl}_3$  of density 1.40 gave a product that contained matter volatile at 1000° 2.05%, free C 97.49% and mineral matter 0.46%. The particles were pure C and were uniformly interspersed through the coal; they were surrounded by fusible resinous constituents which liquefied and carried the particles in suspension. Apparently the variable amts. of the liquefiable substance admixed with particles of C in a coal det. whether the resultant coke will be "fingery," "spongy" or "good." A method is described for detg. the degree of "satn." [with noncoking material] of a coal. App. and methods are described for cutting sections from the cokes formed and detg. their crushing strengths such that fairly consistent checks were obtained. Tests to det. their degree of satn. were made with Durham, South Yorkshire and Welch coals. A remarkable amt. of inert C particles must be added before these coals become satd. The finer the materials were ground the more inert C particles were required for satn. Durham coals when blended with 83% ground coke breeze gave such improved cokes that a 1000-ton sample contg. 25% coke breeze was prepd. and carbonized in a battery of coke ovens. Other large-scale tests were run with blends contg. 5 and 15% ground coke breeze. Better cokes, especially for blast-furnace use, were obtained from the blended mixts. than from the coal alone. Photographs of the cokes obtained, tables of data on analyses of the cokes and breeze, and results of porosity, Trommel, crushing and shatter tests are given and discussed. The

carbonizing period in the practical-scale expts. was diminished slightly more than proportionate to the percentage of inert material used. The complete neutralization of the excess resinous constituent with noncoking material reduces the dimension of the plastic layer to a const. min. throughout the process so that carbonization can proceed at a const. speed. Apparently by such a method, wider ovens of the same modern height and length could be designed which, while carbonizing at the same speed, would yield greater outputs per unit operation, with consequent lower labor costs.

W. W. Hodge

Hydrogenation of coal and oils under high pressure. József Varga. *Math. naturw. Anz. ungar. Akad. Wiss.* 50, 386-406 (1933).—Comparative expts. on the hydrogenation of various raw products and by-products of the Hungarian coal and mineral oil industry on one hand, and paraffin-rich Grosny mazout, coal-tar oil of the gas factory, generator-tar oil from Diósgyőr and brown-coal generator tar on the other hand revealed that most H is required for the hydrogenation of coals and most easily hydrogenated are unsatd. and S-rich gas benzenes. The hydrogenated benzene fraction boiling up to 180° always contained less than 0.03% S, although the S content of the raw materials often exceeded 1%.

S. S. de Finály

Hydrogenation of coal, pitch and petroleum. C. Berthelot. *La Nature* No. 2920, 218 (1931).—A review.

P. T.

The hydrogenation of coal, pitch, wood and corn. H. Isobe. *J. Fuel Soc. Japan* 13, 165-90 (1931) (in English, 13-16).—Prior to the investigation of hydrogenating various substances, I. made a study to generate H economically as far as possible, employing a retort 11 cm. in diam. and 2 m. in height. The retort was fully charged with charcoal or coke and the temp. of the upper part was kept at 500° (600° while the bottom part was maintained at 700-950° by reasonable adjustment. The steam supplied at a rate of 1 l. per sec. through this heated layer from the bottom is decompd. into  $\text{CO}_2$  and H during its travel. The mixed gas thus produced was passed into an app. to absorb  $\text{CO}_2$  and the final gas contained over 90% of H. Hydrogenation of coal: A shaking autoclave of 500 cc. capacity, made of Ni-chrome steel, was used throughout the expt. Among the important conditions which affect the reaction is the balance between pressure and temp. The leading reaction occurs at a temp. ranging between 420° and 440° and it is important to proceed with the hydrogenation within this range. Better results are obtained by previously adding to coal a heavy fraction of hydrogenated oil or creosote fraction, mixed with a catalyzer. Hydrogenation of pitch: It is necessary to select the condition as well as the catalyzer by preliminary tests. Hydrogenation of wood: Pieces of wood can also be hydrogenated under a high pressure when they are treated in the presence of a catalyzer mixed with 5-30% of tar oil or mineral oil as well as wood tar. Hydrogenation of corn, beans and seeds: Most corn and other allied substances react with H and they are active in a powd. state. I. adds that a greater part of the N in the sample is reduced to  $\text{NH}_3$ , S to  $\text{H}_2\text{S}$  and O is converted into  $\text{CO}$  or  $\text{CO}_2$  and water.

F. I. Nakamura

Oxidation of coal and the relation to its analysis. E. Stansfield, W. A. Lang and K. C. Gilbart. *Am. Inst. Mining Met. Engrs. Contrib. No. 69*, 10 pp. (1934). Four coals exposed 16 hrs. to dry natural gas gained 0.55-1.15, av. 0.79%. The absorbed gas was not removed by evacuation in cold and only  $\frac{3}{4}$  of it by heating 1 hr. in vacuum. B. t. u. are higher on treated coal. After storage for 12-36 days, 19 air-dried coals showed a moisture increase of 0.08-1.3% due to oxidation; it is slight in high-rank and large in low-rank coals. Vacuum drying gives higher moisture (av. 0.25%) than drying in air or natural gas. The av. of B. t. u. detns. of 14 coals after drying in gas was 20 B. t. u. more than after vacuum drying and 70 B. t. u. higher than air drying. Moisture detns. in air are 0.1-0.6, av. 0.3%, less than detns. in natural gas. Eleven coals exposed to dry air at 106° for 6 hrs. were reduced in calorific value (dry basis) 60-520 B. t. u., or 0.4-3.9%. Umins in 1 coal increased from 6.0 to 8.4%

after 6 hrs. oxidation and to 46.6% after 600 hrs.

Alden H. Emery

Oxidation of pyritic sulfur in bituminous coal. H. W. Nelson, R. D. Snow, and D. B. Keyes. *Ind. Eng. Chem.* 25, 1355 8(1933).—A Kincaid, Ill., bituminous coal contg. ash 17.6, sulfate S 0.94, pyritic S 2.58 and org. S 2.51% was used in the expts. The coal was pulverized, 80.9% through a 100- and 42.3% through a 200-mesh screen. In the first series of expts. the coal was suspended in approx. 4.5 l. of water and air passed through 1-7 days at temps. of 22°, 50°, 70° and 90°. The percentage of pyritic S oxidized varied from 6.7 to 79.0%, this latter result in the 7 days at 90° test. An increase in temp. increased the rate of oxidation of pyritic S to sol. sulfate S. Increasing the rate of air flow and using O in place of air did not increase the amt. of oxidation. Samples of 10 g. of the coal screened to the mesh sizes, 20-60, 60-100, 100-140, 140-200 and finer than 200, were subjected to oxidation for 24 hrs. at 50°. Results showed a faster rate of oxidation of pyritic S in the finer particles; also the amt. oxidized was nearly inversely proportional to the av. diam. of the coal particles. Addn. of ferric sulfate equiv. to 0.05 or 0.1% ferric ion to the coal-water mixt. in tests made at 22° and 70° increased somewhat the rate of oxidation; this effect was enhanced by a rise in temp. In expts. lasting 15 min.-2 hrs. with a small amt. of Cl gas added to the air bubbling through the coal-water mixt. at 22° and 70°, large amts. of pyritic S were removed; more was removed in the 22° than the 70° tests. The org. S was not much affected by any of the processes. A drawing and description of the app. used, details of procedures, tables of data and equations for reactions involved are given and the results are discussed. W. W. Hodge

The determination of nitrogen in coal by the Kjeldahl method. J. H. G. Carlike. *J. Soc. Chem. Ind.* 52, 306-8T(1933).—Several modifications of the Kjeldahl method for detg. N in coal are briefly reviewed. Expts. were carried out with samples of 3 coals, Barnsley, Parkgate and Warwick Thick seam. Digestions were made in an atm. of CO<sub>2</sub>. The gases evolved were collected over Hg by means of a Töpler pump and were analyzed for CO<sub>2</sub>, SO<sub>2</sub>, O and combustible gases, the residue being N. A drawing and description of the app., and the methods of operation are given. N collected varied from 0.03 to 0.06%. The use of Se in place of HgO definitely reduced the time of digestion (C. A. 25, 5938). To det. the amt. of N adsorbed by coal, samples at 100° were subjected successively to prolonged evacuation, then to adsorption of pure N for 50 hrs. An approx. uniform value was obtained for the adsorption of N. Per g. dry coal the av. values were 0.66, 0.73 and 0.88 cc. of N<sub>2</sub>, resp., for Barnsley, Parkgate and Warwick Thick seams. These quantities are of the same order as those of the free N liberated in the Kjeldahl digestions. If the N adsorbed on the coal was all given off during the Kjeldahl detn., not more than 0.1% N would be collected and it would not be completely removed by evacuation at room temp. Apparently the present method, Kjeldahl-Gunning-Wilfarth, is satisfactory for detg. the combined N in coal. W. W. Hodge

Temperature limits of the plastic state of coals. L. P. Bazilevich. *Coke and Chem. (U. S. S. R.)* 1933, No. 1, 30-41. An app. recently designed in the Dnepropetrovsk Coal-Chem. Inst. was used to study the process of formation of the plastic layer, its temp. and decompn., evolution and pressures of gases, etc. The steel needle of this app. used for detn. of the height of the plastic layer and the progress of solidification was replaced by a thermocouple constructed in such manner as to serve the purpose of the needle and of a thermocouple at the same time. The more important observations made from a series of tests were: Temp. limits of the plastic zone in the inner layer of coal are considerably wider than in the outer layer (one of the expts. gave for softening 348° and for solidification 437° for inner, and corresponding temps. of 383° and 413° for the outer layer); methods employing small samples with app. permitting free access of air were found unreliable as the oxidized coal softens at a higher temp. and

solidifies at a lower temp. than does unoxidized coal. The rate of coking practically did not affect the temp. limits of the plastic layer. James Serrel

Ash-to-mineral-matter correction in coal analyses. A study based upon coal-ash analyses. Gilbert Thiesen. *Am. Inst. Mining Met. Engrs. Contrib. No. 68*, 12 pp. (1934).—The Parr formula, mineral matter in coal =  $1.08 \times \% \text{ ash} + 0.55\% \text{ S}$ , gives values that agree closely with mineral matter values found by calcul. from ash analyses. Mineral-matter-free value = (detd. value) /  $(100 - \% \text{ ash}) \times 100$ .  $f$  for calorific value of 21 coals averaged 1.1188 with a range of 3.5%,  $f$  for fixed C averaged 1.1368, with a range of 4.35%.  $f$  for volatile matter was 0.2030 0.8314. If calorific values are corrected to a dry, 1.1 ash + 0.1 S-free basis, values approaching the Parr unit coal values are obtained. In unit coal values simplified by combining correction in numerator terms with terms in the denominator, it is erroneous to use the same denominator for calorific, fixed C and volatile matter values. The Parr unit coal formulas appear to be the best proposed. Alden H. Emery

The fusibility of coal ash. I. A method for determining the fusibility of coal ash in an oxidizing atmosphere. Yōsburō Kōsaka and Hachirō Toda. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 98-101(1934).—An app. is described which contains an indicator hand showing the deformation of the ash pellet with increasing temp. As testing rod a Pt wire of 1.5 mm. diam. with a bulb of 3 mm. diam. is used, the bulb resting on top of the pellet. The fusion curves are plotted as temp. vs. reading of drop of the Pt rod. The operation of the app. and the prepn. of sample pellets are described. Karl Kammermeyer

Peaty lignite and anthracite coals. C. Mahadevan. *Indian J. Physics* 8, 259-48(1933).—Specimens of tertiary coal ranging from peaty lignite to anthracite were analyzed for their lignin and cellulose contents. In the early stages of coalification the ratio of cellulose to lignin decreases rapidly, but increases later. The lignin-cellulose ratio is a good index of coalification. F. R. Rushton

Austrian brown coal. F. Neuwirth. *Berg- u. Hüttenm. Jahrb. Leoben* 80, 86-93, 136-57(1932).—The extn. of bitumen, wax, resin and oil, the effect of various solvents on the soly. of humic acids in NH<sub>3</sub>, and the properties of the tar, aq. distillate, etc., are discussed. Analytical data are recorded. B. C. A.

Briquetting experiments with Hungarian brown coals. J. Finkey. *Mitt. berg. hüttenmann., Abt. ungar. Hochschule Berg-Forstw. Sopron* 5, 7-21(1933).—A paste of wheat flour contg. 73% starch as a binding material gave briquets that were not sufficiently resistant to water and that molded on storage. On impregnation of briquets thus made with low-temp. tar of Eocene brown coal a few seconds at 35° about 1.5 4.3% tar was absorbed. This treatment gave water-proof briquets, resistant to mold, that could be fired in ordinary stoves. S. S. de Pinily

Chemical study of the carbonaceous deposits of Banat. I. L. Blum. *Bul. chim. soc. române chim.* 35, 77 81(1932).—Analyses of eleven samples of coal are given. In the crude coal the C content varied from 53.87 to 76%; H from 3.43 to 4.88% and S from 2.86 to 7.75%. Calorific values ranged from 5304.5 Cal./kg. to 7730.8. Ash varied from 4.95 to 29.40%. A table is given showing the reduction of S content obtained by treatment with Cl. D. F. Brown

A study of the natural gas and naphtha products from twenty-four wells in Turner Valley, Alberta. P. V. Rosewarne, W. P. Campbell and R. J. Offord. *Canada Dept. Mines, Mines Branch, Report No. 737-4*, 22 pp. (1933).—The gals. per M cu. ft. of gas obtained by distg. absorbed hydrocarbons from activated charcoal under a pressure of 30 lb. per sq. in. and condensing the vapors at 0° were approx. = to the gals. calcd. from the pentane and higher hydrocarbon fraction + 30% of the total butane fraction (or 45% of the normal butane) obtained by a fractional distn. in a Podbielniak column. The stripped gas from high-pressure wells contains a smaller proportion of condensable hydrocarbons than the stripped gas from low-



pressure wells. As the pressure on the well is reduced the stripped gas tends to carry a larger proportion of the higher hydrocarbons. Lowering the back pressure on the well increases the production of naphtha per day. Calcd. overall efficiency is highest for high-pressure wells. A. H. E.

The German earth gases, their occurrence and their constitution. Adolph Grotensohn. *Petroleum Z.* 30, No. 5, 1-8, No. 9, 1-10 (1934).—A literature survey on the nomenclature and constitution of gases from many German gas wells. I. M. Levine

How gas fuel has been applied at the Töbele smelter. J. B. Nealey. *Mining Met.* 15, 375-6 (1933). Descriptive. Alden H. Emery

The behavior of iron catalysts in the temperature range of 250° to 450°, toward illuminating gas and other similar gases. Alfons Kleinenc and Juhadin Rupp. *Angew. Chem.* 47, 182-4 (1934).—The behavior of com. illuminating gas was investigated in the presence of the following Fe catalysts: (1) Fe pptd. from  $\text{Fe}(\text{CO})_5$ , (2) Fe powder, (3) Fe powder activated by treatment with  $\text{AlCl}_3$  and  $\text{NH}_4\text{OH}$  or  $\text{NaOH}$  solns. and (4) synthetic catalysts, e. g., Fe oxides from various sources. A reduction of the CO content and an increase of the  $\text{C}_2\text{H}_4$  content take place. The most effective temp. range for the exptl. conditions was found at 280-450°. A greater retort length results in greater CO conversion, while increasing gas velocity results in smaller CO conversion. The catalyst surface undergoes a continual change and the progress of the reaction dilutes the catalyst. As side reactions the decompn. of heavier hydrocarbons and reactions with  $\text{H}_2\text{O}$  vapor were encountered, but it was found that temps. can be chosen low enough to avoid the decompn. of the heavier components; however, larger quantities of  $\text{H}_2\text{O}$  vapor act disturbingly upon  $\text{CH}_4$  formation. Attempts to regenerate the catalyst by simple processes failed and it was found that a mixt. of 21.22% C and 32.34% Fe, with a ratio of Fe:O = 3:4.1, becomes already inactive. At a gas velocity of 500 l./hr. (area = 81.6 sq. cm.) a consumption of 10 g. catalyst per cu. m. of converted gas was detd., after a passage of 140 cu. m. of gas, and the catalyst was still in a decidedly active condition. K. K.

Experiments with the treatment of crude ammoniacal gas liquor. F. Oliver. *The Surveyor* 85, 55 6 (1934).—The biochem. O demand of the gas liquor at Buxton was 8000-16,000 p. p. m. Attempts were made to steam out the  $\text{NH}_3$  and  $\text{H}_2\text{S}$ , but they were abandoned after expts. showed that the waste could be handled by sufficient diln. A. L. Elder

Hydrogenation of naphthalene under high pressure. József Varga. *Math. naturw. Anz. ungar. Akad. Wiss.* 50, 408-26 (1933). Iron iodide was used in a series of expts. as a catalyst in an autoclave of 4.5 l., under a H pressure of 120 atm. Only 11% of the applied naphthalene was unhydrogenated after 1 hr. at 475° and only 4% after 1 hr. at 500°. No decrease of the catalytic action could be observed during 12 expts. An autoclave of 22 l. was used for another series of expts. with Mo and W compds. Their oxides proved to give much better results than sulfides, Molybdenic acid transformed at 520° about 3 times as much naphthalene as tungstic sulfide. The liquid products were sol. in concd.  $\text{H}_2\text{SO}_4$  in all expts.; hence they contained very little or no decahydronaphthalene. S. S. de Finály

An Ostwald viscometer for tar. A. R. Lec. *J. Soc. Chem. Ind.* 53, 69-70 (1934).—A modified Ostwald app. is described, with operating directions. Some of the merits claimed are: Applicable to opaque liquids, covers a wide range of viscosity, only about 20 cc. of tar used, readings may be repeated on the same sample over any temp. range without cleaning, no drainage error, timing is definite and reproducible to 1 part in 1000 even with the most viscous tars. J. H. Moore

Anthracenoid hydrocarbons of low-temperature tar. Gilbert T. Morgan and E. A. Coulson. *J. Soc. Chem. Ind.* 53, 71-3T (1934).—Low-temp tar and its cracked distillates contain anthracene, 2-methyl-, 2,6-dimethyl-, 2,3,6-trimethyl- and 2,3,6,7-tetramethylanthracene. A

constituent of the distillates which imparts an intense yellow color to the anthracenoid hydrocarbons has been proved to be mainly 2,6-dimethylnaphthacene. W. J. Peterson

Cold tars. H. Mallison. *Gas J.* 202, 802-4 (1933).—Sec. C. A. 28, 290<sup>3</sup>. G. G.

The estimation of bitumen in tar mixtures. G. P. Stöfer. *Roads* 11, 134 (1933); *Bldg. Sci. Abstracts* 6, 344.—The test in which the distillate between 270° and 350° is agitated with  $\text{Me}_2\text{SO}_4$ , allowed to stand, and the vol. of oil sepd. is read is in effect a test for paraffins, as bitumen gave a neg. result while tars from vertical retorts gave pos. results. Such tars frequently contain paraffins, whereas horizontal-retort tars do not. G. G.

The determination of asphaltic bitumen with tar. H. Mallison. *Roads* 11, 105 (1933); *Bldg. Sci. Abstracts* 6, 344.—A sample consisting of 3-4 g. of the mixt. is boiled under a reflux condenser for 15 min. with 10 times its wt. of  $\text{CHCl}_3$  or  $\text{CS}_2$ , filtered to sep. the "free C," this residue being washed with the solvent until colorless, and the solvent then distd. off. The bituminous residue is then treated with 6-8 ml. concd.  $\text{H}_2\text{SO}_4$  on a boiling water bath, allowed to cool, washed, dild. with 500 ml. water, left to stand for 2 hrs., decanted through a weighed filter paper, washed with hot water, dried and weighed. The wt. of the asphaltic bitumen so found is that present in the tar mixt. G. G.

Recent investigations of the coking of Transvaal coals and blends. P. E. Hall. *J. Chem. Met. Mining Soc. S. Africa* 34, 213 17 (1933); cf. C. A. 27, 4377.—Discussion. Alden H. Emery

The reactivity of nearly ash-free coke. Bernhard Neumann and Alex van Ahlen. *Brennstoff-Chem.* 15, 5-10 (1934); cf. C. A. 27, 5940. Coal, reduced to 0.78% ash by size selection and flotation upon 1.275 sp. gr.  $\text{CCl}_4$ -xylene, has been briquetted wet, packed into an Fe retort and carbonized at temps. of 500-900° for 3-6 hrs. to the end of gasification. Reactivity was detd. in a new app.; air was passed up through the coke at various temps. between 200° and 1000° but below carbonizing temp. of the coke tested. With reactivity =  $100(\% \text{CO})/1\% \text{CO} + 2(\% \text{CO}_2)$ , results are plotted to show decreases in differences in reactivity between carbonizing temps. as temps. increase, i. e., extrapolation to 1000° of >600° cokes shows equal reactivity. Previous work upon reactivity and theories is discussed. F. W. Jung

Small coke-oven gas consumers in the Fe industry (Herberholz) 9. Flotation reagents (Shvedov) 9. Complete combustion in gas analysis (Yakovlev) 9. Heating with producer gas in the building-material industry (DeForge) 20. Diesel fuel (Brit. pat. 403,124) 22. Destructive hydrogenation of tars (U. S. pat. 1,950,333) 22. Stirring device for furnace for drying coal (Ger. pat. 593,362) 1. Catalysts [for destructive hydrogenation of carbonaceous materials] (Brit. pat. 402,938) 18.

Kertész, Zoltán: Rechnerische Betrachtungen über Verbrennungsvorgänge und Abgasverluste bei Feuerungen, insbesondere bei Kalk- und Zementöfen. Halle: W. Knapp. 72 pp. M. 4.80; bound, M. 6.

Bureau d'études géologiques et minières coloniales. Les ressources minérales de la France d'outre-mer. I. Le charbon. Paris: Soc. d'éditions géographiques, maritimes et coloniales. 245 pp. Reviewed in *Chimie & industrie* 31, 574 (1934).

Fuel. Allgemeine Elektrizitäts-Ges. Ger. 590,680, Jan. 8, 1934 (Cl. 23b. 4.02). A fuel is composed of hydrocarbons and powd. coal, the latter being blown through a nozzle into the oil.

Smokeless fuel. Soc. de recherches et de perfectionnements industriels. Fr. 757,961, Jan. 8, 1934. In the distn. of carbonaceous material to produce a smokeless fuel a detd. amt. of oxygenated fluid is introduced at chosen points of the principal circuit so that the heat necessary for distn. is furnished by internal combustion of a fraction or

even of the whole of the distn. materials from the coal. An app. is described.

**Agglomerating fuel.** Arthur Roberts (also known as Arthur A. Roberts). Brit. 402,107, Nov. 23, 1933. An inorg. binder of the nature of cement is distributed throughout a pulverulent fuel mass, *e. g.*, coke, coal, lignite, peat, sawdust, spent tan bark, by  $H_2O$  or an aq. soln. or suspension about equal in wt. to the binder when the fuel is fine enough to pass a 30-mesh screen and increasing in proportion as the fineness increases. A small amt. of NaCl or KCl,  $H_3BO_3$  or borax, or  $Fe_2O_3$  and flame-coloring salts, *e. g.*, of Sr, may be added. \*The mass is suitably pressed at 2000-10,000 lb. per sq. in. while at about 100-120°F., the preceding mixing being at about 180-250°F. or not exceeding 400°F. if the fuel itself includes org. binding material. Oxidizing agents or ignition accelerators, *e. g.*,  $CuO$ ,  $Fe_2O_3$  or  $H_3BO_3$  may be applied to the briquet surfaces. In an example coke (30-mesh) 87.5, hydraulic cement 25,  $H_3BO_3$  1.2, NaCl 0.5 and  $H_2O$  6 parts are mixed. The briquets may be heated to 1800°F. for 30-90 min. to make them smokeless. In 402,139, Nov. 23, 1933, divided on 402,107, an org. binder, *e. g.*, pitch, and an inorg. binder as above are used, the  $H_2O$  soln. or suspension being 1.25 times the wt. of the binder when the fuel is 30-mesh size and increasing in proportion as the fineness increases. The briquets are baked to make them smokeless.

**Gelatinized fuels.** James S. B. Fleming and Imperial Chemical Industries Ltd. Brit. 403,401, Dec. 19, 1933. Fuels in paste or jelly form are obtained by dissolving nitrocellulose in MeOH or EtOH, adding a Cu, Pb or Sn compd. which is sol. therein at least in traces so as to gel the soln. and then an aliphatic OH-acid as anti-gelating agent, *e. g.*, citric, malic, tartaric. In an example 7 g. nitrocellulose of 350 c. *e. g.* units viscosity is dissolved in 90 g. MeOH; 0.001 g. Pb(OAc)<sub>2</sub> in 0.5 g. MeOH is mixed therewith and then 0.2 g. citric acid in 2.5 g. MeOH.

**Fuel briquets.** Otto Fehér. Hung. 108,573, Feb. 15, 1934. To powd. or waste coal are added 3.4% pitch, 5-6% beet molasses and 2.5-3%  $Ca(OH)_2$ , and the mixt. is pressed into forms.

**Apparatus for production of coal briquets.** Budapesti Kőszénbánya R. T. Hung. 108,212, Feb. 1, 1934. Mech. details.

**Carbonizing coal briquets.** Ellsworth B. A. Zwoyer and Albert B. Stillman (to General Fuel Briquette Corp.). U. S. 1,950,017, March 6. Various details of app. and operation are described suitable for heat treatment of briquets formed of finely ground anthracite and a binder.

**Carbonizing coal.** Alfred J. A. Hereng. Fr. 757,952, Jan. 8, 1934. A part of the moist coal is distd. at a low temp. to form a semi-distd. porous product which is intimately mixed with the rest of the coal and the whole is heated to at least 800° for sufficient time to obtain hard, dense blocks that burn without smoke, and of which the volatile constituents do not exceed 6%.

**Low-temperature carbonization.** British Carbonised Fuels Ltd., and Harold P. Hird. Brit. 402,853, Dec. 14, 1933. Coal is carbonized at a temp. maintained at or about 420°, the temp. in the flues surrounding the retorts being 600° and being maintained by closed circulation of a large vol. of heating gases whose heat is supplied by a burner. App. is described.

**Furnace for low-temperature carbonization.** Soc. d'études et de valorisation industrielle des combustibles (S. à r. l. called S. E. V. I. C.). Fr. 757,945, Jan. 8, 1934.

**Destructive hydrogenation.** I. G. Farbenind. A.-G. Fr. 758,870, Jan. 24, 1934. In hydrogenating coal, oil, etc., a part, preferably the greater part, of the primary material and the hydrogenating gas are heated by heat exchange to the reaction temp. or near it and the rest of the material is introduced into the reaction vessel without preliminary heating or heating from another source. The proportion of material heated by heat exchange is regulated so that the difference in temp. between the current to be heated and the heating current is not above 100°.

**Destructive hydrogenation of bituminous materials such**

**as coal, tar and pitch.** Erich Steffen. U. S. 1,950,460, March 13. In a process employing a temp. of about 460° and a pressure of not less than about 10 atm., the materials are treated in the presence of a hydrogenating gas contg. about 20%  $CO$ , the balance of the gas consisting mainly of free  $H_2$ . The O compds. in the material treated react to form  $CO_2$  so that the formation of water is thus materially reduced. An arrangement of app. is described.

**Destructive hydrogenation products from coal, etc.** Hein I. Waterman (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,949,891, March 6. Materials such as brown coal are treated with gases which are rich in  $CO$  (suitably at a temp. of about 460° and under a pressure of about 100 atm.) to effect an elimination of O present in the initial material by the oxidation of the  $CO$ ; the substantially O-free product is then subjected to a sep. treatment with  $H_2$  substantially free from  $CO$  to obtain liquid products. \*An arrangement of app. is described.

**Destructive hydrogenation of coal and oil.** James M. Jennings (to Standard-I. G. Co.). U. S. 1,950,309, March 6. Coal reduced to a state of substantially colloidal fineness is suspended in a heavy oil and the suspension, together with  $H_2$ , is passed through a reaction zone packed with lumps of a sulfactive catalyst of a size and arrangement adapted to provide voids permitting free flow of the suspended solids, while maintaining a pressure above 20 atm. and a temp. above 370°. App. is described.

**Hydrogenating carbonaceous materials.** International Hydrogenation Patents Co., Ltd. Brit. 463,481, Dec. 28, 1933. Distillable carbonaceous materials are treated with hydrogenating gases in the presence of catalysts comprising a halogen compd. of Mo, W and (or) V. Addnl. catalysts may be added, *e. g.*, oxides, hydroxides or sulfides of Cu, Ag and metals of groups 2-8; *e. g.*, compds. of Zn, Sn, Cd, Mn, U, rhenium, Ni or Co. The nitrides, phosphides, borides, arsenides and selenides of metals of groups 2-8 and Li, Mg and Al and Si in elementary or compd. form may also be present. The treatment may be destructive hydrogenation, removal of S and O impurities, conversion of O- and S-contg. org. compds., *e. g.*, phenols and cresols, and the hydrogenation of unsatd. hydrocarbons to produce aromatic or hydroaromatic hydrocarbons.

**Hydrogenating coal.** The Ultramar Co. Ltd. and Lindell T. Bates. Brit. 402,846, Dec. 14, 1933. Mixts. of coal and oil are destructively hydrogenated at above 300° and about 10 atm. while the coal is subjected to intensive attrition, *e. g.*, as described in Brit. 281,240 (C. A. 22, 3517). Catalysts may be used, *e. g.*, Zn or Fe balls or grinding bodies. The  $H_2$  may be replaced by water gas. App. is described.

**Rotary retorts and process for the destructive distillation of coal, etc.** British Coal Distillation Ltd. (formerly Leicestershire (L. & N.) Coal Distillation Ltd.) and Clifford MacKen. Brit. 401,767, Nov. 23, 1933.

**Air hearth for dry-working coal and other minerals.** Henry M. Sutton, Walter L. Steele and Edwin G. Steele. Ger. 590,851, Jan. 11, 1934 (Cl. 1a. 28.10).

**Apparatus for pneumatically separating dust and small particles from coal, etc.** The General Electric Co. Ltd. and Bernard Vincent-Lambert. Brit. 403,115, Dec. 8, 1933.

**Recuperative superheating of steam, etc.** André Huot (to Superheater Co.). U. S. 1,949,866, March 6. Various details of app. and operation are described.

**Montan wax.** I. G. Farbenind. A.-G. Brit. 402,751, Nov. 28, 1933. Montan wax products free from asphalt are obtained by sapon. the crude or detersified wax with alkalis and (or) earth alkalis, dissolving out the alcs. and soaps of the wax acids by lower alcs. and ketones or by formic or acetic esters of the alcs. and, if required, acidifying the soaps, which may be first sep'd. from the wax alcs. Sapon. and extrn. may be simultaneous. Solvents specified are EtOH, MeOH, PrOH, EtMeCO. Ex-amples are given.

**Production of gas, oil, etc., from coal, etc.** Lewis C. Karrick. U. S. 1,950,558, March 13. Finely divided solid carbonizable material such as coal is introduced into

a stream of steam, the steam is superheated to above  $370^{\circ}$  and the steam and gas produced are carried into heat-exchange relation with a body of water to produce new steam at a lower pressure which is then used for continuing the process; the hot gas produced is passed through a retort to carbonize other solid carbonizable material and the gas is sep'd. from other products formed. App. is described.

**Combustible gas.** Joseph A. Perry and Walter H. Fulweiler (to United Gas Improvement Co.). U. S. 1,949,810, March 6. A gas suitable for domestic and industrial use is prep'd. by treating coal gas for the substantial removal of its CO content (with recovery of the CO removed), producing H with use of the CO from the coal gas (as by reaction of the CO with  $H_2O$  in the presence of a catalyst), uniting the H thus obtained with blue water gas and thereafter removing a portion of the CO from the mixed gas, converting a substantial portion of the CO remaining in the blue water gas, together with all or part of the H, to  $CH_4$ , producing H by use of the CO removed from the blue water gas, and uniting the resulting H with the methanated blue water gas.

**Apparatus for detecting combustible gases in flue gas.** Svenska Aktiebolaget Monp. Fr. 758,395, Jan. 15, 1934.

**Coal gas.** Alfred Pott. Ger. 590,555, Jan. 5, 1934 (Cl. 26c. 12). A method is desc'd. of regulating the d. and calorific value of coal gas by addn. of steam, air or a mixt. of steam and air.

**Mixed oil gas and water gas.** Harutyun G. Terzian (to United Gas Improvement Co.). U. S. 1,949,819, March 6. In the operation of a set comprising 3 vessels, one of which contains a bed of solid fuel while the other 2 contain heat-storing material, 2 of the vessels are preheated by internal combustion of blast gas generated in the third vessel by air-blasting the fuel bed, and a hydrocarbon material such as oil is introduced alternately to one and then the other of the preheated vessels and then passed through the other preheated vessel; at least a substantial portion of the hydrocarbon gas produced is passed through the fuel bed after tar is extracted from this gas. App. is described.

**Water gas.** Carl Still (trading as the Firma Carl Still) and Alfred Gobiet. Brit. 403,595, Dec. 28, 1933, addn. to 389,377 (C. A. 27, 5944). In the process of 389,377, 2 oven chambers are interconnected so that the water gas and unconverted steam from the 1st oven are passed into the charge of the 2nd oven and the finished water gas is led away.

**Water gas.** Humphreys & Glasgow Ltd. Fr. 758,878, Jan. 24, 1934. The fuel is fed in a continuous manner by a conduit, the lower part of which extends downward into the generator. In the annular chamber formed by this extension, the gases resulting from the air blowing are burnt with secondary air, and, if desired, in contact with the surface of the mass of fuel which forms the base of this annular chamber. During the period of production of water gas, when carburization is necessary, oil, oil residues, tar, etc., are vaporized and disocd. in this chamber and fixed by passage through the mass of fuel, or the injected steam is superheated in this chamber.

**Use of heavy oil in the manufacture of carbureted water gas.** Joseph A. Perry (to United Gas Improvement Co.). U. S. 1,949,811, March 6. Blast gases are burned in a vessel of refractory material to establish a path of radiant heat over which blue water gas is then passed and the blue water gas is carbureted with heavy oil and the blue water gas, oil gas and oil vapors resulting are passed over the radiant heating path and carbon from the oil gas and oil vapors is deposited on the fuel bed by a reversal of flow. App. is described.

**Purifying gases.** I. G. Furhenind, A.-G. Fr. 757,745, Dec. 30, 1933.  $H_2S$  and  $NH_3$  are eliminated from gases by washing the gases with an agent capable of absorbing  $H_2S$  but incapable of absorbing  $NH_3$ , expelling the  $H_2S$  from the agent, burning it to form  $SO_2$  and using this to eliminate  $NH_3$  from the gas. Suitable agents include amines or aq. solns. thereof, hydroxyalkylamines salts of amino acids and alk. solns. of phenols.

**Polymerization of hydrocarbon gases.** Frederick W. Sullivan, Jr., and Robert F. Ruthraft (to The Standard Oil Co.). Can. 340,080, Mar. 13, 1934. Liquid products of the gasoline boiling range are obtained from said hydrocarbon gases other than  $CH_4$  by cracking at  $1400-1600^{\circ}F.$  at atm. pressure to 200 lb. per sq. in. The cracked gases under a pressure of 100-1000 lb. per sq. in. above atm. are brought into contact with a hydrocarbon solvent having a relatively low solvent power for  $CH_4$  and nonhydrocarbon gases. The  $CH_4$  and nonhydrocarbon gases are eliminated from the system. The remaining gases are polymerized at  $700-1000^{\circ}F.$  under 500-3000 lb. per sq. in. for a period of time sufficient to effect conversion. The conversion products are cooled and oils boiling higher than gasoline and unconverted gases are separately recovered.

**Gasification of solid fuel.** Edouard L. A. Brodeur. Fr. 759,154, Jan. 30, 1934. Volatile materials and moisture are completely removed from the fuel before it reaches the furnace proper. The volatile materials are burnt and the combustion products are introduced into the furnace in which they are reduced to combustible gases at the same time as the gas is gasified.

**Furnace for gas and coke.** C. Otto & Co. G. m. b. H. Fr. 758,364, Jan. 15, 1934.

**Double-walled gas producer.** Albert L. Galusha. U. S. 1,950,236, March 6.

**Gas producer for motor cars.** S. I. Dekalenkov. Russ. 31,544, Oct. 31, 1933. Construction details.

**Apparatus for removing hydrogen sulfide from gases.** Carl Still G. m. b. H. Ger. 590,556, Jan. 5, 1934 (Cl. 26d. 9 04).

**Removing sulfur dioxide from gas mixtures.** Metallges. A.-G. (Wilhelm Gensecke, Hans Weidmann and Wolfhart Seeke, inventors). Ger. 593,383, Feb. 24, 1934 (Cl. 12e. 3.01). Gases contg.  $SO_2$  are treated in the presence of O, preferably at 50-60°, with an aq. suspension of products obtained by the complete or partial combustion of carbonaceous material, e. g., with a suspension of coal ash or blue ash. A soln. is obtained contg. sulfates of the metals present in the combustion product, e. g., Al, Mn, Mg and Fe.

**Recovering ammonia and carbon dioxide from gas mixtures.** Nikodem Caro and Albert R. Frank (Rudolf Neubner, inventor). Ger. 536,422, Dec. 29, 1933 (Cl. 12k. 7). Gases contg. at least 2 mols. of  $NH_3$  per mol. of  $CO_2$  are washed with water under pressure to remove all the  $CO_2$  and an equivalent amt. of  $NH_3$ . The residual gases are washed again with water to remove excess of  $NH_3$ . The soln. from the first washing is cooled to sep. solid  $NH_4$  salt, which is removed and decompd. by heat. The mixt. of  $NH_3$  and  $CO_2$  so obtained is washed with water *in vacuo*, whereby  $NH_3$  and some  $CO_2$  are absorbed, and  $CO_2$  free from  $NH_3$  remains. The soln. obtained from the washing *in vacuo* is freed from  $NH_3$  and  $CO_2$  in known manner, and the gases are mixed with fresh initial gases. Cf. C. A. 28, 1481<sup>4</sup>.

**Gas mantles.** South Metropolitan Gas Co. and Albert J. Prestage. Brit. 402,748, Nov. 30, 1933. The inner and outer skeletons of a double mantle with its foundation made in the usual manner are sep'd. except at their ends by supplying air to the interior of the mantle during incineration to produce a greater shrinkage of the inner layer.

**Firelighters.** Walter G. Young, Dennis W. Trussell and Gordon J. H. Howard. Brit. 402,838, Dec. 11, 1933. Firelighters are molded into arched or domed form having slots or perforations from a mixt. of dried sawdust, paraffin scale and saltpeter. A pigment, e. g., Venetian red,  $KClO_3$  and  $C_{10}H_8$  may be included. Molding app. is described.

**Coke.** Gesellschaft für Teerverwertung m. b. H. Brit. 403,232, Dec. 21, 1933. See Fr. 749,014 (C. A. 27, 5917).

**Stamping apparatus for the coal charge in coking plants.** Carl Still (trading as Firma Carl Still). Brit. 403,040, Dec. 14, 1933.

**Apparatus for quenching and conveying away coke discharged from vertical retorts.** Wm. R. McLusky. Brit. 403,023, Dec. 18, 1933.

**Coke ovens.** Soc. de construction de fours de matériel à gaz et hydraulique. Fr. 758,499, Jan. 18, 1934. Means for escapement of the distn. gases is described.

**Coke-oven batteries with regenerator tunnels running longitudinally thereof.** Carl Still (tradig as Firma, Carl Still). Brit. 402,549, Dec. 7, 1933.

## 22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

**Experiments on the determination of the heat of cracking.** N. A. Butkov and O. M. Chechikina. *Neftyanoe Khozyaistvo* 25, 92-3 (1933).—Cracking expts. carried out with a Baku kerosene distillate in an app. constructed by the authors disclosed that a kerosene distillate having a temp. of 20° requires the input of 941-944 cal. per kg. when cracked at 625°, 1052-1095 cal. at 675° and 284-1337 cal. at 725°. A. A. Boetlingk

**Method for the separation of aromatic hydrocarbons from straight-run gasoline and kerosenes.** R. A. Virobyantz. *Neftyanoe Khozyaistvo* 25, 160-1 (1933).—The fraction contg. aromatic compds. is treated with 97-99% H<sub>2</sub>SO<sub>4</sub> (so as to give equal amts. by wt. of H<sub>2</sub>SO<sub>4</sub> and hydrocarbons) and is agitated for at least 5 hrs. and settled for 6-8 hrs. About 90% of the aromatic compds. are extd. The acid sep'd. from the gasoline is diluted with H<sub>2</sub>O (1:1) and distd. with superheated steam, the hydrolysis starting at 140°. The temp. is then gradually raised to 200-210°. From 50 to 90% of the aromatic compds. are sep'd., neutralized and dried. Consists of the aromatic compds. are tabulated. A. A. Boetlingk

**The removal of water dissolved in transformer oil.** Artur Ketnath. *Elektrotech. Z.* 54, 1259-61 (1933).—Phys. and chem. methods are discussed. F. W. Jung

**Hydrogenation of petroleum (Berthelot) 21.** Deposits [crude oil] in the southern part of Baichunas, Ural-Emba dist. (Buskin) 7. Destructive hydrogenation of coal and oil (U. S. pat. 1,950,309) 21. Catalysts [for conversion of hydrocarbons into nonknocking motor fuels] (Brit. pat. 402,938) 18. Condensation products of shale tars with aldehydes (Russ. pat. 31,613) 18.

**Aldehydes and ketones from petroleum acids.** A. E. Chichibabin, M. M. Katznelson and G. V. Chelintzev. Russ. 31,440, Oct. 31, 1933. Petroleum acids are converted into  $\alpha$ -bromo acids and these into  $\alpha$ -hydroxy acids, from which aldehydes and ketones are obtained by dry distn.

**Cracking hydrocarbon oils.** Charles W. MacKay (to Texas Co.). U. S. 1,950,058, March 6. Fresh charging stock is subjected to cracking temp. under superatm. pressure to effect cracking and vaporization in an intermediate pressure zone; condensate oil is subjected to cracking temp. under superatm. pressure to effect cracking and vaporization in a high-pressure zone; residue from the higher pressure zone is passed to the intermediate zone for distn. in the latter; residue from the intermediate pressure zone comprising residual constituents from both the cracked fresh charging stock and condensate is passed to a lower pressure zone for vaporization; and the vapors from the several zones are subjected to fractionation in a dephlegmating zone to produce a vapor fraction and a reflux condensate and this condensate is conducted to the higher pressure zone, and the vapors are condensed. App. is described.

**Cracking hydrocarbon oils.** Sigbert Seelig. Ger. 593,075, Feb. 21, 1934 (Cl. 23b. 1.04). Addn. to 439,044. The oil is led under pressure through a metal bath, and the cracking products, without fractionation, are subjected for some time, e. g., 25 min., to a higher temp. than that of the bath at about the same pressure.

**Cracking and distilling hydrocarbons.** Carl Still. Fr. 759,025, Jan. 27, 1934. Construction of expansion valve.

**Cracking and distilling oils, etc.** Carl Still. Fr. 757,810, Jan. 6, 1934. In cracking and distg. hydrocarbon oils under consecutive pressure and expansion, a section of the furnace for heating and another section for com-

plementary heating or cracking are coupled with a distn. column by 2 expansion valves, so that the heating section may be put into action alone by one valve or the 2 together by the other valve. Details are given.

**Distilling and coking hydrocarbon oils.** Wm. F. Moore (to Texas Co.). U. S. reissue 19,104, March 6. A reissue of original pat. No. 1,873,454 (C. A. 26, 6116).

**Apparatus for cracking vaporized or nebulized heavy hydrocarbon oils.** Sigbert Seelig. Ger. 593,421, Feb. 20, 1934 (Cl. 23b. 1.04).

**Tubular furnaces for cracking or distilling oil, etc.** Gasoline Products Co., Inc. Brit. 402,299, Nov. 30, 1933.

**Atomizer for cracked residuum.** D. A. Strom, P. I. Bulaventzev and Z. E. Matveev. Russ. 31,634, Oct. 31, 1933. The atomizer which is attached to the outlet of the pipe leading from the reaction chamber and terminates in the evaporator is constructed of a flange fastened to the pipe and a second flange held by bolts attached to the first flange at a certain distance from the latter. The second flange has the form of a solid disk.

**Destructive hydrogenation; cracking oils.** Akt. Ges. fur Steinkohleverflüssigung und Steinkohleveredelung. Brit. 402,264, Nov. 30, 1933. See Fr. 749,015 (C. A. 27, 5943).

**Oils, etc.** Jean Herzenberg. Fr. 758,507, Jan. 19, 1934. Compds. of S are removed from benzines, gasolines or mineral or tar oils by treatment with compds. which oxidize org. sulfides and disulfides but do not attack hydrocarbons, e. g., H<sub>2</sub>O<sub>2</sub> and org. per acids.

**Oil-filtering and rectifying apparatus.** Frank C. Frolander and Martin Czarny (to Capillare Holding Corp.). U. S. 1,950,487, March 13. Various structural and operative details are described.

**Motor fuels.** I. G. Farbenind. A.-G. Fr. 759,080, Jan. 29, 1934. Resin-forming hydrocarbons in crude gasoline are polymerized by treatment with a double compd. of AlCl<sub>3</sub> and an olefin. The polymerized compds. are removed.

**Diesel fuel.** Donald A. Howes and Imperial Chemical Industries Ltd. Brit. 403,124, Dec. 15, 1933. Fuel oils for compression-ignition engines are primed by addn. of up to 10% of an aliphatic or aromatic diketone, e. g., 1.5% acetylacetone or benzoylacetone or 1% benzil is added to an oil fraction, boiling up to 300°, obtained by the destructive hydrogenation of coal.

**Refining mineral oils.** Aktiebolaget Separator-Nobel. Fr. 757,987, Jan. 8, 1934. The oil is mixed with H<sub>2</sub>SO<sub>4</sub>, by reiterated and preferably continuous operations and after each mixing operation, the mixt. of oil, tar and free H<sub>2</sub>SO<sub>4</sub> is subjected to a centrifugal sepu. which is also preferably continuous.

**Dewaxing hydrocarbon oils.** Alco Products Inc. Fr. 758,853, Jan. 24, 1934. See U. S. 1,940,014 (C. A. 28, 15209).

**Dewaxing mineral oils.** Leo D. Jones (to The Sharples Specialty Co.). Brit. 403,392, Dec. 18, 1933. A treatment, auxiliary to dewaxing mineral oil by chilling a soln. thereof to -70-0°F. and centrifuging, consists in adding finely divided solids to the oil soln. and filtering the mixt. at a temp., e. g., 50-75°F., low enough to form a cloud other than that due to the added solids but high enough to prevent pptn. of amorphous wax. Kieselguhr, sawdust or paper pulp may be used in proportions of 0.25-1 lb. per gal. oil, or, if clay has been used in the previous refining, a solvent for the oil may be added and the clay removed at the specified temp.

**Bituminous compositions.** The Barber Asphalt Co. Fr. 758,243, Jan. 12, 1934. An aggregate such as ground rock is mixed with a dispersion of soft bitumen in water,

and a powd. hard bitumen is added to the mixt. <sup>1</sup> A volatile solvent for the soft bitumen is incorporated in the mixt.

**Destructive hydrogenation of bituminous materials such as oils, tars, etc., containing sulfur.** Lajos von Szeszich. U. S. 1,950,333, March 6. The material is heated to a high temp. in the presence of a catalyst contg. Mo or W compds., such as molybdic acid, under a pressure above 100 atm. and the material is treated with H under pressure; reaction products are passed off and cooled and subjected to a partial reduction in pressure, to adjust the amt. of H<sub>2</sub>S so that when returned to the reaction the activity of the catalyst is maintained at substantially the optimum (the gas being present within the limits of 1-15%); excess gas rich in H is led off and liquid products are subjected to further reduction, in pressure, this giving a gas rich in hydrocarbons and contg. a substantial amt. of H<sub>2</sub>S; H<sub>2</sub>S is withdrawn from this gas and is added to the gas rich in H, and the latter is then returned to the reaction with sufficient added H to compensate for that used in the reaction.

**Stabilizing gasoline.** August P. Bjerregaard (to Gasoline Antioxidant Co.). U. S. 1,949,896, March 6. For preventing pptn. of gummy substances, gasoline is treated with (about 0.5-3.0 lb. per 200 lbs. of gasoline) anthracene or phenanthrene, and the mixt. is contacted with fuller's earth.

**Apparatus (with a horizontal shell and internal baffles) for refining hydrocarbon material such as cracked gasoline by use of adsorptive material.** Alanson McD. Gray (to Gray Processes Corp.). U. S. 1,950,140, March 6. Various structural and operative details are described.

**Antiknock fuel.** Nicolaas Max (to The Shell Development Co.). Can. 339,889, Mar. 6, 1934. Motor fuels of high antiknock value are produced by adding metal compds. of the condensation products of amines with compds. that contain at least one CO group and several other O-contg. radicals, e. g., hydroxy aldehydes, diketones, or triketones. The components of the condensation product may be aliphatic or aromatic. The most suitable metals are those whose salts can form complexes with NH<sub>3</sub>, Cu, Ni, Co, Zn and Cr.

**Lead tetraalkyls.** Gellert Alleman (to Sun Oil Co.). U. S. 1,949,948, March 6. Compds. suitable for preventing compression knock of motor fuels have the general formula R<sub>4</sub>Pb in which one at least of the R's is a diethylmethyl radical, and are produced, e. g., by adding a mixt. of diethylchloromethane and MeI to a mixt. of Mg, Pb chloride and ether and decomp., the resulting intermediate. U. S. 1,949,949 relates to similar compds. such as dimethylbis(dimethylmethyl) lead.

**Lubricating oils.** Reginald G. Sloane (to Standard Oil Development Co.). Brit. 402,253, Nov. 30, 1933. See Fr. 747,558 (C. A. 27, 5182) and Ger. 582,853 (C. A. 28, 891<sup>2</sup>).

**Lubricating oils.** I. G. Farbenind. A.-G. (Hermann Zorn and Walter Rosinski, inventors). Ger. 593,455, Feb. 28, 1934 (Cl. 23c. 1). A small proportion of a higher polymerization product of isobutylene is mixed with mineral or tar oils or their cracking or hydrogenation products, or with conversion products of fatty oils or with oils obtained by the destructive hydrogenation of coal. The mixts. are then treated with a polymerizing or condensing agent. Thus, a mineral lubricating oil may be mixed with 1% of an isobutylene polymer and the mixt. treated with 2% of AlCl<sub>3</sub> at 80°. The oil may also be treated with the polymerizing or condensing agent before the isobutylene polymer is added. Cf. C. A. 28, 1182<sup>2</sup>.

**Lubricating oils.** I. G. Farbenind. A.-G. Fr. 758,269, Jan. 13, 1934. Solid or liquid hydrocarbons, particularly lubricating oils, are improved by adding small amts. of products having a mean mol. wt. above 500 and obtained by destructive hydrogenation of polymerization products of unsatd. hydrocarbons, e. g., rubber, polymerization products of diolefins or natural or synthetic resins.

**Filter for lubricating oils, etc.** Manufacture de machines auxiliaires pour l'électricité et l'industrie. Fr. 759,199, Jan. 30, 1934.

**Continuous apparatus for indicating the viscosity of lubricating oils, etc.** Walter J. Albersheim and Harvey S. Konheim. Ger. 593,024, Feb. 23, 1934 (Cl. 42/ 7.01).

**Lubricants.** Per K. Frolich (to Standard Oil Development Co.). Brit. 402,262, Nov. 30, 1933. A lubricating oil comprises a hydrocarbon contg. between about 0.25 and 5.5% of a synthetically produced ester having a b. p. above 302°F., preferably above 356°F., the oil being substantially free from suspended matter. In examples, the isopropyl ester of the acids produced by the oxidation of paraffin wax, Me caprylate, Am butyrate, glycol stearate, sec-Bu naphtheneate, iso-propyl benzoate, Ph-OAc, glyceryl oleate, isopropyl oleate and Et stearate are used.

**Lubricants by destructive hydrogenation of heavy petroleum oils.** James M. Jennings (to Standard-I. G. Co.). U. S. 1,950,308, March 6. A relatively heavy petroleum oil and a gas rich in free H are passed under a pressure above 50 atm. over a sulfactive catalyst at a temp. of about 370-440° for a time sufficient to effect appreciable destructive hydrogenation but insufficient to allow formation of more than about 20% of light oil boiling below about 205°, the oil and gas being passed through a stationary bed of the sulfactive solid catalyst and liquid and vaporous products being separately withdrawn. Numerous features of app. arrangement are described.

**Regenerating lubricating oils.** John S. Black, Robert S. Black and Wm. Stewart. Brit. 403,139, Dec. 21, 1933. The used oil is heated to remove volatile impurities, treated with a mixt. of NH<sub>4</sub>Cl and Super-Cel and finally filtered. App. is described.

**Apparatus for regenerating used oils by washing with water.** Wm. F. Johnson and Michael A. Klauck. Brit. 403,178, Dec. 21, 1933.

**Apparatus and method for the hot-water purification of used lubricating oil.** John E. F. Burn. Brit. 402,172, Nov. 30, 1933.

**Separating asphalt from oils such as crude lubricating oil stock.** Ulric B. Bray (to Union Oil Co. of Calif.). U. S. 1,949,989, March 6. The oil is extd. with a normally gaseous liquid hydrocarbon solvent (such as liquefied casing-head gas) a major portion of which consists of hydrocarbons of less than 4 C atoms, to cause a sepn. of the asphalt; pptd. asphalt is washed with fresh solvent. An arrangement of app. is described. Cf. C. A. 28, 2177<sup>4</sup>.

**Aqueous dispersions of asphalt.** August E. Schutte (to Lane Construction Corp.). U. S. 1,950,272, March 6. A dispersion is formed in which the continuous phase comprises water together with the mucilaginous material of flaxseed.

**Rosin and rosin soap from stump tar.** S. P. Serebrovskii. Russ. 31,529, Oct. 31, 1933. The process is carried out in the absence of atm. O to avoid darkening of the products. O is avoided by using a vacuum or an atm. of CO<sub>2</sub>.

## 23—CELLULOSE AND PAPER

CARLETON E. CURRAN

**Amino derivatives of cellulose.** S. Malowan. *Kunststoffe* 24, 53-5 (1934).—A brief discussion. J. W. P.

**The change of cellulose in mercerization and the aging of alkali cellulose.** XLVIII. Communication on viscose by G. Kita and co-workers. Yoshizo Shinoda. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 55 8 (1934); cf.

C. A. 28, 317<sup>6</sup>.—The Cu oxide-ammonia soln. method of varying Cu concn. was used for the characterization of the 10 tested cellulose samples. The exptl. data showed that the mercerized samples became less sol. in the test solns., because of the removal of the more sol.  $\beta$ - and  $\gamma$ -cellulose by the mercerization. Prolonged mercerization, however

resulted in depolymerization and increased soly. in the test soln. Aging results in a more uniform and more sol. product.

Karl Kammermeyer

**Diffuser washing of sulfate pulp.** Th. Overwien and H. Störvik. *Papir-J.* 21, 231-5, 257-60(1933).—An exptl. diffuser is described and data are given showing the effect of several variables on the time required to bring the black liquor to 0°Be. Conclusions: (1) Best results are obtained with many diffusers. (2) The temp. of the wash water should be 40°. (3) The pressure should be as low as time will allow. (4) It is not advisable to tap off the black liquor on a level with the bottom or middle of the diffuser and run it into an intermediate tank as in American practice. The best results are obtained when the black liquor is tapped off at the top of the diffuser, as is customary in Scandinavian practice, and led from one diffuser to the top of another operating in series with the first.

Clinton L. Brooke

**Methods of utilizing sunflower-seed hulls.** V. S. Sadikov, I. D. Abramson, A. D. Ruibak and K. S. Belkova. *Schriften zentr. biochem. Forschungsinst. Nahr.-Genussmittelind.* (U. S. S. R.) 3, 308-36(1933).—Sunflower-seed hulls are potentially valuable because cheap, abundant (oil mill waste about 500,000 tons per year) and rich in useful materials. Potash can be made from the hulls, but it is more profitable to make furfural and cellulose by hydrolysis. The resulting cellulose (about 89%  $\alpha$ -cellulose, Cu no. 0.5-1.6, ash only 0.1%) is excellent for making viscose or for further hydrolysis to fermentable sugars from which alc. can be made.

Julian F. Smith

**Problem of production of halfstuff.** N. N. Nepenin. *Leningrad. Oblastnoi Sovet Nauch. Inzhenerno-Tekh. Obshchestva Tsellyulozno-Bumazhnoi Prom., New Problems of Cellulose-Paper Production 1933*, 8-36.—The theory and practice of the existing methods for production of halfstuff are discussed.

Chas. Blane

**The use of titanium pigments in paper and other cellulose products.** Gistein Ravner. *Papir-J.* 22, 7-8, 15-16(1934).—A review.

Clinton L. Brooke

**Sources of error in measuring opacity of paper by the contrast-ratio method.** Deane B. Judd. *Bur. Standards J. Research* 12, 345-51(1934)(Research Paper No. 660).

E. H.

**Lime is the most economical cooking agent for making the "hard" sheet of straw paper.** Herbert P. Bailey. *Rock Products* 36, No. 11, 28-31(1933).

R. W.

**Some chemical reactions of maple and spruce lignin.** E. E. Harris, E. C. Sheppard and R. L. Mitchell. *J. Am. Chem. Soc.* 56, 889-93(1934).—Lignin, isolated by the cold  $H_2SO_4$  method, is produced quantitatively, is free from carbohydrates and contains all of the MeO not accounted for in the carbohydrates of the wood. HCl lignin contains carbohydrates and has lost MeO groups. Cuprammonium lignin contains carbohydrates and is not obtained quantitatively. A study of the properties of sugar maple and white spruce lignin showed that lignins from hardwoods and softwoods are not the same. The no. of Ac, MeO, Cl and Br groups introduced indicates that the no. of HO and unsatd. groups in the mols. differ. The behavior of the MeO to halogenation and of the HO to methylation in alkali and to halogenation in  $CCl_4$  or  $H_2O$  suggests that the groups to which these radicals are attached represent at least 3 groups. The results obtained from the methylation and chlorination of lignin in wood show that lignin is little changed during isolation by the modified  $H_2SO_4$  method. The HO groups of lignin are not free for methylation until after hydrolysis; the lignin must be attached to some of the carbohydrates, possibly the hemicellulose in the wood cell. The isolated lignin is thought to exist principally in the keto form, while the original lignin in the enolic form is combined with carbohydrates.

C. J. West

**Electrolytic adsorption of Fe on viscose rayon (Tanemura, et al.)** 25. Structure of cellulose gel (Atsuki, Sobue) 25. Reactions relating to carbohydrates and polysaccharides. XLVI. Structure of the cellulose

1 synthesized by the action of *Agelobacter xylinus* on fructose and glycerol (Barsha, Hibbert) 10. Bonding compn. [for fiberboard] (Brit. pat. 403,159) 18. Resin emulsions [for sizing paper] (Brit. pat. 403,095) 26. Resin [for sizing papers] (Fr. pat. 758,801) 26. Adhesives [for cellulose sheets] (Fr. pat. 758,768) 18.

**Mienes, Karl** Celluloseester und Celluloseäther unter besonderen Berücksichtigungen der Benzylcellulose. Berlin: Chem.-techn. Verl. Bodenbender. 124 pp. Cloth, M. 15.

**Cellulose from annual plants.** F. S. Maashak. *Russ* 31,749, Oct. 31, 1933. In the prepn. of cellulose, annual plants are disintegrated, treated with a weak caustic soln. and then with dild. HCl before chlorination, so as to make the pulp susceptible to the treatment to follow.

**Device for separating cellulose and water by drawing off.** Aktiebolaget A. Ekströms. *Ger.* 590,897, Jan. 12, 1934 (Cl. 55d. 33.01).

**Cellulose esters.** Soc. pour l'ind. chim. à Bâle. *Fr* 758,185, Jan. 11, 1934. Cellulose esters invol. in org. solvents are made by treating substances contg. cellulose, or reaction products of cellulose, with acylating agents in the presence of catalysts while preserving the structure of the initial product, the acylating agent still adhering to the ester being removed by washing with liquids which do not react with the agent and which dissolve the catalyst at the same time. The washing liquid is removed by distn.

**Cellulose ester composition.** Hans T. Clarke and Carl J. Mahn (to The Eastman Kodak Co.). *Can.* 339,838, Mar. 6, 1934. A compn. comprises  $Ph_3PO_4$  and at least one mixed ester of cellulose selected from the group cellulose acetate stearate, acetate propionate, acetate butyrate, acetate stearate palmitate, propionate stearate, acetate oleate, acetate laurate, acetate laurate myristate. The product is used in the plastic and analogous arts, for instance the manuf. of wrapping sheets, photographic film, rayon, varnish or lacquer, and molded products.

**Cellulose-ester sponge.** British Celanese Ltd. and Wm. I. Taylor. *Brit.* 402,055, Nov. 9, 1933. Porous masses made of or contg. a cellulose carboxylic ester are subjected to complete or partial sapon. The material may be made by dispersing, in a liquid or plastic mass of the ester, solid, liquid or gaseous particles incompatible with the mass, treating the mass so as to set it, removing the dispersed solid or liquid, if present, and finally sapon. The sapon. material swells on immersion in  $H_2O$  like a sponge, the unsapon. material being more like pumice. In an example graded particles of crushed rock salt are dispersed in cellulose acetate soln., the mass is pressed into the desired shape and dried, the dried mass is extd. repeatedly with  $H_2O$  and then sapon. with NaOH several hrs.

**Coloring cellulose esters.** Société chimique des usines du Rhône. *Ger.* 590,552, Jan. 5, 1934 (Cl. 22h. 4): Plastic masses of cellulose esters are dissolved in org. solvents and colored by pptg. a pigment from a soln. mixed with the soln. of ester. Thus, a soln. of acetyl cellulose in acetone is treated with a soln. of  $FeCl_3$ . A soln. of  $K_4FeC_6N_6$  is added. A pptn. of Prussian blue results. The blue acetyl cellulose is pptd. by addn. of water, washed, dried and the acetone evapd. off. In another example, acetyl cellulose soln. is given an addn. of  $CdSO_4$  and Na<sub>2</sub>S solns. to ppt. CdS which colors the cellulose yellow.

**Films.** C. F. Boehringer & Soehne G. m. b. H. *Fr.* 757,906, Jan. 8, 1934. Films having a high content of plastifiers are made from films of cellulosic derivs. already contg. plastifiers and carefully freed from volatile solvents of low b. p., by causing the films to swell in non-volatile liquid or liquefied gelifying or plastifying agents until the films have absorbed the desired amt. of plastifiers.

**Films, sheets, etc.** Henry Dreyfus. *Fr.* 758,552, Jan. 19, 1934. A soln. of a cellulose ester or ether in a solvent or solvent mixt. is extruded and the extruded products are received into a coagulating bath contg. the same solvent



or solvent mixt. Thus a soln. of cellulose acetate in acetone alc. is extruded into a bath contg. diacetone alc. and EtOH, or a soln. in dioxane is extruded into an aq. soln. of dioxane.

**Embossing celluloid.** Celluloids Ltd. Brit. 403,008, Dec. 14, 1933. See U. S. 1,924,800 (C. A. 27, 5536).

**Apparatus for mixing viscose.** B. O. Evtzikhevich. Russ. 31,504, Oct. 31, 1933. Construction details.

**Rayon, etc.** Henry Dreyfus. Fr. 750,249, Jan. 31, 1934. Threads, ribbons, etc., are made by extruding a soln. of a cellulose ester or ether in a solvent or solvent mixt. and receiving the products in a coagulating bath contg. the same solvent or solvent mixt. The solvent may be dioxane or methylglycol monoacetate, and the coagulating bath an aq. soln. of these.

**Forming rayon filaments, etc., by the evaporative method.** Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,949,983, March 6. A spinning soln. is extruded into an evacuated zone, the extruded product is led from this zone and dry air is supplied adjacent the point of emergence to prevent ingress of moist air. App. is described.

**Artificial threads of regenerated cellulose.** Harold H. Parker (to Du Pont Rayon Co.). U. S. 1,949,919, March 6. A viscose soln. contg. 8% alkali calcd. as NaOH, prep'd. from a cellulose xanthated with 10-25% CS<sub>2</sub> (based on the wt. of the cellulose), is introduced into a bath contg. 40-50% H<sub>2</sub>SO<sub>4</sub> to form threads.

**Producing artificial filaments by the evaporative method.** Henry Dreyfus and Wm. I. Taylor (to Celanese Corp. of America). U. S. 1,950,025, March 6. A soln. of a cellulose deriv. such as cellulose acetate in a volatile solvent is extruded into an evaporative atm. to form a skin-like outer layer on the extruded filaments which are then passed into an atm. contg. solvent vapor to soften the outer layer, and the softened filaments are stretched. U. S. 1,950,026 relates to an app. for carrying out similar processes.

**Centrifugal spinning pots.** Société de constructions mécaniques de Stains. Brit. 402,362, Nov. 30, 1933.

**Spinning jets for the production of artificial filaments, threads, yarns, etc.** British Celanese Ltd. and Wm. I. Taylor. Brit. 402,449, Dec. 4, 1933, and 402,450, Dec. 4, 1933.

**Digester for cellulose manufacture.** Arnold Brobeck. Ger. 593,473, Feb. 27, 1934 (Cl. 55b. 2.40).

**Fibrous materials containing resin.** Soc. pour l'ind. chim. à Bâle. Fr. 758,458, Jan. 18, 1934. Fibrous materials are mixed with condensation products of carbamides and aldehydes in the form of powder, hardened until they are insol. in water and do not glue up but still swell in water. The mixt. is made in known manner into bands, such as paper, card-board or presspan.

**Apparatus for dewatering paper pulp, etc.** Hobert W. French. U. S. 1,949,998, March 6. Structural and mech. features.

**Purifying apparatus for paper pulp, etc., comprising a drum with straining surfaces.** E. & M. Lamort Fils. Brit. 403,103, Dec. 8, 1933.

**Paper.** James d'A. Clark and John E. Graves (to H

Mead Corp.). U. S. 1,950,357, March 6. Water is removed from paper stock on a forming wire to effect an initial definite formation of the web; a suspension of additive material such as a carbonate filler suspension is then brought into absorbing contact with the wire side of the sheet, and the sheet with the additive material is then subjected to a controlled suction. An arrangement of app. is described. Cf. C. A. 28, 1537<sup>2</sup>.

**Paper-making apparatus.** Firma J. M. Voith. Ger. 593,034, Feb. 20, 1934 (Cl. 55d. 8.20). Means for shaking the wire cloth is described.

**Suction cylinder for use in paper-making machines, etc.** Reginald Richardson. Brit. 402,501, Dec. 7, 1933.

**Paper hollander.** P. J. Wolf & Sohne G. m. b. H. and Hermann Mallickh. Ger. 590,888, Jan. 12, 1934 (Cl. 55c. 8.01).

**Preventing the separation of pitch from paper pulp.** V. I. Abramovich. Russ. 31,754, Oct. 31, 1933. The sepn. of pitch from cellulose is prevented by adding kerosene as emulsifying agent without introducing into the pulp a soln. of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>.

**Emulsion for sizing and impregnating paper, card-board, etc.** Vsesyuznii Nauchno-Issledovatel'skii Institut Bumazhnoi i Tsellyuloznoi Promishlennosti. Russ. 31,751, Oct. 31, 1933. An aq. emulsion of kaolin of the consistency of heavy cream is mixed with a bitumen melted to a low viscosity.

**Water-repellent coating on paper or the like.** Alfred E. Van Wirt (to Imperial Paper and Color Corp.). U. S. 1,950,279, March 6. A solubilized protein material such as a solubilized casein and clay compn. is applied to a web of the material and the treated surface is printed with a pigment material including a solubilized protein material. The surface is then sprayed with a liquid such as formaldehyde soln. to react with the protein material and render it insol. App. is described.

**Apparatus for coating paper with carbon composition.** George A. Rutkoskie. Fr. 758,587, Jan. 19, 1934.

**Carbon papers, etc.** Deutsche Hydrierwerke A.-G. Fr. 757,735, Dec. 30, 1933. Satd. or unsatd. mono- or polyhydric aliphatic aces. of high mol. wt., or naphthene aces. are used as solvents or emulsifiers in making coloring pastes for carbon papers, ribbon, etc.

**Copying papers.** Soc. anon. des anciens établissements Braunstein Freres. Brit. 403,002, Dec. 14, 1933. See Fr. 751,410 (C. A. 28, 1192<sup>5</sup>).

**Waterproof paper, etc.** International Bitumen Foundations Corp. Brit. 403,116, Dec. 8, 1933. H<sub>2</sub>O impermeable papers and pasteboards contg. 50-60% of asphalt distributed in finely divided form are prep'd. by pre-treating the fibrous pulp in the hollander or beating vat with solns. of resin soaps, oleates of alkali metals, alk. gels or alkali salts of Turkey-red oils, thereupon adding the requisite amt. of asphalt as an aq. emulsion and then working up the material on the paper machine. If desired, a precipitant may be added, prior to the working up, to cause the asphalt to be pptd. in finely divided form throughout the mass, NaCl, Na<sub>2</sub>SO<sub>4</sub>, NaHSO<sub>4</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and alum being specified.

**Machine for producing thick pasteboard.** Bruno Müller. Ger. 590,531, Jan. 4, 1934 (Cl. 55d. 2.101).

## 24--EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

**Combustion in vacuo of compressed mercury fulminate.** H. Muraour and W. Schumacher. *Compt. rend.* 198, 1161-2 (1934).—Though combustion is not propagated along a train of fine crystals of Hg fulminate when touched by a red-hot wire *in vacuo*, it is so propagated, but without detonation, if the fulminate is compressed (d. 1.4). The behavior of explosives when thus treated divides them into 3 classes: (1) no propagation of combustion, even with compression, e. g., picric acid, gun cotton; (2) propagation on compression, but no detonation, e. g., Hg fulminate; (3) detonation, e. g., PbN<sub>3</sub>, Ag fulmi-

nate, diazo-*m*-nitroaniline perchlorate (very violent), Pb trinitroresorcinate (feeble).

C. A. Silberrad

**Explosions in New Mexico coal mines, 1895 to 1932.** G. M. Kintz. *Bur. Mines, Information Circ.* 6760, 10 pp. (1934).

Alden H. Emery

General law relating to exothermal processes [explosions] (Semenov) 2. Detonation in gaseous mixts. (Sokolik, Shehelkin) 2. Mechanism of the upper limit of ignition of a mixt. of C<sub>2</sub>H<sub>4</sub> and O (Sadovnikov) 2. Theory of the upper pressure limit of ignition (Semenov) 2.

Mechanism of the upper limit and the kinetics of the ignition of detonating gas (Nalhandyan) 2. Effect of inert admixts. on the lower limit of ignition of gases (Lavrov) 2.

General Orders on Explosives, Effective March 27, 1933. Issued by Industrial Commission of Wisconsin. Madison: Democrat Printing Co. 39 pp.

**Explosive.** Charles P. Spaeth (to The Canadian Industries Ltd.). Can. 339,803, Mar. 6, 1934. An explosive contains nitroglycerin 21.0, trimethylolmethane trinitrate 7.0, nitro cotton 0.6,  $\text{NH}_4\text{NO}_3$  15.0,  $\text{NaNO}_3$  43.0, carbonaceous combustible matter 12.4 and chalk 1.0%.

**Explosive.** Charles P. Spaeth (to The Canadian Industries Ltd.). Can. 339,804, Mar. 6, 1934. An explosive comprises nitroglycerin, nitrocellulose, one or more oxidizing agents, a carbonaceous combustible ingredient and dimethyloldimethylmethane dinitrate.

**Absorbent material for use in explosives.** Charles P. Spaeth (to The Canadian Industries Ltd.). Can. 339,802, Mar. 6, 1934. Urea and  $\text{NH}_4\text{NO}_3$  are fused and further amts. of  $\text{NH}_4\text{NO}_3$  and  $\text{NaNO}_3$  dissolved in the melt. The temp. of the soln. is increased until a substantially clear soln. is obtained. Absorbent material is impregnated with the soln. and the impregnated material is cooled for use in explosive compositions, e. g., nitroglycerin 15.0,  $\text{NH}_4\text{NO}_3$  55.0,  $\text{NaNO}_3$  9, bagasse pith 17.0, urea 4.0%.

**Explosive charge suitable for use in fiery mines.** Alexander C. Scott. U. S. 1,950,038, March 6. A container which may be formed of steel and which is capable of withstanding a high internal pressure and which has an aperture closed by a relatively easily rupturable disk is charged with a salt such as  $\text{NH}_4\text{NO}_3$  decomposable by heat so as to yield non-inflammable gaseous decompn. products, together with a K-Cl compd. such as  $\text{KClO}_4$  and a fuel and is provided with means for ignition. Various examples and modifications are described.

**Detonator for explosive charges.** Mario F. F. Biazzi. U. S. 1,950,019, March 6. A primary explosive material such as Hg fulminate or Pb azide is compressed in a cap and there is then compressed in the cap an explosive material, such as nitropentaerythritol, having high power and a sensibility to impact between the primary explosive material and the secondary explosive material, which is separately loaded in a case into which the cap is forced.

**Fuse for shells.** Henry E. Nash (to Hercules Powder Co.). U. S. 1,949,841, March 6. Various details are described of a fuse having a powder train comprising a

mixt. of an oxidizing agent such as  $\text{BaO}_2$  and an element of group 6 of the periodic system such as Se which when burned together do not evolve any substantial amt. of gas.

**Matches.** Knut E. Olsson. Brit. 401,805, Nov. 23, 1933. Repeatedly ignitable compn. rods comprise a combustible mass of org. substances, which leave no ash, and an igniting mass, segregated therefrom and contg. an O-developing substance with a binder having such low affinity for O and present in such amt. that the igniting mass is not combustible, or at least cannot burn more quickly than the combustible body material. Aldehydes, e. g., metaldehyde, and amines, e. g.,  $(\text{CH}_3)_3\text{N}$ , may be used for the body material with a binder of nitrocellulose dissolved in  $\text{Me}_2\text{CO}$ , and O-developing substances, e. g.,  $\text{NH}_4\text{ClO}_4$ , or volatile substances, e. g.,  $\text{C}_2\text{H}_6$ ,  $\text{EtOH}$ , may be included to hasten combustion. The igniting mass may contain up to 70%  $\text{KClO}_4$  or  $\text{NH}_4\text{ClO}_4$  with a binder of 3 alkali silicate, e. g., water glass, cement, gypsum. Ordinary P-contg. striking surfaces, comprising, e. g., P,  $\text{Sb}_2\text{S}_3$ , ground glass and gum arabic, may be used for ignition of the rods.

**Igniting mass for matches.** A. V. Penkin. Russ. 31,805, Oct. 31, 1933. In addn. to the usual ingredients the mass contains oil shale.

**Match that can be used repeatedly.** Rezső König and Zoltán Földi. Hung. 108,056, Jan. 15, 1934. A core of active matter is covered by a filling material satd. with a substance of low burning velocity and gasifying under  $260^\circ$ . An outer coating consists of a substance that melts much higher. As examples: (1) 20 g. red P, 10 g. black  $\text{Sb}_2\text{S}_3$ , 10 g. glass powder, 3 g. powd. gum arabic, 0.5 g.  $\text{NaHCO}_3$  and 2 g. potato starch form an active mixt. that can be ignited on a surface covered by a mixt. of 20 g.  $\text{NaClO}_4$ , 3 g.  $\text{PbO}_2$  and 1 g. acetylcellulose; (2) a rod made of a mixt. of 6 g.  $\text{NaClO}_4$ , 0.4 g. hexachloroethane, 2 g. glass powder, 1.2 g. formaldehyde, 0.8 g. metaldehyde, 0.15 g. S flower and 1.7 g. acetylcellulose dissolved in acetone, is covered by a mass of 13% celluloid and 87% metaldehyde. The prepn. can be ignited on a surface covered by a mixt. of 8 g. amorphous P, 2 g.  $\text{Sb}_2\text{S}_3$ , 1 g.  $\text{MnO}_2$ , 1 g. cement and 1 g. tragacanth.

**Match that can be used repeatedly.** Zoltán Földi and Rezső König. Hung. 108,188, Feb. 1, 1934; cf. preceding abstr. A ground substance, of low tension and low decompn. temp. is mixed with an O-forming substance in the least amt. that is ignitable on a P-contg. surface.

**Miner's safety vapor lamp.** Flame Lamp Research Association Ltd. and Richard L. Woosnam. Brit. 402,862, Dec. 14, 1933.

## 25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

**The present state of knowledge of dyes of the indanthrene type.** Max A. Kunz. *Bull. soc. ind. Mulhouse* 100, 3-50 (1933).—An address. The subject is thoroughly discussed, and mention is made of some expts. of K. on dianthrone derivs. I. H. Odell

**Color and constitution from viewpoint of recent electronic theory.** VI. H. H. Hodgson. *J. Soc. Dyers Colourists* 49, 213-16 (1933); cf. C. A. 25, 5843.—Electronic explanations are offered of the substantivity of benzidine derivs., the possibility of successive coupling with the 2 diazonium groups in  $(\text{C}_6\text{H}_4\text{N}_2\text{X})_2$ , etc., the coupling of diazonium salts with  $\text{NHPh}_2$ , but not with  $\alpha\text{-C}_6\text{H}_4\text{NH}_2$ , in suspension in mineral acid, the replacement of Br by H in 4-bromo-3,5-dinitrobenzaldehyde, the ease of dinitration of the *p*- $\text{MeC}_6\text{H}_4\text{SO}_3$  derivs. of  $\alpha\text{-C}_6\text{H}_4\text{NH}_2$  and 3,5,4-( $\text{NO}_2$ ) $\text{NH}_2\text{C}_6\text{H}_3\text{Me}$ , the sepn. of *m*- and *p*-xylydines by W. R. Hodgkinson and L. Limpach's method (cf. *J. Chem. Soc.*, 77, 65 (1900)), and bromination of phenols in aq. as contrasted with inert solvents. It is suggested that benzidine dyes are substantive to cotton only when the 2 C<sub>6</sub> nuclei are co-planar. B. C. A.

**Action of light upon dyes.** Hanns Rein. *Angew. Chem.* 47, 157-61 (1934).—Exptl. data are given on the

action of light of different wave lengths upon various dyes. With equal conditions of exposure, the max. action of light occurs when the absorption of the dye and the light source coincide most closely in their wave lengths. The destructive action of daylight is due mainly to the abundant visible portion of the sun's spectrum. The ultra-violet absorbing, white and yellow substances form an exception, as their absorption lies almost exclusively in the ultra-violet range. The action of several addns. to increase light fastness is discussed. Most artificial light sources are entirely unsuited for comparative purposes. A series of 8 specially selected wool dyes of decreasing fastness was established for finding the amt. of reacting light. These were tested by sunlight exposures at stations all over the earth, together with dyes of a cotton scale, and exhibited considerable superiority as a standard for comparing climatic influences upon dyes. Karl Kammermayer

**Application of indigosol dyes.** K. Stierwaldt. *Melliand Textilber.* 14, 411-12 (1933).—Soly. data for, and methods of dyeing even shades with, certain indigosol dyes are indicated. In applying mixts. of substantive and non-substantive indigosol dyes even results are promoted by raising the temp. of the dye liquor, since this reduces the

affinity of both types of dyes; an addn. of 0.028–0.1% of Rongalite C to such hot liquors prevents premature oxidation (development) of the dye. With certain dyes which require development in a bath contg. more than the usual amt. of  $H_2SO_4$ , the process is complete within 30 sec. and, if prolonged the  $NO_2$  present decomposes the developed portion of the dye. B. C. A.

Cold dyeing of cellulose acetate with reserve printings. P. Barsy. *Russa* 9, 105, 107 (1934).—Practical operating directions. A. Papineau-Couture

Sorption on cotton fibers of dyes with varying molecular association in solution. Geo. L. Clark and Julia Southard. *Physica* 5, 95–100 (1934).—As a concd. soln. of oxazine dye (Nile Blue sulfate) or of methylene blue is dild., the predominant mol. species alters by steps in complexity (cf. *C. A.* 25, 3223). This property permits a study of cotton fiber pore structure and size by measuring sorption as function of concn. The amt. of sorption was detd. by spectrophotometric measurements on the solns. before and after sorption of the dye to equil. on known wts. of cotton. X-ray diffraction studies of cotton with sorbed dye showed no alteration of cellulose pattern. A large increase in dye sorption naturally accompanies change from micellar to mol. dimensions, compatible with predominating cotton pore sizes. B. R. Anderson

High-pressure steam boilers in the aniline dye industry. B. P. Fintiktkov. *Anilnokraskovnaya Prom.* 3, 106–7 (1933).—The advantages of various types of boilers are discussed. B. C. A.

The structure of cellulose gel. IV. Cellulose structure and direct dyeing. Katsumoto Atsuki and Hiroshi Sobue. *Cellulose Ind.* (Tokyo) 10, 31–7 (1934). *Abstracts* (in English) 7–12; cf. *C. A.* 28, 395. Dyeing with Congo red which has a high colloidal property gives in general very good results. Acetate rayon is dyed proportionally to the dyestuff mol.; good dyeing is obtained with Bismark brown which has an amino group at one end; with orange and fast red having a OH group, dyeing by a chem. combination occurs, because these dyes are more bathochromic. Cotton dyeing occurs as a phys. adsorption; the color on the cotton fiber is hypochromic, and the amt. of dyes on the fiber increases in the following order: orange > Congo red > Bismark brown > fast red > toluylene red. Calico cloth is dyed similarly. Mercerized calico cloth has a stronger affinity for dyestuff than unmercerized cloth. Lilienfeld silk, which has a regular arrangement of micelles, retains the bathochromic effects. All artificial silks have stronger bathochromic effects than cotton, which indicates that viscose and cupro-ammonia rayons have more free OH group than cotton. From these facts, the same combination as in the coordination compd.,  $\lambda$  e.,  $C:O:H$ , is considered between the OH groups of  $H:O:H$ .

cellulose and water, and in the dyeing process the dyestuff is absorbed at first; it is then combined with a cellulose coordination compd. as a substitution or additive compd. as follows:  $[ROH + (H_2O)](D) + (H_2O) = [ROH \cdot (H_2O) \cdot D](H_2O)$ , where R and D are radicals of cellulose and dyestuff. K. Konda

New artificial fibers. M. Jeanny. *Russa* 9, 90, 101, 175–9 (1934).—A description of Soc. Nobel Française's Fr. pat. 751,824, Sept. 11, 1933, for the manuf. of artificial fiber from polyvinyl compds. A. P.-C.

The leading of wool. L. Armand. *Tiba* 12, 83–9 (1934).—A brief review. A. Papineau-Couture

Empire fibers for marine cordage. Anon. *Bull. Imp. Inst.* 31, 500–7 (1933); cf. *C. A.* 27, 3338. Comparative service tests carried out on New Zealand hemp and Manila hemp in the British navy gave very satisfactory results. If the 2 materials were on an equal footing as regards origin, the results of the tests would not warrant any change in present practice; but in view of the Admiralty's policy to give the preference to British Empire products, the results warranted partial adoption of the New Zealand hemp in conjunction with sisal, provided the price was satisfactory and the fiber was sufficiently strong to give

yarn and cordage breaking strains in accordance with specifications. A. Papineau-Couture

X-ray studies of the structure of hair, wool and related fibers. II. The molecular structure and elastic properties of hair keratin. W. T. Astbury and H. J. Woods. *Trans. Roy. Soc. (London)* A232, 333–94 (1933); cf. *C. A.* 25, 4460; 27, 2168. About 200 x-ray photographs of mammalian hairs, spines, etc., were taken under a great variety of conditions. The x-ray fiber photograph of stretched hair ( $\beta$ -keratin) is analogous to that of natural silk (fibroin), whether stretched or unstretched. Stretched hair is therefore built of extended polypeptide chains, while unstretched hair ( $\alpha$ -keratin) must consist of the same chains in a folded state, so that the elastic mechanism is that of a reversible intramol. transformation. By means of "quadrant photographs" it is shown that the mol. complex of  $\alpha$ -keratin stretches reversibly by about 2% before the onset of the main transformation. The limiting elastic extensibility of all mammalian hairs is about 100% of their initial unstretched length. Intramol. folds (transverse to the general direction of the side chains) of the nature of linked pseudo-diketopiperazine rings which open up on extension to produce the normal zigzag protein chain are assigned to  $\alpha$ -keratin. The side chains of  $\beta$ -keratin are roughly coplanar and serve to unite neighboring main chains by a variety of cross linkages, including both covalent and electrovalent bonds. In the extended configuration, the existence of the "primary fold" in the main chains reduces the av. length of an amino acid residue to less than is found in fibroin. The structure of  $\beta$ -keratin is one of flat polypeptide "grids" adhering by virtue of attractions between  $-CO$  and  $=NH$  groups. The normal equil. form of these grids involves the transverse "secondary folds." The general intramolecular elastic mechanism of keratin thus falls into line with that of simpler mols., though the usual possibilities are greatly enhanced by the mobility of both main chains and side chains and by the longitudinal attractions between electropos. and electroneg. centers in the latter. The available chem. analyses of keratin are in close agreement with the concept of an av. vol. per amino acid residue of  $3.38 \times 4.65 \times 9.8$  A., as deduced from the photographs, the dimensions being, resp., the av. length of the residue, the thickness transverse to the side chains and the av. width in the plane of the side chains. These quantities may be used to calc. the av. d. of all proteins and the av. thickness of monomol. protein films. An approx. tentative scheme for the distribution of the keratin side chains is proposed. The elastic properties of hair are referred to 3 "phases," intercellular, cell-wall and intracellular keratin, which, resp., show increasing powers of resistance to extension and the action of reagents, and function elastically both in series and in parallel. The phenomena exhibited under the following conditions are studied and explained: stress of water at increasing temps., action of dil. NaOH at ordinary temps., adsorption of water, hydrolysis with steam or dil. alkali, irradiation with ultra-violet light or x-rays, and action of  $K_2Cr_2O_7$  and of eosin. F. D. Rossini

Delustering of rayon. J. C. Meiss. *Chem. Weekblad* 31, 214–22 (1934). E. Schotte

Military khaki. J. B. Prince. *Tiba* 12, 181–9 (1934). The process of making military khaki is described. The factors affecting the fastness of the shade were investigated. Conclusions: (1) With Cr sulfate and Fe acetate, excellent fastness to washing, Cl and sweat is obtained by using  $Na_2CO_3$  at the boil as fixing agent and passing through the Mather-Platt after the hot flue. (2) Similar results are obtained with Cr formate; Cr acetate gives approx. the same fixation of Cr and Fe, but less satisfactory fastness. A. Papineau-Couture

The effects of laundering processes on fabrics. R. E. V. Hampson. *J. Textile Inst.* 25, 23–32P (1934).—The various stages in the present-day washing process are described and their effects on fabrics are discussed. The relation of the construction and chem. finishing treatments to the behavior of fabrics in laundering is also considered.

Ruby K. Warner

**Strength measurements on rayon crepe yarns before and after boiling.** A new method of testing crepe yarns. W. Weltzien and W. Königs. *Mitt. Textilforschungsanst. Krefeld* 8, 67-9 (1932).—It is recommended to det. the breaking load of rayon crepe yarns both before and after soaking overnight in 1% soap and then heating at 80-90° for 1 hr., washing and drying. This treatment often causes a marked fall in strength, but is less severe than most dyeing processes. The strength of the soaped yarn should be not less than 1.1 g. per denier, and if it is < 1 g. per denier faults are likely. B. C. A.

**Stabilization of hydrogen peroxide in the bleaching of wool.** II. Effect of phosphate, ketone and alcohol sulfonate. R. Folner and G. Schneider. *Melliand Textilber.* 15, 24-7 (1934).—The catalytic effect of  $\text{NH}_3$  on the decompn. of  $\text{H}_2\text{O}_2$  was greatly decreased by adding lauryl alc. sulfonate and acetone. The strength and elasticity of wool yarn bleached in these baths were generally increased. The best results were obtained with lauryl alc. sulfonate and acetone in alk. solns. also contg.  $\text{Na}_2\text{P}_2\text{O}_7$ . Igepon T also gave good results. E. R. Rushton

**Electrolytic adsorption of iron on viscose rayon and other fibers.** Kotaro Tanemura, Hidco Kohno and Kotarō Nishimura. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 89-90 (1934).—The electrolytic adsorption of Fe on viscose rayon, silk, cotton and wool in solns. of  $\text{FeCl}_3$ ,  $\text{FeSO}_4$  and  $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4$  (concn. of Fe = 0.01 g./l. as  $\text{Fe}_2\text{O}_3$ ) was investigated by varying the  $\text{pH}$  of the solns. The optimum  $\text{pH}$  for the adsorption was 2.5-3.0 for  $\text{FeCl}_3$  soln. and 4.0-5.5 for  $\text{FeSO}_4$  soln. All the tested fibers showed the same tendency, although the degree of adsorption was different, showing that the change of the colloidal state of Fe hydroxide sol greatly affected the adsorption process. With  $\text{FeCl}_3$ , negatively charged  $\text{Fe}(\text{OH})_3$  sol and  $\text{Fe}^{++}$  had no affinity for the fiber, but the

positively charged micelle expressed as  $\left[ \frac{m\text{FeCl}_3}{n\text{Cl}} \cdot \frac{x\text{H}_2\text{O}}{x\text{H}_2\text{O}} \right] \text{FeCl}_3^+$  possessed affinity. With  $\text{FeSO}_4$ , the negatively charged micelle expressed as  $\left[ \frac{H\text{FeO}_2}{\text{Cl}, \text{H}_2\text{O}} \right] \text{FeO}_2^-$  had no affinity,

while the positively charged micelle  $\left[ \frac{H\text{FeO}_2}{\text{Cl}, \text{H}_2\text{O}} \right] \text{FeO}^+$  had affinity for the fiber. The greatest amt. of Fe on the fiber which could not be detected with the tannic acid test was about 0.01% of the fiber as  $\text{Fe}_2\text{O}_3$ ; this concn. was called the "allowable Fe concn.," it increased with the concn. of the acid, being 0.01 and 0.005 g.  $\text{Fe}_2\text{O}_3$ /l. for N and 0.1 N  $\text{H}_2\text{SO}_4$ , resp. Karl Kammermeyer

**Absorption of chromium salts by natural silk.** L. P. Michel. *Tiba* 12, 89-93 (1934); *Russa* 9, 185-9 (1934).—Tests carried out under quite different conditions on the whole bore out the findings of Hishiyama and Sekiguchi (C. A. 26, 3380, 5761). The amt. of  $\text{CrO}_3$  fixed by silk increases with the concn. of the bath (up to about 1%), the temp. (up to boiling), the time (up to 30 min.) and the alk. of the bath. Addn. of neutral salts had but little effect on the fixation of  $\text{CrO}_3$ , while addn. of mineral acids decreased it. A. Papineau-Couture

**Fixation of metal ions by animal hair.** I. Joseph Caspe and Wm. E. Austin. *J. Tech. Assoc. Fur Ind.* 4, 12-18 (1933).—Results indicate that the absorption of Fe as  $\text{FeSO}_4$  by Australian rabbit hair increases with the concn. of  $\text{FeSO}_4$  up to a concn. of 7% (where the absorption was 5.15%) and then decreases. At the higher concns. evidence of the formation of a sol. Fe proteinate was obtained. Preliminary treatment of the hair with  $\text{NH}_4\text{OH}$  or the addn. of  $\text{NaCl}$  to the  $\text{FeSO}_4$  soln. increases the absorptive capacity for Fe. Lowering the  $\text{pH}$  decreases the amt. of Fe fixed by the hair. W. A. Moore

**Action of alkaline copper solution on silk fibroin.** VII-VIII. Solution phenomena in the system fibroin-copper-amine alkali. Yūgiro Takamatsu. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 107-10 (1934); cf. C. A. 28, 1539.—Exptl. results are reported which led to the conclusion that, when fibroin is placed in an alk. Cu-

amine soln. where fibroin : Cu : K (as KOH) is 10 : 4 :  $\geq 10$ , and where amine is present in excess, the fibroin reacts first with a Cu-amine base, forming a fibroin-Cu-amine compd., and then reacts further with alkali, forming a fibroin-Cu-alkali compd. The amine therefore takes part in the formation of an intermediate product and thus accelerates the rate of soln. of fibroin. K. K.

**The properties of Sirrix O.** G. Tagliani. *Dyer* 71, 294-5 (1934).—Analyses of fabrics kier-boiled with and without Sirrix O Patented show that, calcd. on the weight of the goods, an addn. of 1/2% of this new kier-boiling assistant effects a more complete removal of the nitrogenous and mineral materials, increases the whiteness and absorbency of the textile and produces a stronger fiber. The compn. of Sirrix O Patented is not indicated. Ruby K. Worner

**Methods for determining the value of different tannins (catechu type) for tanning fish nets.** J. Olie and G. Brouwer. *Collegium* 1933, 541 7.—To det. total and permanent absorption (on cotton yarn with 2% tannin soln., centrifuge, weigh, dry, reweigh (loss of  $\text{H}_2\text{O}$  is used to calc. and correct for capillary absorption), then wash at 15.5° for 15 hrs. with 120 cc.  $\text{H}_2\text{O}$  per lb. to det. fixed or permanent absorption. This method has not been compared with exposure tests. South African wattle ext. is cheaper and is absorbed to a greater extent, and more firmly than catechu which is now used for tanning fish nets. I. D. Clarke

**Determining the wetting properties of liquids.** M. D. Rozenbrock. *Melliand Textilber.* 14, 306-7 (1933).—Constructional details are given of an app. which comprises a long and narrow liquor trough (A) and an arrangement whereby 2 standard lengths of right- and left-hand, hard-twisted cotton yarns are extended horizontally (similar to 2 consecutive links in a chain) between a fixed stop and the lower end of a pivoted needle, the upper end of which moves over a graduated dial. The wetting power of a liquid is detd. by raising A until the yarn is submerged and noting the rate of contraction of the yarn. B. C. A.

**Absorption of dyestuffs by cellulose** (Neale, Stringfellow) 2. Retene field. III. Nitroretenols, nitrofluorenes and related compds. [used in dyeing] (Bogert, Hasselstrom) 10. Effecting chem. reactions [optg. dyes] (Brit. pat. 402,410) 4. Aromatic amines [products used as dye intermediates] (U. S. pat. 1,950,079) 10.

**Gerin, J.:** Traité théorique et pratique de tissage du ruban (Tissus unis) Paris: Librairie polytechnique Ch. Béranger. 273 pp. Bound, F. 75. Reviewed in *Chimie & Industrie* 31, 665 (1934).

**Johannsen, Otto:** Handbuch der Baumwollspinnerei Rohwollerei und Fabrikanlagen. Lfg. 1. 4th ed., revised. Leipzig: B. F. Voigt. 40 pp. M. 2.50.

**Dyes.** I. G. Farbenind. A.-G. (Fritz Baumann, inventor). Ger. 590,746, Jan. 9, 1934 (Cl. 22a. 3.08). Acidones of the anthraquinone series are prepd. by treating 1,4-diaroylamino-5-aminoanthraquinone with *o*-halo carboxylic acids, or by treating 1,4-diaroylamino-5-chloroanthraquinone with *o*-amino carboxylic acids, and converting the products into acidones with optional acylation. In an example, 1,4-dibenzoylamino-5-aminoanthraquinone, Me *o*-bromobenzoate, anhyd. AcOK and Cu powder are heated in  $\text{PhNO}_2$  to give 1,4-dibenzoylaminoanthraquinone-6,5(N)-1',2'(N)-benzeneacidone. Another example describes the prepn. of 1,4-dibenzoylaminoanthraquinone-6,5(N)-2',3'(N)-naphthaleneacidone.

**Dyes.** I. G. Farbenind. A.-G. (Richard Stusser, inventor). Ger. 590,872, Jan. 15, 1934 (Cl. 22a. 2). Dyes contg. Cr or Cu, obtained by chroming or coppering *o*-alkoxy azo dyes, are treated with salts or acids which split off the metal to form Cu or Cr salts. Thus, the complex Cu compd. obtained by coppering the dye from 1 mol. of tetrazotized 3,3'-dimethoxy-4,4'-diaminobiphenyl and 2 mols. of 1-( $\beta$ -naphthyl)-3-methyl-5-pyrazolone-8'.

sulfonic acid is treated with  $\text{Na}_2\text{S}$  and  $\text{NaOH}$ .  $\text{CuS}$  is pptd. and is filtered off to leave a metal-free  $\alpha$ -hydroxy-diazo dye. Other examples are given.

**Dyes.** I. G. Farbenind. A.-G. Fr. 758,289, Jan. 13, 1934. Powd. vat dyes, particularly for printing textiles, are prepd. by intimately mixing fine pastes of the dyes or their leuco compds. with solns. of wetting or dispersing agents besides solns. of fixation accelerators and then drying the mixt. rapidly by pulverization in a current of heated air or other gas.

**Dyes.** I. G. Farbenind. A.-G. Fr. 758,961, Jan. 26, 1934. Derivings of improved fastness are obtained with mixts. on the one hand of vat dyes of the di- and isodibenzanthrone series and on the other those obtained by the process of Ger. 202,788, or their derivs. or substitution products.

**Dyes.** Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord Réunis, établissements Kuhlmann. Fr. 750,178, Jan. 30, 1934. A violet-blue dye suitable for acetate silk is made by nitrating 1,8-diamino-2,7-dimethylanthraquinone and reducing to the 1,4,5,8-tetraamino compd.

**Dyes.** E. I. du Pont de Nemours & Co. Fr. 758,880, Jan. 24, 1934. New diazo-imino compds. sol. in water and alkalies are prepd. by coupling a diazotized aromatic amine contg. no solubilizing group, such as  $\text{SO}_3\text{H}$  or  $\text{COOH}$ , with a compd. of piperidine or pyrrolidine contg. at least one solubilizing group. Dyes are prepd. by mixing these compds. with a coupling component and treating the mixt. with an acid at a high temp. Examples are given.

**Dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 758,081, Jan. 10, 1934. Arylides of carboxylic acids capable of coupling are united with diazotized or polyazotized bases of the formula  $\text{R}^1-\text{N}=\text{N}-\text{R}^2$  ( $\text{R}^1, \text{R}^2$  and  $\text{R}^3$  are any aryl groups, one at least of which has a diazotizable  $\text{NH}$  group and which may contain various substituents). Thus 4-aminotriphenylamine  $\rightarrow$  anilide of 2,3-hydroxynaphthoic acid gives a reddish blue shade. Several examples are given.

**Synthetic dye.** Standard Oil Development Co. Fr. 758,155, Jan. 11, 1934. A dye suitable for coloring lubricating oils is made by causing anhyd.  $\text{AlCl}_3$  to act on a mixt. of a polycyclic aromatic hydrocarbon and another hydrocarbon chosen from the class of aromatic and aromatic polycyclic hydrocarbons, eliminating the  $\text{AlCl}_3$  and sepg. the dye. Examples are given of dyes prepd. from a mixt. of  $\text{C}_{10}\text{H}_{10}$  and  $\text{C}_{10}\text{H}_8$ , xylene and  $\text{C}_{10}\text{H}_8$ .

**Mixed dyes.** Deutsche Hydrierwerke A.-G. Fr. 758,140, Jan. 11, 1934. Mixed quinone dyes are prepd. by condensing di- $\beta$  contg. free, monoalkylated or mono-aralkylated amino groups with quinones, by the usual methods, or dye intermediates are condensed with quinones and the dyes are then formed. The basic character of the amino group becomes sufficiently compensated by the electroneg. properties of the quinone to prevent formation of salts with acid. Several examples are given.

**Dye dispersions.** British Celanese Ltd., Tobias Orkman, George Reeves, Edmund Stanley, Henry C. Olpin and George H. Ellis. Brit. 402,054, Nov. 21, 1933. Dyes which exist in stable and unstable phys. forms and which normally yield dispersions unstable to hot soap soln. are converted into their stable forms by heat and then dispersed in an aq. medium by milling or grinding, whereby dispersions stable to hot soap soln. and suitable for dyeing org. derivs. of cellulose are obtained. Steam, hot air or hot  $\text{H}_2\text{O}$  may be used for the conversion. Among examples (1) diazotized 5-nitro-2-aminonaphthol is added to a soln. of dimethylaniline in aq.  $\text{HCl}$  in the presence of concd. sulfite cellulose waste liquor; the mixt. is made alk. with soda ash and heated to  $80^\circ$  and the dye is then filtered, washed and milled in  $\text{H}_2\text{O}$  and (2) the azo dye  $p$ -nitroaniline  $\rightarrow p$ -xylylene is prepd. and treated as in example 1.

**Metallized dyes.** I. G. Farbenind. A.-G. Fr. 758,069, Jan. 10, 1934. Azo dyes contg. at least 1 acid group and as coupling constituent, an 8-hydroxyquinoline are treated

with agents furnishing a heavy metal. Thus the dye obtained from sulfanilic acid and 5-methyl-8-hydroxyquinoline is heated with a soln. of  $\text{Cr}$  formate. Other examples are given. Fr. 758,070. Azo dyes prepd. by coupling a halogenated, nitrated or sulfonated diazotized  $\alpha$ -aminophenol with a tetrahydro- $\beta$ -naphthol, *e. g.*, 2-hydroxytetrahydronaphthalene-3-sulfonic acid, are treated with an agent furnishing a metal.

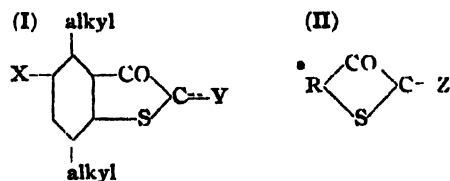
**Chromed dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 758,262, Jan. 13, 1934. Dyes obtained by coupling diazotized  $\alpha$ -hydroxyaminonaphthalene-sulfonic acids with naphthols are chromed so as to contain less than 1 atom of  $\text{Cr}$  for each group capable of being chromed and treating the resulting products with alk. agents which may be capable of yielding  $\text{Cr}$ . Several examples are given. Fr. 758,263. Azo dyes of the formula

$\text{R}^1\text{N}=\text{N}:\text{C}(\text{M})\text{C}(\text{N}:\text{NR}^2):\text{COOH}$ , where  $\text{R}^1$  is aryl contg.  $\text{COOH}$  in one of the  $\alpha$ -positions with respect to the azo chromophore and not contg.  $\text{OH}$  in the other  $\alpha$ -position,  $\text{R}^2$  is  $\text{H}$ , alkyl or aryl and one of the aryls contains at least one  $\text{SO}_3\text{H}$  group, are treated with chroming agents. Several examples are given. Fr. 758,264. Unsulfonated dyes which contain groups forming complexes with metals are caused to react with metallizing agents in the presence of aliphatic hydroxycarboxylic acids, *e. g.*, tartaric, lactic, citric or succinic acid.

**Chromed dyes.** I. G. Farbenind. A.-G. Fr. 758,268, Jan. 13, 1934. The tinctorial properties of chromed dyes are often favorably modified by treatment with org. compds. which are capable of being transformed into complex  $\text{Cr}$  compds., but which are not themselves dyes. Such compds. include oxalic, salicylic, tartaric, picramic, sulfo-salicylic and 2,3-hydroxynaphthoic acid and pyrocatechol.

**Dyes derived from cyanoacetic acid.** Ottmar Walil (to General Aniline Works). U. S. 1,950,421, March 13. Dyes which are suitable for dyeing "acetate silk" yellow to orange shades of good fastness are produced by causing about mol. quantities of a cyanoacetic acid ester or of a cyanoacetic acid arylamide, and of an aromatic  $p$ -amino-aldehyde of the benzene series (or a corresponding benzylidene compd.) which may be substituted in the amino group by alkyl, aralkyl or aryl to react together (suitably in the presence of a solvent such as alc. and pyridine and with the addn. of a sol. alk. reacting substance such as piperidine, ethylenediamine,  $\text{NaOEt}$  or  $\text{KOEt}$ ). Several examples with details of procedure are given.

**Indigoid dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 758,261, Jan. 13, 1934. Asym. indigoid dyes are prepd. by condensing 4,7-dialkyl-3-thionaphthenones of the formula (I) with 3-thionaphthenones of the formula (II) in which  $\text{X}$  is  $\text{H}$  or halogen,  $\text{R}$  is aryl and one of the groups  $-\text{C}-\text{Y}$  or  $-\text{C}-\text{Z}$  is  $-\text{C}-\text{H}_2$  or its equivs. where one  $\text{H}$  is replaced by  $\text{COOH}$  and the other of the groups is  $-\text{C}-\text{O}$  or its equivs. in which the  $\text{O}$  is replaced by  $N$ -aryl, or by  $\text{H}$  and halogen or 2 halogens. The dyes may be halogenated if necessary. Examples are given. Cf. C. A. 28, 2545<sup>1</sup>.



**Indigoid dyes; intermediates.** I. G. Farbenind. A.-G. Brit. 402,265, Nov. 30, 1933. Dimethylalkoxybenzenethioglycolic acids, having either a free  $\alpha$ -position or an  $\text{NH}_2$ ,  $\text{CN}$ ,  $\text{CONH}_2$ , or  $\text{COOH}$  group therein, are obtained by customary methods from dimethylalkoxybenzenes which contain an amino or a  $\text{HSO}_3$  group and a free  $\alpha$ -position thereto or both groups in  $\alpha$ -position to each other and are then converted into the corresponding hydroxythionaphthenes in the usual manner. Dyes are obtained by oxidizing the latter or by condensing them or their 2-anils with indigoid components. Dyes contg. halogen are

obtained by starting with the halogenated dimethylalkoxybenzenes or by halogenating the intermediates, *e. g.*, the hydroxythionaphthenes, or the final products. Among examples (1) 2,3-dimethyl-4-hydroxybenzenesulfonic acid, prep'd. by decomp'g. the diazo comp'd. of 2,3-dimethyl-4-aminobenzenesulfonic acid, is treated with  $\text{Me}_2\text{SO}_4$  and alkali and the resulting Na salt of 2,3-dimethyl-4-methoxybenzenesulfonic acid is melted with  $\text{PCl}_5$ ; the 2,3-dimethyl-4-methoxyphenylthioglycolic acid, obtained by reducing the resulting sulfonyl chloride and condensing with chloroacetic acid, is converted into the thioglycolic sulfonyl chloride and then into the hydroxythionaphthene; by oxidizing the 6,7-dimethyl-5-methoxyhydroxythionaphthene or by condensing with 2,1-naphthoxythiophene anil, dyes are obtained and (2) 1,4-dimethyl-2-methoxybenzene is acetylated, treated with Br and sapon'd. and the resulting base is converted into the corresponding thioglycolic acid and hydroxythionaphthene by the customary methods; the 4,7-dimethyl-5-methoxy-6-bromo-3-hydroxythionaphthene is condensed with 4-methyl-6-chloro-2,3-diketodihydrothionaphthene 2-*p*-dimethylaminoanil or with 4,6-dimethyl-5,7-dichloroisatin  $\alpha$ -chloride.

**Oxazine dyes.** I. G. Farbenind. A.-G. Fr. 758,247, Jan. 12, 1934. Condensation products of the oxazine series are prep'd. by condensing *o*-aminophenols contg. a  $\text{NO}_2$  group with quinones or haloquinones. Examples are given of the prep'n. of 3-bromo-7-nitro-, 4-chloro-7-nitro-, 1,3,4-trichloro- and tribromo-7-nitro-, 1,3,4-trichloro-6-nitro-, 1,3,4-trichloro-6-methyl-7-nitro-, 1,3,4,6-tetrachloro-7-nitro- and 1-chloro-3,4-benzo-7-nitro-2-phenoxazine, triphenyldioxazine dyes and a 6,13-dichloro-3,10-dinitrotriphenyldioxazine.

**Sulfur dyes.** I. G. Farbenind. A.-G. Fr. 758,589, Jan. 19, 1934. S dyes are obtained by treating with sulfurizing agents 2-phenoxazines, which may be substituted in the benzene ring by any substituents and in the quinone ring by atoms of halogen. Thus, dyes may be obtained from 1,3,4-trichloro-, 1,3,4-trichloro-6-methyl-, 1,3,4-trichloro-7-amino-, 1,3,4,6-tetrachloro-7-amino-, 1,3,4-trichloro-6-methyl-7-amino-, 1,3,4-trichloro-7-benzylamino- and 1,3,4-trichloro-7-nitro-2-phenoxazine.

**Sulfur dyes.** I. G. Farbenind. A.-G. (Otto Bayer, Wilhelm Hohenemser and Karl Larbig, inventors). Ger. 580,873, Jan. 12, 1934 (Cl. 22a: 1). Org. compds. are fused with polysulfides and Mo and Cu or compds. of these added. Thus,  $\text{Na}_2\text{S}$ , S,  $\text{H}_2\text{MoO}_4$  and  $\text{CuSO}_4$  are fused with 3-amino-6-hydroxyphenazine to give a dye coloring cotton red. Other examples are given.

**Sulfur dyes.** I. L. Khmel'nitskaya, G. E. Bonvech and V. A. Verkhovskaya. Russ. 31,525, Oct. 31, 1933. Nitro compounds, indophenols, etc., are fused with polysulfides of alkali metals in 2 stages. In the first stage the fusion is carried out under ordinary conditions and the process is discontinued upon a complete reduction of the original material; in the second stage the fusion is continued and is accompanied by the introduction into the melt, without any diln. with oxidizing substances, of such compds. as nitrites which do not contain hydroxyl groups of nitro compounds of K persulfate, air which is blown through the melt, etc. The melt is then treated in the usual manner.

**Acid dyes of the triphenylmethane series.** N. G. Laptev. Russ. 31,523, Oct. 31, 1933. In the oxidizing condensation of dialkyldisulfoaralkylaminodiphenylmethane with dialkylaniline by means of chromic acid mixt. salting out of the dye obtained is effected without preliminary filtration of the ppt. of the Cr compds. The entire ppt. obtained is filtered off and dried in the usual manner.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Brit. 403,222, Dec. 21, 1933. See Fr. 747,641 (C. A. 27, 5193-4).

**Azo dyes.** I. G. Farbenind. A.-G. Brit. 403,106, Dec. 11, 1933. Direct cotton dyeing dyes are made by (1) linking 2 moles of the azo dyes derived from diazotized 4,4'-nitroaminostilbene-2,2'-disulfonic acid (I), or the corresponding dibenzyl compds., by a suitable conversion of their  $\text{NO}_2$  groups, *e. g.*, by reduction to azo or

azoxy groups or conversion into the group  $\text{NHNH}$ , where X is a bivalent radical, *e. g.*, CO or cyanuryl, or (2) linking 2 moles of 4,4'-nitroaminostilbene- or -dibenzyl-2,2'-disulfonic acid itself, tetrazotizing the product thus obtained, *e. g.*, the dinitrodistilbeneureatetrasulfonic acid or the diaminoazoxydistilbenetetrasulfonic acid (if necessary after reduction) and coupling with suitable components. The dyes may be after-treated, *e. g.*, by oxidation, reduction, alkylation or formation of metal complexes. Among examples (1) the dye I  $\rightarrow$  salicylic acid (II) is reduced with NaOH and dextrose to the azoxy comp'd.; the same product is obtained by reducing I to the azoxy stage, tetrazotizing and coupling with II, (2) the monoazo dye of (1) is reduced with  $\text{Na}_2\text{S}$  and phosgenated, and (3)  $(\text{CN})_2\text{Cl}_2$  is condensed with I and the product is reduced, tetrazotized, coupled with PhOH and finally methylated.

**Azo dyes.** I. G. Farbenind. A.-G. (Arthur Zkscher, inventor). Ger. 590,956, Jan. 13, 1934 (Cl. 22a: 1). Dyes, insol. in water, are prep'd. by coupling diazo compds. with 4,8-dihydroxy-1,2,5,8-dibenzophenazine. Examples and a table of components and colors produced are given.

**Azo dyes.** I. G. Farbenind. A.-G. (Georg Niemann, inventor). Ger. 590,957, Jan. 13, 1934 (Cl. 22a: 6). Diazo dyes insol. in water are prep'd. by coupling tetrazotized aromatic diamines with components including 3-alkyl-5-pyrazolone. Thus, 1-amino-4-nitrobenzene is diazotized and coupled with 3-methyl-5-pyrazolone. The product is reduced, further diazotized and again coupled with 3-methyl-5-pyrazolone to give a red dye. Another example is given.

**Azo dyes.** I. G. Farbenind. A.-G. (Hans Schindhelm, Richard Gast, and Richard Fleischhauer, inventors). Ger. 593,144, Feb. 22, 1934 (Cl. 22a: 13). Addn. to 591,495 (C. A. 28, 2543). 1 Mol. of an azo dye from diazotized 4-nitro-4'-aminostilbene-2,2'-disulfonic acid is condensed in the presence of alkali with 1 mol. of an amine or aminoazo dye not identical with the component used in making the stilbene dye. Substantive dyes of various colors are obtained, and may be subjected to any of the after-treatments ordinarily applied to stilbene or azo dyes. Examples are given.

**Azo dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 758,265, Jan. 13, 1934. Azo dyes are prep'd. by coupling arylides of 2,3-hydroxynaphthoic acids with diazotized bases of the

formula  $\text{acylNHC:CH.CR':C(NH}_2\text{):CH:COR}$ , where R is aryl or aralkyl and R' is halogen, alkyl, aralkoxy or alkoxy. A large no. of examples is given.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 758,526, Jan. 18, 1934. Dyes which are stable to vulcanization and may be used for coloring plastic substances, such as rubber and synthetic resins, are made by combining 1 g. mol. of a tetrazotized diamine, such as benzidine, *o*-toluidine, dianisidine, with 2 g. mols. of a 3-alkyl-5-pyrazolone not substituted in the 1-position, the constituents not contg. free COOH or  $\text{SO}_2\text{H}$  groups.

**Azo dyes.** I. G. Farbenind. A.-G. Fr. 759,019, Jan. 27, 1934. Azo dyes insol. in water are prep'd. by coupling diazotized 1-amino-2- $\beta$ -alkoxycethoxy-4-nitrobenzenes with 2'-hydroxynaphthalene-3'-carbonyl-1-amino-4-methoxy-3-methylbenzene.

**Azo dyes.** Imperial Chemical Industries Ltd. Fr. 758,112, Jan. 11, 1934. Azo, diazo and polyazo dyes are prep'd. by combining compds. contg. diazo or tetrazo groups with the condensation products of alkylene chlorohydrin and aminonaphtholsulfonic acids. The products may be treated with compds. of Cu or Cr. Thus, diazotized picramic acid is coupled with the product obtained by condensing 2-amino-8-naphthol-6-sulfonic acid with ethylene chlorohydrin. Several examples are given.

**Disazo dyes.** I. G. Farbenind. A.-G. (Adolf Seglitz and Konrad Stenger, inventors). Ger. 590,879, Jan. 8, 1934 (Cl. 22a: 8). Diaminodiphenyl sulfones or their substitution products are tetrazotized and the products coupled with 1 mol. of a *o*-hydroxy carboxylic acid of the benzene series and 1 mol. of a 2-arylamino-8-hydroxy-



naphthalene-6-sulfonic acid. Thus, 3,3'-diaminodiphenyl sulfone is tetrazotized and coupled with 2-phenylamino-8-hydroxynaphthalene-6-sulfonic acid and salicylic acid, to give a dyescoloring wool in fast brown shades. Other examples are given.

**Disazo dyes.** I. G. Farbenind. A.-G. Fr. 757,817, Jan. 5, 1934. Disazo dyes capable of being chromed are prep'd. by coupling 1 mol. of 2,2'-dihydroxy-1,1'-binaphthyl-*ar*-octahydroide (m. 139-40°, by treating 2,2'-dihydroxy-1,1'-binaphthyl by H in the presence of a catalyst and under pressure in a solvent or diluent) with a sulfo-*o*-hydroxydiazotized component. The diacetyl comp'd. of the above, m. 112-3°, is prep'd. by hydrogenating the corresponding binaphthyl deriv.

**Vat dyes.** I. G. Farbenind. A.-G. Fr. 757,882, Jan. 5, 1934. Leuco acid esters of H<sub>2</sub>SO<sub>4</sub> are prep'd. by transforming phthaloylfluoranthenes, or their substitution products, by reduction and esterification with SO<sub>2</sub> in the presence of tertiary bases, into leuco acid esters of H<sub>2</sub>SO<sub>4</sub> sol. in water, or into const. salts of these. Phthaloylfluoranthene (m. 333°) and its substitution products are prep'd. by condensing fluoranthene and its substitution products with aromatic *o*-dicarboxylic anhydrides, and treating the ketonic acids by agents closing the chain.

**Vat dyes of the etherified hydroxydibenzanthrone series.** Otto Stallmann (to E. I. du Pont de Nemours & Co.). U. S. 1,950,366, March 6. In forming vat dyes of this "jade-green series," if the dihydroxydibenzanthrone is first converted into an alkali metal salt, such as the di-Na salt, and isolated dry in this form, and then submitted to alkylation, the latter reaction proceeds smoothly and regularly even with the heavier and less reactive alkylating agents, and, when using reagents such as Me<sub>2</sub>SO, less of the latter is required. Various examples and details of procedure are given.

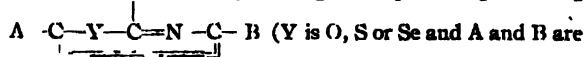
**Derivatives of 4-aminodiphenylamine.** I. G. Farbenind. A.-G. (Arthur Zitscher and Wilhelm Seidenfaden, inventors). Ger. 590,581, Jan. 6, 1934 (Cl. 12q. 1.02). Diphenylaminoderivs. contg. an alkoxy or alkyl group in the 3-position and unsubstituted in the 4-position are coupled with diazonium comp'ds. and the azo dye split off. Thus, sulfanilic acid is diazotized and coupled with 3-methoxydiphenylamine. The product is treated with NaOH and Zn dust to give 4-amino-3-methoxydiphenylamine. Other examples describe the prep'n. of 4-amino-3-methoxy-3'-chlorodiphenylamine, m. 79-80°, 4-amino-3-ethoxydiphenylamine, m. 77-8°, 4-amino-3-propoxydiphenylamine, m. 52-3°, 4-amino-3-butoxydiphenylamine, m. 87-8°, 4-amino-3,6-dimethoxydiphenylamine, m. 117-18°, 4-amino-3-methoxy-5-methyldiphenylamine, m. 64-5°, 4-amino-3-methoxy-6-methyldiphenylamine, m. 80-1°, 4-amino-3-methoxy-3'-methyldiphenylamine, m. 52-3°, 4-amino-3-methoxy-2'-methyldiphenylamine, m. 60-1°, 4-amino-3-methoxy-2'-chlorodiphenylamine, m. 84-5°, 4-amino-3-methoxy-2',5'-dimethyldiphenylamine, m. 89-90°, 4-amino-3-methoxy-2'-methyl-5'-chlorodiphenylamine, m. 102-3°, 4-amino-3-methoxy-2',5'-dichlorodiphenylamine, m. 116-17°, 4-amino-3,6-dimethyldiphenylamine, m. 86-7°, and 4-amino-3-methyl-3'-chlorodiphenylamine, b<sub>p</sub> 188°.

**Naphthalene derivatives.** I. G. Farbenind. A.-G. Brit. 402,309, Nov. 30, 1933. 4-Aminonaphthalimide and derivs. thereof are prep'd. by treating 4-sulfonaphthalene-1,8-dicarboxylic acid (I), or the anhydride or a salt thereof, at 150° or above with NH<sub>3</sub> or with a simple or substituted alkylamine or with N<sub>2</sub>H<sub>4</sub> or cyclohexylamine. The products are useful as dye intermediates or dyes. Among examples I is treated (1) with aq. NH<sub>3</sub> at 170-80°, (2) as in example 1 but with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> instead of NH<sub>3</sub>, (3) with aq. MeNH<sub>2</sub> at 150-100° to yield 4-methylaminonaphthalimide, and (4) taurine soln. at 170° in presence of Na<sub>2</sub>SO<sub>4</sub> to produce 4-sulfoethylaminonaphthalimide, which dyes animal fibers greenish yellow tints.

**Anthraquinone derivatives (dye intermediates).** Alexander J. Wiertz (to E. I. du Pont de Nemours & Co.). U. S. 1,950,348, March 6. A 1-haloanthraquinone-2-carboxylic acid is condensed with an aromatic primary

aminocarboxylic acid such as anthranilic, *m*- or *p*-amino-benzoic acid or a naphthylaminocarboxylic acid in an alk. medium in the presence of a catalyst such as CuCl<sub>2</sub> or CuSO<sub>4</sub>, forming dicarboxylic acid derivs. which when treated with condensing agents such as an excess of thionyl chloride or a slight excess of PCl<sub>5</sub> in an inert medium such as PhNO<sub>2</sub>, solvent naphtha, dichlorobenzene or toluene form anthraquinone acridones, the carboxylic acid being simultaneously converted into a carbonyl chloride group so that the final product has a COCl group in the phenyl nucleus. The resulting products readily condense with aromatic primary amines to form pink and violet dyes, and also readily condense with amino derivs. of anthraquinone to form fast orange dyes. Examples with details of procedure are given.

**Intermediates and dyes.** Kodak-Pathé. Fr. 757,707, Jan. 4, 1934. Selenazoles contg. an alkyl group in the 2-position and II or univalent radicals in the 4- and 5-positions are prep'd. by the reaction of selenoumidates of the aliphatic series with halo aldehydes or ketones of the type X.CHA.COBr (A and B are H, alkyl or aryl and X is Cl or Br), e. g., ClCH<sub>2</sub>CHO, ClCH<sub>2</sub>COCH<sub>3</sub>, BrCH<sub>2</sub>COC<sub>2</sub>H<sub>5</sub>,  $\alpha$ -bromopropiophenone and  $\alpha$ -bromodisubstituted benzoin. Examples are given of the prep'n. of 2-methyl- (b<sub>p</sub> 32-4°), 2,4-dimethyl- (b<sub>p</sub> 56-8°), 4-phenyl-2-methyl- (m. 63-4°), and 4-methyl-2-ethyl-selenazole (b<sub>p</sub> 74-8°). Fr. 757,708. New dyes which are particularly useful as photographic sensitizers are prep'd. by uniting a comp'd. contg. the ring



with a comp'd. contg. a quinoline group. The dyes may be prep'd. by treating an alkylated quaternary salt of the heterocyclic base, contg. a Me group capable of reacting, by an alkyl halide of a 2-haloquinoline, particularly 2-iodoquinoline. Examples are given of the prep'n. of the iodides of 3,4-dimethyl-1'-ethyl-, 4-phenyl-3-methyl-1'-ethyl- and 4-phenyl-1',3-diethyl-oxazolopseudo-cyanine, 3-methyl-1'-ethyl-, 3,4-dimethyl-1'-ethyl-, 4-phenyl-1',3-dimethyl-, 4-phenyl-1',3-diethyl- and 4-phenyl-3,5-dimethyl-1'-ethyl-thiazolopseudo-cyanine, 1',3,4-trimethyl-, 4-methyl-1',3-diethyl- and 4-phenyl-3-methyl-1'-ethyl-selenazolopseudo-cyanine.

**Intermediates and dyes.** Soc. pour l'ind. chim. à Bâle. Fr. 758,079, Jan. 10, 1934. New intermediates for dyes are prep'd. by introducing alc., aryl alc. or alkylenic ether or ester groups into imogen groups of aromatic comp'ds., or new dyes are prep'd. by introducing *N*-hydroxyalkyl groups of which the OH is esterified or etherified into azo dyes. Examples are given of the prep'n. of  $\beta$ -(ethylphenylamino)ethyl methyl ether, b<sub>p</sub> 93°, ( $\omega$ -acetoxyethyl)- $\beta$ -thylaniline, b<sub>p</sub> 128°,  $\beta$ -(2-methoxy-5-methylanilino)-ethyl methyl ether, b<sub>p</sub> 108-10°, and of several dyes.

**Intermediates and dyes.** I. G. Farbenind. A.-G. Fr. 759,210, Jan. 31, 1934. 4,8-Dihydroxy-1,2,5,6-dibenzophenazine (6,13-dihydroxy- $\alpha\gamma'$ -dibenzophenazine), m. 375-80° (with decompn.), and its derivs. are prep'd. by transforming 2-amino-3-hydroxynaphthalene, the II atom of the OH being replaced by an appropriate radical, into the phenazine and splitting off the radicals joined to the OH groups. Dyes are prep'd. by coupling the above with diazo comp'ds. Examples are given of the prep'n. 6,13-dihydroxy-2,9-dimethoxy- (m. above 380°), 6,13-dimethoxy-2,9-dibromo- (m. 382-5°) and 6,13-dihydroxy-2,9-dibromo- $\alpha\gamma'$ -dibenzophenazine (m. above 385°) and of dyes prep'd. from these. The m. p.'s given are uncorrected.

**Intermediates for dyes.** I. G. Farbenind. A.-G. Fr. 757,958, Jan. 8, 1934. Arylamides of 2-hydroxycarbazole-3-carboxylic acid substituted in the imino group are prep'd. by eliminating the alkoxy or alkoxycarbonyl group from 2-alkoxycarbazoles contg. a substituent in the imino group, treating the resulting products in the form of alkali metal salts by CO<sub>2</sub> under pressure and heating the resulting carboxylic acids with aromatic or heterocyclic amines in a solvent and with the addn. of PCl<sub>5</sub>. The prep'n. of *N*-ethyl-2-ethoxy- (m. 85°), *N*-ethyl-2-hydroxy- (m. 109-10°), *N*-methyl-2-ethoxy- (m. 85°), *N*-phenyl-2-

hydroxy-, and *N*-methyl-2-methoxy-carbazole (m. 235°), *N*-phenyl-, *N*-ethyl-, and *N*-methyl-2-hydroxy-carbazole-3-carboxylic acid (m. 239°) and the *p*-chloroanilide of the last compd. (m. 277-8°) is described.

**Dyeing.** I. G. Farbenind. A.-G. Brit. 403,248, Dec. 21, 1933. H<sub>2</sub>O-insol. monoazo dyes are made on the fiber by coupling diazotized 4-amino-3-methoxydiphenylamine with the *m*-nitroanilide of 2,3-hydroxynaphthoic acid. A fast, clear, greenish blue shade is obtained on cotton or regenerated cellulose. An example is given. The *N*-nitrosodiazo compd. of the base may be used in yarn dyeing and the NO group split off.

**Dyeing.** Karl Thies. Ger. 590,902, Jan. 12, 1934 (Cl. 8m. 1.01). Textiles are wetted in a bath at 15-25° before immersion in the hot dye bath.

**Dyeing textiles.** Deutsche Hydrierwerke A.-G. Fr. 758,190, Jan. 11, 1934. Direct dyeings on natural or regenerated cellulose fibers are made fast to washing by treating the fibers in a 2nd bath contg. a soln. of a salt of a quaternary NH<sub>4</sub> base which gives rise to an insol. salt. The fibers may also be treated with the salt before dyeing. Several examples are given.

**Dyeing cellulose esters and ethers.** British Celanese Ltd., George H. Ellis and Frank Brown. Brit. 402,391, Nov. 17, 1933. The cellulose derivs. are colored with an anthraquinone compd. having a *m*-alkylphenylamino or *m*-alkoxyphenylamino group as a substituent in the nucleus, sulfo groups being preferably absent, e. g., 1-hydroxy-4-*m*-tolylaminoanthraquinone, 1-amino-4-*m*-tolylaminoanthraquinone (I), 1,5-diamino-4,8-di-*m*-tolylaminoanthraquinone, 1-amino-4-(5'-methyl-2'-methoxyphenylamino)anthraquinone, 1-amino-4-(2',5'-dimethylphenylamino)anthraquinone. In an example I (from 1-amino-4-methoxyanthraquinone and *m*-toluidine) is dispersed in soap soln. and cellulose acetate dyed a bright blue shade from such soln. In 402,392, Nov. 17, 1933, the materials are colored with an anthraquinone compd. contg. as sole substituents an  $\alpha$ -hydroxy group, a free NH<sub>2</sub> or non-aromatically substituted amino group and an  $\alpha$ -arylamino group of the C<sub>6</sub>H<sub>5</sub> series. Among examples (1) 4-nitrochrysazin is reduced in soda and glucose and condensed with PhNH<sub>2</sub> in H<sub>2</sub>BO<sub>3</sub>; when dispersed by Turkey-red oil it yields blue shades on cellulose acetate, and (2) 4-aminochrysazin is condensed with *o*-toluidine. In 402,393, Nov. 30, 1933, the cellulose derivs. are colored by applying aq. suspensions of unsulfonated arylaminoanthraquinone compds. having an ether group as a substituent in *o*-position in the arylamino residue. In an example, cellulose acetate is dyed blue shades from a soap soln. contg. 1-amino-4-(2'-methoxyphenylamino)anthraquinone and Turkey-red oil; for printing purposes the dye paste is dild. and thickened with a gum thickening paste which may also contain a swelling agent (methylated spirits).

**Dyeing cellulose ester and ether materials.** British Celanese Ltd., Henry C. Olpin and George H. Ellis. Brit. 403,118, Dec. 11, 1933. Colorations are produced on materials made of or contg. cellulose esters or ethers by applying thereto, e. g., by immersion, mech. impregnation, printing or stenciling, an aromatic compd. (other than an azo compd.) contg. a nuclear NO<sub>2</sub> group and a OII-substituted wholly aliphatic group linked to an aryl nucleus through N, O or S, such compd. contg. at least 1 auxochrome. Specified compds. are nitroethanolamino-benzenes, -toluenes or -naphthalenes, e. g., 4-chloro-2-nitro- or 2,4-dinitro-1-ethanolaminobenzene; compds. contg. 2 or more aryl nuclei linked directly or through O, S, NH, CH<sub>2</sub>, CO, CONH or other atom or group, e. g., 2,4-dinitro-4'-ethanolaminodiphenylamine, 3-nitro-4'-ethanolaminobiphenyl, 1-benzoylamino-3-ethanolamino-4-nitrobenzene; nitroanthraquinone derivs., e. g., 1,4-, 1,5- or 1,8-nitro(hydroxyalkylamino)anthraquinones; and di(hydroxyalkyl)aminoaryl compds. They are obtained by the action of chlorohydrins, e. g., ethylene or glycerol chlorohydrins, or ether hydroxyalkylating agents, e. g., ethylene oxide, epichlorohydrin, upon amino, OH or SH compds. of appropriate configuration. Among examples, cellulose acetate in hank form is immersed in an aq. solu. at

80° contg. 4-chloro-2-nitro-1-ethanolaminobenzene (obtainable by reaction of 2,6-dichloronitrobenzene with monoethanolamine) with turning until the requisite golden yellow shade is obtained whereupon the hanks are lifted, rinsed and dried.

**Dyeing regenerated cellulose.** Soc. pour l'ind. chim. à Bâle. Brit. 402,284, Nov. 30, 1933. See Ger. 584,403 (C. A. 28, 340°).

**Dyeing animal fibers.** I. G. Farbenind. A.-G. (Heinrich Wagner, Hans Krzikalla and Alfred Hirsch, inventors). Fr. 758,085, Jan. 22, 1934; Ger. 590,934, Jan. 13, 1934 (Cl. 8m. 10.02). Animal fibers are dyed by treating them with a monoalkyl ether of a 1,4-naphtho-hydroquinone or of a 1,4-dihydroxyanthracene in the presence of an oxidizing agent. Probably 2 mols. combine in the 2-position with elimination of 4 atoms of H to form a new compd. Mordants such as compds. of Fe, Cu and Cr may be added to the fibrous materials.

**Dyeing wool.** Albert Landolt (to Soc. pour l'ind. chim. à Bâle). U. S. 1,949,801, March 6. See Brit. 399,226 (C. A. 28, 1874°).

**Dyeing furs, etc.** I. G. Farbenind. A.-G. (Erich Lehmann and Hans Wassenecker, inventors). Ger. 593,061, Feb. 21, 1934 (Cl. 8m. 10.02). Mordanted or unmordanted furs, hair and feathers are dyed with oxidation products of aromatic diamines contg. a group SR, where R is H or an alkyl or aryl residue. Oxidation products of aromatic *p*-diamines contg. a group SR may be used alone, but oxidation products of other aromatic diamines contg. a group SR are used in assocn. with known oxidation dyes. Thus, an aq. soln. contg. *p*-phenylenediamine and 1-ethylmercapto-2,4-diaminobenzene may be treated with H<sub>2</sub>O<sub>2</sub> soln. and then applied to white rabbit skin mordanted with a Cr, Cu, or Fe salt, whereby the skin is dyed black. Other examples are given.

**Photographically printing designs on textile piece goods with light-sensitive, e. g., diazo-type, materials.** N. V. Philips' Gloeilampenfabrieken. Brit. 403,001, Dec. 14, 1933. A discharge tube is used which has an incandescent cathode, the energy distribution being such that the energy of wave lengths shorter than 2700 Å. is less than 10% of that of wave lengths between 2700 and 5000 Å. The filling may be a gas, e. g., CN, He, or a metal vapor, e. g., Zn, Ti, Hg, Mg, Cd, Bi, Sb.

**Machine for defleshing sisal leaves and like fibrous material.** Geo. F. T. Holloway and Ralph Carter. Brit. 402,202, Nov. 30, 1933.

**Retting.** "Les Fibres Textiles," Soc. anon. Brit. 403,544, Dec. 7, 1933. Plants are retted by immersion in H<sub>2</sub>O, the temp. of which never exceeds 35° and to which is added a sol. agent comprising sapo., oils or fatty acids, sol. carbonates or chlorides, and hyposulfites or hypochlorites or oxides of the Na<sub>2</sub>O type. Cf. C. A. 27, 2826.

**Textile threads.** Marcel Ginet. Fr. 758,330, Jan. 15, 1934. A colloidal soln. of material of animal origin, e. g., pickled skin, is mixed with a soln. of cellulose, e. g., viscose, and the mixt. is used for making threads. The pickled skin is submitted to the action of a boiling concd. soln. of slaked lime to dissolve the skin and the Ca salts are afterwards sepd.

**Treating textiles.** Moritz Freiburger. Fr. 759,182, Jan. 30, 1934. In treatments of textiles involving the use of caustic alk. solns., proteins, e. g., albumin, casein or glue, or products derived therefrom, are added to the treating baths.

**Treating textiles with rubber and dye.** Merwyn C. Teague and Nehemiah H. Brewster (to Naugatuck Chemical Co.). Brit. 403,121, Dec. 11, 1933. Cf. U. S. 1,845,569 (C. A. 26, 2329 30). The dil. rubber dispersion contains a relatively high proportion of casein or other protein.

**Treating textiles.** Merwyn Clarence Teague and Nehemiah Hans Brewster (to Naugatuck Chemical Co.). Brit. 403,394, Dec. 11, 1933. Divided on 403,121 (preceding abstr.). In treating silk or rayon fabrics, e. g., stockings, with an aq. dispersion of rubber, e. g., latex, to produce a deposit of rubber imperceptible to the touch and sight and prevent laddering, etc., the stockings are first

scoured in a soap soln. heated to boiling. After scouring, the liquid may be removed and replaced by a dil. soap soln. together with an aq. dispersion of rubber and a dye preferably composed of 75% acid dye and 25% direct dye. Heating at 110°F. is continued till the dye is set, the latex being thereafter coagulated by adding at intervals a 5% soln. of K or NH<sub>4</sub> alum. Small amts. of glycerol and pine oil may be added prior to the addn. of the dye. Other coagulants may be used.

**Rubber and cloth sheets.** The International Latex Processes Ltd. Fr. 759,270, Jan. 31, 1934. The surface of cloth covered with rubber is hardened and made smooth by treatment with a heavy metal salt of a fatty acid, e. g., Zn stearate, and then halogenating, at least superficially.

**App. for drying webs of fabric.** Ernst Gessner A.-G. Brit. 402,676, Dec. 7, 1933.

**Crape fabrics.** British Celanese Ltd. Brit. 403,251, Dec. 21, 1933. In producing crepe fabrics, mixed fabrics whose warp and (or) wft contain(s) both yarns of org. cellulose derivs. and stretched yarns of regenerated cellulose are treated with a reagent, e. g., H<sub>2</sub>O or aq. solns., that causes the regenerated cellulose to shrink but does not affect the org. deriv. yarn.

**Crepe effect fabrics.** Inward Hoos (to American Glanzstoff Corp.). U. S. 1,950,474, March 13, 1934. After producing viscose filaments, they are wound while untwisted upon spools, the untwisted filaments are washed without desulfurizing, high left- and right-hand twists are applied to the filaments thus produced, a fabric is formed from the filaments, and the fabric is then desulfurized.

**Saponifying and drying rayon.** Henry Dreyfus. Brit. 402,104, Nov. 20, 1933. Filaments, threads, yarns, etc., of org. esters of cellulose, which at some stage of their manuf. have been stretched, or fabrics contg. the same, are saponif. by applying the saponif. agent to the materials while they are traveling and immediately drying under the influence of heat to effect rapid sapon. The products have a high tenacity and an affinity for cotton colors. Brit. 402,105, Nov. 20, 1933. See Fr. 750,550 (C. A. 28, 806<sup>o</sup>). Brit. 402,106, Nov. 20, 1933. Filaments, yarns, fabrics, etc., of org. esters of cellulose are subjected to sapon. by a medium comprising NaOH, KOH or other alk. compd. of an alkali metal, e. g., Na silicate, Na<sub>2</sub>PO<sub>4</sub>, in quantity less than that necessary to effect the desired degree of sapon., and in presence of an auxiliary agent which is not a compd. of an alkali metal and is alk. in character though less alk. than the saponif. agent proper or reacts with NaOAc or KOAc or other salt formed by the sapon. of the cellulose ester to re-form the saponif. agent, e. g., CaO, BaO, SrO, Ca(OH)<sub>2</sub>. Such reagent is present as a satd. soln. or a fine suspension. In 402,141, Nov. 20, 1933, divided on 402,104, the filaments, etc., which have undergone a stretching operation, or fabrics therefrom, are saponif. by an alc. saponif. agent contg. not more than 2% NaOH or the equiv. of another base. App. is described. In 402,143, Nov. 20, 1933, divided on 402,104 and 402,105, filaments, etc., of org. esters of cellulose are saponif. while being drawn in the form of a warp, web or sheet of yarns through a bath contg. the saponif. agent by rollers or the like extending over the whole warp, web or sheet. In 402,144, Nov. 20, 1933, divided on 402,105, the process of 402,104 is applied to the high viscosity products of 402,105. The saponif. agent comprises NaOH, KOH, Na silicate, Na<sub>2</sub>PO<sub>4</sub>, NaOAc or NaCl, in a medium which may contain a mono-, di- or poly-hydric alc., e. g., MeOH, EtOH, glycols, glycerol.

**Washing viscose rayon on bobbins.** T. D. Kornblit. Russ. 31,505, Oct. 31, 1933. The washing operation is discontinued before complete removal of the acid and the drying is carried out only to certain moisture content which should not permit the formation of hydrocellulose, thus eliminating the necessity of moistening the silk again for the spinning operation as well as its fixation by steam treatment.

**Dressing rayon yarn.** Algemeen Kunstzijde Unie N. V. Ger. 500,658, Jan. 8, 1934 (Cl. 8k. 1). Rayon yarn is dressed with solns. of oil and polymerized oil in a volatile solvent.

**Device for detecting defects in a running yarn or the like.** Charles D. Reynolds and George W. Scott (to Universal Winding Co.). U. S. 1,949,943, March 6, 1933. Mech. features.

**Apparatus for centrifuging thread or yarn windings.** Glanzstoff-Courtaulds G. m. b. H. Brit. 403,205, Dec. 21, 1933.

**Deformable bobbins for the liquid treatment of yarn.** Aldo Bazzocchi. Brit. 402,268, Nov. 30, 1933.

**Weighting textiles.** Maywood Chemical Works. Brit. 403,239, Dec. 21, 1933. Silk or fibers of rayon are weighted by treatment with colloidal solns. of mixed basic chlorides of weighting metals, prep'd. by adding to aq. solns. of the chlorides of said metals 1 or more carbonates or hydroxides of weighting metals whose chlorides are sol. and phosphates are insol., followed by the usual treatment with phosphate or other solns. to ppt. the weighting metals. In a modification, solns. of compds. in which the weighting metal is present in the acid radical, e. g., Na zincate, aluminate, plumbate or stannate, are used instead of carbonates or hydroxides. In an example ZnCO<sub>3</sub> is added to a soln. of Sn chloride, degummed silk or viscose is treated with the resulting colloidal soln. of basic Zn-Sn chloride, and the weighting finally effected by treatment with an alkali metal phosphate, e. g., Na<sub>2</sub>HPO<sub>4</sub>. Na silicate, tungstate or molybdate may be used instead of Na<sub>2</sub>HPO<sub>4</sub>, etc., and the chlorides of Fe, Cr, Mn, Zr and Ti are suitable in place of Sn chloride.

**Weighting animal fibers.** I. G. Farbenind. A.-G. Brit. 402,094, Nov. 21, 1933. Animal fibers, e. g., wool, silk, hairs of rabbits, dogs, camels, etc., are weighted by treatment with an aq. acid soln. contg. at least 10% (calcd. on the wt. of the fiber) of sulfonated aliphatic amides having the formula HCONR'R''SO<sub>3</sub>H, in which R and R' are aliphatic radicals and R'' is H or an aliphatic radical. The salts of the sulfonated amides may be used. The weighting may be effected together with other textile processes, e. g., dyeing. Among examples wool yarn is treated at elevated temp. with aq. baths contg. *N*-methylaminoethanesulfonic acid, trichlorostearyl-*N*-methylaminoethanesulfonic acid, etc., and mackintosh gabardine is dyed and weighted in a bath contg. hexachloropalmityl-*N*-methylaminoethanesulfonic acid, Cy-anchrol BGA, Amido yellow R, Amidonaphthol red 6B and H<sub>2</sub>SO<sub>4</sub>.

**Bleaching textiles.** Thomas Wm. Holt and Archibald S. Kilpatrick. Fr. 758,301, Jan. 15, 1934. Textile materials are passed through a bleaching liquid in a longitudinally plaited state. Ozonized air is injected into the liquor. An app. is described.

**Mercerizing.** Chemische Fab. vorin. Sandaz. Ger. 593,048, Feb. 20, 1934 (Cl. 8k. 2). The wetting and penetrating capacity of mercerizing lyes is improved by addn. of a phenol and an org. base. Thus, a mixt. contg. tar cresols 90 and aniline 10% may be added to a lye of 32° Bé. in the proportion of 1.17% by wt. Other examples are given.

**Marking textiles.** Imperial Chemical Industries Ltd. Fr. 759,114, Jan. 29, 1934. A marking compn. fast to boiling, bleaching, etc., contains stabilized rubber latex a pigment (monolite G yellow, Fast Monolite RN scarlet, lampblack, Caledon RC blue or indigo) and a filler (kaolin) and preferably a small amt. of a hydrocarbon such as C<sub>6</sub>H<sub>6</sub>.

**Upholstery material.** Magyar Ruggyantaárnyar R. T. (to The Anode Rubber Co. Ltd.). Brit. 403,375, Dec. 18, 1933. In making shaped upholstery material by coating animal, vegetable or mineral fibers with rubber dispersions, e. g., latex, the fibers are preliminarily treated with liquids which wet them and effect coagulation of the latex, preferably before the fibers are placed in the mold. A single liquid, e. g., CaCl<sub>2</sub> dissolved in a C<sub>6</sub>H<sub>5</sub>-MeOH mixt., or 2 liquids, e. g., C<sub>6</sub>H<sub>5</sub> or an org. sulfonic acid followed by a soln. of a coagulant, may be used. After treatment with the coagulant and drying, the fibers may be loosened by carding. A suitable dispersion comprises rubber latex, S. transformer oil, paraffin wax, a vulcanization accelerator and an antioxidant.

**Mothproofing.** I. G. Farbenind. A.-G. Fr. 758,192, Jan. 11, 1934. Products of the formula  $R-CHX-R$  ( $R$  is an aromatic ring, preferably a  $C_6H_5$  ring, contg. one or more atoms of halogen and an alkoxy or aralkoxy group,  $X$  is H or an aromatic ring, preferably a  $C_6H_5$  ring, which may contain one or more halogen atoms,  $SO_2H$  or both) are used to protect wool, furs, etc., from moths, etc. Examples include 2,2'-dimethoxy(or ethoxy)-3,5,3',5'-tetrachloro-2''- (or 4'')-sulfo-, dicyclohexyloxy (or benzyl-

oxy)-3,5,3',5',4'-pentachloro-6'-sulfo- and 2,2'-dimethoxy-3,5,3',5'-tetrachloro-4'-bromo-6'-sulfo-triphenylmethane. The compds. may be made by condensing 1 mol. proportion of an aldehyde with 2 mol. proportions of an alkyl, cycloalkyl or aralkyl ether of a phenol or naphthol. Several examples are given.

**Cleaning preparation for fabrics.** Arthur Eichengrün. Ger. 590,551, Jan. 5, 1934 (Cl. 8i. 5). The prepn. consists of  $CH_2Cl_2$  alone or mixed with other solvents.

## 26—PAINTS, VARNISHES AND RESINS

### A. H. SABIN

**A discussion on cooperative research.** J. A. Frome Wilkinson. *J. Oil & Colour Chem. Assoc.* 17, 80-8 (1934).—Cooperative research with special reference to paint and varnish problems is discussed. G. G. Sward

**Synthetic resin era in paint, varnish and lacquer technology.** A. O. Plambeck. *Can. Chem. Met.* 18, 50-1 (1934).—Many synthetic resins used in the varnish, lacquer and enamel mfg. industries are grouped in a table.

W. H. Boynton

**Photogenic spots on paint tests.** Henry A. Gardner. Nat'l. Paint, Varnish & Lacquer Mfrs.' Assoc. *Circ.* No. 455, 66-8 (1934).—Paint films prepd. indoors and stored in confined spaces often develop a mottled appearance when later exposed out of doors. Thus paints shipped for exposure at distant places may exhibit this characteristic. The phenomenon is ascribed to the photogenic action of the sun.

G. G. Sward

**Comparison of wet- and dry-film hiding-power tests.** Roscoe H. Sawyer. *Ind. Eng. Chem., Anal. Ed.* 6, 113 16 (1934).—Wet- and dry-film hiding-power detns. were made on paints contg. (1) basic carbonate white lead, (2) lithopone and (3)  $TiO_2$ . Hiding power of paint or pigment increased with increasing pigment concn. Wet- and dry-film tests yield significantly different relations between hiding power and pigment concn. A new dry-film test is described.

H. M. Stark

**The violet pigments.** W. Ludwig. *Farbe u. Lack* 1934, 110, 122, 135, 149-50.—The inorg. violet pigments are more permanent but also more expensive than the org. type. Individual members of each type are briefly discussed.

G. G. Sward

**Manufacture of Mars yellow.** Kaller. *Farben-Ztg.* 39, 301-2 (1934).—Precautions to be observed in the manuf. of Mars yellow are accurate ratio of  $FeCl_3$  to  $CaCO_3$  and oxidation at a low temp. (not over  $10^\circ$ ).

G. G. S.

**Titanium pigments for gloss finishes.** D. W. Robertson. *Official Digest Federation Paint Varnish Production Clubs* No. 134, 67-73 (1934).—The gloss of paints is influenced by the degree of dispersion of the pigments. Different vehicles are needed for active pigments, as  $ZnO$ , and inert pigments, as the  $Ti$  pigments. For the latter, a substantial proportion of highly polar compds. in the vehicle is required. Examples are given of successful formulation with  $Ti$  pigments.

G. G. Sward

**Some fundamental pigment vehicle relations and their effects in paints.** L. W. Ryan. *Paint, Oil & Chem. Rev.* 96, No. 7, 8 et seq. (1934); *Official Digest Federation Paint Varnish Production Clubs* No. 134, 73-83 (April, 1934).—A review of surface and interfacial tension theories and studies of Harkins, Langmuir, Bartell and others.

G. G. Sward

**Physical evaluation of finishes.** A. E. Schuh and H. C. Theuerer. *Ind. Eng. Chem., Anal. Ed.* 6, 91-7 (1934).—Tests measuring abrasion and impact resistance and distensibility were performed periodically on finish panels. The results were correlated with those from the usual exposure tests of the same panels. The phys. tests were shown to offer a means of predicting the probable endurance characteristics of a finish long before any visible failure sets in.

H. M. Stark

**Action of antioxidants on linseed oil for varnishes.** Franco Baldracco. *Boll. ufficiale staz. sper. ind. pell. mat. concianti* 11, 569-73 (1933).—Different series of linseed

films contg. various amts. of stearic acid or 1 or 2 rubber antioxidants were exposed to ozonized air or to ordinary air in the dark or in combination with either sunlight or Hg-vapor arc light. Tabulated data of film wt. variations are given. Further work is promised.

J. W. P.

**Synthetic varnish resins of today.** Ewald Fomrobert. *Farben-Ztg.* 39, 247-9, 273-4 (1934).—The resinous state of matter is characterized by a mixt. of similar high mol. wt. compds. rather than by single compds. contg. so-called resinophoric groups. Stability in resins is easier to control with condensation than with polymerization processes. The properties of some synthetic resins are briefly described.

G. G. Sward

**Evaluating aluminum bronze powder.** W. B. Roberts and Junius D. Edwards. *Official Digest Federation Paint Varnish Production Clubs* No. 134, 61-7 (1934).—The following tests are among those applied to Al bronze powder: coarse-particle by dry screening in a "Rotap" machine, leafing properties in a Cumar mineral spirits soln. (30 g. to 100 cc.), color of flowed films, apparent density by settling in  $CCl_4$  or alc., chem. analysis for impurities, flake thickness by floating on  $H_2O$ .

G. G. Sward

**Reliable protective coatings for underground iron pipe lines.** Stüner. *Bauenschutz* 4, 38 (1933); *Bldg. Sci. Abstracts* 6, 165 G.—The most suitable type of coating for protection during transport and storage consists of 10%  $ZnCrO_4$  and 90% of a vehicle obtained by boiling 75% wood oil and 25% other vegetable or animal oil with 1% metal oxide drier. The oil should be free of resins and of the required viscosity when the pigment and 2 parts by vol. of benzine have been added. The pipes should also subsequently be given a priming coat of rust-preventive paint before the protective bituminous coating and impregnated wrapping are applied. As vehicle for the priming coat, varnish contg. wood oil is preferable to raw linseed oil.

G. G.

**Frederick Walton. Centenary of the birth of the inventor of kerosene.** Wm. B. Coleman. *Ind. Eng. Chem., News Ed.* 12, 119, 128 (1934).

R. J. C.

**Studies of resins. XII. Copal esters and fused copals.** Erich Stock. *Farben-Ztg.* 39, 141 (1934); cf. *C. A.* 26, 1458.—Certain constns. of a no. of com. copal esters and fused copals are given. The Storch-Morawski test may be either pos. or neg. for genuine copals.

**XIII. Larch turpentine.** *Ibid.*—Normal values for acid no. and sapon. no. were obtained, viz., 70.08 and 99.50, resp.

**XIV. Run amber.** *Ibid.* 141-2.—Certain constns. of a no. of samples are given. Contrary to usual experience, some samples were only partially sol. in a mixt. of alc.- $C_6H_6$ .

**XV. Brazilian copal.** *Ibid.* 142.—The authenticity of a so-called Brazilian copal is questioned.

**XVI. Purified kauri copals.** *Ibid.*—The constns. of kauri copals purified by (1) soln. methods and (2) fusion methods are given. In appearance they are similar but vary considerably in their constns. Both types are suitable for varnishes.

G. G. Sward

**The electrical, chemical and physical properties of alkyl resins.** R. H. Kienle and H. H. Race. *Trans. Electrochem. Soc.* 65, 20 pp. (preprint) (1934).—Alkyl resins may be hard, rigid, soft, balsam-like, flexible and rubbery. Such alkyl resins as are typical of the more common states were prepd. and investigated. During the

formation of unmodified alkyd resins, there occurs a progressive increase in elec. resistance with time, temp. of prepn. being const. No abrupt change in resistance was obtained with the heat-convertible resins as they jelled. Mobility is an important factor in influencing the resistance of a resin during formation, since the heat-convertible resin shows a much higher resistance for a given percentage esterification than does the heat-nonconvertible resin. Elec. resistance may be conveniently used to study and follow resin formation. High dielec. losses and, to some extent, high effective dielec. const. of synthetic resins result from some form of conduction in the resin. Curing the resins improves the elec. properties. At high temps. the thermoplastic resins, because of their tendency to liquefy, are poorer electrically than heat-convertible resins. In general, dielec. losses are greater at high temps. than at low temps. Differences in elec. properties of heat-convertible and heat-nonconvertible resins are in agreement with differences in their phys. structure. Of the 3 mechanisms postulated as explanations of observed elec. characteristics having a critical frequency polar orientation in a viscous medium seems least probable, while conduction in the solvating component of a gel structure seems most probable.

**Oil-soluble phenolic resins.** E. Leighton Holmes. *J. Soc. Chem. Ind.* 53, 74-77 (1934).—Fractions of low-temp. tar boiling above 230° are condensable with (CH<sub>3</sub>O)<sub>2</sub> to form resins which can be incorporated in lung oil. This is also the case with phenols boiling above 230° when derived from vertical-retort tars (carbonization temp. 1000-2000°). Unattacked phenols are removed by distn. with superheated steam at 200° and above; *p*-EtPhOH reacts with HCHO in the presence of (COOH)<sub>2</sub> to yield an oil-sol. resin, m. 120-35°.

W. J. Peterson

**Glycerol [use in the production of synthetic resins] (Höover) 27.** Viscosity curves of lyophilic colloids [linseed-oil emulsions] (Shemyakin) 2. [Resin-like] rubber products (Ger. pat. 590,605) 30. Azo dyes [for coloring synthetic resins] (Fr. pat. 758,526) 25.

**Paint.** N. F. Rabotnov. *Russ.* 31,526, Oct. 31, 1933. In mixing an aq. lithopone paste with drying oil, linseed oil and gasoline rapid sep. of the water is effected by the introduction of about 0.2% of Na<sub>2</sub>CO<sub>3</sub> to the paste accompanied by agitation.

**Phosphorescent compositions.** Frederic Wm. V. Fitzgerald. *Brit.* 402,777, Nov. 27, 1933. Dehydrated quinine sulfate (I), which may be replaced by a quinine compd. formed by adding an alc. soln. of I to a soln. of I in AcOH and dehydrating the crystals formed, is added to the compns. to prevent decompn. of the phosphorescent ingredients. A luminous paint is prepd. from a powder or paste, made by mixing dry ZnS or CdS with I (heated to remove H<sub>2</sub>O of crystn.), with or without glycerol and liquid paraffin, by the addn. of a lacquer-such as collodion or a mixt. of French turpentine, copal or dammar, and boiled linseed oil. Small amts. of radioactive substances may be added and powd. glass or pigments. A mixt. of powd. Zn and Si may be incorporated to render the coating electrically conducting.

**Pigments.** Mario Michels. *Fr.* 758,012, Jan. 8, 1934. Pigments fast to light are prepd. by pptg. basic dyes with solns. of prussians and Cu salts, reducing the ppts. obtained and subjecting the pigments which result to a certain ripening by simple storage in the form of a paste or by prolonged heating in acid, neutral or alk. medium and with or without accelerators, such as Na citrate.

**Iron oxide pigments; sodium sulfate.** Verein für chem. und metallurgische Produktion. *Ger.* 593,269, Feb. 23, 1934 (Cl. 22f. 7). FeSO<sub>4</sub> is treated with NaCl in known manner to yield FeSO<sub>4</sub>·Na<sub>2</sub>SO<sub>4</sub>·4H<sub>2</sub>O, and the latter is mixed with soda, in an amt. equivalent to the Fe content, and heated to about 700° with access of air. A mixt. of Fe<sub>2</sub>O<sub>3</sub> and Na<sub>2</sub>SO<sub>4</sub> is obtained, and is sepd. by extn. with water. The double salt may be dehydrated before the soda is added.

**Dispersing pigments.** Brevolite Lacquer Co. *Fr.* 758,068, Jan. 10, 1934. Pigments are dispersed in solns. of cellulose esters by slowly grinding a mixt. of pigment and cellulose ester (e. g., nitrocellulose) with an agent capable of swelling the ester and with an oxidized vegetable oil (e. g., oxidized castor oil) in a hydrocarbon of low b. p. (e. g., petroleum naphtha of low b. p.) until a homogeneous mixt. is obtained, and sepg. the hydrocarbon from the reaction product.

**Lithopone.** Frank G. Breyer and Joseph P. Koller (to Krebs Pigment & Color Corp.). *U. S.* 1,949,925, March 6. An aq. slurry of the previously pptd., muffled and quenched product is passed through a colloid mill to refine the grain size to that of a good French-process ZnO, about 0.3-0.5% of Na silicate is added (based on the lithopone), the slurry is agitated to permit adsorption of the silicate, and the product is filtered out and dried. It has improved flowing properties for producing smooth coatings.

**Cadmium yellow.** Silesia, Verein Chemischer Fabriken. *Brit.* 402,358, Nov. 30, 1933. See *Fr.* 757,225 (C. A. 28, 2553).

**Oxidized fatty oils; paints.** Mitchell G. Thomson, Arthur C. Hetherington, Stuart A. Sinn and Imperial Chemical Industries Ltd. *Brit.* 403,648, Dec. 18, 1933. Solid gelled oils are prepd. by heating nondrying vegetable oils with an O-contg. gas at 140-200° and subsequently working the product, with or without solvents. Thus a stream of air is passed through castor, blown cottonseed or olive oil, heated at 155°, and the stiff jelly thus produced passed through a mill together with PhMe, C<sub>11</sub>H<sub>7</sub>, Me<sub>2</sub>CO, EtOAc or turpentine to form a homogeneous dispersion or soln. A paint is formed by mixing such soln. with a cellulose deriv., e. g., nitrocellulose, together with camphor, ester gum or other resins, pigments, e. g., C black, drying oils and solvents, e. g., methylated spirits, ethyleneglycol, Et<sub>2</sub>O, cyclohexanol, mineral oils. The paint may be applied to fabric to form leather cloth.

**Drying-oil products.** I. C. Farbenind. A.-G. *Brit.* 402,759, Dec. 6, 1933. Sulfite compds. of oxidized drying oils are made by treating blown oils or oxygens with H<sub>2</sub>SO<sub>3</sub> or its salts. The oxygens prepd. from linseed, perilla, soy-bean or tung oil by the process of *Brit.* 238,200 (C. A. 20, 1913), are suspended in H<sub>2</sub>O and agitated with SO<sub>2</sub>. The resulting foaming mass is heated to remove excess SO<sub>2</sub>, whereupon the sulfite compd. is pptd. and rendered H<sub>2</sub>O-sol. by treating with an alkali base or NH<sub>3</sub>. H<sub>2</sub>O-sol. compds. may be made directly by replacing H<sub>2</sub>SO<sub>3</sub> with an aq. soln. of NaHSO<sub>3</sub>. Aq. solns. of such compds. may be used in the manuf. of adhesives or paints and, on evapn., yield films which may be hardened and rendered insol. by heating to 100° or by treating with O or H<sub>2</sub>O<sub>2</sub>. The H<sub>2</sub>O-sol. compds. may be treated with alk. earth or heavy-metal salts, e. g., BaCl<sub>2</sub>, FeCl<sub>3</sub>, Pb(OAc)<sub>2</sub>, to form resinous substances which may be used as varnish ingredients.

**Varnishes and pressed goods.** G. S. Petrov. *Russ.* 31,612, Oct. 31, 1933. Artificial phenol resins or resols are subjected to a preliminary purification by extn. with ethers, gasoline, C<sub>6</sub>H<sub>6</sub>, C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub> or chlorine-substituted hydrocarbons or mixts. of these.

**Novo-varnishes.** G. S. Petrov and A. A. Pichugina. *Russ.* 31,615, Oct. 31, 1933. The initial phase of the condensation of phenols with aldehydes is carried out in the presence of two catalysts, mineral and fatty acids, while the second phase is characterized by the use of only the second catalyst after the removal of mineral acid by washing the semifinished product with H<sub>2</sub>O.

**Lacquers and varnishes.** Jean M. Martinon-Bourget. *Fr.* 758,328, Jan. 15, 1934. A soln. of beeswax in gasoline and a soln. of paraffin and Bourgogne pitch in benzene are mixed and used as a support for lacquers and varnishes.

**Lacquer.** Thomas F. Murray, Jr. (to The Eastman Kodak Co.). *Can.* 339,837, Mar. 26, 1934. An outer coating of cellulose acetate lacquer contg. diphenylguanidine or a diphenylbenzene or their derivs. or equivalents is applied to an undercoating of cellulose nitrate, which deteriorates rapidly in the presence of ultra-violet light.

**Cellulose ester lacquers.** Carbide and Carbon Chemicals Corp. Ger. 590,858, Jan. 11, 1934 (Cl. 22h. 4). The lacquers contain a synthetic resin obtained by the incomplete polymerization of a mixt. of vinyl chloride and vinyl acetate. Examples are given.

**Coating surfaces.** Eberhard Wurbs. Fr. 757,884, Jan. 5, 1934. Coating compns. having a basis of mineral oils, heavy oils, asphalt or varnish have incorporated in them substances which liberate gases more or less continuously. The osmotic pressure of the gases prevents the attacking agents reaching the surface. Carbonates, nitrites, etc., may be used. Metals which are far from one another in the potential series of Arrhenius and which act as a galvanic element may also be incorporated in powder form.

**Apparatus for coating surfaces by spraying.** George A. Stevenson. Brit. 403,207, Dec. 21, 1933.

**Ornamenting.** N. V. Veruis-, Ver- en Japanlaka-fabrieken Hermann A. Schreuder & Co. Brit. 402,710, Dec. 7, 1933. A thick white or colored paint, which comprises a pigment and a binding agent, preferably consisting of a mixt. of wood oil, linseed oil (artificial) resin and driers, and dries to form a mat surface; is applied to the surface to be ornamented, a light relief is formed by means of a roller, etc., and the protruding parts of the pattern are polished to produce a lustrous surface forming a contrast with the low parts.

**Wrinkle finish for flexible materials such as cloth, paper, leather, rubber, etc.** Frank B. Root (to Chadeloid Chemical Co.). U. S. 1,950,417, March 13. A flexibilized wrinkle-finish coating is produced on materials such as paper, cloth, etc., by use of various described compns. which may include wrinkling and non-wrinkling oils, dibutyl phthalate, fillers, etc.

**Condensation products.** I. G. Farbenind. A.-G. Fr. 758,042, Jan. 9, 1934. Products resembling resins are made by causing  $C_2H_2$  to act at a temp. of 100–300° on a hydroxy cyclic compd., e. g.,  $PhOH$ , cresol, *o*-chlorophenol, hydroxybiphenyl, resorcinol,  $\alpha$ -naphthol, tetrahydro- $\beta$ -naphthol and dihydroxydiphenyldimethylmethane, in the presence of an org. salt of Zn or Cd, e. g.,  $(AcO)_2Zn$ .

**Complex polymerization products.** I. G. Farbenind. A.-G. (Walter Reppe, Werner Starck and Arthur Voss, inventors). Ger. 593,399, Feb. 26, 1934 (Cl. 39h. 4.02). Vinyl esters of fatty acids contg. more than 4 C atoms are mixed with other polymerizable substances, e. g., with vinyl esters of lower fatty acids or with acrylic esters or diolefins. The mixts. are then polymerized by standard methods. Products useful for making lacquers and plastic masses are obtained. Examples are given. Cf. C. A. 28, 1484<sup>7</sup>.

**Resinous plastic composition suitable for molding under pressure.** Arthur S. Ford (to Industrial Sugar Products Corp.). U. S. 1,949,831, March 6. A plastic material is obtained by reacting together urea and the reaction product of a mono- or di-saccharide such as sucrose with an aldehyde such as formaldehyde. U. S. 1,949,832 relates to a generally similar process in which, however, phthalic anhydride is used instead of urea.  $(CH_2)_6N_4$  may be added for hardening.

**Alkyd resinous composition.** Frithjof Zwilmeyer (to National Aniline and Chemical Co.). U. S. 1,950,468, March 13. A resinous condensation product which is suitable for plastics, coatings, insulation, etc., is derived from a polyhydric alc. such as glycerol or a polyglycerol or glycol, an org. polycarboxylic acid such as monobromo-

maleic anhydride and a partially esterified org. polycarboxylic acid such as mono-isopropyl ester of monochlorosuccinic acid. Numerous examples are given.

**Resin emulsions.** Kurt Bruckmann and The Arber Size and Chemical Co. Ltd. Brit. 403,095, Dec. 11, 1933. Emulsions, suitable for sizing paper, are prepd. by introducing, simultaneously and as sep. streams, molten resin and an aq. soln. of a protective colloid; e. g., casein or  $CH_3O$ -casein, dispersed in an aq. alk. medium, or glue, gum arabic, agar-agar or Irish moss, into a high-speed rotary pump or a colloid mill. Colloidal or peptized clays may also be incorporated.

**Urea-aldehyde resins.** A. L. Eidlin. Russ. 31,616, Oct. 31, 1933. The reacting mixt. is condensed on a fabric.

**Resin.** Antoine C. Gillet. Fr. 758,891, Jan. 24, 1934. Opaque solns. of resin for sizing papers, etc., are made by subjecting resin to agitation in the acid in the presence of an aq. soln. of a sol. base, e. g.,  $NaOH$ ,  $KOH$  or  $NH_3$ , or of a salt of these. A rotary cylinder contg. balls may be used. Cf. C. A. 28, 1191<sup>4</sup>.

**Resins from cellulose.** Uchtbno-Oputnuil Zavod Moskovskogo Tekhnikuma Zhirovol Promuisl'mosti "Tekhzirzavod", G. S. Petrov and S. I. Dimakov. Russ. 20,747, May 31, 1931. In the prepn. of resins from cellulose materials, reacting with  $H_2O$  or aq. alkali under pressure sun-flower husks either natural or after hydrolysis with mineral acids are used as cellulose-contg. material. The resins are extd. in the usual manner.

**Varnishes.** G. S. Petrov and S. I. Dimakov. Russ. 31,530, Oct. 31, 1933; addn. to Russ. 20,717 (preceding abstr.). In the prepn. of varnishes with the application of resins obtained according to Russ. 20,747, phenol resins or oxidized gasoline-insol. high-mol. acids obtained in the oxidation of hydrocarbons and of drying or semidrying fatty oils or their acids are added.

**Synthetic resins.** Glasurit-Werke M. Winkelmann A.-G. (Richard Weithöner, inventor). Ger. 590,636, Jan. 6, 1934 (Cl. 12o. 26.02). See Brit. 395,894 (C. A. 28, 664<sup>9</sup>).

**Synthetic resins.** Herbert Hönel and Soc. Beck, Koller & Co. Fr. 758,168, Jan. 11, 1931. Resins are prepd. by condensing  $CH_3O$  in considerable excess with phenols or mixts. of phenols in which only 2 positions entering easily into reaction are not substituted and which contain at least one stable hydrocarbon radical of a relatively high order. The reaction takes place in contact with an energetic base which is neutralized after the reaction has terminated, and the whole is heated, before or after neutralization, to form a resinous product, solid at ordinary temp. Suitable phenols include thymol, *p*-tertiarybutylphenol, *p*-tertiaryamylphenol, *o*- and *p*-cyclohexylphenol, *o*-phenylphenol and  $\beta,\beta$ -bis-(4-hydroxy-3-methylphenyl)-propane.

**Synthetic resins.** Imperial Chemical Industries Ltd. Fr. 758,655, Jan. 22, 1934. Resins which are sol. in varnish oils and miscible or otherwise compatible with nitrocellulose are made by treating the Me or Et ether of 1,3,5-xenol with  $CH_3O$  or like reactive compd. of  $CH_2$  in an acid medium, e. g., aq.  $HCl$ .

**Synthetic resins.** Hans Th. Bucherer. Fr. 758,680, Jan. 22, 1934. Resins made from phenols and aldehydes are heated in dil. alk. soln. on a water bath or under reflux until a sample taken, after pptn. and washing with water, does not become turbid by diln. of its alc. soln. with any amt. of water.

## 27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

**Unsaponifiable fraction of spinach fat.** A glucoside of  $\gamma$ -spinasterol. Frederick W. Heyl and Donald Larsen. J. Am. Chem. Soc. 56, 942–3 (1934); cf. C. A. 27, 5996. Extn. of dry spinach with 95% EtOH and extn. of the EtOH residue with petr. ether to remove the lipides and then with 95% EtOH gives *phylosteroles*, m. 275–80°,

$[\alpha]_{D}^{25}$ , –33.0° ( $C_2H_5N$ ); *tetra-Ac deriv.*, m. 178.5–9°;  $[\alpha]_{D}^{25}$ , –13.4° ( $CHCl_3$ ); *tetra-Bz deriv.*, m. 178–8.5°;  $[\alpha]_{D}^{25}$ , 21.6°. Hydrolysis of the glucoside gives  $\gamma$ -*spinasterol*, m. 159.5–60°, optically inactive; *acetate*, m. 139.5–40°;  $[\alpha]_{D}^{25}$ , –14.1°; *benzoate*, m. 118.5–9.5°;  $[\alpha]_{D}^{25}$ , –10.3°; *p*-nitrobenzoate, m. 200°,  $[\alpha]_{D}^{25}$ , –8.0°;



*phenylurethan*, m. 144-5°,  $[\alpha]_{D}^{25}$  -15.9°; *dihydro- $\gamma$ -spinasterol*, m. 105.5-6°,  $[\alpha]_{D}^{25}$  24°; *acetate*, m. 115.5-6°,  $[\alpha]_{D}^{25}$  12.4°. This sterol is probably an isomer of  $\alpha$ -spinasterol. C. J. West

**Fat, lecithin and protein of the soy bean.** Hugo Kuhl. *Mühlenlab.* 4, 7-14 (1934).—A review. C. L. B.

**Direct determination of calcium soaps in fats.** Bergell. *Allgem. Oel- u. Fett-Ztg.* 30, 301-2 (1933).—After refluxing 10 g. of fat for a few min. with 200 cc. of  $Me_2CO$ , the soln. is cooled and decanted through a filter; the residue is again extd. with 100 cc. of  $Me_2CO$ , collected, washed with  $Me_2CO$ , and treated with acid to liberate the fatty acids, which are exhd. with ether and weighed as usual. Loss by solg. of Ca soap is not more than 6 mg. B. C. A.

**The fatty substances of shell fish. I. The fatty substances of asari, shijimi, karasugai, and hamaguri.** Mitsuharu Tsurumoto and Hanji Koyanagi. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 81-5 (1934).—The fatty substances of the 4 shell fish belonging to the class of Pelecypoda amount to only about 0.7% of the hard shell fish ("mukimi"). However, the dried "mukimi" of hamaguri gave 4.5% of substance. The fatty substances usually contained more than 50% by wt. of phosphatides, which gave fatty acids of high I nos. The phosphatide-free fatty substances formed a viscous mass and contained appreciable amts. of unsaponifiable matter, in the case of asari up to 45%. The fatty acids from these substances also had high I nos., e.g. large proportions of highly unsatd. acids. The unsaponifiable matter contained a sterol which is an isomer of cholesterol and forms an acetate of high m. p. It shows a characteristic red color reaction when a drop of  $H_2SO_4$  is added to its  $Ac_2O$  soln. It is probably a new compd. and differs from other zoosterols such as bombicsterol. II. The fatty substances of ear-shell (I) and top-shell (II) belonging to the class of Gastropoda amounted to about 1%. The phosphatide contents were about 40 and 61% for I and II, resp. The unsaponifiable matter of the phosphatide-free substances was about 20 and 38% for I and II, resp., and gave fatty acids with high I nos. The solid parts of the unsaponifiable matter consisted mostly of cholesterol with small amts. of the sterol found in the fatty substances of Pelecypoda. The liquid parts had fairly high I nos. Karl Kummermeyer

**Oleic-elaidic acid transformation as an aid in the analysis of mixtures of oleic, linoleic and linolenic acids.** H. N. Griffiths and T. P. Hilditch. *J. Soc. Chem. Ind.* 53, 75-81T (1934).—A method has been developed whereby oleic acid in admixture with linoleic and linolenic acids, can be detd. by analysis of the mixed fatty acids after treatment with the oxides of  $N_2$  until the oleic-elaidic acid equil. has been reached. The elaidization method is useful as an independent procedure whereby the results by thiocyanogen value may be checked, but its execution is more intricate and tedious than the latter. Its use has served strongly to support the validity of the Kaufmann process in the instances studied. W. J. Peterson

**New determining influences in oil- and fat-spoilage.** Th. Ruemele. *Seifensieder-Ztg.* 61, 125 (1934).—The action of light and the compn. of the fatty acid mixt. det. the speed in fat spoilage. Methyl oleate turns rancid more quickly than the mixed Me esters of oleic plus linoleic acid. The smaller the amt. of linoleic and linolenic acids in a fat, the easier does it turn rancid. P. Escher

**Antioxygens of fatty oils. XIII. Inversion of oxidative catalysts due to the species of fatty oils: 4. Action of *p*-nitroaniline on the oxidation of fatty oils.** Mitsuo Nakamura. *J. Soc. Chem. Ind., Japan* 37, Suppl. binding 80-9 (1934); cf. C. A. 27, 4703.—The action of *p*-nitroaniline (I) upon the oxidation of 2 groups of fatty oils was examd. under special conditions. It was found that I accelerates the oxidation of any fatty oil, natural or blended, in the earlier stage of oxidation, and that the prooxygenic activity increases nearly directly proportional to the I no. of the fatty oils. In oils, which have I

nos. less than 120, I gradually begins to become an anti-oxygen in the course of oxidation and this phenomenon of inversion takes place more quickly as the I nos. become lower. This inversion was not observed for oils of higher I nos. The expl. conditions have no effect on this inversion. From the fact that the relation between the catalytic action of I and the I nos. of fatty oils is analogous in both natural and blended oils, N. concluded that the inversion of catalysis in the case of I can entirely be attributed to the I nos. and not to the minor ingredients of the fatty oils. Karl Kummermeyer

**Palm-oil bleaching.** O. Eckert. *Seifensieder-Ztg.* 61, 140-51 (1934).—Crude as well as refined palm oil is readily bleached with 4% bleaching earth type Tonvil A. C. Addn. of 0.15-0.30%  $H_2SO_4$  to the earth does not improve bleaching but causes darkening during storage. P. Escher

**Processing of cottonseed meats.** W. R. Woolrich and E. L. Carpenter. *Chem. Met. Eng.* 40, 291-2 (1933). The functions and efficiency of the rolling and cooking operations prior to the hydraulic pressing of cottonseed oil are discussed. Expts. indicate that the cooking period can be considerably reduced by (a) good stirring of the meats, which are bad conductors of heat, and (b) adding the moisture immediately before the cooking and then heating to 90° with dry steam. With rapid heating to 110° the cell walls are ruptured by the steam enclosed. The pressure expelling process also is described. B. C. A.

**Chemical composition of the fruits of Aleurites produced in China. I. Aleurites fordii.** Ryu Hakubun. *J. Agr. Chem. Soc. Japan* 10, 25-30 (1934).—Tung oil is prepd. from the fruits of *Aleurites* in China. Analysis of the fruits of *Aleurites fordii* gave:  $H_2O$  3.742, ash 2.606, crude fat 61.500, crude protein 16.500, crude fiber 4.350 and sol. non-nitrogenous compds. 11.233% in air-dry matter. Most of the sugar consisted of nonreducing sugars; 6.68% of pentosans as present. Y. K.

**Extracting oils from comminuted animal wastes with dichloroethane and trichloroethylene.** T. A. Podosevna. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 20-32 (1933).—As solvents for extg. fats from bone meal, fish meal and the like,  $C_2H_5Cl_2$  and  $C_2HCl_3$  are very effective and almost as rapid as petr. ether. They are easily removed from the residue, which has high N content and little of the original odor. The solvent cannot be readily removed from the ext. without the aid of vacuum or aeration, and the fat undergoes a chem. change (decreased I no.). Julian F. Smith

**The grouping of halibut-liver oils.** R. T. M. Haines and J. C. Drummond. *J. Soc. Chem. Ind.* 53, 81-2T (1934); cf. C. A. 27, 3099.—Halibut-liver oils show a relationship between their I values and blue values, and can be grouped on the basis of ratios thus obtained. It is suggested that pure halibut-liver oil can be distinguished from any oils blended with cod-liver or similar oils by a consideration of the I value/blue value ratio, particularly if the origin of the halibut-liver oil is known. W. J. P.

**Effect of salt upon oil spoilage in emulsions.** Lowell B. Kilgore. *Oil and Soap* 11, 72-3 (1934).—A 50% cottonseed oil and water emulsion with pectin as the emulsifying agent and a conventional mayonnaise made with cottonseed oil were used in the tests. It was shown that the presence of above 3% of NaCl in the emulsions has a tendency to inhibit the spoilage of cottonseed oil. Emulsions having little or no NaCl darkened much more than those having a high NaCl content. Those oils which had been removed from the emulsions having a low salt content differed in taste from the oils from salty emulsions, the latter giving sweet oils and the others giving rancid flavors. B. Scherubel

**Making lecithin from soy beans.** A. N. Lebedev and V. S. Gryuner. *Schriften zentral. Forschungsinst. Lebensmittelchem.* (U. S. S. R.) 4, 118-35 (1933).—Crushed soy beans, after  $Et_2O$  extn., gave 1.84% phosphatides by extn. with abs. alc. at 60-65°, and 2.06% phosphatides with 96% alc. at 60-65°. Whole beans contained 1.25% org. P, soy-bean grits 0.77%, and hulls only 0.24%. The

ext. obtained with 96% alc. contained 16.07% lecithin. Extn. with gasoline gave only 0.51% yield of phosphatides; but gasoline contg. 15% alc. gave about the same yield as did 96% alc.; and the phosphatides thus obtained were much richer in lecithin (84.17%) than the phosphatides extd. with alc. A new method of lecithin production, based on this observation, is to ext. oil from the beans with gasoline, ext. again with gasoline and alc. mixt. (85:15), distill off the solvent, purify the ext. with alc. and blend with 20-40% of a solid fat, e. g., cacao butter, to make the finished lecithin product. This prepn. compares favorably with imported (American) lecithin preps. in its effect on the viscosity of chocolate. J. F. S.

**Some newer aspects of glycerol.** Kenneth Hoover. *Oil and Soap* 11, 69-71 (1934).—One of the new applications of glycerol is its use in the production of synthetic resins, especially the "alkyd or Glyptal" resins which are made by esterifying polyhydric alcs. with polybasic acids. These resins have found practical application as constituents of nitrocellulose lacquers where they are used to replace natural resins. They offer a substitute for celluloid and can be handled like rubber and are inflammable. Of the newer outlets for glycerol the most important in size is the anti-freeze field. The application of glycerol to food uses is likely to become of increasing importance. Studies by Carlson, Johnson and Johnson (C. A. 27, 2716) proved glycerol acceptable as food in the animal organism and without adverse subjective effects in human beings even upon the addn. of 110 g. glycerol per day to the diet. A newer field is that of glycerol derivs. of which the esters have received the most attention. Important among other derivs. are the ethers, amino derivs. and the oxidation products of glycerol. The ethers are colorless stable compds. of mild odor and vary from mobile liquids to cryst. solids and have excellent solvent powers. The amines are hygroscopic, viscous liquids or solids. They are strong bases with an ammoniacal odor and combine readily with fatty acids to produce soaps which are sol. in org. liquids and are excellent emulsifying agents. Of the numerous oxidation products of glycerol only a few have had much study such as glyceric acid, tartronic acid, mesoxalic acid and dihydroxyacetone. Biochem. syntheses have produced numerous products from glycerol including EtOH, acrolein, hydroacrylic aldehyde, PrOH, BuOH, butyric, lactic and citric acids, phorone and trimethylene glycol. E. Scherufel

**Liquid soaps and their preparation.** A. Thieme. *Seifensieder Ztg.* 61, 179-80, 199-200 (1934).—T. produces liquid K soaps contg. 4-30% fatty acids by running the oils at 70-90° into 50% KOH diluted with 60% H<sub>2</sub>O and stirring until thick. After standing 12 hrs. it is neutralized with olein or sulfonated oils, stretched with sugar soln. or KCl, etc., and filtered at 8° through asbestos pulp. P. Escher

**Properties of soap solutions.** V. Power of soap solutions to remove oily dirt. B. Tyutyunnikov, S. Pleshkova and A. Chernichkina. *Allgem. Oel- u. Fett-Ztg.* 30, 294-6 (1933); cf. C. A. 27, 4433.—The detergent (oil-removing) power of soap solns. of 0.25-1% concn. was measured; within this range: (1) Soaps of rosin and naphthenic acids have no detergent power (although the solns. can suspend powders in the McBain C test) and reduce the washing action if added to solns. of ordinary (fatty) soaps; (2) the detergent action of soaps increases with the concn. of the soln.; raised temp. improves the detergency of Na palmitate and stearate, but reduces that of soaps of rosin and the higher liquid fatty acids; (3) addn. of Na<sub>2</sub>CO<sub>3</sub> improves the washing power of solns. of soaps of rosin and naphthenic acids and mixts. contg. them, but reduces that of ordinary soap solns. (addn. of Na<sub>2</sub>CO<sub>3</sub> has a similar qual. effect on interfacial tension in all cases). Expts. indicate that the peptizing action of oleic soap is an important, although not the only, factor in detg. detergent power. B. C. A.

**Action of carbon dioxide upon soap base.** L. Lascaray. *Seifensieder-Ztg.* 61, 156 (1934).—Bergell's observation (cf. C. A. 28, 2205<sup>a</sup>, 2209<sup>a</sup>) that atm. CO<sub>2</sub> decomposes

<sup>1</sup> soaps during the drying process is correct. Soap is both a mol. and colloidal soln. and during drying the molecularly dissolved portion becomes colloidal. The decomposition of solid soaps by CO<sub>2</sub> can be explained by the steady spl. of fatty acids in concd. soap soln., because the small amt. of fatty acid which is liberated on the soap surface is strongly absorbed and held by the colloidal body of the soap, thus permitting a further decompn. of the soap. P. Escher

**Shaving-soap manufacture.** G. Knigge. *Allgem. Oel- u. Fett-Ztg.* 30, 299-301 (1933).—Practical notes on com. methods. B. C. A.

**Birch sap and its uses.** C. Voss. *Seifensieder-Ztg.* 61, 163-4 (1934).—Collection of birch sap occurs in March; trees of 12-14" diam. yield 2 l.; alc. is added as a preservative and the product used for cosmetics and soaps. P. Escher

<sup>3</sup> **The "fitting" of soaps and its influence upon stability during storage.** C. Bergell. *Seifensieder-Ztg.* 61, 143-5 (1934).—A cold-made neutral coconut-oil soap with 5% neutral fat may, after a few weeks, how 1-2% free fatty acids which would seriously interfere with its perfume. Cold-made soaps contg. tallow or tallow-like fats do not keep well; it can be analytically proved that the unstable tallow acids are displaced by the stronger free coconut-oil acids. If any stronger rosin soap is present, the rosin acids are liberated in place of the tallow acids, and they, being stable, will prevent rancidity. Stability in soaps is best secured by a gentle alk. reaction in the finished product. P. Escher

<sup>4</sup> **Spontaneous heating of soap.** W. H. Simmons. *Perfumery Essent. Oil Record* 24, 219 20 (1933).—A sample of powd. olive oil soap (0.0025% Fe), packed in paper bags, after one month's storage had a temp. of > 100° in the middle of the package; analysis showed: free fatty acids (as oleic) 13.7%, normal fatty acids 69.1%, oxidized fatty acids 16.0%, and I value of total fatty acids 61.6. B. C. A.

Utilizing sunflower-seed hulls (Sadikov, et al.) 23.

**Cignoli, Francisco:** Antioxigenos. Aceites endurecidos y liporolados. Rosario, Argentina: Ruiz. 40 pp.

<sup>6</sup> **Leent, F. H. van:** Analyse en Warekenis der voornameste vette Lichamen. Amsterdam: D. B. Centen's Uitgevers-Maatschappij. 384 pp. Fl. 9.

**Catalyst for hydrogenating fats and oils.** V. S. Sadikov. Russ. 21,535, Oct. 31, 1933. Glass wool, pearls or glass chips are covered with a metal compd. which is then reduced to metal.

**Apparatus for hydrogenating fats.** S. G. Mamotin. Russ. 31,536, Oct. 31, 1933. A hydrogenation app. constructed of clusters of vertical tubes, each being equipped with valves, which can be disconnected individually without discontinuing the process, is charged with a catalyst. The hydrogen is passed upward and the tubes can be preheated by flushing with superheated water or mineral oil.

<sup>8</sup> **Sulfo derivatives of higher fatty acids.** Georg Kalischer and Karl Keller (to General Aniline Works). U. S. 1,949,837, March 6. By methods similar to those used in accord with U. S. 1,851,102 (C. A. 26, 2989), sulfo derivs. are obtained by using as starting materials a water-sol. sulfite and a water-sol. salt of a halogen-contg. conversion product having an unsatd. character formed by heating a halogenated fatty acid of the general formula C<sub>n</sub>H<sub>m</sub>-RHal, COOH where R means hydroxyl or H and  $\alpha$  the number 4 or more with an alk.-acting agent, selected from the group consisting of hydroxides and carbonates of alkali and alk. earth metals with the addn. of a diluent. The products may be used as protective colloids.

<sup>9</sup> **Oxidation products of sulfur-containing derivatives of high fatty acids.** Karl Keller (to General Aniline Works). U. S. 1,949,838, March 6. See Ger. 553,854 (C. A. 28, 776<sup>a</sup>).

**Fatty glycerides.** The Procter & Gamble Co. Fr. 757,763, Jan. 4, 1934. Glycerides contg. more combined glycerol than necessary for the formation of triglyceride, are prepd. by chemically combining a polyhydric alc. with a fatty ester of the type of those found in fats, fatty oils and waxes, agitating them together in the presence of an active catalytic compd. chosen from the group of alcoholates and soaps, and concurrently removing steam from the reaction mixt.

**Purifying fatty oils.** Standard Oil Co. Brit. 402,651, Dec. 7, 1933. Fatty oils, *e. g.*, lard, sperin, cottonseed, soy or corn oil, are freed from high-melting constituents, *e. g.*, stearin, palmitin, free fatty acids, by dissolving in a liquefied, normally gaseous, org. solvent, *e. g.*, (iso-)butane, (iso-)butylene,  $C_3H_8$ , ethylene, propylene,  $Me_2O$ ,  $MeOEt$ , ethylene oxide, chilling the soln. and sepg. the pptd. substances. App. is described.

**Emulsions of fish-liver oils.** Deutsch Pentosin-Werke G. m. b. H. Ger. 593,395, Feb. 26, 1934 (Cl. 30h. 2). Aq. emulsions of fish-liver oils are stabilized by adding a small proportion of a soln. of Ca saccharate.

**Catalyst suitable for hardening oils.** Robinson Hindley Processes Ltd. Fr. 758,751, Jan. 23, 1934. Ni oxide is treated by another compd. of Si (*e. g.*, ethyl orthosilicate), coagulated by the action of  $NH_3$ , and the mass divided into granules, which are dried and submitted to the action of heat in a reducing atm.

**Waxy substances.** J. G. Farbermand. A.-G. Fr. 759,201, Jan. 31, 1934. A mixt. of aliphatic acyl compds. (acids, anhydrides and esters) is submitted to a "condensation-splitting" treatment in the presence of catalysts capable of removing  $CO_2$  from org. O compds., thus forming direct C chains contg. more C atoms than the primary substances. Several examples are given.

**Soap.** John Wearham. Brit. 403,650, Dec. 20, 1933. In the manuf. of irradiated soaps, ergosterol not previously irradiated is added to the soap or the fats to be saponify, and the mixt. irradiated artificially, *e. g.*, by means of a quartz Hg-vapor lamp or an elec. arc light.

**Irradiated soap.** Anthony Joseph Lorenz and Mark H. Wodlinger. Brit. 403,083, Dec. 11, 1933; cf. Fr. 742,181 (C. A. 27, 3632). Irradiated cholesterol, phytosterol, zymosterol, etc., may be used and irradiation may be with x-rays, infra-red rays or cathode rays.

**Purifying liquid toilet soaps and perfumed liquids.** K. A. Lukin and S. G. Vainshtein. Russ. 31,537, Oct. 31, 1933. The liquid to be purified is treated with freshly pptd.  $Al(OH)_3$  and left to settle for 2-3 days.

**Soap substitutes.** Adolf Welter. Fr. 758,733, Jan. 22, 1934. Sulfonates of hydrocarbon compds. are made into filaments, either alone or in the presence of other electrolytes or small amts. of soap, for rapid soln.

**Emulsifying, cleansing and wetting agents.** H. Th. Böhme A.-G. Ger. 593,422, Feb. 26, 1934 (Cl. 23c. 2).

Use is made of synthetic glucosides of high mol. wt. Suitable glucosides are obtainable by condensing glucose, maltose or lactose with aliphatic alcs. contg. more than 8 C atoms or with alkylphenols or hydrogenated phenols. Examples of the use of the glucosides are given.

**Capillary-active water-soluble substances suitable for wetting, emulsifying, etc.** Ludwig Becker and Robert Müller (to Chemische Fabrik Pott & Co.). U. S. 1,950,287, March 6. Polymerized unsatd. aliphatic hydrocarbons (such as may be produced from oil-cracking gases or from tertiary  $abu$  alc.) contg. non-aromatic polymers are treated with a sulfonating agent such as concd.  $H_2SO_4$ .

**Wetting agents, etc.** H. Th. Böhme A.-G. Brit. 402,295, Nov. 30, 1933, divided on 393,904 (C. A. 27, 4001). To improve their wetting, dispersing and penetrating properties and to improve the conveyance of the effective substances present, esters of tetrahydrofurfural alcohol (I) with aliphatic carboxylic acids contg. not more than 5 C atoms are added to dispersions of liquids insol. in  $H_2O$  and to solns., plastic preps., and dispersions of fats, waxes, highly polymeric hydrocarbons or carbohydrate, *e. g.*, rubber, gutta-percha, cellulose, polysaccharides and cellulose esters, camphor and esters serving as plasticizing agents for lacquers, *e. g.*, triphenyl phosphate, tritolyl phosphate, dibutyl tartrate, glycerol triacetate, and adipic and methyladipic alkyl esters. The insol. liquids specified are (halogenated) hydrocarbons, hydrogenated phenols, higher alcs. and ketones. The said esters of I may be used with soaps, sulfonated oils or higher alcs. and aromatic sulfonic acids, *e. g.*, in the prepn. of solvent soaps. In 402,290, Nov. 30, 1933, said esters are added to dispersions or pastes of dye powders.

**Wetting agents, etc.** Soc. pour l'ind. chim. à Bâle. Fr. 758,078, Jan. 10, 1934. Sulfones of the formula  $R^1SO_2R^2$  ( $R^1$  is an aromatic, aliphatic, aliphatic-aromatic or cycloaliphatic group and  $R^2$  is an aliphatic or cycloaliphatic group, at least one of the 2 being of high mol. wt.) are transformed into sulfuric derivs. sol. in water by the introduction of true sulfonic acid or ester groups. The products are auxiliary products in the textile industry. The sulfones are prepd. by causing  $\alpha$ -halogen acids of high mol. wt. or their derivs. to act on aromatic sulfonic acids. Thus, the Et ester of  $\alpha$ -bromostearic acid is heated under pressure with Na toluenesulfinate in  $EtOH$ , and the product is sulfonated.

**Wetting agents, etc.** Henkel & Cie G. m. b. H. Fr. 759,750, Jan. 23, 1934. Org. compds. which contain at least one lipophilic radical and at least one group of esters of thiosulfuric acid in the mol., are used as agents having capillary activity, particularly wetting, washing, purifying, cleansing, emulsifying and dispersing agents. Compds. include fatty esters of high mol. wt. of the hydroxyethyl ester of thiosulfuric acid ( $RCOOCH_2CH_2SSO_3Na$ ) and alkyl esters of high mol. wt. of the (carboxymethyl) ester of thiosulfuric acid ( $ROCOCH_2SSO_3Na$ ).

## 28—SUGAR, STARCH AND GUMS

J. K. DALE

**Some colloid-chemical processes in the sugar factory.** Erich Gundermann. *Centr. Zuckerind.* 42, 51-2, 71-3 (1934).—A review of the types of colloids present in raw beet juice and of their behavior during defecation with lime and satn. with  $CO_2$ . C. B. Purves

**The relationship among the viscosity, temperature and density of pure sugar solutions.** Kurt Heinrich. *Centr. Zuckerind.* 42, 29-31 (1934).—A graphical method of interpreting data ranging from 20° to 100° and from 0° to 76° Brix. C. B. Purves

**Investigations on the ripening of POJ 2878. VI. Estimation of the number of stalks to be sampled, and practical application of the refractometric method to determine the state of maturity.** L. Levert, C. A. A. van der Woude and C. van Dillewijn. *Arch. Suikerind.* 42, 83-115 (1934); cf. C. A. 27, 4116.—Further expts. have shown that the correlation between Brix of field samples and the

rendement obtained is 0.94 to 0.97; the correlation between Brix by hand refractometer and that of expressed juice is 0.88 to 0.96. This is sufficient for practical purposes. The method for finding the true av. Brix for a field plot is described, and a table is presented, showing the no. of stalks that must be sampled to obtain the Brix within a given limit of error. In practice it is not necessary to det. the Brix for each stalk separately, but a sampling knife with a juice reservoir may be used. Directions are given for the practical use of the new method, which is more reliable and cheaper than the old method. F. W. Z.

**Filterability tests on cane sugars.** F. W. Zerban. *Facts About Sugar* 29, 7-12 (1934).—In filtration tests on 65 raw sugars, with the Elliott filter (C. A. 20, 1000), with a pressure filter which is described and illustrated, and by actual factory runs, it was found that the first 2 methods show fairly high correlation with each other, but that the

filtration rate in the factory cannot be reliably predicted from either. The discrepancies need not be due to errors in the lab. tests, but may be caused by difficulties involved in factory runs. It is recommended that the Elliott test be used for routine tests to improve the quality of raw sugars; definite specifications are proposed to make the results mutually comparable. The pressure method is recommended for research work.

**Processing of sugar beet by the Komers and Cuker method.** K. Smolenski. *Prace Centr. Lab. Cukrownicz., Latach.* 1928-31, 23 5.- The process is criticized.

**Density [of beet juice] and maturity.** F. Guilbert. *Bull. assoc. chim. suc. dist.* 50, 81 5(1933).—High purity of juice depends mainly on ripeness of the roots. Relations between ripening, rainfall, soil texture, and soil temp. at the surface and 30 cm. below are discussed, with reference to tabulated data for 1931 and 1932.

**New results with the magnesia installation at Wismar.** E. v. Huyden. *Deut. Zuckerind.* 59, 17 18(1934).—Thin beet-sugar juice from the third satn. was filtered on the factory scale through mixts. of MgO and charcoal.

**Clarification of sugar solutions according to Horne.** II. P. Honig and K. Douwes Dekker. *Arch. Suikerind.* 42, 116-19(1934); cf. C. A. 27, 4918.—For 35 molasses sugars the polarization after clarification by Horne's method was 0.1 0.35, av. 0.194 lower than with the use of subacetate soln. It is recommended that Horne's method be used in the future because it gives results closer to the truth.

**The control of crystallization on the basis of Claassen's doctrine of saturation and supersaturation.** Brunolf Brukner. *Deut. Zuckerind.* 59, 35 9(1934).—Graphical methods in conjunction with routine analyses facilitate the calcn. of the correct vol. of water to add to the massecuite in the mash and of the yield of beet-sugar crystals.

**Peculiar precipitate in a turbocompressor for saturation gas.** K. Smoleński and W. Reicher. *Prace Centr. Lab. Cukrownicz., Latach.* 1928 31, 160-75.—The compn. of the ppt., which arose from the presence of insufficient air and excess of coke in the lime kiln, is recorded.

**Raffinose. Preparation and properties.** F. H. Hungerford and A. R. Nees. *Ind. Eng. Chem.* 26, 462-4 (1934). Raffinose has been prepd. on a small com. scale from the molasses obtained in the barium desugarizing process, by seeding it heavily with raffinose and allowing it to crystallize at 15° to 18° during 20 days under slow agitation. The crystals are filtered off after dilg. the magma to 65% solids with cold water, and are recrystd. several times from H<sub>2</sub>O. The effect of raffinose on the crystal form of sucrose is described. The soly. of raffinose hydrate has been detd. between 0° and 78°; above this temp. the hydrate is not stable. The anhydride is much more sol. than the hydrate.

**Saccharifying lignin with dilute solutions of sulfuric acid.** L. V. Kotovskii. *J. Applied Chem.* (U. S. S. R.) 6, 519-27 (in German 527-8) (1933).—The use of a large amt. of acid leads as a rule to higher yields of sugar. The concn. of the sugar in hydrolyzed solns. varies usually within 1.8-2%. The yield of sugar does not increase as

rapidly as the increase in the concn. of acid or its amt. The use of a 2 2 1/2% acid in the presence of small amts. of H<sub>2</sub>O is the most economical procedure while the yield of sugar does not exceed 18%. For acid concns. of 3-4% the yield of sugar increases with lower temp. and higher concn. The hydrolysis of the lignin is influenced by the temp. and pressure. Addnl. pressure exercised by an oil press or a gas cylinder raises the yield another 5%. The hydrolysis of the lignin takes place in 2 stages. In the 1st stage are hydrolyzed the less stable polyvinyl compds. which yield products which are also unstable, while in the 2nd stage the more stable carbohydrates are hydrolyzed (probably the cellulose), which require more severe conditions for their decompn. and yield accordingly products of a higher crit. temp. Neutralization with excessive caustic or carbonates leads to an increase in the sugar content and it may reach 5% with chalk. The lignin residues may absorb sugar from the soln. to the extent of 10% of the sugar in the soln.

**Hoppler viscometer (Knop) 1. Relationship of sprouting in sugar beet to the nutrient content of the soil (Claus) 15. Results of the plot tests on various [sugar-cane] problems (Demandt) 15. Results of the fertilizer tests [on sugar-cane] (Demandt) 15. Sugar-cane cultivation and manuf. of white sugar at Palur Agr. Research Station (Krishnaswami) 15. Phys. consts. for Hawaiian sugar-cane soils (Wadsworth) 15.**

**Preservation of beet slices at sugar factories.** Mezögaz-dasági Ipar R. T.° Hung. 108,505, Feb. 15, 1934. A layer of 100 kg. of beet slices is moistened with a soln. of 0.1 8 kg. HCl, 0.1-1.6 kg. molasses and 0.01° 0.1 kg. Ca, Na or K phosphate; successive layers are added and similarly treated, and finally the whole is covered with straw.

**Apparatus for saturating sugar juices.** Oskar Spengler, Georg Bartsch and Jochen Wigand. *Ger.* 590,850, Jan. 11, 1934 (Cl. 89c. 16).

**Centrifugal apparatus for filtering sugar slurry.** Raffinerie Irlenmontoise, Soc. anon. *Ger.* 590,802, Jan. 11, 1934 (Cl. 89c. 16).

**Utilizing sugar diffusion waters.** G. N. Shevchenko and A. S. Fedchenko. *Russ.* 31,835, Oct. 31, 1933. To avoid infection with microorganisms by contact with air diffuser waters are pumped by the diffuser pump directly into the proper diffuser with shavings without any purification of the waters from the pulp, whereby simultaneously with the transfer of the diffuser water the diffuser to be discharged is filled with fresh water and the pressings are mechanically removed in the usual manner.

**Purifying the diffuser water with mud from filter presses.** V. A. Krasilshchukov. *Russ.* 31,836, Oct. 31, 1933. For the purpose of combining in one process the purification of recycled diffuser waters and utilization of the sugar contained in the filter-press mud, the two are mixed after the diln. of the mud and after the addn. of lime to an alk. of 0.01 0.015 and after a proper agitation the mixt. is allowed to stand for clarification.

**Artificial honey.** M. T. Kokonov. *Russ.* 31,838, Oct. 31, 1933. In the prepn. of artificial honey by hydrolyzing starch, rhubarb stalks are used as hydrolyzing medium.

## 29—LEATHER AND GLUE

ALLEN ROGERS

**The leather chemist.** Vittorio Casaburi. *Boll. ufficiale stat. sper. ind. pell. mat. concianti, suppl. tec.* 8, 34-54(1933).—A discussion of the Italian leather industry.

**Dry tanning.** G. Fabzin. *Koshevenno-Obuvnaya Prom. S. S. S. R.* 12, 357-60(1933); *Chimie & industrie* 31, 417.—A study of the accelerated tanning of hides by means of highly concd. vegetable exts. The following procedure may be followed: treat the raw washed hides in a

drum, for 1-3 days, with a buffer soln. consisting of 200% of spent liquor to which are added 1-1.5% H<sub>2</sub>SO<sub>4</sub> and 8% NaCl, remove excess liquid in a hydraulic press, place in a dry drum and rotate for 30 min., add the vegetable ext. at as high a d. as possible (optimum 30-31° Bé., but tanning still takes place at 22-24° Bé.). The temp. at the start is 18-20° and should not exceed 36° at the end. The other operations are as usual.

**Iron tanning.** I. Veisberg and I. Bunimovich. *Koshe-*

*venno-Obuvnaya Prom. S. S. S. R. 12, 383-4(1933); Chimie & industrie 31, 418.*—Tanning can be effected with neutral  $\text{Fe}_2(\text{SO}_4)_3$ , very slightly alkalized by addn. of 0.2-0.3%  $\text{Na}_2\text{CO}_3$  (on the wt. of raw hides). The Fe soln. is prepd. by heating powd. com. salt (contg. 10-15%  $\text{H}_2\text{O}$ , 45-55%  $\text{Fe}_2(\text{SO}_4)_3$ , 4-5%  $\text{FeSO}_4$  and 15-25% insol.) with  $\text{H}_2\text{O}$  under pressure for 2-4 hrs., letting stand overnight, decanting (the soln. has a d. of 45° BÉ., contains about 200 g. Fe oxide per l. and has an acidity equiv. to 200 g.  $\text{H}_2\text{SO}_4$  per l.), dilg. to 25-27° BÉ. (80-90 g. Fe oxide per l.) and neutralizing with  $\text{Na}_2\text{CO}_3$  to an acidity of 55-55 g. per l. Hcps. of the hides is the same as for Chrome tanning. They are then introduced into a drum contg. 100%  $\text{H}_2\text{O}$  at 50° and 2%  $\text{NaCl}$  (on the wt. of hides); during rotation a soln. contg. 185 g.  $\text{CrO}_3$  per l. (0.4-0.5%  $\text{CrO}_3$  on the wt. of hides) and having an alk. of 38-40% is added; at the end of 2 hrs. impregnation of the hides is complete, and they can stand a temp. of 55-60°. The Fe soln. is then added in 3 portions over a period of 1 hr.; at the end of 3 hrs. the hides acquire a light yellow color and can stand a temp. of 80-5°; add 0.4%  $\text{Na}_2\text{CO}_3$  and rotate for another 3 hrs. During the whole operation the temp. should not exceed 30-2°. The tanned hides can stand a temp. of 94-6°.

**Chrome tanning.** XVIII. Further experiments on two-bath tanning processes. B. Masny and A. Papayannis. *Collegium 1934, 89-87*; cf. *C. A. 27, 5573*.—Vertical distribution of Cr and acid in the hide after the first bath was studied. In the second bath, if the acid is added slowly, a more basic Cr salt is formed than if the addn. is rapid; in the latter case the  $\text{Na}_2\text{S}_2\text{O}_8$  is oxidized to  $\text{Na}_2\text{SO}_4$  and  $\text{H}_2\text{SO}_4$ , in the former to  $\text{Na}_2\text{S}_2\text{O}_5$  and  $\text{Na}_2\text{SO}_4$ .  $\text{HCl}$  in the second bath can be replaced by formic but not by lactic acid. With formic acid a soft plump leather is obtained; it is resistant to boiling  $\text{H}_2\text{O}$  and contains 2.2-2.6% Cr in a 30-50% basic salt. I. D. Clarke

**Two-bath (chrome) tanning.** I. B. Bělavský and J. Makarius. *Collegium 1934, 87-92*.—Practical observations on the two-bath chrome-tanning process.

**Determination of sodium chloride in sulfite waste liquor tanning extracts.** P. Kharlamov. *Koshevno-Obuvnaya Prom. S. S. S. R. 12, 284(1933); Chimie & industrie 31, 416*.—The solns. cannot be titrated directly on account of their deep color. Dil. the sample to a d. of 5° BÉ., evap. 10 cc. on water bath, char, take up in water acidified with  $\text{HNO}_3$ , boil off  $\text{H}_2\text{S}$  completely, make to 250 cc., and titrate an aliquot by the Volhard method.

**Further investigations on the effect of pickling process upon imported dried skins infected with anthrax.** G. Pohl. *Z. Infektionskrankh. parasit. Krankh. Hyg. Haustiere 45, 260-4(1934)*.—Imported cattle skins, infected with anthrax, were rendered sterile after pickling in a fluid contg. 3%  $\text{HCl}$  and 10.22%  $\text{NaCl}$ . The process appeared to be more or less harmful to the leather.

**Lizards, serpents, crocodiles.** Vittorio Casaburi. *Boll. ufficiale staz. sper. ind. pell. mat. concianti, Suppl. sec. 8, 73-81, 100, 130-2(1933)*.—Tables are given listing the various reptiles capable of furnishing leather which are found in the Brit. Empire or the East Indies. J. W. P.

**Behavior of sole leather toward water.** M. Bergmann and A. Miekeley. *Collegium 1934, 117-36*.—Review of previous articles by Bergmann and coworkers. Unrolled leather absorbs more  $\text{H}_2\text{O}$  if tanned with sulfited ext. than if with unsulfited ext.; after rolling absorption is about the same. Al soaps are much more effective in decreasing  $\text{H}_2\text{O}$  absorption if they are added in an org. solvent than if produced on the leather fibers from aq. solns.

**Use of fleshings from pig skins for the manufacture of glue.** B. Nisnevich and F. Azarkh. *Koshevno-Obuvnaya Prom. S. S. S. R. 12, 372-3(1933); Chimie & industrie 31, 418*.—First fleshings.—As pig-skin fleshings differ from others, particularly by their high fat content (up to 35%) and smaller size, they are cooked directly without preliminary treatment, and are washed directly in the

cooking tanks. The glue is not transparent and has a high ash content; it has a satisfactory viscosity, but it dries more slowly than ordinary glue, even when the viscosity of the latter is lower. Cooking should be carried out at as low a temp. as possible (70-80°) to avoid formation of emulsions. Second fleshings.—They differ in compn. from the 1st fleshings, and moreover have been subjected to a 4-8 days' liming. They must be first completely neutralized and then washed 2 or 3 times. Other operations are the same as for ordinary fleshings.

A. Papineau-Couture

**Detg. jelly strength (Gradstein, Mendel) 2. Chemistry of quebracho tannin (Freudenberg, Maillard) 10. 2-Rutaldehyde [from tanbark] (Russ. pat. 31,433) 10.**

**Impregnating hides.** V. A. Babun. *Russ. 31,558, Oct. 31, 1933*. The hides are treated with a soln. of a product obtained by treating anthracene and heavy coal-tar oil with small amounts (10 to 20% by wt.) of  $\text{H}_2\text{SO}_4$ . The treatment is carried out in a soln. of light hydrocarbons.

**Treating hides, skins, furs, leather, etc., in order to soften them.** Karl Brodersen and Heinrich Wagner (to I. G. Farbenind. A.-G.). U. S. 1,949,990, March 6. A treating agent is used comprising an org. acid ester of a polyhydric aliphatic alc., such as a glycerol mono-ester of the acids of coconut oil.

**Tanning.** Charles Kannel. *Brit. 402,521, Dec. 7, 1933*. In a process for the quick tanning of leather in rotary drums, the hides, after usual liming and washing processes, are treated with an aq. bath (preferably acid) contg. sulfites, e. g., alkali bisulfites,  $\text{H}_2\text{BO}_3$ , or its salts, and sol. carbohydrates, preferably glucose. They are then treated in a tanning bath contg. sulfonic acids, quinones or hydroquinones and, preferably, aldehydes and then subjected to accelerated rotation in a drum contg. a tannic liquor. App. is described.

**Tanning agents.** I. G. Farbenind. A.-G. (Johann Hunsmann and Gustave Mauthe, inventors). *Ger. 593,053, Feb. 21, 1934 (Cl. 28a. 6)*. See *Brit. 353,046 (C. A. 26, 5150)*.

**Preparing chrome extract and chrome alum.** V. P. Kizhaev and N. A. Andrianov. *Russ. 31,559, Oct. 31, 1933*. The products are prepd. by treating the chrome and mixt. with org. reducing agents and particularly with the sludge obtained as a waste product in tanning.

**Leather.** Manó Frankl. *Hung. 108,534, Feb. 15, 1934*. Pretanned leather is stretched and softened for 45 min. in a 10% salt soln. at 22°, 2% glycerol is added and after 30 min. the usual tanning with Cr salts applied.

**Treatment of coated leather.** J. H. Epstein A.-G. (Frank English, inventor). *Ger. 593,270, Feb. 23, 1934 (Cl. 22g. 13)*. Nitrocellulose coatings are removed from leather with the aid of known lacquer-removing compns. comprising water, an org. solvent, e. g., methylcyclohexanone, and a finely divided solid, e. g., sawdust, asbestos or talc, with or without an emulsifying agent, e. g., Turkey-red oil.

**Dyeing leather, etc.** I. G. Farbenind. A.-G. *Brit. 402,327, Nov. 30, 1933*. See *Rev. 754,388 (C. A. 28, 15484)*.

**Leather substitute.** Harold Jackson. *Brit. 402,982, Dec. 14, 1933*. A latex-vulcanizing agent without a coagulant is added to vegetable fiber having no tendency to coagulate rubber latex, e. g., manila hemp, cotton, flax, jute or wood being pulped in a heating engine, and non-coagulated rubber latex is subsequently added, partly or wholly during or at the end of the beater stage or in the paper-making machine. Known accelerators may be added with the vulcanizer or to the pulp, and dyes, etc., may be added to the pulp or latex.

**Boot and shoe heels.** The British United Shoe Machinery Co., Ltd., and Wm. R. Barclay. *Brit. 402,448, Dec. 4, 1933*. A board of leather board, pulp board or like fibrous leather substitute, before or after cutting into heel lifts, is coated on 1 or both sides with a lubricant

dressing of paraffin wax, applied molten or as an emulsion in H<sub>2</sub>O prep'd. with the aid of Castile soap, an ethanoline soap or similar agent, to facilitate subsequent trimming.

Animal glue composition. Edward F. Christopher and

Frank L. DeBeukelaer (to Swift & Co.). U. S. 1,950,483, March 13. Animal glue is mixed with about 20-50% of urea or biuret to form a product which is liquid at ordinary temps. and which is hygroscopic when dried and suitable for use on articles which are to be exposed to low temps.

### 30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The preparation of chlorinated rubber from latex. Hypochlorination and chlorination processes. G. F. Bloomfield and E. H. Farmer. *J. Soc. Chem. Ind.* 53, 43-7T (1934).—A mixt. of dild. latex (contg. NH<sub>3</sub>) and HClO (I) (1 mol. per C<sub>2</sub>H<sub>4</sub> unit) let stand pptd. a pale yellow substance (II) of the approx. compn. C<sub>2</sub>H<sub>3</sub>OCl. The yield was 95%, based on a simple addn. reaction. It was insol. in org. solvents, but swelled in certain ones. It decompd. at 130°, and by acidic K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, Ac<sub>2</sub>O, H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>. Dild. of the HNO<sub>3</sub> decompn. liquor pptd. an unidentified nitrogenous acid. Heated with water or aq. alkalis, II lost Cl and darkened. In C<sub>2</sub>H<sub>5</sub>N or 1% NH<sub>3</sub> at 120-50°, it formed a brown substance contg. Cl. With varying proportions (in all cases a deficiency) of I, chlorinated substances were obtained, the Cl contents of which corresponded almost exactly to the quantities of HClO used. With very low proportions of I, they were tacky and dissolved in org. solvents, but as the Cl content increased they became nontacky and insol. (at 0.3 mol. of I added), and finally crumbly (at 0.85-0.90 mol. of I added). With excess I (4 mols.), and treatment with NH<sub>3</sub>, there was formed a pale yellow substance (III) (14 g. from 20 cc. of 34% latex) contg. 41.5% Cl, and with the same properties as II. An ice-cold mixt. of latex and aq. NaHCO<sub>3</sub> yielded on chlorination and treatment with NH<sub>3</sub> an insol. cream-colored substance (IV) contg. 45.8% Cl. By incomplete chlorination intermediate substances were obtained with properties like those above from a deficiency of I. Concd. (centrifuged) latex gave cleaner products than did dild. latex, free from serum impurities. II chlorinated in boiling CCl<sub>4</sub> until HCl was no longer evolved yielded an insol. white substance (V) contg. 56.3% Cl, which corresponds to C<sub>2</sub>H<sub>3</sub>OCl<sub>2</sub>. A similar substance contg. 59.1% Cl was obtained under like conditions from III. Chlorination of acid latex stabilized with casein or of latex contg. Na<sub>2</sub>CO<sub>3</sub> or NaOH instead of NaHCO<sub>3</sub> yielded insol. substances similar to IV, but which were probably mixts. of varying degrees of chlorination. Dild. latex contg. NaHCO<sub>3</sub> chlorinated at 0-10° until acidic, and further chlorinated at 80-100° yielded a white substance (VI) contg. 51.1% Cl, sol. in various org. solvents. *In vacuo* at room temp. it lost HCl, and at 110° decompd. rapidly. Heated in water at 100° it lost HCl, and formed an insol. more stable (decompd. 170°) substance, evolved Cl in hot concd. HCl and did not react with PCl<sub>5</sub> or POCl<sub>3</sub>. No other sample of latex gave a sol. chlorinated product, *e. g.*, various samples of Malay, Java and 80% latexes gave white or yellow insol. substances of lower Cl contents than those above. After 2 months the Malay latex from which II and VI were prep'd. no longer gave sol. products, so the effects on the soly. of II of various natural and artificial components of the latex were studied. The catalyst necessary for the formation of sol. chlorinated substances was a serum substance, probably a protein. However, chlorination with a relatively small quantity of NaHCO<sub>3</sub> or in acid medium yielded only insol. substances, even with added serum. Oxidation of latex with H<sub>2</sub>O<sub>2</sub>, addn. of NaHCO<sub>3</sub> and chlorination gave insol. substances, and with addnl. serum, sol. substances. Chlorination of vulcanized latex by the method used in prep'g. V without addnl. serum yielded partly sol. white substances contg. S. Though *q. q.* free of Cl and HCl can be prep'd. by the method of Taylor, MacMullin and Gammal (*C. A.* 19, 968; B. and F., *C. A.* 26, 5065), the method had to be changed in the present work to avoid CaCl<sub>2</sub>. This was achieved by passing Cl into aq. NaHCO<sub>3</sub> in place of a

suspension of CaCO<sub>3</sub>. Though the various products were difficult to analyze, the expts. leave little doubt as to the initial reaction of the rubber and I was a predominantly additive. The differences in soly. and stability between chlorinated rubbers prep'd. from latex and those from rubber solns. are wide, and indicate a great difference in the mechanism of the reaction in water and in an org. solvent. These differences do not depend upon relatively extensive hydroxylation in water because chlorinated derivs. are formed by the action of I on rubber solns., which though extensively hydroxylated are sol. (unpublished work). The work also shows the notable fact that rubber is capable of easy chlorination beyond the point corresponding to additive satn.

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The action of hypochlorous acid on rubber. G. F. Bloomfield and E. H. Farmer. *J. Soc. Chem. Ind.* 53, 47-8T; *India Rubber J.* 87, 301-2 (1934).—Treatment of CHCl<sub>3</sub> solns. of purified rubber (I) with aq. HClO (II) gave substances with properties different from those obtained from latex (*cf.* preceding abstr.). With less than 1 mol. of II per C<sub>2</sub>H<sub>4</sub> unit, there was evidence of substitutional chlorination, and with more II a considerable replacement of H by Cl, so that with sufficient II, substances contg. Cl up to 66% were obtained. Though chlorinated products from latex are insol., those from I solns. are less so, and the highly chlorinated substances were sol. in org. solvents of I. At 0-5°, and with 1 mol. of aq. II, a small quantity of a gelatinous product sep'd., which dried to an insol. substance (III) contg. more Cl than that corresponding to (C<sub>2</sub>H<sub>3</sub>OCl)<sub>2</sub>, while the product pptd. from the CHCl<sub>3</sub> by EtOH dried to a pale brown horny insol. substance (IV) contg. 27.1% Cl, 57.4% C and 6.83% H, *i. e.*, correspondingly deficient in Cl. The Cl in III and IV corresponded to all of that in the II. Substitutional chlorination of IV occurred, judged by the Cl/O ratio. The tendency of IV to become insol. was inhibited by a trace of quinol, so it was probably a mol. aggregation or polymerization. Under the same conditions with 0.5 mol. of aq. II and I in CCl<sub>4</sub>, the gelatinous ppt. yielded a white insol. substance (V) contg. 55.1% Cl (4.3 g. from 10 g. of rubber), corresponding to C<sub>2</sub>H<sub>3</sub>OCl<sub>2</sub>, while EtOH pptd. from the CCl<sub>4</sub> a horny insol. substance (VI), contg. 25.1% Cl with properties like those of IV. All Cl in the I was accounted for by the yields and compns. of V and VI. With 5 mols. of II and I in CHCl<sub>3</sub> at 0°; the CHCl<sub>3</sub> layer yielded on ppt'g. a white substance (VII) contg. 66.0% Cl and 8.5% OH, sol. in some org. solvents. Its analysis corresponded in an approx. way to C<sub>2</sub>H<sub>3</sub>OCl<sub>2</sub>. With solvents other than CHCl<sub>3</sub>, the products were also highly chlorinated substances, but unlike VII were insol. and variable in compn. With unpurified rubbers in place of I, the results were similar, except that with the lower proportions of II, the products were darker. Treatment of Et<sub>2</sub>O-sol. rubber (VIII) (prep'd. by the method of Pummerer, Andriessen and Gündel, *C. A.* 22, 4973) in Et<sub>2</sub>O with different proportions of aq. II pptd. gelatinous products which yielded with 1, 2, 6 and 10 mols., *resp.*, of II, a hard white substance contg. 29.0% Cl, a hard white substance contg. 39.5% Cl, a white spongy substance (IX) contg. 48.7% Cl and a white spongy substance (X) contg. 49% Cl. With increase in II, the Et<sub>2</sub>O was attacked considerably, and in the formation of IX and X most of the II reacted with the Et<sub>2</sub>O. On the other hand, dried VIII in CHCl<sub>3</sub> and aq. II (10 mols.) at 0° yielded a white substance contg. 53.5% Cl, sol. in org. solvents (including Me<sub>2</sub>CO), while under the same conditions dried Et<sub>2</sub>O-insol. (gel) rubber yielded a white



substance contg. 65.8% Cl, and also sol. in org. solvents.  
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**Kinetics of polymerization of butadiene in a glow discharge (Rubanovskii) 2.** Azo dyes [for coloring rubber] (Fr. pat. 759,529) 25. Closures [of rubber-like material] for bottles (Brit. pat. 402,623) 18. Rubber and cloth sheets (Fr. pat. 759,270) 25. Aromatic amines [products used as antioxidants] (U. S. pat. 1,950,079) 10.

**Heintz, Arvid:** Hundert Jahre russische respektive osteuropäische Gummi-Industrie. Riga: N. Kymmels Buchhandlung, 44, pp. Reviewed in *Rubber Age* (London) 14, 299 (1934).

**Rubber.** Firms E. Merck (Erich Wurm, inventor). Ger. 590,685, Jan. 8, 1934 (Cl. 39b, 7)<sup>2</sup>. A rubber soln. which will not vulcanize at ordinary temps. contains Zn stearate as activator, instead of ZnO or ZnO and stearic acid.

**Rubber, etc., compositions.** Dunlop Rubber Co., Ltd., Douglas F. Twiss and John A. Wilson. Brit. 403,341, Dec. 21, 1933. A 3-phase plastic compn. is made by dispersing (synthetic) rubber, gutta-percha, balata, waste or reclaim in a plastic (mixt.) as the continuous medium and then dispersing this modified plastic into rubber as the continuous medium. Rubber-insol. plastics thus used are ca. in, albumin, cellulose deriva. and synthetic resins. Details of the formation of the dispersions are given.

**Latex conversion.** The Naugatuck Chemical Co. Fr. 759,275, Jan. 31, 1934. The rapidity of conversion of latex to cream is increased by adding known conversion agents and afterwards allowing the latex to sep. under the action of gravity into 2 portions, one rich in rubber, the other composed of serum.

**Rubber compositions.** Siemens & Halske A.-G. Brit. 403,503, Dec. 28, 1933. An elec. conductor, e. g., marine cable, is insulated by a mixt. of solid raw rubber, which may be deproteinized, and polyvinyl compds., e. g., polystyrene, polyvinyl acetate. Vulcanization or further polymerization, either during mixing or subsequently, is avoided. Volatile or high-boiling solvents and, if desired, further softeners, e. g., mineral waxes, may be present.

**Rubber compositions.** The International Latex Processes, Ltd. Fr. 758,511, Jan. 18, 1934. Granular, fibrous or divided materials such as leather fiber, sawdust, cork dust, jute fiber or paper pulp are mixed with floccular or granular ppts. of rubber obtained from aq. dispersions, and the mixt. is converted into grains or crumbs, preferably dry. Cf. C. A. 28, 1571<sup>1</sup>.

**Hydrogenation of rubber, etc.** I. G. Farbenind. A.-G. Brit. 402,925, Dec. 14, 1933; Fr. 758,043, Jan. 9, 1934. The hydrogenation of rubber and like highly polymerized unsatd. hydrocarbons is effected, e. g., at 200–320°, under pressure, e. g., 10–180 atm., in presence of solvents and of catalysts contg. heavy metals of the 6th group, or oxides or sulfides thereof, with or without the addn. of oxides or sulfides of other metals, particularly 8th group metals, or of the metals themselves.

**Chlorinated rubber.** Wilfrid D. Spencer and Imperial Chemical Industries, Ltd. Brit. 402,454, Dec. 4, 1933. Chlorinated rubber is removed from solns. by introducing the soln. beneath the surface of an agitated liquid which is immiscible with the solvent and the rubber and which is maintained at above the b. p. of the solvent. In an example a soln. of chlorinated rubber in CCl<sub>4</sub> is fed into boiling H<sub>2</sub>O, the rubber rising to the surface in a porous, spongy or fibrous condition and all the solvent being evapd. before the surface is reached.

**Chlorinated rubber.** Chemische Fabrik Buckau. Fr. 758,290, Jan. 13, 1934. See Brit. 400,898 (C. A. 28, 2219<sup>1</sup>).

**Retarding deterioration of rubber.** Wm. S. Calcott and Wm. A. Douglass (to E. I. du Pont de Nemours & Co.). U. S. 1,950,478, March 13. To retard deterioration, there is incorporated in vulcanized rubber a compd.

1 such as *p*-aminodiphenylamine, *p*-amino-*p*'-hydroxydiphenylamine or *p*-phenylamino-8-aminonaphthalene.

**Aqueous rubber dispersion.** Harold L. Levin (to Patent and Licensing Corp.). U. S. 1,950,451, March 13. Rubber is plasticized in the presence of a softening agent such as cumar, "mineral rubber" or gum rosin and the plasticized rubber is added to a relatively stiff paste of a water-sol. org. colloid such as rosin soap and a non-colloidal "attriting agent" such as whitening and the rubber and paste are masticated together so that the rubber is dispersed in the paste, and a product is obtained which may be used as a latex substitute. U. S. 1,950,452 relates to manuf. of artificial dispersions of rubber by effecting dispersion of the rubber in the presence of a relatively stiff aq. paste of non-colloidal mineral powder such as whitening colloidized with a gum such as locust-bean gum while the paste is maintained as the continuous phase. U. S. 1,950,453 relates to a generally similar process in which, however, starch or dextrin is used instead of a gum as a colloidizing agent for the non-colloidal mineral powder.

**Porous rubber from aqueous rubber dispersions.** Dunlop Rubber Co., Ltd., and The Anode Rubber Co., Ltd. Ger. 591,905, Jan. 29, 1934 (Cl. 39b, 9). Addn. to 551,407 (C. A. 26, 4505). See Brit. 359,584 (C. A. 27, 445).

**Porous rubber articles.** The International Latex Processes, Ltd. Fr. 759,109, Jan. 20, 1934. Reinforced and practically untearable articles which are porous or microporous are made by treating fibers, after teasing them, with aq. dispersions of rubber which have been made capable of setting to a gel under the action of heat, and vulcanizing under such conditions that evapn. of liquid is avoided.

**Rubber articles.** The International Latex Processes, Ltd. Fr. 758,547, Jan. 18, 1934. See Brit. 400,874 (C. A. 28, 2220<sup>1</sup>).

**Rubber products.** Artifex chemische Fabrik G. m. b. H. Ger. 500,605, Jan. 6, 1934 (Cl. 39b, 6). Resin-like products obtained by treating a soln. of rubber, etc., with SCl<sub>2</sub>, S<sub>2</sub>Cl<sub>2</sub> or SO<sub>2</sub>Cl<sub>2</sub> are worked up by application of heat and pressure, after removal of the solvent.

**Rubber thread.** The International Latex Processes, Ltd. Brit. 402,364, Nov. 30, 1933. A coagulant, e. g., AcOH, HCOOH, alc., which may be thickened by the addn. of cellulose acetate, gums, resins, etc., is streamed into a body of latex and the filamentary coagulum formed is continuously withdrawn. Heat-sensitive latex may be used and a hot coagulant streamed into it. Cf. C. A. 27, 5579.

**Rubber threads.** Willis A. Gibbons (to The International Latex Processes, Ltd.). Brit. 402,140, Nov. 27, 1933. Fr. 758,912, Jan. 26, 1934. See U. S. 1,924,924 (C. A. 27, 5579).

**Coating tools with rubber.** I. G. Farbenind. A.-G. Ger. 590,647, Jan. 8, 1934 (Cl. 39b, 5). Tools are given a protective coating by covering them with molten unvulcanized rubber and then vulcanizing the rubber.

**Halo-butadienes.** Wallace H. Carothers and Donald D. Coffman (to E. I. du Pont de Nemours & Co.). U. S. 1,950,441, March 13. See Ger. 588,708 (C. A. 28, 2015<sup>1</sup>).

**Substituted chlorobutadienes.** Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.). U. S. 1,950,440, March 13. Hydrogen halides add to substituted monovinylacetylenes of the general formula CH<sub>2</sub>=CH—C≡C—R to form substituted butadienes of the general formula CH<sub>2</sub>=CH—CX:CHR in which X is a halogen atom and in which R is a C-contg. radical such as alkyl, aryl and heterocyclic residues, new products thus formed having properties generally similar to those of 2-chloro-1,3-butadiene and being suitable for producing rubber-like polymerization products, etc. Details are given of the production of 1-methyl-2-chloro-1,3-butadiene, b<sub>m</sub> 99.5–101.5°; 1-ethyl-2-chloro-1,3-butadiene, b<sub>m</sub> 68.2–69°; 1-butyl-2-chloro-1,3-butadiene b<sub>m</sub> 64–5°; 1-heptyl-2-chloro-1,3-butadiene, b<sub>m</sub> 74–6°; and prepn. of polymerization products from these compds. is also described, many details and modifications of procedure being given.

2-Halo-1,3-butadiene. Arnold M. Collins (to E. I.

du Pont de Nemours & Co.). U. S. 1,950,435, March 13.  $C_2H_2$  is passed in contact with an aq. soln. of a cuprous halide such as  $Cu_2Cl_2$  or  $Cu_2Br_2$ , a halide such as  $NH_4Cl$  or  $C_2H_5Br$  which increases the soly. of the cuprous halide, and a H halide such as  $HCl$  or  $HBr$  (the latter being in a concn. of 6-15% to favor the desired reaction).

**Polymerizing 2-halo-1,3-butadiene.** Wallace, H. Carothers, Arnold M. Collins and James E. Kirby (to E. I. du Pont de Nemours & Co.). U. S. 1,950,438, March 13. The polymerization of compds. such as 2-chloro-1,3-butadiene is controlled by adding an inhibitor of polymerization such as a phenol, quinone, amine, nitro aryl compd., Et selenide, I or Br. U. S. 1,950,439 (Wallace H. Carothers and James E. Kirby (to E. I. du Pont de Nemours & Co.)) relates to effecting similar polymerization in the presence of S or a thiuram disulfide, which serves to control polymerization. Numerous examples are given in both patents.

**Polymerizing 2-chloro-1,3-butadiene.** Howard W. Starkweather, (to E. I. du Pont de Nemours & Co.). U. S. 1,950,437, March 13. Polymerization of 2-chloro-1,3-butadiene is effected (suitably by heating to  $35^\circ$  in the dark) in the presence of a catalyst comprising water, ethylene oxide or dioxane.

**Polymerizing 2-chloro-1,3-butadiene.** Ira Williams and Herbert W. Walker (to E. I. du Pont de Nemours & Co.). U. S. 1,950,442, March 13. Polymerization is effected to a stage short of gelation at a temp. below substantially  $45^\circ$  (suitably at about  $35-40^\circ$ ) and the material is further polymerized at a higher temp. (suitably about  $60^\circ$ ). This method serves to effect satisfactory control of the polymerization.

**Polymers such as those of 2-chloro-1,3-butadiene.** Wallace H. Carothers and Arnold M. Collins (to E. I. du Pont de Nemours & Co.). U. S. 1,950,432, March 13. A polymer which is of the character of a synthetic rubber is obtained by polymerization of 2-chloro-1,3-butadiene (numerous details of procedure being described). U. S. 1,950,433 relates to polymerizing 2-bromo-1,3-butadiene and interrupting the polymerization before the product has reached the insol., elastic stage, so that a product is obtained which is similar to rubber.

**Plastic polymer from 2-chloro-1,3-butadiene.** Ira Williams (to E. I. du Pont de Nemours & Co.). U. S. 1,950,436, March 13. For obtaining a plastic polymer, the material is partially polymerized, and the unpolymerized material is sepd. from the partially polymerized product (suitably by distn. under sub-atm. pressure). A benzene-sol. further polymerizable product is thus obtained. Numerous details, examples and modifications are described.

**Polymerizing monovinyl- and divinyl-acetylene.** Wm. S. Calcott and Frederick B. Downing (to E. I. du Pont de Nemours & Co.). U. S. 1,950,429, March 13. Various details of app. and operation are described for effecting polymerization of the material while in the form of a flowing stream, as while passing through a pipe or coil.

**Addition product from monovinylacetylene and hydrogen halide.** Wallace H. Carothers and Arnold M. Collins (to E. I. du Pont de Nemours & Co.). U. S. 1,950,431, March 13. A product of the formula  $ClCH_2-CH_2C \equiv CH_2$  is obtained by the reaction of monovinylacetylene with  $HCl$  (suitably in the presence of a metal halide)  $HBr$  yields a similar Br deriv. Dihalogen derivs. may also be formed.

**Hydrohalide addition products of acetylene hydrocarbons.** Frederick B. Downing, Albert S. Carter and Donald Hutton (to E. I. du Pont de Nemours & Co.). U. S. 1,950,434, March 13. Reaction of  $HCl$  or  $HBr$  on monovinylacetylene is effected by passing a stream of gaseous monovinylacetylene into contact with a soln. of the halide (suitably in the presence of a catalyst such as  $Cu_2Cl_2$ ).

**Diphenylguanidine salts.** Robert L. Sibley (to Rubber Service Laboratories Co.). U. S. 1,950,067, March 6. Salts are prepd. by reaction between a diphenylguanidine salt of an inorg. acid such as dihydroxyguanidine hydro-

chloride with an alkali metal salt of an org. carboxylic acid, contg. less than 14 C atoms and having a viscos. const. in water less than  $1.0 \times 10^{-2}$ . Diphenylguanidine acetate, phthalate, butyrate, tartrate, citrate and salicylate may be used in regulating rubber vulcanization.

**Plastic compositions.** Jean Baer. Ger. 593,017, Feb. 20, 1934 (Cl. 39b, 4.02). Latex is mixed with a CS<sub>2</sub> soln. of a condensation product prepd. in known manner from an alkali or a k. earth polysulfide and  $C_2H_5Cl_2$  or other sand. halo hydrocarbon. Plastic products which can be vulcanized in the cold are obtained.

**Device for making rubber tubes.** The Anode Rubber Co., Ltd. Ger. 590,910, Jan. 18, 1934 (Cl. 39c, 10.04).

**Machine and method for extruding simultaneously two halves of an inner tube or tread member for a pneumatic tire.** The Goodyear Tire & Rubber Co. Brit. 402,195, Nov. 30, 1933.

**Fibrous tubes.** The B. F. Goodrich Co. Brit. 403,175, Dec. 21, 1933. Resilient material is made of flexible fiber, e. g., hair, maintained in thin open mesh sheet form by an agglutinant, e. g., a flexible glue or nitrocellulose compd. or a rubber compn. deposited on the fibers from a rubber cement or an aq. dispersion such as latex, which unites the fibers at their crossing portions. App. for making tubes of the material is described.

**Removing scale from the surface of molds such as steel molds for rubber tires.** John F. Anderson, Walter J. Strong and Maynard F. Torrence (to B. F. Goodrich Co.). U. S. 1,950,208, March 6. The mold carrying scale is heated in contact with a liquid (such as an alkali soln. contg. a small proportion of soap) adapted to soften the scale, the scale is chilled without substantially cooling the mold and without drying the scale, the mold is cooled to prevent drying of the scale, and the scale is washed from the mold. App. is described.

**Cement receptive backing for rubber soles or the like.** Albert L. Murray. U. S. 1,950,258, March 6. An unvulcanized, but vulcanizable, rubber body is subjected to vulcanization heat, and a cement of raw rubber and solvent is applied to the body prior to its cooling to leave a deposited and unvulcanized film.

**Impregnating porous materials such as cloth, paper, wood or concrete with polymerization products such as those of vinyl acetylenes.** Wm. S. Calcott, Albert S. Carter and Frederick B. Downing (to E. I. du Pont de Nemours & Co.). U. S. 1,950,430, March 13. Polymerization is effected under superatm. pressure after the polymerizable material has been introduced into the pores of the material to be impregnated.

**Impregnating belting.** Alfred Abrahamson and Johannes E. Hansen. Brit. 403,015, Dec. 14, 1933. Conveyor belting consisting of several superposed layers of fabric is coated with an aq. dispersion of rubber, balata or gutta-percha, and stretched and calendered while in a moist condition. App. is described.

**Vulcanizing molds for rubber bar type spring units, more particularly for buffing and draft gear.** George Spencer Moulton & Co., Ltd., and Alexander Spencer. Brit. 402,155, Nov. 30, 1933.

**Vulcanization.** Allon Skipsey. Brit. 404,480, Dec. 28, 1933. Vulcanization of rubber by use of sulfides of P as described in Brit. 230,037 is accelerated by adding an inorg. base and S, with or without oil, to the sulfide and retarded by adding polyhydroxy compds., e. g., glycerol, starch, ester gum, or org. bases, aldehyde-amine condensation products, pine tar, creosote or lycopodium. Several examples are given.

**Vulcanizing rubber.** The Goodyear Tire & Rubber Co. Fr. 758,000, Jan. 10, 1934. Alkylene diamines prepd. by hydrogenating mono- or di-substituted amino-acetonitriles are used in the vulcanization of rubber. The nitriles are prepd. by causing an aldehyde or a ketone to react with a metal cyanide in the presence of a mineral acid and causing the product obtained to react with an amine. Suitable amines include phenyl-(b<sub>1</sub> 112-5°), dibenzoyl deriv., m. 124-7°, o-tolyl-(b<sub>1</sub> 121-2°, dibenzoyl deriv., m. 128-8°) and p-tolylethylenediamine (b<sub>1</sub> 110-15°).

